

Illustrated Parts List and Maintenance Instructions with Initial Installation Instructions

FOR

250-C20R/2 ENGINE CONVERSION INSTALLATION KIT

Part No. 369D298000-519 and -523

USED ON MDHS 500D AND 500E (MODELS 369D AND 369E HELICOPTERS)



**THIS ISSUE SUPERSEDES ALL
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FOREWARD

F-1 Purpose and Contents of This Manual

This manual supplements information contained in the HMI and 369D and 369E/FF (CSP-D-4 and CSP-E/F-4) IPC. It contains instructions for converting Allison 250-C20B engines with 250-C20R/2 engines, and continuing maintenance for 369D298000-519 (369D) and 369D298000-523 (369E) 250-C20R/2 engine. Parts lists are included for use in procuring replacement parts for the system.

F-2 Applicability

NOTE

Engine and battery are customer supplied and not included in package. The 250-C20R/2 engine requires 17 amp hr battery (369D290011). If not installed, refer to CSP-093 for installation instructions.

The Allison 250-C20R/2 engine is applicable for use on MDHC 500 (Models 369D and 369E) helicopters. For compatibility information on which optional equipment may or may not be used in combination at the same time, refer to Section IX, of appropriate Pilot's Flight Manual.

F-3 Organization of Contents

The contents of this manual are grouped into sections as outlined in the Table of Contents. Each section is organized to provide comprehensive coverage of the systems, major equipment groupings, and major components that are similar or associated. Procedures for each of these are presented in sequence as defined in Introduction (HMI).

F-4 Use of This Manual

This manual is for use by operators of the MDHC 500 (Models 369D and 369E) helicopter. Although this manual is a separate publication, it should be kept with HMI and other handbooks listed in Introduction (HMI) that form the primary information file for the helicopter.

F-5 Related Publications

Reference is made to applicable portions of HMI and 369D and 369E/369F Illustrated Parts Catalog - IPC (CSP-D-4 and CSP-E/F-4), applicable Opt Eqpt Manuals and Allison Operation and Maintenance manual publications as required to accomplish instructions contained herein.

F-6 Literature Changes and Revisions

Changes and revisions to contents of this manual are made as defined in Introduction (HMI).

SECTION 1

ILLUSTRATED PARTS LIST

1-1. Scope and Events

This illustrated parts list provides, by means of text (parts list) and companion illustrations, a definition of parts of the 369D298000-519 and 369D298000-523 conversion 250-C20R/2 engine conversion installation manufactured by MDHS, Mesa Arizona.

NOTE

The illustrated parts list is organized and presented in the same manner as CSP-IPC-4. For information on use, refer to CSP-IPC-4.

1-2. Group Assembly Parts List

The parts list furnishes parts list information for 250-C20R/2 engine installation and shall not be used for any other purpose. If part numbers in this manual conflict with those listed in CSP-IPC-4, those listed herein should be used.

1-3. Illustrations

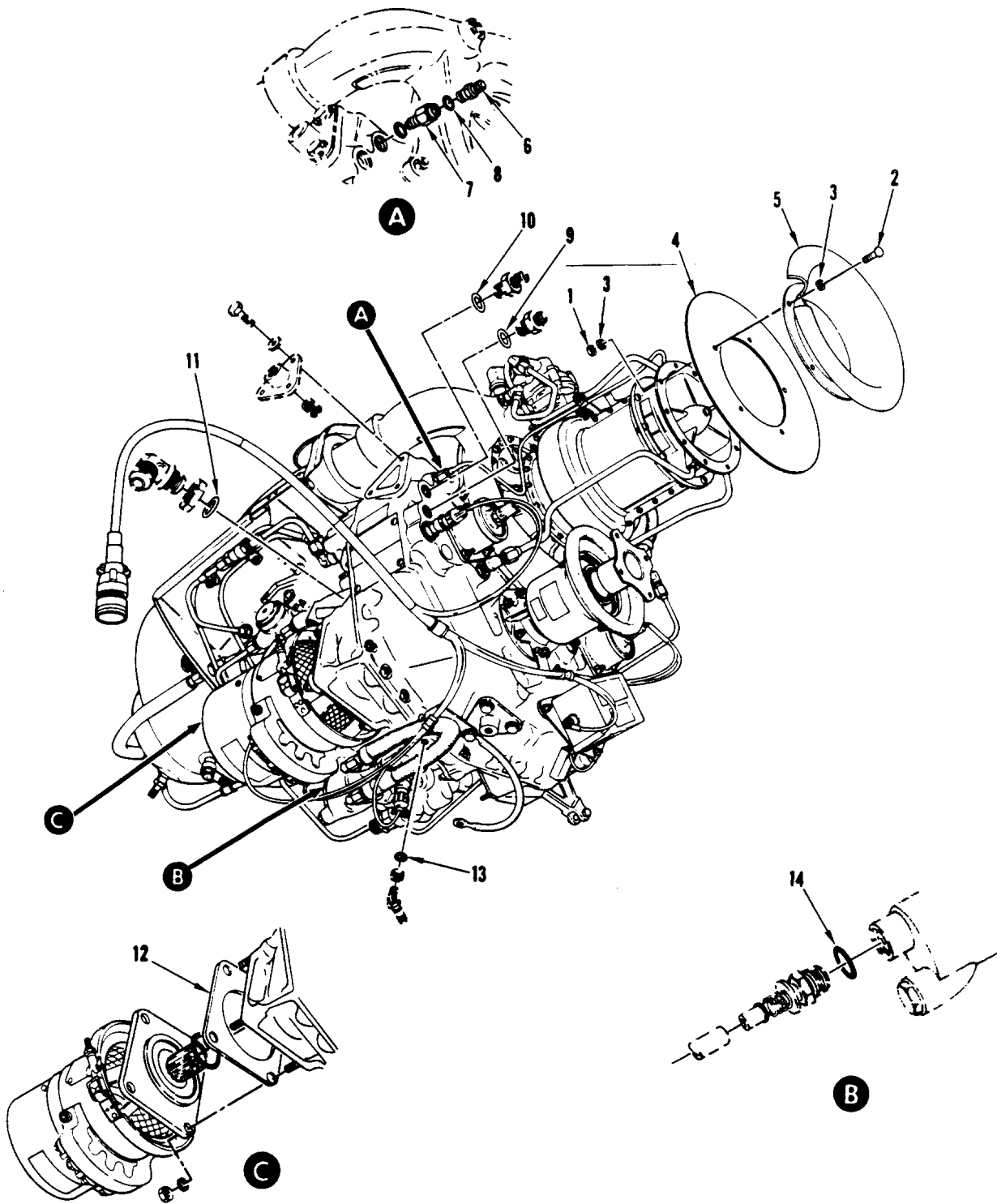
Isometric illustrations are provided for the group assembly parts list. The illustrations are exploded

to the extent necessary to show parts relationship for the 250-C20R/2 engine installation.

1-4. Usable On Code

The USABLE ON CODE column located at the right-hand side of the Group Assembly Parts List pages indicate the effectivity of parts by aircraft model. In many cases, two different parts are listed, one representing the original installation and the other representing an improved replacement item. Alphabetic codes are used to indicate the aircraft model application of a given part. The alphabetic codes used in this manual are listed and explained below:

USABLE ON CODE LETTER	AIRCRAFT MODEL
A	369D
B	369E



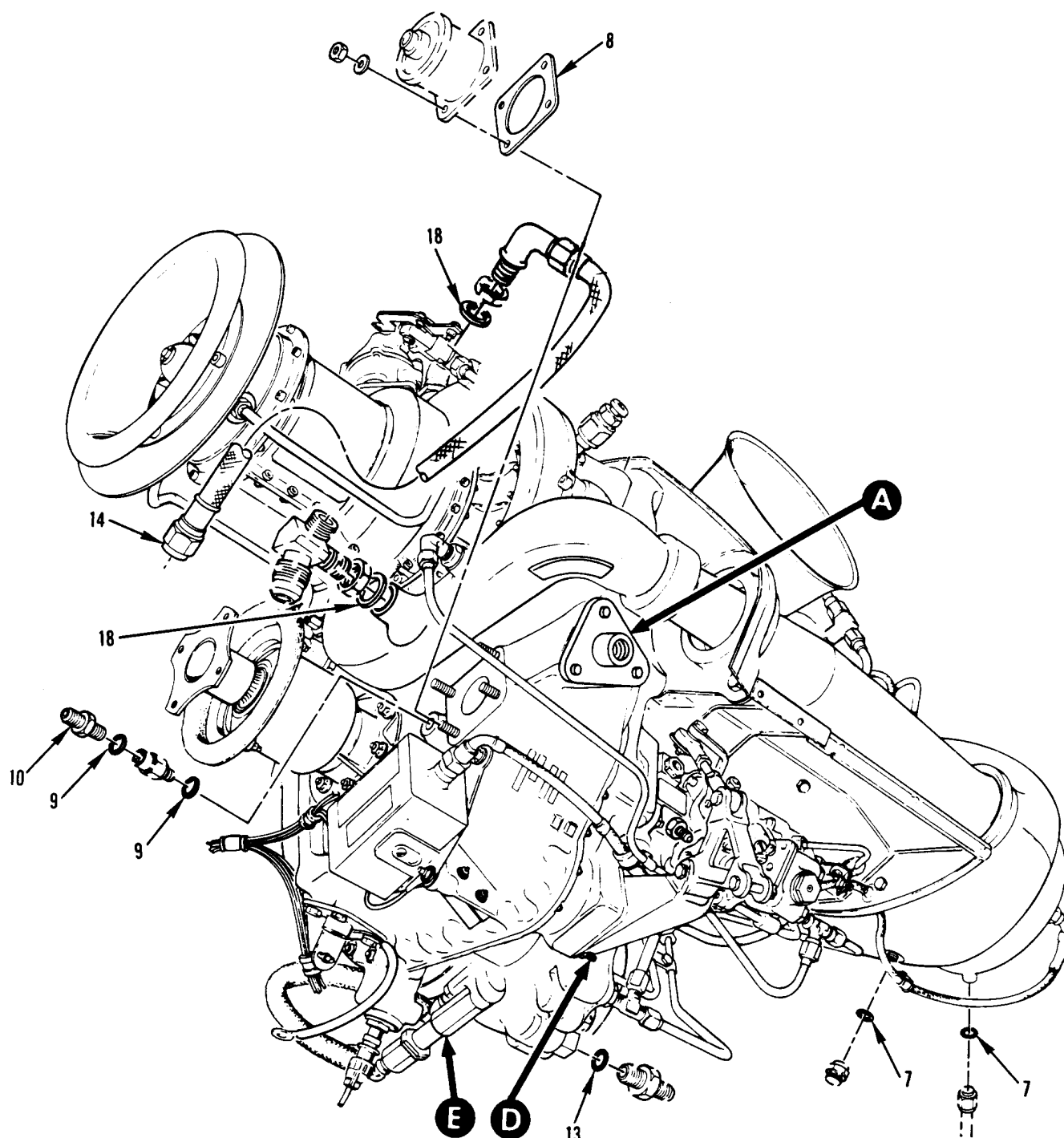
57-149-3

Figure 1-1. 250-C20R/2 Engine Installation Kit

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-1-	369D298000-519	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	A
	369D298000-523	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	B
-1	MS21043-08	. NUT	6	B
-2	NAS1352C08-8	. BOLT	6	A/B
-3	NAS620C08L	. WASHER	12	A/B
-4	369D28750-501 Alternate *369D28750-503	. SEAL PLATE	1	A/B
-5	369D28749-11	. BELL, AIR INLET	1	A/B
-6	369D28410	. REDUCER	1	A/B
-7	39S-003	. SNUBBER	1	A/B
-8	NAS617-4	. PACKING	3	A/B
-9	NAS617-8	. PACKING	2	A/B
-10	NAS617-10	. PACKING	2	A/B
-11	NAS617-12	. PACKING	1	A/B
-12	MS9135-1	. GASKET	1	A/B
-13	MS29512-03	. PACKING	1	A/B
-14	MS29512-04	. PACKING	1	A/B

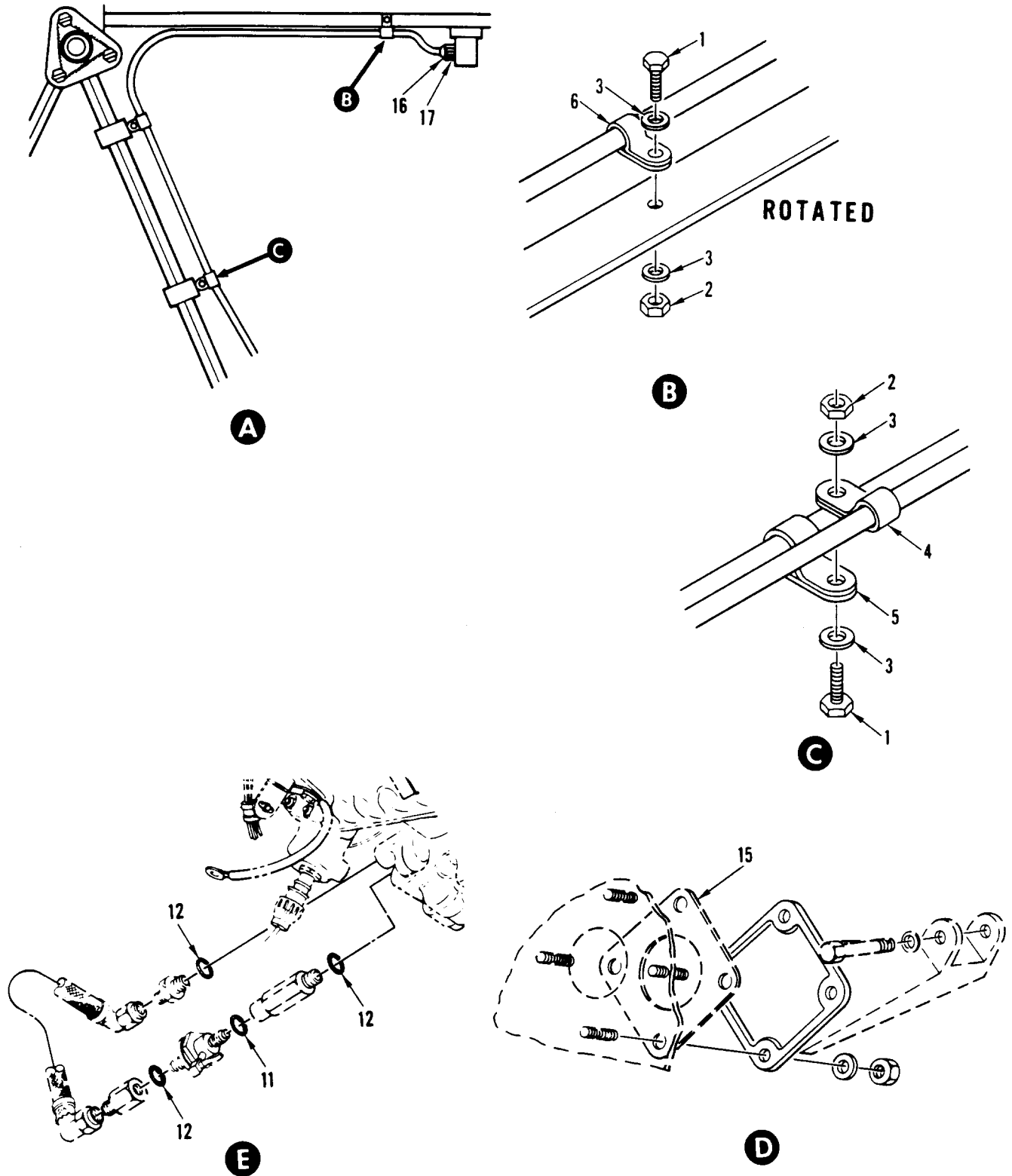
NOTES:

Used with new engine air bleed air valve.



57-149-1A

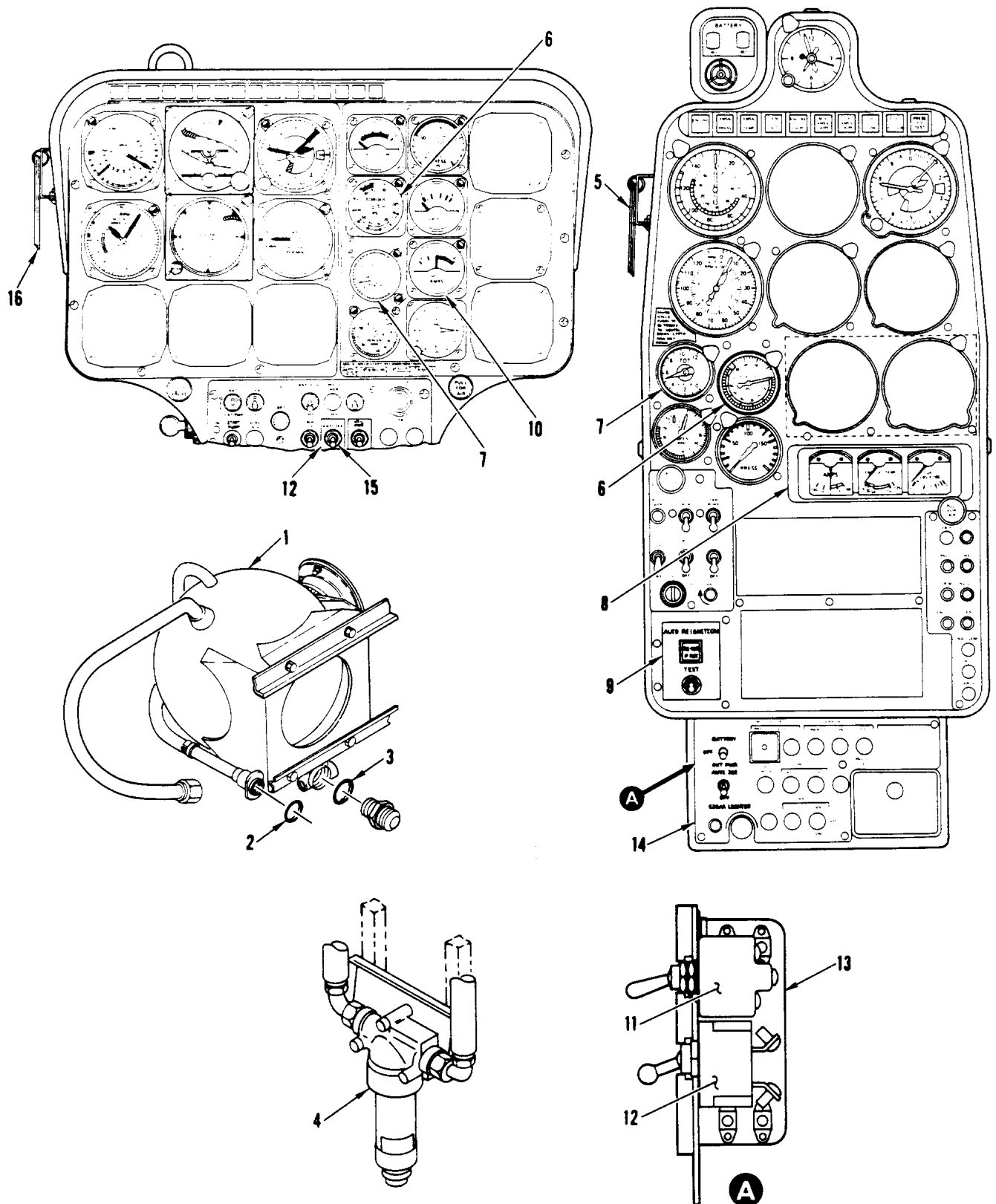
Figure 1-2. 250-C20R/2 Engine Installation Kit (Sheet 1 of 2)



57-149-2A

Figure 1-2. 250-C20R/2 Engine Installation Kit (Sheet 2 of 2)

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-2-	369D298000-519	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	A
	369D298000-523	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	B
-1	NAS1303-1	. BOLT	3	A/B
-2	MS21042-3	. NUT	3	A/B
-3	AN960C10L	. WASHER	10	A/B
-4	MS21919WCH3	. CLAMP	2	A/B
-5	MS21919WCH8	. CLAMP	2	A/B
-6	10904 Alternate MS9825-02	. CLAMP	1	A/B
-7	6843332-03	. PACKING	2	B
-8	MS9134-1	. GASKET	2	A
-9	NAS617-3	. PACKING	2	A/B
-10	57D2-001	. SNUBBER	1	A/B
-11	MS29512-02	. PACKING	1	A/B
-12	MS29512-03	. PACKING	3	A/B
-13	MS29512-05	. PACKING	1	A/B
-14	369D28748-501	. HOSE ASSY (bleed air)	1	A/B
-15	369D28405	. GASKET	1	A/B
-16	M85049/062G08N	. BACKSHELL	1	A/B
-17	M83723/75R08036	. CONNECTOR	1	A/B
-18	HS3190B8	. GASKET	2	A/B



47-1300

Figure 1-3. 250-C20R/2 Engine Installation Kit

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-3-	369D298000-519	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	A
	369D298000-523	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	B
-1	369A8301-507	. TANK, OIL	1	A
-2	NAS617-8	. PACKING	1	A/B
-3	NAS617-10	. PACKING	1	A/B
-4	1741050-01	. SCAVENGE OIL FILTER ASSY	1	A/B
-5	369D26546-BSC	. V _{NE} CARD (set)	1	A
-6	369H4526-19	. INDICATOR, TORQUE	1	A/B
-7	369A4521-11	. INDICATOR, TOT	1	A/B
-8	369D296305-23	. INSTRUMENT CLUSTER	1	A
-9	369D298000-23	. AUTO RE-IGNITION CONTROL PANEL ASSY	1	A
-10	369D24136-3	. INDICATOR, AMMETER	1	B
-12	7270-1-3 Alternate MS24509-A-3	. CIRCUIT BREAKER (CB122)	1	A/B
-13	369D298000-29	. BRACKET ASSY (lwr. sw. pnl.)	1	A
-14	369D24511	. PANEL ASSY (edge-light)	1	A
-15	369D28560-13	. DECAL (anti-ice)	1	B
-16	369D26538-501	. V _{NE} CARD (set)	1	B

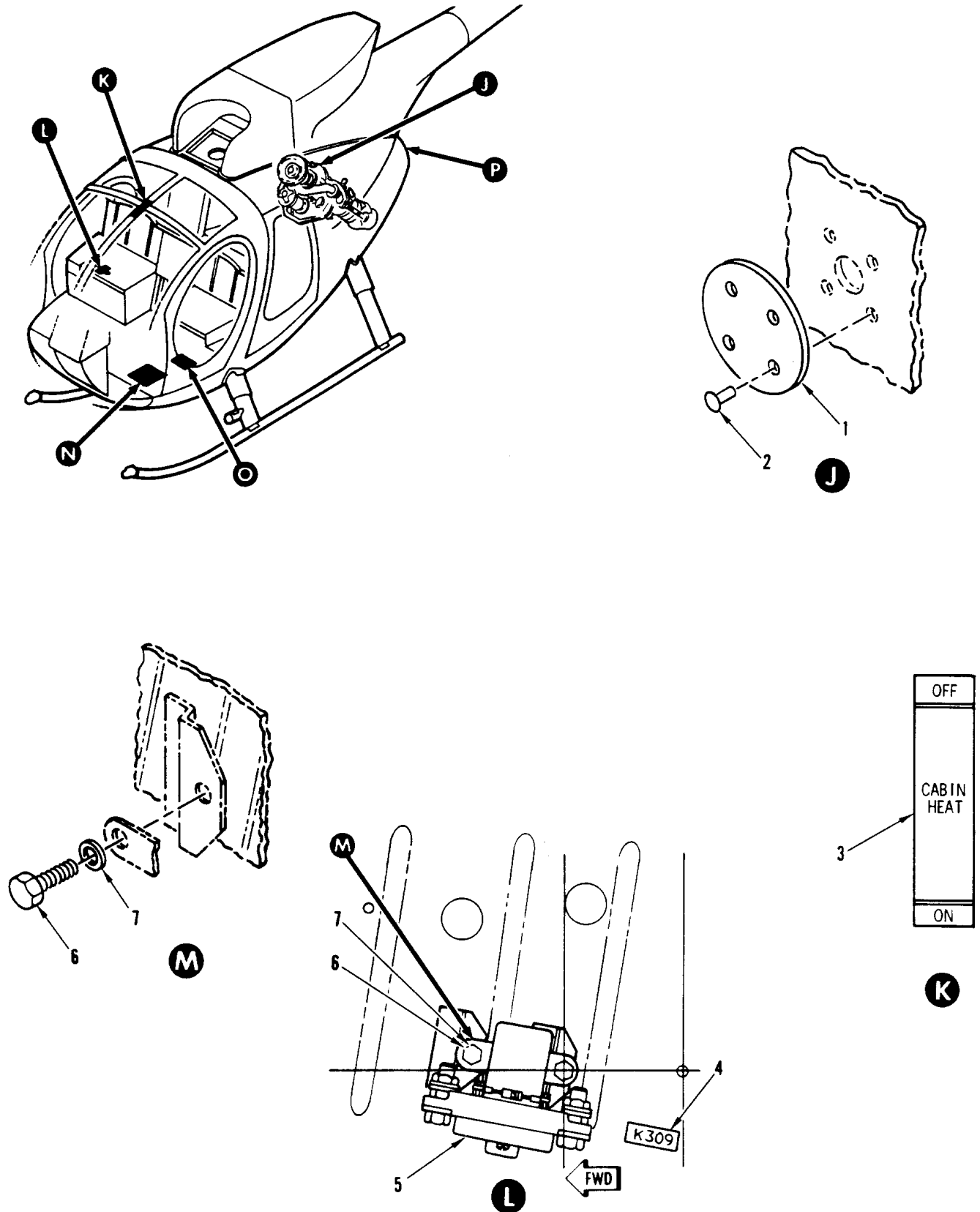
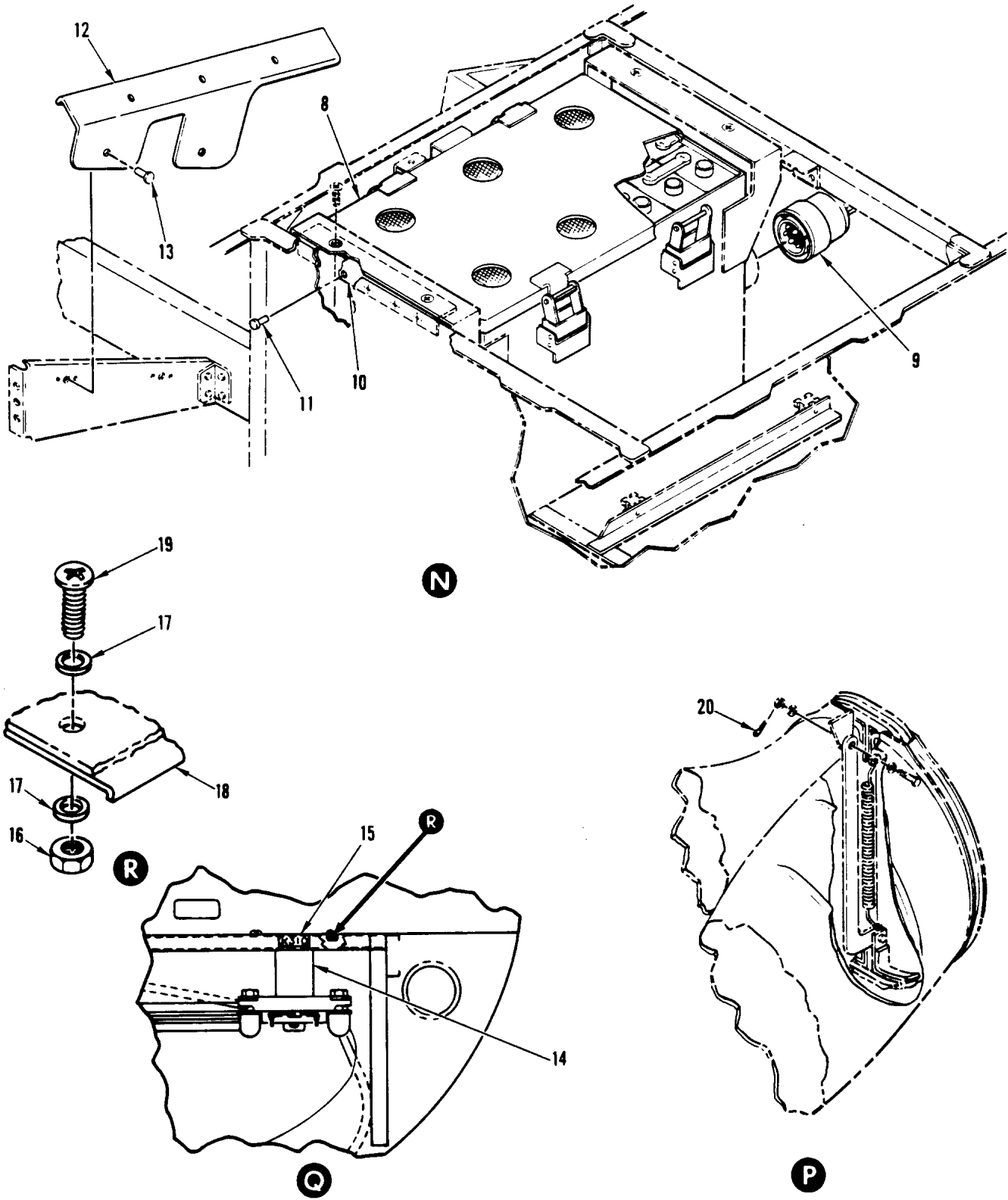


Figure 1-4. 250-C20R/2 Engine installation Kit (Sheet 1 of 2)



57-149-5

Figure 1-4. 250-C20R/2 Engine installation Kit (Sheet 2 of 2)

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-3-	369D298000-519	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	A
	369D298000-523	KIT, 250-C20R/2 ENGINE INSTALLATION (Customer Supplied Engine and Battery)	1	B
-1	369D298000-11	. DOUBLER	1	A/B
-2	MS20615-4M	. RIVET	4	A/B
-3	369H6615-147	. DECAL (C. heat / E. anti-ice)	1	A/B
-4	369A4003-791	. * DECAL (K309)	1	A
-5	AN3370-1	. * RELAY (K309)	1	A
-6	NAS1303-1	. * BOLT	2	A
-7	MS14151-2	. * WASHER	2	A
-8	369D290011	. ** BATTERY (NOT INCLUDED)	1	A/B
-9	CA3106ER2412PD	. CONNECTOR (battery)	1	A/B
-10	369D290011-3	. SUPPORT ASSY (battery)	2	A/B
-11	NAS1738B4-2	. RIVET	AR	A
-12	369D290011-9	. * BRACKET ASSY (TB-)	1	A
-13	NAS1738B5-2	. * RIVET, BLIND	AR	A
-14	MS241171-D1	. * RELAY (K310)	1	A
-15	369A4003-773	. * DECAL (K310)	1	A
-16	MS21043-3	. * NUT	2	A
-17	AN960C10L	. * WASHER	4	A
-18	369D298000-33	. * DOUBLER	1	A
-19	MS51958-63	. * SCREW	2	B
-20	MS24665-151	. COTTER PIN	2	A/B
	MS21042-3	. NUT (NOT SHOWN)	12	A/B
	AN960-10L	. WASHER (NOT SHOWN)	12	A/B
	NAS1096-3-6	. SCREW (NOT SHOWN)	12	A/B
	MS21919WCH7	. CLAMP (NOT SHOWN)	12	A/B
	MS21919WCH13	. CLAMP (NOT SHOWN)	12	A/B
	MS21919WCH10	. CLAMP (NOT SHOWN)	5	A/B
	6851488	. ** ACCUMULATOR (NOT SHOWN)	1	A/B
	E369D298000	. WIRE KIT-C20R/2 (NOT SHOWN)	1	A/B

NOTES:

* Not required on current configuration 369D helicopters.

** See CSP-093 for NHA.

*** Refer to Allison Operation and Maintenance Manual (GTP-5232-2) and Allison Bulletin No. 4001.

SECTION 2

MAINTENANCE INSTRUCTIONS

2-1. General Information

The engine conversion kit provides for improved engine performance and enables increased altitude operation of the MDHS 500 (Model 369D and 369E) helicopter. The general maintenance information in this section applies to 250-C20R/2 engine and subsystems installation. Applicable specific maintenance instructions for each subsystem beyond the scope of this manual, refer to the manufacturer's publications (Table 2-1).

2-2. Reference Data

For information concerning optional or standard helicopter components which interface with the 250-C20R/2 engine system, refer to CSP-HMI-2 and CSP-IPC-4.

2-3. Description

- a. Engine anti-ice system The cable controlled system (if installed) is replaced with an electrically controlled anti-ice system. Compressor bleed air supplied to inlet guide vanes and the number one bearing housing is controlled by the **ANTI ICE** circuit breaker/switch CB122 mounted on the instrument console switch panel. Moving the switch to **ANTI ICE** energizes a solenoid mounted on the compressor scroll that controls the engine anti-icing system. Operation of engine anti-icing system is

accomplished by use of compressor discharge air from a fitting on the engine compressor scroll. The anti-icing air flow is controlled by an electrically operated air shut-off valve mounted on the scroll. The anti-icing solenoid which operates the anti-icing valve is located on the firewall shield. Refer to the applicable Allison engine manual for additional engine anti-ice information (Table 2-1).

- b. Auto-reignition system (369D model helicopters)

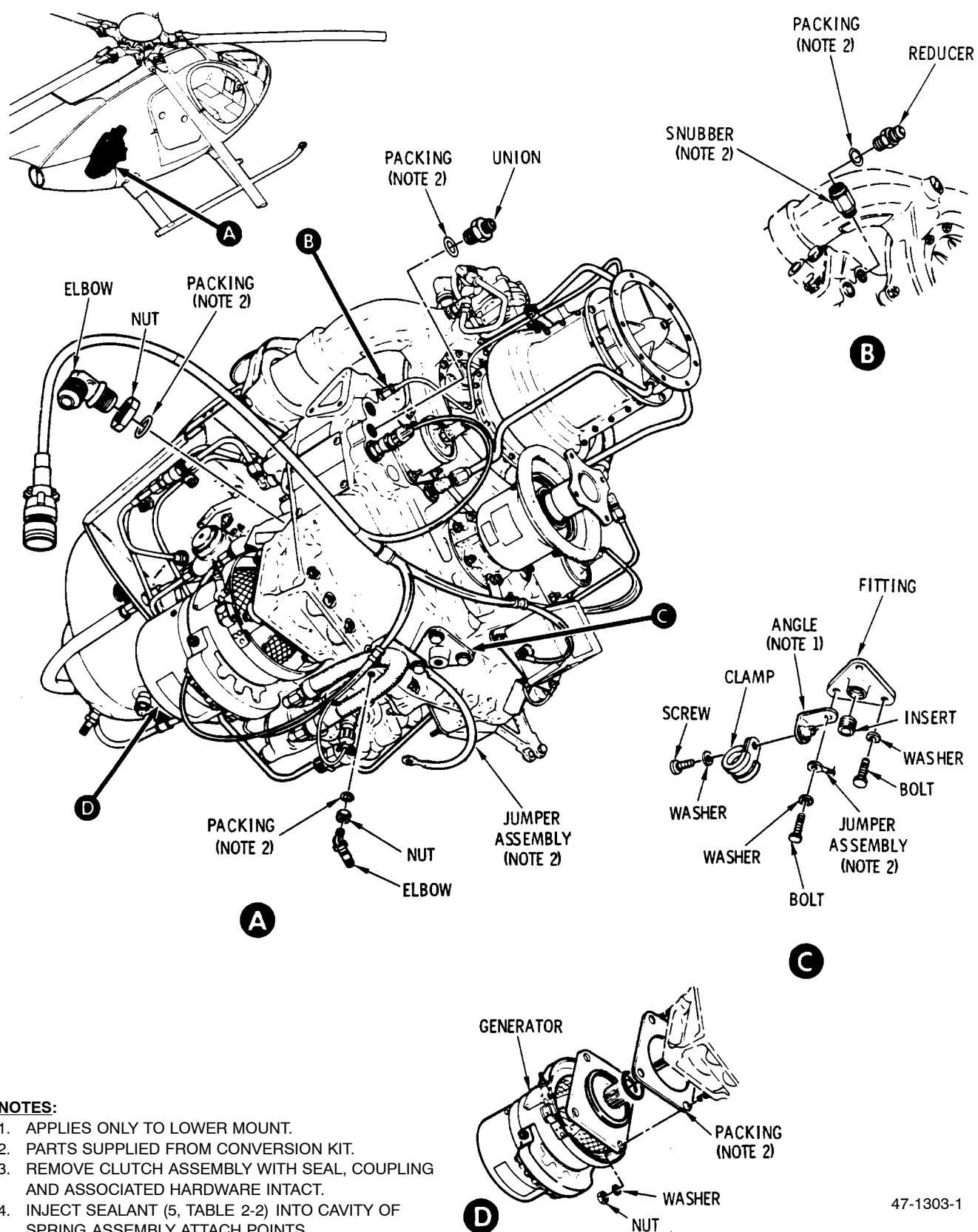
NOTE

For 369D helicopters equipped with auto-reignition systems, removal of all components and associated wiring must be removed to facilitate incorporation of new auto-reignition system.

The new auto-reignition system consists of a new switch assembly (XDS9) placarded **RE-IGN P RST**, auto-reignition relay K104, switch (S11) placarded **TEST**, and terminal (diode) board assembly (TB1000) and associated wiring. The automatic re-ignition system provides a means to automatically re-ignite the engine when either N_1 or N_R speed drops below their specified limits. (Refer to appropriate helicopter model PFM for system operation).

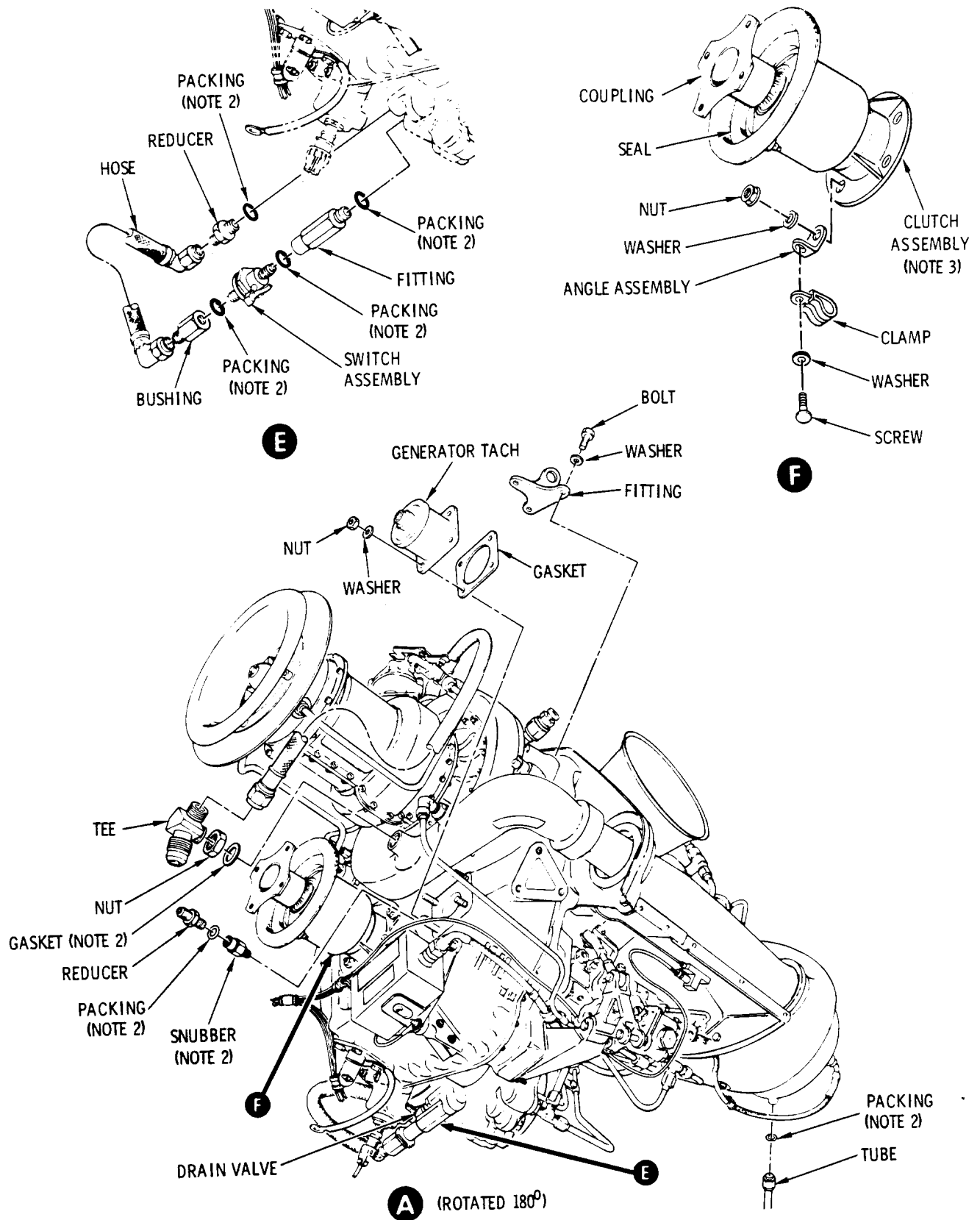
Table 2-1. Reference Documents

System/Installation	Technical Manual or Manufacturers Manual	Maintenance Level
Allison 250-C20R Operation and Maintenance Manual	GTP-5232-2	Organizational
Kit, Conversion, 250-C20R/2 Engine for 369D and 369E	369D298000	Organizational
Installation and Service Manual Scavenge Lube Oil Filter	Facet Kit No. 1741050-01	Facet Enterprises, Inc.
Heavy Duty (17 Amp Hr, 20 Cell) Battery	CSP-093	Organizational



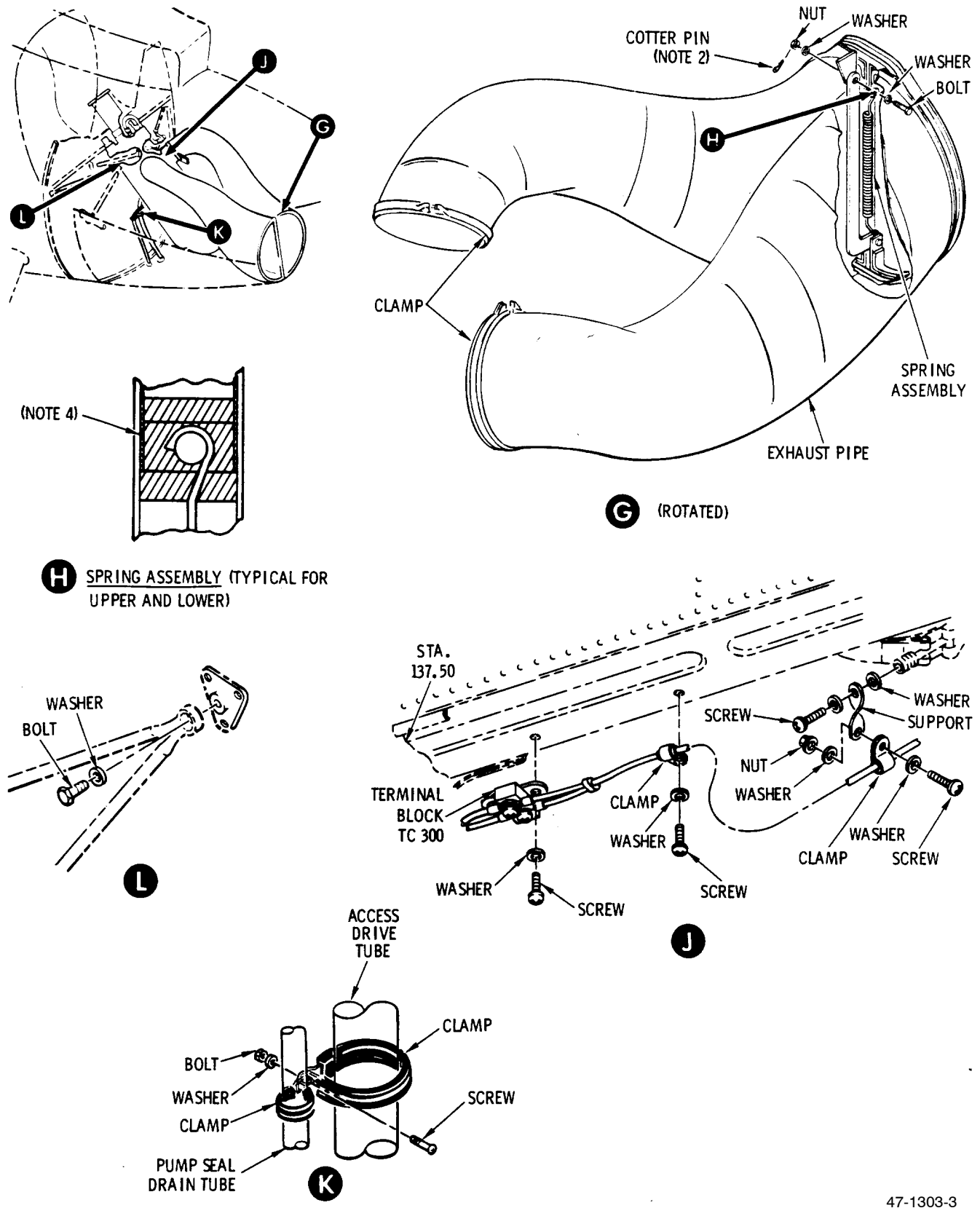
47-1303-1

Figure 2-1. Interchangeable Engine Buildup Components - 250-C20B and 250-C20R/2 (Sheet 1 of 3)



47-1303-2

Figure 2-1. Interchangeable Engine Buildup Components - 250-C20B and 250-C20R/2 (Sheet 2 of 3)



47-1303-3

Figure 2-1. Interchangeable Engine Buildup Components - 250-C20B and 250-C20R/2 (Sheet 3 of 3)

- c. Engine oil system The Allison 250-C20R/2 engine requires a scavenge oil filter (provided by manufacturer), which will clean the oil to a much finer degree and extend flight hours between oil changes. The filter has a visual poppet indicator providing impending bypass warning when the differential pressure on the element is above 7 ± 1 PSID.

A new engine oil tank is provided to eliminate air in the oil system and reduce scavenge back pressure.

- d. Electrical system The electrical system battery is changed from a 13 amp-hr to a 17 amp-hr battery to meet the increased starting ampere requirements of the 250-C20R/2 engine. Helicopter (battery system) wiring size (AWG) is also increased to compensate for the larger flow of current. Modification of the lower switch panel (369D model helicopters with slim-line instrument panel) eliminates the large **BAT-EXT PWR-OFF** circuit breaker switch (S2) with a smaller S2 switch. Wiring size is also changed to facilitate the installation. For 369D model helicopters serial numbers 003-723, incorporation of two relays K309 and K310 are installed.

2-4. Troubleshooting

(Refer to HMI)

2-5. Preparation

Preparation for installation of the 250-C20R/2 engine includes the following:

- Identify all removed components including attaching hardware and components removed to gain access to work areas. Protect components from damage and foreign matter until re-installed.
- Check all electrical switches for **OFF** position.
- Open left and right engine access doors.

2-6. Removal of Helicopter Equipment

- Remove crew and passenger compartment seats.
- Remove engine (250-C20B).
(Refer to Engine - Removal, HMI)
- Stripping the engine (250-C20B).
(Refer to Engine - Stripping, HMI)

Similar engine subsystem components of 250-C20B and 250-C20R/2 engines are identified in Figure 2-1. Remove parts and retain for 250-C20R/2 engine installation.

NOTE

- The clutch assembly may be removed with seal, coupling and associated hardware intact and re-installed in 250-C20R/2 engine.
- The 250-C20R/2 engine requires a 17 amp-hr, 20 cell battery (369D290011).
- Remove 13 amp-hr battery (Ref. Battery Removal, HMI).

NOTE

For 369D helicopters serial numbers 003-1149 and 1151-1 184, terminal board TB1 must be relocated to allow for clearance of the battery. Refer to CSP-093 for installation instructions of battery and relocation instructions of TB1.

2-7. Electrical Bonding Connections

Refer to the maintenance instructions provided in HMI.

2-8. Modifications

2-9. Instrument Panel

(Refer to applicable maintenance instructions provided in HMI)

- Identify and mark wires for removal.
- Remove TOT and torque indicators.
- Remove ammeter as follows:
 - On 369D helicopters, remove instrument cluster.
 - On 369E helicopters, remove ammeter gage.
- Remove V_{NE} placard.
- Install new TOT and torque indicators provided.
- Install new ammeter as follows:
 - On 369D helicopters install instrument cluster (369D296305-23).
 - On 369E helicopters install ammeter.
- Install new V_{NE} placard according to helicopter model and actual helicopter gross weight.

2-10. Anti-Ice Cable System Removal (250-C20B)

(Refer to Anti-Icing Valve Control Cable Removal, HMI).

NOTE

Disregard references to cable reinstallation, adjustment and operational check.

Using sharp knife, remove half of decal, apply side identified with **OFF-CABIN HEAT-ON** to heat duct panel (Ref. Fig. 2-2).

Table 2-2. Special Tools and Equipment

Item No.	Nomenclature	Manufacturer
1	Drill, portable	Commercial
2	Bit, drill No. 1/8 (0.1250)	Commercial
3	Bit, drill No. 1/2 (0.500)	Commercial

2-11. Inlet Assembly Doubler Installation

(Ref. Fig. 2-3)

- Determine correct position of doubler over inlet assembly and mark.
- Using drill motor and number 1/8-inch drill bit (2, Table 2-2), drill four equally spaced 0.128-inch holes at marks.
- Coat bare metals and doubler (Ref. Fig. 1-4, item 1) with primer (1, Table 2-3), allow to dry.
- Apply primer (2) to same surface areas, allow to dry.
- Align doubler over inlet assembly and install four rivets (3) with wet primer (7).
- Apply sealant (4) to edge of doubler, allow to dry.

2-12. Engine Oil Tank Removal (250-C20B)

(Refer to Engine Oil System, HMI) Retain all hoses and fittings for reinstallation.

2-13. Engine Oil Tank Installation (250-C20R/2)

(Refer to Engine Oil System, HMI) Install using all existing hoses, fittings and new packings.

2-14. Wiring Modification

WARNING

Before removing or installing components of electrical system, ensure that all electrical power is OFF. If units are not immediately replaced, ensure that all electrical connectors are suitably capped and stowed, and that all loose cables are properly insulated and stowed to prevent possibility of shorting. Serious injury or death could result from voltages present in electrical system.

2-15. Electrical Wiring Replacement

Refer to Table 2-4 and Figure 2-5 for wiring changes and descriptive information. For information on wire routing, refer to Figure 2-4.

NOTE

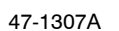
369D model helicopters serial nos. 003-723 do not have an external power relay or battery relay. **BATTERY-EXT PWR-OFF** switch (S2) connects the dc main power bus to either an external power source or the nicad battery.

- Refer to HMI for accessing start relay, reverse current relay, battery relay, start generator, external power relay and external power receptacle. Perform steps 1. and 2. only for 369D series helicopters without external power or battery relays.
- K309 Relay installation (369D helicopters serial nos. 003-723 only). (Ref. Fig. 2-6)

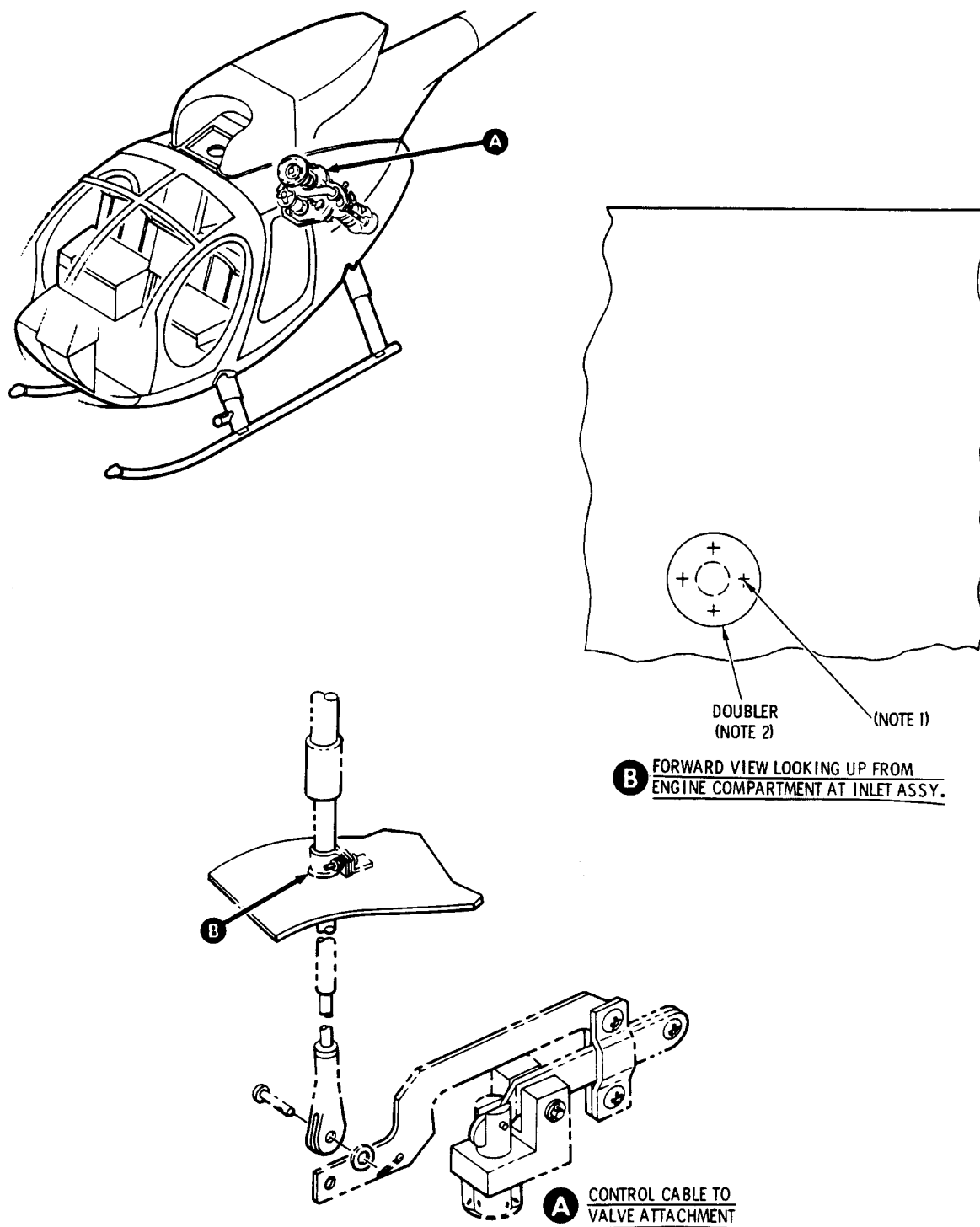
NOTE

For detailed wiring instructions, refer to Table 2-4 and figure 2-5.

- Using kimwipes (8, Table 2-3) and alcohol (9) clean area for application of decal K309; apply decal as shown.
 - Using hardware provided, install relay K309.
 - Attach diode assembly to terminals K309-X1 and K309-X2.
- K310 Relay Installation (369D helicopters serial nos. 003-723 only). (Ref. Fig. 2-6)
 - Using kimwipe (8, Table 2-3) and alcohol (9) dean area for application of decal K310; apply decal as shown.



Page 2-7

**NOTES:**

1. DRILL HOLE 0.128-IN. (4 PLACES). INSTALL RIVETS (MS20615-4M) WITH WET ZINC CHROMATE (7, TABLE 2-2).
2. APPLY SEALANT (4, TABLE 2-2) ON ENGINE SIDE OF INLET ASSEMBLY.

47-1308A

Figure 2-3. Inlet Assembly Doubler Installation

Table 2-3. Consumable Materials and Expendable Items

Item No.	Material	Specification No. ⁽¹⁾	Commercial Product ⁽²⁾	
			Name/No.	Manufacturer
1	Primer, Epoxy	HMS 15-1100 Type I		Advance Coating and Chemicals 2213 N. Tyler So. El Monte, CA 91733
2	Enamel, White Epoxy (Color No. 17875, Fed Std 595)	HMS 15-1100 Type II		Advance Coating and Chemicals
3	Rivet	MS20615-4M MS20470AD3 NAS1738 MS20426AD3 NAS1738B5-2	(4)	
4	Compound, Sealant	MIL-S-38249	Pro Seal 700 (3,4)	Products Research Corp. Glendale, CA.
5	Sealant, High Temp.		GE RTV-106 (3,4)	General Electric
6	Lockwire (diameter as required)	MS20995C	(3,4)	
7	Primer, Zinc Chromate	MIL-P-8585 or TT-P-1757		
8	Kimwipe		(3)	
9	Isopropyl alcohol	TT-I-735	(3)	
10	Lacquer, black acrylic	HMS15-1083	(3)	Advance Coating and Chemicals

NOTES:

- (1) Numbers are U.S.A. Specifications and Standards. Prefix symbols are defined as follows:
AMS - American Material Standard;
MS - Military Standard;
MIL - Military Specification; Single, double or triple alpha prefix of same letter - Federal Specification;
AN - Air Force-Navy Aeronautical Standard; NAS - National Aerospace Standard.
- (2) Primary selection. Any equivalent material may be used as an alternate selection.
- (3) Use best comparable grade material when conformity of available materials of same type with listed Specification No. cannot be determined.
- (4) Materials supplied in kit.

b) Determine correct position of doubler and align doubler with existing fastener holes.

c) Remove existing fastener holes as required and drill holes in doubler to match.

d) Coat bare metals and doubler with primer (1), allow to dry.

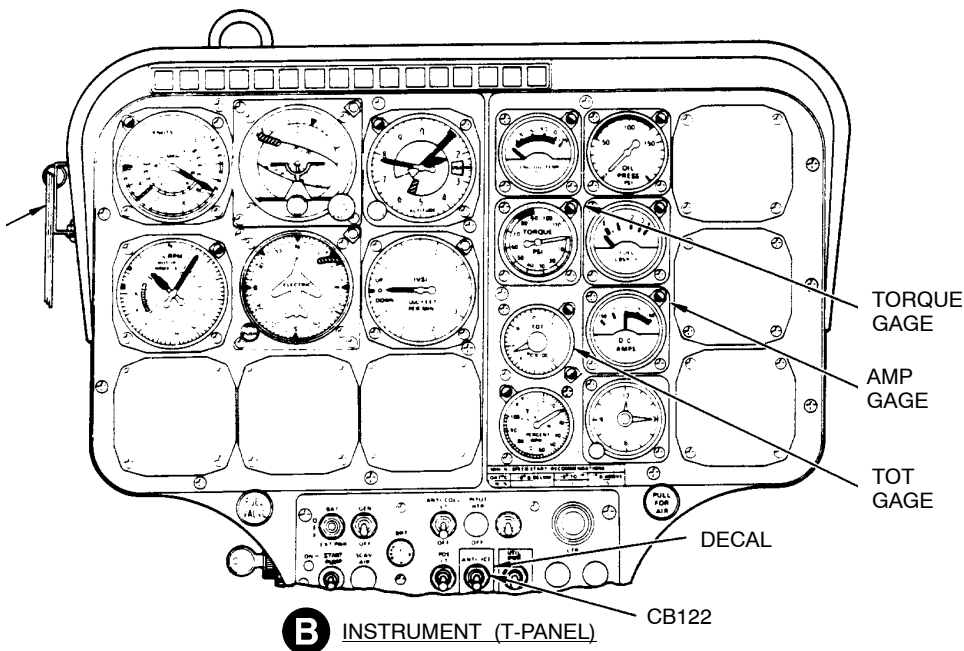
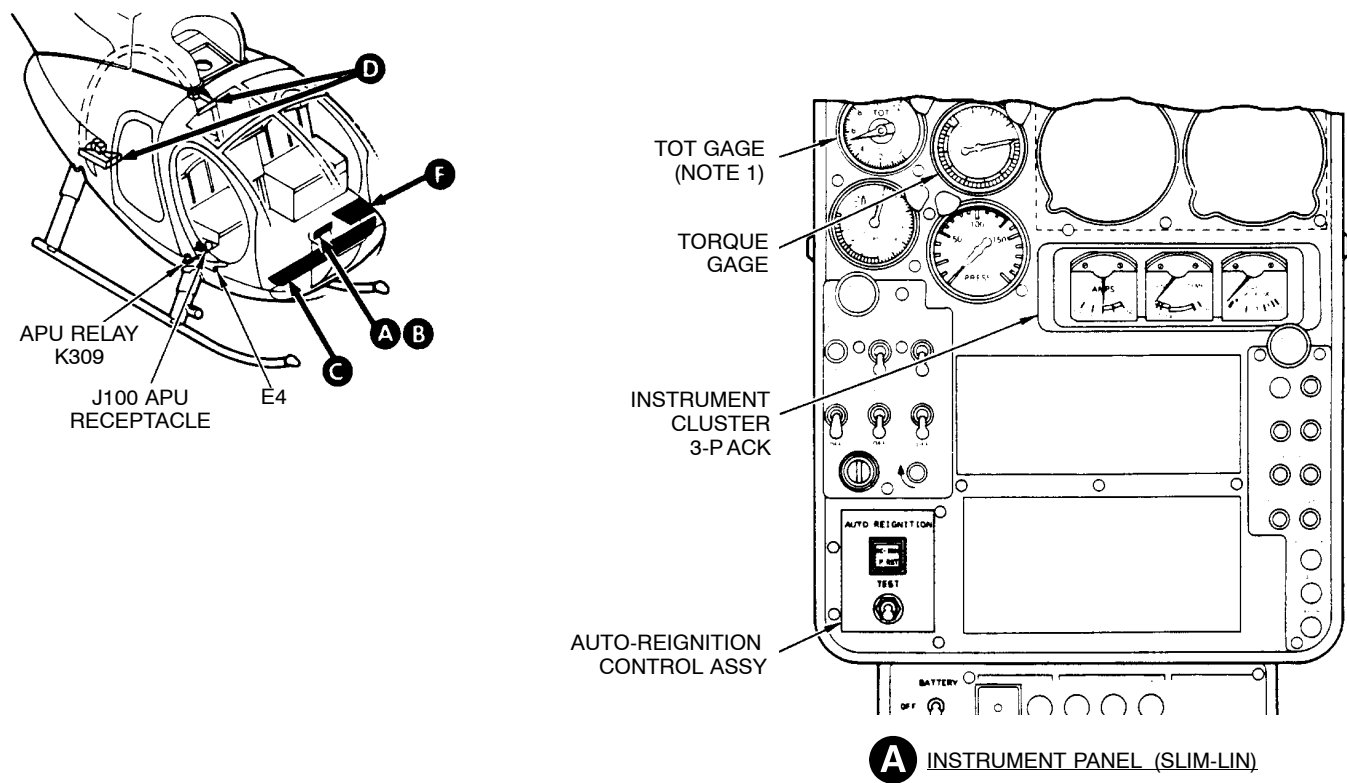
e) Apply primer (2) to same surface areas, allow to dry.

f) Align doubler, and install rivets (3) with wet primer (7).

g) Using hardware provided, install relay K310.

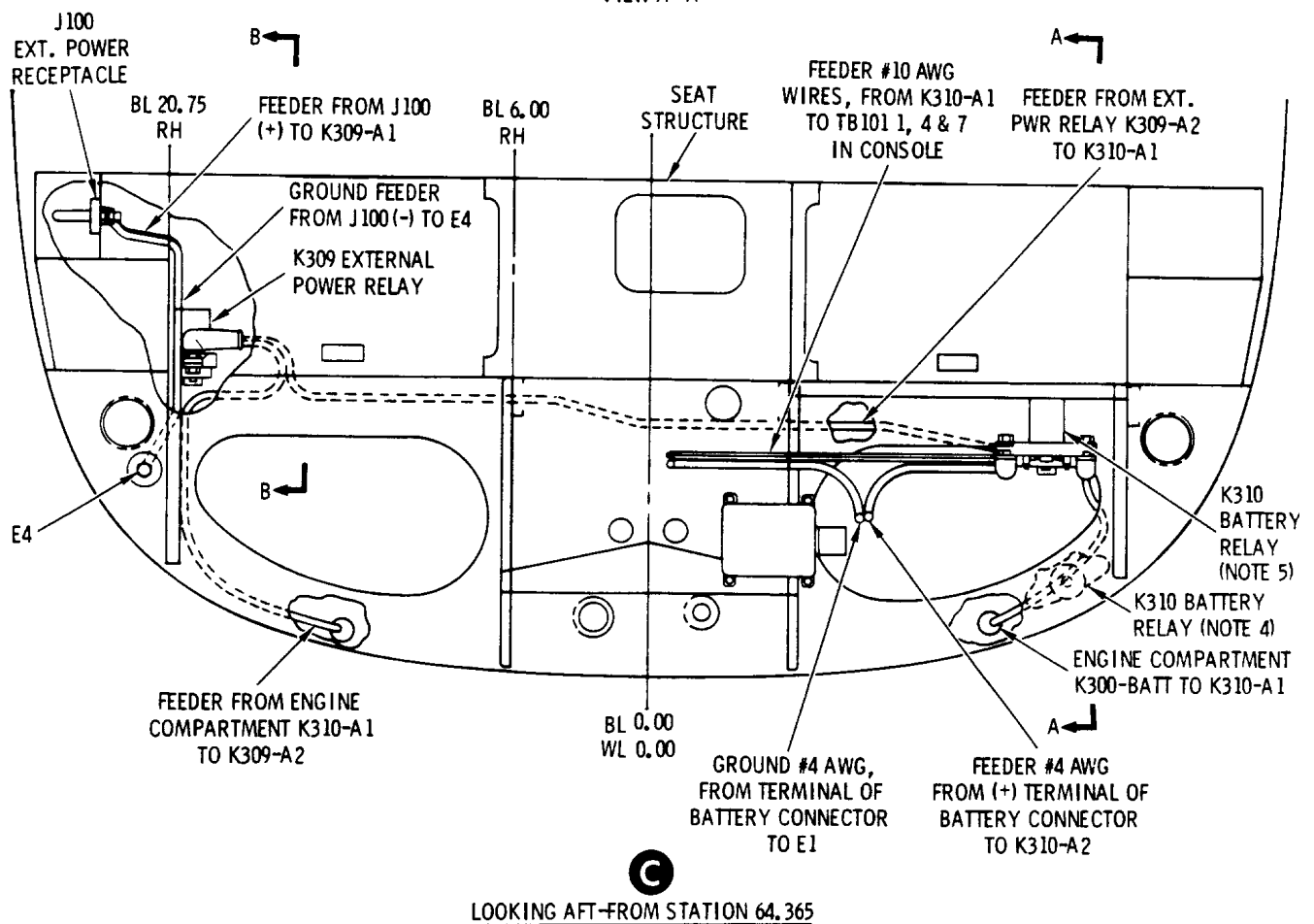
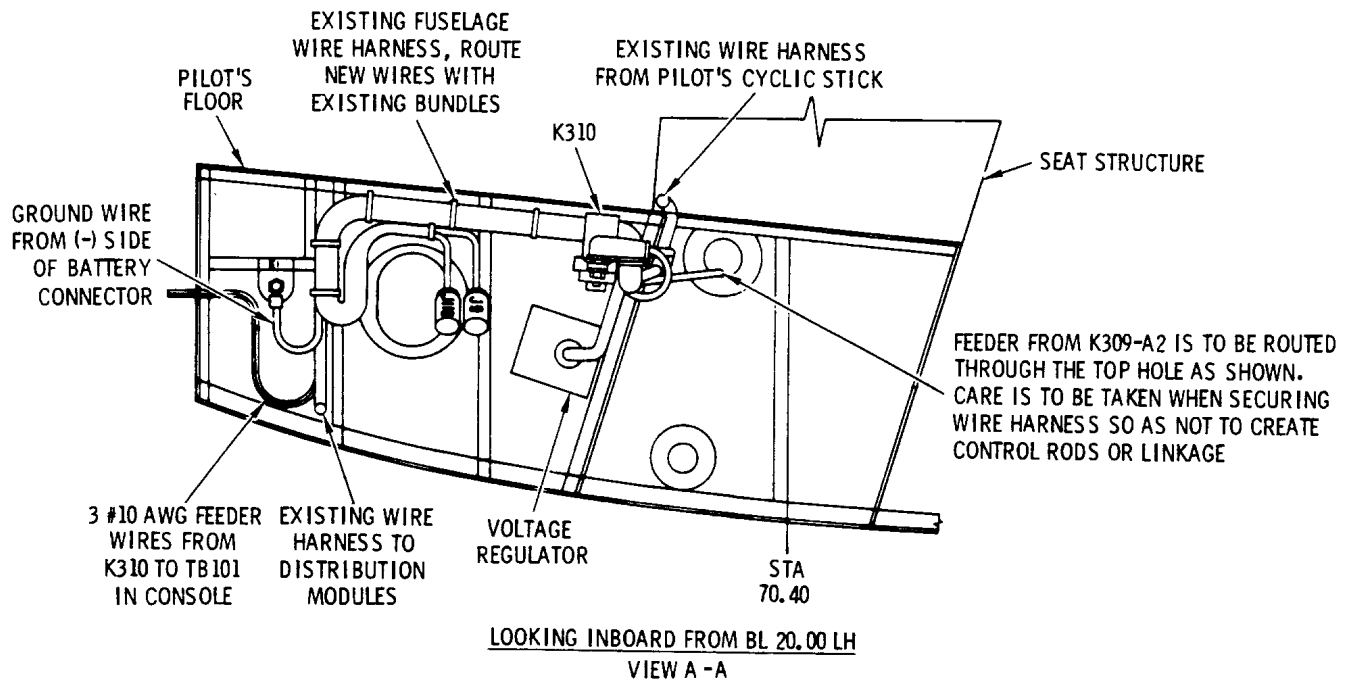
h) Attach diode assemblies to terminals K310-X1 and K310-X2, and K310-X1 and K310-A1.

b. Identify and mark wires for replacement (Ref. Fig. 2-5).



47-1302-1B

Figure 2-4. Component Locations and Wire Routing Installation (Sheet 1 of 5)



47-1302-2A

Figure 2-4. Component Locations and Wire Routing Installation (Sheet 2 of 5)

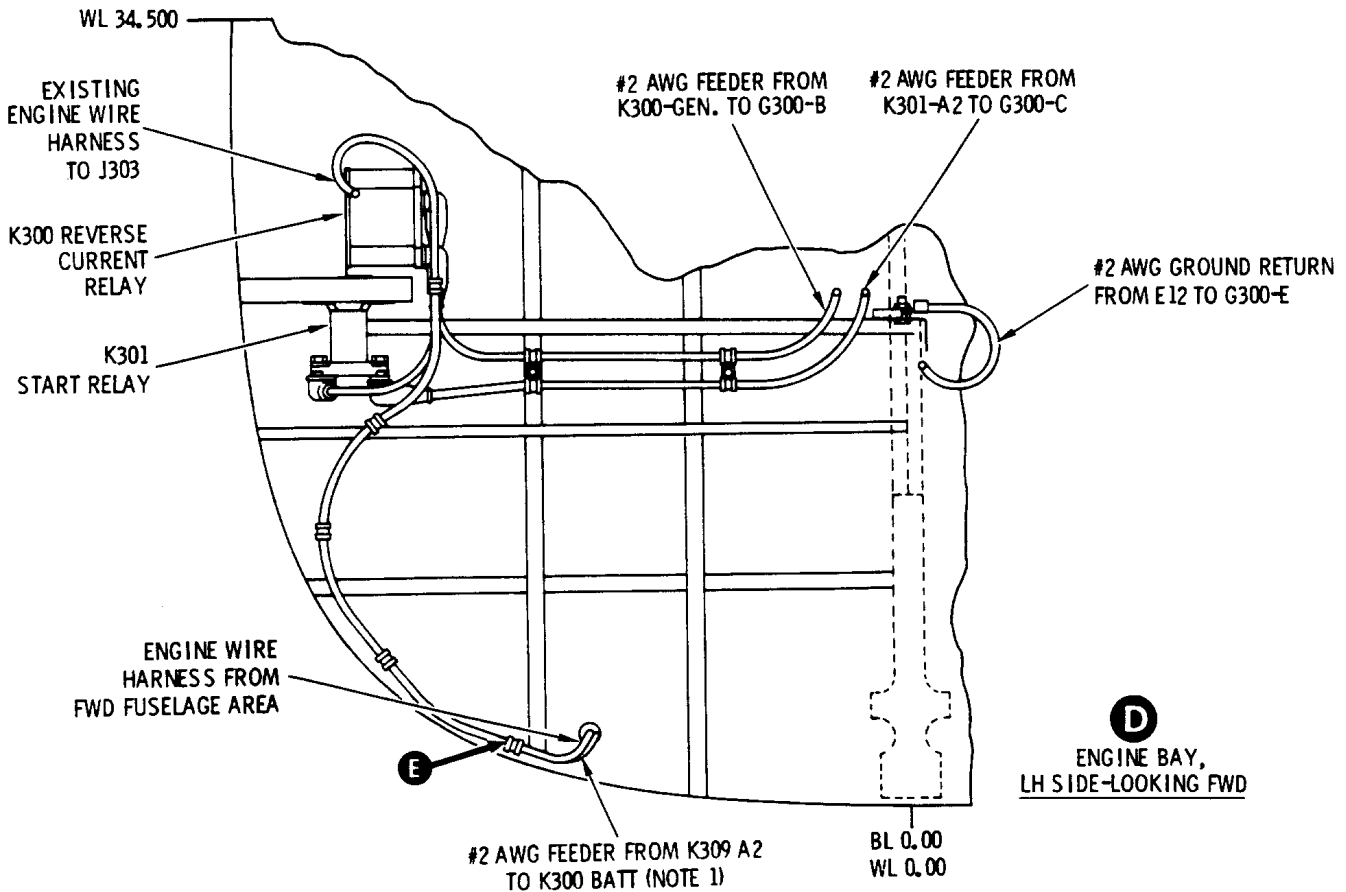
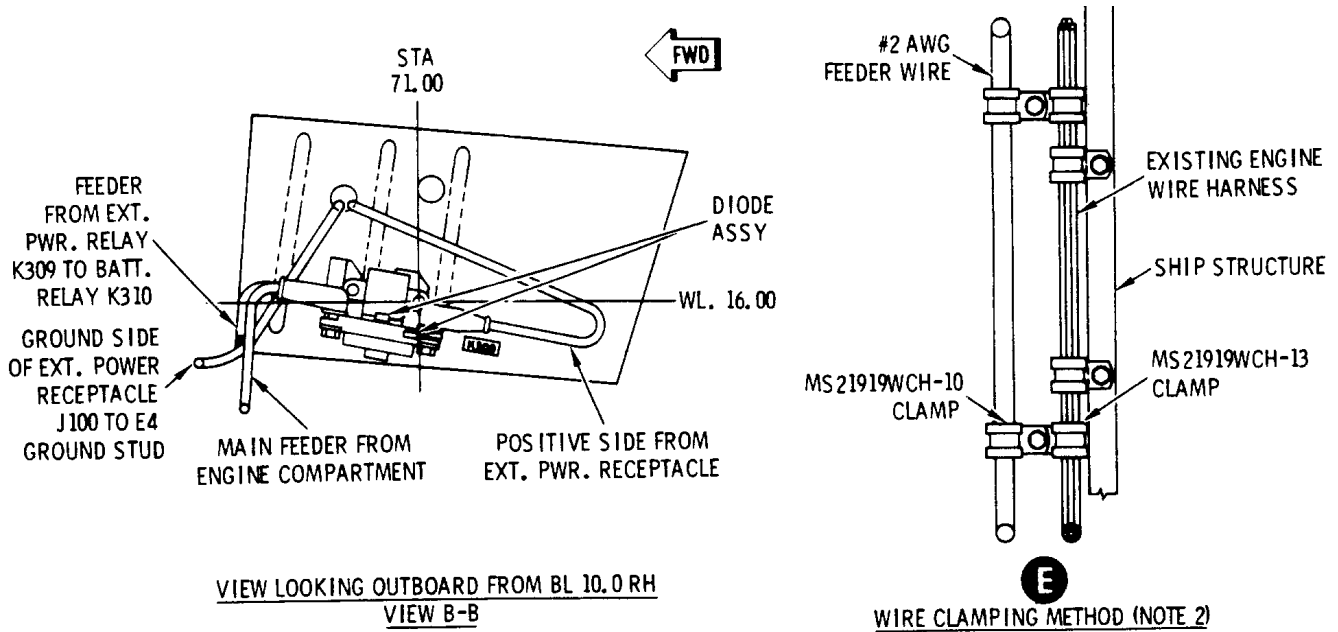
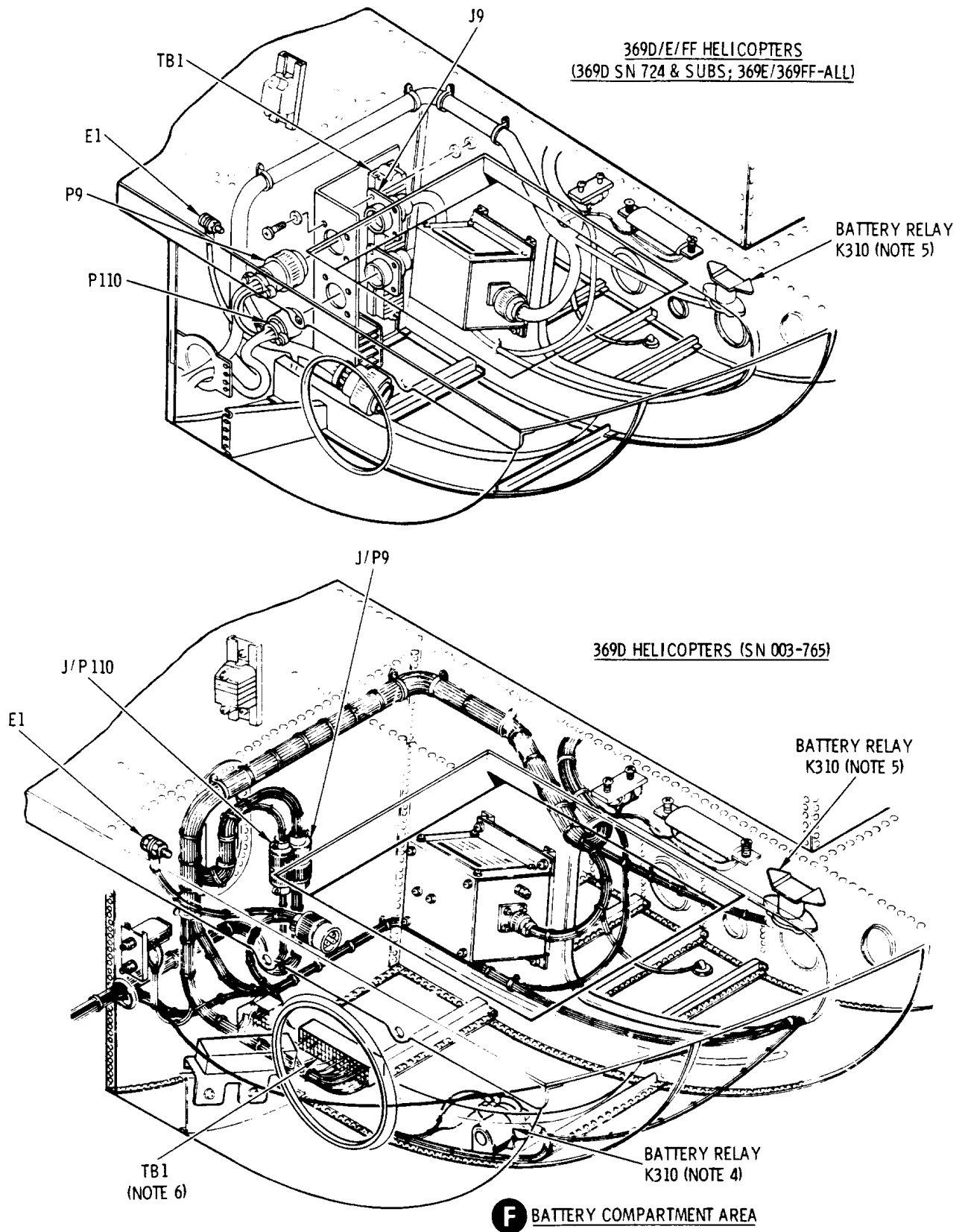
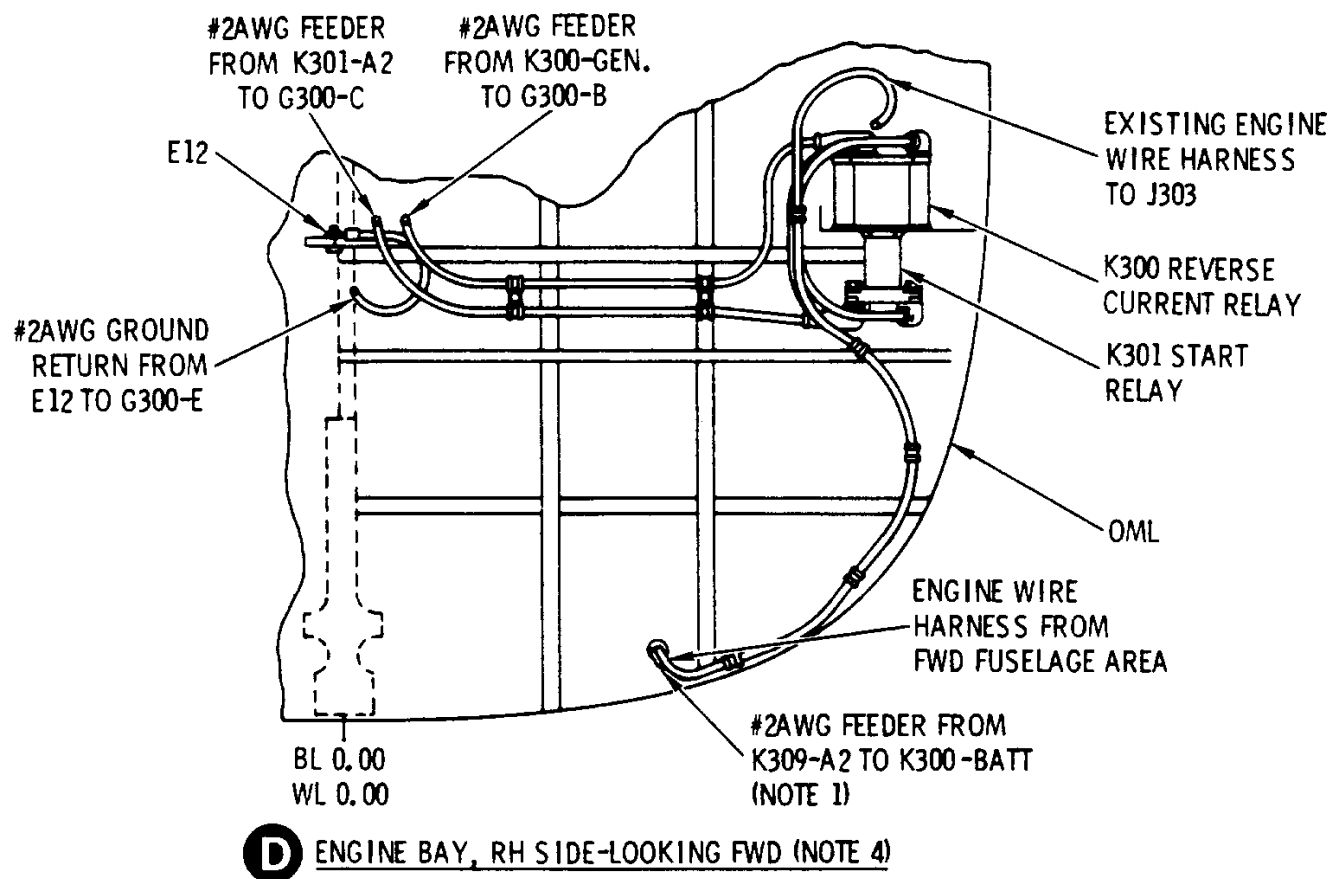


Figure 2-4. Component Locations and Wire Routing Installation (Sheet 3 of 5)



47-1302-4

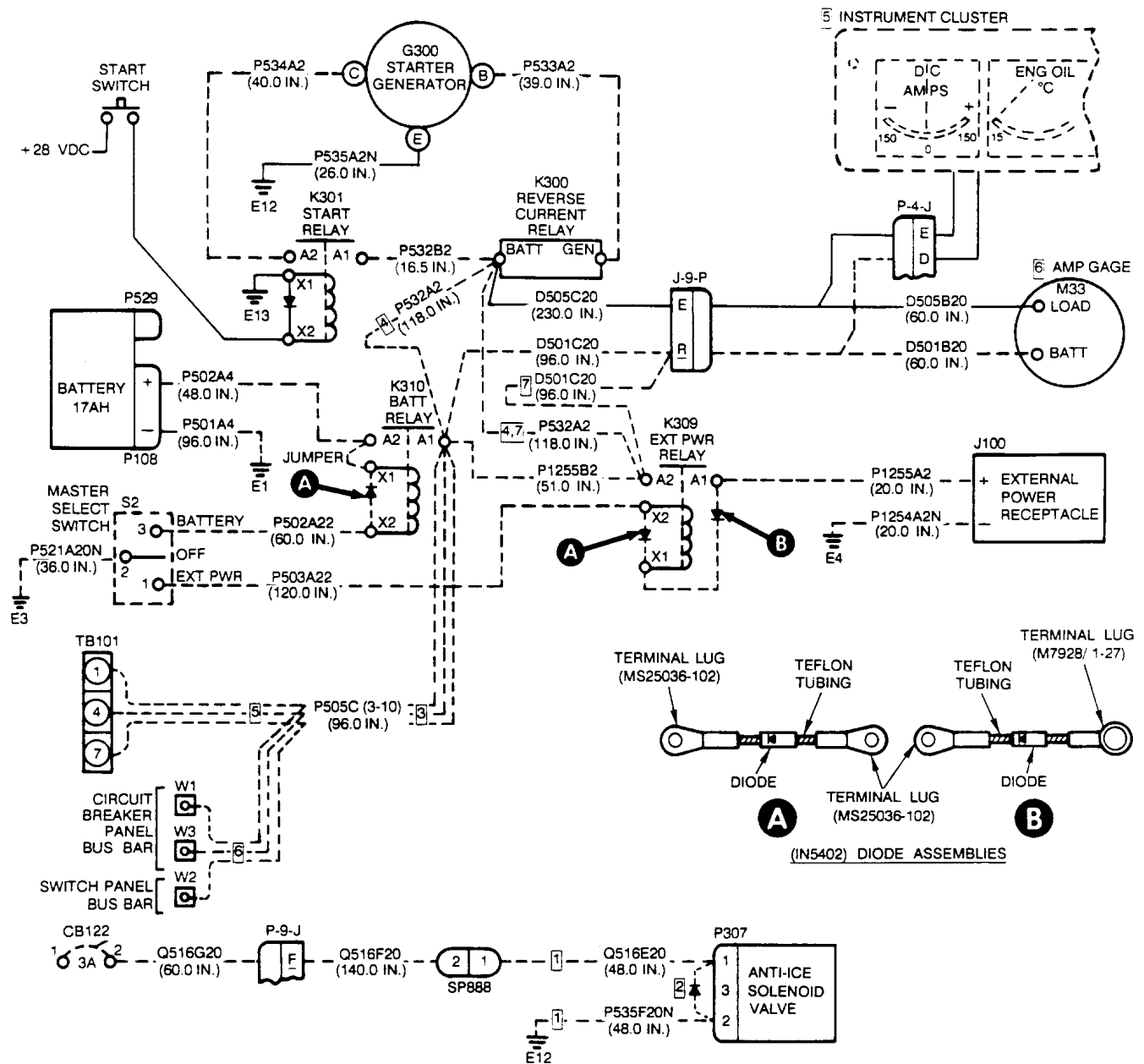
Figure 2-4. Component Locations and Wire Routing Installation (Sheet 4 of 5)

**NOTES:**

1. SEPARATE FEEDER FROM ENGINE WIRE HARNESS UPON EXITING CONDUIT AND MAINTAIN SEPARATION.
2. MAX SPACING DISTANCE BETWEEN CLAMPS NOT TO EXCEED 8.0-IN. THIS IS REQUIRED TO REDUCE TEMPERATURE RISE UNDER HEAVY CURRENT LOAD.
3. EFFECTIVE ON 369D (S/N 003-724) HELICOPTERS ONLY.
4. LOCATION EFFECTIVE ON 369D (S/N 725 THRU 765) HELICOPTERS ONLY. RELOCATION TO PILOT'S FLOOR (UNDERSIDE) IS REQUIRED. REFER TO FIGURE 2-6 FOR RELOCATION INSTRUCTIONS.
5. EFFECTIVE CURRENT CONFIGURATION 369D AND 369E HELICOPTERS.
6. RELOCATION OF TB1 IS REQUIRED TO ALLOW INSTALLATION OF 17 AMP HR BATTERY, REFER TO CSP-093 FOR INSTRUCTIONS.

47-1302-5

Figure 2-4. Component Locations and Wire Routing Installation (Sheet 5 of 5)



47-1304A

Figure 2-5. 250-C20R/2 Wiring Diagram

Table 2-4. 250-C20R/2 Wiring Data List

Wire #	From	Termination	To	Termination	* Material
P534A2	G300-C	● M25036-127	K301-A2	● M25036-127	# 2 AWG
P533A2	G300-B	● M25036-127	K300-GEN	● M25036-127	# 2 AWG
P535A2N	G300-E	● M25036-127	E12	M25036-127	# 2 AWG
P532B2	K301-A1	● M25036-127	K300-BATT	● M25036-127	# 2 AWG
D505B20	M33-(load)	M39029/22-191	P9-E	M39029/32-259	# 20 AWG
D501B20	M33-(batt)	M39029/22-191	P9-r	M39029/32-247	# 20 AWG
P532A2	K300-BATT	M25036-127	K310-A1	M25036-127	# 2 AWG
P1255A2	K309-A1	M25036-127	J100 (+)	M25036-127	# 2 AWG
P1254A2N	E4	M25036-127	J100 (-)	M25036-127	# 2 AWG
† P505C	K310-A1	M25036-127	TB101-1,-4,-7	MS25036-111	# 10 AWG
P502A22	S2-3	MS25036-149	K310-X2	■ MS25036-102	# 22 AWG
P503A22	S2-1	MS25036-149	K309-X2	■ MS25036-102	# 22 AWG
P521A20N	S2-2	MS25036-149	E3	MS25036-102	# 22 AWG
P501A4N	E1	M25036-127	P108 (-)	★	# 4 AWG
P502A4	K310-A2	● M25036-127	P108 (+)	★	# 4 AWG
P535F20N	P307-2	M39029/5-115	E12	M39029/22-191	# 20 AWG
Q516G20	CB122-2	MS25036-149	P9-f	M39029/32-259	# 20 AWG
Q516E20	P307-1	M39029/5-115	SP888-1	M39029/22-192	# 20 AWG
Q516F20	J9-f	M39029/31-240	SP888-2	M39029/22-192	# 20 AWG
D501C20	J9-r	M39029/31-228	K310-A1	MS25036-105	# 20 AWG
P1255B2	K310-A1	● M25036-127	K309-A2	● M25036-127	# 2 AWG
Jumper	K310-A2	MS25036-105	K310-X1	■ MS25036-102	# 22 AWG
Diode-jumper	K309-X1 (cathode)	MS25036-102	K309-A1 (anode)	M7928/1-27	IN5402
Diode-jumper	K309-X2 (anode)	MS25036-102	K309-X1 (cathode)	MS25036-102	IN5402
Diode-jumper	K310-X2 (anode)	MS25036-102	K310-X1 (cathode)	MS25036-102	IN5402
Following Wire Terminations Effective 369D Helicopters Only (Substitute with matching wire # above)					
P532A2	K300-BATT	M25036-127	K309-A2	M25036-127	# 2 AWG
D501C20	J9-r	M39029/31-228	K309-A2	M25036-127	# 20 AWG
D505B20	P9-E	M39029/32-259	P4-E		# 20 AWG
D501B20	P9-r	M39029/32-259	P4-D		# 20 AWG
P505C	K310-A1	M25036-127	W1, W2, W3		# 10 AWG

NOTES:

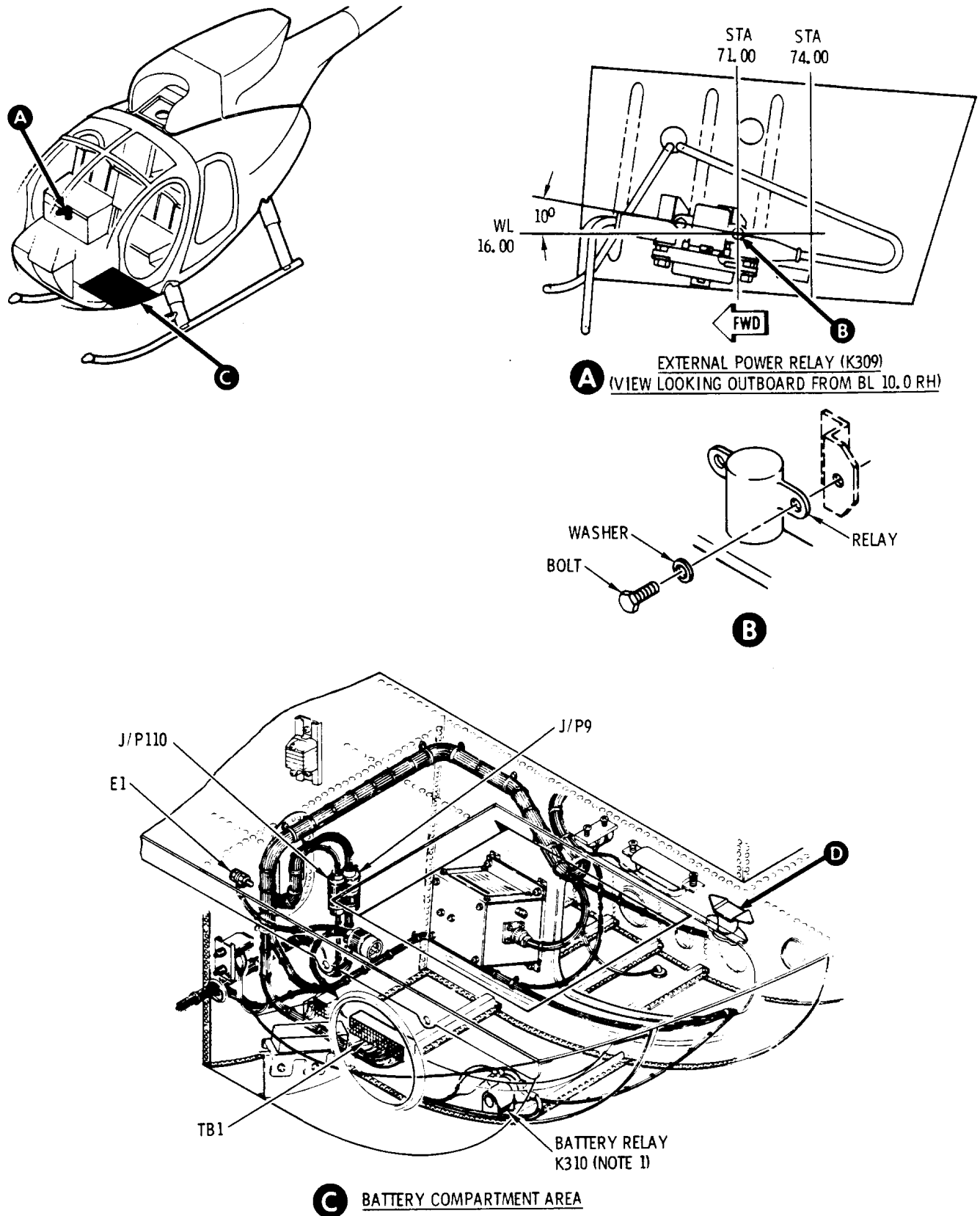
* Preferred wires are M5086/2-20-9, M22759/34-20-9 and M81381/12-2-9.

† Requires I.D. sleeving with wire no. P505C (3-10) on it.

■ Install boot MS25171-1S on wire end before crimping lug.

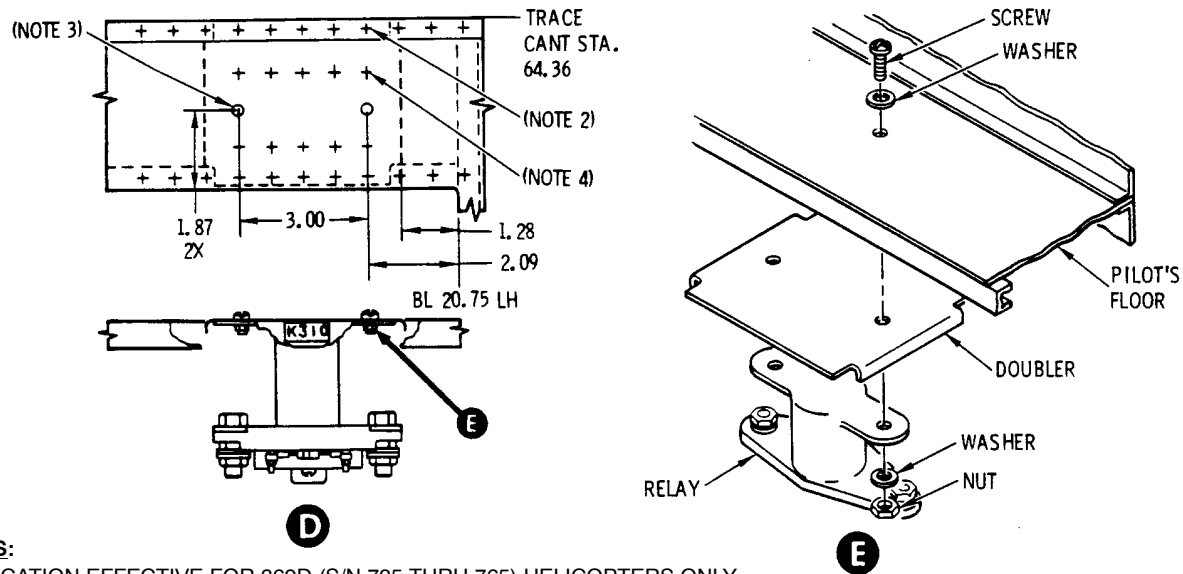
● Install boot MS25171-2S on wire end before crimping lug.

★ Terminations vary with battery configuration.



47-1319-1

Figure 2-6. Battery (K310) and External Power (K309) Relay - Initial Installation (Sheet 1 of 2)
(369D Helicopters Serial Nos. 003-723)

**NOTES:**

1. LOCATION EFFECTIVE FOR 369D (S/N 725 THRU 765) HELICOPTERS ONLY. RELOCATE TO PILOT'S FLOOR (UNDERSIDE), REFER TO VIEW C. CAP AND STOW WIRE ENDS.
2. REMOVE EXISTING FASTENERS AS REQUIRED TO INSTALL -33 DOUBLER. LOCATE AND DRILL HOLES TO MATCH EXISTING FASTENER HOLE LOCATIONS.
3. DRILL HOLE 0.220-0.226 INCH (2 PLACES). INSTALL RIVETS (MS20470AD3) AS REQUIRED WITH WET ZINC CHROMATE (7, TABLE 2-2).
4. DRILL HOLE 3/32 INCH (10 PLACES). INSTALL RIVETS (MS20470AD3) AS REQUIRED WITH WET ZINC CHROMATE (7, TABLE 2-2).

47-1319-2

Figure 2-6. Battery (K310) and External Power (K309) Relay - Initial Installation (Sheet 2 of 2)
(369D Helicopters Serial Nos. 003-723)



Wire No. P532A2 length (118.0 inches) must be maintained for proper operation of amp meter gage.

NOTE

- Do not crimp terminals on wire P532A2 until wire has been installed in the conduit of the aircraft belly.
 - Wires provided in this kit are excessive in length to allow installation in all versions of aircraft. Cut wires to proper length after routing (using existing clamps and routing locations) and terminate with hardware provided.
 - Use clamping method (Ref. Fig. 2-4) in areas where no structural clamp support is provided and to maintain separation between all #2 AWG wires and other ship harnesses located in the engine compartment.
- c. Remove wires and install replacement wiring using provided hardware (Ref. Figs. 2-4 and 2-5).

- d. Install components removed in step a. (Refer to appropriate maintenance instructions in HMI.)

WARNING

Ensure electrical connections are secured and properly spaced and insulated to prevent possibility of shorting.

- e. Trim, connect and secure wiring to fit installation (Ref. Table 2-4).

2-16. Anti-Ice System Modification

(Ref. Fig. 2-7)

WARNING

Before removing or installing components of electrical system, ensure that all electrical power is OFF. If units are not immediately replaced, ensure that all electrical connectors are suitably capped and stowed, and that all loose cables are properly insulated and stowed, to prevent possibility of shorting. Serious injury or death could result from voltages present in electrical system.

NOTE

The 250-C20R/2 engine system requires modification of the following:

- For 369D model helicopters, the lower switch panel (369H6410-15) is modified by enlarging existing hole from **BATTERY-EXT PWR-OFF** switch S2, allowing installation of two new switches (**ANTI ICE** S2 and **BATTERY-EXT PWR-OFF** - CB122). A new edge-lighted panel is provided for replacement of old.
- For 369E model helicopters, the edge-lighted panel (369D26460) is modified to allow installation of the **ANTI ICE** circuit breaker switch CB122. If no space is available, locate switch to operators preference.
- a. Electrical anti-ice system wiring installation - 369D helicopters

NOTE

Lower switch and circuit breaker edge-lighted panel may be attached by 4 or 5 screws depending on effectivity.

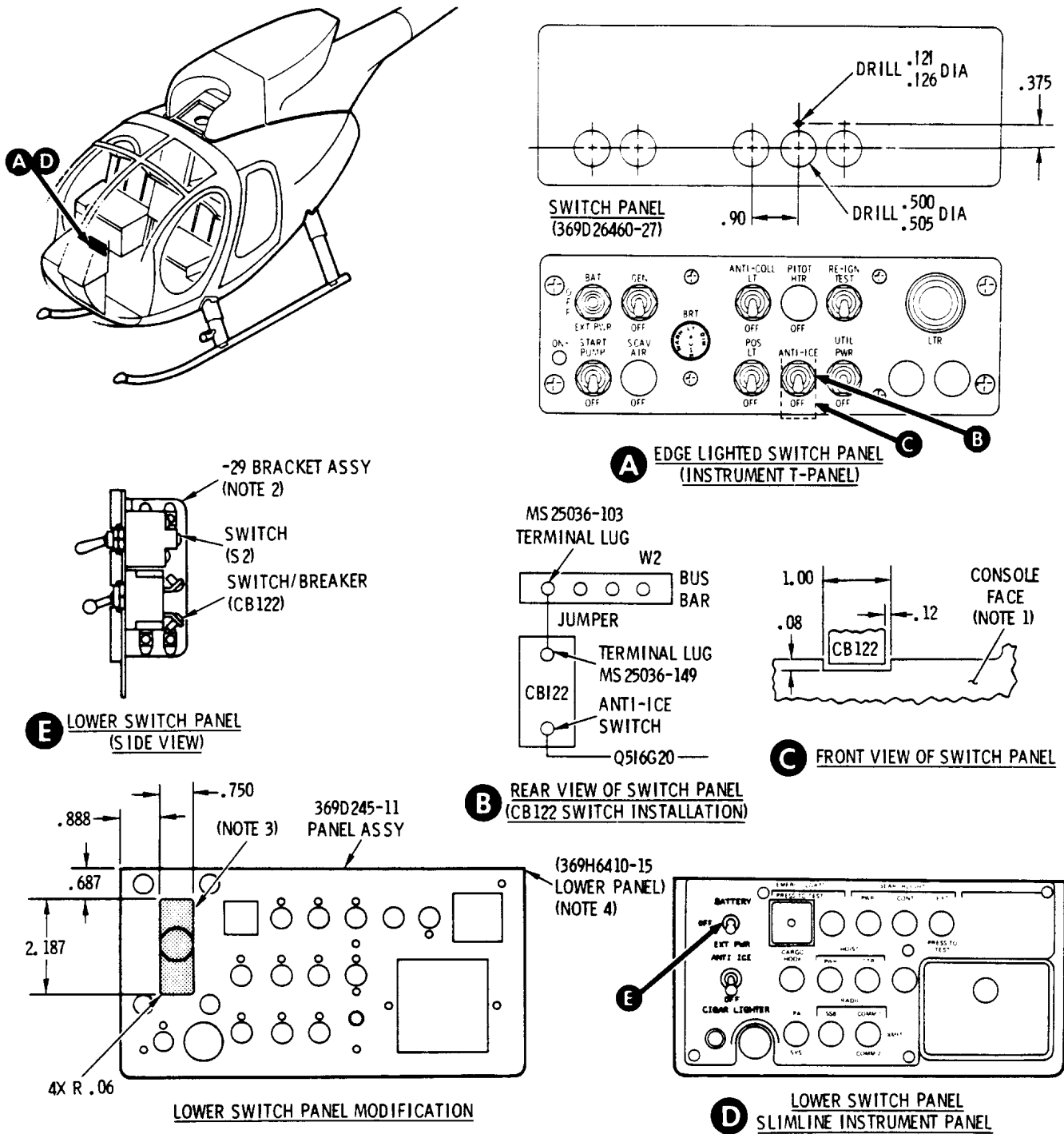
- 1). Remove screws and edge-lighted panel from lower switch and circuit breaker panel. Discard panel; replacement is provided. Retain screws for reinstallation.
- 2). Remove 369H6422-49 angle bracket and switch S2. Discard bracket and switch; replacement provided. Retain hardware for reinstallation.
- 3). Enlarge vacated hole left by switch S2 on panel (369H6410-15) per dimensions shown.
- 4). Install new angle bracket (369H6422-29) with switch (S2) and circuit breaker (CB122) attached; install onto panel using existing hardware.
- 5). Install new edge-lighted panel provided, using existing hardware.

- 6). Trim, connect and secure wiring to appropriate switches and associated components to fit installation (Ref. Table 2-4).
- b. Electrical anti-ice system wiring installation - 369E helicopters.
 - 1). Remove screws and edge-lighted panel from switch panel.
 - 2). Mark and drill holes for circuit breaker (Ref. Fig. 2-7), using numbers 1/8 and 1/2-inch drill bits (2, 3, Table 2-2).
 - a) Measure from center of **POS LT** switch, 0.90-inch center right and mark.
 - b) Measure from mark, above and center 0.375-inch and mark for switch alignment hole.
 - c) Drill a 0.500 - 0.505-inch diameter hole at first mark.
 - d) Drill a 0.121 - 0.126-inch diameter hole at alignment mark.
 - e) Install circuit breaker CB122 to switch panel (Ref. Fig. 2-7).
 - f) Remove plug button from edge-lighted panel to accommodate circuit breaker CB122.
 - 3). Using sharp knife, remove half of decal, apply side identified **ANTI ICE / OFF** to edge-lighted panel as shown (Ref. Fig. 2-2).
 - 4). Trim, connect and secure wiring to circuit breaker CB122 and associated components to fit installation (Ref. Table 2-4).

NOTE

Installation of circuit breaker CB122 may require modification of console on 369E model helicopters, serial nos. 318-383 only (Ref. Fig. 2-7).

- 5). Using existing hardware install screws and edge-lighted panel onto switch panel.
- 6). Perform Operational Check of aircraft electrical systems (refer to appropriate PFM).



NOTES:

1. TRIM CONSOLE TO ALLOW FOR EXTENSION OF CB122. 369E HELICOPTER (S/N 318-383 ONLY).
2. REPLACE EXISTING ANGLE BRACKET WITH -29 BRACKET ASSEMBLY PROVIDED. ATTACH SWITCHES S2 (MS24523-1) AND CB122 (7270-1-3) PROVIDED.
3. ENLARGE EXISTING HOLE TO DIMENSIONS SHOWN (REMOVE SHADED AREA).
4. ALL PANEL SWITCHES OMITTED FOR CLARITY.

47-1318

Figure 2-7. Anti-Ice System Modification - Instrument Panel

2-17.Auto-Reignition Modification

(369D helicopters only)

WARNING

Before removing or installing components of electrical system, ensure that all electrical power is OFF. If units are not immediately replaced, ensure that all electrical connectors are suitably capped and stowed, and that all loose cables are properly insulated and stowed, to prevent possibility of shorting. Serious injury or death could result from voltages present in electrical system.

NOTE

For helicopters with auto-reignition system installed, all auto-reignition system components (S11, XDS9, K104, K304) and associated wiring must be removed. Refer to figure 2-8 for component locations.

- a. Remove screws and edge-lighted panel from switch panel.
- b. Remove switch S11, switch assembly XDS9, relays K104 and K304 and associated wiring.
- c. Fabricate cover as required for hole vacated by switch XDS9.
- d. Install cover on instrument panel.
- e. Paint out lettering at previous auto-reignition switch location with acrylic lacquer (10, Table 2-3).
- f. Install plug button on edge-lighted panel.
- g. Install new auto-reignition control panel provided.
- h. Trim, connect and secure wiring to new auto-reignition control panel and associated components to fit installation (Ref. Table 2-6).

WARNING

Ensure electrical connections are secured and properly insulated to prevent possibility of shorting.

- i. Perform Operational Check of modified auto-reignition system (refer to appropriate PFM).

2-18.Scavenge Oil Filter Installation

(Ref. Fig. 2-10)

- a. Remove engine oil tank - in hose (369H8305) assembly.
- b. Remove engine oil tank - out hose (369H8306) assembly and union (AN815-8D).
- c. Install oil filter assembly per enclosed Facet scavenge oil filter assembly installation instructions.

2-19.Engine Installation and Alignment (250-C20R/2)

(Ref. CSP-HMI-2)

2-20.Engine Rigging and Adjustment (250-C20R/2)

(Ref. CSP-HMI-2)

2-21.Engine Operational Check (250-C20R/2)

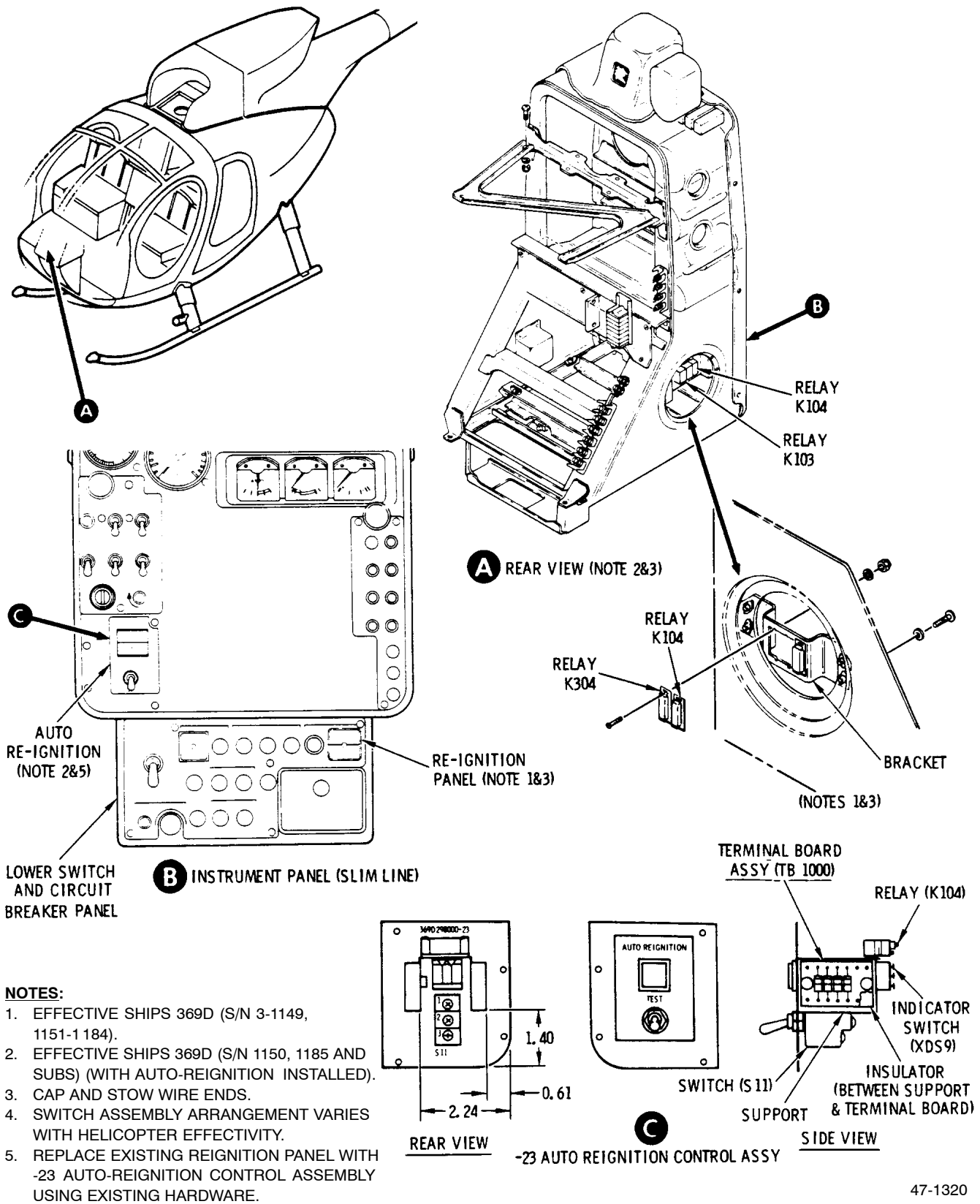
(Ref. appropriate PFM - Section 4, (CSP-D-1, CSP-E-1))

2-22.Weight and Balance**2-23.General**

Revise weight and balance pages in helicopter log book to reflect modification of helicopter. Weight and balance data changes from installation of 250-C20R/2 engine conversion kit are listed in Table 2-5. After installation of 250-C20R/2 engine conversion kit, incorporate changes in helicopter weight and balance records (Ref. Sec. 08-10).

Table 2-5. Weight and Balance Data

Model	Weight (pounds)	Arm (inches)	Moment (in.-lb/100)
369E Helicopters - 369D298000-519			
Added	17.95	89.20	1601
Removed	-8.43	88.71	748
Change	9.52	89.64	853
369D Helicopters - 369D298000-523			
Added	12.48	91.51	1142
Removed	-7.04	80.81	569
Change	5.44	105.37	573



47-1320

Figure 2-8. Auto-Reignition System Modification - Component Locations
(Effective 369D Helicopters Only)

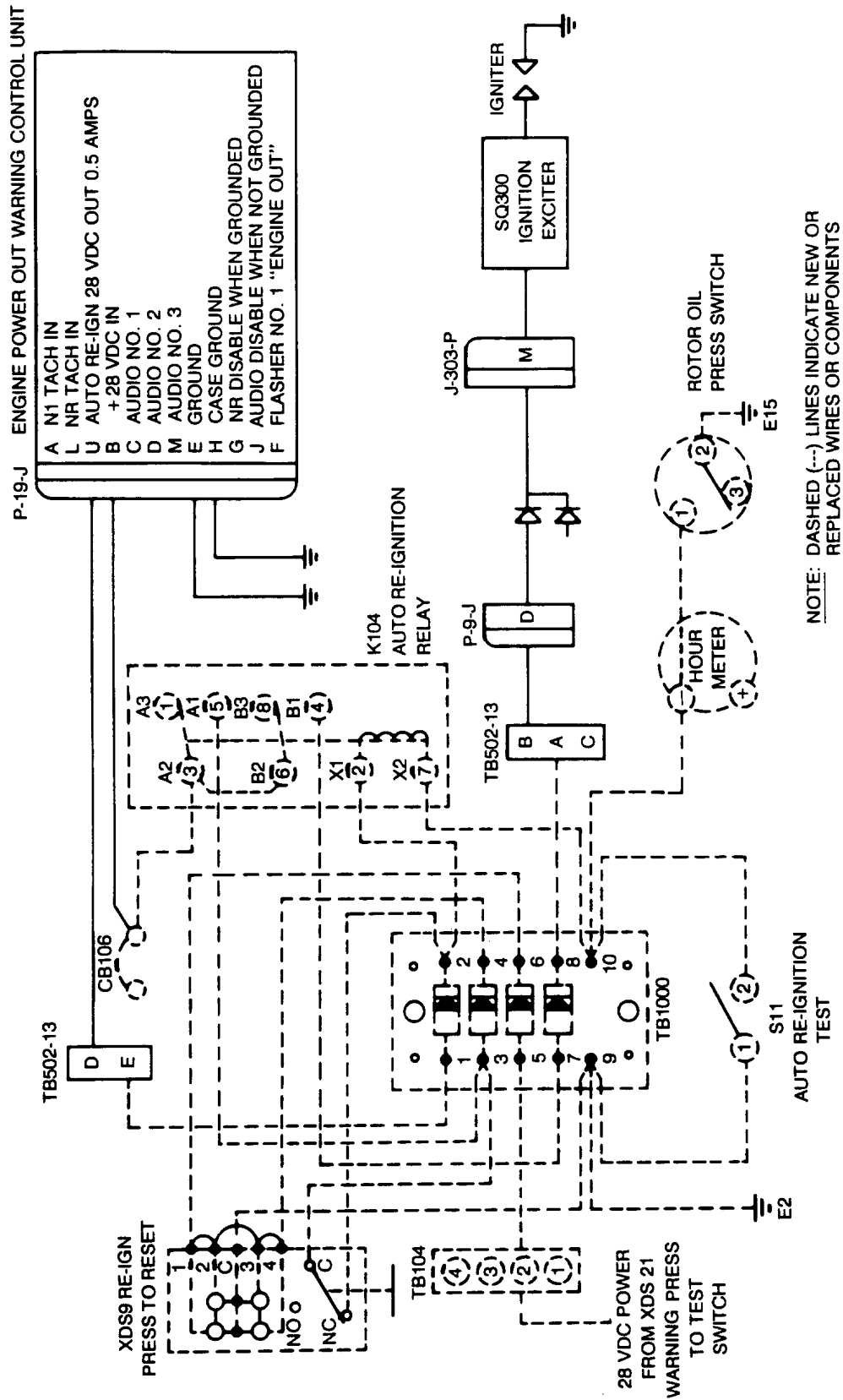


Figure 2-9. Auto-Reignition Modification - Wiring Diagram
(369D Helicopters Only)

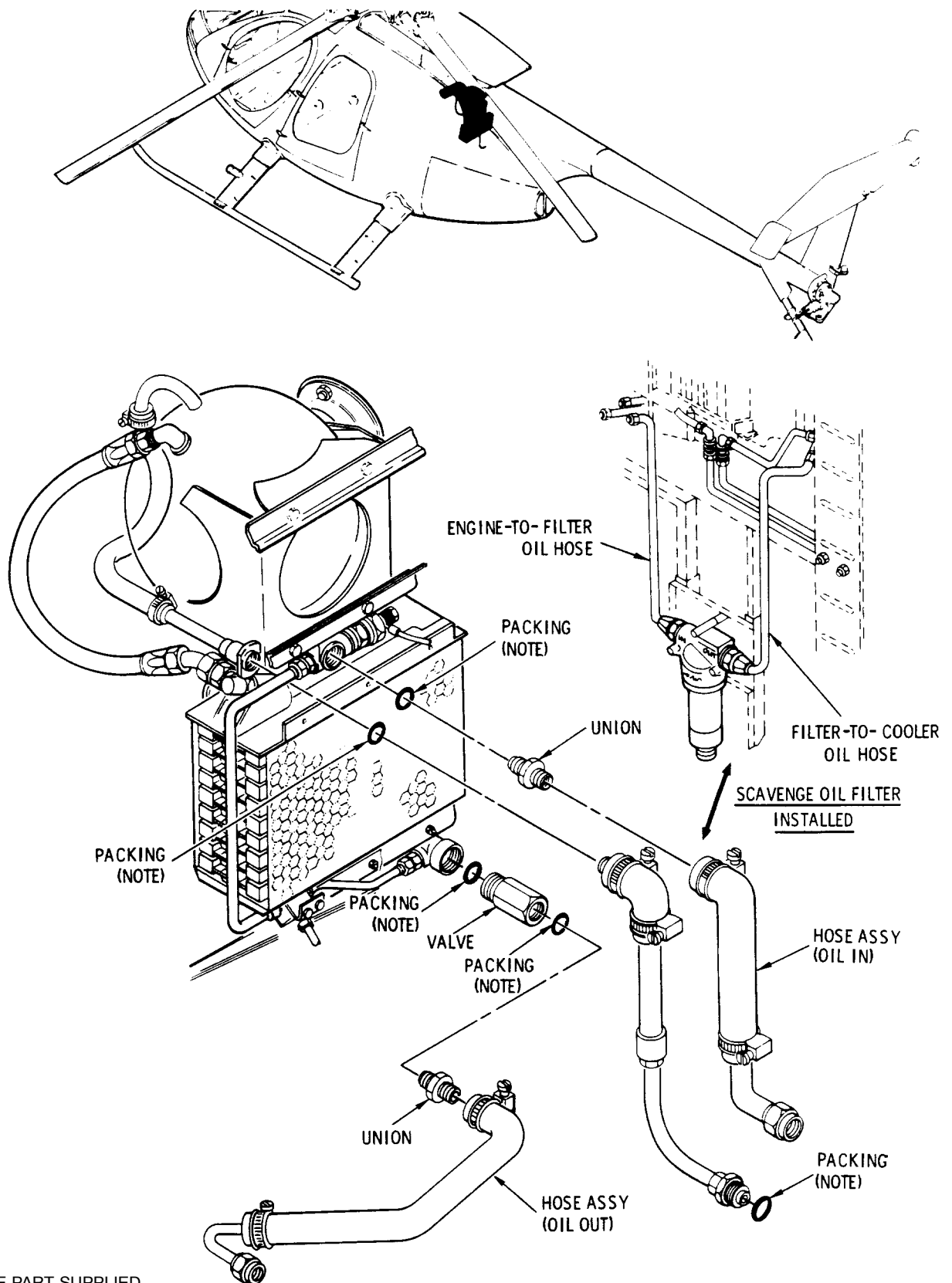
47-1321

Table 2-6. Auto-Reignition Wiring Data List
(Effective on 369D helicopters only)

From	Termination	To	Termination	* Material
CB106-2	MS25036-149	K104-3	* M39029/5-1 16	# 22 AWG
K104-3	* M39029/5-1 16	K104-6	M39029/5-1 15	# 22 AWG
TB1000-1	Solder	TB502-13E	MPCM20M-H2	# 22 AWG
TB1000-2	Solder	XDS9-S1-NC	Solder	# 22 AWG
TB1000-2	Solder	K104-2	M39029/5-1 15	# 22 AWG
TB1000-3	Solder	XDS9-S1-C	Solder	# 22 AWG
TB1000-3	Solder	K104-5	M39029/5-1 15	# 22 AWG
TB1000-4	Solder	XDS9-4	Solder	# 22 AWG
TB1000-5	Solder	TB104-2	M39029/5-1 15	# 22 AWG
TB1000-6	Solder	XDS9-1	Solder	# 22 AWG
TB1000-7	Solder	K104-4	M39029/5-1 15	# 22 AWG
TB1000-8	Solder	TB502-13A	MPCM20M-H2	# 22 AWG
TB1000-9	Solder	E2	MS25036-102	# 22 AWG
TB1000-9	Solder	XDS9-C	Solder	# 22 AWG
TB1000-9	Solder	S11-1	MS25036-149	# 22 AWG
TB1000-10	Solder	S11-2	MS25036-149	# 22 AWG
TB1000-10	Solder	K104-7	M39029/5-1 15	# 22 AWG
TB1000-10	Solder	Hour Meter (-)	3-520141-2	# 22 AWG
XDS9-1	Solder	XDS9-2	Solder	# 22 AWG
XDS9-2	Solder	XDS9-3	Solder	# 22 AWG
XDS9-3	Solder	XDS9-4	Solder	# 22 AWG

NOTES:

* Crimp both wires using M39029/5-116 socket.



47-1301

Figure 2-10. Oil System Hose Removal

