TECHNICAL MANUAL

GENERAL SUPPORT MAINTENANCE MANUAL

RADIACMETER IM-174A/PD (NSN 6665-00-999-5145)

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

HEADQUARTERS, DEPARTMENT OF THE ARMY
8 MAY 1978

RADIOLOGICAL SAFETY NOTICE

All personnel working in high radiation dose areas must be extremely careful to prevent bodily injury. The radiation from radioactive substances cannot be felt or seen; however, prolonged or intensive exposure may result in serious injury. One-tenth of a roentgen (100 milliroentgens) during a 5-day week is considered to be the maximum dose rate of radiation to which the body can be exposed continuously without serious damage.

The material used to mark the scales on the panel meter of Radiacmeters IM-174A/PD without an instrument light is slightly radioactive. The radiation from this material is not dangerous under normal conditions; however, if the glass of the panel meter breaks, do not allow the material to come in contact with the skin. Damage to body tissue can occur if the material is rubbed into the eyes, ears, or nose; or enters the body through cuts in the skin, by accidental swallowing or by inhalation.

WARNING

Batteries BA-1006/U, BA-1391/U and BA-1396/U used in IM-174A/PD contain mercury. These batteries can be hazardous if not handled properly. There is a possibility of the battery exploding or generating a toxic gas when it is heated excessively. Do not throw mercury batteries into a fire, expose them to a high heat or short them out causing them to heat to a high temperature.

WARNING

The fumes of TRICHLOROETHANE are toxic. Provide thorough ventilation whenever it is used; avoid prolonged or repeated breathing of vapor. Do not use near an open flame or hot surface; trichloroethane is nonflammable but heat converts the fumes to a highly toxic phosgene gas the inhalation of which could result in serious injury or death. Prolonged or repeated skin contact with trichloroethane can cause skin inflammation. When necessary, use gloves, sleeves and aprons which the solvent cannot penetrate.

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 7 December 1981

General Support Maintenance Manual
Radiacmeter IM-174A/PD
(NSN 6665-00-999-5145)
and
RADIACMETER IM-174B/PD
(NSN 6665-01-056-7422)

TM 11-6665-232-40, 8 May 1978, is changed as follows:

1. Title of the manual is changed as shown above.
2. New or changed material is indicated by a vertical bar in the margin.
3. Added or revised illustrations are indicated by a vertical bar in front of the figure caption.
4. Remove and insert pages as indicated below:

Remove	*Insert*
i and ii	i and ii
1-1	1-1 and 1-2
3-1 and 3-2	3-1 and 3-2
3-9 and 3-10	3-9 and 3-10
3-13	3-13 through 3-14.2
None	FO-4

5. File this change sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-50 Direct and General maintenance requirements for IM-174A/PD

Technical Manual }
No. 11-6665-232-40 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 8 *May* 1978

GENERAL SUPPORT MAINTENANCE MANUAL
RADIACMETER IM-174A/PD
(NSN 6665-00-999-5145)
AND
RADIACMETER IM-174B/PD
(NSN 6665-01-056-7422)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Communications Electronics Command, ATTN: DRESEL-ME-MQ, Fort Monmouth, NJ 07703.

* This manual together with TM 11-6665-232-40P, 5 August 1981, supersedes TM 11-6665-232-45, 29 29 July 1968 in its entirety.

LIST OF ILLUSTRATIONS

CHAPTER I
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual covers general support maintenance for Radiacmeters IM-174A/PD and IM-174B/PD. It includes instructions appropriate to general support for troubleshooting and testing the equipment and replacing maintenance parts. Detailed functions of the component parts of the radiacmeter are also included .

b. An asterisk in parentheses (*) contained in the model letter position of the official nomenclature indicates all models of the item of equipment.

NOTE

In this manual, except for figures 3-5, 3-8, and FO-3, all references to the IM-174A/PD or single battery type radiacmeter will include the IM - 174B/PD unless otherwise stated.

1-2. Index of Technical Publications

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records and Reports

a. Reports of Maintmance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO 4610.19C/DLAR 4500.15.

1-4. Reporting Equipment Improvement Recommendations (EIR)

If your Radiacmeter needs improvement, let us know. Send us an EIR. You the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

1-5. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-6. Description

Refer to TM 11-6665-232-12, Operator's and Organizational Maintenance Manual for Radiacmeter IM-174(*)/PD for a general description and illustrations of the equipment.

1-7. Tabulated Data

Refer to TM 11-6665-232-12, Operator's and Organizational Maintenance Manual for Radiacmeter IM-174(*)/PD for applicable tabulated data.

1-8. Differences Between Models

Both models of the IM-174/PD are essentially the same in that they have the same case, same operational ranges and same functional principles, The only external difference is in the way the meterface is lighted. The IM-174A/PD has an external lamp hood with battery while the IM-174B/PD uses an internal meter lamp.

a. IM-174A/PD. There are two versions of the IM-174A/PD: the original version which uses six mercury batteries to power the radiacmeter's circuitry; and the updated version which has been changed to use a single carbon-zinc battery for circuitry power, The updated version (single battery type) has a new bottom plate which replaces the old bottom plate that contained the six mercury batteries. The new bottom plate contains an electronic power supply and regulator circuit which supplies the different operating voltages formerly supplied by the six batteries. Both versions use either one of these methods of providing illumination to the meterface for night use. This may be either of two types of an external lamp and battery lighting hood or luminous paint for the meter markings.

b. IM-174B/PD. The IM-174B/PD uses one carbon-zinc battery and its meterfase is illuminated from a lamp which is behind the meterface. Internally it is almost the same as the single battery type IM-174A/PD except for the meter lamp and switch in addition to some component changes in the electronic power supply regulator circuit.

CHAPTER 2
FUNCTIONING OF EQUIPMENT

2-1. Block Diagram Analysis

Radiacmeter IM-174A/PD is a portable, tactical survey meter which is used to detect gamma radiation dose rates of from 1 to 500 roentgens per hour (rad/hr) [1]. The block diagram (fig. 2-1) of the radiacmeter is discussed below.

a. The radiacmeter block diagram consists of the six blocks as shown in figure 2-1. The ionization chamber and the cathode follower VI are physically contained in the detector assembly. Four other blocks include the meter, zero control, dc power supply, and the function switch S2.

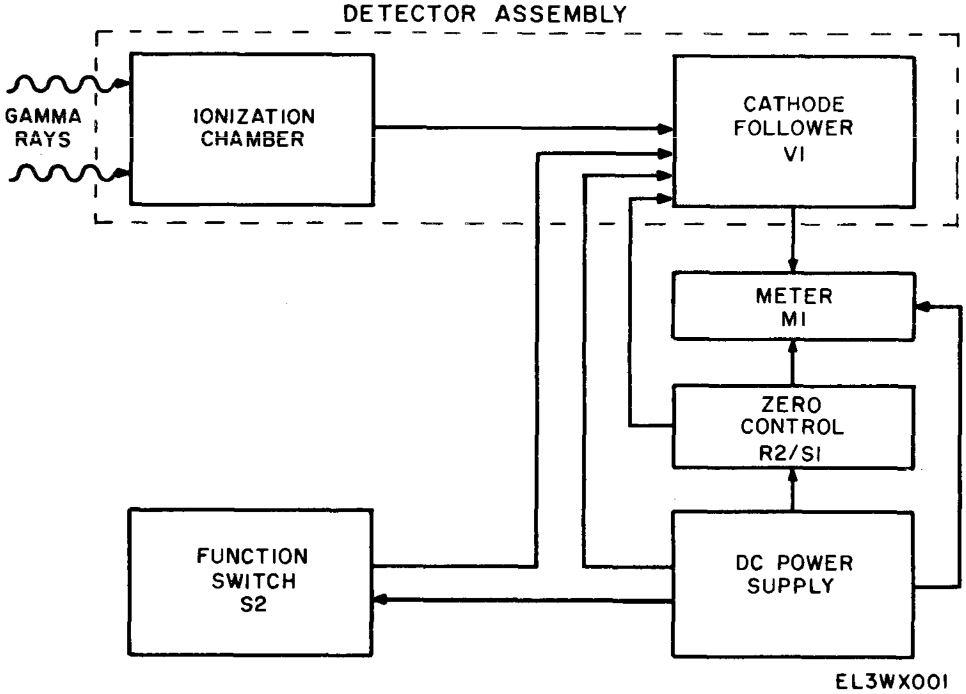


Figure 2-1. Radiacmeter, block diagram.

b. When the radiacmeter is in operation, gamma rays pass through the radiacmeter case and enter the ionization chamber which functions as a gamma ray detector. The gamma rays cause a small amount of current to flow through a large value resistor in the grid circuit of V1 producing a positive voltage as input to V1. Current increases through V1 and through meter M1 in the cathode circuit of VI. Meter Ml is calibrated in rad/hr so that current through the meter will indicate the strength of the gamma rays in the ionization chamber.

c. Zero control R2/S1 provides on/off control of the radiacmeter and zero adjustment. Zero adjustment is accomplished in conjunction with function switch S2. When S2 is placed in the ZERO position the ionization chamber is removed from the cathode follower and the zero control is then adjusted to balance the circuit so that no current flows through the meter and it indicates zero.

d. Function switch S2 also provides a means to check the radiacmeter's operation. When S2 is set to CHECK the ionization chamber is again

[1] Throughout the text, the expression rad can be used interchangeably with the expression roentgen. Any measurement expression (roentgens) can be considered the same when expressed in rads.

removed from the circuit and a fixed, positive bias is applied to cathode follower V1 and the meter responds by indicating in the check band on the meter scale,

2–2. Circuit Analysis

There are two versions of the IM–174A/PD in use; one, which uses a single battery (single battery type) to operate a dc power supply for the different operating voltages required, and; the second version that uses six separate batteries (multi-battery type) for supplying the de operating voltages to the radiacmeter, Both versions use the same detector assemblies, but the other circuits which operate the meter, zero control, function switch, and the dc power supply are connected differently and have different schematics. Except for the detector assembly (para 2-3), separate circuit analysis is presented below for the single battery type (para 2–5) and the multi-battery type (para 2-4) radiacmeters.

2–3. Detector Assembly

a. The detector assembly (fig. 2-2) is made of cast epoxide resin and is hermetically sealed. It consists of an air filled ionization chamber; an electrode; and an electrometer tube (cathode-follower V1) and high megohm resistor R1, both mounted in a styrene box; and a connector (J1). The inside of the ionization chamber is coated with a non flaking colloidal graphite to provide the proper electrical characteristics. The electrode is insulated from the walls of the ioniza tion chamber.

b. The IM–174A/PD has a response which varies nonlinearly with radiation intensity, so that the dose rate range of 1 to 500 rad/hr can be measured without the necessity of range switching. This is done by the use of a nonlinear ionization chamber with a linear amplifier. Nonlinear response in an ionization chamber will result if the collection voltage is kept low, so that a fraction of the ions produced in the ionization chamber will recombine before they are collected. The fraction that recombines is a function of the ion concentration in the ionization chamber. The effect of operating the ionization chamber in this condition is to produce an output current which varies approximately]ogarithmically with the radiation dose rate.

c. On the schematic for the detector, assembly (fig. FO–2 or FO-3) the ionization chamber and its conductive coating is shown around the electrode used for collecting the ions from gamma ray penetration of the ionization chamber. The electrode is connected to the grid, pin 6, of V1. Other connections to the detector assembly through connector J1 are: Pin C which supplies plate voltage; pins A and I) supply filament power and cathode connection; pin F provides

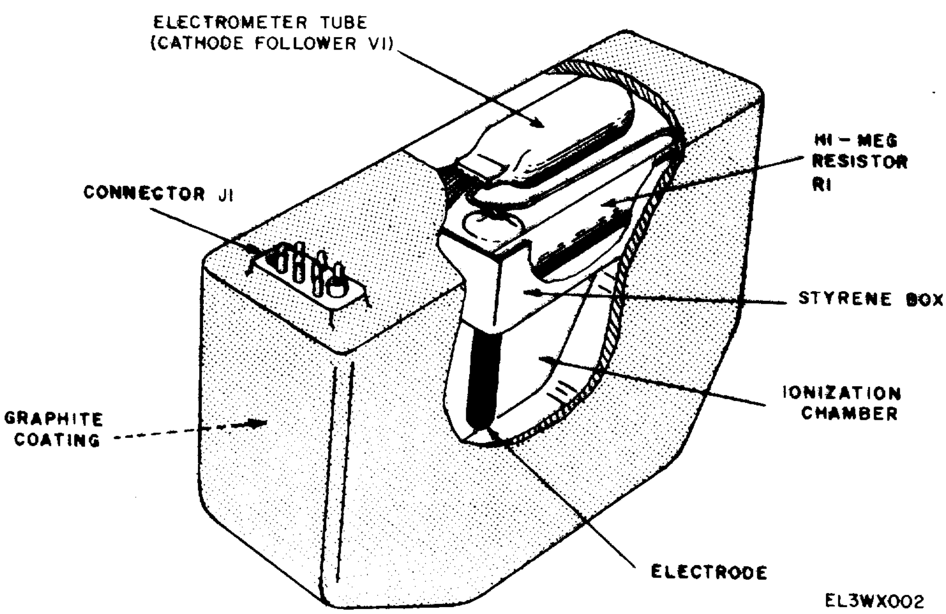


Figure 2-2. Detector assembly.

ground return for the ion chamber; pin H provides ground return for the grid circuit; pin J grounds a shielding coating on the outside of the detector assembly.

d. During operation, the ionization chamber conductive coating is held positive with respect to the collecting electrode. Ionization current develops a positive going voltage on pin 6 of V1 as a result of its flow through grid resistor R1. The total effect is an increase in plate current flow through V1, a result of an increase in ionizations in the ionization chamber.

2-4. Multi-Battery Radiacmeters

The multi-battery radiacmeter uses six batteries to supply the operating power for the radiacmeter. As shown on schematic diagram, figure FO-2, batteries BT-1 and BT-2 provide bias for the ionization chamber; BT-3 and BT-4 supply filament power for cathode follower V1; BT-5 and BT-6 supply plate voltage for V1. Switches S1 and S2 are shown in the normal operating position.

a. Ionizational Chamber Bias. The difference in potential between the walls of the ionization chamber and the collector electrode is provided by batteries BT-1 and BT-2.

(1) The positive terminal of BT-1 is connected to the ionization chamber through terminals 3 and 5 of S2A and connectors P1-F and J1-F.

(2) The negative terminal of BT-2 is connected to the grid of V1 through terminals 9 and 11 of S2B, connectors P1-H and J1-H, and resistor R1.

b. Meter M1 Circuit.

(1) The voltage developed across the high-megohm resistor (located with tube V1 in the upper portion of detector assembly) by the current from the ionization chamber is applied to the grid of cathode-follower V1. An increase in potential causes tube V1 to conduct more heavily and thus causes an increase in cathode current. Meter M1, in the cathode circuit of tube V1, detects this increase in cathode current which results in a meter deflection. Gamma radiation dose rates are then read direct from the scale of meter M1. Calibration variable resistor R4 (in parallel with meter M1) is used to calibrate the radiacmeter.

(2) Zero control R2/S1 consists of switch S1, a single-pole, two-position switch, and variable resistor R2 mounted on a common shaft. When S1 is set to ON, approximately 1.34 volts from parallel-connected batteries BT-3 and BT-4 is applied to the filament of V1 and to the meter circuit, consisting of meter M1, resistor R3, variable resistor R2, and calibration variable resistor R4. The negative terminals of parallel-connected batteries BT–3 and BT-4 are connected to the positive terminal of meter M1, and the negative terminal of BT–6 (which is series-connected to BT–5) is connected through resistive network R5, R6, and R7 to the negative terminal of M1. This arrangement results in voltages of opposite polarity being applied to M1. During zero adjustment of the meter, function switch S2 (*c* below) is set to ZERO, and variable resistor R2 is adjusted until the current from BT–5 and BT–6 through V1 is equal and opposite that from BT–3 and BT-4. At this time M1 indicated 0. When switch S1 is set to OFF, it shorts the meter and dampens the pointer movement when the instrument is not in use. Resistor R3 establishes the resistive range of the R2–R3 circuit from 6.8 kilohms to 21.8 kilohms.

(3) Plate and screen grid voltage (approximately + 10.4 volts) is obtained from series-connected batteries BT-5 and BT-6. The positive terminal of BT-5 is connected to the plate (pin 1) and the screen grid. (pin 2) of V1 through connectors P1-C and J1-C. The negative resistive network R5, R6, and R7; the parallel circuit of meter M1 and calibration variable resistor R4; and connectors P1-C and J1-C. The negative terminal of BT–6 is connected to the cathode (pin 4) of V1 through resistive network R5, R6, and R7; the parallel circuit of meter M1 and calibration variable resistor R4; and connectors P1-D and J1-D.

c. Function Switch S2 (fig. FO-2). Function switch S2 is a two-pole, three position switch, spring-locked to the center (OPERATE) position.

(1) When S2 is set to ZERO (during zero adjustment of the meter (b above)), the ionization chamber is shorted (through R1) to the control grid of V1 through connectors P1-F and J1-F, and contacts 5 and 2 of S2A. As a result, no potential difference exists between the ionization chamber and the control grid of V1. At the same time, the negative terminal of BT-2 is connected to the control grid of V1 through contacts 8 and 11 of S2B, connectors Pi–H and J1-H, and R1; and the positive terminal of BT-2 is connected to the cathode circuit of V1 through resistors R6, R7, and R5. As a result, normal bias conditions (control grid more negative than cathode) exist for V1.

(2) When S2 is set to CHECK (during the check of radiacmeter circuits), the ionization chamber is shorted (through R1) to the control grid of V1 through connectors J1-F and P1–F,

contacts 5 and 4 of S2A, and connectors P1-H and J1-H, and no difference of potential exists between the ionization chamber and the control grid of V1. At the same time, batteries BT-1 and BT-2 are switched out of the circuit through connectors J1-H and P1-H, contacts 11 and 10 of S2B, and resistors R6, R7, and R5. As a result, the bias is removed from the control grid circuit of V1, V1 conducts more heavily, and meter M1 provides an indication in the CHECK band on the scale.

(3) When S2 is set to OPERATE (center position), batteries BT-1 and BT-2 are series-connected between the ionization chamber and the control grid circuit of V1 through connectors J1-F and P1-F, contacts 5 and 3 of S2A, and contacts 9 and 11 of S2B, and connectors P1-H and J1-H. As a result, the ionization chamber wall is made positive with respect to the electrode in the control grid circuit of V1. When gamma radiation strikes the ionization chamber, current is caused to flow through R1 and the electrode to the ionization chamber wall, and a positive voltage is produced in the control grid circuit of V1. Bias for the control grid of V1 is provided from BT-2 through contacts 9 and 11 of S2B, connectors P1-H and J1-H, and R1.

d. Instrument Light. The instrument light (not shown) is attached to the meter of those radiacmeters that do not contain a radioactive dial. The instrument light is used to light the meter dial during low light-level conditions. The instrument light contains a 1.34-volt battery (BT-7), a No. 331 lamp (DS1), a battery/lamp clip ring, and a spring-loaded switch connected in series. When the lamp switch is pressed, the circuit is completed and the lamp lights.

2-5. Single Battery Radiacmeters

The single battery type radiacmeters use a battery and a dc to dc power supply (converter) to develop its required operating voltages. In the schematic diagram (fig. FO-3) the converter is shown as a separate block on the right-hand side. It inputs and outputs on a row of terminals numbered 1 through 10. Voltages on the output of the converter are used to bias the ionization chamber (pin 5), supply plate voltage for V1 (pin 4) and for checking operation or zeroing the meter M1.

a. Ionization Chamber Bias. Bias for the ionization chamber is connected through switch S2, pins 5 and 3 and 11 and 9. Pin 3 of S2 is connected to converter pin 5 which supplies positive 2.8 volts. Pin 5 of S2 is connected to the walls of the ionization chamber. The collector electrode of the ionization chamber connects to pin 11, S2 through R1 and J1/P1 pin H. Pin 9 of switch S2 connects to the common line (ground). Pin 10 of switch S2 connects to the converter, to complete the bias circuit.

b. Meter Circuit.

(1) Voltage is developed across grid resistor R1 of cathode follower V1 by current flow through the ionization chamber. An increase in this voltage increases current flow through V1. There is a similar increase in the cathode voltage as current flow through the cathode resistor R2 (contained in the converter) also increases. Meter M1 is connected between the cathode V1 and a voltage divider composed of R4, R5, R7, and R6. As the voltage on the cathode goes up, the voltage across the meter goes up and results in a meter deflection. Gamma radiation does rates are then read direct from the meter scale. Resistor R3 is used to calibrate the radiacmeter.

(2) Zero control R5/S1 consists of switch S1, a two pole, two-position switch, and potentiometer R5 mounted on a common shaft. When S1 is set to ON, the battery voltage is applied to the filament of V1, and to the converter. The converter produces the regulated voltages required for the operation of the circuit of the radiacmeter. Potentiometer R5 is used to balance the meter circuit and produce the same potential at its wiper as is present at the junction of V1/R2. When these two voltages are equal, the meter circuit is balanced and the radiacmeter zeroed. When switch S1 is set to OFF, it shorts meter M1 and dampens the pointer movement when the radiacmeter is not in use.

(3) Function switch S2 is a two pole, three position switch, spring loaded to the center (OPERATE) position.

(a) When S2 is set to ZERO (during zero adjustment of the meter, (2) above), bias voltage is removed and the ionization chamber is shorted (through R1) to the control grid of V1 through connectors P1/J1 pin F, and contacts 5 and 2 of S2A. As a result, no potential difference exists between the ionization chamber and the control grid of V1.

(b) When S2 is set to CHECK (during the check of radiacmeter circuits), bias voltage is removed and the ionization chamber is effectively shorted (through R1) to the control grid of V1. At the same time, the control grid of V1 is connected to +1.4 volts from the converter through contacts 11 and 10 of S2B. As a result of this increase in grid biases of V1, V1 conducts more and the potential at the junction V1, R2

increases. This drives more current through the meter circuit and causes the meter to deflect and register in the "CHECK BAND" marked on the meter face.

(c) When S2 is set to operate, the ionization chamber walls are connected through P1/J1-F and S2A contacts 5 and 3 to +2.8 volts from the converter. Also, the control grid of V1 is connected through R1, P1/J1 pin H and S2B contacts 9 and 11 to the common negative of the converter. As a result, the ionization chamber wall is made positive with respect to the electrode in the control grid circuit of V1. When gamma radiation strikes the ionization chamber, current is caused to flow through R1 and the electrode to the ionization chamber wall, and a positive voltage is produced in the control grid circuit of V1.

2-6. Converter

The power supply for the single battery radiacmeter is a dc to dc converter. The input to the converter is the battery voltage of 1.5 volts dc. The converter's highest output voltage is +13.2 volts dc. This voltage increase is brought about by taking the low input voltage and; changing it into an ac voltage; applying the ac voltage to a step-up transformer; rectifying the stepped-up voltage; filtering and regulating the stepped-up (converted) voltages.

a. When S1 is set to ON, battery voltage is applied to a free running oscillator circuit consisting of R13, R14, C1, Q1 and T1. Resistors R13 and R14 form a voltage divider network to supply bias current. to Q1 through feedback windings T1-6 and T1-5. Q1 goes into saturation with the aid of the induced voltage from windings T1-4 and T1-1 into the feedback winding. Q1 stays in saturation until current in T1-4 and T1-1 stops changing. At this time, the induce voltage in the feedback winding reverses to bring Q1 into cutoff,

b. The process of Q1 going from cutoff to saturation, to cutoff, repeats providing changing current in the primary winding of T1, pins 4 to 1. Because of step-up transformer action the voltage induced in the secondary winding of T1 (pins 2 to 3) is much higher than the voltage in the primary.

c. Diode CR1 is used to rectify the stepped-up voltage from the secondary of T1. Capacitor C2 filters the rectified stepped-up voltage and the process of converting a low voltage dc to a higher voltage dc is complete.

d. The converter module also contains an integrated circuit (IC) voltage regulator and a voltage divider The IC is a small sized, sealed component which contains transistors, diodes, and other circuit elements to provide highly regulated and stable dc output voltages. on the schematic the IC is labeled VR1. The voltage divider consists of resistors R4, R7 and R6. The voltage divider provides the proper range of voltages for the operation of R5, the zero set potentiometer. VR1 produces 2 regulated dc output voltages, +2.8 volts and +1.4 volts. The +2.8 vdc output is connected to pin 5 of the converter and is used to bias the ionization chamber during operation of the radiacmeter. The other output, + 1.4 volts, is only used when the radiacmeter circuits are checked (para *2-5b* above).

CHAPTER 3
MAINTENANCE INSTRUCTIONS

3-1. Voltage and Resistance Measurements

The following voltage and resistance values have been made on an operating IM-174A/PD using Multimeter AN/GSM-64B. The data is supplied to aid in troubleshooting a defective IM-174A/PD.

a. Voltage Measurements for Multi-Battery Radiacmeters. Voltage measurements are made between the negative battery conduct of the holder for battery BT-6 (fig. 3-2) and the points indicated in the chart below. Before making measurements turn the IM-174A/PD on and zero the meter (TM 11-6665-232-12).

	Voltage with IM-174A/PD function switch in following positions		
	Zero	*Operate*	*Check*
Pin 1 (red wire) on switch S2	10.5 to 10.08	10.05 to 10.08	10.05 to 10.08
Negative terminal on meter M1	1.45 to 1.85	1.45 to 1.85	2.0 to 2.35
Positive terminal on meter M1	1.45 to 1.85	1.45 to 1.85	2.0 to 2.35
Pin 5 on switch S2	−1.32 to −1.35	1.32 to 1.35	0
Pin 11 on switch S2	−1.32 to −1.35	−1.32 to −1.35	0

b. Voltage Measurements for Single Battery Radiacmeters. Voltage measurements are made between the points indicated in the chart below. Before making measurements turn the IM-174A/PD on and zero the meter (TM 11-6665-232-12).

	Voltage with function switch in following position		
	Zero	*Operate*	*Check*
Primary battery PCB pin 1 to pin 9 [a]	1.1 to 1.6	1.1 to 1.6	1.1 to 1.6
Common negative PCB pin 10 to pin 4	13.2 +5%	13.2 +5%	13.2 +5%
Common negative PCB pin 10 to pin 3	1.4 ±4%	1.4 ±4%	1.4 ±4%
Common negative PCB pin 10 to pin 5	2.8 ±4%	2.8 ±4%	2.8 ±4%
Common negative PCB pin 10 to pin 7	3.94	3.94	4.55
Common negative PCB pin 10 to pin 8	5.19	5.19	5.49
Common negative PCB pin 10 to pin 6	2.47	2.47	2.69
J1 pin A to J1 pin D (A positive) [b]	1.1 to 1.6	1.1 to 1.6	1.1 to 1.6
Pin 10 PCB to J1 pin C (C positive)	13 ±5%	13 ±5%	13 ±5%
Pin 10 PCB to J1 pin F (F positive)	Zero	2.8 ±4%	1.4 +4%
Pin 10 PCB to J1 pin H (H positive)	Zero	Zero	1.4 ±4%

[a] Refers to the converter printed circuit board (PCB).
[b] Readings made with J1/P1 separated to introduce meter probe but still electrically connected.

c. Resistance Measurements. Resistance measurements are provided for the detector assembly removed from the radiacmeter. Make measurements at the detector assembly input connector between pins indicated below:

Point of measurement on detector assembly		*Resistance (ohms)*
From	*To*	
J1-A	J1-D	120
J1-A	J1-C	Infinity
J1-A	J1-F	Infinity
J1-A	J1-H	Infinity
J1-A	J1-J	Infinity
J1-C	J1-D	Infinity
J1-C	J1-F	Infinity
J1-C	J1-H	Infinity
J1-C	J1-J	Infinity
J1-D	J1-F	Infinity
J1-D	J1-H	Infinity
J1-D	J1-J	Infinity
J1-F	J1-H	Infinity
J1-F	J1-J	Infinity
J1-H	J1-J	Infinity

3-2. Continuity

Continuity of wires used in the IM-174A/PD can be checked either by inspection or by using an ohmmeter (AN/USM-223). Refer to the wiring diagram (figure 3-5 or 3-6) to determine where wires are connected. Inspect each wire closely moving it slightly back and forth to determine if the wire is broken under its insulation, When wires are laced or otherwise formed into a cable, use an ohmmeter to check continuity. Locate each end of the wire to be checked on the wiring or schematic diagram and measure the resistance of the wire. A low or zero resistance measurement indicates a good wire. Any other value measured indicates a trouble which will require further investigation.

3-3. Calibration Check

WARNING

Extremely dangerous radiation exists in the AN/UDM-2. Before performing the calibration check of the radiacmeter, observe all precautions indicated in TM 11-6665-227-12.

a. General. When used in the field, it is important that the readings obtained from the radiacmeter ‘are accurate. When a calibration check is being performed, the radiacmeter is exposed to known dose rates of radiation contained in the AN/UDM-2. No adjustment (other than operational) will be made to the radiacmeter during the calibration check.

NOTE

During the electrical check *(b* below) and the calibration check *(c* below), the radiacmeter should be positioned so that the meter face is up and parallel with the ground.

b. Electrical Check. Before the calibration check is performed, check for normal operation of the electrical circuits of the radiacmeter by performing the test outlined below:

NOTE

Perform the test in an area that is free from radiation.

(1) Prepare the radiacmeter for use (TM 11-6665-232-12), but do not install the radiacmeter in its carrying case.

(2) Turn on the radiacmeter by turning the zero control clockwise from OFF, Allow at least 2 minutes for the radiacmeter to warmup; if time permits, allow 20 minutes for complete warmup.

NOTE

If the radiacmeter is equipped with an instrument light, press the lamp switch, and then release it. The lamp should light when the switch is pressed, and the lamp should extinguish when the switch is released. If the lamp does not light, replace the lamp and/or the battery (TM 11-6665-232-12).

(3) Press and hold the function switch to ZERO and adjust the zero control until the meter indicates 0.

(4) Release the function switch to the operate (center) position; the pointer of the meter should swing upscale between 5 and 10 rad/hr, and then fall back to 0.

(5) Press and hold the function switch to CHECK. The pointer of the meter should indicate above the check band by 3 meter needle widths. Those readings below the check band or higher than 3 needle widths must be replaced by a new battery.

WARNING

Batteries BA-1006/U, BA-1391/U and BA-1396/U used in IM-174A/PD contain mercury. These batteries can be hazardous if not handled properly. There is a possibility of the battery exploding or generating a toxic gas when it is heated excessively. Do not throw mercury batteries into a fire, expose them to a high heat or short them out causing them to heat to a high temperature.

CAUTION

Mercury contained in Batteries BA-1006/U, BA-1391/U and BA-1396/U is hazardous to the environment. Where ver possible, dead or expended batteries should not be discarded. They should be returned to depot through supply channels.

NOTE

When in the CHECK mode, after new batteries are installed, some multibattery radiacmeters will indicate above the CHECK band by 3 meter needle widths. Radiacmeters reading in the CHECK band or 3 needle-widths above are acceptable for use. Those reading below the CHECK band or higher than 3 needle-widths must be repaired or recalibrated.

(6) Release the function switch to the oper-

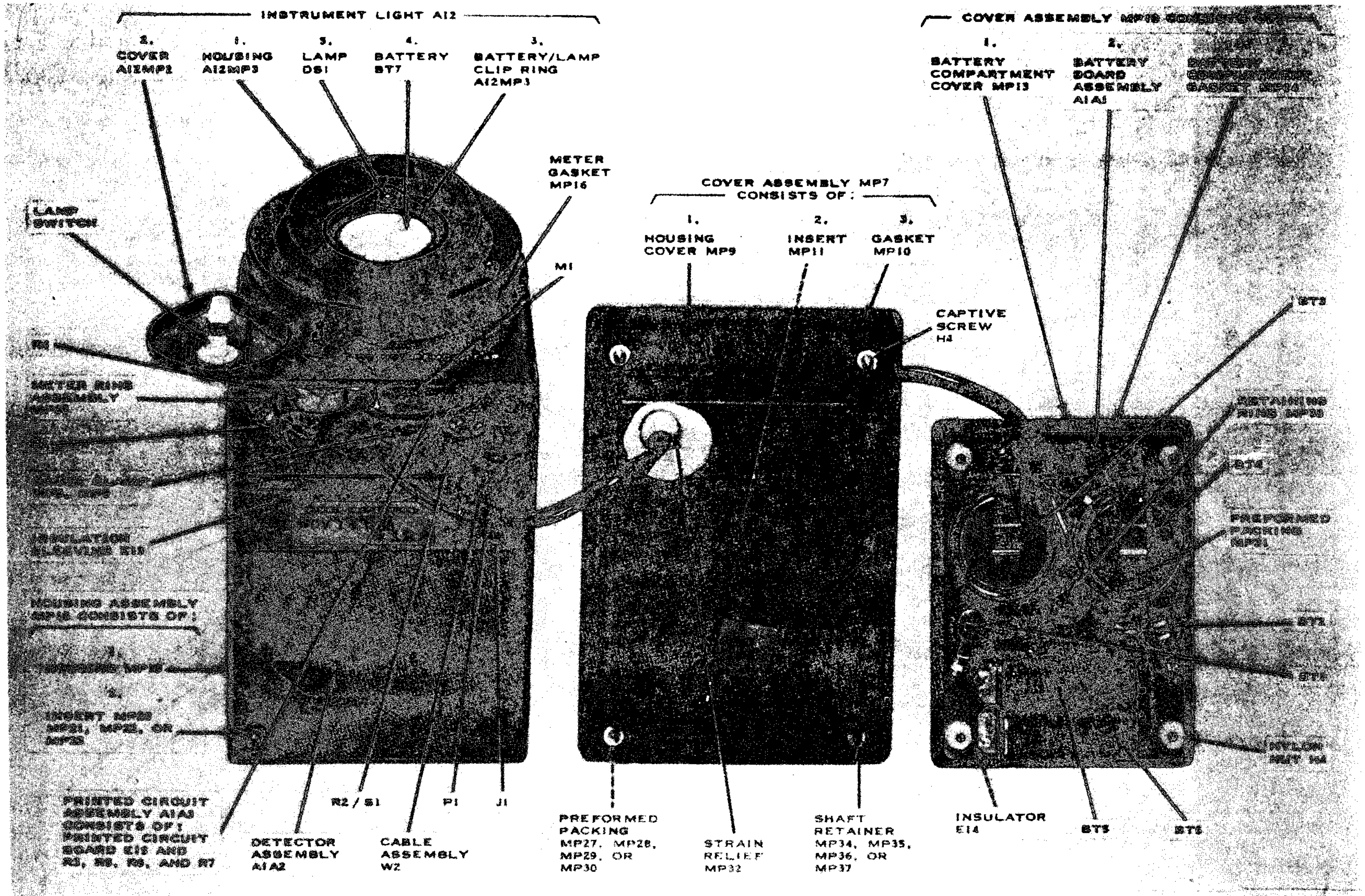


Figure 3-1. Radiacmeter (multi-battery type), with instrument light, parts locations.

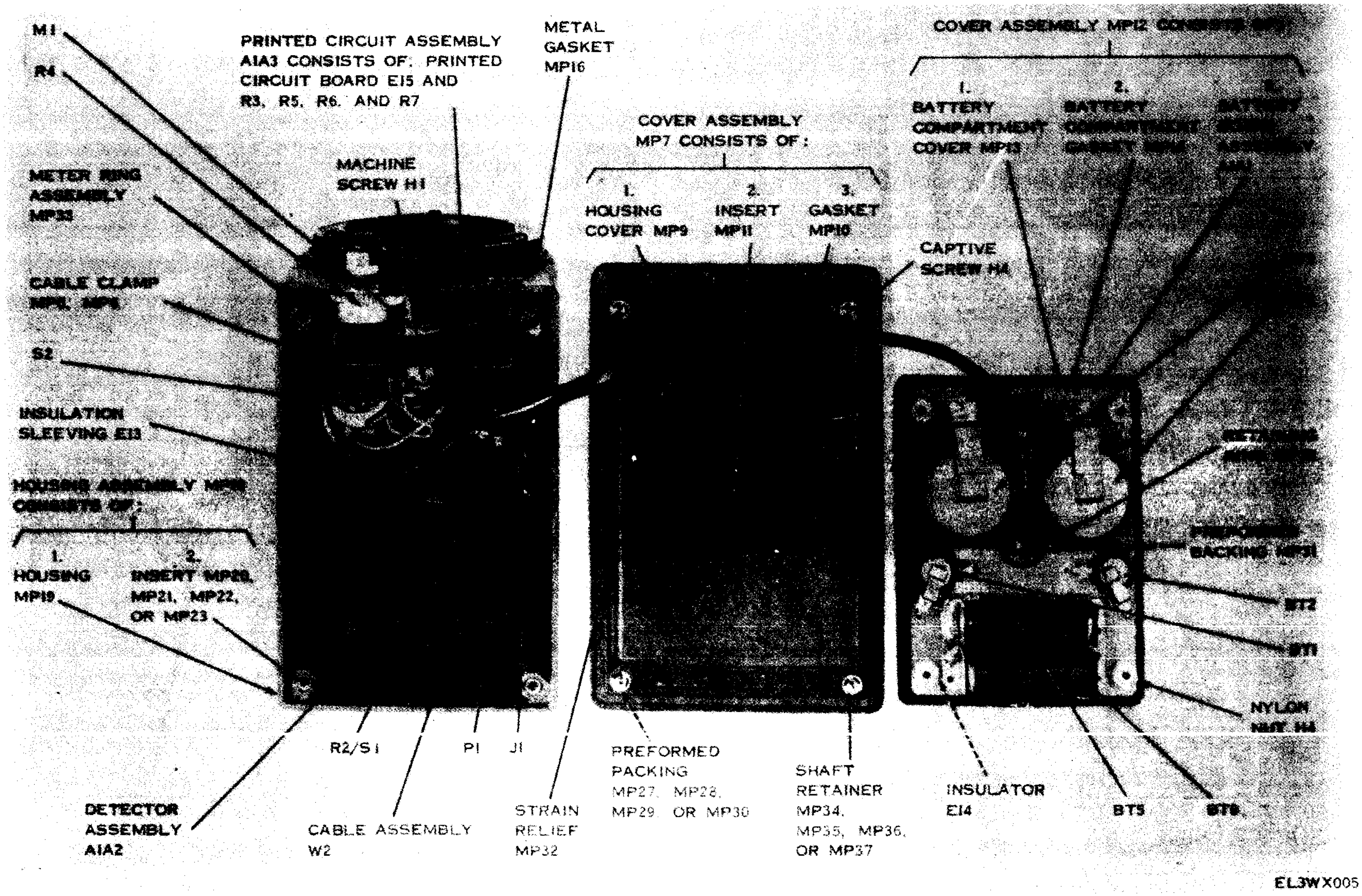


Figure 3-2. Radiacmeter (multi-battery type), without instrument light, parts locations.

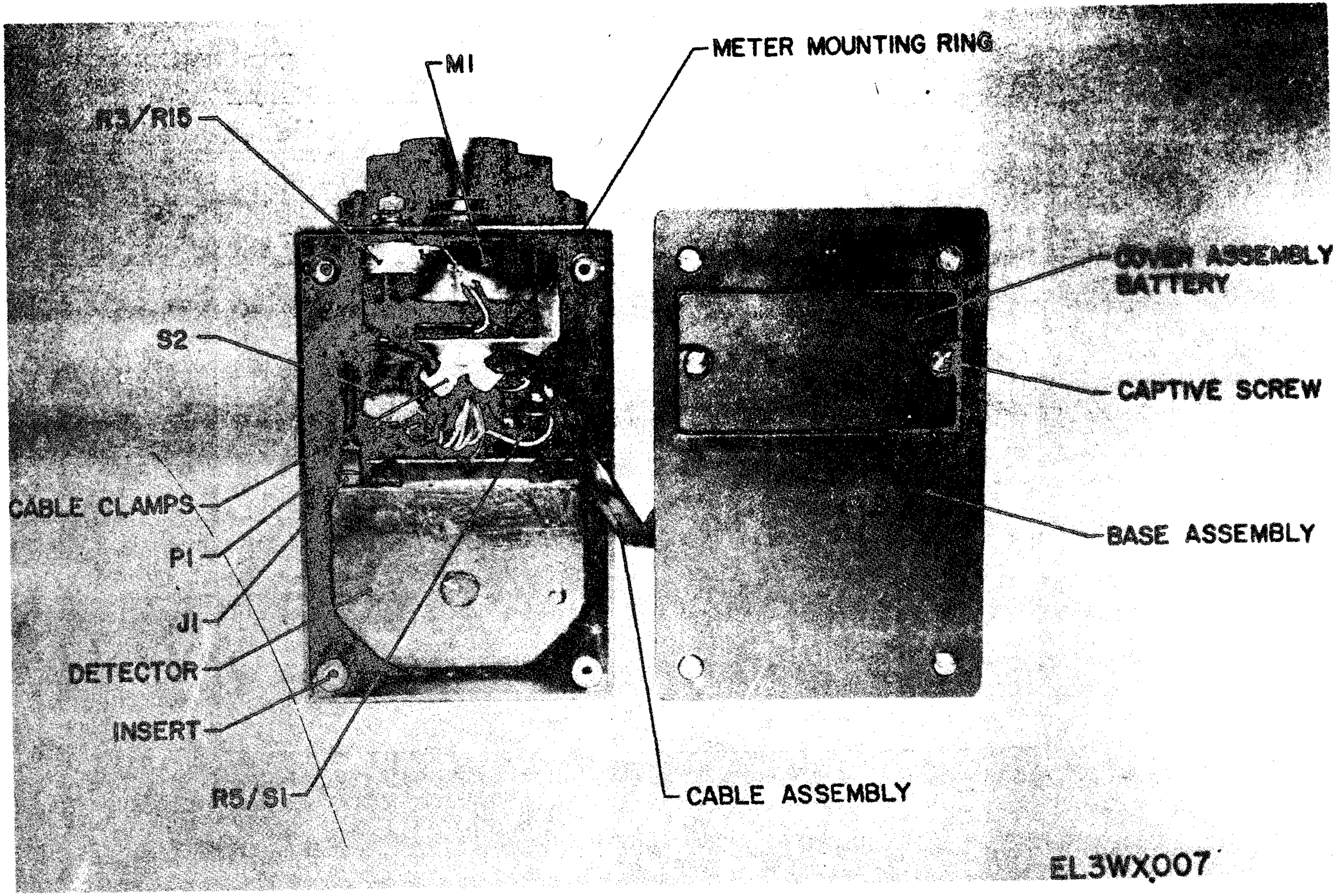


Figure 3-3. Radiacmeter (single battery type), inside case, parts locations.

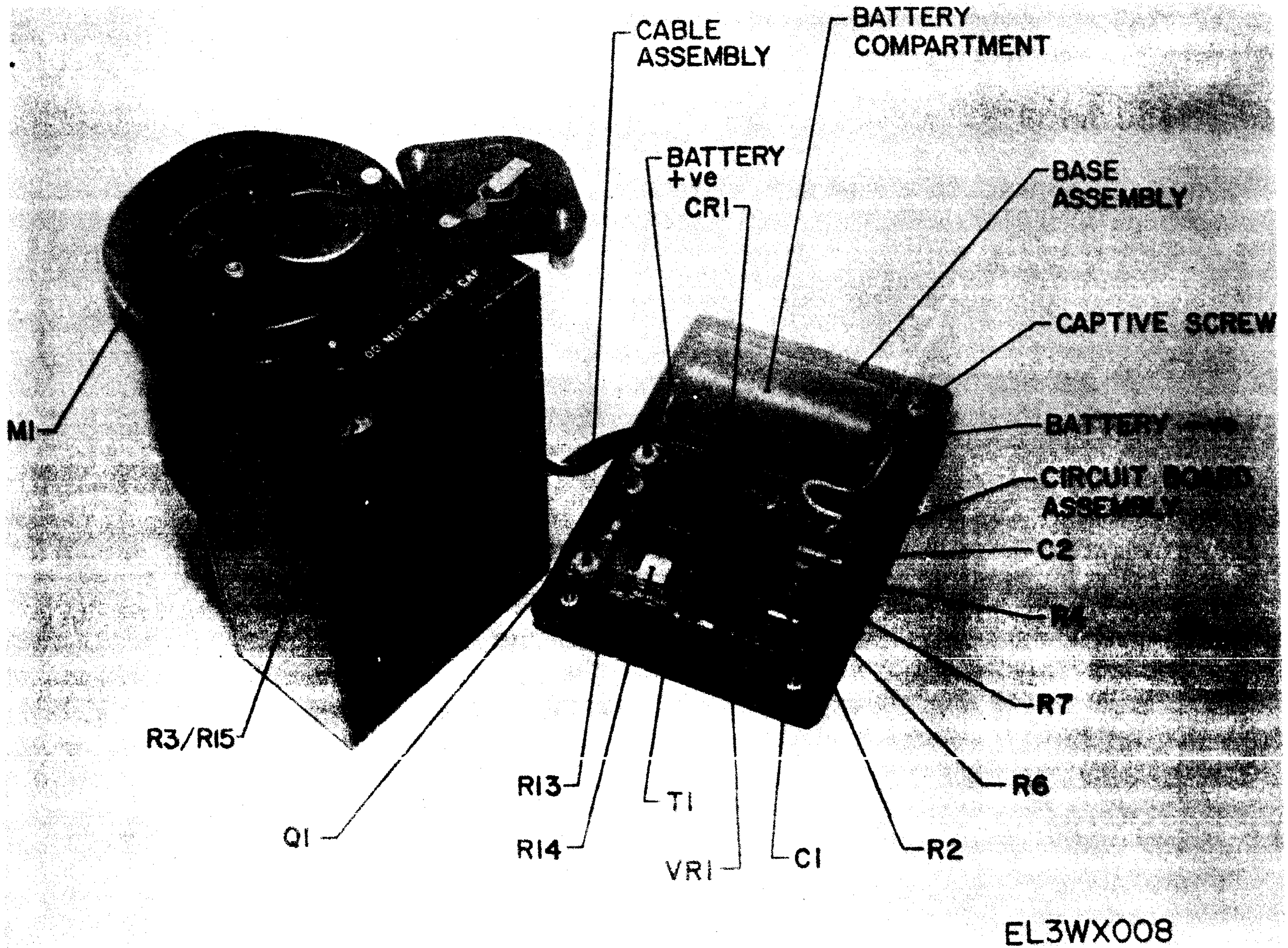


Figure [illegible]. Radiac[illegible] (single battery type), base assembly removed to show parts locations.

ate (center) position. The pointer of the meter should return to 0.

c. Calibration Check. After it has been determined that the radiacmeter is operating normally *(b* above), install the radiacmeter in the AN/USM-2 and perform the calibration check procedure as instructed in TM 11-6665-227-12.

3-4. Troubleshooting Procedures

a. Genera/. The first step in servicing a defective readiacmeter is to localize the fault. Localizing means tracing the fault to a defective stage or circuit responsible for the abnormal condition. The second step is isolation. Isolation means locating the defective part or parts. Some faults, such as burned-out resistors, can often be located by sight and smell. The majority of the faults, however, must be located by checking resistances.

b. Localization. The tests listed below will aid in isolating the trouble. First localize the trouble to a single circuit, and then isolate the trouble within that circuit by resistance; continuity, and voltage measurements.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. All meter readings or other visual signs should be observed and an attempt made to localize the fault to a particular circuit.

(2) *Operational test.* Operational tests frequently indicate the general location of trouble. The calibration check (para 3-3) is a good operational test.

(3) *Resistance measurements.* The resistance measurements will help locate the individual component part at fault. Figures 3-1 through 3-4 show the location of all components. Use the resistor color code (fig. FO-1) to find the value of the components.

(4) *Troubleshooting chart.* The troubleshooting chart (para 3-5) lists symptoms of common troubles and gives (or references) corrective measures.

(5) *Intermittent trouble.* In all the tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. Check the wiring (fig. 3-5 and 3-6) and connections within the radiacmeter.

(6) *Calibration check.* A calibration check (para 3-3) is made to determine if the readings obtained from the radiacmeter are accurate. The radiacmeter is exposed to known dose rates of radiation and the readings obtained are compared with the known dose rates.

3-5. Troubleshooting Chart

NOTE

To reach the parts of the radiacmeter, remove the battery cover from the radiacmeter (TM 11-6665-232-12), unscrew the small captive screws in the cover assembly, and carefully remove the cover assembly.

a. General. In the troubleshooting chart *(c* below), the procedures are outlined for localizing troubles within the various sections of the radiacmeter. The parts locations are indicated in figures 3-1 through 3-4. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When trouble has been localized to a particular portion of the radiacmeter, use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. The troubleshooting chart is designated to supplement the troubleshooting chart in TM 11-6665-232-12. If previous operational checks have resulted in reference to a particular Item of this chart, go direct to the referenced item. If no operational symptoms are known, perform the calibration check (para 3-3) and proceed until a symptom appears.

c. *Troubleshooting Chart.*

NOTE

Replacement of parts indicated and calibration of radiacmeter can be performed only by depot repairmen. If a component is replaced, the radiacmeter must be recalibrated.

Item	*Symptom*	*Probable trouble*	*Correction*
1	Meter pointer cannot be positioned at 0 when zero control (R2/S1, fig. 2-1) is adjusted (function switch S2 is set to ZERO) and meter pointer does not move upscale be-	*a.* Defective wiring. *b.* Defective zero control R2/S1.	*a.* Check wiring (fig. 3-5 or 3-6); replace if defective. *b.* Check continuity of switch S1 section and resistance of variable resistor R2 section of zero control R2/S1 (fig. 3-2). Replace zero control if either section is defective.

Item	Symptom	Probable trouble	Correction
	tween *5* and *10 rad/hr* and then drop to 0 when function switch is released after zero check.	*c.* Defective function switch S2. *d.* Defective meter Ml. e. Defective detector assembly. *f.* Defective calibration variable resistor R4, or resistor R3, R5, R6, or R?. g. Defective printed circuit board E15.	*c.* Check continuity of function switch S2. Replace switch if defective. *d.* Replace meter M1 if defective. *e.* Check resistance of detector assembly (para 3-1). If trouble persists, replace detector assembly (fig. 3-2 or 3-3). *f.* Check resistance of calibration variable resistor R4 and resistors R3, R5, R6, and R7. Replace resistors if defective. *g.* Check continuity of printed wiring on printed circuit board E15. Replace printed circuit board if defective.
2	Pointer of meter Ml does not indicate in CHECK band on meter scale; zero control R2/S1 is set to on, and function switch S2 is set to CHECK.	a. Defective function switch S2. ***b.*** Defective detector assembly.	*a.* Check continuity of function switch S2. Replace switch if defective. *b.* Check resistance of detector assembly (para 3-1). If trouble persists, replace detector assembly (fig. 3-2 or 3-3).
3	Meter MI does not respond properly to radiation.	a. Defective function switch S2. b. Calibration variable resistor R4 improperly adjusted. c. Defective detector assembly.	*a.* Check continuity of function switch S2. Replace switch if defective. *b.* Send radiacmeter for calibration. *c.* Check resistance of detector assembly (para 3-1). If trouble persists, replace defector assembly.

NOTE

The following two items apply only to those radiacmeters that are equipped with an installment light.

Item	Symptom	Probable trouble	Correction
4	Lamp DS1 (fig. 3-1) does not light when lamp switch is pressed.	Defective lamp switch or battery/lamp clip ring.	Replace instrument light (fig. 3-1).
5	Lamp DS1 lights when lamp switch is pressed but does not go out when lamp switch is released.	a. Lamp switch bent . . . . b. Lamp switch broken	*a.* Straighten lamp switch. *b.* Replace instrument light.

3-6. Replacement of Parts

The parts of the radiacmeter can be reached and replaced easily without special procedures. To reach the parts of the radiacmeter, carefully remove the battery cover from the radiacmeter (TM 11-6665-232-12), unscrew the captive screws in the cover assembly, and carefully remove the cover assembly. (Refer to the exploded views of the radiacmeters (fig. 3-7 and 3-8) to aid. in location of parts and parts replacement.) The following precautions apply to the equipment:

a. Before removing a part from the radiacmeter, note the position of the part and its leads. The replacement part must be located in exactly the same position as the part it replaced.

b. If a part is replaced, the radiacmeter must be recalibrated.

c. Do not disturb tile setting of calibration variable resistor R4. Any movement of this control will void the calibration of the radiacmeter.

d. New microammeters are shipped with a wire strap across the terminals. Be sure to remove this strap before installing the new meter in the radiacmeter.

NOTE

The replacement of parts on the in-

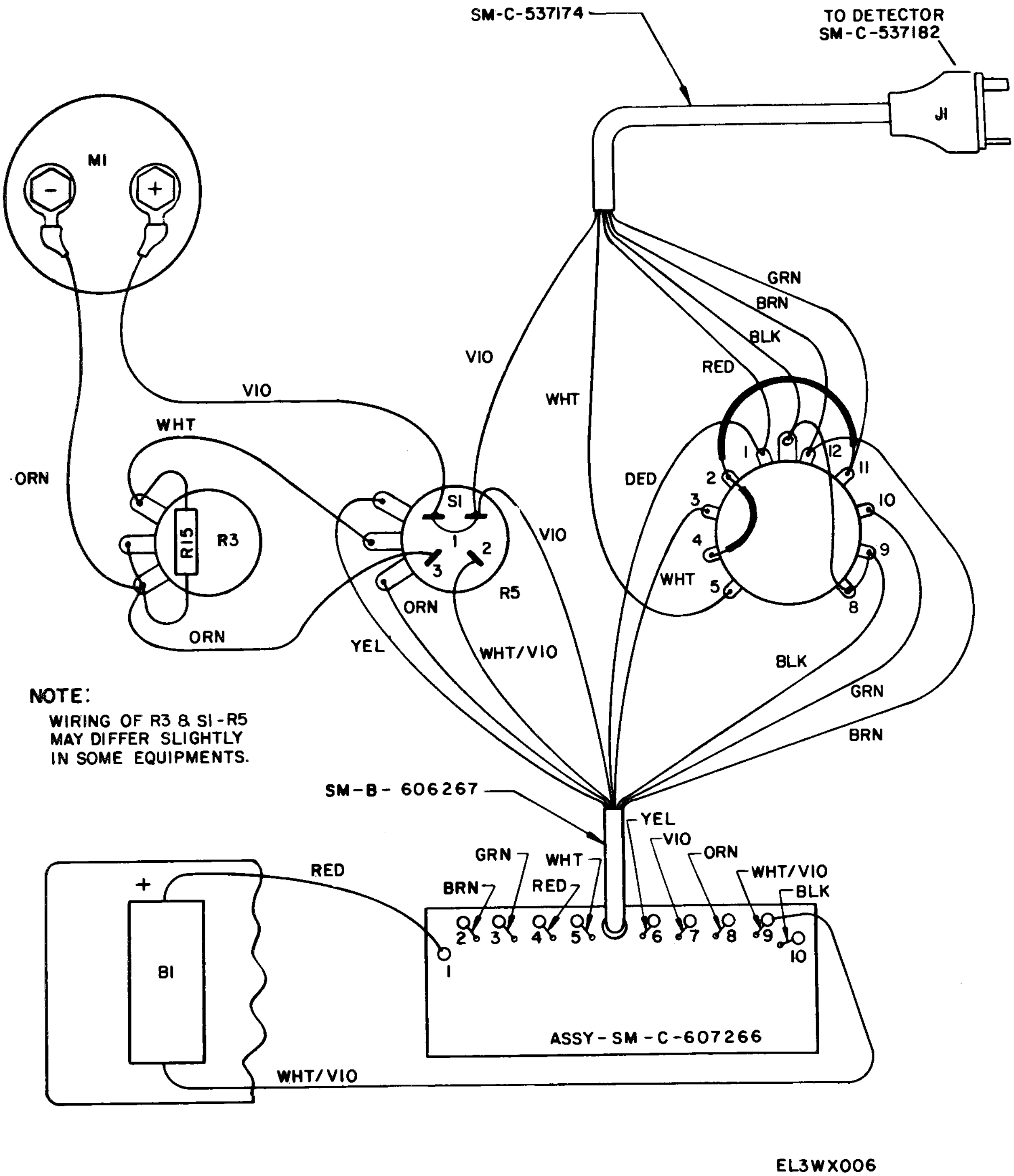
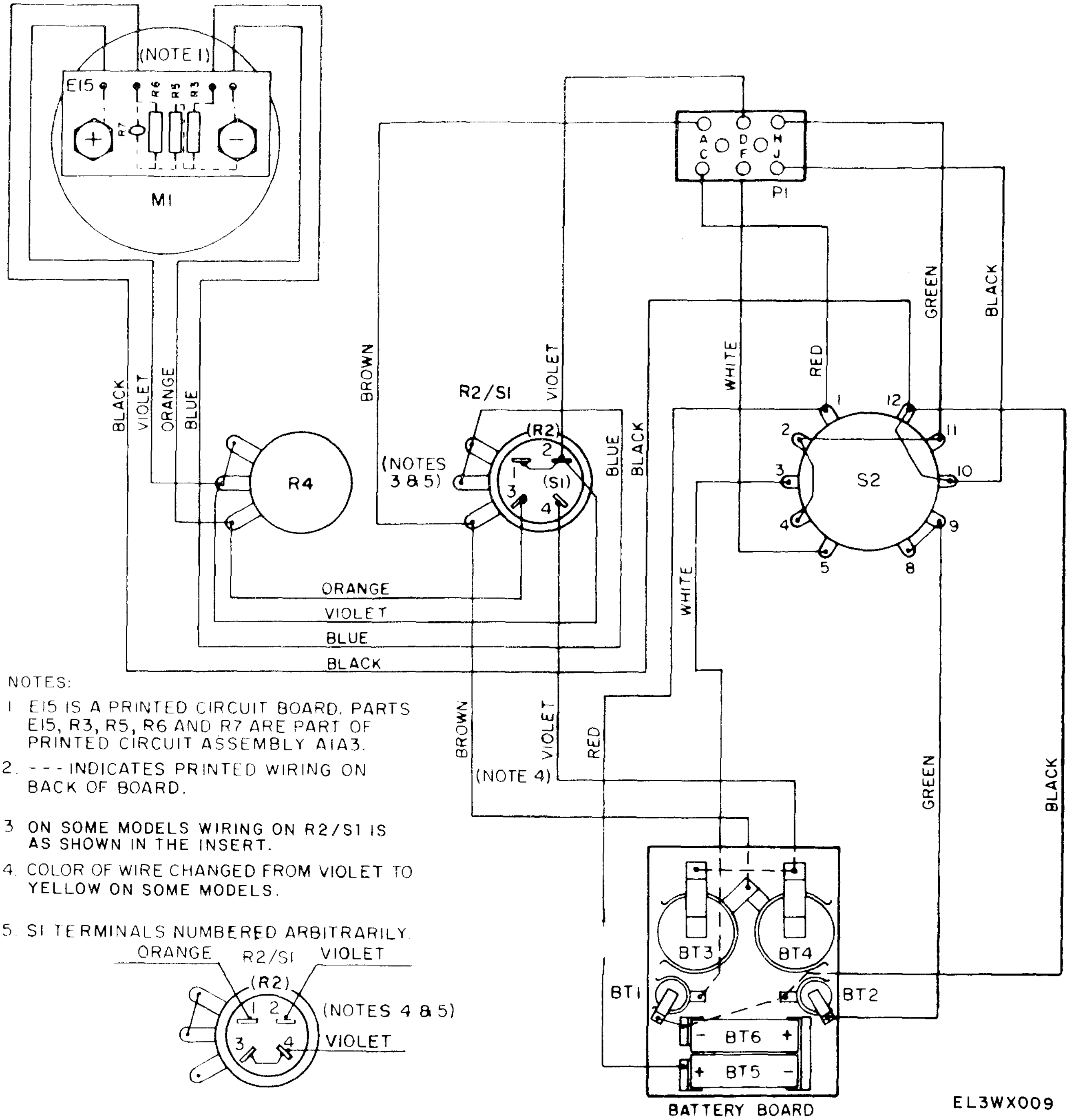


Figure 3-5. Radiacmeter (single battery type), wiring diagram.

instrument light assembly does not make it necessary to recalibrate the radiacmeter.

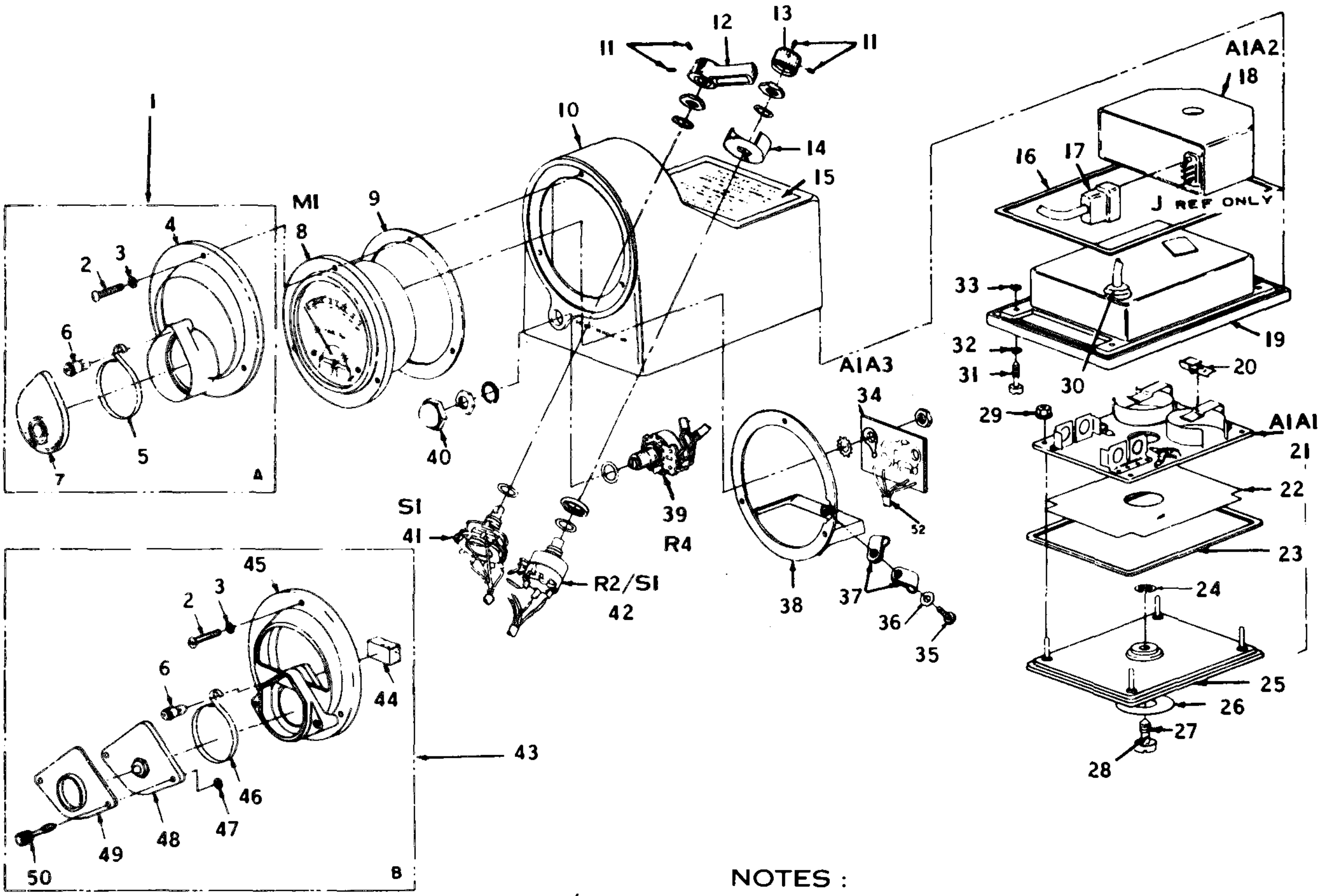
e. Two types of instrument lights are used. The earlier type (fig. 3-1), consists of a plastic hood and battery/lamp compartment (molded as a single unit), a lamp, a metal battery/lamp clip, ring, and a plastic cover with a metal lamp switch and white plastic switch button. This type is not waterproofed. The later type of instrument light (fig. 3-4) consists of a plastic hood and battery/lamp compartment (molded as a single unit), a lamp, a metal battery/lamp clip ring and a molded plastic cover over the battery/lamp compartment. This cover is supplied with a rubber gasket, metal clamping plate, and two knurled finger screws to provide a watertight seal for the battery/lamp compartment. The switch pushbutton to operate the light is covered with a waterproof rubber boot. This style of instrument light is waterproofed.



NOTES:

1. E15 IS A PRINTED CIRCUIT BOARD. PARTS E15, R3, R5, R6 AND R7 ARE PART OF PRINTED CIRCUIT ASSEMBLY A1A3.
2. - - - INDICATES PRINTED WIRING ON BACK OF BOARD.
3. ON SOME MODELS WIRING ON R2/S1 IS AS SHOWN IN THE INSERT.
4. COLOR OF WIRE CHANGED FROM VIOLET TO YELLOW ON SOME MODELS.
5. S1 TERMINALS NUMBERED ARBITRARILY.

Figure 3-6. Radiacmeter (multi-battery type), wiring diagram.

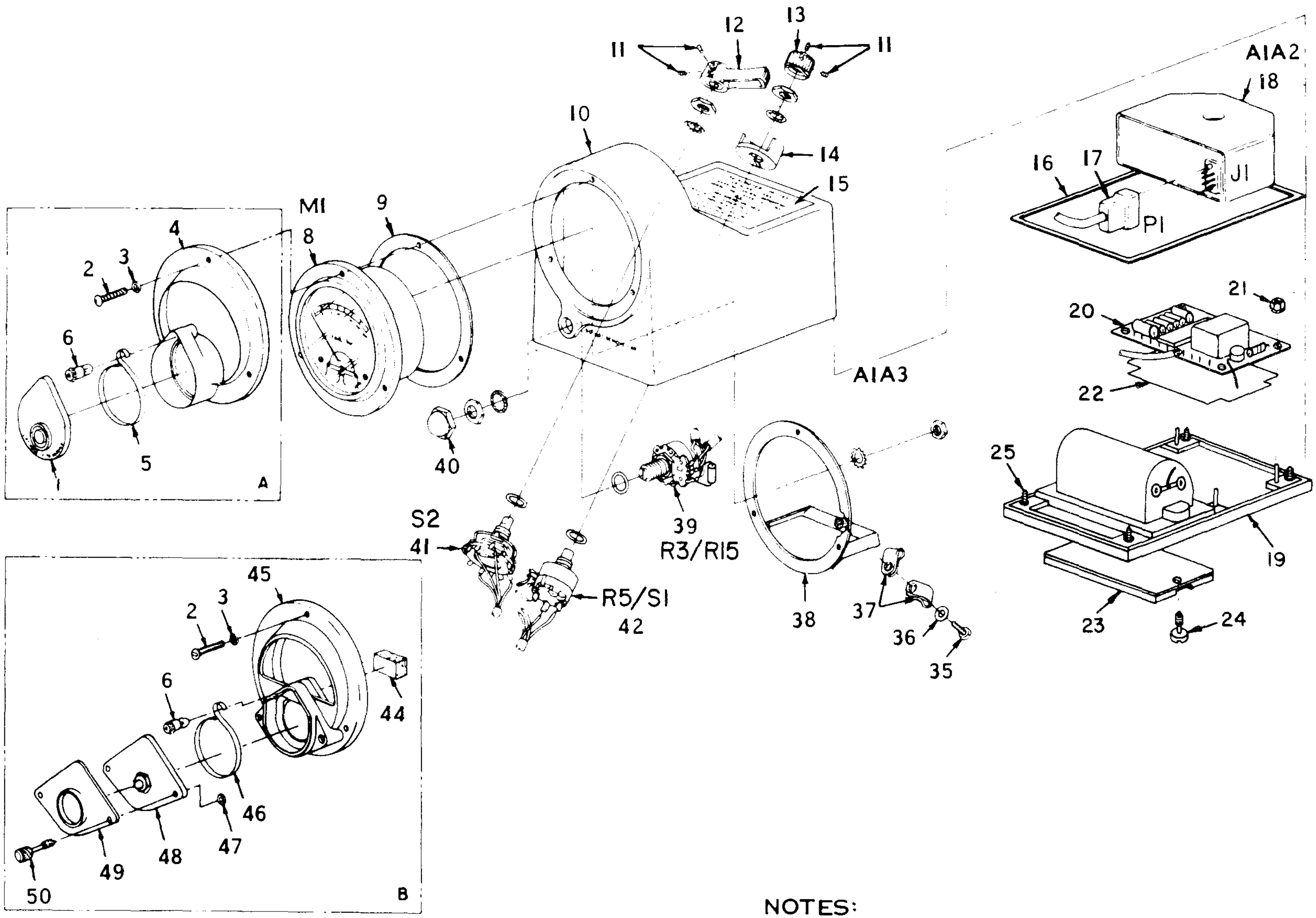


NOTES :
1. ITEM NO. 1 USED ON IM-174A/PD PROCURED ON CONTRACT DAAB0567C1625
2. ITEM NO. 43 USED ON IM-174A/PD PROCURED ON CONTRACT DAAB0569C0762

EL3WX010

1 Instrument light assembly, earlier models
2 Screw
3 Flat washer
4 Light housing
5 Battery lamp clip ring
6 Lamp
7 Lightcover
8 Meter M1
9 Gasket
10 Housing
11 Setscrew
12 Function switch knob
13 Zero control knob
14 Knob guard
15 Identification plate
16 Gasket
17 Connector P1
18 Detector assembly
19 Housing cover
20 Cable clamp
21 Battery board assembly
22 Insulating board
23 Gasket
24 Retaining ring
25 Cover
26 Label
27 Screw
28 Packing
29 Nylon nut
30 Bushing
31 Screw
32 Packing
33 Packing
34 Printed circuit assembly
35 Screw
36 Washer
37 Cable clamp
38 Ring assembly
39 Variable resistor R4
40 Acorn nut
41 Rotary switch S2
42 Control R2/S1
43 Waterproofed instrument light assembly
44 Sponge rubber
45 Light housing
46 Battery lamp clip ring
47 O-ring
48 Cover
49 Guard
50 Captive screw

Figure 3-7. Multi-battery type radiacmeter, exploded view.



NOTES:

1. ITEM NO. A USED ON IM–174A/PD PROCURED ON CONTRACT DAAB05–67–C–1625.
2. ITEM NO. B USED ON IM–174A/PD PROCURED ON CONTRACT DAAB05–69–C–0762.

EL3WX011

Figure 3–8. Single battery type radiacmeter, exploded view.

A. Instrument Light assembly, earlier models.

1 Light cover
2 Screw
3 Flat washer
4 Light housing
5 Battery lamp clip ring
6 Lamp
7 (Deleted)
8 Meter M1
9 Gasket
10 Housing
11 Setscrew
12 Function switch knob
13 Zero control knob
14 Knob guard
15 Identification plate
16 Gasket
17 Connector P1
18 Detector assembly
19 Base assembly
20 Printed circuit board assembly
21 Nylon nut
22 Insulator
23 Battery cover assembly
24 Captive screw
25 Captive screw
26-30 (Deleted)
31 (Deleted)
32 (Deleted)
33 (Deleted)
34 (Deleted)
35 Screw
36 Washer
37 Cable clamp
38 Ring assembly
39 Variable resistor R3/R15
40 Acorn nut
41 Rotary switch S2
42 Control R5/S1
43 (Deleted)

B. Waterproofed instrument light assembly.

44 Sponge rubber
45 Light housing
46 Battery lamp clip ring
47 O-ring
48 Cover
49 Guard
50 Captive screw
50 Captive screw

Figure 3-8.—Continued.

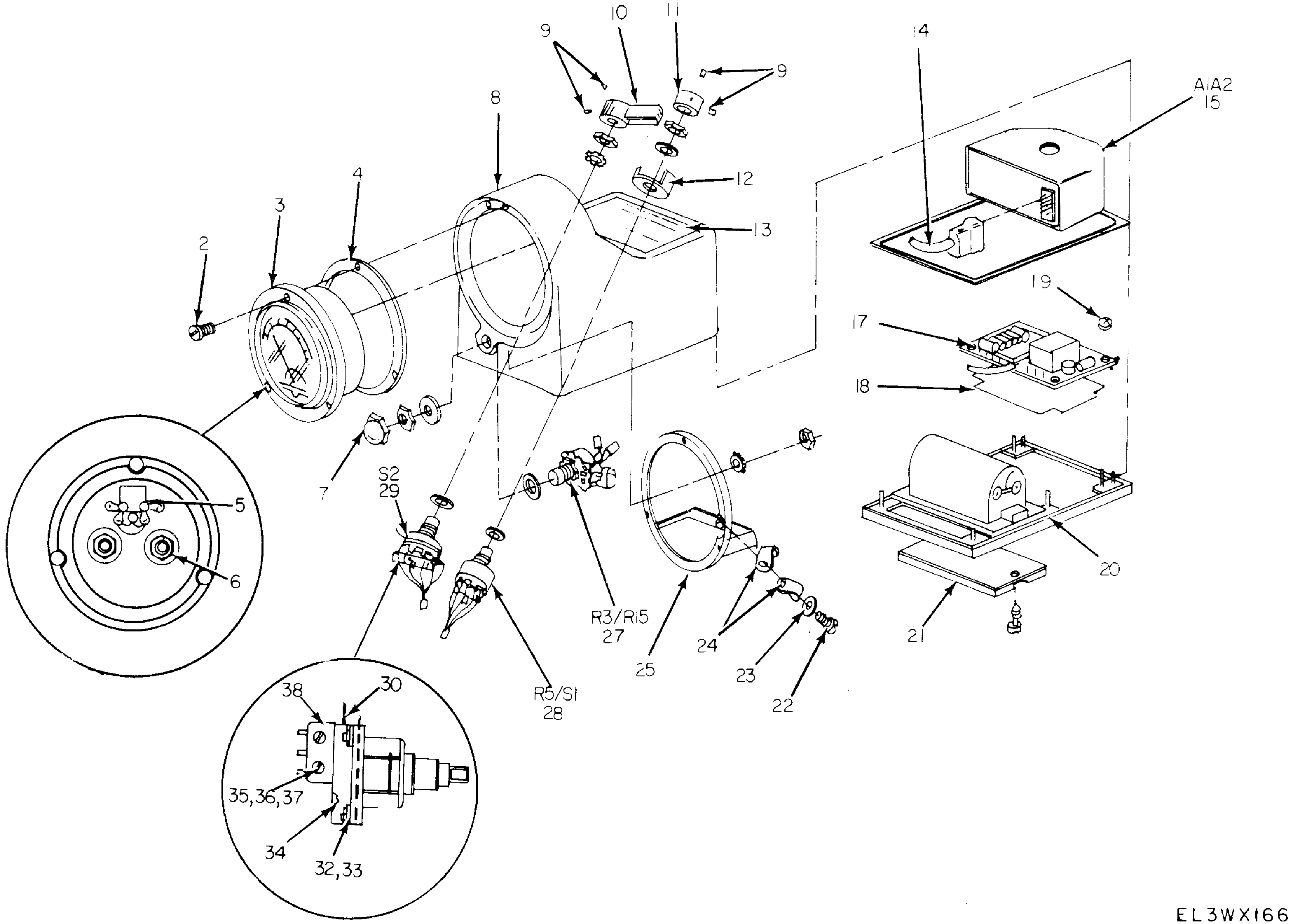


Figure 3-9. Model IM-174B/PD single battery type radiacmeter, exploded view.

Legend for figure 3-9:

1. (Deleted)
2. Screw
3. Meter M1
4. Gasket
5. Mounted lamp connection
6. Nut
7. Acorn nut
8. Housing
9. Set screw
10. Function switch knob
11. Zero control knob
12. Knob guard
13. Identification plate
14. Connector P1 type
15. Detector assembly
16. (Deleted)
17. Printed circuit board assembly
18. Insulator
19. Nylon nut
20. Base assembly
21. Battery cover assembly
22. Screw
23. Washer
24. Cable clamp
25. Ring assembly
26. (Deleted)
27. Variable resistor R3/R15
28. Control R5/S1
29. Rotary switch S2
30. Solder lug
31. (Deleted)
32. P/O S2
33. P/O S2
34. Bracket
35. Screw
36. Lockwasher
37. Hex nut
38. Microswitch

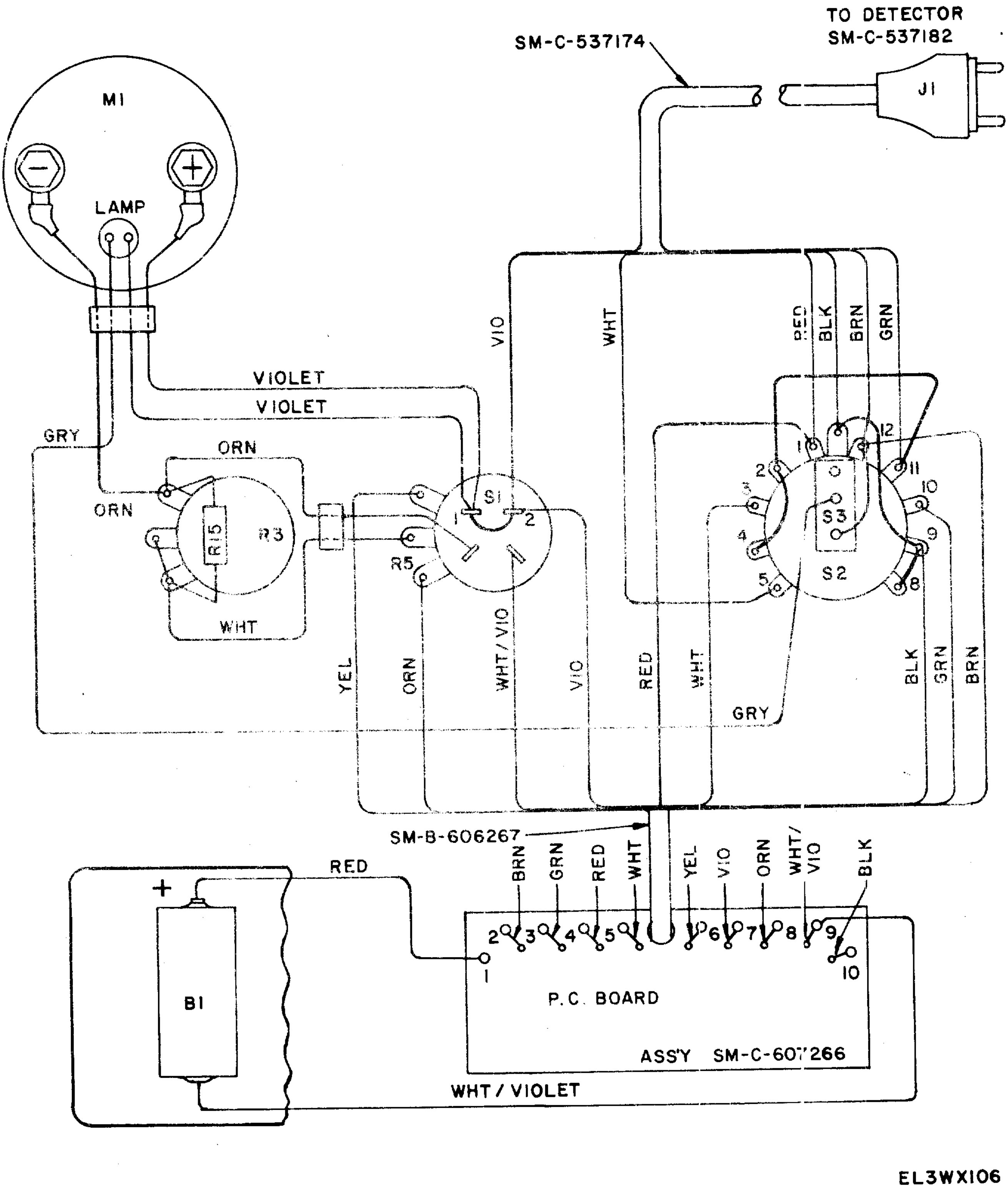


Figure 3-10. Radiacmeter (Model IM-174B/PD), wiring diagram.

APPENDIX A
REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Index of Modification Work Orders.
SB 11-6	Dry Battery Supply Data.
SB 11-573	Painting and Preservation Supplies .Available for Field Use for Electronics Command Equipment.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies and Equipment Used by the Army.
TB 43-180	Calibration Requirements for the Maintenance of Army Materiel.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6665-204-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Calibrator Sets, Radiac TS–784/PD and TS-784A/PD.
TM 11-6665-227-12	Operator's and Organizational Maintenance Manual: Calibrator Set, Radiac AN/UDM-2.
TM 11-6665-232-12	Operator's and Organizational Maintenance Manual: Radiacmeter IM-174A/PD.
TM 38-750	The Army Maintenance Management Systems (TAMMS).

APPENDIX B
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists expendable supplies and materials you will need to operate and maintain the radiacmeter. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

B-2. Explanation of Columns

a. Column 1-Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, app B").

b. Column 2-Level. This column identifies the lowest level of maintenance that requires the listed item.

H-General Support Maintenance.

c. Column 3-National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4-Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

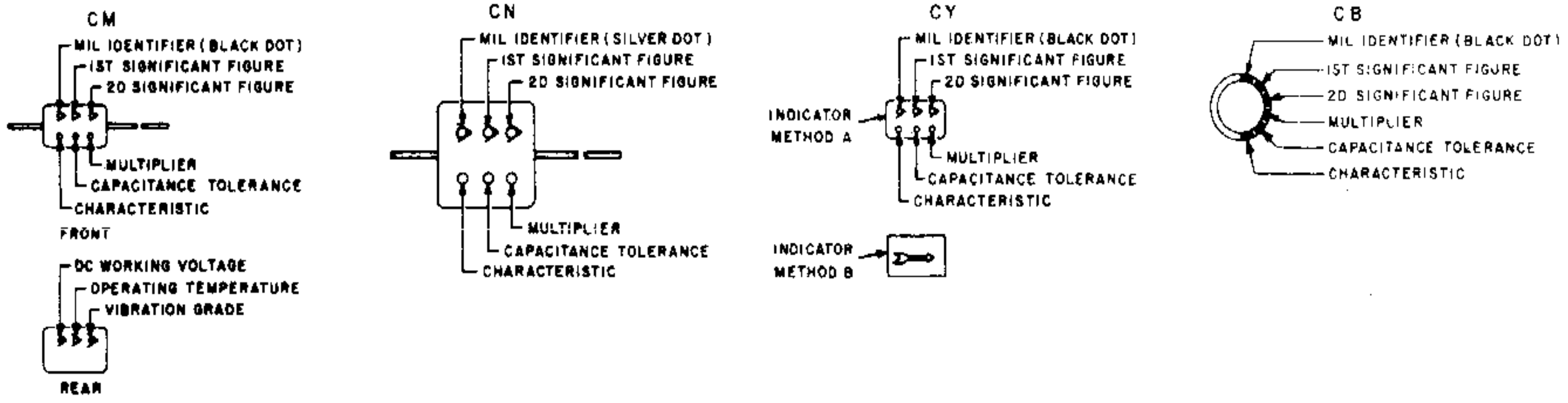
e. Column 5-Unit of Measure(U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satsify your requirements.

SECTION II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO AND FSCM	(5) UNIT OF MEAS
		[illegible]	TRICHLOROETHANE, TECHNICAL:	QT

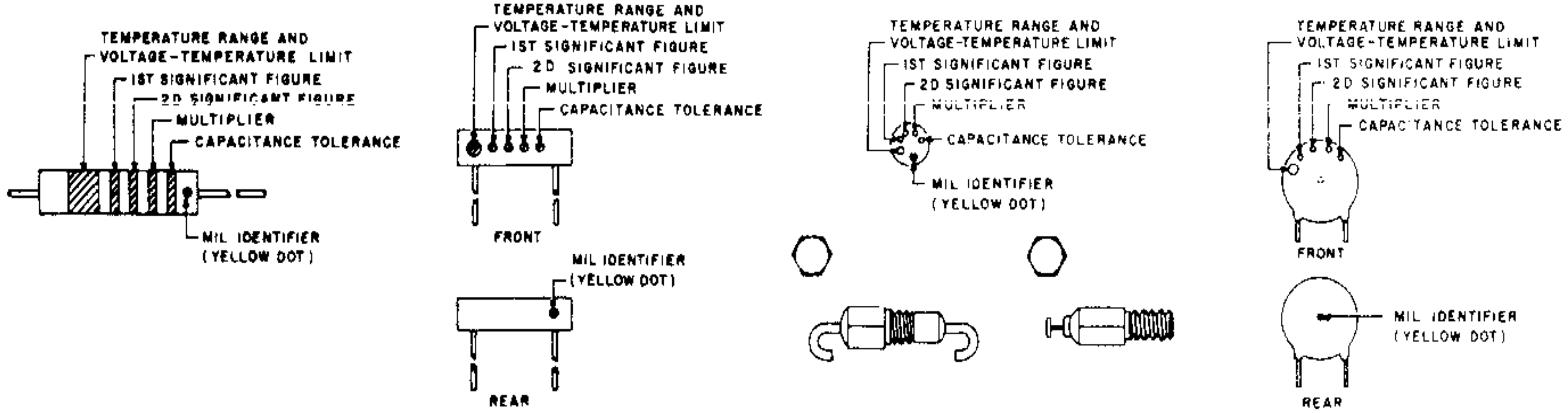
COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



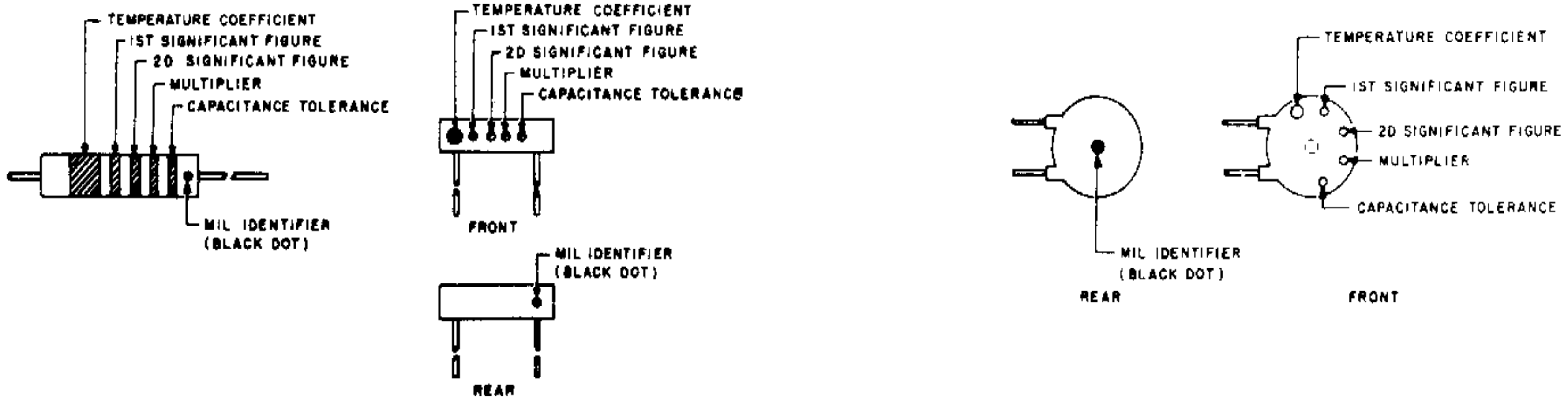
MICA-DIELECTRIC PAPER-DIELECTRIC GLASS-DIELECTRIC, GLASS CASE MICA, BUTTON TYPE

GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



AXIAL LEAD RADIAL LEAD FEED-THROUGH STAND-OFF DISK-TYPE

GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



AXIAL LEAD RADIAL LEAD DISK-TYPE

COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

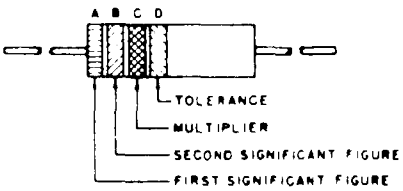
1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD-C2

Figure FO-1 ①. Military standard capacitor color code chart.

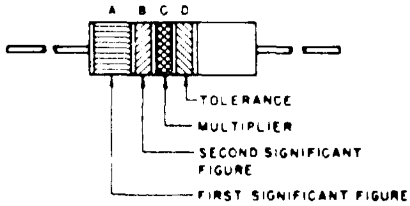
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS



BAND A— Double Width Signifies Wire-wound Resistor

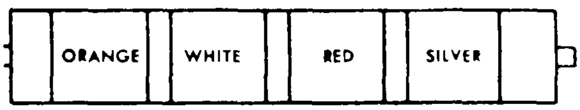
COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING

BAND

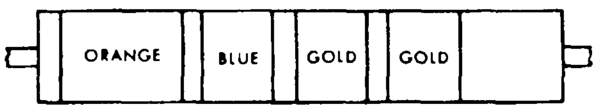
A B C D*



3 9 X100 ± 10%

BAND

A B C D*



3 6 X0.1 ± 5%

NOMINAL RESISTANCE	3,900 Ohms	3.6 Ohms
RESISTANCE TOLERANCE	± 10 percent	± 5 percent

STD-R2

*If Band D is omitted, the resistor tolerance is ± 20%, and the resistor is not Mil-Std.

Figure FO-1 ②. Military standard resistor color code chart.

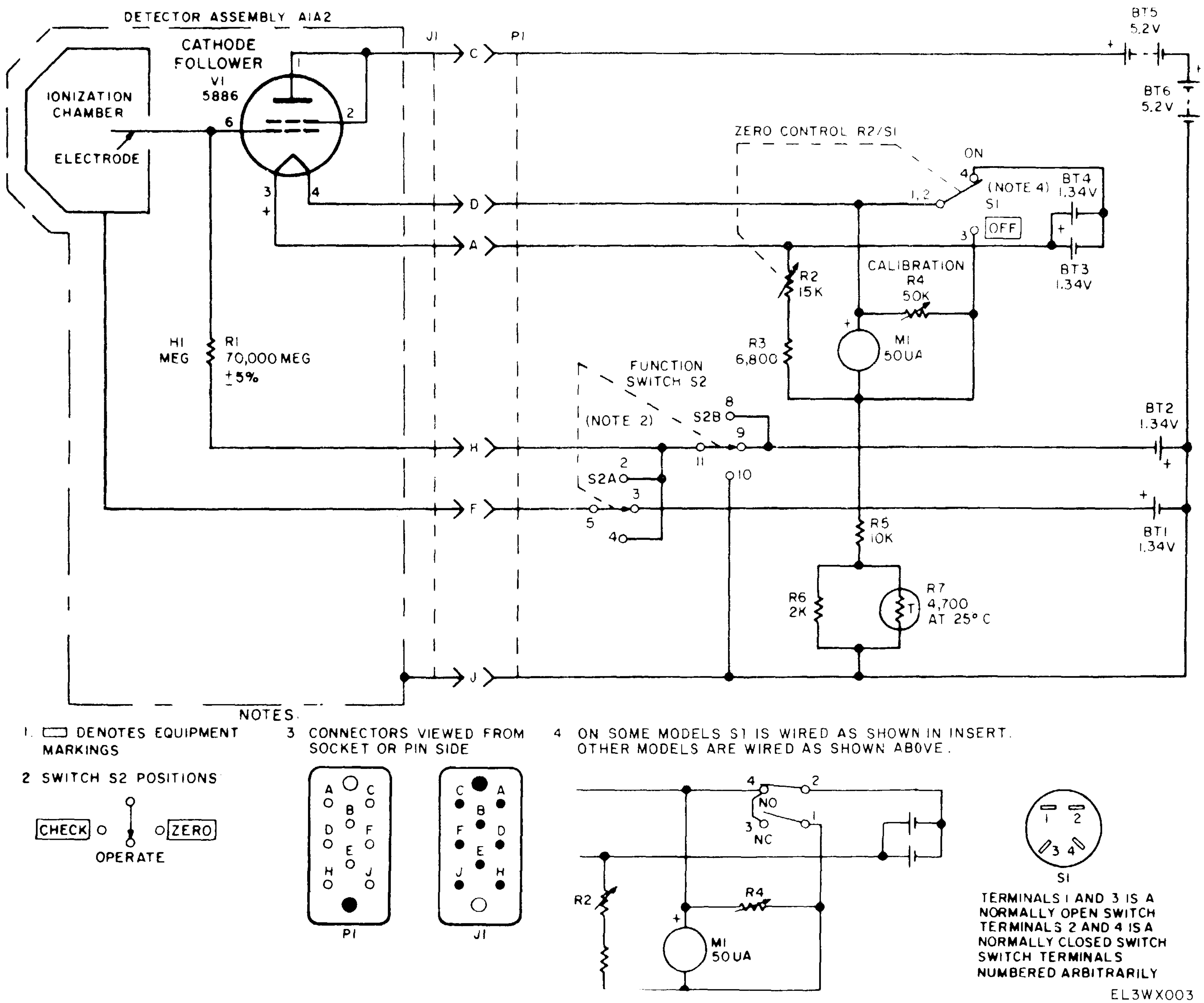
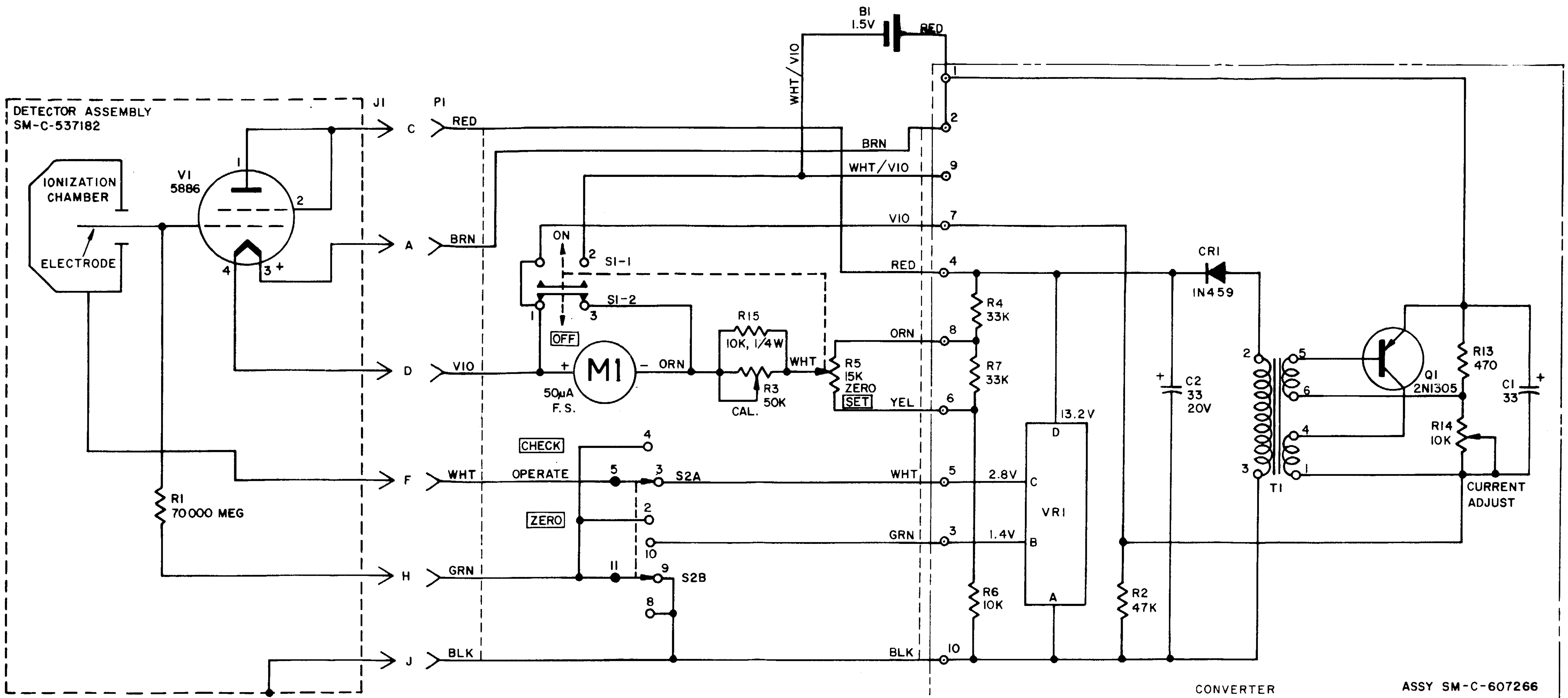
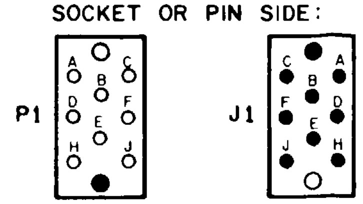


Figure FO 3. Multi battery type radiacmeter, schematic diagram.

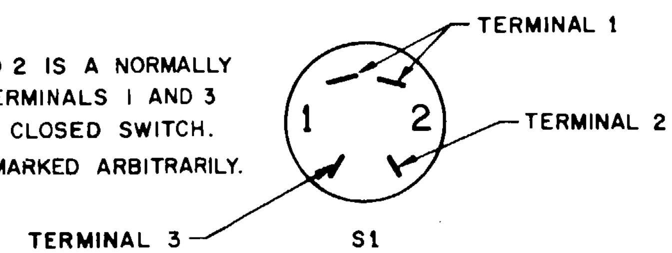


NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN Ω, ±5%, 1/2 W. CAPACITANCE VALUES ARE IN µF, ±20%, 10V.
2. ▭ DENOTES EQUIPMENT MARKINGS.
3. SWITCH S2 SHOWN IN OPERATE POSITION.
4. CONNECTORS VIEWED FROM SOCKET OR PIN SIDE:

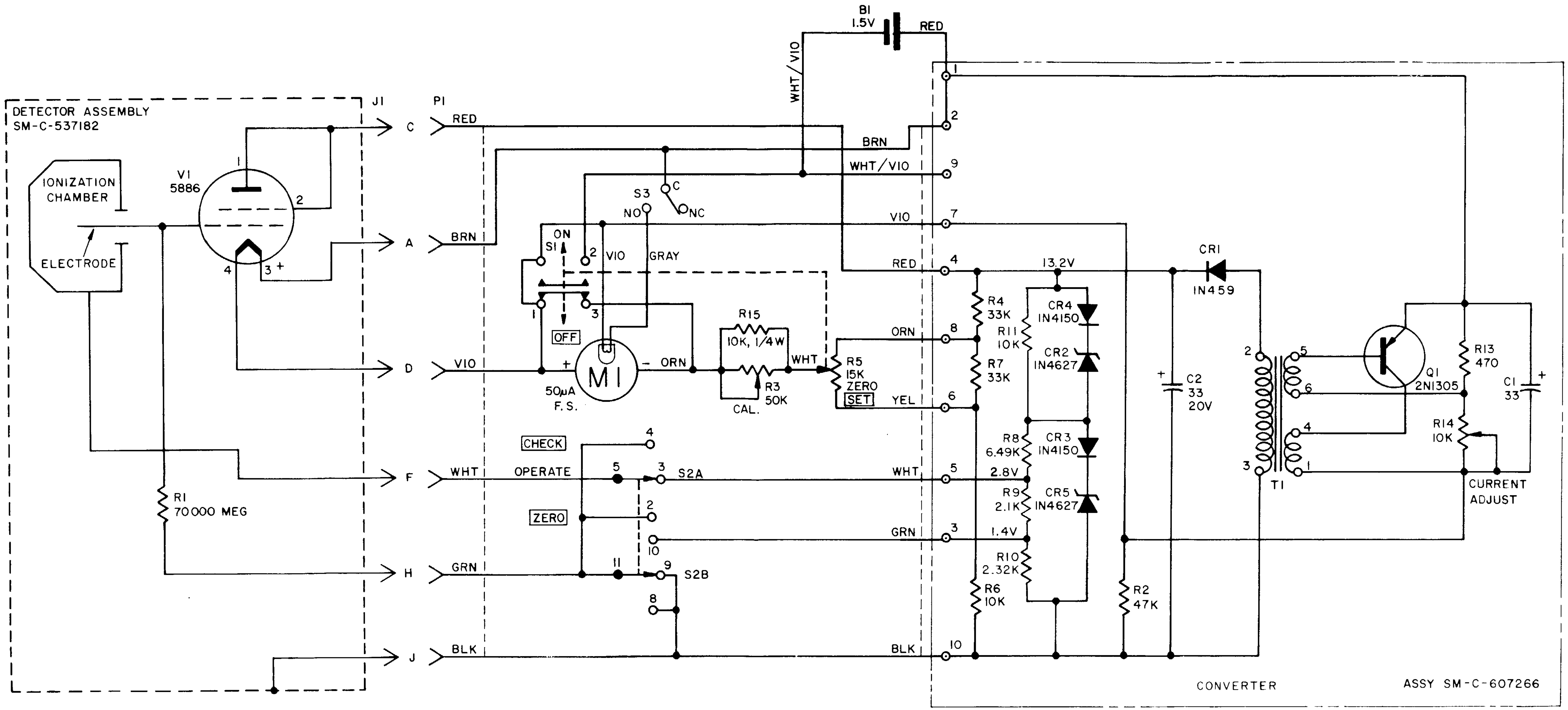


5. TERMINALS 1 AND 2 IS A NORMALLY OPEN SWITCH, TERMINALS 1 AND 3 IS A NORMALLY CLOSED SWITCH. TERMINALS ARE MARKED ARBITRARILY.



EL3WX012

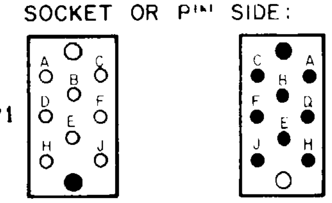
Figure FO-3. Single Battery Type Radiacmeter, Schematic Diagram.



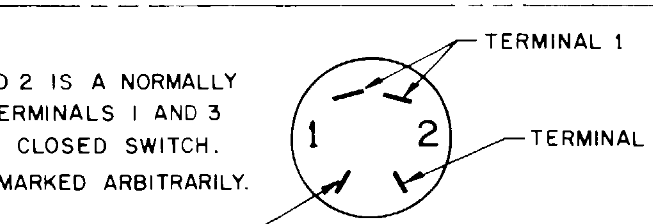
NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN Ω, ±5%, 1/2 W. CAPACITANCE VALUES ARE IN μF, ±20%, 10V.
2. ▭ DENOTES EQUIPMENT MARKINGS.
3. SWITCH S2 SHOWN IN OPERATE POSITION.
4. CONNECTORS VIEWED FROM SOCKET OR PIN SIDE:

P1



5. TERMINALS 1 AND 2 IS A NORMALLY OPEN SWITCH, TERMINALS 1 AND 3 IS A NORMALLY CLOSED SWITCH. TERMINALS ARE MARKED ARBITRARILY.



S1

EL3WX112

Figure FO-4. Radiacmeter (Model IM-174B PD) schematic diagram.

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

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DATE 10 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PPC-76

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

SAMPLE

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HISA 1686-75

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REVERSE OF DA FORM 2028-2 (TEST)

THE METRIC SYSTEM AND EQUIVALENTS

NEAR MEASURE

Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

EIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

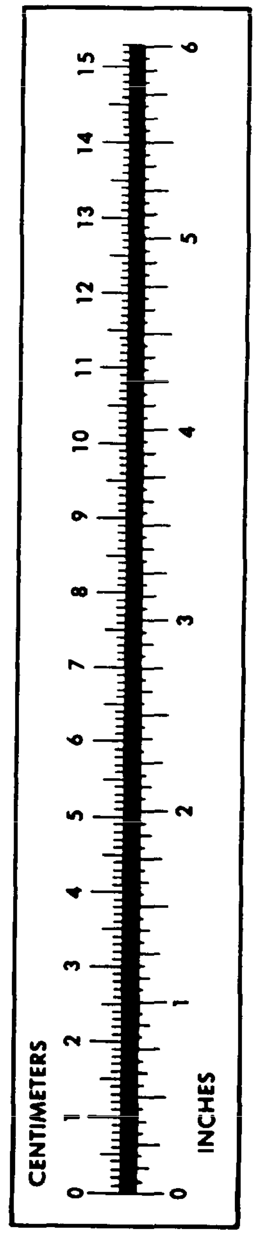
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



P I N : 0 3 3 7 9 9 - 0 0 1