TM 9-4910-485-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR, AND STARTER, FLOOR MOUNTED, 10 TO 50-V, 500-AMP, DC, AND 25 TO 50-V, 100 TO 400 AMP, AC, TESTING RANGES, W/8000 TO 12,000-RPM, 22-1/2 HP, 220/440-V, 60-C, 3 PH, DUAL HEAD VARIDRIVE ASSEMBLY (SUN ELECTRIC CORPORATION MODEL AGT-9 AND AGT-9A) (4910-767-0218)

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY

22 MAY 1970

WARNING

HIGH VOLTAGE

is used in operation
of this equipment

DEATH ON CONTACT

may result if personnel fail
to observe safety precautions

Learn the areas containing high voltage in each 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.

EXTREMELY DANGEROUS POTENTIALS

exist in the following units:

High-voltage compartment (figure 2-4) (when open).

Center control panel (figure 2-9) (when raised).

Rear test stand panels (when removed).

For artificial respiration, refer to FM 21-11.

TM 9-4910-485-12
C 2

Change
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *13 FEBRUARY 1974*

Operator and Organizational Maintenance Manual
(Including Repair Parts and Special Tool Lists)
TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR AND STARTER, FLOOR MOUNTED, 10 TO 50-V, 500 AMP, DC, AND 25 TO 50-V, 100 TO 400 AMP, Ac, TESTING RANGES W/8000 TO 12,000-RPM, 22-1/2-HP, 220/440-V, 60-C, 2-PH DUAL HEAD VARIDRIVE ASSEMBLY (SUN ELECTRIC CORPORATION MODELS AGT-9 AND AGT-9A) (4910-767-0218)

TM 9-4910-485-12, 22 May 1970, is changed as follows:

Page 1-1. Paragraph 1-1e. Change address to: Commander, US Army Armament Command, ATTN: AMSAR-MAS-T, Rock Island, IL 61201.

Page 2-27. Subparagraph 2-78a(1), the following note is added.

NOTE

To obtain a battery voltage reading the bus bar link must be connected to regulator terminals B- and G- (1, fig. 2-11).

By Order of the Secretary of Army:

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

Official:

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

Distribution:
Active Army
DCSLOG **(1)**
CNGB (1) (1)
TSG **(1)**
COE **(5)**
Dir of Trans (1)
OCC-E (1)
CONARC (2)
AMC (5)
ARADCOM (2)
ARADCOM Rgn **(2)**
Armies (3) except
7th USA **(5)**
8th USA (5)
Corps (2)
OS **Maj Comd (2)**
LOGCOMD (2)
ARMCOM (10)
AVSCOM (2)
TROSCOM (3)
APG (1)
TACOM (5)
USARSO (Panama) (2)
USAECFB (1)
USAOC&S (3)
USAQMCENFL (1)
USAQMS (1)
USAFACFS (2)
ATC (3)
Army Dep (3) except
CHAD (5)
LEAD (2)
LBAD (2)
TEAD (16)
Gen Dep (2)
USACDCEC (10)
ACSC-E (1)
USARENBD (1)
EAMTMTS (1)
WAMTMTS (1)
Arsenals (2) except
Rock **Island (10)**
Engr FLDMS (2)
Ft Knox FLDMS (10)
4th USASA Fld USASA Fld **Sta (1)** (1)
Units org under fol org under fol TOE:
(2 copies each unit) copies each unit)
29-1
29-11
29-15
29-16
29-21
29-25
29-26
29-27
29-35
29-36
29-75
29-77
29-79
29-99
29-134
29-135
29-137
29-147
29-207
29-208
29-245
29-247
29-427
29-600

NG: None
USAR: None
For **explanation of** abbreviations used, see AR 310-50.

Change
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *16 May 1973*

Operator and Organizational Maintenance Manual (Including Repair Parts and Special Tool Lists) TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR, AND STARTER, FLOOR MOUNTED, 10 TO 50-V, 500-AMP, DC, AND 25 TO 50-V, 100 TO 400 AMP, AC, TESTING RANGES, W/8000 TO 12,000-RPM, 22-1/2 HP, 220/440-V, 60-C, 3 PH, DUAL HEAD VARIDRIVE ASSEMBLY (SUN ELECTRIC CORPORATION MODEL AGT-9 AND AGT-9A) 4910-767-0218

TM 9-4910-485-12-22, May 1970, is changed as follows:

Page 1-1. Paragraphs d. and e. are superseded as follows:

d. Appendix C contains a list of basic issue items, items troop installed or authorized, and organizational repair parts. It is composed of those items which are issued with the equipment and are required for the operation and performance of operator or crew maintenance. It also contains a list of repair parts required by the using organization for performing organizational maintenance on the test stand.

e. You can improve this manual by calling attention to errors and by recommending improvements using DA Form 2028 (Recommended Changes to Publications) or by a letter and mailing directly to Commander, US Army Weapons Command, ATTN: AMSWE-MAS-SP, Rock Island, IL 61201. A reply will be furnished directly to you.

Page 1-2. Paragraph 1-4.1 is added as follows:

1-4.1. Components of the End Item.

Parts included with the end item and considered as components of the end item configuration are listed in the following table:

Table 1-1. Components of the End Item

Components	Part No.	(FSCM)
ADAPTER, FLANGE: for no. 6 SAE to 1/2 PD adapter	C548-2244	(82386)
ADAPTER, FLANGE: for Delco A8585 generator	C548-2242	(82386)
ADAPTER, MOUNTING FLANGE:	2-764	(82386)
ADAPTER, SPLINE: 1/2 PD male	140-008	(32386)
ADAPTER, SPLINE: no. 6 SAE female	C548-2246	(82386)
ANGLE, MOUNTING:	C548-2141	(82386)
ARM-PIVOT:	B548-2147	(82386)
BAR, TORQUE ARM: scale mtg	C548-2195	(82386)
BATTERY BLOCK, HOLD-DOWN:	C548-1820	(82386)

Table 1-1. Components of the End Item—(Continued)

Components	Part No.	(FSCM)
BELT, V, MATCHED SET: plain type, A cross section	A33	(72781)
BELT, V, MATCHED SET: plain type, B cross section	B33	(72781)
BELT, V, MATCHED SET: plain type, O cross section	3L350	(72781)
BRACKET, CRADLE SUPPORT:	C548-2163	(82386)
BRACKET, RECTIFIER MOUNTING:	C548-2249	(82386)
BRACKED, PIVOT SUPPORT:	C548-2149	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: alternator	C548-4102	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: blower motor	C548-4113	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: generator	C548-4106	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: generator	C548-4105	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: generator	C548-4109	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: rectifier	C548-4104	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: rectifier	C548-4103	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: regulator	C548-4107	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: regulator	C548-4108	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: regulator	C548-4110	(82386)
CABLE, SPECIAL PURPOSE, ELECTRICAL: regulator	C548-4114	(82386)
CHANNEL, MOUNTING:	C548-2169	(82386)
COUPLING, SHAFT: 1/2 PD split	3046-5001-01	(82386)
CRADLE, MOUNTING:	C548-2170	(82386)
EXTENSION, BRACKET:	C548-1235	(82386)
FLANGE GENERATOR DRIVE:	C548-2243	(82386)
FLANGE, UNIVERSAL MOUNTING: starter	C548-2198	(82386)
FUSE, CARTRIDGE: glass body	739-022	(82386)
FUSE, CARTRIDGE: 10 amp	739-914	(82386)
GUARD, BELT:	C548-2226	(82386)
HEAD SET: carbon pile	3931-6001	(82386)
HEATER, THERMAL RELEASE: overload	W151	(21741)
HEATER, THERMAL RELEASE: overload	W158	(21741)
HOOK, CHAIN, S: 0.250 in. wire dia	SCB22001-4	(80063)
JAW, CLUTCH: lock torque	C548-2188	(82386)
KEY, MACHINE: alloy S, 3/8 X 3/8 X 3.000	MS20068-253	(96906)
KEY, MACHINE: carbon S, 7/8 X 3/8 X 1-1/2 lg	MS20068-275	(96906)
LEAD, STORAGE BATTERY: 11 lg	C548-4101-06	(82386)
LEAD, STORAGE BATTERY: 26 lg	C548-4101-02	(82386)
LEAD, STORAGE BATTERY: 30 lg marked N, BT	C548-4101-01	(82386)
LEAD, STORAGE BATTERY: 34 lg	C548-4101-04	(82386)
LEAD, STORAGE BATTERY: 36 lg	C548-4101-05	(82386)
LEAD, STORAGE BATTERY: 30 lg	C548-4101-07	(82386)
LEAD, STORAGE BATTERY: 40 lg	C548-4101-03	(82386)
LEAD, TEST: external meters	C548-4112-01	(82386)
LEAD, TEST: external meters	C548-4112-02	(82386)
LEAD, TEST: generator	C548-4100-09	(82386)
LEAD, TEST: generator	C548-4100-16	(82386)
LEAD, TEST: generator w/1 lug and clip	C548-4100-08	(82386)
LEAD, TEST: generator w/lug i clip	C548-4100-19	(82386)
LEAD, TEST: regulator	C548-4100-04	(82386)
LEAD, TEST: regulator	C548-400-07	(82386)
LEAD, TEST: regulator	C548-4100-10	(82386)
LEAD, TEST: regulator	C548-4100-11	(82386)
LEAD, TEST: regulator	C548-4100-12	(82386)
LEAD, TEST: regulator	C548-4115	(82386)
LEAD, TEST: regulator, w/lugs	C548-4100-01	(82386)
LEAD, TEST: regulator, w/lugs	C548-4100-13	(82386)
LEAD, TEST: regulator, w/lugs	C548-4100-03	(82386)
LEAD, TEST: regulator w/lugs	C548-4100-14	(82386)
LEAD, TEST: w/1 lug	C548-4100-15	(82386)
LEAD, TEST: regulator w/lug and 1 clip	C548-4100-18	(82386)
LEAD, TEST: regulator/starter	C548-4100-17	(82386)
LEAD, TEST: regulator/starter	C548-4100-02	(82386)
LINK, BUS BAR: brass	C548-5700	(82386)
LOCK, TORQUE, ASSEMBLY: clutch driven	C548-2177	(82386)

Table 1-1. Components of the End Item—(Continued)

Components	Part No.	(FSCM)
PULLEY, GROOVE: 0 size	C548-2161	(82386)
PULLEY, GROOVE: A/B size	C548-2161	(82386)
PULLEY OUTPUT SHAFT ASSEMBLY:	C548-2156	(82386)
RING, RETAINING:	MS166-30-1137	(96906)
SCALE, SPRING: dial face,, 0-80 lbs	5006	(82386)
SCALE, SPRING: 0-20 lbs assy	0001-5007	(82386)
SHAFT, PIVOT: pivot arm	C548-2148	(82386)
SPACER, CRADLE SUPPORT:	C548-2168	(82386)
STUD SHOULDERED: hex, pivot	C548-2155	(82386)
SUPPORT, STARTER MOUNTING:	C548-2199	(82386)
SUPPORT ASSEMBLY: regulator, C/O:	C548-2202	(82386)
ADAPTER, REGULATOR MOUNTING:	C548-2232	(82386)
BRACKET, SUPPORT ASSEMBLY:	C548-2203	(82386)
STRAP, TIE DOWN, ELECTRICAL COMPONENTS:	C548-2204	(82386)
PIN PIVOT:	5688-5002	(82386)
THUMBSCREW, WINGHEAD: 1/4-20 X 0.750	10640971-1	(18876)
BAR, CLAMPING, RAIL:	C548-2207	(82386)
BRACKET, SUPPORT: component mounting	C548-2205	(82386)
BASE, COMPONENT MOUNTING:	C548-2206	(82386)
TACHOMETER, HAND: reed type	0316-6001	(82386)
TERMINAL LUG: neg w/bolt	75004-2	(96906)
TERMINAL LUG: pos w/bolt	75004-1	(96906)
TORQUE ARM CLAMP ASSEMBLY: pinion driven	C548-2194	(82386)
CLAMP, TORQUE ARM:	C548-2196	(82386)
BRACKET, COUNTER BALANCE:	C548-2198	(82386)
WASHER, FLAT:	C548-2160	(82386)

Page C-1. Appendix C title is changed as follows:

APPENDIX C
BASIC ISSUE ITEMS LIST, ITEMS TROOP INSTALLED OR AUTHORIZED LIST AND ORGANIZATIONAL REPAIR PARTS LIST

Paragraphs 2 *a.* and *b.* are superseded as follows:

a. Basic Issue Items List. Not Applicable.

b. Items Troop Installed or Authorized List. Not applicable.

Paragraph 2 c. Delete paragraph in its entirety.

Paragraph 2 e. Delete paragraph in its entirety.

Page C-3. Delete paragraph 8. Suggestions and Recommendations.

Page C-4. Delete Section II. Maintenance and Operating Supplies.

Page C-5. Delete Section III. Prescribed Load Allowance.

By Order of the Secretary of the Army:

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

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

Distribution

Active Army:
DCSLOG (1)
CNGB (1)
TSG (1)
COE (5)
Dir of Trans (1)
ACSC-E (1)
USAARENBD (1)
CONARC (2)
AMC (5)
WECOM (10)
TACOM (5)
MECOM (3)
MUCOM (2)
AVSCOM (2)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (2)
USARSO (Panama) (2)
LOGCOMD (2)
USACDCEC (10)
Armies (3) except
Seventh USA (5)
Eighth USA (5)
Corps (2)
ROAD (5)
APG (1)
USAECFB (1)
USAFACFS (2)
USAQMCENFL (1)
USAOC&S (3)
USAQMS (1)
USATC (3)
AD (3) except
TEAD (16)
CHAD (5)
Gen Dep (2)
Arsenals (2) except
Rock Island (10)
Detroit (5)
EAMTMTS (1)
WAMTMTS (1)
Engr FLDMS (2)
Ft Knox FLDMS (10)
4th USASA Fld Sta (1)
Units org under fol TOE:- 2 ea.
29-1
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29-99
29-134
29-135
29-137
29-147
29-207
29-208
29-245
29-247
29-427
29-600

ARNG & USAR: None.
For explanation of abbreviations used, see AR 310-50.

TECHNICAL MANUAL
NO. 9-4910-485-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington 25, D.C., 22 *May 1970*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

(INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS)

TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR AND STARTER, FLOOR MOUNTED, 10 TO 50-V, 500-AMP, DC, AND 25 TO 50-V, 100 TO 400 AMP, AC, TESTING RANGES, W / 8000 TO 12,000-RPM, 22½-Hp, 220 / 440-V, 60-C, 3-PH, DUAL HEAD VARIDRIVE ASSEMBLY

(SUN ELECTRIC CORPORATION MODELS AGT-9 AND AGT-9A)

(4910-767-0218)

This manual is current to 6 April 1970.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This technical manual contains instructions on operation and maintenance of the test stand for the operator and instructions for organizational maintenance of the test stand by personnel of the using organization.

b. Appendix A contains a list of current references, including supply manuals, forms, technical manuals, and other available publications applicable to the test stand.

c. Appendix B contains the maintenance allocation chart for the test stand listing all maintenance and repair operations authorized for all maintenance categories.

d. Appendix C contains a list of the basic issue items, organizational repair parts, and special tools list. It is composed of those items which make up the major end item of equipment and the operator tools, equipment, and repair parts that are issued with the equipment and are required for operating and performing operator or crew maintenance and a list of repair parts and support equipment which are required by the using organizations for performing organizational maintenance on the test stand.

e. Reports of errors, omissions, and recommendations by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to: Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island, Illinois 61201.

1-2. Maintenance Allocation

a. Operator Maintenance Allocation. The prescribed maintenance to be performed by the operator will apply as reflected in the maintenance function column of the maintenance allocation chart (App. B), under the category of maintenance C.

b. Organizational Maintenance Allocation. The prescribed maintenance to be performed by maintenance personnel of the using organization will apply as reflected in the maintenance function column of the maintenance allocation chart (App. B). under category of maintenance O. In all cases, where the nature of the repair, modification, or adjustment is beyond the scope or facilities of the using organization, the supporting category of maintenance should be informed so that trained personnel with suitable tools, and equipment may be provided or other instructions issued.

1-3. Forms, Records, Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the officers of all categories of maintenance maintaining this equipment. However, the value of accurate records must be fully appreciated by all personnel responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of . the materiel upon completion of its repair.

b. Authorized Forms. The forms generally applicable to units operating or maintaining this materiel are listed in appendix A. For a listing of all forms, refer to DA Pam 310-2. For instructions on use of these forms, refer to TM 38-750.

c. Equipment Improvement Recommendation. Any deficiencies detected in the equipment covered herein which occur under the circumstances indicated in AR 750-5, should be immediately reported in accordance with the applicable instructions in cited regulation.

d. Field Reports of Accidents. The reports necessary to comply with the requirements of Army safety program are prescribed in detail in AR 385-40. These reports are references whenever accidents involving injury to personnel or damage to materiel occur.

Section II. DESCRIPTION AND DATA

1-4. Description

The test stand (fig. 1-1), is an electrically operated device having a 10 to 50 volt, 50 to 500 ampere, dc testing range and a 25 to 50 volt, 100 to 400 ampere, ac testing range. Its electrical construction consists of a multiple of circuits which are utilized to test direct-drive or pulley-driven generators, generator regulators, generator control boxes, ac/dc systems (alternator, rectifier, and generator regulator), and starters (cranking motors). A built-in manually operated battery charging unit is supplied with the test stand to provide a means to keep the storage batteries of the internal battery circuit in a fully charged condition. Basically its physical construction consists of a steel cabinet containing a control panel, 22-1/2 horsepower, 220/440-volt, 60-cycle, 3-phase, constant speed, reversible, motor connected to a varidrive assembly with a 0 to 12,000-revolutions per minute speed range dual-head take-off assembly; load bank with a blower both of which are enclosed within a sheet metal housing; generator regulator and generator control box mounting brackets; generator, alternator, or starter (cranking motor), mounting bracket; and the necessary equipment for completing circuits and for setting up the items undergoing tests on the test stand to perform the various tests described within this publication.

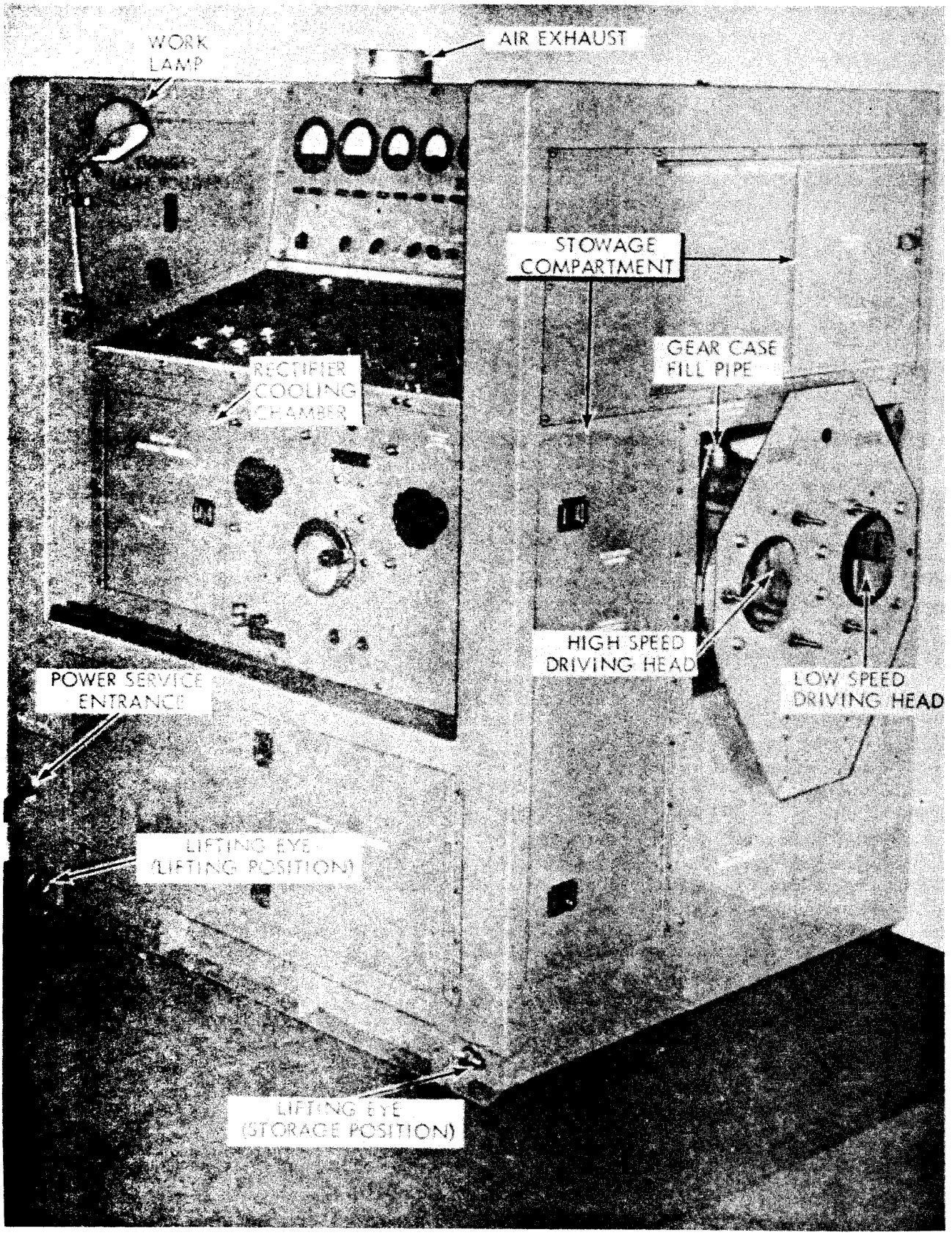


Figure 1-1. Test stand.

1-5. Data Plates

a. Drive Gear Box Lubrication Fill Decalcomania. The drive gear box lubrication fill decalcomania is located on the right hand end of the test stand over the gear case fill pipe.

b. Varidrive Motor General Information Plate. This plate is located on the stator housing of the varidrive motor. It specifies the electrical and mechanical characteristics of the motor, the type letters of the motor, and the manufacturer's name and address.

c. Varidrive Assembly General Instruction Plate. This plate is located on the top rear surface of the varidrive assembly housing. It specifies lubrication instructions and precautionary measures to be observed when operating and maintaining the varidrive assembly.

d. Magnetic Motor Starter Drive Control Time Interval Caution Plate. This plate is mounted on the lower left front of the control panel of the test stand, under the drive control start and stop push buttons. It cautions the operator not to exceed depressing the start button more than 30 seconds, otherwise, damage can develop within the magnetic motor starter.

e. Speed Control Precautionary Instructions. The speed control precautionary instructions is located on the front control panel above the handle of the drive speed control. It alerts the operator to reduce the speed to at least 2000 rpm before shut down of the test stand. Imbossed on the drive speed control handle is a precautionary measure to turn the handle only when the varidrive assembly is running. This precaution is to prevent damage to the chain drive mechanism of the speed control.

f. High-Speed Head RPM Range and Generator Speed Caution Plate. This plate is mounted on the mounting plate over the left hand drive head of the varidrive assembly. It identifies the high speed head and specifies the rpm (revolutions per minute) range, and cautions the operator not to use this head for low" speed generators.

g. Low-Speed Head RPM Range Plate. This plate is mounted on the mounting plate over the right hand drive of the varidrive assembly. It identifies the low speed head and specifies the rpm range.

h. Test Stand General Information Plate. This plate is mounted on the upper center of the center control panel of the test stand. It specifies the Federal stock number, manufacturer's type and model numbers, serial number, contract and specification number, and the manufacturer's name and address.

i. Reversing Switch Precautionary Instruction Decalcomania. This decalcomania is mounted inside the high voltage compartment door, behind which the drive reversing switch is located. This decalcomania can be read only when the compartment door is open. It cautions the operator to turn off the main breaker switch before reversing drive rotation and for other operations within the high voltage compartment.

j. Tachometer Precautionary Instruction Plate. This plate is mounted on the meter panel below the tachometer and cautions the operator not to exceed the manufacturer's predetermined maximum speed of the generator or alternator undergoing test.

1-6. Tabulated Data

a. Test Stand

Manufacturer	Sun Electric Corp.
Model	AGT-9
Testing Range	
Amperes, dc	.50-500
Voltage, dc	.10-50
Amperes, ac	.100-500
Voltage, ac	.25-50

b. Varidrive Assembly

Manufacturer	U.S. Electrical Motors Inc.
Horsepower	.22-1/2
(intermittent)	.35
Voltage	.220/440
Frequency	.60 cycle
Speed (motor)	.1800 rpm
Phase	3
Amps In-rush current (440 volts)	.190
Amps In-rush current *(220* volts)	.380
Temperature rise	.40 C
Frame	.54-326U-51Y
Type	VEUHVGSDT
Class	.B
Gear ratio	
(high speed head)	2.62:1
(low speed head)	1.12:1
High speed head	1830 to 11000rpm
Low speed head	800 to 4800rpm

c. Blower *Motor.*

Manufacturer	Marathon Electric
Model	6F4817D756AE
Horsepower	1/2
Voltage	230
Phase	1
Amps	3.75
Temperature Rise	40 C
Frequency	60-C
Speed	1725rpm

d. Dimensions and Weights.

Length	66-3/4
Width	44
Height	65
Weight (without equipment)	2780 Ibs
Cubage (packed for shipment)	210.4 cu ft
Weight (packed for shipment)	3000 Ibs

1-7. Difference Between Models

The difference between model AGT-9 and AGT-9A is a variance of internal circuitry and has no effect on the operation or maintenance of the test stand as set forth in this manual.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

2-1. Purpose

a. When a new or reconditioned test stand is first received, it is the responsibility of the officer in charge to determine whether the materiel has been properly prepared for service by the supplying organization and to be sure it is in condition to perform its function. For this purpose, assure that all authorized repair parts, tools, and equipment are present and in good condition; inspect all assemblies and parts to be sure they are properly assembled, secured, cleaned, adjusted, and/or lubricated.

b. Make a record of any missing parts and/or equipment, and of any malfunctions. Correct any deficiencies as quickly as possible.

2-2. Services

a. Unpacking and Checking. Place the exterior container containing the test stand in an area where there is sufficient working space. Remove the nails securing the top section of the exterior container to the skid-type base under the test stand. Lift the top section off as a unit from the base. The skid-type base will be left intact until test stand is located in position during installation, *c.* below. Remove the barrier material enveloping the test stand all cushioning material, desiccant (bags), and wrappings from the test stand. Remove the boxed equipment and loose parts from the storage compartments of the test stand. Particular attention should be given to the area behind the access door of the high voltage compartment (fig. 1-1) as there are power leads located near or within this area. Unpack the equipment and parts from the boxes. Check the equipment and loose parts with tools and support equipment listing in appendix C to be sure every item is present and in good condition.

b. Cleaning. Clean all parts of the test stand as prescribed in paragraph 4-12.

c. Installation.

(1) Regulator mounting bracket assembly. The base for holding the regulator mounting bracket assembly is shipped installed on the test stand. The regulator mounting bracket assembly is completely assembled when shipped and is stored in one of the stowage compartments. Slide the assembled regulator mounting assembly on the base and secure with the two winghead thumbscrews as shown in figure 2-1.

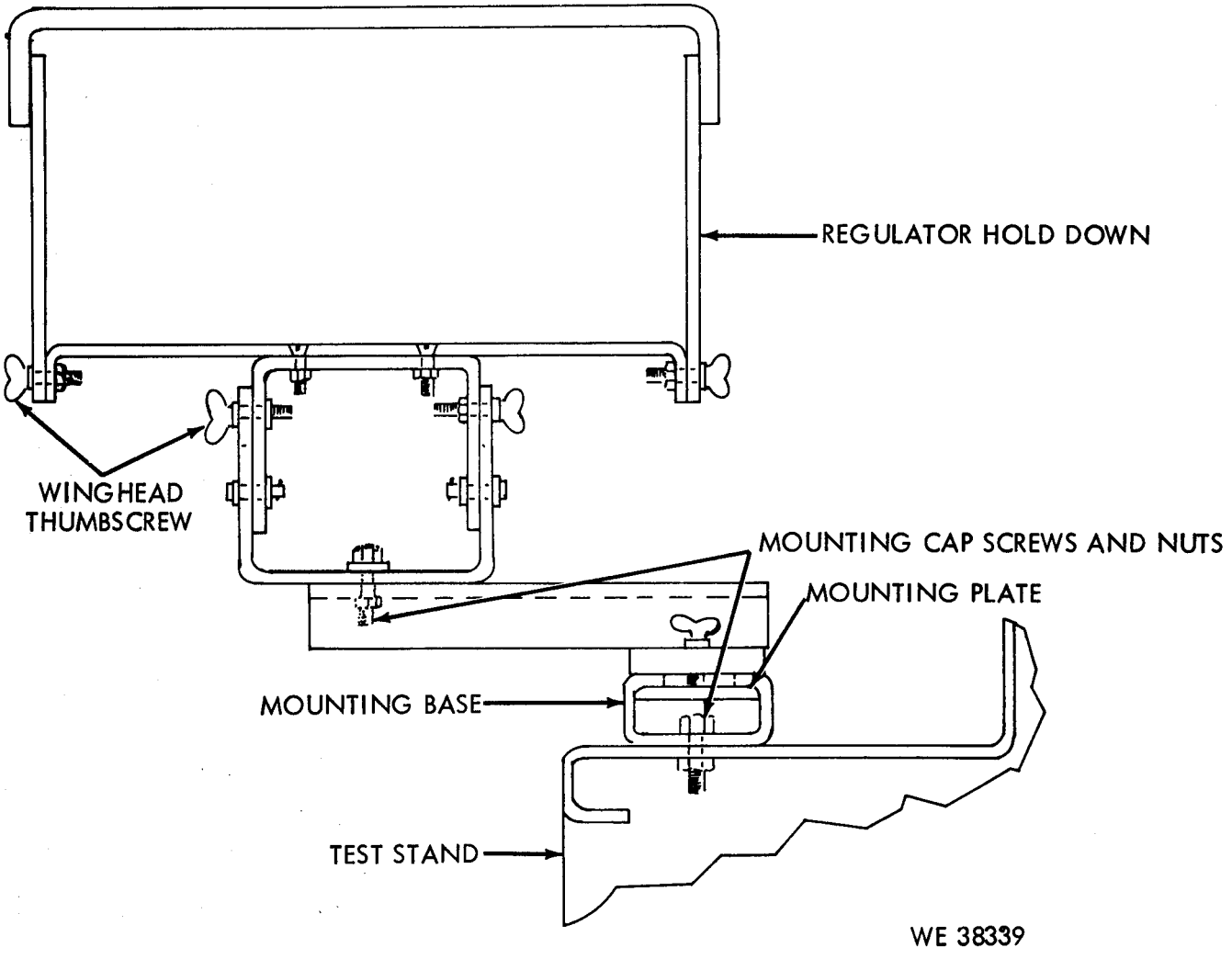


Figure 2-1. Regulator mounting bracket-installed.

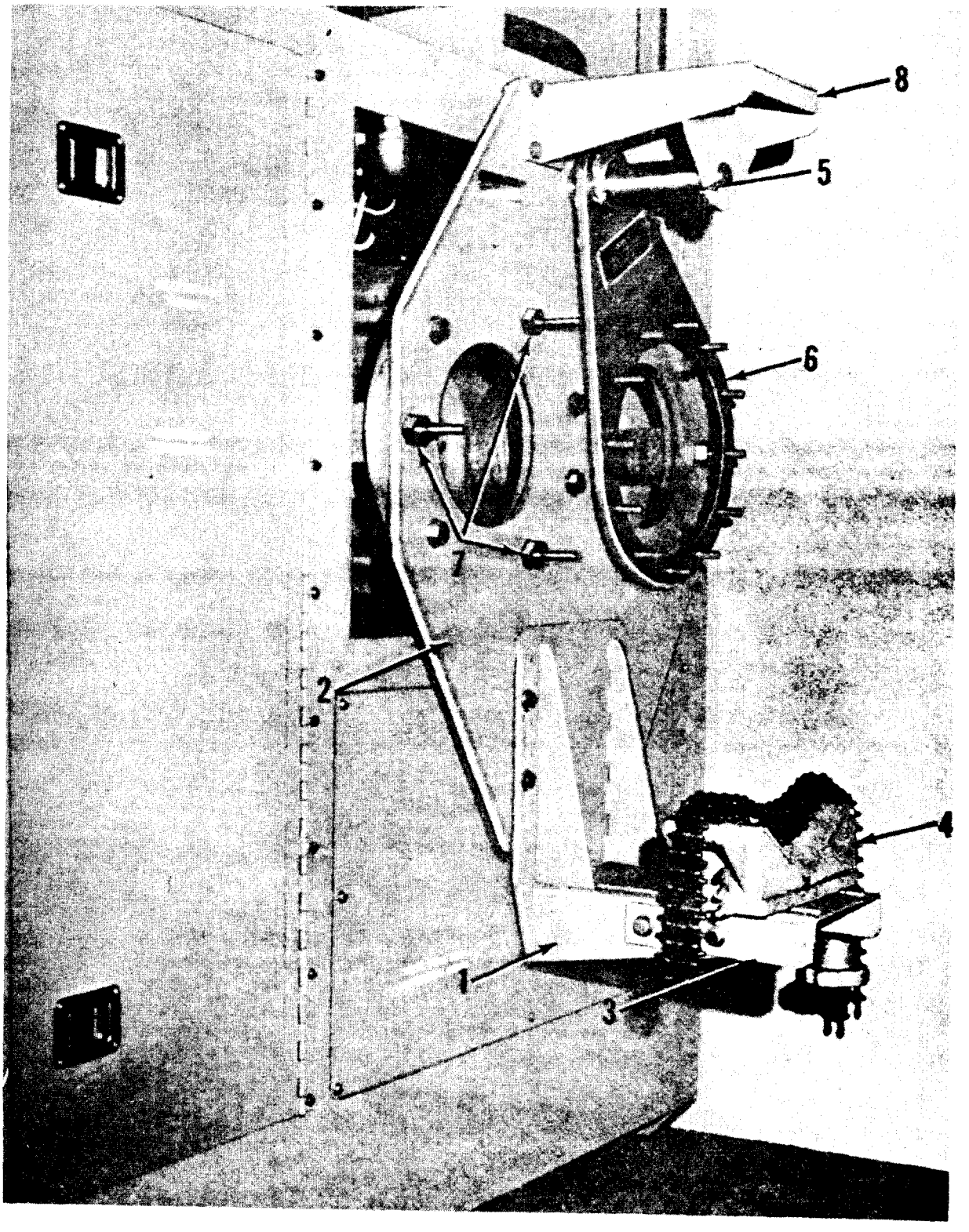
(2) *Generator, alternator, and starter mounting bracket assembly and pivot arm.*

NOTE. The key numbers shown in *(a)* through *(f)* below in parentheses refer to figure 2-2.

(a) Place the mounting bracket (1) in position on the mounting plate (2) and secure with the four 3/8-24 x 5/8 cap screws through the slots in the mounting bracket.

(b) In the event that the mounting surface of the bracket (1) is too short for the unit to be tested, an extension (3) to the bracket is provided. Mount this extension on the outer end of the bracket and secure with the four 3/8-24 x ¾ cap screws, four 3/8 flat washers, and four 3/8-24 hexagon plain nuts.

(c) Place the cradle (or chain) assembly (4) in position on the mounting bracket and secure with the four 3/8-24 x ¾ cap screws and four 3/8 flat washers through the slots in the mounting bracket.



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Key to figure 2-2
1. Mounting bracket
2. Mounting plate
3. Mounting bracket extention
4. Cradle assembly
5. Pivot shaft
6. Pivot arm
7. Hexagon studs
8. Pivot bracket

Figure 2-2. Installation of generator, alternator, and starter mounting bracket assembly, and pivot arm.

(d) Secure the pivot shaft (5) to the mounting plate (2) with the ½-13 x 1 cap screw, ½ special flat washer, and ½ lockwasher.

(e) Slide the pivot arm (6) on the pivot shaft and align the arm over the three hexagon studs (7).

(f) Place the center hole of the pivot bracket (8) over the shoulder end of the pivot shaft (5) and secure to the mounting plate (2) with the four 3/8-24 x 1-¼A cap screws, 3/8-24 hexagon plain nuts, and 3/8 flat washers.

CAUTION: When battery leads are not required or connected, insulate the loose ends of the leads by taping or by other suitable means or disconnect and remove from the battery compartment to prevent accidental grounding of the test stand circuitry.

(3) *Batteries.* Install one 24-volt, two 12-volt. or one 12-volt, and two 6-volt, or four 6-volt bat teries (for 6-12-24 volt hook-up) in the battery) compartment of the test stand and connect in accordance with battery wiring diagram (fig. 2-3)

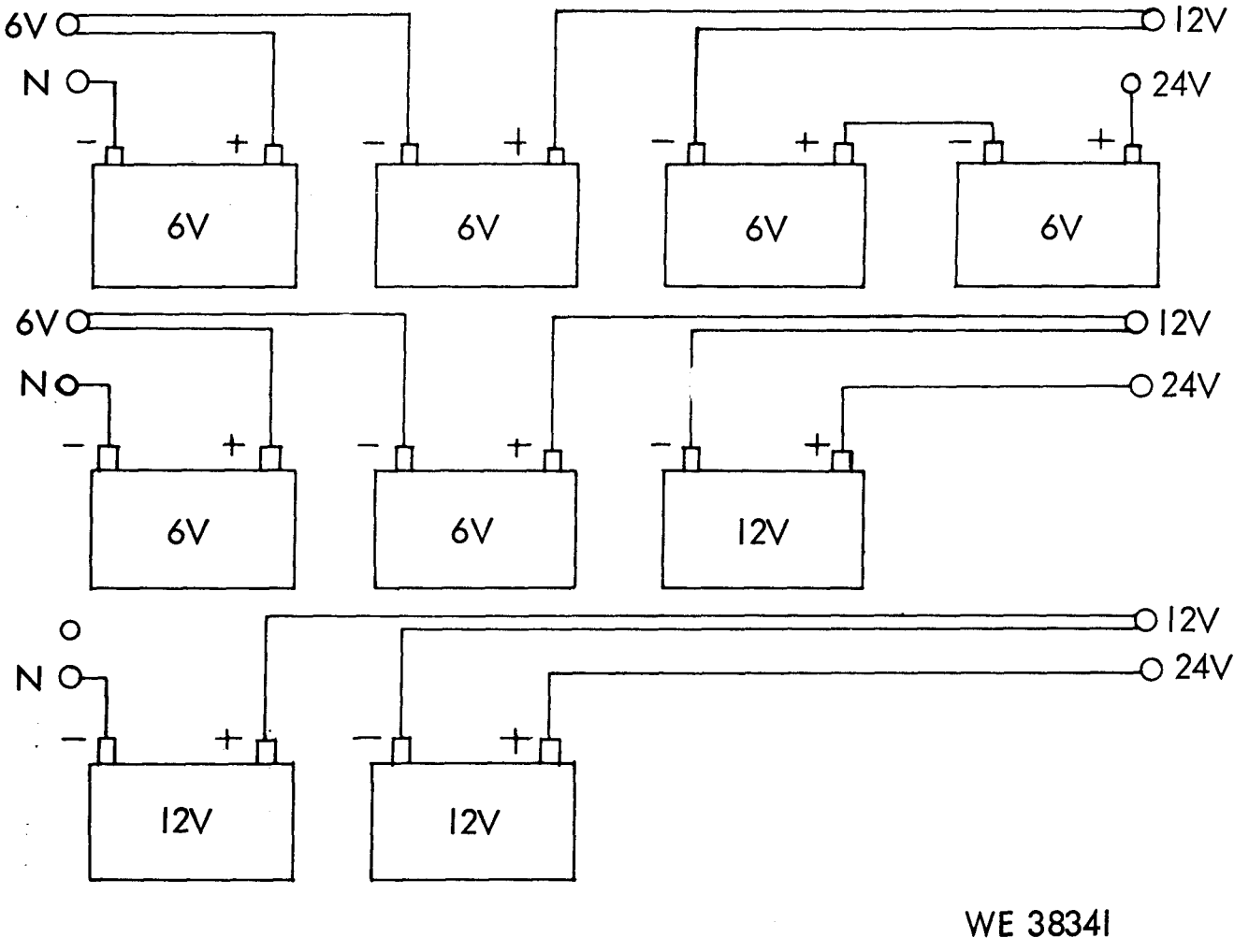


Figure 2-3. Battery wiring diagram. 6, 12, and 24 volt combination.

(4) *Depot Installation.*

CAUTION: The test stand is shipped without oil in the gear case of the varidrive assembly. Do not operate the test stand until the gear case has been filled to proper level with lubricating oil prescribed in paragraph 4-5.

(a) Test stand (fig. 1-1). Select a location for the test stand which is properly ventilated, dry, and not subject to extreme heat, dripping moisture, or exposed to dirt. The location should be where hazardous processes are not being performed. Remove the four lifting eyes from their storage position (fig. 1-1) and secure them to the metal

frame skid. Lift the test stand off the floor using a suitable type hoist and utilizing the lifting eyes. Remove the wooden skid-type base, and position the test stand in place on the floor of the selected location. After the test stand has been positioned, return and secure the lifting eyes in their storage position.

NOTE: Normally the test stand need not be secured to the floor for depot installation, however, if need arises for this requirement mounting holes in the metal skids are provided for this purpose.

(b) Venting

1. Venting of the air intake and exhaust are not required for depot installation; however, be certain the air intake and exhaust are not restricted as restrictions will affect the operation of the air-flow and the operation of the test stand.

2. The battery compartment (fig. 1-1) is vented by means of a rubber hose extending from the rear of the battery compartment to the top of the cabinet assembly.

WARNING: Disconnect the external power supply from the test stand and place the main circuit breaker in the "OFF" position, (c) below, before any attempt is made to change wiring or contact components in the high voltage compartment.

(c) Main circuit breaker. The main circuit breaker (fig. 2-4), is located in the high voltage compartment and protrudes through a slot in the door of the high voltage compartment, serves as an "ON-OFF" switch for the total input power to the test stand. Place this switch in the "ON" position prior to operating the test stand. This switch may be left in the "ON" position unless there will be requirements of opening the high voltage compartment for maintenance to the input circuitry, changing the position of the drive reversing switch (fig. 2-4), or the test stand is not in use for an extended period.

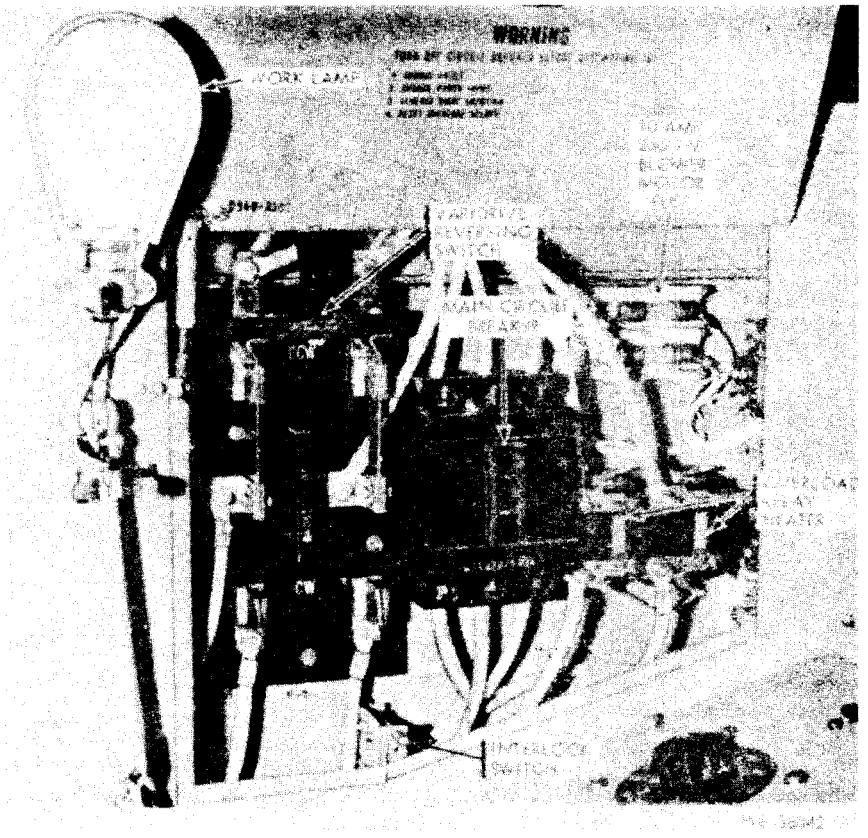


Figure 2-4. *High voltage compartment.*

(d) Wiring.

1. Remove the power service entrance cover (fig. 2-5) and install the power cable through the power service entrance. Connect three of the conductor leads (red, white, black) of the power cable to the power cable connections and ground the fourth conductor lead (green) to the terminal marked GND of the test stand. Ground the frame of the test stand to a suitable external ground.

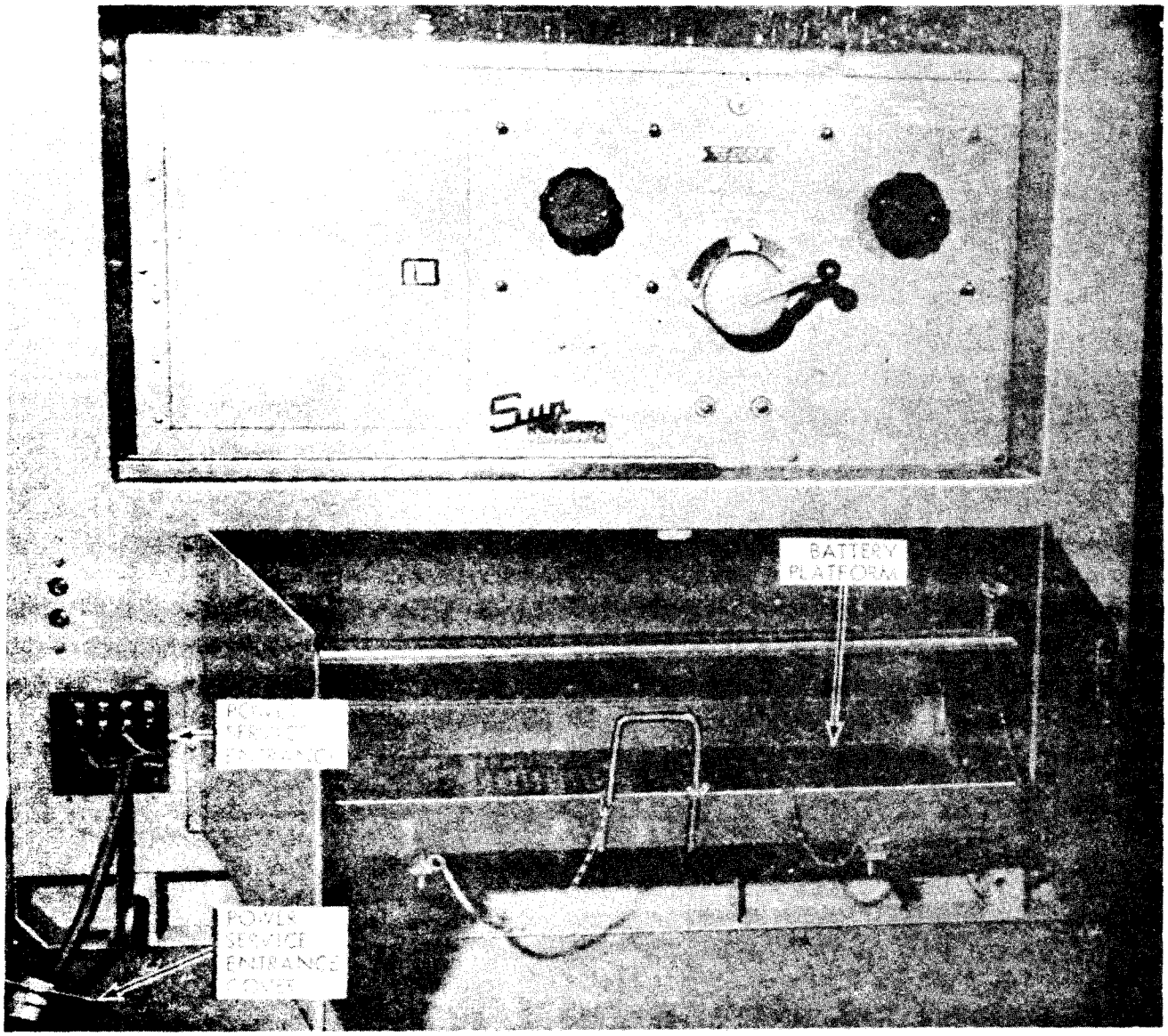


Figure 2-5. Test stand - front.

NOTE. Interchanging any two conductor leads (red, white, or black) of the power cable will change the rotation of the varidrive driving heads

WARNING: The interlock switch (fig. 2-4) only prevents the operation of the test stand. Components within the high voltage compartment are only rendered safe when the main circuit breaker switch is in the "OFF" position.

2. On the high voltage compartment there is an interlock switch (fig. 2-4) to prevent operation of the test stand while the compartment door is open or not closed tightly. Be sure this door is closed tightly or the test stand will not function properly because the interlock switch will not maintain the continuity of the control circuits.

NOTE: The test stand is shipped connect for 220-volt operation. If 440-Volt operation is desired, disconnect the external power supply and place the main circuit breaker (fig. 2-4) in the "OFF" position. Open the rectifier cooling chamber (fig. 2-6) and connect the drive motor terminal board links and the transformer terminal board link in accordance with the power supply wiring diagram (fig. 2-7). Remove the number W-158 overload relay heater

elements (fig. 2-4) and install in their place the number W-151 overload relay heater elements.

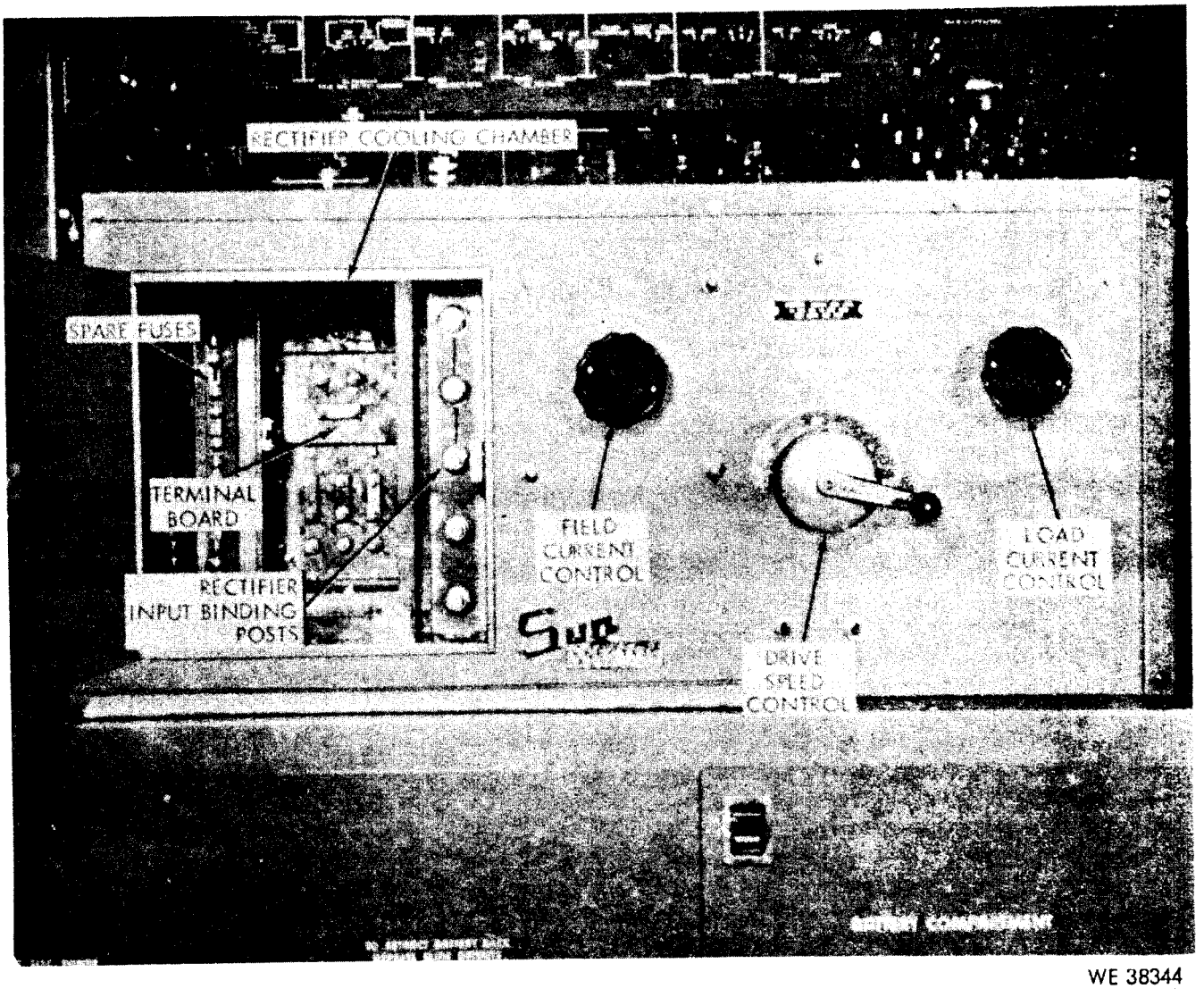


Figure 2-6. Rectifier cooling chamber and front control panel.

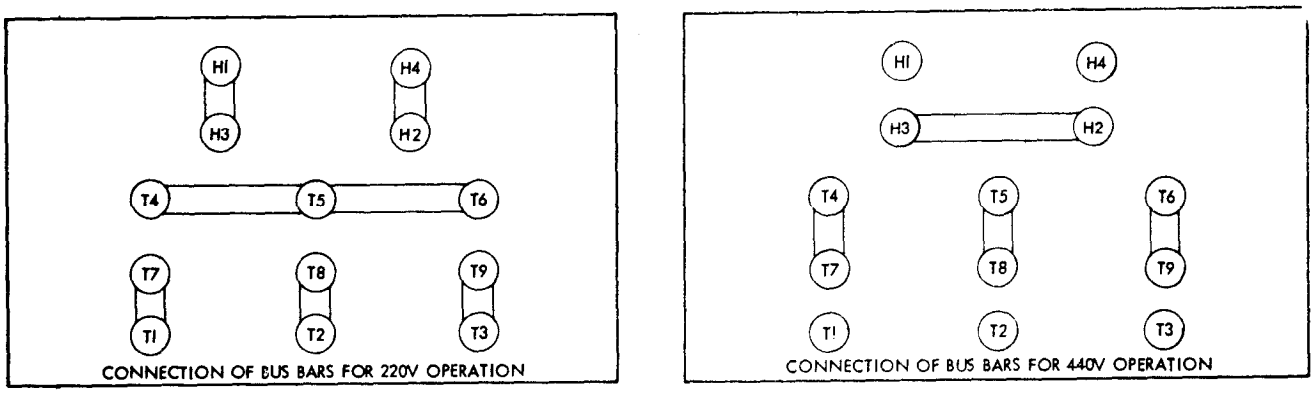


Figure 2-7. *Power supply wiring diagram.*

d. Lubrication. Lubricate the test stand as prescribed in chapter 4, section II.

e. Inspection.

WARNING: Disconnect the external power supply from the test stand and place the switch on the main circuit breaker (fig. 2-4) in the "OFF" position before any attempt is made to inspect connections.

(1) Perform a general inspection of the test stand to assure all parts are properly and securely assembled and in good condition.

(2) Inspect to see that all connections are secure.

(3) Check to see that the meter windows have no presence of static charge (par. 4-12a(3)).

(4) Check all compartments in the test stand for any items (equipment, etc.) that may interfere wit h the operation of the stand.

(5) Perform the preventive-maintenance services as prescribed in tables 4-1 and 5-1.

(6) Operate the test stand and check for proper testing operation (pars. 2-73 and 2-74). Listen for unusual noises when the varidrive assembly is operated, such as bearing grind or excessive gear noise.

Section II. CONTROLS, INSTRUMENTS, AND RELATED ITEMS

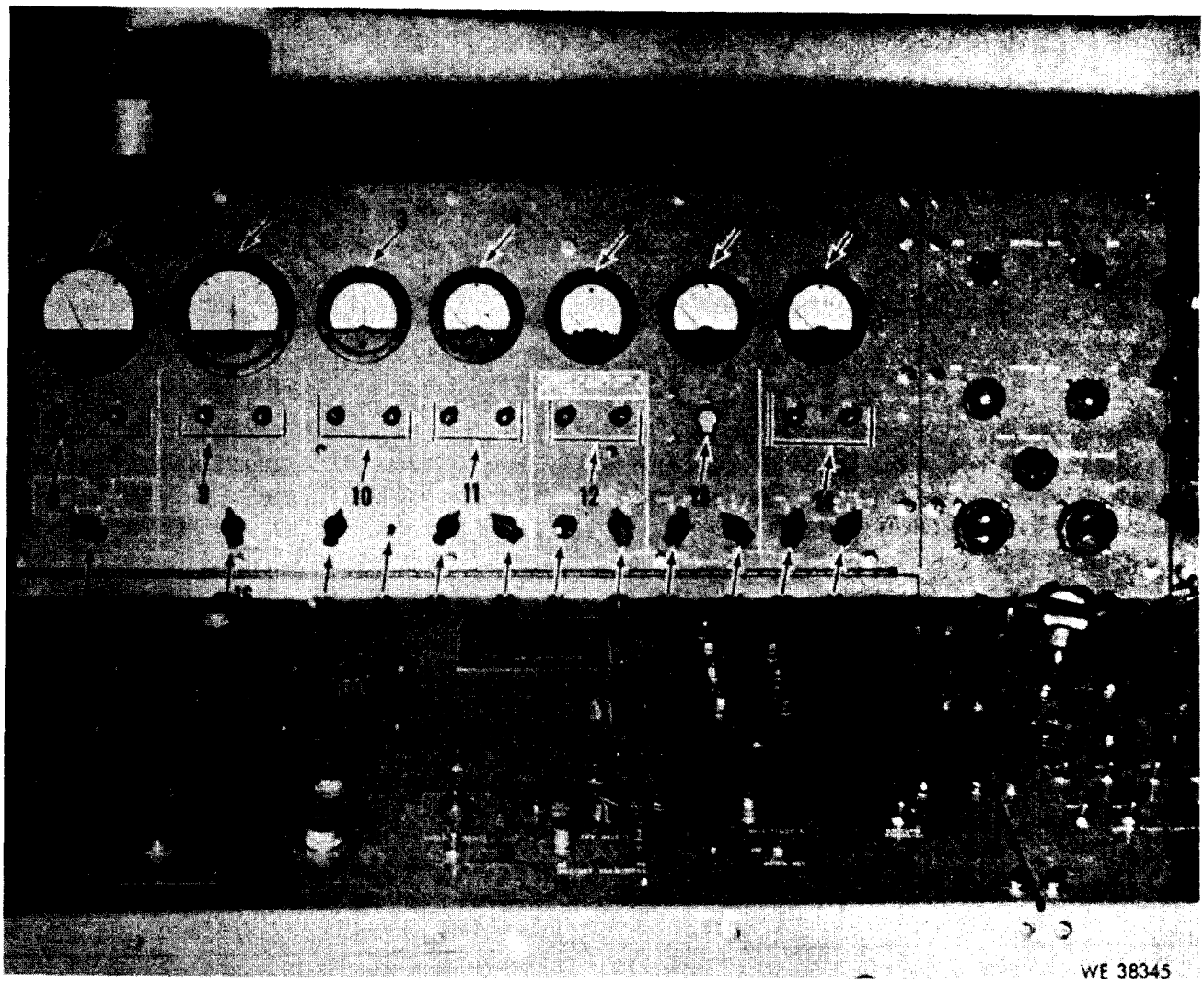
NOTE: The key numbers shown below in parentheses in paragraphs 2-3 through 2-29 refer to figure 2-8 unless otherwise indicated.

2-3. General

This section describes, identifies, illustrates, and furnishes the operator with sufficient information pertaining to the various controls, instruments, and related items provided for the proper operation of the test stand.

2-4. DC Ammeter Load and Starter

The load and starter dc ammeter (1) dc ampere off-center-zero, two-scale meter. The scale has five registers the required dc ampere readings through the settings of a selector switch (par. 2-18). The meter is used to measure the generator output current when testing dc generators. It can also be used to measure the current draw when testing starters (cranking motors), and to measure the current output of the battery charge circuit through settings of the selector.



KEY to figure 2-8.

1. Load and starter dc ammeter.
2. Field and battery charger dc ammeter.
3. Millivolt meter.
4. DC voltmeter.
5. Tachometer.
6. AC ammeter.
7. AC voltmeter.
8. DC ammeter load and starter calibrating binding posts.
9. DC ammeter field and battery charger calibrating binding posts.
10. Millivolt meter calibrating binding posts.
11. DC voltmeter callibrating binding posts.
12. Tachometer calibrating binding posts.
13. AC ammeter calibrating jack.
14. AC voltmeter calibrating binding posts.
15. DC ammeter load and starter selector.
16. DC ammeter field and battery charger selector.
17. Millivolt meter range selector.
18. Millivolt meter momentary-on switch.
19. DC voltmeter range selector.
20. DC voltmeter circuit selector.
21. Tachometer pulley calibration control.
22. Tachometer circuit selector.
23. AC ammeter range selector.
24. AC ammeter phase selector.
25. AC voltmeter range selector.
26. AC voltmeter circuit selector.

Figure 2-8. Control panel - upper.

2-5. DC Ammeter Field and Battery Charger

The field and battery charger dc ammeter (2) is a dc ampere off-center-zero, two scale meter. The upper scale is a 5-0-5 and lower scale register 15-0-15 dc amperes and can be converted to register 0-30 dc amperes through the settings of a selector switch (par. 2-19). The meter is used to measure the field current when testing dc generators and ac (alternator) generators.

2-6. Millivolt Meter

The millivolt meter (3) is a off-center-zero, two scale meter. The scale can be converted to register 0-900 dc millivolts and 0-9 volts through the setting of a selector switch (par. 2-20). The meter is used to measure the dc voltage differential between generator volts and battery volts through a momentary-on switch (par. 2-21). Deflection to the left of the zero mark on the meter indicates higher generator voltage and deflection to the right of the zero mark indicates higher battery voltage.

2-7. DC Voltmeter

The dc voltmeter (4) is a 0-10 and 0-20 dc volts two-scale meter. The scale can be converted to register 0-10, 0-20 or 0-50 dc volts through the settings of a range selector switch (par. 2-22). The meter is used to measure the battery voltage prior to testing operations. It can also be used to measure the applied variable dc voltage and the generator output voltage when testing dc generators, and to measure the dc voltage from a source external to the test stand. These various measurements are acquired through the settings of a circuit selector switch (par. 2-23).

2-8. Tachometer

The tachometer (5) is a two-scale meter used to indicate the driving speed of the generator or alternator being tested. The scales on the meter are 0-12000 and 0-5000 revolutions per minute meter reading. The scale used is determined by the high or low speed driving head on which the generator or alternator is mounted. The meter is calibrated to compensate for the variation between generator speed and varidrive speed through the settings of the tachometer circuit selector switches (par. 2-25) and a pulley calibration control (par. 2-24).

2-9. AC Ammeter

The ac ammeter (6) is a 0-100 and 0-400 ac amperes two-scale meter with a basic movement on the scale of 0-5 ac amperes. The scale can be converted to register 0-100 to 0-400 ac amperes through the settings of a range selector switch (par. 2-26). The meter is used to measure the ac amperes output of ac/dc systems, and also to determine balanced phase conditions of ac/dc systems through the settings of a phase selector switch (par. 2-27).

2-10. AC Voltmeter

The ac voltmeter (7) is a 0-25 and 0-50 ac volts two-scale meter. The scale can be converted to register 0-25 or 0-50 ac volts through the settings on a range selector switch (par. 2-28). The meter is used to measure the ac voltage output of ac/dc systems and also to determine balance phase conditions of ac/dc systems through the settings of a circuit selector switch (par. 29).

2-11. DC Ammeter Load and Starter Calibrating Binding Posts

The dc ammeter load and starter calibrating binding posts (8) are designed to receive test leads and can be tightened to hold the terminals secure or, plug-in type terminals can be inserted in the top of the posts. They are used when calibrating the load dc ammeter. With the selector switch (15) set in either 50A, 150A, or 5000A load positions, or on 200A or 1000A starter positions, the meter can be calibrated by connecting a 50 millivolt dc input to the calibrating binding posts, with allowance being made for the resistance of the external circuit as compared with the resistance of the meter circuit within the test stand. By varying the input between 0 and 50 dc millivolts, the meter can be checked at different points on the scale.

2-12. DC Ammeter Field and Battery Charger Calibrating Binding Posts

The dc ammeter field and battery charger calibrating binding posts (9) are used when calibrating the field dc ammeter. With the field and battery charger selector switch (16) set in either 15A or 30A positions for the field stations and set at the 30A station for the battery charger, the meter can be calibrated by connecting a 50 millivolt dc input to the calibrating binding posts, with allowance being made for the resistance. of the external circuit as compared with the resistance of the meter circuit within the test stand. By varying the input between 0 and 50 millivolts, the meter can be checked at different points on the scale, and by reversing the polarity of the input, the meter can be checked in both directions.

2-13. Millivolt Meter Calibrating Binding Posts

The millivolt meter calibrating binding posts (10) are used when calibrating the millivolts meter. With the millivolts range selector switch (17) set in either the “9V” position or “900V” position, the meter can be calibrated by applying the same amount of dc voltage which was selected on the switch to the calibrating binding posts. To take readings on the meter, it is necessary to place the millivolt momentary-on switch (18) in the “ON” position. A correctly calibrated meter will indicate the amount of applied dc voltage.

2-14. DC Voltmeter Calibrating Binding Posts

The dc voltmeter calibrating binding posts (11) are used when calibrating the dc voltmeter. With the dc voltmeter circuit selector switch (20) set in any position and the dc voltmeter range selector switch (19) set in any one of the voltage positions, the meter can be calibrated by applying the same amount of dc voltage which was selected on the switch (19) to the calibrating binding posts. A correctly calibrated meter will indicate the amount of applied dc voltage.

2-15. Tachometer Calibrating Binding Posts

The tachometer calibrating binding posts (12) are used when calibrating the tachometer. With the pulley-calibration control (21) set in the counterclockwise position, and the tachometer circuit selector set in the "DIRECT DRIVE" position, the meter can be calibrated. The movement of the meter pointer over the entire meter scale is activated by a 0 to 12 ac voltage, therefore, by connecting a 0 to 12 ac volt supply to the calibrated binding posts the meter can be calibrated by varying the ac voltage and checking the reading at different points on the scale of the meter. To determine whether the speed of either output shaft of the varidrive assembly coincides with the meter reading, the speed of the output shafts can be checked with a hand tachometer, or a stobotac. Recalibration instructions for the entire tachometer indicator circuitry is prescribed in paragraph 2-72b.

2-16. AC Ammeter Calibrating Jack

The ac ammeter calibrating jack (13) is a plug-in type unit and is used when calibrating the ac ammeter. The ac ammeter can be calibrated while in use by connecting an external accurate ac ammeter in series with it, using the calibrating jack, and the readings on both meters should coincide. The external meter must have a movement of 0-5 ac amperes and be capable of being used throughout the frequency range of 70 to 800 cps (cycles per second).

2-17. AC Voltmeter Calibrating Binding Posts

The ac voltmeter calibrating binding posts (14) are used when calibrating the ac voltmeter. With the ac voltmeter circuit selector switch (26) set in either the "T1-T2" and "T1-T3" positions or "T1-T3" and "T2-T3" positions, and the ac voltmeter range selector switch (25) set in either the 25V or 50V position, the meter can be checked for correct calibration by connecting the same amount of ac voltage which was selected on the switch (25) to the calibrating binding posts. A correctly calibrated meter will indicate the amount of applied ac voltage.

2-18. DC Ammeter Load and Starter Selector

The dc ammeter load and starter selector (15) controls both load and starter circuits and is a 5-position rotary-type selector switch. It is used to place the load and starter dc ammeter (1) in series with the dc systems undergoing test, within ranges of 50, 150, and 500 dc amperes, by setting the switch in the desired position. The starter test station of the selector is used to place the load and starter dc ammeter (1) in series with the circuit of the starter system undergoing test to indicate current draw on the dc ammeter. The selector is set in the 200A position when performing no load (free running) tests on starters (cranking motor) and set in the 1000A position when performing stall torque tests on starters. The selector is placed in the 500A position on the load side when not being used for the above two tests.

2-19. DC Ammeter Field and Battery Charger Selector

The field and battery charger dc ammeter selector (16) is a 5-position rotary type selector switch including an "OFF" position. It is used to place the field dc ammeter (2) in series with the field circuit of the dc system undergoing test, within ranges of 5, 15, and 30 dc amperes, on the field stations by setting the selector in the desired position. Battery charging station position is 30A under all charging conditions.

2-20. Millivolt Meter Range Selector

The dc millivolt meter range, selector (17), rotary type selector switch. It is used to place the millivolt meter (3), in the circuit of the dc system undergoing test, in either the 9 dc volts or 900 dc millivolts ranges, by setting the switch to the "9V" or "900" dc millivolts ranges, by setting the switch to the "9V" or "900" position,

2-21. Millivolt Meter Momentary-On Switch

The millivolt meter momentary-on switch (18) is an off-momentary-on toggle switch, used to connect the dc millivolt meter (3) in the circuit with the millivolt range selector. Holding the switch lever up to the "ON" position when performing tests will activate the millivolt meter.

2-22. DC Voltmeter Range Selector

Dc voltmeter range selector (19) is a 3-position rotary type selector switch. It is used to place the dc voltmeter (4) in the circuit of the dc system undergoing test, within ranges of 10, 20 and 50 dc volts, by setting the switch in the desired position.

2-23. DC Voltmeter Circuit Selector

a. General. The dc voltmeter circuit selector (20)

is a 4-position rotary type selector switch. It is used to place the dc voltmeter (4) in parallel with the battery circuitry of the test stand or to place the dc voltmeter in the testing circuity of the test stand for a variety of tests on a dc systems and ac/dc systems. It is also used to place the dc voltmeter in the circuit of a voltage source external to the test stand. These various procedures are acquired by placing the switch in positions: "RECT GEN", "BAT", "EXT", and "VAR DC SUPPLY" *b* through *e* below.

b. "RECT GEN" Position. The "RECT GEN" position connects the dc voltmeter (4) circuit to the G+ and G- generator input binding posts (7, fig. 2-11) when testing dc systems and to the -D and +G rectifier input output binding posts in the rectifier cooling compartment (fig. 2-6) when testing ac/dc systems, permitting voltage readings to be indicated on the dc voltmeter for these two systems.

c. "BAT" Position. The "BAT" position connects the dc voltmeter circuit to the battery circuitry of the test stand, permitting the voltage condition of the batteries to be indicated on the dc voltmeter. To take the battery voltage reading on the dc voltmeter, turn the dc voltmeter circuit selector (20) to the "BAT" position.

d. "EXT" Position. The "EXT" position connects the dc voltmeter (4) circuit to the external dc voltmeter positive and negative dc voltmeter binding posts (11) and permits the use of the dc voltmeter for measuring dc voltage from a source external to the test stand circuitry.

e. "VAR DC SUPPLY" Position. The "VAR DC SUPPLY" position connects the dc voltmeter (4) circuit to the dc variable volts negative and positive dc power supply binding posts (10, fig. 2-9). When the two binding posts are connected to the dc system under test with the power supply switch (1, fig. 2-9) in the "ON" position and the dc power supply control (6, fig. 2-9) is operated, the variable voltage applied will be indicated on the dc voltmeter.

2-24. Tachometer Pulley Calibration Control

The tachometer pulley calibration control (21), is a rotary type rheostat control. It is used in conjuction with the tachometer circuit selector (22) to calibrate the tachometer (5) for either a direct-driven or pulley-driven generator or alternator. When testing direct-driven generators or alternators the control is set in the counterclockwise position and the generator speed (rpm) is read on either the 0-12000 or 0-5000 scale of the tachometer which is determined by the high or low speed driving head on which the generator or alternator is mounted. For a pulley-driven generator or alternator the adjustment of this switch is determined by the speed determining formula of the driven generator or alternator (par. 2-77c) and the preset speed. The scale 0-12000 or 0-5000 of the tachometer which is used is determined as stated above.

2-25. Tachometer Circuit Selector

The tachometer circuit selector (22) is a 2-position rotary type selector switch. It is used in conjunction with the tachometer pulley calibration control (21) and to calibrate the tachometer (5), for either a direct-driven or pulley driven generator or alternator. When testing direct-driven generators or alternators the selector is set in the "DIRECT DRIVE" position.

2-26. AC Ammeter Range Selector

The ac ammeter range selector (23) is a 2-position rotary type selector switch. It is connected in series with the ac ammeter phase selector (24), The switch can be set to acquire 100 and 400 ac ampere ranges on the ac ammeter (6) for testing ac/dc systems, by setting the switch in either the "100A" or "400A positions as required.

2-27. AC Ammeter Phase Selector

The ac ammeter phase selector (24) is a 3-position rotary type selector switch. It is used to place the circuitry of the ac ammeter in the circuit of the phase of an ac/dc system being tested. Balance phase condition of an ac/dc system can be detected by setting the switch in the "A", 'B", and "C" positions and observing the amperage reading on the ac ammeter. If readings on the meter register approximately the same when the selector is set in any of these positions a balanced phase condition exists.

2-28. AC Voltmeter Range Selector

The ac voltmeter range selector (25) is a 2-position rotary type selector switch. It is connected in series with the ac voltmeter circuit selector (26). The selector can be set to acquire 25 to 50 volt ranges on the ac voltmeter (7) for testing ac/dc systems, by setting the switch in the "25V" or "50V" positions.

2-29. AC Voltmeter Circuit Selector

The ac voltmeter circuit slector (26) is a 5 position rotary type selector switch including an "OFF" position. It is used to place the circuitry of the ac voltmeter (7) in the circuit of the phase of an ac/dc system being tested. Balance phase condition of an ac/dc system can be detected by setting the switch in the "T1-T2", "T1-T3", and "T2-T3" positions and observing the voltage reading on the ac voltmeter. Voltage differential of more than 1 volt (plus or minus) between any two settings indicates unbalanced phase conditions. When not in use this switch should be set in the "OFF" position.

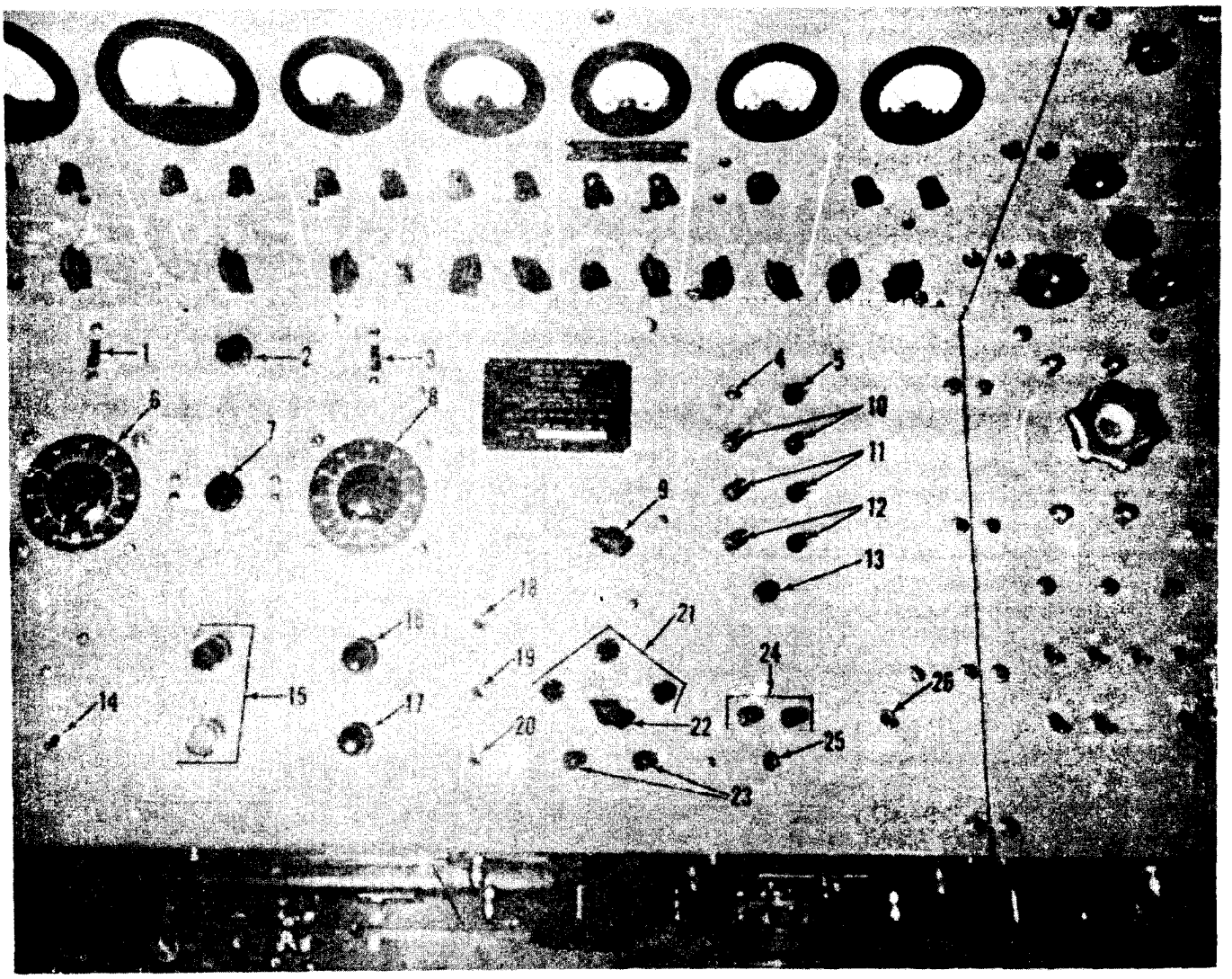
2-30. Power Supply Switch

NOTE: The key numbers shown below in parentheses in paragraphs 2-30 through 2-51 refer to figure 2-9.

The dc power supply switch (1) is an ON-OFF circuit breaker type toggle switch which activates the 0-32V and the power supply control (6) of the test stand.

2-31. Battery Charge Indicator Lamp

The battery charge indicator lamp (2), when lit, indicates that the battery circuit is completed and the batteries are being charged.



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KEY to figure 2-9:

1. Power supply switch.
2. Battery charge indicator lamp.
3. Battery charge switch.
4. Relay lamp switch.
5. Regulator resistor fuse holder.
6. Power supply control.
7. Charge timer.
8. Battery charge control.
9. Regulator load resistor selector.
10. DC power supply remote meter testing binding posts.
11. Millivolt meter remote meter testing binding posts.
12. DC voltmeter remote meter testing binding posts.
13. Relay closure lamp.
14. Work light switch.
15. Start-Stop button.
16. Drive ON indicating lamp.
17. Power ON indicating lamp.
18. External field switch.
19. Field cannon switch.
20. Field current switch.
21. Battery voltage indicator lamps.
22. Battery selector.
23. Battery terminals.
24. Pile flutter.
25. Head set phone jack.
26. Ground polarity switch.

Figure 2-9. Control panel - center.

2-32. Battery Charge Switch

The battery charge switch (3) is an ON-OFF circuit breaker type toggle switch which connects the battery charger controls into the circuit.

2-33. Relay Lamp Switch

The relay lamp switch (4) is a 3-position (12V-OFF-24V) toggle switch, the purpose of which is to select the proper circuit for the relay closure indicator lamp.

2-34. Regulator Resistor Fuse Holder

The regulator resistor fuse holder (5) contains the regulator resistor fuse under a screw cap. The fuse provides overload protection for the regulator load resistors.

2-35. Power Supply Control

The power supply control (6) is a rotary type rheostat control and is used to supply variable dc power supply voltage. This control set in a counterclockwise position is "OFF".

2-36. Charge Timer

The charge timer (7) is a manually set rotary type control and is used to set any desired length of time, for battery charging. The timer is divided into 10 minute stations with increments of one minute up to its maximum setting of 120 minutes.

2-37. Battery Charger Control

The battery charger control (8) is a rotary type rheostat and is used to supply variable amperage to the batteries under charge. This control set in the counterclockwise position is "OFF".

2-38. Regulator Load Resistor Selector

The regulator load resistor selector (9) is a 5-position (OFF, ¼PHM, 1½OHM, 2¼OHM, and 7 OHM) rotary type selector switch which selects the proper resistance for the regulator test circuit.

2-39. Remote Meter Testing Binding Posts

a. DC Power Supply. A combination binding post and jack (10) provides connection to power supply, variable voltage (0-32 VDC).

b. Millivolt Meter. A combination binding post and jack (11) for testing and/or comparison for remote millivolt merer,

c. DC Voltmeter. A combination binding post and jack (12) for externally testing and/or comparison for remote DC voltmeter.

2-40. Relay Closure Lamp

The relay closure lamp (13) indicates the opening or closing of the relay lamp switch (4).

2-41 Work Light Switch

The work light switch (14) is a 2-position (ON-OFF) toggle switch and is used to illuminate the control panel.

2-42. Start-Stop Button

The stop-start buttons (15) control a magnetic switch and are used to start and stop the varidrive unit of the test stand.

2-43. Drive ON Indicating Lamp

The drive ON indicating lamp (16), when lit, indicates the varidrive unit drive is on.

2-44. Power ON Indicator Lamp

The power ON indicator lamp (17), when lit, indicates that input power has been applied to the test stand.

2-45. Field Switches

The field current switches are 2-position toggle switches.

a. External Field Switch. The external field switch (18) controls the external voltage in or out of the unit being tested.

b. Field Common Switch. The field common switch (19) selects the proper ground (+ or-) to agree with the field circuit of the generator under test.

c. Field Circuit Switch. The field circuit switch (20) closes the field circuit of the generator under test. This switch in the "MANUAL" position is used when there is no regulator in the circuit of the unit being tested and is in the "REGULATOR" position when a regulator is connected in to the system being tested.

2-46. Battery Voltage Indicator Lamps

The battery voltage indicator lamps (21) indicate the voltage position in which the battery selector (22) is set. Each respective lamp will light as the battery selector is positioned in its 6V, 12V or 24V position.

2-47. Battery Selector

The battery selector (22) is a 4-position (OFF, 6V, 12V, 24V) rotary type selector which selects the proper battery circuit for testing.

2-48. Battery Terminals

The battery terminals (23) are combination binding posts and jacks and are used for externally testing and comparison of battery voltage.

2-49. Pile Flutter

The pile flutter (24) are combination binding posts and jacks and are used to connect the pile flutter circuit to the carbon pile of a generator (alternator) regulator for testing.

2-50. Head Set Phone Jack

The head set phone jack (25) is used to plug the lead of a head set into the pile flutter circuit for audio testing of the regulator pile under test. The pile flutter is also used when checking vibrator type regulators.

2-51. Ground Polarity Switch

The ground polarity switch (26) selects the proper ground polarity (+ or-) within the test stand as required when testing generators and voltage regulators. This switch will normally be set in the - (minus) grounding position. Positive (+) grounded systems are very rare.

2-52. Field Current Control

The field current control (fig. 2-6) is a rotary type rheostat control that varies the field current through the unit under test. When the control is fully counterclockwise it is in the "OFF" position.

2-53. Drive Speed Control

CAUTION: The drive speed control must never be moved in either direction when the varidrive is not in operation. Also before stopping the varidrive, always reduce the speed to at least one-quarter of the setting.

The drive speed control (fig. 2-6) is a hand crank that varies the speed of the varidrive. The speed of the unit under test is increased by turning the crank in a counterclockwise direction.

2-54. Load Current Control

The load current control (fig. 2-6) is a rotary type rheostat control that varies the load (0-25 amps) to the unit under test. When the control is fully counterclockwise it is in the "OFF" position.

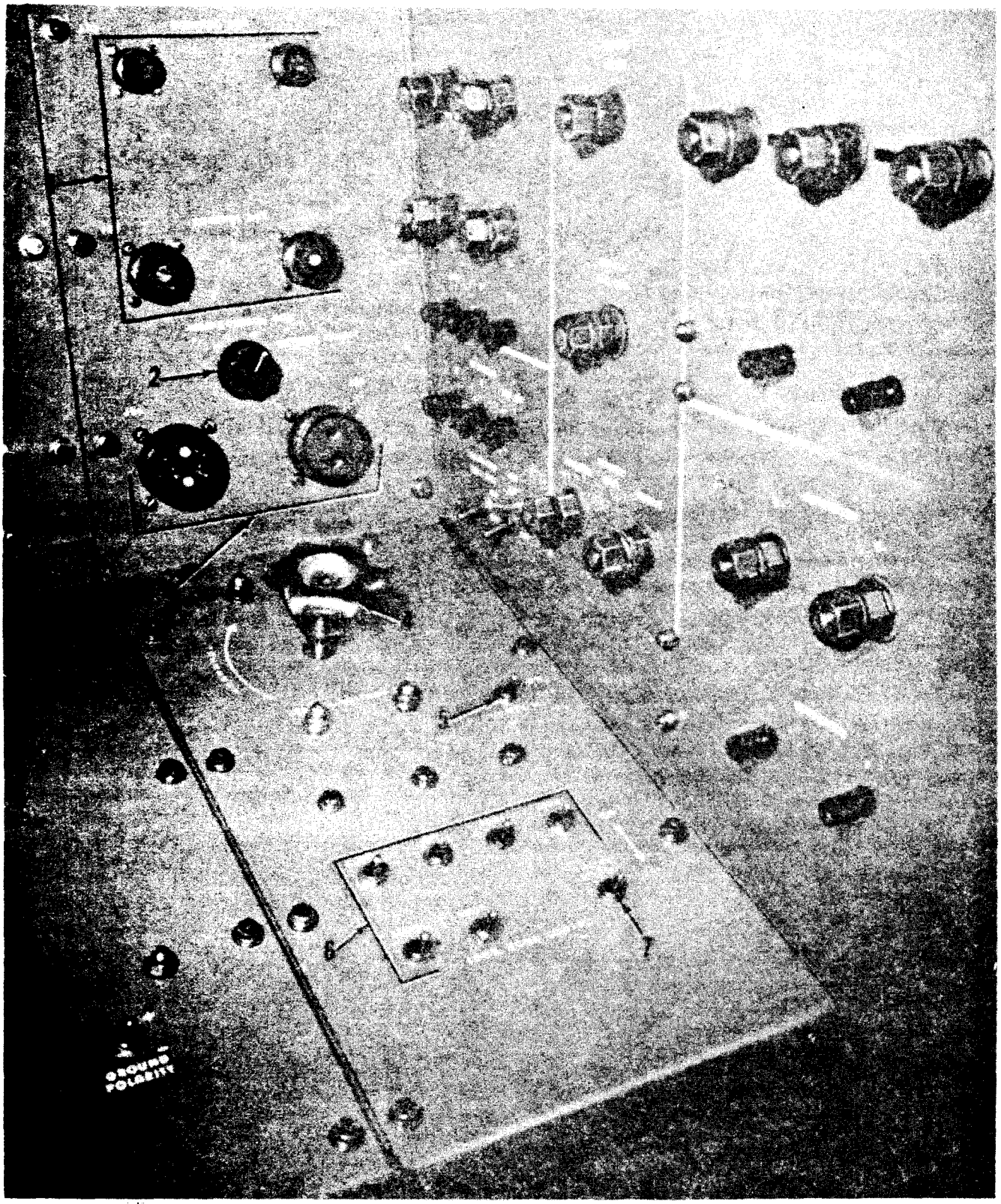
2-55. Control Box Receptacles and Voltage Adjuster

NOTE: The key numbers shown below in parentheses in paragraphs 2-55 through 2-59 refer to figure 2-10.

a. 150-Ampere Generator Control Box Receptacles. The 150-ampere generator control box receptacles (1) consist of four receptacles (or jacks) and are used to connect a 150-amp control box to the test stand for testing its function. Cables are furnished for connecting the individual type of control box under test.

b. Voltage Adjuster. The voltage adjuster (2) is a rheostat type control and is connected in the circuit of the 400-amp control box receptacles. This control is used to increase or decrease the generator output voltage and to adjust the voltage during tests.

c. 400-Ampere Generator Control Box Receptacles. The 400-amp generator control box receptacles (3) consist of two receptacles (or jacks) and are used to connect a 300-or 400-amp generator control box to the test stand for testing its function.



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KEY to figure 2-10.

1. 150-ampere generator control box receptacles.
2. Voltage adjuster.
3. 400-ampere generator control box receptacles.
4. Starter voltage adjuster.
5. Starter test switch.
6. Load bank switches.
7. Master load switch.

Figure 2-10. Control box receptacles, starter test controls, and load bank switches.

2-56. Starter Voltage Adjuster

The starter voltage adjuster (4) is a hand wheel rheostat type control and is used for adjustment of proper voltage for the starter under test. When the adjuster is set fully counterclockwise, the voltage is at its lowest output voltage.

2-57. Starter Test Switch

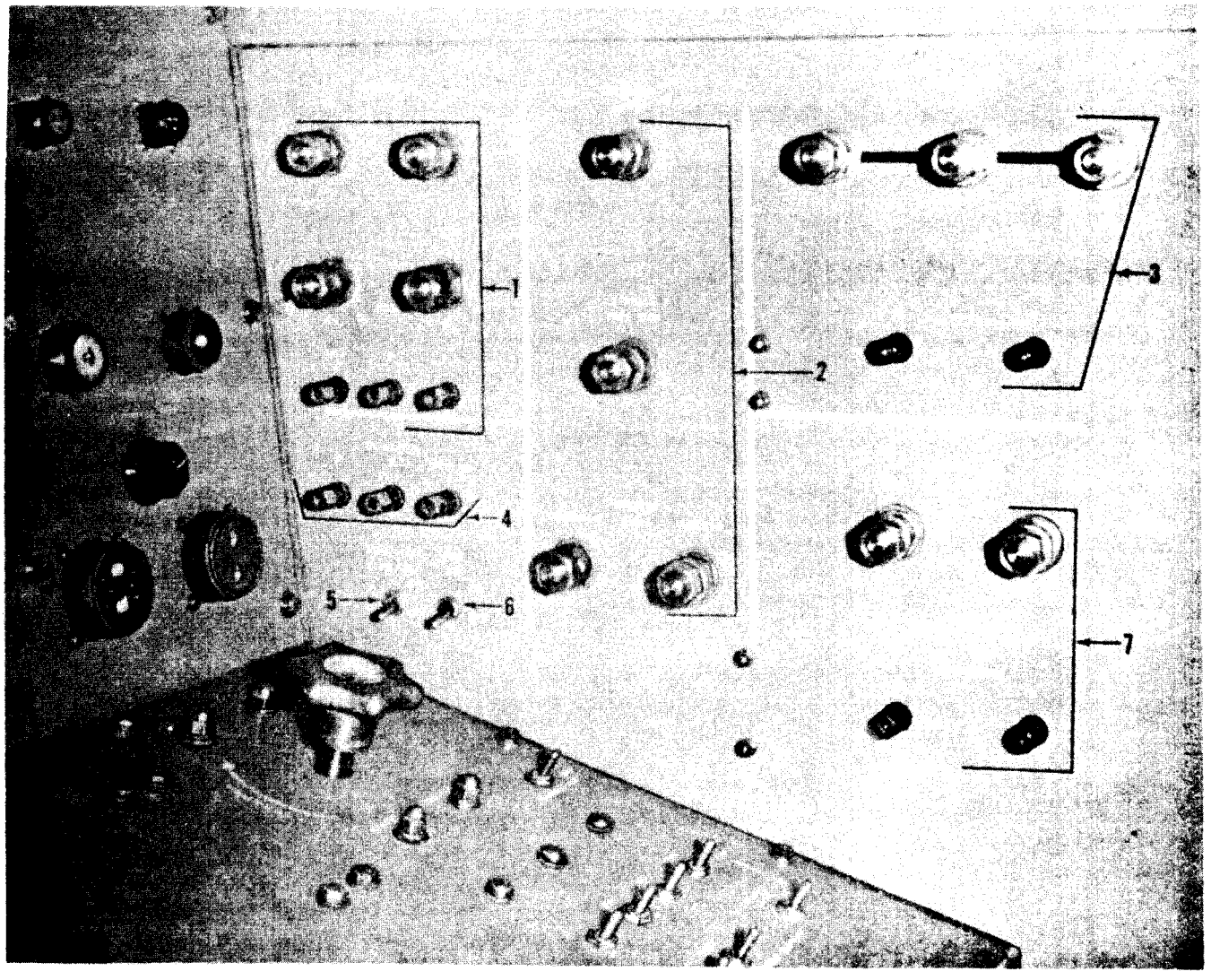
The starter test switch (5) is a 2-position (ON OFF) toggle switch which controls the power feed to the starter voltage adjuster (4).

2-58. Load Bank Switches

The load bank switches (6) consist of six 2-position (ON-OFF) toggle switches designated 0-25A, 25A, 50A, l00A, l00A, and 200A. The 0-25A is a variable load switch and all others are fixed load switches. These switches apply the designated amperage load to the unit under test.

2-59. Master Load Switch

The master load switch (7) is the 2-position (ON-OFF) toggle switch which supplies the amperage load, predetermined by the load bank switch used for the unit under test.



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KEY to figure 2-11.
1. Regulator terminals and binding posts.
2. Starter terminals.
3. Alternator terminals.
4. AC system binding posts.
5. Coil equalizer switch.
6. Ignition switch.
7. Generator terminals and binding posts.

Figure 2-11. Binding post side panel.

2-60. Regulator Terminals and Binding Posts

NOTE: The key numbers shown below in parentheses: in paragraphs 2-60 through 2-66 refer to figure 2-11.

The regulator terminals and binding posts (1) consist of four terminals and three binding posts used to connect the leads of the regulator under test to the test stand. The top two terminals are designated B+ and B- (plus and minus). The lower two terminals are designated G+ and G-. The three binding posts are designated GND, D, and F-B.

2-61. Starter Terminals

The starter terminals (2) consist of four terminals designated as STARTER INPUT, STARTER FREE RUN, STARTER STALL COMMON, and TORQUE. These terminals are utilized when starting units are under test.

2-62. Alternator Terminals

The alternator terminals (3) consist of three terminals and two binding posts. The terminals are designated as ALTERNATOR, Tl, T2, and T3 and the binding posts are designated D and E. These posts are used when connecting the alternator (generator) under test to the stand.

2-63. AC System Binding Posts

The AC system binding posts (4) consist of three binding posts, or jacks, designated D, E, and IGN SW. These posts are used when connecting the alternator (generator) under test to the stand.

2-64. Coil Equalizer Switch

The coil equalizer switch (5) is a 2-position off-momentary-on toggle switch and is used to indicate the alternator (generator) drop-off voltage when testing 28V (100 or 400 amp ac/dc systems) and 150 and 400 amp generator control boxes.

2-65. Ignition Switch

The ignition switch (6) is a 2-position toggle switch designated IGN SW and is used in conjunction with 150 and 400A control box of the unit under test.

2-66. Generator Terminals and Binding Posts

The generator terminals and binding posts (7) consist of two terminals designated GENERATORS G+ and G- (plus and minus) and two binding posts (or jacks) designated D and F. These terminals and binding posts are used for connecting 150 or 300 amp generators to the test stand for testing purposes.

2-67. Varidrive Reversing Switch

The varidrive reversing switch (fig. 2-4) is the 2-blade knife switch which alters the direction of varidrive rotation.

2-68. Interlock Switch

WARNING: The interlock switch, while cutting off the power for operation of the stand, does not eliminate the dangerous electrical potential in the high voltage compartment. Turn "OFF" the main breaker switch while compartment door is open.

The interlock switch (fig. 2-4) is a push-contact, release-breaker switch which automatically cuts off the power to the test stand when the high voltage door is opened.

2-69. Main Breaker Switch

The main breaker switch (fig. 2-4) the control portion of which extends through the high voltage compartment door, is a 2-position switch and is the master control for the test stand.

2-70. Fuse Holder

The fuse holder (fig. 2-4) contains two 10 amp, 250-volt, fuse for in the line protection of the test stand blower motor.

Section III. OPERATIONS UNDER USUAL CONDITIONS

2-71. General

This section contains instructions for the operation of the test stand under conditions of moderate temperature and humidity. Every organization equipped with this item must thoroughly train its personnel in the procedures for operating this item. For operation under unusual conditions, refer to paragraph 2-83 through 2-86.

2-72. Preparation for Operation

a. Adjust each of the seven meters (1 through 7, fig. 2-8) to zero, if required, by turning the adjustment screw (located below lens on center part of meter) clockwise to swing the pointer to the right, or counterclockwise to swing the pointer to the left.

CAUTION: Do not move the handle of the drive speed control (fig. 2-6) when the varidrive assembly is not operating, also, before stopping the varidrive assembly always reduce speed to one-quarter setting.

b. Calibrate the tachometer indicator circuitry for a direct-driven generator (par. 2-77) and with no generator mounted or connected to the test stand, start the varidrive assembly as prescribed in

paragraph 2-74b. Turn the handle of drive speed control (fig. 2-6) until 2000 revolutions per minute are indicated on the tachometer (5, fig. 2-8). Test the tachometer indicator circuitry by checking the speed of the shaft of either driving head (fig. 1-1), utilizing a hand tachometer or strobotac of known accuracy. If the reading on the tachometer does not coincide with the reading on the hand tachometer or strobotac, the tachometer indicator circuitry will need recalibrating.

c. Check the storage batteries following procedures specified in TM 9-6140-200-15.

2-73. Operation

a. Before operating the test stand position all switches and controls as indicated in table 2-1. This switch setting operation places all circuits in their maximum position and precludes damage to the system being tested as well as the test stand circuitry.

Table 2-1. Position of the Controls on Control Panel Prior to Operation of Test Stand

Control	Illustration		Position
	Fig. no.	Key no.	
D.C. ammeter load and starter selector	2-8	15	500A
D.C. ammeter field and battery charger selector	2-8	16	15A
Millivolt meter range selector	2-8	17	9V
D.C. voltmeter range selector	2-8	19	50V
D.C. voltmeter circuit selector	2-8	20	RECT/GEN
Tachometer pulley calibration control	2-8	21	Counterclockwise
Tachometer circuit selector	2-8	22	Direct drive
A.C. ammeter range selector	2-8	23	400A
A.C. ammeter phase selector	2-8	24	Any
A.C. voltmeter range selector	2-8	25	50V
A.C, voltmeter circuit selector	2-8	26	Any
Power supply switch	2-9	1	off
Battery charger switch	2-9	3	Off
Relay lamp switch	2-9	4	24V
Power supply control	2-9	6	Counterclockwise
Charge timer	2-9	7	Off
Battery charger control	2-9	8	Counterclockwise
Regulator load resistor selector	2-9	9	Off
External field switch	2-9	18	Off
Field common switch	2-9	19	GND (-)
Field circuit switch	2-9	20	Any
Battery selector	2-9	22	Off
Ground polarity switch	2-9	26	GND (-)
Field current control	2-6	...	Counterclockwise
Drive speed control	2-6	...	Clockwise
Load current control	2-6	..	Counterclockwise
Coil equalizer switch	2-11	5	Off
Ignition switch	2-11	6	Off
Starter voltage adjust	2-10	4	Counterclockwise
Starter test switch	2-10	5	Off
Load bank switches	2-10	6	Off (All
Master load switch	2-10	7	Off

WARNING: High voltage exists in the area near the varidrive reversing switch. Place the on-off main circuit breaker switch (fig. 2-4) in the "OFF" position before reaching into this area to change position of this switch.

b. Before the start of any generator, alternator, or starter test, position the varidrive reversing switch (fig. 2-4) as required for the rotation of the electrical system undergoing test. See table 2-2, column 5, for rotation of various units.

Table 2-2. Generator Test Data

1	2	3	4	5	6		7			8	
Group	Mfg No.	Ord Part No.	Type	Rotation	Field-Current-Draw		Output			Pulley	
					Volts	Amps	Rpm	Volts	Amps	Mfg. No.	Ord Part No.
					Auto-Lite						
2B	GEG-5002	7540262	W/O PULLEY	C	5	1.3-1.5	1575	8	40	AL-SP502	0345710
2B	GEG-5002A	7540277	W/PULLEY	C	5	1.3-1.5	1575	8	40	.....	0345710
2B	GEG-5002D	0196300	W/PULLEY	C	5	1.3-1.5	1575	8	40	.....	0345710
2B	GEG-5101	7743676	W/O PULLEY	C	5	1.3-1.5	1575	8	40	.....	0345710
2B	GEG-5101D	7734389	W/PULLEY	C	5	1.3-1.5	1575	8	40	AL-SP484A	7734834
2B	GEG-5001A	D196299	W/PULLEY	C	5	1.3-1.5	1575	8	40	AL-SP484A	7734834
3	GDJ-4808	7713901	W/O PULLEY	C	10	1.1-1.3	1125	15	55	.....	7713902
3	GDJ-4808A	7007460	W/PULLEY	C	10	1.1-1.3	1125	15	55		
3	GDJ-4824A	6249017	W/PULLEY	C	10	1.1-1.3	1125	15	55		
2B	GGA-4801A	C-128436	W/PULLEY	C	10	1.1-1.3	1600	15	40		
					Delco-Remy						
	985	D-48138	W/O PULLEY	C	12	1.46-1.62	1000	13	54	DR1884041	B-184141
2	1105906	C-139535	W/O PULLEY	C	12	1.1-1.2	1500	15	26	.....	B-282979
4	117308	C-126149	W/O PULLEY	C	12	1.46-1.62	950	13	55	DR1884041	B-184141
	1117492	7354165	SPLINE DR	CC	24	.85-.89	1600	28.5	25		
4	1117309	078456	W/O PULLEY	CC	24	1.0-1.20	1700	26	50	AL-SP631	B-206331
4	1117486	7524474	W/O PULLEY	C	24	.85-.89	1600	28.5	25	AL-SP966	7374744
5	1117495	7355736	W/O PULLEY	C	24	.85-.89	1600	28.5	25	AL-SP992	7375071
	1902661	A-348554	W/FAN AND PULLEY	CC	24	0.76-0.84	1670	26	50		
					Auto-Lite						
3	GFR-4803B	7744142	W/PULLEY	CC	20	0.7-0.8	1675	30	50		
3	GFR-4804	7712806	S/O PULLEY	CC	20	0.7-0.8	1700	28.5	50	AL-SP631	B-206331
3	GFR-4804B	5700080	W/PULLEY	CC	20	0.7-0.8	1675	30	50		
4	GHA-4802BUT	7374750	W/O PULLEY	C	20	0.7-0.8	1800	28.5	25	AL-SP966	7374744
					Eclipse-Pioneer						
	F91810	D-47404	.....	CC	24	1.1-1.2	1700	28.5			
					General Electric Company						
	P8499315	7021505	W/PULLEY & REG		24	1.65-2.95	4500	28.5	150		

Table 2-2. Generator Test Data - Continued

1	2	3	4	5	6		7			8	
Group	Mfg No.	Ord Part No.	Type	Rotation	Field-Current-Draw		Output			Pulley	
					Volts	Amps	Rpm	Volts	Amps	Mfg. No.	Ord Part No.
Leece & Neville Generator (Alternator)											
	5258012P	.....	.....	C	22.6	8.20	2000				
	5300G12P	7954720	.....	C	21.0	7.70	5000	28	100	37397	8699739

1/C - Clockwise rotation at drive end.
2/CC - Counterclockwise rotation at drive end.
Note: Additional generators which can be tested on test stand are Auto-Lite GDJ-4820 and Delco Remy A8585. Refer to manufacturer's literature or available publications for data on these items.

2-74. Starting and Stopping the Varidrive Assembly

a. Place the circuit breaker switch (fig 2-4) in the "ON" position. Be sure the high voltage compartment access door is closed tightly or the interlock switch (fig. 2-4) may keep the input circuit open preventing the varidrive assembly from operating.

CAUTION: Repeated use of the magnetic motor starter at frequent short intervals may damage starter coil and contacts by overheating.

b. To start the varidrive assembly, depress the "START" button (13, fig. 2-9) on the drive control and hold the button closed long enough until the varidrive assembly comes up to speed at which time the interlock of the magnetic motor starter will function and hold the starting contacts of the starter closed. Holding the button closed should not be in excess of 30 seconds. Before starting tests operate the varidrive assembly over the entire speed range of 11000 to 1830 rpm (revolutions per minute) by turning the handle of the drive speed control (fig. 2-6) clockwise and then counterclockwise.

WARNING: High voltage exists in the high voltage compartment (fig. 2-4), snap the main circuit breaker in the "OFF" position before opening the compartment door.

c. Check the rotation of the unit undergoing test and if reversing of the direction is necessary reverse the rotation by bringing the varidrive to a complete stop and placing the varidrive reversing switch (fig. 2-4) in the opposite position.

d. Depress the "STOP" button (15, fig. 2-9) to stop the varidrive assembly.

2-75. Mounting Direct -Driven Generator or Alternator

NOTE: The key numbers shown in a through c below in parentheses refer to figure 2-12.

a. Install the machine key (1) and the shaft coupling (2) and the splice adapter (3) on the shaft of the proper driving head (high speed or low speed) (fig. 1-1), which is determined by the speed range of the generator (table 2-2, col 7) or applicable manufacturer's test specifications and secure with the set screw (4).

NOTE: The shaft coupling (2) is made to fit a generator or alternator with a large splined shaft and the generator or alternator is mounted directly into this adapter without the splined adapter (3).

b. Pull the pivet arm (5) outward along the pivot shaft (6) far enough to clear the hexagon studs (7) and swing the pivot arm in position with the driving head (high or low speed) which is determined by the speed range of the generator or the applicable manufacturer's test specification (see table 2-2, col 7). Aline the three stud holes in the pivot arm with the hexagon studs and push the pivot arm inward allowing the hexagon studs to enter the stud holes.

CAUTION: Do not leave the shaft coupling (2) or the spline adapter (3) on the driving head shafts after tests have been completed. Remove the adapters and machine key (1) and place in the stowage compartment.

c. Install the mounting flange adapter (8) on the pivot arm (5) and secure with twelve 3/8-24 hexagon plain nuts (4). Mount the direct driven generator (9) over the middle row of studs on the adapter (8). sliding the splined shaft of the generator into the spline adapter (3). Secure the generator on the adapter with the six 3/8-24 hexagon plain nuts (4).

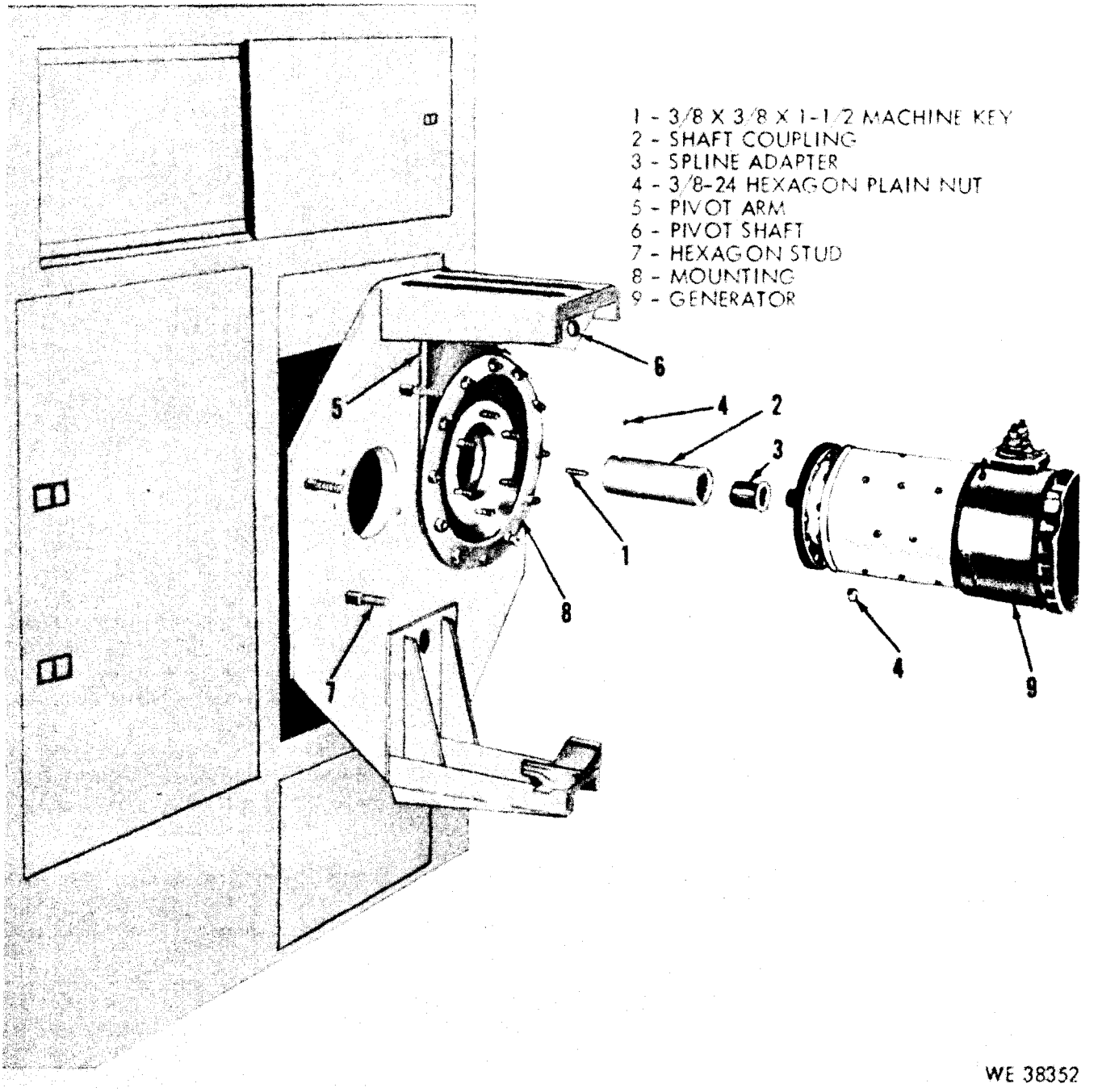


Figure 2-12. Mounting direct driven generator or alternator.

2-76. Mounting Pulley-Driven Generator or Alternator

NOTE: The key numbers shown in *a* through *d* below in parentheses refer to figure 2-13, except where otherwise indicated.

a. Position and secure the pivot arm as indicated in paragraph 2-75b above.

b. Insert the machine key (1) in the internal keyway of the pulley shaft (5).

c. Install the mounting flange adapter (2) on the pivot arm (3). Secure the adapter with twelve 3/8-24 hexagon plain nuts (4).

d. Install the machine key (3, fig, 5-2) in the pulley shaft (5) and install the pulley (6), (select the

proper size pulley to match the generator pulley, refer to appendix D and figure D-3) on the pulley shaft and secure it on the shaft with the brass washer (16, fig. D-3) and retaining ring (15, fig. D-3). Aline the keyway of the driving head with the machine key (1) and slide the pulley shaft on the shaft of the driving head and over the middle row of studs on the mounting flange adapter (2). Secure the pulley shaft (5) on the mounting flange adapter (2) with six 3/8-24 hexagon plain nuts (4).

CAUTION: When installing a alternator or generator in the chain vise (9), be sure to avoid clamping over nameplates and raised or protruding surfaces. On alternator use the cradle (or chain) mounting assembly (23, fig. D-3) do not clamp over the soft shell sections (sheet metal) of alternators not supported by stator or flange iron. Use mounting angle (11, fig. D-3) or mounting channel (12, fig. D-3) as support to prevent crushing the thin sheet steel alternator shell.

e. Mount the pulley driven generator (7) on the generator and starter mounting bracket (8) and secure with the chain vise (cradle mounting assembly) (9). Loosen the four 3/8-24 hexagon plain nuts (4) under the chain vise and slide the unit as required to aline the pulley on the generator with the pulley (6).

f. Loosen the four 3/8-24 hexagon plain nuts (4) and adjust the generator and starter mounting bracket (8) to the required height to allow installation for the V belts (10) (install the proper size V belts to match the pulley) on the generator pulley and the pulley (6). Adjust the mounting bracket (8) to obtain proper tension on the V belts and tighten the four hexagon plain nuts to secure the bracket in place. If further alignment of the pulleys is required, slide the chain vise (9) on the bracket (8) as needed. Tighten the hexagon nut under the chain vise to secure the vise in place.

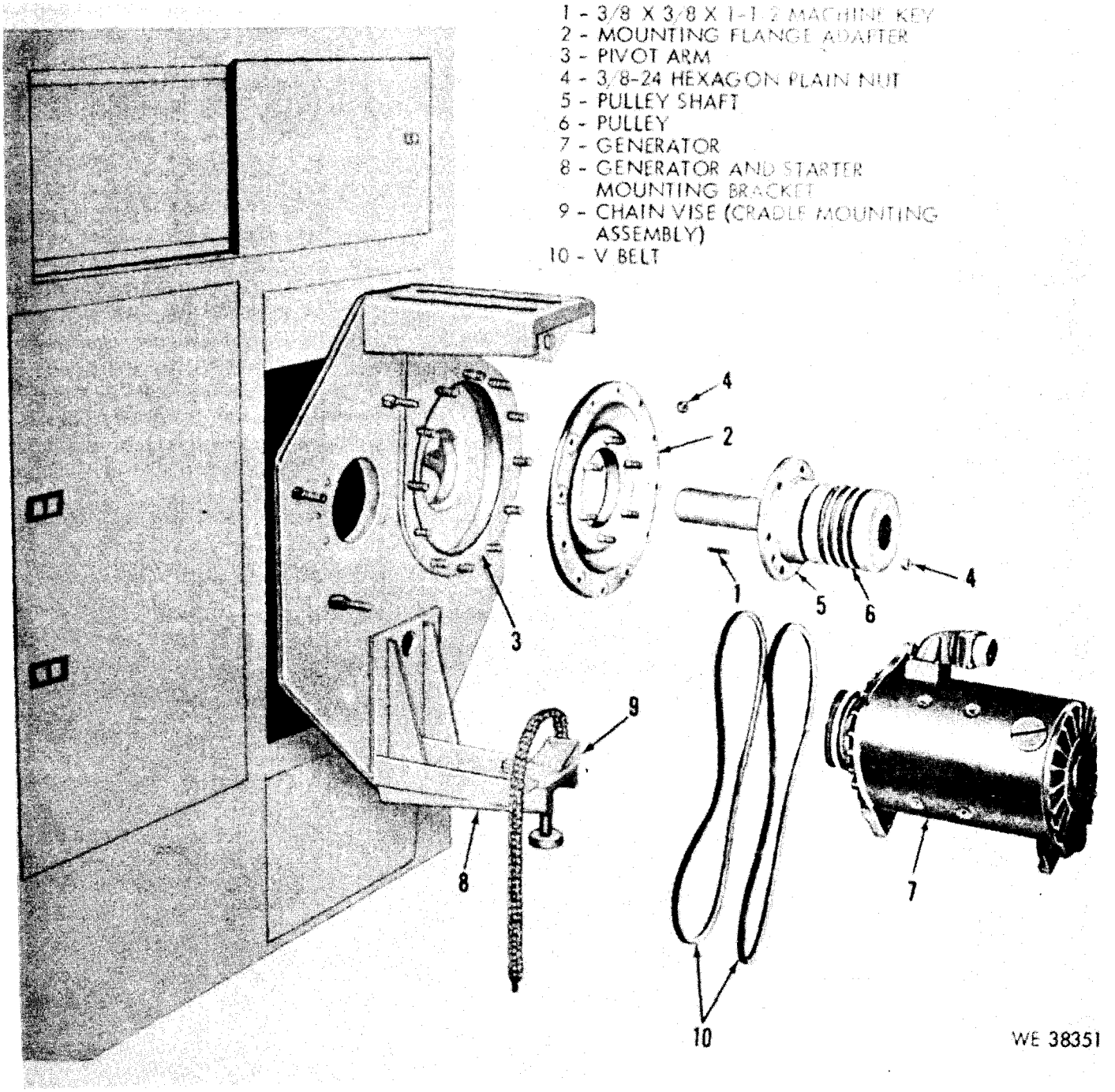


Figure 2-13. Mounting pulley driven generator or alternator.

2-77. Operating the Tachometer Circuitry

NOTE: The key numbers is *a* through *c* below in parentheses refer to figure 2-8, unless otherwise indicated.

a. General The tachometer circuitry is so designed that the speed or rpm (revolutions per minute) of the generator or alternator being tested, whether direct-or-pulley-driven, is indicated. It

consists of a tachometer generator (4, fig. 5-1) (mounted on the varidrive assembly) tachometer (5), pulley calibration control (21) and a tachometer circuit selector (22) for calibrating the circuitry. To determine the speed or rpm of the generator being tested proceed with calibrating procedures as follows:

b. Direct-Driven Generator.

(1) Obtain the rated speed (rpm) for the generator to be tested from table 2-2, paragraph 73b, manufacturer's literature, or nameplate data on generator.

(2) If the rated speed is below 3,000 rpm, mount the generator on the low speed driving head (fig. 1-1). When the rated speed is above 3,000 rpm mount the generator on the high speed driving head, follow mounting procedures prescribed in paragraph 2-75.

(3) Turn the tachometer pulley calibration control (21) to its counterclockwise position and the tachometer circuit selector (22) to the "DIRECT DRIVE" position.

(4) Start the varidrive assembly as prescribed in paragraph 2-74.

(5) Obtain the reading from either the low speed range or high speed range scale on the face of the tachometer (5), depending on which driving head the generator is mounted.

(6) After the test has been completed, stop the varidrive assembly as prescribed in paragraph 2-74 and remove the generator from the driving head.

c. Pulley-Driven Generator or Alternator. When testing a pulley-driven generator or alternator it will be necessary to establish a speed (rpm) for the generator or alternator and make certain adjustments to the tachometer indicator circuitry so the tachometer (5) will indicate this speed (rpm). After completing these adjustments, any variation in the speed (rpm) of the pulley driven generator or alternator will be indicated on the tachometer indicator meter. To make these adjustments proceed as follows:

(1) Obtain the rated speed (rpm) of the generator or alternator to be tested, from table 2-2, paragraph 2-73, or from manufacturer's literature or nameplate data on the generator or alternator.

(2) If the rated speed is below 3,300 rpm, mount the generator or alternator on the low speed driving head (fig. 1-1). If the rated speed is above 3,000 rpm, mount the generator or alternator on the high speed driving head (fig. 1-1). Follow mounting procedures prescribed in paragraph 2-76.

(3) Turn the tachometer pulley calibration control (21) to its counterclockwise position and the tachometer circuit selector (22) to the "DIRECT DRIVE" position.

(4) Start the varidrive assembly as prescribed in paragraph 2-74. Preset the speed (rpm) of the pulley (driver) (5, fig. 2-13) by adjusting the speed (rpm) of the varidrive assembly to a cardinal point on the tachometer (5) using the drive weed control (fig. 2-6). For example: If the generator or alternator is mounted on the low speed head, select a point on the tachometer (reading on low scale) in the vicinity of 2,000 rpm. If mounted on the high speed head, select a point on the tachometer (reading on upper scale) in the vicinity of 6,000 rpm.

(5) Determine the speed (rpm) on the driven generator or alternator pulley using the following formula:

$$\frac{(x)\ X\ 4}{D} = Y$$

(X) - Preset speed (rpm) of drive pulley (5, fig. 2-13) on the test stand
4 = Diameter of drive pulley (5, fig. 2-13) on the test stand
D = Diameter of pulley on the generator (6, fig. 2-13) or alternator being tested
Y = Speed of pulley on generator or alternator

Example

(X) = 2000 rpm
4 = 4 inch diamter of drive pulley
D = 3 inch diameter of generator pulley

$$\frac{2000\ X\ 4}{3} = \frac{8000}{3} = 2{,}666 \text{ rpm}$$

(6) To calibrate the tachometer for the speed indicated in the above sample to constantly indicate the speed of the driven pulley, proceed as follows:

(a) Set the tachometer circuit selector (22) in the "CAL PULLEY" position.

(b) Turn the pulley calibration control (21) clockwise until the scale on the tachometer (5) reads 2,666 rpms.

(c) The speed of the driven pulley will register correctly for faster or slower speeds as required.

(7) After tests are completed, turn the pulley calibration control (21) fully counerclockwise, position the circuit selector in the "DIRECT DRIVE", stop the varidrive assembly prescribed in paragraph 2-74d and remove the generator or alternator from the test stand.

2-78. Battery Charger Operation

NOTE: The key numbers shown in a and b below in parentheses refer to figure 2-9, unless otherwise indicated.

a. Checking Battery Voltage Condition.

(1) The voltage condition of the batteries within the test stand can be checked before tests are

started to assure that the battery voltage is adequate for performing tests and to determine the rated voltage value of the batteries before charging, To perform this check, snap the battery charger circuit breaker switch (3) "ON" and place the dc voltmeter range selector switch (19, fig. 2-8) in the "50V" position for all battery combinations (6, 12, or 24 V).

(2) Turn the dc voltmeter circuit selector (20, fig. 2-8) to the "BAT" position and read the voltage condition of the batteries on the dc voltmeter (4, fig. 2-8). Reading should be 24 volts or a few volts above for an adequate 24-volt check (6- or 12-volt check should read accordingly). If voltage readings specified above are not adequate, connect the battery charger as prescribed in *b* below (also see note in *b* below).

(3) Place the battery selector (22) in the position corresponding to the combined voltage of the batteries in the battery compartment (6, 12, or 24 V).

NOTE: It is also advisable to check the batteries with a hydrometer for specific gravity. Refer to TM 9-6140-200-15 for details. The battery compartment (fig. 2-5) has a sliding platform which can be pulled outward for checking the batteries.

b. Connecting and Settting the Battery Charger.

(1) *6-Volt battery charging procedures.*

NOTE: The procedures for checking the various battery voltage conditions (6, 12, and 24-volt) as specified in *a* above, will determine if battery needs to be recharged which can be accomplished as specified below. Refer to TM 9-6140-200-15 for details covering storage batteries charging procedures.

(a) Connect the batteries to the battery chaging circuit (specified as hook-up wiring diagram for batteries (par. 2-2c (3)).

(b) Turn the main circuit breaker (fig. 2-4) "ON".

(c) Turn "ON" the power supply circuit breaker (1) and battery charger circuit breaker (3).

)d) Turn the selector (16, fig, 2-8) to the "30A" *position on the "battery charger" side and the voltmeter range selector (19,* fig. *2-8) in the "10V" position. Turn the battery charge timer (7) full conterclockwise to reset the timer and open the battery charging circuit.*

NOTE: Turning the battery charge timer fully counterclockwise is an important procedure to follow, otherwise the battery charging circuit will not function properly.

(f) Turn the battery charg timer (7) clockwise to a specified time (see manufacturer's specifications and / or TM 9-6140-200-15) and start the varidrive motor by depressing the start-stop button, (15), the "DRIVE ON" indicator lamp (16) should light up. Rotate the battery charge control (8) counterclockwise or clockwise until the voltage reading on the dc voltmeter (4, fig. 2-8) is approximately two volts below the voltage reading of six volts on the dc voltmeter.

(g) The voltage reading on the dc voltmeter (4, fig. 2-8) will advance when adjusting the battery charger control (8), but this is a normal reaction when these adjustments are being made. It is also advisable to periodically check the rate of current charge on the load and starter dc ammeter (1, fig. 2-8) with the battery charge rate as the current output of the battery charger will vary when the battery charger is in operation over a period of. time. If the current reading has dropped, turn the battery charger control clockwise until the correct current output is indicated on the load and starter dc ammeter.

(h) The battery charger will automatically turn itself off when the battery charge timer (7) has timed out at which time the "DRIVE ON" indicator lamp (16) will go out. The battery charger may be timed out manually if desired, by turning the knob on the timer fully counterclockwise.

(i) To disconnect the battery charge circuit completely, rotate the battery charger control (8) fully counterclockwise. Place the battery charger circuit breaker switch (3) in the "OFF" position.

(2) *12-Volt Battery charging procedures.* The procedures for charging the 12-volt battery system of the test stand is the same as prescribed above, except dc voltmeter range selector switch (19, fig. 2-8) in the "20V" position, and the battery charger control (8) is adjusted until approximately 2 volts reading is indicated below the 12 volt rating of the battery system which will register on the dc voltmeter (4, fig. 2-8) and the correct ampere output reading is indicated on the load and starter dc ammeter (1, fig. 2-8) with the correct time interval set on the battery charge timer (7) (see manufacturer's specification and / or TM 9-6140-200-15). Turn off the battery charge circuit.

(3) *24-Volt battery charging procedures.* The procedures for charging the 24-volt battery system of the test stand is the same as prescribed in b(1) above, except the dc voltmeter range selector switch (19, fig. 2-8) in the "50V" position, and the battery charge control (8) is adjusted until ap proximately 2 volts reading is indicated below the 24 volt rating of the battery system which will register on the dc voltmeter (4, fig. 2-8) and the correct ampere output reading is indicated on the

load and starter dc ammeter (1, fig. 2-8) with the correct time interval set on the battery charger timer (8) (see manufacturer's specifications and / or TM 9-4910-200-15). Turn off the battery charge circuit.

2-79. Polarizing Generator Field Coils

a. General. Generators in storage for extended periods, have been dropped, handled rough, or recently repaired, may attain reverse polarity or become de-polarized. Under these circumstances, they must be re-polarized to make sure that the correct polarity with respect to the battery it is to charge or to have the correct polarity to perform tests on the generator. Failure to re-polarize the generator may result in burned relay contact points, a rundown battery and possible serious damage to the generator itself when assembled on the vehicle. Incorrect polarization will give non-conclusive or incorrect test results when testing generators on the test stand.

b. Purpose. Instructions in this section cover polarization of generators for proper testing results of generators and regulators on the test stand.

c. *Preparation.* The varidrive unit need not be operating for this procedure.

(1) If generator is not mounted on the test stand, mount and connect the leads and cables, as required, in accordance with procedures set forth in sections II through V in this chapter for the type generator requiring polarization.

(2) Set all selectors, switches and controls in accordance with the procedures for the generator under test (Sec. II through V) except that the dc voltmeter circuit selector (20, fig. 2-8) will be placed in the EXT position.

(3) Connect a test lead or cable (any) from the dc power supply negative (-) binding post, identified by J2 (10, fig. 2-9) to the G minus (-) binding post of the generator binding posts (7, fig. 2-11).

(4) Connect a test lead or cable (any) from the dc power supply positive (+) binding post, identified by J1 (10, fig. 2-9) to the binding post "F" of the generator binding posts (7, fig, 2-11).

(5) Place the power supply switch (1, fig. 2-9) in the ON position.

d. Polarizing Procedures.

CAUTION: when turning the power supply control clockwise, do not allow the dc voltmeter to exceed the 6 volt limit since this may be injurious to the generator field.

(1) Turn the power supply control (6, fig. 2-9) slowly clockwise, while observing the dc voltmeter, until it reaches 6 volts. Leave the power supply on at this point for approximately five seconds. Turn the power supply control fully counterclockwise.

(2) Turn the power supply switch (1, fig. 2-9) to the OFF position.

(3) The generator is now polarized, place the dc voltmeter circuit selector in the RECT GEN position, remove the two lead (cables), and continue with the test as prescribed.

2-80. Positive Ground Systems

When testing systems having a positive ground (fig. 2-14) place the ground polarity switch (26, fig, 2-9) in the + (positive ground) position and connect the generator armature terminal to the "G" regulator binding post (1, fig. 2-11) of the generator input binding posts of the test stand. Connect the generator frame (ground) to the "G+" binding post of the generator regulator binding posts. Negative ground systems are in normal use, positive ground systems are very rare.

2-81. Negative Ground Systems

When testing systems having a negative ground (fig. 2-14), place the ground polarity switch (26, fig. 2-9) in the - (negative ground) position and connect the generator armature terminal to the "G+" regulator binding post (1, fig. 2-11) of the generator regulator binding posts of the test stand. Connect the generator frame (ground) to the "G"- binding post of the generator regulator binding posts.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-82. General

In addition to the normal operating procedures described in Section III, Operation Under Usual Conditions, special instructions for operating under unusual conditions are contained herein. In addition to the normal preventive-maintenance services (pars. 4-8 through 4-14), special care in cleaning and lubrication must be observed when extremes of temperature, humidity, and atmospheric conditions are present. Proper cleaning, lubrication, and storage and handling of lubricants not only insure proper operation and functioning but also guard against excessive wear of the working parts and deterioration of the material.

2-83. Operation in Extreme Cold-Weather Conditions

a. General. Other than as specified below, operation under extreme cold-weather conditions will be the same as under usual conditions.

b. Batteries. Refer to TM 9-6140-200-15 for

procedures to follow for the care of batteries when used under unusual conditions.

c. *Lubrication.* Lubricate the test stand in accordance with prevailing temperatures as prescribed in the lubrication chart (fig. 4-1) and paragraphs 4-5 through 4-7.

d. Starting. Start the varidrive assembly (par. 2-74) and allow the assembly to run for a least 15 minutes at approximately 1,000 rpm to warm up completely before starting tests.

2-84. Operation in Extreme Hot-Weather Conditions

a. General. The test stand should be situated so that it is protected from the direct rays of the sun during operation. Keep the air intake and exhaust free of obstructions which may hamper proper ventilation. Be alert during operation for unusual odors, smoke, noises, or other indications of an overheated varidrive assembly or unit under test.

b. Batteries. Refer to paragraph *b* above.

c. *Lubrication.* Lubricate the test stand in accordance with prevailing temperatures as prescribed in the lubrication chart (fig. 4-1) and paragraph 45.

2-85. Operation in High Humidity

Start the test stand and run the test stand approximately 15 minutes at 1,000 rpm to allow the circulation of air within the cabinet to dissipate any condensation. When moving the test stand from a low temperature area to a high-temperature area, keep the unit covered, if possible, with a waterproof coverage until it warms to ambient temperature in order to minimize “SWEATING” or moisture formation.

CHAPTER 3

OPERATOR TESTING INSTRUCTIONS

Section I. GENERAL

3-1. Purpose

Instructions contained in this chapter cover testing of items for serviceability and detecting and locating malfunctions using the test stand. Testing for serviceability and locating malfunctions is a detailed and exacting procedure, requiring specific instructions for each item. In addition to instructions in this chapter, any available data in pertinent publications and / or manufacturer's literature covering the unit under test are also required to properly test each item and to prevent damage to the test stand or the item(s) being tested.

3-2. Scope

Basic data, instructions, operations, and test procedures covered in this chapter are for specific items which can be checked and tested using the test stand. Personnel performing tests should have a good understanding of the theory and operation of each circuit and units of the item being tested. Each item must first be thoroughly bench inspected, adjusted, and in some instances bench tested before attempting to test the item on the test stand. Always refer to the latest manufacturer's literature and available pertinent technical manual and /or technical bulletin for the item, as these publications will contain the current rebuild procedures, settings, and adjustments. To obtain a more accurate setting and adjustment, units should be reset and readjusted several times, and a test made after each setting and adjustment.

3-3. Serviceability Test Procedures

a. General. The items tested in this chapter are inter-related, therefore, it will be necessary to test each of the items with serviceable components, e.g., the generator to be tested is mounted on the test, stand with a known serviceable generator regulator or generator control box; or an alternator is mounted on the test stand with a known serviceable rectifier and generator regulator. Procedure to follow for determination of serviceability are given in *b, c,* and *d* below.

b. Generator Serviceability Test. To determine the serviceability of a generator, tests are performed on the test stand without a generator regulator or generator control box in the circuit. Serviceability tests of this type with serviceability standards are listed in sections under specific manufacturer arid model in this chapter. Refer to the section covering generator under test for these test procedures and serviceability standards.

c. Generator Regulator or Generator Control Box Serviceability Test. serviceability of the generator regulator or generator control box can be determined by testing either of these items in the circuit with a serviceable generator. Test procedures and serviceability standards for tests of this type are listed in sections of this chapter in the same manner as specified in *b* above.

d. Ac/DC System (Alternator, Rectifier, and Generator Regulator), Refer to *TB* 9-2300-206-15 for procedure for checking and testing the components of this system before mounting on the test stand for testing.

Section II. TESTING 18-AMPERE GENERATORS

3-4. Description

The 18-ampere generators, both with and without a regulator in the circuit, can be tested by the methods prescribed in this section, The generators in this class are waterproof types and are pulley driven with a clockwise rotation at the drive end (turns to the right when facing the pulley).

3-5. Testing 18-Ampere Generator without Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-1.

a. Purpose. This test is performed to determine whether the generator is functioning in accordance

with manufacturer's specifications for ampere and voltage output when operated under normal conditions.

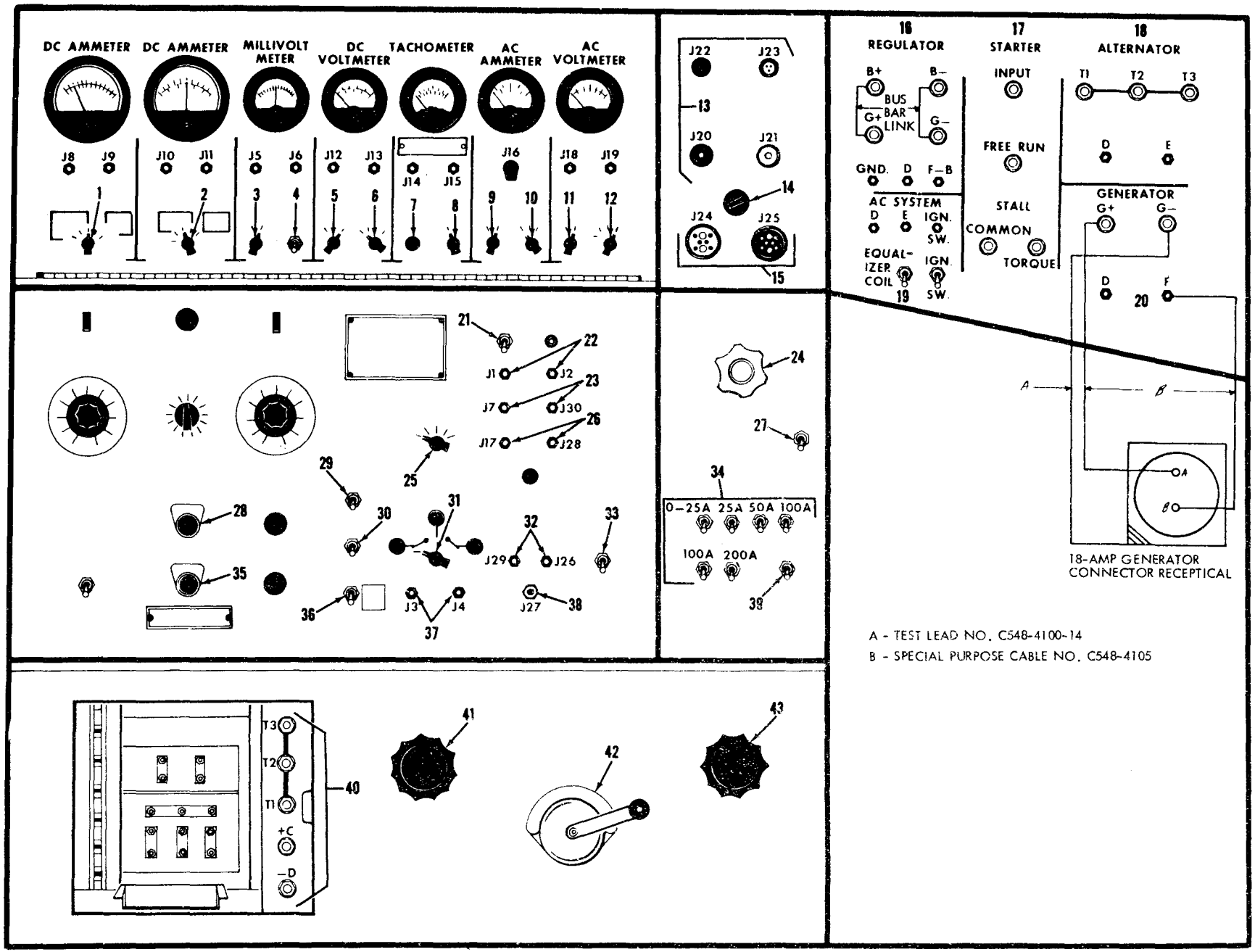
b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operation.

(2) Mount the generator on the mounting bracket of the test stand as prescribed in paragraph 2-76. Mount the pulley shaft on the low speed driving head (fig. 1-1) as shown in file 2-13.

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized par. 2-79, and that rotation of the generator is clockwise. If necessary to reverse the rotation, press the stop button (35), snap "OFF" the main circuit breaker (fig. 2-4), open the door of the high voltage compartment, and activate the varidrive reversing switch (fig. 2-4) to its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".



A - TEST LEAD NO. C548-4100-14

B - SPECIAL PURPOSE CABLE NO. C548-4105

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Figure 3-1. Connecting and testing 18-ampere generator without regulator.

(4) Determine the desired generator pulley speed and calibrate the tachometry circuit (par. 2-77) by using the formula in paragraph 2-77c(5).

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-1.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions:

(a) Place the dc ammeter load and starter selector (1) in the 50A position,

(b) Set the dc ammeter field and battery charger selector (2) in the 5A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the MANUAL position.

(f) All load switches (34) in the OFF position.

(g) Determine that the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing. if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) Snap the 0-25A switch of the load bank switches (34) and the master load switch (39) in the ON position.

(4) Turn the field current control (41) and the load current control (43) simultaneously clockwise until the dc ammeter (load and starter) reads 18 amperes and the dc voltmeter reads 28 volts. The dc ammeter (field and battery charger) should not read over one ampere.

(5) If the dc ammeter (field and battery charger) reads over one ampere or *other* tests are not conclusive, the generator will require adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73)

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator and test stand and remove the generator from the mounting bracket.

3-6. Testing 18-Ampere Generator with Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-2.

a. This test is performed to determine if the generator and regulator are functioning in accordance with manufacturers specifications and for proper ampere and voltage output of the generator when tested in conjunction with a regulator.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to any test stand operation.

(2) Mount the generator on the test stand mounting bracket as prescribed in paragraph 2-76. Install the pulley shaft on the low speed driving head as shown in figure 2-13. Mount the regulator on the regulator mounting bracket by placing it upon the mounting plate of the regulator mounting of the bracket over the regulator, and securing it with the two winghead thumbscrews.

securing it with the two winghead thumbscrews.

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator pulley is turning clockwise. Reverse the pulley rotation, if necessary, by snapping the main circuit breaker (fig. 2-4) "OFF", opening the high voltage compartment, and placing the varidrive reversing switch (fig. 2-4) in its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

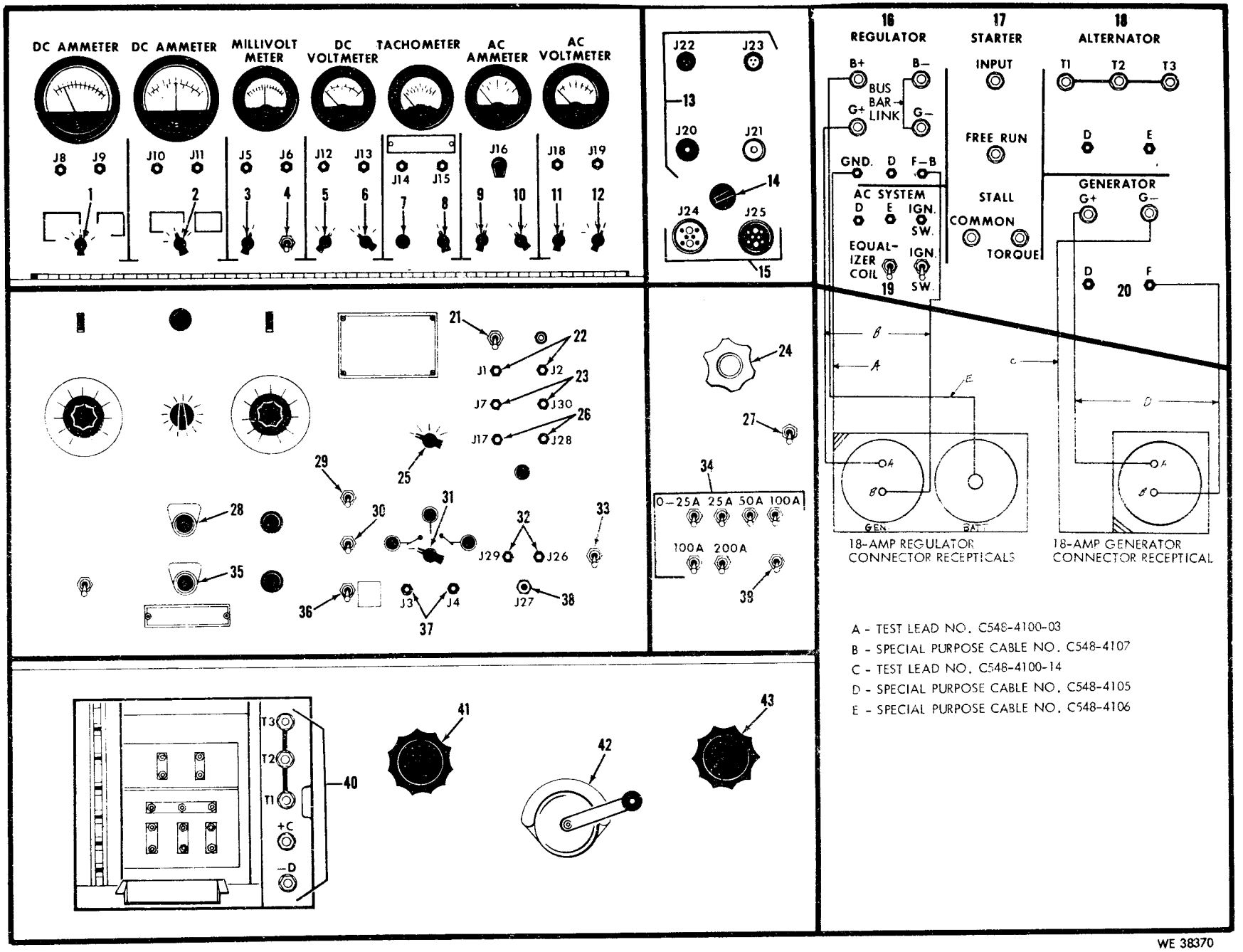


Figure 3-2. Connecting and testing 18-ampere generator with regulator.

(4) Determine that the generator pulley speed is calibrated with the test stand as prescribed in paragraph 2-77. Calibrate the tachometry circuit, if required.

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-2.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 50A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 5A position

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the REGULATOR position,

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) Turn the battery selector (31) in the 24V position

(4) Snap the 0-25A switch, of the load bank switches (34), and the master load switch (39) in the ON position.

(5) Turn the field current control (41) fully clockwise. At this point the dc voltmeter should read 28 volts.

(6) Apply the load by turning the load current control clockwise until a reading on the dc ammeter (load and starter) reads 18 amperes.

(7) The dc ammeter (field and battery charger) should not read over one ampere during this test,

(8) If the dc ammeter (field and battery charger) reads over one ampere or other tests are not conclusive, check the generator without the regulator in the circuit (par. 3-5 above) to determine which unit is at fault. Submit the faulty unit(s) for adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator, regulator, and test stand and remove the generator and regulator from their mounting brackets.

Section III. TESTING 25-AMPERE GENERATORS

3-7. Description

The 25-ampere generators, both with and without a regulator in the circuit, can be tested by the methods prescribed in this section. The generators in this class are waterproof types and are pulley driven with a clockwise rotation at the drive end (turns to the right when facing the pulley).

3-8. Testing 25-Ampere Generator without Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-3.

a. Purpose. This test is performed to determine whether the generator is functioning in accordance with manufacturer's specifications for ampere and voltage output when operated under normal conditions.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operation.

(2) Mount the generator on the mounting bracket of the test stand as prescribed in paragraph 2-76. Mount the pulley shaft on the low speed driving head (fig. 1-1) as shown in figure 2-13.

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized (par. 2-79) and that rotation of the generator is clockwise. If necessary to reverse the rotation, press the stop button (35), snap "OFF the main circuit breaker (fig. 2-4), open the door of the high voltage compartment, and activate the varidrive reversing switch (fig. 2-4) to its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

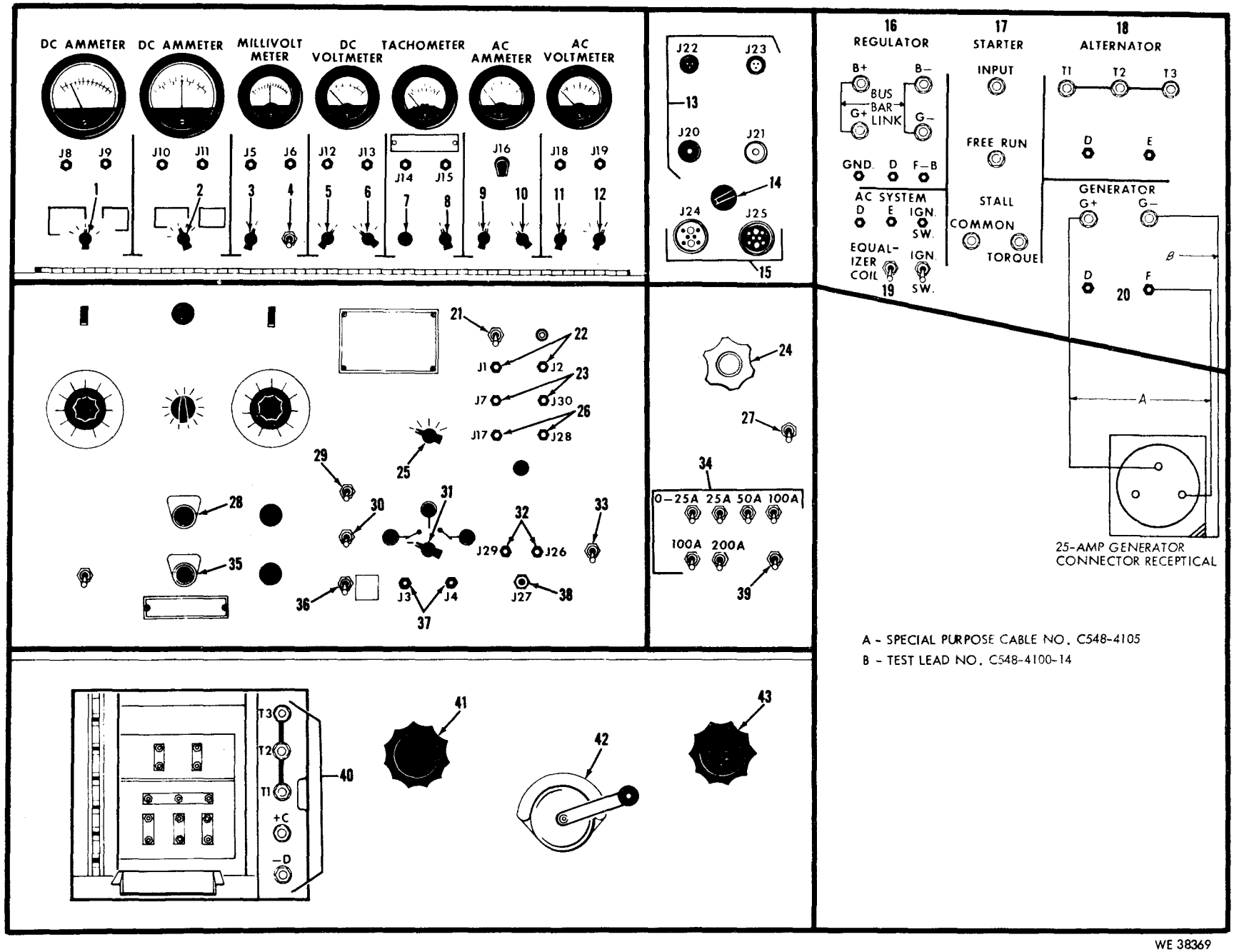


Figure 3-3. Connecting and testing 25-ampere generator without regulator.

(4) Determine the desired generator pulley speed and calibrate the tachometry circuit (par. 2-77) by using the formula in paragraph 2-77c(5).

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-3.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions:

(a) Place the dc ammeter load and starter selector (1) in the 50A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 5A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the MANUAL position.

(f) All load switches (34) in the OFF position.

(g) Determine that the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) Snap the 25A switch, of the load bank switches (34), and the master load switch (39) in the ON position.

(4) Turn the field current control (41) clockwise until the dc ammeter (load and starter) reads 25 amperes and the dc voltmeter reads 28 volts. The dc ammeter (field and battery charger) should not read over one ampere.

(5) If the dc ammeter (field and battery charger) reads over one ampere or other tests are not conclusive, the generator will require adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator and test stand and remove the generator from the mounting bracket.

3-9. Testing 25-Ampere Generator with Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-4.

a. Purpose. This test is performed to determine if the generator and regulator are functioning in accordance with manufacturers specifications for proper ampere and voltage output of the generator when connected with a regulator in the circuit.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to any test stand operation.

(2) Mount the generator on the test stand mounting bracket as prescribed in paragraph 2-76. Install the pulley shaft on the low speed driving head as shown in figure 2-13. Mount the regulator on the regulator mounting bracket as prescribed in paragraph 3-6b(2).

WARNING: Do not open the high voltage compartment door without turning the main ciruit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized (par. 2-79) and that the generator pulley is turning clockwise. Reverse the pulley rotation, if necessary, by snapping the main circuit breaker (fig. 2-4) "OFF", opening the high voltage compartment, and placing the varidrive reversing switch (fig. 2-4) in its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

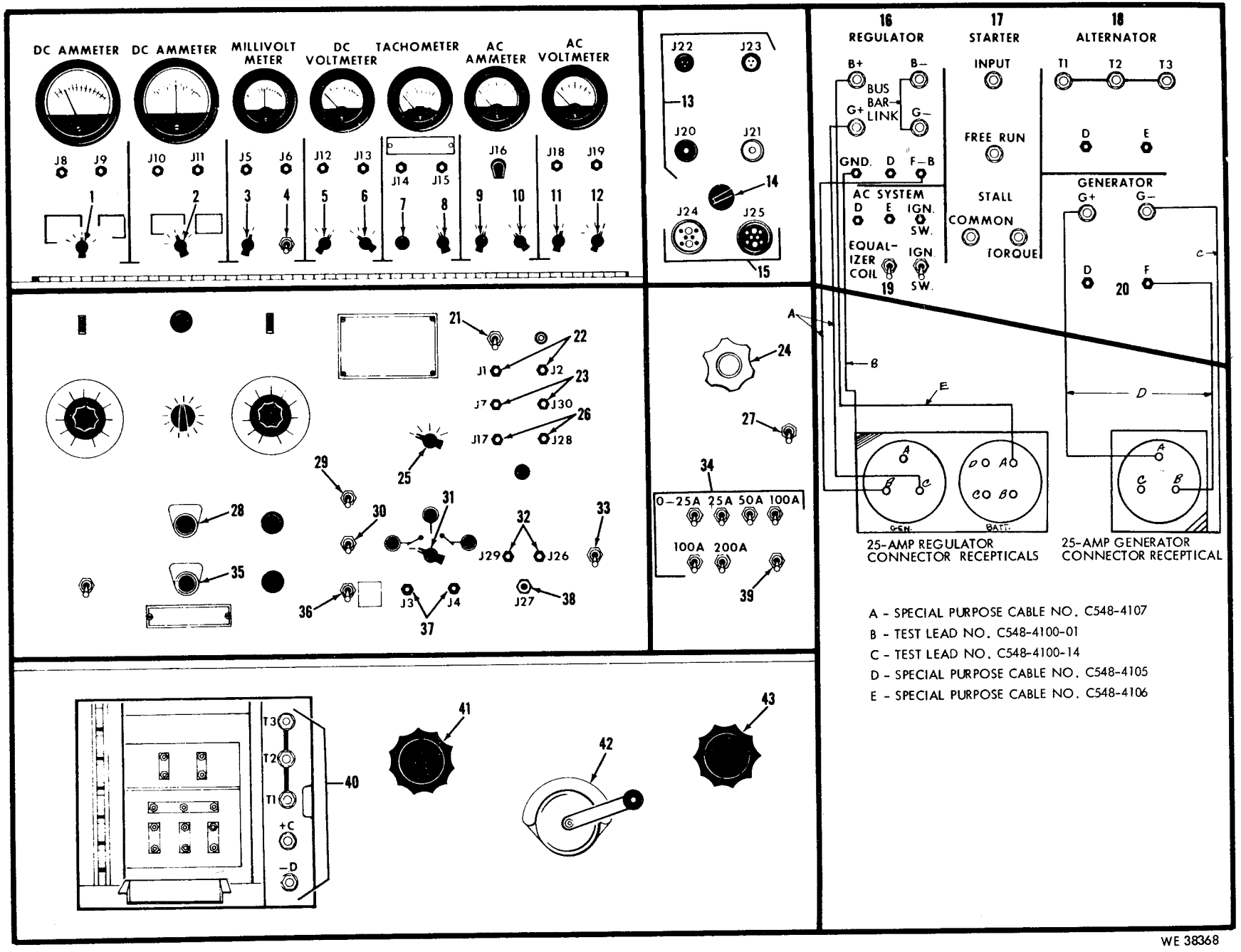


Figure 3-4. Connecting and testing 25-ampere generator with regulator.

(4) Determine that the generator pulley is calibrated with the test stand as prescribed in paragraph 2-77. Calibrate the tachometry circuit, if required.

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-4.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 50A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 5A position

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the REGULATOR position.

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing, if *required.* as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) clockwise until the generator pulley is operating at 2000 rpm.

(3) Turn the battery selector (31) in the 24V position.

(4) Snap the 25A switch, of the load bank switches (34), and the master load switch (39) in the ON Position.

(5) Turn the field current control (41) fully clockwise. At this point the dc ammeter should read 25 amperes and the dc voltmeter should read 28 volts.

(6) If the dc ammeter reads under 25 amperes, snap "ON" the 0-25A switch, of the load bank switches (34), and apply the additional load by turning the load current control (43) clockwise until the dc ammeter (load and starter) reads 25 amperes.

(7) If the voltage drops below 27.5 volts, the regulator requires adjustment.

(8) The dc ammeter (field and battery charger(should not read over one ampere during this test.

(9) If the dc ammeter (field and battery charger(reads over one ampere or other tests are not conclusive, check the generator without the regulator in the circuit (par. 3-8) above, to determine which unit is at fault. Submit the faulty unit(s) for adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator, regulator, and test stand and remove the generator and regulator from their mounting brackets.

Section IV. TESTING 150-AMPERE GENERATORS

3-10. Description

The 150-ampere generators, both with and without a control box in the circuit, can be tested by the methods prescribed in this section. The generators in this class are non-waterproof types and are directly mounted or are pulley driven with a counterclockwise rotation at the drive end (turns to the left when facing the pulley).

3-11. Testing 150-Ampere Generator Without Control Box

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-5.

a. Purpose. This test is performed to determine whether the generators functioning in accordance with manufacturer's specifications for ampere and voltage output when operated under normal conditions.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operations.

(2) Mount the generator directly on the test stand (par. 2-75) or on the mounting bracket of the test stand for pulley driven generators as prescribed in paragraph 2-76. Mount a direct drive generator or the pulley shaft on the low speed driving head (fig. 1-1) as shown in figure 2-12 or 2-13 respectively.

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correct] y polarized (par. 2-79) and that rotation of the generator is counterclockwise. If necessary to reverse the rotation, press the stop button (35), snap "OFF" the main circuit breaker (fig. 2-4, open the door of the high voltage compartment, and activate the varidrive reversing switch (fig. 2-4) to its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

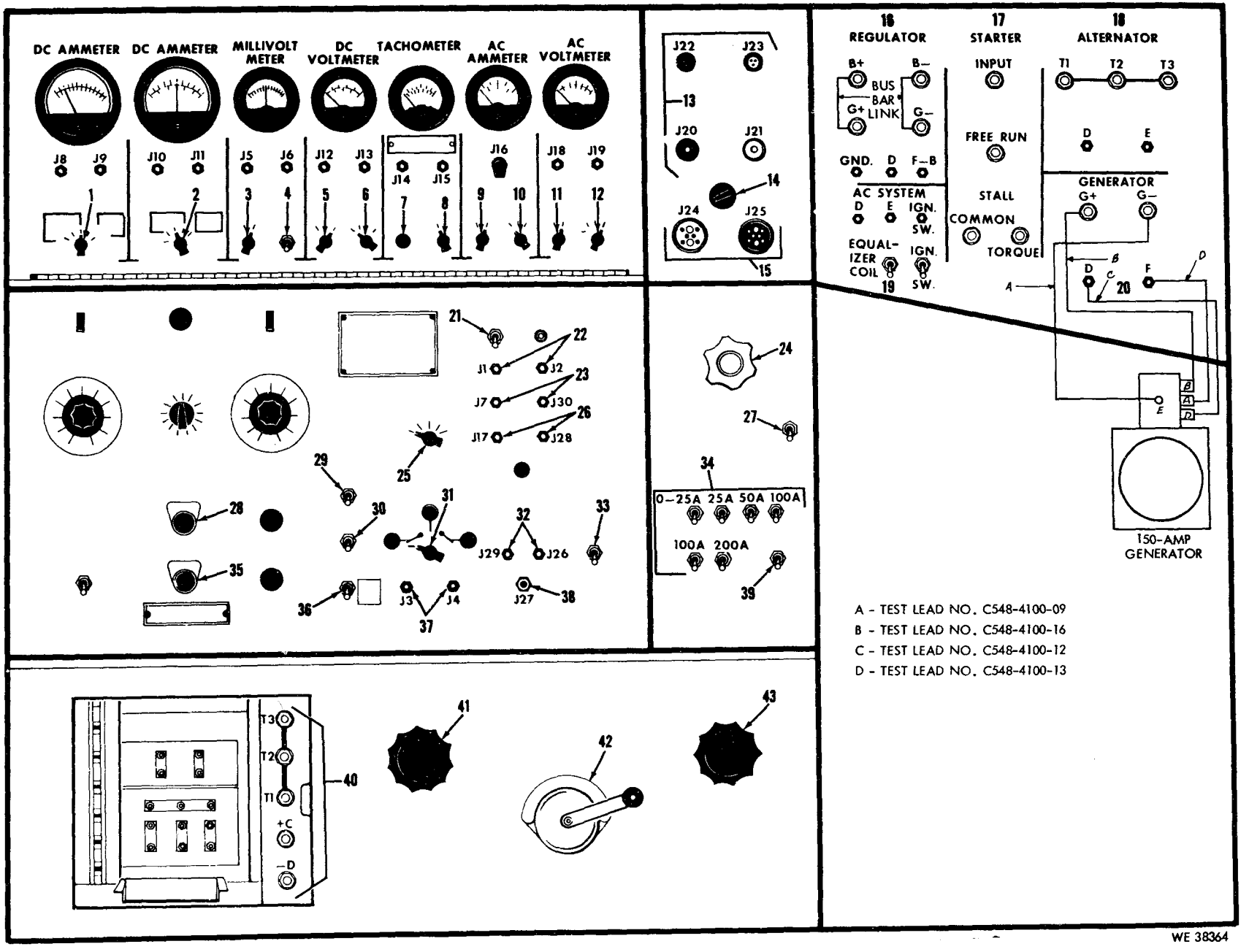


Figure 3-5. Connecting and testing 150-ampere generator without regulator.

(4) If the generator is pulley driven, determine the desired generator pulley speed and calibrate the tachometry circuit (par. 2-77), by using the formula in paragraph 2-77c(5).

(5) Connect. the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-5.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions:

(a) Place the dc ammeter load and starter selector (1) in the 500A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) snap the field circuit switch (36) in the MANUAL position.

(f) All load switches (34) in the OFF position.

(g) Determine that the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 3000 rpm.

(3) To acquire a 150 ampere load, snap the 50A and a 100A switch of the load bank switches (34) in the ON position.

(4) Snap the master load switch (39) "ON".

(5) Turn the field current control (41) slowly clockwise until the dc ammeter (load and starter) reads 150 amperes and the dc voltmeter reads 28 volts. The dc ammeter (field and battery charger) should not read over 7.5 ampere.

(6) If the dc ammeter (field and battery charger) reads over 7.5 ampere or other tests are not conclusive, the generator will require a adjustment or repair.

d. Test Stand Shutdown.

(1) *Turn* the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator and test stand and remove the generator from the test stand or mounting bracket,

3-12. Testing 150-Ampere Generator with Control Box

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-6.

a. Purpose. This test is performed to determine if the generator and control box are functioning in accordance with manufacturers specifications and for proper ampere and voltage output of the generator when tested with a control box in the circuit.

b. Preparation

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to any test stand operation.

(2) Mount the generator on the test stand or the mounting bracket as prescribed in paragraph 3-1lb (2) above. Mount the control box on the regulator mounting bracket in the same manner as mounting a regulator, as prescribed in paragraph 3-66b(2).

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized (par. 2-79) and that the generator pulley is turning counterclockwise. Reverse the pulley rotation, if necessary, by snapping the main circuit breaker (fig. 2-4) "OFF", opening the high voltage compartment, and placing the varidrive reversing switch (fig. 2-4) in its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

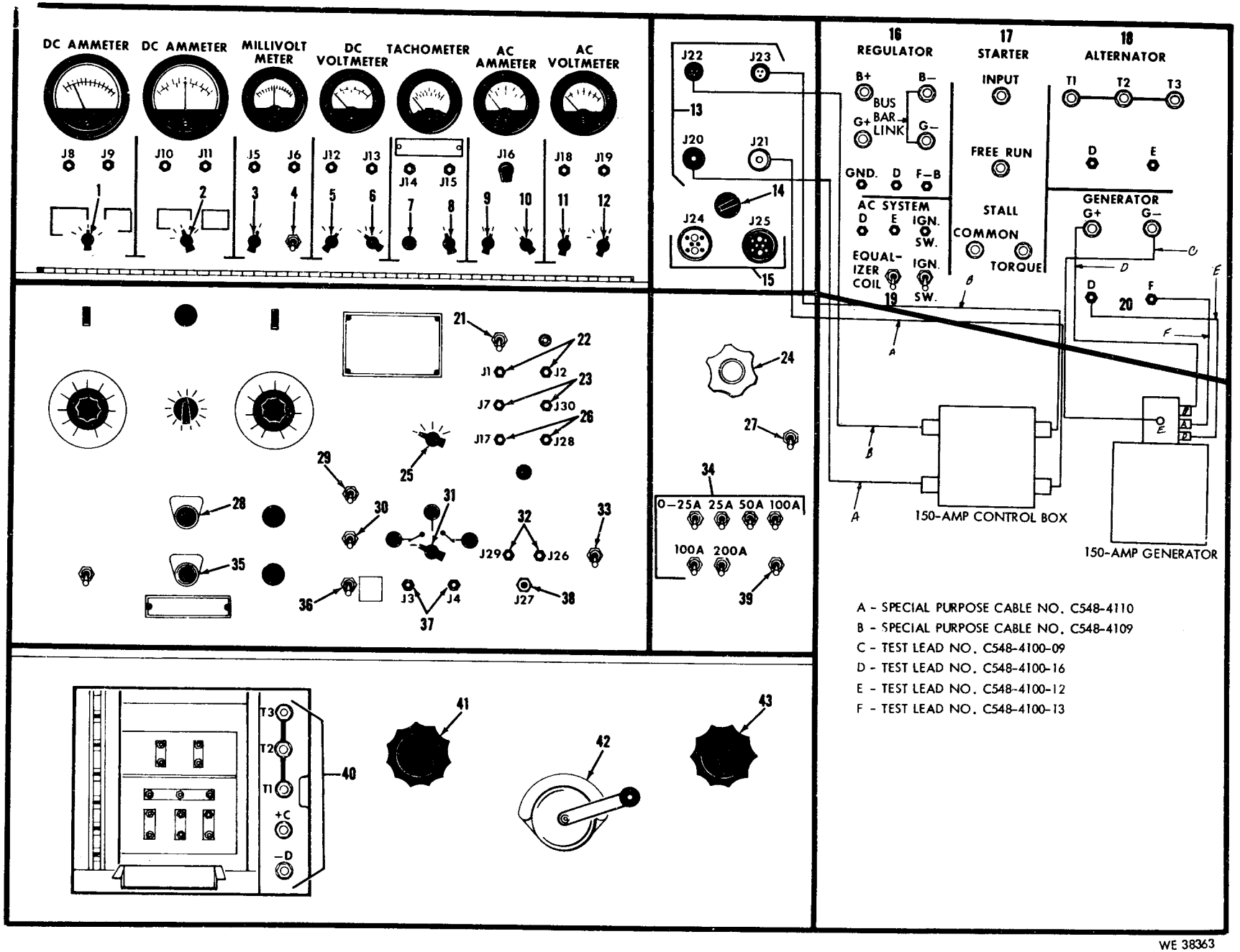


Figure 3-6. Connecting and testing 150-ampere generator with control box.

(4) Determine that the generator speed, if pulley driven, is calibrated with the test stand as prescribed in paragraph 2-77. Calibrate the tachometry circuit, if required.

(5) Connect the cables and leads to the control box, generator, and binding posts of the side panel (fig. 2-11) as shown in figure 3-6.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 500A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the REGULATOR position.

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 3000 rpm.

(3) Turn the battery selector (31) in the 24v position.

(4) To acquire a 150-ampere load, snap the 50A and 100A switch, of the load bank switches (34), and the master load switch (39) in the ON position.

(5) Turn the field current control (41) fully clockwise. At this point the dc voltmeter should read 28 volts and the dc ammeter (load and starter) should read 150 amperes.

(6) If the voltage drops below 27.5 volts, the regulator requires adjustment,

(7) The dc ammeter (field and battery charger) should not read over 7.5 ampere during this test.

(8) If the dc ammeter (field and battery charger) reads over 7.5 ampere or other tests are not conclusive, check the generator without the control box in the circuit (par. 3-11 above) to determine which unit is at fault. Submit the faulty unit(s) for adjustment or repair.

d. Test Stand Shutdown.

(1) *Turn the* drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3). Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator, control box, and the test stand and remove the generator and control box.

Section V. TESTING 300-AMPERE GENERATORS

3-13. Description

The 300-ampere generators, both with and without a regulator in the circuit, can be tested by the methods prescribed in this section. The generators in this class are non-waterproof types and are directly driven or pulley driven with a counterclockwise rotation at the drive end (turns to the left when facing the pulley).

3-14. Testing 300-Ampere Generator without Regulator

NOTE: the key numbers shown in a through d below in parentheses refer to figure 3-7

a. Purpose. This test is performed to determine whether the generator is functioning in accordance with manufacturer's specifications for ampere and voltage output when operated under normal conditions.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operation.

(2) Mount the generator directly on the test stand, for direct driven units (par. 2-75), or on the mounting bracket (for pulley driven units) as prescribed in paragraph 2-76. Mount the generator or pulley shaft on the low speed driving head (fig. 1-1) as shown in figure 2-12 or 2-13 respectively.

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized (par. 2-79) and that rotation of the generator is clockwise. If necessary to reverse the rotation, press the stop button (35), snap "OFF" the main circuit breaker (fig. 2-4), open the door of the high voltage compartment, and activate the varidrive reversing switch (fig. 2-4) to its opposite position. Close the high voltage compartment door tightly and turn the main circuit breaker "ON".

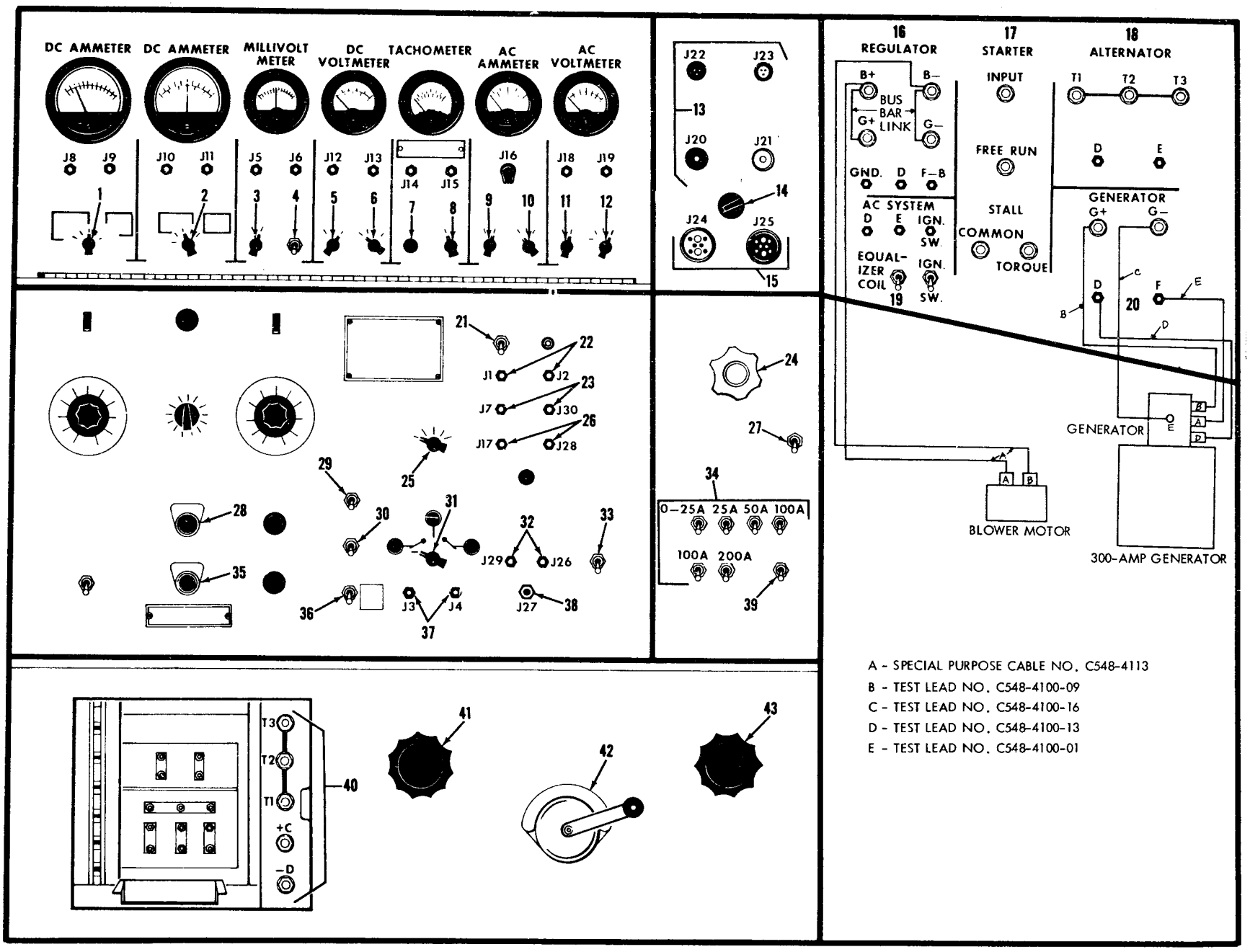


Figure 3-7. Connecting and testing 300-ampere generator without regulator.

(4) If the generator is pulley driven, determine the desired generator pulley speed and calibrate the tachometry circuit (par. 2-77) by using the formula in paragraph 2-77c(5).

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-7.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions:

(a) Place the dc ammeter load and starter selection (1) in the 500A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the de voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the MANUAL position.

(f) All load switches (34) in the OFF position.

(g) Determine that the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Place the battery selector (31) in the OFF position.

(j) Before starting the varidrive, check the draw load on the blower motor by turning the battery selector (31) to the 24V position. Check the dc load and starter ammeter, it should not register over 12-amperes.

c. *Testing Procedure.*

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) To attain a 300-ampere load, snap a 100A and the 200A switch, of the load bank switches (34) and the master load switch (39) in the ON position.

(4) Turn the field current control (41) clockwise until the dc ammeter (load and starter) reads 300-amperes and the de voltmeter reads 28 volts. The dc ammeter (field and battery charger) should read approximately 7.5 ampere.

(5) If the dc ammeter (field and battery charger) reads over or under 7.5 ampere, or other tests are not conclusive, the generator will require a adjustment or repair.

d. Test Stand Shutdown

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator and test stand and remove the generator from the test stand.

3-15. Testing 300-Ampere Generator with Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-8.

a. Purpose. This test is performed to determine if the generator regulator are functioning in accordance with manufacturers specifications for proper ampere and voltage output of the generator when connected in conjunction with a regulator.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to any test stand operation.

(2) Mount the generator directly on the test stand (par. 2-75) or on the mounting bracket as prescribed in paragraph 2-76. Install generator or the pulley shaft on the low speed driving head as shown in figure 2-12 or 2-13. Mount the regulator on the regulator mounting bracket as prescribed in paragraph 3-6b(2).

WARNING: Do not open the high voltage compartment door without turning the main circuit breaker (fig. 2-4) "OFF".

(3) Start the test stand momentarily by pressing the start button (28) and determine that the generator is correctly polarized (par. 2-79) and that the generator pulley is turning counterclockwise. Reverse the pulley rotation, if necessary, by snapping the main circuit breaker (fig. 2-4) "OFF", opening the high voltage compartment, and placing the varidrive reversing switch (fig. 2-4) in its opposite position. close the high voltage compartment door tightly and turn the main circuit breaker "ON"'.

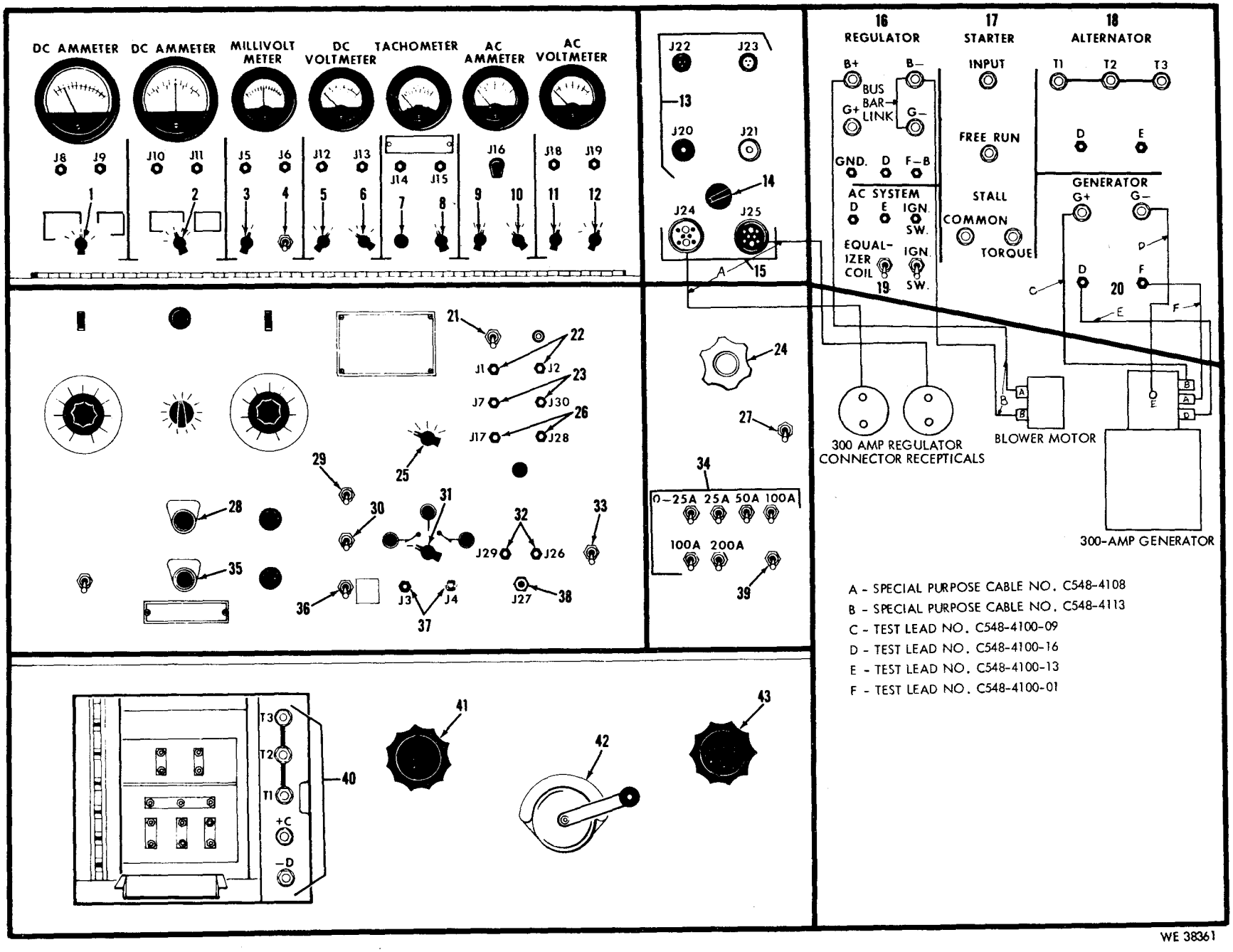


Figure 3-8. Connecting and testing 300-ampere generator with regulator.

(4) If the generator is pulley driven, determine that the generator pulley speed is calibrated with the test stand as prescribed in paragraph 2-77. Calibrate the tachometry circuit, if required.

(5) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-8.

(6) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 500A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the REGULATOR position.

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Make sure the field current control (41) is fully counterclockwise.

(i) Ascertain that the battery selector (31) is in the OFF position.

c. *Testing Procedure.*

(1) Polarize the generator before testing, if required, as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) Turn the battery selector (31) in the 24V position.

(4) To attain a 300-ampere load, snap a 100A and the 200A switch of the load bank switches (34) and the master load switch (39) in the ON position.

(5) Turn the field current control (41) fully clockwise. At this point the dc voltmeter should read 28 volts and the dc ammeter (load and starter) should read 300-amperes.

(6) The dc ammeter (field and battery charger) should not read over 7.5 ampere during this test.

(7) If the voltage drops below 27.5 volts, the regulator requires adjustment.

(8) If the dc ammeter (field and battery charger) reads over 7.5 ampere or other tests are not conclusive, check the generator without the regulator in the circuit (par. 2-14 above) to determine which unit is at fault. Submit the faulty unit(s) for adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Polarize the generator (par. 2-79).

(5) Remove all cables and leads from the generator, regulator, and test stand and remove the generator and regulator from the test stand,

Section VI. TESTING 24-VOLT, 60-AMPERE SELF-CONTAINED GENERATORS (ALTERNATORS)

3-16. Description

The 24-volt, 60-ampere self-contained generators (alternators) are as their name implies, manufactured with a built-in regulator and rectifier, therefore, the unit is mounted on the test stand without regard to the adaption of these units externally. The generators (alternators) in this class are non-waterproof types and are mounted directly on the test stand or are pulley equipped to mount on the generator mounting bracket. The generator (alternator) will operate in either direction of rotation.

3-17. Testing 60-Ampere Generator (Alternator)

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-9, unless otherwise indicated.

a. Purpose. This test is performed to determine whether the generator (alternator) is functioning in accordance with manufacturer's specifications for ampere and voltage output when operated under norm al conditions,

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operation.

(2) Mount the generator (alternator) directly on the test stand (par. 2-75) or on the mounting bracket, if pulley driven, as prescribed in paragraph 2-76. Mount the generator (alternator) or pulley shaft on the low speed driving head (fig. 1-1) as shown in figure 2-12 or 2-13 respectively.

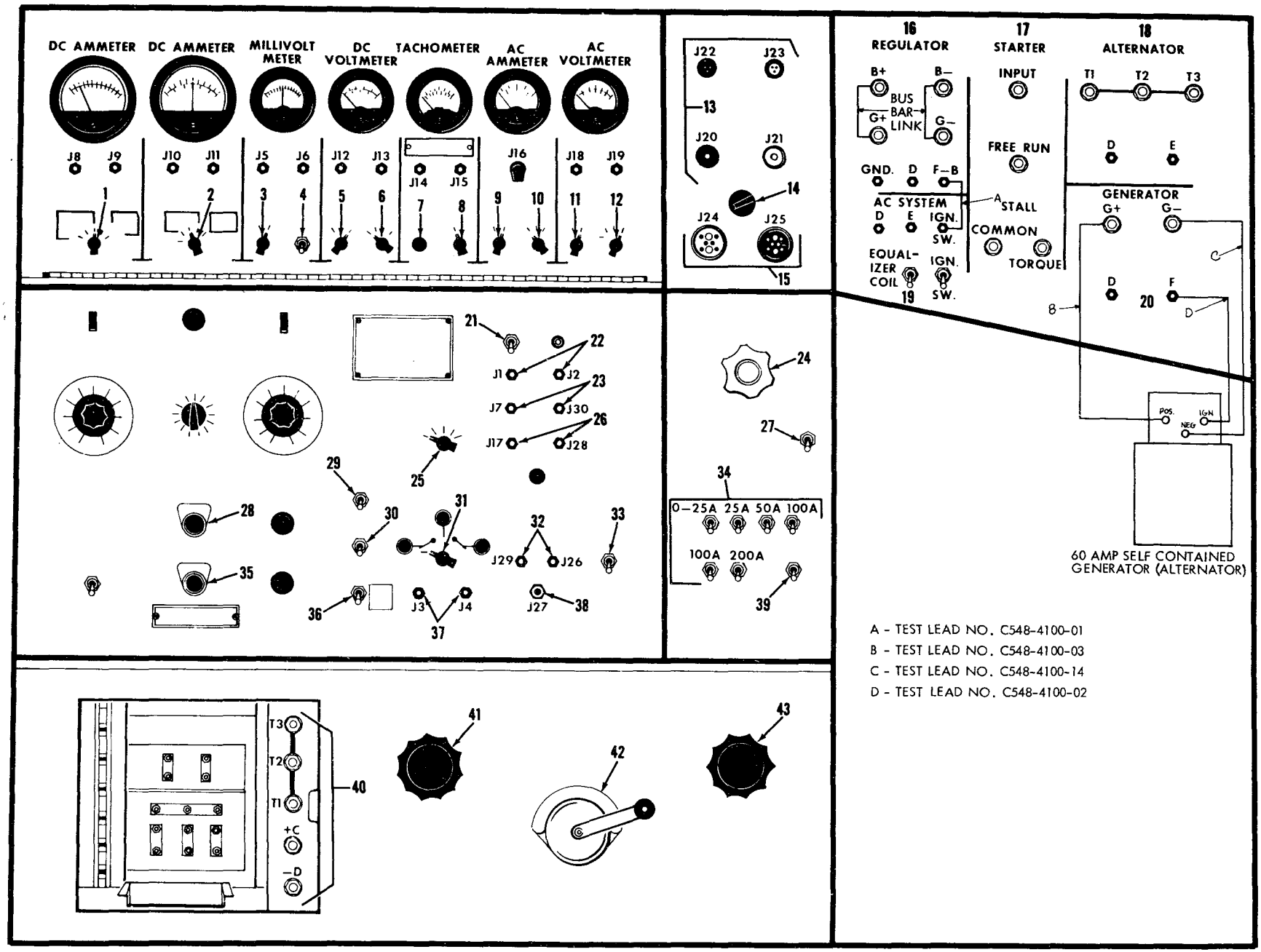


Figure 3-9. Connecting and testing 24-volt, 60-ampere generator (alternator)

(3) If the generator is pulley driven, determine the desired pulley speed and calibrate the tachometer circuit (par. 2-77) by using the formula in paragraph 2-77c(5).

(4) Connect the cables and leads to the generator and binding posts of the side panel (fig. 2-11) as shown in figure 3-9.

(5) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 150A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 5A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the REGULATOR position.

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Check to determine if the IGN switch (6, fig. 2-11) is in the down or OFF position.

(i) Make sure the field current control (41) is fully counterclockwise.

(j) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(2) Turn the field current control (41) fully clockwise.

(3) Turn the battery selector (31) in the 24V position.

(4) Turn the IGN (ignition) switch (6, fig. 2-11) in the ON position and read the dc ammeter (load and starter). If the dc ammeter (load and starter) reads above 10 amperes, snap on the 25A and 0-25A switches of the load bank switches (34) in the ON position.

(5) Snap the master load switch (39) in the ON position.

(6) Apply the load by turning the load current control (41) slowly clockwise until the dc ammeter (load and starter) reads 60-amperes. At this point the voltmeter should read approximately 28-volts and the dc ammeter (field and starter) should not read over one ampere.

(7) If the dc ammeter (field and starter) reads over one ampere or other tests are not conclusive, submit the faulty unit for adjustment or repair.

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Remove all cables and leads from the generator (alternator) from the test stand.

Section VII. TESTING 24-VOLT, 100-AMPERE GENERATOR (ALTERNATOR)

3-18. Description

The 24 volt, 100 ampere generators, (alternator both with and without a regulator in the circuit, can be tested by the methods prescribed in this section. The generators (alternator) in this class are non-waterproof types and are mounted directly on the test stand or are pulley driven. The generators (alternators) require the addition of a ac/dc rectifier mounted in the circuit for operating and testing of the unit as shown in figure 3-10. The units will function rotating in either direction.

3-19. Testing 24-Volt, 100-Ampere Generator (Alternator) without Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-10, unless otherwise indicated.

a. Purpose. This test is performed to determine whether the generator (alternator) is functioning in accordance with manufacturer's specifications for ampere and voltage output when operated under normal conditions.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to connecting any cables to the test stand or starting any other operation.

(2) Mount the generator directly on the test stand (fig. 2-75) or on the mounting bracket of the test stand as prescribed in paragraph 2-76. Mount the unit or pulley shaft on the low speed driving head (fig. 1-1) as shown in figure 2-12, or 2-13 respectively.

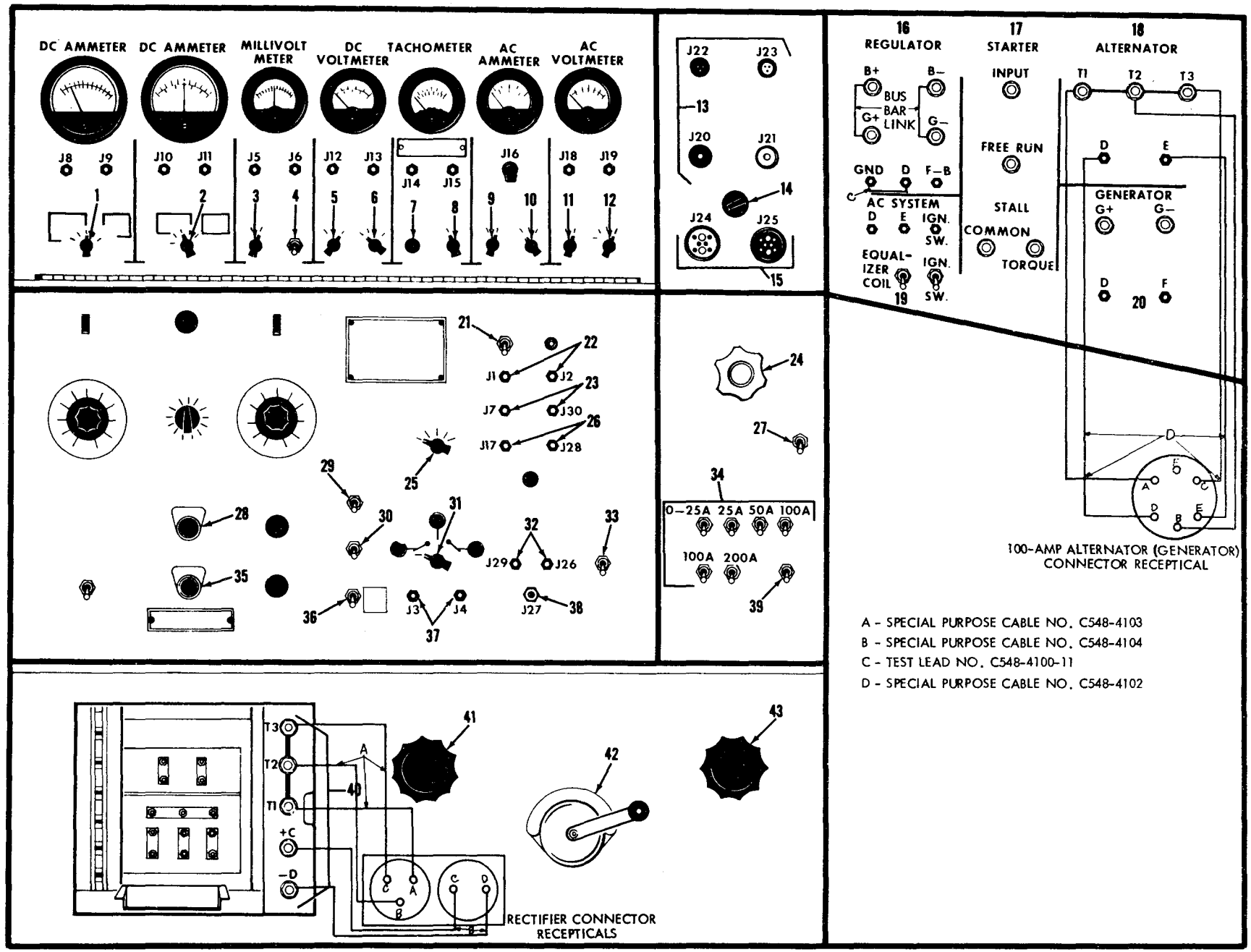


Figure 3-10. Connecting and testing 24-volt 100-ampere generator (alternator) without regulator.

(3) If the unit is pulley driven, determine the desired pulley speed and calibrate the tachometry circuit (par. 2-77) by using the formula in paragraph 2-77c(5).

(4) Connect the cables and leads to the generator (alternator), rectifier, and binding posts of the side panel (fig. 2-11) as shown in figure 3-10.

(5) Before starting the varidrive, place the test stand switches and selectors in the following positions:

(a) Place the dc ammeter load and starter selector (1) in the 150A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter circuit selector (6) is in the RECT GEN position.

(e) Snap the field circuit switch (36) in the MANUAL position,

(f) All load switches (34) in the OFF position.

(g) Determine that the ground polarity switch (33) is in the negative (-) position.

(h) Place the ac ammeter range selector (9) in the 100 A position.

(i) Determine that the ac voltmeter range selector (11) is in the 50V position.

(j) Make sure the field current control (41) is fully counterclockwise.

(k) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Polarize the generator both before and after testing as set forth in paragraph 2-79.

(2) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(3) Place the battery selector (31) in the 24V position.

(4) Snap the 100A switch, of the load bank switches (34) and the master load switch (39) in the ON position.

CAUTION: Never allow the voltage (dc voltmeter) to exceed 32 volts or the ampere reading on the dc ammeter (field and battery charger) to exceed 15 amperes or the rectifier may be damaged.

(5) Turn the field current control (41) slowly clockwise until the dc ammeter (load and starter) reads 100 amperes and the dc voltmeter reads 28 volts. The dc ammeter (field and battery charger) should read between 9 and 11-amperes.

(6) Rotate the ac ammeter phase selector (10) through the A, B, and C positions, the ac ammeter should read approximately the same in all positions.

(7) Rotate the ac voltmeter circuit selector (12) through the T1-T2, T1-T3, and T2-T3 positions, the ac voltmeter should be approximately the same in all positions.

(8) If the dc ammeter (field and battery charger reads under 9 or over 12 amperes or other tests are not conclusive, the generator (alternator) will requuire adjustment or repair,

d. Test Stand Shutdown.

(1) Turn the drive speed control (42) fully clockwise.

(2) Return the field circuit control (41) to its counterclockwise position. Stop the varidrive by actuating the stop button (35).

(3) Return all switches to their original positions as shown on table 2-1 (par. 2-73).

(4) Remove all cables and leads from the generator (alternator) and test stand and remove the generator from test stand or the mounting bracket.

3-20. Testing 24-Volt, 100-Ampere Generator (Alternator) with Regulator

NOTE: The key numbers shown in a through d below in parentheses refer to figure 3-11, unless otherwise indicated.

a. Purpose. This test is performed to determine if the generator (alternator) and regulator are functioning in accordance with manufacturers specification for proper ampere and voltage output of the generator when connected in conjunction with a regulator.

b. Preparation.

(1) Make certain that all controls on the test stand are positioned as shown in table 2-1 (par. 2-73) prior to any test stand operation.

(2) Mount the generator (alternator) directly on the test stand (par. 2-75) or on the mounting bracket as prescribed in paragraph 2-76. Install the generator (alternator) or pulley shaft on the low speed driving head as shown in figures 2-12, or 2-13 respectively. Mount the regulator mounting bracket as prescribed in paragraph 3-6b(2).

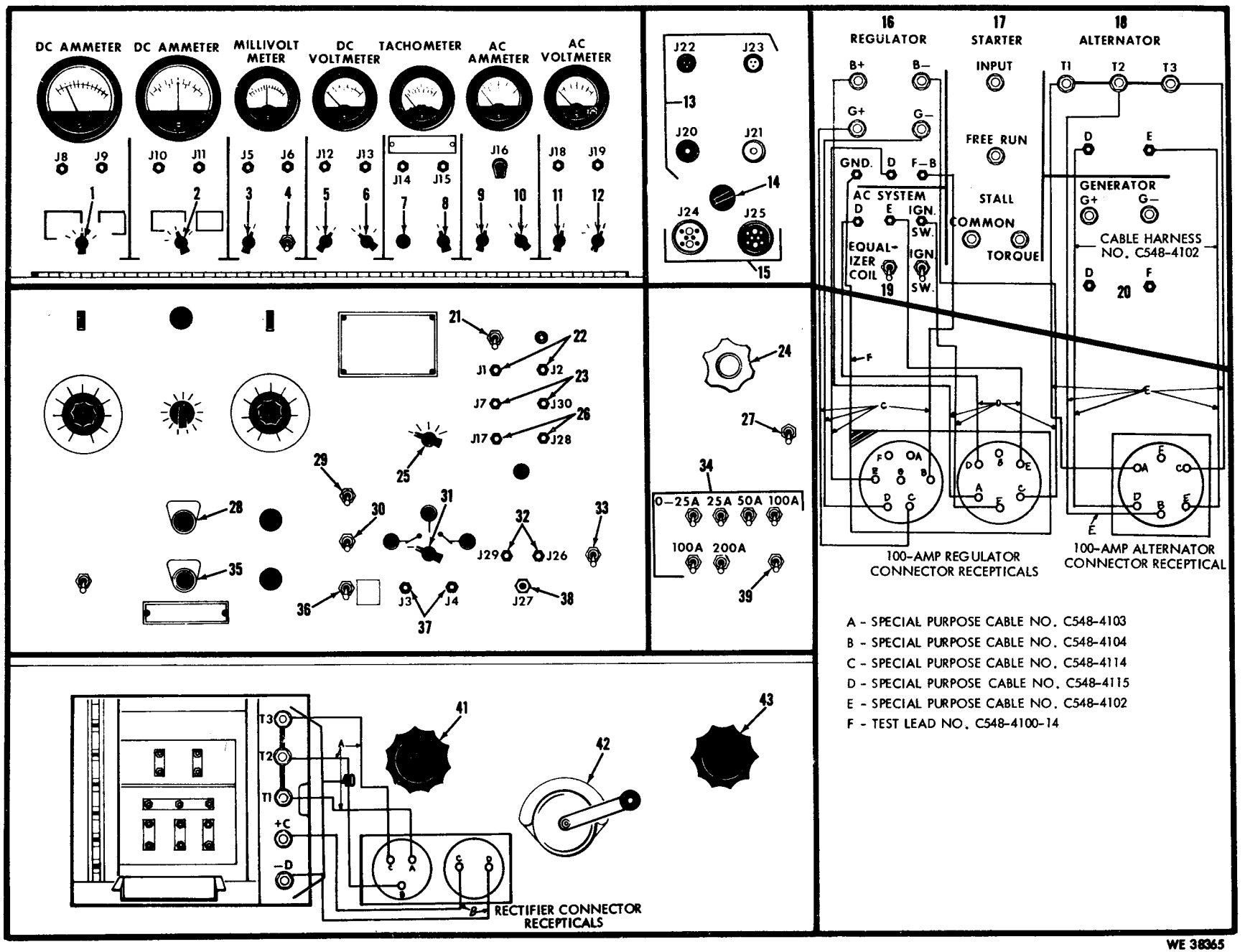


Figure 3-11. Connecting and testing 24-volt, 100-ampere generator (alternator) with regulator.

(3) Determine that the generator (alternator) pulley speed, if pulley drive, is calibrated with the test stand as prescribed in paragraph 2-77. Calibrate the tachometry circuit, if required.

(4) Connect the cables and leads to the generator (alternator), regulator, rectifier, and binding posts of the side panel (fig. 2-11) as shown in figure 3-11.

(5) Before starting the varidrive, place the test stand switches and selectors in the following positions.

(a) Place the dc ammeter load and starter selector (1) in the 150A position.

(b) Set the dc ammeter field and battery charger selector (2) in the 15A position.

(c) Determine that the dc voltmeter range selector (5) is in the 50V position.

(d) Check to see that the dc voltmeter-circuit selector (6) is in the RECT GEN position.

(e) Snap the field switch (36) in the REGULATOR Position.

(f) All load switches (34) in the OFF position.

(g) Determine if the ground polarity switch (33) is in the negative (-) position.

(h) Place the ac ammeter range selector (9) in the 100A position.

(i) Determine that the ac voltmeter range selector (11) is in the 50V position.

(j) Make sure the field current control (41) is fully counterclockwise.

(k) Ascertain that the battery selector (31) is in the OFF position.

c. Testing Procedure.

(1) Start the varidrive by actuating the start button (28) and turn the drive speed control (42) counterclockwise until the generator pulley is operating at 2000 rpm.

(2) Turn the battery selector (31) in the 24V position.

(3) Snap IGN (ignition) switch ON".

(4) Turn the field current control (41) fully clockwise.

(5) Snap the 100A switch, of the load bank switches (34), and the master load switch (39) in the ON position.

CAUTION: Never allow the dc voltmeter to exceed 32 volts or the ampere reading on the dc ammeter (field and battery charger) to exceed 15 amperes or the rectifier may be damaged.

(6) At this point the dc ammeter (load and starter) should read 100-amperes and the dc voltmeter should read 28 volts.

(7) The dc ammeter (field and battery charger) should read between 9 and 11 amperes.

(8) Rotate the ac ammeter phase selector (10) through A, B, and C positions. The reading on the meter should be approximately the same in all positions.

(9) Rotate the ac voltmeter circuit selector (12) though the T1-T2, T1-T3, and T2-T3 positions. The reading on the meter should be approximately the same in all positions.

(10) If the dc ammeter (field and battery charger) reads over 12-amperes or other tests are not conclusive, the generator (alternator) will require adjustment or repair.

Section VII. TESTING STARTERS

3-21. General

a. Two types of tests are performed to determine the general operating condition of starters; the no load (free-running) test, and the stall torque (measuring stall current and torque) test.

b. Precautionary procedures to follow in preparing the test stand before testing starters are listed below.

(1) The starter must be mounted properly using the correct type mounting. There are several manufacturer's with various types and models of starters, therefore, a particular type mounting is required for each of the various units. Figure 3-12 depict mounting requirements for stall torque testing the two types of starter drives. Starter free run tests are performed with the starters mounted in the same manner as for stall torque testing, without the torque arm or torque arm bracket installed.

(2) The dc voltage, dc amperage, and battery voltage must be properly adjusted for the unit undergoing test. These adjustments are made with the dc voltmeter range selector (19, fig. 2-8), dc ammeter load and starter selector (15, fig. 2-8), and battery selector (22, fig. 2-9).

(3) The torque arm or the starter torque arm and bracket assembly (fig. 3-12) must be securely attached, also, the scale support must be bolted down securely.

(4) The stall torque test must be short in duration and never performed at the rated voltage of the starter. Refer to manufacturer's literature, technical manuals listed in appendix A, or table 3-1, for the proper voltage at which this test is to be conducted.

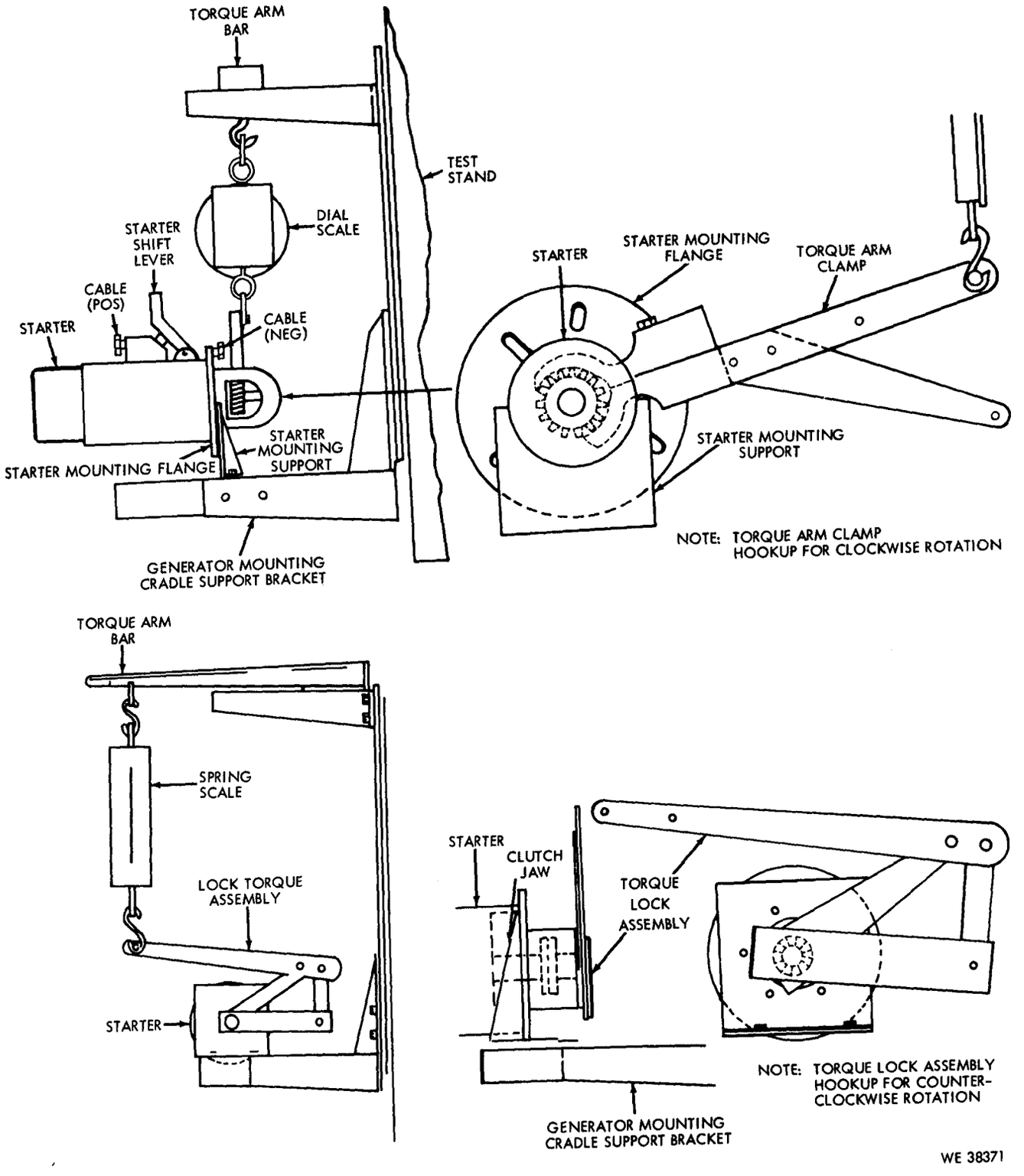


Figure 3-12. Mounting starters for stall torque test.

(5) The direction of rotation of the starter must be determined before tests are started. Rotation of the starter is normally indicated on the starter nameplate, manufacturer's literature, or table 3-1. Direction of rotation must be considered for mounting the starter to the test stand, attaching the torque arm or torque arm and bracket assembly to the starter, and the alignment of the scale with the scale support. If there is any question on rotation direction, observe the starter pinion during the no load (free run) test (par. 3-22a).

Table 3-1. Starter Test Data

Manufacturers Model (part) number	*Drawing Number*	*Rotation*	*No load test*			*Stall test*			
			Maximum Amperage	*Testing voltage (minimum rpm)*	*Minimum Revolutions per minute*	*Maximum amperage*	*Testing voltage*	*Ft-lb minimum torque*	*Rated voltage*
Auto-Lite									
MAW2148	7411590	CC	65	5	4300	335	2	6	6
MAW-4029	7411588	C	65	5	4300	335	2	6	6
MZ-4113	7417959	C	68	5	4800	280	2	4.4	6
MAY-4132		C	35	10	4800	175	4	6.7	12
MAY-4138	6248694	C	35	10	4800	175	4	6.7	12
MAY-4141	C-128135	C	35	10	4800	175	4	6.7	12
MZ-4124	7713415	C	75	10	5500	560	4	10	12
Eclipse-Pioneer									
EC-1416-29G	7705699	CC		Use 12 volts only	24(1)	175	13.5	400	24
EC-1416-29F	7705699	CC			24	175	13.5	400	24
EC-36E15-1A	7386254	CC			24	175	13.5	400	24
EC-36E-16-1A	7346519	CC			24	175	13.5	400	24
Delco-Remy									
DR-1108533	D-48136	C	70	10	2800	530	6.7	33	12
DR-1109123	C-97137	C	65	12	4500	725	4.8	44	12
DR-X10483	8329740	C	35	23.5	2500	265	19.1	19	24
DR-1108568	5614960	C	35	23.5	2500	265	19.1	19	24
DR-1108575	7762618	C	20	23.8	3700	200	19.8	20	24
DR-1108581	7410752	C	35	23.5	2500	265	19.1	19	24
DR-1108685	D-7397	C	50	23	120	125	21.5	150(2)	24
DR-1108898	7731426	C	35	23.7	4000	200	6.0	19.5	24
DR-1109312	D-66462	CC	110	23.3	8500	500	3.0	25	24
DR-1109313	D-66463	CC	110	23.3	8500	500	3.0	25	24
DR-1109317	D-39368	CC	110	23.3	8500	500	3.0	25	24
DR-1109746	8360017	C	35	23.7	4100	200	6.0	19.5	24
Jack and Heintz									
JHZ-D30-	7538988	C	31.5	24-28	25	170	13	400	24
JHZ-D42-	8365476								24

Table 3-1. Starter Test Data - Continued

Manufacturers Model (part) number	*Drawing Number*	*Rotation*	*No load test*			*Stall test*			
			Maximum Amperage	*Testing voltage (minimum rpm)*	*Minimum Revolutions per minute*	*Maximum amperage*	*Testing voltage*	*Ft-lb minimum torque*	*Rated* voltage
Auto-Lite									
MBD-4008-	C124376	C	65	20	5300	380	4	21	24
MBD-4023	7059688	C	65	20	5300	380	4	21	24
MBP-4301UT	7762166	C	26	22	3000	190	16	12	24
MCZ-4001UT	8328132	C	12	22	3400	145	16	13	24
MCZ-4002UT	7355783	C	12	22	3400	145	16	13	24
MCS-4301UT	7762617	C	22	22	4800	250	16	21	24

(1) No load test without gear reduction minimum rpm 3190.
(2) Running torque at 65 rpm.

c. For any of the mountings for the starters, the adjustment cam be made to the scale support to permit a vertical pull on the scale to obtain an accurate reading. Two threaded holes in the torque arm are provided as a means of adjustment. Location of the eyebolt in the torque arm is changed to either of these threaded holes to allow a direct pull on the scale.

CAUTION: In most cases, the no load (free running) test is performed with the starter run at the normal rated voltage of the starter. However, some of the more powerful starters will attain such excessive speeds when running under a no load condition that the manufacturer specifies a reduced voltage for the no load (free running) test. Refer to manufacturer's literature, technical manuals in appendix A, or table 3-1 which covers several manufacturers and modes of starters for this information before conducting the no load (free running) test.

d. The no load (free running) testis performed by mounting the starter on the test stand using the appropriate mounting (b(1) above) and connecting it to the test stand with electrical cables as shown in figure 3-13, and simple motorizing of the unit (para 3-22) at the voltage, current and motor speed as indicated in table 3-1.

CAUTION: Stall torque tests are seldom, if ever, performed at the nominal rated voltage of the starter. Most generally the applied voltage is reduced (specified as testing voltage, table 3-1) considerably below the nominal rated voltage for performance of this type of test. Refer to manufacturer's literature, technical manuals in appendix A, or table 3-1 which covers several manufacturers and models of starters for the proper amount of voltage to be applied during these test procedures.

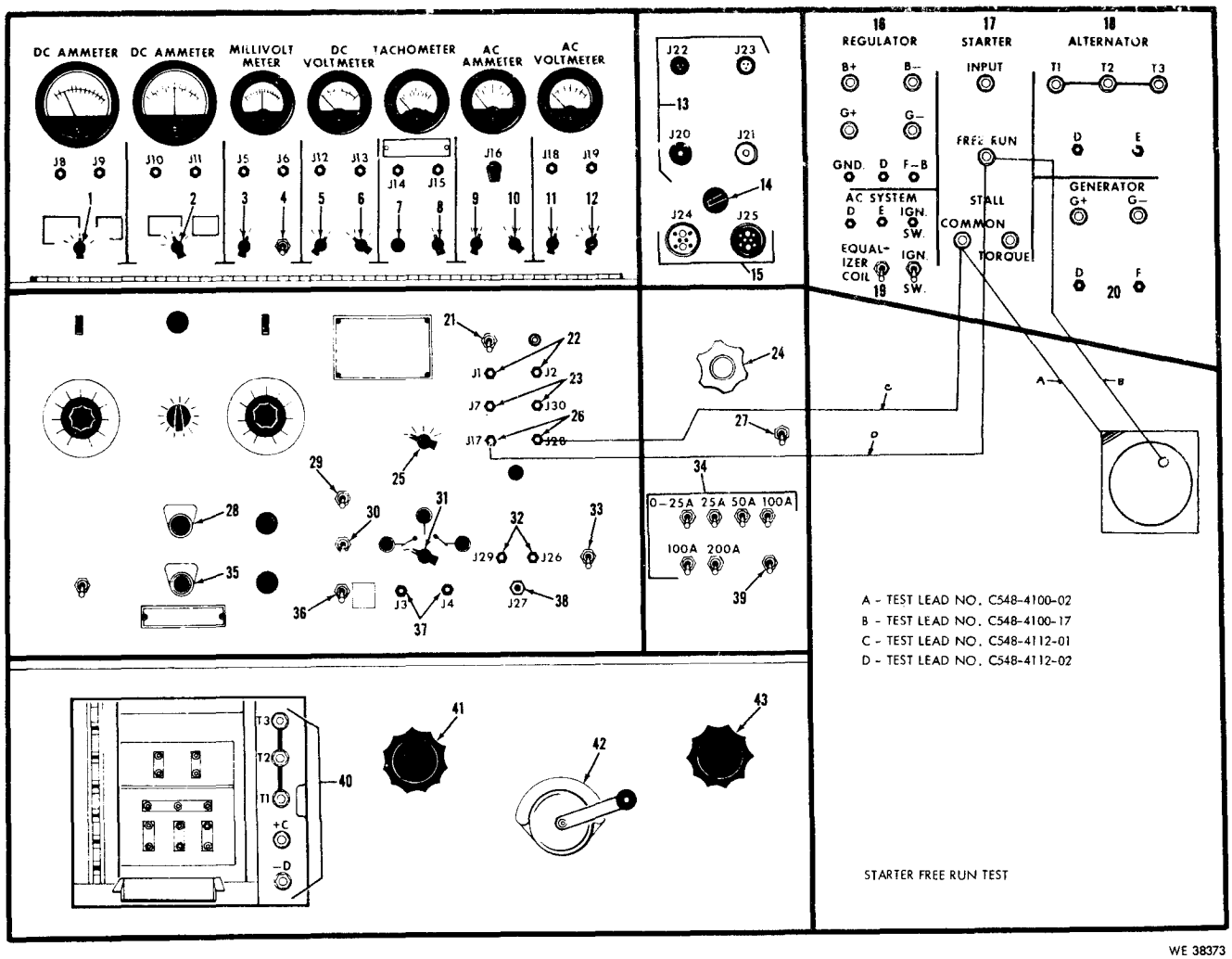


Figure 3-13. Connecting starter for no load (free run) test.

e. The stall torque (measuring stall current and torque) test is performed after the no load (free running test has been completed. The stall torque test is performed similarly to the no load (free running) test, except a scale for recording foot-pounds (torque) is connected to the pinion gear of the starter, by means of the torque lock assembly (fig. 3-12) or the starter torque arm clamp assembly. Detail procedures are given in paragraph 3-22.

j. When performing the stall torque test, requirements may necessitate applying the battery voltage rating next higher than the specified testing voltage; for example: 4.8 testing voltage requires a 6 volt input voltage, 9.6 testing voltage requires a 12 volt input voltage, and 19.2 testing voltage requires a 24 volt input voltage. The setting of the 6, 12, and 24 volt input voltage is accomplished with the battery selector (22, fig. 2-9).

g. Connect the starter for stall torque tests to the test stand as shown in figure 3-14.

h. Torque, in foot-pounds, is read directly on the scale when using the torque arm clamp (fig. 3-12), however, when the starter torque lock assembly is used the scale reading is multiplied by 10 to obtain the correct torque in pound feet.

i. The chain vise and bracket assembly (fig. 2-2) holding the starter on the mounting bracket can be rotated 90 degrees, and can be moved horizontally a distance of 6 inches. Loosen the hexagon plain nuts and mount the chain vise as required.

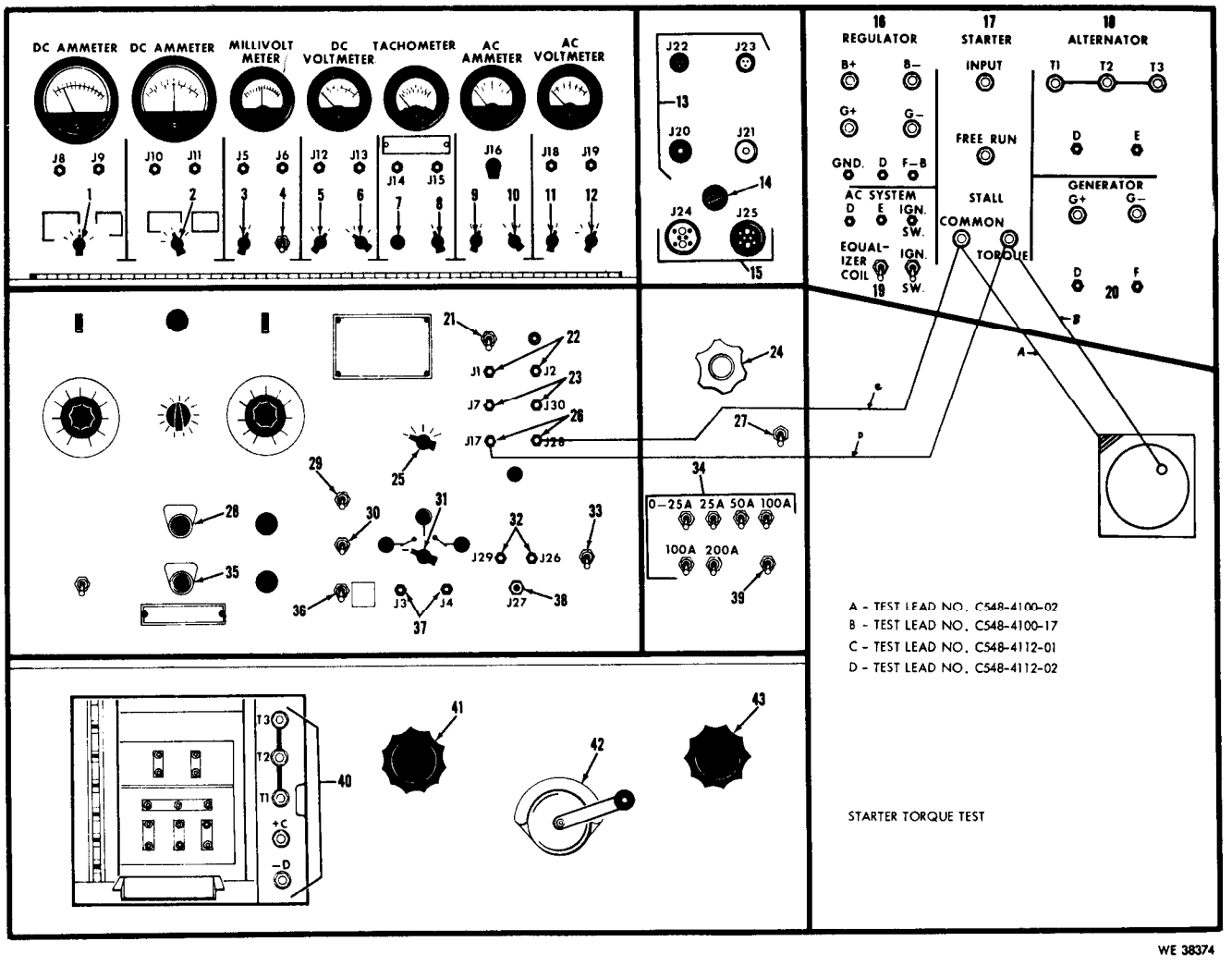


Figure 3-14. Connecting starter for stall torque test.

NOTE: When performing the stall torque test it is necessary to provide a means of shifting the starter pinion gear for maintaining gear accessibility for engagement of the jaws of the torque arm. Do not depend on the jaws of the torque arm to maintain the pinion gear in the shifted position. Starter shifting levers will be blocked, wedged, or clamped to hold the pinion in the operative position.

3-22. Testing Procedures

a. No Load (free running) Test.

(1) *Purpose.* This test is performed to indic the functioning of the starter when there is no load connected to the starter permitting it to run freely. The starter will revolve at a specified rpm when a given testing voltage is applied to the input (+) terminal of the starter.

NOTE: The load (free running) test procedures in (3) and (4) below are for a Delco Products (Delco-Remy) starter model DR 1108575. When testing other manufacturers and/or models starters these instructions can be used as a guide. Refer to table 3-1, technical manuals listed in appendix A, or manufacturers literature for test data when performing tests on other starters.

(2) *Tabulated data.*

Manufacturer . . . . . Delco Products (Delco-Remy)
Manufacturer's model number DR 1108575
Ordnance number 7762618
Rotation . . . . . Clockwise (to left facing test stand)
Rated Voltage . . . . . .25 volts
Ampere . . . . (Refer to table 9)

(3) *Preparation.*

(a) Turn all range selector switches beneath the meters on the test stand to the maximum reading position, all rheostats fully counterclockwise, and all on-off toggle switches to OFF position.

(b) Mount the starter undergoing test on the test stand.

(c) Connect the starter to the test stand as shown in figure 3-13.

(4) *Testing.*

NOTE: The key numbers shown below in parentheses refer to figure 3-13, unless otherwise indicated.

(a) The position of switches and controls pertinent to the tests in paragraphs *(b)* through *(j)* below are listed in table 3-2. Place each of these items in the positions indicated in column 3a of the table before tests are started.

(b) Set battery selector (31) in the proper voltage range as specified by the starter manufacturer specifications, appropriate technical manual, or table 3-1.

(c) Set dc voltmeter circuit selector (6) in the EXT position.

(d) Set the dc voltmeter range selector (5) in the required range for the battery previously selected.

Table 3-2. Position of Switches and Controls Before and After Starter Test.

(1)	(2)		(3) Position	
	Fig. No.	Key No.	(a) Before	(b) After
Dc ammeter load and starter selector	2-8	15	1000A	500A
Dc voltmeter range selector	28	19	50V	50V
Dc voltmeter circuit selector	2-8	20	BAT	ANY
Battery selector	2-9	22	24V	24V
Battery charger switch	2-9	3	OFF	OFF
Starter test switch	2-10	5	OFF	OFF
Start-Stop Button	2-9	15	STOP	STOP
Starter voltage adjuster	2-10	4	Counter-clockwise	Counter-clockwise

(e) Starter terminal voltage is indicated on the dc voltmeter (4, fig. 2-8).

(f) Set the dc ammeter load and starter selector (1) in the 200A position.

(g) Starter current is read on the dc load and starter ammeter (1, fig. 2-8).

(h) Turn the starter voltage adjuster (24) to its lowest resistance position, fully counterclockwise, to attain minimum voltage on the starter. During tests, this control is used to obtain desired test voltage.

(i) Turn the starter test switch (27) "ON" to activate the starter under test.

(j) Use the hand tachometer to measure starter speed.

(k) Refer to manufacturers specifications, appropriate technical manual, or table 3-1 for values of speed, voltage, and current rating.

(l) Slowly turn the starter voltage adjuster (24) until the voltmeter reaches the proper voltage as determined by the starter manufacturer.

(m) Return the starter voltage adjuster to its counterclockwise position and turn the starter test switch "OFF".

b. Stall Torque Test.

(1) *Purpose.* This test is performed to determine the amount of torque, in foot pounds, exerted by the starter when under load.

(2) *Preparation.*

(a) Connect the torque arm clamp, or torque lock assembly to the starter as shown in figure 3-12 making sure the unit is balanced to show a zero reading on the scale.

NOTE: Standard starters are pinion drive type and are connected to the test stand with the torque arm clamp whereas the heavy duty starters are jaw drive type and are mounted with the torque lock assembly.

(b) Turn all switches, selectors. and rheostats as indicated in table 3-2.

(c) Connect the cable "D" from the "free run" terminal to the "torque" terminal as shown in figure 3-14.

(3) *Testing.*

NOTE: The key numbers shown below in parentheses refer to figure 3-14, unless otherwise indicated.

(a) The position of the switches and controls pertinent to the tests in *(b)* through *(f)* below are listed in table 3-2. Place each switch in the position indicated in column 3a prior to the testing of the starter.

(b) Select the proper voltage required, set the battery selector (31) in the proper position, and place the starter test switch (27) "ON".

(c) Slowly turn the starter voltage adjuster (24) until the proper voltage is reached.

CAUTION: This test requires high current and will quickly discharge the batteries and/or damage the starter. Perform this test as quickly as possible.

(d) Note the torque reading on the scale which should correspond with the specifications set forth by the starter manufacturer,

(e) Note the ampere reading and compare same with manufacturers recommendations.

(f) Return starter voltage adjuster to its counter-clockwise position and snap the starter test switch "OFF".

(g) Remove starter and equipment from the test stand.

CHAPTER 4

OPERATOR OR CREW MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, TOOLS, AND EQUIPMENT

4-1. General

Repair parts, tools, and equipment are issued to the operator and/or crew operating and maintaining the test stand. Tools and equipment should not be used for purposes other than prescribed and when not in use, should be properly stored.

4-2. Repair Parts

Repair parts are supplied to the operator and/or crew for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, provided replacement of these parts is within the scope of the operator's and/or crew's maintenance functions. Repair part supplied for the test stand are listed in appendix C, which is the authority for requisitioning replacements.

4-3. Common Tools and Equipment

Common tools and equipment having general application to this materiel are authorized by tables of allowances and table of organization and equipment.

4-4. Special Tools and Equipment

No tools or equipment specially designed for operation or operator and /or crew maintenance are supplied or required for the test stand.

Section II. LUBRICATION

4-5. Lubrication Chart

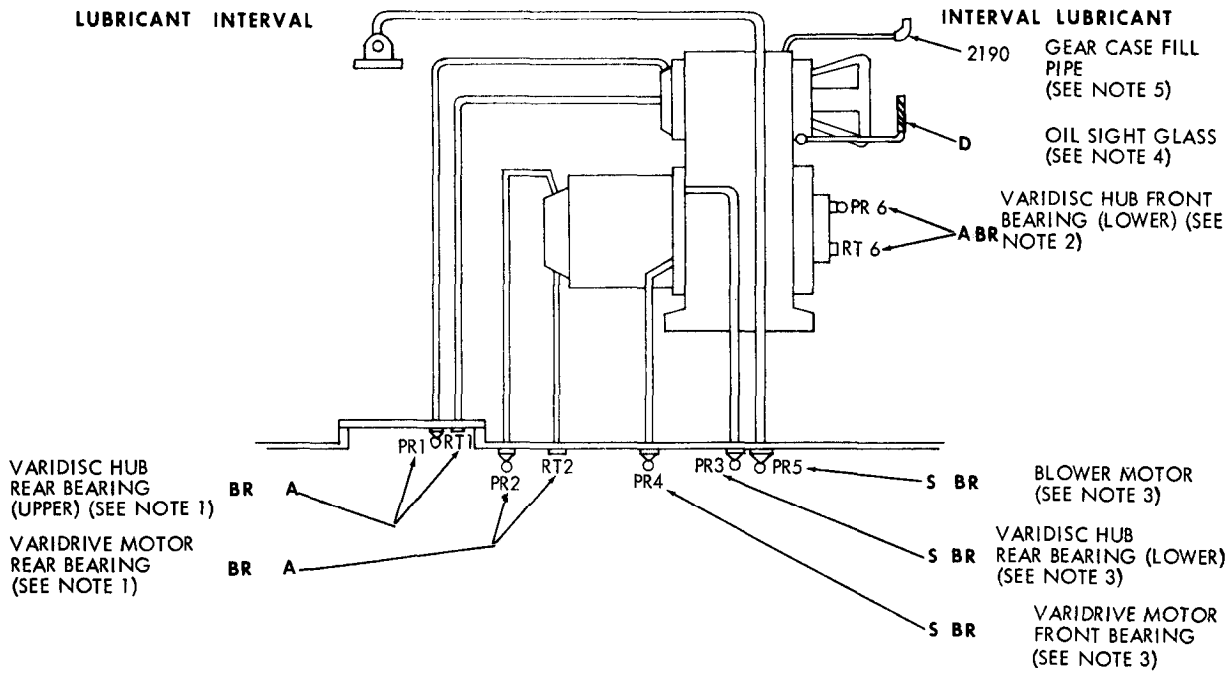
The lubrication chart (fig. 4-1) prescribes cleaning and lubricating procedures as to location, intervals, and proper materials for the test stand. Notes applicable to and referenced by the lubrication chart are contained in figure 4-2.

LUBRICATION CHART

TEST STAND, AUTOMOTIVE GENERATOR, ALTERNATOR AND STARTER, 10 TO 50-V, 500-AMP, DC, AND 25 TO 50-V, 100 TO 400AMP, AC, TESTING RANGES, (SUN ELECTRIC CORPORATION MODEL AGT-9) (4910–767–0218)

INTERVALS ARE BASED ON NORMAL OPERATIONS. REDUCE TO COMPENSATE FOR ABNORMAL OPERATION AND SEVERE CONDITIONS OR CONTAMINATED LUBRICANTS. DURING INACTIVE PERIODS, INTERVALS MAY BE EXTENDED COMMENSURATE WITH ADEQUATE PRESERVATION.

CLEAN LUBRICATION POINTS BEFORE LUBRICATING. CLEAN PARTS WITH THINNER, PAINT, MINERAL SPIRITS (TPM), OR SOLVENT, DRY CLEANING (SD). DRY BEFORE LUBRICATING.



- KEY -

LUBRICANT	EXPECTED TEMPERATURE			INTERVALS
2190 2135 2075 3042 LUBRICATING OIL, GENERAL PURPOSE	ABOVE +32°F	+40°F TO -10°F	0°F TO-65°F	D - DAILY W - WEEKLY S - SEMI-ANNUALLY A - ANNUALLY
	2190	2135	2075	
	2135	2075	3042	
BR - GREASE, BALL AND ROLLER BEARING	ALL TEMPERATURES			
PL - LUBRICATING OIL, PRESERVATIVE, SPECIAL				

WE 38350

Figure 4-1. Lubrication chart.

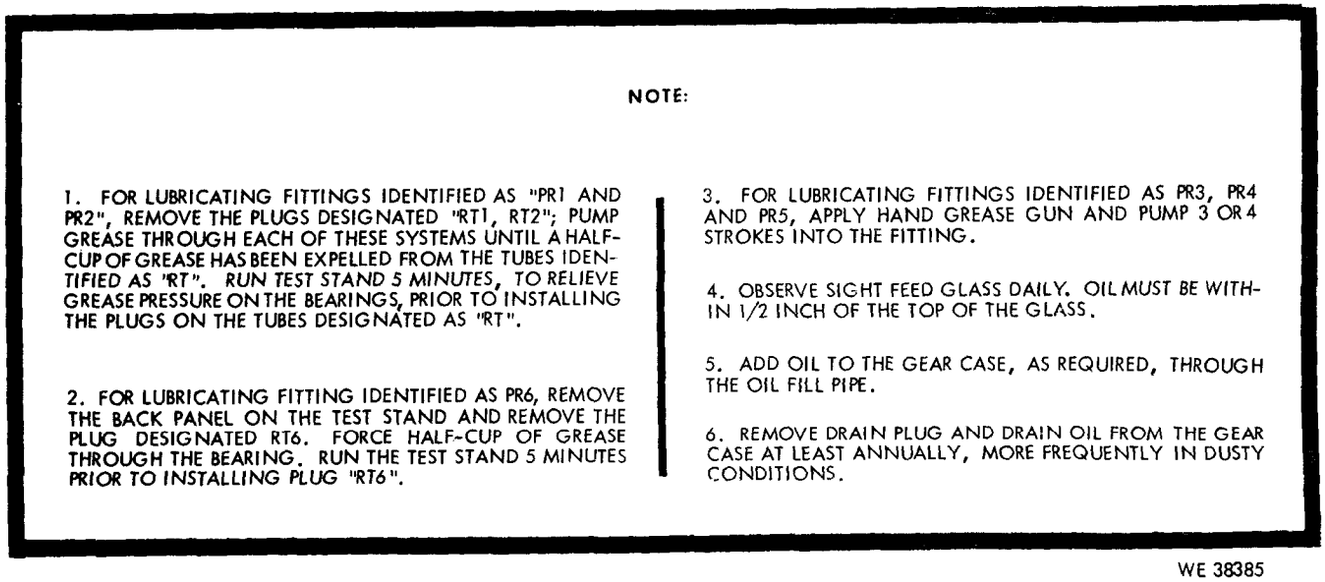


Figure 4-2. Notes - lubrication chart.

4-6. General Lubrication Instructions

a. Usual Conditions. Lubrication intervals specified on the lubrication chart are for normal operation and where moderate temperature and humidity prevail.

b. Lubrication Equipment. Clean lubrication equipment both before and after use. Operating lubricating guns carefully and in such a manner as to insure a proper distribution of the lubricant.

c. Points of Application. Lubrication fittings, oiling points, and the gear case filling point shown on the lubrication chart (fig. 4-1) are indicated by an appropriate identifying call-out as shown in figure 4-3. Wipe these devices and the surrounding surfaces clean before applying lubricant.

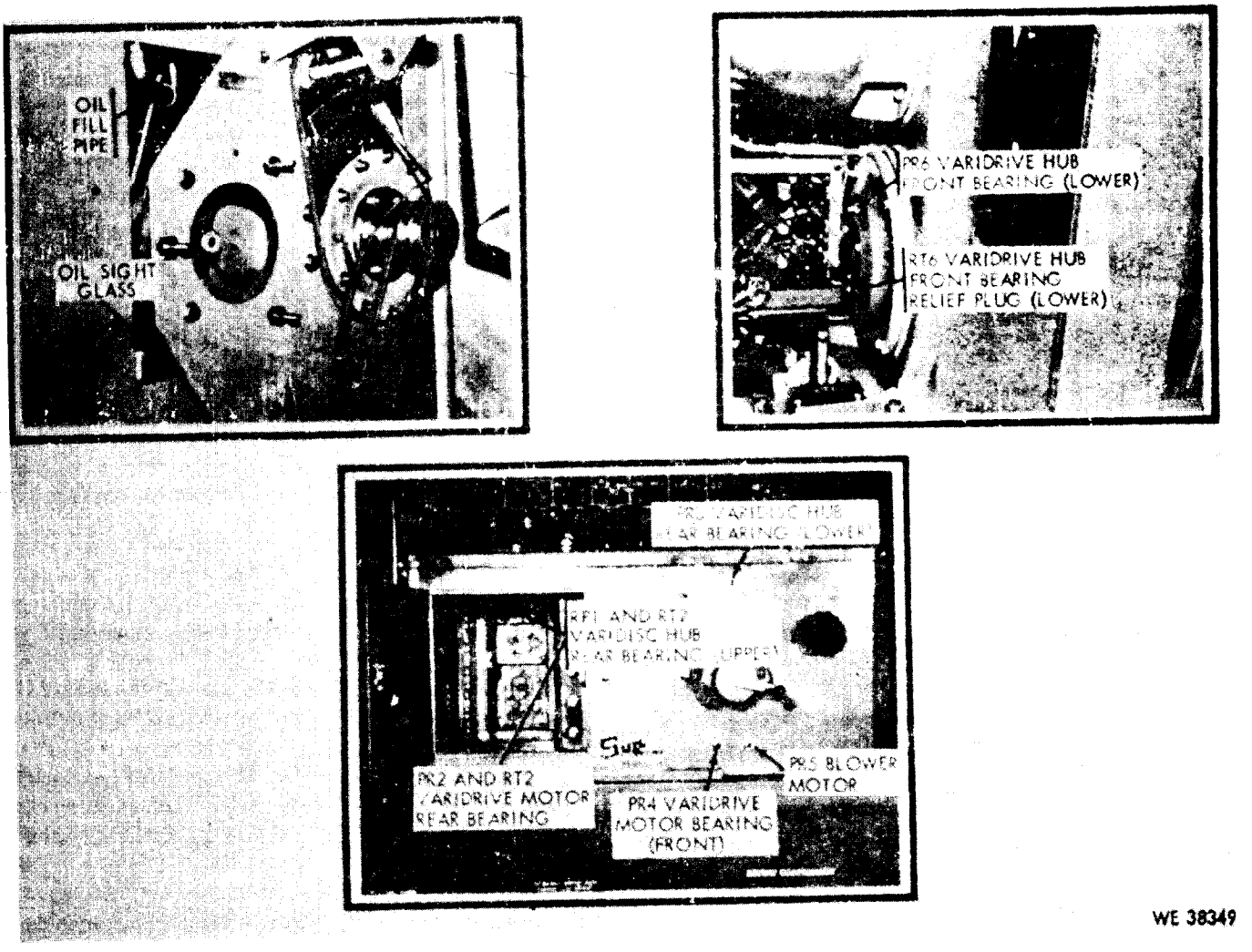


Figure 4-3. Lubrication points.

d. Reports and Records.

(1) Report unsatisfactory performance of prescribed petroleum fuels, lubricants, or preserving materials, using DA Form 2407, Maintenance Request.

(2) Maintain a record of lubrication of the test stand on DA Form 2408-2, Lubrication Record.

4-7. Lubrication Under Unusual Conditions

a. Unusual Conditions. Reduce lubrication intervals specified on the lubrication chart to compensate for abnormal operation and extreme conditions, such as high or low temperatures, prolonged periods of high-speed operation, continued operation in sand or dust, or exposure to moisture, any one of which may quickly destroy the protective qualities of the lubricant. Lubrication intervals may be extended during inactive periods.

b. Changing Grade of Lubricants. Lubricants are prescribed in the "Key" on the lubrication chart, in accordance with three temperature ranges: above +32°F, from +40° to -10°F., and from 0° to 65°F. When to change grades of lubricants is determined by maintaining a close check on operation of the test stand during the approach to change-over periods in accordance with weather forecast date. Ordinarily, it will be necessary to change grade of lubricants only when air temperatures are consistently in the next higher or lower range.

Section III. PREVENTIVE MAINTENANCE SERVICES

4-8. General

Preventive maintenance is the systematic care. inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational readiness. Operator and/or crew preventive maintenance is accomplished by the equipment operator and/or crew. The operator's and/or crew's role in the performance of preventive-amintenance service is:

a. To perform the daily service each day the equipment is operated.

b. To assist the organizational maintenance m-echanics in the performance of any other scheduled periodic services specified by pertinent technical manuals.

c. To assist the organizational maintenance mechanics in the lubrication of the equipment in accordance with the pertinent lubrication order or chart.

4-9. Responsibility

Operators and crew chiefs are personally responsible for assigned equipment. Squad, section, and platoon leaders are charged with supervisory responsibility for equipment pertaining to their commands. Unit and organization commanders are required to insure that equipment issued or assigned to their commands are properly maintained in a serviceable condition, and that they are properly cared for and used.

4-10. Recording Repairs.

Repairs accomplished will be in accordance with procedures and standards prescribed in appropriate technical manuals. The equipment records system provides for recording repairs required and accomplished on specific items of equipment. This will include, but is not limited to, adjusting, cleaning replacing. Deficiencies discovered beofre, during, and after operation that cannot be corrected by the operator and/or crew will be entered on DA Form 2404. Deficiencies immediately corrected by the operator and /or crew are not recorded, except when such corrections are made by replacing parts, or which constitute repairs above operator and/or crew maintenance. Such repairs will be recorded as organizational maintenance.

4-11. General Procedures for All Services and Inspections

a. The following general procedures apply to operator and/or crew preventive-maintenance services and all inspections, and are just as important as the specific procedures.

b. Inspection to see if items are in good condition, correctly assembled or stowed, secure, not excessively worn, not leaking, and adequately lubricated apply to most items in the preventive-maintenance and inspection procedures. Any or all of these checks that are pertinent to any item (including supporting, attaching, or connecting members) will be performed automatically, as general procedure, in addition to any specific procedures given.

(1) Inspection for "good condition"' is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits. Good condition is explained further as meaning; not bent or twisted, not chafed or burred, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.

(2) Inspection of a unit to see that it is correctly assembled or stowed is usually a visual inspection to see if the unit is in its normal position in the vehicle, and if all its parts are present and in their correct relative position.

(3) Inspection of a unit to determine if it is "secure" is usually an external visual examination or a check by hand, wrench, or pry-bar for looseness. Such an inspection must include any brackets, lockwashers, locknuts, locking wires, or cotter pins as well as any connecting tubes, hoses, or wires.

(4) By "excessively worn" is meant worn beyond serviceable limits or to a point likely to result in failure if the unit is not replaced before the next scheduled inspection. Excessive wear of mating parts of linkage connection is usually evidenced by too much play (lash or lost motion). It includes illegibility as applied to markings, data and caution plates, and printed matter.

(5) Where the instruction "tighten" appears in the procedure, it means tighten with a wrench, even if the item appears to be secure.

(6) Such expressions as "adjust if necessary" or "replace if necessary" are not used in the specific procedures. It is understood that whenever inspection reveals the need of adjustment, repairs, or replacement, the necessary action will be taken.

4-12. Cleaning

a. General. Any special cleaning instructions required for specific components or parts are contained in the pertinent section. General cleaning instructions are outlined in (1) through (4) below:

(1) *Metal parts.*

(a) Use self-emulsifying solvent cleaning compound (MIL-S-11090), mineral spirits paint thinner (TT-T-291), or dry-cleaning solvent (Stod-

dard) (P-S-661) to clean or wash grease or oil from all metal parts of the test stand.

(b) Use clean water or a solution of either ¼ pound of soap chips or 6 ounces of painted surface detergent to 1 gallon of hot water for all parts and overall general cleaning of painted surfaces.

(c) After parts are clean, dry them thoroughly. Apply a light film of special preservative lubricating oil (PL, fig. 4-1) to all parts having a polished surface to prevent misting.

(d) Before installing new parts, remove any rust-preventive compound, protective grease, etc. prepare as required (oil seals, etc.), and for those parts requiring lubrication apply the lubricant prescribed in the lubrication chart (fig. 4-1).

(2) *Electrical parts.*

(a) Use technical trichloroethane (methyl chloroform) (O-T-620) for cleaning electrical parts. Clean painted parts and plastics by wiping, brushing, or spraying but never by immersing or soaking in trichloroethane. Do not use trichloroethane for cleaning leather or rubber parts (other than neoprene).

(b) Clean cables and rubber coated electrical parts with a mild soap and water, see (1) *(b)* above. Dry thoroughly before using.

(3) *Meter lens.*

CAUTION: Never use solvents, or cleaning. solutions containing acetone, penzene, carbon tetrachloride, etc. These solvents amy attack and ruin the meter cover or lens surface.

(a) General. A static charge may build up in the lens of the meters and it will have an effect on the accuracy of the meter indication as well as the zero setting of the instrument. The rate at which this charge builds up in the meter lens will vary, depending upon the atmospheric conditions in which the test stand is being used, as well as being effected by rubbing of the windows to remove any accumulation of dust.

(b) *Inspection.* To check the pressure of a static charge in the meter windows, hold the hand as close as possible to the window, without touching it, and move the hand toward the end of the scale. If there is a charge present, the meter pointer will follow the hand for a short distance and will not return to its original setting. This condition can be corrected by cleaning and recoating with antistatic and cleaning compound as prescribed in (c) below.

(c) Cleaning and recoating.

1. Wash the lens of the meter(s) using a damp chamois or a nonabrasive tissue or soft cloth and a mild detergent and water solution, do not rinse.

2. Wipe or blot the lens dry. Avoid use of a dry cloth since it may scratch or mar the surface and possibly produce a static charge.

3. Coat the lens with antistatic and cleaning compound 6850-882-6690 and allow to dry thoroughly.

4. After the coating is completely dry, inspect the action of the meters, as set forth in *(b)* above.

(4) *Rubber parts other than electrical.* Clean rubber parts with soap and warm water. Apply a coating of powdered technical talcum (ZZ-T-416) to preserve the rubber.

b. General Precautions in Cleaning

(1) Provide adequate ventilation both during and after use of trichloroethane. Avoid prolonged inhalation of vapor. Rubber gloves should be worn since this cleaner has a drying effect on the skin.

(2) Self-emulsifying decreasing solvent compound, mineral spirits paint thinner, and dry-cleaning solvent are flammable and should not be used near an open flame. Fire extinguisher should be provided when these materials are used. Use only in well-ventilated places. These cleaners evaporate quickly and have a drying effect on the skin. If used without gloves, they may cause cracks in the skin and, in the case of some individuals, a mild irritation or inflammation.

(3) Avoid getting petroleum products, such as mineral spirits paint thinner, dry-cleaning solvent, engine fuels, or lubricants on rubber parts, as they will deteriorate the rubber.

(4) The use of diesel fuel oil, gasoline, or benzene (benzol) for cleaning is prohibited.

c. Rust *Removal.* Remove rust or corrosion from all parts of the materiel. To remove rust or corrosion from unfinished surfaces, use steel cleaning brushes or abrasive cloth. On finished surfaces, other than highly polished surfaces, remove rust or corrosion by buffing with a rotary wheel wire brush constructed of steel wire between 0.010 and 0.025 inch in diameter. Crocus cloth may be used manually to remove rust or corrosion from polished surfaces,

4-13. Preventive Maintenance by Operator and Crew

a. Purpose. To assure maximum operational readiness, it is necessary that equipment be systematically inspected at intervals every day it is operated, so defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance services will be performed at these designated intervals. Any deficiencies discovered that cannot be corrected by the operator and/or crew, or corrected by replacing parts will be reported on DA Form 2404.

b. Daily Preventive-Maintenance Service. Each equipment will be inspected each day that it is operated. This service is divided into three parts, as indicated in (1) through (3) below.

(1) *Before-operation service.* This is a brief service to ascertain that the equipment is ready for operation, it is mainly to check to see if conditions affections affecting the equipment's readiness have changed since the last after-operation service.

(2) *During-operation service.* This service consists of detecting unsatisfactory performance.

(3) *After-operation service.* This is the basic daily service for the equipment. It consists of correcting, insofar as possible, any operating deficiencies. Thus, the equipment is prepared to operate upon a moment's notice.

(4) *Weekly service.* This service is performed as a general clean-up and inspection.

4-14. Specific Procedures for Operator and/or Crew

Table 4-1 gives the specific procedures to be performed on the equipment by the operator and/or crew for each daily service.

Table 4-1. Preventive-Maintenance Checks and Services

B - Before Operation A - After Operation
D - During Operation W - Weekly

Item Number	Interval: Operator: Daily B	D	A	W	Item to be inspected	Procedure	Reference
1	X		X		Instrument panel and cabinet.	a. Clean outside surface of panel and cabinet.	Clean with low pressure air, free of moisture.
				X		b. Inspect painted surfaces for chips and peeling, and compartment fasteners for distorted or bent condition. Motify organizational-maintenance personnel if surfaces require refinishing or fasteners require repairs.	
2	X		X		Meters	a. Check lens of each meter for loss of antistatic coating. Run hand across lens without touching it and check meter meedle for fluctuation.Recoat lens if required.	Par. 4-12a(3).
				X		b. Adjust needle of each meter to zero if required.	Par. 2-72.
3				X	Knobs	Tighten setscrew in knobs of switches and controls if loose. Be sure pointer of the knob is set in correct position on indicator dial before tightening setscrew.	See figs. 2-8 and 2-9 .
4	X				Stowage compartments -	Remove all items of equipment that may interfere with operation of test stand.	
5				X	Test leads and cable harness.	a. Remove accumulation of corrosion and other foreign matter from clips, sockets, and ferrules. Keep a light coating of automotive and artillery grease (GAA) MIL-G-10924 applied to clips, sockets, and ferrules to prevent further corrosion.	Par. 4-12a(2)(b).
	X					b. Inspect electrical cables and leads for frayed, broken, cracked, and burned insulation.	
						c. Wipe clean and roll-up neatly. Store in stowage compartments provided in test stand.	
6		X			Toggle, selector, and control switches.	Observe operation of toggle switches for nonpositive action, also check selector or control switches for binding when rotated.	See figs. 2-8 and 2-9.
7		X			Lamps	Inspect for burned out condition (observe whether lamp is lit when test stand is operating).	See figs. 2-8 and 2-9 .
8	X				V belts	Inspect the V belts provided with equipment for fraying, cracks, and other indications of excessive wear.	
9	X		X		Gear case level	Observe oil level sight glass and check for proper oil level.	See lubrication chart (fig. 4-1).
10		X			Speed control	Observe operation for unusual feel, binding, or excessive free play.	See fig. 22-2.

Section IV. TROUBLESHOOTING

4-15. Purpose

Troubleshooting is a systematic determination of malfunctions and defective components by indications, symptoms, and tests. Close adherence to the procedures covered herein will materially reduce the, time required to locate trouble and restore the materiel to normal operation.

CAUTION: Operation of materiel without a preliminary examination can cause further damage to a disabled component. Be careful during inspection and troubleshooting, so that damage can be avoided.

4-16. Scope

This section covers troubleshooting which is peculiar to the operator's and/or crew's maintenance operations.

4-17. Procedure

Malfunctions which may occur with the test stand are listed in table 4-2. Upon observing any one of these malfunctions, take immediate steps to locate and correct the cause. Causes are listed apposite each malfunction and are arranged according to the ease of correction.

Table 4-2. Troubleshooting

Malfunction	Probable causes	Corrective action
1. Test stand fails to operate.	a. Main circuit breaker switch (fig. 1-1) is "OFF".	a. Place switch in "ON" position,
	b. Air intake and exhaust vents restricted.	b. Remove any obstructions from intake and exhaust vents.
	c. Interlock switch (fig. 1-1) open.	c. Close compartment tightly (fig. 1-1).
	d. Other causes	d. Refer other causes to organizational maintenance personnel for correction
2. Incorrect reading noted on meters	a. Meter require zero adjustment -	a. Zero adjust meters (par. 2-72).
	b. Knob loose on switch or control shaft.	b. Set knob in correct position and tighten setscrew (see item 6 below).
	c. Switch set in open position (between markings on dial).	c. Set knob of switch to selected markings on switch dial.
	d. Other causes	d. Refer other causes to organizational maintenance personnel for correction.
3. Indicator lamps fail to light.	a. Fuses burned out	a. Replace fuses (pars. 4-18, and 4-19).
	b. Other causes	b. Refer other causes to organizational maintenance personnel for correction
4. Battery charger fails to operate.	a. Batteries not connected properly to charger.	a. Check for proper hook-up (par. 2-78 and fig. 2-3).
	b. Timer on battery charger not set properly.	b. Refer to instructions (par. 2-78).
5. Knob turns on switch shaft or control shaft, or knob is set in wrong position on switch dial.	a. Setscrew loose or missing.	a. Turn shaft of switch or control to the extreme left or right position and aline pointer of knob with extreme lower left or right lined marking on switch or control dial. Replace and/or tighten setscrew in knob.
	b. Other causes	b. Refer other causes to organizational maintenance personnel for correction.
7. Binding posts do not hold lead securely.	a. Threads on binding dirty or corroded.	a. Clean threads (par. 4-16a(2).
	b. Other causes	b. Refer other causes to organizational maintenance personnel for correction.

Table 4-2. Troubleshooting - Continued

Malfunction	probable causes	Corrective action
8. Incorrect speed noted on tachometer indicator.	a. Tachometer indicator circuitry requires adjustment. b. Other causes	a. Adjust tachometer indicator circuitry (par. 2-77). b. Refer other causes to organizational maintenance personnel for correction.
9. Generator or alternator (pulley driven) vibrates excessively, when revolving, while undergoing test.	a. Not clamped securely in mounting bracket. b. Other causes	c. Tighten screws or nuts of mounting bracket, or secure chain onto item undergoing test (pars. 2-76) b. Refer other causes to organizational maintenance personnel for correction.
10. Varidrive assembly noisy.	. . . . .	Refer malfunction to organizational maintenance personnel for correction.
11. Varidrive assembly operates but drive heads run erractic or do not turn.	. . . . .	Refer malfunction to organizational maintenance personnel for correction.

Section V. REGULATOR RESISTOR FUSE AND BLOWER MOTOR FUSE

4-18. Description

a. Regulator Resistor Fuse. The regulator resistor fuse (34, fig. *D-3)* located under the fuse holder (5, fig. 2-9), is a 15-ampere fuse. It provides overload protection for the regulator resistor circuit when the circuit is being used as an external voltage output for testing generator regulators and generator control boxes.

b. Blower Motor Fuse. The blower motor fuses (fig. 2-4) are two 10-ampere, 250-volt, cartridge type fuse (33, fig. D-3). They provide overload protection to the blower motor for the test stand.

4-19. Maintenance

a. General. Operator and/or crew maintenance is limited to such disassembly and assembly required to replace the regulator resistor and blower motor fuses.

b. Disassembly.

(1) Fuse referenced in paragraph 4-18a above, is removed by turning the fuse holder counterclockwise and lifting the cap. The fuse is held in the cap with a friction type sleeve and is removed by pulling outwardly on the fuse.

WARNING: Disconnect the external power supply source and place the main circuit breaker switch (fig. 2-4) in the "OFF" position, before any attempt to remove the fuse.

(2) Fuses referred to in paragraph 4-18b above, are removed by opening the high voltage compartment, placing the main circuit breaker switch (fig. 2-4) in the "OFF" position, and removing the fuses with the fingers or a suitable tool used as a pry. Spare fuses are contained in the rack inside the rectifier cooling chamber (fig. 2-6).

c. Inspection.

(1) Inspect the fuse holder for cracks, breaks, and damaged threads.

(2) Check the continuity of the fuses using a multimeter.

d. Assembly. Place a serviceable 15 amp fuse in the holder cap (5, fig. 2-9) and screw the fuse holder cap in place by turning it clockwise in the test stand. Snap the blower fuses (b(2) above) in the fuse holder, close the high voltage compartment, and snap the main circuit breaker "ON".

CHAPTER 5

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, TOOLS, AND EQUIPMENT

5-1. General

Repair parts, tools, and equipment over and above those available to the operator are supplied to the using organization for maintaining the test stand. Tools and equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored.

5-2. Repair Parts

Repair parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable, providing replacement of these parts is within the scope of organizational maintenance functions. Repair parts supplied for the test stand are listed in appendix D.

5-3. Common Tools and Equipment

Common tools and equipment having general application to this materiel are authorized by tables of allowances and tables of organization and equipment.

5-4. Special Tools and Equipment

No tools or equipment specially designed for organizational maintenance are supplied or required for the test stand.

Section II. LUBRICATION AND PAINTING

5-5. Lubrication

Refer to section II of chapter 4 for lubricating instructions for the operator. These instructions apply equally to maintenance personnel of the using organization.

5-6. Painting

Instructions for preparation of the materiel for painting, methods of painting, and materials to be used are contained in TM 9-213. Materials for painting are listed in appendix D.

Section III. PREVENTIVE MAINTENANCE SERVICES

5-7. General

Preventive-maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdown, and assure maximum operational readiness. Organization preventive-maintenance is accomplished by the organizational mechanics. Their role in the performance of preventive-maintenance services is:

a. To perform the periodic services specified.

b. To lubricate the equipment in accordance with the lubrication chart (par. 4-5).

5-8. Recording Repairs

Repairs accomplished will be in accordance with procedures and standards prescribed in appropriate technical manuals. The equipment record system provides for recording repairs required and accomplished on specific items of equipment. This will include, but is not limited to, adjusting, cleaning, replacing, and straightening. Deficiencies and shortcomings not corrected by operators or crew, or those discovered during periodic inspections, will be corrected insofar as possible by organizational maintenance personnel. These repairs will be indicated on DA Form 2404 and recorded on the organizational maintenance record of the equipment log.

5-9. General Procedures

a. Automatically Applied. All of the general procedures given in the operator's manual will be followed. Organizational mechanics must be so thoroughly trained in these procedures that they apply them automatically at all times in the performance of their duties.

b. Operator Participation. The operator usually accompanies the equipment and assists the organizational mechanics in the performance of organization periodic services.

c. Plates. Nameplates, caution plates, and instruction plates made of steel rust very rapidly. When they are found to be in a rusty condition, they should be thoroughly cleaned and heavily coated with an application of lacquer. Refer to TM 9-123.

d. Services. Organization services are defined by, and restricted to the following general procedures

unless approval has been given by the direct or general support maintenance categories.

(1) *Adjust.* Make all necessary adjustments in accordance with instructions contained in the pertinent section of this technical manual.

(2) *Clean.* Clean the unit as outlined in paragraph 4-12 to remove old lubricant, dirt, and other foreign material.

(3) *Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice. Use a torque-indicating wrench where specified. Do not over-tighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lockwasher, locknuts, locking wire, or cotter pins, to secure the tightened nut.

e. Special Conditions. When conditions make it difficult to perform the complete preventive-maintenance procedures at one time, they can sometimes be handled in sections. Plan to complete all operations within the week, if possible. Utilize all available idle time to assure that maintenance operations are completed.

5-10. Specific Procedures for Organization

Table 5-1 gives the specific procedures to be performed on the test stand by organizational personnel for each monthly "M" service.

Table 5-1. Preventive-Maintenance Checks and Services

Sequence No.	Item to be inspected	Procedure	Reference
1	Painted surfaces of	Inspect for deterioration of painted surfaces. Remove rust or scaled or loose paint grease, and dirt. Repaint surfaces.	See par. 4-12 for cleaning instructions.
2	Binding posts on instrument panels and rectifier compartment.	Inspect for corrosion and damaged threads. Clean by removing corrosion and repair threads using a wire brush or file to dress up threads.	See par. 4-12 for cleaning instructions.
3*	Regulator resistor fuses and fuse holders.	Inspect fuses for being secure in holder and the fuse metal ends free from corrosion or grease preventing positive contact.	See figs. 2-9
4	Generator, alternator and starter mounting bracket assembly.	Inspect the bracket for secure mounting and positive acticn of chain vise. Check threads for dirt, rust, etc. Clean as required and lubricate threads and chain as prescribed in lubrication chart.	See par. 4-12 for cleaning instructions. See fig. 2-4.
5*	Blower motor fuses in high voltage compartment.	Check fuses for corrosion and loose seating in fuse holders. Clean and reset fuses in holder if required. WARNING: Be sure the main circuit breaker is "OFF" before working in area of above items.	See par. 4-12 for cleaning instructions. See fig. 2-4
6	Terminals, binding posts and terminal boards.	Inspect terminals for corrosion and loose connections. Clean off corrosion and tighten terminal screws if required. WARNING: Be sure external power supply is disconnected before working in area of above items.	See par. 4-12 for cleaning instructions. See fig. 2-4.
7*	Varidrive reversing switch.	Inspect switch for positive contact and corrosion on knife connections. Clean and tighten knife contacts if required. WARNING: Be sure external power supply source is disconnected before working in area of above items,	See par. 4-12 for cleaning instructions, See fig. 2-4.

Table 5-1. Preventive-Maintenance Checks and Services-Con't

Sequence No.	Item to be inspected	Procedure	Reference
8	Varidrive assembly and V belt.	Inspect the varidics of the varidrive assembly for scored, greasy, or otherwise damaged condition. Inspect the V belt for frayed, cracked, and excessive wear. Prevent over-lubrication as specified in lubrication chart (fig. 4-1).	See par. 4-12 for cleaning instructions. See fig. 2-4.
9	Binding posts in battery compartment.	Inspect for corrosion and damaged threads. Clean by removing corrosion and repair threads using a wire brush or file to clean or dress threads.	See par. 4-12 for cleaning instructions. See fig. 5-1.

* — To be accomplished upon failure of test stand operation instead of monthly if this condition exists.

Section IV. TROUBLESHOOTING

5-11. Purpose

Troubleshooting is a systematic determination of malfunctions and defective components by indication, symptoms, and tests. Close adherence to the procedures covered herein will materially reduce the time required to locate trouble and restore the material to normal operation.

5-12. Scope

CAUTION: Operation of materiel without a preliminary examination can cause further damage to a disabled component. Be careful during inspection and troubleshooting, so that damage can be avoided.

The section covers troubleshooting which is peculiar to organizational maintenance operations. For troubleshooting procedures performed by the operator, see paragraphs 4-15 through 4-17.

5-13. Procedure

Malfunctions which may occur with the test stand are listed in tables 4-2 and 5-2. In effect, table 5-2 is a continuation of table 4-2. Causes are listed opposite each malfunction and are arranged according to the ease of correction.

Table 5-2. Troubleshooting

Malfunction	Probable causes	Corrective action
1. Test stand fails to operate.	a. High voltage compartment not tightly closed.	Check to see interlock switch is closed.
	b. Loose terminals on power input cable.	b. Check wiring and terminal board.
	c. Circuit breaker switches in "OFF' position.	c. Check circuit breaker switches for correct position.
	d. Burned-out heater elements.	d. Check heater elements using a multimeter. Replace heater ele. ments if required (par. 5-16).
	e. Other causes	a. Refer other causes to direct support maintenance personnel for correction.
2. Incorrect reading noted on meters.	a. Meter lens statically charged	a. Clean and recoat meter lens (par. 4-12) (3)
	b. Other causes	b. Refer other causes to direct support maintenance personnel for correction.
3. Indicator lamps fail to light	a. Lamp (bulb) burned out.	a. Check lamp (bulb) for continuity using a multimeter, replace lamp (bulb) if required (par. 5-15).
	b. Other causes	b. Refer other causes to direct support maintenance personnel for correction.
4. Battery charger fails to operate	.....	Refer malfunction to direct support maintenance personnel for correction.

Table 5-2. Troubleshooting-Continued

Malfunction	Probable causes	Corrective action
5. Variable circuit fails to operate	. . . . .	Refer malfunction to direct support maintenance personnel for correction.
6. Knob turns on switch shaft or knob is set in wrong position on switch dial	. . . . .	Refer malfunction to direct support maintenance personnel for correction.
7. Binding posts do not hold leads securely.	a. Threads on post cross threaded.	a. Use appropriate size file and dress threads and/or repair threads by chasing, if practicable.
	b. Other causes	b. Refer other causes to direct support maintenance personnel for correction.
8. Incorrect speed noted on tachometer.	. . . . .	Refer malfunction to direct support maintenance personnel for correction.
9. Generator, alternator, or starter (cranking motor vibrator excessively, when revolving while undergoing test.	. . . . .	Refer malfunction to direct support maintenance personnel for correction.
10. Varidrive assembly noisy.	. . . . .	Refer malfunction to direct support maintenance personnel for correction.
11. Varidrive assembly operates but drive heads run erratic or do not turn.	a. Check V belt and varidrive for greasy deposits or frayed, cracked, and excessive wear.	a Clean grease from V belt and varidiscs (par. 4-12). Replace V belt if unserviceable (par. 5-19).
	b. Other causes	b. Refer other causes to direct support maintenance personnel for correction.

Section V. INDICATOR LAMP GROUP

5-14. Description

The indicator lamps (2, 16, and 17, fig. 2-9) are all installed in a screw-in type socket assembly built within the center control panel and are inclosed by a flat type lens. Four indicator lamps with torpedo type lens for the battery selector (22, fig. 2-9) and relay closure (13, fig. 2-9) are installed in a screw-in type socket assembly. The indicator lamp provides the means for a visual inspection when using the circuit for testing purposes. All indicator lamps are used to provide a visual means to indicate whether the respective circuits which are connected with are receiving the necessary current to function properly.

5-15. Maintenance

a. General Organizational maintenance is authorized to remove and replace the indicator lamps.

b. Removal. Unscrew the lens from the socket assembly, turn the lamp (bulb) counterclockwise and remove from the socket assembly.

c. Inspection.

(1) Inspect each lamp (bulb) base for corroded condition.

(2) Check the continuity of each bulb using a multimeter.

d. Installation. Install a serviceable lamp (bulb) in each socket assembly. Install the lens over the indicator lamps.

Section VI. OVERLOAD RELAY HEATER

5-16. Description

The overload relay heaters (37, fig. D-3) are accessible for connection and maintenance through the high voltage compartment (fig. 2-4). They provide a thermal overload protection for the test stand. These heaters must be changed to convert the stand from 220-volts to 440-volts (apr. 2-2c(4) *(c)* or opened through overload.

5-17. Maintenance

a. General Organizational maintenance is limited to disassembly and assembly required to replace the heater elements (fig. 2-4).

WARNING: Disconnect the external power supply source, and place the main circuit breaker switch (fig. 2-4) in the "OFF" position, before any attempt is made to replace the heater elements.

b. Removal. Open the high voltage compartment (fig. 2-4). Unscrew the four binding-head machine screws from each heater element and remove the two heater elements.

c. Inspection. Inspect the heater elements for burned-out, cracked, or broken condition.

d. Installation.

(1) Position two serviceable heater elements in their respective position in the heater blocks and secure with the four binding-head machine screws removed in *b* above.

(2) Close the high voltage compartment tightly.

Section VII. VARIDRIVE ASSEMBLY AND TACHOMETER GENERATOR GROUP

NOTE: The key numbers shown in paragraph 5-18 and 5-19 below in parentheses refer to figure 5-1 unless otherwise indicated.

5-18. Description

a. Varidrive Assembly. The varidrive assembly is a self-contained unit, embodying a motor and a built-in speed transmission, all shock mounted on one base to prevent vibration of the control panel. Constant horsepower is maintained through its infinite range of speeds, and any desired speed (rpm) can be obtained by merely turning the handle of the drive speed control (fig. 2-6). Rot sting the handle of the drive speed control in a counterclockwise direction actuates a pivoted strut which slides one of the lower varidisc hubs (12) on the rotor (motor) shaft (13) toward its companion varidisc, thus causing the V belt (15) of the varidrive assembly to climb upward on the tapered varidisc to a larger diameter.

Simultaneously, the V belt causes the slidable upper varidiscs (17) on the driven (driving heads) shaft (18) to retract against a spring, permitting the V belt to assume a smaller diameter on the upper varidiscs and increasing the speed of the driven shaft. Thus the speed of the driven shaft is increased but the rotor (motor) shaft speed remains constant. Reduced speed in any degree is obtained by rotating the handle of the speed control in a clockwise direction.

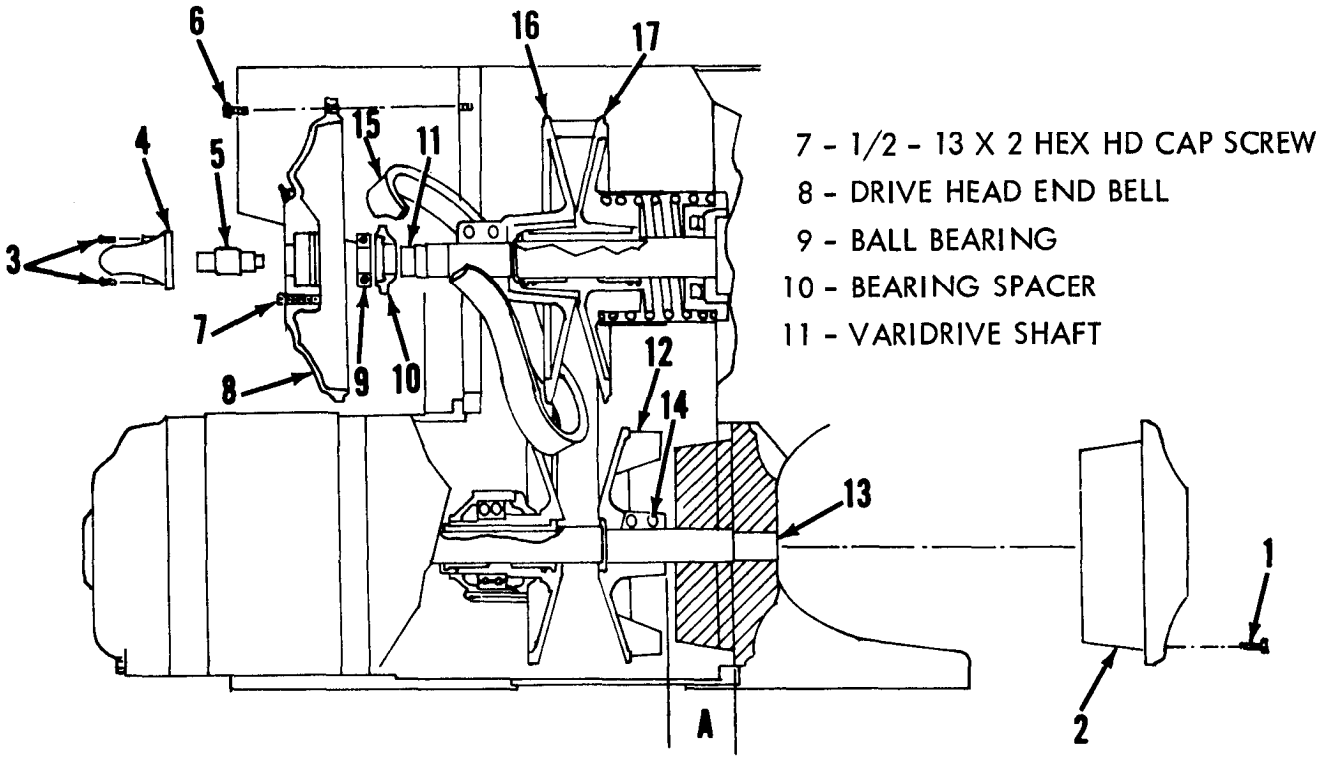


Figure 5-1. Varidrive and tachometer generator assembly.

b. Tachometer Generator. The tachometer generator (4) mounted on the end of the varidrive shaft (11) of the varidrive assembly with a coupling assembly (5) and a flexible shaft coupling (built within the tachometer generator), provide a means of measuring the actual speed (rpm) of a generator or alternator, which is indicated on the tachometer indicator meter (5, fig. 2-8) on the meter panel.

5-19. Maintenance

a. General. Organizational maintenance is limited to such removal and installation required to replace the V belt (15) and tachometer generator (4).

b. Removal

(1) Start the test stand by depressing the start button (15, fig. 2-9) (do not hold the "START" button depressed more than 10 seconds).

(2) Turn the handle of the speed control (fig. 2-6) fully clockwise until the varidrive assembly is operating at minimum speed. Stop the test stand by depressing the stop button (15, fig. 2-9).

WARNING: Disconnect the external power supply source and place the main circuit breaker switch (fig. 2-4) in the "OFF" position before any attempt is made to perform procedures in (3) through (10) below.

(3) Open the high voltage compartment (fig. 2-4) and remove the two 10-ampere fuses.

(4) Remove the two rear panels of the test stand and the generator, alternator, and starter mounting bracket assembly (fig. 2-1) from the test stand. Remove the access cover (not shown) from the side of the varidrive assembly housing.

(5) Unscrew the four 7/16-14 x 1-1/2 hexagon-head cap screws (1) and remove the motor cover end bell (2) intact.

(6) Unscrew the four 12-24 x 3/4 round-head machine screws (3) and remove the tachometer generator (4) and coupling assembly (5) from the varidrive shaft (11).

(7) Unscrew the four 1/2-13 x 1-1/2 hexagon-head cap screws (6) and three 1/2-13x 2 cap screws (7) and remove the drive head end bell (8) using care not to damage the bearing (9) or spacer (10), remove these parts from the varidrive shaft (11).

NOTE: Before removing the lower varidisc hub (12) from the rotor (motor) shaft (13), measure and note the exact distance (A) or scribe a locating line on the rotor (motor) shaft (13) to assure proper V belt alignment at time of installation in d below.

(8) Loosen the four 3/8-16 x 2-1/2 hexagon-head cap screws (14) on the lower varidisc hub (12) and remove the lower varidisc from the rotor (motor) shaft (13).

(9) Remove the V belt (15) from the varidrive assembly housing, by sliding one end of the V belt off and over the end of the rotor (motor) shaft (13), and the opposite end of the V belt off and over the upper left varidisc hub (16) and out of the end bell opening, as illustrated in figure 5-1.

c. Inspection.

(1) Inspect the V belt (15) for frayed, cracked, or other indications of deterioration. Replace if unserviceable.

(2) Inspect the tachometer generator (4) for chipped, cracked or broken housing, and for frayed, burned, hard, and brittle insulation on the electrical leads.

(3) Inspect the lower and upper varidisc hubs and their companion hubs for scarred and greasy condition. Clean if required (par. 4-2).

d. Assembly.

(1) Insert the V belt (15) through the end bell opening. Position one end of the V belt between the upper varidisc hubs (16 and 17). Pry the varidisc hubs (16 and 17) apart with a pry bar and place the V belt in the lowest position. Work the opposite end of the belt over the end of the rotor (motor) shaft (13).

(2) Slide the lower varidisc hub (12) onto the rotor (motor) shaft (13) to the exact position of distance (A) (measured or scribed location line before removal; refer to note in *b* above.

(3) Secure the lower varidisc hub (12) by tightening the four 3/8-16 x 2-1/2 hexagon-head cap screws (14).

NOTE: Correct lower varidisc alinement is essential and at no time should the V belt be more than 1/16 inch out of line.

(4) Rotate the lower varidisc hub (12) by hand, and at the same time turn the handle of the speed control (fig. 2-6) slightly in the counterclockwise direction until the slack in the V belt is taken up.

(5) Replace the spacer (10), bearing (9), and slip the drive head end bell (8) over the end of the varidrive shaft (11). Secure the end bell to the varidrive assembly housing with the four 1/2-13 x 1-1/2 hexagon-head cap screws (6) and three 1/2-13 x 2 hexagon-head capscrews (7).

(6) Install the coupling assembly (5) into the end of the driven (driving heads shaft) (11).

(7) Replace the tachometer generator (4) on the end bell (8) and secure with the four no. 12-24 x 3/4 round-head machine screws (3).

(9) Place the motor cover end bell (2) in position on the varidnve assembly housing and secure with the four 7/16-14 x 1-1/2 hexagon-head cap screws (1).

(10) Install the access cover (not shown) on the side of the varidrive assembly housing.

(11) Install the two rear panels and generator, alternator, and starter mounting bracket assembly (fig. 2-1) on the test stand.

Section VIII. PULLEY SHAFT AND BEARING ADAPTER

NOTE: The key letters shown in paragraphs 5-20 and 5-21 below in parentheses refer to figure 5-2.

5-20. Description.

The pulley shaft and bearing adapter is a self-contained unit; embodying a shaft, flange, bearing, and retainer snap ring. When mounted on the adapter flange of the test stand over one of the driving heads and with a pulley mounted, as shown in figure 2-13, the pulley shaft and bearing adapter drives the pulley of the generator (alternator) being tested.

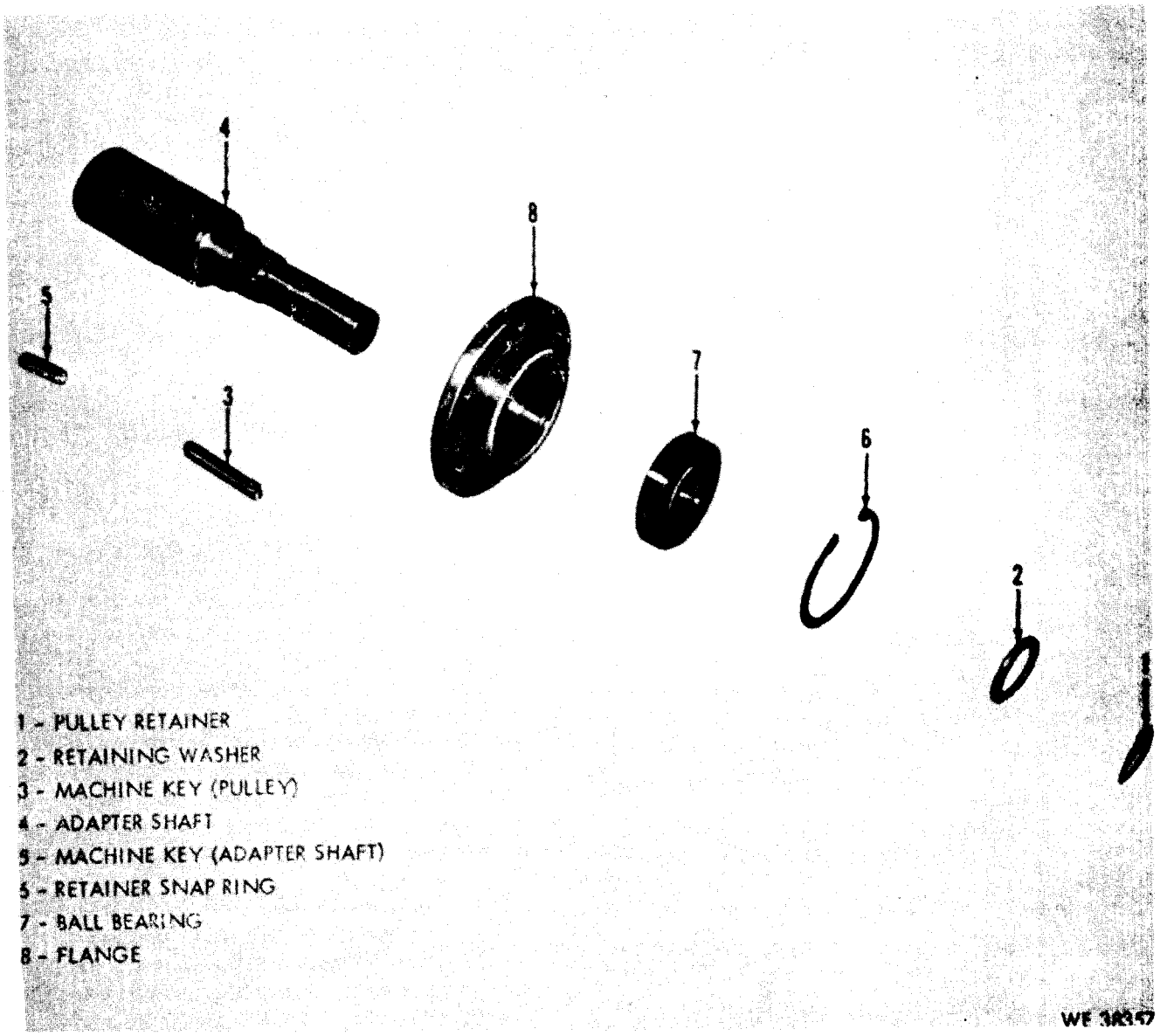


Figure 5-2. Pulley shaft and hearing adapter.

5-21. Maintenance

a. General Organizational maintenance is limited to disassembly and assembly to replace the ball bearing in the adapter.

b. Removal.

(1) Remove the pulley retainer (1) and retaining washer (2) and remove the pulley (if mounted) and machine key (3) from the adapter shaft (4).

(2) Loosen the setscrew in the adapter shaft (4), slide the unit from the varidrive shaft, and

remove the machine key (5) from inside the adapter shaft.

(3) Using snap ring pliers, remove the retainer snap ring (6) and force the ball bearing (7), with adapter shaft attached out of the flange (8).

(4) Press the adapter shaft (4) out of the ball bearing (7).

c. Inspection.

(1) Inspect the bearing (7) for binding, side play, rust, corrosion, or damage.

(2) Inspect the retainer snap ring (6) for rust, corrosion, distortion, or fatigue cracks.

(3) Inspect the flange (8) for rust, corrosion, galls, or distortion.

(4) Inspect the adapter shaft (4) for distortion, galls, rust, or corrosion.

d. Assembly. Assemble the pulley shaft and bearing adapter in the reverse order as outline in *b* above.

CHAPTER 6

SHIPMENT AND ADMINISTRATIVE STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND ADMINISTRATIVE STORAGE

6-1. Shipping Instructions

a. Responsibility. When shipping the test stand the unit commander will be responsible for shipping the materiel, including all tools and equipment, adequately processed, packaged, and packed to protect it from damage until it reaches the category of maintenance for required repairs; or in the case of troop movement, reaches its destination in a serviceable condition.

b. Army Shipping Documents. Prepare all Army shipping documents in accordance with AR 725-50.

c. Preparation for Shipment. The test stand removed from administration storage for shipment need not be reprocessed unless inspection reveals it to be inadequately preserved or when it is necessary because of anticipated intransit weather or shipping conditions. Preservatives must not be removed or disturbed except as necessary to insure that the test stand is complete and serviceable. If preservatives are removed, they must be restored prior to shipment.

6-2. Preservation, Packaging, Packing, and Marking Instructions

a. Preservation and Packaging. Preservation of the test stand must be sufficient to protect it against deterioration and damage during shipment and administrative storage and/or the subsequent interval prior to use. Under no conditions will tools and equipment with critical surfaces be packaged without benefit of sufficient preservatives to assure adequate protection (TM 9-200). Preservation and packaging must be compatible with end use requirements.

b. Packing. Packed items must be acceptable to the carrier while affording adequate protection to the items during shipment and administrative storage and/or the subsequent interval prior to use.

c. Marking. All materiel will be marked in accordance with TM 9-200.

6-3. Administrative Storage

a. General.

(1) Unit commanders may, with the approval of major commanders, place test stands in administrative storage or return to supply agencies equipment that is beyond the maintenance capability or the unit. Test stands must be stored in the most favorable location available, preferably one which affords protection from exposure to elements and pilferage.

(2) All test stands in administrative storage must be maintained so that test stands will be ready for immediate use and/or ready for shipment.

(3) Administrative storage is restricted to a period of 90 days and must not be extended unless the test stand is reprocessed.

b. Storage Procedures.

(1) Perform a quarterly preventive-maintenance (PM) service on the test stand. This maintenance will consist of inspecting, cleaning, servicing, preserving, lubricating, and adjusting, as required, and will also include minor repair parts replacement (if required) not requiring highly technical skills or expensive, complicated, or bulky test equipment or tools.

(2) Lubricate the test stand in accordance with lubrication chart (fig. 4-1) and as prescribed in paragraph 4-6 and 4-7 as applicable.

(3) Provide adequate drainage of test stand.

(4) Remove all tools and equipment and box and store with test stand.

(5) Provide access to the test stand to permit inspection, servicing, and removal from storage.

(6) Mark the test stand "Administrative Storage" (by use of tag or other convenient method). Test stand so marked must not be operated while in this category.

c. *Inspections in Administrative Storage.* Visual inspection of test stand in administrative storage must be conducted at least once each month to detect corrosion and rust. When corrosion and rust are found, corrective action must be taken immediatey. A record of these inspections must be maintained for each test stand in administrative storage. The record must be attached to the test stand in such a manner as to protect it from the elements.

6-4. Loading and Blocking Instructions

Organizational maintenance personnel may assist, as required, in loading and blocking boxed test stand on railroad cars and/or trucks.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

6-5. General

a. Destruction of the automotive generator, alternator, and starter test stand when subject to capture or abandonment in the combat zone will be undertaken by the using Army only when, in the judgement of the unit commander concerned, such action is necessary in accordance with order of, or policy established by the Army Commander. When in the hands of Army maintenance personnel or in storage, destruction will be in accordance with FM 9-6 and the information below when applicable.

b. The information which follows is for guidance only. Certain of the procedures outlined require the use of explosives and incendiary grenades which normally may not be authorized items of issue to the using organization. The issue of these and related materiels and the condition under which destruction will be effected are command decisions in each case, according to the tactical situation. Of the several means of destruction, those most generally applicable are:

Mechanical . .	Requires axe, pick mattock, sledge, crowbar, or similar implement.
Burning	Requires gasoline, oil, incendiary grenades, or other flammables, or welding or cutting torch.
*Demolition	Requires suitable explosives, or ammunition.
✽Gunfire . . .	Includes artillery, machine guns, rifles using rifle grenades, and launchers using antitank rockets. Under some circumstances, hand grenades may be used.
Disposal	Requires burying in the ground, dumping in streams or marshes, or scattering so widely as to preclude recovery of essential parts.

$ Generally applicable only when the automotive generator, alternator, and starter test stand is to be destroyed in conjunction with other equipment.

In general, destruction of essential parts followed by burning will usually be sufficient to render the materiel useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the materiel must be so badly damaged that it cannot be restored to a usable condition in the combat zone either by repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the materiel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of tune and personnel prevents destruction of all parts, priority is given to the destruction of those parts most difficult to replace. Equally important, the same essential parts must be destroyed on all like material so that the enemy cannot construct one complete unit from several damaged ones.

d. If destruction by demolition or gunfiie is directed, due consideration should be given to the observance of appropriate safety precautions. For complete details on the use of demolition materials, refer to FM 5-25.

6-6. Destruction of the Automotive Generator, Alternator, and Starter Test Stand

a. Method No. 1 — Destruction by Mechanical Means.

(1) Disconnect the test stand from its source of electricity.

(2) Open all doors and remove the side and rear sheet metal panels from the cabinet.

(3) Using an axe, pick mattock, sledge, or other heavy implement, destroy the test stand by smashing the drive motor, varidrive assembly, mounting brackets, terminals, meters, jacks, indicators, blower assembly, switches, and controls.

(4) Destroy the cables by cutting them into short lengths. Elapsed time: about 15 minutes.

b. Method No. 2 — Destruction by Burning.

(1) Disconnect the test stand from its source of electricity.

(2) Open all doors and remove the side and rear sheet metal panels from the cabinet.

(3) Using a welding or cutting torch, burn through the stator housing and into the armature of the drive motor. Also fuse the gears in the gear case, Burn the blower assembly, mounting brackets, meters., indicators, switches, and controls.

(4) Destroy the cables by burning them in several places.

(5) In the absence of a welding or cutting torch, place piles of combustible on and about the test stand. Pour gasoline or oil over the combustible and the materiel; ignite by means of an incendiary grenade fried from a safe distance, by a combustible train of suitable length, or other appropriate means. Take cover immediately. A hot fire is required to render the materiel useless.

WARNING: When igniting gasoline, due consideration should be given to the highly flammable nature of gasoline and its vapor. Carelessness in its use

may result in painful burns. Elapsed time: about 15 minutes

c. Method No. 3 — Destruction by Demolition.

(1) Disconnect the test stand from its source of electricity.

(2) Open all doors.

(3) Planning for simultaneous detonation, prepare and place four l-pound demolition charges (using a 1-pound TNT block or equivalent per charge, together with the necessary detonating cord to make up each charge) as follows:

(a) Place the first charge in the high-voltage compartment.

(b) Place the second charge in the stowage compartment.

(c) Place the third charge in the rectifier chamber.

(d) Place the fourth charge on the varidrive assembly housing where it extends through cabinet on the right hand side of the test stand.

(4) Connect the four charges for simultaneous detonation with detonating cord.

(5) Provide for dual priming to minimize the possibility of a misfire.

(6) Detonate the charges. For complete details on the use of demolition materials and methods of priming and detonating demolition charges, refer to FM 5-25. Training and careful planning are essential. The danger zone is approximately 250 yards. Elapsed time: about 4 minutes.

APPENDIX A

REFERENCES

1. General

a. Military Publications. The packaging publications listed herein are available to activities requiring such publications. Forward request for Military Specifications to Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19100. Requisition technical manuals, technical bulletins, supply bulletins, and other publications indexed in 310 series DA Pamphlets, in accordance with AR 310-1.

b. Commercial Publications. Commercial publications listed herein may be obtained from the following addresses: Uniform Freight Classifications Rules and Containers Specifications for Rail Shipment; Uniform Classifications Committee, 202 Union Station, Chicago, Illinois 60600. National Motor Freight Classification Rules and Container Specifications for Truck Shipments; American Trucking Association, 1424 16th Street, N. W., Washington, D.C., National Electrical Code; American Standard Association, 70 E. 45th St., New York, N.Y.

2. Army Regulations

Issue of Supplies and Equipment: Requisitioning Receipt, and Issue System . . . . . AR 725-50
Logistics (General): Report of Damaged or Improper Shipment . . . . . AR 700-58
Maintenance of Supplies and Equipment: Organizational, Policies and Responsibilities for Maintenance Operations . . . . . AR 750-5
Military Publications: General Policies . . . . . AR 310-1
Military Terms, Abbreviations, and Symbols: Dictionary of United States Army Terms . . . . . AR 320-5
Safety: Accident Reporting and Records . . . . . AR 385-40

3. Publications Indexes

The following publications indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this manual.

Indexes of Army Motion Pictures, Film Strips, Slides and Phono-Recordings . . . . . DA Pam 108-1

Military Publications:
- Index of Administrative Publications . . . . . DA Pam 310-1
- Index of Blank Forms . . . . . DA Pam 310-2
- Index of Graphic Training Aids and Devices . . . . . DA Pam 310-5

Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7,8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders . . . . . DA Pam 310-4
Index of Doctrinal, Training and organizational Bulletins . . . . . DA Pam 310-3

4. Field Manuals

Ammunition Service in the Theater of Operations . . . . . FM 9-6
Explosives and Demolition . . . . . FM 5-25
First Aid for Soldiers . . . . . FM 21-11
Military Symbols . . . . . FM 21-30
Military Training Management.. . . . . FM 21-5
Ordnance Direct Support Service.. . . . . FM 9-3
Techniques of Military Instructions . . . . . FM 21-6

5. Forms

The following forms pertain to this materiel:

DA Form 2028, Recommended Changes to DA Technical Manual Parts List or Supply Manual 7, 8, or 9 (cut sheet).

DA Form 2402, Exchange Tag.

DA Form 2404, Equipment Inspection and Maintenance Worksheet.

DA Form 2407, Maintenance Request.

DA Form 2408, Equipment Lubrication Record.

DD Form 6, Report of Damaged or Improper Shipment (cut sheet).

DD Form 250. Materiel Inspection and Receiving Report.

DD Form 1149, Requisition and Invoice/ Shipping Document (cut sheet).

DD Form 1348. DOD Single Line Item Requisition System Document (Manual).

6. Other Publications

a. General

DS, G5, and Depot Maintenance Repair Parts and Special Tools Lists for M113 (gasoline) and M113A1 (diesel) carrier vehicle family includes: carrier, personnel full tracked, armored M113, 2320-629-1294 and M113A1 2320-968-6321; carrier, command post, light, armored, M577 2320-856-6624 and M577A1 2320-056-6806 motor, self-propelled, 107-MM, M106 2350-860-2350 and M106A1 2350-076-9002; flame thrower, self-propelled, M132 2350-987-8900 and M132 2350-056-6809; and carrier, guided missile equipment XM474E2 1450-831-6942. TM 9-2300-224-35P/3

Field Maintenance Repair Parts for Starter Assembly (2920-678-1850) (Autolite Model MCZ 4005UT) and Drive Assembly (2920-678-1858) TM 9-2920-211-34P

The Army Equipment Record System and Procedures TM 38-750

¼-Ton, 4 x 4, Trucks M38, M38A1, M38A1C, and M170; ¾-Ton, 4 x 4 Chassis M56, M56B1, and M56C; Trucks, M37, M37B1, M43, M43B1, and M201; 2-½-Ton, 6 x 6, Chassis M44, M45, M45C, M46, M47, M57, M58, M133, M207, M207C, and M209; Repair Shop M185 and M238; Trucks M34, M35, M36C, M49, M49C, M50, M59, M60, M108, M109, M109C, M135, M211, M215, M217, M217C, M220, M220C, M222, V17A/MTQ and V18A/MTQ; and Truck Tractors M148, M221, and M275 Equipped with High-Capacity, Ac-dc, 100-Amperes, 28-Volt Generating Systems: Test and Rebuild of Generating Systems. TB 9-2300-206-15

b. Rebuild Procedures and Materials.

(1) General.

Cleaning of Ordnance Materiel TM 9-208-1

DS, GS, and Depot Maintenance Manual (Including Repair Parts) Starter, Engine Electrical, Assembly - 2920-226-6545 (Delco-Remy Model 1113943) (Military Part Number 10911018-1) Starter, Engine Electrical, Assembly - 2920-911-5637 (Delco-Remy Model 1113904) (Military Part Number 10911018) Starter, Engine Electrical, Assembly - 2920-912-9510 (Delco-Remy Model 1113944) TM 9-2920-242-35

DS and GS (Including Repair Parts and Special Tool Lists) Generator Assembly (2920-903-9534) (Prestolite Model GHA4804JUT). TM 9-2920-247-34

DS and GS Maintenance Manual: for Part One, Carrier, Personnel, Full Tracked: Armored, M113 (2320-269-1294); and Carrier, Personnel, Full Tracked: Armored M133A1 (2320-968-6321); Part Two, Carrier, Command Post, Light Tracked, M577 (2320-856-6624) and Carrier, Command Post, Light Tracked, 577A1 (2320-056-6808); Part Three, Motor, 107-MM, Self-Propelled: 106 (2350-860-2350); and Motor, 107-MM, Self-Propelled: M106 (2350-860-2350); and Motor, 107-MM, Self-Propelled: M106A1 (2350-076-9002); Part Four, Flame Thrower, Self-Propelled: M132 (2350-987-8900), and Flame Thrower, Self-Propelled: M132A1 (2350-056-6809); Part Five, Carrier, Guided Missile Equipment: XM474E2(1450-831-6943). TM 9-2300-224-34/3

DS and GS Maintenance Manual (Including direct and general support and depot maintenance repair parts list) for Starter, Engine, Electrical (2920-784-1708) (Prestolite model MEK6001T) and Starter, Engine, Electrical (2920-953-9708) (Prestolite model MEK6001AT).	TM 9-2920-222-34
DS and GS and Depot Maintenance Manual (Including direct and general support and depot maintenance repair parts list) for Generators, Engine, Assemblies (alternating current) 2920-050-8221,2920-314-0556,2920-475-1446,2920-818-8635,7954722 and 10929868 (Leece-Neville models 2134, 3002, 5258, 5300, and 5504).	TM 9-2920-225-35
Electrical Equipment, D30 and D42 Starter G22 Generator, F20-4 Inverter and LA4 Magneto (Jack & Heintz).	TM 9-8637
Electrical Equipment (Auto-Lite)	TM 9-1825-B
Electrical Equipment (Delco-Remy)	TM 9-8627
General Packaging Instructions for Ordnance General Supplies	TM 9-200
Field and Depot Maintenance Manual (Including field and depot maintenance repair parts): Generator assembly (2920-737-4750) (Electric Autolite model GHA-4802UT).	TM 9-2920-209-35
Field and Depot Maintenance Manual (Including field and depot maintenance repair parts list) for Generator, Engine, Assembly (300 Amp) 2920-294-3472, 2920-445-0857, 2920-563-0299, 2920-786-1175, 2920-830-1293,2920-830-6660, and 6115-629-1149; (Lear Siegler (formerly) Jack & Heintz) models G22, G22-2, G22-3, G22-6, G22-6F, G22-7, G22-7F, and G22-9).	TM 9-2920-224-35
Field and Depot Maintenance for Recovery Vehicle, Full Tracked: Medium, M88 (T88) (2320-678-5772).	TM 9-2320-222-35/1
Field Maintenance Manual: Starter Assembly (2920-678-1850) and Drive Assembly (2920-678-1858) (Autolite model MCZ 4005UT).	TM 9-2920-211-34
Field and Depot Maintenance Manual: Starter (2920-025-9988) Autolite model no. MCZ-4001-UT.	TM 9-2920-215-35
Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel; and Related. Materials Including Chemicals.	TM 9-247
operation and Organizational Field and Depot Maintenance Storage Batteries Lead-Acid Type.	TM 9-6140-200-15
Ordnance Maintenance: Auxiliary Generator (Delco Products model GM-A8585) and Engine Assemblies (Detroit Diesel GMC Types A41-1 and A41-2).	TM 9-7017-4
Ordnance Maintenance: Electrical Equipment (Eclipse-Pioneer)	TM 9-8631
Ordnance Maintenance: Miscellaneous Components for Full-Tracked Armored Personnel Carrier M59 (T59).	TM 9-7003
Protection of Ordnance General Supplies in Open Storage	TB ORD 379
Use, Care, and Maintenance of Electric Motors	TM 9-244
(2) *Cleaning.*	
1, 1, 1, Trichloroethane, Technical, Inhibited (Methyl Chloroform)	O-T-620
Solvents, Dry-Cleaning	P-S-661
Thinner, Paint, Volatile Mineral Spirits (Petroleum Spirits)	TT-T-291
Tire and Tube Reconditioning Materials and Equipment (Rubber and Related Products).	ZZ-T-416
(3) *Demolition.*	
Ammunition Service in the Theater of Operations	FM 9-6
Demolition Materials	TM 9-1375-200
Explosives and Demolitions	FM 5-25
(4) *Lubrication and Painting.*	
Grease, Automotive and Artillery	MIL-G-10924
Grease, Ball and Roller Bearing	MIL-G-18709
Lubricating Oil, General Purpose	MIL-L-15016
Lubricating Oil, Preservative, Special	MIL-L-644
Painting Instructions for Field Use	TM 9-213

APPENDIX B

MAINTENANCE ALLOCATION CHART

1. General

The maintenance allocation chart allocates maintenance operations to the proper category of maintenance. Allocations of maintenance operations is made on the basis of time, tools, and skills normally available to the various categories of maintenance to combat situation and influenced by maintenance policy and sound maintenance practices, as outlined in AR 750-5.

2. Explanation of Format

Purpose and use of the maintenance allocation chart format are as follows:

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Functional Group. Column 2 lists the noun names of components, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the category of maintenance.

d. Column 4, Tools and Equipment. This column will be used to specify, by code, those tools and test equipment required to perform the designated function.

e. Column 5, Remarks. Self explanatory.

3. Maintenance Functions.

Maintenance functions will be limited to and defined as follows:

INSPECT	To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristic with established standards.
TEST	To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
SERVICE	To clean, to preserve, to charge, and to add fuel, lubricate cooling agents, and air.
ADJUST	To rectify to the extent necessary to bring into proper operating range.
ALIGN	To adjust specified variable elements of an item to bring to optium performance.
CALIBERATE	To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
INSTALL	To set up for use in an operational environment such as an emplacement, site, or vehicle.
REPLACE	To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
REPAIR	To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting and strengthening.
OVERHAUL	To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards.
REBUILD	To restore an item to a standard as nearly as possible to original or new condition in ap pearance, performance, and life expectancy. That is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.
MAINTENANCE LEVEL	The letter placed in the appropriate column indicates the level responsible for performing that particular maintenance function. The maintenance level codes used are:

Maintenance Level	Code
Operator / Crew	C
Organizational Maintenance	O
Direct Support Maintenance	F
General Support Maintenance	H
Depot Maintenance	D

MAINTENANCE ALLOCATION CHART
FOR
GENERATOR, ALTERNATOR, AND STARTER, TEST STAND

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION											(4) TOOLS & EQUIP.	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
1	Battery Charger Circuit (on front panel)	O	F	. .	. .	. .	. .	. .	F	F	H	D		Level O - authorized replacement of indicator lamp (bulb) only
2	Binding Posts, Terminals, and Phone Jacks (except those in group no. 9 and 14)	C	F	O	. .	. .	. .	. .	F	F	. .	. .		Level O - authorized cleaning, preserving, and repairing threads only.
3	Battery, Rectifier, and stowage compartments	C	. .	. .	. .	. .	. .	. .	H	F	H	D		
4	Cabinet and test stand	C	. .	O	. .	. .	. .	F	H	F	H	D		Level O - authorized cleaning and spot painting (painting cleaned-off, rusted or scaled surfaces), also, preserving surfaces where required to prevent rust or corrosion.
5	Drive Control	O	. .	. .	. .	. .	. .	. .	F	F	H	. .		Level O - authorized replacement of indicator lamps (bulb) only.
6	Drive Motor and Varidrive Assembly	O	F	C	. .	. .	O	. .	H	H	H	D		Level O - authorized replacement of V belt and tachometer generator only.
7	Input and Drive Control Circuitry (high voltage compartment):													
	a. Circuit breaker	O	F	. .	. .	. .	. .	. .	F	H	H	D		
	b. Drive reversing switch	O	F	. .	. .	. .	. .	. .	F	F	H	D		
	c. Magnetic motor starter and related components	O	F	. .	. .	. .	. .	. .	F	F	. .	. .		Level O - authorized replacement of heater elements.
8	Load Bank, Blower and Blower Motor	F	F	. .	. .	. .	. .	. .	F	H	D	D		Level C - authorized replacement of fuses only.
9	Meters	O	F	O	C	. .	F	. .	F	F	H	D		Level O - authorized cleaning dial face and outside surfaces.
10	Mounting Brackets	C	. .	O	. .	. .	. .	. .	O	O	H	D		Level C - authorized to set zero adjustment only.
11	Panel Light	C	F	. .	. .	. .	. .	. .	O	F	H	D		
12	Rheostats, Switches, and Controls (except those in group no. 14)	O	F	. .	. .	. .	. .	. .	F	F	. .	. .		
13	Speed Control (varidrive assembly)	O	. .	. .	. .	. .	. .	. .	F	F	H	D		
14	Test Circuits (on main control panel):													
	a. Battery circuit selector	O	F	. .	. .	. .	. .	. .	F	F	H	D		Level O - authorized replacement of indicator lamps (bulbs) only
	b. Variable volts circuit	O	F	. .	. .	. .	. .	. .	F	F	H	D		Level C - authorized replacement of indicator lamp (bulb) only.
	c. External DC Voltmeter	O	F	. .	. .	. .	. .	. .	F	F	H	D		
	d. Pile Flutter	O	F	. .	. .	. .	. .	. .	F	F	H	D		
	e. Regulator Check (fixed resistor methods)	O	F	. .	. .	. .	. .	. .	F	F	H	D		
	f. Test Indicator	O	F	. .	. .	. .	. .	. .	F	F	H	D		

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION												(4) TOOLS & EQUIP.	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPLACE	REPAIR	OVERHAUL	REBUILD		
15	Tools and Equipment	C	O	. .	. .	. .	. .	. .	O	O	F	. .			
16	Wiring and components of internal circuitry (resistors, fuse blocks, insulator blocks, shunts, transformers, capacitors, etc.)	F	F	. .	. .	. .	. .	. .	H	H	H	D			

See Change 1

APPENDIX C

BASIC ISSUE ITEMS, ORGANIZATIONAL REPAIR PARTS, AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items and repair parts required for the performance of operator and organizational maintenance of the automotive generator, alternator, and starter test stand.

2. General

This Basic Issue Items, Repair Parts and Special Tools List is divided into the following sections:

a. Basic Issue Items. Not applicable.

b. Maintenance and Operating Supplies - Section II. A listing of maintenance and operating supplies required for initial operation.

c. Prescribed Load Allowance (PLA) — Section III. Acomposite listing of repair parts, special tools, and support equipment having quantitative for initial stockage at organizational level.

d. Repair Parts — Section IV. A list of repair parts authorized for the performance of maintenance at the organizational level in figure and item number sequence.

e. Tools and Support Equipment — Section V. A list of operating tools and support equipment authorized at the organizational level for use by test stand operator and crew.

f. Special tools, Test and Support Equipment. Not applicable.

g. Federal Stock Number and Reference Number Index — Section VI. A list of Federal stock numbers in ascending numerical sequence, cross-referenced to the illustration figure number, followed by a list of reference numbers appearing in all the listings, in numeric sequence, cross referenced to the Federal stock number.

3. Explanation of Columns

The following provides an explanation of columns in tabular lists in Section II through VII.

a. *Source, Maintenance, and Recoverability Codes (SMR).*

(1) *Source code.* Indicates the selection status and source for the listed item. Source Codes used are:

Code	*Explanation*
P	Applied to repair parts which are stocked in or supplied from GSA / DSA, ar Army supply system and authroized for use at indicated maintenance categories.
M	Applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance categories.
A	Applied to assemblies which are not procured or stocked, as such, but are made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
X	Applied to parts and assemblies which are not procured or stocked; the mortality of which normally is below that of the applicable end item; and the failure of which should result in retirement of the end item from the supply system.
X1	Applied to repair parts which are not procured or stocked, the requirement for which will be supplied by use of next higher assembly or component.
X2	Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain through cannibalization; if not, obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.
G	Applied to major assemblies that are procured with PEMA funds for initial issue only to he used as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DSU and GSU level or returned to depot supply level.

(2) *Maintenance code.* Indicates the lowest category of maintenance authorized to install the listed item. Maintenance level codes are:

Code	*Explantion*
C	Operator / Crew maintenance
O	Organizational maintenance

(3) *Recoverability code.* Indicates Whether unserviceable item should be returned for recovery or salvage. Items not coded are expendable. Recoverability cades are:

Code	*Explanation*
R	Applied to repair parts (assemblies and components) which are considered economically repairable at direct and general support maintenance levels. When the

Code	*Explanation*
	maintenance capability to repair these items does not exist, they are normally disposed of at the GS level. When supply considerations dictate, some of these repair parts may be listed for automatic return to supply for depot level repair as set forth in AR 710-50. When so listed, they will be replaced by supply on an exchange basis.
T	Applied to high dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.
U	Applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high dollar value reusable casings or castings.

NOTE: When no code is indicated in the recoverability column, the part will be considered expendable.

b. *Federal Stock Number.* Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. *Description.* Indicates the Federal item name and any additional description required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturer in parentheses.

d. *Unit of Measure (U/M).* A two character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., EA, SE, etc.

e. *Quantity Incorporated in Unit.* Indicates the quantity of the item used in the assembly group.

f. *Quantity Furnished with Equipment.* Indicates the quantity of an item furnished with the equipment (BILL only).

g. *15-Day Organizational Maintenance Allowance.*

(1) The allowance columns are divided into four subcolumns. Indicated in each subcolumn opposite the first appearance of each item is the total quantity of items authorized for the number of equipments supported. Subsequent appearance of the same item will have the letters "REF" in the allowance columns. Items authorized for use as required but not for initial stockage are identified with an asterisk in the allowance column.

(2) The quantitative allowances for organizational level of maintenance represents one initial prescribed load for a 15-day period for the number of equipments supported. Units and organizations authorized additional prescribed loads will multiply the number of prescribed loads authorized by the quantity of repair parts reflected in the appropriate density column to obtain the total quantity of repair parts authorized.

(3) Organizational units providing maintenance for more than 100 of these equipments shall determine the total quantity of parts required by converting the equipment quantity to a decimal factor by placing a decimal point before the next to last digit of the number to indicate hundredths, and multiplying the decimal factor by the parts quantity authorized in the 51-100 allowance column. Example, authorized allowance for 51-100 equipment is 12; for 140 equipments multiply 12 by 1.40 or 16.80 rounded off to 17 parts required.

(4) Subsequent changes to allowances will be limited as follows: No change in the range of items is authorized. If additional items are considered necessary, recommendation should be forwarded to Commanding General, U.S. Army Weapons Command, Rock Island Arsenal, Rock Island, IL 61201, for exception or revision to the allowance list. Revisions to the range of items authorized will be based upon engineering experience, demand data, or The Army Equipment Record System (TAERS) information.

h. *Illustration.*

(1) *Figure number.* Indicates the figure number of the illustration in which item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

4. Special Information — Not applicable.

5. How to Locate Repair Parts

a. When Federal stock numbers or reference number is unknown:

(1) *First.* Using the table of contents, determine the assembly group, i.e., overload relay heater, varidrive assembly, etc., within which the repair part belongs. This is necessary since illustrations are prepared for assembly groups and listings are divided into the same groups,

(2) *Second.* Find the illustration covering the assembly to which the repair part belongs.

(3) *Third.* Identify the repair part on the illustration and note the illustration figures and item number of the repair part.

(4) *Fourth.* Using the Repair Parts Listing, find the assembly group to which the repair part belongs and locate the figure and item number noted on the illustration.

b. When Federal stock number or reference number is known:

(1) *First.* Using the Index of Federal Stock Numbers and Reference Numbers, find the Federal stock number of reference number, The index is in ascending FSN sequence followed by a list of reference numbers in ascending alpha-numeric

sequence, cross-referenced to the illustration figure number and item number.

(2) *Second*. Using the Repair Parts Listing, find the assembly group of the repair part and the illustration figure number and item number referenced in the Index of Federal Stock Numbers and Reference Numbers.

6. Abbreviations and symbols

a. *Abbreviations* — *Explanation*

amp . . . . . .ampere(s)
BT. . . . . battery
c . . . . . .cycle(s)
c/o . . . . . .consist of
cd-pltd . . . . . .cadium plated
deg.....degree(s)
dr . . . . . drum
F . . . . . Farenheit
fl . . . . . flat
h . . . . . high, height
neg.....negative
ph.....phase
PD . . . . pitch diameter
pos . . . .positive
rev . . . . revision
SAE . . . . . Society of Automotive Engineers
S . . . . . steel
temp . . . . . temperature
v . . . . . volt(s)
w . . . . . wide, width
w/ . . . . . .with

b. Symbols — *Explanation*

& . . . . . and
- . . . . . negative
+.....positive

7. Federal Supply Codes for Manufacturers

Code	*Manufacturer*
21741	Ring Engineering Corp.
43334	New Departure Div. of General Motors Corp.
72781	Durkee Atwood Co.
81300	Dayco corp.
82386	Sun Electric Corp.
96906	Military Standards

8. Suggestions and Recommendations.

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

SECTION II. MAINTENANCE AND OPERATING SUPPLIES

Component Application	Federal Stock	Description	Qty Reqd for Initial Operation	Notes
Varidrive gear case	9150-225-4137	LUBRICATING OIL, GENERAL PURPOSE: antifoam 21.60 centistokes at 210 viscosity, 460 deg min flash point by Cleveland open-cup method MIL-L-15016, military symbol 2110. 5 gal dr	3 qts	For application of lubricating materials - see lubrication chart figure 4-1 and NOTES figure 4-2
Test Stand	9150-663-9795	GREASE, BALL AND ROLLER BEARING: lubricating oil and gelling agent, corrosion resistant used on ball and roller bearings. 32 to 225F temp range, MIL-G-18709. 5 lb can		
General Application	9150-895-7232	LUBRICATING OIL, GENERAL PURPOSE: antifoam, 5.43 centistokes at 210 deg F min flash point by Cleveland open cup method, MIL-L-15016 rev A, 3042 military symbol 1 qt can		

SECTION III.
PRESCRIBED LOAD ALLOWANCE

(1) FEDERAL STOCK NUMBER	(2) DESCRIPTION	(3) 15-Day Organizational Maintenance Allowance (a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
	The following items w / allowances are applicable to organizational maintenance of the test stand listed in this manual				
3110-529-0575	BEARING, BALL, ANNULAR: 1.5748 in. bore, 3.1496 in. od, 0.070 in. NDH3208(43334)	*	*	2	4
3030-249-4311	BELT, V: single arched, cog constructed, 7 / 8 x 2-7 / 8 x 67-15 / 32 X581097(81300)	*	*	*	2
6110-465-9134	HEATER, THERMAL RELEASE: overload relay, 220-v W158(21741)	*	4	8	10
6110-465-9133	HEATER, THERMAL RELEASE: overload relay, 440-v W151(21741)	*	4	8	10
4910-254-6339	FLANGE, ADAPTER : C548-2158(82386)	*	*	*	2
5920-465-0890	FUSE, CARTRIDGE: 10 amp, ferrule type, 250-v 739-014(82386)	5	1(	20	50
5920-783-7859	FUSE, CARTRIDGE: glass body, 15 amp, 125-v, dc, normal instantaneous ferrule type 739-022(82386)	2	6	10	20
4910-703-6069	GENERATOR, TACHOMETER : 0511-5001(82386)	*	*	*	2
6240-460-3951	LAMP, INDICATOR: main control panel, drive-on, power-on 910-6(82386)	2	4	12	20
6240-460-3952	LAMP, INDICATOR: main control panel, battery charger 910-9(82386)	1	2	6	10
6240-460-3949	LAMP, INDICATOR: battery selector and relay closure 910-030(82386)	4	8	16	20
5340-200-5219	RING, RETAINING: S, 1.272 in. id, 0.050 in. thk MS166-30-1137(96906)	*	2	4	6
5340-804-9745	RING, RETAINING: S, 3.325 in. od, 0.093 in. thk MS166-25-281(96906)	*	*	*	2
4910-253-5875	SHAFT, ADAPTER : C548-2157(82386)	*	*	*	4
5310-177-7697	WASHER, FLAT: pully output shaft C548-2160(82386)	*	2	4	6

(1) SOURCE MAINT. AND RECOV. CODE (A) SOURCE	(B) MAINT.	(C) RECOV.	(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY. INC. IN UNIT	(6) 5 DAY ORGANIZATIONAL MAINT. ALLOWANCE (A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(7) ILLUSTRATION (A) FIGURE NO.	(B) ITEM NO.
				INDICATOR LAMP GROUP								
P	O	-	6240-460-3952	LAMP, INDICATOR: main control panel, battery charger	EA	1	*	2	2	4	2-9	2
P	O	-	6240-460-3951	LAMP, INDICATOR: main control panel; LH side, drive-on. power-on. and 910-60 (82386)	EA	3	*	2	2	4	2-9	16,17
P	O	-	6240-460-3949	LAMP, INDICATOR: battery selector and relay closure 910-030 (82386)	EA	4	*	2	2	4	2-9	13,21
				OVERLOAD RELAY HEATER GROUP								
P	O	-	6110-465-9134	HEATER, THERMAL RELEASE: overload relay, 220-v W158(21741)	EA	2	*	*	2	4	C-3	37
P	O	-	6110-465-9133	HEATER, THERMAL RELEASE: overload rely, 400-v W151(21741)	EA	2	*	*	2	4	C-3	37
				VARIDRIVE ASSEMBLY AND TACHOMETER GENERATOR GROUP								
P	O	R	R910-703-6096	TACHOMETER GENERATOR: (0511-5001(82386)	EA	1	*	*	*	2	5-1	4
P	O	-	3030-249-4311	BELT, V: single arched, cog construction, 7/8x2-7/8x67-15/32 X581097(813OO)	EA	1	*	1	2	2	5-1	15
				PULLEY SHAFT AND BEARING ADAPTER GROUP								
P	O	-	5340-200-5219	RING, RETAINING: S, 1.272 in. id, 0.050 thk MS166-30-1137(96906)	EA	1	*	2	4	4	5-2	1
P	O	-	5310-177-7697	WASHER, FLAT: pulley output shaft C548-2160(82386)	EA	1	*	2	4	4	5-2	2
P	O	-	4910-253-5875	SHAFT, ADAPTER: C548-2157(82386)	EA		*	*	*	*	5-2	4
P	O	-	5340-804-9745	RING, RETAINING: S, 3.325 in. od, 0.093 in. thk MS166-25-281(96906)	EA		*	*	*	2	5-2	6
P	O	-	3110-529-0575	HEARING, BALL, ANNULAR: 1.5748 in bore, 3.1496 in. od, 0.708 in. w NDH3208(43334)	EA		*	*	2	4	5-2	7
P	O	-	4910-254-6339	FLANGE, ADAPTER: C548-2158(82386)	EA		*	*	*	*	5-2	8

Section V. TOOLS AND SUPPORT EQUIPMENT

(1) SOURCE MAINT. AND RECOV. CODE (A) SOURCE	(B) MAINT.	(C) RECOV.	(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY INC. IN UNIT	(6) 25 DAY ORGANIZATIONAL MAINT. ALLOWANCE (A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(7) ILLUSTRATION (A) FIGURE NO.	(B) ITEM NO.
P	C	-	6140-239-5972	LEAD, STORAGE BATTERY: 30 lg, marked N, BT C548-4101-01 (82386)	EA	1	*	*	*	*	C-1	1
P	C	-	6140-239-5974	LEAD, STORAGE BATTERY: 26 lg, marked 6V, BT+ C548-4101-02 (82386)	EA	1	*	*	*	*	C-1	2
P	C	-	6140-239-5977	LEAD, STORAGE BATTERY: 40 lg, marked 6V, BT- C548-4101-03 (82386)	EA	1	*	*	*	*	C-1	3
P	C	-	6140-239-5978	LEAD, STORAGE BATTERY: 34 lg, marked 12V, BT+ C548-4101-04 (82386)	EA	1	*	*	*	*	C-1	4
P	C	-	6140-239-5980	LEAD, STORAGE BATTERY: 36 lg marked 12V, BT- C548-4101-05 (82386)	EA	1	*	*	*	*	C-1	5
P	C	-	6140-239-5981	LEAD, STORAGE BATTERY: 11 lg marked BT+, BT+ C548-4101-06 (82386)	EA	1	*	*	*	*	C-1	6
P	C	-	6140-239-5982	LEAD, STORAGE BATTERY: 30 lg marked 12V, BT+ C548-4101-07 (82386)	EA	1	*	*	*	*	C-1	7
P	C	-	5340-549-6581	TERMINAL, LUG: battery, clamp type, pos w/ bolt and nut for lug type cable 75004-1 (96906)	EA	1	*	*	*	*	C-1	8
P	C	-	5340-549-6583	TERMINAL, LUG: battery, clamp type neg, w/ bolt and nut for lug type cable 75004-2 (96906)	EA	1	*	*	*	*	C-1	9
P	C	-	5995-177-2345	CABLE, SPECIAL PURPOSE, ELECTRI-cal: alternator C548-4102 (82386)	EA	1	*	*	*	*	C-1	10
P	C	-	6625-489-8424	LEAD, TEST: regulator,w/ lugs C548-4100-11 (82386)	EA	1	*	*	*	*	C-1	11
P	C	-	5995-134-6677	CABLE, SPECIAL PURPOSE, ELECTRI CAL: generator / starter C548-4109 (82386)	EA	2	*	*	*	*	C-1	12
P	C	-	5995-177-2344	CABLE, SPECIAL PURPOSE, ELECTRI-CAL: rectifier C548-4103 (82386)	EA	1	*	*	*	*	C-1	13
P	C	-	5995-177-2342	CABLE, SPECIAL PURPOSE, ELECTRI-CAL: recitfier C548-4104 (82386)	EA	1	*	*	*	*	C-1	14
P	C	-	5995-177-2341	CABLE, SPECIAL PURPOSE, ELECTRI-CAL: generator C548-4105 (82386) C548-4105 (82386)	EA	i	*	*	*	*	C-1	15
P	C	-	5995-134-6685	CABLE, SPECIAL PURPOSE, ELECTRI-CAL: regulator C548-4110 (82386)	EA	2	*	*	*	*	C-1	16
				CABLE, SPECIAL PURPOSE, ELECTRI-CAL: blower motor C548-4113 (82386)	EA	1	*	*	*	*	C-1	17
P	C	-	5995-134-6676	CABLE, SPECIAL PURPOSE, ELECTRI-CAL: regulator C548-4108 (82386)	EA	:	*	*	*	*	C-1	18
P	C	-	6625-489-8425	LEAD, TEST: regulator, w/ lugs C548-4100-10 (82386)	EA	1	*	*	*	*	C-1	19
P	C	-	6625-491-0585	LEAD, TEST: regulator, w/ lugs C548-4100-04 (82386)	EA	1	*	*	*	*	C-1	20
P	C	-	6625-491-0582	LEAD, TEST: generator/ starter, w/ lugs C548-4100-09 (82386)	EA		*	*	*	*	C-1	21

(1) SOURCE MAINT. AND RECOV. CODE			(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY. INC. IN UNIT	(6) 15 DAY ORGANIZATIONAL MAINT. ALLOWANCE				(7) ILLUSTRATION	
(A) SOURCE	(B) MAINT.	(C) RECOV.					(A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(A) FIGURE NO.	(B) ITEM NO.
P	C		6625-491-0591	LEAD, TEST: generator / starter, w / lugs C548-4100-16(82386)	EA	1	*	*	*	*	C-1	2
P	C		5995-134-668	CABLE SPECIAL PURPOSE, ELECTRICAL: regulator C548-4114(82386)	EA	1	*	*	*	*	C-2	1
P	C		6625-492-6138	LEAD, TEST: external meters w / 1 lug and 1 clip C548-4112-01(82386)	EA	1	*	*	*	*	C-2	2
P	C		6625-400-7683	LEAD, TEST: external meters, w / 1 lug and 1 clip C548-4112-02(82386)	EA	1	*	*	*	*	C-2	3
P	C		6625-491-0586	LEAD, TEST: regulator, w / lugs C548-4100-03(82386)	EA	1	*	*	*	*	C-2	4
P	C		6625-491-0583	LEAD, TEST: generator, w / 1 lug and 1 clip C548-4100-08(82386)	EA	1	*	*	*	*	C-2	5
P	C		6625-491-0610	LEAD, TEST: regulator, w / 1 lug and 1 clip C548-4100-18(82386)	EA	1	*	*	*	*	C-2	6
P	C		6625-489-8423	LEAD, TEST: regulator, w / lugs C548-4100-12(82386)	EA	1	*	*	*	*	C-2	7
P	C		4910-254-6319	LEAD, TEST: regulator, w / lugs C548-4115(82386)	EA	1	*	*	*	*	C-2	8
P	C		6625-491-0584	LEAD, TEST: generator, w / 1 lug and 1 clip C548-400-07(82386)	EA	1	*	*	*	*	C-2	9
P	C		6625-496-8542	LEAD, TEST: generator, w / 1 lug and 1 clip C548-4100-19(82386)	EA	1	*	*	*	*	C-2	10
P	C		6625-491-0581	LEAD, TEST: regulator, w / lugs C548-4100-13(82386)	EA	1	*	*	*	*	C-2	11
P	C		5995-134-6687	CABLE, SPECIAL PURPOSE, ELECTRICAL: generator C548-4106(82386)	EA	1	*	*	*	*	C-2	12
P	C		5995-134-6675	CABLE, SPECIAL PURPOSE, ELECTRICAL: regulator C548-4107(82386)	EA	1	*	*	*	*	C-2	13
P	C		6625-489-8422	LEAD, TEST: regulator, w / lugs C548-4100-14(82386)	EA	1	*	*	*	*	C-2	14
P	C		6625-489-8421	LEAD, TEST: generator, w / 1 lug and 1 clip C548-4100-15(82386)	EA		*	*	*	*	C-2	15
P	C		6625-491-0592	LEAD, TEST: regulator / starter, w / lugsEqp C548-4100-17(82386)	EA		*	*	*	*	C-2	16
P	C		6625-491-0587	LEAD, TEST: regulator / starter, w / lugs C548-4100-02(82386)	EA		*	*	*	*	C-2	17
P	C		6625-491-0588	LEAD, TEST: regulator, w / lugs C548-4100-01(82386)	EA	1	*	*	*	*	C-2	18
P	C		4910-253-5872	SUPPORT ASSEMBLY: regulator, c / o C548-2202(82386)	EA	1	*	*	*	*	C-3	1
P	C		4910-254-6338	ADAPTER, REGULATOR MOUNTING C548-2232(82386)	EA	1	*	*	*	*	C-3	1-A
P	C		4910-254-633	BRACKET, SUPPORT ASSEMBLY C548-2203(82386)	EA	1	*	*	*	*	C-3	1-B
P	C		5975-410-5993	STRAP, TIE DOWN, ELECTRICAI COMPONENTS: C548-2204(82386)	EA	1	*	*	*	*	C-3	1-C
P	C		5315-843-7437	PIN, PIVOT: regulator support 5688-5002(82386)	EA	2	*	*	*	*	C-3	1-D
P	C		5305-956-718	THUMBSCREW, WINGHEAD : S 1 / 4-20 x 0.750 in., fl pt, cd-pltd	EA	5	*	*	*	*	C-3	1-E
P	C		4910-253-587	BAR, CLAMPING, RAIL: C548-2207(82386)	EA	1	*	*	*	*	C-3	1-F

(1) SOURCE MAINT. AND RECOV. CODE			(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY. INC. IN UNIT	(6) 15 DAY ORGANIZATIONAL MAINT. ALLOWANCE				(7) ILLUSTRATION	
(A) SOURCE	(B) MAINT.	(C) RECOV.					(A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(A) FIGURE NO.	(B) ITEM NO.
				TOOLS AND SUPPORT EQUIPMENT Continued								
P	C	-	4910-253-5874	BRACKET, SUPPORT: component mounting C548-2205(82386)	EA	1	*	*	*	*	C-3	1-G
P	C	-	4910-254-6321	BASE, COMPONENT MOUNTING : C548-2206(82386)	EA	1	*	*	*	*	C-3	1-H
P	C	-	4910-789-0479	ADAPTER, MOUNTING FLANGE : 2-764(82386)	EA	1	*	*	*	*	C-3	2
P	C	-	4910-254-6327	GUARD, BELT: C548-2226(82386)	EA	1	*	*	*	*	C-3	3
P	C	-	4910-254-6329	SPACER, CRADLE SUPPORT: C548-2168(82386)	EA	1	*	*	*	*	C-3	4
P	C	-	4910-253-5873	BRACKET, CRADLE SUPPORT: C548-2163(82386)	EA	1	*	*	*	*	C-3	5
P	C	-	4910-254-6332	BRACKET, RECTIFIER MOUNTING : C548-2249(82386)	EA	1	*	*	*	*	C-3	6
P	C	-	3030-834-5928	BELT, V, MATCHED SET: plain type, B cross section, rubberized fabric, 11 / 16 tip w, 33 id matched set of 4 B33(72781)	SE	1	*	2	4	4	C-3	7
P	C	-	3030-834-5926	BELT, V, MATCHED SET: plain type, A cross section, rubberized fabric, 17 / 32 top w, 33 id, matched set of 4 A33(72781)	SE	1	*	2	4	4	C-3	8
P	C	-	3030-834-5935	BELT, V, MATCHED SET: plain type, 0 cross section, rubberizied fabric, 13 / 32 top w, 33-1 / 2 id, matched set of 4 3L350(72781)	SE	1	*	2	4	4	C-3	9
P	C	-	4910-253-5867	ADAPTER, FLANGE: for no. 6 SAE to 1 / 2 PD adapter C548-2244(82386)	EA	1	*	*	*	*	C-3	10
P	C	-	4910-253-5869	ANGLE, MOUNTING: for soft shell alternators C548-2141(82386)	EA	1	*	*	*	*	C-3	11
P	C	-	4910-254-6323	CHANNEL, MOUNTING: for soft shell alternators C548-2169(82316)	EA	1	*	*	*	*	C-3	12
P	C	-	4910-254-6325	EXTENSION, BRACKET: cradle support C548-1235(82386)	EA	1	*	*	*	*	C-3	13
P	C	-	4910-254-6331	FLANGE GENERATOR DRIVE: for Delco A8585 generator attachment C548-2243(82386)	EA	1	*	*	*	*	C-3	14
P	C	-	5340-900-5219	RING, RETAINING: S, 1.272 in. id, 0.050 in. thk MS166-30-1137(96906)	EA	1	*	*	*	*	C-3	15
P	C	-	5310-177-7697	WASHER, FLAT: pulley output shaft C548-2160(82386)	EA	1	*	*	*	*	C-3	16
P	C	-	5315-781-2025	KEY, MACHINE : 0.375 h, 0.375 w, 3.000 lg	EA	1	*	*	2	4	C-3	17
P	C	-	5315-781-2027	KEY, MACHINE : 0.375 h, 0.375 w, 1.500 lg	EA	1	*	*	2	4	C-3	18
P	C	-	4910-254-6326	BATTERY BLOCK, HOLD-DOWN : C548-1820(82386)	EA	1	*	*	*	*	C-3	19
P	C	-	4910-254-6336	BRACKET, PIVOT SUPPORT: C548-2149(82386)	EA	1	*	*	*	*	C-3	20
P	C	-	3020-253-5879	PULLEY, GROOVE: V-belt, 0 size C548-2161(82386)	EA	1	*	*	*	*	C-3	21
P	C	-	3020-253-5878	PULLEY, GROOVE: V-belt A / B size C548-2161(82386)	A	1	*	*	*	*	C-3	22

(1) SOURCE MAINT. AND RECOV. CODE (A) SOURCE	(B) MAINT.	(C) RECOV.	(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY. INC. IN UNIT	(6) 15 DAY ORGANIZATIONAL MAINT. ALLOWANCE (A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(7) ILLUSTRATION (A) FIGURE NO.	(B) ITEM NO.
				TOOLS AND SUPPORT EQUIPMENT Continued								
P	C		4910-254-6322	CRADLE, MOUNTING: generator or alternator C548-2170(82386)	EA	1	*	*	*	*	C-3	23
P	C		4910-254-6335	ADAPTER, FLANGE: for Delco A8585 generator C548-2242(82386)	EA	1	*	*	*	*	C-3	24
P	C		4910-254-6341	PULLEY OUTPUT SHAFT ASSEMBLY: C548-2156(82386)	EA	1	*	*	*	*	C-3	25
P	C		4910-253-5868	COUPLING, SHAFT: 1 / 2 PD spline 3046-5001-01(82386)	EA	1	*	*	*	*	C-3	26
P	C		4910-254-6340	ADAPTER SPLINE: no. 6 SAE female to 1 / 2 PD male spline C548-2246(82386)	EA	1	*	*	*	*	C-3	27
P	C		4910-786-4118	ADAPTER, SPLINE: 1 / 2 PD male to no. 8 PD female spline 140-008 (82386)	EA	1	*	*	*	*	C-3	28
P	C		5965-470-9521	HEAD SET: carbon pile flutter 3931-6001(82386)	EA	1	*	*	*	2	C-3	29
P	C		4910-253-5877	SHAFT, PIVOT pivot arm C548-2148(82386)	EA	1	*	*	*	*	C-3	30
P	C		5307-410-4935	STUD SHOULDERED: hex, pivot arm C548-2155(82386)	EA	3	*	*	*	6	C-3	31
P	C		4910-254-6324	ARM-PIVOT: B548-2147(82386)	EA	1	*	*	*	*	C-3	32
P	C		5920-465-8906	FUSE, CARTRIDGE: 10 amp, ferrule type 600-V 739-014(82386)	EA	6	6	1:	2(	(	C-3	33
P	C		5920-783-7859	FUSE, CARTRIDGE glass body, 15 amp, 125-V, dc, normal, instantaneous, ferrule type 739-022(82386)	EA	1	2	4	8	1(	C-3	4
P	C		6680-834-5941	TACHOMETER HAND: reed type 0316-6001(82386)	EA	1	*	*	*	*	C-3	35
P	C		4910-254-6320	LINK, BUS BAR: brass C548-5700(82386)	EA	2	*	2	4	4	C-3	36
P	C		6110-465-9134	HEATER, THERMAL RELEASE: overload relay, 220-V W158(21741)	EA	2	2	4	8	1(	C-3	37
P	C		6110-465-9133	HEATER, THERMAL RELEASE: overload relay, 440-V W151(21741)	EA	2	2	4	8	1(		
P	C		4910-254-6337	BAR, TORQUE ARM: scale mtg C548-2195(82386)	EA	1	*	*	*	*	C-4	1
P	C		4910-254-6333	SUPPORT, STARTER MOUNTING: C548-2199(82386)	EA	1	*	*	*	*	C-4	2
P	C		4910-253-5876	LOCK, TORQUE ASSEMBLY: clutch driven C548-2177(82386)	EA	1	*	*	*	*	C-4	3
P	C		4910-253-5871	JAW, CLUTCH lock torque assembly C548-2188(82386)	EA	1	*	*	*	*	C-4	4
P	C		6670-440-0318	SCALE, SPRING: dial face 0-80 lbs, assy 0001-5006(82386)	EA	1	*	*	*	*	C-4	5
P	C		6670-440-0317	SCALE, SPRING: 0-20 lbs, assy 0001-5007(82386)	EA	1	*	*	*	*	C-4	6
P	C		4910-254-6328	FLANGE, UNIVERSAL MOUNTING: starter C548-2198(82386)	EA	1	*	*	*	*	C-4	7

(1) SOURCE MAINT. AND RECOV. CODE (A) SOURCE	(B) MAINT.	(C) RECOV.	(2) FEDERAL STOCK NO.	(3) DESCRIPTION	(4) UNIT OF ISSUE	(5) QTY. INC. IN UNIT	(6) 15 DAY ORGANIZATIONAL MAINT. ALLOWANCE (A) 1-5	(B) 6-20	(C) 21-50	(D) 51-100	(7) ILLUSTRATION (A) FIGURE NO.	(B) ITEM NO.
				TOOLS SUPPORT EQUIPMENT - Continued								
				TORQUE ARM CLAMP ASSEMBLY pinion driven C548-2194(82386) c/o:	EA	1	*	*	*	*	C-4	8
P	C	-	4910-254-6318	CLAMP, TORQUE ARM: C598-2196(82386)		1	*	*	*	*	C-4	..
X1	-	-	.....	BRACKET, COUNTER BALANCE C548-2198(82386)		1	*	*	*	*	C-4	..
P	C	-	4030-545-854	HOOK, CHAIN, S: 0.250 in. wire dia, 1 1/2 inside lg, 3/4 id, 3/8 min opng, fc attaching scale to torque arm bar	EA	1	*	*	*	*	3-1	..

FEDERAL STOCK NUMBER AND REFERENCE NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER

Stock Number	Figure No.	Item No.
3020-253-5878	C-3	22
3020-253-5879	C-3	21
3030-249-4311	5-1	15
3030-834-5926	C-3	8
3030-834-5928	C-3	7
3030-834-5935	C-3	9
3110-529-0575	5-2	7
4030-545-8540	3-12	-
4910-253-5867	C-3	10
4910-253-5868	C-3	26
4910-253-5869	C-3	11
4910-253-5870	C-3	1-F
4910-253-5871	C-4	4
4910-253-5872	C-3	1
4910-253-5873	C-3	5
4910-253-5874	C-3	1-G
4910-253-5875	5-2	4
4910-253-5876	C-4	3
4910-253-5877	C-3	30
4910-254-6318	C-4	-
4910-254-6319	C-2	8
4910-254-6320	C-3	36
4910-254-6321	C-3	1-H
4910-254-6322	C-3	23
4910-254-6323	C-3	12
4910-254-6324	C-3	32
4910-254-6325	C-3	13
4910-254-6326	C-3	19
4910-254-6327	C-3	3
4910-254-6328	C-3	7
4910-254-6329	C-3	4
4910-254-6330	C-3	1-B
4910-254-6331	C-3	14
4910-254-6332	C-3	6
4910-254-6333	C-4	2
4910-254-6335	C-3	24
4910-254-6336	C-3	20
4910-254-6337	C-4	1
4910-254-6338	C-3	1-A
4910-254-6339	5-2	8
4910-254-6340	C-3	27
4910-254-6341	C-3	25
4910-703-6096	5-1	4
4910-786-4118	C-3	28
4910-789-0479	C-3	2
5305-956-7184	C-3	1-E
5307-410-4935	C-3	31
5310-177-7697	C-3	16
5315-781-2025	C-3	17
5315-781-2027	C-3	18
5315-843-7437	C-3	1-D
5340-200-5219	C-3	16
	5-2	1
5340-549-6581	C-1	8
5340-549-6583	C-1	9
5340-804-9745	5-2	6
5920-465-8906	C-3	33
5920-783-7859	C-3	34
5965-470-9521	C-3	29
5975-410-5993	C-3	1-C
5995-134-6675	C-2	13
5995-134-6676	C-1	18
5995-134-6677	C-1	12
5995-134-6685	C-1	16
5995-134-6686	C-2	1
5995-134-6687	C-2	12
5995-177-2341	C-1	15
5995-177-2342	C-1	14
5995-177-2344	C-1	13
5995-177-2345	C-1	10
6110-465-9133	C-3	37
6110-465-9134	C-3	37
6140-239-5972	C-1	1
6140-239-5974	C-1	2
6140-239-5977	C-1	3
6140-239-5978	C-1	4
6140-239-5980	C-1	5
6140-239-5981	C-1	6
6140-239-5982	C-1	7
6240-460-3951	2-9	2
6240-460-3952	2-9	16,17
6240-460-3949	2-9	13,21
6625-400-7683	C-2	3
6625-489-8421	C-2	15
6625-489-8422	C-2	14
6625-489-8423	C-2	7
6625-489-8424	C-1	11
6625-489-8421	C-1	19
6625-491-0581	C-2	11
6625-491-0582	C-1	21
6625-491-0583	C-2	5
6625-491-0584	C-2	9
6625-491-0585	C-1	20
6625-491-0586	C-2	4
6625-491-0587	C-2	17
6625-491-0588	C-2	18
6625-491-0591	C-1	22
6625-491-0592	C-2	16
6625-491-0610	C-2	6
6625-492-6138	C-2	2
6625-496-8542	C-2	10
6670-440-0317	C-4	6
6670-440-0318	C-4	5
6680-834-5941	C-3	35

Section VI

FEDERAL STOCK NUMBER AND REFERENCE NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER *continued*

Reference No.	Mfg Code	Fig No.	Item No.
A33	72781	C-3	8
B33	72781	C-3	7
C548-1235	82386	C-3	13
C548-1820	82386	C-3	19
C548-2141	82386	C-3	11
C548-2147	82386	C-3	32
C548-2148	82386	C-3	30
C548-2149	82386	C-3	20
C548-2155	82386	C-3	31
C548-2156	82386	C-3	25
C548-2157	82386	5-2	4
C548-2158	82386	5-2	8
C548-2160	82386	C-3	16
		5-2	2
C548-2161	82386	C-3	22
C548-2162	82386	C-3	21
C548-2163	82386	C-3	5
C548-2168	82386	C-3	4
C548-2169	82386	C-3	12
C548-2170	82386	C-3	23
C548-2177	82386	C-4	3
C548-2188	82386	C-4	4
C548-2194	82386	C-4	8
C548-2195	82386	C-4	1
C548-2196	82386	C-4	
C548-2198	82386	C-4	7
C548-2199	82386	C-4	2
C548-2202	82386	C-3	1
C548-2203	82386	C-3	1-B
C548-2204	82386	C-3	1-C
C548-2205	82386	C-3	1-G
C548-2206	82386	C-3	1-H
C548-2207	82386	C-3	1-F
C548-2226	82386	C-3	3
C548-2232	82386	C-3	1-A
C548-2242	82386	C-3	24
C548-2243	82386	C-3	14
C548-2244	82386	C-3	10
C548-2246	82386	C-3	27
C548-2249	82386	C-3	6
C548-4100-01	82386	C-2	18
C548-4100-02	82386	C-2	17
C548-4100-03	82386	C-2	4
C548-4100-04	82386	C-1	20
C548-4100-07	82386	C-2	9
C548-4100-08	82386	C-2	5
C548-4100-09	82386	C-1	21
C548-4100-10	82386	C-1	19
C548-4100-11	82386	C-1	11
C548-4100-12	82386	C-2	7
C548-4100-13	82386	C-2	11
C548-4100-14	82386	C-2	14
C548-4100-15	82386	C-2	15
C548-4100-16	82386	C-1	22
C548-4100-17	82386	C-2	16
C548-4100-18	82386	C-2	6
C548-4100-19	82386	C-2	10
C548-4101-01	82386	C-1	1
C548-4101-01	82386	C-1	2
C548-4101-03	82386	C-1	3
C548-4101-04	82386	C-1	4
C548-4101-05	82386	C-1	5
C548-4101-06	82386	C-1	6
C548-4101-07	82386	C-1	7
C548-4102	82386	C-1	10
C548-4103	82386	C-1	13
C548-4104	82386	C-1	14
C548-4105	82386	C-1	15
C548-4106	82386	C-2	12
C548-4107	82386	C-2	13
C548-4108	82386	C-1	18
C548-4109	82386	C-1	12
C548-4110	82386	C-1	16
C548-4112-01	82386	C-2	2
C548-4112-02	82386	C-2	3
C548-4113	82386	C-1	17
C548-4114	82386	C-2	1
C548-4115	82386	C-2	8
C548-5700	82386	C-3	36
NDH3208	43334	5-2	7
MS166-25-281	96906	5-2	6
MS166-30-1137	96906	C-3	15
		5-2	1
W151	21741	C-3	37
W158	21741	C-3	37
X581097	81300	5-1	15
0001-5006	82386	C-4	5
0001-5007	82386	C-4	6
0316-6001	82386	C-3	35
0511-5001	82386	5-1	4
140-008	82386	C-3	28
2-764	82386	C-3	2
3046-5001-01	82386	C-3	26
3L350	72781	C-3	9
3931-6001	82386	C-3	29
5688-5002	82386	C-3	1-D
739-014	82386	C-3	33
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75004-2	96906	C-1	9

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- USA FA Cen (2)
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  - TEAD (5)
  - LEAD (5)
  - CHAD (5)
- Gen Dep *(2)*
- USACDCEC (10)
- PG (1)
- EAMTMTS (1)
- WAMTMTS (1)
- Arsenals (2) except
  - Detroit (5)
  - Rock Island (10)
- Engr FLDMS (2)
- Ft Knox FLDMS (10)
- 4th USASA Fld Sta (1)
- Units org under fol TOE:- 2 ea.
  - 29-1
  - 29-11
  - 29-15
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  - 29-138
  - 29-147
  - 29-205
  - 29-207
  - 29-298
  - 29-245
  - 29-247
  - 29-427
  - 29-600

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USAR: None.
For explanation of abbreviations used, see AR 310-50.

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

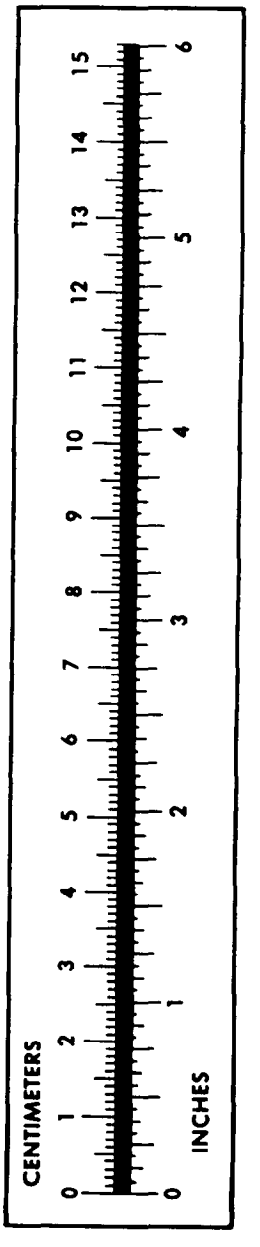
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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