TECHNICAL MANUAL

GENERAL SUPPORT MAINTENANCE MANUAL

TEST SET, CONTROL MONITOR-RECORDING HEAD AN/AYM-9

(FSN 6625-150-1882)

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1973

W A R N I N G

DANGEROUS VOLTAGES EXIST IN TEST SET, CONTROL MONITOR-RECORDING HEAD AN/AYM-9

Be careful when working around connectors, high voltage test points, and high-voltage circuits of equipment when equipment is energized. Keep protective caps on all connectors when not in use.

TECHNICAL MANUAL
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HEADQUARTERS
DEPARTMENT OF THE ARMY
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General Support Maintenance Manual

TEST SET, CONTROL MONITOR-RECORDING HEAD AN/AYM-9 (FSN 6625-150-1882)

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1-1. Scope

a. This technical manual provides general support maintenance instructions for Test Set, Control Monitor-Recording Head AN/AYM-9 (fig. 1-1). The manual includes an introduction, a description of the functioning of the equipment, general support maintenance instructions, and diagrams. The maintenance instructions cover troubleshooting, removal and replacement instructions, adjustment and alinement procedures, repair instructions, and testing procedures.

b. Operator and organizational maintenance instructions are contained in TM 11-6625-2478-12.

1-2. Indexes of Publications

a. DA Pam 310-4. 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.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

NOTE

Applicable forms and records are covered in TM 11-6625-2478-12.

1-3. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN : AMSEL-MA-SS, Fort Monmouth, N.J. 07703.

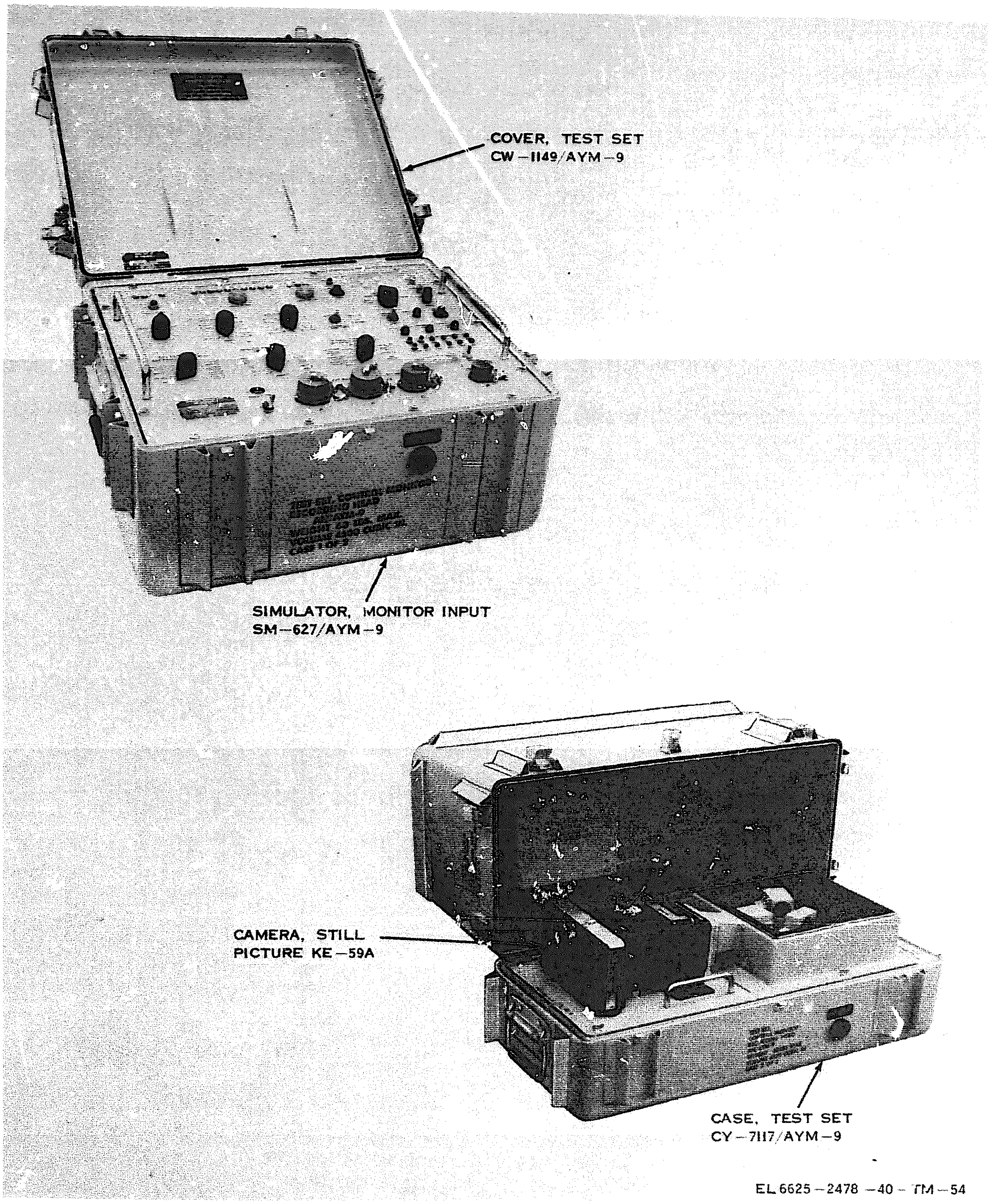


Figure 1-1. Test Set, Control Monitor-Recording Head
AN/AYM-9.

CHAPTER 2

FUNCTIONING OF EQUIPMENT

Section I. SYSTEM FUNCTIONAL ANALYSIS

2-1. Introduction

This chapter describes the functional operation of Test set, Control Monitor-Recording Head AN/AYM-9. The chapter is divided into three sections. This section, System Functional Analysis, contains a functional description of the system supported by an overall block diagram. The diagram illustrates each functional type of circuit as a block and the major signals which flow to and from these circuits and the items under test. Section II, Detailed Functional Analysis, contains detailed functional descriptions of each of the major functional circuits illustrated on the overall block diagram. These descriptions are supported by functional schematic diagrams that show circuits which together perform specific functions. The functional schematic diagrams and the related discussion are to the stage level and show the functional flow of signals from input (or generation) to output. These diagrams also provide aid in troubleshooting and testing. Section III, Detailed Circuit Description, provides a detailed description of the circuits in power supply assembly 1A3A9. The description is supported by reference to the schematic diagram of power supply assembly 1A3A9.

2-2. Overall Block Diagram Analysis (fig. FO-2)

a. When 115 volts ac, 400 Hz is applied to Simulator, Monitor Input SM-627/AYM-9, the ac power distribution circuit is energized. The ac power distribution circuit controls the application and distribution of ac voltages to the high voltage circuits and the low voltage regulator circuits. The high voltage circuits contains four (4) regulated high voltage power supplies : +500, - 442, -80 and +25. These circuits provide the following dc regulated high voltages: deflection, accelerating anode, gird, and cathode. These voltages are generated for use by the CRT under test. The low voltage regulator circuits, consisting of six low voltage, regulated, power supplies (+ 15, - 15, +25, -25, + 5, and + 85vdc) and two low voltage, unregulated, power supplies (+ 10 and + 115 vdc), provide the necessary operating voltages for test set circuitry. These output voltages are monitored by monitor circuits which are capable of sensing loss of any of the voltages. Occurrence of this condition causes the monitor circuit to light a front panel indicator, to indicate a fault condition. Absence of this condition causes the monitor circuit to light a different front panel indicator to indicate a normal operating condition.

b. The +500 volts dc, from the high voltage circuit, is applied to the deflection circuits. The remaining high voltages are sent directly to the CRT under test at accelerating anode, grid, and cathode voltages. The deflection circuits provide the vertical and horizontal deflection plates of the CRT under test with the necessary deflection signals. These signals produce a circular pattern display when the test set is in the KA60, IR/SLAR, CDM or KA76 mode and a raster display when in the PHOSPHOR mode.

c. The unblanking circuit provides an unblanking pulse to the deflection circuits that is used for generating signals in the PHOSPHOR mode. They also control the blanking of the CRT for displaying the circular dot pattern in the KA60, IR/SLAR, CDM or KA76 mode. Front panel controls provide a means of controlling the display time of circular dot patterns for two time intervals: single set operation and continuous operation. When single set operation is selected, the unblanking circuits generate one set of unblanking pulses, causing the dot pattern to be displayed for a single sweep of the CRT. When continuous operation is selected, unblanking pulses are generated continuously, causing the circular dot pattern to be displayed continuously.

d. The switch and resistor testing circuits provide a means of testing the control and thumbwheel switches and resistors in series with the thumbwheel switches of Control-Monitor C-8338/AYA-10. When performing switch tests, test voltages are provided to the switch under test. Thumbwheel switches, in response, forward coded signals to the applicable display indicators of the switch and resistor testing circuits. The display (DECIMAL, BCD, or BCD +3), if the switch is not defective, corresponds to the setting of the thumbwheel switch under test. Control switches, in response, forward a signal to either the DECIMAL -0 or the BCD +3-1 indicator lamp. This causes the applicable indicator to light when the control switch is in the normally-on or operated position. When performing tests * individual resistors in series with the thumbwheel switches in Control-Monitor C-8338/AYA.-iti, a test voltage is applied to the selected resistor. The voltage, read by means of an external voltmeter at test point 1A3J5, is indicative ‘of the condition of the resistor.

e. The battery testing circuit checks the 4.8 volt battery in Control Monitor C-8338/AY 10. The circuit contains a comparator and reference voltage source. If the comparator receives an input within the proper limits of the reference voltage, a fro& panel indicator illuminates indicate an acceptable condition.

2-3. Testing Sensor Recording Head Assemblies

Case, Test Set CY-7117/AYM-9 contains facilities for performing a go-no-go test of sensor recording head assemblies. The RHA to be tested is mounted on the turntable assembly of Camera, Still Picture KE-59A (fig. 1-1). CRT operating voltages, deflection signals, and unblanking signals are supplied by Simulator, Monitor Input SM-627/AYM-9 (fig. FO-2). The camera is used to take a Polaroid print of the test pattern displayed on the RHA CRT.

Section II. DETAILED FUNCTIONAL ANALYSIS

2-4. AC Power Distribution Circuit (fig. F0-3)

a. When primary power is connected to Test Set, Control Monitor-Recording Head AN/AYM-9, 115 volts ac at 400 Hz is applied from pins D and C of connector 1A3J4 to circuit breaker 1A3CB1. (Circuit breaker 1A3CB1 controls application of power to the ac power distribution circuits and in addition shuts off power in the event that excessive current is drawn.) Primary power (115 volts ac) is then applied from circuit breaker 1A3CB1 through filters 1A3FL1 and 1A3FL2 to transformer 1A3T1. Note that one side of the 115 volts ac line is controlled by interlock switch 1A3A9S1, which is connected in the line through pins s and t of connector 1A3P1. Filters 1A3FL1 and 1A3FL2 eliminate high frequency interference. When circuit breaker 1A3CB1 is set to the ON position, 115VAC indicator lamp 1A3DS22 lights and ELAPSED TIME meter 1A3M1 and transformer 1A3T1 are energized. Resistor 1A3R1 provides 115VAC indicator lamp 1A3DS22 with proper energizing voltage. Transformer 1A3T1 provides 435, 379, 78.2 and 26.8 volts ac to respective high voltage circuits. It also provides 82.3, 80.6, 26.1, 19.8, 11.4, and 12.0 volts ac to respective low voltage regulator circuits. In addition, it provides 6.3 volts ac through pins L and K of connector 1A3J3 to the filament of the C under test. The 6.3 volts ac is also applied L.-transformer 1A3A9A3T1 through pins G and b of connectors 1A3P1 and 1A3A9J1. A -442 volt dc level, from the -442 volt dc power supply, is also applied to pin b of connector 1A3A9J1. Transformer 1A3A9A3T1 provides a means of isolating the -442 volts dc voltage and transferring the 6.3 volt ac voltage, originally generated by transformer 1A3T1, to light 6.3VAC indicator lamp 1A3DS23.

b. The inducted 6.3 volt ac voltage, across pins 3 and 4, of 1:1 ratio transformer 1A3A9A3T1, is applied to pin e of connectors 1A3A9J1 and 1A3P1, and normally closed contacts NC of switch 1A3S4 to terminal 2 of indicator lamp 1A3DS23. Terminal 1 of indicator lamp 1A3DS23 is connected to ground. To test indicator lamp 1A3DS23, the BCD PRESS TO TEST switch 1A3S4 is operated causing the normally open contacts NO of switch 1A3S4 to close to switch pole C8. This connects a 10 volt dc voltage to terminal 2 of indicator lamp 1A3DS23 through normally open contacts NO of switch 1A3S4, pi 24 of connectors 1A3XA5 and 1A3A5P1, and current limiting resistor 1A3A5R18 of oscillator board assembly 1A3A5.

2-5. Low Voltage Regulator Circuits (fig FO-4)

The low voltage regulator circuits are mounted on low voltage regulator board assemblies 1A3A1, 1A3A3, and 1A3A4. The +15, −25, and +115 volt dc power supplies are located on low voltage regulator board assembly 1A3A1. The +25, −15, and +10 volt dc power supplies are located on low voltage regulator board assembly 1A3A3. The +85 and +5 volt dc power supplies are located on low voltage regulator board assembly 1A3A4.

cl. 4-85 *Volt Dc* Power Supply. The +85 volt de power supply receives 80.6 volts ac from the ac power distribution circuit through pins 5 and 7 of connectors 1A3XA4 and 1A3A4P1. This voltage is applied to full-wave bridge rectifier, diodes 1A3A4CR1 through 1A3A4CR4. Capacitors 1A3-A4C7 through 1A3A4C10 filter out high frequencies across each diode. The de voltage output from the full-wave bridge rectifier, diodes 1A3-A4CR1 through 1A3A4CR4, is applied to a series regulator circuit consisting of a positive series floating regulator microcircuit 1A3A4Z3 and series pass transistor 1A3A4Q1. Microcircuit 1A3-A4Z3 is a voltage regulator circuit consisting of a voltage reference amplifier, an error amplifier, a series pass transistor, and inputs for temperature compensating and current limiting components. As the load impedance on the +85 volt dc power supply changes, the voltage output from the full wave bridge rectifier circuit, diodes 1A3-A4CR1 through 1A3A4CR4, tends to change. This change in voltage is detected by microcircuit 1A3-A4Z3, across pins 8 (V +) and 5 (V -), producing an error signal at pin 6 (V out). Resistor 1A3-A4R5 limits the current through microcircuit 1A3A4Z3. The error signal is applied through zener diode 1A3A4VR2 to the base of transistor 1A3A4Q1. The biases transistor 1A3A4Q1 to compensate for the change in load current. Zener diode 1A3A4VR2 prevents current overload.

(1) The regulated output from the +85 volt dc power supply is routed to pulse generator board assembly 1A3A6 through pin 1 of connectors 1A3A4P1 and 1A3XA4 and pin 34 of connectors 1A3XA6 and 1A3A6P1.

(2) The +85 volts dc output is also routed through current limiting resistor 1A3A4R9 and pin 2 of connectors 1A3A4P1 and 1A3XA4 to +85V test point 1A3J18. Test point 1A3A4TP1-1 provides a means of monitoring the +85 volt dc voltage. A sensing voltage from the +85 volts de is derived from the junction of resistors 1A3A4R7 and 1A3A4R8 and applied to the monitor circuit on low voltage regulator board assembly 1A3A4.

b. +5 Volt Dc Power Supply. The +5 volt dc power supply receives 12 volts ac from the ac power distribution circuit through pins 32 and 33 of connectors 1A3XA4 and 1A3A4P1. This voltage is applied to full-wave bridge rectifier, diodes 1A3A4CR5 through 1A3A4CR8. Capacitors 1A3A4C11 through 1A3A4C14 filter out high frequencies across each diode. The dc voltage output from the full-wave bridge rectifier, diodes 1A3A4CR5 through 1A3A4CR8, is applied to a series voltage regulator circuit consisting of a positive series voltage regulator microcircuit 1A-3A4Z4 and series pass transistor 1A3A4Q2. Microcircuit 1A3A4Z4 contains a voltage regulator consisting of a voltage reference amplifier, an error amplifier, a series pass transistor, and input for temperature compensating and current limiting components. As the load impedance changes, the voltage output from the full-wave bridge rectifier circuit, diodes 1A3A4CR5 through 1A3-A4CR8, tends to change. This change in voltage is detected by microcircuit 1A3A4Z4, across pins 8 (V +) and 5 (V -), producing an error signal at pin 6 (V out). The error signal is applied to the base of transistor 1A3A4Q2. This biases transistor 1A3A4Q2 to compensate for the change in load current.

(1) The output of transistor 1A3A4Q2, via current limiting resistor 1A3A4R12, is applied to pin 14 of connectors 1A3A4P1 and 1A3XA4, The regulated +5 volts de is then applied to pulse generator board assembly 1A3A6 through pin 14 of connectors 1A3XA6 and 1A3A6P1. It is also applied to oscillator board assembly 1A3A5 at pin 14 of connectors 1A3XA5 and 1A3A5P1.

(2) Test point 1A3A4TP1-8 provides a means of monitoring the +5 volt dc voltage. The +5 volts dc is also routed through current limiting resistor 1A3A4R13 via pin 31 of connectors 1A3A4P1 and 1A3XA4 to test point 1A3J19.

c. +25 Volt Dc Power Supply. The +25 volt dc power supply receives 26.1 volts ac from the ac power distribution circuit via pins 5 and 4 of connectors 1A3XA3 and 1A3A3P1. The 26.1 volts ac is applied to a full-wave bridge rectifier, diodes 1A3A3CR5 through 1A3A3CR8. Capacitors 1A3A3C14 through 1A3A3C17 filter out high frequencies across each diode. Capacitor 1A3A3-C2 filters out 400 Hz ripple frequency. The dc voltage output of the rectifier circuit is applied to a series voltage regulator consisting of a positive series voltage regulator microcircuit 1A3A3-Z1 and series pass transistor 1A3A3Q1. Load cur-. rent flows through the collector-emitter circuit of transistor 1A3A3Q1. If this current changes as a result of a change in load impedance, the power supply voltage tends to change. The function of voltage regulator microcircuit 1A3A3Z1 is to detect the voltage change and generate a proportional error voltage.

(1) The voltage change is detected at pins 5 (V -) and 8(V +) and the error voltage is produced at pin 6 (V out). The error voltage changes the biasing of transistor 1A3A3Q1 causing the collector-emitter current to change, compensating for the change in load current. The +25 volt dc output is developed at the junction of resistors 1A3A3R3 and 1A3A3R7. It is routed through pin 8 of connectors 1A3A3P1 and 1A3-XA3 to the high voltage circuits and to pulse generator board assembly 1A3A6, deflection board assembly 1A3A7, and deflection board assembly 1A3A8 through pin 3 of the respective connectors 1A3XA6 and 1A3A6P1, 1A3XA7 and 1A3A7P1, and 1A3XA8 and 1A3A8P1.

(2) Test point 1A3A3TP1-4 provides a means of monitoring the +25 volt dc voltage. The +25 volt dc output is also applied through current limiting resistor 1A3A3R5 and pin 1 of connectors 1A3A3P1 and 1A3XA3 to test point 1A3-J15. A portion of the +25 volts de is obtained at the junction of resistors 1A3A3R7 and 1A3-A3R9 and routed to the monitor circuit as a sensing voltage through pin 2 of connectors 1A3-A3P1 and 1A3XA3.

d. - 15 Volt Dc Power Supply. The - 15 volt dc power supply receives 19.8 volts ac from the ac power distribution circuit through pins 33 and 32 of connectors 1A3XA3 and 1A3A3P1. This voltage is applied to a full-wave bridge rectifier, consisting of diodes 1A3A3CR9 through 1A3A3-CR12. Capacitors 1A3A3C18 through 1A3A3C21 filter out high frequencies across each diode. Capacitor 1A3A3C6 filters out 400 Hz ripple. The filtered dc voltage is applied to a series voltage regulator consisting of a negative series voltage regulator microcircuit 1A3A3Z2 and series pass transistor 1A3A3Q4. Variation in load impedance tends to change the dc voltage output of the rectifier, diodes 1A3A3CR9 through 1A3A3CR-12. Microcircuit 1A3A3Z2 detects this change at pins 8 (V +) and 5 (V-) and provides an error signal at pin 6 (V out). The error signal changes the bias on transistor 1A3A3Q4 causing collector-emitter current (limited through resistor 1A3-A3R18) to change, correcting the original variation in load current. Diodes 1A3A3VR1 and 1A3A3CR13 prevent current overload. The -15 volt dc output is routed from the junction of resistors 1A3A3R17 and 1A3A3R19 to oscillator board assembly 1A3A5, pulse generator boara assembly 1A3A6, deflection board assembly 1A3-A7, and deflection board assembly 1A3A8. The voltage to the assemblies is routed through pin 34 of connectors 1A3A3P1 and 1A3XA3 through pin 28 of connectors 1A3XA5 and 1A3A5P1, 1A3XA6 and 1A3A6P1, 1A3XA7 and 1A3A7P1, and 1A3XA8 and 1A3A8P1.

(1) The - 15 volts dc is routed to test point 1A3J17 through current limiting resistor 1A3A3-R20 and pin 28 of connectors 1A3A3P1 and 1A3XA3.

(2) Test point 1A3A3TP1-6 provides a means of monitoring the -15 volts dc voltage. A portion of the - 15 volts dc is applied to the monitor circuit as a sensing voltage through current limiting resistor 1A3A3R19 and pin 27 of connectors 1A3A3P1 and 1A3XA3.

e. + 10 Volt Dc Power Supply. The + 10 volt dc power supply receives 11.4 volts ac from the ac power distribution circuit. The voltage is applied through pins 14 and 15 of conrectors 1A3-XA3 and 1A3A3P1 to a full-wave bridge rectifier, diodes 1A3A3CR1 through 1A3A3CR4. Capacitors 1A3A3C10 through 1A3A3C13 filter out high frequencies across each diode. Capacitor 1A3A3-C1 filters out 400 Hz ripple frequency. Voltage regulation is not provided for the + 10 volt dc power supply circuit. The + 10 volt dc output is routed through pin 18 of connectors 1A3A3P1 and 1A3XA3 and pin 23 of connectors 1A3XA5 and 1A3A5P1 to oscillator board assembly 1A3A5. Oscillator board assembly 1A3A5 distributes the + 10 volts dc to various functional circuits. The + 10 volts dc is also made available at test point 1A3J16 through pin 12 of connectors 1A3A3P1 and 1A3XA3. Resistor 1A3A3R1 limits current at test point 1A3J16.

f. + 15 Volt Dc Power Supply. The + 15 volt dc power supply is functionally identical to the +25 volt dc power supply described in c above. The + 15 volt dc. power supply is contained on low voltage regulator board assembly 1A3A1. It receives 19.8 volts ac from the ac power distribution circuit through pins 5 and 4 of connectors 1A3XA1 and 1A3A1P1. The +15 volt dc output is applied from pin 8 of connectors 1A3A1P1 and 1A3XA1 to oscillator board assembly 1A3A5, pulse generator board assembly 1A3A6, deflection board assembly 1A3A7, and deflection board assembly 1A3A8. The +15 volts dc is applied to these assemblies through pin 5 of connectors 1A3XA5 and 1A3A5P1, 1A3XA6 and 1A3A6P1, 1A3XA7 and 1A3A7P1, and 1A3XA8 and 1A3A8P1. The +15 volts dc is also provided through pin 1 of connectors 1A3A1P1 and 1A3XA1 to test point 1A3J12. Test point 1A3J12 provides a means of monitoring the +15 volt dc output. The +15 volts dc sensing voltage is connected to the monitor circuit from pin *2 of connectors 1A3A1P1 and 1A3XA1

g. −25 Volt Dc Power Supply. The −25 volt dc power supply is functionally identical to the −15 volt dc power supply described in *d* above. The -25 volt dc power supply is contained on lobs: voltage renovator board assembly 1A3A1. It receives 26.1 volts ac from the ac power distribution circuit through pins 38 and 32 of connectors 1A3XA1 and 1A3A1P1. The -25 volt dc output is applied from pin 34 of connectors 1A3A1P1 and 1A3XA1 to oscillator board assembly 1A3A5, deflection board assembly 1A3A7, and deflection board assembly 1A3A8. The -25 volts de is applied to the assemblies through pin 10 of connectors 1A3XA5 and 1A3A5P1, 1A3XA7 and 1A3A7P1, and 1A3XA8 and 1A3A8P1. The -25 volts de is also made available at test point 1A3J14 through pin 28 of connectors 1A3A1P1 and 1A3XA1. Test point 1A3J14 provides a means of monitoring the -25 volt de output. A portion of the voltage is applied to the monitoring circuit as a sensing voltage. This sensing voltage comes from pin 27 of connectors 1A3A1P1 and 1A3XA1.

h. +115 Volt DC Power Supply. The +115 volt dc power supply is functionally identical to the +10 volt dc power supply described in e above. The +115 volt dc power supply is contained on low voltage regulator board assembly 1A3A1. It receives 82.3 volts ac from the ac power distribution circuit through pins 14 and 15 of connectors 1A3XA1 and 1A3A1P1. The +115 volts dc output is applied to pin 26 of connectors 1A3XA6 and 1A3A6P1 on pulse generator board assembly 1A3A6 from pin 18 of connectors 1A3A1P1 and 1A3XA1, The +115 volts de is also made available at test point 1A3J13 through pin 12 of connectors 1A3A1P1 and 1A3XA1. A portion of the voltage is applied to 115VDC indicator lamp 1A3DS26 through pin 23 of connectors 1A3XA1 and 1A3A1P1 The indicator lamp lights red to indicate the presence of the voltage.

2-6. Deflection Circuits
(fig. FO-5)

The deflection circuits generate horizontal and vertical CRT deflection signals. The 100 Hz signals originate from generator 1A3A5Z3 which has a frequency stability of +1.0 percent. Generator 1A3A5Z3 operates when +15 and −15 volts dc are applied to the + (positive) and − (negative) pins and ground is applied to pin 2. The routin of the signals varies with the -node selected ‘by RHA TEST SELECT switch 1A3S14 as described in a through d below.

a. KA60, IR/SLAR, CDM Mode. The 100 Hz sinusoidal output at pin 5 of generator 1A3A5Z3 is routed through resistor 1A3A5R2 and contact 4 and arm 2 of relay 1A3A5K1, to pin 3 of buffer amplifier 1A3A5Z1. The 100 Hz sinewave output of generator 1A3A5Z3 is also applied to pin 3 of buffer amplifier 1A3A5Z2 through capacitor 1A3A5C2. The 100 Hz signal applied to buffer amplifier 1A3A5Z1, is then phase shifted -45 degrees by a phase shift network consisting of capacitor 1A3A5C1 and resistor 1A3A5R2 and the 100 Hz signal applied to buffer amplifier 1A3A5Z2 is phase shifted +45 degrees by a phase shift network consisting of capacitor 1A3A5C2 and resistor 1A3A5R4. Therefore, the signal output at pin 6 of amplifier 1A3A5Z2 is 90 degrees out of phase with that at pin 6 of buffer amplifier 1A3A5Z1. Resistors 1A3A5R1 and 1A3A5R3 provide negative feedback for the buffer amplifiers for stability. Both buffer amplifiers 1A3A5Z1 and 1A3A5Z2 receive + 15 and - 15 volt de power at pins 7 and 4, respectively. The sinewave outputs of buffer amplifiers 1A3A5Z1 and 1A3A5Z2, respectively, are present at test points 1A3A5-TP1-8 and 1A3A5TP1-1. Test point 1A3A5TP-1-5 is used for ground connections. The sinewave signals are then routed to pins 25 and 1 of connectors 1A3A5P1 and 1A3XA5.

(1) The sinewave signal from pin 25 of connector 1A3XA5 is applied to pin 2 of inverting amplifier 1A3A7Z1 through pin 19 of connectors 1A3XA7 and 1A3A7P1, and resistor 1A3A7R1. It is also connected to wiper arm C1 of RHA TEST SELECT switch 1A3S14A. The 90° phase shifted sinewave signal from pin 1 of connector 1A3XA5 is applied to pin 2 of inverting amplifier 1A3A8Z1 through pin 19 of connectors 1A3XA8 and 1A3A8P1 and resistor 1A3A8R1. It is also connected to wiper arm C1 of switch

1A3S14B. The inverting amplifiers are identical and have unity gain established by the values of resistors 1A3A7R1, 1A3A7R2, 1A3A7R3, 1A3A8R1, 1A3A8R2, and 1A3A8R3. The sinusoidal signals are then inverted by amplifiers 1A3A7Z1 and 1A3A8Z1, respectively. The output of inverting amplifier 1A3A7Z1 is routed from pin 6 to wiper contact C2 of switch 1A3S14A through pin 18 of connectors 1A3A7P1. and 1A3XA7. The output of inverting amplifier 1A3-A3Z1 is routed from pin 6 to wiper arm C3 of switch 1A3S14A through pin 18 of connectors 1A3A8P1 and 1A3XA8.

(2) The process of inversion described in (1) above results in a sinusoidal signal at wiper arm C2 of switch 1A3S14A, which is 180 degrees out of phase with the signal at wiper arm C1. These signals are hereafter identified as the - (negative) horizontal and + (positive) horizontal deflection signals, respectively. In similar manner, the vertical deflection signal at wiper arm C3 of switch 1A3S14A is 180 degrees out of phase with the signal at wiper arm C1 of switch 1A3S14B. These signals are hereafter identified as the + (positive) vertical and - (negative) vertical deflection signals, respectively.

(3) RHA TEST SELECT switch 1A3S14 routes the horizontal and vertical deflection signals to deflection amplifier board assembly 1A8-A7. The + (positive) horizontal deflection signal is routed from wiper arm C1 to contact 1 of switch 1A3S14A and to the input of deflection amplifier board assembly 1A3A7 through pin 2 of connectors 1A3XA7 and 1A3A7P1. The - (negative) horizontal deflection signal is routed from wiper arm C2 to contact 5 of switch 1A3-S14A and to the input of deflection amplifier board assembly 1A3A7 through pin 34 of connectors 1A3XA7 and 1A3A7P1. The - (negative) vertical deflection signal is routed from wiper arm C1 to contact 1 of switch 1A3S14B and to deflection amplifier board assembly 1A3A8 through pin 34 of connectors 1A3XA8 and 1A3-A8P1. The + (positive) vertical deflection signal is routed from wiper arm C3 to contact 9 of switch 1A3S14A and to deflection amplifier board assembly 1A3A8 through pin 2 of connectors 1A3XA8 and 1A3A8P1. The - (negative) vertical deflection signal and + (positive) vertical deflection signal are available for monitoring at test point 1A3A7TP1-4 and 1A3A8TP1-4, respectively.

(4) The + (positive) horizontal deflection circuits on deflection amplifier board assembly 1A3A7 consist of two feedback amplifier circuits: 1A3A7Z2, transistors 1A3A7Q1 and 1A3-A7Q2, and associated components. The + (positive) horizontal deflection signal is applied to the input of feedback amplifier 1A3A7Z2. Both feedback amplifiers form an operational amplifier whose overall closed loop gain of -3.4 db (nominal) is determined by potentiometer 1A3A7R8 and resistors 1A3A7R9 and 1A3A7R15. Potentiometer 1A3A7R8 is used to calibrate the operational amplifier. The gain of the first feedback amplifier 1A3A7Z2 is determined by resistors 1A3A7R10 and 1A3A7R11. The gain of the second feedback amplifier (1A3A7Q1 and 1A3A7-Q2) is determined by resistors 1A3A7R7, 1A3-A7R12, and 1A3A7R16. Resistors 1A3A7R7 and 1A3A7R12 set the biasing of the first feedback amplifier's (1A3A7Z2) output at 0 volt dc. Both feedback amplifiers are independently stable ; their independent response curves are shaped by capacitors 1A3A7C8 and 1A3A7C5, respectively. The + (positive) horizontal deflection signal is available at test point 1A3A7TP1-3.

(5) The - (negative) horizontal deflection amplifier circuit consists of feedback amplifier 1A3A7Z3 and a feedback amplifier consisting of 1A3A7Q3 and 1A3A7Q4 which comprise the operational amplifier circuit. Potentiometer 1A3A R21 and resistors 1A3A7R22 and 1A3A7R28 determine the closed loop gain of the operational amplifier circuit. Resistor 1A3A7R20 is the collector load resistor for transistor 1A3A7Q3. Resistors 1A3A7R23 and 1A3A7R24 determine the gain of the feedback amplifier 1A3A7Z3. Resistor 1A3A7R19,. 1A3A7R25, and 1A3A7R29 determine the gain of the feedback amplifiers, 1A3A7Q3 and 1A3A7Q4. The + (positive) horizontal deflection amplifier circuit consists of feedback amplifier 1A3A7Z2 and a feedback amplifier consisting of 1A3A7Q1 and 1A3A7Q2 which comprise the operational amplifier circuit. Potentiometer 1A3A7R8 and resistors 1A3A7R9 and 1A3A7R15 determine the closed loop gain of the operational amplifier circuit. Resistor 1A3-A7R4 is the collector load resistor for transistor 1A3A7Q1. Resistors 1A3A7R10 and 1A3A7R11 determine the gain of the feedback amplifier 1A3A7Z2. Resistors 1A3A7R7, 1A3A7R12, an 1A3A7R16 determine the gain of the feedback amplifiers, 1A3A7Q1 and 1A3A7Q2. The + (positive) and - (negative) horizontal deflection signal outputs are available at test points 1A3A7 TP1-3 and 1A3A7TP1-5 respectively. The + (positive) and - (negative) horizontal deflec-

tion signals as inputs to deflection amplifier board assembly 1A3A7 are available at test points 1A3A7TP1-1 and 1A3A7TP1-8, respectively.

(6) The + (positive) and − (negative) vertical deflection signals are amplified in an identical manner as the + (positive) and − (negative) horizontal deflection signals. Deflection amplifier board assembly 1A3A8 is identical to deflection amplifier board assembly 1A3A7. The + (positive) and − (negative) vertical deflection signal outputs are available at test points 1A3A8TP1-3 and 1A3A8TP1-5, respectively.

(7) The + (positive) and − (negative) horizontal deflection signals are applied from pins 12 and 29, respectively, of connectors 1A3A7P1 and 1A3XA7 to pins p and r of connectors 1A3P1 and 1A3A9J1. The + (positive) and - (negative) vertical deflection signals are applied respectively from pins 12 and 29 of connectors 1A3A8P1 and 1A3XA8 to pins L and U of connectors 1A3P1 and 1A3A9J1. The + (positive) horizontal deflection signal at pin p of connector 1A3A9J1 is coupled through capacitor 1A3A9C4 to a +500 volt dc level which is provided through current limiting resistors 1A3A9R12 and 1A3-9R13. The signal is then routed through pin of connectors 1A3A9J1 and 1A3P1 to pin E of connector 1A3J3. The - (negative) horizontal deflection signal and the + (positive) and - (negative) vertical deflection signals are also capacitively coupled (1A3A9C5, 1A3A9C10, and 1A3-A9C9, respectively) to a 500 volt dc level which is provided through resistors 1A3A9R14 and 1A3-A9R15, resistors 1A3A9R31 and 1A3A9R32, and resistors 1A3A9R29 and 1A3A9R30.

(8) The signals are then routed respectively through pins R, N, f, and T of connectors 1A3-A9J1 and 1A3P1 to pins D, E, A, and C of connector 1A3J3. During tests of a CRT monitor assembly or recording head assembly, the deflection signals present at connector 1A3J3 are connected to the deflection plates of the CRT under test.

(9) The amplification given the deflection signals for the KA60 IR/SLAR, CDM mode of operation produces a circular display, approximately 0.6 inch in diameter, on the CRT. Potentiometers 1A3A7R8, 1A3A7R21, 1A3A8R8, and 1A3A8R21 permit adjustment of the amplitudes of the deflection signals. Potentiometers 1A3A7-R5, 1A3A7R17, 1A3A8R5 and 1A3A8R17 permit adjustment of the deflection signal amplitudes in the KA76 mode of operation discussed in b below.

b. KA76 Mode. In the KA76 mode, the development of the deflection signals is identical to that described in *a* above except that the signals are routed to different resistors at the inputs to amplifiers 1A3A7Z2, 1A3A7Z3, 1A3A8Z2, and 1A-3A8Z3 which change the overall gain of the amplifiers to −2.0 db (nominal). The reduced gain in the KA76 mode provides a smaller deflection signal amplitude in order to obtain a circular display, approximately 0.35 inch in diameter, on the CRT. With switch 1A3S14 in the KA76 position, the deflection signal routings from switch 1A3S14 are as follows:

(1) The + (positive) horizontal deflection signal is routed from wiper arm C1 to contact 2 of switch 1A3S14A. From there it is routed to deflection amplifier beard assembly 1A3A7 through pin 1 of connectors 1A3XA7 and 1A3-A7P1. It is applied to pin 3 of amplifier assembly 1A3A7Z2 through potentiometer 1A3A7R5 and resistor 1A3A7R6. The operation of the horizontal deflection circuits is functionally identical to the circuit analysis described in *a*(4) above.

(2) The − (negative) horizontal deflection signal is routed from wiper arm C2 to contact 6 of switch 1A3S14A. From there it is routed to deflection amplifier board assembly 1A3A7 through pin 33 of connectors 1A3XA7 and 1A3-A7P1. It is then applied to pin 3 of amplifier assembly 1A3A7Z3 through potentiometer 1A3-A7R17 and resistor 1A3A7R18. The operation of the horizontal deflection circuits is functionally identical to the circuit analysis described in a(4) above.

(3) The + (positive) vertical deflection signal is routed from wiper arm C3 to contact 10 of switch 1A3S14A. From there it is routed to deflection amplifier board assembly 1A3A8 through pin 1 of connectors 1A3XA8 and 1A3A8P1.

(4) The - (negative) vertical deflection signal is routed from wiper arm C1 to contact 2 of switch 1A3S14B. From there it is routed to deflection amplifier board assembly 1A3A8 through pin 33 of connectors 1A3XA8 and 1A3-A8P1.

(5) Relay 1A3A5K2 is energized when switch 1A3S14B is in the KA76 position. In this position, wiper arm C2 of the switch connects ground to the coil of the relay through contact 6 of the switch and pin 8 of connectors 1A3XA5 and 1A3A5P1. The other terminal of the coil is connected to -25 volts dc. In the deenergized state, +5 volts dc is routed through arm 4 and

wiper 2 of relay lA3A5K2 and pin 12 of connectors lA3A5Pl and lA3XA5 to pin 25 of connector lA3XA6. This selects 152 µsecond pulse off-time in the unblanking circuit. When relay lA3A5K2 is energized, the +5 volt de source is routed through resistor lA3A5R22, arm 3 and wiper 2 of the relay and pin 12 of. connectors lA3A5P1 and lA3XA5 to pin 25 of connector lA3XA6. This selects 80 µsecond pulse off-time in the unblanking circuit.

c. ***Phosphor Mode.*** When switch lA3Sl4 is in the PHOSPHOR position, the deflection signals are developed as described in a above except that relay lA3A5Kl operates and relay lA3A5K2 deenergizes. This causes the CRT blanking time to change from 152 µseconds to 80 µseconds. A sawtooth deflection signal is then used in lieu of a sinusoidal waveform, for linear raster. With switch lA3S14B in PHOSPHOR position, wiper arm C2 of the switch connects ground to the coil of relay lA3A5Kl through contact 7 of the switch and pin 33 of connectors lA3XA5 and lA3A5Pl. The other terminal of the coil is connected to -25 volts dc. In the deenergized state, +5 volts dc is routed through arm 6 and wiper 8 of relay IASA5Kl and pin 32 of connectors lA3-A5Pl and lA3XA5 to pin 24 of connector lA3-XA6. This selects a 20 µsecond pulse width in the unblanking circuit. In the energized state, +5 volts dc is routed through resistor lA3A5R23, arm 7 and wiper 8 of relay lA3A5K1, and pin 32 of connectors lA3A5Pl and lA3XA5 to pin 24 of connector lA3XA6. This selects an 80 µsecond pulse width in the unblanking circuit. With relay lA3A5Kl energized and relay lA3-A5K2 deenergized, a raster unblanking signal is developed by the unblanking circuits, having an 80 µsecond pulse width and an 80 µsecond off-time. The raster unblanking signal is applied to oscillator board assembly lA3A5 at pin 31 of connectors lA3XA5 and lA3A5Pl and is converted to a sawtooth waveform. The 80 volt unblanking signal developed at the junction of resistors lA3A5R24 and lA3A5R25 is coupled through capacitor lA3A5C7 and integrated by resistor lA3A5R24 and capacitor lA3A5Cl. The integrated signal initially has a rise time which is nearly linear. This linear portion of the 80 volt integrated signal is the only portion of the signal which passes through buffer amplifier lA3A5Zl due to the slew rate of amplifier lA3A5Zl. The output of amplifier lA3A5Zl then appears as a 9 volt peak to peak triangular wave. The sawtooth waveform replaces the 100 Hz sinewave in the development of the horizontal deflection signals to produce a raster pattern.

*d. **Single and Continuous CRT Displays.*** The vertical and horizontal deflection signals generated by the deflection circuits are supplied to the CRT under test for all mode selections of RHA TEST SELECT switch lA3Sl4 and for either mode selection of RHA MODE switch lA3Sl2 (fig. FO-6) (single or continuous CRT displays).

2-7. Unblanking Circuits

(fig. FO-6)

The unblanking circuits provide a means of producing a dotted circle and linear raster CRT display. This is accomplished by using two types of display: single and continuous. The operation of the unblanking circuit in the single and continuous CRT display mode is described in a and b below.

a. Single ***CRT Display.*** When the RHA MODE switch lA3Sl2 is set to SINGLE and the RHA TEST SELECT switch lA3Sl4B is set to any position other than PHOSPHOR, pin 23 of connectors lA3XA6 and lA3A6Pl is not grounded. This allows a +5 volt dc level to be applied through resistor lA3A6R22 to pin 13 of gate lA3A6Z9C, thereby conditioning the gate. This allows a 10 millisecond pulse to be gated through gate lA3A6Z9C when SINGLE PULSE pushbutton switch lA3Sl3 is depressed. During this 10 millisecond interval, the pulse generator, consisting of two cross-coupled single shots lA3A6ZlO and lA3A6Zl1, provides a series of unblanking pulses through gate lA3A6Z9D. In the KA60, IR/SLAR, CDM mode, the pulses are 20 µseconds wide with an 80 µsecond off-time between pulses. In the KA76 mode, the unblanking pulses are 20 µseconds wide with a 152 µsecond off-time between pulses. In the PHOSPHOR mode, the pulses are 80 µseconds wide with an 80 µsecond off-time between pulses. The generation of the 10 millisecond pulse from gate lA3A6-Z9B at pin 6 is described in (1) through (6) below.

(1) The 100 Hz deflection sinewave, derived from generator lA3A5Z3, is applied to pin 2 of connectors lA3XA6 and lA3A6Pl through resistor lA3A6R2 to pin 2 of differential comparator lA3ASZl. The zero volt crossings of the sinewave are detected by differential comparator lA3A6Zl. The output from differential comparator lA3A6Zl at pin 6 is applied to resistor lA3-A6R4. The differential comparator lA3A6Z1, re-

sistor 1A3A6R4, and diode 1A3A6CR8 comprise circuit which functions to produce a squarewave from the sinewave input. The squarewave is applied to inverter 1A3A6Z4 pin 11 which provides the proper digital load for differential comparator 1A3A6Z1. From pin 10 of inverter 1A3-A6Z4, the squarewave toggles flip-flop 1A3A-6Z6 at trigger input pin 2. Flip-flop 1A3A6Z6 is toggled once for each squarewave to produce a squarewave one-half the frequency of the input. The Q output at pin 6 of flip-flop 1A3A6Z6 is applied to trigger input pin 2 of flip-flop 1A3A-6Z7 and to pin 2 of gate 1A3A6Z9A. Gate 1A3A-6Z9A, conditioned by a set input of +5 volts dc is now enabled. The output of gate 1A3A6Z9A, at pin 3, is applied to trigger input pin 2 of flip-flop 1A3A6Z8. When SINGLE PULSE switch 1A3S13 is not depressed, flip-flops 1A3-A6Z7 and 1A3A6Z8 are toggled at the 50 Hz output rate of flip-flop 1A3A6Z6. This enables gate 1A3A6Z9B for the duration of 50 Hz or a 10 millisecond interval.

(2) When SINGLE PULSE switch 1A3S13 is depressed, the ground signal connected to pins 1 and 2 of switch 1A3S13 and pin 21 of connectors 1A3XA6 and 1A3A6P1 is removed. The round signal is now routed by switch 1A3S13 gins 3 and 4 to pin 22 of connectors 1A3XA6 and 1A3A6P1, and pin 1 of flip-flop 1A3A6Z5A. Flip-flop 1A3A6Z5A allows only one trigger pulse, generated by SINGLE PULSE switch 1A3S12, to trigger single shot 1A3A6Z3 regardless of any switch contact bounce of SINGLE PULSE switch 1A3S13. Flip-flop 1A3A5Z5A is reset by the +5 volts applied through resistor 1A3A6R14 and its output at pin 6 triggers single shot 1A3A6Z3. Upon release, SINGLE PULSE switch 1A3S13 resets flip-flop 1A3A6Z-5A by the application of +5 volts dc through resistor 1A3A6R13. Single shot 1A3A6Z3 generates a 200 nanosecond pulse which is applied from pin 6 of single shot 1A3A6Z3 to pin 12 of flip-flop 1A3A6Z5B. The 200 nanosecond pulse sets flip-flop 1A3A6Z5B which applies a set conditioning level from its Q output at pin 11. Once this occurs, the toggling action of flip-flops 1A3A6Z7 and 1A3A6Z8 occurs. On the second toggle of flip-flop 1A3A6Z7, the Q output at pin 9 resets flip-flop 1A3A6Z5B. This ends the 10 millisecond interval. The cycle is repeated when switch 1A3S13 is again depressed. In addition to the generation of the 10 millisecond interval, SINGLE PULSE indicator 1A3DS28 lights when SINGLE PULSE switch 1A3S13 is depressed. This occurs as a result of triggering single shot 1A3A6Z12 at pin 1 when gate 1A3A6Z9B is enabled.

(3) Single shot 1A3A6Z12 generates and forwards a 220 millisecond pulse from pin 8 to forward bias transistor 1A3A6Q6 through resistor 1A3A6R32. This places the collector of transistor 1A3A6Q6 effectively at ground, providing a return for the +115 volts dc applied to indicator lamp 1A3DS28. Thus, indicator lamp 1A3DS28 receives ground and +115 volts dc through pins 20 and 15 of connectors 1A3A6P1 and 1A3XA6, respectively. Resistor 1A3A6R1 limits the current through the lamp circuits. Indicator lamp 1A3DS28 remains lighted for 220 milliseconds after SINGLE PULSE switch 1A3S13 is operated.

(4) The pulse generator single shots, 1A-3A6Z10 and 1A3A6Z11, are connected in an astable multivibrator configuration. The output of single shot 1A3A6Z11 at pin 8 is applied to the input of single shot 1A3A6Z10 at pin 1 and, in turn, the output of single shot 1A3A6Z10 at pin 8 triggers single shot 1A3A6Z11 at pin 1. This regenerative action produces a train of pulses from pin 6 of single shot 1A3A6Z11. The pulse width and duration from the end of one pulse to the start of the next is a function of the RC networks connected to pins 11 and 13 of single shots 1A3A6Z10 and 1A3A6Z11. These networks consist of capacitors 1A3A6C15 and 1A3A6C16, resistors 1A3A6R20 and 1A3A6R21, and potentiometer 1A3A6R33. Potentiometer 1A3A6R33 permits adjustment of the pulse interval of single shot 1A3A6Z11.

(5) With gate 1A3A6Z9C enabled during the 10 millisecond interval, gate 1A3A6Z9D provides unblanking pulses from its output at pin 8 to the unblanking amplifier, consisting of transistors 1A3A6Q7, 1A3A6Q8, and 1A3A6Q9. Transistor 1A3A6Q7 amplifies the unblanking pulses. Capacitors 1A3A6C18 and resistor 1A3A-6R25 provide pulse shaping. During the absence of unblanking pulses from gate 1A3A6Z9D, transistor 1A3A6Q8 is forward biased. This effectively places the collector of transistor 1A3A6Q7 at ground. Transistor 1A3A6Q8 is at cutoff as is transistor 1A3A6Q9. Transistors 1A3A6Q8 and 1A3A6Q9 are connected in a Darlington configuration for added current capacity. The emitter of transistor 1A3A6Q9 is applying a - 15 volts dc level out through resistors 1A3A-6R30 and 1A3A6R29 as an unblanking voltage

to the CRT. When an unblanking pulse occurs, transistor 1A3A6Q7 is reverse biased and its base is clamped to −15 volts dc by diode 1A3A-6CR5 and resistor 1A3A6R26. At cutoff, +115 volts dc is applied through resistor 1A3A6R27 to the base of transistor 1A3A6Q8, forward biasing it. The base of transistor 1A3A6Q8 goes to the difference voltage of 30 volts dc as a result of current flow through diode 1A3A6CR7. Collectors of transistors 1A3A6Q8 and 1A3A6Q9 are clamped to −85 volts dc to form the unblanking pulse. Diode 1A3A6CR6 also conducts during this phase, to provide a current feedback through resistor 1A3A6R29.

(6) The unblanking pulses are sent to the CRT monitor assembly of Control-Monitor C-8338/AYA-10 or the RHA under test through pin 32 of connectors 1A3A6P1 and 1A3XA6. The unblanking pulses are also applied to UNBLANKING test point 1A3J20 through pin 31 of connectors 1A3A6P1 and 1A3XA6 and resistor 1A3A6R31.

b. Continuous CRT Display. A continuous mode is initiated if RHA MODE switch 1A3S12 is set to CONTINUOUS or RHA TEST SELECT switch 1A3S14 is set to PHOSPHOR.

(1) When RHA TEST SELECT switch 1A3S14 is set to PHOSPHOR, a ground signal is routed through wiper arm C3 and contact 11 of switch 1A3S14B to pin 23 of connectors 1A-3XA6 and 1A3A6P1. The ground signal is then routed to enable gate 1A3A6Z9C. Gate 1A3A6-Z9D will then pass the output pulses from the pulse generator, consisting of single shots 1A3A-6Z10 and 1A3A6Z11, on a continuous basis. The remaining operation of the circuits is as previously described in the a above.

(2) When RHA MODE switch 1A3S12 is set to CONTINUOUS, ground is applied to pin 23 of connector 1A3XA6 through arm 2 and contact 1 of switch 1A3S12. The circuit operates in the same manner as described in (1) above.

2-8. Monitor Circuit
(fig. FO-7)

a. The monitor circuit receives sensing voltages from the -25, -15, +25, +15 and +85 volt dc power supplies of the low voltage regulator circuits. If all voltages are present, the monitor circuit causes GO indicator lamp 1A3DS9 to light. If one or more of the voltages are not present, FAILURE indicator lamp 1A3DS10 lights. The -25 and - 15 volt dc sensing voltages are applied through pins 21 and 20 of connectors 1A3XA4 and 1A3A4P1 of low voltage regulator board assembly 1A3A4 to pins 1 and 4 of gates 1A3A4Z1A and 1A3A4Z1B, respectively. The +25 and + 15 volt dc sensing voltages are applied to pins 15 and 18 of connectors 1A3XA4 and 1A3A4P1, pins 2 and 4 of gate 1A3A4Z2A, and to pins 12 and 10 of gate 1A-3A4Z2B, respectively. The +85 volt dc sensing voltage, which is generated within low voltage regulator board assembly 1A3A4, is applied to pin 9 of gate 1A3A4Z2A and to pin 5 of gate 1A3A4Z2B. The -15 and -25 volts dc sensing voltages are applied to and inverted by gates 1A3A4Z1A and 1A3A4Z1B. The positive voltage outputs from pins 3 and 6 of gates 1A3A4Z1A and 1A3A4Z1B are applied to pins 1 and 13 of gates 1A3A4Z2A and 1A3A4Z2B, respectively. Gates 1A3A4Z2 detect the + 15, +25 and + 85 volt dc sensing voltages. If they are all present, the outputs at pins 6 and 8 of gates 1A3A4Z2A and 1A3A4Z2B are at ground level. If one or more voltages are not present, the outputs are positive voltage levels.

b. A ground output from pin 6 of gate 1A3A-4Z2A provides reverse bias to transistor 1A3A-4Q3. A ground output from pin 8 of gate 1A3A-4Z2B is inverted by gate 1A3A4Z1C and its output at pin 8 forward biases transistor 1A3A4Q4 since +5 volts dc is applied through resistor 1A3A4R17 to the base of transistor 1A3A4Q4. In this case, (all voltages present at the inputs to the monitor circuit) FAILURE indicator Iamp 1A3DS10 remains off and GO indicator lamp 1A3DS9 lights. If one or more of the voltages are not present, the reverse is true. In this case, transistor 1A3A4Q3 is forward biased through resistor 1A3A4R16 and transistor 1A-3A4Q4 is reverse biased by the presence of a ground level at the output of inverter gate 1A-3A4Z1C. Collector outputs from transistors 1A-3A4Q3 and 1A3A4Q4 are applied through pins 19 and 22 of connectors 1A3A4P1 and 1A3XA4, normally closed contacts and arms 6 and 5 of BCD PRESS TO TEST switch 1A3S4, to pin 1 of indicator lamps 1A3DS10 and 1A3DS9. Pin 2 of indicator lamps 1A3DS10 and 1A3DS9 receive + 10 volts dc from oscillator board assembly 1A3A5. The 10 volts dc is routed through resistors 1A3A5R16 and 1A3A5R15 and pins 20 and 18 of connectors 1A3A5P1 and 1A3XA5. Indicator lamps 1A3DS9 and 1A3DS10 can be tested by depressing switch 1A3S4. This applies a ground through normally open contacts and arms C5 and C6 of switch 1A3S4 to pin 1 of indicator lamps 1A3DS9 and 1A3DS10 causing e indicator lamps to light.

2-9. Battery Testing Circuit (fig. FO-8)

The battery testing circuit determines whether the voltage of the battery in Control-Monitor C-8338/AYA-10 is above its minimum tolerance when under load. The circuit consists of comparator 1A3A6Z2, transistor driver 1A3A6Q5, and associated components. The battery voltage is applied through pins HH and GG of connector 1A3J2 to BATTERY TEST switch 1A3S-11.

a. When BATTERY TEST switch 1A3S11 is depressed, the positive line of the battery is routed through contacts 3 and 4 of switch 1A3S-11 and pin 1 of connectors 1A3XA6 and 1A3A6-P1 to Ioad resistor 1A3A6R5, capacitor (1A3A-6C3, and to pin 3 of comparator 1A3A6Z1. The negative line of the battery is routed through pin GG of connector 1A3J2, and pin 16 of connectors 1A3XA6 and 1A3A6P1 to ground in pulse generator board assembly 1A3A6.

1. The charge voltage of capacitor 1A3A6C3 pin 3 of comparator 1A3A6Z2 is effectively the battery voltage. This charge voltage is compared with the voltage from potentiometer 1A-3A6R9. Using a VTVM, the potentiometer 1A-3A6R9 is adjusted for 4.8 volt dc output. This voltage is developed by a divider network consisting of resistors 1A3A6R7 and 1A3A6R8 and potentiometer 1A3A6R9. Regulated + 25 volts dc is applied to the divider network through resistor 1A3A6R6. Diode 1A3A6VR1 aids in maintaining a constant voltage across the divider. If the voltage from the battery at pin 3 exceeds the reference voltage at pin 2 of comparator 1A3A6Z2, the output from the comparator at pin 7 is at a logic zero. This output is inverted by gate 1A3A6Z4F to +5 volts dc. Gate 1A3A-6Z4F receives the comparator's logic zero input at pin 13 and produces a positive voltage at pin 12. The positive voltage at pin 12 of gate 1A3A-6Z4F is applied to the base of transistor 1A3A-6Q5.

C. The +5 volts dc forward biases transistor 1A3A6Q5. The collector of transistor 1A3A-6Q5 goes to ground and returns pin 1 of BATTERY INDICATOR lamp 1A3DS8 to ground through normally closed contacts and arm C4 of BCD PRESS TO TEST switch 1A3S4. This causes BATTERY INDICATOR lamp 1A3DS8 to light. If the battery voltage is below the reference voltage, comparator 1A3A6Z2 output is at a logic one which is connected to pin 13 of gate 1A3A6Z4F which, in turn, reverse biases transistor 1A3A6Q5. This prevents indicator lamp 1A3DS8 from lighting. The charge voltage of capacitor 1A3A6C3 is bled off after the battery test by resistor 1A3A6R5.

d. To test BATTERY INDICATOR lamp 1A-3DS8, switch 1A3S4 is depressed. This applies ground to pin 1 of the indicator lamp, through arm C4 and the normally open contacts of switch 1A3S4. BATTERY INDICATOR lamp 1A3DS8 receives +10 volts dc at pin 2 from oscillator board assembly 1A3A5 through resistor 1A3A5-R13 and pin 13 of connectors 1A3A5P1 and 1A3XA5. The combination of these signals causes BATTERY INDICATOR lamp 1A3DS8 to light.

2-10. Switch and Resistor Testing Circuits (fig. FO-9)

The switch and resistor testing circuits check the operation of switches and associated components on Control-Monitor C-8338/AYA-10. The circuits test thumbwheel switches, toggle switches, pushbutton switches, and resistors. The functioning of the circuits for testing the thumbwheel switches is described in *a* through *c* below. The functioning of the circuits for testing the toggle switches is described in d below, and for testing the resistors is described in e below.

a. Decimal Coded Thumbwheel Switch Checks. The thumbwheel switches on ControI-Monitor C-8338/AYA-10 are used in generating decimal codes representing the day, month, year, sortie, and taking units. The switches utilized for the tests of these thumbwheel switches are DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9, DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S-10, SWITCH TEST RESISTOR TEST +5VDC POWER switch 1A3S5, and DECIMAL PRESS TO TEST switch 1A3S7.

(1) Switches 1A3S9 and 1A3S10 function to route + 10 volts de from oscillator board assembly 1A3A5 through connector 1A3J2 to the thumbwheel switches. The +10 volts dc is applied to the wiper arm of switch 1A3S10 from voltage dropping resistor 1A3A5R17 and pin 22 of connectors 1A3A5P1 and 1A3XA5. The first position of switch 1A3S10, contact 1, is an OFF position. In the ENABLE position, contact 12,

the +10 volts dc is routed to the wiper arm of deck A of switch 1A3S9. The other positions apply the voltage through contacts 2 through 11 to the thumbwheel switches under test.

(2) From contacts 2 through 11, the +10 volts dc is routed to the thumbwheel switch through pins b, c, V, W, G, H, d, e, p, and q, respectively, of connector 1A3J2. In a similar manner, switch 1A3S9 routes the voltage to switches under test through contacts 2 through 7 and pins w, v, r, s, t, and u, respectively, of connector 1A3J2. The appropriate decimal code, as set in on the thumbwheel switches, is returned and applied to pins J through N, P, and R through U of connector 1A3J2. From the pins of connector 1A3J2, the DEC 0 through DEC 9 signals are applied to arms C6 through C9 of switch 1A3S5B and arms C7 through C12 of switch 1A3S5A. With switch 1A3S5 set to SWITCH TEST position, the DEC 0 through DEC 9 signals are routed through the normally closed contacts of switch 1A3S5 to the normally closed contacts of switch 1A3S7. When not actuated, switch 1A3S7 applies the DEC 0 through DEC 9 signals through arms C1 through C10 to pins 1 of indicator lamps 1A3DS12 through 1A3DS21. Pins 2 of indicator lamps 1A3DS12 through 1A3DS21 are grounded. If the thumbwheel switch under test is good, the associated indicator lamp, 1A3DS12 through 1A3DS21, lights. If not, the indicator lamp does not light. When depressed, DECIMAL PRESS TO TEST switch 1A3S7 applies +10 volts dc, from oscillator board assembly 1A3A5, through the normally open contacts and arms Cl through C10 of switch 1A3S7 to pins 2 of indicator lamps 1A3DS12 through 1A3DS21. The +10 volts dc from oscillator board assembly 1A3A5 is routed through resistor 1A3A5R19 and pin 34 of connectors 1A3A5P1 and 1A3XA5. This causes indicator lamps 1A3DS12 through 1A3DS21 to light.

b. BCD Coded Thumbwheel Switch Checks. Thumbwheel switches on Control-Monitor C-8338/AYA-10 are used in generating the BCD codes representing camera exposure information. The switches utilized for these tests are SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5, BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1, and BCD PRESS TO TEST switch 1A3S4. When SWITCH TEST-RESISTOR TEST + 5VDC POWER switch 1A3S5 is operated to the SWITCH TEST position, a ground is extended from normally closed contacts and arm C5 of switch 1A3S5, through connector 1A3J2 to the thumbwheel switches. The thumbwheel switches return the ground signals to pins H, A, S, J, a, and T of connector 1A3J1 and pins j, k, and F of connector 1A3J2. From these connector pins, the KA60-2 signals are routed through switch 1A3S5 arms C1 through C6 on deck A, arms C1 through C3 on deck B and their respective normally closed contacts on switch 1A3S5 to contacts 8, 9, and 10 of decks E, F, and G of switch 1A3S1. Arms E, F, and G of switch 1A3S1 select the KA76, KA60-1, or KA-60-2 signals and apply them to the normally closed contacts of BCD PRESS TO TEST switch 1A3S4. Switch 1A3S4, when not actuated, applies the KA76, KA60-1, and KA60-2 signals through arms C1, C2, and C3 to pins 1 of BCD indicator lamps 1A3DS5 through 1A-3DS7. Pins 2 of indicator lamps 1A3DS5, 1A-3DS6, and 1A3DS7 receive + 10 volts de from oscillator board assembly 1A3A5. The voltage is applied through resistors 1A3A5R10, 1A3A5R-11, and 1A3A5R12, and pins 7, 9, and 11 of connectors 1A3A5P1 and 1A3XA5. A test of indicator lamps 1A3DS5, 1A3DS6, and 1A3DS7 is made by depressing BCD PRESS TO TEST switch 1A3S4. This applies a ground through normally open contacts and arms C1, C2, and C3 of switch 1A3S4 to pins 1 of indicator lamps 1A3DS5, 1A3DS6, and 1A3DS7.

c. BCD +3 Coded Thumbwheel Switch Checks. Thumbwheel switches on Control-Monitor C-8338/AYA-10 are used in generating the BCD +3 codes representing hours, minutes, seconds, and focal length information. The switches utilized for the tests of these thumbwheel switches are DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9, SWITCH TEST-RESISTOR TEST + 5VDC POWER switch 1A3S5, BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1, FOCAL LENGTH-NORMAL switch 1A3S2, and PRESS TO TEST switch 1A3S3.

(1) With switch 1A3S5 set to SWITCH TEST position, ground is extended through arm C5 and normally closed contacts of switch 1A-3S5B to pin BB of connector 1A3J2. The thumbwheel switches return the ground signal to pins B through G, K through N, P, R, U through Z, and b through g of connector 1A3J1: HRS 10’s-1, 2, 4, and 8; HRS 1’s-1, 2, 4, and 8, MINS 10's-1, 2, 4, and 8; MINS 1's-1, 2, 4, and 8; SECS 10's-1, 2, 4, and 8. These signals are

applied to respective contacts 2 through 7 of switch 1A3S1, decks A through D. Decks A through D of switch 1A3S1 apply the selected signals to contacts 2, 5, 8, and 11 of switch 1A3S2. In NORMAL position, switch 1A3S2 routes the signals through arms C1 through C4 to normally closed contacts of switch 1A3S3. When not actuated, switch 1A3S3 routes the signals from arm c of decks A through D to pins 1 of indicator lamps 1A3DS1 through 1A3DS4. Pins 2 of indicator lamps 1A3DS1 through 1A3DS4 receive +10 volts dc from oscillator board assembly 1A3A5. The +10 volts dc is routed through resistors 1A3A5R6 through 1A3A5R9 and pins 2, 3, 4, and 6 of connectors 1A3A5P1 and 1A3XA5.

(2) When switch 1A3S3 is depressed, ground is applied through normally open contacts and arm c of decks A through D of the switch to pins 1 of indicator lamps 1A3DS1 through 1A3DS4 to light the lamps for test purposes.

(3) TO test the FOCAL LENGTH thumbwheel switches, switch 1A3S9 is set to FOCAL LG 1'S or FOCAL LG 10'S position and switch 1A3S2 is set to FOCAL LENGTH. Switch 1A3S9 extends ground from arm B through contacts 8 or 9 to pins n or m of connector 1A3J1. The FOCAL LENGTH thumbwheel switches return K7F8, K7F4, K7F2, and K7F1 signals to pins X, Y, Z, and a of connector 1A3J2. Assembly 1A321 receives the signals at pins 1, 3, 5, and 9, respectively, and applies the signals to pulse generator board assembly 1A3A6 from pins 2, 4, 6, and 8, respectively. Assembly 1A3Z1 contains gates 1A3Z1A through 1A3Z1D which invert the signals. From pins 2, 4, 6, and 8 of assembly 1A3Z1. the inverted signals are routed through pins 4, 7, 6, and 9 of connectors 1A3XA6 and 1A3A6P1 to gates 1A3A6Z4A through 1A3A6Z4D, at pins 1, 3, 5, and 9, respectively. The outputs of gates 1A3A6Z4A through 1A3A6Z4D at pins 2, 4, 6, and 8, respectively, are applied to the bases of transistors 1A3A6Q1 through 1A3A6Q4. The transistors are biased by +5 volts de applied through resistors 1A3A6R15 through 1A3A6R18. A ground applied to the input of a gate causes the respective transistor to be forward biased and, conversely, a +5 volts input to the gate will reverse bias the transistor.

(4) When forward biased, transistors 1A3A6R15 through 1A3A6R18 cause the respective indicator lamps 1A3DS1 through 1A3DS4 to light. When the transistor is reverse biased, the indicator lamp is extinguished. Transistors 1A3A6Q1 through 1A3A6Q4 apply the signals from their collectors through pins 13, 10, 12, and 11 of connectors 1A3A6P1 and 1A3XA6 to contacts 10, 7, 4, and 1 of switch 1A3S2. From the contacts, arms C4, C3, C2, and C1 of switch 1A3S2 route the signals through normally closed contacts and arms D, C, B, and A of switch 1A3S3 to pins 1 of indicator lamps 1A3DS4, 1A3DS3, 1A3DS2, and 1A3DS1. Pins 2 of indicator lamps 1A3DS4, 1A3DS3, 1A3DS2, and 1A3DS1 receive +10 volts through resistors 1A3A5R9, 1A3A5R8, 1A3A5R7, and 1A3A5R6 and pins 6, 4, 3, and 2 of connectors 1A3A5P1 an 1A3XA5. When switch 1A3S3 is depressed, indicator lamps 1A3DS1 through 1A3DS4 will light since ground is applied through the normally open contacts of switch 1A3S3.

d. Switch Checks. Various switches of Control-Monitor C-8338/AYA-10 are tested by the switch and resistor testing circuit. These switches provide for power control, mode change, push to test function, and frame number reset. Their checks are performed as outlined in (1) through (4) beIow.

(1) A check of the POWER toggle switch is performed by DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9 when set to PWR OFF/ON position with DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S10 set to ENABLE position. This routes 10 volts dc from contact 10 and arm A of switch 1A3S9 to pin h of connector 1A3J1. The POWER switch receives this voltage and returns it to pin J of connector 1A3J2. The signal is routed from pin J of connector 1A3J2 to DECIMAL-0 indicator lamp 1A3DS12 as described in a above. The indicator lamp lights if the +10 volts dc is present or remains extinguished in its absence.

(2) A check of the MODE toggle switch is made by setting SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5 to SWITCH TEST. Ground is extended from the normally closed contacts and arm C5 of the switch to the MODE toggle switch through pin BB of connector 1A3J2. The MODE toggle switch returns the signal to pin FF of connector 1A3J2. From pin FF, the signal is applied to contact 8 of switch 1A3S1. As selected by switch 1A3S1, the ground signal is applied to pin 1 of indicator lamp 1A3DS1 as described in the c

above. The indicator lamp lights if ground is present and remains extinguished in its absence.

(3) The PRESS TO TEST switch is checked by setting SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5 to SWITCH TEST. Ground is extended to the switch through pin BB of connector 1A3J2. The PUSH TO TEST switch returns the ground to pin AA of connector 1A3J2. From pin AA, the signal is routed to contact 9 of switch 1A3S1. As selected by switch 1A3S1, the signal is applied to indicator lamp 1A3DS1 as described in *c* above.

(4) The FRAME NO. RESET toggle switch is checked by setting SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A-3S5 to SWITCH TEST. Ground is extended to the switch through pin BB of connector 1A3J2. The toggle switch returns the ground to pin z of connector 1A3J2. From pin z, the signal is routed to contact 10 of switch 1A3S1. As selected by switch 1A3S1, the signal is routed to indicator lamp 1A3DS1 as described in c above.

e. Resistor Checks. In Control-Monitor C-8338/AYA-10, resistors are connected to lines which provide the binary coded decimal and decimal codes. The resistors are checked by applying +5 volts de and then measuring the voltage on the lines. SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5, when set to RESISTOR TEST +5VDC POWER position, routes +5 volts dc through normally open contacts and wiper arm C4 to pin j of connector 1A3J1. The thumbwheel switches return the +5 volts dc to pins A, H, J, S, T, and a of connector 1A3J1 and pins F, J through N, P, R through U, j, and k of connector 1A3J2.

(1) The voltage is routed through the normally open contacts of switch 1A3S5 to respective contacts 1 through 11 on RESISTOR TEST A switch 1A3S8 or contacts 1 through 10 on RESISTOR TEST B switch 1A3S6. The arm of switch 1A3S8 selects one of the decimal signals and applies it to RESISTOR TEST POINT test point 1A3J5 across resistor 1A3A5R20. Resistor 1A3A5R20 is returned to ground and is connected to RESISTOR TEST POINT test point 1A3J5 through pin 29 of connectors 1A3A5P1 and 1A3XA5.

(2) To enable RESISTOR TEST B switch 1A3S6, RESISTOR TEST A switch 1A3S8 is set to ENABLE. This connects RESISTOR TEST POINT test point 1A3J5 and resistor 1A3A5R20 to the arm of switch 1A3S6.

2-11. High Voltcage Circuits (fig. FO-10)

The high voltage circuits consist of the +500, -442, -80, and +25 volt de power supply circuits. The voltages generated by these circuits operate the CRT under test. Operation of the circuits is described in n through e below.

a. +500 Volt Dc Power Supply. The +500 volt dc power supply provides +500 volts dc to the deflection circuits where it is superimposed on the horizontal and vertical deflection signals and applied to the CRT deflection plates. The +500 volts dc power supply receives 435 volts ac from the ac power distribution circuit through pins Y and Z of connectors 1A3P1 and 1A3A-9J1. This voltage is applied to a full-wave bridge rectifier circuit consisting of diodes 1A3A9A1CR1 through 1A3A9A1CR4. The +500 V dc output from the rectifier is filtered by capacitors 1A3A9A4C1 and 1A3A9A4C2 and resistor 1A3A9A4R1. The +500V dc shunt regulator, transistors 1A3A9A3Q1, 1A3A9A3A-2Q2, and 1A3A9A3A3Q3, across the +500 volts dc output, compensates for load impedance or line voltage variations. Potentiometer 1A3A9A-3R10 senses any change of the +500 volts dc and applies this change to the base of transistor 1A3A9A3A3Q3. Transistor 1A3A9A3A3Q3 amplifies the error signal and applies it to transistor 1A3A9A3A2Q2, which provides further amplification. From transistor 1A3A9A3A2Q2, the error signal is applied through resistor 1A3A9A-3R5 to shunt regulator transistor 1A3A9A3Q1.

(1) The + 500V dc shunt regulator also receives a +25 volt dc reference voltage from low voltage regulator circuits. The reference voltage is applied through pin n of connectors 1A3P1 and 1A3A9J1 and resistor 1A3A9A3R3 to the emitter of transistor 1A3A9A3Q1. Diode 1A3A9A-3VR2 clamps the emitter to a fixed voltage. The reference voltage is also applied to collectors of transistors 1A3A9A3A2Q2 and 1A3A9A3A3Q3. The effect of this configuration is to allow the emitter current through transistors 1A3A9A3A-2Q2 and 1A3A9A3A3Q3, resistor 1A3A9A3R5, and transistor 1A3A9A3Q1 to change only as a function of the difference between the reference voltage and the original error voltage applied to the base of transistor 1A3A9A3A3Q3.

(2) This change in emitter current changes

the collector-emitter current through transistor 1A3A9A3Q1 and its collector resistor 1A3A9A-4R4. This effectively alters the shunt impedance across the +500 volt dc power supply and compensates for the original error. The +500 volts dc is sent to the deflection circuits and the accelerating mode of the CRT under test through pin M of connectors 1A3A9J1 and 1A3P1. In addition, the +500 volts dc is applied to pin 2 of +500VDC indicator lamp 1A3DS24 on test set panel assembly 1A3 through resistor 1A3A9A-3R16 and pin S of connectors 1A3A9J1 and 1A3P1. Pin 1 of indicator lamp 1A3DS24 is returned to ground. The indicator lamp lights when +500 volts dc is present. Potentiometer 1A3A9A3R10 provides for adjusting the output voltage.

b. -442 Volt Dc Power Supply. The -442 volt dc power supply circuit provides -442 volts dc to the cathode of the CRT. It receives 379 volts ac from the ac power distribution circuit through pins V and W of connectors 1A3P1 and 1A3A9J1. This voltage is applied to a full-wave bridge rectifier circuit consisting of diodes 1A3A9A1CR5 through 1A3A9A1CR8. The dc output from the rectifier is filtered by capacitor 1A3A9A4C6 and resistor 1A3A9A4R18. The positive output, from the filter is applied to ground and the negative output is applied to the -442 volt dc shunt regulator, consisting of transistors 1A3A9A3Q4, 1A3A9X3A4Q5, and 1A3A9A3A5Q6, associated resistors 1A3A9A3R20, 1A3A9A3R21, 1A3A9-A3R22, potentiometer 1A3A9A3R27, and diode 1A3A9A3VR3. It operates in the same manner as the + 500 volt shunt regulator in the + 500 volt dc power supply circuit described in a above. The reference voltage for the -442 volt dc power supply circuit is provided by the +25 volt dc power supply of the high voltage circuits. The -442 volt de output is applied to the CRT cathode through pin b of connectors 1A3A9J1 and 1A3P1 and pin K of connector 1A3J3. The -442 volts dc is also applied to test point 1A3A9J2 for test purposes.

c. -80 Volt DC Power Supply. The -80 volt dc power supply circuit receives 78.2 volts ac from the ac power distribution circuit. This voltage is applied through pins i and h of connectors 1A3P1 and 1A3A9J1 to a full-wave bridge rectifier circuit consisting of diodes 1A3A9A1CR9 through 1A3A9A1CR12. The dc output from the full-wave bridge rectifier is filtered by capacitor 1A3A9A4C11. Regulation of the -80 volts dc is accomplished by a series regulator circuit consisting of −80VDC series regulator 1A3A9A3A1Z1 and series pass transistor 1A3A9A3Q7. The −80 volt dc line is in series with the collector-emitter circuit of transistor 1A3A9A3Q7. The current through the collector-emitter circuit of transistor 1A3A9A3Q7 is altered as a function of changes in load impedance or line voltage by −80VDC series regulator 1A3A9A3A1Z1. Pins 8 and 5 of −80VDC series regulator 1A3A9A3A1Z1 receive the −80 volts dc from the full-wave bridge rectifier circuit through resistor 1A3A9A3R39. Pin 3 receives the voltage at the junction of resistors 1A3A9A3R34 and 1A3A9A3R36, which are connetted across the -80 volt dc output. As changes in load occur, the voltage at the junction of resistors 1A3A9A3R34 and 1A3A9A3R36 changes. This change, referred to as the error voltage, is applied by + 80VDC series regulator 1A3A9A3A-1Z1 and compared with an internal reference source. A difference voltage between the reference and the error voltage is applied to the base of transistor 1A3A9A3Q7 from pin 6 of series regulator 1A3A9A3A1Z1 to correct for variation of load impedance or line voltage. The output of the -80 volt dc power supply circuit is effectively in series with the output of the -442 volt dc power supply circuit.

d. With reference to ground, the output of the -80 volt dc power supply is at -522 volts dc. The -522 volts dc is applied to the CRT grid through pin K of connectors 1A3A9J1 and 1A3P1 and pin P of connector 1A3J3. It is also applied through resistor 1A3A9A3R43 and pin d of connectors 1A3A9J1 and 1A3P1 to -522VDC test point 1A3J11 on test set pane! assembly 1A3 and through resistor 1A3A9A3R40 and pin H of connectors 1A3A9J1 and 1A3P1 to pin 2 of -522VDC indicator lamp 1A3DS25. Indicator lamp 1A3DS25 pin 1 is returned to ground. The positive output of the -80 volt dc power supply circuit is routed through resistor 1A3A9A3R43 and pin c of connector 1A3A9J1 and 1A3P1 to pin 2 of -80VDC indicator lamp 1A3DS27. Pin 1 of indicator lamp 1A3DS27 is returned to the negative output of the -80 volt dc power supply circuit through pin J of connectors 1A3P1 and 1A3A9J1. The indicator lamp lights to indicate that the -80 volt dc power supply circuit is operating.

e. +25 Volt DC Power Supply. The + 25 volt dc power supply circuit provides the +25 volt dc reference voltage for the -442VDC shunt regulator. The circuit receives 26.8 volts ac from the ac power distribution circuit through pins j and k of connectors 1A3P1 and 1A3A9J1. The voltage is applied to a full-wave bridge rectifier circuit consisting of diodes 1A3A9A1CR13 through 1A3A9A1CR16. The dc output from the full-wave bridge rectifier circuit is filtered by a pi configuration filter consisting of capacitors 1A3A9A4C13 and 1A3A9A4C14 and resistor 1A3A9A4R4. Regulation of the output is provided by diode 1A3A9A4VR1.

Section III. DETAILED CIRCUIT DESCRIPTION

2-12. General

This section provides a detailed circuit description of power supply assembly 1A3A9. In addition to the high voltage power supply circuits, it contains deflection coupling networks and transformer 1A3A9A3T1. The deflection coupling networks combine the deflection signals generated by the deflection circuit with deflection plate voltage generated by the high voltage power supply circuits. Transformer 1A3A9A3T1 energizes 6.3-VAC indicator lamp 1A3DS23 to indicate that CRT filament voltage has been applied.

2-13. +500 Volt DC Power Supply Circuit (fig. FO-13)

The +500 volt dc power supply circuit receives 435 volts ac from pins Y and Z of connector 1A3A9J1. The ac voltage is applied to a bridge rectifier consisting of diodes 1A3A9A2CR1 through 1A3A9A2CR4. Capacitors 1A3A9A2C15 through 1A3A9A2C22 connected across diodes 1A3A9A2CR1 through 1A3A9A2CR4 filter out any high frequency which may have been coupled through from other circuits. The output of the rectifier is filtered by a capacitor-input type filter consisting of capacitors 1A3A9A4C1 and 1A3A9-A4C2 and resistors 1A3A9A4R1 and 1A3A9A4R2. The +500 volt filtered output from resistor 1A3A9A4R2 is applied to pins M and P of connector 1A3A9J1. From pin M, the +500 volt dc is routed to the CRT accelerating anode. From pin P, the +500 volts is interlocked through pin g of mating connector 1A3P1 and applied to the deflection coupling network (para 2-17).

cc. The +500 volt dc is also applied to pin S of connector 1A3A9J1 through resistors 1A3A9A3-R16 and 1A3A9A3R17 to be routed to +500VDC indicator lamp 1A3DS27. Additional high frequency filtering is provided by capacitors 1A3A9-A3C39 and 1A3A9A3C40. The +500 volts dc output is maintained at a constant level independent of load or line voltage variations by the shunt regulator which consists of transistors 1A3A9-A3Q1, 1A3A9A3A2Q2, and 1A3A9A3A3Q3, and associated components. The shunt regulator operates as follows.

b. A divider network, consisting of resistors 1A3A9A3R8 through 1A3A9A3R11, shunts the output of the +500 volt dc power supply circuit. Any changes in load impedance or input line voltage causes reciprocal changes in current through the divider network. This is reflected in a change in the voltage drop across potentiometer 1A3A9A3R10. This change is applied to and amplified by transistors 1A3A9A3A2Q2 and 1A3A9A-3A3Q3 as an error voltage. The collectors of transistors 1A3A9A3A2Q2 and 1A3A9A3A3Q3 and the emitter of transistor 1A3A9A3Q1 are clamped to a fixed reference voltage. The collectors of transistors 1A3A9A3A2Q2 and 1A3A9A3A3Q3 receive the reference voltage directly from pin * of connector 1A3A9J1. The emitter of transistor 1A3A9A3Q1 is clamped at a voltage determined by diodes 1A3A9A3CR17 and 1A3A9A3VR2, receiving +25 volts dc through resistor 1A3A9A3R3.

c. Transistor 1A3A9A3A3Q3 amplifies the error signal applied to its base from, potentiometer 1A3A9A3R10 and applies the amplified signal across resistor 1A3A9A3R7 to the base of transistor 1A3A9A3A2Q2. Transistor 1A3A9A3A2Q2 further amplifies the error signal and applies the signal across resistor 1A3A9A3R6 and through resistor 1A3A9A3R5 to the base of transistor 1A3A9A3Q1. Resistor 1A3A9A3R46 biases transistor 1A3A9A3Q1. With the collectors of transistors 1A3A9A3A2Q2 and 1A3A9A3A3Q3 and the emitter of transistor 1A3A9A3Q1 connected to a fixed reference voltage, current through the transistors varies only as a function of the difference voltage detected between the reference and the error signal. The amplified error signal at the base of transistor 1A3A9A3Q1 causes the collector emitter current of transistor 1A3A9A3Q1 to change through resistor 1A3A9A4R4. This effectively changes the shunt impedance across the +500 volt de power supply circuit load to compensate for the original change. Capacitor 1A3A9A3C3 provides ac coupling between the +500 volt line and the emitter of transistor

1A3A9A3A2Q2 which causes transients on the +500 volt line to be suppressed.

2-14. -442 Volt Dc Power Supply Circuit (fig. FO-13)

The -442 Volt dc power supply circuit receives 397 volts ac from pins V and W of connector 1A3A9J1. The voltage is applied to the bridge rectifier circuit consisting of diodes 1A3A9A2CR5 through 1A3A9A2CR8. Capacitors 1A3A9A2C23 through 1A3A9A2C30 provide high frequency filtering. The -442 volt dc output from the bridge rectifier is filtered by a capacitor-input type filter consisting of capacitors 1A3A9A4C6 and 1A3A9-A4C7 and resistors 1A3A9A4R18 and 1A3A9A4-R19. The positive output line from the filter circuit at resistor 1A3A9A4R19 is returned to chassis ground and the negative output line is applied to pin J of connector 1A3A9J1. The - 442 volt dc power supply circuit is maintained at a constant voltage output under varying load or line voltage conditions by shunt regulator (transistors 1A3A-9A3Q4, 1A3A9A3A4Q5, 1A3A9A3A5Q6) which is identical in operation to the shunt regulator described in paragraph 2-13. The +25 volt dc reference voltage is furnished by the +25 volt dc power supply circuit of power supply assembly 1A3A9. The components that comprise the shunt regulator are as follows : transistors 1A3A9A3Q4, 1A3A9A3A4Q5, and 1A3A9A3A5Q6, and resistors 1A3A9A3R20, 1A3A9A4R21, and 1A3A9A3R22 through 1A3A9A3R28 and 1A3A9A3R47. Capacitors 1A3A9A3C41 and 1A3A9A3C42 provide added high frequency filtering. The - 442 volt dc output is applied to the CRT cathode through pin b of connector 1A3A9J1. The -442 volts dc is also routed through resistor 1A3A9R45 to test point 1A3A9J2.

2-15. -80 Volt Dc Power Supply Circuit (fig. FO-13)

The -80 volt dc power supply circuit receives 78.2 volts ac from pins i and h of connector 1A3A9J1. The voltage is applied to a full-wave bridge rectifier circuit consisting of diodes 1A3A9-A1CR9 through 1A3A9A1CR12. Capacitors 1A3-A9A1C31 through 1A3A9A1C24 connected across diodes 1A3A9A1CR9 through 1A3A9A1CR12 provide high frequency filtering. The output from the rectifier circuit is filtered by capacitor 1A3A9-A4C11 and is applied to the series regulator circuit, consisting of series regulator 1A3A9A3A1Z1, transistor 1A3A9A3Q7, resistors 1A3A9A3R34 through 1A3A3A3R39, capacitor 1A3A9A3C12, and diodes 1A3A9A3VR4 and 1A3A9A3VR5. These components function to provide series type regulation of the -80 volt dc power supply circuit. The circuit operates as follows.

a. Series regulator 1A3A9A3A1Z1 is an integrated circuit which contains a voltage reference amplifier, an error amplifier, and series pass transistors. Added current capacity is provided by transistor 1A3A9A3Q7. Transistor 1A3A9A-3Q7 controls the series output current of the +30 volt dc power supply in order to maintain a constant output voltage with varying load impedance or line voltage. The basic function of series regulator 1A3A9A3A1Z1 is to detect the error voltage representing a variation in load impedance or line voltage. The voltage is applied to pin 3 of series regulator 1A3A9A1A1Z1 and pmtides a proportional amplified output voltage at pin 6.

b. The amplified output voltage controls the biasing of transistor 1lA3A9A3Q7. This regulates the series current of the -80 volt dc power supply correcting for load or line voltage variations. The error voltage is detected through a divider network consisting of resistors 1A3A9A3R34, 1A3A-9A3R35, and 1A3A9A3R36. Resistor 1A3A9A3-R33 couples the output from the reference amplifier at pin 4 to error voltage amplifier pin 2. A comparison is made between the reference voltage and the error voltage by the error voltage amplifier. The output of the error voltage amplifier is coupled to the series pass transistor. Resistor 1A3A9A3R39 couples the supply voltage to the series pass transistor.

c. The reference amplifier, error voltage amplifier, and series pass transistor are located in series regulator 1A3A9A3A1Z1. Diode 1A3A9-A3VR4 couples the error voltage to the base of transistor 1A3A9A3Q7. Diode 1A3A9A3VR5 maintains a constant voltage to the input of the error voltage and reference voltage amplifier. Capacitor 1A3A9A3C12 connected to pins 2 and 9 of series regulator 1A3A9A3A1Z1 provides frequency compensation of the operational amplifier used in the regulator.

d. The output of the -80 volt series regulator at the junction of resistors 1A3A9A3R42 and 1A3A9A3R43 is effectively at -522 volts dc with respect to ground. This voltage is applied to pin c of connector 1A3A9J1 through resistor 1A3A9-A3R42 and to pin d of connector 1A3A9J1 through resistor 1A3A9A3R43. The voltage is also applied through resistors 1A3A9A3R40 and

1A3A9A3R41 and pin H of connector 1A3A9J1 to −522VDC indicator lamp 1A3DS25. Capacitor 1A3A9A3C43 provides additional high frequency filtering.

2-16. +23 Volt Dc Power Supply Circuit (fig. FO-13)

The +25 volt de power supply circuit receives 26.8 volts ac from pins j an? k of connector 1A3A9J1. This voltage is applied to a full-wave bridge rectifier consisting of diodes 1A3A9A1-CR13 through 1A3A9A1CR16. Capacitors 1A3A9-A1C35 through 1A3A9A1C38, connected across diodes 1A3A9A1CR13 through 1A3A9A1CR16, provide high frequency filtering. Capacitors 1A3A9A4C13 and 1A3A9A4C14 and resistor 1A3A9A4R44 comprise a pi-type filter for filtering out the ac ripple component. Diode 1A3A9A4VR1 provides regulation of the +25 volt dc output. The +25 volt dc output is applied to the shunt regulator of the -442 volt power supply circuit. The negative output line from the + 25 volt dc power supply circuit is connected to the output of the -442 volt dc power supply circuit. This common line is routed to the CRT cathode through pin b of connector 1A3A9J1.

2-17. Deflection Coupling Networks (fig. FO-13)

The deflection coupling networks consist of resistors 1A3A9A1R12 through 1A3A9A1R15, and 1A3A9A1R29 through 1A3A9A1R32, and capacitors 1A3A9C4, 1A3A9C5, and 1A3A9C9 and 1A3A9C10. When connector 1A3A9J1 is mated with connector 1A3P1, the +500 volts dc from the +500 volt dc power supply circuit is connected to resistors 1A3A9A1R12, 1A3A9A1R14, 1A3A9A1-R29, and 1A3A9A1R31. The +500 volts dc and deflection signals are then combined and routed to the CRT deflection plates as follows.

a. When the +500 volt dc level is applied to resistors 1A3A9A1R12 and 1A3A9A1R13, the + (positive) horizontal deflection signal is superimposed. The + (positive) horizontal deflection signal is then coupled through capacitor 1A3A9C4 from pin p of connector 1A3A9J1. The modified **+500 volt dc signal is then routed to the + (positive) horizontal deflection plate of the CR under test through pin N of connector 1A3A9J1.**

b. When the +500 volt dc is applied to resistors 1A3A9A1R14 and 1A3A9A1R15, the - (negative horizontal deflection signal is superimposed. The - (negative) horizontal deflection signal is coupled through capacitor 1A3A9C5 from pin r of connector 1A3A9J1. The modified + 500 volt dc signal by the - (negative) horizontal deflection signal is routed to the - (negative) horizontal deflection plate of the CRT under test through pin R of connector 1A3A9J1.

c. When the +500 volt dc level is applied to resistors 1A3A9A1R29 and 1A3A9A1R30, the - (negative) vertical deflection signal is superimposed. The - (negative) vertical deflection signal is coupled through capacitor 1A3A9C9 from pin U of connector 1A3A9J1. The modified ±500 volts dc signal is then routed to the - (negative) vertical deflection plate of the CRT under test through pin T of connector 1A3A9J1.

d. When the +500 volt dc level is applied to resistors 1A3A9A1R31 and 1A3A9A1R32, the + (positive) vertical deflection signal is superimposed. The + (positive) vertical deflection signa is coupled through capacitor 1A3A9C10 from pin L of connector 1A3A9J1. The modified + 500 volt dc signal is routed to the positive vertical deflection plate of the CRT under test through pin f of connector 1A3A9J1.

2-18. Transformer 1A3A9A3T1 (fig. FO-13)

Pins 1 and 2 of transformer 1A3A9A3T1 receive 6.3 volts ac from pins G and b of connector 1A3A9J1. This voltage is also supplied to the CRT filament. The output voltage of transformer 1A3A9A3T1 at pin 3 is routed through pin e of connector 1A3A9J1 to 6.3VAC indicator lamp 1A3DS23. Pin 4 of transformer 1A3A9A3T1 is returned to ground. Also, the input side at pin 2 of transformer 1A3A9A3T1 is connected to the line which is routed to the CRT cathode through pin b of connector 1A3A9J1.

CHAPTER 3

GENERAL SUPPORT MAINTENANCE

Section I. GENERAL

WARNING

Dangerous voltages exist in Test Set, Control Monitor-Recording Head AN/AYM-9. Take adequate precautions against electrical shock during troubleshooting. Remove power input prior to making physical contact with parts in the AN/AYM-9.

3-1. Scope

This chapter provides general support maintenance procedures for Test Set, Control Monitor-Recording Head AN/AYM-9. Included in the chapter are sections covering the following: troubleshooting, removal and replacement, adjustment and alinement, repair, and testing.

3-2. Maintenance 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 by TM 38-750.

3-3. Tools, Test Equipment, and Materials Required

Tools, test equipment, and materials required for the maintenance of Test Set, Control Monitor-Recording Head AN/AYM-9 are listed in table 3-1.

Table 3-1. Tools, Teat Equipment, and Materials Required

Ifem	Common name
Differential Voltmeter ME 202B-U.	Differential v&meter
Electronic Counter AN/USM-207.	Counter
Multimeter TS352B/U	Multimeter
Oscilloscope AN/USM-281A	Oscilloscope
Digital Voltmeter (Model X-2) (for measuring voltages higher than 500 volts).	Digital voltmeter
Power Supply PP-3940/G	Test power supply
Tool Kit, Electronic Equipment TK-100/G.	Tool kit TK-100/G
Tool Kit, Electronic Equipment TK-105/G.	Tool kit TK-105/G
Cleaning compound (FSN 7930-395-9542).	Cleaning compound

Section II. TROUBLESHOOTING

3-4. General

To troubleshoot Test Set, Control Monitor-Recording Head AN/AYM-9 at the general support category of maintenance, perform the operator's and organizational maintenance procedures contained in TM 11-6625-2473-12 and the procedures contained in this section.. Paragraphs 3-5 through 3-13 provide specific troubleshooting procedures. Waveforms referenced in the procedures are shown in figure FO-11. Illustrations to facilitate the location of test points are provided. Sthematic and wiring diagrams are also provided as an aid to troubleshooting. MIL-STD capacitor, resistor, and inductor color codes are illustrated in figure FO-1.

3-5. Organization of Troubleshooting

a. General. The first step in troubleshooting is to sectionalize the fault. This consists of localizing the fault to a major assembly or a group of parts that make up one of the functional areas shown in figure FO-2. The second step is to localize the fault further to a defective section or stage within the assembly or functional area. The third step is to isolate the fault to the defective part or parts. Defective parts that are burned out or are arcing can often be isolated by sight, smell, and hearing. In these cases, resistance or continuity checks must be made to isolate a possible short or wiring defect which has caused the part to burn out or arc. The majority of faults will not have obvious signs to aid in isolating the trouble. These are isolated by voltage and resistance measurements or observation of waveforms.

b. Sectionalization. Sectionalization of a fault is accomplished by the following methods:

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring the circuits. Visual inspection will reveal most mechanical defects and may reveal defective electronic parts when evidenced by indications of overheating or arcing.

(2) Operational tests. Operational tests frequently indicate the general location of trouble. In many instances, the tests help in determining the exact fault. Operational tests are included in organizational periodic preventive maintenance checks and services (TM 11-6625-2473-12).

(3) Overall testing. Faults which are not evidenced by visual inspection or operational tests can be sectionalized by performance of the general support test procedures. These procedures check all input and output signals and waveforms and will sectionalize malfunctions to a faulty circuit.

c. Localization. Localization is aided by an overall troubleshooting chart, voltage and resistance charts, and continuity charts within this section. Schematic and wiring diagrams are used in support of the charts. The troubleshooting chart includes instructions for taking voltage, resistance, and waveform measurements. Measurements are taken at Simulator, Monitor Input SM-627/AYM-9 front panel test points, connector pins, and component board terminals.

d. Isolation. Faults localized to a stage or functional area are isolated to the faulty assembly or part using the following techniques:

(1) Waveform measurement. Oscilloscope AN/USM-281A is used for observing waveforms. Use the probe furnished with the oscilloscope to check waveforms at the designated test points. Normal waveforms to be observed are illustrated in figure FO-11. Waveforms are designated by letters and are keyed to the test point at which they are to be observed. All waveforms are taken with oscilloscope ground connected to Simulator, Monitor Input SM-627/AYM-9 ground and the probe connected to the applicable test point.

(2) *Voltage measurements.* When measuring the ac and dc voltages of Test Set, Control Monitor-Recording Head AN/AYM-9, use Differential Voltmeter, ME-202B/U. The differential voltmeter is specified for voltage measurements in lieu of Multimeter TS-352B/U in order to ensure the proper accuracy required when performing testing and troubleshooting procedures. All readings are to be taken with respect to ground, except when otherwise specified. Set all test equipment controls to the proper settings for measuring voltage prior to connecting the test equipment to the test point. When performing high voltage measurements, turn off the AN/AYM-9, make all necessary scale settings, connect the test equipment leads to the circuit, and turn on the AN/AYM-9.

CAUTION

Use care when connecting test equipment leads to transistor circuits. Momentarily shorting transistor leads to ground can damage the associated transistor by causing excessive emitter to base current flow. When measuring voltages, use tape or sleeving to insulate the entire test probe except for the extreme tip.

(3) Resistance measurements. Resistance measurements are made using Multimeter TS-352B/U. Prior to taking resistance measurements, power is removed from Test Set, Control Monitor-Recording Head AN/AYM-9. In the voltage and resistance charts, the proper polarities of the multimeter connections are indicated wherever a resistance is to be measured in a circuit containing diodes. Observe these polarities to obtain the correct readings. All readings are to be taken with respect to ground, except where otherwise specified.

(4) Pulse frequency measurements. To measure pulse frequency, pulse width, or pulse interval, use Electronic Counter CP-772/U. All measurements are taken with respect to ground.

3-6. Visual Inspection
(fig. 3-15 through 3-25)

To perform a visual inspection of Test Set, Control Monitor-Recording Head AN/AYM-9, perform the procedures outlined below.

a. Inspect all switch knobs for looseness, cracks, missing retaining hardware, or other damage.

b. Inspect all lens caps for cracked or missing jewels or damaged threads.

c. Inspect all connectors for bent, broken, or missing pins; cracked or otherwise damaged insulation; or damaged threads.

d. Check all switches for proper rotary or toggle action.

e. Inspect all tip jacks for cracked or otherwise damaged insulation.

f. Remove test set panel assembly 1A3 from base 1A1 (fig. 3–15). Inspect base 1A1 for dents, cracks, or corrosion or damaged or missing latches, hinges, or handles.

g. Inspect pressure relief valve 1A1A1A3 (fig. 3–23) for evidence of damage. Make certain that pressure relief valve 1A1A1A3 is secure.

h. Remove board assemblies 1A3A1 and 1A3A3 through 1A3A8 (fig. 3–16), sheet 3). Inspect printed circuit boards for hairline cracks or breaks, circuit ribbon, and evidence of overheating. Inspect all component parts for evidence of overheating or other damage. Inspect all soldered connections for evidence of cold solder joints. Replace board assemblies in their respective slots in basket assemblies 1A3A10 and 1A3A12 (fig. 3–16, sheet 3).

i. Inspect all wiring for frayed insulation, broken leads, or evidence of overheating. Inspect all connection, for loose connections or evidence of cold solder joints.

j. Inspect connectors 1A3P1 (fig. 3-16, sheet 3) and 1A3A9J1 (fig. 3-17, sheet 3) for bent, broken, or missing pins; cracked or otherwise damaged insulation r or damaged threads. Make certain to reconnect connector 1A3P1 to connector 1A3A9J1.

k. Replace test set panel assembly 1A3 in base 1A1 and secure (fig. 3-15).

l. Inspect cover 1A2 for dents, cracks, or corrosion or damaged or missing latches or hinges.

m. Inspect case 2A1 for dents, cracks, or corrosion or damaged or missing latches, hinges, or handles (fig. 3–19, sheet 1).

n. Inspect pressure relief valve 2A1A2A1 (fig. 3–25, sheet 1) for evidence of damage. Make certain that pressure relief valve 2A1A2A1 is secure.

o. Inspect welded plate assembly 2A3A1 for cracks, distortion, or other damage (fig. 3–20, sheet 1).

p. Check that turntable assembly 2A3A3 rotates freely and that turntable locks in position with clamp assemblies 2A3A3A1 (fig. 3–20, sheet 2), 2A3A3A2, and 2A3A3A3 (fig. 3–21) alined with camera lens, in turn.

q. Inspect cover 2A2 for dents, cracks, or corrosion or damaged or missing latches or hinges (fig. 3–19, sheet 1).

r. Inspect connectors of all cable assemblies for bent, broken, or missing pins; cracked or otherwise damaged insulation; or damaged threads.

s. Inspect all cable assemblies for frayed or abraded insulation or other damage.

t. Inspect connectors 2A4A1P1 and 2A4A1J1 of Extender, Circuit Card MX–8966/AYM for bent, broken, or missing contacts. Inspect Extender, Circuit Card MX–8966/AYM for broken conductors or loosened bonding of foil to board (fig. 3-19, sheet 2).

3-7. Troubleshooting Chart

Troubleshooting procedures for Test Set, Control Monitor-Recording Head AN/AYM–9 are given in table 3-2. The table lists malfunction indications which may be observed during operation or general support testing. For each malfunction, the chart lists the probable causes. Associated with each probable cause, the corrective action column lists instructions for isolation procedures and actions required to correct the malfunction.

Table 3-2. Overall Troubleshooting Chart

Item No.	Malfunction	Probable cause	Corrective action
1	115VAC indicator lamp 1A3DS22, 6.3VAC indicator lamp 1A3DS23, and 115 VDC indicator lamp 1A3DS26 do not light.	B. Defective indicator lamp or lamps. b. Circuit breaker 1A3CB1 defective.	a. Replace indicator lamp or lamps (fig. 3-16, sheet 1). b. Check circuit breaker 1A3CB1 for continuity when in closed position. Replace circuit breaker if defective (fig. 3-16, sheet 1).

Table 3-2. Overall troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
		c. Filter 1A3FL1 or 1A3FL2 defective.	*c.* Check filters 1A3FL1 and 1A3FL2 (para 3-9). Replace defective filter (fig. 3-16, sheet 6).
		d. C ble Assembly, Power, Electrical CX-12723/AYM-9 defective.	*d.* Perform continuity check of Cal Assembly, Power, Electrical CX-12723/AYM-9 (para 3-13). Replace Cable Assembly, Power, Electrical CX-12723/AYM-9 if defective.
		e. Defective wiring	*e.* Check wiring (para 3-9). Repair defective wiring.
2	115VAC indicator lamp 1A3DS22 does not light but 6.3VAC indicator lamp 1A3DS23 lights.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 1).
		b. Resistor 1A3R1 defective	*b.* Check that resistance of resistor 1A3R1 is 22K ±5% ohms. If not, replace resistor (fig. 3-16, sheet 6).
		c. Lamp assembly 1A3XDS22 defective.	*c.* Check continuity of lamp assembly 1A3XDS22. Replace lamp assembly if defective (fig. 3-16, sheet 1).
		d. Defective wiring	*d.* Check wiring (para 3-9). Repair defective wiring.
3	ON-OFF circuit breaker 1A3CB1 does not remain in ON position.	*a.* ON-OFF circuit breaker 1A3CB1 defective.	*a.* Check ON-OFF circuit breaker 1A3CB1 for continuity and replace if defective (fig. 3-16, sheet 1).
		b. Transformer 1A3T1 defective	*b.* Check transformer 1A3T1 (par 3-9). Replace transformer it defective (fig. 3-16, sheet 6).
		c. Resistors 1A3R1 or 1A3R3 defective.	*c.* Check that resistance of resistor 1A3R1 is 22K ±5% ohms and resistance of resistor 1A3R3 is 510K ±5% ohms. Replace defective resistor (fig. 3-16, sheet 6).
		d. Power supply assembly 1A3A9 defective.	*d.* Check power supply assembly 1A3A9 for short circuits (para 3-10). Repair power supply assembly if defective (para 3-23).
		e. Low voltage regulator board assemblies 1A3A1, 1A3A3, or 1A3A4 defective.	*e.* Check low voltage regulator board assemblies 1A3A1, 1A3A3, and 1A3A4 for short circuits as follows: Isolate shorted assembly by removing each assembly, in turn, and checking if ON-OFF circuit breaker 1A3CB1 remains in ON position. Replace defective assembly (fig. 3-16, sheet 3).
		f. Wiring defective	*f.* Check wiring (para 3-9). Repair defective wiring.
4	115VAC indicator lamp 1A3DS22 lights. 6.3VAC indicator lamp 1A3DS23 and 115VDC indicator lamp 1A3DS26 do not light, and ELAPSED TIME meter 1A3M1 does not operate.	*a.* Connector 1A3A9J1 not properly mated to connector 1A3P1.	*a.* Make certain that connector 1A3A9J1 is mated properly with connector 1A3P1.
		b. Power supply assembly switch 1A3A9S1 defective.	*b.* Check continuity of power supply assembly switch. Replace switch if defective (fig. 3-17, sheet 2).
		c. Wiring defective	*c.* Check wiring (para 3-9). Repair defective wiring.

Table 3-2. Overall Troubleshooting Chart - continued

Item No.	Malfunction	Probable cause	Corrective action
5	115VAC indicator lamp 1A3DS22 lights and ELAPSED TIME meter 1A3M1 operates. 6.3VAC indicator lamp 1A3DS23 and 115VDC indicator lamp 1A3DS26 do not light.	*a.* Defective indicator lamp or lamps.	*a.* Replace indicator lamp or lamps (fig. 3-16, sheet 1).
		b. Lamp assembly 1A3XDS23 or 1A3XDS26 defective.	*b.* Check continuity of lamp assemblies 1A3XDS23 and 1A3XDS-26. Replace lamp assembly if defective (fig. 3-16, sheet 1).
		c. Transformer 1A3T1 defective	*c.* Check transformer 1A3T1 (para 3-9). Replace transformer if defective (fig. 3-16, sheet 6).
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
6	6.3VAC indicator lamp 1A3DS23, 115VDC indicator lamp 1A3DS26, and 115VAC indicator lamp 1A3DS22 light. ELAPSED TIME. meter 1A3M1 does not operate.	*a.* Wiring defective	*a.* Check wiring (para 3-9). Repair defective wiring.
		b. ELAPSED TIME meter 1A3M1 defective.	*b.* Replace ELAPSED TIME meter (fig. 3-16, sheet 1).
7	+500VDC indicator lamp 1A3DS24 does not light.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 1).
		b. Lamp assembly 1A3XDS24 defective.	*b.* Check continuity of lamp assembly 1A3XDS24. Replace lamp assembly if defective (fig. 3-16, sheet 1).
		c. +500V dc section of power supply assembly 1A3A9 defective.	*c.* Check for +450 ±45V dc at -HORIZ test point 1A3J7. If voltage is out of tolerance, aline power supply assembly 1A3A9 (para 3-17). If voltage is not present or cannot be brought within tolerance, troubleshoot power supply assembly 1A3A9 (para 3-10). Repair all defects.
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
8	−522VDC indicator lamp 1A3DS25 does not light.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 1).
		b. Lamp assembly 1A3XDS25 defective.	*b.* Check continuity of lamp assembly 1A3XDS25. Replace lamp assembly if defective (fig. 3-16, sheet 1).
		c. −442V dc section of power supply assembly 1A3A9 defective.	*c.* Remove test set panel assembly 1A3 (para 3-17). Check for −400 ±20V dc at −442 VDC test point 1A3A9J2 on power supply assembly 1A3A9. If voltage is out of tolerance, aline power supply assembly (para 3-17). If voltage is not present or cannot be brought within tolerance, troubleshoot power supply assembly (para 3-10). Repair all defects.
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
9	-800VDC indicator lamp 1A3DS27 does not light.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 1).
		b. Lamp assembly 1A3XDS27 defective.	*b.* Check continuity of lamp assembly 1A3XDS27. Replace lamp assembly if defective (fig. 3-16, sheet 1).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
		c. -800V dc section of power supply assembly 1A3A9 defective.	*c.* Troubleshoot power supply assembly (para 3-10). Repair all defects.
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
10	GO indicator lamp 1A3DS9 and FAILURE indicator lamp 1A3DS10 do not light.	*a.* Defective indicator lamp or lamps.	*a.* Replace indicator lamp or lamps (fig. 3-16, sheet 6).
		b. Lamp assemblies 1A3XDS9 and 1A3XDS10 defective.	*b.* Check continuity of lamp assemblies 1A3XDS9 and 1A3XDS10. Replace defective lamp assembly (fig. 3-16, sheet 6).
		c. Low voltage regulator board assembly 1A3A4 defective.	*c.* Replace low voltage regulator board assembly 1A3A4 (fig. 3-16, sheet 3).
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
11	FAILURE indicator lamp 1A3DS10 lights and GO indicator lamp 1A3DS9 does not light.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 6).
		b. Lamp assembly 1A3XDS9 defective.	*b.* Check continuity of lamp assembly 1A3XDS9. Replace lamp assembly if defective (fig. 3-16, sheet 6).
		c. Low voltage regulator board assembly 1A3A1, 1A3A3, or 1A3A4 defective.	*c.* Check voltages at the following locations: +10V test point 1A3J16, +15V test point 1A3J12, -15V test point 1A3J17, +25V test point 1A3J15, -25V test point 1A3J14, and +85V test point 1A3J18. Refer to table 3-10. (1) If any voltage reading at -15V, +10V, or +25V test point is out of tolerance, aline low voltage regulator board assembly 1A3A3 (para 3-19). If voltage cannot be brought within tolerance or is not present, replace low voltage regulator board assembly (fig. 3-16, sheet 3). (2) If voltage reading at +15V or -25V test point is out of tolerance, aline voltage regulator board assembly 1A3A1 (para 3-18). If voltage cannot be brought within tolerance or is not present, replace low voltage regulator board assembly (fig. 3-16, sheet 3). (3) If voltage reading at +85V test point is out of tolerance, aline low voltage regulator board assembly 1A3A4 (para 3-20). If voltage cannot be brought within tolerance or is not present, replace low voltage regulator board assembly (fig. 3-16, sheet 3). (4) If all voltage readings in step 11*c* are correct, replace low voltage regulator board assembly 1A3A4 (fig. 3-16, sheet 3).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
		d. Wiring defective	*d.* Check wiring (para 3-9). Repair defective wiring.
12	+5V indicator lamp 1A3DS11 does not light but GO indicator lamp 1A3DS9 lights.	*a.* Defective indicator lamp 1A3DS11.	*a.* Replace indicator lamp (fig. 3-16, sheet 6).
		b. Lamp assembly 1A3XDS11 defective.	*b.* Check continuity of lamp assembly 1A3XDS11. Replace lamp assembly if defective (fig. 3-16, sheet 6).
		c. Wiring defective	*c.* Check wiring (para 3-9). Repair defective wiring.
13	+5V indicator lamp 1A3DS11, FAILURE indicator lamp 1A3DS10, and GO indicator lamp 1A3DS9 do not light.	*a.* Defective indicator lamp or lamps.	*a.* Replace indicator lamp or lamps (fig. 3-16, sheet 6).
		b. Low voltage regulator board assembly 1A3A4 defective.	*b.* Check for +5 ±0.25V dc at +5V test point 1A3J19. If voltage is not present, replace low voltage regulator board assembly (fig. 3-16, sheet 6).
14	BATTERY INDICATOR indicator lamp 1A3DS8 does not light with a known good battery and BATTERY TEST switch 1A3S11 depressed.	*a.* Defective indicator lamp	*a.* Replace indicator lamp (fig. 3-16, sheet 2).
		b. Lamp assembly 1A3XDS8 defective.	*b.* Check continuity of lamp assembly 1A3XDS8. Replace lamp assembly if defective (fig. 3-16), sheet 2).
		c. BCD PRESS TO TEST switch 1A3S4 defective.	*c.* Check continuity of BCD PRESS TO TEST switch 1A3S4 with switch not actuated. Replace BCD PRESS TO TEST switch if defective (fig. 3-16, sheet 1).
		d. Pulse generator board assembly 1A3A6 defective or out of alinement.	*d.* Check alinement of battery test circuit (para 3-22). If alinement cannot be accomplished, replace pulse generator board assembly (fig. 3-16, sheet 3).
		e. BATTERY TEST switch 1A3S11 defective.	*e.* Check continuity of BATTERY TEST switch 1A3S11 with switch depressed. Replace BATTERY TEST switch if defective (fig. 3-16), sheet 1).
		f. Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 defective.	*f.* Check continuity of Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 (para 3-13). Replace Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 if defective.
15	DECIMAL indicator lamps 1A3DS12 through 1A3DS21 do not display code corresponding to input signals.	*a.* SWITCH TEST-RESISTOR TEST +5 VDC POWER switch 1A3S5, DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S10, DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9, or DECIMAL PRESS TO TEST switch 1A3S7 defective.	*a.* Perform continuity test of switch testing circuits (para 3-8). Replace defective switch (fig. 3-16), sheet 1).
		b. One or more of lamp assemblies 1A3XDS12 through 1A3XDS21 defective.	*b.* Check continuity of lamp assemblies 1A3XDS12 through 1A3XDS21. Replace defective lamp assembly (fig. 3-16, sheet 2).
		c. Connector 1A3J2 defective	*c.* Replace connector 1A3J2 (fig. 3-16, sheet 1).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
		d. Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 defective.	d. Perform continuity check of Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 (para 3-13). Replace Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 if defective.
16	DECIMAL indicator lamps 1A3DS12 through 1A3DS21 do not light when DECIMAL PRESS TO TEST switch 1A3S7 is depressed.	a. Defective indicator lamp or lamps.	a. Replace indicator lamp or lamps (fig. 3-16, sheet 2).
		b. Low voltage regulator board assembly 1A3A3 defective.	b. Check for +10 ±0.5V dc at pin 23 of oscillator board assembly 1A3A5. If voltage is not correct, replace low voltage regulator board assembly (fig. 3-16, sheet 3).
			c. Check for +10 ±0.5V dc at pin 34 of oscillator board assembly 1A3A5. If voltage is not correct, replace oscillator board assembly (fig. 3-16, sheet 3).
		d. Wiring defective	d Check for continuity between pin 22 of oscillator board assembly 1A3A5 and wiper arm of switch 1A3S10. Repair defective wiring.
17	BCD indicator lamps 1A3DS5, 1A3DS6, and 1A3DS7 do not display code corresponding to input signals.	Q. SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5, BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1, or BCD PRESS TO TEST switch 1A3S4 defective.	a. Perform continuity check of switch testing circuits (para 3-8). Replace defective switch (fig. 3-16, sheet 1).
		b. One or more of lamp assemblies 1A3XDS5, 1A3XDS6, or 1A3XDS7 defective.	b. Check continuity of lamp assemblies 1A3XDS5, 1A3XDS6, and 1A3XDS7. Replace defective lamp assembly (fig. 3-16, sheet 2).
		c. Connector 1A3J2 defective	c. Replace connector 1A3J2 (fig. 8-16, sheet 1).
		d Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 defective.	d. Perform continuity check of Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 (pars 3-13). Replace Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 if defective.
18	One or more of BCD indicator lamps 1A3DS5, 1A3DS6, or 1A3DS7 does not light. One or more of BCD+3 indicator lamps 1A3DS1 through 1A3DS4 does not light.	a Defective indicator lamp or lamps.	a. Replace indicator lamp or lamps (fig. 3-16, sheet 2).
		b. Low voltage regulator board assembly 1A3A3 defective.	b. Check for +10 ±0.5V dc at pin 23 of oscillator board assembly 1A3A5. If voltage is not correct, replace low voltage regulator board assembly (fig. 3-16, sheet 3).
		c. Oscillator board assembly 1A3A5 defective.	c. Check for +10 ±0.5V dc at pins 2, 3, 4 and 6 of oscillator board assembly 1A3A5. If voltage is not correct, replace oscillator board assembly (fig. 3-16, sheet 3).

Table 3-2. Overall Troubleshooting Chart - Continued

Malfunction		Probable cause	Corrective action
		d. Wiring defective	d. Refer to schematic diagram (fig. FO-12) and check for continuity between terminal of lamp(s) which fails to light and associated pin on oscillator board assembly 1A3A5. Repair defective wiring.
19	BCD+3 indicator lamps 1A3DS1 through 1A3DS4 do not display code corresponding to input signals.	a. BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1, FOCAL LENGTH-NORMAL switch 1A3S2, or BCD+3 PRESS TO TEST switch 1A3S3 defective.	a. Perform continuity check of switch testing circuits (para 3-8). Replace defective switch (fig. 3-16, sheet 1).
		assemblies 1A3XDS1 through 1A3XDS4 defective.	b. Check continuity of lamp assemblies 1A3XDS1 through 1A3XDS4. Replace defective lamp assembly (fig. 3-16, sheet 2).
		c. Connector 1A3J1 defective	c. Replace connector 1A3J1 (fig. 3-16, sheet 1).
		d. Pulse generator board assembly 1A3A6 or integrated circuit 1A3Z1 defective.	d. Replace pulse generator board assembly 1A3A6 (fig. 3-16, sheet 3). If this does not correct the malfunction, replace integrated circuit 1A3Z1 (fig. 3-16, sheet 7).
		e. Cable -Assembly, Special Purpose, Branched CX-12720/AYM-9 defective.	e. Perform continuity check of Cable Assembly, Special Purpose, Branched CX-12720/AYM-9 (para 3-13). Replace Cable Assembly, Special Purpose, Branched CX-12720/AYM-9 if defective.
20	Voltage obtained at RESISTOR TEST POINT 1A3J5 does not correspond to input voltage.	a. SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5, RESISTOR TEST A switch 1A3S6, or RESISTOR TEST B switch 1A3S8 defective.	a. Perform continuity check of resistor testing circuits (para 3-8). Replace defective switch (fig. 3-16, sheet 1).
		b. Connector 1A3J2 defective	b. Replace connector 1A3J2 (fig. 3-16, sheet 1).
		c. Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 defective.	c. Perform continuity check of Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 (para 3-13). Replace Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9 if defective.
		d. Oscillator board assembly 1A3A5 defective.	d. Replace oscillator board assembly (fig. 3-16, sheet 3).
21	SINGLE PULSE INDICATOR indicator lamp 1A3DS28 does not light but proper CRT presentation is obtained.	a. Defective indicator lamp	a. Replace indicator lamp (fig. 3-16, sheet 1).
		b. Lamp assembly 1A3XDS28 defective.	b. Check continuity of lamp assembly 1A3XDS28. Replace lamp assembly if defective (fig. 3-16, sheet 1).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
		c. Pulse generator board assembly 1A3A6 defective.	c. Perform alinement procedure of pulse generator board assembly 1A3A6 (para 3-22). Replace pulse generator board assembly, if defective (fig. 3-16, sheet 3).
22	SINGLE PULSE INDICATOR indicator lamp 1A3DS28 lights but no CRT presentation is obtained.	a. Cable Assembly, Special Purpose, Electrical CX-12725/U defective.	a. Check continuity of Cable Assembly, Special Purpose, Electrical CX-12725/U (para 3-13). Replace Cable Assembly, Special Purpose, Electrical CX-12725/U, if defective.
		b. Cable Assembly, Special Purpose, Electrical CX-12726/U, CX-12727/U, or CX-12728/U defective.	b. Perform continuity check of Cable Assembly, Special Purpose, Electrical CX-12726/U, CX-12727,/U, or CX-12128/U, as applicable (para 3-13). Replace defective cable assembly
		c. Connector 2A3J1 defective _ _	c. Inspect pins of connector 2A3J1 for breaks or bends. Check continuity between jack side and plug side. Replace connector if defective (fig. 3-20, sheet 3).
		d. Pulse generator board assembly 1A3A6 defective.	d. Set RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM position. Set RHA MODE switch 1A3S12 to CONTINUOUS position. Connect oscilloscope to UNBLANKING test point 1A3J20. Compare waveform on oscilloscope display to waveform G in figure FO-11. If waveform is incorrect, replace pulse generator board assembly (fig. 3-26, sheet 3).
23	CRT displays a single centered dot for all settings of RHA TEST SELECT switch 1A3S14.	Oscillator board assembly 1A3A5 defective.	Connect oscilloscope' to test point 1A3A5TP-1. Compare waveform on oscilloscope display to waveform A in figure FO-11. If waveform is incorrect, replace oscillator board assembly (fig. 3-16, sheet 3). If waveform is correct, refer to schematic diagram (fig. FO-12) and check wiring to connector 1A3XA5. Repair defective wiring.
24	CRT displays a straight line with RHA TEST SELECT switch 1A3S14 set to KA76.	a. Deflection amplifier board assembly 1A3A7 or 1A3A8 defective.	u. Set RHA MODE switch 1A3S12 to CONTINUOUS and RHA TEST SELECT switch 1A3S14 to KA76. Connect oscilloscope to test points 1A3A7TP1-3, 1A3A7-TP1-5, 1A3A8TP1-3, and 1A3A8TP1-5, in turn. Compare waveforms on oscilloscope display to waveform D (fig. FO-11). If waveforms are incorrect, replace deflection amplifier board assembly 1A3A7 or 1A3A8 (fig. 3-16, sheet 3).
		b. Oscillator board assembly 1A3A5 defective.	b. If all deflection signals are incorrect as observed in step a, connect oscilloscope to test points

Table 3-2. Overall Troubleshooting Chart - Continued

	Malfunction	Probable cause	Corrective action
			1A3A5TP1-8 and 1A3A5TP1-1 and observe output waveform. Compare waveforms on oscilloscope display to waveform A (fig. FO-11). If waveforms are incorrect, replace oscillator board assembly (fig. 3-16, sheet 3). If signals are correct, refer to schematic diagram (fig. FO-12) and check RHA TEST SELECT switch 1A3S14 and associated wiring to connectors 1A3XA7 and 1A3XA5. Replace switch 1A3S14, if defective (fig. 3-16, sheet 1). Repair defective wiring.
25	CRT displays a straight line for KA60, IR/SLAR, CDM position of RHA TEST SELECT switch 1A3S14.	Deflection amplifier board assembly 1A3A7 or 1A3A8 defective.	Set RHA MODE switch 1A3S12 to CONTINUOUS and RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. Connect oscilloscope to test points 1A3A7TP1-3, 1A3A7TP1-5, 1A3A8TP1-3, and 1A3A8TP1-5, in turn. Compare waveforms on oscilloscope display to waveform C (fig. FO-11). If waveforms are incorrect, replace deflection amplifier board assembly 1A3A7 or 1A3A8 (fig. 3-16, sheet 3).
26	Circular dot pattern on CRT is incorrect (too few dots, too many dots, or circle is a solid pattern).	Pulse generator board assembly 1A3A6 defective.	Set RHA TEST SELECT swit 1A3S14 to KA60, IR/SLAR, CDM position. Set RHA MODE switch 1A3S12 to CONTINUOUS. Connect counter to UNBLANKING test point 1A3J26. Frequency must be 10 ±0.05 kHz. Connect oscilloscope to UNBLANKING test point 1A3J20. Compare waveform on oscilloscope display to waveform G (fig. FO-11). If either frequency or waveform is incorrect, replace pulse generator board assembly 1A3A6 (fig. 3-16, sheet 3).
27	Raster pattern is not properly displayed.	o. Oscillator board assembly 1A3A5 defective.	a. Set RHA TEST SELECT switch 1A3S14 to PHOSPHOR. Connect oscilloscope to test points 1A3A5TP1-1 and 1A3A5TP1-8. Compare waveforms shown on oscilloscope to waveforms A and B (fig. FO-11). If waveforms are incorrect, replace oscillator hoard assembly 1A3A5 (fig. 3-16, sheet 3).
		b. Deflection amplifier board assembly 1A3A7 defective.	b. Set RHA TEST SELECT switch 1A3S14 to PHOSPHOR. Connect oscilloscope to test points 1A3A7TP1-3 and 1A3A7TP1-5. Compare waveform on oscilloscope to waveform E (fig. FO-11). If waveform is incorrect, replace deflection amplifier

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
			board assembly 1A3A7 (fig. 3-16, sheet 3).
		c. Pulse generator board assembly 1A3A6 defective.	c. Set RHA TEST SELECT switch 1A3S14 to PHOSPHOR. Connect counter to UNBLANKING test point 1A3J20. Frequency must be 6.25 ±0.31 kHz. Connect oscilloscope to UNBLANKING test point 1A3J20. Compare waveform shown on oscilloscope to waveform H (fig. FO-11). If frequency or wave. form is incorrect, replace pulse generator board assembly 1A3A6 (fig. 3-16, sheet 3).
28	Patterns are displayed on CRT correctly for continuous mode but not for single mode.	Pulse generator board assembly 1A3A6 defective.	Replace pulse generator board assembly (fig. 3-16, sheet 3). If single mode operation still cannot be engaged, check continuity of SINGLE PULSE switch 1A3S13 when depressed. Replace switch if defective (fig. 3-16, sheet 1).
29	Continuous mode operation cannot be engaged.	RHA TEST SELECT switch 1A3S14 or RHA MODE switch 1A3S12 defective.	Refer to schematic diagram (fig. FO-12) and check wiring to switches 1A3S12 and 1A3S14. Repair defective wiring. Check continuity of RHA TEST SELECT switch 1A3S14 in all positions and RHA MODE switch 1A3S12 in CONTINUOUS position. Replace defective switch (fig. 3-16, sheet 1).
30	Circle displays are distorted or not of specified diameter.	a Deflection amplifier board assemblies 1A3A7 and 1A3A8 not properly alined or defective.	a. Check alinement of deflection amplifier board assemblies 1A37 and 1A3A8 (pare 3-21). If signals cannot be brought within tolerance, replace defective deflection amplifier board assembly (fig. 3-16, sheet 3).
		b. Oscillator board assembly 1A3A5 defective.	b. Set RHA TEST SELECT switch 1A3S14 to KA76. Connect oscilloscope channel A probe to test point 1A3A5TP1-8 and channel B probe to test point 1A3A5TP1-1. Synchronize channel A with channel B and compare waveform on oscilloscope to waveform J (fig. FO-11). Phase difference between channel A and B waveforms shall be 90 ±10 degrees. If phase difference is not within tolerance, replace oscillator board assembly (fig. 3-16, sheet 3).
31	Differential voltmeter fails to indicate -80 ±4V dc at -522VDC test point 1A3J11 (para 3-30c, step 2).	Power supply 1A3A9 defective or out of alinement.	Check alinement of power supply assembly 1A3A9 (para 3-17). If voltage cannot be brought within tolerance, troubleshoot power supply assembly 1A3A9 (para 3-10). Repair power supply assembly 1A3A9 (para 3-23).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
32	Differential voltmeter fails to indicate +497 ±3V dc at +HORIZ test point 1A3J7 (para 3-30c, step 3).	a. Current limiting resistors 1A3A9R12 or 1A3A9R13 defective.	a. Troubleshoot power supply assembly 1A3A9 (para 3-10). Repair power supply assembly 1A3A9 (para 3-23).
E		b. Power supply assembly 1A3A9 defective or out of alinement.	b. Check alinement of power supply assembly 1A3A9 (para 3-17). If voltage cannot be brought within tolerance, troubleshoot power supply assembly 1A3A9 (para 3-10). Repair power supply assembly 1A3A9 (para 3-23).
33	Differential voltmeter fails to indicator +497 ±3V dc at -HORIZ test point 1A3J8 (para 3-30c, step 4).	Current limiting resistor 1A3A9R14 or 1A3A9R15 defective.	Troubleshoot power supply assembly 1A3A9 (para 3-10). Repair power supply assembly 1A3A9 (para 3-23).
34	Differential voltmeter fails to indicate +497 ±3V dc at +VERT test paint 1A3J10 (para 3-30c, step 5).	Current limiting resistor 1A3A9R29 or 1A3A9R30 defective.	Troubleshoot power supply assembly 1A3A9 (para 3-16). Repair power supply assembly 1A3A9 (para 3-23).
35	Differential voltmeter fails to indicate +497 ±3V dc at -VERT test point 1A3J9 (para 3-30c, step 6).	Current limiting resistor 1A3A9R31 or 1A3A9R32 defective.	Troubleshoot power supply assembly 1A3A9 (para 3-10). Repair power supply assembly 1A3A9 (para 3-23).
36	Counter fails to indicate 100 ±1 Hz at +HORIZ test point 1A3J7 (para 3-31c,. step 2).	a. Oscillator board assembly 1A3A5 defective.	u. Connect counter to oscillator output at 1A3A5TP1-8. If counter does not indicate 100 ±1 Hz. replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Deflection amplifier board assembly 1A3A7 defective.	b. If count is correct in step a, replace deflection amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
37	Counter fails to indicate 100 ±1 Hz at -HORIZ test point 1A3J8 (para 3-31c, step 3).	a. Oscillator board assembly 1A3A5 defective.	a. Connect counter to oscillator output at 1A3A5TP1-8. If counter does not indicate 100 ±1 Hz. replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Deflection amplifier board assembly 1A3A7 defective.	b. If count is corrrect in step a, replace deflection amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
38	Counter fails to indicate 100 ±1 Hz at +VERT test point 1A3J10 (para 3-31c, step 4).	a. Oscillator boara assembly 1A3A5 defective.	a. Connect counter to oscillator output at 1A3A5TP1-8. If counter does not indicate 100 ±1 Hz, replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Deflection amplifier board assembly 1A3A8 defective.	b. If count is correct in step a, replace deflection amplifier board assembly 1A3A8 (fig. 3-16, sheet 3).
39	Counter fails to indicate 100 ±1 Hz at -VERT test point 1A3J9 (para 3-31c, step 5).	a. Oscillator board assembly 1A3A5 defective.	a. Connect counter to oscillator output at 1A3A5TP1-8. If counter does not indicate 100 ±1 Hz, replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Deflection amplifier board assembly 1A3A8 defective.	b. If count is correct in step a, replace deflection amplifier board assembly 1A3A8 (fig. 3-16, sheet 3).

Table 3-2. Overall Troubleshooting Chart - Continued

Item No.	Malfunction	Probable cause	Corrective action
40	Differential voltmeter fails to indicate 14.32 ±0.14V ac at +HORIZ test point 1A3J7 (para 3-32c, step 2).	Deflection amplifier board assembly 1A3A7 defective or out of alinement.	Check alinement of deflection ampli- 3-21). If signals cannot 'be brought within tolerance, replace deflecti amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
41	Differential voltmeter fails to indicate 14.32 ±0.14V ac at -HORIZ test point 1A3J8 (para 3-32c, step 3).	Deflection amplifier board assembly 1A3A7 defective or out of alinement.	Check alinement of deflection amplifier board assembly 1A3A7 (para 3-21). If signals cannot be brought within tolerance, replace deflection amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
42	Differential voltmeter fails to indicate 14.32 ±0.14 volts ac at +VERT test point 1A3J10 (para 3-32c, step 4).	Deflection amplifier board assembly 1A3A8 defective or out of alinement.	Check alinement of deflection amplifier board assembly 1A3A8 (para 3-21). If signals cannot he brought within tolerance, replace deflection amplifier board assembly 1A3A8 (fig. 3-16, sheet 3).
43	Differential voltmeter fails to indicate 14.32 ±0.14 volts ac at -VERT test point 1A3J9 (para 3-32c, step 6).	Deflection amplifier board assembly 1A3A8 defective.	Check alinement of deflection amplifier board assembly 1A3A8 (para 3-21). If signals cannot be brought within tolerance, replace deflection amplifier board assembly 1A3A8 (fig. 3-16, sheet 3).
44	Oscilloscope fails to display 3 centimeter circle at +HORIZ and +VERT test points 1A3J7 and 1A3J10 (para 3-324% step 7).	Oscillator board assembly 1A3A5 defective.	Replace oscillator board assembly (fig. 3-16, sheet 3).
45	Oscilloscope fails to display 3 centimeter circle at -HORIZ and -VERT test points 1A3J8 and 1A3J9 (para 3-32c, step 8).	Oscillator board assembly 1A3A5 defective.	Replace oscillator board assembly (fig. 3-16, sheet 3).
46	Waveform displayed by oscilloscope at +HORIZ test point 1A3J7 does not correspond to waveform D of figure FO-11 (para 3-32c, step 10).	Deflection amplifier board assembly 1A3A7 defective or out of alinement.	Check alinement of deflection amplifier board assembly 1A3A7 (para 3-21). If proper alinement cannot be achieved, replace deflection amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
47	Waveform displayed by oscilloscope at -HORIZ test point 1A3J8 does not correspond to waveform D of figure FO-11 (para 3-32c, step 11).	Deflection amplifier board assembly 1A3A7 defective or out of alinement.	Check alinement of deflection amplifier board assembly 1A3A7 (para 3-21). If proper alinement cannot be achieved, replace deflection amplifier board assembly 1A3A7 (fig. 3-16, sheet 3).
48	Counter fails to indicate 10 kHz ±0.05 Hz pulse frequency at UNBLANKING test point 1A3J20 (para 3-32c, step 13).	Pulse generator board assembly 1A3A6 defective or out of alinement.	Check alinement of pulse generator board assembly 1A3A6 (para 3-22). If proper alinement cannot be achieved, replace pulse generatoT board assembly (fig. 3-16, sheet 3:
49	Wavefore displayed by oscilloscope at UNBLANKING test point 1A3J20 does not correspond to waveform G of figure FO-11 (para 3-32c, step 16).	Pulse generator board assembly 1A3A6 defective.	Check alinement of pulse generator board assembly 1A3A6 (para 3-22). If proper alinement cannot be achieved, replace pulse generator board assembly (fig. 3-16, sheet 3)
50	Counter fails to indicate 6.25 kHz ±0.31 kHz at	a. Oscillator board assembly 1A3A5 defective.	u. Replace oscillator board assembly (fig. 3-16, sheet 3).

Table 3-2. Overall Troubleshooting Chart - continued

Item No.	Malfunction	Probable cause	Corrective action
	UNBLANKING test point 1A3J20 (para 3-32c, step 17).	b. Pulse generator board assembly 1A3A6 defective or out of alinement.	b. Check alinement of pulse generator board assembly 1A3A6 (para 3-22). If proper alinement cannot be achieved, replace pulse generator board assembly (fig. 3-16, sheet 3).
51	Waveform displayed by oscilloscope at UNBLANKING test point 1A3J20 does not correspond to waveform F of figure FO-11 (para 3-32c, step 19).	a. Oscillator board assembly 1A3A5 defective.	a. Replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Pulse generator board assembly 1A3A6 defective or out of alinement.	b. Check alinement of pulse generator board assembly 1A3A6 (pars 3-223. If proper alinement cannot be achieved, replace pulse generator board assembly (fig. 3-16, sheet 3).
52	Counter fails to indicate 6.25 kHz ±6.31 kHz at UNBLANKING test point 1A3J26 (para 3-32c, step 21).	a. Oscillator board assembly 1A3A5 defective.	a. Replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Pulse generator board assembly 1A3A6 defective or out of alinement.	b. Check alinement of pulse generator board assembly 1A3A6 (para 3-22). If proper alinement cannot be achieved, replace pulse generator board assembly (fig. 3-16, sheet 3).
		c. Deflection amplifier board assembly 1A3A8 defective or out of alinement.	c. Check alinement of deflection amplifier board assembly 1A3A8 (para 3-21). If proper alinement cannot be achieved, replace deflection amplifier board assembly 1A3A8 (fig. 3-16, sheet 3).
53	Waveform displayed by oscilloscope at UNBLANKING test point 1A3J20 does not correspond to waveform H of figure FO-11 (para 3-32c, step 23).	a. Oscillator board assembly 1A3A5 defective.	a. Replace oscillator board assembly (fig. 3-16, sheet 3).
		b. Pulse generator board assembly 1A3A6 defective.	b. Perform alinement procedure Of pulse generator board assembly 1A3A6 (para 3-22). Replace pulse generator board assembly if defective (fig. 3-16, sheet 3).
		c. Deflection amplifier board assembly 1A3A8 defective.	c. Perform alinement procedure of deflection amplifier board assembly 1A3A8 (para 3-21). Replace deflection amplifier board assembly if defective (fig. 3-16, sheet 3).
54	SINGLE PULSE INDICATOR indicator lamp 1A3DS-28 fails to light (para 3-32c, steps 25 and 26).	Pulse generator board assembly 1A3A6 defective.	Perform alinement procedure of pulse generator board assembly 1A3A6 (para 3-22). Replace pulse generator board assembly if defective (fig. 3-16, sheet 3).
55	Counter fails to indicate 58 ±4 kHz at UNBLANKING test point 1A3J20 (para 3-32c, step 25).	Pulse generator board assembly 1A3A6 defective.	Perform alinement procedure of pulse generator board assembly 1A3A6 (para 3-22). Replace pulse generator board assembly if defective (fig. 3-16, sheet 3).
56	Counter fails to indicate 100 ±5 kHz at UNBLANKING test point 1A3J20 (para 3-32c, step 26).	Defective pulse generator board assembly 1A3A6.	Perform alinement procedure of pulse generator board assembly 1A3A6 (para 3-22). Replace pulse generator board assembly if defective (fig. 3-16, sheet 3).
57	BATTERY INDICATOR lamp 1A3DS8 fails to light (para 3-33c, step 2).	Battery test circuit of pulse generator board assembly 1A3A6 out of calibration or defective.	Check calibration of battery test circuit (para 3-22). If calibration cannot be accomplished, replace pulse generator board assembly (fig. 3-16, sheet 3).

3-8. Switch and resistor Testing Circuits Resistance and Continuity Check

Check the switch and resistor testing circuits by performing resistance and continuity checks between test points indicated in tables 3-3 and 3-4. Table 3-3 lists points of test and corresponding switch settings for the circuits associated with the switch testing circuits. Table 3-4 lists similar data for the circuits associated with the resistor testing circuits. Remove oscillator board assembly 1A3A5 and pulse generator board assembly 1A3A6, and insert Extender, Circuit Card, MX-8966/AYM in place of either oscillator board assembly 1A3A5 or generator board assembly 1A3A6 to facilitate performance of resistance and continuity checks. If any circuit is found to be open, refer to the schematic diagram, figure FO-12, and perform a point to point check of the switch contacts, indicator lamps, and II-C-ing to isolate the fault. Repair defective wiring and replace defective switches or indicator lamps. If an incorrect resistance is obtained at any point, refer to the schematic diagram, figure FO-12, and perform a point to point check of the switch contacts, lamp sockets, and wiring to isolate the fault. Repair defective wiring and replace defective switches or lamp sockets. After performance of resistance and continuity checks, remove Extender, Circuit Card, MX-8966/AYM and reinstall either oscillator board assembly 1A3A5 or generator board assembly 1A3A6.

3-9. AC Power Distribution Circuit Resistance Measurements

Check the ac power distribution circuit by performing the resistance measurements listed in table 3-5. Remove cover (warning plate) from power supply assembly 1A3A9 to facilitate resistance measurements of transformer 1A3T1. Reinstall warning plate upon completion of table 3-5. If any reading is not within the limits specified, refer to the schematic diagram, figure FO-12, and troubleshoot the circuit to isolate the fault. Replace all defective parts.

3-10. Power Supply Assembly 1A3A9 Troubleshooting

a. Troubleshooting of the +500 volts dc and -522 volts dc sections of power supply assembly 1A3A9 is accomplished by performing voltage and resistance measurements. Perform the voltage and resistance measurements with respect to ground in accordance with tables 3-6 through 3-9. Perform the voltage and resistance measurements between transistor elements in accordance with figure 3-1. All voltage measurements are taken with the differential voltmeter and all resistance measurements with the multimeter. Note that when taking voltage measurements within newer supply assembly 1A3A9, it is necessary to keep interlock switch 1A3A9S1 pulled out.

WARNING

Be careful when taking voltage measurements within power supply assembly 1A3A9. Dangerous voltages in excess of 500 volts exist within this assembly.

b. Perform resistance and voltage checks as follows :

(1) Remove warning plate from power supply assembly 1A3A9.

(2) Remove high voltage board assembly 1A3A9A3 from power supply assembly 1A3A9.

(3) Perform all resistance checks of table 3-6.

(4) Reinstall high voltage board assembly 1A3A9A3 is power supply assembly 1A3A9.

(5) Connect Simulator, Monitor Input SM-627/AYM-9 to a source of 115 volt ac power using Cable Assembly, Power, Electrical CX-12723/AYM-9.

(6) Activate 115 volt ac power supply.

(7) Set ON-OFF circuit breaker 1A3C1 to ON; indicator lamps -522VDC (1A3DS25, + 500VDC (1A3DS24), - 80VDC (1A3DS27), 115 VDC (1A3DS26), 6.3VAC (1A3DS23), 115-VAC (1A3DS22), GO (1A3DS9), and +5 V (1A-3DS11) shall illuminate.

(8) Perform all voltage checks of tables 3-7, 3-8, and 3-9.

(9) Set ON-OFF circuit breaker 1A3CB1 to OFF; all indicator lamps of step (7) shall extinguish.

(10) Deactivate 115 volt ac power supply.

(11) Depress and seat interlock switch IA-3A9S1.

(12) Reinstall warning plate on power supply assembly 1A3A9.

c. If any reading is not within the limits specified, refer to the schematic diagram, figure FO-13, and troubleshoot the circuit to isolate the fault. Replace all defective parts.

NOTE

Be sure that all board assemblies 1A-3A1, 1A3A3, 1A3A4, 1A3A5, 1A3A6, 1A3A7, and 1A3A8 are securely mated to their respective connectors on basket assemblies 1A3A10 and 1A3A12 before performing any checks on power SUP-ply assembly 1A3A9.

Table 3-3. Switch Testing Circuit Resistance and Continuity Test Data

Points of test				Switch positions					
From		To		DCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1	DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S10	DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9	SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5	FOCAL LENGTH-NORMAL switch 1A3S2	Resistance (ohms) (see note 1)
Connector	Pin	Connector	Pin						
1A3XA5	2	1A3J1	B	HRS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J1	C	HRS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J1	D	MINS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J1	E	MINS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J1	F	SECS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J1	G	SECS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J2	FF	KA60 EXP AND NUM	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J2	AA	KA76 EXP AND TEST	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	2	1A3J2	z	FR RESET KA60-2	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	K	HRS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	L	HRS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	M	MINS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	N	MINS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	P	SECS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	3	1A3J1	R	SECS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	4	1A3J1	U	HRS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	4	1A3J1	V	HRS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	4	1A3J1	W	MINS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46

Table 3-3 Switch Testing Circuit Resistance and Continuity Data - Continued

Points of test				Switch positions					
From		To		BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1	DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S10	DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9	SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5	FOCAL LENGTH-NORMAL switch 1A3S2	Resistance (ohms) (see note 1)
Connector	Pin	Connector	Pin						
1A3XA5	4	1A3J1	X	MINS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	4	1A3J1	Y	SECS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	4	1A3J1	Z	SECS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	b	HRS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	c	HRS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	d	MINS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	e	MINS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	f	SECS 10'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	6	1A3J1	g	SECS 1'S	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	9	1A3J1	S	KA60 EXP AND NUM	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	9	1A3J1	J	KA76 EXP AND TEST	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	9	1A3J2	k	FR RESET KA60-2	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	11	1A3J1	a	KA60 EXP AND NUM	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	11	1A3J1	T	KA76 EXP AND TEST	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	11	1A3J2	F	FR RESET KA60-2	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6 (see note 2)	...	1A3J2	K	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6		1A3J2	L	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46

1A3J6	..	1A3J2	M	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6	..	1A3J2	N	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6	..	1A3J2	P	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6		1A3J2	R	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6		1A3J2	BB	OFF	OFF	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3J6	..	1A3J2	J	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6		1A3J2	S	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6	.	1A3J2	T	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3J6	..	1A3J2	U	OFF	OFF	OFF	SWITCH TEST	NORMAL	34 to 46
1A3XA5	22	1A3J2	b	OFF	DAY 10'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	c	OFF	DAY 1'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	V	OFF	MONTH 10'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	W	OFF	MONTH 1'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	G	OFF	YEAR 10'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	H	OFF	YEAR 1'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	d	OFF	SORTIE 1,000'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	e	OFF	SORTIE 100'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	p	OFF	SORTIE 10'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	q	OFF	SORTIE 1'S	OFF	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	w	OFF	ENABLE	TAKING UNIT 100,000'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	v	OFF	ENABLE	TAKING UNIT 10,000'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	r	OFF	ENABLE	TAKING UNIT 1,000'S	SWITCH TEST	NORMAL	Less than 1 ohm

Table 3–3. Switch Testing Circuit Resistance and Continuity Test Data—Continued

Points of test				Switch positions					
From		To		BCD THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S1	DECIMAL THUMBWHEEL SWITCH TEST switch 1A3S10	DECIMAL THUMBWHEEL AND PANEL SWITCH TEST switch 1A3S9	SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5	FOCAL LENGTH-NORMAL switch 1A3S2	Resistance (ohms) (see note 1)
Connector	Pin	Connector	Pin						
1A3XA5	22	1A3J2	s	OFF	ENABLE	TAKING UNIT 100'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	t	OFF	ENABLE	TAKING UNIT 10'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J2	u	OFF	ENABLE	TAKING UNIT 1'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3J6	..	1A3J2	n	OFF	ENABLE	FOCAL LG 10'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3J6	..	1A3J2	m	OFF	ENABLE	FOCAL LG 1'S	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	22	1A3J1	h	OFF	ENABLE	PWR OFF/ON	SWITCH TEST	NORMAL	Less than 1 ohm
1A3XA5	2	1A3XA6	11	OFF	OFF	OFF	SWITCH TEST	FOCAL LENGTH	Less than 1 ohm
1A3XA5	3	1A3XA6	12	OFF	OFF	OFF	SWITCH TEST	FOCAL LENGTH	Less than 1 ohm
1A3XA5	4	1A3XA6	10	OFF	OFF	OFF	SWITCH TEST	FOCAL LENGTH	Less than 1 ohm
1A3XA5	6	1A3XA6	13	OFF	OFF	OFF	SWITCH TEST	FOCAL LENGTH	Less than 1 ohm

Notes: 1. All resistances in table 3–3 are taken with Multimeter TS–352B/U set to R × 1 scale.
2. GND test point on test set panel assembly 1A3.

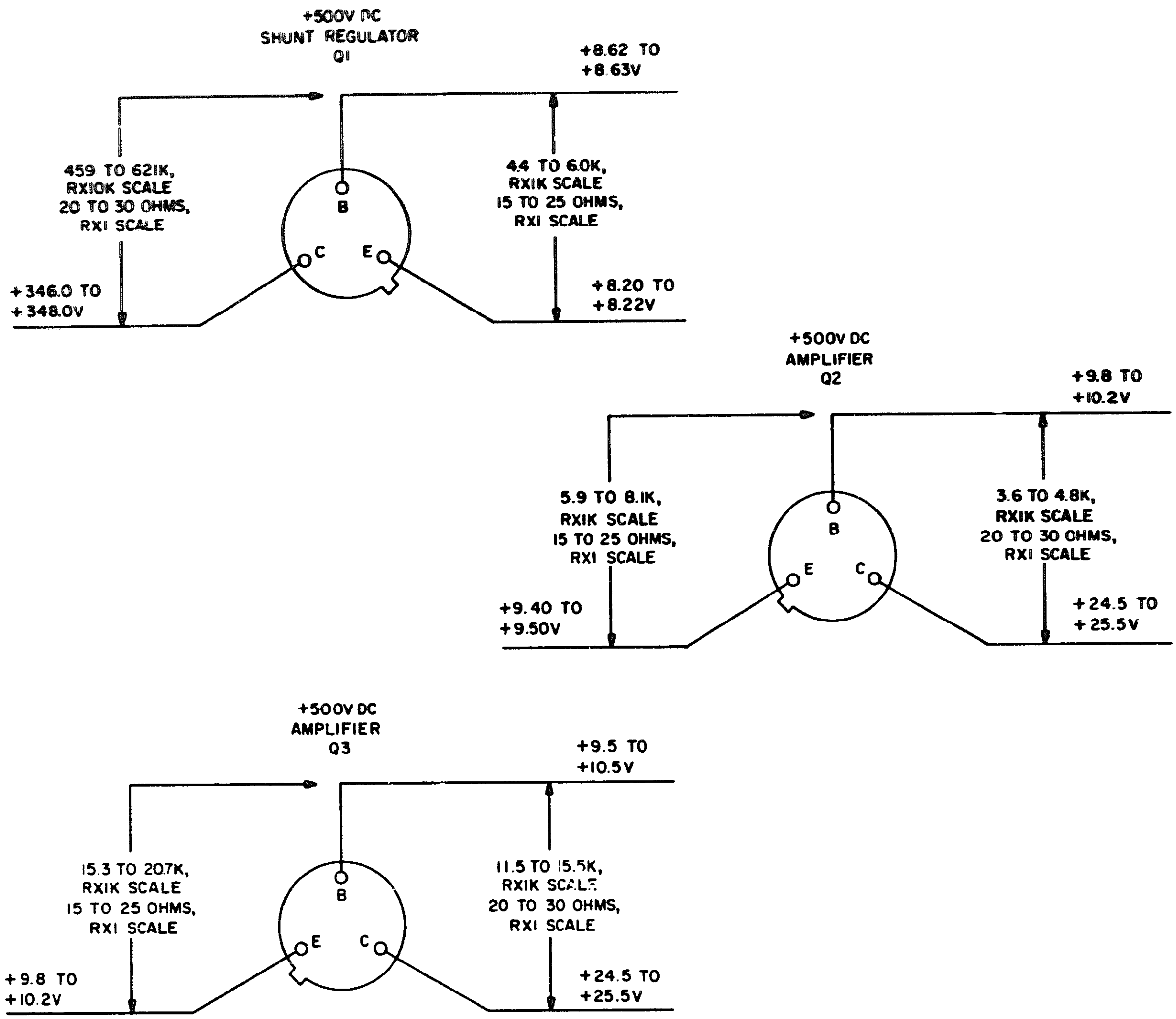
Table 3-4. Resistor Testing Circuit Resistance and Continuity Test Data

Points of test: From Connector	From Pin	To Connector	To Pin	Switch positions: BCD+3 PRESS TO TEST switch 1A3S3	DECIMAL PRESS TO TEST switch 1A3S7	BCD PRESS TO TEST switch 1A3S4	RESISTOR TEST A switch 1A3S8	RESISTOR TEST B switch 1A3S6	SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5	Resistance (ohms) (see note 1)
1A3XA5	2	1A3J6 (see note 2)	..	Operated	Off	Off	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	3	1A3J6	..	Operated	Off	Off	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	4	1A3J6	..	Operated	Off	Off	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	6	1A3J6	..	Operated	Off	Off	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	7	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	9	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	11	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	13	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	18	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	20	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	15	1A3J6	..	Off	Off	Operated	OFF	OFF	RESISTOR TEST +5VDC POWER	34 to 46
1A3XA5	34	1A3J6	..	Off	Operated	Off	OFF	OFF	RESISTOR TEST +5VDC POWER	1.7 to 2.3
1A3J5 (See note 3)	..	1A3J2	J	Off	Off	Off	1	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5		1A3J2	S	Off	Off	Off	2	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	T	Off	Off	Off	3	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	U	Off	Off	Off	4	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	.	1A3J2	N	Off	Off	Off	5	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm

Table 3-4. Resistor Testing Circuit Resistance and Continuity Test Data - Continued

Points of test				Switch positions						
From		To		BCD+3 PRESS TO TEST switch 1A3S3	DECIMAL PRESS TO TEST switch 1A3S7	BCD PRESS TO TEST switch 1A3S4	RESISTOR TEST A switch 1A3S8	RESISTOR TEST B switch 1A3S6	SWITCH TEST-RESISTOR TEST +5VDC POWER switch 1A3S5	Resistance (ohms) (see note 1)
Connector	Pin	Connector	Pin							
1A3J5	..	1A3J2	P	Off	Off	Off	6	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	R	Off	Off	Off	7	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	K	Off	Off	Off	8	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	L	Off	Off	Off	9	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	M	Off	Off	Off	10	OFF	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	A	Off	Off	Off	ENABLE	1	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	J	Off	Off	Off	ENABLE	2	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	T	Off	Off	Off	ENABLE	3	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	H	Off	Off	Off	ENABLE	4	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	S	Off	Off	Off	ENABLE	5	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J1	a	Off	Off	Off	ENABLE	6	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	F	Off	Off	Off	ENABLE	7	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	j	Off	Off	Off	ENABLE	8	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	k	Off	Off	Off	ENABLE	9	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	BB	Off	Off	Off	ENABLE	10	RESISTOR TEST +5VDC POWER	Less than 1 ohm
1A3J5	..	1A3J2	AA	Off	Off	Off	ENABLE	11	RESISTOR TEST +5VDC POWER	Less than 1 ohm

Notes: 1. All resistances in table 3-4 are taken with Multimeter TS-352B/U set to R × 1 scale.
2. GND test point on test set panel assembly 1A3.
3. RESISTOR TEST POINT test point on test set panel assembly 1A3.



NOTES:

1. ALL VOLTAGE MEASUREMENTS ARE FROM DESIGNATED TERMINAL TO CHASSIS USING DIFFERENTIAL VOLTMETER, ME-202B/U, WITHOUT CRT CONNECTED.
2. TO MAKE RESISTANCE MEASUREMENTS, REMOVE MODULE FROM EQUIPMENT. MAKE MEASUREMENTS BETWEEN INDICATED TERMINALS WITH MULTIMETER TS-352B/U.
3. WHERE TWO RESISTANCE READINGS BETWEEN TERMINALS ARE GIVEN, THE TOP READING IS THE RESISTANCE MEASURED WITH THE [OHMS] LEAD CONNECTED TO THE BASE; THE BOTTOM READING IS THE RESISTANCE MEASURED WITH THE [OHMS −DC ±AC] LEAD CONNECTED TO THE BASE. BE SURE TO CHECK THE ACTUAL POLARITY OF THE OHMMETER LEADS BEFORE MAKING MEASUREMENTS.
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3A9.

EL6625-2478-40-TM-10 (1)

Figure 3-1 (1). Power supply assembly 1A3A9, transistor and resistance measurements (sheet 1 of 2)

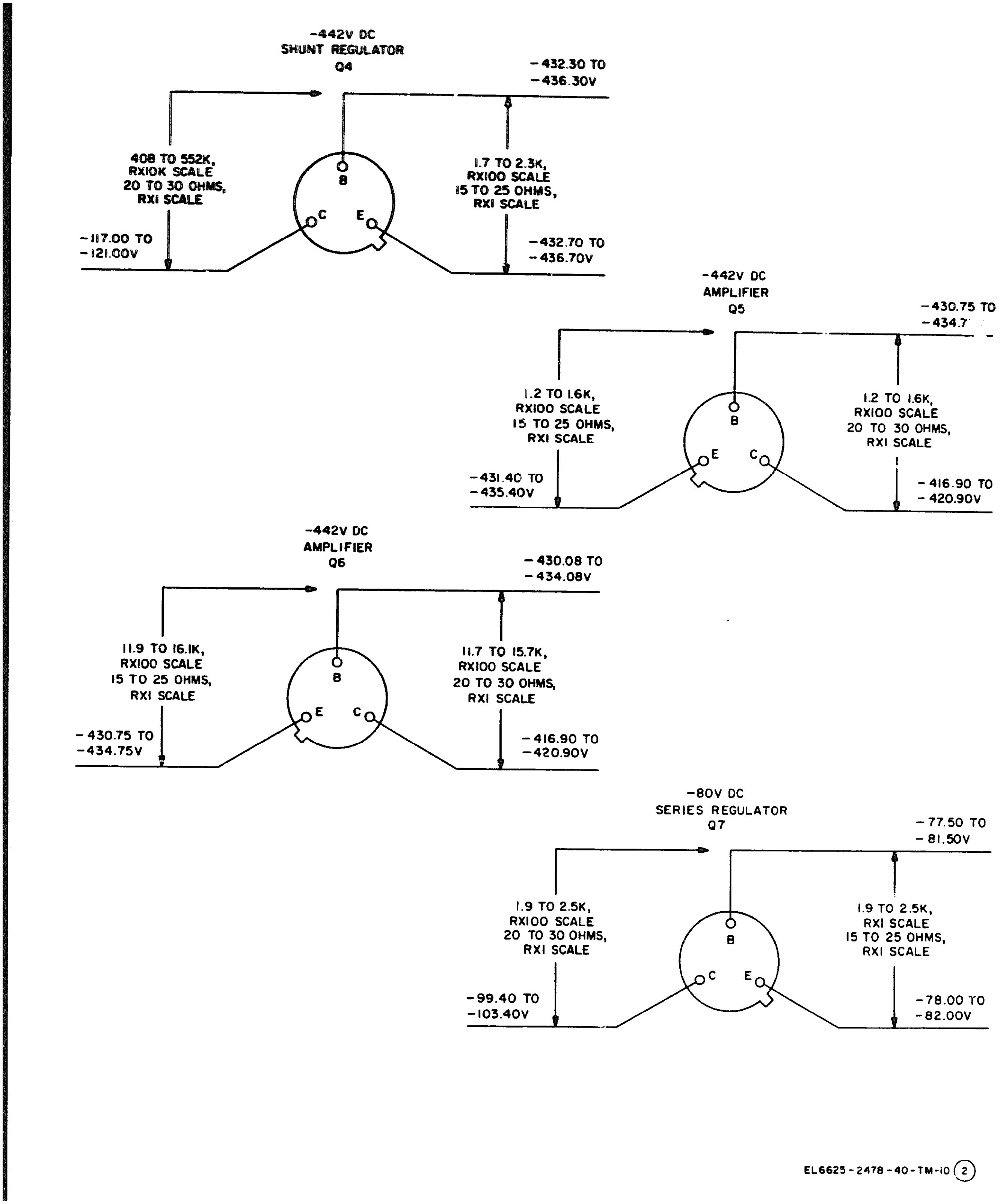


Figure 3-1 (2). Power supply assembly 1A3A9, transistor and resistance measurements (sheet 2 of 2).

Table 3-5. Ac Power Distribution Resistance Measurements Chart

From			To		
Connector 1A3J4 pin (see note 1)	Transformer 1A3T1 terminal	Connector 1A3P1 pin (see note 2)	Transformer 1A3T1 terminal	Other	Resistance (ohms)
C			1		2.0 to 2.6
C			2		1.4 to 1.8
D			1		1.9 to 2.5
D			2		1.3 to 1.7
C				Ground	225K to 275K
D				Ground	225K to 275K
	3		4		0 to 0.2
	5		6		84 to 114
	7		8		19 to 25
	9		10		114 to 126
	27		28		2.1 to 2.9
	11		12		20 to 28
	17		18		0.6 to 0.8
	19		20		0.4 to 0.5
	15		16		0.6 to 0.8
	21		22		0.4 to 0.6
	25		26		0.02 to 0.04
	13		14		18 to 24
	23		24		0 to 0.2
		s	2		850K to 1150K
		t	1		Continuity

Notes: 1. ON-OFF switch 1A3CB1 on test set panel assembly 1A3 set to ON position.
2. Connector 1A3P1 disconnected from connector 1A3A9J1.

Table 3-6. +500 Volt Dc Section of Power Supply Assembly 1A3A9 Resistance Test Data

Assembly	*Terminals*	*Polarity*	*Multimeter, TS-352B/U scale setting*	*Value*
1A3A9A1 (See note 1)	1 to 2	Either	R × 10K	460.6 to 479.4K
	3 to 4	Either	R × 10K	460.6 to 479.4K
	5 to 6	Either	R × 10K	460.6 to 479.4K
	7 to 8	Either	R × 10K	460.6 to 479.4K
	9 to 10	Either	R × 10K	460.6 to 479.4K
	11 to 12	Either	R × 10K	460.6 to 479.4K
	13 to 14	Either	R × 10K	460.6 to 479.4K
	15 to 16	Either	R × 10K	460.6 to 479.4K
	17 to 18	See note 3	R × 10K	Greater than 1 megohm
	17 to 18	See note 4	R × 1	15 to 25 ohms
	18 to 19	See note 3	R × 1	15 to 25 ohms
	18 to 19	See note 4	R × 10K	Greater than 1 megohm
	19 to 21	See note 3	R × 1	15 to 25 ohms
	19 to 21	See note 4	R × 10K	Greater than 1 megohm
	17 to 21	See note 3	R × 1	15 to 25 ohms
	17 to 21	See note 4	R × 10K	Greater than 1 megohm
	23 to 24	See note 3	R × 10K	Greater than 5 megohms
	23 to 24	See note 4	R × 1	15 to 25 ohms
	24 to 25	See note 3	R × 1	15 to 25 ohms
	24 to 25	See note 4	R × 10K	Greater than 5 megohms
	25 to 27	See note 3	R × 1	15 to 25 ohms
	25 to 27	See note 4	R × 10K	Greater than 5 megohms
	26 to 27	See note 3	R × 1	15 to 25 ohms
	26 to 27	See note 4	R × 10K	Greater than 5 megohms
'A9A2 (See note 2)	1 to 2	See note 3	R × 1	20 to 30 ohms
	1 to 2	See note 4	R × 10K	Greater than 400K
	2 to 3	See note 3	R × 1	20 to 30 ohms
	2 to 3	See note 4	R × 10K	Greater than 400K

Table 3-6. +500 Volt Dc Section of Power Supply Assembly 1A3A9 Resistance Test Data - Continued

Assembly	Terminals	Polarity	Multimeter, TS-352B/U scale setting	Value
	3 to 5	See note 3	R × 1	20 to 30 ohms
	3 to 5	See note 4	R × 10K	Greater than 400K
	1 to 5	See note 3	R × 1	20 to 30 ohms
	1 to 5	See note 4	R × 10K	Greater than 400K
	7 to 8	See note 3	R × 10K	Greater than 400K
	7 to 8	See note 4	R × 1	20 to 30 ohms
	7 to 11	See note 3	R × 1	20 to 30 ohms
	7 to 11	See note 4	R × 10K	Greater than 400K
	8 to 9	See note 3	R × 1	20 to 30 ohms
	8 to 9	See note 4	R × 10K	Greater than 400K
	9 to 11	See note 3	R × 1	20 to 30 ohms
	9 to 11	See note 4	R × 10K	Greater than 400K
	1 to 2	See note 3	R × 1K	12 to 14K
	1 to 2	See note 4	R × 10K	160 to 180K
	1 to 6	See note 3	R × 1	20 to 30 ohms
	1 to 6	See note 4	R × 10K	190 to 210K
	2 to 3	Either	R × 1K	9.8 to 10.2K
	2 to 4	See note 3	R × 100	2.2 to 2.4K
	2 to 4	See note 4	R × 100	3.2 to 3.8K
	4 to 5	Either	R × 10	446 to 494 ohms
	6 to 8	Either	R × 100	1584 to 1616 ohms
	7 to 11	Either	R × 1K	37.9 to 38.6K
	2 to 23	Either	R × 1K	9.8 to 10.2K
	12 to 13	See note 3	R × 10K	130 to 150K
	12 to 13	See note 4	R × 10K	246.5 to 251.4K
	13 to 27	See note 3	R × 10K	130 to 150K
	13 to 27	See note 4	R × 10K	246.5 to 251.4K
	22 to 27	Either	R × 1K	9.5 to 10.5K
	22 to 28	Either	R × 1K	5.84 to 5.95K
	31 to 32	Either	R × 100	1.58 to 1.61K
	32 to 33	See note 3	R × 10K	20 to 30 ohms
	32 to 33	See note 4	R × 1	190 to 210K
	33 to 45	See note 3	R × 1K	13 to 15K
	33 to 45	See note 4	R × 10K	160 to 180K
	45 to 46	See note 3	R × 100	2.2 to 2.4K
	45 to 46	See note 4	R × 100	3.2 to 3.8K
	46 to 48	Either	R × 10	446 to 494 ohms
	45 to 49	See note 3	R × 1K	3.3 to 3.7K
	45 to 49	See note 4	R × 100	1.5 to 1.9K
	45 to 70	Either	R × 1K	9.8 to 10.2K
	30 to 51	See note 3	R × 10K	120 to 140K
	30 to 51	See note 4	R × 10K	212.8 to 217.1K
	51 to 76	See note 3	R × 10K	120 to 140K
	51 to 76	See note 4	R × 10K	212.8 to 217.1K
	76 to 77	Either	R × 1K	9.5 to 10.5K
	71 to 77	Either	R × 1K	5.84 to 5.95K
	61 to 72	Either	R × 1K	4.5 to 5.5K
	55 to 61	See note 3	R × 1K	27 to 33K
	55 to 61	See note 4	R × 1K	20 to 24K
	55 to 62	Either	R × 100	2.46 to 2.51K
	57 to 63	Either	R × 100	2.98 to 3.04K
	14 to 16	See note 3	R × 1K	8.8 to 10.2K
	14 to 16	See note 4	R × 1K	7.2 to 7.7K
	15 to 16	See note 3	R × 1	20 to 30 ohms
	15 to 16	See note 4	R × 1K	130 to 150K
	53 to 59	See note 3	R × 1	20 to 30 ohms
	53 to 59	See note 4	R × 1K	20 to 30K
	58 to 64	Either	R × 10K	980 to 1020K
	58 to 65	Either	R × 1K	25.6 to 28.3K
	34 to 44	Either	R × 1K	2.98 to 3.04K
	104 to 105	Either	R × 10K	980 to 1020K

Table 3-6. +500 Volt Dc Section of Power Supply Assembly 1A3A9 Resistance Test Data - Continued

Assembly	Terminals	Polarity	Multimeter, TS-352B/U scale setting	Value
	54 to 60	Either	R × 10K	613.8 to 626.2K
	60 to 66	Either	R × 10K	613.8 to 626.2K
	52 to 53	Either	R × 100	6732 to 6868 ohms
	9 to 11	Either	R × 10K	460.6 to 479.4K
	10 to 24	Either	R × 10K	460.6 to 479.4K
	78 to 79	See note 3	R × 1K	30K
	78 to 79	See note 4	R × 10K	500K
	78 to R1-2	Either	R × 1K	6742 to 6878 ohms
	R2-1 to R2-2	Either	R × 1K	6742 to 6878 ohms
	82 to R18-2	Either	R × 1K	5564 to 5676 ohms
	R19-1 to R19-2	Either	R × 1K	5564 to 5676 ohms
	82 to 85	See note 3	R × 1K	30K
	82 to 85	See note 4	R × 10K	46K
	88 to 90	Either	R × 100	382 to 398 ohms
	89 to 90	See note 3	R × 10K	200K
	89 to 90	See note 4	R × 1	15 to 25 ohms
	92 to 93	See note 3	R × 1	15 to 25 ohms
	92 to 93	See note 4	R × 10K	200K
	88 to 89	See note 3	R × 10	420 ohms
	88 to 89	See note 4	R × 10K	200K
	86 to 87	See note 3	R × 1K	22K
	86 to 87	See note 4	R × 1K	56K

Notes: 1. Perform resistance measurements with connector 1A3A9J1 disconnected from 1A3P1.
2. Perform all remaining measurements with connector 1A3A9J1 connected to 1A3P1.
3. Connect the red test lead prod to the first terminal and the black test lead prod to the second.
4. Connect the black test lead prod to the first terminal and the red test lead prod to the second.

Table 3-7. +500 Volt Dc Section of Power Supply Assembly 1A3A9 Voltage Test Data

Assembly	Terminals	DVM ME-202B/U Value
1A3A9A4	A3-2 to A3-6	+8.20 to +8.22V dc
	A3-2 to A3-4	+8.62 to +8.63V dc
	A3-2 to A3-7	+346.0 to +348.0V dc
	A3-2 to A3-11	+498.0 to +499.9V dc
	A3-2 to A3-3	+9.40 to +9.50V dc
	A3-2 to A3-19	+24.5 to +25.5V dc
	A3-2 to A3-25	+9.8 to +10.2V dc
	A3-2 to A3-1	+7.22 to +7.45V dc
	A3-2 to A3-26	+9.5 to +10.5V dc

Note. Perform all measurements of table 3-7 with connector 1A3A9J1 connected to 1A3P1.

Table 3-8. -442 Volt Dc Section of Power Supply Assembly 1A3A9 Voltage Test Data

Assembly	Terminals	DVM ME-202B/U Value
1A3A9A3	A3-2 to A3-45	−442.00 ±2V dc
	A3-2 to A3-47	−119.00 ±2V dc
	A3-2 to A3-32	−434.70 ±2V dc
	A3-2 to A3-46	−434.30 ±2V dc
	A3-2 to A3-48	−433.40 ±2V dc
	A3-2 to A3-69	−418.90 ±2V dc
	A3-2 to A3-73	−432.75 ±2V dc
	A3-2 to A3-74	−432.08 ±2V dc

Note. Perform all measurements of table 3-8 with connector 1A3A9J1 connected to 1A3P1.

Table 3-9. -80 Volt Dc Section of Power Supply Assembly 1A3A9 Voltage Test Data

Assembly	Terminals	DVM ME-202B/U Value
1A3A9A3	A3-45 to A3-59	−80.00 ±2V dc
	A3-45 to A3-53	−60.50 ±2V dc
	A3-45 to A3-56	−76.50 ±2V dc
	A3-45 to A3-57	−73.20 ±2V dc
	A3-45 to A3-63	−77.72 ±2V dc
	A3-45 to A3-62	−80.00 ±2V dc
	A3-45 to A3-35	−73.40 ±2V dc
	A3-45 to A3-14	−101.40 ±2V dc
	A3-45 to A3-15	−73.24 ±2V dc
	A3-45 to A3-16	−79.50 ±2V dc

Note. Perform all measurements of table 3-9 with connector 1A3A9J1 connected to 1A3P1.

3-11. Test Point Locations

The test points used for troubleshooting are located as follows:

a. Test points 1A3J5 through 1A3J20 are located on the front panel of Simulator, Monitor Input SM-627/AYM-9. Each test point is designated by the voltage or signal to which it provides access.

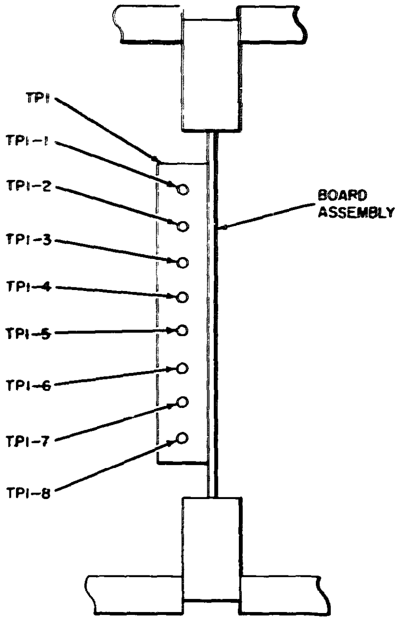
b. A row of eight test points (numbered 1 through 8) is mounted on the outboard end of board assemblies 1A3A1 and 1A3A3 through

1A3A8. These jacks provide access to the circuit test points used in troubleshooting. The arrangement and numbering of these test points is shown in figure 3-2.

c. Terminals on component board assemblies 1A3A9A1 through 1A3A9A3 and cover assembly 1A3A9A4 are used as circuit test points for power supply assembly 1A3A9. The locations of these terminals are shown on figures 3-3 through 3-6.

d. The terminals of transformer 1A3T1 are shown and identified in figure 3-7.

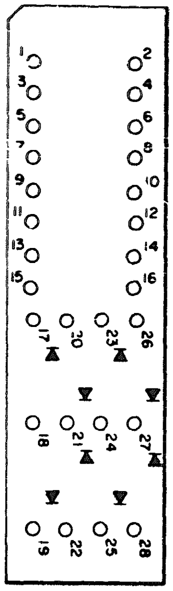
e. Extender, Circuit Card MX-8966/AYM provides electrical access to pins of connectors 1A-3X1 and 1A3X2 through 1A3X8. The test point terminals on Extender, Circuit Card MX-8966/AYM are labeled with the corresponding connector pin number as shown in figure 3-8.



NOTE
REFERENCE DESIGNATIONS ARE ABBREVIATED.
PREFIX THE REFERENCE DESIGNATION WITH
THE COMPONENT ASSEMBLY NUMBER

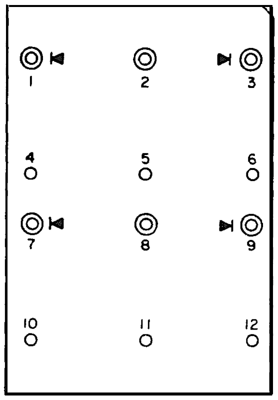
EL6625-2478-40-TM-11

Figure 3-2. Board assemblies 1A3A1 and 1A3A3 through 1A3A8, test point location diagram.



EL6625-2478-40-TM-

Figure 3-3. Component board assembly 1A3A9A1, terminal location diagram.



EL6625-2478-40-TM-45

Figure 3-4. Component board assembly 1A3A9A2, terminal location diagram.

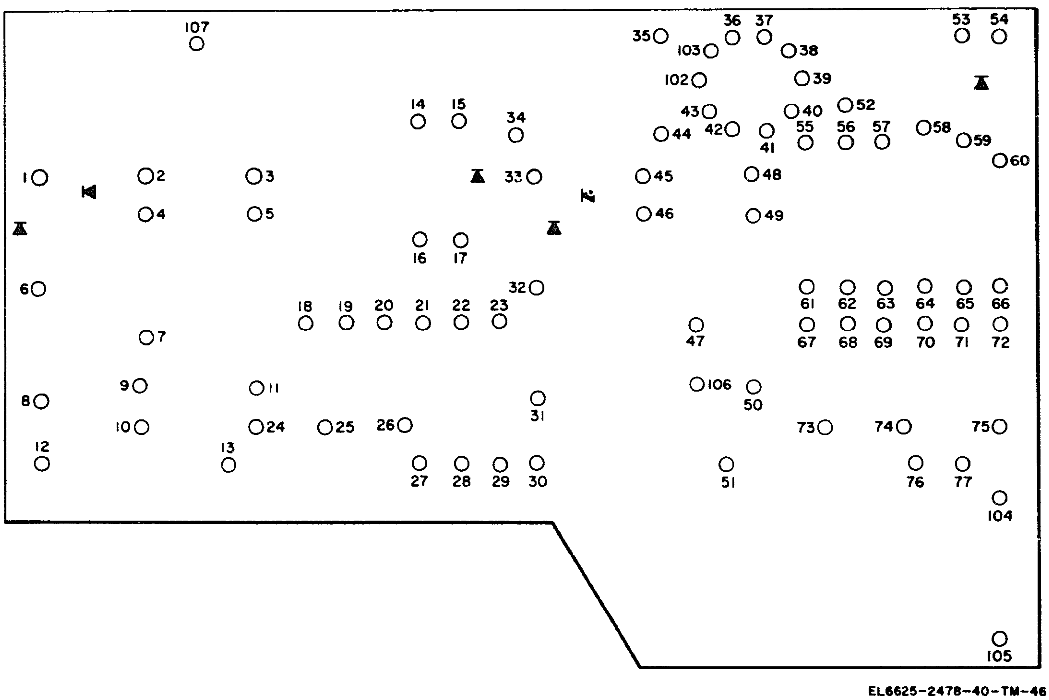


Figure 3-5. Component board assembly 1 A3A9A3, *terminal location diagram.*

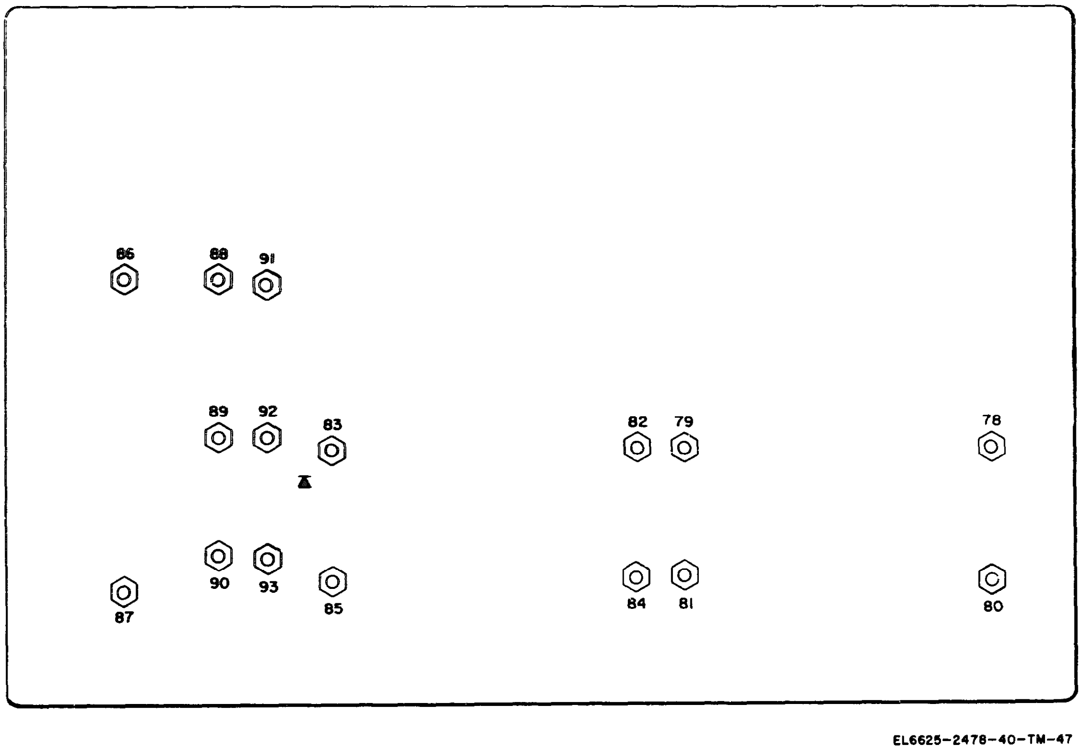
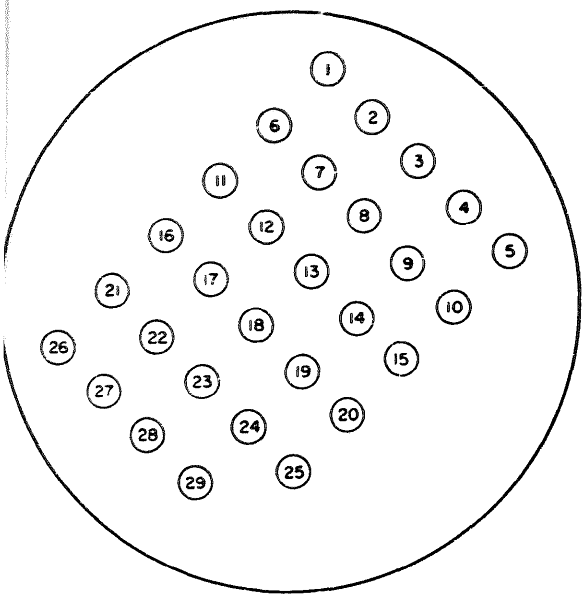


Figure 3-6. Cover assembly 1A3A9A4, terminal location diagram.



EL6625-2478-40-TM-12

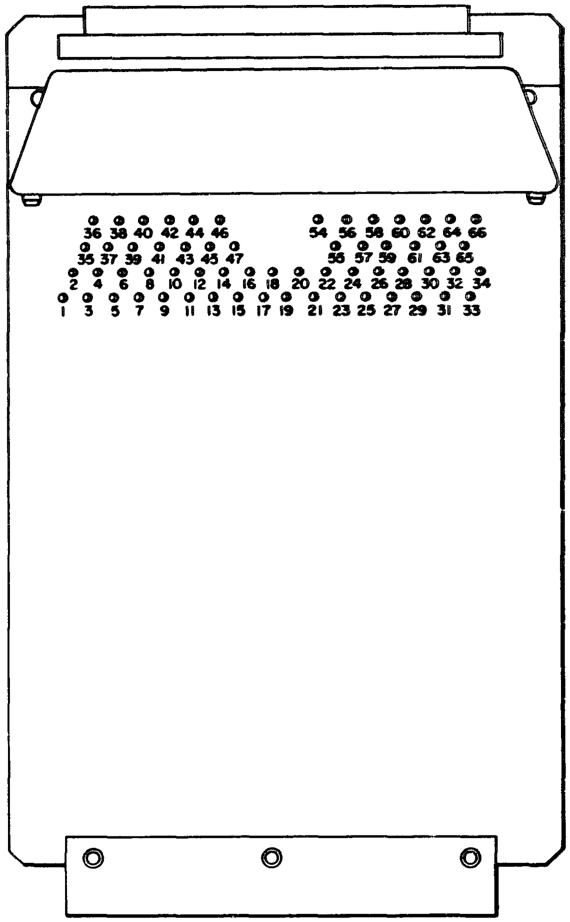
Figure 3-7. Transformer 1A3T1, terminal arrangement.

3-12. Simulator, Monitor Input SM-627/AYM-9 Test Point Voltages

Voltages that are present at the front panel test points of Simulator, Monitor Input SM-627/AYM-9 are listed in table 3-10. Take all voltage measurements with the differential voltmeter.

3-13. Cable Tests

Subject each cable to a continuity and insulation check to determine its condition. Perform the continuity and insulation checks when trouble-shooting cable. Refer to cable wiring diagrams, figures 3-9 through 3-13 and figure FO-16, for point-to-point wiring. End views of the cable connectors are illustrated in figure FO-17.



EL6625-2478-40-TM-13

Figure 3-8. Extender, Circuit Card MX-8966/AYM, terminal arrangement.

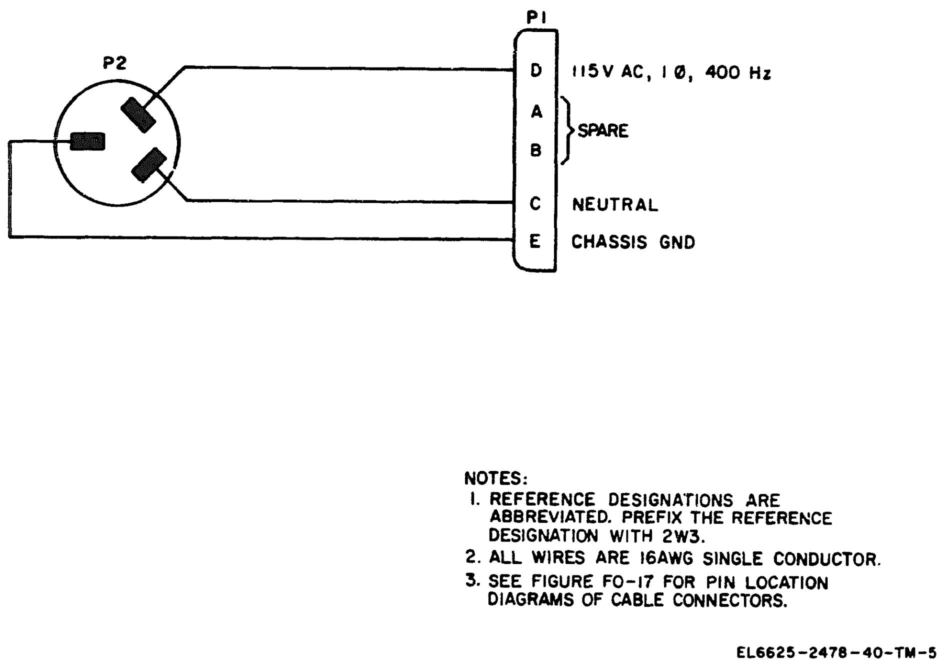
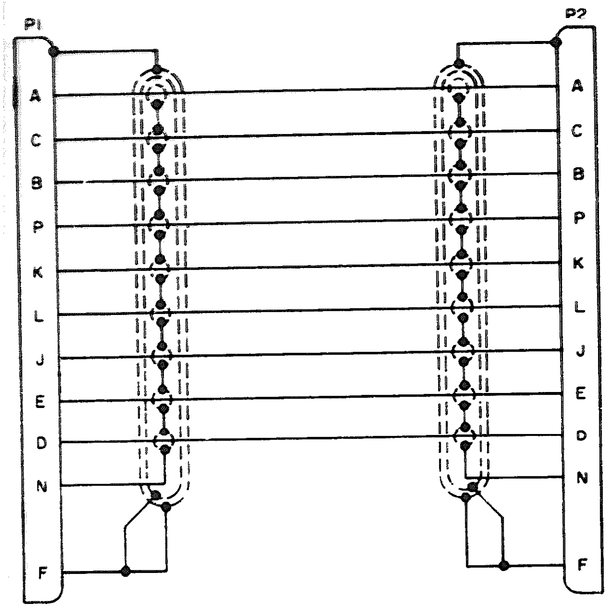


Figure 3-9. Cable Assembly, Power, Electrical CX-12723/
AYM-9 wiring diagram.



NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 2W2.
2. ALL WIRES ARE 18 AWG.
3. SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS Of CABLE CONNECTORS.

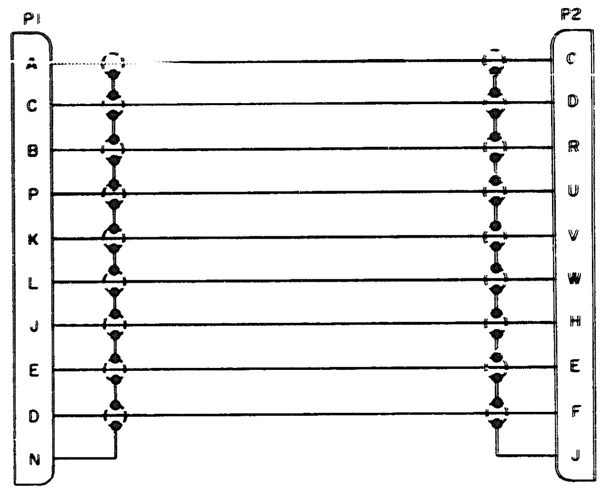
EL6625-2478-40-TM-6

Figure 3-10. Cable Assembly, Special Purpose, Electrical CX-12725/U, wiring diagram.

Table 3-10. Simulator, Monitor Input SM-627/AYM-9 Test Point Voltages

Test point		Dc voltage (volts)
DC INTERNAL		
+5V	1A3J19	+5 ±0.2
+10V	1A3J16	+10 ±1.5
+15V	1A3J12	+15 ±0.005
−15V	1A3J17	−15 ±0.005
+25V	1A3J15	+25 ±0.01
−25V	1A3J14	−25 ±0.01
+85V	1A3J18	+85 ±0.03
+115V	1A3J13	+115 ±12.0
DEFLECTION SIGNALS		
+HORIZ	1A3J7	+496.99 to +499.99
−HORIZ	1A3J8	−496.99 to −499.99
+VERT	1A3J10	+496.99 to +499.99
−VERT	1A3J9	−496.99 to −499.99
HIGH VOLTAGE		
−522VDC (See note)	1A3J11	−78 to −82

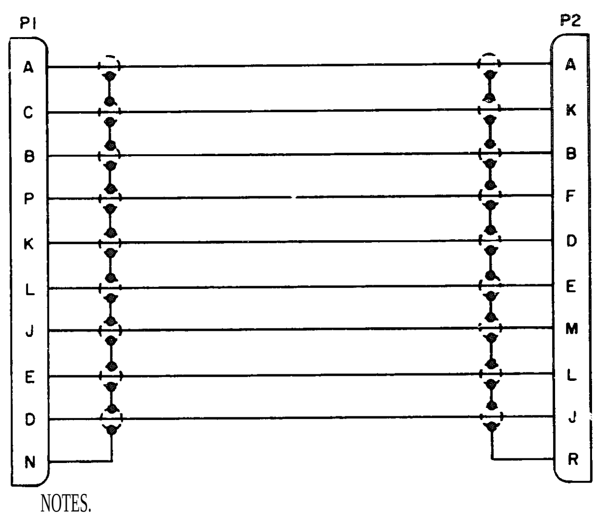
Note. Measurement taken with ground test probe of meter connected to -442VDC test point at bottom of power supply assembly 1A3A9.



NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE REFERENCE DESIGNATION WITH 2W4
2. ALL WIRES ARE 22AWG.
3. SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS OF CABLE CONNECTORS

EL6625-2478-40-TM-7

Figure 3-11. Cable Assembly, Special Purpose, Electrical CX-12726/U, wiring diagram.



NOTES.
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 2W5.
2. ALL WIRES ARE 22AWG.
3. SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS OF CABLE CONNECTORS.

EL6625-2478-40-TM-8

Figure 3-12. Cable Assembly, Special Purpose, Electrical CX-12727/U, wiring diagram.

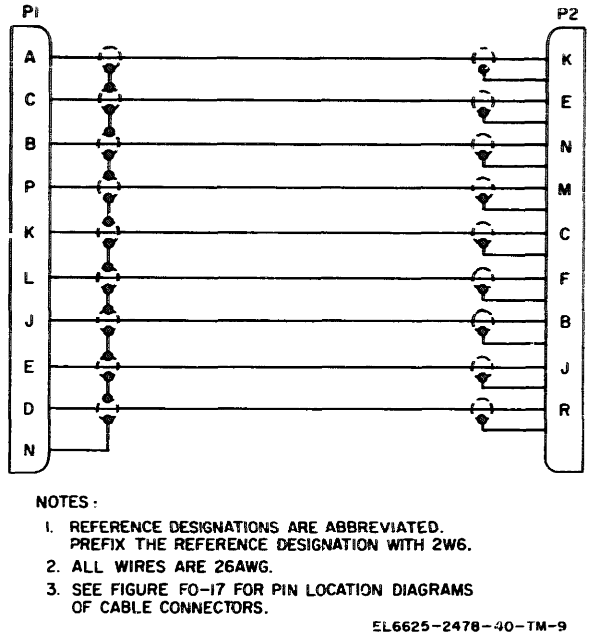


Figure 3-13. Cable Assembly, Special Purpose Electrical CX-12728/U, wiring diagram.

a. Continuity Check. Connect a resistor of known value (50,000 ohms or more) from one end of the cable conductor to ground.

(1) Measure the resistance between the same cable conductor and ground at the other end of the cable.

(2) If the meter indicates the approximate value of the known resistor, the cable has continuity.

(3) If the meter indicates infinite resistance, the cable is open.

(4) If the meter indicates zero resistance, the cable is shorted to ground.

(5) If the meter indicates much less than the value of the known resistor, but not zero, the cable has dc leakage to ground.

b. Insulation Check. Perform the following steps to check insulation. Use an approved high-voltage insulation tester to measure the insulation resistance.

(1) Check the insulation resistance between each terminal and its connector shell.

(2) Check the insulation resistance between each terminal and every other terminal of that connector.

(3) If the meter indicates approximately 90 megohms in each case, the insulation i satisfactory.

Section III. REMOVAL AND REPLACEMENT

3-14. Removal

All parts of Test Set, Control Monitor-Recording Head AN/AYM-9 may be removed using standard tools and maintenance procedures. Refer to parts location illustrations, figures 3-14 through 3-29, when removing parts and subassemblies.

a. Test set panel assembly 1A3 of Simulator, Monitor Input SM-627/AYM-9 is removed by disengaging the 14 screws along the edge of test set panel assembly 1A3 and lifting it from base 1A1 (fig. 3-15).

CAUTION

When disassembling basket assembly 1A3A10 (fig. 3-16, sheet 4) or basket assembly 1A3A12 (fig. 3-16, sheet 5), remove each set of rod and spacers as an assembly and maintain assembly order to aid in installation. Spacers are not interchangeable.

b. Camera, Still Picture KE-59A of Case, Test Set CY-7117/AYM-9 is removed by disengaging 4 panel fasteners and removing 5 screws and nuts securing the hinge of Camera, Still Picture KE-59A to base 2A1 (fig. 3-19 and 3-20).

CAUTION

When disassembling clamp assemblies 2A3A3A1A1, 2A3A3A2, and 2A3A3A3 (fig. 3-21), do not allow disassembled halves to be separated. Assemblies consist of machined, matched halves and must not be interchanged.

3-15. Replacement

All parts may be replaced using standard tools and maintenance procedures. Refer to the parts location illustrations, figures 3-14 through 3-29, when replacing parts and subassemblies.

a. Test set panel assembly 1A3 of Simulator, Monitor Input SM-627/AYM-9 is replaced by inserting it into base 1A1 and securing the 14 screws along the edge of test set panel assembly 1A3 to base 1A1 (fig. 3–15).

NOTE

When inserting regulator board assemblies, do not make physical contact with screw adjustment potentiometers.

b. Camera, Still Picture KE–59A of Case. Test Set CY–7117/AYM–9 is replaced by securing the hinge of Camera, Still Picture KE–59A to base 2A1 with 5 screws and nuts and then engaging 4 panel fasteners to base 2A1 (fig. 3–19 and 3–20).

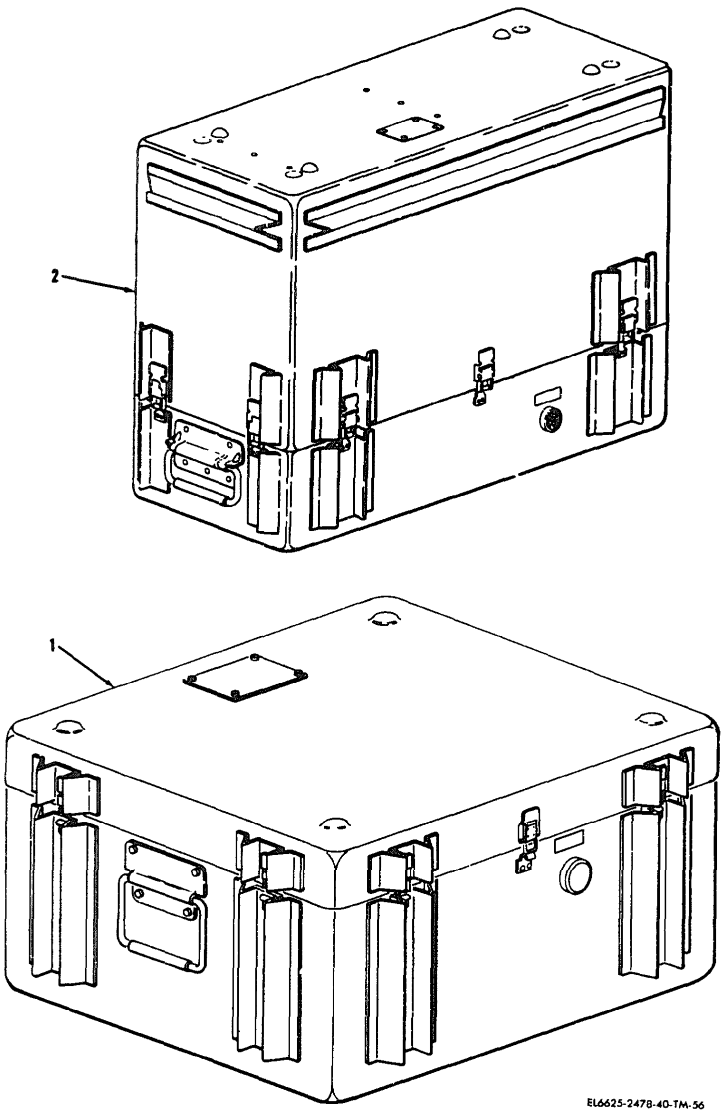


Figure 3-14. Test Set, Control Monitor-Recording Head AN/AYM-9, location of parts.

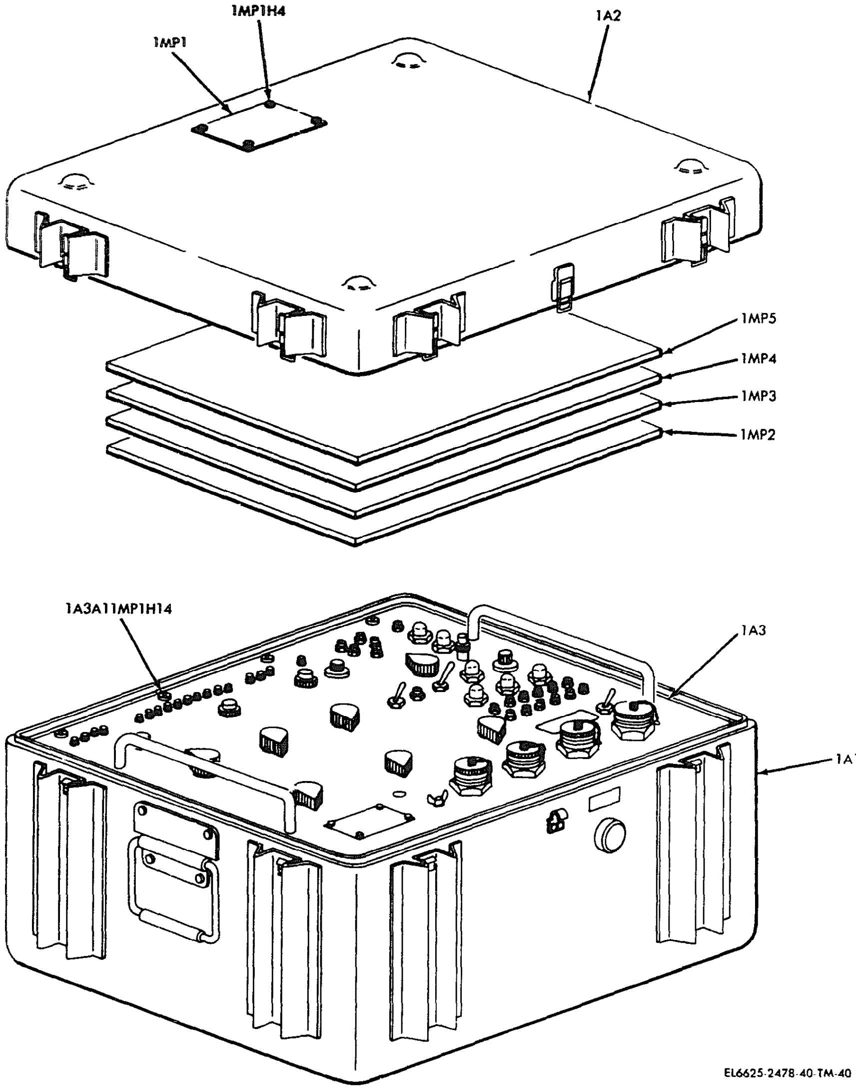


Figure 3-15. Simulator, Monitor Input SM-627/AYM-9 (unit 1), location of parts.

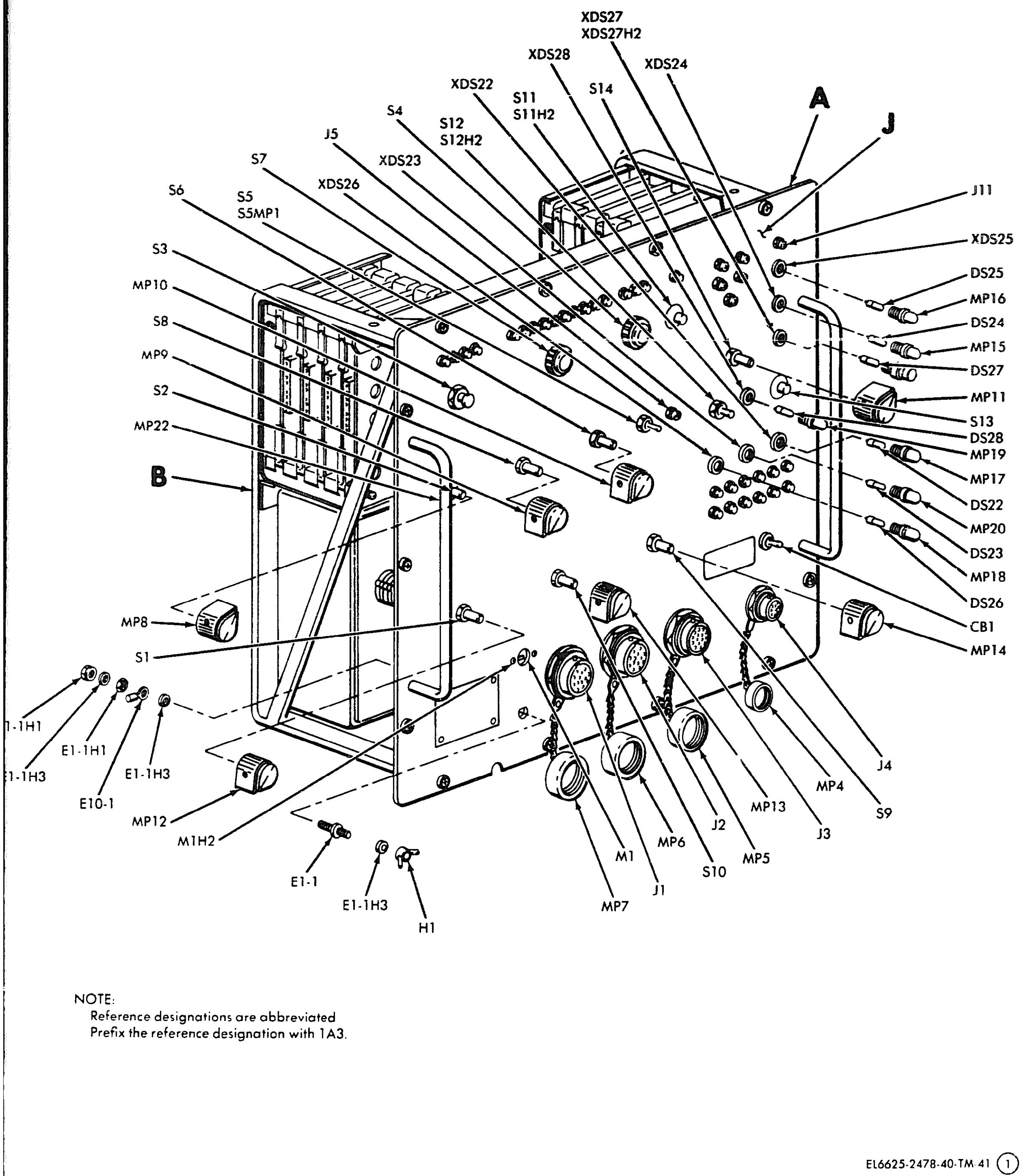


Figure 3-16(1). Test set panel assembly 1A3, location of parts (sheet 1 of 7).

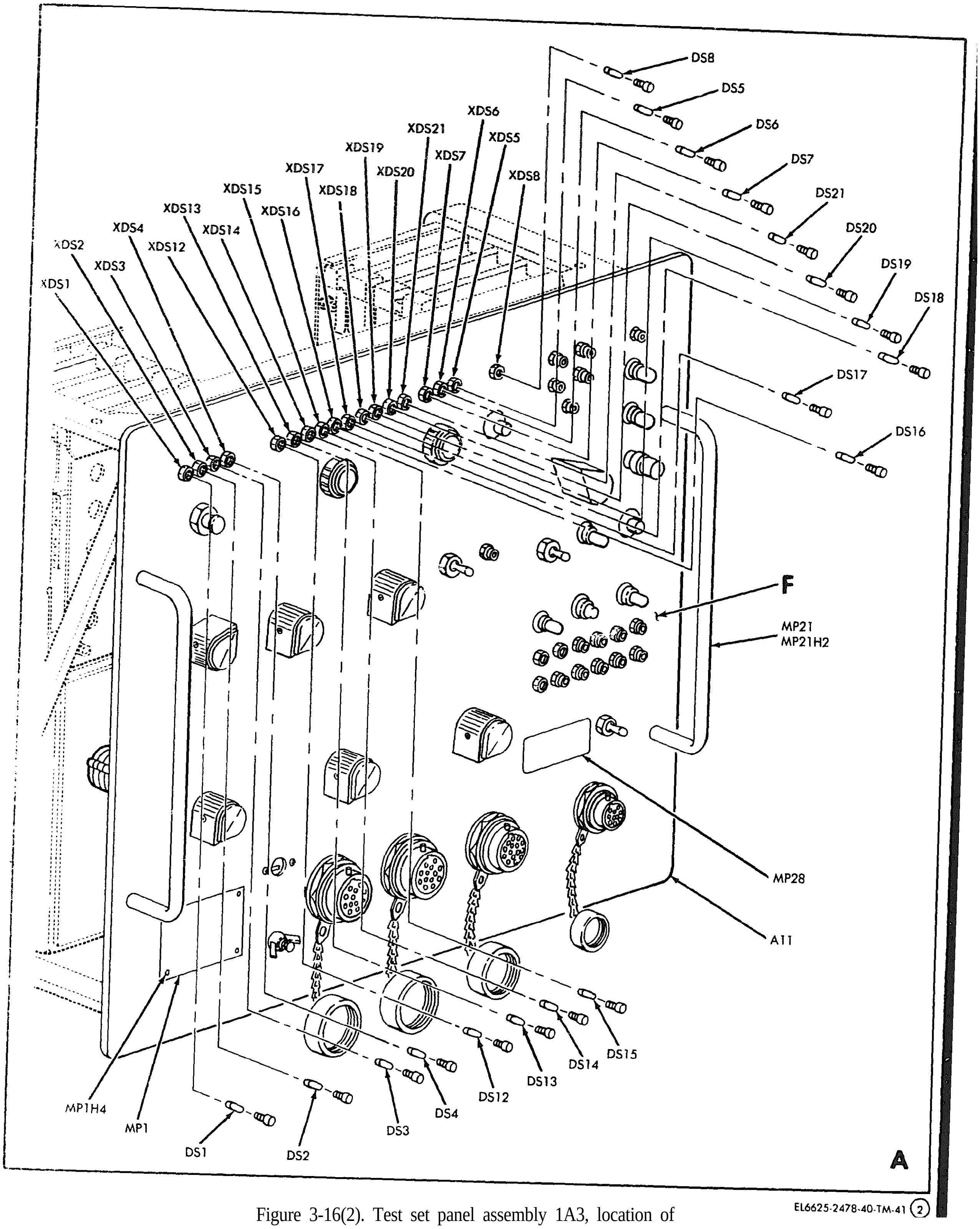


Figure 3-16(2). Test set panel assembly 1A3, location of parts (sheet 2 of 7).

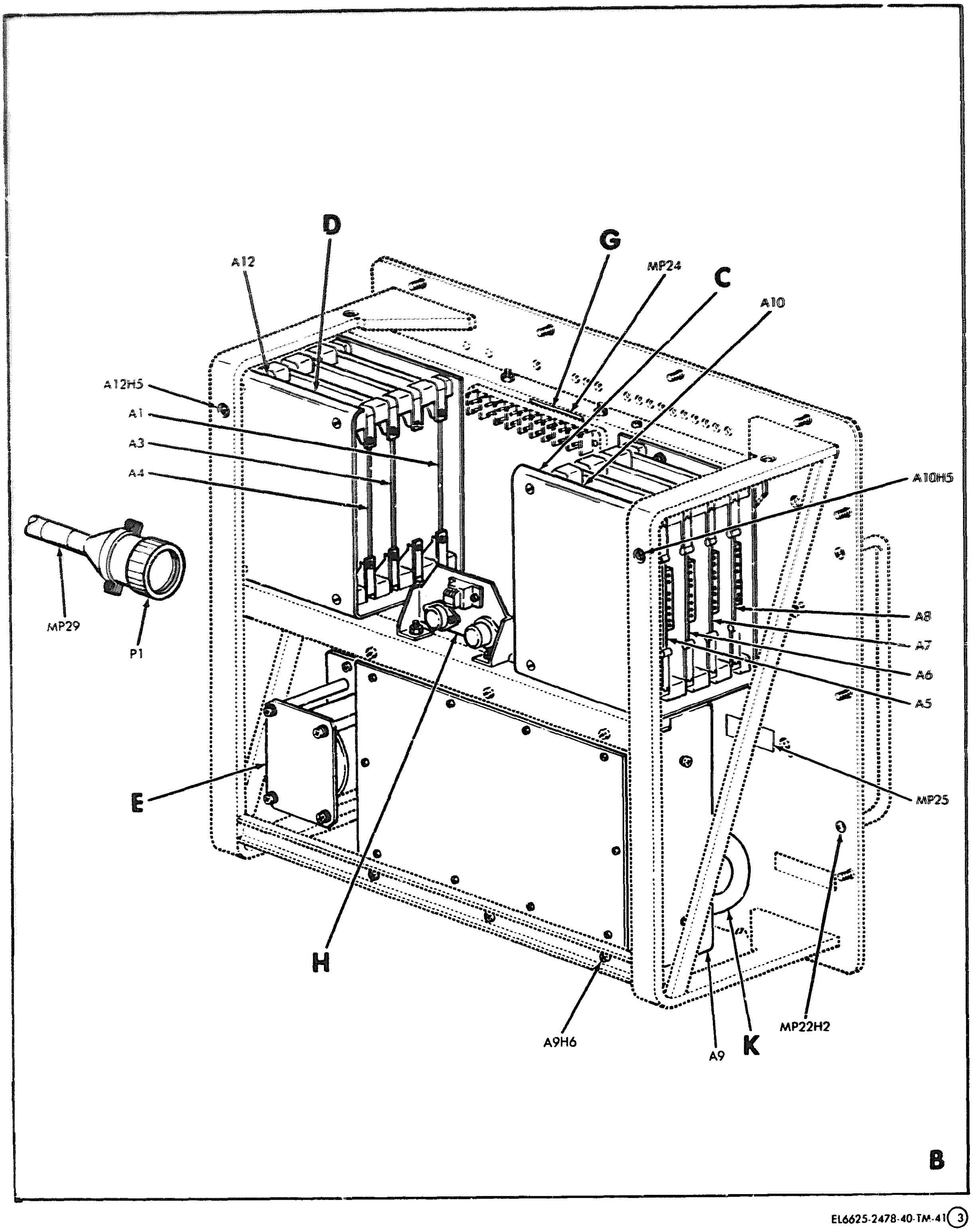


Figure 3-16(3). Test set panel assembly 1A3, location of parts (sheet 3 of 7).

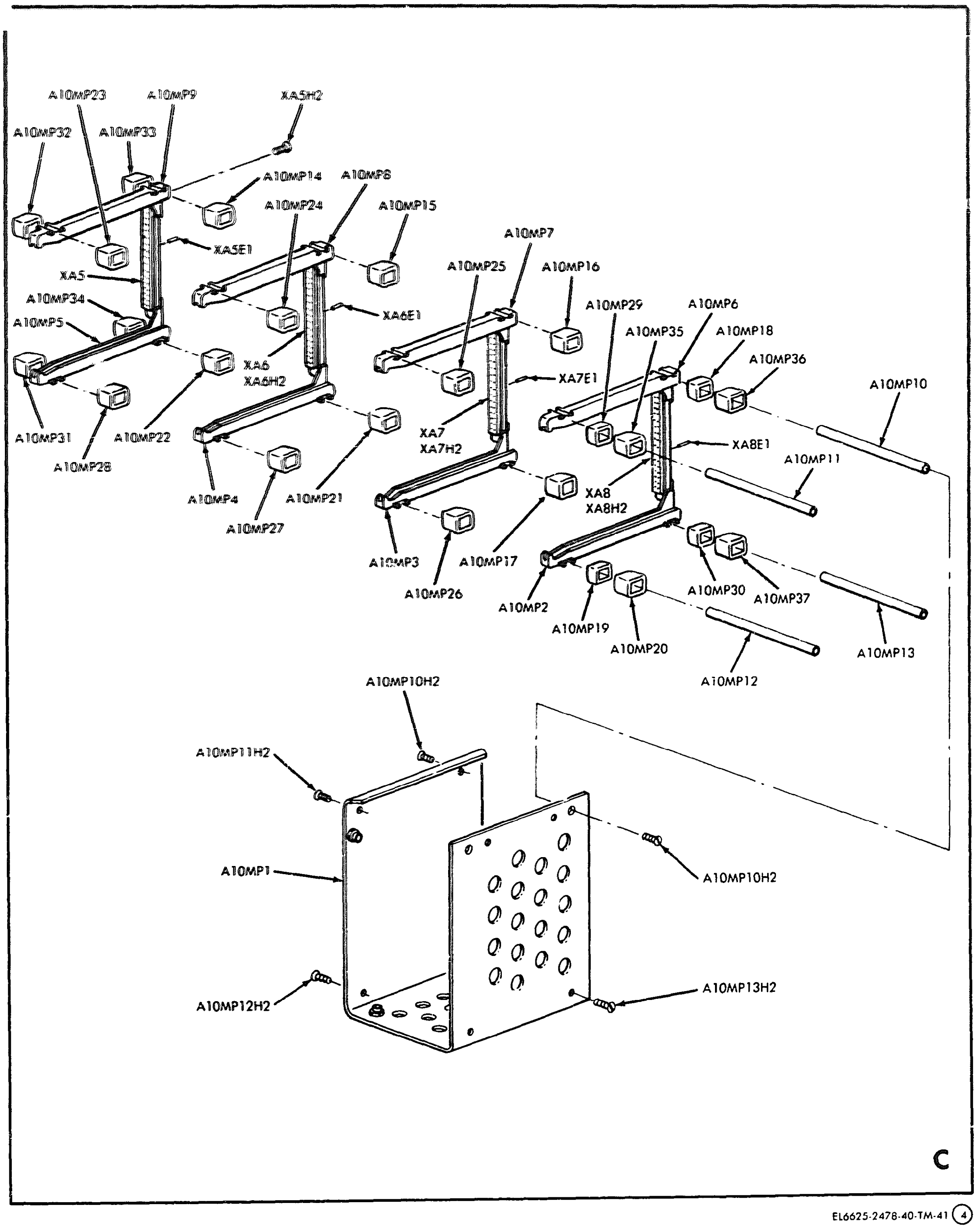


Figure 3-16(4). Test set panel assembly 1A3, location of parts (sheet 4 of 7).

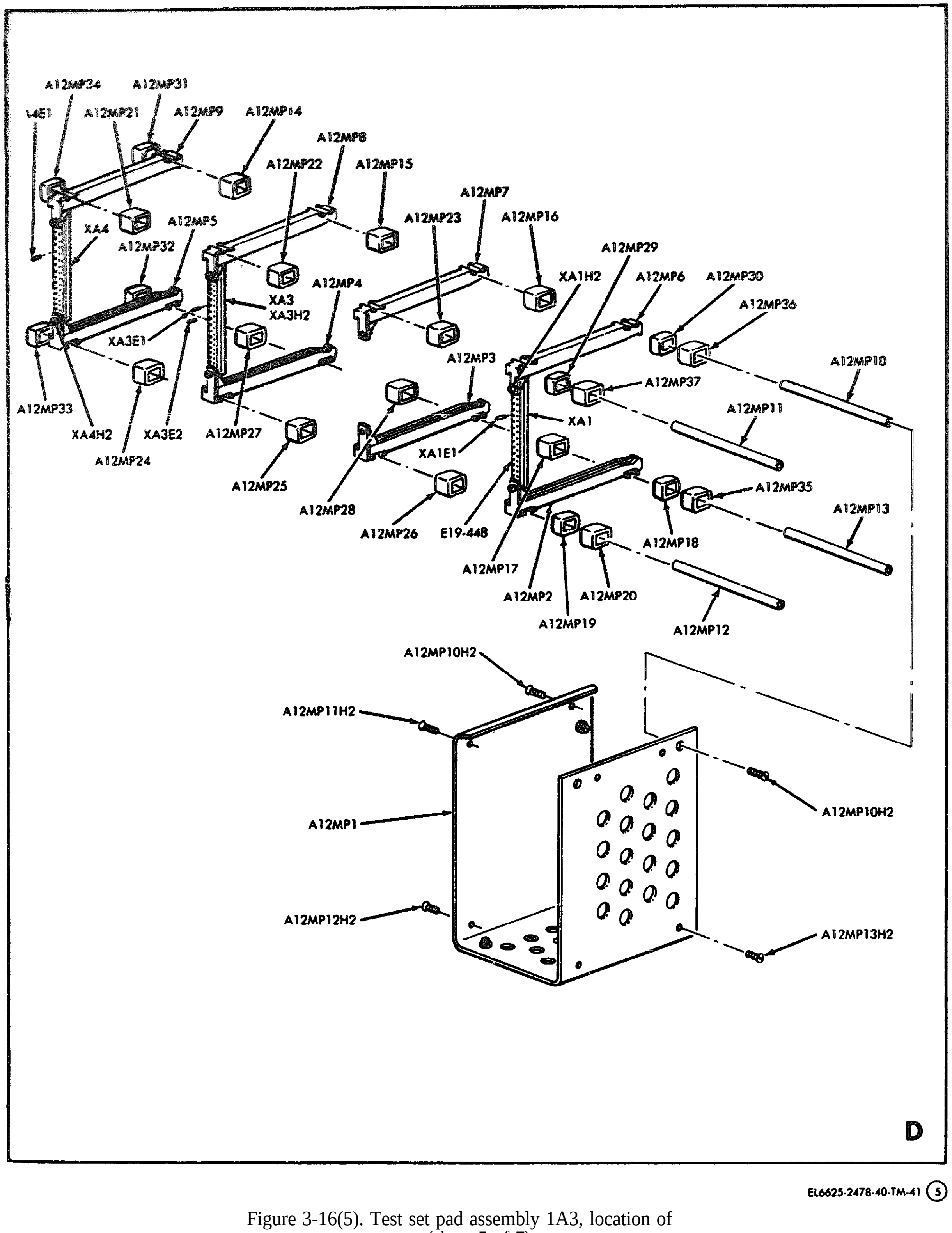
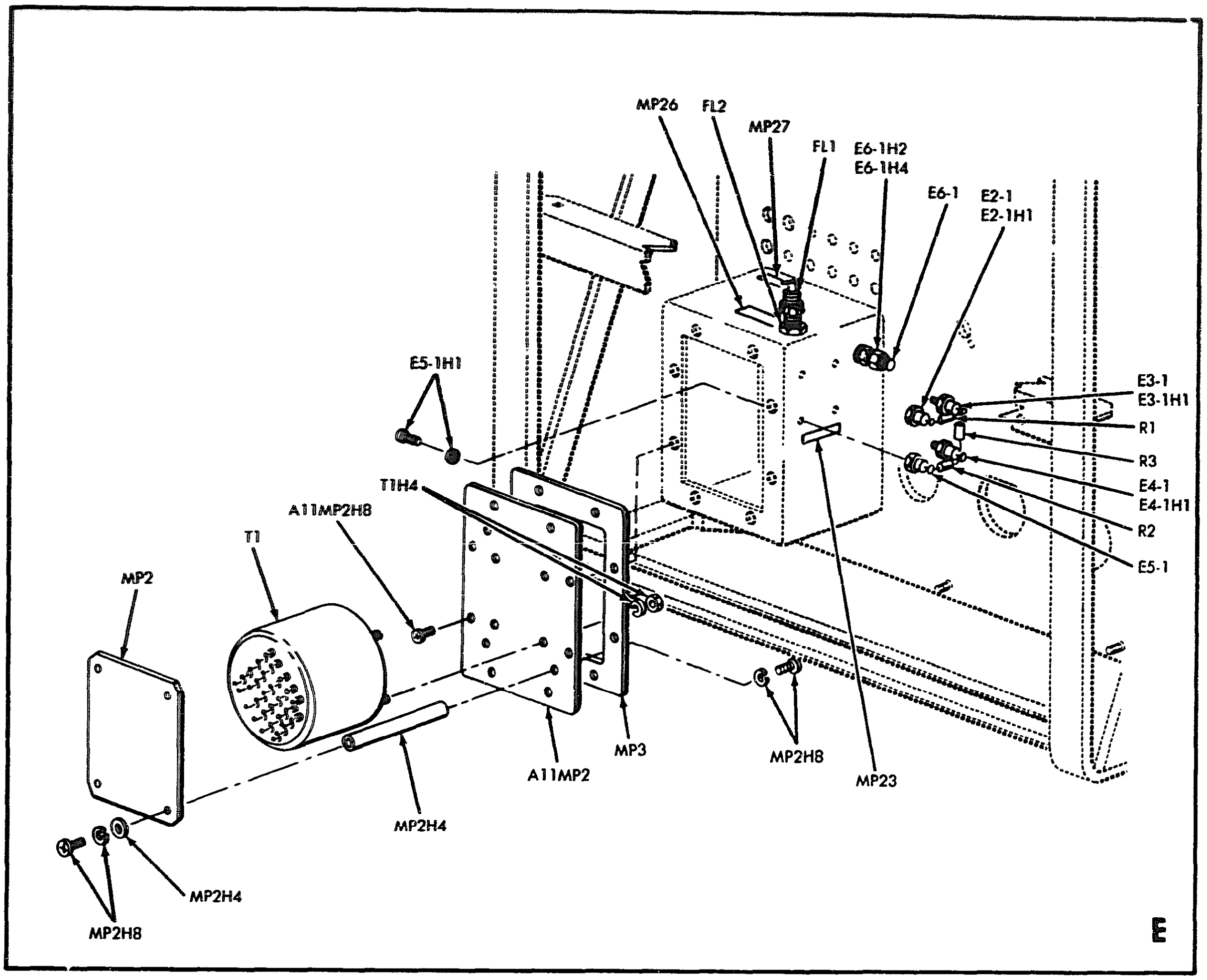
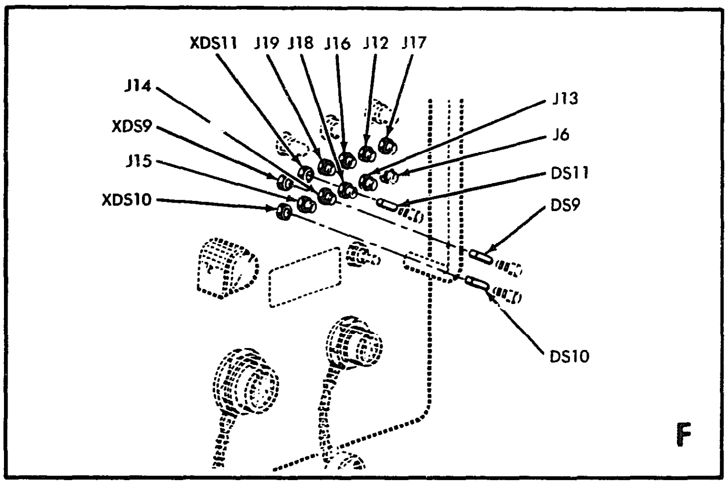


Figure 3-16(5). Test set pad assembly 1A3, location of parts (sheet 5 of 7).





EL6625-2478-40-TM-41 6

Figure 3-16(6). Test set panel assembly 1A3, location of parts (sheet 6 of 7).

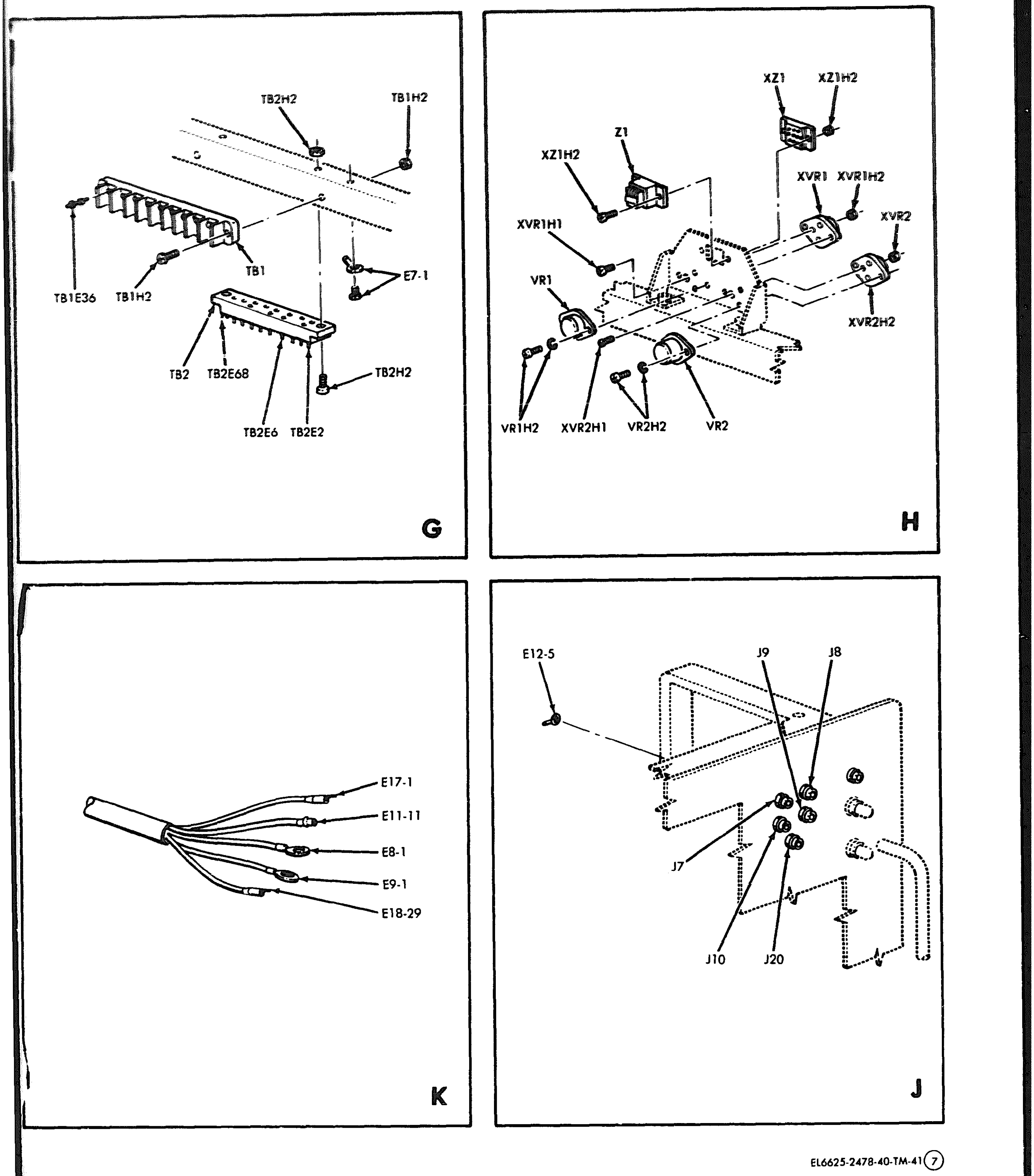


Figure 3-16(7). Test set panel assembly 1A3, location of parts (sheet 7 of 7).

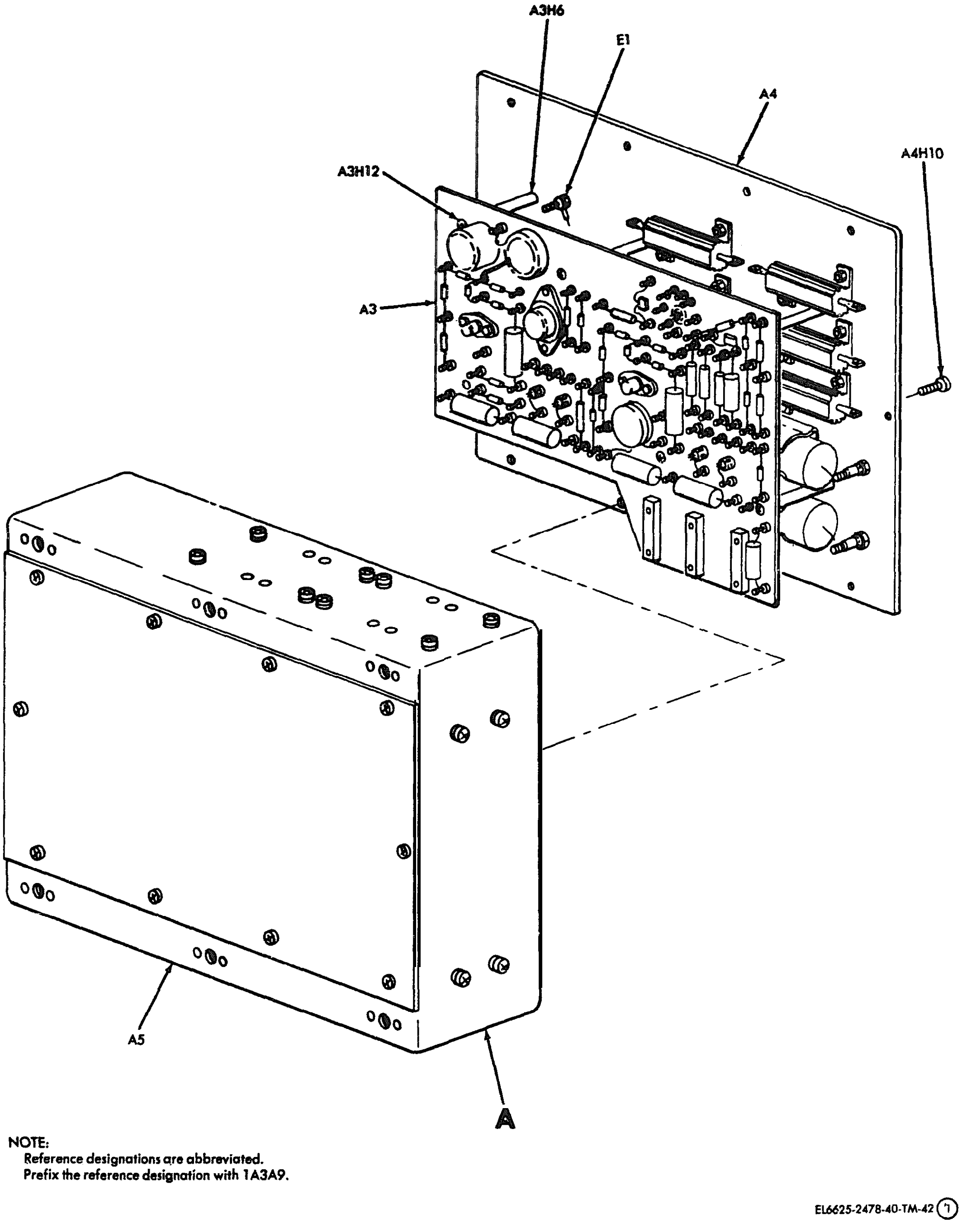


Figure 3-17(1). Power supply assembly 1A3A9, location of parts (sheet 1 of 3).

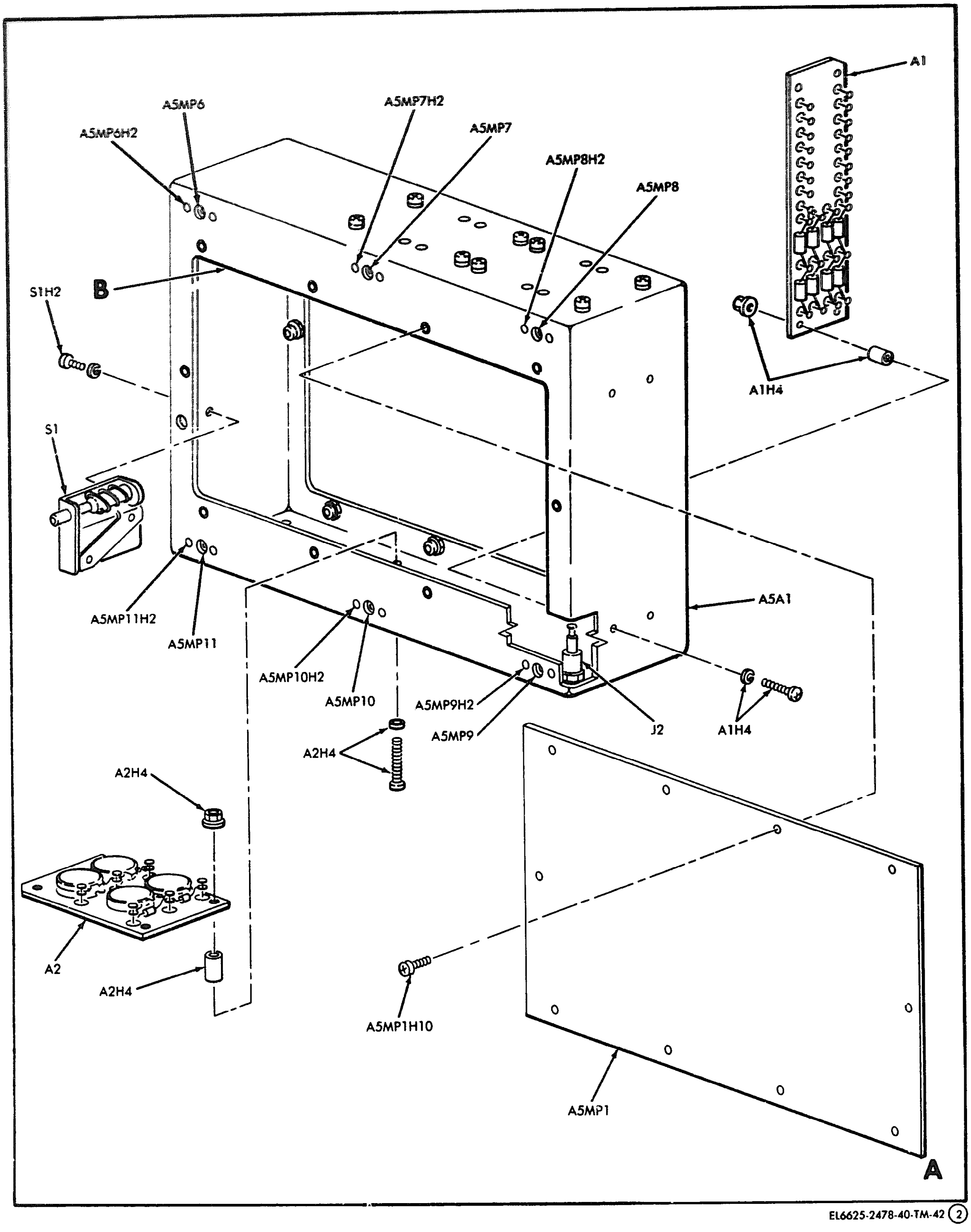


Figure 3-17(2). Power supply assembly 1A8A9, location of parts (sheet 2 of 3).

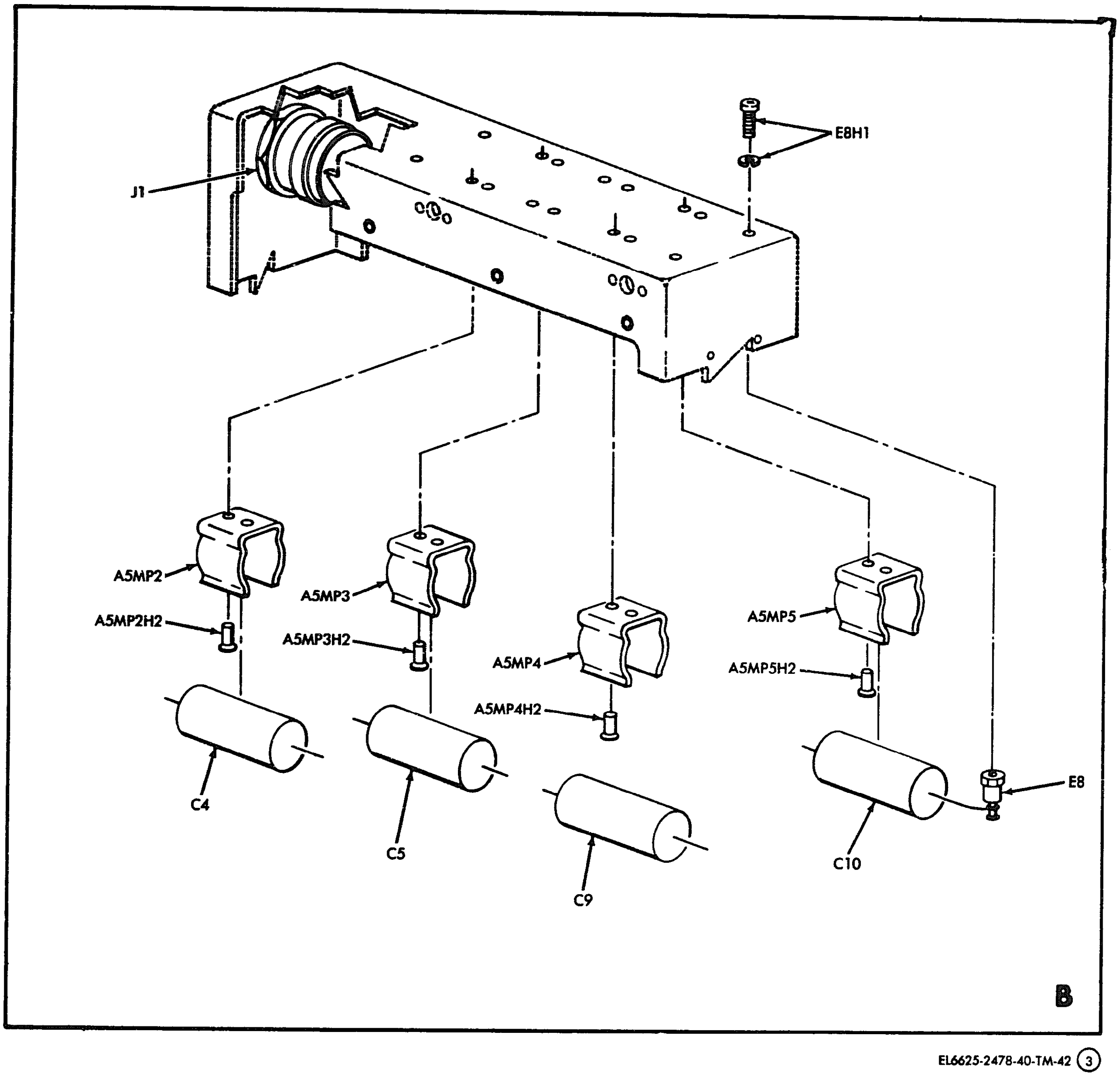


Figure 3-17(3). Power supply assembly 1A3A9, location of pad (sheet 3 of 8).

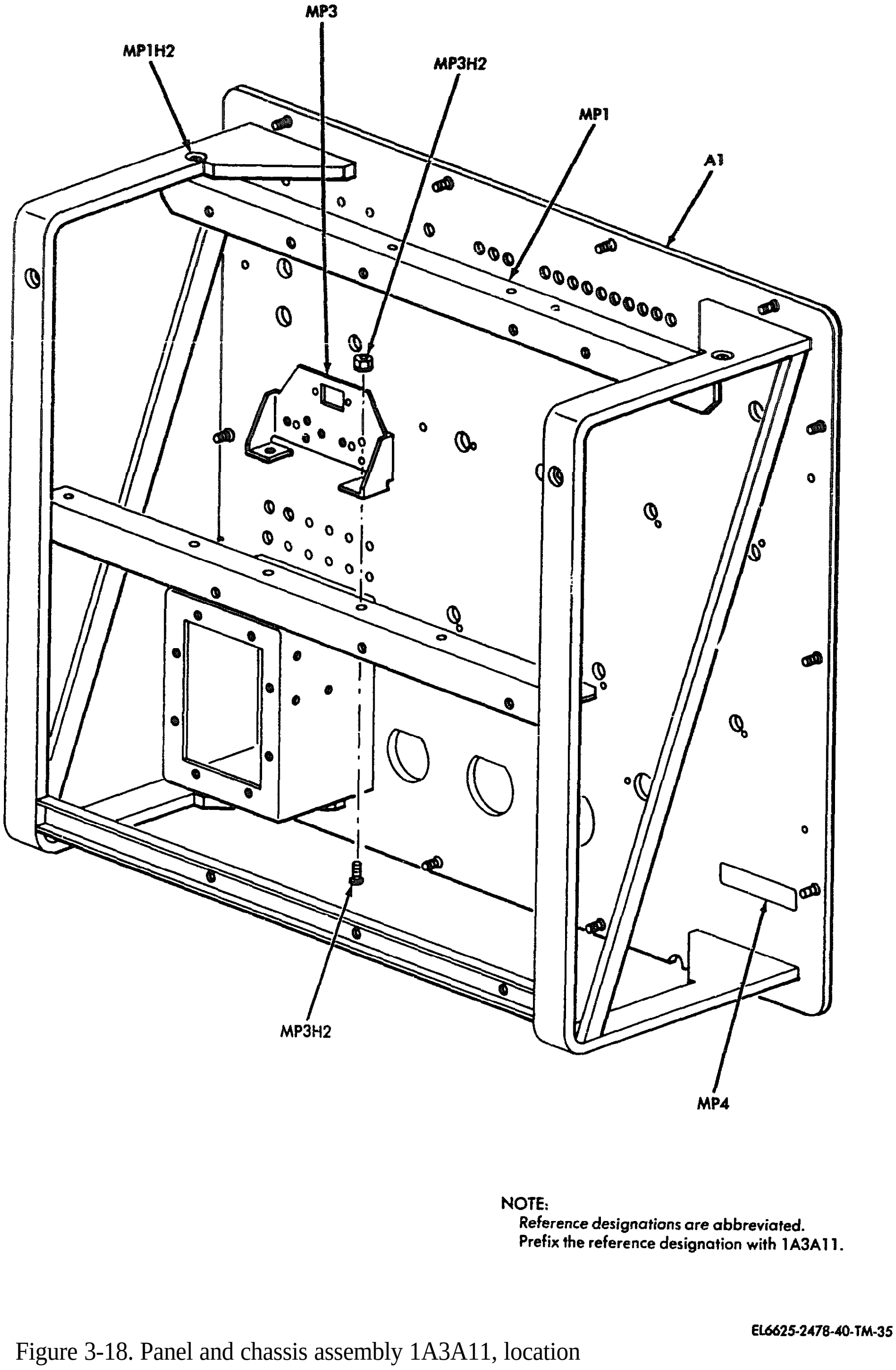


Figure 3-18. Panel and chassis assembly 1A3A11, location of parts.

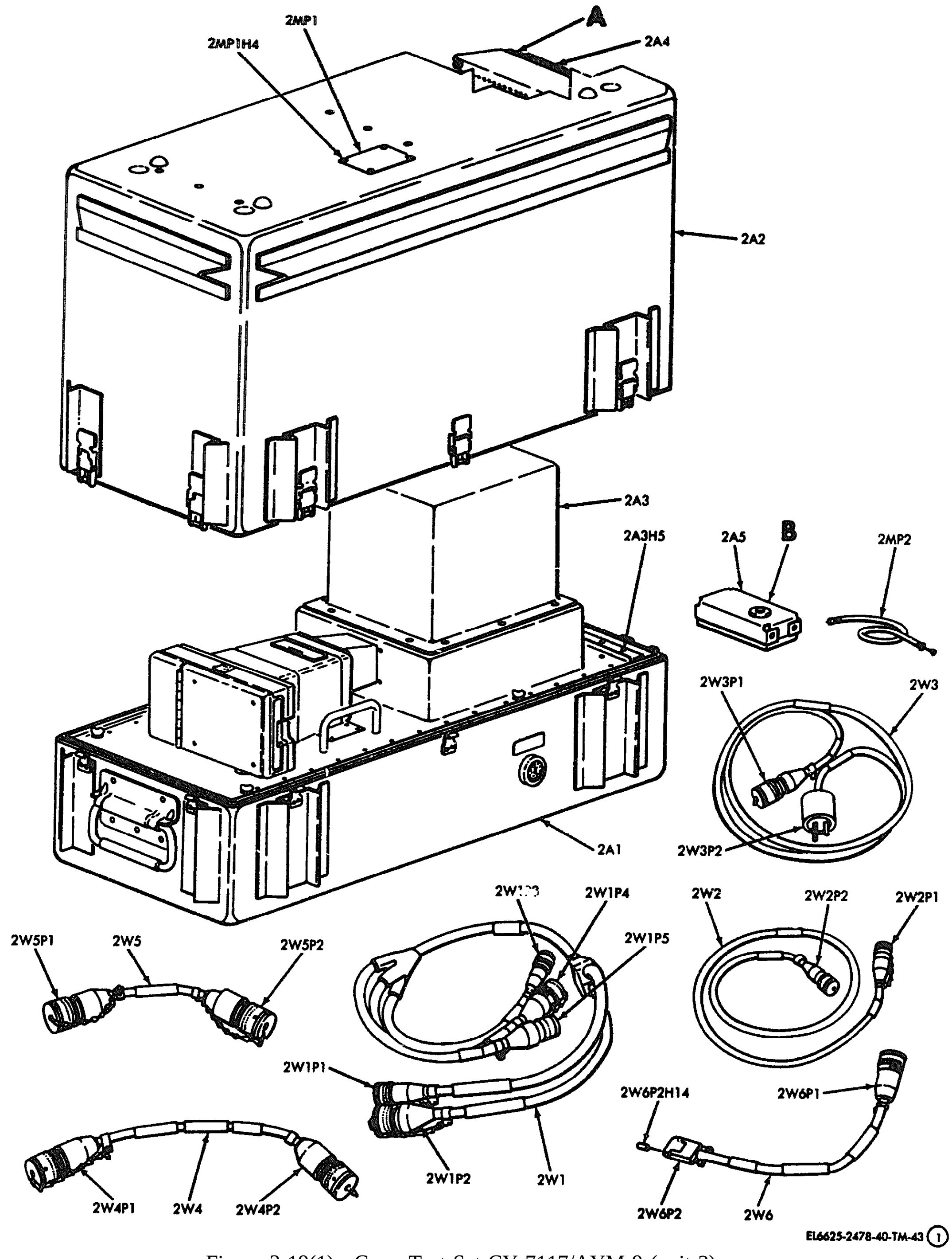


Figure 3-19(1). Case, Test Set CY-7117/AYM-9 (unit 2), location of parts (sheet 1 of 2).

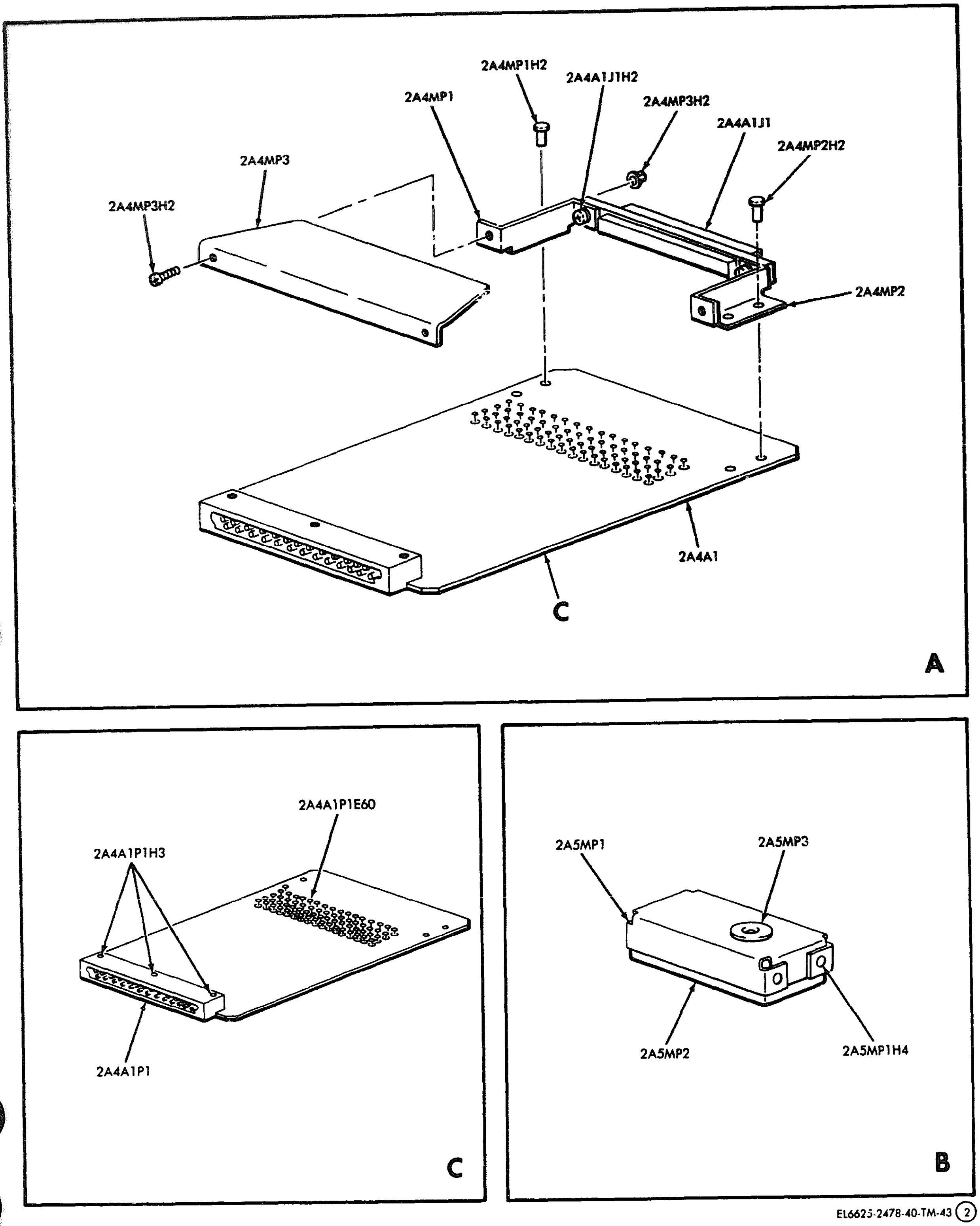
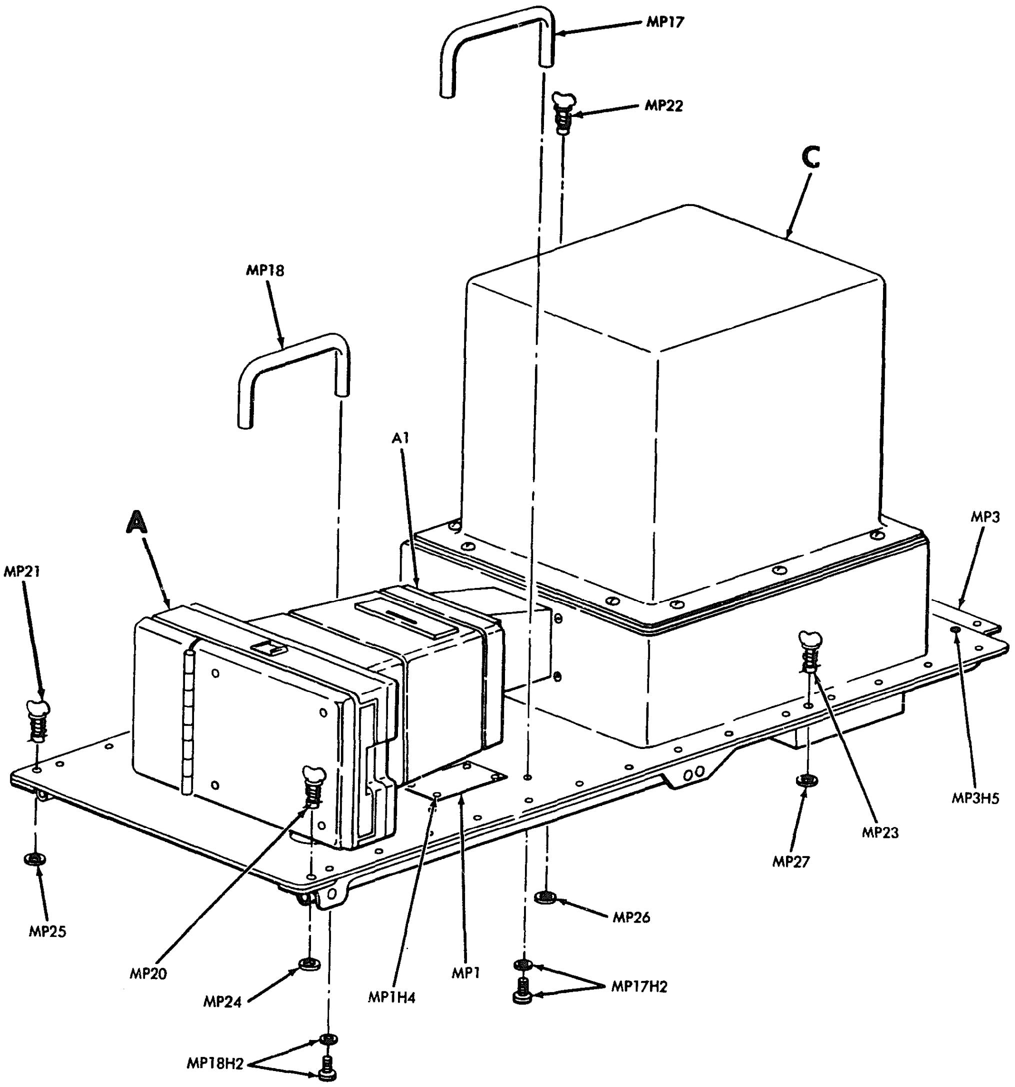


Figure 3-19(2). Case, Test Set CY-7117/AYM-9 (unit 2), location of parts (sheet 2 of 2).



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 2A3.

EL6625-2478-40-TM-53 (1)

Figure 3-20(1). Camera, Still Picture KE-59A (2A3), location of parts (sheet 1 of 4).

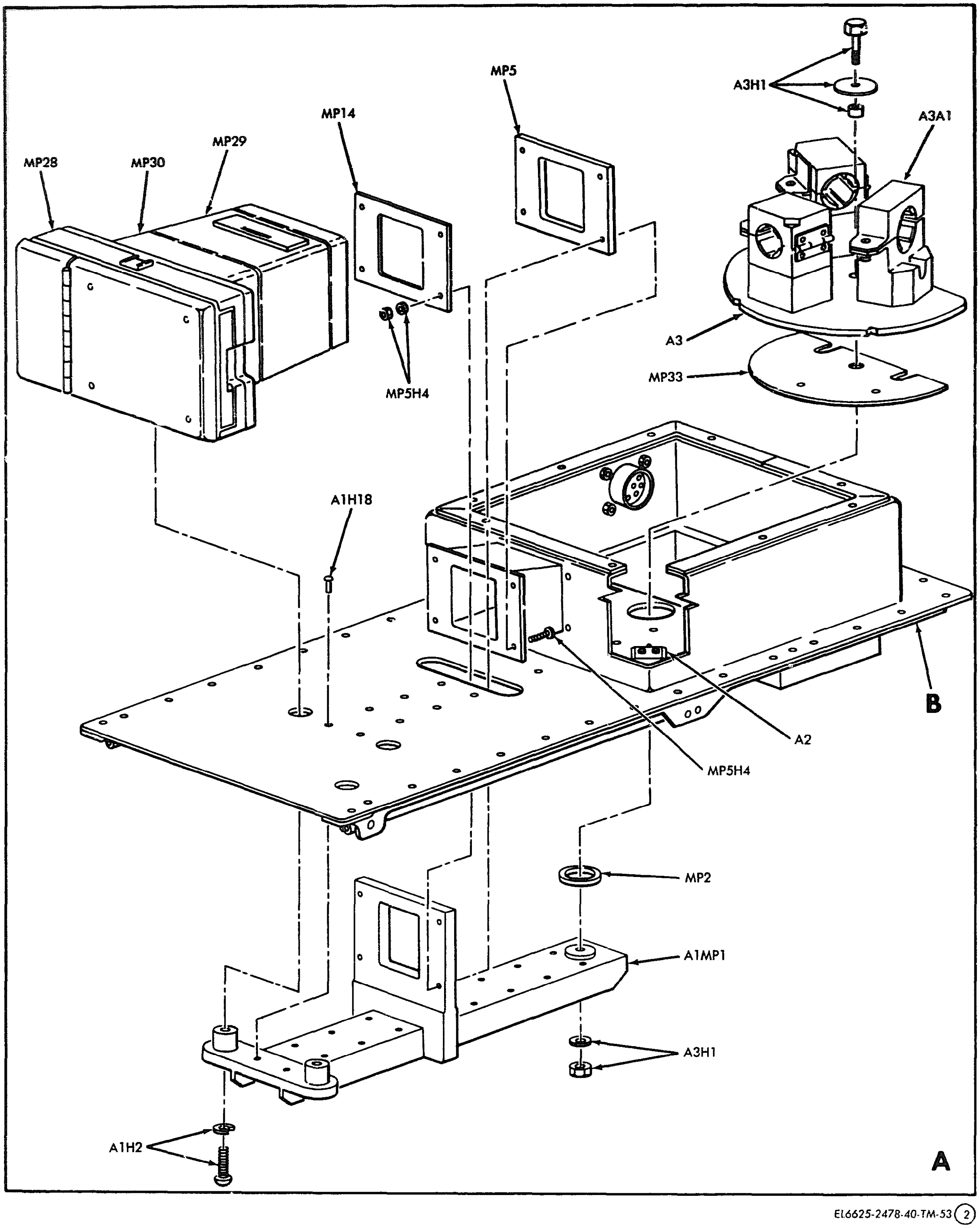


Figure 3-20(2). Camera, Still Picture KE-59A (2A3),
location of parts (sheet 2 of 4).

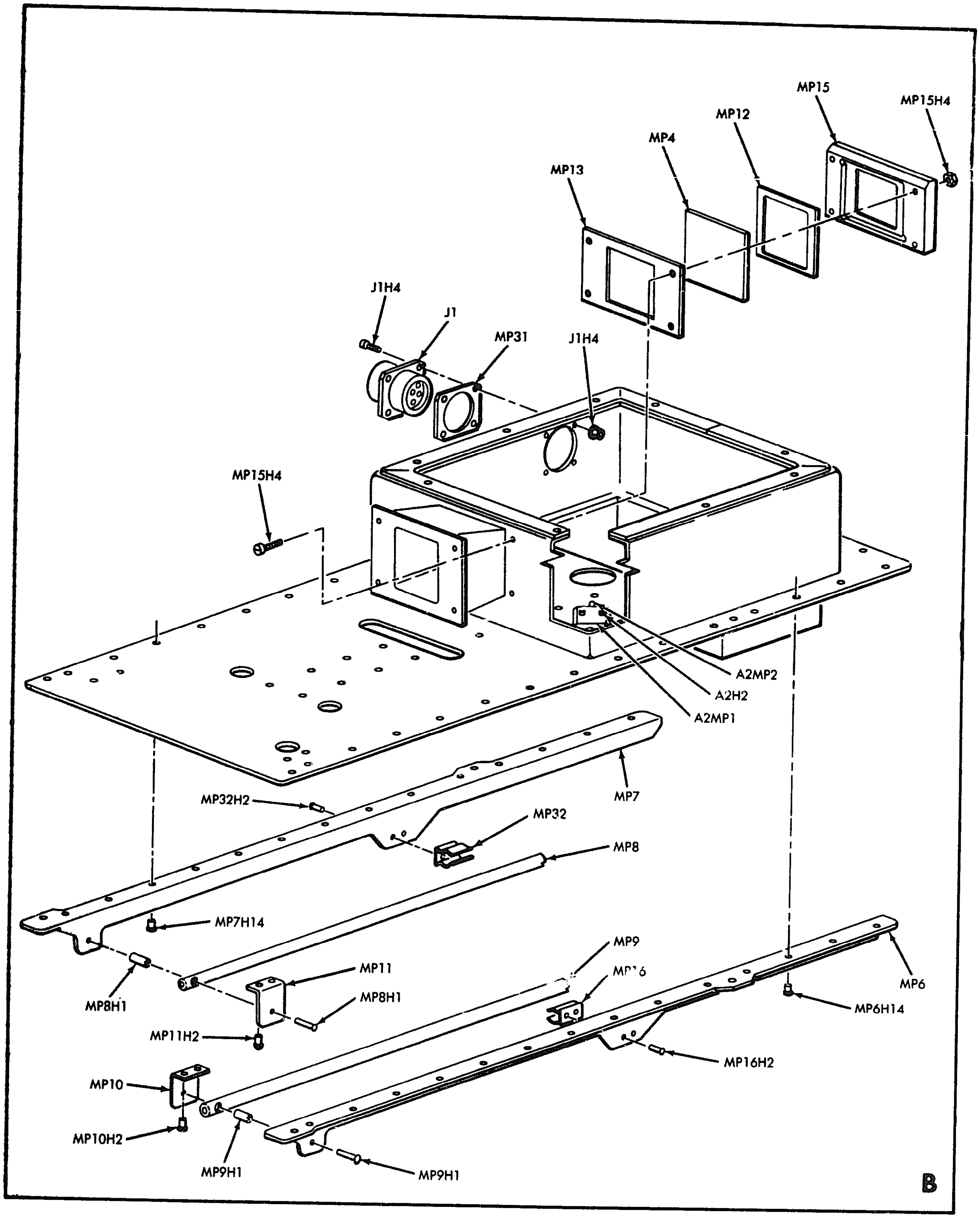


Figure 3-20(3). Camera, Still Picture KE-59A (2A3), location of parts (sheet 3 of 4).

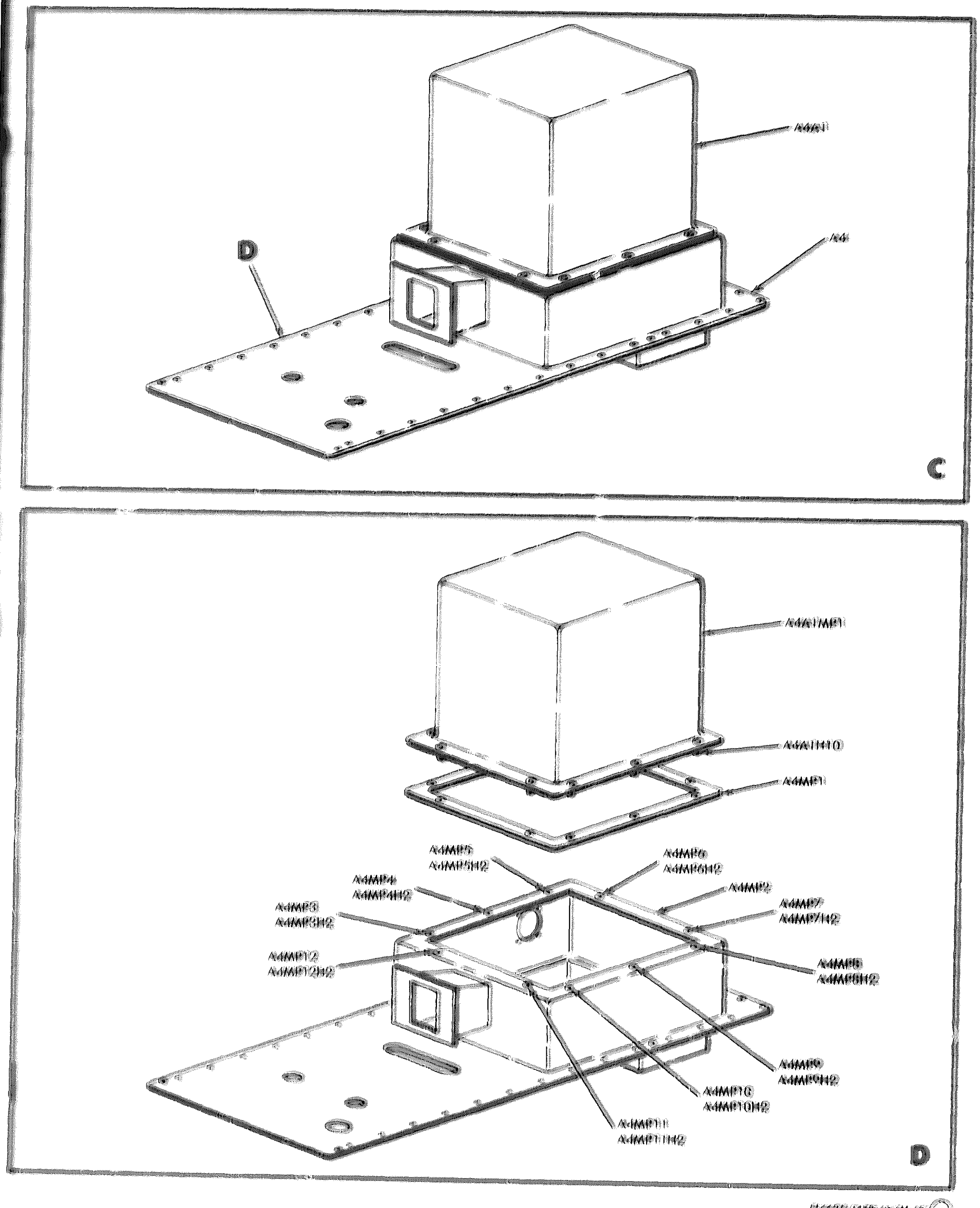
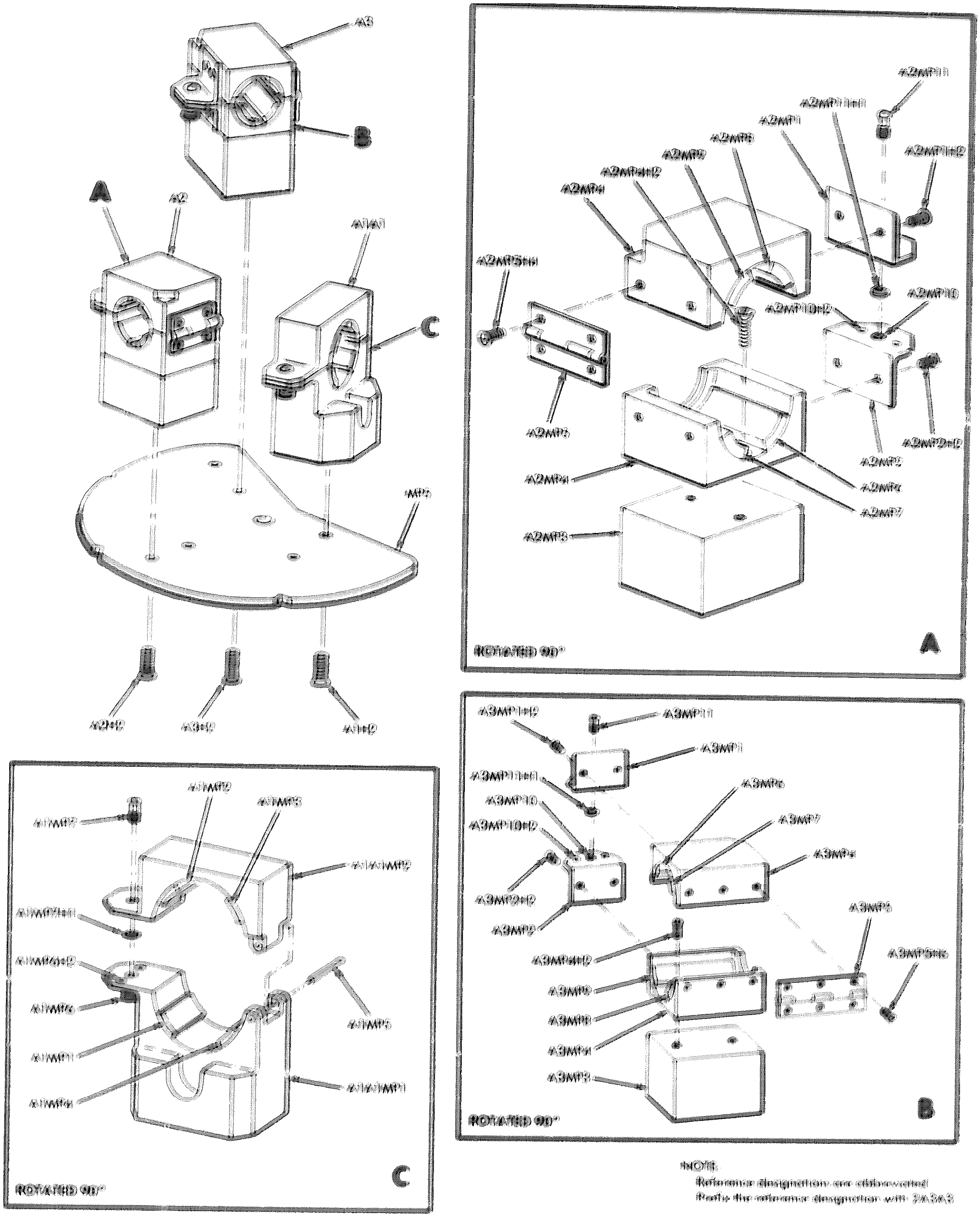


Figure 3-20(Camera, Still Picture KB-10A (?), location of parts (sheet 4 of 4).



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 2A3A3

Figure 3-21. Turntable assembly 2A3A3, location of parts

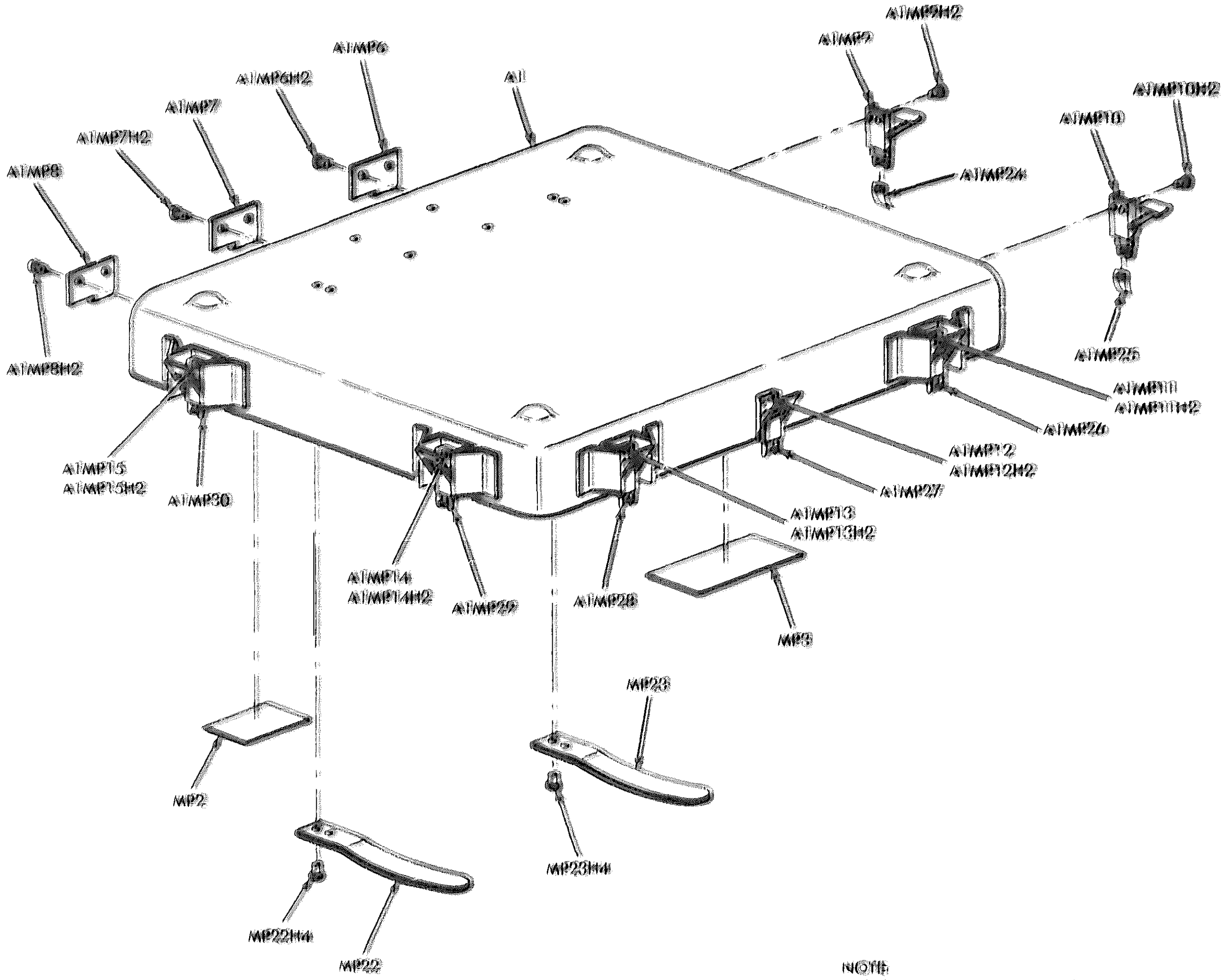


Figure 3-Cover, Test Set CW-1149/AYM-9 (1A2), location of parts.

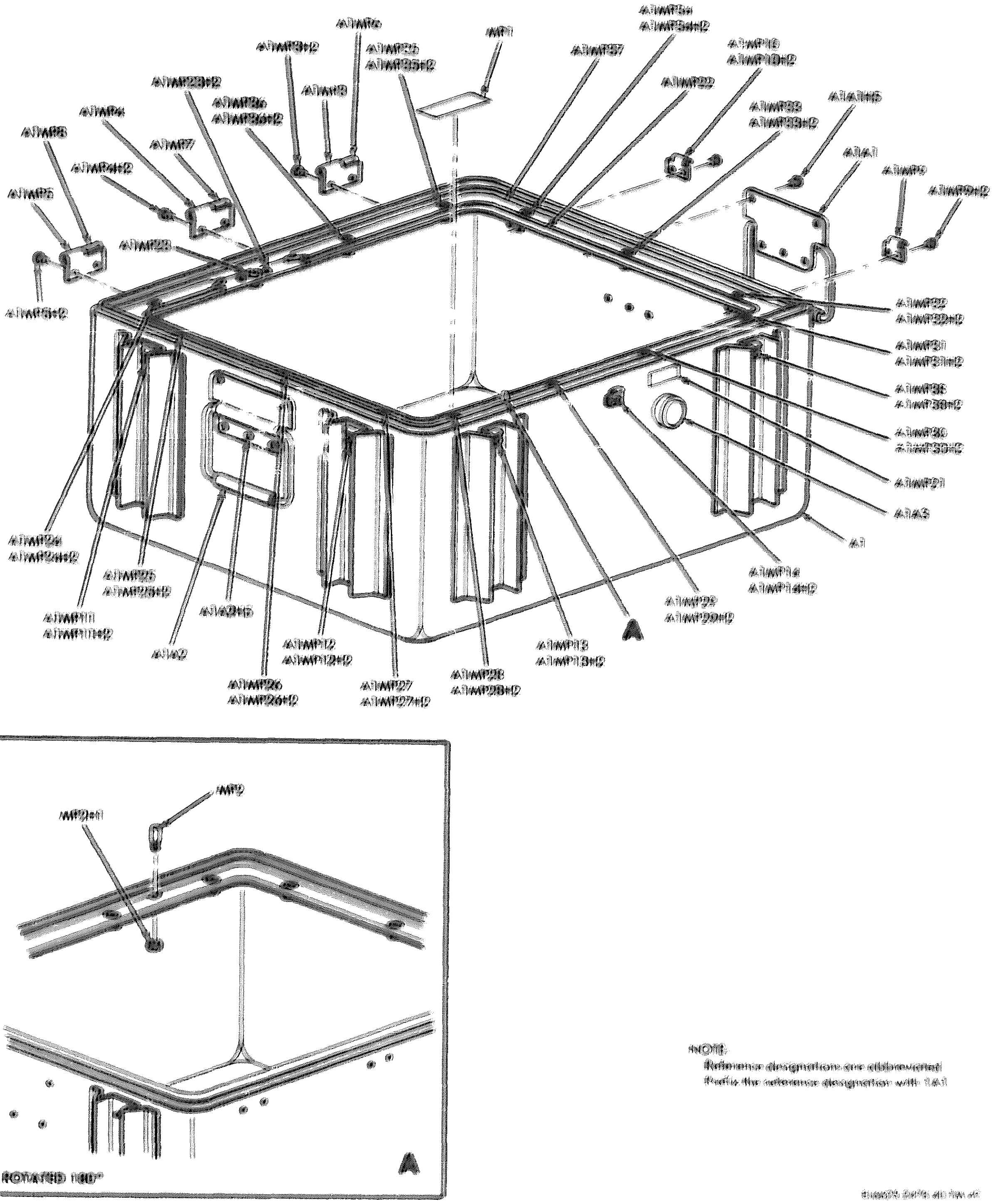
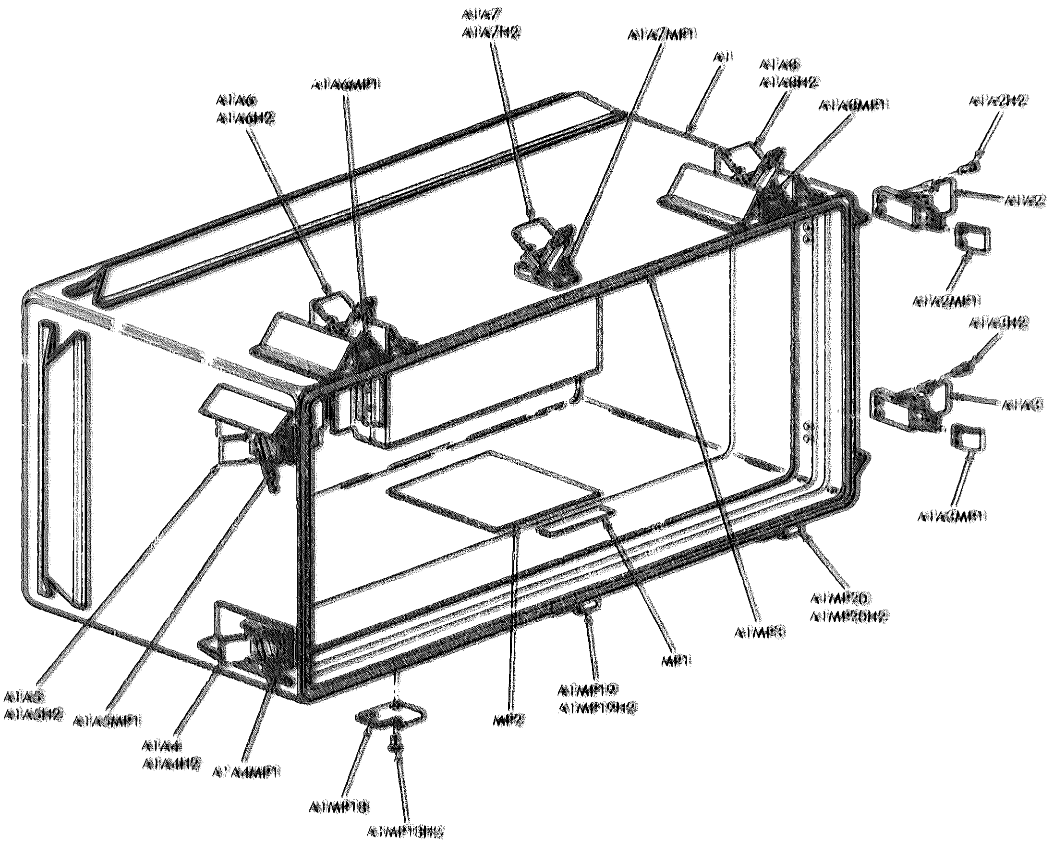


Figure 3-23 Base 1A1, location of parts.



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 2A2.

EL6625-2478-40-TM-52

Figure 3-24(1). Cover 2A2, location of parts (sheet 1 of 2).

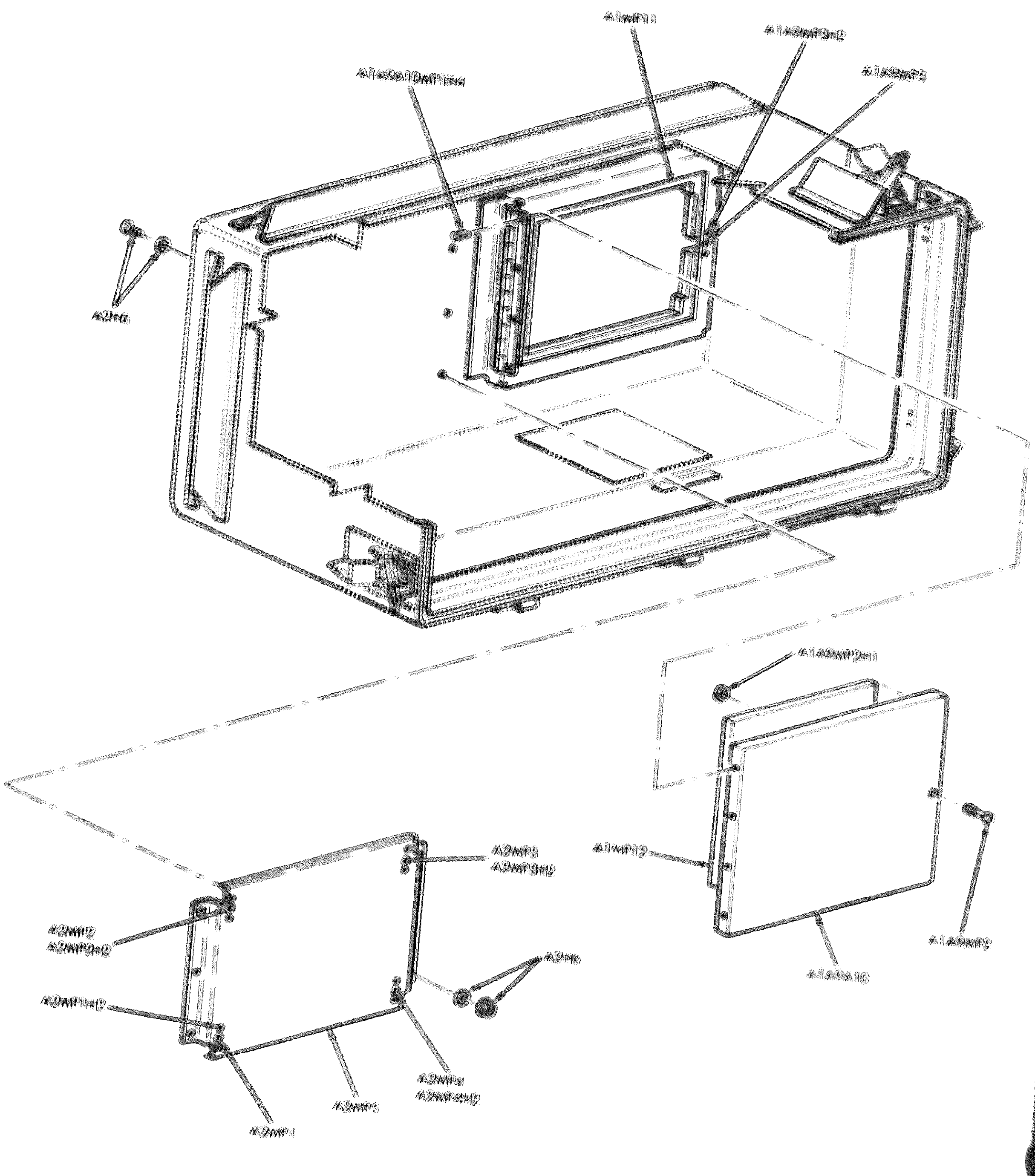
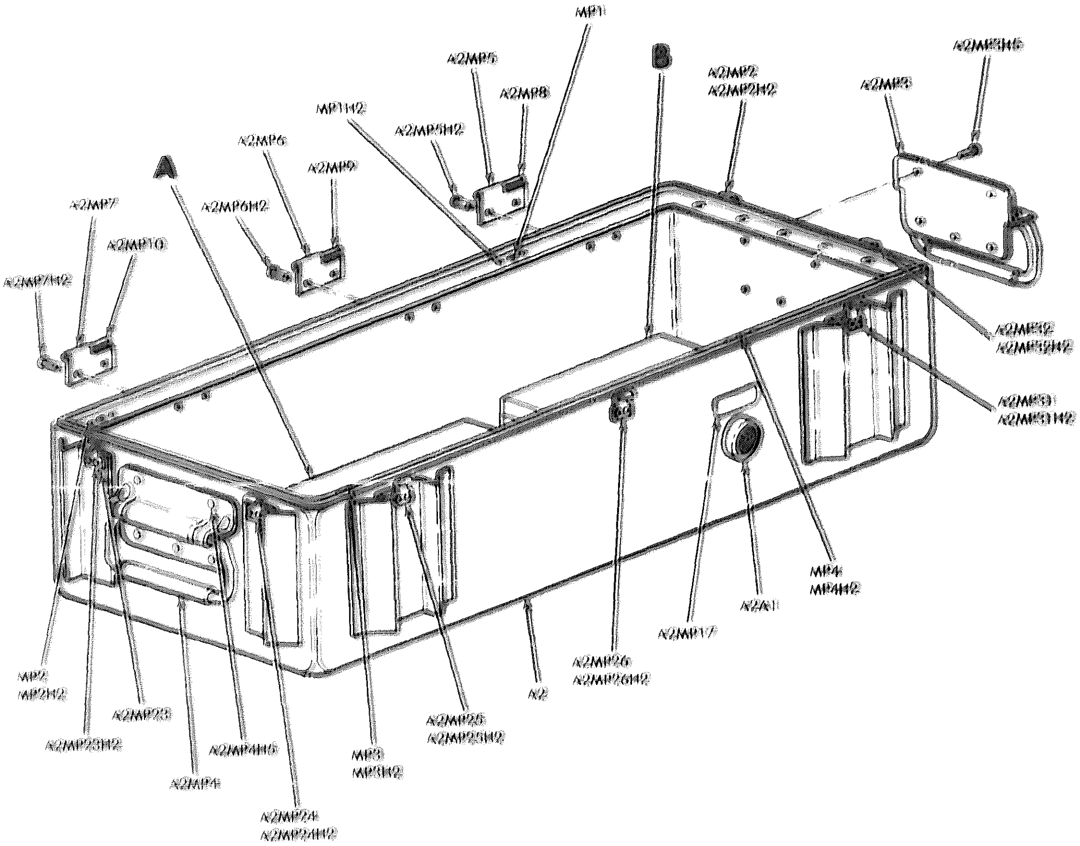


Figure 3 Cover, location of parts (sheet 2 of 2).



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 2A1.

EL6625-2478-40-TM-11 (1)

Figure 3-25(1). Base 2A1, location of parts (sheet 1 of 2).

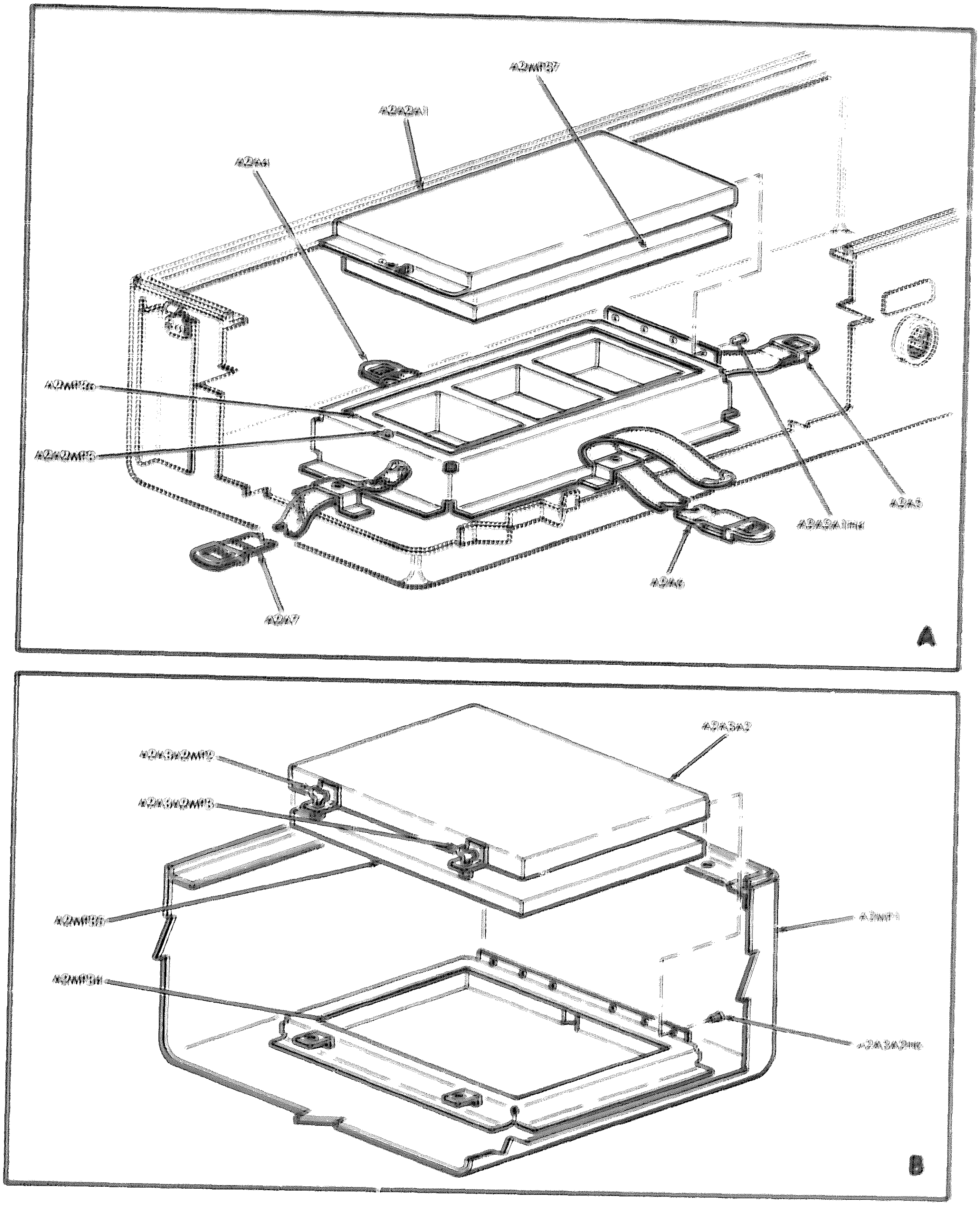
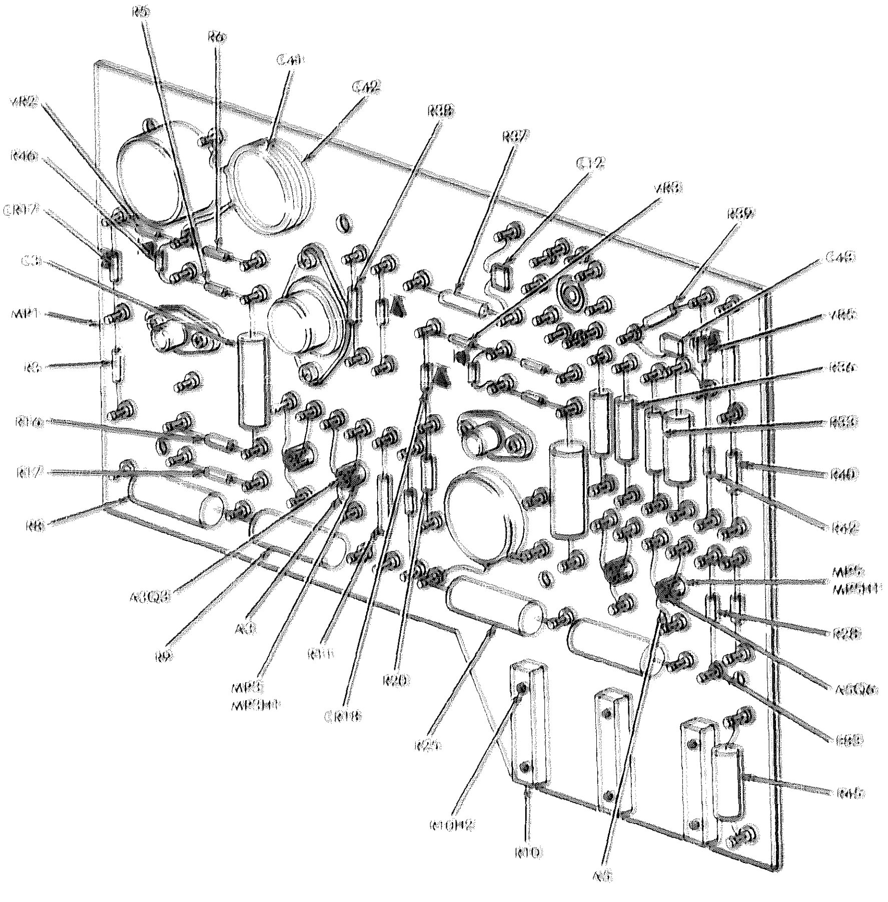


Figure 3-25(2) Base 2A1, location of parts (sheet 2 of 2).



NOTE
Reference designations are abbreviated.
Prefix the reference designation with 1A3A9A3.

Figure 3-26(Component board assembly 1A3A9A3, location of parts (sheet 1 of 3).

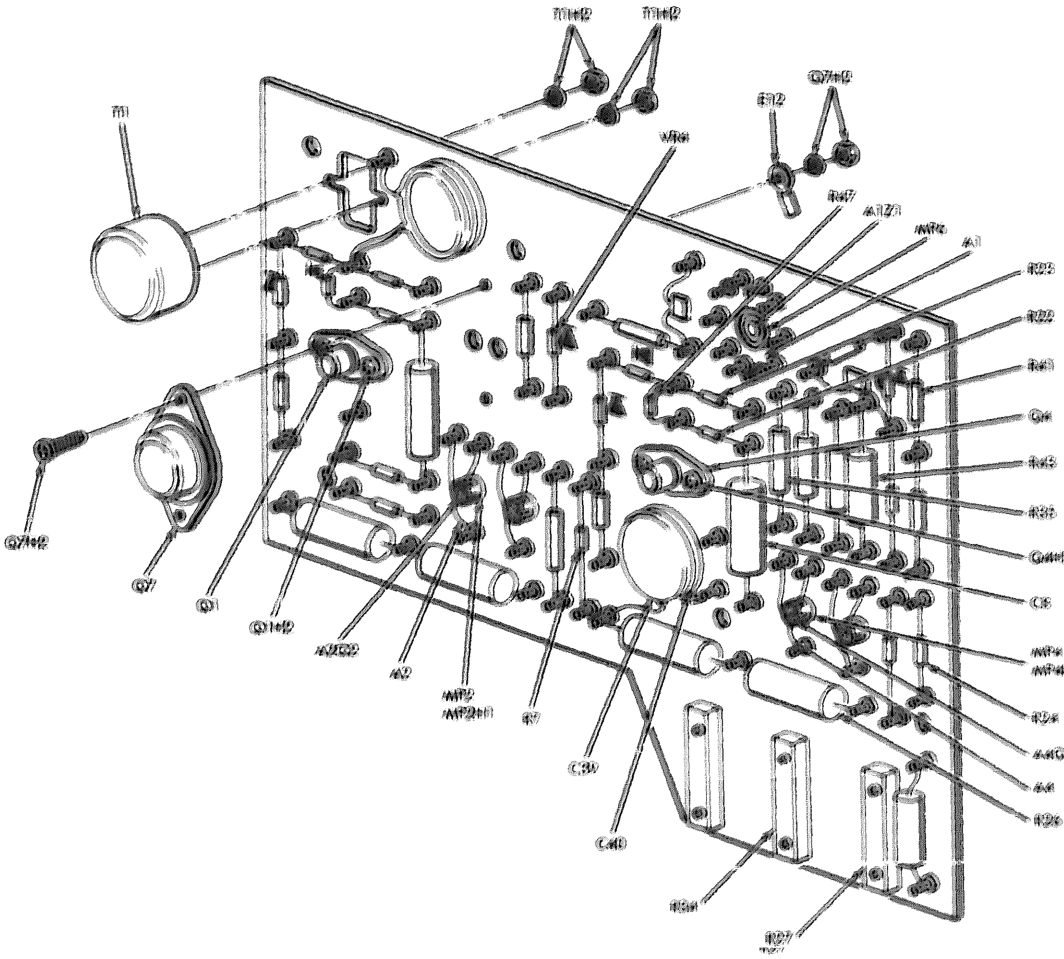
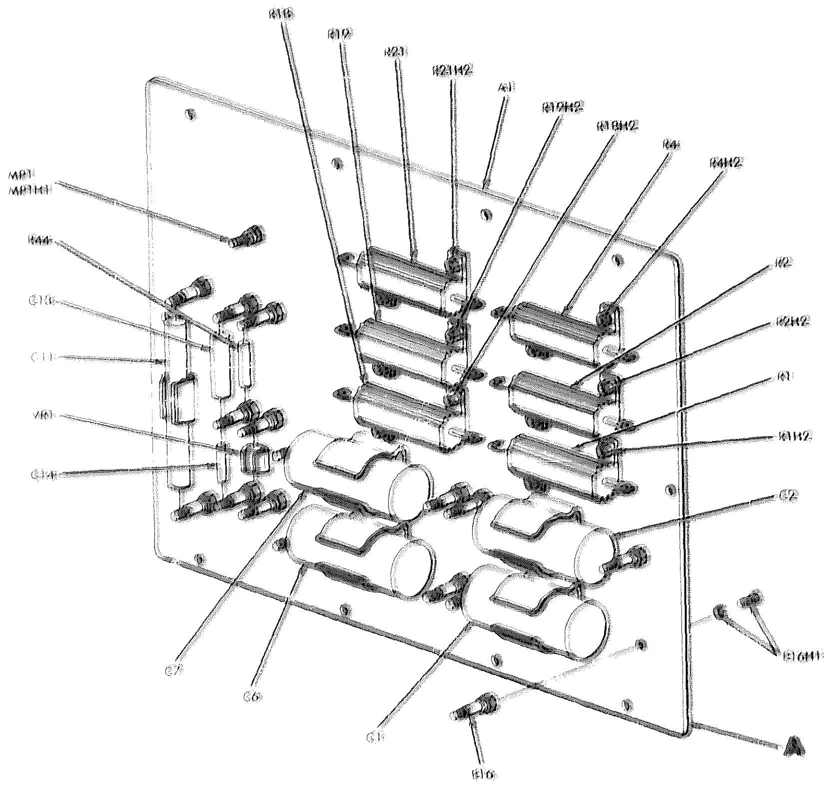


Figure 3-26(2). *Component board assembly [illegible]*
location of parts (sheet 2 of 2).
location of parts (sheet 2 of 2).



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 1A3A9A4.

Figure 3-27(1). *Cover assembly 1A3A9A4, location of parts (sheet 1 of 2).*

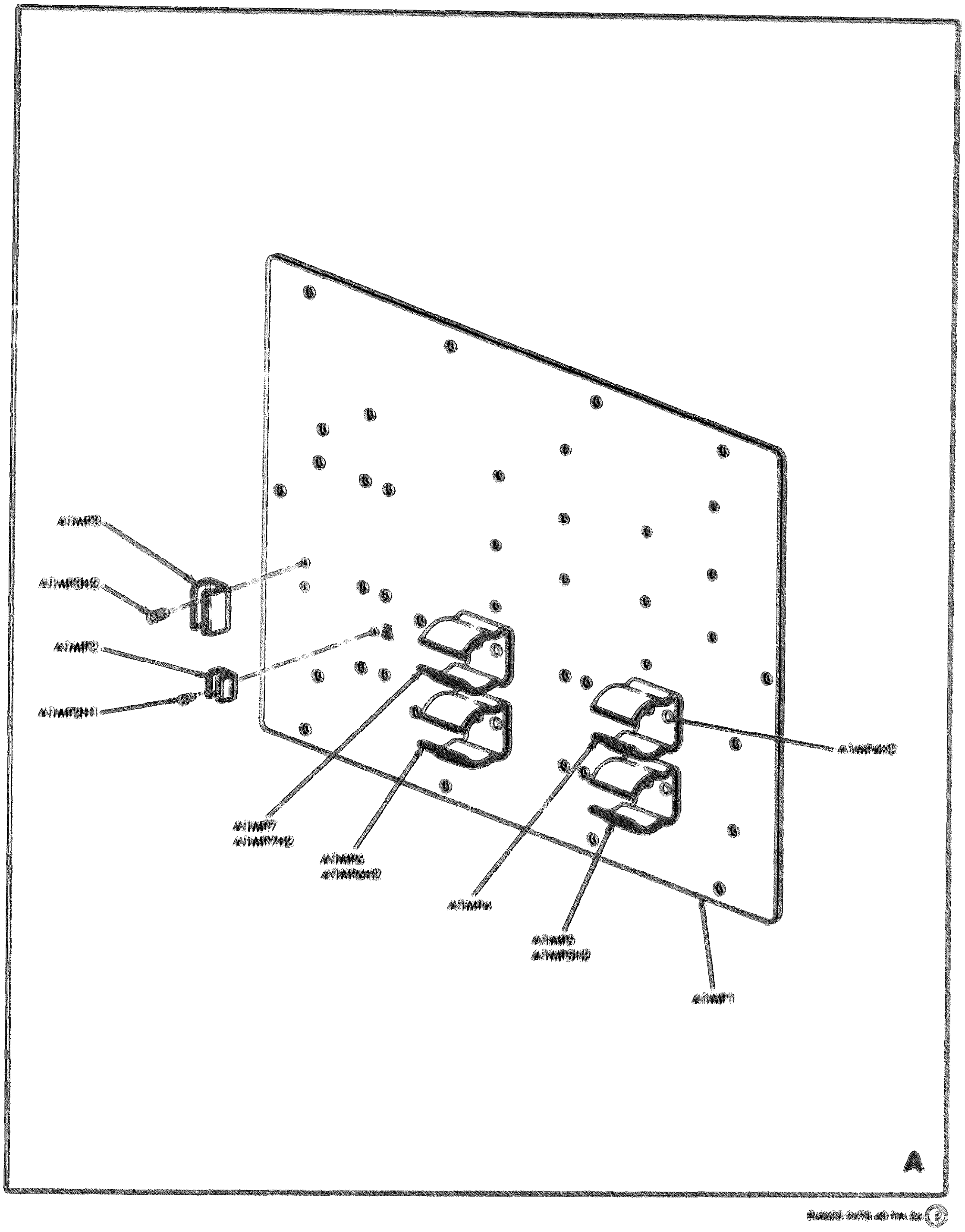
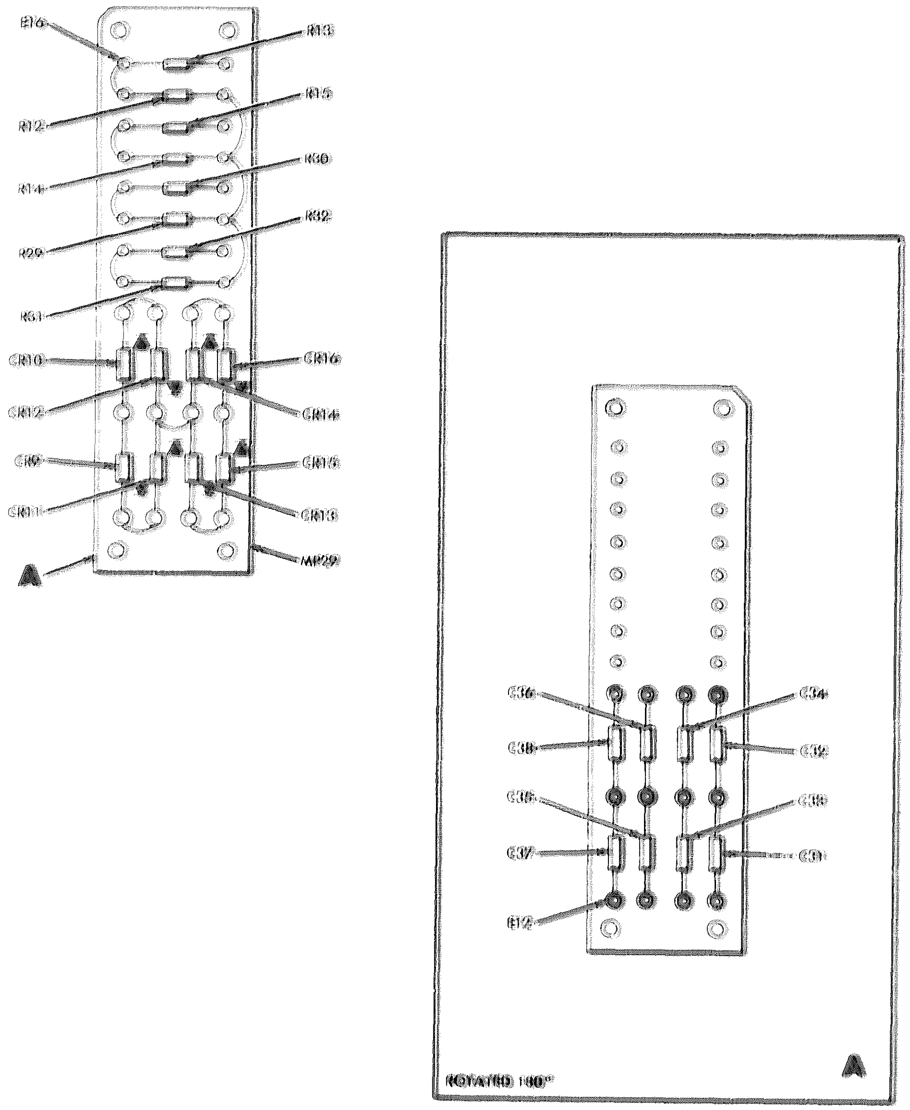


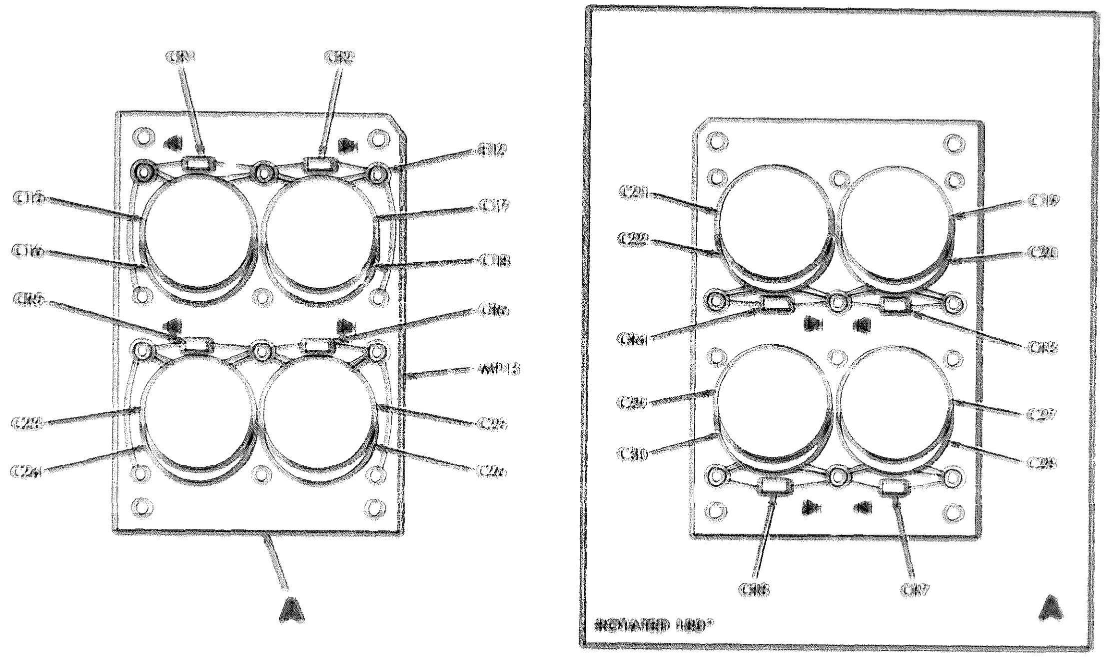
Figure 3-27(2) Cover assembly 1A3A9A1, location of parts (sheet 2 of 2).



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 1A8A9A1.

11-6625-2473-40-TM-34

Figure 3-28 Component board assembly 1A8A9A1, location of parts.



NOTE:
Reference designations are abbreviated.
Prefix the reference designation with 1A3A9A2.

Figure 3-29. *Component board assembly 1A3A9A2, location of parts.*

Section IV. ADJUSTMENT AND ALINEMENT

3-16. General

Test Set, Control Monitor-Recording Head AN/AYM-9 requires no mechanical adjustments. Alinement procedures are outlined in this section for power supply assembly 1A3A9 and board assemblies 1A3A1, 1A3A3, 1A3A4, 1A3A6, 1A3A7, and 1A3A8. Prior to performing the alinement procedures, remove test set panel assembly 1A3 from base 1A1 of Simulator, Monitor Input SM-627/AYM-9. Prior to alinement of deflection amplifier board assemblies 1A3A7 and 1A3A8 or pulse generator board assembly 1A3A6, aline low voltage regulator board assemblies 1A3A1, 1A3A3, and 1A3A4. Prior to any alinement procedure, set the following switches to the positions indicated.

Switch	*Position*
RHA TEST SELECT switch 1A2S14	KA60, IR/SLAR, CDM
RHA MODE switch 1A2S12	CONTINUOUS
CB OFF circuit breaker CB1	OFF

3-17. Alinement of Power Supply Assembly 1A3A9

Alinement of power supply assembly 1A3A9 consists of adjustments of the outputs of the +500 and −522 volt dc section. Refer to figure 3-30 for locations of specified adjustment potentiometers and associated test points and test setup connections. Proceed as follows:

a. Adjustment of +500 Volt Dc Section Output.

(1) Connect the differential voltmeter red

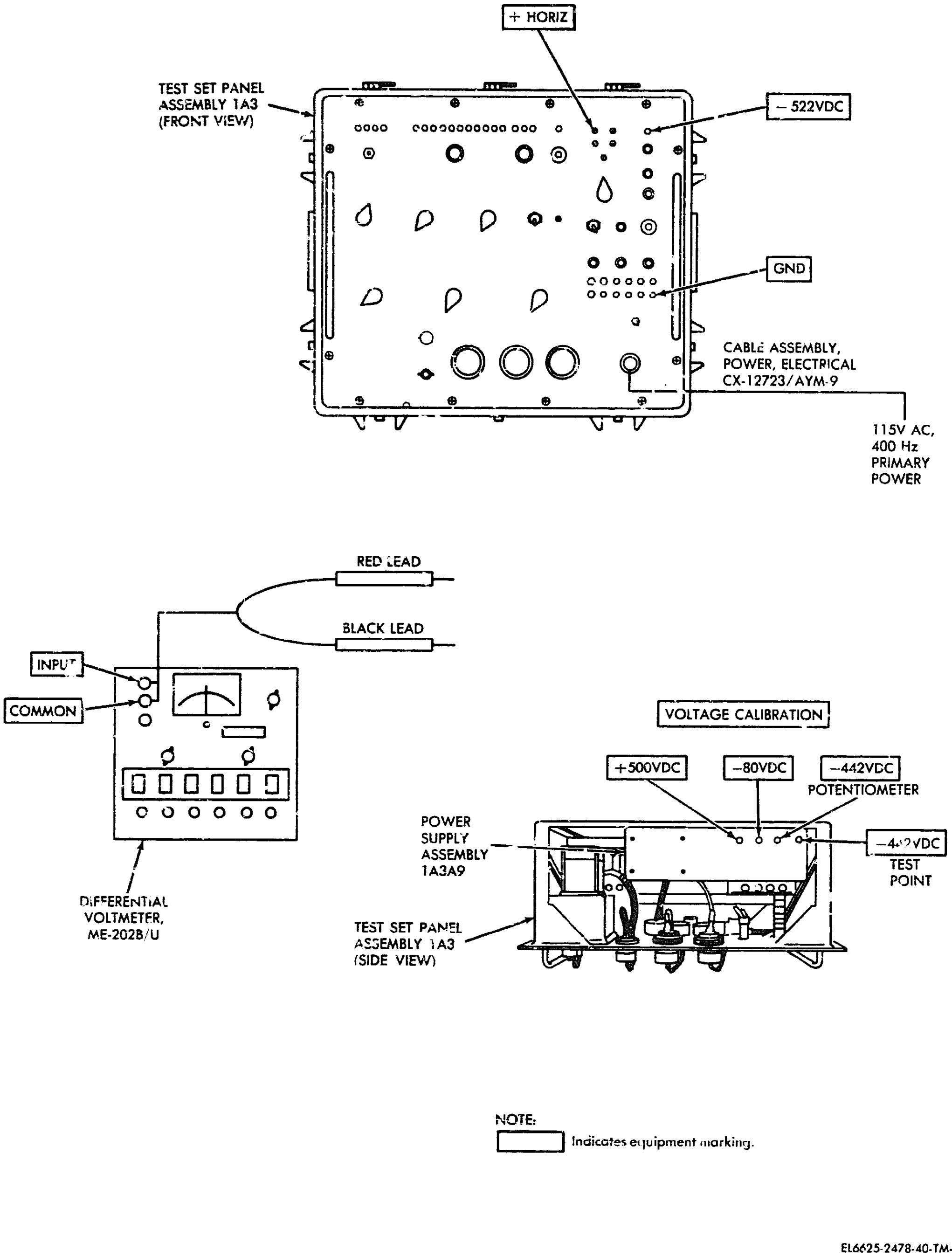


Figure 3-30. Power supply assembly 1A3A9, adjustment and test points.

(positive) lead to + HORIZ test point 1A3J7 and the black (negative) lead to GND test point 1A3J6. Set differential voltmeter to read +499.99 volts dc.

(2) Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	POWER	DC INTERNAL
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500 VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
−80VDC 1A3DS27	6.3VAC 1A3DS23	

(3) Adjust +500VDC screw adjustment potentiometer 1A3A9A3R10 until the differential voltmeter indicates +497 ±3 volts dc.

(4) Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in preceding step 2 shall go out.

(5) Remove the differential voltmeter leads from the test points.

b. Adjustment of -522 Volt DC Section Output.

(1) Connect: the differential voltmeter red (positive) lead to - 442VDC test point 1A3A-9J2 on power supply 1A3A9 and connect the black (negative) lead to GND test point 1A3J6.

(2) Set ON-OFF circuit breaker 1A3CB1 to ON. All lamps of preceding step a (2) shall light.

(3) Adjust - 442VDC screw adjustment potentiometer 1A3A9A3R27 until the differential voltmeter indicates -442 ±4 volts dc.

(4) Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps of the preceding step *a* (2) shall go out.

(5) Remove the differential voltmeter leads from the test points.

(6) Connect the differential voltmeter red (positive) lead (floating input) to - 442VDC test point 1A3A9J2 and connect the black (negative) lead to −522VDC test point 1A3J11.

(7) Set ON-OFF circuit breaker 1A3CB1 to ON. All lamps in preceding step *a* (2) shall light.

(8) Adjust −80VDC screw adjustment potentiometer 1A3A9A3R34 on power supply assembly 1A3A9 until the differential voltmeter indicates +80 +4 volts dc.

(9) Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in the preceding step *a* (2) shall go out.

(10) Remove the differential voltmeter leads from the test points.

3-18. Alinement of Low Voltage Regulator Board Assembly 1A3A1

Alinement of low voltage regulator board assembly 1A3A1 consists of adjustments of the −25 volts dc and +15 volts dc outputs. The locations of the adjustment potentiometers, test points, and test setup diagram are shown in figure 3-31. Proceed as follows:

a. Connect the differential voltmeter red (positive) lead to test point 1A3A1TP1-6 and the black (negative) lead to test point 1A3A1TP1-7.

b. Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	POWER	DC INTERNAL
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
−80VDC 1A3DS27	6.3VAC 1A3DS23	

c. Adjust screw adjustment potentiometer 1A-3A1R8 until the differential voltmeter indicates −25 ±0.01 volts dc.

d. Move the red (positive) lead of the differential voltmeter to test point 1A3A1TP1-4.

e. Adjust screw adjustment potentiometer 1A-3A1R10 until the differential voltmeter indicates +15 ±0.005 volts dc.

f. Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in *b* above shall go out.

g. Remove the differential voltmeter leads from the test points.

3-19. Alinement of Low Voltage Regulator Board Assembly 1A3A3

Alinement of low voltage regulator board assembly 1A3A3 consists of adjustment of the −15 volts dc and +25 volts dc outputs. The locations of the adjustment potentiometers, test points, and test setup diagram are shown in figure 3-32. Proceed as follows:

a. Connect the differential voltmeter red (positive) lead to test point 1A3A3TP1-6 and the black (negative) lead to test point 1A3A3TP1-7.

b. Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

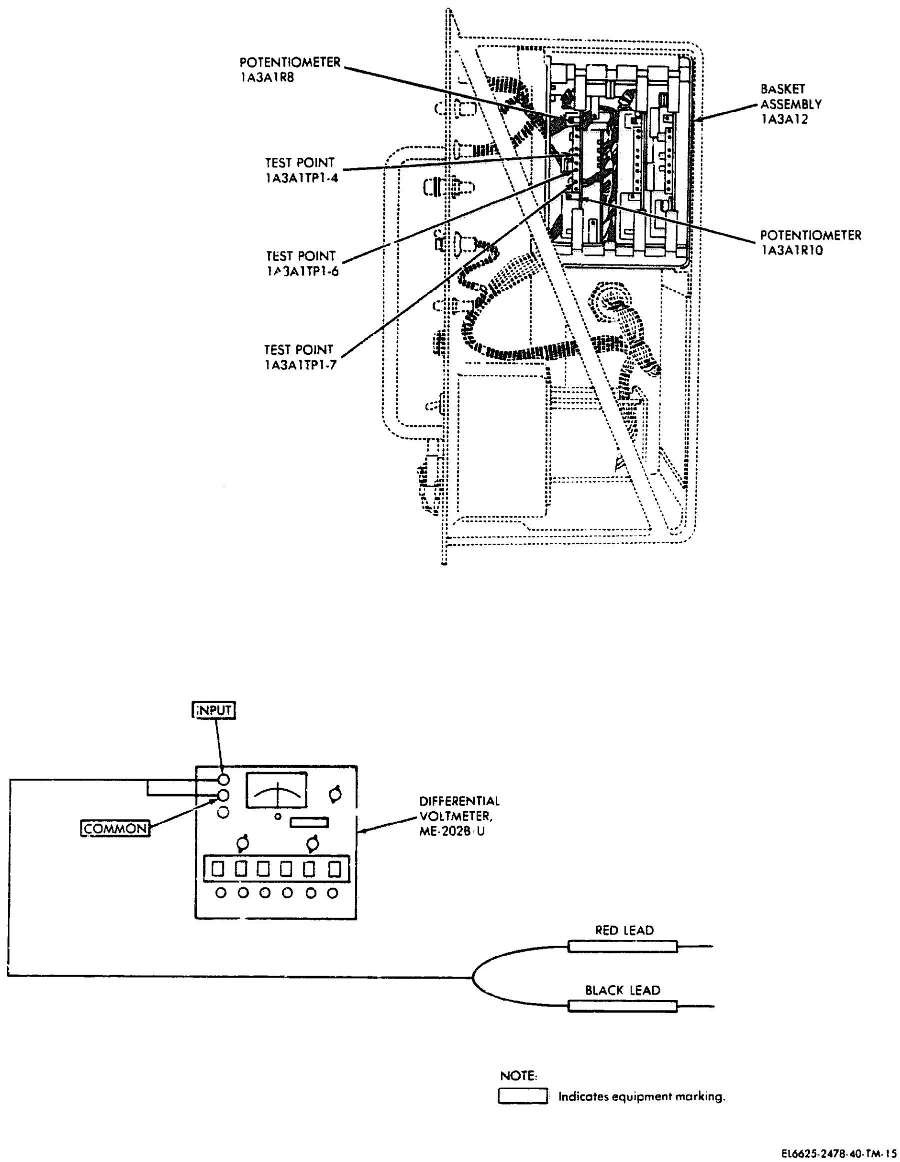


Figure 3-31. Low voltage regulator board assembly 1A3A1, adjustment and test pointer.

RHA HIGH VOLTAGE	*POWER*	*DC INTERNAL*
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
−80VDC 1A3DS27	6.3VAC 1A3DS23	

c. Adjust screw adjustment potentiometer 1A3A3R10 until the differential voltmeter in-'icates - 15 ±0.005 volts dc.

d. Move the differential voltmeter red (positive) lead to test point 1A3A3TP1-4.

e. Adjust screw adjustment potentiometer 1A-A3R8 until the differential voltmeter indicates -25 ±0.01 volts de.

f. Set ON-OFF circuit breaker 1A3CB1 to OFF. All lampa in babove shall go out.

g. Remove the differential voltmeter leads from the test points.

3-20. Alinement of Low voltage Regulator Board Assembly 1A3A4

Alinement of low voltage regulator board assembly 1A3A4 consists of adjustment of the +85 volts dc output. The locations of the adjustment potentiometers, test points, and test setup diagram are shown in figure 3-33. Proceed as follows:

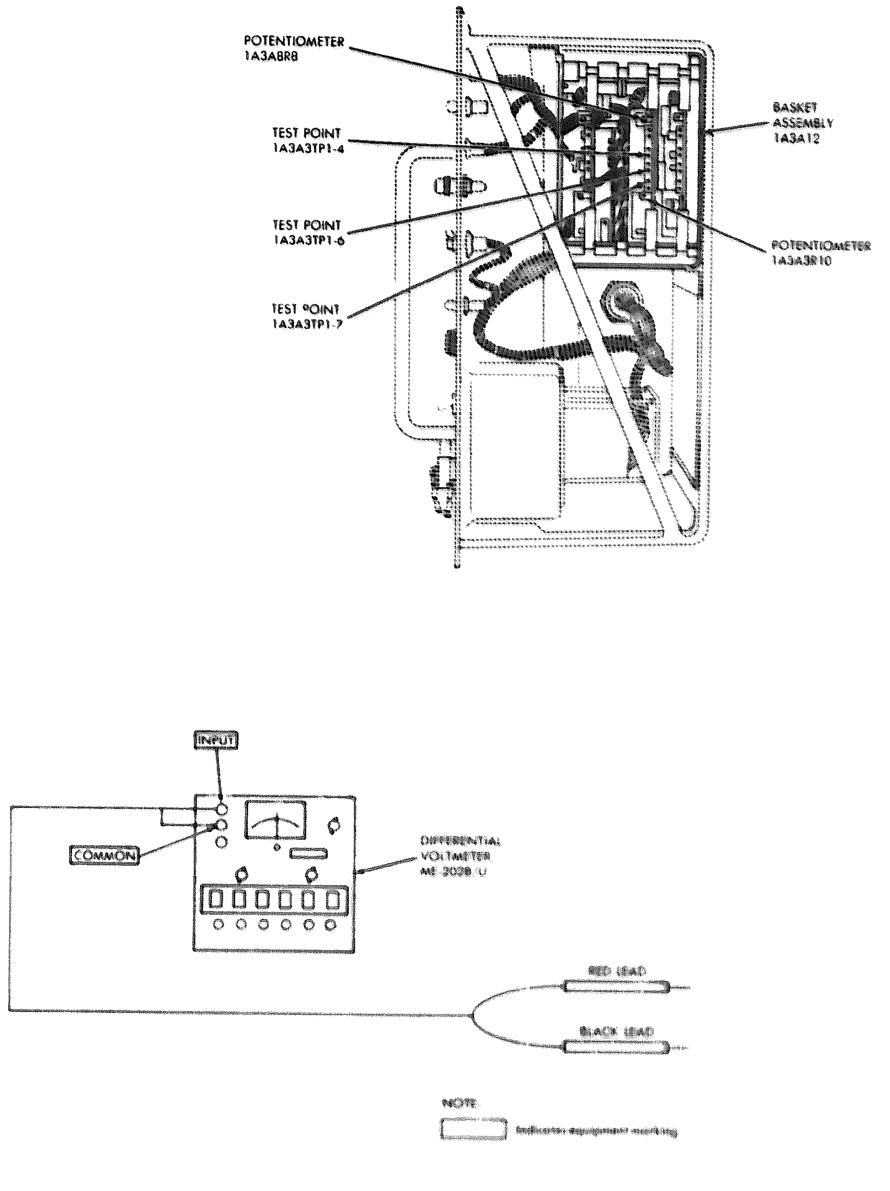


Figure 3-32 *Low voltage regulator board assembly 1A3A3, adjustment and test points.*

a. Connect the differential voltmeter red (positive) lead to test point 1A3A4TP1-1 and the black (negative) lead to test point 1A3A4TP1-5.

b. Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	*POWER*	*DC INTERNAL*
-522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
-30VDC 1A3DS27	6.3VAC 1A3DS23	

c. Adjust screw adjustment potentiometer 1A-3A4R4 until the differential voltmeter indicates +85 ±0.30 volts dc.

d. Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in *b* above shall go out.

e. Remove the differential voltmeter leads from the test points.

3-21. Alinement of Deflection Amplifier Board Assemblies 1A3A7 and 1A3A8

Alinement of deflection amplifier board assemblies 1A3A7 and 1A3A8 consists of adjustments of the horizontal and vertical signal outputs. The assemblies are identical; therefore, the procedures are given for deflection amplifier board assembly 1A3A8 only. The locations of the adjustment potentiometers, test points, and test setup diagram are shown in figure 3-34 for deflection board assembly 1A3A8. Proceed as follows:

a. Connect the differential voltmeter red (positive) lead to test point 1A3A8TP1-3 and the black (negative) lead to test point 1A3A8TP1-6.

b. Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	*POWER*	*DC INTERNAL*
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
−80VDC 1A3DS27	6.3VAC 1A3DS23	

c. Adjust screw adjustment potentiometer 1A-3A8R8 until the differential voltmeter indicates 14.32 +0.14 volts ac.

d. Move the differential voltmeter red (positive) lead to test point 1A3A8TP1-5 and the black (negative) lead to test point 1A3A8TP1-6.

e. Adjust screw adjustment potentiometer 1A-3A8R21 until the differential voltmeter indicates 14.32 ±0.14 volts ac.

f. Set RHA TEST SELECT switch 1A3S14 to KA76 position.

g. Adjust screw adjustment potentiometer 1A-3A8R17 until the differential voltmeter indicates 8.35 ±0.08 volts ac.

h. Move the differential voltmeter red (positive) lead to test point 1A3A8TP1-3.

i. Adjust screw adjustment potentiometer 1A-3A8R5 until the differential voltmeter indicates 8.35 ±0.08 volts ac.

j. Set RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM.

k. Set ON-OFF circuit breaker 1A3CB1 to OFF. All tamps in b above shall go out.

l. Remove the differential voltmeter leads from the test points.

3-22. Alinement of Pulse Generator Board Assembly 1A3A6

Alinement of pulse generator board assembly 1A3A6 consists of calibration of the unblanking pulse output and the battery test circuit. The locations of the adjustment, test points, and test setup diagram are shown in figure 3-35. Proceed as follows:

a. Battery Testing Circuit.

(1) Remove pulse generator board assembly 1A3A6 and reinstall it using Extender, Circuit Card MX-8966/AYM.

(2) Adjust screw adjustment potentiometer 1A3A6R9 fully counterclockwise.

(3) Adjust the test power supply for +4.5 ±0.005 volts dc output.

(4) Connect the red (positive) lead of test power supply to test point 1A3A6TP1-1 and the black (negative) lead to test point 1A3A6-TP1-8.

(5) Connect the differential voltmeter red (positive) lead to terminal 8 on Extender, Circuit Card MX-8966/AYM and connect the black (negative) lead to test point 1A3A6TP1-8.

(6) Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	*POWER*	*DC INTERNAL*	*BATTERY INDICATOR 1A3DS8*
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4	
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11	
−80VDC 1A3DS27	6.3VAC 1A3DS23		

(7) Adjust screw adjustment potentiometer 1A3A6R9 slowly in a clockwise direction to just past the point where the differential voltmeter needle jumps to an indication greater than +4.0 volts dc.

(8) Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in. the preceding step (6) shall go out.

(9) Remwe the differential voltmeter leads from the teat points.

(10) Turn the test power supply off and remove both leads.

b. Unblanking Pulse.

(1) Connect the oscilloscope vertical input probe to test point 1A3A6TP1-7 and the ground lead to test point 1A3A6TP1-8.

(2) Set ON-OFF circuit breaker 1A3CB1 to ON. The following lamps shall light:

RHA HIGH VOLTAGE	*POWER*	*DC INTERNAL*
−522VDC 1A3DS25	115VAC 1A3DS22	GO 1A3DS4
+500VDC 1A3DS24	115VDC 1A3DS26	+5V 1A3DS11
-80VDC 1A3DS27	6.3VAC 1A3DS23	

(3) Adjust screw adjustment potentiometer 1A3A6R33 for a puke period of 100 ±2 useconds.

NOTE

Measure the time period at the SO-percent amplitude level.

(4) Remove the oscilloscope vertical probe and the ground lead from test points 1A3A6TP1-7 and 1A3A6TP1-8.

(5) Set ON-OFF circuit breaker 1A3CB1 to OFF. All lamps in the preceding step (2) shall go out.

(6) Remove Extender, Circuit Card MX-8966/AYM and reinstall pulse generator board assembly 1A3A6.

(7) Reinstall test set panel assembly 1A3 in base 1A1 of Simulator, Monitor Input SM-627/AYM-9.

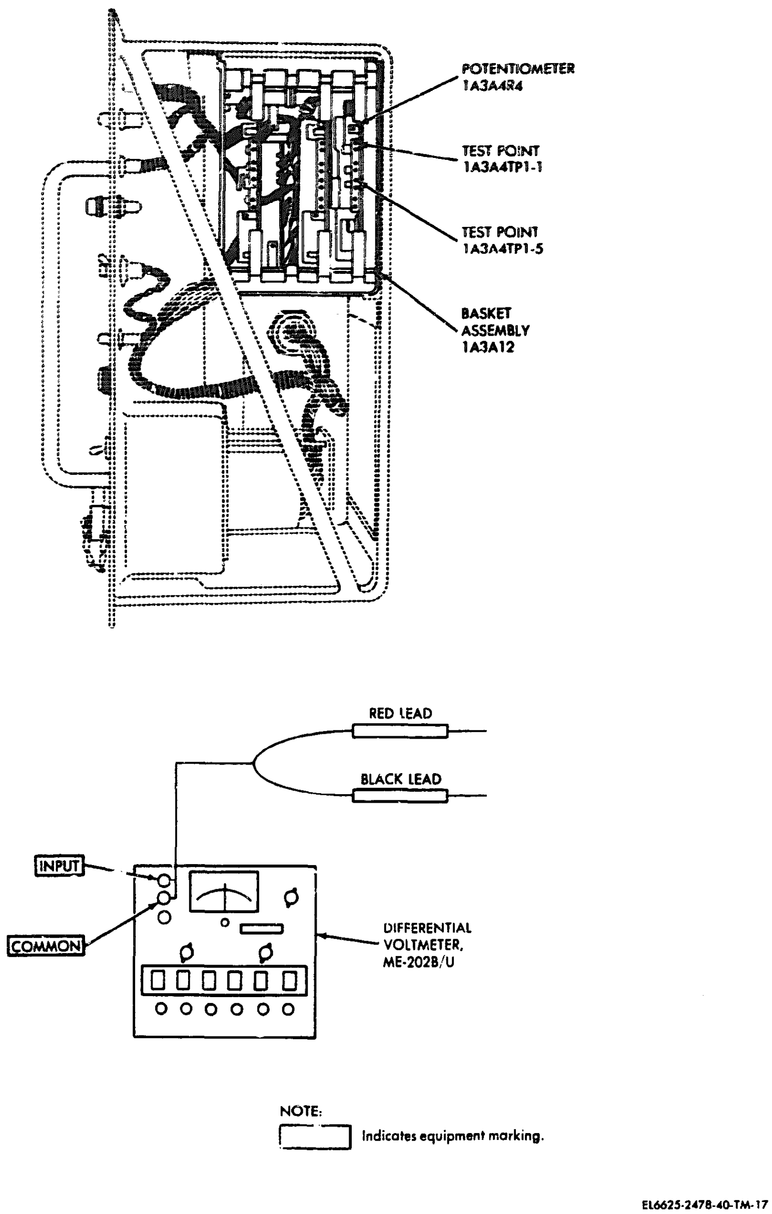


Figure 3-33. Low voltage regulator board assembly 1A3A4, adjustment and test points.

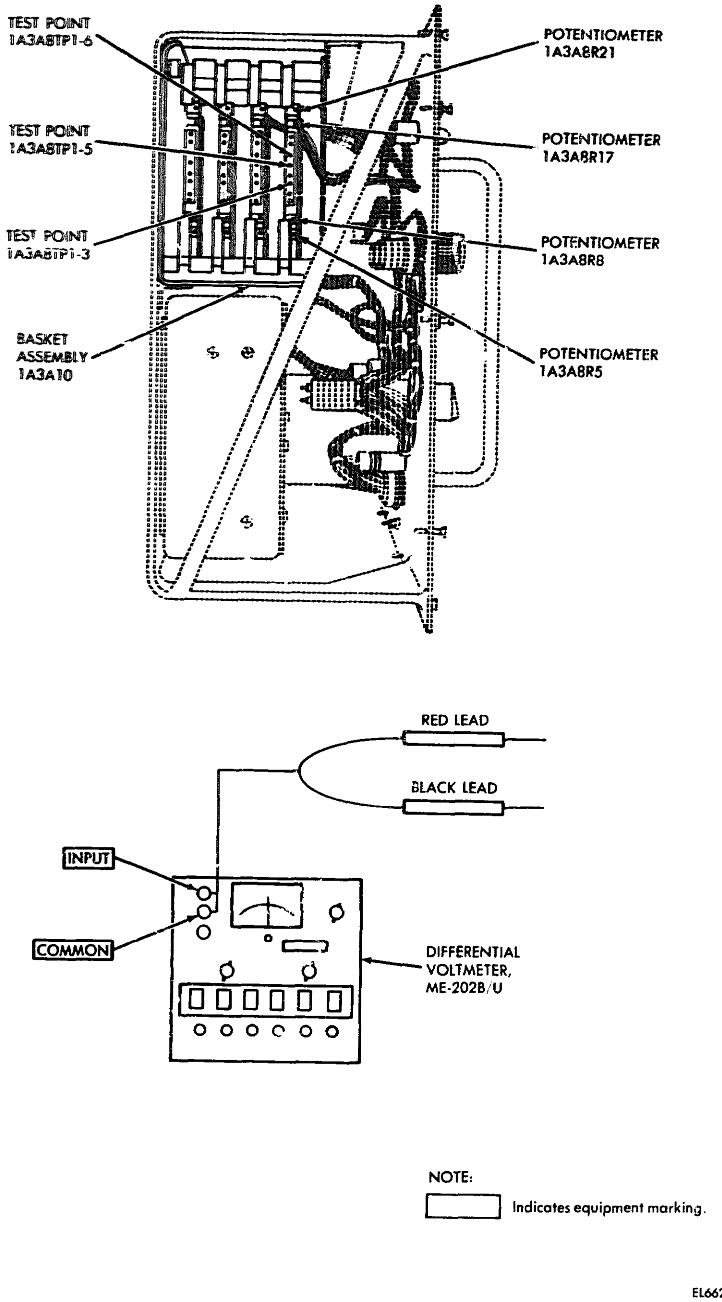


Figure 3-34. Deflection amplifier board assembly 1A3A8, adjustment and test points.

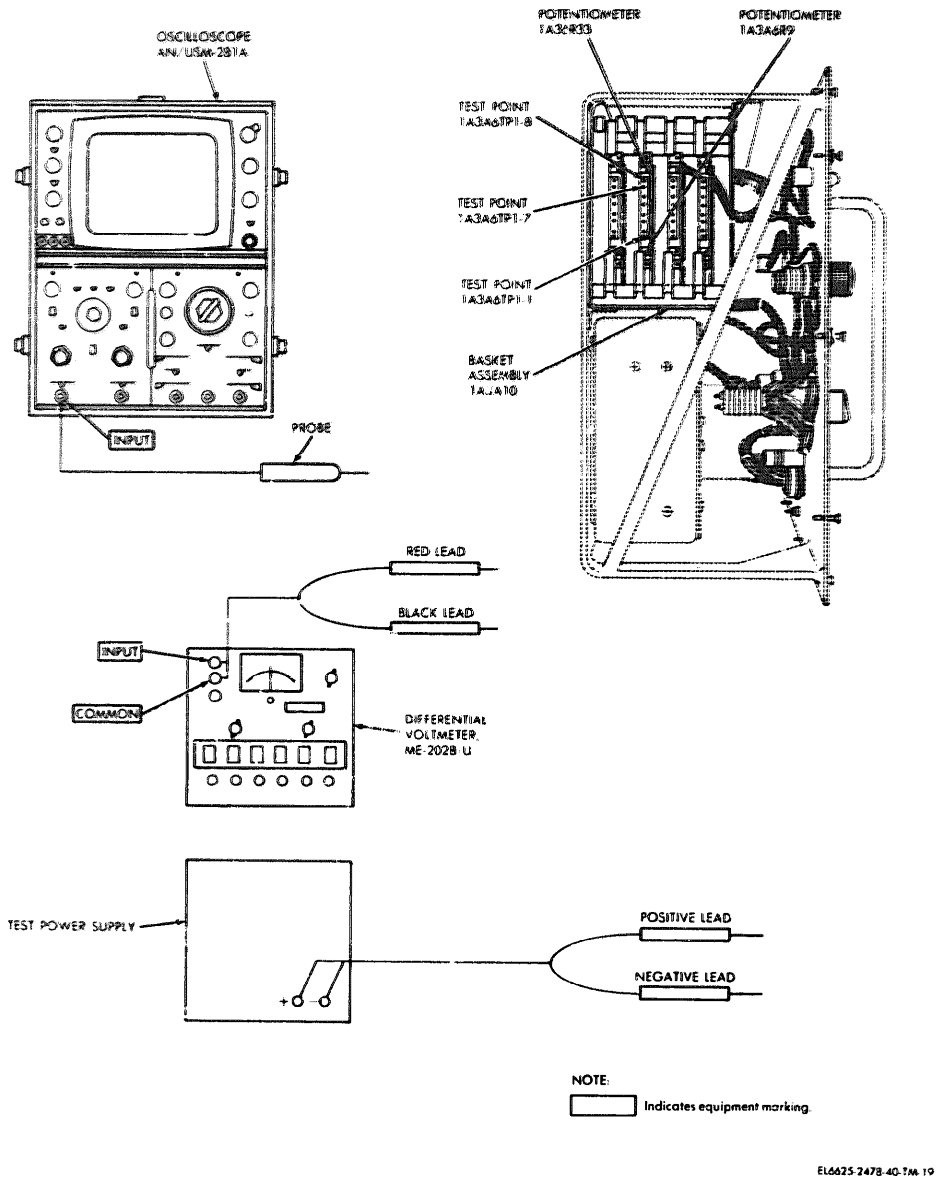


Figure 3-35. Pulse generator board assembly 1A3A6, adjustment and test points.

Section V. REPAIR

3-23. General

This section provides procedures for repair of Test Set, Control Monitor-Recording Head AN/AYM-9. All assemblies and parts found to be defective should be replaced. General removal and replacement instructions are given in section III. This section contains a repair procedure which is to be used when replacing defective camera cover assembly 2A5. All other parts of Test Set, Control Monitor-Recording Head AN/AYM-9 are easily accessible and can be replaced without special procedures. However, the general practices and precautions in the following paragraph apply.

3-24. Soldering Precautions

Observe the following precautions to avoid damaging component parts during soldering operations.

a. Do not use a solder gun. The uncontrolled temperature of a solder gun may damage component parts. Damage may also result from the magnetic field generated by a solder gun.

b. Use a 40- to 50-watt soldering iron.

c. Use a heat sink when soldering connections to crystal diodes, transistors, or microcircuits. Holding the terminal with long-nosed pliers close to the point of connection will dissipate the heat before it reaches the part.

d. Keep the body of the soldering iron away from crystal diodes, transistors, or microcircuits.

e. Maintain soldering contact only as long as required to ensure a satisfactory connection.

f. Use only rosin-core solder.

3-25. Parts Substitution

Do not use parts substitution as a troubleshooting method. Substitute parts only when your analysis of the trouble clearly indicates that a specific stage or part is the likely cause of the problem.

3-26. Checkout After Repair

After repair of Test Set, Control Monitor-Recording Head AN/AYM-9 is complete, perform the checkout procedure of paragraph 3-28.

3-27. Repair of Camera Cover Assembly 2A5 (fig. 3-19)

a. If grommet 2A5MP3 requires replacement, remove the grommet from cover 2A5MP1 and install a new grommet.

b. If gasket 2A5MP2 requires replacement, use a sharp knife to break the bond and remove the old gasket. Install the new gasket as follows:

(1) Thoroughly clean the bonding surface of cover 2A5MP1 using aluminum oxide paper.

(2) Thoroughly clean the bonding surface of cover 2A5MP1 and gasket 2A5MP2, using methyl ethyl ketone, Federal Specification TT-M-261.

(3) Apply adhesive primer RTV 1200 (manufactured by Dow Corning Corp., Midland, Mich.) to the surfaces using a brush, swab, or clean cotton cheesecloth. Apply a uniform film, as thin as possible, and allow to dry for 30 minutes.

(4) When primer has dried 30 minutes, apply Silastic 140 adhesive (manufactured by Dow Corning Corp., Midland, Mich.) in a uniform layer to both bonding surfaces. Use an amount of adhesive sufficient to obtain a bond line thickness of 0.010 to 0.030 inch.

(5) Join the parts immediately, applying sufficient pressure to insure adequate contact.

(6) Cure for 24 hours at room temperature.

Section VI. TESTING

3-28. General

This section contains testing procedures which provide a means of checking the overall performance capability of Test Set, Control-Monitor Recording Head AN/AYM-9 after it has been repaired. These procedures supplement the preoperational checks contained in TM 11-6625-2478-12 and should be performed immediately after performing the aforementioned preoperational checks. These checks provide a means of checking that the AN/AYM-9 has been energized properly, that all indicators are functioning properly and that the power supply circuits are providing the proper voltages. The test procedures contained in this section are more detailed and are subdivided into major functional tests supported by test setup diagrams where necessary. Should the AN/AYM-9 fail to meet all performance standards, refer to and perform the troubleshooting procedures contained in section II.

NOTE

Prior to performing any test procedure, set the following switches to the positions indicated.

Switch	*Position*
RHA TEST SELECT switch 1A3S14	KA60, IR/SLAR, CDM
RHA MODE switch	CONTINUOUS
ON/OFF circuit breaker 1A3CB1	OFF

3-29. Switch and Resistor Testing Circuits Test

To test the switch and resistor testing circuits, perform the continuity checks given in paragraph 3-8.

3-30. High Voltage Circuits Test

a. Test Equipment and Materials. Differential Voltmeter ME-202B/U is the only test equipment required.

b. Test Connections and Conditions. Connect Simulator, Monitor Input SM-627/AYM-9 to a source of 115 volt ac power using Cable Assembly, Power, Electrical CX-12723/AYM-9.

c. Procedure (fig. 3-36).

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Test Set, Control Monitor-Recording Head AN/AYM-9		
1	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to ON.	Following lamps shall light: RHA HIGH VOLTAGE −522VDC 1A3DS25 +500VDC 1A3DS24 −80VDC 1A3DS27 POWER 115VAC 1A3DS22 115VDC 1A3DS26 6.3VAC 1A3DS23 DC INTERNAL GO 1A3DS4 +5V 1A3DS11
2	Differential voltmeter RANGE switch to 500.	ON-OFF circuit breaker 1A3CB1 to ON.	Connect differential voltmeter red (positive) lead to −522VDC test point 1A3J11 and black (negative) lead to −442VDC test point 1A3A-9J2.	Differential voltmeter shall indicate −80 ±4 volts dc (table 3-2, item no. 31).
3	Differential voltmeter RANGE switch to 500.	ON-OFF circuit breaker 1A3CB1 to ON.	Move differential voltmeter red (positive) lead to +HORIZ test point 1A3J7 and move black (negative) lead to GND test point 1A3J6.	Differential voltmeter shall indicate +497 ±3 volts dc (table 3-2, item no. 32).
4	Differential voltmeter RANGE switch to 500.	ON-OFF circuit breaker 1A3CB1 to ON.	Move differential voltmeter red (positive) lead to −HORIZ test point 1A3J8.	Differential voltmeter shall indicate +497 ±3 volts dc (table 3-2, item no. 33).
5	Differential voltmeter RANGE switch to 500.	ON-OFF circuit breaker 1A3CB1 to ON.	Move differential voltmeter red (positive) lead to +VERT test point 1A3J10.	Differential voltmeter shall indicate +497 ±3 volts dc (table 3-2, item no. 34).
6	Differential voltmeter RANGE switch to 500.	ON-OFF circuit breaker 1A3CB1 to ON.	Move differential voltmeter red (positive) lead to −VERT test point 1A3J9.	Differential voltmeter shall indicate +497 ±3 volts dc (table 3-2, item no. 35).
7	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to OFF.	All lamps in preceding step 1 shall go out.
8	N/A	N/A	Remove differential voltmeter leads from test points.	N/A.

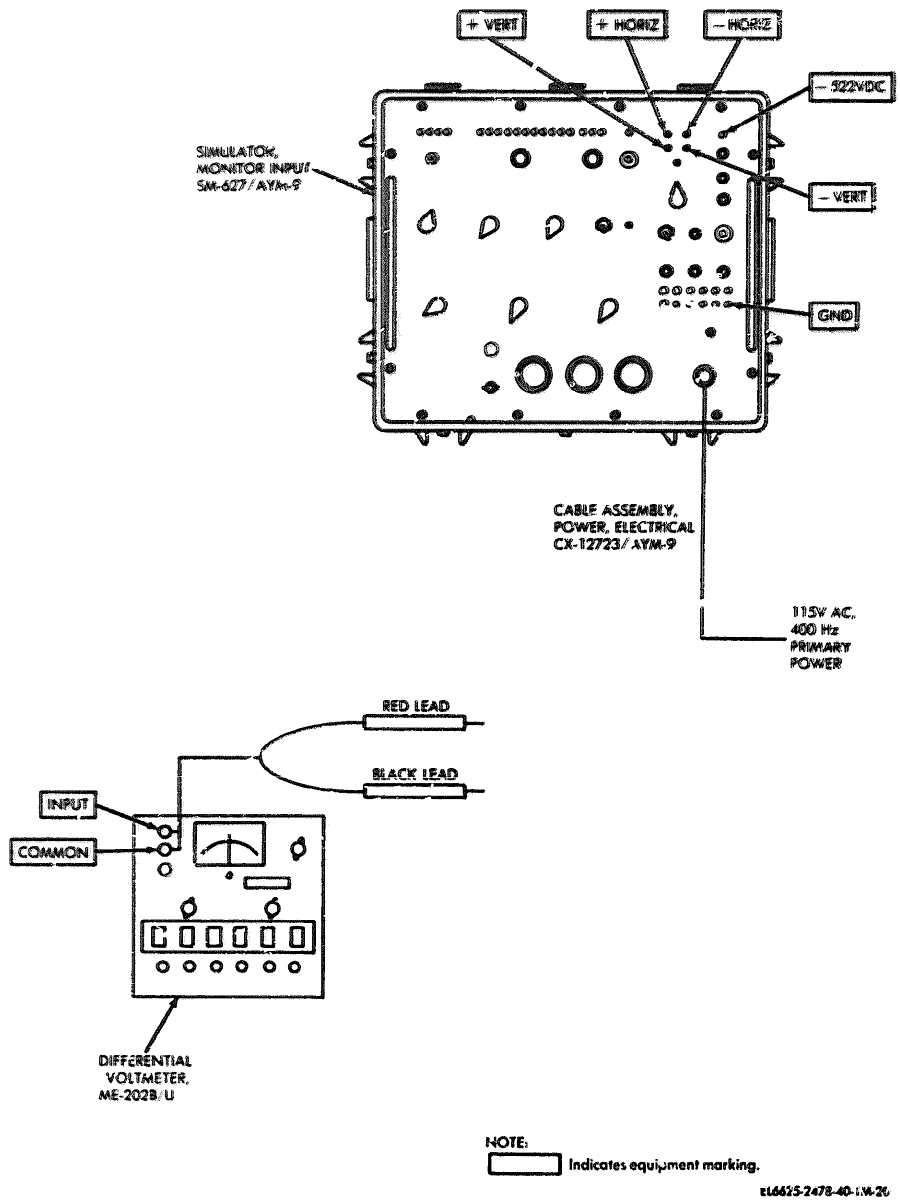


Figure 3-36. High voltage circuits test setup.

3-31. Deflection circuit Frequency Test

a. Test Equipment and Materials. Electronic Cornter AN/USM-207 is the only test equipment required.

b. Test Connections and Conditions. Connect Simulator, Monitor Input SM-627/AYM-9 to a source of 115 volt ac power using Cable Assembly, Power, Electrical CX-12723/AYM-9.

c. Procedure (fig. 3-37).

Step No.	Control settings: Test equipment	Control settings: Test Set, Control Monitor-Recording Head AN/AYM-9	Test procedure	Performance standard
1	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to ON.	Following lamps shall light: RHA HIGH VOLTAGE −522VDC 1A3DS25 +500VDC 1A3DS24 −80VDC 1A3DS27 POWER 115VAC 1A3DS22 115VDC 1A3DS26 6.3VAC 1A3DS23 DC INTERNAL GO 1A3DS4 +5V 1A3DS11
2	Set up counter for measuring frequency of 100 Hz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Connect counter +AC input probe to +HORIZ test point 1A3J7 and connect black probe to GND test point 1A3J6.	Counter shall indicate 100 ±1 Hz (table 3-2, item no. 36).
3	Set up counter for measuring frequency of 100 Hz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move counter +AC input probe to −HORIZ test point 1A3J8.	Counter shall indicate 100 ±1 Hz (table 3-2, item no. 37).
4	Set up counter for measuring frequency of 100 Hz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move counter +AC input probe to +VERT test point 1A3J10.	Counter shall indicate 100 ±1 Hz (table 3-2, item no. 38).
5	Set up counter for measuring frequency of 100 Hz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move counter +AC input probe to −VERT test point 1A3J9.	Counter shall indicate 100 ±1 Hz (table 3-2, item no. 39).
6	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to OFF.	All lamps in preceding step 1 shall go out.
7	N/A	N/A	Remove counter probes from test points.	N/A.

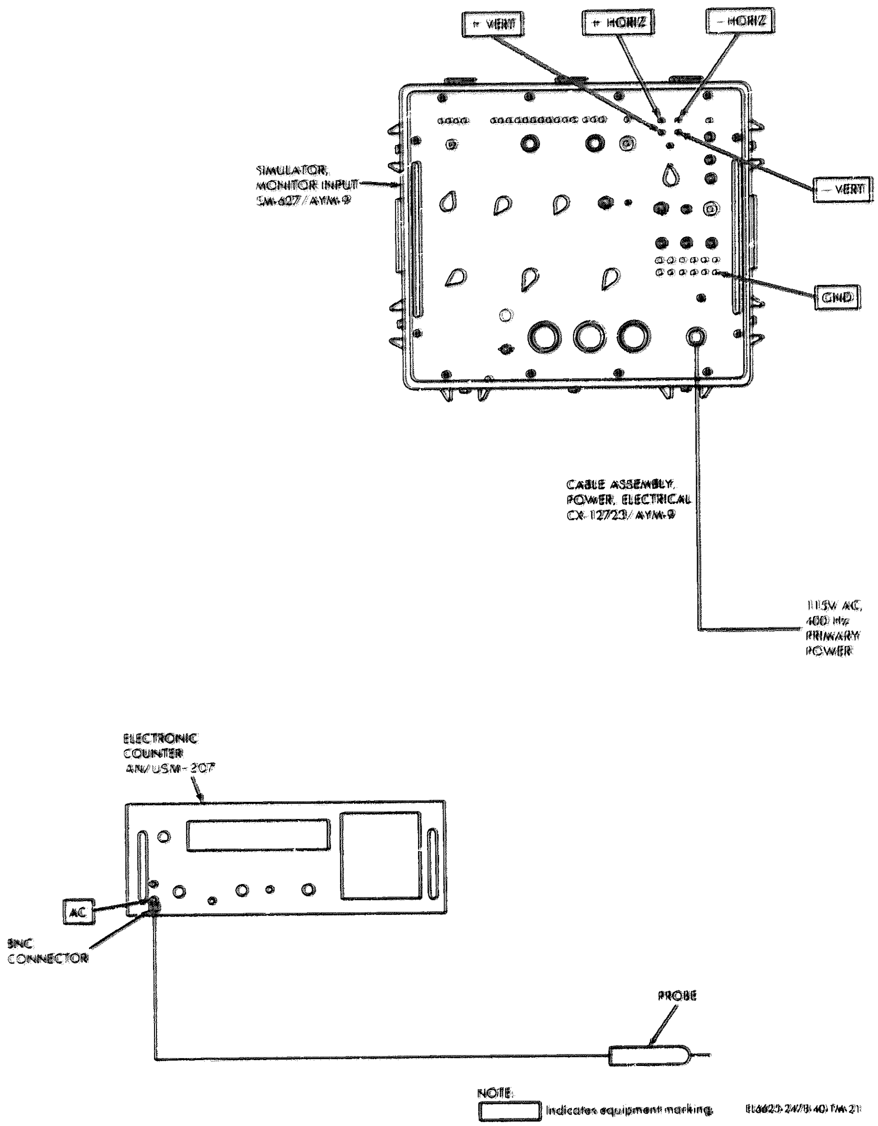


Figure 3-37. Deflection circuit frequency test setup.

3-32. Deflection Circuit Amplitude and Unblanking Signal Test

a. Test Equipment and Materials.

(1) Differential Voltmeter ME-202B/U.

(2) Oscilloscope AN/USM-281A.

(3) Electronic Counter AN/USM-207.

b. Test Connections and Conditions. Connect Simulator, Monitor Input SM-627/AYM-9 to a source of 115 volt ac power using Cable Assembly, Power, Electrical CX-12723/AYM-9.

c. Procedure (fig. 3-38).

Step No.	Control settings: Test equipment	Control settings: Test Set, Control Monitor-Recording Head AN/AVM-9	Test procedure	Performance standard
1	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to ON.	Following lamps shall light: RHA HIGH VOLTAGE −522VDC 1A3DS25 +500VDC 1A3DS24 −80VDC 1A3DS27 POWER 115VAC 1A3DS22 115VDC 1A3DS26 6.3VAC 1A3DS23 DC INTERNAL GO 1A3DS4 +5V 1A3DS11
2	Differential voltmeter RANGE switch to 50.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Connect differential voltmeter red (positive) lead to +HORIZ test point 1A3J7 and black (negative) lead to GND test point 1A3J6.	Differential voltmeter shall indicate 14.32 ±0.14 volts ac (table 3-2, item No. 40).
3	Differential voltmeter RANGE switch to 50.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move differential voltmeter red (positive) lead to −HORIZ test point 1A3J8.	Differential voltmeter shall indicate 14.32 ±0.14 volts ac (table 3-2, item No. 41).
4	Differential voltmeter RANGE switch to 50.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move differential voltmeter red (positive) lead to +VERT test point 1A3J10.	Differential voltmeter shall indicate 14.32 ±0.14 volts ac (table 3-2, item No. 42).
5	Differential voltmeter RANGE switch to 50.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Move differential voltmeter red (positive) lead to −VERT test point 1A3J9.	Differential voltmeter shall indicate 14.32 ±0.14 volts ac (table 3-2, item No. 43).
6	N/A	N/A	Remove differential voltmeter leads from test points.	N/A
7	Adjust oscilloscope controls as necessary.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Connect oscilloscope probe to +HORIZ test point 1A3J7 and oscilloscope horizontal EXT INPUT probe to +VERT test point 1A3J10. Ground oscilloscope to GND test point 1A3J6.	Circle display 3 centimeters in diameter shall be obtained (table 3-2, item No. 44).
8	Adjust oscilloscope controls as necessary.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM. RHA MODE switch 1A3S12 to CONTINUOUS.	Connect oscilloscope vertical INPUT probe to −HORIZ test point 1A3J8 and oscilloscope horizontal EXT INPUT probe to −VERT test point 1A3J9.	Circle display 3 centimeters in diameter shall be obtained (table 3-2, item No. 45).
9	Reset oscilloscope DISPLAY switch to INT.	N/A	Remove oscilloscope horizontal EXT INPUT probe.	N/A

Step No.	Control settings: Test equipment	Control settings: Test Set, Control Monitor-Recording Head AN/AYM-9	Test procedure	Performance standard
10	Reset oscilloscope DISPLAY switch to INT.	RHA TEST SELECT switch 1A3S14 to KA76.	Connect oscilloscope input probe to +HORIZ test point 1A3J7.	Oscilloscope shall display waveform shown in waveform D of figure FO-11 (table 3-2, item No. 46).
11	Reset oscilloscope DISPLAY switch to INT.	RHA TEST SELECT switch 1A3S14 to KA76.	Connect oscilloscope input probe to −HORIZ test point 1A3J8.	Oscilloscope shall display waveform shown in waveform D of figure FO-11 (table 3-2, item No. 47).
12	N/A	N/A	Remove oscilloscope probes from test points.	N/A
13	Set up counter for measuring frequency of 10 kHz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM.	Connect counter +AC input probe to UNBLANKING test point 1A3J20 and counter black probe to GND test point 1A3J6.	Counter shall indicate pulse frequency of 10 ±0.05 kHz (table 3-2, item No. 48).
14	N/A	N/A	Remove counter probes from test points.	N/A
15	Reset oscilloscope DISPLAY switch to INT.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM.	Connect oscilloscope input probe to UNBLANKING test point 1A3J20 and oscilloscope ground clip to GND test point 1A3J6.	Oscilloscope shall display waveform shown in waveform G of figure FO-11 (table 3-2, item No. 49).
16	N/A	N/A	Remove oscilloscope probes and clips from test points.	N/A
17	Set up counter for measuring frequency of 6.25 kHz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to KA76.	Connect counter +AC input probe to UNBLANKING test point 1A3J20 and counter black probe to GND test point 1A3J6.	Counter shall indicate pulse frequency of 6.25 ±0.31 kHz (table 3-2, item No. 50).
18	N/A	N/A	Remove counter probes from test points.	N/A
19	Reset osciilocope DISPLAY switch to INT.	RHA TEST SELECT switch 1A3S14 to KA76.	Connect oscilloscope input probe to UNBLANKING test point 1A3J20 and oscilloscope ground clip to GND test point 1A3J6.	Oscilloscope shall display waveform shown in waveform F of figure FO-11 (table 3-2, item No. 51).
20	N/A	N/A	Remove oscilloscope probes and clips from test points.	N/A
21	Set up counter for measuring frequency of 6.25 kHz and for ac coupling.	RHA TEST SELECT switch 1A3S14 to PHOSPHOR.	Connect counter +AC input probe to UNBLANKING test point 1A3J20 and counter black probe to GND test point 1A3J6.	Counter shall indicate pulse frequency of 6.25 ±0.31 kHz (table 3-2, item No. 52).
22	N/A	N/A	Remove counter probes from test points.	N/A
23	Reset oscilloscope DISPLAY switch to INT.	RHA TEST SELECT switch 1A3S14 to PHOSPHOR.	Connect oscilloscope input probe to UNBLANKING test point 1A3J20 and oscilloscope ground clip to GND test point 1A3J6.	Oscilloscope shall display waveform shown in waveform H of figure FO-11 (table 3-2, item No. 53).

24	N/A	N/A	Remove oscilloscope probes and clips from test points.	N/A
25	Set up counter for manual start mode.	RHA MODE switch 1A3S12 to SINGLE. RHA TEST SELECT switch 1A3S14 to KA76.	Connect counter +AC input probe to UNBLANKING test point 1A3J20 and counter black probe to GND test point 1A3J6. Depress SINGLE PULSE pushbutton 1A3S13.	SINGLE PULSE INDICATOR lamp 1A3DS28 shall light momentarily. Counter shall indicate 58 ±4 kHz (table 3-2, item Nos. 54 and 56).
26	Set up counter for manual start mode.	RHA TEST SELECT switch 1A3S14 to KA60, IR/SLAR, CDM.	Depress SINGLE PULSE pushbutton 1A3S13.	SINGLE PULSE INDICATOR lamp 1A3DS28 shall light momentarily. Counter shall indicate 100 ±5 kHz (table 3-2, item Nos. 54 and 56).
27	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to OFF.	All lamps in preceding step 1 shall go out.
28	N/A	N/A	Remove counter probes from test points.	N/A

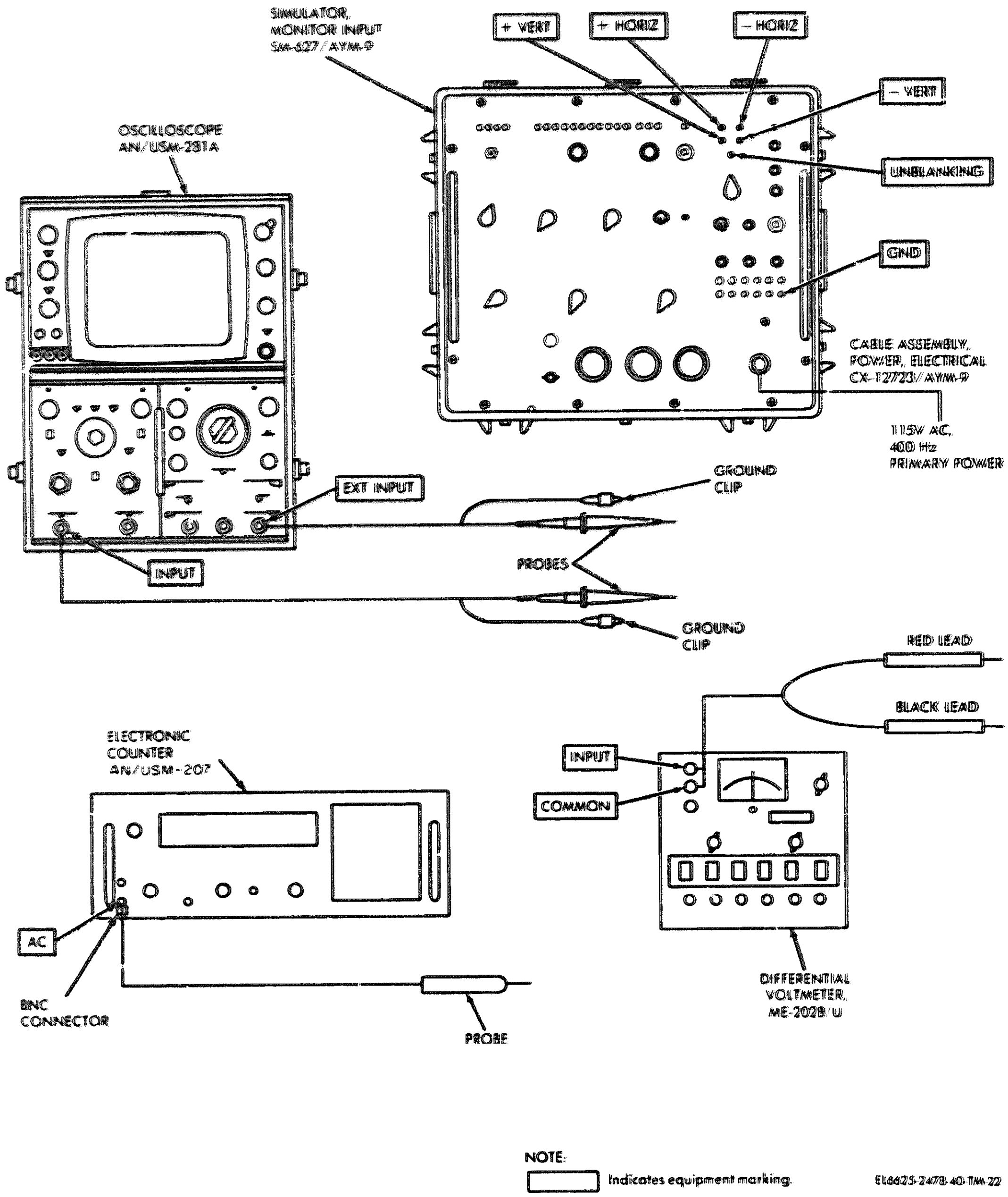


Figure 3-38. Deflection circuit amplitude and unblanking signal test setup.

3-33. Battery Testing Circuit Test

a. Test Equipment and Materials. Power Supply PP-3940/G is the only test equipment required.

b. Test *Connections and Conditions.* Connect Simulator, Monitor Input SM-627/AYM-9 to a source of 115 volt ac power using Cable Assembly, Power, Electrical CX-12723/AYM-9.

c. Procedure (fig. 3-39).

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Test Set, Control Monitor-Recording Head AN/AYM-9		
1	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to ON.	Following lamps shall light: RHA HIGH VOLTAGE −522VDC 1A3DS25 +500VDC 1A3DS24 −80VDC 1A3DS27 POWER 115VAC 1A3DS22 115VDC 1A3DS26 6.3VAC 1A3DS23 DC INTERNAL GO 1A3DS4 +5V 1A3DS11 BATTERY INDICATOR 1A3DS8
2	Adjust test power supply for 4.8 volt dc output.	ON-OFF circuit breaker 1A3CB1 to ON.	Connect positive lead of test power supply to pin HH on CONTROL DISPLAY MONITOR connector 1A3J2 and negative lead to GND test point 1A3J6. Depress and release BATTERY TEST pushbutton 1A3S11.	BATTERY INDICATOR lamp 1A3DS8 shall light (table 3-2, item No. 57).
3	N/A	Controls may be in any position	Set ON-OFF circuit breaker 1A3CB1 to OFF.	All lamps in preceding step 1 shall go out.
4	N/A	N/A	Remove test power supply leads	N/A

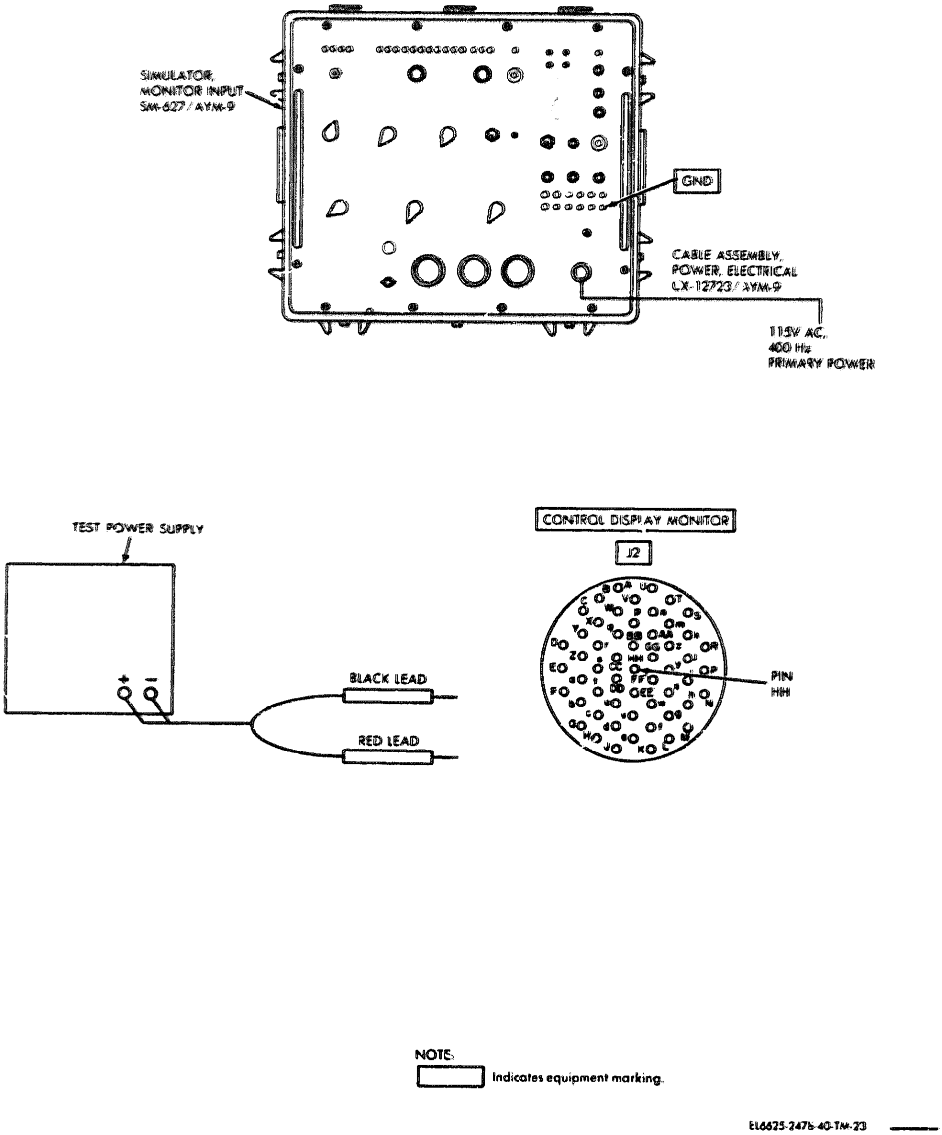


Figure 3-39. Battery testing circuit.

INDEX

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The Adjutant General

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To be distributed in accordance with DA Form 12-36, (qty rqr block No. 245) Direct and General Support maintenance requirements for AN/AYA-10.

APPENDIX A

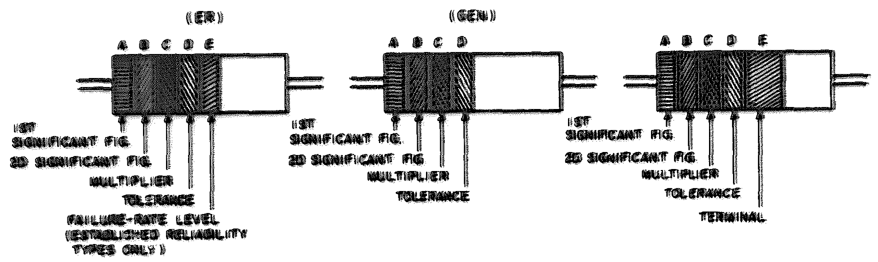
REFERENCES

The following publications contain information applicable to the operation and maintenance of Test Set, Control Monitor-Recording Head AN/AYM-9:

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	U.S. Army Equipment Index of Modification Work Orders
TM 11-6130-247-15	Organizational, DS, GS, and Depot Maintenance Manual (Including Repair Parts and Special Tool Lists): Power Supply PP-3940/G
TM 11-6625-366-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U
TM 11-6625-537-15-1	Organizational, DS, GS, and Depot Maintenance Manual: Voltmeter, Electronic ME-202A/U
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207
TM 11-6625-1703-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tool Lists: Oscilloscope AN/USM-281A.
TM 11-6625-2478-12	Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Test Set, Control Monitor-Recording Head AN/AYM-9 (FSN 6625-150-1882)
TM 38-750	The Army Maintenance Management System (TAMMS)

GLOSSARY

Abbreviation	*Definition*
BDC	Binary coded decimal
CDM	Control-Monitor C-8338/AYA-10
CRT	Cathode ray tube
Hz	Hertz
IR	Detecting Set, Infrared AN/AAS-24
KA60-1	Forward Panoramic Camera Surveillance System KA-60C
KA60-2	Aft Vertical Panoramic Camera Surveillance System KA-60C
KA-76	Airborne Photographic Surveillance System KS-113A
kHz	Kilohertz
NUM	Numeric
RHA	Recording head assembly
SLAR	Radar Surveillance Set AN/APS-94D
μsecond	Microsecond



COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM.
BLACK	0	BLACK	0	BLACK	1			BROWN	M=1.0	
BROWN	1	BROWN	1	BROWN	10			RED	P=0.1	
RED	2	RED	2	RED	100			ORANGE	R=0.01	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S=0.001	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY)	WHITE		SOLD-ERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY).			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

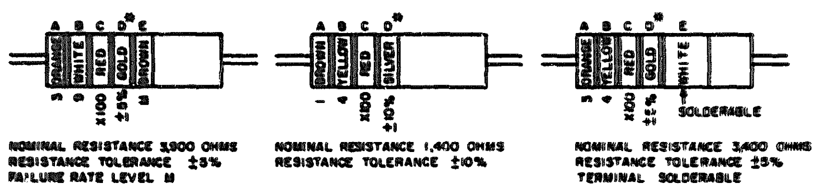
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS
(THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS   10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING

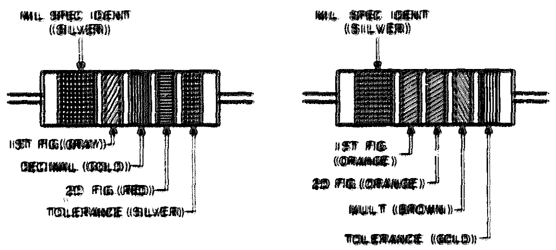


COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



(A) 82UH ± 10%   (B) 330UH ± 5%

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330UH INDUCTOR ARE ILLUSTRATED.

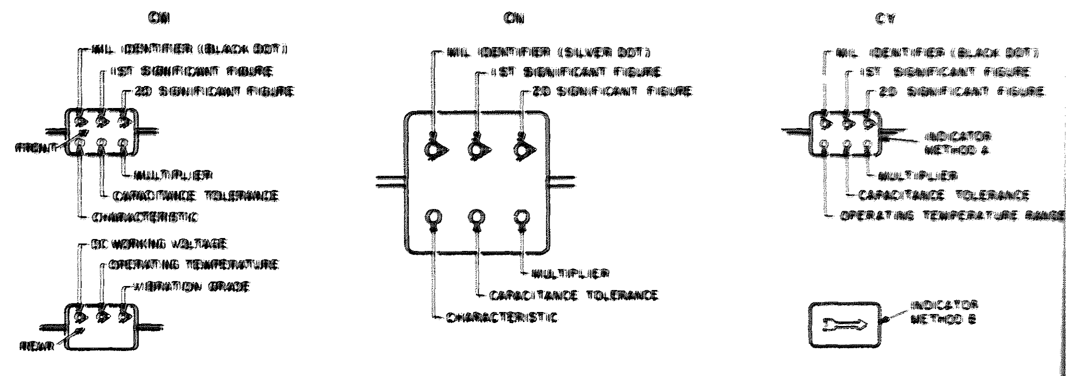
TABLE 2
COLOR CODING FOP TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

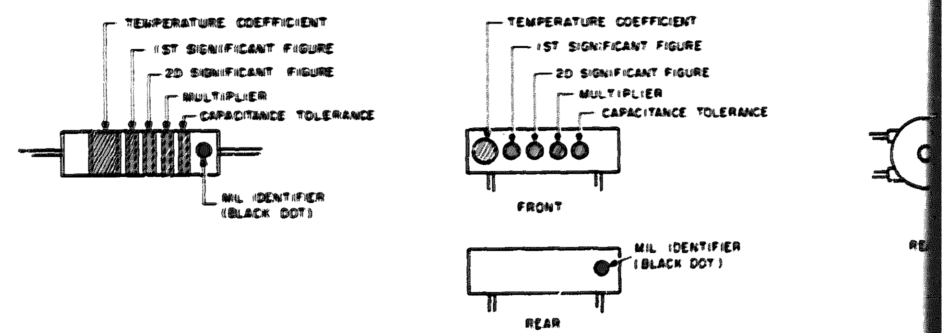
CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB



MICA-DIELECTRIC

PAPER-DIELECTRIC

GLASS-DIELECTRIC, GLASS CASE

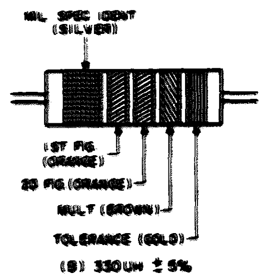


AXIAL LEAD

RADIAL LEAD

C. COLOR CO

FO-1 Color code for military standard resistors, inductors, and capacitors



...ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF ... CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR ...USTRATED.

TABLE 2
...R TUBULAR ENCAPSULATED R.F. CHOKES.

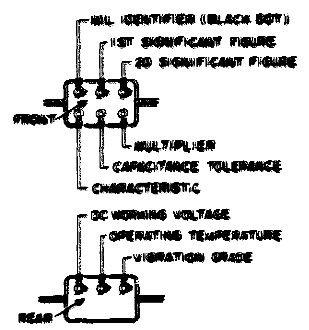
...SIG-...ICANT ...URE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
0	1	
1	10	1
2	100	2
3	1,000	3
4		
5		
6		
7		
8		
9		
		20
		10
...IMAL POINT		5

...THE FACTOR BY WHICH THE TWO COLOR FIGURES ... TO OBTAIN THE INDUCTANCE VALUE OF THE

...ING FOR MILITARY STANDARD INDUCTORS.

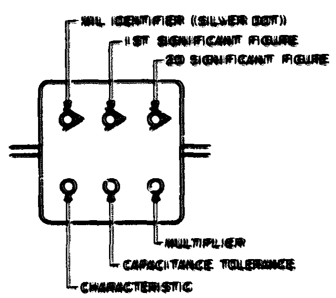
CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.

CM



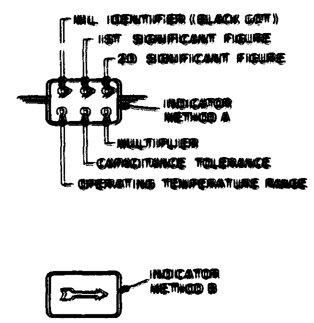
MICA-DIELECTRIC

CN



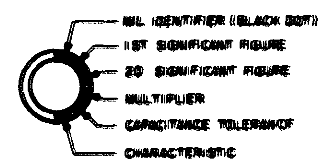
PAPER-DIELECTRIC

CY

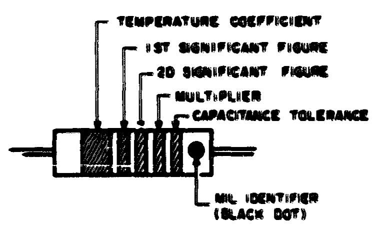


GLASS-DIELECTRIC, GLASS CASE

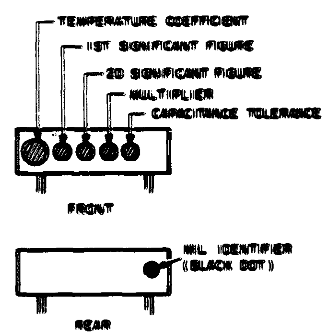
CB



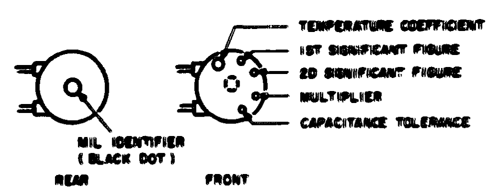
MICA, BUTTON TYPE



AXIAL LEAD



RADIAL LEAD



DISK-TYPE

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 HZ
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	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 HZ
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GREY		8	8											
WHITE		9	9											
GOLD				.1			±5%	±5%						
SILVER	CN				±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

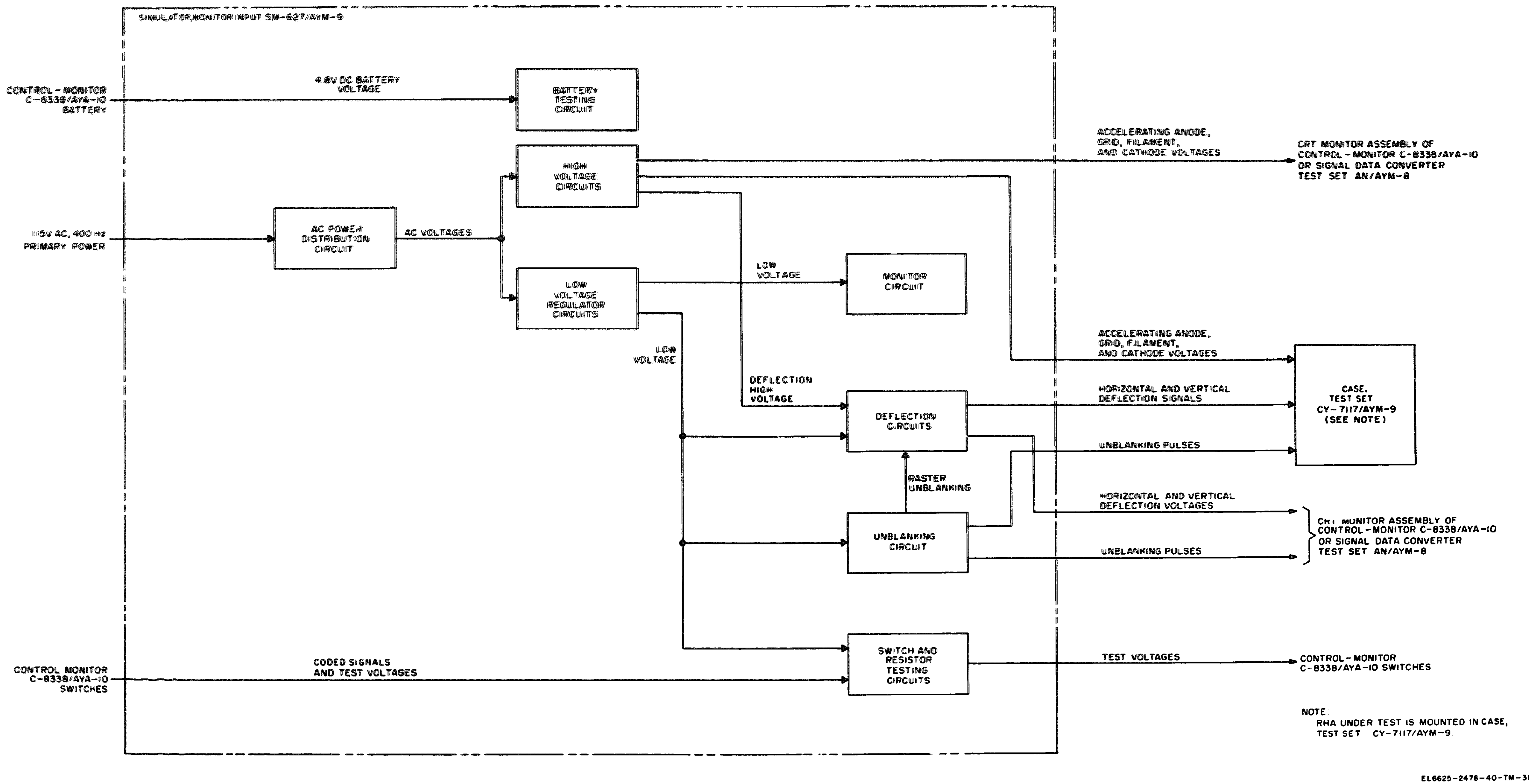
COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	−30	1	1	10	±1%		
RED	−80	2	2	100	±2%	±0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		±5%	±0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	±10%		
GOLD	+100					±1.0 UUF	
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-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

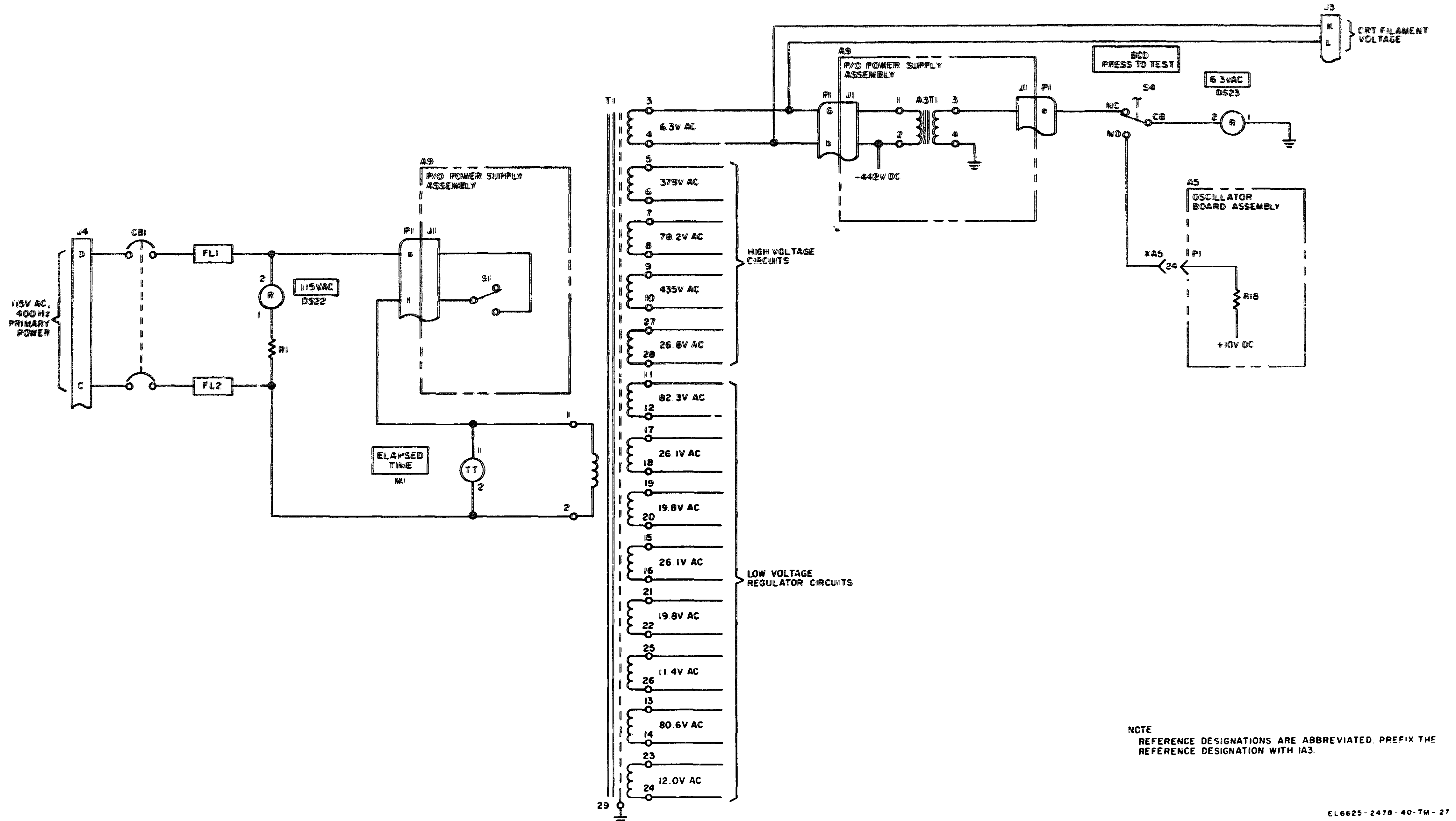
C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

ESC-FM 1794-71

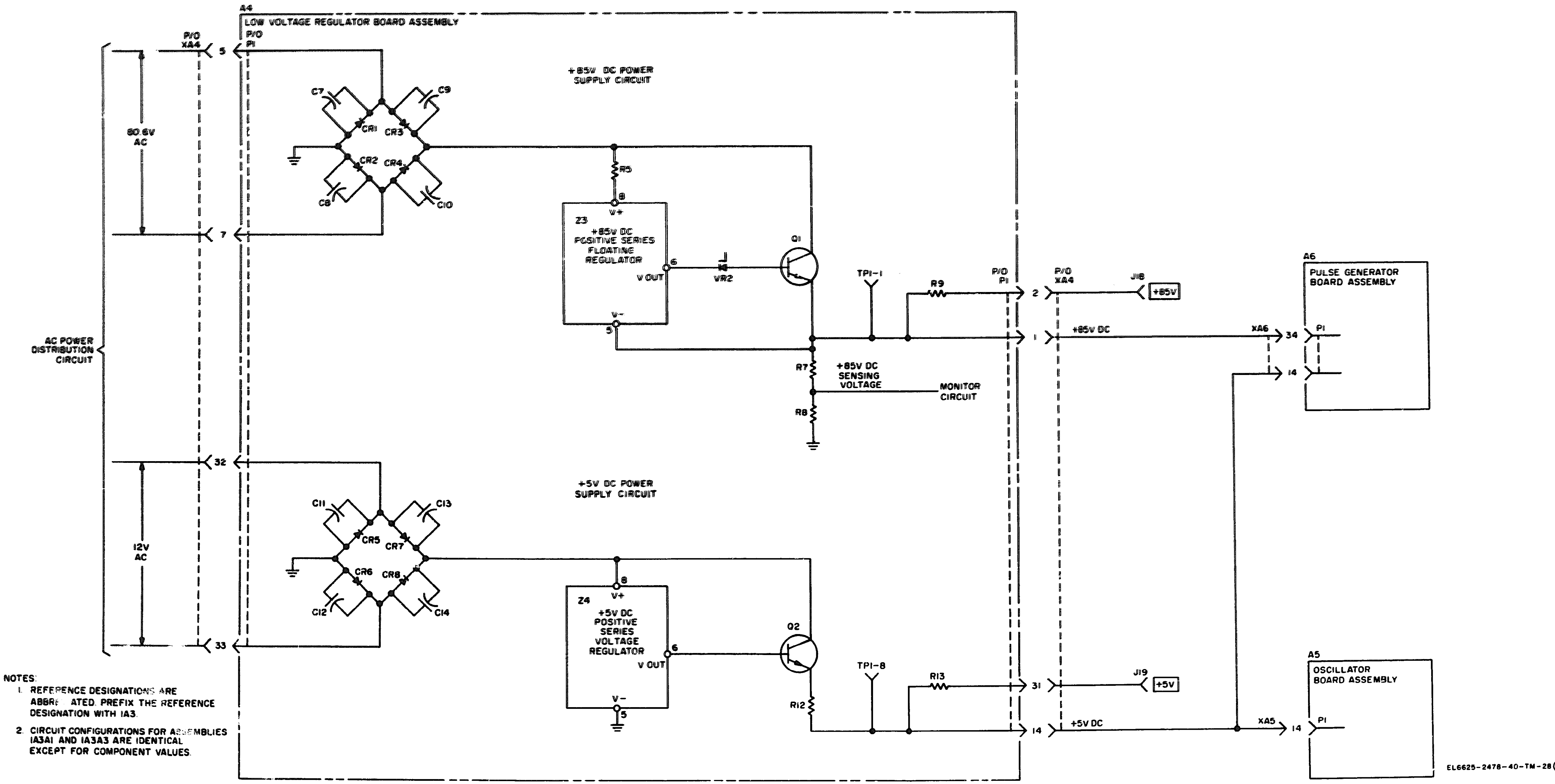
FO-1 Color Code for military standard resistors, inductors, and capacitors



FO-2 Test Set, Control Monitor-Recording Head AN/AYM-9, overall functional block diagram

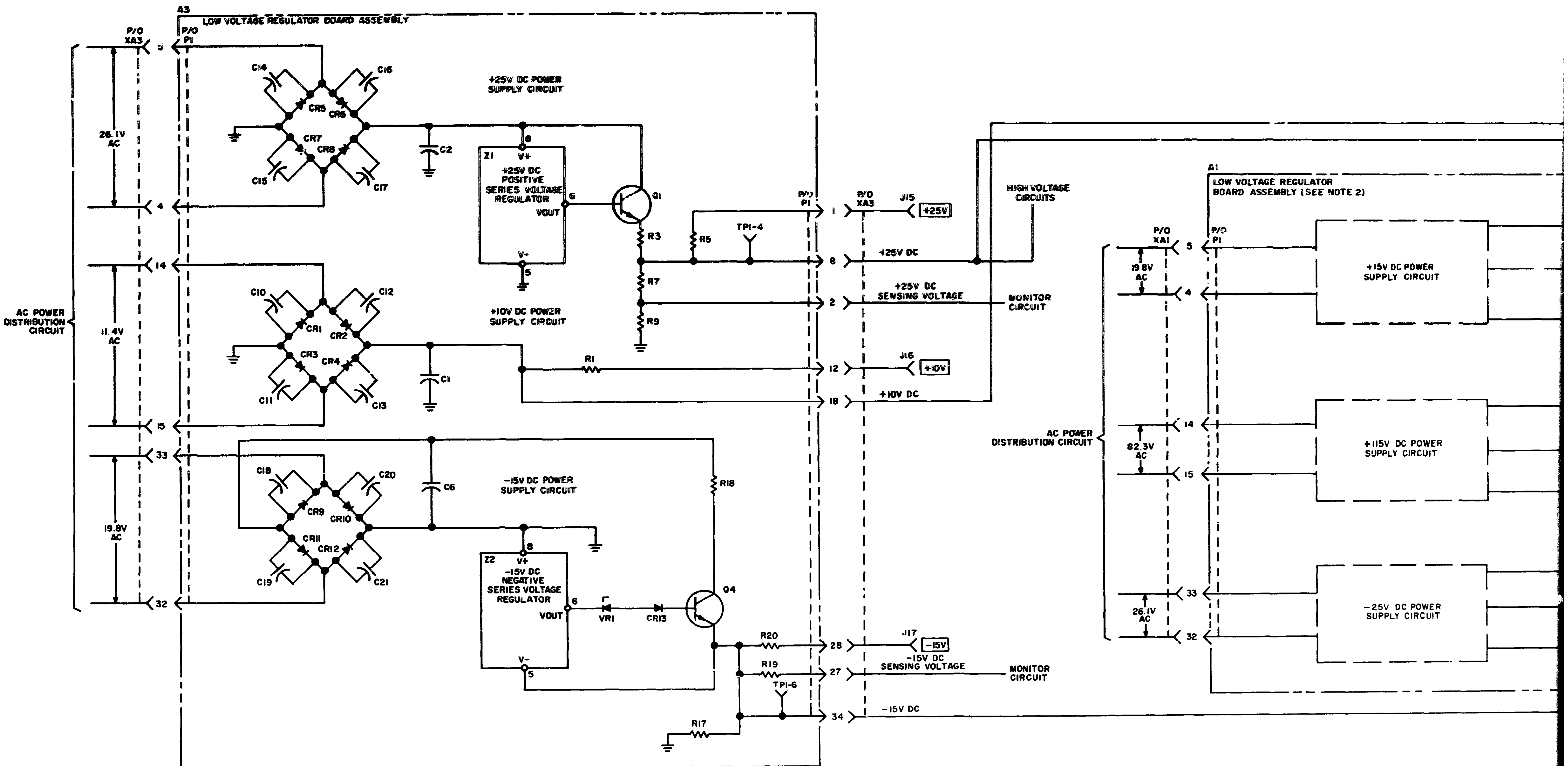


FO-3 Ac power distribution circuit, functional schematic diagram

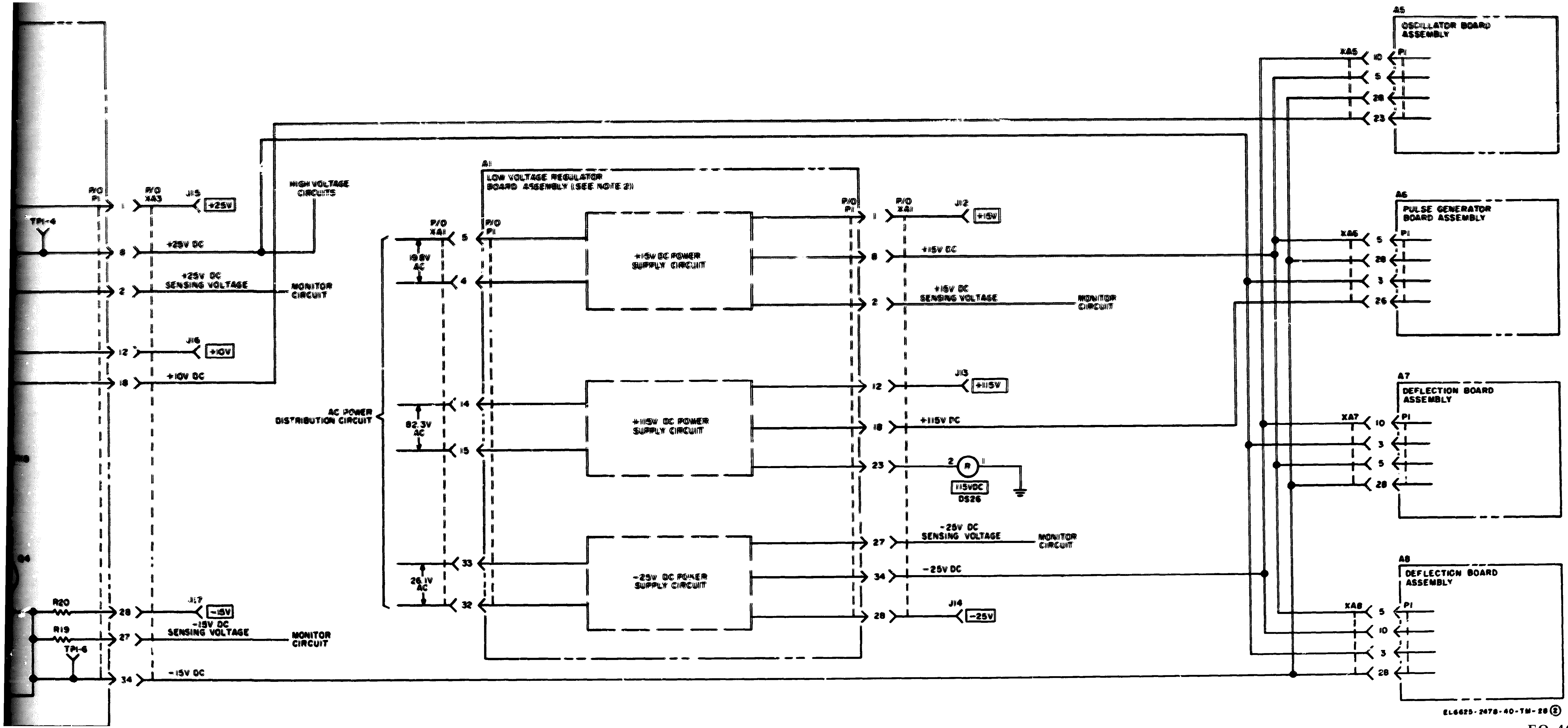


NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3.
2. CIRCUIT CONFIGURATIONS FOR ASSEMBLIES 1A3A1 AND 1A3A3 ARE IDENTICAL EXCEPT FOR COMPONENT VALUES.

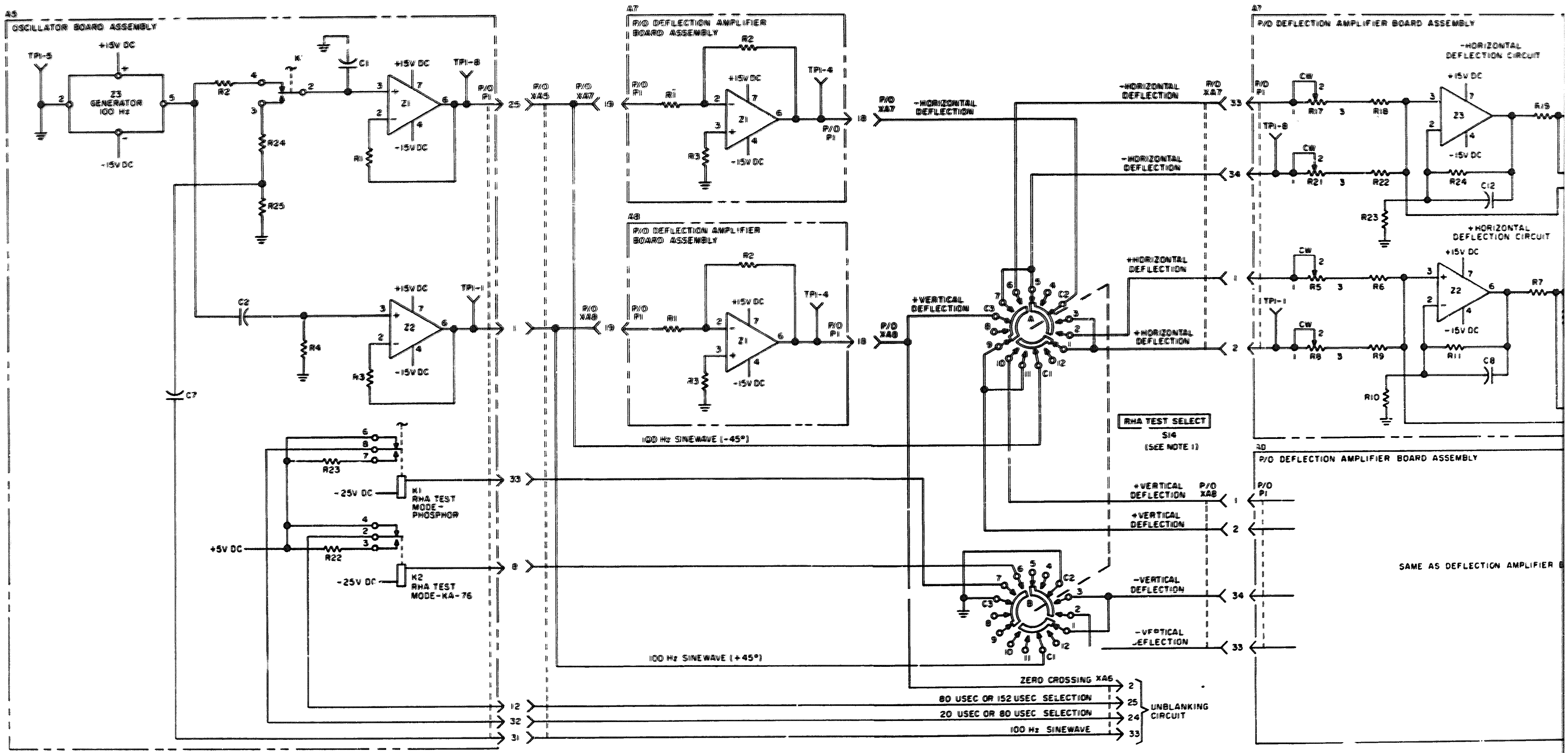
FO-4(1). Low voltage regulator circuits, functional schematic diagram (sheet 1 of 2)



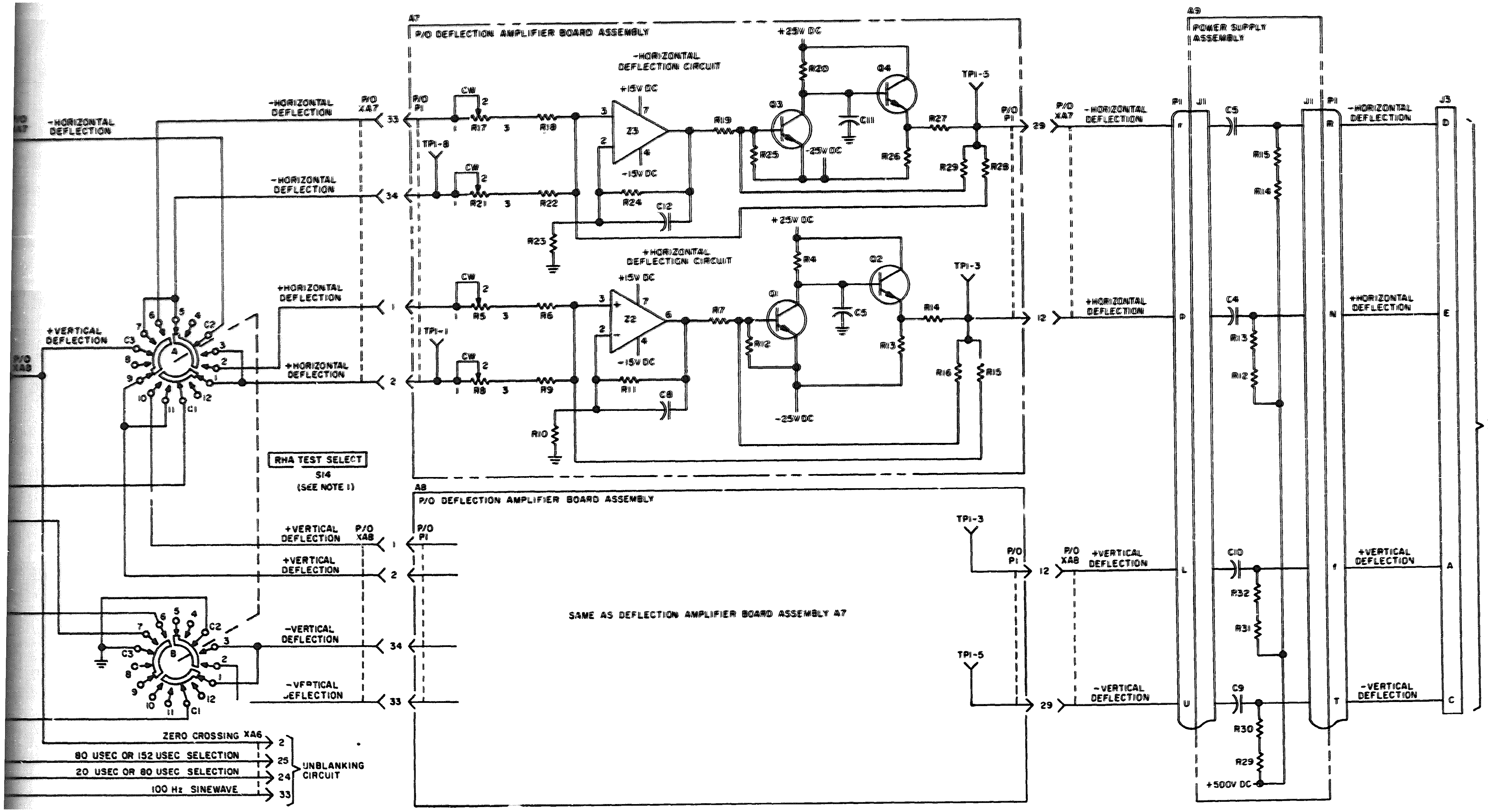
FO-4(2). Low voltage regulator circuits, functional schematic diagram (sheet 2 of 2)



FO-4(2). Low voltage regulator circuits, functional schematic diagram (sheet 2 of 2)



FO-5 Deflection circuits, functional schematic diagram



NOTES:

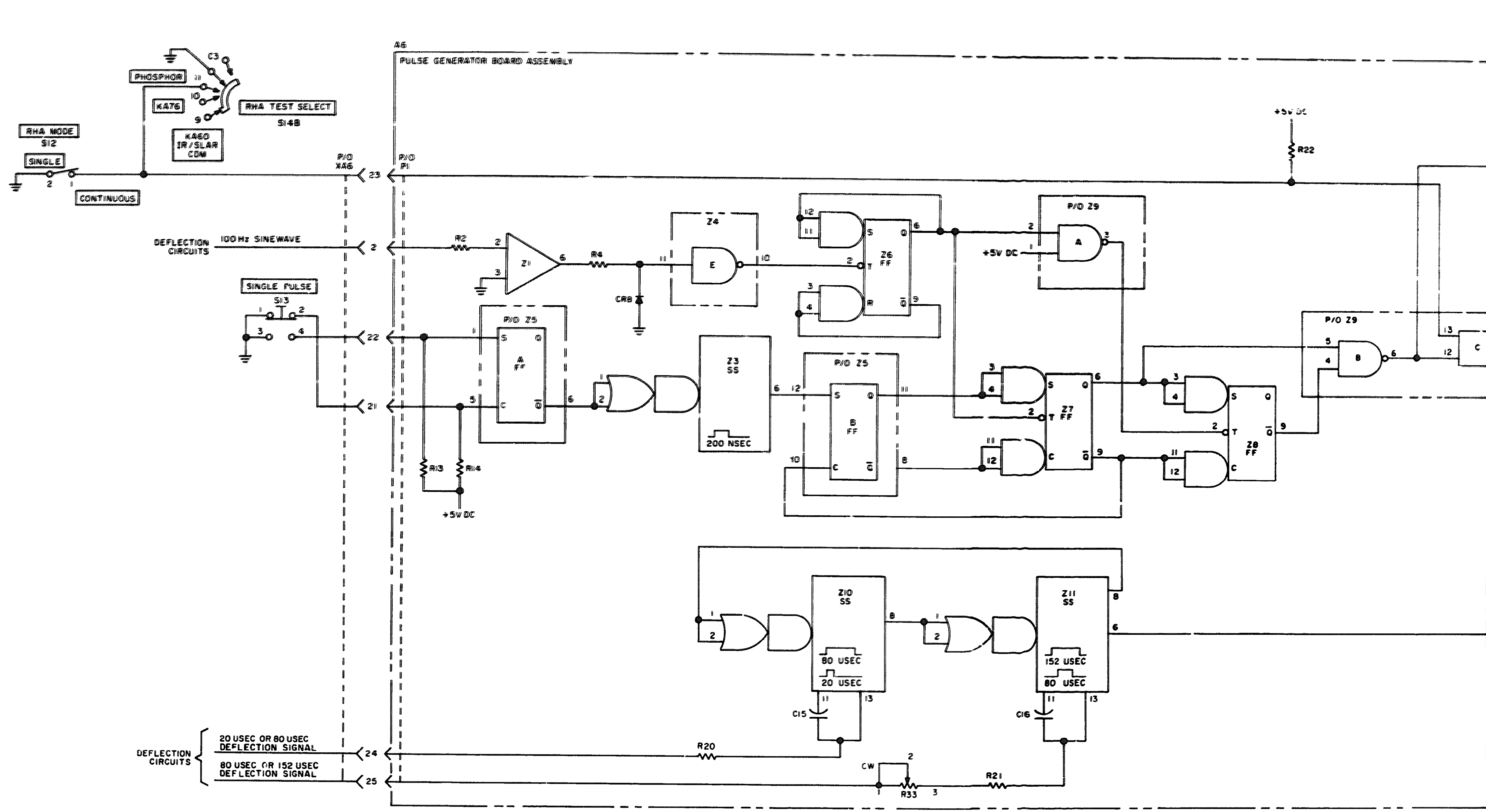
1. SWITCH S14 IS VIEWED FROM REAR. FUNCTION OF SECTIONS AND TEMINALS CONNECTED ARE LISTED AS FOLLOWS:

S14-A OR B		
POSITION	FUNCTION	TERMINALS
1	KA60,IR/SLAR CDM (SHOWN)	C1-1, C2-5, C3-9
2	KA76	C1-2, C2-6 C3-10
3	PHOSPHOR	C1-3, C2-7 C3-11

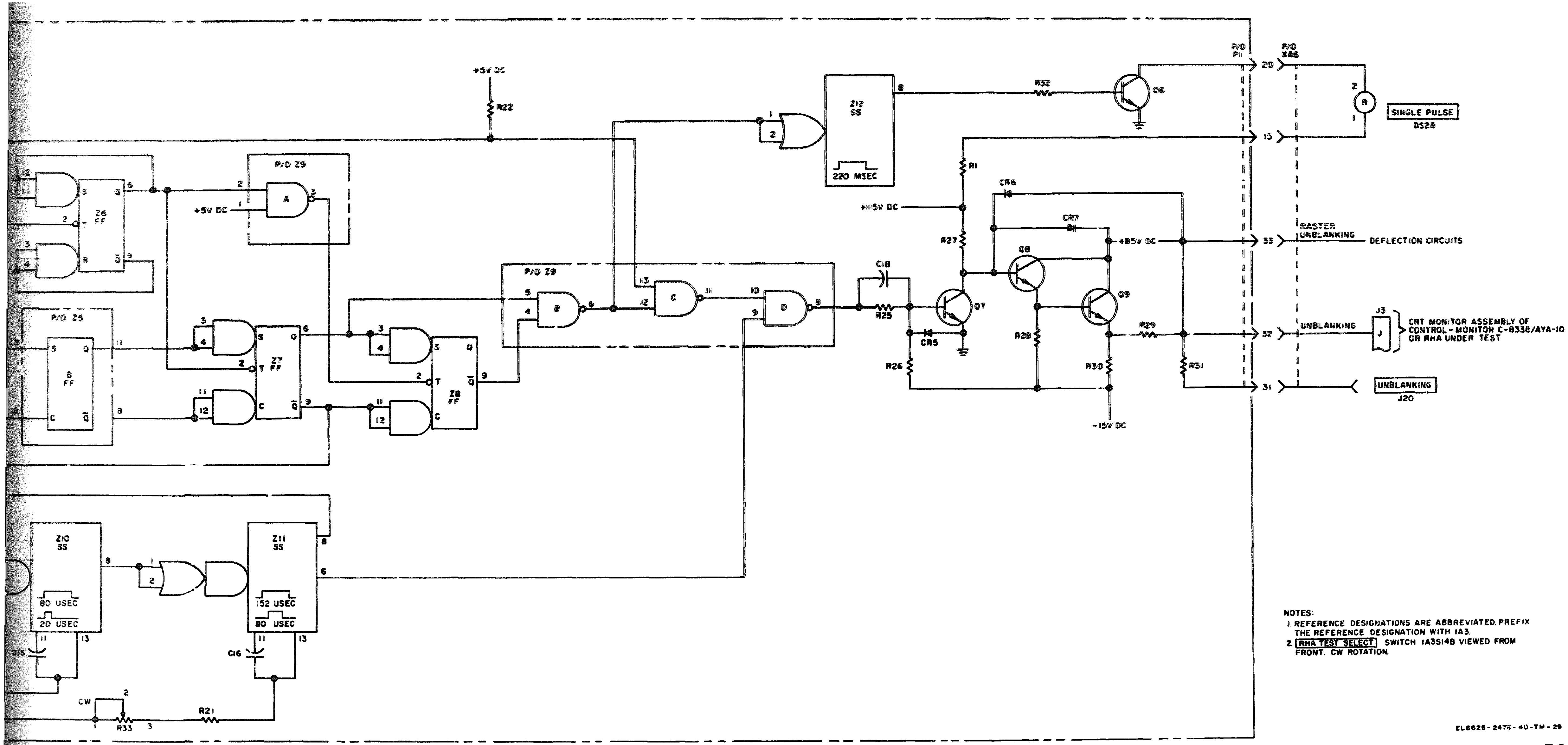
2. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3

EL6625-2478-40-TM-24

FO-5 Deflection circuits, functional schematic diagram



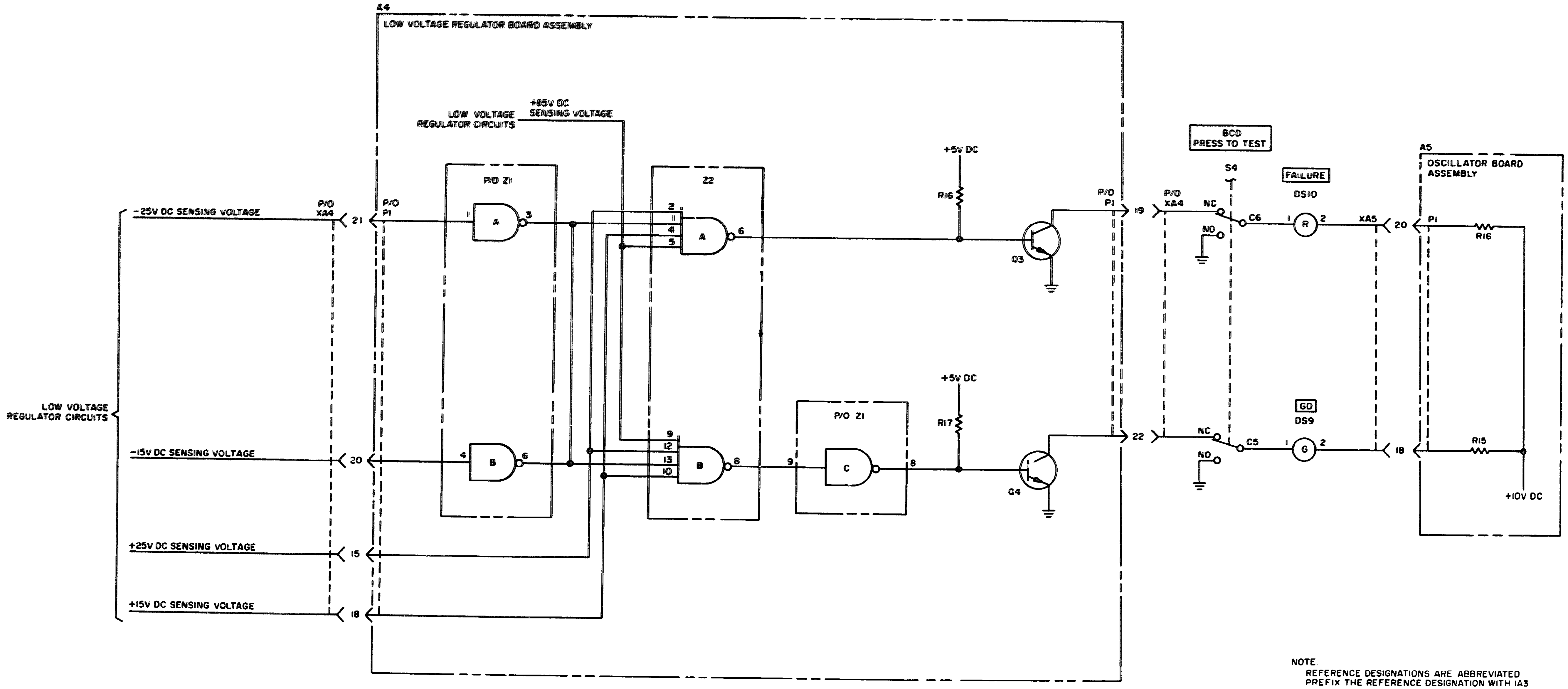
FO-6 Unblanking circuit, functional schematic diagram



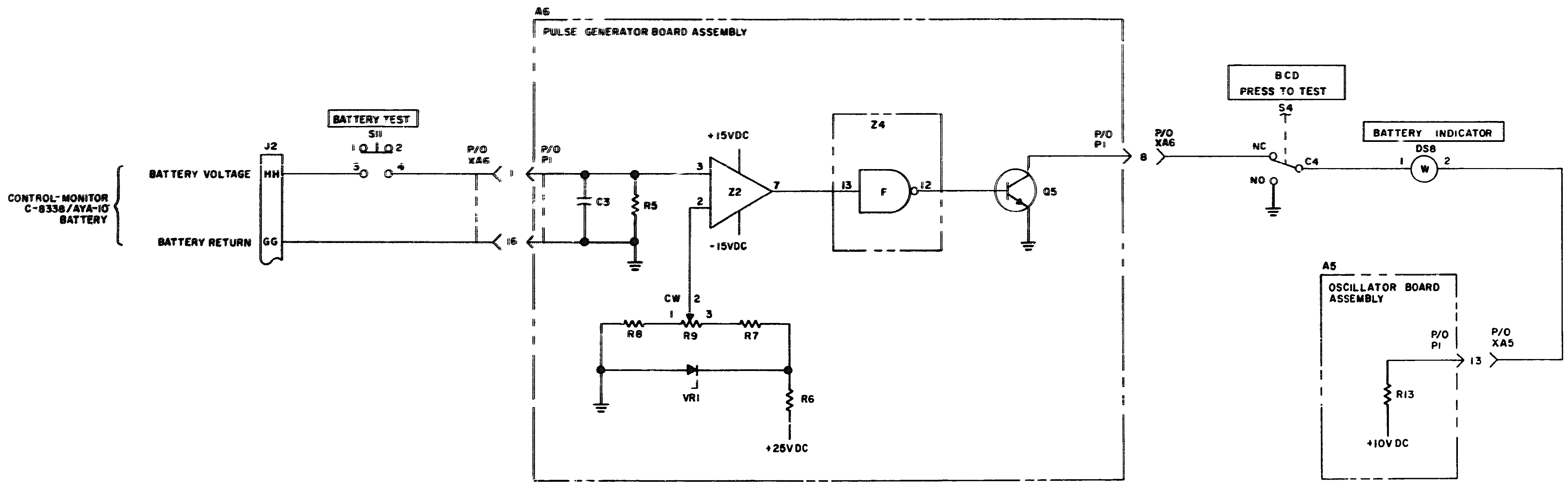
NOTES:
1 REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3.
2 RHA TEST SELECT SWITCH 1A3S14B VIEWED FROM FRONT. CW ROTATION.

EL6625-2478-40-TM-29

FO-6 Unblanking circuit, functional schematic diagram



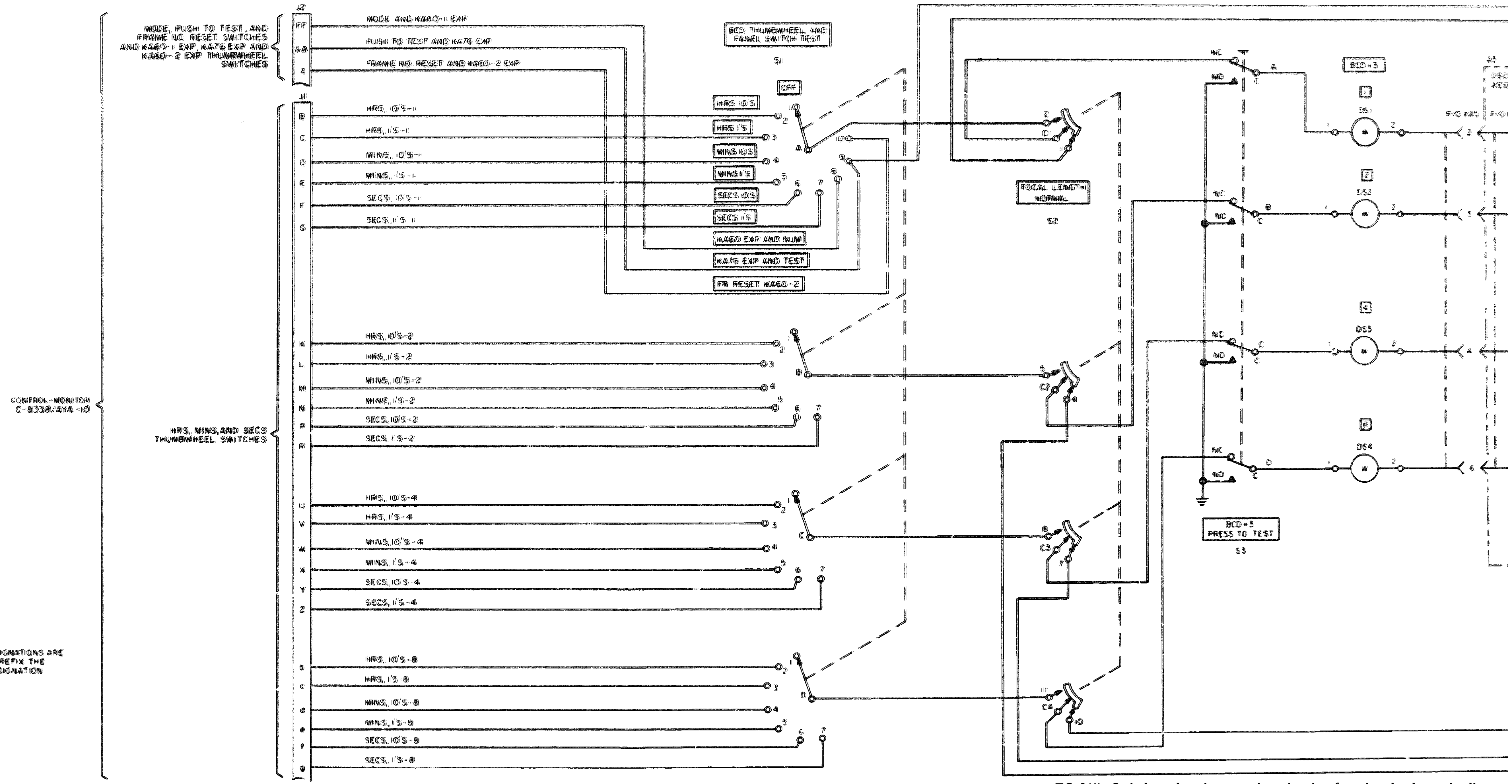
FO-7 Monitor circuit, functional schematic diagram



NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3.

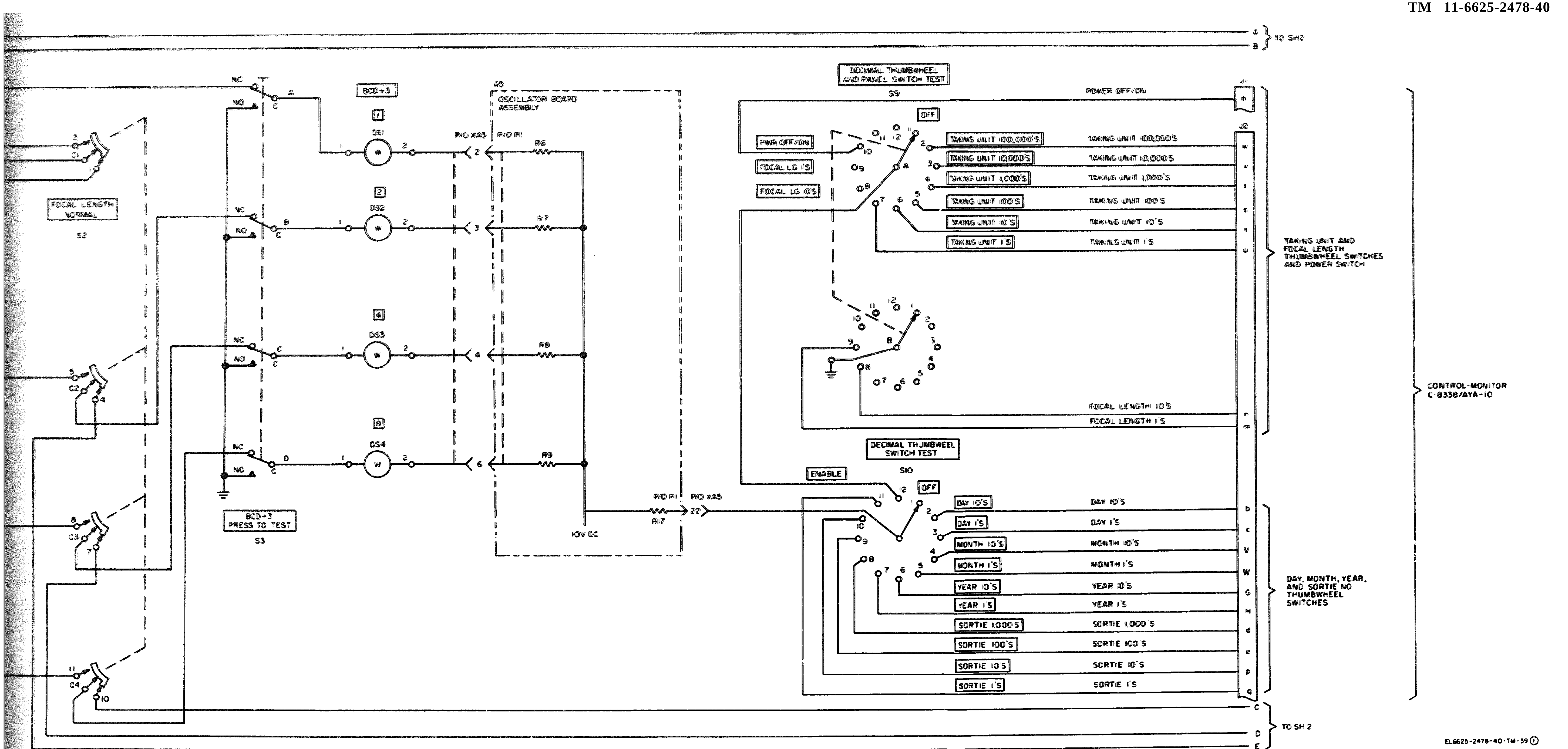
EL6625-2478-40-TM-32

FO-8 Battery testing circuit, functional schematic diagram

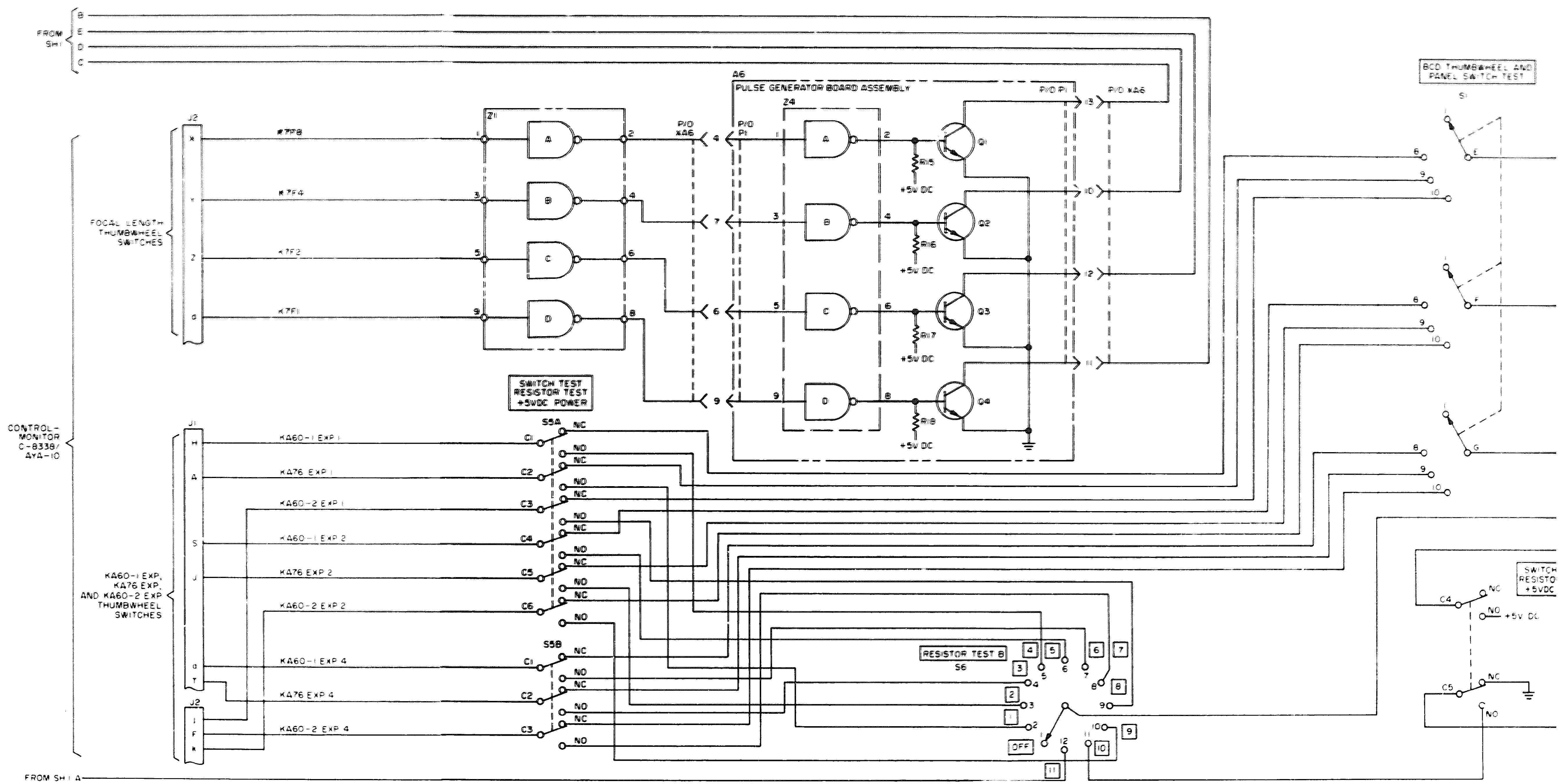


NOTE
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3.

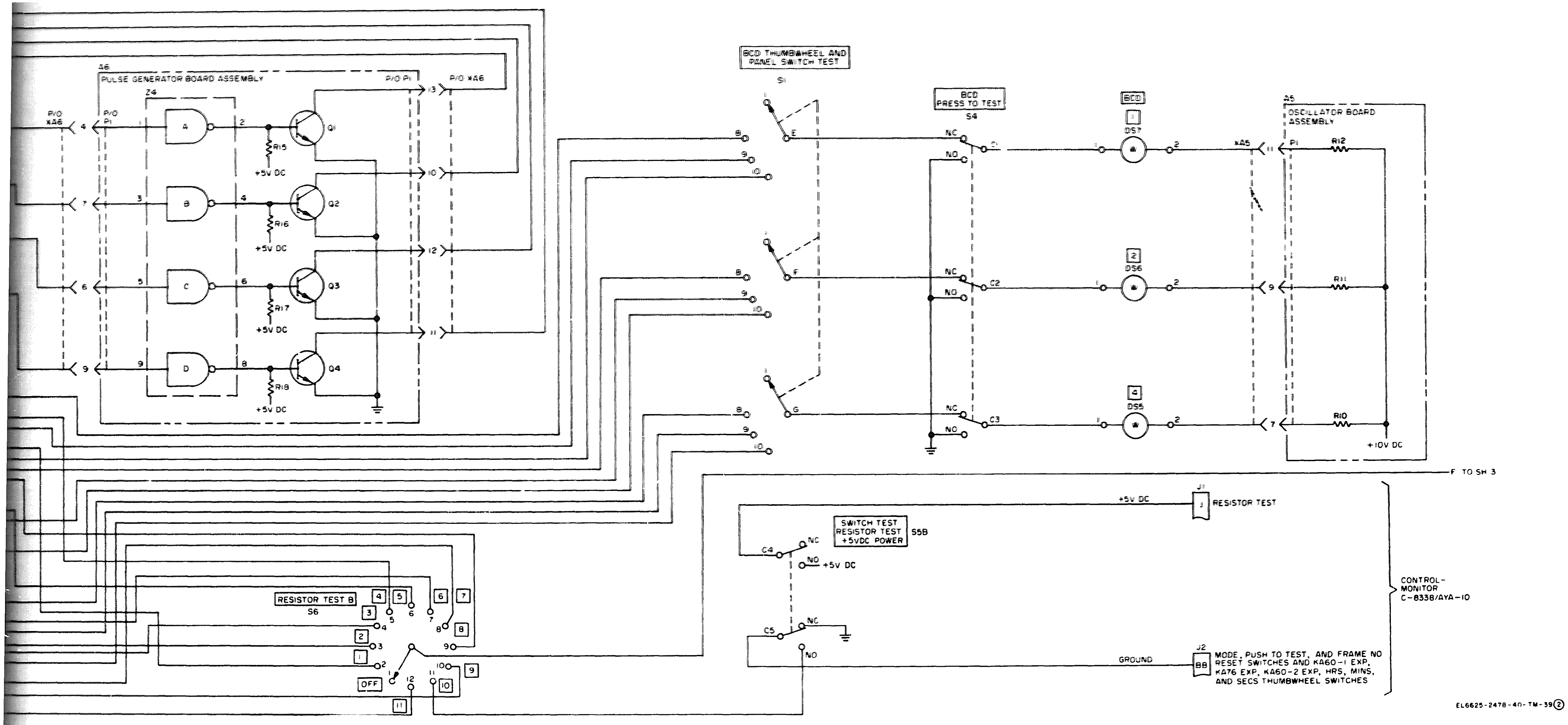
FO-9(1). Switch and resistor testing circuits, functional schematic diagram



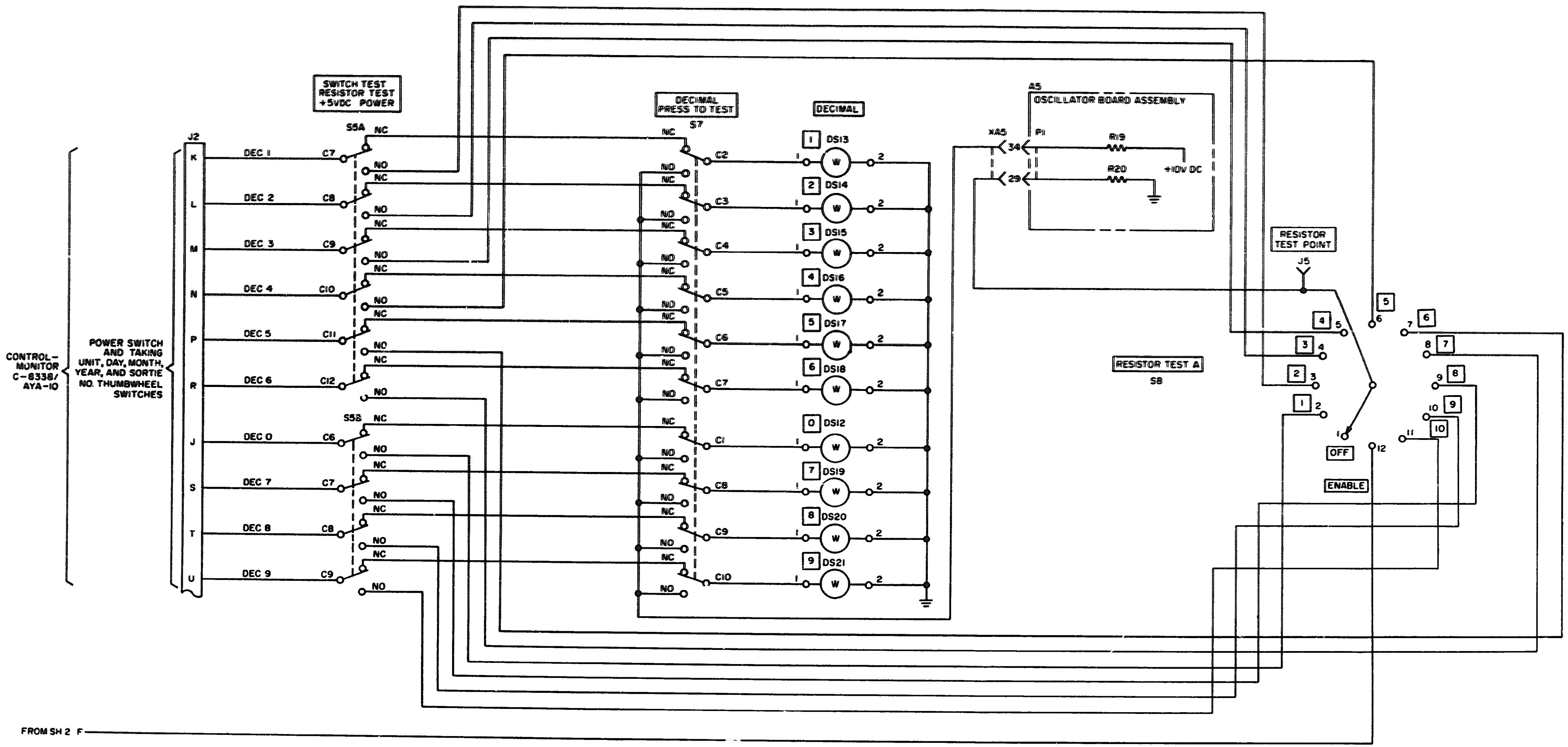
FO-9(1). Switch and Resistor testing circuits, functional schematic diagram (sheet 1 of 3)



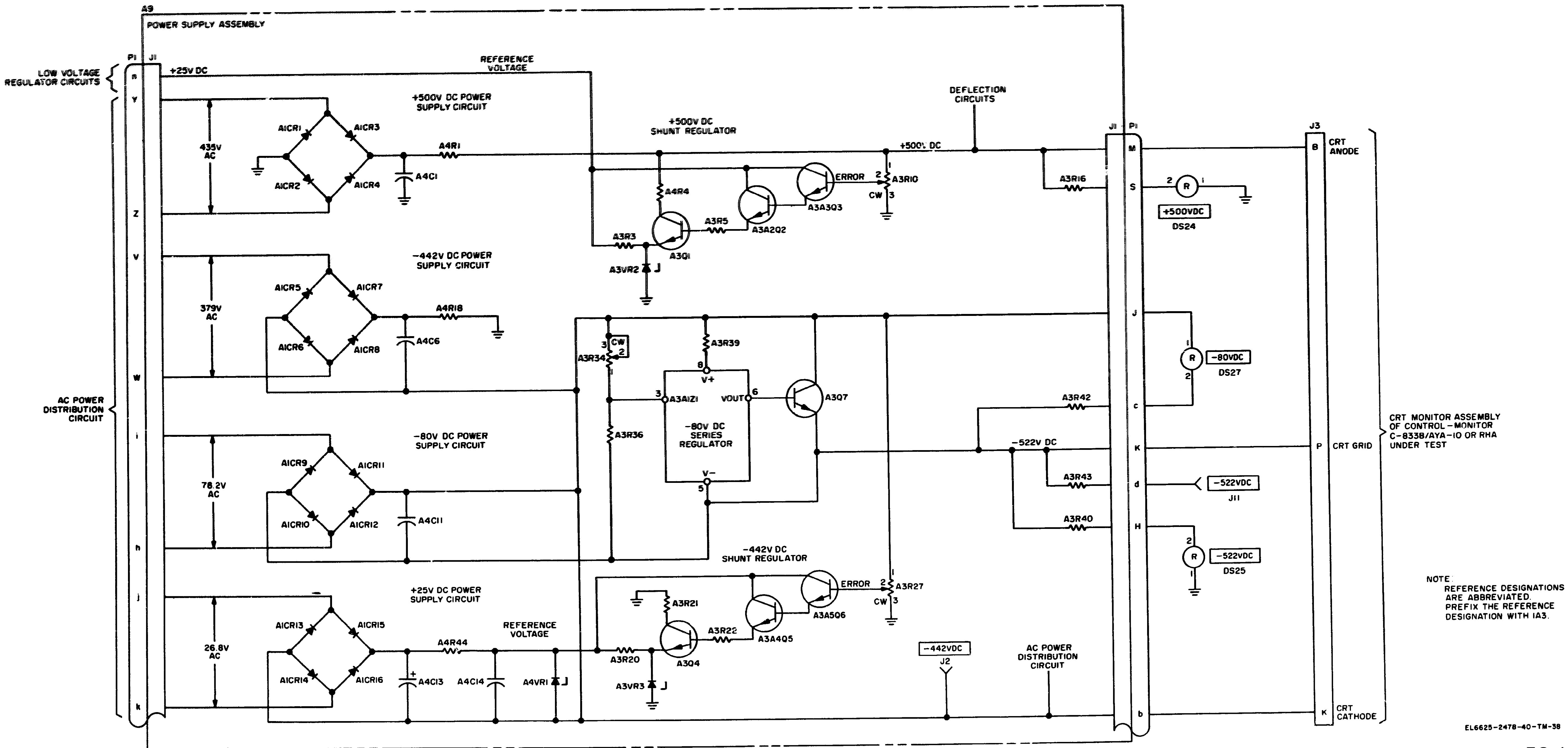
FO-9(2) Switch and resistor testing circuits, functional schematic diagram (sheet 2 of 3)



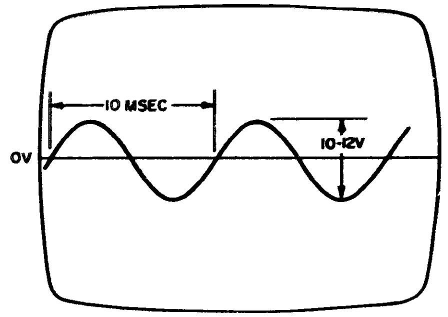
FO-9(2). Switch and resistor testing circuit, functional schematic diagram (sheet 2 of 3)



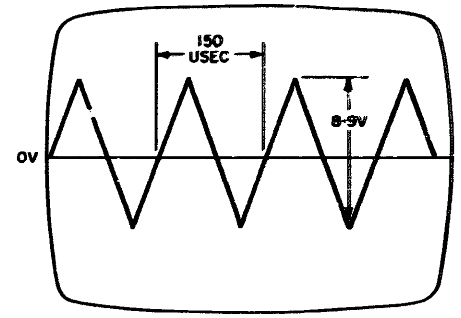
FO-9(3). Switch and resistor testing circuits, functional schematic diagram (sheet 3 of 3)



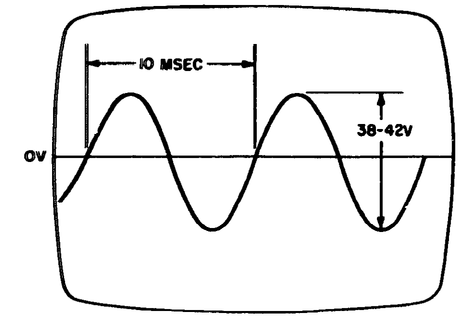
FO-10 High voltage circuits, functional schematic diagram



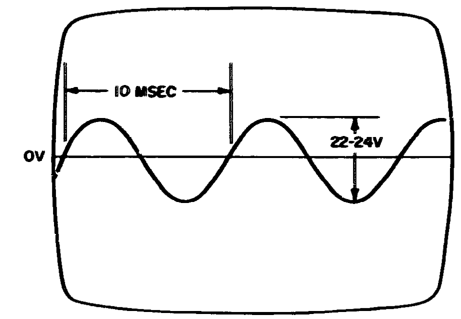
(A)
WAVEFORM AT TEST POINTS: IA3A8TPI-I, IA3A8TPI-4,
AND IA3A8TPI-8 (SEE NOTE 2). WAVEFORM AT
TEST POINTS IA3A7TPI-4 AND IA3A7TPI-8 (SEE NOTE 2). WAVEFORM
AT TEST POINTS IA3A8TPI-4 AND IA3A8TPI-8 (SEE NOTES 3 AND 4).
WAVEFORM AT TEST POINT IA3A5TPI-I (SEE NOTE 6).
WAVEFORM AT TEST POINT IA3A5TPI-8 (SEE NOTES 2 AND 3)
PROBE: IOX
VERTICAL: 5V/CM
HORIZONTAL: 2 MSEC/CM
SYNC: INT +



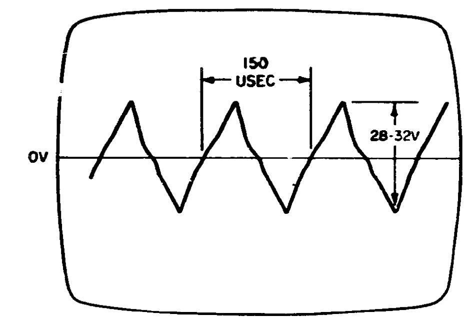
(B)
WAVEFORM AT TEST POINTS:
IA3A5TPI-8, IA3A7TPI-I, IA3A7TPI-4,
AND IA3A7TPI-8 (SEE NOTE 4)
PROBE: IOX
VERTICAL: 2V/CM
HORIZONTAL: 50USEC/CM
SYNC: INT +



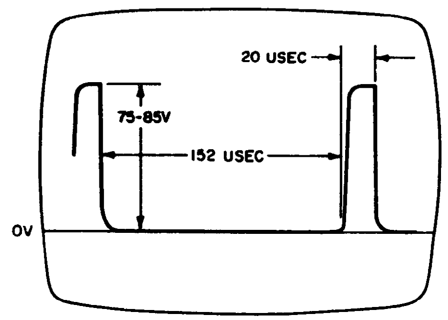
(C)
WAVEFORM AT TEST POINTS:
IA3A7TPI-3, IA3A7TPI-5, IA3A8TPI-3,
IA3A8TPI-5, +HORIZ, -HORIZ,
+VERT, AND -VERT
(SEE NOTE 2)
PROBE: IOX
VERTICAL: IOV/CM
HORIZONTAL: 2 MSEC/CM
SYNC: INT +



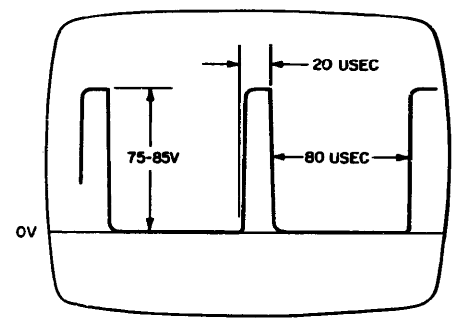
(D)
WAVEFORM AT TEST POINTS: IA3A7TPI-3,
IA3A7TPI-5, IA3A8TPI-3, IA3A8TPI-5, +HORIZ,
-HORIZ, +VERT, AND -VERT (SEE NOTE 3)
PROBE: IOX
VERTICAL: 5V/CM
HORIZONTAL: 2 MSEC/CM
SYNC: INT +



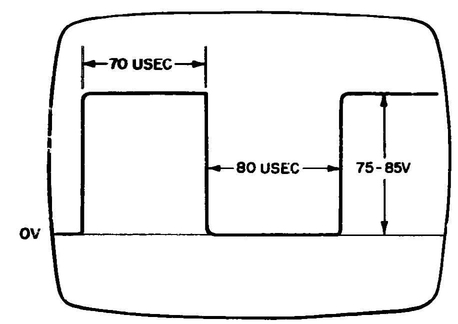
(E)
WAVEFORM AT TEST POINTS
IA3A7TPI-3, IA3A7TPI-5,
+HORIZ, AND -HORIZ (SEE NOTE 4)
PROBE: IOX
VERTICAL: IOV/CM
HORIZONTAL: 50USEC/CM
SYNC: INT +



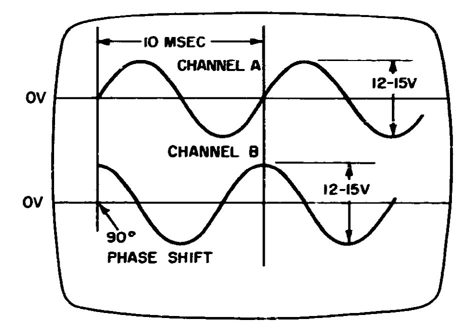
(F)
WAVEFORM AT UNBLANKING
TEST POINT
(SEE NOTE 3)
PROBE: IOX
VERTICAL: 20V/CM
HORIZONTAL: 20 USEC/CM
SYNC: INT +



(G)
WAVEFORM AT UNBLANKING
TEST POINT
(SEE NOTE 2)
PROBE: IOX
VERTICAL: 20V/CM
HORIZONTAL: 20USEC/CM
SYNC: INT +



(H)
WAVEFORM AT UNBLANKING
TEST POINT
(SEE NOTE 4)
PROBE: IOX
VERTICAL: 20V/CM
HORIZONTAL: 20USEC/CM
SYNC: INT +

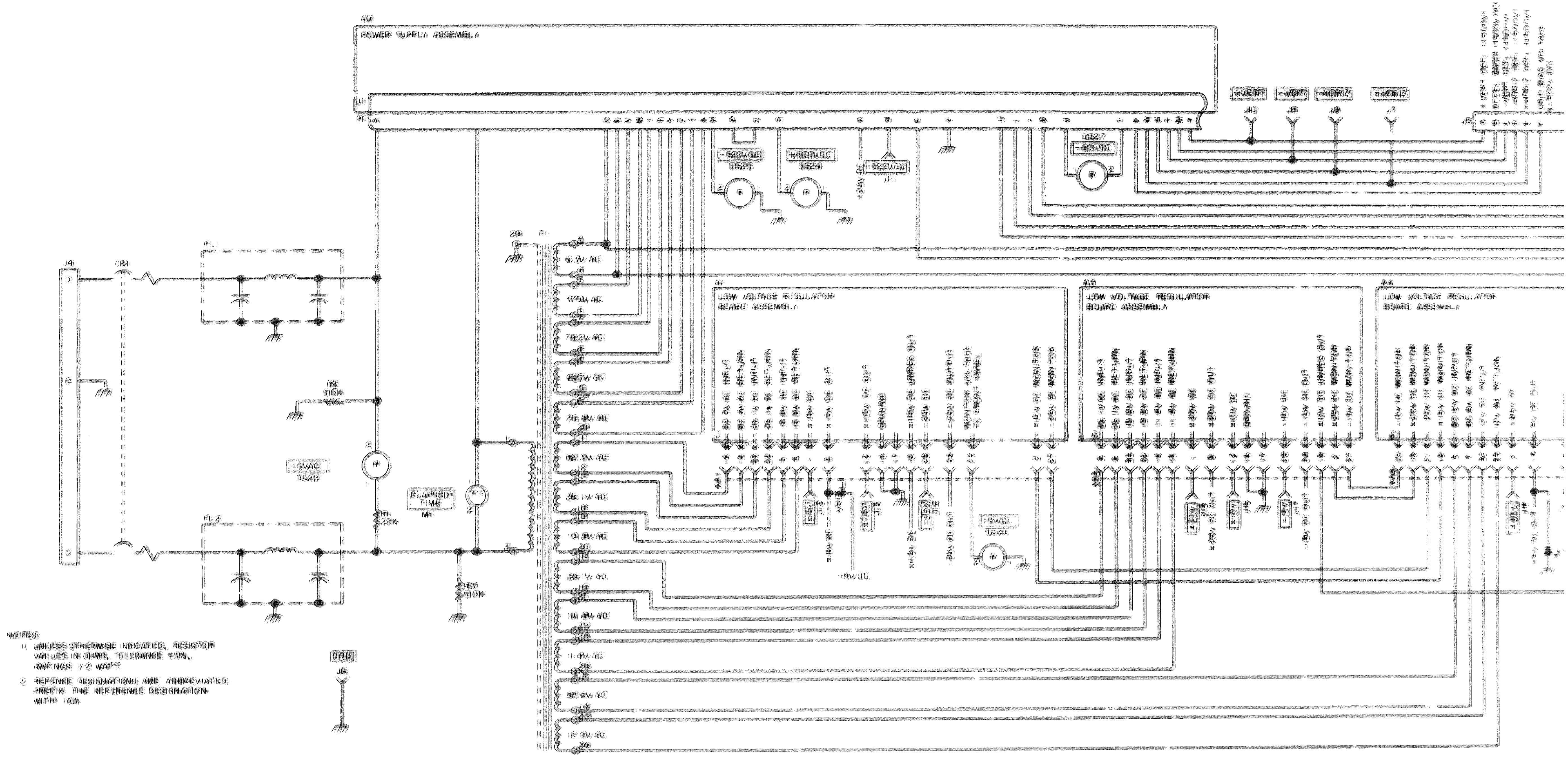


(J)
WAVEFORM AT TEST POINTS
IA3A5TPI-8 (CHANNEL A) AND IA3A5TPI-I
(CHANNEL B)(SEE NOTE 3)
PROBE: IOX
VERTICAL: 5V/CM
HORIZONTAL: 2 MSEC/CM
SYNC: SEE NOTE 5

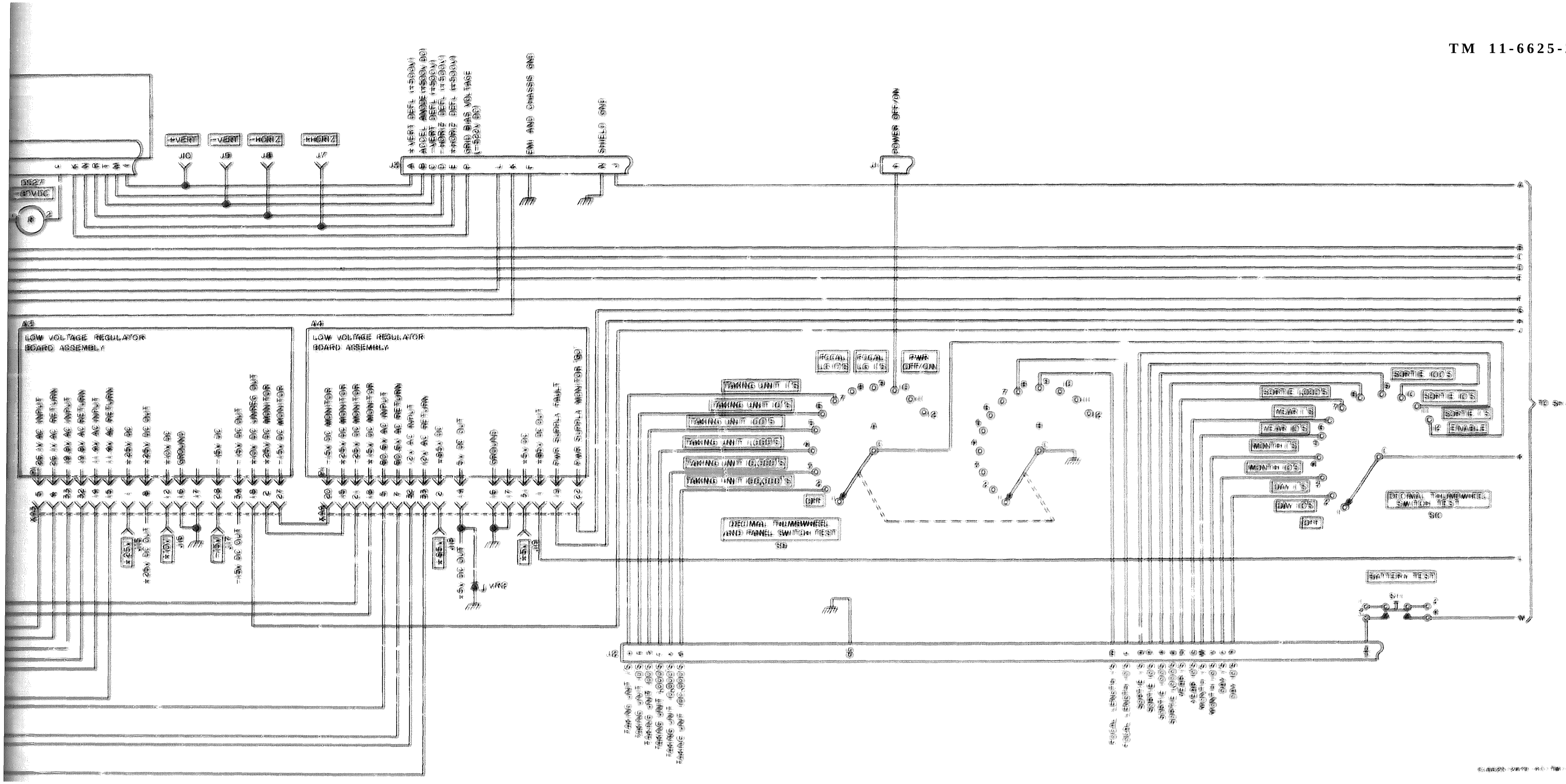
NOTES:

1. ☐ INDICATES EQUIPMENT MARKING ON TEST SET PANEL ASSEMBLY IA3. ALL OTHER TEST POINTS ARE LOCATED ON BOARD ASSEMBLIES WITHIN TEST SET, CONTROL MONITOR-RECORDING HEAD AN/AYM-9.
2. RHA TEST SELECT SWITCH SET TO KA60, IR/SLAR, CDM POSITION.
3. RHA TEST SELECT SWITCH SET TO KA76 POSITION.
4. RHA TEST SELECT SWITCH SET TO PHOSPHOR POSITION.
5. SET UP OSCILLOSCOPE FOR EXTERNAL SYNCHRONIZATION WITH POSITIVE SLOPE. SYNCHRONIZE OSCILLOSCOPE TO CHANNEL A.
6. RHA TEST SELECT SWITCH SET TO ANY POSITION.

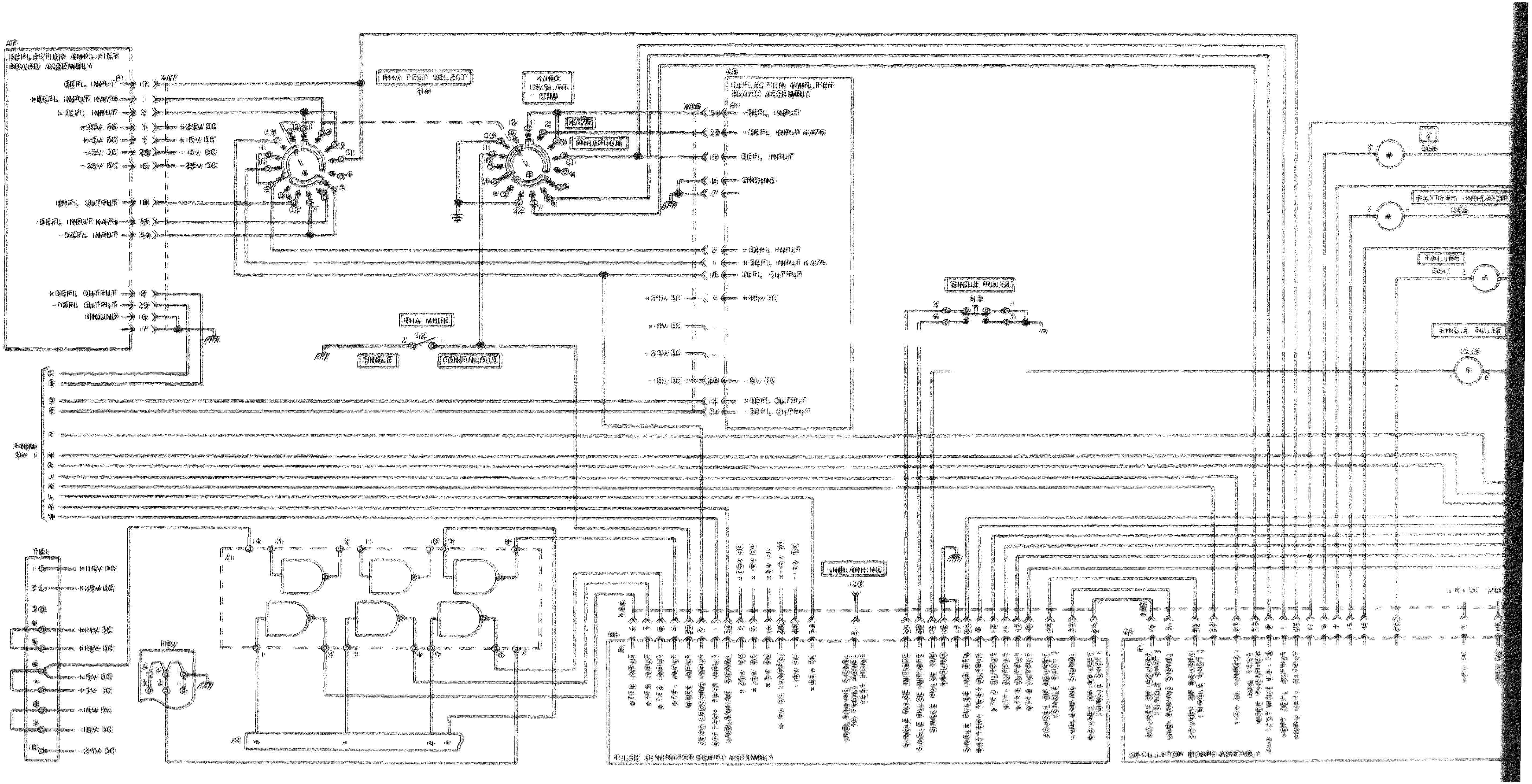
EL6625-2478-40-TM-I



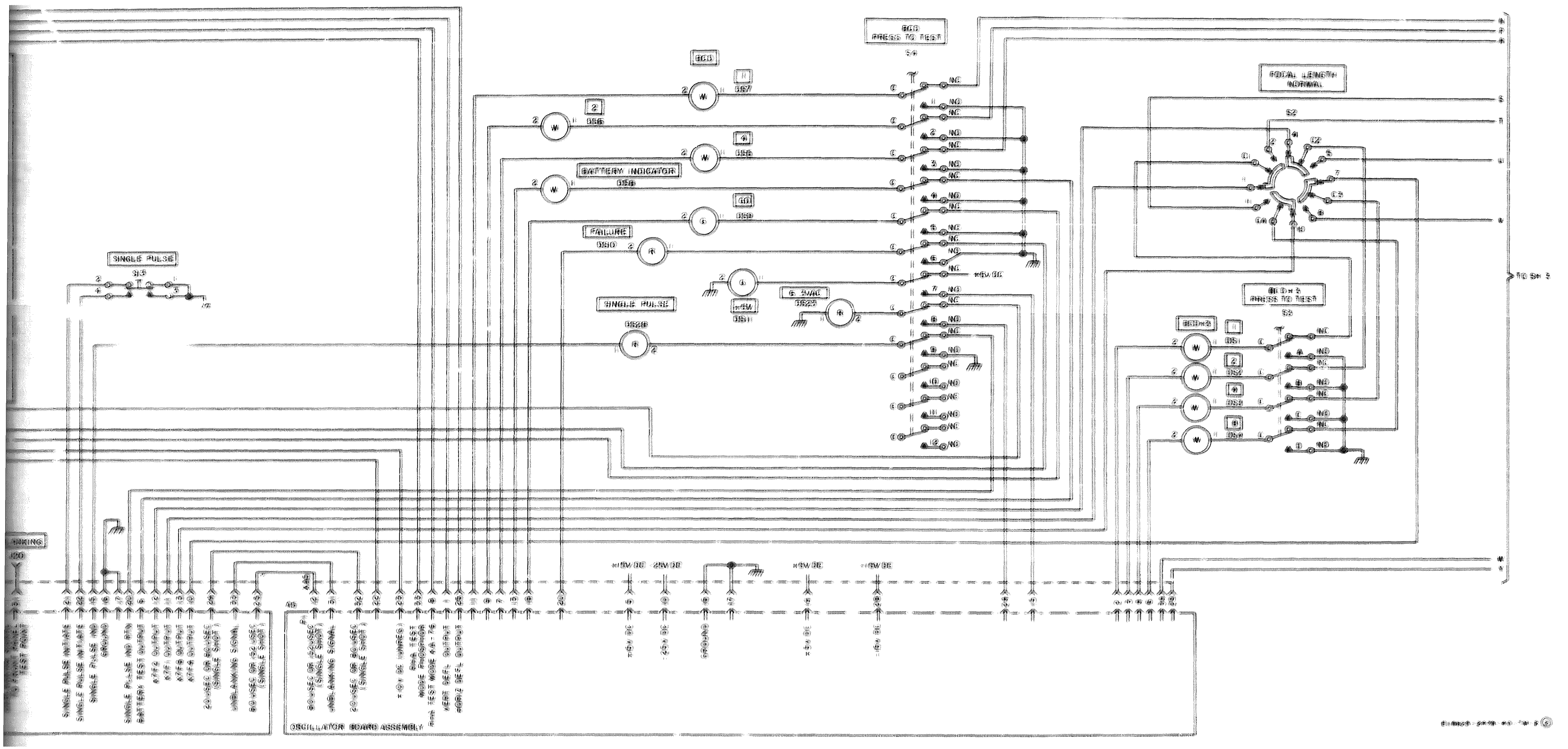
FO-12(1). Simulator monitor input SM-6270/AYM-8, overall schematic diagram (sheet 1 of 3)



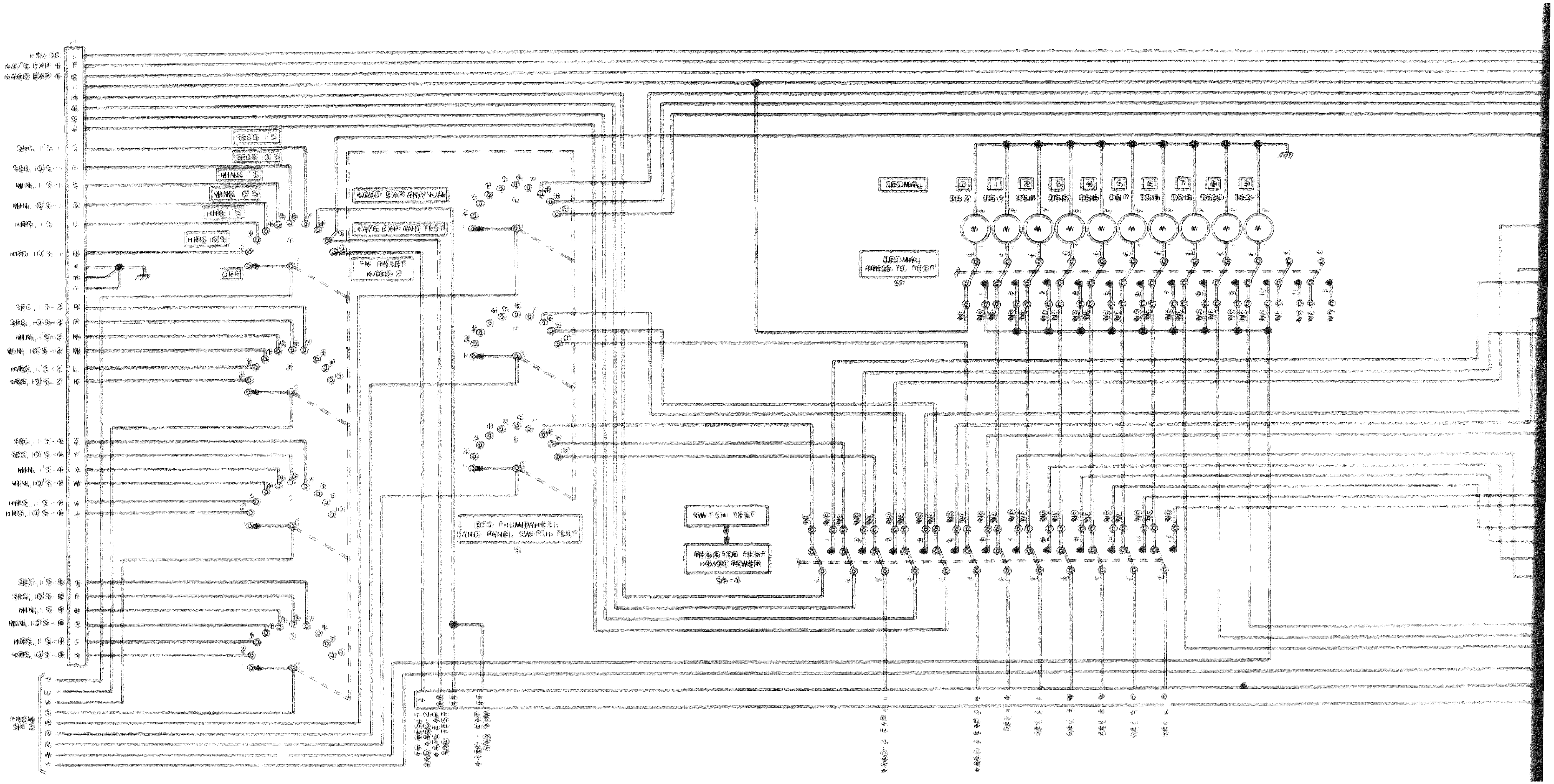
LOW VOLTAGE REGULATOR BOARD ASSEMBLY
DECIMAL THUMBWHEEL AND PANEL SWITCH TEST
BATTERY TEST
POWER OFF/ON
SHIELD GND
EMI AND CHASSIS GND



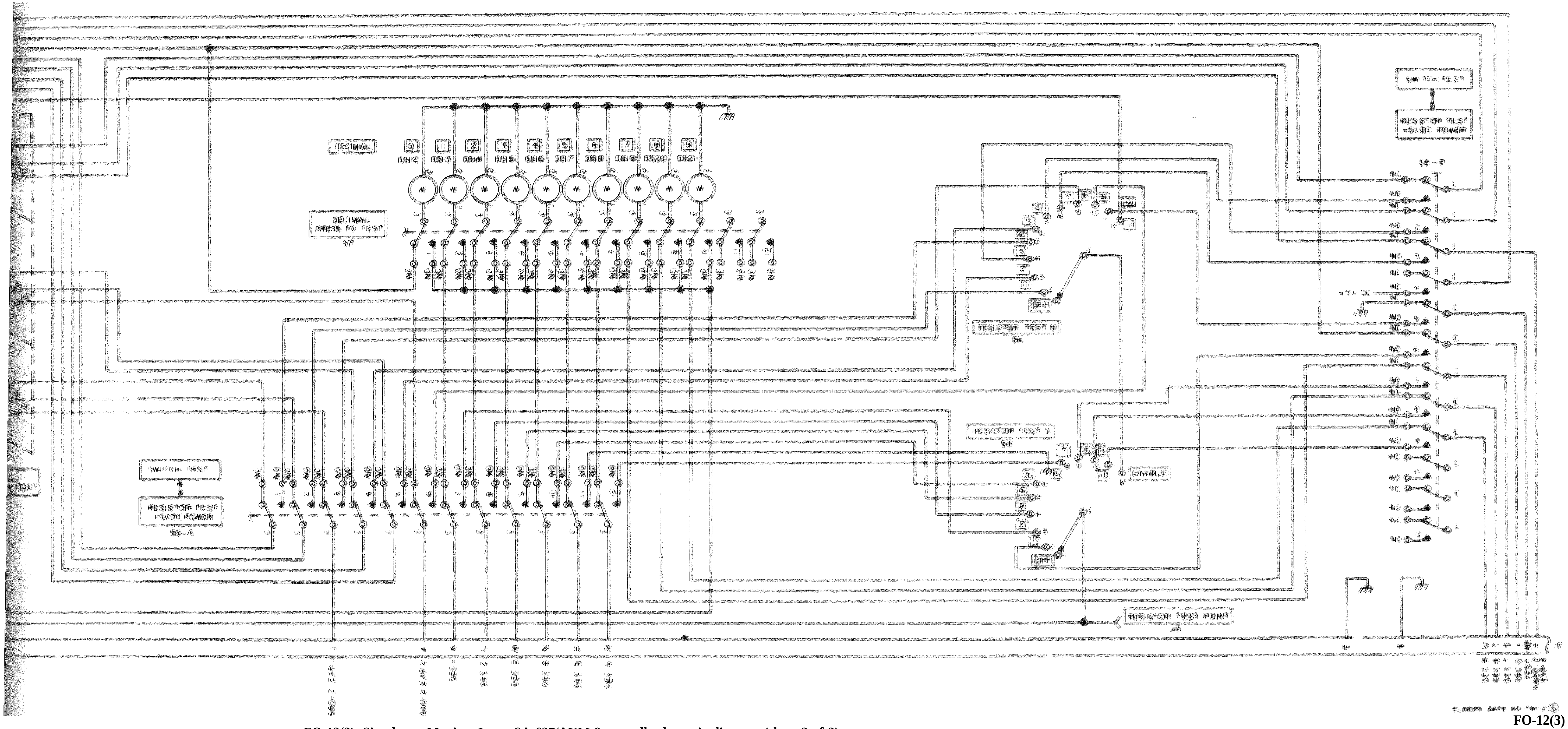
FO-12(2). Simulator Monitor Input SM-627/AYM-9, overall schematic diagram (sheet 2 of 3)



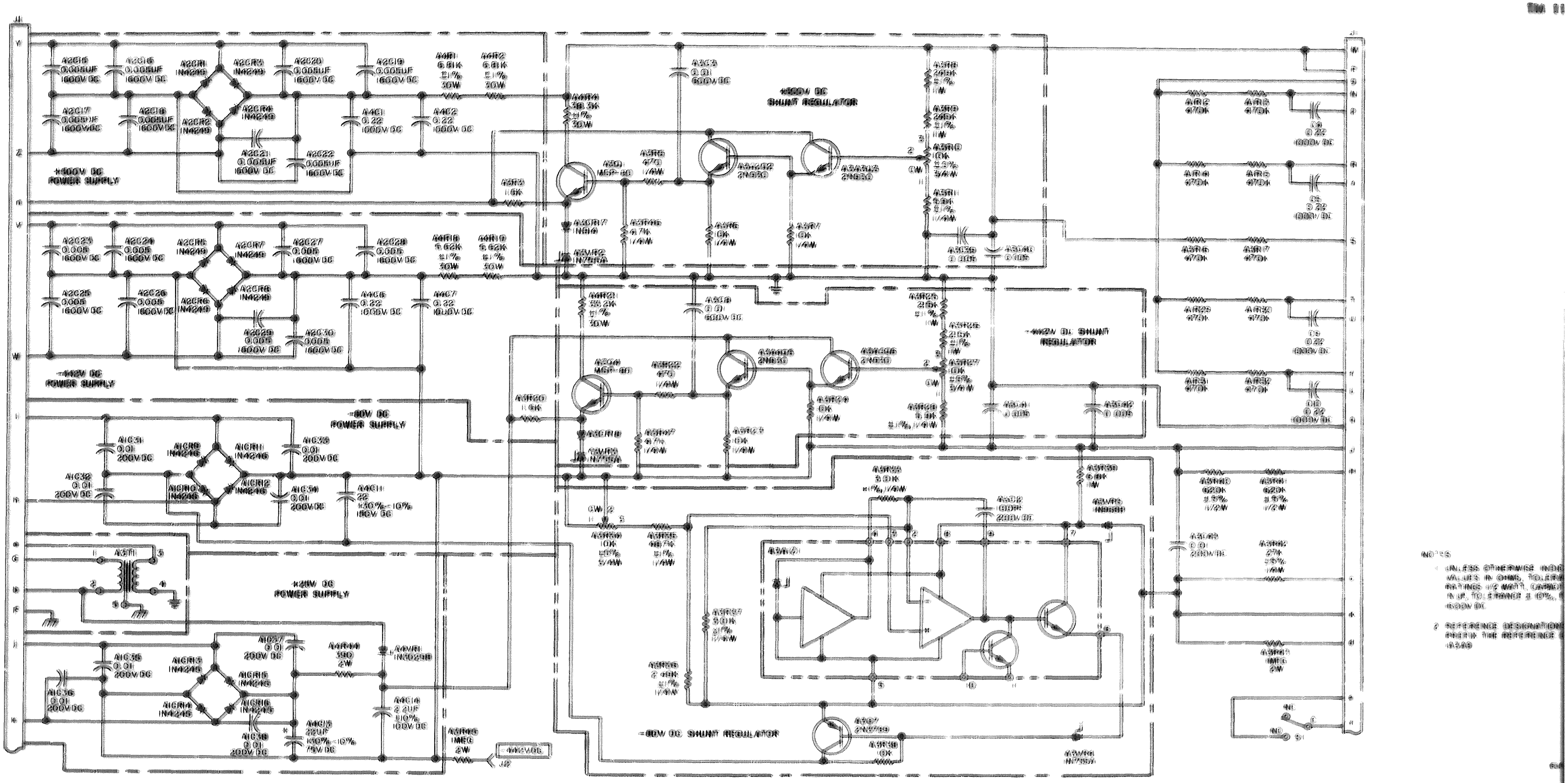
FO-12(3). Simulator, Monitor input SA-627/AYM-9, overall schematic diagram (sheet 3 of 3).



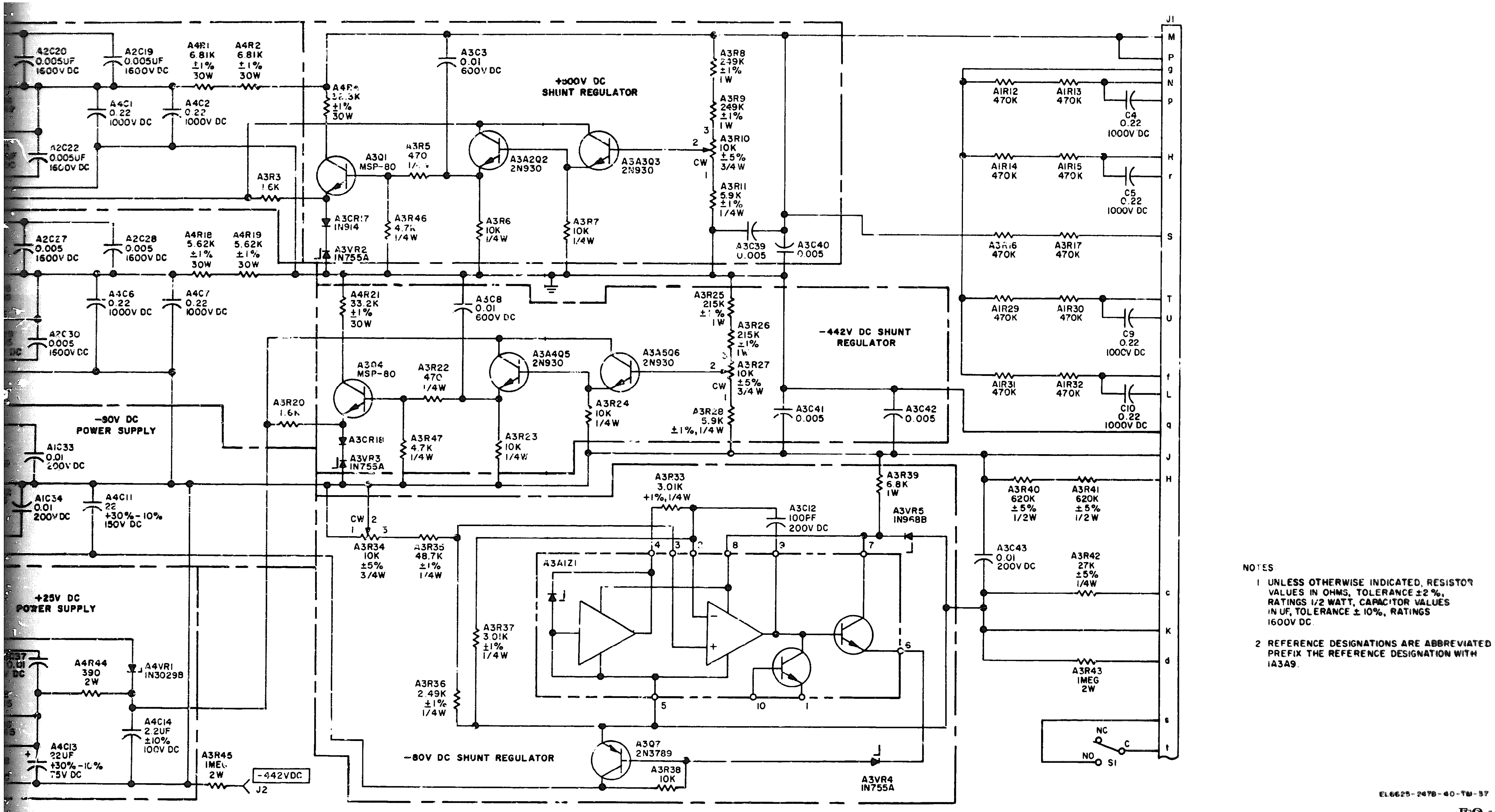
FO-12(3). Simulator, Monitor Input SA-627/AYM-9, overall schematic diagram (sheet 3 of 3).



FO-12(3). Simulator, Monitor Input SA-627/AYM-9, overall schematic diagram (sheet 3 of 3).



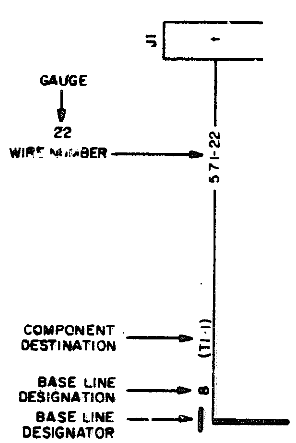
FO-13. Power Supply Assembly 1A3A1, schematic diagram



FO-13 Power supply 1A3A9, schematic diagram

NOTES:

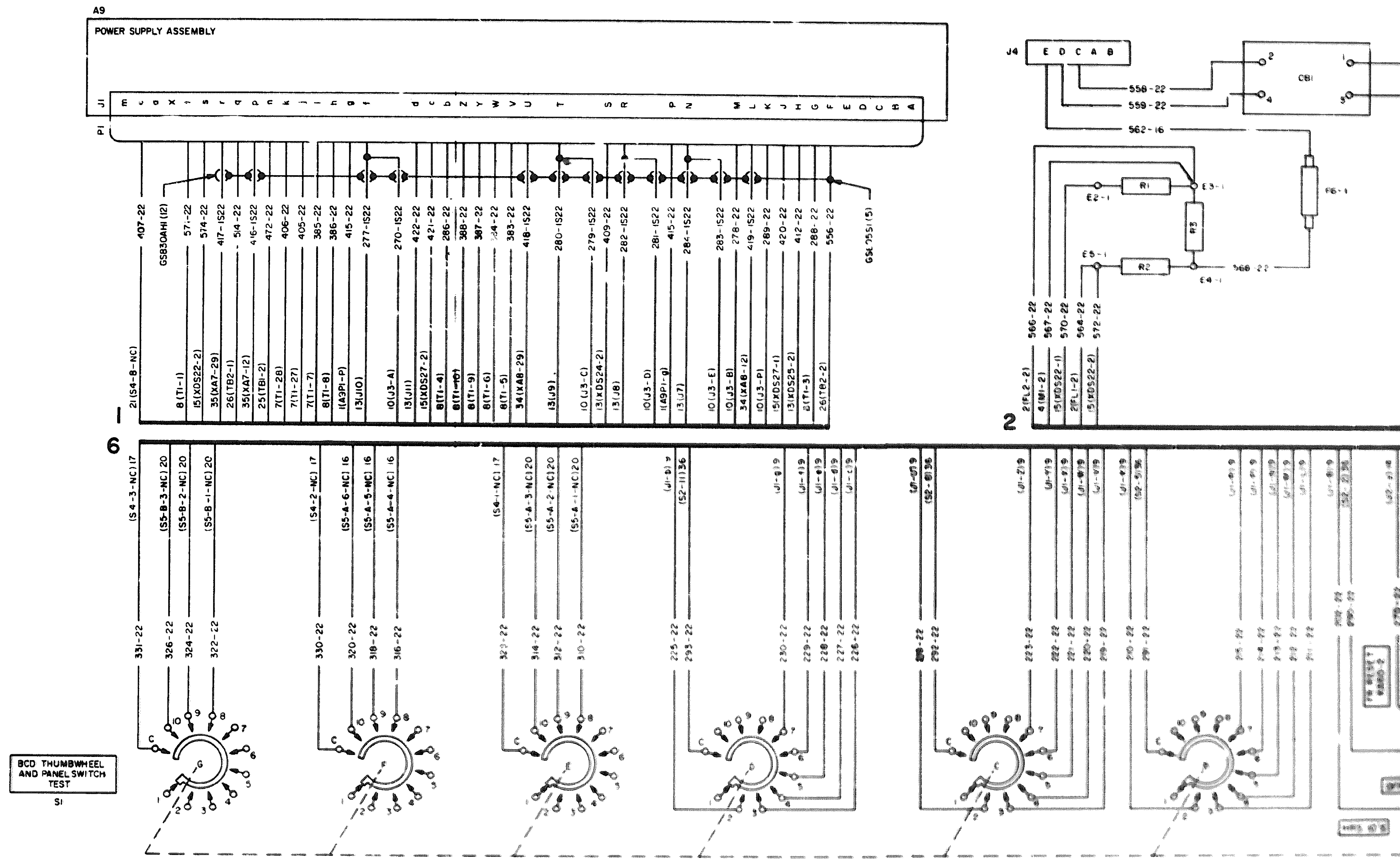
1. HOW TO READ BASE-LINE CONNECTION DIAGRAMS:



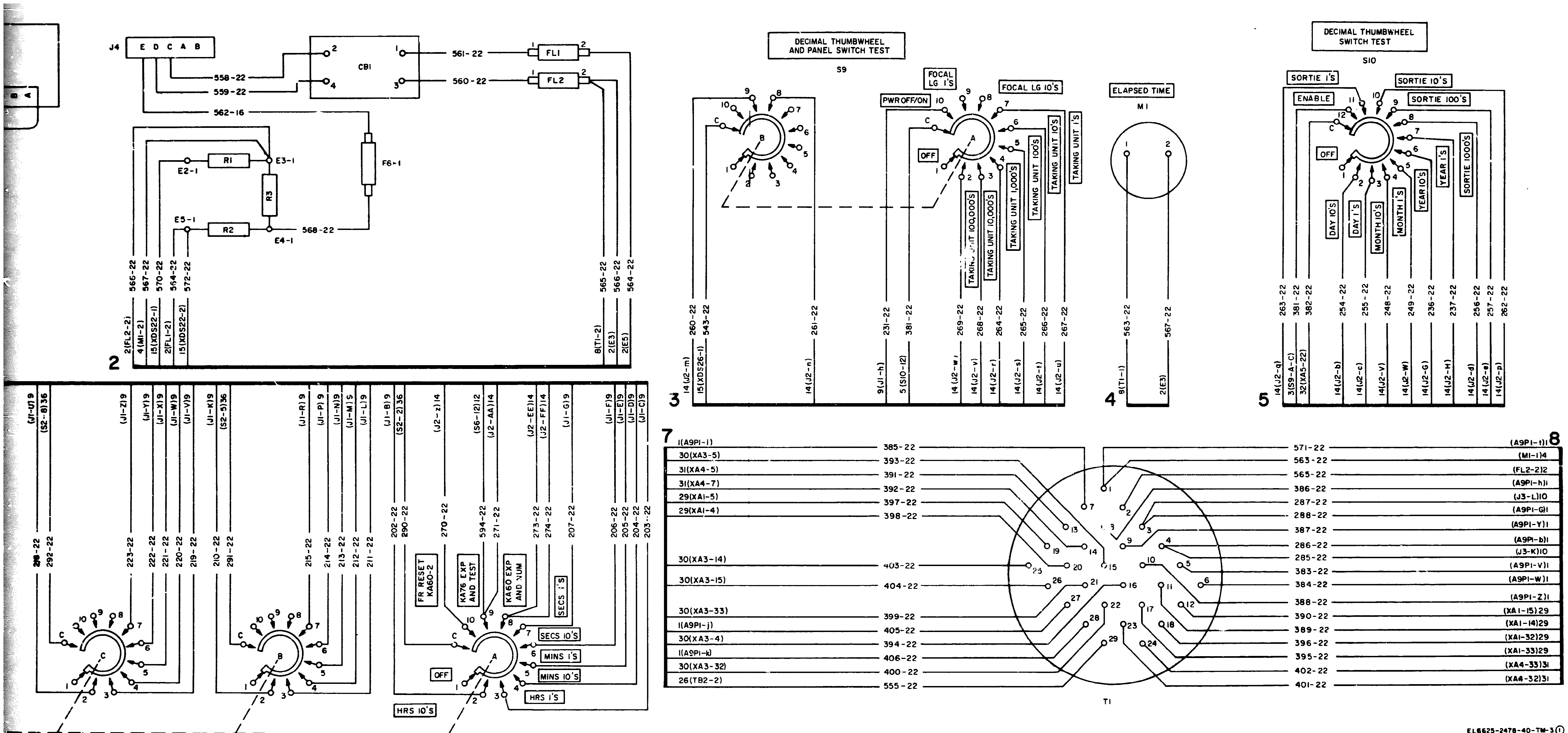
2. REFERENCE DESIGNATIONS ARE ABREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3.

3. E29 IS HEAT SHRINKAGE TYPE SPLICE.

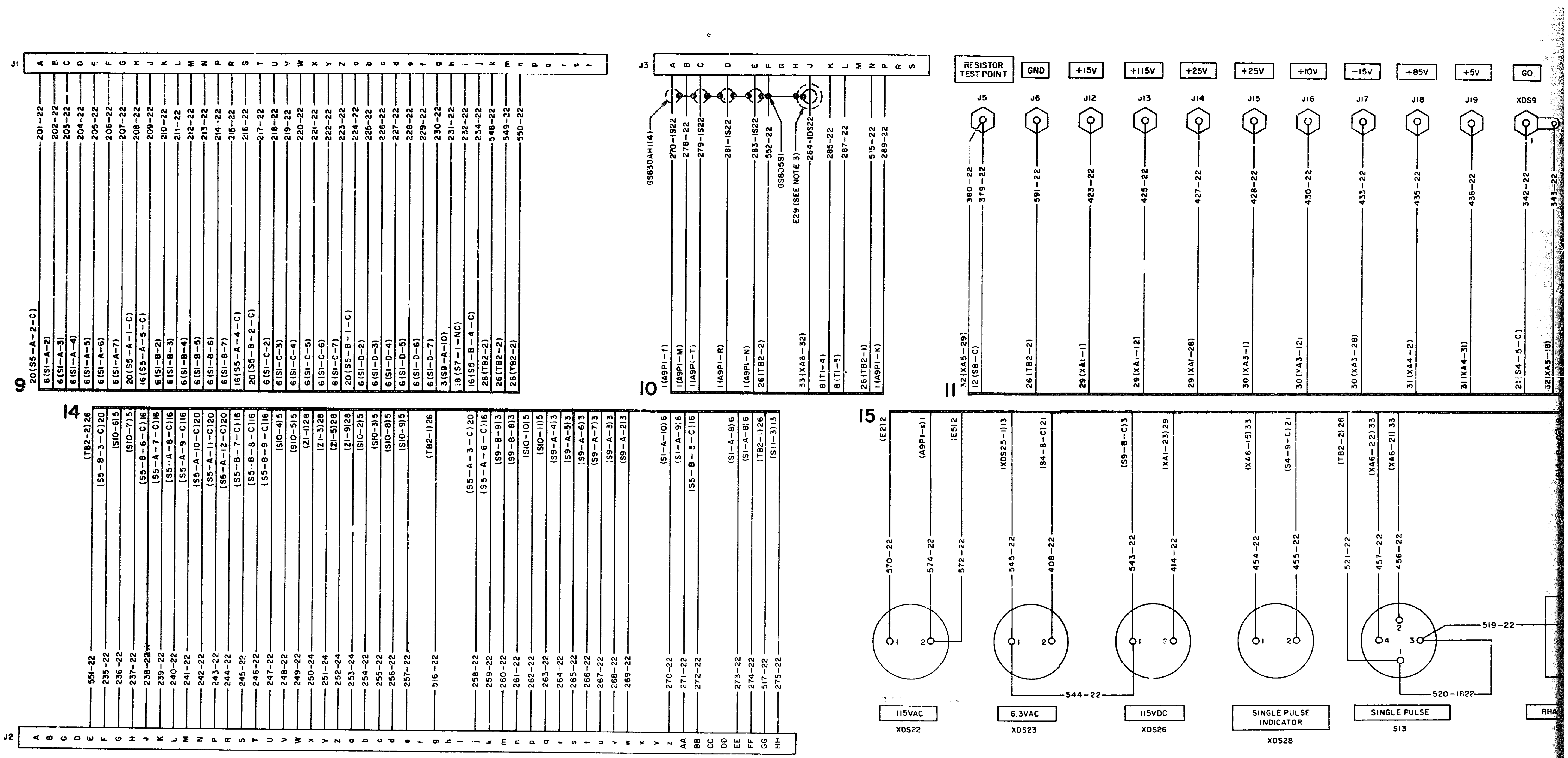
4. SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS OF CABLE CONNECTORS.



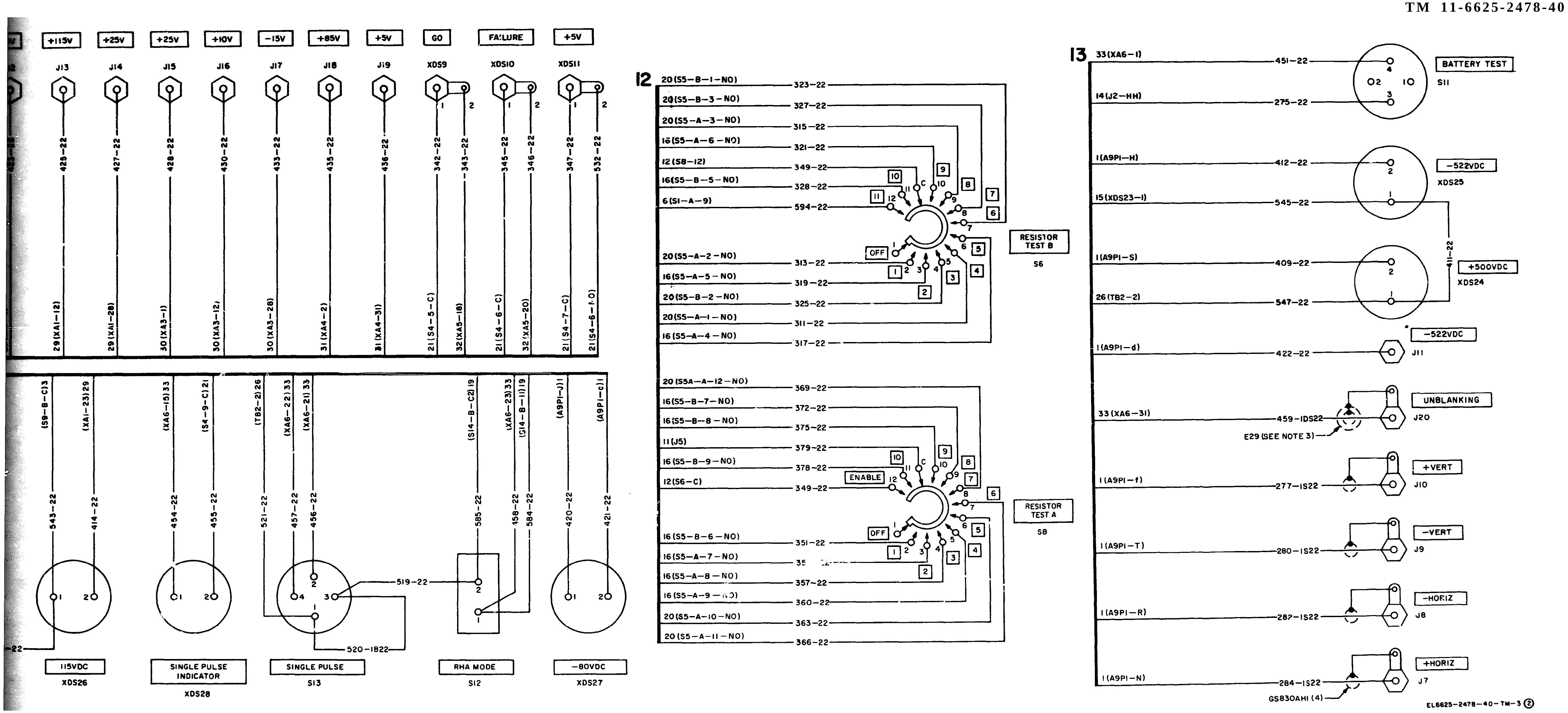
FO-14① Simulator, Monitor Input SM-6?? AYM-9 overall wiring diagram (sheet 1



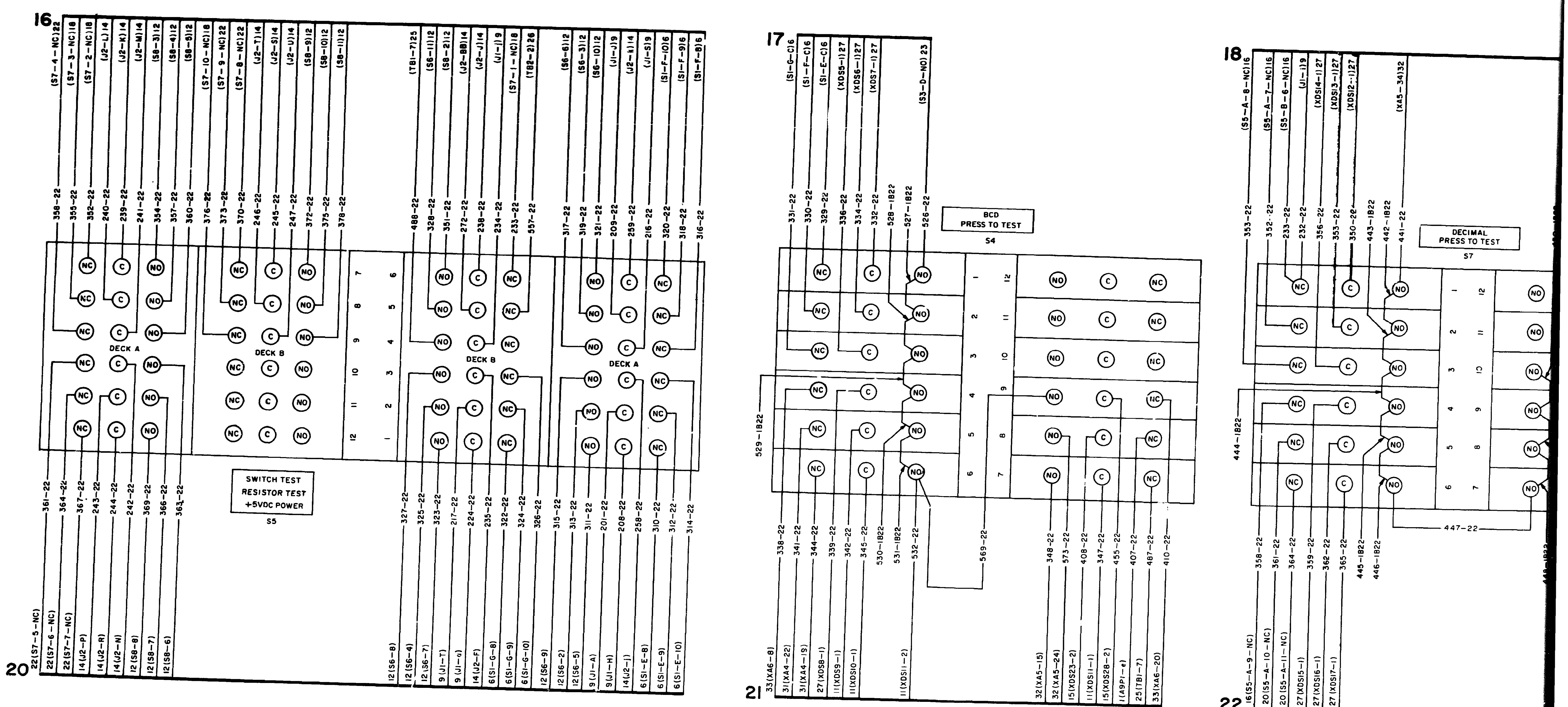
FO-14(1). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 1 of 6)



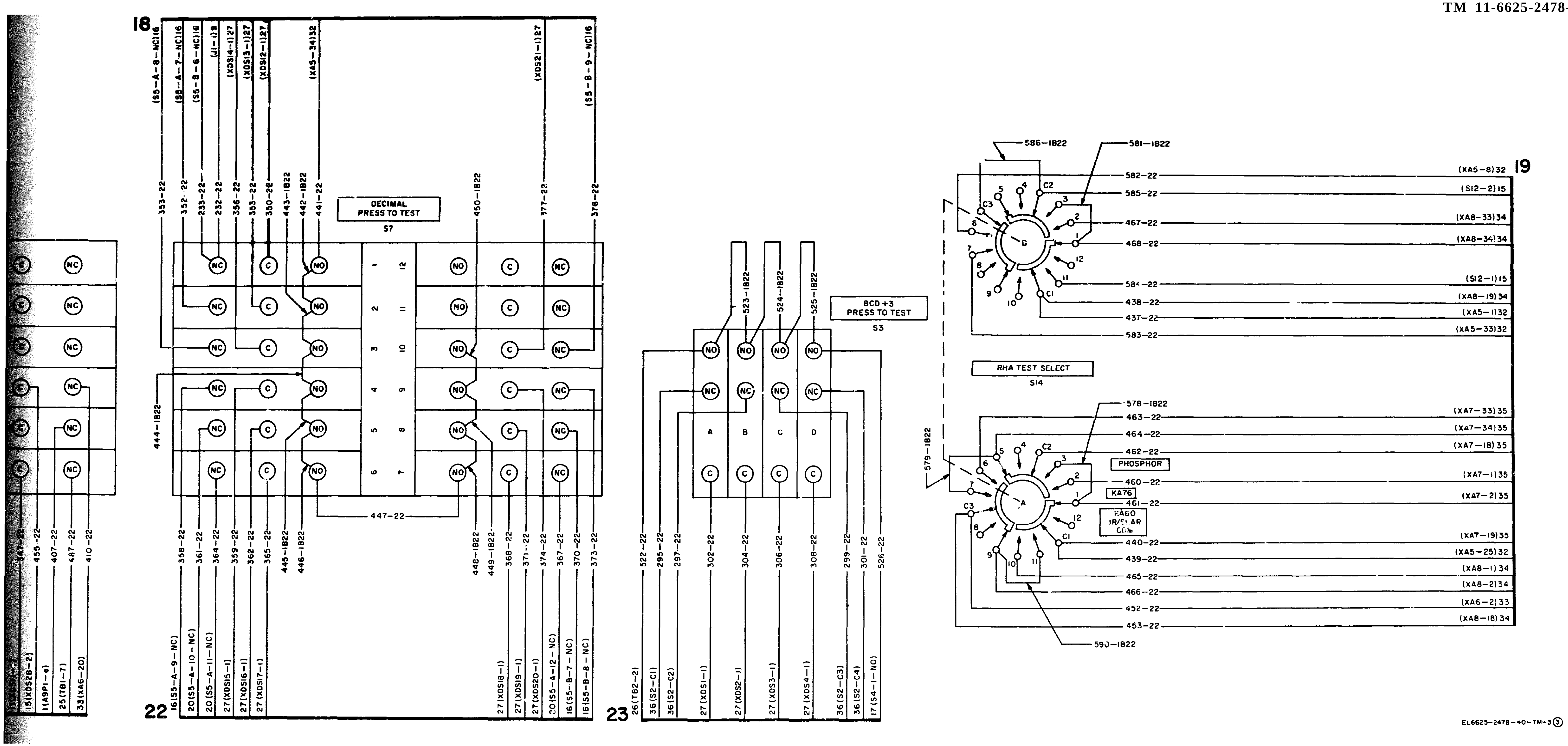
FO-14(2). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 2 of 6)



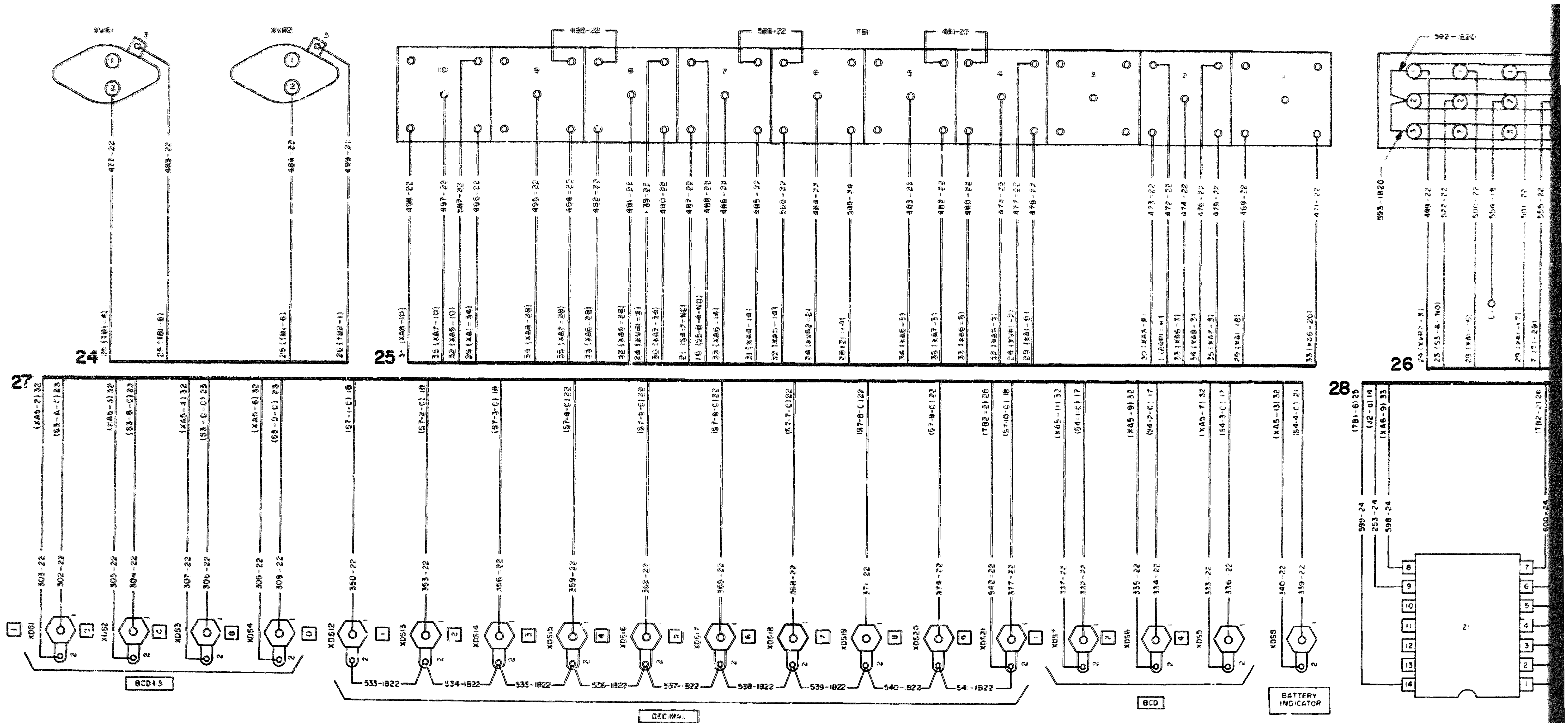
FO-14(2). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 2 of 6)



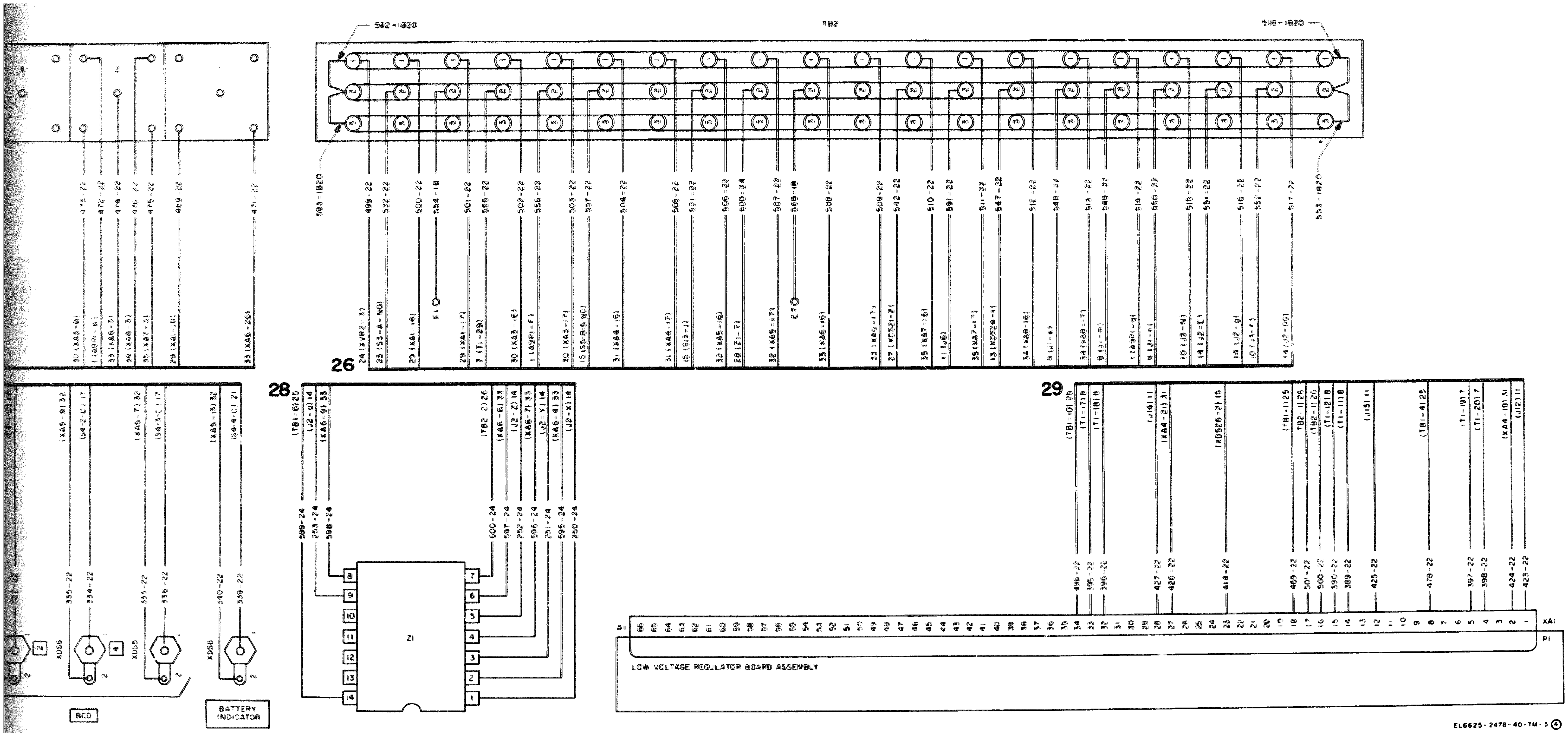
FO-14(3). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 3 of 6)



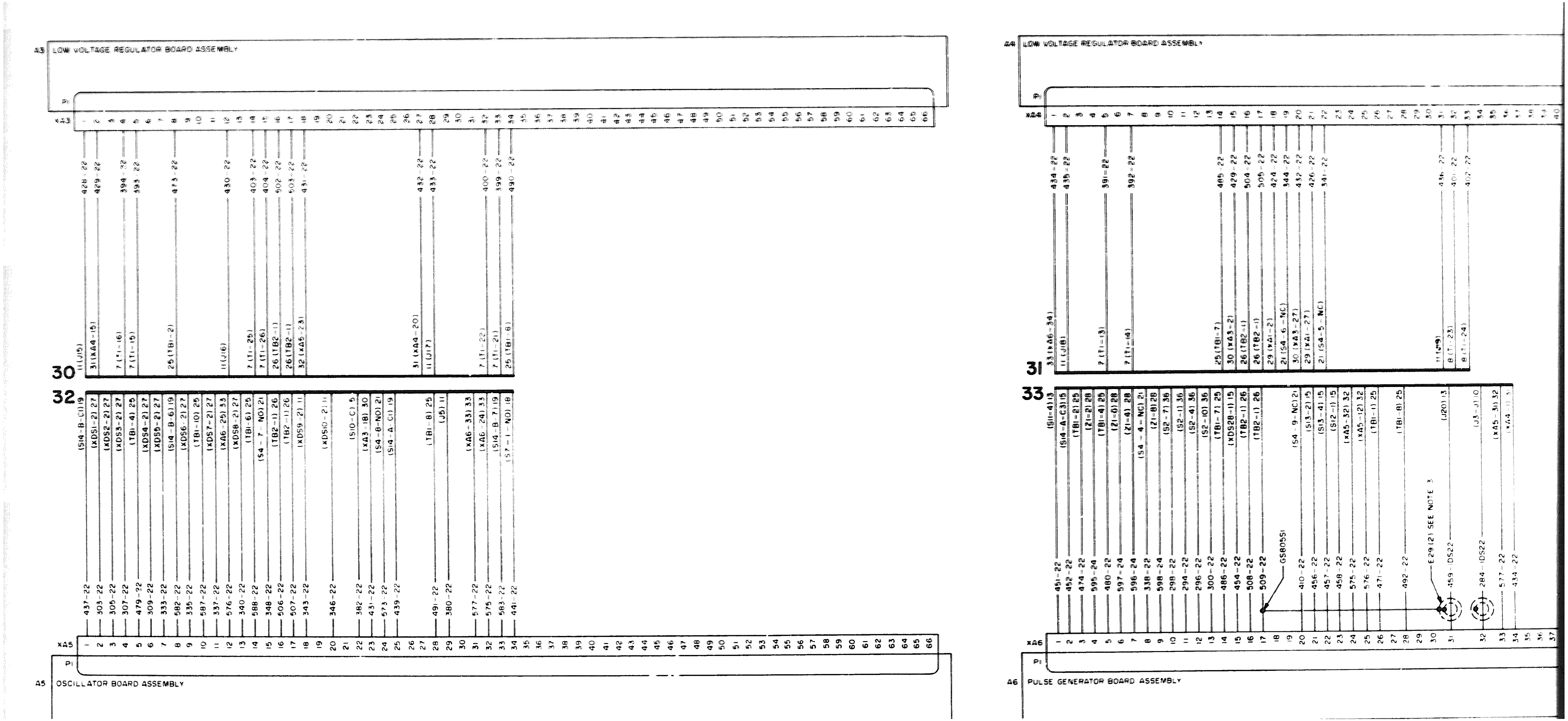
FO-14(3). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 3 of 6)



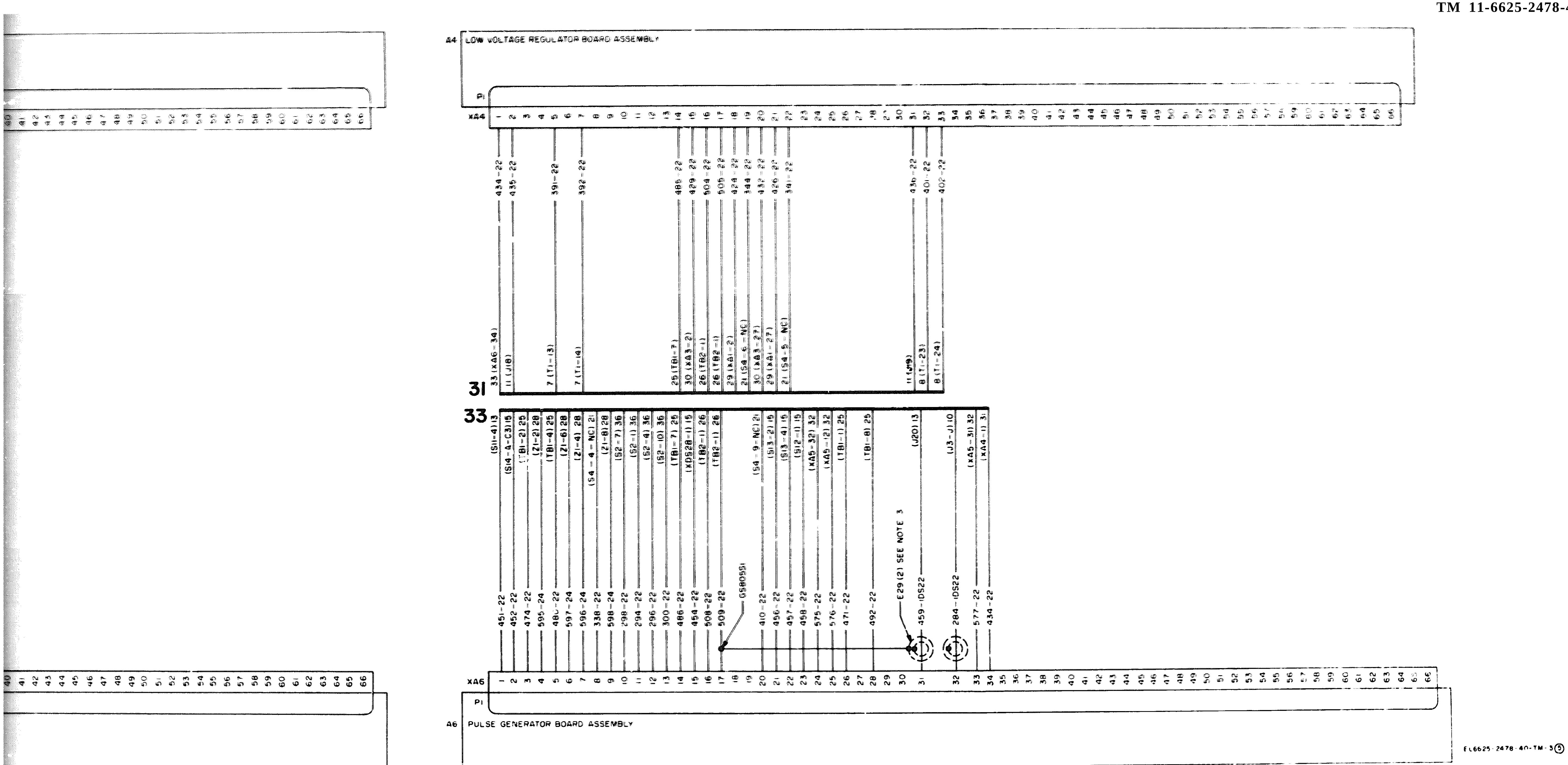
FO-14(4). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 4 of 6)



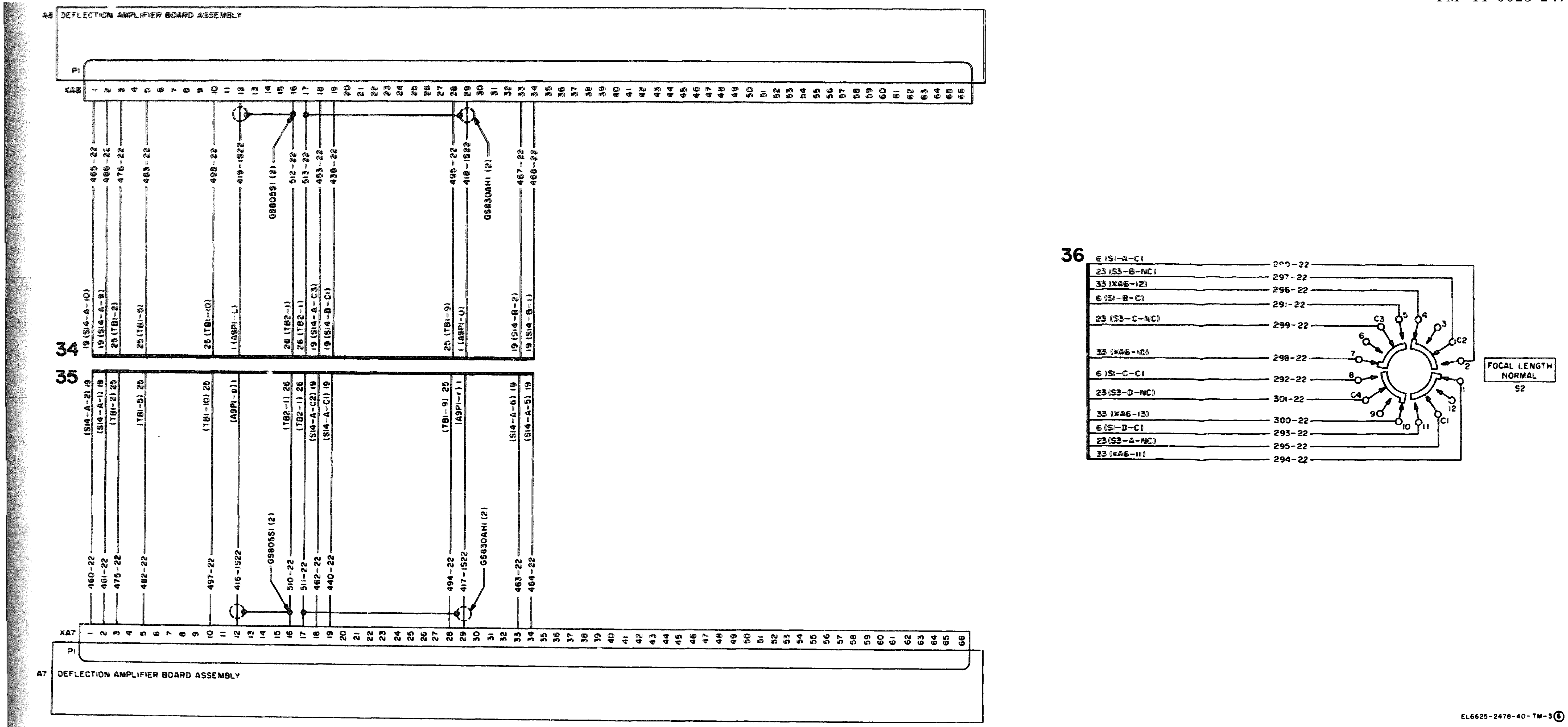
FO-14(4). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 4 of 6)



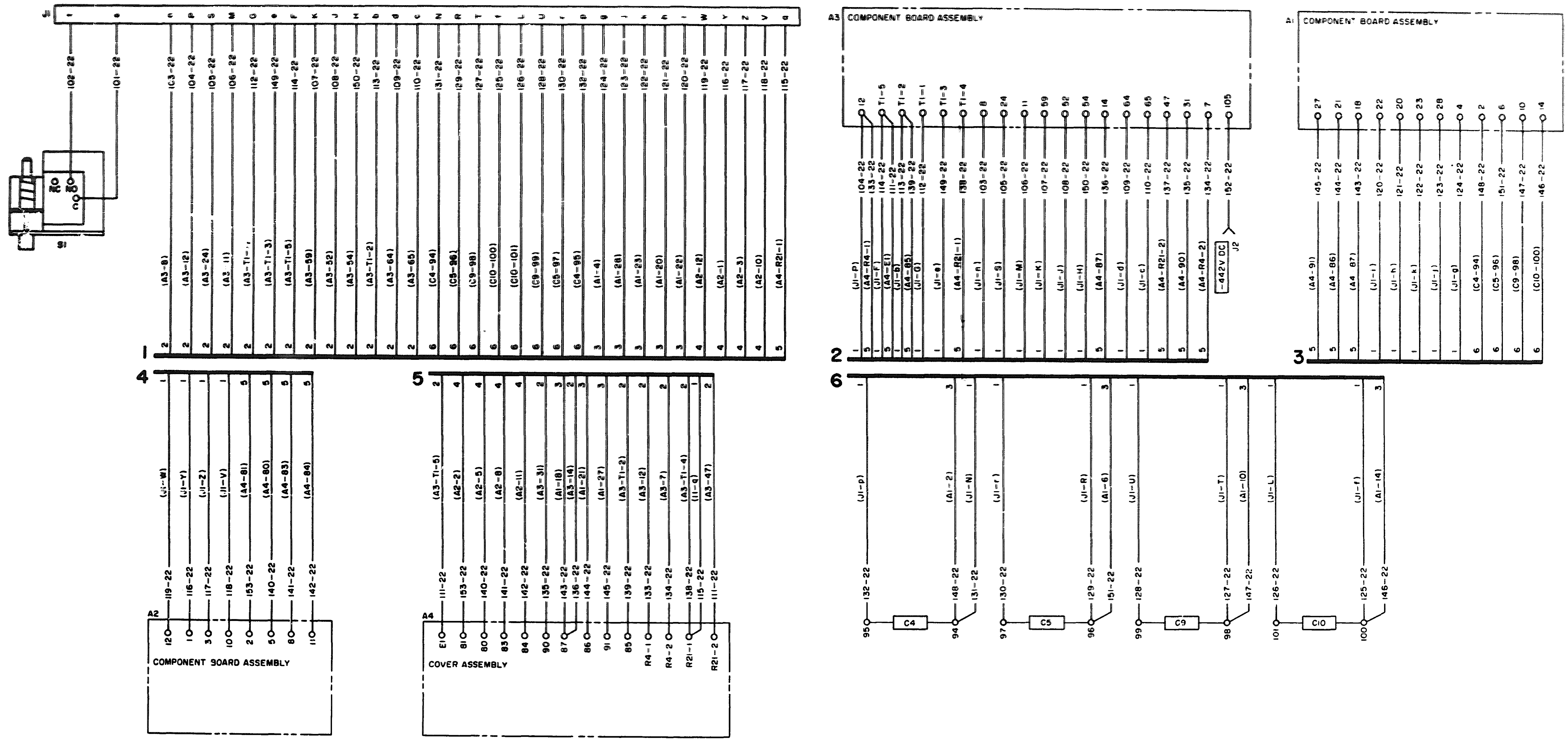
FO-14(5). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 5 of 6)



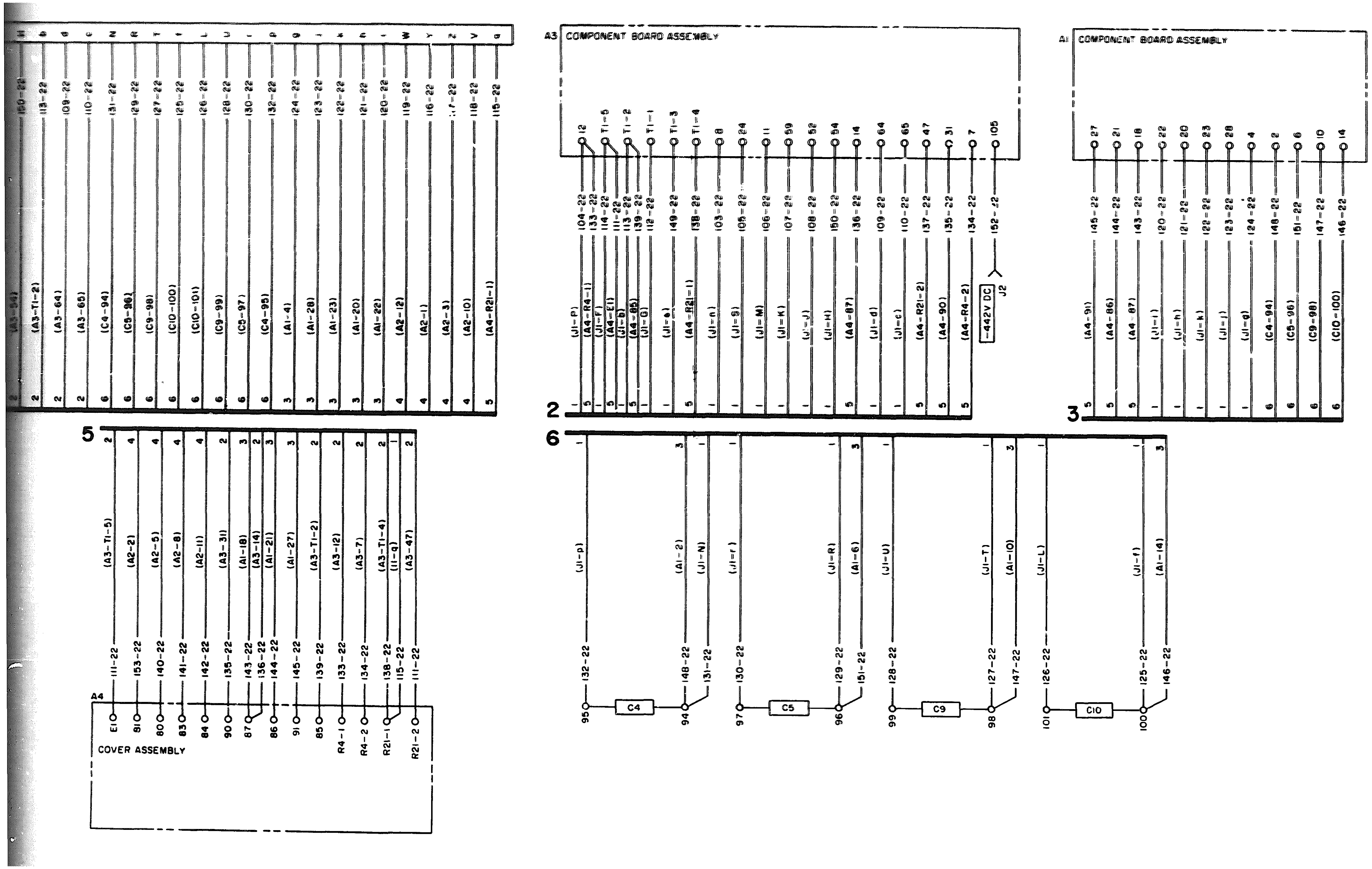
FO-14(5). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 5 of 6)



FO-14(6). Simulator, Monitor Input SM-627/AYM-9, overall wiring diagram (sheet 6 of 6)

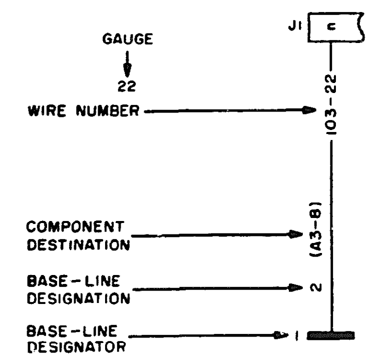


FO-15 Power supply assembly 1A3A9, interconnecting wiring diagram



NOTES

1 HOW TO READ BASE-LINE CONNECTION DIAGRAMS

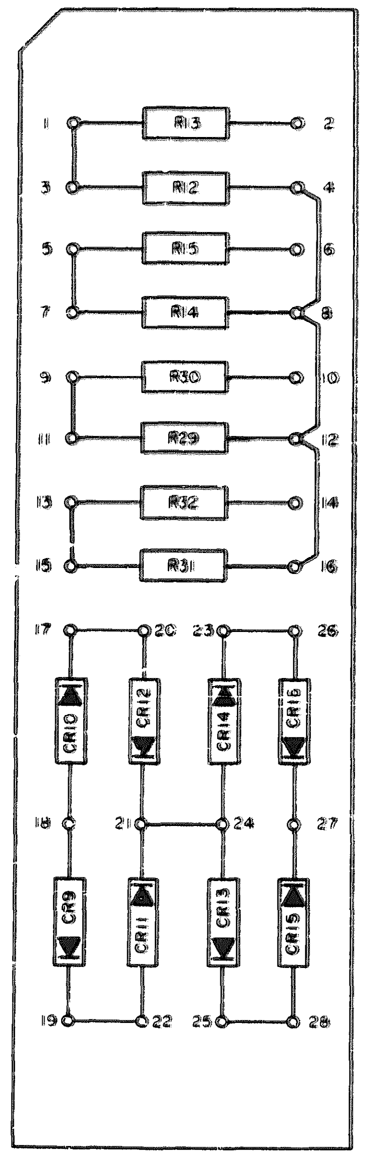


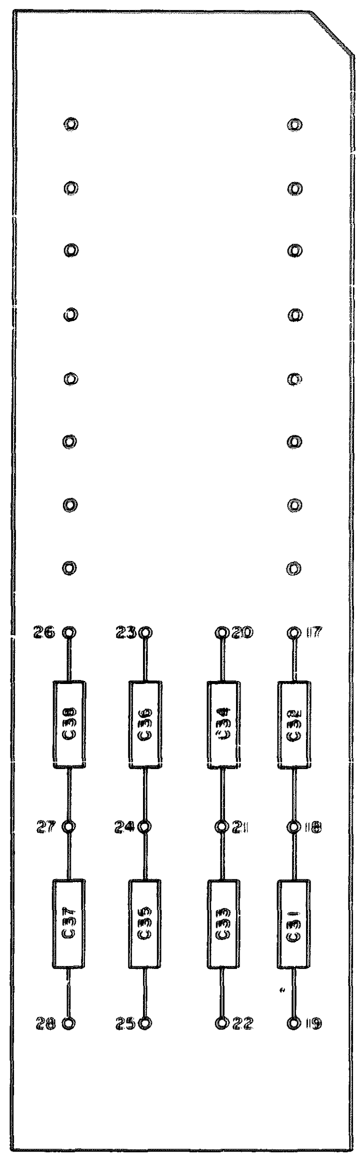
2 REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE REFERENCE DESIGNATION WITH 1A3A9.

3 SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS OF CABLE CONNECTORS

EL6625-2478-40-TM-57

FO-15 Power supply assembly 1A3A9, interconnecting wiring diagram

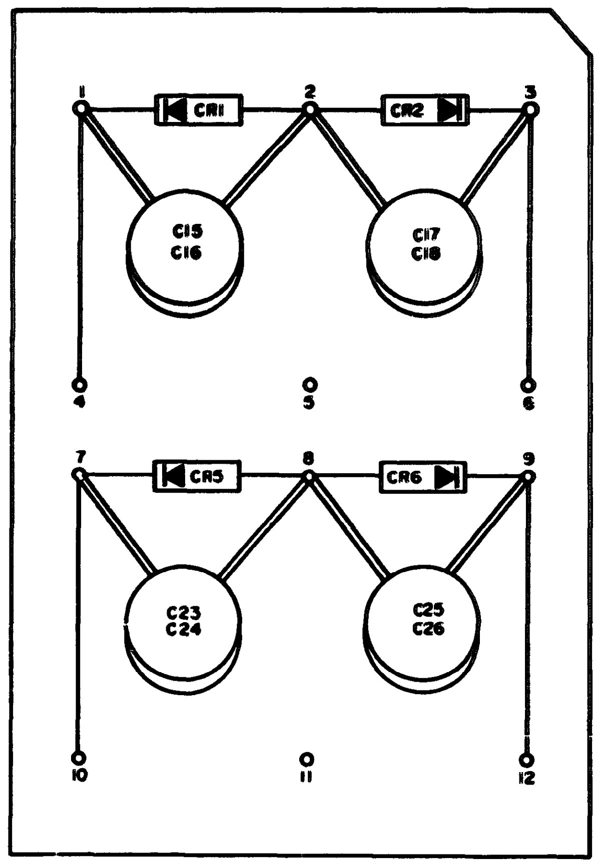


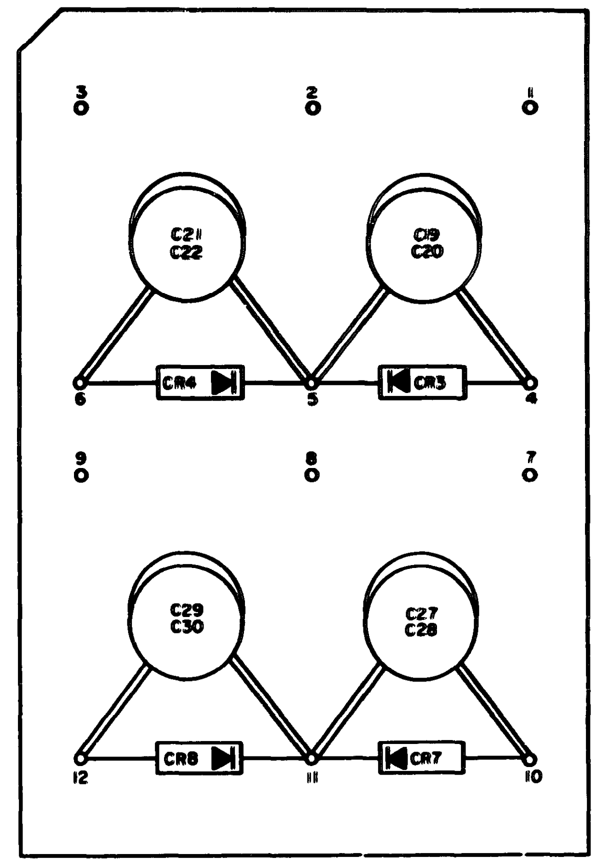


NOTE:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX ALL REFERENCE DESIGNATIONS WITH 1A3A9A1.

EL6625-2478-40-TM-59

FO-16. Component board assembly 1A3A9A1, wiring diagram



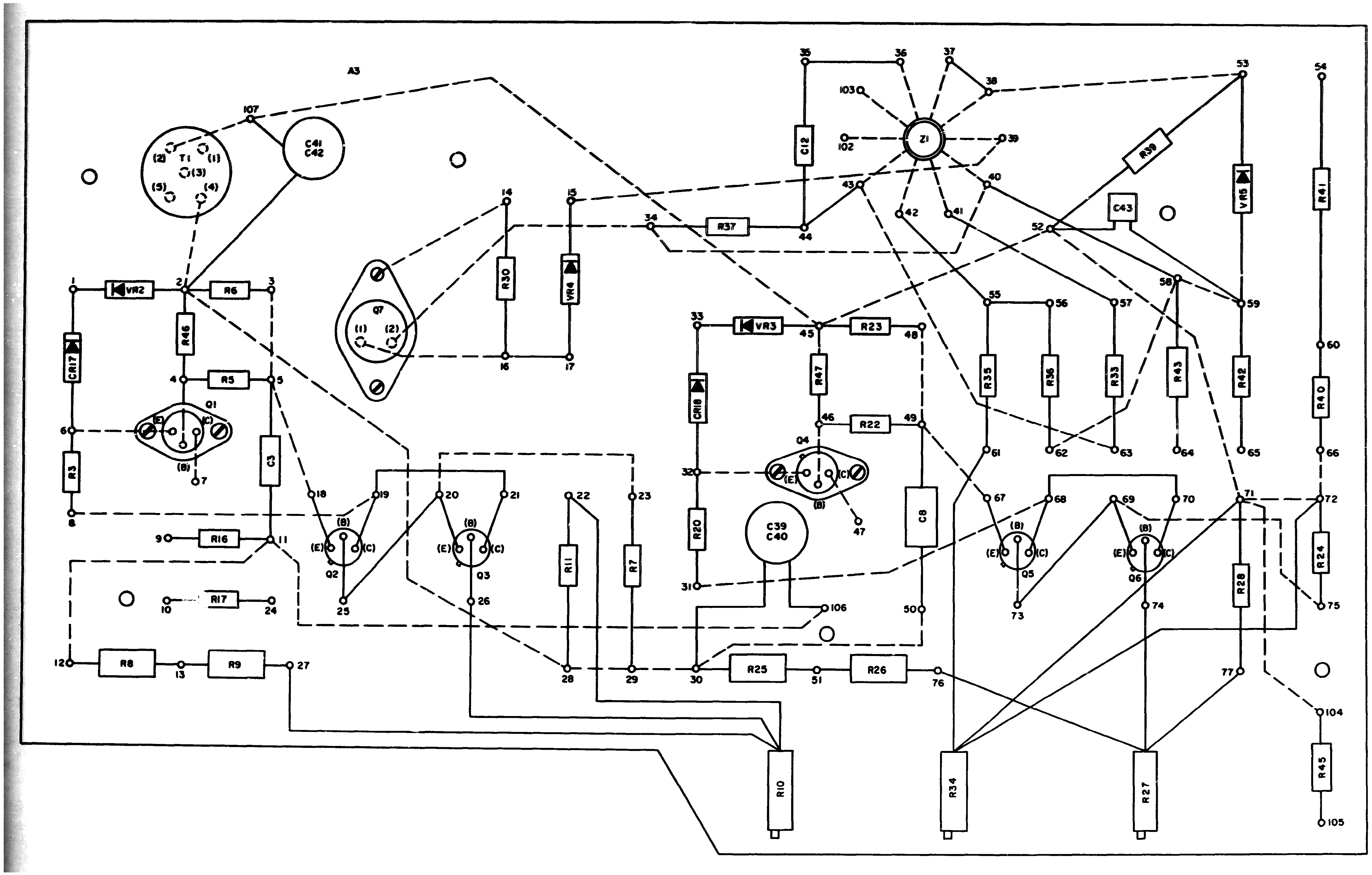


NOTE

1 REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX ALL REFERENCE DESIGNATIONS WITH 1A3A9A2

EL6625-2478-40-TM-60

FO-17

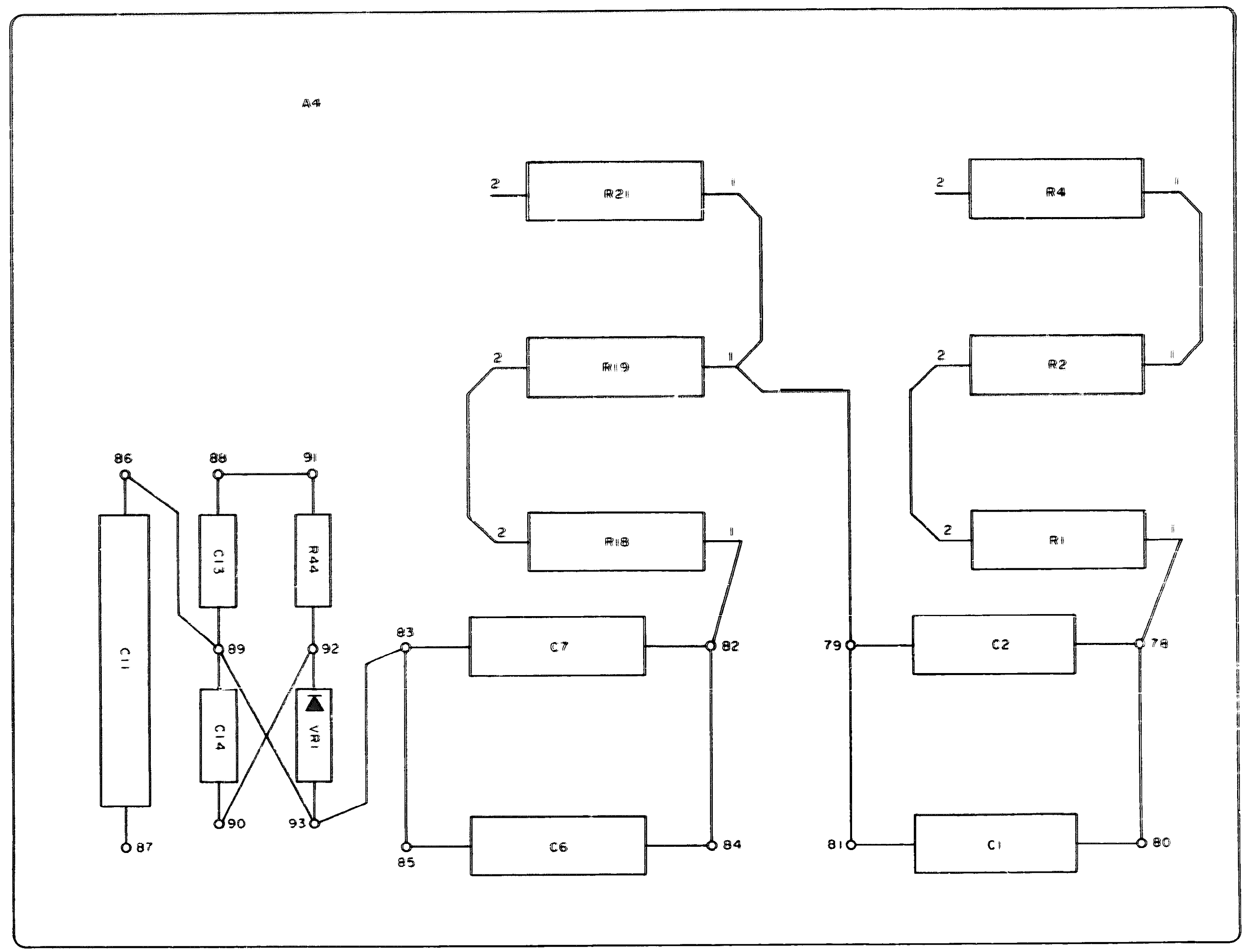


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX ALL REFERENCE DESIGNATIONS WITH 1A3A9.
2. SOLID LINES INDICATE WIRES LOCATED ON FACING SIDE OF BOARD
3. DASHED LINES INDICATE WIRES LOCATED ON FAR SIDE OF BOARD.

EL6625-2478-40-TM-61

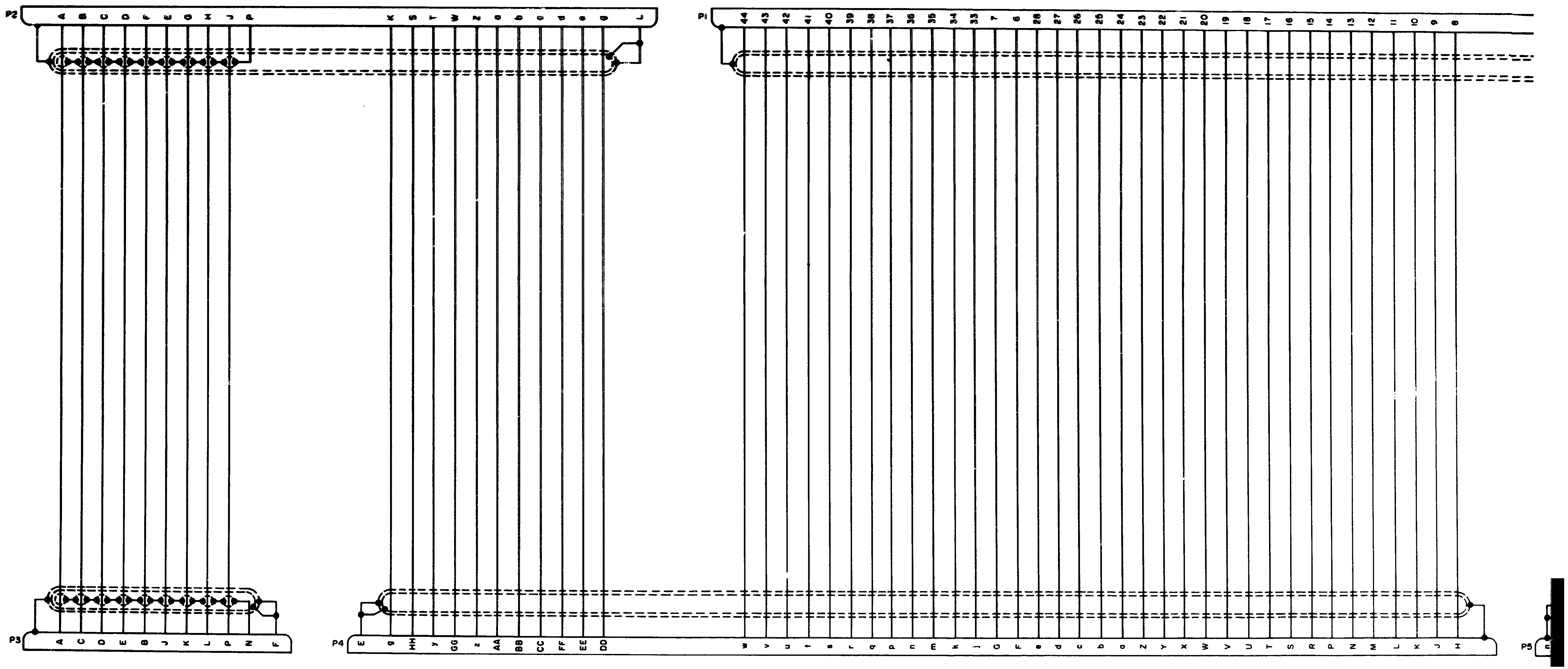
FO-18. Component board assembly 1A3A9A1, wiring diagram



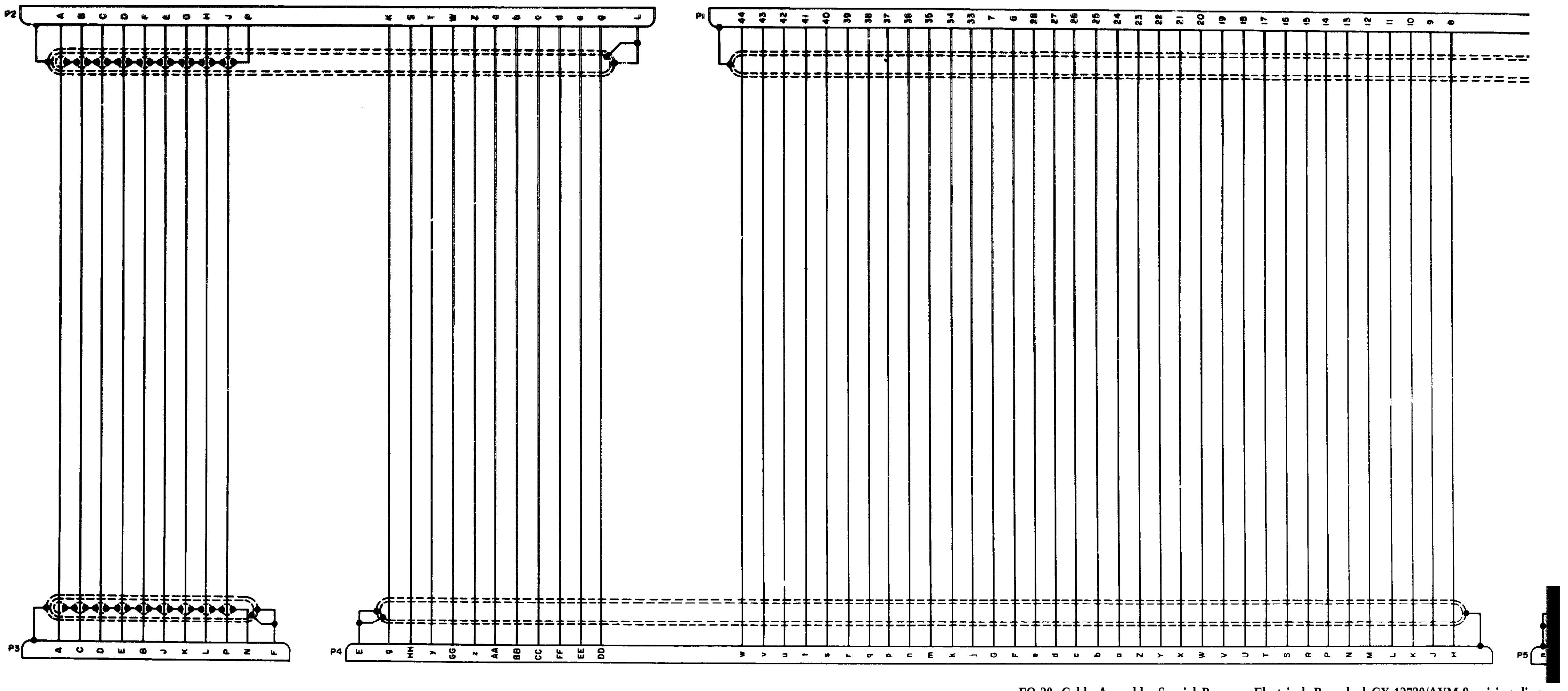
NOTE
1 REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX ALL REFERENCE DESIGNATIONS WITH 1A3A9

EL6625-2478-40-TM-62

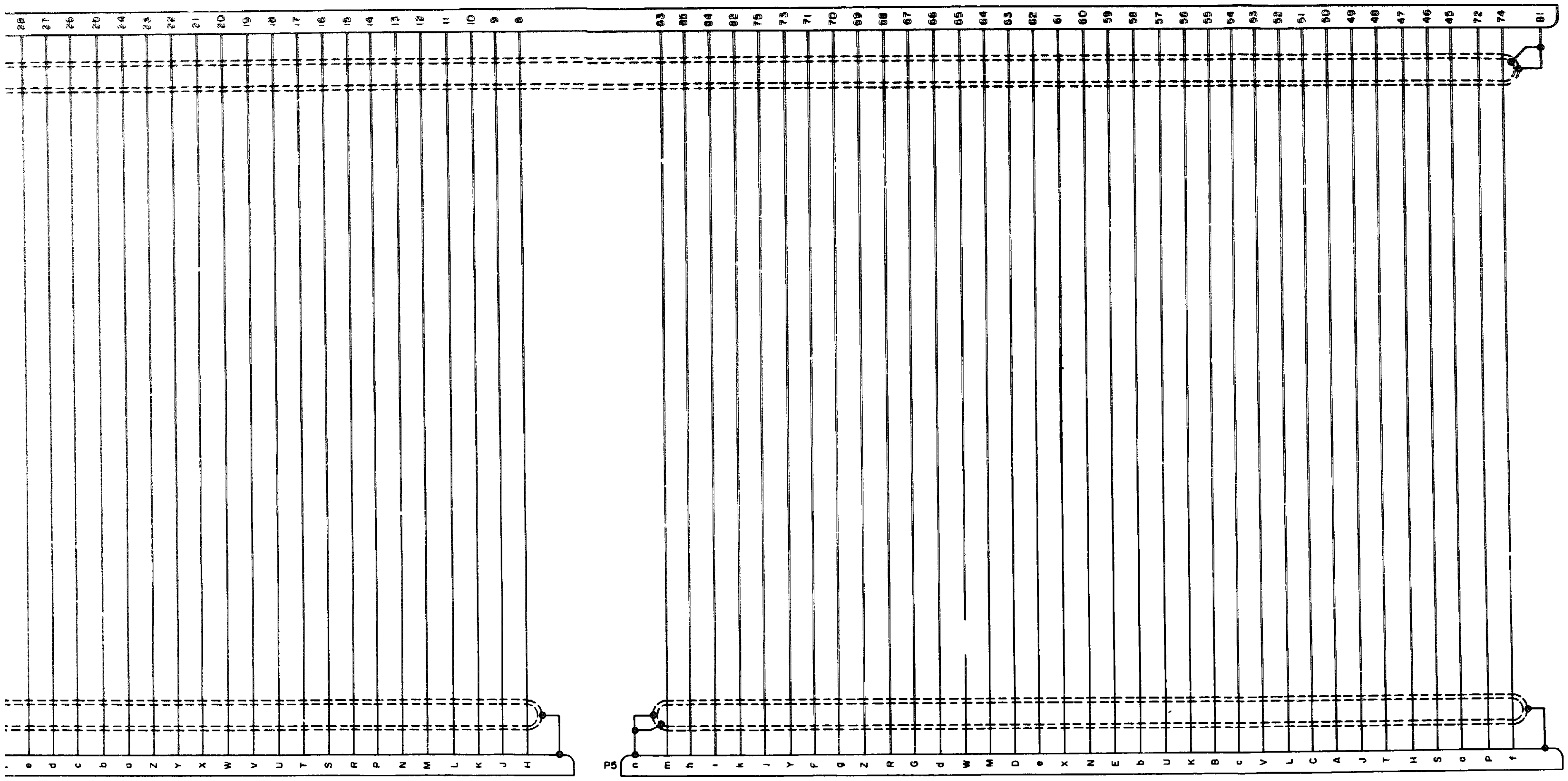
FO-19 Cover assembly lA3A9A4, wiring diagram



FO-20 Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9, wiring diagram



FO-20. Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9, wiring diagram



NOTES

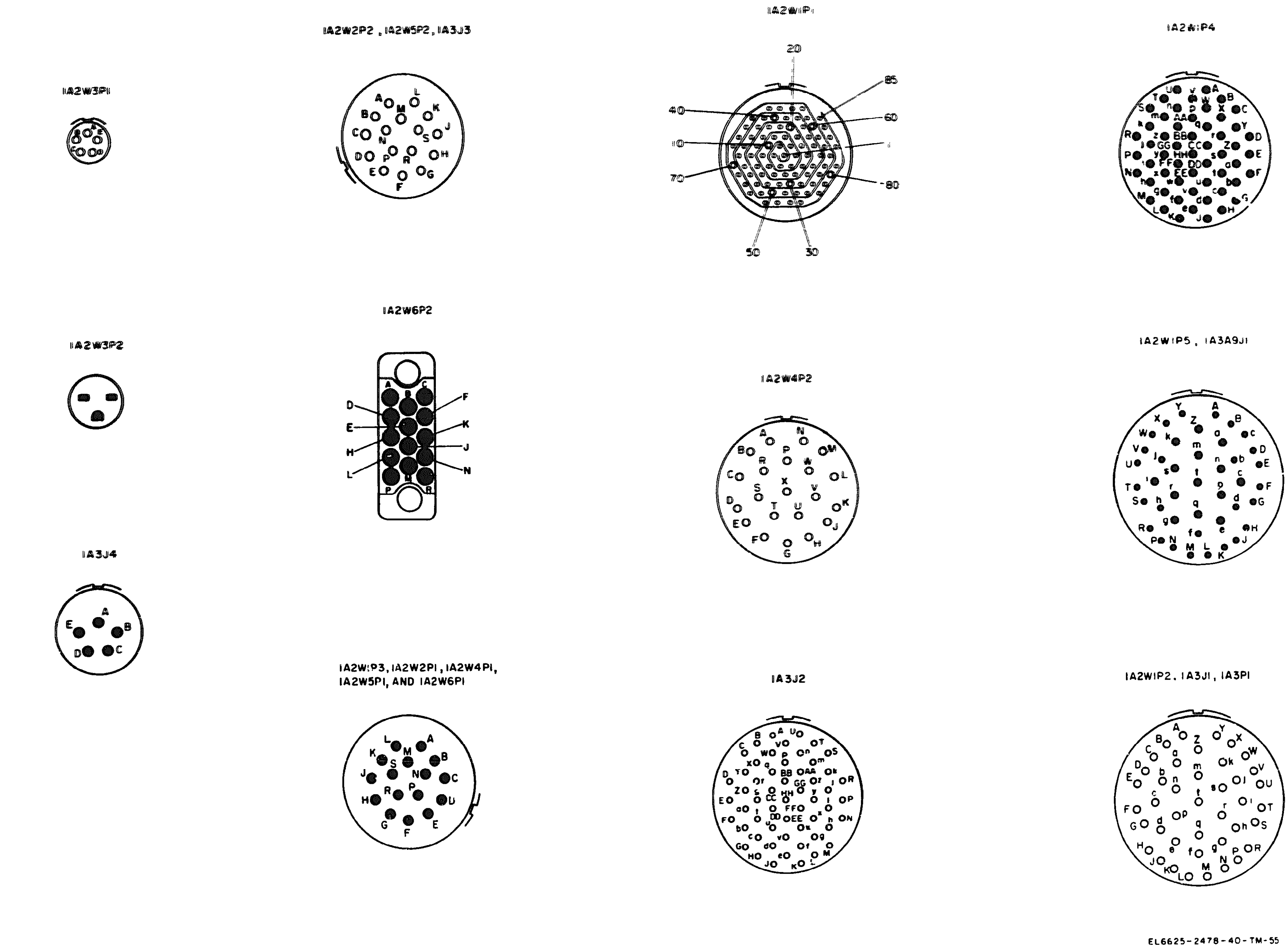
1 REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE REFERENCE DESIGNATION WITH 2W1

2 ALL WIRES ARE 22AWG

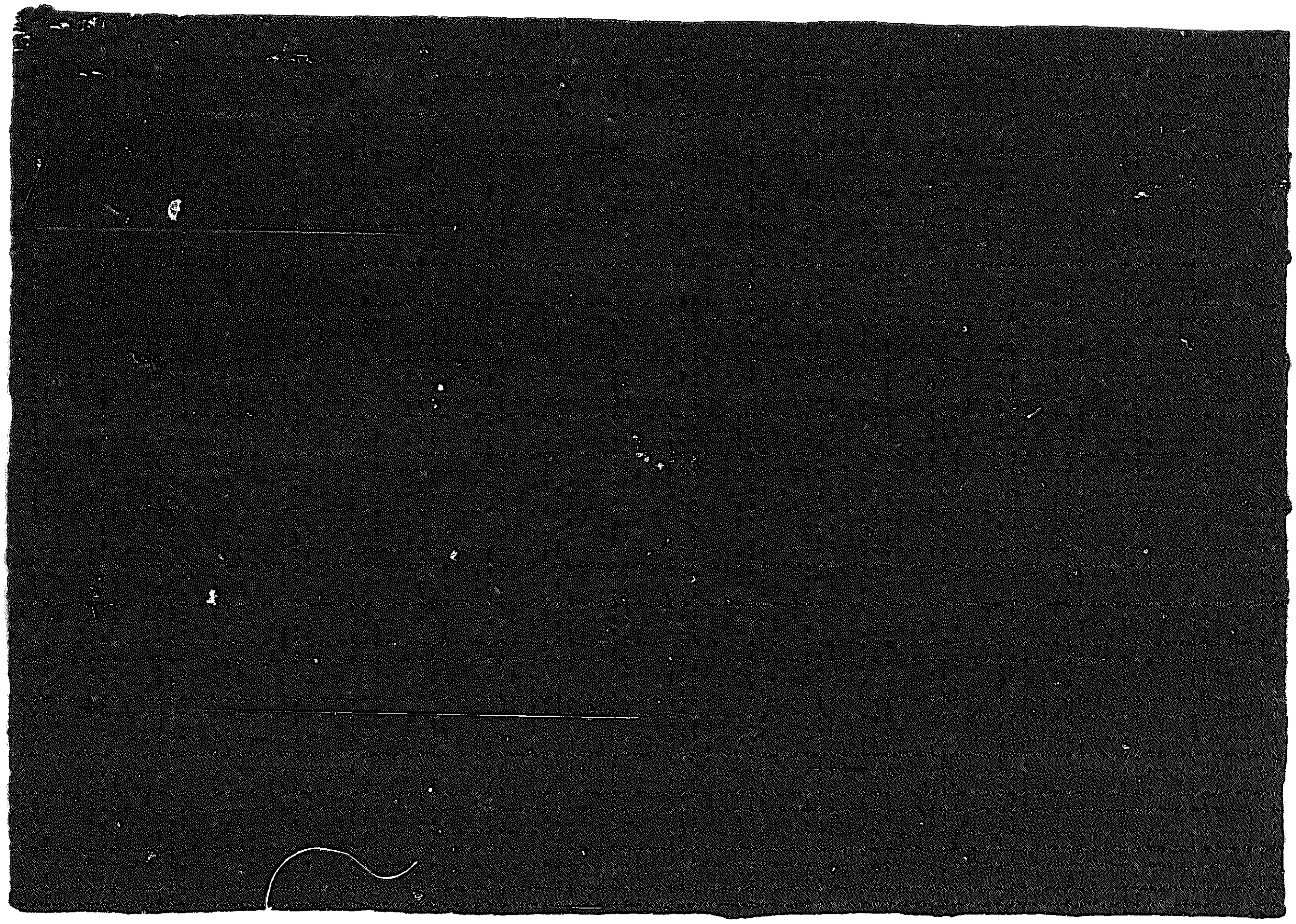
3 SEE FIGURE FO-17 FOR PIN LOCATION DIAGRAMS OF CABLE CONNECTORS

EL6625-2478-40-TM-4

FO-20. Cable Assembly, Special Purpose, Electrical, Branched CX-12720/AYM-9, wiring diagram



FO-21 Cable Assembly Connectors, pin location diagram



DEPARTMENT OF THE ARMY

MICROFORM
TEST TARGET

150 MM

1.5 mm (e= 1.09 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
abcdefghijklmnopqrstuvwxyz$¢£/%#½¼¾—=+×&@*

2.0 mm (e= 1.37 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×&@*

2.5 mm (e= 1.77 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×&@*

1.5 mm (e= 1.09 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
abcdefghijklmnopqrstuvwxyz$¢£/%#½¼¾—=+×&

2.0 mm (e= 1.37 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×&@*

2.5 mm (e= 1.77 mm)

ABCDEFGHIJKLMNOPQRSTUVW
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×

200 MM

250 MM