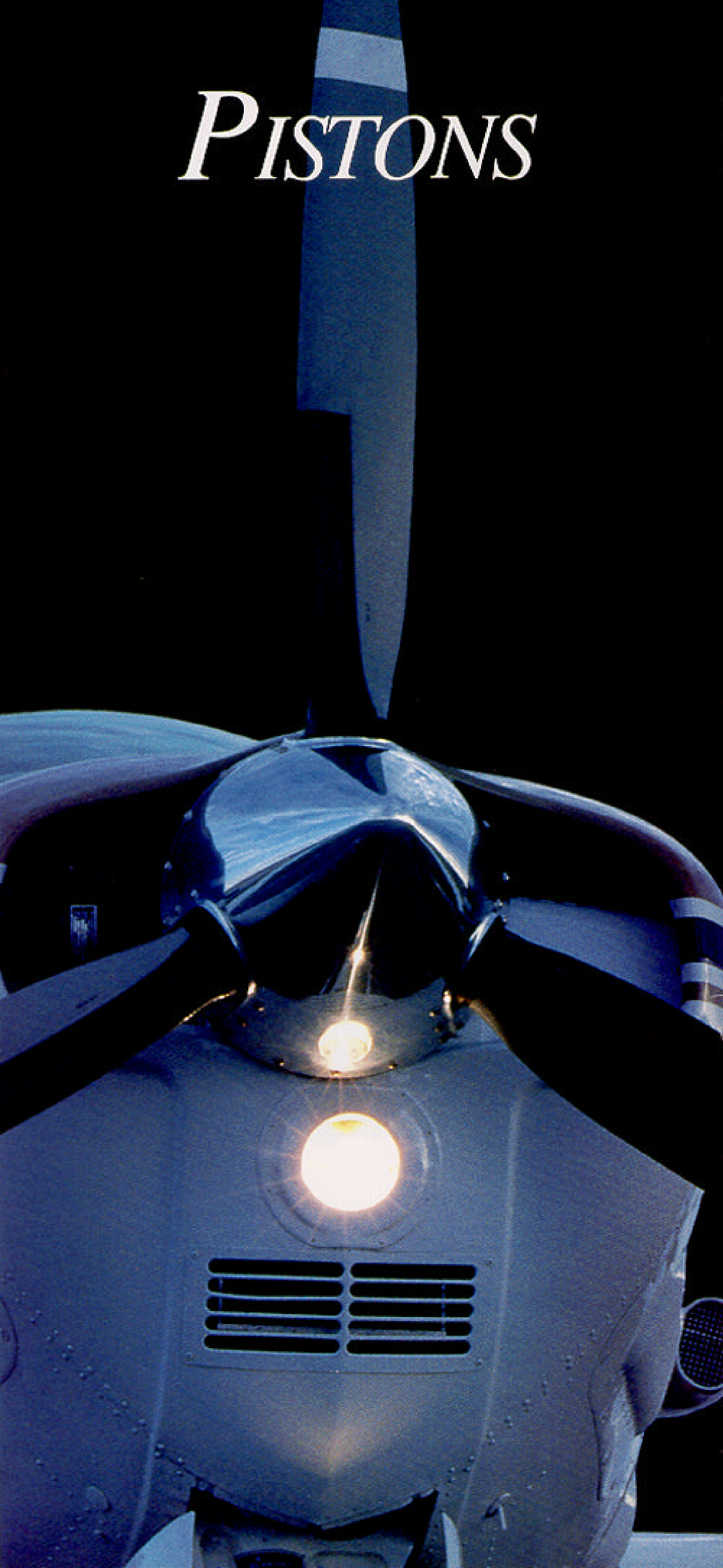

Beech®

Bonanza

Model 35 Series

Shop Manual

35-590096B21

Volume 1 of 1

Raytheon Aircraft Company

BONANZA 35 SERIES SHOP MANUAL

P/N 35-590096, REVISION B21, DATE: AUGUST 29, 2003

The sections which have been revised or added are listed below with the Highlights of each change. Remove the affected pages and insert the B21 Revision in accordance with the attached Instructions Page. Enter the revision number and the date inserted on the Record of Revisions page of this manual. The Highlights Page may be retained with the manual for future reference.

HIGHLIGHTS

Volume Chapter/Section	Description of Change
	Revised format of manual.
7	Changed references to FARs to Title 14 Code of Federal Regulations (14 CFR). Changed voltages. Added and changed inspection requirements. Changed inspection interval for Main Fuel Cell Flapper Valve. Added Unscheduled Maintenance Checks data to this section. Minor text changes.
8	Added WARNING on circuit breaker. Added new items. Changed inspection requirements.

Raytheon Aircraft Company

Beechcraft

BONANZA 35 SERIES

D-1 thru D-10119, except D-10097

Shop Manual

P/N 35-590096B
Reissued: November 15, 1960

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Revised: August 29, 2003

Published By
RAYTHEON AIRCRAFT COMPANY
P.O. Box 85
Wichita, Kansas 67201
U.S.A

NOTE

Where Beech Aircraft Corporation is referred to in this publication, it will be taken to read Raytheon Aircraft Company.

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Raytheon Aircraft Company

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GAMA General Aviation Manufacturers Association

LIST OF EFFECTIVE REVISIONS

PART NUMBER	DATE	SECTIONS AFFECTED
35-590096B	November 15, 1960	B Reissue
35-590096B1	October 27, 1961	2, 4 and 6
35-590096B2	January 15, 1964	2, 3, 4 and 5
35-590096B3	October 25, 1965	2, 3 and 5
35-590096B4	February 11, 1966	2, 3, 4 and 5
35-590096B4*11	December 1969	3 and 5
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Basic publications are assigned a part number which appears on the title page with the date of the issue. Subsequent revisions are identified by the addition of a revision code after the part number. A1 after a part number denotes the first revision to the basic publication, A2 the second, etc. Occasionally, it is necessary to completely reissue and reprint a publication for the purpose of obsoleting a previous issue and outstanding revisions thereto. As these replacement reissues are made, the code will also change to the next successive letter of the alphabet at each issue. For example, B for the first reissue, C for the second, etc.

When ordering a handbook, give the basic number, and the reissue code when applicable, if a complete up-to-date publicationis desired. Should only revision pages be required, give the basic number and revision code for the particular set of revision pages you desire.

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35-590096B19	March 22, 1996	2, 3, 4, 7 and 8
35-590096B20	September 3, 2001	2 and 3
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Beechcraft
BONANZA SERIES
SHOP MANUAL

Record of Revisions

Rev. No.	Date Inserted	By	Rev. No.	Date Inserted	By	Rev. No.	Date Inserted	By

When a revision is inserted, the revision number, the date the revision is inserted into the manual, and the initials of the person(s) inserting the revision should be recorded on this page.

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SHOP MANUAL

RECORD OF TEMPORARY REVISIONS

REVISION NUMBER	CHAPTER/ PAGE AFFECTED	DATE INSERTED	INSERTED BY	DATE REMOVED	REASON REMOVED	REMOVED BY

NOTE: Insert this Record of Temporary Revisions after the Record of Revisions page.

SECTION 1

Introduction

SECTION I

THE BONANZA SHOP MANUAL

The Shop Manual is directed toward helping the experienced mechanic in his day-to-day work in the shop Simple, repetitive maintenance and removal procedures are left out, at the same time we have tried to add key points of specialized procedures so organized that reading through many pages of descriptive text is not required to find them. We think the results are a shop manual that the mechanic can use every day It is small in size but large in scope and usability

As distinguished from the Bonanza Owner's Manual which contains flight procedures, servicing information, and the minor maintenance that the owner needs to know, the Bonanza Shop Manual furnishes the experienced mechanic with detailed instruction and information peculiar to the BEECHCRAFT Bonanza Illustrations, diagrams, and tables are used to present complex information in a concise form. Text is kept brief while covering important points in maintenance and overhaul

The Bonanza Shop Manual will grow as new information becomes available Revisions will be issued whenever needed to keep information current and to add more of the type information included in the original issue. The wiring diagrams for those airplane serials prior to D-9818, are contained within Section 6 of this Shop Manual.

Refer to the BEECHCRAFT Bonanza Wiring Diagram Manual P/N 35-590102-7 for the wiring diagrams pertaining to the Bonanza Model V35B, airplane serials D-9818 through D-10119 except D-10097

For serials D-10097, D-10120 and after refer to BEECHCRAFT Bonanza Wiring Diagram Manual P/N 35-590102-9

CORRESPONDENCE

If a question should arise concerning the care of your airplane, it is important to include the airplane serial number with your inquiry The serial number is stamped on the model designation plate, located in one of the following locations on the fuel selector cover, on the belly of the airplane forward of the differential mechanism inspection cover or on the fuselage inboard of the RH flap.

NOTICE

Beech Aircraft Corporation expressly reserves the right to supersede, cancel and/or declare obsolete any part, part numbers, kits or publication that may be referenced in this manual without prior notice

NOTE

Service publication reissues or revisions are not automatically provided to the holders of this manual. For information on how to obtain a revision service applicable to this manual, refer to the latest revision of BEECHCRAFT Service Bulletin No. 2001.

WARNING

Use only genuine BEECHCRAFT or BEECHCRAFT approved parts obtained from BEECHCRAFT approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine BEECHCRAFT parts are produced and inspected under rigorous procedures to ensure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources, or parts, components, or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

BEECHCRAFT expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-BEECHCRAFT approved parts.

NOTE

It shall be the responsibility of the owner/operator to ensure that the latest revision of publications referenced in this handbook are utilized during operation, servicing, and maintenance of the airplane.

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SUPPLEMENTARY PUBLICATIONS

Following is a list of publications providing servicing, overhaul and parts information on various components of the BEECHCRAFT Bonanza which you may obtain to supplement the Shop Manual. In most instances, you should obtain the publications directly from the manufacturer or his distributor. Beech supplementary publications, are available from BEECHCRAFT Aero or Aviation Centers and International Distributors and Dealers. Those which are so available are listed in the current Publications Price List. Since a wide variety of radio equipment is available and because radio manufacturers normally supply parts and servicing manual with each set, radio publications have not been included in the list.

As publications on additional components become available, they will be added to this list of publications.

VENDOR PUBLICATIONS

ITEM	PART NO.	PUBLICATION	PUBLICATION NO.	VENDOR
Engine	E185-1 E185-8 E185-11 E225-8	E165, E185, E225 Maintenance and Overhaul Manual	X30016	Teledyne Continental Motors Aircraft Products Division P O. Box 90 Mobile, Alabama 36601
	E185-1 E185-8 E185-11 E225-8	E165, E185, E225 Parts Catalog	X30017	Teledyne Continental Motors Aircraft Products Division P.O. Box 90 Mobile, Alabama 36601
	E185-1 E185-8 E185-11 E225-8	E165, E185, E225 Operators Handbook	X30018	Teledyne Continental Motors Aircraft Products Division P O. Box 90 Mobile, Alabama 36601
	0-470-G	Operators Handbook for O-470 Series	X30097	Teledyne Continental Motors Aircraft Products Division P O Box 90 Mobile, Alabama 36601
	IO-470-G IO-470-C IO-470-N	Maintenance and Overahul Manual for O-470 and IO-470 Series	X30022A	Teledyne Continental Motors Aircraft Products Division P.O. Box 90 Mobile, Alabama 36601
		Illustrated Parts Catalog for O-470 and IO-470 Series	X30023A	Teledyne Continental Motors Aircraft Products Division P.O. Box 90 Mobile, Alabama 36601
	IO-470-C IO-470-N	Operators Handbook for IO-470 Series	X30024	Teledyne Continental Motors Aircraft Products Division P.O Box 90 Mobile, Alabama 36601
	IO-520-B IO-520-BA IO-520-BB	Maintenance and Overhaul Manual for IO-520 Series	X30039A	Teledyne Continental Motors Aircraft Products Division P.O. Box 90 Mobile, Alabama 36601
	IO-520-B IO-520-BA IO-520-BB	Illustrated Parts Catalog for IO-520 Series	X30040A	Teledyne Continental Motors Aircraft Products Division P.O. Box 90 Mobile, Alabama 36601

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Engine (Cont'd)	IO-520-B IO-520-BA IO-520-BB	Operators Manual for IO-520 Series	X30041	Teledyne Continental Motors Aircraft Products Division P.O Box 90 Mobile, Alabama 36601
	TSIO-520-D	Maintenance and Overhaul Manual for TSIO-520 Series	X30042A	Teledyne Continental Motors Aircraft Products Division P O Box 90 Mobile, Alabama 36601
	TSIO-520-D	Illustrated Parts Catalog for TSIO-520 Series	X30043A	Teledyne Continental Motors Aircraft Products Division P.O Box 90 Mobile, Alabama 36601
	TSIO-520-D	Operators Manual for TSIO-520 Series	X30044	Teledyne Continental Motors Aircraft Products Division P.O Box 90 Mobile, Alabama 36601
	N/A	Tips on Engine Care		Teledyne Continental Motors Aircraft Products Division P O Box 90 Mobile, Alabama 36601
Fuel Injector		Overhaul Manual and Illustrated Parts Catalog for Continental Fuel Injection System	X30091	Continental Motors Corporation
Turbo-charger	TE06	Overhaul Manual and Parts Catalog for TE06 Turbocharger	X30055	Continental Motors Corporation
Propeller	F12A-3	UNIVAIR Service Manual Model F12 Constant speed Propeller		Universal, Aircraft Industries, Denver, Colorado
	PHC-A3VF4/ V8433-4R	Owner's Manual, Optional Three Blade Propeller	106I	Hartzell Propeller, Inc., Piqua, Ohio
	PHC-A3VF4/ V8433-4R	Overhaul Instructions	114A	Hartzell Propeller, Inc., Piqua, Ohio
	PHC-C3YF-1RF/ F8468-6R or PHC-C3YF-1R/ 8468-6R	Hartzell Propeller Owners Manual	115C	Hartzell Propeller, Inc., Piqua, Ohio
	BHC-C2YF-1BF/ F8468 or BHC-C2YF-1B/ 8468	Hartzell Propeller Owners Manual	115C	Hartzell Propeller, Inc., Piqua, Ohio

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Propeller (Cont'd)	2A36C23-CP/ 84B0	Service Manual and Parts Catalog	720415	McCauley Industrial Corp.
	3A32C76S/ 82NB-2	Service Manual and Parts Catalog	720415	McCauley Industrial Corp.
Governor	C210452	Overhaul Manual with Parts List (IO-520 Engine)	33017	Woodward Governor Co.
	D210680	Overhaul Manual with Parts List (IO-520 Engine)	33080	Woodward Governor Co.
Fuel Pump	RD-7420	Lear-Romec Handbook Service and Overhaul Instructions with Parts Catalog, Aircraft Engine Fuel Pumps, Series RD-7420.		Lear-Romec Division, Lear, Inc.
	RD-7430-2	Lear-Romec Handbook Overhaul Instructions with Parts Catalog Aircraft Engine Fuel Pumps, Series RD-7430		Lear-Romec Division, Lear, Inc.
	RD-7790	Romec Handbook Operation, Service and Overhaul Instructions with Parts Catalog, Series RD-7750 and RD-7790 Aircraft Fuel Pumps		Lear-Romec Division Lear, Inc.
	TF-1900	Thompson Aircraft Engine-Driven Fuel Pump, Model TF-1900		Thompson Products, Inc.
	TF-1100	Thompson Aircraft Engine-Driven Fuel Pump Model TF-1100-2		Thompson Products, Inc
	TF-100-1	Thompson Aircraft Engine-Driven Fuel Pumps		Thompson Products, Inc
Generator	1101879 1101886 1101887 (533730)* 1101888 (539829)* 1101895 (535896)* 1101909 (626380)*	Test Specifications	DR324S	Delco-Remy Division, General Motors Corporation
		Parts List	Group 93-G	Delco-Remy Division, General Motors Corporation
Air Conditioner Compressor	Model 508	Abacus Automotive Air Conditioning Compressor Service Manual	I.D. 160717	Abacus International P.O. Box 327 Dallas, Texas 75221
Battery	PS12-11	Service Manual	GSM-1277	Teledyne Battery Products Redlands, California

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Alternator	1100652 1100643	Service Bulletin, Tests and Maintenance of "Delcotrons"	1G-262	Delco-Remy Division, General Motors Corporation
	ALX-9405 ALV-9407 ALT-9422	Equipment List, Service Parts List	OE-A1	Prestolite Company 511 Hamilton St Toledo, Ohio 43694
	642056A1	Service and Overhaul Instructions	X30531	Teledyne Continental Motors Aircraft Products Division P.O Box 90 Mobile, Alabama 36601
Starter	1109660	Test Specifications	DR 324S	Delco-Remy Division, General Motors Corporation
		Parts List	Group 70	Delco-Remy Division, General Motors Corporation
Yaw Damper	YK631	Automatic Flight Systems	Bulletin No. 758	Edo-Air Mitchel P O Box 610 Mineral Wells, Texas 76067

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Starter (Cont'd)	1109471 (535856)*	Test Specifications	DR324S	Delco-Remy Division, General Motors Corporation
		Parts List	Group 67	Delco-Remy Division, General Motors Corporation
	397-13	Overhaul Manual for E-80 Direct-Cranking Electric Starters Catalog L, Chapter 46, Part B	1912	Utica Division, Bendix Aviation Corporation
	36E14-1-C	Direct-Cranking Electric Starter, Types 36E14-1-B and 36E14-1-C Overhaul Instructions	544-15	Utica Division, Bendix Aviation Corporation
	MHJ-4003	Equipment List, Service Parts List	OE-A1	Prestolite Company 511 Hamilton St Toledo, Ohio 43694
Carburetor	PS-5C	Overhaul Instructions for Injection Carburetor Model PS-5C, Parts List Numbers 380208-7, 380223-4, 391318-5, 391330-7, 391583-1, 391629-3	15-144	Bendix Products Division, Bendix Aviation Corporation
		Illustrated Parts Breakdown for Injection Carburetor Model PS-5C Parts List Numbers 380208-7, 380223-4, 391318-5, 391330-7, 391583-1, 391629-3	15-139A	Bendix Products Division Bendix Aviation Corporation
		Bendix PS Series Carburetor Manual	15-186	Bendix Products Division, Bendix Aviation Corporation
	PSH-5BD	Overhaul Instructions for Injection Carburetor, Model PS-5BD**	15-137	Bendix Products Division, Bendix Aviation Corporation
		Illustrated Parts Catalog for Injection Carburetor, Model PS-5BD**	15-127A	Bendix Products Division Bendix Aviation Corporation
Vacuum Pump	3P-194F	Service Manual with Parts Catalog, Standard Engine-Driven Vacuum Pumps		Pesco Products Division, Borg-Warner Corporation
	G450	Overhaul Manual with Parts List for the G450 Series Vacuum Pump		Garwin, Inc.
	A-513-DB A-513-DA	Operation, Service and Overhaul Instructions with Illustrated Parts Breakdown for Aro Model A-513-DB Air Pump		The Aro Equipment Corporation
Magnetos	S6LN-21	User Operating Instructions, Bendix Aircraft Magnetos	L-239-3	Scintilla Division, Bendix Aviation Corporation
		Service Instructions, Bendix Aircraft Magnetos	L-205-5	Scintilla Division, Bendix Aviation Corporation
		Service Parts List, Bendix Aircraft Magnetos	L-223-5	Scintilla Division, Bendix Aviation Corporation

ITEM	PART NO.	PUBLICATION	PUBLICATION NO.	VENDOR
Magnetos (Cont'd)	S6RN-201 S6RN-205	Installation, Maintenance and Operation Instructions	L-526	Scintilla Division, Bendix Aviation Corporation
	S6RN-1201 S6RN-1205	Service Instructions, Bendix Aircraft Magnetos	L-609	Scintilla Division, Bendix Aviation Corporation
		Service Parts List, Bendix Aircraft Magnetos	L-608	Scintilla Division, Bendix Aviation Corporation
	S-600 Series	Overhaul Instructions	L-551	Scintilla Division, Bendix Aviation Corporation
	S-600 Series	Service Parts List	L-552	Scintilla Division, Bendix Aviation Corporation
	400 and 600 Series	Parts Catalog and Service Manual, Slick Magnetos	1012	Slick Electro Inc.
Voltage Regulator	1118263	Test Specifications	DR324S	Delco-Remy Division, General Motors Corporation
		Parts Lists	Group 6-A	Delco-Remy Division, General Motors Corporation
	1118358 1118384 1118385	Test Specifications	DR 324S	Delco-Remy Division, General Motors Corporation
		Parts Lists	Group 6-D	Delco-Remy Division, General Motors Corporation
	1118713 (537486)*	Test Specifications	DR 324S	Delco-Remy Division, General Motors Corporation
		Parts List	Group 6-E	Delco-Remy Division, General Motors Corporation
	1118891	Test Specifications	DR 324S	Delco-Remy Division, General Motors Corporation
		Parts List	Group 6-H	Delco-Remy Division, General Motors Corporation
	9000590	Service Bulletin, Test and Adjustments of Transistor Regulators	1R-273	Delco-Remy Division, General Motors Corporation
Autopilot	B-5	Flight Control System Ground and Flight Check Procedures	3952	Brittain Industries P.O. Box 51370 Tulsa, Oklahoma 74151
Autopilot	B-5	Automatic Flight Control System Maintenance Manual	3950	Brittian Industries P.O Box 51370 Tulsa, Oklahoma 74151
	B-7	Flight Control System, Flight Procedures Manual	3959	Brittain Industries P.O. Box 51370 Tulsa, Oklahoma 74151

VENDOR PUBLICATIONS (Continued)

ITEM	PART NO.	PUBLICATION	PUBLICATION NO.	VENDOR
Autopilot (Cont'd)	B-7	Troubleshooting Manual	3960	Brittain Industries P.O. Box 51370 Tulsa, Oklahoma 74151
Strobe Light	1000	Instruction and Service Manual	50082	Bullock Magnetics Corp. Pomona, California
Strobe Light Power Supply	60-1750-3	Overhaul Manual with Illustrated Parts List	33-40-58	Grimes Manufacturing Company, 515 North Russell Street Urbana, Ohio 43078
Landing Gear Motor	27-4 (35-380094) 27-8 (96-380022-5)	Component Maintenance Manual with Parts List	32-31-24	Electro-Mech, Inc. Wichita, Kansas

*Continental Motors Corporation part number.
**Same as Model PS-5BD except PSH-5BD is mounted horizontally

SUPPLEMENTARY BEECHCRAFT PUBLICATIONS

92-30582	Servicing and Maintenance Instructions and Illustrated Parts Manual for Main Wheel Assembly P/N 95-300001-1, -5, -6, -67 and -73. Nose Wheel Assembly P/N 95-32669 and P/N 95-32926. Beech Aircraft Corporation
130376A	New-Matic B-4 Autopilot Operating Servicing Instructions. Beech Aircraft Corporation.
130409	New-Matic Autopilot Maintenance Instructions. Beech Aircraft Corporation.
98-35850	Electronics Components Maintenance Manual and Parts Breakdown B-5, B-5A, B-7, B-VII, B-VIII Autopilot Beech Aircraft Corporation.
98-35012	Servicing Maintenance Instructions and Illustrated Parts Breakdown for the Main Wheel, Nose Wheel and Brake Assembly (D-9193 and after)
98-35776	Maintenance Information and Illustrated Parts Breakdown for 35-380094 Landing Gear Motor
98-35655	B-5 and B-7 Owner's Manual Automatic Flight Control System
98-36486	Overhaul Instructions for Vertical Display Engine Indicators used on BEECHCRAFT Bonanza series aircraft
98-33281B	Servicing and Maintenance Instructions and Illustrated Parts Breakdown for the Main Wheel, Nose Wheel and Brake Assembly (D-7923, D-8461 thru D-9192)
98-36234	Installation, Maintenance and Illustrated Parts Breakdown for the 35-380093-2 Voltage Regulator
98-33690B	Installation, Maintenance and Illustrated Parts Breakdown for 35-380093 and 35-380093-1 Voltage Regulator

MODELS, SERIALS, DIFFERENCES

Model	Year	Serials	Gross Wt.	Engine Propeller	Major Changes
35	1947-8	D-1 through D-1500	2550	E-185-1 R-203	
A35	1949	D-1500 through D-2200	2650	E-185-1 B-200	Steerable nose wheel replaced full swivel nose wheel. Delco-Remy starter replaced by E80. Tubular steel carry-through structure replaced by aluminum extrusion carry-through.
B35	1950	D-2201 through D-2680	2650	E-185-8 B-200	30 degree flaps.
C35	1951-2	D-2681 through D-3400	2700	E-185-11 215(88")	Aluminum alloy propeller blades replaced plastic covered wooden blades 35 amp generator replaced 25 amp generator. Wing root fillet added. Larger stabilizer incorporated
D35	1953	D-3401 through D-3698	2725	E-185-11 215(88")	36E14 starter replaced E80 starter.
E35	1954	D-3699 through D-3998	2725	E-185-11 215(88") or or E-225-8 215(84")	Aileron trim control. Electric engine primer
F35	1955	D-3999 through D-4391	2750	E-225-8 215(84")	Optional auxiliary wing fuel tanks.
G35	1956	D-4392 through D-4865	2775	E-225-8 215(84")	
H35	1957	D-4866 through D-5330	2900	O-470-G 278(84")	Hydraulic governor Front seats individually adjustable in flight.
J35	1958	D 5331 through D-5725	2900	IO-470-C 278(82")	Fuel injection engine. Electric fuel boost pump.
K35	1959	D 5726 through D-6161	2950	IO-470-C 278(82")	Gross weight increase Increase fuel capacity. Optional fifth seat.
M35	1960	D-6162 through D-6561	2950	IO-470-C 278(82")	New wing tips.
N35	1961	D-6562 through D-6842	3125	IO-470-N 278(82")	New engine. Gross weight increase. Increased fuel capacity.
P35	1962	D-6842 through D-7309	3125	IO-470-N 278 (82") or F12A-3 (82") or 2A36C23-CP (84")	New instrument panel. Universal seats
S35	1964	D-7310 through D-7639	3300	IO-520-B 2A36C23-CP(84")	New engine. Larger cabin. Increased gross weight
V35	1965	D-7640 through D-7967	3400	IO-520-B 2A36C23-CP(84")	One piece windshield. Flap indicator gage. Improved fresh air system. Increased heater capacity. Increased gross weight

MODELS, SERIALS, DIFFERENCES (Cont'd)

Model	Year	Serials	Gross Wt.	Engine/Propeller	Major Changes
V35 & V35TC	1966	D-7968 through D-8301	3400	IO-520-B 2A36C23-84B-0 TSIO-520-D 2A36C82T/84B-2	Exhaust gas temperature Indicator. 3 blade propeller. External power reversal protection. Oxygen system change. Turbocharged engine.
V35 & V35TC	1967	D-8302 through D-8598	3400	IO-520-B 2A36C23-84B-0 TSIO-520-D 2A36C82T/84B-2	New subpanel styling. Optional deicer system. Wing tip tanks.
V35A & V35A-TC	1968	D-8599 through D-8871	3400	IO-520-B 2A36C23-84B-0 TSIO-520-D 2A36C82T/84B-2	New magnetos. Relocation of pressure air filter. Steerable landing light. Electric pitch trim system.
V35B & V35B-TC	1969	D-8872 through D-9068	3400	IO-520-BA 2A36C23-84B-0 TSIO-520-D 2A36C82T/84B-2	One piece windshield. Vertical instruments.
V35B & V35B-TC	1970	D-9069 through D-9204 and D-9207 through D-9211	3400	IO-520-BA 2A36C23-84B-0 TSIO-520-D 2A36C82T/84B-2	Optional strobe light. New parking brake system. B7 autopilot. Instrument wedge lighting. New fuel cell New fuel gaging transmitters.
V35B	1971	D-9205, D-9206, D-9212 through D-9286	3400	IO-520-BA 2A36C23-84B-0	New propeller gov. Optional post lights Digital hour meter. Fuel gage relocation.
V35B	1972	D-9287 through D-9390	3400	IO-520-BA	Moulded seat cushion. Up-lock roller grease bolt. 3 light strobe light. Standby generator. Emergency locator transmitter.
V35B	1973	D-9391 through D-9537	3400	IO-520-BA	Annunciator light change. Improved air pump filter. Vertical instruments removed. Adjustable door actuating pin.
V35B	1974	D-9538 and after	3400	IO-520-BA	Gust lock improvement. Aft cowl door handle. Improved battery. Pressure pump change.

SECTION 2

General Information (Servicing)

GENERAL INFORMATION

WARNING

Any maintenance requiring the disconnection and reconnection of flight control cables, plumbing, electrical connectors or wiring requires identification of each side of the component being disconnected to facilitate correct reassembly. At or prior to disassembly, components should be color coded, tagged or properly identified in a way that it will be obvious how to correctly reconnect the components. After reconnection of any component, remove all identification tags. Check all associated systems for correct function prior to returning the airplane to service.

Some of the most important information about the Bonanza lubrication, cleaning and shop handling, will be found in this section. Particular attention should be paid to these items, since they are among the items which the customer sees and consequently can influence directly his decision to come back again, or to go elsewhere.

The section includes a three-view drawing giving the major dimensions of the Bonanza; a table of hangar clearance dimensions; and an access opening illustration. A skin plate diagram gives the material and gage of each wing, empennage and fuselage skin, as a guide for making minor skin repair.

Two full page illustrations show the special tools, with their part numbers, which will make maintenance of the Bonanza simpler. Together with the tool part number is a serial designation showing which model Bonanza the tool is used on.

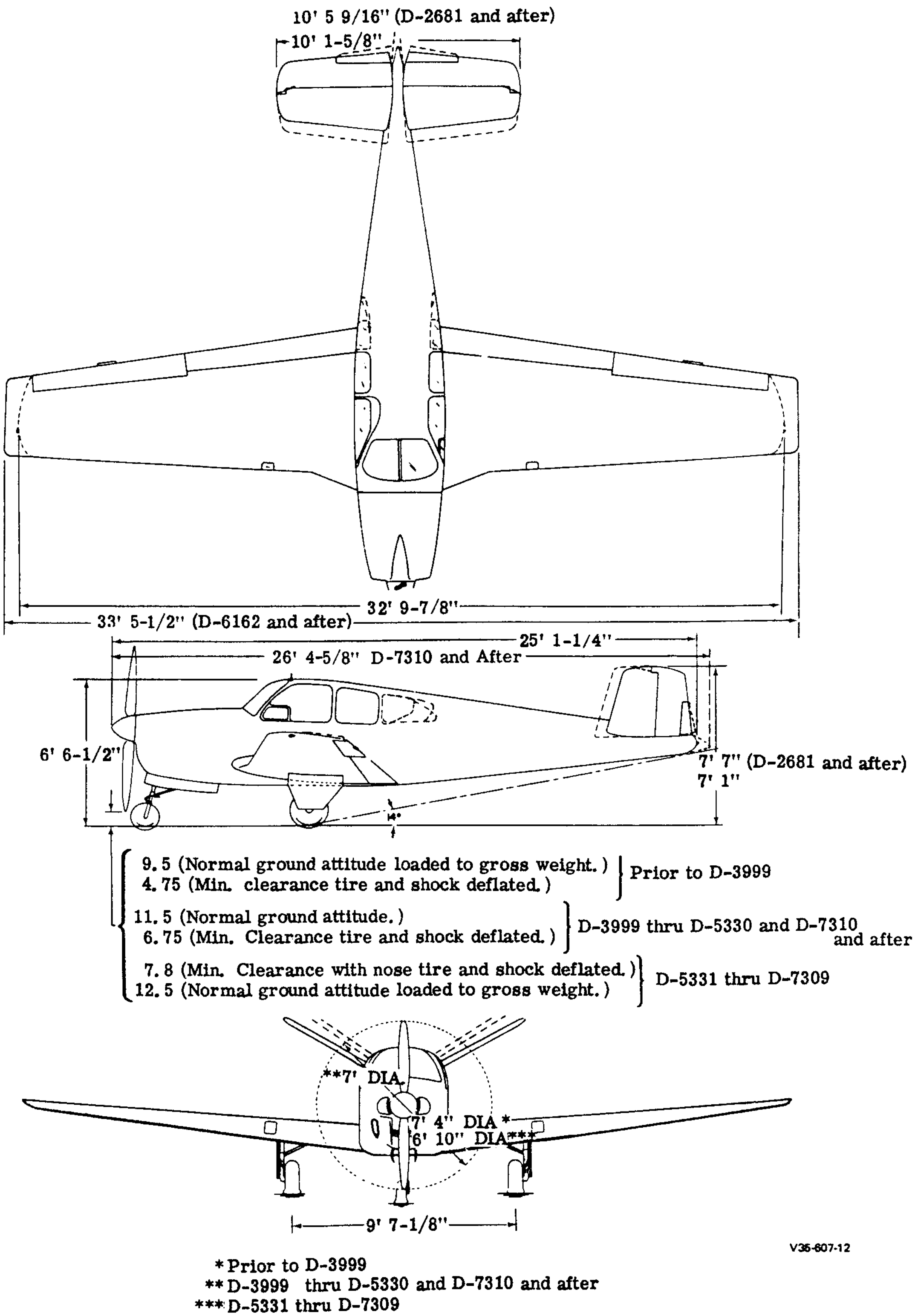


Figure 2-1. Dimensions of Airplane

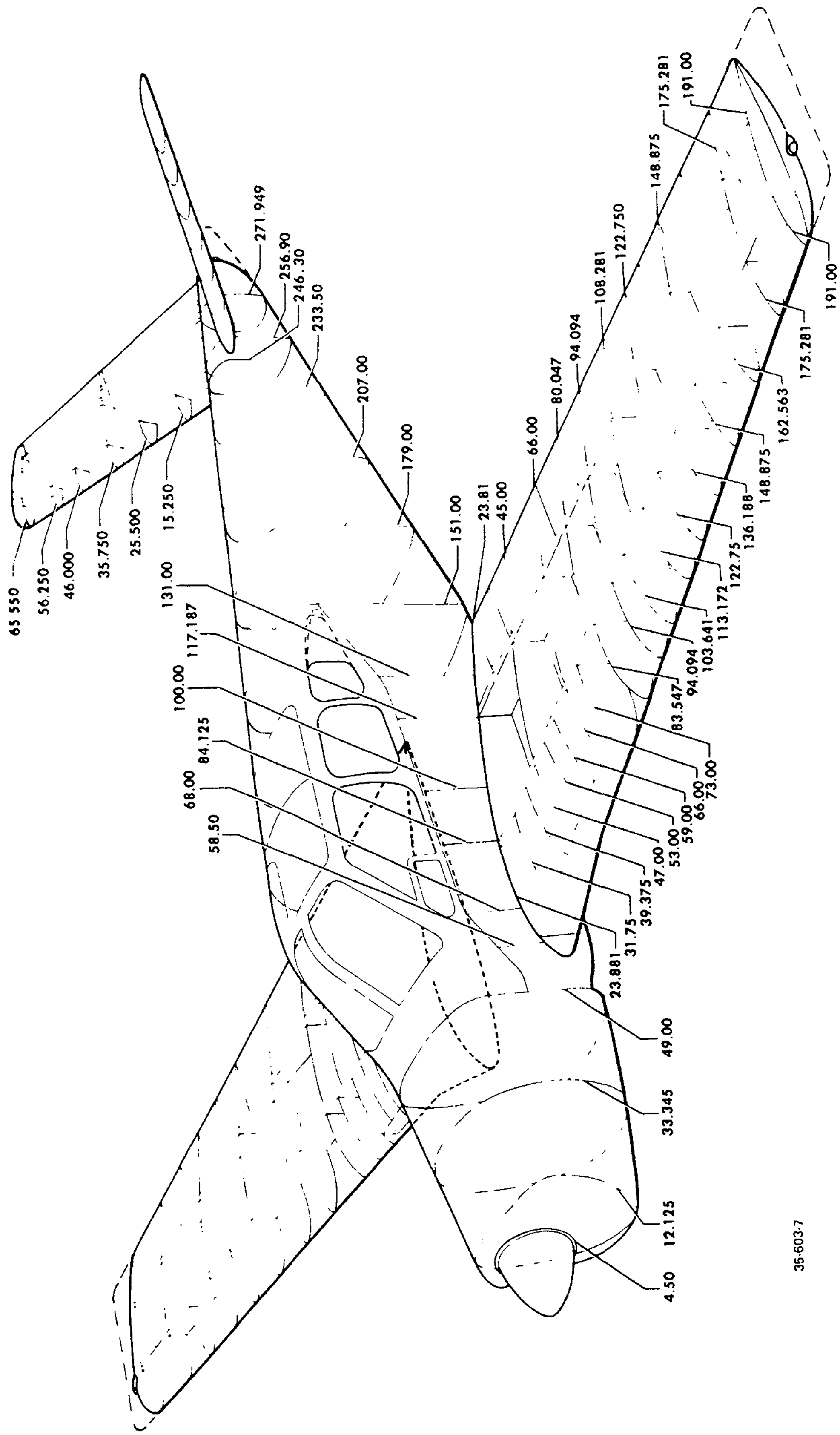
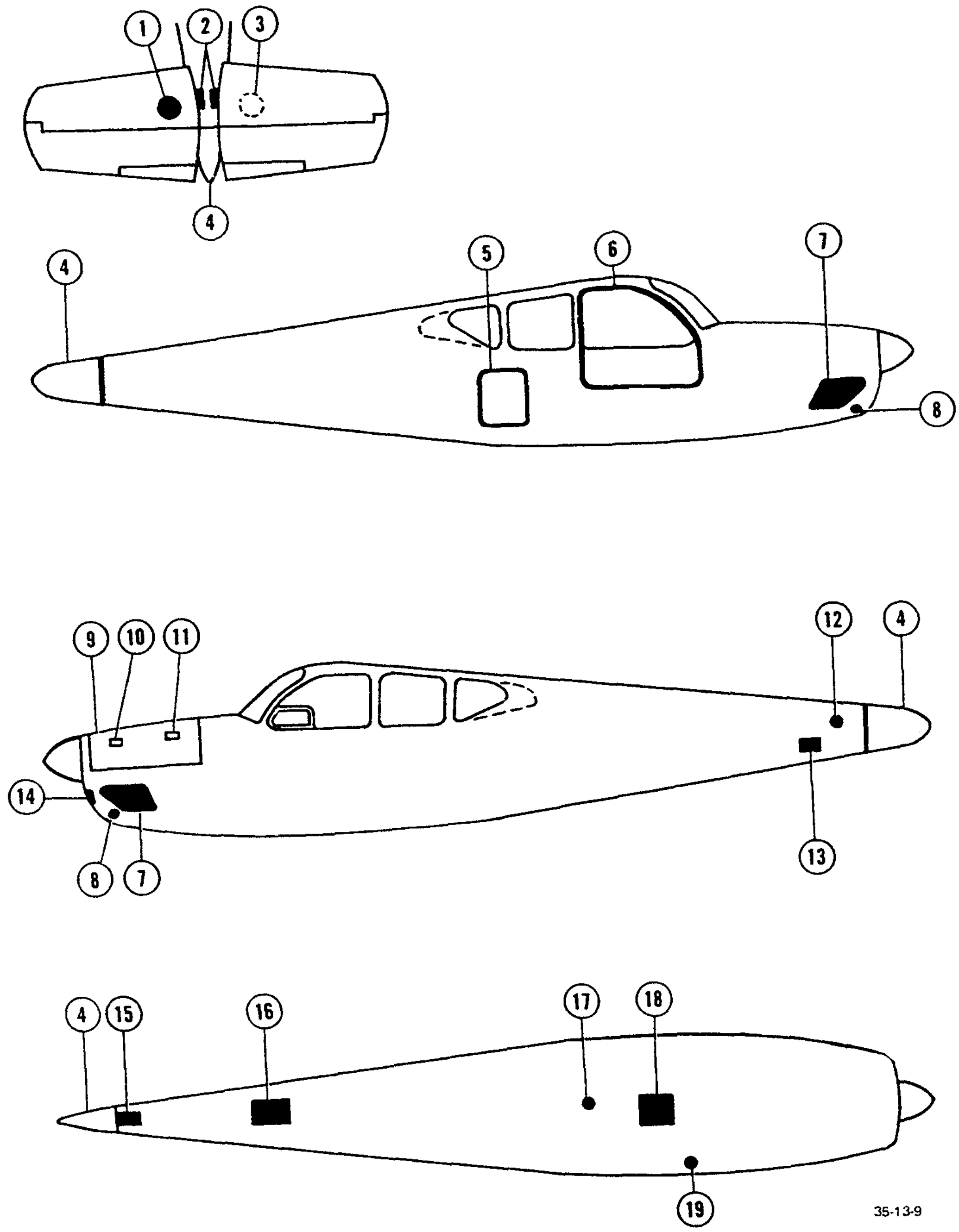
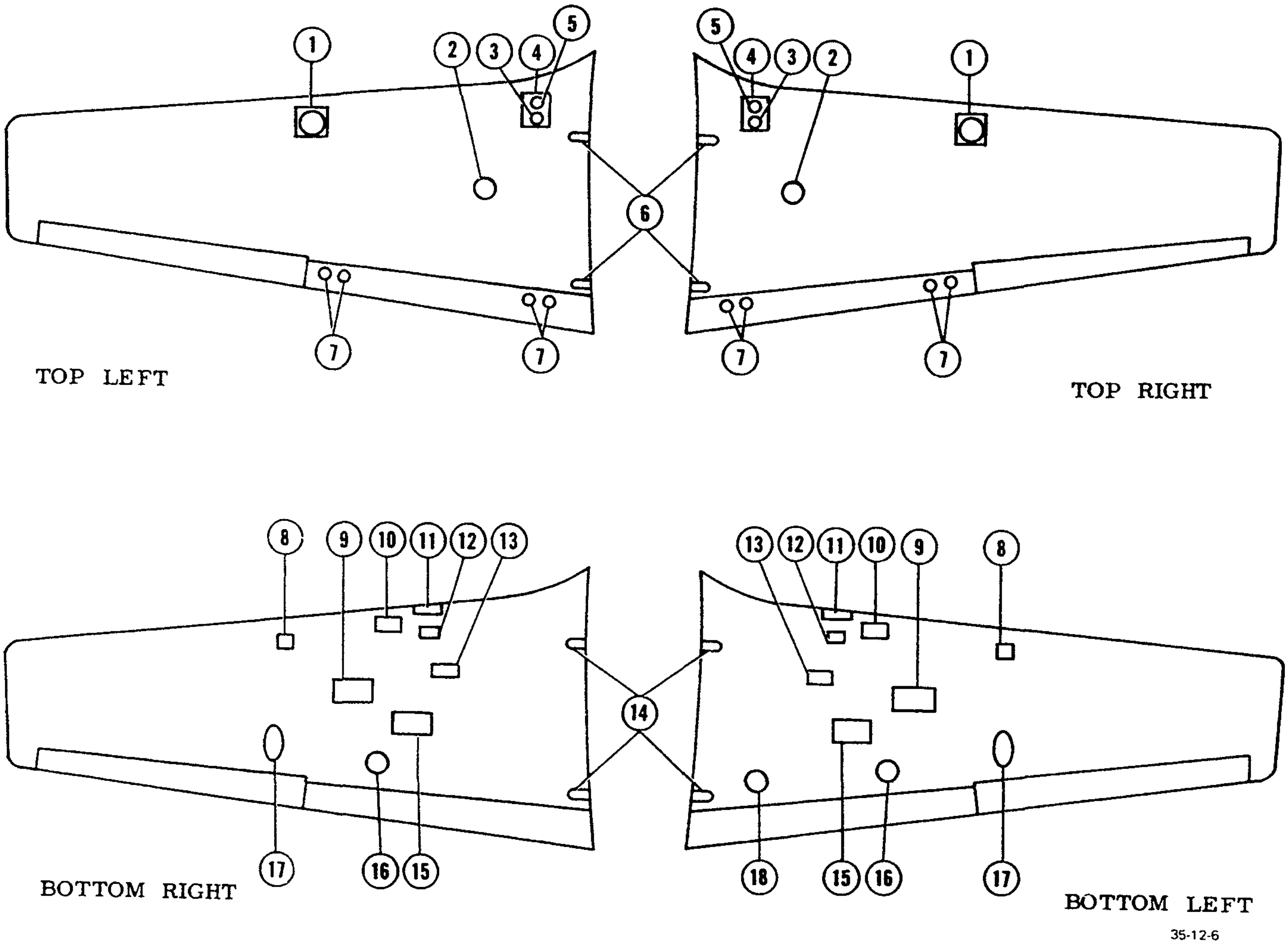


Figure 2-2. Stations Diagram



1. Elevator Tab Cable Pulley LH
2. Upper Stabilizer Spar Bolts (D-1 to D-2680)
3. Elevator Tab Cable Pulley RH
4. Empennage Control Linkage
5. Baggage Compartment
6. Cabin Entrance
7. Access Plates for Engine
8. Hinge Bolts for Nose Wheel Strut
9. Engine Cowl
10. Oil Filler Neck (D-4866 & after)
11. Oil Filler Neck (Prior to D-4866)
12. Lower Stabilizer Spar Bolt (D-1 to D-2680)
13. Differential Mechanism LH
14. Carburetor Air Screen
15. Differential Mechanism, Lower
16. Rudder and Elevator Cables
17. Rear Spar Jack Point
18. Landing Gear Actuator
19. Fuel Strainer

Figure 2-3. Fuselage Access Openings

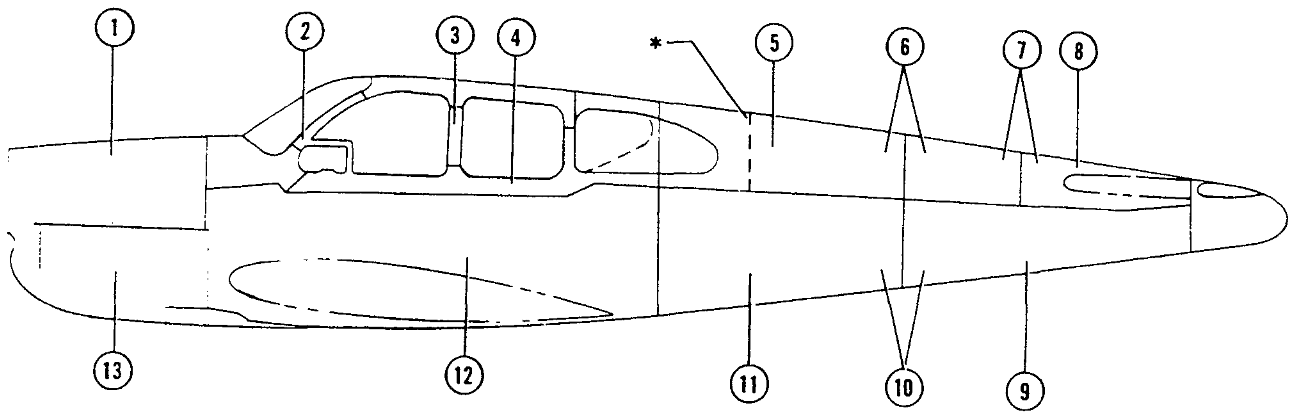


1. Optional Main Fuel Cell Filler Neck (D-6562 and after)
2. Auxiliary Tank Filler Neck (D-4000 to D-6561)
3. Main Fuel Cell Transmitter
4. Main Fuel Cell
5. Standard Main Fuel Cell Filler Neck
6. Upper Front and Rear Spar Bolts
7. Flap Hinge Bolts
8. Fuel and Pitot Lines (D-6562 and after)
9. Auxiliary Fuel Tank (D-4000 to D-6561)
10. Fuel Lines (Pitot Lines in LH Wing) (Prior to D-6562)
11. Landing Light (Prior to D-6562) (Fuel Lines D-6562 and after)
12. Main Fuel Cell (D-6562 and after)
13. Landing Gear Hinge Bolt and Main Fuel Cell
14. Lower Front and Rear Spar Bolts
15. Auxiliary Fuel Tank (D-4000 to D-6561)
16. Aileron Cables and Fuel Lines
17. Aileron Bellcrank
18. Flap Limit Switch (D-1 to D-3702) (Wheel Well)

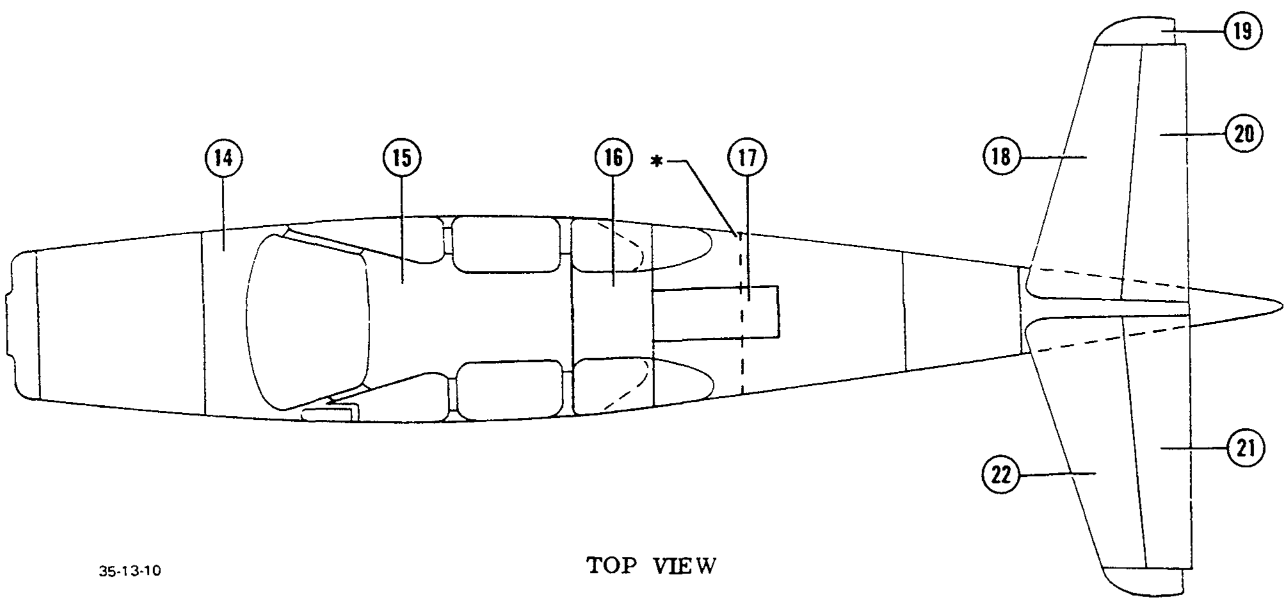
Figure 2-4. Wing Access Openings

Legend for Figure 2-5. (Sheet 1 of 2)

INDEX	GAGE	DESCRIPTION	SERIAL
1.	.020	2024-SO	D-1 & after
2.	.020	2024-T3	D-1 & after
3.	.020	2024-SO	D-1 & after
4.	.025	2024-T3	D-1 & after
5.	.016	2024-T3	D-1575 thru D-6561
	.032	2024-T3	D-6562 & after
6.	.016	2024-T3	D-1575 & after replaced with index no. 6 & 8
7.	.025	2024-T3	D-1575 thru D-2681
	.032	2024-T3	D-2682 & after
8.	.020	2024-T3	D-1575 & after replaced with index no. 7
9.	.020	2024-T3	D-1575 & after
10.	.016	2024-T3	D-1575 & after replaced with index no. 9 & 11
11.	.016	2024-T3	D-1575 thru D-2076
	.020	2024-T3	D-2077 & after
12.	.025	2024-O	D-1 thru D-4865
	.032	2024-O	D-4866 & after
13.	.025	2024-T3	D-1 & after
*14.	.020	2024-O	D-1 & after
15.	.025	2024-T3	D-1 & after
16.	.016	2024-T3	D-1 thru D-6561
	.032	2024-T3	D-6562 & after
17.	.020	2024-T3	D-4866 thru D-6561
18.	.025	2024-T3	D-1 & after
19.	.040	6161-O	D-1 & after
20.	.020	2024-SO	D-1 & after
21.	.020	2024-SO	D-1 & after
22.	.025	2024-T3	D-1 & after
*	.025	2024-T3	D-7310 and after



LEFT HAND VIEW



35-13-10

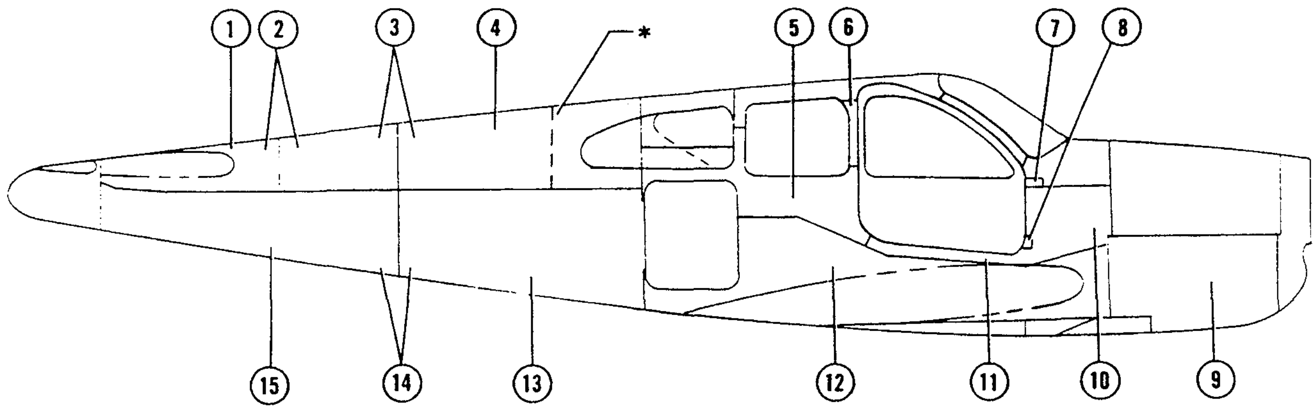
TOP VIEW

*Skin Splice Moved Aft to Sta.179 as Shown. Effective D-6747 and After

Figure 2-5. Fuselage and Empennage Skin Plating (Sheet 1 of 2)

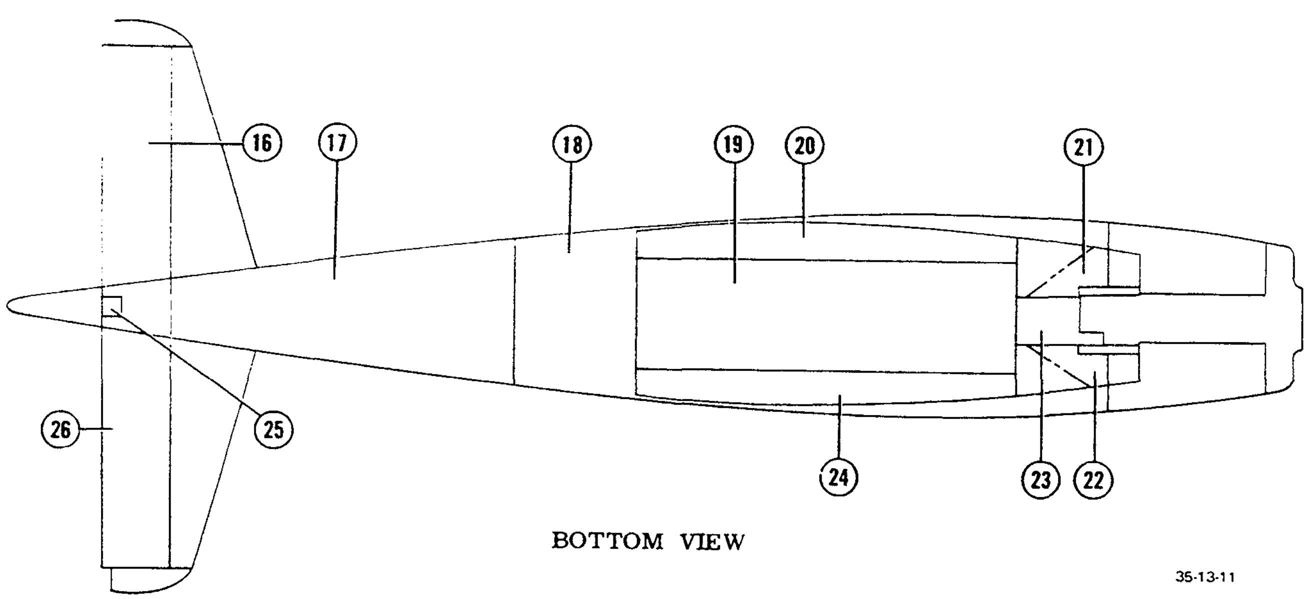
Legend for Figure 2-5. (Sheet 2 of 2)

INDEX	GAGE	DESCRIPTION	SERIAL
1.	.025	2024-T3	D-1575 & after replaced with index no. 2
2.	.025	2024-T3	D-1575 thru D-2680
	.032	2024-T3	D-2681 & after
3.	.016	2024-T3	D-1575 & after replaced with index no. 2 & 4
4.	.016	2024-T3	D-1575 thru D-6561
	.032	2024-T3	D-6562 & after
5.	.025	2024-T3	D-1 thru D-3998
	.032	2024-T3	D-3999 & after
6.	.020	2024-SO	D-1 & after
7.	.025	2024-T3	D-2801 & after
8.	.025	2024-T3	D-2801 & after
9.	.025	2024-T3	D-1 & after
*10.	.020	2024-T3	D-1 & after
11.	.025	2024-T3	D-1 & after
12.	.025	2024-T3	D-1 thru D-4865
	.032	2024-T3	D-4866 & after
13	.016	2024-T3	D-1575 thru D-2076
	.020	2024-T3	D-2077 & after
14.	.016	2024-T3	D-1575 & after replaced with index no. 13 & 15
15.	.020	2024-T3	D-1575 & after
16.	.025	2024-T3	D-1 & after
17.	.016	2024-T3	D-1 & after
18.	.016	2024-T3	D-1 & after
19.	.020	2024-T3	D-1 & after
20.	.020	2024-T3	D-1 & after
21.	.016	CRES	D-1 & after
22.	.016	CRES	D-1 & after
23.	.020	2024-T3	D-1 thru D-1885
	.032	2024-T3	D-1885 & after
24.	.020	2024-T3	D-1 & after
25.	.016	2024-T3	D-1 & after
26.	.025	2024-T3	D-1 & after
*	.025	2024-T3	D-7310 and After



RIGHT HAND VIEW

* Skin Splice Moved Aft to Sta.179 as Shown. Effective D-6747 and After



BOTTOM VIEW

35-13-11

Figure 2-5. Fuselage and Empennage Skin Plating (Sheet 2 of 2)

Legend for Figure 2-6.

INDEX	GAGE	DESCRIPTION	SERIAL
1.	.032	61SO	D-1 & after
2.	.020	24S-T3	D-1 to D-1501
	.025	24S-T3	D-1501 to D-3999
	.032	24S-T3	D-3999 & after
3.	.025	24S-T3	D-1 to D-1501
	.032	2024-T3	D-1501 & after
4.	.025	24S-T3	D-1 to D-1501
	.032	2024-T3	D-1501 to D-4866
	.040	2024-T3	D-4866 & after
5.	.032	2024-T3	D-1 & after
6.	.016	24 STAL	D-1 to D-1245
	.020	24 STAL	D-1245 & after
7.	.016	24S-T3	D-1 to D-1821
	.020	2024-T3	D-1821 & after
8.	.016	24S-T3	D-1 to D-1693
	.020	2024-T3	D-1693 & after
9.	.016	24S-T3	D-1 to D-1245
	.020	2024-T3	D-1245 & after
10.	.032	2024-T3	D-1 & after
11.	.025	24S-T3	D-1 to D-1501
	.032	2024-T3	D-1501 to D-4866
	.040	2024-T3	D-4866 & after
12.	.025	24S-T3	D-1 to D-1501
	.032	2024-T3	D-1501 & after
13.	.020	24S-T3	D-1 to D-1501
	.025	24S-T3	D-1501 to D-3999
	.032	24S-T3	D-3999 & after
14.	.016	24S-T3	D-1 to D-1245
	.020	2024-T3	D-1245 & after
15.	.016	24S-T3	D-1 to D-1693
	.020	2024-T3	D-1693 & after
16.	.016	24S-T3	D-1 to D-1821
	.020	2024-T3	D-1821 & after
17.	.016	24 STAL	D-1 to D-1245
	.020	24 STAL	D-1245 & after
18.	.025	24S-T3	D-1 & after
19.	.025	24S-T3	D-1 & after
20.	.016	24S-T3	D-1 & after
21.	.016	2024-T3	D-1 & after
22.	.032	2024-T3	D-1 & after
23.	.020	2024-T3	D-1 & after
24.	.025	24S-T3	D-1 & after
25.	.016	2024-T3	D-1 & after
26.	.016	24S-T3	D-1 & after
27.	.016	2024-T3	D-1 & after
28.	.016	24S-T3	D-1 & after
29.	.016	24S-T3	D-1 & after
30.	.016	2024-T3	D-1 & after
31.	.025	24S-T3	D-1 & after
32.	.020	2024-T3	D-1 & after
33.	.032	2024-T3	D-1 & after

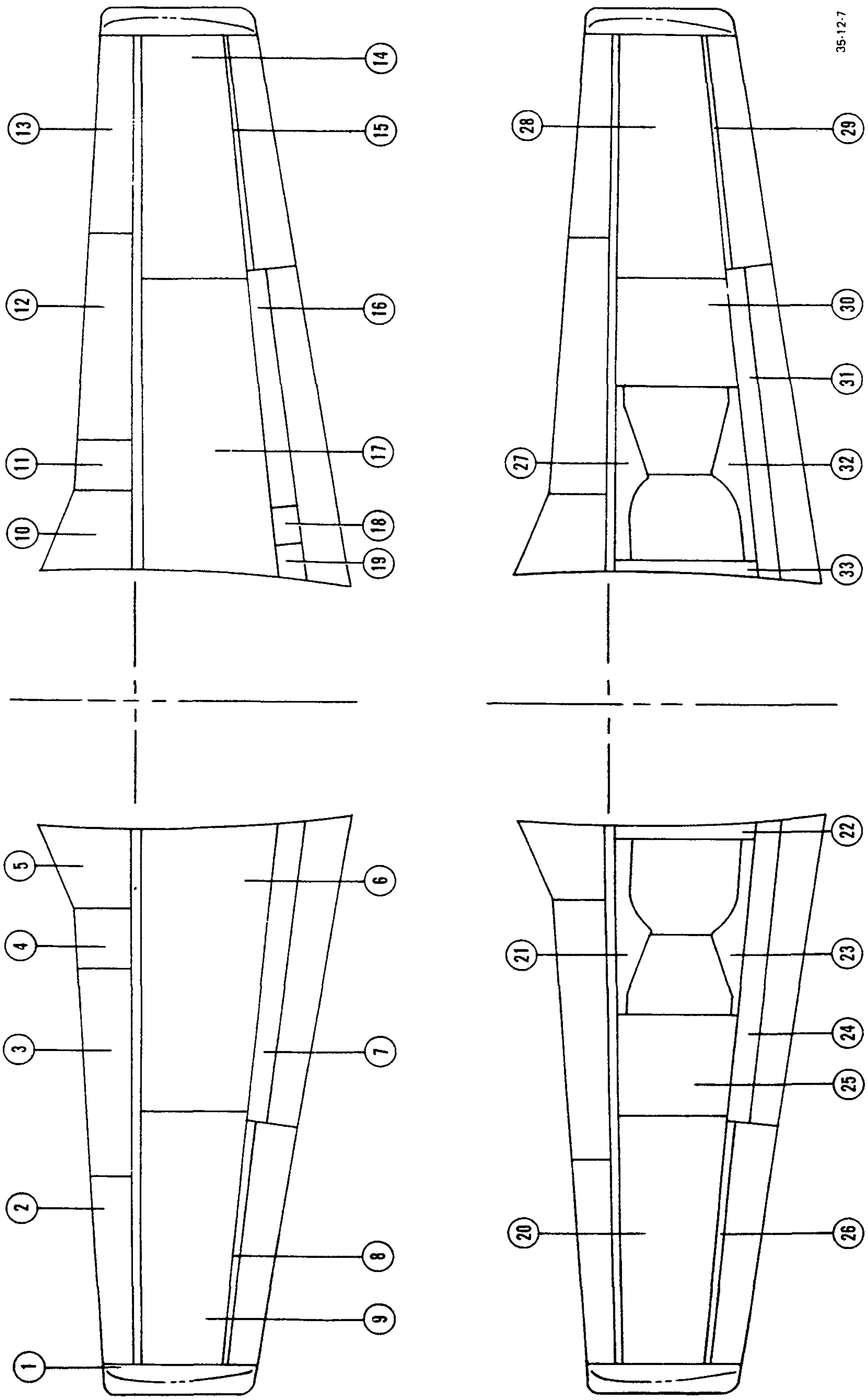
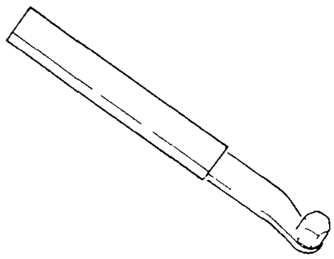
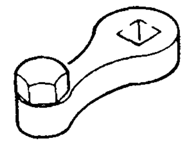


Figure 2-6. Wing Skin Plating



TS1222-3
TS1222-4
TS1222-6
TS1222-8



TS1171-1
TS1171-2
TS1176-1
TS1176-2
50-590013

SPECIAL TOOLS

TS1222-4 or TS1222-8	UPPER FORWARD WING BOLT WRENCH (9/16 inch hex for NAS150 bolts used D-1 thru D-9414 except D-9379)
TS1222-6	UPPER FORWARD WING BOLT WRENCH (1/2 inch hex for MS20010 bolts used interchangeable with NAS150 bolts on airplane serials D-9344 thru D-9414 except D-9379)
TS1222-3	UPPER FORWARD WING BOLT WRENCH (5/8 inch hex for NAS152 bolts used interchangeable with MS20012 and 131790-1 bolts on airplane serials D-9379, D-9415 thru D-10119 except D-10097)
TS1222-4 or TS1222-8	UPPER FORWARD WING BOLT WRENCH (9/16 inch hex for MS20012 and 131790-1 bolts used interchangeably with NAS152 bolts on airplane serials D-9379, D-9415 thru D-10119 except D-10097)
TS1171-1 or TS1176-1 or 50-590013	UPPER FORWARD WING NUT TORQUE WRENCH ADAPTER (D-1 thru D-9414 except D-9379)
TS1171-2 or TS1176-2	UPPER FORWARD WING NUT TORQUE WRENCH ADAPTER (D-9379, D-9415 thru D-10119 except D-10097)
TS1222-4 or TS1222-8	UPPER AFT WING BOLT WRENCH

TS1171-1 or TS1176-1 or 50-590013	UPPER AFT WING NUT TORQUE WRENCH ADAPTER
TS1222-4 or TS1222-8	LOWER FORWARD WING BOLT WRENCH (D-1 thru D-1500).
TS1222-3	LOWER FORWARD WING BOLT WRENCH (D-1501 thru D-7309)
TS1222-4 or TS1222-8	LOWER FORWARD WING BOLT WRENCH (D-7310 thru D-10119 except D-10097)
TS1171-1 or TS1176-1 or 50-590013	LOWER FORWARD WING NUT TORQUE WRENCH ADAPTER (D-1 thru D-1500)
TS1171-2 or TS1176-2	LOWER FORWARD WING NUT TORQUE WRENCH ADAPTER (D-1501 thru D-10119 except D-10097)
TS1222-4 or TS1222-8	LOWER AFT WING BOLT WRENCH
TS1171-1 or TS1176-1 or 50-590013	LOWER AFT WING NUT TORQUE WRENCH ADAPTER.

35-17-6

NOTE

POINTING HAND
DENOTES CHANGE

Figure 2-7. Special Tools (Sheet 1 of 2)

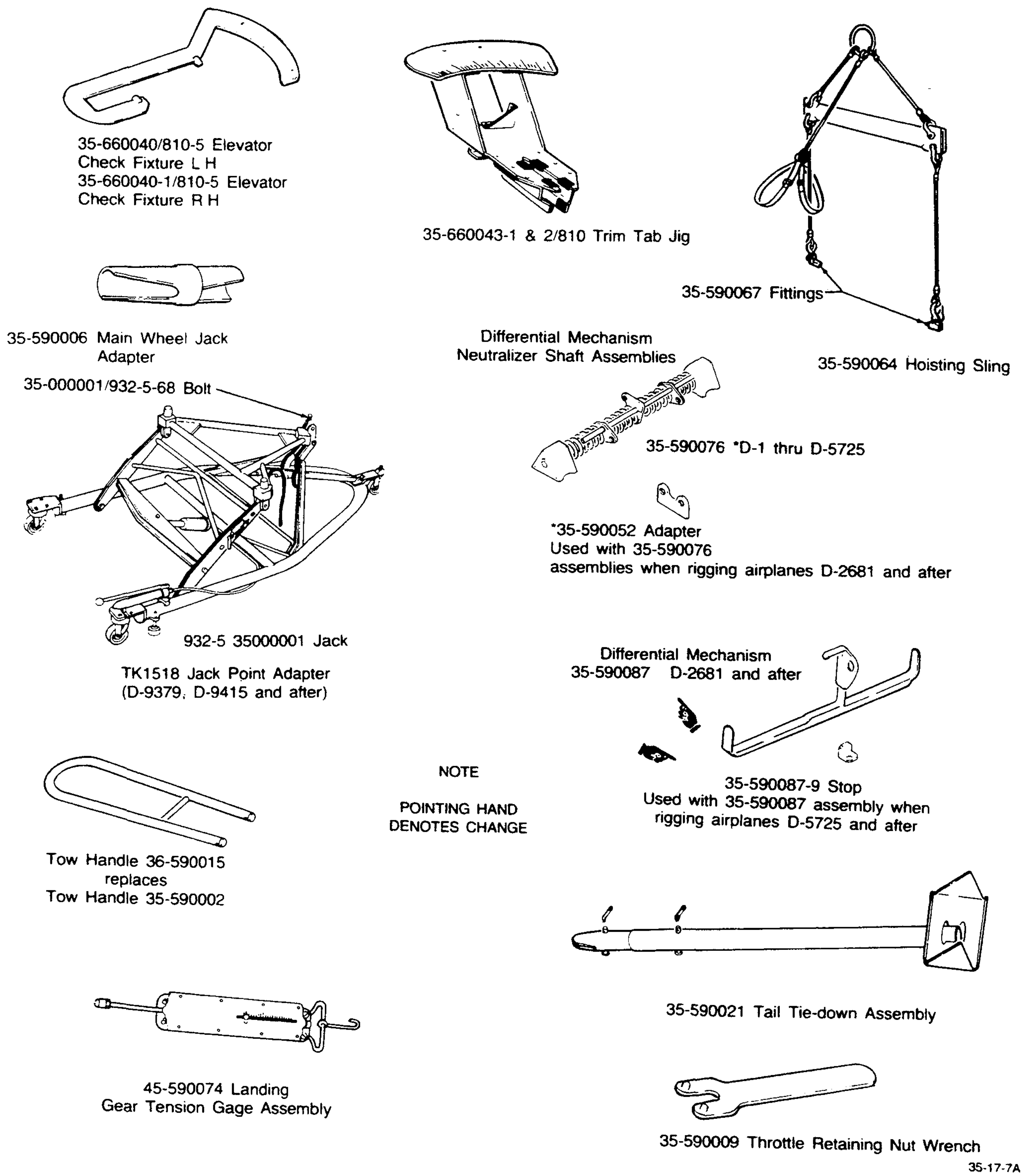


Figure 2-7. Special Tools (Sheet 2 of 2)

ITEM NO	LOCATION	LUBRICANT	INTERVAL
**DETAIL A			
1	Propeller pitch control motor (1)	MIL-G-23827	500 Hr
2	Propeller actuator bearings (1)	MIL-G-23827	250 Hr
3	Propeller blade bearings (2)	MIL-G-81322	250 Hr
4	Propeller actuator mechanism (1)	MIL-G-81322	250 Hr
DETAIL B			
1	Nose shock strut (1)	MIL-H-5606	AR
2	Shimmy Dampener (1)	MIL-H-5606	AR
3	Nose gear hinge points (2)	MIL-G-81322	100 Hr
4	Nose gear linkage (3)	MIL-G-81322	100 Hr
5	Nose gear torque knee (6)	MIL-G-81322	100 Hr
6	"A" frame pivot points (2)	MIL-G-81322	100 Hr
7	Nose wheel bearings (2)	MIL-G-81322	100 Hr
8	Nose gear swivel (2)	MIL-G-81322	100 Hr
9	Felt pads (2)	SAE No. 10	100 Hr
10	Rod end fitting (1)	MIL-G-81322	100 Hr.
DETAIL C			
1	Steering mechanism linkage (3)	MIL-G-81322	100 Hr.
2	Steering mechanism (2)	MIL-G-81322	100 Hr
DETAIL D			
1	Control column linkage (18)	SAE No. 20	100 Hr
2	Control column head (6)	SAE No. 20	100 Hr
3	Control column aileron link (3)	SAE No. 20	100 Hr.
DETAIL E			
1	Trim tab control (1)	SAE No 20	100 Hr.
DETAIL F			
1	Door handle (2)	SAE No. 20	100 Hr
2	Door handle (1)	SAE No 20	100 Hr
DETAIL G			
1	Landing gear motor gear box (1)	MIL-G-81322	300 Hr
2	Landing gear actuator gear box (1)	Mobil Compound GG*	300 Hr.
DETAIL H			
1	Fuel unit linkage (3)	SAE No 20	100 Hr
2	Fuel unit shaft (1)	MIL-G-81322	100 Hr
DETAIL I			
1	Flap motor gear box (1)	MIL-G-23827	300 Hr
DETAIL J			
1	Differential control arm (2)	SAE No 20	100 Hr.
2	Differential control assembly (4)	MIL-G-81322	100 Hr
DETAIL K			
1	Elevator tab reel (1)	MIL-G-81322	100 Hr
2	Elevator tab linkage (4)	SAE No 20	100 Hr
DETAIL L			
1	Flap actuator (2)	MIL-L-6086 Grade M	1000 Hr
DETAIL M			
1	Aileron control linkage (6)	SAE No. 20	100 Hr
DETAIL N			
1	Main shock struts (2)	MIL-H-5606	AR
2	Hinge pts. (D-1 to D-7133) & retract links (8)	MIL-G-81322	100 Hr
3	Landing gear torque knee (12)	MIL-G-81322	100 Hr
4	Main wheel bearings (4)	MIL-G-81322	100 Hr.
5	Landing gear up-lock roller (2) Refer to detailed LUBRICATION OF LANDING GEAR UP-LOCK ROLLERS in this section.		
DETAIL 0			
1	Landing gear door hinge (10)	SAE No. 20	100 Hr.
DETAIL P			
1	Control pedals (8)	SAE No. 20	100 Hr.

ITEM NO.	LOCATION	LUBRICANT	INTERVAL
DETAIL Q			
1	Cowl flap hinges (6)	SAE No 20	100 Hr
DETAIL R			
1	Engine tachometer drive adapter (1)	MIL-G-81322	100 Hr
DETAIL S			
1	Nose wheel door hinges (4)	SAE No 20	100 Hr

NOTES

1 MIL-G-81322 grease may be used in the place of MIL-G-23827 grease in all normal climates however in extremely cold climates, MIL-G-23827 grease should be used.
2. Landing gear components may require lubrication 25 or 50 hours, depending on operation
3 Care should be exercised when using grease MIL-G-81322 and MIL-G-23827 since they contain a rust preventive which will discolor painted surfaces

*Do not overfill When properly filled, the oil level measured on a dip stick inserted through the filler hole will be approximately 1/4 inch.
**Propeller lubrication is shown for the Model 215 propeller No lubrication between overhauls is recommended for the Model 278, F12A or 2A36C23-CB propellers
( ) Indicates number of places to lubricate.

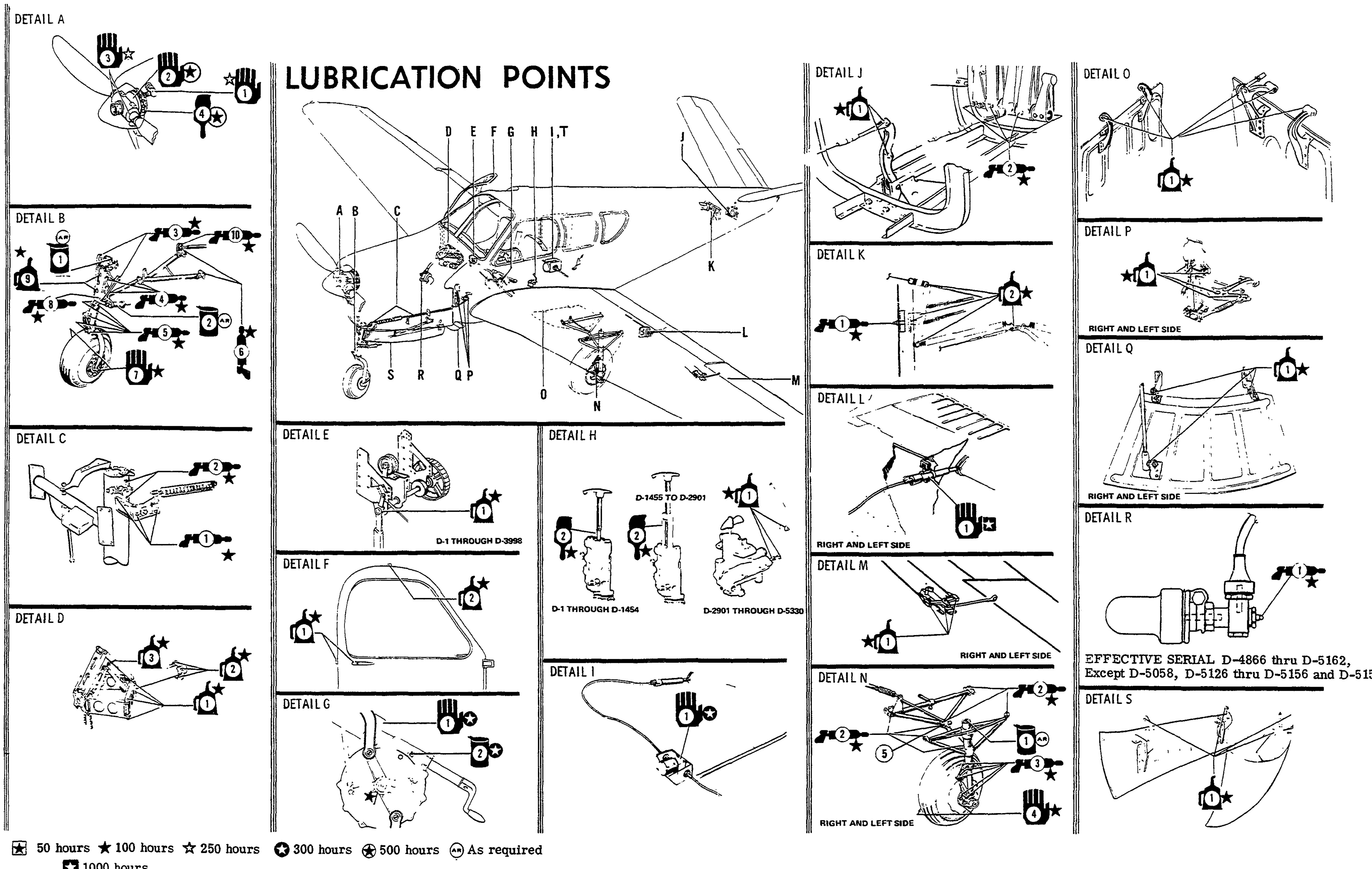


Figure 2-8. Lubrication Diagram

ITEM NO.	LOCATION	LUBRICATION	INTERVAL
DETAIL Q			
1	Cowl flap hinges (6)	SAE No. 10W/30	100 Hr.
DETAIL R			
1	Engine tachometer drive adapter (1)	MIL-G-81322	100 Hr.
DETAIL S			
1	Nose wheel door hinges (4)	SAE No. 10W/30	100 Hr.
DETAIL T			
1	Flap flexible drive	MIL-G-23827A	900 Hr.

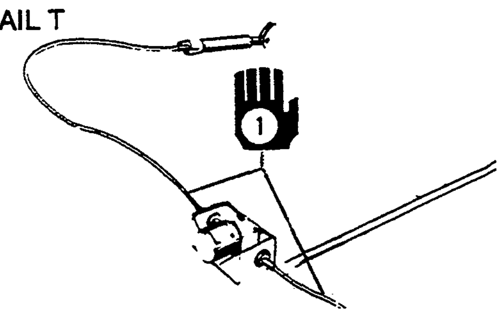
NOTES

1. MIL-G-81322 grease may be used in place of MIL-G-23827 grease in all normal climates, however in extremely cold climates, MIL-G-23827 should be used.
2. Landing gear components may require lubrication 25 or 50 hours, depending on operation.
3. Care should be exercised when using grease MIL-G-81322 and MIL-G-23827 since they contain a rust preventive which will discolor painted surfaces.
4. MIL-G-81322 grease is NOT compatible with Aeroshell #5 grease. DO NOT MIX.

* Do not overfill. When properly filled, the oil level measured on a dip stick inserted through the filler hole will be approximately 1/4 inch.

** Propeller lubrication is shown for the Model 215 propeller. No lubrication between overhauls is recommended for the Model 278, F12A or 2A36C23-CB propellers. ( ) Indicates number of places to lubricate.

DETAIL T



JACKING.

WARNING

The main landing gear on serial D-5791 and after and the nose landing gear on serial D-6562 and after, no longer incorporates a rebound control assembly. On this type gear, do not attempt to remove the torque knees, the torque knee pins or the bolt connecting the torque knees, when the airplane has been placed on jacks, without first deflating the shock absorber assembly. The torque knees provide the extension stop for the lower shock absorber cylinder assembly. When they are disconnected the cylinder is free to slide out of the upper barrel assembly.

One jack point is located on the under side of each forward fuselage wing attaching fitting and a third point, for use with a special jack, is located in the middle of the fuselage at the rear wing spar. This third point is a threaded socket. To use, install an eyebolt with at least 10 threads screwed into the socket. A special jack (figure 2-7) must then be used which will fit the two front jack points and attach to the eyebolt at the third point. The rear jack point pin should be safetied in place. If the jack is fitted with casters, the airplane may be rolled in the hangar or on other paved surfaces as desired. When using only the two front jack points, secure the tail skid to a stationary object and place 100 pounds of sand bags on the fuselage between the stabilizers.

MAIN WHEEL JACKING.

A wheel jack adapter is included with each aircraft prior to aircraft serial D-9222. The adapter is available as optional equipment,serials D-9222 and after. Before raising the airplane, be sure the shock strut is properly inflated to the correct height. If the strut is not inflated to the recommended height it will be impossible to insert the jack adapter into the main wheel axle. A scissor type jack is recommended for individual wheel jacking. When lowering the airplane caution should be exercised so the shock strut will not become compressed and force the landing gear door against the jack adapter.

CAUTION

Do not walk on the wing walk while the airplane is on the main wheel jack.

HOISTING.

An improved hoisting sling assembly has been designed which permits hoisting without removal of the left window, cabin door or engine cowling. The 35-590064-1 sling assembly uses hoist fittings which attach to the upper forward wing mounting bolts and a strap assembly installed around the propeller blade shanks. On airplanes prior to D-1501 the wing mounting bolts must be reversed in order to accommodate the new hoist fitting. If the airplane must be hoisted and the 35-590064-1 sling is not available, remove the cabin door, the left front window and the front seat. Attach a sling to the front wing spar in the fuselage, and a third line to the hoist fitting on the engine.

CAUTION

A spreader must be used above the cabin to prevent damaging the door moulding and window frame.

LEVELING.

On airplanes prior to D-3401 longitudinal leveling holes are located in each side of the baggage door frame. Insert a suitable straight edge in the holes in the baggage door and lay a spirit level on it. Adjust by raising or lowering the tail so the airplane is level longitudinally. Anchor the tail to a stationary object to keep it in this position. Serials D-3401 and after have two external screws in the bulkhead aft of the baggage compartment on the left side for longitudinal leveling. Longitudinal leveling is accomplished by attaching a plumb bob and a piece of string to the upper screw. The airplane is level when the string passes through the center of the lower screw. For lateral leveling, remove the front seat and lay the level along the top of the front wing spar fuselage carry through structure. Adjust the height of the jacks so the airplane is level laterally.

TOWING

WARNING

On fuel injection aircraft if the engine is warm, and it is necessary to move the propeller to attach the tow bar, stand clear of the area of rotation and move the propeller against the normal direction of rotation. Make certain the magneto switch is off. While the engine is warm, residual fuel in the intake ports and injectors may ignite and cause the engine to kick.

The two lugs on the nose gear lower torque knee are used with the hand tow bar, furnished with each airplane, and carried in the baggage compartment. One man can move the Bonanza easily on a smooth and level surface with the tow bar.

CAUTION

After moving the airplane, always remove the tow bar and replace it in the baggage compartment. Never turn the engine over with the tow bar attached to the fork, as the propeller will not clear the tow bar.

In a hangar and where movement is restricted, two men may pivot the airplane on the main wheels; one man should push on the leading edge of a wing tip while the other workman lifts the nose wheel from the ground by applying his weight on the fuselage just forward of the stabilizers. Points where pushing is permitted are the leading edge of the wing, wing tip, and the fuselage forward of the stabilizer leading edge.

CAUTION

Do not push on the propeller or the control surfaces.

To tow the airplane with a tractor or tug, attach the tow bar to the tow lugs on the nose gear lower torque knee. Always observe the turn limits of the nose gear when making turns. Turns greater than these limits can cause extensive damage to the nose gear. Also, exercise care when removing the tow bar from the nose gear lower torque knee to prevent damage to the lubrication fittings on the landing gear.

NOTE

Do not attempt to tow the airplane backward by the fitting in the tail skid. This tail skid was designed only to protect the tail in a tail-low landing and to provide attachment for the tail tie-down.

STARTING ENGINE.

Generator Switch	On
Alternator (on after engine starts) .	Off
Battery Switch.	On
Ignition	Both
Radio Switch	Off
Cowl Flaps	Open
Mixture	Full Rich
Propeller	HI RPM
Parking Brake.	On
Throttle	1/4 inch from closed

On Bonanzas D-1 through D-5330 operate the hand fuel pump to maintain 9 to 10 psi before engaging the starter. Airplanes D-5331 through D-6841 are equipped with an electric boost pump which should be operated until the pressure reaches 2 to 2-1/2 psi before the starter is engaged. On airplanes D-6842 and after the electric boost pump should be operated until the fuel flow reaches 8 gph before engaging the starter. The throttle should not be pumped in an effort to prime the engine. As soon as the engine is started, check the oil pressure gauge for an indicated pressure. If the gauge does not indicate pressure within one-half minute, stop the engine and determine the trouble.

CAUTION

Airplanes before Serial D-551 have a one-way check valve installed in the bottom of the oil tank. If this check valve has not been modified and the propeller is turned backwards, pressure may be built up in the line causing the hose connections to blow off. On these airplanes, always check the oil line hose connections if the engine kicks backwards or is turned opposite to the normal direction of rotation.

STARTING THE TSIO-520-D TURBOCHARGED ENGINE:

Normal Start: position the throttle half open, turn auxiliary fuel pump switch to "High Boost". When the fuel flow reaches 8 gph, turn the auxiliary fuel pump switch to "OFF". Reduce throttle to idle position and then engage starter, opening the throttle approximately 3 to 4 turns.

Hot Start: place the auxiliary fuel pump switch momentarily to "High Boost" immediately before engaging starter; after engine starts turn auxiliary fuel pump switch to "Low Boost" as needed to purge vapor from the system during ground operation.

CAUTION

Do not over-prime engine. In event of flooding, place mixture in Idle-Cut-Off and operate the starter until excess fuel is removed, then repeat hot engine starting procedure.

If the auxiliary pump switch is left in the "High Boost" position with the engine-driven pump operating, an over-rich mixture and slight power loss may occur.

When switching fuel tanks, if one tank is allowed to run completely dry it may be necessary to turn the auxiliary fuel pump to "Low Boost" position and place the mixture control to Full Rich to aid in restarting the engine. Close the throttle as necessary to prevent engine overspeed on restarting. As soon as the engine starts, turn the auxiliary pump switch to the "OFF" position.

CAUTION

When the oil temperature is in the low operating range apply full throttle slowly to avoid a supercharger overboost condition which may exceed the manifold pressure limitation of 32.5 inches Hg.

TAXIING.

The airplane should be taxied with the wing flaps up, and the engine cowl flaps open. On airplanes prior to D-1501, the brakes may be used in turning, and on any firm surface, the airplane can be turned in the radius of its wing span. On Serials D-1501 and after, turning may be accomplished by use of the nose wheel steering mechanism, which permits the inside wheel to describe a circle with a minimum diameter of 2 feet.

STOPPING ENGINE.

Propeller . . . . HI RPM
Throttle . . . . . . 500-700 RPM
Mixture Control . . . . Idle Cut-Off
Smoothly advance throttle to full open position as rpm drops. Turn off all the switches after the propeller stops rotating.
Cowl Flaps . . . . Open
Parking Brake . . . . On

NOTE

The top of the cabin door should not be used as a handhold while entering or leaving the cabin. Always open the storm window to relieve internal pressure when slamming the door. Never leave the cabin door open on the ramp as wind gusts may damage the door.

PARKING BRAKE.

Airplanes prior to D-3999 have a parking brake control handle located under the left side of the right subpanel. The parking brake control valve is installed in the system between the pilot's master cylinder and the reservoir. To apply the parking brakes, pull the parking brake handle back and pump the pilot's toebrakes until the desired pressure is built up in the hydraulic system. The parking brake valve will hold this pressure until the parking brakes are released. To release the parking brakes, push the parking brake handle forward.

On Serials D-3999 through D-4865 a parking brake control knob replaces the control handle; airplanes D-4866 and after have a flush mounting control in the right subpanel.

CONTROL LOCK.

A control lock is provided for the control column and the aileron control wheel. The lock secures the aileron control wheel in neutral and the control column in 5° down elevator position. The lock holds the throttle closed, covers the ignition switch and prevents accidental starting of the engine or attempted take-off.

NOTE

There are three different control locks used on the Model 35 aircraft. Aircraft prior to D-5055 will use the 35-524190 Lock Assembly; Aircraft D-5055 thru D-5131 use 35-524638 Lock Assembly; Aircraft D-5132 and after will use the 35-590081 Lock Assembly.

MOORING (Extended Storage and High Wind)

When mooring the Bonanza, the following method is recommended: Place chocks fore and aft of each main wheel. Position a tail stand under the tail skid, adjusting the height of the stand to slightly compress the nose gear shock strut. Run a line through each wing mooring lug, fastening each end to a ground point, one forward and one aft of the wing. Run a line through the hole in the tail skid and anchor at the sides of the airplane approximately 5 feet from the base of the stand. If a storm is anticipated, two lines may be secured to each main landing gear strut near the V-brace and also a line may be attached around the nose gear strut near the lower torque knee. It is recommended that the airplane be tied down headed into the wind, with the control lock installed.

NORMAL TIE-DOWN

A tie-down lug is located on the lower side of each wing; the tail lug serves as a third tie-down point. After bringing the airplane into the desired position (preferably facing into the wind) chock the main wheels, fore and aft and install the control lock. Then, using a nylon line or chain of sufficient strength, secure the airplane at the wing and tail lugs. DO NOT OVERTIGHTEN.

LUBRICATION.

The lubrication chart (Figure 2-8) contains information that insures the proper operation and preservation of the airplane. Location, interval, lubricant required, and method of application are given. Bearings used in pulleys, bellcranks, hinge points, and rod-ends are of the sealed-type and do not require periodic lubrication. Avoid excessive application of lubricants.

LUBRICATION OF LANDING GEAR UP-LOCK ROLLERS (D-1 through D-9286)

Lubricate the up-lock roller bearings with SAE 20 oil every 50 hours. Every 100 hours pack the bearings with grease, MIL-G-23827, or at any time bearings are subject to degreasing.

Every 100 hours clean the up-lock rollers with solvent and lubricate them as follows

a Place the airplane on jacks, and partially retract the landing gear.

b Remove the bolt attaching the up-lock roller and the center hinge point of the "V" brace drag leg.

c. Remove the up-lock roller bearing from the bolt

d. Hold a finger over one end of the center bearing race of the up-lock roller and place the fitting of the grease gun against the opposite side of the bearing, then pump grease into the bearing inner race. This will force grease into the bearing cavity through the hole in the inner race. Completely fill the bearing with MIL-G-23827 grease.

e. Reinstall the bolt attaching the up-lock rollers at the center hinge point of the "V" brace drag leg. Check the up-lock roller for free movement and a maximum clearance of .010 to .020 inch between the roller and the up-lock block. If this clearance is not correct, the up-lock must be adjusted as indicated under RIGGING THE LANDING GEAR in Section 3 of this manual.

LUBRICATION OF LANDING GEAR UP-LOCK ROLLERS (D-9287 and after)

On serials D-9287 and after and prior aircraft having complied with Service Instruction No. 0448-211, the bolt attaching the up-lock rollers at the center hinge point of the "V" brace drag leg is a grease bolt with a grease fitting. Using a grease pressure gun filled with grease, MIL-G-23827, lubricate the up-lock bearing through the grease fitting. This should be accomplished every 100 hours, or any time that bearings are subjected to degreasing

NOTE

> The grease fitting on the drag leg, directly above the up-lock roller bearing, does not supply lubrication for the up-lock roller bearing.

SERVICING THE OIL SYSTEM.

Bonanzas prior to D-4866 are equipped with a dry-sump type pressure oil system with a 2-1/2 gallon oil tank located in the engine compartment. The oil tank filler cap is accessible through an access door in the left engine cowl. The oil tank drain is located in the top of the nose wheel well on airplanes prior to D-1117. On airplanes D-1117 and after, the oil tank drain is located at the bottom of the tank. When draining the oil tank also drain the engine sump.

Bonanzas D-4866 and after are equipped with a wet sump oil system requiring 9 quarts of oil on airplanes D-4866 through D-5725 and 10 quarts on airplanes D-5726 thru D-7309, and 12 quarts on airplanes D-7310 and after. The oil filler cap is accessible through an access door on the left engine cowl. To drain the engine sump, remove the right hand access plate and unscrew the sump drain plug in the lower right hand side of the engine crankcase. An oil drain trough, furnished with each airplane, is used to convey the oil over the side

Under normal operating conditions, the recommended number of operating hours between oil changes on Bonanza serials prior to D-7310 is 25 hours. A 100 hour oil change interval is recommended for serials D-7310 and after (equipped with full flow oil filters) provided the oil filter element is changed at each oil change.

NOTE

> On Bonanzas D-7310 and after, a torque from 15 to 18 foot-pounds should be applied to the center of the oil filter when the filter element is replaced. If no torque wrench is available when the element is changed, clean and lubricate the new gasket with engine oil. Then turn the center stud of the filter by hand to a light gasket contact and tighten an additional 1-3/4 turns with a suitable wrench.

When operating under adverse weather conditions or continuous high power settings, the oil should be changed more frequently. Before draining the oil, run up the engine until the oil reaches operating temperature to assure complete draining of the oil. Oil grades listed below are general recommendation only, and will vary with individual circumstances. Check oil inlet temperature during flight in determining the use of correct grade of oil. Inlet temperatures consistently near the maximum allowable indicates a heavier oil is needed. Use a detergent or nondetergent aviation grade oil in the heaviest weight that will give satisfactory starting. Above 40°F, SAE 50 viscosity should be used; below 40°F, SAE 30 is recommended. After the first 25 hours of operation, detergent oil only is recommended in aircraft serials equipped with the IO-520 series engine. Any detergent aviation grade engine oil which meets Continental Motors Corporation Specification MHS-24A is acceptable for use.

APPROVED ENGINE OILS

COMPANY	*APPROVED*		*BRAND NAME*
BP Oil Corporation	3/25/70		B/P Aero Oil D65/80
Castrol Limited (Australia)	1/5/67		Grade 40, Castrolaero AD, Type III Grade 50, Castrolaero AD, Type II
Continental Oil Company	11/15/60	* * *	Conoco Aero S No. 65 (SAE 30) Conoco Aero S No. 80 (SAE 40) Conoco Aero S SAE 10W30
Delta Petroleum Company	10/21/70		Delto Avoil - Grades 30, 40 & 50
Gulf Oil Corporation	8/7/58	*	Gulfpride Aviation Series D
Humble Oil & Refining Company	1/25/63		Esso Aviation & Enco Aviation In Grades E65, E80, E100, E120
	10/7/68		Grade A100
Kendall Refining Company	9/20/60	*	Kendall Aviation Oil Type D
Pennzoil Company	11/10/67		Pennzoil Aircraft Engine Oil, Heavy Duty Dispersant, Grades 30, 40, 50
Phillips Petroleum Company	4/18/58		Phillips 66 Aviation Oil Type A (Replaced HD Aviation Oil)
Quaker State Oil & Refining Corporation	8/14/70		Quaker State AD Aviation Engine Oil Grades 20W/30, 40 & 50
Shell Oil Company	8/15/58		Aeroshell Oil W
	12/20/63		Aeroshell Oil W (in 4 grades) Grade 120 (Nominal SAE 60) - Military Grade 1120 Grade 100 (Nominal SAE 50) - Military Grade 1100 Grade 80 (Nominal SAE 40) - Military Grade 1080 Grade 65 (Nominal SAE 20 or 30) - Military Grade 1065
Sinclair Refining Company	11/20/67		Sinclair Avoil 20W-40
Socony-Mobil	11/21/60	* * *	Aero Red Band HD (SAE 50) Aero Gray Band HD (SAE 40) Aero White Band HD (SAE 30)
	2/9/65		Mobil (Aero Oil 65) Ashless Mobil (Aero Oil 80) Dispersant Mobil (Aero Oil 100) Aviation Mobil (Aero Oil 120) Engine Oil
Standard Oil of California	8/12/58	*	RPM Aviation Oil (Compounded)
Texaco, Inc	3/20/62	* *	Texaco Aircraft Engine Oil D100 Texaco Aircraft Engine Oil D80
	9/24/64		Texaco Aircraft Engine Oil - Premium AD Grades 65, 80, 100
Union Oil Company of California	11/9/70		Union Engine Oil HD Grades 80 & 100

The oil designated with an * are ash residue type oils. The balance of the oils are ashless.

SERVICING THE FUEL SYSTEM

CAUTION

Any time the fuel system is drained or a fuel cell is empty for any reason, air may enter the system. If the possibility that air has entered the system does exist, start and operate the engine for several minutes on each tank until proper engine operation is assured. Refer to the applicable Pilot's Operating Handbook and Airplane Flight Manual before starting and operating the engine.

On Bonanzas prior to D-5726, a bladder type, rubber fuel cell is installed in each wing leading edge and is accessible for filling by lifting a Dzus fastened door and removing the pressure type cap. A filler neck drain is provided for fuel tank overflow, but care should be exercised to prevent overfilling. Prior to D-6997, a grounding jack is provided above the leading edge of the wing in the fuselage to eliminate static electricity arcing during the filling operation. The wing tank drain is located on the underside of the wing and is accessible through a small opening in the wing skin. A small amount of fuel should be drained from the tanks periodically to prevent accumulation of water. The fuel strainer enclosed in the bottom portion of the fuel selector valve should be removed and cleaned at least every 100 hours. Two 10-gallon auxiliary wing fuel tanks are optional equipment on airplanes D-4000 thru D-6561. The auxiliary fuel tank filler necks are outboard and aft of the main tank filler necks.

On Bonanzas D-5726 and after, two 25-gallon standard fuel tanks in the wing leading edge replace the previous 20-gallon standard tanks. On airplanes D-6562 thru D-7309, two optional 39-gallon wing leading edge tanks can be installed in place of the two standard 25-gallon tanks. Optional leading edge tanks on serials D-7310 and after have a capacity of 40-gallons. The two 10-gallon auxiliary tanks are not offered after D-6561.

NOTE

Care should be exercised while filling the fuel tank to prevent scratching, denting, or otherwise damaging the surface or leading edge of the wing.

SERVICING WING TIP TANKS

When Brittain wing tip tanks are installed on the Bonanza, the fuel capacity is increased by 40 gallons. Each tank holds 20 gallons. Filler caps are on the upper outboard sides of the tanks and are accessible through small doors secured by Dzus fasteners. Filler drains are provided for tank overflow as in the main tanks. Fuel drains are located in the bottom of the tanks for draining or flushing. Care of the wing tip tanks is similar to that of the other fuel tanks in the airplane, except these do not have rubber cells as do the main tanks. Static grounding lines should be used during refueling.

Make periodic checks for leaks and proper attachment. At each 100 hour inspection, check the plumbing for security and leaks through the inspection panels along the bottom of the wings. Wiring for the fuel quantity transmitters and the navigation lights follow the same approximate route through the lightening holes, and may be checked at the same time.

SERVICING SHOCK STRUTS

The shock struts are filled with MIL-H-5606 hydraulic fluid and compressed dry air or nitrogen. The same procedure is used for servicing both the main and nose gear shock struts. To service a strut, proceed as follows:

a. Remove the air valve cap and depress the valve core to release the air pressure.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown off with considerable force, causing injury to personnel or property damage.

FUEL CELL CAPACITIES

SERIALS	LOCATION	CAPACITY	USABLE	UNUSABLE
D-1 thru D-3998	Wing, 2 Std.	20 gal. ea.	17 gal. ea.	36 lb.
	Fuselage, 1 Opt.	20 gal. ea.		6 lb.
D-3999 thru D-4865	Wing, 2 Std.	20 gal. ea.	17 gal. ea.	36 lb.
	Wing, 2 Opt.	10 gal. ea.		5 lb.
	Fuselage, 1 Opt.	20 gal. ea.		6 lb.
D-4866 thru D-5725	Wing, 2 Std.	20 gal. ea.	17 gal. ea.	36 lb
	Wing, 2 Opt.	10 gal. ea.		5 lb.
D-5726 thru D-6561	Wing, 2 Std.	25 gal. ea.	22 gal. ea.	36 lb.
	Wing, 2 Opt.	10 gal. ea.		5 lb.
D-6562 thru D-10302	Wing, 2 Std.	25 gal. ea.	22 gal. ea.	36 lb.
	Wing, 2 Opt.	40 gal. ea.		36 lb.
D-10303 and after	Wing, 2 Std.	40 gal. ea.	37 gal. ea.	36 lb.

b. With the weight of the airplane on the gear, loosen the filler plug slowly to assure that all air has escaped, then remove the filler plug.

c. With the shock strut fully deflated, raise the strut barrel so that it is 1/4 inch (nose gear strut) or 1 to 2 inches (main gear strut) from the fully compressed position.

d. Fill the strut to the level of the filler plug with MIL-H-5606 hydraulic fluid. Lower the strut barrel and, with the strut in the fully compressed position, allow the excess fluid to drain out.

e. Clean and install the filler plug and inflate the strut. On airplanes D-1 thru D-1500, the nose gear shock strut should be inflated until 2-1/2 inches of piston is exposed; on airplanes D-1501 thru D-6561 there should be 3-1/16 inches of piston exposed; on airplanes D-6562 and after, the amount of exposed piston is 3-1/2 inches. The main gear shock strut should be inflated until 2-5/8 inches of piston is exposed on airplanes D-1 through D-1500. On airplanes D-1501 through D-2680, there should be 3-9/32 inches of exposed piston, and on airplanes D-2681 and after, the shock struts should be inflated until 3 inches of the pistons are exposed.

CAUTION

If a compressed air bottle containing air under extremely high pressure is used, care should be taken not to overinflate the strut.

f. Rock the airplane gently to prevent sticking or binding the strut.

g. Remove all foreign material from the exposed piston of the shock strut with a cloth moistened with hydraulic fluid.

SERVICING THE SHIMMY DAMPENER

To check the fluid level in the shimmy dampener, insert a wire of approximately 1/16-inch diameter through the hole in the disc at the end of the piston rod until it touches the bottom of the hole in the floating piston. Mark the wire, remove and measure the depth of insertion. Inserting the wire in the hole of the floating piston, rather than letting it rest against the face of the piston, will give a more accurate check.

NOTE

To determine if the wire is inserted in the hole of the floating piston, insert the wire several times, noting each insertion depth. When the wire is correctly inserted, the length will be approximately 1/4inch greater.

When the shimmy dampener is full, the insertion depth is 2-3/16 inches. The empty reading is 3-1/16 inches. To add MIL-H-5606 hydraulic fluid, remove the shimmy dampener and proceed as follows:

a. Secure the shimmy dampener in a fixed position with the clevis end down.

b. Remove the cotter pin, washer, and spring, from the piston rod. Remove with care as the spring is compressed.

c. Remove the internal snap ring, scraper ring and the end seal from the aft end of the barrel (oposite the clevis end).

d. Insert a 6-32 threaded rod into the floating piston and remove the piston.

e. Push the piston rod to the end of its travel toward the clevis end and fill the barrel with MIL-H-5606 hydraulic fluid.

f. Slowly actuate the piston rod, allowing the fluid to flow into the clevis end chamber, then return the piston to the clevis end of the barrel.

g. Refill the displaced fluid and replace the end seal, scraper ring and internal snap ring.

h. Insert the 6-32 threaded rod through the clevis end of the piston rod and engage the lower floating piston. Pull the floating piston to the end of its travel toward the clevis end and secure in that position.

i. Fill the piston rod with fluid.

j. Reinstall the floating piston, spring, washer and cotter pin. Spread the cotter pin to allow clearance for the measuring wire.

k. Release the 6-32 rod and remove it from the floating piston.

SERVICING THE BRAKE SYSTEM

The Model 35 hydraulic brakes are self-compensating and require no adjustment. Linings should be checked for small nicks or sharp edges which could damage the brake discs. Worn, dished or distorted brake discs should be replaced. The brake fluid is supplied to the brake system from the reservoir tank located in the engine accessory section and is accessible by raising the right side of the engine cowl. The reservoir should be filled to within 1-1/2 inches of the top and a visible fluid level should be maintained at all times. Use only MIL-H-5606 hydraulic fluid in the brake system. Ensure that no dirt or foreign matter is allowed to get into the system. See Section 3 for bleeding the brake system.

SERVICING TIRES

The nose wheel tire is a 5.00 x 5 4-ply tire. The main wheel tires are 6.50 x 8 4-ply prior to serials D-7725 and 7.00 x 6 6-ply tires on airplane serials D-7725 and after.

CAUTION

Tires that have picked up a fuel or oil film must be washed down as soon as possible with a detergent solution to prevent contamination of the rubber.

Maintaining proper tire inflation will help to avoid damage from landing shock and will minimize tread wear and aid in preventing tire rupture caused from running over sharp stones and ruts. When inflating the tires, inspect for cuts, cracks, breaks, and tread wear. The pressure of a serviceable tire that is fully inflated should not drop more than 4 percent over a 24-hour period.

Tire Pressure

Serials	Nose Gear	Main Gear
D-1 thru D-1500	28	*28
D-1501 thru D-5985	30	*30
D-5986 thru D-7976	40	*30
D-7977 and after	40	33 to 40

*Airplane serials prior to D-7977 using Cleveland wheel and brakes, inflate to 33 to 40.

NOTE

Beech Aircraft Corporation cannot recommend the use of recapped tires. Recapped tires have a tendency to swell as a result of the increased temperature generated during takeoff. Increased tire size can jeopardize proper function of the landing gear retract system, with the possibility of damage to the landing gear doors and retract mechanism.

STORAGE

The storage procedures listed are intended to protect the airplane from deterioration while it is not in use. The primary objectives if these measures are to prevent corrosion and damage from exposure to the elements. Three types of storage are considered.

a. FLYABLE STORAGE - 7 to 30 days.

b. TEMPORARY STORAGE - up to 90 days.

c. INDEFINITE STORAGE.

FLYABLE STORAGE - 7 TO 30 DAYS

a. MOORING - If the airplane cannot be placed in a hangar, tie down securely at the three points provided. Do not use hemp or manila rope. It is recommended that a tail support be used to compress the nose strut and reduce the angle of attack of the wings. Attach a line to the nose gear.

b. ENGINE PREPARATION FOR STORAGE - Engines in airplanes that are flown only occasionally tend to exhibit cylinder wall corrosion much more than engines that are flown frequently.

1. Check for correct oil level and add oil if necessary to bring the oil level to the full mark.

2. Run the engine at least five minutes at 1200 to 1500 rpm with oil and cylinder head temperatures in the normal operating range.

c. DURING FLYABLE STORAGE - Each seven days during flyable storage, the propeller shall be rotated by hand. After rotating the engine six revolutions, stop the propeller 60° or 120° from the position it was in.

WARNING

Before rotation of propeller blades, ascertain magneto switch is OFF, throttle is in CLOSED position and mixture control is in the IDLE CUT-OFF position. Always stand in the clear while turning the propeller.

1. Arrangements should be made to have the airplane flown at least 30 minutes each week in order to keep the internal parts of the engine lubricated. Ground running of the engine will not provide proper heating of the oil without possible damage to other engine compartment components due to lack of air flow, and will result in condensation of moisture in the oil supply, increasing the possibility of cylinder/crankshaft rust.

d. FUEL CELLS - Fill to capacity to minimize fuel vapor and protect the cell inner liners.

e. FLIGHT CONTROL SURFACES - Lock with internal and external locks.

f. GROUNDING - Static ground the airplane securely and effectively.

g. PITOT TUBE - Install cover.

h. WINDSHIELD AND WINDOWS - Close all windows and window vents. It is recommended that covers be installed over windshield and windows.

i. PREPARATION FOR SERVICE - Remove all covers and tape, clean the airplane and give it a thorough inspection, particularly wheel wells, flaps, and control openings.

1. If the engine has a total time of more than 25 hours and the oil consumption has stabilized, drain the MIL-C-6529 oil (MIL-C-6529 is the recommended oil for the first 25 hours of flight) after a ground warm-up, and install oil per Teledyne Continental Motors MHS-24A Specification before flight.

TEMPORARY STORAGE - 30 TO 90 DAYS

a. MOORING - See flyable storage.

b. ENGINE PREPARATION FOR STORAGE - Operate the engine (Preferably in flight) until oil temperature reaches normal range. Drain the oil sypply from the sump while the engine is still warm and replace the drain plug.

1. Fill the sump to the full mark on the dipstick gage with lubricating oil meeting the requirements of MIL-C-6529, Type II, which will mix with normal oil and provide protection against corrosion.

2. Remove the top spark plug and atomize spray preservative oil, (MIL-L-46002, Grade 1) at room temperature, through the upper spark plug hole of each cylinder with the piston in the down position. Rotate the crankshaft as each pair of cylinders is sprayed. Stop the crankshaft with no piston at the top position, and thoroughly respray each cylinder. Reinstall the spark plugs.

3. Apply preservative to engine interior by spraying the above specified oil (approximately two ounces)through the oil filler tube. Seal all engine openings exposed to the atmosphere using suitable plugs, or moisture resistant tape, and attach red streamers at each point. Affix a tag to the propeller in a conspicuous place with the following notation: DO NOT TURN PROPELLER, ENGINE PRESERVED. Seal the propeller blade spinner cutouts with tape.

c. FUEL CELLS - Fill to capacity to minimize fuel vapor and protect cell inner liners.

d. FLIGHT CONTROL SURFACES - Lock with internal and external locks.

e. GROUNDING - Static ground the airplane securely and effectively.

f. PITOT TUBE - Install cover.

g. WINDSHIELD AND WINDOWS - Close all windows and window vents. It is recommended that covers be installed over the windshield and windows.

h. BATTERY - Remove and store according to standard practices.

i. PREPARATION FOR SERVICE - Remove all covers, tape, and tags. Clean the airplane and give it a thorough inspection, particularly wheel wells, flaps, and control openings. With the bottom spark plugs removed, hand turn the propeller several revolutions to clear excess preservative oil, then reinstall the plugs. Preflight the airplane and flight test.

INDEFINITE STORAGE

a. MOORING - See FLYABLE STORAGE.

b. ENGINE PREPARATION FOR INDEFINITE STORAGE - Drain the engine oil and service with lubricating oil, MIL-C-6529, Type II.

1. Immediately after servicing with the corrosion preventive mixture, fly the airplane for a period of time not to exceed a maximum of 30 minutes.

2. It is recommended that the propeller be removed and the engine removed from the airplane. The propeller shaft should be coated with preservative oil and wrapped with moisture proof material and tape.

NOTE

If the engine is removed from the airplane, a tail mooring stand must be used.

3. Remove the top spark plug from each cylinder and spray thoroughly with

corrosion preventive mixture (MIL-C-6529, Type II) at a temperature range of 221° to 250°F.

4. Install protex plugs in each of the top spark plug holes, making sure that each plug is blue in color when installed. Protect and support the spark plug leads with AN4060-1 protectors.

5. Place a bag of desiccant in the exhaust pipes and seal the openings with moisture resistant tape.

6. Seal the cold air inlet to the heater muff with moisture resistant tape.

7. Seal the engine breather by inserting a protex plug in the breather hose and clamping it in place.

8. Wrap the engine with moisture proof material and tape after the desiccant bags have been installed.

9. Attach a red streamer to each place on the engine where bags of desiccant are placed. Either attach red streamers outside of the sealed area with tape, or to the inside of the sealed area with saafety wire to prevent wicking of moisture into the sealed area.

10. If the propeller has not been removed, affix a tag in a conspicuous place with the following notation: DO NOT TURN PROPELLER - ENGINE PRESERVED.

c. CARBURETOR PREPARATION FOR STORAGE

Drain all fuel from the carburetor after removing the strainer, the fuel pressure gage fitting and the drain plug. Replace the strainer and tighten its plug. Install plugs in the three open pipe-tapped holes.

Remove the pipe plug from the regulator spacer to drain moisture frcm the air section and replace the plug immediately. Flushing oil to be introduced later must not enter the air section.

Place the mixture control lever in the "RICH" position and the throttle in the "OPEN" position.

Connect the fuel inlet port to a source of clean, light-weight lubricating oil (SAE 10 or lighter) at a pressure of 5 psi and inject oil until a small amount has escaped from the discharge nozzle at the top of the throttle barrel.

CAUTION

Do not use an oil containing a detergent additive for flushing.

The flushing oil may be either drained from the carburetor by removing the drain plug in the bottom of the regulator, or if the oil is new and unused, left in the carburetor for the period of storage.

CAUTION

In the event the flushing oil contains 2 percent by volume, or more of gasoline, it will deteriorate all systhetic rubber parts and cause a gummy deposit on the internal metal parts, necessitating a carburetor overhaul.

Install pipe plugs in the fuel inlet port and in the gage connection and drain holes if removed for drainage.

Place the carburetor in a container which can be sealed tight and is dust proof. Also place a 1/2 lb. bag of silica gel crystals in the storage container so it can not touch the carburetor.

After sealing the first container, wrap it in moisture-proof paper.

d. DURING INDIFINITE STORAGE - The cylinder protex plugs shall be inspected weekly. The plugs should be changed as soon as their color indicates unsafe conditions of storage. If the dehydrator plugs have changed in one-half or more of the cylinders, all desiccant material on the engine should be replaced.

1. The cylinder bores should be resprayed with corrosion preventive mixture every six months, or more frequently if bore inspection indicates corrosion has started. Replace all desiccant and protex plugs. Before spraying, the engine shall be inspected for corrosion as follows:

Inspect the interior of at least one cylinder on the engine through a spark plug hole. If the cylinder shows rust, spray the cylinder with corrosion preventive oil and turn the prop over five or six times, then respray. Remove the rocker box cover from the engine and inspect the valve mechanism.

e. PROPELLER - Coat the blades with preservative oil and wrap with moisture-proof material and tape. If the propeller has been removed, coat all parts with protective material to exclude dust, and then retape.

f. FUEL CELLS - Drain fuel cells.

1. Flush, spray, or rub a thin coating of light engine oil on the inner liners of all fuel cells which have contained gasoline.

2. After 24 hours, remove the fuel cells and store according to standard practices. Do not remove or handle the fuel cells until 24 hours after oil has been applied.

g. FLIGHT CONTROL SURFACES - Lubricate all flight control surface hinge pins, bearings, bell cranks, chains, control rods and quadrants and coat lightly with corrosion preventive compound.

1. Lock with internal and external locks.

h. GROUNDING - Static ground the airplane securely and effectively.

i. PITOT TUBE - Apply a thin coating of grease, Specification MIL-G-10924, and install the cover.

j. WINDSHIELD AND WINDOWS - Close all windows and window vents and installl covers over the windshield and windows.

k. LANDING GEAR - Coat the extended portion of the shock struts with light weight oil.

l. TIRES - Install covers. Check air pressure periodically and inflate as necessary.

m. WING FLAP TRACKS AND ROLLERS - Coat with corrosion preventive compound. Place flaps in retracted position.

n. BATTERY - Remove and store according to standard practices.

o. INSTRUMENT PANEL - Cover with barrier material and secure with tape.

p. SEATS - Install protective covers.

q. LANDING LIGHTS - Cover with barrier material and secure with tape.

r. STALL WARNING UNIT - Remove and store according to standard practices. Tape connections.

s. LOOSE TOOLS AND EQUIPMENT - Remove and store in a dry temperate room.

t. AIRFRAME - Cover static ports and all openings with barrier material and secure with tape to exclude rain, sun, and foreign matter.

PREPARATION FOR SERVICE

a. Remove all covers, tape, and tags from the airplane.

b. Remove all cylinder plugs and all paper, tape, and dehydrating agent used to preserve the engine.

c. Drain corrosion preventive mixture and reservice with recommended lubricating oil.

d. Rotate the propeller to clear excess preservative oil from the cylinders.

e. Install the spark plugs, battery, and rotate the propeller by hand through all compressions of the engine to check for liquid lock. Reinstall the cowling and start the engine in the normal manner.

f. Give the airplane a thorough cleaning, visual inspection and test fly the airplane.

SERVICING THE BATTERY

CAUTION

Check to confirm 14 or 28 volt system.

14 VOLT SYSTEM (12-VOLT BATTERY) (D-1 THRU D-10119 EXCEPT D-10097)

A 12-volt, 35 ampere-hour BEECHCRAFT Reading or Gill battery, or a 25 ampere-hour Willard battery, is provided to operate the electrical system.

NOTE

On airplane serials D-1 through D-1116, the R33 Reading battery and the AW-12-25 battery are interchangeable provided the proper battery spacer blocks are used.

On airplanes D-1117 through D-1910, original installations were built to accomodate only the Willard battery.

On Bonanza serials D-1911 and after, and airplane serials D-1117 through D-1910 that have incorporated Kit 35-562, the BEECHCRAFT 36-380025 battery (Gill P/N 6-GCAB-11) may be used.

On airplanes prior to D-1117 and airplanes D-6562 and after, the battery is located on the right side of the engine compartment attached to the firewall. The battery is accessible for servicing by raising the right engine cowl and removing the battery box cover. On airplanes D-1117 through D-6561 the battery is located behind the engine firewall on the right side.

Access may be obtained by raising the right engine cowl and unfastening the Dzus fasteners and opening the battery access door. Always loosen the clamp on the battery vent before opening door and be sure that vent is not kinked when closing door. The battery should be maintained in a charged condition at all times and water level should be checked at regular intervals A fully charged battery will not freeze and a clean battery reduces the hazards. Never add anything but distilled water to the battery.

The water level in the Reading R-33 battery should be maintained between the top and 1/4 inch above the separators. Never fill above the baffle. The water level in the BEECHCRAFT 36-380025 battery and in the Gill 6-GCAB-11 battery should be maintained at 1/2 inch above the separators. Never fill above this level Add distilled water to the Willard AW-12-25 battery as required During filling, firmly depress the circle marked above each cell on the vent manifold. Fill each cell to the top of filler well opening, then release finger pressure on vent manifold circle. Liquid will drop to the correct level above plates.

NOTE

Do not overfill When the battery cells are overfilled water and acid will spill on the lower skins of the fuselage.

28 VOLT SYSTEM (24 Volt Battery) (D-10097 D-10120 and after)

On serials D 10097, D-10120 and after, a 24 volt; 110 ampere hour Teledyne battery is provided to operate the electrical system The battery is located on the right side of the engine compartment just forward of the firewall. The battery is accessible for servicing by raising the right engine cowl door and removing the battery box cover

The battery should be maintained in a fully charged state at all times and the electrolyte level checked at regular intervals. Never add anything but distilled water when adjusting the electrolyte level in the battery. If electrolyte is added each time the level in the battery is low, a high concentration of sulfuric acid may cause dissolution of the plates. Under high temperature conditions, this may be indicated by the presence of black particles in the electrolyte of the affected cells.

NOTE

Do not fill the battery over 3/8 inch above the seperators. Only lead-acid equipment should be used when servicing lead-acid type batteries. Do not use tools that are used on nickle-cadmium batteries.

NOTE

Do not overfill the battery When the battery cells are overfilled, water and acid will spill on the lower portions of the engine accessory section and lower fuselage Neutralize the acid in any such spillage immediately with a water solution of sodium bicarbonate (baking soda)

BATTERY CHARGING

The battery should be charged at a rate that will not produce gassing or bubbling of the electrolyte Monitor battery temperature during the charging cycle to ensure that cell temperature does not exceed 115°F. If the temperature reaches this limit, the rate of charge should be reduced. The manufacturer recommends charging the battery at a rate of 2 amperes until four consecutive hourly readings show no rise in specific gravity and voltage for each cell Refer to the Service Manual (P/N GSM-1277) for additional information on the charging procedure recommended by the battery manufacturer (Teledyne Battery Products).

BATTERY MAINTENANCE PROGRAM

A systematic battery maintenance program should be established and carefully followed

a The battery should be removed from the airplane for service.

b A log of the services performed on the battery should be maintained

c. The battery should be removed from the airplane and serviced after 100 flight hours or 30 days, whichever occurs first. If the ambient temperatures are above 90°F or the time between engine starts averages less than 30 minutes, the time between servicing should be reduced. During periods when the ambient temperature is below 32°F, the battery should be in a fully charged state to prevent freezing. When water is added, the battery should be charged sufficiently to thoroughly mix the water with the electrolyte.

d The log of battery service performed should be evaluated to determine the need to service the battery at the above recommended intervals or to extend the intervals if justified Accurate water consumption data is a valid barometer to use for adjustment of the servicing intervals

CAUTION

Excessive spewage may result if the cell vents are not kept clean and open

CLEANING WINDSHIELD AND WINDOWS

A plexiglass material is used for the windshield and windows Extreme care should be taken in cleaning, as the slightest abrasives will scratch the surface. Never wipe the windows or windshield when dry First flush the surface with clean water or a mild soap solution, then rub it lightly with a grit-free soft cloth, sponge, or chamois. To remove marks or a light oil and grease film, the use of trisodium phosphate, completely dissolved in water, is recommended Stubborn grease and oil deposits are quickly cleaned with hexane, aliphatic naphtha, or methonal Rinse with clean water Avoid prolonged rubbing.

After the windshield and windows are dry and free of dirt, wax them with a good grade of commercial wax to prevent scratching and cracking Apply the wax in a thin, even coat and bring to a high polish with a clean, soft cloth.

NOTE

Do not use gasoline, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, de-icing fluid, or lacquer thinners on windshield or windows as they have a tendency to soften and craze the surface

RUBBER SEALS

Deterioration and/or sticking of rubber seals around doors, windows and cowlings may be prevented by coating them with Oakite 6 compound, (product of Oakite Products Inc., 19 Rector St., New York 6, New York) No special care is required when applying the compound to keep it from coming in contact with any painted surfaces. The compound is no-injurious to paint and may be removed by employing normal cleaning methods

INTERIOR CLEANING (CABIN TRIM) (Serials D-9587 thru D-9618)

Proper care and cleaning of the interior cabin trim (Rosyl plastics) is of primary importance to maintain a desirable appearance. Washing the interior cabin trim with a detergent soap, water, and a soft bristle brush will dislodge most dirt Rinse with clean water and wipe dry. Alcohol may be used to remove foreign material that is alcohol soluble

CAUTION

The interior cabin trim can be easily contaminated if cleaned with methyl ethyl ketone, naptha, Mufti standard solvent, gasoline, lacquer thinner and other types of thinners Sharp edges or cuts on the edge of the interior cabin trim material may cause it to crack.

EXTERIOR CLEANING

Prior to cleaning the exterior, cover the wheels, making certain the brake discs are covered; attach pitot cover securely; install plugs in or mask off, all other openings Be particularly careful to mask off both static air buttons before washing or waxing

NOTE

Commerical bug removing compounds can be injurious to paints Proceed with caution when using these compounds until they are proven to be satisfactory.

A clean white cloth, saturated with naphtha, may be used to remove accumulations of oil and grease. A Lux or Ivory soap solution or an equivalent (detergent or harsh soaps are not recommended) may be used to remove dirt and dried insects. Apply the soap solution with a cellulose sponge using a gentle circular motion Flush the surface with plenty of cool water to remove all traces of soap and dry with a chamois to prevent water marks. After washing with a soap solution, cleaning with naphtha or with bug removing compound it is imperative the wax be replaced for proper paint finish maintenance.

A thorough waxing with a good automotive wax, recommended for painted surfaces, will protect the paint finish. Wax application procedures are important and will vary in accordance with the type being used. For best results follow the wax manufacturers specifications.

CAUTION

At the time of delivery, painted surfaces should not be polished or waxed until the finish has cured for a minimum of 60 days. Hard rubbing, abrasive cleaners and wax seals detrimental to the proper curing of the finish should not be used.

Airplanes with aluminum skin surfaces may be polished to a high gloss with any warranted aluminum polish. Soft clean cloths or a chamois should be used to prevent scratching the aluminum when cleaning and polishing.

ENGINE CLEANING

The engine may be cleaned with kerosene, Stoddard solvent, or any standard solvent recommended for cleaning engines. The cleaner may be sprayed or brushed on the engine. Wipe the engine dry; compressed air may be used to remove excessive oil.

PROPELLER BLADE MAINTENANCE

Due to the high stresses to which propeller blades are subjected, their careful maintenance is vitally important, particularly on the leading edge of each blade from the tip inboard to just beyond the 33-inch station. All nicks and scratches must be repaired before the airplane is flown. Nicks and scratches set up concentrations of stress which can exceed the strength of the blade material; the result will be a crack and premature failure of the blade. The method and limits for this type of repair, as outlined in the applicable Propeller Handbook, should be followed carefully.

NOTE

No blade cut-off repair can be made to the 82" propeller blades used on the N35 and P35 Bonanza.

SERVICING THE OXYGEN SYSTEM (OPTIONAL)

In general, the oxygen system on the Bonanzas may be serviced in accordance with FAA AC43.13-1A AIRCRAFT INSPECTION AND REPAIR.

WARNING

Keep fire and sparks away and never smoke in the proximity of oxygen. Tools, equipment and hands must also be kept clean when servicing the oxygen system, since deposits of oil or other hydrocarbons are highly flammable when exposed to high concentrations of oxygen. Furthermore, the presence of other foreign particles in the oxygen lines may result in leaks that will both exhaust the oxygen supply and present a fire hazard. As an additional safety precaution, use only the anti-seize compounds and leak-testing soaps recommended for breathing oxygen systems.

a. On earlier model Bonanzas check cylinder pressure by slowly opening the shutoff valve on the oxygen console just forward and to the left of the pilots seat. On Bonanzas D-7889 and after cylinder pressure is connected directly to the pressure gage on the console.

CAUTION

Always open the shutoff valve slowly to prevent damage to the system.

b. Remove the access panel from the center of the partition located directly beneath the forward side of the pilot's and copilot's seats, then close the shutoff valves on both the cylinder and console.

c. Slide the pilot's seat slightly to the rear until the recharge outlet of the filler valve is clear, then remove the cap from the recharge outlet and connect the supply cylinder to the filler neck.

d. Open the cylinder shutoff valve and slowly fill the system to 1800 ± 50 psi at a temperature of 70°F. This pressure may be increased an additional 3.5 psi for each degree of increase in temperature; similarly for each degree of drop in temperature, reduce the pressure for the cylinder by 3.5 psi.

e. Close the shutoff valve, disconnect the supply cylinder, replace the filler valve cap, and slide the seat forward to its normal position.

f. Slowly open the shutoff valve on the cylinder, leaving the console valve shut off until the system is to be used.

NOTE

A 50 to 70 cc bleed flow is normal at the pressure control assembly (bleed valve). This bleed flow will continue after shutting the regulator off until control chamber pressure equalizes with ambient pressure.

OXYGEN CYLINDER RETESTING

Oxygen cylinders used in the airplane are of two types, light weight cylinders and regular weight cylinders; light weight cylinders, stamped "3 HT" on a plate on the side of the cylinder, must be hydrostatically tested every three years and the test date stamped on the cylinder. This cylinder has a service life of 4,380 pressurizations or fifteen years, whichever occurs first, and then must be discarded. Regular weight cylinders, stamped "3A" or "3AA", must be hydrostatically tested every five years and stamped with the retest date. Service life of these cylinders is not limited.

AIR CONDITIONING SYSTEM
(D-9787, D-9806 and after)

Servicing the air conditioning system consists of periodically checking the refigerant level, checking compressor oil level, checking the compressor belt tension, and changing the system air filter. Recharge the system as outlined under CHARGING THE AIR CONDITIONING SYSTEM whenever the refrigerant level is low, air has entered the system, or components carrying refrigerant are replaced. Refrigerant leaks may be detected by inspection with a flameless leak detector.

CHARGING THE AIR CONDITIONING SYSTEM

WARNING

A face shield should be worn when servicing the lines; refrigerant, coming in contact with the eyes, may cause loss of sight.

When working on a refrigerant air cooling system, observe the following special servicing precautions.

a. Remember, this is a high pressure system. When disconnecting a line, loosen the fittings just enough to bleed off pressure slowly, then disconnect the fitting.
b. Whenever a line is disconnected, purge the entire system with a vacuum pump operating at the 125 micron level.
c. Use only refrigerant R-12, other refrigerants, particularly those containing methyl chloride, will cause rapid deterioration of the aluminum compressor components.
d. When servicing the system with refrigerant, avoid smoking or working near an open flame. Refrigerant passing over an open flame will produce a highly toxic phosgene gas.
e. Hook the service unit to the connections located under the copilot's seat. When charging a completely purged system, charge with 2 pounds of refrigerant. After charging, the sight glass should be observed for bubbles or a milky appearance caused by an insufficient refrigerant level. If it is necessary to add refrigerant to a partially charged system, add refrigerant slowly until a satisfactory condition is observed throught the sight glass.

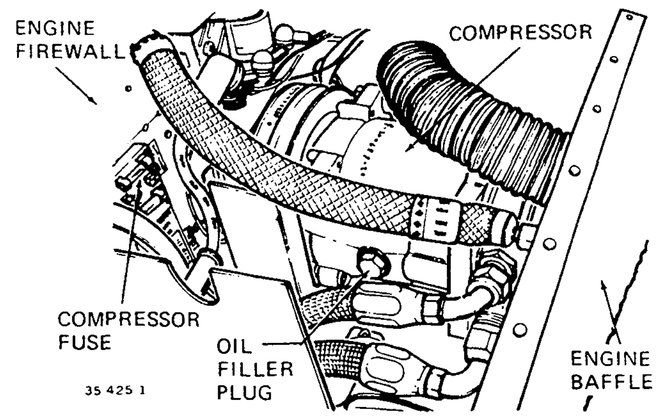


Figure 2-9. Servicing Compressor

CHECKING COMPRESSOR OIL LEVEL

The air conditioner compressor oil level should be checked by a qualified air conditioner service man if the refrigerant charge is lost (evidenced by oil loss). The air conditioner system requires 12-14 ounces of 500 viscosity oil (Texaco Capella E or equivelant) to maintain 4 ounces in the compressor.

Check the compressor oil level as follows:

a. Fabricate a dipstick by bending a wire to a 90° angle so that 1-1/2 inches of the wire will insert into the compressor.
b. Paint the dipstick with a flat black paint. Allow sufficient time for paint to dry.
c. Start engine in accordance with the applicable Pilot's Operating Manual and run the air conditioner. Run air conditioning system for 15 minutes with the engine running at low rpm to allow oil to accumulate in the compressor. Observe engine operating limitations as noted in the applicable Pilot's Operating Manual. Shut down engine in accordance with the applicable Pilot's Operating Manual.
d. Relieve the air conditioner system pressure by loosening the compressor filler plug just enough to bleed off system slowly.
e. After the system pressure is relieved, remove the oil filler plug.
f. Insert dipstick through oil filler port, slowly rotate clutch shaft until the dipstick will insert to the bottom of the compressor.
g. Withdraw dipstick, oil should register on the dipstick 5/8 inch below filler port. Add oil as necessary to obtain this measurement.
h. Install oil filler plug with O-ring and secure plug.

NOTE

Make sure that the O-ring is not twisted and that no dirt or particles are on the O-ring or seat. The plug should be snug. Do not over-tighten plug.

i. Charge the air conditioning system as noted in CHARGING THE AIR CONDITIONING SYSTEM.

j. Check area around filler plug for leaks. If leaks exist, do not over-tighten filler plug, remove plug as noted in steps "c" and "d" and install a new O-ring. Secure plug and recharge system as noted in steps "h" and "i".

COMPRESSOR BELT TENSION ADJUSTMENT

After 36 to 48 hours operating time, a new belt will stretch to its normal operating length. The belt tension should be checked at this time and adjusted (by torquing the adjustment bolt on the idler pulley bracket) so that a belt tension gage, placed at a point midway between the idler pulley and the compressor will register a belt tension of 70 pounds or a 0.13 inch deflection with 6.38 pounds load. After adjusting the belt tension, be sure the belt has ample clearance on all sides.

STATIC GROUND CABLE AND ADJUSTMENT (D-1 through D-9293)

The static ground cable attached to the nose gear is designed to discharge static electricity on touch-down and need not make contact with the runway as the charge will arc from the cable. The cable should not drag on the runway while taxiing as this may create considerable radio interference and lead to rapid wear of the ground cable.

The following adjustment to the static ground cable is recommended:

a. Inflate tires to correct air pressure (see Section 2, SERVICING TIRES).

b. Adjust the tip of the cable to provide 5.75 ± .12 inches of free cable between the attaching bolt and the bottom of the cable. The cable should then be between 1/4 to 1/2 inch from the ground.

WARNING

Do not wrap or tie the static ground cable to the mud scraper, landing gear fork, axle or any other part of the landing gear. Interference between structure and wheel well may develop.

INTERIOR PAINTS

35	A35	B35	C35	D35	E35	F35	G35	COLOR	PAINT NUMBER	H35	J35	K35	M35	N35	P35	S35	V35 V35TC V35A V35A-TC	V35B V35B-TC
			X					Beige	11472									
			X					Beige	10YR5/1.5									
								Beige, Arctic	118684-235									X
								Beige, Desert	27H23292							X	X	
							X	Beige, Seminole	246-55762	X	X	X	X	X	X			
								Beige, Sun	118684-285								X	
								Black, Glossy	ANA Color 515					X				
						X	X	Black, Instrument	ANA Color 514	X	X	X	X	X	X	X	X	X
								Black	118684-133									X
								Black	42G-514									X
						X		Blue	246-23714									
								Blue	118684-471									X
								Blue, Antique	118684-494									X
								Blue, Banff	118684-241								X	
								Blue, Broadway	118684-283								X	
								Blue, Chairman	118684-483									X
								Blue, Colonial	246-57300		X	X	X	X	X			
							X	Blue, Glacier	246-57286	X								
								Blue, Gulf	118684-429									X
X	X	X	X					Brown	7.5YR3.5/2									
				X				Brown	6YR2/2									
			X					Brown	J-272-X-10758									
								Brown, Executive	118684-487									X
								Brown, Sable	118684-257								X	X
								Driftwood	27H23294							X		
								New Bronze	118684-475									X
								Rawhide	118684-495									X
								Sandusky	118684-237								X	X
						X		Tan	246-11472									
								Tan, Castle	118684-61									X
								Walnut	118684-493									X

NOTE

Ascertain that all placards are in place and legible whenever the airplane has been repainted or touched up after repair. Replace any placards that have been inadvertently defaced after such repair.

INTERIOR PAINTS

35	A35	B35	C35	D35	E35	F35	G35	COLOR	PAINT NUMBER	H35	J35	K35	M35	N35	P35	S35	V35 V35TC V35A V35A-TC	V35B V35B-TC
						X		Gray	246-35924									
					X			Gray	258-11604									
				X				Gray	5GY1/1									
						X		Gray	246-38141									
								Gray, Anchor	246-57298						X			
							X	Gray, Mackinaw	246-57716									
					X	X		Gray, Opal	246-35924									
							X	Gray, Saxon	52-13823	X	X	X						
								Gray, Silver	118684-457									X
								Smoke, Autumn	118684-155								X	X
								Smoke, Autumn	118684-255 (Vinyl)									X
						X		Green	246-38249									
								Green	118684-461									X
							X	Green, Lakewood	246-55911	X	X	X	X	X	X			
								Green, Mist	118684-277									X
								Olive	118684-485									X
								Red, Antique	118684-491									X
								Red, Chairman	118684-481									X
								Red, Torch	118684-329								X	X
								Gold, Chairman	118684-479									X
								Gold, Maize	118684-455									X
								Pumpkin	118684-279								X	X
								Sienna	118684-327								X	
								Turquoise	118684-275								X	X
								Nairobi Peal	27H19251					X	X			
								Parchment	118684-489									X
								White	118684-217									X
								Baking Enamel										
								Black	94-515									X
								Red, Insignia	94-509									X

V35 V35TC V35A V35A-TC	S35	P35	VINYL ACRYLIC	COLOR	ENAMEL	URETHANE	35	A35	B35	C35	D35	E35	F35	G35	H35	J35	K35	M35	N35	P35	S35	V35 V35-TC V35A V35A-TC	V35B V35B-TC
X	X	X	118684-151	Black	118684-33	118684-319																	X
				Black, Ebony	118684-11					X	X	X	X	X	X	X	X	X	X	X	X	X	
				Beechwood	118684-345	118684-419																	X
				Blue	83-2063						X												
				Blue	83-5370				X														
				Blue	83-57634								X										
				Blue	83-57656H								X										
				Blue, Aquatone	83-58360									X									
				Blue, Astro	118684-361																		X
				Blue, Bahama	118684-351	118684-395																	X
				Blue, Bedford	83-59233										X								
X	X	X	118684-149	Blue, Blueberry	118684-5					X	X	X	X	X	X	X	X	X	X	X	X	X	X
				Blue, Bristol	118684-503	118684-527																	X
				Blue, Capri	118684-265																		X
				Blue, Crater	118684-505	118684-529																	X
				Blue, Martin	118684-349	118684-393																	X
X	X	X	118684-163	Blue, Morning Glory	118684-3						X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	118684-143	Blue, Pacific	118684-1											X	X	X	X	X	X	X	X
				Blue, Pavonne	118684-353	118684-397																	X
				Blue, Terrace	118684-335																		X
				Brown	83-1017						X	X											
X	X	X	118684-141	Brown, Beaver	118684-21									X	X	X	X	X	X	X	X	X	
X	X	X	118684-225	Brown, Sable	118684-223	118684-320																	X
				Coppertone	83-58454										X	X							
				Tan	83-11256								X										
X	X	X	118684-139	Tan, Castle	118684-19	118684-312											X	X	X	X	X	X	X
				Tan, Sahara	118684-337	118684-411																	X
				Beige, Prairie	118684-339																		X
				Gray	83-8076						X												
				Gray, Gamma	118684-497	118684-521																	X
				Gray, Kingston	118684-299																		X
				Green	118684-43						X	X	X										
				Green	83-31659					X	X												
				Green	83-4039						X												
				Green	83-57688H								X										
				Green	83-51598				X														
				Green	83-9999						X	X	X										
				Green, Citrus	118684-515	118684-539																	X
				Green, Jade Mist	118684-359	118684-403																	X
				Green, Mint	83-59805										X								
				Green, Olive	118684-517	118684-541																	X

NOTE

Ascertain that all placards are in place and legible whenever the airplane has been repainted or touched up after repair. Replace any placards that have been inadvertently defaced after such repair.

NOTE

Precut stripe, numeral, and letter patterns are available through Mid-America Marking, Inc., 1720 South 151 Street West, Route 1, Goddard, Ks. 67052

EXTERIOR PAINTS

V35 V35TC V35A V35A-TC	S35	P35	VINYL ACRYLIC	COLOR	ENAMEL	URETHANE	35	A35	B35	C35	D35	E35	F35	G35	H35	J35	K35	M35	N35	P35	S35	V35 V35-TC V35A V35-TC	V35B V35B-TC
				Green, Sea Sprite	83-58374									X									
X	X	X	118684-167	Green, Shamrock	118684-9	118684-307								X	X	X	X	X	X	X	X	X	X
X	X	X	118684-165	Green, Surf	118684-7											X	X	X	X	X	X	X	X
				Coral	83-58557										X	X							
				Coral, Bittersweet	83-57316									X									
X	X	X	118684-179	Flamingo	118684-23												X	X	X	X			
				Orange, Calypso	118684-509	118684-533																	X
				Orange, Mandarin	118684-513	118684-537																	X
				Orange, Omaha	118684-273																X	X	X
				Red	83-2622		X	X					X										
				Red	83-51078					X	X												
X	X	X	118684-137	Red, Cadmium																			
X	X	X	118684-177	Red, Chianti	118684-29				X		X	X	X	X	X	X							X
				Red, Embassy	118684-347																		X
X	X	X	118684-173	Red, Huntsman	118684-25												X	X	X	X	X	X	X
				Red, Matador	118684-355																		X
				Red, Really	118684-499	118684-523																	X
X	X	X	118684-175	Red, Toreador	118684-27	118684-316					X	X	X	X	X	X	X	X	X	X	X	X	X
				Red, Vendetta	118684-501	118684-525																	X
X	X	X	118684-135	Turquoise	118684-11										X	X	X	X	X	X	X	X	X
				Turquoise, Peacock	118684-333	118684-407																	X
				Cream	83-39829					X	X	X											
X	X	X	118684-153	White, Matterhorn	118684-31	118684-318				X	X	X	X	X	X	X	X	X	X	X	X	X	X
				*White, Matterhorn																			X
				Gold, Antique	118684-341	118684-415																	X
				Gold, Bright	118684-507	118684-531																	X
				Gold, Champagne	118684-39	118684-323																	X
X	X	X	118684-229	Gold, Jubilee	118684-221																		X
				Gold, Mesa	118684-511	118684-535																	X
				Gold, Metalic	118684-271																		X
X	X	X	118684-171	Gold, Saturn	118684-17																X	X	
X	X	X	118684-145	San Mateo Wheat	118684-13								X	X	X	X	X	X	X	X	X	X	
				Yellow	83-51596						X	X											
				Yellow	83-5271							X											
				Yellow	83-5248					X	X												
				Yellow, Lemon	118684-15										X	X	X	X	X	X	X	X	X
				Yellow, Jacket	118684-519	118684-543																	X
				Yellow, Sunburst	118684-357																		X
X	X	X	118684-147	Yellow, Sunshine	83-24567								X	X									

* Epoxy - 118684-217

INSTRUMENT WEDGE LIGHTING (Serials D-9069 and after)

Internal lighting of the instruments provides additional illumination across each instrument. A light tray mounted on the top side of the bezel of each instrument holds two bulbs wired in parallel. If the light bulbs are damaged or burn out the light tray with bulbs must be replaced.

LIGHT TRAY REMOVAL

a. Remove the screws that secure the instrument panel in place and tilt the instrument panel aft to gain access to the instruments.

NOTE

Instruments located at the lower edge of the panel may be removed if necessary, to gain access to the light tray at the top of the instruments.

b. Remove the two screws that attach the light tray to the instrument bezel.

LIGHT TRAY INSTALLATION

a Install the new light tray and secure in place with the two attaching screws.
b Install the instrument in the instrument panel if removed and secure in place with the attaching screws.
c. Secure the instrument panel in place.

LIGHT BULB REPLACEMENT GUIDE (28 volt system) (D-10097, D-10120 and after)

LOCATION	*BULB NUMBER*
Alternator Out Light	327
Cabin Overhead Light	1864
Clock Light	267
Compass Light	327
Condenser Door Open Light	327
Courtesy Light	1864
Flight Compartment Flood Lights	313
Fuel Select Light	327
Instrument Post Lights	327
Instrument Wedge Lights	267
Landing Gear Intransit Light	327
Landing Gear Uplock Light	327
Landing Light	4596
Light Tray Assembly	267
Map Light	1495
Navigation Light (Tail)	A7512-24
OAT Light	327
Reading Light	303
Rotating Beacon (Lower)	D7080A5-24
Rotating Beacon (Upper)	D7080A1-24
Subpanel Post Lights	327
Strobe Light (Tail)	30-0815-1
Strobe Light (Wing)	30-1467-1
Tail Light	4596

SECTION 3

System Description and Maintenance

SECTION III

SYSTEMS DESCRIPTION AND MAINTENANCE

Since it is intended for use as a day-to-day reference, this section has been arranged to provide as far as possible "at-a-glance" information on the location, adjustments and rigging of the components in the various systems.

Each system is pictured in an illustration showing the location of the various components in the airplane and their interconnecting cables, wiring or tubing. Detail illustrations on the basic drawing, either photographs or line drawings, show the exact locations of the components and their adjustment or other maintenance procedures; where-ever practical, cable tensions, pressures, measurements, clearances and the like are tabulated directly on the illustration or shown on the details.

Detailed explanations of procedures have been limited to those instances, such as rigging the landing gear, where the proper sequence of actions is important and its illustration is impractical. Procedures for major disassembly and overhaul of various units are contained in other sections of the Shop Manual; this section has been confined deliberately to day-to-day maintenance information.

FLIGHT CONTROLS.

CONTROL SYSTEM INSPECTION.

Inspect the control system regularly for cleanliness, proper rigging and lubrication. Inspect for the following conditions and correct as necessary.

If the system seems sluggish and sticky look for:
1. Frozen pulleys.
2. Excessive tension on the control cables.
3. Control surface hinge bearings frozen.
4. Control column rollers frozen, flattened or sticking.
5. Cables riding the sides of the pulley grooves.
6. Differential mechanism binding or not properly lubricated.
7. Push-pull rod bent or rod end bearing frozen.
8. Bolts throughout the system over-tightened.

If the system does not tend to neutralize itself look for:
1. Weak bungee springs.
2. Control surfaces not in balance.
3. Improperly rigged cables.

SINGLE CONTROL COLUMN
(Figure 3-0)

CONTROL COLUMN ARM REMOVAL

a. Remove the two screws that secure the retainer collar assembly to the control column housing.
b. Disconnect any electrical wiring.
c. Rotate control column arm over to a near vertical position and slide the control column off of the housing.

RIGGING THE CONTROL COLUMN CHAIN

a. With the control wheel in the neutral position, the yellow marks on the sprockets must align with the yellow marks on the chain.
b. The slot in the sprocket as shown in Figure 3-0 must be in alignment with the yellow marks.
c. To tighten the chain, remove the safety wire from the turnbuckles and adjust as necessary. Check for freedom of movement.
d. After proper adjustment of chain, reinstall new safety wire.

CONTROL COLUMN ARM INSTALLATION

a. Slide the control column on the control column housing.
b. Install the chrome collar and attach with the two screws.
c. Attach all electrical wires.

AILERON RIGGING PROCEDURE
(SERIALS D-1 THROUGH D-1500).

1. Secure the control column wheel in neutral by using the control surface lock. Rig the quadrant just forward of the rear truss by adjusting the cables simultaneously to pounds tension shown on applicable temperature tension graph.
2. Check the quadrant for neutral position by scaling the dimension between the point of attachment of the stop bolt on the quadrant to the stop on the vertical member of the rear truss. Maintain an equal dimension between the two stops and correct cable tension.
3. Adjust the wing aileron cables to pounds tension shown on the applicable temperature tension graph. The turnbuckles are accessible from the wheel wells. Maintain neutral position of the ailerons.
4. Remove the control surface lock and set the aileron travel by adjusting the stops at the aileron quadrant.
5. Actuate the control wheel several times. Recheck the cable tension and aileron travel.
6. Safety all turnbuckles.

WARNING

Check for correct direction of aileron travel by moving the control wheel. When the control wheel is turned to the left, the left aileron should move up, and the right aileron should move down. When the control wheel is turned to the right, the right aileron should move up, and the left aileron should move down.

AILERON RIGGING PROCEDURE
(SERIALS D-1501 AND AFTER).

NOTE

Production models serials D-1501 through serials D-2269 used music wire in lieu of flexible cables in the wings and eliminated the aileron control quadrant. Beginning with approximately serial D-2270 flexible cables are again used in the wings. The stops which limit the aileron travel are located at the aileron bellcrank in each wing and the aileron cable turnbuckles are accessible in the fuselage just forward of rear truss. On many airplanes, the music wire has been replaced with cables; on these airplanes, the system is identical to the later style.

1. Place the rudder pedals in neutral position and install an aligning pin in the pedals to prevent nose wheel drag through the interconnect springs from affecting the rigging. Operate the aileron control system through full travel and inspect the bellcrank in each wing for sufficient clearance from the wing ribs. Make this check also after rigging and adjust as necessary.
2. Adjust the aileron down stops in the wing so the bellcrank just clears the gusset on the wing rib. Set aileron up stop in the wing so that the aileron bellcrank just misses the aileron push rod.
3. Adjust link connecting aileron to bellcrank to allow each stop bolt to contact its individual stop.
4. Connect the cable from the wings to the control column cables. The turnbuckles are located just forward of the rear truss.
5. Secure the control column wheel in neutral with the control surface lock. Adjust cable tension as shown on the applicable temperature tension graph. Take cable reading on the cable at the rear truss where it attaches to the wing cables.
6. Remove the control surface lock and with the control wheel, feel the contact of the stops in both wings in relationship to the contact of the stops in the control column. The bellcrank in the wing should contact its

Manual Affected: BEECHCRAFT Bonanza Shop Manual (35-590096B)

Instructions: Insert this page facing page 3-2 (dated December, 1969) of Section 3.

Reason: Revise text under CONTROL COLUMN ARM REMOVAL and CONTROL COLUMN ARM INSTALLATION.

CONTROL COLUMN ARM REMOVAL

a. Remove the four screws that secure the retainer collar assembly to the control column housing.
b. Disconnect any electrical wiring.
c. Remove the aileron trimmer as indicated in AILERON CONTROL TRIMMER.
d. Pull the "T" handle located on the forward side of the control arm.
e. Rotate the control column arm to the nearly vertical position and slide the control column arm off the housing.

CONTROL COLUMN ARM INSTALLATION

a. Position the control arm vertical as shown in Figure 3-0. Make sure that the slot in the lower sprocket is approximately parallel to the sides of the arm and that the turnbuckles between the long and short chains are opposite each other near the access opening.
b. The ailerons MUST be in the neutral position.
c. Pull the "T" handle located on the forward side of the control arm.
d. Slide the control column arm on the control column housing.
e. Connect all electrical wiring.
f. Install the retainer collar and attach it with the four screws.
g. Install the aileron trimmer as indicated in AILERON CONTROL TRIMMER.
h. Check the control column for full movement and the control surfaces for proper direction of movement.

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stop first, and the travel of the control wheel should be equal in each direction. If there is less travel of the control wheel in one direction, tighten one turnbuckle on the lower cable and loosen the opposite lower cable turnbuckle depending on which the travel is off. Maintain correct cable tension.

7. Secure the control wheel in neutral after correct travel of the wheel is obtained. Adjust the link connecting the aileron to the wing bellcrank to obtain the aileron neutral position. Neutral position of the aileron is determined by aligning the inboard end of the aileron with the outboard end of the flap, the flap being in up position.

8. Remove control surface lock and set aileron travel by adjusting the bellcrank stop bolts in the wing. Be sure each bellcrank contacts its up stop at the same time the bellcrank in the opposite wing contacts the lower stop. Set the stop bolts in the right wing so the bellcrank will contact the stops approximately 1/16 inch ahead of the stops in the control column. Hold the ailerons against the stops in the right wing and adjust the stop bolts in the left wing until they barely touch the stops. Tighten all jam nuts.

9. Set aileron travel according to the table of travel.

10. Re-check cable tension and safety turnbuckles.

WARNING

Check for correct direction of aileron travel by moving the control wheel. When the control wheel is turned to the left, the left aileron should move up, and the right aileron should move down. When the control wheel is turned to the right, the right aileron should move up, and the left aileron should move down.

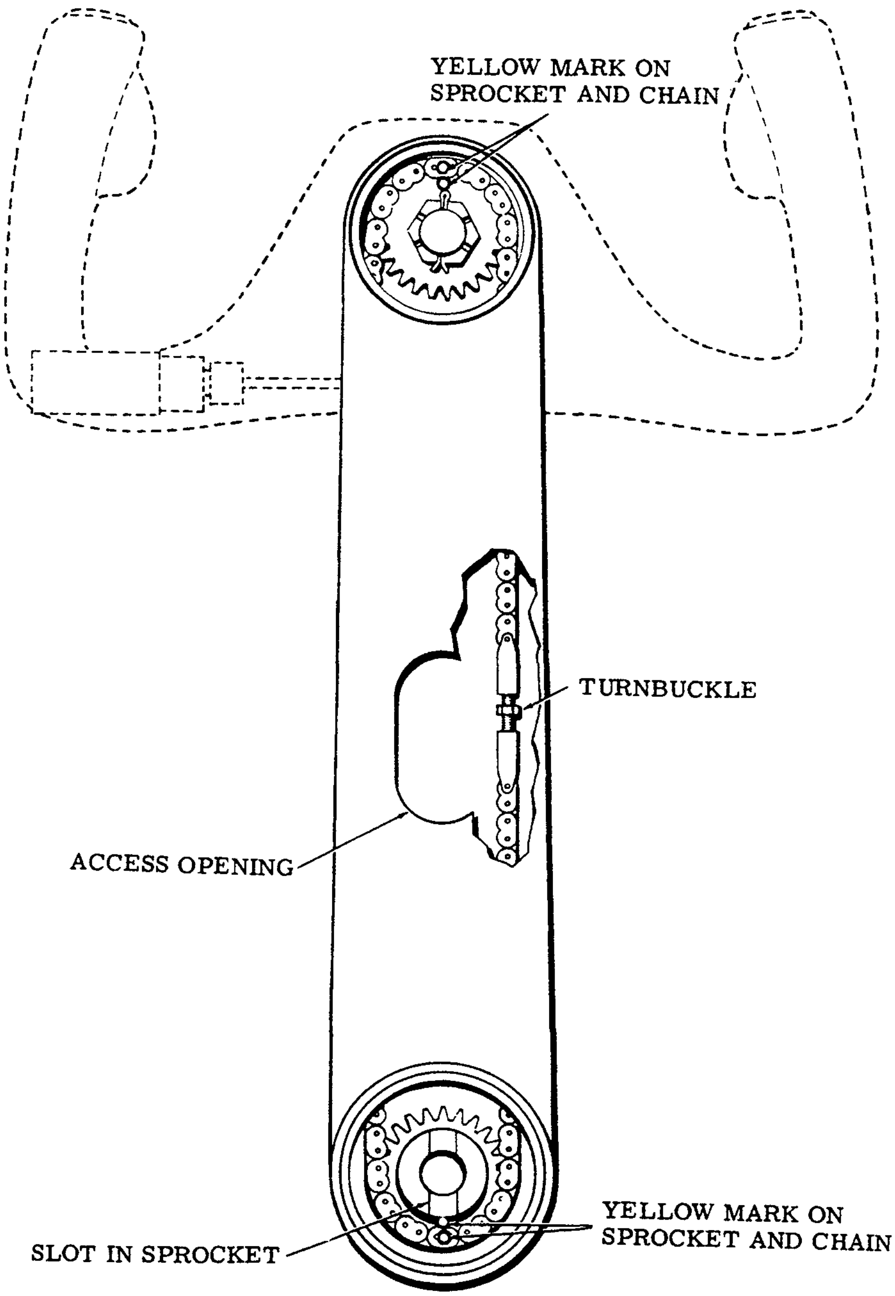
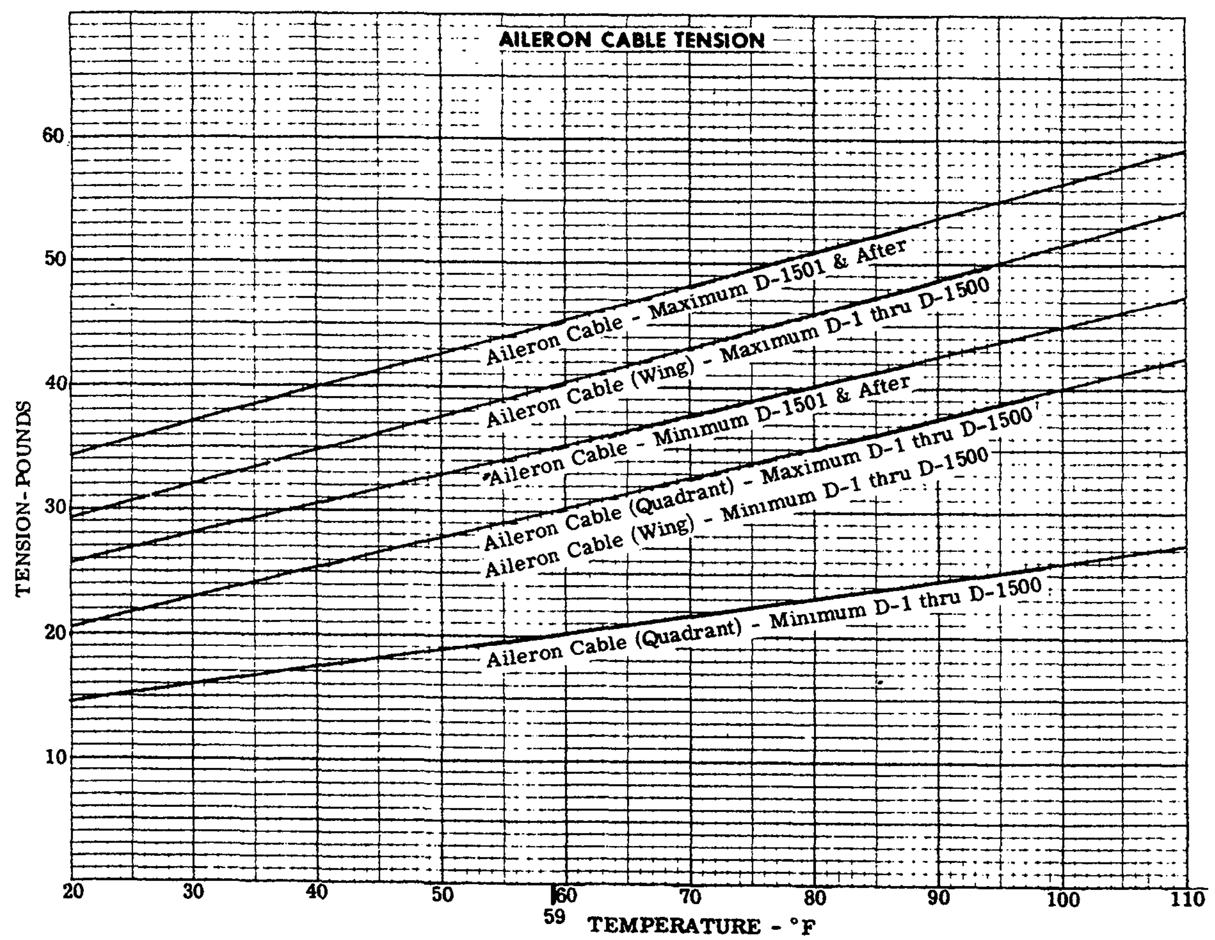


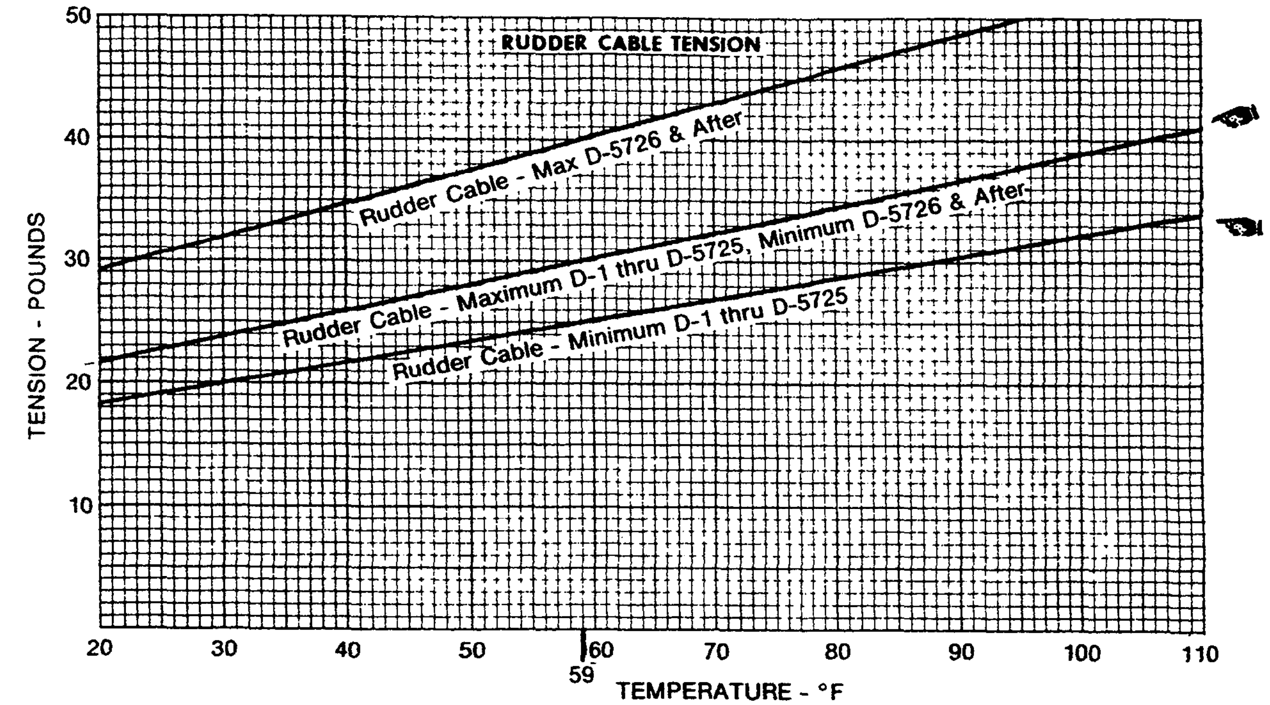
Figure 3-0. Control Column

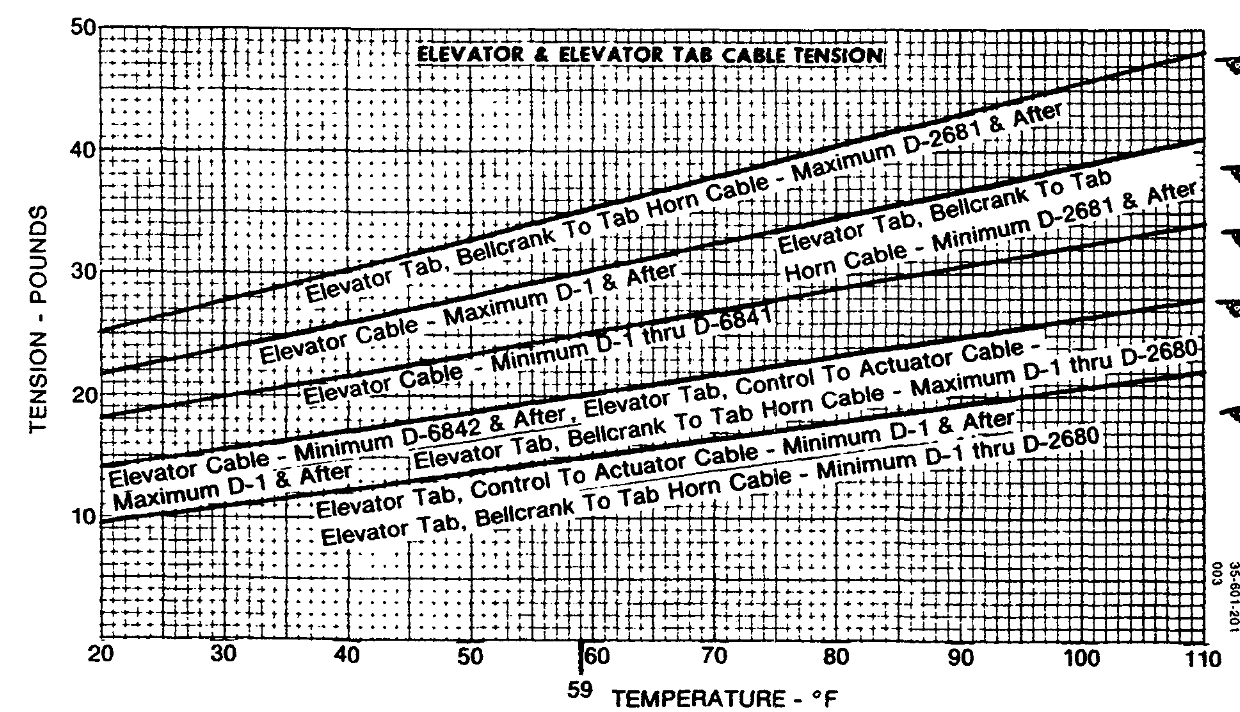
The following graphs specify the correct maximum and minimum cable tension permissable for the individual flight control systems when rigged at temperatures varying from 20°F to 110°F. The horizontal scale on the graph designates the temperature in degrees Fahrenheit at which the control cables may be rigged, and the vertical scale designates the correct tension in pounds for each temperature reading. Cable tensions are based on 59° F Ambient Air Temperature.

NOTE

RIG CABLES TO LOWEST PERMISSABLE TENSION WHEN THE BEECHCRAFT NEW-MATIC FLIGHT CONTROL IS INSTALLED.







Temperature Effect On Cable Tension
Figure 3-1

AILERON CONTROL SYSTEM

AILERON TRAVEL

SERIAL	UP TRAVEL	DOWN TRAVEL
ALL MODELS	20° ±2°	20° ±2°

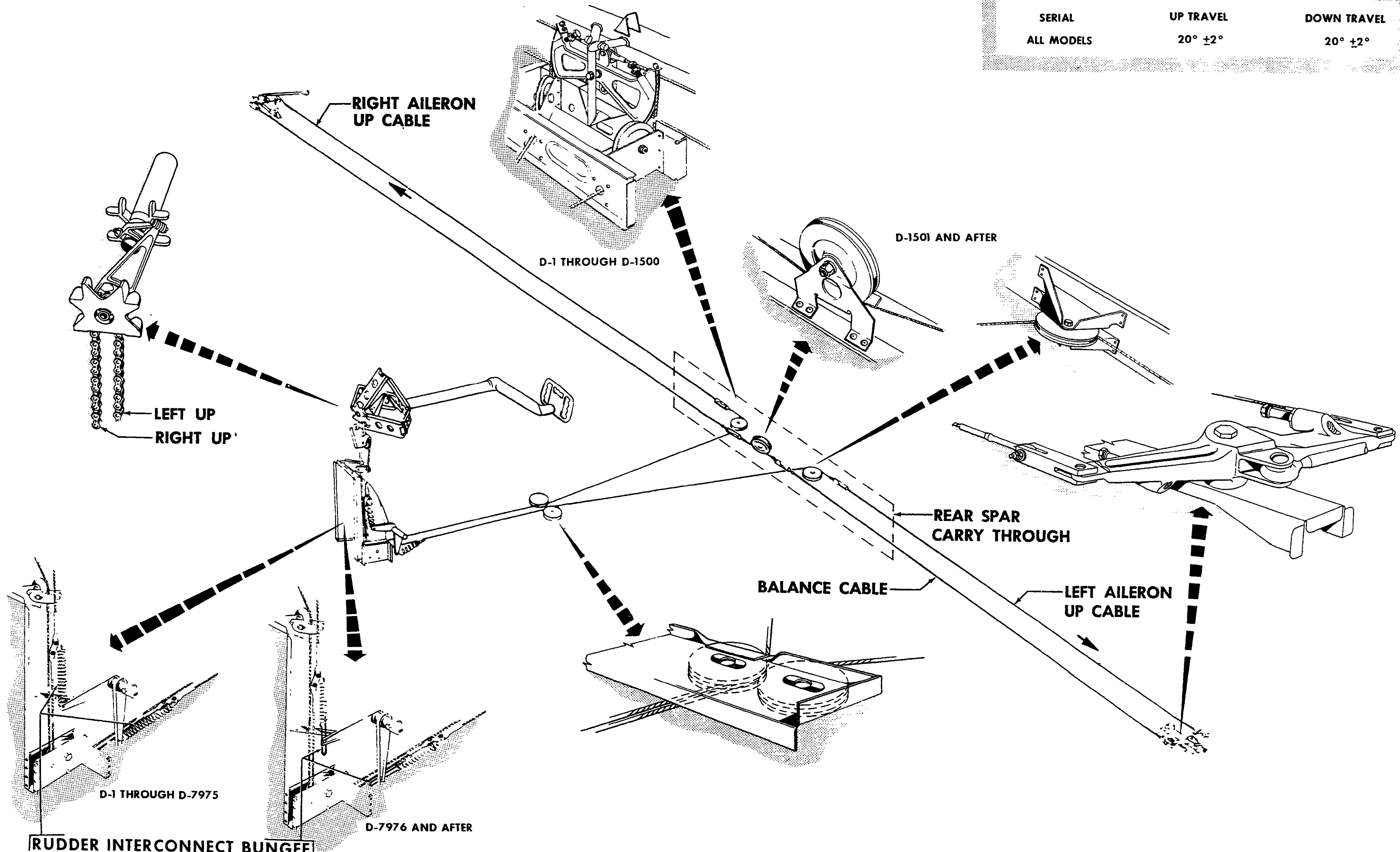


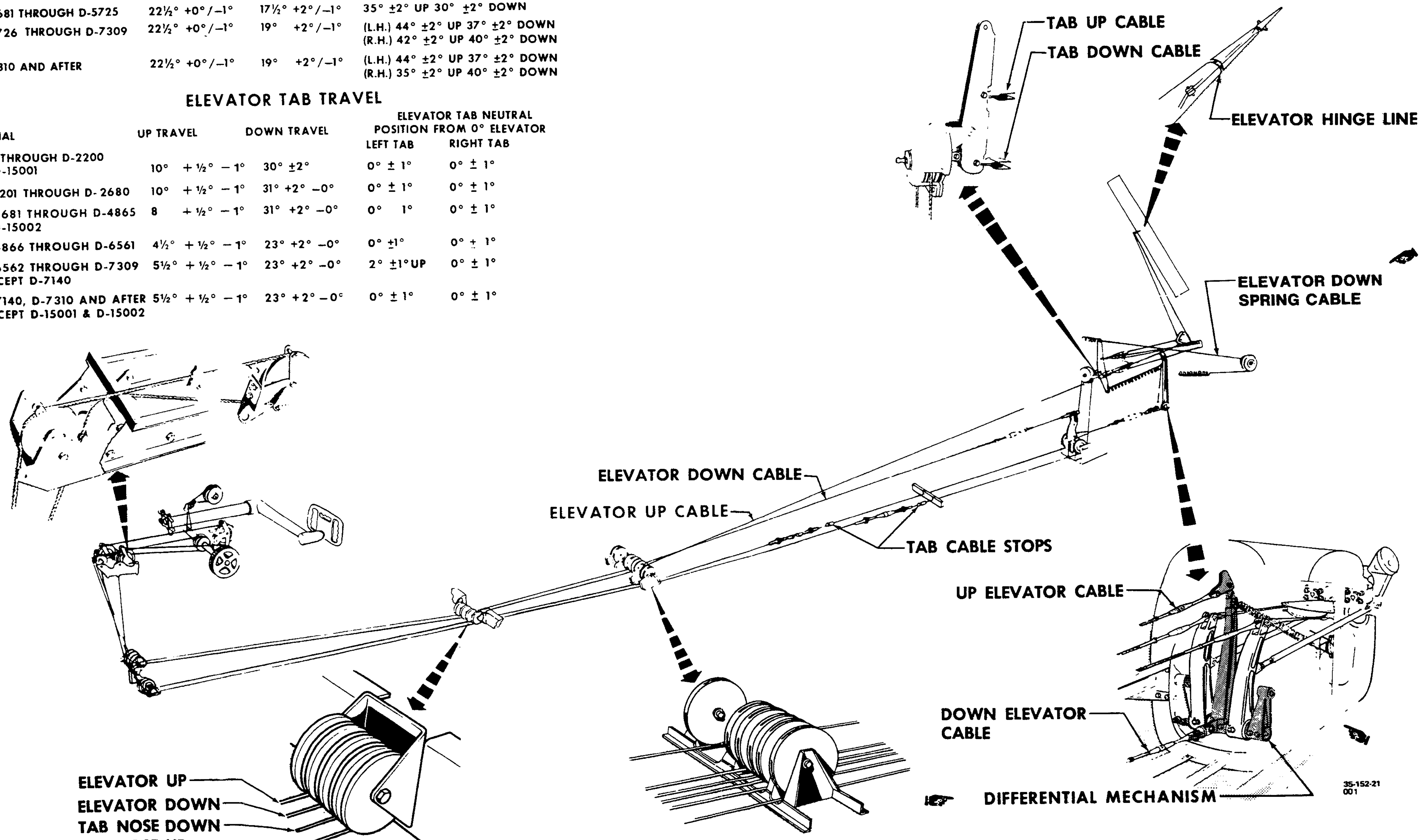
Figure 3-1A. Aileron Control System

ELEVATOR TRAVEL

SERIAL	UP TRAVEL	DOWN TRAVEL	OVER-ALL TRAVEL (COMBINED ELEVATOR AND RUDDER)
D-1 THROUGH D-2680	20° ±1°	20° ±1°	35° ±2° UP 35° ±2° DOWN
D-2681 THROUGH D-5725	22½° +0°/−1°	17½° +2°/−1°	35° ±2° UP 30° ±2° DOWN
D-5726 THROUGH D-7309	22½° +0°/−1°	19° +2°/−1°	(L.H.) 44° ±2° UP 37° ±2° DOWN (R.H.) 42° ±2° UP 40° ±2° DOWN
D-7310 AND AFTER	22½° +0°/−1°	19° +2°/−1°	(L.H.) 44° ±2° UP 37° ±2° DOWN (R.H.) 35° ±2° UP 40° ±2° DOWN

ELEVATOR TAB TRAVEL

SERIAL	UP TRAVEL	DOWN TRAVEL	ELEVATOR TAB NEUTRAL POSITION FROM 0° ELEVATOR LEFT TAB	RIGHT TAB
D-1 THROUGH D-2200 & D-15001	10° + ½° − 1°	30° ±2°	0° ± 1°	0° ± 1°
D-2201 THROUGH D-2680	10° + ½° − 1°	31° +2° −0°	0° ± 1°	0° ± 1°
D-2681 THROUGH D-4865 & D-15002	8 + ½° − 1°	31° +2° −0°	0° 1°	0° ± 1°
D-4866 THROUGH D-6561	4½° + ½° − 1°	23° +2° −0°	0° ±1°	0° ± 1°
D-6562 THROUGH D-7309 EXCEPT D-7140	5½° + ½° − 1°	23° +2° −0°	2° ±1° UP	0° ± 1°
D-7140, D-7310 AND AFTER EXCEPT D-15001 & D-15002	5½° + ½° − 1°	23° +2° −0°	0° ± 1°	0° ± 1°



Elevator Control System
Figure 3-2

AILERON CONTROL TRIMMER

Effective with Serial D-3699 and after, all Bonanza airplanes (except the V35 Bonanza equipped with the optional Stability Augmentation) are equipped with an aileron control trimmer which functions by applying torque to the aileron control tube sprocket to level the wings as needed. The holding pressure exerted by the aileron control trimmer can be easily overridden at the discretion of the pilot. The trimmer does not change the rigging of the system, but should be centered before checking cable tension. To remove, unscrew the two body halves by holding the clutch body housing (outer half) and turning the clutch body nut (inner half) counterclockwise. Separate the two body halves by pulling out on the clutch body housing. Three countersunk screws hold the body of the trimmer to control arm. When reinstalling, carefully insert the shaft through the felt seal into the hub bearing, being careful not to shear the felt seal. Reinstall the three countersunk screws. Screw the two halves of the unit together by holding the clutch body and turning the clutch body nut. Care should be taken to see that the tangs of the drive nut are being tightened by hand. Also note that the position indicator on the face of the unit is right side up as the shaft engages the sprocket. Hand tightening the two halves should be sufficient.

AILERON TABS

The ailerons are equipped with sheet metal tabs which may be adjusted while the airplane is on the ground. The tabs are adjusted by bending them in opposite directions. Bend the tabs only a small amount each time and check the setting by flight test.

NOTE

When bending the tab, use a wood block on each side of the tab. Do not bend the trailing edge of the aileron.

ELEVATOR RIGGING PROCEDURE (SERIALS D-1 THROUGH D-2680)

NOTE

All elevator rigging should be accomplished with a travel board only. A bubble protractor should not be used for any elevator rigging procedure.

a. Adjust the stops on the aft fuselage bulkhead to permit a maximum combined elevator/rudder travel of 35 degrees ±2 degrees up and 35 degrees ±2 degrees down for each elevator surface. (Ref. Figure 3-2 Travel Tables.)

b. Position the control column in the neutral position with 4-1/2 inches between the collar on the instrument panel and the split collar on the control column. This can be accomplished by cutting a block 4-1/2 inches long and taping it to the control column.

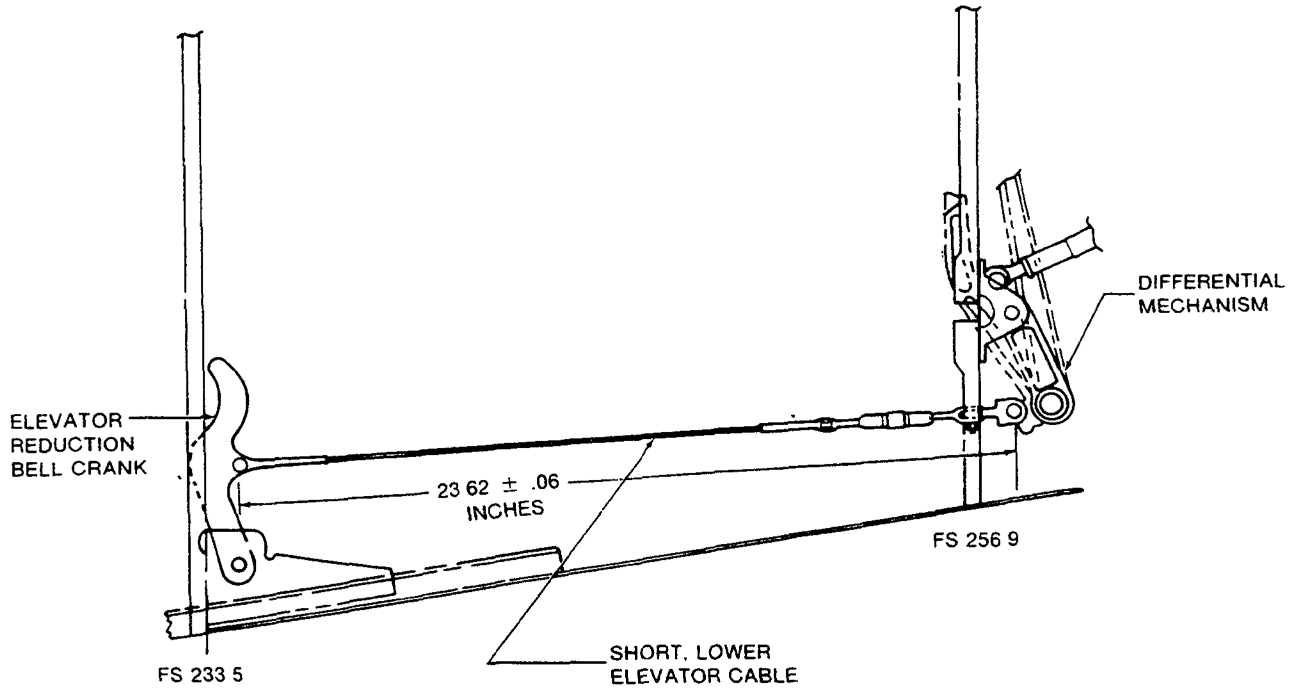
c. Straighten the nose wheel and adjust the pilot's rudder pedals to the same position. Install a .43 inch diameter straight steel aligning (rig) pin (5 inches long) in the pilot's rudder pedals to place them in the neutral position and to prevent rudder system influence on elevator rigging.

d. Install the differential mechanism jig assembly to position the differential mechanism in the neutral position.

NOTE

When rigging airplanes prior to D-2681, the 35-590007 differential mechanism jig assembly can be used, or the 35-590076 jig assembly can be used by removing the 35-590052 adapters.

e. Adjust the short, lower elevator cable between the elevator reduction bell crank and the elevator control arm on the differential mechanism to a total length of 23.62 ±.06 inches, including turnbuckle, terminal and link (see Figure 3-2A). No threads on turnbuckle ends should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.



Elevator Short Lower Cable Adjustment
Figure 3-2A

f. Simultaneously adjust the upper and lower (forward of the reduction bell crank) elevator cable turnbuckles until cable tensions are as shown on the temperature-tension graph. The differential mechanism, control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.

NOTE

The differential mechanism is in its neutral position when, with the rudder, elevator and tab systems correctly adjusted and in neutral, the 3 center differential mechanism arm top bolts are engaged in 3 plates of the 35-590007 or 35-590076 differential mechanism jig assembly (without the 35-590052 adapters) and the blocks on the outboard ends of the jig assembly are lightly contacting the forward side of the fuselage station 256.9 bulkhead.

The elevator and rudder system are in neutral when the differential mechanism jig assembly is correctly installed, the rudder rig pin is installed, the control column block is installed, and the elevators are at the 0° position with the cable tensions set to the cable temperature-tension graphs. The trim tab system is in neutral when the cockpit indicator is at 0°, the cable tensions are set to the cable temperature-tension graph and the tabs are at 0° or symmetrically split (to correct for yaw). The tabs are at 0° when their trailing edges align with the trailing edges of the elevators.

g. Set the elevators in the neutral position (0°) by adjusting the elevator push-pull rod lengths. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

h. Remove the differential mechanism jig assembly and remove the 4-1/2 inch block from the control column and recheck (reset if necessary) the elevator cable tensions. The elevator trim system may be repositioned to minimize the downspring effect on the elevator arm and elevator cable tensions. After the downspring effect is minimized, the up and down cable tension average must fall within the maximum and minimum values designated by the temperature-tension graph.

i. Check the elevators for correct up and down travel limits: 20 degrees ±1 degree up and 20 degrees ±1 degree down. The stops are nonadjustable stops forward of the instrument panel and underneath the control column. Steps "b" through "h" should result in the elevator travels being correct or close to correct. Make any final minor adjustments by lengthening or shortening the elevator push-pull rods. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

j. When elevator travels are correct, tighten rod end jam nuts, safety turnbuckles and recheck travels and tensions. Remove rudder pedal rig pin.

k. Changing elevator rigging may change rudder travels. Check rudder travels after changing elevator rigging.

WARNING

Check for correct direction of elevator travel by moving the control column. When the control column is pushed forward, the correct elevator movement is DOWN. When the control column is pulled back, the correct elevator movement is UP. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

ELEVATOR RIGGING PROCEDURE (SERIALS D-2681 THROUGH D-5725)

NOTE

All elevator rigging should be accomplished with a travel board only. A bubble protractor should not be used for any elevator rigging procedure.

a. Adjust the stops on the aft fuselage bulkhead to permit a maximum combined elevator/rudder travel of 35 degrees ±2 degrees up and 30 degrees ±2 degrees down for each elevator surface. (See Figure 3-2 Travel Tables.)

b. Position the control column in the neutral position with 4-1/2 inches between the collar on the panel and the split collar on the control column. This can be accomplished by cutting a block 4-1/2 inches long and taping it to the control column.

c. Straighten the nose wheel and adjust the pilot's rudder pedals to the same position. Install a .43 inch diameter straight steel aligning (rig) pin (5 inches long) in the pilot's rudder pedals to place them in the neutral position and to prevent rudder system influence on elevator rigging.

d. Install the differential mechanism jig assembly to position the differential mechanism in neutral position.

NOTE

When rigging airplanes D-2681 through D-5725, the 35-590076 differential mechanism jig assembly can be used with the 35-590052 adapters installed. The 35-590087 differential mechanism jig assembly can also be used if the 35-590087-9 stop is removed.

e. Adjust the short, lower elevator cable between the elevator reduction bell crank and the elevator control arm on the differential mechanism to a total length of 23.62 ±.06 inches, including the turnbuckle, terminal and link (see Figure 3-2A). No threads on turnbuckle ends should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.

f. Simultaneously adjust the upper and lower (forward of the reduction bell crank) elevator control cable turnbuckles until cable tensions are as shown on the temperature-tension graph. The differential mechanism, control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.

NOTE

The differential mechanism is in its neutral position when, with the rudder, elevator and tab systems correctly adjusted and in neutral, the differential mechanism tail control (rudder) arms are lightly contacting the aft side of the 35-590087 differential mechanism jig assembly (without the -9 stop installed) and the outboard ends (legs) of the jig assembly are lightly contacting the forward side of the fuselage station 256.9 bulkhead. The nut on the differential mechanism elevator (center) control arm is to be positioned inside the hole in the jig assembly. (See elevator rigging procedure note for D-1 through D-2680 neutral position of 35-590076 jig assembly.)

The elevator and rudder system are in neutral when the differential mechanism jig assembly is correctly installed, the rudder rig pin is installed, the control column block is installed, and the elevators are at the 0° position with the cable tensions set to the cable temperature-tension graphs. The trim tab system is in neutral when the cockpit indicator is at 0°, the cable tensions are set to the cable temperature-tension graph and the tabs are at 0° or symmetrically split (to correct for yaw). The tabs are at 0° when their trailing edges align with the trailing edges of the elevators.

g. Set the elevators in the neutral position (0°) by adjusting the elevator push-pull rod lengths. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

h. Remove the differential mechanism jig assembly and remove the 4-1/2 inch block from the control column and recheck (reset if necessary) the elevator cable tensions. (The jig assembly must be removed before the control column block is removed to prevent damage to the jig assembly.) The elevator trim system may be repositioned to minimize downspring effect on the elevator arm and elevator cable tensions. After the downspring effect is minimized, the up and down cable tension average must fall within the maximum and minimum values designated by the temperature-tension graph.

i. Check the elevators for correct up and down travel limits: 22-1/2 degrees +0 -1 degree up and 17-1/2 degrees +2 -1 degree down. The stops are nonadjustable stops forward of the instrument panel and underneath the control column. Make adjustments by lengthening or shortening the push-pull rods. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

j. For serials D-2681 through D-4865, adjust the elevator downspring cable turnbuckle thus: with the tab system set at 0°, a force of 11 ±1/2 pounds applied on the control column is required to return the elevators to neutral (0°); with the tabs set at 10° up (nose down) (reset to 8° after this adjustment), a force of 16 +4 -1/2 pounds applied on the control column is required to return the elevators to neutral (0°); with the tabs set at 31° down (nose up), a force of 15 ±5 pounds applied on the control column is required to return the elevators to neutral (0°). For serials D-4866 through D-5725, adjust the elevator downspring cable turnbuckle with the elevators 9° up and the tabs 20° down (nose up) to remove all slack from this cable system; then check the force on the elevator control column. With the trim tabs set at neutral (0°), a force of 28 ±3 pounds applied on the control column is required to move the elevators through neutral (0°). If necessary, further adjust the elevator downspring cable turnbuckle to obtain this value.

k. When elevator travels and forces are correct, tighten the rod end jam nuts, safety the turnbuckles and recheck travels and tensions. Remove rudder pedal rig pin.

1. Changing elevator rigging may change rudder travels. Check rudder travels after changing elevator rigging.

WARNING

Check for correct direction of elevator travel by moving the control column. When the control column is pushed forward, the correct elevator movement is DOWN. When the control column is pulled back, the correct elevator movement is UP. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

ELEVATOR RIGGING PROCEDURE (SERIALS D-5726 AND AFTER)

NOTE

All elevator rigging should be accomplished with a travel board only. A bubble protractor should not be used for any elevator rigging procedure.

a. Adjust the stops on the aft fuselage bulkhead to permit maximum combined elevator/rudder travel as shown on the overall travel tables on Figure 3-2.

b. Position the control column in the neutral position with 4-1/2 inches between the collar on the instrument panel and the split collar on the control column. This can be accomplished by cutting a block 4-1/2 inches long and taping it to the control column.

c. Straighten the nose wheel and adjust the pilot's rudder pedals to the same position. Install an aligning (rig) pin in the pilot's rudder pedals to place them in the neutral position and to prevent rudder system influence on elevator rigging. On serials D-6562 and after, the left rudder pedal is aft of the right rudder pedal with the system in neutral. Use a .43 inch diameter straight steel rig pin (5 inches long) for D-5726 through D-6561, and an offset rig pin for D-6562 and after. See rig pin dimensions on Figure 3-3A.

d. Install the differential mechanism jig assembly to position the differential mechanism in the neutral position. This is accomplished with the 35-590087 differential mechanism jig assembly with the 35-590087-9 stop installed. This will position the differential mechanism right tail control arm aft of the differential mechanism left tail control arm with the elevator system and rudder system in neutral.

e. Adjust the short, lower elevator cable between the elevator reduction bell crank and the elevator control arm on the differential mechanism to a total length of 23.62 ±.06 inches, including the turnbuckle, terminal and link (see Figure 3-2A). No threads on turnbuckle ends should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.

f. Simultaneously adjust the upper and lower (forward of the reduction bell crank) elevator cable turnbuckles until cable tensions are as shown on the cable temperature-tension graph. The differential mechanism, control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.

NOTE

The differential mechanism is in its neutral position when, with the rudder, elevator and tab systems correctly adjusted and in neutral, the differential mechanism tail control (rudder) arms are lightly contacting the aft side of the 35-590087 differential mechanism jig assembly (with -9 stop installed) and the outboard ends (legs) of the jig assembly are lightly contacting the forward side of the fuselage station 256.9 bulkhead. The nut on the differential mechanism elevator (center) control arm is to be positioned inside the hole in the jig assembly.

The elevator and rudder system are in neutral when the differential mechanism jig assembly is correctly installed, the rudder rig pin is installed, the control column block is installed, and the elevators are at the 0° position with the cable tensions set to the cable temperature-tension graphs. The trim tab system is in neutral when the cockpit indicator is at 0°, the cable tensions are set to the cable temperature-tension graph and the tabs are at 0° or symmetrically split (to correct for yaw). The tabs are at 0° when their trailing edges align with the trailing edges of the elevators.

g. Set the elevators in the neutral position (0°) by adjusting the elevator push-pull rod lengths. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

h. Remove the differential mechanism jig assembly and remove the 4-1/2 inch block from the control column and recheck (reset if necessary) the elevator cable tensions. (The jig assembly must be removed before the control column block is removed to prevent damage to the jig assembly. The elevator trim system may be repositioned to minimize downspring effect on the elevator arm and elevator cable tensions. After the downspring effect is minimized, the up and down cable tension average must fall within the maximum and minimum values designated by the temperature-tension graph.

i. Check the elevators for correct up and down travel limits: 22-1/2 degrees +0 -1 degree up and 19 +2 -1 degree down. The stops are nonadjustable stops forward of the instrument panel and underneath the control column. Steps "b" through "h" should result in the elevator travels being correct or close to correct. Make any final minor adjustments by lengthening or shortening the push-pull rods. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

j. Adjust the elevator downspring cable turnbuckle with the elevators 9° up and the tabs 20° down (nose up) to remove all slack from this cable system. Then check the force on the elevator control column. With the trim tabs set at neutral (0°), a force of 28 ±3 pounds (D-5726 through D-6561) or 19 ±3 pounds (D-6562 and after) applied on the control column is required to move the elevators through neutral (0°). If necessary, further adjust the elevator downspring cable turnbuckle to obtain these values.

k. When elevator travels and forces are correct, tighten rod end jam nuts, safety turnbuckles and recheck travels. Remove the rudder pedal rig pin.

l. Changing elevator rigging may change rudder rigging. Check rudder rigging after changing elevator rigging.

WARNING

Check for correct direction of elevator travel by moving the control column. When the control column is pushed forward, the correct elevator movement is DOWN. When the control column is pulled back, the correct elevator movement is UP. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

INSPECTION OF ELEVATOR TABS

NOTE

The Model 35 trim tab does not have an upper or lower contoured surface. The Model A35 through G35 trim tabs have a lower contoured surface, while the H35 and after trim tabs have an upper contoured surface.

a. Check the up and down travel of the elevator tabs. The travel should be 10° +1/2° -1 up and 30° ±2° down on Bonanzas D-1 through D-2200 and D-15001. On serials D-2201 through D-2680, the travel is 10° +1/2° -1° up and 31° +2° -0° down. On serials D-2681 through D-4865 and D-15002, the travel is 8° +1/2° -1° up and 31° +2° -0° down. On serials D-4866 through D-6561, the travel is 4-1/2° +1/2° -1° up and 23° +2° -0° down. On serials D-6562 and after, the travel is 5-1/2°

+1/2°-1° up and 23° +2° -0° down (Ref. Figure 3-2 Travel Tables).

b. Check the main and the aft tab cables for proper tension as shown on the temperature-tension graph. The same number of terminal threads should be visible on each end of the turnbuckle barrel; a maximum of three threads may be visible.

ELEVATOR TAB RIGGING

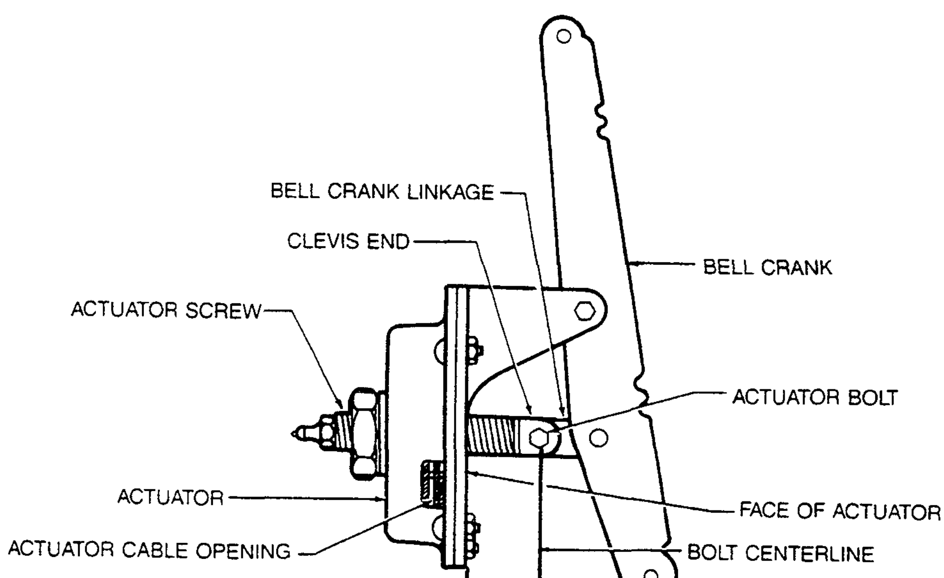
NOTE

The use of a bubble protractor is not adequate to set the elevator travels. A travel board must be used for this. However, with the elevator set at neutral, a tab travel board or a bubble protractor may be used to set elevator tab travel.

Elevator tabs should be rigged with the travel board or bubble protractor perpendicular to the chord plane of the stabilizer or tab respectively.

a. Install the 4-1/2 inch block on the control column and install the rudder rig pin to maintain the elevators in neutral. Rotate the elevator tab wheel in the cabin so the indicator dial is set at 0°. Both elevator trim tabs should be at neutral (tab trailing edge aligned with elevator trailing edge) (see procedure for RIGGING ELEVATORS TABS TO CORRECT FOR YAW). Trim tab actuator stops on the cables should be moved away from the stops in the fuselage.

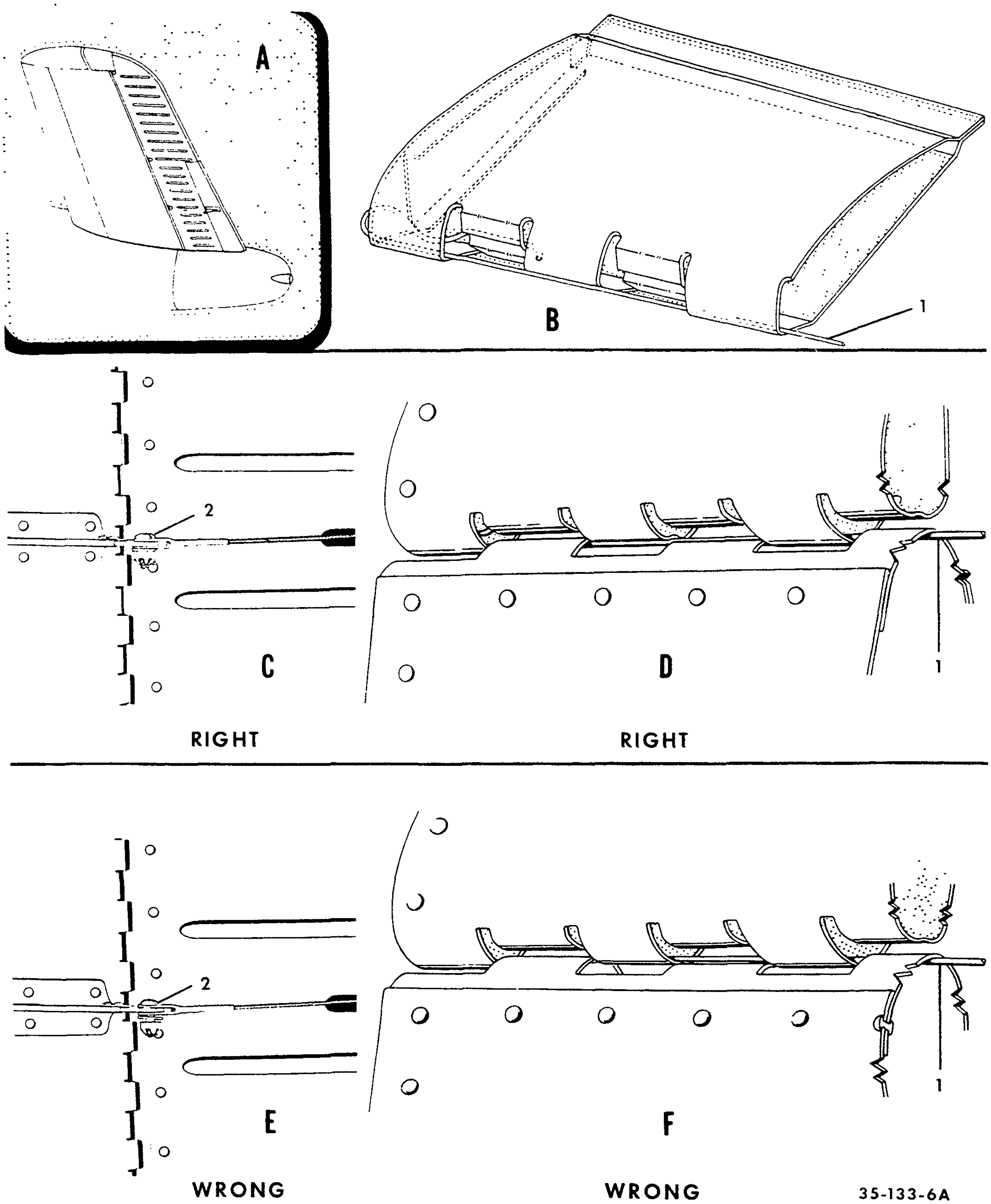
b. Rotate the elevator trim tab control wheel to full nose up on the indicator (tabs down). Check the tab actuator at F.S. 233.5. The clevis end of the actuator screw bolt centerline should extend to the dimension from the actuator face as shown in Figure 3-2B.



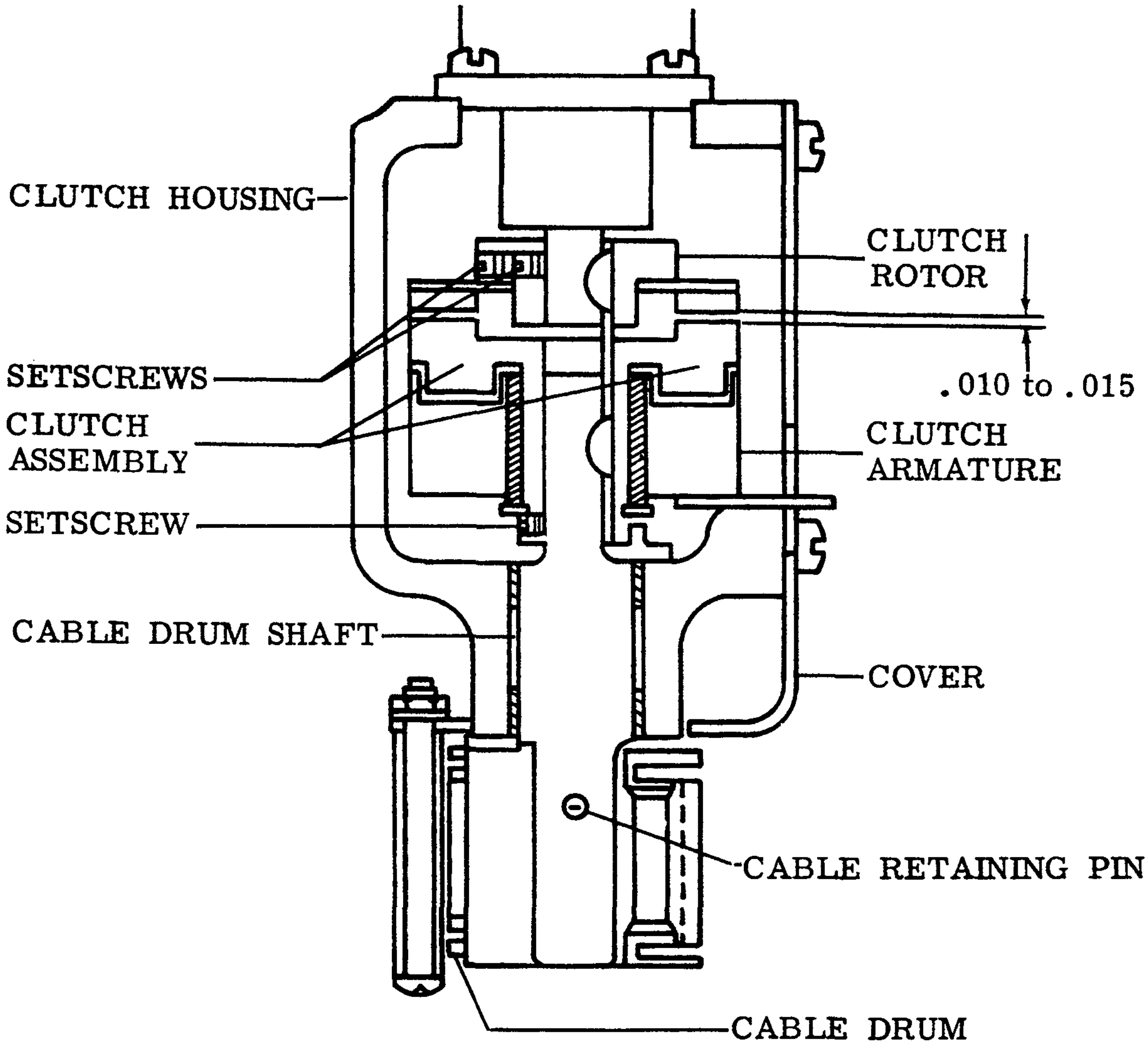
TRIM TAB DOWN POSITION	ACTUATOR BOLT CENTERLINE TO ACTUATOR FACE DISTANCE	
31°	.38 to .50	D-1 thru D-2680
31°	.44 to .56	D-2681 thru D-4865
23°	.38 to .50	D-4866 and after

35-152-40

Trim Tab Actuator and Bell Crank
Figure 3-2B



Elevator Trim Tab Installation
Figure 3-2C



Electric Trim Tab Actuator
Figure 3-2D

c. Adjust the actuator screw length by disconnecting the bell crank at the actuator bolt and turning the screw to the dimension shown in Figure 3-2B.

d. Reconnect the bell crank to the tab actuator.

e. Adjust the four trim tab cables aft of the bell crank to obtain the trim tab down position as shown in Figure 3-2B, and and establish the initial trim tab cable tension per the applicable temperature-tension graph in Figure 3-1. Loosen the tab cable stop if necessary. The same number of terminal threads should be visible on each end of the turnbuckle barrel (a maximum of 3 threads).

f. Move the tab control wheel to full nose down on the indicator (tabs up). The trim tab up position should be as shown on the tab travel table on Figure 3-2 without altering tab cable adjustment. Loosen the tab cable stop if necessary.

The above procedure has established the capability of the elevator tab actuator to move through its required range and correctly oriented the tab indicator, the tab actuator and the trim tabs to each other.

g. Move the tab system to neutral (0°) position. Check and readjust cable tension per the applicable temperature-tension graph on Chart 3-1 if necessary.

h. Move the tab control wheel toward nose down and establish trim tab up-travel per the chart on Figure 3-2. Move the trim tab cable adjustable up stop against the system fixed stop in the fuselage. Move the trim tab control wheel toward nose-up and establish the trim tab down travel per the chart in Figure 3-2. Move the trim tab cable adjustable down stop against the fixed stop in the fuselage.

i. Check the clevis bolts which attach the tab cables to the tab horn. The clevis bolts should be free of corrosion and dirt and loose enough to allow free movement of the horn without binding the tab cables.

j. Move the tab control wheel to neutral (0°) on the indicator. The trailing edge of the trim tabs should align with the trailing edge of the elevators.

k. On serials D-6562 through D-7309, the left elevator tab is now to be set to 2° ±1° above neutral (0°).

l. Reinspect and safety all turnbuckles, nuts, bolts and cable stops affected during this procedure. The tab cable stops are to be tightened to 20 +5 -0 inch-pounds of torque and safetied.

WARNING

After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the control column is moved forward, the elevators should move DOWN. When the control column is moved aft, the elevators should move UP. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab is moved toward the nose-down position, the trim tab should move UP.

m. Close up all inspection panels and test fly the airplane.

n. If yawing occurs in level flight, with ailerons in neutral, adjust the tabs as instructed under RIGGING TRIM TABS TO CORRECT FOR YAW. If aileron pressure is needed to maintain wings level, move the trailing edge up on the wing that tends to move up.

TRIM TAB ACTUATOR REMOVAL

a. Using the trim tab control in the flight compartment, move the trim tab control to the full nose-up position as noted on the elevator trim tab indicator.

b. Remove the access panel on the left hand side of the fuselage, just forward of the elevator.

c. Install identification tags to the cables and disconnect the cables routed aft to the elevator trim tabs from the bell crank.

d. Install identification tags to the cables on each side of the first turnbuckle and disconnect the actuator cables routed forward to the flight compartment. Secure the cables so they do not come off of the forward pulleys. Secure the cables to the actuator so the actuator screw position can be maintained.

CAUTION

Do not damage, kink or put bends in the cables.

e. Identify the cables on the actuator being removed so that the cables on the replacement actuator are reconnected correctly.

f. Remove the three bolts securing the actuator to the bracket and remove the actuator and attached bell crank from the airplane.

NOTE

It may be necessary to remove the two tab cable pulleys, located directly below the actuator, in order to provide clearance through the pulley bracket for the cable ends on the actuator.

TRIM TAB ACTUATOR INSTALLATION

a. Position the actuator assembly in the bracket and install the three attaching bolts.

b. Using the cable at the forward side of the actuator drum, be certain the cable is at the end of its actuator drum travel.

c. Rotate the actuator drum upward until the pin securing the cable to the drum is no longer visible through the actuator cable opening.

NOTE

If the bell crank-to-actuator screw linkage is disconnected, install the actuator bolt, washers, nut and cotter key to attach the bell crank to the actuator.

d. With the actuator bolt connecting the bell crank-to-actuator screw linkage installed, position the trim tab actuator screw by rotating the actuator drum to obtain the actuator bolt centerline-to-actuator face distance as shown in Figure 3-2B.

e. Connect the actuator cables to the cables routed aft from the flight compartment. Ensure that all tab cables are properly routed and located on the pulleys.

f. If the two tab cable pulleys, located directly below the actuators, were removed to provide clearance for the cable ends of the actuator cables, install the two tab cable pulleys at this time.

CAUTION

Do not damage, kink or put bends in the cables.

g. Connect the bell crank cables routed aft to the elevator trim tabs.

h. The elevator trim tab indicator on the pilot's instrument panel should indicate the full nose-up position in degrees as noted in Figure 3-2.

CAUTION

Be certain that all cables are hooked up correctly. Operate the elevator system through full travel to ensure complete and proper degrees of travel of the trim tabs. Check for proper direction of travel. For a nose-up condition on the airplane, the trim tab should move down. For a full nose-down condition, the trim tab should move up.

i. Install the access panel on the left hand side of the fuselage, just forward of the elevator.

ELEVATOR TAB INDICATOR RIGGING

a. Place the proper tension on the cables in the fuselage and place the cables in neutral position. The right hand turnbuckle should (approximately) be just entering bulkhead 179 from the front side.

b. To install the dial indicator cable, wrap the cable three full turns around the dial indicator drum. With the dial at 0 degrees, slip the cables so that both ends of the cable are of equal length. With the dial indicator still in neutral position, take the cable coming off the top of the elevator trim tab dial sheave and bring it down to the forward side of the tab wheel shaft to the left small hole. Wrap the cable toward the hole 4 turns. Insert the cable in the hole and pull it through. Wrap surplus cable around the shaft. Beginning on the right hand side of the small hole, wrap the cable toward the hole 4 turns. Insert the cable into the hole and pull it through. Wrap surplus cable around the shaft, twist the two cables together and solder. Use only rosin-flux solder. Check the tab dial to see that it will roll from one stop to the other.

c. Set the tab dial at 0 degrees. Place tension on the tab cables in the tail section, per the cable temperature-tension graph, to position the tabs in line with the elevators.

NOTE

With the elevators set in the neutral position and the tab indicator set at 0 on Bonanza serials D-6562 through D-7309, the left elevator tab should be set at 2 ±1 degrees above neutral elevator position. The right elevator tab should be set at 0 ±1 degree elevator position.

d. Safety the turnbuckles and set the stops on the fuselage cables to maintain proper travel in accordance with the tab travel limits.

INSPECTION OF TAB HINGES

Improper cable tensions, either above or below the recommended limits, will cause excessive wear on the tab hinges. If excessive wear is noted on the elevator half of the hinge, it should be replaced.

When improperly installed on earlier airplanes, the elevator trim tab hinge wire (detail B1, Figure 3-2C) may cause binding and wear in the hinge lobes (Detail F). Correct intallation of the hinge wire is shown in Detail D, Figure 3-2C.

The bolt securing the cable to the elevator tab horn should swivel in the horn at all times. If the bolt binds, it will cause cracks to develop in the tab horn. The bolt should be just tight enough to prevent rattle (see detail C2, Figure 3-2C), but not tight enough to cause binding in the horn, nor as loose as shown in detail E2, Figure 3-2C. It is not desirable to use grease or oil on the bolt, for this will merely cause dirt to collect.

RIGGING ELEVATOR TABS TO CORRECT FOR YAW

The elevator tabs can be rigged to function as a rudder tab by making minor adjustments up and down from neutral position.

FOR RIGHT YAW (NOSE OF AIRPLANE TENDS TO MOVE TO RIGHT WITH WINGS LEVEL)

a. Adjust the right elevator tab down approximately 1° by lengthening the upper right trim tab cable and shortening the lower right trim tab cable.

b. Adjust the left elevator tab up approximately 1° by shortening the upper left trim tab cable and lengthening the lower left tab cable.

c. Set the cable tension as specified in the applicable graph on Figure 3-1.

d. Safety the two turnbuckles, close the inspection panels and test fly the airplane.

FOR LEFT YAW (NOSE OF AIRPLANE TENDS TO MOVE LEFT WITH WINGS LEVEL)

a. Adjust the right elevator tab up approximately 1° by lengthening the lower right tab cable and shortening the upper right tab cable.

b. Adjust the left elevator tab down approximately 1° by lengthening the upper left cable and shortening the lower left cable.

c. Set the cable tension as specified in the applicable graph on Figure 3-1.

d. Safety the two turnbuckles, close the inspection panels and test fly the airplane.

NOTE

In the event the above procedure results in overcorrection, partial readjustment to reduce the rudder effect can be accomplished in one tab only. In the event the above procedure does not give enough correction for yaw, each tab can be adjusted 1° more from neutral in the same direction as before and rechecked. The maximum allowable amount of split between trim tabs is 6°. The average degree of tab travel at full up or down cannot exceed the limit of travel.

ELECTRIC TRIM TAB SYSTEM (OPTIONAL D-8599 AND AFTER)

ELECTRIC TRIM TAB ACTUATOR REMOVAL

a. Remove the access door on the fuselage just below the leading edge of the LH stabilizer.

b. Disconnect the actuator wire harness at the disconnect splices.

c. Disconnect the actuator cable at the turnbuckle and unwind the cable.

d. Remove the three bolts securing the actuator to the bracket. The actuator may now be removed from the airplane.

ELECTRIC TRIM TAB ACTUATOR INSTALLATION

Installation procedure is the reverse of the removal procedure. Tab rigging and cable tension is identical to the manually operated tab.

NEW TAB CABLE INSTALLATION

Note the position of the old cable in relation to the cable drum and forward end cable fittings. Install the new cable in the same position. This will ensure adequate cable length in both directions allowing full travel of the cable stops.

MAGNETIC CLUTCH REMOVAL
(Figure 3-2D)

a. Remove the lid from the clutch housing.

b. Loosen the setscrew in the clutch rotor and armature hubs.

c. Remove the motor from the clutch housing.

d. Slide the cable drum and shaft assembly from the clutch housing.

e. Remove the clutch from the clutch housing.

MAGNETIC CLUTCH INSTALLATION

Installation procedure is the reverse of the removal procedure. No lubrication is required. Tighten the clutch armature setscrew with no visible end play in the cable drum shaft Slide the clutch rotor on the motor shaft to obtain .010 to .015 clearance between the friction surfaces of the clutch before tightening the setscrew. Stake both setscrews.

NOTE

With no visible end play in the cable drum shaft, the clutch faces must not make contact while the clutch is de-energized or damage to the clutch will result.

ELECTRICAL TRIM TAB ACTUATOR BRUSH WEAR LIMITS (optional)

14 VOLT SYSTEM (D-8841 thru D-10119 except D-10097)

Replace the brushes at intervals 2,000 flight hours.

28 VOLT SYSTEM (D-10097, D-10120 and after)

Replace the brushes at intervals 2,000 flight hours.

MAGNETIC CLUTCH TORQUE TEST (14 volt system) (D-8841 thru D-10119 except D-10097)

The following procedure should be performed any time the magnetic clutch is replaced

a. Use a 14 vdc power source and connect the red electrical lead of the magnetic clutch to ground and the white electrical lead to the power source Using a torque wrench, check that the clutch holds with 30 inch-pounds of torque applied at the actuator shaft.

b. If the static torque of the clutch is less than 30 inch-pounds, burn in the clutch as follows·

1. Find a metal plate of sufficient thickness for rigidity and large enough to fit in a vise with the actuator assembly attached. Anchor the plate in a vise and drill 3 holes in the plate to match the actuator mounting holes. Bolt the actuator to the plate.
2. Locate a blade type screwdriver or similar tool that will fit the shaft on which the cable drum is mounted.
3. Remove the handle from the screwdriver or fabricate a similar tool so that a low speed (approximately 450 rpm) ½ inch drill motor may be attached to the screwdriver or similar tool
4. Secure the screwdriver in the ½ inch drill motor.
5. Remove the access plate from the clutch housing and blow the housing and clutch clean.
6. Using a regulated power source set at 7 to 8 volts dc, connect the red electrical lead of the clutch to ground the white electrical lead to the power source with alligator clips.
7. With the screwdriver in the slot in the drum shaft turn the drill motor on and run for 15 seconds. Turn the drill off and unclip the leads to the clutch.
8. Allow the clutch to cool for one minute before re-attaching the lead for another fifteen second interval. Repeat the foregoing sequence until the clutch will hold 30 inch-pounds of torque as indicated in step "a" then blow the clutch and housing clean with compressed air. Install access plate on the clutch housing.

CAUTION

Exceeding the fifteen second burn-in periods may overheat and damage the magnetic clutch.

MAGNETIC CLUTCH TORQUE TEST (28 volt system) (D-10097, D-10120 and after)

The following check should be performed any time the magnetic clutch is replaced.

a Using a 28 vdc power source, connect the red lead of the magnetic clutch to ground and the white lead to the power source. Using a torque wrench, check that the clutch holds with 30 inch-pounds of torque applied at the actuator shaft.

b. If the static torque of the clutch is less than 30 inch-pounds, burn in the clutch as follows:

1. Find a metal plate of sufficient thickness for rigidity and large enough to fit in a vise with the actuator assembly attached. Anchor the plate in a vise and drill 3 holes in the plate to match the actuator mounting holes Bolt the actuator to the plate.
2. Locate a blade type screwdriver or similar tool that will fit the shaft on which the cable drum is mounted.
3. Remove the handle from the screwdriver or fabricate a similar tool so that a low speed (approximately 450 rpm) 1/2 inch drill motor may be attached to the screwdriver or similar tool.
4. Secure the screwdriver in the ½ inch drill motor.
5. Remove the access plate from the clutch housing and blow the housing and clutch clean with clean dry air
6. Using a regulated power source set at 14 to 16 vdc, connect the red electrical lead of the clutch to ground and the white lead to the power source with alligator clips.
7. With the screwdriver in the slot in the drum shaft turn the drill motor on and run for 15 seconds. Turn the drill off and unclip the leads to the clutch.
8. Let the clutch cool for approximately one minute before reattaching the lead for another 15 second interval. Repeat the foregoing sequence until the clutch will hold with 30 inch-pounds of torque as indicated in step "a", then blow the clutch and housing clean with clean dry compressed air. Install the access plate on the clutch housing.

CAUTION

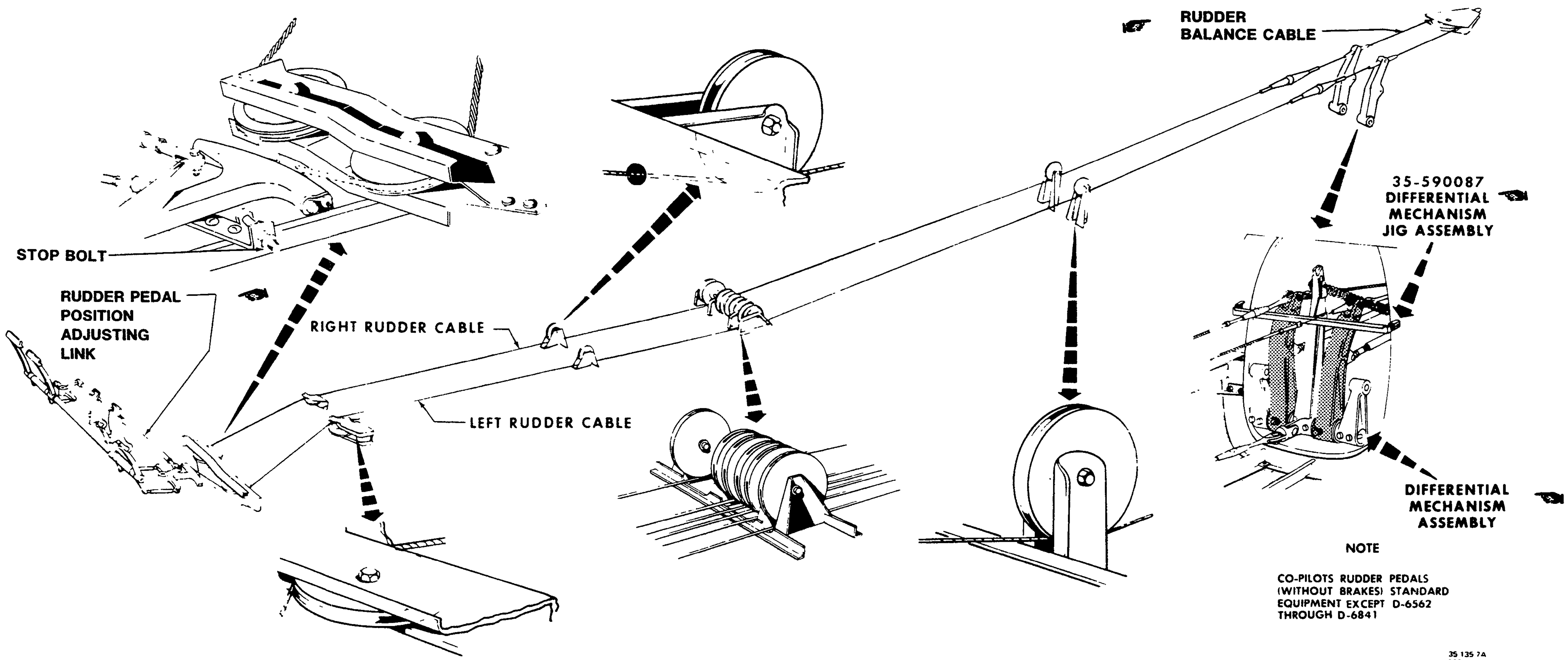
Exceeding the 15 second burn-in periods may overheat and damage the magnetic clutch.

RUDDER PEDAL SETTINGS

	R. H. PEDAL	L. H. PEDAL
D-6562 THROUGH D-7309	NEUTRAL POSITION	.25 TO .38 INCHES AFT OF NEUTRAL POSITION
D-7310 AND AFTER	NEUTRAL POSITION	.38 TO 45 INCHES AFT OF NEUTRAL POSITION

RUDDER TRAVEL

SERIAL	LEFT TRAVEL	RIGHT TRAVEL	(COMBINE RUDDER AND ELEVATOR) OVER-ALL TRAVEL
D-1 THROUGH D-2680	21° ±1°	21° ±1°	35° ±2° UP 35° ±2° DOWN
D-2681 THROUGH D-5725	21° ±1°	21° ±1°	35° ±2° UP 30° ±2° DOWN
D-5726 THROUGH D-7309	23° ±1° UP 26° ±1° DOWN	26° ±1° UP 23° ±1° DOWN	44° ±2° UP 37° ±2° DOWN (L.H.) 42° ±2° UP 40° ±2° DOWN (R.H.)
D-7310 AND AFTER	23° ±1° UP 26° ±1° DOWN	26° ±1° UP 23° ±1° DOWN	44° ±2° UP 37° ±2° DOWN (L.H.) 35° ±2° UP 40° ±2° DOWN (R.H.)



NOTE

CO-PILOTS RUDDER PEDALS (WITHOUT BRAKES) STANDARD EQUIPMENT EXCEPT D-6562 THROUGH D-6841

35 135 7A
002

Rudder Control System
Figure 3-3

RUDDER RIGGING PROCEDURE

NOTE

All rudder rigging should be accomplished with a travel board only. A bubble protractor should not be used for any rudder rigging procedure.

a. Adjust the stops on the aft fuselage bulkhead to permit a maximum combined rudder/elevator travel as shown on the overall travel tables on Figure 3-3.

b. With the adjusting (see Figure 3-3) link at the rudder quadrant, located just aft of the rudder pedals, lengthen or shorten as necessary to align the copilot's pedals with the pilot's pedals. When aligning the pedals, be sure both sets of pedals are in the same position.

c. Straighten the nose wheel and position the pilot's rudder pedals in the neutral position with an aligning (rig) pin as described below:

- On airplane serials D-1 through D-6561, the left and right rudder pedals are to be evenly aligned with the rudder system in neutral.
- On airplane serials D-6562 through D-7309 (except D-7140), the rudder pedals should be rigged with the left rudder pedal .25 to .38 inches aft of the right rudder pedal with the rudder system in neutral.
- On D-7140, D-7310 and after, the rudder pedals should be rigged with the left rudder pedal .38 to .45 inch aft of the right rudder pedal with the rudder system in neutral.

To facilitate rigging of the rudder pedals, a rudder pedal aligning tool (rig pin) is to be fabricated as follows:

- For D-1 through D-6561, this tool can be fabricated as a .43 inch diameter straight steel rod, 5 inches long.
- For D-6562 and after, this tool can be fabricated from a steel block 1/2 x 1 x 2 inches, and two .43 x 2 1/8 inches long steel pins. The two pins are to be welded to one end of the block as shown in Figure 3-3A.

d. Position the control column in the neutral position with 4-1/2 inches between the collar on the instrument panel and the split collar on the control column. This can be accomplished by cutting a block 4-1/2 inches long and taping it to the control column.

e. Install the differential mechanism jig assembly to position the differential mechanism in the neutral position. On airplane D-1 through D-5725, the jig assembly will position the differential mechanism left and right tail controls arms evenly aligned when the elevator and rudder systems are in neutral. On airplane serials D-5726 and after, the jig assembly will position the differential mechanism right tail control arm aft of the differential left tail control arm when the elevator and rudder systems are in neutral.

NOTE

When rigging airplanes prior to D-2681, the 35-590007 differential mechanism jig assembly can be used or the 35-590076 differential mechanism jig assembly can be used by removing the 35-590052 adapters. When rigging airplanes D-2681 through D-5725 the 35-590076 differential mechanism jig assembly can be used with the 35-590052 adapters installed. The 35-590087 differential mechanism jig assembly can also be used if the 35-590087-9 stop is removed. When rigging airplane serials, D-5726 and after, the 35-590087 differential mechanism jig assembly with the 35-590087-9 stop installed is to be used.

See the notes under ELEVATOR RIGGING PROCEDURE which describe how to locate the differential mechanism in the neutral position using a correct differential mechanism jig assembly for the airplane being rigged. These notes also describe the neutral position for the elevator, rudder and tab systems.

f. Adjust the short, lower elevator cable between the elevator reduction bell crank and the elevator control arm on the differential mechanism to a total length of 23.62 ±.06 inches, including turnbuckle, terminal and link (see Figure 3-2A). No threads on the turnbuckle ends should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.

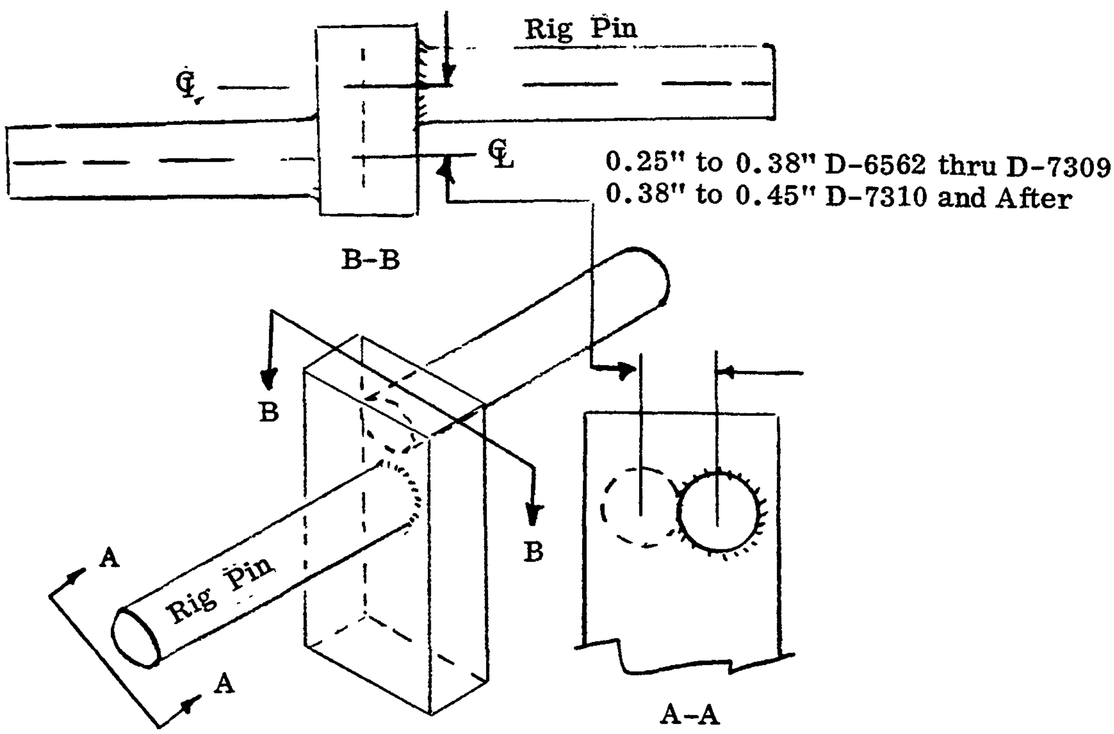
g. Adjust the main rudder cable tensions to the tension shown on the temperature-tension graph. (The cables can be adjusted simultaneously with the rudder balance cable.) The balance cable is adjusted by adding or removing washers behind the balance cable pulley bracket swivel bolt. The differential mechanism, control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.

h. Set the elevators in the neutral position (0°) by adjusting the elevator push-pull rod lengths. Make sure the rod ends remain screwed into the push-pull rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

i. Remove the differential mechanism jig assembly and remove the rudder rig pin. Leave the control column 4-1/2 inch block in place to prevent elevator system influence on rudder rigging.

j. Set the rudder travel by adjusting the stop bolts just aft of the pilot's rudder pedals (Figure 3-3). Refer to the applicable table of travels found on Figure 3-3 for the appropriate rudder travel values. Steps "b" through "h" should result in the rudder travels being correct

Note that the dimensions given in Views A-A and B-B are taken from the center lines of the Rig Pins.



Rig Pins: .43" dia. x 2-1/8" Long
Block: 1/2" x 1" x 2" Long

Rudder Pedal Rig Tool
Figure 3-3A

or close to correct. Make any final minor adjustments by lengthening or shortening the elevator push-pull rods. Make sure the rod ends remain screwed into the push rods the required length. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.

k. When rudder travels are correct, tighten the rod end jam nuts, the rudder stop jam nuts, safety the nut on the balance cable pulley bracket swivel bolt and recheck travels. Remove the elevator column 4-1/2 inch block.

l. Changing rudder rigging may change elevator rigging. Check elevator rigging after changing rudder rigging.

WARNING

Check for correct direction of rudder surface movement by working the rudder pedals. When the left rudder pedal is depressed, the right elevator should move up, and the left elevator should move down. When the right rudder pedal is depressed, the left elevator should move up and the right elevator should move down.

BALANCING CONTROL SURFACES

BALANCING THE AILERON
(Figure 3-4)

When the aileron control surface is being repainted, suspend it by the trailing edge so that excess paint will drain toward the leading edge. After any repainting or repair, the finished surface should be check balanced to ensure that its static moment about the hinge line is within the prescribed limits. The painted aileron assembly must be nose-heavy by 0.2 to 1.5 inch-pounds. The static moment of the aileron is determined by multiplying the unbalanced weight of the aileron assembly times the perpendicular distance from the hinge centerline to the center of gravity when the chord line is horizontally level. The weight is measured in pounds and the distance in inches. The static moment of a 100 percent balanced control surface is 0.0 inch-pounds. A tail-heavy surface exhibits static underbalance. A nose-heavy surface exhibits static overbalance.

CHECKING BALANCE

The aileron balance must be checked in a draft free area with the aileron completely assembled in flying condition. All painting, including stripes and touch-up, must be completed. The tab, static wicks, and hinge bolts must be attached. The chord line must be horizontally level and the hinge line must be properly supported when the static moment is measured. Although many different methods of check balancing exist, they can be categorized under the following two headings:

a. Counterbalancing - The application of a known force or weight at a measured distance from the hinge line to counter the unbalance moment of the aileron assembly.

b. Actual Force Measurement - Measurement of the force applied by the aileron surface on a single support at a known distance from the centerline of the hinge.

EQUIPMENT REQUIRED TO PERFORM BALANCING

a. A stand with knife edge supports as illustrated in Figure 3-4. The knife edges must be in the same horizontal plane.

b. A paper cup or similar light weight container.

c. Approximately 1 pound of lead shot.

d. A certified beam balance weighing device calibrated in units of .01 pound or less.

e. A straight edge, ruler, and spirit level.

BALANCING PROCEDURE

COUNTERBALANCING METHOD

a. Locate the chord line by placing a straight edge at the inboard end of the aileron assembly so that one end is on the trailing edge and the other end is centered on the leading edge. Mark the chord line with a suitable marker, such as a grease pencil, then remove the straight edge.

b. Fit the correct size bolts in the hinge brackets and mount the aileron on the knife edge supports. Ascertain that the aileron is free to rotate about the hinge line.

c. To determine if weight should be added or removed, suspend a paper cup from a point near the center of the aileron trailing edge. Use a short length of small diameter string secured to the surface with a small piece of masking tape as illustrated in Figure 3-4. The cup must be free to hang vertically.

d. Add small quantities of lead shot to the cup until the aileron balances with the chord line level. Check this by holding the spirit level aligned with the marked chord line.

e. The distance "D" must be perpendicular to the hinge line. Measure "D"from the hinge line to the suspension point of the cup.

f. Remove the cup, contents, and string, then weigh them.

NOTE

Since any weighing error is magnified by the distance "D", weighing is móst important and must be done carefully on scales that are certified for accuracy.

g. Calculate the static balance as follows:

1. The weight of the cup and contents is designated by "W".

2. The over or underbalance moment is designated by "M".

3. M = W x D

4. The following is a typical example of a balancing calculation: Assume the aileron is overbalance (nose-heavy) and the paper cup was suspended from the trailing edge. Assume that the aileron balances with the chord line level at "W = .150 pound"and "D = 10.0 inches", then......

M = .150 x 10.0

M = 1.50 inch-pounds (The product of "W x D"). In this instance, "M" is within the required static balance range and is therefore acceptable.

h. The painted aileron assembly must be nose-heavy by 0.2 to 1.5 inch-pounds. The center of gravity of the aileron is forward of the hinge centerline causing the surface to be nose-heavy. Proper aileron balance is obtained by adding or removing lead rod at the leading edge of the aileron. The rod is 15/32 inch in diameter and is installed in brackets attached to the leading edge of the aileron. When adding additional lead rod, the maximum total of the length of rod to be added is not to exceed 5 inches. Add additional rod at the center brackets.

CAUTION

When a lead rod is added to obtain correct balance, it must be installed securely with rivets. A loosely installed rod will vibrate and may cause an undesirable vibration of the surface.

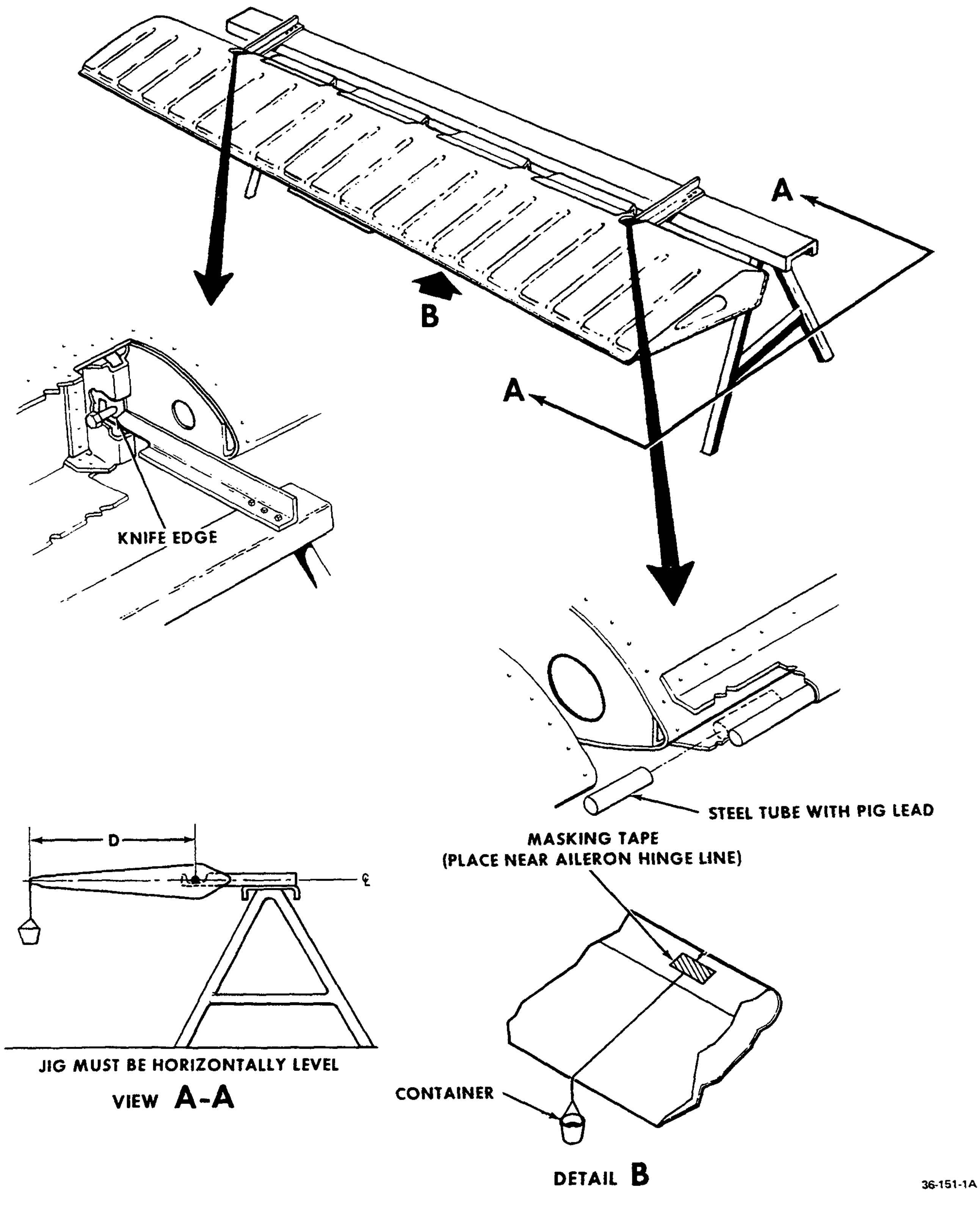


Figure 3-4. Balancing the Aileron

ELEVATOR/RUDDER

BALANCING THE ELEVATOR/RUDDER (Figure 3-5)

When the elevator/rudder control surface is being repainted, suspend it by the trailing edge so that excess paint will drain toward the leading edge. After any repainting or repair, the finished surface should be check balanced to be sure that its static moment about the hinge line is within the manufacturer's prescribed limits. The complete elevator/rudder assembly, painted or unpainted, including the control arm and the tab control cable attach bolt, and the nut and washer for both sides of the tab, must not be tail heavy over the maximum moment as noted:

1) 16.8 to 19.8 inch-pounds on airplanes prior to serial D-8118, except D-7335, D-7923, D-8036, D-8048, D-8057, D-8064, D-8072, D-8075, and D-8090.

2) 14.4 to 17.4 inch-pounds on airplane serials D-7335, D-7923, D-8036, D-8048, D-8057, D-8064, D-8072, D-8075, D-8090, D-8118 and after.

The static moment is the total unbalanced weight of the elevator/rudder control surface multiplied by the perpendicular distance from its hinge centerline to the center of gravity when the chord line is horizontally level. The weight is measured in pounds and the distance in inches. The static moment of a 100 percent balanced elevator/rudder control surface is 0.0 pounds. A tail-heavy surface exhibits static underbalance. A nose-heavy surface exhibits static overbalance.

CHECKING BALANCE

The balance must be checked in a draft-free area with the elevator/rudder completely assembled in flying condition. All painting, including stripes and touch-up, must be completed. The tab, tab control cable attach bolt and the nut and washer for both sides of the tab, static wicks and hinge bolts must be attached. The chord line must be horizontally level and the hinge line must be properly supported when the static moment is measured. Although many different methods of balancing exist, they can be categorized under the following two headings:

a. Actual Force Measurement - Measurement of the force applied by the elevator/rudder surface on a single support at a known distance from the center of the hinge.

b. Counterbalancing - The application of a known force of weight at a measured distance from the hinge line to counter the unbalanced moment of the elevator/rudder assembly.

CHECK BALANCE BY FORCE MEASURMENT

The equipment required to perform the check balance by force measurement is as follows:

a. A stand with knife-edge supports as illustrated in Figure 3-5. The knife edges should be in the same horizontal plane.

b. A certified beam balance calibrated in units of .01 pounds or less. The balance should have a flat weighing platform and its capacity should equal tare plus 2.0 pounds minimum.

c. A support spindle similar to the illustration and leveling blocks, as required. (Blocks + spindle = tare.)

d. A straightedge, rule and spirit level.

BALANCING PROCEDURE FORCE MEASUREMENT METHOD

Locate the chord line by placing a straightedge at the inboard end of the elevator/rudder so that one end is aligned with the center of the torque tube and the other end is centered on the trailing edge. Mark the chord line by a grease pencil or other means on the rib. Remove the straightedge. Fit the correct sized bolts in the hinge brackets and mount the elevator/rudder on the knife edges. Ensure that it is free to rotate about the hinge line. Support the trailing edge behind the center hinge point with a spindle resting on a leveled beam balance platform as illustrated. The spindle must be vertical throughout the balancing procedure. Hold a spirit level against the marked chord line and level it by extending or contracting the spindle, or by using blocks and shims under the spindle. Measure the perpendicular distance from the hinge centerline to the point supported by the spindle. Ensure that the spirit level and rule are removed from the surface and read the reaction on the beam balance. Calculate the static underbalanced moment "M" from the formula:

M=D(R-T) inch-pounds where;
D=Perpendicular distance from the hinge centerline to the spindle point (inches).
R=Reaction (pounds) read from the beam balance.
T=Tare, i.e. spindle plus leveling blocks or shims on the scale platform (pounds).

EXAMPLE

D is 13.5 inches; R is 2.26 pounds and T=1.00 pound.

M=13.5 (2.26-1.00); M=17.0 inch-pounds.

M is within the range which is satisfactory.

If M is not within the prescribed range, refer to step i under BALANCING PROCEDURE COUNTERBALANCING METHOD.

CHECK BALANCING BY COUNTERBALANCING

EQUIPMENT REQUIRED TO PERFORM CHECK BALANCING BY COUNTERBALANCING

a. A stand with knife-edge supports as illustrated in Figure 3-5. The knife edges must be in the same horizontal plane.

b. A paper cup or similar lightweight container.

c. Approximately 3.5 pounds of lead shot.

d. A certified beam balance weighing device calibrated in units of .01 pound or less.

e. A straightedge, ruler, and spirit level.

BALANCING PROCEDURE COUNTERBALANCING METHOD

a. Locate the chord line by placing a straightedge at the lower closure rib of the elevator/rudder so that one end is aligned with the center of the torque tube while the other end is centered on the trailing edge. Mark the chord line with a suitable marker, such as a grease pencil, then remove the straightedge.

b. Secure the trim tab in its neutral position with a small piece or masking tape.

c. Fit the correct sized bolts in the hinge brackets and mount the elevator/rudder on the knife-edge supports. Ascertain that the elevator/rudder is free to rotate about the hinge line.

d. To determine if weight should be added or removed, if the balance is tail down:

1. With the leading edge of the elevator/rudder up, on airplane serials D-1 through D-7309, suspend a paper cup on the front side of the tip. Secure the string to the surface with a small piece of masking tape, near the tip and near the hinge centerline as shown in Figure 3-5. The cup must be free to hang vertically.

2. With the leading edge of the elevator/rudder up, on airplane serials D-7310 and after, slightly loosen the forward top screw. Suspend a paper cup on the inboard side of the tip and wrap the string around the screw. Secure the string to the surface with a small piece of masking tape aft of the forward top screw and near the hinge centerline as shown in Figure 3-5. The cup must be free to hang vertically.

CAUTION

Ascertain the security of the forward top screw on the tip of the leading edge of the elevator/rudder after balancing has been completed.

e. Add small quantities of lead shot to the cup until the elevator/rudder balances with the chord line level. Check this by aligning a spirit level with the marked chord line.

f. The distance "D" must be perpendicular to the hinge line. Measure "D" from the hinge line to the suspension point of the cup.

g. Remove the cup, contents and string, then weigh them.

NOTE

Since any weighing error is magnified by the distance "D", weighing is important and must be done carefully on scales that are certified for accuracy, within 0.01 pound or less.

h. Calculate the static balance as follows:

1. The weight of the cup and contents is designated by "W".

2. The over- or underbalance moment is designated "M".

3. M=W times D

4. The following is a typical example of a balancing calculation: Assume the elevator/rudder was underbalanced (tail heavy) and the paper cup was suspended from the leading edge. If the elevator/rudder balances with the chord line level at "W= 2.83 pounds" and "D=6.0 inches" then.....

M=2.83 times 6.0.

M=17.0 inch-pounds (the product of "W times D"). In this instance, "M" is within the required static balance and is therefore acceptable.

i. Obtain the correct elevator/rudder balance as follows:

1. **Serials D-1 through D-3350:**

a) To gain access to the washers, remove the formed leading edge cover at the extreme forward, outboard tip of the elevator/rudder assembly.

b) A maximum of 11 lead washers (BEECHCRAFT Part No. 183809) can be installed to obtain the correct balance. A brazier head screw may be installed (per BEECHCRAFT Service Bulletin Number 35-26) between the two existing screws at the forward outboard tip of the elevator/rudder if more than six washers are required. Distribution of the washers on the screws are as follows:

1) When the maximum number of 11 washers are required, install three on the outboard screw, four on the center screw and four on the inboard screw. If less than the maximum is needed distribute the washers accordingly.

2) If six or less washers are needed to obtain the correct balance, the center screw is not used; install four washers on the inboard screw and two on the outboard screw.

2. **Serials D-3351 through D-7309:**

a) To gain access to the washers used for balancing, remove the cover from the leading edge on the outboard tip of the elevator/rudder assembly.

b) A maximum of six 183809 or three 35-660042-1 and three 35-660042-3 lead washers may be used to balance the elevator/rudder.

1) If the 183809 washers are used, install three on the outboard screw and three on the inboard screw. If less than the maximum number is needed distribute the washers accordingly.

2) When using the 35-660042 washers, install up to three 35-660042-1 washers on the inboard screw and up to three 35-660042-3 washers on the outboard screw. Distribute the washers accordingly if fewer than the maximum are needed.

3. **Serials D-7310 and after:**

a) If the static balance does not comply with balance requirements, remove the elevator/rudder horn cover and add or remove solder to bring the elevator/rudder balance within required limits.

b) Coat the weight with a corrosion preventative material such as zinc chromate primer to insulate the dissimilar materials. Replace the elevator/rudder horn cover and recheck the balance.

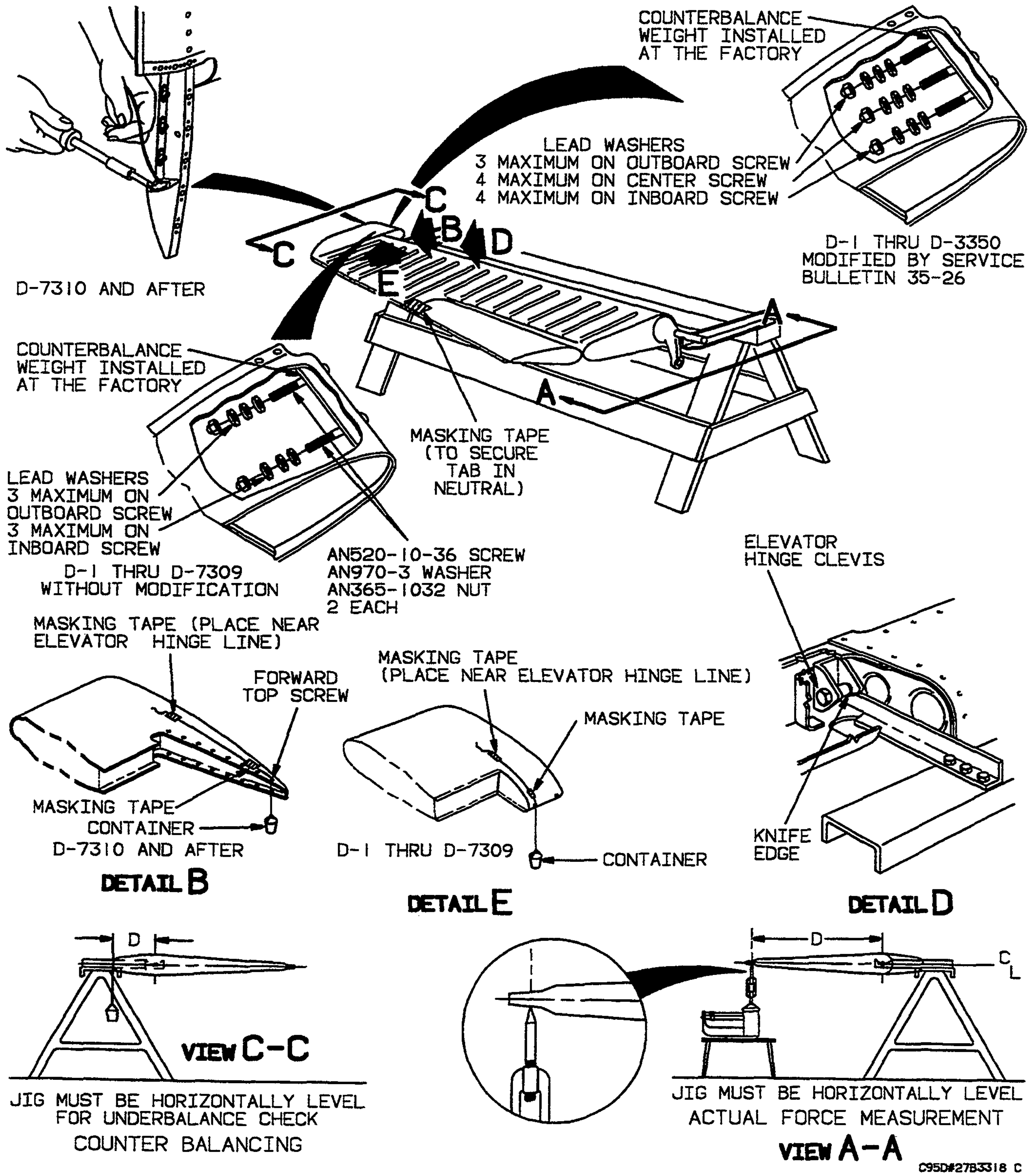
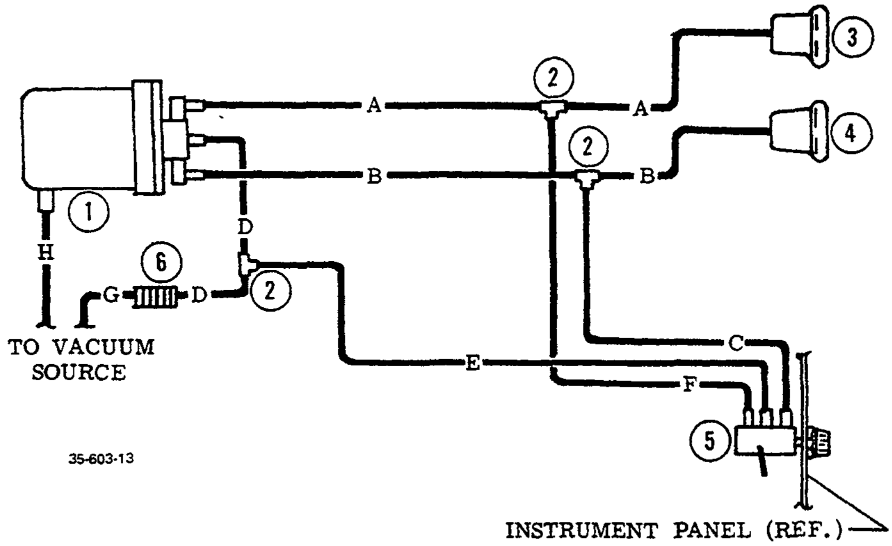


Figure 3-5. Balancing the Elevator/Rudder



1. Gyro Sense Element
2. Tee
3. Aileron Servo (Left Turn)
4. Aileron Servo (Right Turn)
5. Roll Trim Valve
6. Solenoid Valve

TUBING CODE

A. Green 3/8 O.D. Poly-Flo
B. Red 3/8 O.D. Poly-Flo
C. Red 3/16 O.D. Plastic
D. Gray 3/8 O.D. Poly-Flo
E. Gray 3/16 O.D. Plastic
F. Green 3/16 O.D. Plastic
G. Black 3/8 O.D. Poly-Flo
H. Black 3/8 O.D. Poly-Flo

Optional Stability Augmentation System
Figure 3-5A

FUEL SYSTEM

CAUTION

Any time the fuel system is completely drained or parts are replaced (fuel cells, fuel lines, etc.) air may enter the system. This condition could cause rough engine operation or loss of power. If the possibility that air has entered the system does exist, start and operate the engine on the ground until all air is removed from the system (both right and left side). Refer to the applicable Pilot's Operating Handbook and Airplane Flight Manual before starting and operating the engine.

Normal maintenance and repair procedures for the Bonanza's fuel system conform to usual aircraft practices: keeping connections and fittings tight and the supporting clamps in place to avoid vibration and chafing, replacement of defective or doubtful parts and protecting the system from dirt and contamination. The fuel cells themselves, their fittings and certain other components require some special handling; these items are discussed in the following paragraphs.

NOTE

Only graphite-petroleum thread lubricants should be used on fuel system fittings. Avoid sealers and lubricants which are not suitable in fuel.

The fuel inlet hose between the firewall and the fuel pump should be inspected at each periodic inspection for leakage and looseness between the hose and the hose fittings. This inspection should be made while the system is under pressure.

Inspecting and cleaning the fuel strainers should be considered to be of the utmost importance as a regular part of preventive maintenance. The frequency of inspecting and cleaning the fuel filters will depend upon service conditions and fuel handling equipment cleanliness. However, when operating in localities where there is an excessive amount of sand or dust, the strainers should be inspected at more frequent intervals. It is recommended that the fuel strainer located in the fuel selector valve may be inspected and cleaned every 100 hours. Also, the finger screen (if installed) in the fuel injection unit should be inspected and cleaned at intervals of at least 50-hours of operation and under no condition should the period be extended over 100-hours. The finger strainers in the fuel cell outlets should be removed and cleaned whenever solid materials are found in the cells, or if the airplane has been in storage for an extended period of time.

ENGINE FUEL PUMP ADJUSTMENT

Full rich adjustments may be made as follows:

a. Tee into either the fuel pump outlet fitting or metering unit inlet fitting (whichever is more accessible) with an appropriate pressure gage and extended fuel line to observe unmetered fuel pump pressures. (This gage should be vented to atmosphere.)

b. Adjust the engine idle speed to the specified RPM with the throttle plate adjusting; rotate the screw clockwise to increase or counterclockwise to decrease air.

NOTE

Later model fuel pumps are equipped with a variable orifice on the left side to adjust high side unmetered pressure.

c. Turn the fuel pump relief valve adjustment on the aft centerline of the pump to obtain pump pressure limits specified for idle RPM; rotate clockwise to increase pressure or counterclockwise to decrease pressure.

d. While maintaining idle pump pressure and idle RPM, obtain correct idle mixture with adjustment provided at metering unit. (Optimum idle mixture exists if, upon leaning with the mixture control, an increase of 25 to 50 RPM is experienced.)

NOTE

The preceding steps have provided the correct idle pump pressure, correct fuel flow and correct metering cam to throttle plate orientation.

Do not adjust idle mixture without first determining that idle pump pressure is correct.

e. Advance to full throttle and maximum rated engine RPM to check unmetered pump pressure and nozzle (metered) pressures or flows.

NOTE

Nozzle pressure or flow values may be monitored by either the gage in the airplane or an auxiliary pressure gage teed into the fuel manifold valve pressure port on top of the engine. If an auxiliary nozzle pressure gage is used to make this check on turbocharged engines, it must be of the vented type and be referenced to deck pressure in the same manner as the airplane fuel flow gage.

Criteria for full throttle, full rich adjustment of the fuel system should be specified nozzle pressure or flow values. Metered pump pressures at full throttle are included for reference only and may be used for troubleshooting the metering unit portion of the fuel system.

NOTE

If at static run-up, rated RPM cannot be achieved at full throttle, adjust pump pressure or flow slightly below limits, making certain specified values are achieved when rated RPM is achieved during takeoff roll.

NOTE

The procedure for adjusting fuel systems without variable orifice pumps (early IO-470 engines) is the same as above. However, all pressure values must be obtained with adjustment of the fuel pump relief valve only.

All top end values are shown for rated RPM and manifold pressure.

ENGINE	RPM PROPELLER	UNMETERED OR PUMP PRESSURE (PSI)	METERED OR NOZZLE PRESSURE (PSI)	FUEL FLOW LBS./HR.	FUEL FLOW GAL./HR.
IO-470-C, G and N	600	9-11	2.0-2.5		
	2600	25-27	15.5-16.5	123-130	21-22
IO-520-B, BA and BB	600	9-11	2.0-2.5		
	2700	28-31	15.5-16.5	136-144	23-24
TSIO-520-D	600	6-7	3.5-4.0		
	2700	29-32	17.0-18.0	160-175	27-29

CAUTION

The variable orifice adjusting screw on turbocharged engines is located on the aneroid housing and is turned clockwise to decrease pressure and counterclockwise to increase pressure. The rated manifold pressure at full throttle is achieved with the turbocharger controller setting. Do not adjust the fuel system at rated RPM by controlling manifold pressure with the throttle partly closed.

FUEL TRANSMITTER REPLACEMENT

a. Turn off electrical power.

b. Drain and purge fuel cell.

c. Remove the access door on the upper wing at station 98.854.

d. Disconnect transmitter wiring.

e. Cut safety wire and remove the transmitter support screws.

NOTE

Clean the area around the transmitter before removing the transmitter.

f. Remove the transmitter and gasket from the fuel cell.

g. Inspect the fuel cell for wrinkles or other obstructions that might impede transmitter float travel.

h. Set the new gasket and transmitter in position and ensure that the float is unrestricted through its full travel from stop to stop. The float arm may be bent, if necessary, to provide clearance.

i. Install the transmitter support screws and safety.

j. Connect the transmitter wiring. Turn the power on and check the fuel gage for empty reading.

NOTE

If the gage does not read empty, reinspect all transmitters to ensure the float arm is on the down stop and the float clears the bottom of the fuel cell. Check all wiring for faulty connections.

k. Fill the tanks and check the fuel gage for full reading.

INSPECTION OF THE FUEL TANK VENT LINES

The following procedure is recommended for inspection of the fuel tank vent lines and filler caps:

a. Remove the access plate from the lower wing surface at the outboard end of each wing fuel cell.

b. On airplanes not equipped with flush type fuel filler caps, open the door on the upper wing surface above each fuel filler cap.

c. On earlier airplanes equipped with the 10-gallon wing auxiliary fuel cells, remove the access plates from the lower wing surface just outboard of the auxiliary fuel cells and just aft of the auxiliary fuel cell flush vent.

d. Perform the following procedural steps for each fuel cell on the airplane.

1. Disconnect the fuel cell vent line from the fuel cell.

NOTE

On some earlier airplanes equipped with the auxiliary fuel tank in the baggage compartment, the vent tube is connected to the tank on the forward side of the fuel filler neck and is accessible from the inside of the cabin.

2. Apply air pressure to the fuel cell end of the vent line.

3. Alternately plug each vent opening (extended or flush) to assure that air is passing through all branches of the vent system for the cell, and continue to blow air through each branch until any obstructions have been removed. On early serials with the syphon break line terminating at the filler neck scupper, plug the line at the scupper and clear the remaining portion of the cell vent system as described above.

4. On airplanes with the syphon break line terminating on the lower surface of the wing, remove the syphon break check valve and blow air through the syphon break line from the check valve end, then reinstall the valve.

CAUTION

Be certain to reinstall the check valve with the arrow on the valve pointing toward the fuel cell, and with the valve hinge at the top of the valve.

5. Reconnect the fuel cell vent line to the fuel cell.

e. Reinstall the access plate below each fuel cell.

f. Visually check each fuel cell filler cap for looseness or deterioration of the seal which could cause leakage. If seals are deteriorated or damaged in any way, they should be replaced.

g. On airplanes not equipped with flush type fuel filler caps, secure the door above the fuel filler neck of each fuel cell.

h. Check the extended vent of the wing main and auxiliary fuel cells to ascertain that the vent extends a minimum of 1.75 inches below the lower wing skin surface.

The vent tube should be scarfed at a 45° angle on the forward side and canted forward 10° from vertical to assure positive vent pressure.

The common extended vent for the 10-gallon wing auxiliary fuel cell, which is located just forward of the rear spar carry-thru in the fuselage belly, should extend 1.50 inches below the skin surface. This vent tube should also be scarfed at a 45° angle on the forward side, and should be set between canted forward 5° and perpendicular to the skin.

Any configuration of the vent tubes other than the above may create negative air pressure which could draw air from the fuel cells.

WING TIP TANK REMOVAL

To remove wing tip tanks, proceed as follows:

a. Remove the drain plug from the bottom of the tank and drain the fuel.

b. Remove all phillips head screws from the tank flanges.

c. Have an assistant pull the tank from the tip of the wing far enough that the flex line can be disconnected.

d. Slide the spaghetti (insulating tubing) back from the quick disconnects on the two electric wires, part the connections and remove the tank.

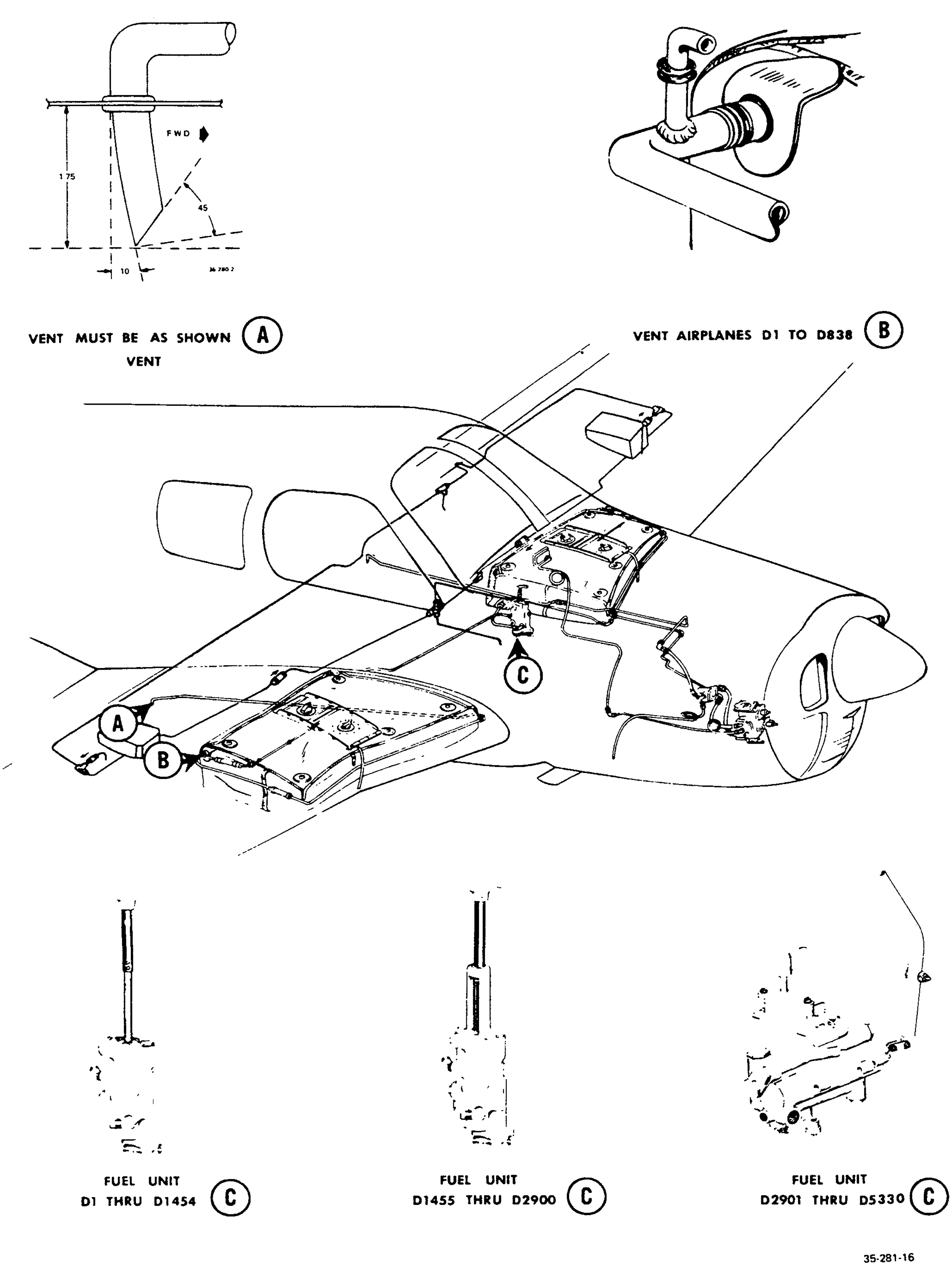


Figure 3-6. Fuel System (D-1 through D-5330)

WING TIP TANK INSTALLATION

a. Support the tank in place, connect the quick disconnects on the electrical wiring and slide the spaghetti (insulating tubing) over the connection.

b. Attach the flex line to the tank.

c. Attach the tank to the wing by installing phillips head screws in the tank flanges.

d. Ascertain that the drain plug is installed in the tank bottom.

After the tanks have been removed, check the flexible hoses for deterioration and inspect the exposed wiring.

REMOVAL AND INSTALLATION OF BLADDER-TYPE FUEL CELLS

CAUTION

Any time the fuel system is completely drained or parts are replaced (fuel cells, fuel lines, etc.) air may enter the system. This condition could cause rough engine operation or loss of power. If the possibility that air has entered the system does exist, start and operate the engine on the ground until all air is removed from the system (both right and left side). Refer to the applicable Pilot's Operating Handbook and Airplane Flight Manual before starting and operating the engine.

When fastening or unfastening the snap fasteners on airplanes prior to D-3543, avoid a straight push or pull. Each fastener should be tilted a little to one side before it is snapped or unsnapped. Care should be exercised to check all fittings for proper alignment to avoid unnecessary strain.

The sealing or compression surfaces of the cells must be assembled while absolutely dry; no sealing paste is to be used. Torque all bolts and screws to 35 ±1 inch-pounds. Under no circumstances should there be a repetition of torquing after the first application, without first backing off to relieve pressure. After final torque is applied, the cell should be inspected for final fit within its compartment, making certain that the cell is extended to the structure and no corners are folded in. After the installation is completed, a final inspection should be made prior to closing the cell to be sure it is free from foreign matter such as lint, dust, oil or installation equipment. If the cell is not thoroughly clean, it should be cleaned with a lint-free cloth moistened in water, alcohol or kerosene.

CAUTION

No other solvent should be used to clean the fuel cell.

The molded nipple fittings on the fuel cell are lightweight fittings, developed for ease in installation in certain locations in the airplane. To get the best service from this type of fitting, it is necessary to exercise certain precautions at the time of installation. The specific precautions other than the general care in handling are as follows:

a. Insert the flow tube into the fitting until 3/8 inch or more of the tube extends through the fitting.

b. Locate the hose clamp on the fabric-reinforced area of the nipple; it should clear the end of the fitting by 1/4 inch as indicated in the NIPPLE CLAMP TORQUE CHART.

c. Torque the hose clamps, drawing them up in one operation. If retightening is necessary, release the clamp completely and wait at least 15 minutes before retightening.

d. Use no sealing paste or gasket compound.

e. Apply a thin film of Simonize wax to metal flow tubes as a lubricant. No other lubricant should be used.

Nipple Clamp Torque Chart

INSIDE DIAMETER (IN INCHES) OF NIPPLE, OUTSIDE DIAMETER (IN INCHES) OF TUBE	INCH-POUNDS OF TORQUE FOR FUEL CELL NIPPLE CLAMPS
.25 through .62	12 to 16
.75 and 1.00	15 to 20
1.50	25 to 30
2.00	30 to 35
3.00	35 to 40

CAUTION

If replacement Goodyear fuel cells have clear/yellow nipples, torque the fuel cell nipple clamps to 25 ±5 inch-pounds.

CARE AND REPAIR OF FUEL CELLS

The following is a recommended method of handling bladder-type fuel cells, including storage and post-installation inspection.

When synthetic rubber fuel cells are placed in service, the gasoline has a tendency to extract the plasticizer from the inner liner of the cell. This extraction of plasticizer is not detrimental as long as gasoline remains in the fuel cell, inasmuch as the gasoline itself will act as a suitable plasticizer.

A thin coating of light engine oil should be flushed, sprayed or rubbed on the inner liners of all serviceable fuel cells which have contained gasoline if it is evident that the cells will remain without fuel for more than 10 days, whether installed in airplanes or not, or if cells are to be collapsed or deformed inside their bays. The oil will act as a temporary plasticizer and will prevent the inner liner from drying out and cracking.

The cell should not be removed or handled until 24 hours after the oil has been applied.

The following method of repair is recommended by the US Rubber Company.

NOTE

No repairs are to be made on the radius of a cell or in the fitting area of the cell. Cells with such damage are to be returned to the US Rubber Company, Fuel Cell Division, Mishawaka, Indiana, for repair. No damaged area larger than 2 inches may be repaired in the field.

OUTSIDE PATCH

a. Use a piece of synthetic rubber coated (US Rubber Company 5264) outside repair material large enough to cover damage at least 2 inches from the cut in any direction. Buff this material lightly and thoroughly with fine sandpaper and wash with methyl ethyl ketone (US Rubber Company 3339 solution) to remove buffing dust.

b. Cement the buffed side of the patch with two coats of black rubber cement (Minnesota Mining and Manufacturing Co. EC678). Allow each coat to dry 10 to 15 minutes.

c. Buff the cell area to be patched lightly and thoroughly with fine sandpaper and wash with methyl ethyl ketone to remove buffing dust.

d. Cement the buffed area with two coats of Minnesota Mining and Manufacturing Co. EC678 cement. Allow each coat to dry 10 to 15 minutes.

e. Freshen the cemented area of the patch and the cemented area of the cell with methyl ethyl ketone.

f. Place the patch on the damaged area while the cement is still tacky. Make contact first at the center of the patch, and then roll the patch outward by hand. Next, apply pressure to the patch with a 1/4 inch roller. Begin at the center and work outward to prevent air or solvent from being trapped between the patch and the cell.

g. Cover the patch with a sheet of polyethylene and lay a 50 pound shot bag over the repair. Allow the shot bag to remain undisturbed for 6 hours.

h. Seal the patch and a half-inch strip of the cell beyond the patch with one coat of black rubber cement and allow the patch to remain undisturbed for 6 hours.

INSIDE PATCH

After the damaged area has been patched on the outside of the cell and the repair allowed to stand a minimum of 6 hours, the cell is then ready to have the patch applied on the inside of the cell. The damaged area, to which this patch is to be applied, may be pulled through the filler neck opening to make the repair simpler. The repair procedure for the inside of the cell is the same as for the outside, except US Rubber Company repair material 5200/5187 must be used.

INSTALLATION OF VELCRO TAPE WITH REPLACEMENT FUEL CELLS (SERIALS D-5726 THROUGH D-9068)

Airplanes that have had or will have existing fuel cells replaced with spare fuel cells P/N 35-370135-1, 35-380135-2, 35-380135-3, and 35-380135-4 should install Kit No. 35-9009 S in the fuel cell liner top, bottom, root rib and spar as described below and in Service Instructions No. 0365-281. Serials D-9069 and after are delivered from the factory with the equivalent of Kit No. 35-9009 S installed.

a. Remove the fuel cell as described in REMOVAL AND INSTALLATION OF THE FUEL CELLS.

NOTE

Airplanes that have had any of the above fuel cells previously installed do not require complete removal of the fuel cell. Access covers and inboard fittings should be removed and the inboard end of the fuel cell pulled back far enough to allow installation of the velcro tape.

b. Lightly sand the surface that the velcro tape will be bonded to as shown in Figure 3-6A and clean the sanded surface with naphtha.

c. Activate the velcro by dipping into methyl ethyl ketone and press the velcro tape in place as shown in Figure 3-6A.

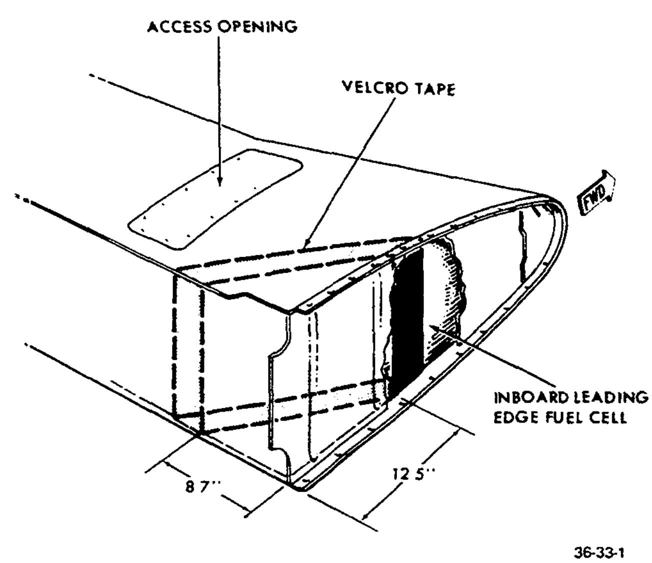
d. Position the fuel cell in place and press the velcro pile and hook together, pressing outboard in the area of the velcro tape.

e. Inspect the flapper valve for free movement under its own weight. If the flapper valve binds, see INSPECTION OF MAIN FUEL CELL FLAPPER VALVE.

NOTE

Before closing the zipper, inspect the fuel cell for any foreign matter.

f. Close the zipper and refer to REMOVAL AND INSTALLATION OF THE FUEL CELLS for further instructions on installing the fuel cell.



Installation Of Velcro Tape
Figure 3-6A

NOTE

Installation of Kit 35-9009 S is required on a first time basis only for each fuel cell. Repeat installations of the kit are unnecessary when new cells are installed.

INSPECTION OF MAIN FUEL CELL FLAPPER VALVE

On aircraft that are equipped with baffled main fuel cells, the flapper valves (Metal or Phenolic) should be inspected periodically (Beech Aircraft recommends that the inspection be accomplished at each annual inspection) for freedom of operation and proper seating.

The inspection may be accomplished as follows:

a. Drain all fuel from the aircraft.
b. Remove the rectangular access plate located just outboard of the fuselage on the upper skin of each wing leading edge.
c. Cut the safety wire and remove the attaching bolts from the fuel cell access plate.

NOTE

Clean the area around the access plate before removing the plate.

d. Remove the fuel cell access plate and open the zipper in the baffle.
e. Locate the flapper valve in the lower outboard section of the baffle and determine if the flapper valve is metal or phenolic.
f. If the flapper valve is metal, it should be inspected and repaired, if necessary, as described below.

1. Move the flapper element of the valve through its full travel. There should be no binding and the element should seat securely against the valve plate.
2. If the flapper element binds and/or does not seat properly, the flapper element arm could be bent. The arm can be straightened by placing a screwdriver between the arm and the element and pressing the element toward the closed position.
3. If after straightening the arm, the flapper element still binds and/or does not seat properly, the flapper element should be removed and replaced with a new flapper element assembly. The flapper element assembly may be replaced by removing the two attaching bolts from the upper part of the flapper valve. The same attaching parts should be used to install the new flapper element assembly. The new flapper element assembly should be inspected, after installation, to determine that the assembly did not receive damage, during installation, that could cause it to bind and/or not seat properly.

g. If the flapper valve is phenolic, it should be inspected and reworked, if necessary, as described below.

1. Move the flapper valve element through its full travel. There should be no binding and the element should seat securely against the valve plate.
2. If the flapper element binds and/or does not seat properly, the upper rear side of the flapper element may be binding against the valve plate.
3. The flapper valve element may be relieved from binding by filing a small radius on the upper rear side of the element.

NOTE

A shop towel saturated with light oil may be placed directly below the flapper valve to absorb the phenolic dust during rework.

4. After determining that the flapper valve is functioning properly, throughly wipe the area in the vicinity of the flapper valve with an oil saturated shop towel.

h. Clean the gasket contact area on the fuel cell and fuel cell access plate.
i. Close the zipper in the baffle.
j. Install a new gasket, and secure the fuel cell access plate in place.
k. Tighten the fuel cell access plate attaching bolts to a torque of 45 to 50 inch-pounds and safety wire.
l. Reinstall the rectangular access plate on the wing leading edge skin.

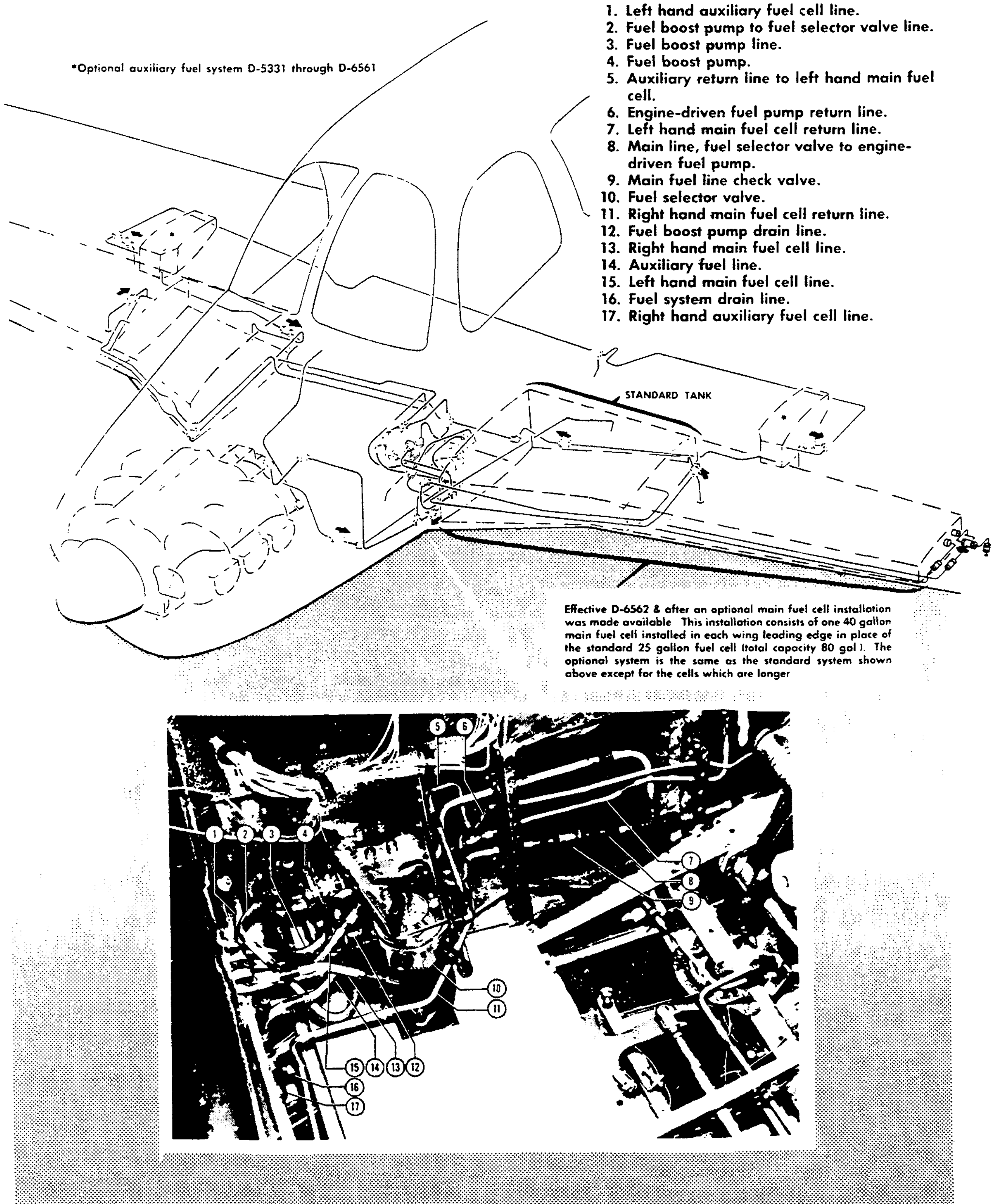
OIL SYSTEM

Bonanzas prior to D-4866 are equipped with a dry-sump type pressure oil system with a 2-1/2 gallon supply tank. The oil system consists of the oil tank, oil radiator, oil temperature indicator, oil pressure indicator, oil pressure relief valve, oil drain on the supply tank and an oil pump which is an integral part of the engine. The oil pressure should be between 40 and 50 pounds at normal operating rpm and 10 pounds minimum at idling rpm.

Bonanzas D-4866 and after are equipped with a wet sump oil system requiring 9 quarts of oil on airplanes D-4866 thru D-5725, 10 quarts on airplanes D-5726 thru D-7309 and 12 quarts on airplanes D-7310 and after. The oil system consists of an oil radiator, oil temperature indicator, oil pressure indicator, oil pressure relief valve, oil drain in the engine sump and an oil pump which is an integral part of the engine. The oil pressure should be between 30 and 60 psi at normal operating rpm and 10 psi minimum at idling rpm.

CLEANING THE OIL TANK AND COOLER, PRIOR TO D-4866.

The oil tank should be cleaned when the engine is removed for overhaul and at each engine change. More frequent cleaning may be required under some operating conditions



1. Left hand auxiliary fuel cell line.
2. Fuel boost pump to fuel selector valve line.
3. Fuel boost pump line.
4. Fuel boost pump.
5. Auxiliary return line to left hand main fuel cell.
6. Engine-driven fuel pump return line.
7. Left hand main fuel cell return line.
8. Main line, fuel selector valve to engine-driven fuel pump.
9. Main fuel line check valve.
10. Fuel selector valve.
11. Right hand main fuel cell return line.
12. Fuel boost pump drain line.
13. Right hand main fuel cell line.
14. Auxiliary fuel line.
15. Left hand main fuel cell line.
16. Fuel system drain line.
17. Right hand auxiliary fuel cell line.

Figure 3-7. Fuel System D-5331 thru D-6874, except D-6632

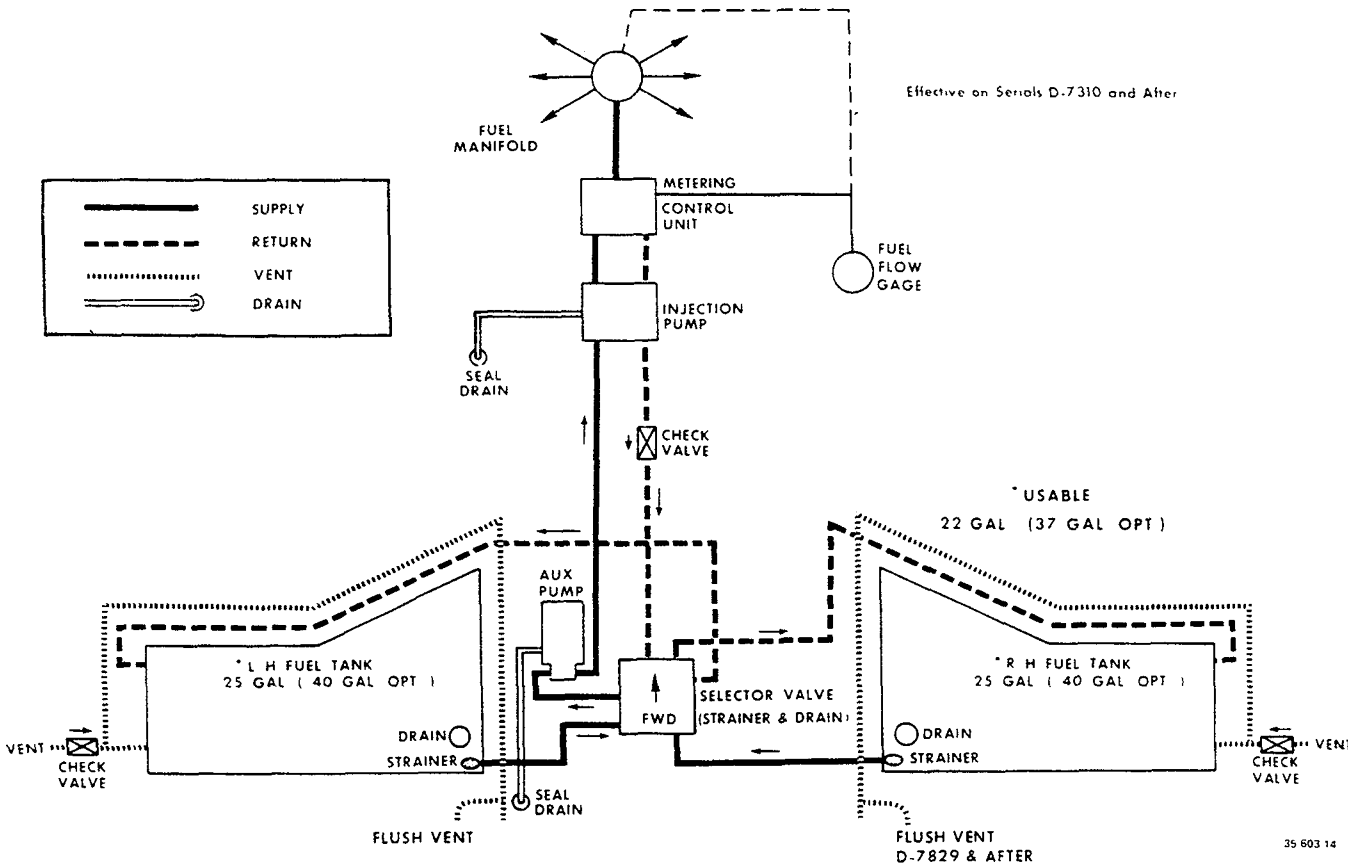


Figure 3-7A. Fuel System, D-6875 and after, Without Turbocharged Engine

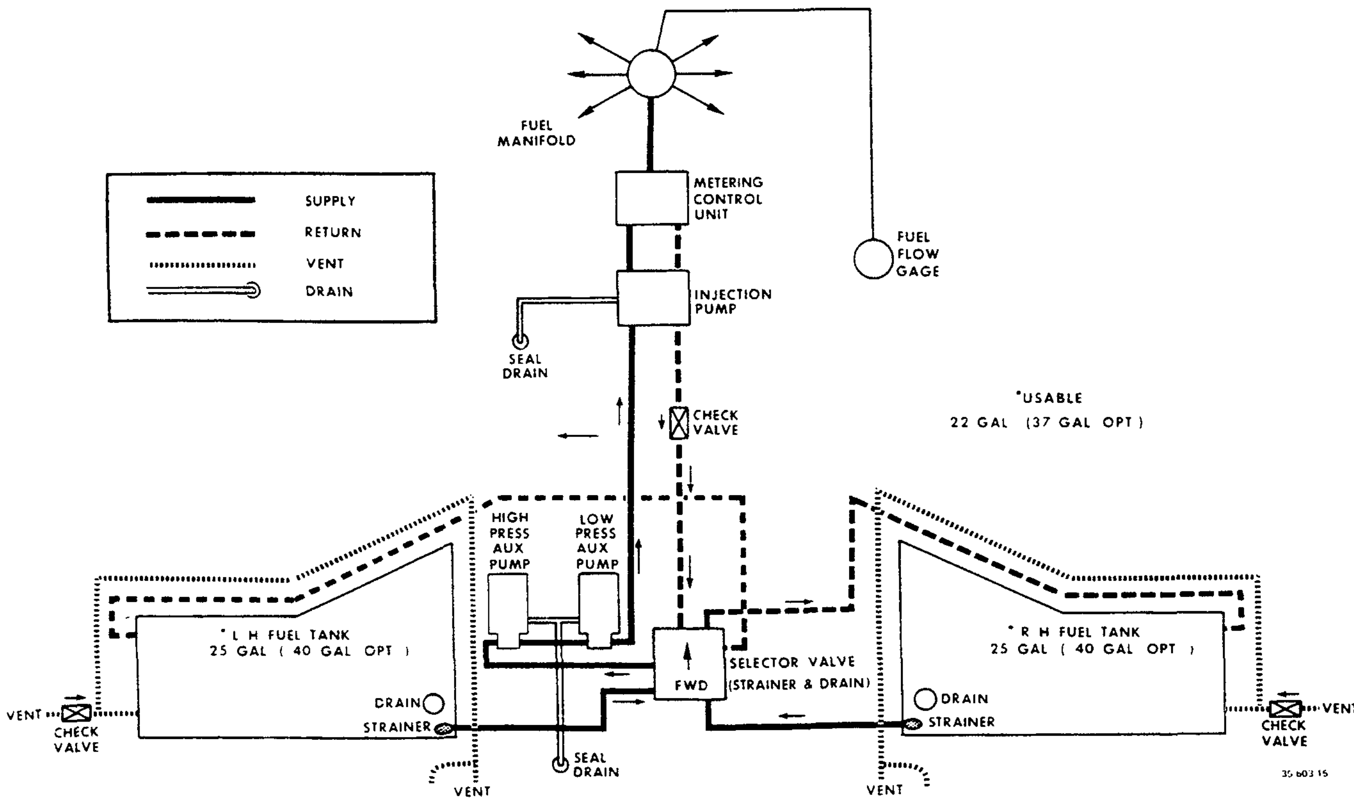


Figure 3-7B. Fuel System, With Turbocharged Engine or by engine trouble which would afford the possibility of foreign particles entering the oil tank and lubrication system.

The oil tank should be removed from the airplane and thoroughly flushed with kerosene or distillate to remove excessive oil, loose carbon particles and gum.

If a vat or tank of sufficient size is available, the oil tank should then be immersed in kerosene or distillate. All openings in the oil tank except the check valve should be unobstructed to permit the fluid to have access to the interior of the tank, and it should be ascertained that the interior is completely filled with cleaner. Do not remove the check valve from the tank. If a vat or tank of sufficient size to permit submersion of the oil tank is not available, the openings in the oil tank may be plugged and the tank completely filled with kerosene or distillate. The tank should be permitted to soak for a minimum of three hours. After soaking, the cooler should be drained and flushed thoroughly with clean kerosene or distillate to remove all traces of loosened carbon and contaminates.

Kerosene or distillate are the only recommended cleaners for the oil tank; commercial cleaners should not be used. The interior of some of the oil tanks was treated with a sealing compound during manufacture, and commercial cleaners may tend to loosen and disintegrate this sealing compound.

COWL FLAP RIGGING

a. Attach the flap control rod end to the flap.

b. Position the control arm, attached to the wheel well cover, up and forward so that the flap control rod parallels the control arm. Connect the rod to the control arm.

c. Adjust the control rod linkage so that the door pulls in snug against the opening.

NOTE

When adjusting the rod end linkage keep rod end threads in bearing by observing threads through sight hole in the rod end.

d. Set the push-pull control in the pilot's compartment to the closed position.

e. Rig the push-pull control arm assembly, at the wheel well cover (right hand side), in the forward position so that the control rod will center over the arm hinge. A maximum of .06 inches forward of the arm hinge center is permissable. An amount greater than this maximum may cause the control to override center and lock.

6. Attach the control rod balljoint link to the arm assembly and pull the control to the full open position. The flap should open approximately 4 inches measured at the aft inboard end of the flap to the face of the exhaust stack flame shield.

RIGGING THE FORWARD COWL FLAPS ON TURBOCHARGED AIRPLANES

The Bonanza equipped with the turbocharged engine has additional cowl flaps installed on the right and left engine access panels. Both flaps are connected, by individual control cables, to a single forward cowl flap control lever on the pedestal below the main control panel. The control cable for the right cowl flap is 52 inches long; 2 inches shorter than the left control cable. The cowl flaps should open 3-1/2 to 4 inches with the forward flap control lever pulled all the way out. Adjustment is accomplished by screwing the clevis on the control rod end clockwise to reduce the opening and counterclockwise to increase the opening of the flaps. After the clevis has been adjusted to its proper position, a jam nut is tightened against the clevis to prevent further movement. The control cable clevis is pinned to the cowl flap control arm by means of a quick-release pin which must be installed before the engine access panels can be secured to the aircraft.

FLAP SYSTEM

NOTE

In event of emergency flap extension at speeds above the normal extension speeds inspect the flaps for damage or distortion and repair as necessary before the next flight.

The flaps are electrically operated and are hinged in specially designed tracks. When extended, the flap moves rearward as it pivots downward. This gives a large effective wing area, which produces additional lift and drag. On serials D-1 through D-3950 the flaps are constructed of magnesium. On serials D-3951 and after the magnesium flaps have been replaced with aluminum flaps.

FLAPS, D-1 THROUGH D-838

The flap operating motor is located ahead of the rear carry thru spar under the rear seat. Power is transmitted to the flap actuator in each wing by flexible shafts enclosed in a steel tube housing.

FLAPS, D-839 AND AFTER.

On airplane Serial No. D-839 and after, the flap operating motor and gearbox are located under the front seat. Power is transmitted to the flap actuator in each wing by flexible shafts.

FLAP LIMIT SWITCH ADJUSTMENT

NOTE

Battery voltage is not sufficient to properly cycle the flaps during rigging. On serials D-10097 and D-10120 and after, a 28.25 ± .25 volt auxiliary power unit capable of maintaining the initial setting within .25 volt during the extension and retraction cycles is recommended. On earlier serials use an auxiliary power supply capable of maintaining 14.25 ± .25 volts during the extension and retraction cycles.

The flap limit switches are located in the left wing panel approximately 3 feet outboard of No. 1 wing rib, and are accessible from the underside of the wing through the landing gear wheel well. Run the flaps down, then up and check the up position. If the flap is not in neutral position, loosen the locknuts on the upper limit switch and adjust as necessary to stop the flaps in the neutral position. Actuate the subpanel switch to landing position and measure the degrees of travel. For airplanes prior to D-2201 the correct travel is 20 + 0 − 1 degrees. For serials D-2201 and after the correct travel is 30 + 0 − 1 degrees. Adjustment of the landing position of the flap is made on the downlimit switch.

On serials D-3702 and after the flap limit switches are mounted on a bracket and installed on the outboard side of the inboard flap track in the left wing panel. The limit switches control the travel of the flaps by breaking the circuit to the flap motor at the extreme limits of travel. They are accessible by lowering the flaps.

TWO-POSITION FLAPS (D-3702 through D-10178)

CAUTION

The flap jack screws must not bottom in up or down position, and the flap rollers must not bottom in the tracks in up or down position.

To adjust the flap to neutral position loosen the screws of the switch installation so that the switch installation can pivot on the forward elongated hole and adjust as necessary to stop flaps in neutral position. Actuate the flap switch to the landing position and measure the degrees of travel. Adjustment of the landing position of the flaps is made on the downlimit switch.

THREE-POSITION FLAPS
(D-10179 and after)

CAUTION

The flap jack screws must not bottom in up or down position, and the flap rollers must not bottom in the flap tracks in up or down position.

The three position flaps adjust in a similar manner to the two position flaps These flap limit switches are located in the same area as the two position switches, and are accessible in the same manner.

The left flap is rigged first and then the right flap is synchronized with it. Rig as follows:

NOTE

Rig the flaps under a simulated flight load to reduce overtravel to a minimum after the limit switches have been adjusted.

1. Adjust the uplimit switch so the flap will stop in the 0° position (determined with flap travel board)
2 Adjust the 14° limit (inboard) switch in its mounting slot until the flap is positioned at 14° to 14.5° after the flap has been actuated from the up to takeoff position (15° range). Adjust the 16° limit (outboard) switch in its mounting slot until the flap is positioned at 15.5° to 16° after the flap has been actuated from the down to takeoff position
3 Adjust the downlimit switch in its mounting slot until it actuates at 28° to 30° of flap travel.
4 Remove the bolt attaching the right actuator to the right flap
5 Turn the jackscrew on the right actuator in or out to align the right flap with the left
6. Install the bolt connecting the actuator to the flap.

CAUTION

If the flaps are removed for any reason the main power switch should be in the OFF position.

NOTE

After the flap is completely rigged, adjust the rubber bumper (flap down) installed on the flap and aileron dividing rib. Turn the adjusting screw in or out, as required, to take out play or stop vibration when the flap is in the up position. A distinct change in the sound of the flap motor near the completion of the flap up travel may indicate an excessive outward adjustment of the bumper.

7. Operate the flaps through full travel to ensure that the flaps contact the limit switches before they contact the rubber bumper

FLAP POSITION INDICATOR AND ADJUSTMENT

On Bonanza serials D-7977 and after a flap position indicator gage is installed in the instrument panel and replaces the flap position indicator lights. An adjustable flap position indicator transmitter is installed on the flap actuator in the left wing just forward of the rear spar to coordinate gage reading with flap travel.

1. Adjust the flap travel limit switches to provide the correct up and down travel of the flaps. (See flap limit switch adjustment.)
2. Run the flaps down and check the pilot's compartment flap position indicator for 100% flaps. If down flaps are not indicated, loosen the transmitter attachment bolts and adjust transmitter fore and aft or rotate slightly until the reading is correct, then tighten the transmitter attaching bolts
3. Run the flaps up and check the indicator for up flaps reading

LANDING GEAR SYSTEM

NOTE

In an emergency, the landing gear may be used to create additional drag. Should disorientation occur under instrument conditions, the lowering of the landing gear will reduce the tendency for excessive speed buildup This procedure would also be appropriate for a non-instrument rated pilot who unavoidably encounters instrument conditions or in other emergencies such as severe turbulence.

Should the landing gear be used at speeds higher than the maximum extension speed, a special inspection of the gear doors is required, with repair as necessary.

The landing gears are operated through adjustable linkage connected to an actuator assembly mounted beneath the front seats. The actuator assembly is driven by an electric motor controlled by the landing gear control switch mounted on the right hand switch panel and limit switches mounted adjacent to the actuator assembly. The landing gear motor and the actuator assembly are accessible by removing the front seat. Access to the limit switches on serials D-1 through D-2680 may be gained by removing the inspection door in the fuselage skin beneath the cabin. On serials D-2681 and after, the switches are accessible by removing the front seats.

The landing gears may be electrically retracted and extended, and in an emergency may be lowered manually The landing gear motor circuit consists of the landing gear control switch, limit switches, safety switch, motor and circuit breaker. The push button for resetting the landing gear motor circuit breaker is located in the right hand subpanel.

When the landing gear control switch is placed in the "UP" position, the circuit is completed to the safety switch on the right hand landing gear. If the safety switch has been actuated to complete the circuit to the up winding of the landing gear motor, as would be the case if the airplane were airborne or supported on jacks, the landing gear motor will run until the landing gear is fully retracted and the uplimit switch is actuated, breaking the circuit to the landing gear motor. When the reversing switch is placed in the "DOWN" position, the circuit is completed to the down winding of the landing gear motor and the motor will operate until the landing gear has been fully extended and the down limit switch actuated, breaking the circuit to the landing gear motor.

LANDING GEAR SAFETY SYSTEM (OPTIONAL)

The optional landing gear safety system functions through the action of a solenoid in the landing gear position switch in conjunction with a three-position safety system switch, a relay and diode mounted on the front spar, two pressure switches mounted on the inboard side of the left main landing gear wheel well, and a microswitch located adjacent to the existing throttle position warning switch in the engine compartment.

Each pressure switch is connected into the pitot and static system The pressure switch in the gear-up circuit is actuated by the pressure differential that exists between the pitot and static air system and will close with increasing pressure at approximately 80 mph on Models 35 thru G35 and 90 mph on H35 Bonanzas and after. The pressure switch in the gear-down circuit will close with decreasing pressure at 110 mph on Model 35 thru G35 and 120 mph on H35 Bonanzas and after.

When the landing gear position switch is in the UP position and an airspeed of 80 or 90 mph has been attained, the pressure switch in the gear-up circuit closes and actuates a relay mounted on the front spar, thus completing the circuit and retracting the landing gear. A diode locks the relay in the closed position until the retraction cycle is completed. For the preceding to occur, however, the microswitch in the engine compartment must also be in the open position. This microswitch is actuated by the throttle control when the throttle is advanced sufficiently for the manifold pressure gage to register approximately 18 inches Hg. Conversely, if the throttle is retarded beyond the position corresponding to approximately 18 inches Hg. of manifold pressure, the microswitch will close If at the same time the microswitch closes the airspeed has dropped below 120 mph, the resultant pressure differential between the pitot and static systems will actuate the pressure switch in the gear-down circuit With both the microswitch and pressure switch closed, the current flow through the solenoid will cause the landing gear position switch to drop into the DOWN position, thus completing the gear-down circuit.

If the landing gear position switch is placed in the UP position while the landing gear safety system switch is in the ON position, the landing gears will retract only when the following conditions are mutually fulfilled:

1. The airplane must have attained an airspeed of at least 80 or 90 mph.
2. The throttle setting must have been advanced sufficiently to have produced a manifold pressure of approximately 18 inches Hg.

NOTE

> The throttle switch is set at the factory to close when an approximate manifold pressure is produced at about 3000 feet of altitude. The approximate manifold reading for aircraft serials prior to D-7882 was 20 inches Hg and 18 inches Hg on aircraft serials thereafter. Airplane serials with the throttle switch set at the factory at 20 inches Hg may change to 18 inches Hg setting. Flight Manual Supplement P/N 35-364170-5, dated June 8, 1965 or later should be incorporated in the airplane if the manifold pressure is changed to 18 inches Hg

By the same token, the landing gear will automatically extend under the following conditions:

1 The airspeed must have dropped below 110 or 120 mph.
2. The throttle setting must have been retarded enough for manifold pressure to have dropped below approximately 18 inches Hg.

The safety system switch is a three position switch, with normally ON or OFF positions. The switch also contains a momentary or test position for checking that the system is functioning properly. When released from the test position, the switch returns to the ON position.

SYSTEM MAINTENANCE AND ADJUSTMENT

No maintenance is required for the landing gear safety system, other than replacing defective units or checking the electrical wiring for condition, security of attachment, and tightness of electrical connections. The switches are preset and adjustment will not normally be required; however, should the system fail to function properly, the following checks and adjustments may be accomplished:

CHECK OF SYSTEM WITH SAFETY SWITCH IN TEST POSITION

1. Place the throttle in the closed or retarded position.
2. Place the battery master switch ON The landing gear circuit breaker may be either IN or OUT.
3. Place the landing gear safety system switch in the momentary full up (TEST) position. Noise or movement of the solenoid in the landing gear position switch indicates that the automatic landing gear extension part of the system is functioning properly. The on-off switch returns normally to the ON position unless the pilot intentionally places the switch in the OFF position

MICROSWITCH ADJUSTMENT

The microswitch cannot be accurately adjusted on the ground. Before the microswitch is adjusted, it must be ascertained that the throttle warning horn switch is properly set (see this section for proper setting of the throttle warning horn switch). The microswitch may then be adjusted as follows.

1. With the airplane in flight, mark the throttle control at the control panel when the manifold pressure gage registers approximately 18 inches Hg.
2. With the airplane on the ground, move the throttle until the mark on the control is aligned with the control panel just as it was when the mark was made while the airplane was in flight.
3. Adjust the microswitch until the cam clicks the switch closed with the throttle in the position indicated in the preceding step

PRESSURE SWITCH ADJUSTMENT

The pressure switches are preset and will not normally require adjustment Because of the built-in tolerance of these switches, they should not be tampered with unless radically out of adjustment, that is unless the switch in question fails to actuate at an airspeed within 2 mph above or below the setting recommended for it. Even then the system plumbing and electrical wiring should be checked to ascertain that the source of trouble is not something other than improper adjustment of the pressure switches.

1. Place the aircraft on jacks.
2. With the master switch ON, the landing gear circuit breaker ON, and the landing gear warning circuit breaker OFF, advance the throttle to its maximum position.
3. Place the landing gear safety position switch in the ON position.
4. Place the landing gear position switch in the UP position.
5. Clamp a section of soft rubber tubing over the pitot head inlet, making certain that the connection is airtight.
6. Crimp the end of the tubing and roll it up until the airspeed indicator registers 80 or 90 mph. The landing gear will start retracting immediately if the pressure switch is properly adjusted.

CAUTION

To avoid rupturing the diaphragm of the airspeed indicator, the rubber tubing must be rolled SLOWLY.

7. If the landing gear failed to retract in the preceding step, turn the master switch OFF and adjust the pressure switch (upper switch of the two installed in the left main wheel well) as follows.

   a. Secure the rolled up tubing so that it will hold the airspeed indicator reading at 80 or 90 mph

   b. Connect a continuity tester across the contacts of the pressure switch, then turn the adjustment screw until the switch closes at the 80 or 90 mph reading on the airspeed indicator.

8. Turn the master switch ON and roll up the rubber tubing until the airspeed indicator registers 130 mph, then secure the tubing so that the airspeed indicator will hold that reading.
9. Retard the throttle.
10. Slowly bleed off pressure until the airspeed indicator registers 110 or 120 mph. The landing gear will extend immediately if the pressure switch is properly adjusted
11. Should the landing gear fail to extend, turn the master switch OFF and adjust the pressure switch (lower switch of the two installed in the left main gear wheel well) as follows:

    a. Secure the rolled up tubing so that it will hold the airspeed indicator reading at 110 or 120 mph.

    b. Connect a continuity tester across the contacts of the pressure switch, then turn the adjustment screw until the switch closes at the 110 or 120 mph reading on the airpseed indicator.

12. Turn the master switch ON and check the landing gear safety system through the complete cycle of operation.

RIGGING THE LANDING GEAR

NOTE

Battery voltage is not sufficient to properly cycle the landing gear during rigging. On serials D-10097 and D-10120 and after, a 28.25 ± .25 volt auxiliary power unit capable of maintaining the initial setting within .25 volt during extension and retraction cycles is recommended. On earlier serials use an auxiliary power supply capable of maintaining 14.25 ± .25 volts during the extension and retraction cycles.

NOTE

If the airplane is not equipped with an external power receptacle, a jumper cable can be used to connect the external power supply to the battery. Care should be taken to match polarities.

CAUTION

Excessive operation of the landing gear motor without proper cooling may cause damage to the motor. Allow a short period of time for cooling after each extension and retraction cycle.

Whenever the landing gear mechanism or doors are removed or disconnected, retract the gear and check the rigging The following procedure for rigging the landing gear was written on the assumption that the entire landing gear is out of rig

NOTE

Over torquing the lubrication type bolt that connects the lower end of the nose gear V-brace assembly to the shock strut can cause binding Torque the nut to only 25 to 75 inch-pounds

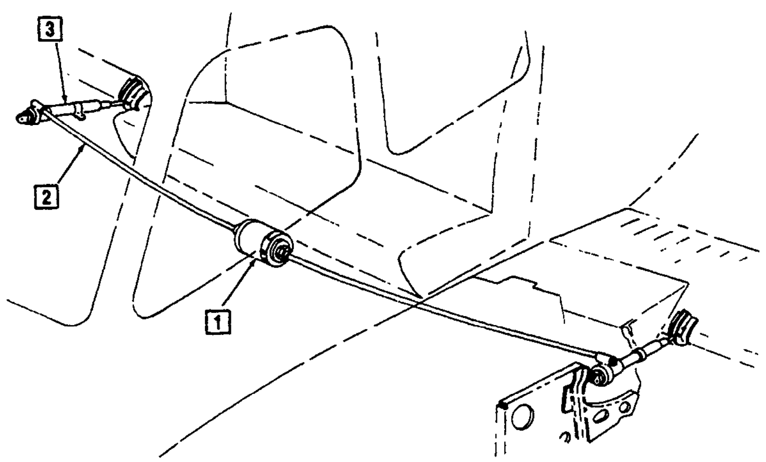
1. Lengthen the main and nose gear retract rods sufficiently to eliminate the danger of the V-brace on the main gear damaging the wing skin when the gear is retracted and to prevent excessive tensions on the nose gear retract rods. Damage to vital parts may result if abnormal loads are applied to the retract system. By lengthening the retract rod, such danger is removed. Disconnect uplock cables at the brackets, leaving the springs attached. If the springs are disconnected, upon the retraction of the gear the uplock arm may damage the top wing skin. Place the uplock block in the lower position
2. Disconnect nose wheel door linkage at attaching point on the door and remove links by unscrewing at the upper ball joint
3. Remove bolts attaching the main gear outboard door links at main strut. Remove inboard door actuator rod by unscrewing from inboard rod ends and removing bolt in door bracket.
4 Screw up travel stop bolt in (located on horizontal segment of main gear strut A-frame) to clear strut.

NOTE

Final adjustment of up travel stop bolt is made after proper travel of gear has been completed

FLAP SYSTEM

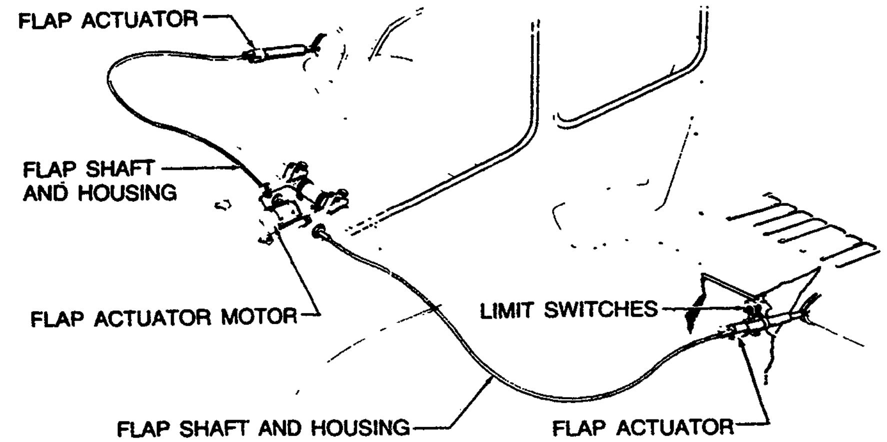
AIRPLANE SERIAL NO. D-1 THROUGH D-838



1. FLAP ACTUATOR MOTOR
2. FLAP SHAFT AND HOUSING
3. FLAP ACTUATOR

FLAP SYSTEM

AIRPLANE SERIAL NO. D-839 AND AFTER



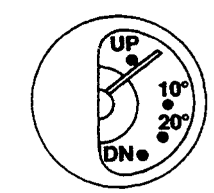
FLAP SETTING

FULL DOWN SETTING
20° DOWN FROM NEUTRAL - SERIAL NO. D-1 THRU D-2200
30° DOWN FROM NEUTRAL - SERIAL NO. D-2201 AND AFTER

APPROACH SETTING
15° DOWN FROM NEUTRAL - SERIAL NO. D-10179 AND AFTER

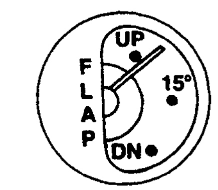
FLAP INDICATOR

AIRPLANE SERIAL NO. D-7977 THROUGH D-10178



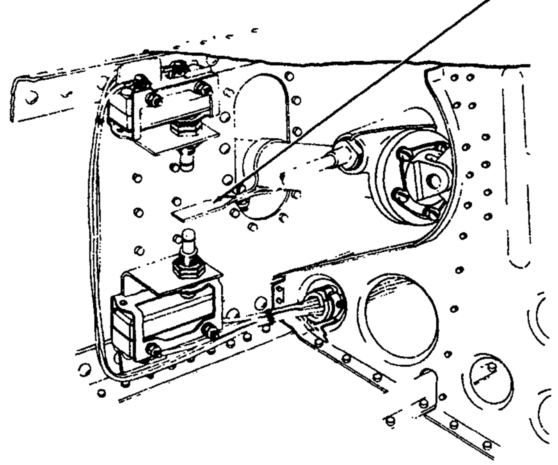
FLAP INDICATOR

AIRPLANE SERIAL NO. D-10179 AND AFTER



FLAP LIMIT SWITCHES

AIRPLANE SERIAL NO. D-1 THROUGH D-3701

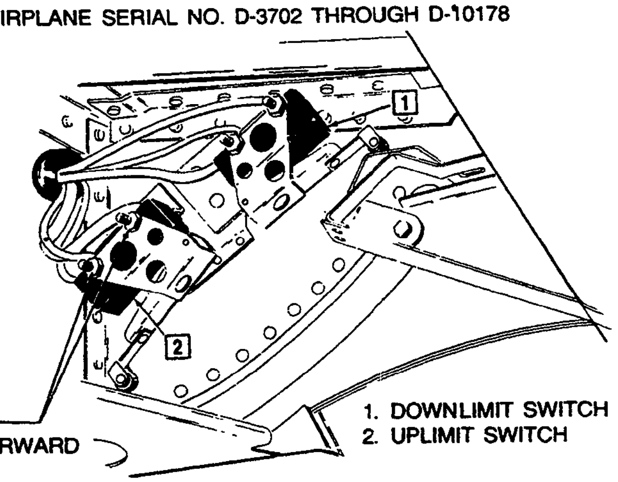


DO NOT BEND TAB OR ROTATE ACTUATOR TO ADJUST SWITCH SETTING.

LOOSEN JAM NUTS ON SWITCH PLUNGERS AND MOVE SWITCHES UP OR DOWN INDIVIDUALLY.

FLAP LIMIT SWITCHES

AIRPLANE SERIAL NO. D-3702 THROUGH D-10178

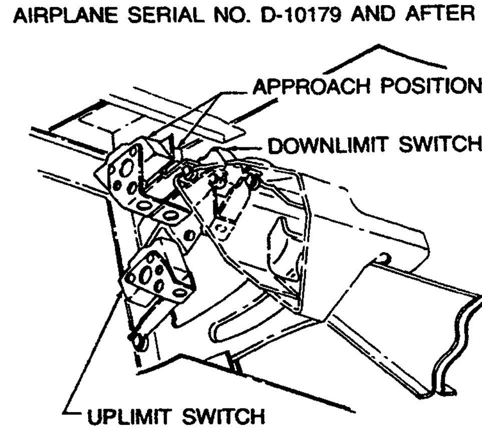


TO ADJUST, LOOSEN MOUNTING SCREW NUTS, SLIDE SWITCH FORWARD OR AFT ON BRACKET.

1. DOWNLIMIT SWITCH
2. UPLIMIT SWITCH

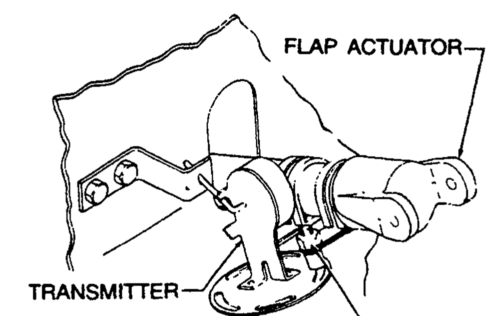
FLAP LIMIT SWITCHES

AIRPLANE SERIAL NO. D-10179 AND AFTER



FLAP TRANSMITTER

AIRPLANE SERIAL NO. D-7977 AND AFTER



TO ADJUST, LOOSEN MOUNTING BOLTS AND MOVE FORE AND AFT, OR ROTATE SLIGHTLY.

35-161-13

Figure 3-8. Flap System

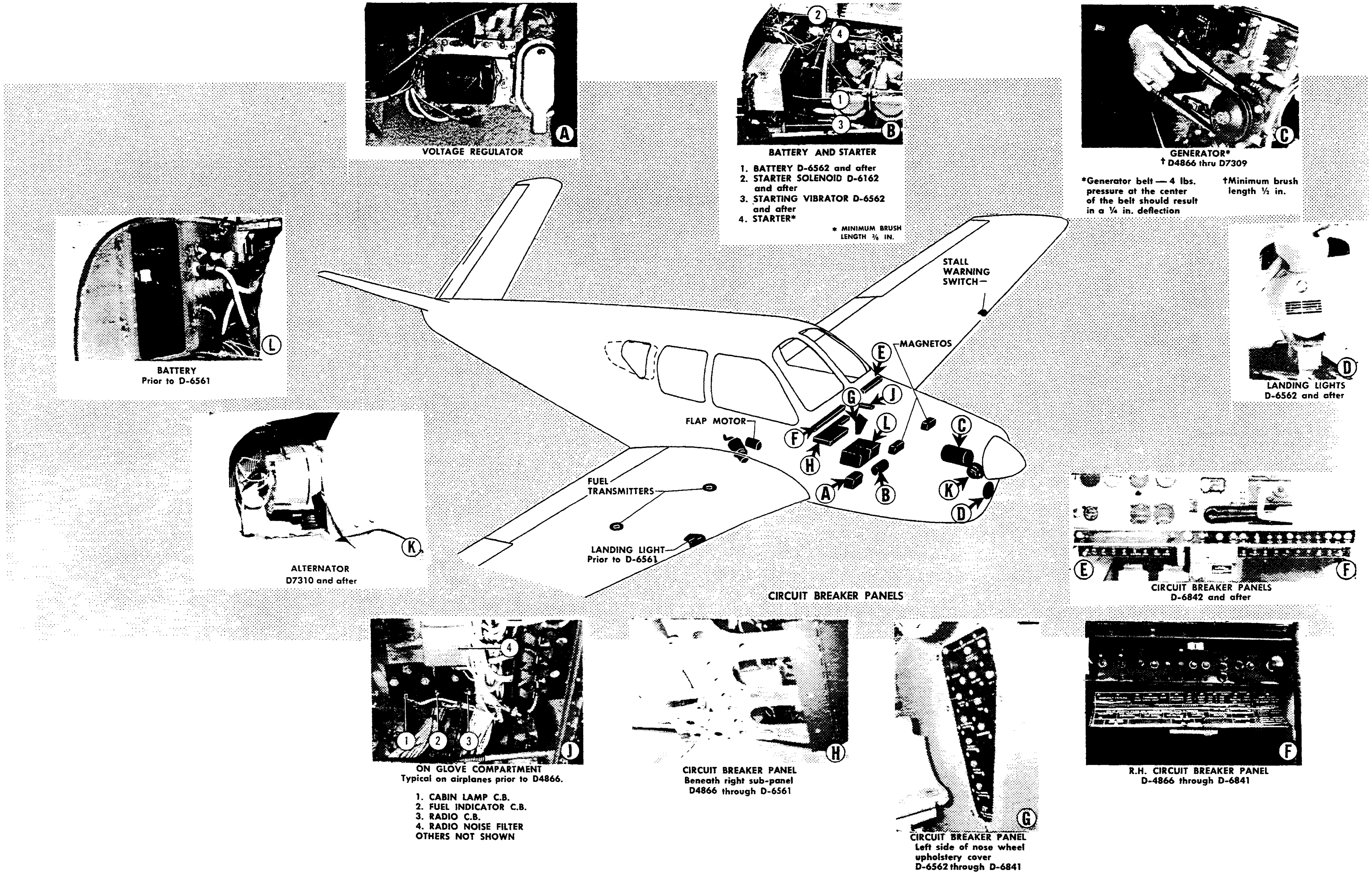


Figure 3-9. Electrical System

CAUTION

When running the gear electrically before the switches are reset, or for the first time after resetting the switches, run it with extreme caution to make sure the switches open the electrical circuits before the sector gear hits the internal stops in the gearbox The sector gear should not be touching the stop when the motor stops coasting Serious damage may result if the internal stops are hit by the sector gear

5. Run the gear about 2/3 up, then stop and inch the gear the remaining distance to either the limit switch or the internal stop by intermittent operation of the circuit breaker Check hand crank for 1/8 to 1/4 turn between retracted position and the internal stop. If this clearance is not obtained, adjust the landing gear up limit switch To adjust the up limit switch, lower the landing gear 1/8 to 1/4 turn of the emergency hand crank and adjust the switch by turning the screw in the actuator so that it just breaks the circuit

NOTE

On airplanes D-1 through D-200, the limit switches should be adjusted to be actuated when the center line of the bolts securing the right hand actuator rod (gear retracted) and the left hand actuator rod (gear extended) to the actuator assembly are 2-5/8 plus 1/16 minus 0 inches from the center line of the stop bolt. See Figure 3-11

6. Extend gear and check hand crank. There should be 1/8 to 1/4 turn between the extended position and the internal stop. The down limit switch adjustment is accomplished by bending the switch actuator arm tab so that it just breaks the circuit.

7 Extend the retract gear two or three times to assure that the switches are correctly set Check the hand crank each time to ensure proper adjustment.

8 Adjust the main retract rod (either right or left) to maintain 1/16 inch minimum clearance between the joint (knee) of the V-brace and lift leg and the top wing skin with the landing gear fully retracted. The main gear should retract only far enough to clear the inboard door in addition to maintaining the minimum of 1/16 inch clearance. To decrease the clearance between the knee and the top wing skin, shorten the retract rod; to increase clearance, lengthen the retract rod

9. When the proper setting is obtained, leave the gears in the retracted position and screw the stop bolt down against the main strut. To assure a firm seating, insert a .003 feeler gage under the bolt head and adjust the bolt until a firm, steady effort is required to pull the feeler gage out With the feeler gage removed, screw the bolt down an additional 3/4 turn Tighten locknut securely.

10. Check the uplock roller for free movement and a maximum clearance of .010 to .020 inch between the roller and the uplock block If this clearance is not correct, the uplock must be adjusted. To adjust, loosen the block retaining bolts and adjust the clearance between the roller and the uplock block. The uplock bracket and the block are serrated and the serrations must be interlocked.

11. Extend gears and attach the uplock cable to bracket

12. Retract the gears intermittently as in step 5 above and observe the locking action of the uplock bracket. If it starts to lock too soon it is an indication that the uplock cable is too tight The cable should be adjusted for a tension of 52-1/2 +10 -0 pounds. The tension is adjusted at the outboard end of the cable. If sufficient adjustment is not obtainable at the cable eye additional adjustment may also be made at No. 3 wing rib by moving the cable housing inboard or outboard.

13. Extend the gear and check the force required to deflect the main gear knee joint. With the gears in down position, it should take 45 to 65 pounds of force to deflect the knee joint To increase tension, add 100951-S-063-012-108 washers between the spring and rod end. A maximum of five washers may be added. If more tension is needed, replace the spring

NOTE

If unable to obtain adequate spring tension, check for worn bushings in the retract linkage Wear in the bushings has the effect of lengthening the entire linkage, causing the rod end spring to compress and stack, leaving nothing for spring adjustments. New bushings will shorten the linkage, again permitting adjustment of the spring.

14. With the gears extended, check the force required to deflect the knee joint of the nose wheel

NOTE

Effective serial D-3751 the 11504-250-046-0212-3 forward nose gear retract link rod spring was replaced by a 35-825188 spring, producing increased tension on the nose gear linkage The heavier spring is interchangeable with the original without alteration and requires a tension of 55 pounds, or higher, to cause deflection when the system is properly adjusted. No washers are used with the new spring to increase tension. Bonanzas prior to serial D-3751 using the old spring require a force of 40 to 50 pounds when the system is properly adjusted. In the event correct tensions cannot be obtained, a maximum of three 100951-00-064-202-102 washers may be added at the aft end of the spring in the retract rod in the nose wheel well

With the nose gear in full retracted position, and doors not connected, a force of 30-35 pounds applied downward at the centerline of the tow pin shall be required to move the strut off the bumper With the nose wheel in full retracted position and both doors fully rigged, a force of 20 pounds minimum applied as noted above, shall be required to move the strut .12 inch measured along the line of force application

15 Unscrew main gear outboard door attaching link to assure the door is not damaged when retracted. Connect outboard door linkage and retract gear slowly, checking to see that clearance is maintained between the door and gear After checking to see that the door is not too tight, run gear down and adjust linkage as required, continue this procedure until a snug, firm fit is obtained when the door is completely closed.

16 Connect main gear inboard door linkage, retract gear slowly and check for clearance between door linkage and root rib. Run gear to 3/4 down position and adjust to maintain 1/4 inch minimum clearance between gear and inboard door with the slack removed from the door linkage Continue this procedure until door will close tightly in both up and down positions. Adjust doors by varying the length of the push-pull linkage rods Disconnect the rods at the clevis fitting to make this adjustment.

NOTE

Install the main landing gear door push rod attaching bolt in the door linkage bracket with the head to the rear If installed wrong, the bolt may catch on the fuselage skin and root rib of the wing, causing damage to the landing gear retract mechanism or preventing the gear from retracting

17. Connect nose door linkage and rig nose door. Check closely to see that right hand aft hinge clears the tire Adjust the nose gear doors by varying the length of the push-pull linkage rods in the nose wheel well. With the gear retracted, the doors should have a slight tension on them from the actuator rods to keep the doors from vibrating.

NOTE

To aid in maintaining proper nose gear door tension, the drag brace assembly on D-9484 and after, has an adjustable door actuating pin.

18. Check the landing gear safety switch for proper adjustment. Measure 3/4 inch down on the piston from the bottom of the right shock strut cylinder and mark the piston with a piece of tape. Raise the right wheel with a small jack, compressing the shock strut, until the tape is even with the lower edge of the cylinder. Adjust the switch actuating arm at the clevis so the switch is actuated as the tape touches the end of the cylinder.

19. Run gear up and check landing gear position indicator. To adjust the mechanical position indicator, remove the indicator cover and bend the actuating wire to move the flag, or bend the tab on the clamp to increase or decrease the flag travel. Set the covering in place, retract the gear and check the indicator position with the gear retracted

NOTE

On aircraft serial D-9257 and after mechanical landing gear position indicator is no longer installed

20. With the gears in the retracted position and the throttle closed, check the operation of the throttle warning horn If the switch has been moved for any reason, it should be adjusted so that the distance from the center line of the roller on the switch to the shoulder on the throttle linkage measure approximately 3/8 inch with the throttle closed.

NOTE

This is a temporary adjustment only To make the final adjustment refer to Throttle Warning Horn Switch Adjustment

21 Check the landing gear position lights The lights are mounted on the right side of the fixed panel The green light should be on when the landing gear is in the fully-extended position The red light should be on when the landing gear is in the fully-retracted position When the landing gear is in an intermediate position, neither light should be on.

22. Recheck limit switch adjustment and remove aircraft from jack.

LANDING GEAR POSITION LIGHT ADJUSTMENT (D-9069 and after)

The landing gear position lights on the instrument panel are operated by the up indicator switches and down indicator switches on each gear.

Before making the following adjustments place the aircraft on jacks. Main Gear: With the gear down and locked, adjust the down switch (located on the forward side of the main gear V-brace) so that the overtravel of the switch plunger is .050 inch after the switch is actuated to the "ON" position. With the gear in the full up position adjust the up switch (located inboard of the forward side of the main gear V-brace) so that the overtravel of the switch plunger is .050 inch after the switch is actuated to the "ON" position.
Nose Gear: With the gear in down and locked position adjust the down switch (located on the right hand side of the wheel well) so that the overtravel of the switch plunger is .050 inch after the switch is actuated to the "ON" position. With the gear in full up position adjust the up switch (located on the right hand side of the wheel well) so that overtravel of the switch plunger is .050 inch after the switch is actuated to the "ON" position. Check the instrument panel to be sure the indicator lights correspond to the gear position.

Recheck the switch adjustment and remove the aircraft from the jacks.

NOSE GEAR IMPROVEMENT CHANGES

Effective D-2901 and after a new nose gear retract rod is installed to prevent inadvertent binding of the rod when airplane is on jacks and the nose gear is retracted. The new rod assembly may be installed on all airplanes provided the tab on the 35-364241 switch can be trimmed 1/8 inch to obtain clearance on rod when the gear is in the up position and make contact with the actuator when the gear is in the down position.

Starting with serial D-4547, longer plungers were installed on the link rod slip joint; the longer plungers are designed to remain in place if the slip joint pin fails during retraction, thus permitting extension of the nose gear. At the same time, the slip joint pin was replaced by a pin designed to fail at loads lower than the failure point of other parts of the system, to protect these parts if the nose gear should bind on retraction.

CAUTION

The new pin, part 45-824104, should be substituted for the previously installed pin only after the longer plunger has been installed Never use the 45-824104 pin with a short plunger.

NOSE WHEEL STEERING MECHANISM

The nose wheel should be parallel to the fore and aft center line of the airplane with the rudder pedals in the neutral position. Loosen the nose gear steering actuator arm at the aft end and screw the end fitting either in or out to make the adjustment.

NOSE WHEEL TRAVEL STOP ADJUSTMENT

The travel stop must be adjusted so that nose wheel travel is stopped when the shimmy dampener is 1/32 inch from its maximum travel.

If adjustment is required the following procedure is recommended:

a. Loosen the locknuts on the adjustment bolts so that they clear the stops on the nose wheel straightener.

b. Turn the nose wheel to the extreme left turn position; the adjustment bolts must be clear of the stops with the nose wheel in this position.

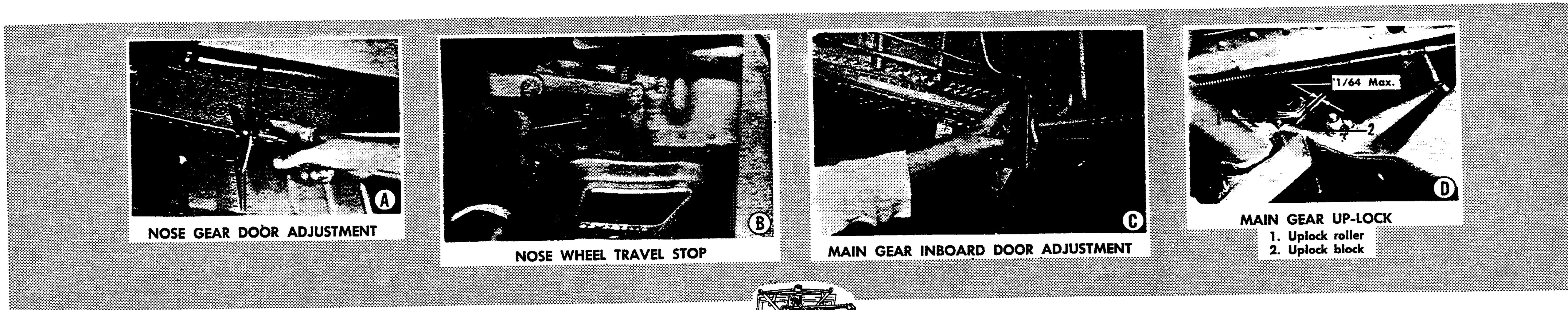
c. Place tape around the aft end of the shimmy dampener position rod 1/32 inch from the dust shield.

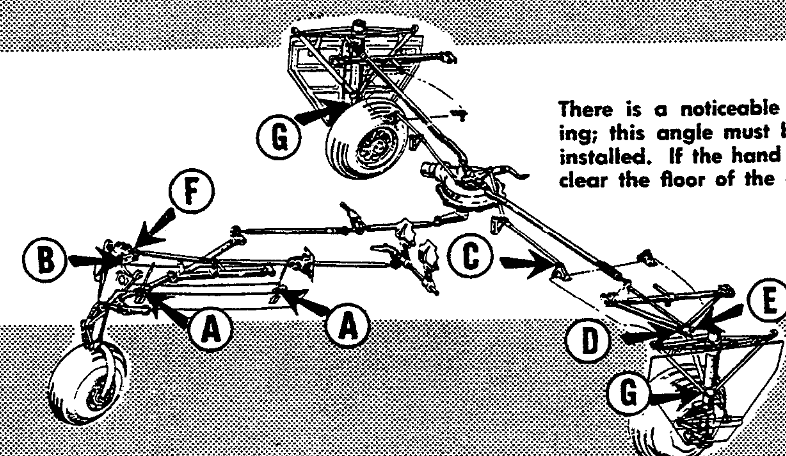
d. Turn the locknuts on the adjustment bolts so that the nose wheel is turned, and the tape on the piston rod just contacts the dust shield. Tighten the locknuts securely.

e Repeat steps b, c, and d above except turn the nose wheel to the extreme right, and place the tape on the forward end of the piston rod.

CORRECTING END PLAY IN MAIN LANDING GEAR FITTING

The following procedure is recommended for correcting

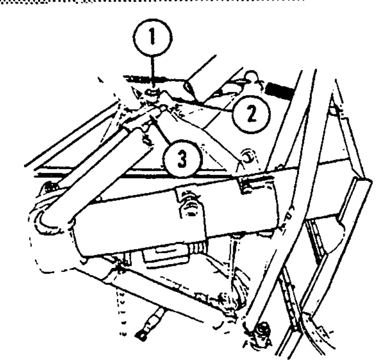




WARNING

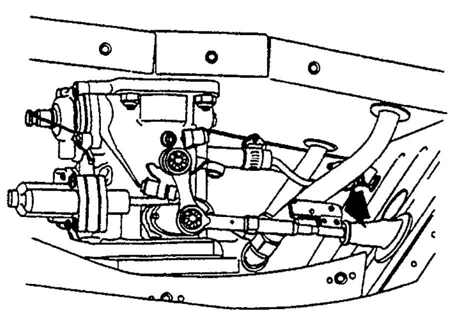
There is a noticeable angle built into the hand crank housing; this angle must be pointing up when the hand crank is installed. If the hand crank is pointing downward, it will not clear the floor of the aircraft.

Figure 3-10. Landing Gear System

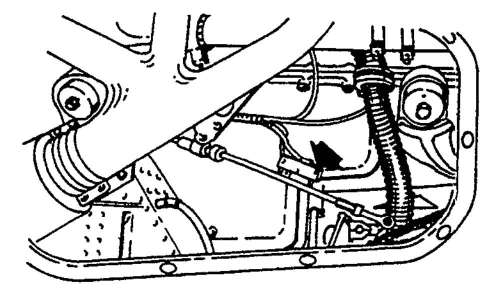


1. Up-lock roller
2. Up-lock striker
3. Up-lock stop

LANDING GEAR UP-LOCK
Airplane Serial No. D-1 Through D-1500

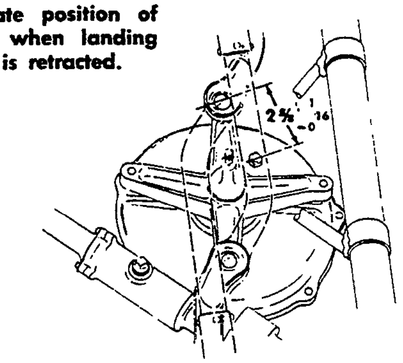


THROTTLE WARNING SWITCH
Airplane Serial No. D-1 through D-5330

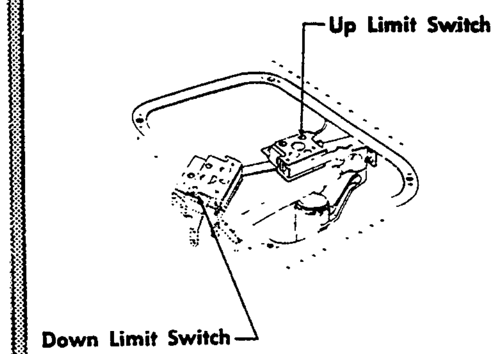


THROTTLE WARNING SWITCH
Airplane Serial No.D-5331 & after

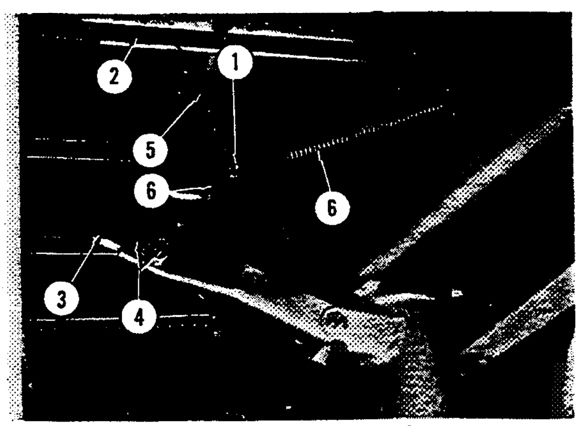
NOTE: Dotted lines indicate position of arms when landing gear is retracted.



LANDING GEAR LIMIT SWITCH ADJUSTMENT
Airplane Serial No. D-1 Through D-200

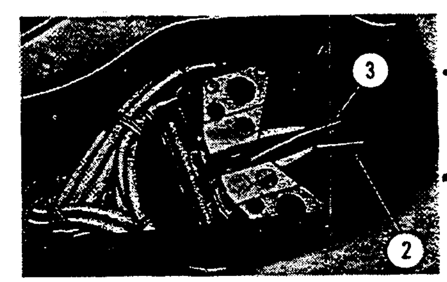


LANDING GEAR LIMIT SWITCH
Airplane Serial No. D-1 Through D-1500

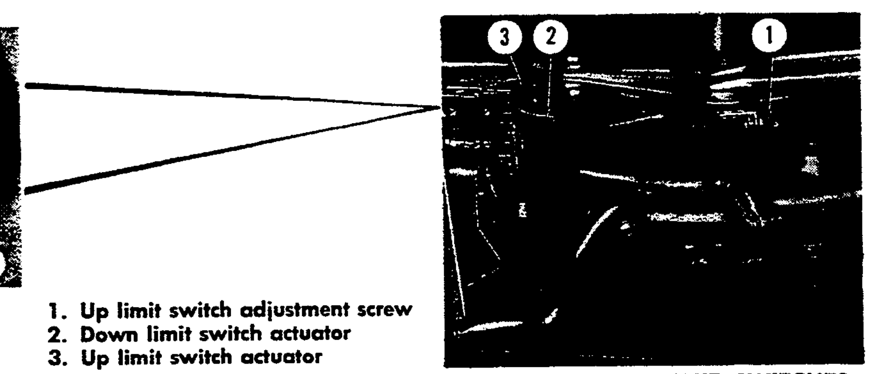


1. Up-lock cable attaching bolt
2. Up-lock cable
3. Up-lock block
4. Up-lock block attaching bolts
5. Up-lock cable adjustment
6. Up-lock springs

LANDING GEAR UP-LOCK
Airplane Serial No. D-1501 and After



1. Up limit switch adjustment screw
2. Down limit switch actuator
3. Up limit switch actuator

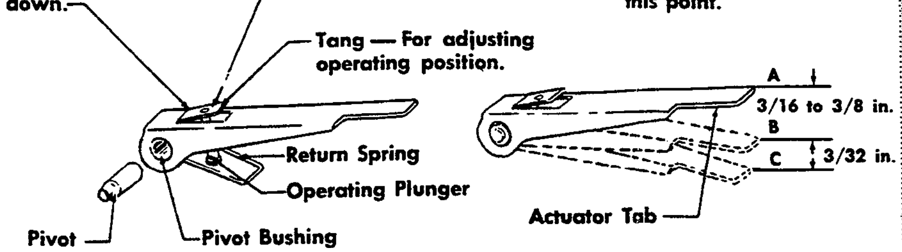


LANDING GEAR LIMIT SWITCHES
Airplane Serial No. D-2801 and After

To decrease travel of the tab and actuate switch sooner, push this tang down.

To increase travel of the tab and actuate switch later, raise this tang up.

Check for 3/32 inch travel between first and last switch actuation at this point.



NOTE

Dimension AB is approximate and will vary with each airplane
"A" represents the normal unactuated position of the switch
"B" represents the point of actuation of the first switch
"C" represents the point of actuation of the last switch
Dimension BC is critical AND MUST BE MAINTAINED

SWITCH OPERATING SEQUENCE

UP POSITION

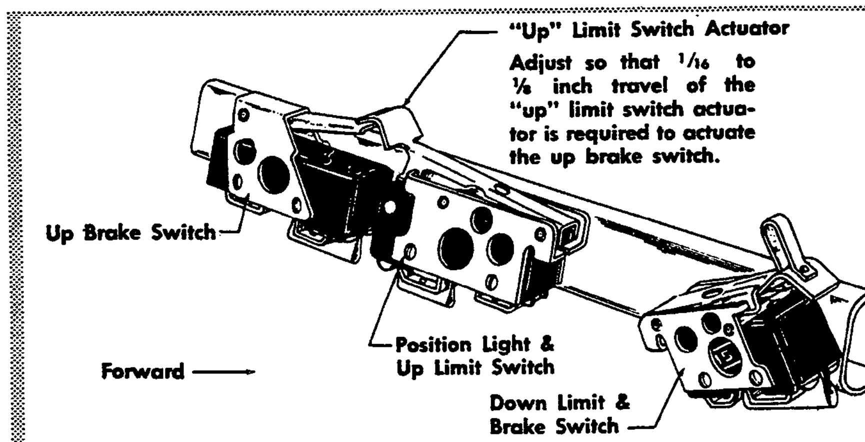
First operation:	Landing gear up limit switch
Second operation:	Landing gear up brake switch

DOWN POSITION

First operation:	Landing gear down limit switch
Second operation:	Landing gear warning horn switch
Third operation:	Landing gear down brake switch

Actuation of all switches must take place within 3/32 inch travel of the actuator tab, from the point where the first switch is actuated to the point where the last is actuated. Take the measurement at the extreme end of the actuator tab.

Access to the limit switches on Serials D-1 to D-2680 may be gained by removing the inspection door in the belly skin beneath the cabin. On Serials D-2681 and after, the switches are accessible by removing the front seat.



LANDING GEAR LIMIT SWITCHES
Airplane Serial No. D-1501 Through D-2800

Figure 3-11 Landing Gear System

end play between the main landing gear and the landing gear fittings, and the retract brace and fittings. Begin by checking the clearance. Install a bolt and nut in one end of the gear and tighten. Install a bolt only, at the opposite end, and use the following as a guide to correct the end play.

When the clearance in inches is:

1. .010 to .015 inclusive--use as is.
2. .016 to .031 inclusive--add one 100951-S-015-012-102 washer at the rear fitting.
3. .032 to 047 inclusive--add one 100951-X-032-012-102 washer at the rear fitting.
4. .048 to .063 inclusive--add one 100951-S-015-012-102 washer at the rear fitting and one 100951-X-032-016-102 washer at the forward fitting.
5. .064 to .079 inclusive--add one 100951-X-032-012-102 washer at the rear fitting and one 100951-X-032-016-102 washer at the forward fitting.
6. .080 and over--reject.

When the clearance in the main gear retract brace assembly exceeds .100 in. but is not more than .131 in., add one 100951-X-031-016-100 washer at the forward end. If the clearance exceeds .131 in. but is not more than .150 in., add one 100951-X-131-016-100 washer at the forward end and add one 100951-X-031-012-102 washer at the aft end. When the clearance is over .150 in., reject the assembly.

THROTTLE WARNING HORN SWITCH ADJUSTMENT

a. With the aircraft in flight, place the propeller control in low pitch and slowly pull the throttle control out until 12 to 14 inches of manifold pressure is indicated.
b. Mark the position of the throttle control.
c. After the aircraft has landed and with engine shut off, position the throttle control at the mark made in step b.
d Adjust the microswitch at this position until the cam "clicks" the switch closed.
e Secure the switch in this position.

ASSIST STEP

On serials D-3351 thru D-6161 a safety link and cable guide is installed in the assist step retract cable installation. Should ice, mud or other foreign matter foul the retract cable when the gear is retracted the cable guide located immediately aft of the nose gear will prevent the cable from fouling on the nose gear grease fittings. The safety link attached to the nose gear is installed as a safety feature to shear in case the retract cable should inadvertently become fouled which would prevent complete extension of the nose gear. On D-4051 thru D-6161, an additional shock cord was installed on production Bonanzas to obtain a more positive retraction of the assist step. This improvement change may be installed on Bonanzas prior to D-4051 by ordering Kit 35-4003 which contains the installation instructions necessary to make this modification. Retrofit is possible on serials prior to D-3351 only if Bulletin 35-23 has been complied with.

ASSIST STEP ADJUSTMENT

The assist step, when extended, should be rigged to allow the two slide tube bumpers to clear the fuselage structure 1/16 to 1/8 inch, at station 151.

The step adjustment is made at two places: on the nose wheel brace, and at station 151, if necessary. The adjustment at the nose wheel is made where the cable assembly is attached to the nose brace, and is accomplished by removing the washers on the aft side of the brace and adding them to the forward side; this will raise the step. The adjustment at station 151 should be made only if proper adjustment cannot be made at the nose wheel brace. This adjustment is made by either lengthening or shortening the amount of cable housing that extends beyond the housing retaining nut. Lengthening the amount of housing extending beyond the retaining nut will raise the step

NOTE

If the step fails to retract check for binding of the control cable, deteriorated or broken shock cord.

On Bonanzas, D-6162 and after a fixed assist step is installed and requires no adjustment.

BRAKE BLEEDING

Pressure bleeding is the only procedure recommended. Use electric or gravity only when pressure bleeding is not possible.

GRAVITY BLEEDING

The reservoir must be kept full during bleeding. The brake pedals should be operated slowly and smoothly to eliminate trapped air in the master cylinders. When no more air bubbles appear in the fluid drained from the bleeder plug, close the bleeder valve.

PRESSURE BLEEDING

Connect the hoses from a pressure pot to the bleeder fitting on the brake and bleed the system from the wheel cylinder up. Disconnect the fluid supply line at the reservoir, attach a hose to it and put the other end of the hose in a large, clean container. Using not more than 30 pounds pressure, bleed the system until all air bubbles are gone from the draining fluid. Pumping the brakes is not necessary.

BLEEDING DUAL BRAKE SYSTEM

In airplanes having the optional dual brake system, the co-pilot's brake system is bled by closing the valve on the pressure pot and pumping the co-pilot's brake pedal to change the shuttle valve position. This causes hydraulic fluid to be routed through the co-pilot's system and this system should be bled as was the pilot's system.

After the pilot's and co-pilot's brakes have been bled, close the bleeder valve and repeat for the other wheel.

GOODYEAR BRAKE ADJUSTMENT

The Goodyear disc brake is self-adjusting, which eliminates lining clearance adjustment as an increased volume of fluid between the brake cylinder head and piston in the master cylinder, compensates for lining wear during the life of the brake lining. The brake pedals require no adjustment regardless of the lining wear.

FIRESTONE BRAKE ADJUSTMENT

The brakes require no adjustment. When the lining disc is worn to the bottom of the radial grooves, or when the copper friction surfaces are worn to the rivet heads or badly scored, the brakes should be overhauled.

DETERMINING GOODYEAR BRAKE LINING WEAR

Brake lining wear for the one pressure cylinder type brake used on aircraft prior to D-6493, is indicated by the position of the steel brake disc on the steel drive keys. Replace lining when the distance from the brake housing (at widest section) to the disc reaches 7/16 inch with brakes applied. Replace the steel brake disc when the thickness is 170 or below, measured at thinnest section. Also replace the disc when the distance from key to disc key slot reaches .040.

On aircraft D-6493 thru D-7208, D-7213 and D-7214, a two pressure cylinder type brake was installed. On this type brake, replace lining when the distance from the brake housing to the face of the disc reaches .250 inch with the brakes applied. Replace the steel brake disc when the thickness is .225 measured at the thinnest section. The brake disc and/or keys must also be replaced when the distance from the key to the disc key slot reaches .040. Steel brake discs have a thickness of .250 when new.

NOTE

If the Goodyear linings are glazed where they have made contact with the steel discs, and are otherwise suitable for use, reinstall for further service. This glazed condition is desirable, and single disc brakes are most effective when linings are glazed. On some Bonanzas the steel brake discs are chrome plated and on others they are not. With applications of the brake the discs will become discolored; this is entirely normal. The chrome plated discs will turn a bluish color and later to a straw color. The unplated discs will turn directly to the straw color after the protective coating has worn off. Better service and less tendency to rust is found after the straw color has appeared. The discoloration does not affect the braking operation in any way Before installing the wheel be sure it has been assembled with the static balance mark of each section aligned with wheel bolts equally torqued Do not overtighten the hub nuts, overtightening may result in a cracked bearing cup or wheel.

DETERMINING BEECH BRAKE LINING WEAR

Aircraft D-7209 through D-8460 except D-7213, D-7214 and D-7923, are equipped with a ring disc type brake assembly Replace the linings on this type of brake when the bottom of the brake housing is within 1/32 of an inch from the landing gear torque flange. When the thickness of the ring is .432 inch or less replace the ring disc.

Aircraft D-7923, D-8461 through D-9192 are equipped with multi-disc brakes. Brake wear is determined by measuring the distance from the flat surface of the brake housing near the piston to the back of the pressure plate. The brake should be overhauled when the distance is .350 inch or more. Replace the rotating disc when their thickness is .104 inch or less Replace the stationary disc when worn to a thickness of 100 inch or less. Replace the stationary disc when worn to a thickness of .100 inch or less. Replace the piston if the diameter is worn to 990 inch or less. Replace the pressure plate if worn to .150 inch or less.

Aircraft D-9193 and after, are equipped with single disc brakes. The brake lining should be replaced before the metal back plate is exposed through the abrasive surface. This can be checked visually without disassembling the brake. The minimum allowable thickness for the abrasive surface is 3/32 inch above the rivet The brake disc should be replaced when its thickness measure .330 inches

MASTER CYLINDERS

The master cylinders are of the compensating barrel type, designed to maintain constant and correct volume of fluid in the system; small amounts of fluid lost through leakage is automatically replaced. The piston actuated by the direct connection to the toe-brake pedal, pressurizes the fluid in the master cylinders, lines, and wheel brake cylinders. Seals in the master cylinders ensure positive fluid pressure and prevent leakage. The main spring in each master cylinder provides for the return of the piston and the toe-brake pedal. The cylinders are directly forward of the pilot's and the copilot's rudder pedals and receive hydraulic fluid from a reservoir tank located on the firewall.

BRAKE MASTER CYLINDER LINKAGE ADJUSTMENT

The proper linkage arrangement will adjust the brake pedals to a straight upright position This is considered the best adjustment since it will prevent the pedals from hitting the firewall in their extreme forward position. Linkage adjustment is obtained by removing the clevis from the rudder pedal and turning the clevis on or off the piston rod as required. After both pistons are adjusted to the same length, tighten the jam nuts.

BRAKE MASTER CYLINDER REMOVAL AND INSTALLATION

a. Close the parking brake valve by pulling the parking brake handle.
b. Unsnap the floor mat and remove the floor-board section below the brake pedals.
c. Disconnect the two brake hydraulic lines at each master cylinder and mark each line to ensure correct reinstallation.
d. Remove the master cylinder attaching bolts and nuts and remove the master cylinder.
e. If a new master cylinder is to be installed, note the position of the 45-degree elbow fittings.
f. Reinstall the master cylinder by reversing the removal procedure.
g. Replenish with hydraulic fluid (MIL-H-5606) and bleed the brake system.

SHUTTLE VALVE

Shuttle valves, located behind the pilot's and copilot's rudder pedals, are used only when dual brakes are installed. The valves shuttle braking operations between the pilot and copilot's brake system. A small piston sliding back and forth prevents the flow of fluid to the inoperative brake line.

NOTE

If evidence of internal and external leakage is noted, the shuttle valve should be disassembled and the seals carefully inspected for wear and deterioration.

PARKING BRAKE VALVE

The parking brake valve is located just forward of the firewall in the engine accessory compartment. The valve incorporates a spring-loaded ball, ball seat and plunger. The spring-loaded ball is pulled off its seat by suction from the master cylinder and automatically reseats to retain the pressure in the lines to the brakes until the plunger moves the ball off its seat, permitting the fluid to flow in the opposite direction.

NOTE

If the parking brake system fails to hold, the valve and connections should be checked for evidence of leakage, and the seal in the valve housing replaced if worn or deteriorated.

TIRES.

Beech Aircraft Corporation cannot recommend the use of recapped tires on the Model 35 series. The tires may pass the retraction test when first installed, however, recapped tires have a tendency to swell after use and may cause malfunction of the retract system or damage the landing gear doors.

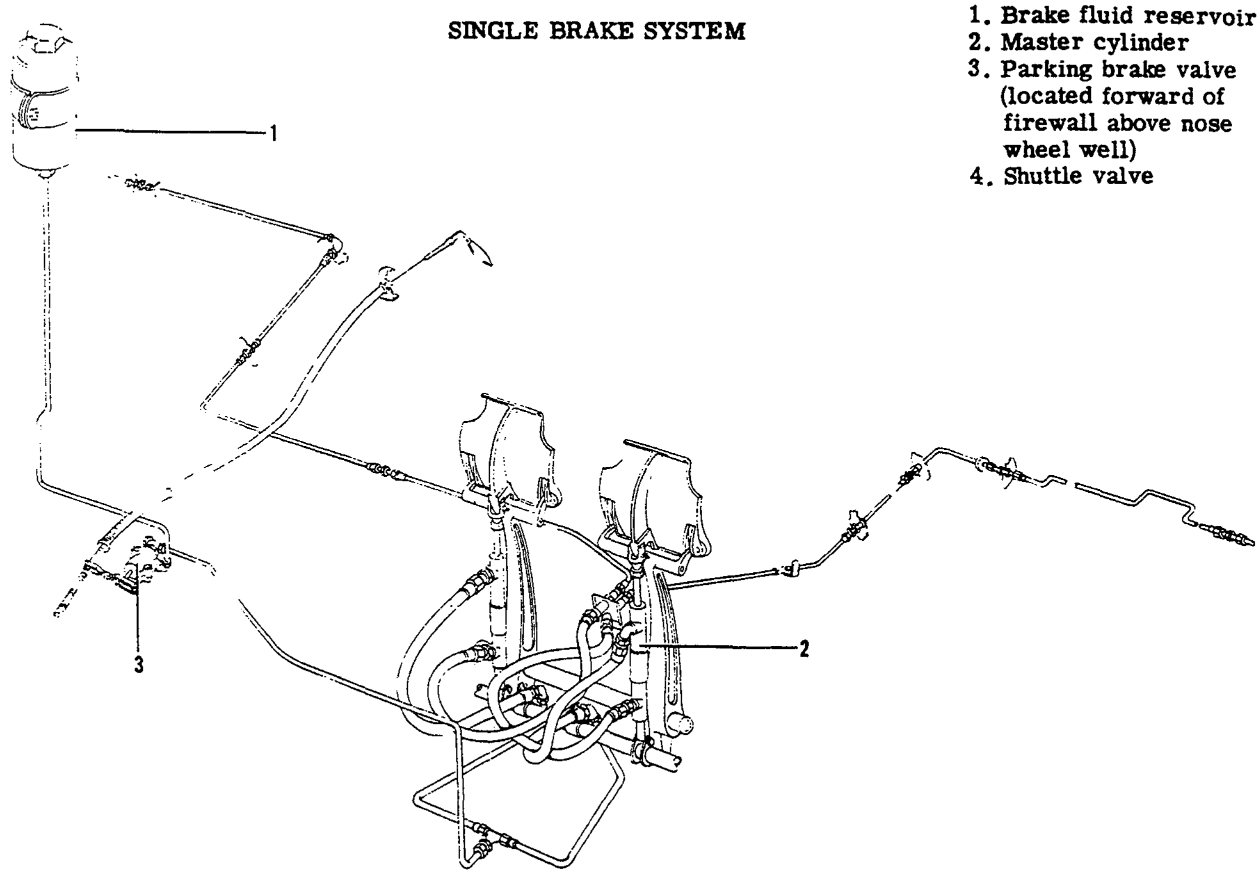
STATIC AIR AND PITOT SYSTEM.

STATIC AIR SYSTEM.

Proper functioning of the static air system is vital to safety of flight, particularly on instrument flight, so

1. Brake fluid reservoir
2. Master cylinder
3. Parking brake valve (located forward of firewall above nose wheel well)
4. Shuttle valve

SINGLE BRAKE SYSTEM



DUAL BRAKE SYSTEM

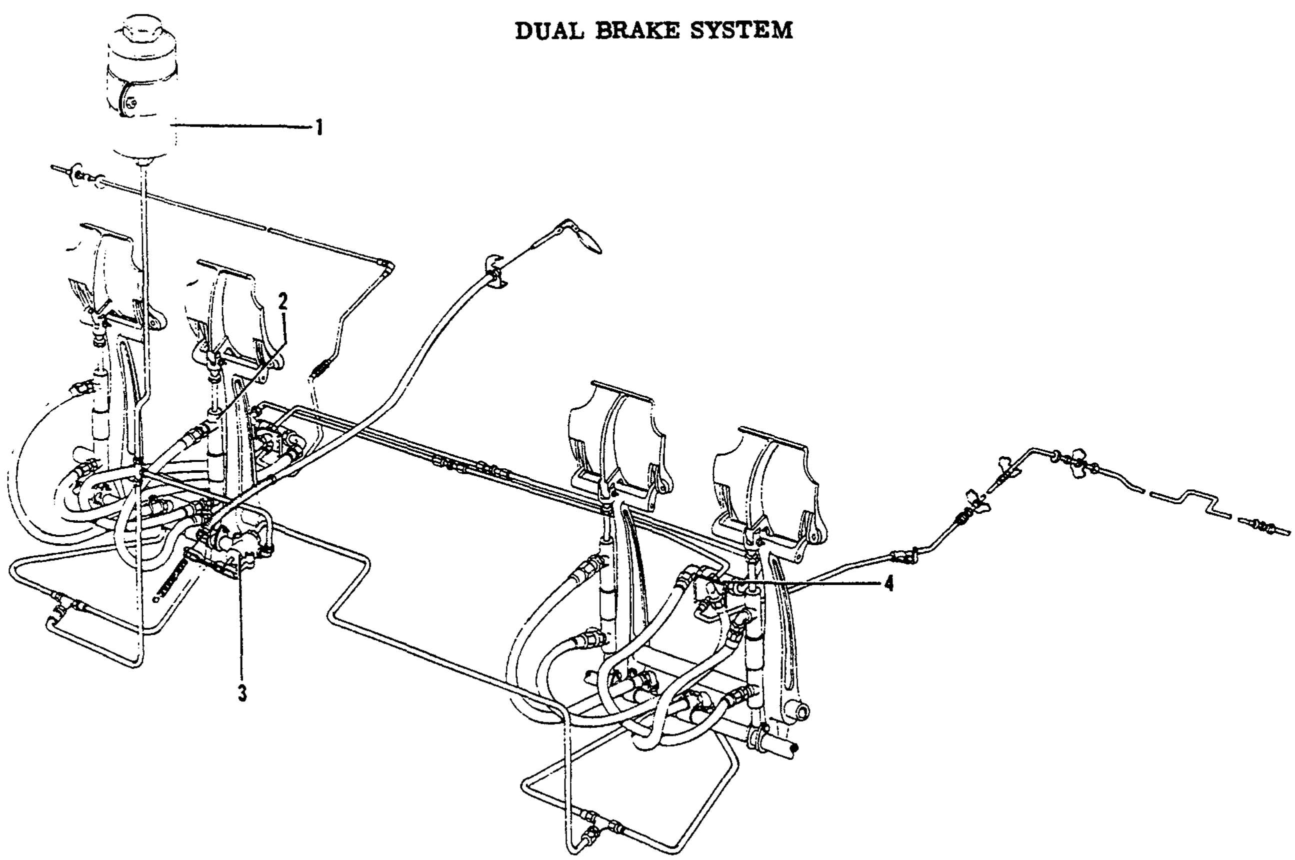


Figure 3-12. Brake System

the correct maintenance of this system, while relatively simple, is a procedure which should be followed religiously.

The amount of attention required by the static system will depend largely on operating conditions. Extremes of humidity or precipitation, or of dry, dusty conditions, should be signals for increased emphasis on static system checks, since both are favorable to accumulations of foreign matter in the ports and lines.

CLEARING STATIC LINES.

Blow low pressure air through the lines from the disconnected line at the airspeed indicator to the static ports. Cover each static port separately when blowing to insure that each line is clear. Instrument error could result if even one port is clogged with dirt or foreign matter.

CAUTION

Never blow air through the line toward the instrument panel; to do so will seriously damage the instruments. Before blowing back through the line from the instrument panel, be sure that the instrument lines have been disconnected, so there is no possibility of air pressure reaching an instrument.

Drain the static air line by opening the access door in the rear baggage compartment and removing the section of rubber hose. Disconnect the line at the airspeed indicator and blow this line clear.

NOTE

Wax or polish applied to the static air buttons can cause wrong instrument readings. The static air buttons should be cleaned periodically with a cleansing solution such as carbon tetrachloride or equivalent to insure that no film exists on the static air buttons.

Check the rubber hoses connecting the static air line to the instrument plumbing and the rubber hose which forms the static air line drain, accessible through the inspection opening in the left side of the baggage compartment. Hoses with outer surfaces checked or cracked, particularly at the bends or connecting points, or which have become hard, should be replaced. Replace defective hose only with Buna-S rubber hose, Federal Specification ZZ-T831, Grade B, or MIL-R-6855.

PITOT SYSTEM.

A functional test of the pitot system can be made by using an observer in the cabin to watch the airspeed indicator while air pressure is built up artifically by using a section of soft rubber tubing as follows:

1. Clamp the rubber tubing over the pitot head inlet, making certain that the connection is airtight.
2. Crimp the end of the tubing and slowly roll it up until the airspeed indicator registers approximately 100 miles per hour.

CAUTION

To avoid rupturing the diaphragm of the airspeed indicator, roll up the rubber tubing slowly.

3. Secure the rolled up tubing so that it will hold the airspeed indicator reading.
4. If there is no decline in the reading after several minutes, there is no leak in the pitot system.
5. If a decline in the reading of the airspeed indicator is observed, check the pitot system plumbing for leaky hoses and loose connections.

CAUTION

Release the air pressure slowly by unrolling the rubber tubing; a sudden release of the air pressure may damage the airspeed indicator.

After the system is checked for leaks, the hose sections should be visually inspected for signs of deterioration. There are two sections of hose in the pitot system: one hose at the pitot mast, accessible by removing the mast from the underside of the wing on serials prior to D-4866, or removing the inspection door adjacent to the mast on serials D-4866 and after; and the other hose behind the floating instrument panel which connects the pitot line to the airspeed indicator, accessible through the access door in the left side of the firewall. Replace defective hose only with hose meeting the specifications described for the static system.

STALL WARNING SYSTEM.

ADJUSTMENTS.

The stall warning switch is carefully adjusted when the airplane is test flown at the factory. Should it require readjusting, proceed as follows: Locate the switch installation on the under surface of the left wing and loosen the two Phillips-head screws, one on either side of the vane. If the stall warning has been coming on too early, pull the vane back and down. If the stall warning has been coming on too late, push the vane up and forward. Moving the vane with the Phillips-head screws loosened moves the entire unit up or down inside the wing causing the switch to be closed earlier or later. Retighten the screws after making each adjustment. NEVER TRY TO ADJUST THE SWITCH BY BENDING THE VANE.

As a rule of thumb, moving the vane 1/4 inch will change the time the stall warning actuates by about 5 mph of indicated airspeed. The only way to test the accuracy of the setting is to fly the airplane into a stall, noting the speed at which the warning horn and light come on and the speed at which the full stall occurs. The stall should be made with the flaps and gear up and power off. Prior to stalling decelerate no faster than one mph per second. It may be necessary to make mph of indicated airspeed. The only way to test the accuracy of the setting is to fly the airplane into a stall, noting the speed at which the warning horn and light come on and the speed at which the full stall occurs.

NOTE

On airplanes, Serial D-6842 and after the stall warning horn and light are replaced by a warning buzzer which is activated in the same manner as the warning horn and light.

The stall should be made with the flaps and gear up and power off. Prior to stalling decelerate no faster than one mph per second. It may be necessary to make

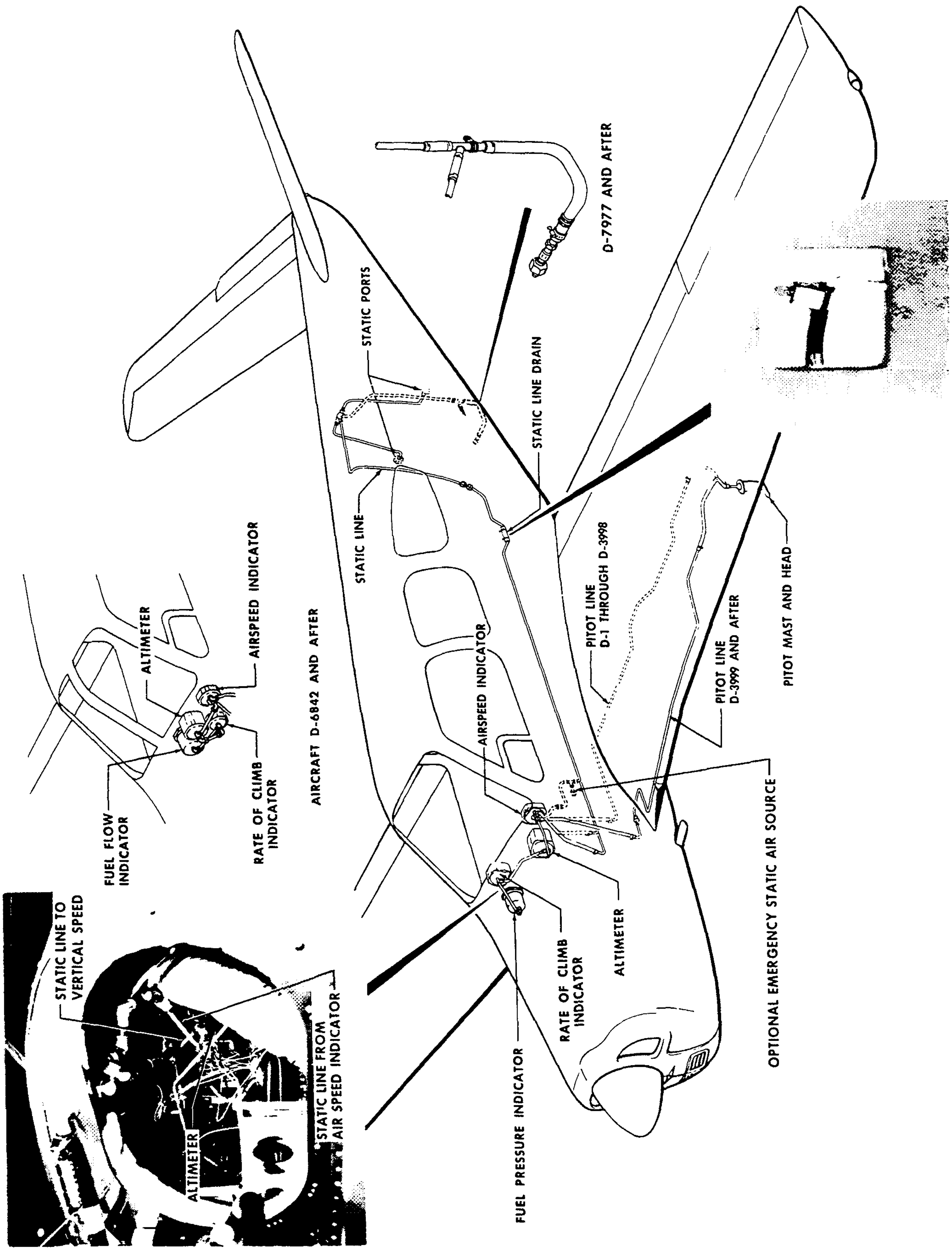
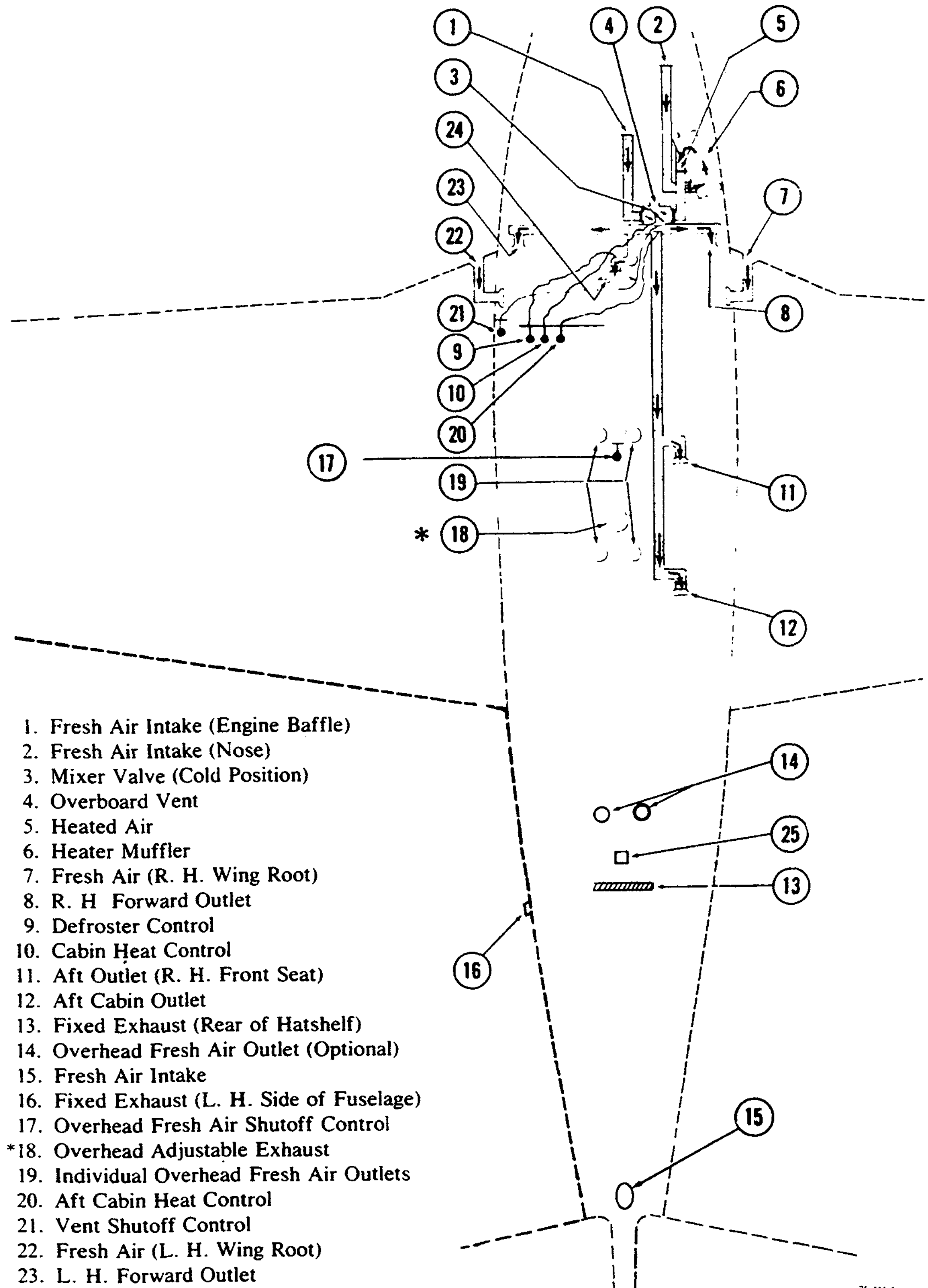


Figure 3-13. Pitot and Static System



1. Fresh Air Intake (Engine Baffle)
2. Fresh Air Intake (Nose)
3. Mixer Valve (Cold Position)
4. Overboard Vent
5. Heated Air
6. Heater Muffler
7. Fresh Air (R. H. Wing Root)
8. R. H Forward Outlet
9. Defroster Control
10. Cabin Heat Control
11. Aft Outlet (R. H. Front Seat)
12. Aft Cabin Outlet
13. Fixed Exhaust (Rear of Hatshelf)
14. Overhead Fresh Air Outlet (Optional)
15. Fresh Air Intake
16. Fixed Exhaust (L. H. Side of Fuselage)
17. Overhead Fresh Air Shutoff Control
*18. Overhead Adjustable Exhaust
19. Individual Overhead Fresh Air Outlets
20. Aft Cabin Heat Control
21. Vent Shutoff Control
22. Fresh Air (L. H. Wing Root)
23. L. H. Forward Outlet
24. Defroster
25. Overhead Fresh Air Shutoff Valve

*Removed at serials D-9920, D-9928
D-9959 and after.

Figure 3-13A. Heat and Vent System (D-9287 and after)

alternate adjustments and test flights before the desired setting can be reached. The stall warning should actuate, ideally, at 7 to 9 mph ahead of the complete stall, although from 5 to 10 mph ahead of the complete stall will meet FAA requirements. The switch setting should be checked and adjusted as necessary whenever a wing or wing leading edge is replaced or extensively repaired, or if a new switch is installed. The switch should require no adjustment in normal service.

HEATING AND VENTILATING SYSTEM

INSPECTION

Inspect the air intake duct leading to the heater: all connections and clamps should be checked for tightness and the duct for holes or cracks. Check the screen at the intake duct: remove and clean as necessary.

Inspect the heater control box and the condition of the air ducts leading to the windshield defroster and cabin heat outlets. Seal or tape openings around wires, tubes, or cables passing through the firewall.

Inspect around the removable web on the lower half of the cabin rear bulkhead for leaks. This panel may be made airtight by cementing felt strips to the edge of the bulkhead where the web attaches. Openings, cutouts or cracks may be filled with sealing compound between the bulkhead and the skin by removing the upper upholstery panel on the bulkhead. The small ventilation door in the top of the bulkhead may be sealed by cementing felt strips around its edge. Also plug the leveling lug holes in the baggage doorframe to prevent entry of cold air.

INSPECTION OF HEAT EXCHANGER

The heat exchanger should be checked at each 100 hour inspection for cracks and leaks which could introduce carbon monoxide gas into the heating system. This can be accomplished as follows:

a. Remove both heater ducts from the heater.

b. Remove the screws from the heater shell and slide the shell off the heater.

c. Make a close visual inspection of the heat exchanger on all surfaces with particular attention to the areas adjacent to the heat transfer pins (prior to serials D-7977) or the heat transfer corrugation (D-7977 and after) and end closures.

NOTE

If any indication of a defective heat exchanger is found, the unit should be removed and air pressure tested at 30 psi with the heat exchanger submerged in water. If any leaks are apparent, replace the heat exchanger. This test is also recommended for the heat exchanger at every engine change.

d. If inspection indicates a good heat exchanger, replace the outer shell and reinstall the heat ducts.

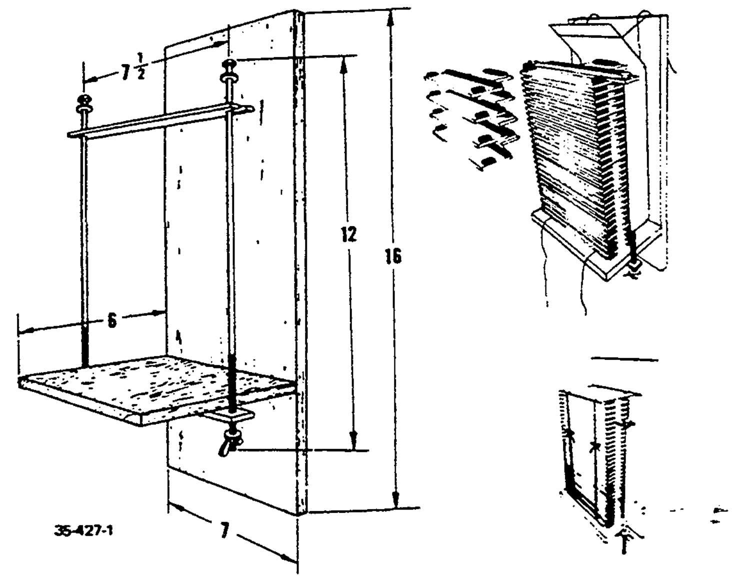


Figure 3-13B. Air Conditioner Wick Jig

AIR CONDITIONER (EVAPORATIVE)

SERVICING

At least twice a year the air conditioner should be drained to remove dirt and other foreign particles from the wick box, drain line, and overflow lines. Open the drain valve and allow all water to drain. Disconnect the drain and overflow lines, and unsnap the four fasteners holding the wick box. Remove the baffle from the wick assembly. The wicks should be flushed with, or soaked in distilled water.

If tap water has been used in the air conditioner continuously, the drains and wicks may be filled with salts and mineral deposits. If so, replace the wicks as follows:

1. Fill the wick box with water and soak the wick assembly for a few hours to loosen the salts and minerals around the wicks.
2. Construct a jig similar to the one shown in Figure 3-13B. The jig will simplify installation of the wicks, as considerable pressure is required to insert all of the wicks in the rack.
3. Remove the wicks from the rack and thoroughly clean the rack and baffle.
4. Make new inter-wick seals from 1/8-inch sheet cellular sponge rubber, 3/8 inch wide and cut to fit the wicks as shown. Dip the sealers in thinned EC-870 cement (Minnesota Mining and Manufacturing Co.) and allow them to dry before installation.
5. Place the jig in a vise. Lay two pieces of heavy twine, approximately thirty inches long, on the jig as shown. The twine is used to temporarily hold the wick assembly together until it is placed in the wick box.
6. Place the rack on the jig with the cut-out for the overflow tube at the top right hand side of the jig, and clamp the rack to the back of the jig with four C-clamps. Tie a string to the top of the rack to hold it open.
7. Place sixteen 35-554022-2 wicks in the rack with the inter-wick sealers between the wicks.
8. Place the aluminum bar across the top of the

wicks and pull it up tight before installing the three 35-554022-4 wicks and the remaining twelve 35-554022-2 wicks.

9. Release the string holding the top of the racks, and tie the heavy twine tightly around the complete assembly. Loosen the wing nuts and slide the aluminum bar out from the side of the wicks.

10 Check the cellular rubber seals in the wick box for deterioration. If new seals are required for the wick box, cut two strips of 1/8-inch cellular sponge rubber to 3/8 x 9-3/4 inches, and two strips to 3/8 x 9-3/16 inches. If new wick box seals are not required, cut only one long rubber strip and one short rubber strip. Cement one longer strip over the inter-wick seals on the front side, and the other inside the box, where the old one was peeled off. Cement one short strip over the inter-wick seals in the rear, and the other on the box. Make certain the two short strips clear the left rear corner of the box by 3/8 inch. Use any good rubber-to-metal cement such as EC-870.

11. Place the wicks in the wick box, making certain that the overflow standpipe has sufficient clearance. The three 35-554022-4 wicks and the cut-out in the rack must align with the overflow standpipe.

12. Cut and remove the heavy twine, and replace the baffle in the box. Position the wick box and secure the fasteners; connect the overflow and drain lines to the rear of the wick box.

AIR CONDITIONING SYSTEM (REFRIGERATIVE) (D-9787, D-9806 and after)

The optional air conditioning system is a recirculating 12,000 BTU cooling system. The system is controlled by a switch on the fuel control panel and 2 pressure sensing switches. The circuit breaker, and switch which control the system are located on the fuel control panel (console) and placarded A/C CIR BKR or AIR COND OFF HI LO respectively. At D-10097, D-10120 and after the circuit breaker was moved to the right hand sub panel.

The air conditioner is wired through the right landing gear uplock position switch, the left landing gear safety switch, and the normally closed full throttle switch. With the air conditioner operating on the ground the control circuit is wired through the left landing gear safety switch, which fully opens the condenser air scoop door located under the airplane. With the gear extended and the throttle fully opened action of the full throttle switch will remove power from the compressor clutch coil, and drive the condenser air scoop door closed. When the airplane is airborne and the landing gear is retracted, power is transmitted from the normally open contacts of the full throttle switch (actuated closed when the throttle is fully open) through the right landing gear uplock position switch (actuated closed when the gear is up and locked) to the compressor clutch permitting the compressor to operate. Also power from the circuit just described is transmitted to the condenser air scoop door actuator, through the normally open contacts of the door flight position limit switch located at the aft end of the door (actuated closed when the door is closed) causing the actuator to open the door to the flight position.

The entire air conditioner system is protected by a 30 amp circuit breaker. The compressor and condenser air scoop door have the added protection of a 10 amp fuse located on the forward side of the firewall in front of the copilot. This allows the evaporator fan to be operated after the compressor has been removed from the system by a blown fuse.

On D-9818 thru D-10119, except D-10097, the entire air conditioner system is protected by a 30 amp circuit breaker. The compressor and condenser air scoop door have the added protection of two separate 10 amp fuses. On D-10097, D-10120 and after, the entire system is protected by a 10 amp circuit breaker. The compressor and condenser air scoop door are protected by two separate 5 amp fuses. The fuses are located on the forward side of the firewall in front of the copilot. This allows the evaporator fan to be operated after the compressor has been removed from the system by a blown fuse.

A light independent of the air conditioner circuit is actuated by the condenser air scoop door, through the left landing gear uplock position switch's normally closed contacts (closed with the landing gear extended) which will indicate a door open condition while the gear is extended.

The high pressure sensing switch monitors the pressure of the refrigerant from the compressor to the expansion valve. The normally closed high pressure switch will actuate, causing an open circuit to the compressor clutch coil when the pressure in the line reaches 390 ± 10 psi, which disables the compressor. The high pressure switch automatically resets to the normally closed position when the refrigerant falls to a safe pressure. There is also a high pressure poppet relief valve, located on the forward side of the firewall, which will relieve the system if the pressure reaches 450 psi, and will reseal again at 400 psi.

The low pressure switch, normally open (actuated closed when the system is charged with refrigerant) senses system pressure. The switch closes, actuating the compressor clutch coil, when the line pressure exceeds 5 to 8 psi. The low pressure switch will prevent damage to the compressor should oil and/or refrigerant loss occur.

The condenser air scoop door under the airplane automatically opens when the air conditioner is turned on. On the ground the door opens to approximately 3 inches. In flight the door opens to approximately 3/4 + 1/4 - 0 inch. The air scoop door actuator limit switches are preset with no adjustment required.

The belt-driven compressor, which is coupled with a magnetic clutch, compresses the refrigerant to a high pressure, high temperature gas. This gas passes through the condenser where cooling air removes heat from the gas, condensing it to a liquid state. The liquid then passes through the expansion valve where it is metered into the evaporator at a rate of 55 psi, which allows most of the liquid to return to a gas. The heat required for evaporation is absorbed from cabin air passing over the evaporator coils. After passing through the evaporator, the refrigerant returns to the compressor at a reduced pressure.

MAINTENANCE OF AIR CONDITIONER

Servicing the air conditioning system consists of periodically checking the refrigerant level, checking compressor oil level and changing the system air filter. Recharge the system whenever the refrigerant level is low, air has entered the system or components carrying refrigerant are replaced. Refrigerant leaks may be detected by inspection with flameless leak detector.

PRECAUTIONARY SERVICE MEASURES

Before any service is attempted which requires opening of refrigeration plumbing or units, the person doing the work should be thoroughly familiar with instructions on servicing the system. He should follow very carefully these instructions when performing the tasks that will maintain this system in a proper functioning order.

The major reasons for these measures are for safety and to prevent dirt and moisture from entering the system. Dirt contaminants may cause leaky valves or wear in the compressor. Moisture may not only freeze into ice at the expansion valve, but can also cause the formation of hydrochloric or hydrofluoric acids in the system.

All precautions should be taken to prevent damage to fittings or connections. Even minute damage to a connection could cause it to leak. Any fittings getting grease or dirt on them should be wiped clean with a cloth dampened with alcohol. Do not use chlorinated solvents such as trichloroethylene for cleaning agent, for they are contaminants If dirt, grease or moisture gets inside lines and cannot be removed, the line will have to be replaced. Use a small amount of clean 500 viscosity refrigeration oil (Texaco Capella E or equivalent) on all tube joints and dip the O-ring in this oil before assembling the joint. This will help in making a leak-proof joint.

WARNING

A face shield should be worn when servicing the lines; refrigerant, coming in contact with the eyes, can cause loss of sight.

CAUTION

Insufficient torque, when tightening tubing connections, can result in loose joints and excessive torque can result in deformed joint parts. Either condition can result in refrigerant leakage.

When connecting aluminum fittings in the refrigerant system, torque all 5/8-inch fittings to 18 - 21 foot-pounds and all 1/2-inch fittings to 11 - 13 foot-pounds.

NOTE

The receiver-dryer is the last assembly to be connected. This is necessary to ensure maximum moisture protection of the refrigeration system.

For charging the air conditioner or checking the oil see Section 2, Servicing.

AIR CONDITIONING FUNCTIONAL TEST

With the engine running at 1,000 rpm and the system ON, observe the sight glass, if refrigerant appears milky or bubbles appear charge the system as noted in CHARGING THE AIR CONDITIONING SYSTEM in Section 2. Check the system for leaks using a flameless leak detector

SYSTEM LEAK DETECTION

A reduction of system cooling ability or the presence of bubbles in the refrigerant, may indicate a partial loss of refrigerant. Check for bubbles in the sight glass located under the copilot seat. The sight glass should be checked during operation at maximum available ambient and cabin temperatures. Streams of bubbles past the glass or foam in the glass indicates and inadequate refrigerant quantity If a loss of refrigerant is suspected, an inspection of the system plumbing should be carried out to locate the source of the leak. Large leaks may be located by the appearance of oily spots where oil has been carried out by escaping refrigerant. Smaller leaks, which are much more difficult to locate may be detected by detergent bubbles, or an electronic detector

COMPRESSOR BELT TENSION ADJUSTMENT

After 36 to 48 hours operating time, a new belt will stretch to its normal operating length The belt tension should be checked at this time and adjusted (by torquing the adjustment bolt on the idler pulley bracket) so that a belt tension gage, placed at a point midway between the idler pulley and the compressor will register a belt tension of 70 pounds or a 0.13 inch deflection with 6.38 pounds load. After adjusting the belt tension, be sure the belt has ample clearance on all sides

COMPRESSOR BELT REMOVAL

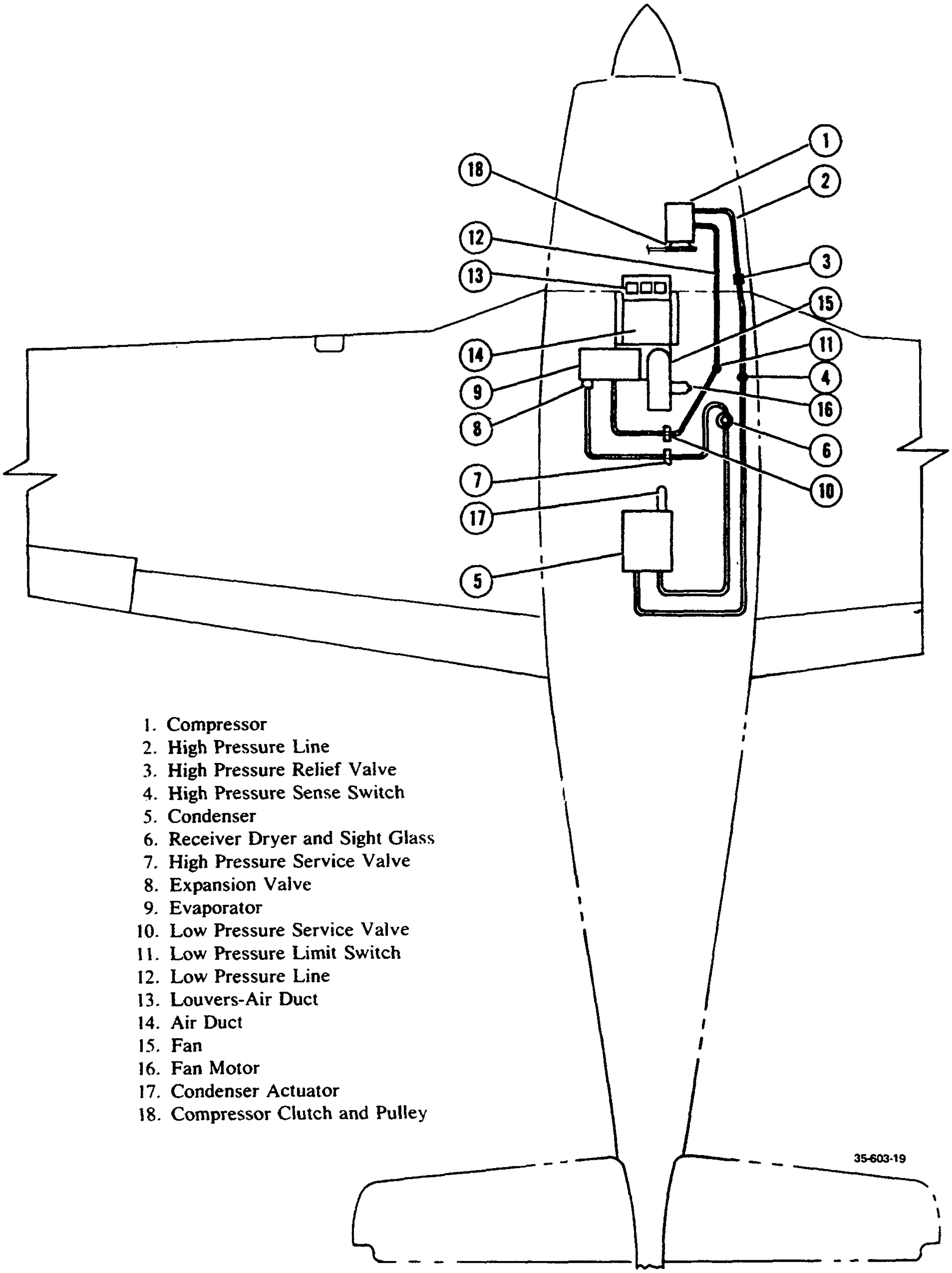
a. Open the engine cowling to gain access to the compressor belt.
b. Loosen the adjustment bolt on the idler pulley bracket to remove tension on the compressor belt
c. Remove the compressor belt.

COMPRESSOR BELT INSTALLATION

a. Install the compressor belt over the compressor pulley, idler pulley and drive pulley.
b. Tighten the adjustment bolt on the idler pulley bracket to increase tension on the compressor belt as stated in the COMPRESSOR BELT TENSION ADJUSTMENT.
c. Close the engine cowling.

CONDENSER REMOVAL

a. The condenser is located beneath the airplane aft of the main spar carry through.
b. Remove the beacon light.
c. Remove the fairing aft of the condenser.
d. Disconnect the hoses at the condenser.
e. Remove actuator bolts.
f. Remove the attach bolts.
g. Remove the condenser.



1. Compressor
2. High Pressure Line
3. High Pressure Relief Valve
4. High Pressure Sense Switch
5. Condenser
6. Receiver Dryer and Sight Glass
7. High Pressure Service Valve
8. Expansion Valve
9. Evaporator
10. Low Pressure Service Valve
11. Low Pressure Limit Switch
12. Low Pressure Line
13. Louvers-Air Duct
14. Air Duct
15. Fan
16. Fan Motor
17. Condenser Actuator
18. Compressor Clutch and Pulley

Figure 3-13C. Air Conditioning System (D-9787, D-9806 and after)

CONDENSER INSTALLATION

a. Place the condenser in position.
b. Secure condenser by the attaching bolts.
c. Install the actuator bolt.
d. Connect the hoses to the condenser
e. Install the fairing.
f. Install the beacon light.

CONDENSER CONTROL RIGGING

The condenser is controlled by the electrical circuitry that controls the air scoop actuator. Check condenser for proper operation. If condenser fails to operate, check for open circuit between the PRESS AIR COOL switch and control actuator.

COMPRESSOR REMOVAL

a. Open the right engine cowling.
b. Remove electrical leads from compressor clutch terminals

WARNING

The air conditioning system is a high pressure system When disconnecting a line, loosen the fittings just enough to bleed off pressure slowly, then disconnect the fitting.

c Disconnect refrigerant lines at the compressor Cap refrigerant lines and compressor fittings.
d Remove compressor belt as noted in COMPRESSOR BELT REMOVAL in this Section.
e. Remove the compressor mounting bolts and nuts and remove compressor

COMPRESSOR INSTALLATION

a. Position compressor on the mounting bracket and install the attaching bolts and nuts.
b. Install compressor belt as noted in COMPRESSOR BELT INSTALLATION in this Section.
c. Adjust belt tension as noted in COMPRESSOR BELT TENSION ADJUSTMENT in this Section.
d. Remove caps from lines and compressor and install lines to the fittings on the compressor.
e. Install the electrical leads to the magnetic clutch.
f. Service the system with oil as noted in CHECKING COMPRESSOR OIL LEVEL in Section 2.
g. Charge the system with refrigerant as noted in CHARGING THE AIR CONDITIONING SYSTEM in Section 2.
h. Close the engine cowling.

VENTILATION BLOWER REMOVAL

a. Remove the pilot and copilot seats
b. Remove the spar cover.
c. Disconnect the electrical leads from the motor.
d Remove the bolts which attach the blower to the evaporator and remove the blower.

VENTILATION BLOWER INSTALLATION

a. Position the blower assembly on the evaporator.
b. Bolt the assembly to the evaporator
c Connect the electrical leads to the motor.
d. Install the spar cover.
e. Install the pilot and copilot seats

EVAPORATOR REMOVAL

a Remove the pilot and copilot seats.
b. Remove the filter cover and filter.
c. Remove the cover assembly from over the ducts.
d Disconnect the drain tubes and remove the tape between the evaporator and duct.
e. Remove the spar cover.
f. Remove the ducts.
g. Loosen the refrigerant inlet line connection just enough to allow all pressure to bleed off.
h. Remove the electrical lead from the motor.
i. Remove the refrigerant lines and cap the four openings.
j. Remove the bolts attaching the evaporator to the floor, and remove the evaporator.

EVAPORATOR INSTALLATION

a. Postition the evaporator in the airplane and install the bolts attaching it to the floor.
b. Attach the refrigerant lines.
c. Attach the electrical connections to the motor.
d. Install the ducts, tape (No. 27 Minnesota Mining and Manufacturing Co.) the duct to the evaporator, and connect the drain tubes.
e. Install the spar cover.
f. Install the filter and filter cover.
g. Install the cover over the ducts.
h. Install the pilot and copilot seats.

EVAPORATOR FILTER REPLACEMENT

The evaporator filter should be replaced on condition. To gain access to the filter remove the screws in the filter cover.

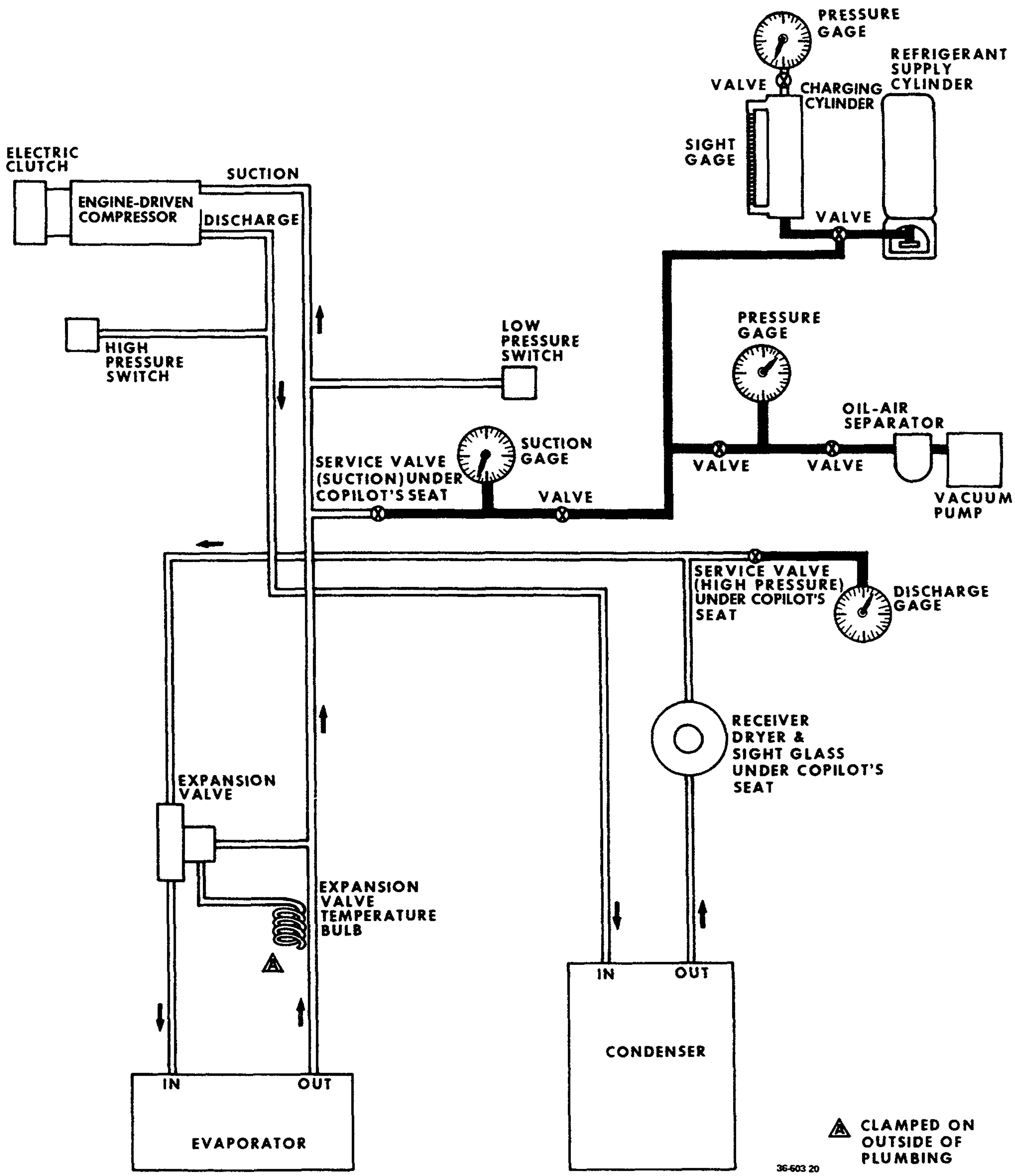


Figure 3-13D. Air Conditioning System Schematic

TROUBLESHOOTING
AIR CONDITIONING SYSTEM

TROUBLE	PROBABLE CAUSE	REMARKS
1 Insufficient cooling.	a. Blower not functioning.	a Repair
	b. Obstructed or disconnected air duct.	b Remove obstruction or repair.
	c. Compressor clutch or belt slipping.	c. Repair or adjust.
	d. Evaporate filter clogged	d Replace
	e. Refrigerant level low.	e. Leak-test and recharge
	f. Expansion valve malfunction.	f Replace
2. No Cooling.	a. Blown fuse, loose connection	a Check connections, fuse, continuity
	b. Blower not functioning.	b. Repair
	c Leak in system.	c. Leak-test and recharge.
	d. Compressor valves inoperative.	d. Repair or replace.
3. Excessive vibration of unit.	a. Overcharged	a. Correct refrigerant charge.
	b. Air in system.	b. Purge and recharge system.
	c. Mount or compressor bolts loose.	c. Tighten
	d. Drive pulley loose.	d. Tighten
4 Noisy unit.	a. Compressor oil level low.	a. Add oil.
	b. Defective belt.	b. Replace
	c. Low refrigerant level.	c Add refrigerant.
	d. Fan hitting shroud.	d Align and tighten shroud.
	e. Defective compressor.	e. Replace
5. Hissing in evaporator module.	a. Low charge.	a. Add refrigerant.
6. Chatter or knock in evaporator module.	a. Defective expansion valve.	a. Replace

TROUBLESHOOTING AIR CONDITIONING SYSTEM

Trouble	Probable Cause	Remarks
7. Belt slipping	a. Loose	a. Adjust
	b. Overcharged	b. Correct refrigerant level
	c. Air in system	c. Evacuate and recharge
8. Excessive belt wear	a. Pulleys not in line	a. Align pulleys
	b. Belt too tight	b. Adjust or replace
	c. Pulley groove wrong size	c. Replace
	d. Belt width wrong	d. Replace
9. Broken belt	a. Check all causes above	a. Replace or correct

VACUUM SYSTEM

INSTALLING VACUUM PUMP

When installing the vacuum pump, it is imperative that the oil holes in the mounting pad, the pump base gasket and the pump base are properly aligned. Misalignment of these holes can cause seizing and consequent failure of the pump due to lack of lubrication.

CLEANING SUCTION RELIEF VALVE SCREEN

The suction relief valve bleeds outside air into the vacuum pump and it is essential for proper operation of the vacuum-operated instruments that the relief valve screen be kept clean. Frequency of cleaning the screen will vary with the conditions under which the airplane is operated. The screen should be cleaned by removing and washing it in cleaning solvent.

ADJUSTMENT OF SUCTION RELIEF VALVE

a. Start the engine and adjust the throttle to approximately 2000 rpm.

b. On Pesco valves turn the adjusting screw counterclockwise to increase suction or clockwise to decrease suction. On Aro valves, turn the adjusting screw clockwise to increase suction and counterclockwise to decrease suction. On airplanes prior to D-5211, adjust the valve until the suction gage reads 4.6 inches Hg. On airplane serials D-5211 and after, adjust to 5.5 inches.

NOTE

On all Bonanzas equipped with a Tactair T-3 autopilot, adjust the vacuum system to 4.2 inches Hg.

CLEANING OF OIL SEPARATOR

If the screen in the oil filter becomes clogged, the oil that would normally drain back into the engine sump will be forced out through the separator vent tube on the underside of the fuselage. Therefore, the oil separator screen should be thoroughly cleaned every 100 hours by back-flushing or submerging the unit in cleaning fluid, then blowing dry with high pressure air. On serials D-7920 through D-7925, D-7929 through D-7931, and D-8381 through D-8598, a dry air type pump is used and no oil separator is required.

REPLACING GYRO INSTRUMENT FILTERS

The filter assemblies in the attitude gyro, directional gyro and the vacuum turn and bank indicator should be replaced every 100 hours under normal operating conditions and more often if operated in dusty conditions.

PRESSURE SYSTEM (SERIALS D-8599 AND AFTER) (Figure 3-14)

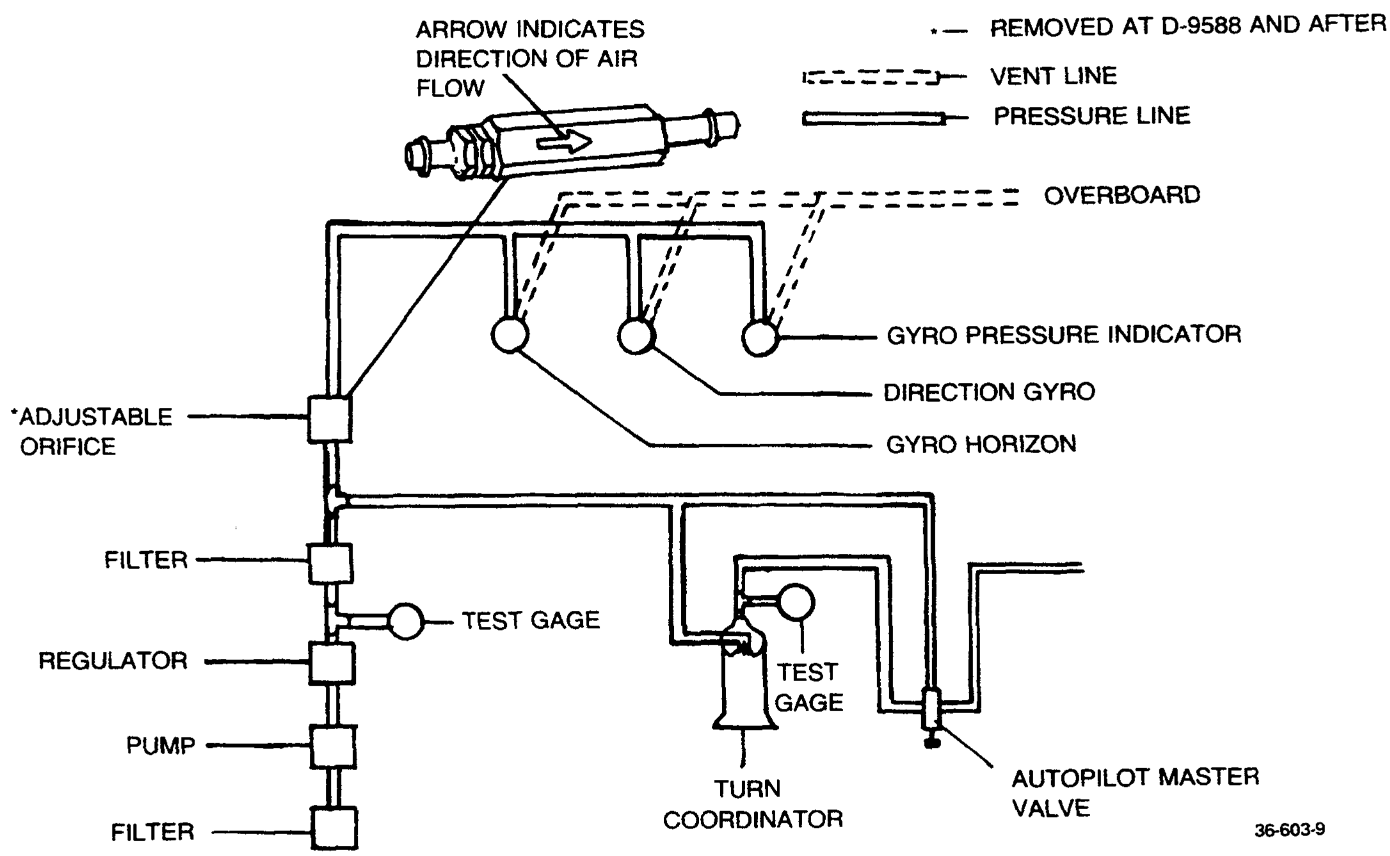
NOTE

When the airplane is equipped with four air driven gyros and an air driven autopilot, it is necessary to have a higher capacity dry air pump in order to safely operate the gyros and/or the autopilot system.

The pressure system provides the air required for operation of the autopilot and instruments. Air pressure from an externally filtered engine-driven dry air pump is regulated by a pressure relief regulator valve mounted in the RH side of the engine compartment aft of the rear engine baffle. The air is then routed through an inline system filter and an adjustable orifice (on serials prior to D-9588) to the instrument panel. If an autopilot is installed, air is plumbed off the pressure system prior to the adjustable orifice.

NOTE

If the pressure pump has failed or operation of the instruments indicates a fluctuation of the system pressure or a decrease in the system pressure, check for excessive pressure, a partial restriction in the lines, a filter partially obstructed, or pressure loss resulting from loose connections. These conditions may be



Pressure System Schematic
Figure 3-14

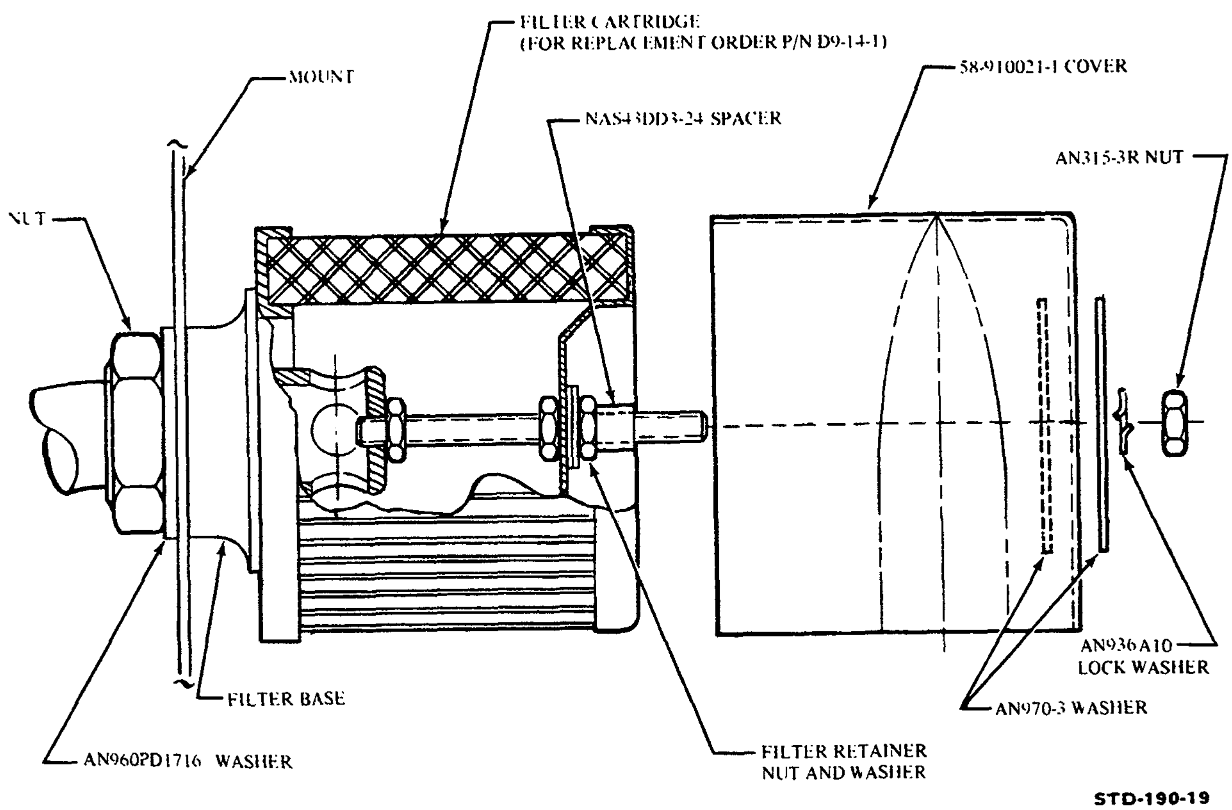
checked by: (1) Removing the inline filter from the system and checking it for obstructions by comparing the resistance to flow with a new filter. Use a dry, low pressure air source (max. of 10 psi) for this test. If air flow resistance in the filter removed from the airplane exceeds that of the new filter by more than 1.0 psi, replace the filter. (2) Check all connections for tightness. (3) Check the lines for bends, kinks, and excessive carbon. With the discrepancy repaired, or whenever any components are replaced in the pressure system, adjust the pressure as follows.

CAUTION

Never use a pressure pump which has been dropped or mishandled. Never jam or force the pump onto the engine mounting pad. Always install a new inline filter when installing a new pump.

a. Install a test gage (0-10 psi) at the "out" side of the pressure regulator. If the airplane is equipped with a BEECHCRAFT autopilot, an additional test gage (0-10 psi) should be installed in the turn coordinator supply line (See Figure 3-14).

b. On airplanes without an autopilot, the pressure regulator should be adjusted to obtain a reading of 4.5 psi on the test gage at the pressure regulator with the engine operating at 2300 rpm. On airplanes equipped with an autopilot, the pressure regulator should be adjusted to obtain a reading of 5.0 +0 -.5 psi on the test gage in the turn coordinator supply line with the engine operating at 2300 rpm and the autopilot ON. Normally, a pressure of 6.5 psi on the test gage at the pressure regulator is sufficient to obtain the 5.0 +0 -.5 psi reading at the turn coordinator. Rotating the adjusting screw on the pressure regulator clockwise increases pressure and counterclockwise rotation decreases pressure.



Intake Air Filter
Figure 3-14A

CAUTION

Under no circumstances should the reading at the pressure regulator exceed 7.0 psi.

c. Locate the adjustable orifice on the LH side of the airplane forward of the instrument panel, near the system filter, and loosen the check nut. Rotate the orifice body to obtain a reading of 5.0 +.1 -.2 in. Hg on the gyro pressure indicator with the engine operating at 2300 rpm. Tighten the checknut. Check the gyro pressure indicator with the engine operating at 1500 rpm. The pressure should remain in the green arc at this speed.

d. After adjusting the orifice, check the pressure on the test gages with the engine operating at 2300 rpm. If the pressure on these gages has been affected by the adjustment of the orifice, the pressure regulator should be adjusted.

NOTE

Airplane serials D-9588 and after do not have the adjustable orifice. Pressure system adjustment for these airplanes will be the same as noted in steps "a" through "b".

e. Remove the test gages from the airplane.

PRESSURE SYSTEM FILTERS

The pressure system has an air filter located between the gyro instruments and the pressure regulator. This filter should be removed and replaced every 500 hours or sooner, depending upon operating conditions. An additional air filter is provided at the ambient air inlet, located on the engine baffle. This filter should be removed every 100 hours and cleaned with solvent and blown dry with air pressure. The filter should be replaced every 500 hours or sooner, depending upon operating conditions.

On airplane serials D-9508 and after, and those prior airplanes that have complied with Service Instructions No. 0581-194, will have the new 1J2-1 filter installed. This filter should be replaced annually or every 300 to 500 hours service time, depending upon operating conditions. The filter element must not be subjected to solvents and must be replaced if this occurs. Always reinstall the filter cover with the opening facing down.

ENGINE INSTRUMENTS

BEECHCRAFT Bonanza, D-9222 through D-9390 except those equipped with turbo-charged engines, are equipped with vertical readout engine instruments, operated electrically, lighted internally and installed in a box assembly which is installed in the instrument panel. A male connector attached to the rear of each instrument fits into a female connector attached to the rear of the box assembly. The male connector is pulled from the female connector, removing the instrument from the electrical circuit.

CAUTION

In the event of a malfunction of an instrument or the dimming circuit, check the electrical circuitry, wiring, and connectors. If the fault is not in these itms, do not attempt to repair the instrument itself. Replace the instrument and return the defective instrument to Beech Aircraft Corporation.

REMOVAL AND INSTALLATION OF VERTICAL INSTRUMENTS

a. Remove the six screws holding the plastic instrument retainer plate to the box assembly and remove the plate.

b. Pull the desired instrument straight out.

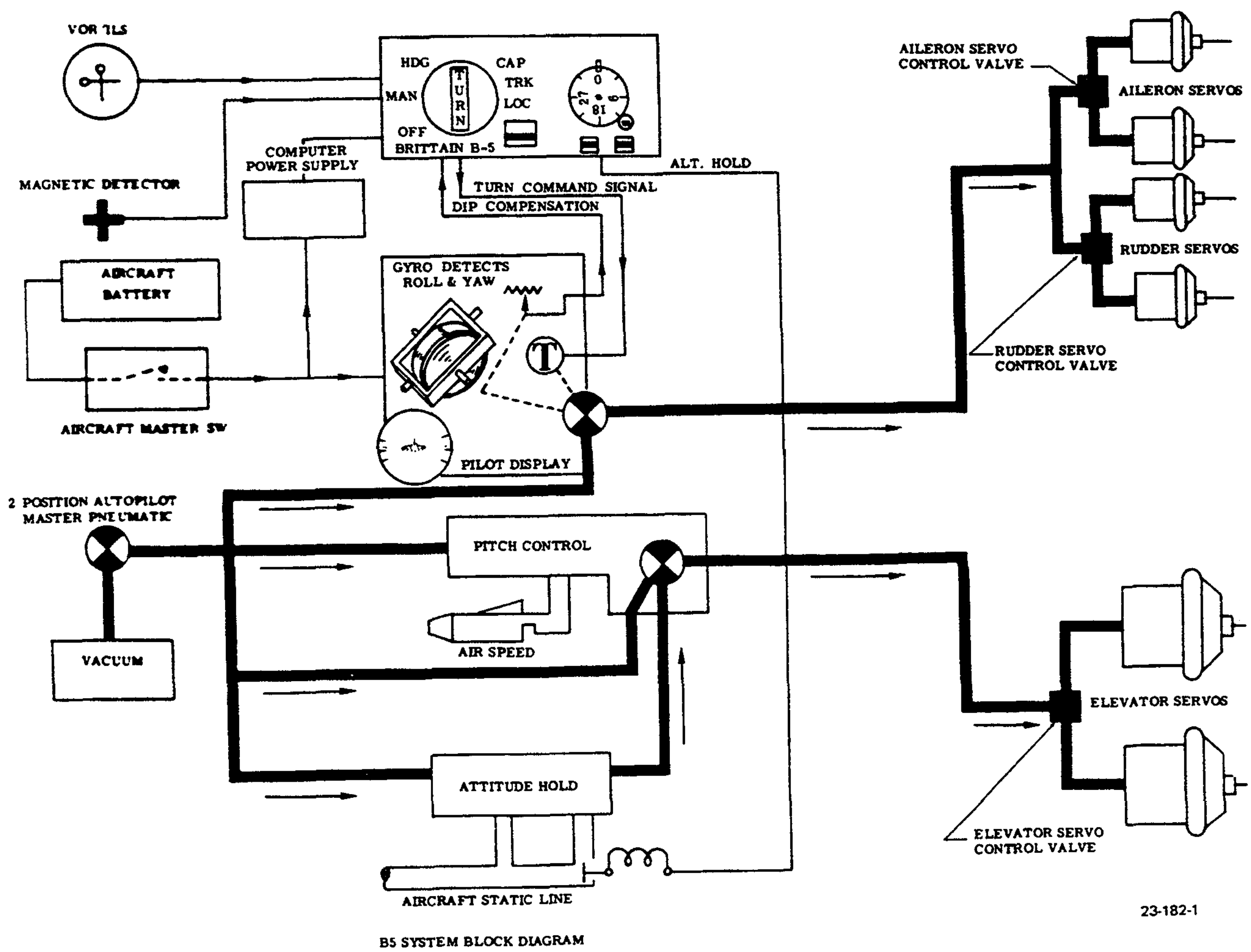
NOTE

The EGT indicator must have the thermocouple leads removed from the back of the instrument after it has been pulled from the box assembly.

c. Reinstallation may be accomplished in the reverse of the removal procedure.

BEECHCRAFT NEW-MATIC AUTOPILOT (OPTIONAL)
(Figures 3-14B)

The BEECHCRAFT New-matic autopilots operate on an electro-pneumatic concept. Electronic circuitry is used for navigational beam detection, magnetic heading direction and turns. Pneumatic servos are used for the flight control actuators. The systems are completely nontumbling. Yaw, roll and turn detection is made by a tilted gyro (EVT turn coordinator electrical vacuum torquing combination) mounted in the instrument panel. A dampened miniature airplane serves as the instrument indicating arm. Any deviation from straight flight causes the rate gyro to move a pressure (or vacuum) valve which puts force into the aileron or rudder to return the airplane to straight flight. Turns or beam following is made by rotating a valve sleeve by a torquing movement proportional to the voltage imposed upon it. This unit also supplies an output voltage proportional to the turning rate that is used for dip compensation and nose up signal during turns. The pitch control system does not use a gyro for reference, but uses the airspeed, rate-of-airspeed change and inertial signals to control the elevator through the pitch servos. An altitude hold sensing unit works in conjunction with the pitch control to sustain a given altitude.



BEECHRAFT New-Matic B-5 Autopilot System
Figure 3-14B

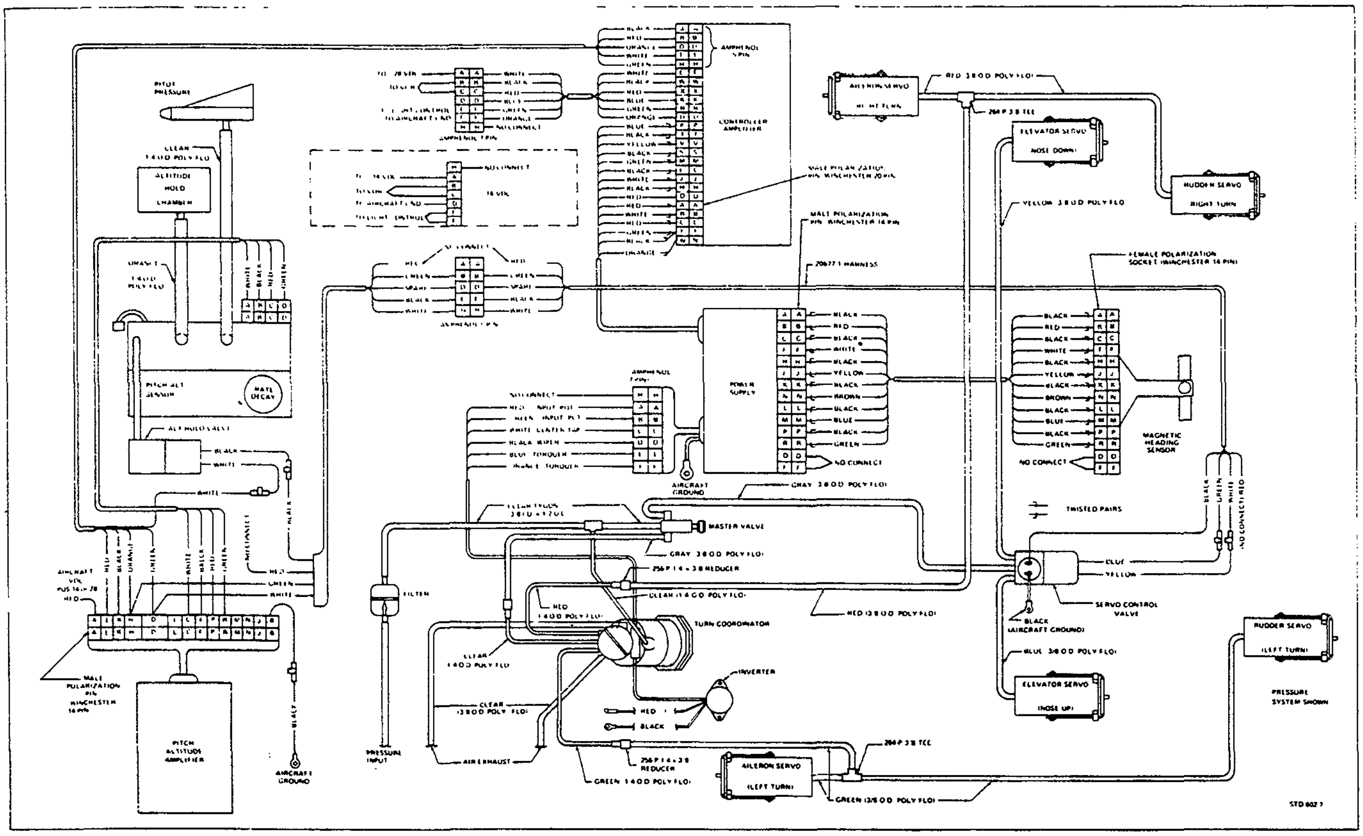


Figure 3-14C. BEECHCRAFT New-Matic B-7 System Block Diagram

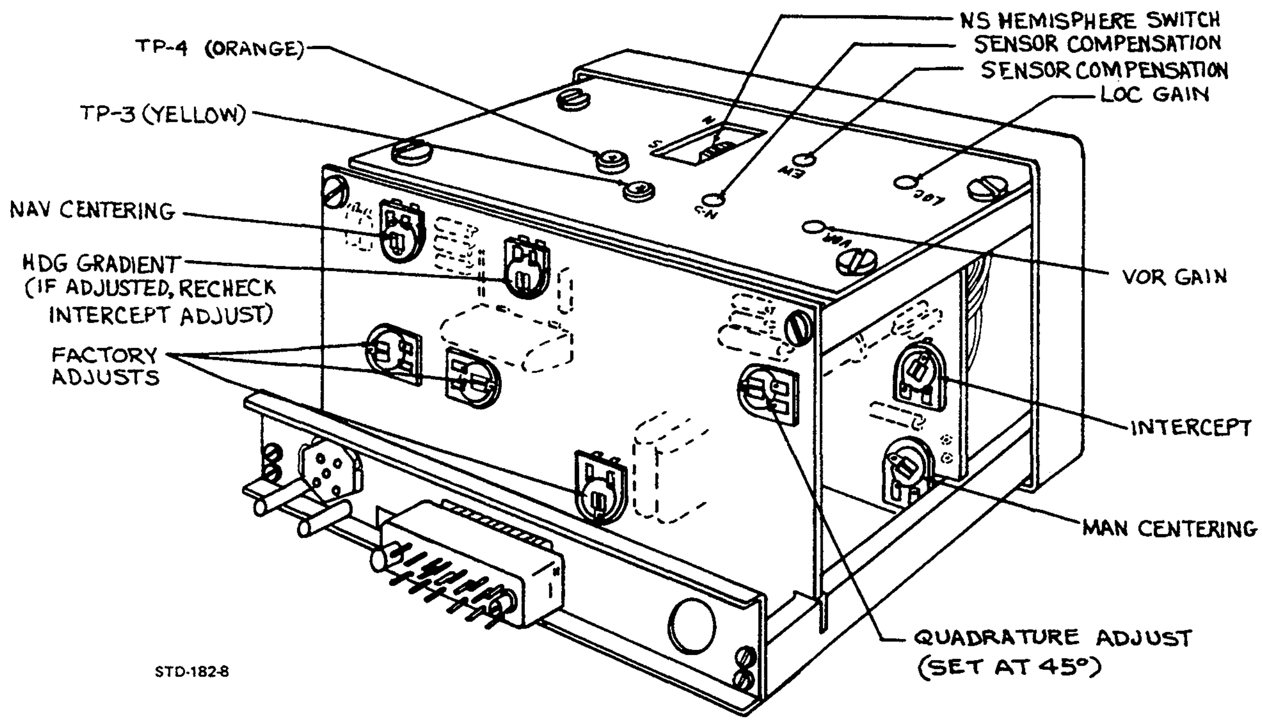


Figure 3-14D. BEECHCRAFT New-Matic B-5 and B-7 Heading Lock/Navigation Coupler System Adjustment Points

AUTOPILOT TROUBLESHOOTING GUIDE

NOTE

This procedure applies to the BEECHCRAFT New-Matic autopilots. Manuals noted in the Supplementary Publications list and the appropriate test sets as listed in those manuals will aid further in troubleshooting procedures.

INDICATION	PROBABLE CAUSE	REMARKS
ROLL AXIS		
1. Insufficient or excessive pressure indicated on aircraft system gage.	a. Leak in aircraft pressure system.	a. Check all lines and fittings for breaks, looseness, kinks, etc.
	b. Regulator valve improperly adjusted.	b. Adjust as outlined in Section 3.
	c. Adjustable orifice improperly adjusted.	c. Adjust as outlined in Section 3.
	d. Faulty pressure pump.	d. Replace pump.
	e. Ambient air filter clogged.	e. Clean or replace.
	f. Clogged system filter.	f. Check as outlined in Section 3 and replace if necessary.
2. Aircraft hunts or recovers slowly from turn in one direction.	a. Regulator valve improperly adjusted.	a. Adjust as outlined in Section 3.
	b. Loose aircraft primary cables or excessive friction in aileron and/or rudder cables, pulleys, bell cranks or loose servo cables.	b. Check security of attachment, binding, etc. and adjust as outlined in Section 3.
	c. Leak in servo or servo lines.	c. Check for leaks.
	d. Obstruction in servo lines.	d. Check for foreign matter.
	e. Faulty turn coordinator gyro.	e. Replace turn coordinator.
3. Autopilot sluggish.	a. Low system pressure setting.	a. Check system filters and adjust as outlined in Section 3.
4. Aircraft turns continuously on basic stabilization. (Controller "OFF").	a. Aircraft out of trim or improperly rigged.	a. Trim aircraft or check controls for proper rig as outlined in Section 3.
	b. Loose primary cables or excessive friction in cables and system. Loose servo cable.	b. Check security of attachment, binding, etc. and adjust as outlined in Section 3.
	c. Defective turn coordinator gyro.	c. Replace turn coordinator gyro.
	d. Leak in servo or servo line.	d. Check for servo or line leaks.
5. Aircraft rate of turn too fast or too slow.	a. Improper regulator adjustment.	a. Adjust regulator as outlined in Section 3.
	b. Turn coordinator faulty.	b. Replace turn coordinator.

INDICATION	PROBABLE CAUSE	REMARKS
6. Continuous control wheel oscillation in smooth air.	a. Turn coordinator faulty.	a. Replace turn coordinator.
	b. Improper gyro speed or excessive pressure in system.	b. Adjust system pressure as outlined in Section 3.
7. No turns or turns in one direction only, in response to turn control or on all modes of navigation coupler operation.	a. Faulty turn coordinator.	a. Replace turn coordinator.
	b. Faulty controller/amplifier.	b. Replace controller/amplifier.
8. Aircraft rolls in one direction only either left or right.	a. Servos improperly phased.	a. Plumb as noted on Figure 3-14C.
	b. Turn coordinator not plumbed properly.	b. Plumb as noted on Figure 3-14C.
9. Aircraft turns in the wrong direction in "CAP" and "TRK" modes.	a. Nav input signal reversed.	a. Reverse connectors to VOR.
10. No aircraft response from navigation coupler in any mode, ground check shows electrical.	a. Faulty turn coordinator gyro.	a. Replace turn coordinator.
	b. Obstruction in pressure lines.	b. Check for foreign matter.
11. Aircraft fails to turn to and hold magnetic headings.	a. Faulty magnetic heading sensor.	a. Replace magnetic heading sensor.
	b. Faulty heading selector resolver.	b. Replace controller/amplifier.
	c. Faulty controller/amplifier.	c. Replace controller/amplifier.
12. Magnetic headings consistently high or low.	a. Heading sensor misaligned in aircraft.	a. Check for proper installation.
	b. Heading azimuth dial shifted on shaft.	b. Tighten screw and recalibrate.
	c. Improper adjustment of controller/amplifier.	c. Calibrate for the magnetic cardinal points.
13. Cardinal headings inaccurate.	a. Controller/amplifier improperly adjusted.	a. Calibrate for the magnetic cardinal points.
	b. Leak in servo system.	b. Check for leaks.
	c. Low primary pressure.	c. Adjust system as outlined in Section 3.
14. Cardinal headings accurate both intermediate headings inaccurate.	a. Faulty heading sensor.	a. Replace the heading sensor.
	b. Faulty controller/amplifier.	b. Replace controller/amplifier.
15. Insufficient or no control in "CAP" and "TRK" modes.	a. Faulty controller/amplifier.	a. Replace controller/amplifier.
	b. Faulty omni converter.	b. Replace omni converter.
	c. Insufficient signal from omni.	c. Repair or replace omni indicator.
	d. "NAV SENS" improperly adjusted.	d. Readjust.

INDICATION	PROBABLE CAUSE	REMARKS
16. Localizer approach is either sluggish or too sensitive.	a. Loc gain is set high or low.	a. Adjust localizer gain.
17. No electrical output left or right on controller/ amplifier test jacks.	a. No A+ input or improperly grounded.	a. Check A+ and ground.
	b. Defective controller/ amplifier or power supply.	b. Replace controller/amplifier or power supply.
18. Output only one way on controller/amplifier test jacks.	a. Defective controller/ amplifier.	a. Replace controller/amplifier.
19. No output on HDG mode on controller/amplifier test jacks.	a. Defective controller/ amplifier, or harness, or heading sensor.	a. Replace controller/amplifier; or harness, or heading sensor.
20. Heading output on two reciprocal headings, but not on the other two.	a. Defective sensor; or harness; or faulty controller/amplifier.	a. Replace heading sensor, or check harness. Replace controller/amplifier.
21. "0" output when in CAP, TRK, or APP mode, with nav signal.	a. Defective nav switching console; or no nav information; or defective controller/ amplifier.	a. Check nav input leads. Replace controller/amplifier.
22. Output voltage in CAP mode decays to "0" voltage.	a. Wrong nav input signals.	a. Check wiring.
	b. Defective switching console (if installed).	b. Repair or replace console.
	c. Dirty input signal (AC volts).	c. Check indicators.
23. Voltage output in MAN, CAP, TRK, and APP mode, but none in HDG mode.	a. Polarization pins reversed on heading sensor plug.	a. Reverse pins. (See Figure 3-14C).
24. Nav indicator needle deflects left or right when controller/amplifier or radio is turned on.	a. One of the components is shorted to ground.	a. Check for shorts.
25. Low or high intercept angle.	a. Incorrect setting on controller/amplifier.	a. Adjust intercept angle.
	b. Low or high voltage output on nav indicators.	b. Check nav indicators to manufacturer's specs.
PITCH AXIS		
1. Pitch channel will not center up electrically.	a. Defective pitch/altitude sensor or amplifier.	a. Check on Test Set TS-108 or replace one at a time.
2. Altitude channel will not center up electrically.	a. Defective pitch/altitude sensor or amplifier.	a. Check on Test Set TS-108 or replace one at a time.
3. Altitude hold solenoid valve will not actuate.	a. Pressure switch on servo control valve out of circuit.	a. Check for faulty switch and replace if necessary.
	b. Defective solenoid valve.	b. Replace solenoid valve.
	c. Defective altitude switch on controller/amplifier.	c. Check continuity (see Figure 3-14C).

INDICATION	PROBABLE CAUSE	REMARKS
4. Servo control valve will not center.	a. Improper pressure adjustment.	a. Adjust as outlined in Section 3.
	b. Sticky valve.	b. Replace valve.
5. Output voltage is inadequate.	a. Pitch/altitude amplifier sensor or harness shorted or improperly wired.	a. See Figure 3-14C; run continuity check and check for shorts.
6. Pressure switch will not make contact when pressure is on.	a. Defective pressure switch or not set at proper pressure.	a. Replace pressure switch.
7. Output voltage one way only on pitch and altitude channels.	a. Servo control valve shorted to ground.	a. Replace valve.
8. System will not maintain trimmed configuration even though centered electrically.	a. Servo control valve not pneumatically centered.	a. Disconnect electrical power. Center valve pneumatically by use of differential gage to ± 0.4 in Hg.
	b. Leak in servos or improperly rigged.	b. Check for leaks and rig.
	c. Leak in pitch/altitude sensor.	c. Replace sensor.
9. System will not respond to airspeed changes.	a. Primary pressure not set properly.	a. Adjust as outlined in Section 3.
	b. Pitot pressure inadequate.	b. Check pitot plumbing.
	c. Decay rate improperly adjusted.	c. Adjust as required.
10. System will not respond to up-command adjustment.	a. Defective pitch/altitude amplifier.	a. Replace pitch/altitude amplifier.
	b. No EVT potentiometer output.	b. Replace turn coordinator.
11. System will not respond to altitude gain adjustment.	a. Pitch/altitude amplifier limiter improperly set.	a. Adjust as required.
12. Aircraft has long term oscillation about pitch axis with altitude hold OFF.	a. Decay rate improperly adjusted.	a. Adjust as required.
	b. Pitch/altitude gain improperly adjusted.	b. Adjust as required.
	c. Friction in elevator or servo system.	c. Check for friction and correct.
13. Aircraft has short term oscillation about pitch axis.	a. Decay rate too tight.	a. Adjust as required.
	b. Pitch gain too high.	b. Adjust as required.
	c. Primary pressure too high.	c. Readjust as outlined in Section 3.
14. Aircraft oscillates with altitude hold ON.	a. Altitude gain too high.	a. Adjust as required.
	b. Decay rate improperly adjusted.	b. Adjust as required.

INDICATION	PROBABLE CAUSE	REMARKS
15. Aircraft does not return to altitude when displaced.	a. Altitude hold solenoid inoperative.	a. Replace solenoid.
	b. Leak in altitude system.	b. Check for leaks.
	c. Altitude limiter improperly adjusted.	c. Adjust as required.
16. Aircraft descends or ascends continually when system engaged.	a. Servo control valve not phased correctly.	a. Apply positive 6.0 volts (max) to blue lead and verify nose up response.

STROBE LIGHT

BULLOCK UNIT

The system consists of a solid state power supply unit, a circuit breaker switch on the instrument panel, a shielded power cable and a single, ventral-mounted xenon gas light. System operation is based on the capacitance discharge principle. A DC converter steps up the aircraft battery voltage to approximately 400 volts to charge the capacitor. The trigger circuit consists of a unijunction oscillator and a silicon controlled rectifier which applies a pulse of negative voltage to the trigger transformer in the lamp. The trigger transformer produces an ionization voltage of approximately 4000 volts to ignite the xenon gas in the lamp. As the lamp ignites, the energy stored in the capacitor is discharged through the lamp to produce a peak light intensity of over a million candle power. When the capacitor voltage drops below 50 volts, the lamp will go out and the capacitor begins recharging for the next cycle. System operational cycle will repeat, until the strobe light is turned off, at a flash rate of 45 flashes per minute.

TROUBLE ANALYSIS

Whenever trouble occurs, check all primary power lines, external circuit elements, fuses and wiring for a malfunction before troubleshooting the strobe light system. System electrical failure may be traced to any of three general areas; power unit, lamp assembly or wiring. A quick method of isolating the trouble source is to remove the lens of the xenon lamp and test the lamp. Inspect the lamp to see if it is broken or loose in its socket. If the lamp is intact, use a DC voltmeter to check for approximately 350 volts at the top of the lamp with the system turned on. The rate that the voltage peaks should be between 40 and 55 times per minute. If no voltage is present, the fault is probably located in the power unit.

TROUBLESHOOTING POWER UNIT

Disassemble the power unit by removing the screws securing the end plates to the power unit. Remove the end plate which has the power plug and slide the bottom heat sink forward until it can be separated. The large capacitor may be attached to the rear end plate by thermal epoxy for efficient heat transfer and care should be taken to avoid breaking this bond. The upper heat sink (with transistors mounted on it) can be slid forward, exposing the component board and capacitor bracket. Remove the nuts securing the board to the metal bracket and the component board will be completely accessible.

CONVERTER TROUBLESHOOTING

a. If the fuse keeps blowing, check transistor 2N3055 for a possible short. It will be necessary to remove the emitter wire, and unsolder the base wire before an ohmmeter check can be made. Many times only one transistor will fail. Failure of Capacitor C1 will also cause the fuse to blow.

b. If the converter won't start when voltage is first applied, a small current "kick" is noted and then no current is drawn; look for a poor solder joint in the starting circuit, R2 1.3K and R1 82 ohms. The converter may be started by applying about 2 volts to the junction of R1 and R2.

c. Low or no output voltage, but converter operates otherwise. Using an ohmmeter, look for a shorted diode in the bridge circuit. In extreme cases, the transformer could have a shorted winding. As a check, disconnect a lead from the transformer secondary, if the current remains the same, the transformer should be replaced.

d. Low output voltage can be the result of a faulty capacitor C2. Check by removing the positive lead from the capacitor.

e. Low voltage coupled with very slow voltage buildup can be traced to a faulty transistor 2N3055. An ohmmeter check will indicate which transistor has failed. Select replacement transistors having a collector to emitter resistance of 100 ohms minimum.

TRIGGER CIRCUIT TROUBLESHOOTING

a. Using a high impendance voltmeter, check for 180 volts DC at the junction of R8, R9 and C5. If there is no voltage, check C5 and SCR T1145A2.

b. If there is voltage at the junction, it should periodically drop to around 30 volts as the SCR triggers. If the SCR does not trigger, measure the voltage across R7 (100 ohms). This voltage will be below .5 volts. If the voltage is indicated, place an oscilloscope across R7 and look for a positive going pulse of around 4 volts at the repetition rate of 40 to 55 times per minute. If the pulse is recorded on the scope, then the SCR is not triggering and should be replaced.

c. When no voltage is observed across R7, check for battery voltage at R5 and R6. If voltage is present, then the trouble is in the unijunction.

d. If normal voltage is observed across R7, check the capacitor C4 for shorts and leakage.

e. If unijunction Q3 is to be replaced, it may be necessary to readjust the flash rate. This can be done by changing R5 or by changing the value of C4. In many cases, the value is recorded on the component board, and it is only necessary to order the exact value from the manufacturer (see the Vendor Publication List).

NOTE

In some instances, power supply units which have been stored or not operated on the aircraft for a considerable period of time, may not operate instantly when the system is turned on. Before determining that the power unit is inoperative, leave the system on for a period of at least 30 minutes. If the power unit does not operate in this span of time, refer to TROUBLESHOOTING POWER UNIT.

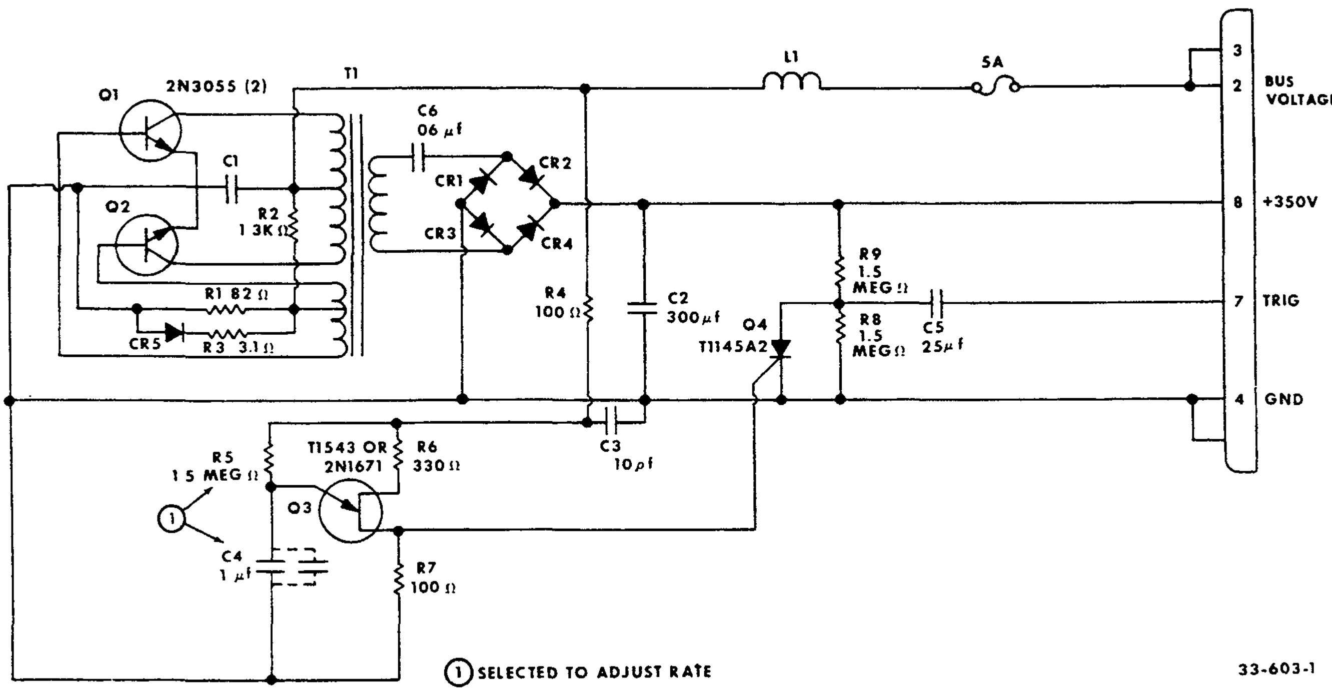


Figure 3-14E. Bullock Power Supply Schematic (Internal)

GRIMES STROBE LIGHT SYSTEM

The system consists of a solid state power supply unit, a circuit breaker switch on the instrument panel, and 3 xenon gas lights mounted in the tail and each wing tip. The function of the Grimes Strobe Light system is essentially the same as the strobe light system described earlier in this Section. Use that system description for a more detailed explanation of the method by which the Grimes system operates. The Grimes System does not incorporate a timing circuit, since all the lights flash at the same time at a rate of 60 flashes per minute.

Power Supply Removal and Installation

To gain access to the power supply unit, remove the floorboard on the RH side of the baggage compartment. The entire unit may be removed by disconnecting the electrical wiring to the power supply and removing the screws anchoring the module to the support structure To reinstall the power supply unit, merely reverse the foregoing procedures.

CAUTION

Observe the precautions noted in the following procedure when removing and installing the power supply.

Strobe Light Wiring

An incorrect hook-up of the wires at either the power input or between the strobe light assemblies and the power supply unit will cause a reversal of polarity that results in serious component damage and failure. Care must be taken to ensure that the red wire is connected to positive power and the black wire to ground. Make sure that the connectors are properly assembled and that red, white, and black wires (white/red, white/black, and white/yellow wires on the 28-volt system) are connected to pins "A", "B", and "C" of the connector respectively. The shields for the wing and tail light cables should be grounded to the aircraft structure at the power supply.

WARNING

Although a bleed-off resistor is incorporated in the power supply circuit, high voltage is involved in the circuit between the power supply and light assemblies. For this reason, turn the control switch for the strobe lights OFF and wait for at least 10 minutes to elapse before disconnecting the cables at the power supply or light assemblies and before handling or disassembling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

Removal and Installation of Tail Strobe Light

a. Remove the tail cone and light cover to gain access to the strobe light assembly

WARNING

To avoid damage to the strobe light system or possible physical injury from electrical shock, observe the precautions outlined under STROBE LIGHT WIRING in this section before removing or installing the strobe light assembly

b. Remove the two retaining screws that secure the light assembly in place and disconnect the light from the aircraft electrical system.
c. Remove the 2 screws on the side of the light assembly to free the retainer and lens.
d Rotate the lamp until free if it is to be replaced.
e. If the flashtube is to be replaced, remove the 4 screws on the backside of the light subassembly, and pull it apart from the light assembly.
f. Remove the 2 screws on the bottom of the subassembly and remove the flashtube.
g. Reverse the preceding steps to reinstall the strobe light assembly

Removal and Installation of Wing Strobe Lights

WARNING

To avoid damage to the strobe light system or possible physical injury from electrical shock, observe the precautions outlined under STROBE LIGHT WIRING before removing or installing the strobe light assembly.

a. Remove the transparent shield over the wing tip lights.
b. Remove the two screws securing the lens and light to the mounting bracket.
c. Remove the lens, and lift the strobe light out to disconnect the electrical wiring.
d. Reverse the preceding steps to reinstall the light assembly.

STROBE LIGHT LAMP REPLACEMENT GUIDE	BULB NUMBER
Tail Strobe Light Lamp (Grimes)	633
Tail Strobe Light Flashtube (Grimes)	31-2440-1
Tail Strobe Light (28 Volt) Flashtube (Grimes)	30-0815-1
Wing Strobe Light Flashtube (Grimes)	31-1840-1
Wing Strobe Light (28 Volt) Flashtube (Grimes)	30-1467-1

EMERGENCY LOCATOR TRANSMITTER

Factory delivered airplanes, D-9306 and D-9308 and after, have an emergency locator transmitter (ELT) to assist in the tracking and recovery of any airplane and crew in the event of a crash or an emergency landing is necessitated.

The ELT is mounted on the right side of the aft fuselage at approximately FS 230. An antenna is located on top of the aft fuselage at approximately FS 211, and an access hole with a spring loaded cover is located in the right aft fuselage skin adjacent to the transmitter providing access for manual activation of the ELT.

The output frequency is 121.5 and 243.0 MHz, simultaneously. Range is approximately line of sight. The ARM-OF-ON switch is located on the transmitter, and controls the operation of the set. The ON position turns the set on for testing and the ARM position actuates the set to operate automatically upon impact. A reset switch, located on the forward end of the transmitter, resets the transmitter to the ARM position in the event the impact switch is accidentally triggered.

MAINTENANCE

Maintenance on the ELT is normally limited to replacing the battery. The battery must be replaced at fifty percent of its useful life, or when the transmitter has been in use for more than one cumulative hour.

NOTE

The battery furnished with the ELT in the Bonanza has a shelf life of two years. Therefore, the battery must be replaced in one year.

To replace the battery, proceed as follows:

a. Place the ARM-OFF-ON switch in the OFF position.

b. Disconnect the antenna cable and remove the ELT from the airplane.

c. Remove the four screws which hold the mounting base on the transmitter and remove the base.

d. Remove the old battery and disconnect the electrical connector.

e. Connect a fresh battery and install it in the compartment.

f. Replace the base and four screws.

g. Install the transmitter in the airplane and attach the antenna cable.

h. A new replacement date must be marked on the outside of the transmitter. This date is one year from the battery manufacture.

TESTING

Generally, tests will be performed following maintenance or repair of ELTs, other than battery replacement, to determine their operational capability. Testing of the ELT, if properly done, could trigger false alerts and create frequency jamming, and may interfere with the reception of a bonafide emergency transmission. Federal Communications Commission regulations require that this testing be performed in a screened or shielded test room, or in a test enclosure that will hold the self-contained ELT unit with the antenna fully extended.

Operational testing of installed ELT's may be accomplished as follows:

NOTE

Tests should not be longer than three audio sweeps. One audio sweep may be defined as amplitude modulation the carrier with audio frequency sweeping downward over a range of not less than 700 Hz, within the range 1,600 to 300 Hz, and a sweep repetition rate between two and four Hz.

Tests should be conducted only in the first five minutes of any hour. If the operational tests must be made at a time not included within the first five minutes after the hour, the tests should be coordinated with the nearest FAA tower or flight service station.

a. Turn COM-1 ON and tune to 121.5 MHz.

b. Turn COM-1 to the SPEAKER position.

c. Turn the ELT ARM-OFF-ON switch to ON and monitor ELT signal.

NOTE

If there is no audible signal, the battery is probably disconnected or dead. Assuming that VHF transceiver is operational.

d. Place the ARM-OFF-ON switch on the ELT to the OFF position. The audio signal should disappear completely.

e. Place the switch in the ARM position. There should be no audio signal present.

NOTE

If a signal is heard, the impact switch has probably been activated and should be reset.

f. Firmly press the reset switch on the front of the ELT and listen to ensure the audio signal disappears from COM-1.

INSPECTION OF FUSELAGE BULKHEADS (35, A35, B35, C35 AND D35)

On the above noted airplanes, the fuselage bulkheads at stations 256.90 and 272.00 should be inspected periodically for cracks. If cracks are found they must be repaired before the next flight. The following procedure is recommended for inspection.

a. Remove tailcone assembly.

b. Remove all access doors in fuselage tail section to permit adequate inspection of the bulkheads.

c. Examine skin in area of bulkhead stations 256.90 and 272.00 for evidence of wrinkles or possible cracks.

d. Investigate bulkheads at stations 256.90 and 272.00 for evidence of cracks, distortion, loose rivets, or other obvious damage.

Refer to the Inspection Guide for the interval of inspection for both the above noted airplanes and later airplanes.

NOTE

Due to possible damage to the stabilizers, personnel are advised not to place weight on the stabilizers while trying to raise or hold the nose gear off the ground.

INSTALLING CABIN DOOR LOCK AND FITTING TUMBLER TO KEY

When a lock on the baggage compartment door, cabin door or ignition is broken or worn, it is not necessary to install a full set of replacement locks with a new key. A new tumbler can readily converted for use with the old key. To fit a new tumbler to a key proceed as follows:

a. Insert key to be used in the new lock.

b. With key in the unlocked position examine the top of the lock barrel where the slots for the tumbler are located.

c. Note that one or more tumblers are protruding through the slot.

d. With a fine file remove the raised portion of each of these tumblers. The key will not operate the new lock.

To install a new lock in the cabin door, proceed as follows:

a. Loosen the upholstery panel on cabin door to gain access to cutout in formed channel under the latch assembly.

b. Remove the screw from the external door panel directly under the lock mechanism, and remove the pin from the handle through the cutout in the door channel.

c. Remove the screw from the external door panel to the rear of the handle. This will free the handle spring and allow the handle to be disengaged from the actuating assembly.

d. After fitting the new lock to the key, install the new lock barrel, in the unlocked position, into the handle.

e. Bevel the edges of the square hole in the locking cam (unless these edges are beveled, proper installation cannot be made) and place the cam on the end of the lock barrel. The locking lug on the cam must be in line with the handle.

f. Cover a steel plate with cloth to prevent marring the latch handle and peen the end of the lock barrel until the locking cam is firmly riveted in place.

g. Install the handle in the door by reversing the removal procedure.

ADJUSTMENT OF CABIN ENTRANCE DOOR

Several adjustments are available to assure proper closing and sealing of the door.

a. If the door permits air leaks by the lower hatch when completely closed (with the door seals in good condition) loosen the four retaining screws in the edge of the door and move the latch tongue guide outboard to create additional tension on the latch tongue.

b. If the door permits air leaks by the upper latch on serials prior to D-3226 the upper latch may be made to fit tighter by installing a properly shaped metal block in the latching cavity. On serials D-3226 and after, remove the top sill catch and remove washers from the back of the sill or file off a small amount of material from the back of the sill to obtain a tighter door fit.

c. Improper fitting of the door may be corrected by adding thin shims under either hinge to raise or lower the aft portion of the door.

d. Adjustment of the lower latch may be made as follows:

1. Remove the bolts securing the arm rest to the door and remove the arm rest.

2. Remove the screws securing the door lower upholstery panel to the door frame.

3. Release the push-fasteners securing the upholstery panel and remove the panel. The push-fasteners may be released with a screwdriver modified by making a 90-degree bend near the end and cutting a notch in the end of the blade.

4. Insert a screwdriver in the access hole below the inside handle and remove the push-rod from the shaft by pushing up on the push-rod retainer.

5. Turn the push-rod to the right to shorten the plunger or to the left to lengthen the plunger until properly adjusted, then reinstall the push-rod on the shaft.

6. Changing the length of the push-rod will change the length of the wire or cable operating the upper lock latch. With the inside handle in the locked position check if the outside handle will unlatch the inside handle. To synchronize the handles on serials D-1 through D-4145 and D-4151 through D-4378 except D-4306, remove the small upholstery panel above the door window and loosen the upper latch control wire in the eyebolt. Adjust the length of the wire by sliding the wire through the eyebolt until the inside handle will unlatch when unlocking the door with the outside handle. To adjust the handles on serials D-4146 through D-4150, D-4306 and D-4379 and after, remove the small upholstery panel above the door window by removing small upholstery panel above the door window by removing the screws and releasing the push-fasteners and remove the nut and bolt on the door catch. Adjust the cable to proper length by screwing the turnbuckle in of out.

G35 FRONT SEATS

Beginning with the Model G35 airplanes an adjustable front seat is installed as standard equipment. The Model G35 has a sliding front seat with adjustable backs. The controls for moving the front seat are located aft on each end of the seat. The front seat's position should be changed only while the airplane is on the ground. The controls for the seat backs are levers located on the inboard side of both seat backs.

REMOVAL OF G35 FRONT SEAT

a. Remove the nut and bolt securing the right hand seat back to the right rear bracket.

b. Remove the nut and bolt securing the right hand seat back to the left rear bracket, and the nuts and bolts securing the left hand seat back to the right and left rear brackets.

c. Remove the top bolt from the right front bracket holding the outboard side of the right hand seat bottom, and move the top of the bracket outboard until it clears the seat frame.

d. Lift the right hand side of the seat up, pull left hand side of the seat free of the left front bracket, and remove the seat from the airplane.

INSTALLATION OF G35 FRONT SEAT

a. Before the seats are reinstalled, make certain that the seat mounting frames and the channels they slide on are clean. Then rub paraffin on the seat mounting frames to insure that the frames will slide easily on the channels.

b. Place the left hand seat in the rear bracket and lower the seats into the remaining three rear brackets.

c. Raise the aft side of the left hand seat until the forward part of the frame falls into the left forward bracket.

d. Install the bolts attaching the right hand seat, spacer, and safety belt lug to the right outboard bracket, leaving off the nut. Pass the bolt and spacer through the center adjustment slot on the seat with the head of the bolt on the inboard side of the bracket.

e. Install the bolt attaching the left hand seat, spacer, and safety belt lug to the left outboard bracket, leaving off the nut. Pass the bolt and spacer through the center adjustment slot on the seat with the head of the bolt on the inboard side of the bracket.

f. Move the right hand forward bracket inboard so that it holds the frame of the right hand seat, and install the bolt in the bracket. The two forward brackets should now prevent side movement of the seats.

g. Attach the left hand seat, spacer, and safety belt to the left inboard bracket with the head of the bolt on the right hand side of the bracket, and install the nut.

h. Attach the right hand seat, spacer, and safety belt to the right inboard bracket with the head of the bolt on the left hand side of the bracket, and install the nut.

i. Install the nuts on the bolts in the outboard bracket securing the right hand seat and the outboard bracket securing the left hand bracket, and install the nut.

H35 FRONT SEATS

The Model H35 has sliding individual front seats which can be adjusted fore and aft in flight. The latching mechanism is operated by a lever under the right front side of each seat.

FRONT SEAT REMOVAL, MODEL H35

The adjustable individual front seats of the H35 Bonanza series, D-4866 and after, are secured by pins through the aft attaching fittings which fit over rails on the seat structure and hooks at the front of the carry-through structure which likewise engage rails on the seat structure. To remove a front seat either detach the shoulder harness attaching loops at the spar fittings or remove the harness from the loops.

Pull the retainer pins on the front attaching hooks and lift up on the seat until the hooks clear the attaching fittings then pull the seat forward to clear the aft pins and lift it out.

ROTON LOCKS

Usually, Roton locks will need no service. If there is a grinding and binding in the lock as the seat reclines or the return action becomes jerky, a little grease properly applied as follows should improve the operation.

a. Use only Enco ANDOK-B grease (product of Humble Oil Co., Houston, Texas) on the thread as shown in Figure 3-15. Too much grease or grease in the wrong place can cause improper operation.

b. Compress the spring guide and counter-balance spring approximately one inch.

c. Remove the retaining ring.

d. Relax pressure on the spring guide and counter-balance spring slowly until the spring is fully extended.

e. Remove the lock from the fixture and remove the spring guide, counter-balance spring, and spring guide tube.

f. Apply a small quantity of grease to the completely extended thrust screw. See Figure 3-15.

g. Reassemble the lock. For service other than lubrication, return the Roton lock to the manufacturer.

FORWARD CARRY-THROUGH SPAR COVER REMOVAL

a. Remove the pilot and copilot seats.

b. Remove emergency landing gear crank cover from the spar cover.

c. On aft side of spar cover, pull back carpet and remove screws from spar cover.

d. Remove RH access cover.

e. From inside of RH access cover, loosen clamp and remove air duct from plenum and grill assembly.

f. Lift the spar cover and remove from froward spar.

FORWARD CARRY-THROUGH SPAR COVER INSTALLATION

CAUTION

Improper installation of the forward carry-through spar cover may interfere with the landing gear emergency hand crank operation. Ensure the landing gear hand crank will rotate without interference with the spar cover.

a. Center spar cover on the forward spar.

b. From inside of RH access cover, install air duct on plenum and grill assembly and tighten clamp.

c. Install RH access cover assembly.

d. On forward side of spar cover, install screws to secure forward end of spar cover and install carpet.

e. On aft side of spar cover, install screws to secure aft end of spar cover and install carpet.

f. Check emergency landing gear hand crank to ensure handle will rotate without interference with the forward carry-through spar cover.

g. Install emergency landing gear crank cover to spar cover.

h. Install the pilot and copilot seats.

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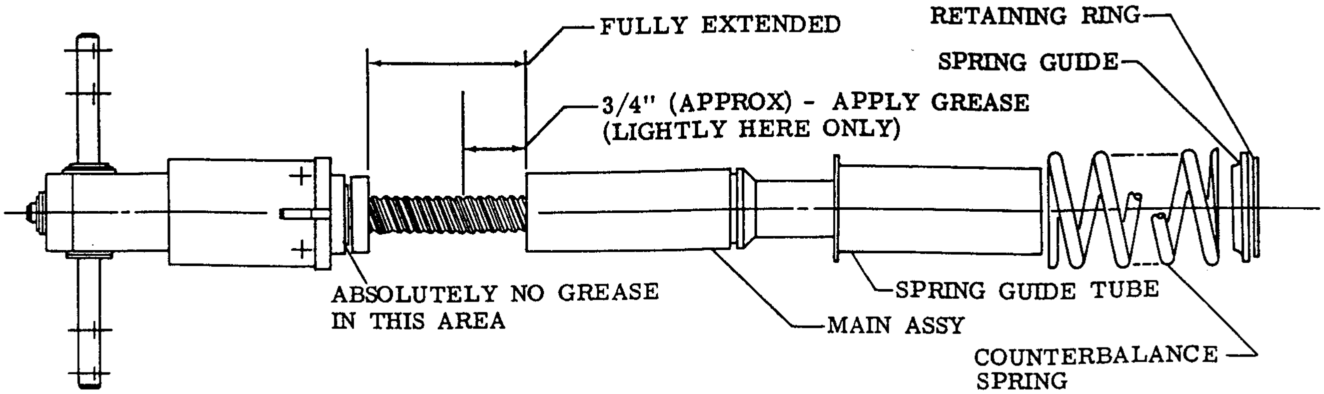


Figure 3-15. Servicing Roton Chair Lock

NOSE WHEEL SCRAPER
(D-1 through D-9273)

The nose wheel mud scraper clearance should be checked frequently to insure that the scraper is not contacting the tire.

FLARES (OPTIONAL)

Three 1-1/2 minute, parachute type flares are provided for emergency night landings. The flare circuit consists of a circuit breaker, buss bar, three toggle switches, and three flares with release mechanism. Since only 1 to 1-1/4 volts are required to release a flare, the wires from the release switches to the flare mechanism are enclosed in grounded shielding to prevent induced current from releasing the flares. Extreme care should be exercised when inspecting the flare circuit. The flare installation should be inspected at each 100 hour inspection for security of mounting, since it is possible for the recoil to damage the flare bracket if a flare is fired. Inspect the clamps which secure the flares to the retaining cups at the fuselage skin; they should be tight enough to prevent the flare housings from moving in the cups when the flares are fired.

To prevent accidental discharging of the flares by a short circuit due to some foreign material falling across the buss bar and terminals on the flare selector switches, rubber terminal covers, Part Number AN 781-1 should be installed on wires M3, M4, and M5, and slipped down over the terminal connections on the switches. Upon installation of the covers, check to see that they completely cover the switch terminals. Effective with D-3282 and after, the terminal covers are installed as standard equipment on all flare installations.

CARBURETOR IDLER ADJUSTMENT

a. Start the engine and warm it up in the usual manner in "Full Rich" position until the oil and the cylinder head temperatures are normal.

b. Check the magnetos in the usual manner. If the "drop off" is excessive (over 100 rpm) check for fouled spark plugs. If the drop is normal (100 rpm or less) proceed with the idle adjustment.

c. Close the throttle to idle at approximately 500 rpm. If the rpm increased appreciably after a change in the idle mixture adjustment during the succeeding steps, readjust the closed throttle stop to restore the desired rpm.

d. When the rpm has stabilized, move the cockpit mixture control momentarily, but with a smooth, steady pull, into the "Idle Cut-Off" position and observe the tachometer for any change in rpm during the leaning process. Caution should be exercised to return the mixture control to the "Full Rich" position before the rpm can drop to a point where the engine cuts out. An increase of more than 10 rpm while "leaning out" indicates an excessively rich idle adjustment. An immediate decrease in rpm (not preceded by a momentary increase) indicates the idle mixture adjustment is too lean.

e. If steps c and d indicate that the idle mixture adjustment is too rich or too lean, turn the adjustment one or two notches in a clockwise direction to lean the mixture, or counterclockwise to enrich the mixture, and check this new position by repeating Steps c and d. Make additional readjustments as necessary until a check with Steps c and d results in a momentary "pick up" of approximately 5 to 10 rpm, but never more than 20 rpm.

f. After each adjustment is made, the engine should be run up to 1800 rpm to clear the spark plugs before proceeding with the rpm check.

g. Make the final adjustment of the throttle to obtain 500 rpm with the throttle closed.

IGNITION

Ignition for the 35 series Bonanza is provided by two magnetos. These magnetos will be either two Eismann LA-6, two Bendix S6LN-21, two Bendix S6RN-25, one Bendix S6RN-201 and one Bendix S6RN-205, one Bendix S6RN-1201 and one Bendix S6RN-1205, two Slick 662, two Slick 680 or two Bendix S6RN-1225 magnetos. To prevent the engine from "kicking" when it is being cranked either an impulse coupling or a retard set of points is incorporated into the magneto. The Eismann LA-6, Bendix S6LN-21, Bendix S6RN-25, Slick 662, Slick 680, and Bendix S6RN-1225 are the magnetos which incorporate an impulse coupling. The Bendix S6RN-201, Bendix S6RN-205, Bendix S6RN-1201, and Bendix S6RN-1205 are the magnetos which do not incorporate the impulse coupling. The Bendix S6RN-201 and Bendix S6RN-1201 are mounted on the left side and contain the retard set of breakers. These two magnetos use an ignition vibrator in conjunction with the retard points.

A key switch is provided for control of the ignition system. The switch has 5 settings:

"OFF" means all electrical circuits are inoperative.
"BATT." means the battery electrical circuit is operative.
"L" means the left magneto, battery circuit, and generator circuit are operative.
"R" means the right magneto, battery circuit, and generator circuit are operative.
"BOTH" means all electrical circuits are operative.

The Bonanza magneto system, serials D-6562 thru D-8999 except D-8622 & D-8623, consists of a retard breaker magneto, a single breaker magneto, a starting vibrator and a combination ignition and starter switch. The retard breaker is actuated by the same cam as the main breaker and is positioned so that its contacts open a predetermined number of degrees after the main breaker contacts open (the degree of retard is stamped in the bottom of the breaker compartment). The starting vibrator is used with this magneto to provide ignition for starting regardless of engine speed. The combination ignition and starter switch has five positions: "OFF" position means both magnetos are not operating. "R" position means the right magneto is operating, the left is inoperative. "L" position menas the left magneto is operating, the right is inoperative. "BOTH" position means that both magnetos are operating. "START" position means that the starter solenoid is operating allowing vibrator current to flow through the retard breaker on the left magneto while the right magneto is grounded to prevent advanced ignition.

SPARK PLUGS

Consult Continental Motors Corporation, FAA engine specs and Beech Aircraft Corporation publications for lists of approved spark plugs to be used with the various Continental engines.

TIMING THE MAGNETO

It is assumed that the magnetos have been properly internally timed and points adjusted per the applicable Eismann, Bendix, or Slick vendor publication. To adjust the magneto points other than that specified in the applicable vendor publication manual will alter the magneto "E gap" and cause a weak spark. This internal timing and point adjustment should not be made on the airplane. For inspection purposes the point gap may be checked when the cam follower is resting on the high point of the cam lobe. The magneto point gap should be as follows:

MAGNETO	POINT GAP IN INCHES
Eismann LA-6	0.018 to 0.022
Bendix S6LN-21	0.018 ± 0.006
Bendix S6RN-25 (D-4866 thru D-6561)	0.018 ± 0.006
Bendix S6RN-201 and S6RN-205 (D-6562 thru D-7931)	
main breakers	0.018 ± 0.006
retard breakers (S6RN-201 only)	0.018 ± 0.006
Bendix S6RN-1201 and S6RN-1205 (D-7932 thru D-8999 except D-8622 and D-8623)	
main breakers	0.016 ± 0.003
retard breaker (S6RN-1201 only)	0.016 ± 0.006
Slick 662 (D-8622, D-8623, D-9000 thru D-9086 except D-9001, D-9008, D-9027, D-9039, D-9048, and D-9055) (D-9738 thru D-9752)	
Slick 680 (D-9069 thru D-9362)	
No point gap is specified for the Slick magnetos but the points should be ready to break open with, the timing pin in place and, the timing marks aligned when viewed through the side vent hole.	
Bendix S6RN-1225 (D-9363 thru D-9737, D-9753 and after)	0.016 ± 0.003

On the Bendix series magnetos the internal timing and point adjustment should be made at the time of assembly or overhaul. (Bendix timing kit No. 11-8150-1 is available for internal timing of the magento.)

NOTE

For adjustment of contact opening and internal timing of Bendix magnetos, refer to Bendix, for applicable manuals. Magneto contact assemblies should be checked after the first 25 and 50 hours operation and each 50 hours thereafter.

PREPAIRING THE MAGNETO FOR INSTALLATION ON THE ENGINE

EISMANN MAGNETOS

NOTE

The distributor section of the magneto will be removed while installing the magneto on the engine. Confirm that the carbon brush is in place in distributor cap when reinstalling this section.

On Eismann magnetos turn the magneto drive in the direction opposite to normal rotation (this keeps the impulse couplers from engaging) until the distributor rotor electrode (finger) is centered in the window of the distributor plate. Now the points should be ready to break open, and the magneto is ready to install on the engine, and to fire number 1 cylinder.

BENDIX MAGNETOS

On Bendix magnetos turn the magneto drive in the direction opposite to normal rotation (this keeps the impulse couplers from engaging) until the respective timing marks (viewed through the inspection hole) on the magnet is aligned with the divided casting line of the magneto housing. Now the magneto is ready to install on the engine and to fire number 1 cylinder.

SLICK MAGNETOS

On Slick magentos turn the magneto drive in the direction opposite to normal rotation (this keeps the impulse couplers from engaging) until the timing marks are aligned, (as viewed through inspection hole) and the timing pin is in place through the frame and rotor shaft. Now the magneto is ready to install on the engine and fire number 1 cylinder.

INSTALLATION AND TIMING OF MAGNETOS

The engines should be timed as indicated by the following:

Continental Engine	DEGREES BTC
E-185-1, E-185-8, E-185-11	26 + 0 − 2
E-225-8	26 + 0 − 2
O-470-G, O-470-GCI	24 + 0 − 2
IO-470-C	26 + 0 − 2
IO-470-N	20 + 0 − 2
IO-520-B, IO-520-BA, IO-520-BB	22 + 0 − 2

On engines without factory installed timing marks the use of a positive top dead center (TDC) locator and timing disc similar to that provided with the "Universal Engine Timing Indicator" is the most accurate method of locating TDC and the advanced timing position (BTC). On engines with factory installed timing marks this type of locator and timing disc may be used to check the accuracy of the timing marks.

WARNING

The magneto is grounded through the ignition switch, therefore, any time the switch (primary) wire is disconnected from the magneto, the magneto is in a switch ON or HOT condition. Before turning the propeller by hand, disconnect all spark plug leads to prevent accidental firing of the engine.

CAUTION

The internal, automatic grounding devices used on the original Scintilla S series magnetos have proven unreliable in service and current production magnetos do not have this feature. To be safe, treat all magnetos as hot whenever the ground lead is disconnected. To ground the magneto, connect a wire to the switch lead at the filter capacitor and ground the wire to the engine case.

1. To locate the compression stroke of number one cylinder, remove the lower spark plugs from each cylinder except number one cylinder. Remove the top plug from number 1 cylinder.
2. Place thumb of one hand over the number 1 cylinder spark plug hole and rotate the crankshaft in the direction of normal rotation until the compression stroke is indicated by positive pressure inside the cylinder lifting the thumb off the spark plug hole.
3. After locating the compression stroke of number 1 cylinder, locate the advanced firing position of number 1 cylinder by the use of a timing disc and pointer or the factory installed timing marks on the engine.

NOTE

On IO-470 series engines the external timing marks are located on a bracket attached to the starter adapter, with a timing mark on the alternator drive pulley as the reference point.

NOTE

On IO-520 series engines the timing marks are located on the alternator drive gear. Remove the plug in front of number 6 cylinder to observe the TDC and advance timing marks.

In all cases, it must be definitely determined that the number 1 cylinder is at the correct firing position on the compression stroke, after the crankshaft is turned in its normal direction of rotation.

4. If a universal timing disc and pointer is to be used, install the TDC locator in the top spark plug hole of number 1 cylinder, after locating compression stroke.
5. Slowly rotate the engine in the normal direction of rotation until the piston lightly touches the locator.
6. Install the timing disc on the propeller spinner and rotate the timing disc until 0° (TC) is located under the pointer
7 Rotate the engine in the opposite direction to normal rotation until number 1 piston lightly touches the locator.
8. Note the reading on the timing disc. Now rotate the timing disc toward 0° (TC) until 1/2 the reading noted is shown
9. Remove the TDC locator from the spark plug hole
10 Rotate the engine in the normal direction of rotation to the compression stroke of number 1 cylinder and until the pointer arrives at the number of degrees noted last in step "8" (1/2 the first noted reading in step "8").
11. Rotate the timing disc until the pointer is positioned at 0° (TC)
12 Rotate the engine opposite the normal direction of rotation to approximately 5° beyond the specified timing for the engine being timed.
13 Rotate the engine in the normal direction to the specified before top center (BTC) firing position (this is to remove gear backlash). Further movement of the engine should not be necessary until the magnetos are installed.

NOTE

Without turning the magneto coupling, hold the magneto in the position it will occupy when installed on the engine and check alignment of magneto drive coupling slot of engine and magneto impulse coupling lugs. If not aligned, pull engine gear out of mesh (but not out of the oil seal) and turn to alignment. Push gear back into mesh

14. Place new gaskets on magneto flanges and install the magnetos carefully so drive coupling lugs mate with slots of engine drive coupling Install holding washers, lockwashers and nuts, but tighten only enough to permit turning the magnetos for final timing, without looseness.

NOTE

The magnetos were prepared for installation, to fire number 1 cylinder, in PREPARING THE MAGNETO FOR INSTALLATION ON THE ENGINE in this section

NOTE

On Slick series magnetos check the distributor lead spring to make sure it is located in the center of the distributor shaft hole in the distributor bearing plate. Before removing the timing pin and reinstalling the distributor block housing on the magneto frame assembly, apply a drop of SAE 20 lubricating oil to the oilite bearings.

15. Install timing lights on the magnetos.
16. With the engine still positioned to fire number 1 cylinder at the specified BTC rotate the right magneto in the direction necessary to cause the points to just break open as indicated by the timing light.
17 Secure the right magneto.
18. Repeat steps "16" and "17" on the left magneto.
19. Recheck the magneto setting to confirm the + 0° – 2° has not been exceeded.
20. Turn the engine crankshaft a few degrees in the opposite direction to normal rotation and bring it back again until the advance timing mark is under the pointer on timing disc. At this point both timing lights should indicate, at the same time, that the magneto points opened.

NOTE

Do not engage the impulse coupling

21 If the timing lights do not respond at the same time, loosen the magneto that is either early or late and repeat the process outlined in step "16".
22. Remove the timing lights and reinstall the electrical leads to the magentos.

MAGNETO DROP-OFF CHECK

1. Thoroughly warm up the engine and set the propeller control to low pitch. Place the mixture control in FULL RICH.
2. Set the throttle to 1700 rpm.
3. Note engine rpm when the magneto switch is turned from BOTH to the LEFT position and from BOTH to the RIGHT position.

NOTE

Due to the design changes in today's higher performance engines, the comparison of single magneto operation versus dual magnetos is no longer a sound criteria for evaluation of magneto performance; therefore, all magneto checks should be performed on a comparative basis between left and right magneto performance. Also absence of magneto drop-off should be cause for suspicion that the timing has been bumped UP in advance of the specified setting.

CAUTION

Operation of one magneto should not exceed 5 seconds to avoid fouling the spark plugs.

4. Normal magneto drop-off is approximately 100 rpm on either magneto and should be within 50 rpm of each other. If the magneto-drop-off persistently exceeds 150 rpm, an inspection to determine the cause should be accomplished. Common causes are incorrect grades of fuel, fouled spark plugs, incorrectly timed magnetos, or an incorrect fuel/air ratio.

REPLACEMENT OF GENERATOR BRUSHES

The brushes may be inspected by removing the dust cover from the generator. If the brushes measure less than 1/2 inch, they must be replaced. To replace the brushes, lift the brush retaining springs, remove the old brushes, and insert the new brushes. If the armature is dirty it may be cleaned with unleaded gasoline or other suitable solvent.

CAUTION

Do not use carbon tetrachloride, since its use will result in excessive wear of the brushes and the corrosion of other parts. Do not apply an abrasive of any kind to the commutator under any circumstances.

VOLTAGE REGULATOR ADJUSTMENT (Prior to Serial D-7310)

Before any check or adjustment of the voltage regulator can be made, it must be at operating temperature. During cold weather, turn on the cabin heater and allow the cabin to warmup. To check voltage regulator, turn the battery switch OFF and the instrument and navigation lights ON. Then connect a test voltmeter between the voltage regulator BAT terminal and ground. With the generator switch ON and the engine operating at 1800 to 2300 rpm, the test voltmeter should indicate 14.3 volts.

If this reading is not obtained, remove the voltage regulator cover and turn the voltage adjusting screw clockwise to increase voltage and counterclockwise to decrease voltage. The adjusting screw is located above the voltage relay on the right side of the voltage regulator.

NOTE

The most accurate checks are made with a mechanic observing buss voltage during flight or immediately after flight.

CAUTION

If adjusting screw is turned down (clockwise) beyond the normal adjustment range, the spring support may fail to return when pressure is relieved. In such case, turn screw counterclockwise until sufficient clearance develops between screw head and spring support, then bend spring support upward carefully with small pliers until contact is made with screw head. Final setting of the unit should be approached by increasing spring tension, never by reducing it. If setting is too high, adjust unit below required value, and then raise to exact setting by increasing spring tension.

After adjusting the regulator, replace the regulator cover before taking the final voltage reading, reduce generator speed until points open and then bring the generator back to speed again.

VOLTAGE REGULATOR ADJUSTMENT (Airplane Serials D-7310 thru D-10119 except D-10097)

On serials D-7310 through D-8035, D-8037 through D-8047, D-8049 through D-8056, D-8058 through D-8063, D-8065 through D-8071, D-8073, D-8074, D-8076 through D-8089, D-8091 through D-8126, and D-8128 through D-8132, the voltage regulator is located on the engine compartment firewall. On serials D-8036, D-8048, D-8057, D-8064, D-8072, D-8075, D-8090, D-8127, and D-8133 and after, the voltage regulator is on the aft side of the firewall. Run the engine approximately 15 to 20 minutes before checking or adjusting the voltage regulator to allow the regulator temperature to stabilize. With the battery switch ON, the alternator switch ON, and the instrument and navigation lights ON, connect test voltmeter to the battery bus and to ground. Then operate the engine at 1800 to 2300 rpm, and check the voltmeter for reading of 14.3 volts (variation should be limited between 14.0 and 14.5 volts).

If this reading is not obtained, remove the hex head plug from the cover of the voltage regulator and turn the inner slot head screw clockwise to increase voltage and counterclockwise to decrease voltage. Each graduation marked on the cover corresponds to a 0.3 volt change.

VOLTAGE REGULATOR ADJUSTMENTS (Airplane serials D-10097, D-10120 and after)

The output of the alternator is regulated by a fully transistorized voltage regulator located on the aft right side of the firewall. The voltage regulator is adjusted to 28.50 ± .25 vdc and will automatically adjust the alternator output to the required electrical load, including battery recharging. The voltage regulator is connected to the airplane bus through a 10 ampere switch/circuit breaker.

NOTE

The voltage regulator is set and sealed at the factory. Breaking the seal prior to the warranty limitations voids the warranty Once the warranty limitations have been reached and it should become necessary to adjust the voltage regulator, adjustments may be made in the following manner.

CAUTION

Observe engine operating limitations.

a. Bring the voltage regulator and alternator up to operating temperature by operating the engine at 1800 rpm with approximately 50% load for a minimum of 15 minutes.

b. Connect a precision voltmeter to the circuit breaker bus.

c. Operate the engine at cruise rpm (2500 rpm) with the alternator "ON", and the electrical load reduced to a minimum.

d. Check the bus voltage. The voltage reading should be 28.50 ± .25 vdc. If the voltage reading is not as noted, adjustments should be made as follows:

e Remove the plastic plug labeled "REG" from the corner of the regulator and adjust the regulator by turning the potentiometer clockwise to increase the voltage and counterclockwise to decrease the voltage. Make any adjustments in small increments and allow 2 or 3 minutes operation time for the system to stablize between adjustments.

NOTE

Final voltage check can best be made during flight or immediately after flight.

f. For final check and adjustment, the engine should be operated at cruise rpm (2500 rpm) with the alternator "ON" and carrying approximately 50% load.

OVERVOLTAGE RELAY

The electrical system on airplanes D-7310 and after is protected by an overvoltage relay that disconnects the alternator from the electrical bus whenever an overvoltage condition occurs during flight. The pilot is warned of this condition by the illumination of the ALT-OUT light located on the instrument panel. The voltage regulator establishes a holding circuit from the battery bus that keeps the overvoltage relay energized. To reset the relay and attempt to return the alternator to service requires isolating the relay from the power source. If an overvoltage condition occurs in flight the following procedure may be used:

1. Momentarily move the BATTERY switch (some models may be placarded BAT-ALT switch) to the OFF position. This allows the overvoltage relay to de-energize and the alternator voltage again will return to the bus.
2. If the overvoltage condition does not recur, continue to use the alternator.
3. Should the overvoltage condition persist and the voltage relay again disconnects the alternator, turn the ALTERNATOR switch to the OFF position and minimize electrical current consumption.

OVERVOLTAGE RELAY ADJUSTMENT (28 volt system) (D-10097, D-10120 and after)

CAUTION

This adjustment should only be performed in the airplane in cases of most extreme necessity and with precision equipment. An error in following the procedures could result in damage to the airplane electrical equipment.

If it is necessary to adjust the overvoltage relay and it is not feasible to make the adjustments on the bench, it may be made on the airplane. To make this adjustment the alternator is used as a power source, and the voltage regulator must be put out of adjustment and the entire system subjected to abnormal voltages. Prior to making the adjustment, turn off all unnecessary electrical and avionics equipment and open all circuit breakers not necessary for the test.

a. Connect a precision voltmeter to the circuit breaker bus.

CAUTION

Observe engine operating limitations

b. Operate the engine at cruise rpm (2500 rpm)

c Monitor the voltmeter to determine the voltage at which the overvoltage relay trips and remove the alternator from the line Slowly adjust the voltage regulator to increase the bus voltage The overvoltage relay must trip at 32.0 ± 1 volts.

d. If the overvoltage relay trips below the 31.0 volts requirements or fails to trip when the bus reaches 33.0 volts as measured on a precision voltmeter, the overvoltage relay must be adjusted Remove the plastic plug marked O.V and turn the adjustable potentiometer clockwise to increase voltage and counterclockwise to decrease the trip voltage

NOTE

To allow the overvoltage relay to reset all power must be momentarily removed from the unit.

e Recheck the adjustment

f Readjust the voltage regulator to 28.5 ± .25 volts. This adjustment should be checked with the engine running at cruise rpm (2500 rpm) and the alternator on and stabilized as noted in VOLTAGE REGULATOR ADJUSTMENTS.

g. Replace the plastic plugs over the adjustable potentiometers

ALTERNATOR (D-7310 and after)

On serials D-7310 through D-10119 except D-10097 a 12 volt 70 amp alternator is installed. On serial D-10097, D-10120 and after, a 28 volt 50 amp gear driven alternator is standard equipment, although a 100 amp alternator may be installed as optional equipment

At serials D-10097, D-10120 and after the alternator output is controlled by a transistorized voltage regulator/overvoltage relay. Current to excite the alternator field is normally derived from the airplane bus through a 10 amp switch/circuit breaker and the voltage regulator/overvoltage relay The alternator is designed to have a small amount of residual magnetism. In the event the battery is discharged to the extent that it will not excite the alternator field, the residual magnetism is strong enough to excite the alternator field if all load is removed from the airplane electrical system until the bus is brought up to proper voltage. When attempting to start the alternator without battery current, turn off all electrical load and operate the engine at near cruise speed. In the event of alternator failure the alternator sensor will illuminate an annunciation light.

ALTERNATOR REMOVAL

a. Access to the alternator is gained through the right hand cowl door and through the forward opening of the cowl.

CAUTION

The output terminal of the alternator is connected directly to the master battery relay. Make sure the battery switch is in the "OFF" position before removing the wires at the alternator or serious damage to the wiring harness and alternator may result from accidental grounding of the output stud.

b. Disconnect the electrical wiring harness from the alternator.

c. Remove the attaching bolts. Remove the alternator.

ALTERNATOR INSTALLATION (28 volt system) (D-10097, D-10120 and after)

a Install a new gasket on the alternator flange.

CAUTION

Do not force the alternator into position or damage to the alternator or drive gears could result. Care must be taken to assure that the alternator pilot enters the crankcase pilot bore squarely.

b. Position the alternator on the mounting pad.

c. Install the attaching nuts and washers tightening to a snug condition. Torque the nuts to 150 to 180 inch-pounds in diagonally opposite pairs.

d. Connect the electrical wiring to the alternator.

CAUTION

Never turn the battery switch "ON" until all wiring harness connections have been made and properly tightened or serious damage to the wiring harness and alternator may result from accidental grounding.

f. Start the engine and check for oil seepage and proper operation.

PREPARATION FOR NEW ALTERNATOR INSTALLATION (28 volt system) (D-10097, D-10120 and after)

The new alternator will be received without the drive gear and coupling. The drive gear and coupling from the old alternator will need to be installed on the new alternator. The drive and coupling may be changed by following the procedures as follows.

a. Remove the shipping spacer and washer (if installed) from the 100 ampere alternator.

b. Install the woodruff key (if not already installed), coupling assembly and thrust washer. Ensure the bearing surface (copper color) of the thrust washer is installed toward the alternator.

c. Install the nut and tighten to a torque of 400 inch-pounds. If the slots of the castellated nut do not align with he cotter pin hole in the shaft, the nut should be tightened further, but not to exceed 500 inch-pounds. Do not back off the nut to align holes.

d. Install an MS24665-302 cotter pin carefully to ensure clearance when the alternator is installed in the engine.

NOTE

The cotter pin must be installed and then trimmed. The portion bent toward the alternator housing must NOT touch the thrust washer when bent over the nut. The portion bent away from the alternator housing must NOT reach beyond the threads on the end of the shaft.

Once the preceding steps are completed, refer to ALTERNATOR INSTALLATION (28 volt system) (D-10097, D-10120 and after) for installation of the alternator on the engine.

STANDBY GENERATOR SYSTEM

A standby generator system is provided to power essential equipment in the event of loss of electrical power on the main system.

The standby generator system is an independent electrical system incorporated into the main system in such a manner to furnish power only to essential engine instruments, turn coordinator and navigation and communication system. A diode in the circuit from the battery to the standby generator system prevents the generator from furnishing any power to the battery, but allows the battery (if serviceable) to supply power to the essential equipment in the event of inadequate output of failure of the standby generator.

NOTE

The circuits from the battery to the standby generator system and the battery to the stall warning system are always alive, even though the battery switch may be in the OFF position.

The standby generator system should only be used when there is a loss of electrical power on the main electrical system. As soon as a loss of electrical power is evident, turn the alternator/generator and battery switches OFF. (This is to prevent possible damage to the main system if a short exists therein, and to save battery power for lowering the flaps and gear if the problem is determined to be only a faulty alternator/generator). After turning the switches OFF, turn the standby generator switch ON.

14 VOLT SYSTEM

The standby generator (optional on D-9338 through D-10119 except D-10097) requires an engine rpm of at least 1700 to function adequately. With the engine running at 1700 rpm, place the standby generator switch momentarily to the TEST position. The GEN TEST and BAT TEST lights will illuminate, indicating that the battery and generator are both supplying power.

The standby generator is located on the accessory drive pad of the engine. The ON-OFF-TEST switch and the GEN TEST and BAT TEST lights are located above the NAV COMM XFER switch on the instrument panel. The terminal board, zener diode and number 1 transistor (which controls the conductance of the number 2 transistor) is located on a bracket attached to the rear of the ON-OFF-TEST switch. The number 2 transistor is located in the engine compartment on the lower left side.

On serials D-9338 to D-9818 the overvoltage relay and rheostat are on the lower aft side of the firewall in the vicinity of the landing gear warning horn and flasher. At serial D-9818 and after the standby generator overvoltage relay was moved to the structure forward of the control column, close to the center line of the airplane. On serials prior to D-9945 the overvoltage relay will actuate at 15.7 ± .1 volts. On serial D-9945 and after the overvoltage relay will actuate at 16.0 ± .3 volts, and remove the standby generator from service should the standby voltage regulator fail. The overvoltage relay will reset when the input voltage is removed. When the overvoltage relay is actuated it bypasses the ON-OFF switch to lock the relay in the actuated position until the engine is shut down, at which time the regulator will reset. Generator and battery fuses are on the upper forward side of the firewall and the bus and circuit breakers are on the forward side of the cabin. The two power relays are located on the upper right aft side of the firewall. Maintenance of the system is limited to isolating an inoperative component and replacing it in accordance with accepted electrical maintenance practices. Refer to the troubleshooting guide for probable trouble and corrective action.

28 VOLT SYSTEM

At serial D-10206 and after a 28 volt standby generator is offered as optional equipment. It is mounted aft of the right magneto on the engine accessory case. Cooling air for the generator is picked up from the engine baffle on the left side of the engine.

The switch and voltmeter are located on the right side of the instrument panel. The switch is placarded OFF-ON GEN/TEST. The voltage regulator/overvoltage relay is mounted aft of the firewall and controls the generator output to a standby bus.

The standby generator is self exciting and requires no external electrical power for it to function, although it does require at least 1950 engine rpm to function adequately. This standby system will supply sufficient power to operate essential instruments such as turn coordinator, fuel quantity, oil and cylinder temperature,Comm-1 and Comm-2, transponder, audio amplifier, panel voltmeter, glareshield light, and standby panel light. The generator will produce a continuous 6.5 amps at 28 volts or for intermittent (1 minute on 2 minutes off) operation 11 amps at 24 volts with a minimum engine speed of 1950 rpm.

The standby generator system is controlled and protected by its own voltage regulator/overvoltage relay. The regulator will control the voltage at 28.50 ± .50 volts. The overvoltage relay will remove the standby generator from the circuit should the voltage reach 32.0 ± 0.1 volts. Although the overvoltage relay is set to trip and remove the generator from the circuit at 32.0 ± 0.1 volts it is not sensitive to small voltage spikes of short duration. Should a transient voltage spike cause the overvoltage relay to trip removing the generator from the system, it may be reset in flight by moving the switch momentarily to the standby GEN/RESET position.

STARTER

STARTER REMOVAL (IO-520 engine) (D-7310 and after)

a. Access to the starter may be gained through the right hand cowl door.
b. Disconnect the electrical wiring from the starter.
c. Remove the two hex nuts and washers from the mounting studs, and remove the starter.

STARTER INSTALLATION (IO-520 engine) (D-7310 and after)

a. Install a new O-ring on the flange of the starter.
b. Position the starter on the mounting pad.
c. Install the attaching nuts and torque the nuts to 200-220 inch-pounds.
d. Connect the electrical wiring to the starter.
e. Start the engine to check for oil seepage at the mounting flange and check for proper operation.

STARTER OVERHAUL

Refer to applicable Vendor Publications for complete tests and maintenance procedures.

STARTER LUBRICATION (D-7310 and after)

DELCO-REMY (D-7310 thru D-10119 except D-10097)

When the motor is disassembled for any reason, lubricate as follows:

a. Oil wicks, if present, should be resaturated.
b. Bushings and the armature shaft should be coated with a small amount of Delco-Remy Lubricant No. 1960954.
c. The drive assembly should be wiped clean.

CAUTION

Do not clean in any degreasing tank or with grease dissolving solvents; this will dissolve the lubricant in the clutch mechanism.

d. The roll type overrunning clutch requires no lubrication.
e. Avoid excessive lubrication.

PRESTOLITE (D-7310 and after)
(10-520 engine) (14 and 28 volt system)

Soak new absorbent bronze bearings in SAE 20 oil before installation. Saturate the felt oiling pad in the commutator end head with SAE 20 oil. Allow excess oil to drain out before installing end head on motor. Put a light film of Lubriplate #777 on the drive end of the armature shaft before and after installing the drive end head

CAUTION

Do not clean the starter in any degreasing tank or grease dissolving solvents. Avoid excessive lubrication

STARTER BRUSH REPLACEMENT (IO-520 engine)

DELCO-REMY (D-7310 thru D-10119 except D-10097)

If the brushes are excessively worn when compared to a new brush, they should be replaced. Make sure the brush holders are clean and that the brushes are not binding in the holders. The full brush surface should ride on the commutator to give proper performance. Check by hand to ensure that the brush springs are giving firm contact between the brush and the commutator. If the springs are discolored or distorted, they should be replaced.

PRESTOLITE (D-7310 and after)

Brushes must be replaced when they have worn down to a length of 1/4" or less. Refer to Prestolite service bulletin ASM-1 for brush replacement procedure. There should be a spring tension of 32 to 40 ounces with new brushes. Measure with a spring scale hooked under the spring at the brush. Pull on a line opposite the line of force exerted by the spring and take the reading just as the spring leaves the brush.

TURBOCHARGER

The turbocharger is fully automatic, requiring no additional controls in the codkpit, and is designed to increase the power output and efficiency of the engine by supplying compressed air to the engine intake manifold. The power to drive the turbocharger is drawn from the exhaust gases passing through the turbine housing and over the turbine wheel to spin the shaft which is connected to the compressor. Ambient, filtered, air is then drawn in through the air inlet duct to the compressor where it is compressed and delivered to the throttle. As the engine power output increases, the flow of exhaust gases increases resulting in a proportionate increase in speed of the rotating assembly and turbocharger output Power output, above 16,000 feet, is limited by the outside air temperature which will effect air density in the induction system

The turbocharger system (see Figure 3-16) consists of an exhaust driven turbine and centrifugal compressor mounted on a common shaft. The center section of the unit contains the bearings and lubrication passages and supports the turbine and compressor housing. Lubrication to the center section is supplied by regulated engine oil pressure at the oil cooler and directed from a tee outlet to the housing, providing a constant oil flow over the bearings. The oil then drains by gravity into the sump tank located at the lowest point in the system and is returned by scavenge pump to the engine sump. Exhaust headers, crossover pipe, turbine inlet plenum, wastegate, exhaust by-pass duct, and tail pipe make up the exhaust system.

Automatic control of the system is supplied by three principal components; the variable absolute pressure controller, the wastegate actuator and engine oil pressure. Engine oil is supplied to the inlet port of the actuator which is permanently restricted by a capillary tube. The actuator is a hydraulic cylinder with oil pressure acting against spring tension. The piston inside the cylinder with an actuating rod attached is heavily spring loaded in the up, or retracted position. As the oil pressure increases within the chamber an expander-type seal on the piston seals the upper oil chamber from the lower chamber, forcing the piston down, against spring tension, extending the actuator rod which moves the attached wastegate butterfly toward the closed position. A decrease in oil pressure allows spring tension to return the piston, retracting the actuating rod, and returning the wastegate butterfly to the open position. Oil from the outlet oil port of the actuator is not restricted at the actuator but is pressure controlled by the variable absolute pressure controller which contains an aneroid bellows sensitive to pressure changes in the induction manifold. As the pressure it senses decreases, it expands, extending a metering pin which reduces the flow of oil through the body of the unit and increases the pressure across the actuator diaphragm forcing the piston down and moving the wastegate toward the closed position. The lower chamber of the controller equipped with an adjustable cam is linked to the throttle valve and is designed so that the controller setting is varied proportionally to the amount of power the pilot selects with the throttle by moving the metering pin seat. The compressor output is automatically controlled at a constant pressure by the variable absolute pressure controller providing the engine fuel pump and injector nozzles with the required flow and pressure at altitudes they are referenced to. The fuel flow gage diaphragm is also referenced to this pressure to prevent an erroneous reading.

TURBOCHARGER CONTROLLER

REMOVAL
(Figure 3-15A)

1. Disconnect the pressure sensing line (1) from the controller, and cap the line.
2. Disconnect the two oil lines (2) and (3) from the controller, and cap the lines.
3. Disconnect the throttle linkage (4) from arm (10), and the throttle butterfly linkage (5) from the arm (11).

NOTE

DO NOT CHANGE ANY LINKAGE ADJUSTMENTS.

4. Remove the two screws (6) and (7).
5. Remove the safety wire and both bolts (8) and (9).
6. Remove the controller from the aircraft.

INSTALLATION
(Figure 3-15A)

1. Note the position of arms (10) and (11) on the controller. Remove the cotter key and castellated nut that holds arm (10) to the shaft. Remove the safety wire and drive out the pin that holds arm (11) to the shaft.

NOTE

If arms (10) and (11) are worn, they should be replaced with new arms, P/N 632555-7 for arm (11), and P/N 632555-12 for arm (10).

2. Install arms (10) and (11) on the new unit in the same position they had on the old unit, and safety wire arm (11). Due to the serrations on the controller shaft, do not torque the castellated nut on arm (10) until the final setting has been reached. Once the final setting has been reached, torque the castellated nut between 100-120 inch/lbs.

CAUTION

Do not torque the castellated nut for arm (10) while the linkage is against the stop.

3. Install the controller on the aircraft.
4. Insert bolts (8) and (9); do not tighten.
5. Insert screws (6) and (7) and tighten.
6. Tighten bolts (8) and (9) and safety wire.
7. Measure the linkage between the controller and the throttle butterfly (4.06 inches, ± .09 inch between the linkage pin centers). If it has been changed during removal, use the following procedure to recalibrate it:

   a. Rotate arm (11) to the full open stop (rotate outboard).
   b. Rotate arm (12) to the full open stop (rotate outboard).
   c. Connect the linkage, using the washers called out in Figure 3-15B.
   d. Make sure that the measurement between the linkage pin centers is 4.06 inches, ± .09 inch.
   e. Adjust the linkage as necessary.

8. Attach the throttle control linkage to arm (10).
9. Reconnect oil lines (2) and (3) and pressure sensing line (1).

ADJUSTMENT AND TEST PROCEDURE
(Figure 3-15A)

1. Head aircraft into the wind. Set brakes and securely chock wheels.
2. Warm up the engine until the oil temperature reaches at least 180° - 200°F.
3. Slowly and smoothly apply the throttle until 32.5 in. Hg manifold pressure or the full throttle position is reached.

CAUTION

DO NOT EXCEED 32.5 IN. HG MANIFOLD PRESSURE.

4. If at the full throttle position the manifold pressure HAS NOT REACHED 32.5 IN. HG:

   a. Shut the engine down.
   b. Loosen the lock nut on screw (13).
   c. Turn screw (13) counterclockwise to increase manifold pressure (one full turn approximates 1/2 inch manifold pressure).
   d. Retighten the lock nut on screw (13).

5. If the manifold pressure REACHES 32.5 IN. HG BEFORE THE APPLICATION OF FULL THROTTLE:

   a. Shut the engine down.
   b. Loosen the lock nut on screw (13).
   c. Turn the screw (13) clockwise to decrease manifold pressure (one full turn approximates 1/2 inch manifold pressure).
   d. Retighten the lock nut on screw (13).

6. Repeat steps 2 through 5 until the manifold pressure at full throttle is 32.5 in. Hg.

CAUTION

DO NOT EXCEED 32.5 IN. HG MANIFOLD PRESSURE

TURBOCHARGER LEAK TEST PROCEDURE

The turbocharger system on the Bonanza may be checked for leaks in the induction, exhaust and air reference sections of the system as outlined in the following procedure.

a. Plug the exhaust stack with a large rubber stopper.
b. Remove the tube between the induction filter and the compressor inlet. Plug the inlet with a large rubber stopper.
c. Plug the manifold drain hose extending out the right side of the cowl flap opening.

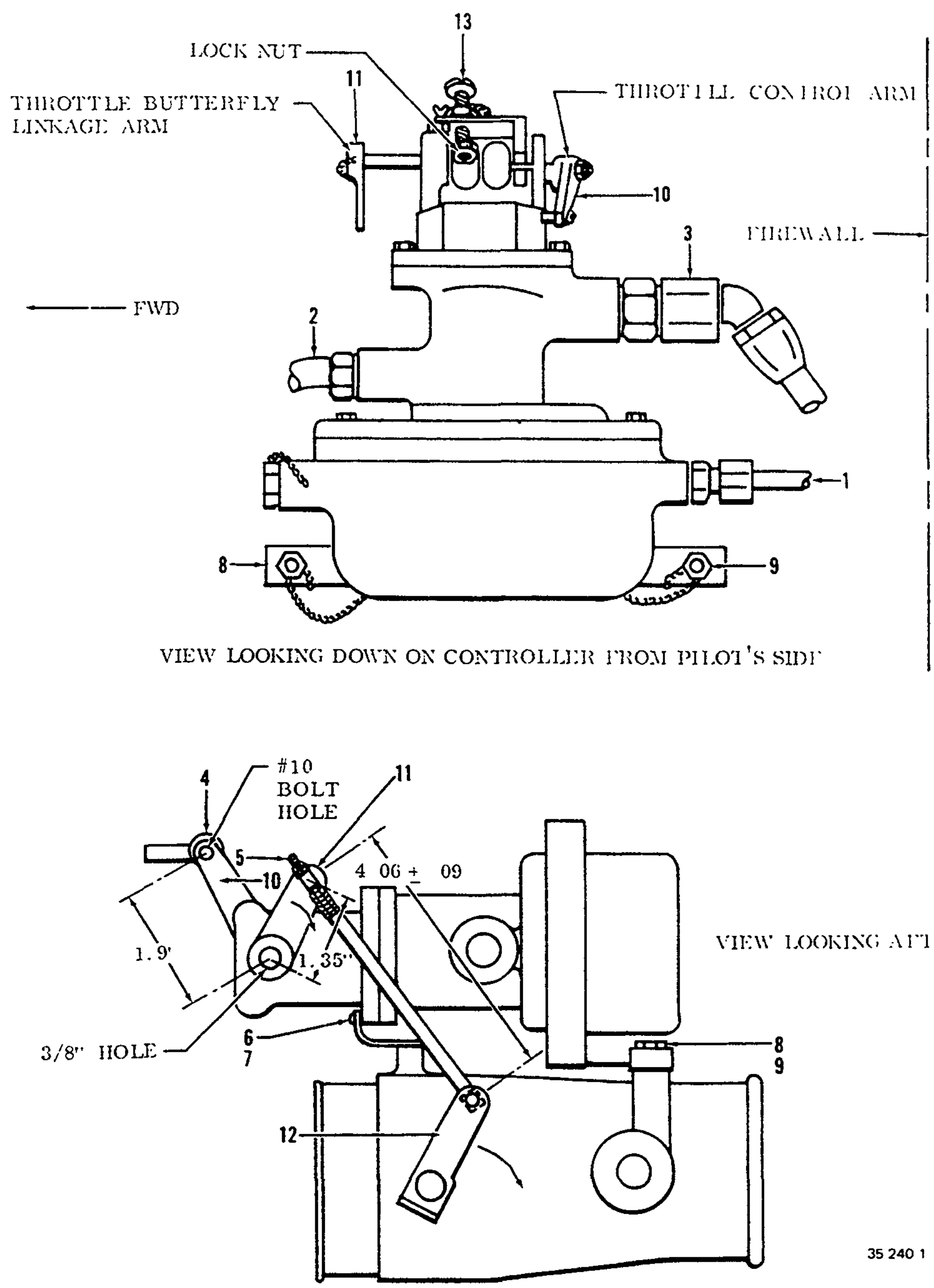
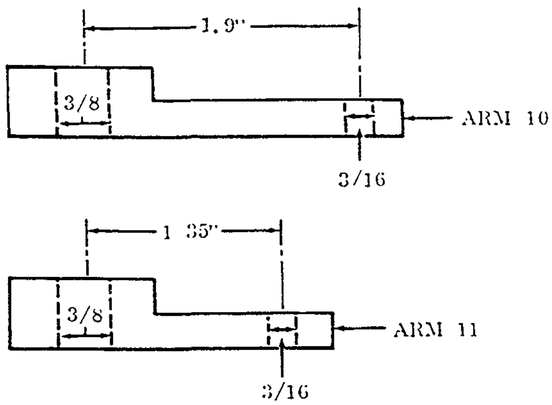


Figure 3-15A. Turbocharger Controller



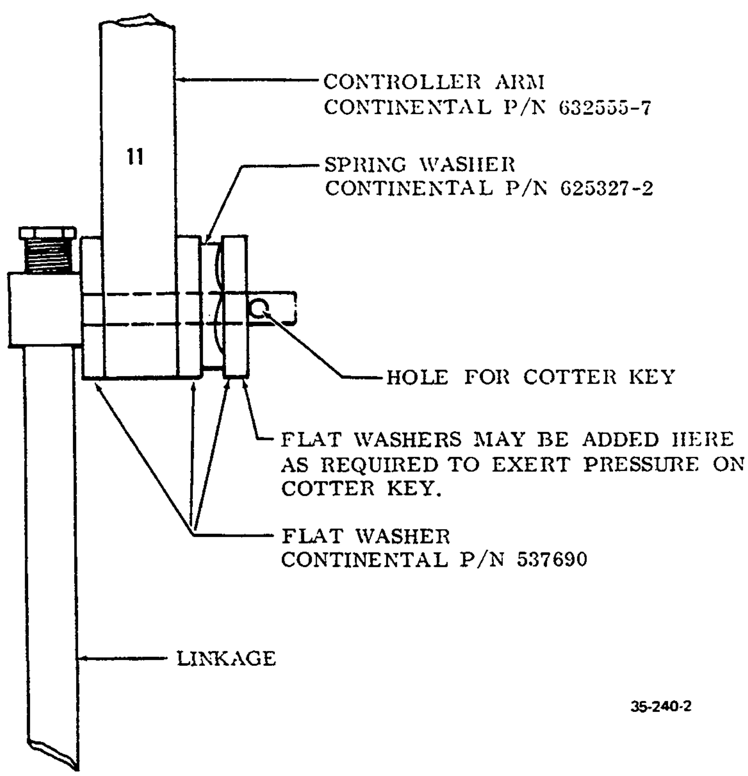


Figure 3-15B. Control Arm Installation

d. Remove one spark plug from any cylinder and rotate the propeller until the intake valve for the cylinder is in the open position. Proceed with the test as described below. When the intake valve test is complete, rotate the propeller until the exhaust valve for the cylinder is in the open position, and again test the system as described below.

e. Install a regulator valve to a shop air supply line. Apply approximately 50 psi air pressure to the turbocharger system through the spark plug port of the cylinder described in step "d".

The following areas of the system should be tested for leaks by applying a soap solution.

a. The hose clamps on the induction manifold of the engine.

b. The clamp at the compressor discharge outlet.

c. The clamps on the compressor discharge elbow at the throttle inlet.

d. The clamps at the throttle outlet to the riser manifold.

e. All fittings in the compressor discharge pressure reference lines to the fuel nozzles and fuel pressure gage.

f. The exhaust flanges at the cylinder exhaust ports. (With the exhaust valve in the open position.)

g. The waste gate flanges. (With the exhaust valve in the open position.)

NOTE

The waste gate flanges must be aligned correctly and care taken on assembly to prevent damage to the thin metal gaskets.

h. The turbo inlet gasket and flange bolts.

i. The clamp holding the exhaust tail pipe to the turbo outlet

j. The slip joint between the exhaust elbow and the turbo inlet.

NOTE

The slip joint must be a good fit. However, it will not be a leak tight joint.

k. Rigging of the waste gate in the completely closed position.

NOTE

Rigging of the waste gate is checked by removing the waste gate assembly from the exhaust bypass, plugging the oil outlet line and applying an air pressure of 40 to 50 psi to the oil inlet line of the waste gate actuator. Observe the valve movement. Adjust the linkage between the actuator and the valve to obtain a tolerance of .005 to .025 inch between the waste gate butterfly and bore.

After completing the preceding steps, remove all plugs and reassemble the inducation system.

FREEING TURBOCHARGER SHAFTS

Rust deposits may form in the area of the turbocharger turbine shaft piston ring seal as a result of water vapor accumulation if the airplane is subjected to short intervals of engine operation. This condition occurs only when the unit is new and combustion deposits have not formed a protective barrier on the seal surfaces. Although these deposits do restrict, and even stops shaft rotation, they are not harmeful to subsequent turbocharger operation once they are removed sufficiently to give free shaft movement.

When this condition is noted, remove the exhaust discharge stack and apply Kano Kroil penetrating oil or Mouse Milk liberally to the area behind the wheel around the turbine shaft seal. After a few minutes, attempt to turn the shaft. A light tap on the shaft end with a soft mallet will often assist in freeing the shaft. Once the shaft is free, the engine can be started and a power check made to confirm turbocharger output either on the ground or in flight.

TURBOCHARGER CRITICAL ALTITUDE TEST

The following procedure provides a means of checking turbocharger performance. Refer to the Critcal Pressure Altitude verses Temperature graph. To check the turbocharger performance against the graph it will be necessary to flight test the aircraft. With the aircraft in a climb configuration, note the altitude at which the manifold pressure begins to drop off from 32.5 in. Hg.; then observe the outside air temperature gage.

NOTE

Make sure this is a true drop in manifold pressure and not a temporary fluctuation.

Locate the cross section of the graph. The point at which these lines intersect is the aircraft's critical pressure altitude. If this point is located below the minimum acceptable pressure altitude line, a thorough check of the turbocharger system, including variable controller, induction system leaks, and wastegate adjustment, should be accomplished.

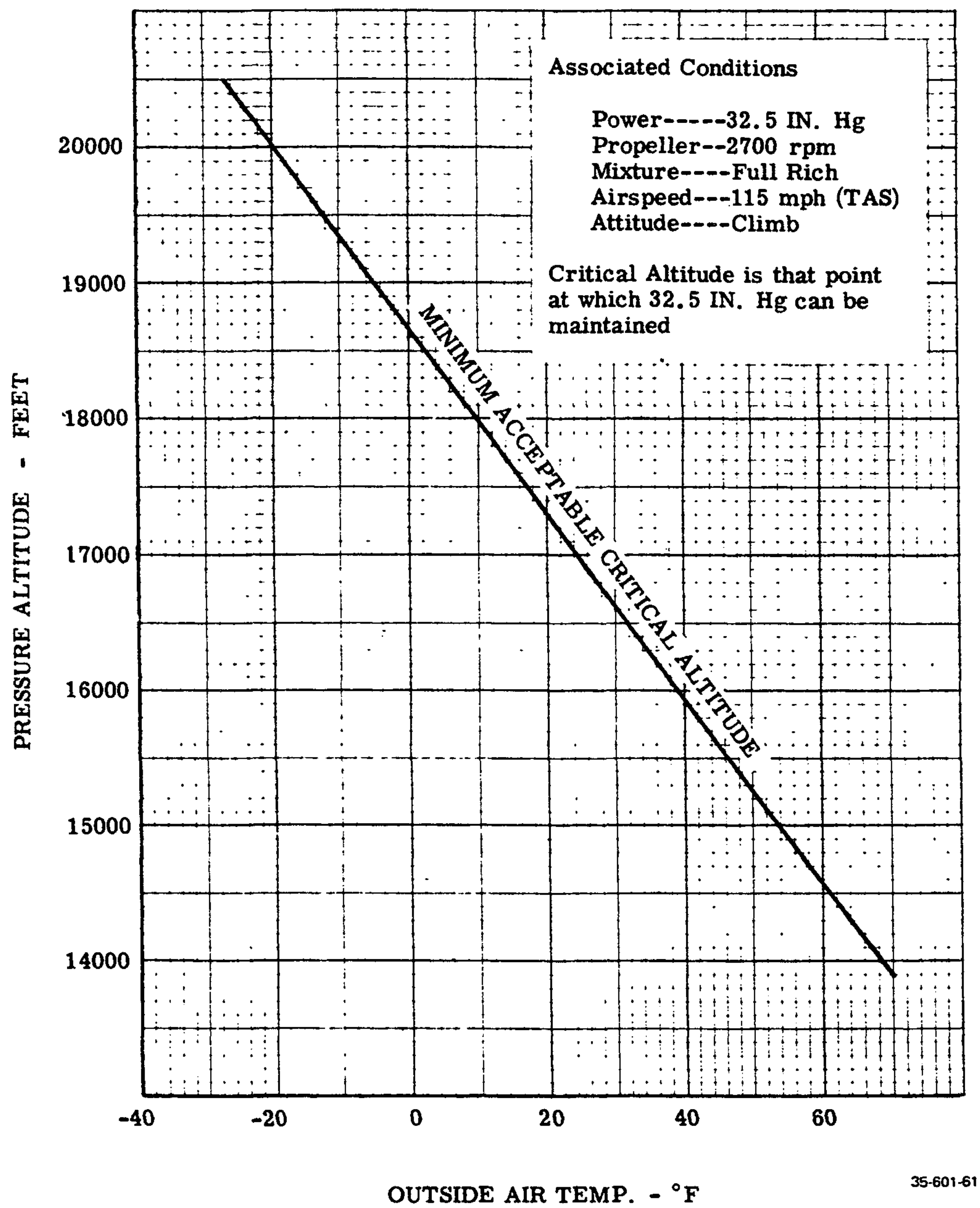


Figure 3-15C. Critical Pressure Altitude Vs. OAT Graph

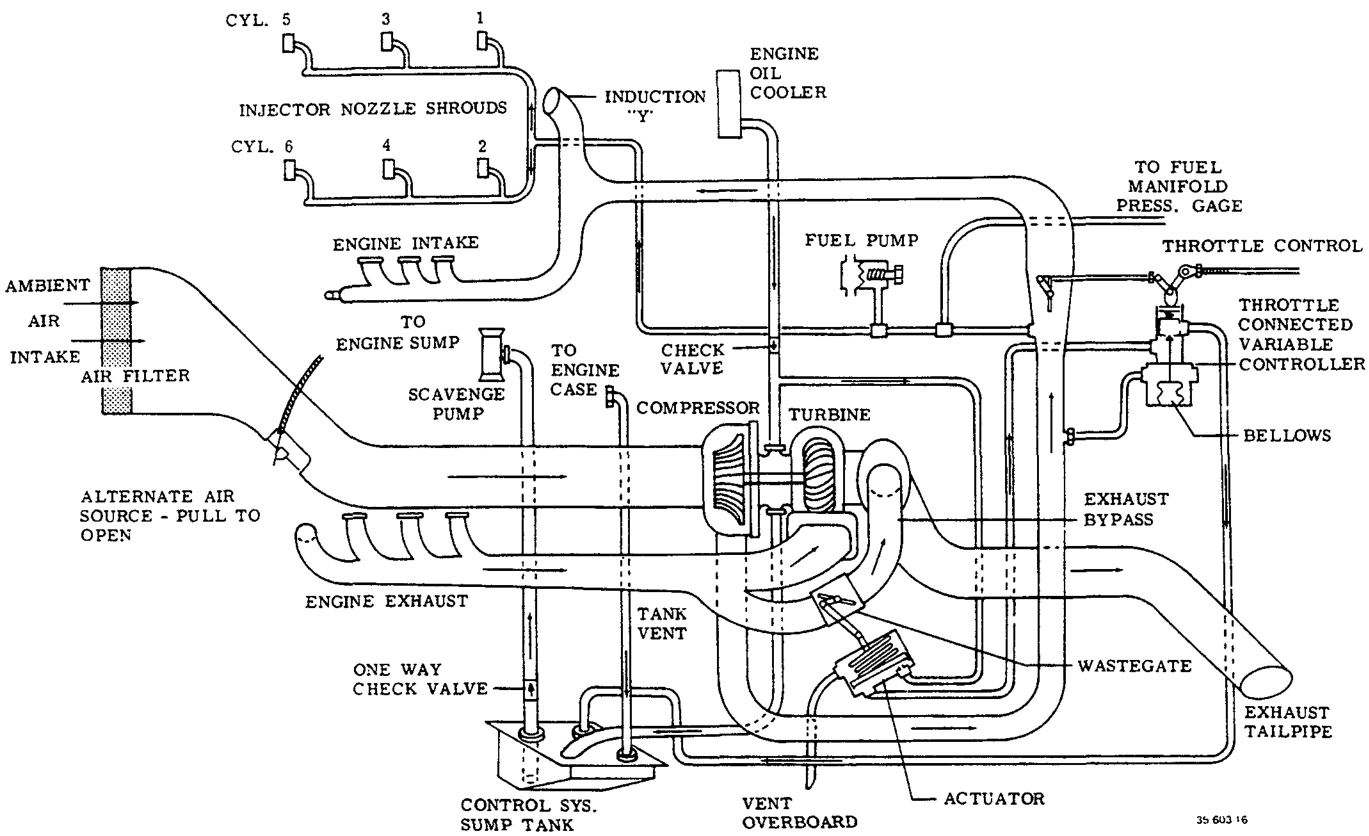


Figure 3-16. Turbocharger Schematic

ELECTRICAL UTILIZATION LOAD CHART

Airplane Serial No. Prior to D-6842

EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Cigarette lighter	1	10.0
Stall warning horn	1	3.0
Cylinder head temperature indicator	1	Negligible
Flap indicator	2	.10
Fuel quantity indicator	1	.30
Landing gear indicator	2	.10
Oil temperature indicator	1	.12
Stall warning indicator	1	.10
Throttle warning horn	1	3.0
Fuel boost pump warning indicator	1	.08
Tab indicator	1	.10
Cabin dome light	1	.56
Instrument light	2	.56
Landing light	2	19.00
Navigation light	3	1.15
Flap motor	1	6.0
Landing gear motor	1	20.0
Fuel boost pump motor	1	5.0
Battery relay	1	.59
Starter	1	210.0
Turn and bank indicator	1	.30

OPTIONAL EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Auxiliary fuel cell quantity indicator	1	.30
Heated pitot tube	1	7.0
Rotating beacon	1	6.5
LTRA-6 Receiver	1	6.0
LTRA-6 Transmitter	1	6.3
Lear Unimeter & Omni Receiver (with LTRA-6)	1	8.8
Lear Unimeter & Omni Transmitter (with LTRA-6)	1	8.9
ADF-12E	1	5.7
Type 15D	1	5.8
Type R-20	1	.6
Type T-20	1	2.15
Type 21ADF	1	5.6
VTR-2 Receiver	1	4.0
VTR-2 Transmitter	1	5.4
VTR-2 Receiver (with Omni)	1	4.8
VTR-2 Transmitter (with Omni)	1	6.0
VC-27 Receiver	1	3.4
VC-27 Transmitter	1	4.5

NOTE

In computing a load analysis, items that require only intermittent operation need not be included in the total figure.

ELECTRICAL UTILIZATION LOAD CHART

Airplane Serial No D-6842 thru D-10119 except D-10097

The following are lists of those standard and optional items which place continuous loads on the aircraft's circuitry. These loads must be tabulated when performing an electrical load analysis on the airplane. The lists include only items that are physically able to function at the same time. When computing the load analysis, the load for items of optional radio equipment should also be computed.

STANDARD EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Cylinder head temperature indicator	1	.12
Flap indicator	1	.08
Fuel indicator	2	.3
Landing gear indicator	1	.08
Oil temperature indicator	1	.12
Turn and bank indicator	1	.30
Engine instrument light	3	.23
Trim tab light	1	.10
Compass light	1	.08
Landing gear visual light	1	.10
Instrument flood light	2	.58
Wing navigation light	2	1.6
Tail navigation light	1	1.01
Battery relay	1	.50

OPTIONAL EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Heated pitot	1	7.0
Instrument post lights	24	.08
Upper rotating beacon (Beech)	1	5.3
Upper rotating beacon (Grimes)	1	6.5
Lower rotating beacon (Beech)	1	5.3
Lower rotating beacon (Grimes)	1	6.5

OPTIONAL RADIO EQUIPMENT	TRANSMIT AMPERES	RECEIVER AMPERES
KY-90 Transceiver	8.5	3.5
KX-100 Navigation Communication	9.5	4.5
KX-110 Navigation Communication	9.9	5.0
KZ-10		1.5
KR-40		2.5
KR-20		.5
17L-8A Transmitter	4.6	
51X-3 Receiver		3.5
344D-2 Omni Converter Indicator		.166
ADF-T-12 Automatic Direction Finder		1.2
NAV/COM M-135	6.96	2.54
NAV/COM 2374E	8.0	1.6
5607D Glideslope		1.3
5613A		1.5
5537A		.7
5642A	6.96	1.04
236A		3.11
T-5-D Transceiver	9.4	4.0
T-5-RA Transceiver	9.9	5.0
UDI-2 DME Distance Measuring Equipment		8.5
Mark II (VTR-2A) Omnigator	5.4	4.0
Mark V Transceiver	8.5	6.5
Mark VI Omni Receiver		3.5
Mark VII Transceiver	9.5	5.5
Mark X Communication and Omni Transceiver	11.0	7.5
MBT-12 Marker Beacon Receiver	2.0	.005
VOA-3 Omni Converter		2.4
UGR-1 Glideslope		2.5
VC-27A Simplexer	5.0	
ADF-29 Automatic Direction Finder		.6

The following is a list of intermittent load equipment which is itemized for your convenience. Do not include these items when computing the total electrical load.

INTERMITTENT LOAD EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Landing gear motor	1	20.0
Flap motor	1	10.0
Landing gear warning horn	1	.7
Stall warning buzzer	1	.06
Upper landing light	1	7.7
Lower landing light	1	19.23
Cigarette lighter	1	7.0
Cabin light	3	.58
Starter relay	1	.5
Starter motor	1	210.0
Auxiliary fuel pump	1	4.0
Starting vibrator	1	2.5

ELECTRICAL UTILIZATION LOAD CHART

Airplane serials D-10097, D-10120 and after

The following specifices the electrical load for each piece of equipment, either standard or optional, available on the airplane. Based on this information, the total electrical load for the airplane may be determined. Intermittent items should not be figured into the total figure since the short duration of their usage will not significantly alter the standard load.

The electrical load has been divided into 4 catagories as follows:

a. Continuous load (standard equipment)
b. Continuous load (optional equipment)
c. Intermittent load (standard equipment)
d. Intermittent load (optional equipment)

We recommend under no condition shall the total continuous electrical load be more than 80% of the total alternator capacity. Total continuous load consists of loads listed as continuous and the avionics receiving loads, transmit loads are intermittent loads.

NOTE

The loads listed as continuous loads are for equipment which will be operated for periods of 15 minutes or longer. However, the intermittent loads and the avionics transmitting loads should be considered for determining possible overloading during shorter periods of time, i. e., takeoff and landing.

CONTINUOUS LOAD (standard equipment)

EQUIPMENT	*NUMBER PER AIRPLANE*	*AMPS*	
		EACH	*TOTAL*
Indicator, Flap Position and P.C. Board	1	.06	.06
Indicator, Fuel and P.C. Board	2	.02	.04
Inverter, Electroluminescent	1	.50	.50
Instrument, Engine	1	.32	.32
Heater, Pitot	1	4.60	4.60
Potentiometer, Light Dim	4	.03	.12
Relay, Annunciator Dim	1	.04	.04
Relay, Master Battery	1	.50	.50
Sensor, Alternator Out	1	.04	.04
Turn Coordinator	1	.40	.40
Voltage Regulator	1	3.00	3.00
Clock, Panel	1	.01	.01
LIGHTING			
3rd and 4th Reading Light	2	.30	.60
Cabin Light	2	.17	.34
Elevator Tab	1	.04	.04
Flap Position	1	.04	.04
Glareshield Flood	12	.17	2.04
Tail Position	1	1.02	1.02
Wing Tip Nav Light	2	.93	1.86
OAT	1	.04	.04
Fuel Select	2	.04	.08
Compass	1	.04	.04

CONTINUOUS LOAD (optional equipment)

EQUIPMENT	*NUMBER PER AIRPLANE*	*AMPS EACH*	*AMPS TOTAL*
Air Conditioning			
Actuator, Condenser Door	1	.86	.86 (1)
Compressor Clutch	1	1.70	1.70
Condenser Blower	1	13.5	13.5 (2)
Clock, Digital	1	.20	.20
Electrothermal Prop Anti-Ice			
(2 Blade)	1	10.0	10.0
(3 Blade)	1	15.0	15.0
Ammeter	1	.01	.01
Timer	1	.10	.10
Power Supply, Strobe	1	5.00	5.00
LIGHTING			
5th and 6th Seat Reading	2	.30	.60
Clock, Control Wheel 8-Day	1	.04	.04
Instrument, Post Light (Single)	26	.04	1.04
Instrument, Post Light (Dual)	37	.04	1.48
Instrument, Wedge Light (Single)	14*	.024	.67
Instrument, Wedge Light (Dual)	16*	.024	.77
Map	1	.30	.30
Rotating Beacon, Lower	1	3.22	3.22
Rotating Beacon, Upper	1	3.22	3.22
Tail Nav/Strobe	1	1.02	1.02

(1) Intermittent Operation
(2) Unit Operates in Gear Down Position Only
* 2 Light Bulbs per Light

INTERMITTENT LOADS (standard equipment)

EQUIPMENT	*NUMBER PER AIRPLANE*	*AMPS EACH*	*AMPS TOTAL*
Cigarette Lighter	2	6.0	12.0
Flap Motor	1	11.0	11.0
Flasher, Gear Warning	1	.04	.04
Horn, Gear Warning	1	.20	.20
Horn, Stall Warning	1	.20	.20
Landing Gear Motor	1	40.0	40.0 (3)
Pump, Auxiliary Fuel	1	3.00	3.00
Pump, Auxiliary Fuel	1	3.00	3.00 (4)
Relay, Dynamic Brake	1	1.25	1.25
Relay, Starter	1	3.30	3.30
Starter, Engine	1	100.0	100.0
Relay, Landing Gear Latch	1	.08	.08
LIGHTING			
Alternator Out	1	.04	.04
Courtesy Light	2	.17	.34
Door Ajar	1	.04	.04
Landing Gear Indicator	4	.04	.16
Landing Light	1	8.93	8.93
Condenser Door Open	1	.04	.04
INTERMITTENT LOADS (Optional equipment)			
Actuator, Elevator Trim	1	.85	.85
Resistor, Trim Shunt	1	.38	.38
LIGHTING			
Taxi Light	1	8.93	8.93

(3) Peak current after initial start-up load.
(4) Used only when dual auxiliary fuel pumps are required.

TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	STARTER SYSTEM	
1. Starter Inoperative.	a. Circuit breaker tripped.	a. Reset circuit breaker.
	b. Battery switch inoperative.	b. Check cockpit light; if not operative, check switches and battery solenoid.
	c. Defective starter solenoid.	c. Check continuity of starter system.
	d. Low battery.	d. Test battery; if low, replace or start with external power.
	e. Open circuit.	e. Check continuity of circuit.
	f. Defective starting motor.	f. Check brushes, springs, condition, and commutator. Replace if necessary.
	GENERATOR SYSTEM	
1. No ammeter indication.	a. Loose connection.	a. Check connection throughout circuit.
	b. Open field circuit in generator; defective armature.	b. Test resistance of field. Check field circuit connections. Replace generator if defective.
	c. Brushes not contacting commutator.	c. Clean brushes and holders Replace weak springs.
	d. Brushes worn.	d. Replace brushes if worn to a length of 1/2 inch or less.
	e. Dirty commutator.	e. With generator running, clean commutator with No. 0000 sandpaper.

TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	GENERATOR SYSTEM (CON'T)	
1. No ammeter indication. (Con't.)	f. Defective voltage regulator.	f. Replace regulator.
	g. Defective ammeter.	g. Replace ammeter.
2. No generator output.	a. Circuit breaker tripped.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
	c. Loss of residual magnetism.	c. Flash generator field.
	d. Defective generator control switch or reverse current relay.	d. Test switches; replace if defective.
3. Low generator output.	a. Voltage regulator out of adjustment.	a. Set generator voltage.
	b. High resistance connection.	b. Tighten generator system.
	ALTERNATOR SYSTEM (D-7310 and After)	
1. No ammeter indication.	a. Loose connection.	a. Check connections throughout system.
	b. No alternator output.	b. Check alternator output.
	c. Defective voltage regulator.	c. Replace regulator.
	d. Overvoltage relay tripped.	d. Check overvoltage relay (see item 2).
	e. Defective ammeter.	e. Replace ammeter.
2. Overvoltage relay trips.	a. Alternator overcharging.	a. Check alternator output . Repair or replace as necessary.
	b. Defective voltage regulator.	b. Replace regulator.
	c. Defective overvoltage relay.	c. Replace relay.
3. No alternator output.	a. Circuit breaker tripped.	a. Reset.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective control switch.	c. Replace switch.
	d. Brushes worn out.	d. Replace brushes.
	e. Dirty slip rings.	e. Clean slip rings with No. 400 or finer sandpaper. Use air jet to remove grit.
	f. Brushes not contacting slip rings.	f. Clean brushes and holders with a clean, lint-free, dry cloth. Replace weak springs.
	g. Open or shorted circuit in rotor.	g. Test resistance of rotor. Replace if defective.

ALTERNATOR SYSTEM (D-7310 and After) (Cont'd)

TROUBLE	PROBABLE CAUSE	CORRECTION
3. No alternator output. (Cont'd)	h. Open or shorted circuit in stator.	h. Test resistance of stator Replace if defective.
	i. Defective voltage regulator.	i. Replace regulator.
4. Alternator output low.	a. Defective rectifier diode.	a. Replace diode.

STANDBY GENERATOR

ENGINE NOT RUNNING

NOTE

The number 2 transistor and other components mounted to the rear of the ON-OFF-TEST switch will be referred to as the voltage regulator.

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Battery switch off. ON-OFF-TEST switch to TEST-BAT TEST light will not illuminate. a.	a. Open circuit between battery and BAT TEST light.	a Locate and repair open circuit.
	b. Fuses between battery and ON-OFF-TEST switch blown.	b. Check for and correct cause of blown fuse. Replace fuse.
	c. Faulty diode between battery and ON-OFF-TEST switch.	c. Replace diode.
	d. Defective BAT TEST lamp.	d. Replace lamp.
	e. Defective ON-OFF-TEST switch.	e. Replace switch.
2. With STBY switch to ON and PWR XFER switch to NAV COMM 1 - COMM 1, NAV 1, Audio Amplifier, Turn Coordinator and Engine Instruments are inoperative.	a. Defective power relay.	a. Replace relay.
3. With STBY switch to ON and PWR XFER switch to NAV COMM 2, NAV 2 and COMM 2 are inoperative.	a. PWR XFER switch defective or wired incorrectly.	a. Replace switch or rewire as necessary.

ENGINE RUNNING

TROUBLE	PROBABLE CAUSE	CORRECTION
4. With STBY switch to TEST, engine at 1200 RPM, GEN TEST light will not illuminate.	a. Loose connection.	a. Secure connections.
	b. Defective GEN TEST lamp.	b. Replace lamp.

STANDBY GENERATOR (Cont'd)

TROUBLE	PROBABLE CAUSE	CORRECTION
4. With STBY switch to TEST, engine at 1200 RPM GEN TEST light will not illuminate. (Cont'd)	c. Blown standby generator fuse.	c. Check for and correct cause of blown fuse. Replace fuse.
	d. Defective overvoltage relay.	d. Replace relay.
	e. Defective voltage regulator.	e. Replace faulty, component of voltage regulator.
	f. Defective standby generator.	f. Replace standby generator.
	g. Defective ON-OFF-TEST switch.	g. Replace switch.
5. With the STBY switch to TEST, engine at 1200 RPM, GEN TEST light illuminates dimmly but will not get brighter as engine RPM is increased.	a. Faulty overvoltage relay.	a. Replace relay.
	b. Rheostat out of adjustment.	b. Bench set rheostat or replace.
	c. Faulty generator.	c. Replace generator.
	d. Faulty voltage regulator.	d. Replace faulty component of regulator.
6. With the STBY switch to TEST, engine at 1200 RPM GEN TEST light will illuminate dimmly, but goes out as engine RPM increases.	a. Faulty overvoltage relay.	a. Replace relay.
	b. Rheostat out of adjustment.	b. Bench set rheostat.
	c. Defective voltage regulator.	c. Replace faulty component of regulator.
	d. Defective generator.	d. Replace generator.

IGNITION SYSTEM

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Engine fails to start.	a. Spark plugs loose, wet, fouled, or defective.	a. Clean or replace defective spark plugs.
	b. Magneto primary ground wire short circuited.	b. Check primary ground wire between magneto and switch.
	c. Dirty, burned or pitted magneto breaker points.	c. Clean points or replace if badly burned or pitted.
	d. Moisture or oil in magneto distributor.	d. Clean magneto distributor.

IGNITION SYSTEM (Cont'd)

TROUBLE	PROBABLE CAUSE	CORRECTION
1. Engine fails to start. (Cont'd)	e Internal trouble with magnetos.	e Turn engine over and check spark jump. Replace magneto if there is no spark or if spark is weak.
2. Hard starting.	a. Low voltage at vibrator input (S-200 series magnetos) (S-1200 series magnetos)	a. Measure voltage between vibrator terminal marked "in" and the ground terminal while operating starter Must be at least 13 volts
	b Inoperative or defective vibrator. (S-200 series magnetos.) (S-1200 series magnetos)	b. If voltage is adequate, listen for buzzing of vibrator during starting If no buzzing is heard, either the vibrator is defective or the circuit from the "output" terminal on the vibrator to the retard (dual breaker) magneto is open Check both "Switch" and "Retard" circuits Also check for good electrical ground
	c. Retard breaker or impulse coupling not operating. Engine may kick back during cranking due to advance timing of ignition.	c. Points may not be closing due to wrong adjustment, or may not be electrically connected in the circuit due to a poor connection. Inspect points to see if they close Check for proper contact at the terminals of magneto and at the vibrator. Check wiring

TROUBLE	PROBABLE CAUSE	CORRECTION
	IGNITION SYSTEM (CONT'D)	
2. Hard starting. (Cont'd.)	d. Vibrator-magneto combination not "functioning" electrically. (S-200 series magnetos.) (S-1200 series magnetos)	d. Turn engine in proper direction of rotation until retard points just open on No. 1 cylinder position. Remove input connection from starter to prevent engine turning and while holding No. 1 plug lead 5/16 inch from ground energize vibrator by turning switch to start. Plug lead should throw a 5/16 inch spark. If spark is weak or missing try new vibrator. If this does not correct trouble remove magneto and check for improper internal timing or improperly meshed distributor gears.
	e. Magneto improperly timed to engine.	e. Check magneto-to-engine timing.
	f. Advance breaker out of adjustment (internal timing off).	f. Check magneto internal timing.
	g. Retard points opening too late or impulse coupling timed wrong.	g. Check timing of retard points or impulse coupling.
3. Rough running engine.	a. Spark plugs loose or fouled.	a. Clean and regap spark plugs.
	b. Spark plugs leads or connectors oily, dirty or cracked.	b. Clean leads and connectors and replace damaged connectors.
	c. Defective ignition harness.	c. Make continuity and high voltage tests on harness. Replace harness or leads if necessary.
	d. Magnetos incorrectly timed.	d. Time magnetos to engine.
	e. Dirty or burned breaker points.	e. Clean or replace if badly burned.
4. Low power.	a. Burned or defective ignition harness.	a. Check continuity of harness and replace if necessary.
	b. Magnetos incorrectly timed.	b. Time magnetos to engine.
	c. Internal trouble with magnetos.	c. Turn engine over and check spark. Replace magneto if there is weak or no spark.
	LANDING GEAR POSITION INDICATOR CIRCUIT	
1. One indicator light inoperative.	a. Defective light bulb or indicator.	a. Check bulb for proper contact and burned out filament.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	LANDING GEAR POSITION INDICATOR CIRCUIT (CONT'D)	
1. One indicator light inoperative. (Cont'd.)	b. Defective switch.	b. Check continuity of switch. Replace if necessary.
	c. Open circuit.	c. Check continuity of circuit affected.
2. Both indicator lights inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Defective bulbs or indicators.	b. Check bulbs for proper contact and burned out filament.
	c. Open circuit.	c. Make continuity check on circuit and check for loose connections.
3. Indicator lights inoperative when navigation lights are turned on.	a. Open circuit through dimming resistor.	a. Check dimming resistor for open circuit and loose wire connections.
	WARNING HORN CIRCUIT	
1. Warning horn inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Throttle switch out of adjustment.	b. Check throttle switch for proper adjustment and continuity.
	c. Open circuit.	c. Check circuit for continuity and loose connections.
	FLAP CONTROL AND INDICATOR CIRCUIT	
1. Flaps will not lower.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Defective down limit switch.	b. Check continuity of switch. Replace switch if defective.
	c. Open circuit or loose connections.	c. Run continuity check on circuit. Check for loose connections.
	d. Defective flap motor.	d. Check brushes, springs, condition of commutators. Replace if necessary.
2. Flaps will not raise.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Defective up limit switch.	b. Check continuity of switch. Replace if necessary.
	c. Open circuit or loose connections.	c. Check continuity of up position circuit. Check for loose connections.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	FLAP CONTROL AND INDICATOR CIRCUIT (CONT'D)	
2. Flaps will not raise. (Cont'd.)	d. Defective flap motor.	d. Check continuity of switch. Replace if necessary.
3. Up position light inoperative.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of switches and circuit.
4. Up position light inoperative only when navigation lights are on.	a. Open circuit in dimming resistor circuit.	a. Check continuity of dimming resistor.
5. Down position light inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of switches and circuit.
6. Down position light inoperative only when navigation lights are on.	a. Open circuit in dimming resistor circuit.	a. Check continuity of dimming resistor. Replace if necessary.
7. Both position lights inoperative.	a. Open circuit or tripped circuit breaker.	a. Check continuity of circuit. Reset circuit breaker.
	STALL WARNING CIRCUIT (Serials D-1 through D-2680)	
1. Stall warning lights inoperative.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Defective relay.	b. Check continuity of relay when landing gear safety switch is actuated. Replace if necessary.
	c. Defective bulb.	c. Check bulbs for proper contact and burned out filament.
	d. Open circuit or loose connections.	d. Check continuity of circuit.
2. Stall warning light burns at all times in flight.	a. Defective stall warning switch.	a. Check switch for proper operation and freedom of movement.
	b. Grounded circuit.	b. Check for ground in circuit between switch and light.
3. Stall warning light burns while plane is on the ground.	a. Defective stall warning switch.	a. Check switch for proper operation and free movement.
	b. Defective relay.	b. Check relay for points sticking in open position.
	c. Grounded circuit.	c. Check for grounded circuit between stall warning switch and light.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	STALL WARNING INDICATOR CIRCUIT (Serials D-2681 through D-6841)	
1. Warning horn and light inoperative.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective switch.	c. Check switch for proper operation. Replace if necessary.
	d. Defective indicator.	d. Check light for proper bulb contact and burned out filament. Check horn for proper operation.
2. Horn or light stays on.	a. Grounded circuit between horn and switch or light and switch.	a. Test for ground in circuit.
	b. Defective switch.	b. Check for proper switch operations.
	STALL WARNING INDICATOR CIRCUIT (Serials D-6842 and After)	
1. Warning buzzer inoperative.	a. Tripped circuit breaker.	a. Check and reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective switch.	c. Check switch for proper operation. Replace if necessary.
	d. Defective indicator.	d. Check buzzer for proper operation.
2. Buzzer operates continuously.	a. Grounded circuit between buzzer and switch.	a. Test for ground in circuit.
	b. Defective switch.	b. Check for proper switch operations.
	LANDING LIGHT CIRCUIT	
1. Light inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Defective light.	b. Check bulb for proper contact and burned out filament.
	c. Open circuit.	c. Check continuity of circuit.
	d. Landing light switch defective.	d. Check continuity through switch. Replace if necessary.
	NAVIGATION LIGHT CIRCUIT	
1. Navigation lights inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	NAVIGATION LIGHT CIRCUIT (CONT'D)	
1. Navigation lights inoperative. (Cont'd.)	b. Open circuit.	b. Check continuity of entire circuit.
2. One navigation light inoperative.	a. Defective light.	a. Check bulb for proper contact and for burned filament.
	b. Open circuit.	b. Check continuity of circuit wiring from switch to ground.
	FUEL QUANTITY INDICATOR CIRCUIT	
1. Fuel indicator inoperative on one tank only.	a. Defective selector switch.	a. Check selector for proper contact.
	b. Defective transmitter.	b. Check continuity of fuel transmitter.
	c. Open circuit from switch to transmitter.	c. Check continuity of circuit.
2. Fuel indicator inoperative on both tanks.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
	MANIFOLD PRESSURE GAGE	
1. Instrument fails to indicate or give correct indication.	a. Defective instrument.	a. Repair or replace instrument.
	b. Loose or broken line or fitting.	b. Repair or replace.
2. Excessive error at barometric pressure.	a. Leak in pressure lines.	a. Repair lines.
	b. Condensation in lines.	b. Clean lines.
	c. Faulty mechanism.	c. Replace instrument.
3. Jerky pointer.	a. Leak in pressure lines.	a. Repair lines.
	b. Faulty mechanism.	b. Replace instrument.
4. Sluggish pointer.	a. Dirt in lines.	a. Clean lines.
	b. Leak in lines.	b. Repair lines.
	c. Faulty mechanism.	c. Replace instrument.
5. Excessive pointer vibration.	a. Panel vibration.	a. Check panel mounts.
6. Low reading when operating above atmospheric pressure.	a. Leak in lines.	a. Repair lines.
	b. Faulty engine power.	b. Consult engine manual.
	c. Faulty mechanism.	c. Replace instrument.
7. Improper calibration.	a. Faulty mechanism.	a. Replace instrument.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	MANIFOLD PRESSURE GAGE (CONT'D)	
8. No pointer movement.	a. Faulty mechanism.	a. Replace instrument.
	b. Broken pressure line.	b. Repair line.
	AIRSPEED INDICATOR	
1. Instrument inoperative.	a. Pressure line not properly connected.	a. Tighten or repair connection.
	b. Pitot line clogged.	b. Disconnect lines and blow clear.
	c. Defective instrument.	c. Repair or replace instrument.
2. Incorrect indication.	a. Leak in lines.	a. Locate and repair.
	b. Leak in instrument.	b. Repair or replace instrument.
	c. Restricted pitot or static line.	c. Disconnect and blow clear.
	d. Defective instrument.	d. Repair or replace instrument.
3. Pointer vibrates.	a. Excessive vibration.	a. Check panel mounts.
	b. Tubing vibration.	b. Check tubing clamps.
4. Hand oscillates.	a. Leak in pitot or static line.	a. Repair leaks.
	b. Leak in Rate of Climb or Altimeter.	b. Repair all 3 lines.
	c. Defective mechanism.	c. Replace instrument.
	d. Leaking diaphragm.	d. Replace instrument.
	RATE OF CLIMB INDICATOR	
1. Does not indicate zero with constant altitude.	a. Ageing aneroid.	a. Return pointer to zero with pointer reset. Tap lightly while resetting.
2. Instrument inoperative.	a. Clogged static line.	a. Disconnect lines and blow clear.
	b. Plugged aneroid equalizing port.	b. Repair or replace instrument.
	c. Defective instrument linkage.	c. Repair or replace instrument.
	d. Static line broken.	d. Repair line.
3. Incorrect indication.	a. Leak in static lines.	a. Repair lines.
	b. Restricted static lines.	b. Disconnect line and blow clear.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	RATE OF CLIMB INDICATOR (CONT'D)	
3. Incorrect indication. (Cont'd.)	c. Leak in instrument case.	c. Repair or replace instrument.
	d. Ruptured aneroid.	d. Repair or replace instrument.
4. Pointer oscillates.	a. Clogged static line.	a. Disconnect line and blow clear.
	b. Leak in static line.	b. Repair line.
	c. Leaky instrument case.	c. Replace instrument.
5. Pointer vibrates.	a. Excessive vibration.	a. Check panel mounts.
	b. Defective diaphragm.	b. Replace instrument.
	TURN AND BANK INDICATOR	
1. Instrument inaccurate or fluctuating.	a. Leak in line or instrument.	a. Repair line leak. Repair or replace instrument if leaking.
	b. Damaged gyro.	b. Repair or replace instrument.
	c. Vacuum supply fluctuating or not properly set.	c. Check for constant and correct vacuum.
2. Pointer fails to respond.	a. Inlet cap or screen clogged.	a. Clean or replace.
3. Vibrating hand.	a. Excessive vibration.	a. Check panel mounts.
	b. Damping screw not properly adjusted.	b. Readjust.
	c. Defective mechanism.	c. Replace instrument.
4. Hand sluggish returning to zero.	a. Damping screw improperly adjusted.	a. Readjust.
	b. Defective mechanism.	b. Replace instrument.
	c. Insufficient vacuum.	c. Repair vacuum source.
5. Hand does not indicate proper turn.	a. Out of calibration.	a. Recalibrate.
	b. Defective mechanism.	b. Replace instrument.
6. Gyro fails to start.	a. Clogged filter.	a. Clean or replace.
	b. Low vacuum.	b. Repair vacuum source.
7. Hand does not sit on zero.	a. Out of balance.	a. Replace instrument.
	b. Faulty mechanism.	b. Replace instrument.
8. Incorrect sensitivity.	a. Vacuum low or high.	a. Repair vacuum.
	b. Inlet cap or screen clogged.	b. Clean or replace.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	TURN AND BANK INDICATOR (CONT'D)	
8. Incorrect sensitivity. (Cont'd)	c. Sensitivity spring faulty.	c. Replace instrument.
9. When cold hand fails to respond or is sluggish.	a. Oil is too thick.	a. Replace instrument.
	b. Improper bearing end play.	b. Replace instrument.
	c. Inlet cap or screen clogged.	c. Clean or replace.
10. Noisy gyro.	a. Vacuum too high.	a. Adjust vacuum.
	b. Loose or defective bearings.	b. Replace instrument.
	GYRO HORIZON	
1. Horizon bar fails to respond.	a. Air filter dirty (high vacuum indication).	a. Clean or replace filter.
	b. Vacuum regulating valve improperly adjusted.	b. Readjust valve.
	c. Faulty suction gage.	c. Replace gage.
	d. Pump or venturi failure.	d. Replace pump or venturi.
	e. Vacuum line kinked or leaking.	e. Repair or replace.
2. Horizon bar does not settle.	a. Defective mechanism.	a. Replace instrument.
	b. Insufficient vacuum.	b. Readjust vacuum.
	c. Excessive vibration.	c. Check panel mounts.
3. Horizon bar oscillates or vibrates.	a. Air filter dirty.	a. Clean or replace filter.
	b. Vacuum regulating valve improperly adjusted.	b. Readjust valve.
	c. Faulty vacuum gage.	c. Replace gage.
	d. Defective mechanism.	d. Replace instrument.
	e. Excessive vibration.	e. Check panel mounts.
	f. Leak in vacuum line.	f. Repair line.
4. Excessive drift in either direction.	a. Air filter dirty.	a. Clean or replace.
	b. Low vacuum.	b. Set regulator valve.
	c. Faulty vacuum gage.	c. Replace gage.
	d. Pump or venturi failure.	d. Replace pump or venturi.
	e. Vacuum line kinked or leaking.	e. Locate and repair.
	ALTIMETER	
1. Instrument fails to operate.	a. Static line plugged.	a. Disconnect all instruments operating on static pressure. Blow lines clear.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	ALTIMETER (CONT'D)	
1. Instrument fails to operate. (Cont'd.)	b. Defective mechanism.	b. Replace instrument.
2. Incorrect indication.	a. Hands not set properly.	a. Reset hands.
	b. Leaking diaphragm.	b. Replace instrument.
	c. Out of calibration.	c. Re-calibrate.
3. Hand oscillates.	a. Static irregular.	a. Check lines for restriction.
	b. Leak in airspeed or Rate of Climb installations.	b. Check other lines and instruments.
	c. Leak in altimeter case.	c. Repair or replace instrument.
	DIRECTIONAL GYRO	
1. Instrument inaccurate or fluctuating	a. Leak in line or instrument.	a. Repair leak. Repair or replace instrument if leaking.
	b. Damaged gyro.	b. Repair or replace instrument.
	c. Vacuum supply fluctuating or not properly set.	c. Check for constant and correct vacuum.
	MAGNETIC COMPASS	
1. Excessive card error.	a. Compass not properly compensated.	a. Compensate instrument.
	b. External or internal magnetic interference.	b. Locate magnetic interference and eliminate if possible.
2. Excessive card oscillation.	a. Insufficient liquid.	a. Add fluid, Specification MIL-L-5020.
	b. Excessive vibration of instrument mounting panel.	b. Correct vibration difficulty.
	c. Friction between jewel port and jewel port support bearing.	c. Repair or replace compass.
3. Card element not level.	a. Leaking float chamber.	a. Repair or replace compass.
	b. Card magnets detached from card.	b. Repair or replace compass.
	c. Pivot friction.	c. Repair or replace compass.
	d. Instrument heavily compensated.	d. Recompensate.
4. Card sluggish.	a. Weak card magnets.	a. Repair or replace compass.
	b. Excessive pivot friction or broken jewel.	b. Repair or replace compass.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	MAGNETIC COMPASS (CONT'D)	
4. Card sluggish. (Cont'd.)	c. Instrument heavily compensated.	c. Recompensate.
5. Leakage of fluid.	a. Loose screws.	a. Tighten screws.
	b. Broken glass or case.	b. Repair or replace compass.
	c. Defective gaskets.	c. Repair or replace compass.
6. Discolored liquid or card markings.	a. Age.	a. Replace instrument.
7. Defective light system.	a. Bulb burned out.	a. Replace bulb.
	b. Shorted circuit.	b. Repair wiring.
8. Air bubble.	a. Leak in case or flange.	a. Replace instrument.
	VACUUM SYSTEM	
1. Low suction gage reading.	a. Suction relief valve not properly adjusted.	a. Adjust suction relief valve.
	b. Pump failure.	b. Repair or replace pump.
	c. Insufficient lubrication of vacuum pump.	c. Provide proper lubrication.
	d. Leak or break in suction line.	d. Locate and repair.
	e. Defective gage.	e. Replace.
2. Excessive suction gage reading.	a. Air filter clogged.	a. Clean filter element.
	b. Suction relief valve not properly adjusted.	b. Adjust valve.
	c. Suction relief valve failure.	c. Repair or replace.
	d. Defective gage.	d. Replace gage.
3. Suction gage inoperative.	a. Clogged lines.	a. Clean lines.
	b. Shaft on vacuum pump broken.	b. Replace pump.
4. Vacuum operated instruments inoperative.	a. Clogged lines.	a. Clean lines.
	b. Oil separator defective.	b. Replace separator.
	c. Shaft on vacuum pump broken.	c. Replace pump.
	PITOT AND STATIC PRESSURE SYSTEM	
1. Heating element inoperative.	a. Bad switch.	a. Replace switch.
	b. Grounded or open circuit.	b. Check circuit for continuity. Repair or replace as necessary.
	c. Low voltage.	c. Correct voltage.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	PITOT AND STATIC PRESSURE SYSTEM (CONT'D)	
1. Heating element inoperative. (Cont'd.)	d. Defective element.	d. Replace element.
2. Circuit breaker trips.	a. Grounded wire.	a. Replace or repair wire.
	b. Defective element.	b. Replace element.
3. Instruments do not read the same.	a. Line clogged or connections loose.	a. Check all fittings for tightness. Disconnect lines from instruments and blow clear.
	b. Leak in instruments.	b. Check instrument cases.
	c. Instruments non-reading.	c. Check static holes.
	FLARE CIRCUIT	
1. No flare will release.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
2. One flare will not release.	a. Defective switch.	a. Check continuity of switch. Replace if necessary.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective flare release mechanism.	c. Inspect the release mechanism. Replace if necessary.
	TURBOCHARGER SYSTEM	
1. Turbocharger inoperative	a. T/C rotor jammed	a. Replace
	b. Controller malfunctioning	b. Replace
	c. Wastegate linkage not functioning	c. Adjust or replace
	d. Metering jet in actuator inlet blocked	d. Backflush with solvent, 50 psi
	e. T/C inlet blocked	e. Remove obstruction
	f. Controller pressure sensing line blocked	f. Remove obstruction
2. Engine has low critical altitude	a. Controller out of calibration	a. Replace
	b. Controller malfunctioning	b. Replace
	c. Wastegate out of rig	c. Adjust
	d. Leak in exhaust system	d. Eliminate any leaks
	e. Metering jet in actuator inlet blocked	e. Backflush with solvent, 50 psi

TROUBLE SHOOTING

TURBOCHARGER SYSTEM (CONT'D)

TROUBLE	PROBABLE CAUSE	CORRECTION
	f. Controller pressure sensing line blocked	f. Remove obstruction
	g. Compressor discharge duct loose or leaking	g. Eliminate any leaks
3. Manifold pressure surges at altitude	a. Controller malfunctioning	a. Replace
	b. Metering jet in actuator inlet blocked	b. Backflush with solvent, 50 psi
	c. Controller pressure sensing line blocked	c. Remove obstruction
	d. Compressor discharge duct loose or leaking	d. Eliminate any leaks
	e. Leak in exhaust system	e. Eliminate any leaks
4. Engine smokes at idle	a. T/C rotor jammed	a. Replace
	b. Seal ruptured in controller	b. Replace
	c. T/C bearing seals leaking	c. Replace
5. Oil leaking from actuator drain	a. Actuator piston seal ruptured	a. Replace
6. High manifold pressure at take-off	a. Controller out of calibration	a. Replace
	b. Controller malfunctioning	b. Replace
	c. Controller pressure sensing line broken	c. Replace
	d. Wastegate linkage not functioning	d. Adjust or replace
	e. Controller pressure sensing line blocked	e. Remove obstruction
7. Low manifold pressure at take-off	a. Controller out of Calibration	a. Replace
	b. Controller malfunctioning	b. Replace
	c. Controller pressure sensing line blocked	c. Remove obstruction
	d. Compressor discharge duct loose or leaking	d. Eliminate any leaks
	e. Metering jet in actuator inlet blocked	e. Backflush with solvent, 50 psi
	f. Leak in exhaust system	f. Eliminate any leaks

TROUBLE SHOOTING

TURBOCHARGER SYSTEM (CONT'D)

TROUBLE	PROBABLE CAUSE	CORRECTION
8. High fuel pressure at altitude	a. Leak in pressure reference line at fuel pressure line	a. Eliminate any leaks
	b. Pressure reference line blocked	b. Remove obstruction
9. Low fuel pressure at altitude	a. Leak in pressure reference line at fuel pump	a. Eliminate any leaks
	b. Pressure reference line blocked	b. Remove obstruction
	c. Auxiliary fuel pumps not on or inoperative	c. Repair or replace
10. Turbocharger overspeeding	a. Controller malfunctioning	a. Replace
	b. Wastegate out of rig	b. Adjust
	c. Compressor discharge duct loose or leaking	c. Eliminate any leaks
11. Excessive noise or vibration	a. Improper bearing lubrication	a. Clean or replace oil line; clean oil strainer, and supply oil pressure. IF trouble still persists, overhaul turbocharger
	b. Leaking engine intake or exhaust manifold.	b. Tighten connections or replace manifold gaskets as necessary
12. Engine will not deliver rated power	a. Clogged manifold system	a. Clear all ducting
	b. Foreign material lodged in compressor turbine or impeller	b. Disassemble and clean
	c. Excessive dirt build-up in compressor	c. Thoroughly clean compressor. Service air cleaner and check for leakage.
	d. Leak in engine intake or exhaust manifold	d. Tighten connections or replace manifold gaskets as necessary
	e. Rotating assembly bearing seizure	e. Overhaul turbocharger

ELECTRIC PROPELLER DEICING, GOODRICH

The electric propeller deicer system includes an on-off switch (on the LH instrument subpanel), an ammeter, a timer, a brush assembly, slip rings, and an electrically heated boot for each propeller blade. When the ON-OFF switch is turned ON, the ammeter (to the left of the switch) registers the amount of current (20-24 amperes, two-blade; 30-34 amperes, three-blade) passing through the system. If the current rises beyond the switch limit, an integral circuit breaker will cut off the power to the timer. The current flows from the timer (on the RH aft side of the firewall) to the brush assembly (mounted in front of the engine case) and is conducted by the brush assembly to the slip rings installed on the spinner backing plate. The slip rings distribute current to the deicer boots on the propeller blades. Heat from the boots reduces the grip of the ice, which is then removed by the centrifugal effect of propeller rotation and by the blast of the airstream. The timer cycles power to the two heating elements on each blade in the following sequence: outboard, inboard, outboard, inboard. The four phases make one complete cycle. Since each of the phases is 30 seconds in duration, the timer makes a complete cycle every two minutes. Whenever the timer switches to the next phase of operation, the ammeter on the LH subpanel registers a momentary deflection.

ELECTRIC PROPELLER DEICER BRUSH REPLACEMENT

a Check brush wear by inserting a piece of safety wire into the holes above the brush assembly block. If the wire will insert more than 15/32 inch it is time to replace the brushes (see Figure 3-17).

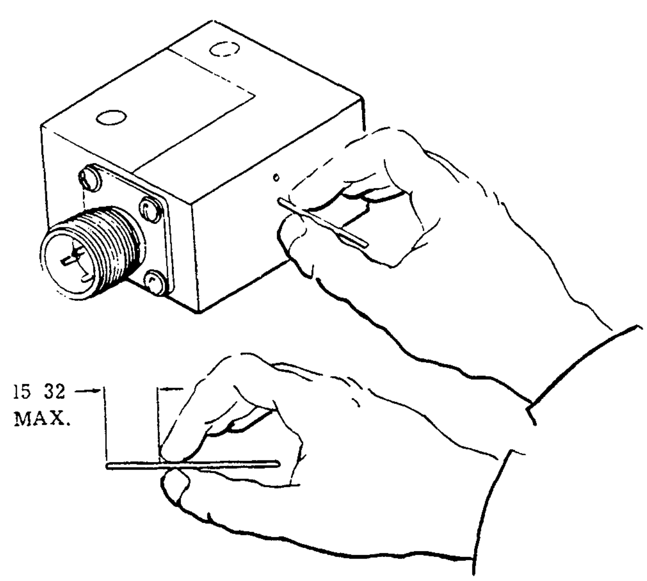


Figure 3-17. Determining Propeller Deicer Brush Wear

b. Disconnect the cannon plug and remove the brush assembly from the bracket (see Figure 3-18).

NOTE

To prevent breaking reusable brushes during and after removal, tape the brushes in place before moving the brush assembly.

c Remove the screws attaching the cannon plug to the brush holder, then disassemble the brush holder by pulling the guide block approximately 1/4 inch toward the cannon plug to disengage the pins.

d Remove the plug, brushes and springs from the brush holder, then slide the springs off the brushes.

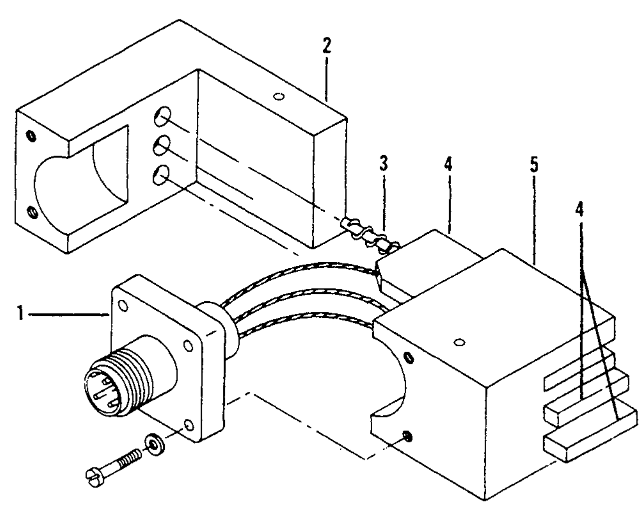
e Unsolder the wires for the brushes being replaced, noting which pin on the cannon plug they correspond to.

f. Solder the wire from the new brush to the appropriate pin on the plug, holding the "wicking" to 1/8 inch maximum.

g Set the springs in the holes of the larger block and insert the brush rods far enough to partially compress the springs. Taking care against applying a side load on the brushes and against pinching or damaging the brush leads, slip the smaller block over the brushes and onto the larger block.

NOTE

When replacing brushes or brush retainer assemblies, always install new springs.



1. Cannon Plug
2 Support Block
3. Brush Spring
4. Brush
5. Guide Block

Figure 3-18. Propeller Deicer Brush Assembly

h. Install the cannon plug on the brush block with the attaching screws and washers. Note that, to assure proper deicer operation, the guide pin of the plug must be toward the brush support block and the brush wires must not be crossed.

NOTE

Tape the brushes in the brush holder to prevent breakage during assembly and installation. Remove the tape after installation is completed.

i. Check how far the brushes protrude from the block. If the brushes protrude less than 7/16 inch, the brush leads should be untwisted to give more length. If the brushes protrude more than 9/16 inch, the leads should be twisted to shorten the effective length until the brushes protrude from 7/16 to 9/16 inch. The brushes should then be checked for free sliding action.

j. Place the brush block assembly on the mounting bracket and insert the mounting screws through both the block and the bracket.

k. Before installing the retainer nuts, make sure that the brushes are aligned with the slip rings so that each brush face contacts in its entirety with the copper ring it slides on. If the brushes do not align with the slip rings throughout the entire 360 degrees of slip ring rotation, install shims (P/N 1 E1157) between the brush holder and the mount until each brush is properly aligned with the approximate center of the copper ring it slides on.

l. Install the retaining washers and nuts, making certain that 1/16 plus or minus 1/32 inch is maintained between the brush block and slip ring surface. To prevent damage to the brushes, the brush block assembly should be angled in such a manner that the brushes contact the slip ring at an angle of approximately two degrees from the perpendicular, as measured toward the direction of slip ring rotation (see Figure 3-19).

m. Connect and safety the cannon plug.

n. To prevent arcing caused by the rough surfaces of the new brushes, the engine should be operated for at least five hours before the deicer system is turned on. This does not apply to ground checks of the system performed while the engine is not running.

ELECTRIC PROPELLER DEICER TIMER CHECK

Experience in the field has indicated that often the timer is considered defective when the source of the trouble lies elsewhere. For this reason, the following test should be performed before the timer is removed as defective:

a. With the wiring harness disconnected at the timer, and the deicer switch in the ON position, check the voltage from pin B of the harness plug to ground. If no voltage is present, the timer is NOT at fault, however, if system voltage is present at pin B, check the circuit from harness plug pin G to ground with an ohmmeter. If no circuit is indicated, the fault is in the ground lead rather than in the timer. If ground connection is open, the timer step switch will not change position.

b. After the ground and power circuits have been checked, connect a jumper wire from pin B of the timer receptacle to terminal B of the connector plug and from pin G of the timer receptacle to ground. With the deicing system switch ON, check the voltage to ground from pin B of the timer. The voltmeter should indicate approximately 14 volts when the aircraft battery supply is being used. Next check the dc voltage to ground from pins C, D, E, and F, the points at which the system voltage is impressed in sequence to cycle power to the propeller deicers. Each of the plugs should read 14 volts in the following sequence:

Timing Sequence	Time ON	Areas of Prop Deicers Heated
Pin C	30 sec.	Outboard halves of prop.
Pin D	30 sec.	Inboard halves of prop.
Pin E	30 sec.	Outboard halves of prop.
Pin F	30 sec.	Inboard halves of prop.

NOTE

The timer does not reposition itself to start at pin C when the system is turned off, but begins its cycling at the same position it held when last turned off. Cycling will then proceed, as before, in the order of C, D, E, and F.

After obtaining a voltage reading of 14 volts DC, hold the voltmeter probe on the pin until the voltage drops to zero before moving the probe on to the next pin in the sequence noted above. After establishing the correctness of the cycling sequence, to facilitate performance of the following test, turn the deicing system switch OFF at the beginning of one of the "on-time" periods and record the letter of the pin at which the voltage supply is present.

HEAT TEST

Before this test can be performed, the jumper wire installed for the timer test must be removed so that the connector plug can be replaced in the timer receptacle. Two men are required to perform this test: one in the cockpit to monitor the ammeter; the other outside by the prop to check the deicer boots. The man in the cockpit turns the deicer system ON while the man outside feels the deicer boots to see if they are heating properly. The man in the cockpit observes the ammeter for the proper readings (20-24 amperes, two-blade, 30-34 amperes, three-blade) throughout the timing sequence. The ammeter needle should deflect every 30 seconds in response to the switching action of the timer. Each time this occurs, the man in the cockpit must notify the man inspecting the propeller deicer boots so that the latter can change the position of his hands to check the proper heating sequence of the propeller deicer areas. If any irregularities are detected, a continuity check should be performed on the

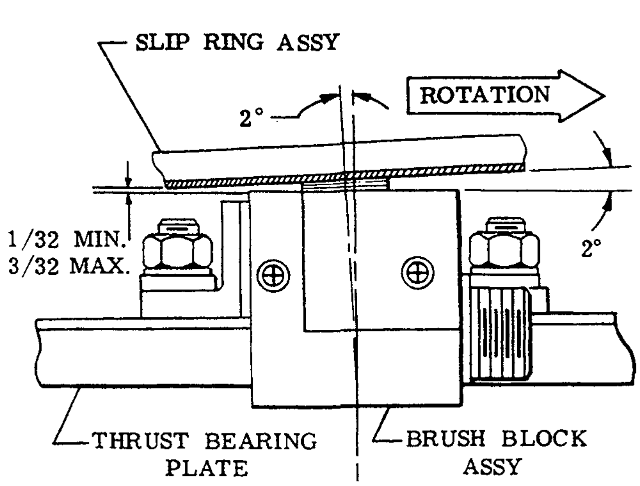


Figure 3-19. Propeller Deicer Brush Block Installation

wiring from the timer to the brush block holder and the propeller deicer terminal connections.

CONTINUITY TEST

After removing the plug from the timer, use an ohmmeter to check continuity from:

a. Pin C of the plug to the outboard terminal of one prop boot.
b Pin D of the plug to the inboard terminal of one prop boot.
c Pin E of the plug to the outboard terminal of one prop boot.
d. Pin F of the plug to the inboard terminal of one prop boot.
e. Pin G of the plug to ground.
f Ground terminal of one prop boot to ground.

DEICER RESISTANCE CHECK

To check for incorrect resistance or the presence of a short or open circuit at the brush-to-slip ring contact, disconnect the harness at the timer and, using a low range ohmmeter, check the resistance from each deicer circuit lead (pins C, D, E, and F of the harness plug) to ground. If the resultant readings are not 0 48 to 0.58 ohm (two-bladed propeller) or 0.31 to 0.39 ohm (three-bladed propeller), disconnect the deicer lead straps to measure heater resistance individually Individual boot resistance should measure between 0 95 and 1.15 ohms If the readings in the first check are not within the accepted limits but those in the second check are, the trouble is probably in the brush-to-slip ring area. If the readings in the second check are also off, the deicer concerned is damaged and must be replaced.

BRUSH BLOCK RESISTANCE CHECK

To check for an open circuit, a short, or high resistance in the brush block, measure the resistance from the face of the brush to its terminal studs or receptacle pin with a low range ohmmeter. If this resistance measures over 0.013 ohm, locate and repair the cause of high resistance. If the resistance measure zero, locate and correct the open circuit or ground, or else replace the brush. Check the resistance between the three terminal studs or receptacle pins. This resistance should not be less than 0.5 meg-ohm.

SLIP RING ALIGNMENT

The slip rings are properly aligned when they run in a true plane relative to the brush block. This condition may be checked by attaching a dial indicator gage to the engine reduction gear housing in such a manner that a reading of the slip ring wobble may be obtained. To avoid error in readings, rotate the slip rings slowly while pushing in on the propeller to take the play out of the thrust bearings. If the total runout over 360 degrees or rotation exceeds 0.005 inch, or if over any 4-inch arc it exceeds 0.002 inch, the slip rings should be aligned as follows:

a. Approximately a 0.012 inch adjustment may be made to correct the slip ring wobble by varying the torque on the attachment bolts. Using the dial indicator to follow the points of maximum deviation, adjust the slip ring assembly to the prescribed runout limits by varying the torque of the mounting bolts as required, within a range of 25 to 65 inch-pounds.
b. If more than 0.012 inch of adjustment is required for alignment, the slip ring assembly may be shimmed to within the prescribed limits for true running by the addition of AN960C416L washers on the mounting bolts between the slip ring assembly and the spinner bulkhead.

NOTE

The above adjustments may affect the clearance between the brush block and slip rings, consequently, after slip ring alignment, a check should be made to ascertain that a distance of from 1/32 to 3/32 inch is maintained between the brush block and slip ring surface (see Figure 3-19).

c. Structurally sound slip rings with roughened or damaged surfaces can be machined to restore them to serviceability. Remove the slip ring assembly from the aircraft and mount it in a lathe, located concentrically in the lathe and with not over 0.002 wobble or run-out over 360 degree rotation. Take a light cut for smooth finish and cut no deeper than required to remove surface damage. Contact surfaces of the three slip rings must be parallel within 0.005 inch and flat within 0.005 inch overall-deviation from flat not to exceed 0.002 inch over a 4 inch arc. If necessary, undercut insulation between slip rings to a depth of 0.020 to 0.030 inches below the contact surface of the slip rings. In this operation, width of slip ring must not be reduced more than 0.005 inch. Contact surface of slip rings must have a finish of 29 to 30 micro inches

Deburr slip ring edges, install in aircraft and perform alignment check.

TROUBLESHOOTING PROPELLER ELECTRICAL DEICER SYSTEM

The ammeter of the deicer system can be used to indicate the general nature of most electrical problems. Consequently, it is recommended that, to determine which circuits are involved, troubleshooting be preceded by the ammeter test outlined in step 1 of the 50-hour inspection and the heat test described in this Section. A reading of two-thirds the normal amount of current (or of one-half on two-blade props) is an indication that one of the circuits is open between the slip ring assembly and deicer heater. If the ammeter registers excess current, the power lead is shorted to ground. It is possible that the excess current has welded the timer contacts in one phase. Under these circumstances, the timer will either feed current to the welded contacts continuously or not cycle. If the former is true, the heat test will show two phases heating simultaneously throughout three of the four phases. Unless the grounded power lead is located and corrected, any new timer that is installed may suffer the same internal damage during the first use of the system. In general, for most effective use of the troubleshooting chart, all of the "indication" entries should be read to locate that which matches conditions of the particular system being checked. The numbered "probable cause" and "remarks" then indicate the proper sequence of checks. It should be noted, however, that such numbers are assigned with respect to the approximate usefulness of the check rather than to the most likely sequence of occurrence.

TROUBLESHOOTING

PROPELLER DEICER SYSTEM

TROUBLE	PROBABLE CAUSE	REMARKS
1. Ammeter shows zero current. (All 4 phases of the 2 minute cycle.)	a. Switch circuit breaker tripped.	a. Locate and correct short before resetting circuit breaker by turning switch OFF, then ON.
	b. Switch faulty.	b. If no voltage at switch output with voltage at switch input, replace the switch. If voltage is OK at switch output, go to step d.
	c. No power from aircraft.	c If no voltage into switch, locate and correct open circuit.
	d. Ammeter faulty. (If some or all Deicers heat with ammeter at zero, replace ammeter.)	d Test for voltage up to and out of ammeter. If low or zero output but proper input, replace ammeter. If no voltage to ammeter, locate and fix open between switch and ammeter.
	e. Open circuit between ammeter and timer.	e Disconnect harness at timer and check voltage pin B (of harness) to ground. If none, locate and correct open circuit.
2. Ammeter shows normal current part of cycle, zero current rest of cycle.	a. Open in wiring between timer and firewall connector.	a. Refer to the paragraph on heat test to find Deicers not heating and test for voltage on that pin of firewall connector. If zero over 2 minutes, locate and fix open in wiring from timer to firewall.
	b. Open between firewall and Deicer lead straps.	b. If voltage OK to firewall plug, try voltage at junction of Deicer lead and slip ring lead. If no voltage, find and correct open in wiring to brush block, open within brush block, or no contact brush to slip ring.
	c. No ground circuit, one engine.	c. If voltage at Deicer leads, locate and fix open from Deicer to ground.
3. Ammeter shows normal current part of cycle, low current rest of cycle.	a. Inner and outer Deicers heating same phase.	a. Locate and repair incorrect connections.
	b. Open in Deicer or slip ring assembly	b Disconnect Deicer straps to check heater resistance. If resistance is within specified limits, locate and fix open in slip ring leads. If not, replace Deicer with open circuit.
	c High resistance in circuit with low current	c If not in contact of brush to slip ring (including ground brush), trace wiring to Deicer and to timer to fix partially broken wire, loose or corroded connection.

TROUBLESHOOTING

PROPELLER DEICER SYSTEM (Cont'd)

TROUBLE	PROBABLE CAUSE	REMARKS
4. Ammeter shows low current over entire cycle.	a Aircraft voltage low.	a. Check voltage into switch.
	b. Ammeter faulty.	b. Refer to step 1-d.
	c High resistance up to timer.	c. Check for partially broken wire, loose or corroded connection in wiring from aircraft supply to timer input.
5. Ammeter shows excess current over entire cycle.	a. Ammeter faulty.	a. Refer to step 1-d.
	b Ground between ammeter and timer.	b. Disconnect harness at timer and, with ohmmeter, check from pin B (of harness) to ground. If ground is indicated, locate and correct.
6. Ammeter shows normal current part of cycle, excess current rest of cycle.	a. Ground between brush block and timer.	a. Disconnect leads at brush block and check from power leads to ground with ohmmeter. If ground is indicated, locate and correct.
	b. Ground between brush block and Deicers. (Excluding ground brush circuit.)	b. If no short exists at brush-slip ring contact, check for ground from slip ring lead to bare prop while flexing slip ring and Deicer leads. If a ground is indicated, locate and correct.
	c Short between two adjacent circuits.	c. Check for shorts or low resistance between circuits; if any, locate and correct.
	d. Timer faulty.	d. Test timer as indicated in paragraph on timer check.
7. Ammeter does not "flick" each 30 seconds.	a. Timer ground open.	a. Disconnect harness at timer and check with ohmmeter from pin G (of harness) to ground. If no circuit, refer to wiring diagram in Section VI to fix open circuit.
	b. Timer contacts are welded (caused by short circuit in system.)	b. Test timer as in paragraph on timer check. If timer does not cycle with voltage at pin B, replace timer but be sure short causing original failure has been located and corrected.
8. Ammeter flicks between 30 second phase periods (confirm by ground test as in step 12 of 100 hour inspection.	a. Loose connection between aircraft power supply and timer input.	a. If trouble occurs over entire cycle, trace wiring from power source to timer input to locate and tighten loose connection.

TROUBLE	PROBABLE CAUSE	REMARKS
	b. Loose or poor connection timer to Deicers.	b. If trouble occurs in part of cycle, find which Deicers are affected and check for rough or dirty slip rings causing brush to "skip". If not this, trace circuits to locate and fix loose or poor connection. (If all Deicers on one prop are affected, check the ground circuit.)
	c Timer cycles erratically.	c. Test timer as indicated in paragraph on timer check.
9 Radio noise or interference with Deicers on	a Brushes "arcing".	a. Check brush alignment as in step 9 of 100 hour inspection. Look for rough or dirty slip rings. If this is the cause, clean, machine or replace slip ring assembly. Check for slip ring alignment.
	b. Loose connection.	b. Refer to step 8 above.
	c. Switch faulty.	c Try jumper wire across switch. If radio noise disappears, replace the switch.
	d. Wiring located within less than 8 inches of radio equipment wiring.	d. Replace at least 8 inches from input wiring to radio equipment.
10. Cycling sequence not correct	a. Crossed connections.	a. Check system wiring against circuit diagram for improper connections.
11. Rapid brush wear or frequent breakage	a. Brush block out of alignment.	a. Check brush alignment as in step 9 of 100 hour inspection.
	b. Slip ring wobbles.	b. Check slip ring alignment with dial indicator.

SECTION 4

Major Disassembly

SECTION 4
RECORD OF TEMPORARY REVISIONS

REVISION NUMBER	DATE INSERTED	DATE REMOVED	REASON REMOVED	PAGE NUMBER
4-1	Dec 11/92	Nov 15/93	Temporary Revision 4-2	4-6
4-2	Nov 15/93			4-6

NOTE: Insert this Record of Temporary Revisions after the Section 4 divider tab.

SECTION IV

MAJOR DISASSEMBLY

This section stresses special points on removing and installing major assemblies of the Bonanza.

Step-by-step procedures are given only where it is considered necessary because the process is complex - such as the removing and installing of the wing and the installing of the wing panel leading edge.

WINGS

Airplane serials D-1 thru D-1500 were constructed with tubular steel front and rear spars. With the introduction of airplane serials D-1501 and after, the front and rear spars in the fuselage were changed from a tubular construction to a sheet metal assembly. The position of the bolts and nuts were reversed; thus, moving the wing attach nuts from the fuselage fittings to the wing fittings. A number of the original 1500 Bonanzas were modified with BEECHCRAFT KIT NO. 35-694S (no longer available). This kit incorporated the sheet metal front spar into the early fuselage structure. The illustrations in this section denote the various wing attach components and the proper orientation for each configuration.

REMOVING THE WING

a. Drain the fuel cells.
b. Remove the front seats.
c. Remove the carpet and cover from the rear spar carry-through structure.
d. Remove the wing mounting bolt access plates from the top and bottom of the wing.
e. Place the airplane on a three point jack and raise until the wheels are clear (see Section 2 for jacking instructions).
f. Open the brake cylinder bleed ports and pump all fluid from the system. Disconnect the hydraulic lines at the wing root. Cap all open lines to prevent contamination.
g. Operate the landing gear switch until the inboard landing gear doors are fully open.
h. Disconnect the inboard door actuator rod at the door.
i. Disconnect the landing gear uplock cable housing at the inboard connection in the fuselage. Disconnect the cable at the inboard gear door idler arm.
j. Disconnect the landing gear actuator rod from the V-brace in the wheel well.
k. Disconnect the fuel lines. The left tank lines can be disconnected between the left wing root and the fuselage. The right tank lines can be disconnected between the right wing root and the fuselage.
l. Disconnect the pitot line at the left wing root in the wheel well.
m. Disconnect the electrical wiring in the wheel well terminal blocks.
n. Disconnect the aileron cables at the quadrant under the rear seat.
o. Disconnect the flap drive shaft from the motor.
p. Place a stand under each wing and under the aft portion of the fuselage.
q. Using a grease pencil, outline the position of the wing on the fuselage.

CAUTION

There should be no bolt binding during removal. Should binding occur, adjust the wing position until the bolt disengages freely. Do not screw or drive a bolt in or out of the fittings.

WARNING

The bushing installed in the upper forward wing spar fitting (D-9344 thru D-9414 except D-9379) and in the lower forward wing spar fitting (airplanes prior to 1501 with BEECHCRAFT Kit No. 35-694S installed and D-9344 thru D-10119 except D-10097) should not be removed and must be in place prior to installation of the wing bolts.

r. Remove the wing attach bolts, washers and nuts from the fittings.

NOTE

Discard the soft aluminum washers used between the upper wing attach fittings. Install new washers when installing the wing.

s. Remove the wing by pulling it straight away from the fuselage.

REMOVAL OF LEADING EDGE AND MAIN SPAR

The wing must be removed from the airplane before the leading edge or main spar can be removed. Remove the screws at the wing tip, station 66 and wing butt. Pull the hinge pins which attach the leading edge. On airplanes prior to D-4866 disconnect the pitot mast and rubber tube from the left wing before removing the leading edge.

To remove the main spar remove the landing gear.

NOTE

Support the landing gear to avoid damaging the aft spar gear connection or remove the gear at both connections.

INSTALLATION OF LEADING EDGE AND MAIN SPAR

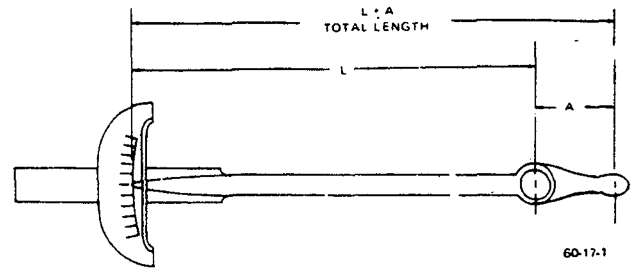
NOTE

When installing the wing leading edge to the spar and/or the spar to the box section, inspect the hinge halves to insure that no metal chips or other foreign objects can affect proper mating of the segments or block the segment holes.

The hinge pins may be driven with a rivet gun by supporting the hinge pin in telescoping tube, repair kit 35-588. Make sure the hinge halves are mated before attempting to drive the hinge pin. Grind the end of the pin to a point before starting it in the hinge. A second rivet gun or mallet may be used to tap along the upper or lower edge of the main spar to help the pin through the hinge. Use a wooden block as a pad to prevent damage to the spar.

When a torque wrench and adapter is used, compensation must be made for the extra leverage gained. New indicator readings must be calculated before the wrench is used. To figure the desired lower readings which will actually give the torques specified, use the following formula:

$$\frac{\text{Original wrench length x specified torque}}{\text{length of wrench + adapter}} = \text{Desired reading}$$

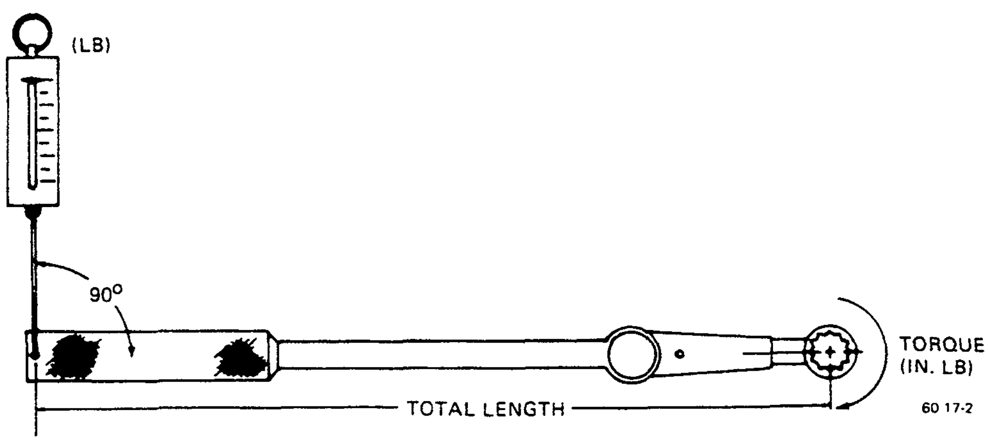


Example: D = Desired reading
L = Length of torque wrench
A = Adapter length
T = Torque

D = ?
L = 33 inches
A = 11 inches
T = 5,000 inch-pounds

$$\frac{33 \text{ x } 5{,}000}{33 + 11} = \frac{165{,}000}{44} = 3{,}750 \text{ inch-pounds}$$

Figure 4-1. Torque Wrench Adapter



An acceptable method of checking the torque, if a torque wrench is not available, is to attach a spring scale to a conventional flex or "T" handle inserted in an adapter. Force should be applied in a direction perpendicular to an imaginary line extending from the center of the bolt through the spring scale attaching point.

To calculate the force in pounds (scale reading) required to obtain the specific torque, divide the torque in inch-pounds by the distance in inches between the center of the bolt and the scale attaching point. For example, if the specified torque is 5,000 inch-pounds and the distance is 25 inches, a pull of 200 pounds must be applied. Unless torque values are specified as wet (lubricated), bolts to be torqued must be clean and free of all lubricants; otherwise loss of normal friction allowed for establishing the torque values may result in overtorquing of the bolt.

When a torque wrench adapter is used, the length of the adapter must be added to the length of the flex or "T" handle wrench and a value calculated for that particular combination. The following is a typical example in finding a desired value.

Effective length of flex or "T" handle wrench .... 12 inches
Length of adapter .... 3 inches
Total length .... 15 inches
Desired torque on bolt .... 2,000 inch-pounds

$$\frac{2{,}000 \text{ inch-pounds}}{15 \text{ inches}} = 133.3 \text{ pounds (scale reading)}$$

Figure 4-1A. Computing Torque with Spring Scale

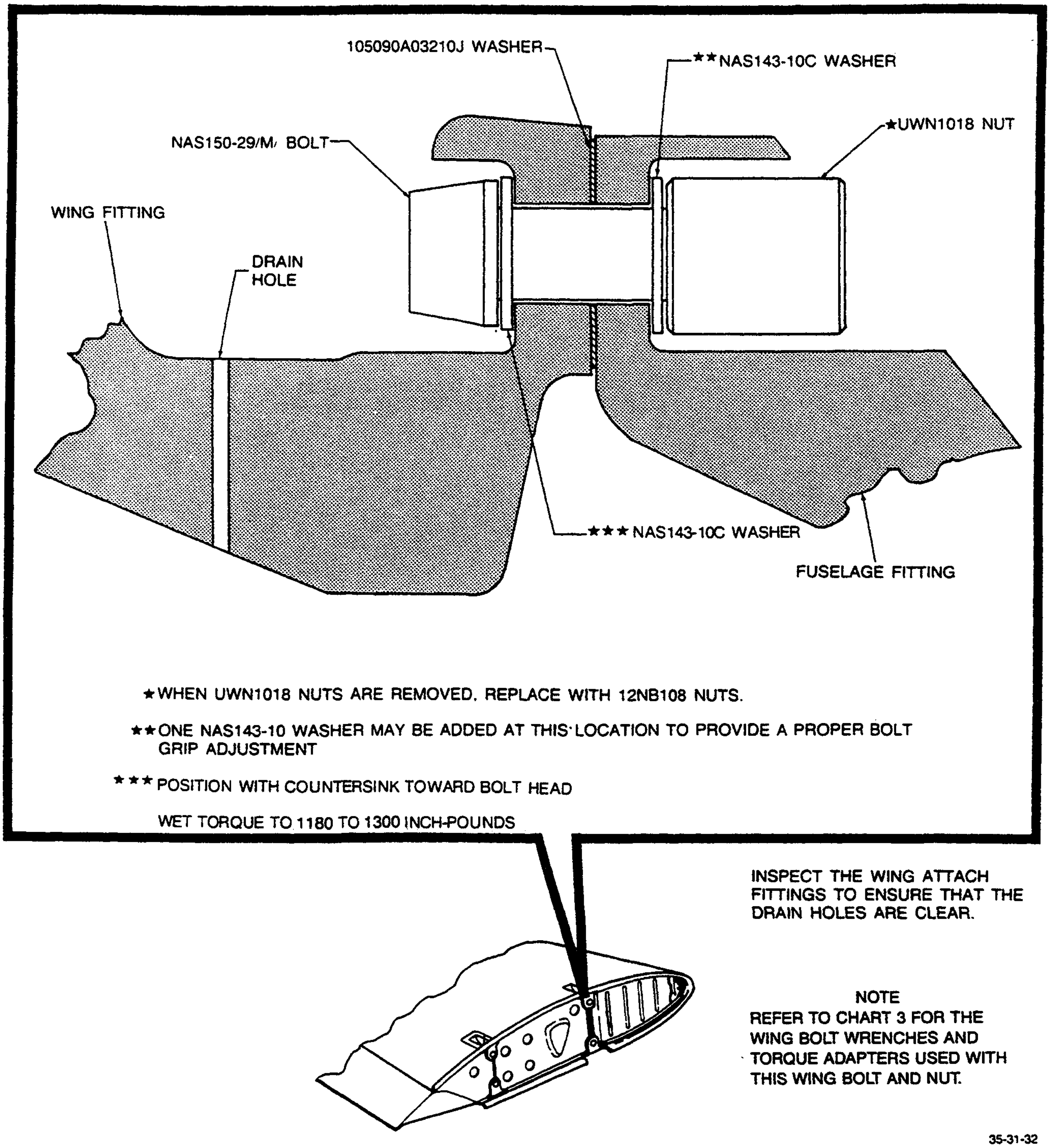
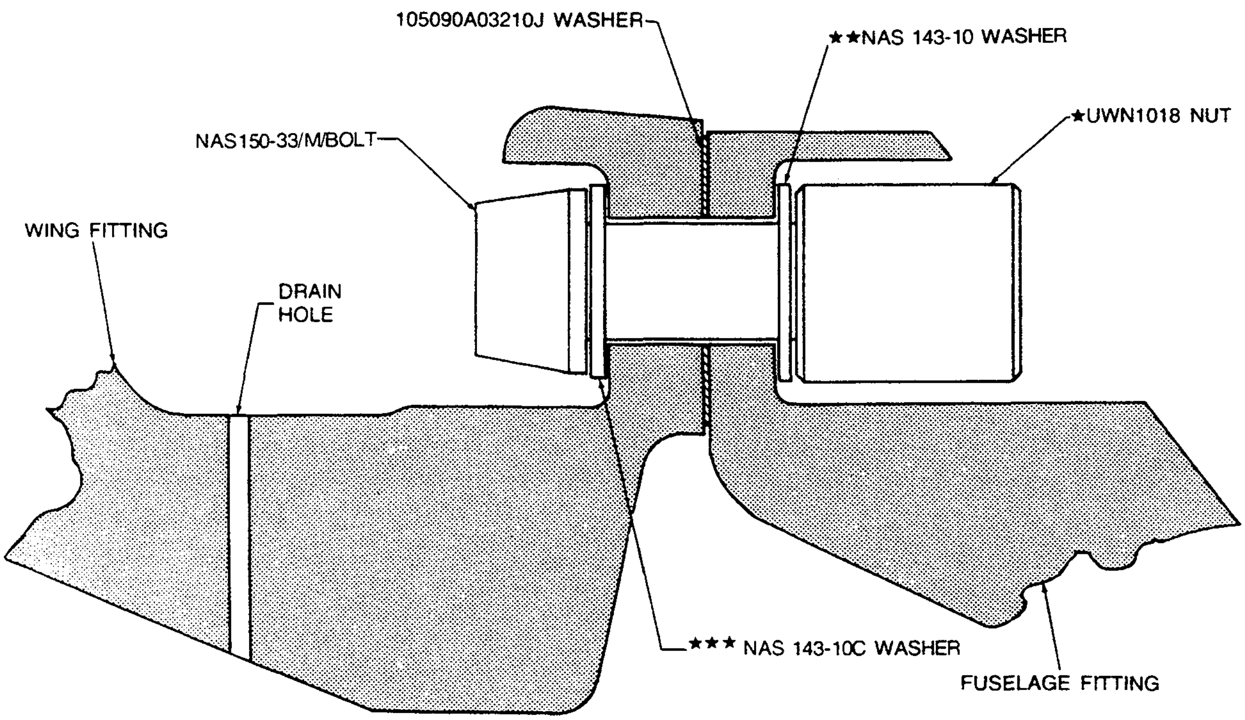


Figure 4-1B. Upper Forward Wing Bolt Installation (D-1 thru D-1500 Except Airplanes with BEECHCRAFT Kit No. 35-694S Installed)



★WHEN UWN1018 NUTS ARE REMOVED, REPLACE WITH 12NB108 NUTS

★★ONE NAS143-10C WASHER MAY BE ADDED AT THIS LOCATION TO PROVIDE A PROPER BOLT GRIP ADJUSTMENT

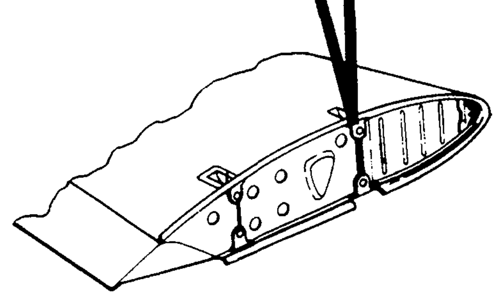
★★★POSITION WITH COUNTERSINK TOWARD BOLT HEAD

WET TORQUE TO 1180 TO 1300 INCH-POUNDS

35-31-40

NOTE

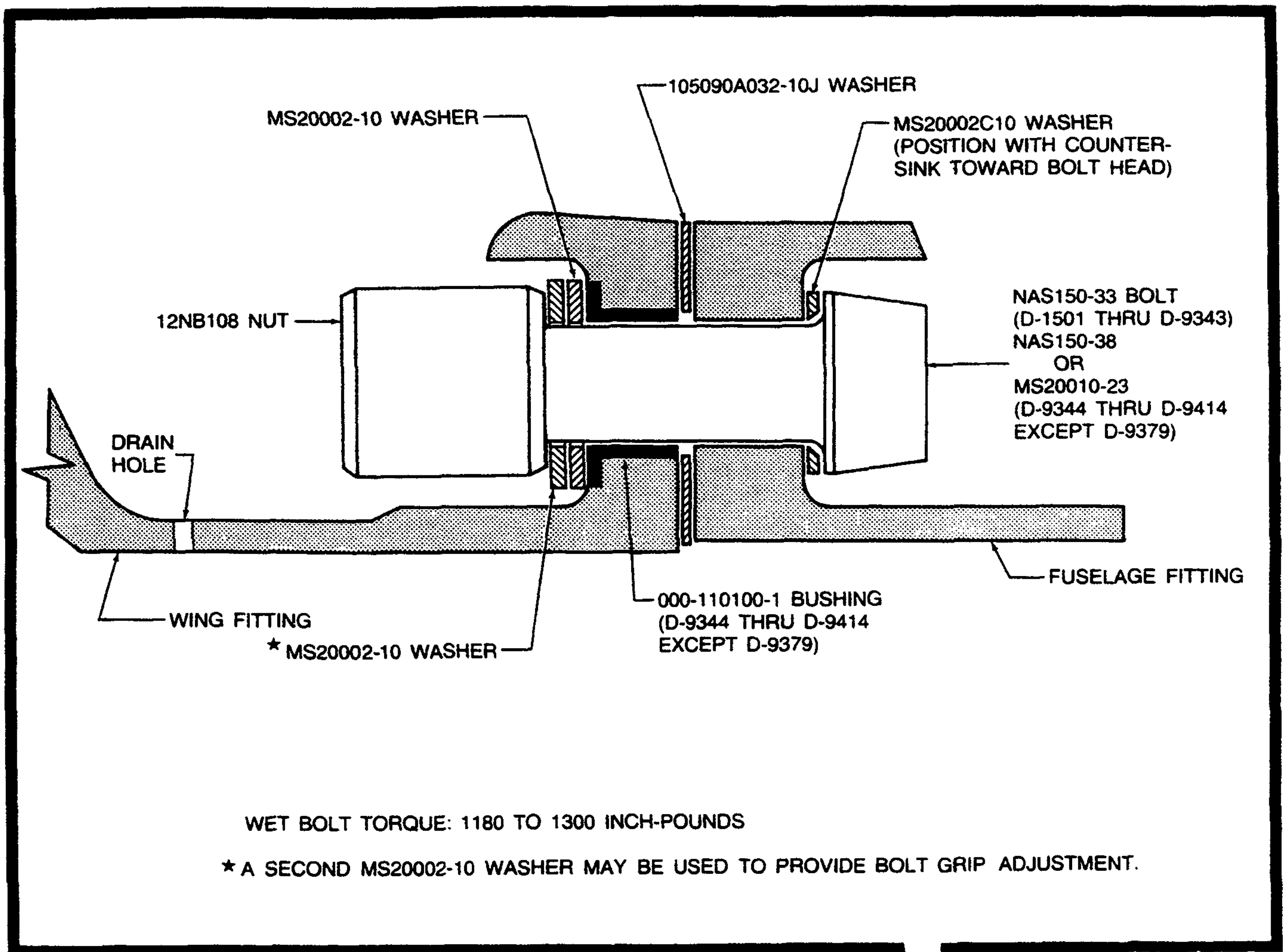
Concurrent with the scheduled torque check, inspect the upper wing attach fittings to assure that the drain holes are clear.



NOTE

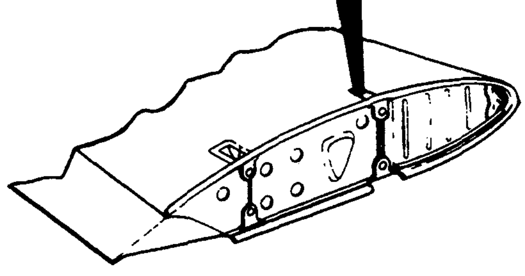
REFER TO CHART 3 FOR THE WING BOLT WRENCHES AND TORQUE ADAPTERS USED WITH THIS WING BOLT AND NUT

Figure 4-1C. Upper Forward Wing Bolt Installation (D-1 thru D-1500 with BEECHCRAFT Kit No. 35-694S Installed)



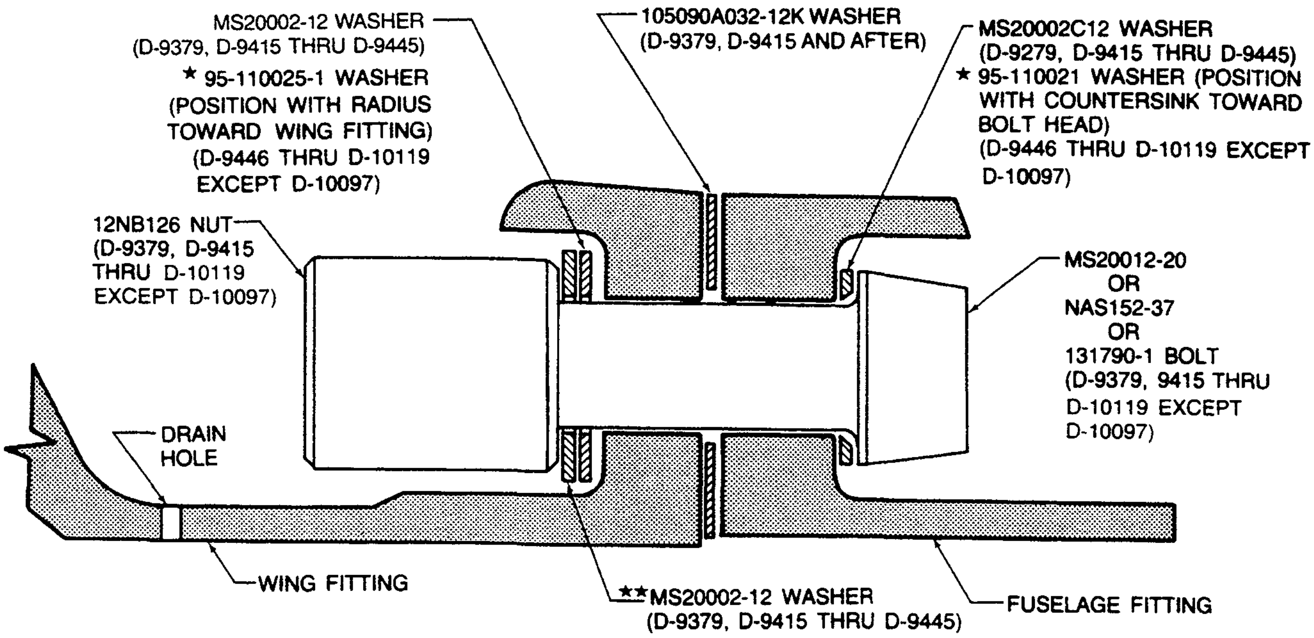
NOTE
INSPECT THE UPPER WING ATTACH FITTING TO ENSURE THAT THE DRAIN HOLES ARE CLEAR.

NOTE
REFER TO CHART 3 FOR THE WING BOLT WRENCHES AND TORQUE ADAPTERS USED WITH THIS WING BOLT AND NUT.



35-31-26

Figure 4-1D. Upper Forward Wing Bolt Installation (D-1501 thru D-9414 Except D-9379)

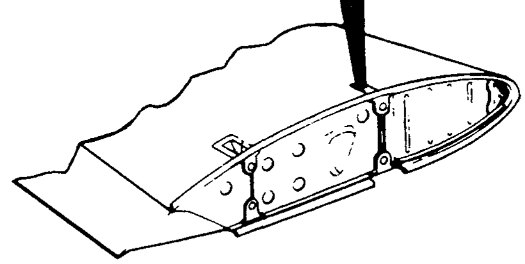


WET BOLT TORQUE 2480 TO 2600 INCH-POUNDS

* CHECK FOR A SMOOTH COMPLETE RADIUS.

** AN MS20002-12 WASHER MAY BE USED BETWEEN THE NUT AND THE MS20002-12 OR 95-110025-1 WASHER AS REQUIRED TO PROVIDE BOLT GRIP ADJUSTMENT

NOTE
INSPECT THE UPPER WING ATTACH FITTING TO ENSURE THAT THE DRAIN HOLES ARE CLEAR



35-31-42

Figure 4-1E. Upper Forward Wing Bolt Installation (D-9379, D-9415 and after)

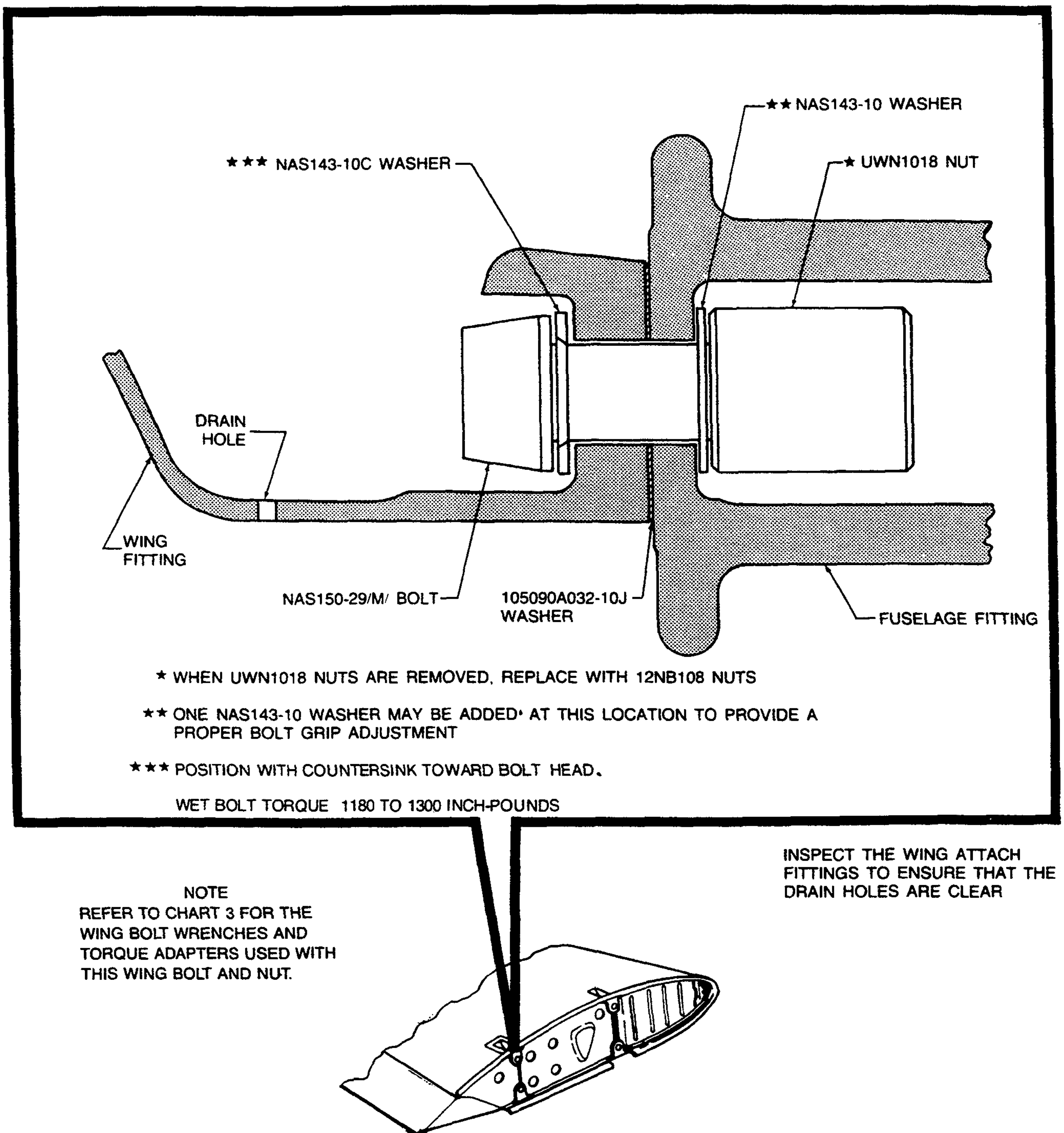


Figure 4-1F. Upper Rear Wing Bolt Installation (D-1 thru D-1500)

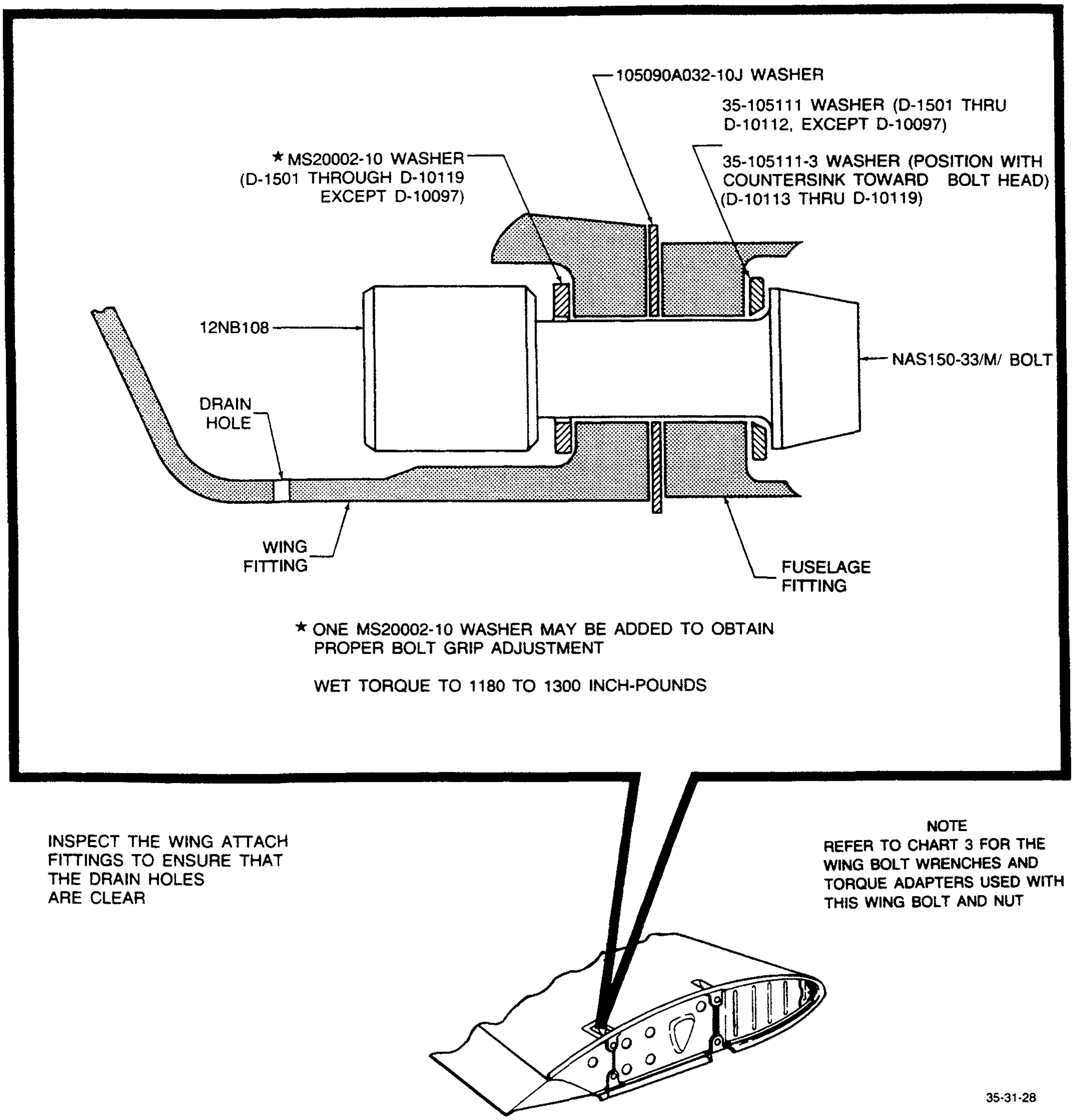
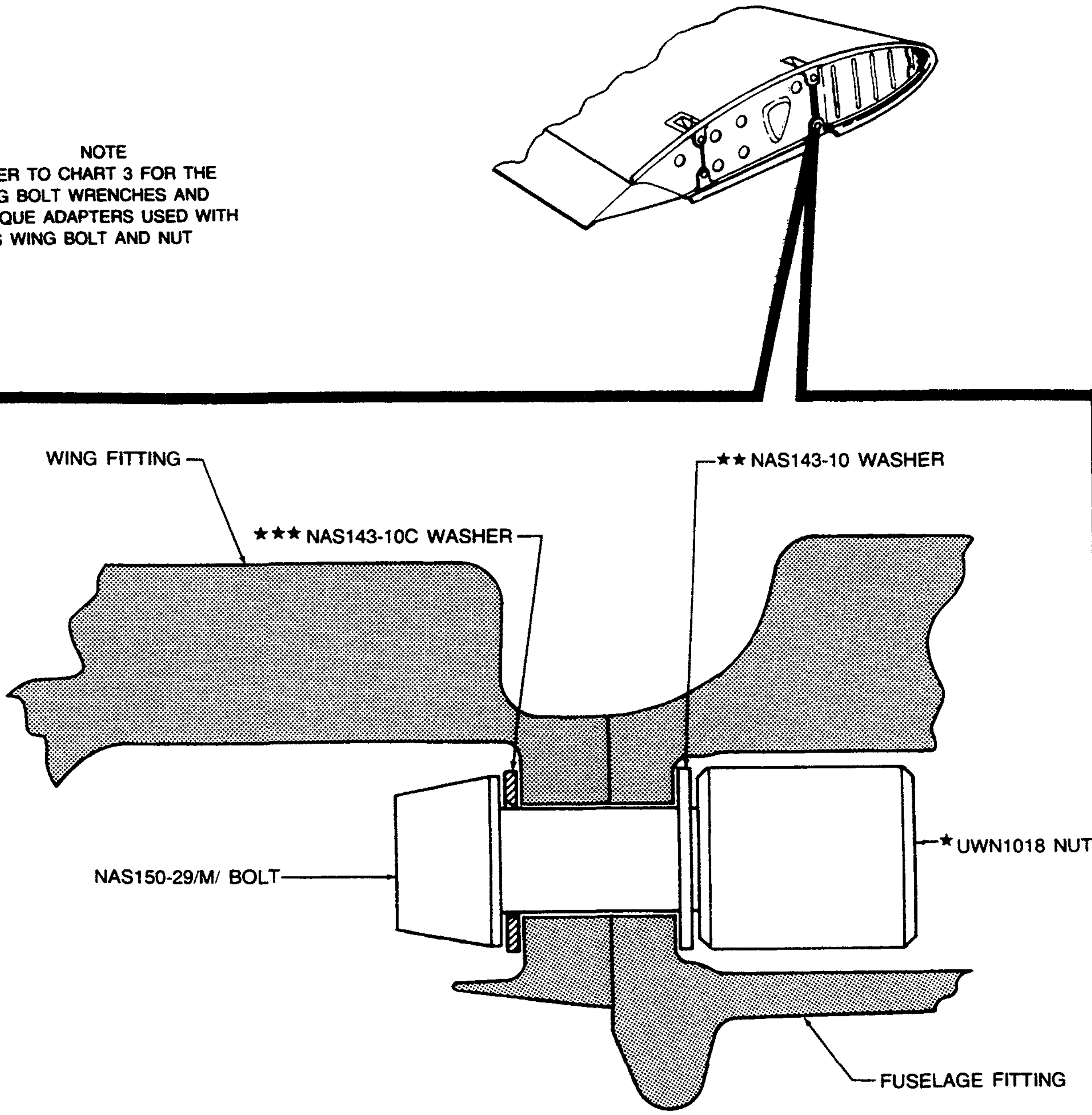


Figure 4-1G. Upper Rear Wing Bolt Installation (D-1501 and after)

NOTE
REFER TO CHART 3 FOR THE WING BOLT WRENCHES AND TORQUE ADAPTERS USED WITH THIS WING BOLT AND NUT



★ WHEN UWN1018 NUTS ARE REMOVED, REPLACE WITH 12NB108 NUTS.

★★ ONE MS20002-10 WASHER MAY BE ADDED AT THIS LOCATION TO PROVIDE A PROPER BOLT GRIP ADJUSTMENT.

★★★ POSITION WITH COUNTERSINK TOWARD BOLT HEAD.

WET BOLT TORQUE: 1180 TO 1300 INCH-POUNDS.

35-31-29

Figure 4-1H. Lower Forward Wing Bolt Installation (D-1 thru D-1500 Except Model 35R and Airplanes with BEECHCRAFT Kit No. 35-694S Installed)

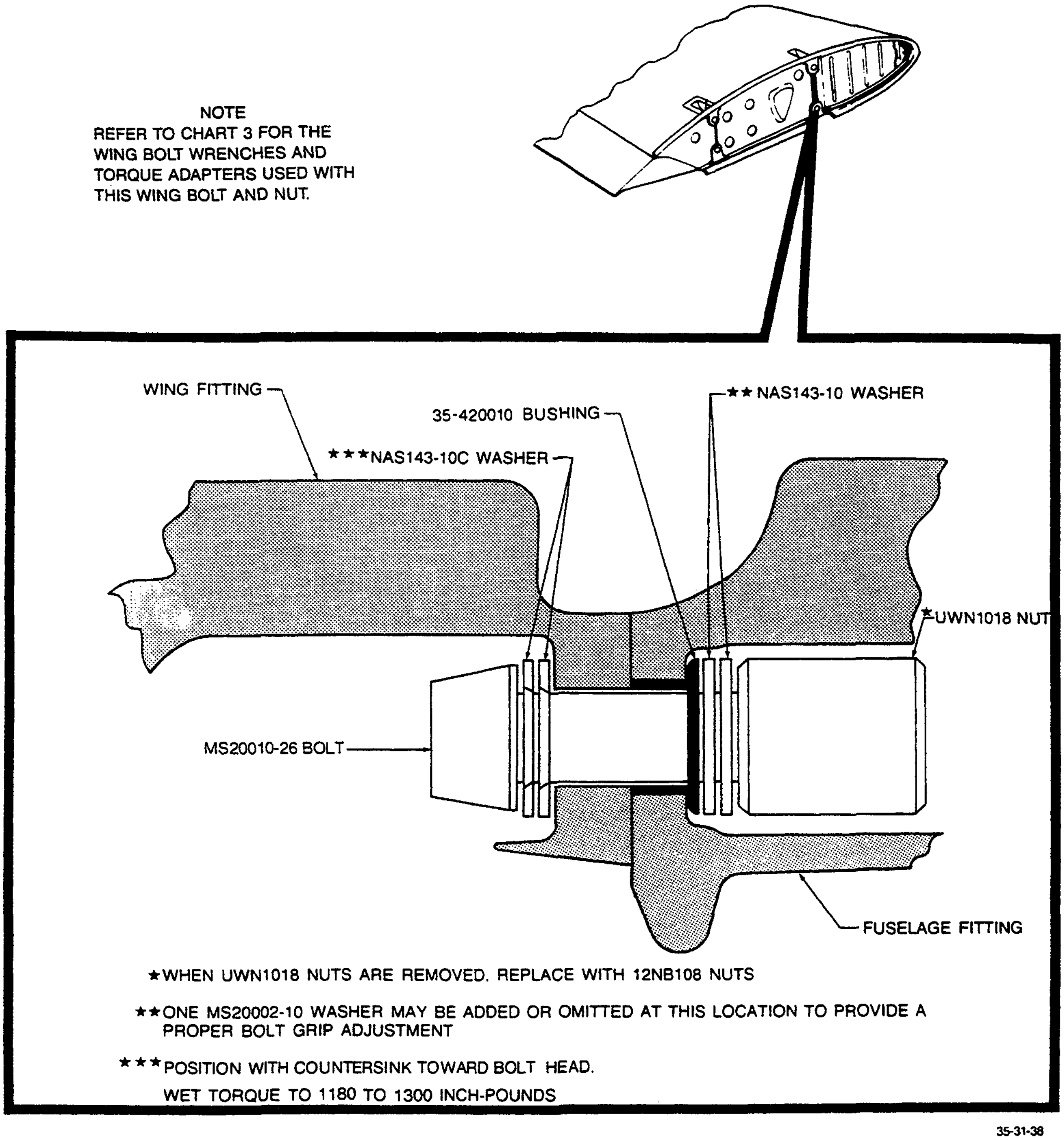


Figure 4-1I. Lower Forward Wing Bolt Installation (D-1 thru D-1500 with BEECHCRAFT Kit No. 35-694S Installed Except Model 35R)

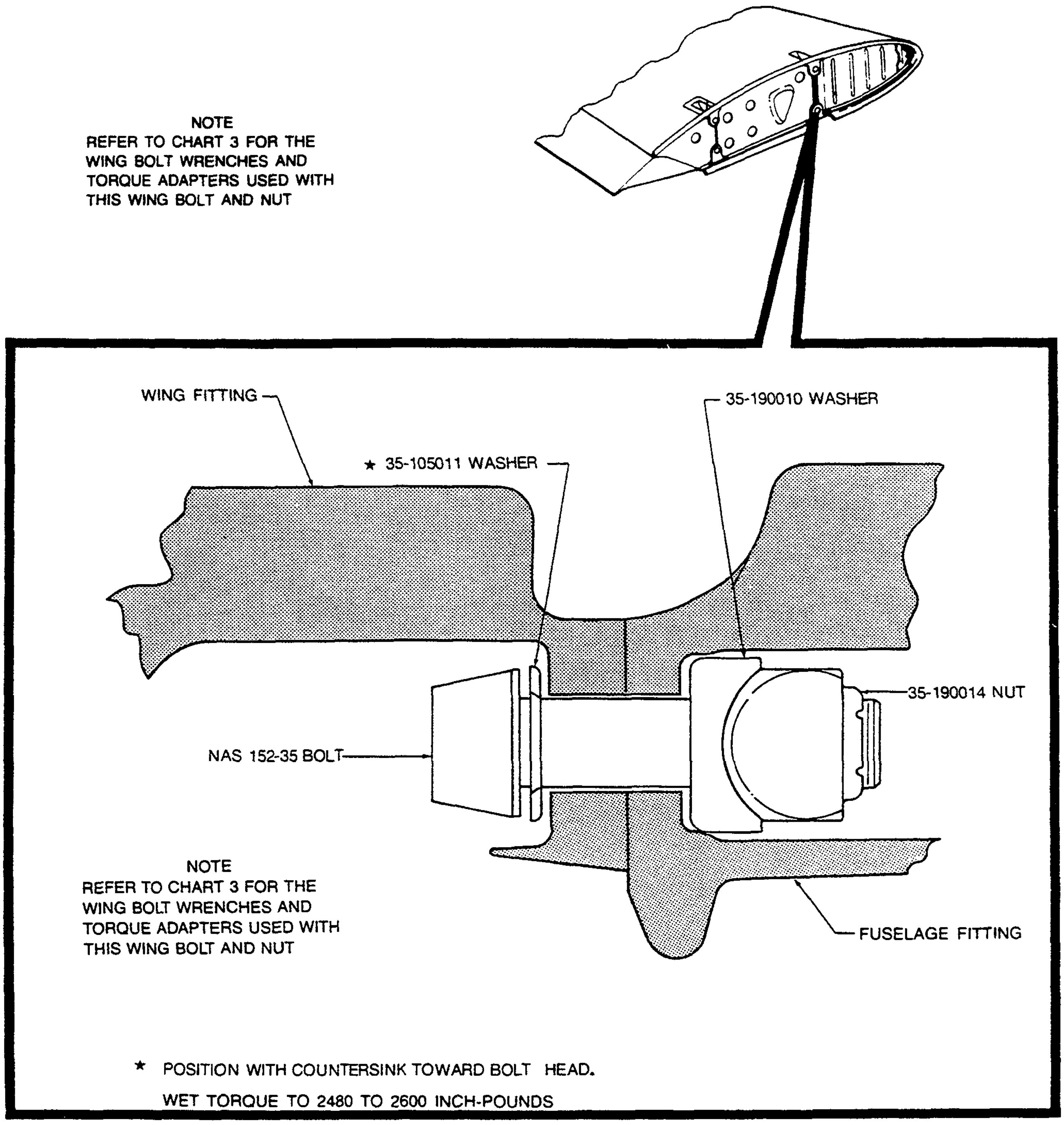


Figure 4-1J. Lower Forward Wing Bolt Installation (Model 35R; D-3, D-25, D-92, D-122, D-329, D-418, D-532, D-535, D-588, D-721, D-838, D-944, D-1186 and D-1424 Except Airplanes with BEECHCRAFT Kit No. 35-694S Installed)

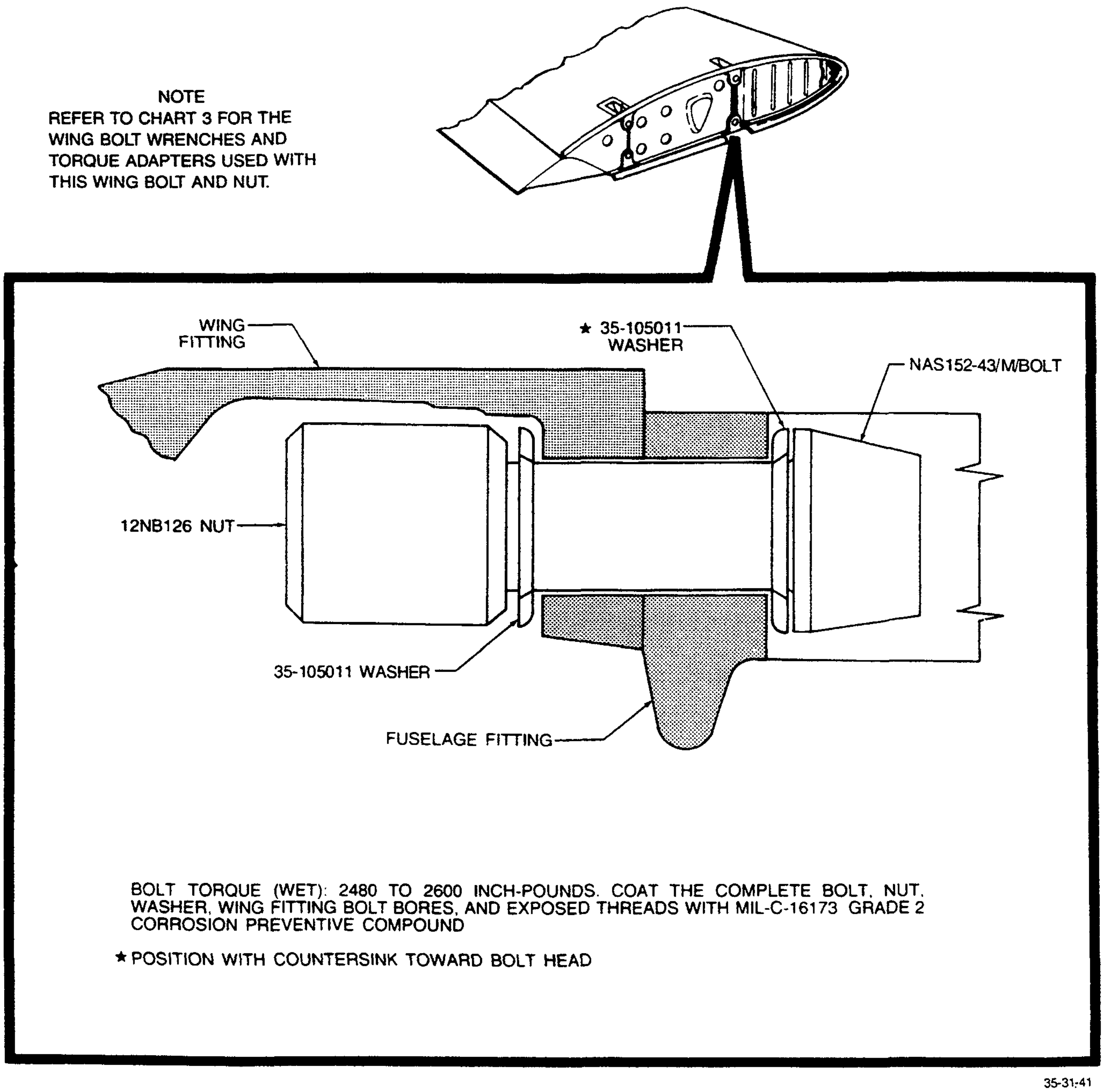


Figure 4-1K. Lower Forward Wing Bolt Installation (Model 35R with BEECHCRAFT Kit No. 35-694S Installed)

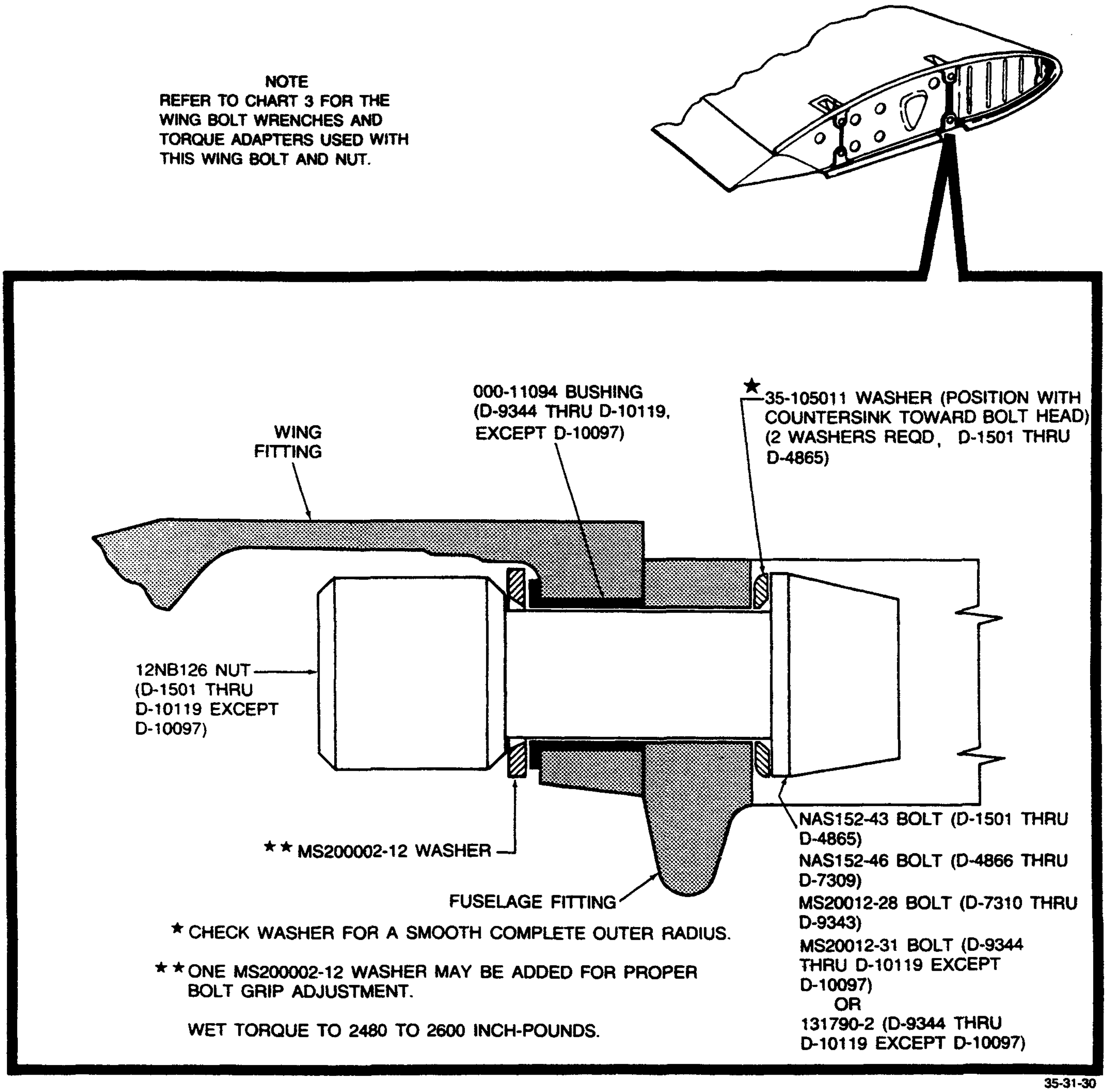


Figure 4-1L. Lower Forward Wing Bolt Installation (D-1501 thru D-10119 Except D-10097)

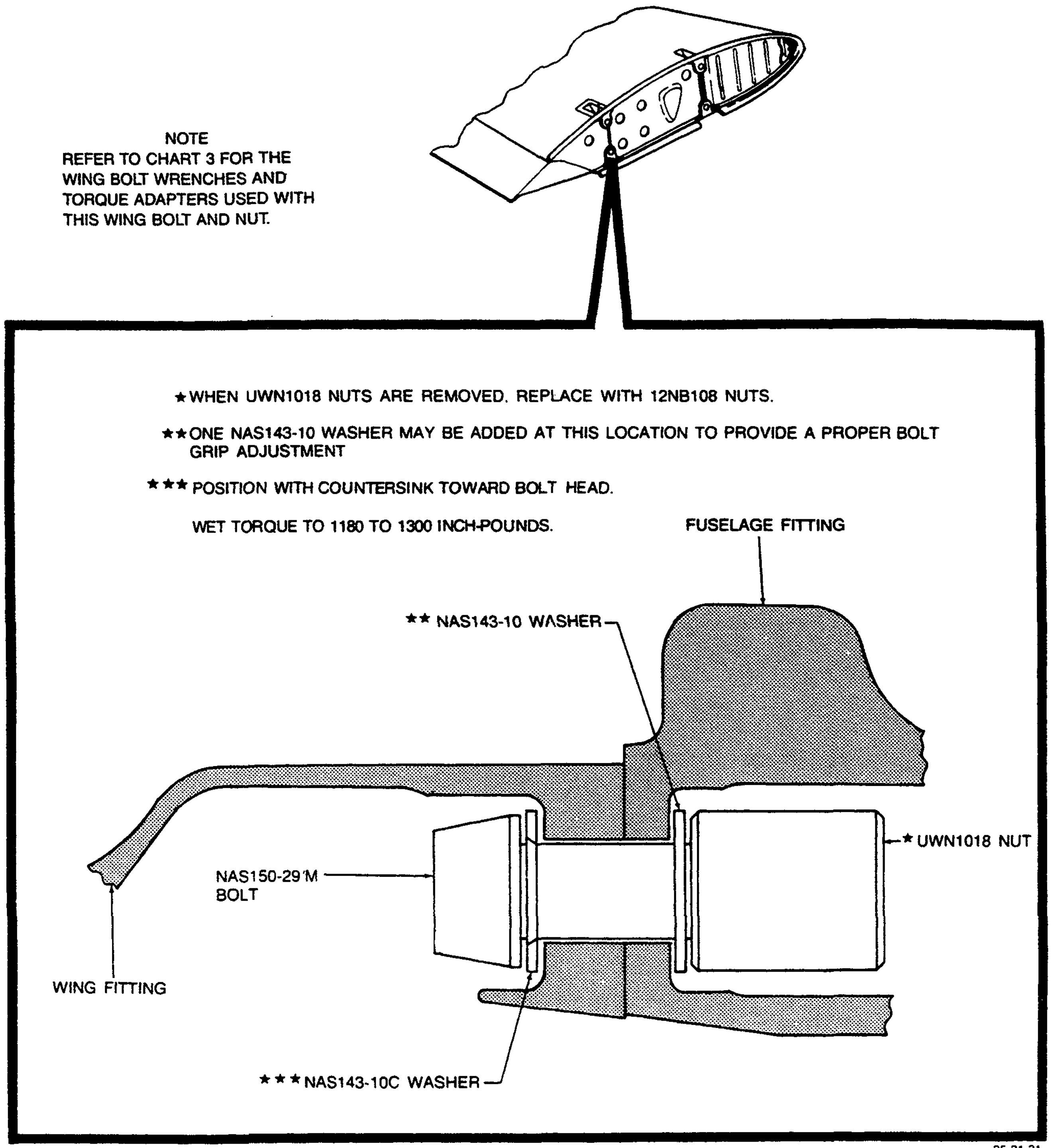


Figure 4-1M. Lower Rear Wing Bolt Installation
(D-1 thru D-1500)

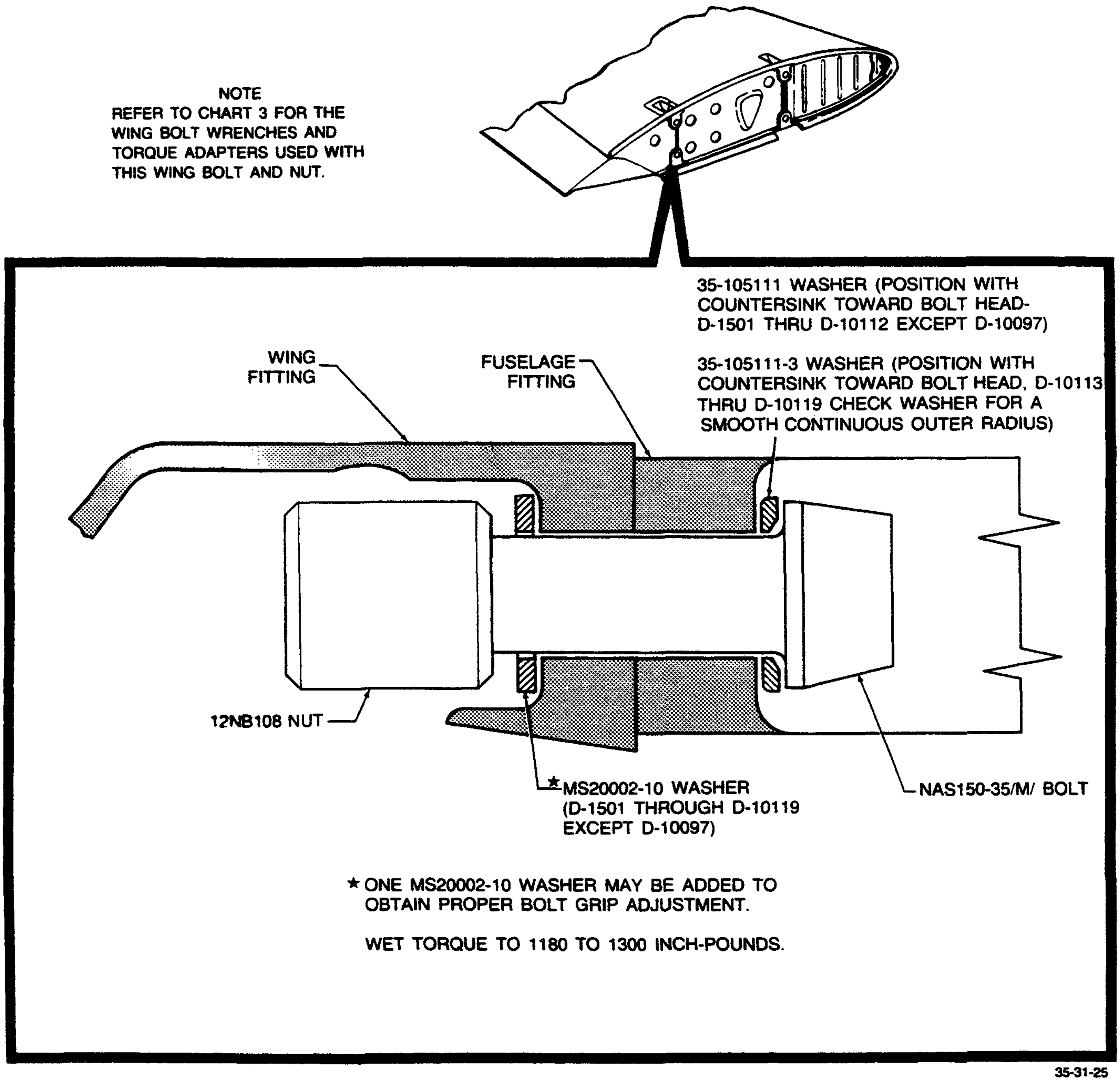


Figure 4-1N. Lower Rear Wing Bolt Installation (D-1501 and after)

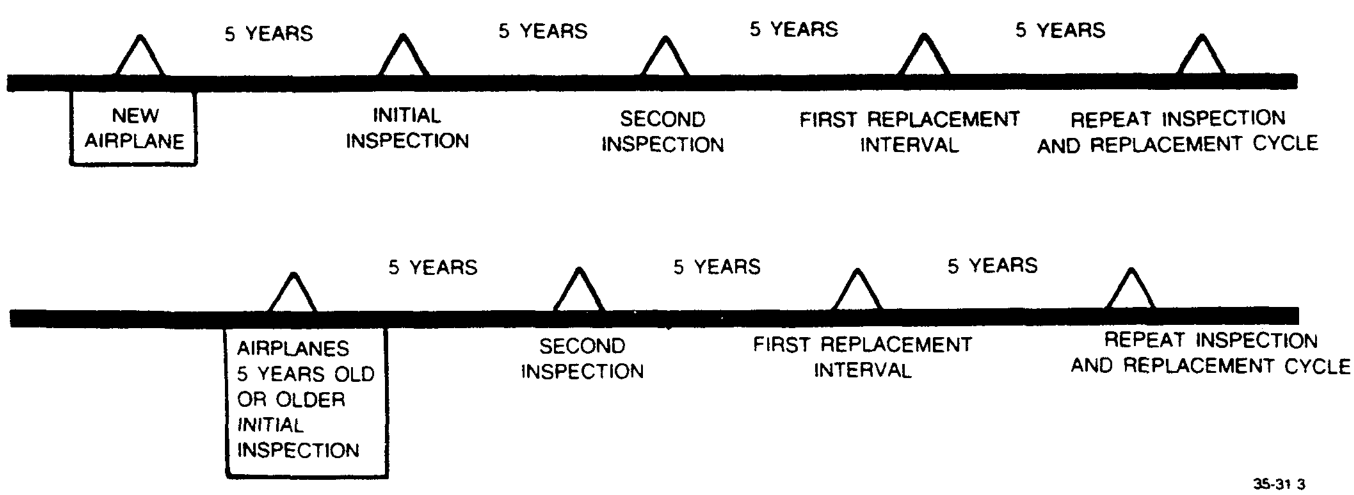
CHART I

CONSUMABLE MATERIALS

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
1. Naphtha	TT-N-95		
2. Methyl Ethyl Ketone	TT-M-261		
3. Corrosion Preventive Compound	MIL-C-16173	Braycote 137	Bray Oil Co., 1925 Marrianna St. Los Angeles, Calif. 90032
		Petrotech 1-4	Penreco P.O. Box 671, Butler, Penn. 16001
4. Coating		Alodine 1200, 1200S, 1201	AMCHEM Products Inc., Spring Garden St. Ambler, Penn. 19002
5. Primer, Zinc Chromate	MIL-P-8585		

CHART 2

WING BOLT and NUT INSPECTION and REPLACEMENT CYCLE



NOTE

The first inspection for airplanes five years old or older must be performed at the first scheduled inspection following the issue date of revision B15.

NOTE

At each replacement interval, all wing attach bolts, washers, and nuts must be replaced with new hardware.

CAUTION

Do not attempt to spin the hinge pin in with a drill motor.

INSTALLING THE WING

a. Using a nonmetallic brush and naphtha or methyl ethyl ketone (Item 1 or 2, Chart 1), clean the wing attach fittings and hardware (bolts, washers, and nuts). Inspect the wing attach fittings and hardware as instructed under WING BOLT, NUT, AND FITTING INSPECTION.

WARNING

Wing bolts and nuts that have reached their life limit (10 years after the initial inspection) must not be reused. See Chart 2 for wing bolt and nut inspection and replacement intervals.

b. Coat the fitting bolt bores and bearing faces, bolts, washers, and nuts with MIL-C-16173 Grade II corrosion preventive compound (Item 3, Chart 1).

WARNING

The bushing installed in the upper forward wing fitting (D-9344 thru D-9414 except D-9379) and in the lower fitting (airplanes prior to D-1501 with BEECHCRAFT KIT No. 35-694S installed and D-9344 thru D-10119 except D-10097) must be in place prior to installation of the wing bolts.

c. Move the wing into position, align the wing fittings with the carry through fittings, install new soft aluminum washers between the upper fittings, and insert the bolts.

CAUTION

Each bolt must be inserted by hand without binding. If a bolt cannot be easily inserted, reposition the wing until the bolt moves freely through the fittings. Do not screw or drive a bolt into the fittings. Bolts and nuts must be oriented as shown in the applicable illustration for each location (Figure 4-1B thru Figure 4-1N).

d. Start the nuts on the upper forward and aft bolts. Rotate the wing trailing edge until alignment with the outline on the fuselage is realized. After rotation is established, verify that the lower forward bolt is not binding in the bolt bore. If binding is encountered, adjust the wing position until the bolt moves freely.

e. Tighten the upper forward and aft nuts.

CAUTION

When torquing the wing nuts, assure that the wrenches do not bottom out on the wing fittings. Such an occurrence could cause false torque readings and damage to the wing fittings. After torquing the upper forward wing attach nut, remove the holding force from the wing cradle and torque the remaining three nuts.

f. Torque the nuts in the following order: upper forward, upper aft, lower forward, and lower aft. When a torque wrench adapter is used, the length of the adapter must be added to the length of the torque wrench and the proper wet torque value computed as detailed in Figure 4-1.

CAUTION

Before torquing the lower aft nut, a slight gap may be evident between the fittings. This gap should not exceed a width of .060 inch. No gap should remain after the nut is torqued. Torque the wing attach bolts at the nut end; do not rotate the bolt in the bolt bore.

g. Coat the bolt threads that protrude through the nut with MIL-C-16173 Grade II corrosion preventive compound (Item 3, Chart 1).

h. Connect the flap drive shaft to the flap motor.

i. Connect the aileron cables to the aileron quadrant.

j. Connect the electrical wiring in the wheel well.

k. Connect the pitot line in the wheel well (left hand only).

l. Connect the fuel lines.

m. Connect the landing gear actuator rod.

n. Connect the landing gear uplock cable.

o. Connect the inboard door actuator rod.

p. Connect the hydraulic brake lines and bleed the brakes.

r. At the first scheduled inspection after the wing has been installed, check the attaching bolts for proper torque. Check the drain ports in the upper wing attach fittings to assure that they are unobstructed.

WING BOLT, NUT AND FITTING INSPECTION

Read this entire section before removing any bolts for inspection.

WARNING

The wing bolts and nuts installed in all Model 35 Series airplanes five years old or older must be removed and inspected. If after inspection the bolts and nuts prove to be free of corrosion, cracks, and mechanical damage, they may be reinstalled for an additional five year period at which time another wing bolt and nut inspection must be performed. Ten years after the initial inspection, all wing bolts and nuts must be replaced with new hardware. Render unserviceable all components removed in compliance with the Wing Bolt and Nut Inspection And Replacement Chart.

a. Before removing any wing bolt, draw an outline of the wing position on the fuselage with a grease pencil to aid realignment, should it be necessary.

CAUTION

There should be no bolt binding during removal or installation. Do not drive or screw a bolt in or out of the fittings. If wing bolt binding is encountered, place the airplane on a three point jack and raise the airplane until the wheels are clear (see Section 2 for jacking instructions). Place a suitable cradle under each wing and a tail stand under the aft portion of the fuselage. Defuel the wing, loosen the remaining bolts and reposition the wing until the bolt moves freely through the fittings. Replace the soft aluminum washers between the upper fittings and retorque the bolts as instructed under INSTALLING THE WING. If bolt binding is not encountered and the wing is not shifted, replacement of the soft aluminum washers between the upper wing attach fittings is not required.

NOTE

Beech Aircraft Corporation supplies wing attach hardware that has been given an additional magnetic particle inspection since manufacture. These components may be identified by the green dye on the head of the bolt and on the nut.

WARNING

Use only the components specified in the applicable illustrations. Do not install the black P/N H-20 nuts, these nuts have been dry film lubricated with molybdenum disulfide. When MIL-C-16173 Grade II corrosion preventive compound is added to these nuts, the additional lubrication may cause improper preload in the bolt when it is tightened to the wet torque value specified in Figure 4-1B thru 4-1N.

b. Starting at the lower forward wing attach point on each side, remove, inspect, and replace one bolt and nut set at a time until the complete set of eight bolts and nuts have been inspected.

c. Using a nonmetallic brush, thoroughly clean the bolts, washers and nuts with naphtha or methyl ethyl ketone (Item 1 or 2, Chart 1)

CAUTION

Assure that the radiused washers shown in Figure 4-1E, 4-1G, 4-1J, 4-1K, 4-1L and 4-1N have a complete radius with no sharp edges that could mark the fittings. Replace the washer if it has an incomplete radius or sharp edges.

d. If the bolts and nuts do not exceed the life limit shown in Chart 2, visually inspect each bolt and nut with a 10-power or stronger magnifying glass; inspect for corrosion, cracks and mechanical damage. The cadmium plating may display areas that appear rubbed, discolored, or polished. These areas are usually the result of prevailing installation procedures and are of no significance. A bolt should not be rejected because of cadmium plating deterioration; however, any component (bolt, washer or nut) that is cracked, corroded or has mechanical damage must be replaced.

e Using the magnetic particle inspection process described in this chapter, check each bolt for circumferential crack indications and each nut for longitudinal crack indications. If the bolt and nut prove to be free of all damage (corrosion, cracks, crack indications, and mechanical damage), they may be reused after demagnetization and cleaning.

f. Clean the attach fitting bolt bores and bearing faces with naphtha or methyl ethyl ketone (1 or 2, Chart 1). Do not strip the epoxy paint from this area. Inspect the surface condition of each fitting, focusing special attention on the washer seat and bolt bore area. If scoring, corrosion pitting or washer impressions are discovered in this area, contact the Commercial Service Department of Beech Aircraft Corporation. If the fitting is satisfactory, coat the bolt bore and bearing face of each fitting with Alodine 1200, 1200S or 1201 (Item 4, Chart 1). Allow the coating to remain on the surface for approximately five minutes. When the five minutes have elapsed, wash the coated area with water and blow dry (do not wipe dry). Paint the treated areas with zinc chromate primer (Item 5, Chart 1) and allow to dry.

g. Coat the bearing faces and bolt bores of the fittings, the complete bolt, washers, and nut with MIL-C-16173 Grade II corrosion preventive compound (Item 3, Chart 1).

h. Install the bolt, washers and nut into the wing fittings.

CAUTION

Ensure that the wing bolt wrenches do not bottom out on the wing fittings. This could cause erroneous torque readings and damage to the fittings.

NOTICE
WING BOLTS ARE LUBRICATED SEE MAINTENANCE MANUAL FOR CORRECT TORQUE VALUES

WHEN THE CORROSION PREVENTIVE COMPOUND HAS BEEN APPLIED TO THE WING BOLTS, AFFIX THE ABOVE DECAL TO THE FOLLOWING LOCATIONS:

1. On the side of the fuselage immediately above the RH forward and aft wing bolt covers.
2. On the wing immediately forward of the LH forward and aft wing bolt covers.
3. On the wing immediately forward of the lower forward wing bolt covers on both sides.
4. On the wing immediately aft of the lower aft wing bolt covers on both sides.

Figure 4-10. Lubricated Bolt Identification Placard Location

CHART 3
WING BOLT WRENCHES AND TORQUE ADAPTERS

POSITION	BOLT PART NO.	WRENCH P/N	NUT PART NO.	NUT TORQUE WRENCH ADAPTER
Upper Forward	NAS150-29/M/ (D-1 thru D-1500 except airplanes with BEECHCRAFT Kit No 35-694S installed)	TS1222-4 or TS1222-8	UWN1018 (D-1 thru D-1500)	TS1171-1 or TS1176-1 or 50-590013
	NAS150-33/M/ (Airplanes with BEECHCRAFT Kit No 35-694S installed)			
	NAS150-33/M/ (D-1501 thru D-9343)		12NB108 (D-1501 thru D-9414 except D-9379)	
	NAS150-38/M/ or MS20010-23 (D-9344 thru D-9414 except D-9379)	TS1222-6		
	NAS152-37/M/ or MS20012-20 or 131790-1 (D-9379, D-9415 thru D-10119 except D-10097)	TS1222-3 TS1222-4 or TS1222-8	12NB126 (D-9379, D-9415 thru D-10119 except D-10097)	TS1171-2 or TS1176-2
Upper Aft	NAS150-29/M/ (D-1 thru D-1500)	TS1222-4 or TS1222-8	UWN1018 (D-1 thru D-1500)	TS1171-1 or TS1176-1 or 50-590013
	NAS150-33/M/ (D-1501 thru D-10119 except D-10097)		12NB108 (D-1501 thru D-10119 except D-10097)	
Lower Forward	NAS150-29/M/ (D-1 thru D-1500 except Model 35R and airplanes with BEECHCRAFT Kit 35-694S installed)	TS1222-4 or TS1222-8	UWN1018 (D-1 thru D-1500 except Model 35R)	TS1171-1 or TS1176-1 or 50-590013
	MS20010-26 (Airplanes with BEECHCRAFT Kit 35-694S installed except Model 35R)	TS1222-7 or TS1222-6 or TS1222-9	35-190014 (Model 35R except airplanes with BEECHCRAFT Kit 35-694S installed)	None
	NAS152-35/M (Model 35R except with BEECHCRAFT Kit 35-694S installed)	*TS1171-3 Torque Wrench Adapter	12NB126 (D-1501 thru D-10352 and Model 35R s with BEECHCRAFT Kit 35-694S installed)	TS1171-2 or TS1176-2
	NAS152-43/M/ (Model 35R with BEECHCRAFT Kit 35-694S installed and D-1501 thru D-4865)	TS1222-3		
	NAS152-46/M/ (D-4866 thru D-7309)			
	MS20012-28 (D-7310 thru D-9343)	TS1222-4 or TS1222-8		
	MS20012-31 or 131790-2 (D-9344 thru D-10119 except D-10097)			
Lower Aft	NAS150-29/M/ (D-1 thru D-1500)	TS1222-4 or TS1222-8	UWN1018 (D-1 thru D-1500)	TS1171-1 or TS1176-1 or 50-590013
	NAS150-35/M/ (D-1501 thru D-10119 except D-10097)		12NB108 (D-1501 thru D-10119 except D-10097)	

The Model 35R s that do not have BEECHCRAFT Kit 35-694S installed are equipped with a barrel nut at the lower forward wing attach point Therefore, the bolt must be torqued at the bolt head All other attach bolts must be torqued at the nut end

i. Torque the nut to the wet torque value shown in the appropriate illustration (Figure 4-1B thru 4-1N). When a torque wrench adapter is used, the length of the adapter must be added to the length of the torque wrench and the proper torque value computed as shown in Figure 4-1.

j. Coat the exposed threads that protrude through the nut with MIL-C-16173 Grade II corrosion preventive compound (Item 3, Chart 1).

k. Check that the decal shown in Figure 4-1O is affixed to the appropriate locations on the airplane.

l. At the first scheduled inspection after the wing bolts have been loosened and retorqued or after initial installations, check each bolt for proper torque.

m. Check the drain ports in the upper wing attach fittings to ensure that they are unobstructed.

MAGNETIC-PARTICLE INSPECTION

Magnetic-Particle Inspection is a method for locating surface and subsurface discontinuities in ferromagnetic materials (i.e. materials capable of being magnetized); consequently, nonferromagnetic materials (such as aluminum alloys, magnesium alloys, copper alloys, lead, titanium alloys, nickle base alloys and many stainless steel alloys) cannot be inspected by this method. Magnetic-Particle Inspection is based upon the principle that any discontinuities lying in a direction generally transverse to the direction of the magnetic field of the part magnetized for the test will cause a leakage field to be formed at and above the surface of the part. The presence of the leakage field denoting the discontinuity is detected by the use of finely divided ferromagnetic particles over the surface of the part. Some of the particles are magnetically gathered and held by the leakage field to form an outline indicating the location, size, shape and extent of the discontinuity. In general, magnetic particle inspection utilizes a variety of types of equipment for magnetization as well as several methods for application of ferromagnetic particles to the test part. Additionally, the ferromagnetic particles are available in a selection of colors (including fluorescent) and particle shapes. Magnetic particle inspections required by this manual can best be accomplished utilizing the "wet continuous method" on the standard wet horizontal type equipment with either visible or fluorescent magnetic particles suspended in a petroleum base vehicle (normally kerosene). Since magnetic particle indications are best obtained when the discontinuity lies in a direction transverse to the magnetic field, the following procedures are recommended for optimum detection of discontinuities in both bolts and nuts.

WARNING

Improper operation of the particle inspection, because of faulty equipment or untrained operators, can jeopardize the airworthiness of parts being inspected. Minute electrical arc burns caused during inspection by improper operation of the test equipment can result in eventual failure of the part.

CHART 4
MAGNETIC-PARTICLE INSPECTION
(BOLTS)

BOLT DIAMETER	*TOTAL BOLT LENGTH INCLUDING HEAD TO NEAREST ¼ INCH*	*AMPERE TURNS**
⅝ INCH	2½ INCH	7900
⅝ INCH	2¾ INCH	7100
⅝ INCH	3 INCH	6600
¾ INCH	3 INCH	7900
¾ INCH	3¼ INCH	7400
¾ INCH	3½ INCH	6700
¾ INCH	3¾ INCH	6300
⅞ INCH	3½ INCH	7900
⅞ INCH	3¾ INCH	7400
⅞ INCH	4 INCH	6900
⅞ INCH	5 INCH	5500
1 INCH	5 INCH	6300

*Amperage requirement is the ampere turns value divided by the number of turns on the coil. For example: A 1-inch diameter × 5-inch long bolt tested on a 5-turn coil would require 6300 ÷ 5, or 1260 amps.

Bolts: Inspection of a bolt is accomplished by longitudinal magnetization in a multiturn low-fill factor coil (i.e. the inner diameter of the coil greatly exceeds the bolt diameter). For proper magnetization the bolt is positioned close to the coil inside wall with the bolt length perpendicular to the winding direction. The magnetic particle suspension is flowed on the bolt and the appropriate current is applied to achieve adequate field strength. Using the described procedure, laboratory testing has indicated that the ampere turn values listed in Chart 4 provide for optimum detection of discontinuities perpendicular to the bolt axis.

Nuts: Inspection of a nut is accomplished by circular magnetization on a central conductor (usually a copper rod) the approximate size of the nut inside diameter. For proper magnetization, the central conductor bar is inserted through the nut and the bar is positioned between the heads of the wet horizontal equipment. The magnetic particle suspension is flowed on the nut and the appropriate current is applied through the central conductor to achieve adequate field strength. Using the described procedure, laboratory testing

CHART 5
MAGNETIC-PARTICLE INSPECTION
(NUTS)

NUT SIZE	*CENTRAL CONDUCTOR SIZE*	*AMPERAGE*
⅝ INCH	½ INCH	500 AMPS
¾ INCH	⅝ INCH	600 AMPS
⅞ INCH	¾ INCH	700 AMPS
1 INCH	⅞ INCH	800 AMPS

has indicated that the amperage values listed in Chart 5 provide for optimum detection of discontinuities parallel to the nut axis.

After magnetic particle inspection, the parts must be carefully demagnetized and cleaned of the ferromagnetic particles. Examine parts for any possible evidence of electric arc burn that may have occurred during the inspection.

WING MAIN SPAR CAP INSPECTION (Figure 4-1P)

The outboard wing main spar caps must be inspected annually for corrosion.

WARNING

All areas of the spar caps from the outboard end of the spar cap to the wing attach fitting must be inspected.

BEECHCRAFT KIT NO. 35-4008-1S contains parts and information necessary to install new forward wing spars on the Model 35 Series airplanes. This kit does not include the spars.

NOTE

Special emphasis should be placed on airplanes that have been operated or stored for extended periods (5 years or more) where geographical locations or atmospheric conditions are highly conducive to corrosion.

Inspection of the upper and lower spar caps should be accomplished in the following manner:

a. Examine the forward and aft sides of the spar cap where it meets the skin. If a whitish, salt-like, nonmetallic substance is noted in these areas, a thorough inspection should be performed to determine if corrosion is present. Wax or paint trapped between the skin and the exposed portion of the spar caps should not be misinterpreted as corrosion.

b. Wash all exposed areas of the upper and lower spar cap.

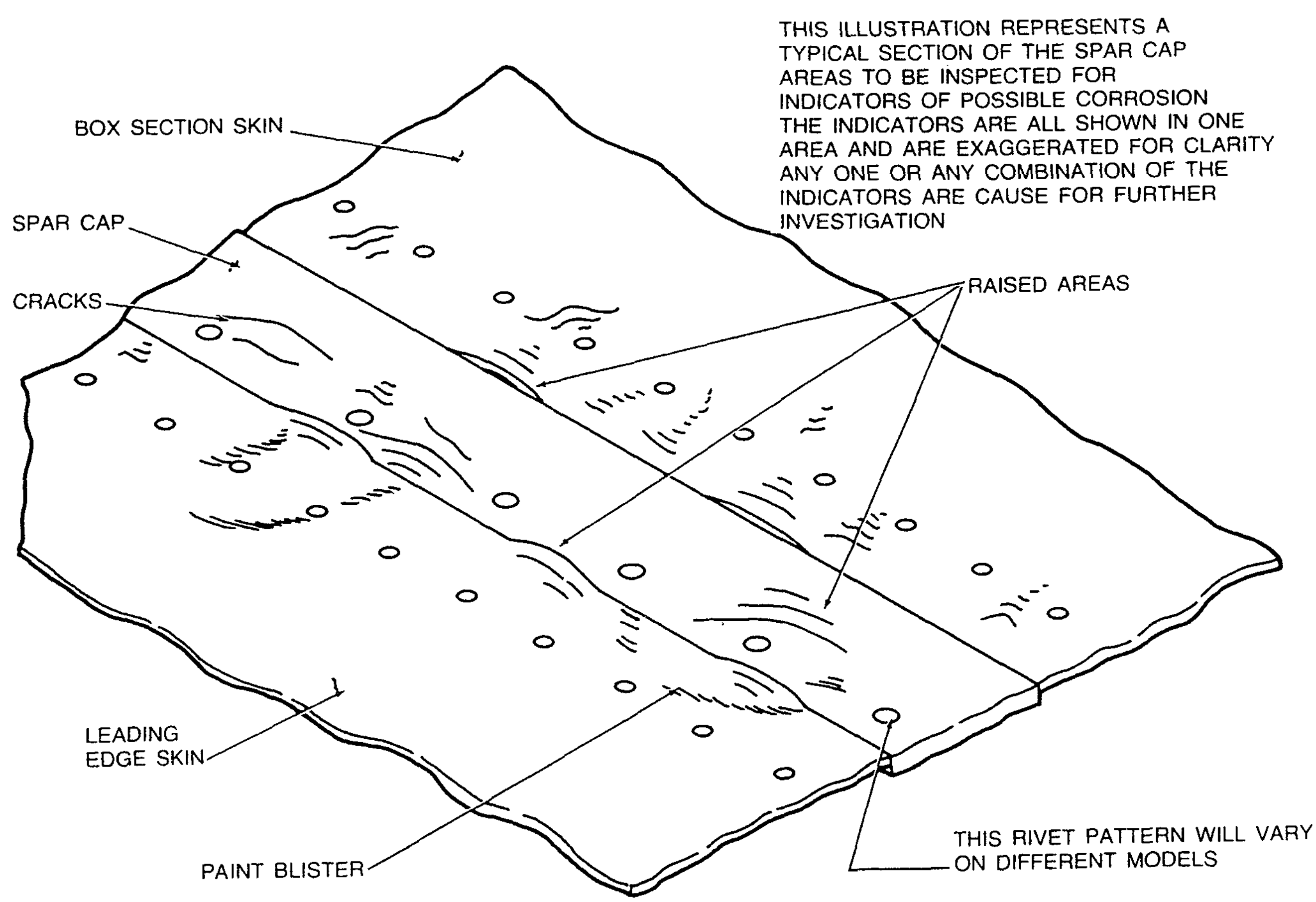


Figure 4-1P. Spar Cap Inspection

c. Visually inspect all exposed areas of the upper and lower spar caps for irregularities, such as paint blisters, raised or uneven areas, and cracks. The exposed areas of the spar cap are extruded flat and irregularities could be an indication of corrosion. Investigate all irregularities to determine if any damage has occurred.

NOTE

Uneven or raised areas on the spar cap may be detected by sliding the fingers over the surface, by moving a straight edge over the surface or by sighting down the length of the spar cap surface.

d. If unusual conditions are encountered that cannot be resolved locally, contact the Commercial Service Department of Beech Aircraft Corporation for evaluation of the problem and corrective action to be taken.

ADJUSTING THE WINGS

After a wing has been reinstalled or repaired, flight tests may show the wing to be chronically heavy or light. This condition may be corrected by rotating the wing to lower the trailing edge of a heavy wing or raise the trailing edge of a light wing or by a combination of adjusting both wings. The aluminum washers between the upper wing fittings must be replaced each time the position of the wing is changed. If both wings have been removed, install the right wing with the trailing edge at the highest point of the adjustment travel and the left wing $^1/_{16}$ inch down from the highest point of travel. The total adjustment on each wing is approximately ⅛ inch.

REMOVAL AND INSTALLATION OF NOSE LANDING GEAR ASSEMBLY

WARNING

The nose landing gear on serial D-6562 and after, no longer incorporates a rebound control assembly. On this type of gear, do not attempt to remove the torque knees, the torque knee pins or the bolt connecting the torque knees, when the airplane has been placed on jacks, without first deflating the shock absorber assembly. The torque knees provide the extension stop for the lower shock absorber cylinder assembly. When they are disconnected the cylinder is free to slide out of the upper barrel assembly.

a. With the aircraft on a jack, partially retract the landing gear to take the load off the retract rod compression spring.

b. Disconnect the steering yoke at its fitting at the upper end of the nose gear brace assembly.

c. Disconnect the assist step cable (where applicable).

d. Disconnect the drag leg at its fitting on the nose gear brace assembly.

e. Remove the hinge bolts securing the nose gear brace assembly to the fuselage structure and lower the nose gear away from the aircraft.

f. Reinstall the nose gear assembly by reversing the above removal procedure.

CAUTION

The drag leg hinge bolt should be tightened finger tight, then turned one hex more before installing the cotter pin. Do not overtighten.

REMOVAL AND INSTALLATION OF MAIN LANDING GEAR ASSEMBLY.

WARNING

The main landing gears on serial D-5791 and after, no longer incorporates a rebound control assembly. On this type of gear, do not attempt to remove the torque knees, the torque knee pins or the bolt connecting the torque knees, when the airplane has been placed on jacks, without first deflating the shock absorber assembly. The torque knees provide the extension stop for the lower shock absorber cylinder assembly. When they are disconnected the cylinder is free to slide out of the upper barrel assembly.

a. With aircraft on jack, retract gear until inboard landing gear door is fully open.
b. Disconnect outboard landing gear door from landing gear strut.
c. Disconnect the inboard landing gear door actuating rod at the door hinge.
d. Disconnect the uplock assembly from the strut.
e. Open brake cylinder bleed ports and pump all fluid from the system.
f. Disconnect the hydraulic line where the flexible hose couples to the tubing at the wing front spar.
g. Disconnect the safety switch wires (right gear).
h. Remove the bolt attaching the lift leg to the strut.
i. Remove the access door in the lower surface of the wing leading edge for access to the forward hinge bolt retaining nut and remove the nut.

NOTE

The rear strut brace hinge bolt is accessible by lowering the flap.

j. Remove the hinge bolts securing the main gear strut assembly and lower it away from the aircraft.
k. Reinstall the main landing gear assembly by reversing the above removal procedure. After reinstalling, check the landing gear for proper rigging (Section III).

REMOVAL AND INSTALLATION OF MAIN LANDING GEAR RETRACT ROD.

a. Remove the front seat bottom (s).
b. Remove the access covers directly behind the front carry-through spar.
c. With airplane on jack, partially retract the gear until the inboard door is fully open.
d. Remove attaching bolts and disconnect retract rod from landing gear actuator retract arm.
e. Remove attaching bolt and disconnect retract rod from main landing gear V-brace.
f. Remove retract rod through the wheel well.
g. Reinstall the retract rod by reversing the above removal procedure.

CAUTION

When installing a landing gear retract rod, be extremely careful to install the rod so that the curved portion of the rod end will fit around the actuator shaft when the gears are in the retracted position.

REMOVING AND INSTALLING THE LANDING GEAR MOTOR.

a. Remove the cabin front seat bottom (s).
b. Remove the access plate over the motor and disconnect the heater duct from the outlet.
c. Disconnect the electrical wiring at the landing gear dynamic brake relay.
d. Remove the three landing gear motor attaching bolts and remove the landing gear motor.
e. Reinstall the landing gear motor by reversing the above removal procedure and safety the three attaching bolts.

REMOVING AND INSTALLING THE LANDING GEAR ACTUATOR.

a. Remove the cabin front seats.
b. Remove the access cover directly behind the front carry-through structure.
c. Disconnect the main landing gear retract rods at the actuator.
d. Remove the flap motor attaching bolts and disconnect the landing gear door actuating rods at the actuator.
e. Remove the four screws securing the landing gear limit switch assembly on the left hand side of the actuator, and move the switch assembly aside to permit removal of the actuaotr.
f. Disconnect the landing gear motor electrical wiring.
g. Remove the landing gear actuator access door on the bottom of the fuselage, and remove the nose gear actuator retract arm and linkage from the actuator.
h. Remove the four actuator attaching nuts and remove the actuator.
i. Installation is the reverse of removal. When reinstalling the nose gear actuator retract arm on the actuator, make certain that the index mark on the arm coincides with the index mark on the actuator shaft.
j. Make certain that the landing gear limit switch actuators are installed when the retract rods are connected to the actuator.
k. Reinstall cotter pins and safety wire.
l. After completing the landing gear actuator installation, check the landing gear for proper rigging (Section III).

REMOVING AND INSTALLING THE FLAP MOTOR, D-1 THROUGH D-838.

a. Remove the cabin rear seat.
b. Remove the access cover.
c. Disconnect the electrical wiring at the motor.
d. Unsafety and remove the housing retainer nuts.

e. Remove the "U" clamp that holds the motor in place.

f. Slip the motor and housing as far to the left as it will go.

g. Slip the right flap shaft and housing outboard. This will disengage the shaft. The reinstallation procedure is the reverse of the removal with the exception that the flaps should both be set in the neutral position before engaging the flap shaft to the motor.

FLAP MOTOR REMOVAL (Effectivity: D-839 thru D-9965) (Figure 4-1Q)

a. Remove the cabin front seat assemblies.

b. Remove the access cover.

c. Detach the clamp that supports the electrical wiring from the right-hand flap shaft housing.

d. Disconnect the motor electrical wiring (except ground wire) at the quick-disconnect.

e. Loosen the two set screws on each cable retainer.

f. Rotate the cable retainers 90°.

g. Loosen the nuts on the inboard side of the mounting supports.

h. Pull the flexible drive shafts from the flap motor shafts and retainers.

i. Remove the flap motor attaching bolts and the ground wire secured to one of the bolts and remove the flap motor.

FLAP MOTOR INSTALLATION (Effectivity: D-839 thru D-9965) (Figure 4-1Q)

NOTE

When an existing motor on airplanes D-839 thru D-8872 is replaced by a 35-380109 motor, the larger size of the new motor makes it necessary to enlarge the flap motor access hole (located under the front seat) by 0.75 inch on the aft edge to provide clearance. The existing cover plate over the access hole may be retained to cover the enlarged hole. Refer to Figure 4-1R.

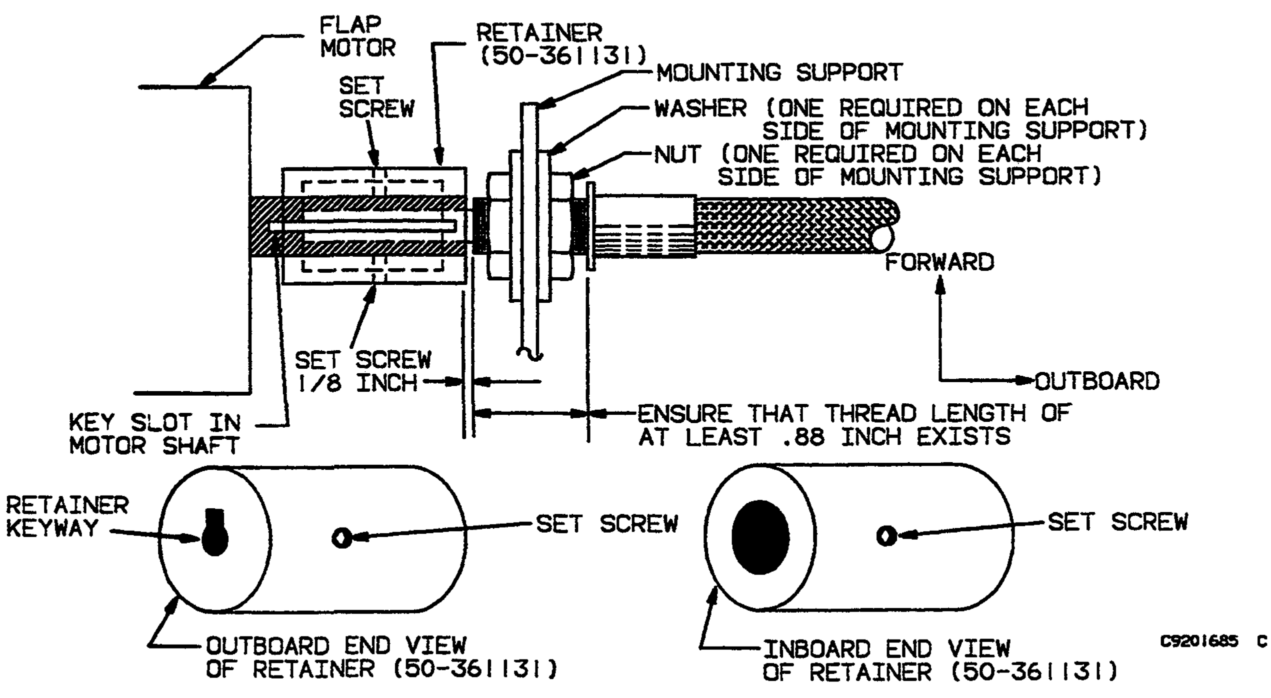


Figure 4-1Q. Flap Cable Retainer (Effectivity: D-839 and after)

TEMPORARY REVISION NO. 4-2

Manual Affected: Bonanza 35 Series Shop Manual (35-590096B).

Filing Instructions: Insert adjacent to page 4-6.

Reason: Revise procedures for flap drive cable connection.

FLAP DRIVE CABLE CONNECTION (D-838 AND AFTER)

Connect the LH and RH flap drive cables to the flap drive motor as follows, using the illustration for component locations:

a. Install the outboard nut and washer as far as it will go on the threaded portion of the flap cable.

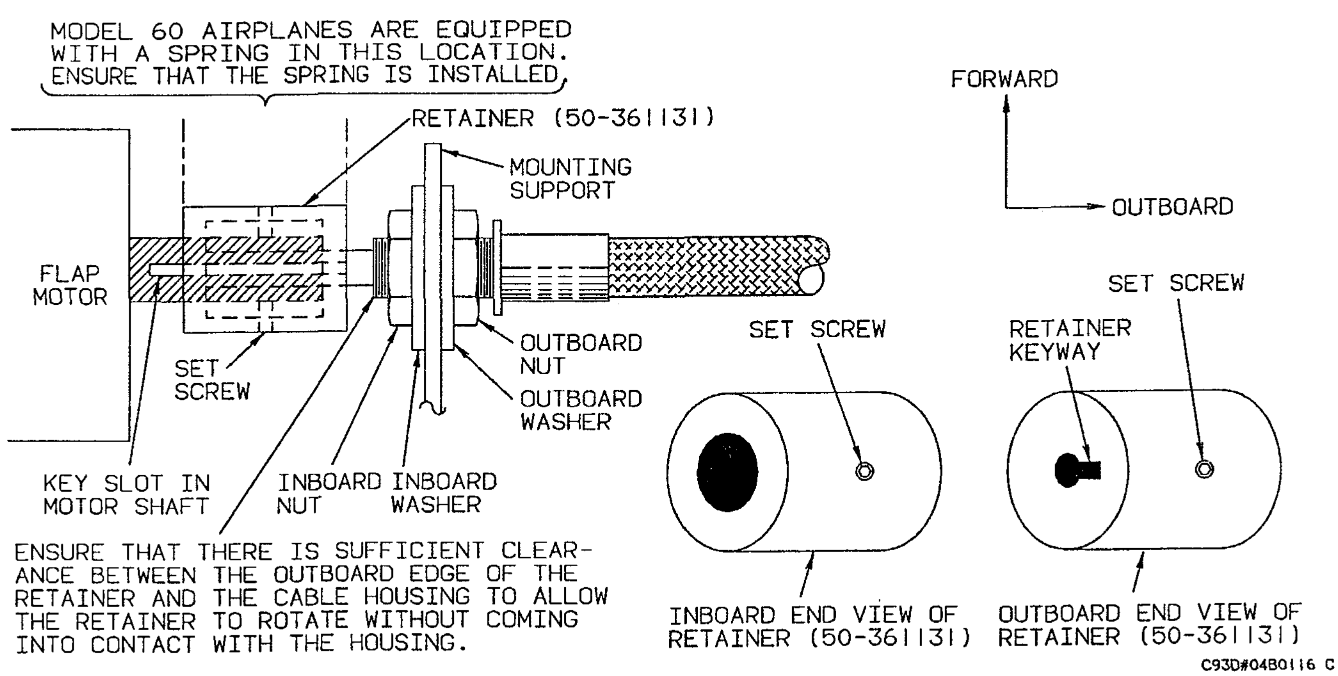
b. Insert the retainer through the mount support and onto the motor shaft as far as it will go. Align the retainer keyway with the key slot in the flap motor drive shaft and tighten one set screw temporarily.

c. While inserting the flap cable through the mount support, install the inboard washer and nut. Install the cable through the retainer and into the motor drive shaft until the keyway is just past the key slot in the retainer.

d. Loosen the set screw that was tightened in Step b. Ensure that the retainer is still installed on the motor shaft as far as it will go and rotate the retainer 90°.

e. Keep inboard pressure on the retainer and tighten both retainer set screws.

f. Secure the flap drive cable to the mounting support by tightening the nuts. Tighten the inboard nut to ensure that there is sufficient clearance between the outboard edge of the retainer and the cable housing to allow the retainer to rotate without coming into contact with the cable housing. If the threaded part of the cable housing is not long enough to install the two nuts and washers, using a die, add 5/8-24 UNEF threads until .88 inch thread length is reached. Tighten the outboard nut against the mounting support.



a. Place the flap motor in position and secure with flap motor attaching bolts. Ensure that the ground wire is attached to one of the bolts.

b. Connect the flap motor electrical wiring at the quick-disconnect.

c. Align the retainer keyway with the key slot in the drive shaft of the flap motor and slide the retainer onto the shaft as far as it will go.

d. Align the shaft key of the flap drive cable with the retainer key slot and insert the shaft into the motor drive shaft. Insert the shaft until the key on the shaft is past the key slot on the outboard end of the retainer.

e. Rotate the retainers 90° and push it onto the motor drive shaft until it bottoms out against the end of the motor shaft.

f. Keep inboard pressure on the retainer and tighten both retainer lock screws.

g. Secure the drive cable to the mounting support by tightening the nuts. When tight, there should be approximately 1/8 inch of clearance between the inboard edge of the cable housing and the outboard edge of the retainer.

h. Attach the clamp that supports the electrical wiring to the right-hand flap shaft housing.

i. Install the access cover.

j. Install the front seat assemblies.

FLAP MOTOR REMOVAL (Effectivity: D-9966 and after) (Figure 4-1Q)

CAUTION

The flap motor used on serials D-9966 and after, is NOT interchangeable with the flap motor used on prior serials. If the flap motor fails or major overhaul is required for the flap motor to operate properly, the flap motor should be replaced. No attempt should be made to overhaul the motor in the field.

a. Remove the front seat assemblies.

b. Remove the spar cover.

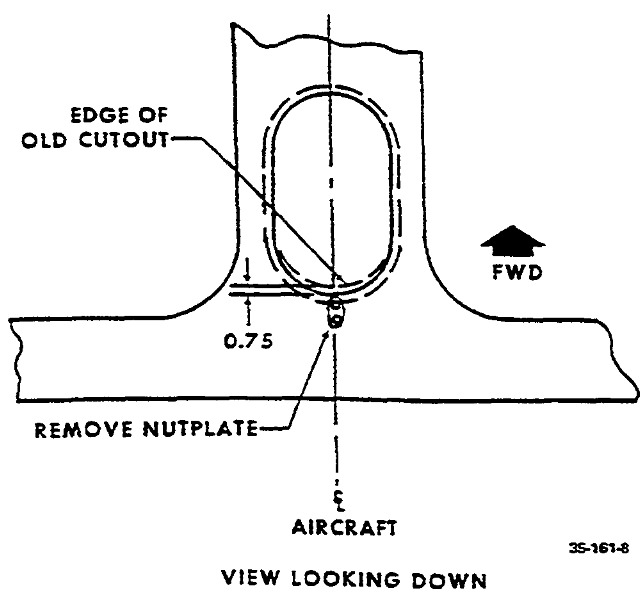


Figure 4-1R. Flap Motor Access Hole Modification (When Making Initial Installation of 35-380109 Flap Motor) (Effectivity: D-839 thru D-8872)

c. Detach the clamp that supports the electrical wiring from the right hand flap shaft housing.

d. Disconnect the motor electrical wiring at the quick disconnect.

e. Loosen the two set screws on each cable retainer.

f. Rotate the cable retainers 90°.

g. Loosen the nuts on the inboard side of the mounting supports.

h. Pull the flexible drive shafts from the flap motor shafts and retainers.

i. Remove the flap motor attaching bolts and remove the flap motor.

FLAP MOTOR INSTALLATION (Effectivity: D-9966 and after) (Figure 4-1Q)

CAUTION

The flap motor used on serials D-9966 and after, is NOT interchangeable with the flap motor used on prior serials. In the event of flap motor failure or it is determined that major overhaul is required for the flap motor to operate properly, the flap motor should be replaced. No attempt should be made to overhaul the motor in the field.

a. Place the flap motor in position and secure with the flap motor attaching bolts:

b. Connect the flap motor electrical wiring at the quick disconnect.

c. Align the retainer keyway with the key slot in the drive shaft of the flap motor and slide the retainer onto the shaft as far as it will go.

d. Align the shaft key of the flap drive cable with the retainer key slot and insert the shaft into the motor drive shaft. Insert the shaft until the key on the shaft is past the key slot on the outboard end of the retainer.

e. Rotate the retainers 90° and push it onto the motor drive shaft until it bottoms out against the end of the motor shaft.

f. Keep inboard pressure on the retainer and tighten both retainer lock screws.

g. Secure the drive cable to the mounting support by tightening the nuts. When tight, there should be approximately 1/8 inch of clearance between the inboard edge of the cable housing and the outboard edge of the retainer.

h. Attach the clamp that supports the electrical wiring to the right-hand flap shaft housing.

i. Install the spar cover.

j. Install the front seat assemblies.

FLAP SHAFT REMOVAL (Effectivity: D-1 thru D-838)

a. Unsafety and remove the housing retaining nut on the shaft to be removed.

b. Loosen the "U" clamp that holds the motor in place and move the motor as far as it will go away from the shaft being removed.

c. Push the shaft and housing outboard until it is free.

d. Disconnect the shaft from the flap actuator and pull the flap shaft out of the wing.

FLAP SHAFT INSTALLATION (Effectivity: D-1 thru D-838)

a. Lubricate the shaft lightly using MIL-G-23827 grease.

b. Pull the flap shaft through the wing and attach to the actuator.

c. Set both flaps in the up position.

d. Place the motor in its original position and tighten the "U" clamp that holds the motor in place.

e. Install the housing retaining nut and safety.

FLAP SHAFT REMOVAL (Effectivity: D-839 and after) (Figure 4-1Q)

a. Place the airplane on jacks and use the circuit breaker to retract the landing gear until the inboard doors are open.

b. Remove the front seat assemblies.

c. Remove the spar cover.

d. Loosen the two set screws on each cable retainer.

e. Rotate the cable retainer 90°.

f. Remove the nut on the inboard side of the mounting support.

g. Pull the flexible drive shaft from the flap motor shaft and retainer.

h. Disconnect all clamps securing the shaft housing to the wing structure.

i. Remove the dust cover in the rear section of the wheel well.

j. Disconnect the flap actuator from the wing flap and wing spar section.

k. Pull the flap actuator, flexible shaft and shaft housing out of the wing.

FLAP SHAFT INSTALLATION (Effectivity: D-839 and after) (Figure 4-1Q)

a. Pull the flexible shaft and housing through the wing and attach the actuator to the wing flap and the actuator to the wing flap and wing spar section.

b. Set the flaps in the up position.

c. Align the retainer keyway with the key slot in the drive shaft of the flap motor and slide the retainer onto the shaft as far as it will go.

d. Align the shaft key of the flap drive cable with the retainer key slot and insert the shaft into the motor drive shaft. Insert the shaft until the key on the shaft is past the key slot on the outboard end of the retainer.

e. Rotate the retainers 90° and push it onto the motor drive shaft until it bottoms out against the end of the motor shaft.

f. Keep inboard pressure on the retainer and tighten both retainer lock screws.

g. Secure the drive cable to the mounting support by tightening the nuts. When tight, there should be approximately 1/8 inch of clearance between the inboard edge of the cable housing and the outboard edge of the retainer.

h. Install the clamps securing the shaft housing to the wing structure.

i. Install the dust cover in the rear section of the wheel well.

j. Run the flaps through full travel, up and down, to check flap rigging.

k. Lower the landing gear and remove the airplane from the jacks.

l. Install the spar cover.

m. Install the front seat assemblies.

FLAP ACTUATOR REMOVAL

a. Place the airplane on jacks and use the circuit breaker to retract the landing gear until the inboard doors are open.

b. Remove the dust cover in the rear section of the wheel well to gain access to the actuator.

c. Lower the flaps and disconnect the actuator from the flap.

NOTE

To retain the original rigging of the flaps, mark the extension of the flap actuator before it is removed so that it may be installed in the same position.

d. Remove the snap ring and disconnect the flexible drive housing.

e. Remove the pivot bolts from the flap actuator mounting bracket and remove the flap actuator.

FLAP ACTUATOR INSTALLATION

NOTE

Install the flap actuator with the vent hole on top to prevent the loss of lubricant.

a. Place the flap actuator in position and secure it to the flap actuator mounting bracket with the pivot bolts.

b. Connect the flexible drive housing and install the snap ring.

c. Connect the flap actuator to the flaps in the extended position marked during removal.

d. Install the dust cover in the rear section of the wheel well.

e. Check the flap rigging.

f. Lower the landing gear and remove the airplane from jacks.

FLAP TRACK WEAR LIMITS

The allowable track wear on the bearing surfaces is .032 inch, resulting in a maximum flap track slot dimension of .785 inch. The allowable wear into the track surface is .050 inch. Track wear within the preceding limitations may be dressed smooth with light emery cloth to prevent roller binding. Molykote Z mixed with naphtha may be brushed on the flap tracks during servicing of the airplane.

REMOVAL OF GOODYEAR BRAKE LININGS (ONE PRESSURE CYLINDER TYPE)

NOTE

Linings should be replaced when the distance from the brake housing to the disc reaches 7/16 inch with brakes applied.

Replacement of either linings or disc will require the following disassembly:

a. Remove the hubcap.

b. Remove the wheel retaining nut.

c. Remove the brake disc clips.

d. Remove the wheel.

e. Remove the floating steel disc from the brake housing slot.

f. Remove the brake lining segments.

NOTE

It is not necessary to remove the brake housing from the axle flange to remove the disc.

REPLACEMENT OF GOODYEAR BRAKE LININGS (ONE PRESSURE CYLINDER TYPE)

a. Place the thick lining segment in the piston side of the housing cavity.

b. Install the thin lining segment in the stationary side of the brake housing.

c. Hold the linings apart and place the steel disc between the linings.

d. Install the wheel to the axle and steel disc.

NOTE

Care should be taken to properly install the disc clips in the wheel flange.

DISASSEMBLY OF GOODYEAR BRAKE UNIT (ONE PRESSURE CYLINDER TYPE)

When obvious leakage is noted around the wheel and brake housing, disassemble the brake and check the seals and parts for damage and wear. The seals should be replaced if damaged or shrunk.

a. Remove the large lock ring from the brake housing.

b. Remove the parts from the housing.

c. Wash the parts with alcohol and flush out system.

d. Replace damaged seals or parts and reassemble the brake.

REPLACEMENT OF GOODYEAR BRAKE LININGS (Two Pressure Cylinder Type).

NOTE

Linings should be replaced when the distance from the outside edge of the housing to the face of the disc reaches 1/4 inch.

a. Jack up the airplane.
b. Remove the brake disc clips and the wheel.
c. Remove the two Truarc rings and the two anvil linings.
d. Remove the brake from the mounting flange and remove the brake disc.
e. Remove the worn piston linings from the brake, applying light pressure to the brake if necessary to move the piston out for accessibility.
f. Install the thicker brake linings on the piston side of the brake housing with the part number (molded in the lining) facing the pistons so that the smooth side of the linings are in contact with the brake disc.
g. Install the brake disc and remount the brake on the axle mounting flange.
h. Install the thinner brake linings on the anvil side of the brake housing with the part number (molded on the lining) facing the Truarc ring so that the smooth side of the lining is in contact with the brake disc. Install the two Truarc rings securely.
i. Install the wheel on the airplane, adjust the bearings and safety.

NOTE

Position the wheel so that the five wide slots between the teeth of the disc are in alignment with the missing teeth in the wheel flange. This will permit the installation of the disc clips.

j. Install the five disc clips as follows:

NOTE

It is recommended that new disc clips be installed when brakes are overhauled or new brake linings are installed.

1. Rotate the wheel so that one of the sections without a drive tooth is opposite the brake cylinders.
2. Slide a disc clip into position so the large bend in the clip is inserted (in the wide slot between the teeth of the disc) between the disc and the wheel flange. The wide section of the clip (with the dimple) should go over the flange to permit the dimple to seat itself into the small hole in the flange of the wheel.

CAUTION

Be sure the clip is properly seated to avoid the possibility of damaging the brake.

3. Rotate the wheel and insert the other four clips in the same manner (according to instructions given in j. 1. and 2. above).
4. Rotate the wheel to see that all clips are installed properly and do not rub against the brake.

k. Apply the brakes several times to seat the parts.
l. Release the brakes and check the wheel to see that it rotates freely and does not rub against the brake.

DISASSEMBLY, REPAIR AND REASSEMBLY OF GOODYEAR TWO PRESSURE CYLINDER TYPE BRAKE UNIT.

a. Remove the wheel.
b. Disconnect the hydraulic line.
c. Remove the bolts from the axle torque flange, thus releasing the brake.
d. Remove the brake disc, the Truarc rings and the brake linings from the brake housing.
e. Remove pistons and "O" ring seals. Apply light hydraulic or air pressure at inlet to move pistons. Remove seals from pistons.
f. Remove bleeder screw, washer, bleeder valve, bleeder adapter and bleeder gasket from housing.
g. Remove the inlet plug and gasket from the brake housing.

NOTE

It is recommended that O-ring seals and gaskets be replaced at each overhaul. If the seals and gaskets are to be reinstalled on reassembly, note their positions before carefully removing them. Place each seal on a clean sheet of paper on which has been indicated the position of the seal with relation to its seat. On reassembly they should be reinstalled as nearly as possible in their original positions.

h. Clean all metal parts in dry cleaning solution and dry with a lintfree cloth.
i. Wash seals in clean hydraulic fluid.
j. Repair or replace all worn or damaged parts.
k. Brake discs which have dished (in excess of 1/16 inch) may cause disc clips to become disengaged and should be replaced.
l. Brake discs which have worn to a thickness of .225 inch or less should be replaced.
m. Inspect the brake housing for wear or damage. Any small nicks or corrosion should be polished out with fine sandpaper (400 grit) and repainted with two coats of zinc chromate primer followed by two coats of of aluminum lacquer.
n. Inspect the cylinder walls and contacting surfaces of the piston for damage. Small scratches and nicks can be removed by polishing with fine sandpaper (400 grit).

CAUTION

Never mix new and used brake linings. If necessary to reuse worn linings, install them in their original positions.

o. Lubricate the cylinder walls of the brake housing and the contacting surfaces of the pistons with a thin coat of MIL-G-7711 grease (or equivalent).
p. Lubricate the piston O-ring seals with MIL-G-7711 grease (or equivalent) and install on the pistons.
q. Install the pistons in the brake housing with the small diameter entering the housing first.
r. Install the thicker brake linings on the piston side of the brake housing with the part number (molded in the lining) facing the pistons so that the smooth side will be in contact with the disc.

s. Install the thinner brake linings on the anvil side of the brake housing with the part number (molded in the lining) facing the anvil, so that the smooth side of the lining will be incontact with the disc.
t. Install the Truarc rings carefully to insure that they are properly seated.
u. Install the brake disc between the brake linings.
v. Install the inlet gasket on the inlet plug and screw the plug into position in the housing if the unit is to be stored.
w. Install the bleeder gasket, bleeder adapter, bleeder valve, washer and bleeder screw completing the reassembly.

REPLACEMENT OF BEECH BRAKE LINKINGS (D-7209 through D-8460 except D-7213, D-7214 and D-7923)

a. Remove the wheel assembly.
b. Cut the safety wire and remove the hinge bolt, washer, and sleeve from the brake housing and torque arm.
c. Remove the brake assembly from the torque arm.
d. Remove the anvil lining by unscrewing the attaching brass screw.
e. Remove the piston lining by lifting it straight up from the brake housing.
f. Remove the self-locking screw and pry out the piston lining.
g. Blow out the piston lining recess to remove any loose foreign matter.
h. Attach the new piston lining with the self-locking screw.
i. Secure the new anvil lining to the anvil backplate with the attaching brass screw.
j. Secure the torque arm to the brake housing with the hinge bolt, sleeve, and washer. Tighten the hinge bolt until approximately five pounds of force is required to pivot the brake assembly.
k. Secure the hinge bolt with safety wire.
l. Pack the wheel bearings and install the wheel. Safety the axle nut when the wheel rotates freely without side motion.

CAUTION

When installing the wheel, carefully guide the ring disc of the main wheel into position between the brake linings to avoid damaging the linings. The piston lining must be in the completely released position during this operation.

m. Apply the brake several times to seat the parts, then with the brake released, check the wheel for free rotation.

DISASSEMBLY OF BEECH BRAKES (D-7209 through D-8460 except D-7213, D-7214 and D-7923)

a. Remove the wheel from the aircraft.
b. Disconnect the hydraulic brake line from the brake fitting and drain the brake fluid from the brake cylinder, while taking the precautions necessary to avoid getting brake fluid or other oil on the brake linings.
c. Remove the bolts securing the brake and torque arm spacer to the torque flange of the landing gear.
d. Remove the hinge bolt, washer, and spacer securing the torque arm to the brake assembly.
e. Remove the nuts and washers from the two bolts securing the back plate subassembly, lining guide, and spacer to the brake housing, and separate the back plate and spacer from the housing while removing the piston lining and carrier.
f. Remove the attaching screw to separate the piston lining from the carrier.
g. Release the anvil lining from the anvil by removing the retaining screw.
h. Remove the flat head screw, washer, and nut that anchor the lining guide to the brake housing.
i. Remove the piston from the housing and the O-ring seal from the piston.

NOTE

It is recommended that the O-ring seal be replaced at each overhaul; however, if the seal is to be reinstalled upon reassembly of the wheel, its position with relation to its seat should be carefully indicated on a clean sheet of paper. The seal should then be carefully removed and placed on the paper as indicated by the markings so that it can be reinstalled as nearly as possible in its original position.

j. Remove the bleed screw and washer from the brake housing.

REASSEMBLY OF BEECH BRAKES (D-7209 through D-8460 except D-7213, D-7214 and D-7923)

a. Apply a thin coat of MIL-G-7711 grease (or its equivalent) to the cylinder wall of the housing and to the contacting surfaces of the piston.
b. Lubricate the piston O-ring seal with MIL-G-7711 grease (or its equivalent) prior to installing it on the piston.
c. When installing the piston in the brake housing, position it so that the wider surface adjacent to the O-ring groove will be toward the lining.
d. Align the lining guide with the brake housing and secure it in place with the retaining screw, washer, and nut.
e. Anchor the anvil lining to the anvil with the retaining screw.
f. Anchor the piston lining to the carrier with the attaching screw.
g. With the spacer properly aligned with the brake housing and the piston lining and carrier held in position on the spacer and guide, insert the two attaching bolts through the brake housing, guide, spacer, and back plate.
h. With a washer in place under each bolt head and nut, apply a torque of 160-190 inch-pounds to the nuts, locking in place the bolts that secure the brake housing and back plate together.
i. Insert the bleeder screw through the washer and into the housing.
j. After lubricating the hinge bolt sleeve with MIL-G-7711 grease (or its equivalent), secure the torque arm to the brake housing with the sleeve, washer, and hinge bolt. Torque the hinge bolt to 50 inch-pounds dry torque and secure with safety wire.
k. After aligning the torque arm spacer and torque arm of

the brake assembly on the backside of the landing gear torque flange, secure the brake assembly in place with the four attaching bolts, washers, and nuts.
l. Connect the hydraulic line to the elbow on the brake housing, and bleed the brake. The back fill method of pressure filling from the brake bleeder screw is recommended.
m. Install the wheel on the landing gear axle.

CAUTION

When installing the wheel, carefully guide the ring disc into position between the brake linings to avoid possible damage to the linings. This means that the brake piston must be forced far enough back into the recess of the brake housing for the piston lining to clear the ring disc during this operation.

n. Apply the brake several times to seat the parts.
o. Release the brake and check to be sure that the wheel rotates freely and has no side motion.

DISASSEMBLY AND REASSEMBLY OF BEECH BRAKES (D-7923, D-8461 through D-9192)

For disassembly and reassembly of brakes on the above aircraft, refer to BEECHCRAFT Supplementary Publications Manual P/N 98-33281B or subsequent.

DISASSEMBLY AND REASSEMBLY OF BEECH BRAKES (D-9193 and after)

For disassembly and reassembly of brakes on the above aircraft, refer to BEECHCRAFT Supplementary Publications Manual P/N 98-35012 or subsequent.

FIRESTONE BRAKE OVERHAUL.

Overhaul and repair will consist of the replacement of component parts as required. If the brake has not been giving satisfactory service and the trouble is not attributed to faulty bleeding or a malfunctioning master cylinder, the brake should be removed and disassembled for inspection.

The brake may be disassembled after removal from the axle as follows:

a. Release the lock washer fingers from the screw slots and remove the six 1/4 inch fillister head screws and washers.
b. Remove the stationary disc from the brake assembly and inspect the copper friction surfaces. If the friction surfaces are excessively scored, concaved more than .016 inch, or worn down to the rivet heads, the stationary disc should be replaced.
c. Remove the lining disc from the brake assembly and inspect it for structural cracks and wear. Any sign of structural failure is cause for replacement, but hair-like heat checks which are usually present should not be confused with structural cracks. If the lining is worn to the bottom of the radial grooves it should be replaced.
d. Remove the retraction spring and inspect it for proper tension and damage. If the tension fingers are warped, cracked, or broken, the spring should be replaced.
e. Remove the floating disc and inspect the copper friction surfaces as was done for the stationary disc in step d.
f. Remove the pusher ring and inspect it for damage.
g. Remove the seal from the gland assembly by applying very low air pressure to the hydraulic inlet. Caution should be used to guide the seal as it comes out so that it does not bend the metallic seal backing ring. If the metal backing ring is not perfectly flat, and cannot be reformed by hand so that it is perfectly flat, a new seal must be used. The lips of the seal should be sharp with no nicks or scratches, and the sidewalls should diverge so that when the seal is installed, wall pressure will be caused by the compression of the outer seal lip and extension of the inner seal lip. If the sidewalls are straight, so as to make a right angle with the backing ring, or if the seal is damaged in any way, it should be replaced.
h. Inspect the gland casting for evidence of damage, such as scratches in the sidewalls of the gland cavity or accumulation of dirt. The gland cavity should be cleaned with alcohol or carbon tetrachloride. Scratches less than .010 inch may be removed by using very fine emery cloth. If scratches exceed .010 inch the gland assembly should be replaced.

After the necessary repairs have been made, the Firestone brake may be assembled by reversing the procedure used for disassembly. Care must be taken to prevent damaging the seal as it is installed in the gland assembly. After the lips of the seal have been started into the gland cavity, the pusher ring should be used to press the seal into the cavity until the seal touches bottom. When the brake has been assembled, check the clearance between the floating disc and pusher ring for a minimum clearance of .005 inch. After pressure has been applied to the brake and released there should be sufficient clearance for the disc to rotate freely.

The brake should be installed on the axle and bolted to the torque plate in such a position that the bleeder valve is approximately 45° aft of the vertical centerline of the shock strut and below the horizontal centerline of the axle.

A lining giving proper performance for maximum life should present a dark glazed surface, and the mating copper surfaces should present a dark, burnished appearance.

TIRE DISMOUNTING.

a. Completely deflate the tube by removing the valve core.
b. Loosen the tire beads from both rim flanges by using flat tire irons or a rubber mallet. The application of pressure on the sidewall of the tire by the feet or hands will aid in this operation.
c. Remove the locking nuts and pull out both sections of the wheel from the tire.

NOTE

Exercise care to prevent damaging the tire beads or wheel flanges.

TIRE MOUNTING.

Thoroughly examine the tire and wheel for damage or defects. Remove the burrs and nicks on the wheel by filing. After filing, brush the exposed areas of the wheel with Dow No. 1 Solution. This solution was developed and formulated by the Dow Chemical Company, Midland, Michigan and may be prepared by mixing 3 ounces of sodium dichromate with 3/16 pint of nitric acid (Specific gravity 1.42) and water sufficient to make one pint of solution. After one minute, wash off the Dow No. 1 Solution with clear water. Allow the surfaces to dry, then prime the treated areas with two coats of zinc chromate primer.

WARNING

When preparing the Dow No. 1 Solution, do not add water to the acid, but add acid to the water. Water added to the acid may cause a violent chemical reaction, and severe injury may result.

WHEEL DISASSEMBLY AND ASSEMBLY.

Before disassembling either the main wheel or the nose wheel completely deflate the tire, thus avoiding the possibility of bodily injury. Then break the tire beads away from the wheel flanges and remove the self locking nuts and washers from the wheel bolts. Separate the wheel halves and remove the tire.

Inspect the wheel halves for damage or cracks. If cracks or excessive corrosion are evident, the wheel should be replaced. Small nicks or gouges may be blended out and polished with fine (400 grit) sandpaper. Thoroughly clean these surfaces and paint with two coats of zinc chromate primer and two coats of aluminum lacquer. Assemble the wheel in the reverse order of disassembly, making certain the "O" ring seal (installed with tubeless type wheels) are lubricated with MIL-G-81322 bearing grease or equivalent. Install the "O" ring in the brake side wheel half. Torque the wheel half bolts to 140 inch-pounds.

NOTE

When installing the wheel to the axle, rotate the wheel while adjusting the axle nut to assure proper seating of the wheel bearings and maintain free movement of the wheel with no side motion.

a. To facilitate installation and prevent chafing of the tube, dust the interior of the casing with tire talc. Insert a fully deflated tube into the casing, install valve core, and inflate until the tube is just rounded out. To assure the proper wheel balance, align the balance mark on the tube with the red dot on the tire; on tubes having no balance mark, place the valve at the red dot.

b. Place the wheel half with the valve hole into the tire, and push the valve of the tube through the valve hole in the wheel.

c. Install the other section of the wheel, holding the valve in position. Care must be exercised to avoid pinching the tube during this operation.

d. Secure the wheel sections by tightening the retaining nuts to equal torque.

e. Inflate the tube sufficiently to seat the tire beads then deflate completely and reinflate. This operation will help to prevent pinching and wrinkling of the tube, and eliminate stretching of any portion. See Section 2 for tire servicing.

WARNING

Use no lubricant on the tire beads or on the wheel to aid installation as this may cause tire slippage on the wheel.

TUBELESS TIRES

Airplane serials D-5986 thru D-7724 were originally delivered with side inflation tubeless tires on both the nose and main gears. The wheel is especially designed for the sidewall inflating tubeless tire and cannot be used with tube type tires. To convert the wheel of the sidewall inflating tubeless tire to an inner tube type wheel, see CONVERTING WHEELS FOR INNER TUBES in this Section.

The following are servicing procedures for inflation, dismounting and mounting tubeless tires.

INFLATION

Inflation of the tubeless tires may be accomplished as follows:

1. Lubricate the end of the inflating needle by pressing it against the lubrication pads in the carrying case.
2. With the end of the inflating needle, work glycerine around the guide hole of the tire valve located in the side of the tire.

CAUTION

The needle and the valve opening should be well lubricated before the needle is inserted. Never insert the needle into a dry valve.

3. Insert the inflating needle into the tire valve opening with a rotating motion.

CAUTION

Do not force the needle; if the needle does not enter easily, relubricate needle and valve.

4. After the needle is seated in the tire valve, inflate in the usual manner. See tire inflation pressure in Section 2.
5. After the tire has been inflated to the correct pressure, remove the inflating needle and place it in its carrying case.

DISMOUNTING

The tires may be removed from the wheel assemblies as follows:

1. Remove the wheel assembly from the airplane in the usual manner.
2. Insert the inflating needle into the tire sidewall valve as described in the inflating procedure and fully deflate the tire.

WARNING

Make certain the tire is fully deflated before disassembling the wheel.

3. Break the beads loose from both flanges by applying even pressure around the entire circumference of each sidewall with suitable tire tools.

CAUTION

Do not pry between the flange and bead with tools; the wheel or tire bead may be damaged, destroying its sealing qualities.

4. Remove all wheel bolts and nuts and remove both wheel halves from the tire.

MOUNTING

1. Inspect and clean the wheel, wheel seal and tire.
2. Lubricate the wheel seal with MIL-G-81322 grease and place it on the wheel half which has the seal groove.
3. Place the wheel half with the seal in the side of the tire opposite the sidewall valve, and insert the other wheel half in the side with the sidewall valve.
4. Install the bolts with the heads in the wheel half opposite sidewall valve; draw up the bolts evenly until the wheel halves seat.
5. Tighten the nuts, marking two or more rounds and applying equal torque on each round. Torque main wheel nuts to 140 inch-pounds, and nose wheel nuts to 83 inch-pounds.
6. Inflate the tire as described in the inflating procedure to 45 psi to seat beads, then reduce to operating pressure.
7. Install the wheel assembly on the airplane in the usual manner.

NOTE

Install the nose wheel so the bolt heads are on the left hand side of the airplane.

CONVERTING WHEELS FOR INNER TUBES

Airplanes originally delivered with sidewall inflating tubeless tires, on the main and nose gear wheels, can be converted so they may be used with inner tubes.

CONVERTING MAIN GEAR WHEELS (GOODYEAR P/N 9532135) (Figure 4-1S)

In wheel half P/N 9524232 (the half not containing the brake):

1. Locate the hole for the valve half way between two bolt holes (30° from either one) and 1-5/32 inches from the centerline of the wheel.

2. Drill a hole .625 ±.007 inch in diameter at an angle of 22° 50", as shown in Figure 4-1S, from the centerline. Then add a 5/64 inch x 45° chamber at the top of the hole.

3. Before reassembling the wheel, treat the machined surfaces with two coats of zinc chromate primer followed by two coats of aluminum lacquer. The letter "R", 1/8 inch high, should be stamped behind the sub assembly and assembly numbers to show that the wheel has been modified.

CONVERTING NOSE GEAR WHEELS (GOODYEAR P/N 9532102) (Figure 4-1T)

Both wheel halves are modified in the nose wheel, one half with a cutout in the inner flange and the other half with a hole through the side in addition to the cut-out in the flange.

1. In wheel half P/N 9524193, locate the large hole in the flange .275 + .005 - .000 inches from the inner edge and half way between two bolt holes (60° from each). Do not drill the hole.

2. Bolt the two wheel halves together. After drilling a pilot hole, drill a 5/8 inch hole vertically through the rim.

3. Disassemble the wheel and file off the corners at the inner edge of the wheel half, P/N 9524193.

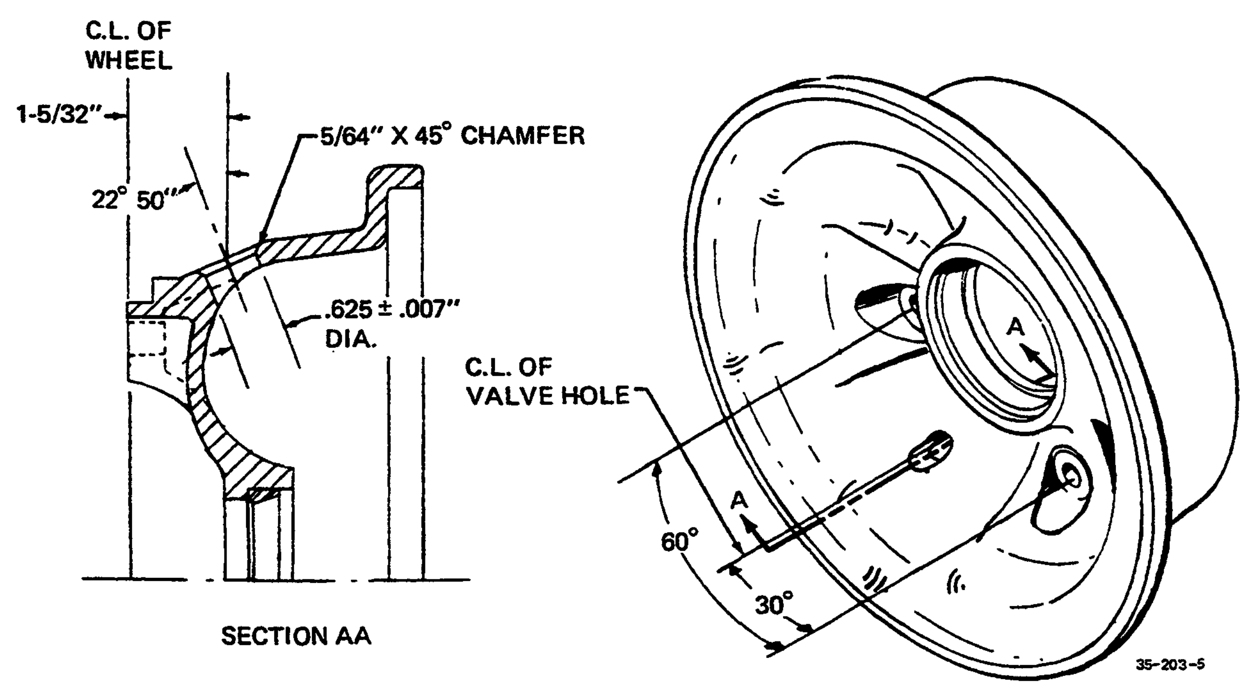


Figure 4-1S. Converting Main Wheel Gear

4. Mark the location for the valve stem hole in the side of the wheel half, P/N 9524192, 1-59/64 inches out from the center of the axle and in line with the center of the hole just drilled in the rim.

5. After first drilling a pilot hole, drill the 3/8 inch valve stem hole parallel to the axle.

6. Before reassembling the wheel, prime the machined surfaces and re-mark the wheel part numbers. Refer to CONVERTING MAIN GEAR WHEELS under step 3 for modification instructions.

REMOVING AND INSTALLING THE CABIN DOOR TELEFLEX CABLE

a. Remove the three machine screws on the door upper facing.

b. Remove the door upholstery panels.

c. Remove the bolt securing the teleflex cable to the upper door latch.

d. Remove the bolt securing the lower end of the cable to the lower latch actuating arm.

NOTE

Attach a length of safety wire to the lower end of the cable before removing it from the door and leave the wire in the cable track as a means of positioning the new cable.

e. Grasp the upper end of the cable with vise-grip pliers and pull it through the upper latch opening. Remove the safety wire from the cable.

NOTE

Braze or silver solder two AN340-832 nuts to new AN742-4 clamps.

f. Prior to installing the upper clevis, place one of the newly prepared clamps between the shoulders on the lower end of the cable housing and attach the safety wire remaining in the door to the upper end of the cable housing.

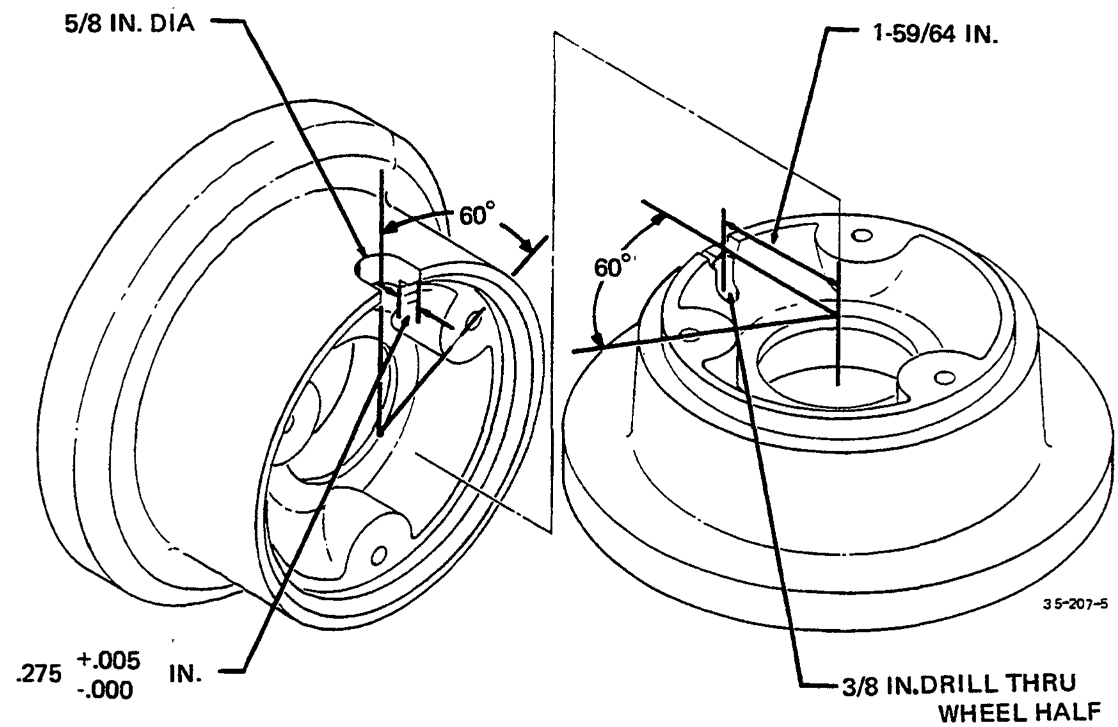


Figure 4-1T. Converting Nose Gear Wheel

g. Pull the housing into position by gripping it with vise-grip pliers below the shoulder at the lower end. Pull on the safety wire attached to the upper end while tapping on the vise-grip pliers to drive the housing through the door channel.

h. Align the lower clamp with the hole in the door facing and secure it with a machine screw, then install the upper clamp in place on the housing and secure it in the same manner.

i. Install the upper clevis and attach the cables to the upper and lower latch connections.

j. Adjust cable tension by varying the cable length at either latch connection. Refer to Section 3 for rigging instructions.

EMPENNAGE REMOVAL AND INSTALLATION

Structural integrity of the C35 through V35B-TC Bonanza airpanes is improved by the installation of structural reinforcement kits which provide additional support to the stabilizer leading edge. These kits are to be installed on the aft fuselage at the leading edge of each stabilizer, and do not require removal of the stabilizer for installation.

The kits, as specified in BEECHCRAFT Mandatory Service Bulletin No. 2188 or subsequent issue, are as follows:

Model	Kit No.
C35, D35, E35, F35, G35	35-4016-3S
H35, J35, K35, M35	35-4016-5S
N35, P35, S35, V35 , V35TC, V35A, and V35-TC	35-4016-7S
C35, D35, E35, F35 , G35	*35-4016-9S

*This kit is required on airplanes which are equipped with an additional stabilizer access plate. The additional access plate is located between the forward and rear stabilizer spars.

ELEVATOR/RUDDER REMOVAL (Figures 4-1U and 4-1V)

NOTE

The elevator/rudder control surfaces will be referred to as ruddervator.

Before disassembly, check the ruddervator for movement perpendicular to the hinge line. If any movement exists find the cause of the looseness. Any hinge bolt, bearing or bushing showing signs of wear must be replaced.

a. Remove the screws holding the tail cone in position.

b. Remove the tail cone and disconnect the navigation light wire.

c. Remove the aft fuselage side and bottom panels.

d. Remove the 5/16-inch bolt from the push-pull tube.

e. Working inside the open inspection hole on the left side, release the tab cable tension, then fasten the ruddervator tab cables so that no slack in the cables will be transmitted beyond the affected tab.

NOTE

Identify the cables so that they may be reinstalled in the proper location.

f. Disconnect the elevator tab cables at the tab.

g. Remove the guide block located on the tab cable at the front of the ruddervator.

h. Remove the cotter pins from the hinge bolts.

i. Remove the nuts from the three hinge bolts.

NOTE

Support the ruddervator so that it will not fall or twist when the hinge bolts are removed.

Note the position of the washers in each hinge assembly. Tag each hinge assembly as to the location of the washers. Refer to Figures 4-1U or 4-1V.

j. Remove the bolts from the hinges.

k. Remove the two bonding jumpers which are attached near the hinges.

l. Remove the ruddervator.

ELEVATOR/RUDDER INSTALLATION (Figures 4-1U and 4-1V)

WARNING

Airframe vibration may be caused by worn elevator hinges, misthreaded trim tab hinges, loose stabilizer attachment or any improper installation which will allow free play.

1 STABILIZER
2 BOLT
3 WASHER
4 ELEVATOR (RUDDERVATOR) INBOARD HINGE SUPPORT
5 NUT
6 WASHER
7 WASHER
8 TORQUE FITTING

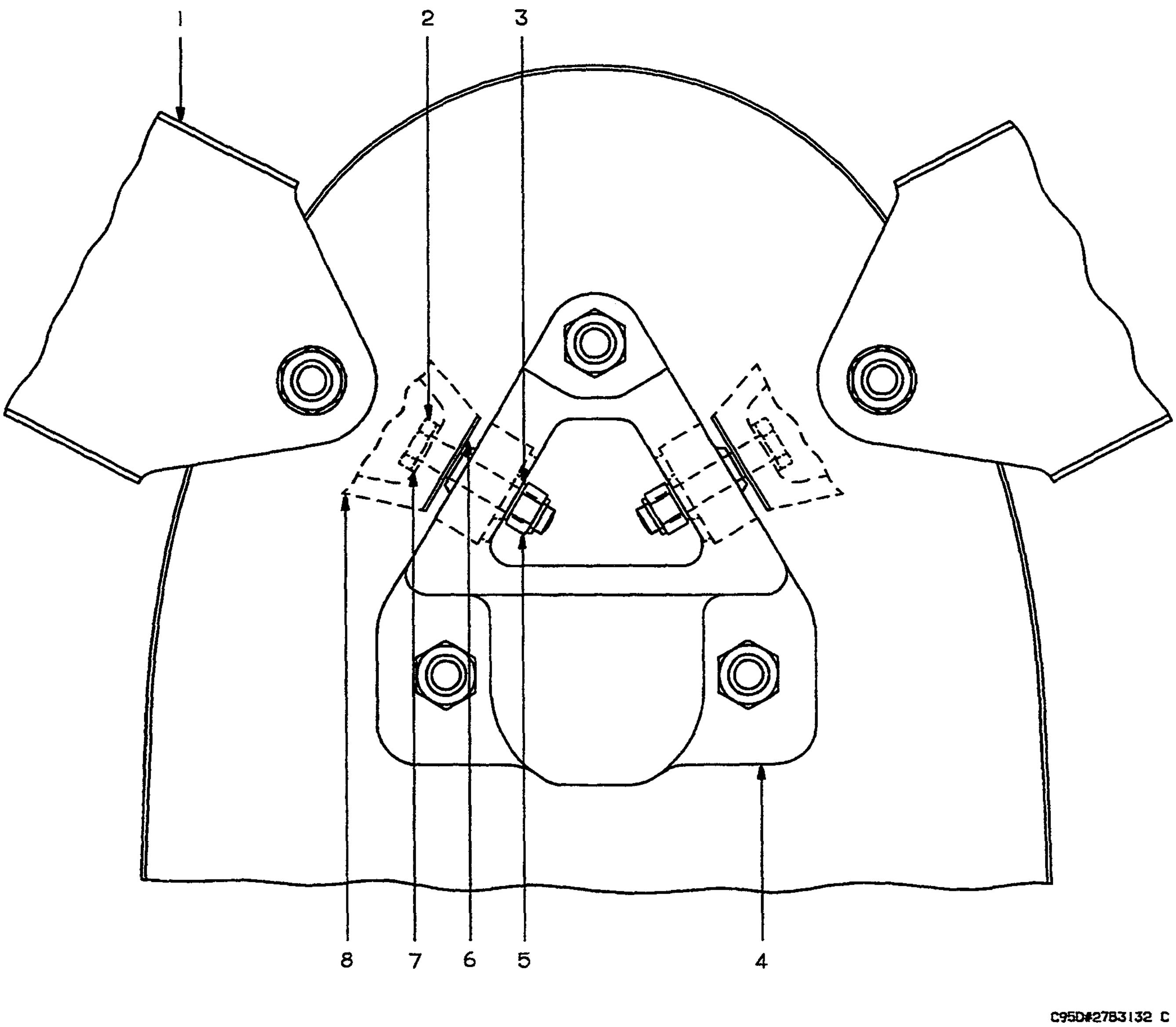


Figure 4-1U. Ruddervator Installation (D-1 through D-2680)

1 STABILIZER
2 BOLT
3 WASHER
4 ELEVATOR (RUDDERVATOR) INBOARD HINGE SUPPORT
5 NUT
6 WASHER
7 WASHER
8 TORQUE FITTING

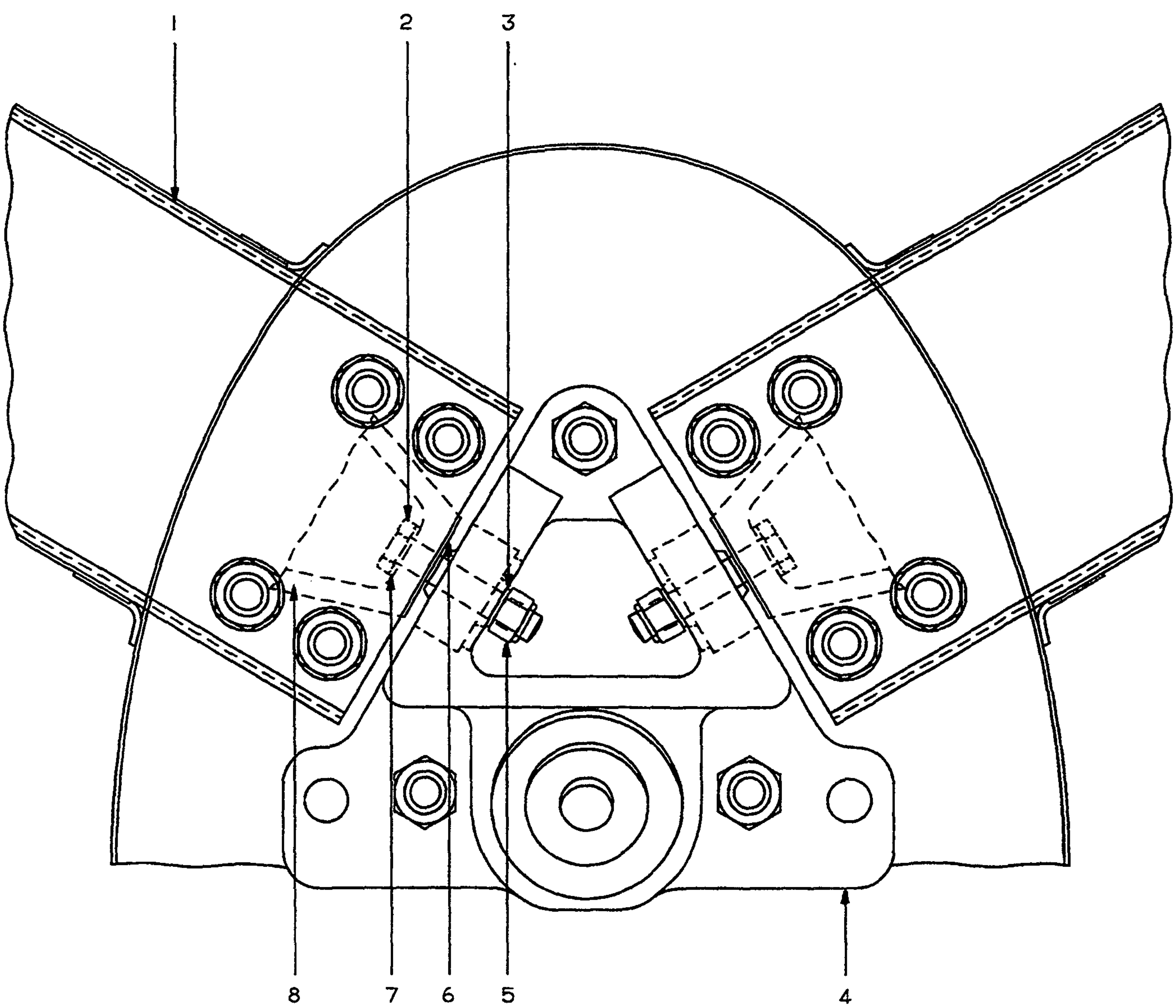


Figure 4-1V. Ruddervator Installation (D-2681 and after)

NOTE

The elevator/rudder control surfaces will be referred to as ruddervator.

a. Support the ruddervator in its proper position. Make sure the hinge bushings are installed in the hinge halves on the stabilizer.

NOTE

Any hinge bolt, bearing or bushing showing signs of wear must be replaced. The maximum wear for the inboard bearing is .001-inch radial and .025-inch axial.

b. Install the bonding jumpers at the center and outboard hinges (two 105090D032-1D washers go between the screw head and skin).

c. Using the notes made during removal, install the washers and bolts on the hinge assemblies as follows:

1. Install the bolts with the nuts toward the fuselage.

2. The inboard hinge requires two AN960-416L and one AN960-416 washers. Install one AN960-416L washer under the bolt head and one between the torque fitting and the bulkhead support fitting. One AN960-416 washer should be installed under the nut.

3. Torque the nut to 30 to 40 inch-pounds, it may be tightened up to 70 inch-pounds to align the cotter pin holes.

d. Install the nuts on the center and outboard hinge bolts. The center and outboard hinge bolt each require two AN960-10 washers under the nut. If the bolt grip length is too long one additional washer may be added under the nut.

e. Torque the nuts to 20 to 25 inch-pounds, they may be tightened up to 40 inch-pounds to align the cotter pin holes.

f. Install the cotter pins in all three hinge bolts.

g. Install the guide block for the tab cable at the front of the ruddervator.

h. Connect the tab cables to their respective tab horn.

NOTE

The bolt connecting the cable to the tab horn should be tight enough to prevent rattle, but loose enough to swivel. If the bolt is too tight, the tab control system may bind.

i. Remove the fasteners which were installed to prevent cable slack from being transmitted to the rest of the tab system.

j. Install the 5/16-inch push-pull tube bolt.

k. Install the aft fuselage inspection panels.

l. Connect the tail light wire and install the tail cone.

NOTE

Check for proper ruddervator and trim tab travel after installation is complete. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

ELEVATOR TRIM TAB REMOVAL

a. Remove the screws from the tail cone.

b. Disconnect the electrical wires and remove the tail cone.

c. Remove the cotter pin from the control cables clevises and trim tab.

d. Remove the nuts, washers and bolts from the control cable clevises.

e. Support the trim tab so that it will not fall or twist when the hinge pin is removed.

f. Remove the safety wire from the trim tab hinge pin.

g. Unclip the hinge pin.

h. Pull the hinge pin out and remove the elevator trim tab.

ELEVATOR TRIM TAB INSTALLATION

a. Support the elevator trim tab in position on the ruddervator.

b. Install the trim tab hinge pin. Refer to Figure 4-1W.

c. Clip the hinge pin in position and safety wire.

d. Connect the control cable clevises to the trim tab with the proper bolts, washers and nuts.

NOTE

The clevises should be tight enough that they will not rattle but loose enough so that they will swivel. If the clevises are too tight, binding may occur.

e. Install the cotter pins in the clevis bolts.

f. Connect the electrical wires and install the tail cone.

NOTE

Check that the trim tab moves in the correct direction as indicated by movement of the controls.

ENGINE REMOVAL

a. Remove the propeller and cowling and disconnect the engine controls, plumbing and wiring harness.

b. Support the tail. Hoist the engine enough to take the strain off of the shock mount bolts.

c. Remove the shock mount bolts and finish hoisting the engine. Replace the shock mounts at engine change.

NOTE

When the optional TSIO-520-D turbocharged engine is installed in the Bonanza, the turbocharger assembly, exhaust system and air induction system must be removed before the engine can be removed. The turbocharger system diagram (Figure 4-1Y) and exhaust and air induction diagram (Figure 4-1X) may be used as a guide for removal and installation of the turbocharger unit. When the engine is ready for removal, position the engine slightly down in front and hoist the engine slowly, making certain that the engine crankshaft flange clears the nose cowl ring. As the engine is hoisted away from the nose cowl, check to see that all wires, hose and lines have been disconnected.

CAUTION

The magnetos should be considered hot when the ground lead is disconnected. To avoid accidental starting of the engine, ground the magnetos to the engine case or disconnect the spark plug leads.

APPROVED ENGINE INSTALLATION

Torque the shock mount bolts to 300/350 inch-pounds when installing the engine.

The following chart indicates the approved engines for the different Bonanza models and will serve as a guide in determining the approved interchangeability of engines used in the Bonanzas prior to serial D-2681.

Three modifications of the basic Continental E-185 engine have been used in the Bonanzas. As indicated by the chart, it is permissible to install an E-185-1, E-185-8 or E-185-11 engine in the model 35; however, it is not permissible to install an E-185-1 engine in models B35 and C35. Also, although the E-185-8 and E-185-11 engines are approved for 205 horsepower, this high horsepower cannot be used when the engines are installed in models 35, A35 and B35 since the engines must be used in accordance with the limitations set fourth in the airplane flight manual.

The E-185-11 engine is the latest modification of the basic E-185 engine. The E-185-11 engines are equipped with improved engine mount legs which require different engine mount bushings. They are also equipped with E80 starter gearing and 35-ampere generators; therefore, it will be necessary to make certain changes to accomodate the installation

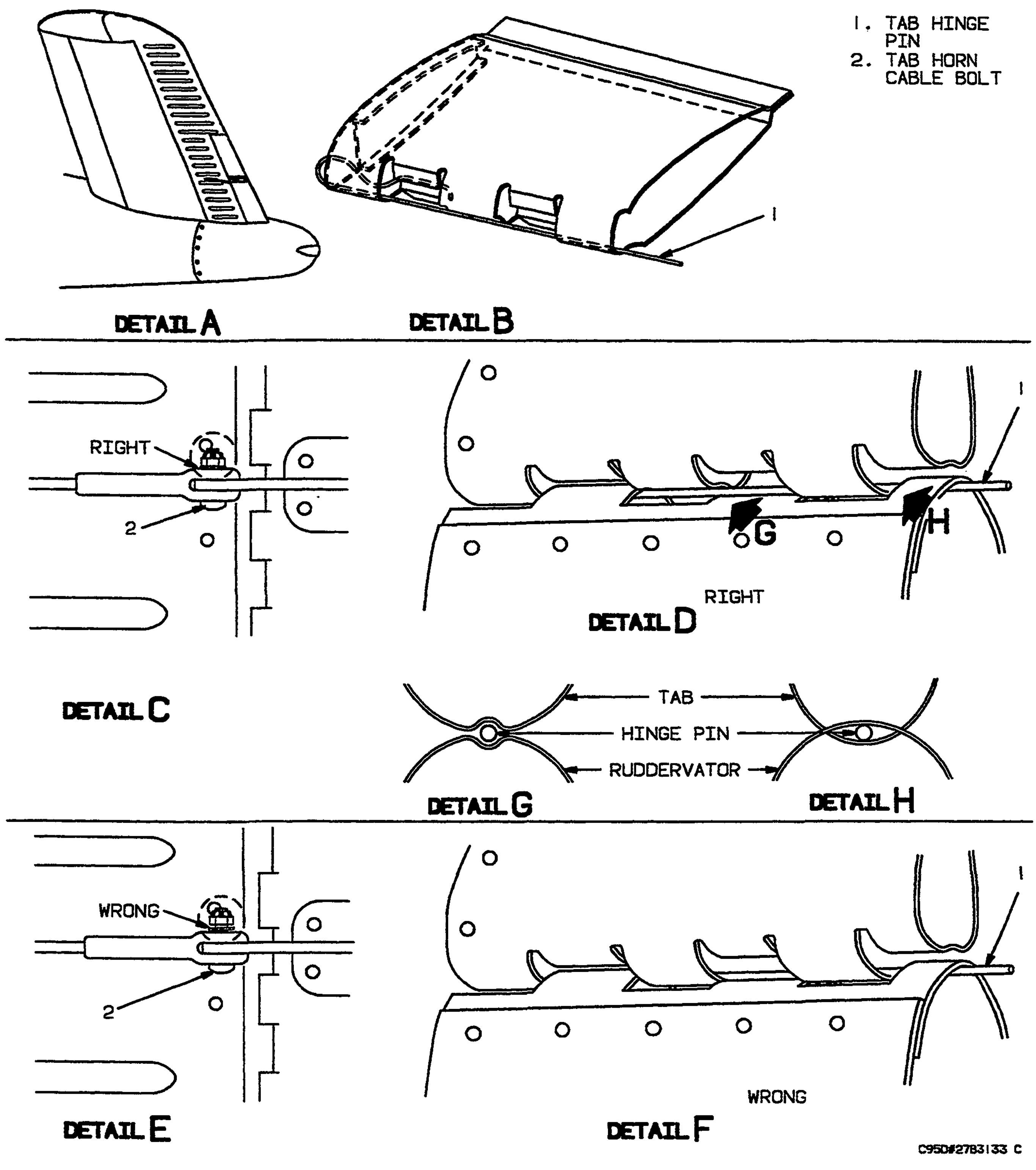


Figure 4-1W. Elevator Trim Tab Installation

ORIGINAL ENGINES

35	A35	B35	C & D35	E & F35	G35	H35
E-185-1	E-185-1	E-185-8	E-185-11	E-185-11 E-225-8	E-225-8	O-470-G

J, K & M35	N & P35	V35TC V35-ATC & V35-BTC	S35 V35 V35A & V35B	V35B (Serials D-10179 and after)
IO-470-C	IO-470-N	TSIO-520-D	IO-520-B IO-520-BA	IO-520-BB

If IO-520-BA engines are not available, IO-520-BB engines may be used when the proper fuel pump is installed.

APPROVED ALTERNATE ENGINES

35	A35	B35	H35
E-185-8 E-185-11	E-185-8 E-185-11	E-185-11	O-470-G-CI

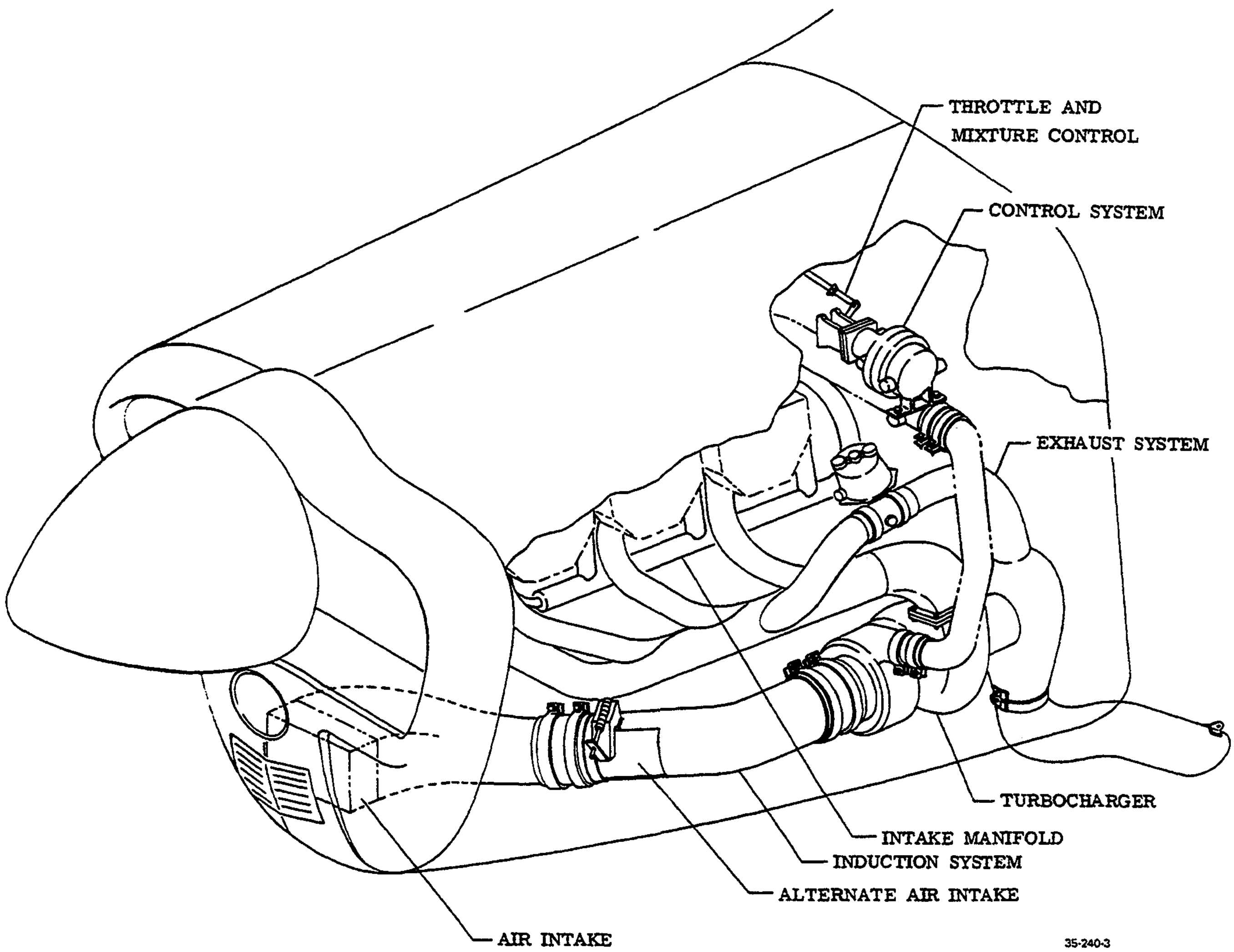


Figure 4-1X. Turbocharger Exhaust and Air Induction System

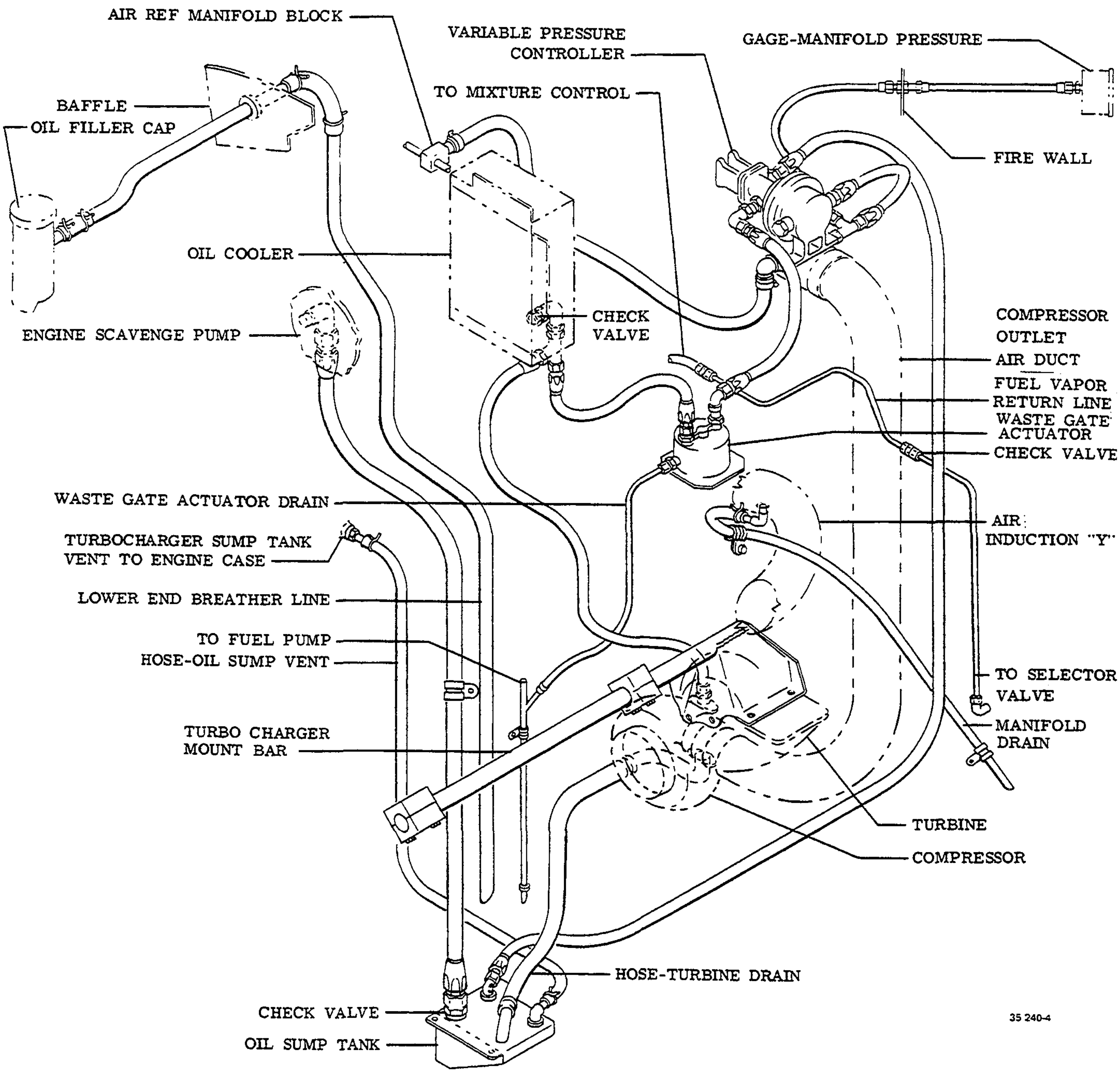


Figure 4-1Y. Turbocharger System

Code	Part No.	Name	No. Req.
ABCDE	J-3049-17	Mount Bushing	8
ABCDE	105739-X0446-0563-1-869	Spacer	4
ABCDE	105090-CR-106-7-220	Washer (rear mounts only forward side)	2
ABCDE	AN7-42A (M)	Bolt (front mounts)	2
ABCDE	AN7-30A (M)	Bolt (LH rear mount)	1
ABCDE	AN7-31A (M)	Bolt (RH rear mount)	1
ABCDE	AN960-716	Washer	4
ABCDE	AN365-720	Nut	4
CDE	35-415377	Mount Bracket (rear)	2
ABCDE	35-369001-16	Voltage Regulator	1
DE	35-369005	Starter (E80)	1
DE	(Wiring changes necessary for E80 Starter)		

CHANGES REQUIRED FOR ENGINE INSTALLATION

of E-185-11 engines. The above chart lists the changes and parts per airplane which will be necessary for specific serials prior to D-2681.

The following code to the above chart may be used to determine the changes required for any specific serial.

Code	Mode	Serial
A	B35	D-2201 through D-2680
B	A35	D-2141 through D-2200
C	A35	D-1823, D-1950 through D-2140
D	A35	D-1501 through D-1949 except D-1823
E	35	D-1 through D-1500

The O-470-G-CI as indicated, is approved for the H35. This engine is a basic O-470-G which has a fuel injection conversion kit installed.

ENGINE MOUNTS

The shock mounts on airplanes prior to D-4866 should be rotated 180 degrees after each 100 hours of operation. On airplanes D-4866 and after, remove the shock mounts after each 100 hours of operation and install them on opposite sides of the engine, since they cannot be rotated. Inspect the engine mount brackets for security. Torque all shock mount bolts to 300/350 inch-pounds.

REMOVAL OF MAGNETOS

a. Remove the four screws retaining the high tension outlet and remove the outlet from the magneto.

CAUTION

The internal, automatic grounding devices used on the original Scintilla S series magnetos have proved unreliable in service and current production magnetos do not have this feature. To be safe, treat all S series magnetos as hot whenever the ground lead is disconnected. To ground the magneto, connect a wire to the switch lead of the magneto and ground the wire to the case.

b Remove the grounding wire from the magneto.
c. Remove the two magneto retaining nuts and washers and pull the magneto away from the accessory case.

INSTALLATION OF MAGNETOS

Refer to INSTALLATION AND TIMING OF MAGNETOS in Section 3.

POSITIONING THE THREE BLADED PROPELLER

Positioning, or indexing the three bladed propeller (P/N PHC-A3VF-4/V8433-2R or -4R), installed as optional equipment on the S35 Bonanza, and after, is critical. Since the dowels on the propeller are symmetrical, it is possible to install the propeller exactly 180° off of its required position on the hub. To make sure that the propeller is properly indexed, it should be installed with one blade pointing down when the number 1 cylinder is at the top dead center position. After installation of the propeller, check that the spinner is located to assure proper clearance of the propeller with respect to the upper and lower cowl by maintaining .28 + .10 or − .15 inch clearance at the closest point on the cowl to the aft end of the spinner. Torque AN8 propeller installation bolts to 65 ± 5 foot pounds.

REPLACEMENT FUEL LEVEL TRANSMITTERS IN THE MAIN FUEL CELLS

When installing replacement fuel level transmitters, P/N 95-380012-5 inboard, and P/N 95-380012-7 outboard, the replacement inboard transmitter has been changed from a three stud to a two stud electrical connection, and the replacement outboard transmitter has been changed from a two stud to a one stud electrical connection. Either the inboard transmitter, outboard transmitter, or both may be installed by using the following transmitter wiring diagram combinations as shown by Figures 4-2, 4-3, 4-4, and 4-5.

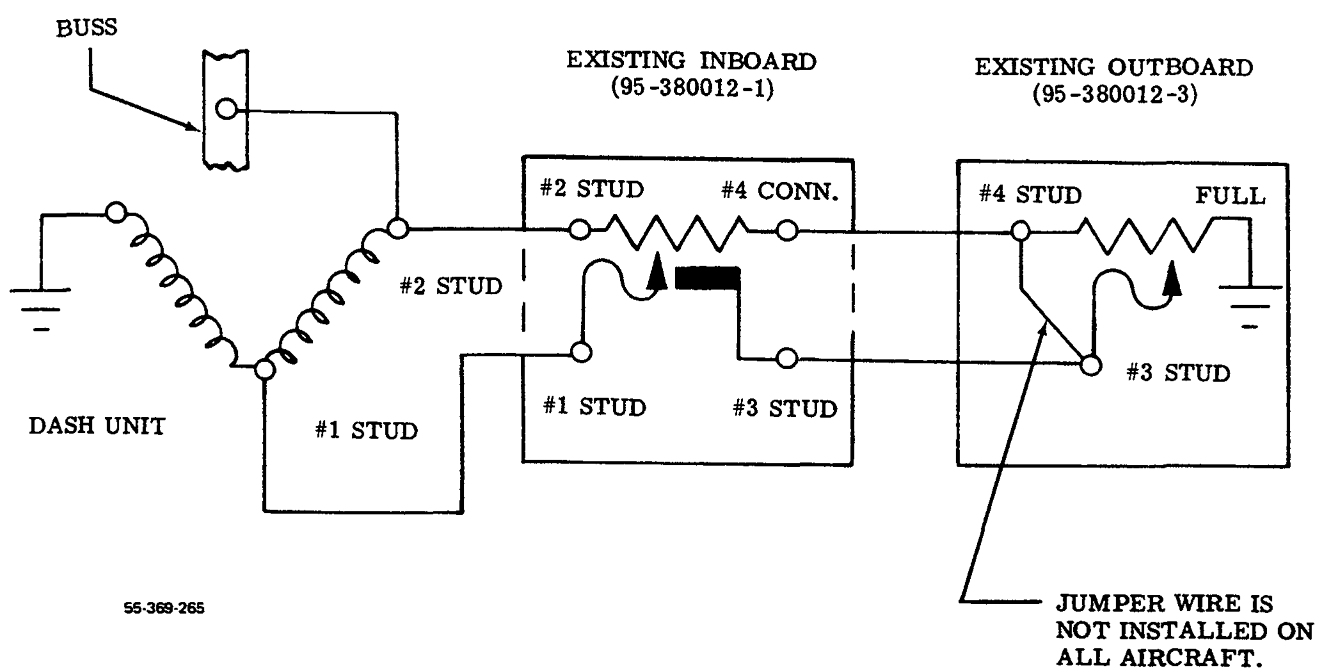


Figure 4-2. Wiring Diagram (Original Transmitters)

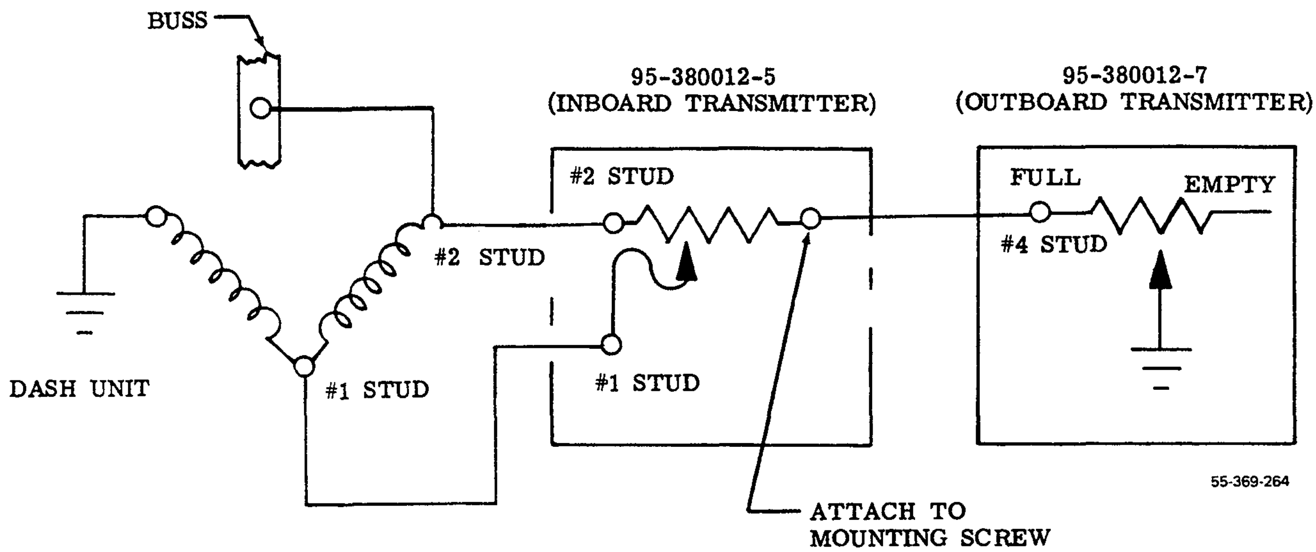


Figure 4-3. Wiring Diagram (Inboard and Outboard Transmitters)

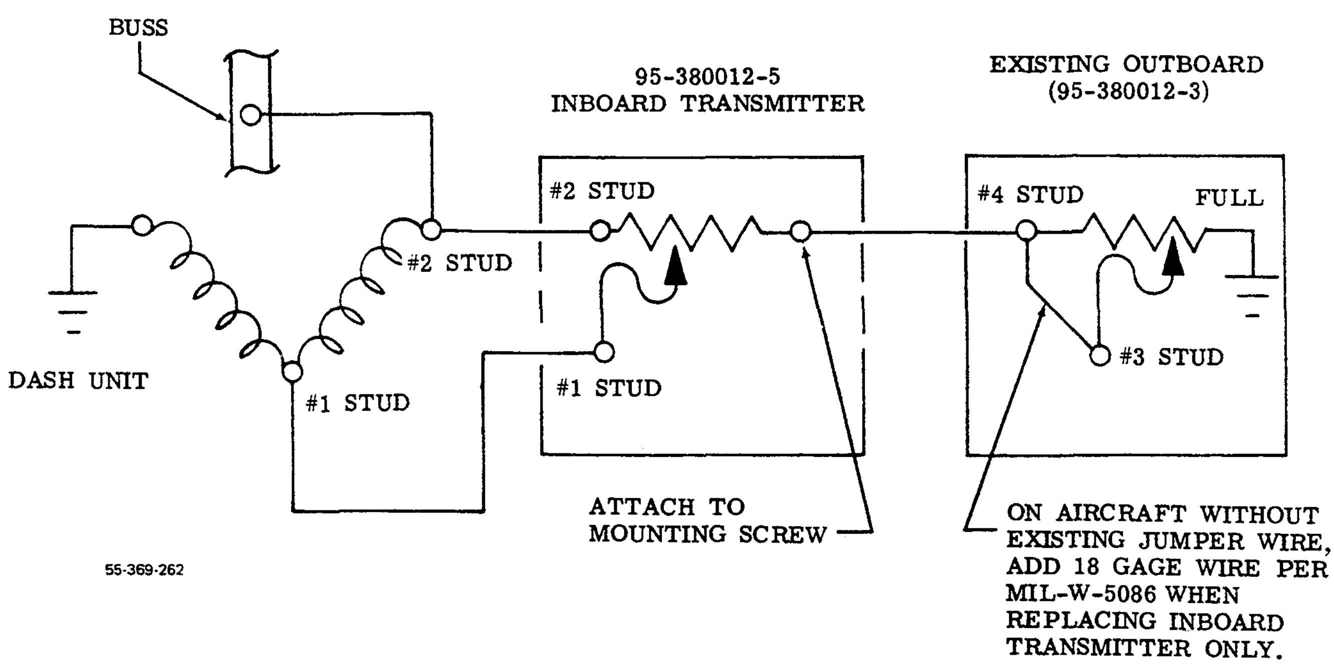


Figure 4-4. Wiring Diagram (Replacement Inboard Transmitter)

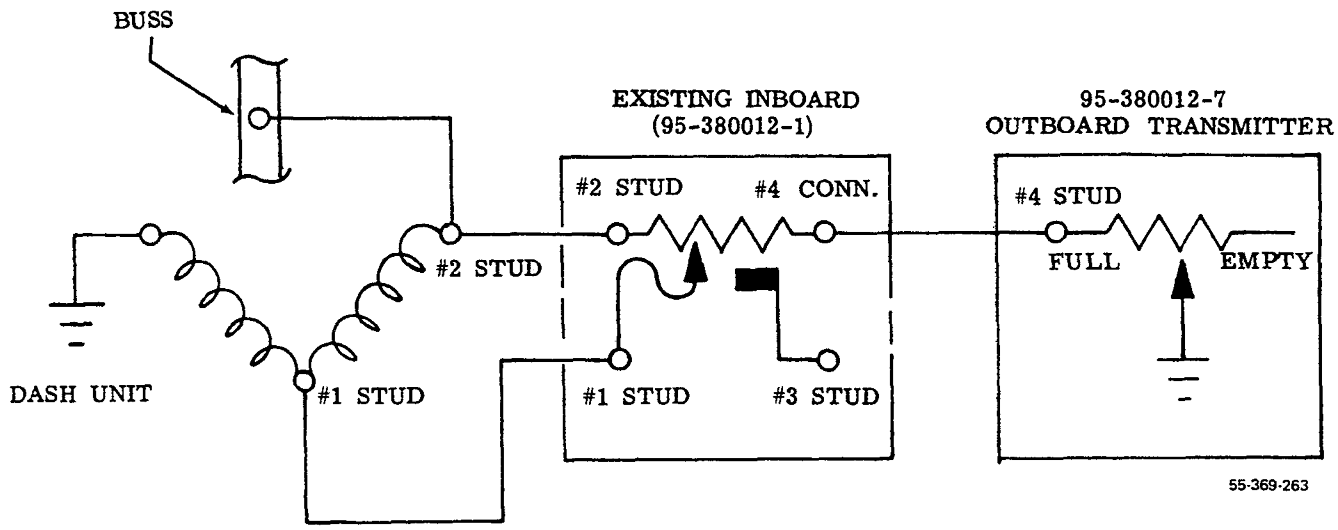


Figure 4-5. Wiring Diagram (Replacement Outboard Transmitter)

WINDSHIELD REMOVAL (ONE AND TWO PIECE)

a. Remove the glareshield and outside air temperature gage (If necessary).

b. Remove the attaching screws from the defroster duct and move the duct to clear the lower row of rivets on the windshield.

c. Remove the screws and spacers from the glareshield angles.

d. Remove the trim strips from around the inside of the windshield.

e. To facilitate reinstallation, mark the location of the trim strip clips.

f. Remove the rivets from around the windshield.

g. Remove the windshield.

NOTE

Because the window is sealed, considerable effort may be required to break the windshield loose from the canopy section.

WINDSHIELD INSTALLATION

a. Remove any sealer around the canopy with toluol. Touch-up any scratches or bare metal with zinc chromate primer.

b. Trim the tooling tabs from the windshield, place the windshield in position and mark the areas where material must be removed from the windshield to obtain a proper fit.

c. Remove the windshield and trim off excess material as determined in step "b".

d. Place the windshield in position and cleco in place using the pilot holes provided.

e. Back drill the windshield frame using the existing holes in the canopy section as a guide.

f. Remove the windshield, burr all holes and apply Presstite No. 576 sealer to the windshield frame where it makes contact with the canopy section.

g. Place the windshield in position and cleco in place.

h. Using AN470AD4 rivets, secure the windshield to the canopy section.

NOTE

When riveting the windshield in place, install the trim strip clips in the same locations as marked in step "e" of the windshield removal procedure.

i. Secure the glareshield angles in place with attaching screws, nuts and spacers.

j. Position the defroster duct and secure in place.

k. Install the trim strips.

l. Install the glareshield and outside air temperature gage (if removed).

m. Clean and paint as necessary.

PROPELLER DEICER BOOT REMOVAL, GOODRICH

a. Remove the propeller spinner.

b. Disconnect the deicer boot leads from the spinner bulkhead.

c. Remove the clip securing the lead strap to the spinner bulkhead and the clamp securing it to the propeller hub.

d. Using methyl ethyl ketone or toluol to soften the adhesion line between the boot and the blade loosen one corner of the boot sufficiently to grasp it with vise grip pliers or a similar tool.

CAUTION

Unless the boot being removed is to be scrapped, cushion the jaws of any pulling tool to prevent damaging the boot surface.

e. While continuing to use the solvent to soften the adhesive, apply a slow, steady pull on the boot to pull it off the propeller surface.

f. Remove the remaining adhesive from the boot and propeller blade with toluol or methyl ethyl ketone.

PROPELLER DEICER BOOT INSTALLATION (See figure 4-6).

a. Position the deicer boot on the propeller blade. Its center line at the inboard end should be adjacent to the split in the propeller blade clamp and 1 inch outboard of the clamp. The center line at the outboard end should fall on the blade leading edge. Be sure the lead strap is in the proper position to be clamped to the blade retaining clamp (see Detail A).

b. Mask off an area extending approximately 1/2 inch from the outer end and each side of the boot (see Detail A).

c. Remove the deicer boot and, from the retaining clamp outboard, strip any paint in the masked area. Clean the area throughly with methyl ethyl ketone or acetone. For final cleaning, wipe the solvent off quickly with a clean, dry, lint-free cloth to avoid leaving a film.

CAUTION

To assure maximum adhesion, the metal and rubber parts must be thoroughly clean.

d. Moisten a clean cloth with methyl ethyl ketone or acetone and clean the unglazed surface of the deicer boot, changing the cloth frequently to avoid contamination of the clean area.

e. Apply one even brush coat of thoroughly mixed EC-1403 cement to the propeller blade. Allow the cement to dry at 40 degrees or above for at least one hour when the relative humidity is less than 75% and two hours if the humiditiy is between 75% and 90%. Do not apply the cement if the relative humidity is higher than 90% or the temperature is lower than 40 degrees F.

f. After allowing sufficient drying time, apply a second brush coat of cement to the propeller and one coat of cement to the unglazed surface of the deicer boot. It is not necessary to cement more than 1/2 inch of the deicer lead strap. Allow the cement to dry.

g. Position the deicer boot on the propeller, starting 1 inch from the blade-retaining clamp. Make sure the lead strap is in position for clamping to the blade-retaining clamp. Moisten the cement lightly with methyl ethyl ketone or toluol and tack the boot center line to the blade leading edge. If the center line of the boot deviates from the blade leading edge, pull it up with a quick motion and replace it properly. Roll firmly along the center line with a rubber roller (see Detail B).

CAUTION

Never use a metal or wooden roller for this purpose, for they would damage the heating elements in the deicer boot.

h. Gradually tilting the roller, work the boot carefully over each side of the blade contour. Avoid trapping air pockets under the boot (see Detail C).

i. Roll outward from the center line to the edges of the boot. If excess material at the edges tend to pucker, work the puckers out smoothly and carefully with the fingers (see Details D and E).

j. Roll the tapered edges of the boot with a narrow

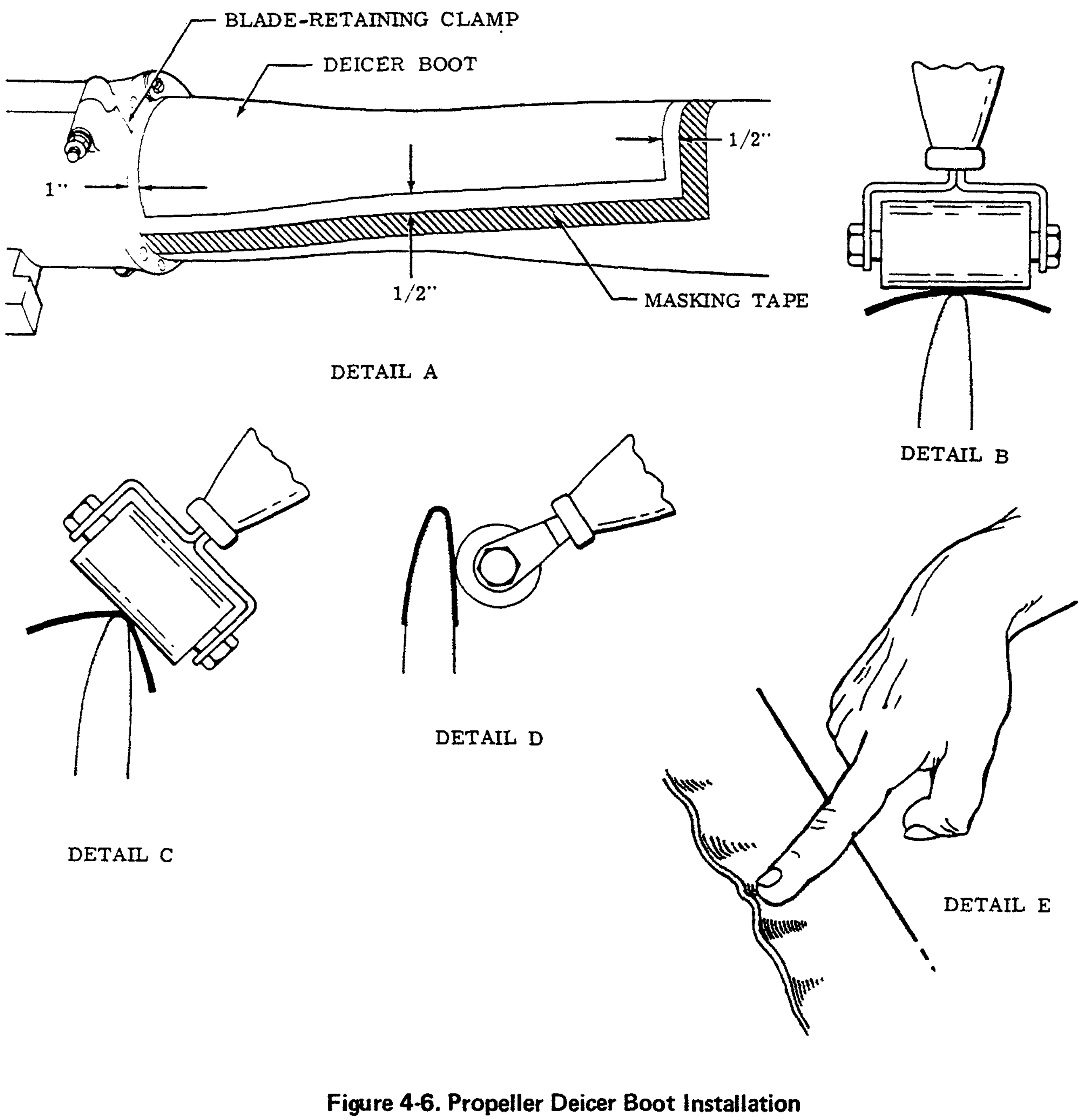


Figure 4-6. Propeller Deicer Boot Installation

steel stitcher roller.

k. Clean the blade with a clean cloth moistened with toluol or methyl ethyl ketone. Be careful not to let solvent run into the edge of the boot.

l. Apply one even brush coat of A-56-B cement around the edges of the boot, allowing a 1/16 to 1/8 inch overlap on the boot, and extending the cement to the masking tape. To obtain a neat border, remove the masking tape after applying the cement.

m. Install the clamp securing the lead strap to the propeller blade-retaining clamps.

n Connect the lead terminals and install the clip on the spinner bulkhead. To assure enough slack between the clip and the clamp on the blade to allow propeller feathering, there must be no slack between the terminal and the clip.

SECTION 5

5

Major Maintenance and Overhaul

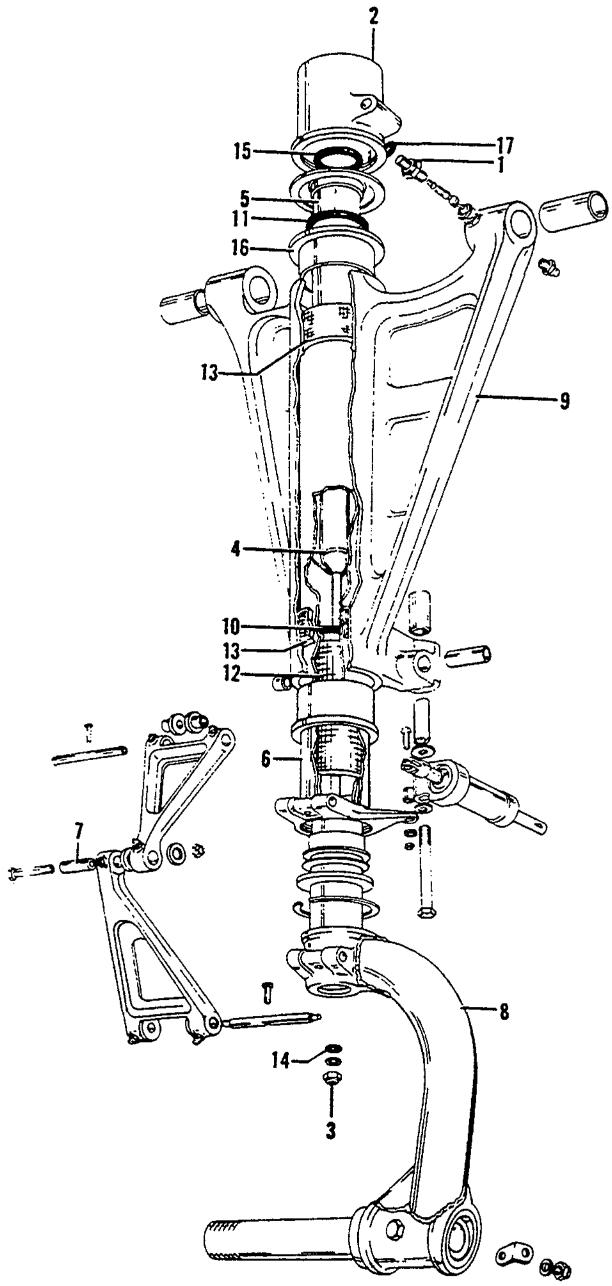
SECTION V

MAJOR MAINTENANCE AND OVERHAUL

This section contains maintenance and overhaul information on major components of the aircraft. Assembly and disassembly procedures and wear tolerances and other criteria for replacing parts are given.

The procedures are given on a parts-replacement basis only. Repair procedures such as welding, brazing, building up with weld material and machining to size, etc., cannot be given a blanket endorsement, since each such case must be evaluated individually. This section is intended, rather, as a guide to normal overhaul, its goal being the restoration of the parts to full serviceability.

As a requirement for them appears, or the information becomes available, overhaul instructions for additional major assemblies will be added to this section.



1. Air Valve Assembly
2. Barrel Cap
3. Rebound Control Retaining Nut
4. Rebound Control Slotted Head
5. Rebound Control Assembly
6. Barrel Assembly
7. Torque Knee Bushings
8. Piston and Fork Assembly
9. Brace Assembly
10. Center Bearing "O" Ring
11. Upper "O" Ring
12. Lubricating Felt Pad
13. Felt Pads
14. Rebound Control Pin "O" Ring
15. Rebound Control Tube "O" Ring
16. Brace Assembly Bearings
17. Air Valve "O" Ring

Figure 5-1. Nose Gear Shock Strut (Prior to D-6562)

1. RETAINER RING
2. "O" RING
3. COLLAR
4. AIR VALVE ASSEMBLY
5. SHIM
6. ORIFICE TUBE
7. "O" RING
8. FELT PAD
9. UPPER TORQUE KNEE BUSHING
10. UPPER TORQUE KNEE PIN
11. PISTON RING
12. SHIMMY DAMPER
13. BARREL
14. UPPER TORQUE KNEE
15. TORQUE KNEE BUSHING
16. BEARING
17. SCRAPER ADAPTER
18. SCRAPER
19. SNAP RING
20. PISTON
21. LOWER TORQUE KNEE
22. LOWER TORQUE KNEE PIN
23. PLUG
24. FORK ASSEMBLY

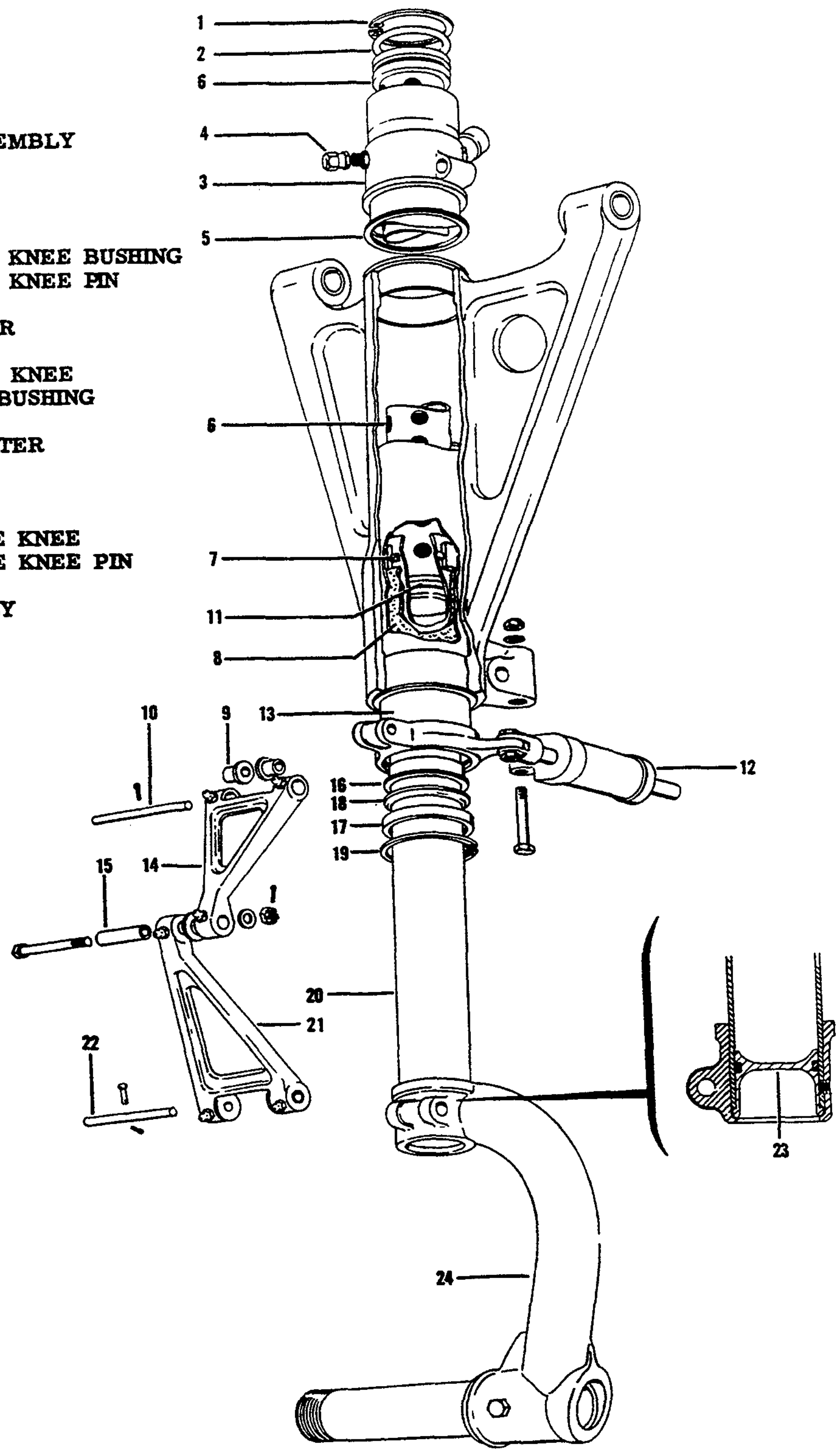


Figure 5-2. Nose Gear Shock Strut (Serial D-6562 and After)

DISASSEMBLY OF NOSE GEAR SHOCK STRUT (Prior to Serial D-6562).

a. Deflate strut and remove the air valve assembly (1).

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown off with considerable force and cause injury or damage.

b. Remove the barrel cap (2) and "O" ring. Invert the strut to drain out the fluid. While the strut is inverted, pump the rebound control tube up and down several times to release fluid trapped in the rebound control assembly.
c. Remove nut (3) by holding the slotted head of the rebound control assembly (4) with a screwdriver. Slide the rebound control assembly (5) out of the barrel (6).
d. Disconnect the torque knees by removing the bolt and bushing (7). Pull the piston and fork assembly (8) out of the barrel.
e. Remove the shimmy dampener and pull the barrel out of the brace (9).
f. Remove the snap ring, adapter and scraper. Remove the "O" ring (10) from the center bearing using the wire tool as shown in figure 5-2. Remove "O" ring (11) and lubricating felt pad (12) from inside the barrel. Remove the felt pads (13) from inside the brace assembly.

DISASSEMBLY OF NOSE GEAR SHOCK STRUT (Serial D-6562 and After).

a. Deflate strut and remove the air valve assembly.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown off with considerable force and cause injury or damage.

b. Remove the snap ring retaining the orifice tube assembly.
c. Retract piston to push the orifice tube out of the top of the barrel. Remove the orifice tube.
d. Invert the strut and drain out the hydraulic fluid.
e. Disconnect the torque knees by removing the bolt and bushing. Slide the piston and fork assembly out of the barrel. Remove the coller.

CAUTION

The torque knees provide the extension stop for the lower shock absorber cylinder assembly and when disconnected, the piston is free to slide out of the upper barrel assembly.

f. Remove the lower snap ring, adapter, and scraper. Remove the "O" ring from the center bearing and remove the felt lubricating pad from inside the barrel.
g. Remove the shimmy dampener and pull the barrel out of the brace.

REPAIR OF NOSE GEAR SHOCK STRUT.

If the strut has been leaking, take note of where the leak has occurred before disassembly and attempt to determine the cause of the leak during inspection of the components. Clean all parts with solvent Federal Specification P-S-661, and inspect for cracks, weld breaks, distortion and excessive wear. Replace all unserviceable parts. Replace piston scraper ring and all "O" rings. Lubricate the parts with hydraulic fluid, MIL-H-5606, before assembly.

ASSEMBLY OF NOSE GEAR SHOCK STRUT (Prior to Serial D-6562).

a. Install the felt pads inside the nose wheel brace.
b. Install the "O" ring in the center bearing, using two dowel rods to work it into position. See figure 5-3. Soak the lubricating felt pad (12) in SAE #10 oil before installation. Install the "O" ring (11) in the upper groove in the barrel.
c. Install the torque knees using the shorter pin in the upper torque knee.
d. Slide the barrel assembly into the nose wheel brace and install the shimmy dampener using washers between the shimmy dampener and the brace as required to align the dampener rod end and bracket.
e. Slide the snap ring, scraper, and wiper over the top of the piston. Slide the piston into the barrel and connect the torque knees.
f. Insert the rebound control assembly into the barrel and install the "O" ring, (14), washer and nut. Install the "O" ring (15) in the rebound control tube.

NOTE

If bearings (16) or laminated shim have not been replaced, disregard step "G".

g. Leave the shim off the barrel and install the cap temporarily with three nuts. Peel one layer at a time from the laminated shim until it will fit freely into the space between the cap and the upper nose wheel brace bearing. Remove the cap after the shim has been fitted.
h. Fill the strut with MIL-H-5606 hydraulic fluid to the level of the air valve port and work the piston up and down several full strokes and refill the strut. Repeat this operation until the fluid stops bubbling when the piston is worked up and down.
i. Install the shim, barrel cap, and roller assembly. Torque the barrel cap retaining nuts to 20/25 inch-pounds. Check the clearance between the shim and cap with a feeler gage. The maximum clearance is .012 inch. Install the "O" ring (17) and air valve assembly.
j. Inflate the strut to approximately 100 psi. Coat the cap and air valve with soap suds to test for leaks.

ASSEMBLY OF NOSE GEAR SHOCK STRUT (Serial D-6562 and After)

a. Install the "O" ring in the center bearing, using two dowel rods to work it into position. Soak the lubricating felt pad in SAE #10 oil before installation. Install the "O" ring in the upper groove in the barrel.

b. Install the torque knees using the shorter pin in the upper torque knee.

c. Slide the barrel assembly into the nose wheel brace and install the shimmy dampener, using washers between the shimmy dampener and the brace as required to align the dampener rod end and bracket.

d. Slide the snap ring, adapter, and scraper over the top of the piston. Slide the piston into the barrel and connect the torque knees.

e. Fill the strut with 500/550 cc of MIL-H-5606 hydraulic fluid.

NOTE

If bearings or laminated shim have not been replaced, disregard step "f".

f. Leave the shim off of the barrel and install the collar temporarily. Peel one layer at a time from the laminated shim until it will fit freely into the space between the collar and the upper nose wheel brace bearing. Remove the collar after the shim has been fitted.

g. Install the shim, barrel collar, and roller assembly. Check the clearance between the shim and collar with a feeler gage. The maximum clearance is .012 inch. Install the "O" ring and air valve assembly.

h. Install the compression ring and the "O" ring on the orifice tube. Install the orifice tube in the barrel assembly. Install the orifice tube retaining snap ring with the "beveled side down".

i. Inflate the strut to approximately 100 psi. Coat the cap and air valve with soap suds to test for leaks.

DISASSEMBLY OF MAIN GEAR SHOCK STRUT (Prior to Serial D-5791).

a. Deflate strut completely and remove the air valve assembly.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown out with considerable force and cause injury or damage.

b. Remove the snap ring (1), lock (2), barrel end plug (3), and "O" ring. Invert the strut to drain hydraulic fluid. While the strut is inverted, pump the rebound control tube up and down several times to release fluid trapped in the rebound control assembly.

c. Remove nut (4) by holding slotted head of the rebound control assembly (5) with screwdriver. Slide the rebound control assembly out of the barrel.

d. Disconnect the torque knees and slide the piston out of the barrel. Remove the snap ring (6), adapter and scraper. Remove the felt pad and "O" ring (7) from the barrel. See figure 5-3.

DISASSEMBLY OF MAIN GEAR SHOCK STRUT (Serial D-5791 and After)

a. Deflate strut completely and remove the air valve assembly.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released or it may be blown out with considerable force, causing injury or damage.

b. Remove the snap ring and pull the orifice tube assembly out of the barrel.

c. Invert the strut and drain the hydraulic fluid out of the strut.

d. Disconnect the torque knees and slide the piston out of the barrel.

CAUTION

The torque knees provide the extension stop for the lower shock absorber assembly and when disconnected, the piston is free to slide out of the upper barrel assembly.

e. Remove the snap ring and adapter (D-5791 thru D-7132 only) and scraper. Remove the felt pad and "O" ring from the barrel.

REPAIR OF MAIN LANDING GEAR SHOCK STRUT.

Clean parts with Stoddard solvent, Federal Specification P-S-661, and inspect for cracks, weld breaks, corrosion and excessive wear. Replace unserviceable parts. If the strut has been leaking, take note of where the leak has occurred before disassembly and attempt to determine the cause of the leak during inspection. Replace all "O" rings. If the torque knee bushings (8) have been replaced, line ream to .500 inch plus or minus .0005. Lubricate shock strut parts with MIL-H-5606 hydraulic fluid before assembly.

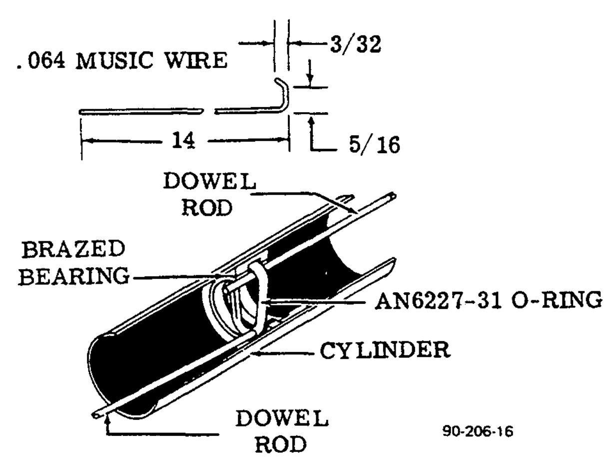
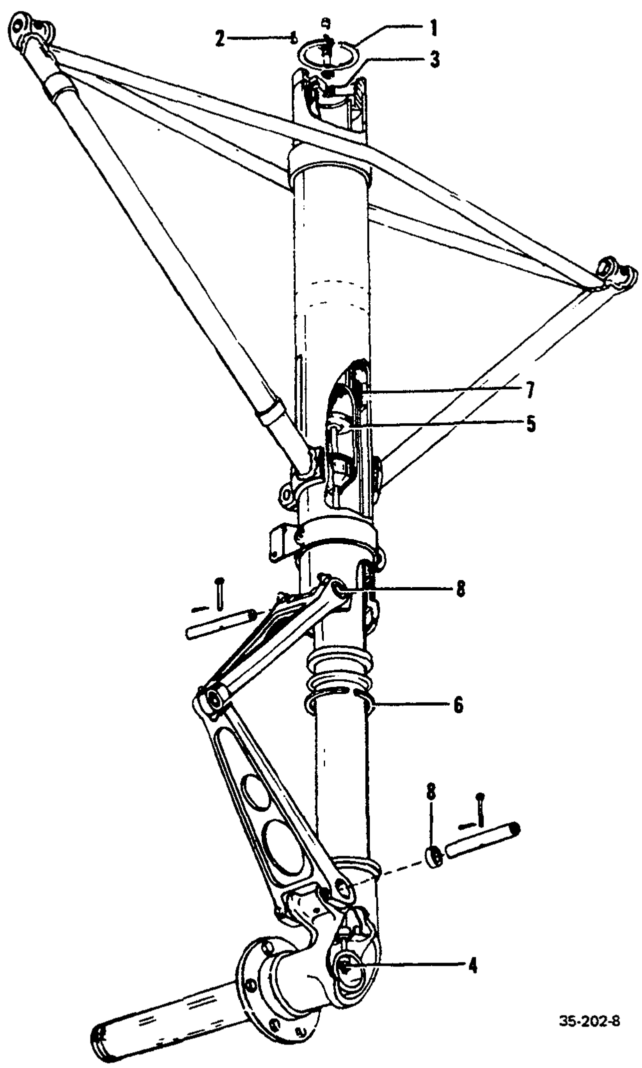
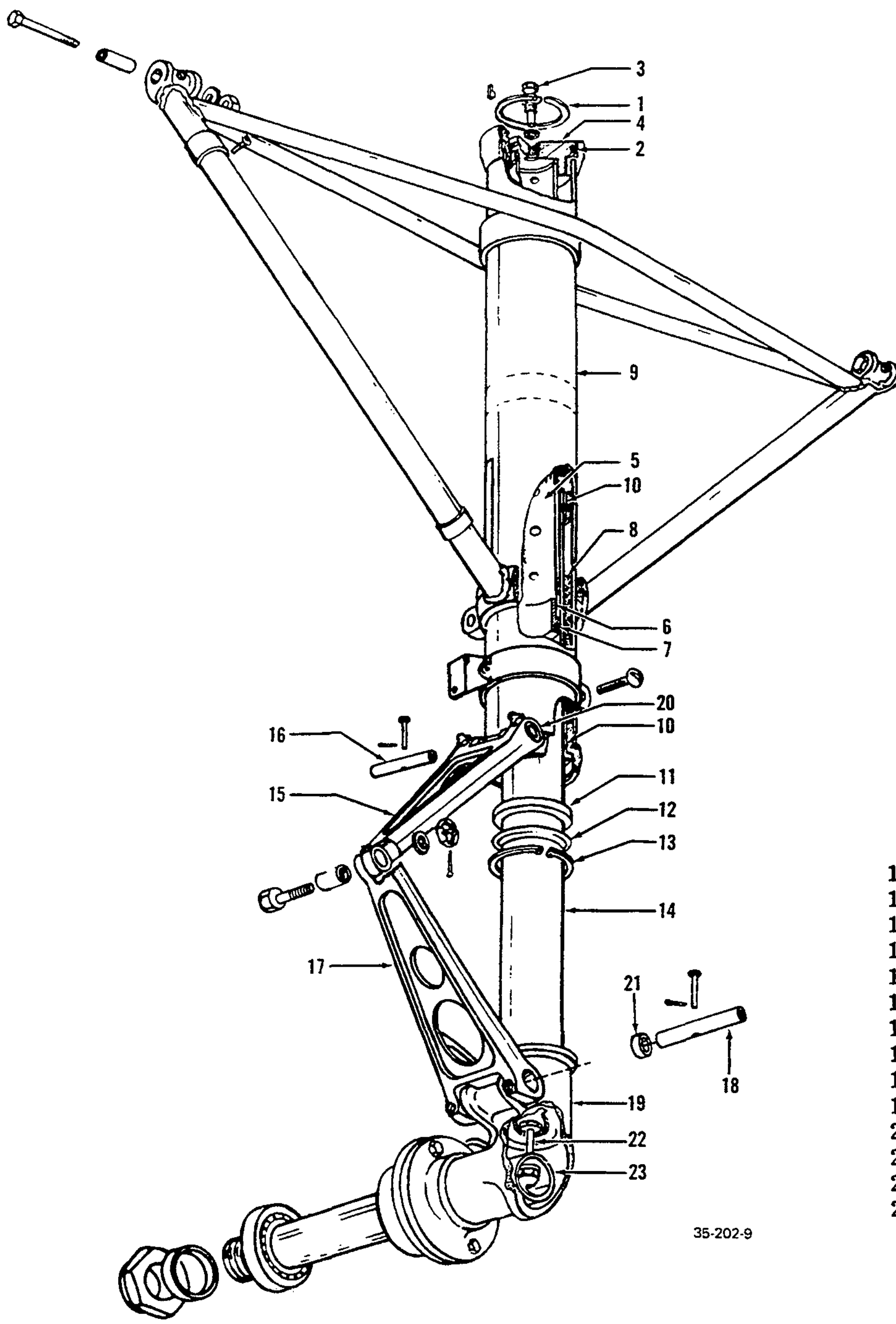


Figure 5-3. "O" Ring Removal and Installation



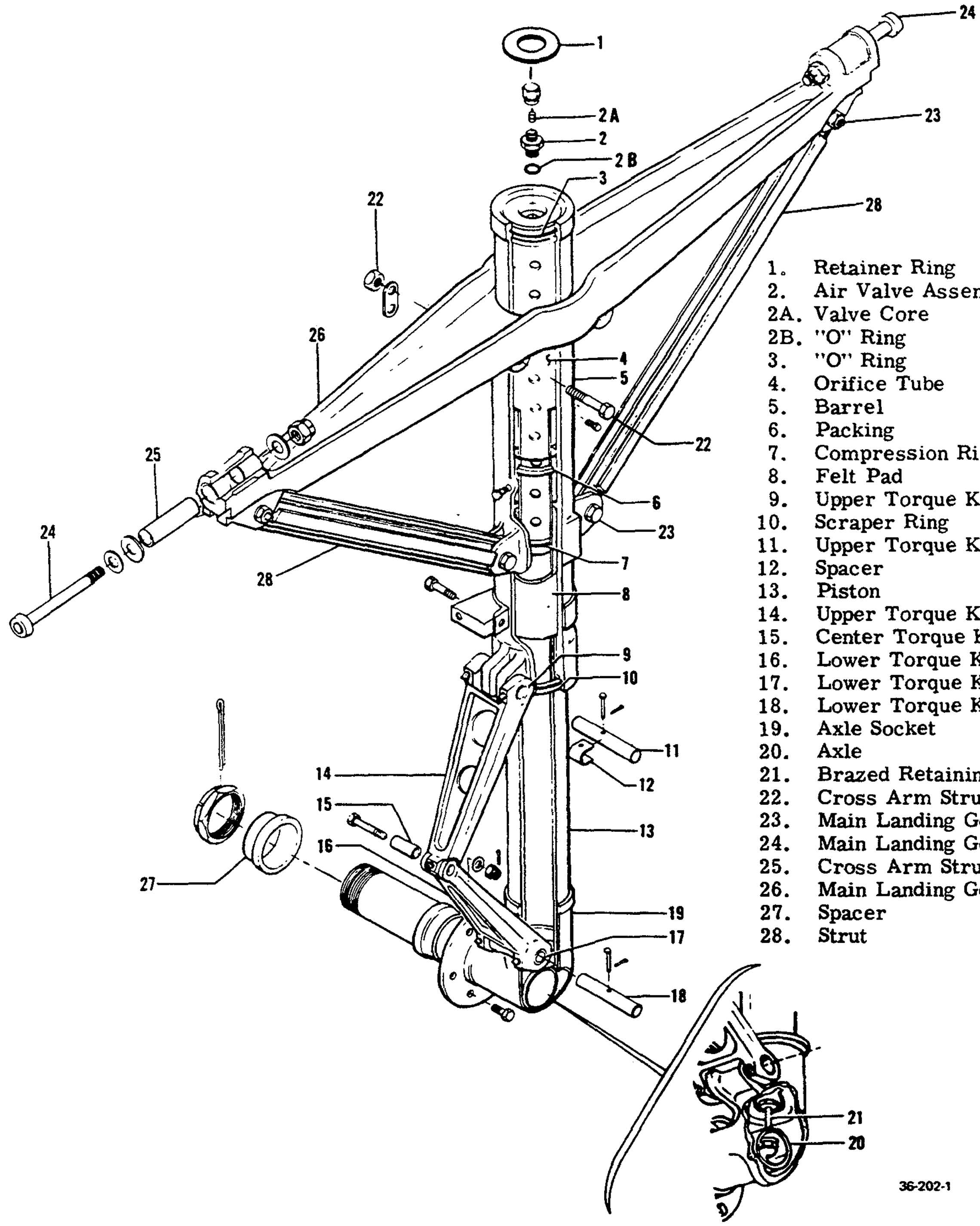
1. Snap Ring
2. Lock
3. Barrel End Plug
4. Rebound Control Pin Retaining Nut
5. Rebound Control Slotted Head
6. Snap Ring
7. "O" Ring
8. Torque Knee Bushings

Figure 5-4. Main Gear Shock Strut (Prior to Serial D-5791)



1. Snap Ring
2. "O" Ring
3. Air Valve Assembly
4. Cap
5. Orifice Tube
6. Orifice Head
7. "O" Ring
8. Felt Pad
9. Barrel
10. Brazed Bearing
11. Scraper Ring
12. Adapter Ring
13. Snap Ring
14. Piston
15. Upper Torque Knee
16. Upper Torque Knee Pin
17. Lower Torque Knee
18. Lower Torque Knee Pin
19. Axle Socket
20. Upper Torque Knee Bushing
21. Lower Torque Knee Bushing
22. Brazed Retaining Bolt
23. Axle

Figure 5-5. Main Gear Shock Strut (Serial D-5791 thru D-7132)



1. Retainer Ring
2. Air Valve Assembly
2A. Valve Core
2B. "O" Ring
3. "O" Ring
4. Orifice Tube
5. Barrel
6. Packing
7. Compression Ring
8. Felt Pad
9. Upper Torque Knee Bushing
10. Scraper Ring
11. Upper Torque Knee Pin
12. Spacer
13. Piston
14. Upper Torque Knee
15. Center Torque Knee Bushing
16. Lower Torque Knee
17. Lower Torque Knee Bushing
18. Lower Torque Knee Pin
19. Axle Socket
20. Axle
21. Brazed Retaining Bolt
22. Cross Arm Strut Attach Bolt
23. Main Landing Gear Brace Bolt
24. Main Landing Gear Hinge Bolt
25. Cross Arm Strut Bushing
26. Main Landing Gear Cross Arm
27. Spacer
28. Strut

Figure 5-5A. Main Gear Shock Strut (Serials D-7133 and after)

ASSEMBLY OF MAIN LANDING GEAR SHOCK STRUT. (Prior to Serial D-5791).

a. Install the "O" ring in the center brazed bearing. See figure 5-3.
b. Soak the felt pad in SAE #10 oil and install it below the center brazed bearing.
c. Slip the snap ring, adapter, and scraper over the piston.
d. Slide the piston into the barrel. Work the scraper, adapter and snap ring into the lower end of the barrel. Connect the torque knees. Install the rebound control assembly.
e. Pour 800 cc of MIL-H-5606 hydraulic fluid into the strut and install the "O" ring, barrel end plug, lock, and snap ring. Install the air valve assembly. If a fluid measuring device is not available use the following procedure.
1. With the strut extended at least 1/4 inch fill the strut with MIL-H-5606 hydraulic fluid and fully actuate the strut slowly several times to remove all air from below the orifice; then refill with the strut at least 1/4 inch from the fully compressed position.
2. Install the barrel end plug and lock pin over the "O" ring and install the snap ring with its beveled edge facing down.
3. Install the "O" ring over the threads of the air valve assembly and screw the air valve assembly (minus the valve core) into the barrel end plug.
4. Extend the strut at least two inches then compress it completely allowing the excess air and fluid to escape through the air valve body.

NOTE

If the strut has been properly refilled a little fluid will escape through the air valve body. If no fluid escapes, slowly actuate the strut several times, remove the snap ring and plug and repeat steps 1, 2, 3 and 4.

f Inflate the strut to approximately 100 psi air pressure. Coat the barrel end plug and air valve with soap suds to test for air leaks. With the weight of the airplane on the gear, check the strut inflation. There should be two inches of piston exposed with the airplane empty except for fuel.

ASSEMBLY OF MAIN LANDING GEAR SHOCK STRUT (Serial D-5791 and After).

a. Install the "O" ring in the center brazed bearing.
b. Soak the felt pad in SAE #10 oil and install it below the center brazed bearing.
c. Slip the snap ring and adapter (D-5791 thru D-7132 only) and scraper over the piston.
d. Slide the piston into the barrel. Work the adapter and snap ring (D-5791 thru D-7132 only) and scraper into the lower end of the barrel. Connect the torque knees.
e. Pour 800 cc of MIL-H-5606 hydraulic fluid into the strut. Install the top "O" ring and the compression ring on the orifice tube and install the orifice tube into the barrel assembly. Install the snap ring and the air valve assembly. If a fluid measuring device is not available use the following procedure.
1. With the strut extended at least 1/4 inch, fill the strut with MIL-H-5606 hydraulic fluid and fully actuate the strut slowly several times to remove all the air from below the orifice; then refill with the strut at least 1/4 inch from the fully compressed position.
2. Install the orifice tube into the barrel assembly and install the snap ring with its beveled edge facing down.
3. Install the "O" ring over the threads of the air valve assembly and screw the air valve assembly (minus the valve core) into the threaded hole in the orifice tube assembly.
4. Extend the strut at least two inches then compress it completely allowing the excess air and fluid to escape through the air valve body.

NOTE

If the strut has been properly refilled a little fluid will escape through the air valve body. If no fluid escapes, slowly actuate the strut several times, remove the snap ring and repeat steps 1, 2, 3, and 4.

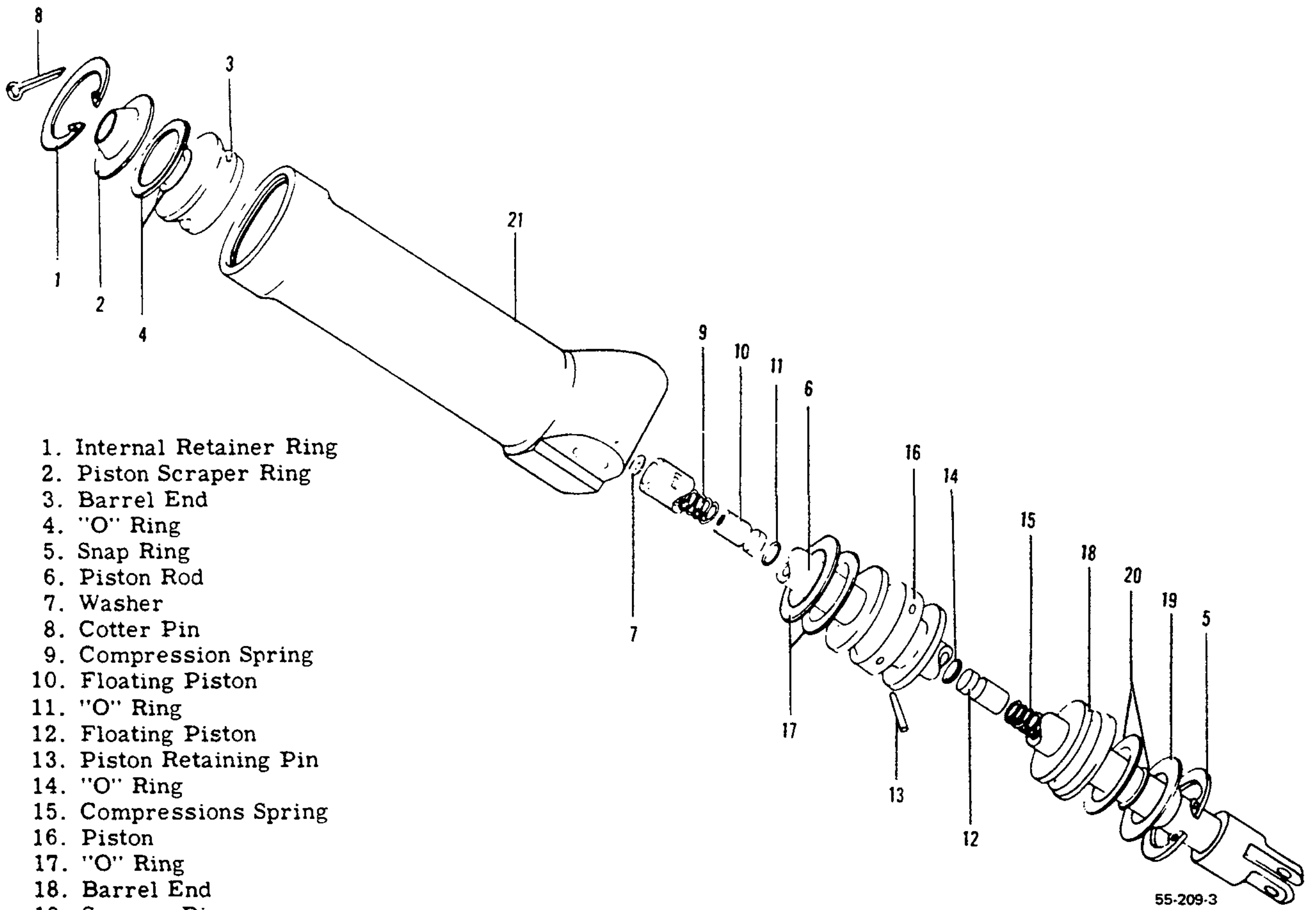
f. Install the valve core.
g. Inflate the strut to approximately 100 psi air pressure. Coat the top of the orifice tube and the air valve with soap suds to test for air leaks. With the weight of the airplane on the gear, check the strut inflation. There should be 4 1/2 inches of piston exposed with the airplane empty except for fuel.

DISASSEMBLY OF THE SHIMMY DAMPENER.

a. Remove cotter pin (8), washer (7), aft retainer ring (1), and the scraper ring (2). Force the barrel end (3) out of the barrel (21) by working the piston back and forth. Remove the "O" ring (4) from the barrel end.
b. Remove all remaining hydraulic fluid from the shimmy dampener.
c. Remove the forward snap ring (5) and slide the piston rod (6) and parts out of the barrel.
d. Remove the washer and compression spring (9).
e. Remove the aft floating piston (10) with a 6-32 screw and remove the "O" ring (11).
f. Insert a long 6-32 screw into the hole at the clevis end of the piston and engage the floating piston (12). Maintain tension on the floating piston while driving out the piston retaining pin (13).
g. Release the floating piston slowly and push it out the open end of the piston rod and remove the "O" ring (14).
h. Remove the remaining compression spring (15) from the rod and slide the piston (16) off the piston rod. Remove the "O" rings (17) from piston and the "O" rings (20) from the barrel end (18).
i. Remove the barrel end (18) and the scraper ring (19) from the piston rod.

OVERHAUL OF THE SHIMMY DAMPENER.

Clean all parts with solvent, Federal Specification PD680. Inspect for cracks, corrosion and distortion.



1. Internal Retainer Ring
2. Piston Scraper Ring
3. Barrel End
4. "O" Ring
5. Snap Ring
6. Piston Rod
7. Washer
8. Cotter Pin
9. Compression Spring
10. Floating Piston
11. "O" Ring
12. Floating Piston
13. Piston Retaining Pin
14. "O" Ring
15. Compressions Spring
16. Piston
17. "O" Ring
18. Barrel End
19. Scraper Ring
20. "O" Ring
21. Barrel

Figure 5-6. Shimmy Dampener

Check wear against the Table of Manufacturer's Tolerances. Replace all "O" rings. Lubricate parts with MIL-H-5606 hydraulic fluid prior to assembly.

CAUTION

For replacement, use "O" rings approved for use with mineral base hydraulic fluid.

TABLE OF MANUFACTURER's TOLERANCES.

NOTE

Parts may be reused if maximum wear is no greather than 0.005 inch below the tolerances listed below. For example, the barrel may be reused if its inside diameter does not exceed 0.867.

Barrel Inside Diameter	Max.	0.862
	Min.	0.860
Piston Outside Diameter.	Max.	0.857
	Min.	0.853
Piston Rod Outside Diameter.	Max.	0.3745
	Min.	0.3735
Piston Rod Inside Diameter	Max.	0.250
(Reservoir Portion)	Min.	0.246
Floating Piston Diameter	Max.	0.240
	Min.	0.235
Barrel End Inside Diameter	Max.	0.377
	Min.	0.376

REASSEMBLY OF SHIMMY DAMPENER
(Figure 5-6)

a. Replace the "O" rings (20) on the barrel end (18).

Slide the scraper ring (19) and barrel end on the piston rod (6).

b. Replace the "O" ring (14) on the forward floating piston (12) and insert the compression spring (15) and the floating piston into the piston rod (6). With a long 6-32 screw, engage the floating piston (12) and pull it toward the clevis end of the piston rod to compress the spring (15) until the dampener piston retaining pin (13) can be inserted.

c. Place the dampener piston (16) on the piston rod and insert the retaining pin. Replace the "O" rings (17) on the dampener piston.

d. Insert the piston rod assembly into the barrel (21) and place the snap ring (5) into position.

e. Place the dampener in a vise with the open end up and fill the barrel and piston with MIL-H-5606 hydraulic fluid). Work the piston rod up and down until bubbles stop appearing in the fluid, then refill the barrel and the piston rod.

f. Replace the "O" rings in the other barrel end (3), and "O" ring (11) on the floating piston (10) and insert the barrel end and the scraper ring (2) into the barrel (21) and secure them with the snap ring (1).

g. Engage the forward floating piston (12) with the 6-32 long screw and pull forward. At the same time, insert the aft floating piston (10) and compression spring (9) and push down. The piston will follow the fluid down and prevent the entry of air into the rod assembly. Secure the spring and piston with the washer (7) and the cotter pin (8). To check the fluid level in the shimmy dampener, spread the portion of the cotter pin within the piston rod and insert a wire through the hole in the washer at the aft end of the piston rod until the wire touches the bottom of the hole in the floating piston. If the wire enters the piston rod over 2-3/8 inches, remove the floating piston and add more fluid to the piston rod.

TESTING THE SHIMMY DAMPENER.

Clean the shimmy dampener thoroughly and place it on a clean dry surface for 24 hours. If a leak occurs during this period, disassemble and determine the cause.

DISASSEMBLY OF THE FUEL UNIT.

NOTE

This procedure applies to the 35-924230 fuel unit used on airplanes D-2901 through D-5330, and as a replacement part on prior models.

Disassemble the fuel unit carefully to prevent damage to components. On fuel units that have drive-in plugs, do not remove the plugs unless they have been leaking or are damaged.

REPAIR OF THE FUEL UNIT

Clean all parts in Stoddard solvent, methanol or equivalent and dry with compressed air.

WARNING

Methanol is flammable, explosive and can be toxic if in prolonged contact with the skin or if the vapor is inhaled.

Inspect the parts for damage, corrosion and excessive wear. Replace unserviceable parts. Replace "O" rings, gasket and felt washer.

NOTE

Some types of "O" rings deteriorate when exposed to fuel and may cause pump failure. "O" rings indexed 10, 11 and 12 must be replaced with 2-2045-2-7, 2-2045-2-15 and 2-2045-2-8 "O" rings made by Parker Appliance Co., Cleveland, Ohio.

Drive-in plugs are no longer sold as replacement parts.

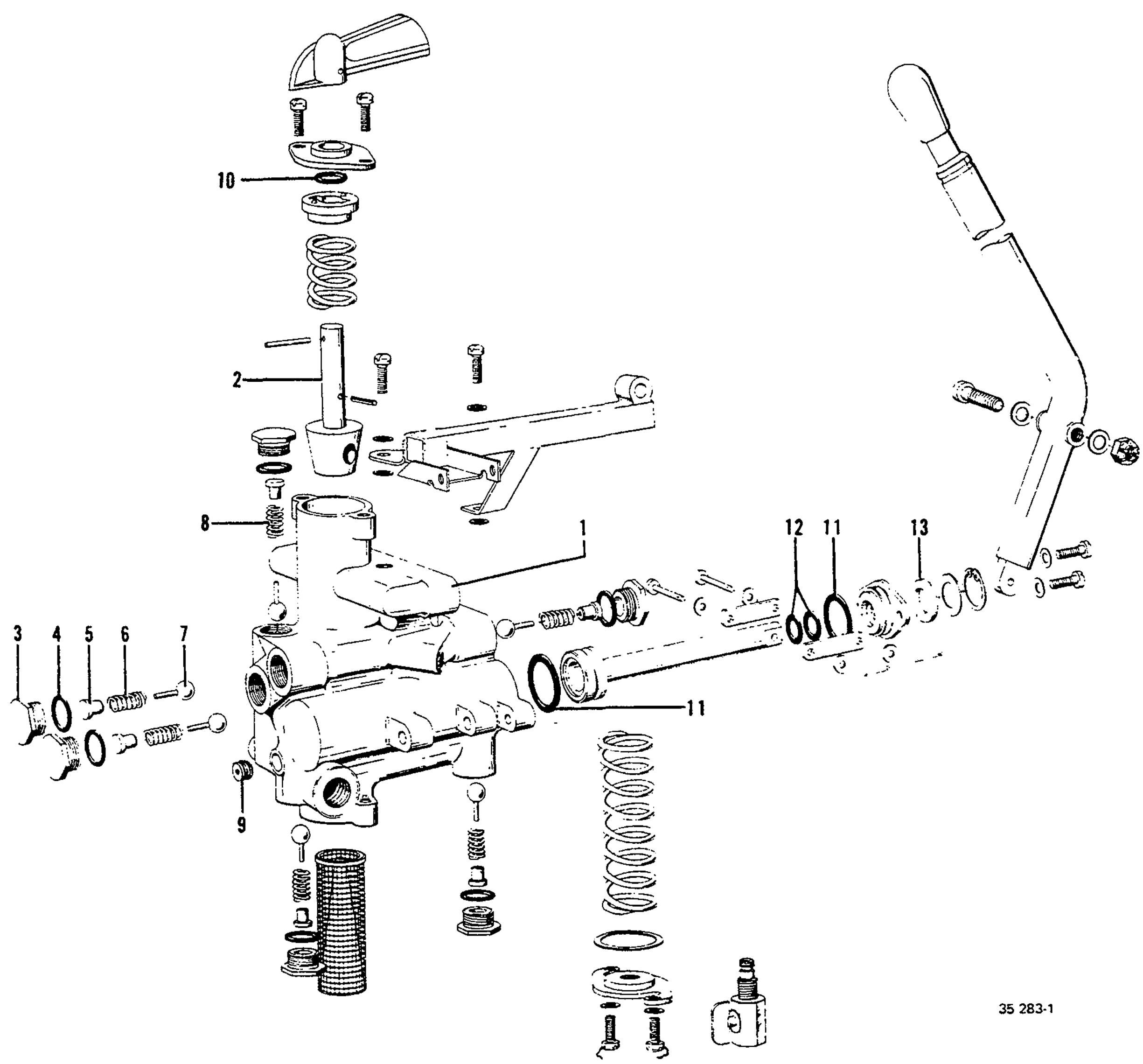
If a drive-in plug needs replacing, tap threads in the hole and replace it with an AN932-2 plug (9). Lubricate the parts with gasoline before assembly. Soak the felt washer (13) in SAE #10 oil before assembly. Lubricate the pump handle linkage with SAE #20 oil after assembly. If the output pressure of the fuel unit is too high or too low, replace the relief valve spring (8).

ASSEMBLY OF THE FUEL UNIT.

After the selector valve (2) has been installed, look through the center inlet hole. The hole in the selector valve should line up with the inlet hole when the handle is turned to that position. Pressure relief and check valve stems (7) must work freely in the guides (5) and guides must work freely in the plugs (3). Run tests one and two before installing the pump handle and bracket.

TESTING THE FUEL UNIT

1. To test the housing (1) for cracks, apply approximately 100 psi air pressure to the pump outlet with all other openings plugged and with the unit immersed in Stoddard solvent. Continue the test for three minutes. Leaking of the selector valve is permissible during this test.
2. To test the selector valve for leaks, apply 1 psi to the center inlet openings with the valve turned to one of the other inlet openings. Immerse in Stoddard solvent and continue the test for three minutes.
3. To test the pressure outlet of the fuel unit, plug the center inlet opening and attach hoses to the outer inlet openings. Attach a pressure gage to the outlet opening. Place the ends of the hoses in clean Stoddard solvent and pump the handle 128 strokes per minute. The gage should read from 11 to 15 psi on both the in and out strokes.
4. The torque required to break the selector valve away from a detent should be between 10 and 15 in. lbs. and the torque required to turn the handle between detents should be 3 to 5 in. lbs. less than the break away torque.



1. Housing
2. Fuel Selector Valve
3. Plug
4. "O" Ring
5. Guide
6. Check Valve Spring
7. Valve
8. Pressure Relief Valve Spring
9. Plug
10. "O" Ring, Selector Valve
11. "O" Ring, Piston Head and Cylinder Head
12. "O" Ring, Piston Rod
13. Felt Washer

Figure 5-7. Fuel Unit

DISASSEMBLY OF THE FLAP ACTUATOR

D-1 thru D-837: refer to Figure 5-8 during disassembly.

a. Disconnect wires which safety the worm gear holder (1), and actuator plug (2).

b. Unscrew worm gear holder (1), remove seal (3), snap ring (4), actuator worm bearing (5) and actuator worm (6). The actuator worm gear must be unscrewed as it is drawn off the gear on the actuator screw (7).

c. Unscrew the actuator plug (2) and remove the snap ring (8) and the actuator worm bearing (9).

d. Cut the safety wire and remove the screws which hold the actuator cover (10), to the actuator housing (11). Beneath the actuator cover is the screw retaining nut (12) which is secured with a cotter pin. Remove the cotter pin and unscrew the retaining nut from the actuator screw.

e. Tap the piston plug (13) with a rawhide mallet or equivalent to drive out the bearing (14). Slide the piston (15) out of the housing and remove the "O" ring (16). To remove the piston plug (13), drill out the pin (17) and drive the plug out of the piston.

D-838 and after: refer to Figure 5-8 during disassembly.

CAUTION

On aircraft serials D-838 through D-4865, two snap rings must be removed from the actuator housing before disassembly of the actuator piston. To gain access to the second snap ring, the oil seal must first be removed. Any sharp instrument may be used to puncture the seal and draw it out of the actuator housing. On aircraft D-4866 and after, only one snap ring is installed. The amount of spacers in each actuator assembly may vary due to the installation of spacers of different thickness, but the maximum number allowed is seven.

Remove the snap ring (2) to disconnect the flexible shaft (1) from the actuator. Tap on the piston plug (10) to drive out the seal (5) and bearing (6). Slide the piston (7) out of the housing (8) and remove the "O" ring (11). To remove the plug, drill out the pin (9) and drive the plug out of the piston.

OVERHAUL OF THE FLAP ACTUATOR

Clean parts with solvent and inspect for cracks, corrosion, distortion and excessive wear. Replace the "O" ring and seal. Coat the plug and pin with zinc chromate primer before assembly. Peen the pin and file it flush with the piston. Pack the bearings with MIL-G-23827 grease. Lubricate the "O" ring with MIL-L-6086, Grade M gear lube before inserting the piston in the housing

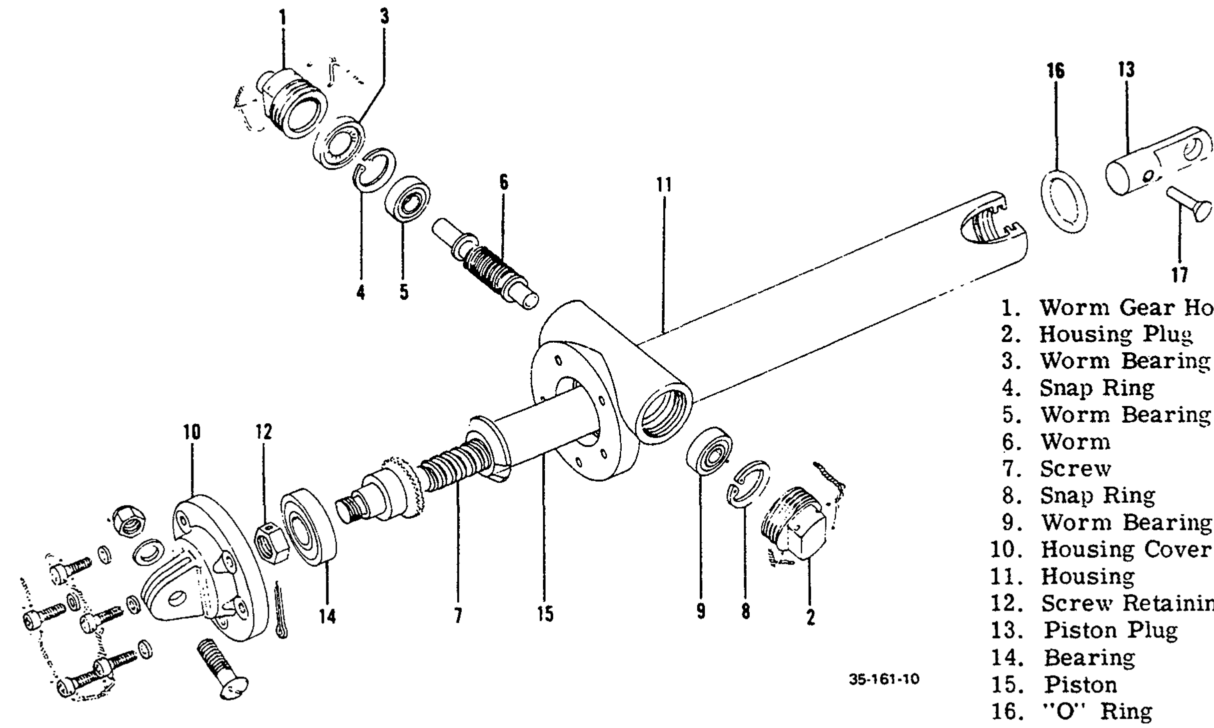
ASSEMBLY OF THE FLAP ACTUATOR

D-1 thru D-837:

To reassemble the flap actuator, reverse the above disassembly procedure for this series.

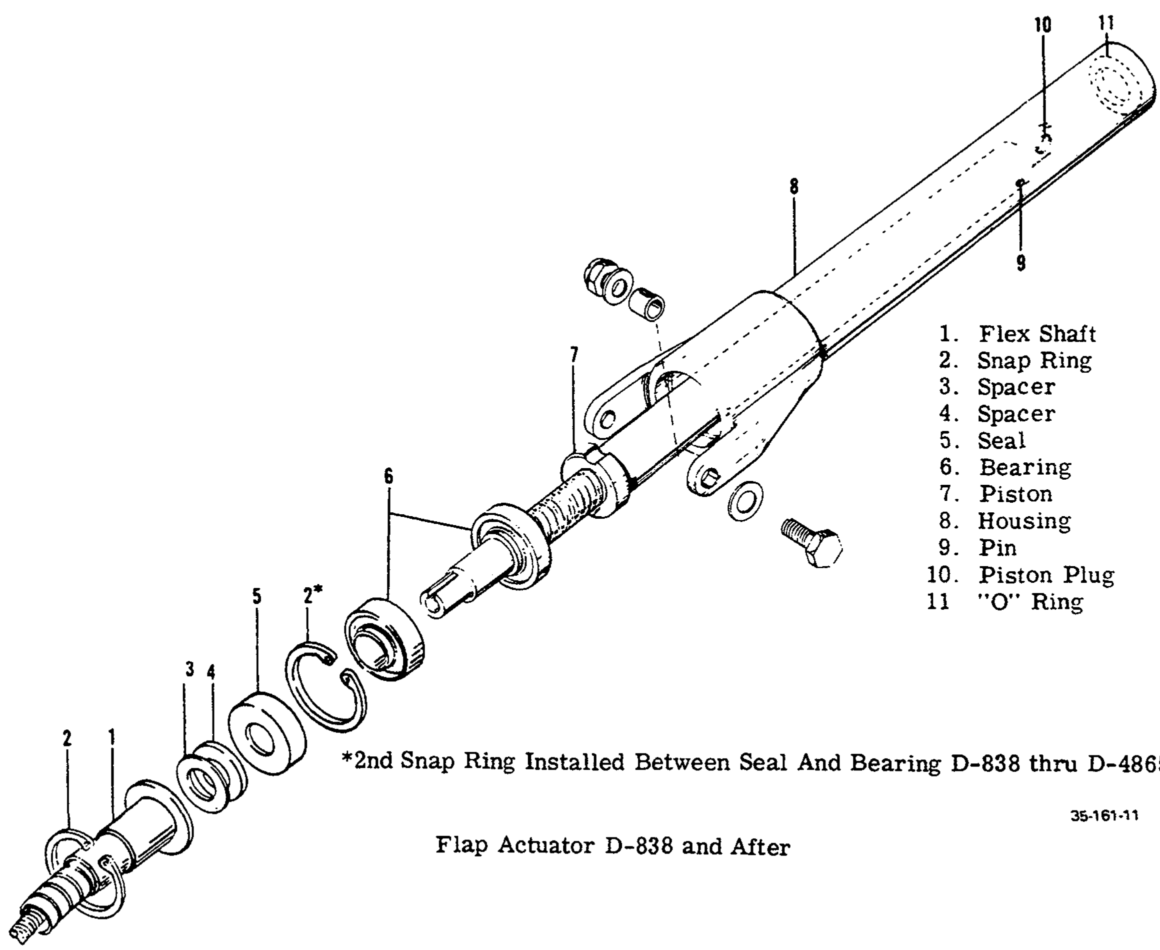
D-838 and after:

Pour 2/3 oz. of MIL-L-6086, Grade M, gear lube or No. 9615 Homoco heavy duty gear oil (P/N Home Oil Co., Wichita, Kansas) into the piston. Slide a bearing on the screw. Start the screw in the piston and slide the piston into the housing. Install the remaining bearing, snap ring (if installed) and seal. Seat these parts in the housing with approximately 1000 lbs. pressure or use a suitable drift and mallet if a press is not available. Install the spacers, shaft (1), and snap ring. Tap the piston plug with a rawhide mallet to seat the parts against the snap ring. End play between the piston and housing should be between .010 and .031 inch. Run the actuator in and out several times to assure proper operation in its full travel. Excess lubricant will be forced out of the vent hole the first time the actuator is run all the way up. Install the actuator with the vent hole up to prevent the loss of lubricant.



1. Worm Gear Holder
2. Housing Plug
3. Worm Bearing Seal
4. Snap Ring
5. Worm Bearing
6. Worm
7. Screw
8. Snap Ring
9. Worm Bearing Seal
10. Housing Cover
11. Housing
12. Screw Retaining Nut
13. Piston Plug
14. Bearing
15. Piston
16. "O" Ring
17. Plug Attaching Rivet

Flap Actuator D-1 Thru D-837



1. Flex Shaft
2. Snap Ring
3. Spacer
4. Spacer
5. Seal
6. Bearing
7. Piston
8. Housing
9. Pin
10. Piston Plug
11 "O" Ring

*2nd Snap Ring Installed Between Seal And Bearing D-838 thru D-4865

Flap Actuator D-838 and After

Figure 5-8. Flap Actuators

OVERHAUL OF THE LANDING GEAR ACTUATOR (Figure 5-9)

a. Remove the motor (1) from the actuator and remove the gear (2) from the face of the motor.

b. Remove the snap ring (3) from the end of the shaft (19) and remove the gear (4) from the shaft.

c. Remove the snap ring (5) from the end of the actuator drive shaft (7) and remove the actuator retract arm (6) from the shaft. On aircraft prior to D-7293, and on aircraft D-7294, D-7302 and after, except D-7336, push the shaft out of the assembly in the direction of the arrow.

NOTE

On aircraft D-7293, D-7295 through D-7301 and D-7336, the drive shaft (7) and sector gear (10) form a one-piece unit. With this exception, all maintenance procedures are the same as on earlier aircraft.

d. Remove the screws (8), and the bolt (9) from the housing. Separate the housing and remove the sector gear (10).

e. Remove the screw (11) from the actuator hand crank (12) and remove the spacer (13) and "O" ring (14) from the shaft.

f. Remove the screws (15) from the hand crank housing (16) and remove the hand crank housing from the actuator housing.

g. With a lug spanner wrench remove the retainer nut (17) from the actuator housing. Remove the cotter pin and back off the lock nut (21) and remove the two sections of the half-ring (18) from the shaft. Tap out the shaft (19) in the direction of the arrow. The bearing (20) is now free and the seal (22) will come out with the shaft.

h. Remove the bearings (23 and 24) from the actuator housing.

i. Remove the seal (25) and the bearing (26) from the top and bottom housing halves.

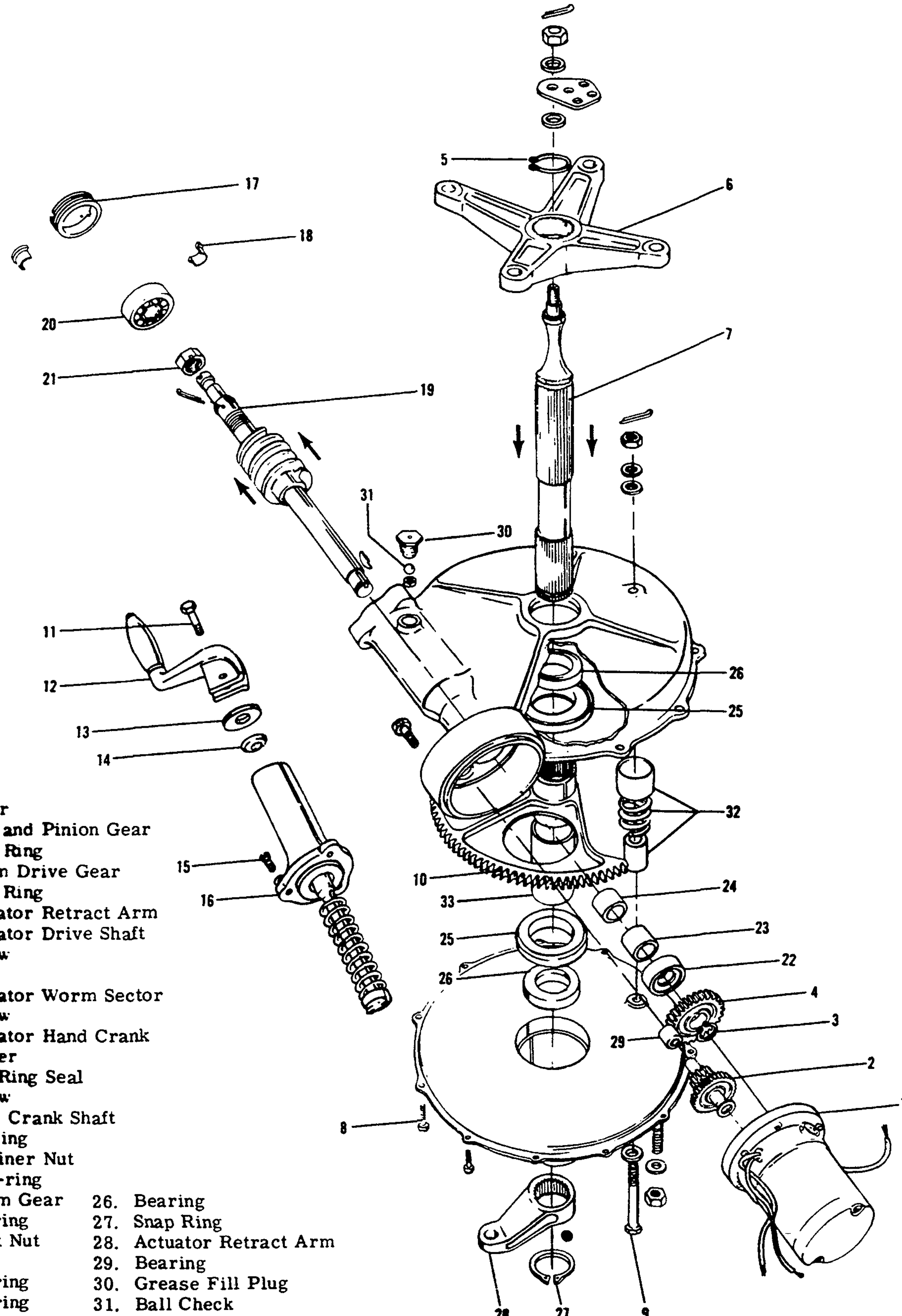
j. Remove the snap ring (27) from the shaft (7) and slide the nose gear actuator retract arm (28) off the shaft.

k. Remove the bearing (29) from the housing.

Clean all parts in solvent removing the grease and oil. Check all bearings for cracks and wear. Check the teeth of the sector gear for cracks and wear. Replace parts as necessary. Replace all seals in reassembly. Seal the upper and lower housing joints using Perfect Seal Sealing Compound No. R-134-B (Product of Ford Motor Co., Dearborn, Michigan). Reassemble the actuator in the reverse of the above procedure. Remove the filler plug from the actuator housing and fill the housing with 1/2 pint of Mobil Compound GG. Before attaching the motor, pack the motor gear housing with approximately one ounce of MIL-G-7711. (Fill within -00 + .10 inch of the housing center line.)

NOTE

At assembly, install the retract arms on the drive shaft with the scribe marks on the arms aligning with the marks on the shaft. The same procedure applies when installing the drive shaft through the sector gear on aircraft prior to D-7293 and on aircraft D-7294, D-7302 and after, except D-7336.



1. Motor
2. Spur and Pinion Gear
3. Snap Ring
4. Worm Drive Gear
5. Snap Ring
6. Actuator Retract Arm
7. Actuator Drive Shaft
8. Screw
9. Bolt
10. Actuator Worm Sector
11. Screw
12. Actuator Hand Crank
13. Spacer
14. "O" Ring Seal
15. Screw
16. Hand Crank Shaft Housing
17. Retainer Nut
18. Half-ring
19. Worm Gear
20. Bearing
21. Lock Nut
22. Seal
23. Bearing
24. Bearing
25. Seal
26. Bearing
27. Snap Ring
28. Actuator Retract Arm
29. Bearing
30. Grease Fill Plug
31. Ball Check
32. Sector Gear Stop Assy.
33. Spacer

Figure 5-9. Landing Gear Actuator

ELECTRIC PROPELLER DEICER BOOT REPAIR, GOODRICH

Minor damage to the deicer boots may be repaired with the rubber patch material provided in the manufacturer's (B.F. Goodrich Company, Akron, Ohio) Field Repair Kit No. 77-802. The following information describes the proper procedure for repairing the propeller deicer boots.

a. Clean the rubber area being patched, using methyl ethyl ketone or acetone to remove all grease and dirt.

b. Wipe the surface dry with a clean, lint-free cloth to remove the solvent film.

c. Cut a patch big enough to overlap the damaged area 1/4 inch on all sides. Since this patch will be exposed to the airstream, the edges should be cut clean (without fringes) and beveled.

NOTE

If, in the damaged area, any of the heating element wires are exposed (but not broken), cut a second patch big enough to extend 1/4 inch beyond all sides of the first patch.

d. Apply an even coat of EC-1403 cement (Minnesota Mining and Manufacturing Company, Saint Paul, Minnesota) to the damaged portion of the boot and to the patch. Allow the coated surfaces approximately one hour to dry before applying a second coat of cement and allowing it to dry.

e. Moisten surfaces of the patch and deicer boot with a cloth slightly dampened with methyl ethyl ketone or toluol.

f. Stick either the center or one edge of the patch lightly in place on the boot, then work the remainder of the patch down carefully to avoid trapping air between the surfaces of the patch and the boot.

g. Roll the patch down securely with a rubber roller.

CAUTION

Never use a metal or wooden roller for this purpose, for they would damage the heating elements in the deicer boot.

h. After allowing one hour's drying time and before releasing the airplane for flight, rub the edges and center of the patch to see that it is holding.

NOTE

If the patch covers a heating element that was previously exposed, the second patch should be installed at this time, as indicated in the preceding steps.

i. Wrinkled or loose patches must be reattached. Loosen the bond for an additional 1/4 inch beyond the wrinkles or loose area with methyl ethyl ketone, then reattach the loose portion of the patch with EC-1403 cement as indicated in the preceding steps.

BRAKE MASTER CYLINDER OVERHAUL

PARAMOUNT (Figure 5-10)

DISASSEMBLY

a. Remove the snap ring (3) and pull the assembled piston from the housing (18).

b. Remove the clevis (1), nut (2) and cotter pin (11) from rod (16), this will allow the removal of retaining washer (4), rod wiper (5), guide bushing (6) and "O" rings (7 & 8) from the piston rod.

c. Remove the piston (10) and "O" ring (9) from piston rod and remove the spring washer (15).

d. Remove cotter pin (12) from valve stop (14) and remove the valve stop from the piston rod.

e. The valve assembly and spring will fall free of the housing with the piston assembly removed.

f. Clean all parts with solvent (PD680).

g. Check all parts for cracks, corrosion, distortion and wear.

ASSEMBLY

a. Lubricate all parts with hydraulic fluid (MIL-H-5606).

NOTE

During assembly, install new washers and seals.

b. Install the valve assembly (13) and spring (17) into the housing (18).

c. Install the valve stop (14) and cotter pin (12) to the piston rod (16).

d. Install spring washer (15), "O" ring (9) and piston (10) to the piston rod.

e. Install "O" rings (7 & 8), guide bushing (6), rod wiper (5), retaining washer (4), cotter pin (11), nut (2) and clevis (1) from piston rod.

f. Install the assembled piston assembly into the housing and install snap ring (3).

GERDES (Figure 5-10)

DISASSEMBLY

a. Remove the snap ring (22) from the clevis end of housing (35) and pull the assembled piston assembly from the housing.

b. Remove the clevis (19), locknut (20) and cap, end and bearing (24) from shaft (21).

c. Remove "O" rings (23 & 25) from cap, end and bearing.

d. Remove snap ring (26), thrust collar (27) and spacer (28) from shaft.

e. Remove "O" ring (29) from shaft.

f. Remove snap ring (33) and spring (32) from shaft.

g. Remove piston (31) from shaft.

h. Remove "O" ring (30) from piston.

i. Remove spring (34) from the housing.

j. Clean all parts with solvent (PD680).

k. Check all parts for cracks, corrosion, distortion and wear

ASSEMBLY

a. Lubricate all parts with hydraulic fluid (MIL-H-5606).

NOTE

Use new "O" rings when assembling the master cylinder.

b. Install spring (34) into the housing (35).

c. Install "O" ring (30) on the piston (31).

d. Install piston on shaft (21).

e. Install spring (32) and snap ring (33) on shaft.

f. Install "O" ring (29) on shaft at clevis end.

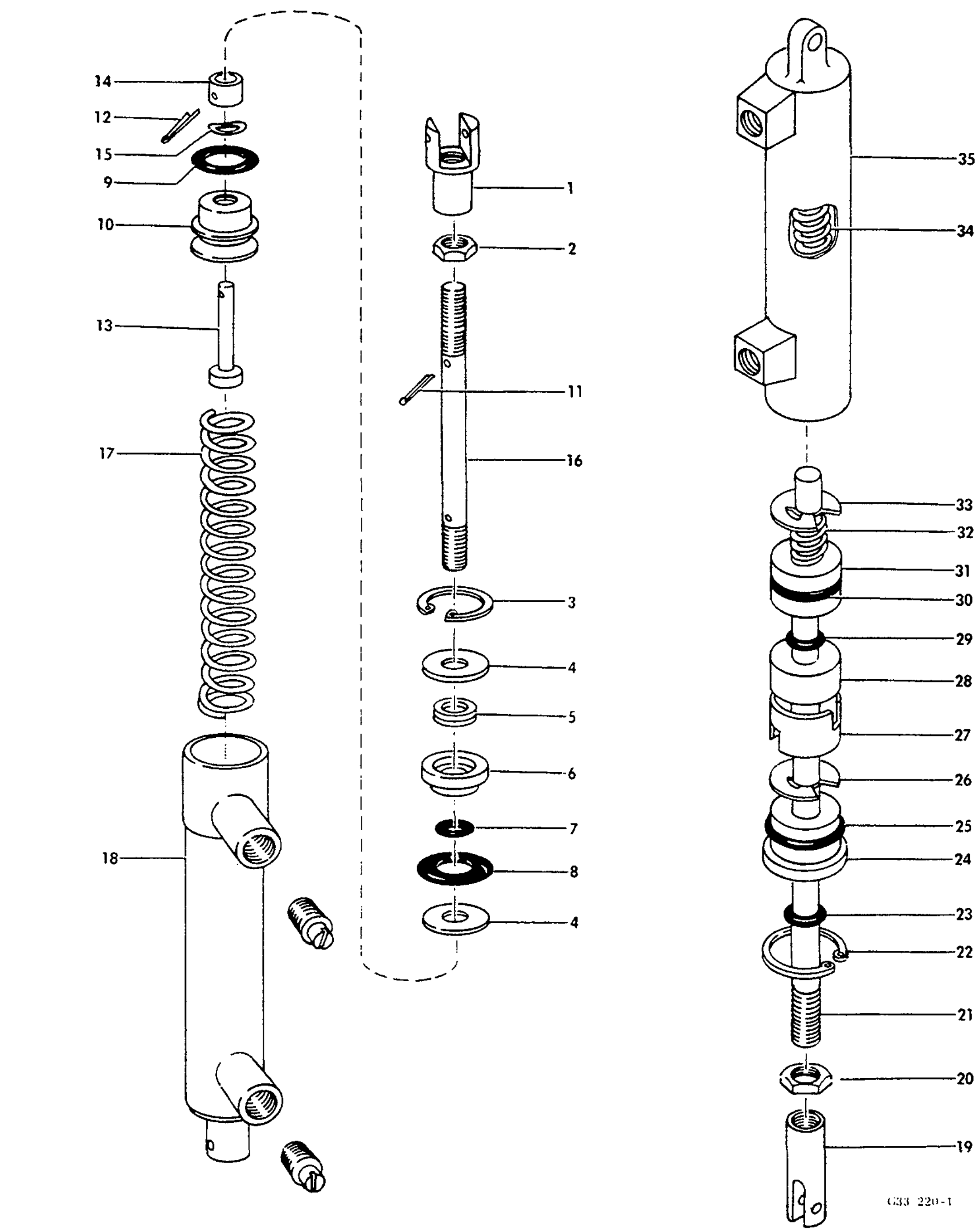
g. Install spacer (28), thrust collar (27) and snap ring (26) on shaft.

h. Install "O" ring (25) to cap. end and bearing (24).

i. Install cap, end and bearing (24), locknut (20) and clevis (19) to shaft.

j. Install assembled piston assembly into housing.

k. Install snap ring (22) to housing.



PARAMOUNT

GERDES

1. Clevis
2. Nut
3. Snap Ring
4. Retaining Washers
5. Rod Wiper
6. Guide Bushings
7. O-Ring
8. O-Ring
9. O-Ring
10. Piston
11. Cotter Pin
12. Cotter Pin (Modified)
13. Valve Assembly
14. Valve Stop
15. Spring Washer
16. Piston Rod
17. Spring
18. Housing

19. Clevis
20. Lock Nut
21. Shaft
22. Snap Ring
23. O-Ring
24. Cap End & Bearing
25. O-Ring
26. Snap Ring
27. Collar
28. Spacer
29. O-Ring
30. O-Ring
31. Piston
32. Spring
33. Snap Ring
34. Spring
35. Housing

Figure 5-10. Brake Master Cylinders

SECTION 6

Electrical Wiring Diagrams

6

SECTION VI

ELECTRICAL WIRING DIAGRAMS

The purpose of these diagrams is to show the electrical components, wiring, and connections of the aircraft in a manner that makes the operation of each circuit easily understandable. The circuits are arranged to help understand their operation and do not indicate the actual physical locations of the components. Each wire is identified by the number it bears in the aircraft. The individual components of each circuit are indexed and identified in the list of components with each circuit or diagram.

With the exception of the Models P35 and S35, the circuits are shown individually. A General Wiring Diagram has been introduced for the Models P35 and S35. This diagram provides the technician with single fold-out on which most of the electrical circuits are shown. The page adjacent to the General Diagram contains a keyed index of the individual circuit components. For optional circuits, or circuits with other serial effectivities, refer to the Index of Wiring Diagrams for the applicable Model. The wiring diagrams for those airplanes prior to D-9818, CE-613 and CJ-105 are contained within Section 6 of this Shop Manual.

Refer to the BEECHCRAFT Bonanza Wiring Diagram Manual P/N 35-590102-7 for the wiring diagrams pertaining to the Bonanza Model V35B airplane serials D-9818 through D-10119 except D-10097. On serials D-10097, D-10120 and after refer to the BEECHCRAFT Bonanza Wiring Diagram Manual P/N 35-590102-9 for the wiring diagrams on the 28 volt system.

INDEX OF WIRING DIAGRAMS

MODELS 35 through N35

INDEX OF WIRING DIAGRAMS

MODEL P35

General Wiring Diagram
Page-----6-48

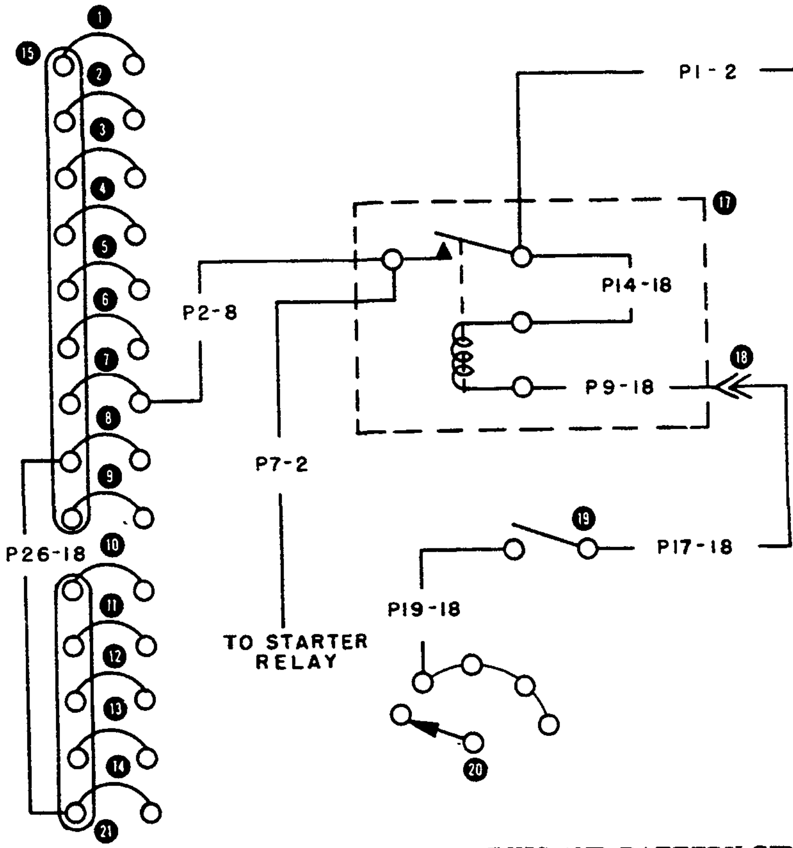
MODEL S35

General Wiring Diagram
Page-----6-50

MODELS V35, V35A, V35A-TC, V35B, and V35B-TC

MODELS
V35, V35A, V35A-TC, V35B and V35B-TC

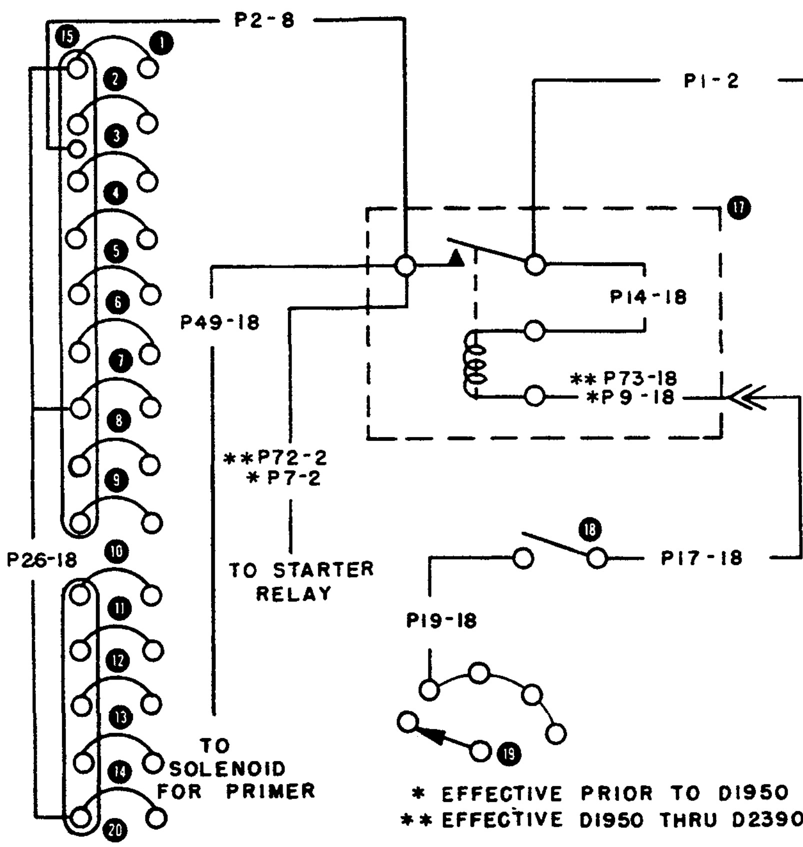
(Continued)



1. Navigation light circuit breaker
2. Flare switch circuit breaker
3. RH landing light circuit breaker
4. LH landing light circuit breaker
5. Instrument light circuit breaker
6. Flap motor circuit breaker
7. Radio circuit breaker
8. Prop governor circuit breaker
9. Landing gear motor circuit breaker
10. Stall warning indicator circuit breaker
11. Flap position indicator circuit breaker
12. Landing gear position indicator circuit breaker
13. Fuel gage circuit breaker
14. Cabin light circuit breaker
15. Buss bar
16. 12-volt battery
17. Battery master relay
18. Connector
19. Battery master switch
20. Ignition switch
21. Buss bar

35-369-109

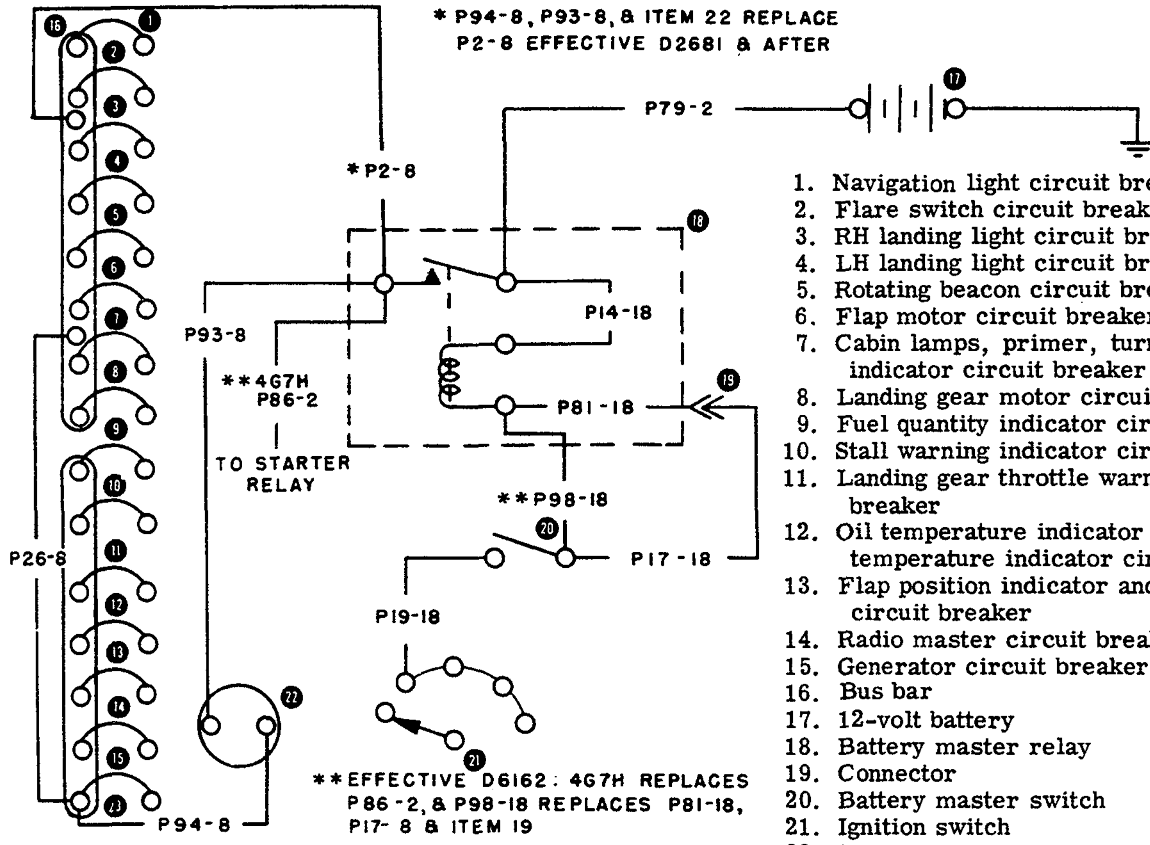
BUSS AND BATTERY CIRCUIT
Airplane Serial No. D-1 thru D-1116



1. Navigation light circuit breaker
2. Flare switch circuit breaker
3. RH landing light circuit breaker
4. LH landing light circuit breaker
5. Instrument light circuit breaker
6. Flap motor circuit breaker
7. Radio circuit breaker
8. Prop governor circuit breaker
9. Landing gear motor circuit breaker
10. Stall warning indicator circuit breaker
11. Flap position indicator circuit breaker
12. Landing gear position indicator circuit breaker
13. Fuel gage circuit breaker
14. Cabin light circuit breaker
15. Buss bar
16. 12-volt battery
17. Battery master relay
18. Battery master switch
19. Ignition switch
20. Buss bar

B35-369-110

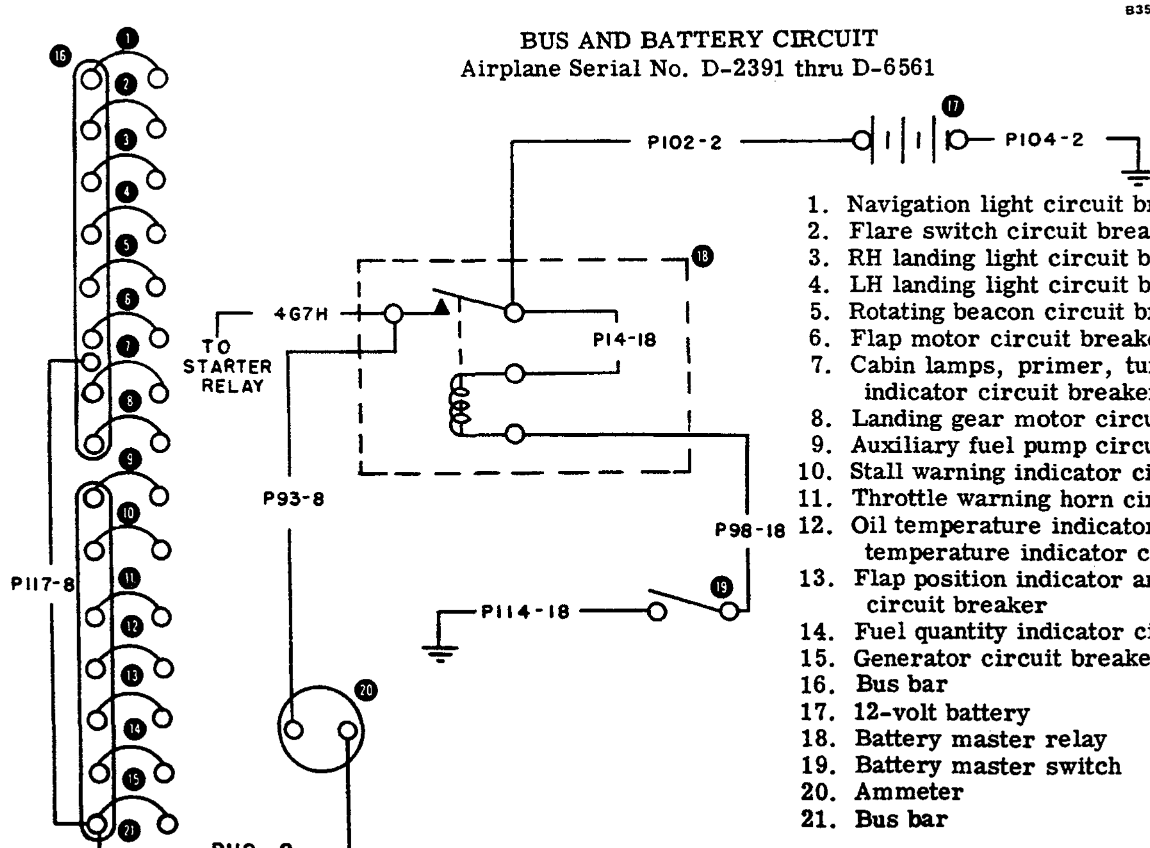
BUSS AND BATTERY CIRCUIT
Airplane Serial No. D-1117 thru D-2390



1. Navigation light circuit breaker
2. Flare switch circuit breaker
3. RH landing light circuit breaker
4. LH landing light circuit breaker
5. Rotating beacon circuit breaker
6. Flap motor circuit breaker
7. Cabin lamps, primer, turn and bank indicator circuit breaker
8. Landing gear motor circuit breaker
9. Fuel quantity indicator circuit breaker
10. Stall warning indicator circuit breaker
11. Landing gear throttle warning horn circuit breaker
12. Oil temperature indicator and cylinder head temperature indicator circuit breaker
13. Flap position indicator and instrument lights circuit breaker
14. Radio master circuit breaker
15. Generator circuit breaker
16. Bus bar
17. 12-volt battery
18. Battery master relay
19. Connector
20. Battery master switch
21. Ignition switch
22. Ammeter
23. Bus bar

B35-369-111

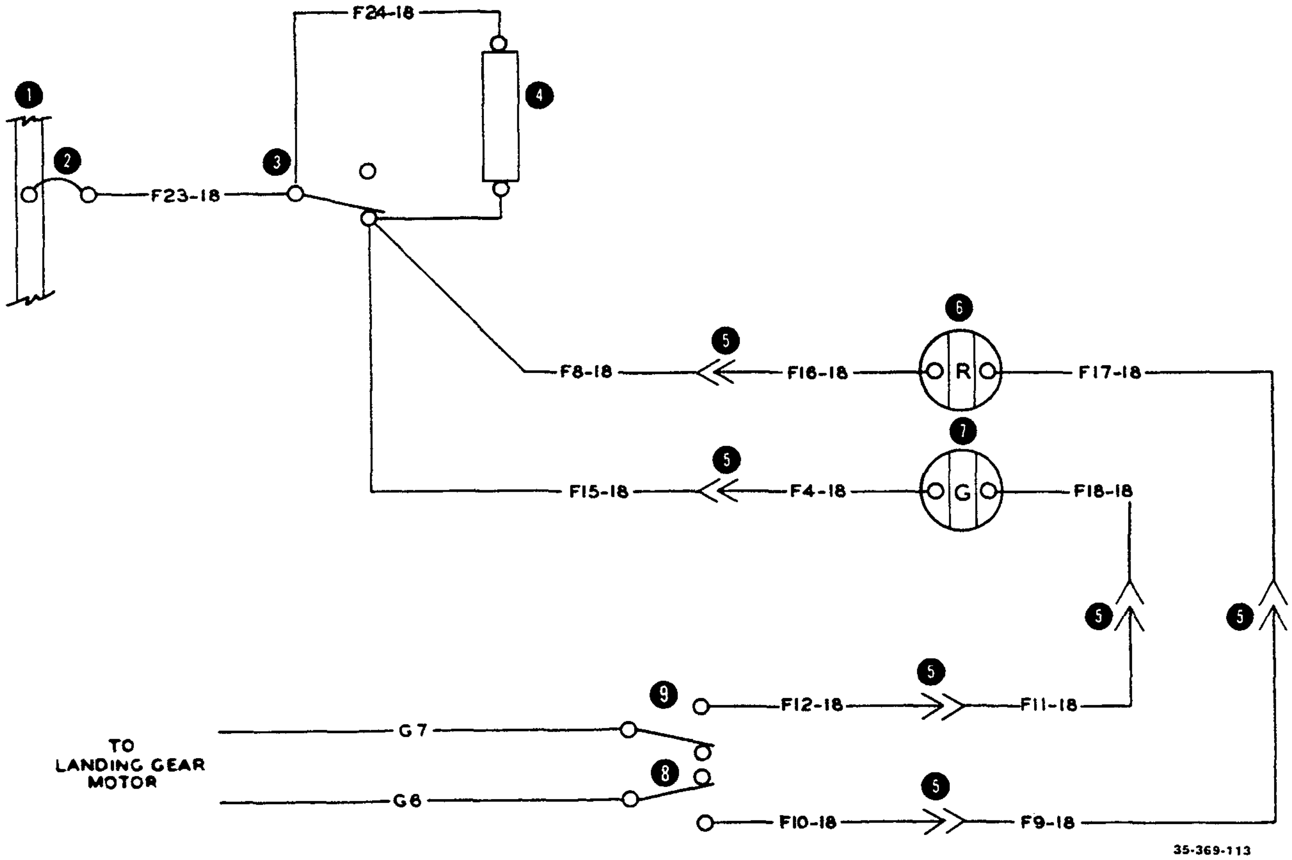
BUS AND BATTERY CIRCUIT
Airplane Serial No. D-2391 thru D-6561



1. Navigation light circuit breaker
2. Flare switch circuit breaker
3. RH landing light circuit breaker
4. LH landing light circuit breaker
5. Rotating beacon circuit breaker
6. Flap motor circuit breaker
7. Cabin lamps, primer, turn and bank indicator circuit breaker
8. Landing gear motor circuit breaker
9. Auxiliary fuel pump circuit breaker
10. Stall warning indicator circuit breaker
11. Throttle warning horn circuit breaker
12. Oil temperature indicator and cylinder head temperature indicator circuit breaker
13. Flap position indicator and instrument lights circuit breaker
14. Fuel quantity indicator circuit breaker
15. Generator circuit breaker
16. Bus bar
17. 12-volt battery
18. Battery master relay
19. Battery master switch
20. Ammeter
21. Bus bar

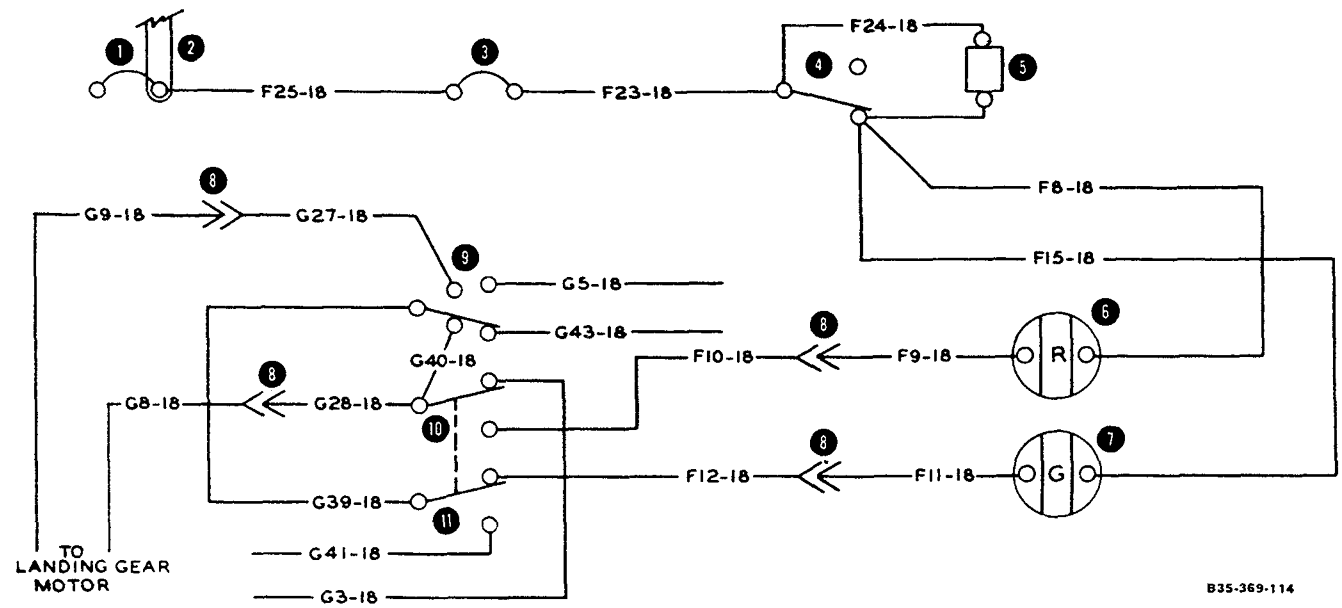
BUS AND BATTERY CIRCUIT
Airplane Serial No. D-6562 thru D-6841

N35-369-112



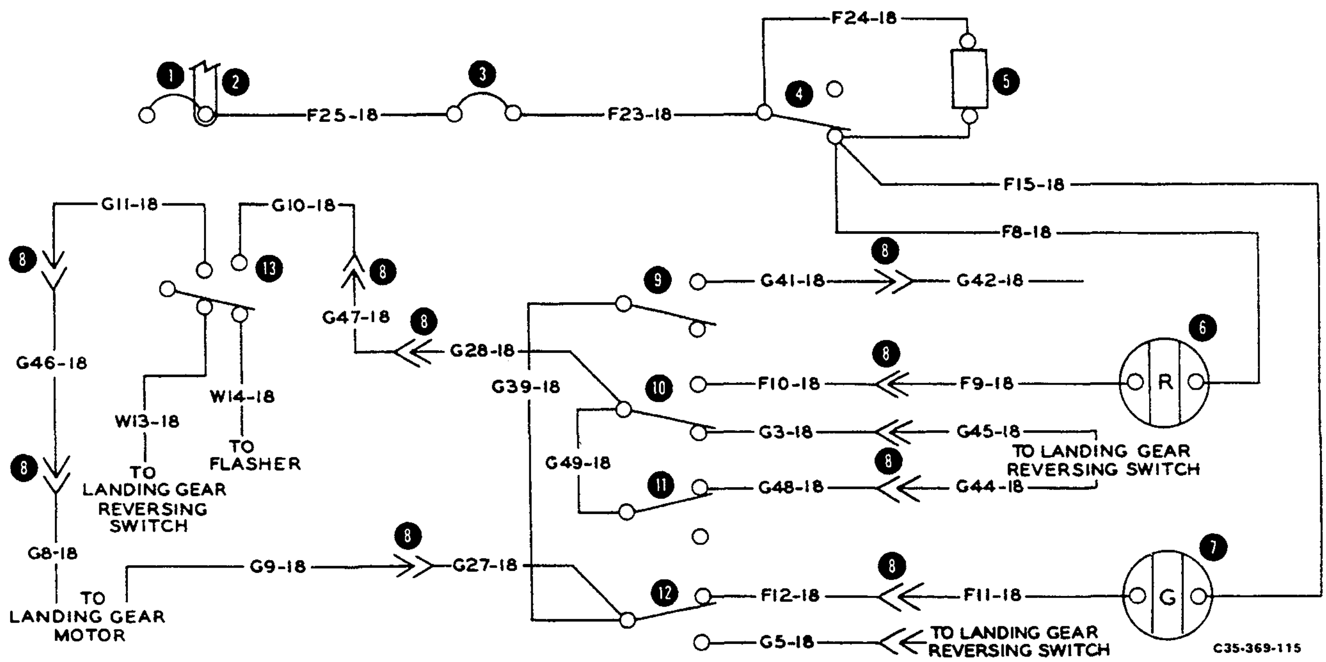
1. Buss bar
2. Landing gear position indicator light circuit breaker
3. Navigation light switch
4. Resistor located on navigation light switch (100 ohm)
5. Connectors
6. Landing gear up indicator light (red)
7. Landing gear down indicator light (green)
8. Up limit switch
9. Down limit switch

LANDING GEAR POSITION INDICATOR CIRCUIT
Airplane Serial No. D-1 thru D-1500



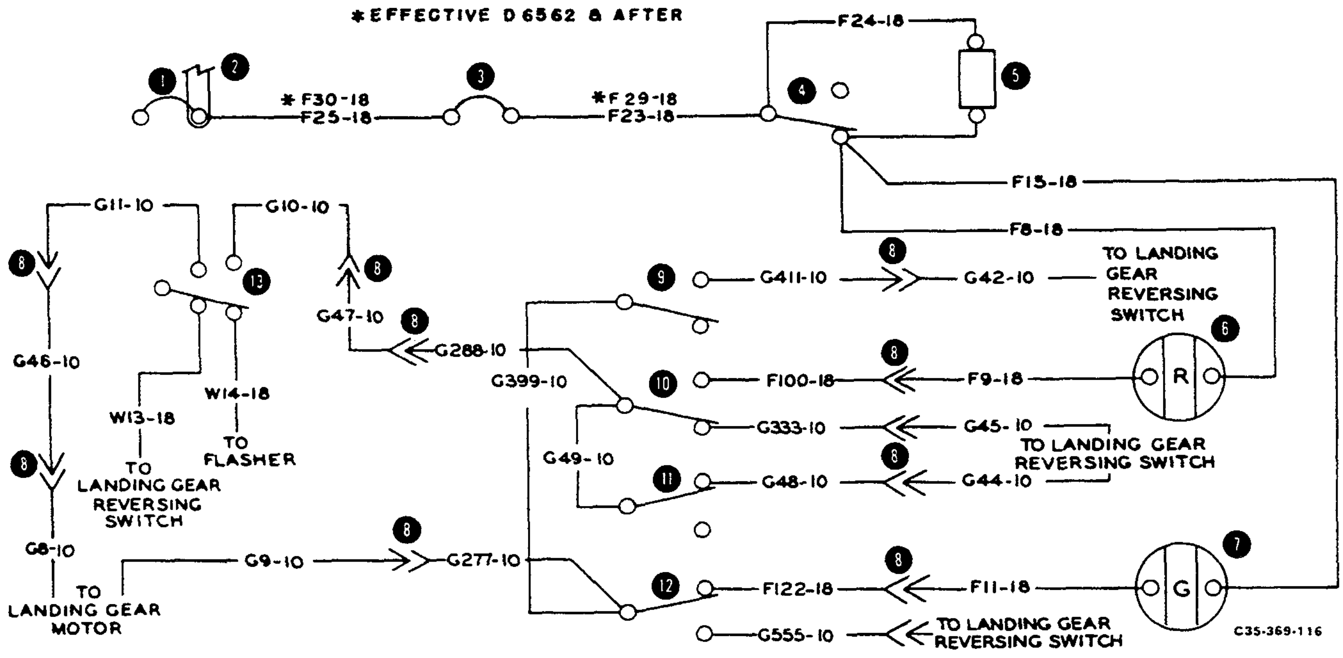
1. Landing gear motor circuit breaker
2. Buss bar
3. Landing gear position indicator light circuit breaker
4. Navigation light switch
5. Resistor located on navigation light switch (100 ohm)
6. Landing gear up indicator light (red)
7. Landing gear down indicator light (green)
8. Connector
9. Down limit and brake switch
10. Up position light and up limit switch
11. Down position light and up brake switch

LANDING GEAR POSITION INDICATOR CIRCUIT
Airplane Serial No. D-1501 thru D-2800



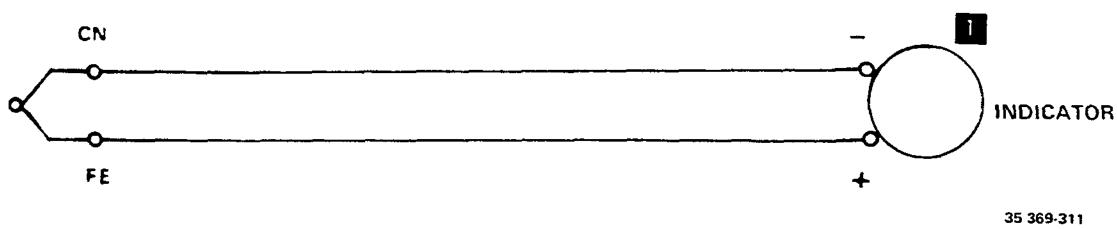
1. Landing gear motor circuit breaker
2. Buss bar
3. Landing gear position indicator light circuit breaker
4. Navigation light switch
5. Resistor located on navigation light switch (100 ohm)
6. Landing gear up indicator light (red)
7. Landing gear down indicator light (green)
8. Connector
9. Landing gear up brake switch
10. Landing gear up limit switch
11. Landing gear down brake switch
12. Landing gear down limit switch
13. Landing gear safety switch

LANDING GEAR POSITION INDICATOR CIRCUIT
Airplane Serial No. D-2801 thru D-3319

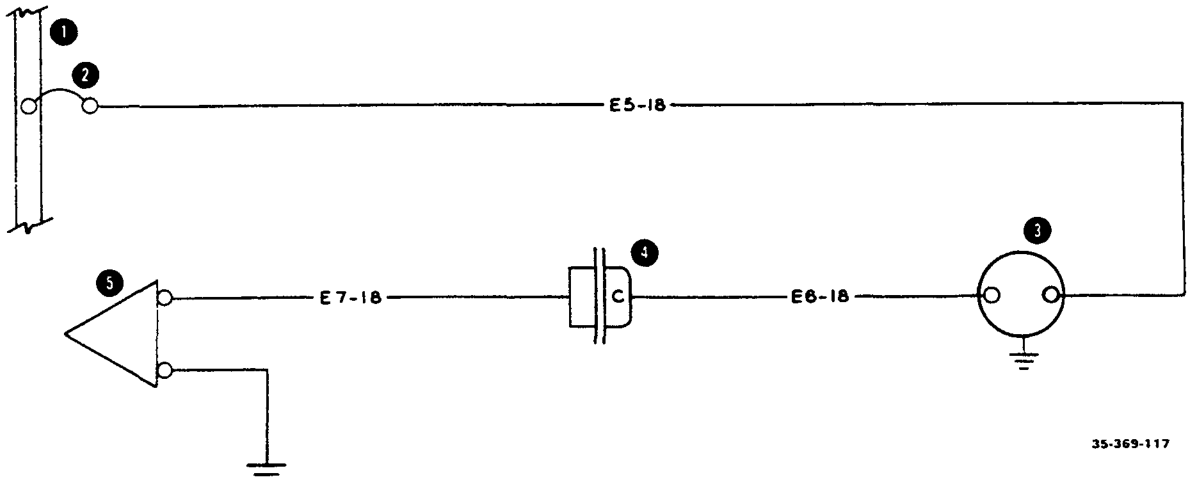


1. Landing gear motor circuit breaker (Auxiliary fuel pump circuit breaker D-6562 and after)
2. Bus bar
3. Landing gear position indicator light circuit breaker
4. Navigation light switch
5. Resistor located on navigation light switch (100 ohm)
6. Landing gear up indicator light (red)
7. Landing gear down indicator light (green)
8. Connector
9. Landing gear up brake switch
10. Landing gear up limit switch
11. Landing gear down brake switch
12. Landing gear down limit switch
13. Landing gear safety switch

LANDING GEAR POSITION INDICATOR CIRCUIT
D-3320 thru D-6841

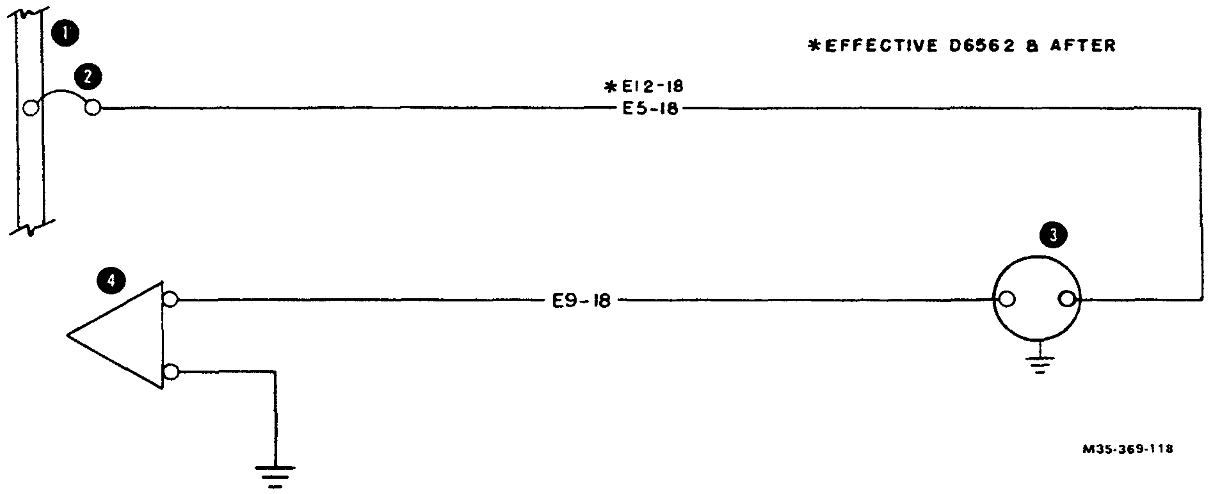


CYLINDER HEAD TEMPERATURE INDICATOR CIRCUIT (THERMOCOUPLE)
D-1 thru D-5083 and D-5352 except D-4974



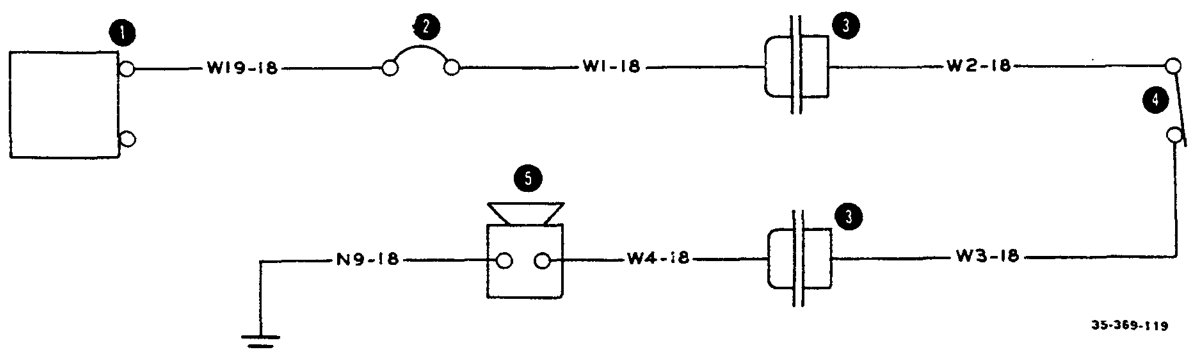
1. Bus bar
2. Oil temperature indicator and cylinder head temperature indicator circuit breaker
3. Cylinder head temperature indicator
4. Firewall connector
5. Cylinder head temperature thermocouple

CYLINDER HEAD TEMPERATURE INDICATOR CIRCUIT
(12V RESISTIVE ELEMENT)
D-4974, D-5084 thru D-6161 except D-5352



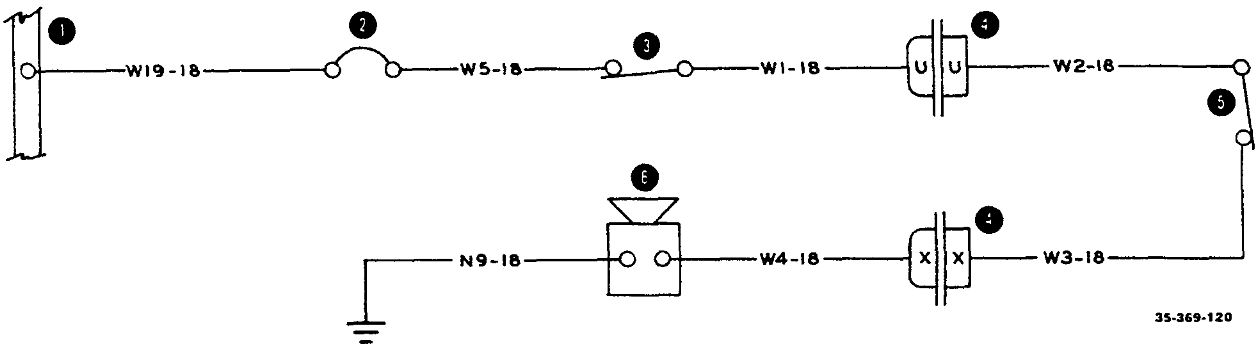
1. Bus bar
2. Oil temperature indicator and cylinder head temperature indicator circuit breaker
3. Cylinder head temperature indicator
4. Cylinder head temperature thermocouple

CYLINDER HEAD TEMPERATURE INDICATOR CIRCUIT
Airplane Serial No. D-6162 thru D-6841



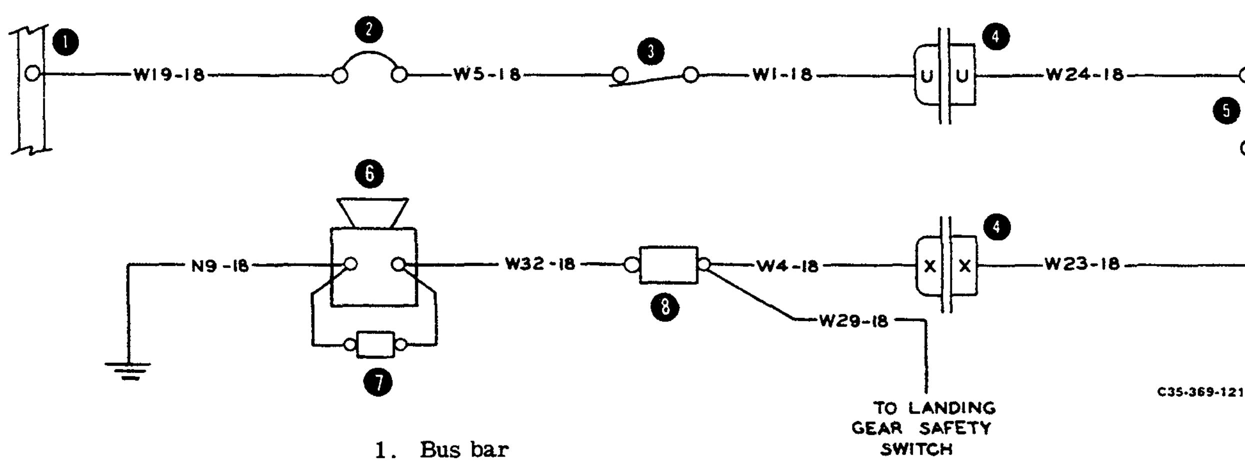
1. Landing gear reversing switch
2. Landing gear warning horn circuit breaker
3. Firewall connector
4. Throttle warning horn switch
5. Warning horn

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-1 thru D-150



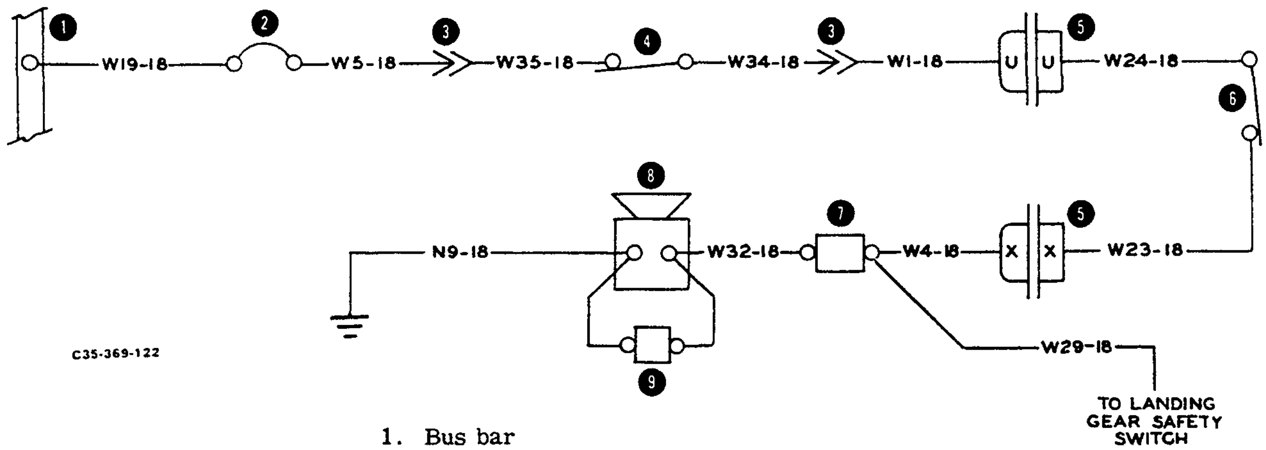
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Landing gear warning horn switch
4. Firewall connector
5. Throttle warning horn switch
6. Warning horn

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-151 thru D-2680



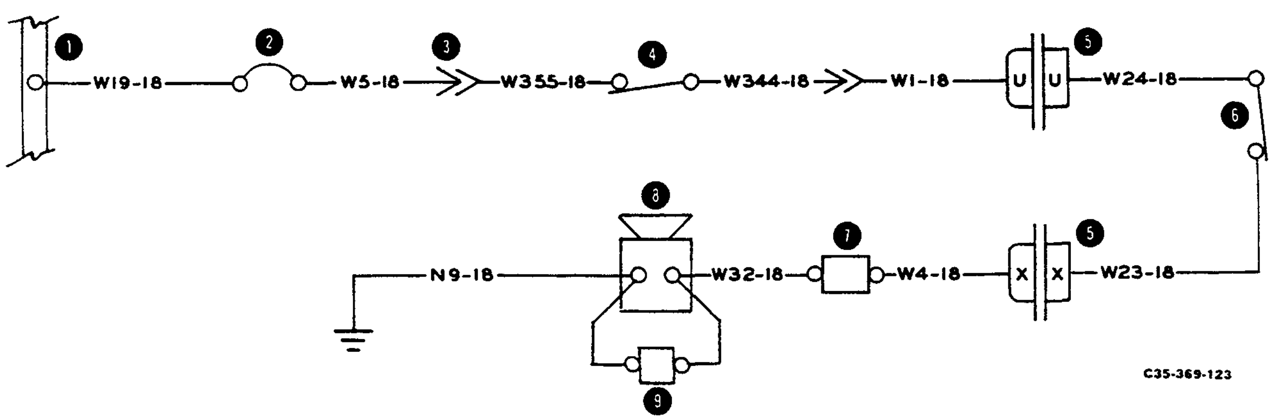
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Landing gear warning horn switch
4. Firewall connector
5. Throttle warning horn switch
6. Warning horn
7. Resistor (7.5 ohm 10 watt)
8. Flasher

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-2681 thru D-2800



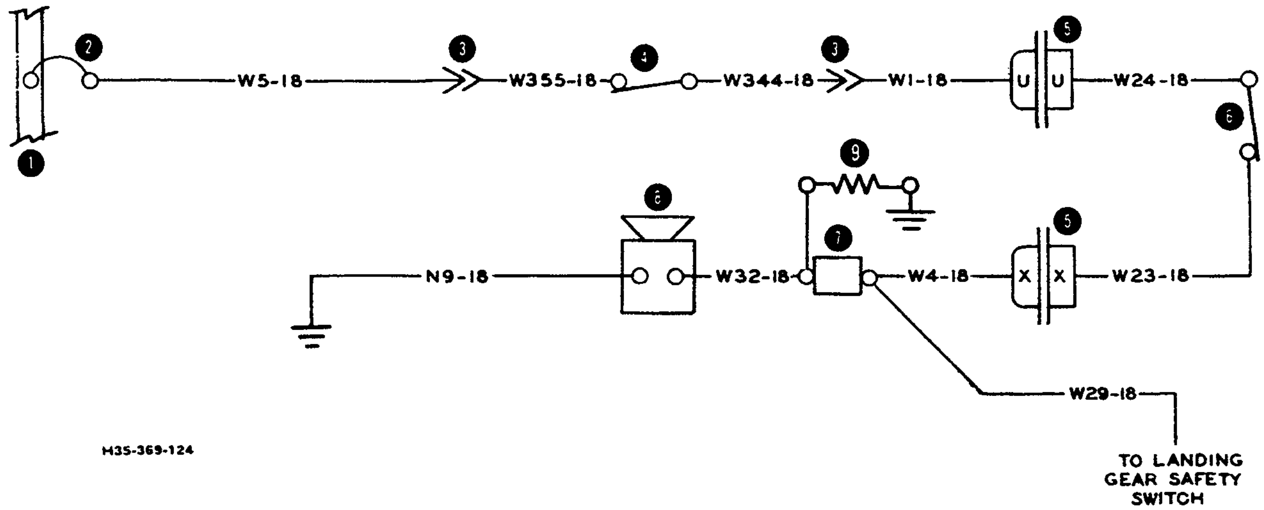
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Connector
4. Landing gear warning horn switch
5. Firewall connector
6. Throttle warning horn switch
7. Flasher
8. Warning horn
9. Resistor (7.5 ohm 10 watt)

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-2801 thru D-3319



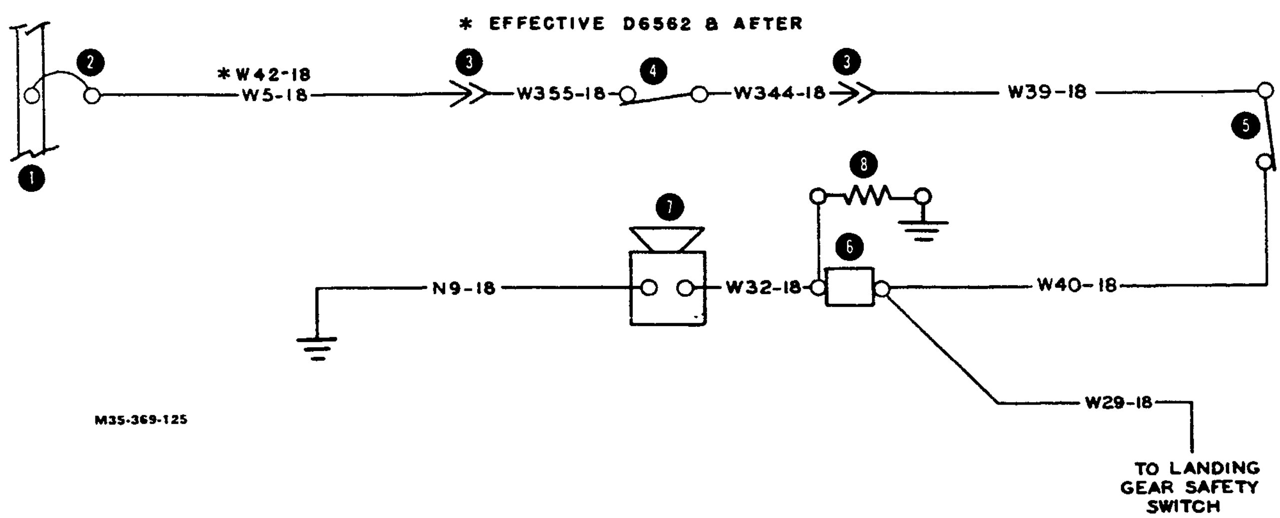
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Connector
4. Landing gear warning horn switch
5. Firewall connector
6. Throttle warning horn switch
7. Flasher
8. Warning horn
9. Resistor (7.5 ohm 10 watt)

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-3320 thru D-4865



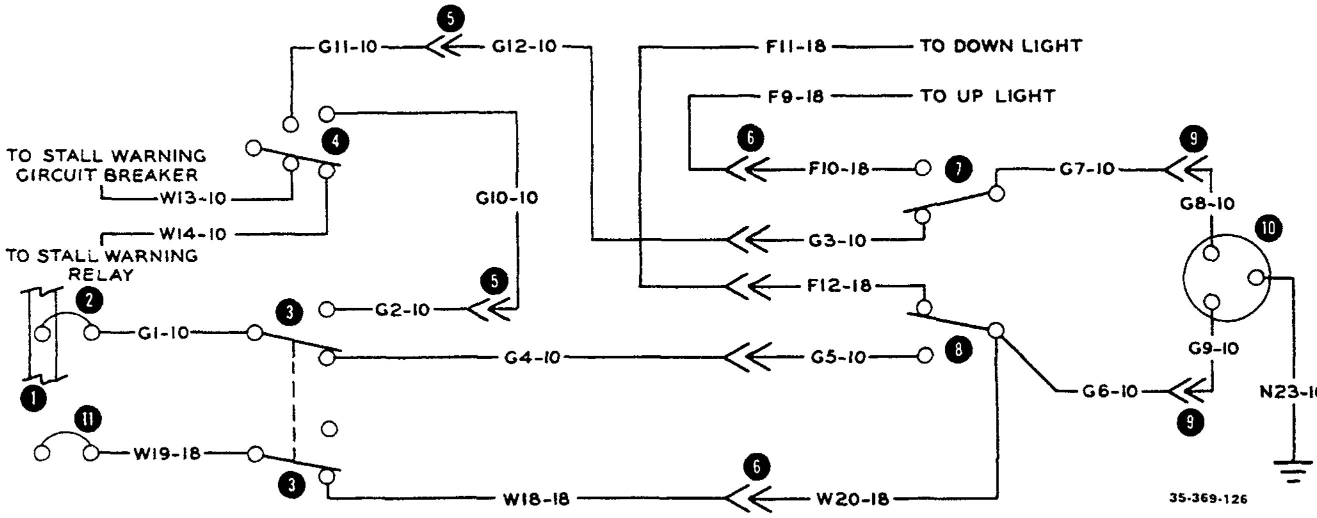
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Connector
4. Landing gear warning horn switch
5. Firewall connector
6. Throttle warning horn switch
7. Flasher
8. Warning horn
9. Resistor (7.5 ohm 10 watt)

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-4866 thru D-6161



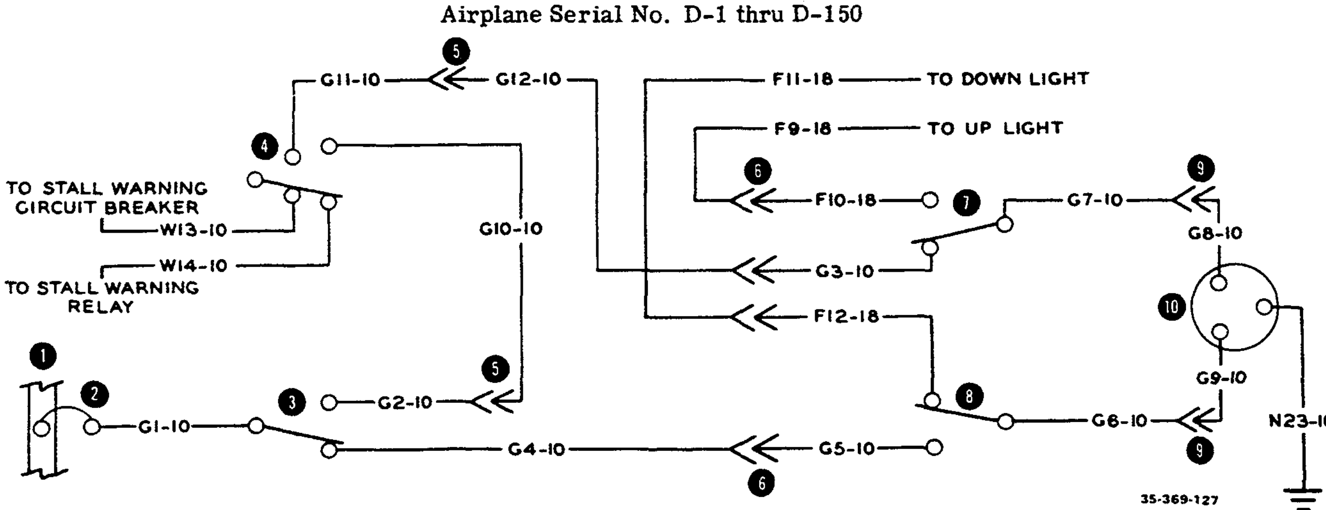
1. Bus bar
2. Landing gear warning horn circuit breaker
3. Connector
4. Landing gear warning horn switch
5. Throttle warning horn switch
6. Flasher
7. Warning horn
8. Resistor (7.5 ohm 10 watt)

LANDING GEAR WARNING HORN CIRCUIT
Airplane Serial No. D-6162 thru D-6841



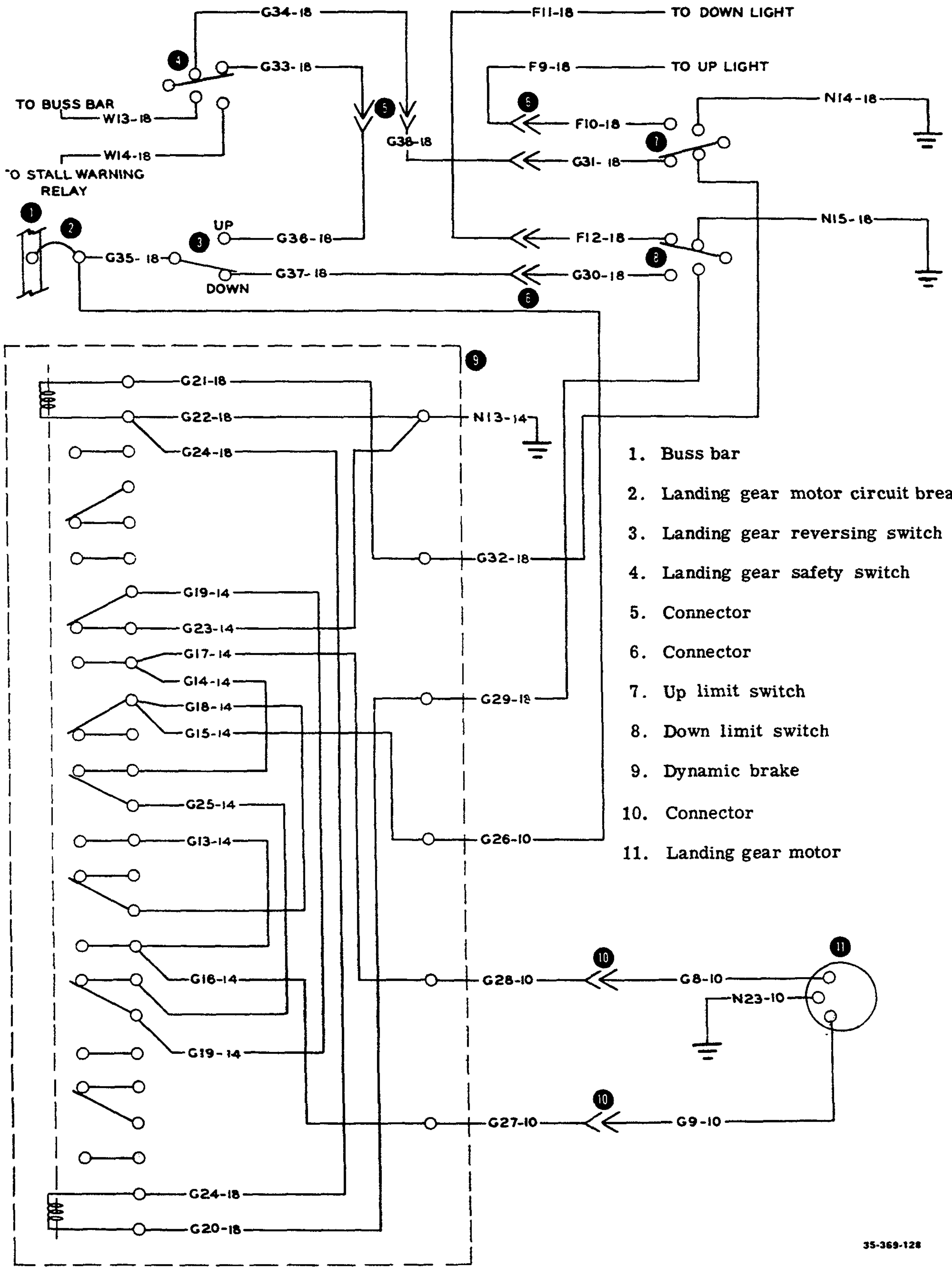
1. Buss bar
2. Landing gear motor circuit breaker
3. Landing gear reversing switch
4. Landing gear safety switch
5. Connector
6. Connector
7. Up limit switch
8. Down limit switch
9. Connector
10. Landing gear motor
11. Warning horn circuit breaker

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-1 thru D-150



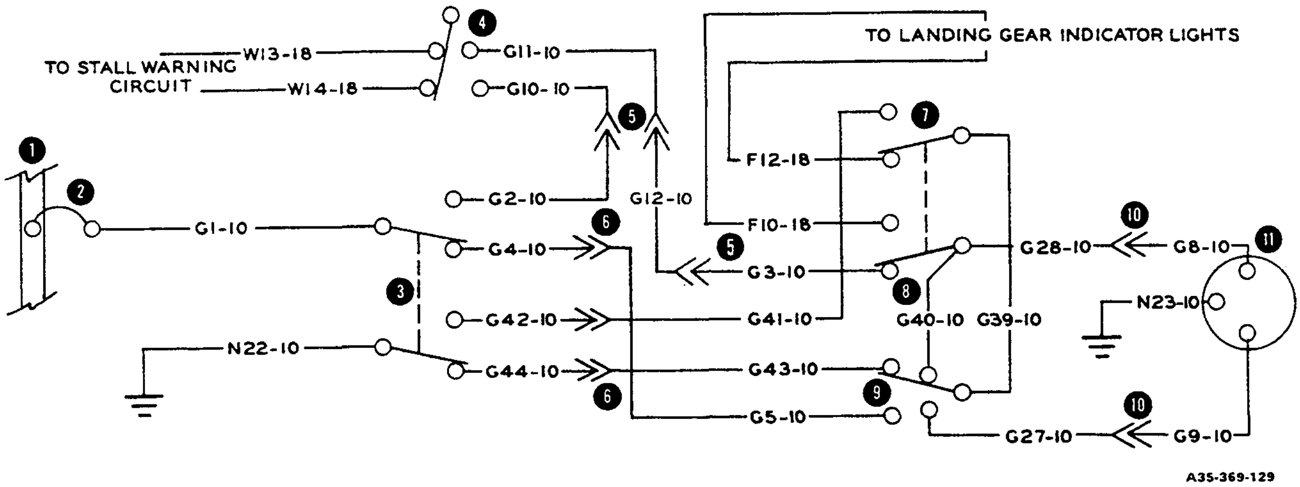
1. Buss bar
2. Landing gear motor circuit breaker
3. Landing gear reversing switch
4. Landing gear safety switch
5. Connector
6. Connector
7. Up limit switch
8. Down limit switch
9. Connector
10. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-151 thru D-200



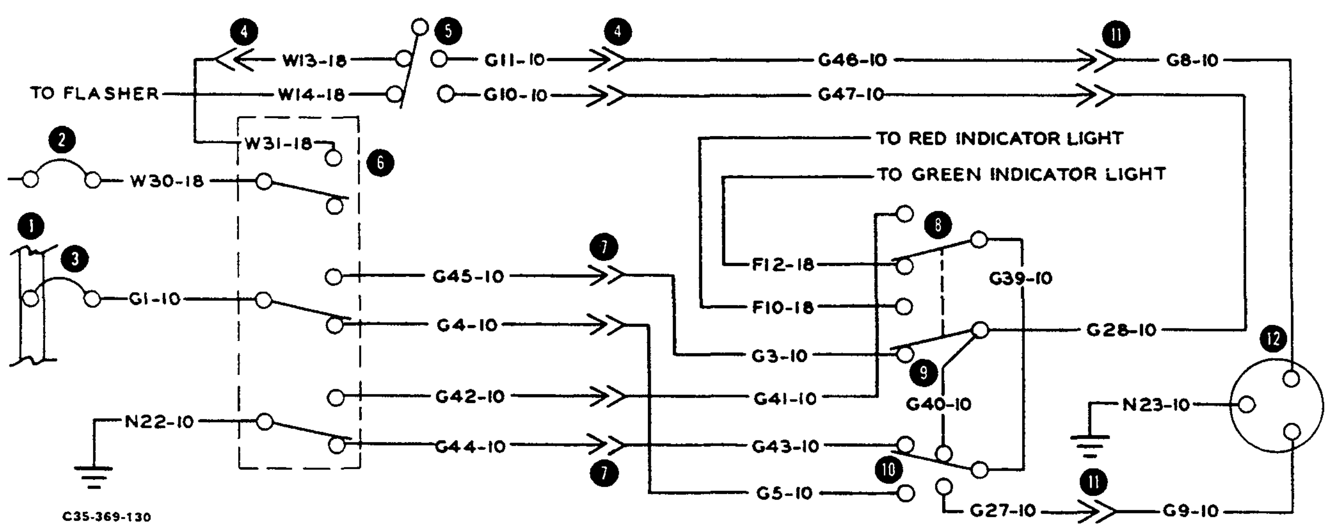
1. Buss bar
2. Landing gear motor circuit breaker
3. Landing gear reversing switch
4. Landing gear safety switch
5. Connector
6. Connector
7. Up limit switch
8. Down limit switch
9. Dynamic brake
10. Connector
11. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-201 thru D-1500



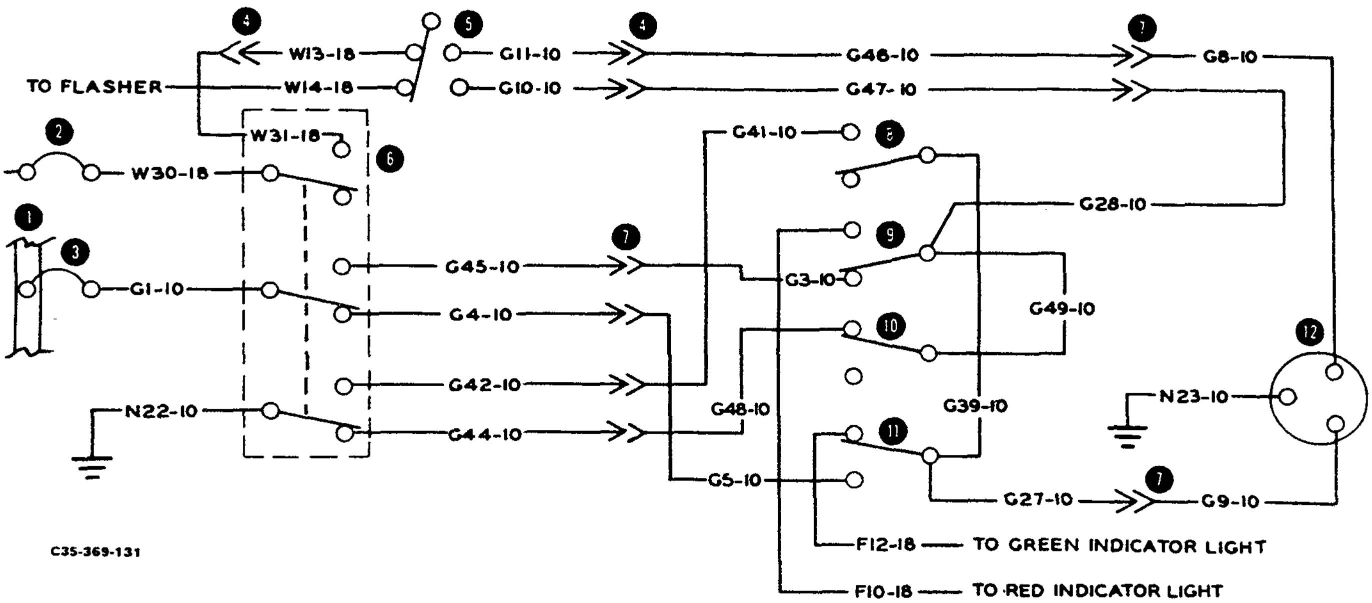
1. Buss bar
2. Circuit breaker
3. Landing gear reversing switch
4. Landing gear safety switch
5. Connector
6. Connector
7. Up brake switch
8. Up limit and position light switch
9. Down limit and brake switch
10. Connector
11. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-1501 thru D-2680



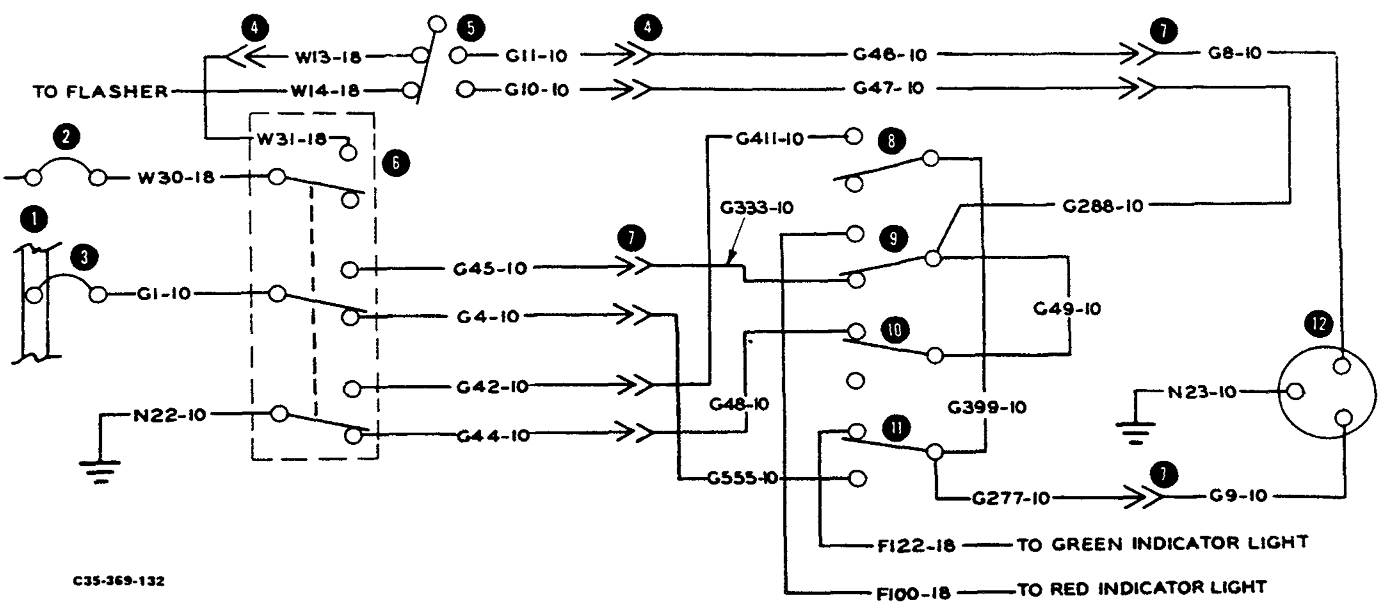
1. Buss bar
2. Landing gear throttle warning horn circuit breaker
3. Landing gear motor circuit breaker
4. Fuselage wing break
5. Landing gear safety switch
6. Landing gear reversing switch
7. Connector
8. Up brake switch
9. Up limit and position light switch
10. Down limit and brake switch
11. Connector
12. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-2681 thru D-2800



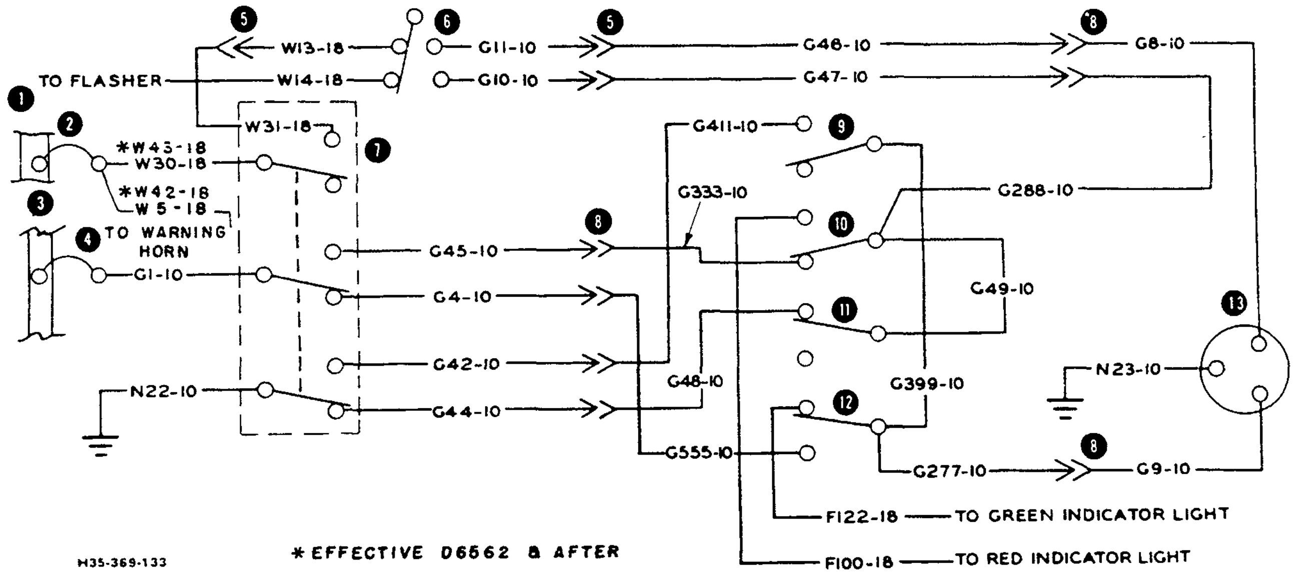
1. Buss bar
2. Landing gear warning horn circuit breaker
3. Landing gear motor circuit breaker
4. Fuselage wing break
5. Landing gear safety switch
6. Landing gear reversing switch
7. Connector
8. Up brake switch
9. Up limit switch
10. Down brake switch
11. Down limit switch
12. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-2801 thru D-3319



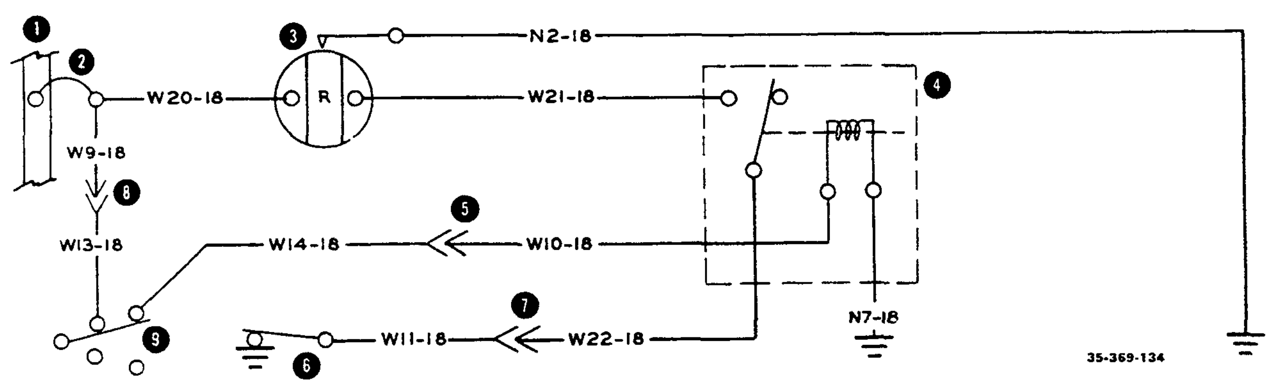
1. Buss bar
2. Landing gear warning horn circuit breaker
3. Landing gear motor circuit breaker
4. Fuselage wing break
5. Landing gear safety switch
6. Landing gear reversing switch
7. Connector
8. Up brake switch
9. Up limit switch
10. Down brake switch
11. Down limit switch
12. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-3320 thru D-4865



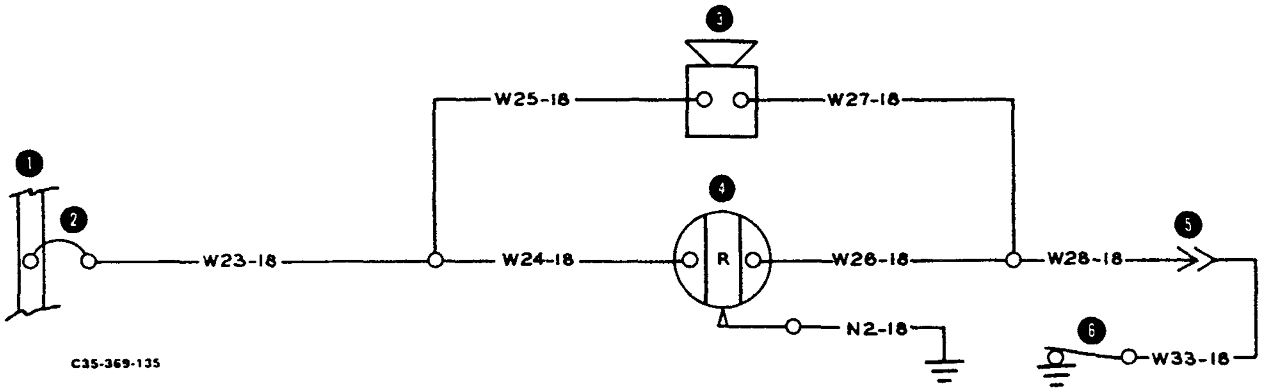
1. Manual circuit breaker bus bar
2. Landing gear warning horn circuit breaker
3. Emergency switch panel bus bar
4. Landing gear motor circuit breaker
5. Fuselage wing break
6. Landing gear safety switch
7. Landing gear reversing switch
8. Connector
9. Up brake switch
10. Up limit switch
11. Down brake switch
12. Down limit switch
13. Landing gear motor

LANDING GEAR CONTROL CIRCUIT
Airplane Serial No. D-4866 thru D-6841



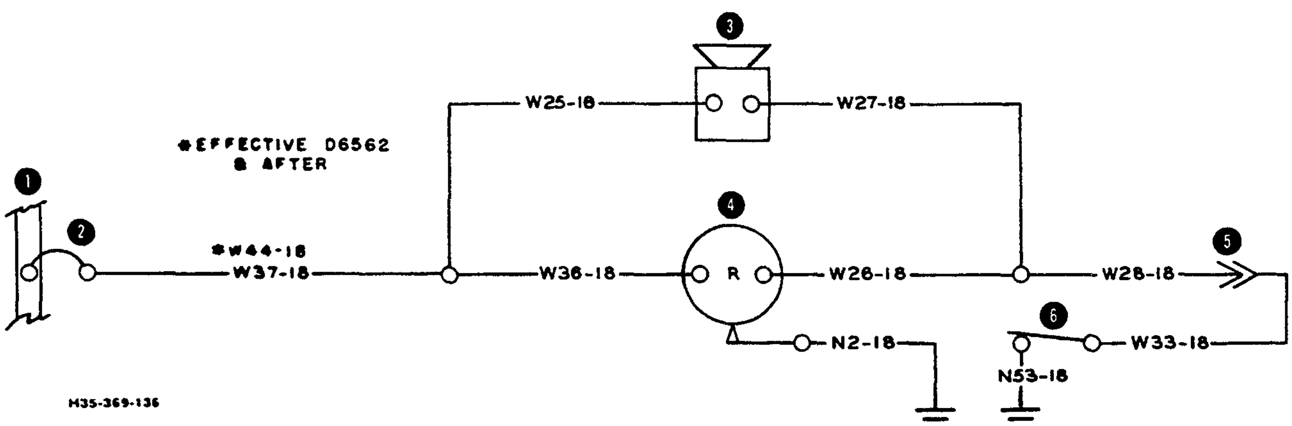
1. Bus bar
2. Stall warning light circuit breaker
3. Stall warning light
4. Relay
5. Connector
6. Wing stall detector unit
7. Fuselage wing break
8. Connector
9. Landing gear safety switch

STALL WARNING LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-2680



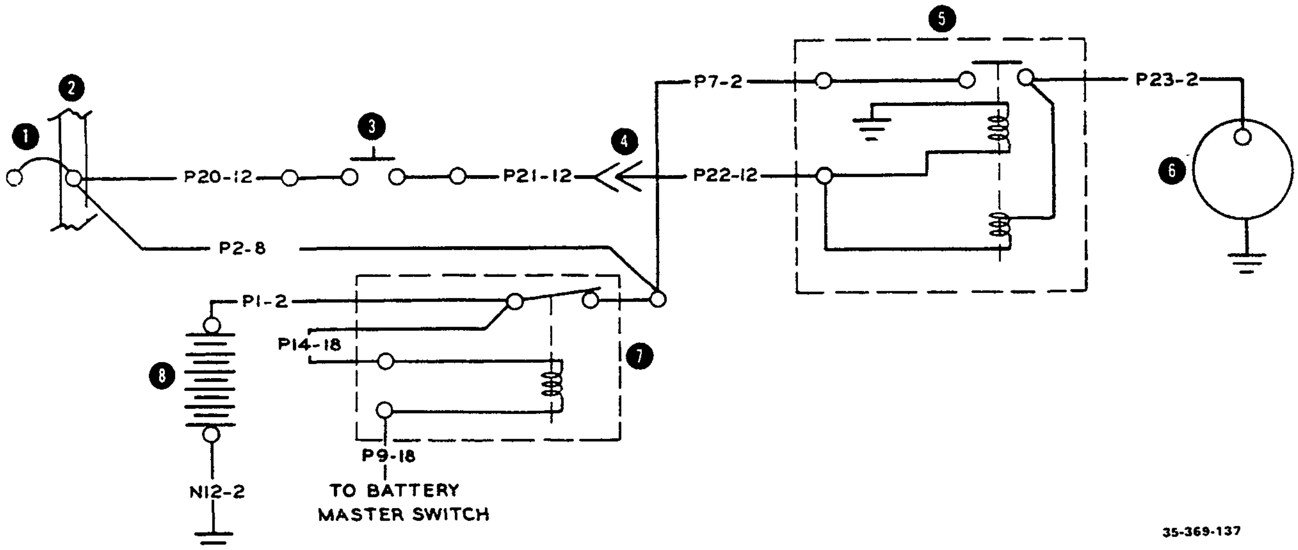
1. Bus bar
2. Stall warning indicator circuit breaker
3. Stall warning horn
4. Stall warning indicator light
5. Fuselage wing break
6. Wing stall detector unit

STALL WARNING INDICATOR CIRCUIT
Airplane Serial No. D-2681 thru D-4865



1. Bus bar
2. Stall warning indicator circuit breaker
3. Stall warning horn
4. Stall warning indicator light
5. Fuselage wing break
6. Wing stall detector unit

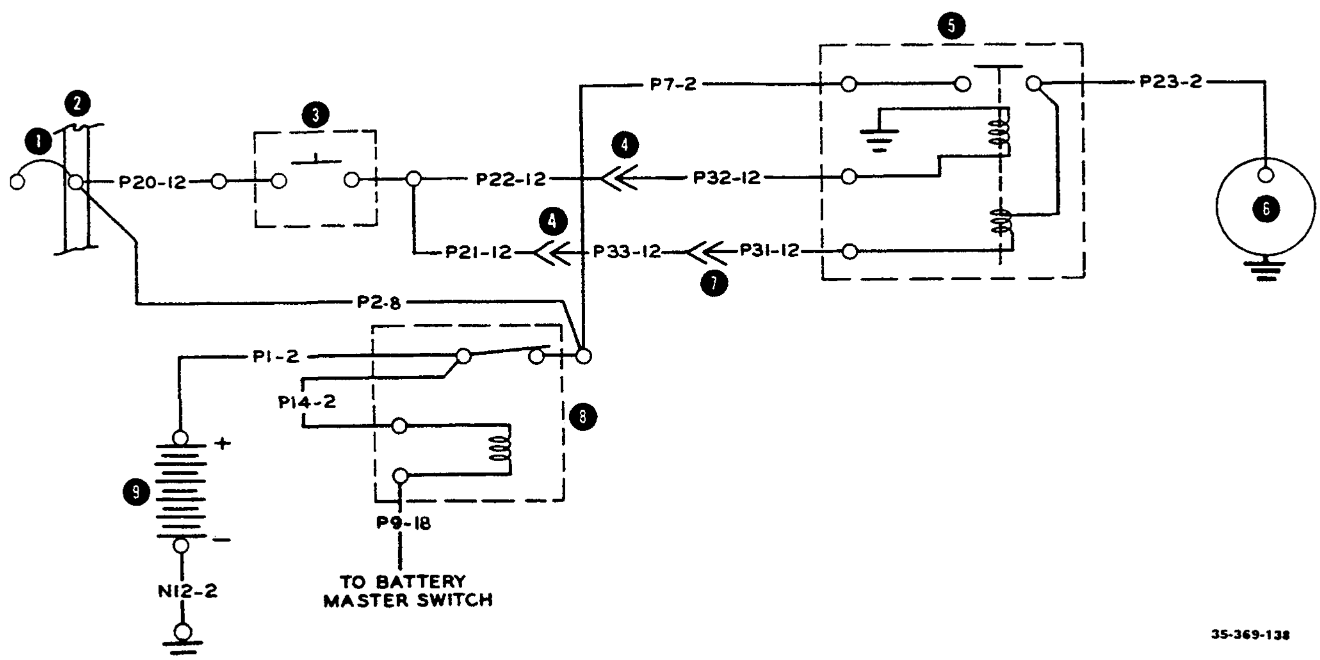
STALL WARNING INDICATOR CIRCUIT
Airplane Serial No. D-4866 thru D-6841



1. Radio circuit breaker
2. Bus bar
3. Starter switch
4. Firewall connector
5. Starter relay
6. Starter motor
7. Battery master switch relay
8. Battery

STARTER CIRCUIT
Airplane Serial No. D-1 thru D-359

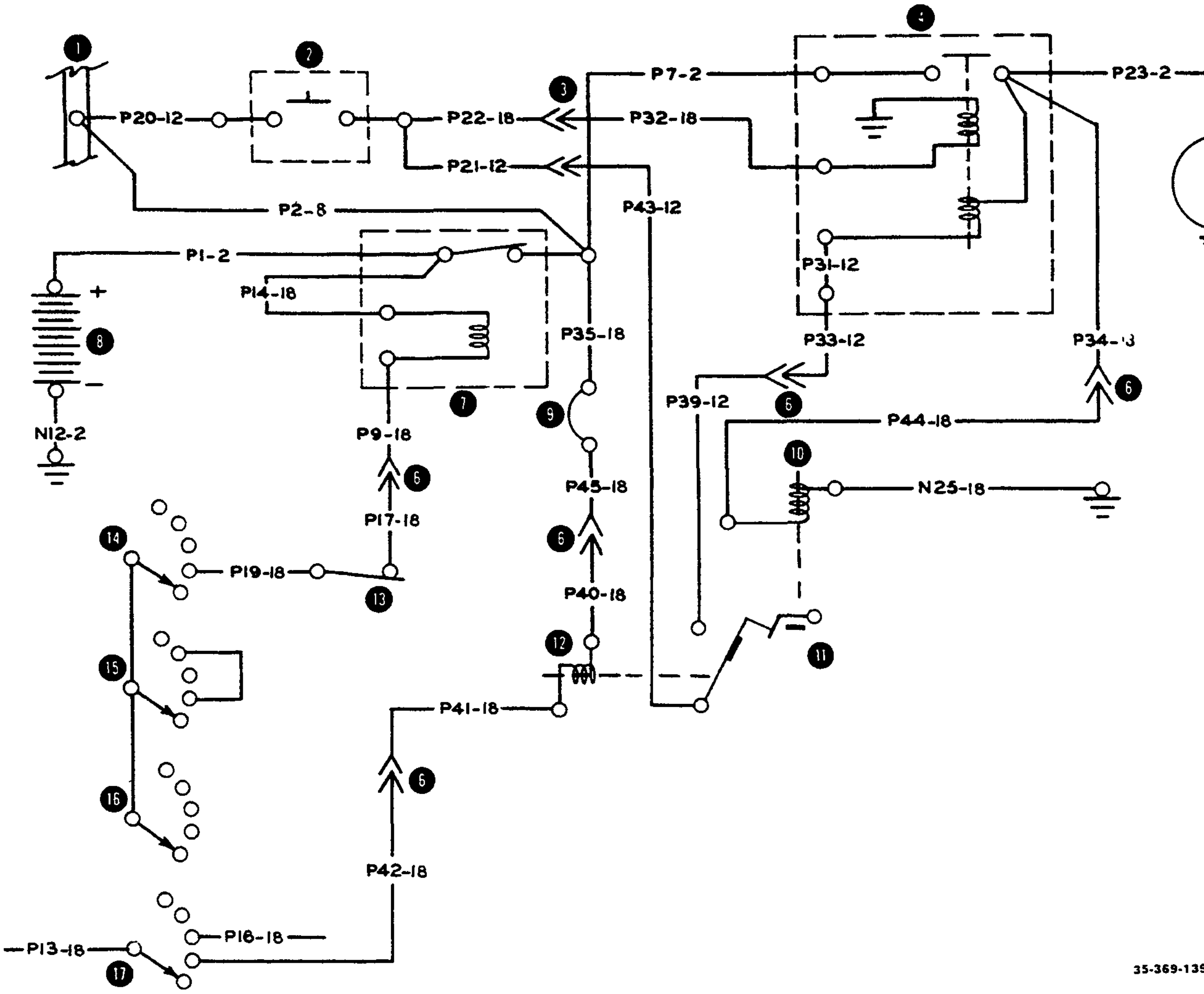
(If Service Letter No. 10 has been complied with see wiring diagram page 6-21)



1. Radio circuit breaker
2. Bus bar
3. Starter switch
4. Firewall connector
5. Starter relay
6. Starter motor
7. Connector
8. Battery master switch relay
9. Battery

STARTER CIRCUIT
Airplane Serial No. D-360 thru D-518

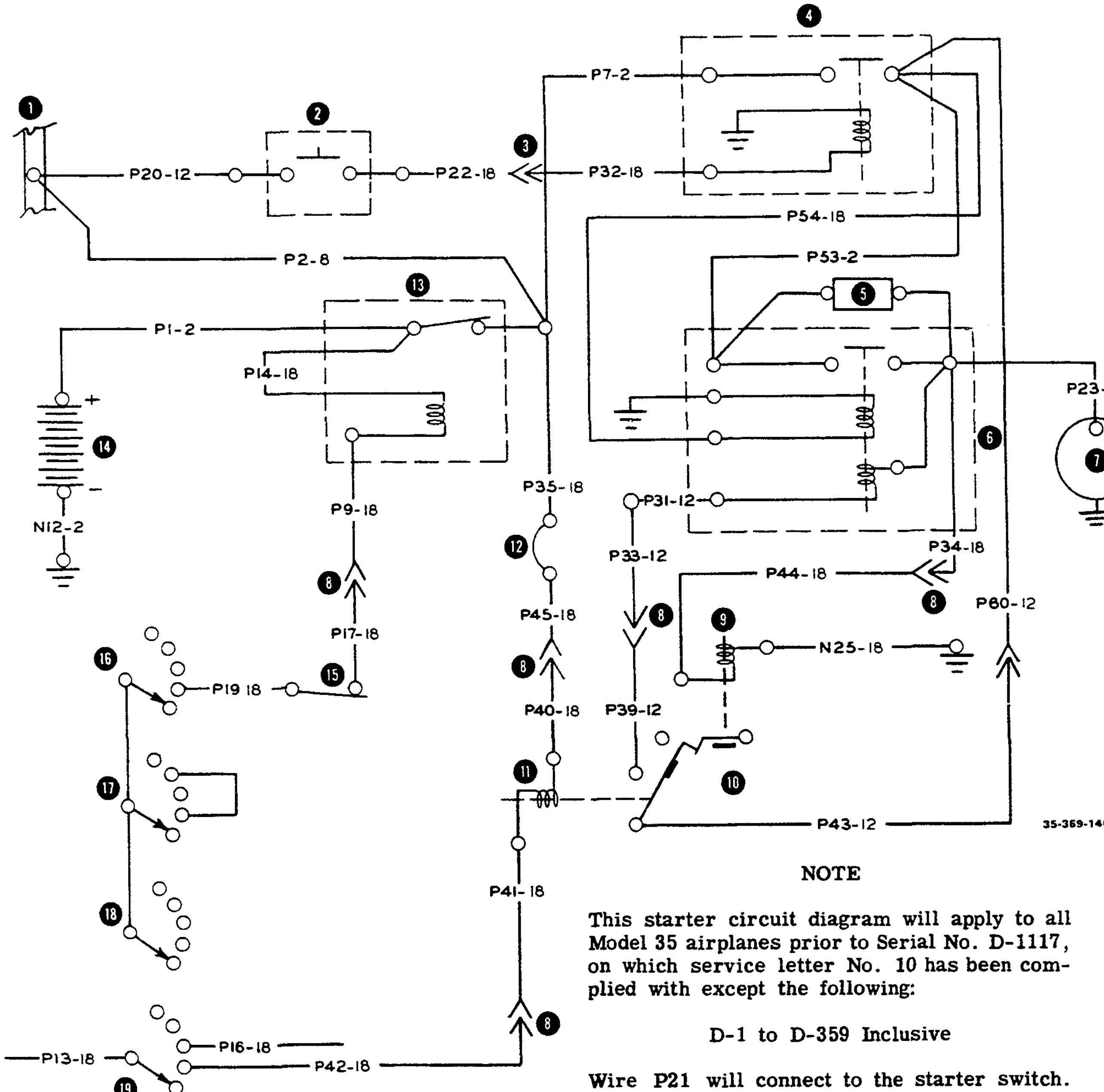
(If Service Letter No. 10 has been complied with see wiring diagram page 6-21)



1. Bus bar
2. Starter switch
3. Firewall connector
4. Starter relay
5. Starter motor
6. Connector
7. Battery master switch relay
8. Battery
9. Relay circuit breaker
10. 4-1/2 volt relay
11. Latching relay
12. 12 volt relay
13. Battery master switch
14. Battery switch
15. LH magneto switch
16. RH magneto switch
17. Generator switch

STARTER CIRCUIT
Airplane Serial No. D-519 thru D-1116

(If Service Letter No. 10 has been complied with
see wiring diagram page 6-21)



NOTE

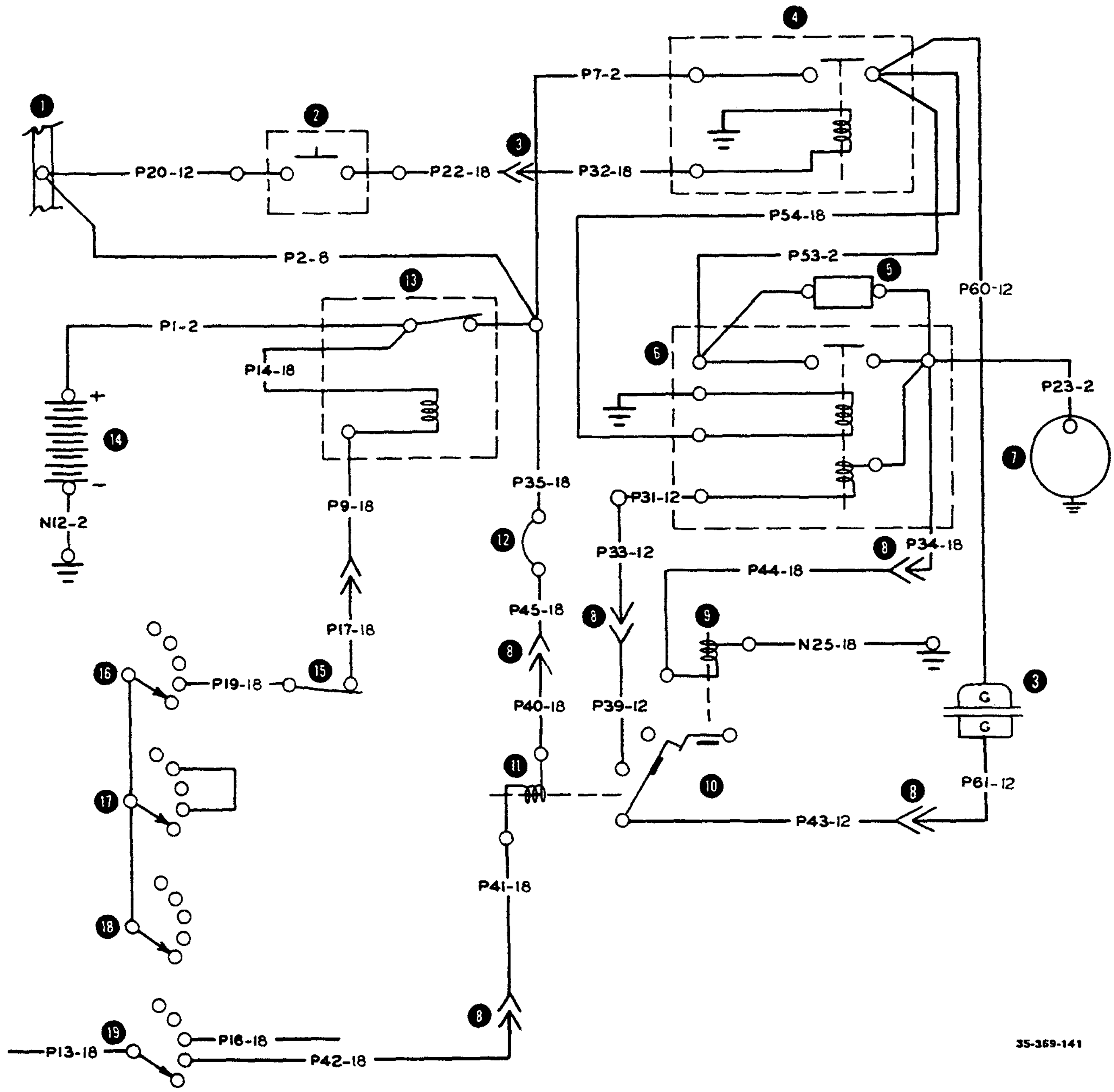
This starter circuit diagram will apply to all Model 35 airplanes prior to Serial No. D-1117, on which service letter No. 10 has been complied with except the following:

D-1 to D-359 Inclusive

Wire P21 will connect to the starter switch. Wire P22 will connect to wire P21 and the energizing terminal on the starter relay.

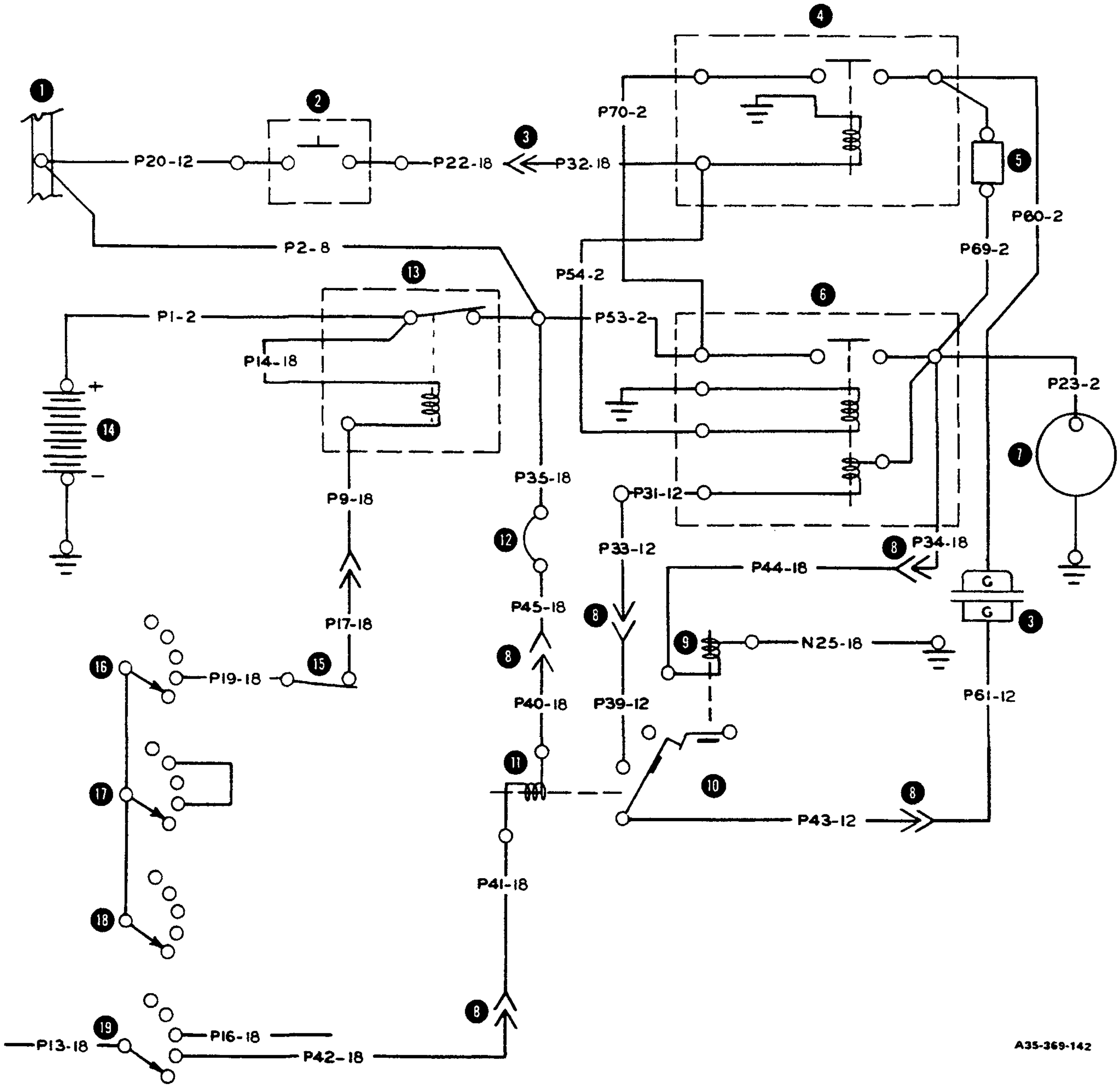
1. Buss bar
2. Starter switch
3. Firewall connector
4. Starter relay
5. Resistor
6. Starter solenoid
7. Starting motor
8. Connector
9. 4-1/2 volt relay
10. Latching relay
11. 12 volt relay
12. Relay circuit breaker
13. Battery master switch relay
14. Battery
15. Battery master switch
16. Battery switch
17. LH magneto switch
18. RH magneto switch
19. Generator switch

STARTER CIRCUIT
Airplane Serial No. D-1 thru D-1116



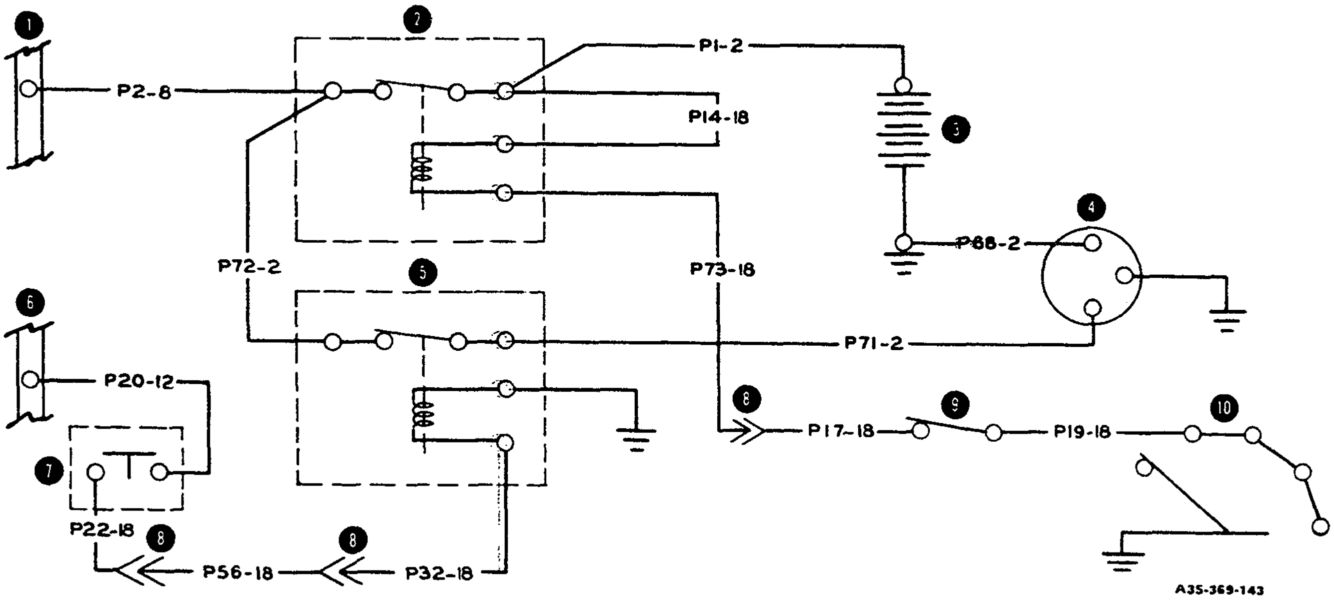
1. Buss bar
2. Starter switch
3. Firewall connector
4. Starter relay
5. Resistor
6. Starter solenoid
7. Starting motor
8. Connector
9. 4-1/2 volt relay
10. Latching relay
11. 12 volt relay
12. Relay circuit breaker
13. Battery master switch relay
14. Battery
15. Battery master switch
16. Battery switch
17. LH magneto switch
18. RH magneto switch
19. Generator switch

STARTER CIRCUIT
Airplane Serial No. D-1117 thru D-1884



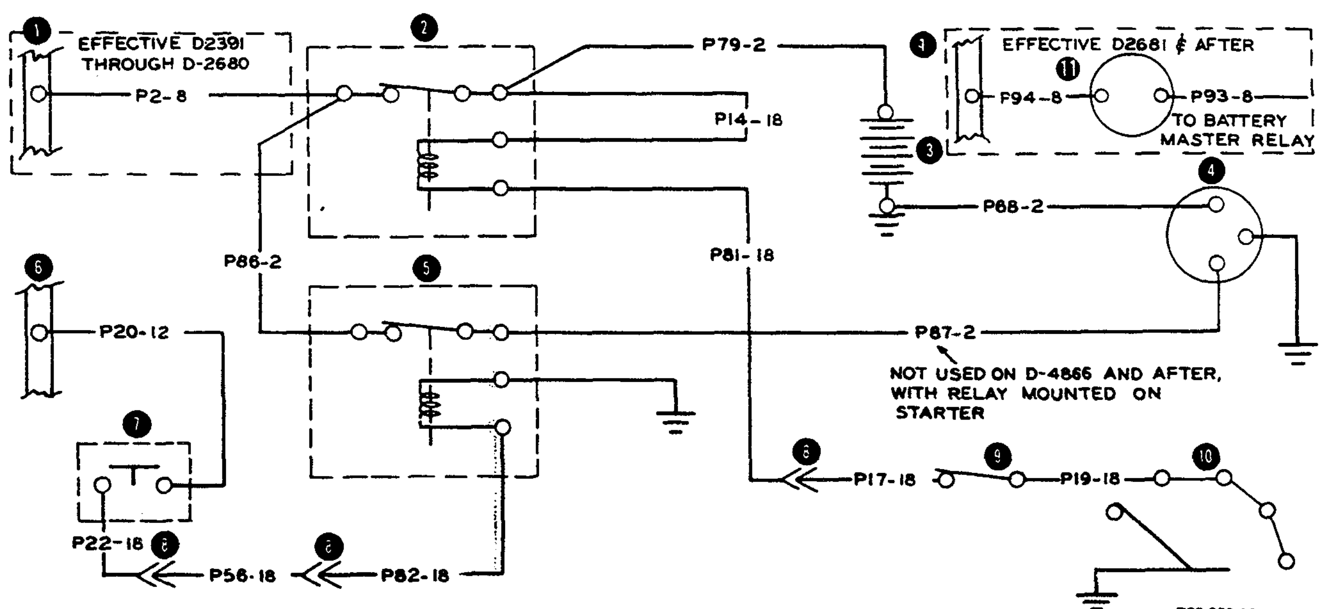
1. Buss bar
2. Starter switch
3. Firewall connector
4. Starter relay
5. Resistor
6. Starter solenoid
7. Starting motor
8. Connector
9. 4-1/2 volt relay
10. Latching relay
11. 12 volt relay
12. Relay circuit breaker
13. Battery master switch relay
14. Battery
15. Battery master switch
16. Battery switch
17. LH magneto switch
18. RH magneto switch
19. Generator switch

STARTER CIRCUIT
Airplane Serial No. D-1885 thru D-1949



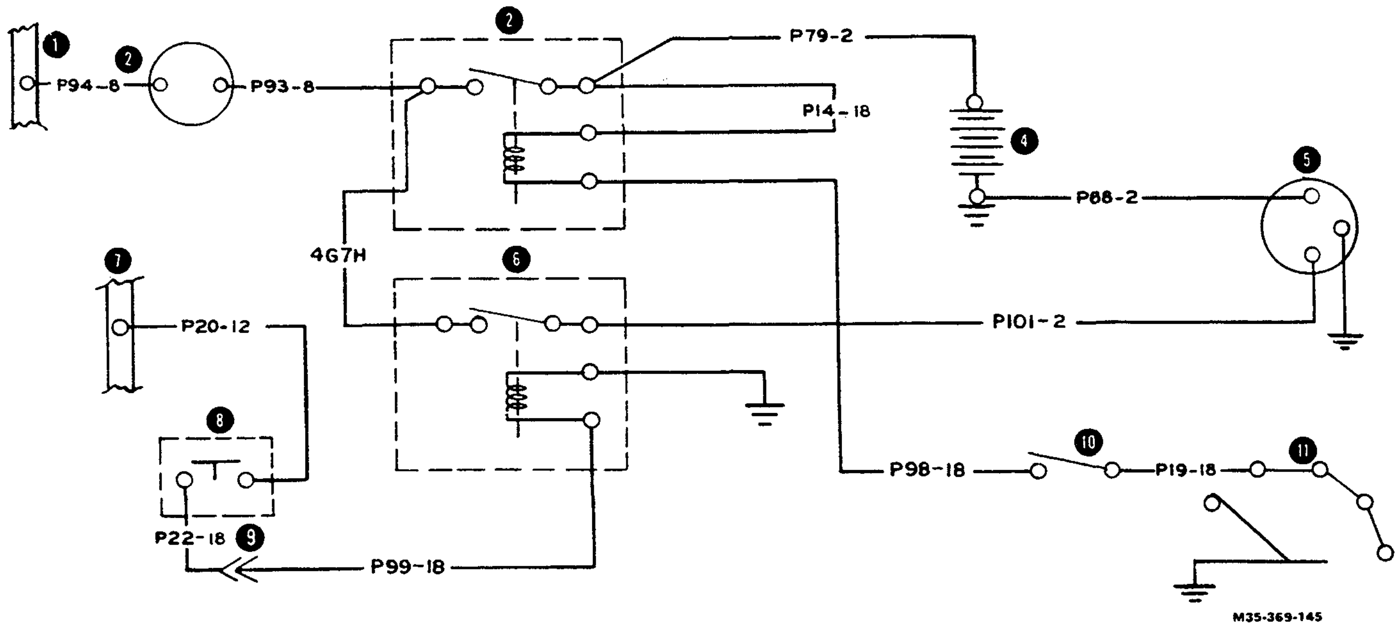
1. Buss bar
2. Battery master relay
3. Battery
4. Starting motor
5. Starter relay
6. Buss bar
7. Starter switch
8. Connector
9. Battery master switch
10. Ignition switch

STARTER CIRCUIT
Airplane Serial No. D-1950 thru D-2390



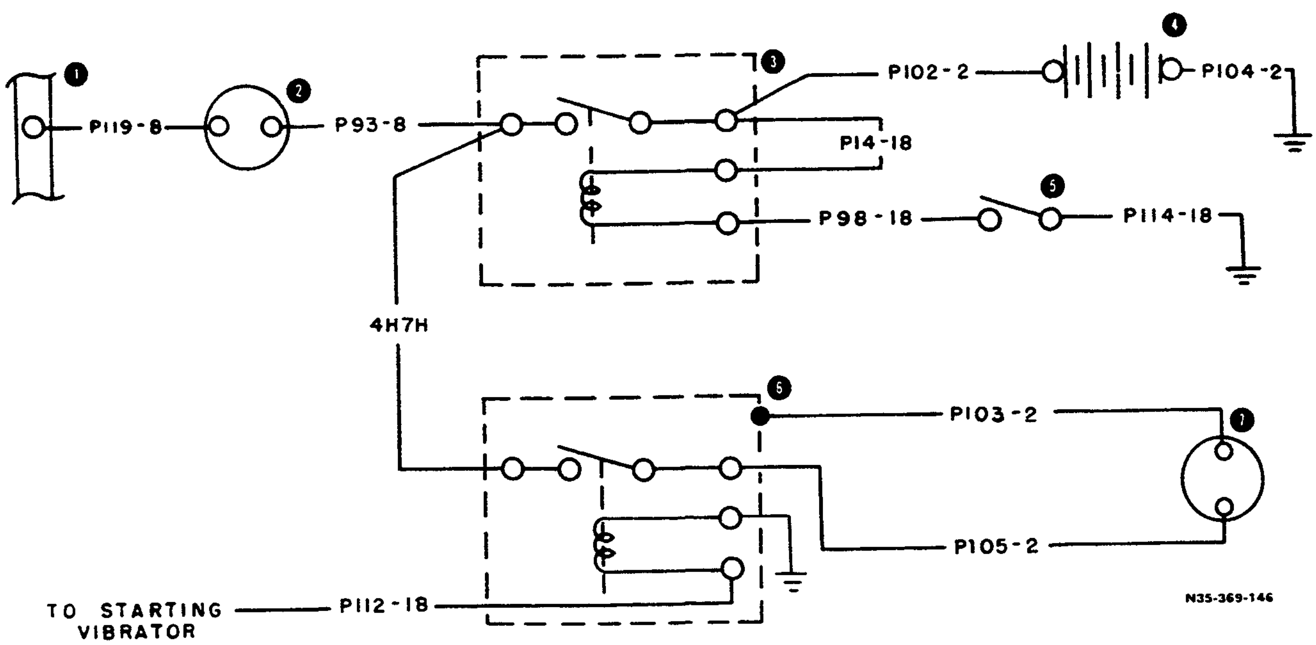
1. Buss bar
2. Battery master relay
3. Battery
4. Starting motor
5. Starter relay
6. Buss bar
7. Starter switch
8. Connector
9. Battery master switch
10. Ignition switch
11. Ammeter

STARTER CIRCUIT
Airplane Serial No. D-2391 thru D-6161



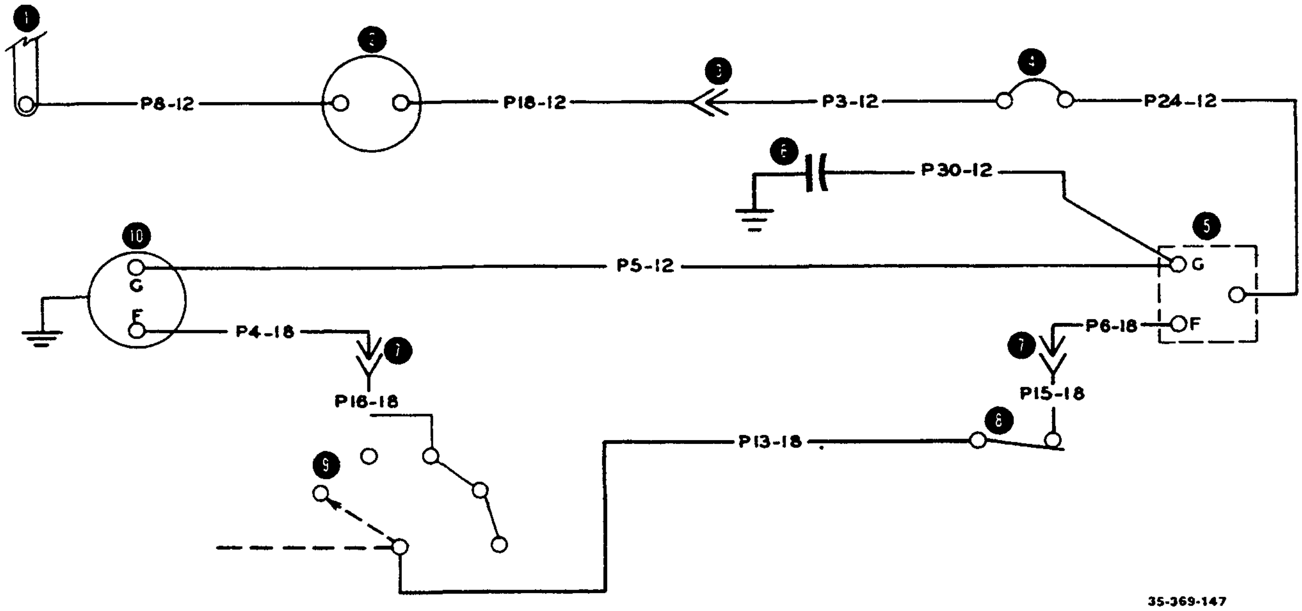
1. Bus bar
2. Ammeter
3. Master relay
4. Battery
5. Starting Motor
6. Starter relay
7. Bus bar
8. Starter switch
9. Connector
10. Battery master switch
11. Ignition switch

STARTER CIRCUIT
Airplane Serial No. D-6162 thru D-6561



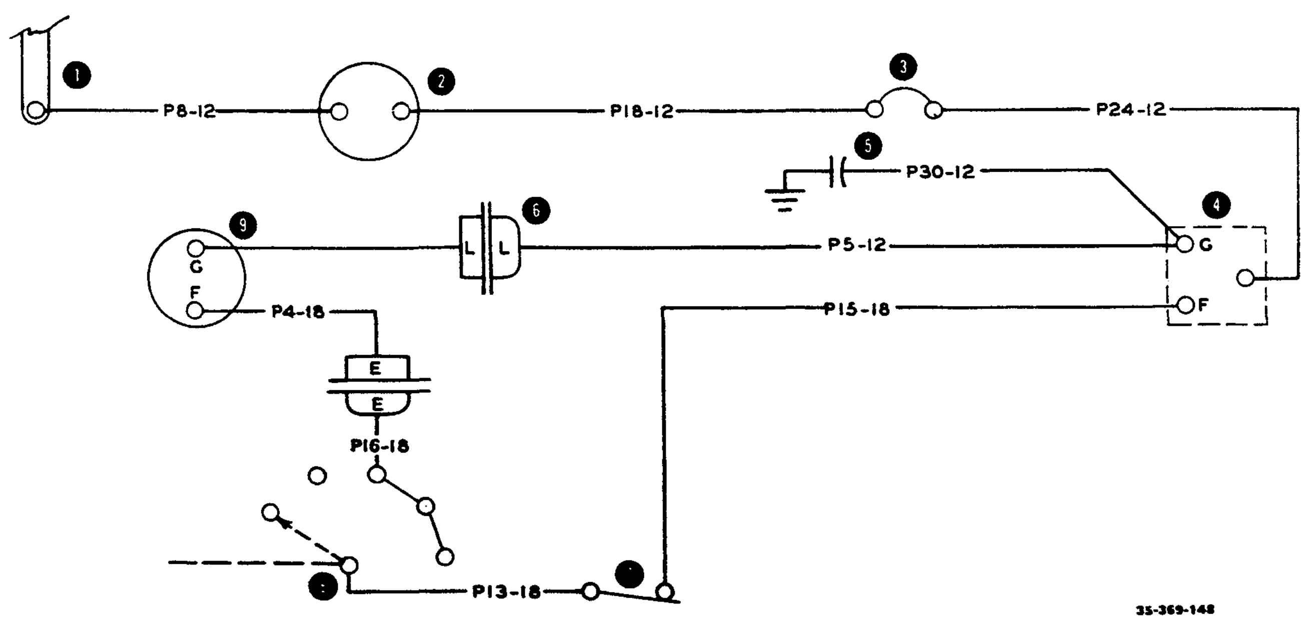
1. Bus bar
2. Ammeter
3. Master relay
4. Battery
5. Battery master switch
6. Starter relay
7. Starting motor

STARTER CIRCUIT
Airplane Serial No. D-6562 thru D-6841



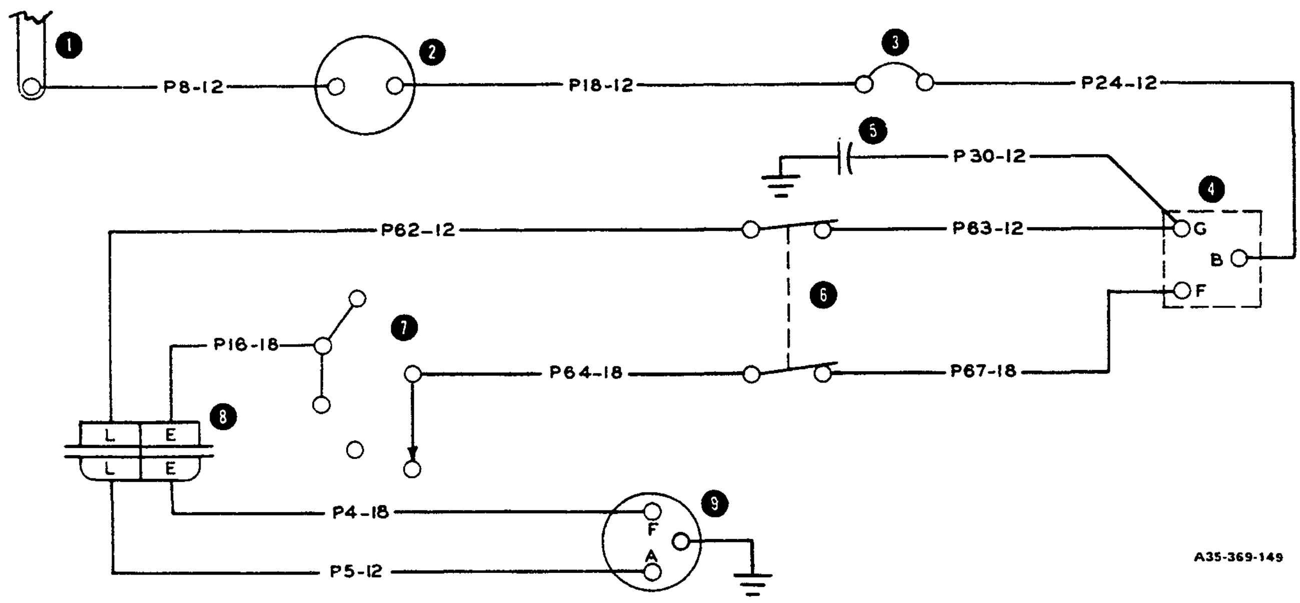
1. Bus bar
2. Ammeter
3. Connector
4. Generator circuit breaker
5. Voltage regulator
6. Capacitor
7. Connector
8. Generator switch
9. Ignition switch
10. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-1 thru D-1116



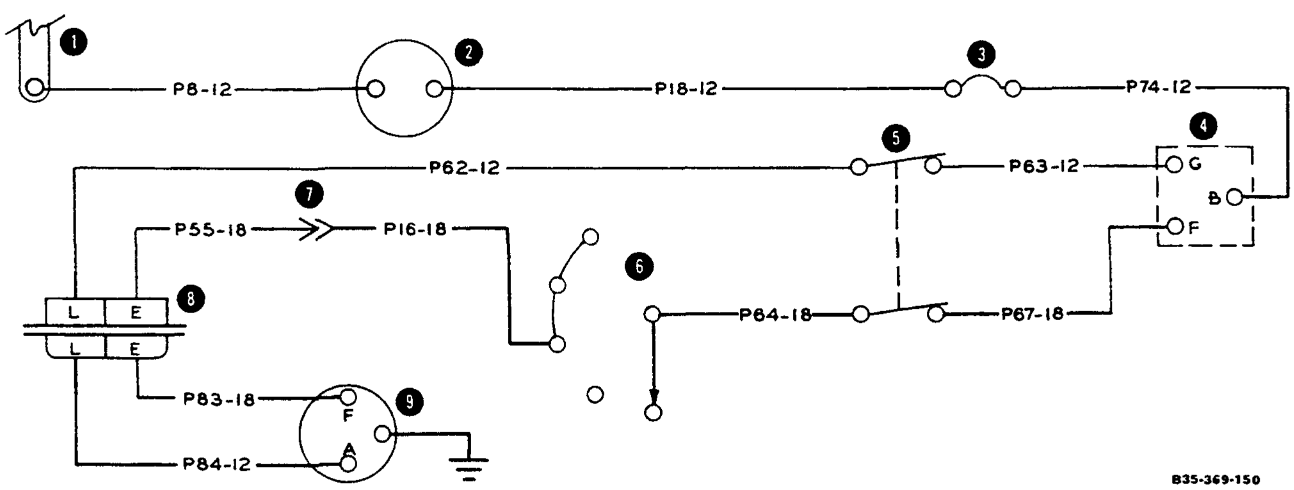
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Capacitor
6. Firewall disconnect
7. Generator switch
8. Ignition switch
9. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-1117 thru D-1500



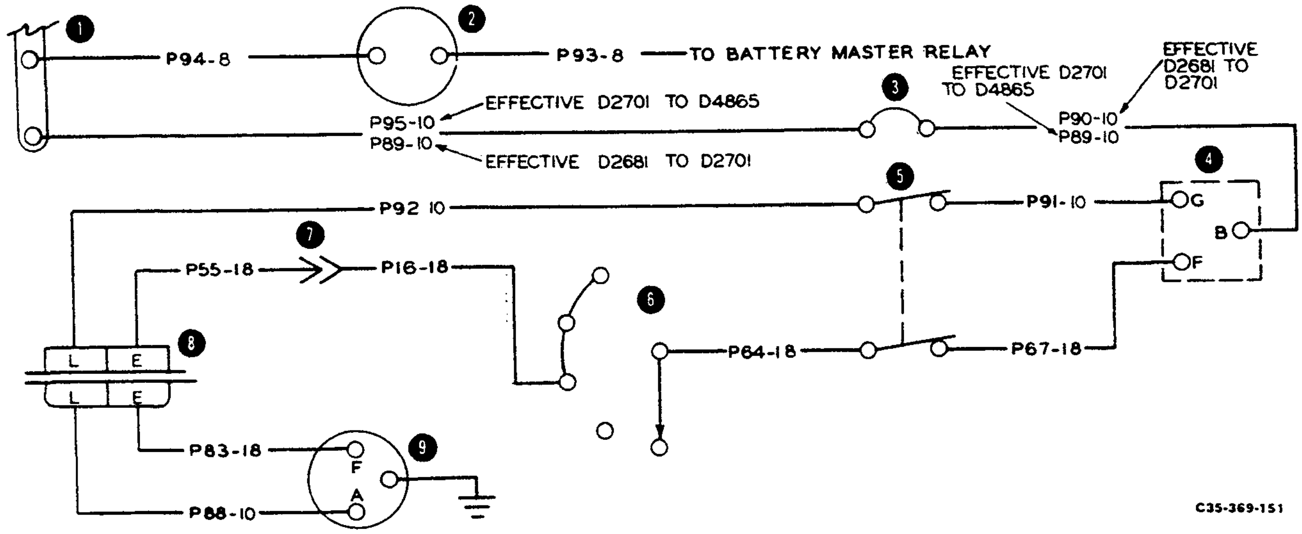
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Capacitor
6. Generator switch
7. Ignition switch
8. Firewall disconnect
9. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-1501 thru D-2485



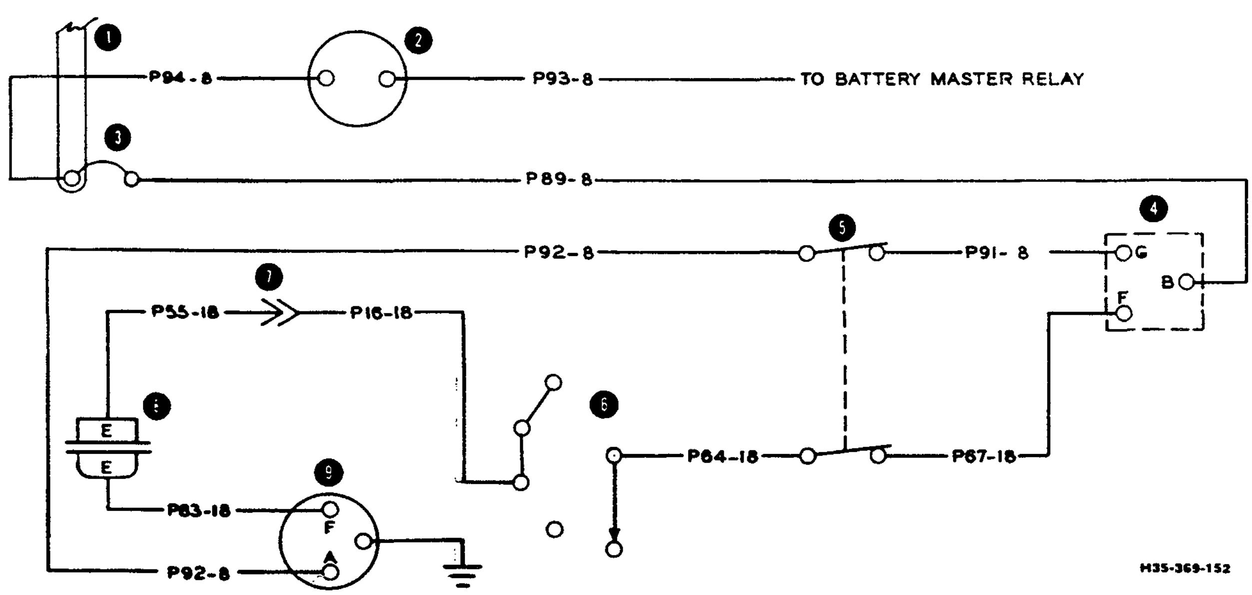
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Generator switch
6. Ignition switch
7. Connector
8. Firewall disconnect
9. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-2486 thru D-2680



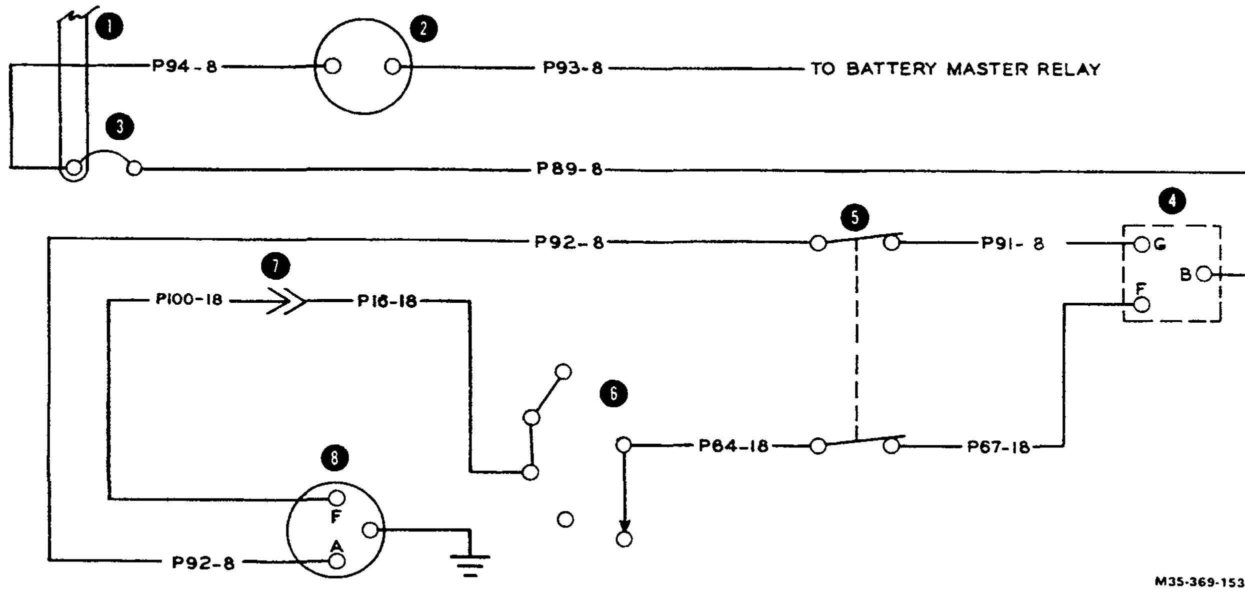
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Generator switch
6. Ignition switch
7. Connector
8. Firewall disconnect
9. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-2681 thru D-4865



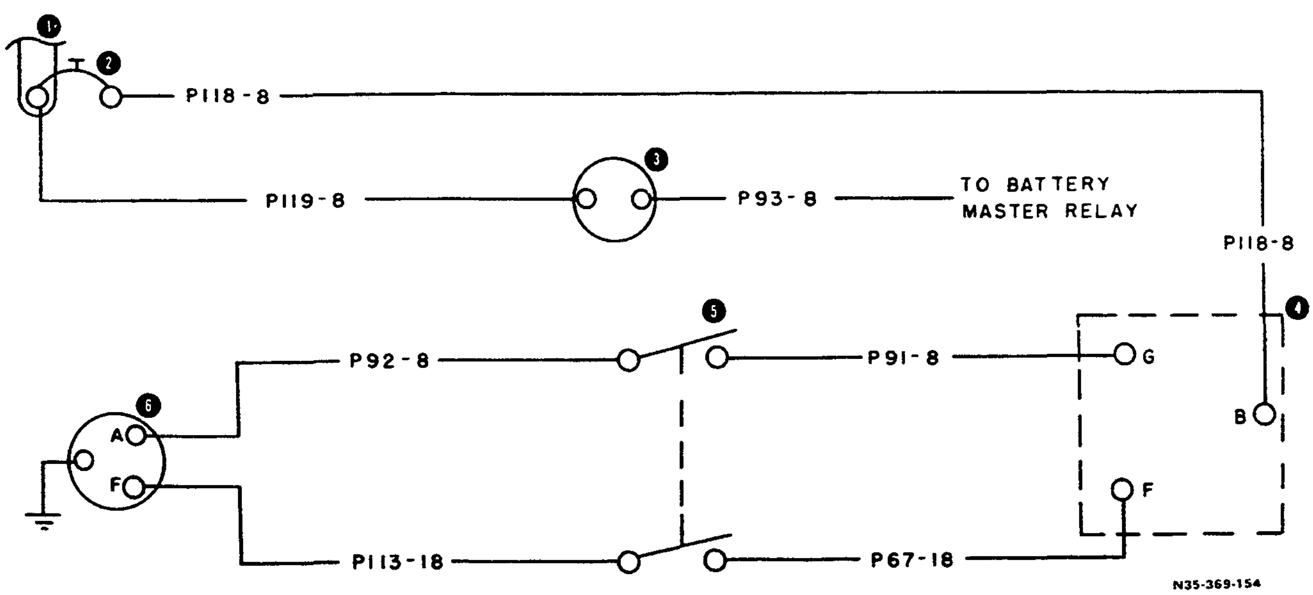
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Generator switch
6. Ignition switch
7. Connector
8. Firewall disconnect
9. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-4866 thru D-6161



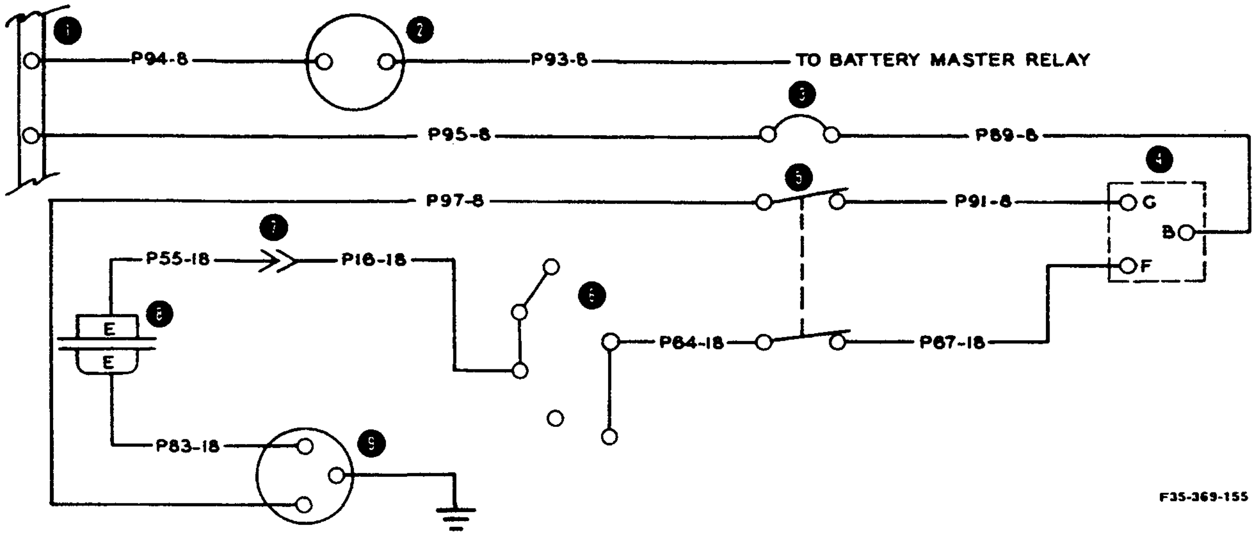
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Generator switch
6. Ignition switch
7. Connector
8. Generator

GENERATOR CIRCUIT
Airplane Serial No. D-6162 thru D-6561



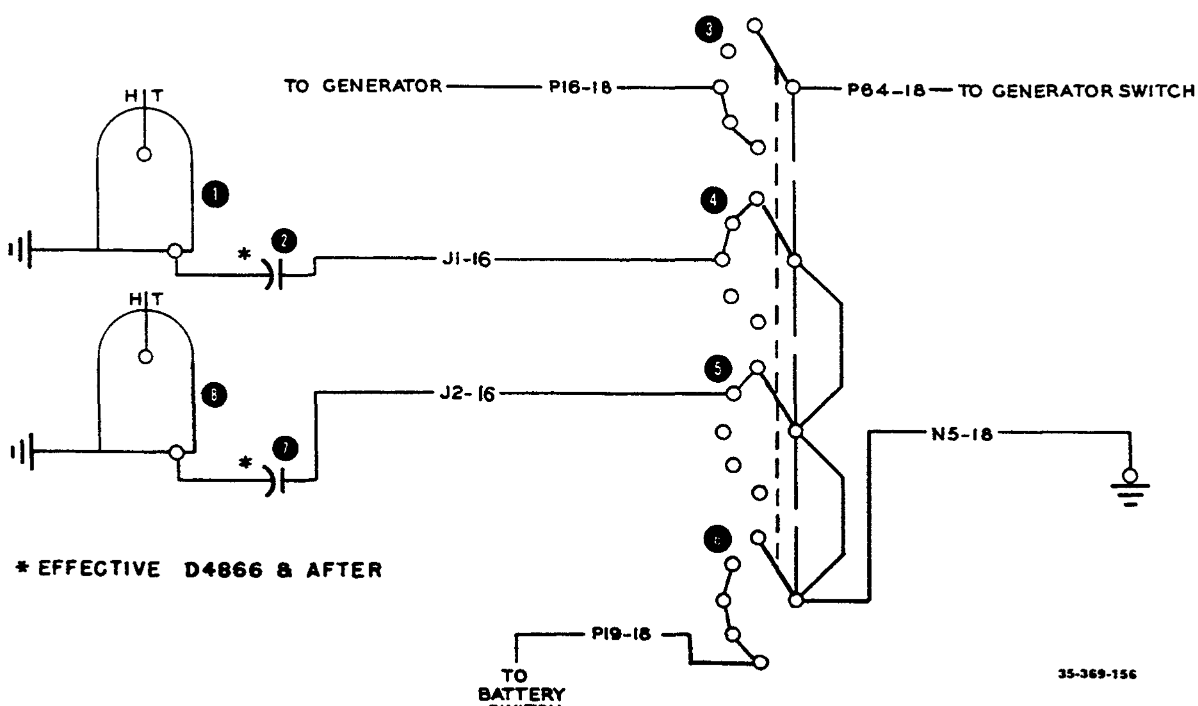
1. Bus bar
2. Generator circuit breaker
3. Ammeter
4. Voltage regulator
5. Generator switch
6. Generator

GENERATOR CIRCUIT
Airplane Serial No.-D-6562 thru D-6841



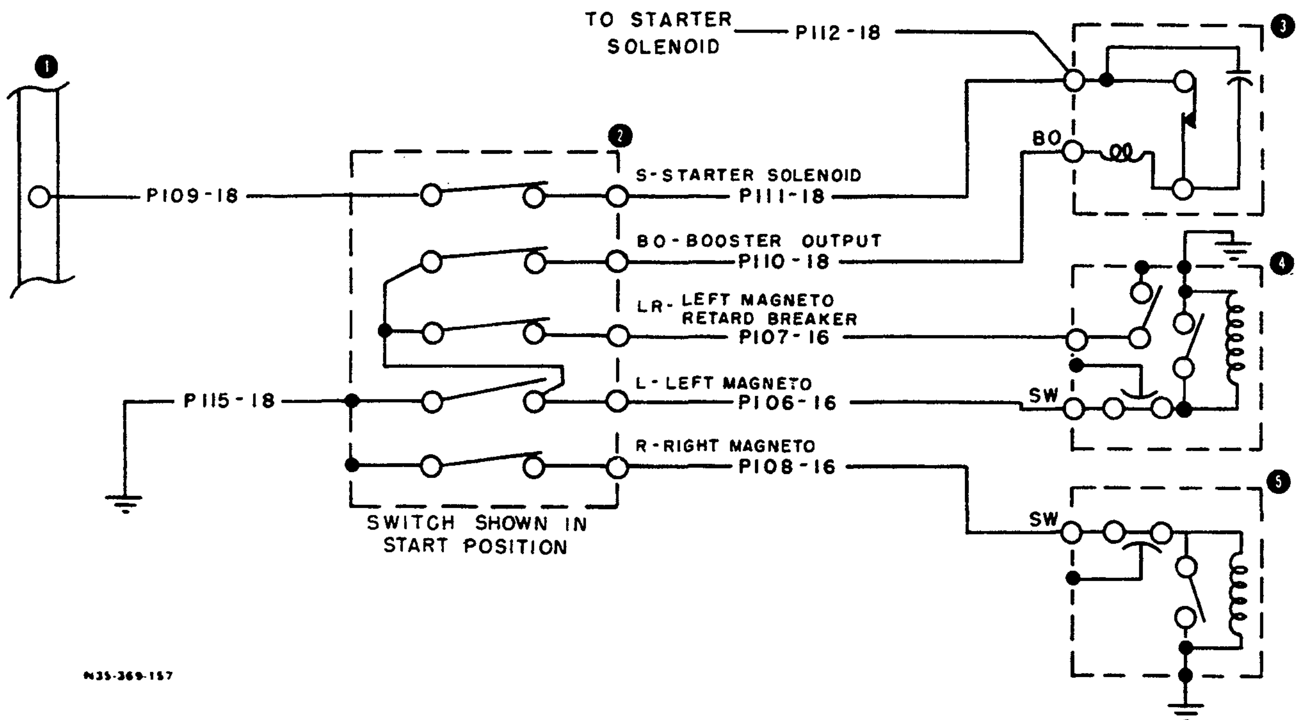
1. Bus bar
2. Ammeter
3. Generator circuit breaker
4. Voltage regulator
5. Generator switch
6. Ignition switch
7. Connector
8. Firewall disconnect
9. Generator

50 AMP GENERATOR CIRCUIT (Optional)
Airplane Serial No. D-4376, D-4392 thru D-6841



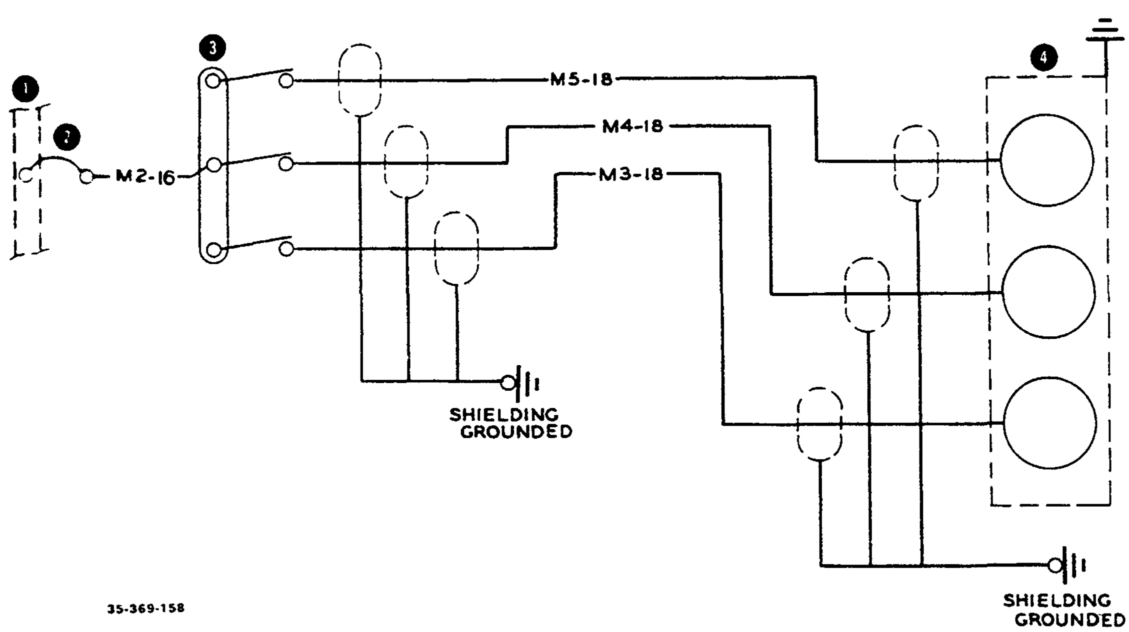
1. RH magneto
2. RH magneto filter unit
3. Generator switch
4. RH magneto switch
5. LH magneto switch
6. Battery master switch
7. LH magneto filter unit
8. LH magneto

IGNITION CIRCUIT
Airplane Serial No. D-1 thru D-6561



1. Bus bar
2. Ignition switch
3. Starting vibrator
4. LH magneto
5. RH magneto

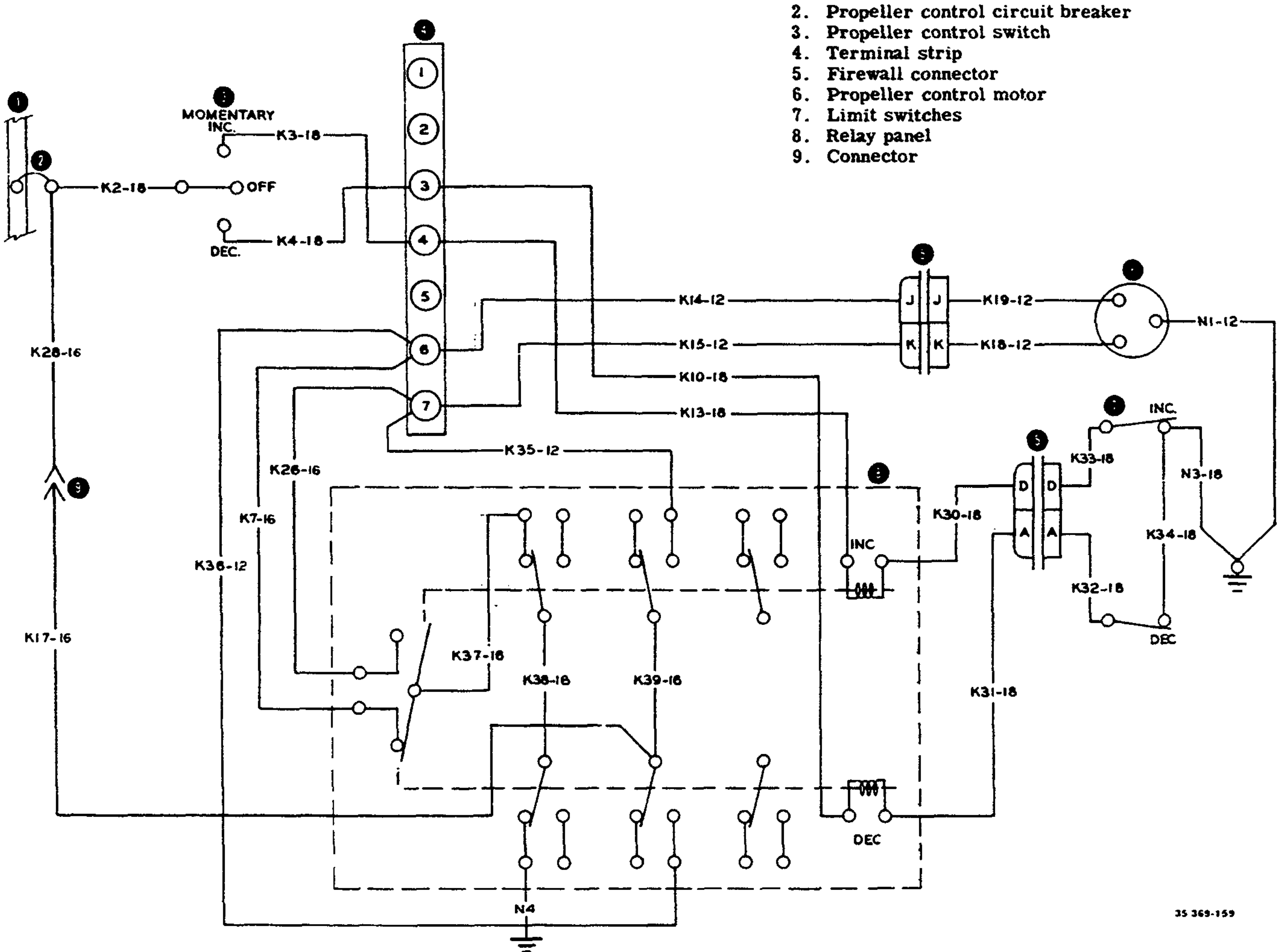
IGNITION CIRCUIT
Airplane Serial No. D-6562 thru D-6841



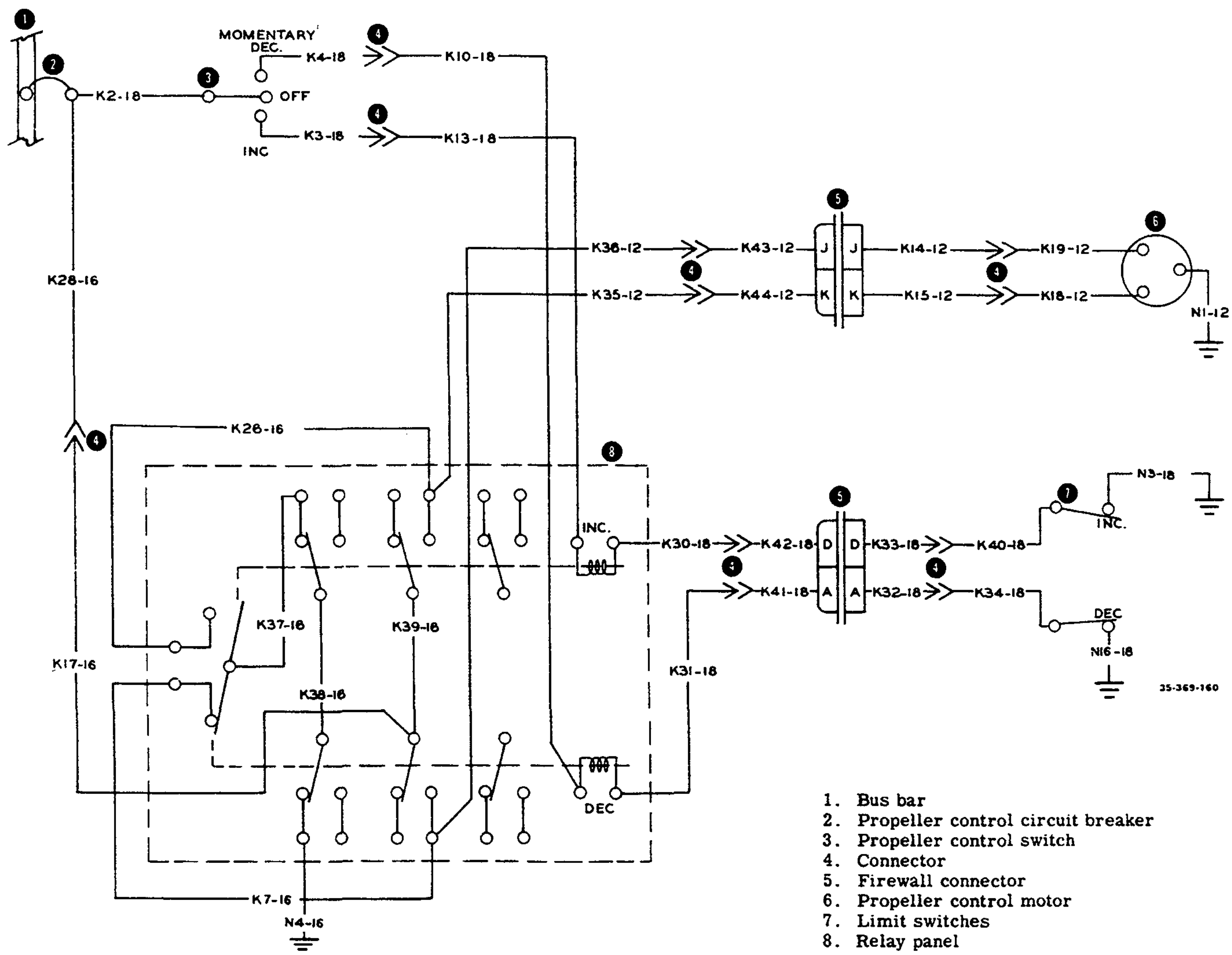
1. Bus bar
2. Flare circuit breaker
3. Flare switches
4. Flares

FLARE CIRCUIT
(Optional)
Airplane Serial No. D-1 thru D-6561

1. Bus bar
2. Propeller control circuit breaker
3. Propeller control switch
4. Terminal strip
5. Firewall connector
6. Propeller control motor
7. Limit switches
8. Relay panel
9. Connector

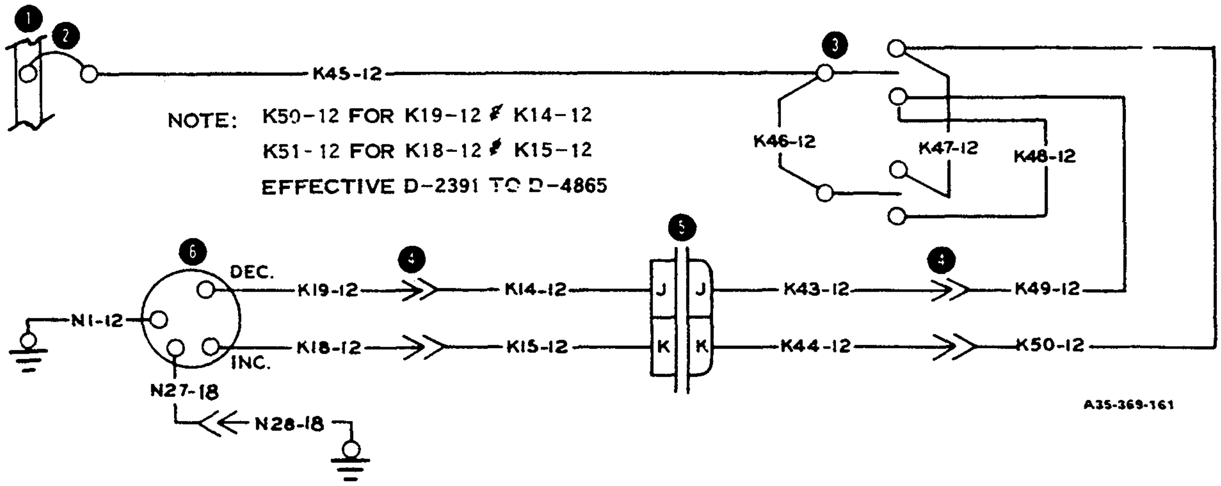


PROPELLER CONTROL CIRCUIT
Airplane Serial No. D-1 thru D-1116



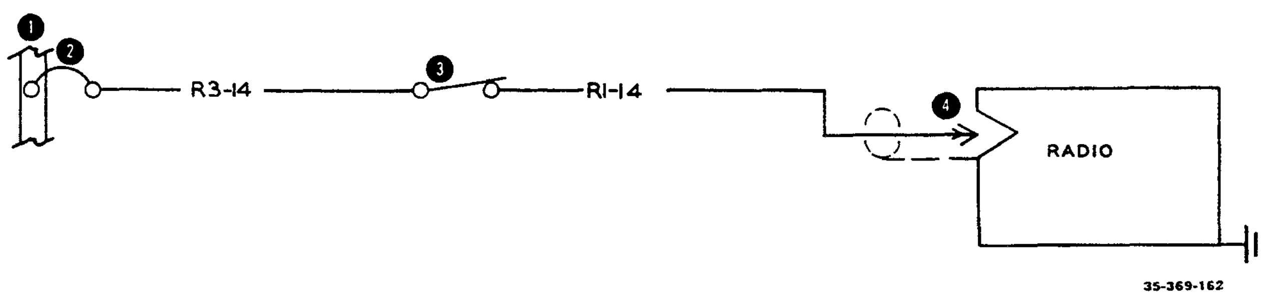
1. Bus bar
2. Propeller control circuit breaker
3. Propeller control switch
4. Connector
5. Firewall connector
6. Propeller control motor
7. Limit switches
8. Relay panel

PROPELLER CONTROL CIRCUIT
Airplane Serial No. D-1117 thru D-1820



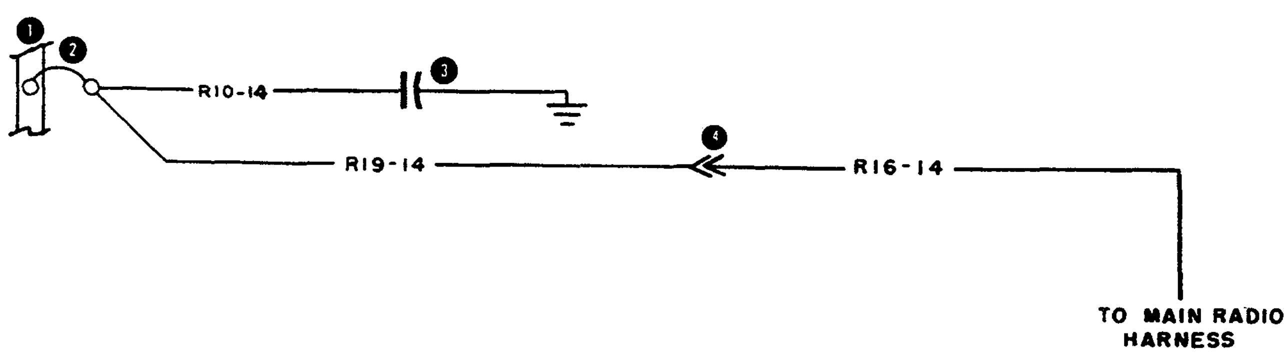
1. Bus bar
2. Propeller control circuit breaker
3. Propeller control switch
4. Connector
5. Firewall connector
6. Propeller control motor

PROPELLER CONTROL CIRCUIT
Airplane Serial No. D-1821 thru D-4865



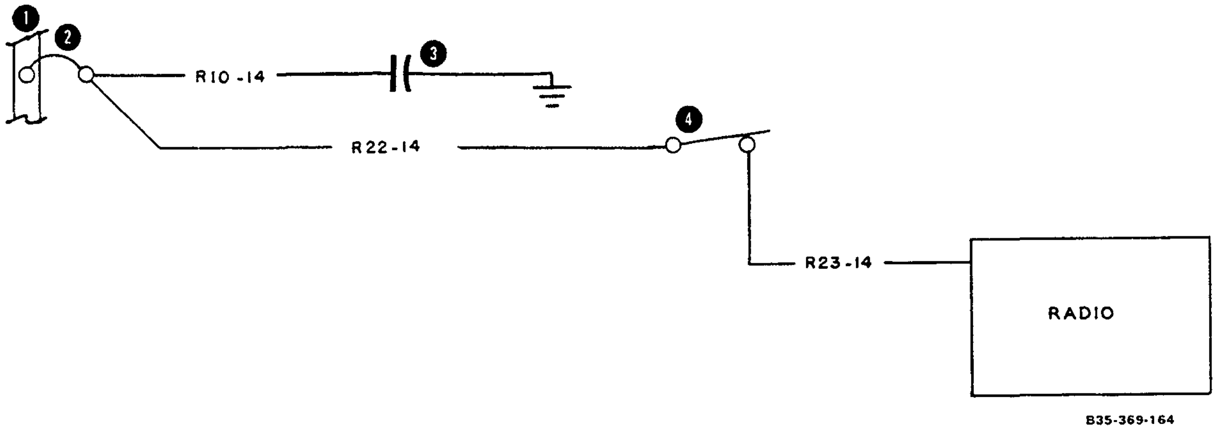
1. Bus bar
2. Radio circuit breaker
3. Radio master switch
4. Connector

RADIO CIRCUIT
Airplane Serial No. D-1 thru D-2148 except D-2119 thru D-2126



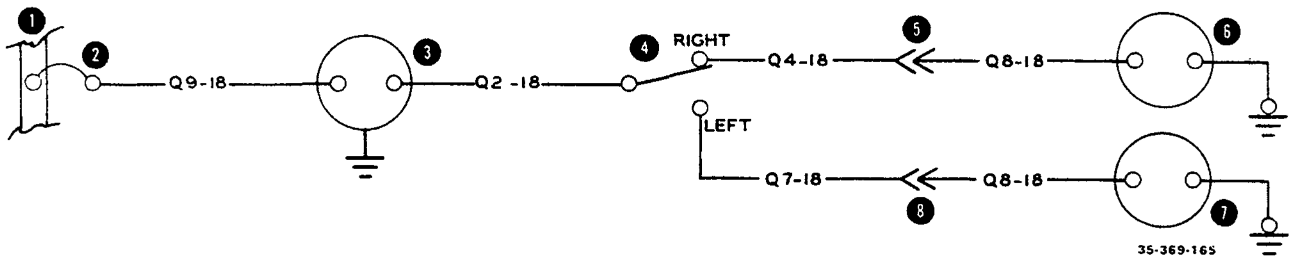
1. Bus bar
2. Radio circuit breaker
3. Radio filter capacitor
4. Connector

RADIO CIRCUIT
Airplane Serial No. D-2119 thru D-2484 except D-2127 thru D-2147



1. Bus bar
2. Radio circuit breaker
3. Radio filter capacitor
4. Radio master switch

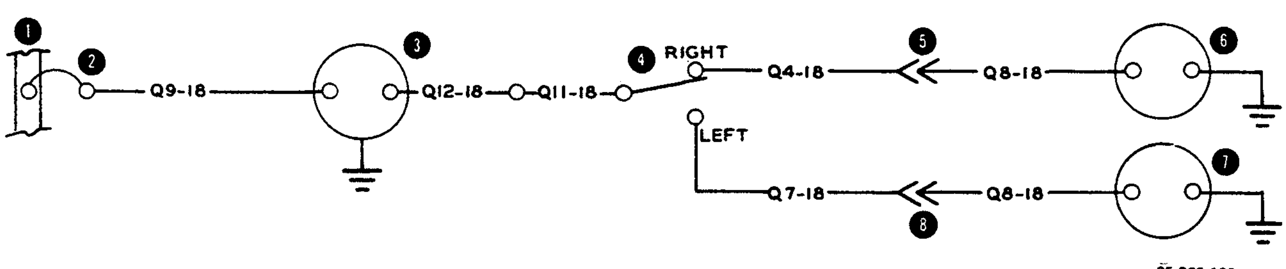
RADIO CIRCUIT
Airplane Serial No. D-2485 thru D-6561



NOTE: Serials D-1 through D-3998 used 6-volt gages with 30-ohm resistors (adaptors) on the power terminal of the gage. D-3999 and after use 12-volt gages without adaptors.

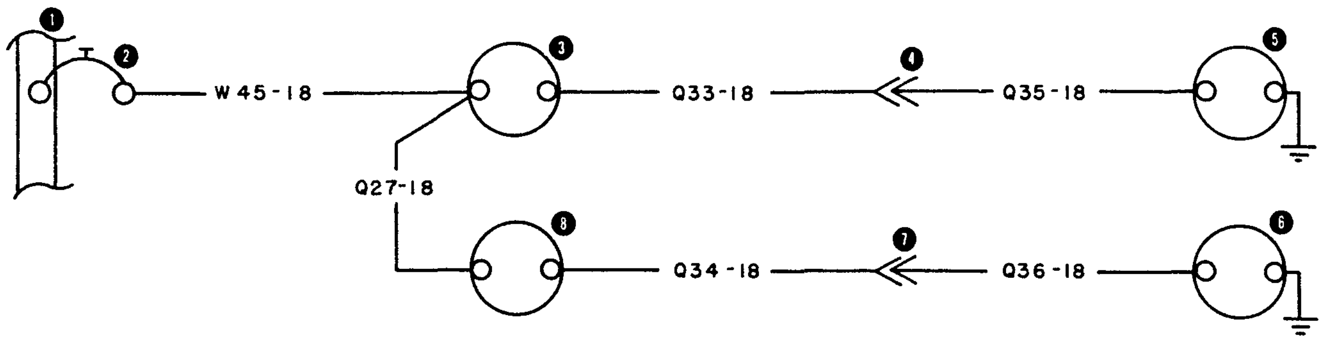
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. Fuel quantity indicator
4. Tank selector switch
5. Tank transmitter unit - right
6. Tank transmitter unit - left

FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-1 thru D-300



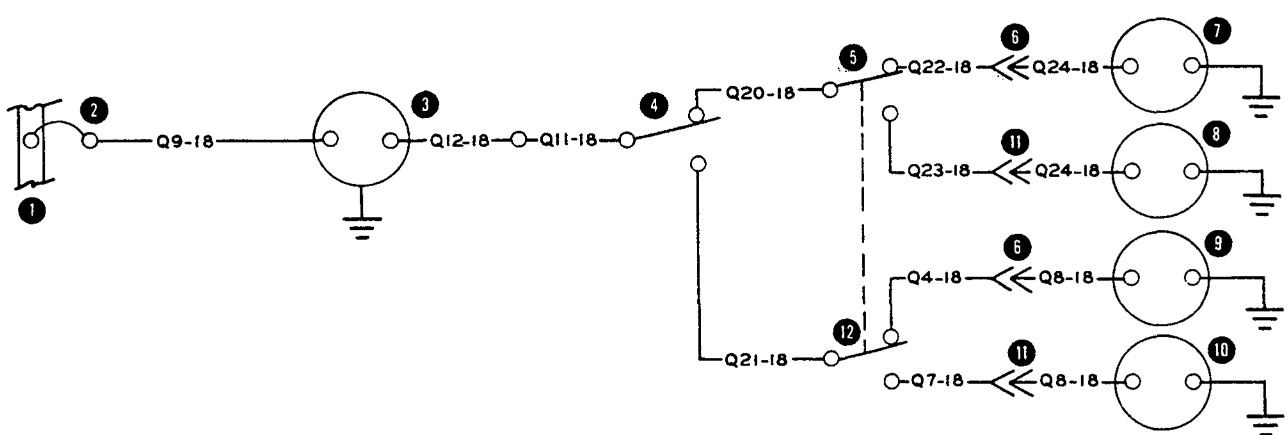
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. Fuel quantity indicator
4. Tank selector switch
5. Right wing break connector
6. Tank transmitter unit - right
7. Tank transmitter unit - left
8. Left wing break connector

FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-301 thru D-6561



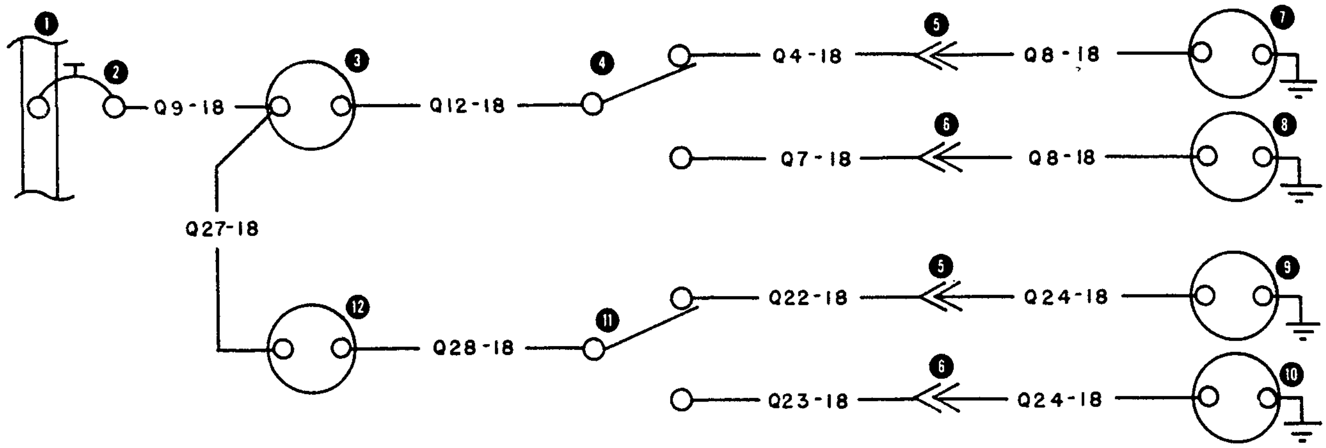
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. LH fuel cell quantity indicator
4. LH wing break connector
5. LH fuel cell transmitter unit
6. RH fuel cell transmitter unit
7. RH wing break connector
8. RH fuel cell quantity indicator

STANDARD FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-6562 thru D-6841



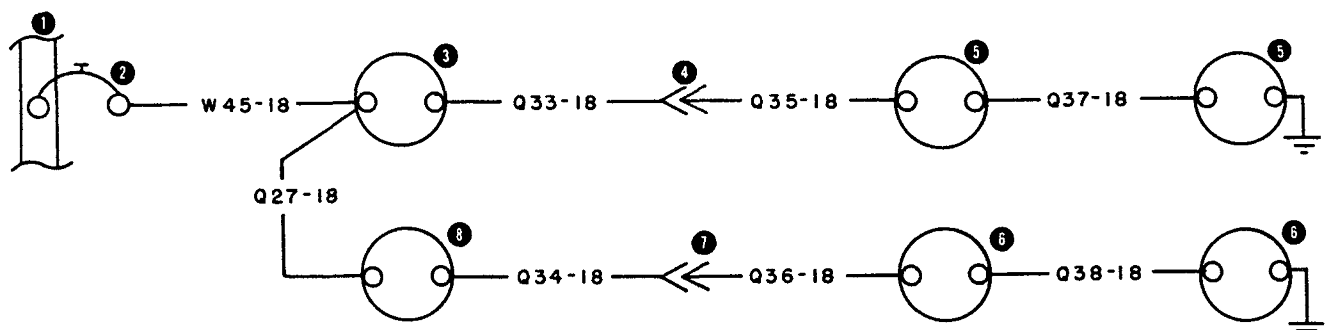
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. Fuel quantity indicator
4. Tank selector switch (main - auxiliary)
5. Auxiliary tank selector switch (left - right)
6. Right wing break connector
7. Tank transmitter unit (RH auxiliary)
8. Tank transmitter unit (LH auxiliary)
9. Tank transmitter unit (RH main)
10. Tank transmitter unit (LH main)
11. Left wing break connector
12. Main tank selector (left - right)

OPTIONAL AUXILIARY WING FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-3999 thru D-5330



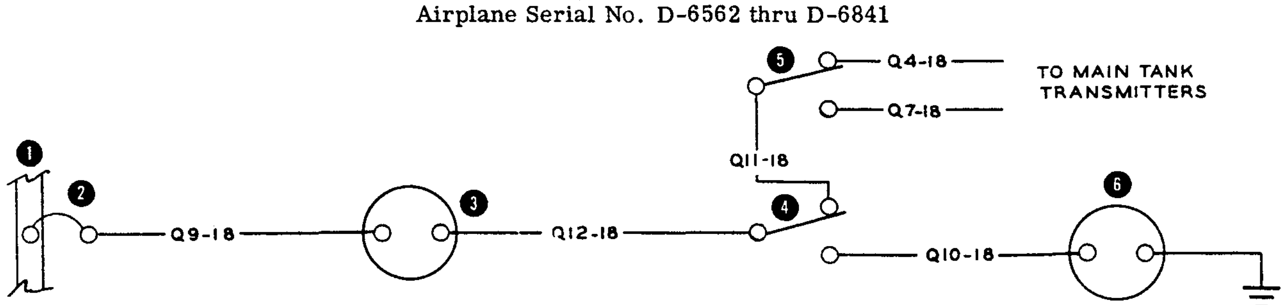
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. Main fuel cell quantity indicator
4. Main fuel cell quantity indicator selector switch (Left - Right)
5. RH wing break connector
6. LH wing break connector
7. RH main fuel cell quantity unit
8. LH main fuel cell quantity unit
9. RH auxiliary fuel cell quantity unit
10. LH auxiliary fuel cell quantity unit
11. Auxiliary fuel cell quantity indicator selector switch (Left - Right).
12. Auxiliary fuel cell quantity indicator

OPTIONAL AUXILIARY WING FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-5331 thru D-6561



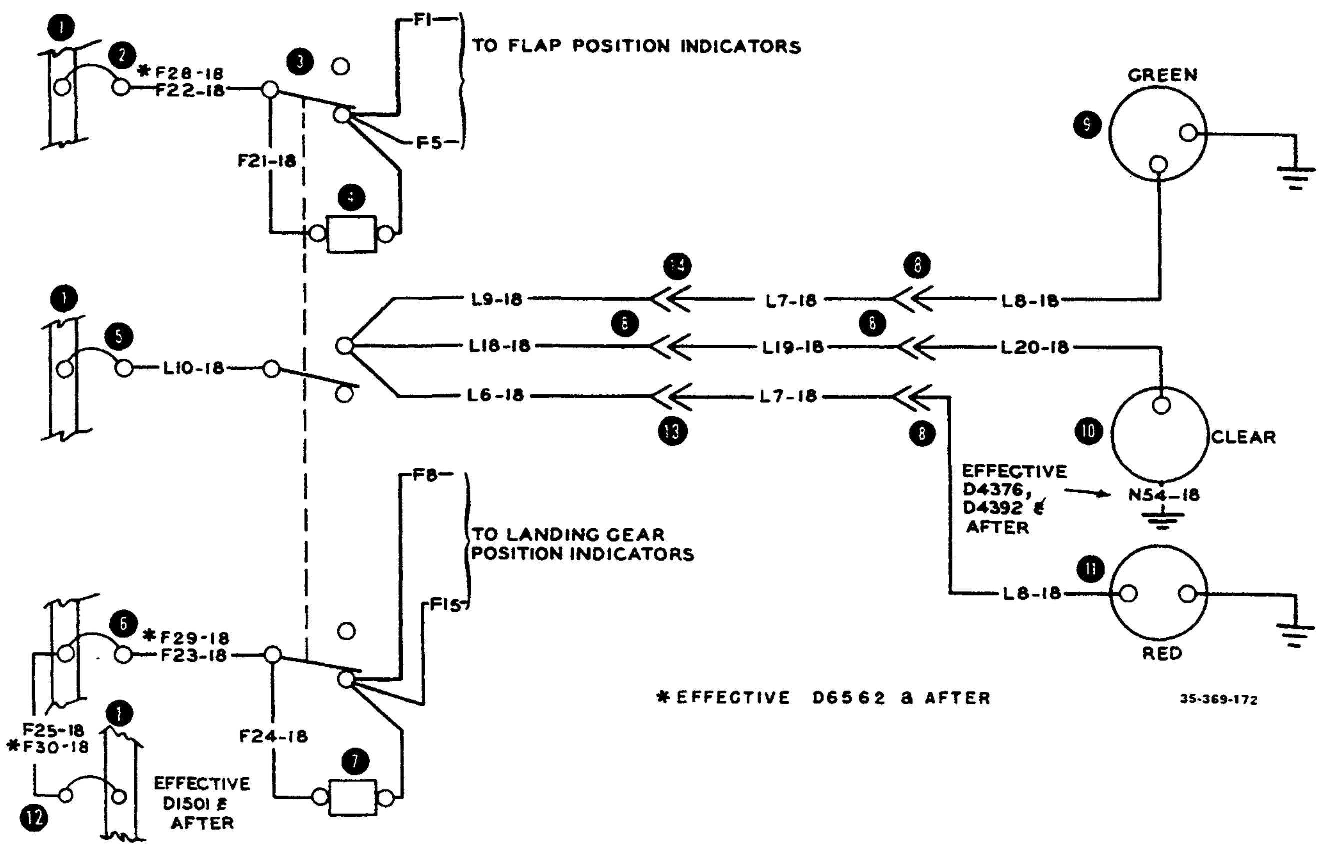
1. Bus bar
2. Fuel quantity indicator circuit breaker
3. LH fuel cell quantity indicator
4. LH wing break connector
5. LH fuel cell transmitter unit
6. RH fuel cell transmitter unit
7. RH wing break connector
8. RH fuel cell quantity indicator

OPTIONAL FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. D-6562 thru D-6841



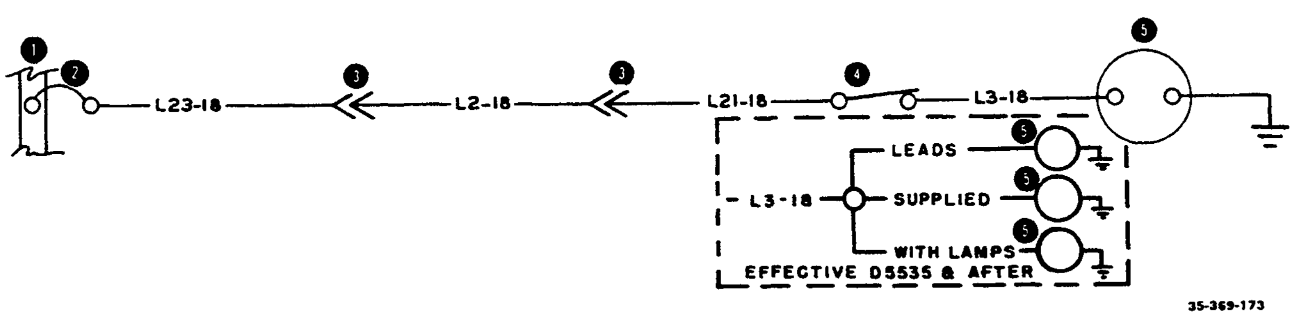
1. Bus bar
2. Fuel indicator circuit breaker
3. Fuel quantity indicator
4. Auxiliary tank selector switch
5. Fuel indicator tank selector switch
6. Auxiliary tank transmitter unit

NOTE: Same circuit is used for 10 gallon and 20 gallon tanks.
OPTIONAL BAGGAGE COMPARTMENT AUXILIARY FUEL QUANTITY INDICATOR CIRCUIT
Airplane Serial No. Prior to D-4866



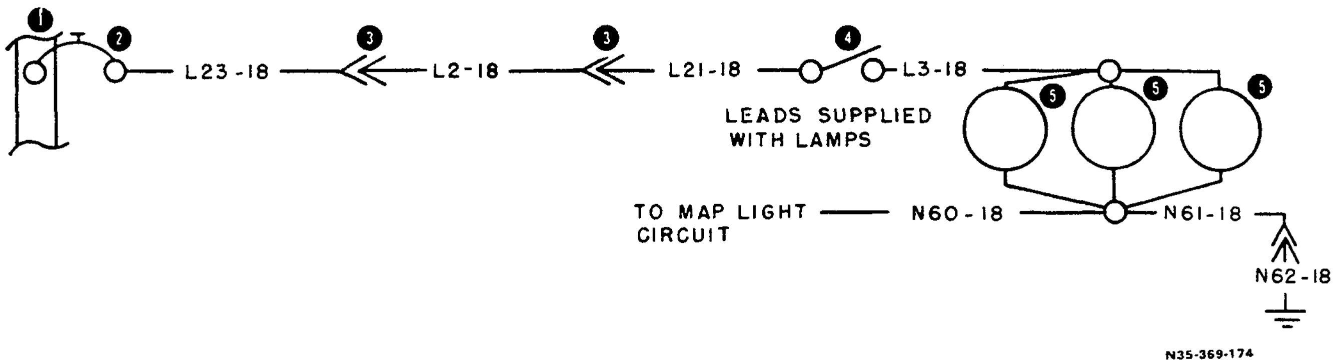
1. Bus bar
2. Flap position indicator circuit breaker
3. Navigation light switch
4. Flap position indicator resistor, 8 ohms (100 ohms effective D-3999 and after)
5. Navigation light circuit breaker
6. Landing gear position indicator circuit breaker
7. Landing gear position indicator resistor, 8 ohms (100 ohms effective D-3999 and after)
8. Connector
9. RH navigation light (green)
10. Rear fuselage navigation light (clear)
11. LH navigation light (red)
12. Landing gear circuit breaker (Auxiliary fuel pump circuit breaker D-6562 and after)
13. Left wing break connector
14. Right wing break connector

NAVIGATION LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-6841



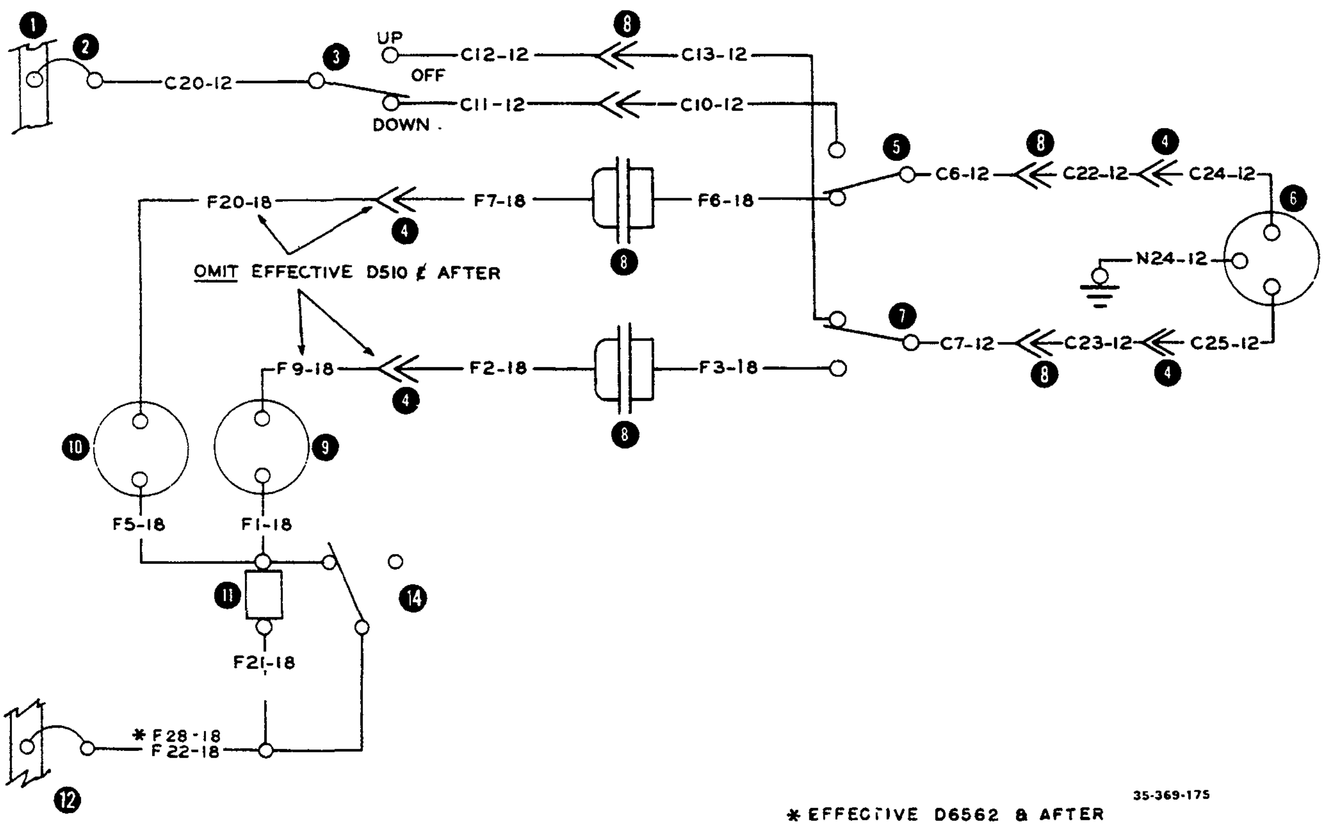
1. Bus bar
2. Circuit breaker
3. Connector
4. Cabin lamp switch
5. Cabin lamp

CABIN LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-6561



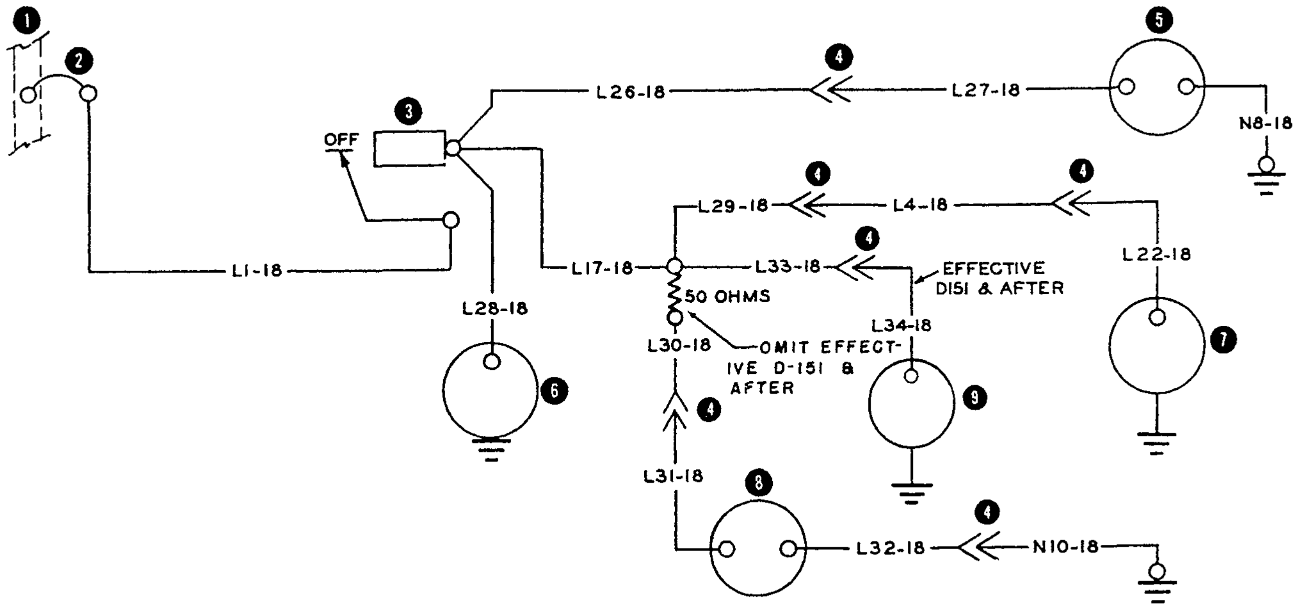
1. Bus bar
2. Cabin lamp, primer, turn and bank circuit breaker
3. Connector
4. Cabin lamp switch
5. Cabin lamps

CABIN LIGHT CIRCUIT
Airplane Serial No. D-6562 thru D-6841



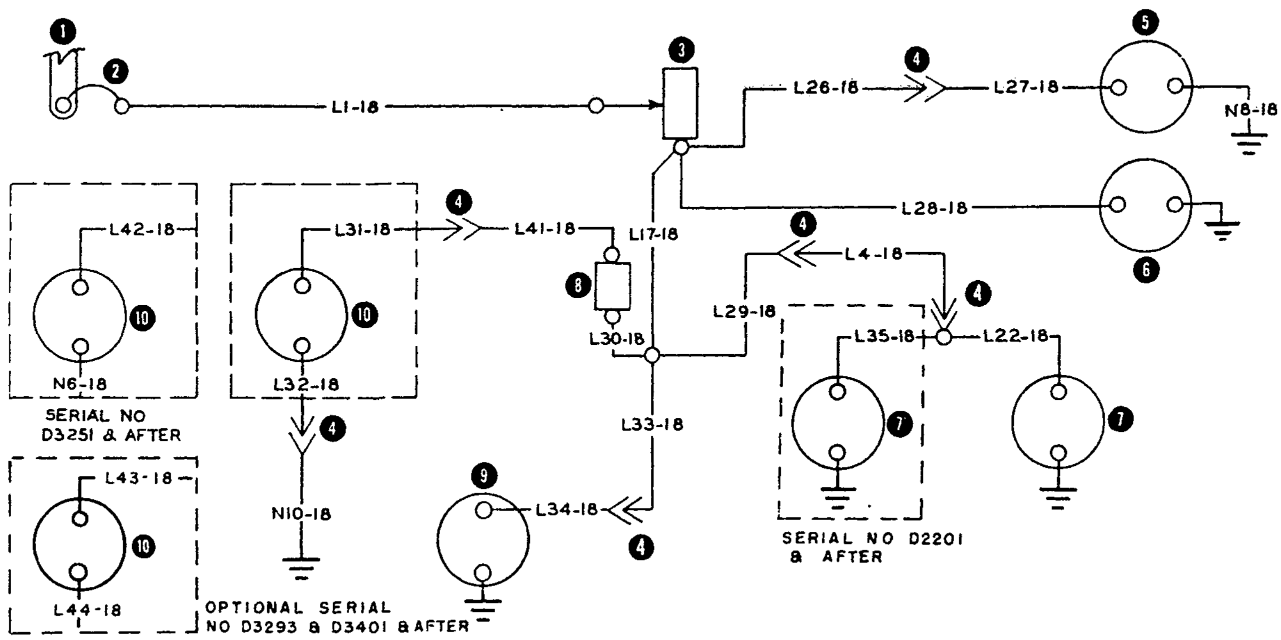
1. Bus bar
2. Flap circuit breaker
3. Flap position switch
4. Connector
5. Down limit switch
6. Flap motor
7. Up limit switch
8. Wing break connector
9. Flap up indicator (green)
10. Flap down indicator (red)
11. Resistor
12. Flap position indicator and position light circuit breaker
13. Right wing break connector
14. Navigation light switch

FLAP CONTROL AND POSITION INDICATOR CIRCUIT
Airplane Serial No. D-1 thru D-6841



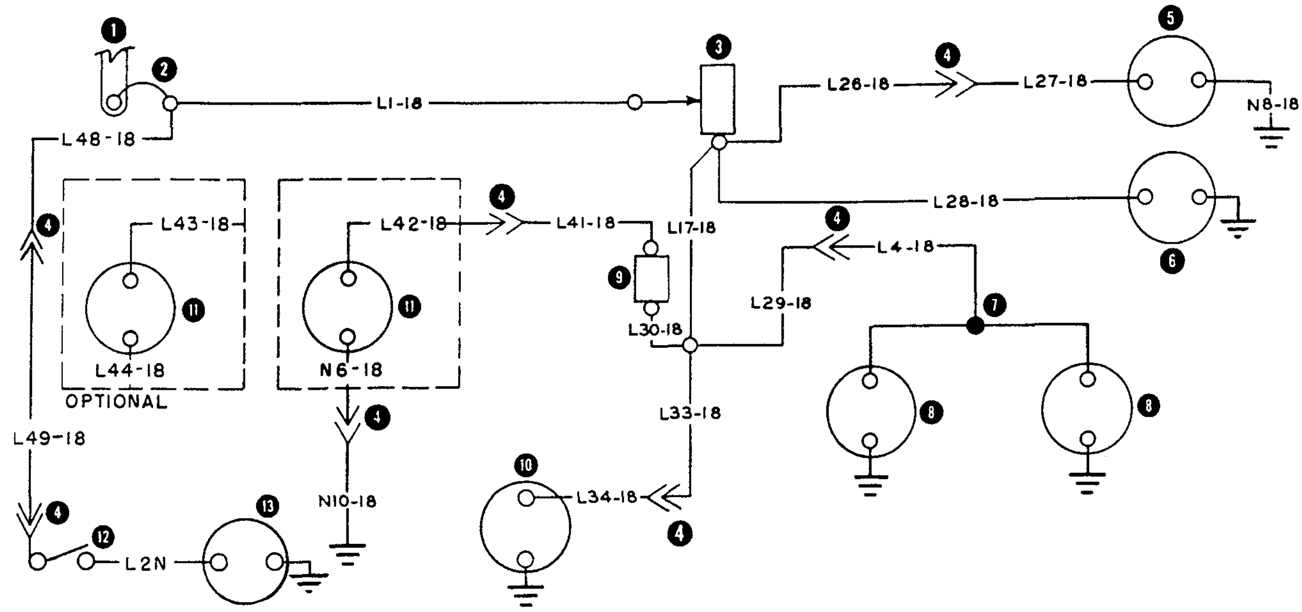
1. Bus bar
2. Instrument light circuit breaker
3. Rheostat (25 ohms)
4. Connector
5. Fuel pump placard light
6. Tab position indicator light
7. Instrument light
8. Compass light
9. Landing gear visual indicator

MISCELLANEOUS LIGHTING CIRCUITS
Airplane Serial No. D-1 thru D-1015



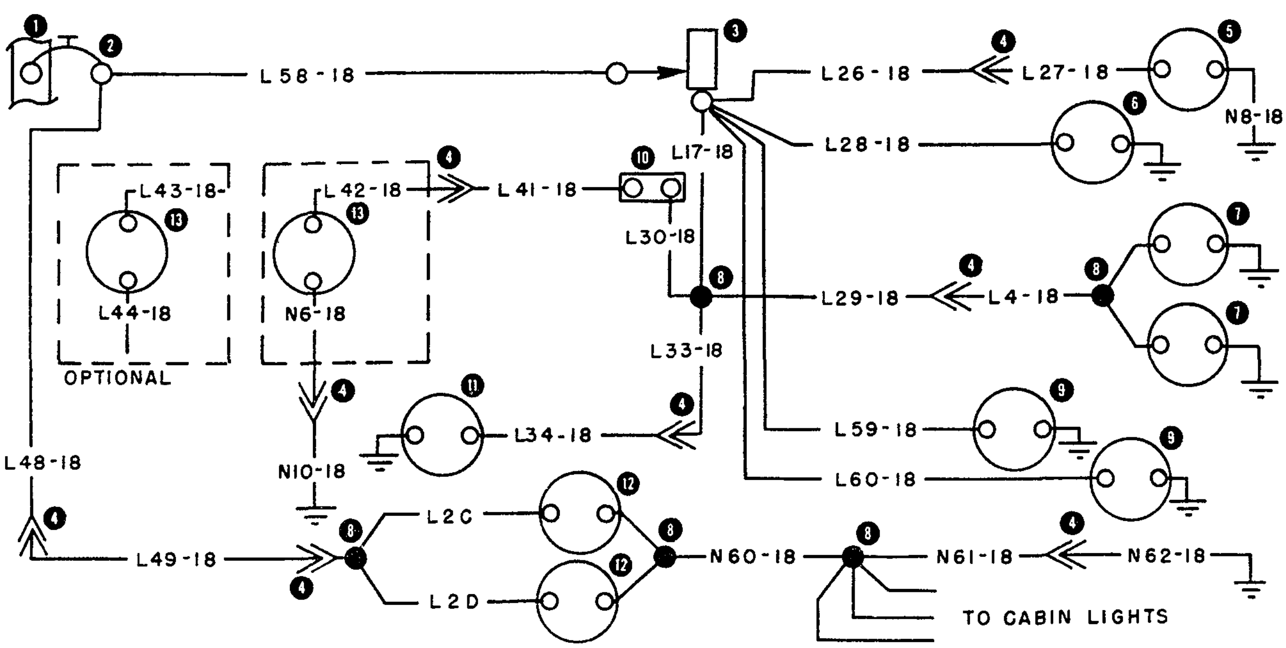
1. Bus bar
2. Instrument light circuit breaker
3. Rheostat (1 0 ohms)
4. Connector
5. Fuel pump placard light
6. Tab position indicator light
7. Instrument light
8. Resistor (50 ohms)
9. Landing gear visual indicator
10. Compass light

MISCELLANEOUS LIGHTING CIRCUITS
Airplane Serial No. D-1016 thru D-5534



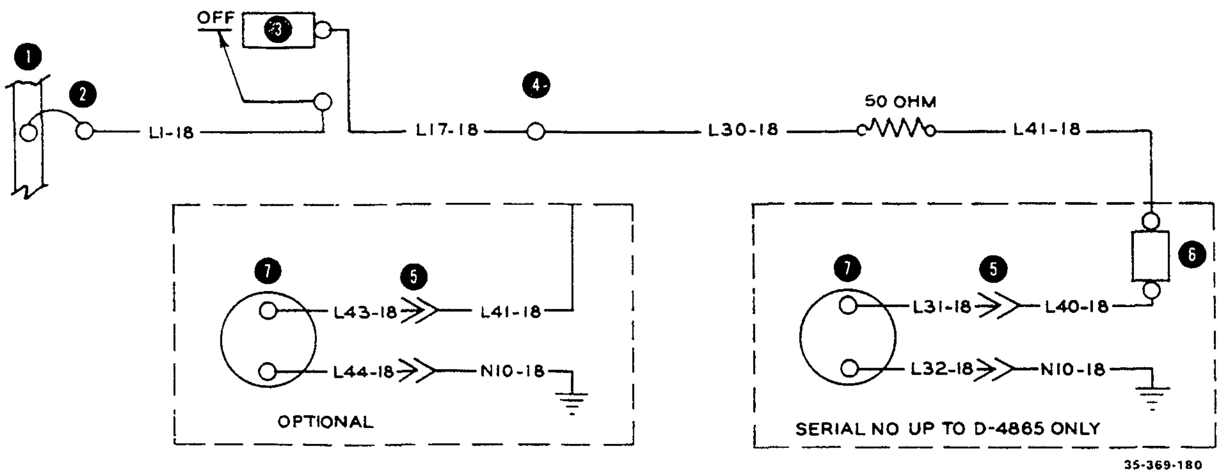
1. Bus bar
2. Instrument light circuit breaker
3. Rheostat (10 ohms)
4. Connector
5. Fuel pump placard light
6. Tab position indicator light
7. Permanent connector
8. Instrument light
9. Resistor (50 ohms)
10. Landing gear visual indicator
11. Compass light
12. Map light switch
13. Map light

MISCELLANEOUS LIGHTING CIRCUITS
Airplane Serial No. D-5535 thru D-6561



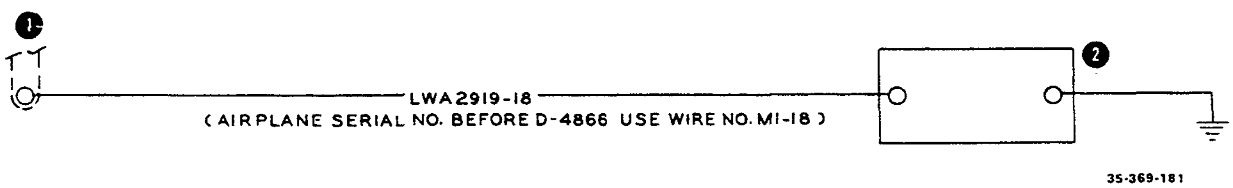
1. Bus bar
2. Instrument light circuit breaker
3. Rheostat (10 ohms)
4. Connector
5. Fuel pump placard light
6. Tab position indicator light
7. Instrument light
8. Permanent connector
9. Instrument cluster lights
10. Resistor (50 ohms)
11. Landing gear visual indicator
12. Map lights
13. Compass light

MISCELLANEOUS LIGHTING CIRCUITS
Airplane Serial No. D-6562 thru D-6841



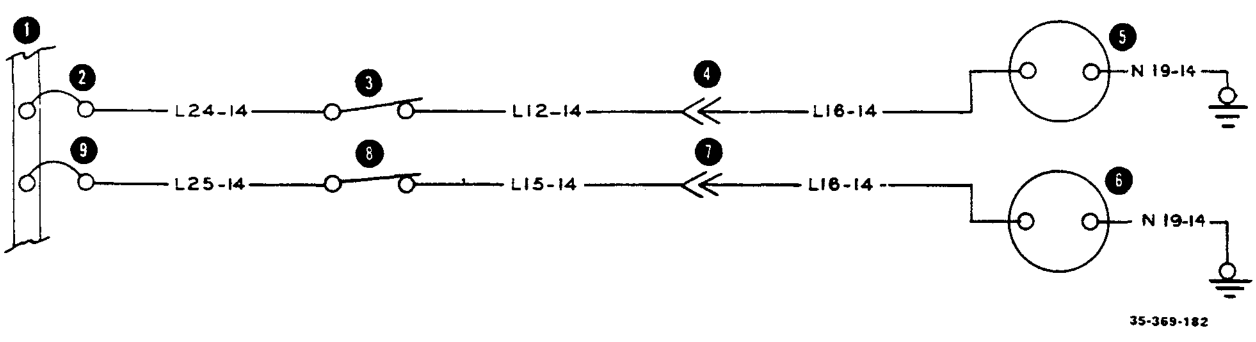
1. Bus bar
2. Instrument light circuit breaker
3. Rheostat (10 ohms) 25 watt
4. 4-way splice
5. Connector
6. Resistor
7. Compass light

AIRPATH COMPASS LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-6841



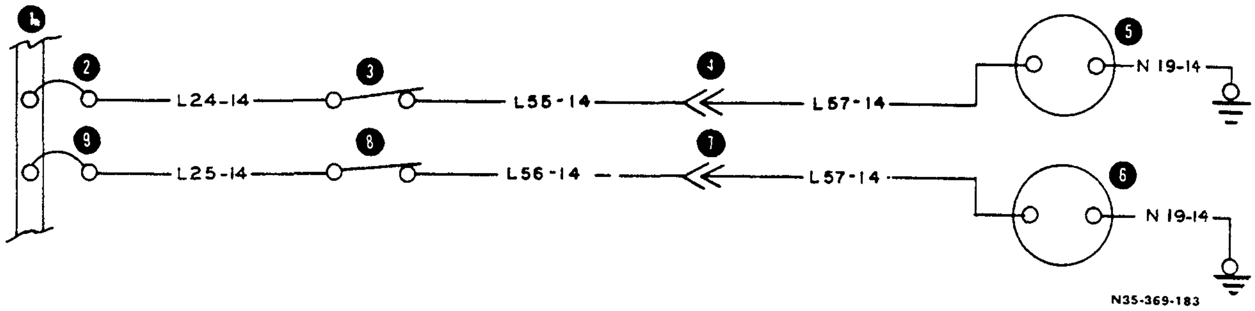
1. Bus bar
2. Cigarette lighter

CIGARETTE LIGHTER CIRCUIT
Airplane Serial No. D-1 thru D-6841



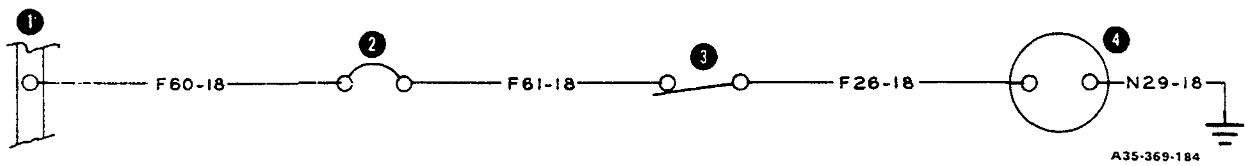
1. Bus bar
2. Landing light circuit breakers (RH)
3. Landing light switch (RH)
4. Wing break connector
5. Landing light (RH)
6. Landing light (LH)
7. Wing break connector
8. Landing light switch (LH)
9. Landing light circuit breakers (LH)

LANDING LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-6561



1. Bus bar
2. Landing light circuit breaker
3. Landing gear mounted landing light switch
4. Connector
5. Landing gear mounted landing light
6. Nose mounted landing light
7. Connector
8. Nose mounted landing light switch
9. Landing light circuit breaker

LANDING LIGHT CIRCUIT
Airplane Serial No. D-6562 thru D-6841

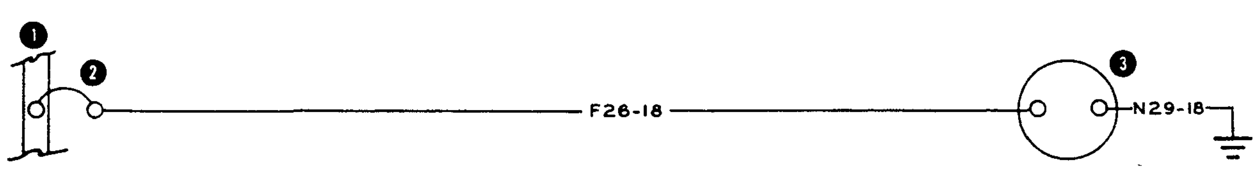


1. Bus bar
2. Turn and bank indicator circuit breaker
3. Turn and bank indicator switch
4. Turn and bank indicator

TURN AND BANK INDICATOR CIRCUIT
Airplane Serial No. D-1501 thru D-2680

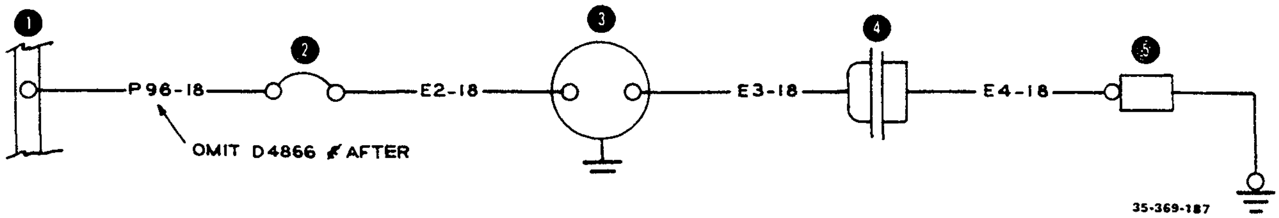
1. Bus bar
2. Turn and bank indicator circuit breaker
3. Turn and bank indicator

TURN AND BANK INDICATOR CIRCUIT
Airplane Serial No. D-2681 thru D-4865



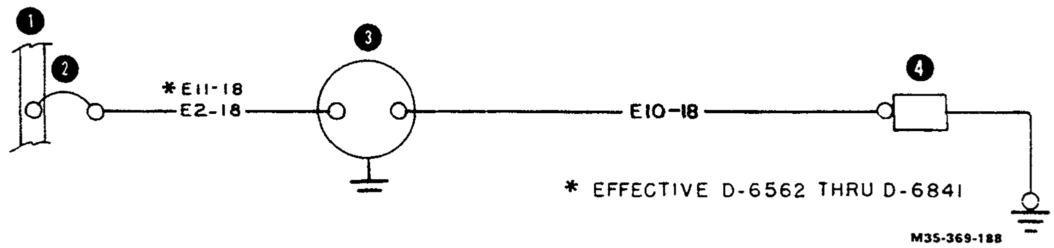
1. Bus bar
2. Turn and bank indicator circuit breaker
3. Turn and bank indicator

TURN AND BANK INDICATOR CIRCUIT
Airplane Serial No. D-4866 thru D-6841



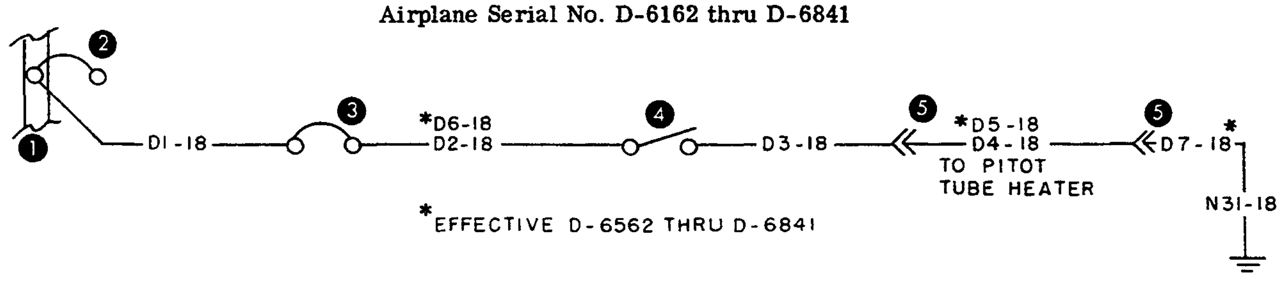
1. Bus bar
2. Oil temperature indicator circuit breaker
3. Oil temperature indicator
4. Firewall connector
5. Engine oil temperature resistance bulb

OIL TEMPERATURE INDICATOR CIRCUIT
Airplane Serial No. D-1 thru D-6161



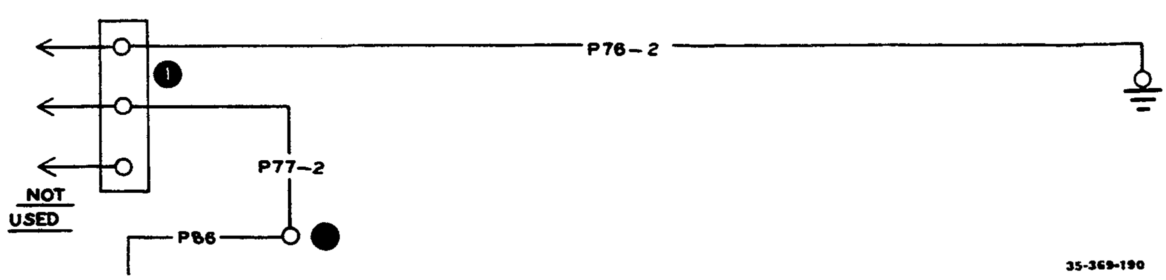
1. Bus bar
2. Oil temperature indicator circuit breaker
3. Oil temperature indicator
4. Engine oil temperature resistance bulb

OIL TEMPERATURE INDICATOR CIRCUIT
Airplane Serial No. D-6162 thru D-6841



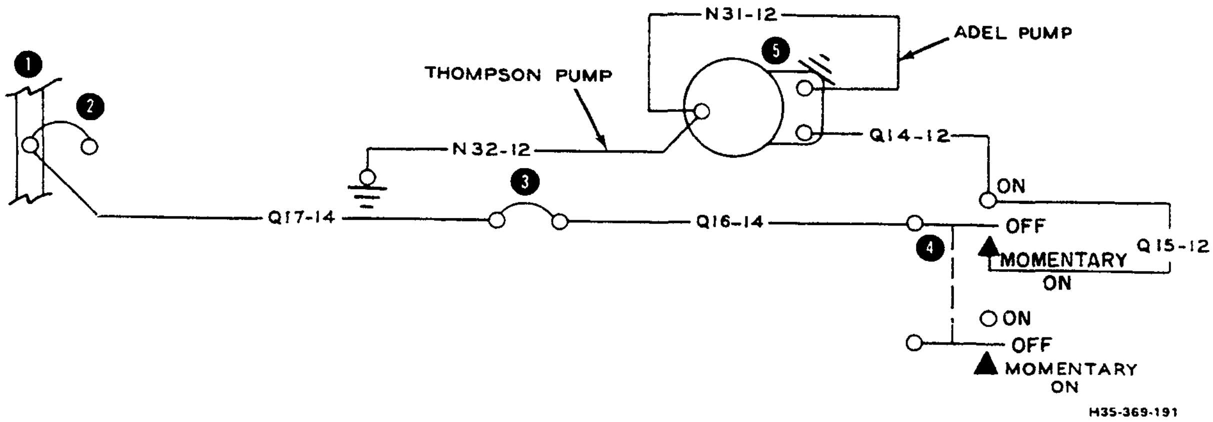
1. Bus bar
2. Oil temperature and cylinder head temperature circuit breaker
3. Pitot tube heater circuit breaker
4. Pitot tube heater switch
5. Connector

OPTIONAL PITOT HEAT CIRCUIT
Airplane Serial No. D-2861 thru D-6841



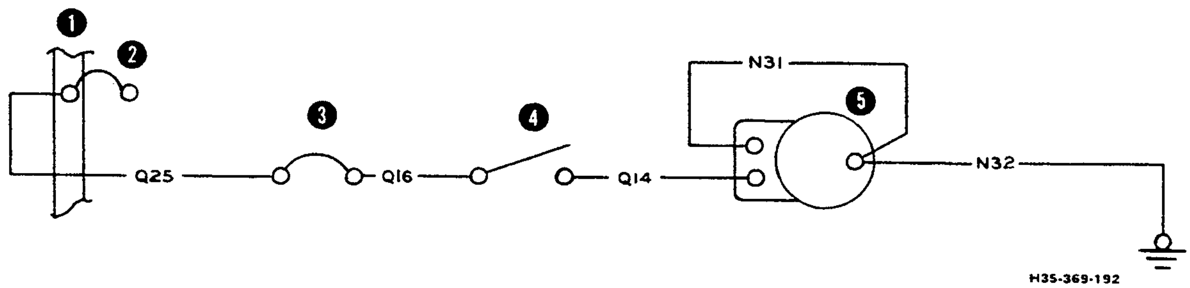
1. External power receptacle
2. Starter relay

OPTIONAL EXTERNAL POWER SOURCE CIRCUIT
Airplane Serial No. D-1 thru D-6841



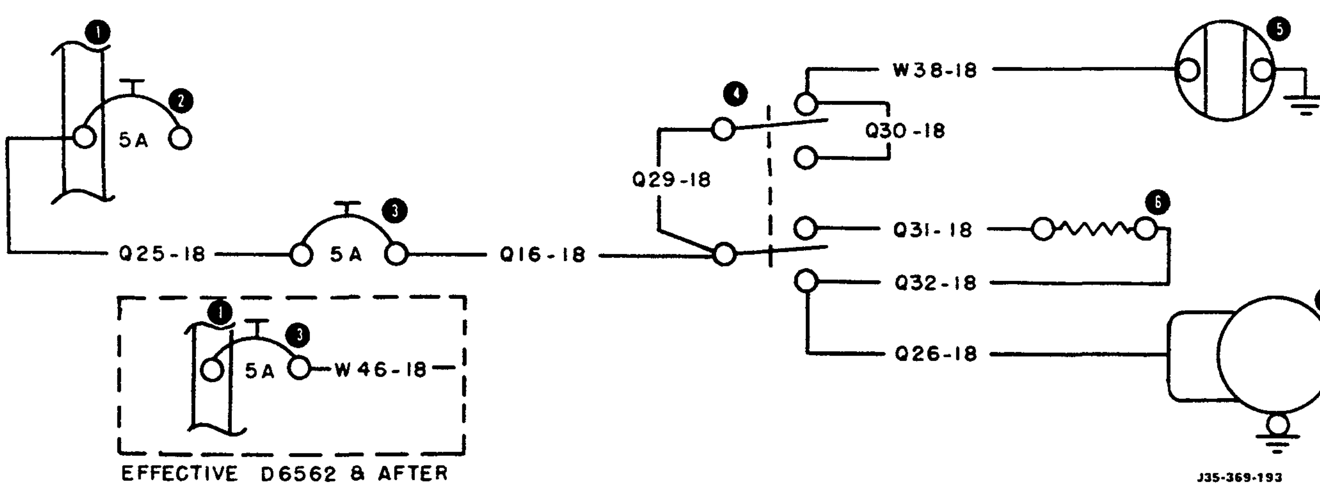
1. Bus bar
2. Stall warning indicator circuit breaker
3. Fuel boost pump circuit breaker
4. Fuel boost pump switch
5. Fuel pump

OPTIONAL FUEL BOOST PUMP CIRCUIT
Airplanes prior to Serial No. D-4866



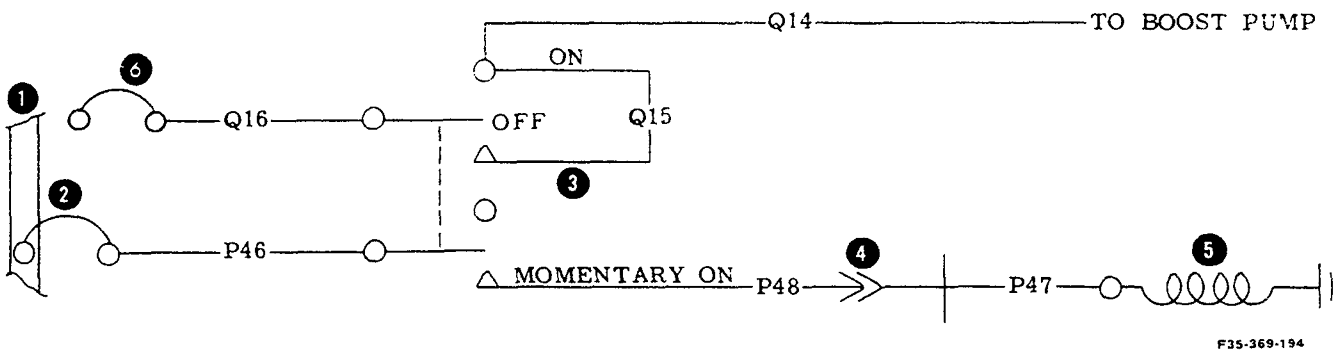
1. Bus bar
2. Stall warning indicator circuit breaker
3. Fuel boost pump circuit breaker
4. Fuel boost pump switch
5. Fuel pump

OPTIONAL FUEL BOOST PUMP CIRCUIT
Airplane Serial No. D-4866 thru D-5330



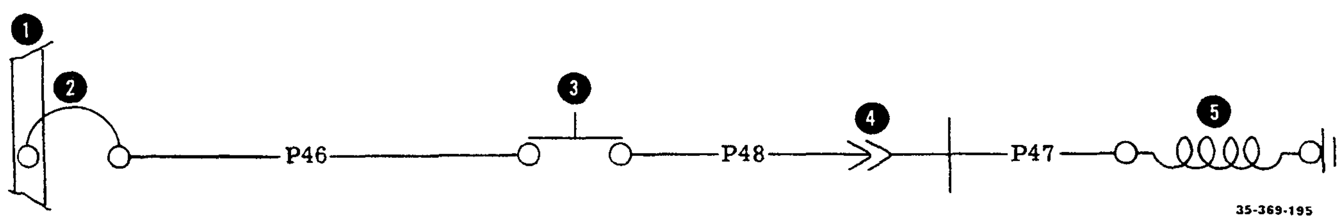
1. Bus bar
2. Stall warning indicator circuit breaker
3. Fuel boost pump circuit breaker
4. Fuel boost pump switch
5. Fuel boost pump warning indicator
6. Fuel boost pump resistor
7. Fuel boost pump

OPTIONAL FUEL BOOST PUMP CIRCUIT
Airplane Serial No. D-5331 thru D-6841



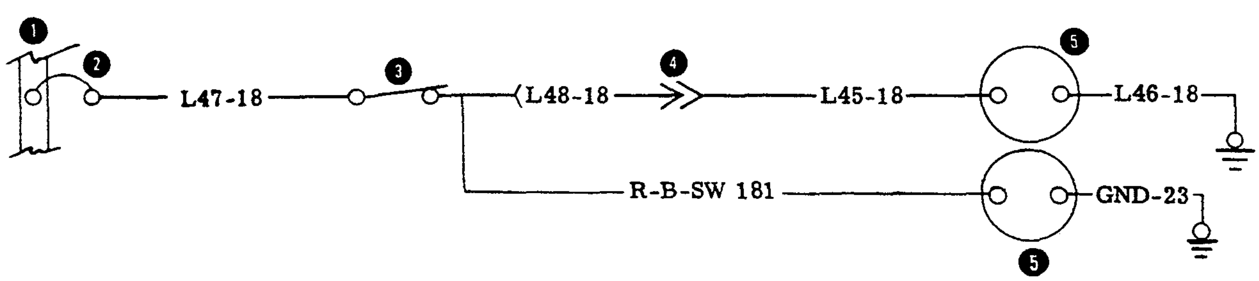
1. Bus bar
2. Cabin light circuit breaker
3. Primer and auxiliary pump switch
4. Firewall connector
5. Primer solenoid
6. Fuel boost pump circuit breaker

OPTIONAL PRIMER CIRCUIT-
with auxiliary fuel pump
Airplane Serial No. D-3999 thru D-5330 when Kit 35-548 has been complied with



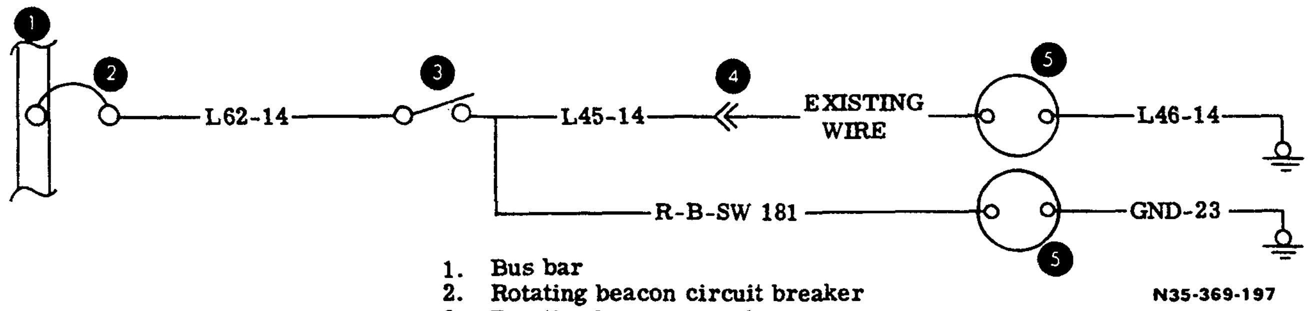
1. Bus bar
2. Cabin light circuit breaker
3. Primer switch
4. Firewall connector
5. Primer solenoid

PRIMER CIRCUIT
Airplane Serial No. D-1 thru D-5330



1. Bus bar
2. Rotating beacon circuit breaker
3. Rotating beacon switch
4. Rotating beacon connector
5. Rotating beacon

OPTIONAL ROTATING BEACON LIGHT CIRCUIT
Airplane Serial No. D-1 thru D-6785

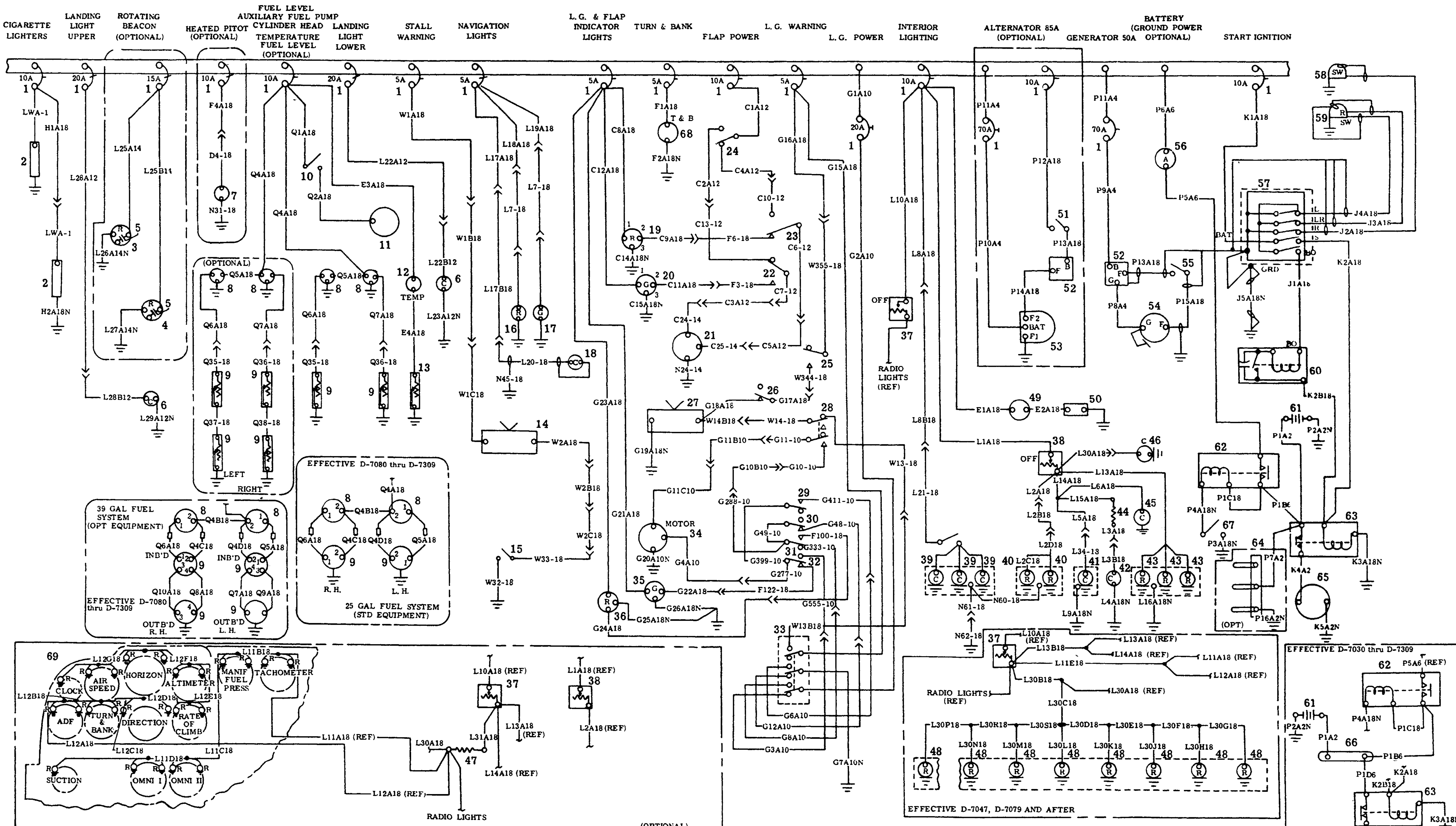


1. Bus bar
2. Rotating beacon circuit breaker
3. Rotating beacon switch
4. Rotating beacon connector
5. Rotating beacon

OPTIONAL ROTATING BEACON LIGHT CIRCUIT
Airplane Serial No. D-6786 thru D-6841

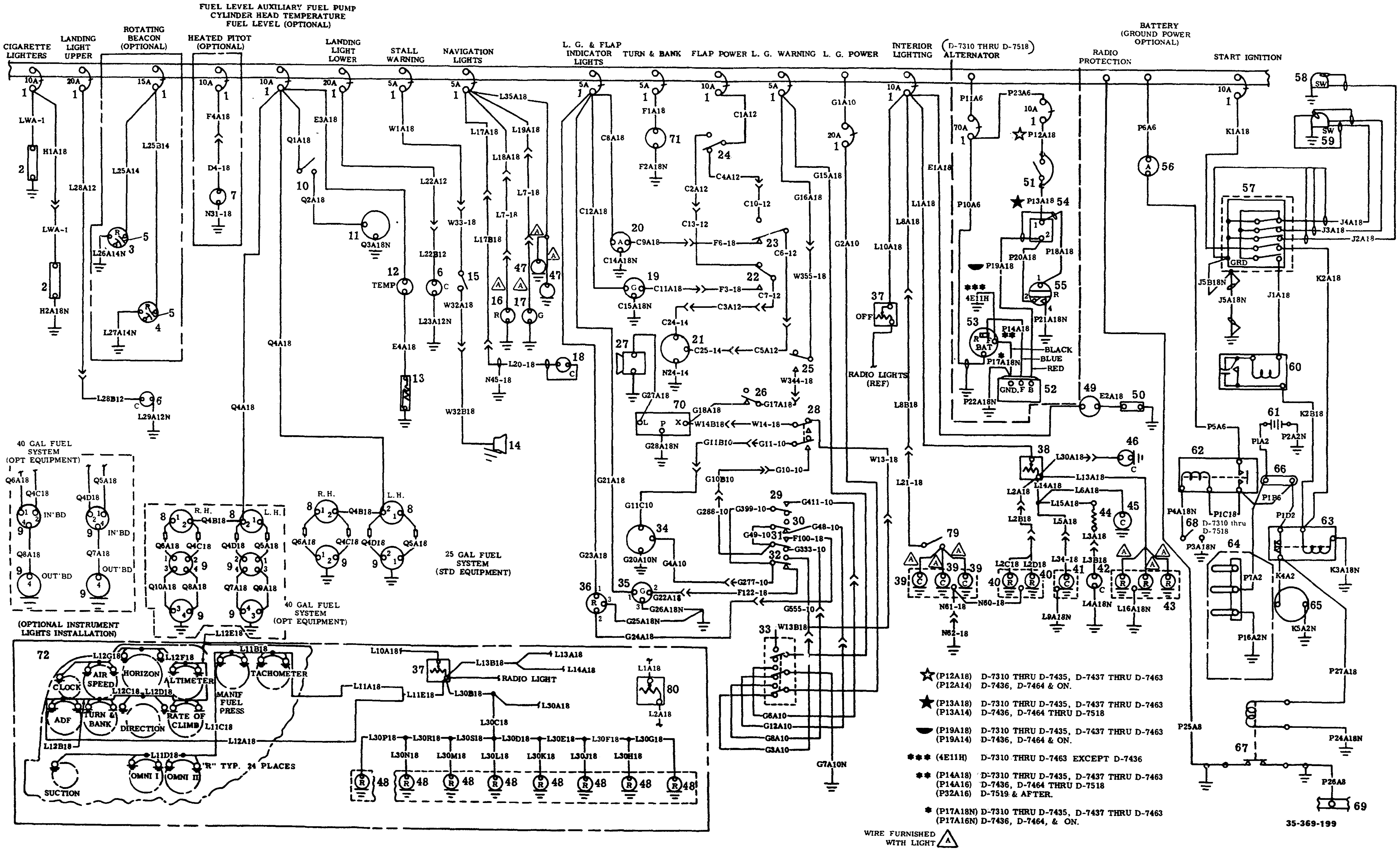
Index	Nomenclature	Index	Nomenclature
1.	Circuit breaker	35.	Landing gear down indicator light
2.	Cigarette lighter	36.	Landing gear up indicator light
3.	Upper rotating beacon light	37.	Radio lights rheostat
4.	Lower rotating beacon light	38.	Instrument flood rheostat
5.	Capacitor	39.	Cabin light
6.	Landing light	40.	Instrument flood light
7.	Heated pitot	41.	Landing gear visual indicator light
8.	Fuel level indicator	42.	Compass light
9.	Fuel level transmitters	43.	Engine instruments lights
10.	Auxiliary fuel pump switch	44.	Compass light 50 ohm resistor
11.	Auxiliary fuel pump	45.	Trim tab indicator light
12.	Cylinder head temperature indicator	46.	Fuel selector placard light
13.	Cylinder head temperature transmitter	47.	Dimming resistor
14.	Stall warning buzzer	48.	Placard edge lights
15.	Stall warning detector	49.	Oil temperature indicator
16.	Left wing navigation light	50.	Oil temperature transmitter
17.	Right wing navigation light	51.	Alternator switch
18.	Tail navigation light	52.	Voltage regulator
19.	Flap up indicator light	53.	Alternator
20.	Flap down indicator light	54.	Generator
21.	Flap motor	55.	Generator switch
22.	Flap down limit switch	56.	Ammeter
23.	Flap up limit switch	57.	Ignition switch
24.	Flap control switch	58.	RH magneto
25.	Landing gear warning limit switch	59.	LH magneto
26.	Throttle warning limit switch	60.	Vibrator
27.	Landing gear warning horn	61.	Battery
28.	Landing gear safety limit switch	62.	Battery relay
29.	Landing gear up brake limit switch	63.	Starter relay
30.	Landing gear down brake limit switch	64.	External power receptacle
31.	Landing gear up limit switch	65.	Starter motor
32.	Landing gear down limit switch	66.	Terminal board
33.	Landing gear switch	67.	Battery switch
34.	Landing gear motor	68.	Turn and bank indicator
		69.	Instrument post lights (24 req.)

GENERAL WIRING DIAGRAM – INDEX
Model P35



GENERAL WIRING DIAGRAM
Model P35

35-3691-98



GENERAL WIRING DIAGRAM (Sheet 1 of 4)
Model S35

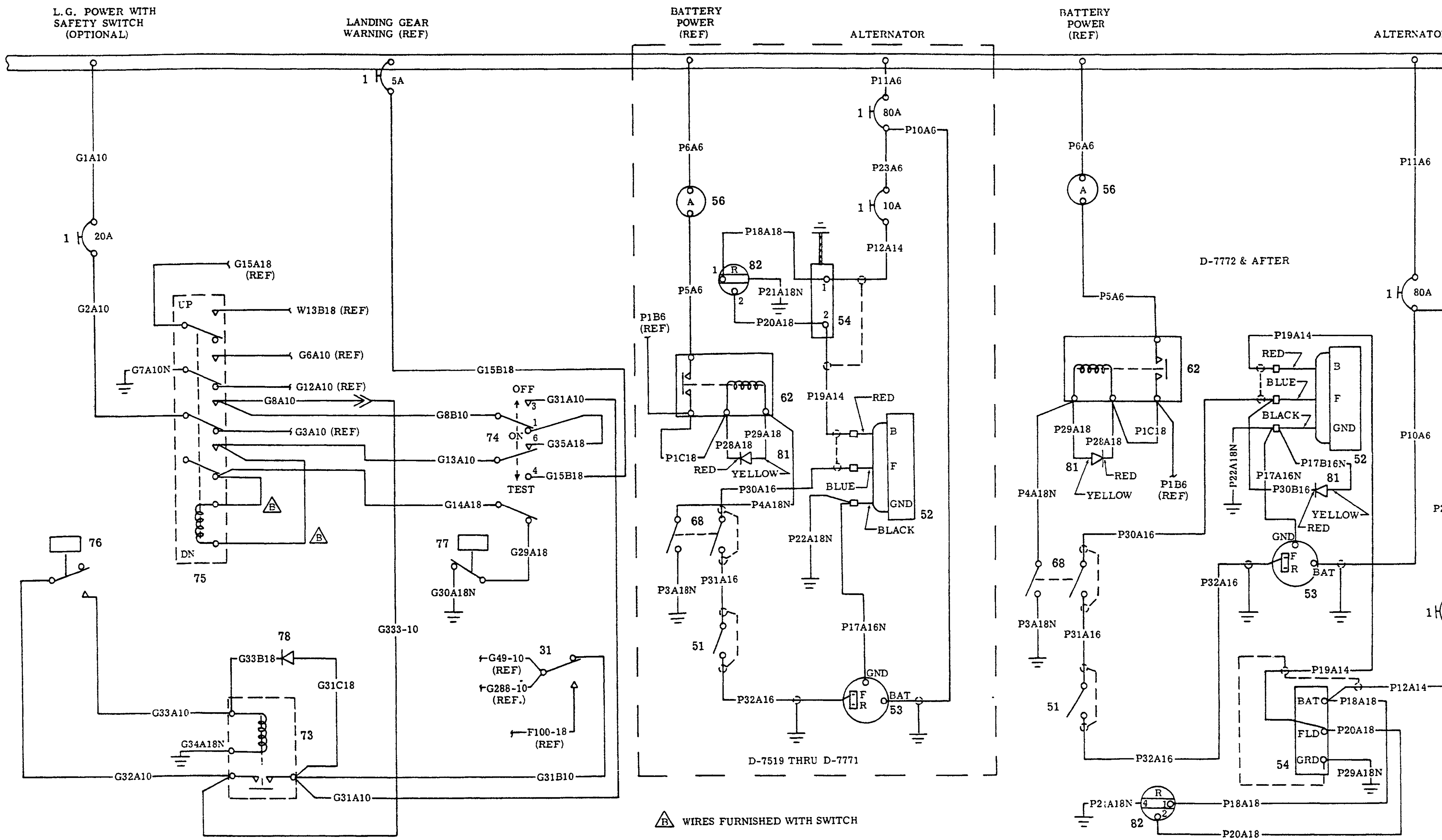
Issued: January, 1970

Index	Nomenclature	Index	Nomenclature
1.	Circuit breaker	43.	Engine instruments light
2.	Cigarette lighter	44.	Resistor
3.	Upper rotating beacon light	45.	Trim tab indicator light
4.	Lower rotating beacon light	46.	Fuel selector placard light
5.	Capacitor	47.	Subpanel lights
6.	Landing light	48.	Placard edge light
7.	Heated pitot	49.	Oil temperature indicator
8.	Fuel level indicator	50.	Oil temperature transmitter
9.	Fuel level transmitter	51.	Alternator switch
10.	Auxiliary fuel pump switch	52.	Voltage regulator
11.	Auxiliary fuel pump	53.	Alternator
12.	Cylinder head temperature indicator	54.	Overvoltage relay
13.	Cylinder head temperature transmitter	55.	Press-to-test light
14.	Stall warning horn	56.	Ammeter
15.	Stall warning detector	57.	Ignition switch
16.	Left wing navigation light	58.	RH magneto
17.	Right wing navigation light	59.	LH magneto
18.	Tail navigation light	60.	Vibrator, starting
19.	Flap up indicator light	61.	Battery
20.	Flap down indicator light	62.	Battery relay
21.	Flap motor	63.	Starting relay
22.	Flap down limit switch	64.	External power receptacle
23.	Flap up limit switch	65.	Starter
24.	Flap control switch	66.	Terminal board
25.	Landing gear warning limit switch	67.	Radio protection relay
26.	Throttle warning limit switch	68.	Battery switch
27.	Landing gear warning horn	69.	D. C. bus
28.	Landing gear safety limit switch	70.	Flasher
29.	Landing gear up brake limit switch	71.	Turn & bank indicator
30.	Landing gear down brake limit switch	72.	Instrument post lights (24 req.)
31.	Landing gear up limit switch	73.	Landing gear safety relay (Safety system)
32.	Landing gear down limit switch		
33.	Landing gear switch	74.	Landing gear safety switch (Safety system)
34.	Landing gear motor		
35.	Landing gear down indicator light	75.	Landing gear switch (Safety system)
36.	Landing gear up indicator light	76.	Air speed pressure switch (90 mph)
37.	Instrument light rheostat	77.	Air speed pressure switch (120 mph)
38.	Instrument flood rheostat	78.	Diode, landing gear safety system
39.	Cabin light	79.	Cabin light switch
40.	Instrument flood light	80.	Radio light rheostat
41.	Landing visual indicator light	81.	Suppressor
42.	Compass light	82.	Indicator light

GENERAL WIRING DIAGRAM- INDEX (Sheet 2 of 4)
Model S35

Index	Nomenclature	Index	Nomenclature
1.	Circuit breaker	43.	Engine instruments light
2.	Cigarette lighter	44.	Resistor
3.	Upper rotating beacon light	45.	Trim tab indicator light
4.	Lower rotating beacon light	46.	Fuel selector placard light
5.	Capacitor	47.	Subpanel lights
6.	Landing light	48.	Placard edge light
7.	Heated pitot	49.	Oil temperature indicator
8.	Fuel level indicator	50.	Oil temperature transmitter
9.	Fuel level transmitter	51.	Alternator switch
10.	Auxiliary fuel pump switch	52.	Voltage regulator
11.	Auxiliary fuel pump	53.	Alternator
12.	Cylinder head temperature indicator	54.	Overvoltage relay
13.	Cylinder head temperature transmitter	55.	Press-to-test light
14.	Stall warning horn	56.	Ammeter
15.	Stall warning detector	57.	Ignition switch
16.	Left wing navigation light	58.	RH magneto
17.	Right wing navigation light	59.	LH magneto
18.	Tail navigation light	60.	Vibrator, starting
19.	Flap up indicator light	61.	Battery
20.	Flap down indicator light	62.	Battery relay
21.	Flap motor	63.	Starting relay
22.	Flap down limit switch	64.	External power receptacle
23.	Flap up limit switch	65.	Starter
24.	Flap control switch	66.	Terminal board
2..	Landing gear warning limit switch	67.	Radio protection relay
26.	Throttle warning limit switch	68.	Battery switch
27.	Landing gear warning horn	69.	D. C. bus
28.	Landing gear safety limit switch	70.	Flasher
29.	Landing gear up brake limit switch	71.	Turn & bank indicator
30.	Landing gear down brake limit switch	72.	Instrument post lights (24 req.)
31.	Landing gear up limit switch	73.	Landing gear safety relay (Safety system)
32.	Landing gear down limit switch		
33.	Landing gear switch	74.	Landing gear safety switch (Safety system)
34.	Landing gear motor		
35.	Landing gear down indicator light	75.	Landing gear switch (Safety system)
36.	Landing gear up indicator light	76.	Air speed pressure switch (90 mph)
37.	Instrument light rheostat	77.	Air speed pressure switch (120 mph)
38.	Instrument flood rheostat	78.	Diode, landing gear safety system
39.	Cabin light	79.	Cabin light switch
40.	Instrument flood light	80.	Radio light rheostat
41.	Landing visual indicator light	81.	Suppressor
42.	Compass light	82.	Indicator light

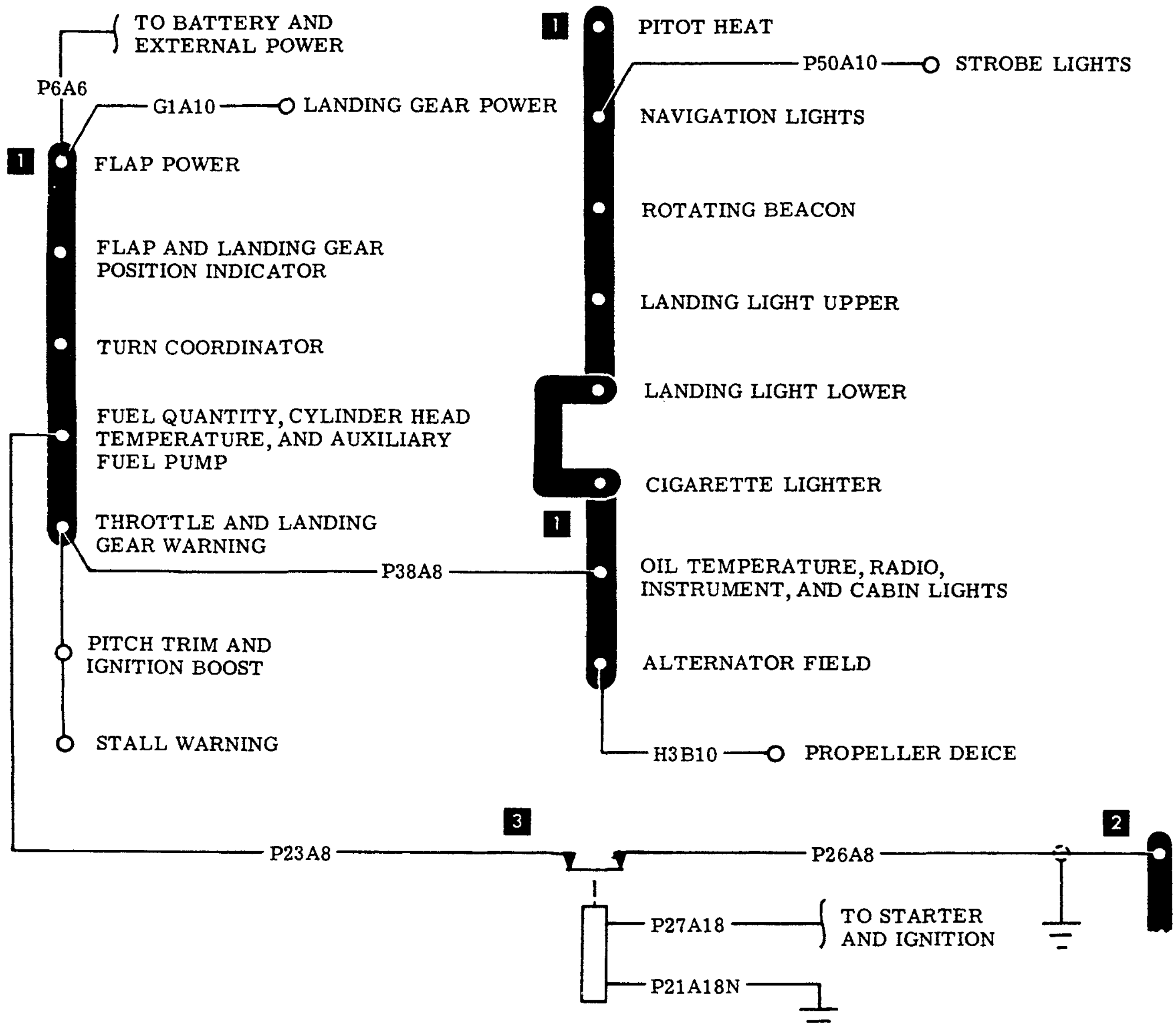
GENERAL WIRING DIAGRAM - INDEX (Sheet 3 of 4)
Model S35



B WIRES FURNISHED WITH SWITCH

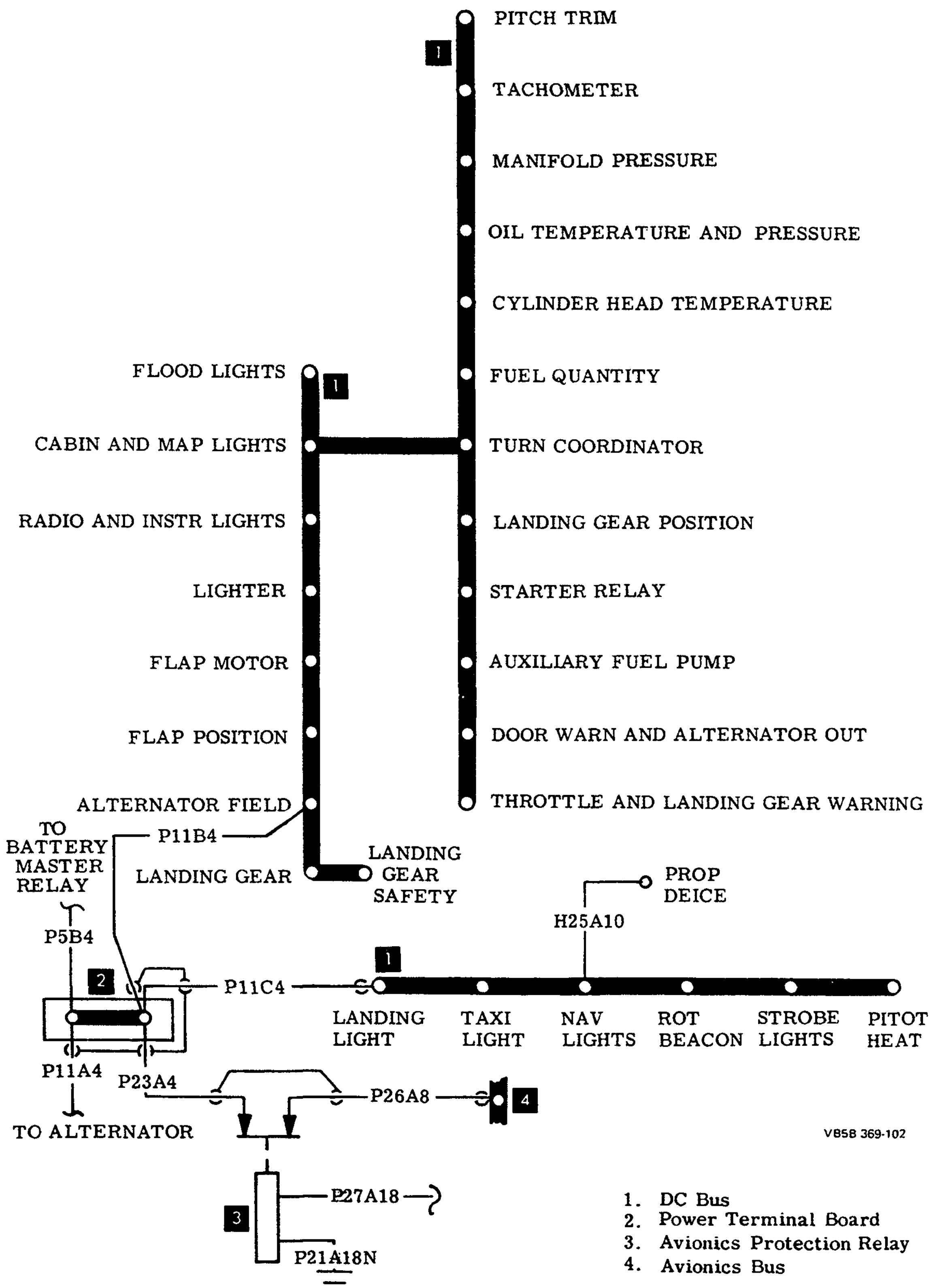
S35 GENERAL WIRING DIAGRAM (CONTINUED)

GENERAL WIRING DIAGRAM (Sheet 4 of 4)
Model S35



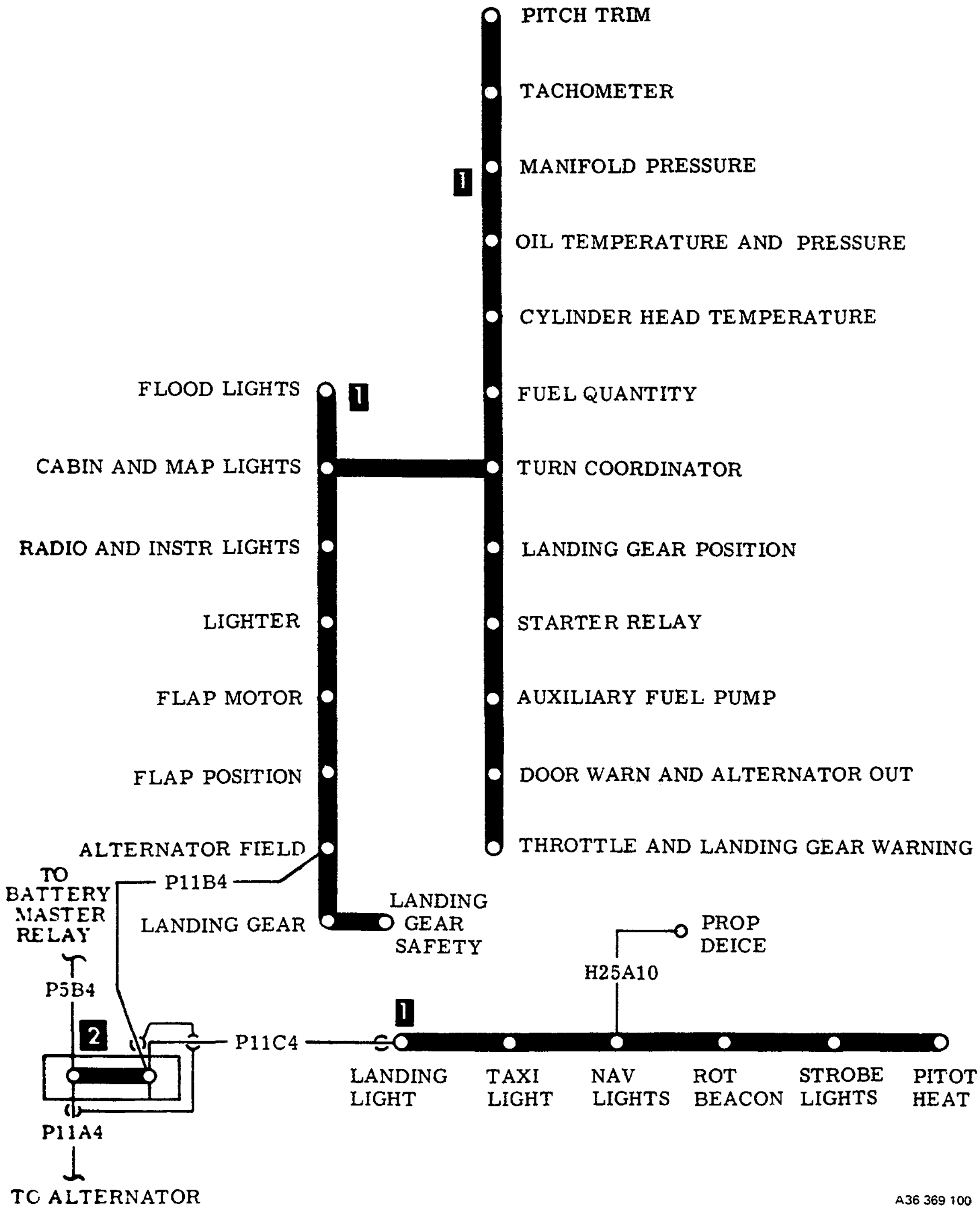
1. Main Bus
2. Avionics Bus
3. Avionics Protection Relay

POWER DISTRIBUTION
D-7977 thru D-9068



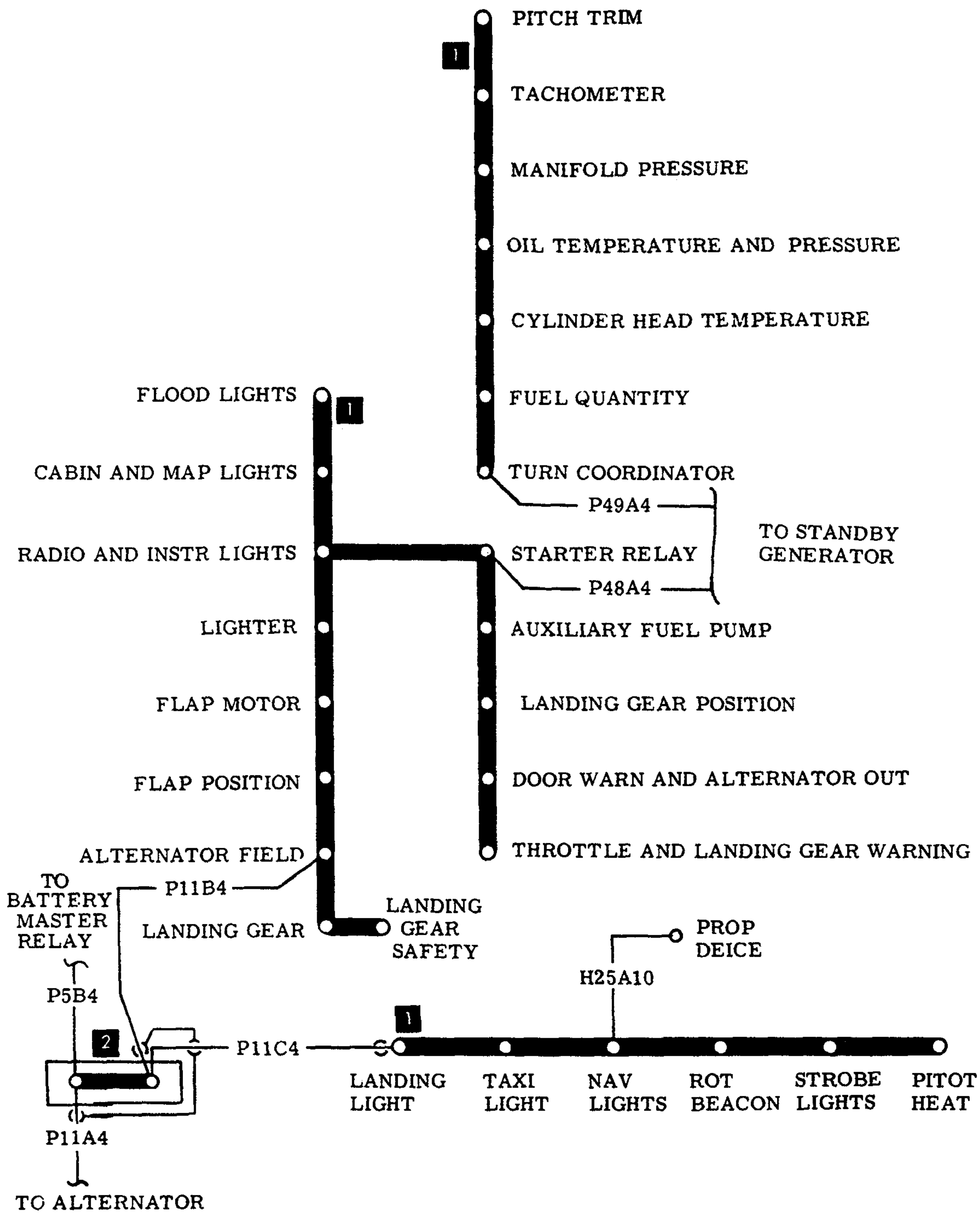
1. DC Bus
2. Power Terminal Board
3. Avionics Protection Relay
4. Avionics Bus

POWER DISTRIBUTION
D-9069 thru D-9290



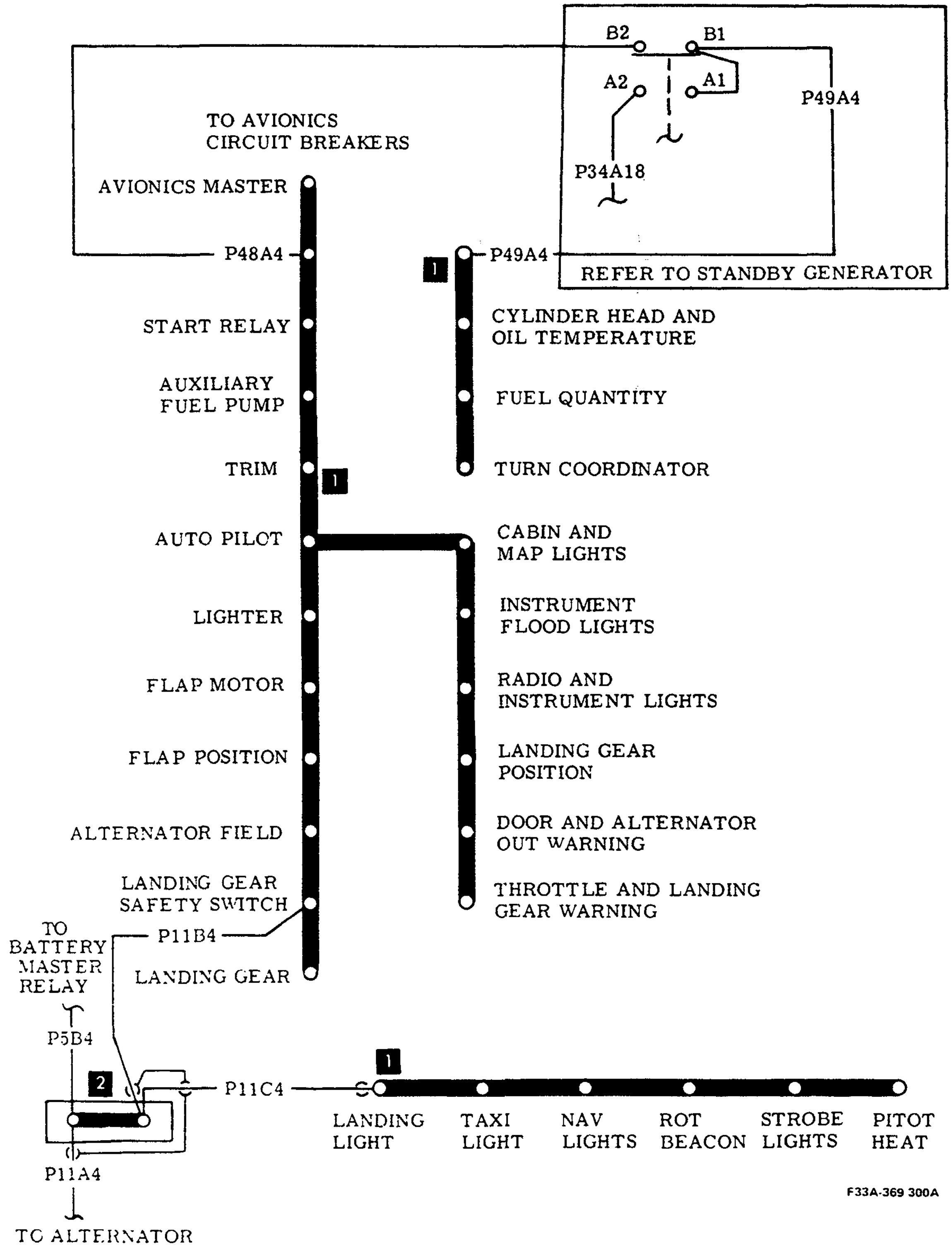
1. DC Bus
2. Power Terminal Board

POWER DISTRIBUTION (Vertical Instruments)
Model V35B (D-9291 thru D-9337)



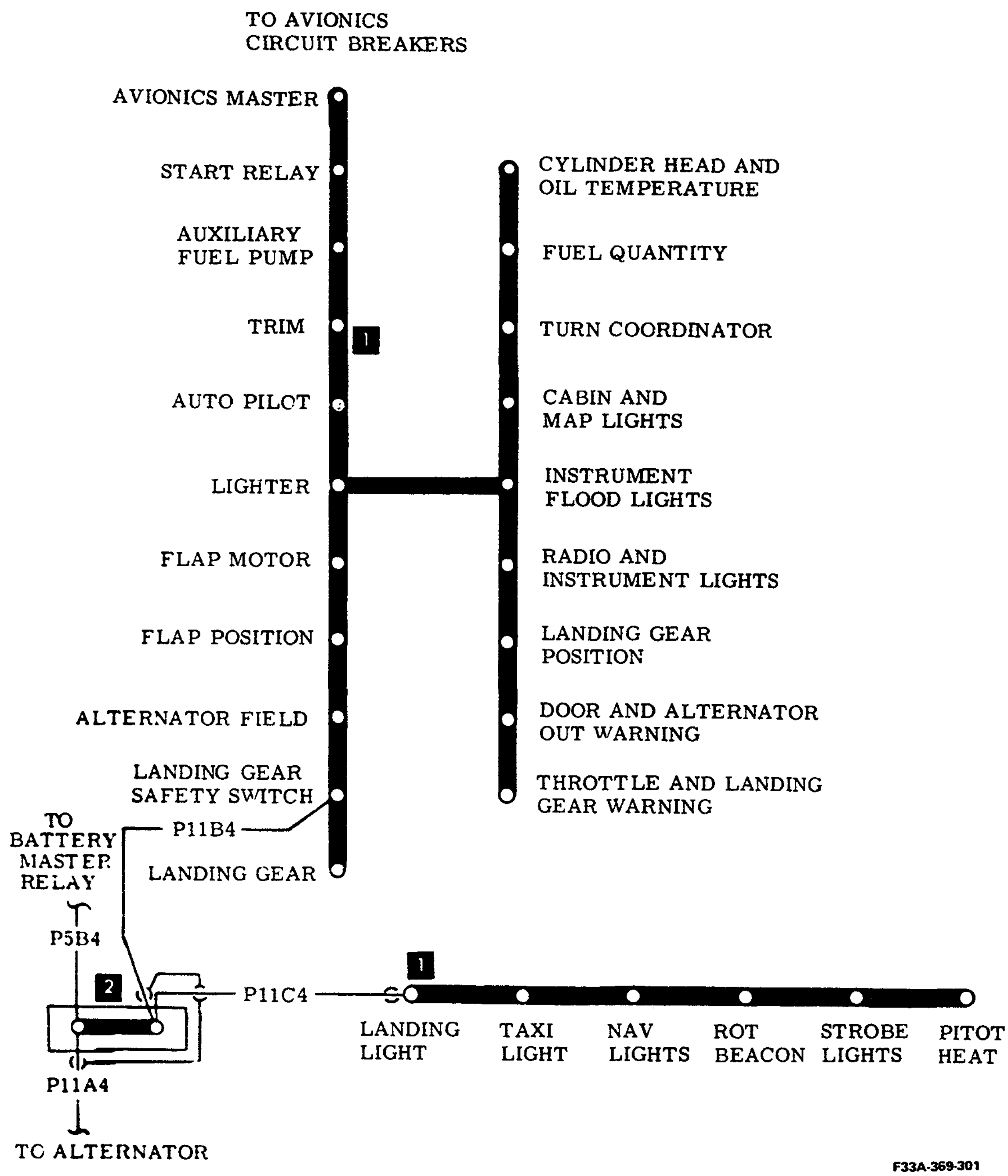
1. DC Bus
2. Power Terminal Board

POWER DISTRIBUTION (Vertical Instruments)
Model V35B (D-9338 thru D-9362)



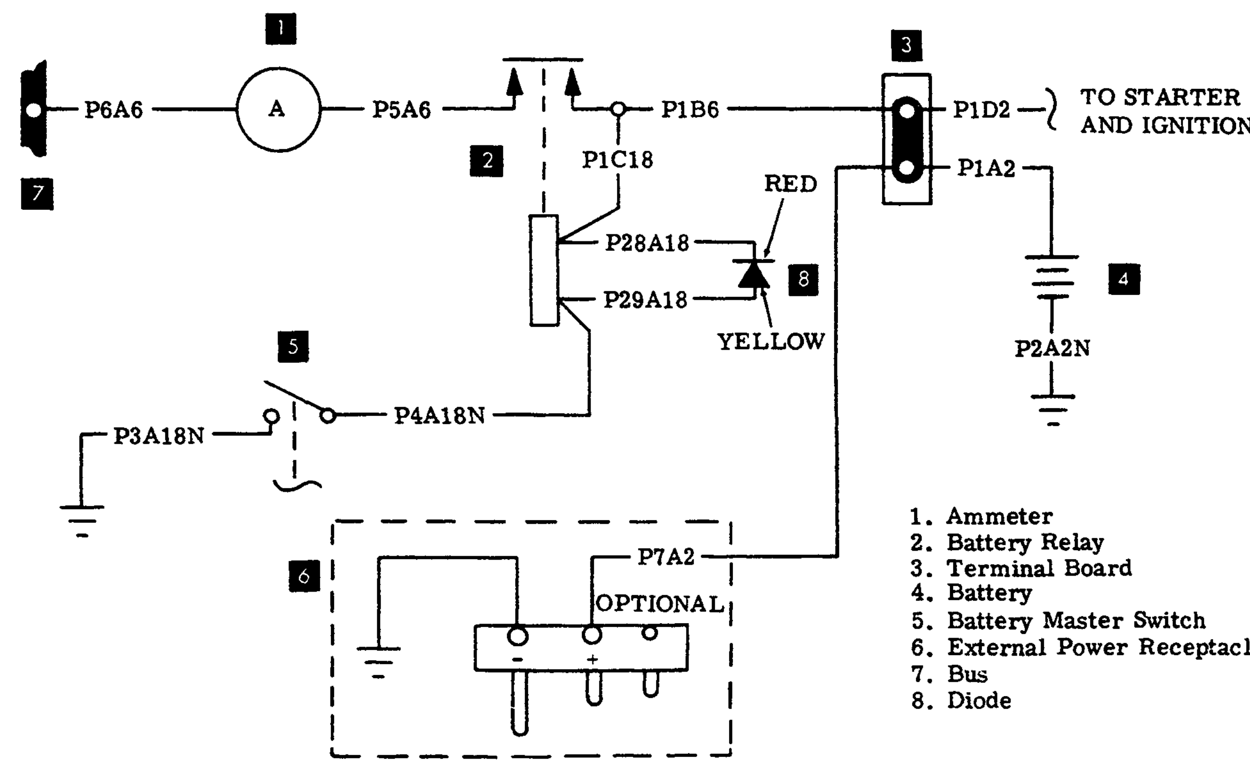
1. DC Bus
2. Power Terminal Board

POWER DISTRIBUTION (with Standby Generator)
D-9363 thru D-9817



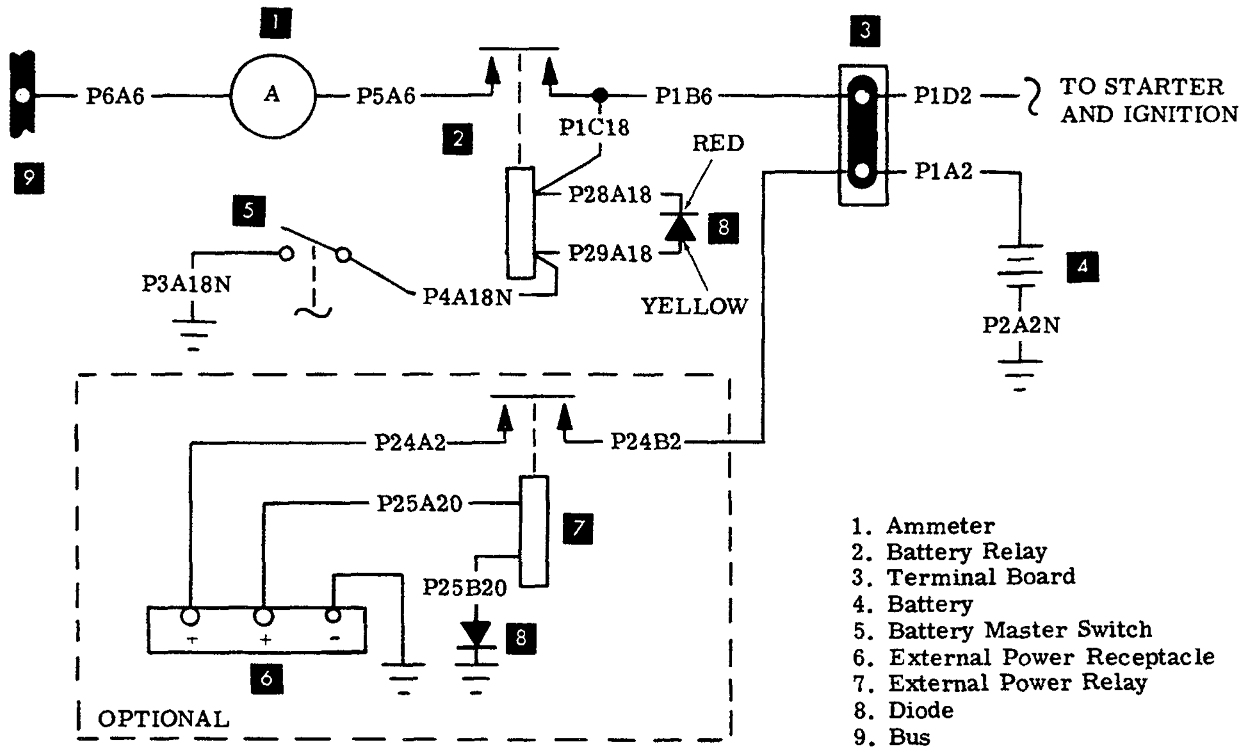
1. DC Bus
2. Power Terminal Board

POWER DISTRIBUTION (without Standby Generator)
D-9363 thru D-9817



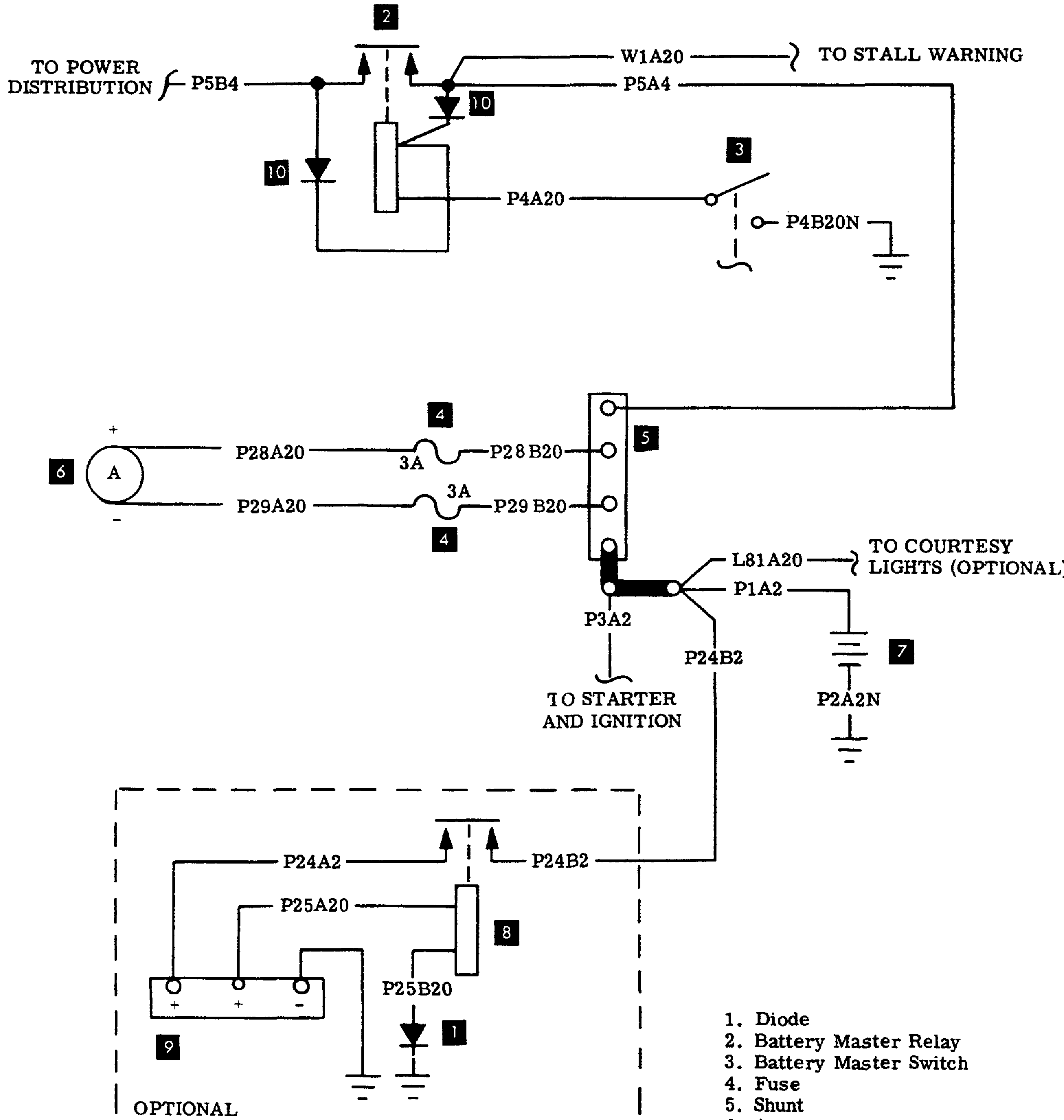
1. Ammeter
2. Battery Relay
3. Terminal Board
4. Battery
5. Battery Master Switch
6. External Power Receptacle
7. Bus
8. Diode

BATTERY AND EXTERNAL POWER
D-7977 thru D-8295



1. Ammeter
2. Battery Relay
3. Terminal Board
4. Battery
5. Battery Master Switch
6. External Power Receptacle
7. External Power Relay
8. Diode
9. Bus

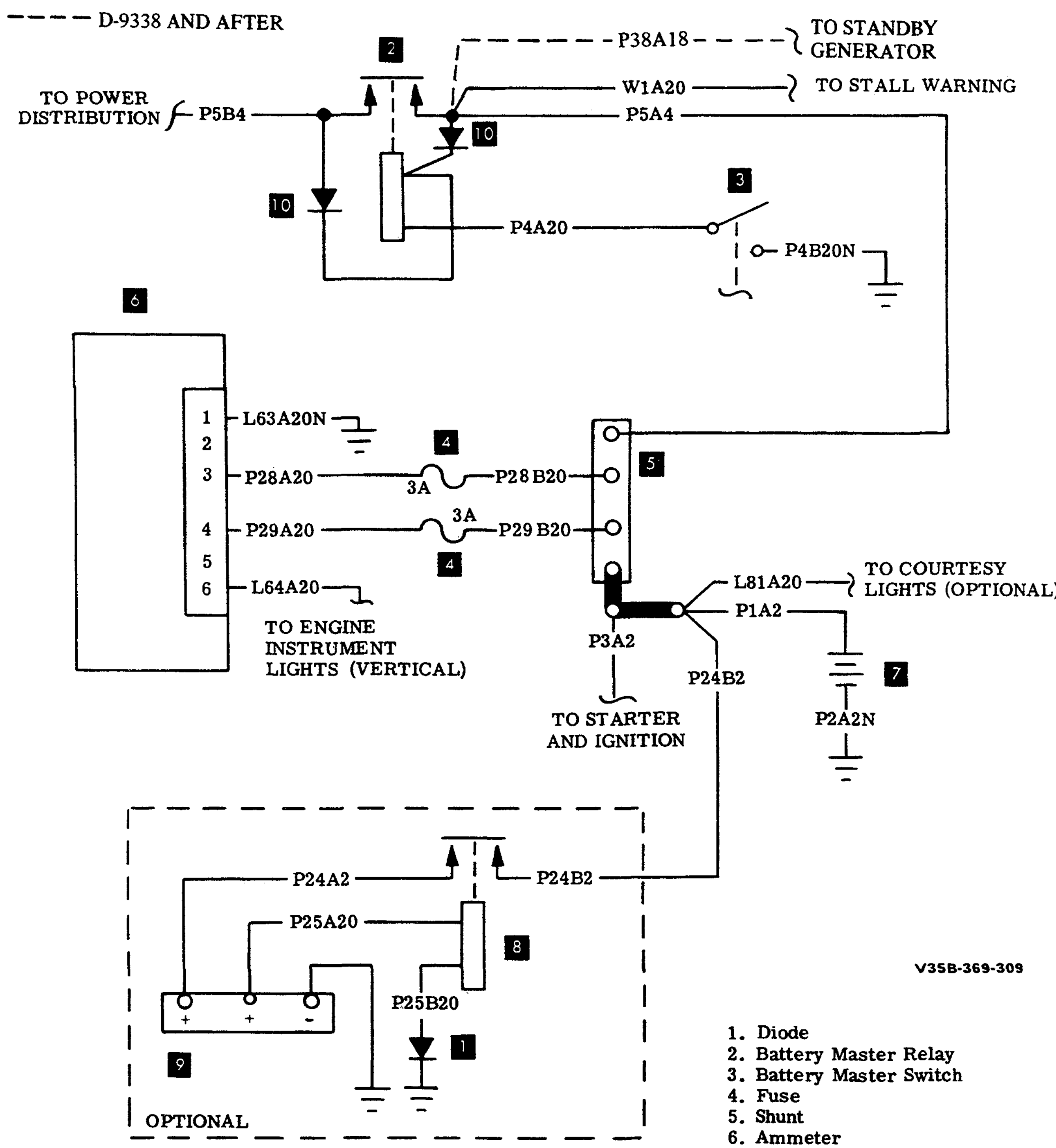
BATTERY AND EXTERNAL POWER
D-8296 thru D-9068



1. Diode
2. Battery Master Relay
3. Battery Master Switch
4. Fuse
5. Shunt
6. Ammeter
7. Battery
8. External Power Relay
9. External Power Receptical
10. Diode

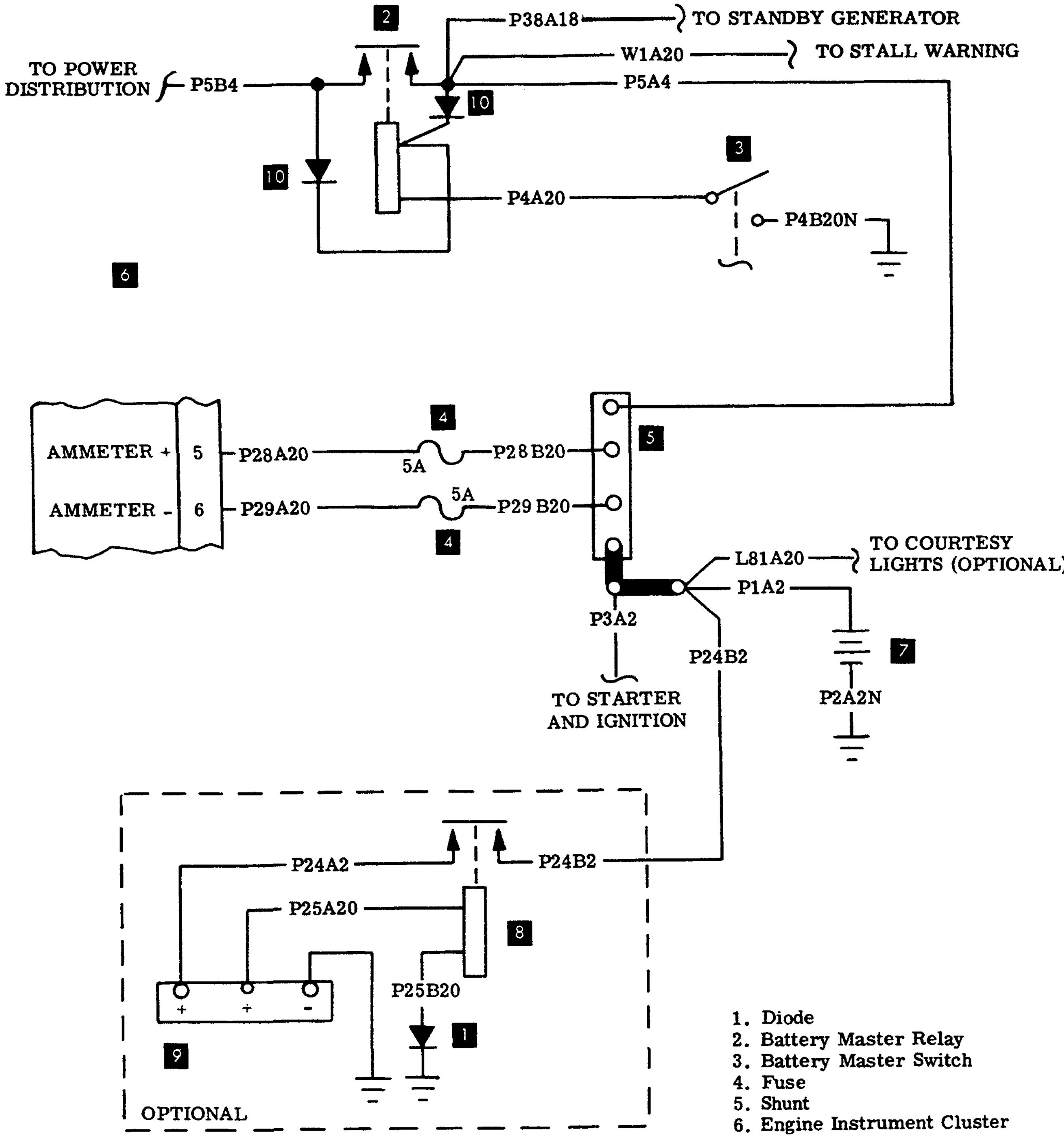
BATTERY AND EXTERNAL POWER
Model V35B & V35B-TC (D-9069 thru D-9221)

V35B-369-78



1. Diode
2. Battery Master Relay
3. Battery Master Switch
4. Fuse
5. Shunt
6. Ammeter
7. Battery
8. External Power Relay
9. External Power Receptical
10. Diode

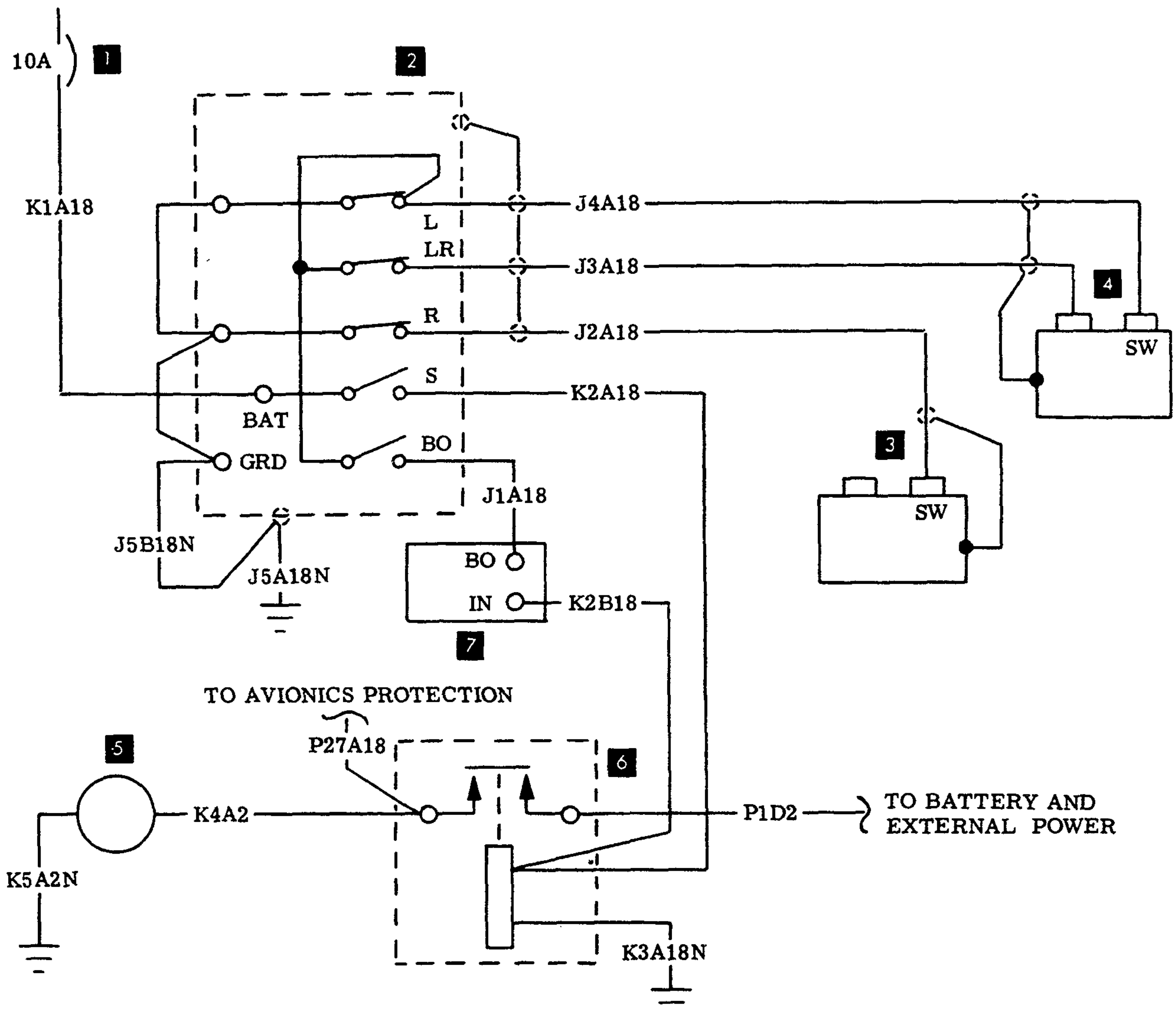
BATTERY AND EXTERNAL POWER (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



1. Diode
2. Battery Master Relay
3. Battery Master Switch
4. Fuse
5. Shunt
6. Engine Instrument Cluster
7. Battery
8. External Power Relay
9. External Power Receptical
10. Diode

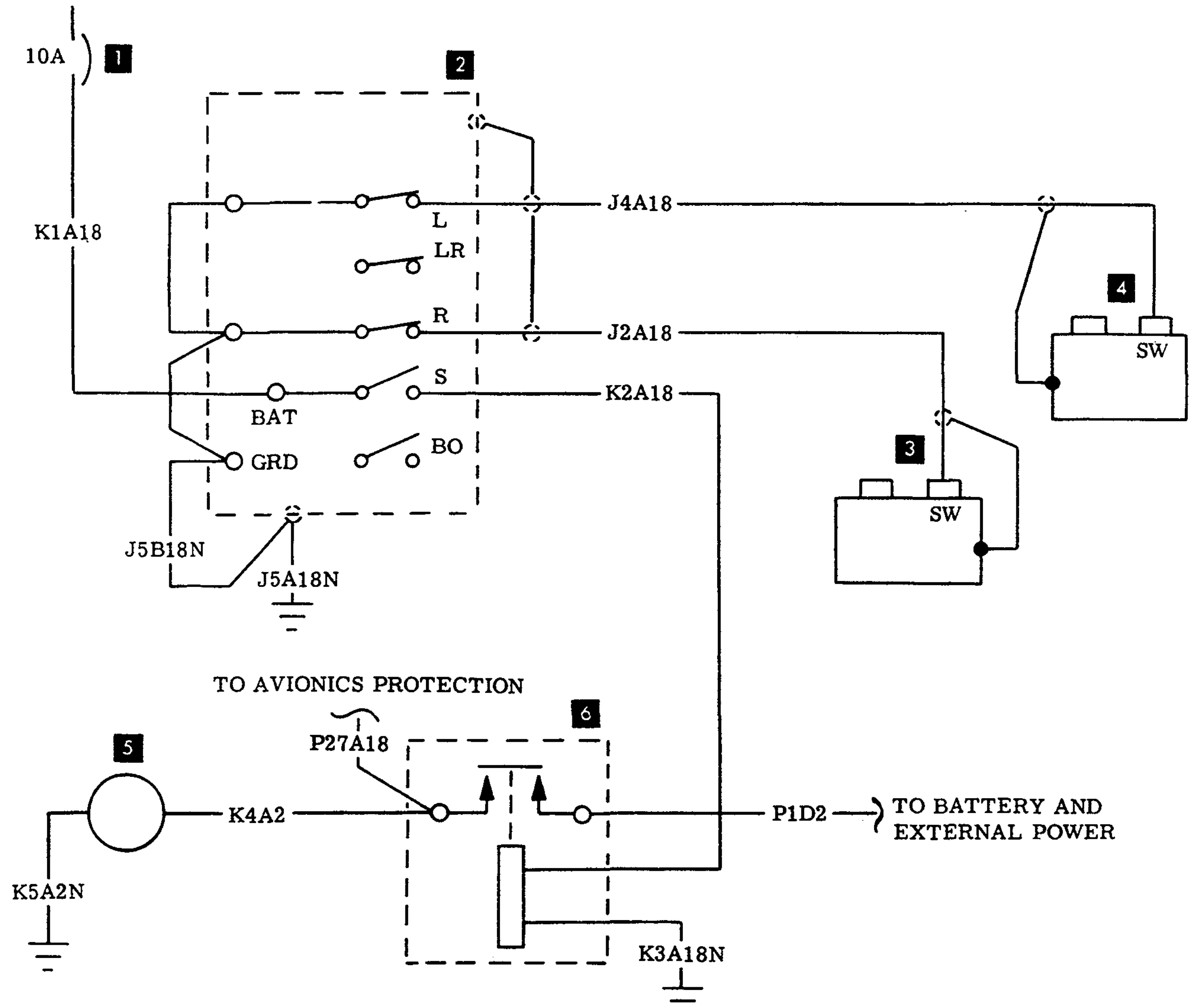
V35B-369-5A

BATTERY AND EXTERNAL POWER
D-9391 thru D-9817



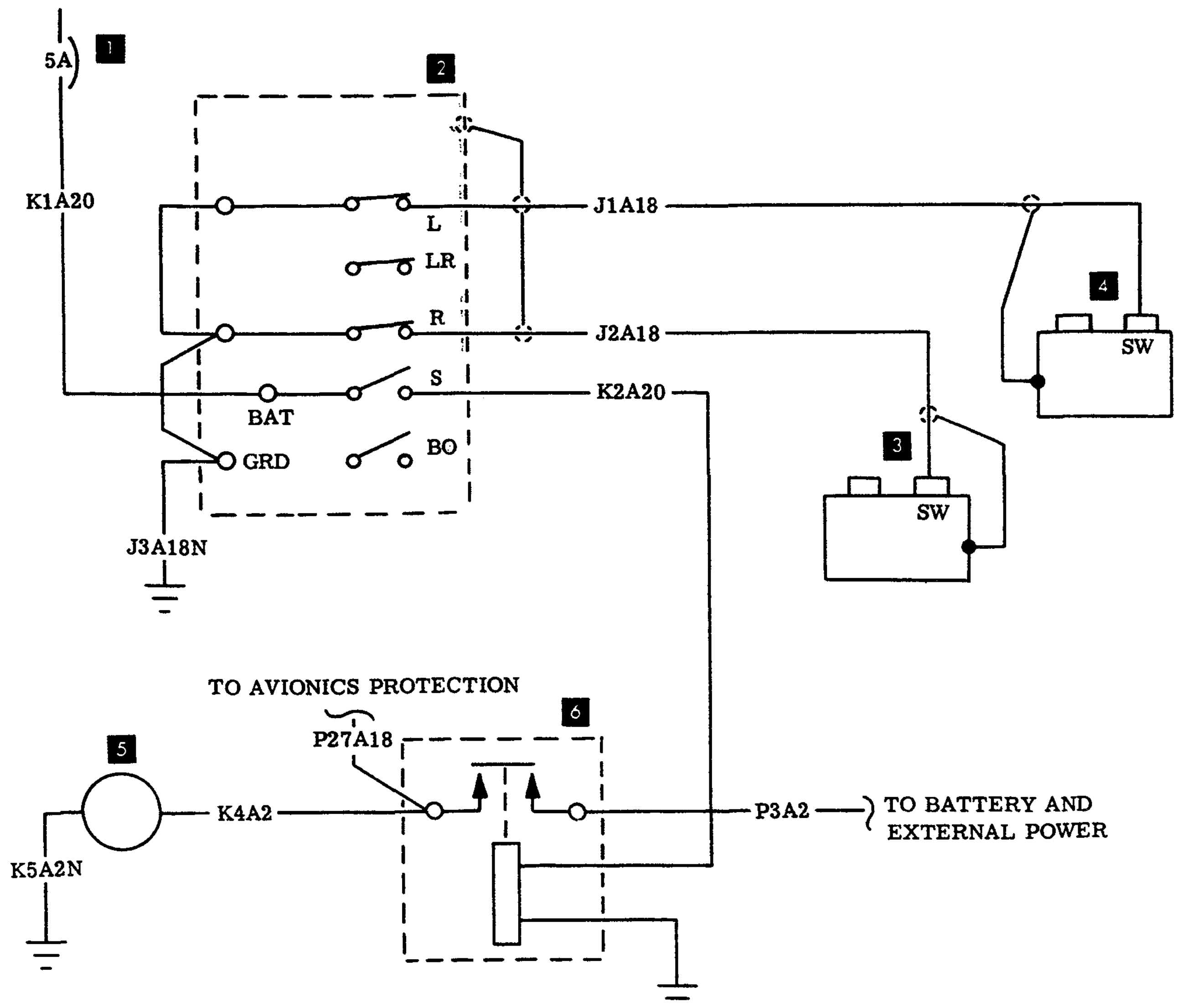
1. Ignition Boost and Pitch Trim Circuit Breaker
2. Ignition Switch
3. RH Magneto
4. LH Magneto
5. Starter
6. Starter Relay
7. Vibrator

STARTER AND IGNITION
D-7977 thru D-8621
D-8624 thru D-8627
D-8629 thru D-8999
D-9001, D-9008, D-9019, D-9027, D-9039, D-9048, D-9055



1. Ignition Boost and Pitch Trim Circuit Breaker
2. Ignition Switch
3. RH Magneto
4. LH Magneto
5. Starter
6. Starter Relay
7. Vibrator

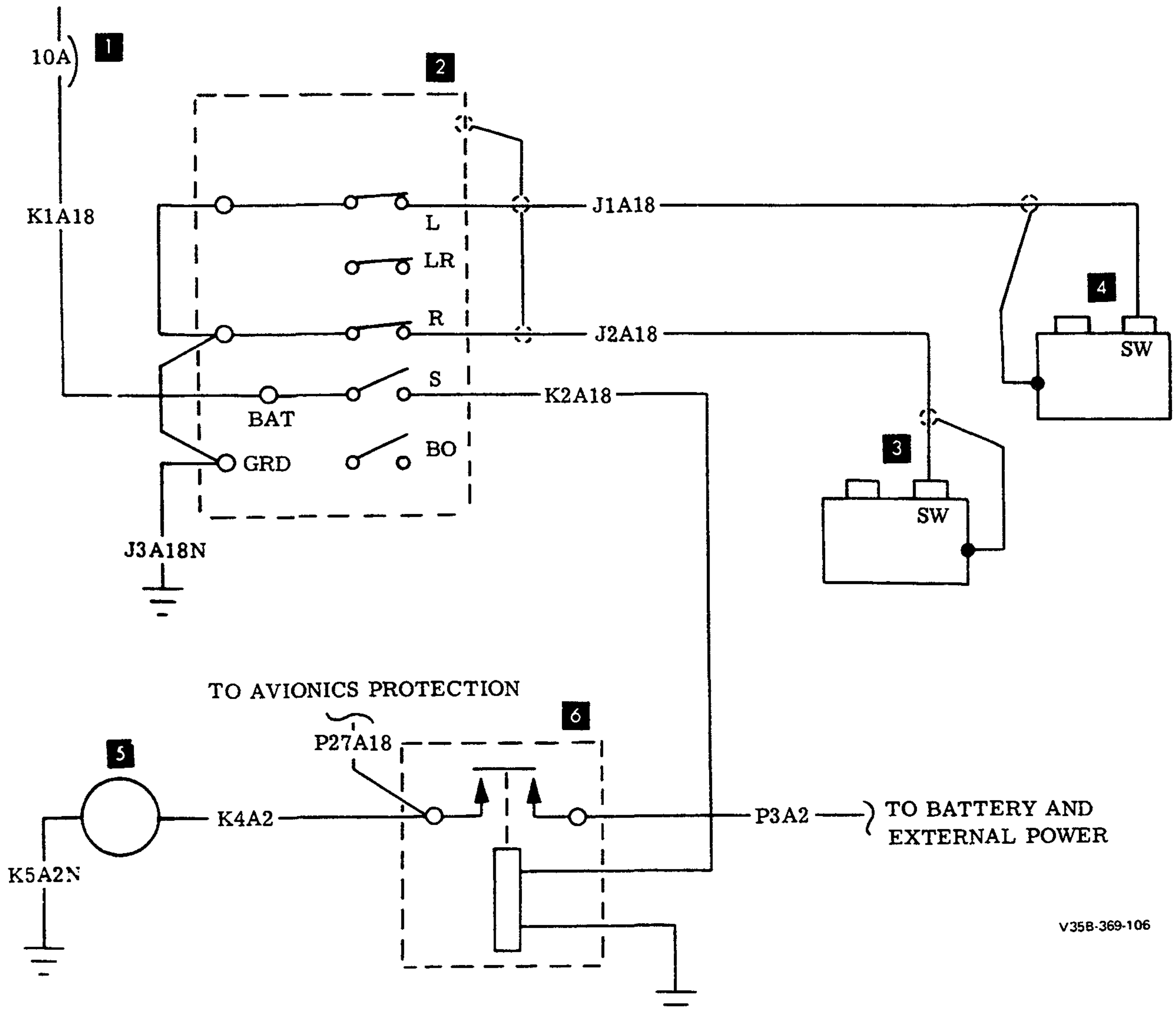
STARTER AND IGNITION
D-8622, D-8623, D-8628, D-9000 thru D-9063 except
D-9001, D-9008, D-9019, D-9027, D-9039, D-9048 and D-9055



1. Engine Start Relay Circuit Breaker
2. Ignition Switch
3. RH Magneto
4. LH Magneto
5. Starter
6. Starter Relay

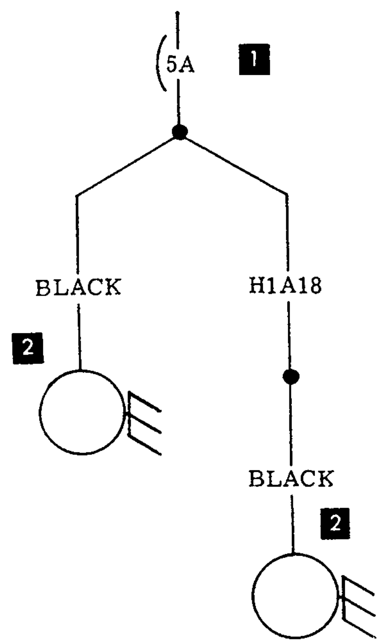
V35B-369-8

STARTER AND IGNITION
Model V35B & V35B-TC (D-9069 thru D-9222)



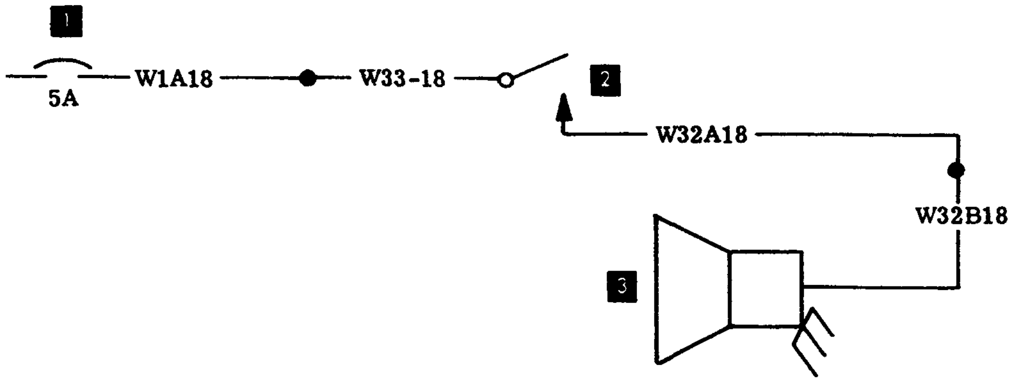
1. Engine Start Relay Circuit Breaker
2. Ignition Switch
3. RH Magneto
4. LH Magneto
5. Starter
6. Starter Relay

STARTER AND IGNITION
D-9223 thru D-9817 and airplanes in compliance with S.I. 0410-354 Rev.1



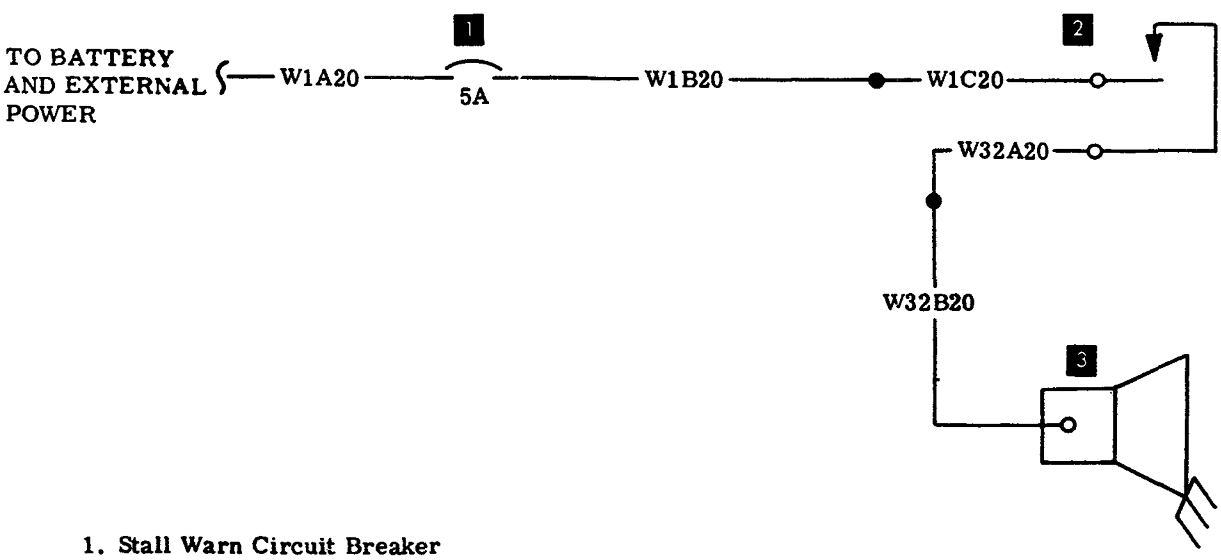
1. Circuit Breaker
2. Cigarette Lighter

V35 369-9



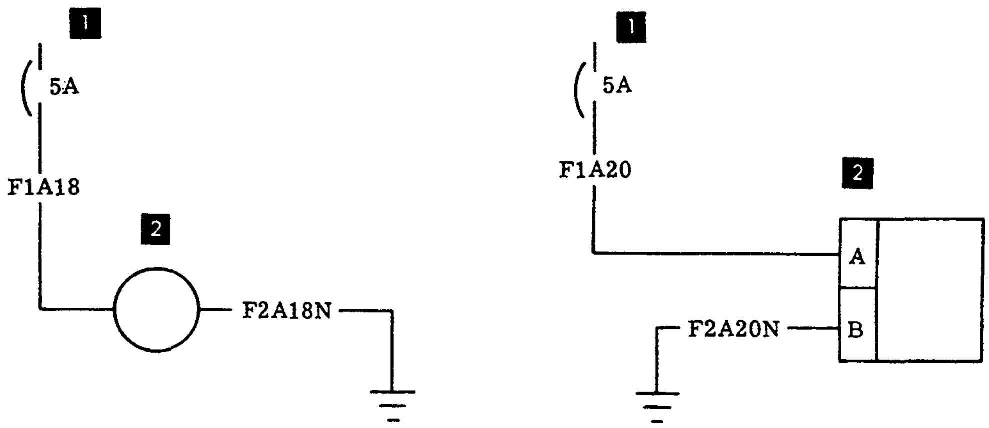
1. Stall Warning Circuit Breaker
2. Stall Detector Switch
3. Stall Warning Horn

STALL WARNING
D-7977 thru D-9068



1. Stall Warn Circuit Breaker
2. Stall Detector Switch
3. Stall Warning Horn

STALL WARNING
D-9069 thru D-9817

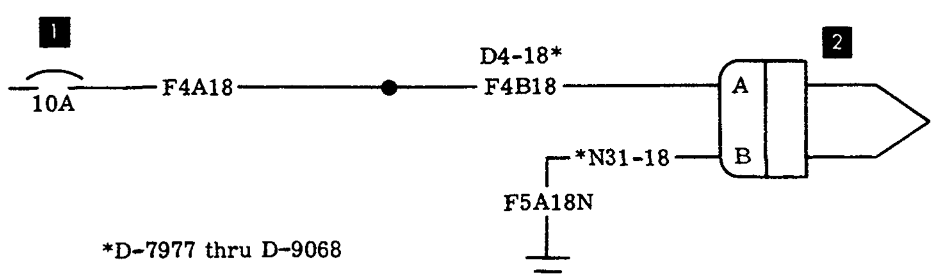


D-7977 thru D-9068

D-9069 and after

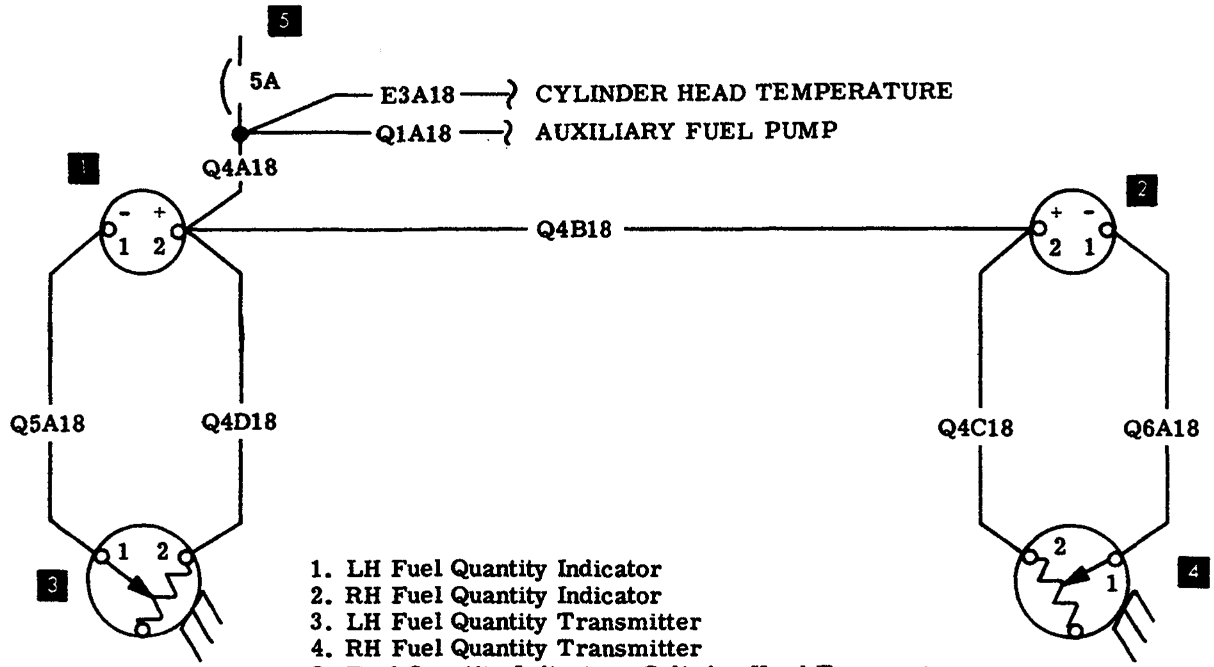
1. Turn Coordinator Circuit Breaker
2. Turn Coordinator Indicator

TURN COORDINATOR
D-7977 thru D-9817



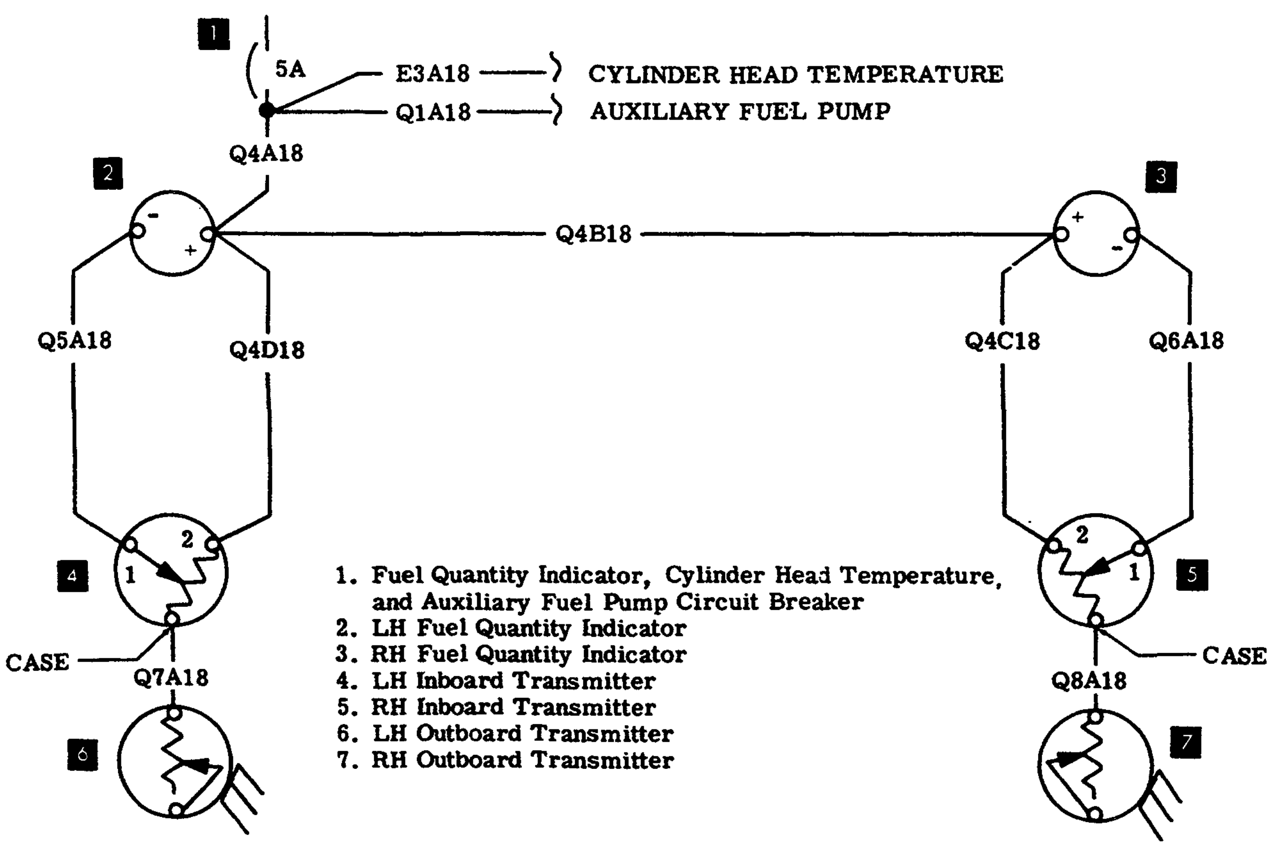
1. Pitot Heat Circuit Breaker
2. Pitot Heater

PITOT HEAT
D-7977 thru D-9817



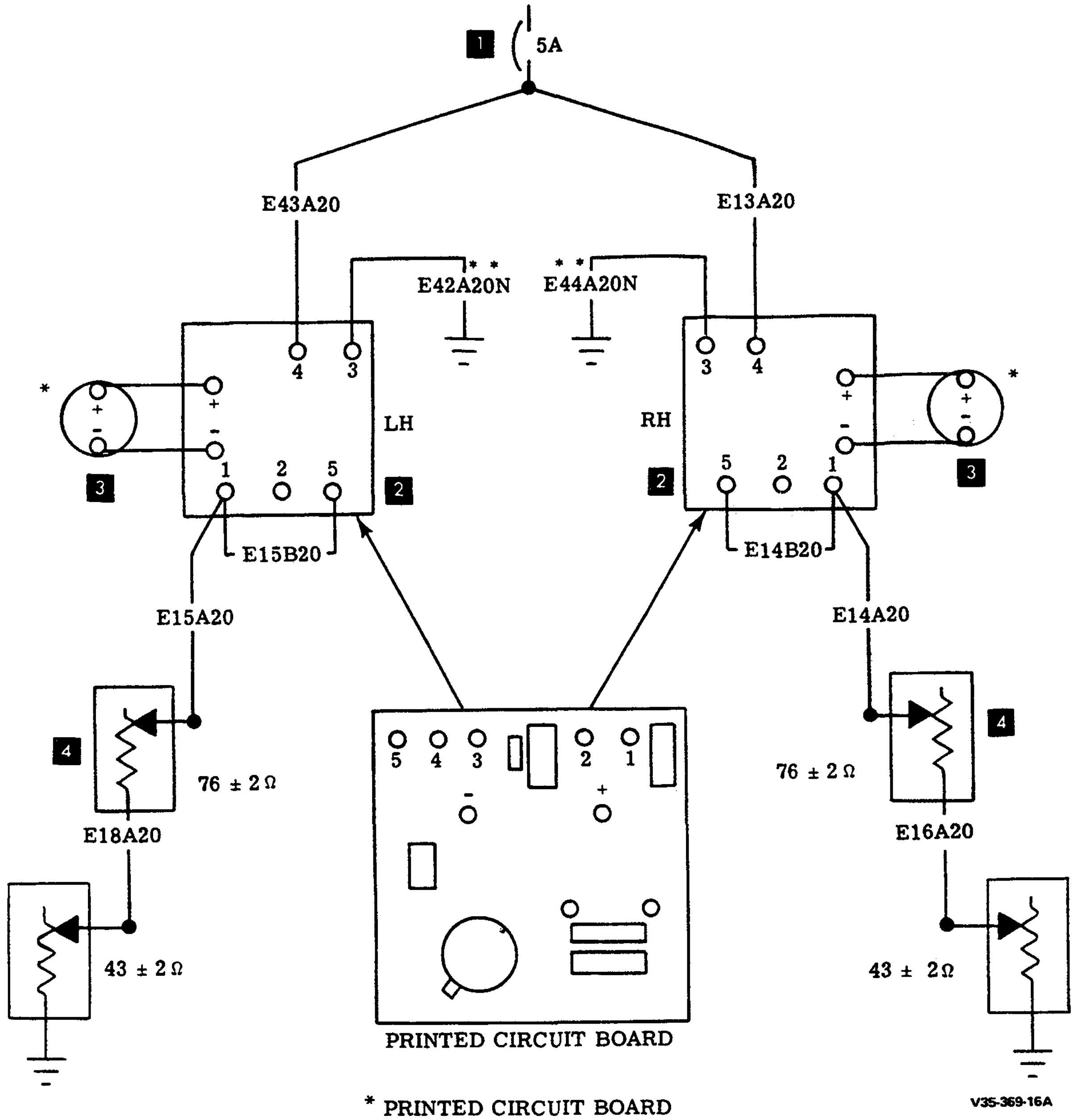
1. LH Fuel Quantity Indicator
2. RH Fuel Quantity Indicator
3. LH Fuel Quantity Transmitter
4. RH Fuel Quantity Transmitter
5. Fuel Quantity Indicator, Cylinder Head Temperature, and Auxiliary Fuel Pump Circuit Breaker

FUEL QUANTITY
D-7977 thru D-9068



1. Fuel Quantity Indicator, Cylinder Head Temperature, and Auxiliary Fuel Pump Circuit Breaker
2. LH Fuel Quantity Indicator
3. RH Fuel Quantity Indicator
4. LH Inboard Transmitter
5. RH Inboard Transmitter
6. LH Outboard Transmitter
7. RH Outboard Transmitter

FUEL QUANTITY (OPTIONAL)
D-7977 thru D-9068

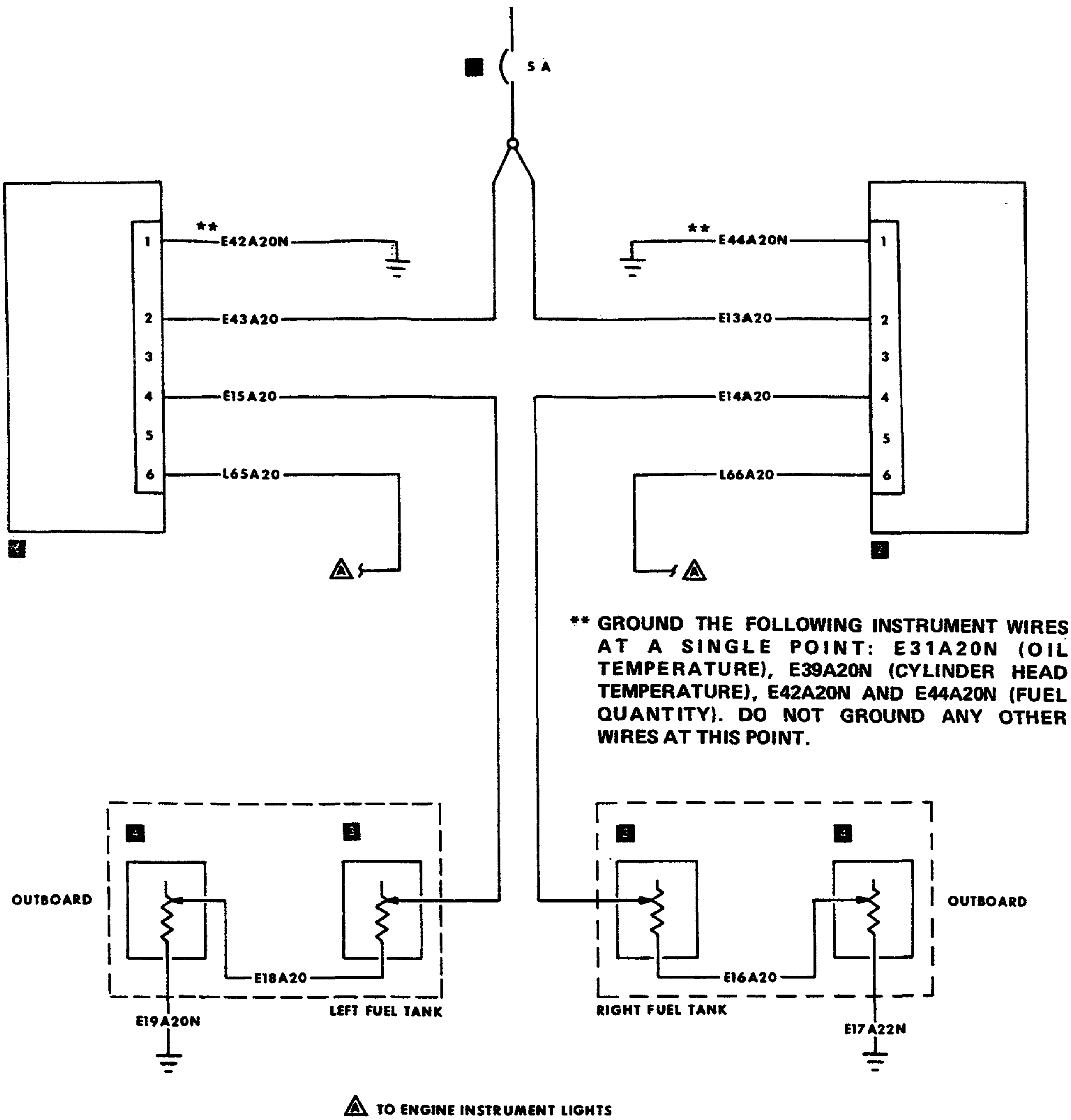


* PRINTED CIRCUIT BOARD IS MOUNTED ON INDICATOR TERMINALS

* * GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Fuel Quantity Circuit Breaker
2. Printed Circuit Board
3. Fuel Quantity Indicator
4. Inboard Fuel Cell Transmitter
5. Outboard Fuel Cell Transmitter

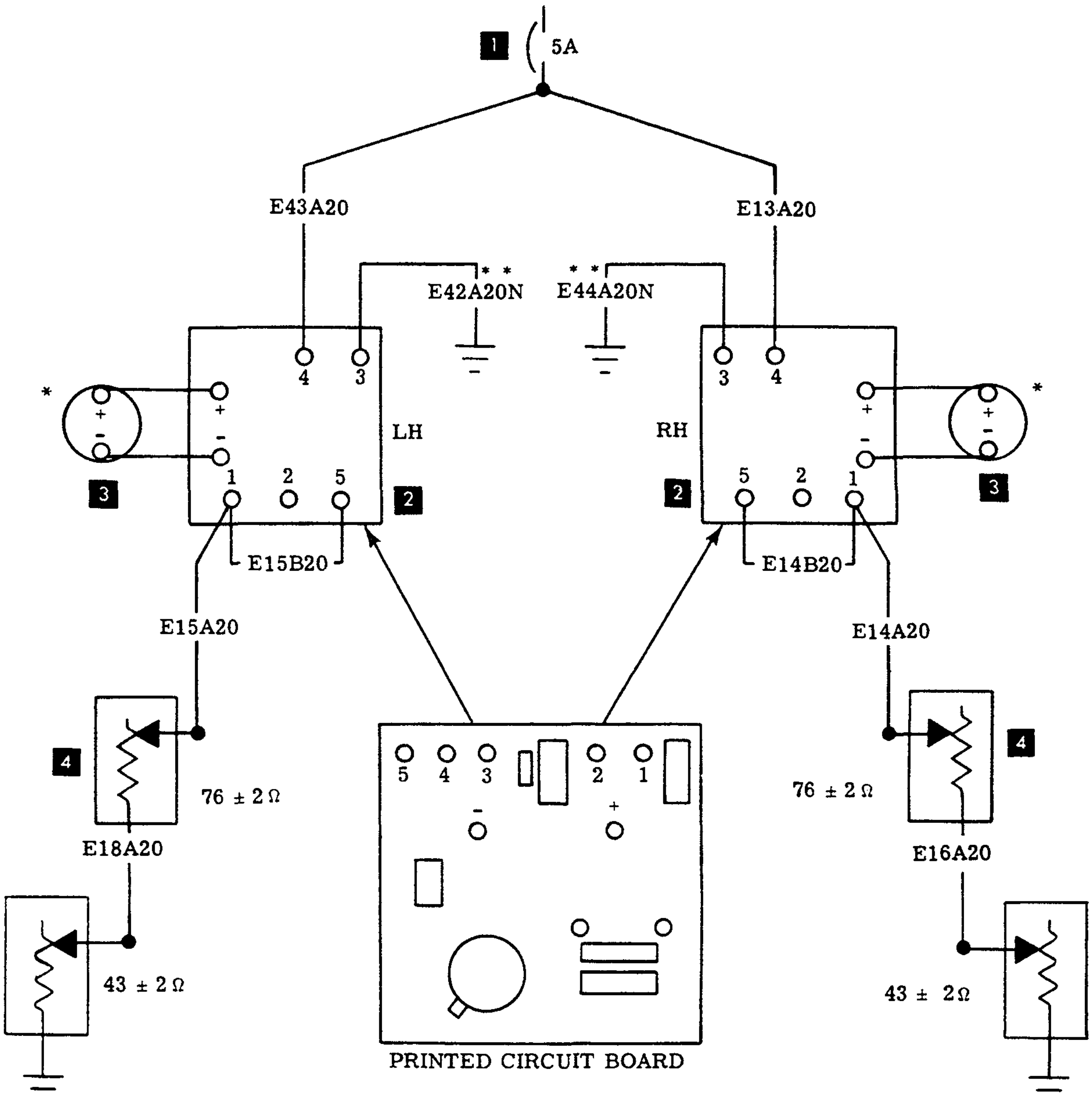
FUEL QUANTITY (Vertical Instruments)
Model V35B (D-9069 thru D-9221)



35-369-75

1. Circuit Breaker
2. Fuel Quantity Indicator
3. Inboard Fuel Quantity Transmitter
4. Outboard Fuel Quantity Transmitter

FUEL QUANTITY (Vertical Instruments)
Model V35B (D-9222 thru D-9390)

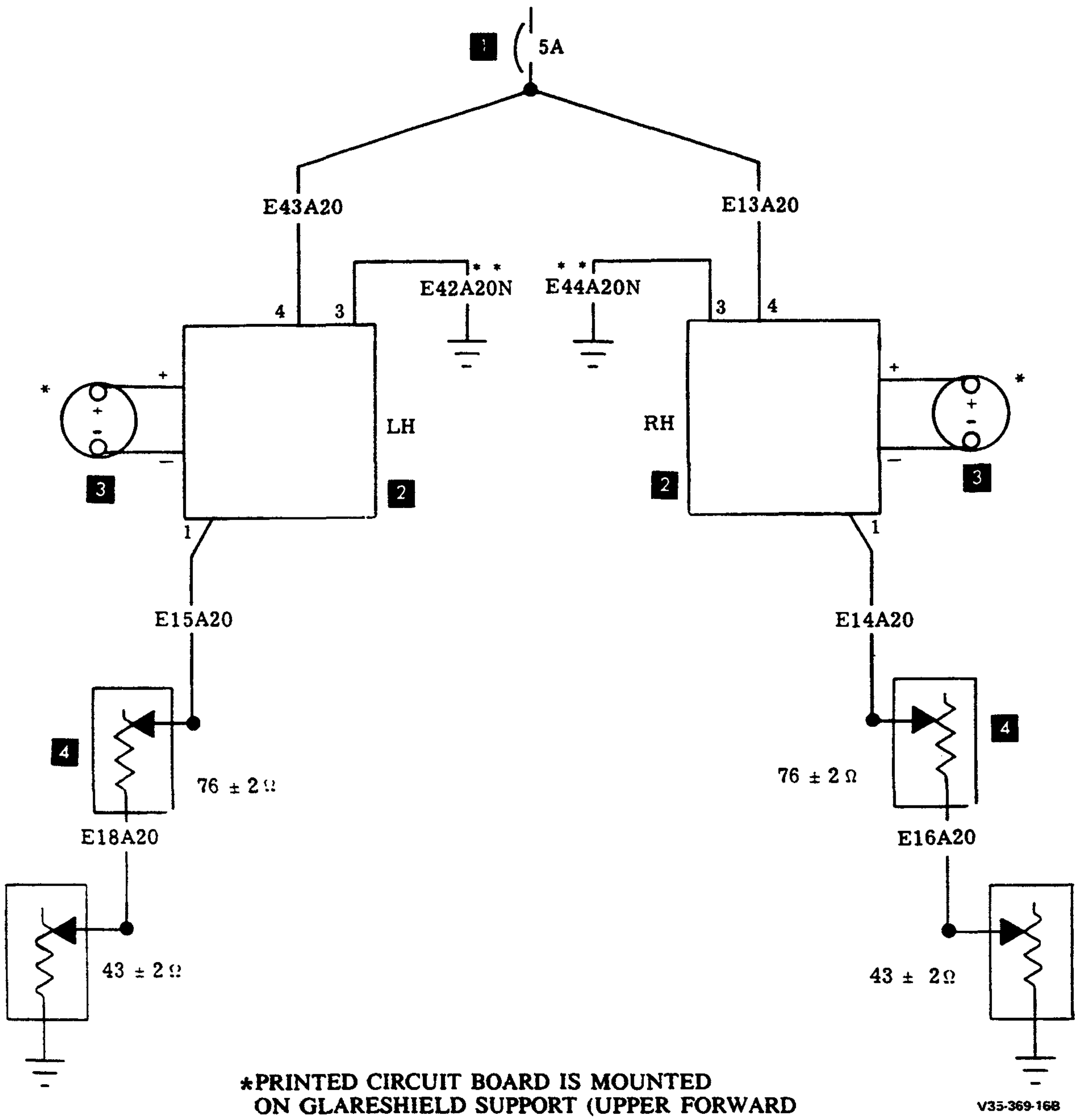


* PRINTED CIRCUIT BOARD IS MOUNTED ON INDICATOR TERMINALS

* * GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Fuel Quantity Circuit Breaker
2. Printed Circuit Board
3. Fuel Quantity Indicator
4. Inboard Fuel Cell Transmitter
5. Outboard Fuel Cell Transmitter

FUEL QUANTITY (Optional)
Model V35B (D9391 thru D-9568)

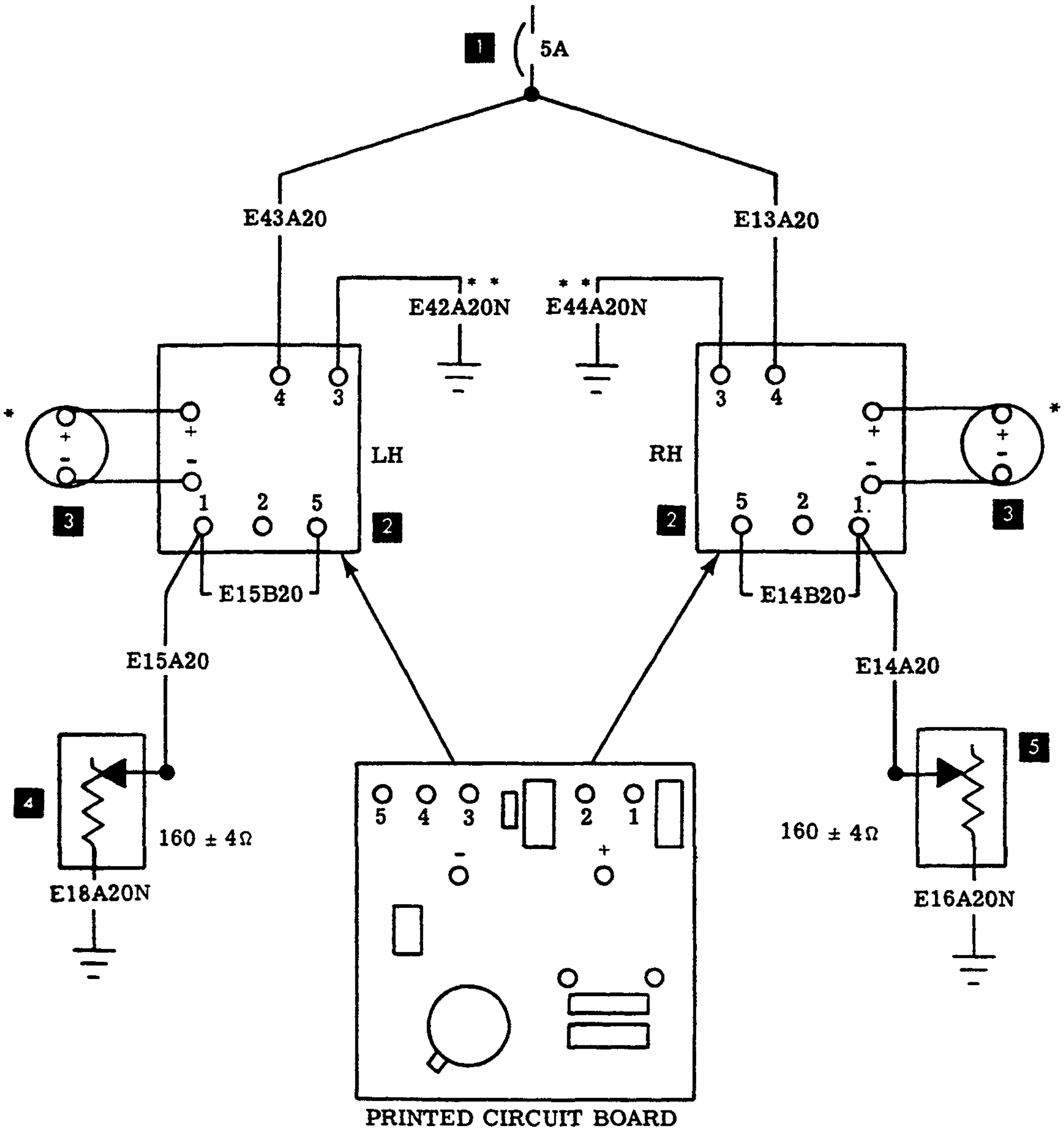


*PRINTED CIRCUIT BOARD IS MOUNTED ON GLARESHIELD SUPPORT (UPPER FORWARD PORTION OF FIXED INSTRUMENT PANEL)

* * GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Fuel Quantity Circuit Breaker
2. Printed Circuit Board
3. Fuel Quantity Indicator
4. Inboard Fuel Cell Transmitter
5. Outboard Fuel Cell Transmitter

FUEL QUANTITY (OPTIONAL)
D-9569 thru D-9817



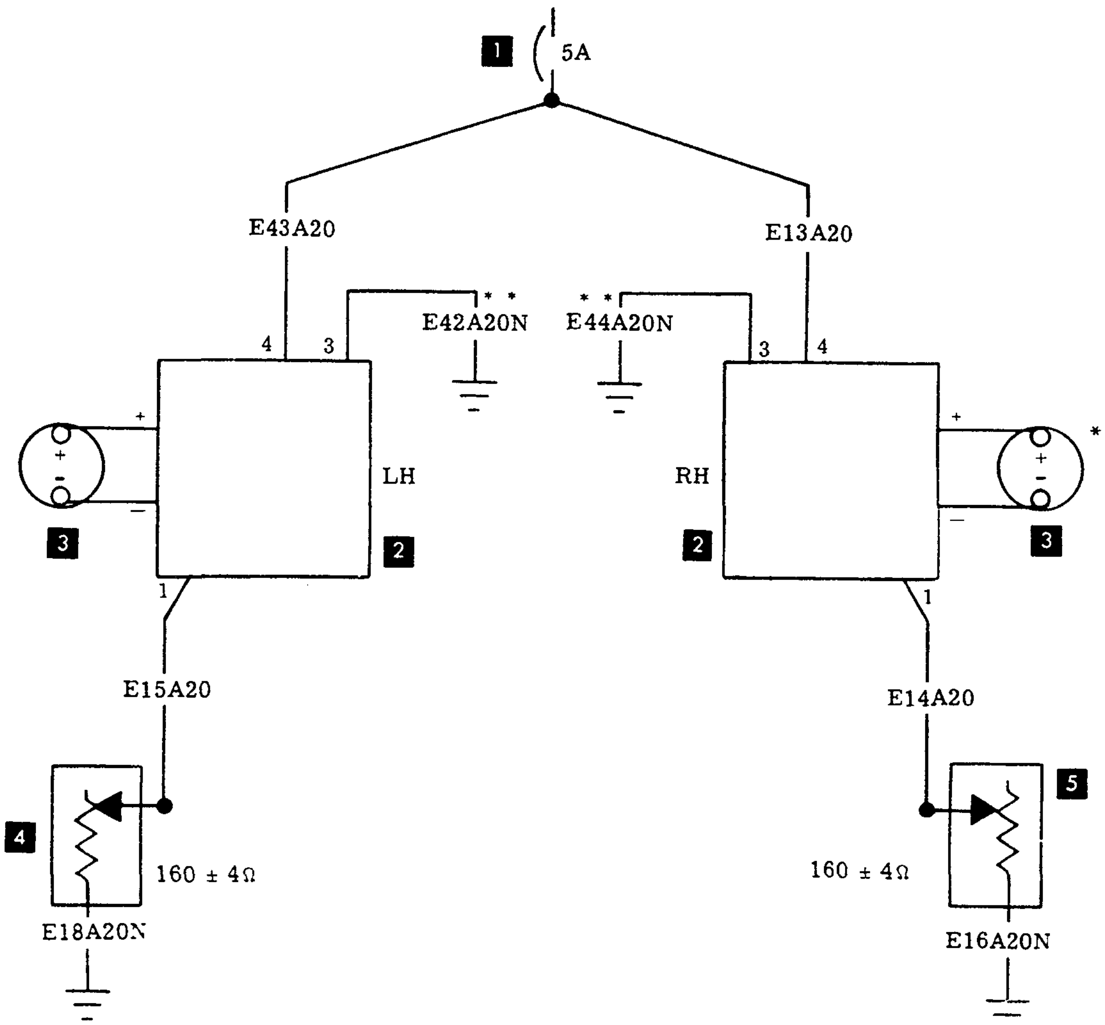
* PRINTED CIRCUIT BOARD IS MOUNTED ON INDICATOR TERMINALS

F33-369-302

* * GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Fuel Quantity Circuit Breaker
2. Printed Circuit Board
3. Fuel Quantity Indicator
4. LH Fuel Cell Transmitter
5. RH Fuel Cell Transmitter

FUEL QUANTITY (STANDARD)
Model V35B (D-9391 thru D-9568)



* PRINTED CIRCUIT BOARD IS MOUNTED ON GLARESHIELD SUPPORT (UPPER FORWARD PORTION OF FIXED INSTRUMENT PANEL)

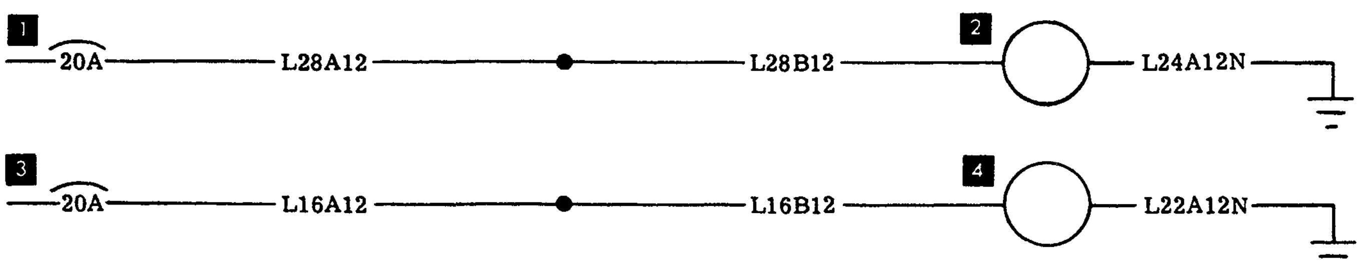
* * GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Fuel Quantity Circuit Breaker
2. Printed Circuit Board
3. Fuel Quantity Indicator
4. LH Fuel Cell Transmitter
5. RH Fuel Cell Transmitter

FUEL QUANTITY (STANDARD)
D-9599 thru D-9817

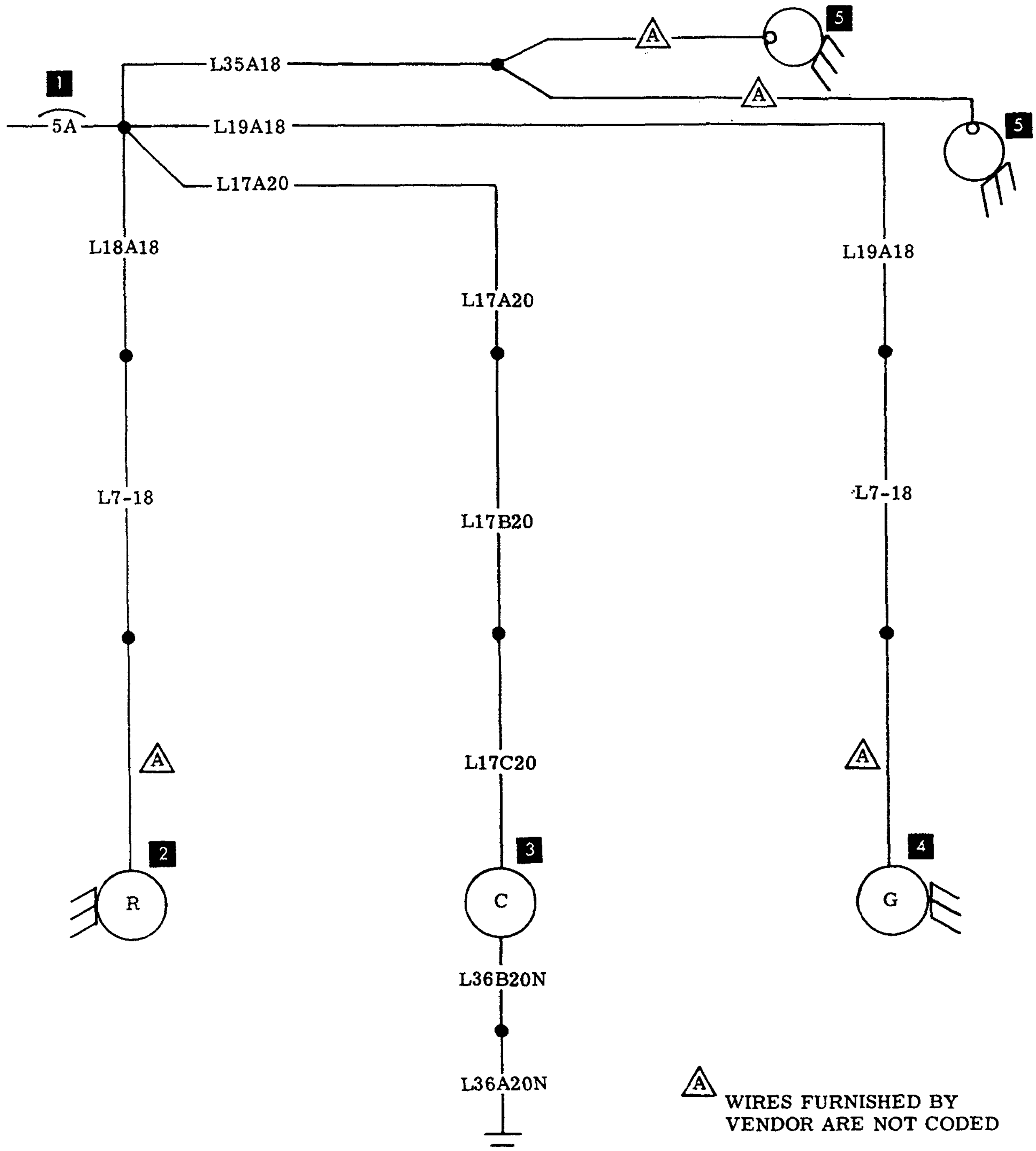
1. Upper Landing Light Circuit Breaker
2. Upper Landing Light
3. Lower Landing Light Circuit Breaker
4. Lower Landing Light

LANDING LIGHTS
D-7977 thru D-9068



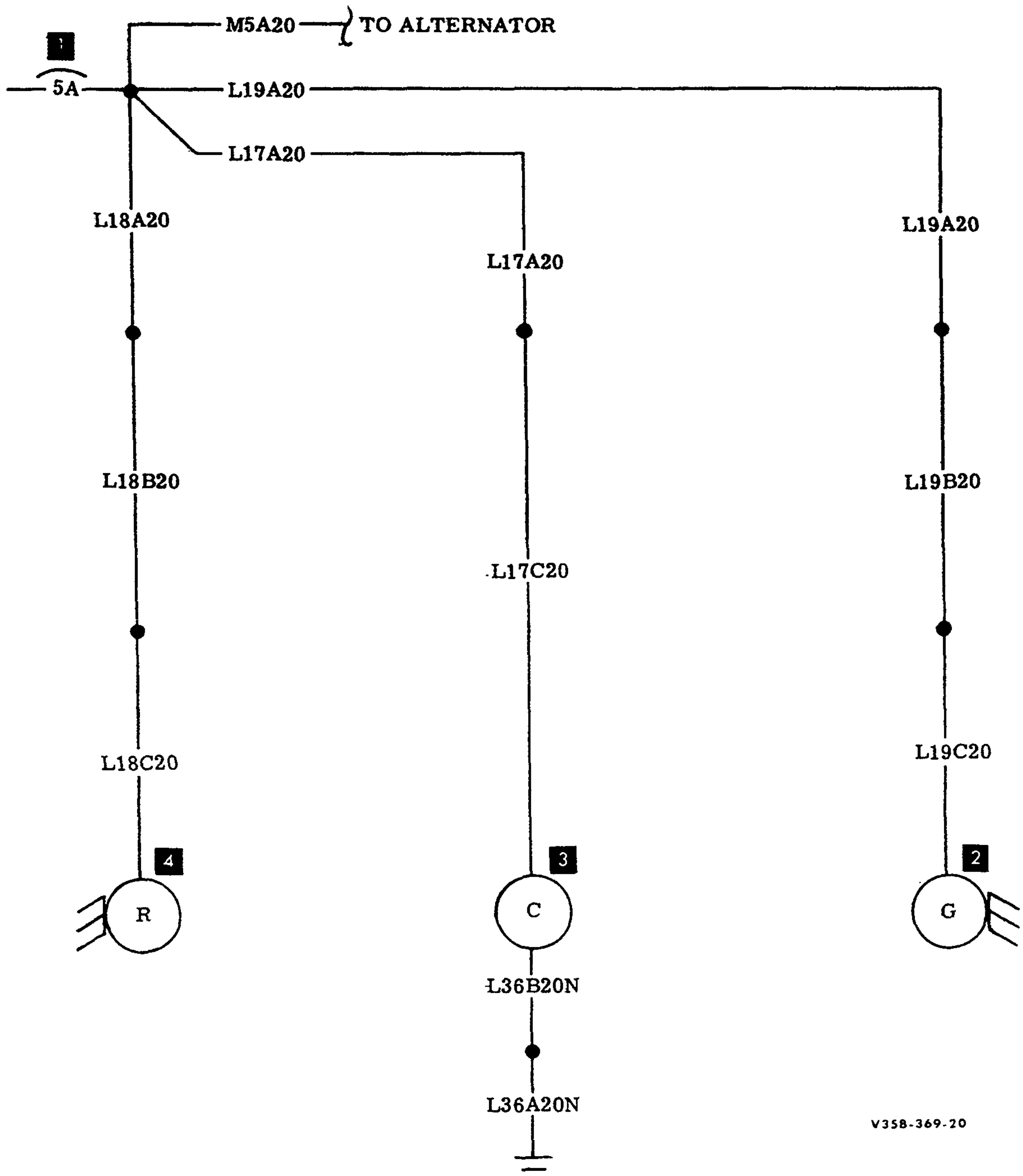
1. Landing Light Circuit Breaker
2. Landing Light
3. Taxi Light Circuit Breaker
4. Taxi Light

LANDING AND TAXI LIGHTS
D-9069 thru D-9817



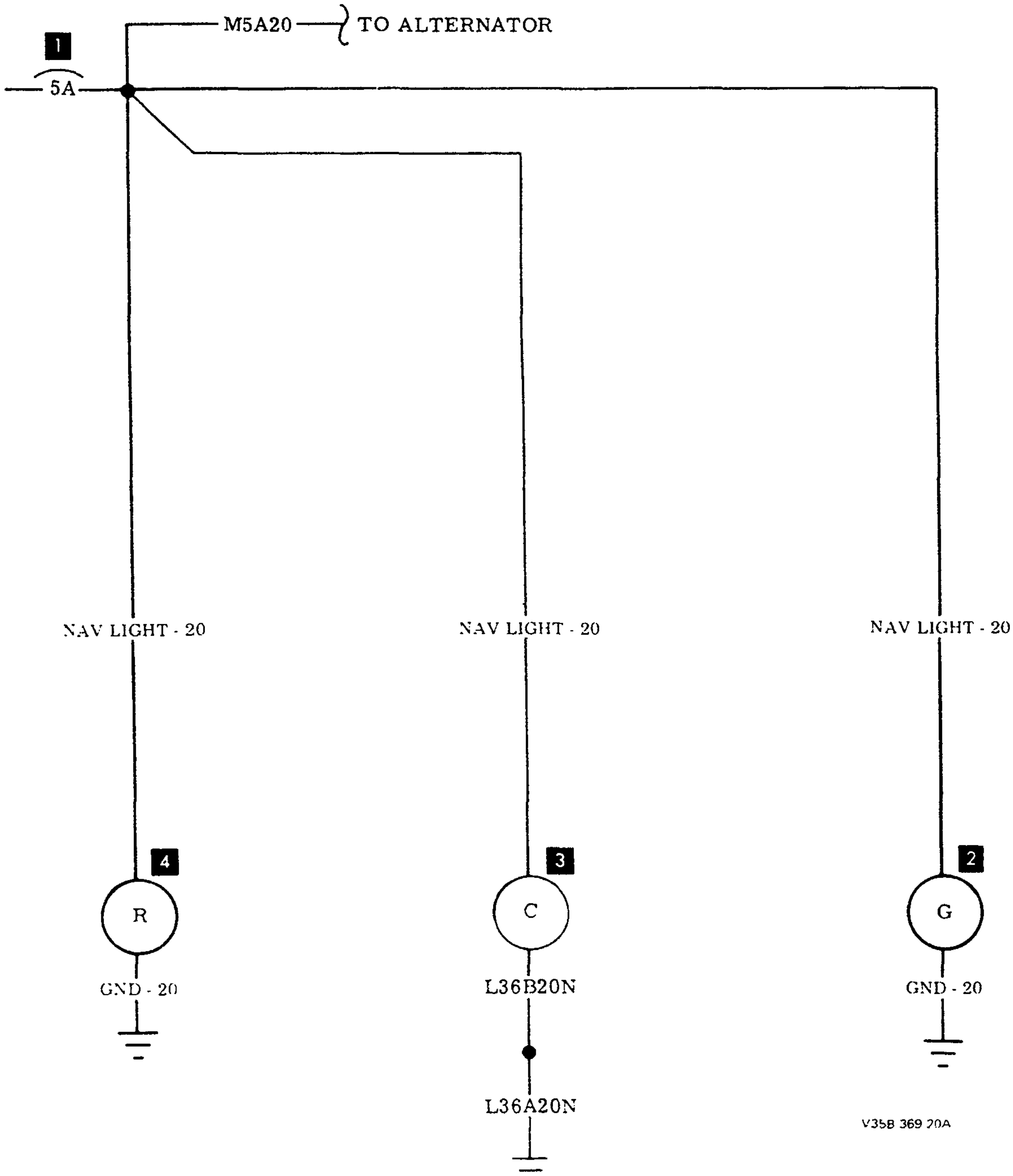
1. Navigation Lights Circuit Breaker
2. LH Navigation Light
3. Tail Navigation Light
4. RH Navigation Light
5. Circuit Breaker Panel Lights

NAVIGATION LIGHTS
D-7977 thru D-9068



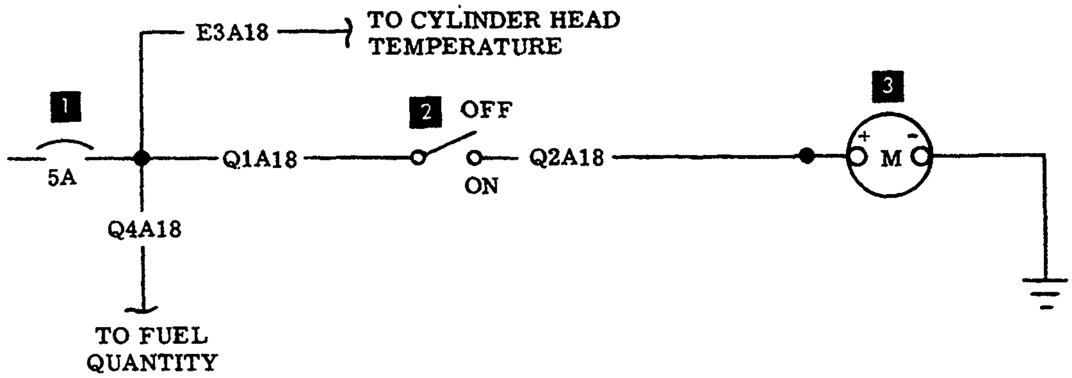
1. Navigation Lights Circuit Breaker
2. RH Navigation Light
3. Tail Navigation Light
4. LH Navigation Light

NAVIGATION LIGHTS
Model V35B (D-9069 thru D-9467)



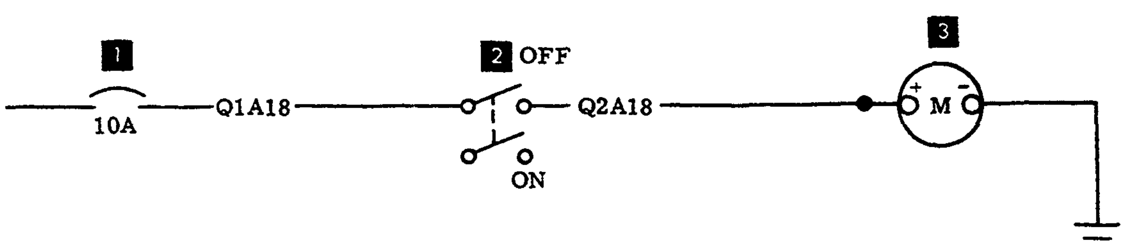
1. Navigation Lights Circuit Breaker
2. RH Navigation Light
3. Tail Navigation Light
4. LH Navigation Light

NAVIGATION LIGHTS
D-9468 thru D-9817



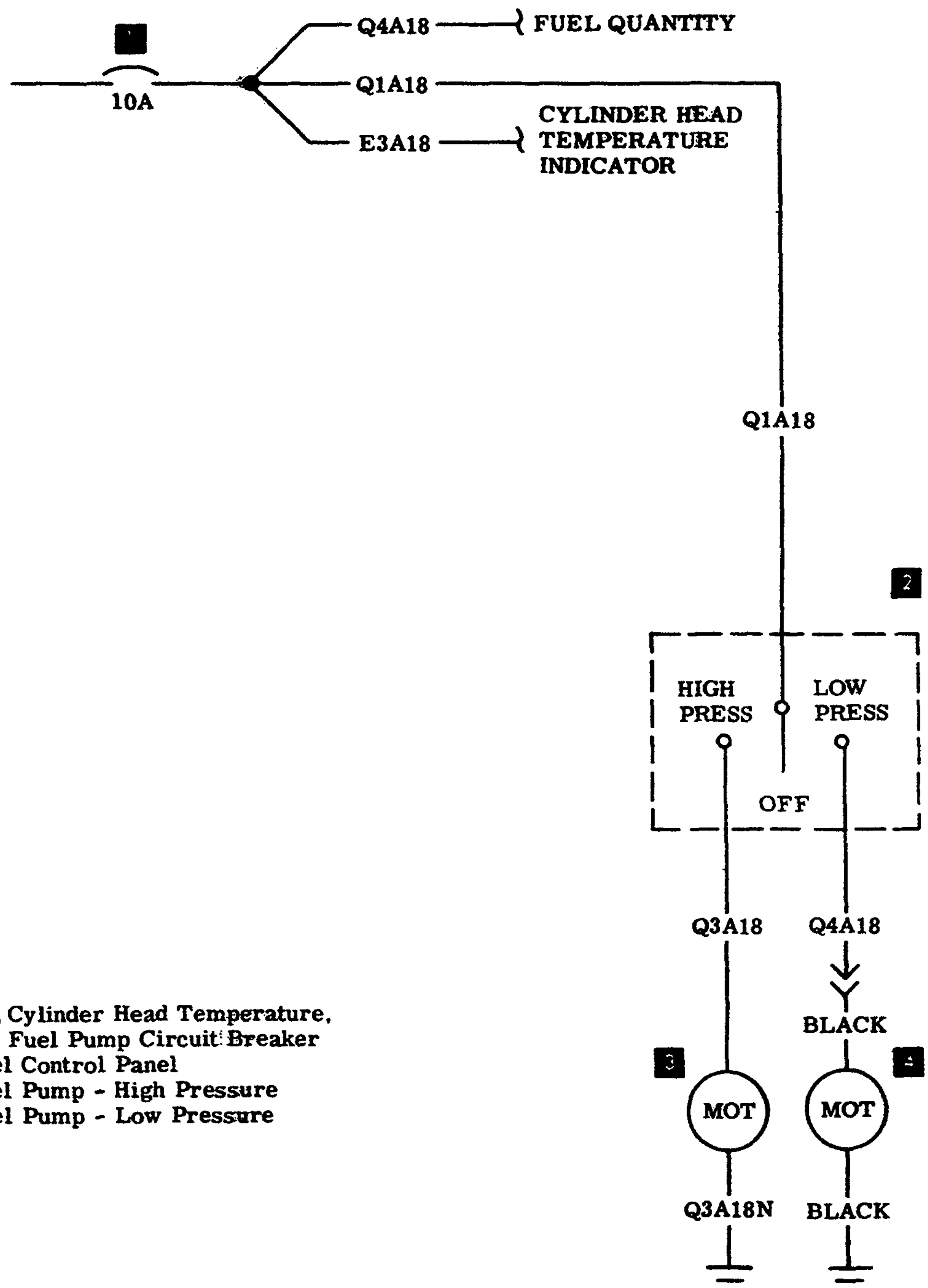
1. Fuel Quantity Indicator, Cylinder Head Temperature, and Auxiliary Fuel Pump Circuit Breaker
2. Auxiliary Fuel Pump Switch
3. Auxiliary Fuel Pump

AUXILIARY FUEL PUMP
D-7977 thru D-9068



1. Auxiliary Fuel Pump Circuit Breaker
2. Auxiliary Fuel Pump Switch
3. Auxiliary Fuel Pump Motor

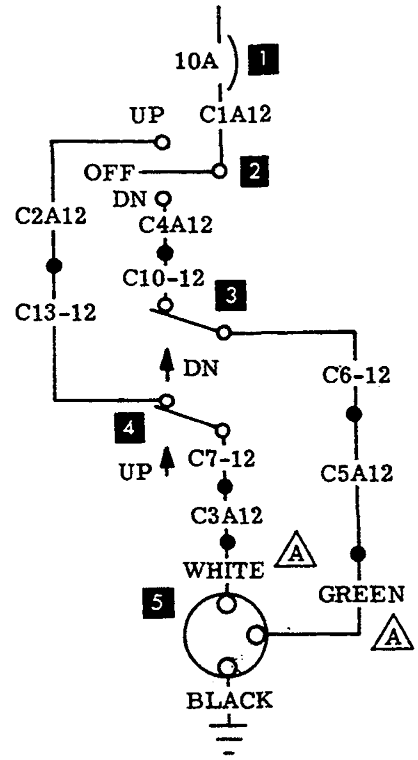
AUXILIARY FUEL PUMP
D-9069 thru D-9817



1. Fuel Quantity, Cylinder Head Temperature, and Auxiliary Fuel Pump Circuit Breaker
2. Auxiliary Fuel Control Panel
3. Auxiliary Fuel Pump - High Pressure
4. Auxiliary Fuel Pump - Low Pressure

FUEL BOOST PUMP (HIGH AND LOW PRESSURE)
Models V35-TC, V35A-TC, and V35B-TC

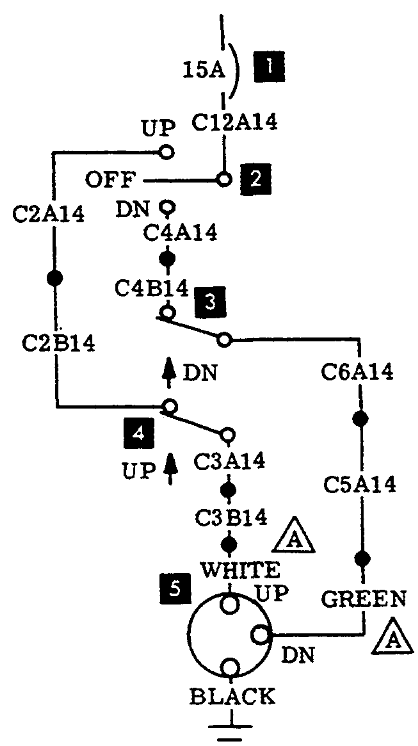
1. Flap Motor Circuit Breaker
2. Flap Control Switch
3. Flap Down Limit Switch
4. Flap Up Limit Switch
5. Flap Motor



A WIRE FURNISHED BY VENDOR

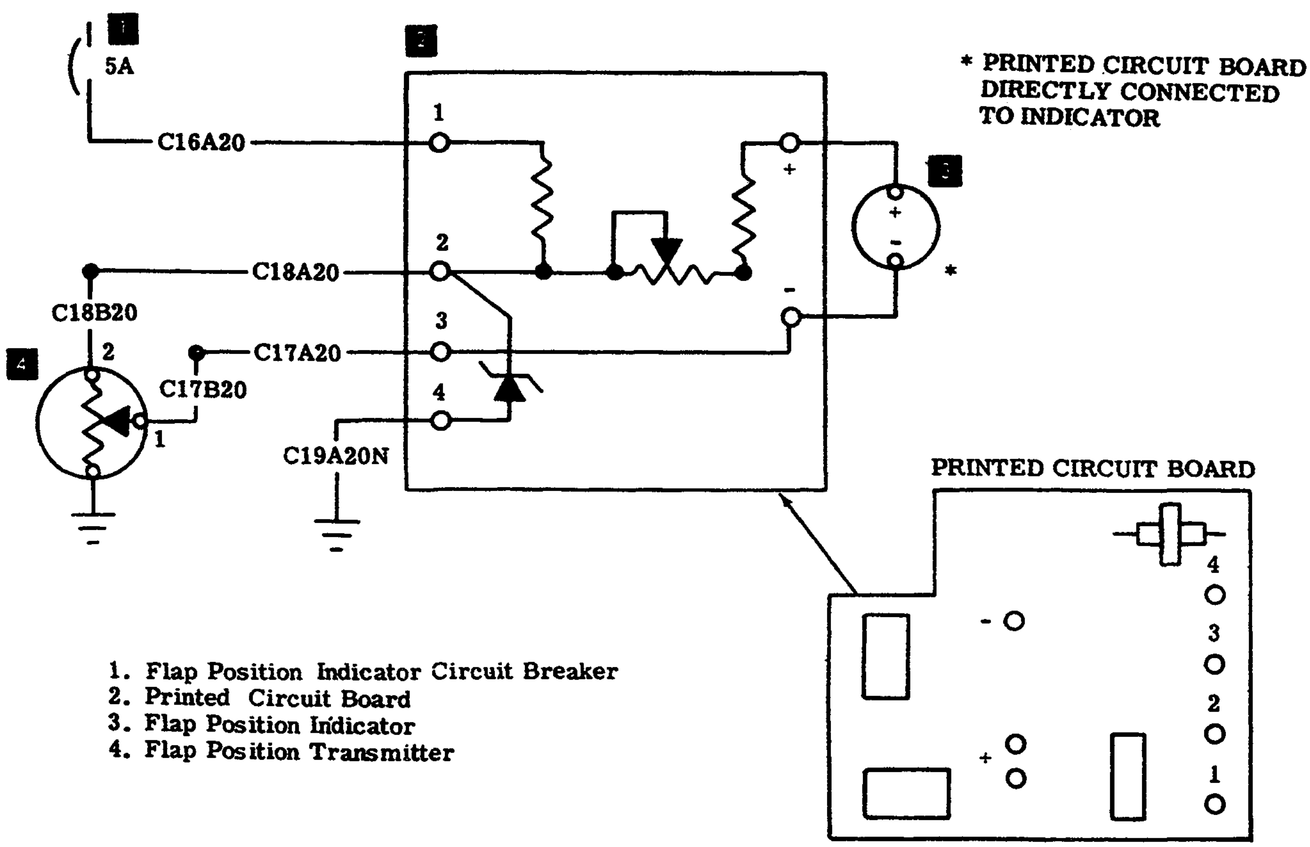
FLAP MOTOR
D-7977 thru D-9068

1. Flap Motor Circuit Breaker
2. Flap Control Switch
3. Flap Down Limit Switch
4. Flap Up Limit Switch
5. Flap Motor



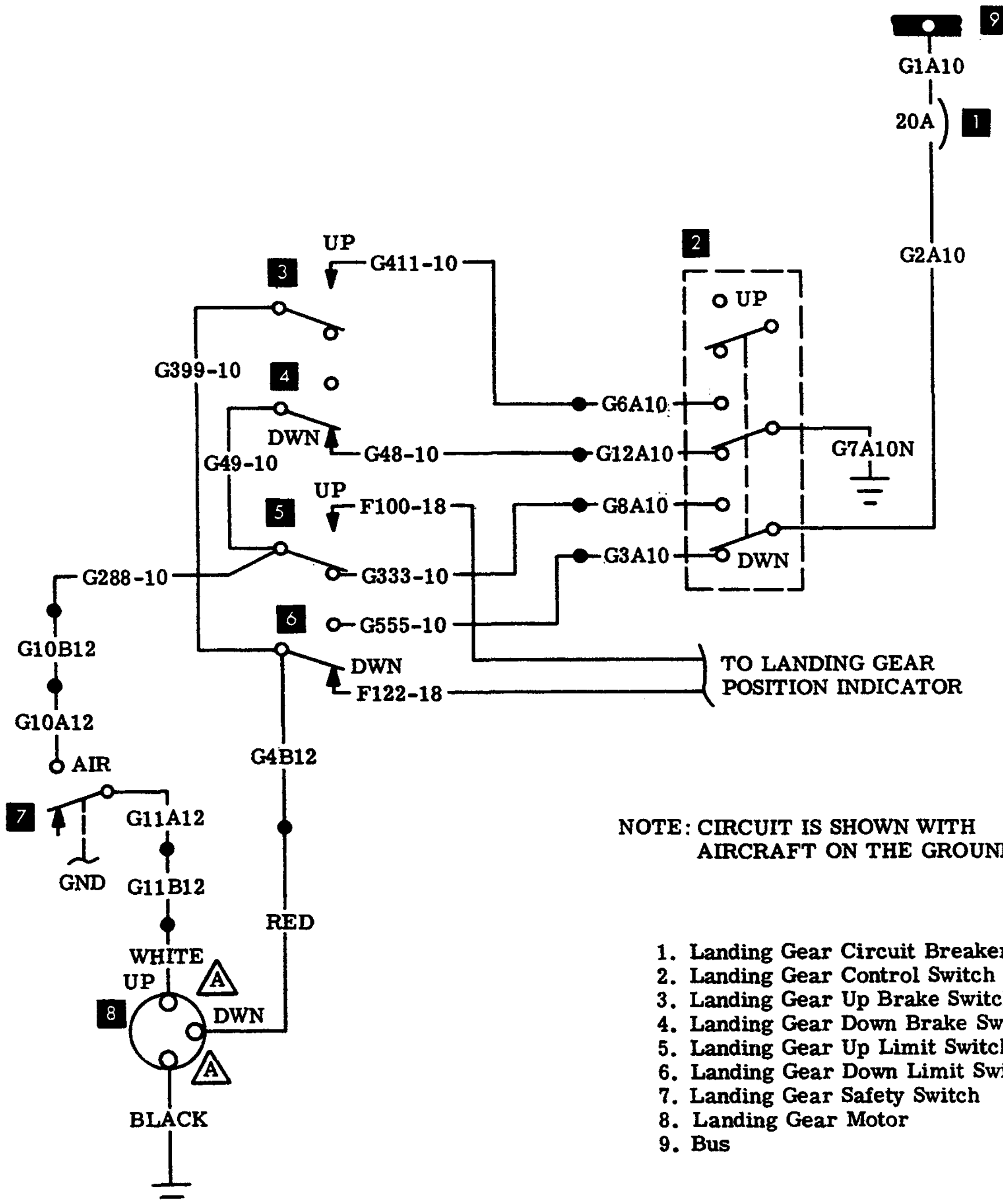
A WIRE FURNISHED BY VENDOR

FLAP MOTOR
D-9069 thru D-9817



1. Flap Position Indicator Circuit Breaker
2. Printed Circuit Board
3. Flap Position Indicator
4. Flap Position Transmitter

FLAP POSITION INDICATOR
D-7977 thru D-9817

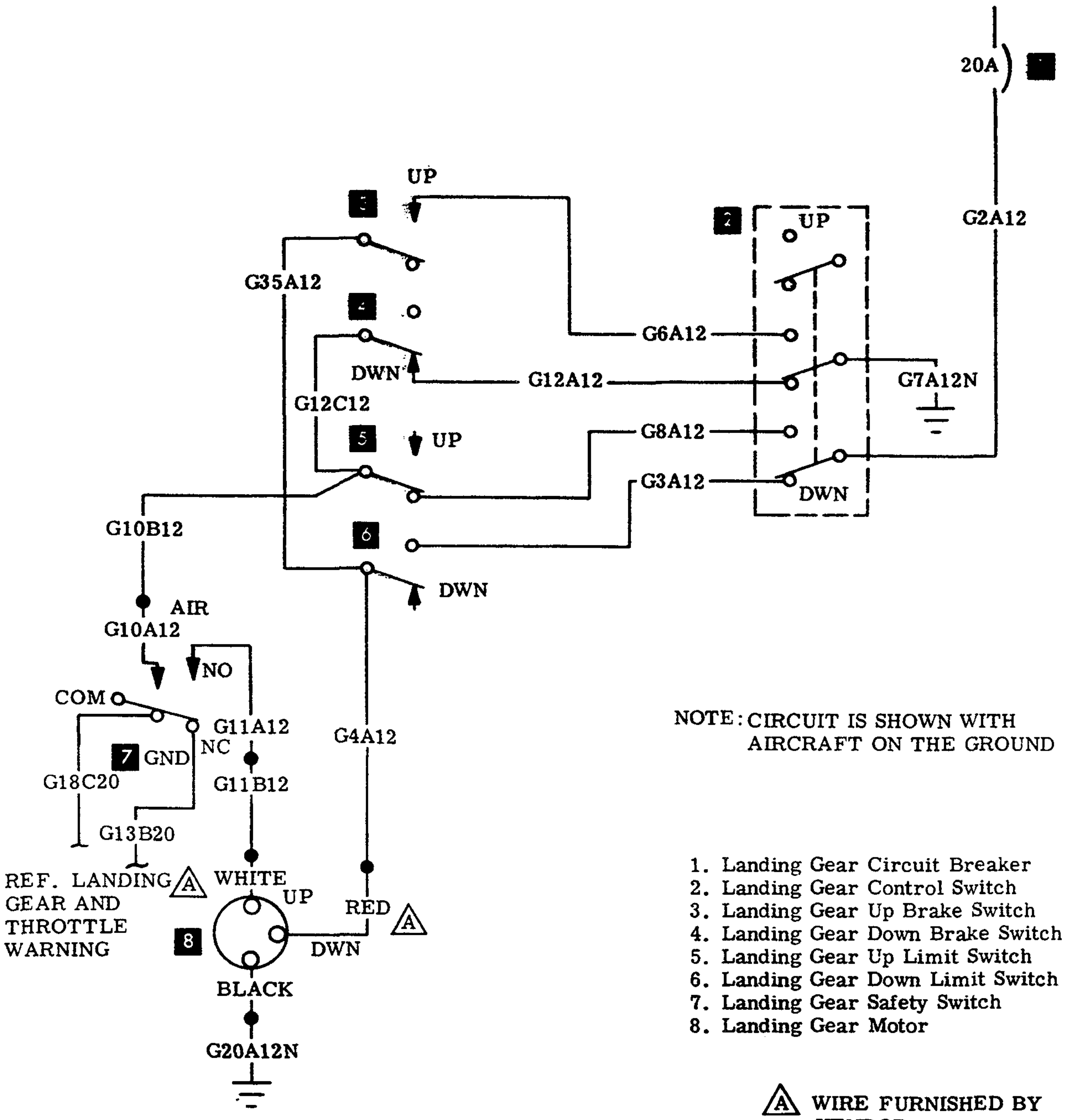


NOTE: CIRCUIT IS SHOWN WITH AIRCRAFT ON THE GROUND

1. Landing Gear Circuit Breaker
2. Landing Gear Control Switch
3. Landing Gear Up Brake Switch
4. Landing Gear Down Brake Switch
5. Landing Gear Up Limit Switch
6. Landing Gear Down Limit Switch
7. Landing Gear Safety Switch
8. Landing Gear Motor
9. Bus

A WIRE FURNISHED BY VENDOR

LANDING GEAR WITHOUT SAFETY SYSTEM
D-7977 thru D-9068



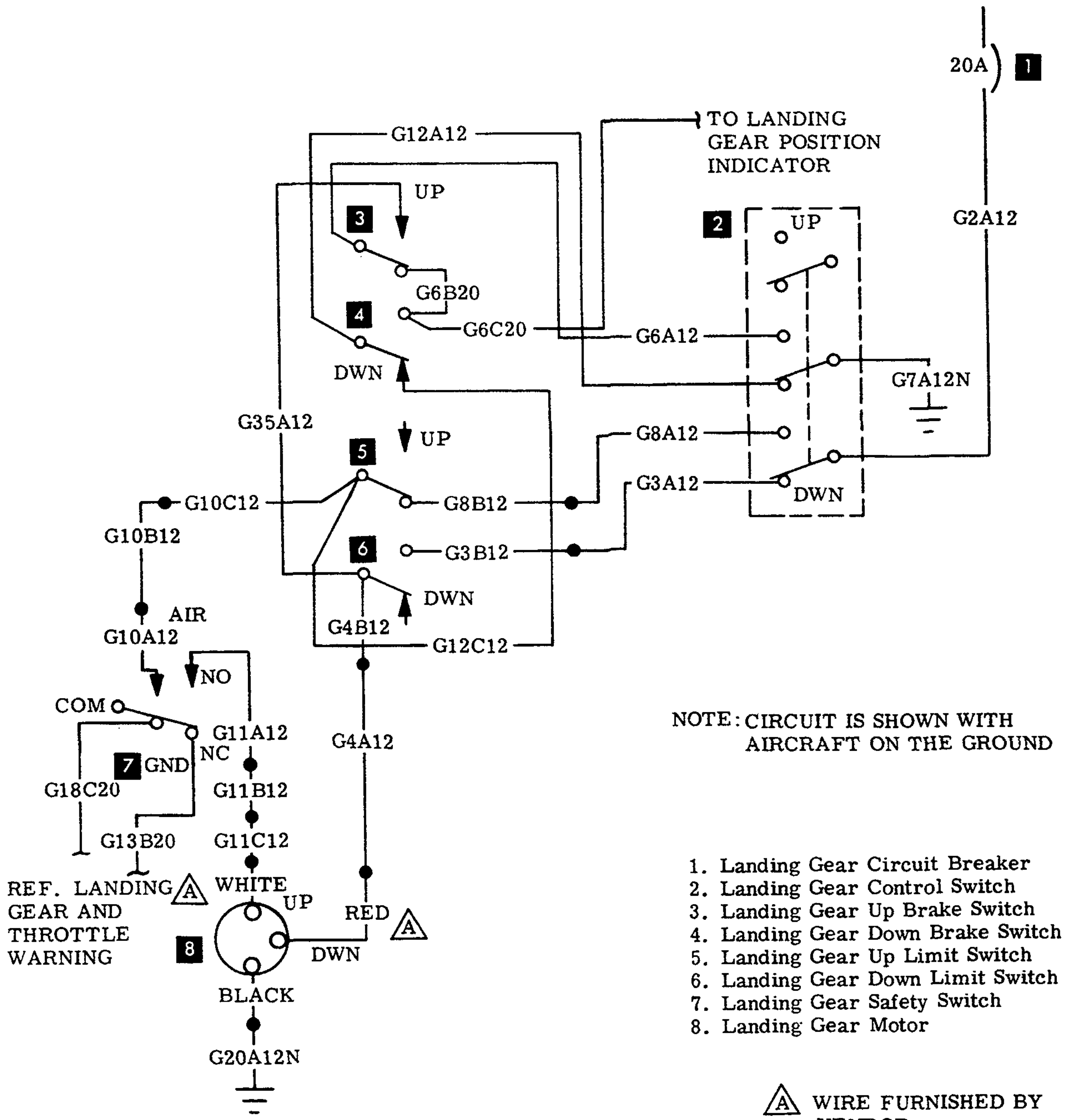
NOTE: CIRCUIT IS SHOWN WITH AIRCRAFT ON THE GROUND

1. Landing Gear Circuit Breaker
2. Landing Gear Control Switch
3. Landing Gear Up Brake Switch
4. Landing Gear Down Brake Switch
5. Landing Gear Up Limit Switch
6. Landing Gear Down Limit Switch
7. Landing Gear Safety Switch
8. Landing Gear Motor

(A) WIRE FURNISHED BY VENDOR

V35B-369-28

LANDING GEAR WITHOUT SAFETY SYSTEM
D-9069 thru D-9176



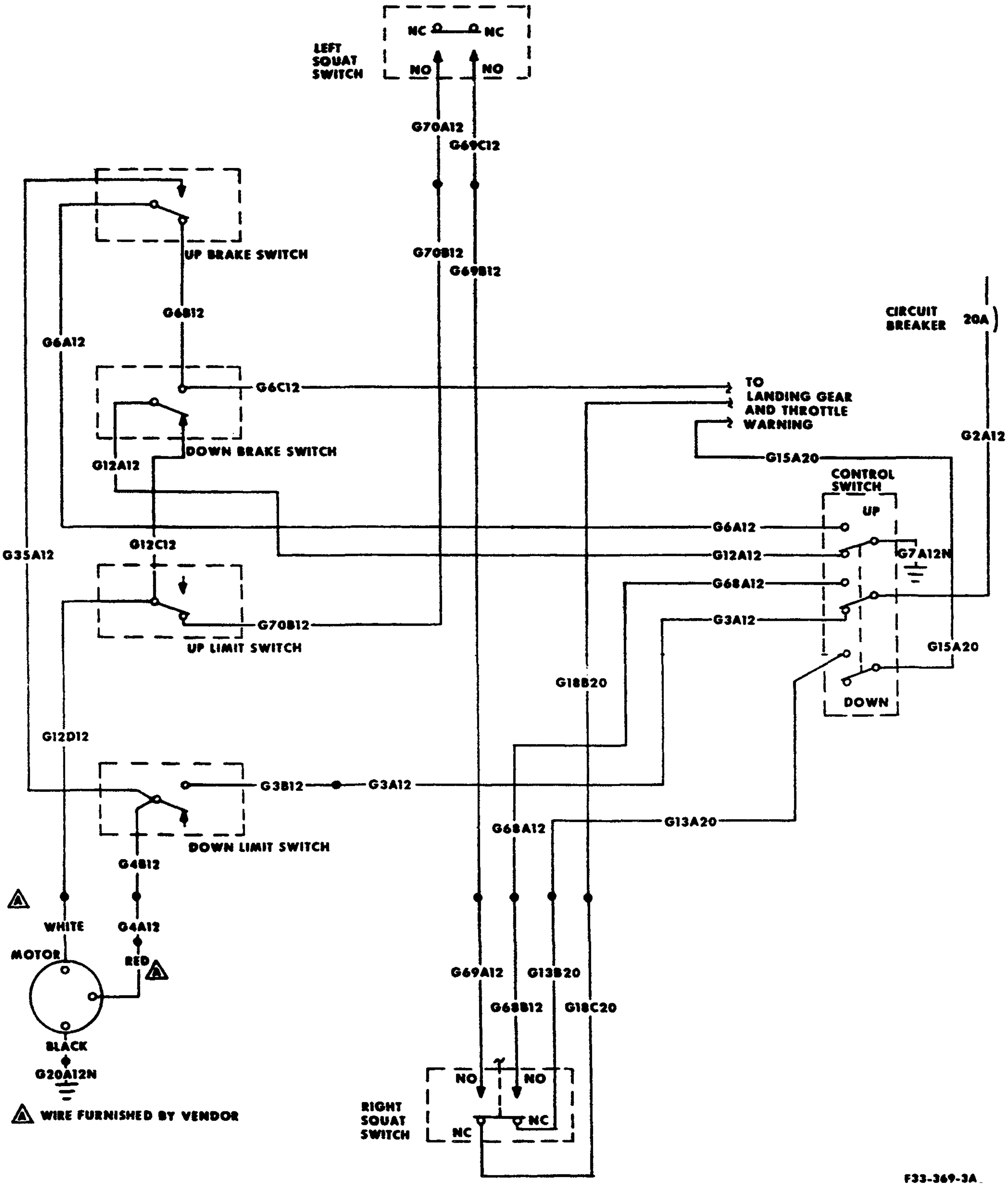
NOTE: CIRCUIT IS SHOWN WITH AIRCRAFT ON THE GROUND

1. Landing Gear Circuit Breaker
2. Landing Gear Control Switch
3. Landing Gear Up Brake Switch
4. Landing Gear Down Brake Switch
5. Landing Gear Up Limit Switch
6. Landing Gear Down Limit Switch
7. Landing Gear Safety Switch
8. Landing Gear Motor

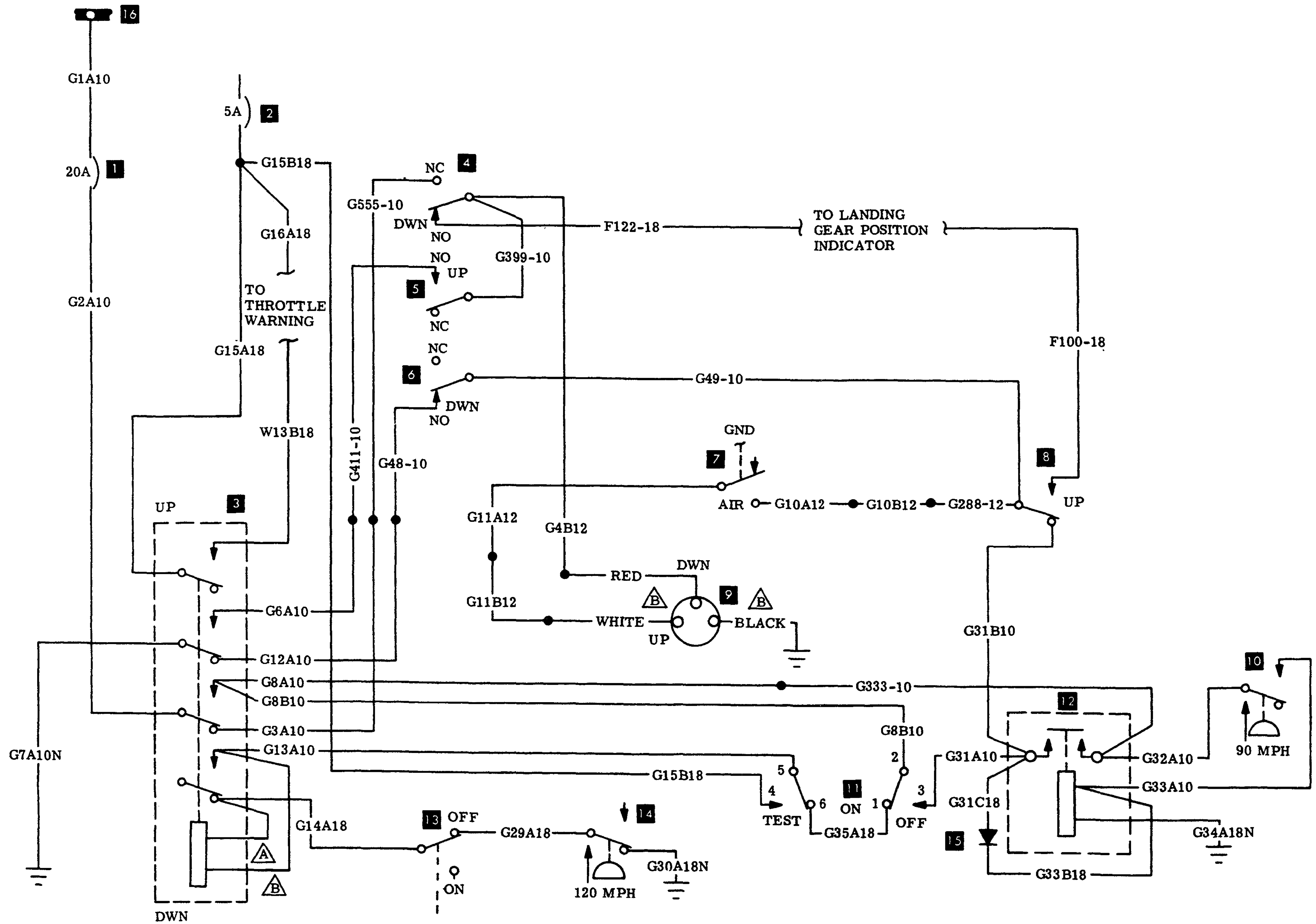
A WIRE FURNISHED BY VENDOR

G33 369-81

LANDING GEAR WITHOUT SAFETY SYSTEM
Model V35B (D-9177 thru D-9690)



LANDING GEAR WITHOUT SAFETY SYSTEM
D-9691 thru D-9817



NOTE: CIRCUIT SHOWN WITH AIRCRAFT ON THE GROUND AND THROTTLE OFF

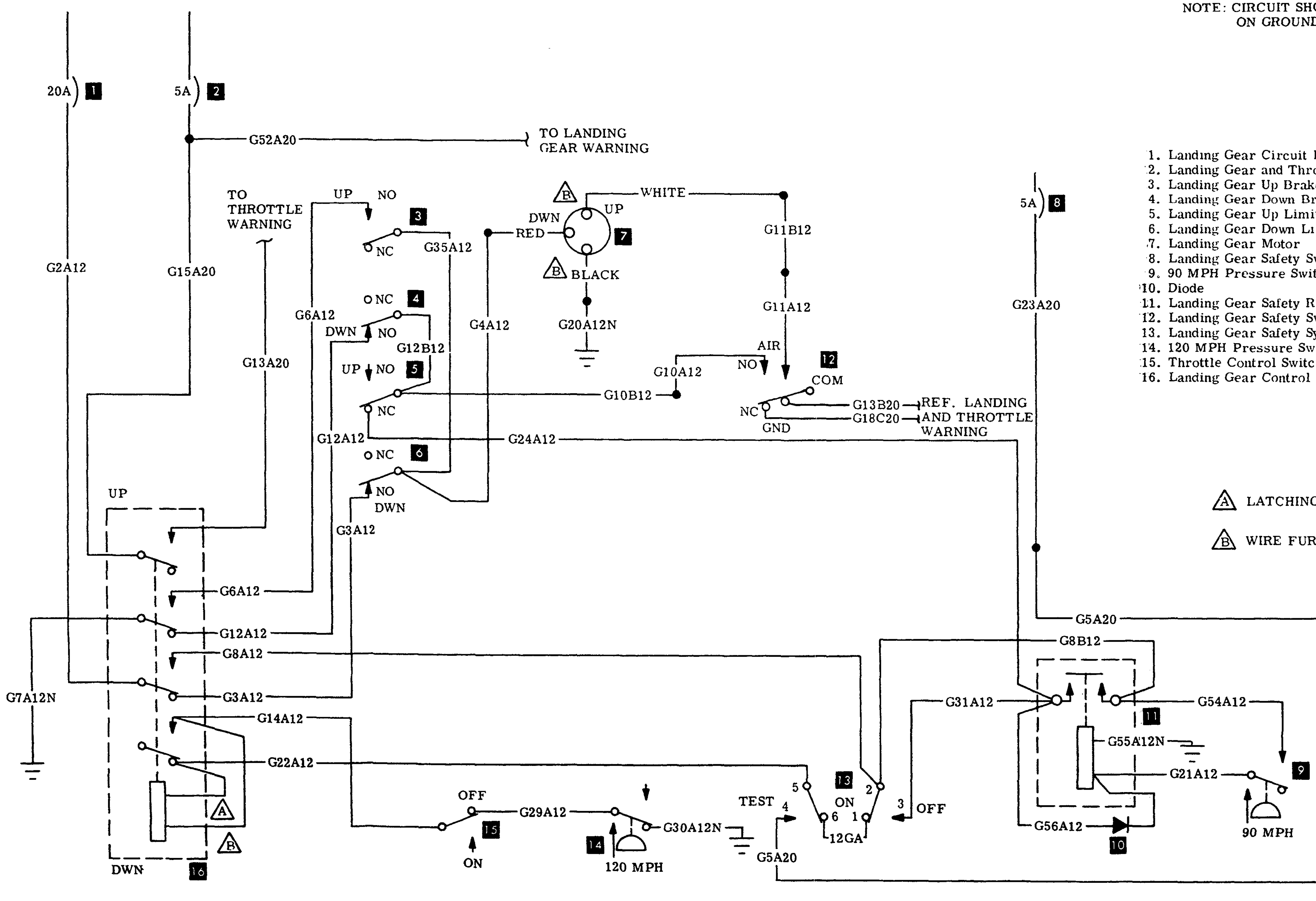
1. Landing Gear Circuit Breaker
2. Throttle and Landing Gear Warn Circuit Breaker
3. Landing Gear Control Switch
4. Landing Gear Down Limit Switch
5. Landing Gear Up Brake Switch
6. Landing Gear Down Brake Switch
7. Landing Gear Safety Switch
8. Landing Gear Up Limit Switch
9. Landing Gear Motor
10. 90 MPH Pressure Switch
11. Landing Gear Safety System Switch
12. Landing Gear Safety Relay
13. Throttle Control Switch
14. 120 MPH Pressure Switch
15. Diode
16. Bus

A LATCHING SOLENOID

B WIRES FURNISHED BY VENDOR

LANDING GEAR WITH SAFETY SYSTEM
D-7977 thru D-9068

NOTE: CIRCUIT SHOWN WITH AIRCRAFT ON GROUND AND THROTTLE OFF



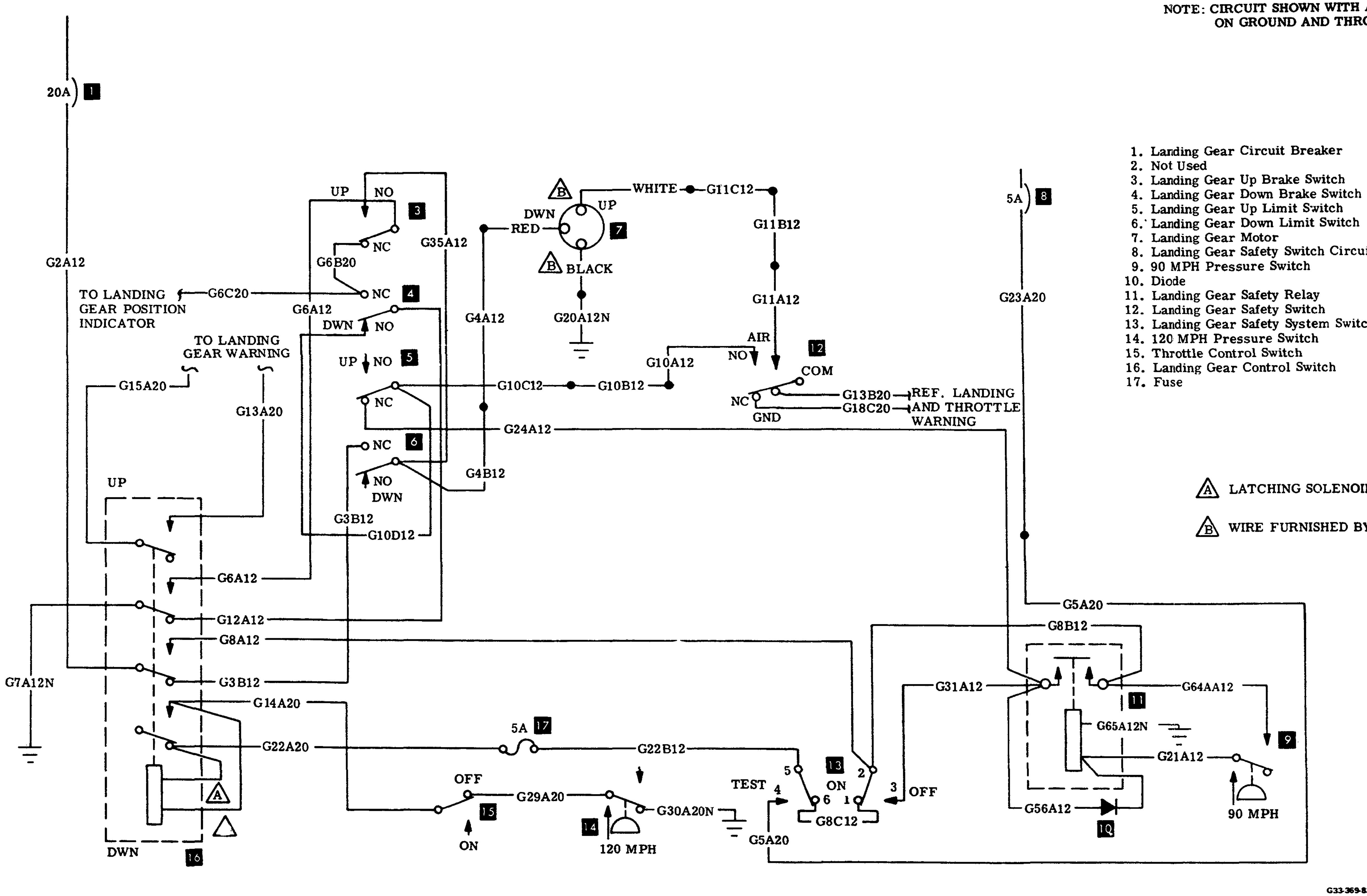
1. Landing Gear Circuit Breaker
2. Landing Gear and Throttle Warn Circuit Breaker
3. Landing Gear Up Brake Switch
4. Landing Gear Down Brake Switch
5. Landing Gear Up Limit Switch
6. Landing Gear Down Limit Switch
7. Landing Gear Motor
8. Landing Gear Safety Switch Circuit Breaker
9. 90 MPH Pressure Switch
10. Diode
11. Landing Gear Safety Relay
12. Landing Gear Safety Switch
13. Landing Gear Safety System Switch
14. 120 MPH Pressure Switch
15. Throttle Control Switch
16. Landing Gear Control Switch

A LATCHING SOLENOID

B WIRE FURNISHED BY VENDOR

LANDING GEAR WITH SAFETY SYSTEM
D-9069 thru D-9176

NOTE: CIRCUIT SHOWN WITH AIRCRAFT ON GROUND AND THROTTLE OFF



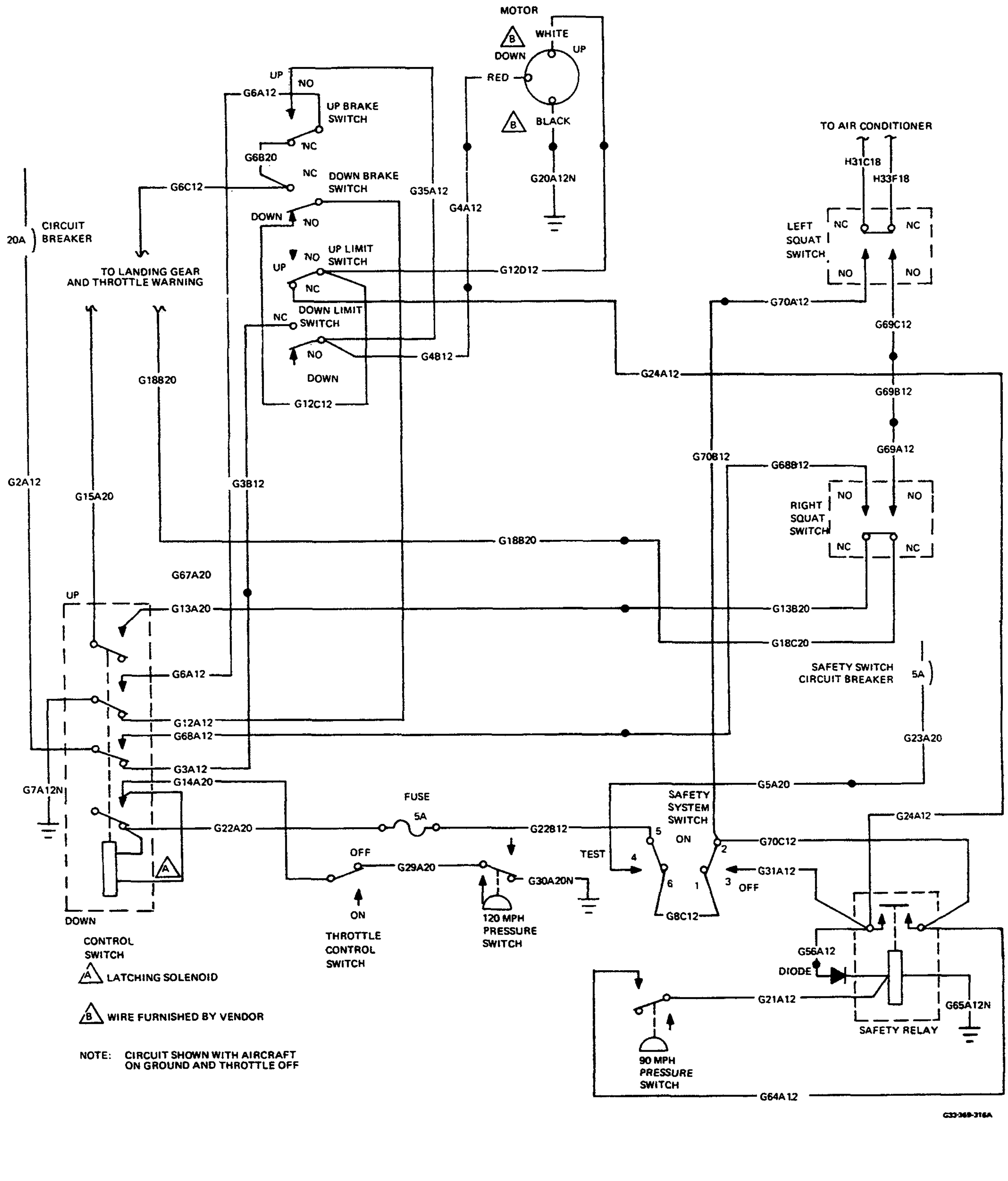
1. Landing Gear Circuit Breaker
2. Not Used
3. Landing Gear Up Brake Switch
4. Landing Gear Down Brake Switch
5. Landing Gear Up Limit Switch
6. Landing Gear Down Limit Switch
7. Landing Gear Motor
8. Landing Gear Safety Switch Circuit Breaker
9. 90 MPH Pressure Switch
10. Diode
11. Landing Gear Safety Relay
12. Landing Gear Safety Switch
13. Landing Gear Safety System Switch
14. 120 MPH Pressure Switch
15. Throttle Control Switch
16. Landing Gear Control Switch
17. Fuse

A LATCHING SOLENOID

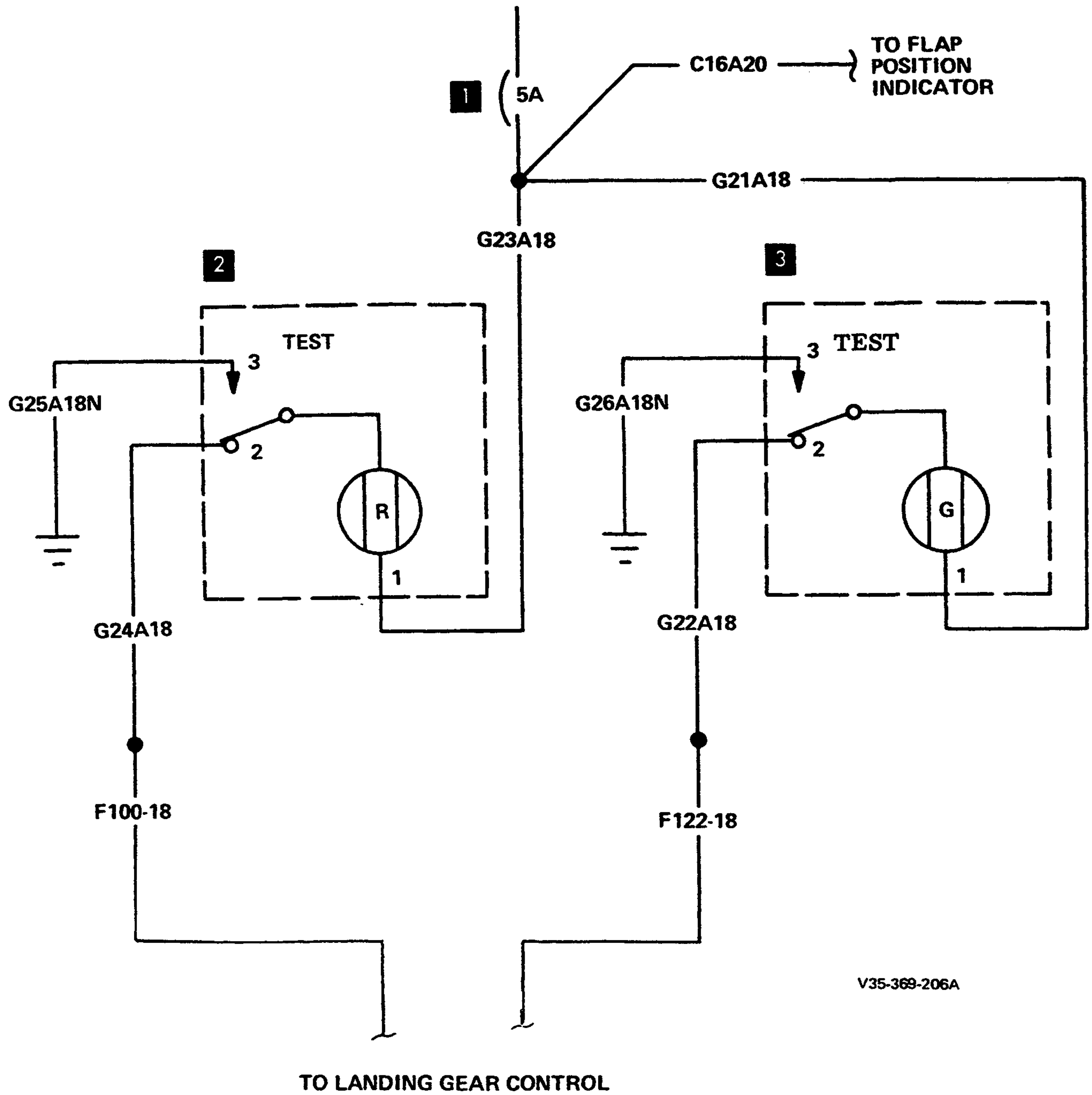
B WIRE FURNISHED BY VENDOR

LANDING GEAR WITH SAFETY SYSTEM

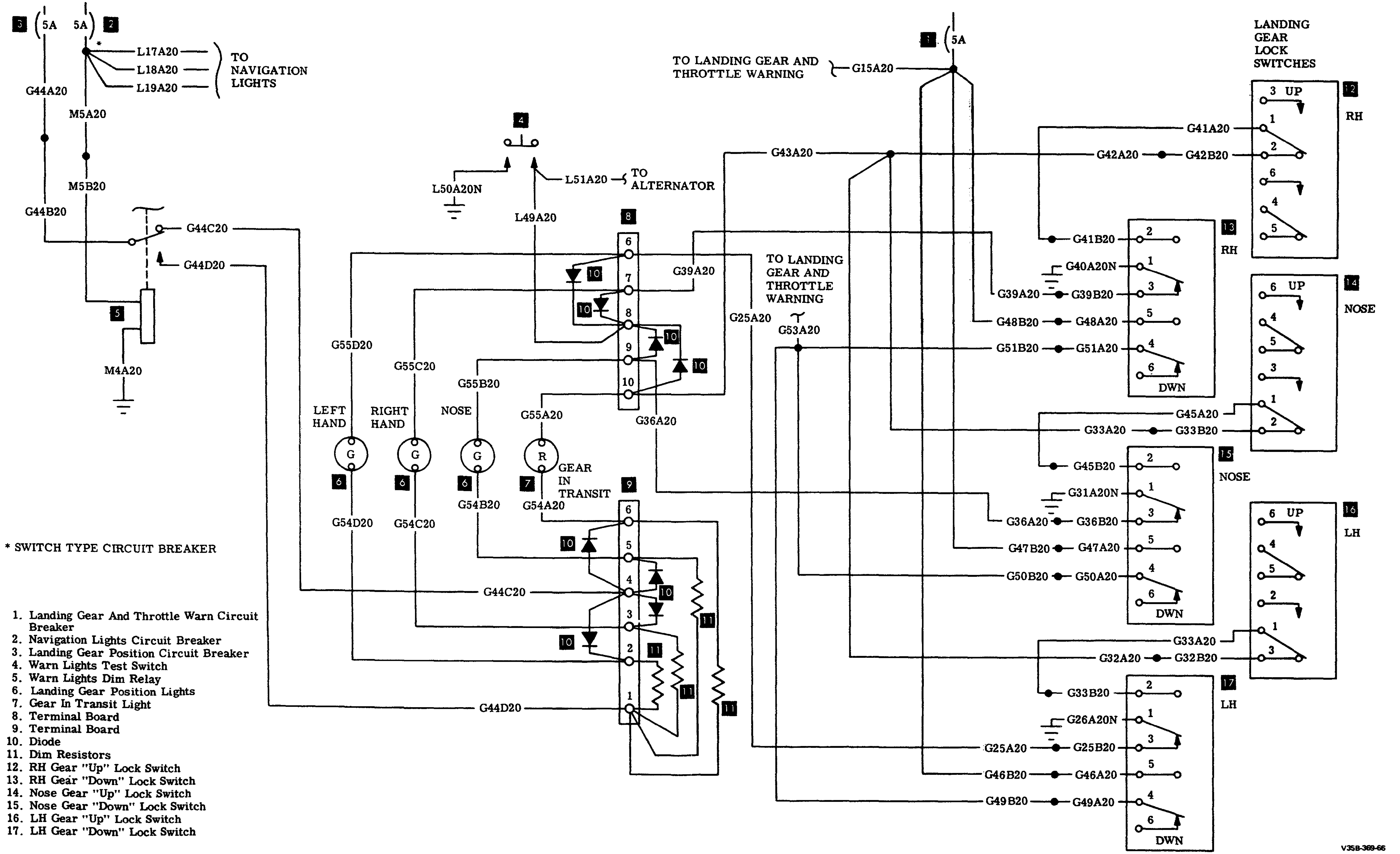
LANDING GEAR WITH SAFETY SYSTEM
D-9177 thru D-9690



LANDING GEAR WITH SAFETY SYSTEM
D-9691 thru D-9817



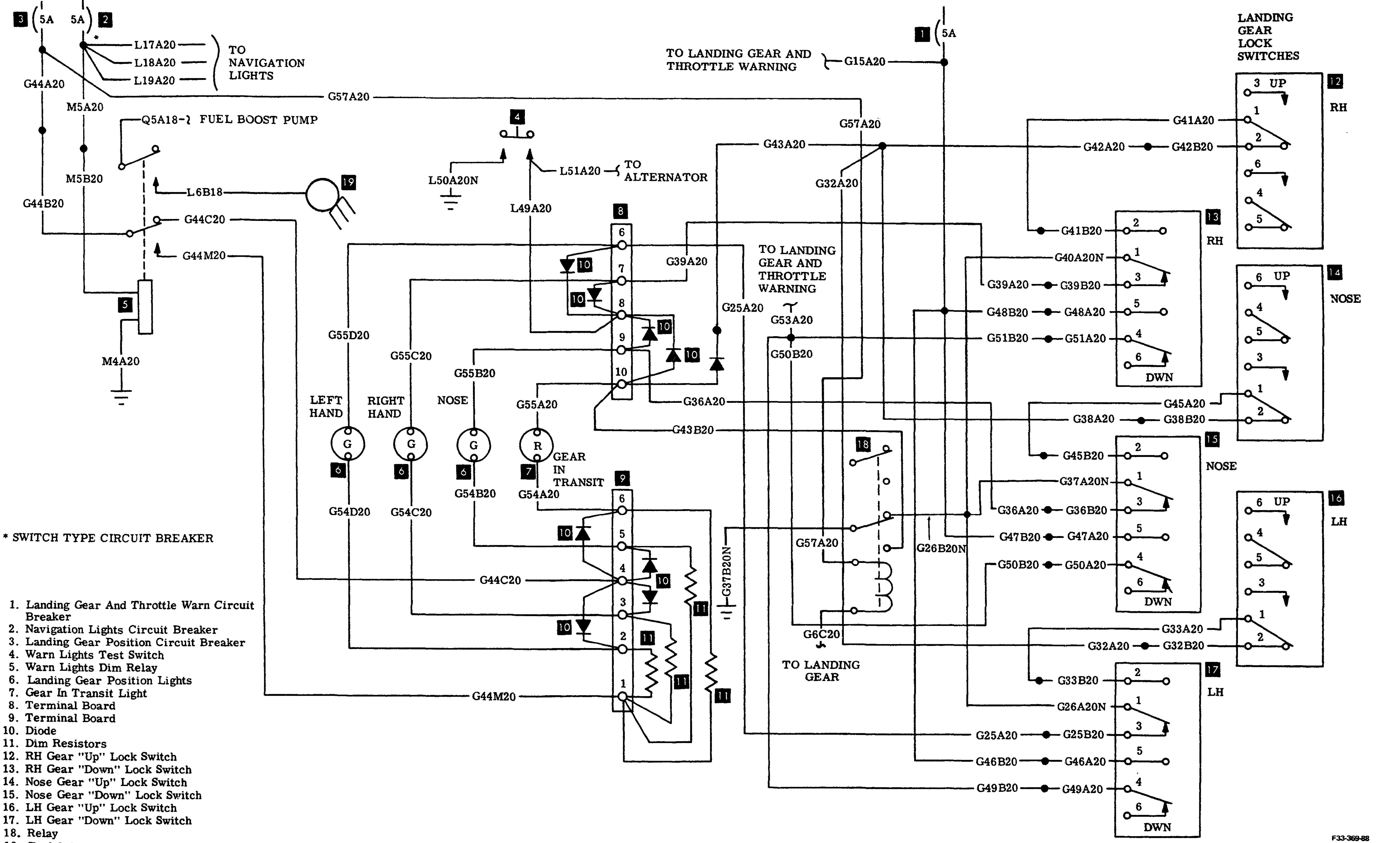
LANDING GEAR POSITION INDICATOR
Model V35B(D-7977 thru D-9068)



* SWITCH TYPE CIRCUIT BREAKER

1. Landing Gear And Throttle Warn Circuit Breaker
2. Navigation Lights Circuit Breaker
3. Landing Gear Position Circuit Breaker
4. Warn Lights Test Switch
5. Warn Lights Dim Relay
6. Landing Gear Position Lights
7. Gear In Transit Light
8. Terminal Board
9. Terminal Board
10. Diode
11. Dim Resistors
12. RH Gear "Up" Lock Switch
13. RH Gear "Down" Lock Switch
14. Nose Gear "Up" Lock Switch
15. Nose Gear "Down" Lock Switch
16. LH Gear "Up" Lock Switch
17. LH Gear "Down" Lock Switch

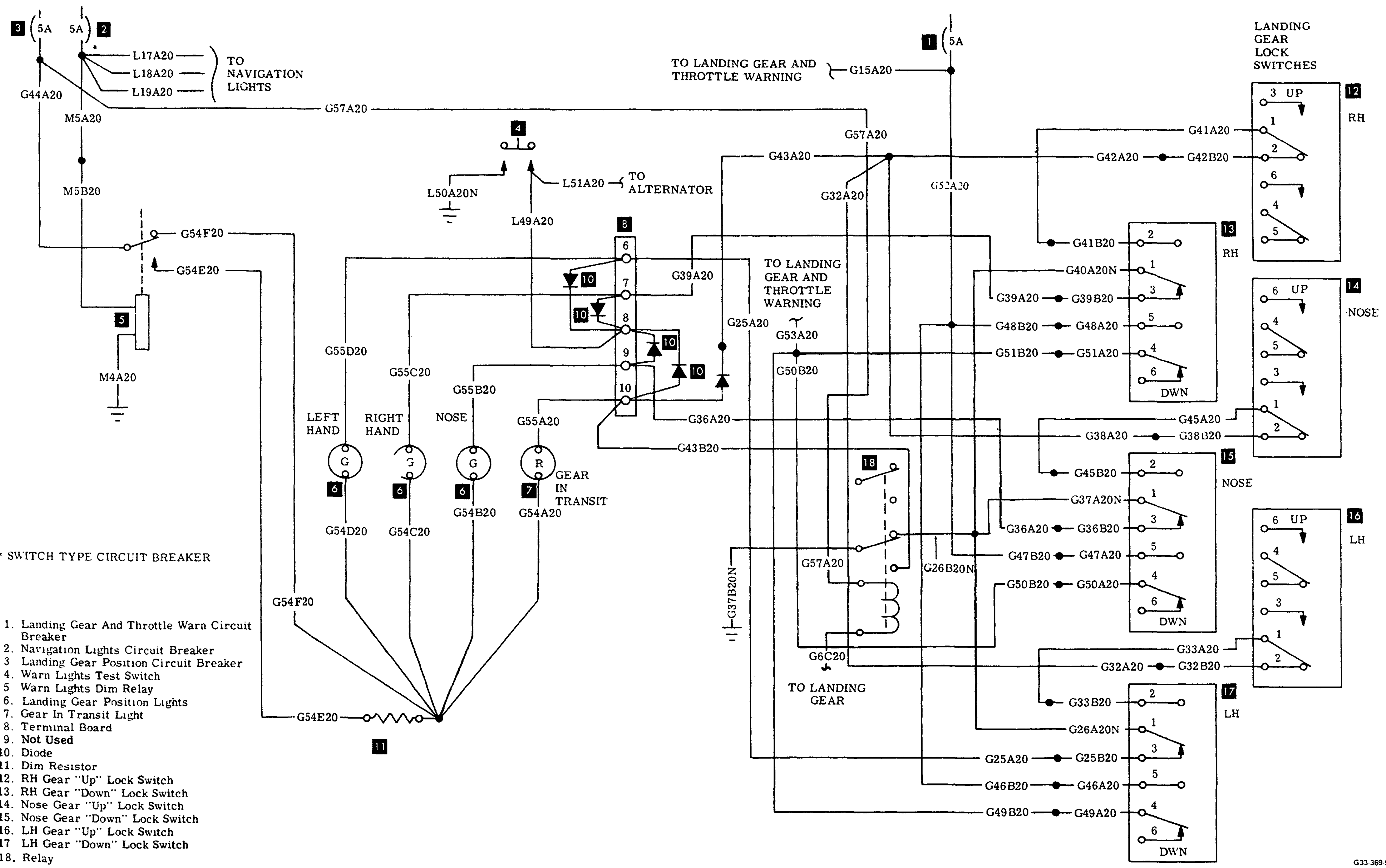
LANDING GEAR POSITION INDICATOR
D-9069 thru D9176



* SWITCH TYPE CIRCUIT BREAKER

1. Landing Gear And Throttle Warn Circuit Breaker
2. Navigation Lights Circuit Breaker
3. Landing Gear Position Circuit Breaker
4. Warn Lights Test Switch
5. Warn Lights Dim Relay
6. Landing Gear Position Lights
7. Gear In Transit Light
8. Terminal Board
9. Terminal Board
10. Diode
11. Dim Resistors
12. RH Gear "Up" Lock Switch
13. RH Gear "Down" Lock Switch
14. Nose Gear "Up" Lock Switch
15. Nose Gear "Down" Lock Switch
16. LH Gear "Up" Lock Switch
17. LH Gear "Down" Lock Switch
18. Relay
19. Fuel Select Light

LANDING GEAR POSITION INDICATOR
D-9177 thru D-9286

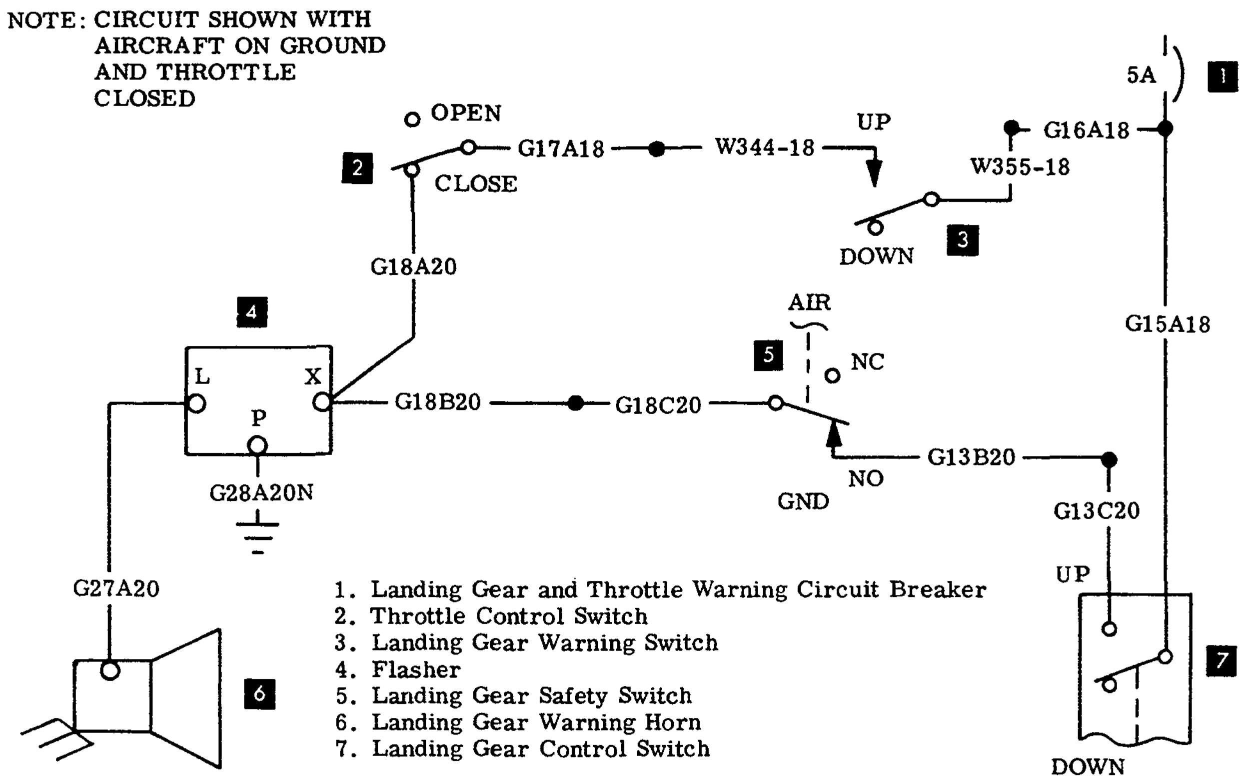


* SWITCH TYPE CIRCUIT BREAKER

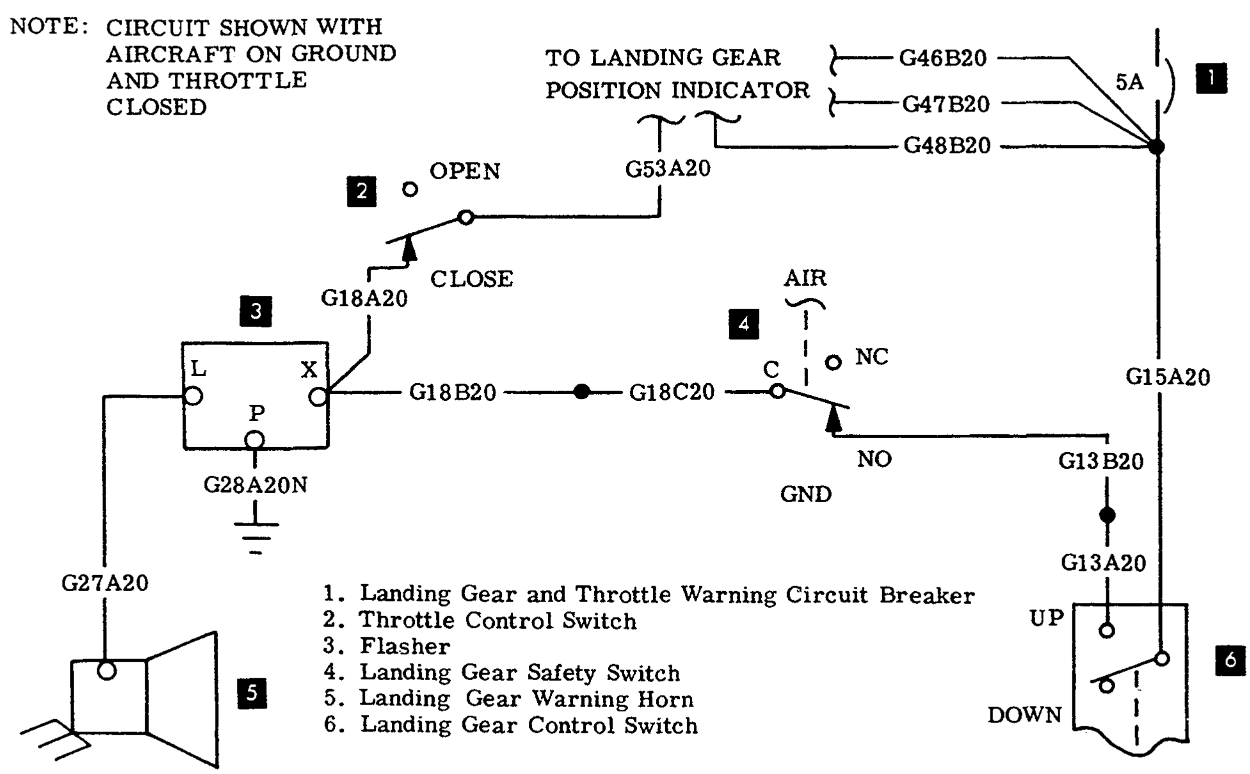
1. Landing Gear And Throttle Warn Circuit Breaker
2. Navigation Lights Circuit Breaker
3. Landing Gear Position Circuit Breaker
4. Warn Lights Test Switch
5. Warn Lights Dim Relay
6. Landing Gear Position Lights
7. Gear In Transit Light
8. Terminal Board
9. Not Used
10. Diode
11. Dim Resistor
12. RH Gear "Up" Lock Switch
13. RH Gear "Down" Lock Switch
14. Nose Gear "Up" Lock Switch
15. Nose Gear "Down" Lock Switch
16. LH Gear "Up" Lock Switch
17. LH Gear "Down" Lock Switch
18. Relay

G33-369-92C

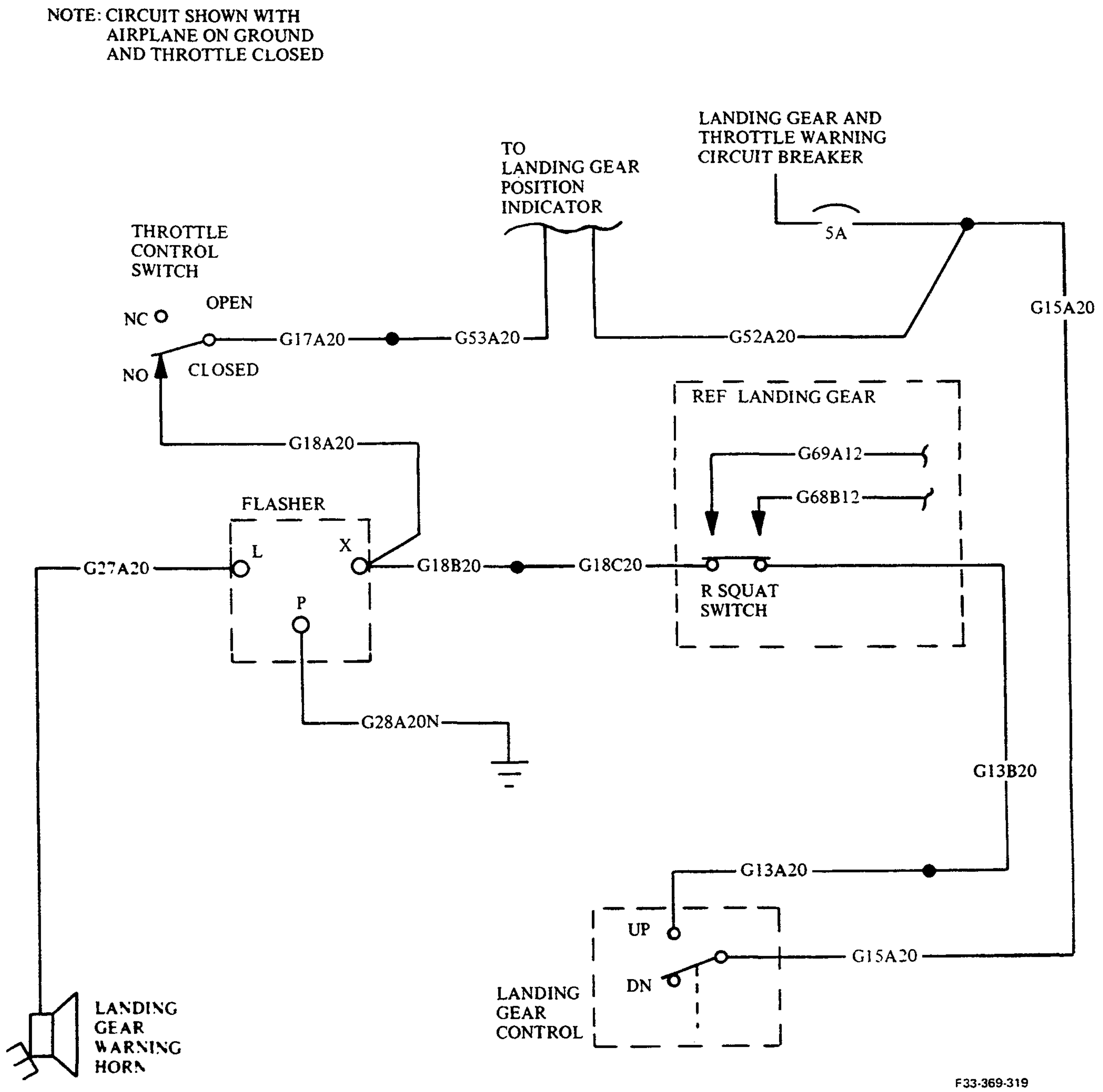
LANDING GEAR POSITION INDICATOR
D-9287 thru D-9817



LANDING GEAR AND THROTTLE WARNING
V35B (D-7977 thru D-9068)

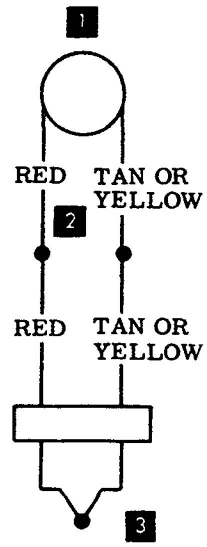


LANDING GEAR AND THROTTLE WARNING
Model V35B (D-9069 thru D-9690)



LANDING GEAR AND THROTTLE WARNING
D-7977 thru D-9817

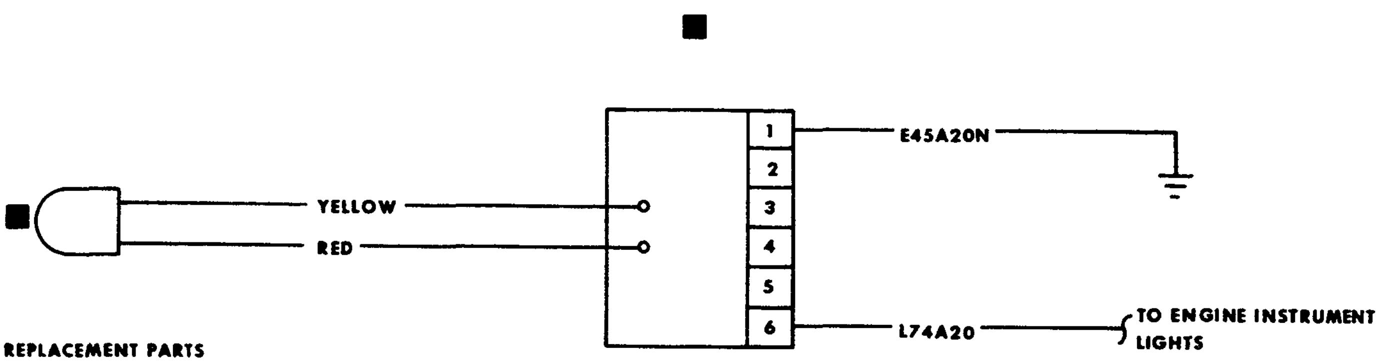
1. Indicator
2. Thermocouple Harness
3. Thermocouple Probe



REPLACEMENT PARTS MUST BE IDENTICAL OR ENTIRE UNIT MUST BE REPLACED

V35-369-33

EXHAUST GAS TEMPERATURE
Model V35B & V35B-TC (D-7977 thru D-9221, D-9391 and after)

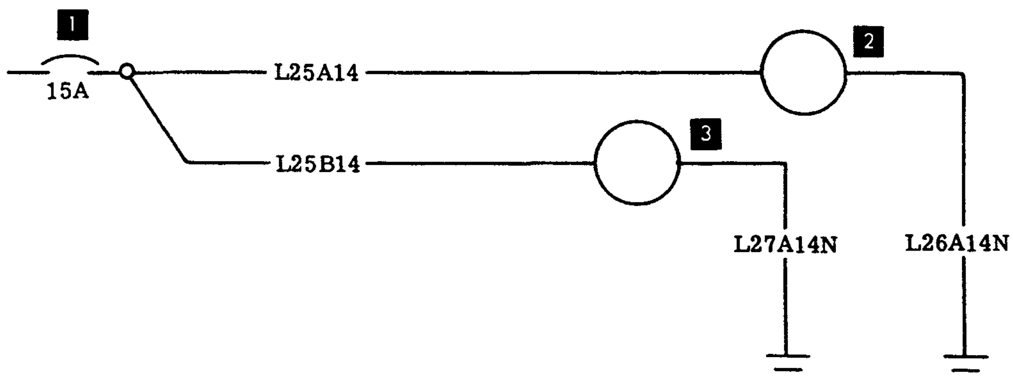


REPLACEMENT PARTS MUST BE IDENTICAL OR ENTIRE UNIT MUST BE REPLACED.

1. EGT Indicator
2. EGT Bulb

35-369-70

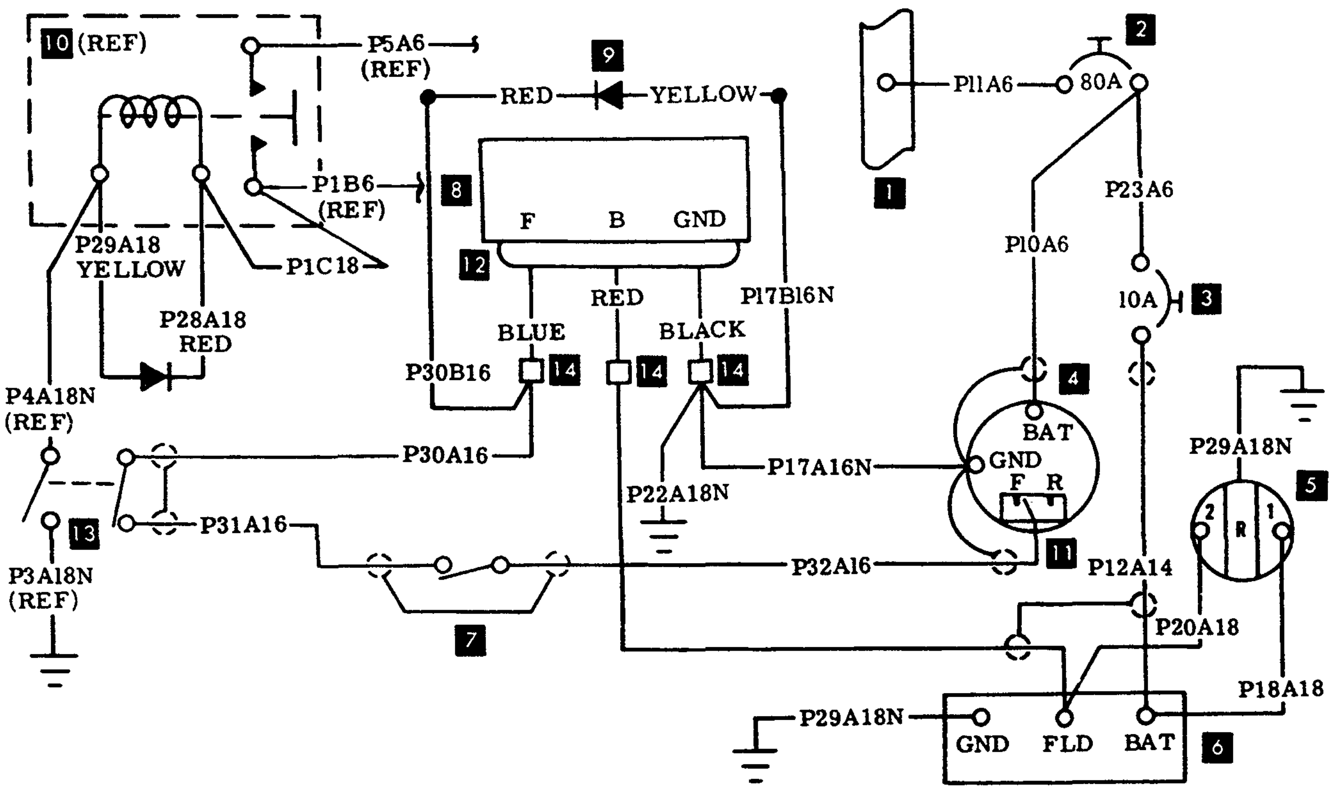
EXHAUST GAS TEMPERATURE (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



1. Rotating Beacon Circuit Breaker
2. Upper Rotating Beacon
3. Lower Rotating Beacon

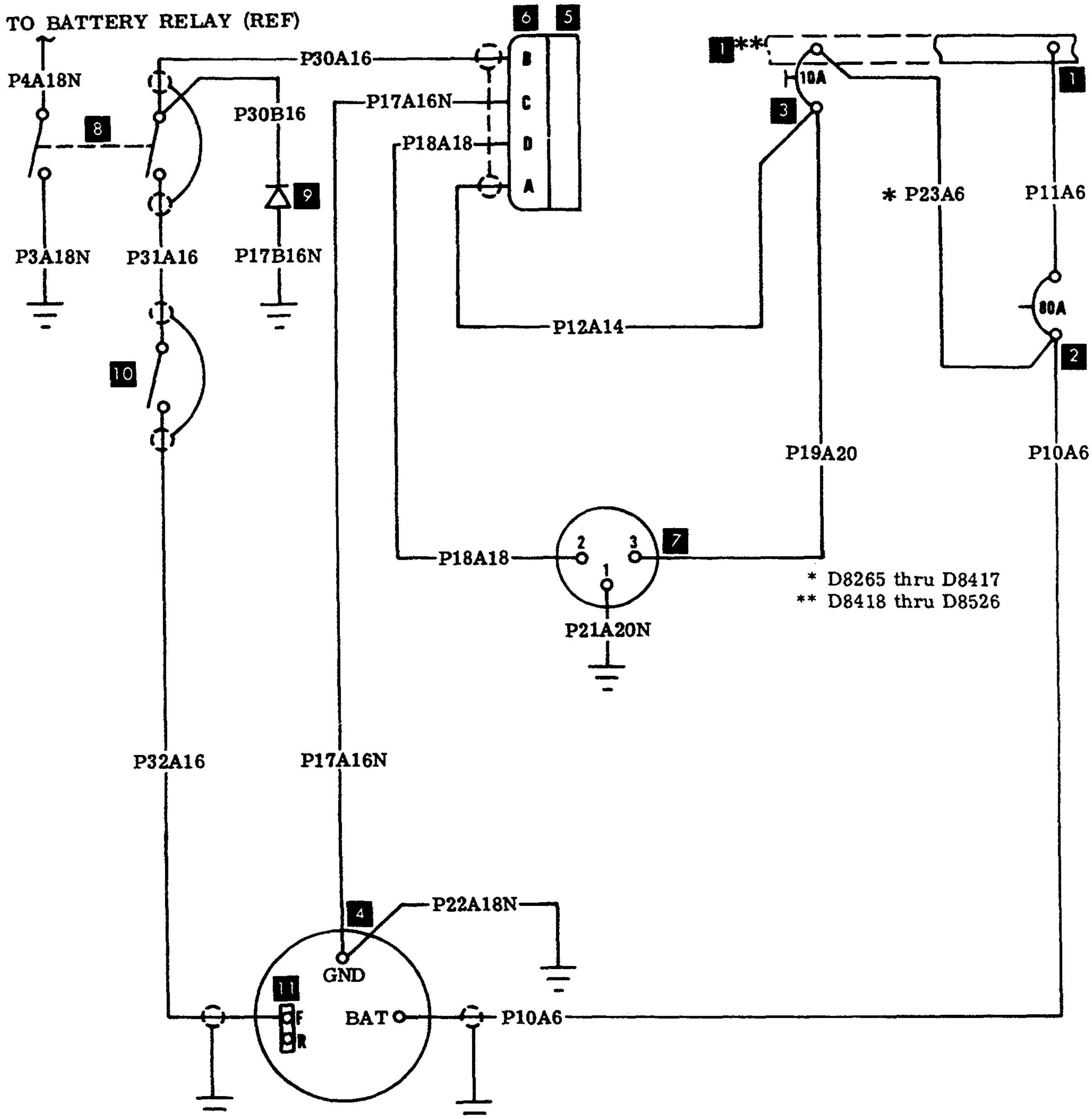
V35B-369-32

ROTATING BEACON
Model V35B & V35B-TC (D-7977 and after)



1. Bus Bar
2. 80A Circuit Breaker
3. 10A Circuit Breaker
4. Alternator (70A)
5. Indicator & #330 Lamp
6. Overvoltage Relay
7. Alternator Switch
8. Voltage Regulator
9. Suppressor
10. Battery Relay
11. Connector
12. Plug and Cable Assembly
13. Battery Switch
14. Perm. Splice

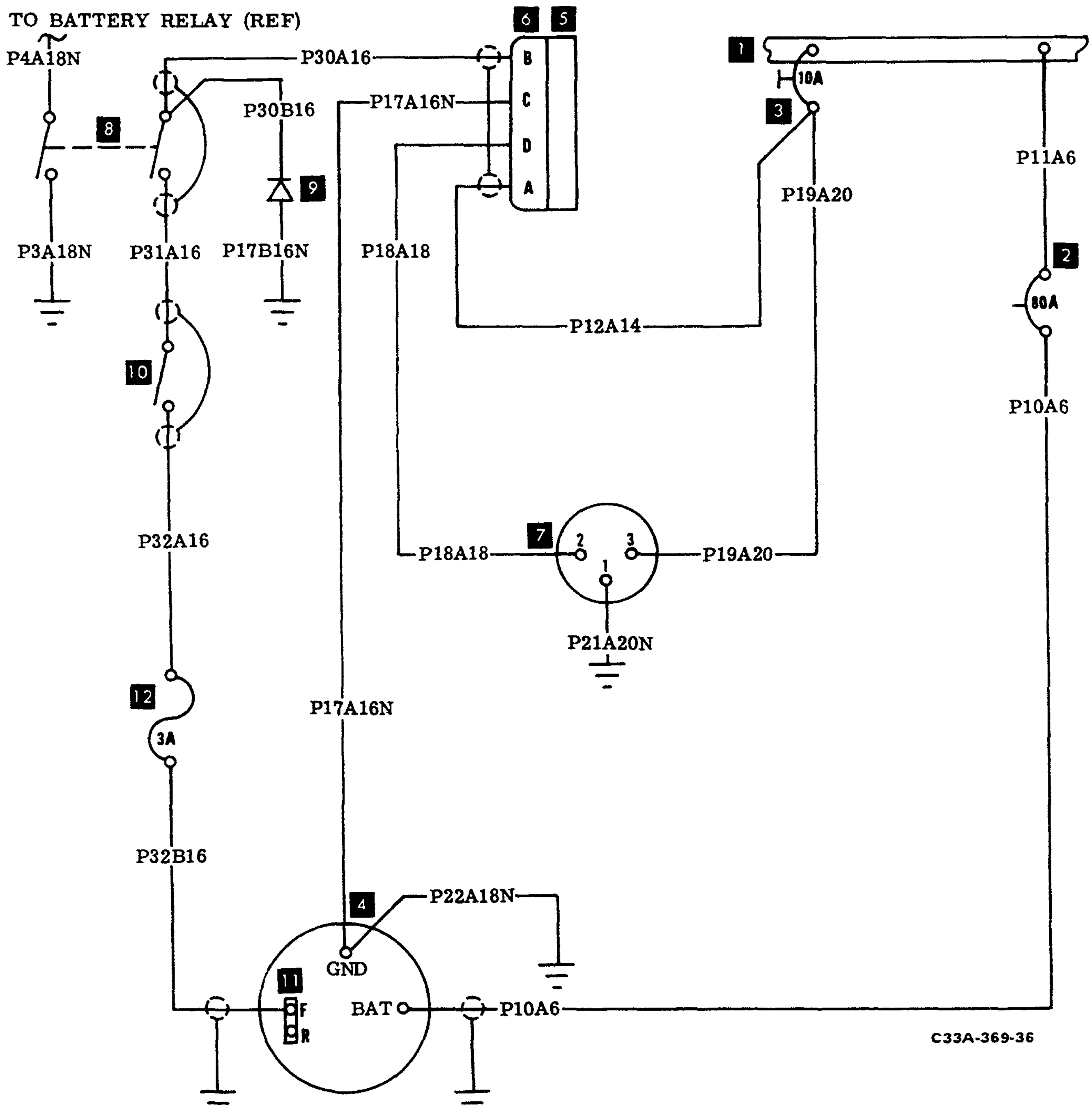
ALTERNATOR
D-7977 thru D-8264



1. Bus Bar
2. Alternator Circuit Breaker
3. Overvoltage Relay Circuit Breaker
4. Alternator
5. Voltage Regulator and Overvoltage Relay
6. Connector
7. Overvoltage Indicator
8. Battery Switch
9. Suppressor
10. Alternator Switch
11. Connector

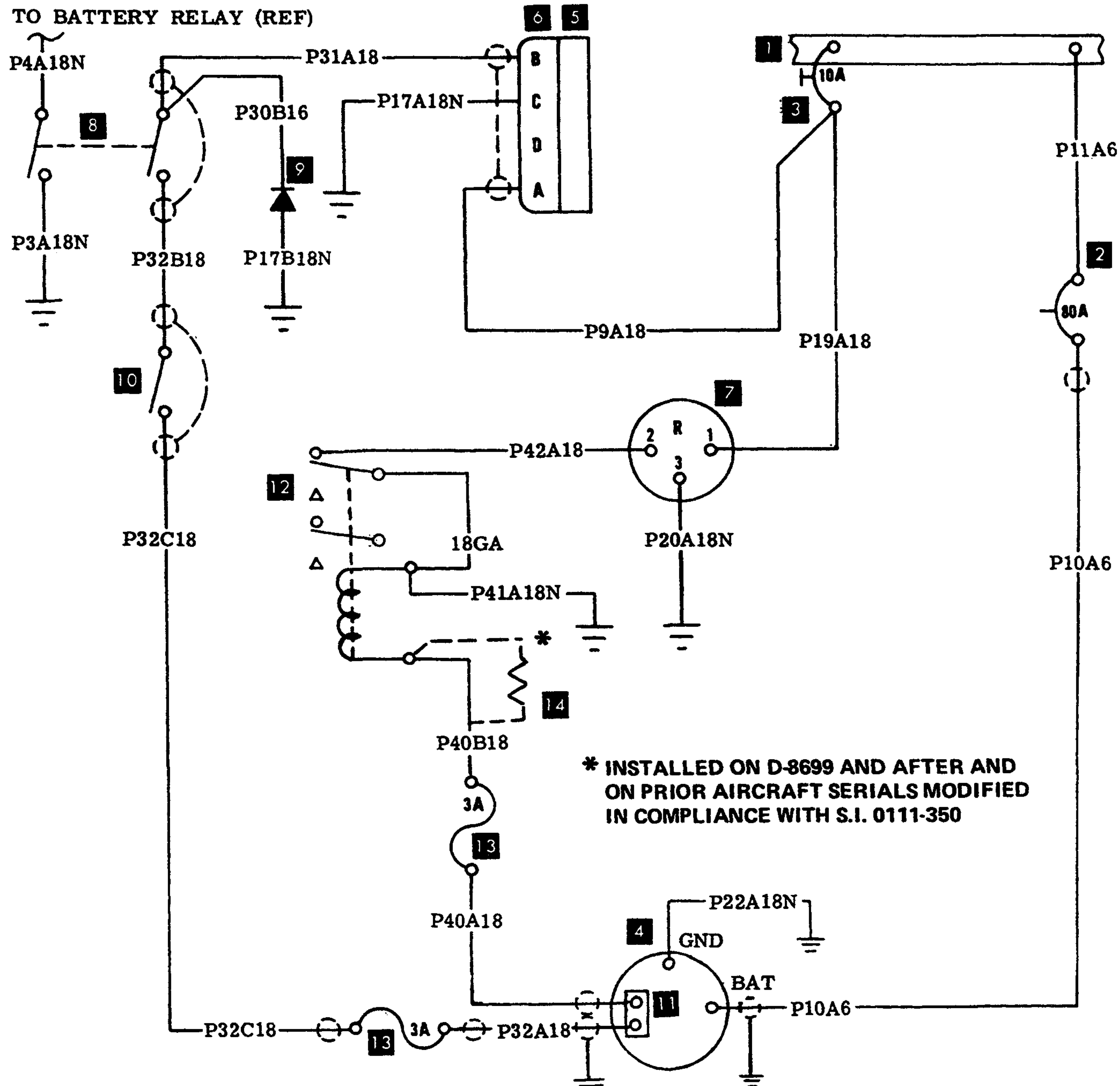
ALTERNATOR
D-8265 thru D-8526

Issued: January, 1970



1. Bus Bar
2. Alternator Circuit Breaker
3. Overvoltage Relay Circuit Breaker
4. Alternator
5. Voltage Regulator and Overvoltage Relay
6. Connector
7. Overvoltage Indicator
8. Battery Switch
9. Suppressor
10. Alternator Switch
11. Connector
12. Fuse

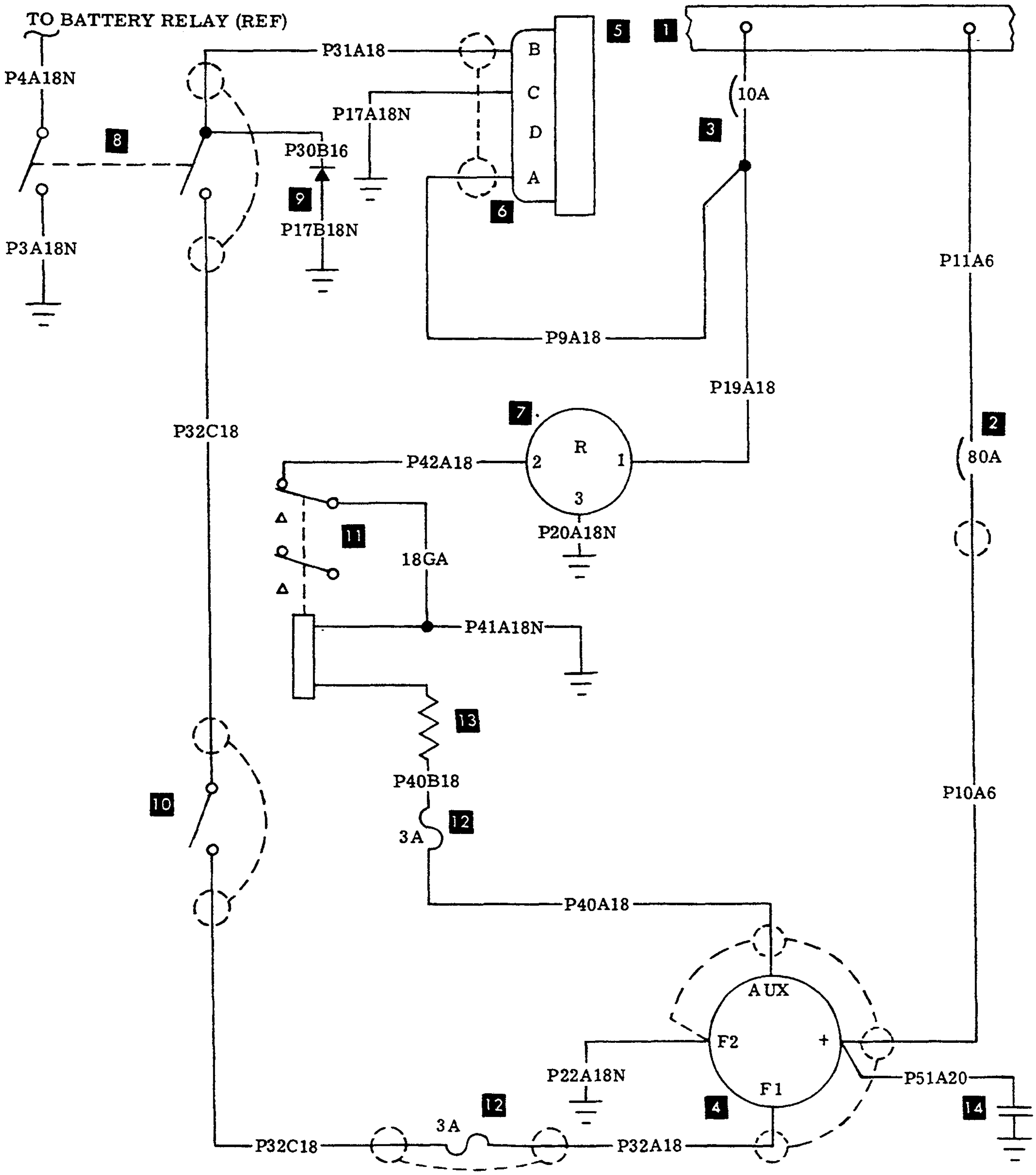
ALTERNATOR
D-8527 thru D-8598



1. Bus Bar
2. Alternator Circuit Breaker
3. Overvoltage Relay Circuit Breaker
4. Alternator
5. Voltage Regulator and Overvoltage Relay
6. Connector
7. Alternator - Out Indicator
8. Battery Switch
9. Suppressor
10. Alternator Switch
11. Connector
12. Alternator Out Relay
13. Fuse
14. Resistor

ALTERNATOR
D-8599 thru D-8882

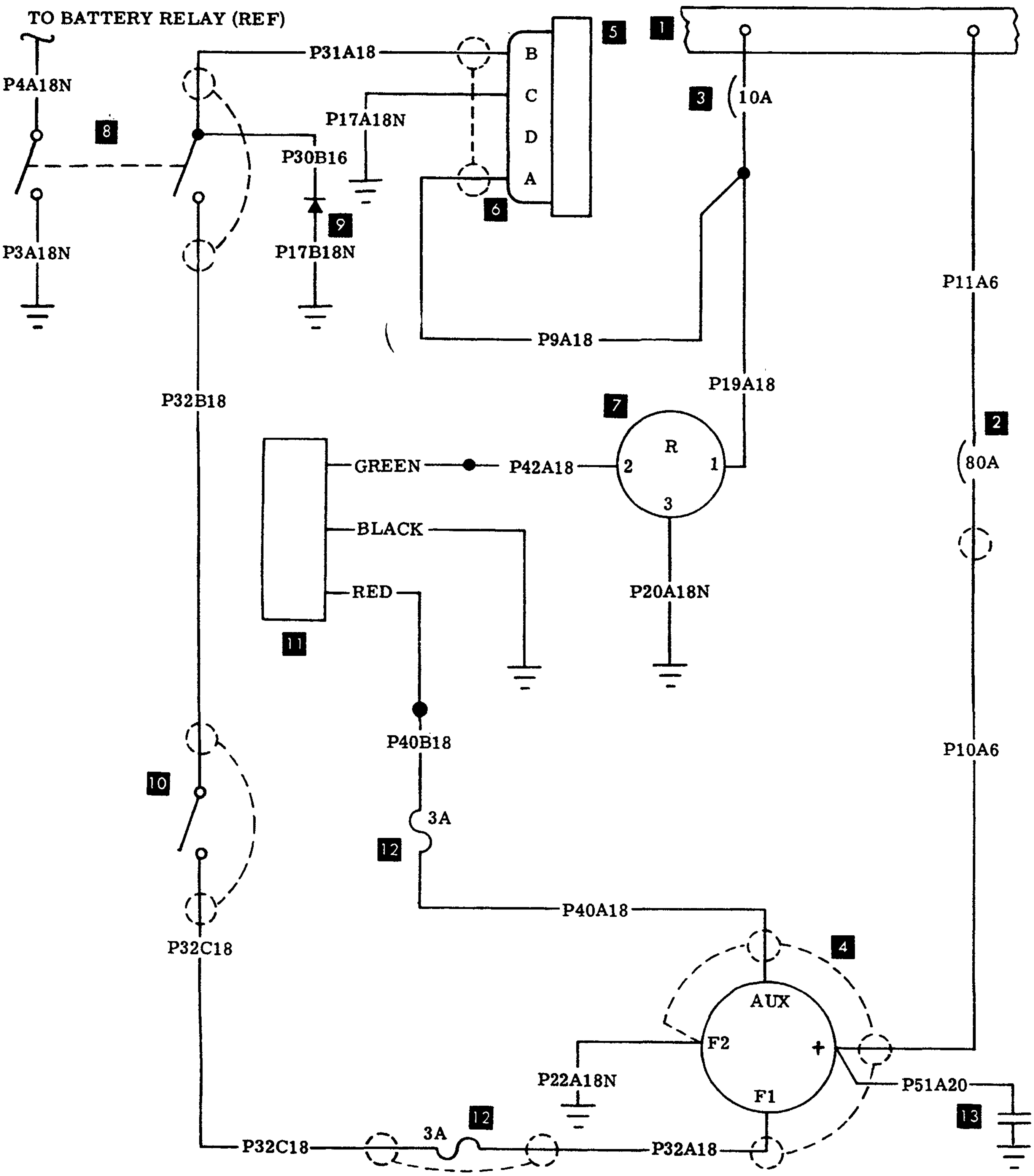
Issued: September, 1971



1. Bus Bar
2. Alternator Circuit Breaker
3. Overvoltage Relay Circuit Breaker
4. Alternator
5. Voltage Regulator and Overvoltage Relay
6. Connector
7. Alternator - Out Indicator
8. Battery Switch
9. Suppressor
10. Alternator Switch
11. Alternator-Out Relay
12. Fuse
13. Resistor
14. Capacitor

V35A-369-37

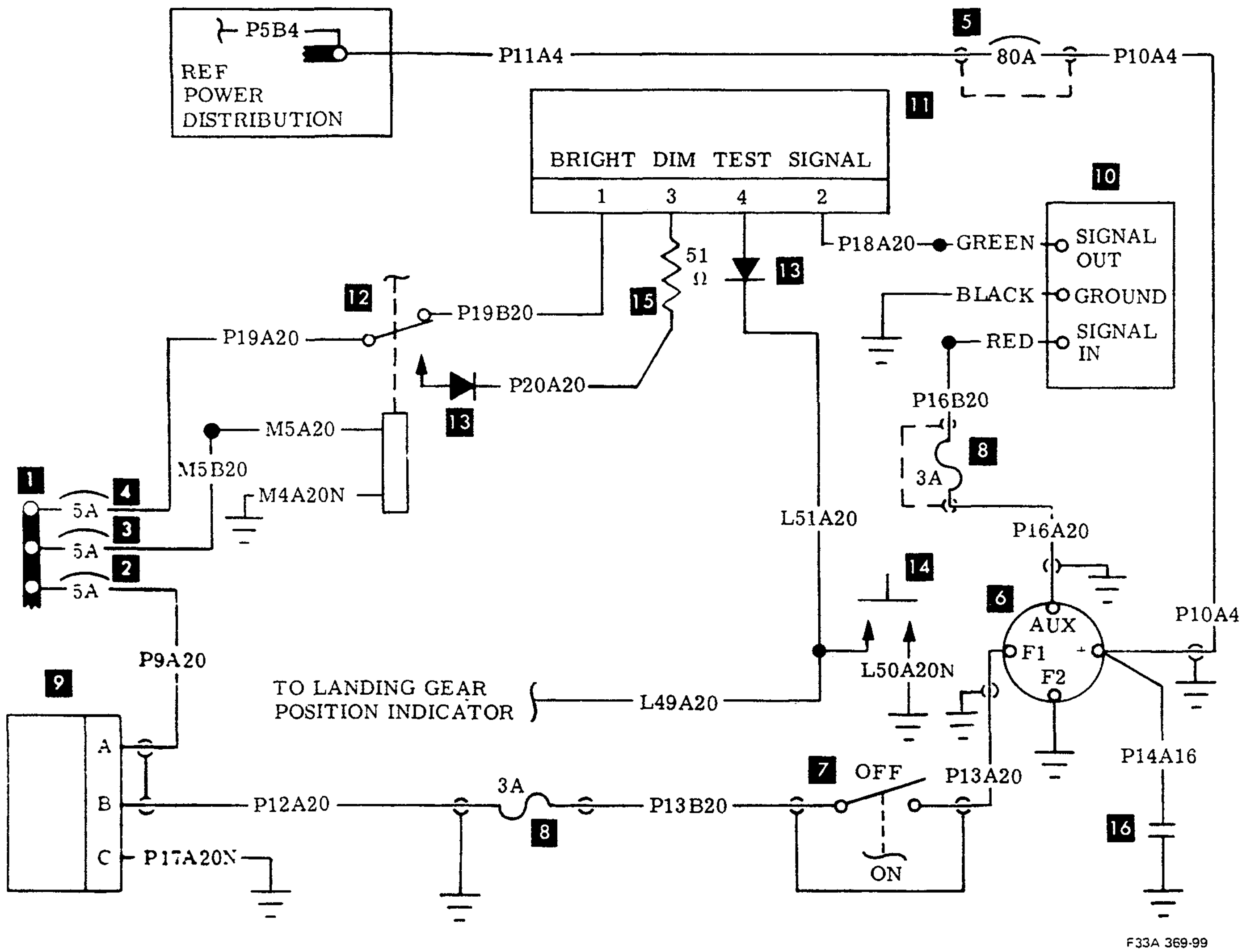
ALTERNATOR
D-8883 thru D-8947



1. Bus Bar
2. Alternator Circuit Breaker
3. Overvoltage Relay Circuit Breaker
4. Alternator
5. Voltage regulator and Overvoltage Relay
6. Connector
7. Alternator-Out Indicator
8. Battery Switch
9. Suppressor
10. Alternator Switch
11. Alternator-Out Sensor
12. Fuse
13. Capacitor

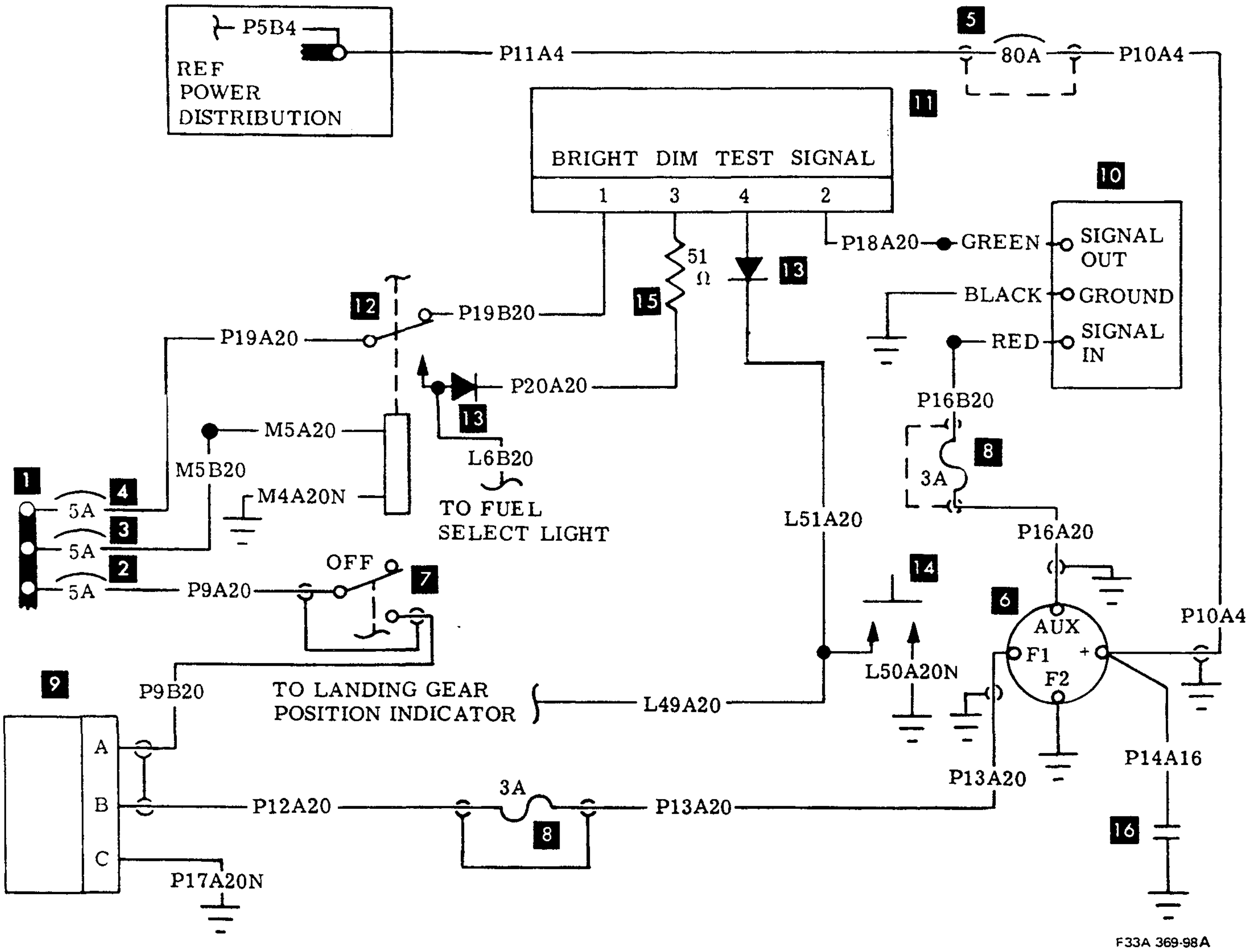
V35A-369-38

ALTERNATOR
D-8948 thru D-9068



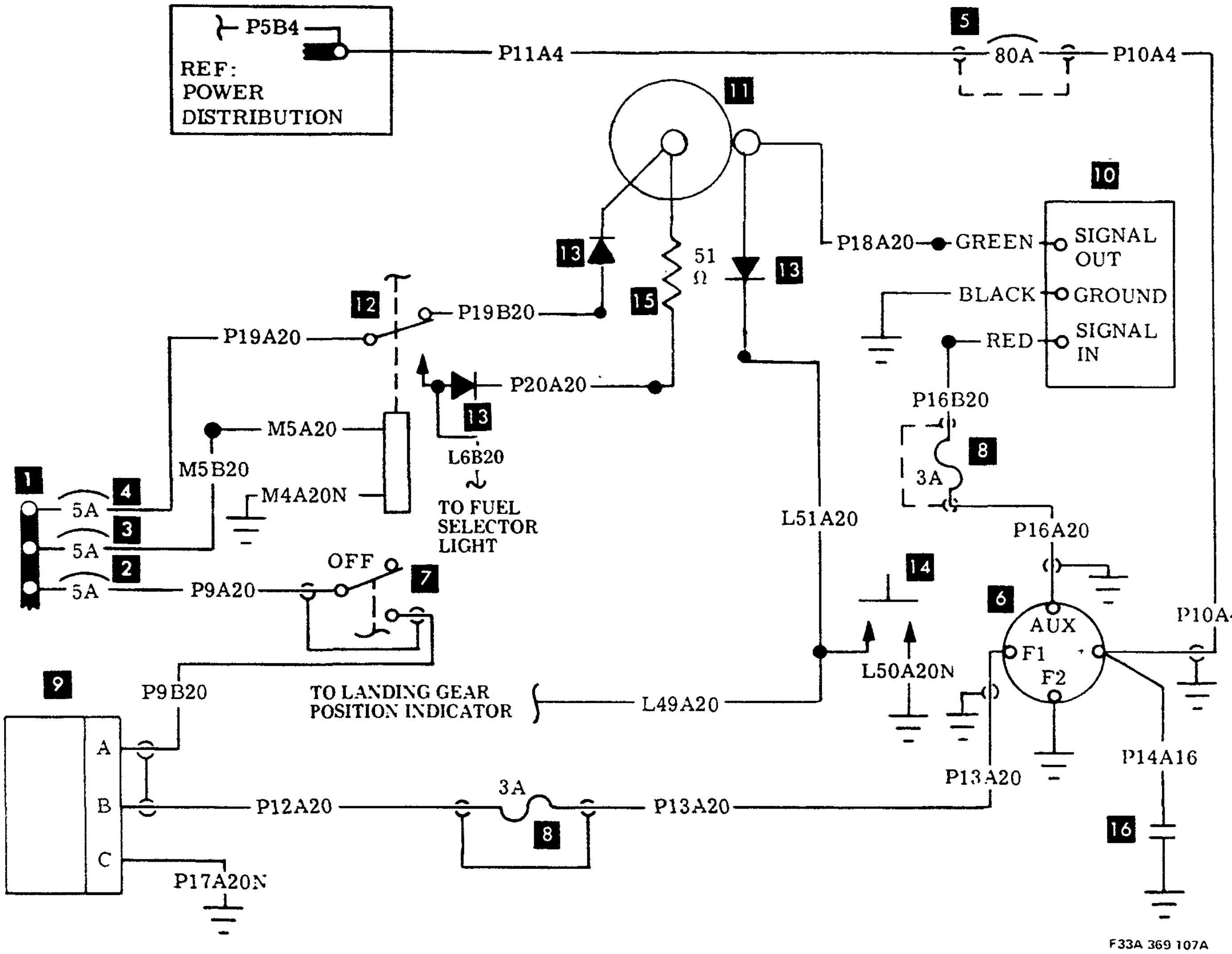
1. Bus
2. Alternator Field Circuit Breaker
3. Navigation Lights Circuit Breaker
4. Alternator Out Circuit Breaker
5. Alternator Circuit Breaker
6. Alternator
7. Alternator Master Switch
8. Fuse
9. Overvoltage Relay
10. Low Voltage Sensor
11. Alternator Out Light
12. Warning Light dim Relay
13. Diode
14. Warning Lights Switch
15. Resistor
16. Capacitor

ALTERNATOR
D-9069 thru D-9273



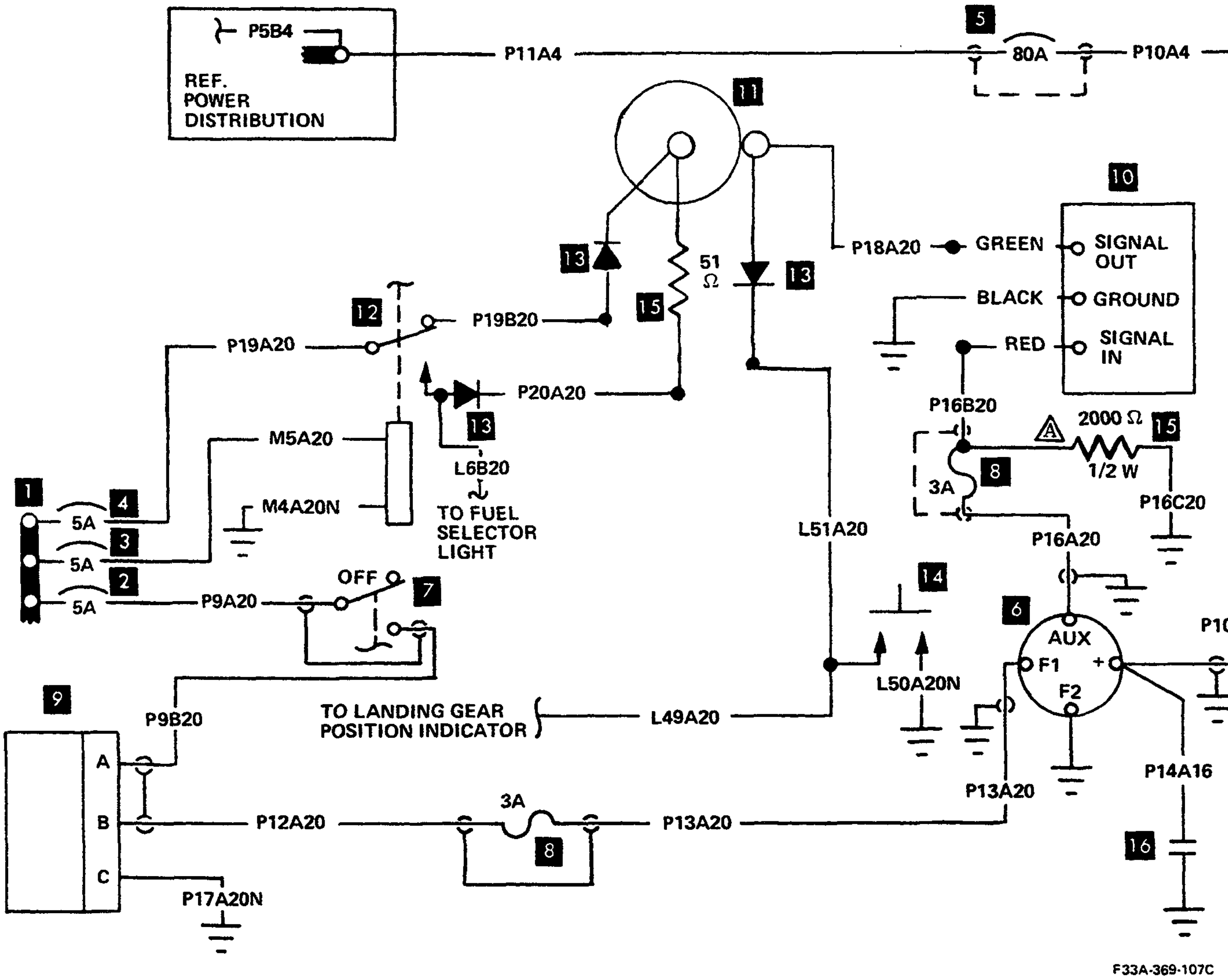
1. Bus
2. Alternator Field Circuit Breaker
3. Navigation Lights Circuit Breaker
4. Alternator Out Circuit Breaker
5. Alternator Circuit Breaker
6. Alternator
7. Alternator Master Switch
8. Fuse
9. Overvoltage Relay
10. Low Voltage Sensor
11. Alternator Out Light
12. Warning Light dim Relay
13. Diode
14. Warning Lights Switch
15. Resistor
16. Capacitor

ALTERNATOR
Model V35B (D-9274 thru D-9573)



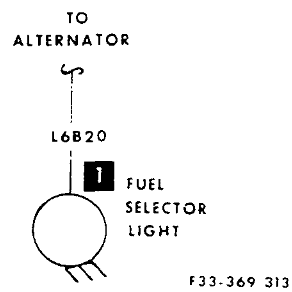
1 Bus
2 Alternator Field Circuit Breaker
3 Navigation Lights Circuit Breaker
4 Alternator Out Circuit Breaker
5 Alternator Circuit Breaker
6 Alternator
7 Alternator Master Switch
8 Fuse
9 Overvoltage Relay
10 Low Voltage Sensor
11 Alternator Out Light
12 Warning Light dim Relay
13 Diode
14 Warning Lights Switch
15 Resistor
16 Capacitor

ALTERNATOR
Model V35B(D-9574 thru D-9600, D-9641 and D-9642)

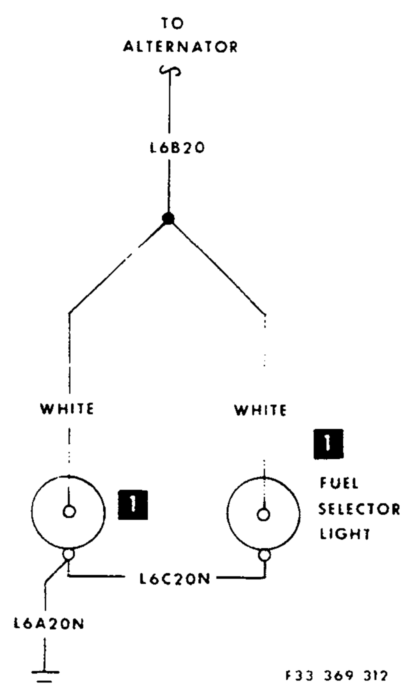


1. Bus
2. Alternator Field Circuit Breaker
3. Navigation Lights Circuit Breaker
4. Alternator Out Circuit Breaker
5. Alternator Circuit Breaker
6. Alternator
7. Alternator Master Switch
8. Fuse
9. Overvoltage Relay
10. Low Voltage Sensor
11. Alternator Out Light
12. Warning Light dim Relay
13. Diode
14. Warning Lights Switch
15. Resistor
16. Capacitor

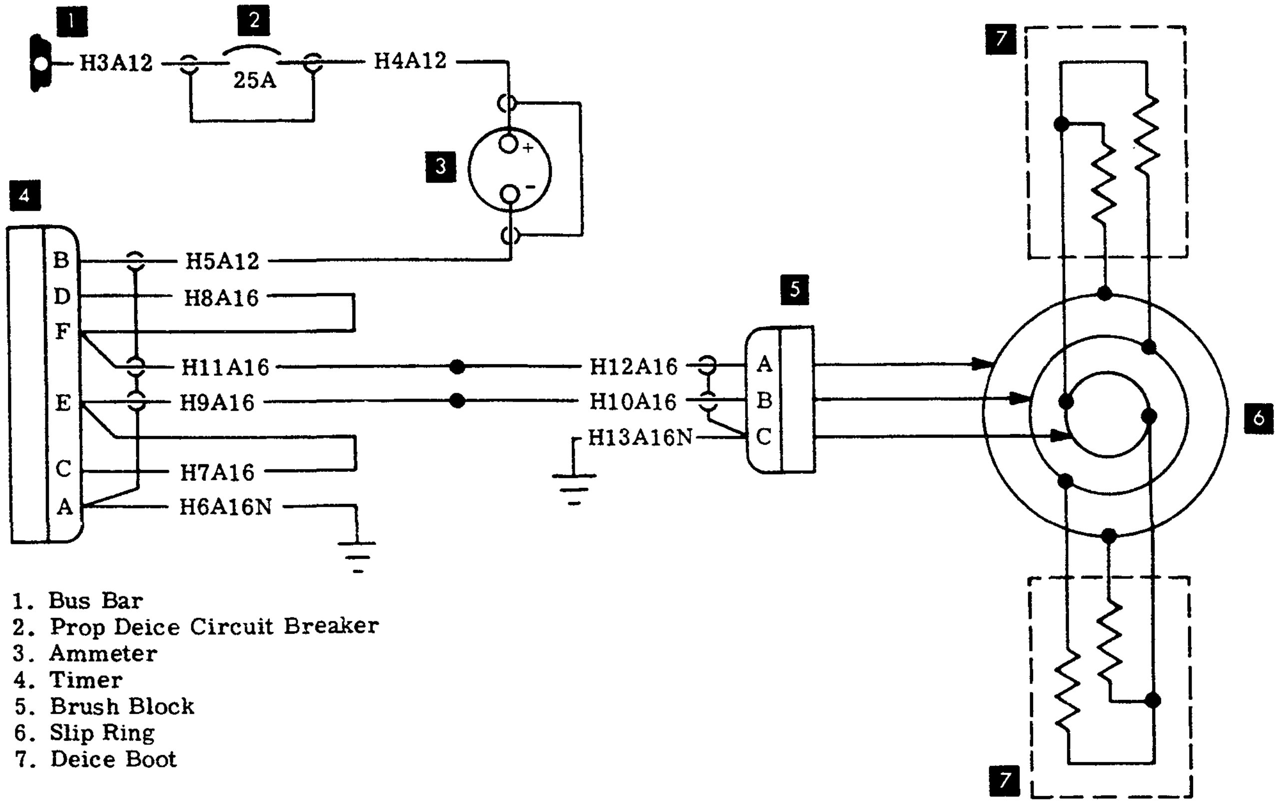
ALTERNATOR
D-9601 thru D-9817 except D-9641 and D-9642



FUEL SELECTOR LIGHT
Model V35B (D-9274 thru D-9537)

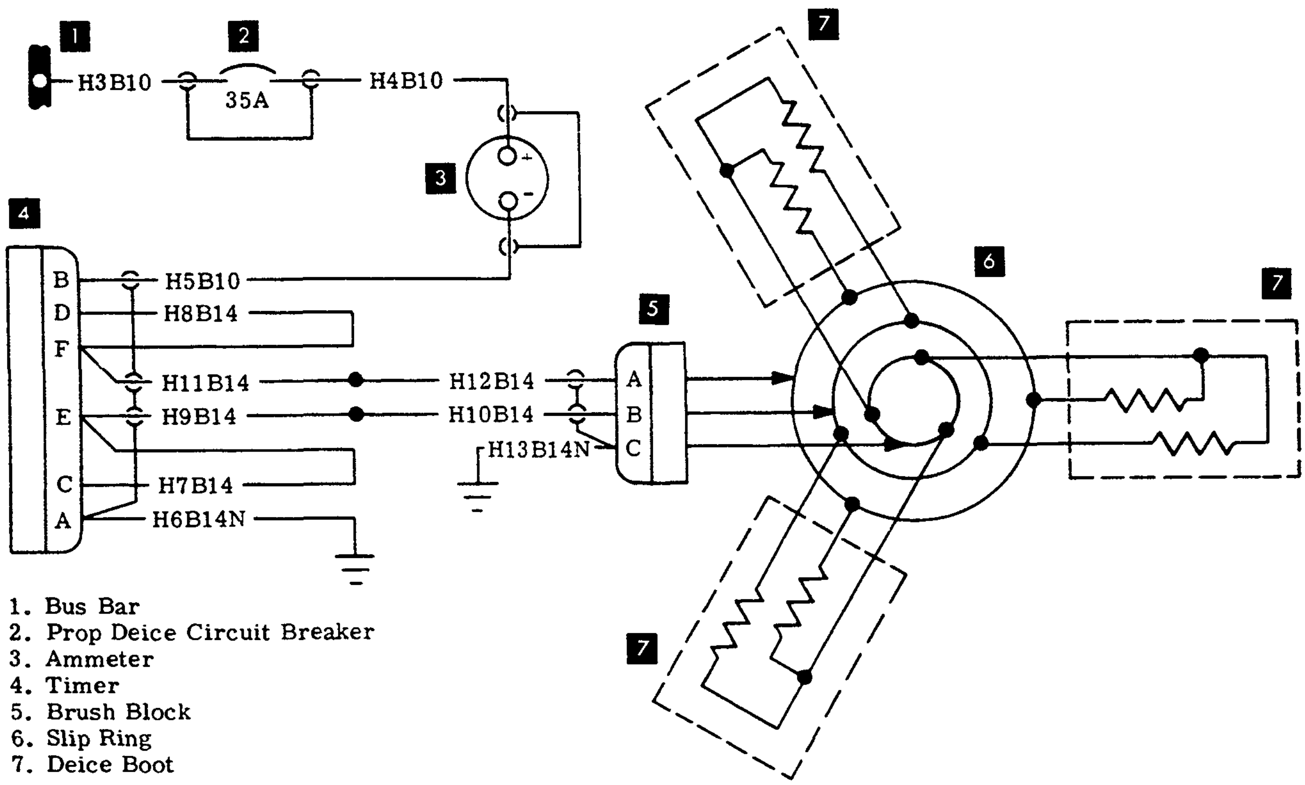


FUEL SELECTOR LIGHT
D-9538 thru D-9817



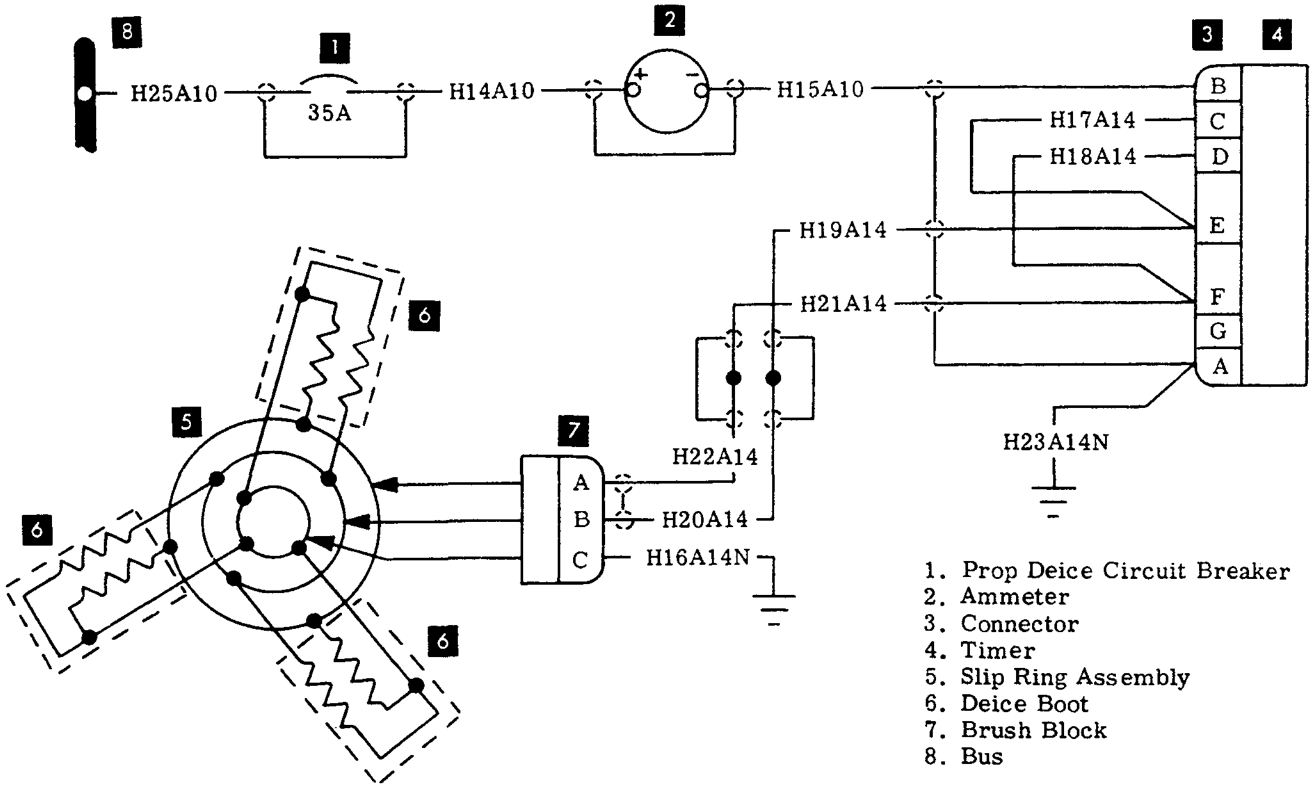
1. Bus Bar
2. Prop Deice Circuit Breaker
3. Ammeter
4. Timer
5. Brush Block
6. Slip Ring
7. Deice Boot

PROPELLER DEICE (TWO BLADED)
D-8407 thru D-9068



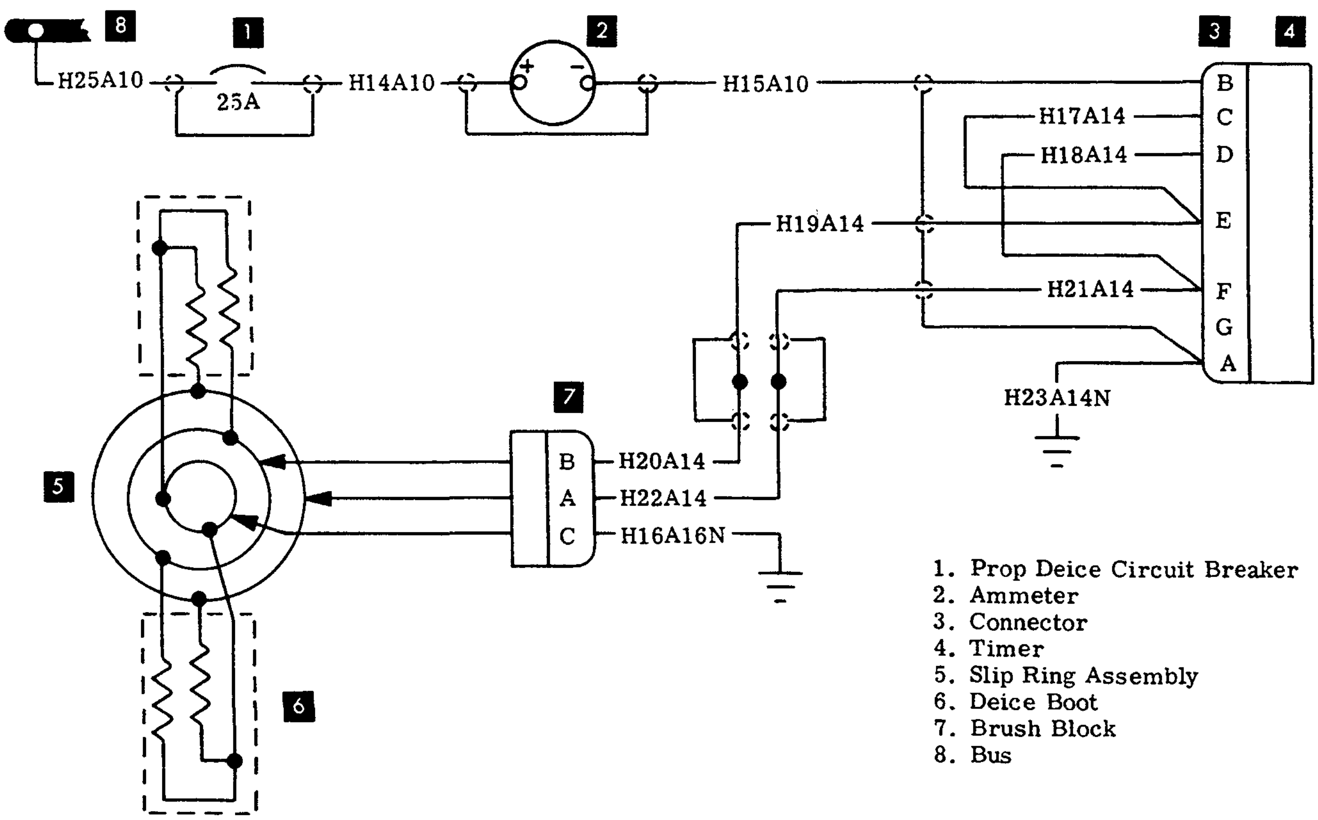
1. Bus Bar
2. Prop Deice Circuit Breaker
3. Ammeter
4. Timer
5. Brush Block
6. Slip Ring
7. Deice Boot

PROPELLER DEICE (THREE BLADED)
D-8532 thru D-9068



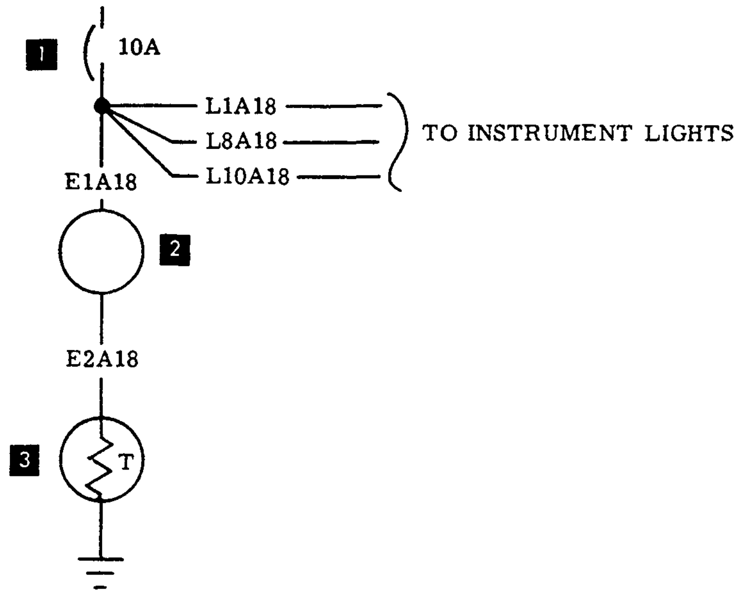
1. Prop Deice Circuit Breaker
2. Ammeter
3. Connector
4. Timer
5. Slip Ring Assembly
6. Deice Boot
7. Brush Block
8. Bus

PROPELLER DEICE (THREE BLADED)
D-9069 thru D-9817



1. Prop Deice Circuit Breaker
2. Ammeter
3. Connector
4. Timer
5. Slip Ring Assembly
6. Deice Boot
7. Brush Block
8. Bus

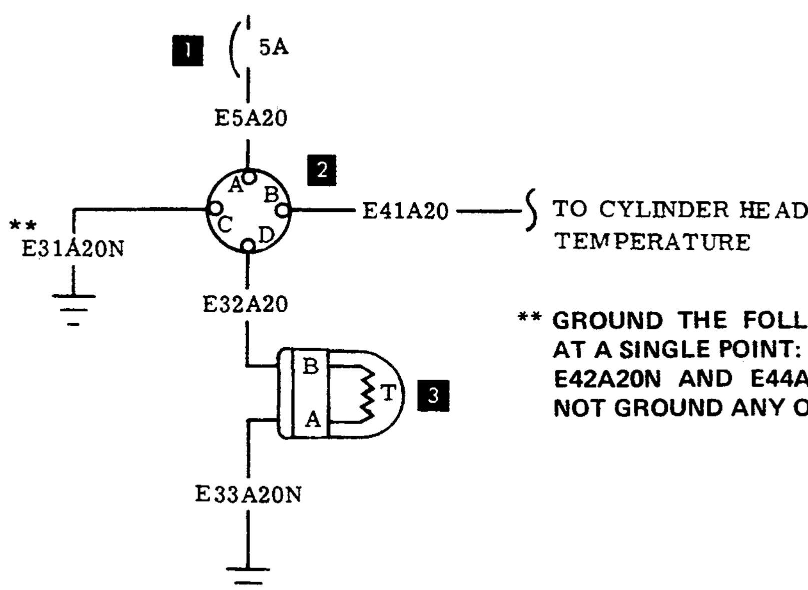
PROPELLER DEICE (TWO BLADED)
D-9096 thru D-9817



1. Instrument Lights Circuit Breaker
2. Oil Temperature Indicator
3. Oil Temperature Transmitter

V35-369-44

OIL TEMPERATURE
D-7977 thru D-9069

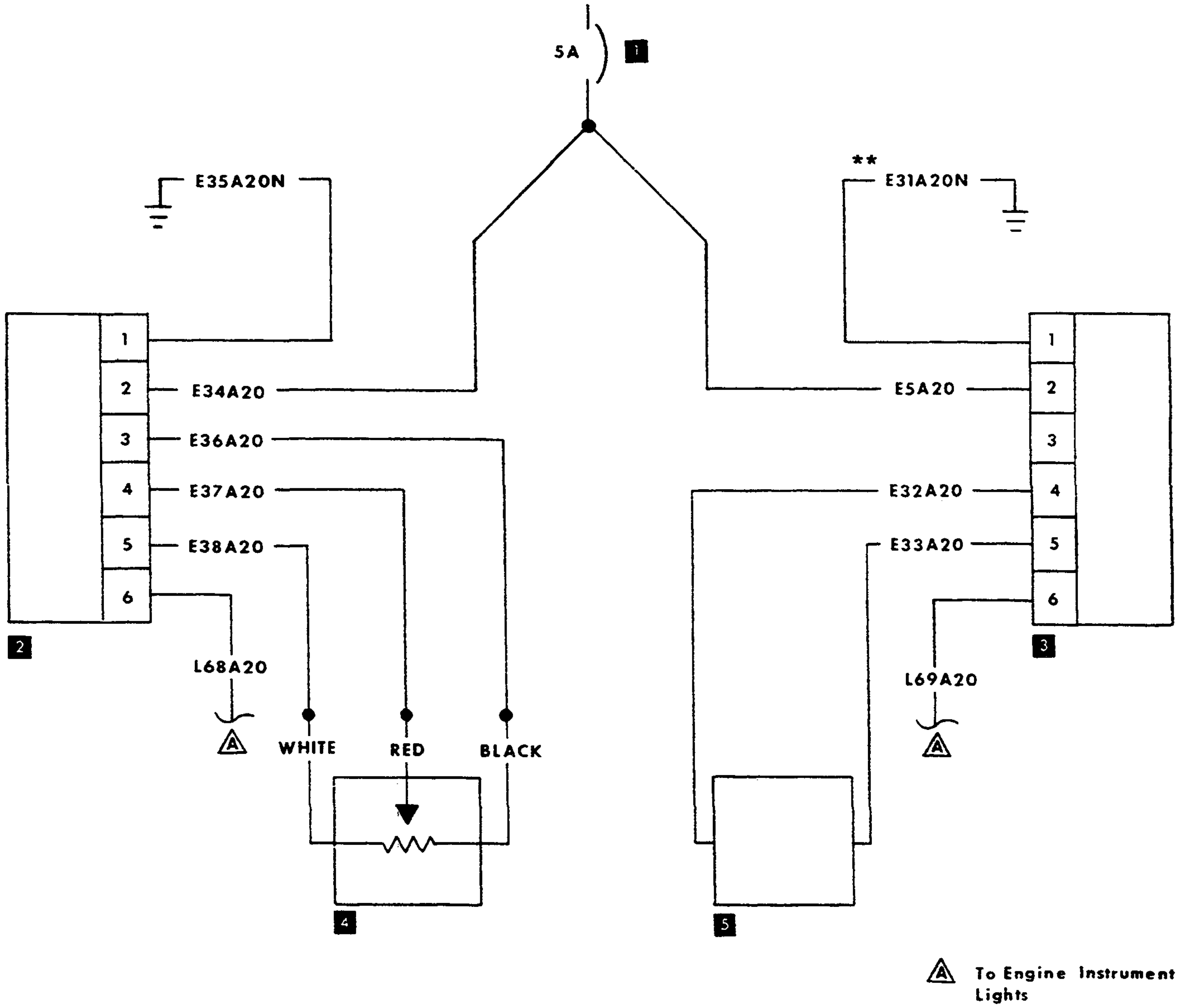


** GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Cylinder Head and Oil Temperature Circuit Breaker
2. Cylinder head, Oil Temperature, and Oil Pressure Indicator
3. Oil Temperature Transmitter Bulb

V35B-369-45

OIL TEMPERATURE
D-9069 thru D-9221

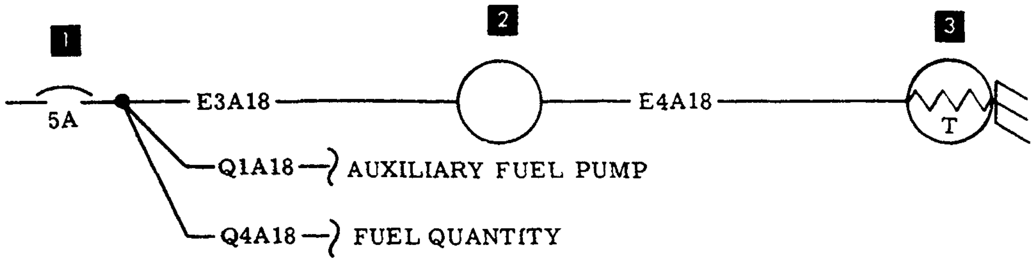


** GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (OIL TEMPERATURE), E39A20N (CYLINDER HEAD TEMPERATURE), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

35-369-74

1. Circuit Breaker
2. Oil Pressure Indicator
3. Oil Temperature Indicator
4. Oil Pressure Transmitter
5. Oil Temperature Transmitter

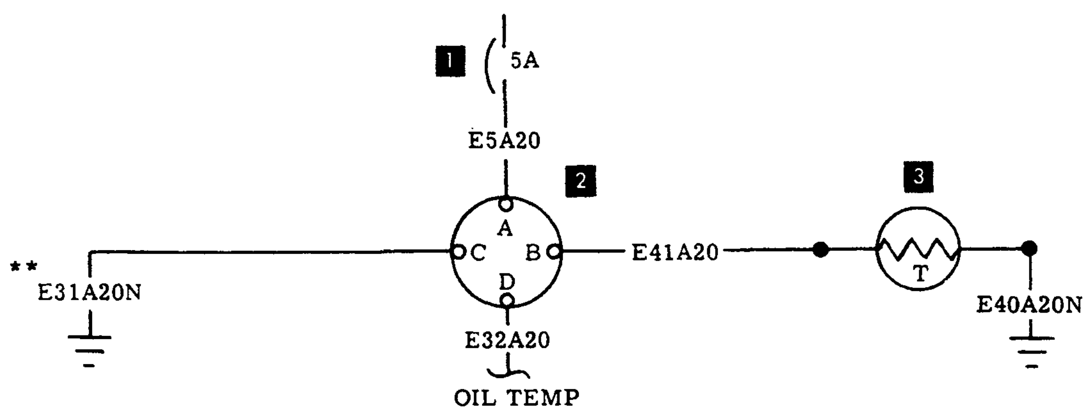
OIL TEMPERATURE AND OIL PRESSURE (Vertical Instruments)
Model V35B (D-9222 thru D -9390)



1. Fuel Quantity Indicator Cylinder Head Temperature and Auxiliary Fuel Pump Circuit Breaker
2. Cylinder Head Temperature Indicator
3. Cylinder Head Temperature Transmitter

V35-369-46

CYLINDER HEAD TEMPERATURE
D-7977 thru D-9068

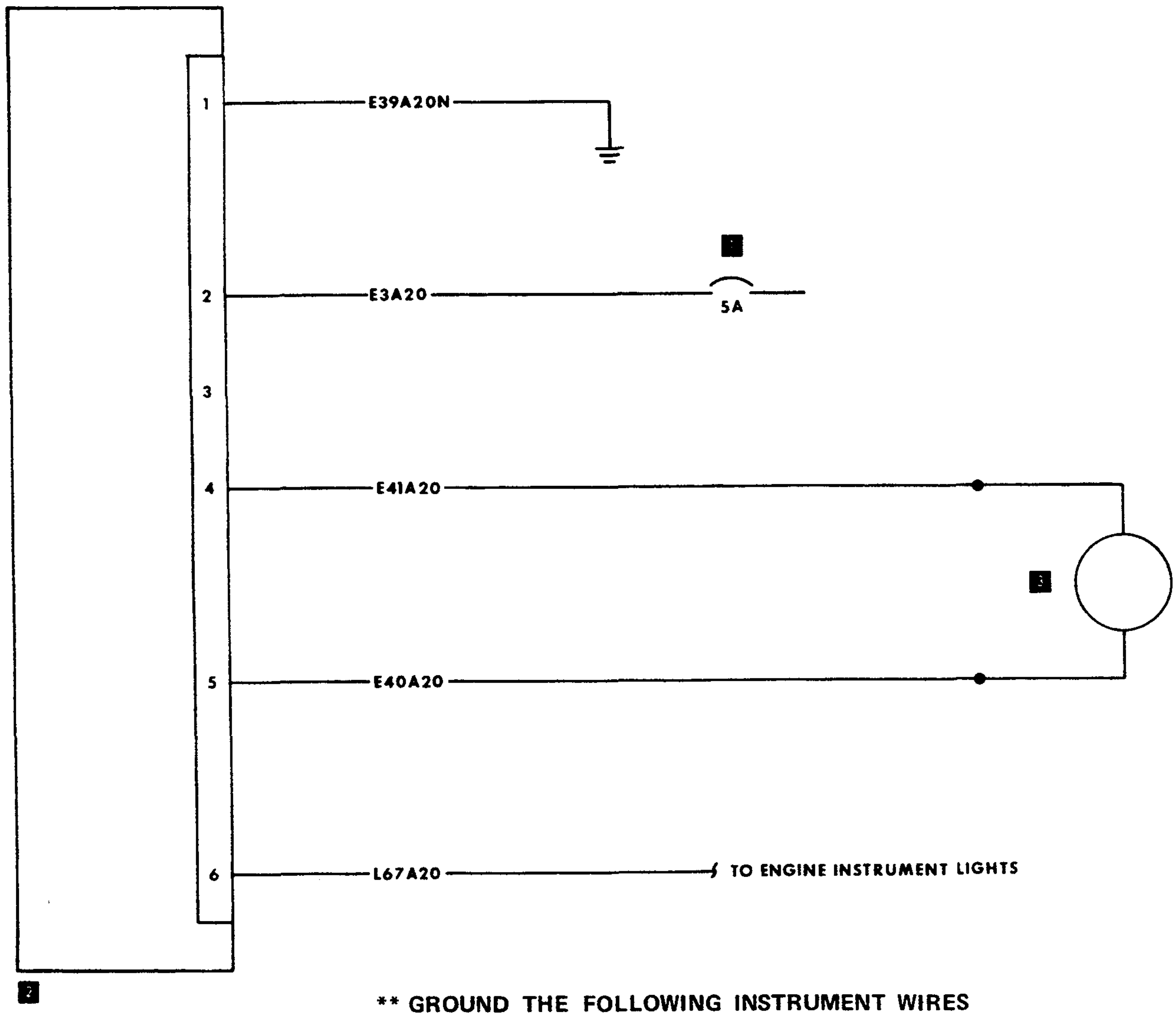


** GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (CYLINDER HEAD), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

1. Cylinder Head and Oil Temperature Circuit Breaker
2. Cylinder Head, Oil Temperature, and Oil Pressure Indicator
3. Cylinder Head Temperature Transmitter Bulb

V35B-369-47

CYLINDER HEAD TEMPERATURE
D-9069 thru D-9221

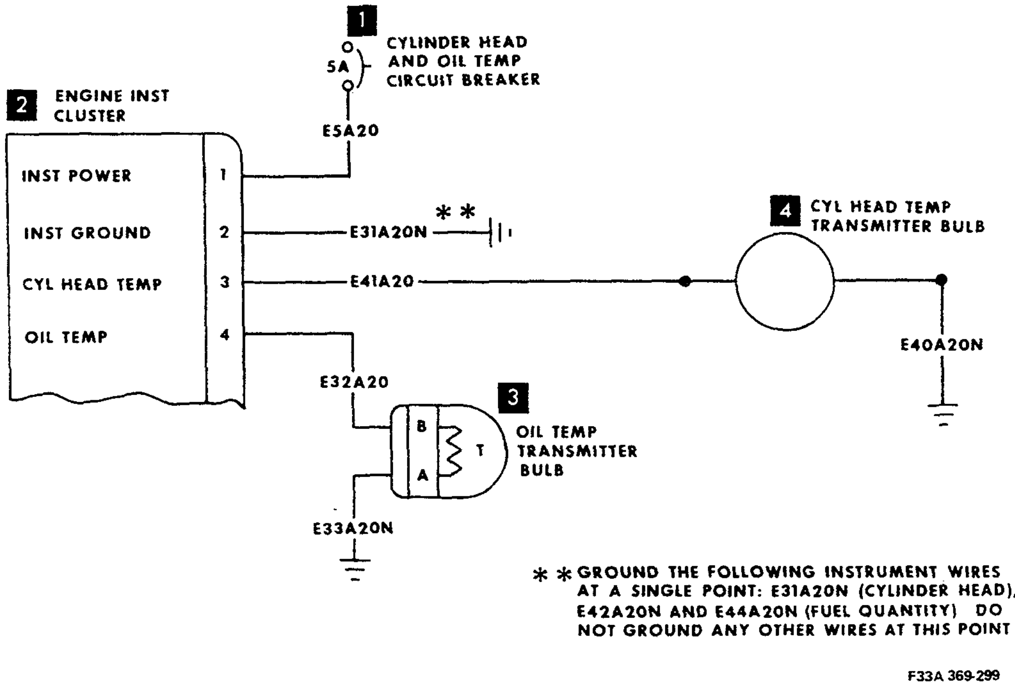


** GROUND THE FOLLOWING INSTRUMENT WIRES AT A SINGLE POINT: E31A20N (OIL TEMPERATURE), E39A20N (CYLINDER HEAD TEMPERATURE), E42A20N AND E44A20N (FUEL QUANTITY). DO NOT GROUND ANY OTHER WIRES AT THIS POINT.

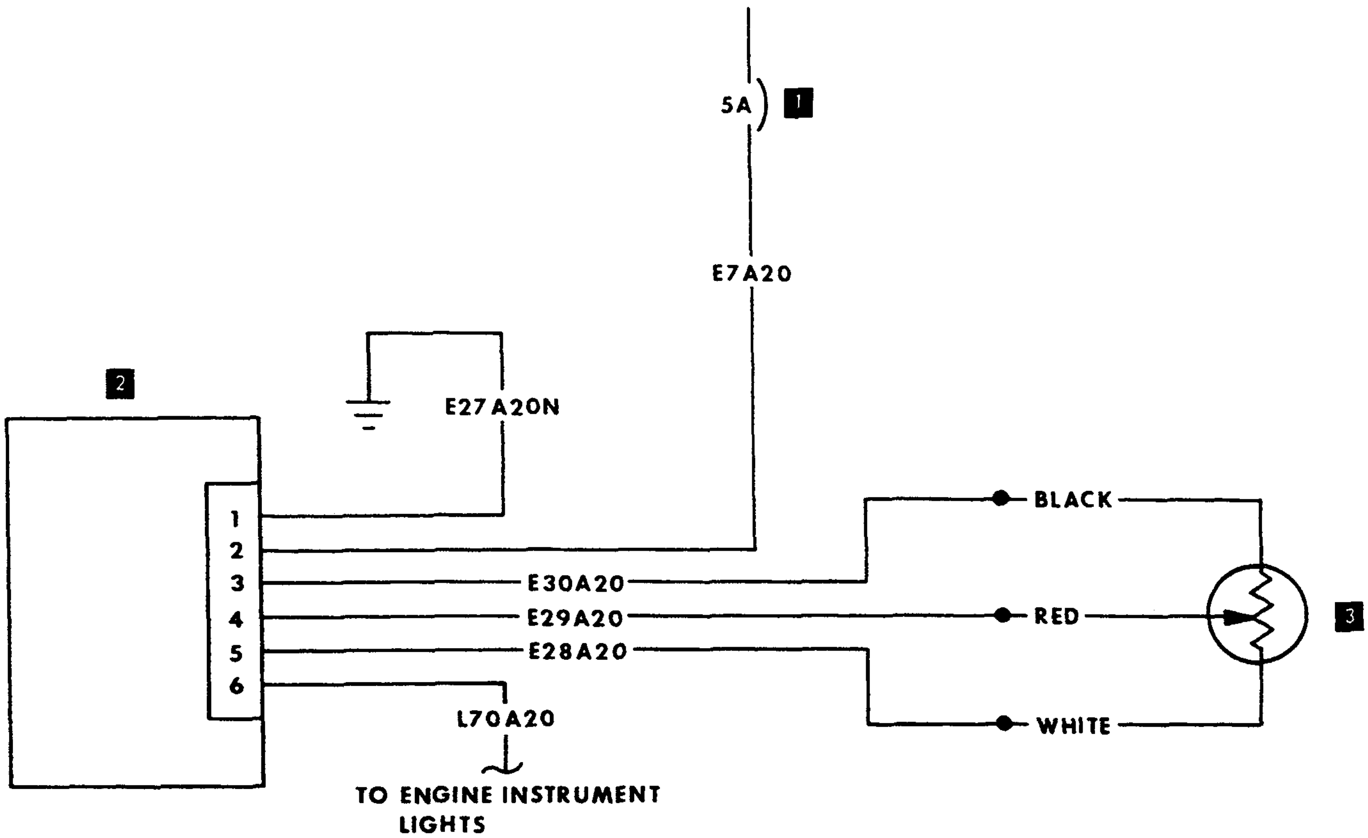
1 Circuit Breaker
2 Cylinder Head Temperature Indicator
3 Cylinder Head Temperature Transmitter

35-369-73

CYLINDER HEAD TEMPERATURE (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



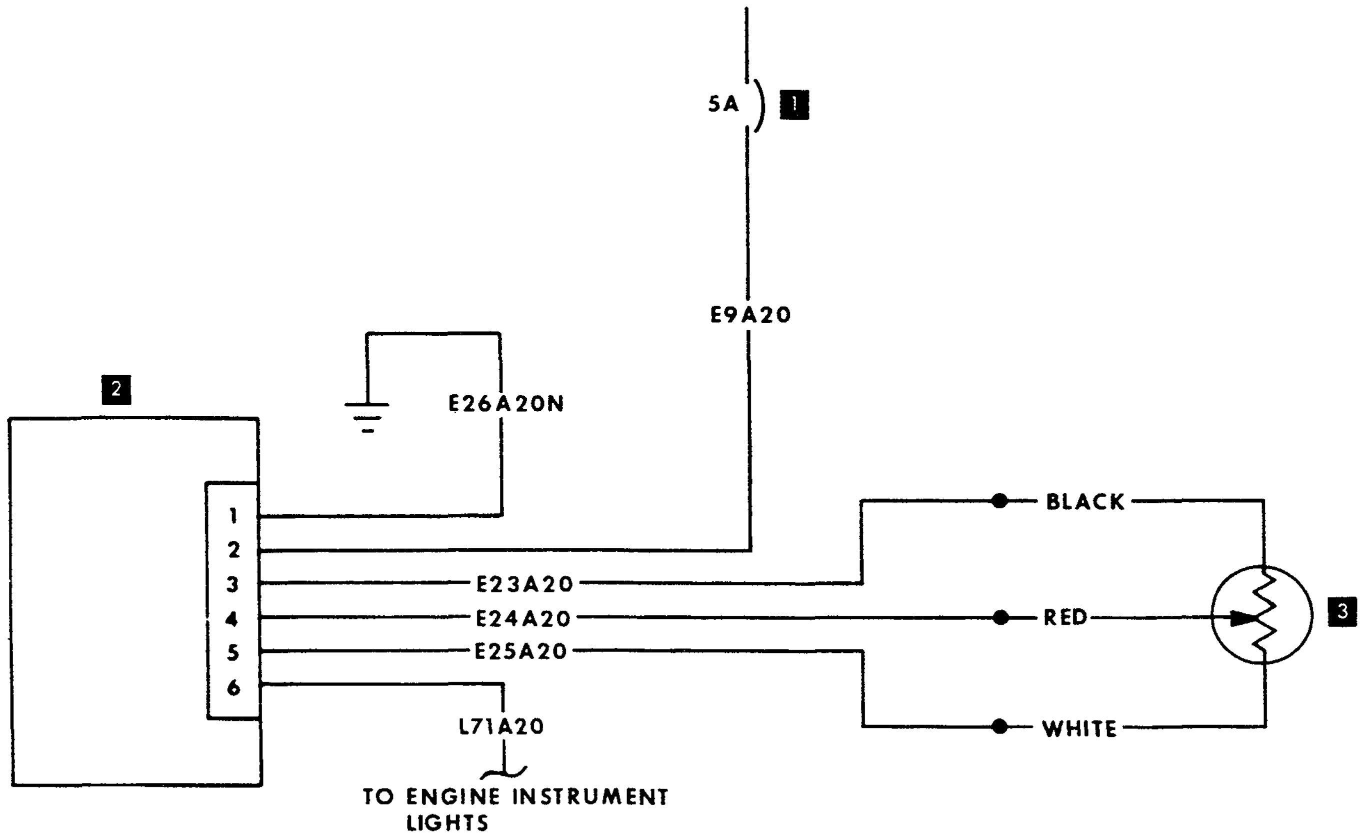
CYLINDER HEAD AND OIL TEMPERATURE
D-9391 thru D-9817



1. Circuit Breaker
2. Manifold Pressure Indicator
3. Manifold Pressure Transducer

35-369-72

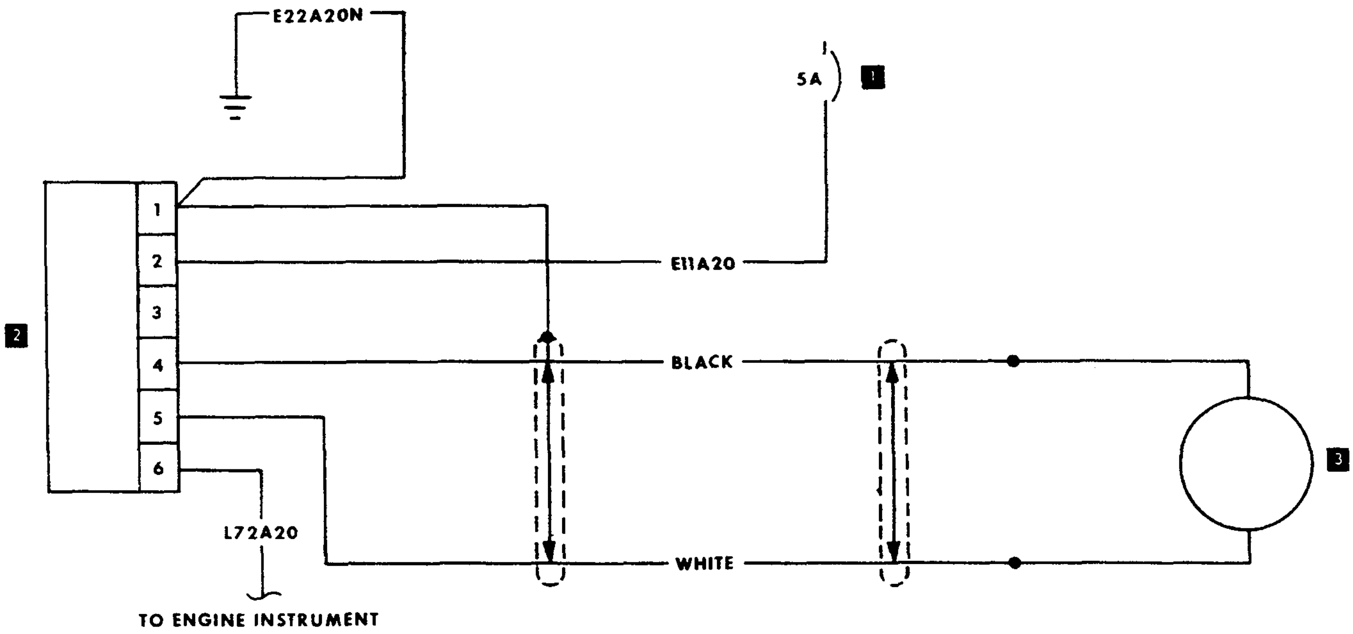
MANIFOLD PRESSURE (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



1. Circuit Breaker
2. Fuel Flow Indicator
3. Fuel Flow Transducer

35-369-71

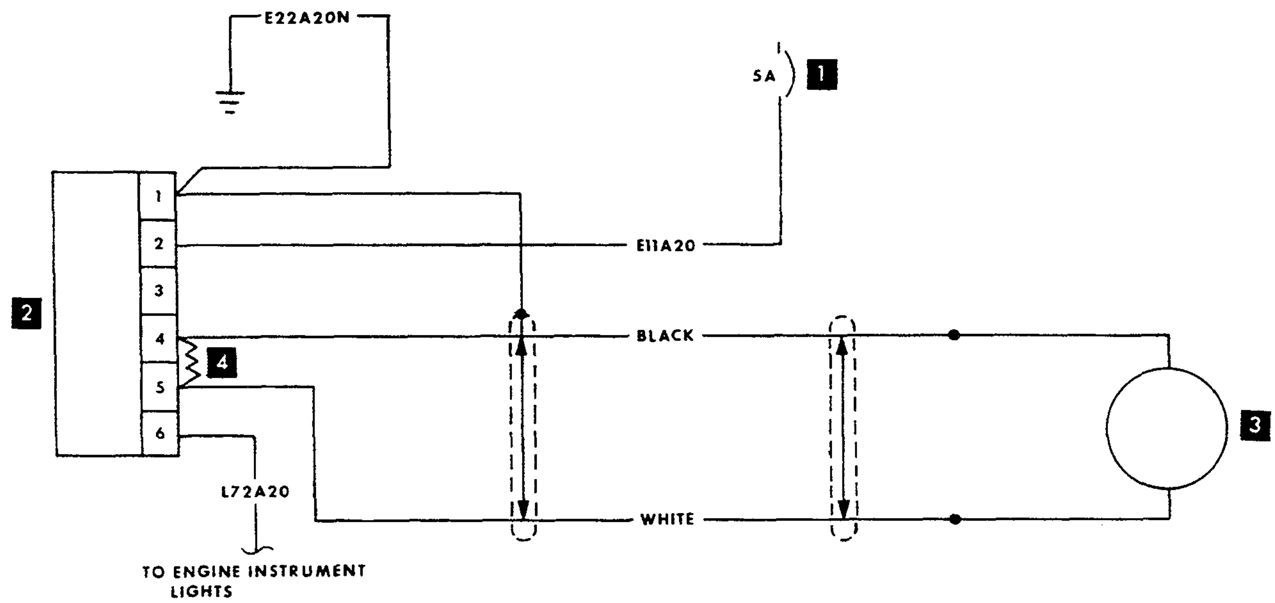
FUEL FLOW (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



1. Circuit Breaker
2 Tachometer Indicator
3. Tachometer Pickup Probe

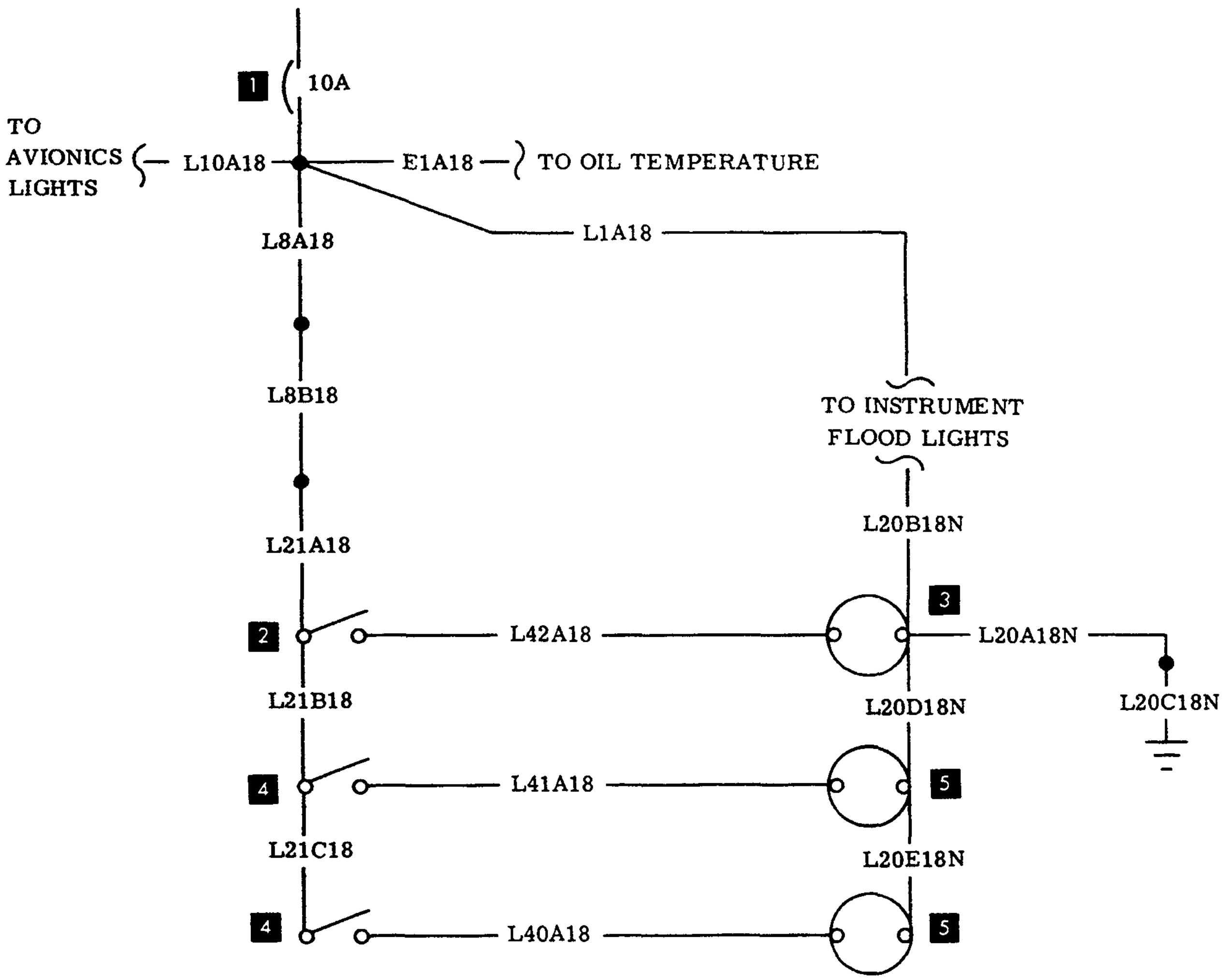
35-369-77

TACHOMETER (Vertical Instruments)
Model V35B (D-9222 thru D-9362)



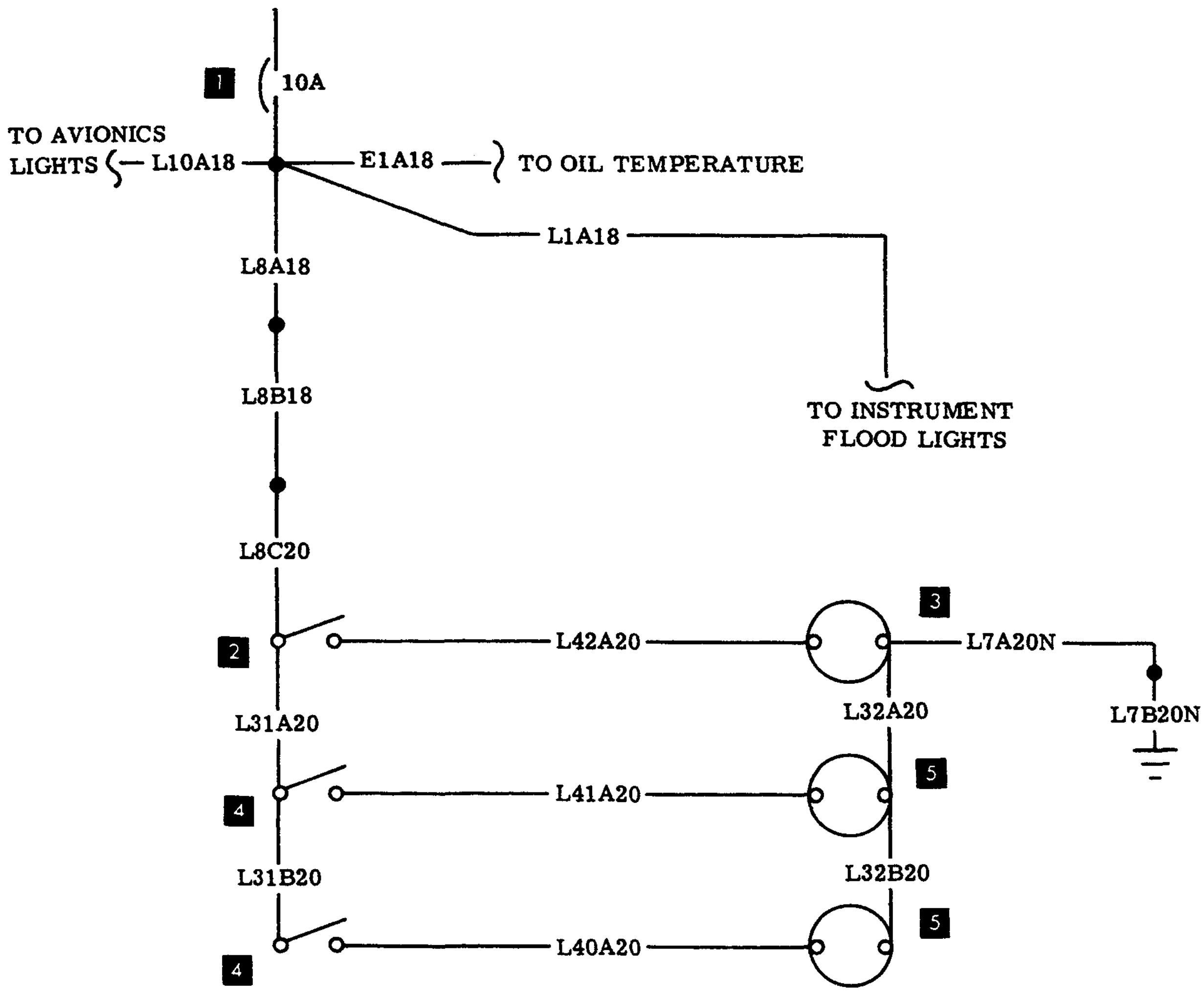
1 Circuit Breaker
2. Tachometer Indicator
3 Tachometer Pickup Probe
4 Resistor

TACHOMETER (Vertical Instruments)
Model V35B (D-9363 thru D-9390)



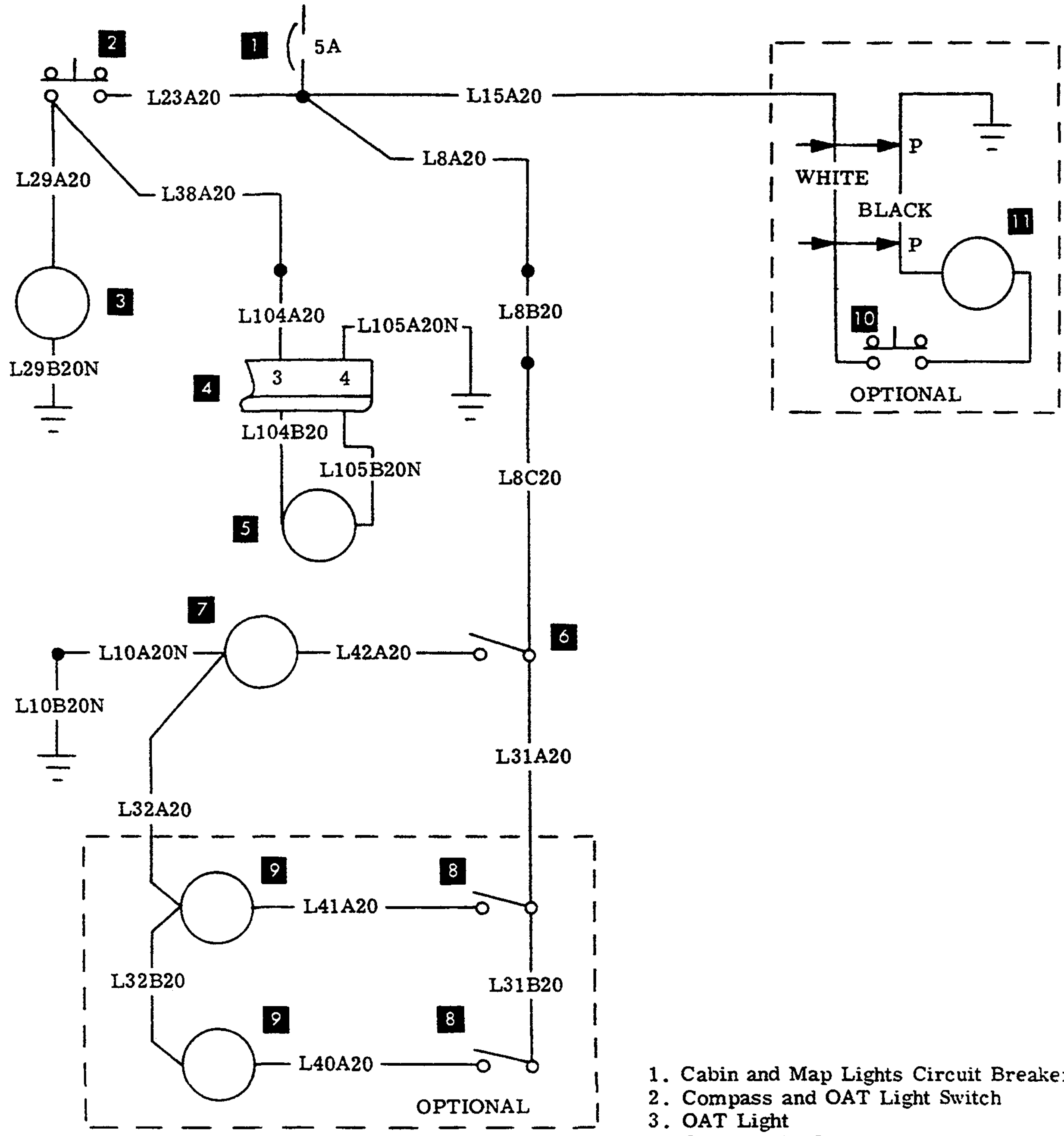
1. Oil Temperature, Radio Instrument, and Cabin Lights Circuit Breaker
2. Cabin Light Switch
3. Cabin Light
4. Reading Light Switch
5. Reading Light

CABIN LIGHTS
D-7977 thru D-8598



1. Oil Temperature, Radio Instrument, and Cabin Lights Circuit Breaker
2. Cabin Light Switch
3. Cabin Light
4. Reading Light Switch
5. Reading Light

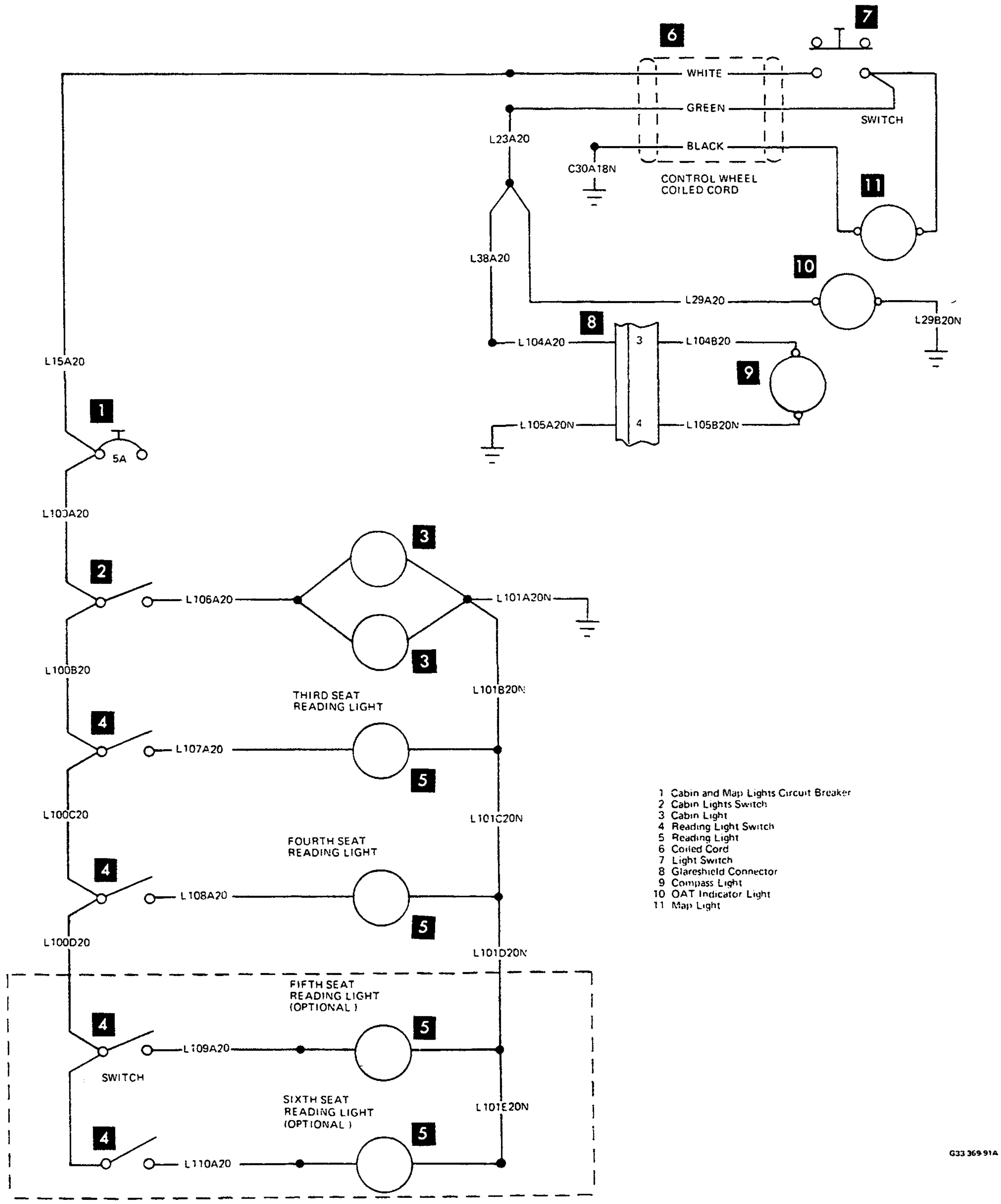
CABIN LIGHTS
D-8599 thru D-9068



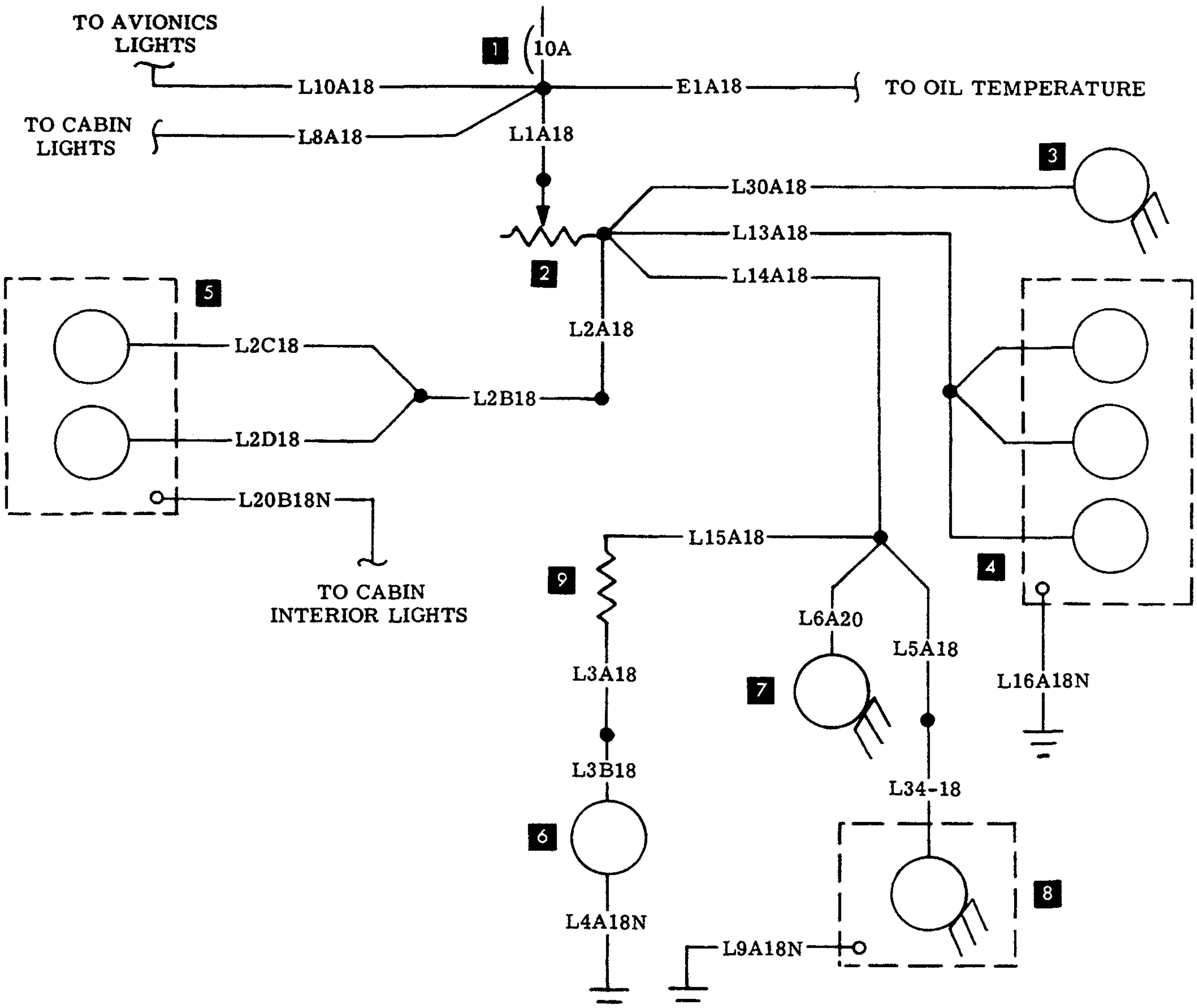
1. Cabin and Map Lights Circuit Breaker
2. Compass and OAT Light Switch
3. OAT Light
4. Glareshield Connector
5. Compass Light
6. Cabin Light Switch
7. Cabin Light
8. Reading Light Switch
9. Reading Light
10. Map Light Switch
11. Map Light

V35B-369-50

CABIN AND MAP LIGHTS
D-9069 thru D-9286

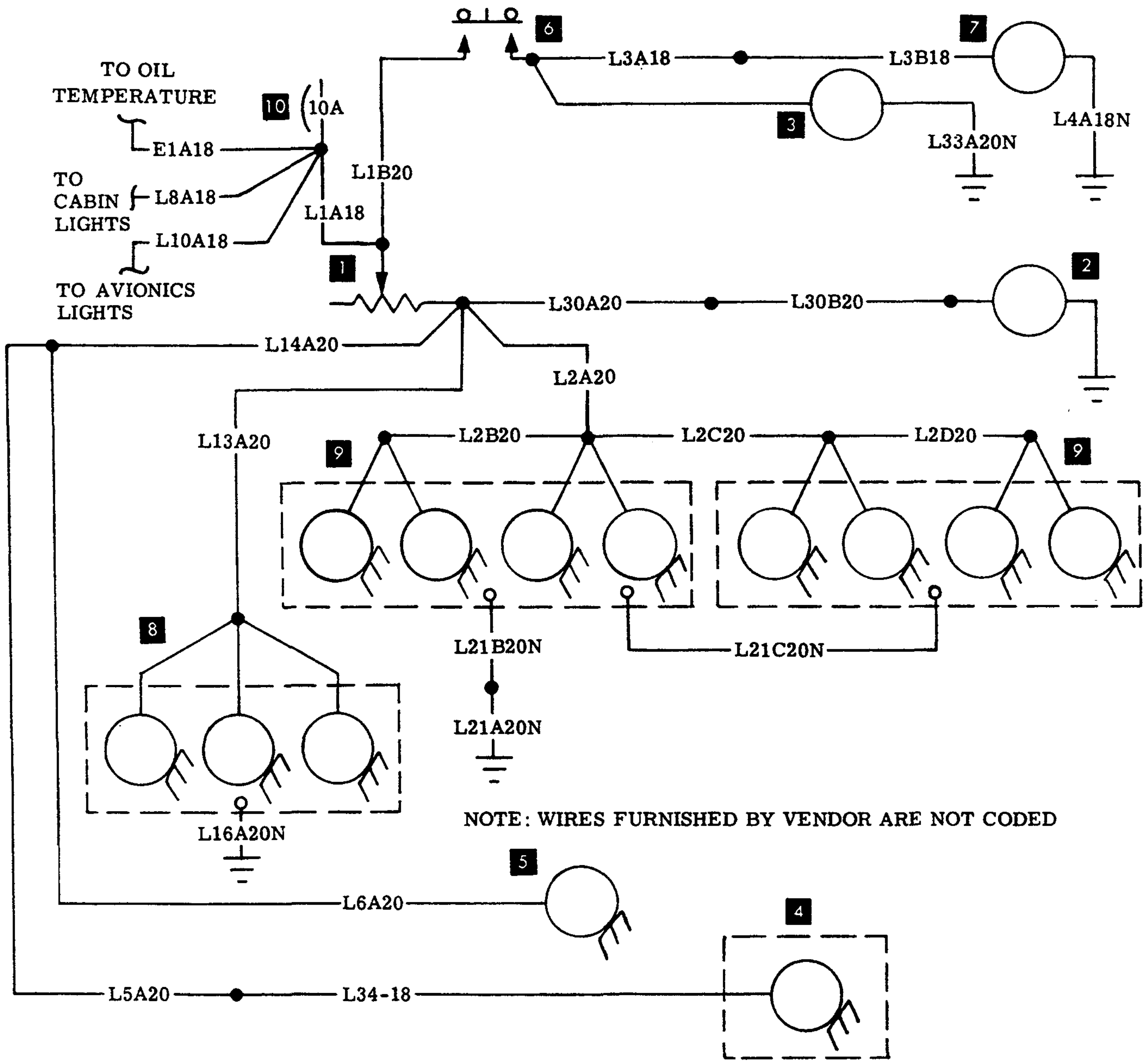


CABIN AND MAP LIGHTS
D-9287 thru D-9817



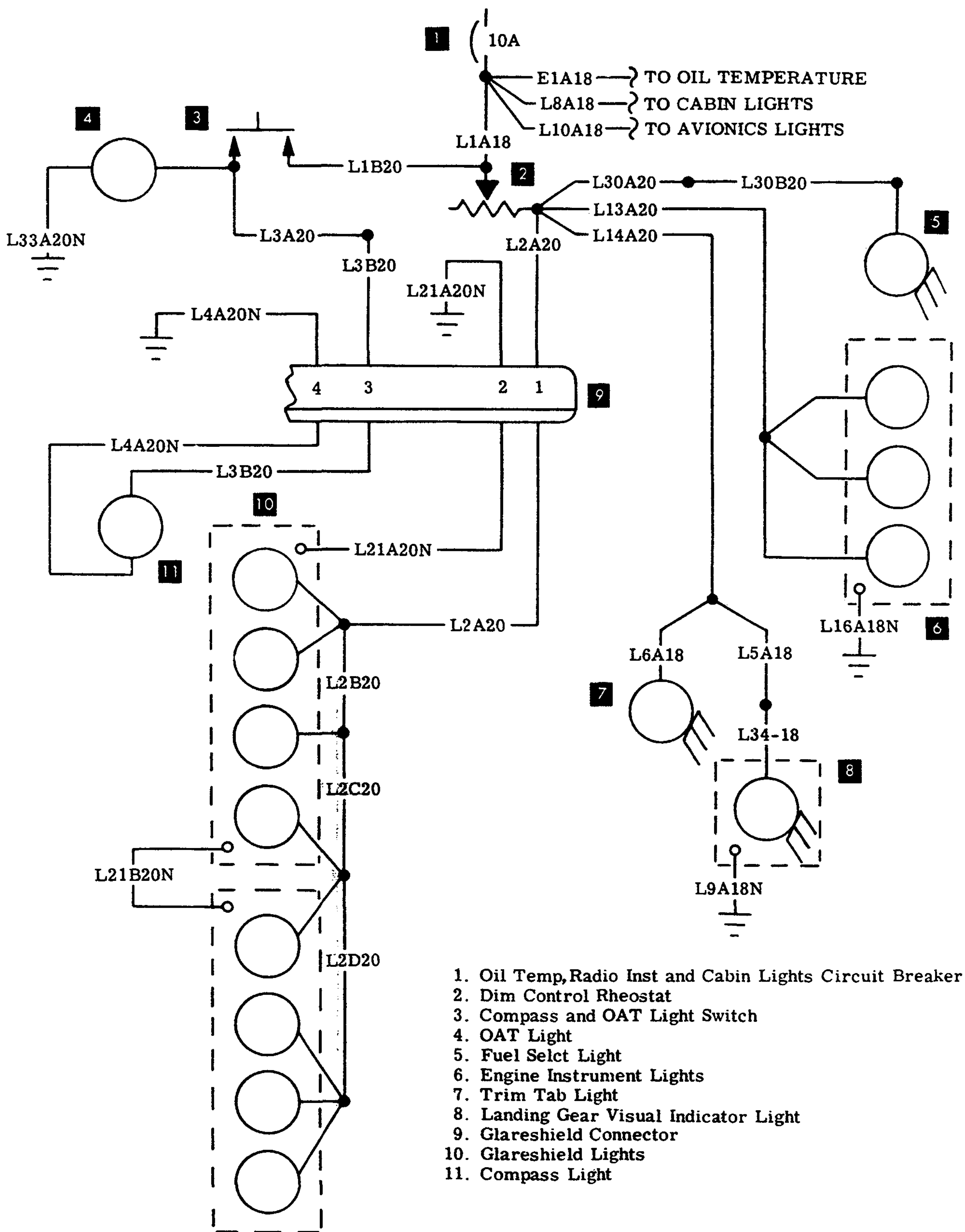
1. Oil Temperature, Radio, Instrument, and Cabin Lights Circuit Breaker
2. Dim Control Rheostat
3. Fuel Select Light
4. Engine Instrument Lights
5. Glareshield Lights
6. Compass Light
7. Trim Tab Indicator Light
8. LG Visual Indicator Light
9. Resistor

INSTRUMENT FLOOD LIGHTS
D-7977 thru D-8598



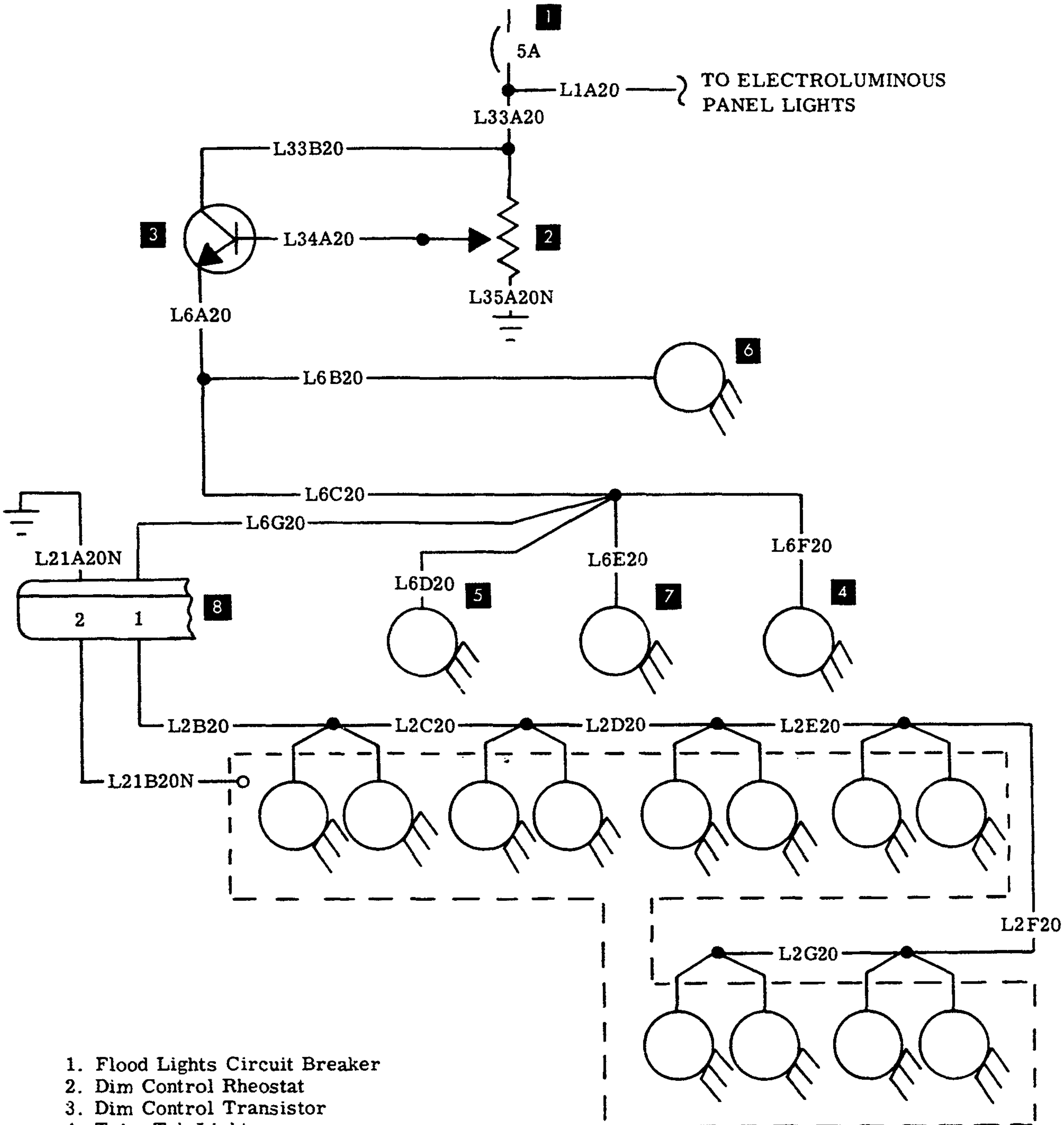
1. Instrument Light Rheostat
2. Fuel Panel Light
3. OAT Light
4. Landing Gear Visual Indicator Light
5. Trim Tab Indicator Light
6. Compass and OAT Light Switch
7. Compass Light
8. Engine Instrument Lights
9. Glareshield Instrument Flood Lights
10. Oil Temp, Radio, Instrument, and Cabin lights Circuit Breaker

INSTRUMENT FLOOD LIGHTS
D-8599 thru D-8892



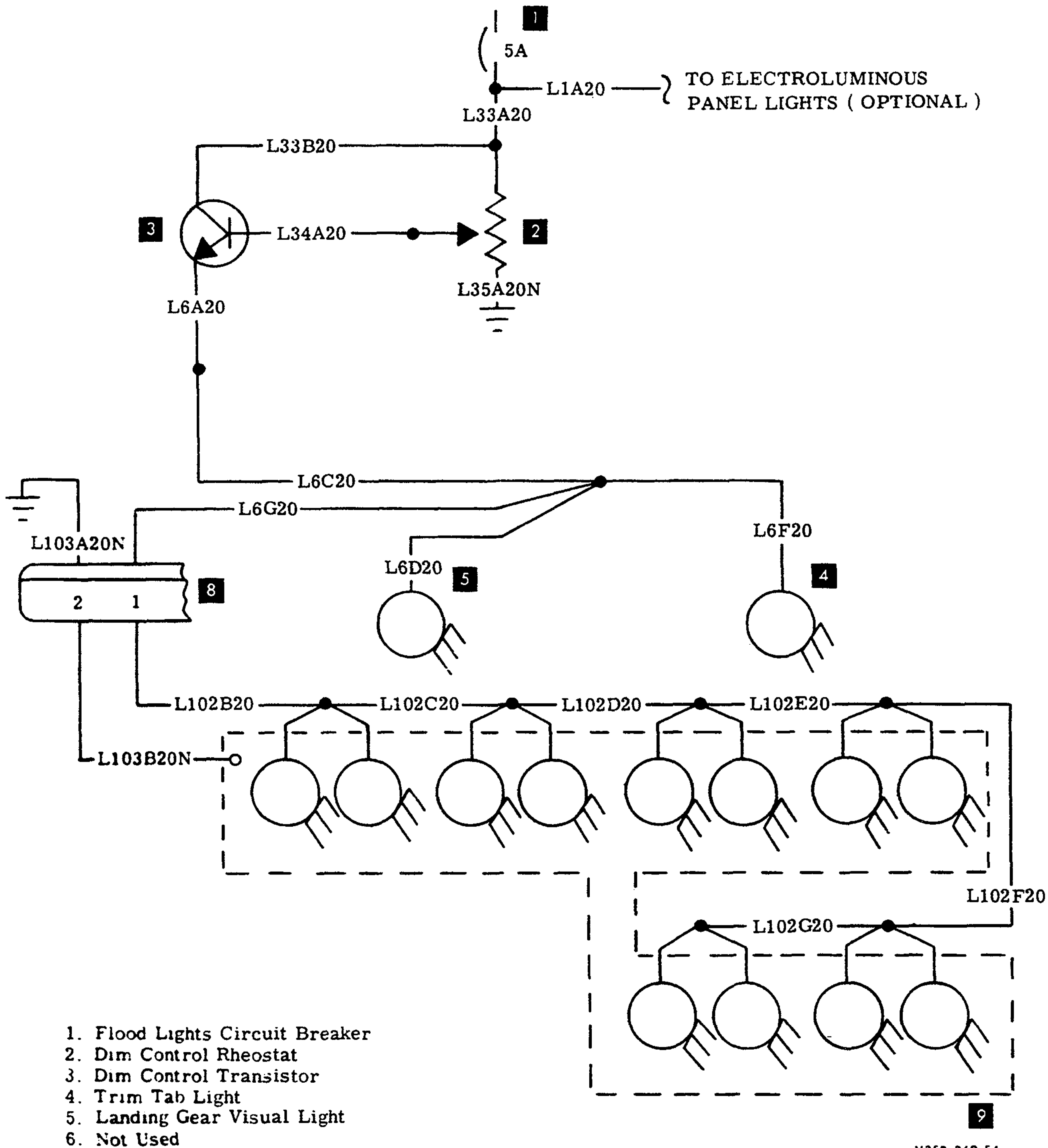
1. Oil Temp, Radio Inst and Cabin Lights Circuit Breaker
2. Dim Control Rheostat
3. Compass and OAT Light Switch
4. OAT Light
5. Fuel Selct Light
6. Engine Instrument Lights
7. Trim Tab Light
8. Landing Gear Visual Indicator Light
9. Glareshield Connector
10. Glareshield Lights
11. Compass Light

INSTRUMENT FLOOD LIGHTS
D-8893 thru D-9068



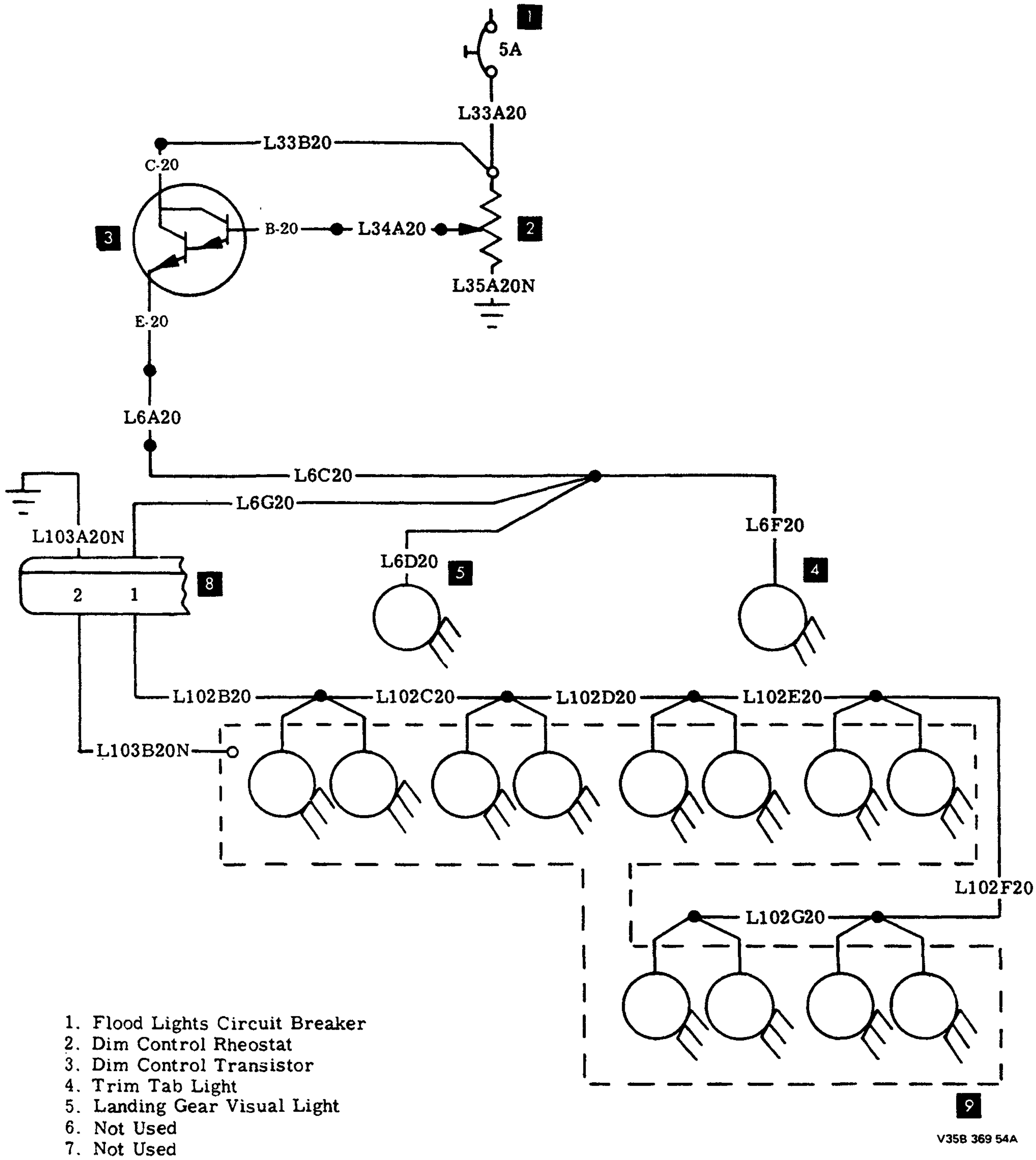
1. Flood Lights Circuit Breaker
2. Dim Control Rheostat
3. Dim Control Transistor
4. Trim Tab Light
5. Landing Gear Visual Light
6. Fuel Select Light
7. Clock Light (Optional)
8. Glareshield Connector
9. Glareshield Flood Lights

INSTRUMENT FLOOD LIGHTS
D-9069 thru D-9286



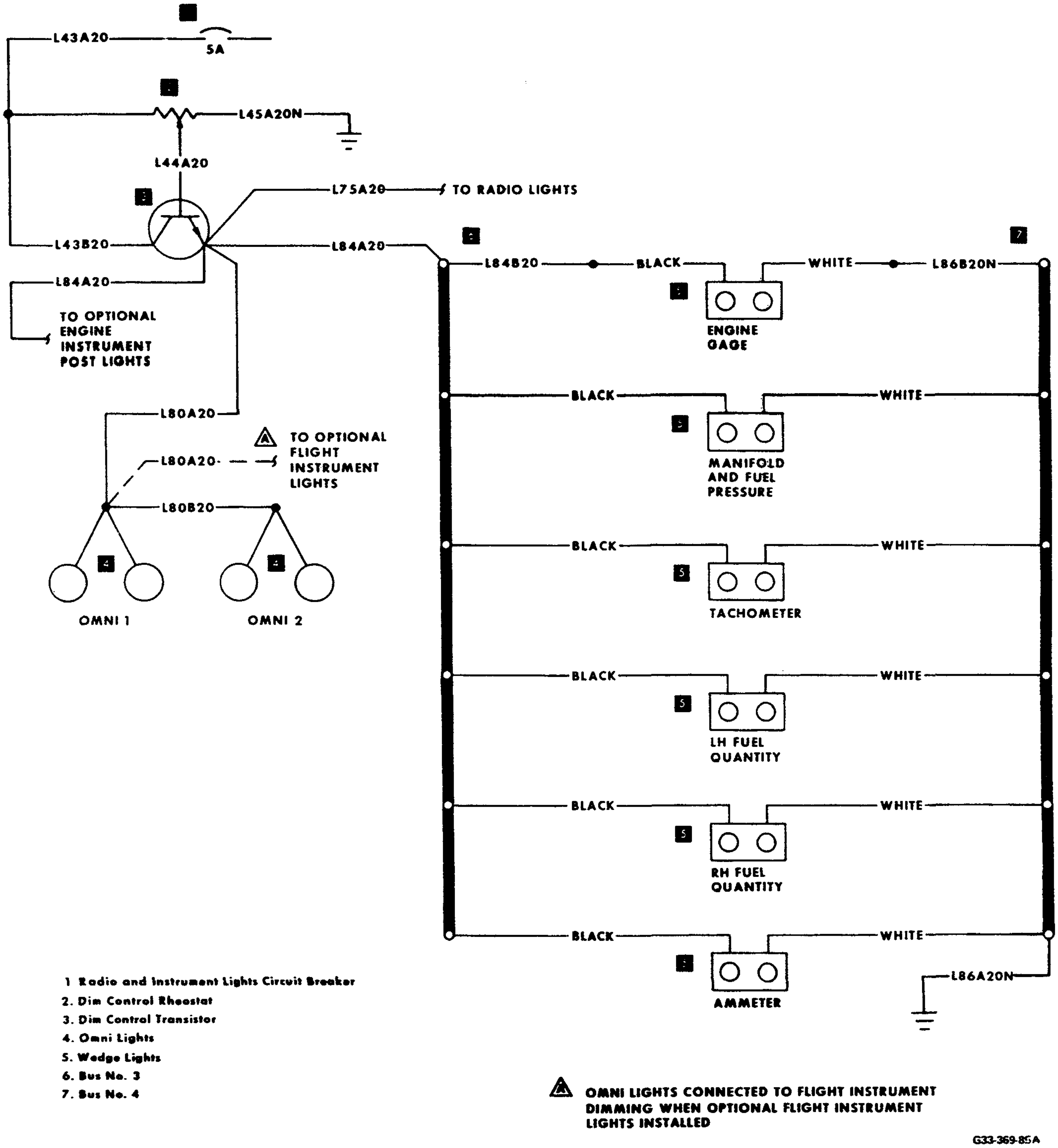
1. Flood Lights Circuit Breaker
2. Dim Control Rheostat
3. Dim Control Transistor
4. Trim Tab Light
5. Landing Gear Visual Light
6. Not Used
7. Not Used
8. Glareshield Connector
9. Glareshield Flood Lights

INSTRUMENT FLOOD LIGHTS
Model V35B (D-9287 thru D-9559)

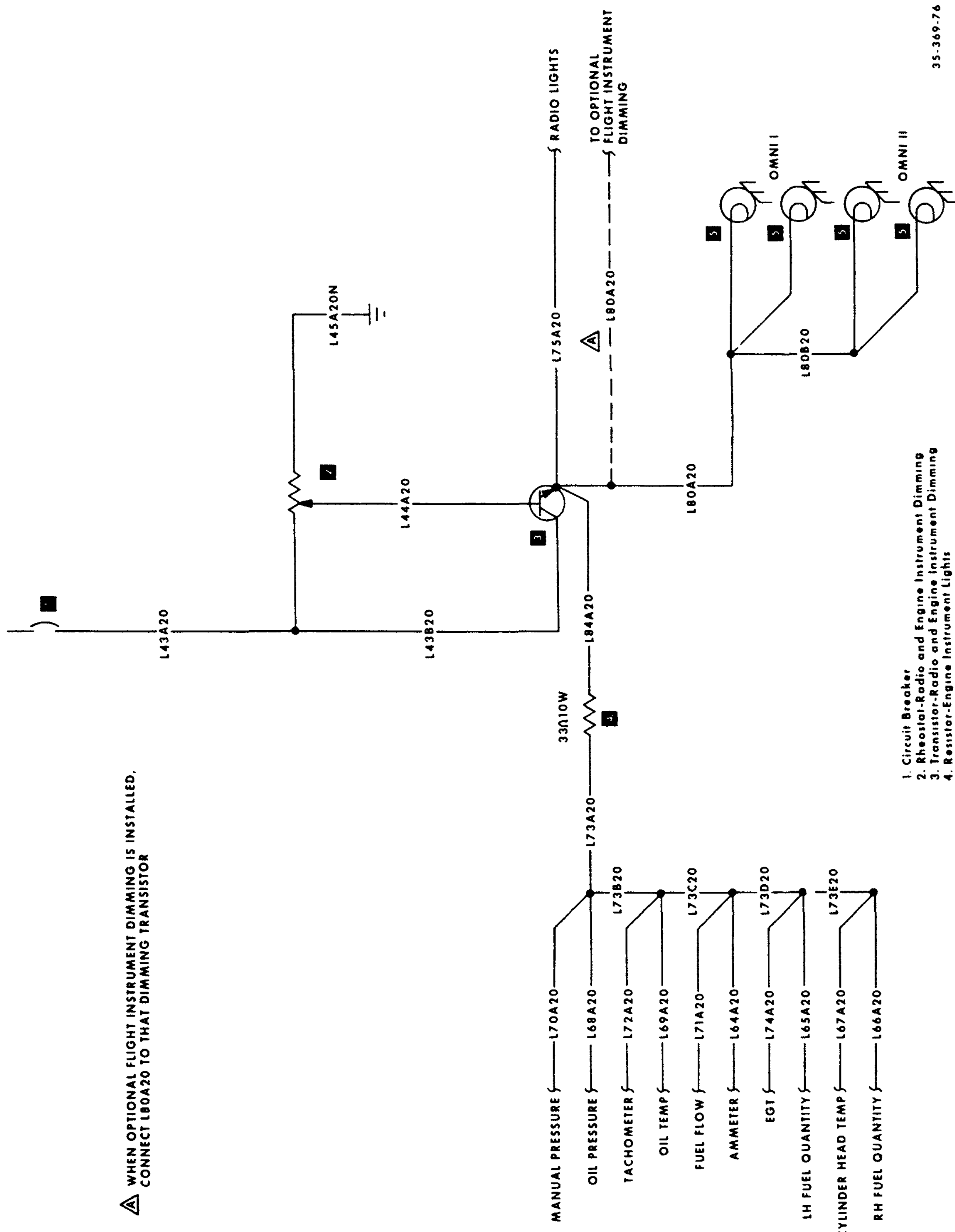


1. Flood Lights Circuit Breaker
2. Dim Control Rheostat
3. Dim Control Transistor
4. Trim Tab Light
5. Landing Gear Visual Light
6. Not Used
7. Not Used
8. Glareshield Connector
9. Glareshield Flood Lights

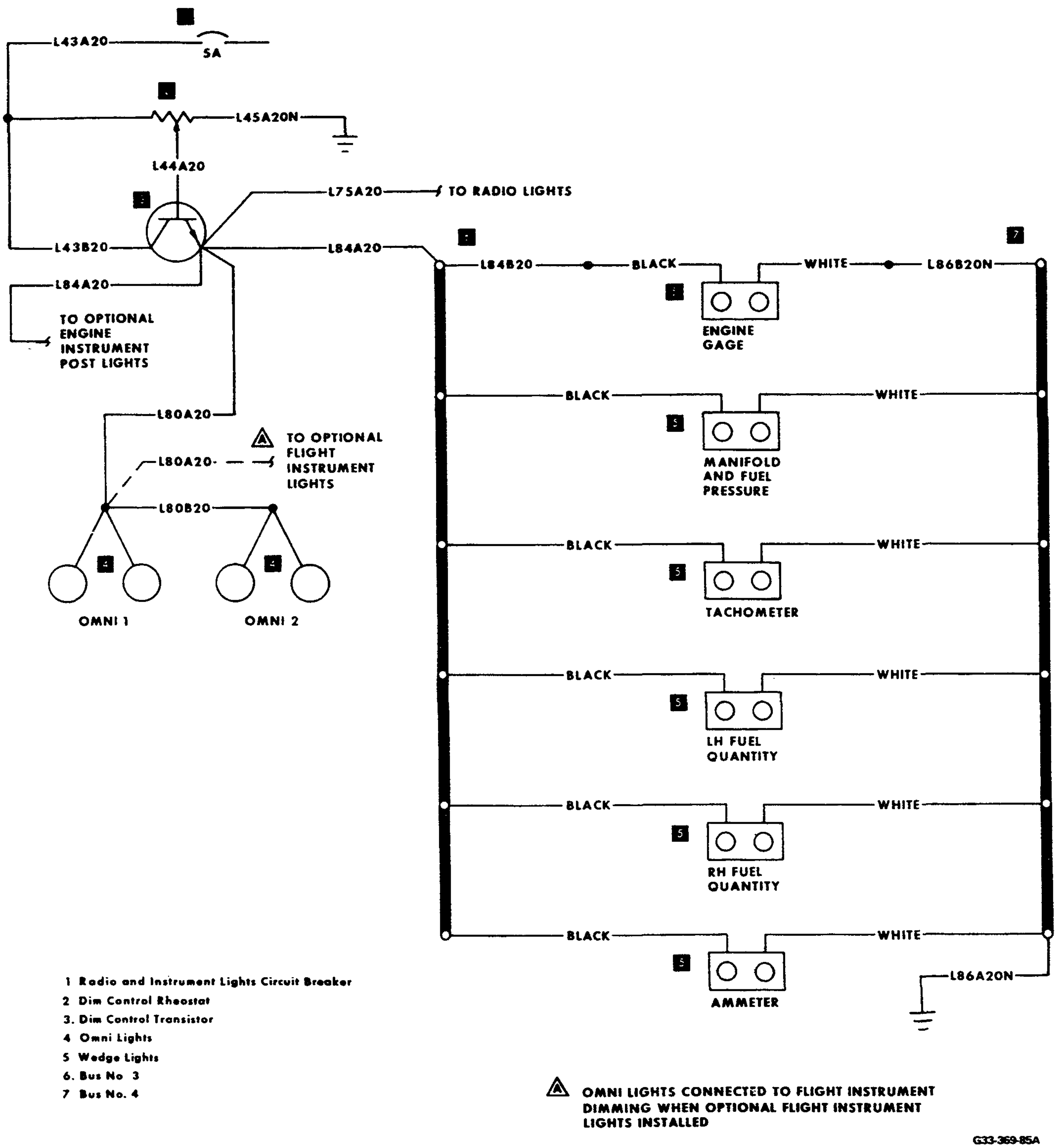
INSTRUMENT FLOOD LIGHTS
D-9560 thru D-9817



ENGINE INSTRUMENT WEDGE LIGHTS (OPTIONAL)
D-9069 thru D-9221

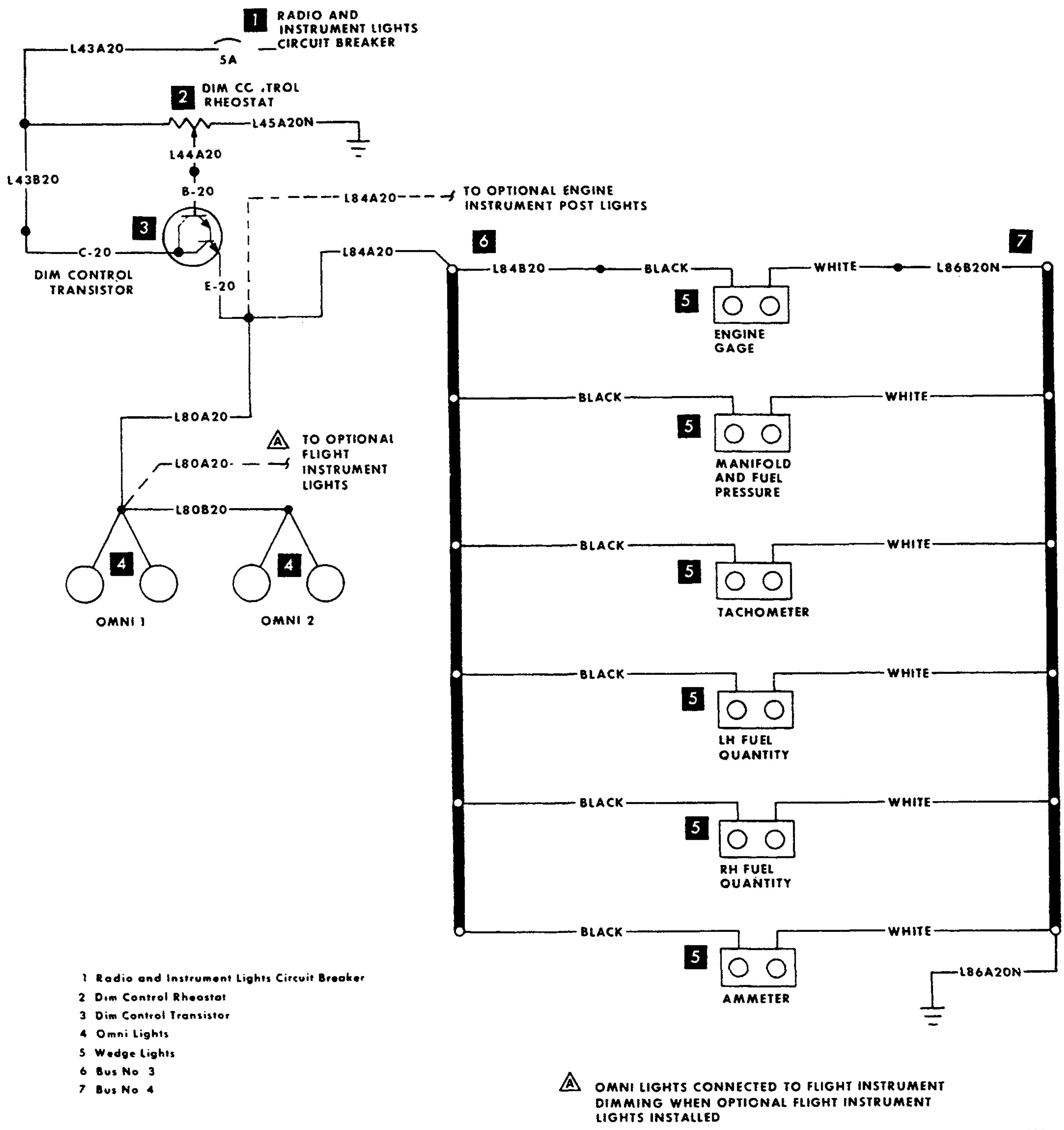


ENGINE INSTRUMENT LIGHTS (Vertical Instruments)
Model V35B (D-9222 thru D-9390)



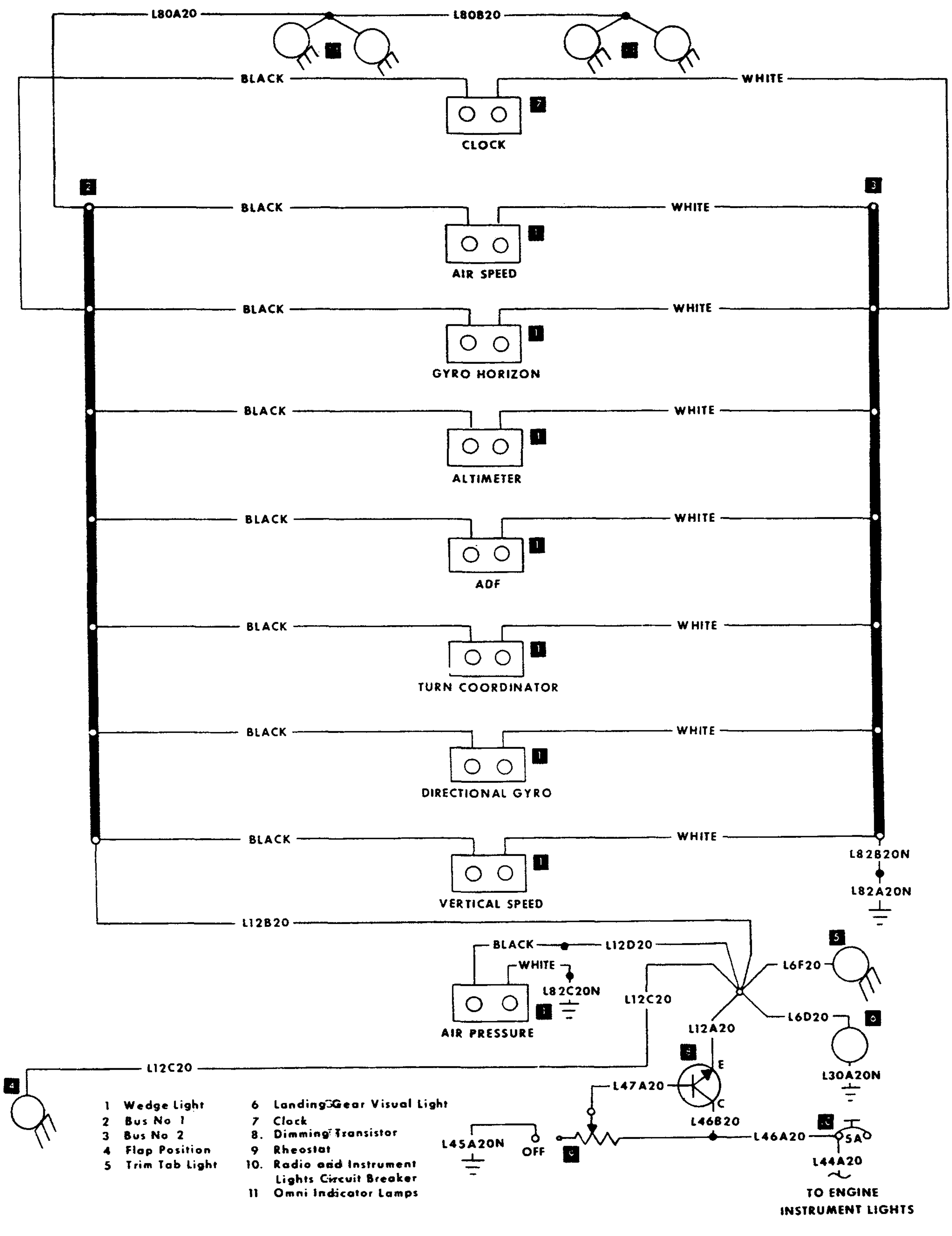
1 Radio and Instrument Lights Circuit Breaker
2 Dim Control Rheostat
3. Dim Control Transistor
4 Omni Lights
5 Wedge Lights
6. Bus No 3
7 Bus No. 4

ENGINE INSTRUMENT WEDGE LIGHTS
Model V35B (D-9391 thru D-9559)

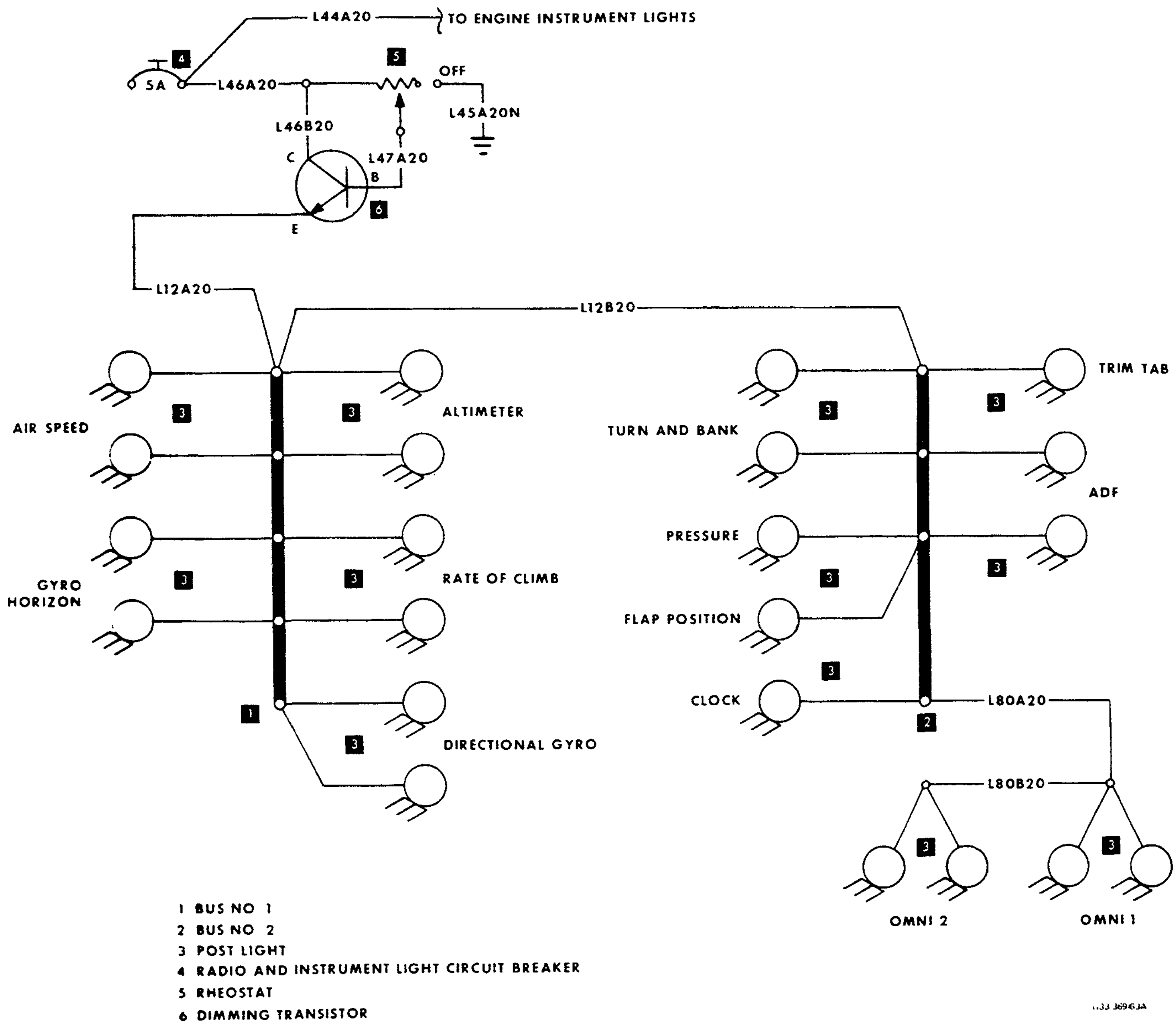


1 Radio and Instrument Lights Circuit Breaker
2 Dim Control Rheostat
3 Dim Control Transistor
4 Omni Lights
5 Wedge Lights
6 Bus No 3
7 Bus No 4

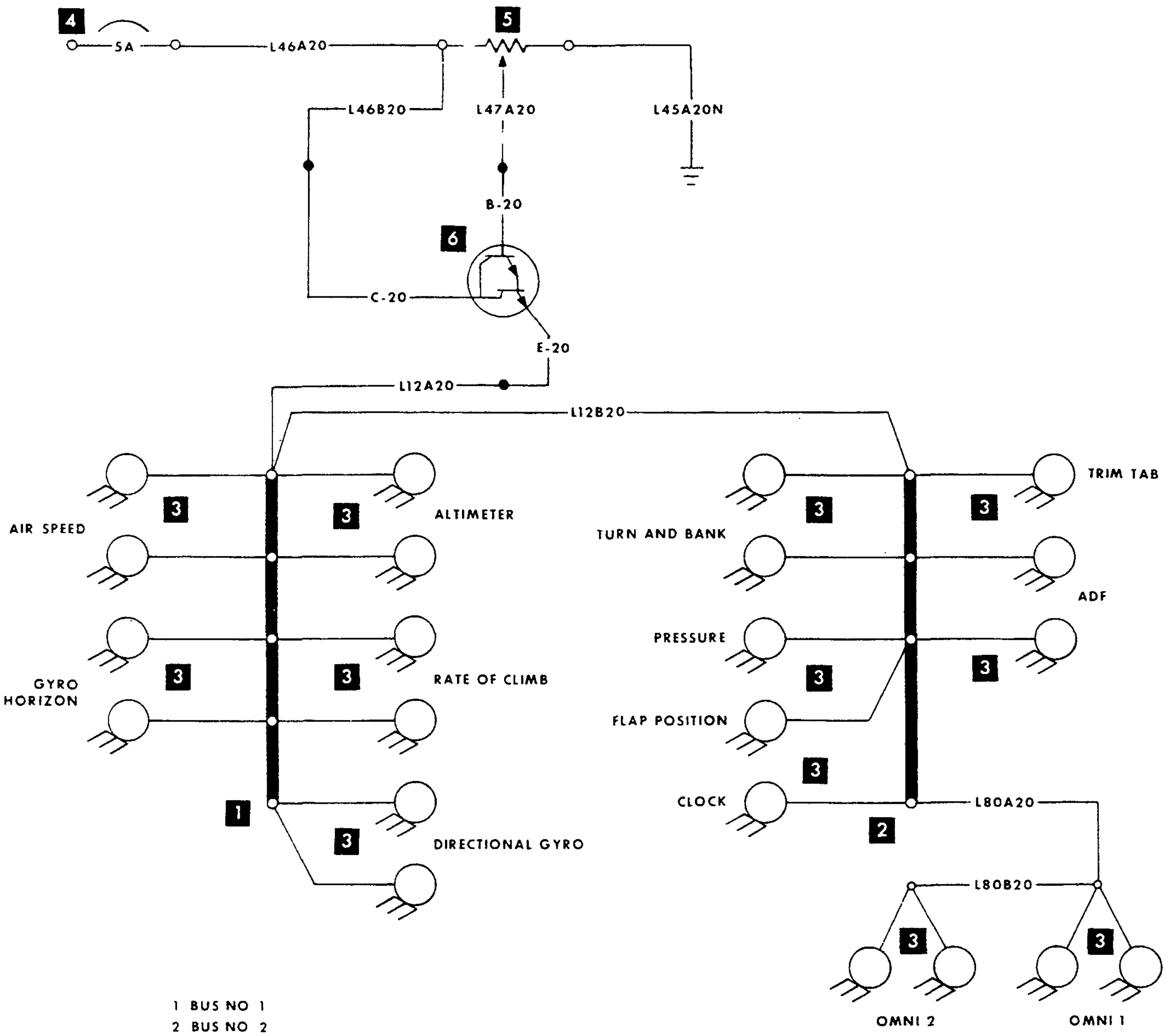
ENGINE INSTRUMENT WEDGE LIGHTS
D-9558 thru D-9817



FLIGHT INSTRUMENT WEDGE LIGHTS
D-9069 thru D-9817



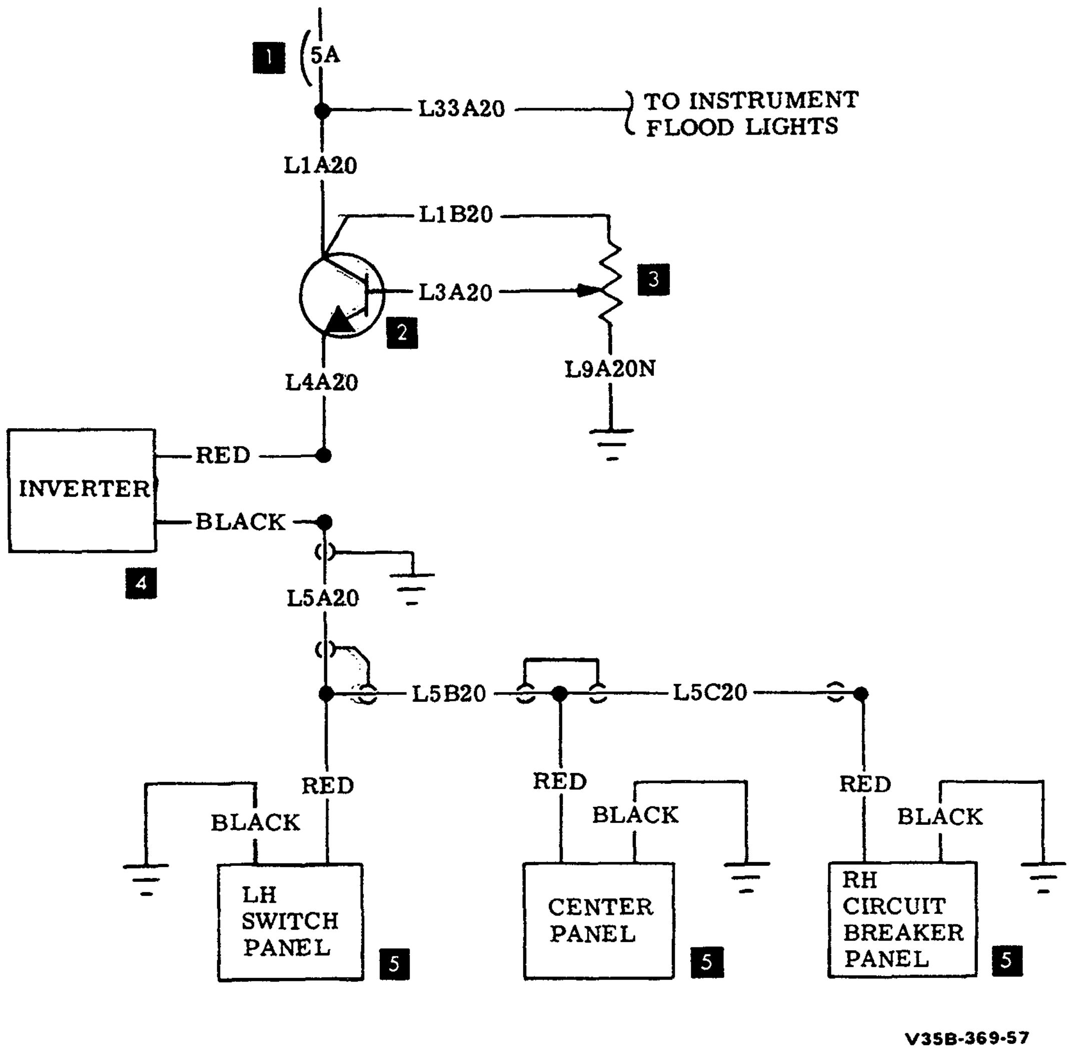
FLIGHT INSTRUMENT POST LIGHTS
Model V35B (D-9069 thru D-9559)



1 BUS NO 1
2 BUS NO 2
3 POST LIGHT
4 RADIO AND INSTRUMENT LIGHT CIRCUIT BREAKER
5 RHEOSTAT
6 DIMMING TRANSISTOR

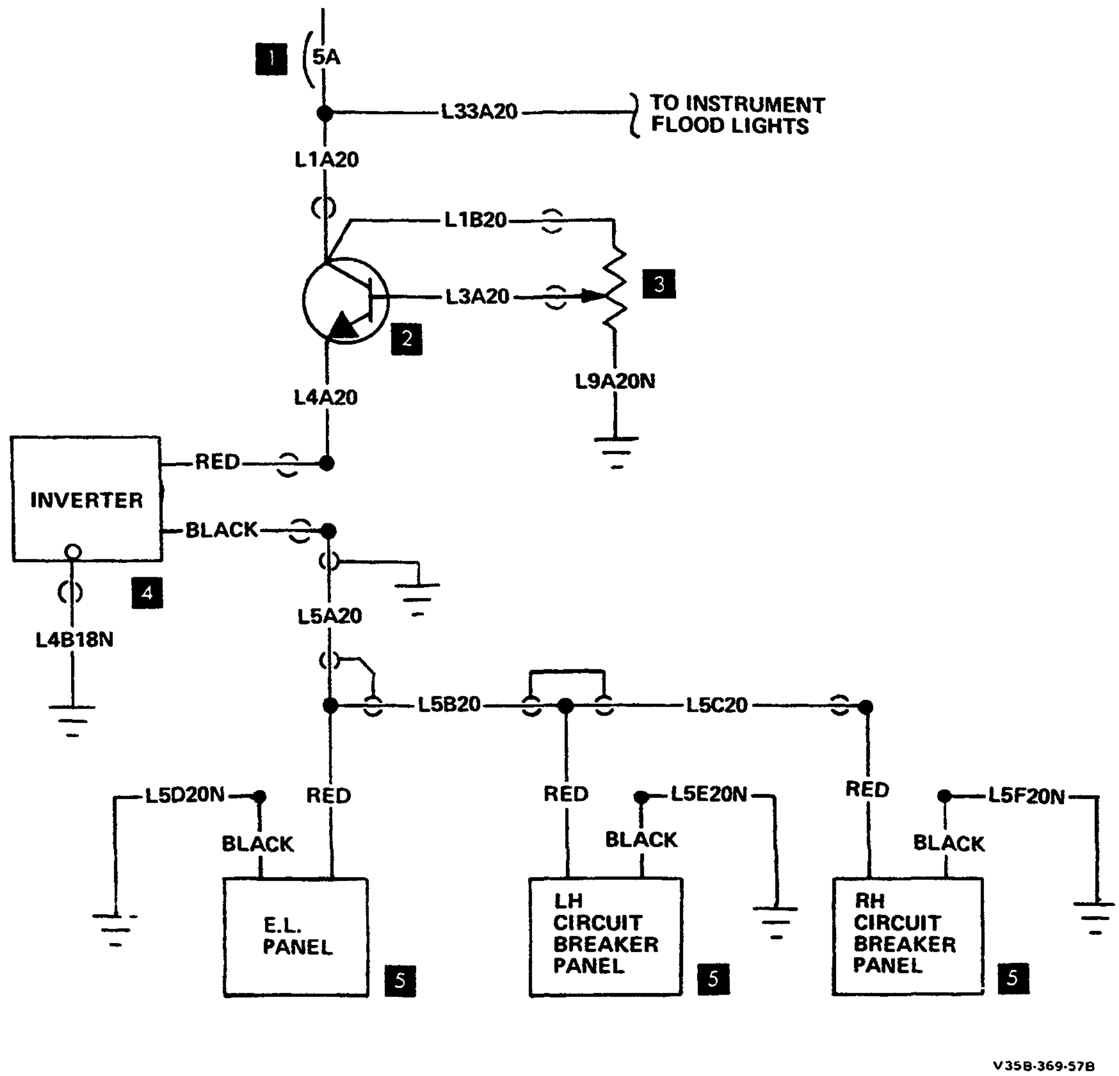
G33-369-83B

FLIGHT INSTRUMENT POST LIGHTS
D-9560 thru D-9817



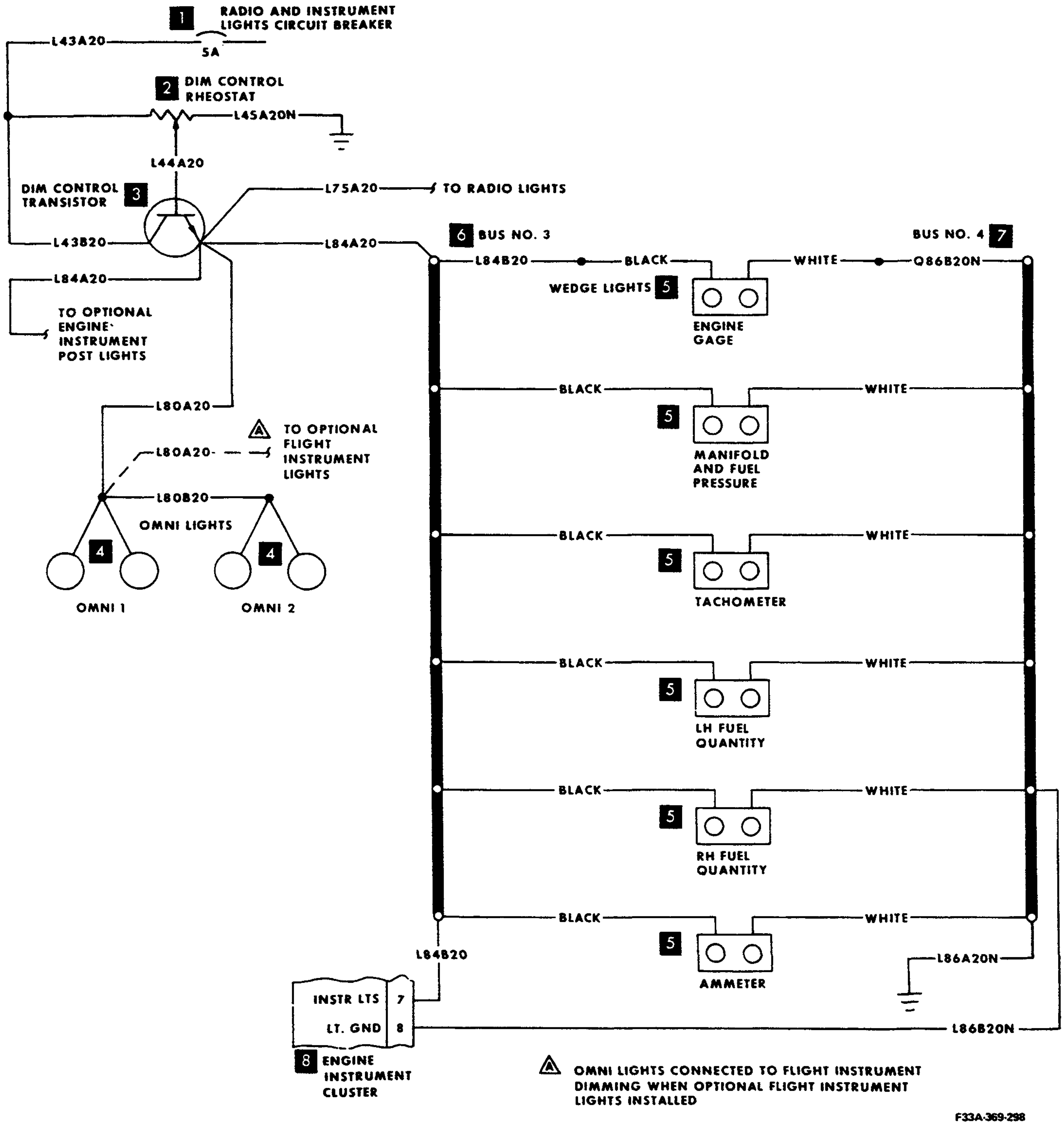
1. Flood Lights Circuit Breaker
2. Electroluminous Panel Lights Dim Transistor
3. Dim Control Rheostat
4. Inverter
5. Electroluminous Panel

ELECTROLUNINOUS PANEL LIGHTS
Model V35B (D-9069 thru D-9537)

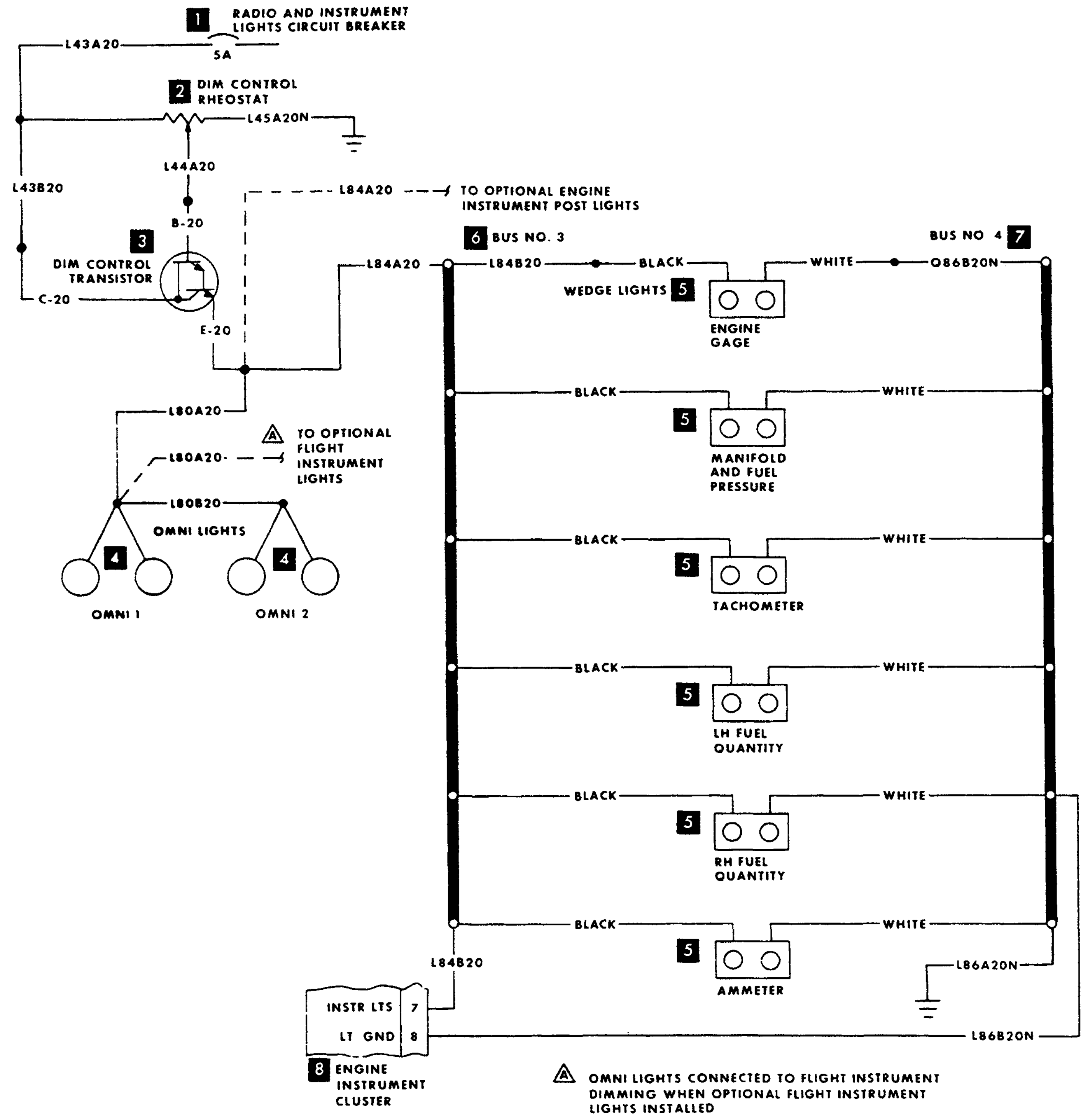


1. Flood Lights Circuit Breaker
2. Electroluminous Panel Lights Dim Transistor
3. Dim Control Rheostat
4. Inverter
5. Electroluminous Panel

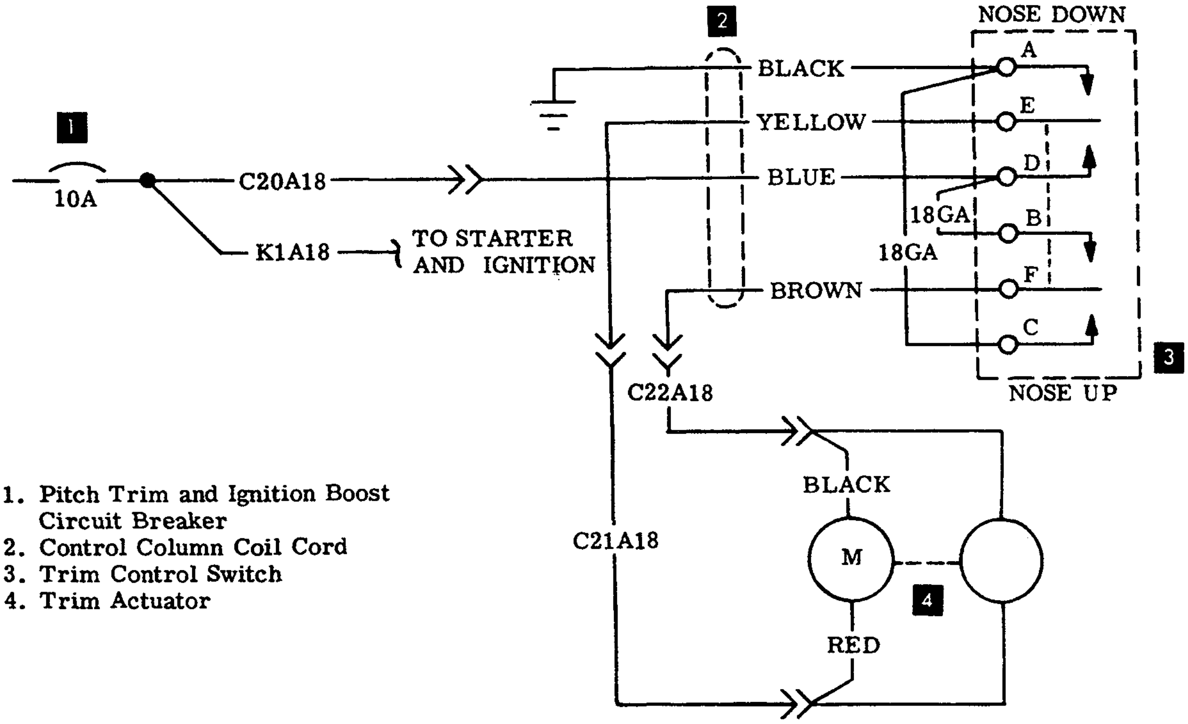
ELECTROLUMINOUS PANEL LIGHTS
D-9538 thru D-9817



OPTIONAL INTERNALLY LIT INSTRUMENTS
Model V35B (D-9391 thru D-9559)

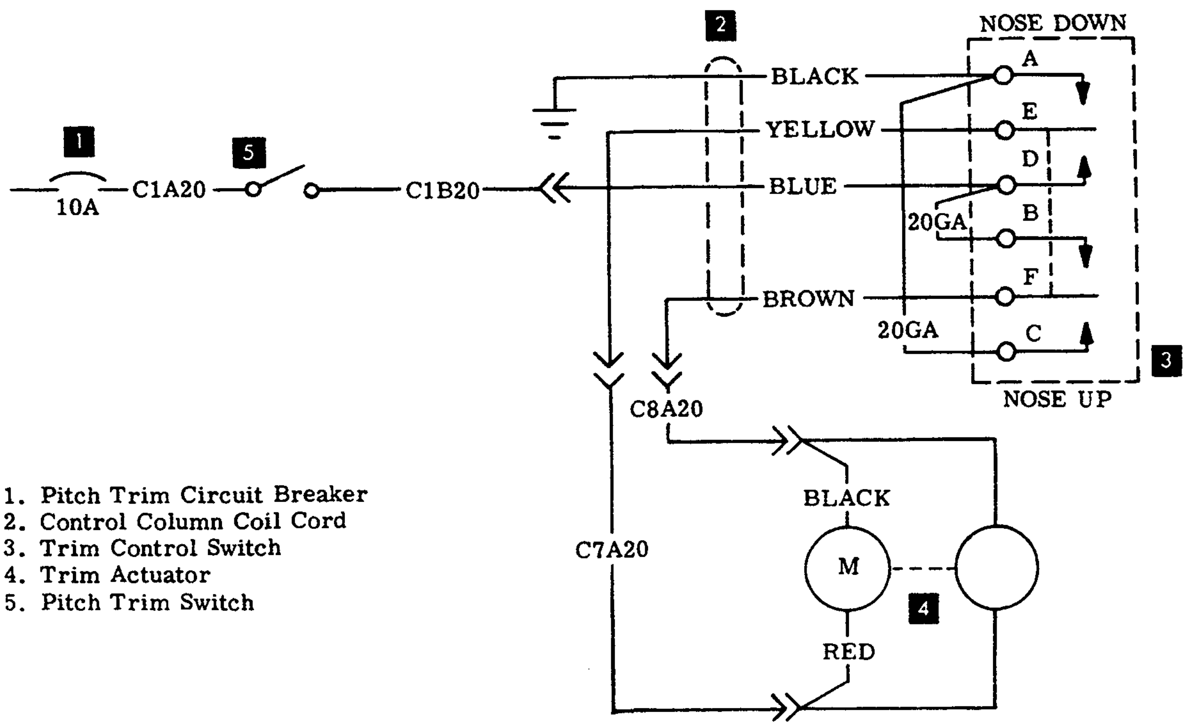


OPTIONAL INTERNALLY LIT INSTRUMENTS
D-9560 thru D-9817



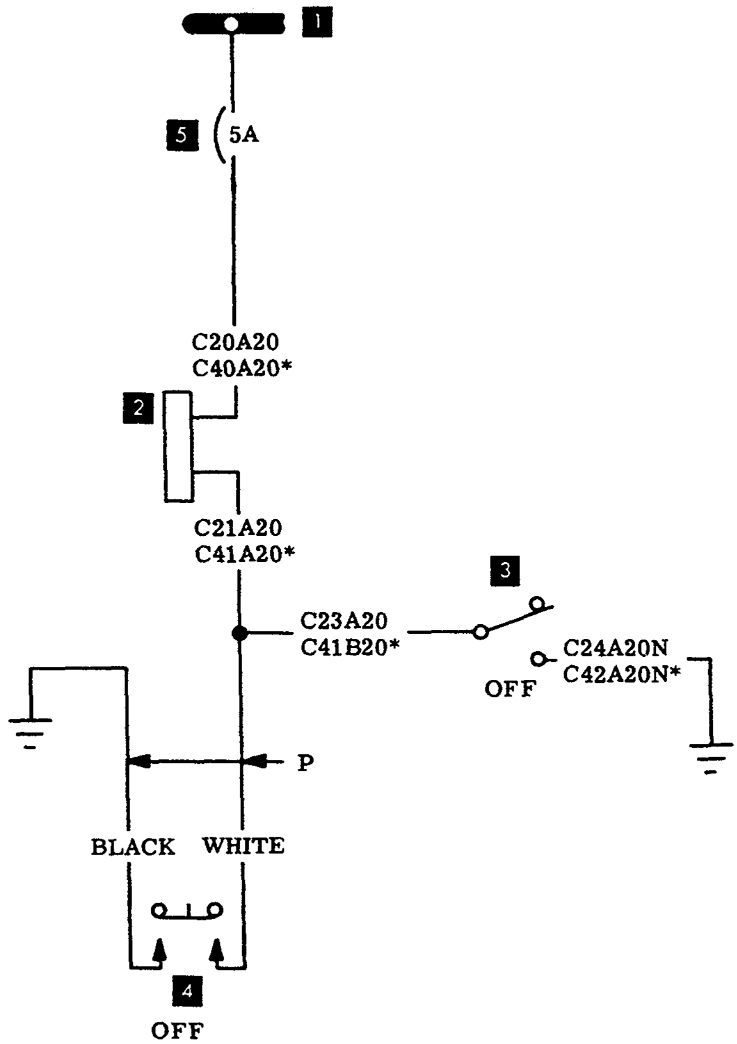
1. Pitch Trim and Ignition Boost Circuit Breaker
2. Control Column Coil Cord
3. Trim Control Switch
4. Trim Actuator

ELEVATOR TRIM
D-8599 thru D-9068



1. Pitch Trim Circuit Breaker
2. Control Column Coil Cord
3. Trim Control Switch
4. Trim Actuator
5. Pitch Trim Switch

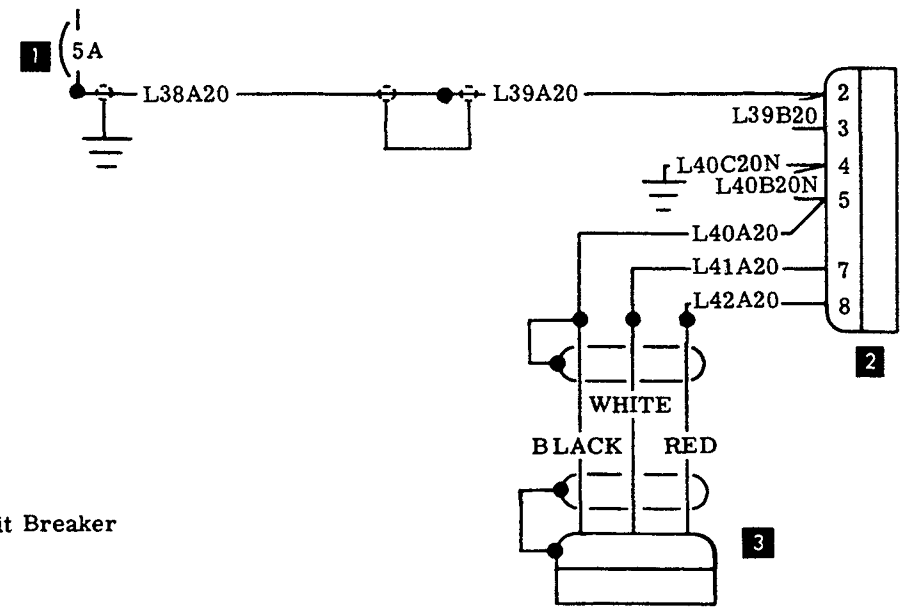
ELEVATOR TRIM
D-9096 thru D-9817



* PRIOR TO D-9069

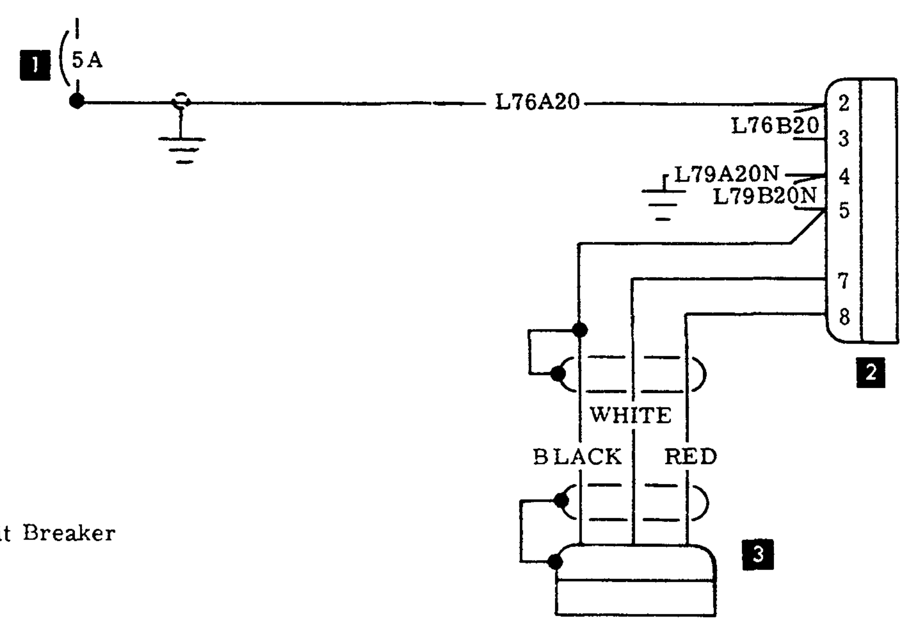
1. Avionics Bus
2. Constant Copilot Solenoid Valve
3. Constant Copilot Switch
4. Constant Copilot Wheel Switch
5. Constant Copilot Autopilot Circuit Breaker

CONSTANT COPILOT
D-7977 thru D-9817



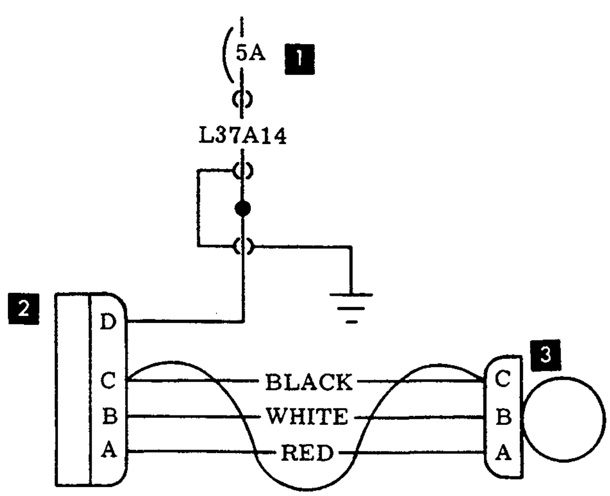
1. Strobe Light Circuit Breaker
2. Power Supply
3. Strobe Light

STROBE LIGHT (BULLOCK)
D-7977 thru D-9068



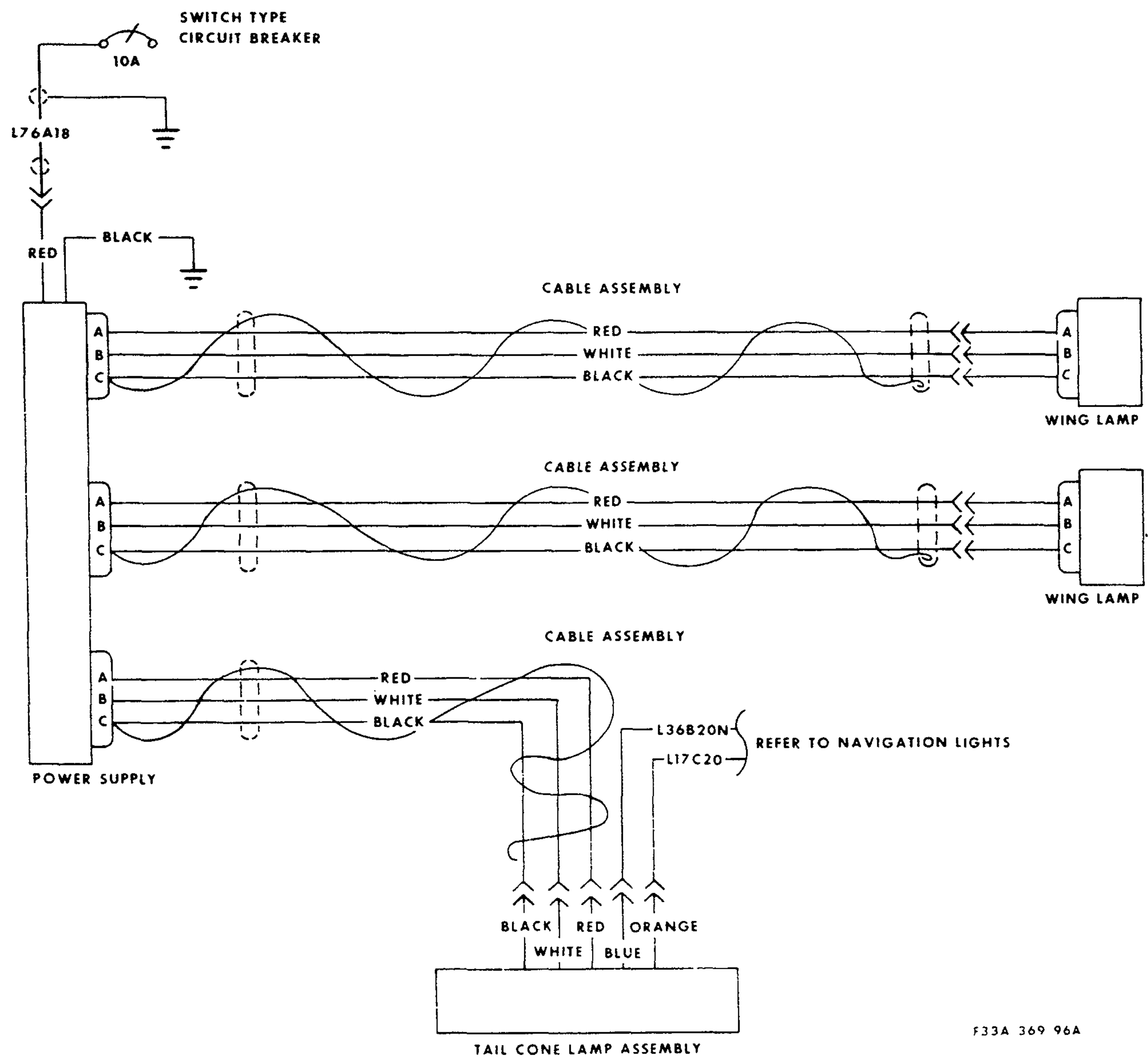
1. Strobe Light Circuit Breaker
2. Power Supply
3. Strobe Light

STROBE LIGHT (BULLOCK)
D-9069 thru D-9817

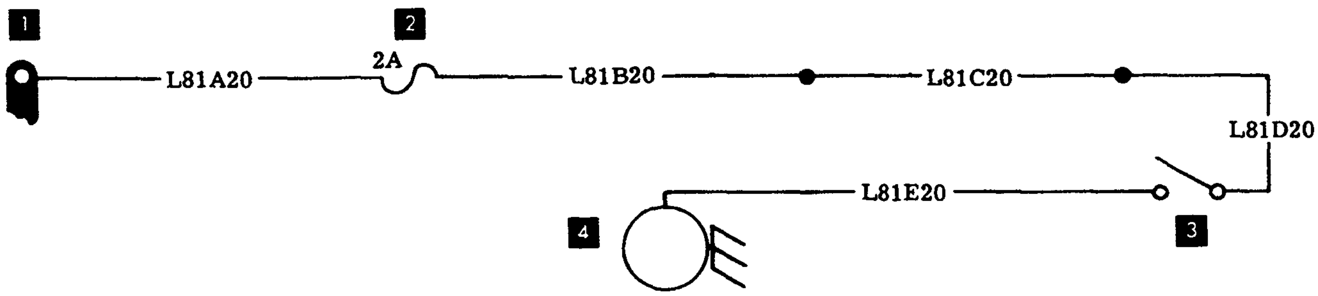


1. Strobe Light Circuit Breaker
2. Power Supply
3. Strobe Light

STROBE LIGHT (HOSKINS)
D-7977 thru D-9817

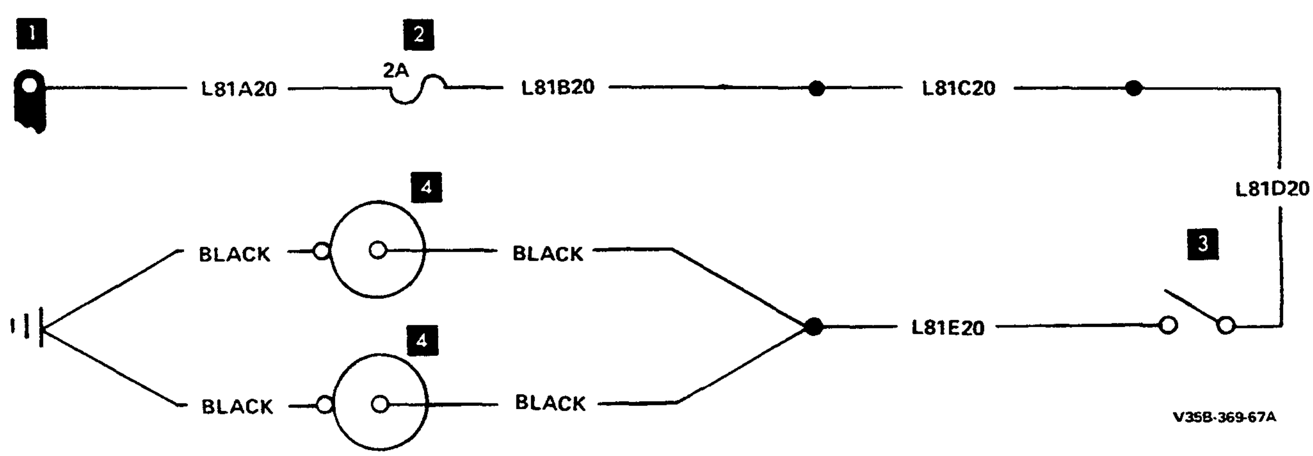


STROBE LIGHT (GRIMES)
D-9294 thru D-9817



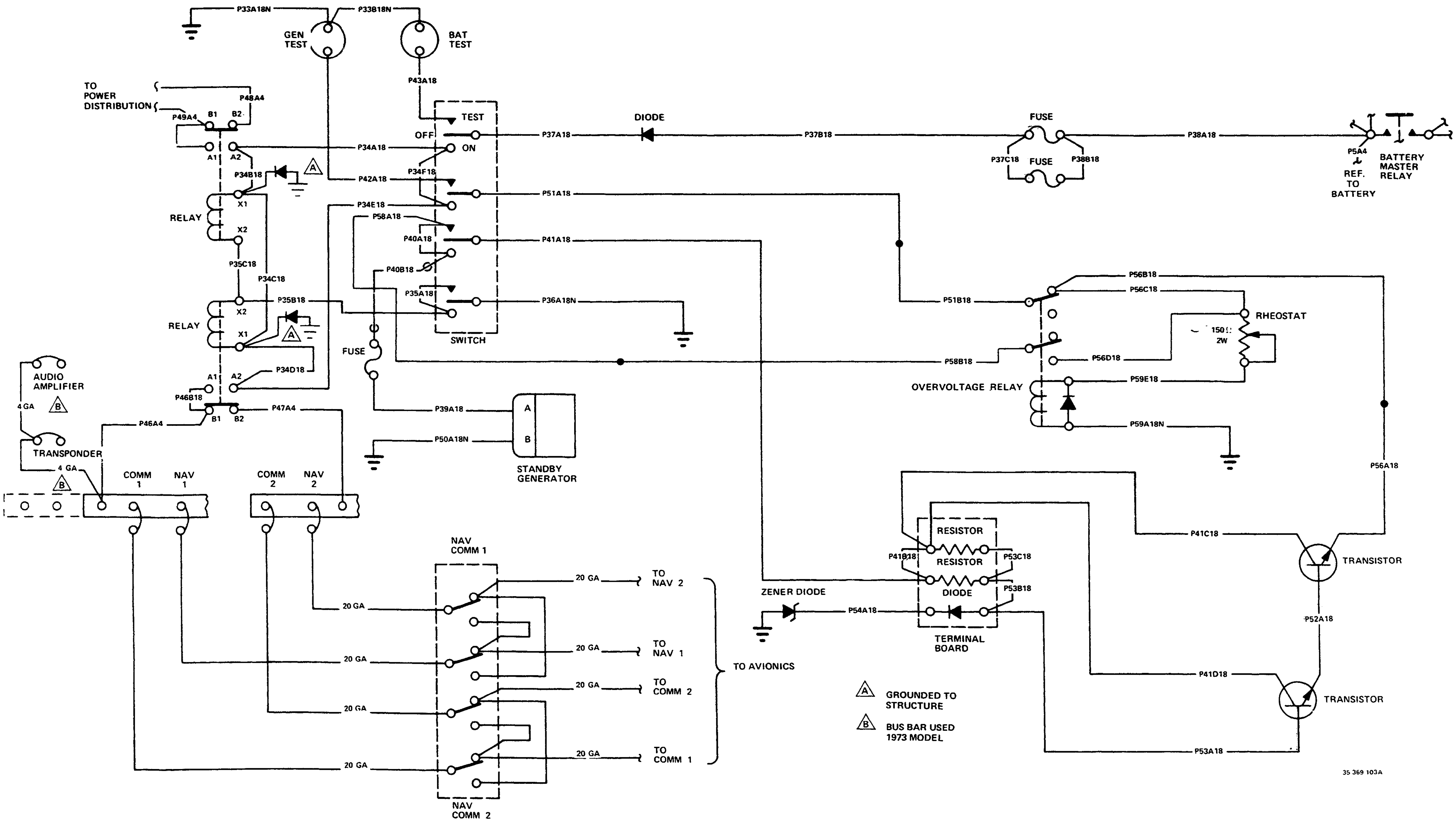
1. Battery Bus
2. Courtesy Light Fuse
3. Courtesy Light Switch
4. Courtesy Light

COURTESY LIGHTS
Model V35B (D-9069 thru D-9559)



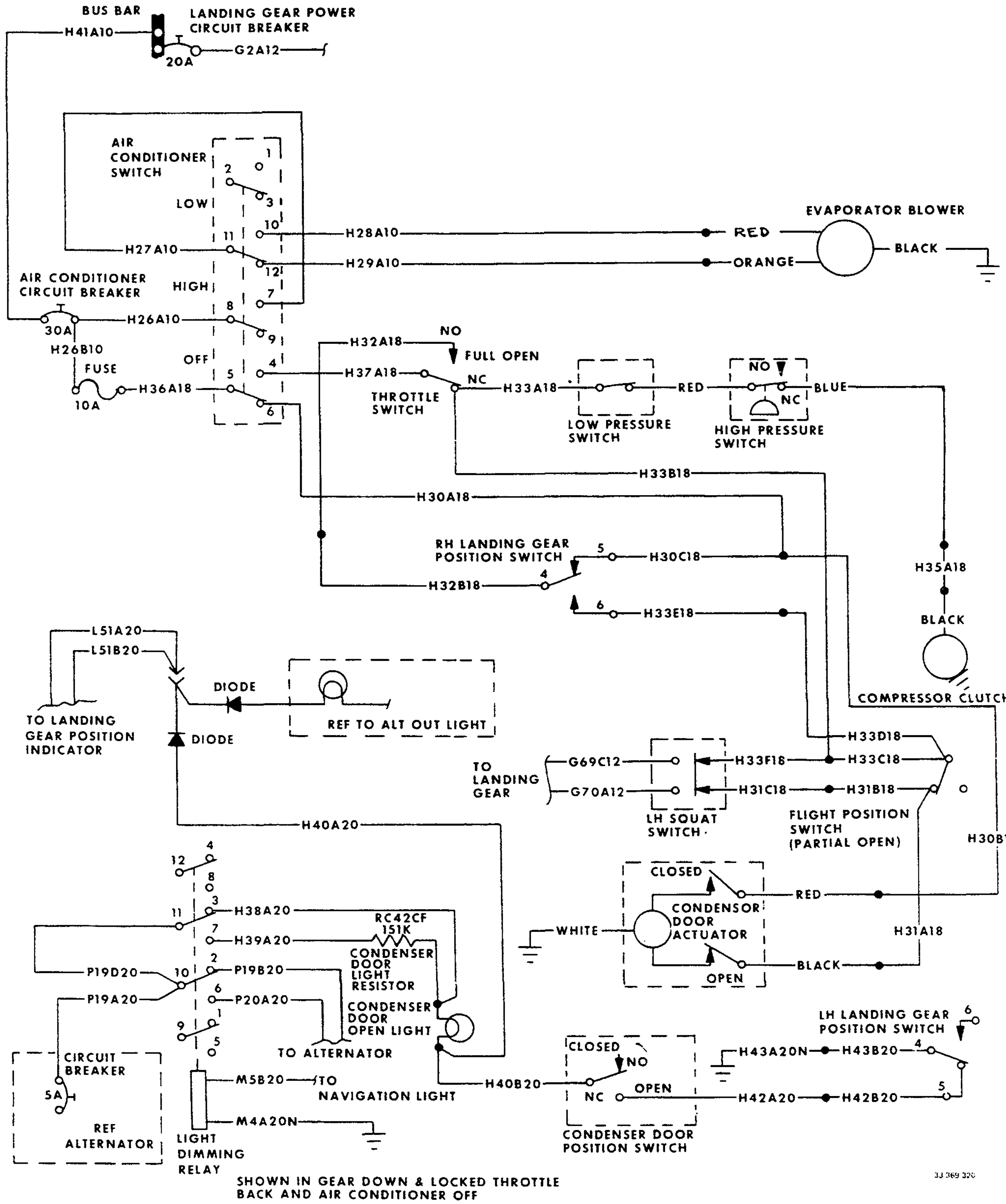
1. Battery Bus
2. Courtesy Light Fuse
3. Courtesy Light Switch
4. Courtesy Light

COURTESY LIGHTS
D-9560 thru D-9817



STANDBY GENERATOR
D-9338 thru D-9817

B10



AIR CONDITIONER
D-9787, D-9806 thru D-9817

SECTION 7

Periodic Inspection Schedule

7

SCHEDULED MAINTENANCE CHECKS

ELECTRIC PROPELLER DEICER SYSTEM INSPECTION GUIDE

50-HOUR INSPECTION

The various components of the deicer system should be inspected periodically for incipient defects. The purpose of the following inspection is to provide a means for detecting and correcting such defects before they render the system inoperative.

a. Lock the brakes and operate the engines at near take-off power. Turn the deicer system switch ON and observe the ammeter for at least 2 minutes. If the ammeter needle does not rest within the shaded band, except for a flicker at 30-second intervals when the step switch of the timer cycles, refer to the troubleshooting chart for the probable source of trouble.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when a propeller is moved.

CAUTION

While following the instructions of step b, move the propeller back and forth to prevent arcing between the brushes and the slip ring.

b. With the engine shut off, turn the deicer switch ON and feel the deicer boots on the propeller for the proper sequence of heater operation. The presence of local hot spots indicate severe damage to the deicer heaters, which should be repaired before more serious damage develops.

c. Remove the spinner dome and open all access doors pertaining to the wiring and components of the deicer system. Turn the deicer switch ON and station an assistant in the airplane to observe the ammeter. Flex all accessible wiring, particularly the lead straps, leads from the slip ring assembly, and the firewall electrical connectors and their wiring. Any movement of the ammeter, other than the cycling flicker that occurs at 30-second intervals, indicates a short or open circuit that must be located and corrected.

d. To extend the life of the lead strap between the hub clamp and clip, reposition the bend in the strap at a point at least 1/2 inch from the existing location of the bend.

e. Check for damaged brush rods or springs and for worn or damaged brushes.

100-HOUR INSPECTION

a. Repeat the 50-hour inspection.

b. Check for radio noise or radio compass interference by operating the engine at near take-off power with the radio gear turned on. If, under these conditions noise or interference occurs when the deicer switch is ON and disappears when the switch is OFF, refer to the troubleshooting chart for the probable source of trouble.

c. Check all clamps, clips, mountings, electrical connections, and connectors for tightness and electrical soundness. Also check for loose, broken or missing safety wire.

d. Closely check the deicer boots for wrinkled, loose or torn areas, particularly around the outboard end and at the point where the strap passes under the hub clamp. Look for abrasions or cuts along the leading edge of the flat or thrust face. If the heater wires are exposed in damaged areas or if the rubber is found to be tacky, swollen, or deteriorated (as from contact with oil or solvent fluids), replace the damaged deicer boot.

e. Check that the hub clamps are tight. Inspect for cracks or other damage. Check to see that the cushioning material is not missing or damaged in the area under the hub clamp or on the edge of the spinner dome. Manually operate the propeller from "high pitch" to "low pitch" while checking that the deicer lead straps do not come under tension.

f. Check the slip rings for gouges, roughened surface, cracks, burned or discolored areas, and for deposits of oil, grease, or dirt. Clean greasy or contaminated slip rings with CRC-2-26 solvent (a product of Corrosion Reaction Consultants Inc., of Philadelphia, Pennsylvania). After such a cleaning, a run-in time of 5 hours of engine operation must be allowed before the deicer system is turned on.

g. If uneven wear or wobble is detected, check the alignment of the slip rings on the prop shaft with a dial indicator. While checking the alignment, push in while turning the prop to eliminate play in the propeller thrust bearing. If the run-out over 360 degrees of rotation is over 0.005 inch or in excess of 0.002 inch in any 4-inch arc, refer to Section 3 for the paragraph on slip ring alignment.

h. Examine the brush mounting brackets and housings for cracks, deformation or other indications of damage. Check for tight connections and that the leads are not chafed or binding.

i. Check that each brush rides fully on its slip ring over 360 degrees of rotation. If the brush is not properly aligned, add or remove shims under the brush block or elongate the holes in the mounting bracket to raise or lower the brush block to the proper position. If the brushes ride both high and low with respect to the slip rings in 360 degrees of rotation, the slip ring assembly is eccentrically mounted and must be replaced.

j. Check for proper spacing between the brush block and slip rings as indicated in DEICER BRUSH REPLACEMENT in Section 3. If this distance is not within the specified limits, loosen the mounting screws and reposition them in the elongated holes until the block is properly positioned. If necessary, shims can be added between the thrust bearing plate and the mounting bracket until the brush block is properly located.

k. Estimate the contact angle of the brush block in relation to the slip rings. If this angle is not approximately 2 degrees, as indicated in DEICER BRUSH REPLACEMENT in Section 3, loosen the mounting bolts and reposition the brush block until the proper angle exist between the brush block and slip rings. It should be noted that the spacing established in step j must also be maintained after the proper angle is established.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when a propeller is moved.

CAUTION

While following the instructions of step l, move the propeller back and forth to prevent arcing between the brushes and slip ring.

l. With the deicer system operating, and a man in the airplane, observe the ammeter, visually inspect and physically flex the wiring from the brush block to each component of the deicer system and the airplane power supply. Jumps of the ammeter needle, other than the momentary flicker that occurs when the timer switches at 30-second intervals, indicate loose or broken wiring in the area under examination at the moment. In such instances, continue to flex the wiring in the area that first indicated trouble while checking the continuity through the individual wires of the affected harness until the source of trouble is located. Use the wiring diagram to trace the circuit of the deicer system.

TURBOCHARGER INSPECTION GUIDE

25-HOUR INSPECTION

Visually inspect the system for oil leaks, exhaust system leaks and general condition.

50-HOUR INSPECTION

Visually inspect the system for oil leaks, exhaust system leaks and general condition.

100-HOUR INSPECTION

a. Inspect the turbocharger system per the following method:

    1. Remove the compressor inlet duct assembly by loosening the four clamps and removing the two boots. Loosen the alternate air duct control as necessary and lower the duct.

    2. Inspect the compressor wheel for nicks, cracks or broken blades. Turn the wheel by hand and feel for excess bearing drag or wheel rubbing against the housing.

    3. Reinstall the air inlet duct and check the rigging of the alternate air control if it was disturbed.

    4. The oil inlet and outlet ports in the center housing should be checked for leaks, and the turbine heat blanket for condition and security.

b. Check for any interference with linkage between the bypass valve (wastegate) and the actuator, its general condition and security.

c. Inspect all exhaust system components for worn or damaged areas, loose clamps, cracks and leaks.

d. Inspect the lubrication system components for worn or damaged areas, loose clamps and leaks. Special attention should be given to the ducting downstream (pressure side) of the compressor.

e. Inspect the fuel injection nozzle pressure reference manifold, for deteriorated hose, loose connections, leaks and obstructions.

f. Check all fluid power lines for leaks and security.

g. The compressor discharge reference line from the throttle air valve to the controller should be opened and inspected for oil leakage from the controller. Any leakage is cause for replacement of the controller.

LANDING GEAR INSPECTION AFTER LOWERING AT HIGH SPEED

a. Visually inspect each landing gear strut, V-brace assembly, cables, and actuator rod ends for damage, distortion, looseness, and or misalignment.

b. Visually inspect the landing gear doors for cracks and/or distortion, pay particular attention to the inboard doors.

CAUTION

Prior to jacking the airplane, ensure that an unbalanced condition does not exist. Fuel should be distributed evenly in both wings to prevent an unbalanced condition which would cause the airplane to be unstable on the jack.

c. Place the airplane on jacks.

d. Retract the landing gear and check that the doors close properly and have a snug fit.

e. Lower the landing gear and remove the airplane from the jacks.

FLAPS INSPECTION AFTER EXTENSION AT HIGH SPEED

a. Check the flap rollers and bolts for visible damage and distortion.

b. Check the flap flexible drive ends at the motor and actuator for cracks and distortion, and flex drive shaft for distortion.

c. Check the points of actuator attachment to both the wing and flap for cracks and distortion.

d. Check the skin for cracks and distortion.

100-HOUR OR ANNUAL INSPECTION GUIDE

The owner or operator is responsible for maintaining the airplane in an airworthy condition, including compliance with all applicable Airworthiness Directives as specified in Part 39 of Title 14 Code of Federal Regulations (14 CFR). It is further the responsibility of the owner or operator to ensure that the airplane is inspected in conformity with the requirements covered in 14 CFR Parts 43 and 91. These 14 CFR Parts cover the requirements concerning the Inspection Guide. This Inspection Guide is not intended to be all inclusive, for no such guide can replace the good judgement of a certified airframe and power plant mechanic in the performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

SPECIAL CONDITIONS CAUTIONARY NOTICE

The time periods for the inspections noted in this schedule are based on normal usage under average environmental conditions. Airplanes operated in humid tropics, or in cold, damp climates, etc., may need more frequent inspections for wear, corrosion, lubrication, and/or lack of maintenance. Under these adverse conditions, perform periodic inspections in compliance with this guide at more frequent intervals until the owner or operator can set his own inspection periods based on the contingencies of field experience.

NOTE

The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer.

This inspection program, in accordance with 14 CFR Parts 43 and 91, consists of, but is not limited to, inspection items listed in this Inspection Guide, any applicable Airworthiness Directives issued against the airframe or any equipment installed therein and conformity to Type Certificate Data Sheet as applicable.

Material contained in this guide, including the inspection intervals, may be changed at any time by the owner/operator, with prior notification and approval of the local FAA General Aviation District Office, when warranted by service experience or engineering recommendations. Information contained herein is applicable to all Bonanza series airplanes covered in this shop manual except where differences are indicated by serial effectivity.

While the Inspection Guide may be used as an outline, detailed information of the many systems and components in the airplane will be found in the various sections of this shop manual and the pertinent supplier publications. It is also recommended that reference be made to the applicable maintenance handbooks, service instructions, Beech and Raytheon Aircraft service bulletins, applicable FAA regulations and publications, and supplier bulletins and specifications for torque values, clearances, settings, tolerances, and other requirements. In the final analysis, it is the responsibility of the owner/operator to ensure that the airframe and power plant mechanic inspecting the airplane has access to the previously noted documents as well as to this Inspection Guide.

NOTE

Any time an airplane is repainted or touched up, inspect all placards and decals to assure that they are not covered with paint, are easily readable, and are securely attached. Replace any placards that have been inadvertently defaced or removed.

In addition to the inspections prescribed by this schedule, the altimeter system and all ATC transponders MUST be tested and inspected at 24-month intervals in compliance with the requirements specified in 14 CFR Parts 91.411, and 91.413.

The tachometer and manifold pressure indicators are to be removed from the airplane and functionally tested for accuracy every 24 months at a qualified instrument repair facility. The propeller governors should be reset according to the calibrated tachometers. Refer to Beechcraft Service Instruction Number 0723-241.

A complete inspection of the airplane must be accomplished within each 12-month period for compliance with the Title 14 Code of Federal Regulations. The time periods for inspections stated in this inspection guide should NEVER be exceeded by more than 10 hours, and then only if the additional time is required to reach a place where the inspection can be satisfactorily accomplished. However, the additional time used must be deducted from the next inspection time. If 10 hours were used to reach the inspection facility, the next inspection would be due in 90 hours for the next 100-hour inspection with no extension allowed.

An airplane must receive a complete (100-hour, annual, or complete continuing care inspection) inspection every 12 months regardless of the hours flown. The inspections completed during a 12-month period can be deleted from the items to be inspected. Rubber goods such as fuel lines are recommended to be changed at five year periods regardless of airplane time.

NOTE

Additional publications are listed in the current Publications Price List CD ROM (P/N 994-32808). For information on these publications contact the Technical Manual Distribution Center (TMDC) at 1-800-796-2665, fax (316) 676-4824, E-mail TMDC@rac.ray.con or visit our web site at http://raytheonaircraft.com.

NOTE

All electrical systems operational inspections are to be made using an external power source capable of delivering and maintaining 14.25 volts ± 0.25 volts DC.

Raytheon Aircraft Company issues service information for the benefit of owners and operators in the form of two classes of Service Bulletins. MANDATORY (Red Border) Service Bulletins are changes, inspections or modifications that could affect safety. The factory considers compliance with these Service Bulletins mandatory. OPTIONAL and/or RECOMMENDED (No Border) Service Bulletins cover changes, modifications, improvements or inspections which may benefit the owner. Due to the wide range of information covered by the OPTIONAL Service Bulletin, each owner or operator is responsible for conducting a thorough review of each OPTIONAL Service Bulletin to determine if compliance is required based on the applicability of the OPTIONAL Service Bulletin to his particular set of operating conditions. It is the responsibility of the owner or operator to ensure that all Beechcraft and Raytheon Aircraft Service Bulletins which are pertinent to his particular operation are complied with.

NOTE

Model E33C and F33C airplanes being spun MUST also have the AEROBATIC INSPECTION at 50 hours.

WARNING

During the performance of this inspection the airplane will be placed on three-point jacks. Ensure the landing gear is down and locked before removing the airplane from the jacks.

100-HOUR OR ANNUAL INSPECTION

A. OPERATIONAL INSPECTION	MECH	INSP
1. STARTER - Check for proper operation, unusual noise and dragging. Check starter energized light (if installed) and/or load meter to ensure starter disengagement when starter switch is released.		
2. FUEL PRESSURE - Check for proper fuel pressure limits and fluctuations.		
3. CYLINDER HEAD TEMPERATURE - Check for proper operation, temperature and fluctuations.		
4. ALTERNATOR/GENERATOR - Check for proper output and unusual noises.		
5. STANDBY GENERATOR - Check for proper operation in test mode. Perform a functional test as outlined in AFM Supplement 35-590118-19.		
6. INSTRUMENT AIR SYSTEM - Check for proper operation and output pressure.		
7. PROPELLER OPERATION - Cycle propeller and check for proper rpm drop and smoothness of operation.		
8. PROPELLER DEICER - Check for proper operation and amperage drawn on ammeter.		
9. OIL PRESSURE AND TEMPERATURE - Check for proper pressure, temperature limits and unusual fluctuations.		
10. MAGNETOS - Check the performance of the magneto as outlined under the heading NORMAL PROCEDURES in the appropriate Pilot's Operating Handbook.		
11. POWER CHECK - Refer to NORMAL PROCEDURES in the appropriate Pilot's Operating Handbook.		
12. AMMETER - Check for proper indication and unusual fluctuations.		
13. HEATING AND VENTILATING SYSTEM - Check for proper operation, heat and airflow output. Check controls for freedom of movement.		
14. FIREWALL SHUTOFF VALVE - Check for proper operation and freedom of movement.		
15. IDLE RPM AND MIXTURE SETTINGS - Check for both proper rpm and mixture settings. Check controls for freedom of operation.		
16. IDLE CUT-OFF - Check for proper operation and freedom of movement.		
17. IGNITION SWITCH - Rotate the ignition switch through the OFF position to the extreme limit of switch travel; if the engine stops firing, the switch is normal. If the engine continues to run with the switch held against the OFF stop, it is an indication that one magneto is still "hot" or ungrounded. When the switch is released, it should automatically return to OFF and the engine should stop running. However, any ignition switch exhibiting this abnormal condition should be replaced.		
18. ALL ENGINE CONTROLS - With the engine running, check for proper operational limits, engine response and rigging. Check friction locks for proper operation.		
19. FUEL QUANTITY GAGES - Check for proper operation and unusual fluctuations.		
20. AUXILIARY FUEL PUMP - Check pump for proper operation, unusual noise and fluctuations.		

100-HOUR OR ANNUAL INSPECTION (Continued)

A. OPERATIONAL INSPECTION *(Continued)*	**MECH**	**INSP**
21. FUEL TANK SELECTOR - Check for proper placarding, proper operation and feel for positive detent.		
22. ALL LIGHTS - Check for condition, attachment, cracked or broken lenses. Check switches, knobs and circuit breakers for looseness and operation.		
23. STALL WARNING SYSTEM - Check for proper operation and heating of the unit.		
24. RADIO OPERATION - Check for proper operation, security of switches and knobs.		
25. FLAPS - Check for noisy operation, full travel and proper indication.		
26. PITOT HEAT - Check for amperage drawn on ammeter and for proper heating of the unit.		
27. FLIGHT INSTRUMENTS - Check for condition and proper operation.		
28. BRAKES - Check for condition and wear, ease of operation and proper release of the parking brake. Check for unusual brake chatter.		
29. EMERGENCY LOCATOR TRANSMITTER - Check for proper operation. Tune radio to 121.5 MHz on VHF or 243 MHz on UHF, then turn ELT switch to ON and monitor for one signal. Turn ELT switch OFF, then place in ARM position. Ensure that the ELT is armed when the airplane is returned to service.		
30. AIR-CONDITIONER (Evaporative System) - Drain unit to remove dirt and other foreign particles from the wick box, drain line and overflow line. Remove wick assembly from box and flush with water. Refer to AIR CONDITIONER (EVAPORATIVE) SERVICING in Section 3.		
31. AIR-CONDITIONER (Refrigerant System) - Operate the air conditioner and verify that the retractable condenser moves to the ground extended position when turned on and returns to the retracted position when turned off. Check for proper operation and unusual noise.		
32. OXYGEN SYSTEM - Functionally check the oxygen system for proper operation. Check the oxygen bottle shutoff valve for proper operation.		
33. SWITCHES, CIRCUIT BREAKERS - Check for proper operation.		
34. FLIGHT CONTROLS, TRIM CONTROLS AND TRIM INDICATOR - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation.		
B. POWER PLANT		
1. NACELLE SKIN - Check for deformation and obvious damage or cracks. Check for loose or missing rivets.		
2. NACELLE STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets and concealed damage.		
3. COWLING - Check for condition, security and adjustment of latches. Open the upper cowling and clean. Inspect for cracks.		
4. COWL FLAPS - Check for travel, deformation and security. Inspect for cracks.		

100-HOUR OR ANNUAL INSPECTION (Continued)

B. POWER PLANT *(Continued)*	**MECH**	**INSP**
5. SPARK PLUGS - Clean, inspect, regap, test and replace as necessary. Tighten spark plugs to proper torque and check ignition harness condition and for proper attachment.		
6. COMPRESSION - Perform cylinder leakage check per TCM Service Bulletin 03-3.		
7. BATTERY - Inspect for clean, tight connections and add distilled water to maintain a level of 3/8-inch above top of separators. Inspect the vents and overflow tube for obstructions. Check for security and proper attachment. Check for corrosion. Make certain the battery is clean. Water or dirt on battery surface can cause the battery to discharge.		
8. PLUMBING - Inspect plumbing and associated accessories for condition (such as cracks and fraying) and attachment. Check plumbing clearance and secure against possible chafing.		
9. BRAKE FLUID RESERVOIR - Check reservoir for security, open vent, proper fluid level and for leaks.		
10. ENGINE OIL TANK OR SUMP - Check for cracks, leaks, proper fluid level, deformation and security.		
11. CRANKCASE - Check security of crankcase-thru bolts. Inspect the dipstick tabs for security and that the tabs are not bent.		
12. OIL SUMP DRAINS AND SCREENS - Clean screens, check for holes in the screens and for obstructions. Check for metal particles or foreign matter on screens and filters. Check for proper torque after installation.		
13. OIL COOLER - Check oil cooler, lines and fittings for condition, security, chafing and leaks.		
14. PROPELLER AND MOUNTING HARDWARE - Check for condition and security.		
15. PROPELLER BLADES - Inspect the blades for cracks, dents, nicks, scratches, erosion, corrosion, security and movement in the hub. Check the tip of the blades for evidence of lightning strikes. If there is evidence of lightning strikes, refer to the INSPECTION AFTER LIGHTNING STRIKE procedure in this section.		
16. PROPELLER HUB - Check for cracks, excessively leaking seals and condition. Refer to publication 115187 for the 200 and 215 series Beechcraft propellers and publication 115090-19-1B for the 278 series Beechcraft propeller.		
17. PROPELLER SPINNER - Check for deformation, security and cracks.		
18. ALTERNATOR/GENERATOR - Check for condition and attachment. Check wiring for proper attachment and possible chafing. Check for unusual noise.		
19. ALTERNATOR - (Prestolite or Delco Remy only) Remove and disassemble the alternator as necessary to inspect the rotor shaft bearings for condition and replace if necessary. Refer to Beechcraft Service Instruction No. 0546-359 Rev II or subsequent.		
20. ALTERNATOR/GENERATOR BELT- Check for proper tension and condition. Check tightness of tension adjustment bolts.		
21. STARTER - Check for condition, attachment and chafed or loose wires.		

100-HOUR OR ANNUAL INSPECTION (Continued)

B. POWER PLANT *(Continued)*	**MECH**	**INSP**
22. STANDBY GENERATOR - Check for condition, attachment, security of wires and for chafing.		
23. MAGNETOS - Check contact points for proper clearance. Points with deep pits or excessively burned areas must be discarded. Inspect the cam follower felt pad for proper lubrication and clean the compartment with a clean, dry cloth. Check timing.		
24. CYLINDERS AND INNER BAFFLES - Check cylinders for obvious leaks, broken cooling fins and loose or missing base nuts. Check inner baffles for proper sealing, cracks and security.		
25. ENGINE BAFFLE SEALS - Inspect for security and condition at each 100-hour or annual inspection. Replace as necessary or every 10 years of service.		
26. EXHAUST SYSTEM - Check for deformation, security, cracks, leaks, loose or missing nuts and clamps. Check for thin wall condition which may occur due to normal internal erosion on stacks which have long service time.		
27. FIREWALL - Check for wrinkles, damage or cracks. Check all electrical and control access holes for proper sealing.		
28. HOSE AND DUCTS - Check all fuel, oil and air hose or duct for leakage, cracks, deterioration and damage. Check fittings for security.		
29. ENGINE ACCESSORIES - Check for condition, security and leaks. Check wiring, hoses and tubes for chafing, security and leaks.		
30. ENGINE MOUNTS - Check for cracks, corrosion and security. Inspect rubber cushions, mount bolts and nuts, and grounding straps for condition and security. Check engine mount support for cracks and material integrity.		
31. CABIN HEATER SYSTEM - Check for cracks, distortion, corrosion, leaks and obstructions. Refer to HEATING AND VENTILATING SYSTEM INSPECTION in Section 3.		
32. PROPELLER GOVERNOR - Check for leaks and corrosion and control arm for security.		
33. ENGINE CONTROLS - Check controls and associated equipment for condition, attachment, alignment and rigging. Remove cable connection bolts and check for wear each 300 hours. Check for security of throttle cable and for proper clearance of electrical wiring.		
34. IGNITION HARNESS - Inspect for fraying, attachment and proper connection.		
35. ELECTRICAL WIRING AND EQUIPMENT - Inspect electrical wiring and associated equipment and accessories for fraying and attachment.		
36. ALL DRAINS AND PLUGS - Check for condition, security and obstructions. Check for leaks and correct tightness.		
37. PRESSURE PUMP INTAKE FILTER - Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent. Refer to Section 8 for additional information.		

100-HOUR OR ANNUAL INSPECTION (Continued)

B. POWER PLANT *(Continued)*	**MECH**	**INSP**
38. AIR-CONDITIONER COMPRESSOR - Check for security and attachment. Check refrigerant level and for oil leaks. Refer to Section 3. Check belt for tension and worn or frayed condition.		
39. INDUCTION AIR FILTER - Check for condition, cleanliness and security.		
40. INDUCTION SYSTEM AND ALTERNATE AIR - Check hot and cold flexible air ducts for delamination of the inner lining. Check the alternate air valve for blockage, security, cracks, operation and wear.		
41. CARBURETOR HEAT SYSTEM- Check for blockage, security and operation.		
42. CARBURETOR - Clean the screen and check for damage. Drain the inlet chamber and rear section. Install screen and check for leaks. Check the primer solenoid for operation and ensure secure mounting.		
43. FUEL INJECTION CONTROL VALVE - Clean the screen and check for damage. Install screen and check for leaks.		
44. FUEL INJECTION SYSTEM - Inspect all fuel injection components, lines and fittings for evidence of fuel leaks, fraying and cracking.		
45. OIL SEPARATOR - (Vacuum system) Clean the screens as directed in this shop manual. Check for condition, mounting and proper operation. Install the screen and check for security. Inspect for cracks.		
46. VACUUM SYSTEM AIR FILTER - (Located forward of the instrument panel) Check for security of attachment, replace as required.		
47. ELECTRIC PROPELLER DEICER -		
a. Check for service damage to the deicer heaters, brush rods, springs and brushes. Check for attachment and security.		
b. Check the lead strap and all other clamps, connectors and wiring for electrical soundness, security and attachment.		
c. Check the slip rings for roughness, cracks, burned or discolored areas and for deposits of oil, grease or dirt. Check for security and attachment of all components.		
d. Check deicer boots for wrinkles, loose or torn areas.		
48. TURBOCHARGER SYSTEM -		
a. Inspect the system for oil leaks, exhaust system leaks, cracks and attachment.		
b. Inspect the compressor wheel for nicks, cracks or broken blades and freedom of movement.		
c. Inspect the bypass valve (wastegate) for proper operation and inspect all linkage for interference, condition, security and attachment.		
d. Inspect all exhaust system components for worn or damaged areas, loose clamps, cracks and leaks.		
e. Inspect lubrication system components for worn or damaged areas, loose clamps, cracks and leaks.		

100-HOUR OR ANNUAL INSPECTION (Continued)

B. POWER PLANT *(Continued)*	**MECH**	**INSP**
f. Inspect the upper deck pressure reference lines and the fuel injection reference manifold for loose connections, leaks and possible chafing.		
g. Check and calibrate the turbine inlet temperature indicator.		
h. Check manifold pressure controller linkage for wear.		
49. FILTERS - Inspect pressure system in-line filter for condition, cleanliness and security. Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent. Refer to Section 8 for additional information.		
50. PRESSURE PUMP (Airborne) - Inspect as required by Parker - Hannifin Service Letter 43A or subsequent. Refer to Section 8 for additional information. PRESSURE PUMP (Aero Accessories Pump Part Number AA216CW) - Initially inspect at 600 hours time-in-service in accordance with Aero Accessories Service Letter No. 004 and thereafter as directed by the Service Letter. Refer to Section 8 for additional information.		
51. FILTERS - Inspect pressure system in-line filter for condition, cleanliness and security. Replace pressure system in-line filter and all other individual instrument air filters in accordance with the Overhaul and Replacement Schedule in Section 8.		
52. MAIN ENGINE FUEL PUMP (TRW or Thompson Model TF1900)- Inspect drive pin every 300 hours. Refer to TRW Service Bulletin ESD 182D or subsequent.		
C. CABIN AND BAGGAGE COMPARTMENT		
1. SKIN - Inspect skins for deformation, cracks and loose or missing rivets. If damage is found, check adjacent structure.		
2. STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets and concealed damage.		
3. CABLES, PULLEYS AND TURNBUCKLES - Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension. **NOTE** - It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		
4. AILERON QUADRANT (D-1 thru D-1500) - Inspect for condition, attachment and proper operation such as binding.		
5. LANDING GEAR GEARBOX AND ACTUATING LINKAGE - Check for leakage, wear, condition and attachment. Check for unusual noise. Remove oil filler plug and check oil level by engaging and turning the emergency hand crank 1/2 turn to determine that oil is being picked up on the worm gear. The oil level should be maintained no more than necessary to cover 1/2 of the diameter of the worm gear. Install oil filler plug.		
6. FLAP MOTOR AND SHAFTS - Check for condition, security and wear at all points. Check drive shaft housing for security and check jam nuts for tightness.		

100-HOUR OR ANNUAL INSPECTION (Continued)

C. CABIN AND BAGGAGE COMPARTMENT *(Continued)*	**MECH**	**INSP**
7. AUXILIARY FUEL PUMP AND FUEL LINES - Check for condition, security and leaks. Check lines for signs of chafing or cracks.		
8. BRAKE MASTER CYLINDER AND PARKING BRAKE VALVE - Check for condition, security and leaks. Check lines for signs of chafing or cracks.		
9. RUDDER PEDALS - Check for freedom of movement. Check cables, push/pull rods, bellcranks, pulleys, turnbuckles and fair leads for proper routing, condition and security. Check rudder pedal fore and aft positions for wear. Check locks and pins to ensure positive lock. **NOTE** - It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		
10. CONTROL COLUMN, TRIM CONTROL AND INDICATOR (Electric and Manual) - Check for freedom of movement. Inspect pulleys, sprockets, bearings, actuators, chains and turnbuckles for condition, security and operation. Check trim indicator for proper indication.		
11. ENGINE CONTROLS - Check for ease of operation through full travel. Check friction locks for proper operation.		
12. ELECTRICAL WIRING AND EQUIPMENT - Check for condition, security and signs of chafing.		
13. PLUMBING - Check all plumbing and connections for security, leakage and general condition.		
14. WINDOWS AND DOORS - Inspect windows for scratches, crazing and general condition. Inspect doors for security of attachment. Check latching mechanism for proper engagement and ease of operation. Check that rotation of the interior door handle without depressing the handle lock release button does not unlatch the door.		
15. INSTRUMENTS AND INSTRUMENT PANEL - Inspect instrument panel, sub panels, placards and instruments for condition and attachment. Check all knobs for security. Inspect shock mounts and ground straps for cracks and security.		
16. SEATS, SEAT BELTS AND SHOULDER HARNESSES - Inspect cabin seats, seat belts and shoulder harnesses for proper operation, condition and security of attachment. Inspect floorboards for condition and seat attachment. Check for operation of the seat stops.		
17. OXYGEN SYSTEM - Check condition of the oxygen system and check the oxygen masks for cleanliness and stowage.		
18. VENTILATING SYSTEM - Check all fresh air and heat outlet vents for proper movement and operation.		
19. FUEL SELECTOR VALVE - Inspect for leakage, security, freedom of movement, proper detent feel and condition. Check for proper placarding.		
20. EMERGENCY EXIT HATCH - Check emergency release handle and latch assembly for proper operation. Check that the hatch moves out freely. Check the complete latch assembly for condition and all moving parts for proper operation. With the hatch installed, check for proper latching and seal. Safety the emergency exit with 0.020 inch-diameter copper wire after opening.		

100-HOUR OR ANNUAL INSPECTION (Continued)

C. CABIN AND BAGGAGE COMPARTMENT *(Continued)*	**MECH**		**INSP**
21. STATIC SYSTEM - Check and drain water from the static lines.			
22. CABIN AIR BLOWER - Check for condition, mounting security and wear at all points.			
23. FUEL STRAINER - Drain and clean. On fuel cells with foam inserts, check for brown foam material. Refer to Safety Communique No. 67 and Service Bulletin No. 2109.			
24. VACUUM RELIEF VALVE - Clean and inspect filter, check for security of attachment (located between instrument panel and firewall).			
D. WINGS AND CARRY-THROUGH STRUCTURE	**MECH**		**INSP**
	LH	**RH**	
1. SKIN - Check for deformation and obvious damage. Check for cracks, loose or missing rivets. If damage is found, check adjacent structure. Check for indications of hard landing or excessive flight loading.			
2. STRUCTURE - Check for cracks, deformation and concealed damage. Check for loose or missing rivets. Refer to Section 3 of this shop manual for inspections for fuselage web cracks at the fuselage/wing spar carry-through area.			
3. ACCESS DOORS AND PANELS - Inspect for cracks, proper fit and attachment.			
4. CABLES, PULLEYS AND TURNBUCKLES - Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension. **NOTE** - It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.			
5. AILERONS - Check for condition and security. Check for cracks, loose or missing rivets and freedom of movement. Check hinge bearings and brackets for condition, push/pull rods for security and rod ends for corrosion.			
6. FUEL CELLS, CAPS AND VENTS - Inspect fuel cells, caps and vent lines as indicated in Section 3 of this shop manual. Refer to Service Instruction Number 0632-280.			
7. PLUMBING - Check for leakage, chafing, condition and security.			
8. ELECTRICAL WIRING AND EQUIPMENT - Inspect for chafing, damage, security and attachment.			
9. FLAP LIMIT SWITCHES - Check for condition, security and freedom of operation.			
10. FLAPS AND ACTUATORS - Check for condition, security, binding or chafing of actuator drive shafts. Check flap skin and structure for cracks, loose or missing rivets. Check roller bearings and tracks for condition. Check stop area for condition and damage.			
11. FLAP POSITION TRANSMITTER - Check for security and operation.			
12. DRAIN HOLES - Check the drain holes in the upper wing attach fittings to ensure that they are open and free of obstruction.			

100-HOUR OR ANNUAL INSPECTION (Continued)

D. WINGS AND CARRY-THROUGH STRUCTURE *(Continued)*	**MECH**		**INSP**
	LH	**RH**	
13. WING SPAR CAP - Inspect the wing spar cap for corrosion. Refer to Section 4. See Service Bulletin 2538.			
14. WING BOLTS - Check wing bolts for proper torque at the first 100-hour inspection and at the first 100-hour inspection after each reinstallation of the wing attach bolts. Refer to Section 3 of this shop manual for wing bolt, nut and fitting inspection criterion and frequency.			
15. RADAR ANTENNA COVER - Check the fiberglass for security, attachment and cracks.			
16. FUEL VENTS AND AIR INLETS, PITOT TUBE AND STALL WARNING VANE - Check for condition and obstruction.			
17. Perform the INSPECTION OF MAIN FUEL CELL FLAPPER VALVE procedure. Refer to Section 3. **NOTE** - This inspection is to be performed at every second 100-Hour inspection or every second Annual inspection.			

E. NOSE GEAR	**MECH**	**INSP**
1. WHEEL AND TIRE - Check wheel for cracks and tire for wear, damage and proper inflation. Check wheel bearings for condition and wear and lubrication.		
2. LANDING GEAR STRUT - Inspect the shock strut and components for cracks, attachment, proper inflation and evidence of leakage.		
3. ACTUATING LINKAGE - Check for wear at attach points. Check for cracks and security.		
4. GEAR DOORS AND LINKAGE - Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security.		
5. NOSE GEAR STEERING LINKAGE - Inspect linkage for tightness, condition and security. Inspect linkage boots for condition.		
6. SHIMMY DAMPER - Check for condition and attachment. Check attach points for cracks. Check fluid level per Section 2.		
7. STRUT FLUID LEVEL - Check and maintain the proper fluid level in the strut as outlined in Section 2.		
8. STRUT AND A-FRAME HINGE BOLTS - Inspect for corrosion and security of attachment.		
9. STATIC CABLE (If installed) - Inspect for condition, proper clearances and attachment.		
10. VISUAL INDICATOR - Check for condition.		
11. NOSE LANDING GEAR DRAG BRACE (P/N 002-820016-31, P/N 002-820018-3, or with Kit 35-4012-1 Installed) - Check that the two drag brace bracket attachment bolts are secure. Check drag brace assembly for shear stress, wear and corrosion. At 2,000 hours, remove and inspect the two bracket attachment bolts. Replace all hardware with evidence of shear stress, wear and/or corrosion.		

100-HOUR OR ANNUAL INSPECTION (Continued)

E. NOSE GEAR *(Continued)*	**MECH**		**INSP**
12. NOSE LANDING GEAR RETRACT ROD ROD-ENDS - Check the retract rod rod-ends for signs of cracking, sheer stress, wear and corrosion.			
F. MAIN GEAR AND BRAKES	**MECH**		**INSP**
	LH	**RH**	
1. BRAKES, LINES, LINING AND DISCS - Check for condition, wear and security. Check lines for chafing and signs of leakage or cracks. Check discs for wear or warping. Check brake discs for cracks.			
2. WHEELS AND TIRES - Check wheels for cracks and tires for wear, damage, condition and proper inflation. Check wheel bearings for condition and wear and lubrication.			
3. ACTUATOR GEARBOX, MOTOR AND SWITCHES - Check for leakage, condition and security.			
4. LANDING GEAR STRUTS - Inspect the shock struts and components for cracks, attachment, corrosion, proper inflation and evidence of leakage.			
5. ACTUATING LINKAGE - Check for wear and cracks at attach points. Check for condition and security,			
6. GEAR DOORS AND LINKAGE - Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security. Determine that all clevis retaining pins are in place and secured with cotter pins.			
7. STRUT FLUID LEVEL - Check and maintain the proper hydraulic fluid level in the struts as outlined in Section 2.			
8. STRUT AND A-FRAME HINGE BOLTS - Inspect for corrosion and security of attachment.			
G. MAIN GEAR OPERATION			
WARNING **Under no circumstances should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed to determine damage to the engagement slot in the worm shaft.** **CAUTION** *Since the battery voltage is not sufficient to properly cycle the landing gear for this inspection, use only an external power source capable of delivering and maintaining 14.25 ± 0.25 VDC to the airplane's electrical system throughout the extension and retraction cycles when performing the landing gear retraction inspection. Refer to Section 5 for more specific information on the following items.*			
1. DOORS - Check operation, fit and fair. Check for unusual noise.			
2. POSITION LIGHTS - Check for security, adjustment and wiring for breaks, condition of insulation, loose connections and proper indication.			
3. WARNING HORN - Check for proper operation.			

100-HOUR OR ANNUAL INSPECTION (Continued)

G. MAIN GEAR OPERATION *(Continued)*	MECH		INSP
	LH	RH	
4. UPLOCK CABLE TENSION - Check uplock cable mechanism for condition and security. Check uplock cable for proper tension and for possible fraying.			
5. EMERGENCY EXTENSION - Check system for freedom of operation. Check for unusual noise. With the spar cover installed, check for proper engagement of the emergency extension handle and proper system operation.			
6. DOWNLOCK TENSION - Check for proper deflection force on the main gear knee joints.			
7. UPLOCK ROLLERS - Check condition and clearance of uplock rollers and lubricate as indicated in Sections 2 and 5 of this shop manual. Check for binding.			
8. LIMIT SWITCH RIGGING - Check for security and proper adjustment of the limit switches. Refer to Section 5 of this shop manual for correct landing gear gearbox internal clearance.			
9. SAFETY SWITCH - Check for security, proper rigging and operation.			
10. GENERAL OPERATION - Place the airplane on jacks and cycle the landing gear while checking to ascertain that the position light switches operate in conjunction with the landing gear position. Check the condition and operation of the complete landing gear system.			
11. DYNAMIC BRAKING ACTION - Verify proper operation of dynamic brake relay.			
12. ASSIST STEP (If Installed) - Inspect the retractable step for cable and safety link condition, proper adjustment and operation. Check fixed link condition, proper adjustment and operation. Check fixed steps for security.			

H. NOSE GEAR OPERATION	MECH	INSP
WARNING **Under no circumstances should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed to determine damage to the engagement slot in the worm shaft.** **CAUTION** *Since the battery voltage is not sufficient to properly cycle the landing gear for this inspection, use only an external power source capable of delivering and maintaining 14.25 ± 0.25 VDC to the airplane's electrical system throughout the extension and retraction cycles when performing the landing gear retraction inspection. Refer to Section 5 for more specific information on the following items.*		
1. DOORS - Check operation, fit and fair. Check for unusual noise.		
2. NOSE GEAR UP TENSION - Check the up tension on the nose gear as indicated in Section 5 of this shop manual.		
3. DOWNLOCK TENSION - Check the downlock tension on the nose gear as indicated in Section 5 of this shop manual.		

100-HOUR OR ANNUAL INSPECTION (Continued)

H. NOSE GEAR OPERATION *(Continued)*	MECH	INSP
4. GENERAL OPERATION - Place the airplane on jacks and cycle the landing gear while checking to ascertain that the position light switches operate in conjunction with the landing gear position. Check the condition and operation of the complete landing gear system.		
5. VISUAL INDICATOR - Inspect for proper adjustment and operation.		
6. NOSE GEAR STEERING - Check for condition and security.		
I. REAR FUSELAGE AND EMPENNAGE		
1. SKIN - Check for deformation, cracks and obvious damage. Check for loose or missing rivets. If damage is found, check adjacent structure.		
2. INTERNAL FUSELAGE STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets. Check bulkheads, door posts, stringers and doublers for corrosion, cracks and buckles.		
3. STRUCTURE - Inspect the two most aft bulkheads for cracks, distortion, loose rivets or other obvious damage.		
4. CABLES, PULLEYS AND TURNBUCKLES - Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension. **NOTE** - It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		
5. CONTROL SURFACES - Check for deformation, cracks and security. Check for loose or missing rivets. Check for freedom of movement. Check for security of hinges and bond cables.		
6. TRIM TABS AND ACTUATORS - Check for security and wear. Check free play. Check hinges and trim tab actuators for security and wear. Check trim tabs for cracks and control rods for attachment. Lubricate trim tab hinges per Section 2.		
7. STATIC PORTS - Check for obstruction and clean as necessary.		
8. PLUMBING - Check for leakage, cracks, chafing, condition and security.		
9. ELECTRICAL WIRING AND EQUIPMENT - Inspect for chafing, damage, security and attachment.		
10. STATIC LINES - Check condition of static lines and drain.		
11. ASSIST STEP BUNGEE - Inspect for condition and attachment.		
12. ANTENNAS - Check for condition and security.		
13. ELEVATOR/RUDDER (Ruddervators) -		
a. Check that the drain holes are open and clean.		
b. Check that the ruddervator trim tab and hinge pin are correctly mated.		
c. Check for cracks on the trim tab hinge support channel.		

100-HOUR OR ANNUAL INSPECTION (Continued)

I. REAR FUSELAGE AND EMPENNAGE *(Continued)*	**MECH**	**INSP**
d. Check the stabilizer front and rear spar attach points for cracks and looseness.		
e. Check the installation of the bolts securing the four trim tab cable terminals to the ruddervator trim tab horn. The bolts should be free enough to rotate with your fingers.		
J. GENERAL		
1. Airplane cleaned and serviced.		
2. Airplane lubricated, after cleaning, in accordance with this shop manual lubrication chart.		
3. Inspect all placards to ensure that they are easily readable and securely attached.		
4. Ensure that all Airworthiness Directives, Beechcraft and Raytheon Aircraft Service Bulletins and previously issued Service Instructions are reviewed and complied with as required.		
5. For a complete or annual inspection of the airplane, all items on the airplane that are noted in this guide should be inspected.		

UNSCHEDULED MAINTENANCE CHECKS - MAINTENANCE PRACTICES

This subchapter is assembled in chart form to allow a technician to perform checks for damage after operating the airplane in conditions which could require unscheduled maintenance. Specific conditions, such as lightning strikes, turbulent air penetration or hard landings, etc., are included. Inspection instructions are included for each of the conditions listed.

WARNING

During the performance of these inspections the airplane could be placed on three-point jacks. Ensure the landing gear is down and locked before removing the airplane from the jacks.

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
OPERATION AFTER SUDDEN STOPPAGE INCIDENTS		
Propeller Governor	The propeller governors should be overhauled or replaced as instructed in the manufacturer's manuals.	After sudden engine stoppage.
WHEN OPERATING IN AREAS OF HIGH DUST CONTENT		
Nose Landing Gear Shock Strut	Clean off and wipe dry exposed polished surfaces.	Routine.
Instrument Air Filters	Replace instrument line supply filters at or before 100 hours under extremely dusty conditions.	As noted.
Alternate Air Door	Ensure door is sealed around all edges and there is adequate spring tension on the door.	Routine.
CAUTION *To avoid damaging the barometric sensor, disconnect the autopilot sensor line prior to applying reverse air pressure to the pitot and static lines.*		
Pitot and Static Lines	Check for obstructions by applying reverse air pressure (not to exceed 20 psi.) to the ends of the pitot and static lines with them disconnected from the instruments.	200 hours or as required.
WHEN OPERATING IN AREAS OF HIGH HUMIDITY		
Floor Structure	Check structure under the floor for corrosion by removing a floor panel and inspection the structure, especially the channel sections.	At a scheduled inspection.
Aft Cabin	Remove aft cabin access covers and inspect for corrosion, especially aft of bulkhead points.	At a scheduled inspection.

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
WHEN OPERATING IN AREAS OF HIGH HUMIDITY *(Continued)*		
Wing	Remove wing and center section access covers and check for corrosion.	At a scheduled inspection.
Empennage	Remove all fuselage access covers and check for corrosion.	At a scheduled inspection.
AFTER RECEIPT OF THE AIRPLANE		
Wing	Check torque of the wing attach bolts.	After the first 100 hours and at the first 100 hours after adjustment of the wing.
OPERATING FROM VERY SOFT OR UNUSUAL TERRAIN		
LANDING GEAR		
Tires	Visually check for cuts, wear, deterioration and inflation.	Routine.
Main Landing Gear	Check strut inflation.	
a. Wheels	1. Check for obvious damage.	Routine.
	2. Remove and clean; inspect for abrasions, cracks and chipped rims, bearing for wear, corrosion, fretting and bluing; check seals for distortion, deterioration, and proper fit and security.	Every 100 hours and/or annually.
b. Brake Units	1. Check cylinders and associated lines for damage and leaks.	Routine.
	2. Check for evidence of overheating.	Every 100 hours and/or annually.
	3. Check discs for scoring, distortion, damaged plating and evidence of overheating.	Every 100 hours and/or annually.
c. Shock Absorber	Check surfaces for cleanliness, free from oil or grease deterioration.	Every 100 hours and/or annually.
d. Wheel Wells	Clean foreign material (dirt, etc.) from wheel wells. Inspect supports between main and aft spars in upper wheel well and the lift leg attach bracket at the main spar for deformation, cracks, etc.	As required.
Nose Landing Gear		
a. Wheel	1. Visually check for obvious damage.	Routine.
	2. Remove and clean. Inspect for abrasions, cracks and chipped rims, bearings for wear, corrosion, fretting and bluing; check seals for distortion, deterioration, proper fit and security.	Every 100 hours.

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
OPERATING FROM VERY SOFT OR UNUSUAL TERRAIN *(Continued)*		
b. Shock Strut	1. Check for obvious damage and leaks. Clean exposed surface of shock strut piston with clean cloth moistened with hydraulic fluid.	Routine.
	2. Check for correct extension. Refer to Section 5.	Every 100 hours.
	3. Thoroughly clean and inspect for leaks, damage and security; service as necessary.	Every 100 hours.
c. Fork Assembly	Check for cleanliness and obvious damage.	Routine.
d. Nose Wheel Steering	Check for obvious damage, associated rods and connections for damage and security; steering and pulleys for wear and security.	Every 100 hours.
e. Actuator Linkage	Check for excessive play, safety and security.	Every 100 hours.
f. Shimmy Damper	Inspect for condition and attachment. Refer to Section 5 and service as required.	Every 100 hours.
INSPECTION AFTER HARD LANDING		
	Perform the following:	As applicable
NOTE This inspection should be carried out after a hard landing and before the airplane is certified as ready for further flight. The inspections are conducted at two levels. The first level consists of determining if any external damage has occurred and looking for evidence of internal structural failure. The second level is concerned with a more detailed inspection of any damaged areas which were indicated in the findings of the first level inspection. If it is determined by the determined by the first level inspection that there is no damage to the airplane, it is not necessary to proceed to the second level inspection.		
WARNING **Even though wrinkles in the wing or fuselage skin surface may be slight enough to be considered as negligible, a close inspection of the internal supporting structure may reveal serious damage.**		
	FIRST LEVEL INSPECTION	Prior to next flight
General Appearance	Determine that the airframe components (wings, fuselage and empennage) are in their normal configuration.	
Landing Gear	a. Inspect tires for excessive wear, splits in the tread, bottoming out or folding over the sidewalls.	
	b. Check the wheels (rims) for flat spots or cracked castings.	
	c. Check shock struts and attachment lugs for cracks.	
	d. Inspect hydraulic brake lines for leaks	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER HARD LANDING *(Continued)*		
	e. Inspect nose drag legs and gear door retract linkage for damage.	
	f. Inspect landing gear lift leg attach bracket at the main spar for deformation, cracks, etc.	
	g. Inspect area around landing gear attach points.	
Nose Structure	a. Inspect external skin surfaces for distortion, loose or missing rivets.	
	b. Check cowling attachment for alignment or damage.	
	c. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment.	
	d. Inspect engine support fittings for cracks or structural failure.	
	e. Check tips of propeller for damage.	
	f. Check propeller spinner and backplate for evidence of interference with cowling.	
	g. Inspect wheel well structure for damage or cracks. Check area surrounding the landing gear attachment points.	
Wing Carry-thru Structure	a. Check wing attachment fittings for cracks. Perform a Dye Penetrant inspection.	
	b. Inspect plumbing, wiring and actuator for damage and security of attachment.	
	c. Check keel, front and rear spar on the lower side of fuselage for damage and alignment.	
Wings	a. Inspect external wing surface skin for cracks, abnormal wrinkles and loose or missing rivets.	
	b. Check wing attachment fittings for cracks Perform a Dye Penetrant inspection.	
	c. Inspect internal structure.	
	d. Inspect plumbing and wiring for security of attachment.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER HARD LANDING *(Continued)*		
Fuselage Center Section	a. Inspect external skin surface for cracks, abnormal wrinkles and loose or missing rivets.	
	b. Inspect around cabin windows for structural cracks.	
Fuselage, Aft	a. Check external skin surface the entire length for cracks, abnormal wrinkles and loose or missing rivets.	
	b. Inspect empennage and control surfaces for freedom of movement.	
	SECOND LEVEL INSPECTION	As required
NOTE Because shock loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area found in the first level inspection.		
Landing Gear	a. Place airplane on jacks and check shock strut for free up and down movement.	
	b. Remove tires and inspect internally for cuts or broken areas.	
	c. Disassemble and examine wheels (rims) for cracks or distortion.	
	d. Visually inspect axle with 10-power glass. If suspect, dye check or magnaflux.	
	e. Remove and replace or magnaflux the landing gear attach bolts, check bolt holes for cracks or elongation.	
	f. Remove and replace or magnaflux drag link bolts and supports.	
	g. Perform landing gear retraction test.	
Nose Structure	a. If tips of propeller have been damaged, refer to the applicable Engine Maintenance Manual for engine inspection procedure.	
	b. Inspect areas surrounding the engine support fittings.	
	c. Check the internal structure of the wheel well for cracks or damage.	
	d. Test plumbing and wiring for proper operation.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER HARD LANDING *(Continued)*		
	e. Inspect wheel well structure and surrounding areas for signs of structural failure.	
Wing Carry-thru Structure	a. Dye check wing attachment fittings; examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimensions	
	b. Remove floorboards and access plates and inspect the front and rear spar, and keel structure for evidence of deformation or structural failure.	
	c. Test plumbing, wiring, flaps, control cables, pulley mounts, and any other system found in this area for proper operation.	
Wings	a. Dye check wing attachment fittings; examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimensions	
	b. Test plumbing and wiring for proper operation.	
Fuselage, Center and Aft Section	a. Examine stringers, frames and sidewalls for deformation structural failure.	
	b. Test plumbing and wiring for proper operation.	
	c. Inspect heating and air-conditioning ducts for damage.	
	d. Examine the control cables and pulley mountings and check for clearance from structure at pass-through locations. Ensure a smooth operation.	
REPAIR OF DAMAGE		
Due to the variety and degree of structural damage which may be involved, the best repair of replacement procedure must be based on the findings of the individual airplane. If the hard landing inspection indicates that serious structural damage has occurred, contact Raytheon Technical Support, Raytheon Aircraft Company, Wichita, Kansas, 67201 for assistance.		
LOG BOOK ENTRY		
Following a hard landing inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the airplane permanent records.		

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER ENCOUNTERING TURBULENT AIR		
	Perform the following:	As applicable
NOTE This inspection should be carried out after the airplane has been subjected to high G loading while flying through turbulent air and before the airplane is returned to service. The inspection is conducted on two levels. The first level consists of determining if any external damage has occurred and looking for evidence of internal structural failure. The second level is concerned with a more detailed inspection of damaged areas which were indicated in the findings of the first level inspection. If it is determined by the first inspection that there is no damage to the airplane, it is not necessary to proceed to the second level inspection.		
	FIRST LEVEL INSPECTION	Prior to next flight
WARNING **Even though wrinkles in the wing or fuselage skin surface may be slight enough to be considered as negligible, a close inspection of the internal supporting structure may reveal serious damage.**		
General Appearance	Determine that the airframe components (wings, fuselage and empennage) are in their normal configuration.	
Wing Carry-thru Structure	a. Inspect the external skin surface for cracks, abnormal stress wrinkles and loose or missing rivets.	
	b. Check wing attachment fittings for cracks.	
	c. Inspect plumbing and wiring for damage and security of attachment.	
	d. Check the keel and the front and rear spar on the lower side of the fuselage for damage and alignment.	
Nose Structure	a. Inspect the external skin surfaces for wrinkles and loose or missing rivets.	
	b. Check cowling attachment for alignment or damage.	
	c. Inspect the engine support fittings for cracks or deformation or structural failure.	
	d. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment.	
	e. Inspect structure in wheel well for damage or cracks.	
Wings	a. Inspect the top and bottom wing surface for cracks, wrinkles and loose or missing rivets.	
	b. Inspect wing attachment fittings for cracks.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER ENCOUNTERING TURBULENT AIR *(Continued)*		
	c. Inspect aileron, aileron tab and flaps for wrinkles or cracks.	
	d. Inspect internal structure and fuel cells through access panels.	
	e. Inspect plumbing and wiring for security of attachment.	
Nose Structure	a. Check external skin surface for cracks, wrinkles and loose or missing rivets.	
	b. Inspect area forward of windshield for evidence of structural deformation or failure.	
Fuselage, Center Section	Inspect external skin surface for cracks, abnormal wrinkles and loose or missing rivets.	
Fuselage, Aft	a. Inspect the entire length of the external skin surface for cracks, stress wrinkles and loose or missing rivets.	
	b. Check the empennage surfaces for damage and free movement.	
	c. Inspect for skin wrinkles at the juncture of the fuselage and empennage.	
	SECOND LEVEL INSPECTION	As required
NOTE Because G loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area found in the first level inspection.		
Wing Carry-thru Structure	a. Dye check wing attachment fittings, examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimension.	
	b. Remove floorboards and access plates and inspect the front and rear spar and keel structure for evidence of deformation or structural failure.	
	c. Operational test plumbing, wiring, flaps, control cables, pulley mounts and any other system found in this area.	
Nose Structure	a. Inspect areas surrounding the engine support fittings.	
	b. Inspect internal structure for cracks or damage.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER ENCOUNTERING TURBULENT AIR *(Continued)*		
	c. Operational test plumbing and wiring.	
Wings	a. Dye check wing attachment fittings, examine (magnaflux or replace) attachment bolts.	
	b. If there is evidence of damage to the fuel cells or fuel lines, remove the cells and inspect the fuel cell liners and liner support structure.	
	c. Operational test the plumbing and wiring, flap actuator, aileron and tab control cables and pulley mounting.	
Fuselage Center Section	a. Examine stringers, frames and sidewalls for deformation or structural failure.	
	b. Examine heating and air-conditioning ducts for damage.	
	c. Operational test plumbing and wiring.	
	d. Examine the control cables, pulley mountings and the cable clearance at areas the cables pass through the structure. Ensure a smooth, normal operation.	
Empennage	a. Inspect elevator pushrods, torque tubes and bellcrank for damage.	
	b. Inspect the attachment of the vertical stabilizer spars to the top of the fuselage for evidence of damage.	
	c. Inspect skin surfaces for condition and loose or missing rivets.	
	d. Check structure for cracks, loose rivets and/or concealed damage.	
	e. Check rudder for freedom of movement and attachment.	
	f. Check elevator for freedom of movement and attachment.	
	g. Check trim tab actuators for smoothness of operation and attachment. Check the wiring of the electrical trim tab actuator for connection, security of attachment and condition. Check the electrical trim tab actuator for full travel and security of attachment.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER ENCOUNTERING TURBULENT AIR *(Continued)*		
REPAIR OF DAMAGE		
Due to the variety and degree of structural damage which may be involved, the best repair or replacement procedure must be based on the inspection findings of the individual airplane. If the turbulent air inspection indicates that serious structural damage has occurred, contact Raytheon Technical Support, Raytheon Aircraft Company, Wichita, Kansas 67201, for assistance.		
LOG BOOK ENTRY		
Following a turbulent air inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the permanent records.		
INSPECTION AFTER LIGHTNING STRIKE		
	Perform the following:	Prior to next flight
CAUTION *Propellers must be inspected and/or replaced utilizing the data provided in the manufacturers manuals prior to returning the airplane to service following any lightning strikes or other impact damage.*		
Propeller	a. At times the difficulty is not in inspecting the airplane, but in determining if a strike has occurred. Most times, an exit location will indicate possible damage to the components. The entry point is most often the propeller. A darkened area in the propeller tip may be noticeable after a lightning strike. A 3- to 5-power magnifier will show slag at the bottom of a nick in the propeller blade. If a strike is suspected, inspect deep nicks in the blade. Damage after a lightning strike should be corrected utilizing the procedure specified by the manufacturer.	
	b. Blade overhaul must be accomplished by a mechanic certified by propeller manufacturer. Damage beyond the limits specified the propeller manufacturer may require the blade to be returned to the factory or to a designated repair facility for evaluation.	
Engine	Inspect as instructed in the appropriate Engine Maintenance Manual.	

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
INSPECTION AFTER LIGHTNING STRIKE *(Continued)*		
Fuselage	a. Carefully inspect the exterior of the airplane. Evidence of a strike will usually appear as a burned hole or as a series of burned holes in metallic surfaces. Plastic parts may be delaminated and/or deformed due to high internal pressures. Normally two or more points will be found, the entry and the exit points. Antennas are frequently an entry point of lightning and should be carefully inspected for evidence of arcing, sooting or pitting.	
	b. From the point of entry, the strike usually spreads aft in a series of small holes or burn marks. After the points of entry and exit are found, the structure between these points should be carefully inspected. Attention should be given to hinges and hinge pins for possible pitting. Cables, pulleys, bearings, bolts and all bonding jumpers in the area should be inspected for possible damage. Antennas, electrical and electronic equipment should be visually checked for damage and functionally checked for operation. If the strike was near the fuel vent, all plumbing should be carefully inspected for damage. Steel components may exhibit magnetism and require degaussing so as not to affect compass systems.	

SECTION 8

Accessory and Component Replacement Schedule

8

OVERHAUL AND REPLACEMENT SCHEDULE

The first overhaul or replacement must be performed not later than the recommended period. The condition of the item at the end of the first period can be used as a criteria for determining subsequent periods applicable to the individual airplane or fleet operation, provided the operator has an approved monitoring system.

The time periods for inspections noted in this manual are based on average usage and average environmental conditions.

SPECIAL CONDITIONS CAUTIONARY NOTICE

WARNING

Prior to performing maintenance on an engine or the Airframe, ALWAYS pull the starter control circuit breakers and the Landing Gear circuit breaker. This will remove power to the starter control as well as the igniter power relay and Landing Gear Control relay.

Airplanes operated for Air Taxi, or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

The recommended periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

WARNING

Use only genuine Raytheon Aircraft Company or Raytheon Aircraft Company-approved parts obtained from Raytheon Aircraft Company-approved sources, in connection with the maintenance and repair of Raytheon Aircraft Company airplanes.

Genuine Raytheon Aircraft Company parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Raytheon Aircraft Company airplane applications. Parts purchased from sources other than those approved by Raytheon Aircraft Company, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from sources not approved by the Raytheon Aircraft Company or parts, components or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by Raytheon Aircraft Company, unsuitable and unsafe for airplane use.

Raytheon Aircraft Company expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of parts not authorized by the Raytheon Aircraft Company.

Overhaul and Replacement Schedule

ITEM	OVERHAUL OR REPLACE

NOTE

All items not listed are to be overhauled or replaced “on condition”. “On condition” items are to be overhauled or replaced if inspection reveals a potentially unsafe or unserviceable condition, if they are worn, inoperative, inaccurate, intermittent and not repairable through normal maintenance. Primarily items that are calender, cycle or hour limited are included in the following list.

LANDING GEAR

Brake Assembly	On condition
Landing Gear Motor	1,000 hours
Landing Gear Actuator P/N 35-810075-7	2,000 hours
Landing Gear Actuator P/N 35-810075-13	4,000 hours
Master Cylinder	On condition
Main Gear Assembly	On condition (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the “On condition” requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul.)
Nose Gear Assembly	On condition (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the “On condition” requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul.)
Parking Brake Valve	On condition
Retract Motor Brushes	500 hours or on condition
Shimmy Damper	1,000 hours
Shuttle Valve Assembly	On condition
Wheels and Tires	On condition
All Hoses	Hoses carrying flammable liquids at engine overhaul, or every 5 years, whichever occurs first since the last replacement or delivery date of the airplane from the factory. All other hoses on condition.
Nose Gear Retract Rod Rod-Ends (All)	2,000 hours

Overhaul and Replacement Schedule (Continued)

ITEM	OVERHAUL OR REPLACE
POWER PLANT	

NOTE

A TBO (time between overhaul) recommendation is in no way to be construed as a warranty or engine life proration basis. The TBO recommendation is based on the projected time for most advantageous initial overhaul. The individual operator's experience may indicate a departure in either direction from the recommended TBO for the particular operation.

ITEM	OVERHAUL OR REPLACE
Standby Generator	1,500 hours
*Engine (E-185 series, E-225 Series, O-470 series and IO-470 series)	1,500 hours
*Engine (IO-520 series)	1,700 hours
*Engine (TSIO-520 series)	1,400 hours

*Reference Teledyne Continental Motors Corporation Service Information Letter SIL 98-9 or subsequent.

ITEM	OVERHAUL OR REPLACE
Engine Controls	On condition
Engine Vibration Isolator Mounts	Engine change or on condition
Exhaust System	On condition
Oil Cooler	On condition, replace if contaminated
Air Pressure Pump	Airborne Pumps - refer to Airborne Replacement Schedule SI 300-17 or subsequent. See Supplier Data CAUTION at the end of this section. Aero Accessories Pumps Part Number AA442CW - replace at 500 hours time-of-operation. Aero Accessories Pump Part Number AA216CW - Replace at 1200 hours time-of-operation.
Standby Air Pressure Pump	Airborne Pumps - refer to Airborne Replacement Schedule SI 300-17 or subsequent except hours are to be pump operation time. See Supplier Data CAUTION at the end of this section. Aero Accessories Pump Part Number AA216CW - Replace at 1200 hours time-of-operation.
Propeller (Beech 215 series)	At engine overhaul or at engine failure but not to exceed 1500 hours
Propeller (Beech 278 series)	At engine overhaul or at engine failure but not to exceed 1500 hours
Propeller (Hartzell)	Refer to the latest revision of Hartzell Service Letter HC-SL-61-61 for TBO
Propeller (McCauley)	Refer to the latest revision of McCauley Service Bulletin 137
Propeller Controls	On condition

Overhaul and Replacement Schedule (Continued)

ITEM	OVERHAUL OR REPLACE
POWER PLANT *(Continued)*	
Propeller Governor (Electric)	600 hours
Propeller Governor (Hydraulic)	At engine overhaul or on condition but not to exceed 1,500 hours
Starter	Inspect at engine overhaul, overhaul or replace on condition
Vacuum Pumps	1,200 hours
All Hoses	Hoses carrying flammable liquids at engine overhaul or every 5 years, whichever occurs first since the last replacement or delivery date of the airplane from the factory; all other hoses on condition
Engine Air Filter	Clean every 50 hours of operation (10 times max.). Replace every 500 hours or 1 year, whichever occurs first.
Engine Baffle Seals	Replace as necessary or every 10 years of service.
Main Engine Fuel Pump (TRW or Thompson Model TF1900)	Overhaul every 900 hours. Refer to TRW Service Bulletin ESD 182D or subsequent.
FLAPS AND FLIGHT CONTROLS	
Trim Tab Actuator	2,000 hours
Flap Flexible Shaft	2,000 hours
Flap Gearbox	2,000 hours
Flap Motor and Drives	2,000 hours
Flap Motor Brushes	On condition
Flap Actuator	2,000 hours
FUEL SYSTEM	
Fuel Cells	On condition. (If fuel reservoir is installed, inspect foam insert material for deterioration.) Replace foam insert material every 10 years.
Fuel Boost Pump	Overhaul every 10 years
Fuel Cell Drain Valve	On condition
Fuel Selector Valve	On condition
Fuel System Check Valves	On condition
Wing Fuel Quantity Transmitters	On condition

Overhaul and Replacement Schedule (Continued)

ITEM	OVERHAUL OR REPLACE
FUEL SYSTEM *(Continued)*	
All Hoses	Hoses carrying flammable liquids at engine overhaul or every 5 years, whichever occurs first since the last replacement or delivery of the airplane from the factory; all other hoses on condition
INSTRUMENTS	
Altimeter	Every 24 months per FAA directive (inspect and calibrate)
Air Pressure Regulator Valve	On condition
Pressure System Filter (In-line and Intake)	Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent. See Supplier Data CAUTION at the end of this section.
Airspeed Indicator	On condition
Attitude Gyro	On condition
Clock	On condition
Directional Gyro	On condition
Flap Position Indicator	On condition
Free Air Temperature Indicator	On condition
Fuel Flow Gage	On condition
Gyro Horizon	On condition
Gyro Filter	On condition
Gyro Filter (Pressure System)	300 hours
Gyro Pressure Gage	On condition
Manifold Pressure	On condition
Rate-Of-Climb	On condition
Suction Gage	On condition
Turn and Bank Indicator	On condition
Tachometer	On condition
Standby Pressure System Filters (In-line and Intake)	Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent except hours are to be pump operation time. See Supplier Data CAUTION at the end of this section.
All Hoses	On condition

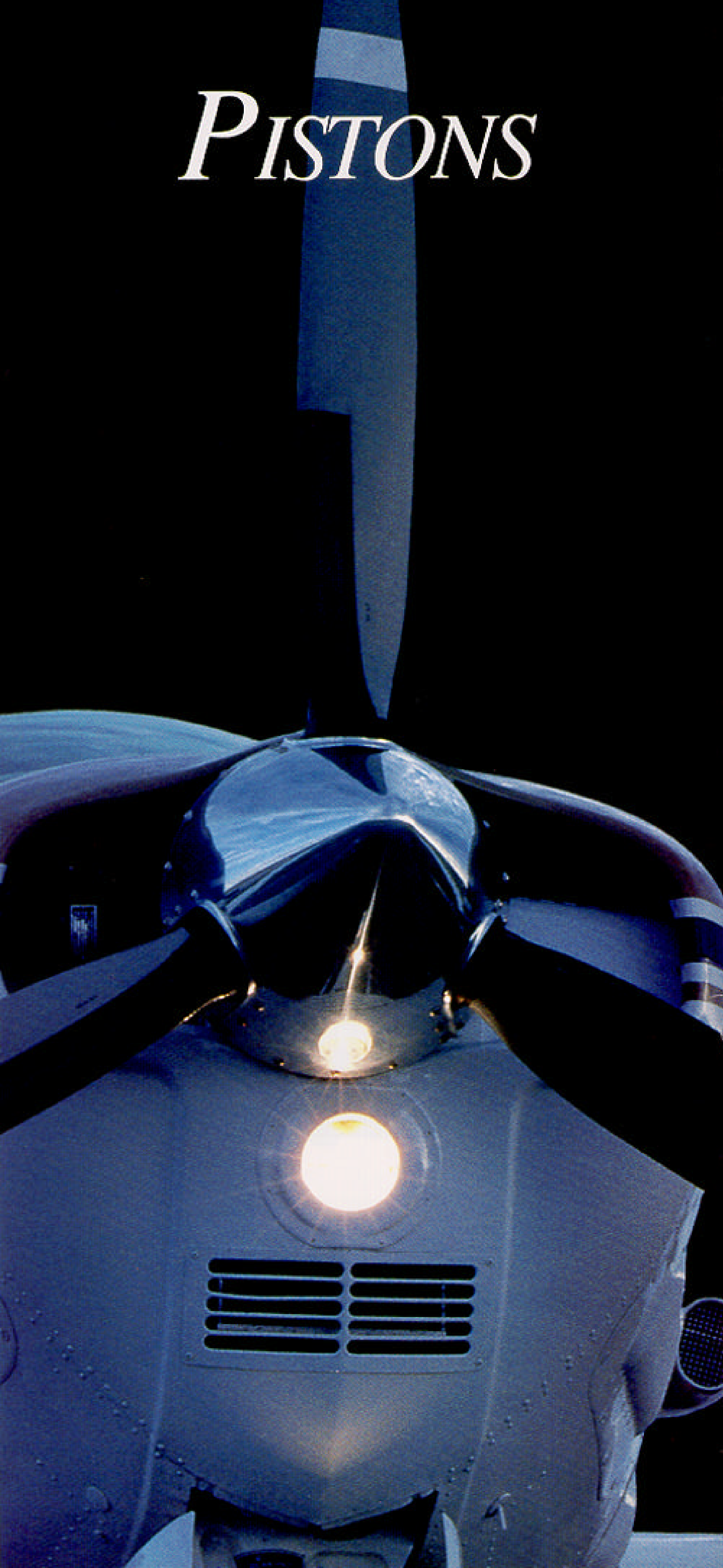
Overhaul and Replacement Schedule (Continued)

ITEM	OVERHAUL OR REPLACE
ELECTRICAL SYSTEM	
Alternator	On condition
Battery Master Relay	On condition
Generator	On condition
Voltage Regulator	On condition
All Other Relays	On condition
Flares (if installed)	Return to manufacturer for inspection and renovation every 36 months
Landing Gear Dynamic Brake Relay	On condition
Propeller Control Relay	On condition
Starter Relay	On condition
Standby Generator (14 volt)	1,500 hours
Magneto (Bendix & Teledyne Continental Motors (TCM))	Engine overhaul or every four years, whichever comes first. Refer to TCM Service Bulletin 643.
STRUCTURE	
Wing-Attach Bolts (4 each side)	Replace 10 years after initial inspection or on condition. Refer to Section 4.
MISCELLANEOUS	
Seat Belts or Shoulder Harnesses	Inspect every 12 months, replace on condition
Cabin Heating and Ventilating Ducts	Inspect every 12 months or on condition
Cabin Heating Exchanger (Heater Muffler)	On condition
Hand Fire Extinguisher	Inspect every 12 months, recharge as necessary
Oxygen Cylinder (22.0 cu. ft., Standard Weight) ICC 3AA 1800	Hydrostatically test every 5 years (ICC regulation)
Oxygen Cylinder (49.2 and 65.5 cu. ft., Lightweight) ICC 3HT 1850)	Hydrostatically test every 3 years (ICC regulation). Replace every 24 years or 4,380 refills, whichever occurs first.
Oxygen Regulator	On condition
Air Conditioner Filter	On condition
Air Conditioner Compressor	On condition

With particular attention to throttle response, smooth power and oil consumption, a qualified certified mechanic must determine that the engine is operating normally at the time of each periodic inspection.

CAUTION

Supplier Data is subject to change. Users of this manual should refer to the Parker-Hannifin website (www.parker.com/airborne) for the latest information regarding Parker-Hannifin Airborne components.



Beech ®

Debonair

Model 33 Series

Shop Manual

33-590011-1C17

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