TM 9-4933-211-14

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECTOR SUPPORT,

AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

POWER SUPPLY,

HYDRAULIC/ELECTRIC, PORTABLE:

(4933-933-4742)

USED WITH M5, M18(XM18), M18A1(XM18E1),

M21, XM27E1, M28(XM28), M28A1(XM28E1),

M35(XM35) AND XM156 AIRCRAFT

ARMAMENT SUBSYSTEMS

HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 1972

TM 9-4933-211-14
C 3

CHANGE
NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *23 February 1976*

Aviation Unit and Aviation Intermediate Maintenance Manual (Including Repair Parts and Special Tools List)

POWER SUPPLY, HYDRAULIC/ELECTRIC, PORTABLE: (4933-00-933-4742) USED WITH M5, M18, M18A1, M21, M27, M28A1, M28A1E1, M35 AND XM156 AIRCRAFT ARMAMENT SUBSYSTEMS

TM 9-4933-211-14, 14 March 1972, is changed as follows:

The title is changed as shown above.

Page i. Immediately below the title, add the following:

To implement the three level maintenance concept, the following changes will be made to this manual, as applicable:

a. Substitute the words, "Aviation Unit maintenance" for Crew/Operator and Organizational maintenance (first level of maintenance). Also, wherever the symbol for Crew/Operator maintenance (C)is used, change to the symbol for Aviation Unit maintenance (0).

b. Substitute the words Aviation Intermediate maintenance for Direct Support and General Support maintenance (second level of maintenance). Also, wherever the symbol for General Support maintenance (H) is used, change to the symbol for Aviation Intermediate maintenance (F).

c. The Depot level of maintenance remains the same (third level of maintenance).

d. Under the new three level maintenance concept, the maintenance codes are as follows: Aviation Unit Maintenance (0), Aviation Intermediate Maintenance (F), and Depot Maintenance (D).

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-31, Direct and General Support maintenance requirements for 7.62 MM Machine-Gun/2.75" Rocket Launcher, High Rate, M21 Armament POD M18M18A1, High Rate, M27, 40-MM Grenade Launcher, M28/M28A1/M28A1E1, 20-MM Automatic Gun, M35, 40-MM Grenade Launcher, M5, Mount, Multi-Armament, Helicopter, M156.

U.S. GOVERNMENT PRINTING OFFICE: 1976-665668/426

TM 9-4933-211-14
C2

Change No. 2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D. C., *17 May 1973*

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR

POWER SUPPLY, HYDRAULIC/ELECTRIC, PORTABLE: (4933-933-4742) USED WITH M5, M18/M18A1, M21, M27, M28/M28A1, M35 AND XM156 AIRCRAFT ARMAMENT SUBSYSTEMS

TM 9-4933-211-14, 14 March 1972, is changed as follows:

Page 2-3, Table 2-3, change right hand column head to read "Figure reference".

Page 2-6, paragraph 2-10, last sentence, delete "Extreme" from title of TM 9-207.

Page 3-3, "Table 3-1. Preventive Maintenance Checks and Services", is superseded as follows:

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

D—Daily *W—Weekly* *AR—As Required*

Interval and Sequence No.			Item to be Inspected Procedure	Work Time (M/H)
D	W	AR		
X			HYDRAULIC HOSES, TUBINGS AND FITTINGS Visually inspect for leaks and signs of pending breaks.	0.1
X			WIRING Visually inspect for frayed or damaged insulation and loose connections.	0.1
X			BATTERY Inspect level of electrolyte and add if required.	0.2
X			RESERVOIR Check level of fluid and add if required (para 2-3b).	0.2
X			ELECTRIC CABLES Inspect connectors for bent pins; inspect cables for damaged insulation.	0.2
	X		RESERVOIR Remove and clean filler neck strainer.	0.3
	X		HYDRAULIC STRAINER Remove plug from wye of strainer and remove and clean strainer mesh.	0.6
		X	POWER SUPPLY Lubricate (Fig. 3-1).	0.1
		X	ACCUMULATOR Recharge to 750 psi (para 3-2).	0.2

Page B-3, "Section II. Maintenance Assignment Chart", is superseded as follows:

Section II—MAINTENANCE ALLOCATION CHART

(1) Group number	(2) Functional Group Component assembly nomenclature	(3) Maintenance Function											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhall	Rebuild		
1	Power Supply, Hydraulic/Electric, Portable:	0 0.5		0 0.5	D 0.4			0 0.4		F 15.8	D 67.8		1–A–, 1–I–2	
a.	Power Supply, Hydraulic/Electric, Portable; HEPC-1	0 0.4	F 0.6	0 0.3	0 0.2					F 8.0	H 16.2		1a–C–3	Charge accumulator with dry nitrogen.
(1)	Cable Assemblies	0 0.2	F 0.3						F 0.2	F 1.0	H 1.6			
(2)	Motor, Electric	0 0.2	D 0.4	F 0.2					F 2.0		D 9.5			
(3)	Pump, Hydraulic	0 0.2	D 0.6	0 0.2	0 0.2				F 1.5					Unserviceable pump will be returned to depot and in turn to MFG for repair or overhaul.
(4)	Power Supply, DC	0 0.2	F 1.0						F 1.0	D 3.0	D 9.0			
b.	Box, Distribution: HEDP	0 0.3	F 0.4						F 0.4	F 2.0	H 1.0			
c.	Battery	0 0.2		0 0.2					F 0.3					See note 1, section IV REMARKS.

LEGEND: 0–Organizational Maintenance
F–Direct Support Maintenance
H–General Support Maintenance
D–Depot Maintenance

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-31, direct and general support maintenance requirements for 40MM Grenade Launcher M5; 7.62MM Machine Gun, Armament POD M18/M18A1; Helicopter, Multi-Armament Mount XM156; 7.62MM Machine Gun/40MM Grenade Launcher M28/M28A1; and 20MM Automatic Gun, M35.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1973-754152/139

Change
No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D. C., *10 October 1972*

Operator, Organizational, Direct Support, and General Support Maintenance Manual For POWER SUPPLY, HYDRAULIC/ELECTRIC, PORTABLE: (4933-933-4742) USED WITH M5, M18/M18A1, M21, M27, M28/M28A1, M35 AND XM156 AIRCRAFT ARMAMENT SUBSYSTEMS

TM 9-4933-211-14, 14 March 1972, is changed as follows:

Change title to read as shown.

Page 2-2 and 2-3, table 2-2. The last column header "Figure 2-1 reference" is changed to read "Figure 2-2 reference."

Page 2-5, paragraph 2-3d. In line 3, "7.5 KVA power source" is changed to read "5.7 KVA power source."

Page 4-1, table 4-1. In "probable cause" column, line 4 under "Electric Power System" header, change "DB3" to read "CD3."

Page B-3, Maintenance Assignment chart. In the "Repair" column of the "Maintenance Function" column, "Group 4, Power Supply," change "D" to "F".

By order of the Secretary of the Army:

BRUCE PALMER, JR.
General, U. S. Army
Acting Chief of Staff

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-31, Section IV, Direct and General Support Maintenance requirements for 40-MM Grenade Launcher M5; 7.62-MM Machine Gun, Armament pod M18/M18A1; Helicopter Multi-Armament Mount XM156; 7.62-MM Machine Gun/40-MM Grenade Launcher M28/M28A1; and 20-MM Automatic Gun, M35- one (1) copy to each account.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1972-769612/239

WARNING

HIGH VOLTAGE

Prior to connecting power supply electrical cables to a power source, be sure all electrical switches are in off position.

Power input should be OFF before connecting or disconnecting any test leads to equipment. Reasonable care must be exercised, when equipment is under power, to avoid injury to personnel and / or damage to test equipment or unit under test.

HIGH PRESSURE-HYDRAULIC

Do not connect or disconnect any hoses when bypass valve is closed.

Technical Manual
No. 9-4933-211-14

HEADQUARTERS,
DEPARMENT OF THE ARMY
Washington, D.C., *14 March 1972*

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR POWER SUPPLY, HYDRAULIC / ELECTRIC, PORTABLE,

(4933-933-4742)

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope.

This manual contains information and instructions for personnel responsible for performing operator, organizational, direct support and general support maintenance of the Portable Hydraulic / Electric Power Supply. Maintenance responsibilities will apply as reflected in the maintenance allocation chart (Appendix B) and by allocation of repair parts and special tools (see TM 9-4933-211-34P).

1-2. Forms and Records.

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750 (The Army Maintenance Management Systems (TAMMS)).

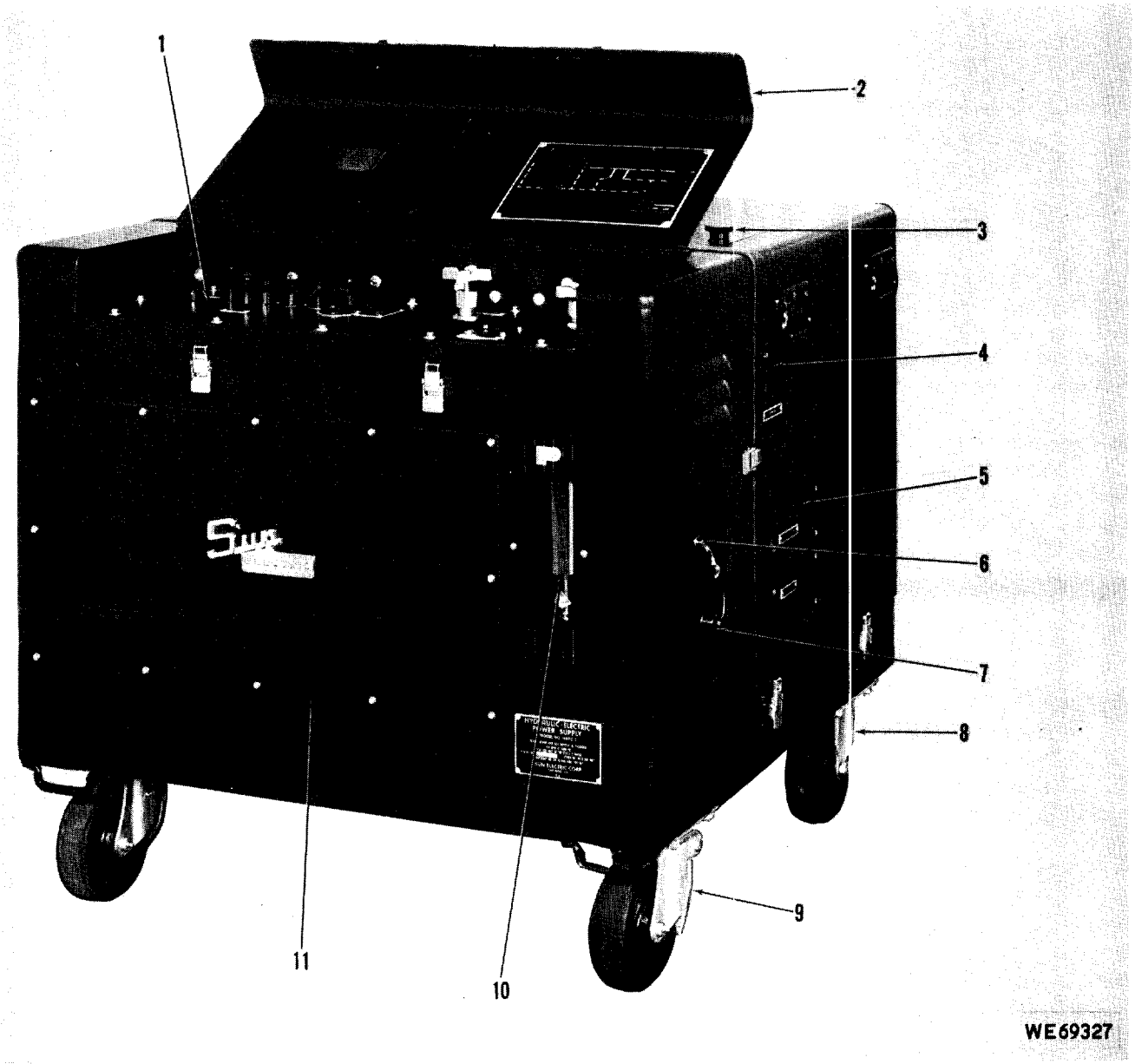
1-3. Reporting of errors.

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to: Commanding General, Headquarters, U. S. Army Weapons Command, ATTN: AMSWE-MAP, Rock Island, Illinois 61201.

Section II. DESCRIPTION AND DATA

1-4. Description.

The hydraulic / electric power supply includes one portable hydraulic / electric power supply, model HEPC-1, which will be referred to throughout this manual as the power supply (fig. 1-1), and one distribution box, model HEDP, which will be referred to throughout this manual as the distribution box (fig. 1-2). This unit is designed to provide a hydraulic fluid supply of 3.5 gpm at up to 1500 psi. It is also capable of providing a regulated dc power supply, furnishing 40 ampere at 28 volts dc. The unit provides instrumentation, input-output electrical receptacles and components necessary to provide electrical power distribution to aircraft weapons systems. The electrical system of the power supply is designed for Class I, group C, or D, division 2 hazardous locations. Both the power supply and distribution box are enclosed within weather resistant housings. Quick-disconnect fittings are provided for hydraulic connection. The power supply utilizes a 24 volt, nickel cadmium battery, 34 ampere-hour, government furnished. A control panel containing all hydraulic and electric controls is conveniently located at the top of the power supply under a cover at the front. Facing the operator, at the front of the power supply is the fluid flow meter (10, fig. 1-1). The reservoir level gage is located at the right side of the power supply (4, fig. 1-1). A reservoir fill cap is located on the top, front, right side of the power supply under access door (3, fig. 1-1). Hydraulic connections (6 and 7, fig. 1-1) are located on the right. front side of the power supply. Ac and dc cables, battery cables, and hoses are stored under the access cover at the top rear of the power supply. DC power supply components are located under the housing on the left side. The battery is installed behind an access door at the rear of the unit. Four casters, two swivel type, two rigid type, are provided for ease of transporting the power supply.



1. Control panel
2. Control panel cover
3. Reservoir fill access door
4. Reservoir level gage
5. Hydraulic pump volume and compensator control access door
6. Supply port
7. Return port
8. Rigid caster
9. Swivel caster
10. Flowmeter
11. Electrical box access plate

Figure 1-1. Power supply

1. Distribution box
2. Hose assembly
3. Hose assembly
4. Cable assembly
5. Hose assembly
6. Hose assembly
7. Cable assembly
8. Cable assembly
9. Cable assembly
10. Cable assembly
11. Cable assembly

Figure 1-2. Distribution box: HEDP.

1-5. Tabulated Data.

a. Distribution Panel Controls and Instruments.

Voltmeter . . . . . Panel mounted, ruggedized meter, 3½ inch diameter. range 0 to 30 vdc. monitors Power Supply output voltage.

Ammeter . . . . . Panel mounted, ruggedized meter, 3½ inch diameter. range 0 to 50 amps. used to monitor Power Supply output current.

Receptacle . . . . . Duplex twist lock, 2 wire per W-C-596a (B5), used for 24 vdc test set connection.

Switches . . . . . Toggle switches are sealed lever type per MS35058-23: push switches are moisture proof per MS25089-3CR: rotary switch is non-shorting type per MIL-S-6807: used to select and control input to voltmeter.

Circuit breakers . . . . . Trip-free, push-pull type per MIL-C-3809: used for circuit protection.

Tip jacks . . . . . Color coded, low voltage type with wrap around terminals conforming to MS16108. used for ammeter connection.

Connectors . . . . . .Input, output, and interconnecting receptacles conforming to MIL-C-5015 or MIL-C-26482.

b. Power Supply Controls and Instruments.

High pressure dial gage . . . . . .0 to 2000 psi range, MS28061-6, indicates system test pressure.
Outlet shutoff valve . . . . . .Needle type, controls flow to unit on test.
Bypass valve . . . . . .Needle type. bypasses pump discharge.
Flowmeter . . . . . .Variable area glass tube type, range 0.35 to 4.0 gpm, indicates fluid flow from unit under test.
Switches . . . . . START and stop pushbuttons. running overload, high fluid temperature, an d undervoltage interlock,
Indicator lights . . . . . AC power ON, green, high differential pressure iu high pressure filter, red.

c. Hydraulic Data.

Hydraulic reservoir . . . . . .Two gallon capacity
Reservoir level gage . . . . . 0, ¼, ½, ¾, Full
Reservoir fill and strainer . . . . . 1½ inch, 100 mesh size
Reservoir drain . . . . . ½ inch
Low pressure filter . . . . . .40 mesh strainer
Thermoswitch . . . . . .Preset to 175 ±4°F
Hydraulic pump . . . . . .Axial piston type, variable volume, pressure compensated
Check valve . . . . . .Quick acting poppet type
Differential pressure switch . . . . . .Adjustable-preset to 35 psi
High pressure filter . . . . . .10 micron nominal Supply port
Valve, relief . . . . . .Adjustable-preset to 1750 psi Return port
Heat exchanger . . . . . Air / oil type integral cooling fan
Accumulator . . . . . 1 quart capacity-piston type-power off 750 psi
Hose assembly and quick disconnect . . . . . AN6264-6-75 with aeroquip part number 340206-4
Hose assembly and quick disconnect . . . . . MS28741-8-0720 with aertoquip part number 340206-6

d. Electrical Data.

Motor, B1 . . . . . 4 hp, 1440 1730 rpm, 220, / 440v, 3 phase, 50 / 60 cps integral pump mount, drip proof.
Motor protection, CB1, MK1, OL1 OI2 . . . . . Magnetic Circuit Breaker. magnetic starter and two overload relays with automatic reset.
Thermal switch, S3 . . . . . stops motor when fluid temperature exceeds 175°F ± 4°F.
Power input cable . . . . . .25 ft, 4 conductor, 10 awg, neoprene jacket, with terminals for 3/8 inch size studs.
Dc power supply . . . . . Solid state, 26-30V, 40A continuous output, 208 to 230 vac, 3 phase, 50 / 60 cycle input. Line and load voltage regulation 1% . Peak-to-peak ripple at full load 100 mv. Series Regulator. Convection cooled.
Dc short circuit protection, CB2 . . . . . .Magnetic circuit breaker and automatic current limiting.
Dc output cable . . . . . .10 ft long, two conductor, 8 awg, neoprene jacket, with one connector, MS3106A-20-8S.
Battery, BT1 . . . . . Aircraft type storage battery, nickel / cadmium, 24v, 34amp-hr.
Battery output cable . . . . . .10 ft long, neoprene jacket, two separate conductors, one connector MS3106A-321S.

e. Physical Data.

Power supply:
  Length . . . . . 36 inches
  Depth . . . . . .36 inches
  Height . . . . . .34 inches
  Weight . . . . . .725 pounds (dry)
Distribution box:
  Depth . . . . . 18¾ inches
  Height . . . . . .12 2⅞ inches
  Width . . . . . .21 inches
  Weight . . . . . .48 pounds {including hoses and cables)

1-6. Identification Plates.

Refer to table 1-1 for power supply identification plate tabulation.

Table 1-1. Identification Plates

Description	Location
NOTE Control panel is front nf *power* supply. Reference to left, right, front. or rear is taken facing the control panel.	
Hydraulic schematic plate. Contains schematic diagram of power supply hydraulic system.	Located on right hand, underside of control panel cover.
Unit plate. Contains model number and description of power supply,	Located on lower, right front of power supply.
Supply port plate. Contains words SUPPLY PORT.	Located on front, right side of power supply just above hydraulic supply port.

Table 1-1. Identification Plates-Continued

Description	Location
Return port plate. Contains words RETURN PORT.	Located on front, right side of power supply just above hydraulic return port.
Bypass valve plate. Contains words BYPASS VALVE. Identifies bypass valve.	Located on power supply control panel.
Outlet shutoff plate. Contains words OUTLET SHUTOFF VALVE. Identifies outlet shutoff valve.	Located on power supply control panel.
Pressure gage plate. Contains words PUMP PRESS GAGE. Identifies high pressure hydraulic gage.	Located on power supply control panel.
Reservoir plate. Contains words RESERVOIR LEVEL. Identifies hydraulic reservoir level gage.	Located on right side of power supply under level gage hole.
Voltage adjust plate. Contains words DC VOLT ADJUST. Identifies dc voltage adjust rheostat.	Located on power supply control panel.
28V battery plate. Contains words 28V OFF BATTERY.	Located on power supply control panel.
Filter plate. Contains words H. P. FILTER. Identifies high pressure hydraulic filter differential indicator.	Located on power supply control panel.
Legend plate. Red: Contains word STOP. Identifies electric motor stop switch.	Located on power supply contol panel.
Motor control plate. Contains words MOTOR CONTROL. Identifies electric motor control switches.	Located on power supply control panel.
Legend plate. Green: Contains word START. Identifies electric motor start switch.	Located on power supply control panel.
Power on plate. Contains words POWER ON. Identifies power on indicator.	Located on power supply control panel.
Legend plates. Black; contains word RESET. Instruction for circuit breakers.	Two located on power supply control panel.
DC breaker plate. Contains words DC BREAKER. Identifies dc circuit breaker.	Located on power supply control panel.
Master switch plate. Contains words OFF MASTER ON. Identifies and instructs master switch.	Located on power supply control panel.
AC breaker plate. Contains words AC BREAKER. Identifies ac circuit breaker.	Located on power supply control panel.
DC supply plate. Contains words DC SUPPLY. Identifies dc supply cable.	Located inside storage bin.
Battery plus plate. Contains words + BATTERY. Identifies battery positive cable.	Located inside storage bin.
Accumulator plate. Contains words ACCUM CHAR V. Identifies accumulator charge valve.	Located on lower, left front of power supply.
Fill plate. Contains words RESERVOIR FILL. Identifies reservoir fill location.	Located on top of hydraulic reservoir.
Volume control plate. Contains words VOLUME CONTROL. Identifies location of hydraulic pump volume control.	Located on access door on middle, right side of power supply.
Compensator control plate. Contains words COMPENSATOR CONTROL. Identifies location of hydraulic pump compensator control.	Located on access door on middle right side of power supply

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INSTRUMENTS

2-1. General.

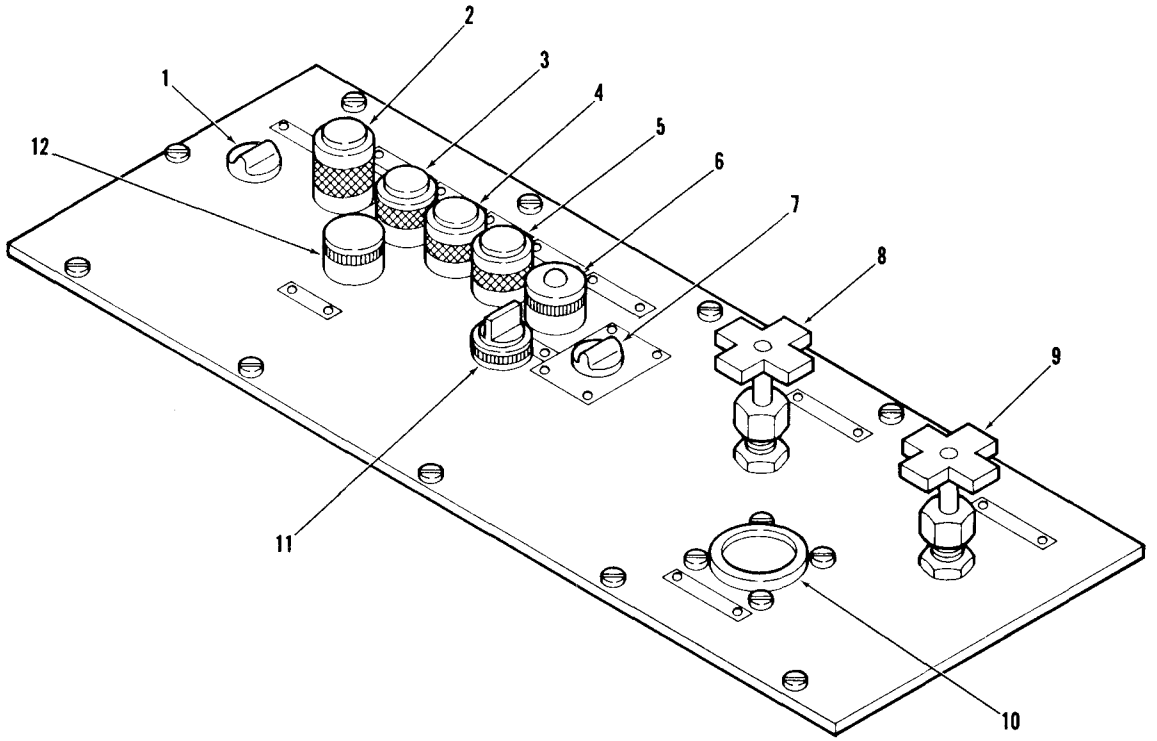
This section describes the various controls and instruments and provides information to insure the proper operation of the portable hydraulic/ electric power supply.

2-2. Controls and Instruments.

Table 2-1 lists and describes the controls and instruments located on the control panel of the power supply (fig. 2-1). Table 2-2 lists and describes the controls and instruments located on the distribution box (fig. 2-2). Table 2-3 list and describes the controls and instruments located throughout the power supply.

Table 2-1. Power Supply Control Panel Controls and Instruments

Control or instrument	Range or positions	Function	Figure 2-1 reference
Master switch	ON-OFF	Thermal circuit breaker. Energizes electric control circuit only.	1
DC Circuit breaker	Reset	Pushbutton. Permits manual reset only upon dc supply short circuit or overload.	2
AC Circuit breaker	Reset	Pushbutton. Permits manual reset only upon automatic shutdown due to short circuit or overload.	3
Start switch	Pushbutton	Controls motor start coil MK 1 to start electric motor.	4
Stop switch	Pushbutton	Controls motor start coil MK 1 to stop electric motor.	5
Indicator, HP filter	Red indicating light. Normally not lighted.	Indicates high pressure filter is clogged. When hydraulic fluid is cold this light may be ON.	6
DC Voltage adjust	Rheostat	Adjust dc supply voltage from 26 to 30 vdc.	7
Outlet shutoff valve	Fully open or fully closed	Controls flow of hydraulic fluid to unit on test.	8
Bypass valve	Open or close	Bypasses hydraulic pump discharge.	9
High pressure gage	O to 2000 psi	Indicates hydraulic system fluid pressure.	10
Selector switch	3 position	Controls dc power supply output. Allows either battery charging or dc output mode of operation.	11
Power ON indicator	Green indicator	When lighted, indicates control circuit is energized.	12



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1. Master switch
2. DC circuit breaker
3. AC circuit breaker
4. Start switch
5. Stop switch
6. High pressure filter indicator
7. DC voltage adjust rheostat
8. Outlet shutoff valve
9. Bypass valve
10. High pressure gage
11. Selector switch
12. Power ON indicator

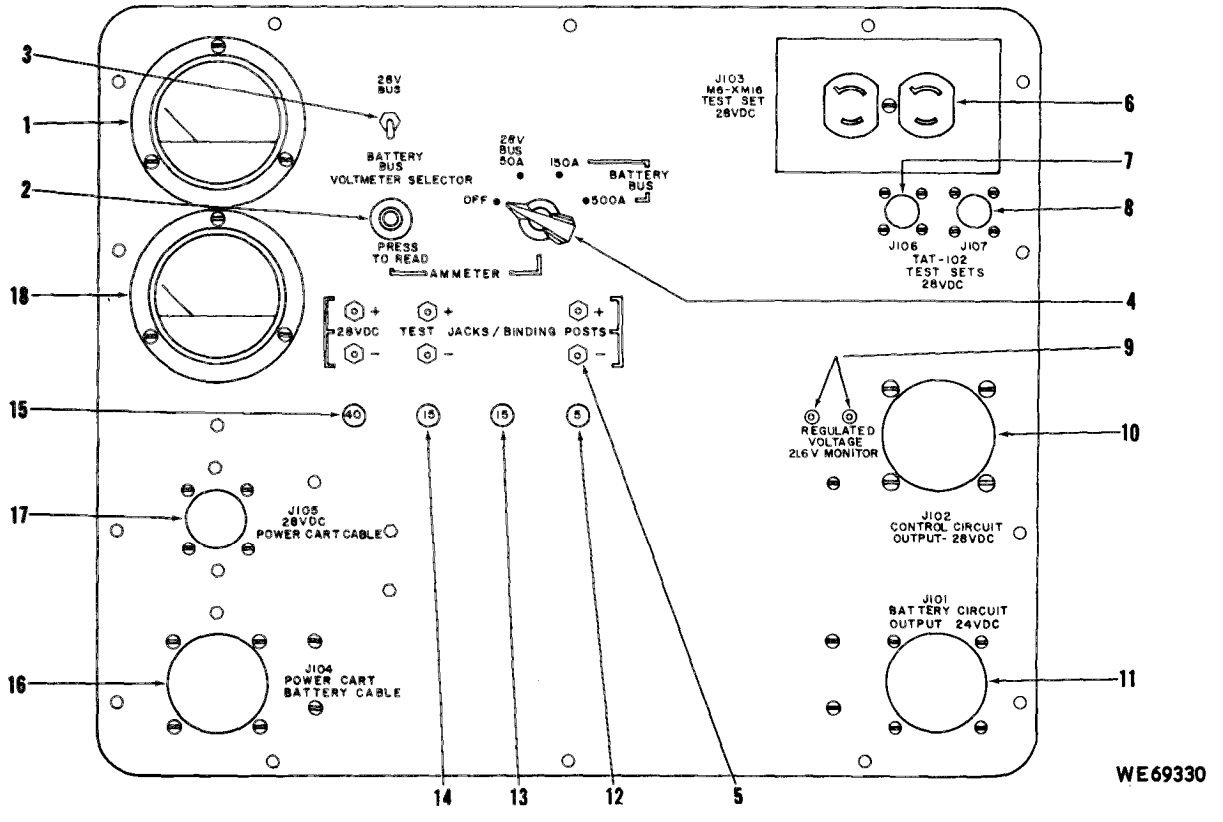
Figure 2-1. Power supply control panel.

Table 2-2. Distribution Panel Controls and Instruments

Control or instrument	Range or positions	Function	Figure 2-1 reference
Voltmeter	0 to 30 volts DC	Voltage monitoring.	1
Ammeter switch	Press to read	Applies current to ammeter for monitoring.	2
Voltmeter selector switch	28V BUS; BATTERY BUS	Selects input to panel from power supply battery or power supply dc power supply.	3
Ammeter selector switch	4 positions; OFF; 28V BUS 50A; 150A; 500A BATTERY BUS	Selects input to ammeter for monitoring current depending upon battery or power supply input from power supply.	4
Binding posts	28 VDC TEST JACKS/ BINDING POSTS	Connection for auxiliary meters.	5
Duplex receptacle	TEST SET 28 VDC	Connection to unit under test.	6
Connector	TEST SETS 28 VDC	Connection to unit under test. (Connectors J106 and J107, marked for TAT-102, will be used for M28 and M28A1 test sets).	7
Connector	TEST SETS 28 VDC	Connection to unit under test.	8
Test jacks	REGULATED VOLTAGE 21.6V MONITOR	Connection for auxiliary meter.	9
Connector	CONTROL CIRCUIT OUTPUT - 28 VDC	Connection to unit under test.	10
Connector	BATTERY CIRCUIT OUTPUT - 24 VDC	Connection to unit under test.	11
Circuit breaker 5A	Press to reset	Test jack circuit protection.	12

Table 2-2. Distribution Panel Controls and Instruments—Continued

Control or instrument	Range or positions	Function	Figure 2-1 reference
Circuit breaker, 15A	Press to reset	Test jack circuit protection.	13
Circuit breaker, 15A	Press to reset	Test jack circuit protection.	14
Circuit breaker, 40A	Press to reset	Test jack circuit protection.	15
Connector	POWER SUPPLY BATTERY CABLE	Connection to power supply.	16
Connector	28 VDC POWER SUPPLY CABLE	Connection to power supply.	17
Ammeter	0 to 50 Amp DC	Current monitoring	



1. Voltmeter (M1)
2. Ammeter switch (S2)
3. Voltmeter selector switch (S1)
4. Ammeter selector switch (S3)
5. Binding posts
6. Duplex receptacle (J103)
7. Connector (J106)
8. Connector (J107)
9. Test jacks
10. Connector (J102)
11. Connector (J101)
12. Circuit breaker, 5A
13. Circuit breaker, 15A
14. Circuit breaker, 15A
15. Circuit breaker, 40A
16. Connector (J014)
17. Connector (J105)
18. Ammeter (M2)

Figure 2-2. Distribution panel control.

Table 2-3. Miscellaneous Power Supply Controls and Instruments

Control or instrument	Range or positions	Function	Figure 2-1 reference
Flowmeter	0.35 to 4.0 gpm	Indicates hydraulic fluid flow from unit under test.	10, figure 1-1
Supply port	Quick disconnect	Connection for fluid flow to unit under test.	6, figure 1-1
Return port	Quick disconnect	Connecting for fluid flow return from unit under test	7, figure 1-1
Reservoir level gage	0-¼-½-¾-FULL	Indicates level of hydraulic fluid contained in reservoir.	4, figure 1-1
Volume control	Variable	Regulates volume of hydraulic fluid output of pump,	4, figure 2-3
Compensator control	Variable	Regulates pump pressure to maximum system requirements.	5, figure 2-3

2-3. Preparation for Use.

a. Power Supply Position. For hydraulic power supply operations, the power supply must he positioned within 6 feet of the unit to be supplied. This distance is determined by the 6 foot long supply and return hose assemblies furnished with the power supply. The dc power supply cable for connection to the distribution box is 14 feet long. The ac supply cable is 28 feet long. After positioning power supply, look swivel casters in position to prevent movement. Open control panel cover (2, fig. 1-1).

b. Hydraulic System. Check level of hydraulic fluid in reservoir as indicated on reservoir level gage (4, fig. 1-1). If required, fill hydraulic reservoir as follows:

(1) Open reservoir fill access door (3, fig. 1-1). Remove fill cap from reservoir (1, fig. 2-3).

CAUTION

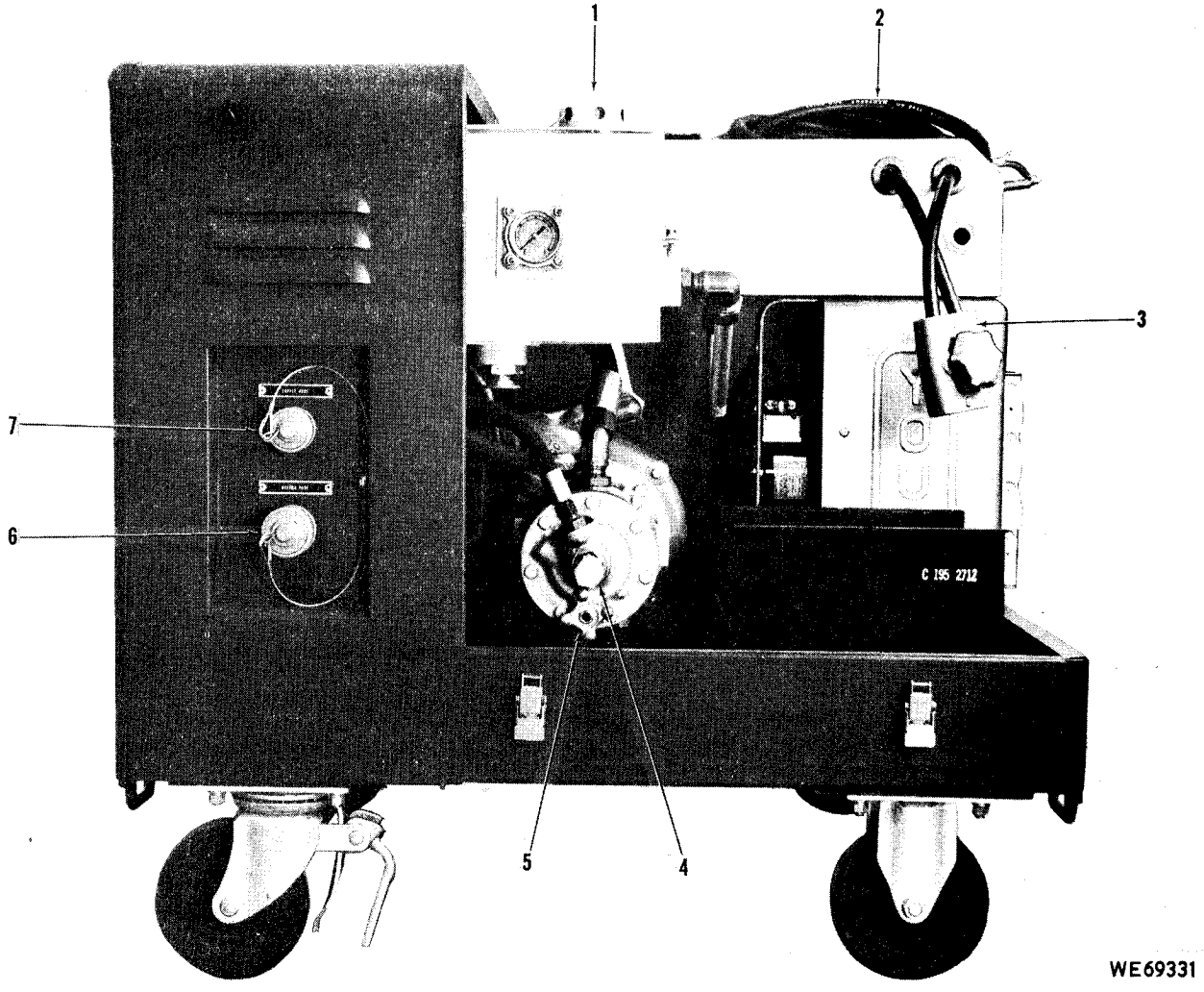
Do not fill reservoir above top of strainer. Room for thermal expansion of the hydraulic fluid is required.

CAUTION

Insure hydraulic fluid utilized is not contaminated with foreign material, and that hose connectors are clean and free of dirt or sand before connecting to aircraft armament subsystems.

(2) Fill hydraulic reservoir with fluid MIL-L-5606B.

(3) Install fill cap and close access door.



1. Reservoir fill
2. AC supply cable
3. Battery charging cable
4. Volume control
5. Compensator control
6. Return port
7. Supply port

Figure 2-3. Power supply, right side view.

c. Hose Connections. Open rear access door and remove two hose assemblies from storage bin. Remove dust caps from ports (6 and 7, fig. l-l) and from hose assemblies. Connect one end of hose assembly to supply port (6) and other end to the corresponding port on unit to be supplied. Connect one end of second hose assembly to return port (7) and other end to corresponding port on unit to be supplied.

WARNING

Prior to connecting power supply cables, ascertain that electrical switches are in OFF position.

d. AC Power Supply Connection. Connect ac power supply cable (2. fig. 2-3) to a 220 / 240 volt ac, 3 phase, 50 / 60 Hz, 7.5 KVA power source.

c. Distribution Box Connection. For electrical supply operations using the distribution box, interconnect the box with the power supply.

(1) Connect DC power supply cable to connector (J105) (17, fig. 2-2).

(2) Connect battery cable to connector (J104) (16. fig. 2-2).

CAUTION

Disconnect P105 or P104 from power distribution panel when in battery charge mode.

NOTE

Using charging regulator kit, FSN 4933-856-5593, preload accumulator with dry nitrogen to approximately 750 psi.

2-4. Starting Power Supply.

a. Close outlet shutoff valve (8. fig. 2-1).

WARNING

Do not connect or disconnect any hoses when bypass valve is closed.

b. Open bypass valve (9).

c. Place selector switch (11) in OFF position. Place master switch (1) in ON position. Green indicator (12) shall light.

d. Press motor start switch (4).

2-5. Hydraulic Operation.

a. Starting Hydraulic Operation.

(1) Start power supply (para 2-4).

CAUTION

Pressure shall not be set higher than 1500 psi.

(2) Set pump compensator control (5. fig. 2-3) if a change from normal 3.5 gpm - 1500 psi setting is desired. To adjust compensator. close outlet shutoff valve (8, fig. 2-1) and bypass valve (9). Adjust for desired pressure as read on high pressure gage (10).

CAUTION

Flow shall not be set higher than 3.5 gpm.

(3) Set pump volume control (4, fig. 2-3) if a change from normal 3.5 gpm - 1500 psi setting is desired. To adjust volume control, close outlet shutoff valve (8, fig. 2-1) and open bypass valve (9). Adjust for desired flow as read on flowmeter (10, fig. 1-1).

(4) Close bypass valve (9, fig. 2-1).

(5) Open outlet shutoff valve (8, fig. 2-1) fully.

(6) Hydraulic fluid is now being applied to unit undergoing test.

h. Stopping Hydraulic Operation.

(1) Close outlet shutoff valve (8, fig. 2-1).

(2) Open bypass valve (9).

2-6. DC Supply System Operation.

The dc supply system can be used for battery charging with a limit of 10 to 13 amperes or as a regulated 40 ampere, 26 to 30 volt dc power source.

a. Battery Charging. Refer to TM 11-6140-203-15-2 for information on safety precautions, procedures, and technical data concerning nickel cadre ium batteries. A battery charging cable (3, fig. 2-3) with terminals in a plug (P1) is used for battery charging. To charge a battery, connect plug (P1) to the battery, observing proper polarity.

WARNING

Insure that location for charging batteries is well ventilated. Projective clothing and equipment will be worn as required by AR 385-32. Insure against smoking or proximity of flame or spark producing equipment in the battery charging area.

(1) Start power supply (par 2-4).

(2) Place selector switch (11, fig. 2-1) in BATTERY CHARGE position.

(3) Refer to TM 11-6140-203-15-2 for information on battery temperature limitations and hydrometer readings.

(4) To stop battery charging, place selector switch (11) in OFF position.

b. DC Power Supply. Output of 40 amperes at 26 to 30 volts is available through the use of the dc power supply cable. The power supply is not equipped with monitoring instruments for the dc power supply output. The distribution box or other external meters must be used for monitoring.

(1) Start power supply (para 2-4).

(2) Place selector switch (11, fig. 2-1) in DC POWER SUPPLY position.

(3) Use dc voltage adjust rheostat (7, fig. 2-1) as required to increase or decrease the output voltage.

(4) To stop the dc power supply output, place selector switch (11) in OFF position.

2-7. Procedures During Operation.

During hydraulic or electric operation of the power supply observe the following:

a. If an emergency should arise during hydraulic operation (ruptured hose, etc.) or if, for any other reason it is necessary to immediately stop hydraulic fluid pressure flow to the unit undergoing test, open bypass valve (9, fig. 2-1).

b. If red indicator (6, fig. 2-1) should light during operation, stop power supply and service high pressure filter (see para 3-9). This light may come on if the hydraulic fluid is extremely cold and remain on until the fluid has warmed. However, if light remains on the high pressure must be checked.

c. If temperature of hydraulic fluid reaches 175 degrees F or higher, power supply will shut down automatically through the action of thermostatic switch (S3).

d. The power supply will shutdown automatically as a result of a short circuit in either the ac or dc systems. If such shutdown occurs, check dc circuit breaker (2, fig. 2-1) or ac circuit breaker (3). If circuit breaker has tripped, check appropriate circuit for cause and then reset circuit breaker.

c. During operation. listen for unusual noises and be alert for any abnormal sound, smell, sight, or feel which may indicate a pending malfunction.

2-8. Stopping Power Supply.

a. Stop hydraulic operation (para 2-5) or dc supply system operation (para 2-6).

b. Press motor stop switch (5, fig. 2-1).

c. Place master switch (1) in OFF position. Green indicator (12) shall extinguish.

2-9. Procedures After Operation

When supply operations have been completed and unit is shut down, perform the following steps to secure the power supply.

a. Disconnect and cap all external hoses. Place protective caps on outlet ports.

b. Disconnect all electrical cables.

c. Place hoses and cables in storage bin.

d. Close control panel cover and any access doors that were opened during operation.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-10. Operation in Extreme Cold.

The power supply is designed to operate at temperatures above zero degrees Fahrenheit, but not below this temperature. Where the power supply is subjected to sub-zero temperatures, adequate protection should be provided against the deteriorating effects of wind, snow, and ice. When practical, portable electric heaters may be placed inside the power supply to raise ambient temperature to at least zero degrees Fahrenheit. Remove heater before placing power supply in operation. Refer to TM 9-207, Operation and Maintenance of Army Materiel in Extreme Cold Weather 0° to - 65° F.

2-11. Operation in Extreme Heat and High Humidity.

The power supply is designed to operate at temperatures up to 125 degrees F., but prolonged exposure to environments of excessively high temperature and humidity requires special treatment, with particular attention to the use of desiccants to inhibit corrosive action due to high moisture content.

2-12. Operation in Sand, Snow, or Mud.

Inspect power supply frequently. Clean out and remove accumulated dust, sand, or mud. Wipe electrical components with a dampened soft cloth. Clean interior or power supply with a low pressure jet of dry air. Keep access doors closed whenever possible.

2-13. Operation in Salt Water Areas.

Adequate use of desiccants will reduce corrosion due to high humidity conditions and salt laden atmosphere. Clean power supply frequently with fresh water and approved solvent.

WARNING

To prevent electrical shock when cleaning with water, be sure electric switch is closed, power off, and cables disconnected. Insure that dust covers are on cable connectors.

2-14. Operation at High Altitudes.

The power supply is designed to operate satisfactorily at altitudes ranging from sea level to 15,000 feet.

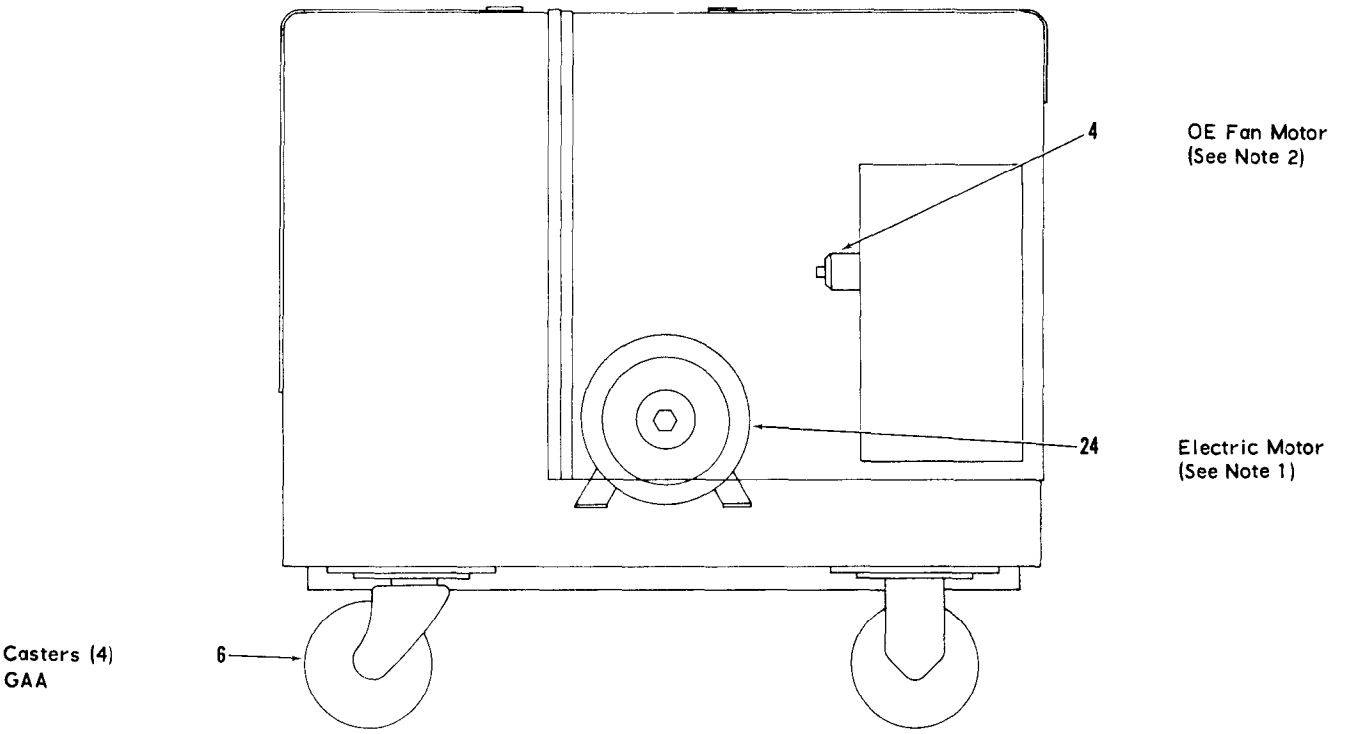
CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

3-1. General.

When new materiel is first received by the using organization. inspect all assemblies, and subassenlblies to be sure they are properly assembled, secured, cleaned, correctly adjusted and lubricated. Make a record of any missing parts and any malfunctions. The shipping crate and other packaging materials should be retained for reuse. For preventive-maintenance checks and services, refer to table 3-1. Refer to figure 3-1 for lubrication.



GENERAL

Intervals are based on normal months of operation. Adjust to compensate for abnormal operations and severe conditions. During inactive periods sufficient lubrication must be performed for adequate preservation.

Clean fittings before lubricating.

Relubricate after washing.

Clean parts with dry-cleaning SOLVENT. Dry before lubricating.

The following is a list of lubricants with the Military Symbols and applicable specification numbers:

OE - MIL-L-2104 GAA - MIL-G-10924A

NOTES

1. Lubricate motor bearings with silicone DC44 grease or equivalent. With motor stopped, remove filler and drain plugs. Add new grease. Install plugs and operate motor at no load. Check and add grease if required.

2. Apply 2 to 3 drops of oil to each sleeve bearing through oiling tube.

WE69332

Figure 3-1. Lubrication instructions.

3-2. Accumulator.

The hydraulic system accumulator should maintain a 1500 psi dry nitrogen charge when power supply is turned on, 750 psi when not in operation. To replenish this charge, use charging regulator kit, FSN 4933-856-5593 and apply nitrogen to accumulator charging valve located on lower left side of power supply near the front. This valve is identified by an identification plate.

Section II. BASIC ISSUE ITEMS

3-3. General.

No repair parts, tools, or accessories are issued with the portable hydraulic / electric power supply.

3-4. Basic Issue Items List.

Not applicable.

Section III. LUBRICATION INSTRUCTIONS

3-5. General.

Detailed lubrication instructions for this quipment are shown in figure 3-1.

3-6. Service Intervals.

Service intervals prescribed in figure 3-1 are the minimum for usual operating conditions.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-7. General.

This section contains instructions for performing the periodic preventive maintenance checks and services required to maintain the power supply.

3-8. Preventive Maintenance Checks and Services.

a. General. To insure that the power supply is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance check and services to be performed are listed in table 3-1.

b. Preventive Maintenance Checks and Services. Refer to table 3-1.

Table 3-1. Preventive Maintenance Checks and Services

Item	Interval	Prodecure	Reference
Hydraulic hoses, tubing, and fittings	Daily	Visually inspect for leaks and signs of pending breaks.	
Wiring	Daily	Visually inspect for frayed or damaged insulation and loose connections.	
Battery	Daily	Inspect level of electrolyte and add if required.	
Reservoir	Daily	Check level of fluid and add if required.	Paragraph 2-3b
Electrical cables	Daily	Inspect connectors for bent pins. Inspect cable for damaged insulation.	
Reservoir	Weekly	Remove and clean filler neck strainer.	
Low pressure hydraulic strainer	Weekly	Remove plug from wye of strainer and remove and clean strainer mesh with solvent.	
Power supply	As required	Lubricate,	Figure 3-1
Power supply	Weekly	Clean.	TM 9-208-1
Accumulator	Quarterly	Recharge to 750 psi.	Paragraph 3-2

Section V. MAINTENANCE OF POWER SUPPLY

3-9. High Pressure Filter.

Red indicating light (6, fig. 2-1) will light when the high pressure filter is clogged. When this condition occurs, service the high pressure filter as follows:

a. Cut and remove safety wiring between filter bowl (1, fig. 3-2) and filter head (9).

b. Using a wrench on wrench pad at bottom of filter bowl, unscrew bowl from head. Remove bowl

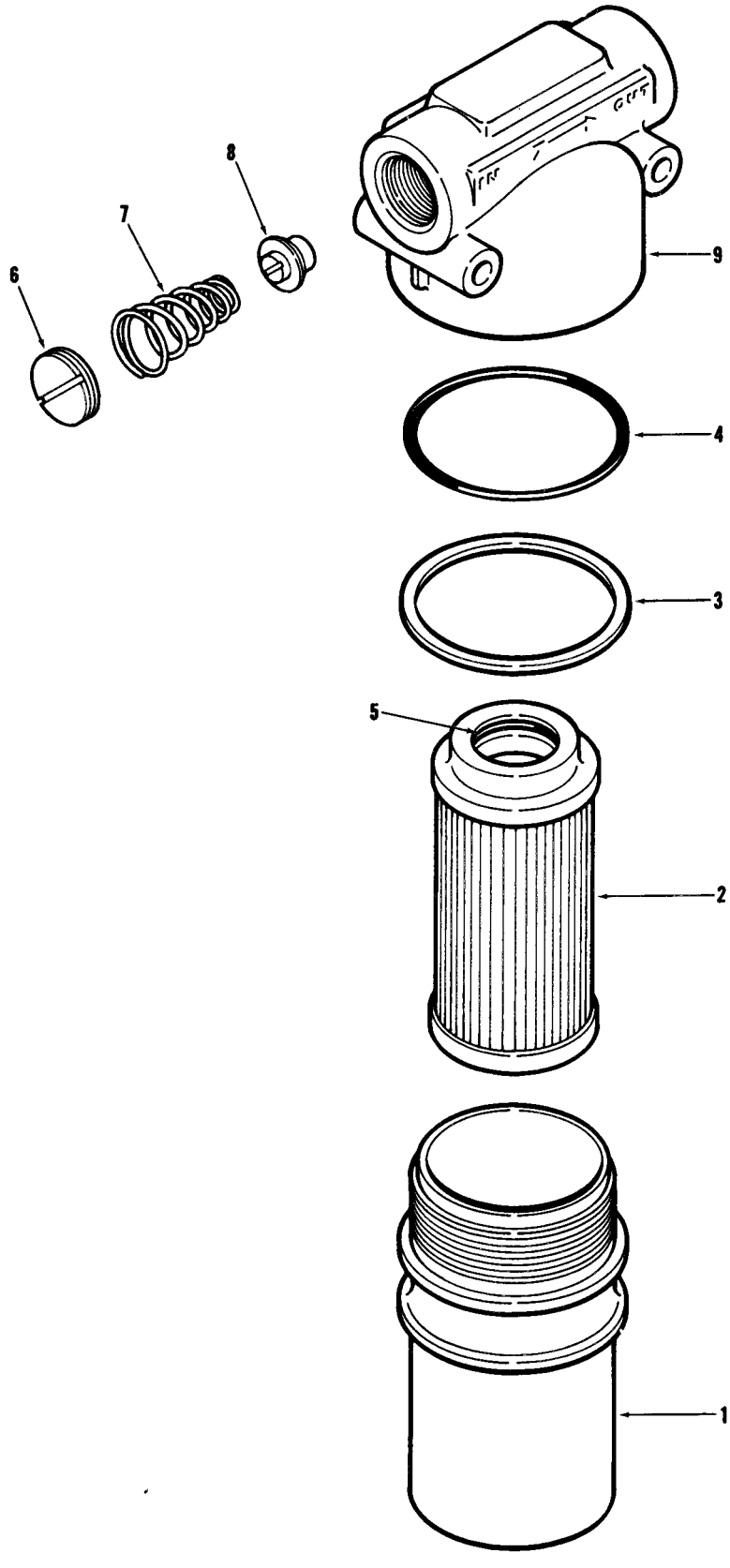
(1), backup ring (3), and preformed packing (4) from head (9). Remove element (2) from bowl.

c. Wash metal parts with cleaning solvent, Federal Specification P-S-661 and dry with compressed air. Replace filter element and preformed packing (4).

d. Before reassembly, lubricate preformed packing (4) and (5) with hydraulic fluid. Lubricate threads *on* head (9) and bowl (1) with hydraulic fluid.

e. Install element (2) in bowl (1). Position performed packing (4) and backup ring (3) in head (9) and screw bowl (1) into filter head.

f. Tighten filter bowl in filter head using 150 in-lb torque. Safety wire filter bowl to filter head.



1. Filter bowl
2. Element
3. Backup ring
4. Preformed packing
5. Preformed packing
6. Adjust screw
7. Spring
8. Valve
9. Filter head

Figure 3-2. High pressure filter.

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

4-1. Repair Parts, Special Tools, and Equipment. Refer to TM 9-4933-211-34P.

Section II. TROUBLESHOOTING

4-2. Troubleshooting.

Table 4-1 is intended as a guide in troubleshooting. The table does not cover all possible malfunctions that may occur. Only the more common malfunctions are listed. To troubleshoot the power supply and components, refer to table 4-1 and locate the trouble under the "Malfunction" column. The "Probable cause" column will indicate the most probable defective component or item. Correct the malfunction by performing the procedures indicated under the "Corrective action" column.

Table 4-1. Troubleshooting

Malfunction	Probable Cause	Corrective Action
	Hydraulic System	
Hydraulic Pump Failure	Pump not getting sufficient fluid	Check and refill reservoir. Check and clean L. P. filter.
	Pump not primed	Bleed air from system at low pressure filter.
	Sheared or seized pump drive shaft	Replace pump.
Fluid temperature too high	Thermoswitch improperly set	Adjust thermoswitch, replace if necessary.
Pump fails to deliver sufficient volume	Incorrect compensator setting	Reset compensator.
	L. I'. filter clogged	Check and clean L. P. filter.
	Air leakage at pump inlet	Check piping for leakage, repair, replace if necessary.
	Incorrect volume control setting.	Reset.
Pump fails to compensate	Compensator valve improperly set	Reset compensator.
	Compensator ports dirty	Clean ports.
Test stand fails to deliver sufficient pressure	Malfunctioning relief valve and /or incorrect setting	Check relief valve setting, replace relief valve if necessary.
	Incorrect compensator setting	Reset compensator.
System pressure too high.	High pressure relief valve improperly adj us ted and incorrect compensator setting.	Reset valve and compensator.
Fluid temperature too high.	Thermoswitch improerly set.	Adjust thermoswitch.
	Electric Power System	
Motor will not start.	AC power not connected to power supply.	Connect power.
	Main circuit breaker CB1 open.	**Close** CB1.
	Control circuit breaker DB3 open.	Close CB3.
Motor will not start "POWER ON" lamp on.	Fluid temperature too high.	Let temperature drop to normal range.
	Thermoswitch improperly adjusted or defective - open.	Reset thermoswitch or replace if defective.
	Motor Starter defective.	Check starter. replace if necessary.

Table 4-1. Troubleshooting-Continued

Malfunction	Probable Cause	Corrective Action
	Electrict Power System - Continued	
Pump motor stops during operation	Motor overloaded. overload relays OL1 and OL2 open. High ambient temperature inside explosion proof box	Check hydraulic load and decrease it if beyond unit rating. Overload relays will reset automatically after excessive load is removed and unit cools off. Overload heaters are rated at 11.2 amps and current range can be manually adjusted from 9.5 amps to 13 amps with a knurled knob provided on each relay.
	Momentary voltage dip in 3 phase in put line	Undervoltage interlock open. Remove hydraulic load and restart unit.
Power indicator light on; relays K1, K2, and filter light DS2 inoperative	Bridge rectifier CR1 defective. No 24vdc control voltage available	Check and replace.
	Transformer T2 defective	Check and replace
	Battery Charging System	
Power "ON". No voltage at battery plug. Voltage at TB2 normal when S5 is in dc Power Supply Position	Battery charge relay K2 defective	Check and repair or replace relay.
Power "ON". No voltage at battery plug. No voltage at TB2 when S5 is in dc Power Supply Position.	Defective components in 3 phase bridge rectifier.	Check and replace defective components.
	Battery charge relay K2 defective	Check and repair or replace relay.
Power "ON". No voltage at battery plug. Voltage at TB2 normal when S5 is in dc Power Supply Position.	S5 is not in "Battery Charge" position.	Reposition S5 to "Battery Charge".
	CB2 open.	Close CB2.
Power "ON". No voltage at battery plug. No voltage at TB2 when S5 is in dc Power Supply Position.	CB2 open.	Close CB2.
	DC Power Supply	
No dc output.	Circuit breakers: CB1 open CB2 open CB3 open Selector switch S5 OFF.	Reset breakers. Position S5 to "DC Supply". Check power input.
Output voltage approx. 40 vdc voltage adjustment control inoperative	One or more transistors in series regulator Q21 through Q36 short circuited.	Disconnect each transistor one at a time. check and replace if needed. See troubleshooting procedure.
Poor regulation, voltage drops 5-10 volt when load is applied. High ripple.	One or more diodes in three phase bridge D6 through D11 damaged.	Disconnect each diode, check and replace if needed.
	Capacitor C2 defective.	Replace C2.
Series regulator Q21-Q36 overheats at full load.	One or more transistors open circuited.	Check voltage drops across emitter resistors R21-R36. If voltage drop is zero. replace transistor connected to this resistor.
No difference in output voltage of dc supply and battery charging circuit when selector is switched to battery charge position.	Blocking diode D13 snorted.	Disconnect one lead from diode and check forward and reverse resistance with ohmmeter. If diode conducts both ways-replace.

4-3. Troubleshooting Procedures.

WARNING

Power input should be OFF before attaching or disconnecting any test leads to equipment. Care must be exercised when equipment is under power to avoid injury to personnel and / or damage to test equipment or unit under test.

CAUTION

Test equipment must be set at a range or scale greater than output of circuit under test to avoid overload of testing circuit and resultant damage.

The following is a list of procedures to isolate difficulties with the dc voltage supply.

a. *Series Pass Transistor Bank (Q21 thru Q36).* To check operation of this circuit disconnect lead P9A16 from TB1-2 (fig. FO-1). Apply input power. Output voltage should be zero. If it is approximately 40 vdc; one of the series pass transistors is defective. To isolate the bad unit, apply a load of approximately 5A to output.

Measure voltage drop across each emitter resistor (R21 thru R36). Voltage drops should be the same. Check the associated transistor of any resistor which shows a different reading (either high or low). At 5 amp load voltage drop should be approximately 50 MV.

b. Current Limit Circuit. The current limit circuit is designed to protect the power supply. Upon any component failure of the power supply, the current limit circuit should be checked first. When current limiter circuit has functioned and nullified the power supply regulated output, it is necessary to momentarily turn off 220 V input power at source to reset current limiter circuit.

c. Voltage Regulator Circuit.

(1) Differential Amplifier. Disconnect wire P10A16 from TB1-3 and wire P11A16 from TB1-4. Also disconnect wire 12A from resistor R6. Connect separate, regulated and filtered 28 vdc power source of 0.5 amp capacity across TB 1-3 (positive) and TB 1-4 (negative). Monitor voltage drop across R6. Move voltage adjusting knob (R3) from extreme CCW to full CW. Voltage drop across R6 should swing from approximately 5V to approximately 18 vdc. If there is no voltage variation across R6, differential amplifier is defective.

(2) *Driver Transistors Q9 and Q10.* To check operation of driver circuit, disconnect and separately insulate leads P9A16 and P10A16 from TB1-2 and TB1-3. Connect a 500 ohm resistor TB1-2 and TB1-5, leaving P7G16 and all other connections in place. Connect a separate, regulated and filtered 28 vdc source of 0.5 amp capacity across TB 1-3 (positive) and TB1-4 (negative).

NOTE

First apply 220V input voltage to power supply. Then turn on separate dc source, and adjust to 28.0 volts. The procedure of application is important. Monitor voltage drop across the 500 ohm resistor. Move output voltage adjust knob (R3) from extreme CC W position to full C W position. Voltage drop across the 500 ohm resistor should go from 15 volts to 40 volts when passing through what would be the 28vdc setting. If there is no voltage change across 500 ohm resistor, driver circuit is defective provided differential amplifier circuit operates properly. In turning off, firat turn off 28.0V source. Then turn off 220 vac input.

Table 4-2. Voltage Regulator Voltage Measurements

Power Supply HEPC-1, DC Supply Test Voltage Readings
Regulated DC Supply Mode
(Tolerance ± 20%)

+ Lead	- Lead	No load voltage	40 Amp load voltage	Remarks
TB1-1	TB1-2	14	9	Collector to base Q21-Q36 also Collector to emitter Q9.
TB1-1	TB1-3	15	10.9	Collector to emitter Q21-Q36.
TB1-1	TB1-4	43	39.5	Rectifier plus filter output less R 10 drop.
TB1-1	TB1-5	43	39.5	Rectifier / filter output.
TB1-1	TB1-8	43.5	39.5	Resistor R11 plus Diode D4 voltage.
TB1-2	TB1-3	0.65	1.5	Base to emitter plus emitter resistor Q21-Q36 plus R21-R36.
TB1-3	TB1-6	21.5	21.5	R2 plus R3 voltage.
TB1-3	TB1-7	18	21.5	R2 voltage.
TB1-3	TB 1-9	19	19	
TB1-4	TB1-5	0.05	0.5	R10 voltage.
TB1-6	TB 1-4	7.2	7	R4 voltage.
TB1-7	TB1-4	10.5	10..5	R3 plus R4 voltage.
TB1-7	TB1-6	3.6	3.6	R3 voltage.
TB1-7	TB1-9	1.25	1.25	
TB1-8	TB1-4	0	0	
TB1-8	TB 1-5	0	0.1 -0.2	Base to emitter voltage on Q13
TB1-9	TB1-4	9.4	9.4	
TB1-9	TB1-6	7.4	7.4	

NOTES

1. Use multimeter supplied with either basic or supplemental tool set.
2. Position refers to terminal board TB1.
3. Polarity signs refer to meter polarity.
4. All readings taken with 220 volt, 50 / 60 Hz, 3 phase input and 28 vdc output.

Section III. PREEMBARKATION INSPECTION OF MATERIEL IN UNITS ALERTED FOR OVERSEAS MOVEMENT

4-4. General.

This inspection is conducted on materiel in alerted units scheduled for overseas duty to insure that such materiel will not become unserviceable in a relatively short time. It prescribes a higher percentage of remaining usable life in serviceable materiel to meet a specific need beyond minimum serviceability.

4-5. Specific Inspection Points for Portable Hydraulic / Electric Power Supply.

a. Check hose, tube, and cable assemblies for leaks, shorts, frayings, breaks, or damaged couplings and connectors.

b. Check for availability of dust caps for hose connectors.

c. Check conditions of controls and indicators.

d. Check hinges and fasteners for damage that would hinder free operation.

Section IV. GENERAL MAINTENANCE

4-6. General.

Information and instructions contained herein are provided for personnel performing direct and general support maintenance on the materiel. In subsequent chapters of this technical manual, the main assemblies of the power supply are disassembled, inspected, cleaned, replaced or repaired, and assembled. The illustrations in this manual are numbered in the sequence of disassembly. W hen assembling, the reverse order of disassembly will be followed unless otherwise instructed. Subsequent reference to components being worn and requiring replacement is intended to mean that only those items or mechanisms worn to a degree that affects functioning will be replaced.

4-7. Repair Methods.

a. Disassembly and Assembly Procedures.

(1) In disassembling a unit, remove the major subassemblies and assemblies whenever possible. Subassemblies may then be disassembled, as necessary, into individual parts.

(2) During assembly, subassemblies should be assembled first and then installed to form a complete unit.

(3) Complete disassembly of a unit is not always necessary in order to make a required repair or replacement. Good judgement should be exercised to keep disassembly and assembly operations to a minimum.

b. Replacement of Parts.

(1) When assembling a unit, replace defective spring pins with new ones. If screws, bolts, washers, or nuts are damaged, they should be replaced.

(2) Springs should be replaced if they fail to function properly.

(3) If a required new part is not available, reconditioning of the old part is required. Such parts should be examined carefully, after reconditioning, to determine their suitability.

c. Use of Tools.

(1) Care must be exercised to use tools that are suitable for the task to be performed in order to avoid mutilation of parts and / or damage to tools. Use aircraft armament repairman basic tool set MOS 45J, and aircraft armament repairman supplemental tool set, MOS 45J.

(2) Keep tools clean and work with clean parts. The rules of good housekeeping must be observed.

d. Repair and Replacement of Bushings.

(1) If a bushing is drilled, or has a groove to provide lubrication, be sure these openings are clean before assembling the parts.

(2) Extreme care must be exercised when installing bushings. An arbor press should be used, when possible. If an arbor press is not available, hold a clean wood block against the bushing and strike the block with a hammer. Start the bushing straight and avoid cocking it in the bore.

e. Finish of Metals.

(1) Painted surfaces of the power supply, if chipped or cracked, may be repainted.

(2) Exposed electrical components will be coated lightly with oil varnish MIL-V-173B.

f. Repair of Damaged Machine and Polished Surfaces. Smooth rough spots, scores, burrs, galling. and gouges from damaged machine and polished surfaces so that the part will efficiently perform its normal function. The finish of the repaired part is to approximate that of the original finish. In performing any of these operations, critical dimensions must not be altered.

g. Removal of Rust or Corrosion. Remove corrosion from all parts of the materiel. To remove rust or corrosion, the use of crocus cloth, vapor blast equipment. or wipe-on type phosphoric acid metal conditioner is recommended.

4-8. Cleaning.

a. Cleaning Materiel Received from Storage. Remove all rust spots from highly finished surfaces with a light application of crocus cloth. Use grade 2 / 0 abrasive cloth on ordinary machine finished surfaces.

b. Cleaning After Repair. After repair operations and prior to assembly, remove shop dirt and other foreign matter from all metal surfaces. Clean with cloths soaked in dry cleaning solvent or mineral spirits paint thinner.

c. Cleaning After Shop Inspection. Apply preservatives as soon as possible after cleaning.

d. Electrical Parts. Clean all electrical parts in accordance with TM 9-247.

e. Rubber Parts Other Than Electrical. Clean rubber parts with soap and warm water. Apply coating of powdered technical talcum, Federal Specification, ZZ-T-416 to preserve the rubber.

4-9. Lubrication and Preservation.

a. Lubrication. Refer to figure 3-1 for lubricating instructions for the power supply.

b. Preservation. After cleaning and drying, immediately coat unpainted metal surfaces with an oil or grease, as appropriate.

Section V. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

4-10. General.

a. The order of removal is in accordance with illustration index number sequence of the referenced illustrations.

b. Installation is in reverse order of removal unless otherwise indicated.

c. Tag for identification and disconnect electrical leads from components to be removed.

d. Disconnect hydraulic lines from components to be removed.Cap or otherwise protect open hydraulic lines to prevent entrance of dirt or foreign material into hydraulic system.

4-11. Removal.

a. Refer to figure 4-1 and disassemble power supply external components.

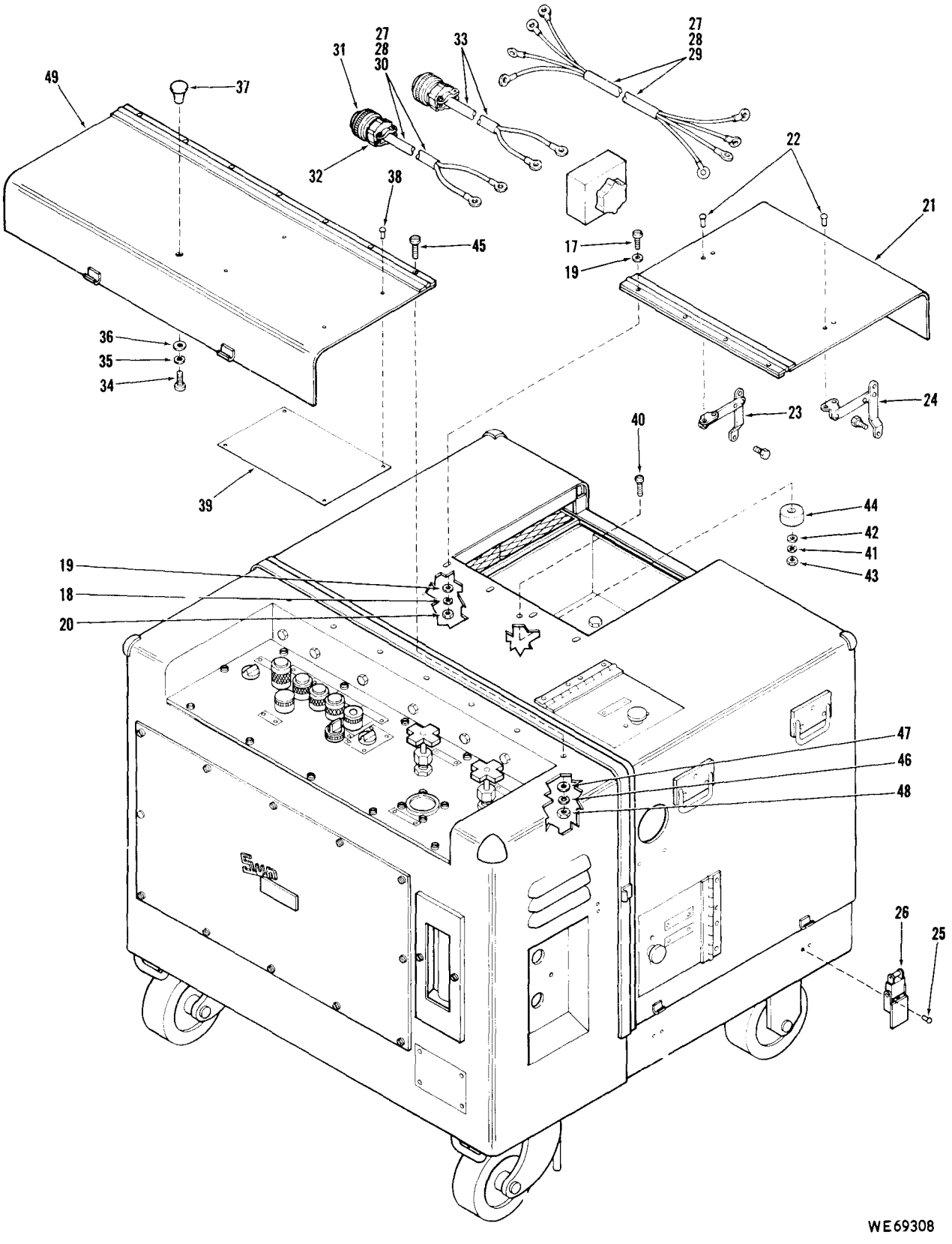


Figure 4-1. Portable, hydraulic / electric power supply: w / battery BB433A, HEPC-1, external group (sheet 1 of 2).

KEY to fig. 4-1 (sheet 1 of 2):

17. Machine screw
18. Lock washer
19. Flat washer
20. Hexagon nut
21. Storage cover
22. Blind rivet
23. Access door support, rh
24. Access door support. lh
25. Blind rivet
26. Draw bolt
27. Lock nut
28. Connector box
29. Cable assembly
30. Cable assembly
31. Connector
32. Clamp
33. Battery cable assembly
34. Machine screw
35. Lock washer
36. Flat washer
37. Knob
38. Blind rivet
39. Instruction plate
40. Machine screw
41. Lock washer
42. Flat washer
43. Hexagon nut
44. Rubber bumper
45. Machine screw
46. Lock washer
47. Flat washer
48. Hexagon nut
49. Panel cover

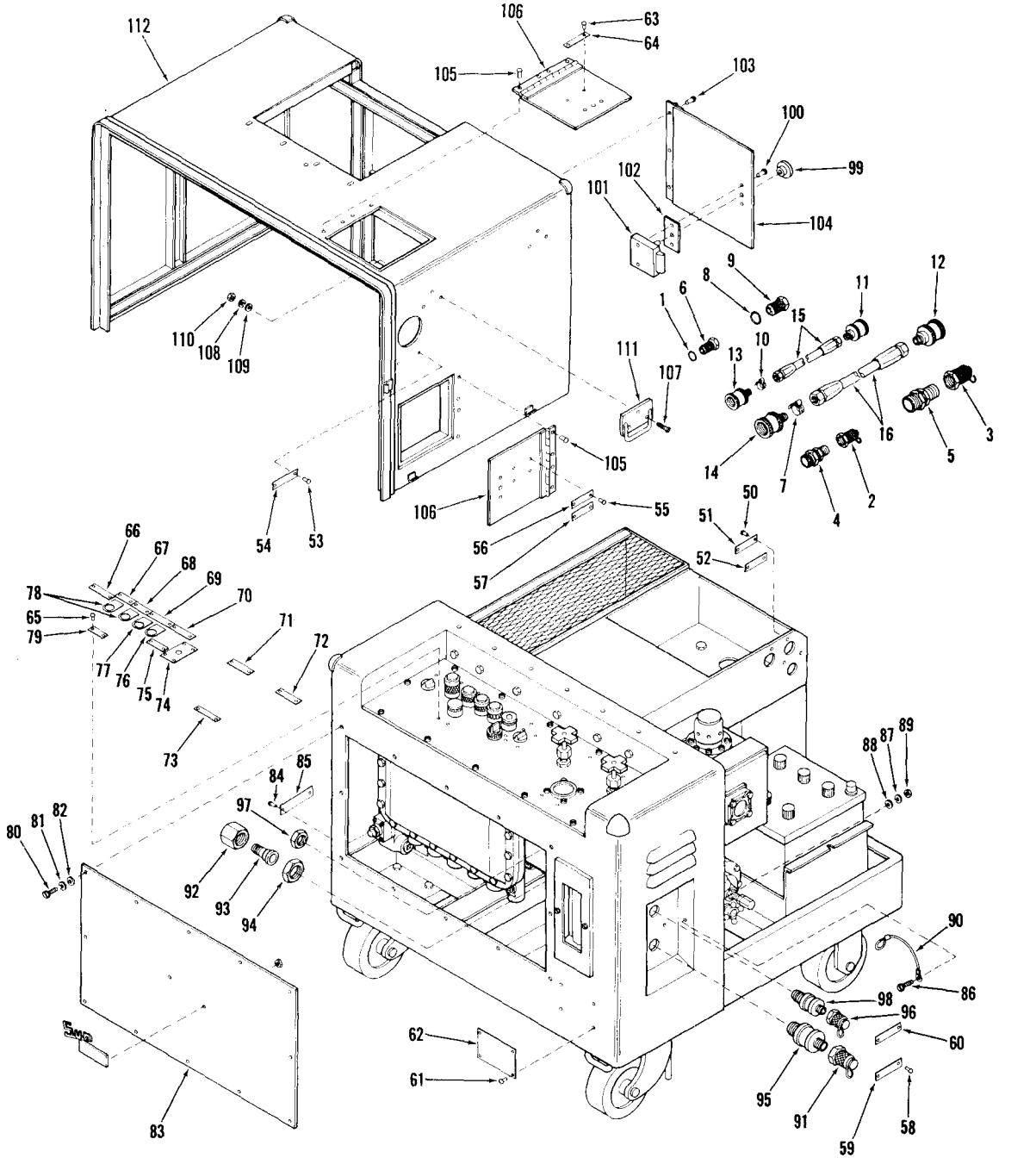


Figure 4-1. Portable, hydraulic / electric power supply: w / battery BB433A, HEPC-1, external group (sheet 2 of 2).

KEY to fig. 4-1 (Sheet 2 of 2):

1. Preformed packing
2. Dust plug
3. Dust plug
4. Coupling half
5. Coupling half
6. Pipe bushing
7. Hose clamp
8. Preformed packing
9. Pipe bushing
10. Hose clamp
11. Coupling
12. Coupling
13. Coupling half
14. Coupling half
15. Hose assembly
16. Hose assembly
50. Blind rivet
51. Identification plate
52. Identification plate
53. Blind rivet
54. Identification plate
55. Blind rivet
56. Identification plate
57. Identification plate
58. Blind rivet
59. Identification plate
60. Identification plate
61. Blind rivet
62. Identification plate
63. Blind rivet
64. Identification plate
65. Blind rivet
66. Identification plate
67. Identification plate
68. Identification plate
69. Identification plate
70. Identification plate
71. Identification plate
72. Identification plate
73. Identification plate
74. Identification plate
75. Identification plate
76. Identification plate
77. Identification plate
78. Identification plate
79. Identification plate
80. Machine screw
81. Lock washer
82. Flat washer
83. Access cover
84. Blind rivet
85. Identification plate
86. Machine screw
87. Lock washer
88. Fiat washer
89. Hexagon nut
90. Wire rope assembly
91. Hose cap
92. Tube nut
93. Tube reducer
94. Hexagon nut
95. Coupling half
96. Dust cap
97. Hexagon nut
98. Coupling half
99. Knob
100. Blind rivet
101. Latch assembly
102. Strike slide
103. Blind rivet
104. Battery door
105. Blind rivet
106. Access door
107. Machine screw
108. Lock washer
109. Flat washer
110. Hexagon nut
111. Folding handle
112. Rear housing

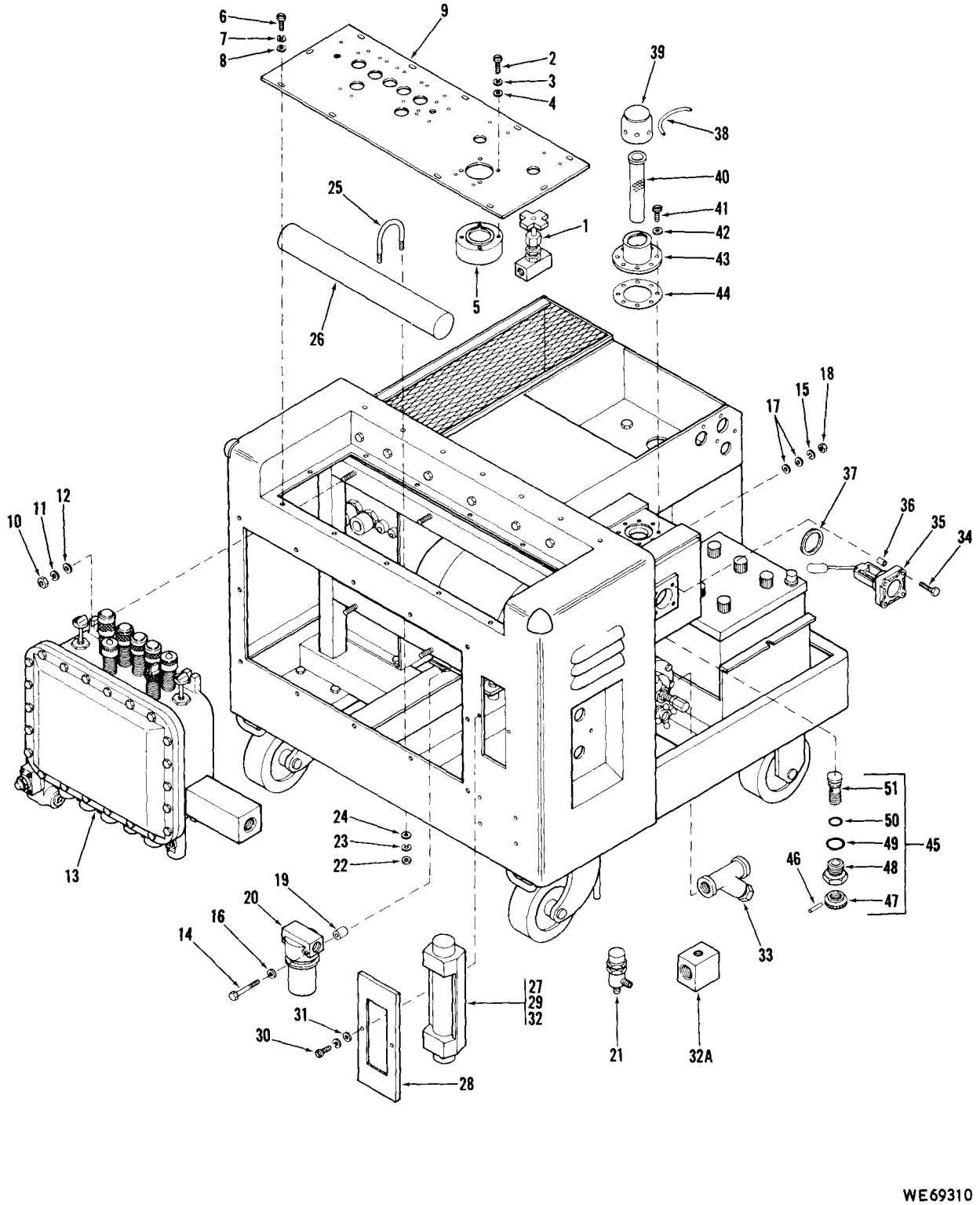


Figure 4-2. Portable, hydraulic / electric power supply: w / battery BB433A. HEPC-1, internal group (sheet 1 of 2).

b. Refer to figure 4-2 and disassemble power supply internal components.

KEY to fig. 4-2 (sheet 1 of 2):

1. Stop-check valve
2. Machine screw
3. Lock washer
4. Flat washer
5. Pressure gage
6. Machine screw
7. Lock washer
8. Flat washer
9. Instrument panel
10. Hexagon nut
11. Lock washer
12. Flat washer
13. Electrical box assembly
14. Cap screw
15. Lock washer
16. Flat washer
17. Flat washer
18. Hexagon nut
19. Sleeve spacer
20. Sediment strainer
21. Safety relief valve
22. Hexagon nut
23. Lock washer
24. Flat washer
25. U. bolt
26. Hydraulic accumulator
27. Flow rate indicating meter
28. Panel
29. Screw
30. Screw
31. Flat washer
32. Screw
32A. Manifold
33. Sediment strainer
34. Cap screw
35. Liquid level gage
36. Sleeve spacer
37. Gasket
38. Wire rope assembly
39. Cap
40. Sediment strainer
41. Machine screw
42. Lock washer
43. Filler neck
44. Gasket
45. Drain cock
46. Grooved pin
47. Knob
48. Valve body
49. Preformed packing
50. Preformed packing
51. Valve stem

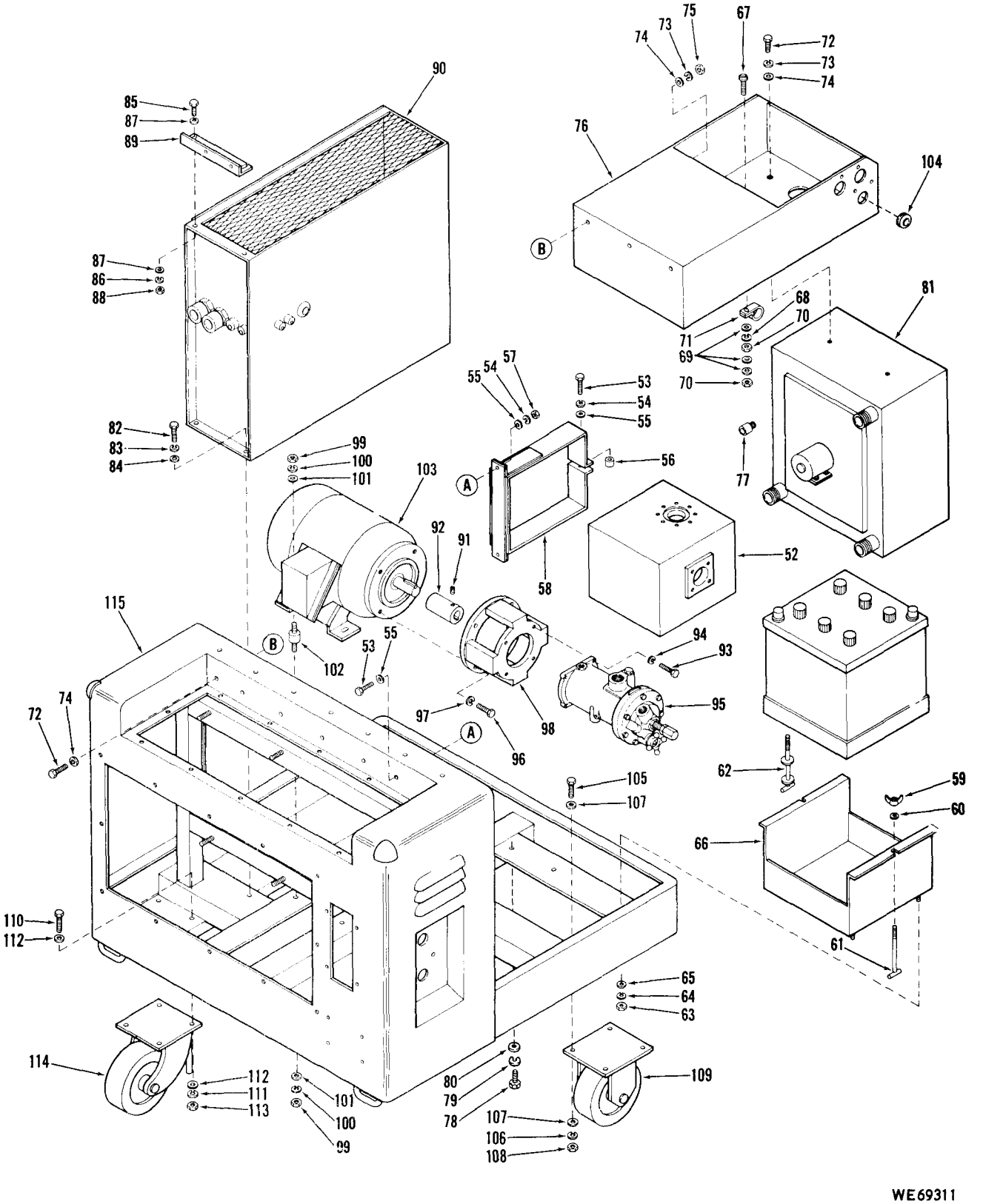


Figure 4-2. Portable, hydraulic / electric power supply: w / battery BB433A, HEPC-1, internal group (sheet 2 of 2).

KEY to fig. 4-2 (sheet 2 of 2):

52. Hydraulic reservoir
53. Cap screw
54. Lock washer
55. Flat washer
56. Spacer
57. Hexagon nut
58. Reservoir strap
59. Wing nut
60. Flat washer
61. Stud
62. stud
63. Hexagon nut
64. Lock washer
65. Flat washer
66. Battery box
67. Machine screw
68. Lock washer
69. Flat washer
70. Hexagon nut
71. Loop clamp
72. Cap screw
73. Lock washer
74. Flat washer
75. Hexagon nut
76. Storage bin
77. Connector
78. Cap screw
79. Lock washer
80. Flat washer
81. Fluid cooler
82. Cap screw
83. Lock washer
84. Flat washer
85. Cap screw
86. Lock washer
87. Flat washer
88. Hexagon nut
89. Support angle
90. Power supply
91. Setscrew
92. Drive coupling
93. Cap screw
94. Lock washer
95. Centrifugal pump
96. Cap screw
97. Lock washer
98. Pump mount
99. Hexagon nut
100. Lock washer
101. Fiat washer
102. Resilient mount
103. Alternating current motor
104. Rubber grommet
105. Cap screw
106. Lock washer
107. Flat washer
108. Hexagon nut
109. Rigid caster
110. Cap screw
111. Lock washer
112. Flat washer
113. Hexagon nut
114. Swivel caster
115. Frame assembly

c. Refer to figure 4-3 and disassembly power distribution box.

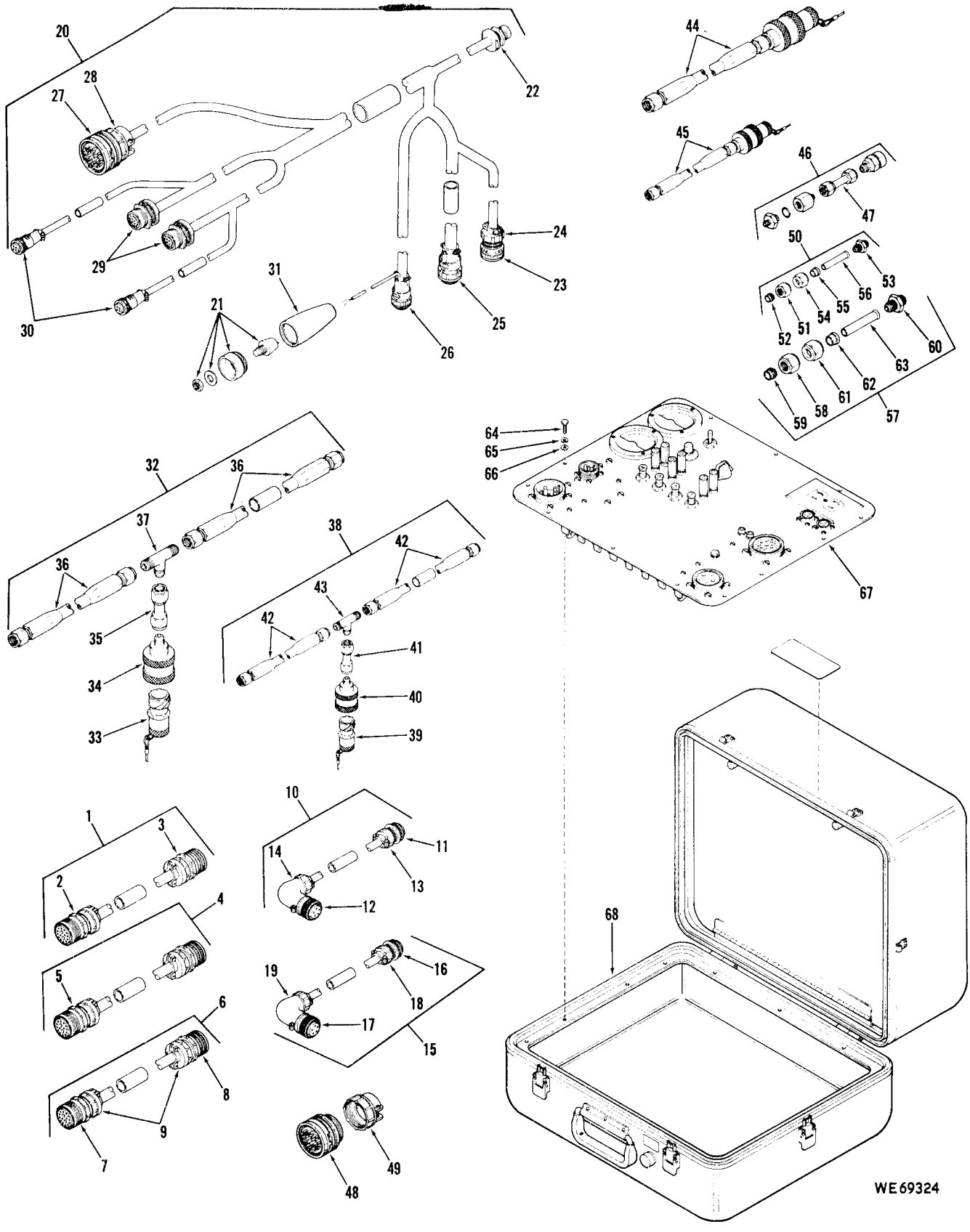


Figure 4-3. Power distribution box.

KEY to fig. 4-3:

1. Cable assembly
2. Connector
3. Connector
4. Gable assembly
5. Connector
6. Cable assembly
7. Connector
8. Connector
9. Cable adapter
10. Cable assembly
11. Connector
12. Connector
13. Cable adapter
14. Cable adapter
15. Cable assembly
16. Connector
17. Connector
18. Cable adapter
19. Cable adapter
20. Cable assembly
21. Push switch
22. Connector
23. Connector
24. Cable clamp
25. Connector
26. Connector
27. Connector
28. Cable adapter
29. Connector
30. Connector
31. Boot
32. Hose assembly
33. Dust plug
34. Coupling half
35. Tube assembly
36. Hose assembly
37. Tube tee
38. Hose assembly
39. Dust plug
40. Coupling half
41. Tube assembly
42. Hose assembly
43. Tube tee
44. Hose assembly
45. Hose assembly
46. Straight adapter
47. Tube assembly
48. Connector
49. Loop clamp
50. Tube assembly
51. Tube nut
52. Clinch sleeve
53. Tube nipple
54. Coupling nut
55. Sleeve
56. Tube
57. Tube assembly
58. Tube nut
59. Clinch sleeve
60. Union
61. Coupling nut
62. Sleeve
63. Tube
64. Cap screw
65. Lock washer
66. Flat washer
67. Instrument panel assembly
68. Case assembly

4-12. Cleaning, Inspection and Repair.

a. Cleaning. Refer to TM 9-247 and Section IV of this chapter for general cleaning instructions.

b. Inspection and Repair.

(1) Refer to section IV of this chapter for general inspection and repair instructions.

(2) Repair dents in access doors (21, 49, 104, and 106, fig. 4-1).

(3) Test cables (29, 30, and 33, fig. 4-1) for continuity. Replace shorted or broken wires and wires with damaged insulation.

(4) Replace illegible identification and instruction plates.

(5) Check fluid flow indicator (29, fig. 4-2) against test equipment that includes a calibrated flow meter.

(6) The accuracy of fluid level indicator (35, fig. 4-2) may be checked by draining the fluid reservoir and adding measured predetermined amount of fluid to the reservoir and" observing the indicator. Replace defective indicator.

(7) Refer to TM 11-6140-203-15-2 for field maintenance of the storage battery.

4-13. Installation.

a. Refer to figure 4-3 and assemble power distribution box in reverse order of disassembly.

b. Refer to figure 4-2 and assemble power supply internal components in reverse order of disassembly. Refer to figure 4-4 for interconnecting wiring diagram, to figure 4-5 for hydraulic piping, and to figure 4-6 for distribution box functional diagram.

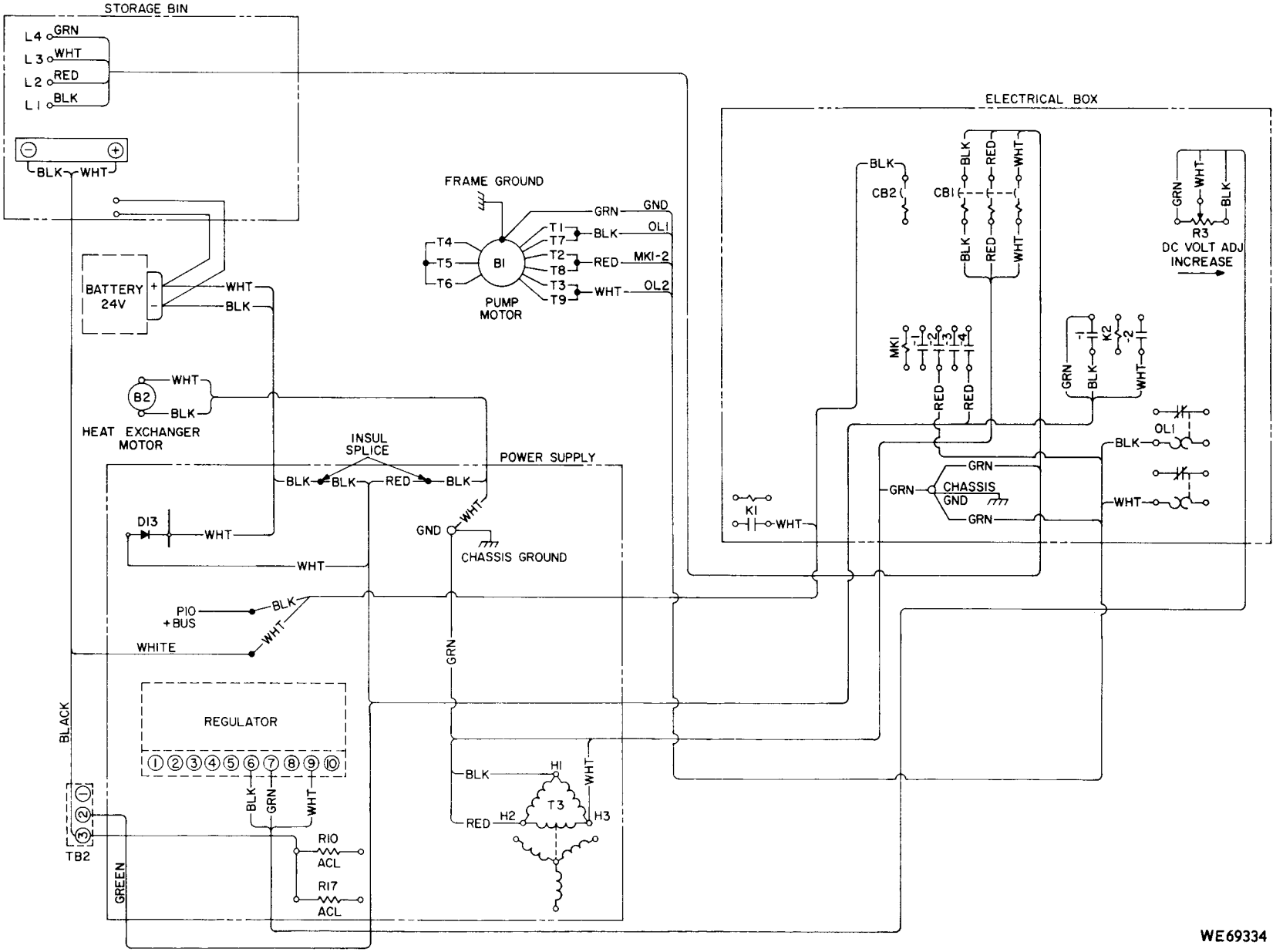
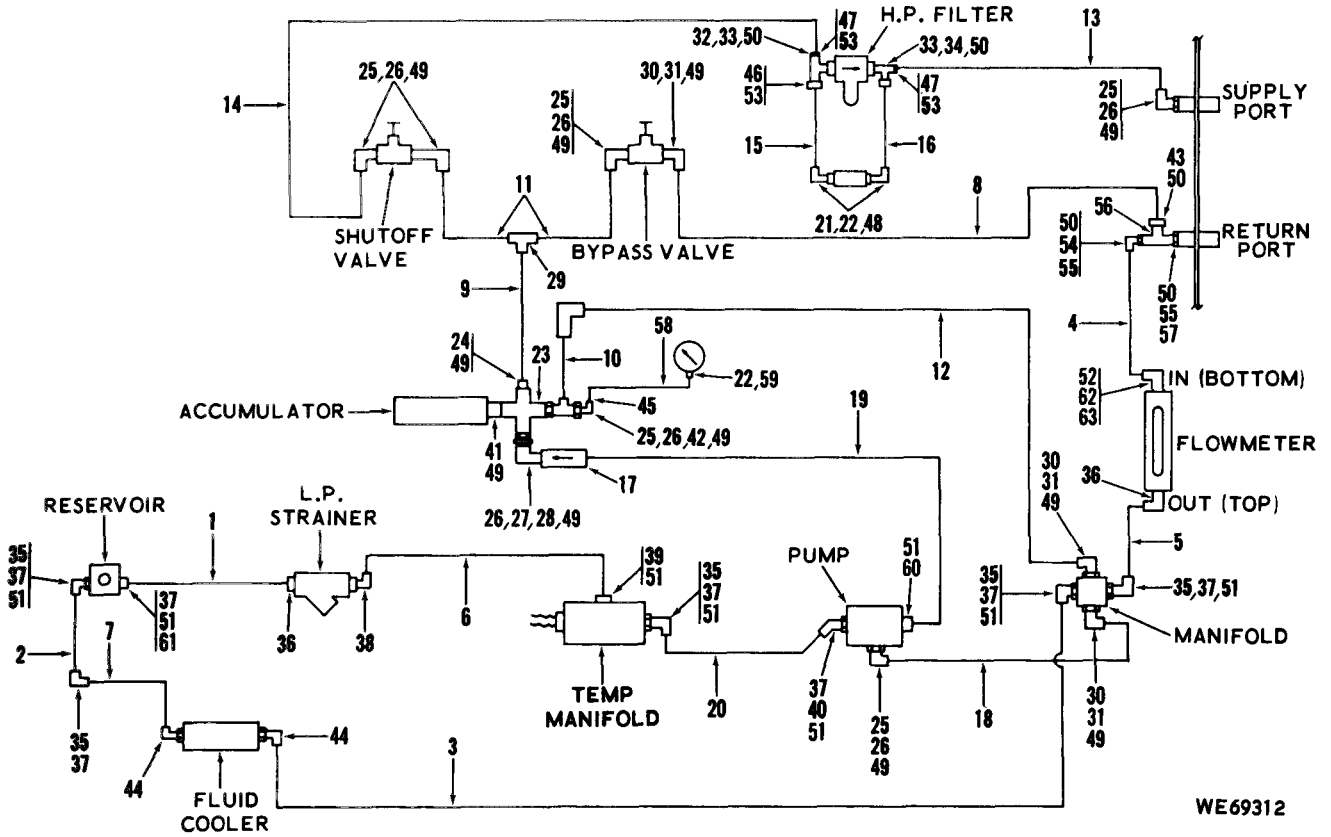


Figure 4-4. Power supply interconnecting wiring diagram.



1. Tube assembly
2. Tube assembly
3. Tube assembly
4. Tube assembly
5. Tube assembly
6. Tube assembly
7. Tube assembly
8. Tube assembly
9. Tube assembly
10. Tube assembly
11. Tube assembly
12. Tube assembly
13. Tube assembly
14. Tube assembly
15. Tube assembly
16. Tube assembly
17. Check valve
18. Hose assembly
19. Hose assembly
20. Hose assembly
21. Tube elbow
22. Hexagon nut
23. Cross
24. Tube nipple
25. Tube elbow
26. Hexagon nut
27. Pipe union
28. Elbow
29. Tube tee
30. Tube elbow
31. Hexagon nut
32. Tube tee
33. Hexagon nut
34. Tube tee
35. Tube elbow
36. Pipe nipple
37. Hexagon nut
38. Pipe to tube elbow
39. Tube nipple
40. Tube elbow
41. Pipe nipple
42. Tube to boss tee
43. Tube reducer
44. Pipe to tube elbow
45. Tube reducer
46. Tube reducer
47. Tube reducer
48. Preformed packing
49. Preformed packing
50. Preformed packing
51. Preformed packing
52. Pipe bushing
53. Tube nut
54. Tube elbow
55. Hexagon nut
56. Boss tee
57. Pipe union
58. Hose assembly
59. Tube elbow
60. Tube reducer
61. Pipe union
62. Pipe to tube elbow
63. Pipe bushing

Figure 4-5. Power supply hydraulic piping diagram.

c. Refer to figure 4-1 and assemble power supply external components in the reverse order of disassembly.

d. Refer to chapter 6 for checkout and adjustment procedures of the power supply after assembly.

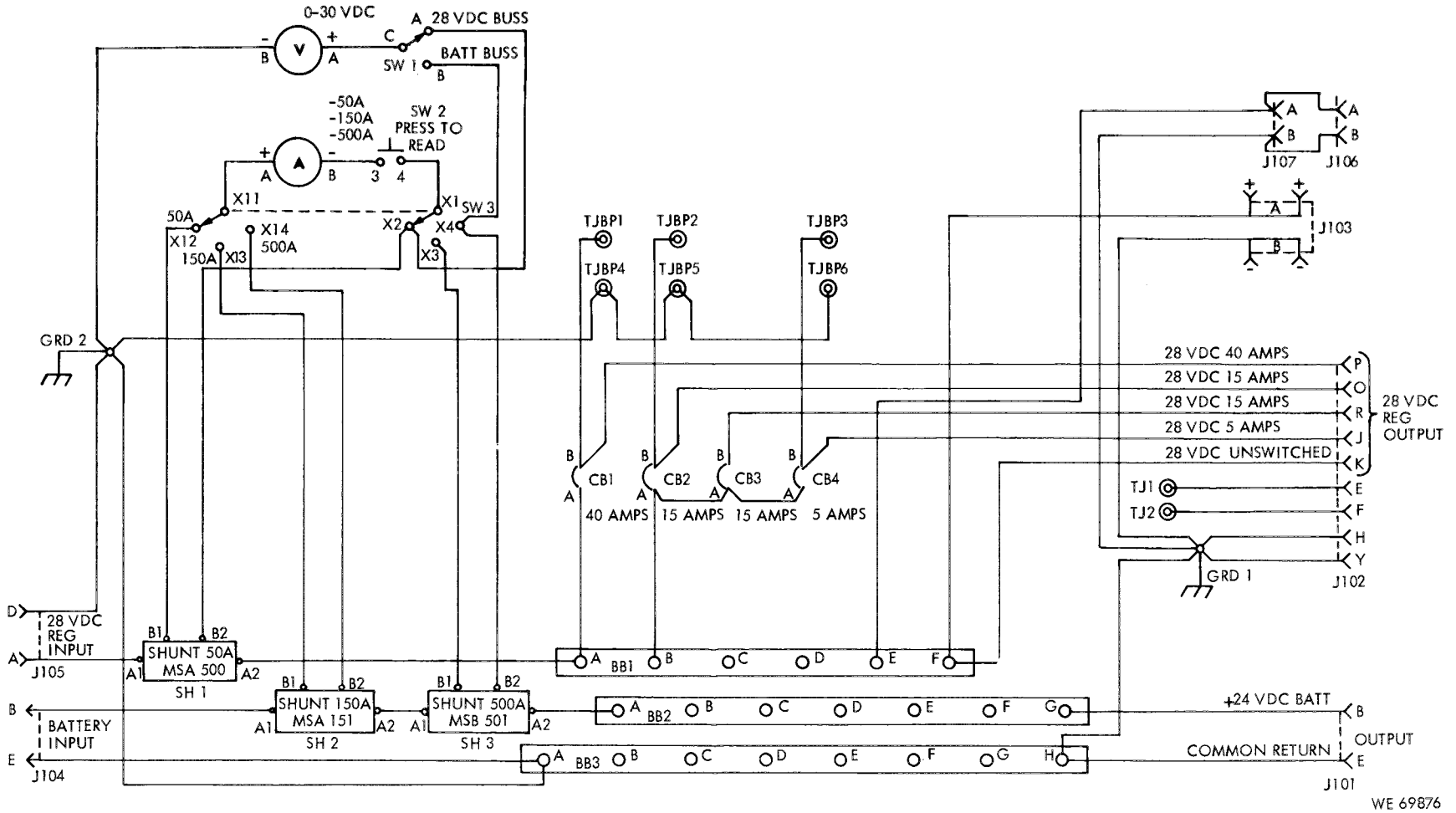


Figure 4-6. Distribution box functional diagram.

CHAPTER 5

REPAIR OF POWER SUPPLY

Section I. REPAIR OF ELECTRICAL BOX ASSEMBLY

5-1. General.

a. Refer to chapter 4 for removal of electrical box assembly (13, fig. 4-2) from power supply.

b. The order of disassembly is in accordance with illustration index number sequence of the referenced illustrations.

c. Assembly is in reverse order of disassembly sequence unless otherwise indicated.

d. General cleaning, inspection, repair and replacement instructions are contained in chapter 4. Any specific instructions are noted in these repair procedures.

5-2. Disassembly.

a. Refer to figure 5-1 and disassemble electrical box.

b. Refer to figure 5-2 and disassemble electrical panel assembly (31, fig. 5-1).

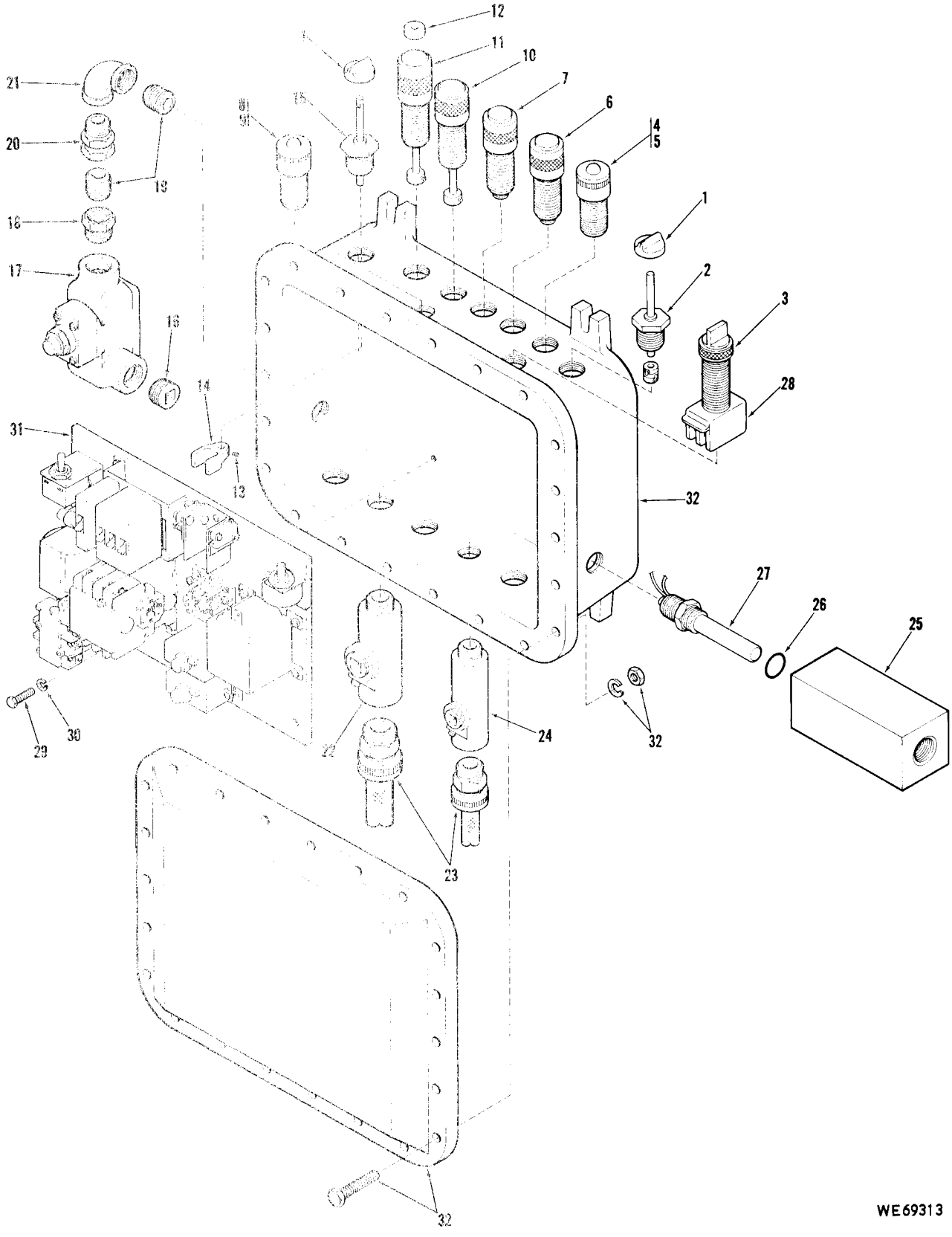


Figure 5-1. Electrical box assembly.

KEY to fig. 5-1:

1. Knob
2. Shouldered shaft
3. Rotary switch, acutator
4. Incandescent lamp
5. Indicator light
6. Switch
7. Push switch
8. Incandescent lamp
9. Indicator light
10. Push switch
11. Push switch
12. Sleeve spacer
13. Setscrew
14. Manual control lever
15. Straight shaft
16. Plug
17. Pressure switch
18. Reducer
19. Close nipple
20. Union
21. Elbow
22. Terminator
23. Wiring harness
24. Terminator
25. Hydraulic manifold
26. Preformed packing
27. Thermostatic switch
28. Rotary switch
29. Cap screw
30. Lock washer
31. Electrical panel assembly
32. Control box

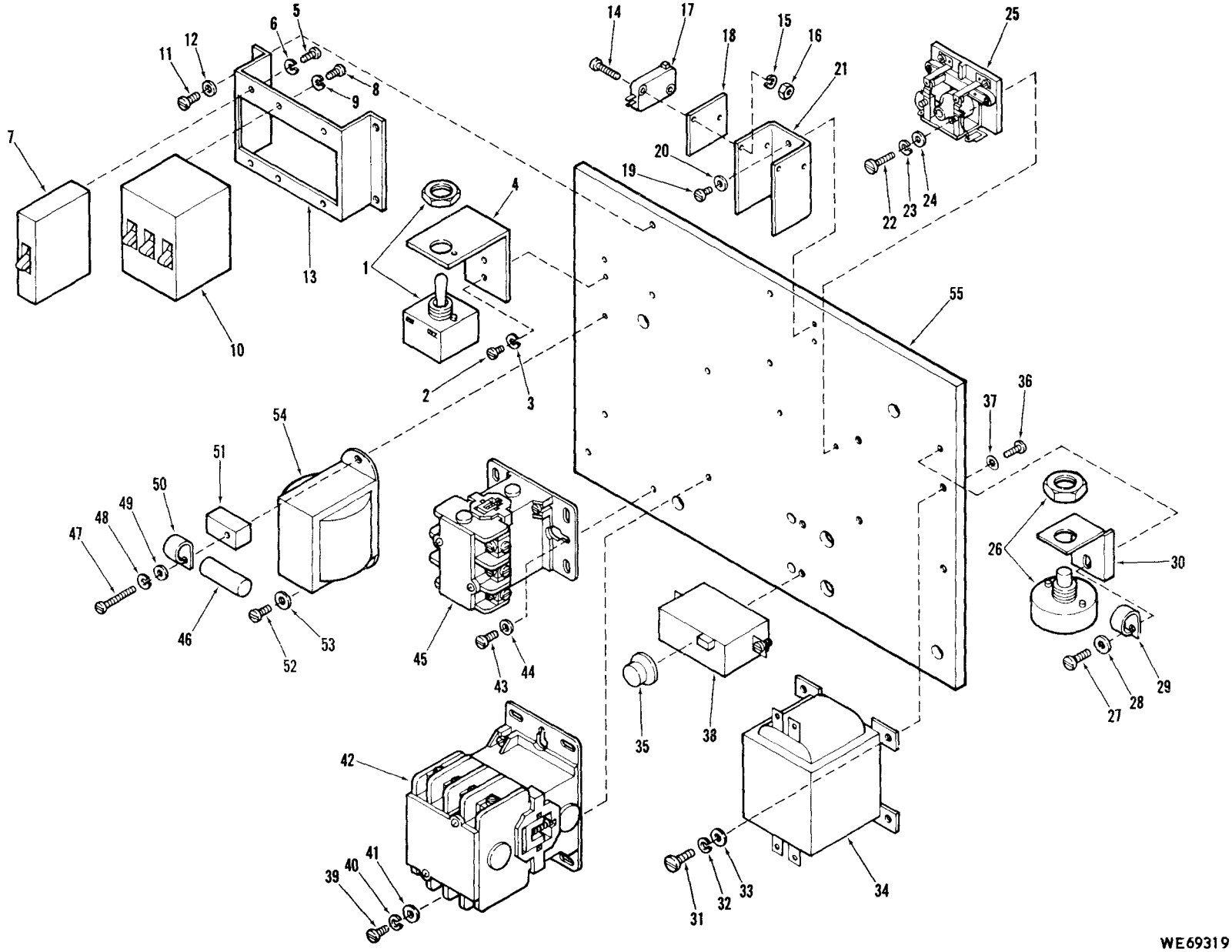


Figure 5-2. Electrical panel assembly.

KEY to fig. 5-2:

1. Circuit breaker
2. Machine screw
3. Lock washer
4. Angle bracket
5. Machine screw
6. Lock washer
7. Circuit breaker
8. Machine screw
9. Lock washer
10. Circuit breaker
11. Machine screw
12. Lock washer
13. Bracket
14. Machine screw
15. Lock washer
16. Hexagon nut
17. Sensitive switch
18. Feedthru insulator
19. Machine screw
20. Lock washer
21. Switch bracket
22. Machine screw
23. Lock washer
24. Flat washer
25. Relay
26. Variable resistor
27. Machine screw
28. Lock washer
29. Loop clamp
30. Rheostat bracket
31. Cap screw
32. Lock washer
33. Flat washer
34. Current transformer
35. Heating element
36. Machine screw
37. Lock washer
38. Circuit breaker
39. Machine screw
40. Lock washer
41. Flat washer
42. Induction armature
43. Machine screw
44. Lock washer
45. Electrical contact
46. Rectifier
47. Machine screw
48. Lock washer
49. Flat washer
50. Loop clamp
51. Sleeve spacer
52. Machine screw
53. Lock washer
54. Current transformer
55. Electrical panel

5-3. Cleaning, Inspection, and Repair.

a. Cleaning. Refer to paragraph 4-8.

b. Inspection and Repair. Refer to tables 5-1 and 5-2.

Table 5-1. Electrical Box Assembly Component Inspection

Figure 5-1 Index No.	Description	Inspection
3,28	Rotary switch	Inspect for proper mechanical operation and electrical continuity. Replace defective switch.
4,8	Incandescent lamp	Test for operation. Replace burned out lamp.
5,9	Indicator light	Inspect for broken lens.
6,7,10,11	Push switch	Inspect for proper mechanical operation. Replace defective switch.
27	Thermostatic switch	Test switch in liquid bath. Set and lock switch to actuate at 175 ± 4 degrees F.

Table 5-2. Electrical Panel Assembly Component Inspection

Figure 5-2 Index No.	Description	Inspection
1,7,10,38	Circuit breaker	Inspect for proper mechanical operation. Replace defective circuit breakers.
17	Sensitive switch	Inspect for proper mechanical operation and electrical continuity.
25	Relay	Visually inspect contacts for signs of burning or pitting. Check operation at 24 vdc.
26	Variable resistor	Inspect for proper mechanical operation. Test for 100 ohms ± 10%, 3W maximum.
42	Induction armature	Visually inspect for signs of burning or pitting. Contacts are 25 amp, 600 volts. Maximum coil is 115 volt, 50 / 60 Hz.
46	Rectifier	Electrical characteristics: single phase, full wave, 100 volts, 1.8 amp.
54	Current transformer	Electrical characteristics: 115 volt, 60 Hz primary; 26.8 volts center tap secondary at 1.0 amp.

5-4. Assembly.

a. Referr to figure 5-2 and assemble electrical panel in reverse order of disassembly.

(1) Position circuit breakers (7 and 10) with handles projecting downward in ON position.

(2) Set springs of circuit breakers (38) to AUTO RESET position. Set adjusting knobs to 90-95 per cent of rating.

(3) Refer to figure 4-5 for wiring connections.

b. Refer to figure 5-1 and assemble electrical box in reverse order of disassembly.

(1) Maximum torque on body of thermostatic switch (27) is 70 in. lb.

(2) With push switch (11) resting firmly on spacer (12) the plastic button of switch must touch circuit breaker handle in ON position without binding. With circuit breaker in tripped position, switch (11) must allow free travel of circuit breaker handle to OFF position. No weight must be allowed on Circuit breaker handle. Adjust position by raising or lowering switch (11) in tapped hole of electrical control box (32). Total travel shall be 31 / 32 inch minimum. No binding shall occur during reset operation.

(3) In downward position, plastic button of switch (10) must rest firmly on bar that connects circuit breaker handles of circuit breaker (10, fig. 5-2), with circuit breaker in ON position. In upward position, switch (10) must allow free travel of circuit breaker handles to OFF position. Total travel is approximately 1-3 / 32 inches. No binding of plastic button shall occur during reset operation. Center plastic button of switch (10) by moving electrical panel assembly (31) left or right. If necessary, loosen and move bracket (13, fig. 5-2).

(4) Refer to figure 5-3 and adjust position of indicator light (9), switches (7, 6, and 3), indicator light (5), and lock nuts of these components.

(5) Refer to figure 5-4 for wiring connections.

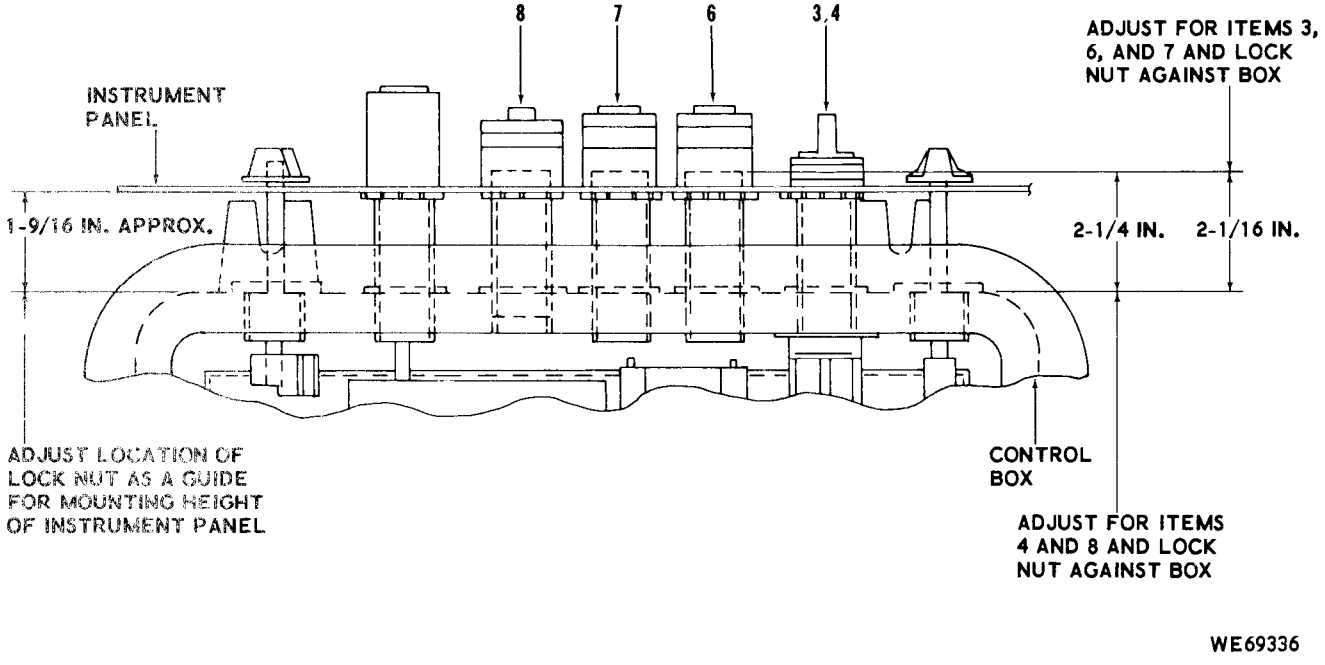


Figure 5-3. Height adjustment of electrical box components.

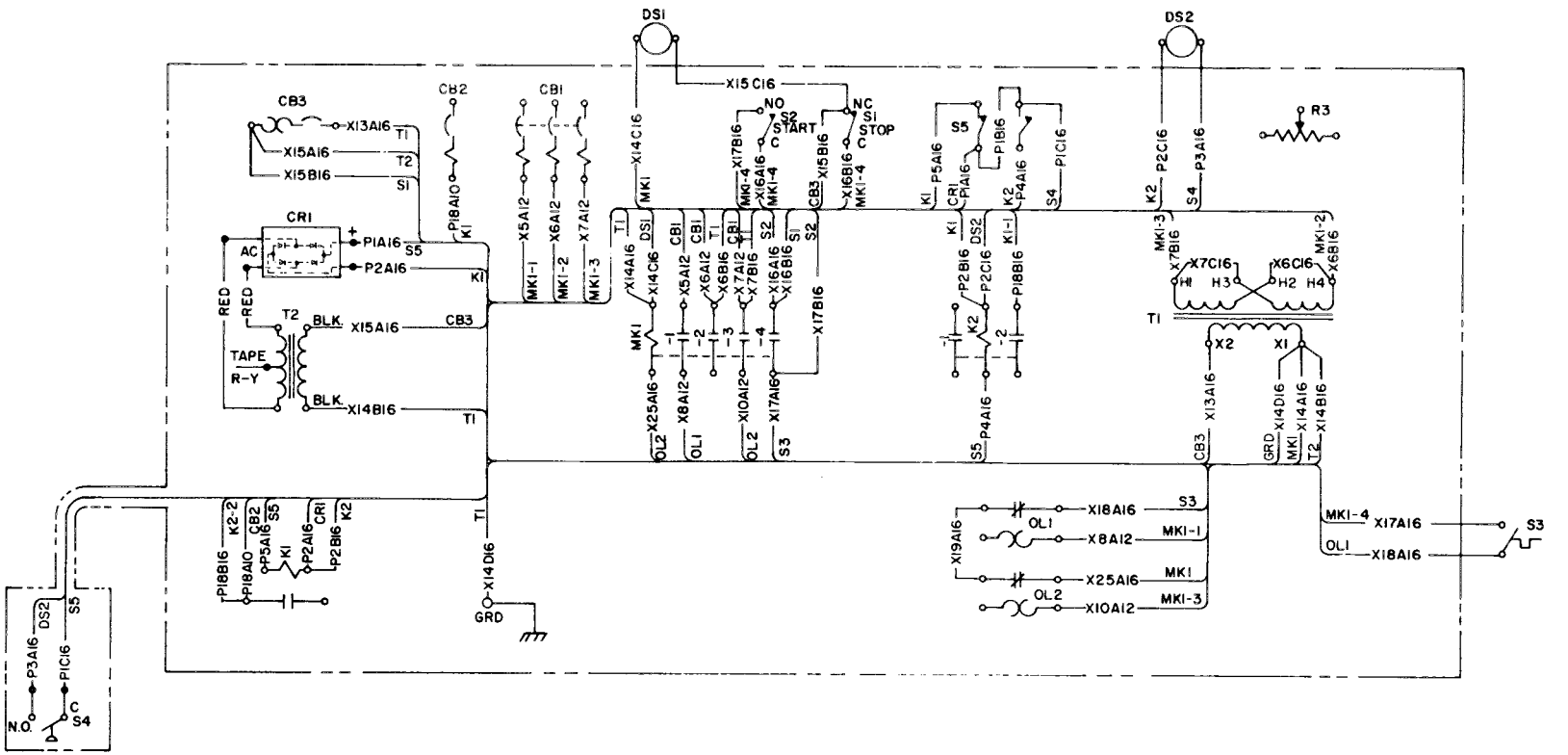


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Figure 5-4. Electrical box wiring diagram.

Section II. REPAIR OF DC POWER SUPPLY

5-5. General.

a. Refer to chapter 4 for removal of dc power supply (90, fig. 4-2) from power supply.

b. The order of disassembly is in accordance with illustration number sequence of the referenced illustrations.

c. Assembly is in reverse order of disassembly sequence unless otherwise indicated.

d. General cleaning, inspection, repair and replacement instructions are contained in chapter 4. Any specific instructions are noted in these repair procedures.

5-6. Disassembly.

a. Refer to figure 5-5 and disassemble dc power supply.

b. Refer to figure 5-6 and disassemble heatsink assembly (7, fig. 5-5).

c. Refer to figure 5-7 and disassemble resistor board assembly (15, fig. 5-5).

d. Refer to figure 5-8 and disassemble regulator assembly (51, fig. 5-5).

e. Refer to figure 5-9 and disassemble panel board assembly (22. fig. 5-5).

KEY to fig. 5-5:

1. Machine screw
2. Lock washer
3. Flat washer
4. Cover
5. Machine screw
6. Lock washer
7. Heatsink assembly
8. Sleeve spacer
9. Standoff insulator
10. Machine screw
11. Lock washer
12. Flat washer
13. Sleeve spacer
14. Hexagon nut
15. Resistor board assembly
16. Cap screw
17. Lock washer
18. Lock washer
19. Flat washer
20. Hexagon nut
21. Rubber grommet
22. Stain relief bushing
23. Lock nut
24. Cable connector
25. Strain relief bushing
26. Cap screw
27. Lock washer
28. Flat washer
29. Hexagon nut
30. Cap screw
31. Lock washer
32. Lock washer
33. Flat washer
34. Hexagon nut
35. Current transformer
36. Machine screw
37. Lock washer
38. Fixed resistor
39. Hexagon nut
40. Lock washer
41. Flat washer
42. Diode
43. Hexagon nut
44. Lock washer
45. Flat washer
46. Plain stud
47. Fixed resistor
48. Cap screw
49. Lock washer
50. Flat washer
51. Regulator assembly
52. Machine screw
53. Lock washer
54. Flat washer
55. Spacer
56. Hexagon nut
57. Resistor assembly
58. Machine screw
59. Lock washer
60. Flat washer
61. Hexagon nut
62. Bus bar
63. Resistance element
64. Bus bar
65. Electrical component board
66. Machine screw
67. Lock washer
68. Flat washer
69. Hexagon nut
70. Terminal board
71. Marker strip
72. Plug button
73. Machine screw
74. Lock washer
75. Flat washer
76. Disk insulator
77. Hexagon nut
78. Rectifier assembly
79. Diode
80. Heatsink
81. Machine screw
82. Lock washer
83. Hexagon nut
84. Fixed capacitor
85. Machine screw
86. Lock washer
87. Flat washer
88. Hexagon nut
89. Bracket and clamp assembly
90. Cabinet

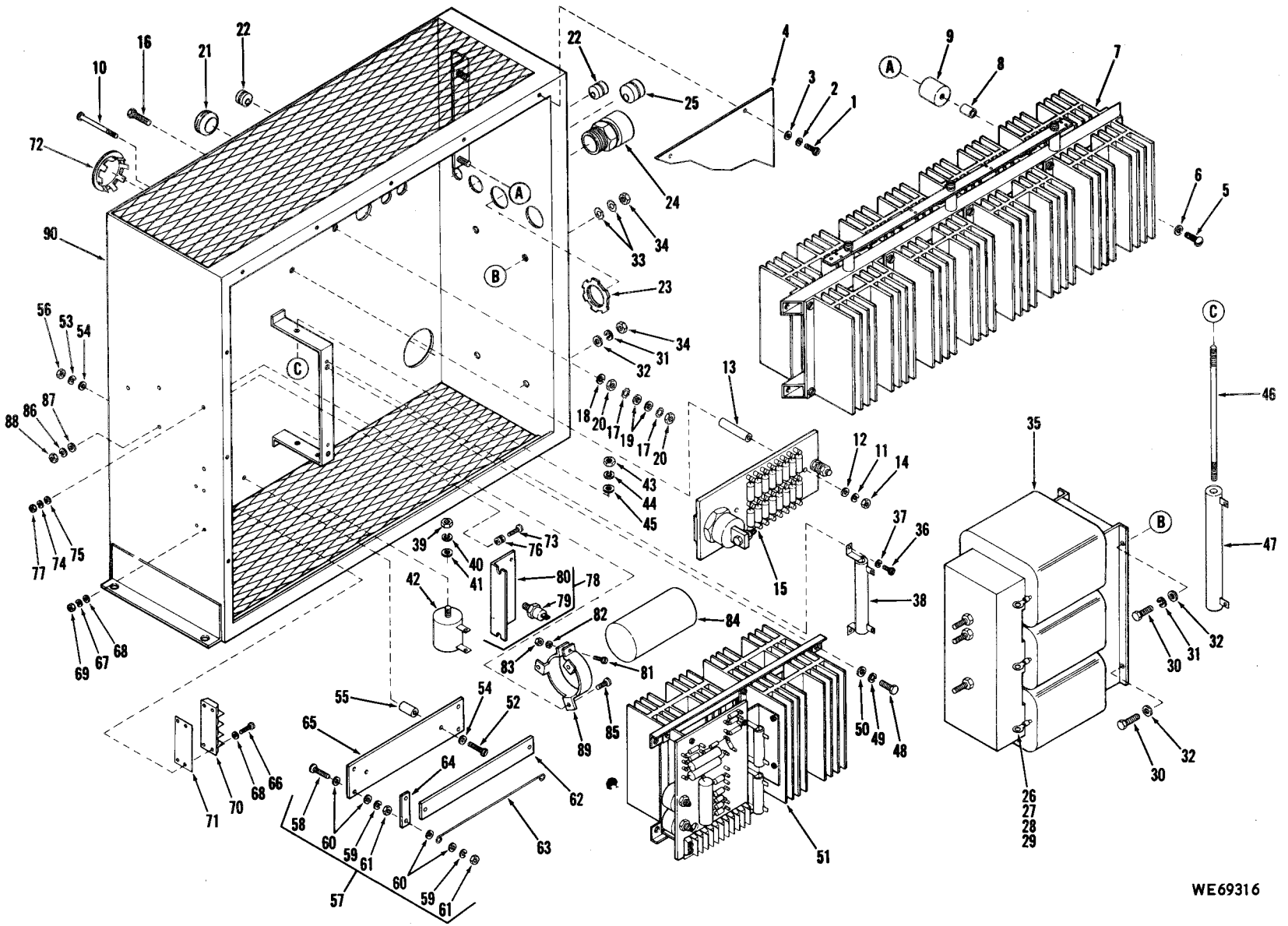
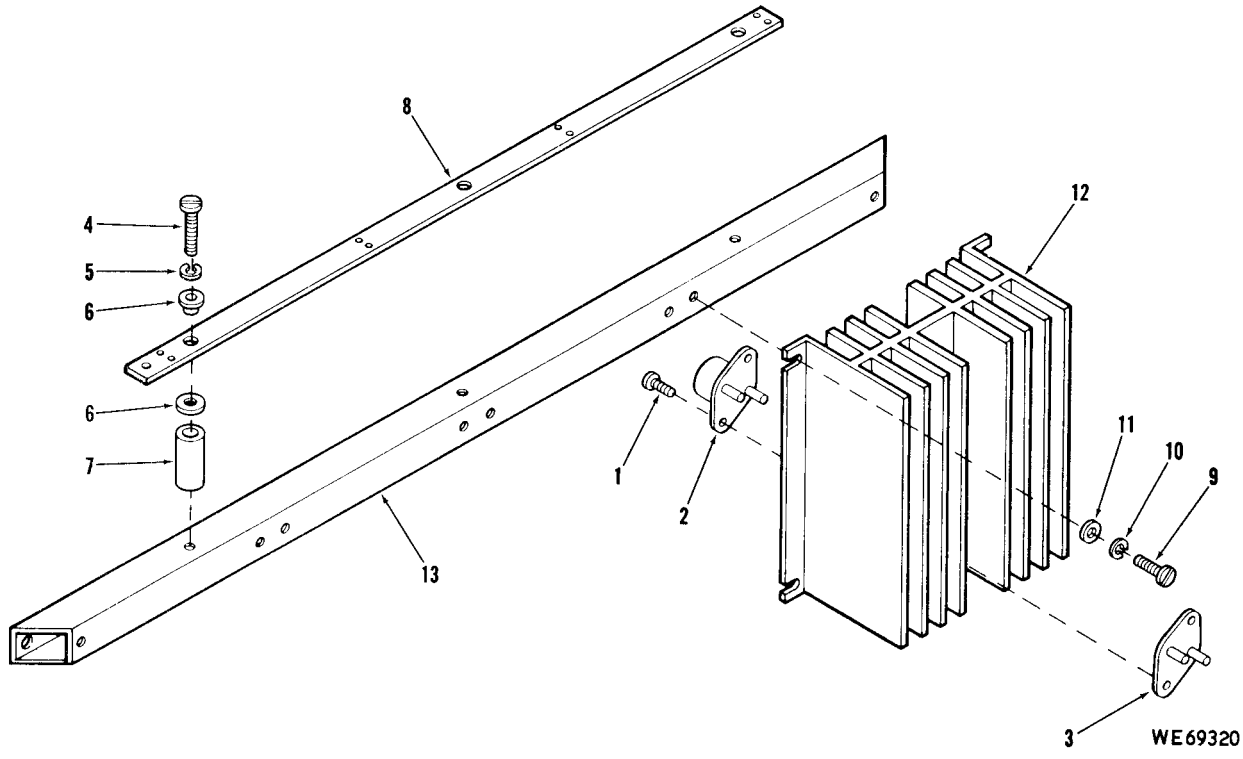
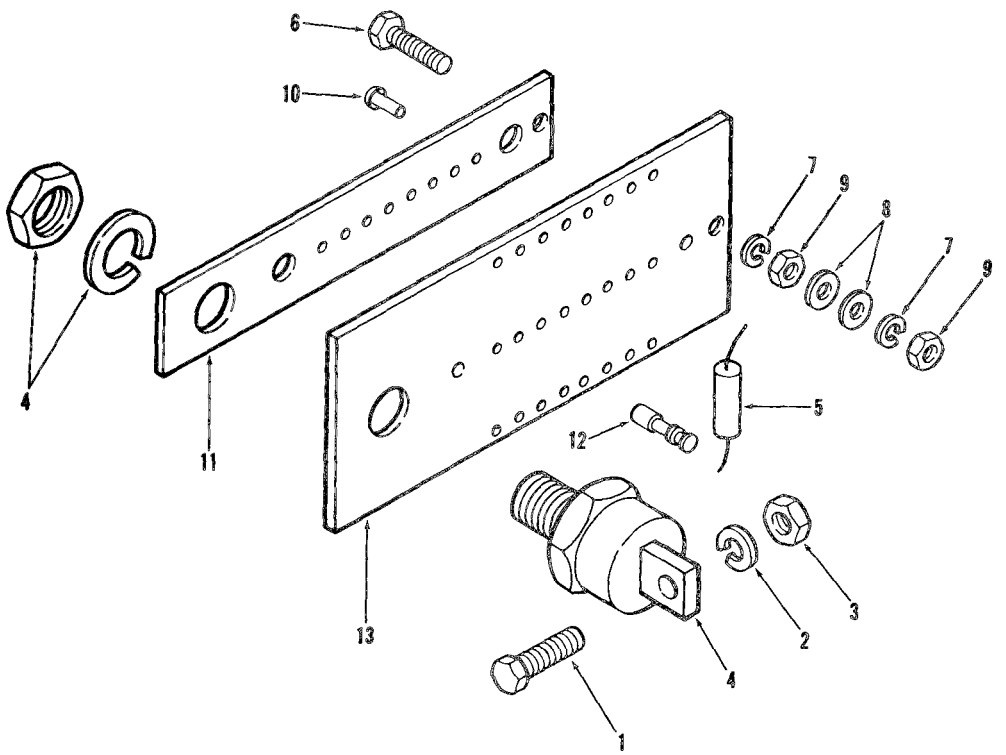


Figure 5-5. DC Power supply.



1. Thread forming screw
2. Transistor
3. Transistor socket
4. Machine screw
5. Lock washer
6. Insulator
7. Spacer
8. Bus bar
9. Machine screw
10. Lock washer
11. Flat washer
12. Heatsink
13. Support

Figure 5-6. Heatsink assembly.



1. Machine bolt
2. Lock washer
3. Hexagon nut
4. Rectifier
5. Fixed resistor
6. Cap screw
7. Lock washer
8. Flat washer
9. Hexagon nut
10. Eyelet
11. Bus bar
12. Stud terminal
13. Component board

Figure 5-7. Resistor board assembly.

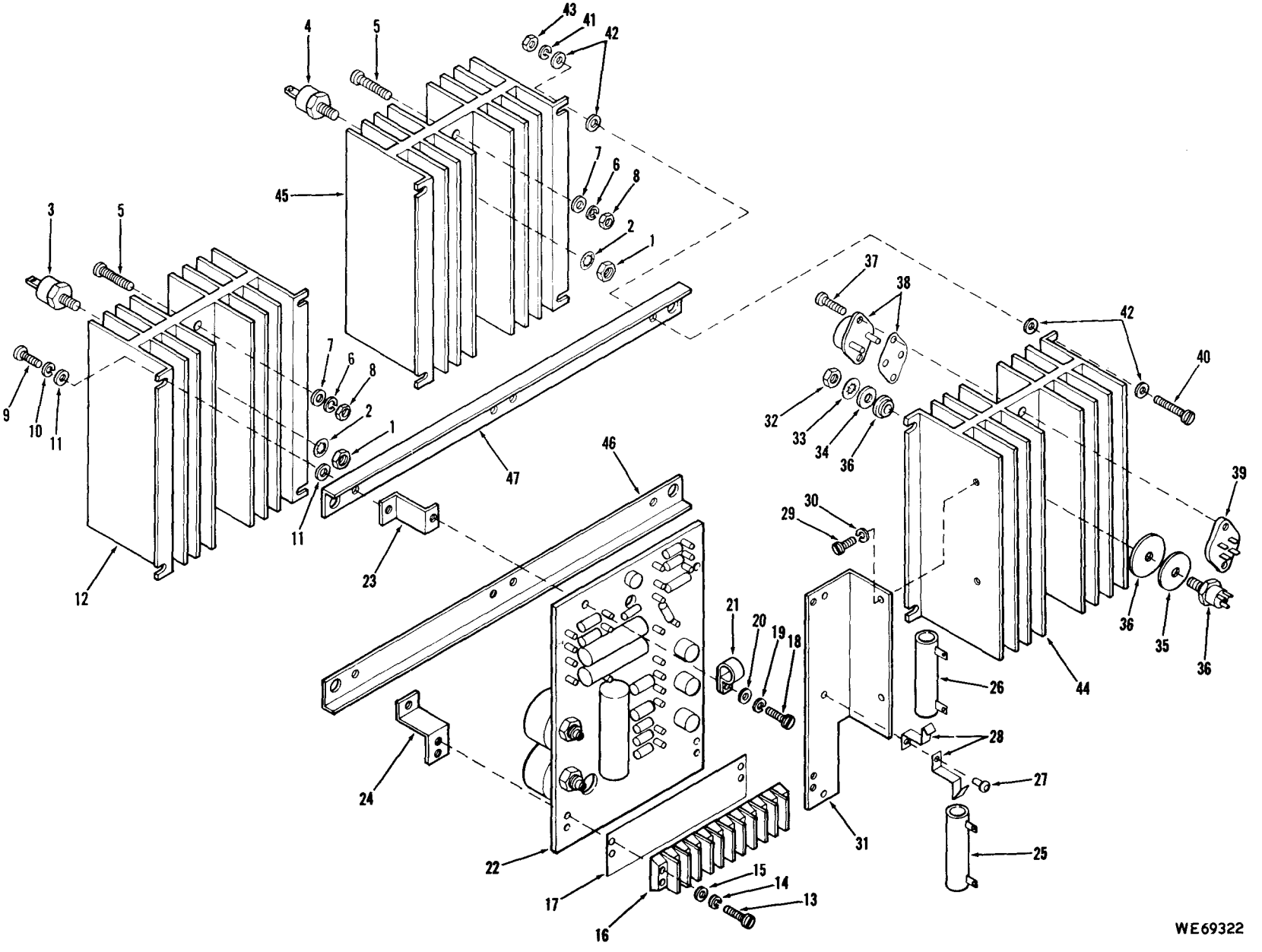
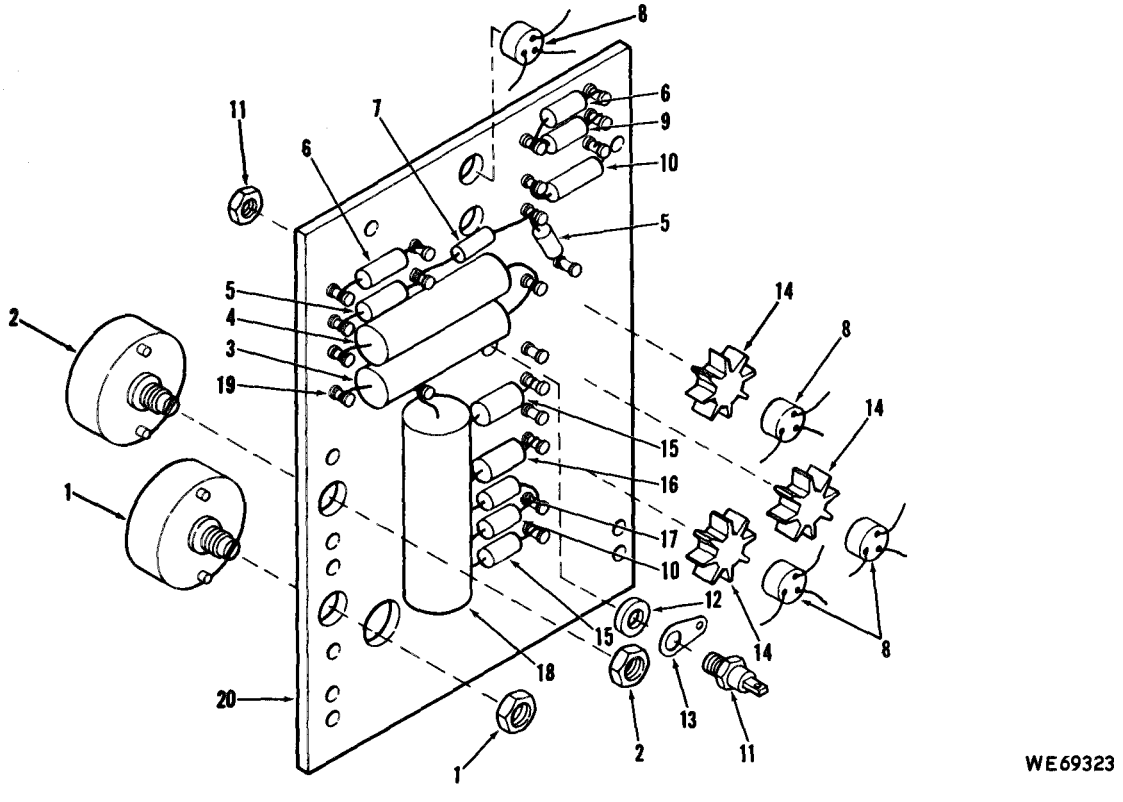


Figure 5-8. Regulator assembly.

KEY to fig. 5-8:

1. Hexagon nut
2. Lock washer
3. Diode
4. Diode
5. Machine screw
6. Lock washer
7. Flat washer
8. Hexagon nut
9. Machine screw
10. Lock washer
11. Flat washer
12. Heatsink
13. Machine screw
14. Lock washer
15. Flat washer
16. Terminal board
17. Marker strip
18. Machine screw
19. Lock washer
20. Flat washer
21. Loop clamp
22. Panel board assembly
23. Panel support
24. Panel support
25. Adjustable resistor
26. Fixed resistor
27. Eyelet
28. Resistor bracket
29. Machine screw
30. Lock washer
31. Panel support
32. Hexagon nut
33. Lock washer
34. Flat washer
35. Flat washer
36. Tran sister
37. Tapping screw
38. Diode
39. Tran sister socket
40. Machine screw
41. Lock washer
42. Flat washer
43. Hexagon nut
44. Heatsink
45. Heatsink
46. Angle bracket
47. Angle bracket



1. Variable resistor
2. Variable resistor
3. Fixed resistor
4. Fixed resistor
5. Fixed resistor
6. Diode
7. Fixed resistor
8. Transistor
9. Fixed resistor
10. Fixed resistor
11. Diode
12. Flat washer
13. Lug terminal
14. Heatsink
15. Fixed resistor
16. Fixed resistor
17. Diode
18. Capacitor
19. Stud terminal
20. Component board

Figure 5-9. Panel board assembly.

5-7. Cleaning, Inspection, and Repair.

a. Cleaning. Refer to paragraph 4-8.

b. Inspection and Repair. Refer to Tables 5-3 through 5-6.

CAUTION

Insure that proper heatsink techniques are utilized when installing semiconductor devices and / or transistors.

Table 5-3. DC Power Supply Component Inspection

Figure 5-5 Index No.	Description	Inspection
35	Current transformer	Electrical characteristics: 1.5 kva, 3 phase; 220 volt ± 5%L/ L, 3 phase, 50 / 60 Hz, delta connected primary; 30 volt L / L rms, wye connected secondary. Replace defective transformer.
38	Fixed resistor	Inspect for signs of overheating, shorts, and electrical rating of 25 ohms, 50 W. Replace defective resistor.
42,79	Diode	Check for infinite resistance in one direction, then reverse ohmmeter leads and obtain a definite resistance value. Replace diode not functioning in this manner.
47	Fixed resistor	Inspect for signs of overheating, shorts, and electrical rating of 25 ohms, 100 W. Replace defective resistor.

Table 5-4. Heatsink Assembly and Resistor Board Component Inspection

Figure 5-7 Index No.	Description	Inspecting
4	Rectifier	Check for infinite resistance in one direction, then reverse ohmmeter leads and obtain a definite resistance value. Replace rectifier not functioning in this manner.
5	Fixed resistor	Inspect for signs of overheating, shortings and electrical rating of 0.2 ohm, 5W. Replace defective resistor.

Table 5-5. Regulator Assembly Component Inspection

Figure 5-8 Index No.	Description	Inspecting
3,4.38	Diode	Check for infinite resistance in one direction, then reverse ohmmeter leads and obtain a definite resistance value in the opposite direction. Replace diode not functioning in this manner.
25	Adjustable resistor	Inspect for signs of overheating, shorting, and electrical rating of 25 ohms, 25W. Replace defective resistor.
26	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 250 ohms, 25W. Replace defective resistor.

Table 5-6. Panel Board Component Inspection

Figure 5-9 Index No.	Description	Inspection
1	Variable resistor	Inspect for signs of overheating, shorting, and electrical rating of 250 ohms, 2W. Check for proper mechanical operation. Replace defective resistor.
2	Variable resistor	Inspect for signs of overheating, shorting and electrical rating of 2K. Check for proper mechanical operation. Replace defective resistor.
3	Fixed resistor	inspect for signs of overheating, shorting, and electrical rating of 240 ohms, 11W. Replace defective resistor.
4	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 510 ohms, 11W. Replace defective resistor.
5	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 270 ohms, ½W. Replace defective resistor.
6,11,17	Diode	Check for infinite resistance in one direction then, reverse ohmmeter leads and obtain a definite resistance value in the opposite direction. Replace diode not functioning in this manner.

Figure 5-9 Index No.	Description	Inspection
7	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 560 ohms, 1W. Replace defective resistor.
9	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 2.2K, 1W. Replace defective resistor.
10	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 1K, 2W. Replace defective resistor.
15	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 270 ohms, 2W. Replace defective resistor.
16	Fixed resistor	Inspect for signs of overheating, shorting, and electrical rating of 120 ohms, 2W. Replace defective resistor.
18	Capacitor	Electrical rating of 1 UF, 200 vdc.

5-8. Assembly.

a. Refer to figure 5-9 and assemble panel board assembly in reverse order of disassembly.

(1) Make all solder connections per TB-SIG-222.

(2) Leads of diodes (6 and 17) shall not be taut. Loop leads approximately 1 / 2 inch to prevent strain on seal.

(3) Insulate with tubing any bare leads which may tend to short circuit.

b. Refer to figure 5-8 and assemble regulator assembly in reverse order of disassembly.

(1) Solder wires to variable resistors (1 and 2, fig. 5-10) before assembling panel board (22, fig. 5-9) to brackets.

(2) Refer to figure 5-10 for regulator wiring diagram.

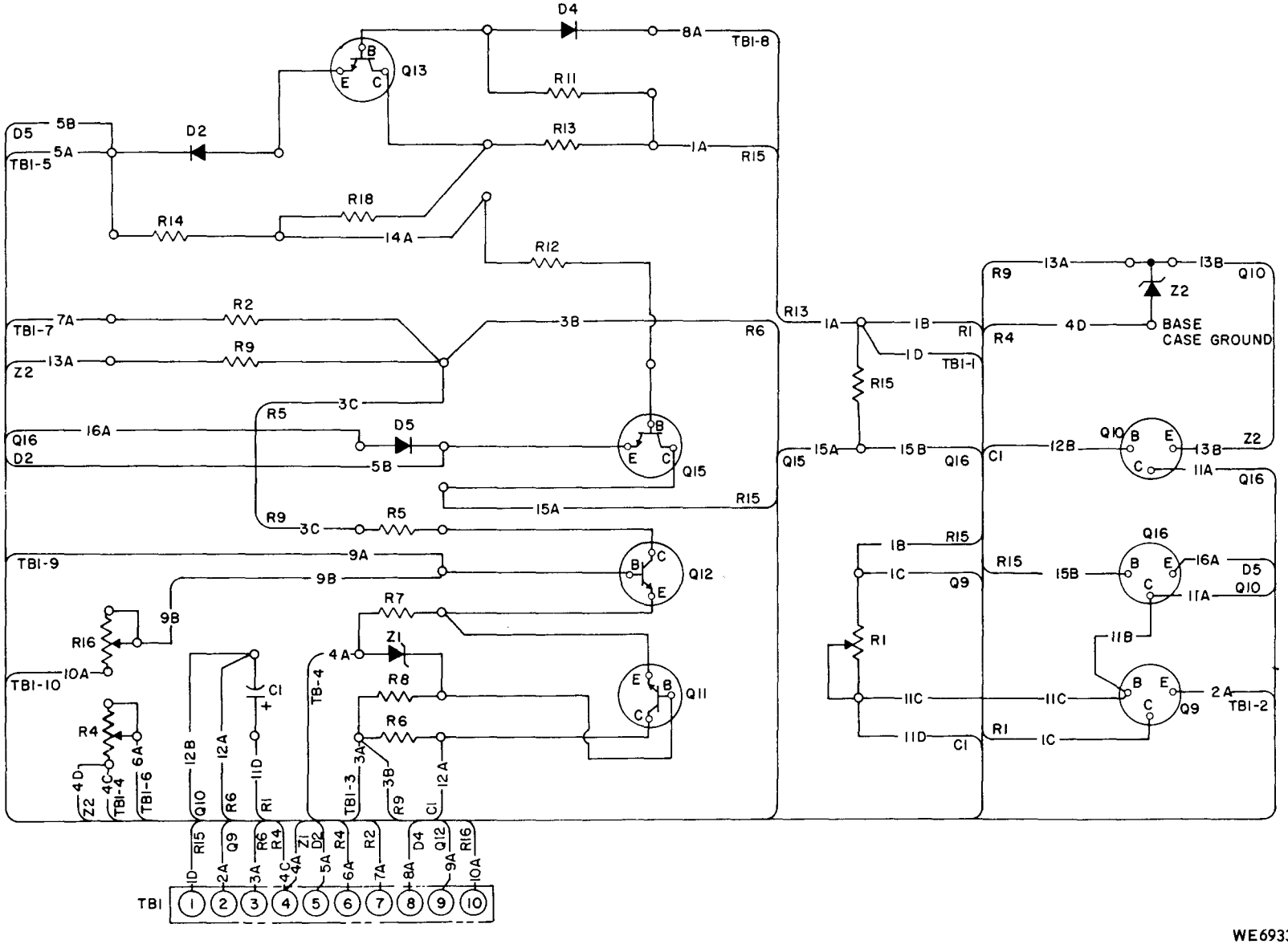


Figure 5-10. Regulator assembly wiring diagram.

c. Refer to figure 5-7 and assemble resistor board assembly in reverse order of disassembly. Solder resistors (5) to eyelets (10) and then solder eyelets and screws (6) to bus bar (11).

d. Refer to figure 5-6 and assemble heatsink assembly in reverse order of disassembly.

e. Refer to figure 5-5 and assemble dc power supply in reverse order of disassembly Refer to figure FO-2 for wiring diagram. Refer to chapter 6 for tests and adjustment of power supply after installation.

Section III. REPAIR OF INSTRUMENT PANEL ASSEMBLY

5-9. General.

a. Refer to chapter 4 for removal of instrument panel assembly (71. fig. 4-3) from distribution panel assembly.

b. The order of disassembly is in accordance with illustration number sequence of the referenced illustrations.

c. Assembly is in reverse order of disassembly sequence unless otherwise indicated.

d. General cleaning, inspection, repair and replacement instructions are contained in chapter 4. Any specific instructions are noted in these repair procedures.

5-10. Disassembly.

Refer to figure 5-11 and disassemble the instrument panel assembly.

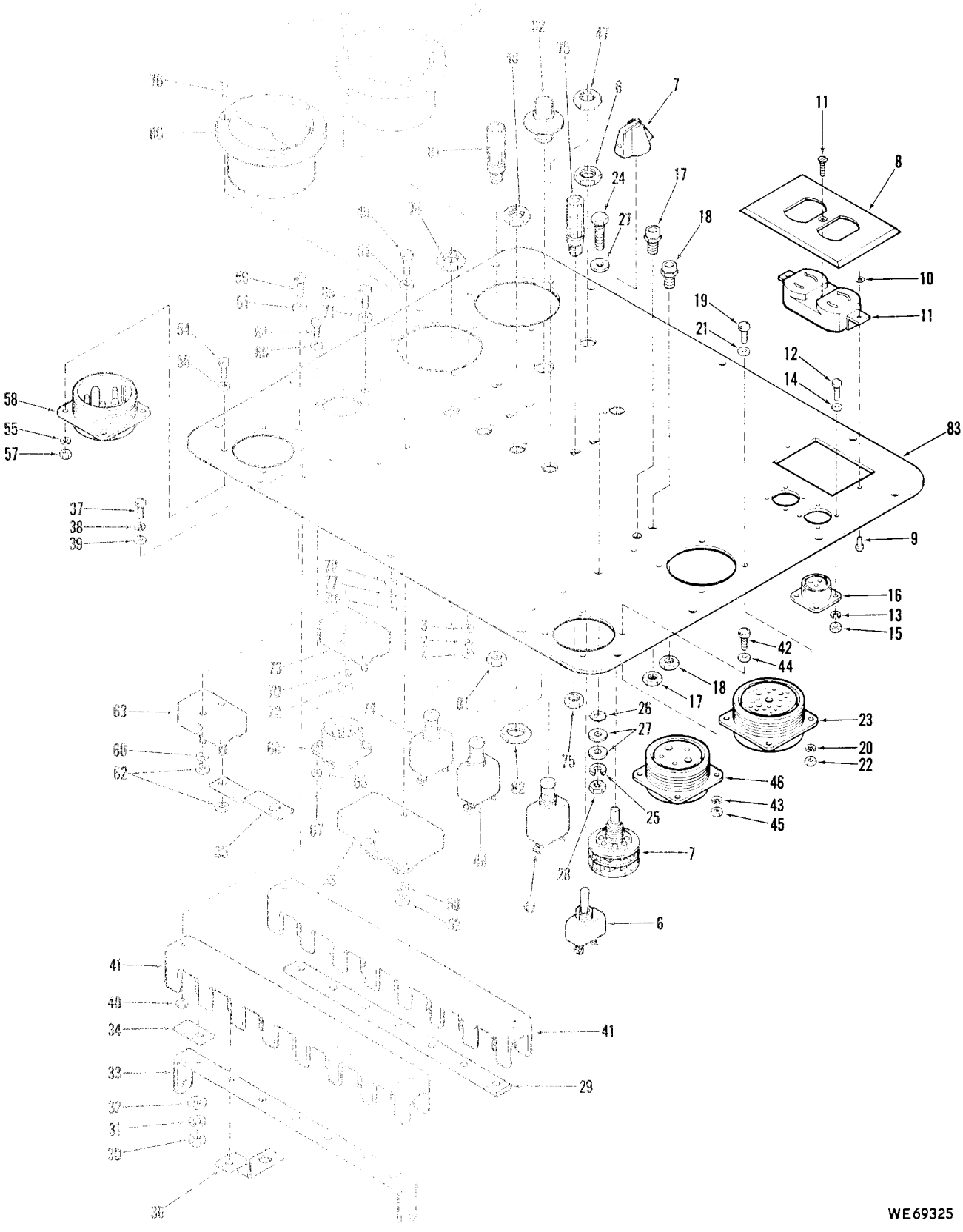


Figure 5-11. Instrument panel assembly.

KEY to fig. 5-11:

1. Machine screw
2. Lock washer
3. Flat washer
4. Hexagon nut
5. Voltmeter
6. Toggle switch
7. Rotary switch
8. Receptacle cover
9. Blind rivet
10. Flat washer
11. Electrical receptacle
12. Machine screw
13. Lock washer
14. Flat washer
15. Hexagon nut
16. Electrical connector
17. Red test jack
18. Black test jack
19. Machine screw
20. Lock washer
21. Flat washer
22. Hexagon nut
23. Electrical connector
24. Cap screw
25. Lock washer
26. Lock washer
27. Flat washer
28. Hexagon nut
29. Bus bar
30. Hexagon nut
31. Lock washer
32. Flat washer
33. Bus bar
34. Insulator
35. Bus bar
36. Bus bar
37. Machine screw
38. Lock washer
39. Flat washer
40. Hexagon nut
41. Terminal board
42. Machine screw
43. Lock washer
44. Flat washer
45. Hexagon nut
46. Electrical connector
47. Circuit breaker
48. Circuit breaker
49. Machine screw
50. Lock washer
51. Flat washer
52. Hexagon nut
53. Instrument shunt
54. Machine screw
55. Lock washer
56. Flat washer
57. Hexagon nut
58. Electrical connector
59. Machine screw
60. Lock washer
61. Flat washer
62. Hexagon nut
63. Instrument shunt
64. Machine screw
65. Lock washer
66. Flat washer
67. Hexagon nut
68. Electrical connector
69. Machine screw
70. Lock washer
71. Flat washer
72. Hexagon nut
73. Instrument shunt
74. Circuit breaker
75. Black binding post
76. Machine screw
77. Lock washer
78. Flat washer
79. Hexagon nut
80. Ammeter
81. Red binding post
82. Push switch
83. Instrument panel

5-11. Cleaning, Inspection and Repair.

a. Cleaning. Refer to paragraph 4-8.

b. Inspection and Repair. Refer to table 5-7 for instrument panel component inspection. Replace all parts that are unsuitable for reuse.

5-12. Assembly.

Refer to figure 5-11 and assemble the instrument panel assembly in the reverse order of disassembly. Refer to figure 5-12 for instrument panel wiring diagram.

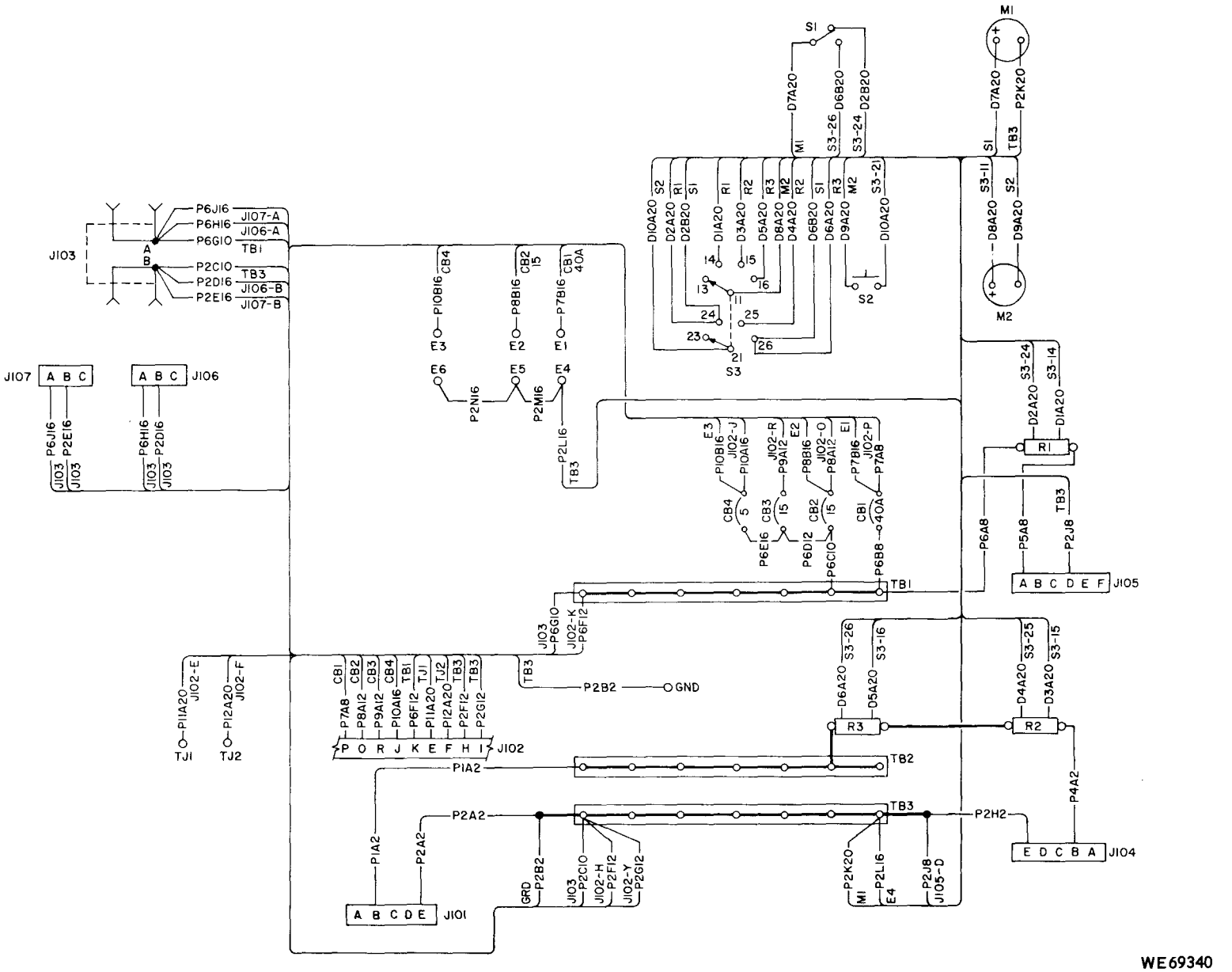


Figure 5-12. Instrument panel assembly wiring diagram.

Table 5-7. Instrument Panel Assembly Component Inspection

Figure 5-11 Index No.	Description	Inspection
6	Toggle switch	Inspect switch for mechanical action and electrical continuity.
7	Rotary switch	Inspect switch for mechanical action and electrical continuity in all positions.
16,23,46 58,68	Connector	Inspect for broken or bent pins. Straighten bent pins. Check pins for electrical continuity.
47,48,74	Circuit breaker	Check for proper mechanical operation. Circuit breaker ratings are 40 amp, 15 amp, and 5 amp, respectively.
82	Push switch	Inspect switch for mechanical action and electrical continuity.

Section IV. REPAIR OF CASE ASSEMBLY

5-13. General.

a. Refer to chapter 4 for removal of components from case assembly (fig. 4-31).

b. The order of disassembly is in accordance with illustration number sequence of the referenced illustrations.

c. Assembly is in reverse order of disassembly sequence unless otherwise indicated.

d. General cleaning, inspection, repair and replacement instructions are contained in chapter 4. Any specific instructions are noted in these repair procedures.

5-14. Disassembly / Assembly.

Refer to figure 5-13 and disassemble the case assembly.

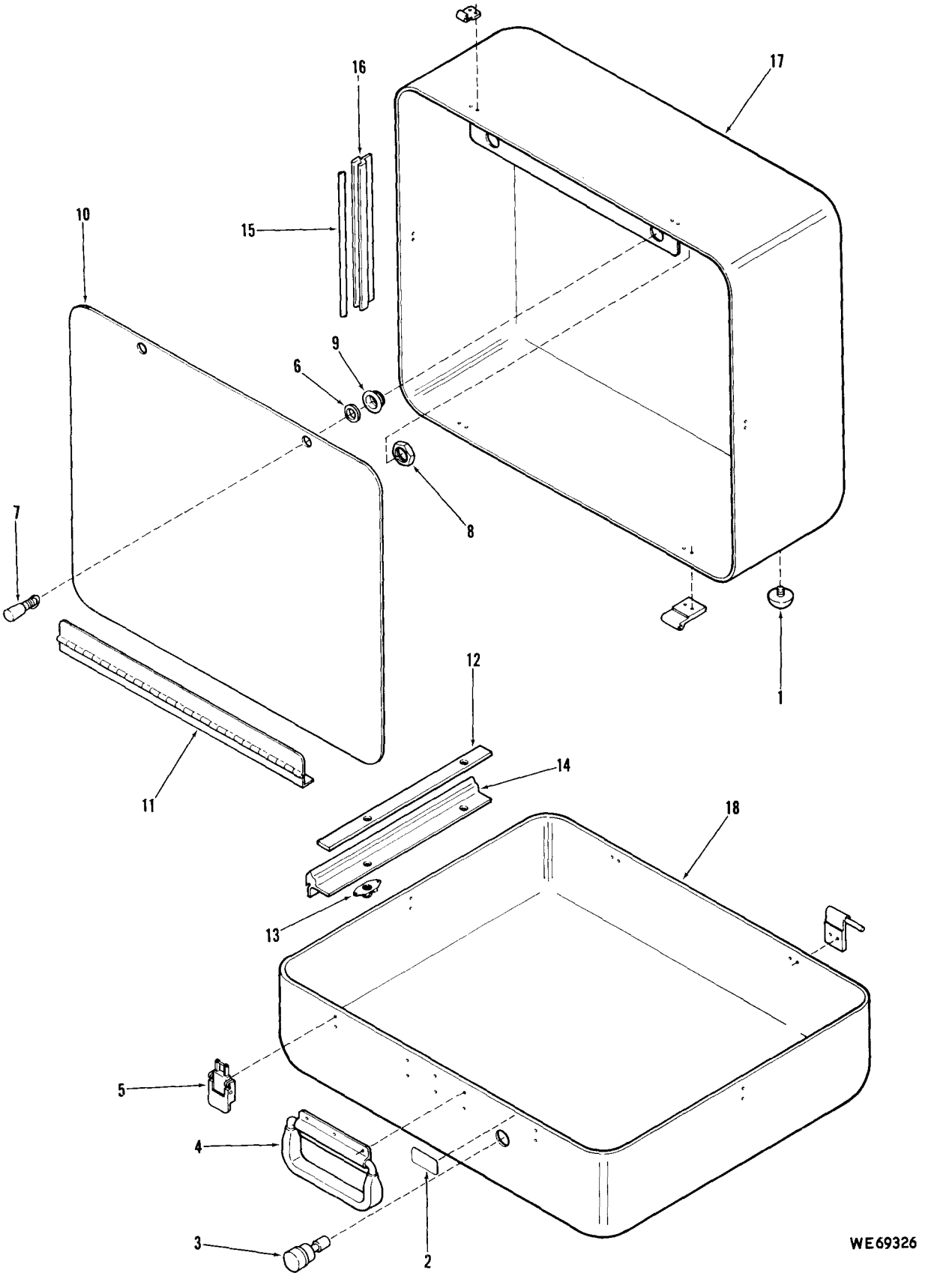


Figure 5-13. Case assembly.

KEY to fig. 5-13:

1. Foot
2. Instruction plate
3. Manual valve
4. Handle
5. Latch
6. Retainer
7. Stud
8. Nut
9. Receptacle
10. Inner lid
11. Hinge
12. Sealing frame
13. Anchor nut
14. Sealing gasket
15. Sealing frame
16. Sealing gasket
17. Cover
18. Case

CHAPTER 6

FINAL INSPECTION

6-1. General.

Final inspection to insure power supply components are complete and serviceable, is performed after components have been repaired and assembled in direct support and general support for return to user or stock.

6-2. Visual Inspection.

Visually inspect power supply for completeness, cleanliness, and service.

6-3. Functional Inspection.

Manually operate all doors, switches, valves, and controls to insure proper mechanical operation.

6-4. Test Equipment.

Battery or power supply, 24 vdc, capable of 120 amperes output for 5 seconds, is required to inspect, test and adjust the power supply after assembly.

6-5. Control Circuit and Safety Interlocks Test and Adjust.

a. Connect 220 vat, 3 phase, 50 / 60 Hz power.

b. Check voltage at transformer (T1) secondary. Voltage should be 110 volts ± 5%between X1 and X2 terminals.

c. Turn master switch (CB3) ON. Power ON indicator will light. Set control panel selector switch to dc power supply. Coil of relay (K1) will be energized. Voltage across the coil should be 24 to 28 vdc. Set control panel selector switch to BATTERY position. Coil of relay (K2) will be energized. Voltage across coil should be 24-28 vdc.

d. Depress start switch (S2). Pump motor (B1) and heat exchanger fan motor (B2) should rotate. Rotation of pump motor could be in either direction. Rotation of fan motor should move air through heat exchanger from the inside to the outside of power supply.

CHAPTER 7

ADMINISTRATIVE STORAGE

Refer to TM 740-90-1 for administrative storage of the power supply.

APPENDIX A
REFERENCES

1. Publication INDEXES.

Consult each new issue of the following for the latest changes or revisions to publications listed in this appendix or for new publications on the subsystem covered in this technical manual.

Index of Administrative Publications . . . . . DA Pam 310-1
Index of Blank Forms . . . . . DA Pam 310-2
Index of Doctrinal, Training, and organizational Publications . . . DA Pam 310-3
Index of Supply Catalogs and Supply Manuals . . . . . DA Pam 310-6
Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9) Supply Bulletins, and Lubrication orders. . . . . DA Pam 310-4
U.S. Army Equipment Index of Modification Work Orders . . . . . DA Pam 310-7

2. Forms.

In addition to forms required by the Army Maintenance Management System (TM 38-750), the following forms pertain to this materiel:

Materiel Inspection Tag . . . . DA Form 9-1
Recommended Changes to Publications . . . . . DA Form 2028
Report of Packaging and Handling Deficiencies . . . . . DD Form 6
Request for Issue or Turn-In . . . . . DA Form 2765
Requirements for Army Aviation and Army Avionic Configuration Publications.. . . . . DA Form12-31
Requisition for Publications and Bland Forms . . . . . DA Form 17

3. Other Publications.

The following publications contain information pertinent to this materiel and associated equipment:

a. Camouflage.

Camouflage . . . . . FM 5-20

b. Decontamination.

Chemical, Biological, and Radiological (C13R) Decontamination TM 3-220
Chemical, Biological, Radiological and Nuclear Defense . . . . . FM 21-40

c. Destruction to Prevent Enemy Use.

Explosives and Demolitions . . . . . FM 5-25
Procedues for Destruction of Equipment toPrevent Enemy Use . . TM 750-244-7

d. General.

Accident Reporting and Records AR385-40
Army Maintenance Management System (TAMMS) . . . . . TM 38-750
Basic Cold Weather Manual . . . . FM 31-70
Protective Clothing and Equipment . . . . . AR 385-32

e. Maintenance and Repair.

Cleaning of Ordnance Materiel . . . . . TM 9-208-1
Direct Support and General Support, Repair Parts and Special Tools List (Including Depot Maintenance and Special Tools) for Portable Hydraulic / Electric Power Supply (4933-933-4742) . . . . . TM 9-4933-211-34P
Maintenance Assistance and Instruction Team (MAIT) Program . . . . AR 750-51
Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel; and Related Materials Including Chemicals . . . . . TM 9-247
Operator, Organizational, DS, GS and Depot Maintenance Manual, Including Repair Parts and Special Tools List: Aircraft Nickel Cadmium Battery, Storage BB433A . . . . . TM 11-6140-203-15-2
Solder and Soldering TB-SIG-222

f. Operations.

Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to −65° F.) ..... TM 9-207

g. Shipment and Storage.

Accounting for Lost, Damaged, and Destroyed Property ..... AR 735-11
Administrative Storage of Equipment ..... TM 740-90-1
Centralized Inventory Management of the Army Supply System .. AR 710-1
Control of COMSEC Material ..... AR 380-41
Disposal of Excess, Surplus, Foreign Excess, Captured and Unwanted Materiel ..... AR 755-2
Materiel Management for Using Units, Support Units, and Installation ..... AR 710-2
Preservation-Packaging, Packing, and Marking of Items of Supply ..... AR 700-15
Reporting, Utilization, and Redistribution of Installation, U.S. Army Materiel Command, and Oversea Command Excess Personal Property ..... AR 755-1
Requisitioning, Receipt and Issue System ..... AR 725-50
Special Authorization and Procedures for Issues, Sales, and Loans ..... AR 725-1
Standards for Overseas Shipment and Domestic Issue of Small Arms, Aircraft Armament, Towed Howitzers, Mortars, Recoilless Rifles, Rocket Launchers, and Associated Fire Control Equipment ..... TB 9-1000-247-35
Storage and Materials Handling ..... TM 743-200-1
Use of Controlled Cannibalization as a Source of Repair Parts for Supply Augmentation ..... AR 750-50

APPENDIX B

MAINTENANCE ALLOCATION CHART

1. Scope.

The maintenance allocation chart (DA Form 3047-R) identifies for each component and assembly of the end item the maintenance operations that must be performed, and assigns each of these operations to the lowest level of maintenance capable of performing the task in terms of the availability of time, tools, test and support equipment, skills, and employment of the item.

2. General.

DA Form 3047-R is divided into four sections:

a. Section I contains definitions of the several classes of maintenance operations.

b. Section II is the maintenance assignment portion and contains the following data elements.

(1) *Group Number.* The numerical scheme for grouping related components and assemblies.

(2) Component Assembly Nomenclature. A listing of the components and assemblies applicable to the end item and requiring maintenance. An assembly is a group of two or more physically connected or related parts which are capable of disassembly. A component is a group of connected assemblies and parts which are capable of operating independently, but which may be externally controlled or which may derive its power from another source.

(3) *Maintenance Function.* The assignment of each item's maintenance operation to the lowest level of maintenance is recorded in the appropriate column by the maintenance level symbol "C" for operator / crew, "O" for organizational, "F" for direct support, "H" for general support, and "D" for depot maintenance.

(4) *Tools and Equipment.* A reference code column for any special tool or test equipment with identification in section III.

(5) *Remarks.* A reference code column for items which have supplemental instructions in section IV.

c. Section III lists the tools and equipment referenced in the maintenance allocation chart section, giving the tool or test equipment reference code, maintenance category nomenclature, Federal stock number, and the tool number.

d. Section IV is used to record supplemental instructions explaining or illustrating a particular maintenance function.

Section I. GENERAL

This maintenance allocation chart designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of field maintenance task upon this end item or component will be consistent with the assigned maintenance operations which are defined as follows:

Operation	Definition
Inspect	To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
Test	To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
Service	To clean, preserve, to charge and to add fuel, lubricants, cooling agents and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.
Adjust	To rectify to the extent necessary to bring into proper operating range.
Align	To adjust specified variable elements of an item to bring to optimum performance.
Calibrate	To determine the corrections to be made in the reading of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrum ent being compared with the certified standard.
Install	To set up for use in an operational environment, such as an emplacement, site or vehicle.
Replace	To replace unserviceable items with serviceable assemblies, subassemblies or parts.
Repair	Those maintenance operations necessary to restore an item to serviceable condition through correction of material damaged or a specific failure. Repair may be accomplished at each category of maintenance.
Overhaul	Normally the highest degree of maintenance performed by the Army in order to minimize time work is in process consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to complete serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

Operation	Definition
Rebuild	The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment or component thereof has been in use.

Nomenclature of End Item or component

Section II. MAINTENANCE ASSIGNMENT

(1) GROUP NO.	(2) COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTION											(4) TOOLS AND EQUIPMENT	(5) REMARKS
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
1	Power Supply, Hydraulic / Electric, Portable:	O		O	O			O		F	D		1-A-l, 1-I-2	
a	Power Supply, Hydraulic/ Electric, Portable: w / Battery BB433A, HEPC-1	O	F	O	O					F	H		1a-C-3	Charge accumulator with dry nitrogen.
1	Cable Assemblies	O	F						F	F	H			
2	Motor, Electric	O	D	F					F		D			
3	Pump, Hydraulic	O	D	O	O				F					
4	Power Supply DC	O	F						F	D	D			
5	Battery	O		O					F					See NOTE 1 Remarks.
b	Box, Distribution: **HEDP**	O	F						F	F	H			

LEGEND:
C-Operator / crew
O-Organizational maintenance
F-Direct support maintenance
H-General support maintenance
D-Depot maintenance

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Tool or Test Equipment Reference Code	Maintenance Category	Nomenclature	FSN	Tool Number
1-A-1	O	Tool Set, Aircraft Armament Repairman: MOS 45J Basic	4933-987-0816	SC 4933-95-CL-A13
1-1-2	F	Tool Set, Aircraft Armament Repairman: MOS 45J Supplemental	4933-994-9242	SC 4933-95-CL-A14
1a-C-3	O	Regulator Kit, Charging	4933-856-5593	8427780
		The tools listed above are used in subsequent maintenance functions as required.		

Section IV. REMARKS

Reference Code	Remarks
1c	NOTE 1: Aircraft armament maintenance functions for the battery shall be limited to visual inspection and addition/removal of electrolyte as authorized in TM 11-6140-203-15-2. Requirements for other maintenance functions shall be referred to the unit electrical shop for compliance with TM 11-6140-203-15-2.

APPENDIX C

BASIC ISSUE ITEMS LIST

Not applicable.

INDEX

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

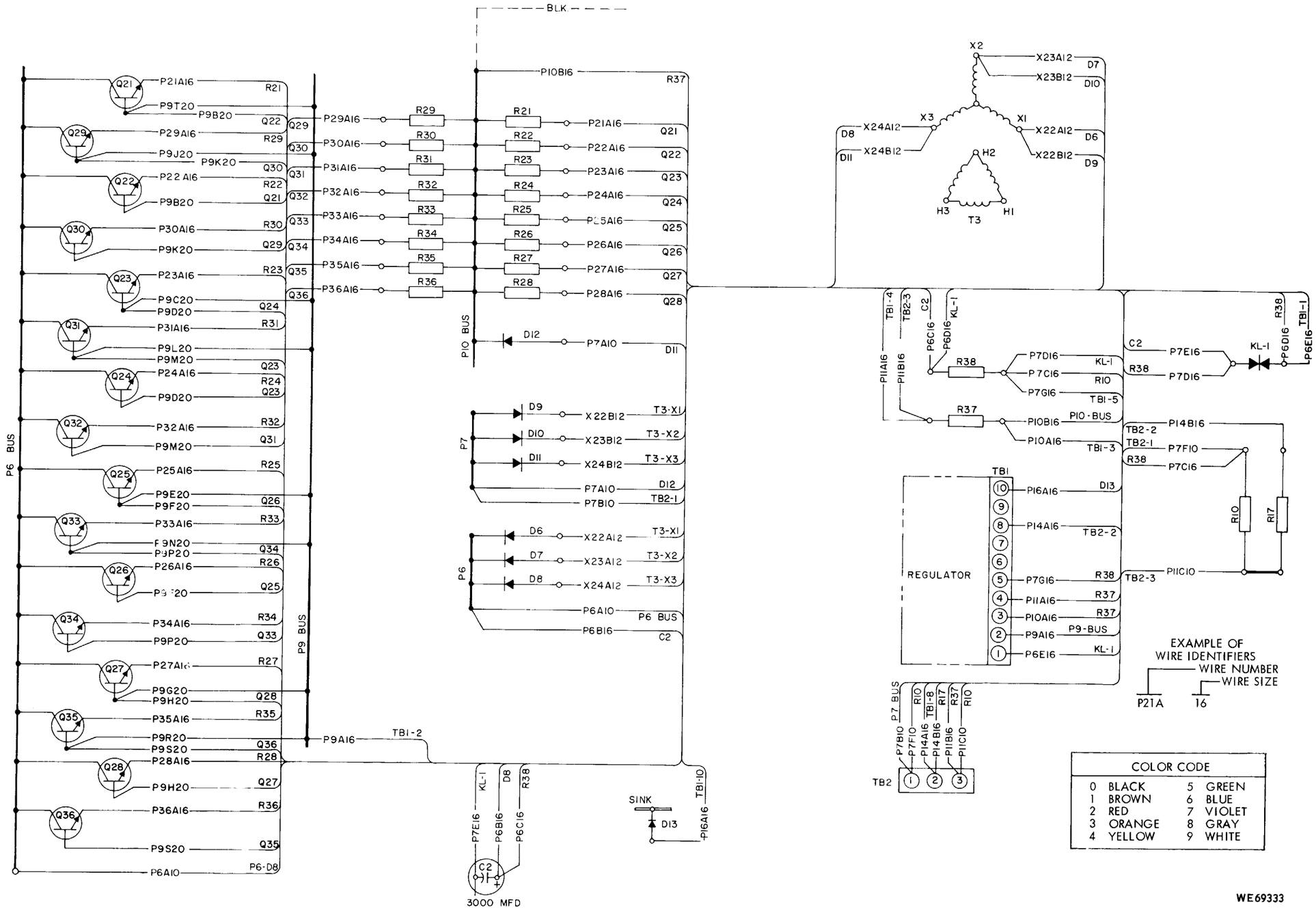
Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

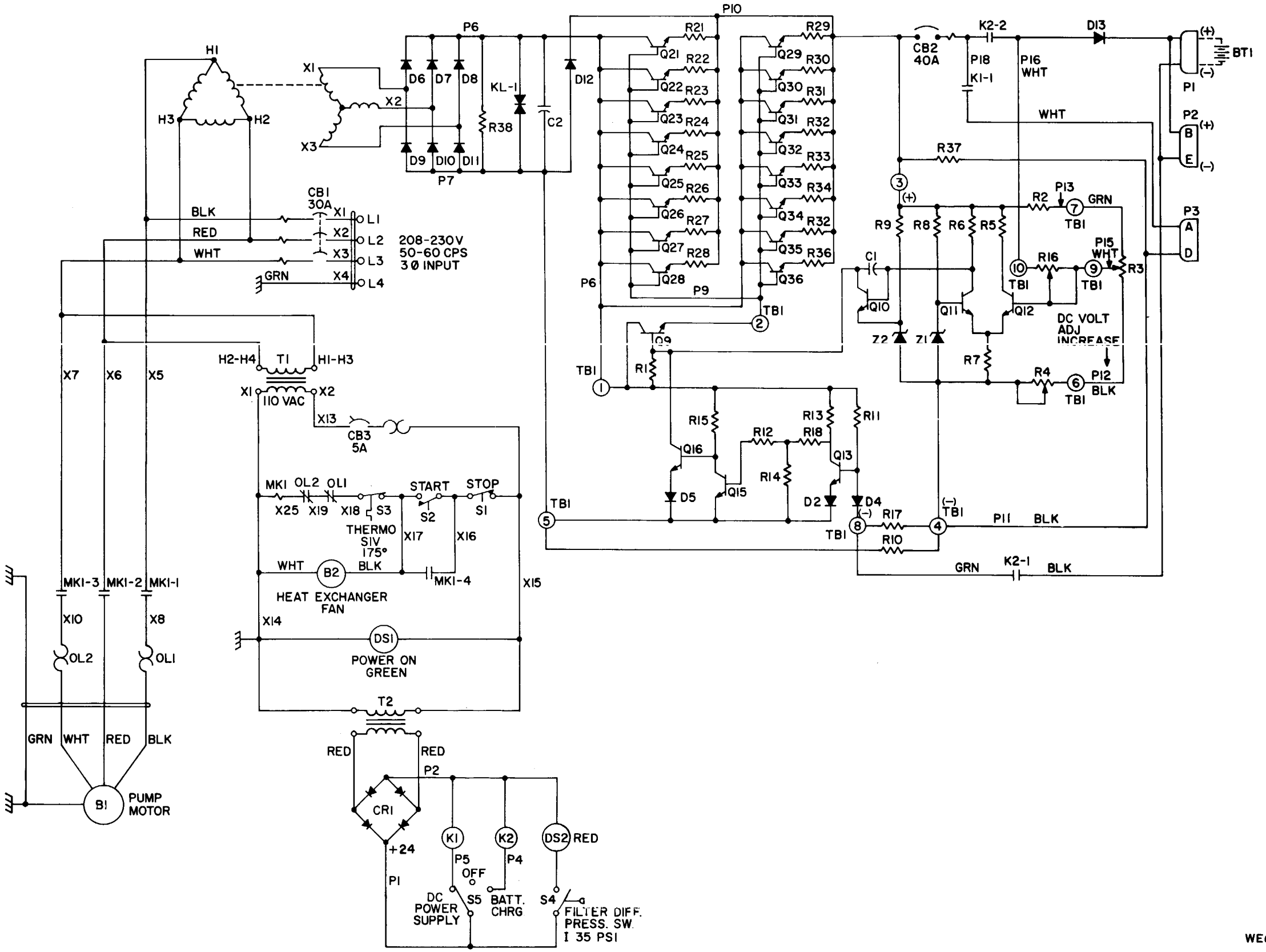
DISTRIBUTION:

To be distributed in accordance with DA Form 12-31, Section IV, direct and general support maintenance requirements for 40-MM Grenade Launcher, M5; 7.62-MM Machine Gun, Armament POD XM18 / XM18Al; Mount, Multi-Armament, Helicopter, XM156; 7.62-MM Machine Gun / 40-MM Grenade Launcher, XM28 / XM28E1; and 20-MM Automatic Gun, XM35, one (1) copy each account.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1972—754-104/92



FO-1. Power supply wiring diagram.



WE69339

FO-2. DC Power supply functional diagram.

TM 9-4933-211-14 POWER SUPPLY, HYDRAULIC/ELECTRIC, PORTABLE: (4933-933-4742)
USED WITH M5, M18(XM18), M18A1(XM18E1), M21, XM27E1,
M28(XM28), M28A1(XM28E1), M35(XM35) AND XM156-1972