TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR FUEL-QUANTITY-GAGE TEST SET CAPACITANCE TYPE

(MODEL TF579)

NSN 4920-00-109-5066

This copy is a reprint which includes current pages from Change -1

HEADQUARTERS, DEPARTMENT OF THE ARMY

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CHANGE
No 1

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OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT
AND
GENERAL SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS
AND
SPECIAL TOOLS LIST
FOR
FUEL-QUANTITY-GAGE TEST
SET CAPACITANCE TYPE
(MODEL TF 579)
NSN 4920-00-109-5066

TM 55-4920-325-14&P, 18 June 1976, is changed as follows:

1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 4	4-5 and 4-6	4-5 and 4-6

2. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

3. Retain this sheet in front of manual for reference purposes.

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WARNING

Personnel performing operations, procedures, and practices which are included or implied in this technical manual shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury, death, or destruction of material.

HIGH VOLTAGE

is used in the 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.

Technical Manual
No. 55-4920-325-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 18 *June 1976*

OPERATOR, ORGANIZATIONAL DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FUEL-QUANTITY-GAGE TEST SET: CAPACITANCE TYPE (MODEL TF579) NSN 4920-00-109-5066

REPORTING OF ERRORS

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028-2 (TEST), Recommended Changes to Equipment Technical Manuals, should be mailed directly to Commander, US Army Aviation Systems Command, ATTN: DRSAV-FR, PO Box 209, St. Louis, MO 63166. A reply will be furnished directly to You.

LIST OF ILLUSTRATIONS

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page.

Total number of pages in this manual is 96 consisting of the following:

Page No	#Change No.
Title	0
Warning	0
A	0
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A1	0
B1	0
C1-C3	0

#Zero in this column indicates an original page.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Scope.

The Capacitance Type Fuel-Quantity-Gage Test Set, Part Number TF579, hereinafter referred to as the test set, is a variable capacitance fuel quantity gage test set used to measure the capacitance of fuel gaging systems, both compensated and noncompensated. The test set is also used for measuring insulation resistance of the fuel gage tank units of the capacitance type, and testing and calibrating the fuel quantity indicators. The test set is designed for field and shop use. The test set, together with its accessory cables, is illustrated in figure 1-1.

1-2. Forms and Records.

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed in TM 38-750.

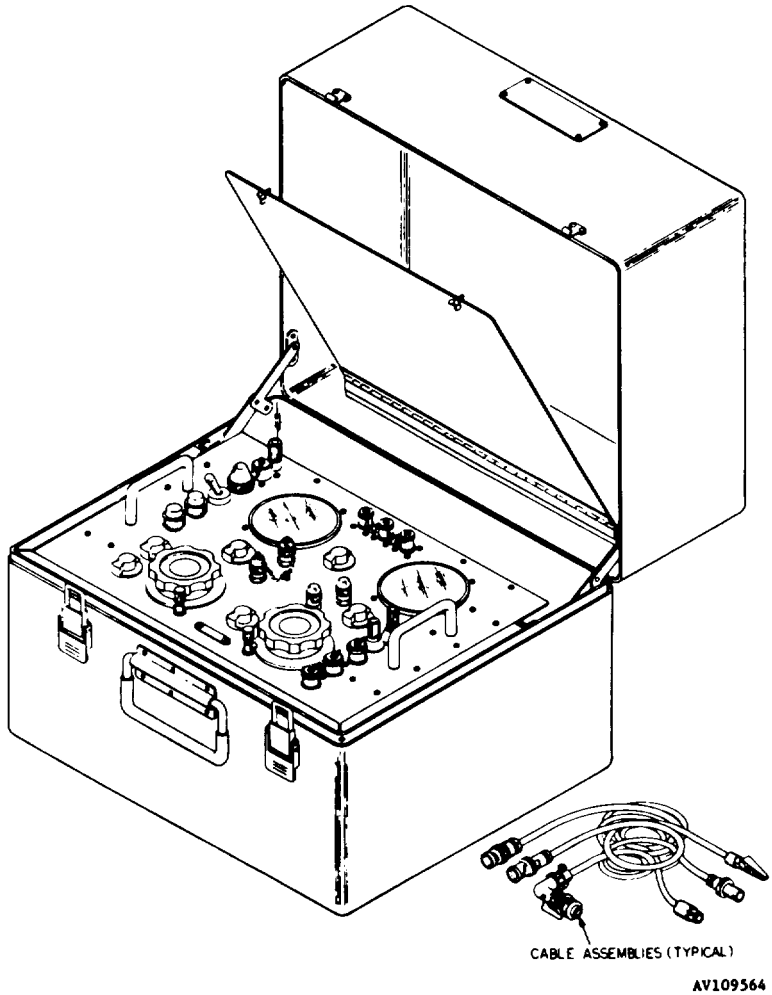


Figure 1-1. Fuel-Quantity-Gage Test Set, Capacitance Type, Part Number TF579.

Section II. DESCRIPTION AND LEADING PARTICULARS

1-3. Description.

The Model TF579 test set is manufactured by Consolidated Airborne Systems, Inc., Carla Place, L.I., New York. The test set provides a means to determine the serviceability of aircraft (fixed and rotary wing) employing a capacitance type fuel gaging system. The" test set consists of a single integral unit incorporating a transit case, direct current (dc) electrical resistance measuring circuit, capacitance measuring circuitry of an alternating current (at) rebalancing bridge type, capacitance substitution circuitry, calibration circuitry with built-in standards of capacitance and resistance, cable assemblies, and accessories.

1-4. Leading Particulars.

Leading particulars, consisting of the technical characteristics of the test set, are contained in table 1-1. Cables and accessories supplied with the test set are listed in table 1-2.

Table 1-1. Leading Particulars.

Item	Characteristics
Power Requirements	
Voltage	105 to 125 Volts.
Current	200 to 236 Milliamperes.
Wattage	25 Watts.
Frequency	360 to 440 Hz.
Phase	Single Phase.
Range of Operation	
Capacitance Measurement	
Range	0 to 5000 uuf in four ranges.
Accuracy	0 to 1/2 scale = 0.25% of full scale. 1/2 to full scale = 0.5% of reading.
Maximum short circuit current	Less than 0.2 ampere.
Scale multipliers	X1, X3, X10, and X50.
Vernier indicator scale	Subdial, producing direct vernier readings to within 0.1%.
Self-calibrating feature	Precise tolerance capacitor, of known value, is included within test set.
Insulation Resistance Measurement	
Range	0 to 10,000 megohms in four ranges.
Accuracy	±1/16 in. of scale reading.
Measurement capabilities	Selector switch provides means for testing resistance between the following: Unshielded conductor and compensator conductor to ground. Coaxial conductor to ground. Coaxial conductor to unshielded conductor. Coaxial conductor to compensator conductor.
Maximum short circuit current	33 microamperes at normal 33-volt operation.
Scale multipliers	X1, X10, X100, end X1000.
External resistance terminals	For checking insulation resistance of system wiring or other equipment, using separate test leads.

Table 1-1. Leading Particulars - Continued.

Item	Characteristics
Self-calibrating feature	Test set resistance standards provide for calibration at zero and midscale range.
Capacitance Simulator Circuit	
Range	25 uuf to 5,000 uuf for main probe simulation. 25 uuf to 250 uuf for compensator probe simulation.
Accuracy	0.15% of indicator full scale.
Measurement capabilities	Selector switch provides means to substitute capacitance of (1) main tank unit probes, (2) compensator tank unit probe, and (3) empty and full probe capacitance, for the purpose of calibrating the indicator under test.
Weight (Complete with Accessories)	30 pounds.
Dimensions:	
Length	16-5/8 inches
Width	14-1/4 inches
Depth	14-1/4 inches
Environmental Operating Limits	
Ambient temperature	-40° c to 55° c
Storage temperature	-55° C to 71°C
Humidity	Up to 95°/0 relative humidity

Table 1-2. Cables and Accessories.

Description	Part Number	Aircraft	Qty
Main Cable Assembly	• 2688	---	1
Adapter Cable Assembly	2687-A-1	UH-1/AH-1	1
Adapter Cable Assembly	2687-A-2	CH-34C	1
Adapter Cable Assembly	2687-A-3	CH-54B	1
Adapter Cable Assembly	2687-A-4	CH-47A, B	1
Adapter Cable Assembly	2687-A-5	CH54A, B	1
Adapter Cable Assembly	2687-A-6	OV-1	1
Adapter Cable Assembly	2687-B-1	UH-1/AH-1	1
Adapter Cable Assembly	2687-B-2	CH-34C	1
Adapter Cable Assembly	2687-B-3	CH-54B	1
Adapter Cable Assembly	2687-B-4	CH-47A, B	1
Adapter Cable Assembly	2687-B-5	CH-54A, B	1
Adapter Cable Assembly	2687-B-6	OV-1	1
Power Cable Assembly	2237	---	1

Table 1-2. Cables and Accessories - Continued.

Description	Part Number	Aircraft	Qty
Power Cable Assembly	2238	---	1
Power Cable Assembly	2239	---	1
BNC Connector Cable Assembly	100036	---	1
BNC Connector Cable Assembly	100037	---	1
BNC Connector Cable Assembly	100041	---	1
BNC Connector Cable Assembly	100042	---	2
BNC Connector Cable Assembly	1237	- -	1
BNC Connector Cable Assembly	1423	---	1
Ground Lead Assembly	2240	---	1
Test Lead Assembly	100038	---	2
indicator Test Cable Assembly	2689	- .	1
Break-in Cable Assembly	2690-1	CH-47C	1
Break-in Cable Assembly	2690-2	CH-47C	1
Tee Connector	EJA14	---	2
Tee Connector	UG274/U	---	3

Section III. TEST EQUIPMENT, SPECIAL TOOLS AND MATERIALS

1-5. Test Equipment.

No maintenance special tools are required to support direct and general maintenance activities.

A list of maintenance test equipment will be found in tabular form in table 1-3.

*Tab/e 1-3. Test Equipment Required.**

Nomenclature	Part Number
Multimeter	Triplett 630 NA
Megohmmeter	6625-00-X55-6562
Resistance standard: 1 megohm to 100 megohms	6625-00-678-9677
Resistance standard: 1000 megohms	6625-00-779-9151
Electronic voltmeter	6625-00-073-0049

*The test equipment listed is recommended. However, equivalent test equipment may be used,

1-6. Special Tools.

No special tools are required to support direct and general maintenance activities.

1-7. Consumable Materials.

Consumable materials required for direct and general support maintenance activities are contained in table 1-4.

Table 1-4. Consumable Materials.

item Number	Nomenclature	Military Specification
1	Ethyl alcohol	MIL-E-463
2	Solvent	P-D-680
3	Locking compound	MIL-S-22473
4	Solder	QQ-S-571D
5	Adhesive (3M No. EC-2216-B/A)	

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. INTRODUCTION

2-1. Scope.

This chapter contains information and instructions for operating Capacitance Type Fuel-Quantity-Gage Test Set, Part Number TF579. Operating instructions for measuring the capacitance of tank unit probes is contained in Section II of this chapter. Section III contains operating instructions for measuring the tank unit probe insulation resistance. Instructions for the use of the test set to simulate the capacitance of a tank unit probe (or probes) to check the aircraft fuel quantity gage is contained in Section IV. Section V contains operating instructions for measuring aircraft wiring leakage resistance.

2-2 General.

Adherence to the procedures set forth in the following sections will enable an operator with limited experience to successfully operate the test set. Perform the required procedures in the sequence given in order to assure proper operation of the equipment. Operating personnel should be thoroughly familiar with the location and function of all operating controls, indicators, and connectors before attempting to make any measurements or tests.

2-3. Operating Controls, Indicators and Connectors.

The location of operating controls, indicators, and connectors are shown in figure 2-1. The function of these controls are described in table 2-1.

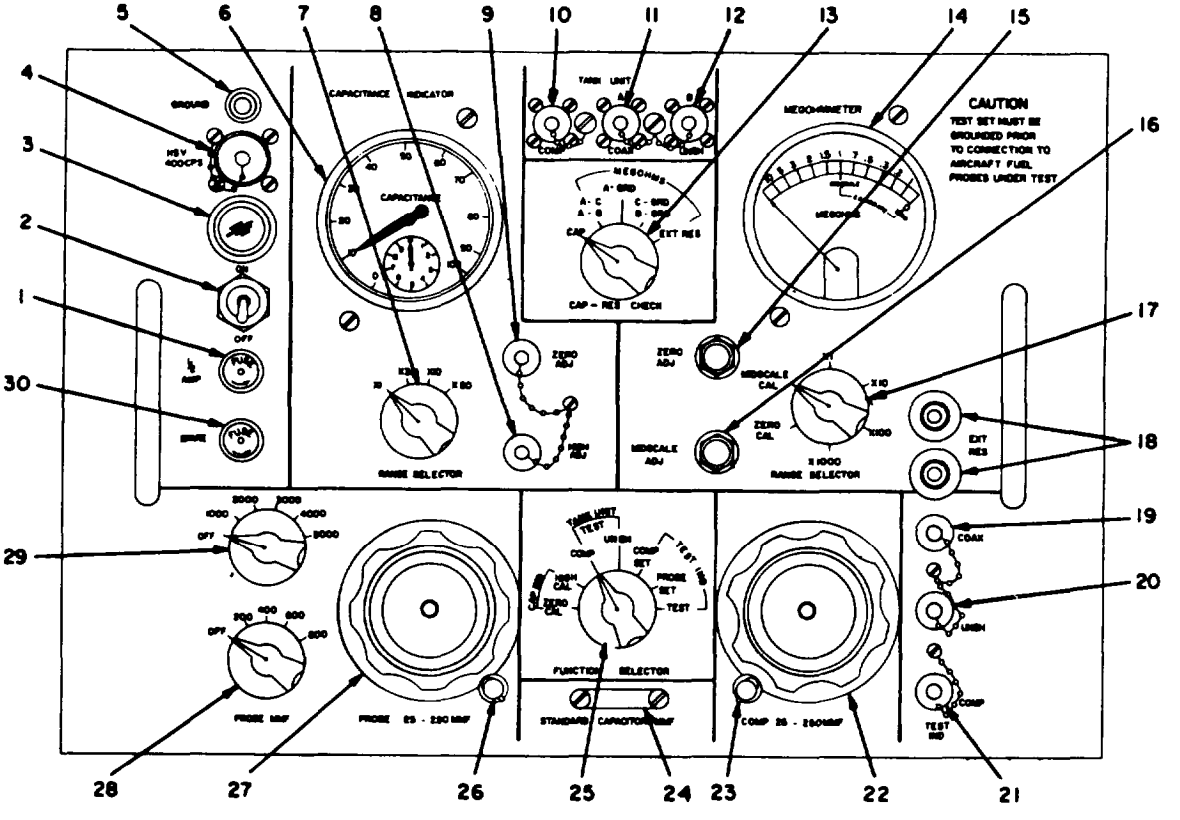


Figure 2-1. Control Panel Operating Controls, Indicators end Connectors.

Key to Fig. 2-1:

1. 1/2 AMP fuse
2. Power ON/OFF switch
3. Power ON indicator
4. 1 15V 400 CPS connector
5. GROUND terminal
6. CAPACITANCE INDICATOR
7. Capacitance RANGE SELECTOR switch
8. Capacitance HIGH ADJ control
9. Capacitance ZERO ADJ control
10. TANK UNIT COMP C connector
11. TANK UNIT COAX A connector
12. TANK UNIT UNSH B connector
13. CAP-RES CHECK switch
14. MEGOHMMETER indicator
15. Megohmmeter ZERO ADJ control
16. Megohmmeter MIDSCALE ADJ control
17. Megohmmeter RANGE SELECTOR switch
18. EXT RES terminals
19. TEST IND COAX connector
20. TEST IND UNSH connector
21. TEST IND COMP connector
22. COMP 25-250 MMF control
23. COMP 25-250 MMF control lock
24. STANDARD CAPACITOR MMF nameplate
25. FUNCTION SELECTOR switch
26. PROBE 25-250 MMF control lock
27. PROBE 25-250 MMF control
28. PROBE MMF range selector switch (200 pF step)
29. PROBE MMF range selector switch (1000 pF step)
30. SPARE fuse

Table 2-1. **Control** *Panel, Operating Controls, Indicators, and Connectors,*

Figure 2-1 Index Number	Name of Control, Indicator, or Connector	Function
1	1/2 AMP fuse (F101)	Provides protection to test set in case of overload or short circuit.
2	Power ON/OFF switch (S101)	When set to ON, applies AC power to test set. In OFF position power is disconnected from test set.
3	Power ON indicator (DS101)	Operates in conjunction with power ON/OFF switch. When lighted, indicates that AC power is applied to test set.
4	1 15V 400 CPS connectors (J104)	Provides for connection of 115V, 400 Hz external power to test set.
5	Ground terminal (E101)	Allows test set to be grounded to aircraft by means of external cable.
6	CAPACITANCE INDICATOR	Indicates capacitance of aircraft tank unit probe (or probes) in pF, Operates in conjunction with Capacitance RANGE SELECTOR switch. Capacitance indicated on meter is a multiple of setting selected on Capacitance RANGE SELECTOR switch.
7	Capacitance RANGE SELECTOR switch (S104)	Operates in conjunction with CAPACITANCE INDICATOR to extend range of capacitance which can be measured by CAPACITANCE INDICATOR.
8	Capacitance HIGH ADJ control (R108)	Operates in conjunction with FUNCTION SELECTOR switch. Permits calibration of CAPACITANCE INDICATOR to be made at HIGH CAL setting when FUNCTION SELECTOR switch is set to CAP IND HIGH CAL position.

Table 2-1. Control Panel, Operating Controls, Indicators, and Connectors (continued).

Figure 2-1 Index Number	Name of Control, Indicator, or Connector	Function
9	Capacitance ZERO ADJ control (R109)	Operates in conjunction with FUNCTION SELECTOR switch. Allows low range calibration of CAPACITANCE INDICATOR when FUNCTION SELECTOR switch is set to CAP IND ZERO CAL.
10	TANK UNIT COMP C connector (J105)	Provides means for connecting test set to aircraft tank unit probe compensation connector.
11	TANK UNIT COAX A connector (J103)	Provides means for connecting test set to aircraft tank unit probe coaxial connector.
12	TANK UNIT UNSH B connector (J102)	Provides means for connecting test set to aircraft tank unit probe unshielded connector.
13	CAP-RES CHECK switch (S103)	Operates in conjunction with FUNCTION SELECTOR switch. Permits selection of either capacitance or resistance measurements on aircraft tank unit probe. When set to CAP position, test set measures capacitance of aircraft tank unit probe. When FUNCTION SELECTOR switch is set to TANK UNIT TEST-COMP and CAP-RES CHECK switch is set to MEGOHMS A-C, test set measures resistance between aircraft tank unit probe COAX A and COMP C connectors. Setting FUNCTION SELECTOR switch to TANK UNIT TEST-UNSH and CAP-RES CHECK switch to MEGOHMS A-B allows test set

Table 2-1. Control Panel, Operating Controls, Indicators, and Connectors (continued).

Figure 2-1 Index Number	Name of Control, Indicator, or Connector	Function
13	CAP-RES CHECK switch (S103) (continued)	to measure resistance between aircraft tank unit probe COAX A and UNSH B connectors. Similarly, when FUNCTION SELECTOR switch is set to TANK UNIT TEST-COMP and CAP-RES CHECK switch is set to MEGOHMS C-GRD, test set measures resistance between aircraft tank unit COMP C connection and ground. Setting FUNCTION SELECTOR switch to TANK UNIT UNSH and CAP-RES CHECK switch to MEGOHMS B-GRD allows test set to measure resistance between aircraft tank unit probe UNSH B connector and ground. Setting test set CAP-RES CHECK switch to MEGOHMS A-GRD allows test set to measure resistance between aircraft tank unit probe COAX A connector and ground. When test set CAP-RES CHECK switch is set to MEGOHMS EXT RES, test set can be used to measure insulation resistance of any aircraft system wiring.
14	MEGOHMMETER indicator	Displays measured resistance in megohms. Operates in conjunction with Megohmmeter RANGE SELECTOR switch. Resistance displayed on indicator is a multiple of setting selected on Megohmmeter RANGE SELECTOR switch.
15	Megohmmeter ZERO ADJ control (R107)	Operates in conjunction with Megohmmeter RANGE SELECTOR switch.

Table 2-1. Control Panel, Operating Controls, Indicators, and Connectors (continued).

Figure 2-1 Index Number	Name of Control, Indicator, or Connector	Function
15	Megohmmeter ZERO ADJ control (R107)-continued	Permits calibration of MEGOHMMETER indicator at zero setting when Megohmmeter RANGE SELECTOR is set to ZERO CAL.
16	Megohmmeter MIDSCALE ADJ control (R106)	Operates in conjunction with Megohmmeter RANGE SELECTOR switch. Permits calibration of the midscale setting when Megohmmeter RANGE SELECTOR is set to MIDSCALE CAL.
17	Megohmmeter RANGE SELECTOR switch (S102)	Operates in conjunction with MEGOHMMETER indicator to extend range of resistance which can be measured by MEGOHMMETER indicator. When set to MIDSCALE CAL or ZERO CAL, permits calibration of MEGOHMMETER indicator at midscale or zero points.
18	EXT RES terminals (E102 and E103)	Provides for connection to external resistance to be measured. Functions in conjunction with CAP-RES CHECK switch.
19	TEST IND COAX connector (J401)	Provides means for connecting test set to aircraft indicator coaxial connector.
20	TEST IND UNSH connector (J402)	Provides means for connecting test set to aircraft indicator unshielded connector.
21	TEST IND COMP connector (J403)	Provides means for connecting test set to aircraft indicator compensator connector.

Table 2-1. Control Panel, Operating Controls, hdicators, and Connectors (continued).

Figure 2-1 Index Number	Name of Control Indicator, or Connector	Function
22	COMP 25-250 MMF control (C402)	Provides fine adjustment of tank unit compensator probe capacitance which is simulated by test set when testing aircraft indicator.
23	COMP 25-250 MMF control lock	Locks COMP 25-250 MMF control setting.
24	STANDARD CAPACITOR MMF nameplate	Indicates capacitance of standard capacitor included in test set.
25	FUNCTION SELECTOR switch (S401)	Establishes test set mode of operation. When FUNCTION SELECTOR switch is set to CAP IND-ZERO CAL permits zero adjustment of CAPACITOR INDICATOR. When FUNCTION SELECTOR switch is set to CAP IND-HIGH CAL, permits adjustment of CAPACITOR INDICATOR in high range, When FUNCTION SELECTOR switch is set to TANK UNIT TEST-COMP, test set measures either resistance or capacitance of aircraft tank unit compensator probe, depending on setting of CAP-RES CHECK switch.
26	PROBE 25-250 MMF control lock	Locks PROBE 25-250 MMF control setting.
27	PROBE 25-250 MMF control (C401)	Provides fine adjustment of tank unit main probe capacitance to be simulated by test set when testing aircraft indicator.
28	PROBE MMF range selector switch (200 pF step) (S403)	Provides adjustment of tank unit main probe capacitance (in 200 pF steps, from 0 to 800 pF) to be simulated by test set when testing aircraft indicator.

Table 2-1. Control Panel, Operating Controls, Indicators, and Connectors (continued)

Figure 2-1 Index Number	Name of Control, Indicator, or Connector	Function
29	PROBE MMF range selector switch (1000 pF step) (S402)	Provides adjustment of tank unit main probe capacitance (in 1000 pF steps, from 0 to 5000 pF) to be simulated by test set when testing aircraft indicator.
30	SPARE fuse (F401)	Provides for rapid replacement of defective 1/2 AMP fuse (F101).

2-4. Preliminary Operating Procedure.

Before tests or measurements can be made using the test set, the following preliminary steps must be performed. The steps given must be performed in the sequence indicated in order to ensure proper system build-up.

a. Set test set Power ON/OFF switch (2, figure 2-1) to OFF.

WARNING

The test set must be properly grounded before power is applied to the test set. Do not operate an ungrounded test set under any conditions.

NOTE

Suitability of ground connection depends on where the test set is being used. If the test set is being used to *measure equipments* installed *on* aircraft, *ground the test set at any con-*venient *point on the aircraft's ground* bus. *If the test set is being used to measure equipment in a laboratory or shop, ground* the test set to *an appropriate ground.*

b. Connect grounding lead from test set GROUND terminal (5) to suitable ground.

CAUTION

Test set operates from 400 Hz, single phase power source. Do not connect test set to 60 Hz power source or damage to test set may occur.

c. Connect power cable (2237, figure 2-2) to 115V 400 CPS connector (4, figure 2-1) on test set.

NOTE

Test set *can be operated from either exposed AC power terminals or conventional AC outlets.*

d. If conventional AC outlet is available, connect AC adapter power cable 2238 to power cable 2237. If conventional AC outlet is not available, but exposed AC power terminals are available, connect AC power cable 2239 to power cable 2237.

e. Connect AC adapter power cable 2238 or 2239 to AC power source.

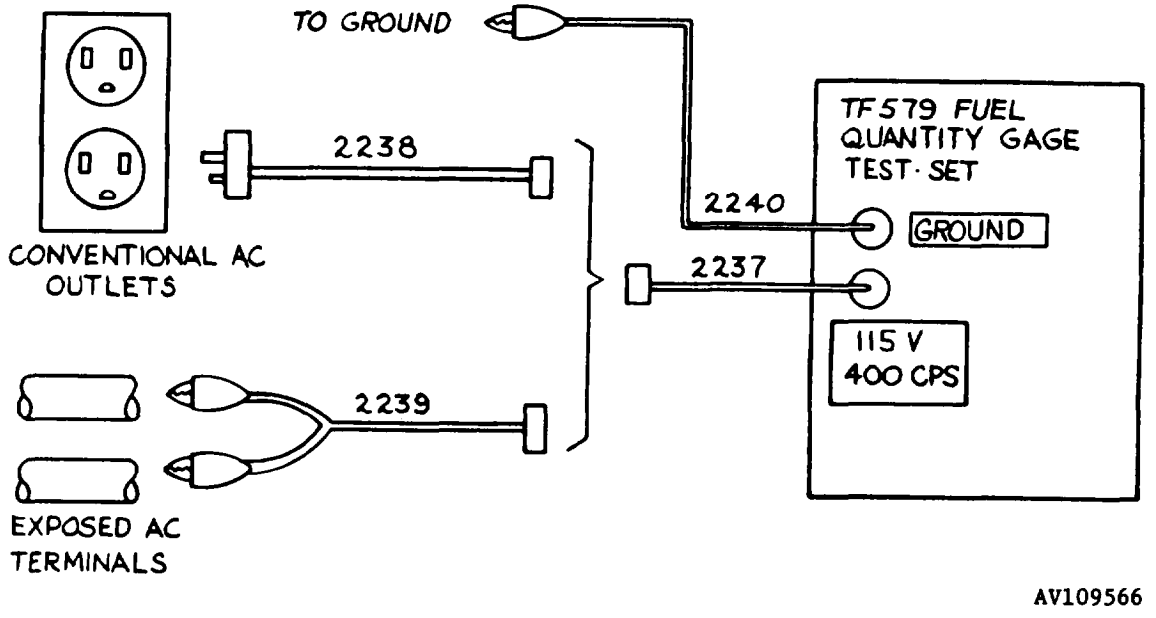


Figure 2-2. Typical AC Power Connections.

Section II. MEASURING TANK UNIT PROBE CAPACITANCE

2-5. Scope.

This section contains information and instructions for measuring tank unit probe capacitance on aircraft using liquid fuel gaging systems.

2-6. Operating Procedure.

Proceed as follows to measure tank probe capacitance.

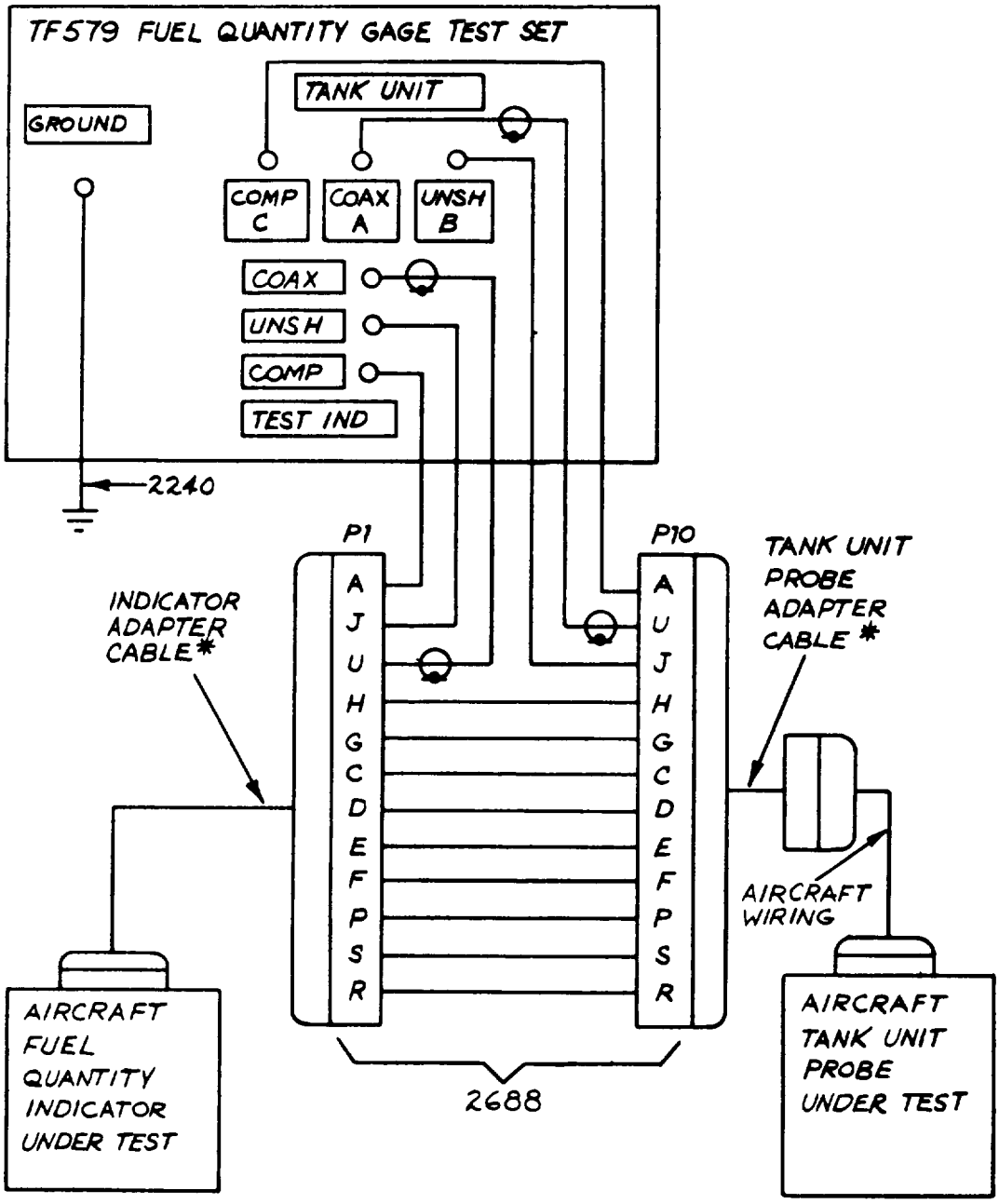
WARNING

Do not operate ungrounded test set.

a. Check that the grounding lead is properly connected (see *2-4b).*

b. Check that power cable is connected from test set to 115 Volts, 400 Hz, single-phase power source (see 2-4c through e).

c. Connect test set to aircraft liquid quantity fuel gage system as shown in figure 2-3.



NOTE:
* REFER TO ARMY AIRCRAFT AND FUEL QUANTITY INDICATOR CABLE TABLE FOR APPROPRIATE CABLE REFERENCE DESIGNATION

AV109567

Figure *2-3.* *Typical* System Interconnection Diagram

d. Set Power ON/OFF switch (2, figure 2-1) to ON and allow test set to warm up for at least five minutes.

e. Set CAP-RES CHECK switch (13) to CAP.

f. Check calibration of CAPACITANCE lNDICATOR (6) as follows:

(1) Set FUNCTION SELECTOR switch (25) to CAP IND ZERO CAL and Capacitance RANGE SELECTOR switch (7) to X1.

(2) Check that CAPACITANCE lNDICATOR (6) reads 0 pF. If not, remove Capacitance ZERO ADJ control (9) protective cap and, using insulated screwdriver, adjust capacitance ZERO ADJ control (9) until CAPACITANCE lNDICATOR (6) reads exactly 0 pF.

(3) Set FUNCTION SELECTOR switch (25) to CAP IND HIGH CAL and Capacitance RANGE SELECTOR switch (7) to X50.

(4) Check that CAPACITANCE lNDICATOR (6) reads value stamped on STANDARD CAPACITOR MMF nameplate (24). If not, remove Capacitance HIGH ADJ control (8) protective cap and use insulated screwdriver to adjust control (8) until CAPACITANCE INDICATOR (6) reads exactly value stamped on STANDARD CAPACITOR MMF nameplate (24).

(5) Repeat steps (1) through (4) above as often as necessary until proper indications are obtained.

(6) Reinstall protective caps on Capacitance ZERO ADJ (9) and HIGH ADJ (8) controls.

g. Set Capacitance RANGE SELECTOR switch (7) to X50.

h. To measure tank unit main probe capacitance, set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-UNSH position. To measure tank unit compensator probe capacitance, set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-COMP.

i. Set Capacitance RANGE SELECTOR switch (7) to lowest multiplier at which CAPACITANCE INDICATOR (6) pointers come to rest. For example, if capacitance being measured is 270 pF, CAPACITANCE INDICATOR' (6) pointers will come to rest when Capacitance RANGE SELECTOR switch (7) is set to X50, X10, and X3 positions. Although the capacitance indicated on CAPACITANCE INDICATOR (6) can be guessed at the X50 setting of the Capacitance RANGE SELECTOR switch (7), and approximated at the X10 setting, an accurate value can be measured only at the X3 setting. If Capacitance RANGE SELECTOR switch (7) is too low to measure capacitance of tank unit probe, CAPACITANCE lNDICATOR (6) pointers will rotate clockwise without stopping. In the example given, setting Capacitance RANGE SELECTOR switch (7) to X3 will cause CAPACITANCE INDICATOR (6) to indicate 90. Multiply reading displayed on CAPACITANCE INDICATOR (6) by setting on Capacitance RANGE SELECTOR switch (7) to determine actual capacitance in pF.

For example:

CAPACITANCE INDICATOR display=	90
Capacitance RANGE SELECTOR switch setting=	x 3
Actual capacitance=	270pF

NOTE

When power is removed from test set, reading displayed on CAPACITANCE lNDICATOR (6) may not return to zero. No harm or damage will result to the test set if CAPACITANCE INDICATOR does not indicate a reading of zero.

j. When all tank unit probe capacitance measurements have been made, set Power ON/OFF switch (2) to OFF.

k. Disconnect test set from aircraft and reconnect aircraft wiring.

Section III. MEASURING TANK UNIT PROBE INSULATION RESISTANCE

2-7. Scope.

This section contains information and instructions for measuring tank unit probe insulation resistance on aircraft using liquid fuel gaging systems.

2-8. Operating Procedure.

WARNING

Do not operate ungrounded test set.

Proceed as follows to measure tank unit probe insulation resistance.

a. Check that the grounding lead has been properly connected (see 2-4 b).

b. Check that power cable is connected from test set to 115 volts, 400 Hz, single phase power source (see 2-4c through e).

c. Connect test set to aircraft liquid quantity fuel gage system as shown in figure 2-3.

d. Set Power ON/OFF switch (2, figure 2-1) to ON and allow test set to warm up for at least five minutes.

e. Set CAP-RES CHECK switch (13) to EXT RES position.

f. Check that MEGOHMMETER indicator (14) is properly calibrated at ZERO and MIDSCALE points of indicator as follows:

(1) Set Megohmmeter RANGE SELECTOR switch (17) to ZERO CAL.

(2) Observe that MEGOHMMETER indicator (14) pointer is deflected to ZERO calibration mark on dial. if pointer does not deflect to ZERO calibration mark, unscrew protective cover from Megohmmeter ZERO ADJ control (15). Using insulated screwdriver, adjust Megohmmeter ZERO ADJ control (15) until MEGOHMMETER indicator (14) pointer is on ZERO calibration mark, Do not replace Megohmmeter ZERO ADJ control (15) cover at this time.

(3) Set Megohmmeter RANGE SELECTOR switch (17) to MIDSCALE CAL.

(4) Observe that MEGOHMMETER indicator (14) pointer is deflected to MIDSCALE calibration mark on dial. If pointer does not deflect to MIDSCALE calibration mark, unscrew protective cover from Megohmmeter MIDSCALE ADJ control (16). Using insulted screwdriver, adjust Megohmmeter MIDSCALE ADJ control (16) until MEGOHMMETER indicator (14) pointer is on MIDSCALE calibration mark. Do not replace Megohmmeter MIDSCALE ADJ control (16) cover at this time.

(5) Repeat steps (1) through (4), above, as often as necessary until proper indications are obtained.

(6) Install Megohmmeter ZERO ADJ control (15) cover and Megohmmeter MIDSCALE ADJ control (16) cover.

g. To measure leakage resistance between elements of tank unit main probe, set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-UNSH. To measure leakage resistance between elements of tank unit compensator, set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-COMP.

NOTE

The three center positions of CAP-RES CHECK switch (13) have letter designations A, B, and C which correspond to *TANK UNIT connectors (10), (11), and (12); A designates the coaxial conductor, B designates the unshielded conductor, and C designates the compensator conductor.*

h. Set CAP-RES CHECK switch (13) to position corresponding to resistance measurement to be made.

i. Set Megohmmeter RANGE SELECTOR switch (17) to multiplier setting so that MEGOHMMETER indicator (14) displays a reading closest to midscale. For example, if resistance to be measured is 50 megohms, the resistance can be measured when Megohmmeter RANGE SELECTOR switch (17) is set to X10, X100, or X1000 positions. However, an accurate value can be measured only at X100 setting. In the example given, setting Megohmmeter RANGE SELECTOR switch (17) to X100 position causes indicator to read 0.5. Multiply reading displayed on MEGOHMMETER indicator (14) by setting on Megohmmeter RANGE SELECTOR switch (17) to determine actual resistance in ohms.

For example:

MEGOHMMETER display=	0.5
Meghohmmeter RANGE SELECTOR switch setting=	X100
Actual resistance=	50 megohms

When all tank unit probe resistance measurements have been made, set Power ON/OFF switch (2) to OFF.

k. Disconnect test set from aircraft and reconnect aircraft wiring.

Section IV. SIMULATING TANK UNIT PROBE CAPACITANCE

2-9. Scope.

This section contains information and instructions for simulating the capacitance of tank unit probes used on aircraft using liquid fuel gaging systems.

NOTE

In order to avoid erroneous indications when *testing aircraft liquid fuel* gages without *compensating capacitors, the protective cover on the TEST IND COMP connector (21, figure 2-1) must be installed on the connector. This protective cover* has *a pin which grounds the compensator capacitor terminal and eliminates stray capacitance.*

2-10. **Operating Procedure.**

WARNING

Do not operate ungrounded test set.

Proceed as follows to simulate the capacitance of a tank unit probe:

a. Check that the grounding lead has been properly connected (see *2-4b).*

b. Check that power cable has been connected to 115 volts, 400 Hz, single phase power source (see 2-4c through e).

c. Connect test set to aircraft liquid quantity fuel gage system as shown in figure 2-3.

d. Set Power ON/OFF switch (2, figure 2-1) to ON and allow test set to warm up for at least five minutes.

e. Set CAP-RES CHECK switch (13) to CAP.

f. Determine the value of probe and compensation capacitances to be simulated. Refer to applicable aircraft technical manual

NOTE

Tank unit compensation capacitance *can be simulated from 25 to 250 pF.*

g. To simulate tank unit compensation capacitance, proceed as follows:

(1) Set FUNCTION SELECTOR switch (25) to TEST IND COMP SET.

(2) Set Capacitance RANGE SELECTOR switch (7) to lowest multiplier which will permit an accurate reading on CAPACITANCE INDICATOR (6).

(3) Loosen COMP 25-250 MMF control lock (23).

(4) Adjust COMP 25-250 MMF control (22) and Capacitance RANGE SELECTOR switch (7) until compensation capacitance determined in step *f* above, is indicated by CAPACITANCE lNDICATOR (6).

(5) Tighten COMP 25-250 MMF control lock (23).

h. To simulate tank unit probe capacitance, proceed as follows;

(1) Set FUNCTION SELECTOR switch (25) to TEST IND-PROBE.

(2) Subtract largest 1000 pF multiple possible from value of probe capacitance to be simulated as determined in step *f* above, without obtaining a negative value,

For example:

Should the simulated probe capacitance be 3355 pF, then

3955 pF=Simulated probe capacitance
-3000 pF=Largest 1000 pF multiple
955 pF=Remainder

(3) Subtract largest 200 pF multiple possible from remainder calculated in step (2), above, without obtaining a value less than 25' pF.

For example:

The remainder in step (2), above, is 955 pF, then

955 pF=Remainder step (2), above
-800 pF=Largest 200 pF multiple
155 pF=Remainder

(4) Set both PROBE MMF range selector switches (28) and (29) to OFF.

(5) Set Capacitance RANGE SELECTOR switch (7) to lowest multiplier which will permit an accurate reading on CAPACITANCE INDICATOR (6) of remainder calculated in step (3), above.

(6) Loosen PROBE 25-250 MMF control lock (26).

(7) Adjust PROBE 25-250 MMF control (27) and Capacitance RANGE SELECTOR switch (7) until capacitance calculated in step (3), above, is indicated by CAPACITANCE INDICATOR (6).

(8) Tighten PROBE 25-250 MMF control lock (26).

(9) Set Capacitance RANGE SELECTOR switch (7) to lowest multiplier which will permit an accurate reading on CAPACITANCE INDICATOR (6) of remainder calculated in step (2).

(10) Set PROBE MMF range selector switch (200 pF step) (28) to largest 200 pF multiple, as calculated in step (3).

(11) Observe that capacitance value displayed by CAPACITANCE INDICATOR (6) multiplied by setting of Capacitance RANGE SELECTOR switch (7) is value calculated as remainder in step (2).

(12) Set Capacitance RANGE SELECTOR switch (7) to lowest multiplier which will permit an accurate reading on CAPACITANCE INDICATOR (6) of value determined in step *f.*

(13) Set PROBE MMF range selector switch (1000 pF step) (29) to largest 1000 pF multiple, as calculated in step (2).

(14) Observe that capacitance value displayed by CAPACITANCE INDICATOR (6) multiplied by setting of Capacitance RANGE SELECTOR switch (7) is value determined in step f.

i. Set FUNCTION SELECTOR switch (25) to TEST IND-TEST. Setting FUNCTION SELECTOR switch (25) to IND-TEST automatically applies simulated probe and compensation capacitances to aircraft liquid fuel gage indicator under test.

WARNING

Make certain that when second test set is connected, ground lead has been properly connected as required in 2-4b.

Section V. MEASURING EXTERNAL RESISTANCE

2-11. Scope.

This section contains information and instructions for measuring aircraft wiring leakage resistance.

2-12, Operating Procedure.

WARNING

Do not operate ungrounded test set.

Proceed as follows to measure aircraft wiring leakage resistance,

a. Check that the grounding strap has been properly connected (see 2-4 b).

b. Check that power cable is connected to 115 volts, 400 Hz, single-phase power source (see 2-4c through e).

c. Connect aircraft wiring to be measured across EXT RES terminals (18, figure 2-1) of test set.

cf. Set Power ON/OFF switch (2) to ON and allow test set to warm up for at least five minutes.

e. Set CAP-RES CHECK switch (13) to EXT RES.

f. Check that MEGOHMMETER indicator (14) is properly calibrated at ZERO and MIDSCALE points of indicator (see paragraph 2-8 f).

g. Set Megohmmeter RANGE SELECTOR switch (17) to multiplier setting so that MEGOHMMETER indicator (14) displays a reading closest to midscale. For example, a 50 megohm resistance can be measured when the Me-

gohmmeter RANGE SELECTOR switch (17) is set to X10, X100, or X1000. Although the resistance can be guessed at the X1000 setting, and approximated at the X10 setting, an accurate value can be measured only at the X100 setting. In the example given, setting Megohmmeter RANGE SELECTOR switch (17) to X100 causes indicator to display 0.5. Multiply reading displayed on MEGOHMMETER indicator (14) by the setting of Megohmmeter RANGE SELECTOR switch (17) to determine actual resistance in ohms.

For example:

MEGOHMMETER display=	0.5
Megohmmeter RANGE SELECTOR switch setting=	X100
Actual resistance=	50 megohms

h. When all aircraft wiring leakage resistance measurements have been made, set Power ON/OFF switch (2) to OFF.

i. Disconnect test set from aircraft and reconnect aircraft wiring.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREPARATION FOR INSTALLATION, STORAGE AND SHIPMENT

3-1. Preparation for Installation.

CAUTION

Care should be exercised when moving the test set. The test set contains electronic and electro-mechanical components and assembles which may be damaged if improperly handled.

The test set is shipped as a single, self-contained unit, integrally housed in a combination case. No special instructions are required to unpack and prepare the test set for use. Provision, at the using site, must be made to meet at least the minimum requirements listed below:

a. Adequate lighting and ventilation.

b. Provision for the power requirements stated in table 1-1.

3-2 Equipment Inspection on Delivery.

When the test set is received, inspect the test set for possible damage in transit. Report evidence of damage immediately as required. A visual inspection of the equipment should include the following as a minimum:

a. Check for dented or sprung covers or other visible signs of external damage.

b. Check for cracked or shattered glass.

c. Check all cables and accessories for evidence of damage.

d. Check the equipment received against the master shipping list making certain that all the materials have been received.

e. Check that all packing materials, dust, or other foreign matter has been removed from the test set. Pay particular attention to points of electrical contact.

f. Report any irregularities and/or damage to the responsible activity.

3-3. Preparation for Storage.

The method of storage of the test set is the same as that specified for reshipment. Refer to paragraph 3-4 for reshipment instructions.

3-4. Preparation for Reshipment.

Preservation, packaging, packing, and marking requirements for reshipment of the test set must be in accordance with the instructions contained in figure 3-1.

PRESERVATION, PACKAGING, PACKING AND MARKING REQUIREMENTS

NOMENCLATURE: Test Set Indicator, Fuel Quantity Gauge (Capacitance Type)

STOCK NUMBER	PART NUMBER
4920-109-5066	MIL-T-58092

NET WEIGHT (In Pounds)	SHIPPING DIMENSIONS	GROSS WEIGHT (In Pounds)	CUBIC FEET
	26"X 21" X 21"	54 lbs	4.6

PACKAGING: ☐ LEVEL A ☐ LEVEL C

☒ PACKAGING SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-P-116. THE FOLLOWING DETAILED REQUIREMENTS SHALL APPLY:

UNIT PKG QTY	METHOD	PRESERVATIVE	WRAP	DUNNAGE	CONTAINER
1	III	None	MIL-B-121 Grade A	PPP-C-843	See Packing

☐ OTHER

PACKING: ☐ LEVEL A ☒ LEVEL C

☒ a. ITEMS SHALL BE PACKED IN CONTAINERS CONFORMING TO PPP-B-636 Weather Resistant

☐ b. ITEMS SHALL BE PACKED IN CONTAINERS CONFORMING TO SPECIFICATION PPP-B-601 STYLE (OVERSEAS TYPE.

☐ c. PLYWOOD USED SHALL BE STANDARD GRADE WITH EXTERIOR GLUE OF GROUP B OF NN-P-530.

☐ d. ITEMS SHALL BE PACKED IN A MANNER TO INSURE CARRIER ACCEPTANCE AND SAFE DELIVERY AT DESTINATION. CONTAINERS SHALL BE IN ACCORDANCE WITH UNIFORM FREIGHT CLASSIFICATION RULES OR REGULATIONS OF OTHER CARRIERS APPLICABLE TO THE MODE OF TRANSPORTATION.

☐ e. OTHER

MARKING

a. MARKING OF SHIPMENTS (1966 JUN)
THE CONTRACTOR SHALL MARK ALL SHIPMENTS UNDER THIS CONTRACT IN ACCORDANCE WITH THE EDITION OF MIL-STD-129, "MARKING FOR SHIPMENT AND STORAGE," IN EFFECT AS OF THE DATE OF THE SOLICITATION. (ASPR 7-104.68) IN ADDITION, CONTROL PART NUMBER, IF ANY, PART NUMBER, AND SERIAL NUMBER, IF ANY, SHALL BE MARKED ON THE UNIT CONTAINER.

b. MATERIEL CONDITION MARKING SHALL BE APPLIED IN ACCORDANCE WITH PARAGRAPH 5.5.16 OF MIL-STD-129. A MATERIEL CONDITION TAG OF THE APPLICABLE TYPE WILL BE SECURELY ATTACHED DIRECTLY TO ALL UNINSTALLED OR STORED AERONAUTICAL OR AIR DELIVERY ITEMS. WHEN SUCH ITEMS ARE PLACED OR STORED IN CARTONS, PACKAGES, CRATES OR METAL SHIPPING CONTAINERS, A DUPLICATE MATERIEL CONDITION TAG OR LABEL WILL BE SECURELY ATTACHED TO THE EXTERIOR OF THE PACKAGE OR CONTAINER IN SUCH A MANNER THAT WILL AFFORD MAXIMUM PROTECTION FROM HANDLING AND WEATHER. TAGS WILL BE COMPLETED EITHER BY TYPEWRITTEN OR PRINTED BLACK LEAD PENCIL ENTRIES. ITEMS OF A COMMON OR NONTECHNICAL NATURE (i.e., COMMON HARDWARE, BULK MATERIALS, ETC.) THE SERVICEABILITY OF WHICH IS OBVIOUS, AND THE IDENTITY AND INSPECTION REQUIREMENTS ADEQUATELY INDICATED BY COMMERCIAL TAGS, LABELS OR MARKINGS, MAY BE RECEIVED, STORED, ISSUED OR SHIPPED WITHOUT MATERIEL CONDITION TAGS.

☒ c. EXTERIOR SHIPPING CONTAINERS OF SIMS (*Selected Item Management System*) MATERIEL SHALL BE MARKED WITH SIM PROJECT CODE DISC LABELS IN ACCORDANCE WITH PARAGRAPH 5.3.3.2.7 OF MIL-STD-129. THE CONTRACTING OFFICER WILL PROVIDE SIM PROJECT CODE LABELS ON REQUEST. THEY ARE AVAILABLE IN TWO SIZES, 3 X 3 AND 6 X 6. SPECIFY ON YOUR ORDER THE SIZE AND QUANTITY REQUIRED.

APPROVED BY	ORGANIZATION	DATE	PUBLICATION NUMBER
NATHAN SILVERMAN	AMSAV-QNP	10 Sep 74	TM55-4920-325-14

AV109568

Figure 3-1. Preservation, Packaging, Packing, and Marking Requirements.

Section II. INSTALLATION

3-5. Installation Requirements.

The test set does not require any special installation instructions. The unit may be placed on a maintenance area work bench. The bench must contain facilities for furnishing the required ac operating power (see table 1-1).

Section III. INSPECTIONS AND SERVICING

3-6. Inspection Requirements.

Table 3-1 contains the requirements to complete daily, intermediate, periodic, and special inspections as applicable to the test set. These inspections must be accomplished at the specified periods by organizational maintenance activities to assure that ail defects are discovered and corrected before a malfunction or serious trouble occurs.

NOTE

All inspections required at each operation shall be reaccomplished during daily, intermediate, and periodic inspections. All daily inspections shall be reaccomplished during intermediate and periodic inspections. All inter*mediate inspections shall be reaccomplished during periodic inspections.*

a. *Each Operation.* Every time the test set is operated the inspections noted in this column shall be performed.

b. *Daily Inspection.* The daily inspection is accomplished following the last operation of the day, or preceding the next day's operation. Daily inspection requirements consist of visual examination and operational checks to insure that the test set can safely and efficiently perform its assigned mission.

c. *Intermediate Inspection.* The intermediate inspection is a combination of daily and intermediate inspection requirements for checking the test set that requires verification of normal operation at frequencies between the daily and periodic inspections. intermediate inspection is accomplished every *25* to *30* hours of operation. it is intended that evidence of progressive inefficient operation or abnormal conditions be discovered during this inspection. This will preclude a progression of discrepancies that will result in a major maintenance action required to remedy the deficiencies.

d. Periodic Inspection. The periodic inspection is a thorough and searching inspection of those items subject to failure or discrepancy. Periodic inspection is accomplished every 100 to 120 hours of operation.

e. *Special Inspection.* The special inspection is a series of tests to determine the cause of failure. Special inspections are not required at the organizational level.

3-7. Servicing.

The test set does not require any servicing beyond the inspection requirements contained in paragraph 3-6 at the organizational level.

Table 3-1. Inspection Requirements.

Item	Major Assembly Item, or Area	Requirement
	Each Operation Inspection	
Controls	Test set front panel.	Operate switches and controls. Performance should be smooth and positive. Detents should hold switches firmly in selected position.
Indicator Lamp	Test set front panel	Check that power indicator lamp lights when Power ON/OFF switch (2, figure 2-1) is set to ON.
Electrical Connectors and Cable Assemblies	Test set front panel and accessory cables.	Inspect connectors for bent pins, damaged shells, worn or frayed wiring.
Indicators	Test set front panel.	Check for cracked or shattered glass.
	Daily Inspection	
Hardware	Test set, general.	Inspect for loose or missing hardware.
Fuses	Test set front panel.	Check that proper fuse is installed in fuse holder.
	Intermediate Inspection	
Transit Case	Test set exterior.	Check for dented or sprung cover on case.
	Periodic Inspection	
Test Set	Test set and cable assemblies,	Check for grease, dirt, dust, or grime.

Section IV. PREVENTIVE MAINTENANCE

3-8. Cleaning.

The removal of grease, dirt, dust and grime on the test set is necessary for the proper operation of the test set. All items, except electrical contacts, should be wiped with a clean, lint-free cloth dipped in ethyl alcohol (item 1, table 1-4). A dry, lint-free cloth should be used to clean contacts.

3-9. Lubrication.

No lubrication of the test set is required at the organizational level of maintenance.

Section V. OPERATIONAL CHECKOUT

3-10. Performance Checks.

Performance checks are given in table 3-2. Performance checks are used to determine if the test set is operating within its operating limits. If the test set does not meet the requirements established in the Normal Indication column of table 3-2, a trouble is indicated and reference should be made to the Corrective Action column to correct the malfunction. The steps given in table 3-2 must be performed in the sequence indicated, in order to ensure proper system build-up and provide an immediate means of detecting a fault. Before starting the performance checks given in table 3-2, the Power ON/OFF switch (2, figure 2-1) must be set to OFF.

Table 3-2. Performance Checks

Step	Action	Normal Indication	Abnormal Indication	Corrective Action
		NOTE		
		Numbers in parentheses refer to *index numbers of figure 2-1.*		
1	Set Power ON/OFF switch (2) to ON.	Power ON indicater (3) lights.	Power ON indicator (3) does not light.	Replace Power ON indicator (3), 1/2 AMP fuse (1), or power cable if defective. If normal indication cannot be obtained, refer test set to higher level of maintenance.
2	Set meghommeter RANGE SELECTOR switch (17) to ZERO CAL.	MEGOHMMETER indicator (14) reads O megohms (ZERO CALIBRATE mark).	MEGOHMMETER indicator (14) does not read zero megohms.	See paragraph *2-8f.* If proper reading cannot be obtained, refer test set to higher level of maintenance.

Table 3-2. Performance Checks-Continued.

Step	Action	Normal Indication	Abnormal Indication	Corrective Action
3	Set megohmmeter RANGE SELECTOR switch (17) to MID-SCALE CAL.	MEGOHMMETER indicator (14) reads one megohm (MIDSCALE CALIBRATE mark).	MEGOHMMETER indicator (14) does not read one megohm.	See paragraph *2-8f.* If proper reading cannot be obtained, refer test set to higher level of maintenance.
4	Set FUNCTION SELECTOR switch (25) to CAP IND-ZERO CAL and Capacitance indicator RANGE SELECTOR switch (7) to X1.	CAPACITANCE INDICATOR (6) reads zero pF.	CAPACITANCE INDICATOR (6) does not read zero pF.	See paragraph 2-6f. If proper reading cannot be obtained, refer test set to higher level of maintenance.
5	Set FUNCTION SELECTOR switch (25) to CAP IND HIGH CAL and Capacitance RANGE SELECTOR switch (7) to *X50.*	CAPACITANCE INDICATOR (6) reads value stamped on STANDARD CAPACITOR MMF nameplate (24).	CAPACITANCE INDICATOR (6) does not read value stamped on STANDARD CAPACITOR MMF nameplate (24).	See paragraph 2-6f. If proper reading cannot be obtained, refer test set to higher level of maintenance.

Section VI. REPAIR AND REPLACEMENT OF AUTHORIZED PARTS

3-11. Removal.

WARNING

High voltages, dangerous to personnel, are present in the test set. Do not attempt to work on test set components while test set is operating or connected to 115 volt power line. To prevent injury to personnel, make certain that Power ON/OFF switch (item 2, figure 2-1) is in the OFF position when making minor parts replacements.

a. Fuse. The fuseholder cap (1, figure 3-2) must be removed to gain access to fuse (2). Remove fuseholder cap (1) from fuseholder (3) by pressing cap down, rotating cap one-quarter turn counterclockwise, and pulling the cap and fuse (2) from fuseholder (3). Extract fuse (2) from fuseholder cap (1).

b. Lamp. The indicator lens (4, figure 3-2) must be removed to gain access to lamp (5). Unscrew indicator lens (4) counterclockwise from indicator socket (6). Remove lamp (5) from indicator socket (6) by pressing lamp down, rotating lamp one-quarter turn counterclockwise, and extracting lamp from indicator socket.

3-12. Replacement.

WARNING

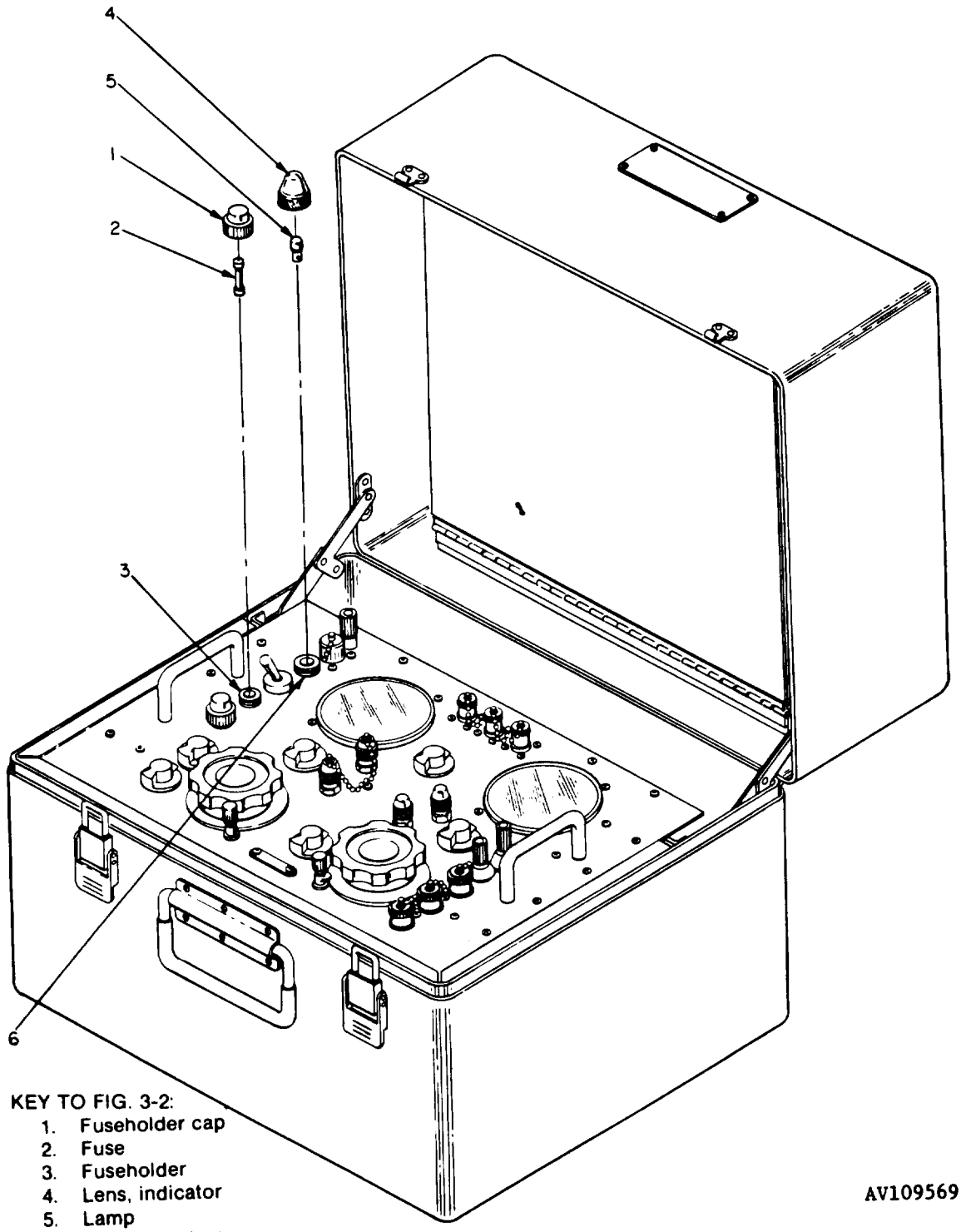
Set Power ON/OFF switch (2, figure 2-1) to the OFF position before replacing fuse.

CAUTION

When inserting a new fuse into the test set, check to see that the proper value fuse (1/2 ampere) is used as a replacement. Damage to the test set can occur if wrong value fuse is used.

a. *Fuse.* Insert fuse (2, figure 3-2) into fuseholder cap (1). Seat fuse (2) and fuseholder cap (1) into fuseholder (3), then press and turn fuseholder cap clockwise until fuseholder cap is secure in fuseholder.

b. Lamp. Install lamp (5, figure 3-2) into lamp socket (6) by pressing and turning lamp clockwise until lamp is secure in lamp socket. Screw indicator lens (4) clockwise into indicator socket (6) until indicator lens is secure in indicator socket.



KEY TO FIG. 3-2:
1. Fuseholder cap
2. Fuse
3. Fuseholder
4. Lens, indicator
5. Lamp
6. Socket, indicator

Figure 3-2. Removal and Replacement of Parts Authorized at Organizational Level.

SECTION VII. PARTS LIST-ORGANIZATIONAL MAINTENANCE

	PART NO.	FIG. AND INDEX NO.
3-2-		
-1	FHN19G	05808
-2	412-1/2	75915
-3	FHN19G	05808
-4	EF2112R05	05808
-5	NE51H(B2A)	24455
-6	EF2112R05	05808

CHAPTER 4

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. PREPARATION FOR MAINTENANCE, STORAGE, AND RESHIPMENT

4-1. Preparation for Maintenance.

a. If test set is packed, unpack in accordance with paragraph 3-1.

b. Inspect the test set in accordance with paragraph 3-2.

c. Make certain proper size fuse is installed in the test set prior to operation.

4-2. Preparation for Storage.

Prepare the test set for storage in accordance with paragraph 3-3.

4-3. Preparation for Reshipment.

Prepare the test set for reshipment in accordance with paragraph 3-4.

Section II. CHECKOUT AND ANALYSIS

4-4. Checkout Instructions.

The following instructions are used to determine whether the test set meets minimum performance standards. Figures 4-1 through 4-8 illustrate test setup configurations and are referenced at appropriate points in the checkout instructions. These instructions are performed in sequence to provide complete and rapid checkout of the test set,

a. Set Power ON/OFF switch (2, figure 2-1) to OFF and connect 115 volts, 400 Hz input power to test set 115V 400 CPS connector (4) (refer to paragraph 2-4c).

WARNING

Do not operate ungrounded test set.

b. Connect ground lead from test set GROUND terminal (5) to suitable ground.

c. Set test set Power ON/OFF switch (2) to ON. Check that Power ON indicator (3) lights, and allow five minutes for test set to warm up.

d. Set CAP-RES CHECK switch (13) to CAP, Capacitance RANGE SELECTOR switch (7) to Xl and FUNCTION SELECTOR switch (25) to CAP IND ZERO CAL. CAPACITANCE INDICATOR (6) shall read 0 pF. Refer to paragraph *2-6f* for calibration if CAPACITANCE INDICATOR does not read exactly zero.

e. Rotate Capacitance RANGE SELECTOR switch (7) to X3, X10 and X50, stopping at each position. Check that CAPACITANCE INDICATOR (6) pointers do not shift from zero. If pointers shift from zero, refer to paragraph 4-23 for adjustment of STRAY BAL ADJ potentiometer R120.

f. Set FUNCTION SELECTOR switch (25) to CAP IND HIGH CAL. CAPACITANCE INDICATOR (6) shall read exact value stamped on STANDARD CAPACITOR MMF nameplate (24). Refer to paragraph *2-6f* for calibration if CAPACITANCE INDICATOR (6) reading and STANDARD CAPACITOR MMF nameplate (24) value are not identical.

g. Set FUNCTION SELECTOR switch (25) to TEST IND PROBE SET, Capacitance RANGE SELECTOR switch (7) to X3 and PROBE MMF range selector switches (28) and (29) to OFF. Release PROBE 25-250 MMF control lock (26) and rotate PROBE 25-250 MMF control (27) through entire range. Check that CAPACITANCE INDICATOR (6) reads from 25 to 250 pF as PROBE 25-250 MMF control (27) is rotated from maximum counterclockwise to maximum clockwise.

h. Set Capacitance RANGE SELECTOR switch (7) to X1 and rotate PROBE 25-250 MMF control (27) until CAPACITANCE INDICATOR (6) reads 30 pF and set PROBE 25-250 MMF control lock (26). Set PROBE MMF range selector switch

(200 pF step) (28) to 200, 400, 600, and 800 in succession. Set Capacitance RANGE SELECTOR switch (7) as required and check that CAPACITANCE INDICATOR (6) reads 230 ±5 pF, 430 ±6,5 pF, 630 ±9.0 pF, and 830 ±12.0 pF, respectively.

i. Set PROBE MMF range selector switch (200 pF step) (28) to OFF and (1000 pF step) (29) to 1000, 2000, 3000, and 4000 in succession. Check that CAPACITANCE INDICATOR (6) reads 1030225 pF, 2030 ±32.5 pF, 3030 ±45.0 pF, and 4030 ±60.0 pF. Record CAPACITANCE INDICATOR (6) reading with PROBE MMF range selector switch (1000 pF step) (29) set to 4000.

j. Connect appropriate test cables to test set as shown in figure 4-1.

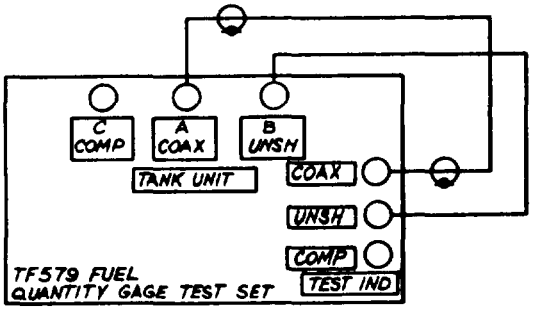


Figure 4-1. Setup for Checking TEST IND TEST Circuits, COAX- UNSH.

k. Set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-UNSH and check that CAPACITANCE INDICATOR (6) reads value recorded in step *i* above.

l. Set FUNCTION SELECTOR switch (25) to TEST IND COMP SET, release COMP 25-250 MMF control lock (23) and repeat step g above using COMP 25-250 MMF control (22).

m. Adjust COMP 25-250 MMF control (22) for CAPACITOR INDICATOR (6) reading of 100 pF. Disconnect test cables.

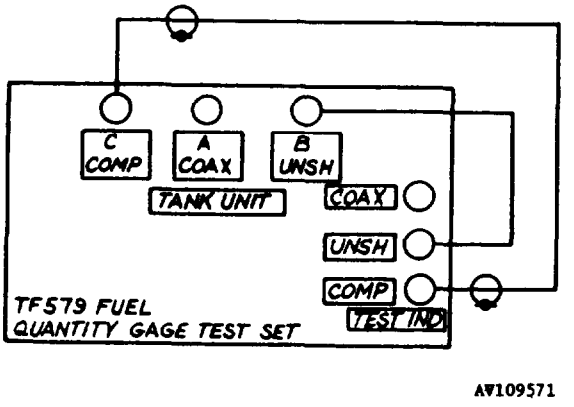


Figure 4-2. Setup for Checking TEST IND TEST Circuits, COMP-UNSH.

n. Connect test set cables as shown in figure 4-2.

0. Set FUNCTION SELECTOR switch (25) to TANK UNIT TEST-COMP and check that CAPACITANCE INDICATOR (6) reads 100 pF.

p. Set Megohmmeter RANGE SELECTOR switch (17) to ZERO CAL and check that MEGOHMMETER indicator (14) reads exactly ZERO megohms. Refer to *2-8f* for calibration if necessary.

q. Set Megohmmeter RANGE SELECTOR switch (17) to MIDSCALE CAL and check that MEGOHMMETER indicator (14) reads exactly 1 megohm (MIDSCALE). Refer to *2-8f* for calibration if necessary.

r. Connect 1 megohm resistance standard (table 1-3) across EXT RES terminals (18) as shown in figure 4-3.

s. Set CAP-RES switch (13) to EXT RES, Megohmmeter RANGE SELECTOR switch (17) to X1 and check that MEGOHMMETER indicator (14) reads 1 megohm.

t. Substitute 10 megohm resistance standard (table 1-3) for 1 megohm resistance standard across EXT RES terminals (18) and set Megohmmeter RANGE SELECTOR switch (17) to X10. Check that MEGOHMMETER indicator (14) reads 10 megohms.

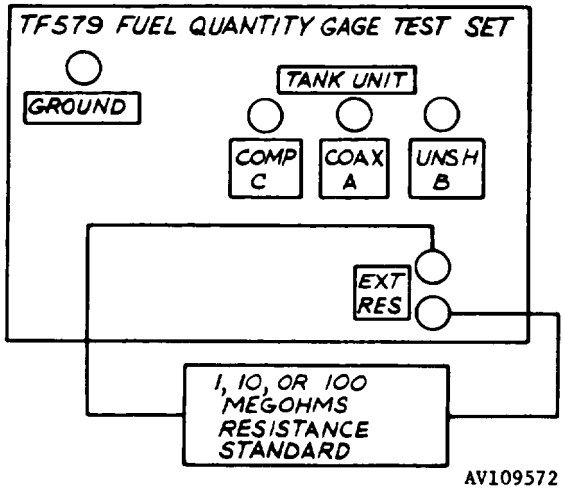


Figure 4-3. Setup for Checking **Resistance** *Measuring Circuits Using EXT RES Terminals.*

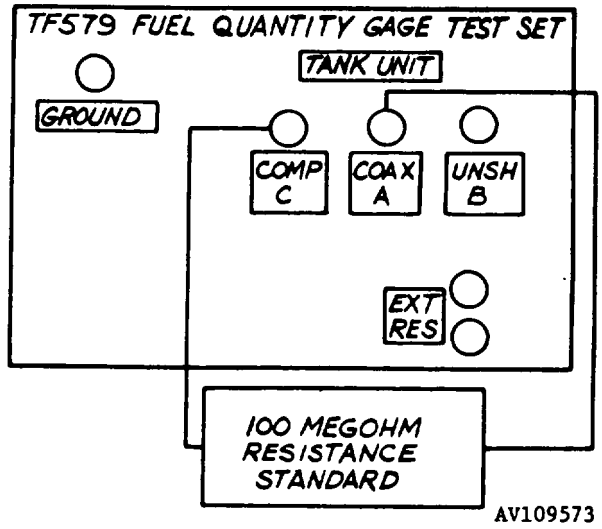


Figure 4-4. Setup for Checking Resistance Measuring Circuits using TANK UNIT COMP C and COAX A Connectors.

u. Substitute 100 megohm resistance standard for 10 megohm resistance standard (table 1-3) across EXT RES terminals (18) and set Megohmmeter RANGE SELECTOR switch to X100. Check that MEGOHMMETER indicator (14) reads 100 megohms. Disconnect 100 megohm resistance standard.

v. Connect 100 megohm resistance standard across TANK UNIT COMP C (10) and TANK UNIT COAX A (11) connectors as shown in figure 4-4 and set CAP-RES CHECK switch (13) to MEGOHMS A-C A-B.

w. Check that MEGOHMMETER Indicator (14) reads 1 megohm ±0.125 inch of scale. Disconnect 100 megohm resistance standard.

x. Repeat step w above with 100 megohm resistance standard connected across TANK UNIT COAX A (11) and TANK UNIT UNSH B (12) connectors as shown in figure 4-5. Disconnect 100 megohm resistance standard.

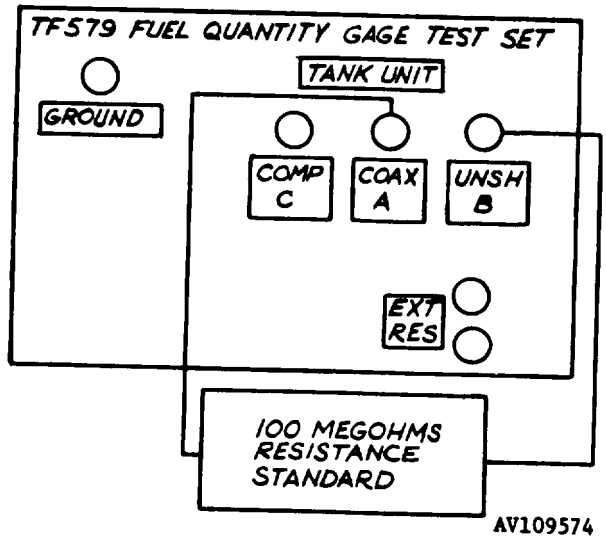


Figure 4-5. Setup for Checking Resistance Measuring Circuits Using TANK UNIT COAX A and UNSH B Connectors.

y. Set CAP-RES CHECK switch (13) to MEGOHMS A-GRD and repeat step w with 100 megohm resistance standard connected across TANK UNIT COAX A connector (11) and GROUND terminal (5) as shown in figure 4-6. Disconnect 100 megohm resistance standard.

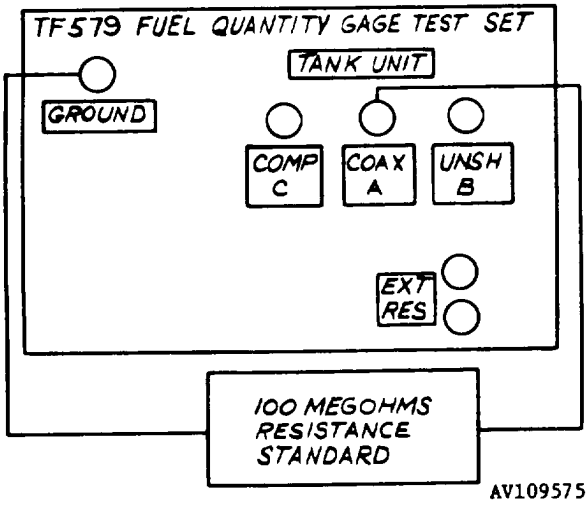


Figure 4-6. Setup for Checking Resistance Measuring Circuits Using TANK UNIT COAX A* Connector *and GROUND Terminal.

z. Set CAP-RES CHECK switch (13) to MEGOHMS C-GRD B-GRD and repeat step w above, with 100 megohm resistance standard connected first across TANK UNIT COMP C connector (10) and GROUND terminal (5) as shown in figure 4-7, and then across TANK UNIT UNSH B connector (12) and GROUND terminal (5) as shown in figure 4-8. Disconnect 100 megohm resistance standard.

aa. Set Power ON/OFF switch (2) to OFF and disconnect standard resistance and all cables from test set.

ab. Check continuity of main cable assembly (part number 2688) as follows:

NOTE

Use multimeter set to R X1 scale for all continuity *checks.*

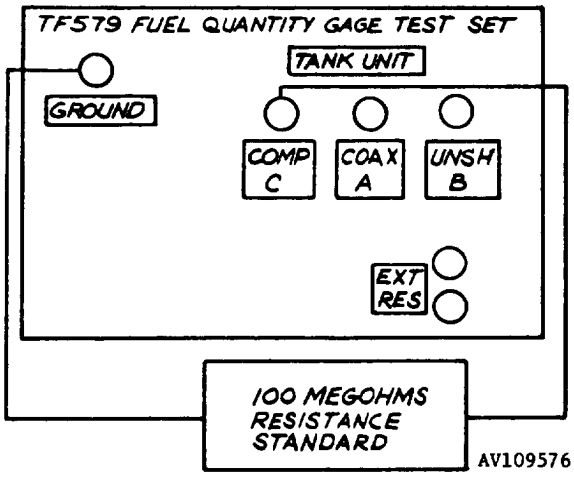


Figure 4-7. Setup for Checking Resistance Measuring Circuits Using TANK UNIT COMP C Connector and GROUND Terminal.

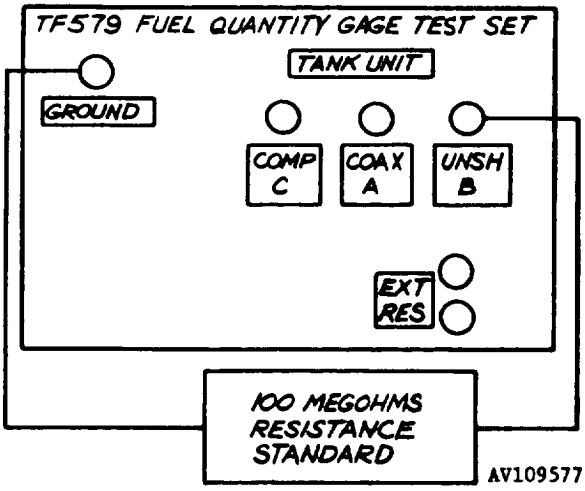


Figure 4-8. Setup for Checking Resistance Measuring Circuits Using TANK UNIT UNSH B Connector and GROUND Terminal.

(1) Using four tee connectors supplied with test set connect P5 to P6 P4 to P7 P3 to P8 and P2 to P9

(2) Check for continuity between corresponding pins of connectors P1 and P10 (for example P1-H to P10-H) except for pins L K M N V and T

(3) Check for continuity between pins L K M N V and T of connector P1

(4) Repeat step (3) above for connector P10

(5) Check for continuity between pin A of connector P11 and pin F of connectors P1 and P10

(6) Check for continuity between pin C of connector P11 and pin E of connectors P1 and P10

NOTE

Do not disconnect tee connectors at this time

ac Check 12 adapter cable assemblies (part numbers 2687A1 through A6 and 2687B1 through B6) as follows

(1) Connect adapter cable assemblies 2687A1 and 2687B1 to connectors P1 and P10 of main cable assembly

(2) Check for continuity between corresponding pins of A1 and B1 adapter cable assembly connectors that remain unconnected

(3) Disconnect two adapter cable assemblies and repeat steps (1) and (2) above for A2 through A6 and B2 through B6 cable assemblies

(4) Disconnect all adapter cables and tee connectors from main cable assembly

ad Check continuity of indicator test cable assembly (part number 2689) as follows

(1) Check for continuity between the following corresponding pins of connectors P1 and P2 G D P N M H and B (for example P1-G to P2-G)

(2) Check for continuity between pin G of connectors P1 and P2 and pin A of connectors P3 and P4

(3) Check for continuity between pin D of connectors P1 and P2 and pin C of connectors P3 and P4

(4) Set toggle switches S1 and S2 to 1 and check for continuity between inner conductors of connectors P8 P7 P6 and P5 and pins C F K and A respectively of connector P1

(5) Set toggle switches S1 and S2 to 2 and check for continuity from inner conductor of connectors P6 and P7 to pin R of connector P1

ae Check continuity of tank unit test harness (part number 2690-1 and -2) as follows

(1) Check for continuity between pin M of connector P1 and inner conductor of connector P2

(2) Check for continuity between pin V of connector P1 and inner conductor of connector P3

(3) Check for continuity between pins L N and A of connector P1

af Check power cable assembly (part number 2239) by checking for continuity between pin A of connector and clip no 1 and between pin C and clip no 2

ag Check power cable assembly (part number 2237) by checking for continuity between corresponding pins (A B and C) of connector P1 and P2

ah Check power cable assembly (part number 2238) by checking for continuity between pins A C and B of connector P1 and pin no 1 no 2 and the ground lug of connector P2 respectively

ai Check for continuity across remaining single conductor cables and leads

4-5 Troubleshooting Analysis

Troubleshooting of the test set is presented in table 4-1 which lists common malfunctions probable causes and appropriate corrective action Procedures provided in table 4-1 are used in conjuction with the schematic diagram figure 4-9 as a guide to efficient troubleshooting Troubleshooting is further simplified by functionally dividing test set circuits into categories which aid fault isolation The following five categories outline logical approaches to isolate the causes of possible malfunctions

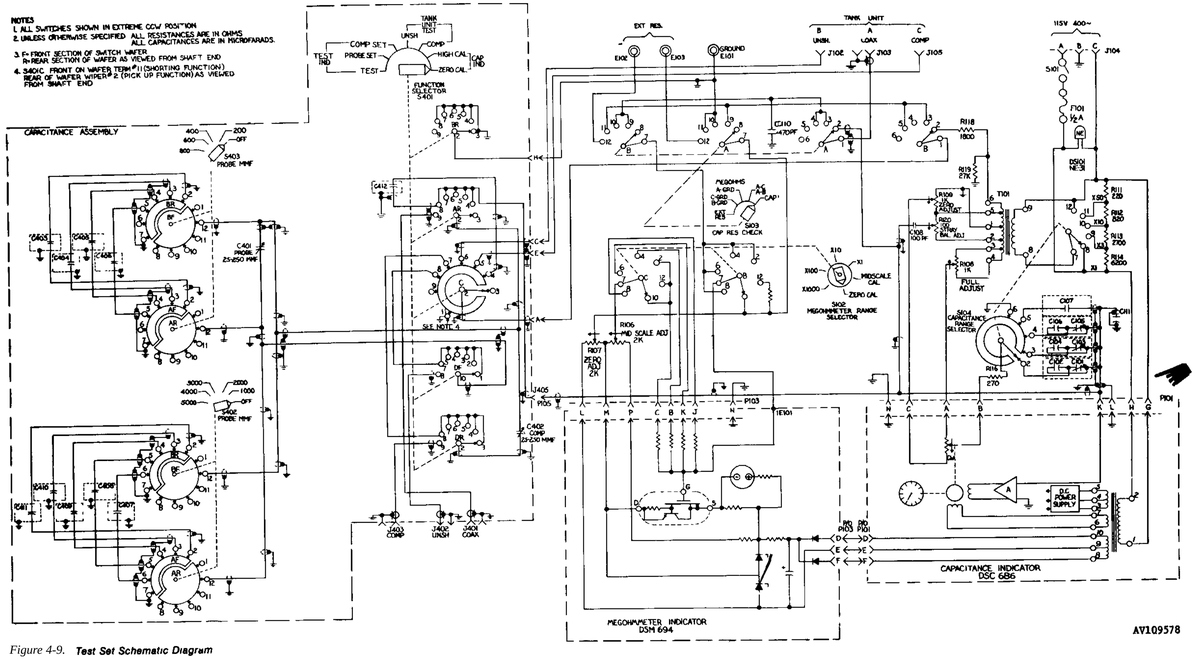


Figure 4-9. ***Test Set Schematic Diagram***

a. Input Power and Signal Voltages. If the test set is completely inoperative, check for input power (115 volts, 400 Hz) across J104-A and J 104-C (see figure 4-9). Then check Power ON/ OFF switch S101 and fuse F101. If signal voltage is not present across potentiometers R108, R109, or R120, check bridge transformer T101.

b. Switching Circuits. If operation of any test set functional switch (S101 through S104, S401 through S403) does not cause proper indication when the test set is operative, a power-off continuity test may immediately locate the cause of the trouble (refer to figure 4-9).

c. Capacitance Simulator Assembly. Basically the capacitance simulator assembly consists of capacitors C401 through C411, and rotary switches S402 and S403 (see figure 4-9). If operation of switches S402 and S403, or variable capacitors C401 or C402 does not cause a related indication on the CAPACITANCE INDICATOR, either replace the capacitance simulator assembly as a unit, or isolate the trouble to the faulty component, replace and recalibrate. (See paragraph 2-6f.) For example, if rotation of switch S402 causes proper CAPACITANCE INDICATOR reading, whereas rotation of switch S402 causes an incorrect reading, then capacitors C403, C404, C405 and C406 are suspect and should be checked.

NOTE

Capacitors C401 through C411 are temperature-stabilized assemblies. *If a short or significant value change occurs, the defective capacitor* assembly *must be replaced.*

d. Capacitance Indicator DSC686. If this unit is inoperative or cannot be properly calibrated, it must be replaced. To check calibration, refer to paragraph *2-6f.* In addition, with pcwer off, use volt-ohmmeter and check for continuity between capacitance indicator case and the following pins of connector J101: J, I, M, and L. Resistance shall not be greater than 0.2 ohm.

e. *Megohmmeter Indicator DSM694.* If this unit is inoperative or cannot be properly calibrated, it must be replaced. To check calibration, refer to paragraph *2-8f.* In addition, with power off, use volt-ohmmeter and check for continuity between indicator rear case plate and J501-N and between J501-E and J501-L.

Table 4-1. Troubleshooting Chart.

Malfunction	Probable cause	Corrective action
1. Test set completely inoperative.	*a.* Fuse F101 open.	*a.* Replace fuse F101. (Refer to paragraphs 3-11 and 3-12.)
	b. Power source faulty.	*b.* Use VTVM and check input power,
	c. Faulty Power ON/ OFF switch S101 (2, figure 2-l1.	c. Replace switch S101. (Refer to paragraph 4-10.)
2. When measuring capacitance, rotation of Capacitance RANGE SELECTOR switch S104 (7, figure 2-1) does not have proper effect on CAPACITANCE	*a.* Open in resistor network R111 through R114.	*a.* Check and replace resistors as required. (Refer to paragraph 4-10.)
	b. Improperly calibrated RANGE SELECTOR switch	*b,* Check calibration as described in paragraph 2-6f.

Table 4-1. Troubleshooting Chart-continued

Malfunction	Probable cause	Corrective action
2-continued INDICATOR (6) pointers.		
3. When measuring capacitance, pointers of CAPACITANCE INDICATOR (6) always drive fully clockwise.	a. Open potentiometer R109 or R108.	a. Check and replace as required. (Refer to paragraph 4-10.)
	b. Open secondary winding of bridge transformer T101.	b. Check for ac voltage across T101-3 and T101-4 and across T101-1 and T101-5. If either is open, replace transformer T101. (Refer to paragraph 4-11.)
	c. Open within capacitance indicator.	c. With power off, use VOM and check for 10,000 ohms ±500 ohms across P101-B and P101-C. **NOTE** If corrective action is required for steps 1 through 3, check calbration of CAPACITANCE INDICATOR (see paragraph 2-6 f).
4. CAPACITANCE INDICATOR (6, figure 2-1) is inoperative.	a. Loss of input power (115 volts, 400 Hz) to capacitance indicator DSC686.	a. If power ON indicator DS101 (3, figure 2-1) is lighted, check for 115 volts, 400 Hz across P101-H (high) and P101-G (low).
	b. Loss of ac signal input to capacitance indicator DSC686.	b. Use VTVM and check for ac voltage across P101-K (high) and ground. If no voltage is present, check test set switching circuits. (Refer to paragraph 4-5b.)

Table 4-1. Troubleshooting Chart -continued

Malfunction	Probable cause	Corrective action
4 - continued	c. Defective capacitance indicator DSC686.	c. Replace capacitance indicator. (Refer to paragraph 4-8.)
5. When measuring resistance, rotation of Megohmmeter RANGE SELECTOR switch (17, figure 2-1) does not have proper effect on MEGOHMMETER indicator (14) pointers.	a. Open within megohmmeter range selector circuit.	*a.* Use VOM to make power-off continuity check. Repair as required.
	b. Open within megohm meter indicator DSM694.	*b.* With power off, use volt-ohmmeter and check for proper resistance across GROUND terminal E101 (5, figure 2-1) and Megohmmeter connector P103 pins as follows: P103-J-1000 megohms ±1% P103-K-100 megohms ±1% P103-K-100 megohms ±1% P103-B-10 megohms +1% P103-C-1 megohm±1% Replace megohmmeter indicator if resistance is not as specified above. (Refer to paragraph 4-8.)
6. MEGOHMMETER indicator (14, figure 2-1) completely inoperative.	a. Open potentiometer R107.	a. Check and replace potentiometer as required. (Refer to paragraph 4-10.)
		b. Use UTVM and check for ac voltage between P103-D and -E and P103-F and -E of megohmmeter indicator. If no voltage, check for ac voltage across same pins of capacitance

Table 4-1. Troubleshooting Chart -continued

Malfunction	Probable cause	Corrective action
6- continued	b. Loss of ac input voltage to megohmmeter indicator DSM694.	indicator DSC688. If no voltage, replace capacitance indicator DSC688. (Refer to paragraph 4-8.)
7. When simulating probe capacitance, rotation of PROBE MMF range selector switch S403 (28, figure 2-1) does not cause proper CAPACITANCE INDICATOR (6) reading.	a. Faulty switch S403.	a. Check and replace as required. (Refer to paragraph 4-9.)
	b. Short or significant value change of capacitor C403, C404, C405 or C406.	b. Check and replace as required. (Refer to paragraph 4-12.)
8. When simulating probe capacitance, rotation of PROBE MMF range selector switch S402 (29, figure 2-1) does not cause proper CAPACITANCE INDICATOR (6) reading.	a. Faulty switch S402.	a. Check and replace as required. (Refer to paragraph 4-9.)
	b. Short or significant value change of capacitors C407, C408, C409, C410 or C411.	b. Check and replace as required, (Refer to paragraph 4-12.)
9. When simulating probe capacitance, rotation of PROBE 25-250 MMF control (27, figure 2-1) does not cause proper CAPACITANCE INDICATOR (6) reading.	Faulty variable capacitor C401.	Check and replace as required. (Refer to paragraph 4-9.)
10. When simulating compensator capacitance, rotation of COMP 25-250 MMF control (22, figure 2-1) does not cause proper CAPACITANCE INDICATOR (6) reading.	Faulty variable capacitor C402.	Check and replace as required. (Refer to paragraph 4-9.)

Table 4-1. Troubleshooting Chart -continued

Malfunction	Probable cause	Corrective action
11. With FUNCTION SELECTOR switch (25, figure 2-1) set to CAP IND HIGH CAL, CAPACITANCE INDICATOR (6) does not read within 1% of value shown on STANDARD CAPACITOR MMF nameplate (24).	*a.* Poor shielding or grounding of system test interconnections. *b.* Short or significant value change in standard capacitor C412. c. Defective FUNCTION SELECTOR switch S401.	*a.* Check system test setup to assure proper shielding and grounds. *b.* Check and replace as required. (Refer to paragraph 4-12.) c. Check that pin 4 of switch S401 (section C) is not shorted to ground. Repair wiring or replace switch S401 as required. (Refer to paragraph 4-9.)

Section III. REPAIR PROCEDURES

4-6. Scope.

This section contains instructions for authorized repair of the test set and replacement of defective components. These instructions include removal and disassembly, cleaning, detail repair instructions, lubrication, and testing.

4-7. Removal and Disassembly.

Disassembly of the entire test set is not recommended; disassemble the test set only to the extent required to replace defective components. The following procedures are keyed to figures 4-10 through 4-14, which are indexed in disassembly order.

4-8. Test Set Disassembly.

To disassemble the test set, refer to figure 4-10 and proceed as follows:

KEY to fig. 4-10:

1. Screw
2. Capacitance indicator
3. Connector P1Q1
4. O-ring
5. Screw
6. Megohmmeter indicator
7. Connector P103
8. O-ring
9. Switch knob
10. Variable capacitor knob
11. Screw
12. Skirt
13. Cap and chain
14. Cap and chain
15. Screw
16. Nylon washer
17. Shoulder washer
18. Screw
19. Lockwasher
20. Nameplate
21. Screw
22. Nylon washer
23. Screw
24. Nylon washer
25. Stiffener rod
26. Stiffener rod
27. Instrument case
28. Panel gasket
29. Hex nut
30. Shoulder washer
31. Fiber washer
32. Capacitance assembly
33. Panel assembly
34. Screw
35. Lockwasher
36. Support rod
37. Machine screw
38. Lockwasher
39. Hex nut
40. Vibration isolator
41. Screw
42. Lockwasher
43. Flat washer
44. Cable support
45. Screw
46. Lockwasher
47. Acorn cap nuts
48. Identification plate
49. Instruction placard
50. Screw
51. Clamp
52. Transit case assembly

Release two snap locks and open lid of transit case assembly (52).

b. Loosen screw (1) and carefully slide capacitance indicator (2) out from front of panel assembly (33).

c. Separate connector P101 (3) from connector J101 of capacitance indicator (2).

d. Remove O-ring (4) from capacitance indicator (2).

e. Loosen screw (5) and carefully slide megohmmeter indicator (6) out from front of panel assembly (33).

f. Separate connector P103 (7) from connector J103 of megohmmeter indicator (6).

g. Remove O-ring (8) from megohmmeter indicator (6).

h. Loosen associated setscrews and slide three switch knobs (9) off three rotary switch shafts.

i. Loosen associated setscrews and slide two variable capacitor knobs (10) off variable capacitor shafts.

j. Detach two skirts (12) from two variable capacitor knobs (10) by removing six screws (11).

k. Remove two caps and chains (13) and cap and chain (14) from associated connector.

l. Detach three caps and chains (13, 14) from panel assembly (33) by removing two screws (15), two nylon washers (16) and two shoulder washers (17).

m. Detach nameplate (20) from panel assembly (33) by removing two screws (18) and two lockwashers (19).

n. Remove eight machine screws (21) and eight nylon washers (22); remove panel assembly (33) from transit case assembly (52).

o. Remove 20 screws (23) and 20 nylon washers (24) and carefully detach two stiffener rods (25), two stiffener rods (26), instrument case (27) and panel gasket (28) from panel assembly (33).

NOTE

As disassembly proceeds, tag and disconnect wiring as *required.*

p. Remove three hex nuts (29), three shoulder washers (30) and three fiber washers (31) and detach capacitance assembly (32) from panel assembly (33). Refer to paragraph 4-9 for disas-

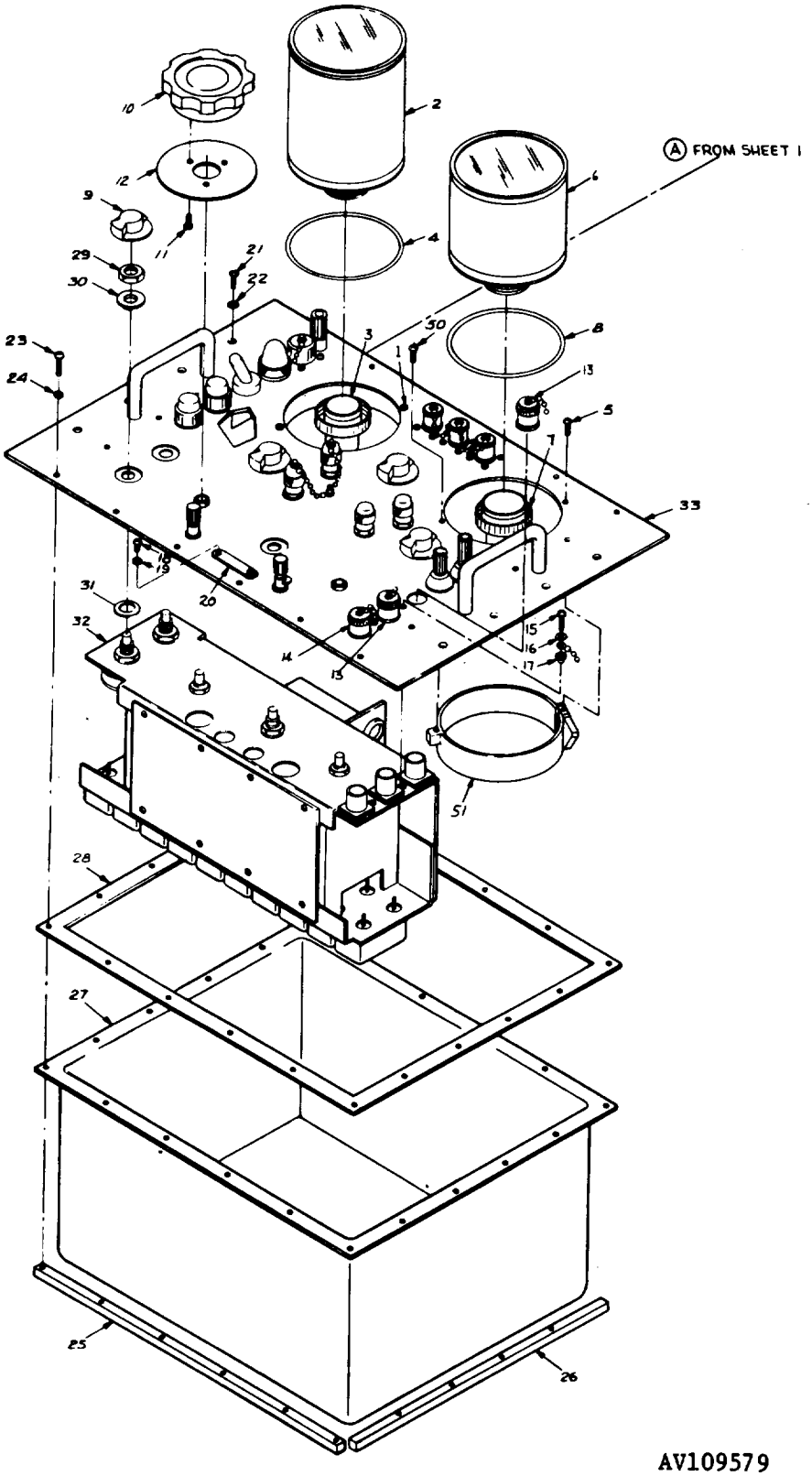


Figure 4-10. Test Set, *Exploded View* (Sheet 1 of 2).

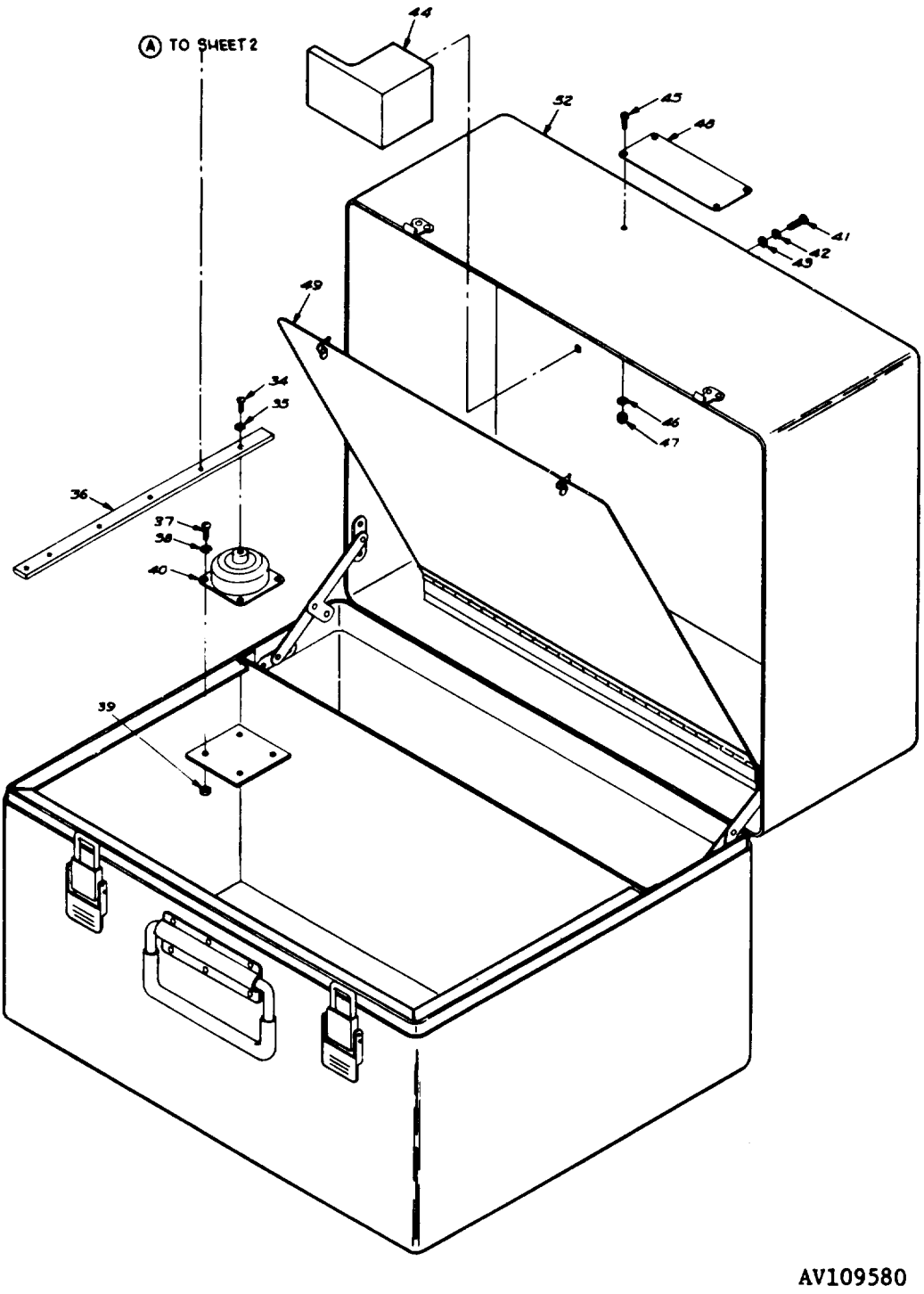


Figure 4-10. Test Set, Exploded View (Sheet 2 of 2).

sembly of capacitance assembly (32) and to paragraph 4-10 for disassembly of panel assembly (33).

Remove four screws (34) and four lockwashers (35) and detach two support rods (36) from vibration isolators (40).

r. Detach four vibration isolators (40) from transit case assembly (52) by removing 16 machine screws (37), 16 lockwashers (38) and 16 hex nuts (39).

Remove three power cable assemblies from lid of transit case assembly (52).

t. Remove the following cables and accessories from cable storage compartment of transit case assembly (52):

(1) Main cable assembly.

(2) Twelve (12) adapter cable assemblies.

(3) Seven BNC connector cable assemblies.

(4) Ground lead assembly.

(5) Test lead assembly.

(6) Indicator test cable.

(7) Two break-in cables.

(8) Five tee connectors.

u. Remove four screws (41), four lockwashers (42) and four flat washers (43) and detach two cable supports (44) from lid of transit case assembly (52).

v. Remove four screws (45), four lockwashers (46) and four acorn cap nuts (47) and detach identification plate (48) from transit case assembly (52).

Remove instruction placard (49) from transit case assembly (52).

Remove two screws (50) and detach two clamps (51) from panel assembly (33).

4-9. Disassembly of Capacitance Assembly.

To disassemble the capacitance assembly, refer to figure 4-11 and proceed as follows:

NOTE

As disassembly proceeds, tag and disconnect wiring as required.

KEY to fig. 4-11:

1. Screw
2. Shield plate
3. Screw
4. Hex nut
5. Lockwasher
6. Shield bracket
7. Pan head screw
8. Insulating washer
9. Flat washer
10. Bracket assembly
11. Screw
12. Simulator shield
13. Screw
14. Screw
15. Capacitance simulator assembly
16. Pan head screws
17. Flat washer
18. Lockwasher
19. Nylon clamp
20. Nylon clamp
21. Pan head screw
22. Teflon bushing
23. Washer
24. Flat washer
25. Capacitor assembly C401
26. Capacitor assembly C402
27. Retaining ring
28. Shouldered shaft
29. O-ring seal
30. Screw
31. Pan head screw
32. Lockwasher
33. Simulator bracket
34. Pan head screw
35. Hex nut
36. Flat washer
37. Lockwasher
38. Nylon clamp
39. Hex nut
40. Washer
41. Rotary switch S401
42. Hex nut
43. Washer
44. Rotary switch S402
45. Hex nut
46. Washer
47. Rotary switch S403
48. Pan head screw
49. Lockwasher
50. Solder lug
51. Connector J401
52. Connector J402
53. Connector J403
54. Hex nut
55. Panel bushing
56. Simulator chassis

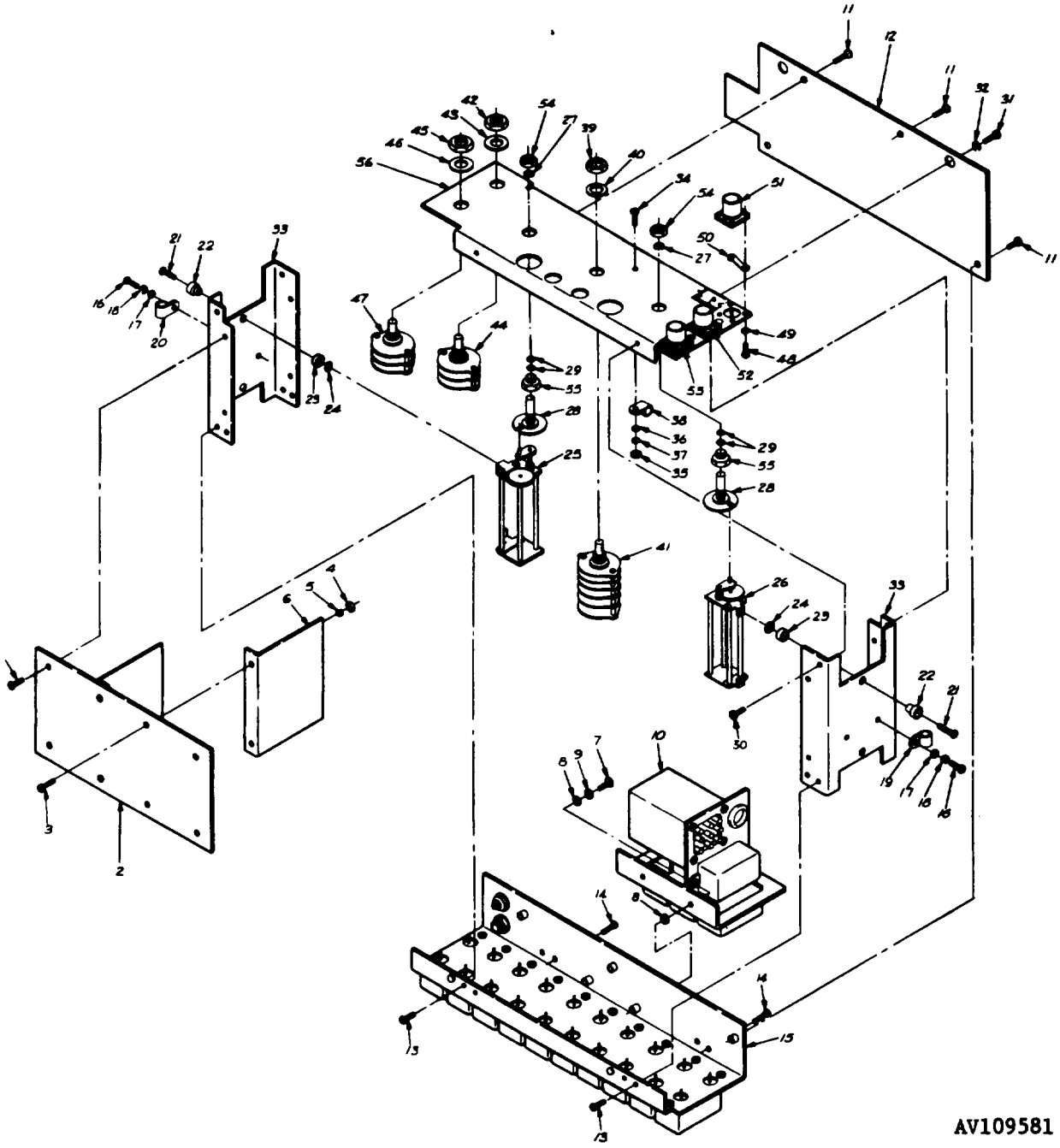


Figure 4-11. Capacitance Assembly, Exploded View.

a. Remove four screws (1) and detach shield plate (2) from capacitance simulator assembly (15) and simulator chassis (56).

b. Remove four screws (3), four hex nuts (4) and four lockwashers (5) and detach two shield brackets (6) from shield plate (2).

c. Remove two pan head screws (7), four insulating washers (8) and two flat washers (9) and detach bracket assembly (10) from capacitance simulator assembly (15). Refer to paragraph 4-11 to disassemble bracket assembly (10).

d. Remove five screws (11) and detach -simulator shield (12) from capacitance simulator assembly (15) and simulator chassis (56).

Remove four screws (13) and four screws (14). and detach capacitance simulator assembly (15) from two simulator brackets (33). Refer to paragraph 4-12 to disassemble capacitance simulator assembly (15).

f. Remove three pan head screws (16), three flat washers (17), and three lockwashers (18) and detach three nylon clamps (19 and 20) from simulator brackets (33).

g. Remove four pan head screws (21), four teflon bushings (22), four washers (23), and four flat washers (24) and detach two capacitor assemblies C401 (25) and C402 (26) from two simulator brackets (33).

h. Remove two retaining rings (27) and extract two shouldered shafts (28) from two panel bushings (55).

i. Remove four O-ring seals (29) from two shouldered shafts (28).

j. Remove two pan head screws (30), two screws (31) and two lockwashers (32) and detach two simulator brackets (33) from simulator chassis (56).

k. Remove pan head screw (34), hex nut (35), flat washer (36) and lockwasher (37) and detach nylon clamp (38) from simulator chassis (56).

l. Remove hex nut (39) and washer (40) and detach rotary switch S401 (41) from simulator chassis (56).

m. Remove hex nuts (42) and washers (43) and detach rotary switch S402 (44) from simulator chassis (56).

n. Remove hex nut (45) and washer (46) and detach rotary switch S403 (47) from simulator chassis (56).

o. Remove 12 pan head screws (48) and 12 lockwashers (49) and detach three solder lugs (50) and three connectors J401 (51), J402 (52) and J403 (53) from simulator chassis (56).

p. Remove two hex nuts (54) and detach two panel bushings (55) from simulator chassis (56).

4-10. Disassembly of Panel Assembly.

To disassemble the panel assembly, refer to figure 4-12 and proceed as follows:

NOTE

As disassembly proceeds, tag and disconnect wiring as required.

KEY to fig. 4-12:

1. Self-locking nut
2. Nylon washer
3. Terminal E101
4. Screw
5. Nylon washer
5a. Self-locking nut
6. Cap and chain
7. O-ring screw
8. Hex nut
9. Lockwasher
10. Connector J104
11. Connector gasket
12. Hex nut
13. Washer
14. Washer
15. Indicator light and lens assembly DS101
16. Washer
17. Toggle switch boot
18. Hex nut
19. Toggle switch S101
20. Hex nut
21. Fuseholder
22. Knob
23. Resistor R114
24. Resistor R111
25. Resistor R112
26. Resistor R113.
27. Hex nut
28. Rotary switch S104
29. Resistor R105
30. Hex nut

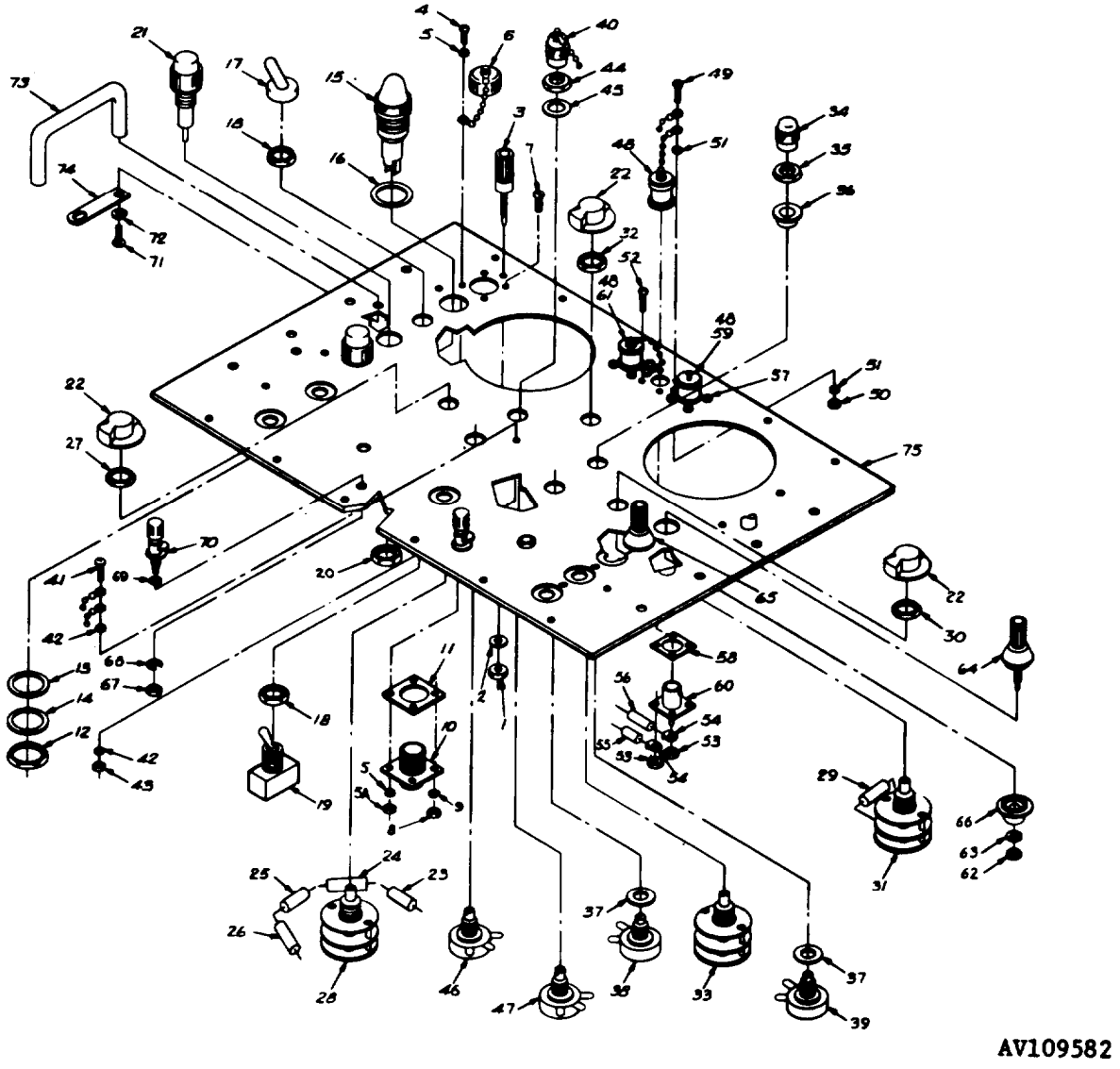


Figure 4-12. Panel Assembly, Exploded **View.**

KEY to fig. 4-12 (continued):

31. Rotary switch S102
32. Hex nut
33. Rotary switch S103
34. Cap
35. Hex nut
36. Teflon bushing
37. Washer
38. Potentiometer R106
39. Potentiometer R107
40. Cap and chain
41. screw
42. Nylon washer
43. Self-locking nut
44. Hex nut
45. Internal tooth lockwasher
46. Potentiometer R108
47. Potentiometer R109
48. Cap and chain
49. Screw
50. Self-locking nut
51. Nylon washer
52. O-ring screw
53. Hex nut
54. Solder lug
55. Capacitor C110
56. Capacitor C111
57. O-ring screw
58. Connector gasket
59. Connector J102
60. Connector J103
61. Connector J105
62. Self-locking nut
63, Washer
64. Terminal E102
65. Terminal E103
66. Washer
67. Hex nuts
68. Lockwashers
69. Nylon washer
70. Dial lock
71. Screw
72. Lockwasher
73. Handle
74. Ground strap
75. Panel

a. Remove self-locking nut (1) and nylon washer (2) and detach terminal E101 (3) from panel (75).

b. Remove cap and chain (6) from connector J104 (10); detach cap and chain (6) from panel (75) by removing screw (4), two nylon washers (5) and self-locking nut (5A).

c. Remove three O-ring screws (7), three hex nuts (8) and three lockwashers (9) and detach connector J104 (10) and connector gasket (11) from panel (75).

d. Remove lamp (see paragraph 3-11b) and hex nut (12) and two washers (13 and 14) and detach indicator light and lens assembly (15) and washer (16) from panel (75).

e. Remove toggle switch boot (17) and hex nut (18) and detach toggle switch S101 (19).

f. Remove two fuses (see paragraph 3-11a) and two hex nuts (20) and detach two fuseholders (21) from panel (75).

g. Loosen corresponding setscrews and remove three knobs (22) from associated rotary switches.

h. Tag, unsolder and remove four resistors R114 (23), R111 (24), R112 (25) and R113 (26) from rotary switch S104 (28).

i. Remove hex nut (27) and detach rotary switch S104 (28) from panel (75).

j. Tag, unsolder and remove resistor R105 (29) from rotary switch S102 (31).

k. Remove hex nut (30) and detach rotary switch S102 (31) from panel (75).

l. Tag and disconnect capacitors C110 (55) and C111 (56) from rotary switch S103 (33). Remove hex nut (32) and detach rotary switch S103 (33) from panel (75).

m. Remove two caps (34) from two potentiometers R106 (38) and R107 (39).

n. Remove two hex nuts (35), two teflon bushings (36), and two washers (37) and detach two potentiometers R106 (38) and R107 (39) from panel (75).

o. Remove two caps and chains (40) from two potentiometers R108 (46) and R109 (47). Detach caps and chains (40) from panel (75) by removing screw (41), two nylon washers (42) and self-locking nut (43).

p. Remove two hex nuts (44) and two internal tooth lockwashers (45) and detach two potentiometers R108 (46) and R109 (47) from panel (75).

q. Remove three caps and chains (48) from associated connectors. Detach three caps and chains (48) from panel (75) by removing two screws (49), two self-locking nuts (50) and four nylon washers (51).

r. Remove two O-ring screws (52) and two hex nuts (53) and detach two solder lugs (54), capacitor C110 (55) and capacitor C111 (56) from connector J103 (60); unsolder capacitors C110 (55) and C111 (56) from two solder lugs (54).

s. Remove ten O-ring screws (57) and detach three connector gaskets (58), three connectors J102 (59), J103 (60) and J105 (61).

t. Remove two self locking nuts (62), two washers (63) and detach two terminals E102 (64) and E103 (65) and two washers (66).

u. Remove two hex nuts (67), two lockwashers (68), and two nylon washers (69) and detach two dial locks (70) from panel (75).

v. Remove four screws (71) and four lockwashers (72) and detach two handles (73) and ground strap (74) from panel (75).

4-11. Disassembly of Bracket Assembly.

To disassemble the bracket assembly, refer to figure 4-13 and proceed as follows:

NOTE

As disassembly proceeds, tag *disconnect wiring* as *required.*

KEY to fig. 4-13:

1. Resistor R118
2. Resistor R119
3. Hex nut
4. Lockwasher
5. Solder lug
6. Transformer T101

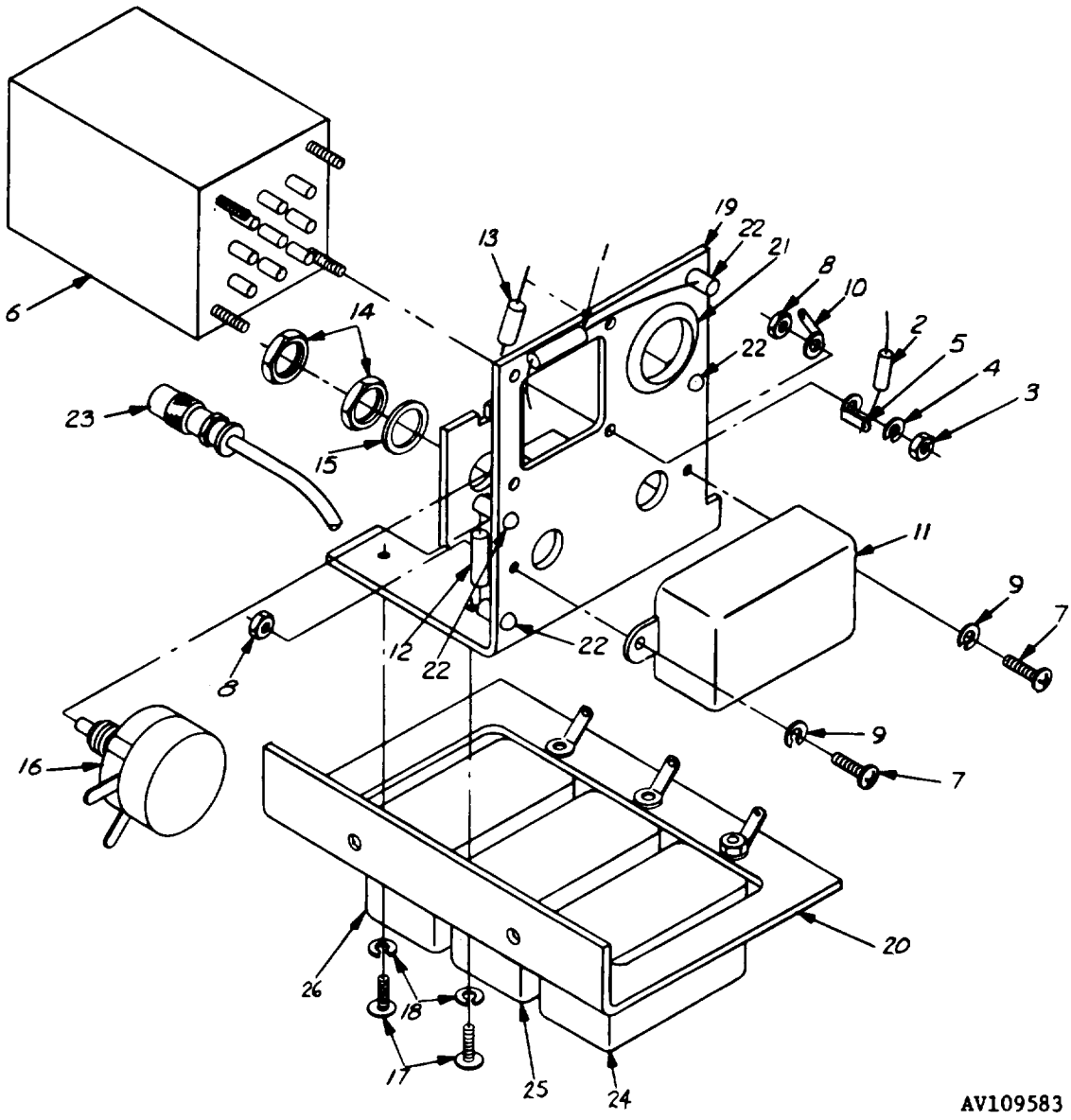


Figure 4-13. Bracket Assembly, Exploded View.

Key to Fig. 4-13:

7	Cross-recessed screw	17	Cross-recessed screw
8	Hex nut	18	Lockwasher
9	Lockwasher	19	Mounting bracket
10	Solder lug	20	Mounting bracket
11	Capacitor assembly C7	21	Grommet
12	Resistor R116	22	Teflon terminal
13	Capacitor C108	23	Cable assembly
14	Hex nut	24	Capacitor assembly C105/C106
15	Washer	25	Capacitance assembly C103/C104
16	Potentiometer R120	26	Capacitance assembly C101/C102

a. Tag, unsolder and remove resistor R118 (1) from teflon terminal (22) and transformer T101 (6).

b. Tag, unsolder and remove resistor R119 (2) from transformer T101 (6) and solder lug (5).

c. Remove four hex nuts (3) and four lockwashers (4) and detach solder lug (5) and transformer T101 (6) from mounting bracket (19).

d. Remove two cross-recessed screws (7), two hex nuts (8) and two lockwashers (9) and detach solder lug (10) and capacitor assembly C7 (11) from mounting bracket (19).

e. Tag, unsolder and remove resistor R116 (12) from two teflon terminals (22).

f. Tag, unsolder and remove capacitor C108 (13) from potentiometer R120 (16) and teflon terminal (22).

g. Remove hex nut (14) and washer (15) and detach potentiometer R120 (16) from mounting bracket (19).

h. Remove four cross-recessed screws (17) and four lockwashers (18) to separate mounting bracket (19) from mounting bracket (20).

NOTE

To replace capacitor assemblies C105l C106 (24), C103IC104 (25), or C101/ C102 (26), *refer* test *set to higher level of mairrtenance.*

i. Remove grommet (21) from mounting bracket (19).

j. Remove four teflon terminals (22) from mounting bracket (19).

4-12. Disassembly of Capacitance Simulator Assembly.

To disassemble capacitance simulator assembly, refer to figure 4-14 and proceed as follows:

NOTE

As disassembly proceeds, tag and *disconnect wiring as required.*

a. Remove six cross-recessed screws (1), six hex nuts (2) and detach six solder lugs (3) and capacitor assemblies C403 (4), C406 (5) and C410 (6) from lower simulator chassis (28).

b. Remove 12 cross-recessed screws (7), 12 hex nuts (8) and 12 lockwashers (9) and detach six capacitor assemblies C404 (10), C405 (11), C412 (12), C411 (13), C409 (14), and C408 (15) from lower simulator chassis (28).

c. Remove two cross-recessed screws (16), two hex nuts (17) and detach three solder lugs (18) and capacitor assembly C407 (19) from lower simulator chassis (28).

d. Remove hex nut (20) and two insulating washers (21 and 22) and detach connector J405 (23) from lower simulator chassis (28).

e. Remove hex nut (24) and washer (25) and detach connector J404 (26) from lower simulator chassis (28).

f. Remove two bumpers (27) from lower simulator chassis (28).

4-13. Cleaning.

WARNING

Solvent (item 2, table 1-4) is toxic and flammable. Use in well ventilated area. Avoid breathing of vapors and contact with skin. Keep away from flames and other ignition sources.

Clean all parts, except electrical contacts, using a clean, lint-free cloth moistened in ethyl alchohol (item 1, table 1-4). Remove stubborn deposits of dirt, grease and grime, using solvent (item 2, table 1-4) and a soft-bristled brush; dry using compressed air, 15 psi maximum. Clean electrical contacts using a dry, lint-free cloth.

4-14. Detailed Repair Instructions.

Detailed repair of the test set consists of replacing defective parts or assemblies. Refer to paragraphs 4-8 through 4-12 and perform only those steps of the disassembly procedures required to remove the defective component. The following paragraphs provide instructions for reassembly of the panel assembly, capacitance assembly, bracket assembly and capacitance simulator assembly and repair of cable assembles. After all assemblies are reassembled, refer to paragraph 4-22 for reassembly of the test set.

CAUTION

As reassembly proceeds, do not strip coax insulation or shielding mor e than 1/4" from solder connection. Be certain shields are properly grounded. Improper grounding will cause inaccurate CAPACITANCE INDICATOR readings.

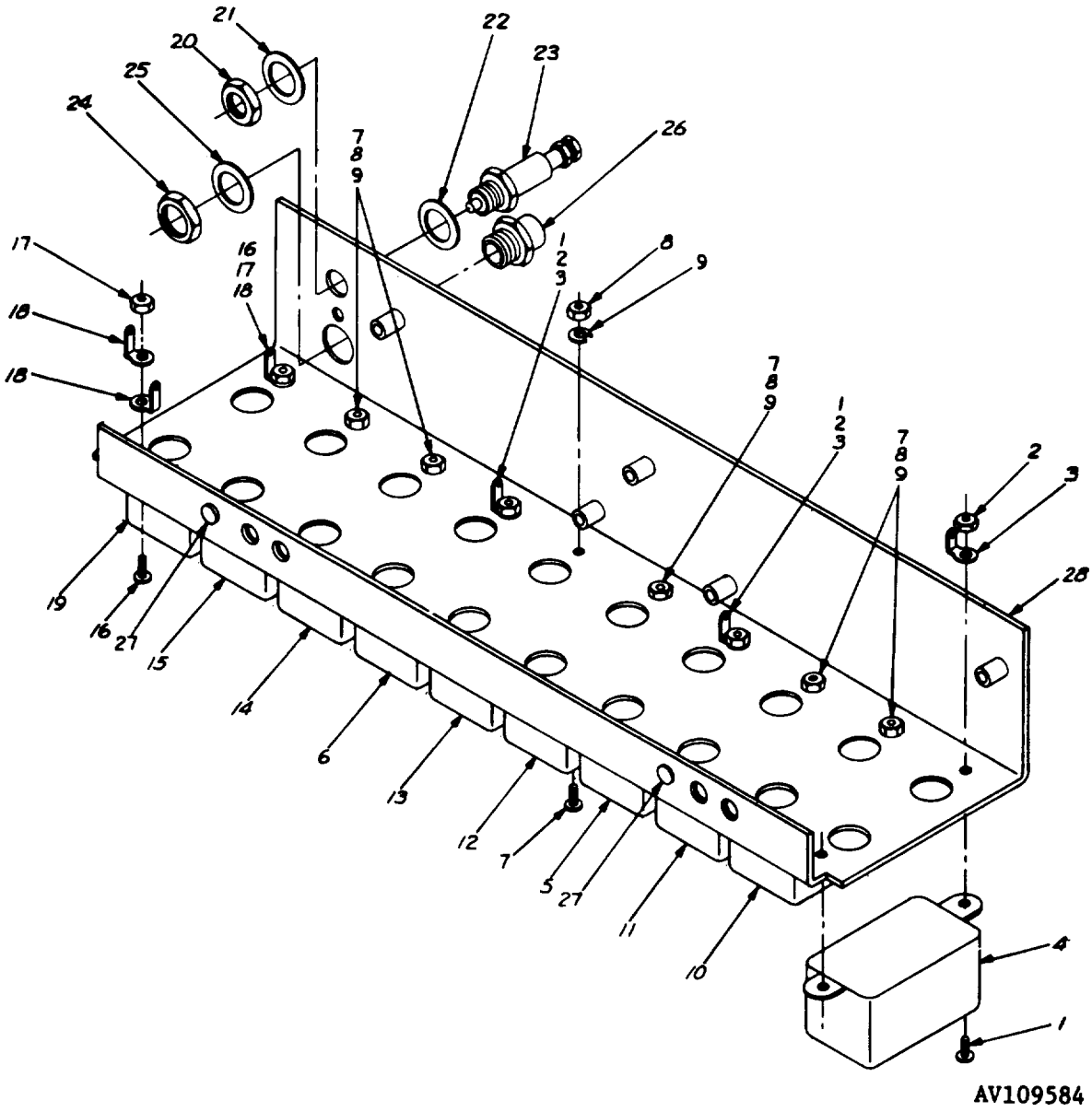


Figure 4-14. Capacitance Simulator Assembly, Exploded View.

KEY to fig. 4-14:

1. Cross-recessed screw
2. Hex nut
3. Solder lug
4. Capacitor assembly C403
5. Capacitor assembly C406
6. Capacitor assembly C410
7. Cross-recessed screw
8. Hex nut
9. Lockwasher
10. Capacitor assembly C404
11. Capacitor assembly C405
12. Capacitor assembly C412
13. Capacitor assembly C411
14. Capacitor assembly C409
15. Capacitor assembly C408
16. Cross-recessed screw
17. Hex nut
18. Solder lug
19. Capacitor assembly C407
20. Hex nut
21. Insulating washer
22. Insulating washer
23. Connector J405
24. Hex nut
25. Washer
26. Connector J404
27. Bumper
28. Lower simulator chassis

4-15. Cable Assembly Repair.

Because the cable assemblies are potted and are of critical length, they are not repairable and should be replaced. However, two toggle switches which are part of the indicator adapter cable assembly (part number 2689) may be replaced as follows:

a. Remove four screws and detach switch box cover from switch box.

b. Tag and unsolder wires connected to defective toggle switch.

c. Remove hex nut and lockwasher to detach toggle switch from switch box.

d. Attach new toggle switch to switch box using hex nut and lockwasher.

e. Connect wires to toggle switch, using solder (item 4, table 1-4) in accordance with tags on wires. Check that wires are on proper terminal and remove tags.

f. Secure switch box cover to switch box using four screws.

4-16. Lubrication.

No lubrication of the test set is required at direct support and general support levels of maintenance.

4-17. Reassembly of Capacitance Simulator Assembly.

To reassemble the capacitance simulator assembly, refer to figure 4-14 and proceed as follows:

NOTE

As reassembly proceeds, reconnect wiring in accordance with *tags on wires,* using *solder (item* 4, table 1-4).

a. Install two bumpers (27, figure 4-14) on lower simulator chassis (28).

b. Attach connector J404 (26) to lower simulator chassis (28) using hex nut (24) and washer (25).

c. Attach connector J405 (23) to lower simulator chassis (28) using hex nut (20) and two insulating washers (21 and 22).

d. Attach capacitor assembly C407 (19) and three solder lugs (18) to lower simulator chassis (28) using two cross-recessed screws (16), two hex nuts (17) and locking compound (item 3, table 1-4).

e. Attach six capacitor assemblies C404 (10), C405 (11), C412 (12), C411 (13), C409 (14) and C408 (15) to lower simulator chassis (28) using 12 cross-recessed screws (7), 12 lockwashers (9), 12 hex nuts (8) and locking compound (item 3, table 1-4).

f. Attach three capacitor assemblies C403 (4), C406 (5) and C410 (6) and six solder lugs (3) to lower simulator chassis (28) using six cross-recessed screws (1), six hex nuts (2) and locking compound (item 3, table 1-4).

g. Check that wires are connected to proper terminals and remove tags.

4-18. Reassembly of Bracket Assembly.

To reassemble the bracket assembly, refer to figure 4-13 and proceed as follows:

NOTE

As reassembly proceeds, reconnect wiring in accordance with tags on wires, using solder (item 4, table 1-4).

a. Install four teflon terminals (22) on mounting bracket (19).

b. Install grommet (21) on mounting bracket (19).

c. Attach mounting bracket (20) to mounting bracket (19) using four cross-recessed screws (17), four lockwashers (18) and locking compound (item 3, table 1-4).

d. Attach potentiometer R120 (16) to mounting bracket (19) using hex nut (14) and washer (15).

Connect and solder capacitor C108 (13) to potentiometer R120 (16) and teflon terminal (22) using solder (item 4, table 1-4).

f. Connect and solder resistor R116 (12) to two teflon terminals (22).

g. Attach capacitor assembly C7 (11) and solder lug (10) to mounting bracket (19) using two cross-recessed screws (7), two hex nuts (8), two lockwashers (9) and locking compound (item 3, table 1-4).

h. Attach transformer T101 (6) and solder lug (5) using four hex nuts (3) and four lockwashers (4).

i. Connect and solder resistor R119 (2) across transformer T101 (6) and solder lug (5) using solder (item 4, table 1-4).

i. Connect and solder resistor R118 (1) across teflon terminal (22) and transformer T101 (6) using solder (item 4, table 1-4).

k. Check that components and wires are connected to proper terminals and remove tags.

4-19. Reassembly of Panel Assembly.

To reassemble the panel assembly, refer to figure 4-12 and proceed as follows:

NOTE

As reassembly proceeds, reconnect wiring in accordance with tags on wires, using solder (item 4, table 1-4).

a. Attach two handles (73) and ground strap (74) to panel (75) using four screws (71), four lockwashers (72) and locking compound (item 3, table 1-4).

b. Attach two dial locks (70) to panel (75) using two hex nuts (67), two lockwashers (68) and two nylon washers (69).

c. Attach two terminals E102 (64) and E103 (65) to panel (75) using two self-locking nuts (62), two washers (63) and two washers (66).

d. Attach three connectors J102 (59), J103 (60) and J105 (61) and three connector gaskets (58) to panel (75) using ten O-ring screws (57) and locking compound (item 3, table 1-4).

e. Attach two solder lugs (54) to connector J 103 (60) using two O-ring screws (52), two hex nuts (53) and locking compound (item 3, table 1-4).

f. Attach three caps and chains (48) to panel (75) using two screws (49), two self-locking nuts (50), four nylon washers (51) and locking compound (item 3, table 1-4).

Mount three caps (48) on connectors J102 (59) J103 (60) and J105 (61).

h. Attach two potentiometers R108 (46) and R109 (47) to panel (75) using two hex nuts (44) and two internal tooth lockwashers (45).

i. Attach two caps and chains (40) to panel (75) using screw (41), two nylon washers (42), self-locking nut (43) and locking compound (item 3, table 1-3).

j. Mount two caps (40) on two potentiometers R108 (46) and R109 (47).

k. Attach two potentiometers R106 (38) and R107 (39) to panel (75) using two hex nuts (35), two teflon bushings (36) and two washers (37).

l. Mount two caps (34) on two potentiometers R106 (38) and R107 (39).

m. Solder capacitors C110 (55) and C111 (56) across appropriate pins of rotary switch S103 (33) and solder lugs (54) in accordance with tags, using solder (item 4, table 1-4).

n. Attach rotary switch S103 (33) to panel (75) using hex nut (32).

o. Attach rotary switch S102 (31) to panel (75) using hex nut (30).

p. Solder resistor R105 (29) across appropriate pins of S102 (31) in accordance with tags, using solder (item 4, table 1-4).

Attach rotary switch S104 (28) to panel (75) using hex nut (27).

r. Solder four resistors R114 (23), R111 (24), R112 (25) and R113 (26) across appropriate pins of rotary switch S104 (28) in accordance with tags, using solder (item 4, table 1-4).

s. Using a pliers, rotate shafts of rotary switches S102 (31), S103 (33), and S104 (28) to extreme counterclockwise position. Mount three knobs (22) on rotary switch shafts, align marker with extreme left panel graduation, and tighten setscrews of knobs (22).

t. Attach two fuseholders (21) to panel (75) using two hex nuts {20) and install two fuses (see paragraph 3-12a).

u. Attach toggle switch S101 (19) to panel (75) using hex nut (18) and toggle switch boot (17).

v. Attach indicator light and lens assembly (15) to panel (75) using three washers (13, 14 and 16) and hex nut (12) and install lamp (see paragraph 3-12b).

w. Attach connector J104 (10) and connector gasket (11) to panel (75) using three O-ring screws (7), three hex nuts (8), three lockwashers (9) and locking compound (item 3, table 1-4).

x. Mount cap and chain (6) on connector J104 (10); attach cap and chain (6) to panel (75) using screw (4), two nylon washers (5), self-locking nut (5A) and locking compound (item 3, table 1-4).

y. Attach terminal E101 (3) to panel (75) using self-locking nut (1) and nylon washer (2).

z. Check that components and wires are connected to proper terminals and remove tags.

4-20. Reassembly of Capacitance Assembly.

To reassemble the capacitance assembly, refer to figure 4-11 and proceed as follows:

NOTE

As reassembly proceeds, reconnect wiring in accordance with tags on wires, using solder (item 4, table 1-4).

a. Attach two panel bushings (55) to simulator chassis (56) using two hex nuts *(54)* and adhesive (item 5, table 1-4).

b. Attach three connectors J401 (51), J402 (52), J403 (53) and three solder lugs (50) to simulator chassis (56) using 12 pan head screws (48), 12 lockwashers (49) and locking compound (item 3, table 1-4).

c. Attach rotary switch S403 (47) to simulator chassis (56) using hex nut *(45)* and washer (46).

d. Attach rotary switch S402 (44) to simulator chassis (56) using hex nut (42) and washer (43).

e. Attach rotary switch S401 (41) to simulator chassis (56) using hex nut (39) and washer (40).

f. Attach nylon clamp (38) to simulator chassis using pan head screw (34), hex nut (35), flat washer (36), lockwasher (37) and locking compound (item 3, table 1-4).

g. Attach two simulator brackets (33) to simulator chassis (56) using two pan head screws (30), two screws (31), two lockwashers (32) and locking compound (item 3, table 1-4).

h. Mount four O-ring seals (29) on two shouldered shafts (28).

i. Insert two shouldered shafts (28) into two panel bushings (55) and secure in place with two retaining rings (27).

j. Attach two capacitor assemblies C401 (25) and C402 (26) to two simulator brackets (33) using four pan head screws (21), four teflon bushings (22), four washers (23), four flat washers (24) and locking compound (item 3, table 1-4).

NOTE

Ensure that pins of capacitor assemblies C401 (25) and C402 (26) engage *corresponding* slots *in two shouldered shafts (28).*

k. Attach three nylon clamps (19 and 20) to two simulator brackets (33) using three pan head screws (16), three flat washers (17), three lockwashers (18) and locking compound (item 3, table 1-4).

l. Attach capacitance simulator assembly (15) to two simulator brackets (33) using four screws (13), four screws (14) and locking compound (item 3, table 1-4).

NOTE

Check that *components and wires are connected to proper terminals and remove tags.*

m Attach simulator shield (12) to capacitance simulator assembly (15) and simulator chassis (56) using five screws (11) and locking compound (item 3, table 1-4).

n. Attach bracket assembly (10) to capacitance simulator assembly (15) using two pan head screws (7), four insulating washers (8), two flat washers (9) and locking compound (item 3, table 1-4).

o. Attach two shield brackets (6) to shield plate (2) using four screws (3), four hex nuts (4), four lockwashers (5) and locking compound (item 3, table 1-4).

p. Attach shield plate (2) to capacitance simulator assembly (15) and simulator chassis (56) using four screws (1) and locking compound (item 3, table 1-4).

Section IV. REASSEMBLY AND ALIGNMENT

4-21. Scope.

This section contains instructions for installing components and assemblies that have been reassembled in accordance with paragraphs 4-15 through 4-19. In addition, before the test set is installed in the transit case assembly, instructions are provided for adjusting STRAY BAL ADJ potentiometer R120.

4-22. Reassembly.

To reassemble the test set, refer to figure 4-10 and proceed as follows:

NOTE

As reassembly proceeds, reconnect wires and cables *in accordance with tags on wires. Check that wires and cables are connected to proper* terminal *or connector and remove tags.*

a. Attach two clamps (51) to panel assembly (33) using two screws (50) and locking compound (item 3, table 1-4).

b. Attach capacitance assembly (32) to panel assembly (33) using three hex nuts (29), three shoulder washers (30) and" three fiber washers (31).

c. Attach nameplate (20) to panel assembly (33) using two screws (18), two lockwashers (19) and locking compound (item 3, table 1-4).

d. Mount two caps (13) and cap (14) on associated connector. Attach two caps and chains (13) and cap and chain (14) to panel assembly (33) using two screws (15), two nylon washers (16), two shoulder washers (17) and locking compound (item 3, table 1-4).

e. Attach two skirts (12) to two variable capacitor knobs (10) using six screws (11) and locking compound (item 3, table 1-4).

f. Mount two variable capacitor knobs (10) on two capacitor assembly shafts and tighten associated setscrews.

g. Mount three switch knobs (9) on three rotary switch shafts and tighten associated setscrews.

h. Mount O-ring (8) on megohmmeter indicator (6).

i. Mate connector P103 (7) and connector J103 of megohmmeter indicator (6); then slide megohmmeter indicator (6) into panel assembly (33) and secure in clamp (51) using screw (5) and locking compound (item 3, table 1-4).

j. Mount O-ring (4) on capacitance indicator (2).

k. Mate connector P101 (3) with connector J 101 of capacitance indicator (2); then slide capacitance indicator (2) into panel assembly (33) and secure in clamp (51) using screw (1).

l. Perform steps *a* through e of checkout instructions (see paragraph 4-4). If necessary, adjust STRAY BAL ADJ potentiometer R120 in accordance with paragraph 4-23, before proceeding to step m below.

m. Mount instruction placard (49) on transit case assembly (52).

n. Attach identification plate (48) to transit case assembly (52) using four screws (45), four lockwashers (46), four acorn cap nuts (47) and locking compound (item 3, table 1-4).

o. Attach two cable supports (44) to lid of transit case assembly (52) using four screws (41), four lockwashers (42), four flat washers (43) and locking compound (item 3, table 1-4).

p. Install three power cable assemblies in lid of transit case assembly (52).

q. Attach four vibration isolators (40) to transit case assembly (52) using 16 machine screws (37), 16 lockwashers (38), 16 hex nuts (39) and locking compound (item 3, table 1-4).

r. Attach two support rods (36) to four vibration isolators (40) using four screws (34), four lockwashers (35) and locking compound (item 3, table 1-4).

s. Attach two stiffener rods (25), two stiffener rods (26), panel gasket (28) and instrument case (27) to panel assembly (33) using 20 screws (23), 20 nylon washers (24) and locking compound (item 3, table 1-4).

t. Attach panel assembly (33) to transit case assembly (52) using eight machine screws (21), eight nylon washers (22) and locking compound (item 3, table 1-4).

u. Place the following cables and accessories into the storage compartment of transit case assembly (52):

(1) Main cable assembly.

(2) Twelve (12) adapter cable assembies.

(3) Seven BNC connector assemblies.

(4) Ground lead assembly.

(5) Test lead assembly.

(6) Indicator test cable.

(7) Two break-in cables.

(8) Five tee connectors.

v. Perform complete checkout procedure (see paragraph 4-4) to verify operation of the test set.

w. Close lid of transit case assembly (52) and secure two snap locks.

4-23. Alignment.

The following procedure is used to align STRAY BAL ADJ potentiometer R120 to minimize the effect of stray capacitance on capacitance indicator readings.

a. Set Power ON/OFF switch (2, figure 2-1) to OFF and connect 115 volts, 400 Hz input power to test set 115V 400 CPS connector (4).

WARNING

Do not operate ungrounded test set.

b. Connect ground lead to test set GROUND terminal (5) and to suitable ground.

c. Set Power ON/OFF switch (2) to ON and check that Power ON indicator lights; allow five minutes for test set to warm up.

d. Set CAP-RES CHECK switch (13) to CAP, and FUNCTION SELECTOR switch (25) to CAP IND ZERO CAL.

e. Rotate Capacitance RANGE SELECTOR switch (7) through X1, X3, X10 and X50, stopping at each position. Use an insulated screwdriver to adjust potentiometer R120 (16, figure 4-13) slowly while switching back and forth through all four positions.

f. Lock potentiometer R120 in that position which produces a minimum shift of CAPACITANCE INDICATOR (6, figure 2-1) subdial pointer, without regard to actual reading.

g. If subdial pointer of CAPACITANCE INDICATOR (6) is off zero when minimum shift is achieved, adjust Capacitance ZERO ADJUST control (9) (see paragraph 2-8f.

SECTION V. PARTS LIST-

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

FIG. AND INDEX NO.	PART NUMBER	FSCM	FIG. AND INDEX NO.	PART NUMBER	FSCM
4-10-			4-10-		
-1	MHSM2AC8S	05808	-27	ME33S405	05808
-2	DSC686	05808	-28	MWG201RP	05808
-3	EJD8P8	05808	-30	MHW323-2	05808
-4	MYS490	05808	-31	MHW322	05808
-5	MHSM2AC8S	05808	-32	2287	05808
-6	DSM694	05808	-33	2284	05808
-7	EJD8P10	05808	-34	MS51957-30	96906
-8	MYS490	05808	-35	MHWP2N6	05808
-9	MNBA3B2A	05808	-36	M3V04C302	05808
-10	MNBB9B2AT	05808	-37	MHSM2A10F10S	05808
-11	MHSM5A6C5S	05808	-38	MS35338-138	96906
-12	MC2187	05808	-39	MS35650-304	96906
-13	CW123A/U	81349	-40	MM2001S	05808
-14	CW159/U	81349	-41	MS51957-45	96906
-15	MS51957-32	96906	-42	MS35338-137	96906
-16	MHWP2N6	05808	-43	MS15795-807	96906
-17	MHW323-1	05808	-44	MBS605	05808
-18	MS51957-17	96906	-45	MS51957-13	96906
-19	MS35338-135	96906	-46	MS35338-135	96906
-20	MD03B202	05808	-47	MHNA4CS	05808
-21	MHSL1A10C8S	05808	-48	MDP508	05808
-22	MHWP2N10	05808	-49	MDP518	05808
-23	MS51957-30	96906	-50	MS51957-45	96906
-24	MHWP2N6	05808	-51	MS28042-2	96906
-25	M3V04C303	05808	-52	2234	05808
-26	M3V04C302	05808			

FIG. AND INDEX NO.	PART NUMBER	INDEX NO.	FIG. AND INDEX NO.	PART NUMBER	FSCM
4-11-			4-11-		
-1	MS35249-33	96906	-26	1501	05808
-2	MCP344	05808	-27	MS16633-25	96906
-3	MS35249-35	96906	-28	ML1020	05808
-4	MS35649-64	96906	-29	M2SR22	05808
-5	MS35338-137	96906	-30	MS35249-33	96906
-6	MCB343	05808	-31	MS51957-26	96906
-7	MS51957-32	96906	-32	MS35338-136	96906
-8	MHWP3-G	05808	-33	MC2186	05808
-9	MS15795-305	96906	-34	MS51957-28	96906
-10	2286	05808	-35	MS35649-64	96906
-11	MS35249-35	96906	-36	MS15795-305	96906
-12	MCS454	05808	-37	MS35338-136	96906
-13	MS35249-33	96906	-38	MFC3N1A5	05808
-14	MS51957-26	96906	-41	ESR311	05808
-15	2285	05808	-44	ESW-4107C	05808
-16	MS51957-28	96906	-47	ESW-4108C	05808
-17	MS15795-305	96906	-48	MS51957-12	96906
-18	MS35338-136	96906	-49	MS35338-135	96906
-19	MFC3N1A3	05808	-50	EJLS1465	05808
-20	MFC3N1A6	05808	-51	EJA01F01	05808
-21	MS51957-30	96906	-52	EJA01M01	05808
-22	MB0001TP	05808	-53	EJA01F01	05808
-23	MWS001TP	05808	-54	MHNB201	05808
-24	MS15795-806	96906	-55	MB2109	05808
-25	1501	05808	-56	MC2180	05808

FIG. AND INDEX NO.	PART NUMBER	FSCM NO.	FIG. AND INDEX NO.	PART NUMBER	FSCM
		4-12	4-12		
-1	MHNL1A6CA	05808	-41	MS51957-30	96906
-2	MHWP2N6	05808	-42	MHWP2N6	05808
-3	EJTA002	05808	-43	MHNL1A6CA	05808
-4	MS51957-18	96906	-46	ERV2ASA102A	05808
-5	MHWP2N4	05808	-47	ERV2ASA102A	05808
-5A	MHNL1A4CA	05808	-48	CW123A/U	81349
-6	MS25043-10C	96906	-49	MS51957-30	96906
-7	MHSR2A4C8S	50808	-50	MHNL1A6CA	05808
-8	MS35649-244	96906	-51	MHWP2N6	05808
-9	MS35338-135	96906	-52	MHSR2A4C8S	05808
-10	MS3102E-10SL-3P	96906	-53	MS35649-244	96906
-11	MWG003RP	05808	-54	EJLS1465	05808
-13	MNS201TP	05808	-55	CM15BD471MN3	81349
-14	MWS202AA	05808	-56	CM35BD512JN3	81349
-15	EF2113	05808	-57	MHSR2A4C8S	05808
-16	MWS203TP	05808	-58	MWG003RP	05808
-17	MSB2A01	96906	-59	EJA01M01	05808
-19	MS35058-22	96906	-60	EJA01F01	05808
-21	EF2120N04	05808	-61	EJA01F01	05808
-22	MNBA3B2A	05808	-62	MHNL1A6CA	05808
-23	RW69V622	81349	-63	MWS003TP	05808
-24	RC20GF221J	81349	-64	EJTA001	05808
-25	RC20GF821J	81349	-65	EJTA001	05808
-26	RC32GF272J	81349	-66	MSW004NP	96906
-28	ESW0003C	05808	-67	MS35649-244	96906
-29	RN70D1004F	81349	-68	MS35338-135	96906
-31	ESW0001C	05808	-69	MHWP2N10	05808
-33	ESW002C	05808	-70	MTL201	05808
-34	ME99R002	05808	-71	MS51957-63	96906
-36	MB002TP	05808	-72	MS35338-138	96906
-37	MWS002TP	05808	-73	MTH02AB	05808
-38	ERV2ASA202A	05808	-74	MC2119	05808
-39	ERV2ASA202A	05808	-75	MDP507	05808
-40	ME99R001	05808			

FIG. AND INDEX NO.	PART NUMBER	FSCM	FIG. AND INDEX NO.	PART NUMBER	FSCM
4-13-			4-13-		
-1	RC32GF122K	81349	-16	ERV2ALA101A	05808
-2	RC20GF273J	81349	-17	MS51957-27	96906
-5	EJLS1466	05808	-18	MS35338-136	96906
-6	ETB001H	05808	-19	MC0001AA	05808
-7	MS51957-27	96906	-20	MCB456	05808
-8	MS35649-64	96906	-21	MGBR1043-1	05808
-9	MS35338-136	96906	-22	EJTT2AL	05808
-10	EJLS1466	05808	-23	1210-3	05808
-11	1226	05808	-24	1223	05808
-12	RW69V271	81349	-25	1224	05808
-13	CM15ED101JN3	81349	-26	1225	05808
4-14-			4-14-		
-1	MS51957-27	96906	-14	1221	05808
-2	MS35649-64	96906	-15	1221	05808
-3	EJLS1466	05808	-16	MS51957-27	96906
-4	1220	05808	-17	MS35649-64	96906
-5	1220	05808	-18	EJLS1466	05808
-6	1221	05808	-19	1221	05808
-7	MS51957-27	96906	-21	MHW324	05808
-8	MS35649-64	96906	-22	MHW323-3	05808
-9	MS35338-136	96906	-23	EJA07F01	05808
-10	1220	05808	-26	EJD10R5F	05808
-11	1220	05808	-27	MBB2A1	05808
-12	2311	05808	-28	MC2189	05808
-13	1221	05808			

APPENDIX A

REFERENCES

A-1. Dictionaries of Terms and Abbreviations.

AR 310-25	Dictionary of United States Army Terms
AR 310-50	Authorized Abbreviations and Brevity Codes

A-2. Publications Index.

DA PAM 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types .7, 8 and 9), Supply Bulletins, and Lubrication Orders

A-3. Logistics and Storage.

TM 740-90-1	Administrative Storage of Equipment
TM 743-200-1	Storage and Materials Handling

A-4. Maintenance of Supplies and Equipment.

AR750-1	Army Material Maintenance Concepts and Policies
TM 9-213	Painting Instructions for Field Use
TM 38-750	The Army Maintenance Management System (TAMMS)

A-5. Other Publications.

AR 420-90	Fire Prevention and Protection
TM 750-244-1-4	Procedures for the Destruction of Aviation Ground Support Equipment (FSC 4920) to Prevent Enemy Use

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. General. The purpose of the maintenance allocation chart is to provide all activities with authorized maintenance functions to be performed at each level of maintenance.

B-2. Maintenance Functions. Maintenance functions shall be limited to and defined as follows:

a. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

b. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

c. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons 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.

d. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

e. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

f. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in pertinent technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

g. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

h. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

i. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) in a manner to allow the proper functioning of an equipment/system.

j. Service. Operations required periodically to keep an item in proper operating conditions, i.e. , to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

k. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

I. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

B-3. Explanation of Format. Purpose and use of the format are as follows:

a. Column 1. Group number. Column 1 lists group numbers, the purpose of which is to match components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2. Functional group. Column 2 lists the next higher assembly group and the item names of components, assemblies, subassemblies and modules within the group for which maintenance is authorized.

c. Column 3. Maintenance function. Column 3 lists the twelve maintenance functions defined in B-2 above. Each maintenance function required for an item shall be specified by the symbol among those listed in d below which indicates the level responsible for the required maintenance.

d. Use of symbols. The following symbols shall be used to prescribe work function responsibility:

C - Operator/Crew
O - organization
F - Direct Support
H - General Support
D - Depot

e. Column 4. Tools and equipment. This column shall be used to specify, by code, those tools and test equipment required to perform the designated function.

f. Column 5. Remarks. Self-explanatory.

MAINTENANCE ALLOCATION CHART
FOR
TEST SET, FUEL QUANTITY
(AVSCOM Reg 310-10)

(1) GROUP NO	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION											(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
400	608 FLUID TEST SETS	0	0	0	0		*			F	D			*Refer to TB 43-180
0101	01 GROUP, CASE AND COVER ASSY													
0101	Case and Cover Assy	0		0						F				
	02 GROUP, INSTRUMENT PANEL ASSY													
0201	Panel Assy	0		0					F	F				
	03 GROUP, INDICATING DEVICES													
0301	Capacitance Assy	0	F		F				F	H	D			
	04 GROUP, SWITCHES AND CIRCUIT BREAKERS INSTRUMENTS													
0401	Switches and Circuit Breakers	0							F					
	05 GROUP, HARNESSES AND CONNECTORS													
0501	Harnesses and Connectors	0	F						F	F				
	06 GROUP, CONTROLS													
0601	Capacitance Simulator Assy	0	F						F	F				
	08 GROUP, MODULES													
0801	Modules	F	F						F	H				

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST
(Current as of 1 June 1975)

Section I. INTRODUCTION

C-1. Scope.

This appendix lists repair parts required for operation and performance of direct support and general support maintenance of the Fuel Quantity Gage and Indicator Test Set, P/N TF579.

C-2. General.

This Repair Parts and Special Tools List is divided into the following sections:

a. *Section Il. Repair Parts List.* A list of repair parts authorized for use in the performance of maintenance. Parts are listed in figure and item number sequence,

b. *Section III.* Special Tools List. Not applicable.

c. *Section IV. National Stock Number and Part Number Index.* A list, in ascending numerical sequence, of all National stock numbers appearing in the listings, followed by a list, in alphanumeric sequence, of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

C-3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. IIlustration. This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Itern Number.* The number used to identify each item called out in the illustration.

b. Source. Maintenance and Recoverability Codes (SMR).

(1) *Source Code.* Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code		*Definition*
PA	---	Item procured and stocked for anticipated or known usage.
PB	___	Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply systems.
XB	___	Item is not procured or stocked. If not available through salvage, requisition.

NOTE

Cannibalization or salvage may be used as a source of supply for any items source coded above except aircraft support items as restricted by AR 700-42.

(2) Maintenance Code. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code		*Application/Exp/anation*
F	——	Support item is removed, replaced, used at the direct support level.
H	——	Support item is removed, replaced, used at the general support level.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i. e., all authorized maintenance functions). This position will contain the following maintenance code:

Code	*Application/Explanation*
Z	—-- Nonreparable. No repair is authorized.

(3) Recoverability Code. Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Code	*Definition*
Z	—— Nonreparable tem. When unserviceable, condemn and dispose at the level indicated in position 3.

c. *National Stock Number. Indicates* the National stock number assigned to the item and will be used for requisitioning purposes.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards and inspection requirements, to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the repair part received may *have a different part number than the part being replaced.*

e. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB *708-42* which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

g. Unit *of Measure (U/M).* Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in., pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e. g., shims, spacers, etc.).

C-4. Special Information. Not applicable.

C-5. How to Locate Repair Parts.

a. When National *Stock Number or Part* Number is Unknown:

(1) First. Find the illustration covering the assembly to which the repair part belongs.

(2) Second. Identify the repair part on the illustration and note the illustration figure and item number of the repair part.

(3) Third. Using the Repair Parts Listing, find the figure and item number noted on the illustration.

b. When National Stock Number or Part *Number is Known.*

(1) *First.* Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in ascending NSN sequence followed by a list of part numbers in ascending alphanumeric sequence, cross-referenced to the illustration figure number and item number.

(2) Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

C-6. Abbreviations. Not applicable

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
1-1			4920-00-109-5066	TF579	5808	TEST SET,FUEL QUANTITY GAGE AND INDICATOR		
						SECTION II. REPAIR PARTS LIST		
						PANEL AND CASE ASSEMBLY		
4-10	3	PBFZZ	5935-00-846-2329	MS3106R20-27SC	96906	CONNECTOR,PLUG,ELECTRICAL	EA	1
	7	XBFZZ		97-3106A22-19S	2660	CONNECTOR,PLUG,ELECTRICAL	EA	1
4-10	9	XBFZZ		S657-3LBB	75376	KNOB,CONTROL	EA	3
4-10	10	XBFZZ		S008-70	75376	KNOB,CONTROL	EA	2
4-10	11	PBFZZ	5305-00-763-6961	MS51959-26	96906	SCREW,MACHINE	EA	6
4-10	13	PBFZZ	5935-00-885-2264	CW122U	80058	COVER,ELECTRICAL: W/CHAIN	EA	2
4-10	15	PAFZZ	5305-00-054-6656	MS51957-32	96906	SCREW,MACHINE	EA	2
4-10	16	XBFZZ		NW6-3122	95987	WASHER,FLAT	EA	2
4-10	18	PBFZZ	5305-00-054-5651	MS51957-17	96906	SCREW,MACHINE	EA	2
4-10	19	PAFZZ	5310-00-933-8118	MS35338-135	96906	WASHER,LOCK	EA	2
4-10	22	XBFZZ		MW10-4373	95987	WASHER,FLAT	EA	8
4-10	23	PAFZZ	5305-00-054-6654	MS51957-30	96906	SCREW,MACHINE	EA	20
4-10	24	XBFZZ		NW6-3122	95987	WASHER,FLAT	EA	20
4-10	34	PAFZZ	5305-00-054-6654	MS51957-30	96906	SCREW,MACHINE	EA	4
4-10	35	XBFZZ		NW6-3122	95987	WASHER,FLAT	EA	4
4-10	38	PAFZZ	5310-00-933-8120	MS35338-138	96906	WASHER,LOCK	EA	14
4-10	39	PBFZZ	5310-00-934-9765	MS35650-304	96906	NUT,PLAIN,HEXAGON	EA	14
4-10	40	XBFZZ		144BA5	81860	MOUNT,RESILIENT	EA	4
4-10	41	PAFZZ	5305-00-054-6670	MS51957-45	96906	SCREW,MACHINE	EA	4
4-10	42	PAFZZ	5310-00-933-8119	MS35338-137	96906	WASHER,LOCK	EA	4
4-10	45	PBFZZ	5305-00-054-5647	MS51957-13	96906	SCREW,MACHINE	EA	4
4-10	46	PAFZZ	5310-00-933-8118	MS35338-135	96906	WASHER,LOCK	EA	4
4-10	50	PAFZZ	5305-00-054-6670	MS51957-45	96906	SCREW,MACHINE	EA	4
4-10	51	PBFZZ	5340-00-579-6359	MS28042-2	96906	CLAMP,INSTRUMENT MOUNTING	EA	2
						CAPACITANCE ASSEMBLY		
4-11	1	PBFZZ	5305-00-763-6961	MS51959-26	96906	SCREW,MACHINE	EA	4
4-11	3	PAFZZ	5305-00-763-6963	MS51959-28	96906	SCREW,MACHINE	EA	4
4-11	5	PAFZZ	5310-00-933-8119	MS35338-137	96906	WASHER,LOCK	EA	4
4-11	7	PAFZZ	5305-00-054-6656	MS51957-32	96906	SCREW,MACHINE	EA	2
4-11	9	PAFZZ	5315-00-722-5998	MS15795-305	96906	WASHER,FLAT	EA	2
4-11	11	PAFZZ	5305-00-763-6963	MS51959-28	96906	SCREW,MACHINE	EA	5
4-11	13	PBFZZ	5305-00-763-6961	MS51959-26	96906	SCREW,MACHINE	EA	6
4-11	14	PBFZZ	5305-00-054-6650	MS51957-26	96906	SCREW,MACHINE	EA	6
4-11	16	PAFZZ	5305-00-054-6652	MS51957-28	96906	SCREW,MACHINE	EA	3
4-11	17	PAFZZ	5310-00-722-5998	MS15795-305	96906	WASHER,FLAT	EA	3
4-11	18	PBFZZ	5310-00-929-6395	MS35338-136	96906	WASHER,LOCK	EA	3
4-11	21	PAFZZ	5305-00-054-6654	MS51957-30	96906	SCREW,MACHINE	EA	4
4-11	22	XBFZZ		MB0001TP	5808	INSULATOR,BUSHING	EA	4
4-11	23	XBFZZ		MWS001TP	5808	WASHER,NONMETALLIC	EA	4

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
4-11	24	PBFZZ	5310-00-880-5976	MS15795-806	96906	WASHER,FLAT		EA	4
4-11	27	XBFZZ		MS16633-25	96906	RING,RETAINING		EA	2
4-11	30	PBFZZ	5305-00-763-6961	MS51959-26	96906	SCREW,MACHINE		EA	4
4-11	31	PBFZZ	5305-00-054-6650	MS51957-26	96906	SCREW,MACHINE		EA	2
4-11	32	PBFZZ	5310-00-929-6395	MS35338-136	96906	WASHER,LOCK		EA	2
4-11	34	PAFZZ	5305-00-054-6652	MS51957-28	96906	SCREW,MACHINE		EA	1
4-11	36	PAFZZ	5310-00-722-5998	MS15795-305	96906	WASHER,FLAT		EA	1
4-11	37	PBFZZ	5310-00-929-6395	MS35338-136	96906	WASHER,LOCK		EA	1
4-11	44	PBFZZ	5930-00-903-1057	ESW4107C	05808	SWITCH,ROTARY		EA	1
4-11	47	PBFZZ	5930-00-868-1489	ESW4108C	05808	SWITCH,ROTARY		EA	1
4-11	48	PBFZZ	5305-00-054-5646	MS51957-12	96906	SCREW,MACHINE		EA	12
4-11	49	PAFZZ	5310-00-933-8116	MS35338-135	96906	WASHER,LOCK		EA	12
4-11	51	XBFZZ		3125-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-11	52	XBFZZ		3126-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-11	53	XBFZZ		3125-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
						CONTROL PANEL ASSEMBLY			
4-12	2	XBFZZ		MW6-3122	95987	WASHER,FLAT		EA	1
4-12	3	XBFZZ		938P	24655	POST,BINDING: GROUND		EA	1
4-12	4	PAFZZ	5305-00-054-5652	MS51957-18	96906	SCREW,MACHINE		EA	1
4-12	5	XBFZZ		NW4-2812	95987	WASHER,FLAT		EA	1
4-12	6	PBFZZ	5935-00-137-4668	MS25043-10D	96906	COVER,ELECTRICAL CONNECTOR		EA	1
4-12	8	PBFZZ	5310-00-934-9748	MS35649-244	96906	NUT,PLAIN,HEXAGON		EA	3
4-12	9	PAFZZ	5310-00-933-8118	MS35338-135	96906	WASHER,LOCK		EA	3
4-12	10	PBFZZ	5935-00-726-0708	MS3102R10SL3P	96906	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-12	13	XBFZZ		MWS201TP	05808	WASHER,NONMETALLIC		EA	1
4-12	14	XBFZZ		MWS202AA	05808	WASHER,FLAT		EA	1
4-12	15	PBFZZ	6240-00-682-3411	M15098-10-002	81349	LAMP,NEON		EA	1
4-12	16	XBFZZ		MWS203TP	05808	WASHER,NONMETALLIC		EA	1
4-12	17	PBFZZ	5930-00-539-7013	M5423-02-01	81349	BOOT,DUST AND MOISTURE: TOGGLE		EA	1
4-12	19	PBFZZ	5930-00-655-1514	MS35058-22	96906	SWITCH,TOGGLE		EA	1
4-12	21	PBFZZ	5920-00-581-7957	FHN 19G	81349	FUSEHOLDER		EA	2
4-12	22	XBFZZ		S657-3LBB	75376	KNOB,CONTROL		EA	3
4-12	24	PBHZZ	5905-00-104-8350	RCR20G221JS	81349	RESISTOR,FIXED,COMPOSITION		EA	1
4-12	25	PAHZZ	5905-00-116-8569	RCR20G821JS	81349	RESISTOR,FIXED,COMPOSITION		EA	1
4-12	26	PBHZZ	5905-00-106-1245	RCR32G272JS	81349	RESISTOR,FIXED,COMPOSITION		EA	1
4-12	28	PBHZZ	5930-00-755-2494	ESW0003C	05808	SWITCH,ROTARY		EA	1
4-12	29	XBHZZ		RNC70K1004FS	81349	RESISTOR,FIXED,FILM		EA	1
4-12	31	PBHZZ	5930-00-755-3204	ESW0001C	05808	SWITCH,ROTARY		EA	1
4-12	33	XBHZZ		ESW0002C	05808	SWITCH,ROTARY		EA	1
4-12	37	XBHZZ		MWS002TP	05808	WASHER,FLAT		EA	2
4-12	41	PAFZZ	5305-00-054-6654	MS51957-30	96906	SCREW,MACHINE		EA	1
4-12	42	XBFZZ		NW6-3122	95987	WASHER,FLAT		EA	2
4-12	46	XBHZZ		RA20SASA102A	81349	RESISTOR,VARIABLE		EA	1

(1) ILLUSTRATION (A) FIG NO	(B) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
4-12	47	XBHZZ		RA20SASA102A	81349	RESISTOR,VARIABLE		EA	1
4-12	48	PBFZZ	5935-00-885-2264	CW122U	80058	COVER,ELECTRICAL: W/CHAIR		EA	3
4-12	49	PAFZZ	5305-00-054-6654	MS51957-30	96906	SCREW,MACHINE		EA	2
4-12	51	XBFZZ		NW6-3122	95987	WASHER,FLAT		EA	4
4-12	53	PAFZZ	5310-00-934-9748	MS35649-244	96906	NUT,PLAIN,HEXAGON		EA	2
4-12	59	XBFZZ		3126-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-12	60	XBFZZ		3125-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-12	61	XBFZZ		3125-1	95712	CONNECTOR,RECEPTACLE,ELECTRICAL		EA	1
4-12	71	PBFZZ	5305-00-050-9229	MS51957-63	96906	SCREW,MACHINE		EA	4
4-12	72	PAFZZ	5310-00-933-8120	MS35338-138	96906	WASHER,LOCK		EA	4
						BRACKET ASSEMBLY			
4-13	1	PAHZZ	5905-00-369-6916	RCR32G122JS	81349	RESISTOR,FIXED,COMPOSITION		EA	1
4-13	2	PAHZZ	5905-00-106-9351	RCR20G273JS	81349	RESISTOR,FIXED,COMPOSITON		EA	1
4-13	5	PAHZZ	5940-00-156-7196	MS77072-2	96906	TERMINAL,LUG		EA	4
4-13	6	PBHZZ	5950-00-804-3787	ETB001H	05808	TRANSFORMER,POWER		EA	6
4-13	7	PBHZZ	5305-00-054-6651	MS51957-27	96906	SCREW,MACHINE		EA	2
4-13	9	PBHZZ	5310-00-929-6395	MS35338-136	96906	WASHRE,LOCK		EA	2
4-13	10	PAHZZ	5940-00-156-7196	MS77072-2	96906	TERMINAL,LUB		EA	2
4-13	12	PBHZZ	5905-00-984-0429	RW69V271	81349	RESISTOR,FIXED		EA	1
4-13	16	PBHZZ	5905-00-687-0789	RA2LASB101A	81349	RESISTOR,VARIABLE		EA	1
4-13	17	PBHZZ	5305-00-054-6651	MS51957-27	96906	SCREW,MACHINE		EA	4
4-13	18	PBHZZ	5310-00-929-6395	MS35338-136	96906	WASHRE,LOCK		EA	4
4-13	21	PBHZZ	5325-00-616-4858	1043-1	72653	GROMMET,RUBBER		EA	1

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5305-00-054-6650	4-11	14	5310-00-933-8120	4-10	38
5305-00-054-6650	4-11	31	5310-00-933-8120	4-12	72
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5305-00-054-6651	4-13	17	5310-00-934-9748	4-12	53
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5305-00-054-6652	4-11	34	5325-00-616-4858	4-13	21
5305-00-054-6654	4-10	23	5340-00-579-6359	4-10	51
5305-00-054-6654	4-10	34	5905-00-104-8350	4-12	24
5305-00-054-6654	4-11	21	5905-00-106-1245	4-12	26
5305-00-054-6654	4-12	41	5905-00-106-9351	4-13	2
5305-00-054-6654	4-12	49	5905-00-116-8569	4-12	25
5305-00-054-6656	4-10	15	5905-00-369-6916	4-13	1
5305-00-054-6656	4-11	7	5905-00-687-0789	4-13	16
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MS51957-30	96906	4-12	49
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PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.
80		22	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Item 27/27A Clarify installation location of special washers.

Subject figure shows a special washer on both fwd and aft flap roller bearings. Reference is made to TM 55-1510-209-20-3 para 9-14d (2) where the installation of special washers is specified on rear flap wide flange roller only.

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