TM 94910-736-14&P

DEPARTMENT
OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE
MANUAL INCLUDING REPAIR PARTS LIST

FOR

IGNITION COIL - CAPACITOR TESTER

MODEL NUMBER 403

(4910-00-300-1305)

FEBRUARY 1984

HEADQUARTERS,
DEPARTMENT OF THE ARMY

WARNING PAGE

HIGH VOLTAGE is used in the operation of this equipment. DEATH ON CONTACT may result if personnel fail to observe the safety equipment.

Be careful not to contact high voltage connections when operating or servicing this equipment.

High voltages capable of causing death are used in this equipment. Use extreme caution when operating or servicing the test set with the PUSH TO TEST switch depressed (pages 2-6, 2-11, 2-13, 3-18, and 3-22) or when troubleshooting the condenser leakage test circuit (page 3-7).

When using compressed air, do not exceed 10 psi. Compressed air in excess of 10 psi can cause injury. Do not direct compressed air against skin (page 3-l).

When PUSH TO TEST switch is depressed, HIGH VOLTAGE is present across TEST LEADS and condenser under test. DO NOT touch leads or condenser under test when PUSH TO TEST switch is depressed.

When PUSH TO START switch is depressed, HIGH VOLTAGE is present across all leads and coil under test. DO NOT touch leads or coil under test when PUSH TO TEST switch is depressed.

High voltage is present in this test. DO NOT TOUCH ANY EXPOSED COMPONENTS. Exercise extreme caution when measuring voltage. Set instrument to off during inspection. For steps 3 through 7, use VTVM on 500 V scale.

DO NOT touch TEST LEADS or any equipment or leads when the PUSH TO TEST switch is depressed. HIGH VOLTAGE is present in this procedure.

When PUSH TO TEST switch is depressed DO NOT touch leads or coil. HIGH VOLTAGE is present in this procedure.

Technical Manual

No. 94910-736-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 13 February 1984

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

Operator, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts List for:

Ignition Coil-Capacitor Tester
Model No. 403
NSN 4910-00-300-1305

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this equipment is issued.

Manufactured by: Bruno-N.Y. Industries Corporation
40th Smith Street
Farmingdale, NY 11735

Procured under Contract No. DAM 09-80-C-4968

INSTRUCTIONS FOR REQUISITIONING PARTS

NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer’s Federal Supply Code Number - 95325

2 - Manufacturer’s Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer’s Model Number - 403

5 - Manufacturer's Serial Number (End Item).

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer’s Federal Supply Code Number - 95325 followed by a colon and manufacturer’s Part Number for the repair part.

(b) Complete Remarks field as follows:

Noun: (nomenclature or repair part)
For: NSN: 4910-00-300-1305
Manufacturer: Bruno-NY Industries Corporation
40th Smith Street, Farmingdale, NY 11735
Model: 403
Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the high voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position, due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery.

The following warnings appear in the text in this volume, and are repeated here for emphasis.

WARNING

High voltages capable of causing death are used in this equipment. Use extreme caution when operating or servicing the test set with the PUSH TO TEST switch depressed (pages 2-6, 2-11, 2-13, 3-18, and 3-22) or when troubleshooting the condenser leakage test circuit (page 3-7).

WARNING

When using compressed air, do not exceed 10 psi. Compressed air in excess of 10 psi can cause injury. Do not direct compressed air against skin. (Page 3-l.)

Section I. INTRODUCTION AND GENERAL INFORMATION

1-1. INTRODUCTION . This manual provides operation and maintenance instructions along with a parts list for the Ignition Coil-Capacitor Tester (figure l-l), Model Number 403.

1-2. SCOPE OF MANUAL. Section I of this manual includes a description of the Ignition Coil-Capacitor Tester (also referred to as the test set), its leading particulars, and tables of equipment furnished and test equipment required for maintenance e. Section II covers operation instructions and Section III covers maintenance. The diagrams section (IV) includes a schematic diagram of the test set and Section V is a replacement parts list of the test set.

1-3. PURPOSE . The purpose of the test set is to test the coil and condenser in the ignition systems of automotive vehicles.

1-4. DESCRIPTION. The test set is a self-contained unit. It includes, in a carrying case (with a handle), compartments for the main chassis (front panel and printed circuit board assembly), test and battery leads and the coil pick-up lead. Access to these compartments may be gained by opening the cover, latched on one side and hinged on the other. The front panel contains the switches and indicators required to operate the test set.

1-5. LIST OF ITEMS FURNISHED. Refer to table 1-1 for a list of items furnished.

Table 1-1. List of Items Furnished

Name	Description/model no.
Ignition Coil-Capacitor Tester	Model 403
Battery Leads	AWG No. 16 with insulated clips (9 feet long)
Test Leads	AWG No. 18 with insulated clips (9 feet long)
Coil Pick-Up Lead	9 feet long
Coil Voltage Test Adapters	403BA031, 403BA032, 403BA033, and 403BA034
Technical Manual	

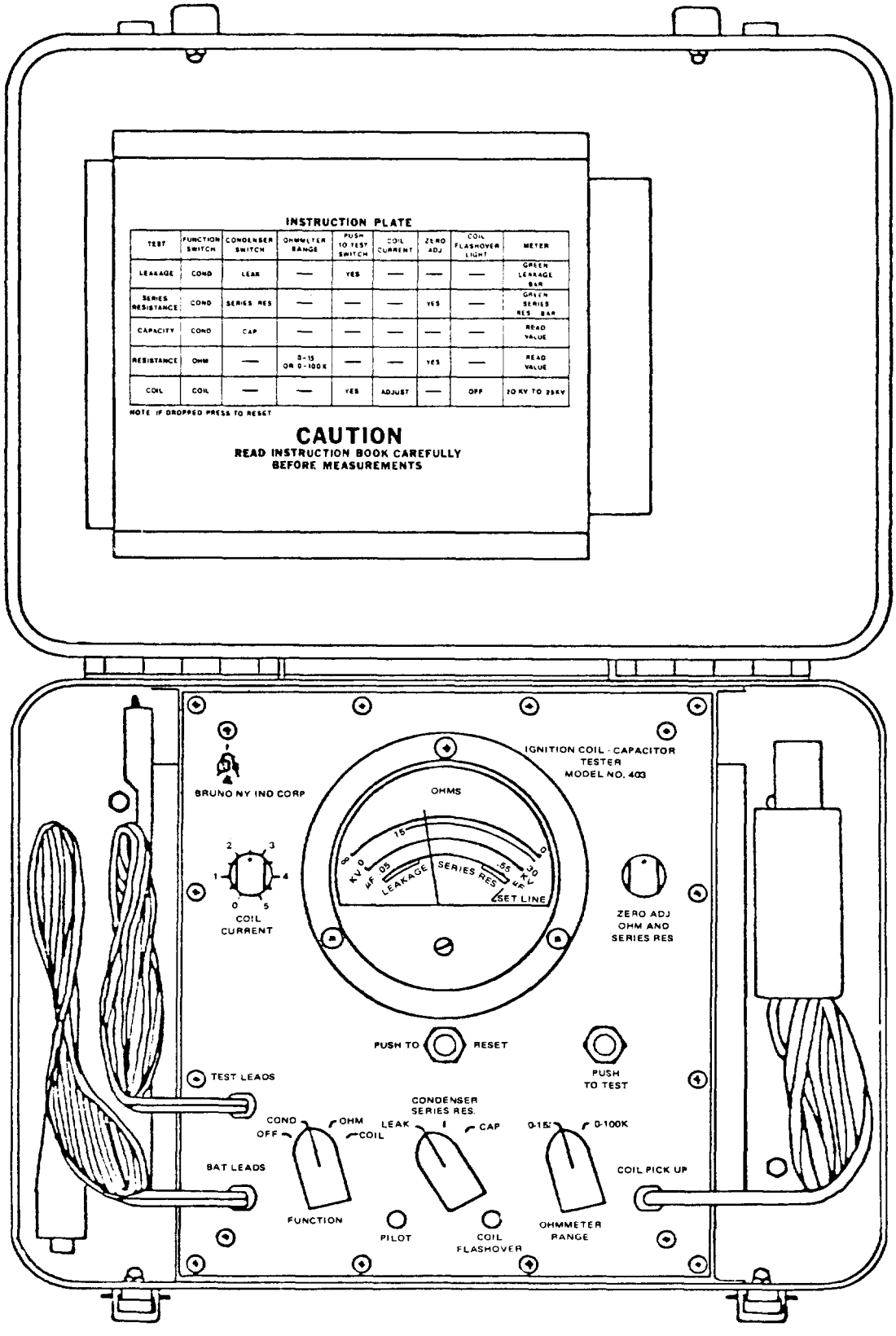

Figure 1-1. Ignition Coil-Capacitor Tester

1-6. LEADING PARTICULARS. Table 1-2 is a list of leading particulars for the test set.

Table 1-2. Leading Particulars

Nomenclature	Ignition Coil-Capacitor Tester. Model No. 403
Dimensions:	
Length	11-1/16 inches
Width	14-1/8 inches
Height	6-3/4 inches
Weight	Approximately 11 pounds
Supply Voltage	12 to 16 V dc
Condenser Leakage Test:	
Voltage	500 V dc ± 10%
Allowable Limit	2 Mohms minimum (within green LEAKAGE bar)
Condenser Series Resistance Test	
Allowable Limit	0.3 ohm maximum (within green SERIES RES bar)
Condenser Capacitance Test:	
Range	0.05 to 0.55 uf
Accuracy	±3% of full-scale deflection
Ohmmeter	
Ranges	0-15 ohms, 0-100 Kohms
Center of Scale	5 ohms and 5 Kohms
Accuracy	±3% of arc length over 2/3 of scale
High Voltage Range	0 to 30 kV
Coil Flashover Indicator	Red LED
Environmental Requirements:	
Operating Temperature Range	+30°F (-1°C) to +115°F (+46°C)
Storage Temperature Range	-65°F (-54°C) to +155°F (+68°C)
Humidity	Up to 97%
Vibration	Less than 0.06 inch maximum excursion, from 5 to 55 cycles
Shock	Vertical drop in its three major axis of 8 inches maximum

1-7. TEST EQUIPMENT. Table 1-3 lists special and standard test equipment to be used for maintenance of the test set.

Table 1-3. Test Equipment

Name		Special/standard
Power Supply 0-60 V dc, 0-10 amperes		Standard
Digital Multimeter with 115 v ac, 60 Hz adapter		Standard
TIC VTVM		Standard
Multimeter (0 to 0.5 amp)		Standard
Audio Generator		Standard
Oscilloscope and Probe		Standard
AC VTVM		Standard
Leakage Test Circuits Adjustment-Test Fixture		Special
Test Capacitors:		Standard
0.1 uf, ±0.25%, 100 WV	PFC Inc., PJ Type	
0.2 uf, ±0.25%, 100 WV	PFC Inc. , PJ Type	
0.3 uf, ±0.25%, 100 WV	PFC Inc. , PJ Type	
0.4 uf, ±0.25%, 100 WV	PFC Inc. , PJ Type	
0.5 uf, ±0.25%, 100 WV	PFC Inc. , PJ Type	
Test Resistors:		Standard
0.3 ohm, ±1%, 1/2 w		
0.33 ohm, ±1%, 1/2 w		
1.0 ohm, ±1%, 1/2 w		
5.0 OhITIS, ±.25%, 1/2 w		
5.0 Kohms, ±0.25%, l/2 w		

Section II. OPERATION INSTRUCTIONS

2-1. INTRODUCTION. This section contains procedures for operating the test set. It includes descriptions of controls and indicators, preoperation check-out, condenser testing, coil resistance testing, and coil voltage testing.

2-2. CONTROLS, INDICATORS AND ACCESSORIES. Table 2-1 is a description of the test set controls, indicators and accessories. These items are illustrated in figure 2-1.

Table 2-1. Controls, Indicators and Accessories

Figure 2-1 index no.	Control, indicator or accessory	Function
1	INSTRUCTION PLATE	Provides a summary of test set operation, listing tests, switch positions, and expected results.
2	Technical Manual	Provides instructions for use and maintenance of test set.
3	Meter Ml	Multicolored scales as follows: O to 15Ω (blue) O to ∞ Ω (blue) O to 30 KV (black) 0.05 to 0.55 μF (red) LEAKAGE bar (green) SERIES RES bar (green) The above are used to indicate various coil resistances and voltage and condenser capacitance, leakage and series resistance.
4	ZERO ADJ OHM AND SERIES RES potentiometer R103	Adjusts meter to zero for condenser series resistance and for coil resistance tests.
5	COIL PICK-UP lead	9-foot long lead for testing coil voltage.
6	PUSH TO TEST switch S4	Safety switch, used during performance of coil voltage and condenser leakage tests, to avoid exposure of personnel to high voltage. When personnel are not in physical contact with equipment under test, then switch may be used to perform test.

Table 2-1. Controls, Indicators and Accessories-Continued

Figure 2-1 index no.	Control, indicator or accessory	Function
7	PUSH TO RESET circuit breaker CB1	Circuit breaker actuated by overvoltage, or by impact to test set if it is dropped.
8	OHMMETER RANGE switch S3	Selects 0-15 ohm or 0-100 Kohm range.
9	COIL FLASHOVER indicator CR23	When illuminated, indicates arcing in coil under test.
10	CONDENSER switch S2	Selects condenser test: LEAK, SERIES RES, or CAPACITANCE.
11	PILOT indicator CR24	When illuminated, indicates power is on. (FUNCTION switch S1 set to any position other than OFF.)
12	FUNCTION switch S1	Selects test set function: OFF : Turns test set off. COND: Turns on test set and conditions it for condenser tests. OHM: Turns on test set and conditions it for various coil resistance tests. COIL: Turns on test set and conditions it for coil voltage test.
13	BAT LEADS	9-foot long leads for connecting battery to test set.
14	COIL CURRENT potentiometer R104	Controls current in primary of coil during coil test.
15	TEST LEADS	9-foot long test leads for connecting to condenser or coil under test.

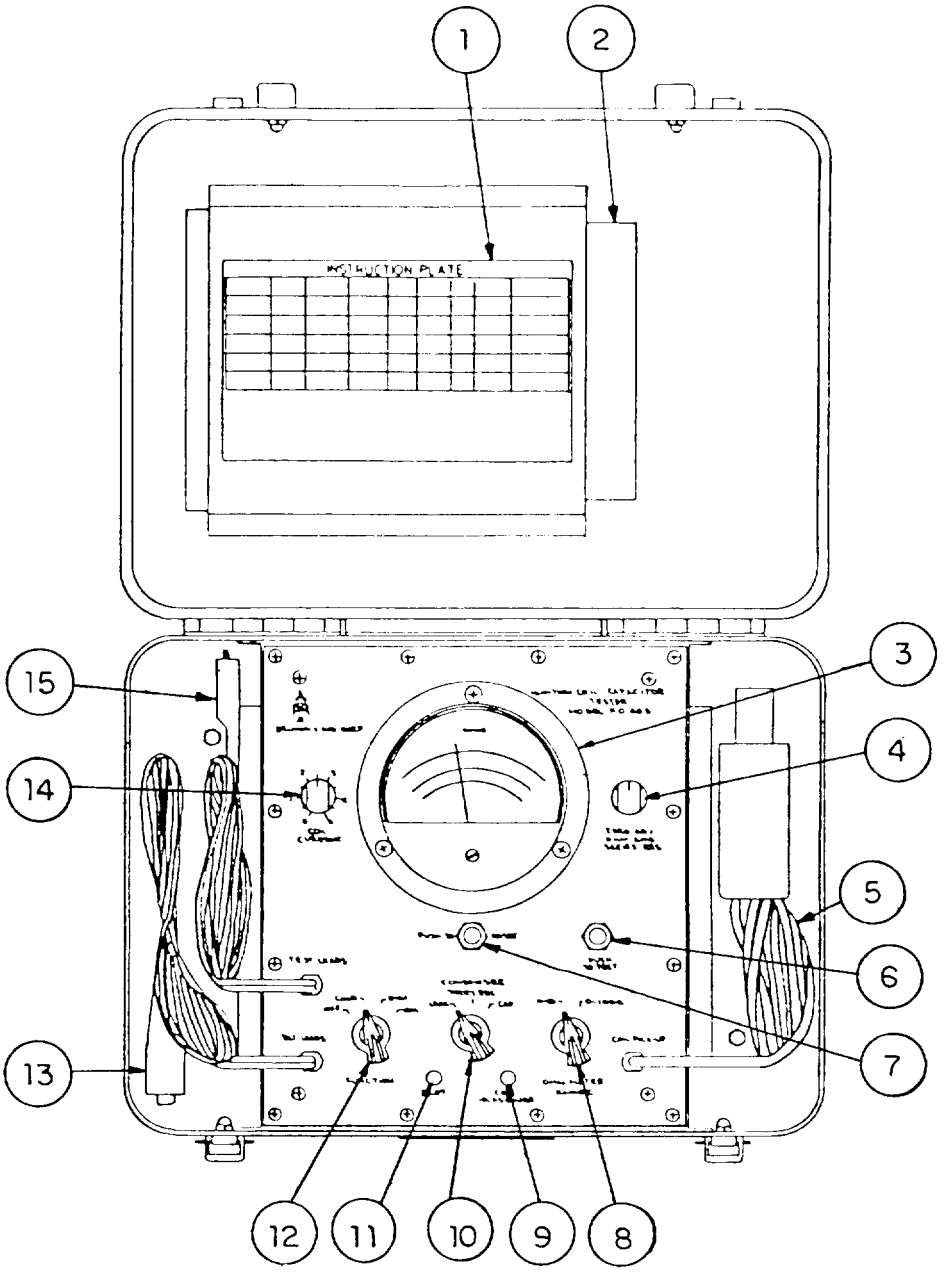

Figure 2-1. Controls, Indicators and Accessories

2-3. PREOPERATIONAL CHECK. Prior to using the test set, if a power supply (0-60 V dc) is available, perform the following preoperational checks on the test set protection circuits.

NOTE

If a power supply is not available, just perform a power-on check as follows: connect the BAT LEADS to the 12-volt battery (red + lead to + terminal and black - lead to - terminal); set FUNCTION switch to COND and verify that PILOT light comes on.

a. Connect the BAT LEADS to the power supply (red +12 V lead to + terminal and black -12 V to - terminal). Set the power supply for 17.0 V dc.

b. Set the FUNCTION switch to COND. Check to see that the PILOT light is off and the PUSH TO RESET window is red (circuit breaker tripped.

c. Set the power supply for 32 V dc. Check that PILOT light is still off and PUSH TO RESET window is still red.

d. Reverse the BAT LEADS (red + lead to - terminal and black - lead to + terminal). Press the PUSH TO RESET switch and check that PILOT light is off.

e. Set the power supply for 12 V dc.

f. Reconnect the BAT LEADS in correct polarity (red + lead to + terminal and black - lead to - terminal).

g. Press the PUSH TO RESET switch. Check that window is no longer red and that the PILOT light is on.

2-4. CONDENSER TESTING. Condenser testing procedures include initial procedures, leakage test, series resistance test, and capacitance test. Figure 2-2 illustrates the various test connections described below.

a. Initial Procedures. Proceed as follows:

(1) Turn FUNCTION switch to OFF.

(2) When testing a condenser mounted in a distributor, disconnect the distributor primary lead from the coil and block the ignition points open.

(3) Connect the BAT LEADS to the battery as follows: Red +12 V lead to + terminal and black -12 V lead to - terminal.

b. Leakage Test. Proceed as follows:

(1) Connect TEST LEAD with red boot to pigtail of condenser and the other TEST LEAD to the condenser case.

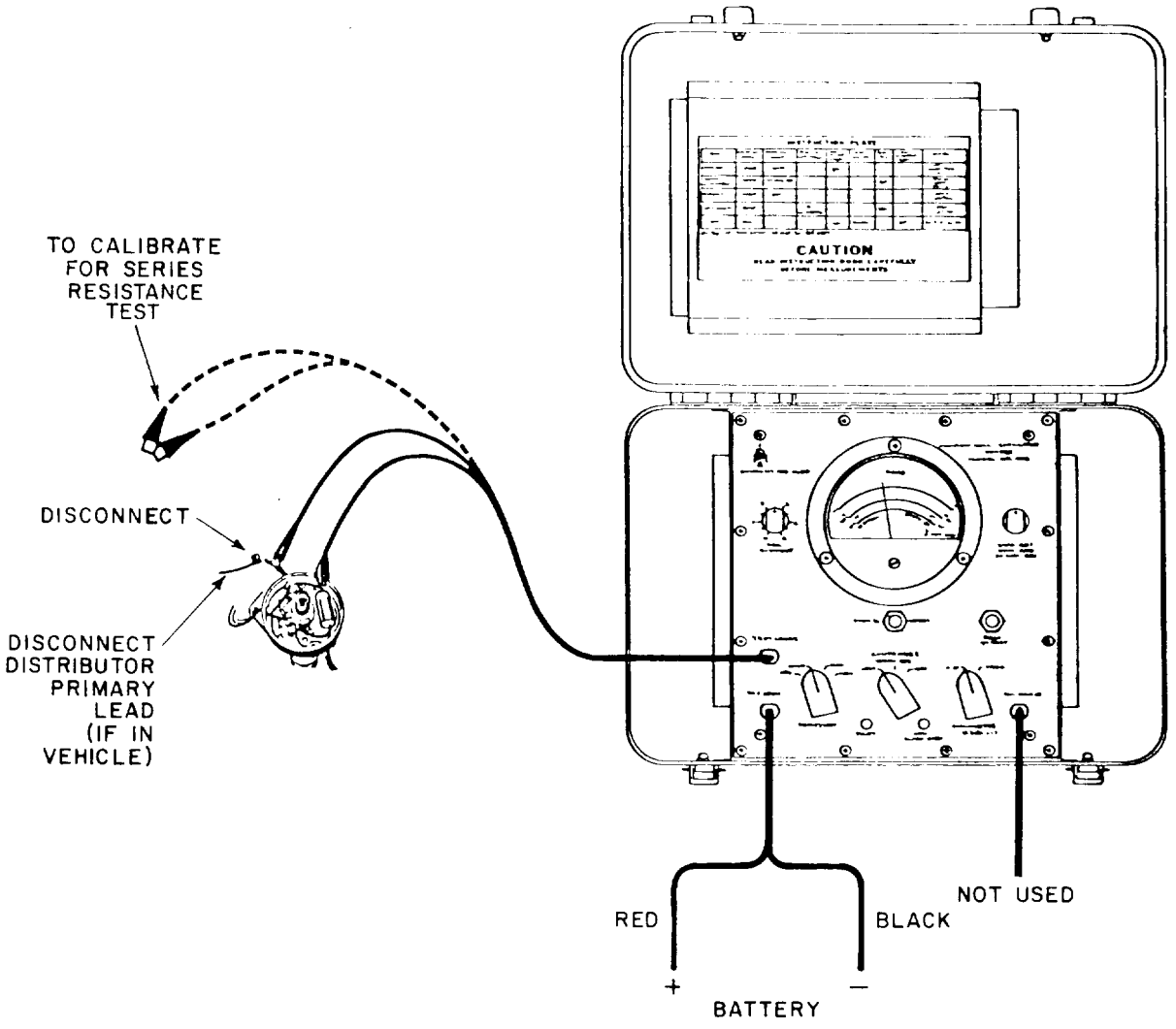

Figure 2-2. Setup for Testing Condenser

(2) Set FUNCTION switch to COND.

(3) Set CONDENSER switch to LEAK.

WARNING

When PUSH TO TEST switch is depressed, HIGH VOLTAGE is present across TEST LEADS and condenser under test. DO NOT touch leads or condenser under test when PUSH TO TEST switch is depressed.

(4) Observe WARNING and depress PUSH TO TEST switch. Meter reading should be within the green LEAKAGE bar at the left of the dial.

(5) Release the PRESS TO TEST switch.

(6) Set FUNCTION switch to OFF.

(7) Disconnect test leads from condenser.

c. Series Resistance Test. Proceed as follows:

(1) Set FUNCTION switch to COND.

(2) Set CONDENSER switch to SERIES RES.

(3) Connect TEST LEADS together.

(4) Using ZERO ADJ OHM AND SERIES RES control, adjust meter reading to SET LINE.

(5) Connect TEST LEAD with red boot to pigtail of condenser and the other TEST LEAD to condenser case. Meter reading should be within the green SERIES RES bar at the right of the dial.

(6) Set FUNCTION switch to OFF.

(7) Disconnect TEST LEADS from condenser.

d. Capacitance Test. Proceed as follows:

(1) Set FUNCTION switch to COND.

(2) Set CONDENSER switch to CAP.

(3) Connect TEST LEAD with red boot to pigtail of condenser and the other TEST LEAD to the condenser case. Meter reading of capacitance on the red scale should be within rated tolerance.

2-5. COIL RESISTANCE TESTING. Coil resistance testing procedures include initial procedures, coil primary resistance, coil primary-to-case resistance, coil secondary resistance, and coil secondary-to-case resistance. (See figure 2-3.)

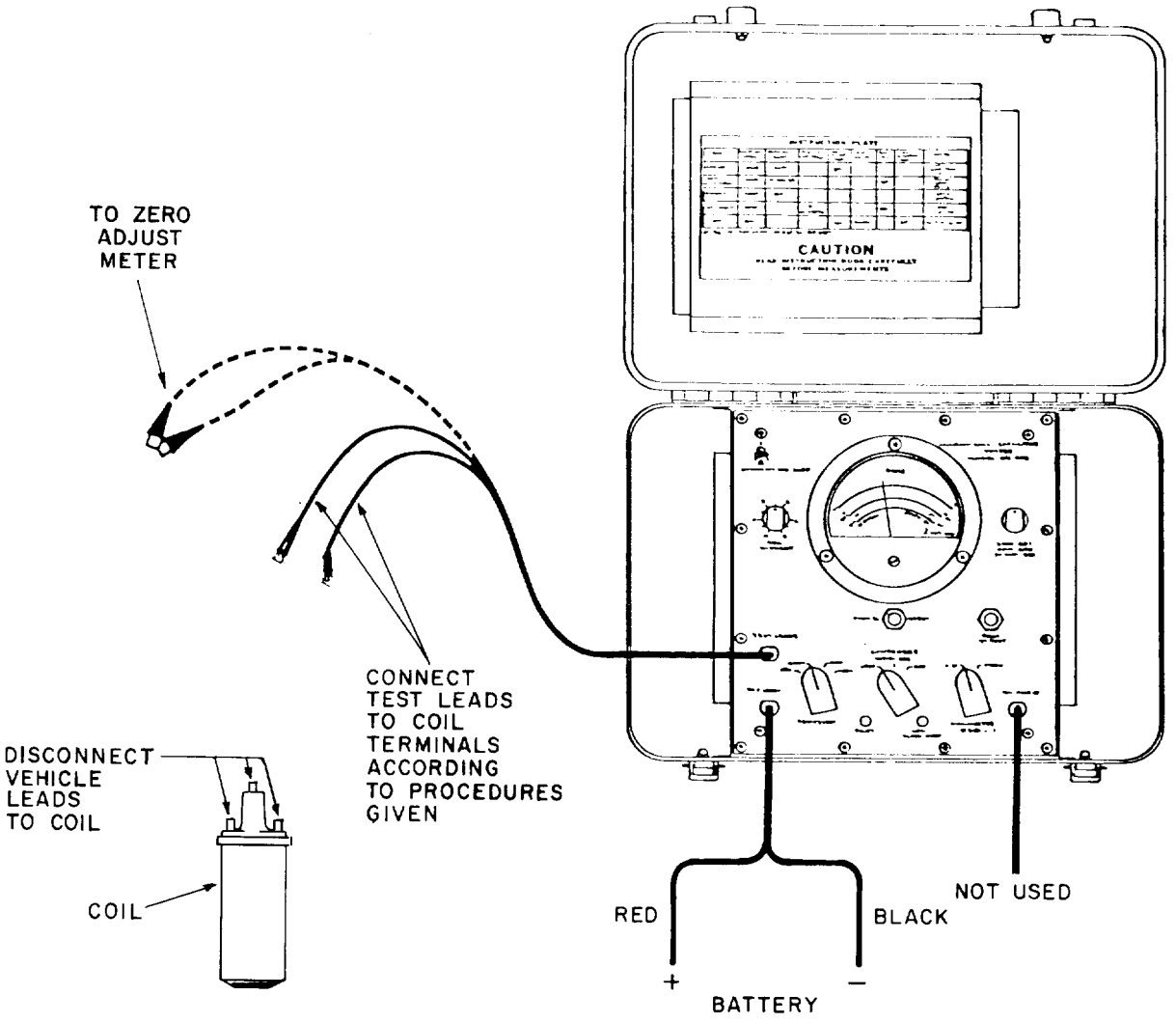

Figure 2-3. Setup for Testing Coil Resistance

a. Initial Procedures. Proceed as follows:

(1) Turn FUNCTION switch to OFF.

(2) Connect BAT LEADS to battery as follows: Red +12 V lead to + terminal and black -12 V lead to - terminal.

(3) Set FUNCTION switch to OHM.

(4) If test is being performed on a coil mounted in the vehicle, disconnect the primary leads from + and - coil terminals and disconnect secondary lead from coil tower. (If the coil is Delco-Remy 1115282, disconnect connectors marked "-" and SECONDARY and remove the lead attached with screw in the center of the coil.)

b. Coil Primary Resistance Test. Proceed as follows:

(1) Set OHMMETER RANGE switch to 0-15.

(2) Connect TEST LEADS together, and using the ZERO ADJ OHM AND SERIES RES control, adjust meter reading to zero ohms.

(3) Connect TEST LEADS to + and - coil terminals. (If the coil is Delco-Remy 1115282, connect one TEST LEAD to the pin inside the connector marked "-" and the other TEST LEAD to the center screw on the opposite side of the connectors.) Typical coil primary resistance readings are as follows:

Manufacturer part no.	Coil primary resistance
Autolite - Prestolite 115049	
P&D Mfg. VC2 X	
Delco-Remy 1915992	1.5 ohms
Delco-Remy 1115282	7 ohms

c. Coil Primary-To-Case Resistance. Proceed as follows:

(1) Set OHMMETER RANGE switch to 0-100K.

(2) Connect TEST LEADS together, and using the ZERO ADJ OHM AND SERIES RES control, adjust meter reading to zero ohms.

(3) Connect one TEST LEAD to coil case and the other LEAD to one primary terminal. The reading should typically indicate an open circuit.

d. Coil Secondary Resistance. Proceed as follows:

(1) Set OHMMETER RANGE switch to 0-100K.

(2) Connect TEST LEADS together, and using the ZERO ADJ OHM AND SERIES RES control, adjust meter reading to zero ohms.

(3) Connect one TEST LEAD to the - terminal and the other TEST LEAD to the high tension tower. (If the coil is Delco-Remy 1115282. connect one TEST LEAD to the case and the other to the SECONDARY terminal.) Typical coil secondary resistance readings are as follows:

Manufacturer/part no.	Coil secondary resistance
Autolite - Prestolite 115049	10 Kohms
P&D Mfg. VC2X	10 Kohms
Delco-Remy 1915992	9 Kohms
Delco-Remy 1115282	11 Kohms

e. Coil Secondary-To-Case Resistance. Proceed as follows:

(1) Set OHMMETER RANGE switch to 0-100K.

(2) Connect TEST LEADS together, and using the ZERO ADJ OHM AND SERIES RES control, adjust meter reading to zero ohms.

(3) Connect one TEST LEAD to the case and the other to the high tension tower. Typical coil secondary-to-case resistance readings are as follows:

Manufacturer/part no.	Coil secondary-to-case resistance
Autolite - Prestolite 115049	Open circuit
P&D Mfg. VC2X	Open circuit
Delco-Remy 1915992	Open circuit
Delco-Remy 1115282	11 Kohms

2-6. COIL VOLTAGE TESTING. The following paragraphs contain initial procedures (paragraph a), and procedures for testing coil voltage for Prestolite - Autolite 115047, Delco-Remy 1915992, P&D Mfg. VC2X (paragraph b) and Delco-Remy 1115282 (paragraph c).

a. Initial Procedures. Proceed as follows:

(1) Set FUNCTION stitch to OFF.

(2) If test is being performed on a coil mounted in the vehicle, disconnect the primary leads from + and - coil terminals and disconnect secondary lead from coil tower. (If the coil is Delco-Remy 1115282, disconnect connectors marked "-" and SECONDARY and remove the lead attached with screw in the center of the coil.)

(3) Connect BAT LEADS to batteryas follows: Red +12 V lead to + terminal and black -12 V lead to - terminal.

(4) Set COIL CURRENT control to extreme counterclockwise position.

b. Coil Voltage Test (Prestolite-Autolite 115047, Delco-Remy 1915992, and P&D Mfg. VC2X). See figure 2-4 and proceed as follows:

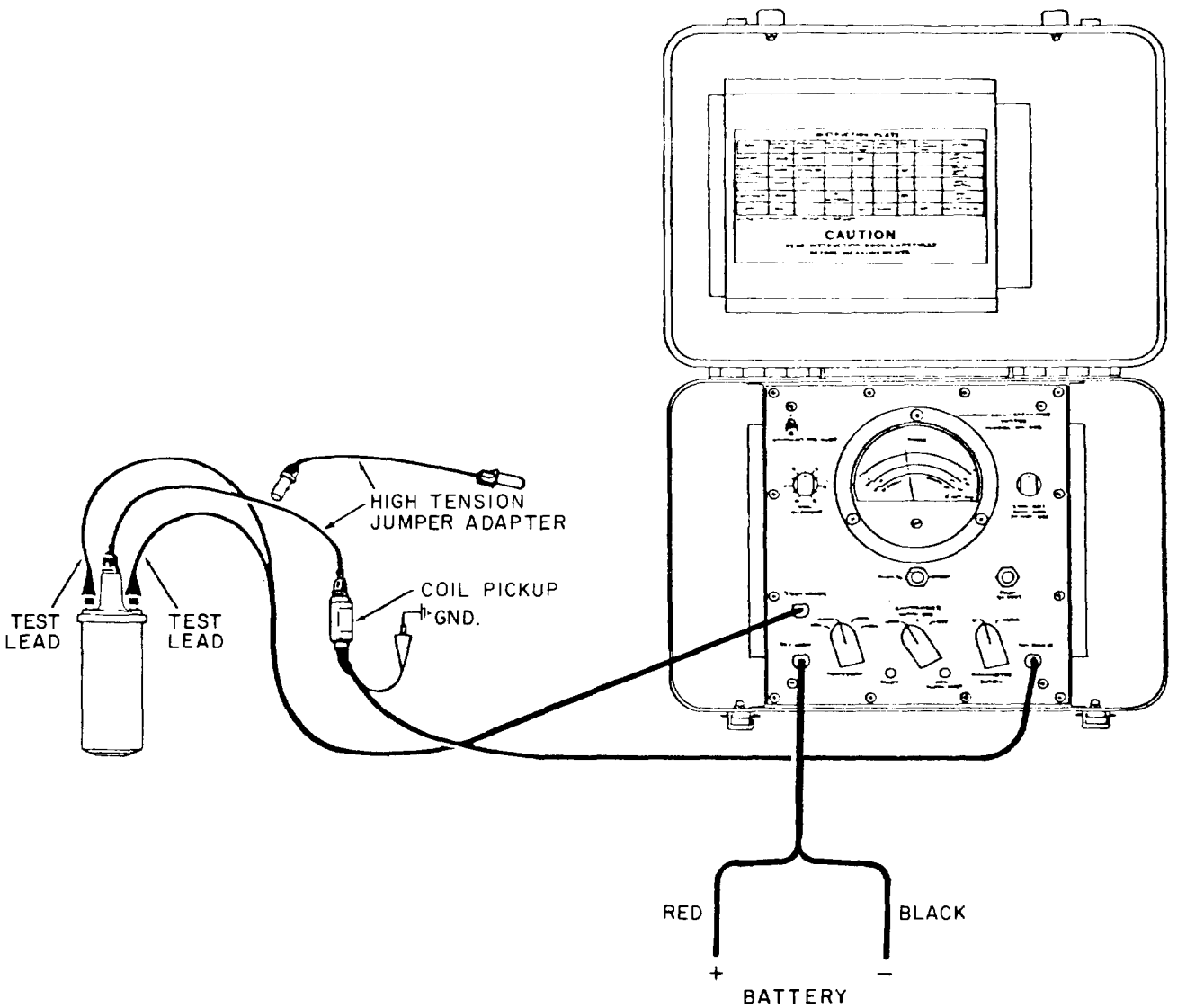

Figure 2-4. Setup for Testing Coil Voltage
(Prestolite-Autolite 115047, P&D Mfg. VC2X and Delco-Remy 1915992)

(1) Connect TEST LEAD with red boot to + terminal and the other TEST LEAD to - terminal.

(2) Depending upon the coil under test, using the proper adapter (as indicated below), connect the COIL PICK-UT to the high tension tower of the coil.

Coil under test	Adapter no.
Prestolite - Autolite 115047	403BA032
P&D Mfg. VC2X	403BA032
Delco-Remy 1915992	403BA031

(3) Connect black lead attached to COIL PICK-UP to chassis of vehicle or to another good ground.

(4) Set FUNCTION switch to COIL.

WARNING

When PUSH TO TEST switch is depressed, HIGH VOLTAGE is present across all leads and coil under test. DO NOT touch leads or coil under test when PUSH TO TEST switch is depressed.

(5) Observe WARNING and depress PUSH TO TEST switch. While holding PUSH TO TEST switch depressed, adjust COIL CURRENT control clockwise until meter indicates 20 to 25 KV on the black scale. Check that COIL FLASHOVER indicator does not illuminate.

(6) Release PUSH TO TEST switch.

(7) Set COIL CURRENT control to extreme counterclockwise position.

(8) Set FUNCTION switch to OFF.

c. Coil Voltage Test (Delco-Remy 1115282). See figure 2-5 and proceed as follows:

(1) Connect TEST LEAD with red boot to terminal lug on the end of the wire to + connector.

(2) Using adapter number 403BA034, connect the other TEST LEAD to the connector.

(3) Using adapter number 403BA033, connect COIL PICK-UP to coil secondary. Be sure that adapter is firmly inserted into COIL PICK-UP and coil secondary connector.

(4) Connect the black lead attached to the COIL PICK-UP to the case of the coil.

(5) Set FUNCTION switch to COIL.

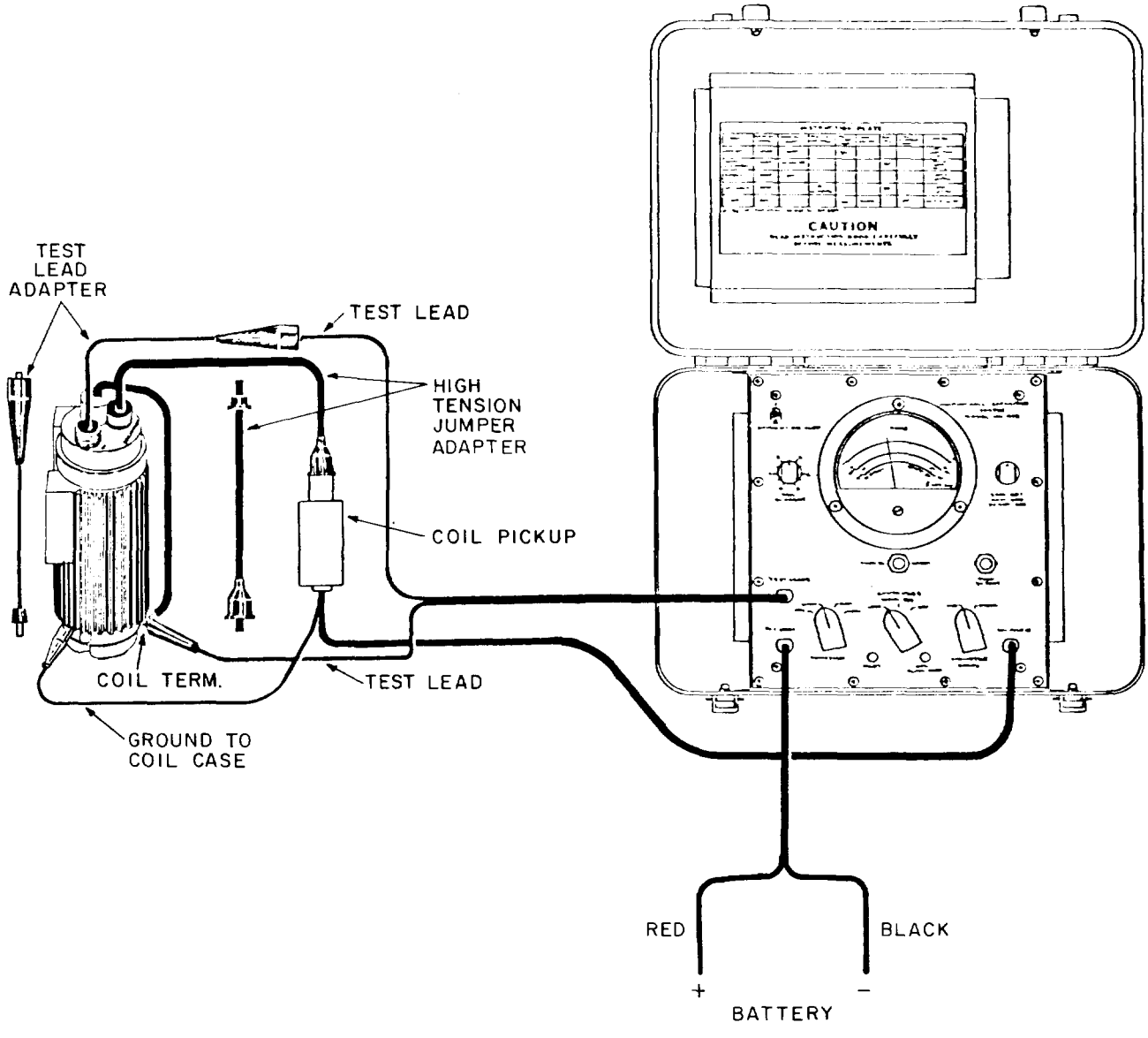

Figure 2-5. Setup for Testing Coil Voltage (Delco-Remy 1115282)

WARNING

When PUSH TO TEST switch is depressed HIGH VOLTAGE is present across all leads and coil under test. DO NOT touch leads or coil under test when PUSH TO TEST switch is depressed.

(6) Observe WARNING and depress PUSH TO TEST switch. While holding PUSH TO TEST switch depressed, adjust COIL CURRENT control clockwise until meter indicates 20 to 25 KV on the black scale. Check that COIL FLASHOVER indicator does not illuminate.

(7) Release PUSH TO TEST switch.

(8) Set COIL CURRENT control to extreme counterclockwise position.

(9) Set FUNCTION switch to OFF.

Section III. MAINTENANCE

3-1. INTRODUCTION. This section contains procedures for maintaining the test set. It includes instructions for performing cleaning, troubleshooting, repair, disassembly, reassembly, adjustments, and test procedures.

3-2. CLEANING . Periodically clean the test set using procedures given below.

a. Case, Cover and Panel Assembly. Proceed as follows:

(1) Wipe case, cover, and panel assembly with lint-free cloth dampened with soap and water.

(2) Rinse thoroughly with fresh, clean water.

WARNING

When using compressed air, do not exceed 10 psi. Compressed air in excess of 10 psi can cause injury. Do not direct compressed air against skin.

(3) Observe WARNING and dry with filtered compressed air (10 psi maximum).

Electrical Parts. Clean with soft-bristle brush or with compressed air (ohserve WARNING).

3-3. TROUBLESHOOTING . Troubleshooting procedures should be accomplished in the following order. First perform a pre-troubleshooting check, then a visual check, then a resistance (continuity) check and finally if the trouble has not yet been located, troubleshoot by consulting the troubleshooting guide.

a. Pre-Troubleshooting Check. Proceed as follows:

(1) Check that BAT LEADS are properly connected to the battery; +12 V lead to positive terminal and -12 V lead to negative terminal.

(2) Check that the PUSH TO RESET window is clear. If it is red, depress the PUSH TO RESET switch to reset the circuit breaker.

(3) Check that battery or power supply voltage being used is at least 12 volts and does not exceed 16 volts.

b. Visual Check. Remove 12 front panel screws and lift out the front panel printed circuit board assembly. Visually inspect for open wire, discolored resistor, signs of burnt component, and any other visible signs of malfunction.

c. Resistance Check. Refer to table 3-1 for resistance check. Disconnect the battery from the unit and perform the resistance (continuity) checks with the switches as indicated in table 3-1.

d. Troubleshooting Guide. Consult the troubleshooting guide (table 3-2) and from the trouble symptom determine the probable cause and the action that should be taken. These are usually fault-isolating, voltage measurement checks given in tables 3-3 through 3-11. Use the test set schematic diagram (figure FO-1) as an aid in troubleshooting.

Table 3-1. Resistance Chart

NOTE

Disconnect battery from unit and measure DC resistance as specified.

Resistance between points / FUNCTION switch / CONDENSER switch	COND			OHM	COIL
	LEAK	SERIES RES	CAP		
-12 V lead and pin E22	/	/	/	/	0 ohms
-12 V lead and pin E19	0 ohms	/	/	/	/
+12 V lead and pin El	0 ohms	/	/	0 ohms	0 ohms
+12 V lead and test lead with red boot	/	/	/	/	∞ ohms
Test lead with black boot and pin E22	0 ohms	/	/	0 ohms	/

NOTE

If all resistance measurements are normal, consult trouble-shooting guide (table 3-2) for further action.

If any resistance measurements are abnormal, inspect the defective line to locate the interruption.

Table 3-2. Troubleshooting Guide

Step no.	Symptom	Probable cause	Action
1	Test set does not work in COND, OHM or COIL position. PILOT light off.	a. Battery leads defective. b. Power supply protection defective.	a. Replace or repair battery leads. b. Refer to tables 3-3 and 3-4.
2	No indication during condenser leakage test. PILOT light on.	Ql3 or A2 defective.	Refer to table 3-5.
3	Test set does not work in OHM and SERIES RES positions. PILOT light on.	A21 or Q4 defective.	Refer to table 3-4, steps 2 through 5.
4	SERIES RES position problems:		
4.1	With test leads shorted, meter cannot be set to SERIES RES SET LINE by ZERO ADJ control.	One of the following ICS is defective: A15, A18, A13, A14, A16, A17, or A19.	Refer to table 3-6, steps 4 through 9.
4.2	Meter swings sharply to left (below 0 KV) mark when test leads are open.	A19 defective.	Refer to table 3-6, step 11.
4.3	Meter indication remains constant whether test leads are shorted or open.	IC All or A12 defective. One of the following transistors is defective: Q9, Ql0, Q11 or Q12.	a. Refer to table 3-6, steps 2 and 3. b. Refer to table 3-7, steps 2 through 5.
5	capacitance Test: Meter indication is independent of capacity connected to test leads.	A3 defective.	Refer to table 3-8.
6	Ohmmeter Test: With test leads shorted, neter cannot be set to zero ohms with ZERO ADJ control. (In both 0-15 and 0-100K positions of the OHM–METER RANGE switch.)	A21 or Q4 defective.	Refer to table 3-4, steps 1 through 5.

Table 3-2. Troubleshooting Guide-Continued

Step no.	Symptom	Probable cause	Action
7	Coil Test: Meter indicates zero at all times.	One of the following devices is defective: A4, A5, Q6, A8 or A9.	Refer to table 3-9. If voltages per table 3-9 are normal, proceed to table 3-10.
8	Coil Test: COIL FLASHOVER light not working.	A6, A7, Q5, or CR23 defective.	Test voltage as per table 3-9, steps 4 and 5. Refer to table 3-10, steps 3 and 4.
9	PILOT light on. Meter does not respond in all modes of operation.	Meter shorted or open.	a. Inspect wires leading from pins E5 and E7 to meter. b. Replace CR22. c. Refer to table 3-11.
10	Circuit breaker cannot be reset by pushing PUSH TO RESET button.	a. Battery voltage more than 16 V. b. Al defective. c. Circuit breaker CB1 defective.	a. Use 12 V battery. b. Change Al and calibrate tester. c. Replace circuit breaker CB1.

Table 3-3. DC Voltage Chart No. 1 - Protection Circuit

NOTE

All voltages are measured with a DC VTVM between point specified and pin E19. All voltages are ±20%. Battery voltage is assumed to be 12 V.

FUNCTION switch position: COND

Step no	Test point	Normal voltage	Action: voltage normal	Action: voltage abnormal
1	Pin E16	12 v	Proceed to step 2.	Inspect positive and negative battery leads connection on battery side and pin E16, E19 side.
2	Pin El	12 v	Proceed to step 3.	Inspect wire connecting pin El and lug 9, Section 1, front of FUNCTION switch.
3	Pin E4	11.3 v	Proceed to step 4.	Replace CR1.
4	Pin E3	11.3 v	Proceed to step 5.	a. Check window of PUSH TO RESET switch. If window is red, depress switch. b. Inspect wire between pin E4 and lug 1 of circuit breaker CB1. c. Inspect wire between pin E3 and lug 2 of circuit breaker CB1. d. Replace circuit breaker CB1.
5	Ql In	11.3 v	Proceed to step 6.	Inspect copper side of printed circuit board for cold solder or open circuit between Ql - In and pin E3.
6	Q1 out	5 V	Proceed to step 7.	Replace Q1.
7	Q3 E	4.4 V	Proceed to step 8.	Replace Q3.
8	Q3 C	5.3 V	Proceed to step 9.	a. Measured voltage: 12 V. CR3 or relay K1 shorted; Remove short. b. Measured voltage: Less than Q3-E. Relay K1 open. Replace K1.
9	A20 + In	12 v	Proceed to table 3-4.	Replace relay K1.

Table 3-4. DC Voltage Chart No. 2 - Power Supply

NOTE

All voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COND or COIL
CONDENSER switch position: Any position
OHMMETER RANGE position: Any position
ZERO ADJ Control: Set to 12 o'clock

Step no.	Test point	Normal voltage	Action: voltage normal	Action: voltage abnormal
1	A20 + Out	11.5 v	Proceed to step 2.	Replace A20.
2	Q2 Out	8 V	Proceed to step 3.	Replace Q2.
3	Q4 E	0.6 V	Proceed to step 6.	Proceed to step 4.
4	E 29	6.2 V	Proceed to step 5.	Inspect wires leading from E6 and E29 to ZERO ADJ control R103 .
5	A 21 Pin 7	1.2 v	Repeat step 3.	a. If measured voltage is 0.6 V higher than in step 3, replace A21. b. If measured voltage is below 0.8 volt, replace A21. c. If measured voltage is much higher than in step 3, replace Q4.
6	E 18	2.5 V	a. PILOT light off. Replace CR24. b. PILOT light on. No action to be taken.	a. Inspect leads from pins E18 and E22 leading to CR24. b. Replace CR24.

Table 3-5. DC Voltage Chart No. 3 - Condenser Leakage Test Circuits

NOTE

All voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COND
CONDENSER switch position: LEAK
Test leads: Shorted together

WARNING

High voltage is present in this test. DO NOT TOUCH ANY EXPOSED COMPONENTS. Exercise extreme caution when measuring voltage. Set instrument to OFF during inspection. For steps 3 through 7, use VTVM on 500 V scale.

Step no.	Test point	Normal voltage	Action: voltage normal	Action: voltage abnormal
1	Q 13 In	12 v	Proceed to step 2.	Inspect copper side of printed circuit board for open circuit or cold solder on Q13 in line.
2	Q 13 Out	7.5 v	Proceed to step 3.	Replace Q13.
3	A2 + Out	500 v	Proceed to step 4.	Replace A2.
4	E 9	450 v	Proceed to step 5.	R18 open. Replace R18.
5	E 26	450 v	Proceed to step 6.	Inspect wire between E26 and E9.
6	E 25	450 v	Proceed to step 7.	Inspect wire from pin E26 to lug 9 of section 1 rear of CONDENSER switch S2.
7	E 25 PUSH TO TEST switch activated	0 v		a. Inspect wires leading from E24 and E25 to PUSH TO TEST switch S4. b. Switch S4 defective. Replace S4.

Table 3-6. DC Voltage Chart No. 4 - Condenser Series Resistance Test Circuits

NOTE

All voltages are measured between point specified and pin E22 (instrument ground), with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COND
CONDENSER switch position: SERIES RES
Test Leads: Shorted unless otherwise specified
ZERO ADJ OHM AND SERIES RES: At 12 o'clock position

Step no.	IC symbol	Test point (Pin number) 1	2	3	4	5	6	7	8	Action: voltage normal	Action: voltage abnormal
1	A10	-	-	6 V	11.5 V	8 V	-	-	11.5 V	Proceed to table 3-7, step 1.	See Note 1.
2	A11	-	-	1.5 V	-5.0 V	-	1.5 V	8 V	-	Proceed to step 3.	See Note 2.
3	A12	-	-	1.5 V	-5.0 V	-	1.5 V	8 V	-	Proceed to table 3-7, step 2.	See Note 2.
4	A15	-	-	1.5 V	-5.0 V	-	1.5 V	8 V	-	Proceed to step 5.	See Note 2.
5	A18	-	-	0 V	-5.0 V	-	0 V	8 V	-	Proceed to step 6.	See Note 2.
6	A13	-	0 V	0 V	-5.0 V	-3.9 V	-	8 V	-	Proceed to step 7.	See Note 2.
7	A14	-	-	0 V	-5.0 V	-	0 V	8 V	-	Proceed to step 8.	See Note 2.
8	A16	-	-	0 V	-5.0 V	-	0 V	8 V	-	Proceed to step 9.	See Note 2.
9	A17	-	-	0.3 V	-5.0 V	-	0.6 V	8 V	-	Proceed to step 10.	See Note 3.
10	A17 Test leads open	-	-	4 V	-5.0 V	-	0 V	8 V	-	End	Proceed to step 11.
11	A19 Test leads open	-	-	0 V	-5.0 V	-	-	+3.5 V	8 V		a. Voltage at pin 7 too high, replace CR20. b. Voltage at pin 7 too low, replace A19.

Table 3-6. DC Voltage Chart No. 4 - Condenser Series Resistance Test Circuits-Continued

NOTES

1a. Abnormal voltage at pins 4 and 8 of A10 indicates wiring problem. Trace this line to A20 + out through PC board wiring and switches S2 and S1.

1b. Abnormal voltage at pins 3 or 5 of A10: Replace A10.

2a. Abnormal voltage at pin 7 of all ICs through A18, and pin 8 of A19 indicates wiring problem. Trace this line to Q2 out through PC board wiring and switches S1 and S2.

2b. Abnormal voltage at pin 4 of all ICs through A19 indicates a faulty IC A10 or Q8. Proceed to table 3-6, step 1 and table 3-7, step 1.

2c. Abnormal voltage at pins 3, 5, and 6 of all ICs through A19 indicates defective IC. Replace IC.

3a. Voltage at pin 3 depends on ZERO ADJ control setting. If voltage at pin 3 is high at all times, replace A19.

3b. If voltage at pin 6 is too low or too high, replace A17.

Table 3-7. DC Voltage Chart No. 5 - Condenser Series Resistance Test Circuits

NOTE

All voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COND
CONDENSER switch position: SERIES RES
Test Leads: Shorted unless otherwise indicated.

Step no.	Device symbol	Test point					Action: voltage normal	Action: voltage abnormal
		In	Out	E	B	C		
1	Q8	-8 V	-4.5 V	-	-	-	Refer to table 3-6.	See Note 1.
2	Q9	-	-	-	2.1 V	8 V	Proceed to step 3.	Replace Q9.
3	Q10	-	-	0.9 V	-	4 V	Proceed to step 4.	Replace Q10.
4	Q11	-	-	-	6 V	8 V	Proceed to step 5.	Replace Q11.
5	Q12	-	-	4.8 V	-	8 V	End	Replace Q12.

NOTES

1a. Abnormal voltage at input, repeat step 1 of table 3-6. If voltage is normal, replace CR16 or CR19.

1b. Abnormal voltage at output, replace Q8.

Table 3-8. DC Voltage Chart No. 6 - Condenser Capacitance Test Circuits

NOTE

All dc voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COND
CONDENSER switch position: CAP
Test Leads: As specified

Step No.	Device symbol	Test leads	Test point: pin number													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	A3	Shorted	-	-	5.3 V	8 V	7.4 V	-	-	-	6.5 V	7.4 V	5.3 V	-	-	8 V
2	A3	Open	-	-	5.3 V	8 V	7.4 V	-	-	-	0 V	7.4 V	5.3 V	-	-	8 V

NOTES

1. Voltage at pins 4 and 14 abnormal: trace voltage to Q2 out through S1 and S2 switches.
2. Voltage at pins 3, 5, 10, 11, or 12 abnormal: replace IC.
3. All voltages normal, refer to table 3-2, step 8 and meter indicates zero: C9 shorted or R25, R26 open.

Table 3-9. Voltage Chart No. 7 - Coil Test Circuits

NOTE

All dc voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COIL
Test leads: Open
COIL CURRENT control: Set to 2
PUSH TO TEST switch: Up unless otherwise indicated

Connect pin E27 and pin 3 of A7 to lug 9 of OHMMETER RANGE Switch S3-1R. (Remove these connections after step 6.)
Set ZERO ADJ OHM AND SERIES RES for 0.7 V at pin E27 and pin 3 of A7.

Step no.	IC symbol	Test point: pin number														Remarks
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	A4	-	-	5.3 V	8 V	4 V	-	0 V	-	2 V	8 V	5.3 V	-	-	8 V	See Note 1.
2	A6	-	-	0.7 V	-4.5 V	-	0.7 V	8 V	-	See Note 2.						
3	A7	-	-	0.7 V	-4.5 V	-	-	8 V	-	See Note 2.						
4	A8	-	-	0.7 V	-4.5 V	-	-	8 V	-	See Note 3.						
5	A9	-	-	0.7 V	-4.5 V	-	0.7 V	8 V	-	See Note 3.						
6 PUSH TO TEST switch de-pressed	A5	-	2 V	0.8 V	0	-	2.9 V	8 V	-	a. Voltage normal: Proceed to step 2 of table 3-10. b. Voltage abnormal: Proceed to step 2 of table 3-10. c. FLASHOVER Light off: Proceed to step 4 of table 3-10.						
7	Remove the connections from lug 9 S3-1R to pin E27 and pin 3 of A7.															

Table 3-9. Voltage Chart No. 7 - Coil Test Circuits-Continued

NOTES

1a. Abnormal voltage at pins 4, 10, and 14 indicates defective switch S1.
1b. Abnormal voltage at pins 3, 5, 9, or 11, replace IC.

2a. Pin 3 voltage abnormal; Replace CR9 or A7.
2b. Pin 4 voltage abnormal: One of the components C25, C14, CR5, or CR6 is defective.
2c. Pin 6 voltage abnormal: Replace A6.
2d. Voltages normal: In step 7, FLASHOVER light will be ON.

3a. Pin 3 voltage abnormal: Replace CR15 or A8.
3b. Pin 6 voltage abnormal: Replace A9.
3c. Voltages normal: Meter should indicate approximately 9 kV.

Table 3-10. Voltage Chart No. 8 - Coil Test Circuits

NOTE

All dc voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM.
Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: COIL
COIL CURRENT control: Set to 2, except in step 1, set to extreme counterclockwise position.
Test leads: Shorted
PUSH TO TEST switch: Depressed during measurements.

Step no.	Device symbol	Test point			Action: voltage normal	Action: voltage abnormal
		E	B	C		
1	Q6	0 V	0.6 V	2 V	Proceed to step 2.	Replace Q6.
2	Q14	1.2 V	1.7 V	8 V	Proceed to step 3.	Replace Q14.
3	Q7	0.3 V	1.1 V	12 V	Examine high voltage pick-up. Refer to paragraph 3-8b.	Replace Q7.
4	Q5	0 V	0 V	7 V	Replace Q5 if, in step 6 of table 3-9, FLASHOVER light was off.	Replace CR23.
5	Set FUNCTION switch to OFF, CONDENSER switch to LEAK, and COIL CURRENT Control to extreme counterclockwise position. Disconnect test set from battery.					

Table 3-11. Voltage Chart No. 9 - Meter Operation

NOTE

All dc voltages are measured between point specified and pin E22 (instrument ground) with DC VTVM. Battery voltage is assumed to be 12 V. All voltages are ±20%.

FUNCTION switch position: OHM
OHMMETER RANGE: 0-100 K
Test leads: Shorted

Step no.	Test point	Normal voltage	Action: voltage normal	Action: voltage abnormal
1	Lug 9 of switch S3, ohmmeter range	Set ZERO ADJ. control for 0.6 V indication	Proceed to step 2.	Refer to table 3-4.
2	Pin E5	0.21 V	Proceed to step 3.	a. (Voltage is very low: meter shorted, replace CR22 or CR23. b. Voltage high: proceed to step 3.
3	Pin E7	0.11 v	If meter is still not reading, replace it.	a. Voltage is 0 V: examine leads from pin E5 and E7 leading to meter. If in order, replace meter. b. Voltage high: proceed to step 4.
4	Switch S1, section 1R, lug 8	0.0 V	a. Replace R96. b. Replace meter.	Examine switch S1. If defect not apparent, check wiring.

3-4. REPAIR . Repair consists of replacing defective components. This is accomplished by first disassembling the test set (paragraph 3-5) to the extent required to gain access to the defective component, replacing it and then re-assembling (paragraph 3-6) the test set. Once the defective component has been replaced, perform the applicable adjustment (paragraph 3-7) and test procedure (paragraph 3-8). Refer to the parts lists in Section V which contains ordering information for replacement parts (part number, vendor. etc.).

3-5. DISASSEMBLY. Use the following procedures to disassemble only to the extent required to gain access to the component to be replaced.

a. Remove 12 screws (MP129 through MP140, figure 5-4) and lift out front panel and printed circuit board assembly. Access to the printed circuit board components is now available.

b. To remove the printed circuit board assembly, remove four screws (MP72 through MP75, figure 5-2) and eight washers (MP76 through MP83) and lift it off the four standoffs (MP30 through MP33, figure 5-l). Access to the back of the front panel assembly is now available.

c. To remove a component from the front panel assembly see figures 5-1, FO-3, and 5-4. Figures 5-1 and 5-4 are rear and front views of the front panel assembly with reference designation callouts of the components and their attaching parts. Figure FO-3 shows the electrical cables and wiring between the front panel and the printed circuit board.

d. To remove a component from the printed circuit board assembly, see figure 5-3 which shows wiring between printed circuit board and front panel assembly. Also, see figure FO-2 which locates and calls out components mounted on the printed circuit board assembly.

3-6. REASSEMBLY. After the defective component has been replaced and rewired, reassemble the test set. Then perform the applicable adjustment and test procedure necessary to restore the equipment for use.

3-7. ADJUSTMENT PROCEDURES. The following procedures should be accomplished when it is found that the test set is out of adjustment or after a defective component has been replaced. The following paragraphs contain equipment setup procedures and procedures for adjusting the protection circuit, condenser leakage test circuit, condenser series resistance test circuit, condenser capacitance test circuit, ohmmeter test circuit, and coil test circuits. In addition, procedures for securing trimmer potentiometers are given.

a. Equipment Setup. Proceed as follows.

(1) Set FUNCTION switch to OFF position and remove 1.2 screws from front panel so that access to the printed circuit card may be gained. Check that meter indicates zero on the lower scale.

(2) Connect the BAT LEADS (red + lead to + terminal and black - lead to - terminal) to battery or power supply.

(3) Set FUNCTION switch to OHM.

(4) Connect TEST LEADS together and set meter to zero ohms using ZERO ADJ OHM AND SERIES RES control.

(5) Disconnect the TEST LEADS.

(6) Allow at least 2 minutes for temperature stabilization. PILOT light should be on.

b. Protection Circuit. Proceed as follows:

(1) Set FUNCTION switch to OFF.

(2) Connect BAT LEADS through a 0.5 A meter to the power supply as follows: red +12 V lead to positive and the other lead to negative terminal.

(3) Set FUNCTION switch to OHM. If the PUSH TO RESET window is red, depress it to reset the circuit breaker.

(4) Set the power supply to 16.6 v dc. The PILOT light should be off and the test set meter should indicate exactly zero.

(5) Set trimmer potentiometer R1 (see figure FO-2 for location) to extreme clockwise position. Depress the PUSH TO RESET button. The PILOT light should be on and the ammeter should indicate 170 to 270 mA.

(6) Slowly rotate potentiometer R1 until the PILOT light goes off.

(7) Set the power supply to 16.4 v dc.

(8) Reset the circuit breaker by depressing the PUSH TO RESET button. The PILOT light should go on.

(9) Set the power supply to 32 V dc. The ammeter should indicate zero.

(10) Set the power supply to 12 V dc.

(11) Reverse the BAT LEADS connections.

(12) Reset the circuit breaker by depressing PUSH TO RESET button. The ammeter should indicate zero.

(13) Remove the ammeter and restore the proper BAT LEADS connections. The PILOT light should be on.

c. Condenser Leakage Test Circuits. Proceed as follows:

(1) Set test set FUNCTION switch to OFF and if not already done, connect BAT LEADS to 12 V dc supply.

(2) Connect TEST LEADS to test fixture number 403-TF-01.

(3) Connect DC DVM to test fixture and set DC DVM for 20 V dc range.

(4) Set test fixture switch to 2 Mohms.

(5) Set test set FUNCTION switch to COND.

(6) Set test set CONDENSER switch to LEAK.

WARNING

DO NOT touch TEST LEADS or any equipment or leads when the PUSH TO TEST switch is depressed. HIGH VOLTAGE is present in this procedure.

(7) Observe WARNING, depress PUSH TO TEST switch, and adjust potentiometer R15 (figure FO-2) until test set meter indicates 10 KV on the black scale.

(8) Set test fixture switch to DC VOLTS and observe that DC DVM indicates from 4.55 to 5.45 V dc.

(9) Set test fixture switch to 0.47 uF.

(10) Observe the DC DVM and release the PUSH TO TEST switch. The DC DVM indication should drop to zero very quickly.

(11) Set the power supply for 16 V dc .

WARNING

DO NOT touch TEST LEADS or any equiment or leads when the PUSH TO TEST switch is depressed. HIGH VOLTAGE is present in this procedure.

(12) Observe WARNING and depress the PUSH TO TEST switch. The test set meter should indicate from 9.9 to 10.1 KV.

(13) Release the PUSH TO TEST switch.

(14) Set FUNCTION switch to OFF and disconnect test equipment.

d. Condenser Test Circuits. Proceed as follows:

(1) See figure FO-2 for location and set trimmer potentiometer R83 to 12 o'clock position and R55 to 11 o'clock position.

(2) Set ZERO ADJ OHM AND SERIES RES control to 12 o'clock position.

(3) Set FUNCTION switch to COND and if not already done, connect BAT LEADS to 16 V dc supply.

(4) Set CONDENSER switch to SERIES RES.

(5) Connect TEST LEADS and oscilloscope across 0.1 uF test capacitor.

(6) Adjust trimmer potentiometer R72 (figure FO-2) for 450 mV p-p indication on oscilloscope. Note the frequency of the signal.

(7) Connect oscilloscope to junction of R99 and CR21 (E5) and ground.

(8) Adjust trimer potentiometer R67 for a clean sine wave twice the frequency displayed in step (6) with an amplitude of approximately 150 mV p-p.

(9) Disconnect the oscilloscope.

(10) Connect the TEST LEADS together.

(11) Verify that ZERO ADJ OHM AND SERIES RES control is at 12 o'clock position and then adjust trimmer potentiometer R55 (figure FO-2) for a full-scale deflection (30 KV black scale).

(12) Connect TEST LEADS across 0.1 uF test capacitor.

(13) Adjust trimmer potentiometer R68 for 30 KV indication on the black scale.

(14) Repeat steps (10) through (13) until meter indicates 30 KV whether the TEST LEADS are shorted together or connected across the 0.1 uF test capacitor.

(15) Connect the TEST LEADS to 0.3 ohm test resistor.

(16) Adjust trimmer potentiometer R83 (figure FO-2) until meter indicates 27 KV.

(17) Connect the TEST LEADS together.

(18) Adjust trimmer potentiometer R55 for 30 KV indication.

(19) Connect the TEST LEADS to 0.3 ohm test resistor.

(20) Adjust trimmer potentiometer R83 (figure FO-2) for 27 KV indication.

(21) Repeat steps (14) through (17) until meter indicates 30 KV with TEST LEADS shorted and 27 KV when connected across 0.3 ohm test resistor.

(22) Connect the TEST LEADS across the 0.1 uF test capacitor wired in series with 0.3 ohm test resistor. Meter indication should be 26.5 to 27.5 KV.

(23) Connect the TEST LEADS across 0.5 uF test capacitor wired in series with 0.3 ohm test resistor. Meter should indicate 26.5 to 27.5 KV.

(24) Set the power supply for 12 V dc. The meter should indicate 26.5 to 27.5 KV.

(25) Disconnect the TEST LEADS. The meter should indicate approximately zero.

e. Condenser Capacitance Test Circuits. Proceed as follows:

(1) Set FUNCTION switch to COND and if not already done, connect BAT LEADS to 12 V dc supply.

(2) Set CONDENSER switch to CAP.

(3) Connect TEST LEADS together.

(4) Adjust trimmer potentiometer R25 (figure FO-2) for 30 KV indication on black scale.

(5) Connect TEST LEADS across 0.5 uF test capacitor.

(6) Adjust trimmer potentiometer R23 (figure FO-2) for 0.5 UF indication on red scale.

(7) Connect TEST LEADS across 0.1 uF test capacitor. The meter should indicate 0.09 to 0.11 uF.

(8) Set power supply for 16 V de. The meter indication should be 0.09 to 0.11 uF.

(9) Disconnect the TEST LEADS.

NOTE

Other test capacitors may also be used to calibrate at other points along the scale.

f. Ohmmeter Test Circuits. Proceed as follows:

(1) Set FUNCTION switch to OHM and if not already done, connect BAT LEADS to 16 V dc supply.

(2) Set OHMMETER RANGE switch to 0-15.

(3) Connect the TEST LEADS together.

(4) Adjust ZERO ADJ OHM AND SERIES RES control for zero ohm indication.

(5) Connect the TEST LEADS to 50 ohm test resistor. The meter should indicate 4.7 to 5.3 ohms.

(6) Set OHMMETER RANGE switch to 0 - 100K.

(7) Connect the TEST LEADS together.

(8) Adjust ZERO ADJ OHM AND SERIES RES control for zero ohm indication.

(9) Connect TEST LEADS across 5 Kohm test resistor. The meter should indicate 4.7 to 5.3 Kohms.

(10) Set power supply for 12 V dc. The meter indication should be 4.7 to 5.3 Kohms.

(11) Disconnect the TEST LEADS.

NOTE

Other test resistors may also be used to calibrate at other points along the scale.

g. Coil Test Circuits. These adjustments consist of meter and current drive calibration.

(1) Meter Calibration. Proceed as follows:

a. Set FUNCTION switch to COIL and if not already done, connect BAT LEADS to 12 V dc supply.

b. Connect 2.5 V dc between terminal E27 (figure FO-2) and -12 V BAT LEAD.

c. Adjust trimmer potentiometer R49 (figure FO-2) for 30 KV indication on black scale of meter.

d. Disconnect the voltage from terminal E2T and the -12 V BAT LEAD.

(2) Current Drive Calibration. Proceed as follows:

a. Connect oscilloscope to center lug of COIL CURRENT control potentiometer R104 (E10) (figure FO-3).

b. Set vertical input of oscilloscope to DC mode.

c. Set COIL CURRENT control to extreme clockwise position.

d. Adjust trimer potentiometer R32 (figure FO-2) for 4.5 V p-p square wave.

e. Set COIL CURRENT control to extreme counterclockwise position. Oscilloscope should display 2 V p-p square wave.

f. Disconnect oscilloscope.

h. Securing Trimmer Potentiometers. Secure trimmer potentiometers into positions adjusted to, by applying a drop (minimum amount) of Clyptol to the base of each trimmer.

3-8. TEST PROCEDURES. Perform the following test procedures:

a. Coil High Voltage Test Circuits. Proceed as follows:

(1) If not already done, set FUNCTION switch to COIL and connect BAT LEADS to 12 V dc supply.

(2) Set COIL CURRENT control to extreme counterclockwise position.

(3) Connect the TEST LEADS to a known good ignition coil. (Observe polarity; red boot to + terminal and other lead to - .)

(4) Connect COIL PICK-UP to high voltage output of coil and connect the black lead of the COIL PICK-UP to ground.

WARNING

When PUSH TO TEST switch is depressed DO NOT touch leads or coil. HIGH VOLTAGE is present in this procedure.

(5) Observe WARNING, depress PUSH TO TEST switch, and rotate COIL CURRENT control until the meter indicates 20 to 25 KV.

(6) Release PUSH TO TEST switch. The meter indication should drop to zero.

(7) Set the COIL CURRENT control to the extreme counterclockwise position.

(8) Observe polarity and connect TEST LEADS to test coil (one that is known to flashover). Connect the COIL PICK-UP to the high voltage output of the test coil and the COIL PICK-UF black lead to ground.

WARNING

When PUSH TO TEST switch is depressed DO NOT touch leads or coil. HIGH VOLTAGE is present in this procedure.

(9) Observe WARNING, depress PUSH TO TEST switch and adjust COIL CURRENT control until flashover occurs as evidenced by the red COIL FLASHOVER light coming on either steadily or intermittently.

(10) Release the PUSH TO TEST switch.

(11) Set the COIL CURRENT control to extreme counterclockwise position.

(12) Set the FUNCTION switch to OFF.

(13) Disconnect all leads.

b. High Voltage Pick-up Check. Proceed as follows:

(1) Set FUNCTION switch to OHM.

(2) Connect audio generator to the hot side of the COIL PICK-UP and to the test lead with the black boot.

(3) Set audio generator output to 100 V at 1 kHz.

(4) Using AC VTVM, measure the voltage level between point E27 and the black booted test lead. The voltage should be 10.5 mV ±10%.

(5) Disconnect the AC VTVM and the audio generator.

(6) Disconnect all leads.

Section IV. DIAGRAMS

4-1. INTRODUCTION. A schematic diagram of the test set is given in figure FO-1.

Section V. REPLACEMENT PARTS LIST

5-1. INTRODUCTION. This section lists and describes the parts necessary for the support of the test set. It may be used for requisitioning, storing, issuing and identifying parts, and for illustrating assembly and disassembly relationships. The list is separated into main groups and keyed to associated illustrations by figure number and reference designation. For each part listed, the Federal Supply Code for Manufacturers (FSCM) is given. These codes are in accordance with FSCM Cataloging Handbook H4-2 and the manufacturers can be determined by referring to this handbook.

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
FO-2-TB1	PRINTED CIRCUIT BOARD	95325	403DM013
K1	RELAY	95325	403CA026
S1	SWITCH, FUNCTION	95325	403CM005
S2	SWITCH, CONDENSER	95325	403CM006
S3	SWITCH, OHMMETER RANGE	95325	403CM007
E1 THROUGH E29	TERMINAL	71279	160-2034-02-01
A1	IC	27014	LM311N
A2	POWER SUPPLY	95325	403CM046
A3, A4	IC	01295	NE556N
A5	IC	27014	LM741CN
A6 THROUGH A9	IC	27014	LF351N
A10	IC	01295	NE555N
A11, A12	IC	27014	LF351N
A13	IC	02735	CA3080A5
A14 THROUGH A17	IC	27014	LF351N
A18	IC	27014	LF357N OR LM318N OR LM318N
A19	IC	27014	LM3
A20	POWER SUPPLY	95325	403CM047
A21	IC	27014	LM311N
Q1	TRANSISTOR	07263	UA78M05UC
Q2	TRANSISTOR	07263	UA78M08UC
Q3, Q4	TRANSISTOR	01295	TIP31
Q5, Q6	TRANSISTOR	01295	2N2222A
Q7	TRANSISTOR	01295	TIP162
Q8	TRANSISTOR	07263	UA7905UC
Q9 THROUGH Q12, Q14	TRANSISTOR	01295	2N2222A
Q13	TRANSISTOR	27014	LM3
CR1	DI	01295	IN4004
CR2	DIODE	01295	IN757A
CR3	DI	01295	IN4004
CR4 THROUGH CR7	DIODE	01295	IN4148
CR8	DIODE	01295	IN752A
CR9	DI	01295	IN4148
CR12	DIODE	24444	1.5KE250
CR13	DIODE	01295	IN752A
CR14	DI	01295	IN4148
CR15, CR16			

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER PART NO.
FO-2-CR17, CR18 THROUGH CR22	DIODE DI	01295 01295	IN5230 IN4148
C1	CAP 0.1 UF, 50 V V	81349	CK05BX104K
C2	CAP 10 UF, 25 V	30039	PDA10M25ML
C3	CAP 0.1 UF, 50 V	81349	CK05BX104K
C4	CAP 10 UF, 25 V	30039	PDA10M25ML
C5	CAP 0.1 UF, 50 V	81349	CK05BX104K
C6	CAP 0.033 UF, 400 V	56289	715P33354KD3
C7, C8	CAP 0.01 UF, 100 V	81349	CK05BX103K
C9	CAP 2.2 UF, 50 V	30039	PDA2R2M50ML
10	CAP 0.1 UF, 50 V V	81349	CK05BX104K
C11	CAP 0.001 UF, 200 V	81349	CK05BX102K
C12, 13	CAP 0.01 UF, 100 V	81349	CK05BX103K
14	CAP 47 UF, 16 V	30039	TD47M16
15	CAP 0.15 UF, 50 V	81349	CK06BX154K
16	CAP 0.1 UF, UF, 50 V	81349	CK05BX104K
18	CAP 0.15 UF, 50 V	81349	CK06BX154K
C19	CAP 0.0022 UF, 100 V	81349	CK05BX222K
C20	CAP 0.22 UF, 400 V	56289	715P22454MD3
C21	CAP 0.01 UF, 100 V	81349	CK05BX103K
22	CAP 0.1 UF, 50 V V	81349	CK05BX104K
C23	CAP 0.15 UF, 50 V V	81349	CK06BX154K
24	CAP 150 UF, 200 V	81349	CK05BX151K
C25	CAP 47 UF, 16 V	30039	TD47M16
C26	CAP 0.1 UF, UF, 50 V	81349	CK05BX104K
27	CAP 0.001 UF, 200 V	81349	CK05BX102K
C28	CAP 0.01 UF, 100 V	81349	CK05BX103K
C29	CAP 100 UF, 16 V	30039	TD100M16
C30	CAP 100 PF, 200 V	81349	CK05BX101K
C31	CAP 2.2 UF, 50 V	30039	PDA2R2M50ML
C32	CAP 100 UF, 16 V	30039	TD100M16
C33, C34	CAP 100 PF, 200 V	81349	CK05BX101K
C35	CAP 2.2 UF, 50 V	30039	PDA2R2M50ML
36	CAP 0.0022 UF, 100 V	81349	CK05BX222K
37	CAP 0.15 UF, 50 V V	81349	CK06BX154K
C38	CAP 0.01 UF, 100 V	81349	CK05BX103K
C40	CAP 0.1 UF, UF, 50 V V	81349	CK05BX104K
C41	CAP 4.7 UF, 50 V	30039	PDA4R7M50ML
C42	CAP 0.1 UF, UF, 50 V	81349	CK05BX104K
C43	CAP 0.15 UF, 50 V V	81349	CK06BX154K
C44	CAP 0.1 UF, 50 V	81349	CK05BX104K
C45	CAP 2.2 UF, 50 V	30039	PDA2R2M50ML
C46	CAP 0.1 UF, 50 V	81349	CK05BX104K
C47, C49	CAP 10 UF, 25 V	30039	PDA10M25ML

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
FO-2-C50, C51	CAP 0.1 0.1 UF, 50 V	81349	CK05BX104K
C52	CAP 33Ω, 200 V	81349	CK05BX330K
R1	RES VARY1K 1K	01121	D4D102
R2	RES 1.5 K, 1/4 W W	81349	RC07GF152J
R3	RES 5.1 K, 1/4 W W	81349	RC07GF512J
R4	RES 680Ω, 1/4 W	81349	RC
R5	RES 5.1 K, 1/4 W W	81349	RC07GF512J
R6	RES 1 K, 1/4 W	81349	RC07GF102J
R7	RES 220Ω, 1/4 W	81349	RC07GF221J
R8	RES 7.5 K, 1/4 W W	81349	RC07GF752J
R9	RES 240Ω, 1/4 W	81349	RC07GF241J
R10	RES 820Ω, 1/4 W	81349	RC07GF821J
R11	RES 33Ω, 1 W	81349	RC32GF330J
R12	RES 12 K, 1/4 W W	81349	RC07GF123J
R	RES 2.2 K, 1/4 W W	81349	RC
R14	RES 1 K, 1/4 W W	81349	RC07GF102J
R15	RE VAR 500Ω	01121	D4D501
R16	RES 240Ω, 1/4 W	81349	RC
R17	RES 10 M, 1/4 W	81349	RC07GF106J
R18	RES 1 M 3/4 W	81349	RN70D
R19	RES 1.5 M, 1/4 W	81349	RC07GF155J
R20 THROUGH			
R22	RES 10 K, 1/4 W	81349	RC07GF103J
R23	RES VAR 10 K	01121	D4D103
R24	RES 43 K, 1/4 W	81349	RC07GF433J
R25	RES VAR 20 K	01121	D4D203
R26	RES 56 K, 1/4 W	81349	RC07GF563J
R27	RES 68 K, 1/4 W	81349	RC07GF683J
R28	RES 62 K, 1/4 W	81349	RC07GF623J
R29	RES 180 K, 1/4 W	81349	RC07GF184J
R30	RES 1 K, 1/4 W	81349	RC07GF102J
R31	RES 330Ω, 1/2 W	81349	RC20GF331J
R32	RES VAR 5 K 5 K	01121	D4D502
R33	RES 3.9 K, 1/4 W	81349	RC07GF392J
R34	RES 1 K, 1/4 W	81349	RC07GF102J
R35	RES 3.9 K, 1/4 W	81349	RC07GF392J
R36	RES 10 K, 1/4 W	81349	RC07GF103J
R37	RES 7.5 K, 1/4 W	81349	RC07GF752J
R38	RES 1 M, 1/4 W	81349	RC07GF105J
R39	RES 100Ω 1/2 W	81349	RC20GF101J
R40	RES 3.3 K, 1/4 W	81349	RC07GF332J
R41	RES 100 K, 1/4 W	81349	RC07GF104J
R42	RES 0.5$, 5W	11502	PW5
R44	RES 1 M, 1/4 W	81349	RC07GF105J
R45	RES 10 K, 1/4 W	81349	RC07GF103J
R46	RES 10 K, 1/4 W	81349	RC07GF103J
R47	RES 10 K, 1/4 W	81349	RC07GF103J
R48	RES 18 K, 1/4 W	81349	RC07GF183J
R49	RES VAR 10 K	01121	D4D103
R50	RES 1 M, 1/4 W	81349	RC07GF105J

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
FO-2- R51	RES 6.8 K, 1/4 W	81349	RC07GF682J
R52	RES 68 K, 1/4 W	81349	RC07GF683J
R53	RES 6.8 K, 1/4 W	81349	RC07GF682J
R54	RES 5.1 K, 1/4 W	81349	RC07GF512J
R55	RES VAR 100 K	01121	D4D104
R56	RES 39Ω, 1/4 W	81349	RC07GF390J
R57	RES 100 K, 1/4 W	81349	RC07GF104J
R58	RES 10 K, 1/4 W	81349	RC07GF103J
R59	RES 220Ω, 1/4 W	81349	RC07GF221J
R60	RES 43 K, 1/4 W	81349	RC07GF433J
R61	RES 33 K, 1/4 W	81349	RC07GF33 3J
R62	RES 27 K, 1/4 W	81349	RC 07GF273J
R63	RES 39Ω, 1/4 W	81349	RC07GF390J
R65	RES 33 K, 1/4 W	81349	RC07GF33 3J
R67	RES VAR 20 K	01121	D4D203
R68	RES VAR 1 K	01121	D4D102
R69	RES 5.6 K, 1/4 W	81349	RC07GF562J
R70	RES 220 K, 1/4 W	81349	RC07GF224J
R71	RES 3.3 K, 1/4 W	81349	RC07GF332J
R72	RES VAR 10 K	01121	D4D103
R73	RES 5.1 K, 1/4 W	81349	RC07GF512J
R74	RES 10 K, 1/4 W	81349	RC07GF103J
R75	RES 33 K, 1/4 W	81349	RC07GF333J
R76	RES 12 K, 1/4 W	81349	RC07GF123J
R77	RES 10 K, 1/4 W	81349	RC07GF103J
R78	RES 6.8 K, 1/4 W	81349	RC07GF682J
R79	RES 4.7 K, 1/4 W	81349	RC07GF472J
R80	RES 100 K, 1/4 W	81349	RC07GF104J
R81	RES 15 K, 1/4 W	81349	RC07GF153J
R82	RES 120Ω, 1/4 W	81349	RC07GF121J
R83			
R84	RES VAR 20 K	01121	D4D203
R85	RES 10 K, 1/4 W	81349	RC07GF103J
R86	RES 120Ω, 1/4 W	81349	RC 07GF121J
R87			
R88	RES 10 K, 1/4 W	81349	RC07GF103J
R89	RES 22 K, 1/4 W	81349	RC07GF223J
R90	RES 5.6 K, 1/4 W	81349	RC07GF562J
R91	RES 10 K, 1/4 W	81349	RC07GF103J
R92	RES 47 K, 1/4 W	81349	RC07GF473J
R93	RES 3.9 K, 1/4 W	81349	RC07GF392J
R94	RES 1.5 K, 1/8 W	81349	RN55D1501F
R95	RES 1.5 K, 1/4 W	81349	RC07GF152J
R96	RES 1.13 K, 1/4 W	81349	RN60D1131F
R98	RES 330Ω, 1/2 W	81349	RC20GF331J
R99	RES 3.83 K, 1/4 W	81349	RN60D3831F
R100	RES 15 K, 1/2 W	81349	RC20GF153J
R101	RES 10Ω, 1/2 W	81349	RN65D10R0F
R102	RES 30.9 K, 1/4 W	81349	RN60D3092F

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
FO-2-R105	RES 10$, 1/2 W	81349	RN65D10R0F
R106	RES 100Ω, 1/4 W	81349	RC07GF101J
R107	RES 1 K, 1/2 W	81349	RC20GF102J
R108	RES 39Ω, 1/4 W	81349	RC07GF390J
R109	RES 120Ω, 1/4 W	81349	RC07GF121J
MP1	HEAT SINK	13103	6045B
MP2	HEAT SINK	13103	6038B
MP3	HEAT SINK	13103	6072B
MP4			
MP5	SCREW, PAN HD, PHH NO. 4-40 X 5/16	81349	MS51957-14
MP6			
MP7	WASHER, LK, INTL TOOTH, NO. 4	81349	MS35333-70
MP8, MP9	NUT, HEX, NO. 4-40	81349	MS35649-244
J1 THROUGH J17	WIRE, CU, SOLID TINNED, QQ-W-343/S	81349	AWG #22
J18 THROUGH J22	WIRE, STRD, PVC, WHT	81349	M16878/B24

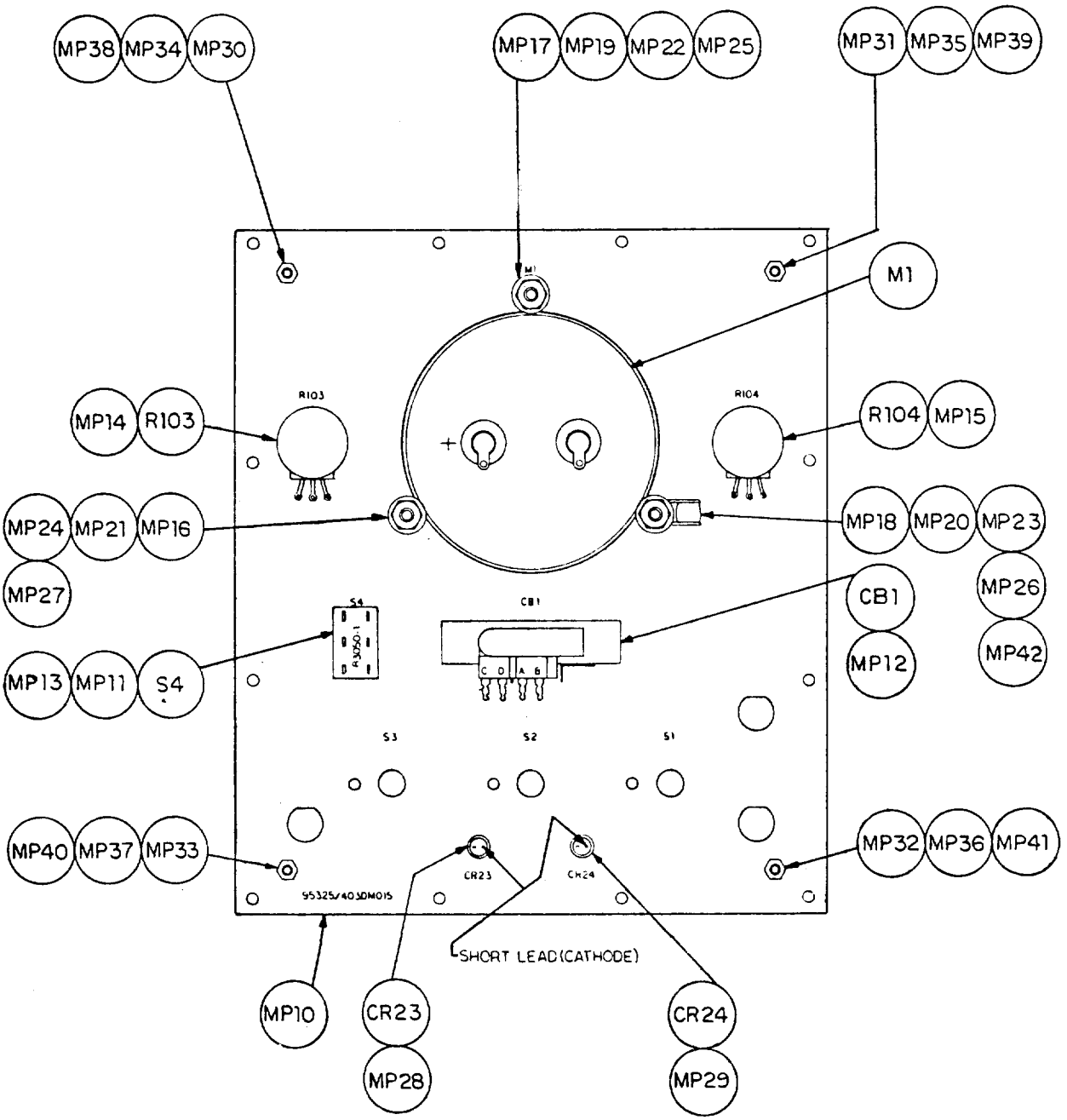

Figure 5-1. Front Panel, Rear View

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
5-1-MP10	FRONT PANEL	95325	403DM015
S4	PUSH SWITCH DPDT	04009	83094C
MP11	PUSH BUTTON BOOT	97539	N3030-B
CB1	CIRCUIT BREAKER	95235	199-3803
MP12	CIRCUIT BREAKER SPACER	95325	199AM001
R103, R104	RES VAR 5K	81349	RV4NAYSD502A
MP13	LOCKING RING	83330	1172
MP14, MP15	KNOB	72512	1510
M1	METER	95325	403CM004
MP16 THROUGH MP18	SCREW, PAN HD, PHH NO. 10-32X1	81349	MS51958-67
MP19 THROUGH MP21	WASHER, FLAT, NO. 10	81349	AN960C10L
MP22 THROUGH MP24	WASHER, LOCK, SPLIT NO. 10	81349	MS35337-81
MP25 THROUGH MP27	NUT, HEX, NO. 10-32	81349	MS35650-304
CR23	LED, RED	71744	CM4-284B
CR24	LED, GREEN	71744	CM4-384B-2
MP28, MP29	MOUNTING CLIP	71744	CM4-6B
MP30 THROUGH MP33	STANDOFF	55566	2200-632-A-6
MP34 THROUGH MP37	SCREW, PAN HD, PHH NO. 6-32X3/8	81349	MS51957-28
MP38 THROUGH MP41	WASHER, LOCK, INT TOOTH, NO. 6	81349	MS35333-71
MP42	CABLE CLAMP	95987	WC-44

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
FO-3-MP43, MP44	STRAIN RELIEF	28520	SR1127
MP45	STRAIN RELIEF	28520	SR1154
MP46	BAT (+) LEAD	95325	403BA041
MP47	BAT (-) LEAD	95325	403 BA042
MP48	TEST LEADS	95325	403 BA043
MP49	VOLTAGE DIVIDER ASSY	95325	403BA024
MP50	WIRE, STRD, PVC-BLU	81349	M16878/B24
MP51	WIRE, STRD, PVC-BLK-YEL	81349	M16878/B24
MP52	WIRE, STRD, PVC-BLK	81349	M16878/B24
MP53	WIRE, STRD, PVC-WHT-BRN	81349	M16878/B24
MP54	WIRE, STRD, PVC-GY	81349	M16878/B24
MP55	WIRE, STRD, PVC-WHT-BLU	81349	M16878/B24
MP56	WIRE, STRD, PVC-BRN	81349	M16878/B24
MP57	WIRE, STRD, PVC-YEL	81349	M16878/B24
MP58	WIRE, STRD, PVC-WHT-ORN -V10	81349	M16878/B24
MP59	WIRE, STRD, PVC-WHT-GRN	81349	M16878/B24
MF60	WIRE, STRD, PVC-WHT-RED	81349	M16878/B24
MP61	WIRE, STRD, PVC-WHT	81349	M16878/B24
MF62	WIRE, STRD,PVC-WHT	81349	M16878/B24
MP63	WIRE, STRD, PVC-V10	81349	M16878/B24
MP64	WIRE, STRD, PVC-WHT-YEL	81349	M16878/B24
MP65	WIRE, STRD, PVC-WHT-BLK	81349	M16878/B24
MP66	WIRE, STRD, PVC- GRN	81349	M16878/B24
MP67	WIRE, STRD, PVC- ORN	81349	M16878/B24
MP68	WIRE, STRD, PVC- ORN	81349	M16878/B24
MP69	WIRE, STRD, PVC-RED	81349	M16878/B24
MP70, MP71	WIRE, CU, SOLID, TINNED QQ-W-343/5	81349	AWG24

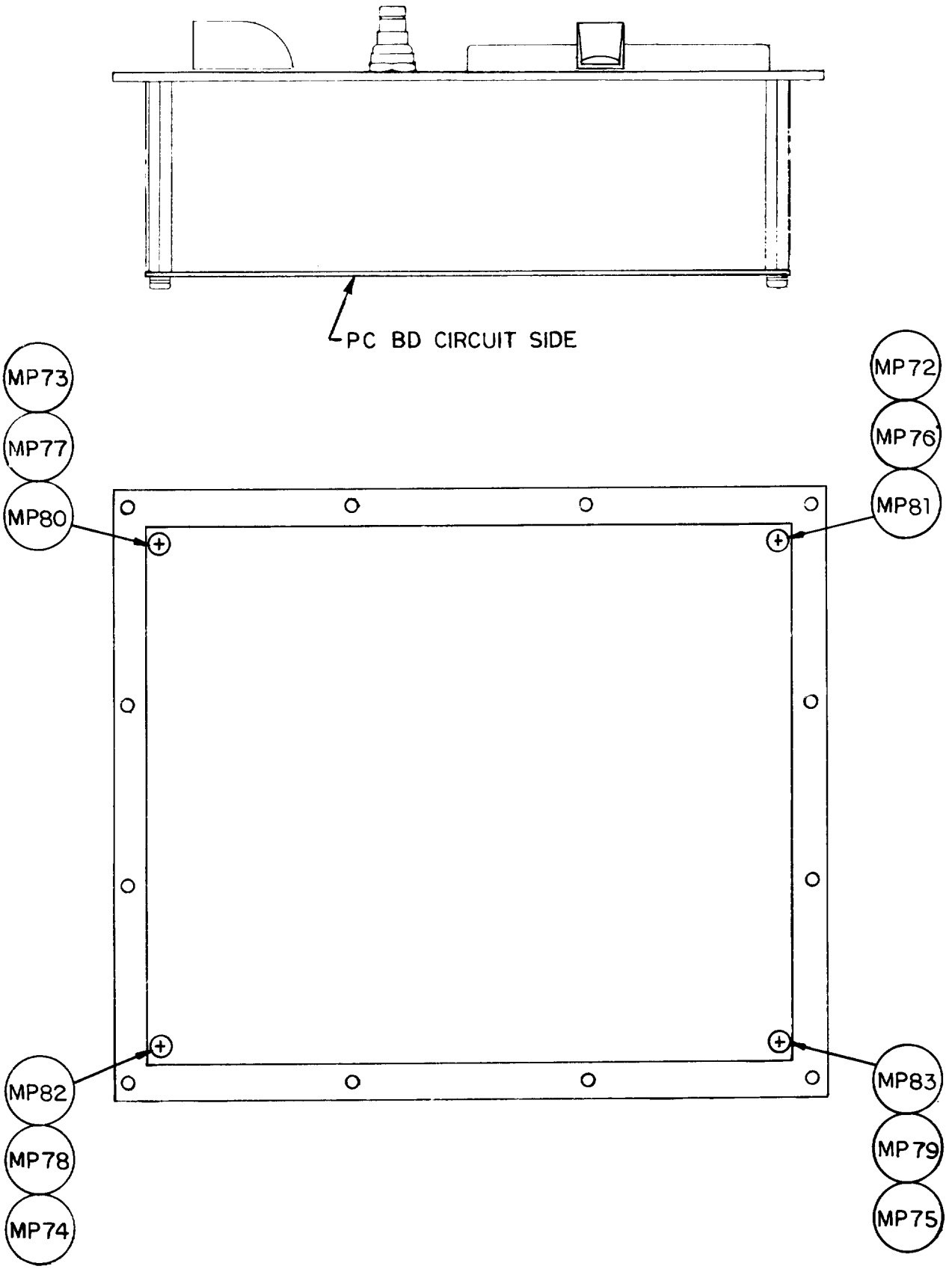

Figure 5-2. Printed Circuit Board, Attaching Parts

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
5-2-MP72 THROUGH MP75	SCREW, PAN HD, PHH, NO. 6-32X3/8	81349	MS51957-28
MP76 THROUGH MP79	WASHER, LK, INT TOOTH, NO. 6	81349	MS35333-71
MP80 THROUGH MP83	WASHER, FLAT, NO. 6	81349	MS15795-805

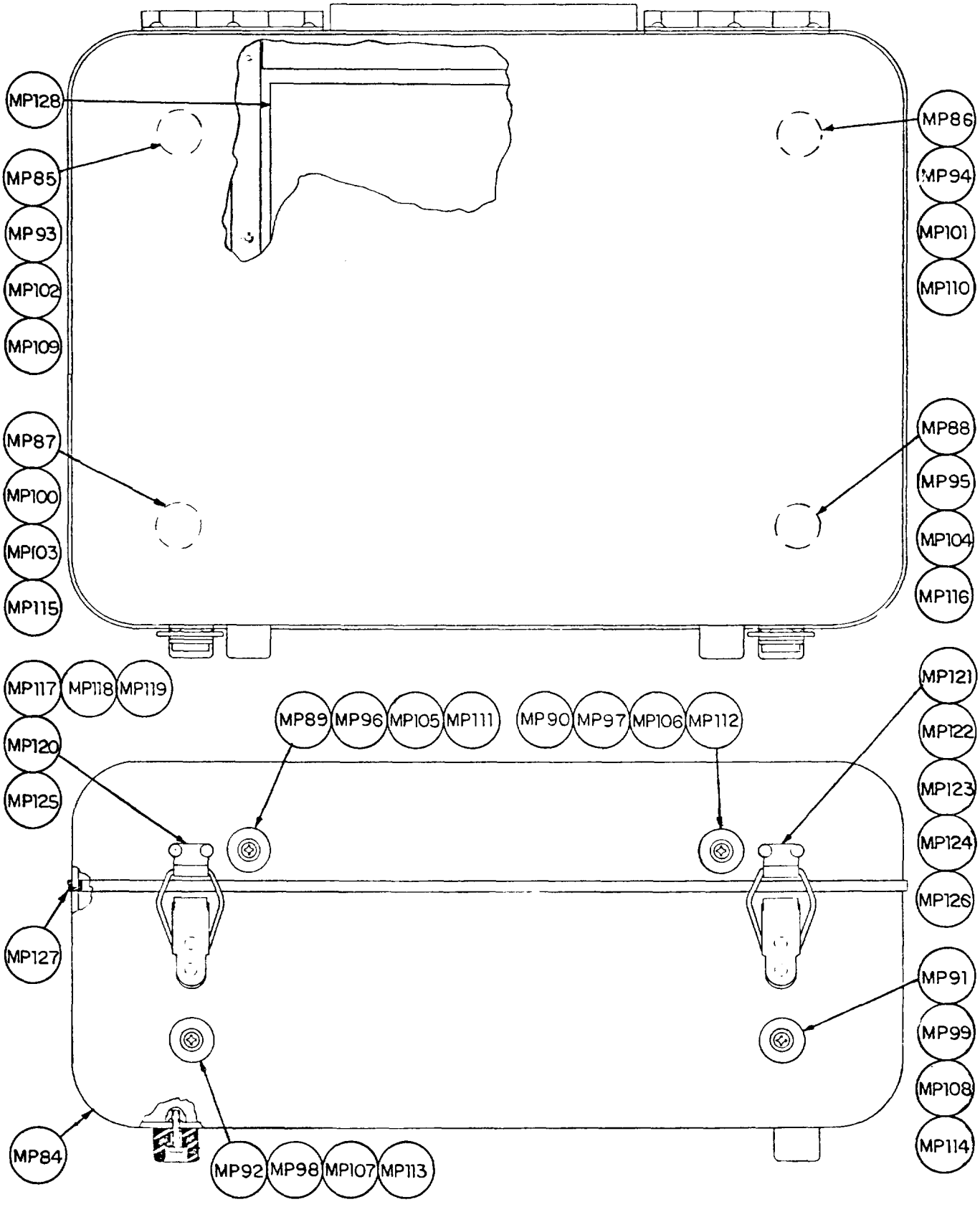

Figure 5-3. Case and Cover Assembly

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
5-3-MP84	CASE AND COVER	95325	403DA018
MP85 THROUGH MP92	ACORN NUT	77122	AC632 ZINC FIN.
MP93 THROUGH MP100	SCREW, PAN HD, PHH, NO. 6-32 X 1/2	81349	MS51957-30
MP101 THROUGH MP108	BUMPER	70485	NO. 18W NEOPRENE
MP109 THROUGH MP116	WSHER, LK, INT TOOTH NO. 6	81349	MS35333-71
MP117 THROUGH MP124	RIVET, TUB, OVAL HD, NI PLT, . 125 DIA X 219	81349	MS20450C8B7
MP125, MP126	CATCH AND STRIKE	98003	HC-200CE
MP127	"U" CHANNEL	95325	403-319
MP128	CIRCUIT DIAGRAM PLATE	95325	403-320

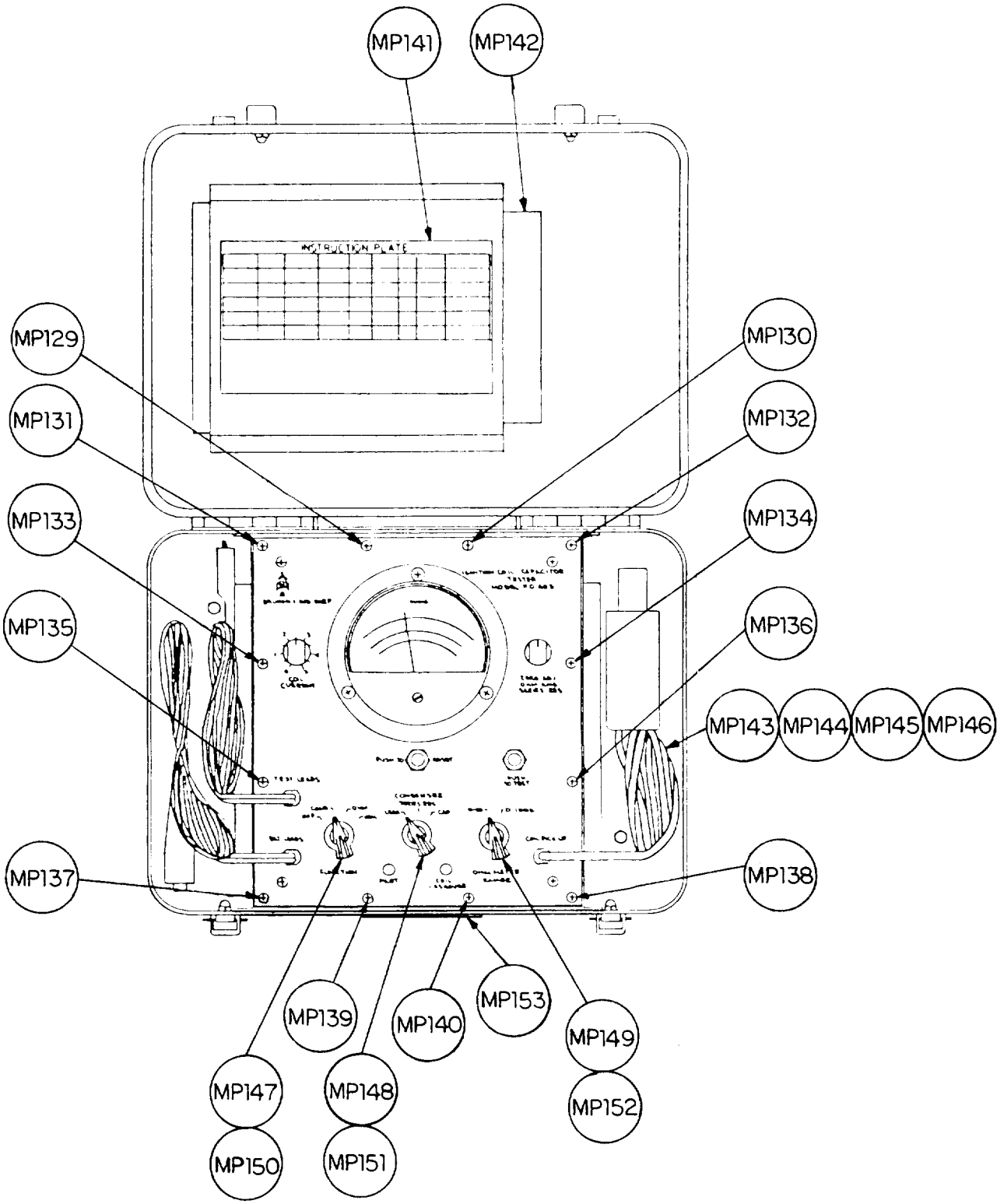

Figure 5-4. Test Set, View with Cover Open

FIGURE & REF DES NO.	DESCRIPTION	FSCM	MANUFACTURER'S PART NO.
5-4-MP129 THROUGH MP140	SCREW, PAN, HD, PHH, NO. 6-32 X 3/8	81349	MS51957-28
MP141	INSTRUCTION PLATE	95325	403BM035
MP142	INSTRUCTION HANDBOOK	95325	403HB06
MP143	COIL ADAPTER ASSY (FOR DELCO 1915992)	95325	403BA031
MP144	COIL ADAPTER ASSY (FOR STD 12 V COIL)	95325	403BA032
MP145	COIL ADAPTER ASSY (FOR DELCO 1115282)	95325	403BA033
MP146	COIL ADAPTER ASSY (FOR DELCO 1115282)	95325	403BA034
MP147 THROUGH MP149	KNOB	72512	2300
MP150 THROUGH MP152	WASHER, LK, INT TOOTH 3/8	78189	1220-02 STL ZINC PLT
MP153	NAMEPLATE	95325	403AM021

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
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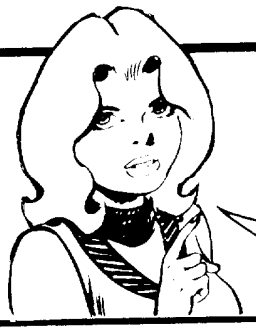

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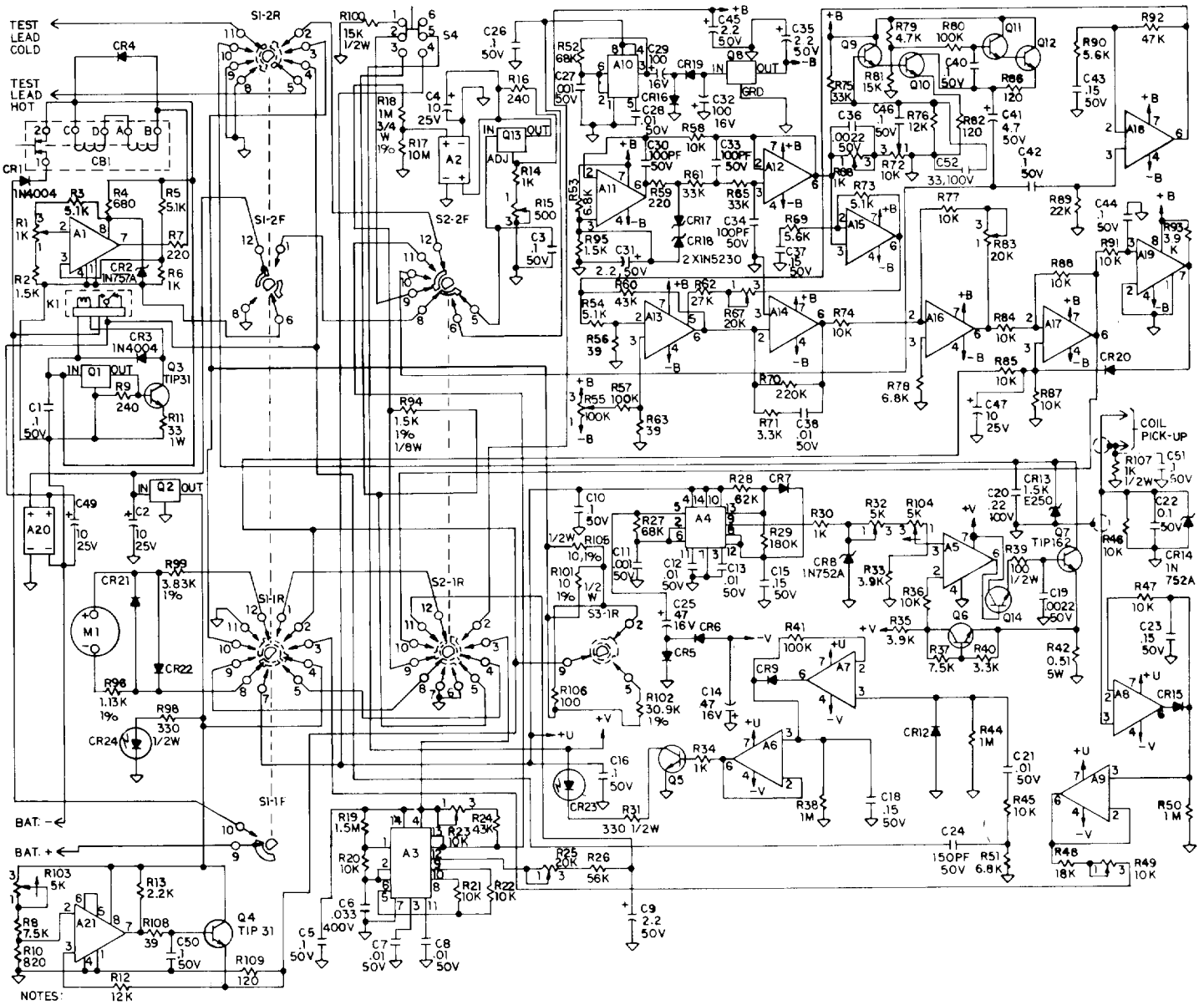
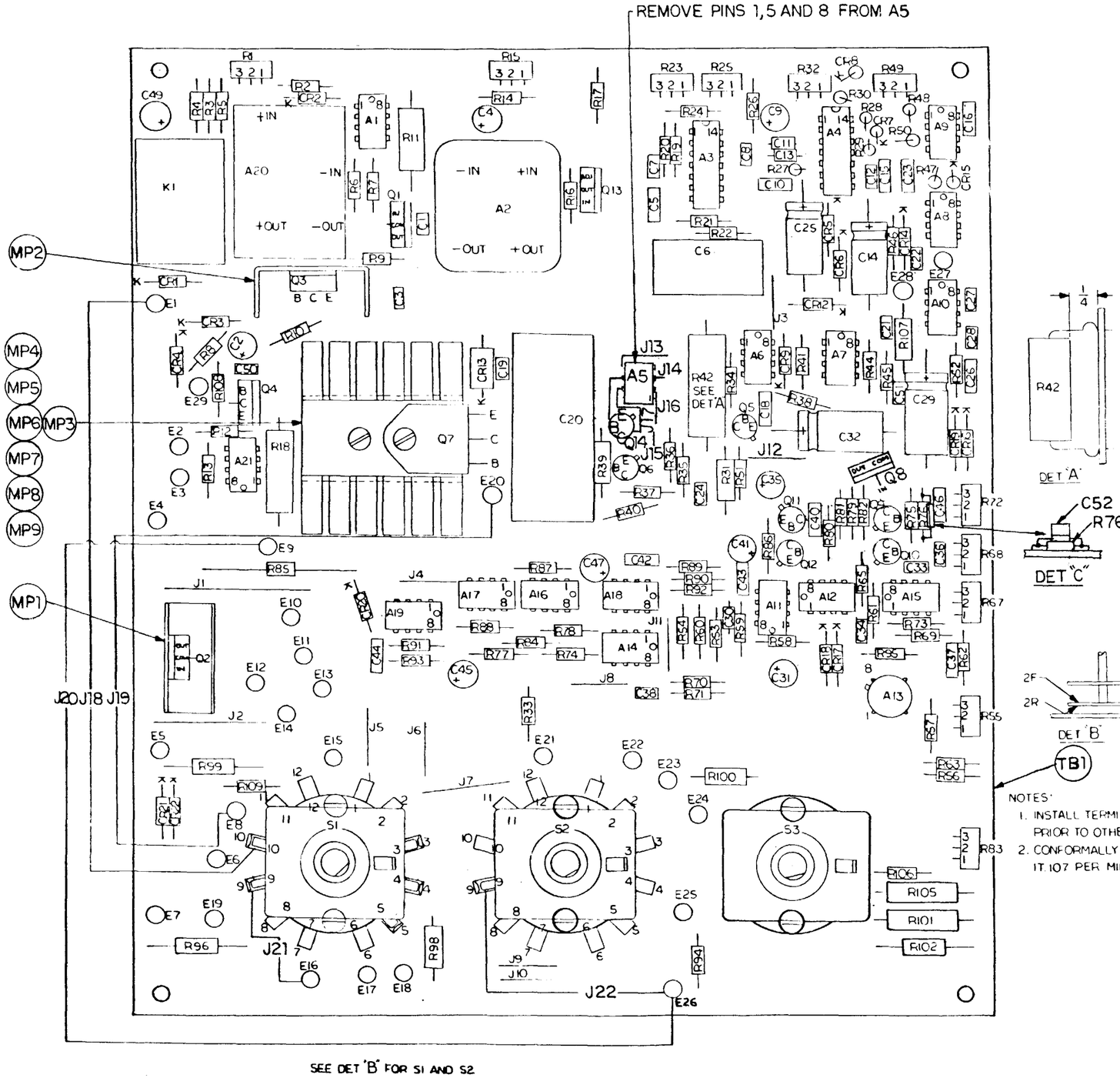


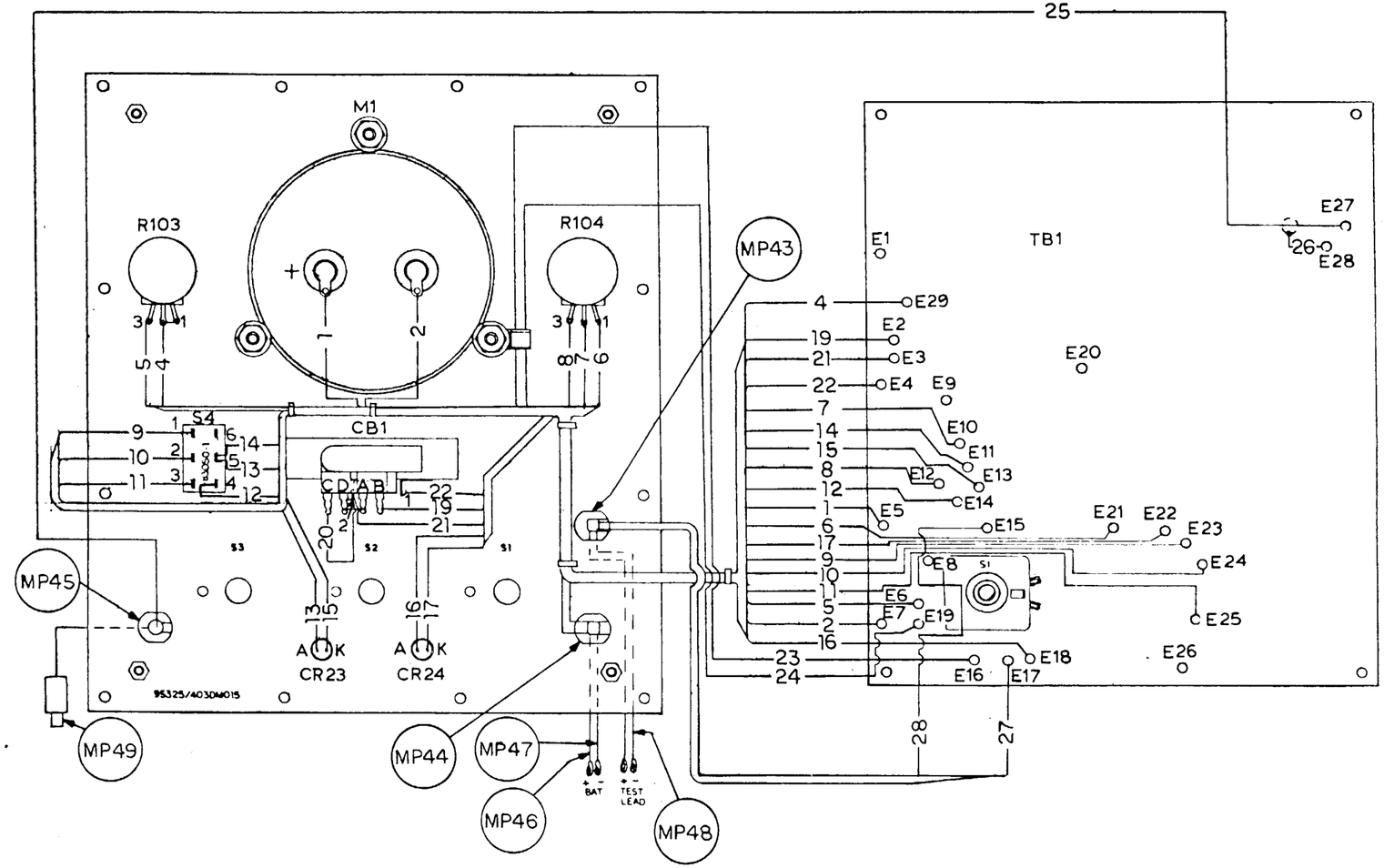
Figure FO-1. Test Set Schematic Diagram



WIRE LIST		
WIRE NO	FROM	TO
J18	E1	S1-1F-10
J19	E20	E8
J20	E9	E26
J21	E16	S1-1F-9
J22	E26	S2-1R-9

NOTES:
1. INSTALL TERMINALS E1 THRU E29 PRIOR TO OTHER COMPONENTS.
2. CONFORMALLY COAT BOARD WITH IT-107 PER MIL-STD-275.

Figure FO-2. Printed Circuit Board Assembly



WIRE NO.	COLOR	FROM	TO	REF DES
28	BLK	TEST LEAD –	TB1-E15	MP48
27	BLK	TEST LEAD +	TB1-E17	MP48
26		SHLD OF MP49	TB1-E28	MP49
25	WHT	VOLT DIV.	TB1-E27	MP49
24	BLK	BAT –	TB1-E19	MP47
23	BLK	BAT +	TB1-E16	MP46
22	RED	CB1-1	TB1-E4	MP69
21	ORN	CB1-2	TB1-E3	MP68
20	ORN	CB1-C	CB1-2	MP67
19	GRN	CB1-B	TB1-E2	MP66
18		CB1-A	CB1-D	MP71
17	WHT-BLK	CR24-K	TB1-E22	MP65
16	WHT-YEL	CR24-A	TB1-E18	MP64
15	VIO	CR23-K	TB1-E13	MP63
14	WHT	S4-5	TB1-E11	MP62
13	WHT	S4-5	CR23-A	MP61
12	WHT-RED	S4-4	TB1-E14	MP60
11	WHT-GRN	S4-3	TB1-E25	MP59
10	WHT-ORN-VIO	S4-2	TB1-E24	MP58
9	YEL	S4-1	TB1-E23	MP57
8	BRN	R104-3	TB1-E12	MP56
7	WHT-BLU	R104-2	TB1-E10	MP55
6	GY	R104-1	TB1-E21	MP54
5	WHT-BRN	R103-3	TB1-E6	MP53
4	BLK	R103-2	TB1-29	MP52
3		R103-1	R103-2	MP70
2	BLK-YEL	M1-	TB1-E7	MP51
1	BLU	M1 +	TB1-E5	MP50

WIRE LIST

Figure FO-3. Front Panel and Printed Circuit Board, Wiring View

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 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

WEIGHTS

1 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

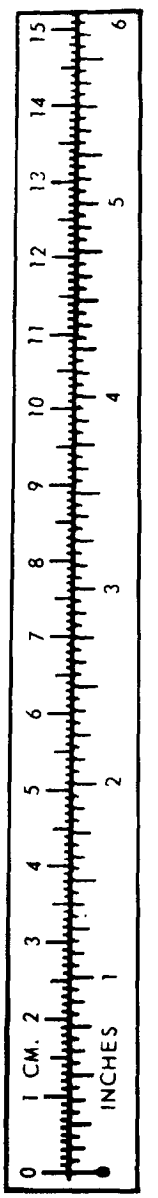
TEMPERATURE

$5/9\ (^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\ C^0 + 32 = F^0$

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
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	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
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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