TECHNICAL MANUAL
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

TEST STAND,
AUTOMOTIVE GENERATOR,
ALTERNATOR, STARTER,AND
ASSOCIATED EQUIPMENT,
MODEL GASR-500

PART NUMBER	NSN
7458-2	4910-01-041-8161
7458-4	4910-00-767-0218

This copy is a reprint which includes current pages from Changes 1.

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H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
15 JUNE 1981

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

Learn the areas containing high voltage in this piece of equipment. Be careful not to contact high-voltage connections when installing or operating this equipment. Before working inside the equipment, turn power off and ground points of high potential before touching them. When making test measurements, turn power off before connecting or disconnecting test equipment.

WARNING

RAPIDLY ROTATING MACHINERY

is used in the operation of this equipment. Severe injury may result to personnel if loose clothing is allowed to come into contact with rotating parts. Before operating this equipment, make certain that all parts that rotate are securely mounted.

WARNING

HIGH NOISE LEVEL

is present during operation of the test stand. To protect hearing, wear an acoustical ear muff.

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 3 December 1987

Technical Manual

Direct Support and General Support Maintenance Manual

TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR, STARTER, AND ASSOCIATED EQUPMENT, MODEL GASR-500

PART NUMBER	NSN
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TM 9-4910-663-34, 15 June 1981, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. Added or revised illustrations are indicated by a pointing hand.

Remove Pages	Insert Pages
i and ii	i and ii
1-1/(1-2 blank)	1-1/(1-2 blank)
2-1 and 2-2	2-1 and 2-2
None	2-2.1/(2-2.2 blank)
2-3 through 2-7	2-3 through 2-7
None	2-7.1/(2-7.2 blank)
2-8 through 2-10	2-8 through 2-10
None	2-14.1/(2-14.2 blank)
2-15 through 2-18	2-15 through 2-18
2-29 and 2-30	2-29 and 2-30
2-59 through 2-64	2-59 through 2-64
2-69 through 2-74	2-69 through 2-74
3-1 through 3-18	3-1 through 3-18
3-21 through 3-28	3-21 through 3-28
3-33 through 3-36	3-33 through 3-36
5-1 and 5-2	5-1 and 5-2
5-5 and 5-6	5-5 and 5-6
D-1 and D-2	D-1 and D-2
Index-7/(Index-8 blank)	Index-7/(Index-8 blank)
FP-1 through FP-4	FP-1 through FP-4
Front Cover and Warning Page	Front Cover and Warning Page

4. File this change sheet in back of the publication for reference purposes.

By Order of the Secretary of the Army:

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General, United States Army
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Brigadier General, United States Army
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DISTRIBUTION:

To be distributed in accordance with DA Form 12-25A, Direct and General Support Maintenance requirements for Test Stand, Auto Generator Starter, and Associated Equipment, GASR-500.

TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 June 1981

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR, STARTER, AND ASSOCIATED EQUIPMENT, MODEL GASR-500 PART NUMBER 7458-2 (4910-01-041-8161) PART NUMBER 7458-4 (4910-00-767-0218)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, U.S. Army Armament, Munitions, and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished directly to you.

Approved for public release; distribution is unlimited.

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. SCOPE. This manual is for your use in performing direct support and general support maintenance of Automotive Generator, Alternator, Starter Test Stand, Model GASR-500, Part Numbers 7458-2 and 7458-4, hereinafter referred to as the test stand. Unless otherwise stated, the instructions in this manual apply to both test stands.

1-2. MAINTENANCE FORMS AND RECORDS. Maintenance forms and records which you are required to use are listed and explained in DA PAM 738-750.

1-3. CALIBRATION. Calibration of all test stand meters shall be performed in accordance with TB 9-4910-527-50, Calibration Procedure for Generator and Starter Test Stand, United Manufacturing Models 7336, 7458 and Sun Electric Model AGT-9.

1-4. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC). No requirement for pertinent QA/AC instructions.

1-5. REPORTING QUALITY DEFICIENCIES: QDRs will be prepared using Standard Form 368, Quality Deficiency Report. Instructions for preparing QDRs are provided in DA PAM 738-750, The Army Maintenance Management system. QDRs should be mailed directly to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. A reply will be furnished directly to you.

Section II. DESCRIPTION AND TABULAR DATA

1-6. DESCRIPTION. Refer to paragraph 1-7, TM 9-4910-663-12.

1-7. DATA PLATES. Refer to paragraph 1-8, TM 9-4910-663-12.

1-8. TABULATED DATA. Refer to paragraph 1-9, TM 9-4910-663-12.

1-9. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

a. Special Tools and Equipment. No special tools and equipment are required.

b. Spares and Repair Parts. Spares and repair parts are listed and illustrated in TM 9-4910-663-24P, the Repair Parts and Special Tool list covering direct support and general support for this equipment.

CHAPTER 2

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

2-1. UNPACKING AND INSPECTION

a. Uncrate the test stand and set it on a solid, level floor or foundation using a suitable fork-lift through the locations provided (fig 2-2).

b. Remove all barrier material from the test stand.

c. Inspect the test stand for damage to the motor housing of the varidrive, the gearcase of the varidrive (90, fig 3-5, sheet 2 of 2), the blower motor assembly (fig 2-10), and all front panel switches and meters (figs 2-4, 2-5, 2-6, and 2-7).

d. Check to see that all accessory interconnecting cables are in good condition and that wiring is undamaged and secure.

NOTE

The accessories are shipped in the storage compartment or in the rectifier and battery compartments.

e. Inspect and tighten, as necessary, all screws, bolts, knobs, and terminals.

2-2. SERVICING

CAUTION

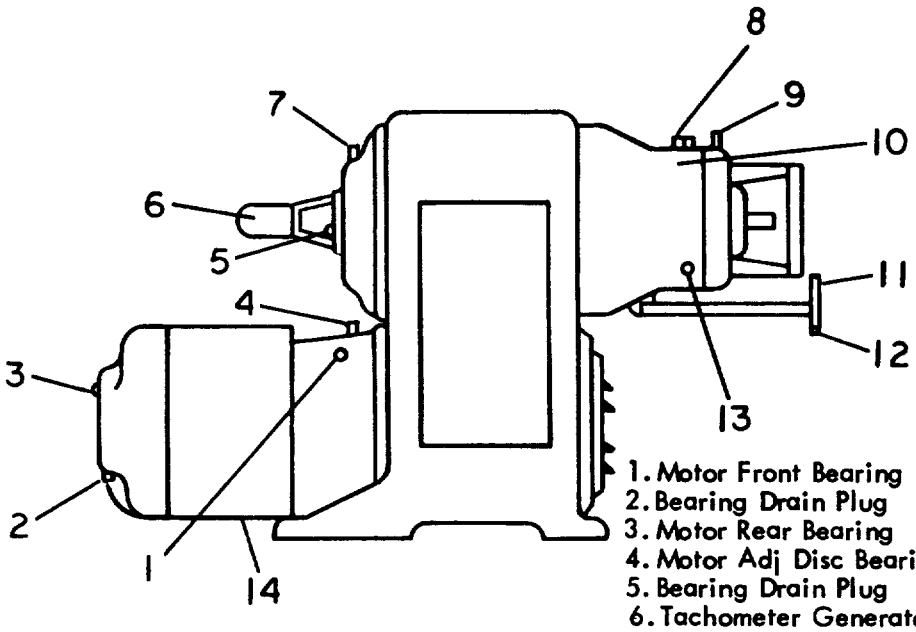
Running the test stand without gearcase lubricant can damage the gearcase. The gearcase is emptied before shipment and must be filled before the test stand is placed in service.

Lubricate the gearcase of the varidrive as shown in the lubrication chart (fig 2-1 or 2-1.1).

2-3. INSTALLATION

a. Power Requirements.

(1) A 230/460 volt, 3 Phase, 60 Hz AC power source is required for operation of the test stand. Refer to table 2-1.



1. Motor Front Bearing
2. Bearing Drain Plug
3. Motor Rear Bearing
4. Motor Adj Disc Bearing
5. Bearing Drain Plug
6. Tachometer Generator
7. Input Shaft Rear Bearing
8. Oil Fill Plug
9. Breather Plug
10. Gear Case
11. Oil Sight Gage
12. Oil Drain Plug
13. Oil Level Plug
14. Motor Housing

GEAR CASE LUBRICANT – MIL-L-15016
BEARING LUBRICANT – MIL-G-18709

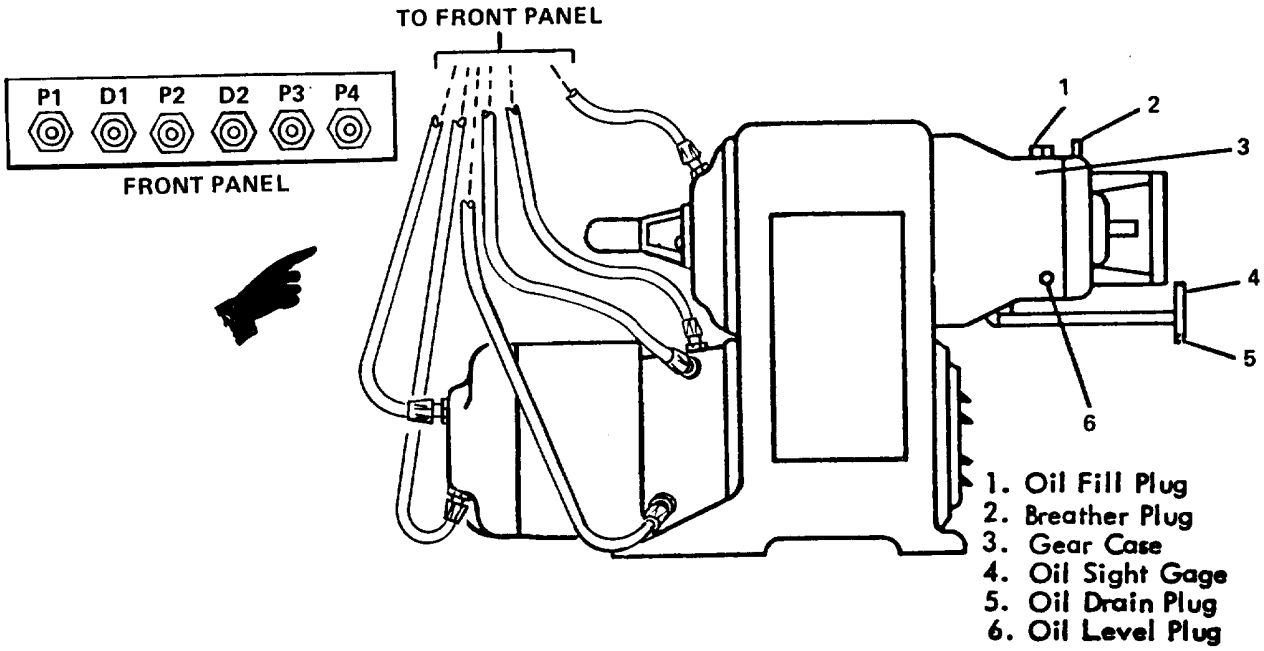
VARIDRIVE GEAR CASE				
OPERATIONAL TIME	OPER TEMP °F	VISCOSITY S.U.V. SEC	APP SAE NO.	LUBRICATION INTERVAL
8 HR/DAY	25 – 65	300 – 400 @ 100°F	20	CHANGE YEARLY
	50 – 110	500 – 650 @ 100°F	30	
CONTINOUS	25 – 65	300 – 400 @ 100°F	20	CHANGE SEMI ANNUALLY
	50 – 110	500 – 650 @ 100°F	30	

NOTE – CHANGE VARIDRIVE OIL AFTER FIRST WEEK OF SERVICE

VARIDRIVE BEARINGS

OPERATING TIME	LUBRICATIOI INTERVAL	LOCATION	REMARKS
8 HR/DAY	MONTHLY	3 & 4	ADD 2 OZ GREASE
	SEMI ANNUALLY	3 & 4	ADD 2 OZ GREASE
CONTINUOUS	2 WEEKS	1 & 5	LUBRIFLUSH
	QUARTERLY	1 & 5	LUBRIFLUSH

Figure 2-1. Varidrive lubrication chart, part number 7458-2.



GEAR CASE LUBRICANT – MIL-L-15016
BEARING LUBRICANT – MIL-G-18709

VARIDRIVE GEAR CASE				
OPERATIONAL TIME	OPER TEMP °F	VISCOSITY S.U.V. SEC	APP SAE NO.	LUBRICATION INTERVAL
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8 HR/DAY	MONTHLY	3 & 4	ADD 2 OZ GREASE
	SEMI ANNUALLY	3 & 4	ADD 2 OZ GREASE
CONTINUOUS	2 WEEKS	1 & 5	LUBRIFLUSH
	QUARTERLY	1 & 5	LUBRIFLUSH

Figure 2-1.1. Varidrive lubrication chart, part number 7458-4.

Table 2-1. Power Requirement Chart

Condition	Speed	KVA at 230/460V
Starting	Locked rotor	166.0
35 HP (intermittent)	1000 RPM	37.1
	9000 RPM	39.3
22 HP (intermittent)	1000 RPM	24.9
	9000 RPM	26.4

To determine input current requirements, use following formula:

$$I_{(Amps)} = \frac{KVA}{1.73V_{(Line)}}$$

When connected to a power source of less than 230/460 volts, continuous rating remains at rated HP, provided that the voltage reduction is not more than 10%. However, intermittent duty overload rating should be reduced in direct proportion to the square of percent reduced voltage to nominal voltage. For example:

Nominal volts = 230
Reduced voltage = 210
210/230 = 0.913
$(0.9132)^2 = 0.8336$
New intermittent duty rating = 35 HP X 0.8336 = 29.2 HP

(2) The test stand can be operated from a diesel-engine generator source of power if the input to the test stand is regulated and maintained at 230/460 volts, 60 Hz. For diesel-engine generator operation, note the following:

(a) Compensation for the low voltage starting condition associated with a diesel-engine generator is provided by using a low voltage coil for starting and a voltage dropping resistor in series with the coil for running conditions.

(b) If the nominal output voltage of the diesel-engine generator is less than 230/460 volts, the power delivered by the output shafts is reduced as shown in table 2-1.

b. Site Selection. Ensure that the selected installation site for the test stand is dry, free from moisture drips, and clean. The selected site should also be in a cool, ventilated location that is free from hazardous processes. Outline dimensions o-f the test stand are shown in figure 2-2.

c. Installation Procedure.

(1) Using a fork lift completely through the locations provided (fig 2-2), set the test stand into position. Vibration dampening material between the machine and floor and hold down bolts are recommended.

(2) Using flexible grounding straps, ground the base assembly of the test stand to a substantial electrical ground.

(3) Attach suitable outlet pipes to the air exhaust and air intake and to the battery vent located on the top left side of test stand. Use 6-inch round, smooth ducting and elbows. The air exhaust will accept a 6-inch external diameter pipe, and the air inlet will accept a 6-inch internal diameter pipe. Keep all external ducting to a minimum length.

NOTE

If the air exhaust and air intake pipes are not attached properly, the airflow interlock switch will prevent test stand operation.

(4) The test stand is shipped connected for 230 volt, 3 phase, 60 Hz operation. To convert the test stand for operation from a 460 volt source, rearrange the links as shown in figure 2-3.

WARNING

Make certain that the main circuit breaker switch, located in the high voltage compartment, is set to the off position before touching any internal electrical connections.

(5) Install the proper heater elements in the starter. On part number 7458-2, use heater element CR 123 F 91.4B for 230-volt operation, and use heater element CR123 F48.7B for 460 volt operation. On part number 7458-4, use heater elements part number 42430, FSCM 04009, NSN 5999-00-850-3707, for 230 volt operation, and use heater element part number 42232, FSCM 04009, NSN 5925-00-374-2528, for 460 volt operation.

(6) On part number 7458-2, route the input power cable through the power service entrance on the left side of the test stand. On part number 7458-4, an input power conduit connector is provided at the lower rear section of the test stand.

WARNING

Observe all high voltage precautions when making power connections. Make certain that the external power source is turned off.

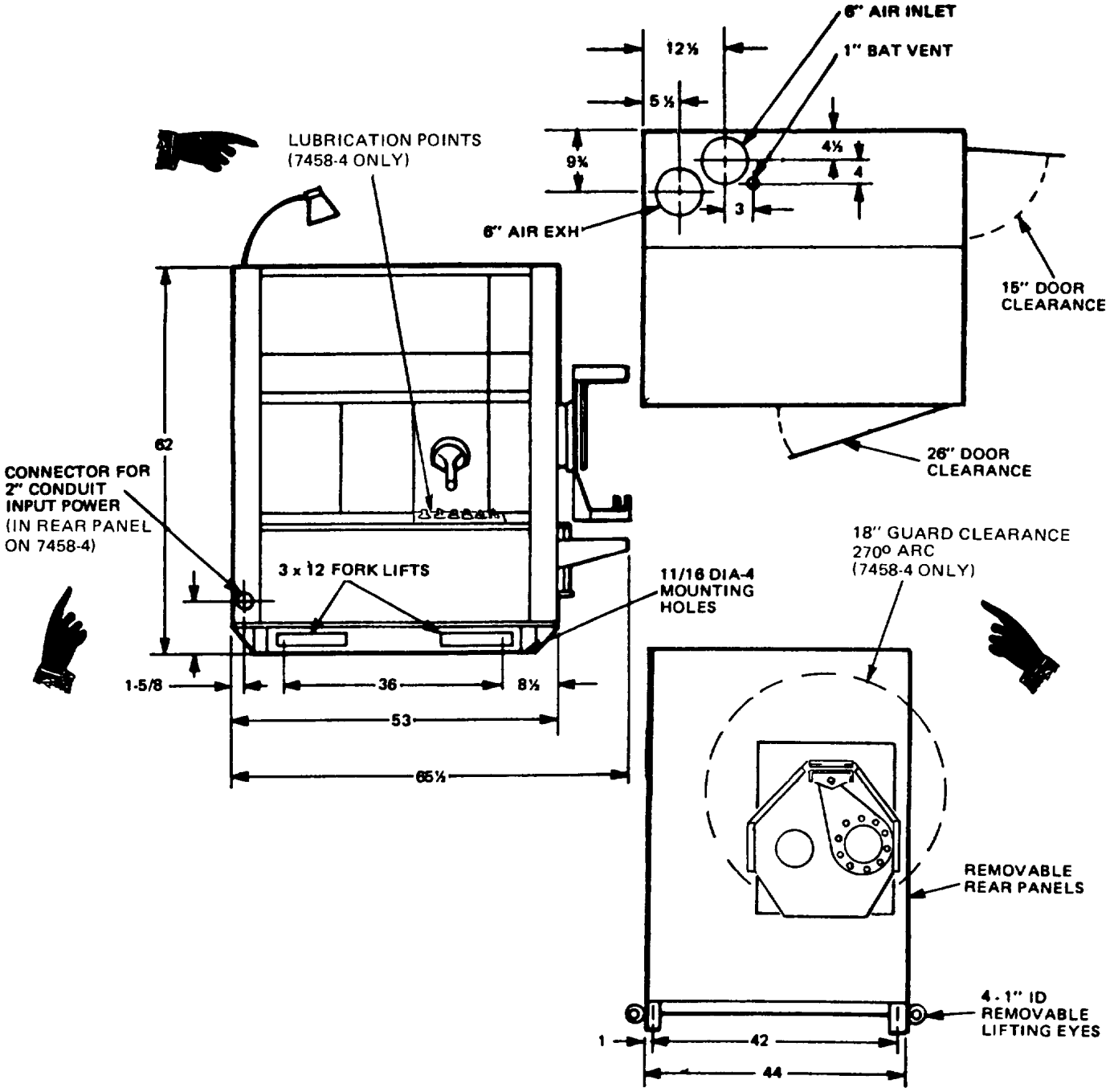
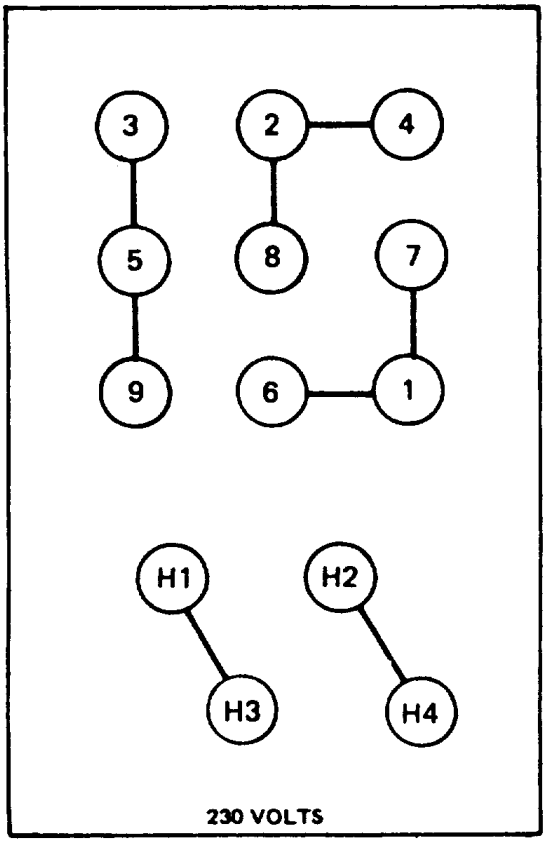


Figure 2-2. Test stand outline dimensions.



TERMINAL BOARD

PART NO.	VOLTAGE	HEATER ELEMENT
7458-2	230V	GE CR123F91.4B
	460V	GE CR123F48.7B
7458-4	230V	AH 42430
	460V	AH 42232

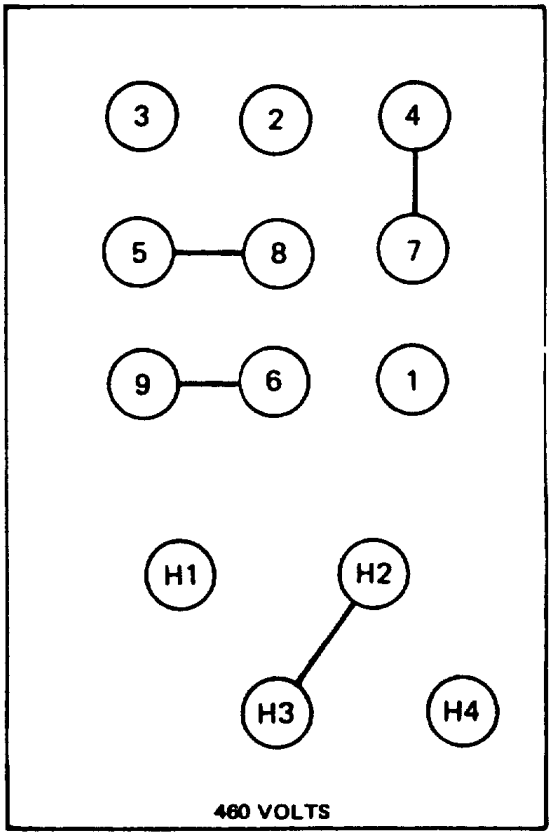


Figure 2-3. Link board assembly connections.

2-4. EQUIPMENT CHECKOUT

a. Check the zero setting of all front panel meters, per paragraph 2.3.c of TM 9-4910-663-12.

b. Turn on the external power source, set the main circuit breaker switch in the high voltage compartment to the on position (CB1, fig 2-8), and check to see that the test stand operates. A reversing switch is provided in the drive motor circuit for reversing drive motor rotation as necessary. With an input A-B-C phase sequence, setting the reversing switch to the down position will cause clockwise rotation of the output shafts as viewed facing the output shafts.

Section II. PRE-EMBARKATION INSPECTION OF MATERIAL IN UNITS ALERTED FOR OVERSEAS MOVEMENT

2-5. Not applicable.

Section III. TROUBLESHOOTING

2-6. INTRODUCTION

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the test stand. Each malfunction for an individual section of the test stand is followed by a list of tests or inspections which will help you to determine the corrective actions for you to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all possible malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed (except when the malfunction and cause are obvious) or is not corrected by listed corrective actions, notify your supervisor.

2-7. PRELIMINARY CONTROL SETTINGS. Before proceeding with troubleshooting, set the operating controls of the test stand to the positions listed in table 2-2.

2-8. USE OF TROUBLESHOOTING TABLE

a. Troubleshooting information is contained in table 2-5. To minimize unnecessary repetition of information in the table, troubleshooting information is arranged in a logical sequence. For any malfunction listed in the table, the tests and corrective actions listed are based on the assumption that none of the preceding malfunctions exists; therefore, make sure that none of the preceding malfunctions listed in the table are present. For direct reference to troubleshooting procedures by subject, the following alphabetical list is provided:

Subject	Troubleshooting Item No.
AC Ammeter Output Current Meter circuit	15
AC/DC Systems Equalizer Coil Circuit	18
AC/DC Systems Ignition Circuit	19
AC Voltmeter Output Voltage Meter Circuit	14
Auxiliary Start Circuit	20
Battery Charge Circuit	9
Battery Voltage Selector Circuit	7
DC Ammeter Load and Starter Output Current Battery Charge Current Meter Circuit	13
DC Variable Power Supply Circuits	3
DC Voltmeter Output Voltage Meter Circuit	8
Drive Control Circuit/Varidrive/Blower Motor	1
Field Shorting Circuit	21
Generator D-Sensing Circuit	17
Generator Field Circuit	12
Load Bank Circuit	6
Millivolt Meter Millivolt Drop Meter Circuit	16
Polarity Reversing Circuit	5
Regulator Fixed Resistance Circuit	2
Relay Contact Closure Circuit/DC Control Power	4
Starter Test Circuit	10
Tachometer RPM Circuit	11
Voltage Adjust Circuit	22

Table 2-2. Preliminary Control Settings

Control	Reference Designation	Position
INSTRUMENT PANEL (fig 2-4)		
DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHART CURRENT RANGE switch	S14	LOAD X10
DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch	S15	Off
DC AMMETER FIELD CURRENT RANGE switch	S30	X6
MILLIVOLT METER MILLIVOLT DROP RANGE switch	S16	X10
MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch	S34	Off
DC VOLTMETER OUTPUT VOLTAGE RANGE switch	S12	X5
DC VOLTMETER OUTPUT VOLTAGE SELECT switch	S11	REC GEN (P/N 7458-2) EXT (P/N 7458-4)
TACHOMETER RPM SELECT switch	S36	DIRECT DRIVE
TACHOMETER RPM PULLEY CALIBRATION control	R35	Fully ccw
AC AMMETER OUTPUT CURRENT SELECT switch	S25	T1
AC AMMETER OUTPUT CURRENT RAINCE switch	S26	X5
AC VOLTMETER OUTPUT VOLTAGE SELECT switch	S28	CIRCUIT T1-T2
AC VOLTMETER OUTPUT VOLTAGE RANGE switch	S27	X2
CONTROL PANEL (fig 2-5)		
EXTERNAL FIELD EXCITER AC SYSTEMS switch	S31	OFF
GENERATOR FIELD switch	S37	INT GND
POLARITY REVERSING switch	S7	NEG GND
FIELD CIRCUIT switch	S32	OFF
FINE CONTROL 0-5 AMPS (MAX) switch	S29	OFF
FIELD CURRENT control (fine)	R27	Fully ccw
FIELD CURRENT 0-20 AMPS (MAX) control	R26	Fully ccw
CIRCUIT BREAKERS	CB2 through CB11	IN
BATTERY CIRCUIT SELECTOR switch	S6	OFF (fully cw)
REGULATOR CHECK FIXED RESISTANCE METHOD switch	S13	OFF
DC VARIABLE VOLTS switch	S10	OFF

Table 2-2. Preliminary Control Settings (Continued)

Control	Reference Designation	Position
LOAD SELECTION 100 AMPS/50 AMPS switches	S17 through S19	OFF
LOAD SELECTION 50 AMPS/25 AMPS switches	S20 through S22	OFF
LOAD SELECTION 25 AMPS/12.5 MAPS switch	S23	OFF
LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch	S24	OFF
MASTER LOAD DISCONNECT switch	S8	OFF
VARIABLE LOAD control	R32	Fully ccw
RHEOSTAT PANEL (fig 2-5)		
VOLTAGE ADJ control	R37	Fully ccw
FIELD SHORTING SWITCH	S38	OFF
STARTER RHEOSTAT control	R18	Fully ccw
STARTER TEST switch	S9	OFF
AUX START switch	S39	OFF
TIMING PANEL (fig 2-7)		
CHARGE TIMER (MINUTES) control	TD1	OFF
BATTERY CHARGER CIRCUIT control	T3	Fully ccw
DC VARIABLE POWER SUPPLY 0-32 VDC control	T5	Fully ccw
HIGH VOLTAGE COMPARTMENT (fig 2-8)		
Circuit breaker switch	CB1	OFF
Reversing switch	S1	Down
BINDING POSTS PANEL (fig 2-6)		
AC/DC SYSTEMS EQUALIZER COIL TEST switch	S35	OFF
AC/DC SYSTEMS IGN ON switch	S33	OFF
Link between REGULATOR G+ and REGULATOR B+ binding posts	-	Removed
Link between REGULATOR G- and REGULATOR B- binding posts	-	Removed
GENERATOR D-SENSING switch	S40	ON
WORK LIGHT FIXTURE (fig 2-4)		
Work light switch	S5	OFF

b. Before proceeding with troubleshooting, perform a visual inspection for obvious signs of malfunction. Check parts and internal wiring for loose connections, breaks, chafing, and signs of overheating.

c. Before proceeding with troubleshooting procedures, disconnect and remove all accessories from the test stand, and disconnect all batteries.

d. When directed in the troubleshooting table to make continuity checks of switches, circuit breakers, or wiring, use the lowest range of an ohmmeter so that zero resistance will be indicative of continuity. When making continuity checks of components connected to their normal circuits, be aware of the possible effects of shunt circuits on the meter indication. Refer to the schematic and wiring diagrams (FO-1 and FO-2). If in doubt, disconnect one lead from the component whose continuity is to be checked.

e. To protect test equipment from damage, always set the test equipment to a scale or range higher than the value to be measured. If the normal value is not known, start with the highest scale or range and reduce the scale or range setting until a usable indication is obtained.

WARNING

High voltages dangerous to life are used in the test stand. Avoid contact with conducting parts. Turn off input power before connecting or disconnecting any test leads to the test stand.

WARNING

Use of the test stand involves rapidly rotating parts. Make certain that all parts subject to rotation are securely attached before turning on the test stand.

WARNING

The noise level is high during operation of the test stand. To protect hearing, wear an acoustical ear muff.

CAUTION

Never connect an ohmmeter across the calibration binding posts or jacks of the front panel meters. Some of these meters have millivolt movements that may be damaged by the ohmmeter output voltage.

Table 2-3. Wire Size Table

NOTE: s = strip wire approximately .5 in.

Wire code	Wire size	Wire length	Terminal #1	Terminal #2	Wire code	Wire size	Wire length	Terminal #1	Terminal #2
AC1A	6	39	s	s	AC4R	18	60.5	16	16
AC1B	18	9.5	13	14	AC4S	18	14.5	16	11
					AC4T	18	6	11	11
AC1C	18	14	12	14	AC4V	14	53	26	21
AC1D	18	11	12	14	AC4W	14	71.5	26	22
AC1E	6	26.5	51	s					
AC1F	18	62.5	13	11	AC5A	14	8.5	22	22
AC1G	18	74.5	11	s	AC5B	14	29	21	22
AC1H	18	21.5	s	s	AC5C	14	41.5	21	21
AC1J	18	11.5	s	s	AC5D	18	37.5	11	12
AC1K	18	19.5	s	s	AC5E	18	19.5	11	12
AC11	18	13.5	s	s	AC5F	18	50.5	11	12
					AC5G	18	71.5	s	11
AC2A	6	14.5	s	51	AC5H	18	16.5	11	s
AC2B	6	21	51	51	AC5J	18	36.5	11	12
AC2C	6	37	51	s	AC5K	18	78.5	16	11
AC2D	6	26.5	51	s	AC51	18	48.5	16	16
AC2E	14	84.5	26	24	AC5M	18	38	16	11
AC2F	14	56.5	26	s	AC5N	14	35.5	26	22
					AC5P	14	40.5	26	22
AC3A	6	13	s	51	AC5R	12	36	38	32
AC3B	6	21	51	51	AC5S	12	34.5	38	32
AC3C	6	32.5	51	s					
AC3D	18	8.5	13	14	AC6A	1/0	90	63	61
AC3E	18	10	12	14	AC6B	1/0	79	63	61
AC3F	18	14	12	14	AC6C	1/0	72	63	61
AC3G	6	25.5	51	s	AC6D	18	58	s	15
AC3H	14	84	26	24	AC6E	18	58.5	s	15
AC3J	14	59	26	s	AC6F	18	62.5	s	15
AC3K	18	43	16	11	AC6G	18	14	s	13
					AC6H	18	11	s	13
AC4A	18	80.5	s	s	AC6J	18	8.5	s	s
AC4B	18	17.5	s	s	AC6K	18	32.5	s	s
AC4C	18	86.5	s	s	AC61	18	29.5	13	s
AC4D	18	75.5	13	s	AC6M	18	58.5	11	14
AC4E	18	59.5	11	12	AC6N	18	11.5	s	14
AC4F	18	87.5	11	s	AC6P	18	15	s	s
AC4G	18	11.5	11	s	AC6R	18	59	s	11
AC4H	18	30.5	16	12	AC6S	18	59	s	11
AC4J	18	67	11	12	AC6T	18	57	s	11
AC4K	18	13.5	11	11	AC6U	18	57	s	11
AC41	18	8	11	12	AC6V	18	62.5	s	11
AC4M	18	68.5	16	12	AC6W	18	62.5	s	11
AC4N	18	63.5	16	11	AC6X	18	12	s	s
AC4P	18	73	16	12	AC6Y	18	16.5	s	s

Table 2-3. Wire Size Table (Continued)

Wire code	Wire size	Wire length	Terminal #1	Terminal #2	Wire code	Wire size	Wire length	Terminal #1	Terminal #2
AC6Z	18	13.5	s	s	DC2X	18	9	s	13
					DC2Y	18	13	s	14
DC1A	18	44.5	11	16	DC2Z	1/0	59	63	63
DC1B	18	30	11	12					
DC1C	18	68.5	11	11	DC3A	14	62.5	21	26
DC1D	18	46	11	11	DC3B	14	13.25	26	21
DC1E	18	23	s	12	DC3C	14	15.5	23	26
DC1F	18	8.5	s	12	DC3D	18	40	s	13
DC1G	18	22.5	s	s	DC3E	14	22	21	23
					DC3F	14	14.75	31	31
DC1J	18	49.5	s	12	DC3G	10	14.5	31	31
DC1K	18	60	12	11	DC3H	10	56.5	31	34
DC11	18	55	s	12	DC3J	10	63	31	33
DC1M	18	79	s	11	DC3K	10	13.5	31	31
DC1N	18	78.5	s	11	DC31	10	69	31	37
DC1P	18	87	s	11	DC3M	10	68	31	37
DC1R	18	89	s	11	DC3N	14	15	21	21
DC1S	18	91.5	s	11	DC3P	10	55.5	31	34
DC1T	18	79	11	11	DC3R	10	13	31	33
DC1U	18	76	11	11	DC3S	18	13.5	13	13
DC1V	18	27.5	s	s	DC3T	14	10.5	21	23
DC1W	18	23	s	s	DC3U	18	13.5	16	13
DC1X	18	12.75	s	s	DC3V	18	53	16	14
DC1Y	18	13.5	s	s	DC3W	10	69	33	33
DC1Z	1/0	58	63	63	DC3X	14	8	23	23
					DC3Y	14	6	24	26
DC2A	18	66	13	16	DC3Z	14	4	24	26
DC2B	18	18	13	s					
DC2C	18	52	13	s	DC4A	14	34.5	23	26
DC2D	18	59.5	11	13					
DC2E	18	14	11	11	DC4C	4/0	64.5	72	71
DC2F	18	10	11	11	DC4D	4/0	64.5	72	71
DC2G	18	10	11	11	DC4E	1/0	47	63	61
DC2H	18	10.25	11	11	DC4F	14	51	23	25
DC2J	18	15.75	11	11	DC4G	18	34.5	s	13
DC2K	18	8.25	11	11	DC4H	18	12.5	11	13
DC21	18	7	11	11	DC4J	18	41.5	13	11
DC2M	18	13.75	11	11	DC4K	18	46.25	13	13
DC2N	14	36.5	23	25	DC41	18	46	13	13
DC2P	18	33.5	s	13	DC4M	18	48.75	13	13
DC2R	1/0	21	62	61	DC4N	18	50.5	s	13
DC2S	1/0	15.5	62	61	DC4P	18	51	s	11
DC2T	1/0	10.5	62	61	DC4R	18	46.5	11	14
DC2U	12	85.75	35	38	DC4S	18	37	s	14
DC2V	12	40	38	34	DC4T	12	30.5	33	38
DC2W	12	86	34	38	DC4U	1/0	18	63	62

Table 2-3. Wire Size Table (Continued)

Wire code	Wire size	Wire length	Terminal #1	Terminal #2	Wire code	Wire size	Wire length	Terminal #1	Terminal #2
DC4V	1/0	18	63	62	DC6V	1/0	36	62	62
DC4W	14	21	24	21	DC6W	1/0	26.5	63	63
DC4X	18	7.5	11	13	DC6X	1/0	26.5	63	63
DC4Y	18	18	s	s	DC6Y	1/0	22.5	63	63
DC4Z	18	11.5	s	13	DC6Z	1/0	22.5	63	63
DC5A	14	8	23	23	DC7A	12	18.5	31	33
DC5B	10	5.5	33	31	DC7B	12	19	31	33
DC5C	10	14	33	31	DC7C	12	19	31	33
DC5D	14	21	s	23	DC7D	12	20	31	33
DC5E	14	21	s	23	DC7E	12	21	31	33
DC5F	14	21.5	s	23	DC7F	12	21	31	33
DC5G	14	6	23	25	DC7G	12	17.25	31	33
DC5H	18	53	s	13	DC7H	12	16	31	33
DC5J	14	23.5	s	23	DC7J	12	18.75	31	33
DC5K	14	20.75	21	23	DC7K	12	19	31	33
DC51	14	16.75	21	24	DC71	12	19.5	31	33
DC5M	18	34.5	s	14	DC7M	12	20	31	33
DC5N	18	25.5	13	s	DC7N	12	19.75	31	33
DC5P	18	25	11	s	DC7P	12	21/25	31	33
DC5R	18	21	14	11	DC7R	12	60	31	36
DC5S	18	32.5	s	14	DC7S	12	61	31	36
DC5T	18	6.5	s	13	DC7T	12	64	31	36
DC5U	18	12	s	13	DC7U	12	62.5	31	36
DC5V	18	19.5	s	s	DC7V	12	48.5	31	34
DC5W	18	17.5	s	s	DC7W	12	51.5	31	34
DC5X	18	6.5	s	14	DC7X	1/0	15	61	62
DC5Y	18	5.5	s	13	DC7Y	18	14.5	s	s
DC6A	14	17	S	s	DC8A	12	66	31	33
DC6B	14	16	s	s	DC8B	12	65.5	31	33
DC6C	14	37	s	s	DC8C	12	67	31	33
DC6D	14	22	21	21	DC8D	12	68	31	33
DC6E	1/0	27	61	63	DC8E	12	70.25	31	33
DC6F	1/0	27	61	62	DC8F	12	64.5	31	33
DC6G	8	49.5	41	42	DC8G	12	65.5	31	33
DC6H	8	10.5	41	42	DC8H	12	67.5	31	33
DC6J	1/0	52	62	63	DC8J	12	68	31	33
DC6K	1/0	52	62	63	DC8K	12	70	31	33
DC61	1/0	36	62	63	DC81	12	72.5	31	33
DC6M	1/0	36	62	63	DC8M	12	73	31	33
DC6N	1/0	12.5	61	63	DC8N	12	76	31	33
DC6P	8	68	42	41	DC8P	12	77.5	31	33
DC6R	18	37	s	13	DC8R	12	73.5	31	33
DC6S	14	16	s	23	DC8S	12	66.5	31	33
DC6T	18	39.5	13	14	DC8T	12	69.5	31	33
DC6U	1/0	14	61	62	DC8U	12	69.75	31	33

Table 2-3. Wire Size Table (Continued)

Wire code	Wire size	Wire length	Terminal #1	Terminal #2	Wire code	Wire size	Wire length	Terminal #1	Terminal #2
DC8V	12	74	31	33					
DC8W	12	18.5	31	33					
DC8X	12	77	33	33					
DC8Y	18	7.5	14	s					
DC9A	16	84	s	22					
DC9B	16	84	s	22					
DC9C	16	92	21	22					
DC9D	16	92	21	22					
DC9E	16	84	s	22					
DC9F	16	84	s	22					
DC9G	16	84	s	22					
DC9H	16	84	s	22					
DC9J	16	84	s	22					
DC9K	16	84	s	22					
DC91	16	8	s	21					
DC9M	16	7	21	23					
DC9N	16	7	21	23					
DC9P	16	8	s	21					
DC9R	18	46	s	12					
DC9S	18	46	s	12					
DC9T	18	46	s	12					
DC9U	18	46	s	12					
DC9V	18	46	s	12					
DC9W	18	9	s	13					
DC9X	18	9	s	13					
DC9Y	18	12.5	s	13					

Table 2-4. Connectors/Terminals

NOTE: Code corresponds to Terminal code on Wire Table.

Code	P/N	FSCM	NSN	Wire Size	Lug Size
			TEST STAND, PART NO. 7458-2		
11	MS25036-102	96906	5940-00-204-8966	22-18	#6
12	MS25036-149	96906	5940-00-557-1629	22-18	#8
13	MS25036-103	96906	5940-00-143-4771	22-18	#10
14	IIS25036-150	96906	5940-00-113-8184	22-18	1/4
15	MS25036-151	96906	5940-00-113-8185	22-18	1/2
16	FIT S09153	14726	-	22-18	Tab
21	MIS25036-107	96909	5940-00-113-8179	16-14	#6
22	MS25036-153	96906	5940-00-143-4774	16-14	#8
23	MS25036-108	96906	5940-00-143-4780	16-14	#10
24	MS25036-154	96906	5940-00-230-0515	16-14	1/4
25	MS25036-155	96906	5940-00-660-3633	16-14	1/2
26	FIT S09111	14726	-	16-14	Tab
31	MS25036-111	96906	5940-00-204-8990	12-10	#6
32	MS25036-156	96906	5940-00-143-4775	12-10	#8
33	MS25036-112	96906	5940-00-143-4794	12-10	#10
34	MS25036-157	96906	5940-00-143-4777	12-10	1/4
35	MS25036-113	96906	5940-00-113-8183	12-10	5/16
36	MS25036-114	96906	5940-00-113-9826	12-10	3/8
37	MS25036-158	96906	5940-00-682-2445	12-10	1/2
38	FIT S09174	14726	-	12-10	Tab
41	MS20659-140	96906	5940-00-115-0763	8	#8
42	MS20659-141	96906	5940-00-113-9825	8	1/4
51	MS20659-109	96906	5940-00-114-1317	6	1/4
61	MS20659-151	96906	5940-00-115-2683	1/0	5/16
62	MS20659-118	96906	5940-00-115-2684	1/0	3/8
63	MS20659-135	96906	5940-00-115-5001	1/0	1/2
71	MS20659-123	96906	5940-00-115-5013	4/0	3/8
72	MS20659-124	96906	5940-00-115-5023	4/0	1/2
			TEST STAND, PART NO. 7458-4		
11	51862-16	00779		22-16	#6
12	2-31890-16	00779		22-16	#8
13	2-31891-16	00779		22-16	#10
14	2-31894-26	00779		22-16	1/4
15	328948	00779		22-16	1/2
16	FIT S09153	14726		22-16	Tab

Table 2-4. Connectors/Terminals (Continued)

Code	P/N	FSCM	NSN	Wire Size	Lug Size
		TEST STAND, PART NO. 7458-4 (Continued)			
21	2-32442-16	00779		16-14	#6
22	2-31902-16	00779		16-14	#8
23	2-31903-26	00779		16-14	#10
24	1-31906-16	00779		16-14	1/4
25	328850	00779		16-14	1/2
26	FIT S09111	14726		16-14	Tab
31	2-35107-16	00779		12-10	#6
32	2-35108-16	00779		12-10	#8
33	2-35109-16	00779		12-10	#10
34	2-35110-16	00779		12-10	1/4
35	2-35111-16	00779		12-10	5/16
36	1-320577-36	00779		12-10	3/8
37	MS25036-158	96906		12-10	1/2
38	FIT S09174	14726		12-10	Tab
41	322047	00779		8	#8
42	322049	00779		8	1/4
	322004	00779		8	3/8
51	322051	00779		6	1/4
61	322086	00779		1/0	5/16
62	322087	00779		1/0	3/8
63	321677	00779		1/0	1/2
71	322061	00779		4/0	3/8
72	322062	00779		4/0	1/2

Table 2-5. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. DRIVE CONTROL CIRCUIT/VARIDRIVE/BLOWER MOTOR

a. AC POWER ON INDICATOR DS2 FAILS TO LIGHT WHEN CIRCUIT BREAKER SWITCH CB1 IS SET TO ON POSITION.

Step 1. Shut off external power source, remove AC POWER ON indicator lamp DS2, and check lamp for continuity with an ohmmeter.

Replace AC POWER ON indicator lamp DS2 if it is open.

Step 2. Disconnect lead from one side of CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker. Using an ohmmeter, check for continuity across terminals of circuit breaker CB2 with circuit breaker closed.

Replace circuit breaker CB2 of continuity is not obtained.

Step 3. Reconnect lead to circuit breaker CB2. Turn on external power source, set circuit breaker switch CB1 to the ON position, and close CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker. Using an AC voltmeter, check for 230/460 volts ±10% between terminals Hi and H4 of transformer T1, and for 115 volts ±10% between terminals X1 and X4 of transformers T1.

If voltage between terminals HI and H4 is normal but no voltage is obtained between terminals X1 and X4, replace transformer T1.

Step 4. With circuit breaker switch CB1 set to ON position, check for 230/460 volts AC between power in terminals L1 and L2, L2, and L3, and L3 and L1 of starter MS1, using AC voltmeter.

If AC voltage between any pair of terminals is any value other than 230/460 volts, proceed to Step 5.

Step 5. Using AC voltmeter, check for 230/460 volts AC across each phase at input terminals of circuit breaker switch CB1. Then, with circuit breaker switch CB1 set to ON position, check for 230/460 volts AC across each phase at output terminals of circuit breaker switch CB1.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If input voltage is normal but output voltage is not normal, replace circuit breaker switch CB1.

Step 6. Using AC voltmeter, check for 230/460 volts AC between output terminals of drive reversing switch S1 with circuit breaker switch CB1 set to ON position. Then, set circuit breaker switch CB1 to OFF position, set drive reversing switch S1 to its opposite setting, set circuit breaker switch CB1 back to ON position, and repeat voltage measurement.

If AC voltage is any value other than 230/460 volts, replace drive reversing switch S1.

b. WORK LAMP FAILS TO LIGHT WHEN WORK LIGHT SWITCH S5 SET TO ON POSITION.

Step 1. Check to make sure that circuit breaker switch CB1 and CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker are both set to ON position.

Set circuit breakers to ON position.

Step 2. Remove work lamp DS3 and check for continuity with ohmmeter.

Replace work lamp DS3 if continuity is not obtained. If continuity is obtained, replace work light switch S5.

c. VARIDRIVE DOES NOT START WHEN START SWITCH S3 IS PRESSED.

Step 1. Check to make sure that circuit breaker CB1 is set to ON position.

Set circuit breaker switch CB1 to ON position.

Step 2. Check to make sure that high voltage compartment door is closed.

Close high voltage compartment door.

Step 3. Check to see that drive starter MS1 is not tripped.

Press overload reset on drive starter MS1 in.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 4. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity across terminals of high voltage compartment door interlock switch S4 while manually operating switch.

Replace switch S4 if continuity indication is not obtained.

Step 5. With circuit breaker switch CB1 set to OFF position, and the high voltage compartment door open, check for continuity across terminals of START switch S3, using ohmmeter, while START switch is depressed.

Replace START switch S3 if continuity indication is not obtained.

Step 6. With circuit breaker switch CB1 set to OFF position, check for continuity across terminals of STOP switch S2, using ohmmeter, as switch is actuated. Open indication should be obtained with switch S2 depressed, and continuity indication should be obtained with switch S2 in normal up position.

Replace STOP switch S2 if indications are not as specified.

Step 7. With circuit breaker switch CB1 set to OFF position, check for 2-ohm resistance indication across actuating coil of drive starter MS1, using low resistance scale of ohmmeter.

Replace coil of drive starter MS1 if open or short circuit indication is obtained.

Step 8. With circuit breaker switch CB1 set to OFF position, check for zero resistance across each contact of drive starter MS1, using low resistance range of ohmmeter, while manually actuating drive starter MS1.

If some resistance is noted, remove drive starter cover and clean contacts. If contacts are burned or pitted excessively, replace contacts.

Step 9. Set circuit breaker switch CB1 to ON position. Press START switch S3 and check for single-phasing of varidrive, which is indicated by humming noise from varidrive motor.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If single-phasing is noted, replace drive starter MS1.

Step 10. Set circuit breaker switch CB1 to OFF position. Remove links from terminals 1 through 9 of link board assembly. Using ohmmeter, check for 0.3 to 0.4 ohm resistance indication between terminals 1 and 4, 1 and 9, 2 and 5, 2 and 7, 3 and 6, and 3-8 of link board assembly.

If open indication is obtained between any specified pair of terminals, replace varidrive motor.

Step 11. Reconnect links removed in step 10. Set circuit breaker switch CB1 to ON position. Press START switch S3, and check for tripping of overloads OL1, OL2, OL3 of drive starter MS1.

Replace varidrive motor if overloads trip repeatedly.

d. WHEN START SWITCH S3 IS PRESSED, VARIDRIVE STARTS MOMENTARILY, BUT THEN STOPS.

Step 1. Check to make sure that CIRCUIT BREAKERS CB3 BLOWERS and CIRCUIT BREAKERS CB4 BLOWERS circuit breakers are set to ON position.

Set circuit breakers to ON position.

Step 2. Set circuit breaker switch CB1 to OFF position, and check to make sure that cooling air ducts are not obstructed.

Clear away any obstruction.

Step 3. With circuit breaker switch CB1 set to OFF position, inspect air flow switch (fig 2-10) visually.

Replace air flow switch if it is broken.

Step 4. With circuit breaker switch CB1 set to OFF position, disconnect lead from one terminal of CIRCUIT BREAKERS CB3 BLOWERS and CIRCUIT BREAKERS CB4 BLOWERS circuit breakers. Using ohmmeter, check for continuity across terminals of -each circuit breaker with circuit breaker set to ON position.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace circuit breaker CB3 or CB4 if open indication is obtained.

Step 5. Reconnect leads disconnected in step 4. Set circuit breaker switch CB1 to ON position. Open rectifier chamber door and visually examine wheel of blower B2 while pressing START switch S3.

Replace blower motor B2 if wheel fails to rotate.

2. REGULATOR FIXED RESISTANCE CIRCUIT a. REGULATOR TESTS INVOLVING USE OF FIXED RESISTANCES PRODUCE ABNORMAL RESULTS, EVEN WITH REGULATOR KNOWN TO BE GOOD.

Step 1. Check to see that REGULATOR CHECK FIXED RESISTANCE METHOD switch S13 is set to ON position.

Set switch S13 to ON position.

Step 2. Using ohmmeter, check for continuity across terminals of REGULATOR CHECK FIXED RESISTANCE METHOD switch S13 with switch S13 set to ON position.

Replace switch S13 if open indication is obtained.

Step 3. Using ohmmeter, check for 7 ohm ±10% indication between REGULATOR B-binding post and REGULATOR CHECK FIXED RESISTANCE METHOD 7 OHM binding post.

Replace resistor R13 if resistance indication is not as specified.

Step 4. Using ohmmeter, check for 2-1/4 ohm ±10% indication between REGULATOR B-binding post and REGULATOR CHECK RIXED RESISTANCE METHOD 2 1/4 OHM binding post.

Replace resistor R12 if resistance indication is not as specified.

Step 5. Using ohmmeter, check for 1-1/2 ohm ±10% indication between REGULATOR B-binding post and REGULATOR CHECK FIXED RESISTANCE METHOD 1 1/2 OHM binding post.

Replace resistor R11 if resistance is not as specified.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 6. Using ohmmeter, check for 1/4 ohm ±10% indication between REGULATOR B± binding post anU REGULATOR CHECK FIXED RESISTANCE METHOD 1/4 OHM binding post.

Replace resistor R10 if resistance is not as specified.

3. DC VARIABLE POWER SUPPLY CIRCUITS

a. DC VOLTAGE AT DC VARIABLE VOLTS OUTPUT BINDING POSTS CANNOT BE ADJUSTED OVER 0 TO 32 VOLT RANGE.

Step 1. If DC voltage at DC VARIABLE VOLTS OUTPUT binding posts is zero, check to make sure that circuit breaker switch CB1, CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, CIRCUIT BREAKERS CB7 DC VAR. VOLTS circuit breaker, CIRCUIT BREAKERS CB9 DC VAR. VOLTS circuit breaker, and DC VARIABLE VOLTS switch S10 are all set to ON position.

Set switches and circuit breakers to ON position.

Step 2. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity across terminals of DC VARIABLE VOLTS switch S10 with switch set to ON position.

Replace switch S10 if open indication is obtained.

Step 3. Using ohmmeter, check for continuity across terminals of CIRCUIT BREAKERS CB9 DC VAR. VOLTS circuit breaker with circuit breaker set to ON position.

Replace CIRCUIT BREAKER CB9 if open indication is obtained.

Step 4. Disconnect lead from one terminal of CIRCUIT BREAKERS CB7 DC VAR. VOLTS circuit breaker. Using ohmmeter, check for continuity across terminals of CIRCUIT BREAKER CB7 with circuit breaker set to ON position.

Replace CIRCUIT BREAKER CB7 if open indication is obtained.

Step 5. Replace lead disconnected in step 4. Disconnect lead from ± terminal of rectifier assembly CR9 through

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CR12. Connect positive lead of ohmmeter to + terminal of rectifier assembly and negative ohmmeter lead to each AC input terminal in turn, and check for very high resistance indication in each case.

Replace rectifier assembly CR9 through CR12 if resistance indication in range of 0 to 1000 ohms is obtained.

Step 6. Repeat resistance checks of step 5, except with ohmmeter leads reversed. Check for very low resistance indications.

Replace rectifier assembly CR9 through CR12 if open circuit indication is obtained.

Step 7. Disconnect lead from - terminal of rectifier assembly CR9 through CR12. Connect negative lead of ohmmeter to- terminal of rectifier assembly CR9 through CR12, and connect positive ohmmeter lead to each AC input terminal in turn. Check for very high resistance indication in each case.

Replace rectifier assembly CR9 through CR12 if resistance indication of 0 to 1000 ohms is obtained.

Step 8. Repeat the measurements of step 7, except with ohmmeter leads reversed. Check for very low resistance indication.

Replace rectifier assembly CR9 through CR12 if open indication is obtained.

Step 9. Reconnect leads disconnected in steps 5 and 7. Set circuit breaker switch CB1 to ON position. Using AC voltmeter, measure AC voltages between terminals X1 and X4, and between terminals Hi and H4 of transformer T6 as DC VARIABLE POWER SUPPLY 0-32 VDC control is rotated over its full range. AC voltage should vary over range of 0 to 36 volts at terminals Xl and X4, and over range of 0 to 130 volts at terminals H1 and H4.

If voltage between terminals H1 and H4 is normal but not voltage is obtained at terminals Xl and X4, replace transformer T6. If voltages at both measurement points are not normal, replace transformer T5.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. RELAY CONTACT CLOSURE CIRCUIT/DC CONTROL POWER

a. WITH JUMPER CONNECTED BETWEEN RELAY CONTACTS INPUT BINDING POSTS, CONTACT CLOSURE INDICATOR DS7 FAILS TO LIGHT.

Step 1. Check to make sure that circuit breaker switch CB1, CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, and CIRCUIT BREAKERS CB5 RELAY CONTROL circuit breaker are all set to ON position.

Set circuit breakers to ON position.

Step 2. Set circuit breaker switch CB1 to OFF position. Remove lamp from CONTACT CLOSURE indicator DS7, and check lamp filament for continuity with ohmmeter.

Replace lamp if open indication is obtained.

Step 3. With circuit breaker switch CB1 set to OFF position, check resistance across terminals of resistor R5 with ohmmeter.

Replace resistor RS if resistance indication is not within 150 ±15 ohms.

Step 4. Set circuit breaker switch CB1 to ON position. Using DC voltmeter, check for 26 to 30 volt DC indication between RELAY CONTACTS INPUT binding posts.

If DC voltage is not as specified, set circuit breaker switch CB1 to OFF position and proceed to step 5.

Step 5. With circuit breaker switch CB1 set to OFF position, disconnect lead from one terminal of CIRCUIT BREAKERS CB5 RELAY CONTROL circuit breaker. Using ohmmeter, check for continuity across terminals of circuit breaker CB5 with circuit breaker set to ON position.

Replace circuit breaker CB5 if open indication is obtained.

Step 6. Reconnect lead disconnected in step 5. Disconnect lead from ± terminal of rectifier assembly CR1

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

through CR4. Connect positive lead of ohmmeter to + terminal of rectifier assembly CR1 through CR4, and connect negative ohmmeter lead to each AC input terminal in turn. Check for very high resistance in each case.

If resistance of approximately 0 to 1000 ohms is measured, replaced rectifier assembly CR1 through CR4.

Step 7. Repeat measurements of step 6, except with ohmmeter leads reversed. Check for very low resistance indication.

If open circuit indication is obtained, replace rectifier assembly CR1 through CR4.

Step 8. Disconnect lead from - terminal of rectifier assembly CR1 through CR4. Connect negative lead of ohmmeter to - terminal of rectifier assembly CR1 through CR4, and connect positive ohmmeter lead to each AC input terminal in turn. Check for very high resistance indication in each case.

If resistance indication of 0 to 1000 ohms is obtained, replace rectifier assembly CR1 through CR4.

Step 9. Repeat measurements of step 8, except with ohmmeter leads reversed. Check for very low resistance indication.

If open circuit indication is obtained, replace rectifier assembly CR1 through CR4.

Step 10. Reconnect leads disconnected in steps 6 and 8. Set circuit breaker switch CB1 to ON position. Using AC voltmeter, check for 30 volts ±10% between terminals X1 and X4 of transformer T2, and for 115 volts ±10% between terminals H1 and H4 of transformer T2.

If voltage between terminals H1 and H4 is normal; but no voltage indication is obtained between terminals Xl and X4, replace transformer T2.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

5. POLARITY REVERSING CIRCUIT

a. POLARITY REVERSING CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY WHEN PERFORMING GENERATOR TESTS.

Step 1. Check to make sure that circuit breaker switch CB1, CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, and CIRCUIT BREAKERS CB5 RELAY CONTROL circuit breaker are all set to ON position. Set POLARITY REVERSING switch S7 to POS GND position. Using ohmmeter, check for continuity between GENERATOR G± binding post and ground terminal post.

If open indication is obtained, proceed to step 2; if continuity indication is obtained, proceed directly to step 4.

Step 2. Set circuit breaker switch CB1 to OFF position. Disconnect lead from one terminal of coil of relay K4, and check coil of relay K4 for resistance between 56.7 and 66.2 ohms, using ohmmeter.

If coil resistance is not as specified, replace relay K4.

Step 3. Reconnect lead disconnected in step 2. With circuit breaker switch CB1 set to OFF position, check for continuity across appropriate terminals (fig 2-4) of POLARITY REVERSING switch S7 with switch set to POS GND position, using ohmmeter.

Replace switch S7 if open indication is obtained.

Step 4. With circuit breaker switch CB1 set to ON position, set POLARITY REVERSING switch S7 to NEG GND position and check for continuity between GENERATOR G- binding post and ground terminal post with ohmmeter.

If continuity indication is not obtained, proceed to step 5.

Step 5. Set circuit breaker switch CB1 to OFF position. Disconnect lead from one terminal of coil of relay K5, and check coil of relay K5 for resistance between 56.7 and 66.2 ohms, using ohmmeter.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If coil resistance is not within specified limits, replace relay K5.

Step 6. Reconnect lead disconnected in step 5. With circuit breaker switch CB1 set to OFF position, check for continuity across appropriate terminals (fig 2-4) of POLARITY REVERSING switch S7 with switch set to NEG GND position.

Replace switch S7 if open indication is obtained.

6. LOAD BAND CIRCUIT

a. LOAD BANK CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY DURING TESTING OF EXTERNAL COMPONENTS.

Step 1. Set all LOAD SELECTION switches to OFF position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to LOAD X1 position. Connect ohmmeter between REGULATOR B± and REGULATOR B-binding posts. Check to see that circuit breaker switch CB1, CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, and CIRCUIT BREAKERS CB5 RELAY CONTROL circuit breaker are all set to ON position. Set MASTER LOAD DISCONNECT switch S8 and LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to ON position. Check ohmmeter indication as VARIABLE LOAD control R32 is rotated from fully counterclockwise setting to fully clockwise setting. Resistance should vary between 46.1 ohms ±5% and 1.14 ohms ±5%.

If ohmmeter indicates open circuit, proceed to step 2; if indication is normal, proceed directly to step 9.

Step 2. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B-binding post and load bank terminal 19.

If resistance is not as specified, replace load bank element.

Step 3. Using ohmmeter, check resistance between center terminal of rheostat R32 and terminal with lead. Resistance should be variable between 0 and 45 ohms.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If resistance indication is not as specified, replace rheostat R32.

Step 4. Using ohmmeter, check for continuity across terminals of LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24.

Replace switch S24 if open indication is obtained.

Step 5. Using ohmmeter, check for continuity across contacts of relay K10.

If continuity indication is not obtained, proceed to step 6.

Step 6. Using DC voltmeter, check for 24 to 30 volts across coil of relay K10.

If no voltage indication is obtained, set circuit breaker switch CB1 to OFF position, and perform continuity check of wiring in accordance with figure 2-4.

Step 7. Set circuit breaker switch CB1 to OFF position. Disconnect leads from one side of coil of relay K10, and check for resistance of 290 ohms ±10% across coil terminals, using ohmmeter.

If resistance is not as specified, replace relay K10.

Step 8. With circuit breaker switch CB1 set to OFF position, reconnect lead disconnected in step 7. Using ohmmeter, check for continuity across terminals of MASTER LOAD DISCONNECT switch S8.

Replace switch S8 if open indication is obtained.

Step 9. Set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to OFF position. Set LOAD SELECTION 25 AMPS/12.5 AMPS switch S23 to ON position. With circuit breaker switch CB1 set to ON position, check resistance indication between REGULATOR B+ and REGULATOR B- binding posts with ohmmeter. Resistance should be 1.14 ohms ±5%.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If open circuit indication is obtained, proceed to step 10; if normal indication is obtained, proceed directly to step 12.

Step 10. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B-binding post and-terminal 20 of load bank.

If open circuit indication is obtained, replace load bank element.

Step 11. Using ohmmeter, check for continuity across terminals of LOAD SELECTION 25 AMPS/12.5 AMPS switch S23 with switch set to ON position.

Replace switch S23 if open indication is obtained.

Step 12. Set LOAD SELECTION 25 AMPS/12.5 AMPS switch S23 to OFF position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to LOAD X3 position. Set LOAD SELECTION 50 AMPS/25 AMPS switch S22 to ON position. With circuit breaker switch CB1 set to ON position, check for 0.57 ohm ±5% indication between REGULATOR B± and REGULATOR B-bending posts, using ohmmeter.

If resistance indication is not as specified, proceed to step 13; if resistance indication is normal, proceed to step 18.

Step 13. Set LOAD SELECTION 50 AMPS/25 AMPS switch S22 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B-binding post and each of terminals 17 and 18 of load bank.

If either resistance indication is not as specified, replace load bank element.

Step 14. Using ohmmeter, check for continuity across each set of contacts of LOAD SELECTION 50 AMPS/25 AMPS switch S22 with switch set to ON position.

Replace switch S22 if open indication is obtained for either or both sets of contacts.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 15. Using ohmmeter, check for continuity across contacts of relay K6 with circuit breaker CB1 set to ON position.

If continuity indication is not obtained, proceed to step 16.

Step 16. Using DC voltmeter, check for 24 to 30 volt DC indication across coil of relay K6 with circuit breaker CB1 set to ON position.

If no voltage is indicated, set circuit breaker switch CB1 to OFF position, and perform continuity check of wiring and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14. Replace switch S14 if it is defective.

Step 17. With circuit breaker switch CB1 set to OFF position, disconnect lead from one coil terminal of relay K6. Using ohmmeter, check for relay K6 coil resistance between 60.3 and 70.4 ohms. Then reconnect lead.

If coil resistance is not within specified limits, replace relay K6.

Step 18. Set LOAD SELECTION 50 AMPS/25 AMPS switch S22 to OFF position. Set LOAD SELECTION 50 AMPS/25 AMPS switch S21 to ON position. With circuit breaker switch CB1 set to ON position, check for 0.57 ohm ±5% indication between REGULATOR B+ and REGULATOR B- binding posts, using ohmmeter.

If resistance indication is not as specified, proceed to step 19; if resistance indication is normal, proceed to step 21.

Step 19. Set LOAD SELECTION 50 AMPS/25 AMPS switch S21 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B- binding post and each of terminals 15 and 16 of load bank.

If either indication is not as specified, replace load bank element.

Step 20. Using ohmmeter, check for continuity across each set of contacts of LOAD SELECTION 50 AMPS/25 AMPS switch S21 with switch S21 set to ON position.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If open indication is obtained for either set of switch contacts, replace switch S21.

Step 21. Set LOAD SELECTION 50 AMPS/25 AMPS switch S21 to OFF position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to LOAD X10 position. Set LOAD SELECTION 50 AMPS/25 AMPS switch S20 to ON position. Using ohmmeter, check for 0.57 ohm ±5% indication between REGULATOR B+ AND REG ULATOR B- binding posts.

If resistance indication is not as specified, proceed to step 22; if resistance indication is normal, proceed to step 27.

Step 22. Set LOAD SELECTION 50 AMPS/25 AMPS switch S20 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B- binding post and each of terminals 13 and 14 of load bank.

If either resistance indication is not as specified, replace load bank element.

Step 23. Using ohmmeter, check for continuity across each set of contacts of LOAD SELECTION 50 AMPS/25 AMPS switch S20 with switch S20 set to ON position.

If open indication is obtained for either set of contacts, replace switch S20.

Step 24. Using ohmmeter, check for continuity across contacts of relay K7 with circuit breaker CB1 set to ON position.

If continuity indication is not obtained, proceed to step 25.

Step 25. Using DC voltmeter, check for DC voltage between 24 and 30 volts across coil of relay K7.

If no voltage is indicated, set circuit breaker switch CB1 to OFF position, and perform continuity check of wiring and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14. Replace switch S14 if it is defective.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 26. Set circuit breaker switch CB1 to OFF position. Disconnect leads from one coil terminal of relay K7. Using ohmmeter, check for relay K7 coil resistance between 60.3 and 70.4 ohms. Then reconnect leads.

Replace relay K7 if coil resistance is not as specified.

Step 27. Set LOAD SELECTION 50 AMPS/25 AMPS switch S20 to OFF position. Set LOAD SELECTION 100 AMPS/50 AMPS switch S19 to ON position. With circuit breaker switch CB1 set to ON position, check for 0.285 ohm ±5% resistance indication between REGULATOR B+ and REGULATOR B- binding posts, using ohmmeter.

If resistance is not as specified, proceed to step 28; if resistance is normal, proceed to step 30.

Step 28. Set LOAD SELECTION 100 AMPS/50 AMPS SWITCH S19 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B- binding post and each of load bank terminals 9, 10, 11, and 12.

If any indication is not as specified, replace load bank element.

Step 29. Using ohmmeter, check for continuity across each set of contacts of LOAD SELECTION 100 AMPS/50 AMPS switch S19 with switch S19 set to ON position.

If open indication is obtained for any set of switch contacts, replace switch S19.

Step 30. Set LOAD SELECTION 100 AMPS/50 AMPS switch S19 to OFF position. Set LOAD SELECTION 100 AMPS/50 AMPS switch S18 to ON position. With circuit breaker switch CB1set to ON position, check for 0.285 ohm ±5% resistance indication between REGULATOR B+ and REGULATOR B- binding posts, using ohmmeter.

If resistance indication is not as specified, proceed to step 31; if resistance indication is normal, proceed to step 33.

Step 31. Set LOAD SELECTION 100 AMPS/50 AMPS switch S18 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% indication between REGULATOR B- binding post and each of load bank terminals 5, 6, 7, and 8.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If resistance indication at any terminal is not as specified, replace load bank element.

Step 32. Using ohmmeter, check for continuity across each set of contacts of LOAD SELECTION 100 AMPS/50 AMPS switch S18 with switch S18 set to ON position.

If open indication is obtained for any set of switch contacts, replace switch S18.

Step 33. Set LOAD SELECTION 100 AMPS/50 AMPS switch S18 to OFF position. Set LOAD SELECTION 100 AMP/50 AMPS switch S17 to ON position. With circuit breaker switch CB1 set to ON position, check for 0.285 ohm ±5% resistance indication between REGULATOR B+ and REGULATOR B- binding posts, using ohmmeter.

If resistance indication is not as specified, proceed to step 34.

Step 34. Set LOAD SELECTION 100 AMPS/50 AMPS switch S17 to OFF position. Using ohmmeter, check for 1.14 ohm ±5% resistance indication between REGULATOR B- binding post and each of load bank terminals 1, 2, 3, and 4.

If resistance indication at any terminal is not as specified, replace load bank element.

Step 35. Using ohmmeter, check for continuity across each set of terminals of LOAD SELECTION 100 AMPS/50 AMPS switch S17 with switch S17 set to ON position.

If open indication is obtained for any set of switch contacts, replace switch S17.

7. BATTERY VOLTAGE SELECTOR CIRCUIT

a. BATTERY VOLTAGE SELECTOR INOPERATIVE OR OPERATES ERRATICALLY WHEN TESTING EXTERNAL COMPONENTS.

Step 1. Disconnect all batteries from battery compartment battery terminals. Check to see that circuit breaker switch CB1, CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, and CIRCUIT

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BREAKERS CB5 RELAY CONTROL circuit breaker are all set to ON position. Set BATTERY CIRCUIT SELECTOR switch S6 to 24V position, and check to make sure that 24 VOLT indicator DS6 lights.

If 24 VOLT indicator DS6 fails to light, proceed to step 2; if indicator lights, proceed to step 4.

Step 2. Remove lamp from 24 VOLT indicator DS6, and check lamp filament for continuity, using ohmmeter.

Replace lamp if filament is open.

Step 3. With lamp removed from 24 VOLT indicator DS6, check for 39 ohm ±10% resistance indication across resistor R4, using ohmmeter.

Replace resistor R4 if resistance is not as specified

Step 4. Using ohmmeter, check for continuity between 24V battery terminal and STARTER + INPUT binding post.

If open indication is obtained, proceed to step 5; if continuity indication is obtained, proceed to step 8.

Step 5. With circuit breaker switch CB1 set to ON position, check for 24 to 30 volt DC indication across coil terminals of relay K3, using DC voltmeter.

If voltage is normal, replace relay K3; if no voltage is indicated, proceed to step 6.

Step 6. Set circuit breaker switch CB1 to OFF position. Disconnect leads from one coil terminal of relay K3, and check for coil resistance of 60.3 to 70.4 ohms, using ohmmeter. Then, reconnect leads.

Replace relay K3 if coil resistance is not as specified.

Step 7. With circuit breaker switch CB1 set to OFF position, check for continuity between arm of BATTERY CIRCUIT SELECTOR switch S6 and 24 volt position terminal of switch S6, using ohmmeter.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace switch S6 if continuity indication is not obtained.

Step 8. Connect ohmmeter between 12V battery terminal and STARTER + INPUT binding post. Set BATTERY CIRCUIT SELECTOR switch S6 to 12V position. Check to see that 12 VOLT indicator DS5 lights, and ohmmeter indicates continuity.

If 12 VOLT indicator fails to light, proceed to step 9; if ohmmeter indicates open circuit, proceed to step 11; if indications are normal, proceed to step 14.

Step 9 With circuit breaker switch CB1 set to OFF position, remove lamp from 12 VOLT indicator, and check lamp filament for continuity, using ohmmeter.

Replace lamp if filament is open.

Step 10. With lamp removed from 12 VOLT indicator, check for 39 ohm ±10% resistance indication across resistor R3, using ohmmeter.

Replace resistor R3 if resistance indication is not as specified.

Step 11. With circuit breaker switch CB1 set to ON position, check for 24 to 30 volt DC indication across coil terminals of relay K2, using DC voltmeter.

If voltage is normal, replace relay K2; if no voltage is indicated, proceed to step 12.

Step 12. Set circuit breaker switch CB1 to OFF position. Disconnect leads from one coil terminal of relay K2. Using ohmmeter, check for relay K2 coil resistance between 60.3 and 70.4 ohms. Then reconnect leads.

Replace relay K2 if resistance is not as specified.

Step 13. With circuit breaker switch CB1 set to OFF position, check for continuity between arm of BATTERY CIRCUIT SELECTOR switch S6 and 12 volt position terminal of switch S6, using ohmmeter.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace switch S6 if open indication is obtained.

Step 14. Connect ohmmeter between 6V battery terminal and STARTER + INPUT binding post. Set BATTERY CIRCUIT SELECTOR switch S6 to 6V position. Check to see that 6 VOLT indicator DS4 lights, and ohmmeter indicates continuity.

If 6 VOLT indicator DS4 fails to light, proceed to step 15; if ohmmeter indicates open circuit, proceed directly to step 17.

Step 15. Set circuit breaker switch CB1 to OFF position. Remove lamp from 6 VOLT indicator DS4, and check filament for continuity with ohmmeter.

Replace lamp if open indication is obtained.

Step 16. With lamp removed from 6 VOLT indicator DS4, check for 39 ohm ±10% indication across resistor R2, using ohmmeter.

If resistance indication is not as specified, replace resistor R2.

Step 17. With circuit breaker switch CB1 set to ON position, check for 24 to 30 volt DC indication across coil terminals of relay K1, using DC voltmeter.

If DC voltage indication is normal, replace relay K1; if no voltage is indicated, proceed to step 18.

Step 18. Set circuit breaker switch CB1 to OFF position. Disconnect leads from one coil terminal of relay K1, and check for 60.3 to 70.4 ohm resistance indication across coil terminals of relay K1, using ohmmeter. Reconnect leads.

If resistance indication is not as specified, replace relay K1.

Step 19. With circuit breaker switch CB1 set to OFF position, check for continuity between arm of BATTERY CIRCUIT SELECTOR switch S6 and 6-volt position terminal of switch S6.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If open indication is obtained, replace switch S6.

8. DC VOLTMETER OUTPUT VOLTAGE METER CIRCUIT

a. DC VOLTMETER OUTPUT VOLTAGE METER INOPERATIVE OR PROVIDES INCORRECT INDICATIONS DURING TEST OF EXTERNAL COMPONENTS.

Step 1. Set circuit breaker switch CB1 to OFF position. Connect external 0-50 volt DC voltmeter to DC VARIABLE VOLTS OUTPUT binding posts, observing polarity. Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X5 position, and DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position. Check to see that CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, CIRCUIT BREAKERS CB9 DC VAR. VOLTS circuit breaker, and CIRCUIT BREAKERS CB7 AC VAR. VOLTS circuit breaker are all set to ON position. Position DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to fully counterclockwise setting. Set circuit breaker switch CB1 to ON position. Set DC VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE VOLTS 0-32 VDC control for 5 volt indication on external DC voltmeter. Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X1 position, and check to see that both external DC voltmeter and DC VOLTMETER OUTPUT VOLTAGE meter M2 both indicate 5 volts.

If DC VOLTMETER OUTPUT VOLTAGE meter M2 fails to indicate, proceed to step 2; if indication is normal, proceed to step 4.

Step 2. With control settings as in step 1, connect external DC voltmeter to calibrating jacks beneath DC VOLTMETER OUTPUT VOLTAGE meter M2, and check for 5 volts DC indication on both meters.

If external DC voltmeter and DC VOLTMETER OUTPUT VOLTAGE meter M2 both do not indicate, replace DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11; if external DC voltmeter indicates but DC VOLTMETER OUTPUT VOLTAGE meter does not, proceed to step 3.

Step 3. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity between arm of DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 and terminal 12 of PC board assembly.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 if open indication is obtained; replace DC VOLTMETER OUTPUT VOLTAGE meter M2 if continuity indication is obtained.

Step 4. Connect external DC voltmeter to calibration jacks beneath DC VOLTMETER OUTPUT VOLTAGE meter M2. With all other control settings as in step 1, set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position, and adjust DC VARIABLE VOLTS 0-32 VDC control for 10 volt indication on external DC voltmeter. Check to see that DC VOLTMETER OUTPUT VOLTAGE meter M2 also indicates 10 volts.

If DC VOLTMETER OUTPUT VOLTAGE meter M2 fails to indicate 10 volts, proceed to step 5; if meter indication is normal, proceed to step 7.

Step 5. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity from arm of DC VOLTMETE OUTPUT VOLTAGE RANGE switch S12 and terminal 6 of PC board assembly.

If open indication is obtained, replace DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12.

Step 6. Set DC VARIABLE VOLTS switch S10 to OFF position. Using ohmmeter, check for 10,000 ohm ±1% indication between terminals 12 and 6 of PC board assembly.

If resistance indication is not as specified, replace resistor R8 on PC board assembly.

Step 7. With all other control settings as in step 1 and external DC voltmeter connected to calibration jacks below DC VOLTMETER OUTPUT VOLTS meter M2, set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X5 position. Adjust DC VARIABLE VOLTS 0-32 VDC control for 20 volt indication on external DC voltmeter. Check to see that DC VOLTMETER OUTPUT VOLTAGE meter M2 also indicates 20 volts.

If DC VOLTMETER OUTPUT VOLTAGE meter M2 does not indicate 20 volts, proceed to step 8; if indication is normal, proceed to step 10.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 8. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity between arm of DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 and terminal 11 of PC board assembly.

Replace switch S12 if open indication is obtained.

Step 9. Set DC VARIABLE VOLTS switch S10 to OFF position. Using ohmmeter, check for 40,200 ohm ± 1% indication between terminals 11 and 12 of PC board assembly.

Replace resistor R9 on PC board assembly if resistance indication is not as specified.

Step 10. Set circuit breaker switch CB1 to OFF position. Connect external DC voltmeter to DC VARIABLE VOLTS OUTPUT binding posts, observing polarity. Connect a test lead from positive (red) DC VARIABLE VOLTS OUTPUT binding post to REGULATOR B+ binding post, and connect second test lead from negative (black) DC VARIABLE VOLTS OUTPUT binding post to REGULATOR B- binding post. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to BAT pos. Set circuit breaker switch CB1 to ON position and adjust DC VARIABLE VOLTS 0-32 VDC control to provide 10 volt indication on external DC voltmeter. Then, change external DC voltmeter leads to calibration jacks below DC VOLTMETER OUTPUT VOLTAGE meter M2, and check to see that both meters indicate 10 volts.

If meters fail to indicate 10 volts, replace DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11.

Step 11. Set circuit breaker CB1 to OFF position. Connect external DC voltmeter to DC VARIABLE VOLTS OUTPUT binding posts, observing polarity. Connect a test lead from positive (red) DC VARIABLE VOLTS OUTPUT binding post to REGULATOR G+ binding post, and connect second test lead from negative (black) DC VARIABLE VOLTS OUTPUT binding post to REGULATOR G- binding post. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to RECT GEN position. Set circuit breaker switch CB1 to ON position and adjust DC VARIABLE VOLTS 0-32 VDC control to provide 10 volt indication on external DC voltmeter. Then, change external DC voltmeter connections to calibration jacks below DC VOLTMETER OUTPUT VOLTAGE meter M2, and check to see that both

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

indicate 10 volts.

If meters fail to indicate 10 volts, replace DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11.

Step 12. Set circuit breaker CB1 to OFF position. Connect external DC voltmeter to DC VARIABLE VOLTS OUTPUT binding posts, observing polarity. Connect a test lead from positive (red) DC VARIABLE VOLTS OUTPUT binding post to positive (red) EXTERNAL DC VOLTAGE INPUT binding post, and connect another test lead from negative (black) DC VARIABLE VOLTS OUTPUT binding post to negative (black) EXTERNAL DC VOLTAGE INPUT binding post. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to EXT position. Set circuit breaker switch CB1 to ON position and adjust DC VARIABLE VOLTS 0-32 VDC control to provide 10 volt indication on external DC voltmeter. Then, change external DC voltmeter connections to calibration jacks below DC VOLTMETER OUTPUT VOLTAGE meter M2, and check to see that both meters indicate 10 volts.

If meters fail to indicate 10 volts, replace DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11.

9. BATTERY CHARGE CIRCUIT

a. BATTERY CHARGE CIRCUIT INOPERATIVE.

Step 1. Check to make sure that all batteries are disconnected from battery compartment battery terminals. Check to see that CIRCUIT BREAKERS CB2 DRIVE CONTROL circuit breaker, CIRCUIT BREAKERS CB5 RELAY CONTROL circuit breaker, CIRCUIT BREAKERS CB6 AC BATT. CHG. circuit breaker, CIRCUIT BREAKERS CB8 DC BATT. CHG. circuit breaker, and CIRCUIT BREAKERS CB11 DC circuit breaker are all set to ON position. Set circuit breaker switch CB1 to ON position. Set BATTERY CIRCUIT SELECTOR switch S6 to 24V position. Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position, and DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to BAT position. Set MASTER LOAD DISCONNECT switch S8 to ON position. Adjust CHARGE TIMER (MINUTES) control TD1 to 5 minute position and BATTERY CHARGE CIRCUIT control T3 to maintain 12 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

M2. Set LOAD SELECTION 25 AMPS/12.5 AMPS switch S23 to ON position. Press DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch S15, and readjust BATTERY CHARGE CIRCUIT control T3 to maintain 12 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Check to see that CHARGE INDICATOR is lighted, and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3 indicates approximately 10 amperes when switch S15 is pressed.

Proceed to step 2.

Step 2. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity across terminals of CIRCUIT BREAKERS CB11 DC circuit breaker.

Replace circuit breaker CB11 if open indication is obtained.

Step 3. With circuit breaker switch CB1 set to OFF position, check for continuity across terminals of CIRCUIT BREAKERS CB8 DC BATT. CHG. circuit breaker, using ohmmeter.

Replace circuit breaker CB8 if open indication is obtained.

Step 4. If CHARGE INDICATOR DS8 does not light, remove lamp from CHARGE INDICATOR DS8 and check for open filament, using ohmmeter.

Replace lamp if filament is open.

Step 5. With circuit breaker switch CB1 and CHARGE TIMER (MINUTES) control both set to OFF position, check for continuity across terminals of CIRCUIT BREAKERS CB6 AC BATT. CHG. circuit breaker, using ohmmeter.

Replace circuit breaker CB6 if open indication is obtained.

Step 6. Disconnect lead from common side of switch portion of CHARGE TIMER (MINUTES) timer TD1, position timer TD1 to 10 minute setting, and check for continuity across switch portion of timer TD1, using ohmmeter.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace timer TD1 if open indication is obtained.

Step 7. Reconnect lead disconnected in step 6. Disconnect lead from + terminal of rectifier assembly CR5 through CR8. Using high range of ohmmeter, check for very high resistance with ohmmeter positive lead connected to + terminal of rectifier assembly CR5 through CR8, and negative lead of ohmmeter connected to each AC input terminal of rectifier assembly in turn.

If resistance of 0 to 1000 ohms is indicated, replace rectifier assembly CR5 through CR8.

Step 8. Repeat procedure of step 7, except reverse ohmmeter leads and check for very low resistance.

If open circuit is indicated, replace rectifier assembly CR5 through CR8.

Step 9. Reconnect lead disconnected in step 7. Disconnect lead from negative terminal of rectifier assembly CR5 through CR8. Using high range of ohmmeter, check for very high resistance with ohmmeter negative lead connected to negative terminal of rectifier assembly CR5 through CR8 and positive lead of ohmmeter connected to each AC input terminal of rectifier assembly in turn.

If resistance of 0 to 1000 ohms is indicated, replace rectifier assembly CR5 through CR8.

Step 10. Repeat procedure of step 9, except reverse ohmmeter leads and check for very low resistance.

If open circuit is indicated for either check, replace rectifier assembly CR5 through CR8.

Step 11. Reconnect lead disconnected in step 9. Set circuit breaker switch CB1 to ON position, and adjust CHARGE TIMER (MINUTES) control to 10 minute setting. Using AC voltmeter, check that AC voltage between terminals H1 and H4 of transformer T4 is adjustable over range of 0 to 130 volts using BATTERY CHARGE CIRCUIT control T3, and AC voltage between terminals X1 and X4 of transformer T4 is adjustable over range of 0 to 32 volts using BATTERY CHARGE CIRCUIT control T3.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

If both voltages are zero, replace transformer T3; if voltage at terminals H1 and H4 is normal, but zero voltage is obtained at terminals X1 and X4, replace transformer T4.

10. STARTER TEST CIRCUIT

a. STARTER TEST CIRCUIT INOPERATIVE WHEN PERFORMING TEST OF EXTERNAL COMPONENTS.

Step 1. Check to see that CIRCUIT BREAKERS CB2 DRIVE CONTROL, CIRCUIT BREAKERS CB5 RELAY CONTROL, CIRCUIT BREAKERS CB7 AC VAR. VOLTS, and CIRCUIT BREAKERS CB9 DC VAR. VOLTS circuit breakers are all set to ON position. Set circuit breaker switch CB1 to OFF position. Connect a test lead from positive (red) DC VARIABLE VOLTS OUTPUT binding post to STARTER FREE RUN binding post, and connect another test lead from negative (black) DC VARIABLE VOLTS OUTPUT binding post to STARTER COM binding post. Set AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to STARTER FREE RUN X4 position. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position. Rotate STARTER RHEOSTAT control R18 clockwise until it is snug. Set circuit breaker switch CB1 to ON position. Set DC VARIABLE VOLTS switch S10 to ON position and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control as required to provide 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Set LOAD SELECTION 25 AMPS/12.5 AMPS switch S23 to ON position, set STARTER TEST switch S9 to ON position, and check to see that indication of approximately 6 amperes in the reverse direction is obtained on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3.

If no current indication is obtained, proceed to step 2.

Step 2. Set DC VARIABLE VOLTS switch S10 to OFF position. Disconnect test leads at STARTER FREE RUN and STARTER COM binding posts. Using ohmmeter, check for continuity across contacts of relay K8.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If continuity indication is not obtained, proceed to step 3; if continuity indication is obtained, proceed directly to step 6.

Step 3. Using DC voltmeter, check for 24 to 30 volts DC across coil terminals of relay K8.

If voltage is normal, replace relay K8; if no voltage or low voltage is obtained, proceed to step 4.

Step 4. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, check for continuity across terminals of STARTER TEST switch S9 with one lead disconnected from switch terminal and switch set to ON position.

Replace switch S9 if open indication is obtained.

Step 5. With circuit breaker switch CB1 set to OFF position, reconnect lead disconnected in step 4, and disconnect leads from one coil terminal of relay K8. Using ohmmeter, check for 60.3 to 70.4 ohm resistance indication across coil terminals of relay K8.

Replace relay K8 if resistance is not as specified.

Step 6. With circuit breaker switch CB1 set to OFF position, check for resistance indication of 1 ohm or less across terminals of STARTER RHEOSTAT R18 with rheostat control turned clockwise until snug.

Repair rheostat R18 if resistance is above 1 ohm.

Step 7. With circuit breaker switch CB1 set to OFF position, perform continuity check of starter test circuit, including DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14, using ohmmeter.

Replace switch S14, if it is defective. Repair wiring defects.

11. TACHOMETER RPM CIRCUIT

a. TACHOMETER RPM CIRCUIT INOPERATIVE OR PROVIDES INCORRECT INDICATIONS DURING TEST OF EXTERNAL COMPONENTS.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 1. Check to see that CIRCUIT BREAKERS CB2 DRIVE CONTROL, CIRCUIT BREAKERS CB3 BLOWER, and CIRCUIT BREAKERS CB4 BLOWER circuit breakers are all set to ON position. Set TACHOMETER RPM SELECT switch S36 to DIRECT DRIVE position, and set TACHOMETER RPM PULLEY CALIBRATION control R35 to mid-range. Connect AC voltmeter (0-10 range) to calibration jacks below TACHOMETER RPM meter M1. Set circuit breaker switch CB1 to ON position and start varidrive. Increase varidrive speed to 6000 RPM at high speed head, as measured with hand-held tachometer. Check to see that external AC voltmeter indicates approximately 2 volts, TACHOMETER RPM meter M1 indicates approximately 6000 RPM, and both meter readings vary when TACHOMETER RPM SELECT switch is set to CAL PULLEY position and TACHOMETER RPM PULLEY CALIBRATION control is varied.

If external AC voltmeter indication is correct but TACHOMETER RPM meter M1 does not indicate, replace TACHOMETER RPM meter M1. If neither meter indicates, proceed to step 2.

Step 2. With varidrive operating at 6000 RPM at high speed head, check for 10 to 16 volt AC indication between black calibration jack at right side of TACHOMETER RPM meter M1 (facing meter) and terminal 2 of PC board assembly, using AC voltmeter.

If no voltage indication is obtained, replace tachometer generator B3. If voltage indication is normal, proceed to step 3.

Step 3. Stop varidrive and set circuit breaker switch CB1 to OFF position. Set TACHOMETER RPM SELECT switch S36 to DIRECT DRIVE position. Using ohmmeter, check for continuity indication between left calibration jack of TACHOMETER RPM meter M1 and terminal 7 of PC board assembly. Then, set TACHOMETER RPM SELECT switch S36 to CAL PULLEY position, and check for open indication between same points, using ohmmeter.

If either indication is not as specified, replace TACHOMETER RPM SELECT switch S36.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 4. Connect ohmmeter between left calibration jack of TACHOMETER RPM meter M1 (facing meter) and center terminal of TACHOMETER RPM PULLEY CALIBRATION potentiometer R35. Set TACHOMETER RPM SELECT switch S36 to CAL PULLEY position and check for zero indication on ohmmeter. Then, set TACHOMETER RPM SELECT switch S36 to DIRECT DRIVE position, and check for open circuit indication on ohmmeter.

If either indication is not as specified, replace TACHOMETER RPM SELECT switch S36.

Step 5. Connect ohmmeter between center terminal of TACHOMETER RPM PULLEY CALIBRATION potentiometer R35 and terminal 1 of PC board assembly. Set TACHOMETER RPM SELECT switch S36 to DIRECT DRIVE position, and check that resistance indication on ohmmeter is adjustable over range of 0 to 100,000 ohms ±10%, using TACHOMETER RPM PULLEY CALIBRATION control.

If resistance indication is not within specified range, replace TACHOMETER RPM PULLEY CALIBRATION potentiometer R35.

Step 6. Connect ohmmeter between terminals 1 and 2 of PC board assembly. Set TACHOMETER RPM SELECT switch S36 to DIRECT DRIVE position. Check for 2740 ohm ±1% indication on ohmmeter.

If resistance is not as specified, replace resistor R33 on PC board assembly.

Step 7. Connect ohmmeter between center terminal of potentiometer R36 on PC board assembly and terminal 2 of PC board assembly. Set TACHOMETER RPM SELECT switch S36 to CAL PULLEY position. Check for 15,000 ohm ±1% indication on ohmmeter.

If resistance is not as specified, replace resistor R34 on PC board assembly.

Step 8. Connect ohmmeter between terminals 2 and 7 of PC board assembly. Set TACHOMETER RPM SELECT switch to CAL PULLEY position. Check for indication between 15,000 and 25,000 ohms on ohmmeter.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If open circuit is indicated, replace potentiometer R36 on PC board assembly.

NOTE
If potentiometer R36 is replaced, tachometer must be recalibrated.

12. GENERATOR FIELD CIRCUIT

a. GENERATOR FIELD CIRCUIT INOPERATIVE OR OPERATES INCORRECTLY DURING TESTS OF EXTERNAL COMPONENTS.

Step 1. Set all controls to the preliminary positions listed in table 2-2. Set FIELD CIRCUIT switch S32 to MANUAL position. Set EXTERNAL FIELD EXCITER AC SYSTEM switch S31 to ON position. Set DC AMMETER FIELD CURRENT RANGE switch S30 to X6 position. Set FINE CONTROL 0-5 AMPS (MAX) switch S29 to OFF position. Set FIELD CURRENT 0-30 AMPS (MAX) control R26 and FIELD CURRENT (fine) control R27 fully clockwise. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position and DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to X1 position. Connect jumper lead between GENERATOR F and REGULATOR B+ binding posts. Connect 0-50 DC millivolt meter to calibration jacks below DC AMMETER FIELD CURRENT meter M7, observing polarity. Set circuit breaker switch CB1 to ON position. Check to see that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 and VARIABLE LOAD control R32 are fully counterclockwise. Set DC VARIABLE VOLTS switch S10, MASTER LOAD DISCONNECT switch S8, and LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to provide a 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Rotate VARIABLE LOAD control R32 slowly clockwise to full clockwise setting, and readjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to maintain 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Check to see that DC AMMETER FIELD CURRENT meter M7 and external millivolt meter both start to indicate as VARIABLE LOAD control R32 is rotated clockwise. (DC AMMETER LOAD & STARTER CURRENT BATTERY CHARGE CURRENT meter M3 should also indicate.) With

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

VARIABLE LOAD control R32 at its fully clockwise position, check to see that DC AMMETER FIELD CURRENT meter M7 indicates approximately 6 to 8 amperes, and external DC millivolt meter indicates approximately 8 to 15 millivolts.

If DC AMMETER FIELD CURRENT meter M7 indicates zero but indication on external DC millivolt meter is normal, replace DC AMMETER FIELD CURRENT meter M7. If neither DC AMMETER FIELD CURRENT meter M7 nor external DC millivolt meter indicate, but DC AMMETER LOAD & STARTER CURRENT BATTERY CHARGE CURRENT meter M3 indicates, proceed to step 2. If indications on all three meters are zero, proceed to step 3. If all meter indications are normal, proceed to step 4.

Step 2. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, perform continuity check of DC AMMETER FIELD CURRENT RANGE switch S30 and associated circuit. (See FO-1.)

NOTE

Disconnect leads from shunts R28, R29, and R30 as required when making continuity checks.

Replace DC AMMETER FIELD CURRENT RANGE switch S30 if it is defective.

Step 3. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, perform continuity check of generator field circuit from REGULATOR F-B binding post to GENERATOR F binding post. (See FO-1.) Check for continuity across each contact of each switch, and across contacts of FINE CONTROL circuit breaker CB10.

Replace any defective switch or circuit breaker. Repair wiring defects.

Step 4. Disconnect external DC millivolt meter. Set DC AMMETER FIELD CURRENT RANGE switch S30 to X3 position. Adjust VARIABLE LOAD control R32 to provide 5 ampere indication on DC AMMETER FIELD CURRENT meter M7.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

If DC AMMETER FIELD CURRENT meter M7 indicates zero amperes, replace DC AMMETER FIELD CURRENT RANGE switch S30.

Step 5. Adjust VARIABLE LOAD control R32 to provide 3 ampere indication on DC AMMETER FIELD CURRENT meter M7. Then, set DC AMMETER FIELD CURRENT RANGE switch S30 to X1 position, and check to see that DC AMMETER FIELD CURRENT meter indicates 3 amperes.

If DC AMMETER FIELD CURRENT meter M7 indicates zero, replace DC AMMETER FIELD CURRENT RANGE switch S30.

Step 6. Adjust FIELD CURRENT 0-30 AMPS (MAX) control R26 counterclockwise, and check to see that indication on DC AMMETER FIELD CURRENT meter M7 decreases with adjustment of control.

If indication does not decrease, indication varies erratically, or indication drops off suddenly, replace FIELD CURRENT 0-30 AMPS (MAX) control R26.

Step 7. Set FIELD CURRENT 0-30 AMPS (MAX) control R26 and FIELD CURRENT (fine) control R27 fully clockwise. Adjust VARIABLE LOAD control R32 to provide 3 ampere indication on DC AMMETER FIELD CURRENT meter M7. Set FINE CONTROL 0-5 AMPS (MAX) switch S29 to ON position. Rotate FIELD CURRENT (fine) control R27 counterclockwise and check to see that indication on DC AMMETER FIELD CURRENT meter M7 decreases smoothly toward zero. If there is no current indication, perform a continuity check of CB10, R27 and associated wiring (See FO-1). Replace defective component.

If current indication does not decrease, or if indication varies erratically, replace FIELD CURRENT (fine) control R27.

13. DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT METER CIRCUIT

a. DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT METER CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY DURING TESTS OF EXTERNAL COMPONENTS.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 1. Set all controls to initial positions listed in table 2-2. Set FIELD CIRCUIT switch S32 to MANUAL position. Set EXTERNAL FIELD EXCITER AC SYSTEM switch S31 to ON position. Set DC AMMETER FIELD CURRENT RANGE switch S30 to X6 position. Set FINE CONTROL 0-5 AMPS (MAX) switch S29 to OFF position. Set FIELD CURRENT 0-30 AMPS (MAX) control R26 fully clockwise. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to X1 position. Connect jumper lead between GENERATOR F and REGULATOR B+ binding posts. Connect 0-50 DC millivolt meter to calibration jacks below DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3, observing polarity. Set circuit breaker switch CB1 to ON position. Check to see that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 and VARIABLE LOAD control R32 are set fully counterclockwise. Set DC VARIABLE VOLTS switch S10 to ON position. Set MASTER LOAD DISCONNECT switch S8 and LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control to provide 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Adjust VARIABLE LOAD control R32 clockwise to obtain 6 to 8 ampere indication on DC AMMETER FIELD CURRENT meter M7. Check to see that DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3 indicates 6 to 8 amperes, and external DC millivolt meter indicates 10 to 13 millivolts.

If external DC millivolt meter indication is normal but DC AMMETER LOAD & STARTER CURRENT BATTERY CHIARGE CURRENT meter M3 fails to indicate, replace meter M3. If both meters indicate zero, proceed to step 2. If both meter indications are normal, proceed to step 3.

Step 2. Set circuit breaker switch CB1 to OFF position. Using ohmmeter, perform continuity check of circuits associated with DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch S15. (See FO-1.)

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Replace defective switches. Repair wiring defects.

Step 3. With circuit breaker switch CB1 set to ON position, momentarily press DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch S15, and check to see that indications on external DC millivolt meter and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3 both drop to zero momentarily.

If meter indications do not drop to zero momentarily, replace switch S15.

Step 4. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to X3 position, then to X10 position. Check to see that DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3 indicates 6 to 8 amperes on appropriate scale for each switch position.

If meter indicates zero in either position, replace switch S14.

14. AC VOLTMETER OUTPUT VOLTAGE METER CIRCUIT

a. AC VOLTMETER OUTPUT VOLTAGE METER INOPERATIVE OR INDICATES INCORRECTLY DURING TEST OF EXTERNAL COMPONENTS.

Step 1. Set all controls to preliminary settings listed in table 2-2. Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27 to X1 position. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X1 position. Connect positive lead of external 0-50 volt DC voltmeter to right calibration jack (facing panel meter) for AC VOLTMETER OUTPUT VOLTAGE meter M6, and negative lead of external DC voltmeter to left calibration jack. Set AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28 to CIRCUIT T1-T2 position. Connect test lead between positive DC VARIABLE VOLTS OUTPUT binding post and ALTERNATOR T1 binding post, and connect another test lead between negative DC VARIABLE VOLTS OUTPUT binding post and ALTERNATOR T2 binding post. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 is set fully counterclockwise. Set DC VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

T5 to provide 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Check to see that external DC voltmeter and AC VOLTMETER OUTPUT VOLTAGE meter M6 both indicate approximately 5 volts.

If indication on external DC voltmeter is normal but AC VOLTMETER OUTPUT VOLTAGE meter M6 indicates zero, replace meter M6.

Step 2. Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27 to X2 position, and check that AC VOLTMETER OUTPUT VOLTAGE meter M6 indicates approximately 5 volts.

If meter indication is not normal, proceed to step 3; if meter indication is normal, proceed to step 5.

Step 3. Set circuit breaker CB1 to OFF position. Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27 to X1 position. Using ohmmeter, check for 24,900 ohm ±1% indication between terminals 3 and 4 of PC board assembly.

If resistance indication is incorrect, replace resistor R25 on PC board assembly.

Step 4. With circuit breaker CB1 set to OFF position, perform continuity check of AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27, AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28, and associated circuits. (See FO-1.) Replace switches if defective. Repair wiring defects.

Step 5. Set all controls to preliminary positions listed in table 2-2. Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27 to X1 position. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch to X1 position. Leave external DC voltmeter connected as in step 1. Set AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28 to CIRCUIT T1-T3 position. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to ALTERNATOR T1 binding post, and connect another test post to ALTERNATOR T3 binding post. Make certain that DC VARIABLE POWER SUPPLY

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

0-32 VDC control T5 is set fully counterclockwise. Set circuit breaker switch CB1 and DC VARIABLE VOLTS switch S10 to ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to provide 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Check to see that external DC voltmeter and AC VOLTMETER OUTPUT VOLTAGE meter M6 both indicate approximately 5 volts.

If meter indications are zero, replace AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28.

Step 6. Set all controls to preliminary positions listed in table 2-2. Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch S27 to X1 position. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch to X1 position. Leave external DC voltmeter connected as in step 1. Set AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28 to CIRCUIT T2-T3 position. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to ALTERNATOR T2 binding post, and connect another test lead from negative DC VARIABLE VOLTS OUTPUT binding posts to ALTERNATOR T3 binding post. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 is set fully counterclockwise. Set circuit breaker switch CB1 and D.C. VARIABLE VOLTS switch-S10 to ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to provide 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Check to see that external DC voltmeter and AC VOLTMETER OUTPUT VOLTAGE meter M6 both indicate approximately 5 volts.

If meter indications are zero, replace AC VOLTMETER OUTPUT VOLTAGE SELECT switch S28.

15. AC AMMETER OUTPUT CURRENT METER CIRCUIT

a. AC AMMETER OUTPUT CURRENT METER INOPERATIVE OR OPERATES INCORRECTLY DURING TEST OF EXTERNAL COMPONENTS.

Step 1. Set all controls to preliminary settings listed in table 2-2. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X5 position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CURRENT RANGE switch S14 to X1 position. Set DC AMMETER FIELD CURRENT RANGE switch S30 to X1 position. Plug phone plug into calibration jack for AC AMMETER OUTPUT CURRENT meter M5, and connect plug leads to calibrating jacks of DC AMMETER FIELD CURRENT meter M7. Set AC AMMETER OUTPUT CURRENT RANGE switch S26 to X1 position, and AC AMMETER OUTPUT CURRENT SELECT switch S25 to T1 position. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to ALTERNATOR T1 binding post, and connect another test lead from rectifier chamber T1 binding post to REGULATOR B+ binding post. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 is set fully counterclockwise. Set circuit breaker switch CB1 to ON position. Set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to ON position. Set MASTER LOAD DISCONNECT switch S8 to ON position. Set D.C. VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to provide 20 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Adjust VARIABLE LOAD control R32 slowly to provide 14 ampere indication on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3. (It may be necessary to readjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to obtain 14 ampere meter indication.) Check to see that pointers of AC AMMETER OUTPUT CURRENT meter M5 and DC AMMETER FIELD CURRENT meter M7 deflect slightly when MASTER LOAD DISCONNECT switch S8 is set to OFF position, and when it is set back to ON position. Repeat check with AC AMMETER OUTPUT CURRENT RANGE switch set to X5 position.

If DC AMMETER FIELD CURRENT meter M7 shows slight deflection but AC AMMETER OUTPUT CURRENT meter M5 does not, replace meter M5. If either meter shows slight deflection in only one position of AC AMMETER OUTPUT CURRENT RANGE switch S26, replace switch S26. If neither meter shows slight deflection, perform continuity check of circuit associated with current transformer CT1 and AC AMMETER OUTPUT CURRENT SELECT switch S25, and replace defective part.

Step 2. Set circuit breaker CB1 to OFF position. Leave DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11, DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12, DC AMMETER

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14, DC AMMETER FIELD CURRENT RANGE switch S30, and AC AMMETER OUTPUT CURRENT RANGE switch S26 set as in step 1. Leave phone jack connected as in step 1. Set AC AMMETER OUTPUT CURRENT SELECT switch S25 to T2 position. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to ALTERNATOR T2 binding post, and connect another test lead between rectifier chamber T2 binding post to REGULATOR B+ binding post. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 is set fully counterclockwise. Set circuit breaker switch CB1 to ON position. Set LOAD SELECTION 0-25 AMPS/ 0-12.5 AMPS switch S24 to ON. Set MASTER LOAD DISCONNECT switch S8 to ON position. Set DC VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control slowly to provide 20 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Adjust VARIABLE LOAD control R32 slowly to provide 14 ampere indication on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3. (It may be necessary to readjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to obtain 14 ampere indication.) Check to see that pointers of AC AMMETER OUTPUT CURRENT meter M5 and DC AMMETER FIELD CURRENT meter M7 deflect slightly when MASTER LOAD DISCONNECT switch S8 is set of OFF position, and when switch S8 is set back to ON position. Repeat check with AC AMMETER OUTPUT CURRENT RANGE switch S26 set to X5 position.

If either meter shows slight deflection in only one position of AC AMMETER OUTPUT CURRENT RANGE switch, replace switch S26. If neither meter shows slight deflection, perform continuity check of circuit associated with transformer CT2 and AC AMMETER OUTPUT CURRENT SELECT switch S25, using ohmmeter; replace defective parts.

Step 3. Set circuit breaker switch CB1 to OFF position. Leave DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11, DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12, DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14, DC AMMETER FIELD CURRENT RANGE switch S30, and AC AMMETER OUTPUT CURRENT RANGE switch S26 set as in step 1. Leave phone jack connected

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

as in step 1. Set AC AMMETER OUTPUT CURRENT SELECT switch S25 to T3 position. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to ALTERNATOR T3 binding post, and connect another test lead from rectifier chamber T3 binding post to REGULATOR B+ binding post. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control T5 is set fully counterclockwise. Set circuit breaker switch CB1 to ON position. Set LOAD SELECTION 0-25 AMPS/ 0-12.5 AMPS switch S24 to ON position. Set MASTER LOAD DISCONNECT switch S8 to ON position. Set DC VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 slowly to provide 20 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter M2. Adjust VARIABLE LOAD control R32 slowly to provide 14 ampere indication on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter M3. (It may be necessary to readjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 to obtain 14 ampere indication.) Check to see that pointers of AC AMMETER OUTPUT CURRENT meter M5 and DC AMMETER FIELD CURRENT meter M7 deflect slightly when MASTER LOAD DISCONNECT switch S8 is set to OFF position, and when switch S8 is set back to ON position. Repeat check with AC AMMETER OUTPUT CURRENT RANGE switch S26 set to X5 position.

If either meter shows slight deflection in only one position of AC AMMETER OUTPUT CURRENT RANGE switch S26, replace switch S26. If neither meter shows slight deflection, perform continuity check of circuit associated with transformer CT3 and AC AMMETER OUTPUT CURRENT SELECT switch S25, using ohmmeter; replace defective parts.

16. MILLIVOLT METER MILLIVOLT DROP METER CIRCUIT

a. MILLIVOLT METER MILLIVOLT DROP METER CIRCUIT INOPERATIVE OR PROVIDES INCORRECT INDICATIONS DURING TEST OF EXTERNAL COMPONENTS.

Step 1. Set all controls to preliminary positions listed in table 2-2. Set FIELD CIRCUIT switch S32 to MANUAL position. Connect ohmmeter between GENERATOR G+ and GENERATOR F binding posts, and adjust FIELD CURRENT 0-30 AMPS (MAX) control R26 for 10-ohm indication on ohmmeter. Disconnect ohmmeter. Connect test lead

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

from GENERATOR F binding post to REGULATOR B+ binding post. Connect test lead from positive DC VARIABLE VOLTS OUTPUT binding post to GENERATOR G+ binding post. Connect positive lead of external DC voltmeter (0-5 volt range) to REGULATOR G+ binding post, and connect negative lead of external DC voltmeter to REGULATOR B+ binding post. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch S14 to X1 position. Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch S11 to VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch S12 to X2 position. Set MILLIVOLT METER MILLIVOLT DROP RANGE switch S16 to X10 position. Make certain VARIABLE LOAD control R32 is set fully counterclockwise; then, set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch S24 to ON position. Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control is set fully counterclockwise. Set circuit breaker switch CB1 to ON position. Set MASTER LOAD DISCONNECT switch S8 to ON position. Set DC VARIABLE VOLTS switch S10 to ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control T5 slowly to obtain 2 volt indication on external DC voltmeter. Press MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch S34 momentarily, and check to see that MILLIVOLT METER MILLIVOLT DROP meter M4 indicates 2 volts.

If correct meter indication is not obtained, proceed to step 2.

Step 2. Do not disturb any control setting. Move connections of external DC voltmeter to calibration binding posts for MILLIVOLT METER MILLIVOLT DROP meter M4, observing polarity. Press MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch S34 momentarily, and check indications on external DC voltmeter and MILLIVOLT METER MILLIVOLT DROP meter M4.

If no indication is obtained on both meters, replace MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch S34. If external DC voltmeter indicates normally but MILLIVOLT METER MILLIVOLT DROP meter M4 indicates zero, proceed to step 3.

Step 3. Set circuit breaker switch CB1 to OFF position. Disconnect test lead from REGULATOR B+ and GENERATOR

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

F binding posts. Set MILLIVOLT METER MILLIVOLT DROP RANGE switch S16 to X10 position. Connect ohmmeter between REGULATOR G+ binding post and terminal 9 of PC board assembly. Press MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch S34 momentarily, and check for zero ohm indication on ohmmeter.

If ohmmeter indication is not zero ohm, replace MILLIVOLT METER MILLIVOLT DROP RANGE switch S16.

Step 4. Set MILLIVOLT METER MILLIVOLT DROP RANGE switch S16 to X1 position. Connect ohmmeter between REGULATOR G+ binding post and terminal 8 of PC board assembly. Press MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch S34 momentarily, and check for zero ohm indication on ohmmeter.

If ohmmeter indication is not zero ohm, replace MILLIVOLT METER MILLIVOLT DROP RANGE switch S16.

Step 5. Using ohmmeter, check for 900 ohm (approximate) resistance indication between terminals 8 and 5 of PC board assembly.

If resistance indication is incorrect, check resistances of resistor R22 and potentiometer R20 on PC board assembly with ohmmeter; replace defective part.

Step 6. Using ohmmeter, check for 9000 ohm (approximate) indication between terminals 9 and 5 of PC board assembly.

If resistance indication is incorrect, check resistances of resistor R23 and potentiometer R21 on PC board assembly with ohmmeter; replace defective part.

Step 7. Disconnect lead from positive terminal (left terminal facing rear of meter) of MILLIVOLT METER MILLIVOLT DROP meter M4. Set ohmmeter to low range. Connect positive lead of ohmmeter to terminal 5 of PC board assembly, and negative ohmmeter lead to terminal 10, and check for indication between 5 and 20 ohms. Then, reverse ohmmeter leads, and check for same indication.

If correct indications are obtained for both ohmmeter

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

connections, replace MILLIVOLT METER MILLIVOLT DROP meter M4.

If zero ohm indication is obtained for either ohmmeter connection, replace diodes CR13 and CR14 on PC board assembly.
If normal indication is obtained with positive lead of ohmmeter connected to terminal 5 and negative lead connected to terminal 10, but open indication is obtained with ohmmeter leads reversed, replace diode CR13 on PC board assembly.
If normal indication is obtained with positive lead of ohmmeter connected to terminal 5, but open indication is obtained when ohmmeter leads are reversed, replace diode CR14 on PC board assembly.

NOTE

Millivolt meter must be recalibrated if any of resistors R22 and R23, potentiometers R20 and R21, or diodes CR13 and CR14 are replaced.

17. GENERATOR D-SENSING CIRCUIT

a. GENERATOR D-SENSING SWITCH INOPERATIVE DURING TESTS OF EXTERNAL COMPONENTS.

Step 1. With all controls set to preliminary positions listed in table 2-2, connect ohmmeter between GENERATOR D binding post and REGULATOR D binding post. Check for zero ohm indication with GENERATOR D-SENSING switch S40 set to ON position, and open circuit indication with switch S40 set to OFF position.

Replace GENERATOR D-SENSING switch S40 if incorrect indications are obtained.

18. AC/DC SYSTEMS EQUALIZER COIL CIRCUIT

a. AC/DC SYSTEMS EQUALIZER COIL CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY DURING TESTS OF EXTERNAL COMPONENTS.

Step 1. Set all controls to preliminary positions listed in table 2-2. Set AC/DC SYSTEMS EQUALIZER COIL TEST switch S35 to ON position. Using ohmmeter, check for 40 to 50 ohm indication between GENERATOR G+ and AC/DC

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SYSTEMS D binding posts.

If indication is incorrect, proceed to step 2.

Step 2. Using ohmmeter, check for continuity across terminals of AC/DC SYSTEMS EQUALIZER COIL TEST switch S35 with switch set to ON position, and for open indication with switch set to OFF position.

Replace AC/DC SYSTEMS EQUALIZER COIL TEST switch S35 if either indication is incorrect.

Step 3. Using ohmmeter, check for 40 to 50 ohm indication across terminals of equalizer coil potentiometer R24.

If indication is incorrect, replace potentiometer R24.

19. AC/DC SYSTEMS IGNITION CIRCUIT

a. AC/DC SYSTEMS IGNITION CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY DURING TESTS OF EXTERNAL COMPONENTS.

Step 1. Set circuit breaker switch CB1 to OFF position. Connect ohmmeter between REGULATOR B+ binding post and AC/DC SYSTEMS IGN SW binding post. Check for zero indication with AC/DC SYSTEMS IGN SW S33 set to ON position, and open circuit indication with switch S33 set to OFF position.

Replace AC/DC SYSTEMS IGN SW S33 if either indication is incorrect.

20. AUXILIARY START CIRCUIT

a. AUXILIARY START CIRCUIT INOPERATIVE OR OPERATES ERRATICALLY DURING TEST OF EXTERNAL COMPONENTS.

Step 1. Set circuit breaker switch CB1 to OFF position. Connect ohmmeter between pins A and F of BAT connector J6. Check for zero indication with AUX START switch S39 held in ON position.

If open indication is obtained, replace AUX START switch S39.

Table 2-5. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
21. FIELD SHORTING CIRCUIT
a. FIELD SHORTING SWITCH INOPERATIVE OR OPERATES ERRATICALLY DURING TESTS OF EXTERNAL COMPONENTS.
Step 1. Set circuit breaker switch CB1 to OFF position. Connect ohmmeter between pins D and A of GEN connector J3. Check for zero indication when FIELD SHORTING switch S38 is held in ON position. If open indication is obtained, replace switch S38.
22. VOLTAGE ADJUST CIRCUIT
a. VOLTAGE ADJ CONTROL INOPERATIVE OR OPERATES ERRATICALLY DURING TESTS OF EXTERNAL COMPONENTS.
Step 1. Set circuit breaker switch CB1 to OFF position. Connect ohmmeter between pins B and D of BAT connector J6. Check to see that resistance indication varies from 0 to 100 ohms ±10% when VOLTAGE ADJ control R37 is rotated over its entire range. If resistance indication is not as specified, replace VOLTAGE ADJ potentiometer R37.

Section IV. GENERAL MAINTENANCE

2-9. GENERAL. This section provides instructions for lubrication to be performed by direct support personnel(See fig 2-1).

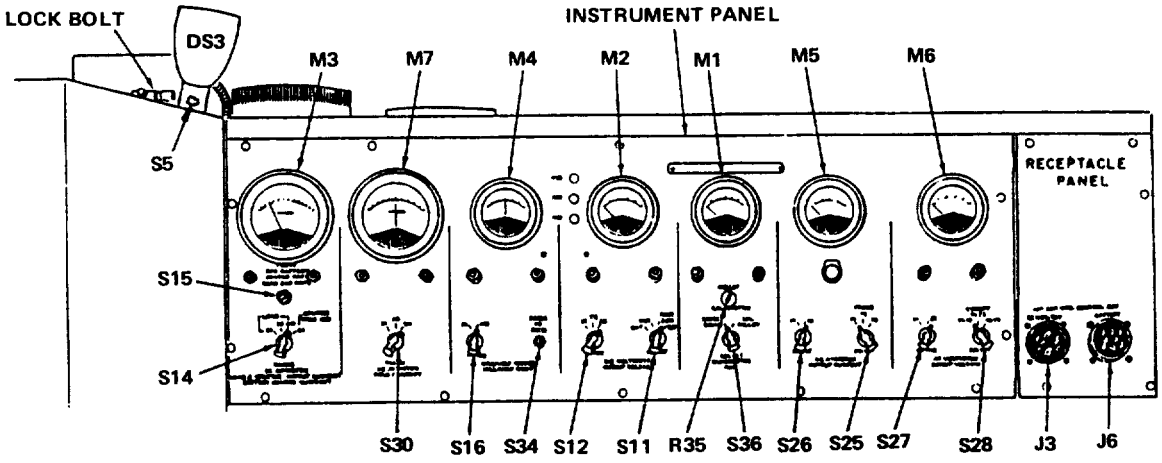
2-10. LUBRICATION OF VARIDRIVE. For lubrication of the varidrive refer to para 3-3.c.(2) and 3-3.c.(3) of TM 9-4910-663-12.

Section V. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

2-11. GENERAL. This section provides instructions for removal and installation of test stand assemblies authorized at the direct support maintenance level. See figures 2-4 thru 2-11 for the locations of the major assemblies of the stand.

2-12. REMOVAL AND INSTALLATION OF BATTERY COMPARTMENT ASSEMBLY.

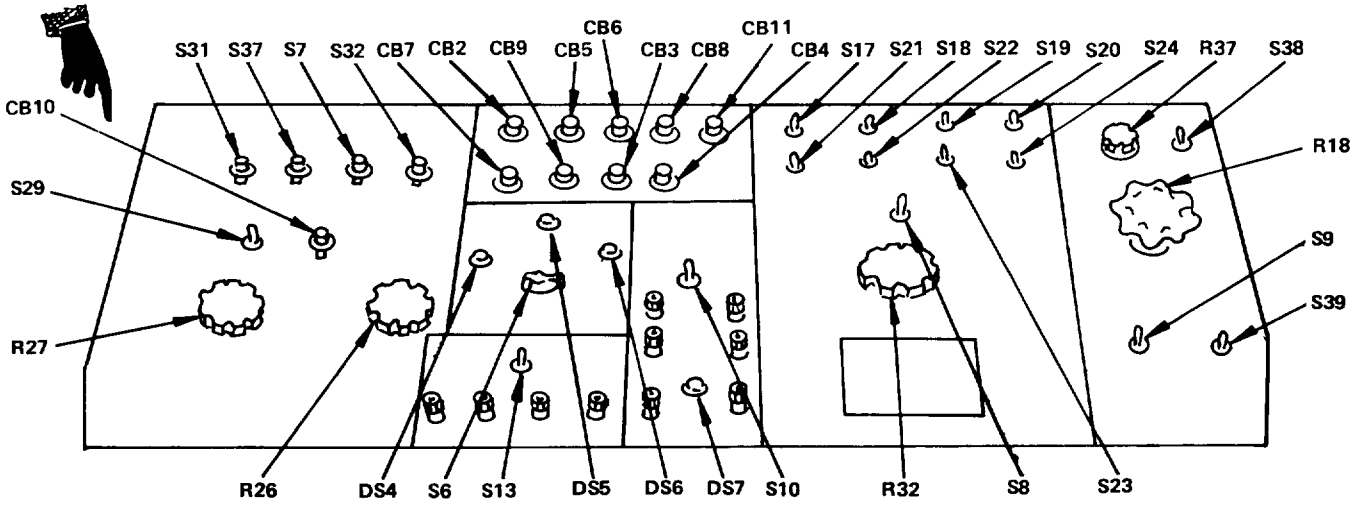
a. Disconnect main power from the test stand.
b. Remove the panel retaining hardware from the side panel of the I test stand, and remove the side panel.
c. Open the battery compartment door and the high voltage compartment door (fig 2-9).
d. Detach the door interlock switch (S4, fig 2-8) and bracket from the high voltage compartment by removing two screws, lockwashers, I and nuts.
e. Remove the nuts, washers, and wiring from the rear of the battery terminal posts.
f. Lift the battery draw retaining hook, and pull the battery drawer out against the stop.
g. Remove all battery cables used to connect batteries to the battery compartment binding posts.
h. Remove eight wing nuts and washers, and remove the battery holddown brackets.
i. Remove all batteries.
j. Unscrew the eight tie rods from the battery drawer.
k. Remove the six screws, lockwashers, and washers that secure the track U-brackets and the battery enclosure to the test stand.
1. Remove the U-brackets and the battery enclosure from the test stand.
m. Reverse the procedures of steps a through 1 to install the battery compartment assembly in the stand.



Legend for fig 2-4:

DS3	Work Lamp
J3	Connector
J6	Connector
M1	Tachometer RPM Meter
M2	DC Voltmeter Output Voltage Meter
M3	DC Ammeter Load and Starter Output Current Battery Charge Current Meter
M4	Millivolt Meter Millivolt Drop Meter
M5	AC Ammeter Output Current Meter
M6	AC Voltmeter Output Voltage Meter
M7	DC Ammeter Field Current Meter
R35	Tachometer RPM Pulley Calibration Control
S5	Work Light Switch
S11	DC Voltmeter Output Voltage Select Switch
S12	DC Voltmeter Output Voltage Range Switch
S14	DC Ammeter Load and Starter Output Current Battery Charge Current Range Switch
S15	DC Ammeter Load and Starter Output Current Battery Charge Press for Battery Charge Rate Switch
S16	Millivolt Meter Millivolt Drop Range Switch
S25	AC Ammeter Output Current Select Switch
S26	AC Ammeter Output Current Range Switch
S27	AC Voltmeter Output Voltage Range Switch
S28	AC Voltmeter Output Voltage Select Switch
S30	DC Ammeter Field Current Range Switch
S34	Millivolt Meter Millivolt Drop Press to Read Switch
S36	Tachometer RPM Select Switch

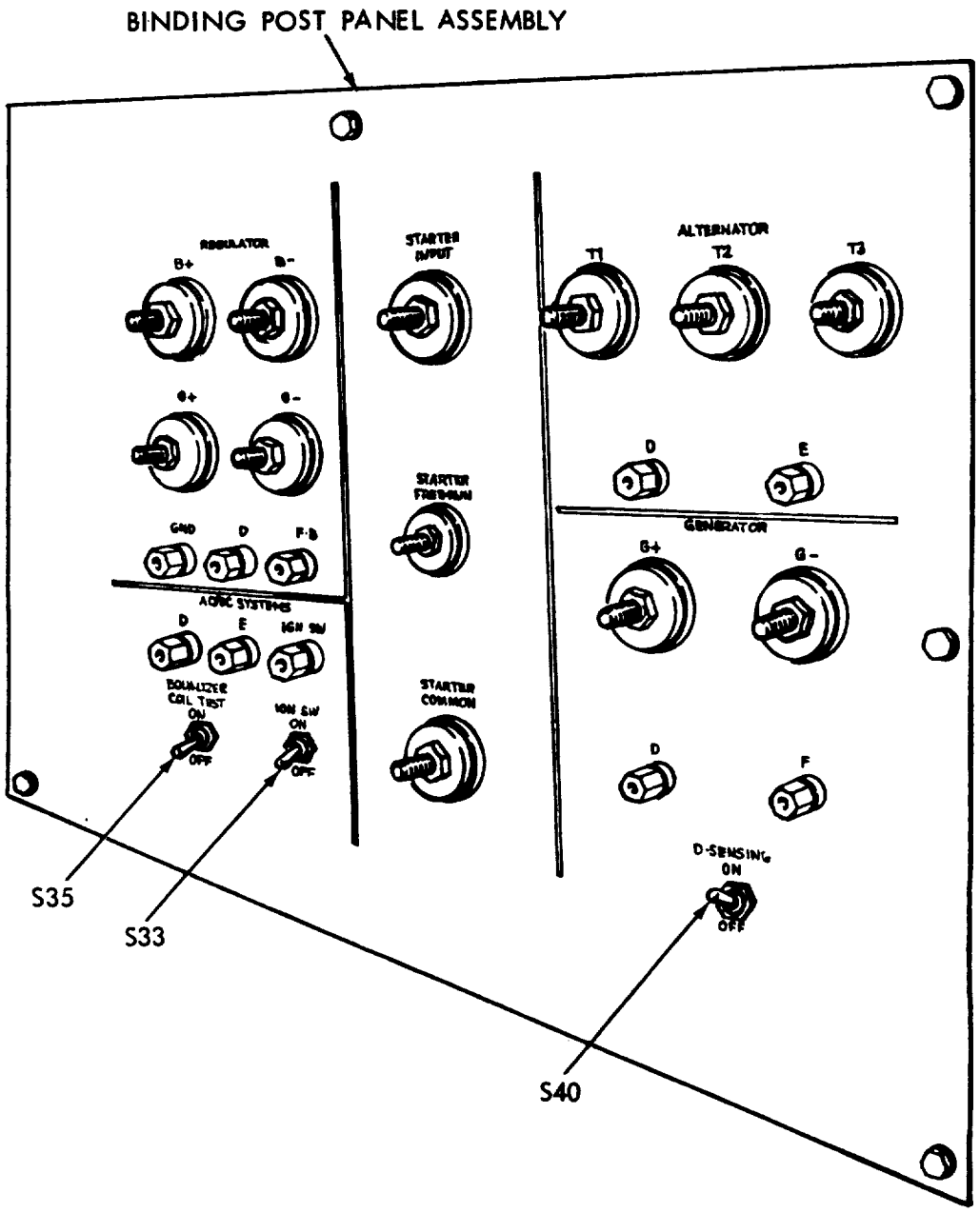
Figure 2-4. Instrument and receptacle panels, controls and indicators.



Legend for fig 2-5:

CB2	Circuit Breaker
CB3	Circuit Breaker
CB4	Circuit Breaker
CB5	Circuit Breaker
CB6	Circuit Breaker
CB7	Circuit Breaker
CB8	Circuit Breaker
CB9	Circuit Breaker
CB10	Circuit Breaker
CB11	Circuit Breaker
DS4	6 Volt Indicator Light
DS5	12 Volt Indicator Light
DS6	24 Volt Indicator Light
DS7	Contact Closure Indicator Light
R18	Starter Rheostat Control
R26	Field Current 0-30 Amps (Max) Control
R27	Field Current 0-5 Amps (Max) Control
R32	Variable Load Control
R37	Voltage ADJ Control
S6	Battery Circuit Selector Switch
S7	Polarity Reversing Switch
S8	Master Load Disconnect Switch
S9	Starter Test Switch
S10	DC Variable Volts Switch
S13	Regulator Check Fixed Resistance Method Switch
S17	Load Selection Switch
S18	Load Selection Switch
S19	Load Selection Switch
S20	Load Selection Switch
S21	Load Selection Switch
S22	Load Selection Switch
S23	Load Selection Switch
S24	Load Selection Switch
S29	Fine Control 0-5 Amps (Max) Switch
S31	External Field Exciter AC System Switch
S32	Field Current Switch
S37	Generator Field Switch
S38	Field Shorting Switch
S39	AUX Start Switch

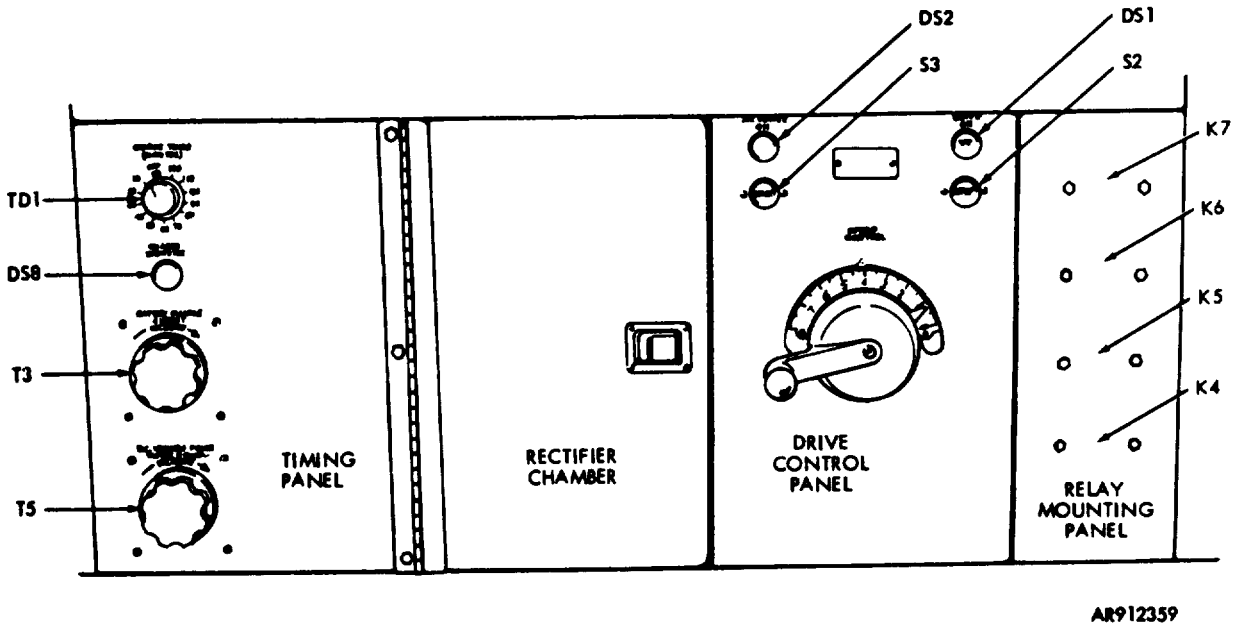
Figure 2-5. Control and rheostat panels, controls and indicators.



Legend for fig 2-6:

S33	IGN SW Switch
S35	Equalizer Coil Test Switch
S40	D-Sensing Switch

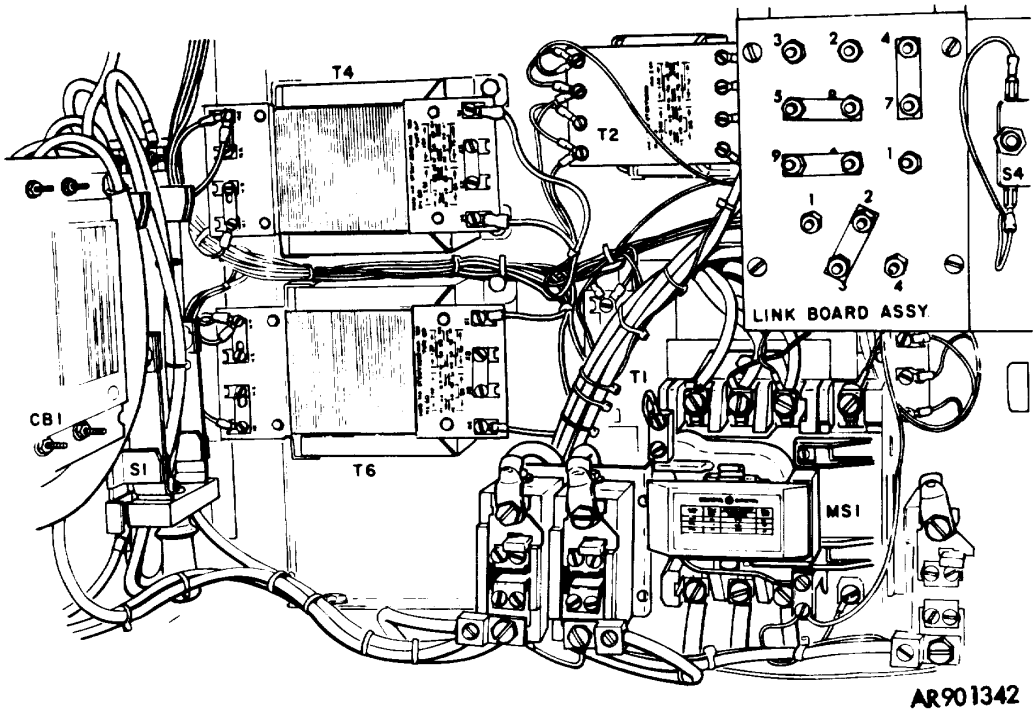
Figure 2-6. Binding post panel, controls and binding posts.



Legend for fig 2-7:

DS1	Drive On Indicator Light
DS2	AC Power On Indicator Light
DS8	Charge Indicator Light
K4	Relay
K5	Relay
K6	Relay
K7	Relay
S2	Stop Pushbutton Switch
S3	Start Pushbutton Switch
T3	Battery Charge Circuit Control
T5	DC Variable Power Supply 0-32 VDC Control
TD1	Charge Timer (Minutes) Control

Figure 2-7. Timing, drive control, and relay mounting panels, controls and indicators.



Legend for fig 2-8:

CB1	Circuit Breaker Switch
MS1	Drive Magnetic Starter Coil
S1	Reversing Switch
S4	Interlock Switch
T1	Power Transformer
T2	Power Transformer
T4	Power Transformer
T6	Power Transformer

Figure 2-8. High voltage compartment controls.

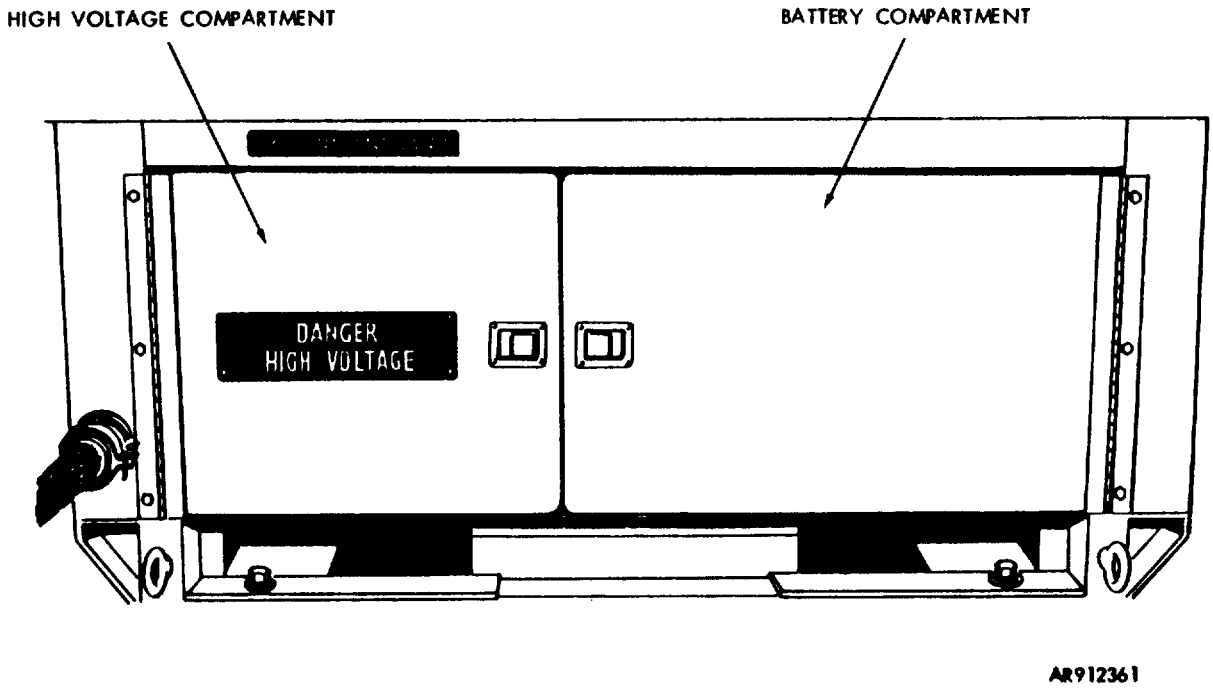


Figure 2-9. High voltage and battery components.

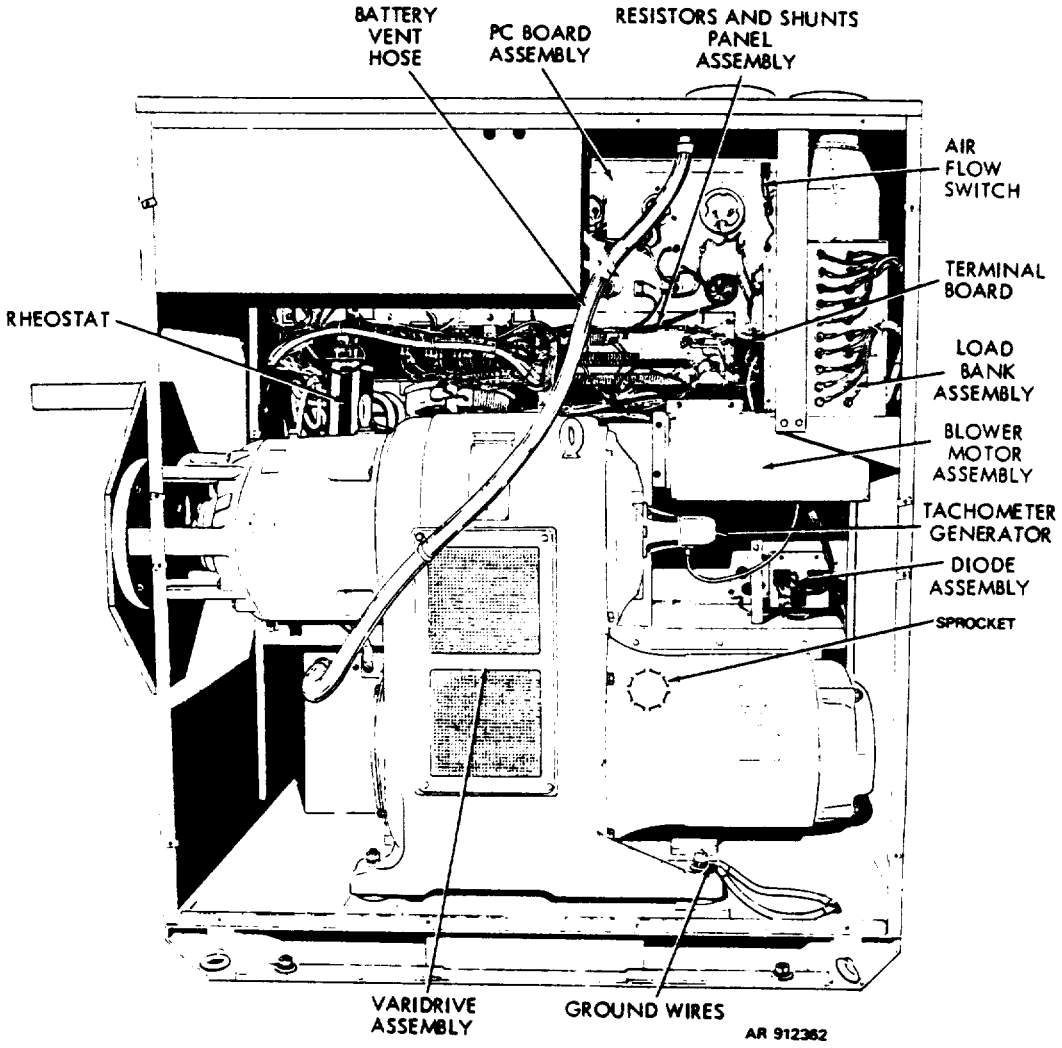
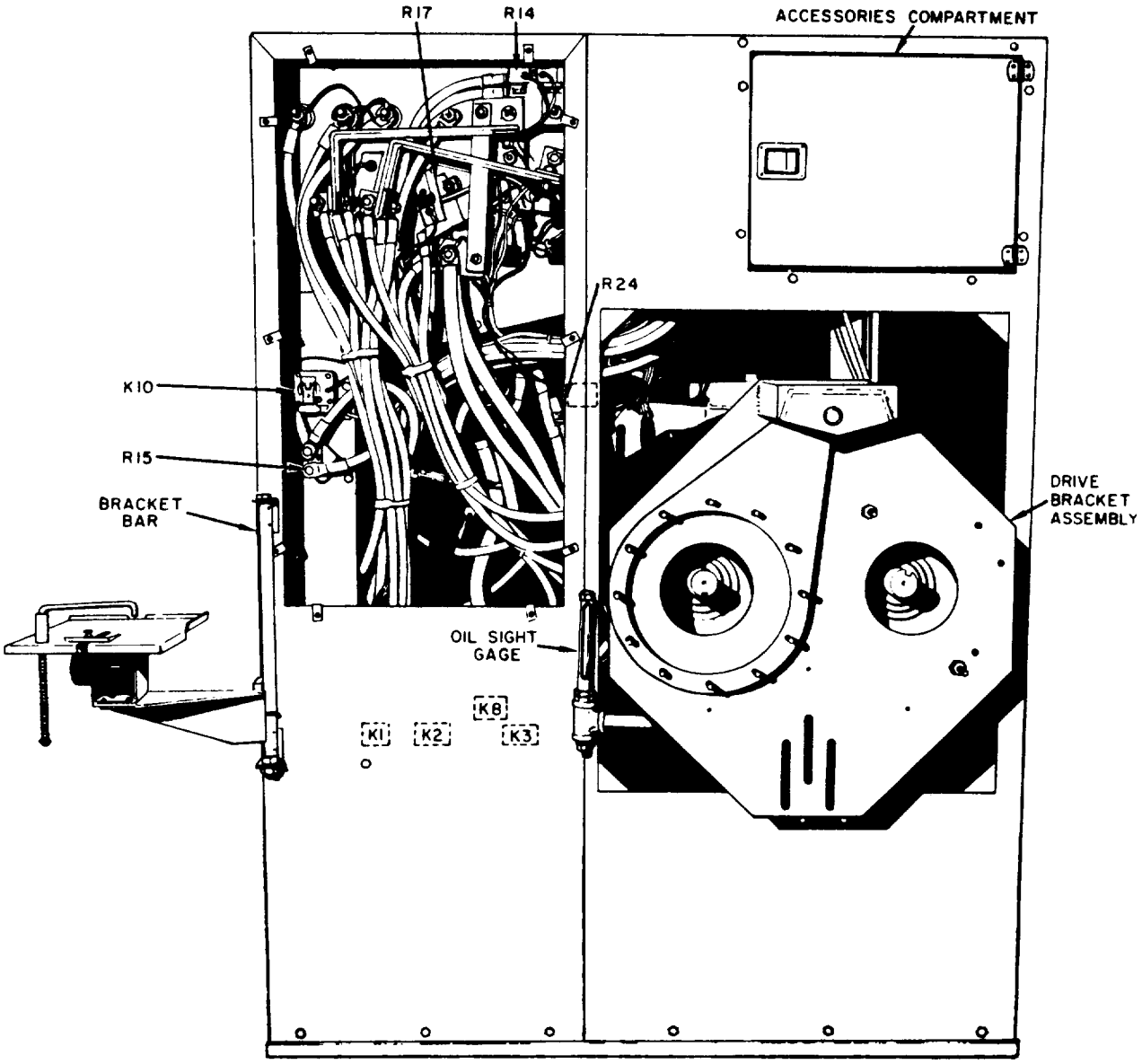


Figure 2-10. Test stand rear view showing components.



Legend for fig 2-11:

K1	Relay
K2	Relay
K3	Relay
K8	Relay
K10	Relay
R14	Shunt
R15	Shunt
R17	Shunt
R24	Equalization Coil Resistor

Figure 2-11. Test stand right side view showing components.

2-13. REMOVAL AND INSTALLATION OF PC BOARD ASSEMBLY (fig 2-10)

a. Disconnect electrical input power from the test stand.
b. Remove the panel retaining screws at the top and sides of the instrument panel (fig 2-4).
c. Swing the instrument panel down.
d. Remove the four screws that attach the PC board assembly to the instrument panel.
e. Unsolder wiring (tag wires for identification) from the terminals of the PC board assembly, and remove the PC board assembly from the test stand.
f. Reverse the procedures of steps a through e to install the PC board assembly in the test stand.

2-14. REMOVAL AND INSTALLATION OF RHEOSTAT ASSEMBLY (R18, fig 2-5).

a. Disconnect main power from the test stand.
b. Remove 10 1/4-20 screws that attach the side panel of the test stand, and remove the side panel.
c. Remove seven 1/4-20 panel retaining screws at the sides and front of the control panel.
d. Raise the control panel and secure it in the up position, using the lock bolt (fig 2-4).
e. Disconnect the wiring from the upper and lower terminals of the rheostat assembly.
f. Remove the knob from the rheostat.
g. Remove the four 1/4-20 screws that secure the rheostat assembly to the rheostat panel, and remove the rheostat assembly from the test stand.
h. Reverse the procedures of steps a through g to install the rheostat assembly in the test stand.

2-15. REMOVAL AND INSTALLATION OF LINK BOARD ASSEMBLY (fig 2-8)

a. Disconnect main power from the test stand.
b. Remove the mounting bolts that attach the link board assembly to the test stand.
c. Drop the link board assembly and disconnect all wiring.

d. Remove the link board assembly from the test stand.

e. Reverse the procedures of steps a through d to install the link board assembly in the test stand.

2-16. REMOVAL AND INSTALLATION OF LOAD BANK ASSEMBLY (fig 2-10).

a. Disconnect main power from the test stand.

b. Remove eight 1/4-20 bolts and lockwashers from both the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

c. Remove the panel retaining hardware, the control panel (fig 2-5), and raise the control panel. Lock the control panel in the up position with the locking bolt.

d. Disconnect the wiring from the load bank copper buses, the terminal block, and the load bank elements.

e. Remove the retaining hardware that attaches the blower adapter to the blower motor assembly .

f. While supporting the load bank assembly from below, remove the retaining hardware that attaches the load bank assembly to the left side of the test stand.

g. While supporting the load bank assembly from below, remove the two 1/4-20 bolts and lockwashers that attach the load bank assembly to the top of the test stand.

h. Slide the load bank assembly gently approximately 1 inch back toward the rear of the test stand, lower the load bank assembly, and remove it from the test stand.

i. Remove the nuts, lockwashers, bolts, and washers that attach the load bank support to the load bank assembly, and remove the load bank support.

j. Remove the eight nuts, lockwashers, and screws that attach the blower adapter to the load bank assembly, and remove the blower adapter.

k. Reverse the procedures of steps a through j to install the load bank assembly in the test stand.

2-17. REMOVAL AND INSTALLATION OF LOAD BANK (fig 2-10)

a. Disconnect main power from the test stand.

b. Remove the load bank assembly from the test stand. (Refer to paragraph 2-16.)

c. Remove the six 10-32 bolts that attach the exhaust duct to the load bank, and remove the exhaust duct.

d. Remove the 10 1/4-20 bolts that retain the plenum chamber, bracket, and load bank, and remove the load bank.

e. Reverse the procedures of steps a through d to install the load bank.

2-18. REMOVAL AND INSTALLATION OF DIODE ASSEMBLY (fig 2-10)

a. Disconnect main power from the test stand.

b. Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

c. Unsnap all leads from the three rectifiers on the diode assembly.

d. Unsolder the leads from suppressor B4.

e. Remove the two 10-32 screws, washers, and nuts that attach the diode assembly to the test stand.

f. Remove the diode assembly from the test stand.

g. Reverse the procedures of steps a through f to install the diode assembly in the test stand.

2-19. REMOVAL AND INSTALLATION OF VARIDRIVE ASSEMBLY (fig 2-10)

a. Remove the panel retaining hardware from both the upper and lower rear panels of the test stand and remove the upper and lower rear panels.

b. Start the varidrive and turn the speed control until the chain connecting link is positioned at the top of the varidrive sprocket. This may require a few start-speed change-stop operations. Then, stop the varidrive.

c. Disconnect main power from the test stand.

d. Remove the load bank assembly from the test stand. (Refer to paragraph 2-16.)

e. Remove the chain connecting link from the chain, and remove the chain from the varidrive sprocket.

f. Remove the retaining hardware that attaches the link board assembly (fig 2-8) to the test stand, and lower the link board assembly. (Refer to para 2-15.)

g. Disconnect all varidrive wire leads (tag wires for identification) from the rear of the link board assembly.

h. Remove the battery vent hose clamp (fig 2-10) from the right panel of the varidrive assembly. Disconnect the vent hose from vent tube.

i. Remove the drive bracket assembly (fig 2-11) from the varidrive output pad by removing six 7/16-14 bolts from the rear of the varidrive output pad.

(1) Remove the tachometer generator mounting bracket retaining hardware and remove the tachometer generator mounting bracket from the varidrive.

(2) On part number 7458-4, detach the six adapters from the lubrication fittings on the varidrive.

j. Remove the four 5/8-11 varidrive retaining bolts, nuts, washers, and lockwashers, and the grounding wires.

k. Install a heavy duty chain from each lifting eye at the sides of the varidrive to the forward lifting eye. Make the chains taut.

l. Insert the tongue of a 1500-pound capacity fork lift under the chains, and raise the varidrive assembly slightly.

m. Guide the varidrive assembly and remove it from the test stand. Guide the motor end of the varidrive out first, being careful not to come in contact with the rheostat assembly.

n. Reverse the procedures of steps a through m to install the varidrive assembly in the test stand.

2-20. REMOVAL AND INSTALLATION OF DRIVE BRACKET ASSEMBLY (fig 2-11)

a. Remove the six bolts and lockwashers that attach the bracket assembly to the varidrive.

b. Remove the drive bracket assembly from the test stand.

c. Reverse the procedures of steps a and b to install the bracket assembly in the test stand.

2-21. REMOVAL AND INSTALLATION OF STARTER MS1 (fig 2-8)

a. Disconnect main power from the test stand.

b. Open the high voltage compartment door. Disconnect the three power leads from terminals L1, L2, and L3 of the starter.

c. Disconnect the three power leads from terminals T1, T2, and T3 of the starter.

d. Remove the three 1/4-20 bolts that attach the starter to its mounting bracket.

e. Pull the starter gently approximately 2 inches toward the front of the test stand. Remove the control wires from the L2, L3, and common terminals of the starter.

f. Tip the front of the starter up and remove the control wires from the right-side overload and lower right coil terminals.

g. Remove the starter from the test stand.

h. Reverse the procedures of steps a through g to install the starter in the test stand.

2-22. REMOVAL AND INSTALLATION OF BLOWER MOTOR ASSEMBLY (fig 2-10)

a. Disconnect main power from the test stand.
b. Remove the load bank assembly from the test stand. (Refer to paragraph 2-16.)
c. Remove the retaining hardware that attaches the blower motor assembly to its support bracket.
d. Rotate the rear of the blower motor carefully toward the rear of the test stand.
e. Loosen the two screws that secure the connection cover to the blower motor, and swing the connection cover open.
f. Unsnap the two wires from the blower motor.
g. Remove the blower motor assembly from the test stand.
h. Reverse the procedures of steps a through g to install the blower motor assembly in the test stand.

CHAPTER 3

REPAIR INSTRUCTIONS

Section I. DIRECT SUPPORT REPAIR INSTRUCTIONS

3-1. TEST PANEL FRAME-MOUNTED COMPONENTS

a. Removal and Replacement of Regulator Mounting Bracket (fig 2-11).

(1) Disconnect main power from the test stand.
(2) Remove the two nuts from the U-bolt.
(3) Remove the regulator mounting bracket.
(4) Reverse the procedures of steps (1) through (3) to install the replacement regulator mounting bracket.

b. Removal and Replacement of Circuit Breaker CB1 (fig 2-8).

(1) Disconnect main power from the test stand.
(2) Open the high voltage compartment door.
(3) Loosen the screws that secure wires to the circuit breaker terminals and disconnect the wires.
(4) Remove the four nuts, lockwashers, washers, and bolts that attach the circuit breaker to the test stand, and remove the circuit breaker.
(5) Reverse the procedures of steps (1) through (4) to install the replacement circuit breaker.

c. Removal and Replacement of Indicator DS1, DS2, or DS8 (fig 2-7)

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining screws from the sides and front of the control panel, raise the control panel, and secure it in the up position with the toggle bolt.
(3) Disconnect wires from the terminals of the indicator that is to be removed.
(4) Remove the indicator retaining nut and washers.
(5) Remove the indicator from the test stand.
(6) Reverse the procedures of steps (1) through (5) to install the replacement indicator.

d. Removal and Replacement of Work Lamp DS3 (fig 2-4).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the instrument panel and lower panel. Then remove the upper rear panel.

(3) Disconnect the lead wires of work lamp DS3 from terminal board TB1 (fig 2-10).

(4) Cut cable ties as necessary to free the work lamp wiring.

(5) Remove the work lamp retaining nut, and remove the work lamp from the test stand.

(6) Reverse the procedures of steps (1) through (5) to install the replacement work lamp.

e. Removal and Replacement of Connector J3 or J6 (fig 2-4).

(1) Disconnect main power from the test stand.

(2) On part number 7458-2, remove the panel retaining hardware from the receptacle panel and lower the panel. On part number 7458-4, remove the panel retaining hardware from the upper and lower rear panels of the test stand and remove the upper and lower rear panels.

(3) Remove the nut, lockwasher, washer, and bolt that attach the cable to the bus bar of the connector that is to be removed, and detach the cable from the bus bar.

(4) Remove the two nuts and lockwashers that attach the wires and connector bus bar to the connector that is to be removed, and detach the bus bar from the connector.

(5) Using a sharp-bladed knife, remove the heat-shrinkable tubing from the remaining wires attached to the connector.

(6) Unsolder the wires from the connector.

(7) Remove the four nuts, lockwashers, and screws that attach the connector to the receptacle panel, and remove the connector.

(8) Install the replacement connector using four screws, lockwashers and nuts.

(9) Slide a 3/4-inch long piece of heat shrinkable tubing (1/8 inch ID) over the wires that are to be soldered to the connector.

(10) Solder wires to the connector pins. Do not apply heat to the heat-shrinkable tubing.

(11) Slide the heat-shrinkable tubing down over the wires and soldered connections.

(12) Using a heat gun, shrink the heat-shrinkable tubing in place over the soldered connections.

(13) Attach the connector bus bar and wires to the connector with two lockwashers and nuts.

(14) Attach the cable to the connector bus bar with one bolt, washer, lockwasher, and nut.

(15) On part number 7458-2, install the receptacle panel on the test stand using the panel retaining hardware. On part number 7458-4, install the upper and lower rear panels using the panel retaining hardware.

f. Removal and Replacement of Relay K1, K2, or K3 (fig 2-11).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the battery compartment assembly from the test stand. Refer to paragraph 2-12.

(4) Remove the three nuts and lockwashers that attach the cable and bus bar to the three relays, and remove the bus bar.

(5) Remove the nut and lockwasher that attach the cable to the relay, and disconnect the cable from the relay.

(6) Remove the retaining hardware that attaches the relay to the test stand, and remove the relay.

(7) Reverse the procedures of steps (1) through (6) to install the replacement relay.

g. Removal and Replacement of Relay K4 or K5 (fig 2-7).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the battery compartment assembly from the test stand. Refer to paragraph 2-12.

(4) Remove the retaining hardware that attaches the bus bar to the relay that is to be replaced.

(5) Remove the nut, lockwasher, washer, and bolt that attach the bus bar to the test stand, and remove the bus bar.

(6) Remove the retaining hardware that attaches wires and cables to the relay that is to be replaced, and detach the wires and cables from the relay.

(7) Remove the four nuts, lockwashers, and bolts that attach the relay to the test stand, and remove the relay.

(8) Reverse the procedures of steps (1) through (7) to install the replacement relay.

h. Removal and Replacement of Relay K6 or K7 (fig 2-7).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel to the test stand, and remove the right side panel.

(3) Remove the two nuts, lockwashers, and washers that attach the cables to the relay contact terminals, and detach the cables.

(4) Remove the two nuts, lockwashers, and washers that attach wires to the relay coil terminals, and detach the wires.

(5) Remove the two nuts, lockwashers, and bolts that attach the relay to the test stand, and remove the relay.

(6) Reverse the procedures of steps (1) through (5) to install the replacement relay.

i. Removal and Replacement of Relay K8 (fig 2-11).

(1) -Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel to the test stand, and remove the right side panel.

(3) Remove the battery compartment assembly from the test stand. Refer to paragraph 2-12.

(4) Remove the two nuts, lockwashers, and washers that attach cables or wire to the relay contact terminals, and detach the cables or wire from the terminals.

(5) Remove the two nuts and lockwashers that attach wires to the relay coil terminals, and detach the wires from the terminals.

(6) Remove the two nuts, lockwashers, and bolts that attach the relay to the test stand, and remove the relay.

(7) Reverse the procedures of steps (1) through (6) to install the replacement relay.

j. Removal and Replacement of Relay K10 (fig 2-11).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the four screws and lockwashers that attach the bus bar, cables, and wires to the relay terminals.

(4) Remove the two screws, nuts, and lockwashers that attach the relay to the test stand, and remove the relay.

(5) Reverse the procedures of steps (1) through (4) to install the replacement relay.

k. Removal and Replacement of Shunt R14 or R17 (fig 2-11).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the bolt and lockwasher that attach the cable to the shunt that is to be removed, and detach the cable from the shunt.

(4) Remove the two screws and lockwashers that attach wires to the shunt.

(5) Remove the bolt and lockwasher that attach the shunt to the bus bar, and remove the shunt.

(6) Reverse the procedures of steps (1) through (5) to install the replacement shunt.

l. Removal and Replacement of Shunt R15 (fig 2-11).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the two nuts and lockwashers that attach cables and bus bars to the shunt, and detach the cables from the shunt.

(4) Remove the screw and lockwasher that attach the bus bar to relay K10, and remove the bus bar.

(5) Remove the two screws and lockwashers that attach wires to the shunt, and detach the wires from the shunt.

(6) Remove the two nuts, lockwashers, and screws that attach the shunt to the test stand, and remove the shunt.

(7) Reverse the procedures of steps (1) through (6) to install the replacement shunt.

m. Removal and Replacement of Equalization Coil Resistor R24 (fig 2-11).

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Unsolder the wires from the resistor.

(4) Remove the two nuts, lockwashers, and screws that attach the resistor to the test stand, and remove the resistor.

(5) Reverse the procedures of steps (1) through (4) to install the replacement resistor.

n. Removal and Replacement of Voltage Adjust Potentiometer R37 (fig 2-5).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel, raise the control panel, and secure it in the up position with the toggle bolt.

(3) Unsolder the wires from the terminals of the potentiometer.

(4) Loosen the knob setscrew, and remove the knob from the potentiometer.

(5) Remove the nut that attaches the potentiometer to the test stand, and remove the potentiometer.

(6) Reverse the procedures of steps (1) through (5) to install the replacement potentiometer.

o. Removal and Replacement of Reversing Switch S1 (fig 2-8).

(1) Disconnect main power from the test stand.

(2) Open the high voltage compartment door.

(3) Remove the four nuts, lockwashers, and washers that attach the wires to the terminals of the reversing switch, and detach the wires from the terminals.

(4) Remove the retaining hardware that attaches the reversing switch to the test panel, and remove the reversing switch.

(5) Reverse the procedures of steps (1) through (4) to install the replacement reversing switch.

p. Removal and Replacement of STOP or START Switch S2 or S3 (fig 2-7).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel (fig 2-5), raise the control panel, and secure it in the up position with the toggle bolt.

(3) Remove the two retaining screws, nuts, and washers from the switch that is to be removed, and separate the switch from the test stand carefully.

(4) Disconnect wiring from the switch terminals.

(5) Reverse the procedures of steps (1) through (4) to install the replacement switch.

q. Removal and Replacement of Door Interlock Switch S4 (fig 2-8).

(1) Disconnect main power from the test stand.

(2) Open the high voltage compartment door and the battery compartment door.

(3) Unsnap the leads from the terminals of the door interlock switch.

(4) Remove the two screws that attach the door interlock switch to the test stand, and remove the switch.

(5) Reverse the procedures of steps (1) through (4) to install the replacement door interlock switch.

r. Removal and Replacement of Toggle Switch S9, S38, or S39 (fig 2-5).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the front and sides of the control panel, raise the control panel, and secure it in the up position with the toggle bolt.

(3) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(4) Disconnect all wires from the toggle switch that is to be replaced.

(5) Remove the nut that attaches the toggle switch to the test stand, and remove the toggle switch.

(6) Reverse the procedures of steps (1) through (5) to install the replacement toggle switch.

s. Removal and Replacement of Battery Charge Timer TD1 (fig 2-7).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the front and sides of the control panel (fig 2-5), raise the control panel, and secure it in the up position with the toggle bolt.

(3) Remove the knob from the timer. Disconnect the timer switch contact wire and the timer motor wires from the terminals of the CHARGE INDICATOR.

(4) Remove the three timer retaining screws, and remove the timer from the test stand.

(5) Reverse the procedures of steps (1) through (4) to install the replacement timer.

t. Removal and Replacement of Power Transformer T1, T2, T4, or T6 (fig 2-8).

(1) Disconnect main power from the test stand.

(2) Open the high voltage compartment door.

(3) Remove eight 1/4-20 screws and lockwashers from both the upper and lower rear panels of the test stand, and remove the panels.

(4) Remove the screws that attach the wires to the terminals of the transformer that is to be replaced, and detach the wires from the transformer terminal.

(5) Remove the four nuts, lockwashers, and bolts that attach the transformer to the test stand, and remove the transformer.

(6) Reverse the procedures of steps (1) through (5) to install the replacement transformer.

u. Removal and Replacement of Variable Transformer T3 or T5 (fig 2-7).

(1) Remove the seven 1/4-20 screws from the control panel (fig 2-5), raise panel and secure with lock bolt. Remove lower rear panel.

(2) Remove the screws that attach wiring to the terminals of the transformer that is to be replaced, and detach the wires from the transformer terminals.

(3) Remove the four nuts, lockwashers, and screws that attach the transformer to the test stand, and remove the transformer.

(4) Reverse the procedures of steps (1) through (3) to install the replacement transformer.

3-2. BINDING POST PANEL ASSEMBLY (fig 2-6)

a. Description. The binding post panel assembly contains binding posts used to make electrical connections for testing of external components on the test stand, and three toggle switches. Repair is limited to inspection to detect defective parts, and removal and replacement of the defective part. All repair procedures can be performed with the binding post panel assembly installed on the test stand.

b. Inspection of Binding Post Panel Assembly.

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Inspect the binding posts for indications of burning.

(4) Inspect the binding posts for stripped threads.

(5) Inspect the toggle switches for ease of manual operation.

c. Removal and Replacement of Binding Posts.

(1) Disconnect main power from the test stand.

(2) Remove the 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the nut and lockwasher that secure the cables, wire(s) and/or bus bar to the defective binding post. It may also be necessary to loosen the retaining hardware of the joining bus bar.

(4) Remove the cable, wire(s) and/or bus bar from the binding post.

(5) Remove the defective binding post retaining nuts and lockwashers, remove the insulated washers, and remove the binding post.

(6) Reverse the procedures of steps (1) through (5) to install a replacement binding post.

d. Removal and Replacement of Switch S33, S35, or S40.

(1) Disconnect main power from the test stand.

(2) Remove 10 1/4-20 screws and lockwashers that attach the right side panel of the test stand, and remove the right side panel.

(3) Remove the retaining nut from the toggle side of the defective switch. Pull the switch away from the binding post panel carefully. Do not place any strain on the wiring.

(4) Remove the wire retaining hardware from the switch terminals, and detach the wires from the switch terminals.

(5) Reverse the procedures of steps (1) through (4) to install the replacement switch.

3-3. RECTIFIER CHAMBER ASSEMBLY (fig 2-7)

a. Description. The rectifier chamber assembly consists of a rectifier enclosure and binding posts used for making electrical connections. Repair is limited to inspection to locate defective binding posts, and removal and replacement of the defective binding posts.

b. Inspection of Rectifier Chamber Binding Posts.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel (fig 2-5) of the test stand, raise the control panel, and secure it in the up position with the toggle bolt.

(3) Open the rectifier chamber door and inspect all binding posts for indications of burning or stripped threads.

c. Removal and Replacement of Rectifier Chamber Binding Posts.

(1) Disconnect main power from the test stand.

(2) Remove the retaining hardware from the sides and front of the I test stand control panel, raise the control panel, and lock the control panel in the up position with the locking bolt.

(3) Open the rectifier chamber front door.

(4) Remove the nut and lockwasher that secure the wire to the defective binding post.

(5) Remove the two nuts, washer, and insulating washer that attach the defective binding post to the rectifier chamber, and remove the binding post.

(6) Reverse the procedures of steps (1) through (5) to install the replacement binding post.

3-4. BATTERY COMPARTMENT ASSEMBLY (fig 2-9)

a. Description. The battery compartment assembly contains connection and mounting provisions for the batteries used with the test stand. Repair is limited to inspection and replacement of binding posts, and replacement of a defective terminal board. Inspection and replacement of binding posts can be accomplished with the battery compartment assembly installed in the test stand; replacement of the terminal board requires removal of the battery compartment assembly from the test stand. Refer to paragraph 2-12 for the battery compartment assembly removal procedure.

b. Inspection of Binding Posts.

(1) Disconnect main power from the test stand.

(2) Open the battery compartment door. Disconnect the battery cables from the binding battery posts. Lift the battery drawer retainer hook, pull out the battery drawer, and remove the batteries.

Push the battery drawer back in.

(3) Disconnect the battery cables from the binding posts, and inspect the binding posts for indications of burning and for stripped threads.

(4) Reverse the procedures of steps (1) through (3).

c. Removal and Replacement of Binding Post.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the side panel of the test stand, and remove the side panel.

(3) Open the battery compartment door. Disconnect the battery cables from the binding battery posts. Lift the battery drawer retainer hook, pull out the battery drawer, and remove the batteries. Push the battery drawer back in.

(4) Remove the nut and washer that secure the wiring at the rear of the binding post that is to be replaced. On part number 7458-2, remove the retaining nuts from the rear of the binding post, and remove the binding post from the battery compartment. On part number 7558-4, remove the jam nut, round nut, washer and knob from the binding post, and remove the binding post from the battery compartment.

(5) Reverse the procedures of steps (1) through (4) to install the replacement binding post.

d. Removal and Replacement of Terminal Board.

(1) Remove the battery compartment assembly from the test stand. (Refer to paragraph 2-12.)

(2) Remove the two 1/4-20 screws, lockwashers, and nuts that attach the terminal board, and remove the terminal board.

(3) Remove the retaining hardware from the rear of the binding posts and remove the binding posts.

(4) Reverse the procedures of steps (1) through (3) to install the replacement terminal board.

3-5. INSTRUMENT PANEL ASSEMBLY (fig 2-4).

a. Description. The instrument panel assembly contains electrical meters and associated controls used to measure electrical values during various tests of external components on the test stand. It is hinged at the bottom for convenient access to electrical connections. Repair at the direct support maintenance level is limited to test, remove, repair, and adjust defective switches, potentiometers, and meters.

b. Removal and Replacement of Meters.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining screws from the top and sides of the instrument panel.

(3) Swing the instrument panel down.

(4) Disconnect electrical wiring from the terminals of the meter that is to be replaced.
(5) Remove the meter from the instrument panel.
(6) Reverse the procedures of steps (1) through (5) to install the replacement instrument.

c. Removal and Replacement of Rotary Switches.

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining screws from the top and sides of the instrument panel.
(3) Swing the instrument panel down.
(4) Disconnect all wiring from the terminals of the switch that is to be replaced.
(5) Remove the switch retaining hardware.
(6) Remove the switch from the instrument panel.
(7) Reverse the procedures of steps (1) through (6) to install the replacement switch.

d. Removal and Replacement of Toggle Switches.

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining screws from the top and sides of the instrument panel.
(3) Swing the instrument panel down.
(4) Disconnect the wiring from the terminals of the toggle switch that is to be replaced.
(5) Remove the switch retaining hardware.
(6) Remove the switch from the instrument panel.
(7) Reverse the procedures of steps (1) through (6) to install the replacement switch.

e. Removal and Replacement of Potentiometer R35.

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining screws from the top and sides of the instrument panel.
(3) Swing the instrument panel down.
(4) Disconnect wiring from the terminals of the potentiometer.
(5) Remove the knob and the retaining nut from the shaft of the potentiometer, and remove the potentiometer from the instrument panel.
(6) Reverse the procedures of steps (1) through (5) to install the replacement potentiometer.

3-6. CONTROL PANEL ASSEMBLY (fig 2-5)

a. Description. The control panel assembly contains switches, circuit breakers, indicating lamps, rheostats, and resistors used in operation of the test stand. It is hinged at the top and may be locked in the up position for convenient access to electrical wiring. Repair at the direct support maintenance level is limited to test, remove, replace, repair, and adjust defective electrical parts.

b. Removal and Replacement of Toggle Switches.

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining hardware from the sides and front of the control panel.
(3) Raise the control panel and secure it in the up position with the toggle bolt.
(4) Disconnect wiring from the terminals of the toggle switch that is to be replaced.
(5) Remove the 15/32 nut from the front of the toggle switch.
(6) Remove the toggle switch from the control panel.
(7) Reverse the procedures of steps (1) through (6) to install the replacement toggle switch.

c. Removal and Replacement of Circuit Breakers.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel.
(3) Raise the control panel and secure it in the up position with the toggle bolt.
(4) Disconnect wiring from the terminals of the circuit breaker that is to be replaced.
(5) Remove the circuit breaker retaining nut.
(6) Remove the circuit breaker from the control panel.
(7) Reverse the procedures of steps (1) through (6) to install the replacement circuit breaker.

d. Removal and Replacement of Indication, Lamps.

(1) Disconnect main power from the test stand.
(2) Unscrew the lens cap from the indicator light assembly.
(3) Press the indicating lamp down while twisting it to the left, and remove the indicating lamp from the indicator light assembly.
(4) Reverse the procedures of steps (1) through (3) to install the replacement indicating lamp.

e. Removal and Replacement of Field Rheostats (R26 and R27).

(1) Disconnect main power from the test stand.
(2) Remove the panel retaining hardware from the sides and front I of the control panel. Remove the field rheostat knob.
(3) Raise the control panel and secure it in the up position with the toggle bolt.
(4) Disconnect wiring from the terminals of the field rheostat that is to be replaced.
(5) Remove the rheostat retaining hardware.
(6) Remove the field rheostat from the control panel.
(7) Reverse the procedures of steps (1) through (6) to install the replacement field rheostat.

f. Removal and Replacement of Load Rheostat (R32).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel.
(3) Remove the knob from the load rheostat.
(4) Raise the control panel and secure it in the up position with the lock bolt.
(5) Disconnect both wires from the rheostat.
(6) Remove the copper bus and resistor from the rheostat mounting bracket.
(7) Remove the retaining hardware that attaches the rheostat to the control panel.
(8) Remove the rheostat from the control panel.
(9) Reverse the procedures of steps (1) through (8) to install the replacement rheostat.

g. Removal and Replacement of BATTERY CIRCUIT SELECTOR Switch (S6).

(1) Disconnect main power from the test stand.
(2) Re-move the panel retaining hardware from the sides and front of the control panel.
(3) Remove the knob from the switch.
(4) Raise the control panel and secure it in the up position with the lock bolt.
(5) Unsolder the wires from the terminals of the switch.
(6) Remove the switch retaining nut.
(7) Remove the switch from the control panel.
(8) Reverse the procedures of steps (1) through (7) to install the replacement switch.

h. Removal and Replacement of MASTER LOAD DISCONNECT Switch (S8).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel.

(3) Raise the control panel and secure it in the up position with the lock bolt.

(4) Remove the two retaining screws from the FASTER LOAD DISCONNECT switch and swing the switch to the side of the adjacent rheostat.

(5) Disconnect the wire leads from the terminals of the switch and remove the switch from the test stand.

(6) Reverse the procedures of steps (1) through (5) to install the replacement switch.

i. Removal and Replacement of Resistor R2, R3, or R4.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel.

(3) Raise the control panel and secure it in the up position with the lock bolt.

(4) Locate resistors R2, R 3,or R4 behind BATTERY CIRCUIT SELECTOR I switch S6. Unsolder the leads of the resistor that is to be replaced from the terminals of the switch, and remove the resistor.

(5) Reverse the procedures of steps (1) through (4) to install the replacement resistor.

j. Removal and Replacement of Resistor R5.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel.

(3) Raise the control panel and secure it in the up position with the lock bolt.

(4) Locate resistor R5 on the right side of the load rheostat (R32) mounting bracket. Remove the screw, nut, and lockwasher that attach the resistor and terminal strip to the bracket.

(5) -love the resistor and terminal strip to one side. Unsolder the resistor leads and remove the resistor.

(6) Reverse the procedures of steps (1) through (5) to install the replacement resistor.

3-7. RHEOSTAT ASSEMBLY (R18, fig 2-5)

a. Description. The rheostat assembly consists of a carbon pile that is used to limit current during testing of starters on the test stand.

b. Repair Instructions. It must be removed from the test stand for repair. Refer to paragraph 2-14 for removal instructions.

(1) Remove the four 1/4-20 screws from the plate (lower) end of the rheostat assembly, and remove the plate.
(2) Remove the insulator and lower brass contact plate.
(3) Remove and replace the defective carbon pile plates.
(4) Install the lower brass contact plate and the insulator.
(5) Install the end plate and secure it with four 1/4-20 screws.

3-8. LINK BOARD ASSEMBLY (fig 2-8)

a. Description. The link board assembly consists principally of 8 copper links and associated connecting studs. The links provide means for changing circuit connections for input AC voltage (230/460) conversion. Repair of the link board assembly is limited to removal and replacement of studs that may have damaged threads.

b. Removal and Replacement of Studs. The removal procedure for the link board assembly is provided in paragraph 2-15.

(1) Remove the links from the studs.
(2) Remove the mounting hardware from the defective stud, and remove the stud.
(3) Replace the defective stud, install the stud mounting hardware, and install the links on the studs.

3-9. SPEED CONTROL COMPONENTS AND CURRENT TRANSFORMER (C. T.) PANEL BRACKET ASSEMBLY

a. Description. The SPEED CONTROL and associated parts (fig 3-1) provide a means for manual adjustment of the speed of the output shafts of the varidrive assembly and the C.T. panel bracket assembly contains current transformers used with the instrument panel AC ammeter, and a resistor used with the coil of starter MS1. Repair of the SPEED CONTROL components is limited to removal and replacement of defective parts. Repair of the C.T. panel bracket assembly consists of testing to locate the defective part, and removal and replacement of that part.

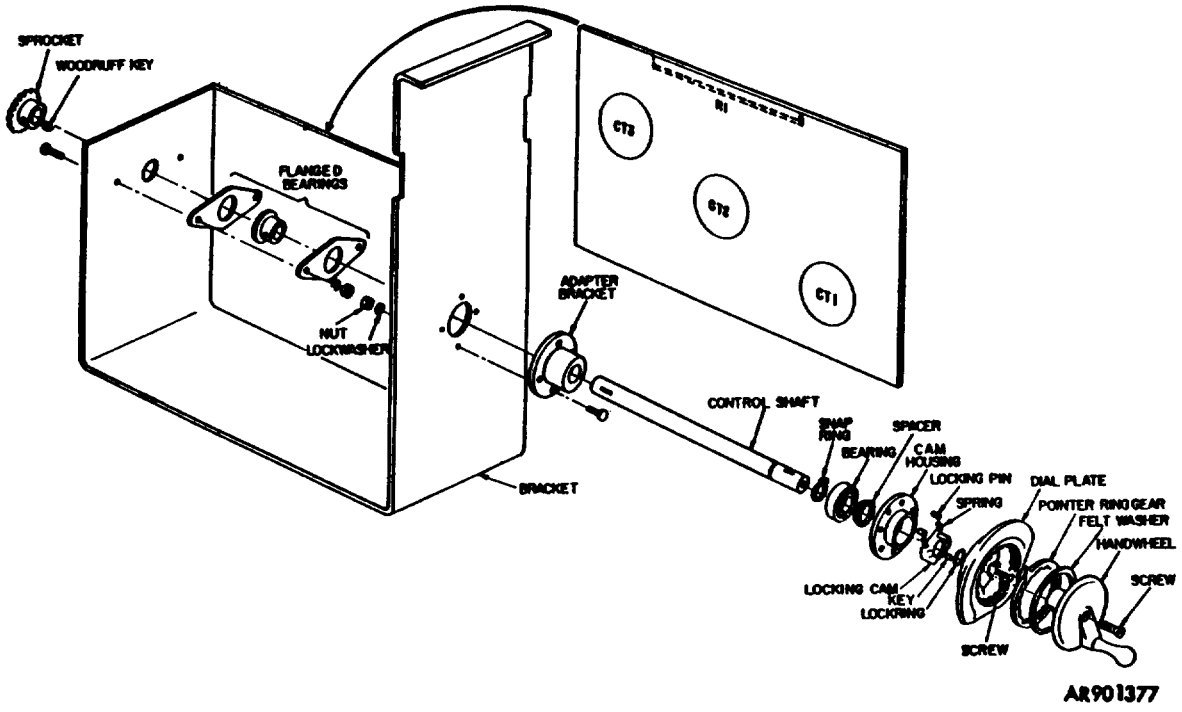


Figure 3-1. Speed control components and current transformers, exploded view.

b. Removal and Replacement of SPEED CONTROL Components.

(1) Remove the panel retaining screws from the sides and front of the control panel of the test stand, raise the control panel, and secure it in the up position with the slide bolt. Remove bottom rear panel.

(2) Start the varidrive and rotate the SPEED CONTROL until the chain connecting link is at the top of the sprocket.

(3) Stop the varidrive. Disconnect main power from the test stand.

(4) Remove the chain connecting link from the chain, and remove the chain.

(5) Loosen the setscrew in the sprocket and remove the sprocket and key. Loosen the two setscrews in the flanged bearing.

(6) Remove the attaching screw from the handwheel, and remove the handwheel, felt washer, and pointer ring gear.

(7) Remove grease from the dial plate.

(8) Remove the four attaching screws from the dial plate, and remove the dial plate.

(9) Remove the lock ring from the control shaft.

(10) Remove the cam housing, key, and associated parts as a unit from the control shaft.

(11) Remove the locking pins, springs, and locking cam from the cam housing.

(12) Remove the spacer from the control shaft.

(13) Pull the control shaft out through the front of the test stand. It may be necessary to use a block of wood and a crow bar between the varidrive frame and the inner end of the control shaft to force the adapter bracket bearing from the adapter bracket.

(14) Remove the control shaft from the bracket.

(15) Remove the snap ring and bearing from the control shaft.

(16) Remove the two bolts from the flanged bearing, and remove the flanged bearing from the bracket.

(17) Remove the four bolts that attach the adapter bracket to the bracket, and remove the adapter bracket.

(18) Reverse the procedures of steps (1) through (17) to assemble the SPEED CONTROL components after replacing defective parts.

c. Testing Current Transformers CT1, CT2, and CT3.

(1) Disconnect main power from the test stand.

(2) Remove 10 1/4-20 screws and lockwashers that attach the right side panel to the test stand, and remove the right side panel.

(3) Disconnect the three leads of each control transformer from the terminal block.

(4) Using an ohmmeter, measure the resistance between the white (center) lead of each control transformer, and each of the end (black) leads of that control transformer. The ohmmeter indication should be essentially zero ohm. If an open circuit or high resistance is indicated, replace the current transformer.

d. Removal and Replacement of Current Transformer CT1, CT2, or CT3.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the front and sides of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(3) Remove the 10 1/4-20 screws and lockwashers that attach the right side access panel to the test stand, and remove the right side access panel.

(4) Disconnect the three leads of the current transformer that is to be replaced from the terminal block.

(5) Disconnect the power cable associated with the current transformer that is to be removed from the ALTERNATOR T1, T2, or T3 binding post on the binding post panel assembly (fig 2-6) by removing the attaching nut and lockwasher at the rear of the binding post.

(6) Remove the retaining hardware of the current transformer that is to be replaced.

(7) Slide the current transformer along the power cable to the free end of the power cable, cutting and removing cable ties as necessary, and remove the current transformer.

(8) Reverse the procedures of steps (1) through (7) to install the replacement current transformer. Install new cable ties as required.

e. Testing Starter Coil Resistor R1.

(1) Disconnect the main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel (fig 2-5), raise the control panel, and secure it in the up position with the lock bolt.

(3) Using an ohmmeter, measure the resistance of resistor R1. The resistance should be 250 ±02.5 ohms.

f. Removal and Replacement of Starter Coil Resistor R1.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel (fig 2-5), raise the control panel, and secure it in the up position with the lock bolt.

(3) Unsolder the leads at both ends of resistor R1, remove the 10-32 screws, lockwashers, and nuts, and remove the resistor.

(4) Reverse the procedures of steps (1) through (3) to install the replacement resistor.

3-10. LOAD BANK ASSEMBLY (fig 2-10)

a. Description. The load bank assembly contains a resistive load bank, a cooling plenum chamber and outlet duct, and an air-flow actuated mercury switch. The load bank provides resistive loads used during testing of external components on the test stand. The plenum chamber and outlet duct are part of a forced-air cooling system for the load bank, and the mercury switch is used to shut down the varidrive if the cooling air flow is restricted. Repair of the load bank assembly is limited to the removal and replacement of a defective air flow switch and load bank elements. (Repair of the load bank is covered in paragraph 3-11 below.) Removal and replacement of the air flow switch can be done with the load bank assembly installed in the test stand.

b. Removal and Replacement of Air Flow Switch.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Disconnect the leads of air flow switch from the terminal block on the load bank assembly.

(4) Unclip air flow switch from its holder, and remove the switch.

(5) Reverse the procedures of steps (1) through (4) to install the replacement switch.

3-11. LOAD BANK (fig 2-10)

a. Description. The load bank is a subassembly of the load bank assembly. It consists of resistive elements that serve as loads to external components that are tested on the test stand. Repair consists of testing to isolate a defective element, and removal and replacement of the defective element. Testing can be accomplished with the load bank installed in the test stand; the load bank must be removed from the test stand and load bank assembly for removal and replacement of a defective element. Refer to paragraph 2-17.

b. Testing of Load Bank Elements.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper rear panel of the test stand, and remove the upper rear panel.

(3) Set all LOAD SELECTION switches on the control panel to the OFF position.

(4) Remove the panel retaining hardware from the sides and front of the control panel of the test stand, raise the control panel, and secure it in the up position with the lock bolt.

(5) Using an ohmmeter, measure the resistance between the common bus bar of the load bank and the terminal of each element. The resistance of each element should be 1.14 ohms ±5%.

c. Removal and Replacement of Load Bank Element.

(1) Remove the load bank in accordance with instructions in paragraph 2-17.

(2) Remove the 10 10-32 nuts, lockwashers, and flat washers that secure the bus bar of the load bank, and remove the bus bar.

(3) Remove the defective load bank element, remove the female insulator from each end of the element, and remove the element and its male insulator from within the load bank.

(4) Install the replacement element by reversing the procedures of steps (1) through (3).

3-12. RESISTOR AND SHUNTS PANEL ASSEMBLY (fig 2-10)

a. Description. The resistor and shunts panel assembly provides mounting facilities and electrical connections for resistors used in the fixed resistance regulator check circuit, and shunts and a shunt switching relay used with instrument panel DC ammeters. Repair at the direct support maintenance level is limited to inspection and test to locate a defective part, and removal and replacement of that part.

b. Inspection of Shunts R19, R28, R29, R30, and R31 (fig 3-2).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Remove the panel retaining hardware from the sides and front of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(4) Inspect the shunts for indications of burning and melted solder.

c. Testing Resistors R10, R11, R12, and R13 (fig 3-2).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Using an ohmmeter, measure the resistance across each resistor. The resistances should be 1/4 ohm ±5% for resistor R10, 1-1/2 ohms ±10% for resistor R11, 2-1/4 ohms ±10% for resistor R12, and 7 ohms ±10% for resistor R13.

d. Testing Relay K9 (fig 3-2).

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the sides and front of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(3) Inspect the contacts of relay K9 for excessive pitting.

(4) Disconnect the wire lead from one relay coil terminal. Using an ohmmeter, measure the resistance across the coil terminals. The resistance should be 400 ohms ±10%.

e. Removal and Replacement of Shunt R19, R28, R29, R30, or R31.

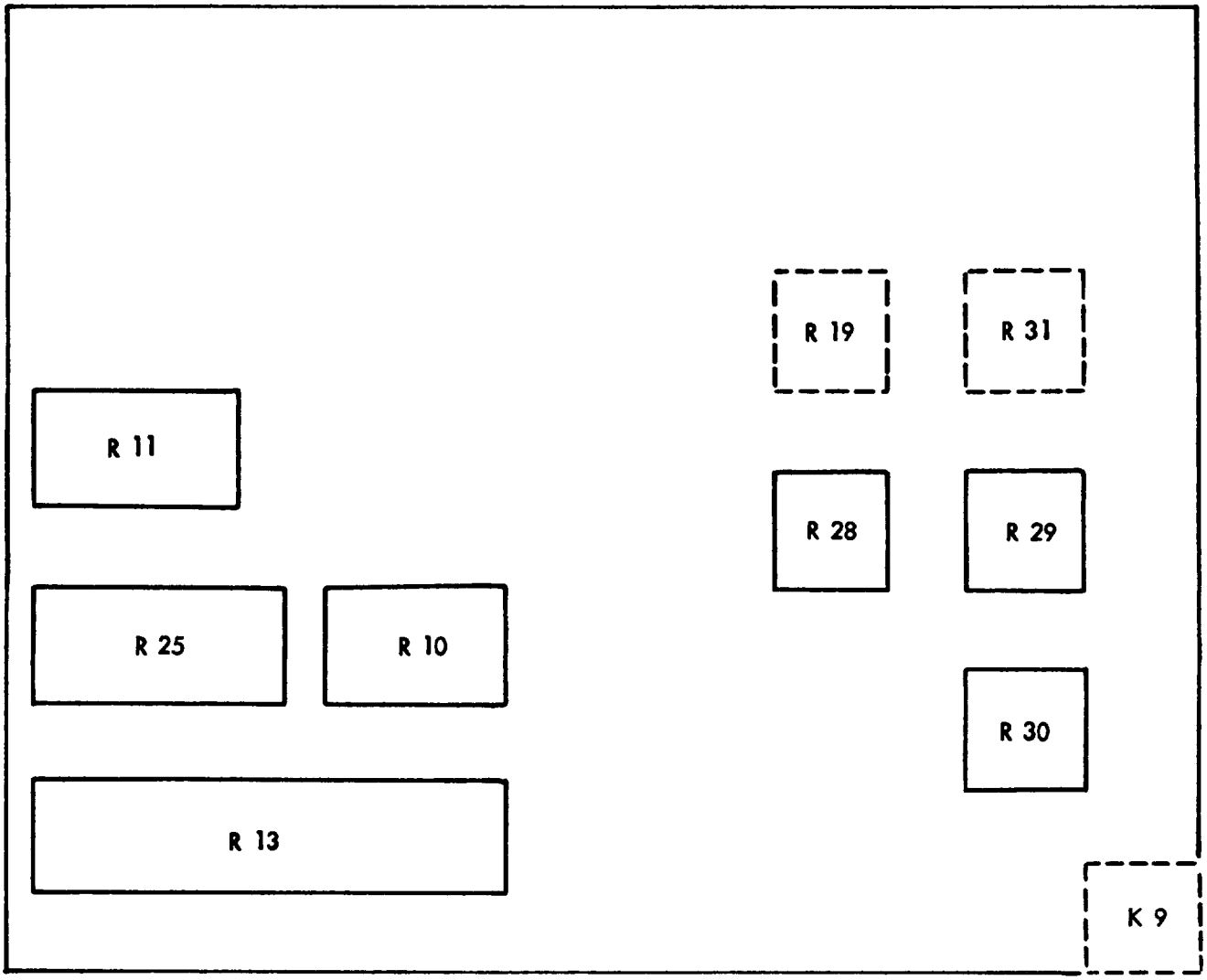


Figure 3-2. Resistor and shunt panel assembly parts

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Remove the panel retaining hardware from the sides and front of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(4) Remove the bolts and lockwashers that secure wires and/or bus bars to the shunt that is to be replaced, and disconnect the wires and/or bus bars.

(5) Remove the shunt retaining hardware that attaches the shunt to the resistor and shunts panel and remove the shunt.

(6) Reverse the procedures of steps (1) through (5) to install the replacement shunt.

f. Removal and Replacement of Resistors R10, R11, R12, and R13.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Remove the panel retaining hardware from the sides and front of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(4) Remove the two nuts, lockwashers, and screws that attach wiring to the terminals of the resistor that is to be replaced.

(5) For resistor R10, R11, or R12: Remove the two nuts, lockwashers, and screws that attach the resistor to the resistor and shunts panel and remove the resistor.

(6) For resistor R13: Remove two nuts and lockwashers, one washer and cable clamp, and two screws that attach the resistor to the resistor and shunts panel and remove the resistor.

(7) Reverse the procedures of steps (1) through (6) to install the replacement resistor.

g. Removal and Replacement of Relay K9.

(1) Disconnect main power from the test stand.

(2) Remove the panel retaining hardware from the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Remove the panel retaining hardware from the sides and front I of the control panel, raise the control panel, and secure it in the up position with the lock bolt.

(4) Unsnap the wires from the relay terminals.

(5) Unsolder the other wires from the relay terminals.

(6) Remove the screw that attaches the relay to the resistor and shunts panel and remove the relay.

(7) Reverse the procedures of steps (1) through (6) to install the replacement relay.

3-13. DIODE ASSEMBLY (fig 2-10)

a. Description. The diode assembly contains the bridge rectifiers for the DC variable volts, battery charge, and relay control circuits.

b. Testing. Test each of the three bridge rectifiers on the diode assembly as follows:

(1) Remove lower rear panel.

(2) Connect the positive lead of an ohmmeter to the positive output terminal of the bridge rectifier, and connect the negative lead of the ohmmeter to each AC input terminal of the bridge rectifier in turn. The ohmmeter should indicate a high resistance. Then, repeat the resistance measurements with the ohmmeter leads reversed. The ohmeter should indicate zero ohm or a very low resistance. If the correct indications are not obtained, replace the rectifier.

(3) Connect the negative lead of the ohmmeter to the negative output terminal of the bridge rectifier, and connect the positive lead of the ohmmeter to each AC input terminal in turn. The ohmmeter should indicate a very high resistance. Then, repeat the resistance measurements with the ohmmeter leads reversed. The ohmmeter should indicate zero ohm or a very low resistance. If the correct indications are not obtained, replace the rectifier.

(4) Repeat steps (2) and (3) for each of the other two rectifiers on the diode assembly.

c. Repair Instructions. Instructions for removal of the diode assembly from the test stand are provided in para 2-13.

(1) Remove the retaining hardware from the rectifier that is to be replaced.

(2) Remove the defective rectifier.

(3) Install the replacement rectifier.

CAUTION

Observe proper polarity of the rectifier output terminal when installing the replacement rectifier. (See FO-1.)

(4) Install and tighten the rectifier retaining hardware.

3-14. VARIDRIVE ASSEMBLY (fig 2-10)

a. Description. The varidrive assembly provides an adjustable speed motive force for driving external components that are tested on the test stand. A tachometer generator provides an output voltage that is proportional to speed to drive the front panel TACHOMETER RPM meter. Repair at the direct support maintenance level is limited to removal and replacement of a defective tachometer generator and varidrive assembly. This procedure can be done with the varidrive assembly installed in the test stand. Procedures for the removal of the varidrive assembly from the test stand are provided in paragraph 2-19.

b. Removal and Replacement of Tachometer Generator.

(1) Disconnect main power from the test stand.

(2) Remove eight 1/4-20 screws and lockwashers from both the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Disconnect the two-conductor cable from the terminal block on the load bank assembly.

(4) Remove the retaining hardware that attaches the tachometer generator and bracket to the varidrive, and remove the tachometer generator together with the bracket and coupling from the test stand.

(5) Remove the coupling from the shaft of the tachometer generator. Remove the retaining hardware that attaches the bracket to the tachometer generator, and separate the tachometer generator from the bracket.

(6) Reverse the procedures of steps (1) through (5) to install the replacement tachometer generator.

3-15. DRIVE BRACKET ASSEMBLY (fig 2-11)

a. Description. The bracket assembly provides means for mounting and coupling to the varidrive of external components that are to be tested by the test stand. Repair of the bracket assembly is limited to the removal and replacement of defective mounting studs and a defective pivot arm. Procedures for removal of the bracket assembly from the test stand are provided in paragraph 2-20.

b. Removal and Replacement of Hex Mounting Stud.

(1) Remove the nuts from all hex mounting studs.

(2) Swing the pivot arm to the side of the bracket assembly that is opposite to the damaged stud, and slip the pivot arm over the studs.

(3) Using a 3/4-inch wrench, remove the damaged hex stud.

(4) Using the 3/4-inch wrench, install the replacement hex stud.

c. Removal and Replacement of Pivot Arm.

(1) Retain the pivot arm by threading nuts onto the hex studs that pass through the pivot arm.

(2) Remove the retaining ring from the rear of the bracket assembly shaft.

(3) Slide the shaft out of the bracket assembly.

(4) Remove the nuts from the hex studs which support the pivot arm, and remove the pivot arm.

(5) Reverse the procedures of steps (1) through (4) to install a replacement pivot arm.

3-16. STARTER MS1 (fig 2-8)

a. Description. Starter MS1 protects the varidrive of the test stand against overload. It consists of a starter coil, three overload relays, three heaters, and contacts. Testing of the starter and removal and installation of heater elements can be accomplished with the starter installed in the test stand. For other repair procedures, the starter must be removed from the test stand. Starter removal procedures are provided in paragraph 2-21.

b. Testing of Overload Relays and Coil.

(1) Disconnect the main power source from the test stand.

(2) Disconnect the wire leads from each of the three overload relays, and depress each overload relay reset button.

(3) Disconnect the wire leads from the starter coil.

(4) Using an ohmmeter set to its lowest range, check for continuity (zero ohm) across each overload relay.

(5) Using the ohmmeter, measure the resistance of the starter coil. The resistance should be approximately 2 ohms.

(6) Reconnect all wire leads at the end of the test.

c. Removal and Installation of Heater Element.

(1) Disconnect main power from the test stand.
(2) Open the high voltage compartment door.
(3) Remove the four attaching screws from the heater element, and remove the heater element.
(4) Reverse the procedures of steps (1) through (3) to install the replacement heater element.

d. Repair of Starter.

(1) Remove the starter from the test stand. (Refer to paragraph 2-21.)
(2) Loosen the two screws that attach the coil retaining bracket to the starter coil.
(3) Move the upper bracket up and the lower bracket down.
(4) Remove the coil from the pole piece.
(5) Inspect all contacts for excessive pitting and burning.
(6) Remove the contact carrier spring assembly.
(7) Hold down the contact spring(s) and slide out the double contact.
(8) Replace the burned or pitted contact member.
(9) Remove the screws that hold the stationary contacts.
(10) Replace burned or pitted stationary contacts.
(11) Assemble the starter by reversing the procedures of steps (1) through (10).

3-17. BLOWER ASSEMBLY (fig 2-10)

a. Description. The blower assembly contains an electric motor that provides forced-air cooling for the load bank of the test stand. Repair consists of removal and replacement of a defective blower motor. The blower assembly must be removed from the test stand for blower motor removal and replacement.

b. Removal and Replacement of Blower Motor.

(1) Remove the blower motor assembly from the test stand. Refer to paragraph 2-22.

(2) Remove the five sheet metal screws that attach the blower assembly inlet flange, and remove the inlet flange.

(3) Loosen the setscrew in the blower wheel, and remove the blower wheel.

(4) Remove the four 10-32 nuts that secure the blower housing and back plate to the blower motor, and remove the blower housing.

(5) Remove the rubber washers, flat washers, and spacers.

(6) Reverse the procedures of steps (1) through (5) to install the replacement blower motor.

Section II. GENERAL SUPPORT REPAIR INSTRUCTIONS

3-18. PC BOARD ASSEMBLY

a. General. Repair of the PC board assembly is done by locating the defective part through resistance checks, and removing and replacing that part. See figure 3-3 for parts identification. The PC board assembly must be removed from the test stand for repair. Refer to para 2-13 for removal.

b. Testing of PC Board Assembly.

(1) Using an ohmmeter, measure the resistance of resistor R33 between terminals 1 and 2 of the PC board assembly. The resistance should be 2740 ohms ±1%.

(2) Connect the ohmmeter between terminal 2 of the PC board assembly and the center terminal of potentiometer R36. The resistance should be 15,000 ohms ±1%. Replace resistor R34 if the correct reading is not obtained.

(3) Connect the ohmmeter between terminal 7 of the PC board assembly and the center terminal of potentiometer R36. The resistance should be variable from zero to 10,000 ohms ±10% by adjusting potentiometer R36. Replace the potentiometer if the correct indication is not obtained.

(4) Connect the ohmmeter between terminals 3 and 4 of the PC board assembly. The resistance should be 24,900 ohms ±1%. Replace resistor R25 if the correct indication is not obtained.

(5) Connect the ohmmeter between terminal 5 of the PC board assembly and the center terminal of potentiometer R20. The resistance should be 750 ohms ±1%. Replace resistor R22 if the correct indication is not obtained.

(6) Connect the ohmmeter between terminal 8 of the PC board assembly and the center terminal of potentiometer R20. The resistance should be adjustable from zero to 250 ohms ±10% by adjusting the potentiometer. Replace potentiometer R20 if the correct indication is not obtained.

(7) Connect the ohmmeter between terminal 5 of the PC board assembly and the center terminal of potentiometer R21. The resistance should be 8660 ohms ±1%. Replace resistor R23 if the correct indication is not obtained.

(8) Connect the ohmmeter between terminal 9 of the PC board assembly and the center terminal of potentiometer R21. The resistance should be adjustable from zero to 500 ohms ±10% by adjusting potentiometer R21. Replace potentiometer R21 if the correct indication is not obtained.

(9) Connect the ohmmeter between terminals 6 and 12 of the PC board assembly. The resistance should be 10,000 ohms ±1%. Replace resistor R8 if the correct indication is not obtained.

(10) Connect the ohmmeter between terminals 11 and 12 of the PC board assembly. The resistance should be 40,200 ohms ±1%. Replace resistor R9 if the correct indication is not obtained.

(11) Connect the positive lead of the ohmmeter to terminal 5 of the PC board assembly, and the negative lead of the ohmmeter to terminal 10. If the ohmmeter reading is less than 5 ohms, replace diodes CR13 and CR11. If a very high resistance reading is obtained, replace diode CR11. If a reading between 5 and 20 ohms is obtained, reverse the ohmmeter leads; if a high resistance reading results, replace diode CR13.

c. Removal and Replacement of PC Board Assembly Parts. Instructions for removal of the PC Board Assembly from the test stand are provided in para 2-13.

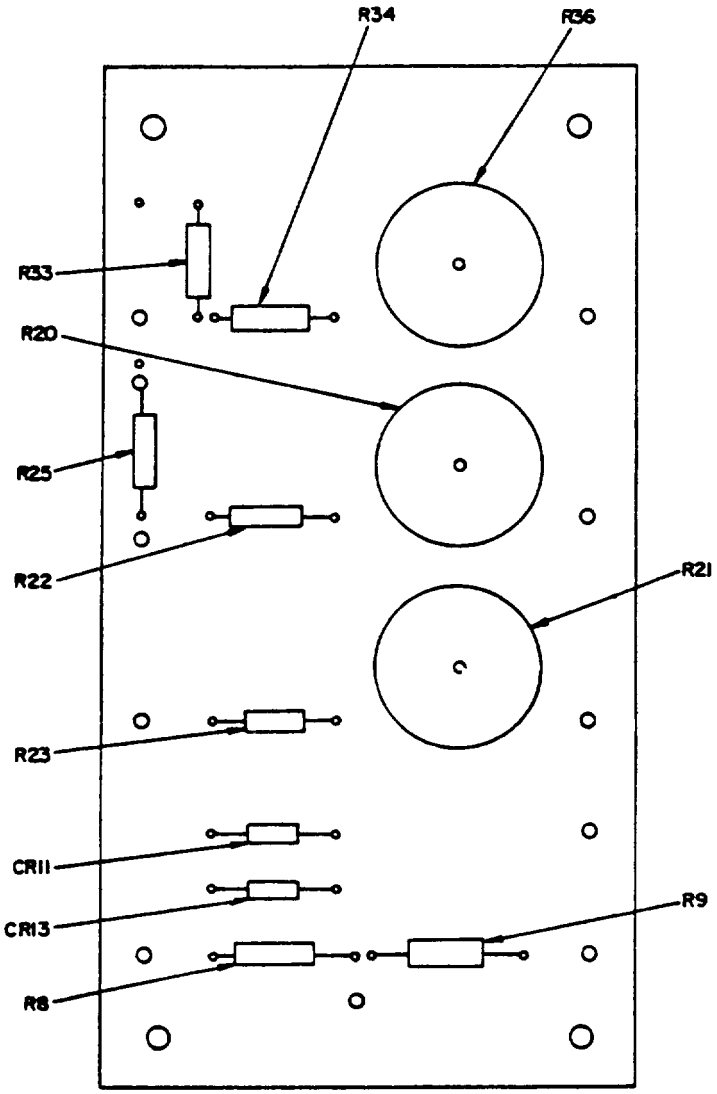
(1) Using a low wattage soldering iron, unsolder the leads of the defective part from the printed circuit board, and remove the part.

CAUTION
Do not overheat the printed circuit board; otherwise the PC board copper clad may lift off.

(2) Clean the area of excess solder, using a de-soldering bulb.

(3) Insert the leads of the replacement part through the holes in the printed circuit board.

(4) Solder the replacement part leads to the printed circuit board.



Legend for fig 3-3:

CR11	Diodes
CR13	Diodes
R8	Resistor
R9	Resistor
R20	Potentiometer
R21	Potentiometer
R22	Resistor
R23	Resistor
R25	Resistor
R33	Resistor
R34	Resistor
R36	Potentiometer

Figure 3-3. PC board assembly parts identification.

CAUTION

If a diode is being replaced, make sure that the correct polarity is observed when the diode is being inserted into the printed circuit board holes. (See FO-1.)

3-19. VARIDRIVE ASSEMBLY

a. Removal and Replacement of Varidrive Belt (fig 3-4).

(1) Set circuit breaker switch CB1 (fig 2-8) to the ON position, start the varidrive, and adjust the varidrive speed to high.

Stop the varidrive and set circuit breaker switch CB1 to the OFF position.

(2) Remove eight 1/4-20 screws from both the upper and lower rear panels of the test stand, and remove the upper and lower rear panels.

(3) Remove the right side cover from the varidrive.

(4) Remove screws (8) and lockwashers (8.1) that attach tachometer generator with bracket (9) to the varidrive, and remove the tachometer generator with bracket and coupling bushing (7) from the test stand. Remove the bearing retainer attaching hardware from support bracket.

(5) Unscrew plug adapter (6) from support bracket (5) end of the variable shaft.

(6) Remove cap screws (4 and 14), lockwashers (4.1 and 14.1), support bracket (5), and end cover (13).

(7) Place a block of wood between variable discs (1 and 2) to block them open. Use care not to nick or otherwise damage the disc faces.

(8) Carefully mark the axial and radial position of stationary varidisc (11) in relation to shaft (19), as shown in figure 3-4.

(9) Loosen clamping bolts (12) on varidisc split hub (11), and remove split hub stationary varidisc (11) from shaft (10). Wedge open the split hub if the varidisc is tight on the shaft.

(10) Withdraw the varibelt over shaft (10), over varidisc (2), and through the opening in frame case (3).

(11) Insert the replacement varibelt through the opening in frame case (3), and insert it between driven discs (1 and 2) and around shaft (10).

(12) Install split hub varidisc (11) in its original premarked position on shaft (10). Make sure the positioning is correct because this affects belt alignment.

(13) Tighten clamping bolts (12) on the varidisc split hub securely.

(14) Remove the block of wood from between variable discs (1 and 2).

(15) Rotate the varidisc by hand and turn the speed control handwheel until all varibelt slack is taken up. Do not force the speed control handwheel.

(16) Install support bracket (5) and end cover (13) using screws (4 and 14) and lockwashers (4.1 and 14.1).

(17) Install plug adapter (6) on support bracket (5) end of the variable shaft. Install bearing retaining hardware in the support bracket.

(18) Install coupling bushing (7), and install tachometer generator with bracket (9) using screws (8) and lockwashers (8.1).

(19) Install the right side cover of the varidrive.

(20) Install the upper and lower rear panels of the test stand.

b. Removal and Replacement of Gearcase Front Bearings (fig 3-5).

(1) Remove the varidrive assembly from the test stand. Refer to paragraph 2-19.

(2) Remove two 5/16-18 hex head screws (121) and lockwashers (122) from each of two bearing caps (123).

(3) Remove 10 3/8-16 hex head screws (31) from gearcase and generator mounting bracket (75) and remove the gearcase and generator mounting bracket.

(4) Remove two bearing locknuts (73) and washers (74).

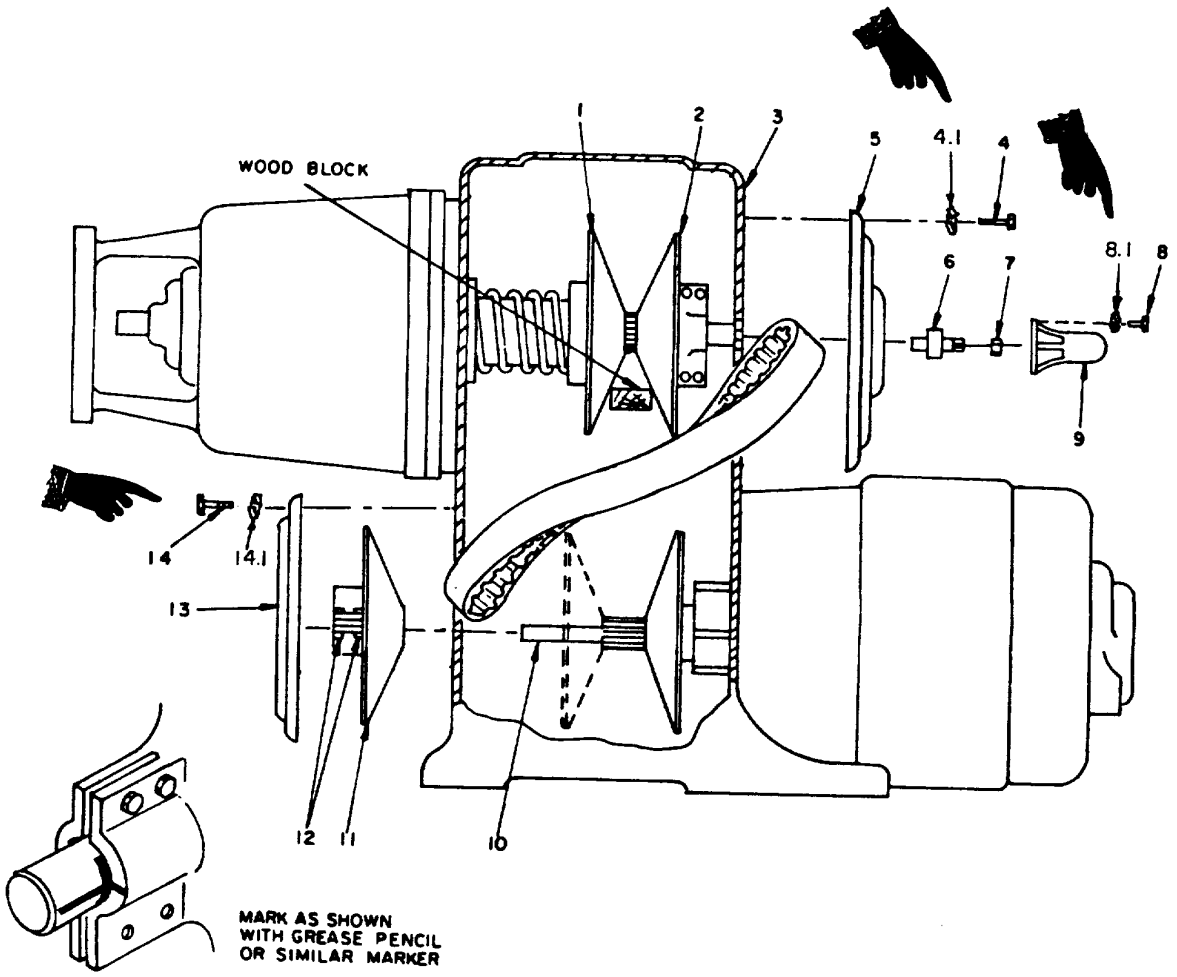
(5) Remove bearings (77).

(6) Reverse the procedures of steps (1) through (5) to install the replacement gearcase front bearings. Use gasketing material to reseal gearcase and generator mounting bracket (75).

c. Removal and Replacement of Gearcase Rear Bearings (fig 3-5).

(1) Remove the varidrive assembly from the test stand, and remove the gearcase front bearings. (Refer to paragraphs 2-19 and 3-19b.)

(2) Remove two locknuts (94) from input shaft (98).



Legend for fig 3-4:

1. Variable disc
2. Variable disc
3. Frame case
4. Cap screw
4.1. Lockwasher
5. Support bracket
6. Plug adapter
7. Coupling bushing
8. Screw
8.1. Lockwasher
9. Tachometer generator with bracket
10. Shaft
11. Split hub stationary varidisc
12. Clamping bolts
13. End cover
14. Cap screw
14.1. Lockwasher

Figure 3-4. Removal and replacement of varidrive belt.

(3) Remove outer low speed gear (82).

(4) Pull inner high speed gear (83) forward 1/2 to 1 inch so that the rear bearings on pinion take off shaft (95) and take off shaft (79) clear the inner high speed gear.

(5) Remove pinion take off shaft (95) and remove bearing (83).

(6) Remove take off shaft (79) and remove bearing (84).

(7) Reverse the procedures of steps (1) through (6) to install the replacement gearcase rear bearings.

d. Removal and Replacement of Gearcase Gear Sets (fig 3-5).

(1) Remove the gearcase rear bearings. Refer to paragraph 3-19c.

(2) Pull low speed gear (81) from take off shaft (79).

(3) Remove key (80).

(4) Pull inner high speed gear (83) off input shaft (98).

(5) Reverse the procedures of steps (1) through (4) to install the replacement gears.

e. Removal and Replacement of Input Shaft Rear Bearing (fig 3-5).

(1) Remove the varidrive assembly from the test stand. Refer to paragraph 2-19.

(2) Remove the tachometer generator with bracket. Refer to paragraph 3-14b.

(3) Unscrew adapter plug (110) from the rear end of input shaft (98).

(4) Remove three 1/4-20 screws (105) and lockwashers (104) that attach rear bearing cap (101) to support bracket (102).

(5) Remove four hex head screws (106) and lockwashers (107) and remove support bracket (102).

(6) Pull rear bearing (29) from input shaft (98).

(7) Reverse the procedures of steps (1) through (6) to install the replacement input shaft rear bearing.

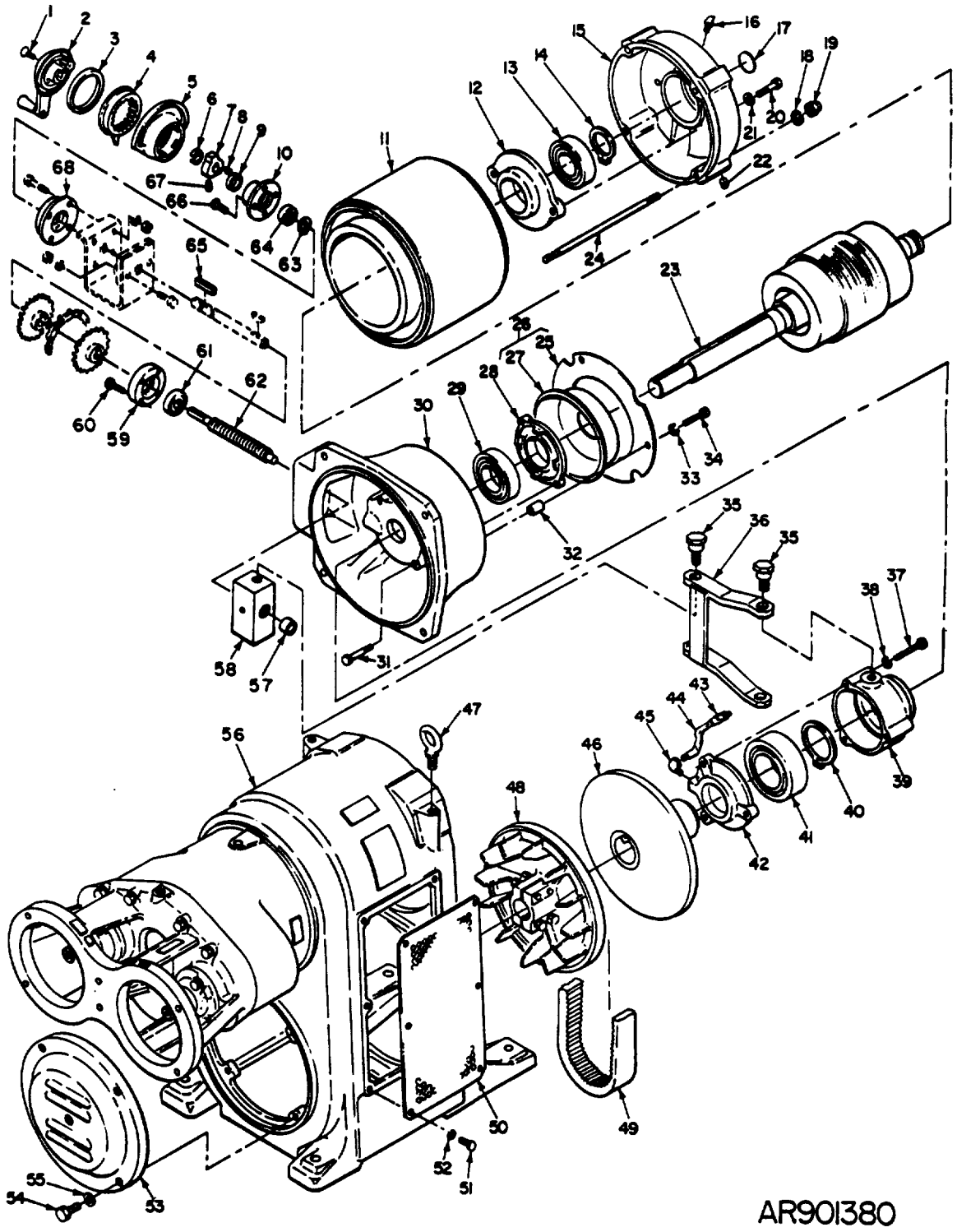


Figure 3-5. Varidrive assembly, exploded view (sheet 1 of 2).

Legend for fig 3-5, sheet 1 of 2:

1. Screw
2. Handwheel assembly
3. Felt washer
4. Pointer ring gear
5. Dial plate
6. Lock ring
7. Locking cam
8. Key
9. Spacer
10. Cam housing
11. Stator assembly
12. Bearing cap
13. Ball bearing
14. Retaining ring
15. Stator end bracket
16. Grease fitting
17. Bracket plug
18. Lockwasher
19. Cap nut
20. Screw
21. Lockwasher
22. Plug
23. Rotor assembly
24. Stud
25. Air deflector ring
26. Air deflector assembly
27. Air deflector
28. Bearing cap
29. Ball bearing
30. Adapter bracket
31. Screw
32. Spacer
33. Lockwasher
34. Screw
35. Pivot nut
36. Shifting lever
37. Screw
38. Lockwasher
39. Shift bearing housing
40. Retaining ring
41. Ball bearing
42. Bearing cap
43. Male connector
44. Flexible lubrication hose
45. Elbow fitting
46. Adjustable motor varidisc assembly
47. Eyebolt
48. Stationary motor varidisc assembly
49. Varibelt
50. Side cover plate
51. Screw
52. Lockwasher
53. Front cover plate
54. Screw
55. Lockwasher
56. Frame case
57. Needle bearing
58. Control nut assembly
59. Clamping plate
60. Screw
61. Ball bearing
62. Control shaft
63. Snap ring
64. Ball bearing
65. Key
66. Screw
67. Spring
68. Adapter

Figure 3-5. Varidrive assembly, exploded view (sheet 1 of 2).

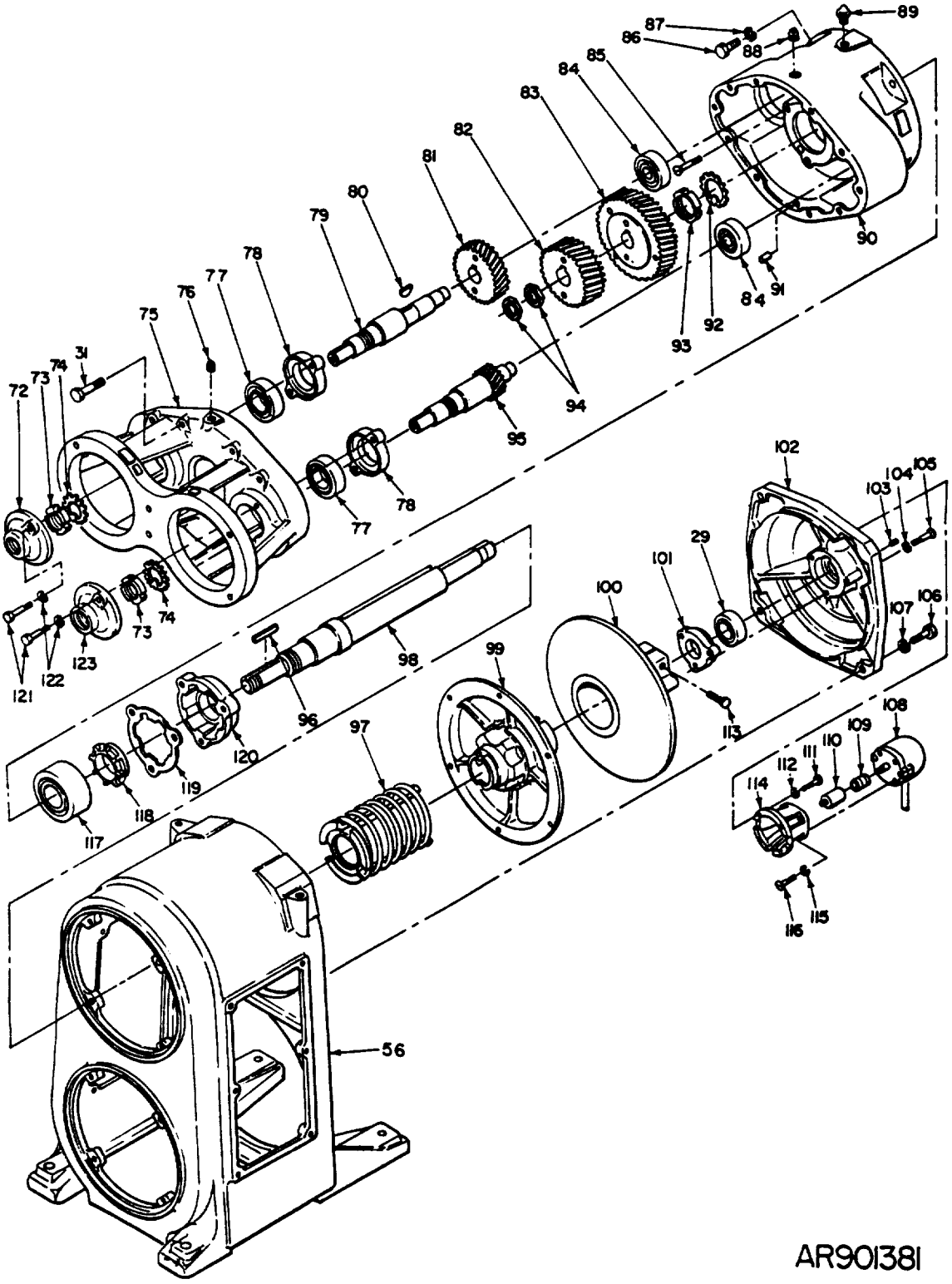


Figure 3-5. Varidrive assembly, exploded view (sheet 2 of 2).

Legend for fig 3-5, sheet 2 of 2:

72. Bearing cap
73. Locknut
74. Lockwasher
75. Generator and gear mounting bracket
76. Plug
77. Ball bearing
78. Clamping ring
79. Take-off shaft
80. Woodruff key
81. Low-speed gear
82. Low-speed gear
83. High-speed gear
84. Ball bearing
85. Screw
86. Screw
87. Lockwasher
88. Plug
89. Vent plug
90. Gearcase
91. Dowel pin
92. Lockwasher
93. Locknut
94. Locknut
95. Pinion take-off shaft
96. Square key
97. Spring assembly
98. Input shaft
99. Adjustable driven varidisc assembly
100. Stationary driven varidisc assembly
101. Bearing cap
102. Support bracket
103. Plug
104. Lockwasher
105. Screw
106. Screw
107. Lockwasher
108. Speed pick-up
109. Flexible coupling
110. Adapter plug
111. Screw
112. Lockwasher
113. Screw
114. Mounting bracket
115. Lockwasher
116. Screw
117. Ball bearing
118. Oil slinger
119. Bearing cap gasket
120. Bearing cap
121. Screw
122. Lockwasher
123. Bearing cap

Figure 3-5. Varidrive assembly, exploded view (sheet 2 of 2).

f. Removal and Replacement of Stationary Driven Varidisc Assembly (fig 3-5).

(1) Remove the varidrive assembly from the test stand. Refer to paragraph 2-19.

(2) Remove the input shaft rear bearing. Refer to paragraph 3-19e.

(3) Remove six screws (51) and lockwashers (52) from each side plate cover (50) and remove both side plate covers.

(4) Mark carefully the axial and radial position of stationary driven varidisc assembly (100) in relation to input shaft (98). (See fig 3-4.)

(5) Loosen the four clamping screws on the split hub of stationary driven varidisc assembly (100), alternating on the clamping screws carefully, until spring assembly (97) is relaxed or fully extended.

WARNING

When the four clamping screws are loosened, stationary driven varidisc assembly (100) may have a tendency to slide back on input shaft (98) because of spring tension; therefore, ascertain that the varibelt is at the outermost position of the stationary driven varidisc assembly to relieve the spring tension.

(6) Loosen the four clamping screws on the split hub of stationary driven varidisc assembly (100) completely, and slide the stationary driven varidisc assembly off input shaft (98).

(7) Reverse the procedures of steps (1) through (6) to install the replacement stationary driven varidisc assembly.

g. Removal and Replacement of Adjustable Driven Varidisc Assembly (fig 3-5).

(1) Remove the stationary driven varidisc assembly. Refer to paragraph 3-19f.

(2) Move varibelt (49) back and over the end of input shaft (98).

(3) Slide adjustable driven varidisc assembly (99) off input shaft (98).

(4) Reverse the procedures of steps (1) through (3) to install the replacement adjustable driven varidisc assembly.

h. Removal and Replacement of Spring Assembly (fig 3-5).

(1) Remove the adjustable driven varidisc assembly. Refer to paragraph 3-19g.

(2) Slide spring assembly (97) off input shaft (98).

(3) Reverse the procedures of steps (1) and (2) to install the replacement spring assembly.

i. Removal and Replacement of Input Shaft Front Bearing (fig 3-5).

(1) Remove the gearcase gear sets. Refer to paragraph 3-19d.

(2) Remove the spring assembly. Refer to paragraph 3-19h.

(3) Remove three screws (85) that attach bearing cap (120).

(4) Pull or tap input shaft (98) toward the rear, and remove it through the rear side of frame (59).

(5) Remove locknut (93) and lockwasher (92) from input shaft (98) and press ball bearing (117) off the front end of input shaft (98).

(6) Reverse the procedures of steps (1) through (5) to install the replacement input shaft rear bearing. Reseal bearing cap (120) with gasket compound.

j. Removal and Replacement of Stationary Motor Varidisc Assembly (fig 3-5).

(1) Remove the varidrive assembly from the test stand. Refer to paragraph 2-19.

(2) Remove six hex head screws (51) and lockwashers (52) from each side plate cover (50) and remove both side plate covers from frame (59).

(3) Remove four hex head screws (54) and lockwashers (55) from front plate cover (53) and remove the front plate cover.

(4) Mark carefully the axial and radial position of stationary motor varidisc assembly (48) in relation to the motor shaft. (See fig 3-4.)

(5) Loosen the four clamping screws on the split hub of stationary motor varidisc assembly (48) and slide the stationary motor varidisc assembly off the motor shaft and remove it from the frame.

(6) Reverse the procedures of steps (1) through (5) to install the replacement stationary motor varidisc assembly. Make certain that the stationary motor varidisc assembly is positioned exactly as marked in step (4).

k. Removal and Replacement of Control Shaft (fig 3-5).

(1) Remove the stationary motor varidisc assembly. Refer to paragraph 3-19j.

(2) Move varibelt (49) forward and over the end of the motor shaft.

(3) Loosen the control shaft sprocket setscrew, and remove the control shaft sprocket and key (fig 3-1).

(4) Remove four hex head screws (60) from clamping plate (59) and remove the clamping plate.

(5) Unscrew control shaft (62) from control nut assembly (58) and remove the control shaft/bearing assembly.

(6) Reverse the procedures of steps (1) through (5) to install the replacement control shaft/bearing assembly.

l. Removal and Replacement of Control Shaft Bearing (fig 3-5).

(1) Remove the control shaft. Refer to paragraph 3-19k.

(2) Press control shaft bearing (61) from control shaft (62).

(3) Reverse the procedures of steps (1) and (2) to install the replacement control shaft bearing.

m. Removal and Replacement of Adjustable Motor Varidisc Assembly (fig 3-5).

(1) Remove the control shaft. Refer to paragraph 3-19k.

(2) Unscrew the adjustable motor varidisc bearing lube hose fitting (45).

(3) Slide adjustable motor varidisc assembly (46) forward on the motor shaft, and remove it through the front of the frame.

(4) Reverse the procedures of steps (1) through (3) to install the replacement adjustable motor varidisc assembly.

n. Removal and Replacement of Adjustable Motor Varidisc Shift Bearing (fig 3-5).

(1) Remove the adjustable motor varidisc assembly. Refer to paragraph 3-19m.

(2) Remove three hex head screws (37) and lockwashers (38) from shift bearing housing (39), and remove the shift bearing housing.

(3) Remove bearing retaining snap ring (40).

(4) Remove shift bearing (41).

(5) Reverse the procedures of steps (1) through (4) to install the replacement shift bearing.

o. Removal and Replacement of Motor Stator Assembly, Motor Rotor Assembly, and Motor front Bearing (fig 3-5).

(1) Remove the adjustable motor varidisc assembly. Refer to paragraph 3-19m.

(2) Remove the four hex head screws that attach adapter bracket (30) to frame (59), and remove the adapter bracket from the frame.

(3) Remove three hex head screws (31) that attach motor front bearing cap (28) to adapter bracket (30).

(4) Remove two screws (20) and lockwashers (21) that attach motor rear bearing cap (12).

(5) Remove four acorn nuts (19) and lockwashers (18) from stator end bracket (15).

(6) Remove stator end bracket (15).

(7) Remove stator assembly (11) from studs (24) and adapter bracket (30).

(8) Remove three screws (34) and lockwashers (33) that attach air deflector assembly (26) to adapter bracket (30).

(9) Remove rotor assembly (23) from adapter bracket (30).

(10) Press front bearing (29) off the motor shaft.

(11) Reverse the procedures of steps (1) through (10) to install replacement stator assembly, rotor assembly, and motor front bearing.

p. Removal and Replacement of Motor Rear Bearing (fig 3-5).

(1) Remove the varidrive assembly from the test stand. Refer to paragraph 2-19.

(2) Remove four cap nuts (19) and lockwashers (18) from stator end bracket (15).

(3) Remove two bearing cap retaining screws (20) and lockwashers (21) and remove stator end bracket (15).

(4) Remove retaining ring (14) and remove bearing (13).

(5) Reverse the procedures of steps (1) through (4) to install the replacement rear bearing.

CHAPTER 4

MAINTENANCE OF AUXILIARY EQUIPMENT

(Not applicable)

CHAPTER 5

FINAL INSPECTION

5-1. GENERAL. Following repair of the test stand, perform the test and inspection procedures of this chapter to verify that all malfunctions have been corrected. The test stand must satisfy all test and inspection requirements before it is returned to service.

5-2. FINAL TESTS.

a. Drive Control Circuit, Varidrive, and Blower Motor.

(1) Set the test stand controls to the preliminary settings listed in table 2-2.

(2) Set circuit breaker switch (CB1, fig 2-8) to the ON position. Check to see that AC POWER ON indicator (DS2) lights (fig 2-7).

(3) Set work light switch (S5, fig 2-4) to the ON position and check to see that work light (DS3) lights.

(4) Press START switch (S3, fig 2-7) and hold it in the depressed position momentarily. Release the START switch. Check to see that DRIVE ON indicator (DS1) is lighted, the blower motor is operating, and the varidrive is rotating.

(5) Adjust the SPEED CONTROL and verify that the varidrive speed can be adjusted smoothly. Check to see that TACHOMETER RPM meter (M1, fig 2-4) indicates the correct varidrive speed (as checked with the handheld tachometer) with TACHOMETER RPM SELECT switch (S36) set to the DIRECT DRIVE position. Set TACHOMETER RPM SELECT switch (S36) to the CAL PULLEY position and verify that indication on TACHOMETER RPM meter M1 varies as TACHOMETER RPM PULLEY CALIBRATION control (R35) is varied.

(6) Press STOP switch (S2, fig 2-7). Set circuit breaker switch (CB1) to the OFF position. Set drive reversing switch (S1) to its opposite setting. Set circuit breaker switch (CB1) to the ON position.

(7) Repeat step (4). The varidrive should rotate in the opposite direction.

(8) Press STOP switch (S2). Set circuit breaker switch (CB1) to the OFF position.

b. Regulator Fixed Resistance Check Circuits (fig 2-5).

(1) Check to see that circuit breaker switch (CB1) is set to the OFF position.

(2) Set REGULATOR CHECK FIXED RESISTA1NCE METHOD switch (S13) to the ON position.

(3) Using an ohmmeter, verify that the resistance between the REGULATOR B-binding post and the REGULATOR CHECK FIXED RESISTANCE METHOD 7 OHM binding post is 7 ±0.7 ohms.

(4) Using an ohmmeter, verify that the resistance between the REGULATOR B-binding post and the REGULATOR CHECK FIXED RESISTANCE METHOD 2-1/4 OHM binding post is 2.25 ±0.23 ohms.

(5) Using an ohmmeter, verify that the resistance between the REGULATOR B-binding post and the REGULATOR CHECK FIXED RESISTANCE METHOD 1-1/2 OHM binding post is 1.5 ±0.15 ohms.

(6) Using an ohmmeter, verify that the resistance between the REGULATOR B+ binding post and the REGULATOR CHECK FIXED RESISTANCE METHOD 1/4 OHM binding post is 0.25 ±0.03 ohm.

(7) Set REGULATOR CHECK FIXED RESISTANCE METHOD switch (S13) to the OFF position.

c. DC Variable Power Supply Circuit (fig 2-5).

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set circuit breaker switch (CB1) to the ON position.

(3) Set D.C. VARIABLE VOLTS switch (S10) to the ON position.

(4) Using a DC voltmeter, verify that the DC voltage at the DC VARIABLE OUTPUT binding posts can be adjusted over a range of 0 to 32 volts using DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7).

(5) Set D.C. VARIABLE VOLTS Switch (S10) to the OFF position.

d. Relay Contact Closure and DC Control Power Circuits (fig 2-5).

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Connect a jumper between the RELAY CONTACTS INPUT binding posts.

(3) Set circuit breaker switch (CB1) to the ON position and check to see that CONTACT CLOSURE indicator (DS7) lights.

(4) Remove the jumper. CONTACT CLOSURE indicator (DS7) should go off.

(5) Set circuit breaker switch (CB1) to the OFF position.

e. Polarity Reversing Circuit (fig 2-5).

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set circuit breaker switch (CB1) to the ON position.

(3) Set POLARITY REVERSING switch (S7) to the POS GND position.

(4) Using an ohmmeter, verify that continuity exists between the GENERATOR G+ binding post (fig 2-6) and the ground terminal post.

(5) Set POLARITY REVERSING switch (S7) to the NEG GND position.

(6) Using an ohmmeter, verify that continuity exists between the GENERATOR G-binding post and the ground terminal post.

(7) Set circuit breaker switch (CB1) to the OFF position.

f. Load Bank Circuits.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14, fig 2-4) to the LOAD X1 position.

(3) Set circuit breaker switch (CB1) to the ON position.

(4) Set MASTER LOAD DISCONNECT switch (S8, fig 2-5) and LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch (S24) to the ON position.

(5) Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts (fig 2-6) is adjustable over the range of 1.14 ±0.06 ohms to 46.1 ±2.3 ohms by means of VARIABLE LOAD control (R32).

(6) Set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch (S24) to the OFF position. Set LOAD SELECTION 25 AMPS/12.5 AMPS switch (S23) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 1.14 ± 0.06 ohms.

(7) Set LOAD SELECTION 25 AMPS/12.5 AMPS switch (S23) to the OFF position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the LOAD X3 position. Set LOAD SELECTION 50 AMPs/25 switch (S22) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.57 +0.03 ohm.

(8) Set LOAD SELECTION 50 AMPS/25 AMPS switch (S22) to the OFF position. Set LOAD SELECTION 50 AMPS/25 switch (S21) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.57 ± 0.03 ohm.

(9) Set LOAD SELECTION 50 AMPS/25 AMPS switch (S21) to the OFF position. Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the LOAD X10 position. Set LOAD SELECTION 50 AMPS/25 AMPS switch (S20) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.57 ± 0.03 ohm.

(10) Set LOAD RESISTANCE 50 AMPS/25 AMPS switch (S20) to the OFF position. Set LOAD SELECTION 100 AMPS/50 AMPS switch (S19) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.285 ±0.01 ohm.

(11) Set LOAD SELECTION 100 AMPS/50 AMPS switch (S19) to the OFF position. Set LOAD SELECTION 100 AMPS/50 AMPS switch (S18) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.285 ±0.01 ohm.

(12) Set LOAD SELECTION 100 AMPS/50 AMPS switch (S18) to the OFF position. Set LOAD SELECTION 100 AMPS/50 AMPS switch (S17) to the ON position. Using an ohmmeter, verify that the resistance between the REGULATOR B+ and REGULATOR B-binding posts is 0.285 ±0.01 ohm.

(13) Set circuit breaker switch (CB1) to the OFF position.

g. Battery Voltage Selector Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Disconnect all batteries from the battery compartment (fig 2-9) battery terminals.

(3) Set circuit breaker switch (CB1) to the ON position.

(4) Set BATTERY CIRCUIT SELECTOR switch (S6, fig 2-5) to the 24V position. Check to see that 24 VOLT indicator (DS6) lights.

(5) Using an ohmmeter, verify that continuity exists between the 24V battery terminal and the STARTER + INPUT binding post (fig 2-6).

(6) Set BATTERY CIRCUIT SELECTOR switch (S6) to the 12V position. Check to see that 12 VOLT indicator (DS5) lights.

(7) Using an ohmmeter, verify that continuity exists between the 12V battery terminal and the STARTER INPUT binding post.

(8) Set BATTERY CIRCUIT SELECTOR switch (S6) to the 6V position. Check to see that 6 VOLT indicator (DS4) lights.

(9) Using an ohmmeter, verify that continuity exists between the 6V battery terminal and the STARTER + INPUT binding post.

(10) Set circuit breaker switch (CB1) to the OFF position.

h. DC VOLTMETER OUTPUT VOLTAGE Meter Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Connect an external 0-50 volt DC voltmeter to the DC VARIABLE VOLTS OUTPUT binding posts (fig 2-5), observing polarity.

(3) Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12, fig 2-4) to the X5 position, and DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position.

(4) Set DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) fully counterclockwise.

(5) Set circuit breaker switch (CB1) to the ON position.

(6) Set D.C. VARIABLE VOLTS switch (S10) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) for a 5-volt indication on the external DC voltmeter.

(7) Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X1 position, and verify that the indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2) agrees with that on the external DC voltmeter.

(8) Connect the external DC voltmeter to the calibration jack associated with DC VOLTMETER OUTPUT VOLTAGE meter (M2). Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) the X2 position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) for a 10-volt indication on the external DC voltmeter. Verify that DC VOLTMETER OUTPUT VOLTAGE meter (M2) also indicates 10 volts.

(9) Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X5 position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 20 volt indication on the external DC voltmeter. Verify that DC VOLTMETER OUTPUT VOLTAGE meter (M2) indicates 20 volts.

(10) Set circuit breaker switch (CB1) to the OFF position.

(11) Connect the external DC voltmeter to the DC VARIABLE VOLTS OUTPUT binding posts, observing polarity.

(12) Connect a test lead from the positive (red) DC VARIABLE VOLTS OUTPUT binding post to the REGULATOR B+ binding post (fig 2-6) and connect a second test lead from the negative (black) DC VARIABLE VOLTS OUTPUT binding post to the REGULATOR B-binding post.

(13) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the BAT POSITION.

(14) Set circuit breaker switch (CB1) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 10 volt indication on the external DC voltmeter.

(15) Change the external DC voltmeter lead connections to the calibration jacks associated with DC VOLTMETER OUTPUT VOLTAGE meter (M2), and verify that both the external DC voltmeter and the DC VOLTMETER OUTPUT VOLTAGE meter indicate 10 volts.

(16) Set circuit breaker switch (CB1) to the OFF position.

(17) Connect the external DC voltmeter to the DC VARIABLE VOLTS OUTPUT binding posts, observing polarity.

(18) Connect a test lead from the positive (red) DC VARIABLE VOLTS OUTPUT binding post to the REGULATOR G+ binding post, and connect a second test lead from the negative (black) DC VARIABLE VOLTS OUTPUT binding post to the REGULATOR G-binding post.

(19) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the RECT GEN position.

(20) Set circuit breaker switch (CB1) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 10 volt indication on the external DC voltmeter.

(21) Switch the connecting leads of the external DC voltmeter to the calibration jacks associated with DC VOLTMETER OUTPUT VOLTAGE meter (M2), and check to see that both the external DC voltmeter and the DC VOLTMETER OUTPUT VOLTS meter indicate 10 volts.

(22) Set circuit breaker switch (CB1) to the OFF position.

(23) Connect the external DC voltmeter to the DC VARIABLE VOLTS OUTPUT binding posts, observing polarity.

(24) Connect a test lead from the positive (red) DC VARIABLE VOLTS OUTPUT binding post to the positive (red) EXTERNAL D.C. VOLTAGE INPUT binding post, and connect a second test lead from the negative (black) DC VARIABLE VOLTS OUTPUT binding post to the negative (black) EXTERNAL D.C. VOLTAGE INPUT binding post.

(25) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the EXT position.

(26) Set circuit breaker switch (CB1) to the ON position and adjust DC VARIABLE POWER SUPPLY 0-32 control (T5) to provide a 10 volt indication on the external DC voltmeter.

(27) Change the external DC voltmeter connections to the calibration jacks associated with DC VOLTMETER OUTPUT VOLTAGE meter (M2), and check to see that both the external DC voltmeter and the DC VOLTMETER OUTPUT VOLTAGE meter indicate 10 volts.

(28) Set circuit breaker switch (CB1) to the OFF position, and disconnect the test leads and external DC voltmeter.

i. Battery Charge Circuit.

(1) Make sure that all batteries are disconnected from the battery terminals in the battery compartment (fig 2-9).

(2) Set all test stand controls to the preliminary setting listed in table 2-2.

(3) Set circuit breaker switch (CB1) to the ON position.

(4) Set BATTERY CIRCUIT SELECTOR switch (S6, fig 2-5) to the 24 V position.

(5) Set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12, fig 2-4) to the X2 position, and set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the BAT position.

(6) Set MASTER LOAD DISCONNECT switch (S8) to the ON position.

(7) Adjust CHARGE TIMER (MINUTES) control (TD1, fig 2-7) to the 5 minute position, and adjust BATTERY CHARGE CIRCUIT control (T3) to provide a 12 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(8) Set LOAD SELECTION 25 AMPS/12.5 AMPS switch (S23) to the ON position.

(9) Press DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch (S15), and read BATTERY CHARGE CIRCUIT control (T3) to maintain the 12 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(10) Check to see that CHARGE INDICATOR (DS8) is lighted, and that DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3) indicates approximately 10 amperes when switch (S15) is pressed.

(11) Check to see that CHARGE TIMER (MINUTES) control (TD1) times out (CHARGE INDICATOR DS8 goes off) after five minutes.

(12) Set circuit breaker (CB1) to the OFF position.

j. Starter Test Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Connect a test lead from the positive (red) DC VARIABLE VOLTS OUTPUT binding post (fig 2-5) to the STARTER FREE RUN binding post (fig 2-6), and connect a second test lead from the negative (black) DC VARIABLE VOLTS OUTPUT binding post to the STARTER COM binding post.

(3) Set AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14, fig 2-4) to the STARTER FREE RUN X4 position.

(4) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X2 position.

(5) Rotate STARTER RHEOSTAT CONTROL (R18) clockwise until it is snug.

(6) Set circuit breaker switch (CB1) to the ON position.

(7) Set D.C. VARIABLE VOLTS switch (S10) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) as required to obtain a 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(8) Set LOAD SELECTION 25 AMPS/12.5 AMPS switch (S23) to the ON position.

(9) Set STARTER TEST switch (S9) to the ON position, and check to see that an indication of 8 to 9 amperes is obtained on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3).

(10) Set circuit breaker switch (CB1) to the OFF position and disconnect the test leads.

k. Generator Field Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set FIELD CIRCUIT switch (S32, fig 2-5) to the MANUAL position.

(3) Set EXTERNAL FIELD EXCITER AC SYSTEM switch (S31) to the ON position.

(4) Set DC AMMETER FIELD CURRENT RANGE switch (S30, fig 2-4) to the X6 position.

(5) Set FINE CONTROL 0-5 AMPS (MAX) switch (S29) to the OFF position.

(6) Set FIELD CURRENT 0-30 AMPS (MAX) control (R26) and FIELD CURRENT (fine) control (R27) fully clockwise.

(7) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X2 position.

(8) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the X1 position.

(9) Connect a jumper lead between the GENERATOR F and the REGULATOR B+ binding posts (fig 2-6).

(10) Connect an external 0-50 DC millivoltmeter to the calibration jacks of DC AMMETER FIELD CURRENT meter (M7), observing polarity.

(11) Set circuit breaker switch (CB1) to the ON position.

(12) Check to see that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) and VARIABLE LOAD control (R32) are both set to their fully counterclockwise setting.

(13) Set D.C. VARIABLE VOLTS switch (S10), MASTER LOAD DISCONNECT switch (S8), and LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch (S24) to the ON position.

(14) Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(15) Rotate VARIABLE LOAD control (R32) clockwise slowly to the full clockwise setting, and readjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) as necessary to maintain the 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2). Check to see that DC AMMETER FIELD current meter (M7) and the external DC millivoltmeter both start to indicate as VARIABLE LOAD CONTROL (R32) is rotated clockwise. At the fully clockwise setting of VARIABLE LOAD control (R32), check to see that DC AMMETER FIELD CURRENT meter (M7) indicates approximately 6 to 8 amperes, and the external DC millivoltmeter indicates approximately 8 to 15 millivolts.

(16) Disconnect the external DC millivoltmeter.

(17) Set DC AMMETER FIELD CURRENT RANGE switch (S30) to the X3 position. Check to see that the indication on the DC AMMETER FIELD CURRENT meter varies as VARIABLE LOAD control (R32) is adjusted.

(18) Adjust VARIABLE LOAD control (R32) to provide a 3 ampere indication on DC AMMETER FIELD CURRENT meter (M7).

(19) Set DC AMMETER FIELD CURRENT RANGE switch (S30) to the X1 position, and check to see that DC AMMETER FIELD CURRENT meter (M7) indicates 3 amperes.

(20) Adjust FIELD CURRENT 0-30 AMPS (MAX) control (R26) counter clockwise, and check to see that the indication on DC AMMETER FIELD CURRENT meter (M7) decreases as the control is adjusted.

(21) Set FIELD CURRENT 0-30 AMPS (MAX) control (R26) and FIELD CURRENT (final) control (R27) fully clockwise.

(22) Adjust VARIABLE LOAD control (R32) to provide a 3 ampere indication on DC AMMETER FIELD CURRENT meter (M7).

(23) Set FINE CONTROL 0-5 AMPS (MAX) switch (S29) to the ON position.

(24) Rotate FIELD CURRENT (fine) control (R27) counterclockwise and check to see that the indication on DC AMMETER FIELD CURRENT meter (M7) decreases smoothly toward zero.

(25) Set circuit breaker switch (CB1) to the OFF position and disconnect the external jumper lead.

l. DC Ammeter Load & Starter Output Current Battery Charge Current Meter Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set FIELD CIRCUIT switch (S32, fig 2-5) to the MANUAL position.

(3) Set EXTERNAL FIELD EXCITER AC SYSTEM switch (S31) to the ON position.

(4) Set DC AMMETER FIELD CURRENT RANGE switch (S30, fig 2-4) to the X6 position.

(5) Set FINE CONTROL 0-5 AMPS (MAX) control (S29) to the OFF position.

(6) Set FIELD CURRENT 0-32 AMPS (MAX) control (R26) fully clockwise.

(7) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X2 position.

(8) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the X1 position.

(9) Connect a jumper lead between the GENERATOR F and REGULATOR B+ binding posts (fig 2-6).

(10) Connect a 0-50 DC millivoltmeter to the calibration jacks associated with DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3), observing polarity.

(11) Set circuit breaker switch (CB1) to the ON position.

(12) Check to see that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) and VARIABLE LOAD control (R32) are set fully counterclockwise.

(13) Set D.C. VARIABLE VOLTS switch (S10) to the ON position.

(14) Set MASTER LOAD DISCONNECT switch (S8) and LOAD SELECTION 0-25 AMPs/0-12.5 AMPS switch (S24) to the ON position.

(15) Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 10 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(16) Adjust VARIABLE LOAD control (R32) clockwise to provide a 6 to 8 ampere indication on DC AMMETER FIELD CURRENT meter (M7). Verify that DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter indicates 6 to 8 amperes, and the external DC millivoltmeter indicates 10 to 13 millivolts.

(17) Press DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT PRESS FOR BATTERY CHARGE RATE switch (S15) momentarily, and check to see that the indications on the external DC millivoltmeter and DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3) both drop to zero while the switch is pressed.

(18) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the X3 position, then to the X10 position. Check to see that DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3) indicates 6 to 8 amperes on the appropriate scale for each switch position.

m. AC Voltmeter Output Meter Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch (S27, fig 2-4) to the X1 position.

(3) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X1 position.

(4) Connect the positive lead of an external 0-50 volt DC voltmeter to the right calibration jack (facing the panel meter) for AC VOLTMETER OUTPUT VOLTAGE meter (M6), and connect the negative lead of the external DC voltmeter to the left calibration jack.

(5) Set AC VOLTMETER OUTPUT VOLTAGE SELECT switch (S28) to the CIRCUIT T1-T2 position.

(6) Connect a test lead between the positive DC VARIABLE VOLTS OUTPUT binding post (fig 2-5) and the ALTERNATOR (T1) binding post (fig 2-6), and connect a second test lead between the negative DC VARIABLE VOLTS OUTPUT binding post and the ALTERNATOR (T2) binding post.

(7) Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) is set fully counterclockwise.

(8) Set D.C. VARIABLE VOLTS switch (S10) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(9) Check to see that the external DC voltmeter and AC VOLTMETER OUTPUT VOLTAGE meter (M6) both indicate approximately 5 volts.

(10) Set AC VOLTMETER OUTPUT VOLTAGE RANGE switch (S27) to the X2 position, and check to see that AC VOLTMETER OUTPUT VOLTAGE meter (M6) indicates approximately 5 volts.

(11) Repeat steps (1) through (3).

(12) Leave the external DC voltmeter connected as in step (4).

(13) Connect a test lead between the positive DC VARIABLE VOLTS OUTPUT binding post and the ALTERNATOR (T1) binding post, and connect a second test lead between the negative DC VARIABLE VOLTS OUTPUT binding post and the ALTERNATOR (T3) binding post.

(14) Set AC VOLTMETER OUTPUT VOLTAGE SELECT switch (S28) to the CIRCUIT T1-T3 position.

(15) Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) is set fully counterclockwise.

(16) Set circuit breaker switch (CB1) and D.C. VARIABLE VOLTS switch (S10) to the ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(17) Check to see that the external DC voltmeter and AC VOLTMETER OUTPUT VOLTAGE meter (M6) both indicate approximately 5 volts.

(18) Repeat steps (1) through (3).

(19) Leave the external DC voltmeter connected as in step (4).

(20) Set AC VOLTMETER OUTPUT VOLTAGE SELECT Switch (S28) to the CIRCUIT T2-T3 position.

(21) Connect a test lead from the positive DC VARIABLE VOLTS OUTPUT binding posts to the ALTERNATOR (T2) binding post, and connect a second test lead from the negative DC VARIABLE VOLTS OUTPUT binding post to the ALTERNATOR (T3) binding post.

(22) Make sure that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) is set fully counterclockwise.

(23) Set circuit breaker switch (CB1) and D.C. VARIABLE VOLTS switch (S10) to the ON position. Adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 5 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(24) Check to see that the external DC voltmeter and the AC VOLTMETER OUTPUT VOLTAGE meter both indicate approximately 5 volts.

n. AC AMMETER OUTPUT CURRENT METER Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11, fig 2-4) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X5 position.

(3) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14) to the X1 position.

(4) Set DC AMMETER FIELD CURRENT RANGE switch (S30) to the X1 position.

(5) Plug a phone plug into the calibration jack for AC AMMETER OUTPUT CURRENT meter (M5), and connect the phone plug leads to the calibration jacks for DC AMMETER FIELD CURRENT meter (M7).

(6) Set AC AMMETER OUTPUT CURRENT RANGE switch (S26) to the X1 position, and set AC AMMETER OUTPUT CURRENT SELECT switch (S25) to the (T1) position.

(7) Connect a test lead from the positive DC VARIABLE VOLTS OUTPUT binding post (fig 2-5) to the ALTERNATOR (T1) binding post (fig 2-6), and connect another a second test lead from the rectifier chamber (T1) binding post to the REGULATOR B+ binding post.

(8) Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) is set fully counterclockwise.

(9) Set circuit breaker (CB1) to the ON position.

(10) Set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch (S24) and MASTER LOAD DISCONNECT switch (S8) to the ON position.

(11) Set D.C. VARIABLE VOLTS switch (S10) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to provide a 20 volt indication on DC VOLTMETER OUTPUT VOLTAGE meter (M2).

(12) Adjust VARIABLE LOAD control (R32) slowly to provide a 14 ampere indication on DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT meter (M3). (It may be necessary to readjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) to obtain the 14 ampere indication.

(13) Toggle MASTER LOAD DISCONNECT switch (S8) between the ON and OFF positions, and check to make sure that the pointers of AC AMMETER OUTPUT CURRENT meter (M5) and DC AMMETER FIELD CURRENT meter (M7) deflect each time switch (S8) is actuated.

(14) Set AC AMMETER OUTPUT CURRENT RANGE switch (S26) to the X5 position and repeat the check of step (13).

(15) Set circuit breaker switch (CB1) to the OFF position.

(16) Do not disturb the settings of DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11), DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12), DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14), and DC AMMETER FIELD CURRENT RANGE switch (S30).

(17) Set AC AMMETER OUTPUT CURRENT RANGE switch (S26) to the X1 position, and set AC AMMETER OUTPUT CURRENT SELECT switch (S25) to the T2 position.

(18) Leave the phone plug connected as in step (5).

(19) Connect a test lead from the positive DC VARIABLE VOLTS OUTPUT binding post to the ALTERNATOR (T2) binding post, and connect a second test lead from the rectifier chamber (T2) binding post to the REGULATOR B+ binding post.

(20) Repeat steps (8) through (14).

(21) Set circuit breaker switch (CB1) to the OFF position.

(22) Set AC AMMETER OUTPUT CURRENT RANGE switch (S26) to the X1 position, and set AC AMMETER OUTPUT CURRENT SELECT switch (S25) to the T3 position.

(23) Connect a test lead from the positive DC VARIABLE VOLTS OUTPUT binding post to the ALTERNATOR (T3) binding post, and connect a second test lead from the rectifier chamber (T3) binding post to the REGULATOR B+ binding post.

(24) Repeat steps (8) through (14).

(25) Set circuit breaker switch (CB1) to the OFF position and disconnect the phone plug and test leads.

o. MILLIVOLT METER MILLIVOLT DROP Meter Circuit.

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Set FIELD CIRCUIT switch (S32, fig 2-5) to the MANUAL position.

(3) Connect an ohmmeter between the GENERATOR G+ and GENERATOR F binding posts (fig 2-6), and adjust FIELD CURRENT 0-32 AMPS

(MAX) control (R26) for a 10 ohm indication on the ohmmeter. Disconnect the ohmmeter.

(4) Connect a test lead from the GENERATOR F binding post to the REGULATOR B+ binding post, and connect a second test lead from the positive DC VARIABLE VOLTS OUTPUT binding post to the GENERATOR G+ binding post.

(5) Connect the positive lead of an external DC voltmeter (0-5 volt range) to the REGULATOR G+ binding post, and connect the negative lead of the external DC voltmeter to the REGULATOR B+ binding post.

(6) Set DC AMMETER LOAD & STARTER OUTPUT CURRENT BATTERY CHARGE CURRENT RANGE switch (S14, fig 2-4) to the X1 position.

(7) Set DC VOLTMETER OUTPUT VOLTAGE SELECT switch (S11) to the VAR position, and set DC VOLTMETER OUTPUT VOLTAGE RANGE switch (S12) to the X2 position.

(8) Set MILLIVOLT METER MILLIVOLT DROP RANGE switch (S16) to the X10 position.

(9) Make certain VARIABLE LOAD control (R32) is set fully counterclockwise. Set LOAD SELECTION 0-25 AMPS/0-12.5 AMPS switch (S24) to the ON position.

(10) Make certain that DC VARIABLE POWER SUPPLY 0-32 VDC control (T5, fig 2-7) is set fully counterclockwise.

(11) Set circuit breaker switch (CB1) to the ON position.

(12) Set MASTER LOAD DISCONNECT switch (S8) to the ON position.

(13) Set D.C. VARIABLE VOLTS switch (S10) to the ON position, and adjust DC VARIABLE POWER SUPPLY 0-32 VDC control (T5) slowly to obtain a 2 volt indication on the external DC voltmeter.

(14) Press MILLIVOLT METER MILLIVOLT DROP PRESS TO READ switch (S34) momentarily, and check to see that MILLIVOLT METER MILLIVOLT DROP meter (M4) indicates 2 volts.

p. Generator D-Sensing, Circuit (fig 2-6).

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Connect an ohmmeter between the GENERATOR D binding post and the REGULATOR D binding post.

(3) Check to see that the ohmmeter indicates continuity when GENERATOR D-SENSING switch (S40) is set to the ON position, and an open circuit when the switch is set to the OFF position.

(4) Disconnect the ohmmeter.

q. AC/DC Systems Equalizer Coil Circuit (fig 2-6).

(1) Set all test stand controls to the preliminary settings listed in table 2-2.

(2) Connect an ohmmeter between the GENERATOR G+ binding post and the AC/DC SYSTEMS D binding post.

(3) Check to see that the ohmmeter indicates 40 to 50 ohms when AC/DC SYSTEMS EQUALIZER COIL TEST switch (S35) is set to the ON position, and an open circuit when switch (S35) is set to the OFF position.

r. AC/DC Systems Ignition Circuit (fig 2-6).

(1) Check to see that circuit breaker (CB1) is set to the OFF position.

(2) Connect an ohmmeter between the REGULATOR B+ binding post and the AC/DC SYSTEMS IGN SW binding post.

(3) Check to see that the ohmmeter indicates continuity when AC/DC SYSTEMS IGN SW (S33) is set to the ON position, and an open circuit when the switch is set to the OFF position.

(4) Disconnect the ohmmeter.

s. Auxiliary Start Circuit.

(1) Check to see that circuit breaker switch (CB1) is set to the OFF position.

(2) Connect an ohmmeter between pins A and F of BAT connector (J6, fig 2-4).

(3) Check to see that the ohmmeter indicates zero ohm when AUX START switch (S39, fig 2-5) is held in the ON position, and an open circuit when switch (S39) is released.

(4) Disconnect the ohmmeter.

t. Field Shorting Circuit.

(1) Check to see that circuit breaker switch (CB1) is set to the OFF position.

(2) Connect an ohmmeter between pins D and A of GEN connector (J3, fig 2-4).

(3) Check to see that the ohmmeter indicates zero ohm when FIELD SHORTING switch (S38, fig 2-5) is held in the ON position, and an open circuit when switch (S38) is released.

(4) Disconnect the ohmmeter.

u. Voltage Adjust Circuit.

(1) Check to see that circuit breaker switch (CB1) is set to the OFF position.

(2) Connect an ohmmeter between pins B and D of BAT connector (J6, fig 2-4).

(3) Check to see that the ohmmeter indication varies from 0 to 100 +10 ohms when VOLTAGE ADJ control (R37, fig 2-5) is rotated over its entire range.

(4) Disconnect the ohmmeter.

5-3. INSTRUMENT CALIBRATION. After final testing has been completed successfully, calibrate the front panel instruments of the test stand. Refer to paragraph 1-3 for references to the applicable calibration procedures.

5-4. MECHANICAL INSPECTION

a. Set circuit breaker switch (CB1) to the OFF position.

b. Inspect all instruments for cracked glass.

c. Inspect switches for ease of operation.

d. Check that all knobs are securely fastened and are not cracked.

e. Check rheostats for ease of operation.

f. Inspect binding posts for stripped threads.

g. Inspect the test stand for dented panels that may interfere with operation.

h. Inspect the test stand for accumulations of dust or other foreign particles, chipping or flaking of paint, and rust.

i. Inspect all mechanical accessories for indications of rust.

j. Inspect all cable harnesses for fraying of cables, loose terminations, and for damaged connectors.

k. Inspect all pulley belts for fraying or cracks.

l. Check to see that the varidrive is properly lubricated.

APPENDIX A

REFERENCES

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Pam 108-1	Index of Army Motion Pictures and Related Audio-visual Aids
DA Pam 310-1	Index of Administrative Publications
DA Pam 310-2	Index of Blank Forms
DA Pam 310-3	Index of Doctrinal Training and Organizational Publications
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manual (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-6	Index of Supply Catalogs and Supply Manuals (excluding types 7, 8, and 9)
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to 60°F)
FM 31-70	Basic Cold Weather Manual
TB 9-4910-527-50	Calibration Procedure for Generator and Starter Test Stand, United Manufacturing Models 7336, 7458, and Sun Electric Model AGT-9, AGT-9A
TM 9-247	Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel
TM 9-4910-663-12	Operator's and Organizational Maintenance Manual for Test Stand, Automotive Generator, Alternator, Starter and Associated Equipment
TM 9-4910-663-24P	Repair Parts List for Test Stand, Automotive Generator, Alternator, Starter and Associated Equipment
TM 9-6140-200-14	Maintenance of Lead-Acid Batteries
TM 38-750	The Army Maintenance Management System
TM 43-0139	Painting Instructions for Field Use
TM 740-90-1	Administrative Storage of Equipment
TM 743-200-1	Storage and Materiel Handling

APPENDIX B

EXPENDABLE SUPPLIES AND MATERIALS LIST

Not applicable.

MAINTENANCE ALLOCATION CHART

Table D-1

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools & Equipment Remarks
			O	F	H	D	
00	TEST STAND	INSPECT	1.7	1.2			
		REPLACE		0.5			
		REPAIR		6.5	12.0		
01	PANEL ASSY BINDING POST	INSPECT		0.3			
		REPLACE		0.4			
		REPAIR		1.0			
02	RECTIFIER CHAMBER ASSY	INSPECT		0.1			
		REPLACE		0.5			
		REPAIR		0.4			
03	BATTERY COIPARTMENT ASSY	INSPECT	0.1	0.3			
		REPLACE		1.2			
		REPAIR		0.3			
04	INSTRUMENT PANEL ASSY	INSPECT	0.2				
		TEST		0.5	0.5		
		SERVICE					
		ADJUST	0.1	0.5			
		REPLACE	0.3	1.0			
		REPAIR		2.3	1.5		
0401	PC BOARD ASSY	TEST			0.6		
		REPLACE		1.5	1.5		
		REPAIR			1.5		
05	CONTROL PANEL ASSY	INSPECT	0.4				
		TEST		0.5			
		SERVICE					
		ADJUST		0.5			
		REPLACE	0.3	1.0			
		REPAIR		1.8			
06	RHEOSTAT ASSY	REPLACE		1.1			
		REPAIR		1.5			
07	LINK BOARD ASSY	REPLACE		0.8			
		ADJUST	0.3				
		REPAIR		0.5			
08	PANEL DRIVE CONTROL ASSY	TEST		0.2			
		REPLACE		0.7			
		REPAIR		1.0			

Table D-1 - Continued

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools & Equipment Remarks
			O	F	H	D	
09	LOAD BANK ASSY	REPLACE REPAIR		3.8 2.5			
0901	LOAD BANK	TEST REPLACE REPAIR		0.5 2.3 2.5			
10	PANEL ASSY RESISTOR AND SHUNT	INSPECT TEST REP LACE REPAIR		0.2 0.2 0.9 1.0			
11	DIODE ASSY	TEST REPLACE REPAIR		0.4 0.7 1.0			
12	VARIDRIVE ASSY	INSPECT REPLACE SERVICE REPAIR	0.3 0.4 	 2.0 2.0	 7.0 12.0		
	LUBRICATION HOSES AND FITTINGS	INSPECT SERVICE REPLACE	0.3 0.4 0.5				
13	DRIVE BRACKET ASSY	REPLACE REPAIR		0.4 0.5			

INDEX

Subject — Paragraph, Figure, Table Number

E,F (Contd)

G

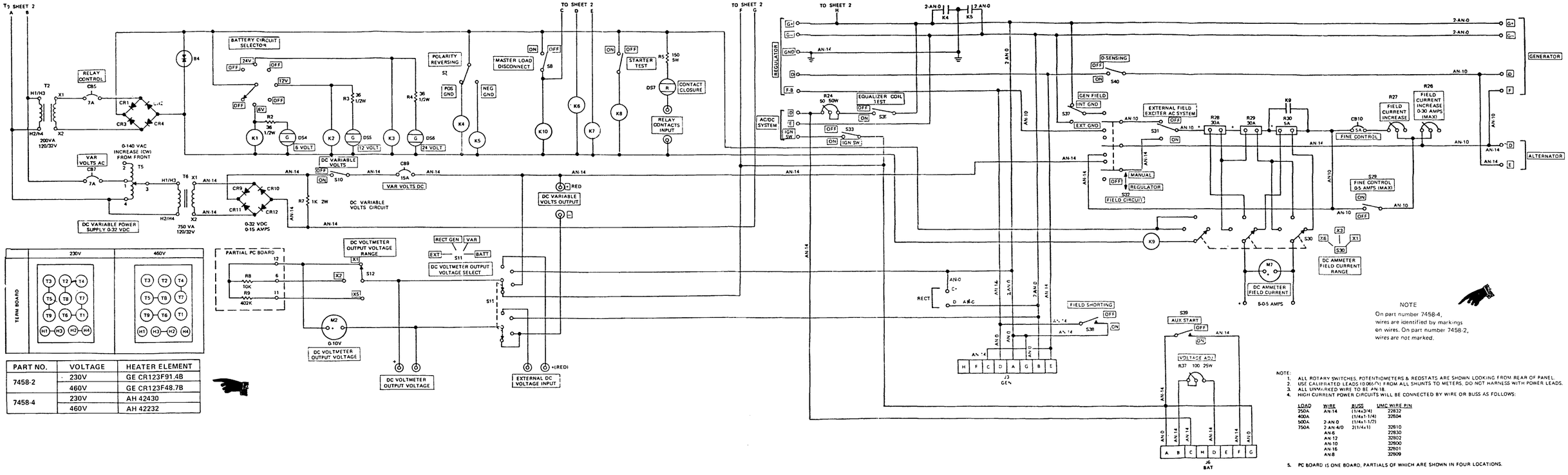
H, I

J, K, L

Subject — Paragraph Figure, Table Number

R

S



PART NO.	VOLTAGE	HEATER ELEMENT
7458-2	230V	GE CR123F91.4B
	460V	GE CR123F48.7B
7458-4	230V	AH 42430
	460V	AH 42232

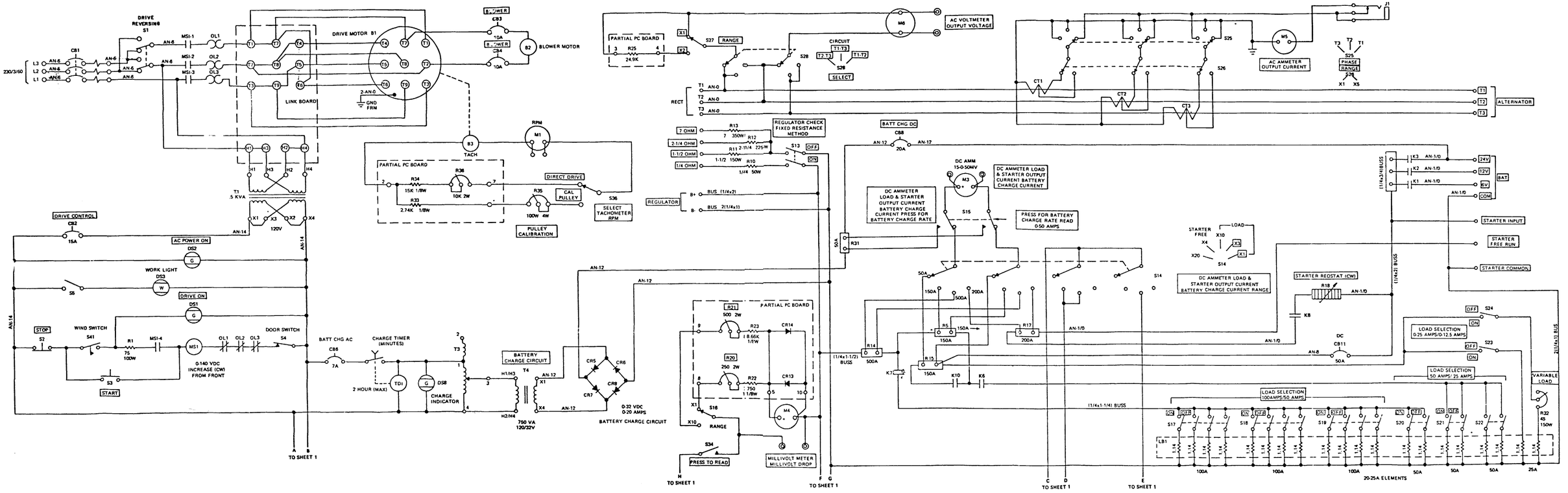
NOTE
On part number 7458-4, wires are identified by markings on wires. On part number 7458-2, wires are not marked.

NOTE:
1. ALL ROTARY SWITCHES, POTENTIOMETERS & REOSTATS ARE SHOWN LOOKING FROM REAR OF PANEL.
2. USE CALIBRATED LEADS (0.06Ω/ft) FROM ALL SHUNTS TO METERS. DO NOT HARNESS WITH POWER LEADS.
3. ALL UNMARKED WIRE TO BE AN-18.
4. HIGH CURRENT POWER CIRCUITS WILL BE CONNECTED BY WIRE OR BUSS AS FOLLOWS:

LOAD	WIRE	BUSS	UMC WIRE P/N
250A	AN-14	(1/4x3-1/4)	22832
400A		(1/4x1-1/4)	32504
500A	2 AN 0	(1/4x1-1/2)	
750A	2 AN 4/0	2(1/4x1)	32810
	AN-6		22830
	AN-12		32802
	AN-10		32800
	AN-16		32801
	AN-8		32809

5. PC BOARD IS ONE BOARD, PARTIALS OF WHICH ARE SHOWN IN FOUR LOCATIONS.

FO-1. Test stand schematic diagram (sheet 1 of 2).



FO-1. Test stand schematic diagram (sheet 2 of 2).

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 049118-001