



USER'S MANUAL

RBT-EU

Resistance Bulb Transmitter
Eurocard

No. 149-760-00 C

October 1988

Table of Contents

Introduction	1
Description	1
Calibration	3
Installation	6
Theory of Operation	7
Maintenance	9
Troubleshooting	9
Drawings	9

Introduction

The RBT-EU Resistance Bulb Transmitter converts inputs from any 2-, 3- or 4-wire RTD or from a slide wire potentiometer to a 4-20MA or 1-5V output signal.

Description

The RBT-EU is used in process control systems to monitor temperature changes. The RBT-EU provides isolation between a floating input and a grounded common output or a grounded common input and a floating output. Internally, the RBT-EU features compensation for the resistance of the lead that connects one side of the bulb excitation through the RBT-EU to the resistance bulb. The dc input signal is then chopped to an ac signal to allow ac coupling to be used in the following stages. The ac signal is synchronously demodulated to produce a dc output signal that is proportional to the input signal. High stability is achieved by using feedback to the operational amplifiers. In total, a highly stable and completely isolated coupling is obtained between the input and output terminals.

The RBT-EU consists of two printed circuit boards, one mounted to the other. One board contains the resistance bulb excitation supply and lead-length compensating circuit. The other board contains all remaining circuitry.

The RBT-EU is configured to allow for high-density installation in a plug-in Eurorack. Twelve Eurocard transmitters may be installed in a single 19-inch (483mm) Eurorack. Installation dimensions and plug-in details are presented in figure 1.

Specifications

A complete set of specifications for the RBT-EU is shown in table 1. This specification contains complete information on input, output, and performance.

Model Number Explanation and Use

Moore Industries' model numbers identify the type of instrument, functional characteristics, operating parameters, any options ordered, and housing. If all accompanying documentation of a unit is missing, the model number can be used to obtain technical information. The model number for the RBT-EU is located on the inside of the front panel.

A complete history is kept on every Moore Industries' unit. This information is keyed to the serial number. Whenever service data is required on a unit, it is necessary to provide the factory with the serial number. This information is engraved on the printed circuit board of the unit.

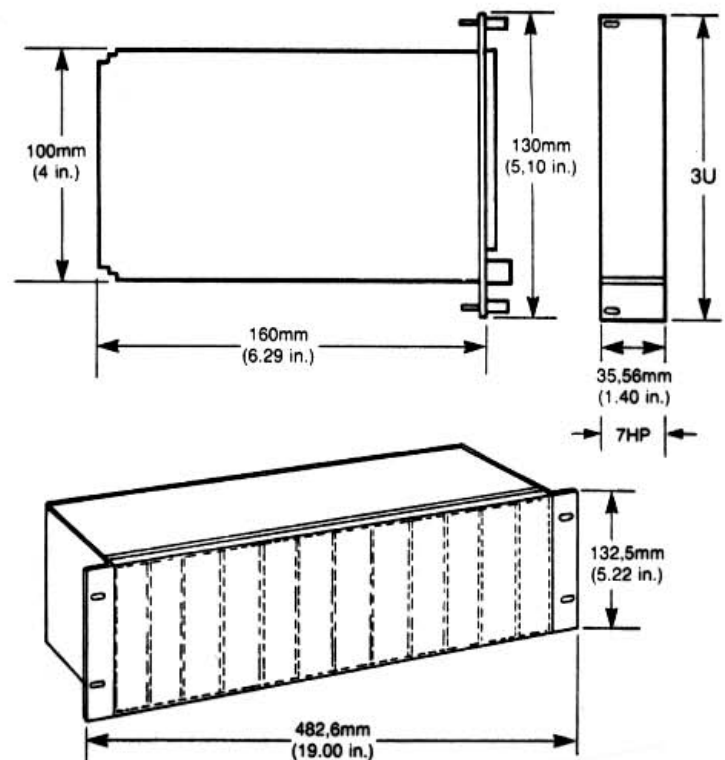


Figure 1. RBT-EU Installation Dimensions

Important Note: This document is complete as of the printing date; however, subsequent product changes may be reflected in companion documents.

RBT-EU

Specifications

Characteristics: RBT-EU	Ordering Specifications	
<p>Front Panel Adjustments Adjustable with multiturn potentiometers Span: With full scale input, adjusts output to 100% $\pm 10\%$ Zero: With minimum input, adjusts output to 0% $\pm 10\%$</p> <p>Calibration Capability Linearity and Repeatability $\pm 0.1\%$ of span $\pm 0.25\%$ of span for LSA</p> <p>Ambient Temperature Range -18°C to $+82^{\circ}\text{C}$ $(-4^{\circ}\text{F}$ to $+180^{\circ}\text{F})$</p> <p>Performance Ambient Temperature Effect: $\pm 0.005\%/^{\circ}\text{F}$ over above specified range Frequency Response: 5 Hz maximum at the -3dB point Isolation: Input, output, and power input are transformer isolated with no dc connections. Common mode rejection exceeds 120dB at 60 Hz with a limit of 500 volts rms.</p> <p>Weight Approximately 11ozs (300 grams)</p>	<p>Input 0-5 through 10 Ω change 0-10 through 20 Ω change 0-20 through 40 Ω change 0-40 through 80 Ω change 0-80 through 160 Ω change 0-160 through 320 Ω change 0-320 through 640 Ω change</p> <p>Output Operational amplifier feedback current source; output limited to 150% of maximum output range value Current: 0-20mA into 0-1200Ω load 1-5 MA into 0-4800Ω load 4-20 MA into 0-1200Ω load 10-50 MA into 0-480Ω load Voltage: 0-5V, 1-5Vdc standard into 20KΩ minimum; 0-10Vdc standard into 40KΩ Ripple: 10 MV P/P at maximum span and maximum load resistance. Load Effect: $\pm 0.01\%$ of span from 0 to maximum load resistance (current output)</p> <p>Power 24Vdc, 5 watts nominal. Line Voltage Effect: $\pm 0.005\%$ / 1% line change</p>	<p>Options</p> <ul style="list-style-type: none"> -CS Coding strip -DI Dual Input -DO Dual Output -DT Differential temperature input -EZ Zero Elevation -FNL Foxboro nickel linearization -FU Power fuse, 400mA -LNN Linearization Standard 120Ω nickel 100Ω platinum -LNP Linearization Standard 100Ω platinum -LSA Lower span (2-5Ω) -RO Reverse output, current or voltage <p>Housings EUR Eurocard</p>
<p>When Ordering Specify: Unit / Input / Output / Power / Options [Housing]</p> <p>Model number example: RBT-EU / 3W20-40 / 4-20MA / 24DC / -EZ100 [EUR]</p>		

Table 1. RBT-EU Specifications

Calibration

This section provides information necessary to adjust and calibrate the unit. Each unit is adjusted and checked at the factory for proper performance before shipping.

After the RBT-EU unit is unpacked, general operation level checks of the individual unit are recommended. Generally these checks, which are specified in the Calibration portion of this section, require little or no adjustments.

Control Description and Location

The RBT-EU has ZERO and SPAN controls located on the front panel of the unit. Each of these controls has a multiturn potentiometer that is adjustable with a blade screwdriver.

CAUTION

The screwdriver blade should not be more than 0.1 inches (2.54 mm) wide. A wider blade may cause permanent damage to the potentiometer mounting.

The type of potentiometer used with these controls usually requires 20 turns of the shaft to move the wiper from one end of its range to the other. It is equipped with a slip clutch at each end to prevent damage if the control is turned beyond the wiper stop. Usually a slight change can be felt when the clutch is at the end of a range (i.e., it is slipping). However, if this change is not felt, either end can be reached by turning the shaft 20 turns in the desired direction.

Equipment and Tools Required

Test equipment and tools required to calibrate the RBT-EU are listed in Table 2. Test equipment and tools are not supplied with the unit and must be provided by the user.

Calibration Setup

Off-line calibration for all RBT-EU units requires the same test equipment setup regardless of the physical configurations or types of options used. Refer to the test equipment setup for unit calibration as shown in Figure 2 or 3.

Table 2. Test Equipment and Tools Required

Equipment or Tool	Characteristics	Purpose
Screwdriver (blade)	Blade not wider than 0.1 inches (2.54 mm)	Front panel control adjustments
Resistance Decade Box	Must be capable of producing signal ranges defined by INPUT requirements of purchased unit.	Simulate input signal
DC Voltmeter	Must be accurate to within $\pm 0.05\%$ or better	Output signal monitoring (voltage outputs only)
DC Milliammeter	Must be accurate to within $\pm 0.05\%$ or better	Output signal monitoring (current outputs only)

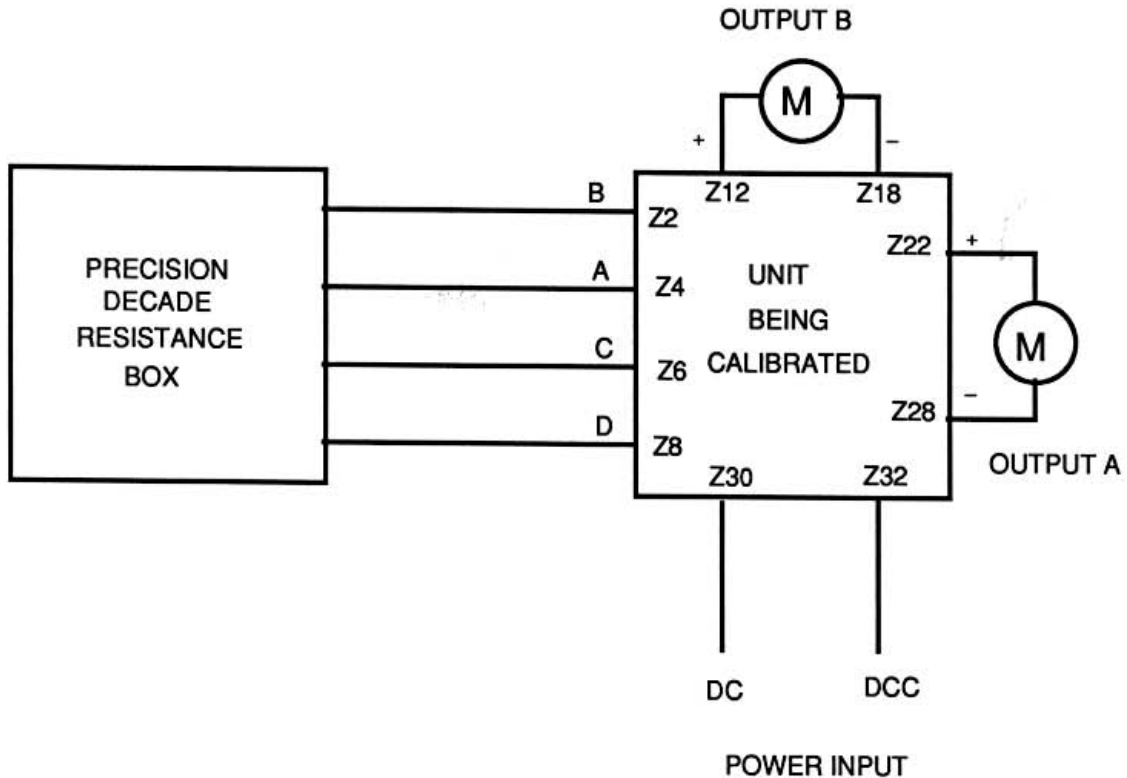


Figure 2. Test Equipment Setup for Calibration of the RBT-EU and RBT-EU Dual Output

Calibration Procedure

Calibration consists of simulating the input signal and adjusting the unit to obtain the specified output. An adjustable input signal source and input and output monitoring devices are required.

For All Units (without LNP option):

1. Connect the unit and test equipment as shown in Figure 2 or 3. For RBT-EU dual output units, connect the unit one output at a time as instructed in the figure.
2. Connect the resistance box to the input of the unit.
3. Adjust the resistance box to a value, in ohms, equal to the minimum resistance of the bulb to be used in actual operation.
4. Adjust the ZERO potentiometer to obtain 0% output (1 MA, 4 MA, 10 MA, 1 VDC, or whatever the specified 0% output is for the unit) with the minimum resistance connected to the input per step 3.
5. Adjust the resistance box to a value, in ohms, equal to the maximum input specified for the unit.
6. Adjust the SPAN potentiometer to obtain 100% output with the maximum input signal applied per step 5.
7. Repeat steps 3 through 6 until no further adjustment of either the ZERO or SPAN potentiometer is required.
8. Apply 0% input plus 25%, 50%, and 75% of the span successively and check that the output is linearly proportional (to within $\pm 0.1\%$ of the span).
9. After step 8 has been successfully completed, turn off the power to the unit and disconnect the test equipment.

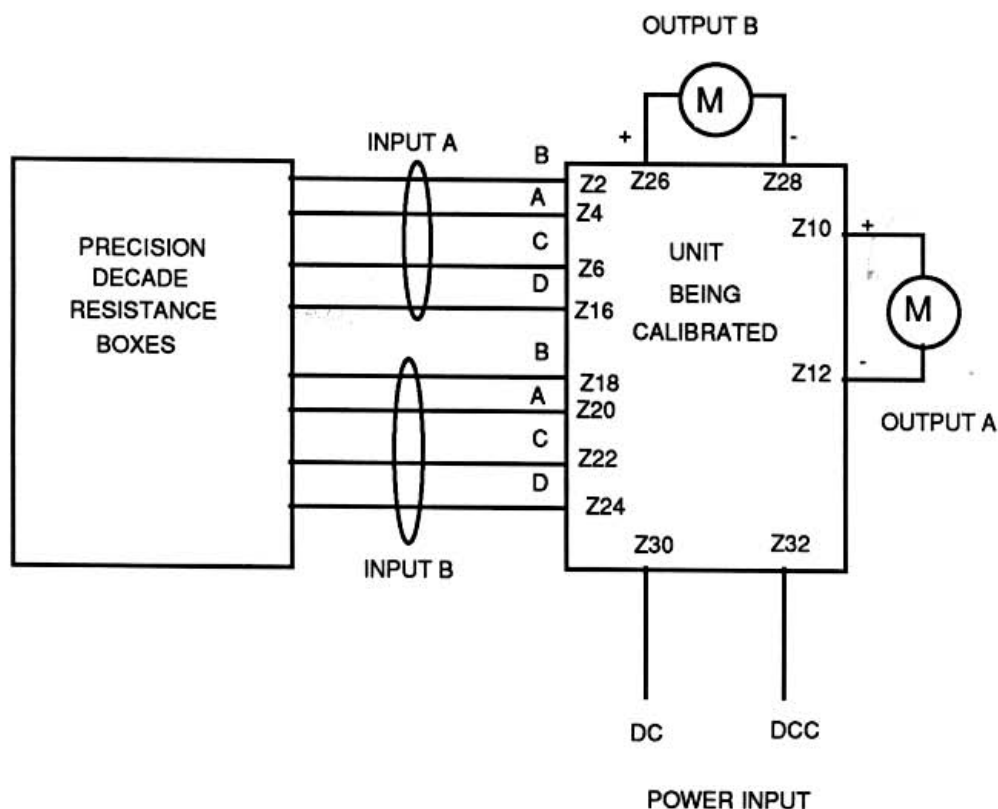


Figure 3. Test Equipment Setup for Calibration of the Dual Channel RBT-EU

For Units With LNP Option:

1. Connect the unit and test equipment as shown in figure 2 or 3. For RBT-EU dual output units, connect the unit one output at a time as instructed in the figure.
2. Connect the resistance box to the input of the unit.
3. Adjust the resistance box to a value, in ohms, equal to the minimum resistance of the bulb to be used in actual operation.
4. Adjust the ZERO potentiometer to obtain 0% output (1 MA, 4 MA, 10 MA, 1 VDC, or whatever the specified 0% output is for the unit) with the minimum resistance connected to the input per step 3.
5. Adjust the resistance box to a value, in ohms, equal to the maximum input specified for the unit.
6. Adjust the SPAN potentiometer to obtain 100% output with the maximum input signal applied per step 4.
7. With the decade box set to a value equal to the mid point of the span, adjust the mid point control for an output of 50%. If 50% output cannot be obtained, make a slight MIDSCALE control adjustment in the direction of the required value and then readjust the ZERO and SPAN controls.
8. Repeat steps 2 through 7 until no further adjustment is required.
9. After step 8 has been successfully completed, turn off the power to the unit and disconnect the test equipment.

Installation

This section provides information for mechanical installation, electrical connections, and power connections for the RBT-EU. The front panel dimensions for the unit are shown in Figure 1.

Mechanical Installation

Rack Mounted (RMR-EU) Euro-Card Rack. These rack enclosures are designed to be flush-mounted in a standard 19-inch relay rack. Twelve position RMR racks are available. Each enclosure is provided with standard EIA hole patterns and is rear-accessed for rack wiring convenience. DC power supplies are available. Refer to the Electrical Connections portion of the installation section for a more detailed description of electrical connections to the card rack. Individual PC cards are front loaded. Edge connectors can be keyed to assure that the units are plugged into the proper position. Key positions may be altered in the

field if the system configuration changes. Filler cards are available for positions not used by any modules.

Electrical Connections

Terminals used for electrical connections for both standard and optional units are listed in table 3.

All electrical connections are made to the terminals on the mating connector of the unit, located in the rack. No special wire or cable is required for signal connections (The terminals are designed for 16AWG maximum wire size).

To avoid transients and stray pickups, it is recommended that twisted conductors be used where the signal wires run close to other services (i.e., power wiring). The DC power source should be regulated to within $\pm 10\%$ of the nominal voltage and should be capable of delivering 5 watts.

Table 3. Terminal Nomenclature for the RBT-EU

Terminal Positions																	
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	ROW
RBT	B	A	C	D							+OUT			-OUT	(+) DC	(-) DCC	Z
RBT DUAL OUT	B	A	C	D		+OUT B			-OUT B		+OUT A			-OUT A	(+) DC	(-) DCC	Z
RBT DUAL CHANNEL	B	A	C		+OUT A	-OUT A		D	B	A	C	D	+OUT B	-OUT B	(+) DC	(-) DCC	Z

Legend: DC +DC Power Input A, B, C, & D Signal Input
 DCC -DC Power Input \pm OUT Signal Output

Theory of Operation

This section describes the unit operation. The functional description is based on the block diagram in figure 4.

The RBT-EU is a device that senses a resistance variation in a temperature bulb. By passing a current through the temperature bulb, a changing dc level is sensed across the unit input terminals whenever the temperature bulb resistance changes. This signal is chopped into ac and buffered by the input section components. The resultant signal is coupled to the output section by a transformer, thus isolating the sections from each other. The output section restores the ac from the transformer to dc and provides power to the output terminals.

Power Supply Circuit

Units are supplied for use with a dc power input that is applied directly to the power inverter, with diode protection to prevent damage to the power inverter if the dc power input is accidentally connected with reverse polarity.

Power Inverter Circuit

The power inverter produces a number of different ac (square wave) and dc outputs from the dc applied to its input. Four separate square-wave outputs at approximately 3KHz are developed. These are used as (a) the power source for the resistance bulb excitation and zero adjust circuit, (b) the drive voltages for the two input switches, and (c) the drive voltage for the demodulator.

Two isolated sets of regulated (+) and (-) dc outputs are also produced and used as operating voltages for the amplifiers in the input section of the unit. The inverter also produces a higher (+) dc output as the operating voltage for the power amplifier.

Resistance Bulb Excitation Source Circuit

The resistance bulb excitation source develops the voltage (or current) that is ultimately applied to the resistance bulb. The excitation source accepts the 3KHz voltage from the power inverter and converts it to an adjustable regulated dc voltage or current output. This dc output is applied through the lead length compensation and zero adjust circuit as excitation to the resistance bulb.

Lead Length Compensation and Zero Adjust Circuit

The circuit is arranged as a bridge (except for the 320-640 Ω range) with the resistance bulb serving as one leg between A and B. The resistance of each lead between the transmitter and the resistance bulb is effectively in the circuit, too. However, the effect of the resistance in leads A and B is cancelled because these leads are effectively connected to opposite sides of the bridge circuit. This leaves only the resistance of lead C to be compensated for, and this is accomplished by the zero adjust circuit. The voltage across the resistance bulb, modified by the zero adjust circuit, is then applied to the series input switch.

With a resistance change of 320-640 Ω , the circuit is arranged differently to maintain the required linearity over a wide variation in resistance of the bulb. Instead of being in a bridge circuit, the resistance bulb is supplied with a constant current. The zero adjust circuit then modifies the resulting voltage variation with resistance change so the unit produces the desired output range (normally in a ratio of 1:5) of either current or voltage.

Input Switches

The input switches produce a 3KHz square-wave output with an amplitude proportional to the input signal applied to the unit. Each switch is operated by a separate 3KHz square-wave drive signal from the power inverter. During one half of the drive signals, the series switch passes the composite input signal to

RBT-EU

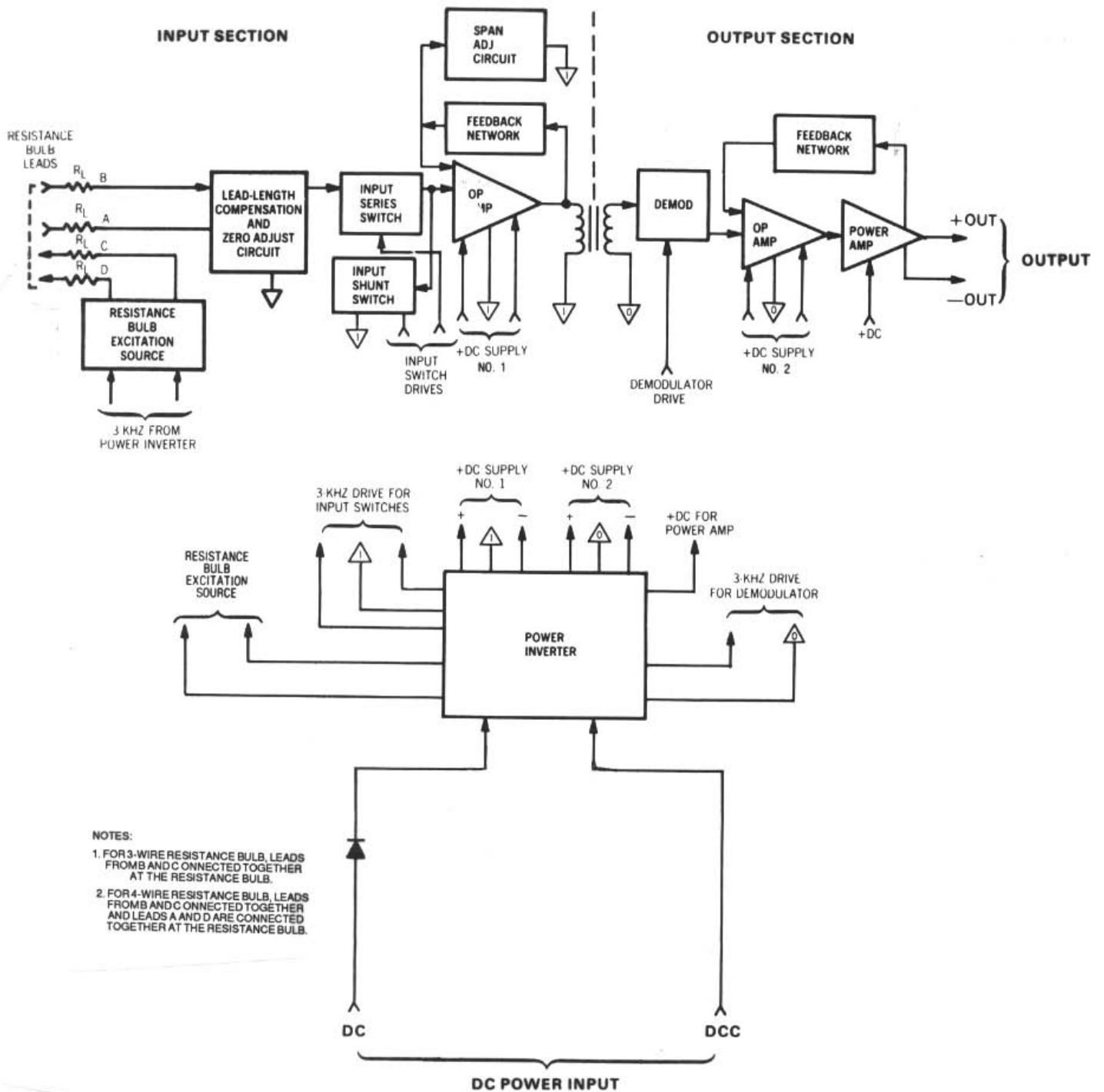


Figure 4. RBT-EU Block Diagram

the input of the next stage (operational amplifier). At the same time, the drive signal applied to the shunt switch causes this switch to act effectively as an open circuit. During the next half cycle of the drive signals, the series switch opens and the shunt switch acts as a short-circuit to the ground. In this manner, the dc input signal is chopped into a proportional 3KHz signal so ac coupling can be used from this point to the demodulator. The use of both a series and a shunt switch for chopping virtually eliminates any loading of the composite input signal by the circuit following the switches.

Operational Amplifier Circuit

The operational amplifier following the input switches is used to provide gain and a low impedance source for driving the primary of the isolation transformer between the input and output sections. High stability is achieved through the use of feedback. In addition, the gain of the amplifier is varied by the span adjust circuit to establish the maximum output signal when the maximum specified signal is applied to the input of the unit. The transformer couples the signal from the output of the operational amplifier to the output switch and also completely isolates the input section from the output section of the unit.

Demodulator Circuit

The demodulator accepts the 3KHz signal from the secondary of the transformer and converts it back into a proportional dc level. The power converter provides a 3KHz demodulator drive signal that is out of phase with the drive signal applied to the series input switch. This phase relationship between the two drive signals satisfies the drive requirements for simultaneous (i.e., synchronous) identical switching action of solid-state devices with opposite-type channels, thereby assuring proper operation of the unit.

Output Circuit

The output circuit consists of an operational amplifier and power amplifier. Feedback is used to achieve high stability and a nearly ideal output impedance for the type of output used. The operational amplifier operates from the higher positive voltage from the power inverter.

Maintenance

In general, maintenance is limited to checking that the unit is properly seated in the rack and that the electrical connections are tight and free from corrosion. Periodically, the calibration of the unit may be checked.

Troubleshooting

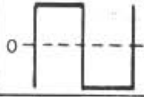
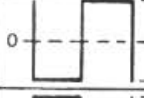


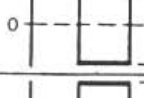
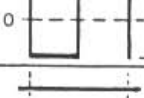
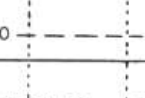
The schematic diagrams include flagged numbers at various points in the circuit. Table 4 gives the voltages and waveforms at these points for specified input signal conditions. The assembly drawings show the physical locations of the parts on the circuit board.

In general, troubleshooting is carried out by tracing the signal with an oscilloscope and referring to the schematic diagram to determine what component might be causing an observed abnormal indication. If the original symptom was a complete failure of the unit to operate, the most likely components to suspect are those associated with the power supply. If the unit is producing an incorrect (but not zero) output, check the outputs from the voltage regulator, and, if these are normal, apply a standard input signal and trace the resulting signal through the unit.


Drawings

This section consists of assembly and schematic drawings, and a list of materials.

Table 4. Waveforms and Voltages

TEST POINT(S)	WAVEFORM AND AMPLITUDE OR VOLTAGE LEVEL
1	 37V
2	 37V
3	 (APPROXIMATELY EQUAL TO INPUT AMPLITUDE)
4	 1 to 5V
5	 0.4 to 2V
6	 40V
7,8	 0.2 to 1V

~ 333μs

TEST POINT	WAVEFORM	POWER INPUT AND WAVEFORM AMPLITUDE	
		24VDC/117VAC/220VAC	45VDC
9	 A	48V	90V

~ 333μs

(This page intentionally left blank)

RBT-EU

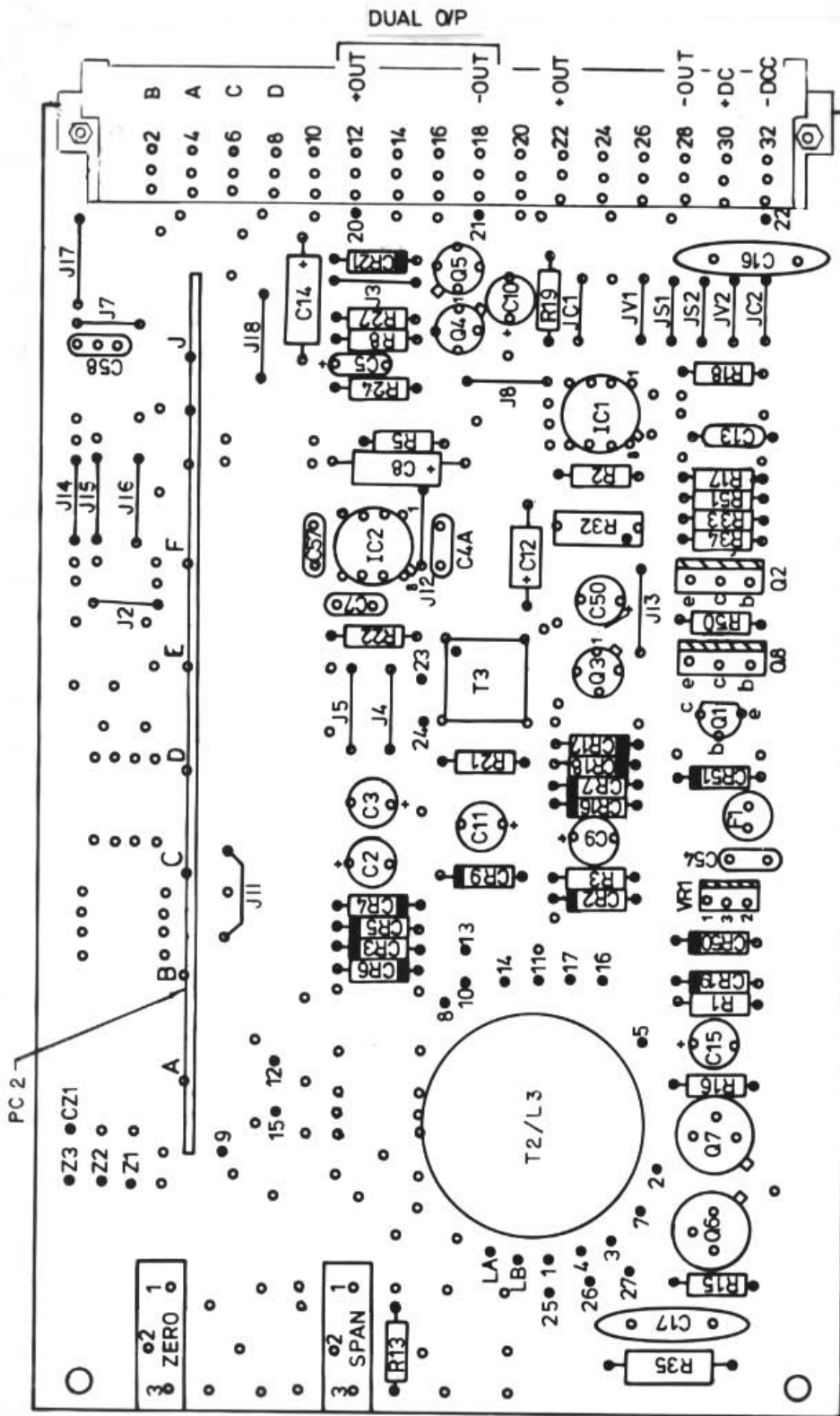


Figure 5. PC1 Assembly, Ranges A-F and LSA Option

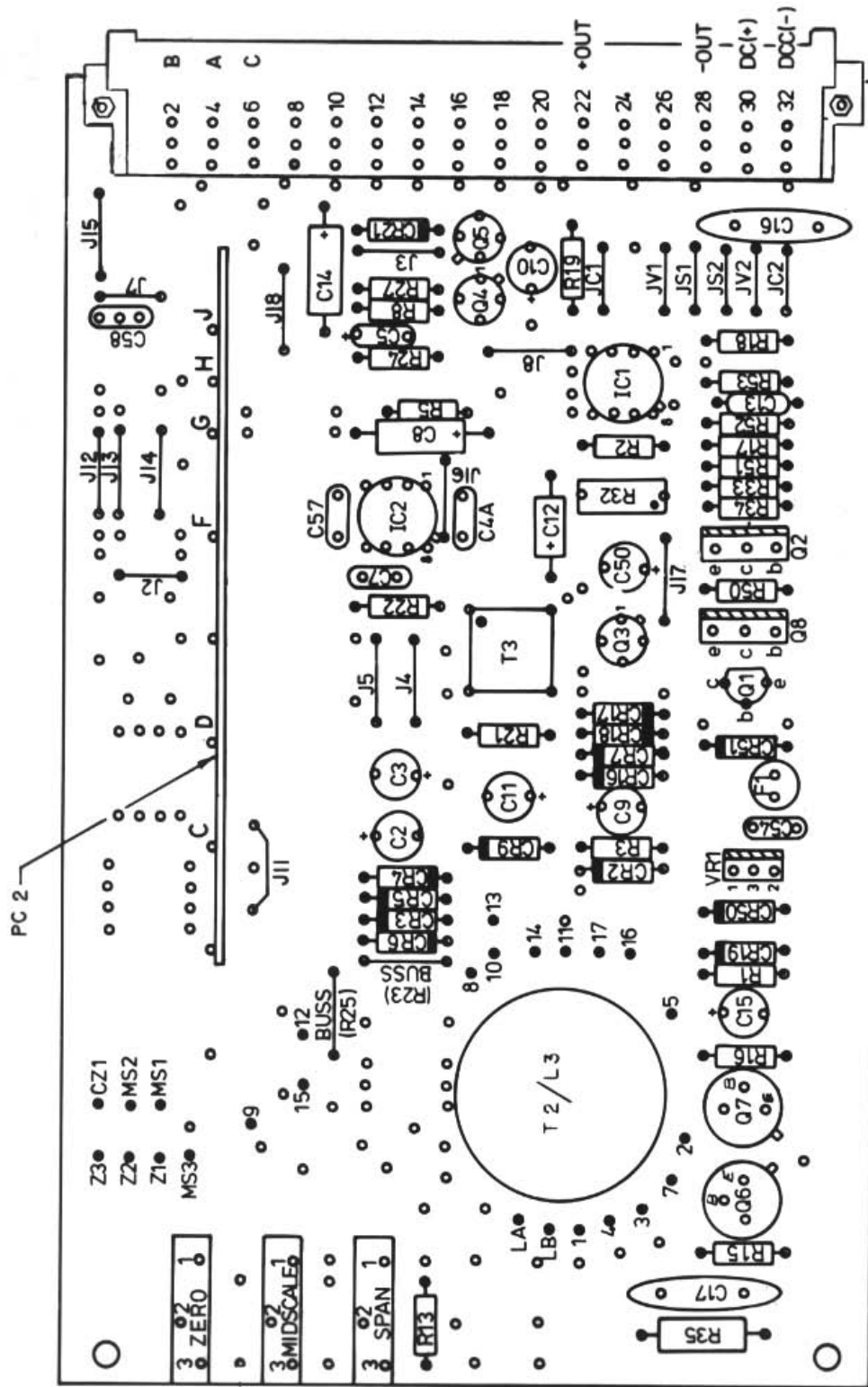


Figure 6. PC1 Assembly, FNL/LNN/LNP Options

RBT-EU

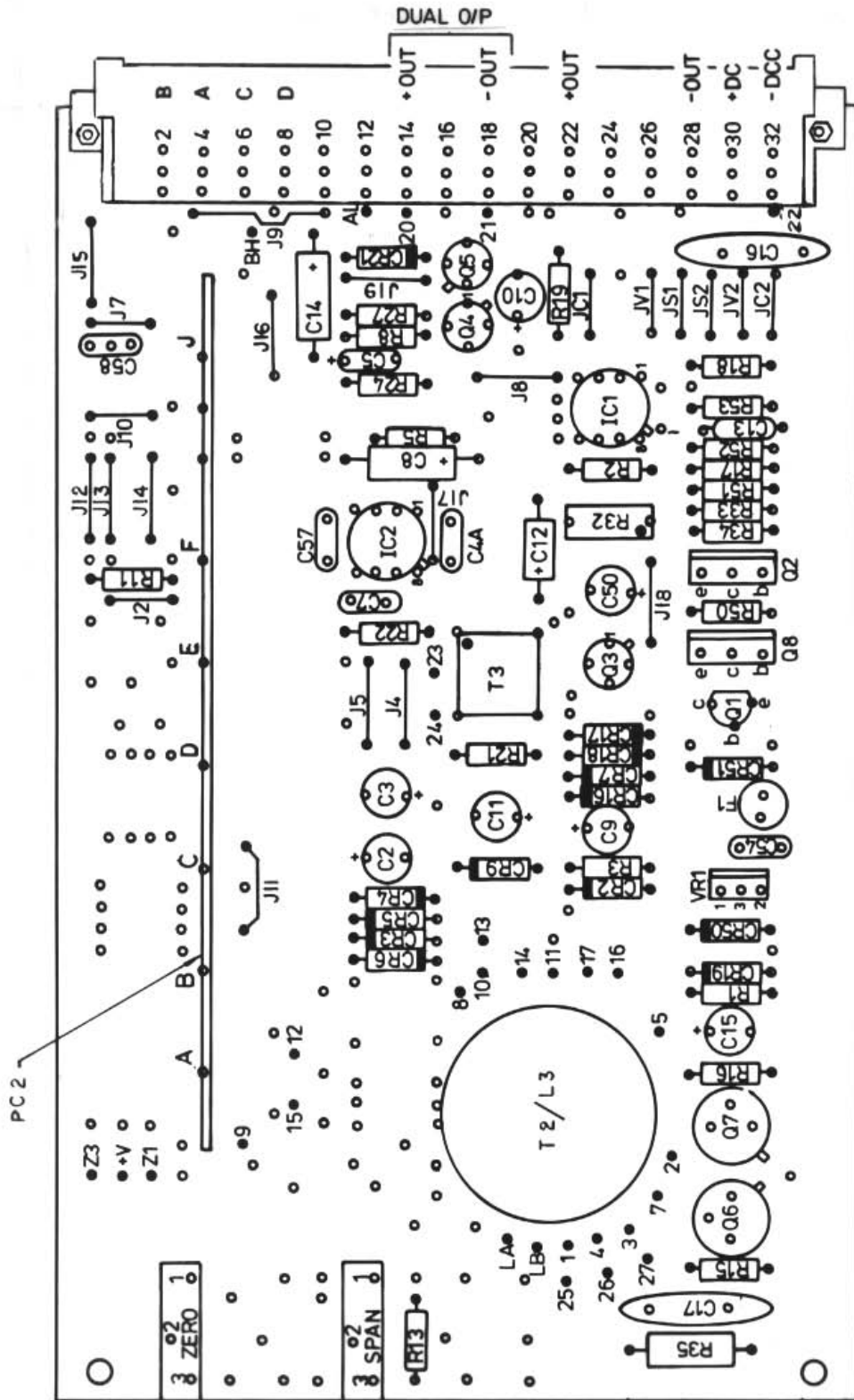


Figure 7. PC1 Assembly, DT Option

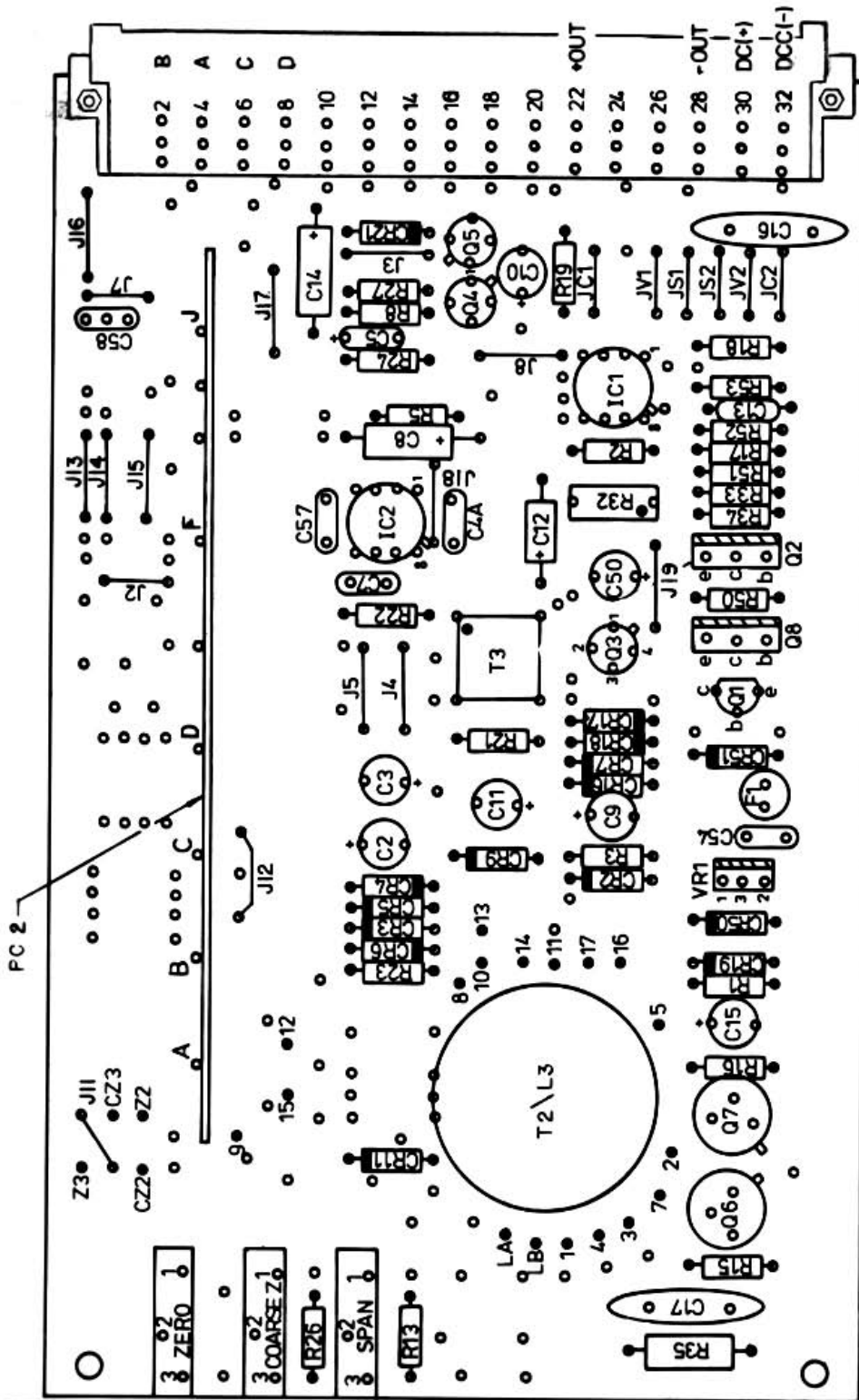
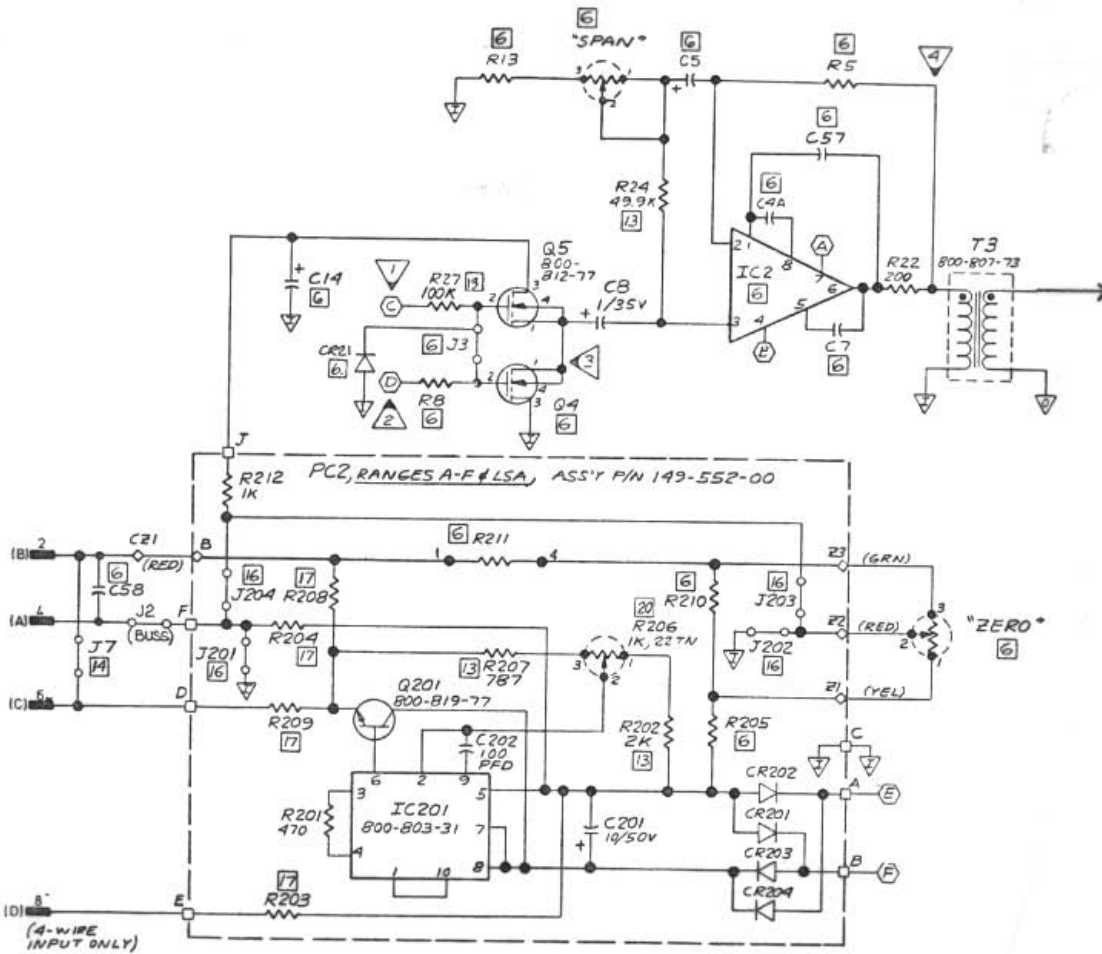


Figure 8. PC1 Assembly, Range G and RO Option

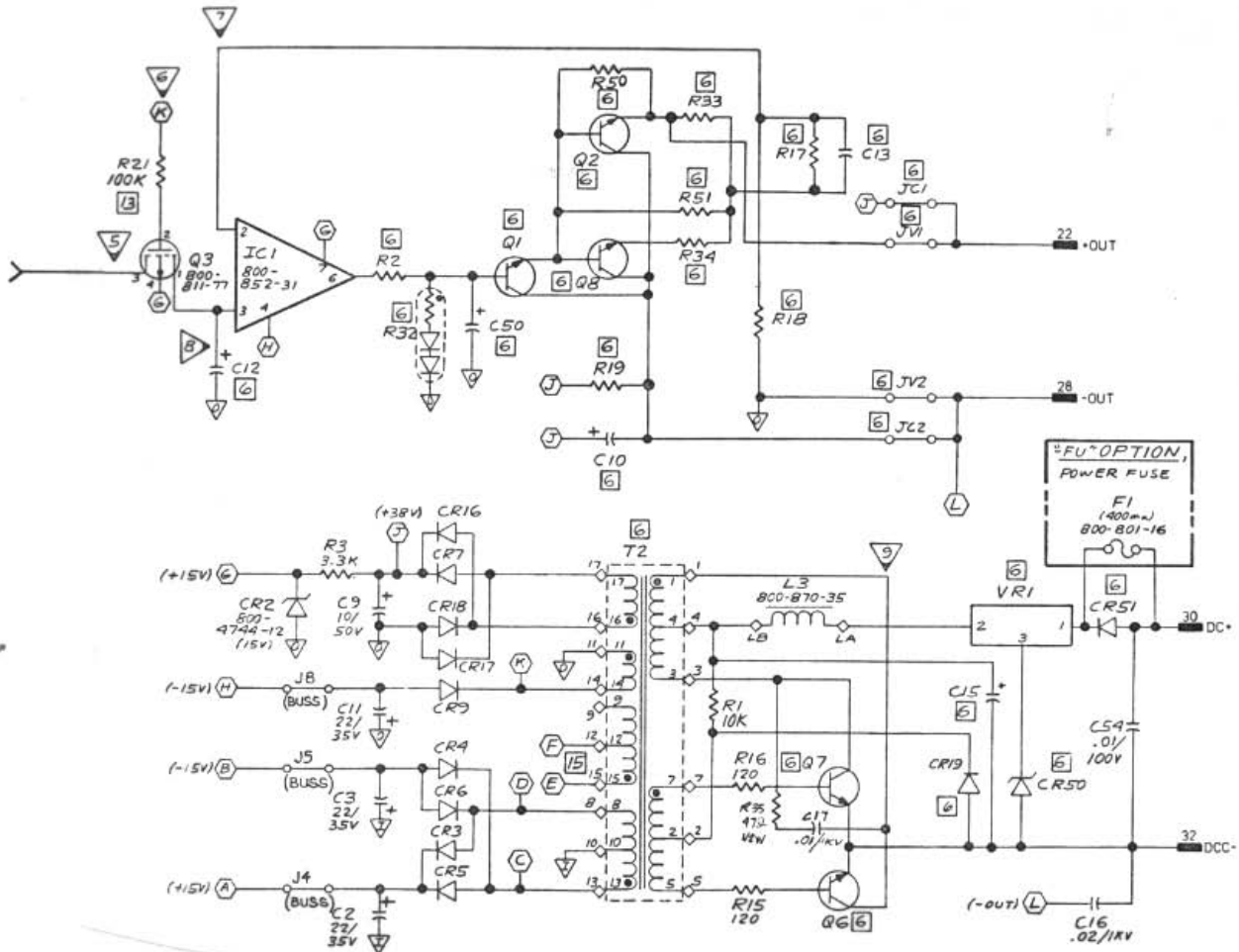
RBT-EU



- 13. METAL FILM RESISTOR, KMS5C, ± 1% TOL.
- 12. TEST POINTS; FILLED END IS POINTER. REFER TO SECTION 5 OF MANUAL, "MAINTENANCE."
- 11.
- 10. INDICATES INPUT SECTION COMMON (GROUND).
INDICATES OUTPUT SECTION COMMON (GROUND).
- 9. INDICATES PLUG-IN CONNECTOR POSITION.
- 8. INDICATES IDENTIFIED WIRING PAD ON P.C. BD.
- 7. INDICATES PC1/PC2 INTERCONNECT PIN.
- 6. SEE LIST OF MAT'L'S FOR USAGE, VALUE & P/N.
- 5. INDICATES ELECTRICAL COMMONS (SAME LETTERS); LETTERS DO NOT APPEAR ON P.C. BD. OR ASS'Y DWG.
- 4.
- 3. ALL POTENTIOMETERS INCREASE C.W. FROM 1 TO 3.
- 2. ALL DIODES ARE M.I.I. P/N 800-4148-11; ALL RESISTORS ARE 1/4W CARBON COMP, ± 10% TOL.
- 1. RESISTANCE VALUES ARE IN OHMS; CAPACITANCE VALUES ARE IN MICROFARADS.

*NOTE: UNLESS OTHERWISE SPECIFIED

Figure 9. RBT-EU Schematic (page 1 of 2)



20 ADJUST R206 FOR VOLTAGE AS FOLLOWS, MEASURED FROM C201(-) TO Q201-E:
10V, RANGES A & B; 12.5V, RANGES C-F.

19. - FOR "FNL" OPTION SEE ASS'Y 149-559-00 # SCHEMATIC 149-459-00.

- FOR "G" RANGE 2 & 3-WIRE INPUTS SEE ASS'Y 149-555-00 # SCHEMATIC 149-455-01;
IF UNIT HAS "RO" OPTION ALSO SEE SCHEMATIC 149-455-02 INSTEAD.

- FOR "G" RANGE 4-WIRE INPUT SEE ASS'Y 149-557-00 # SCHEMATIC 149-457-00.

- FOR "DT" OPTION, 3-WIRE INPUTS, RANGES A-F SEE ASS'Y 149-558-00 # SCHEMATIC 149-458-00.

- FOR "LNP" OPTION, 3-WIRE INPUT, SEE ASS'Y 149-554-00 # SCHEMATIC 149-454-00.

17 R203 & R208 ARE USED ONLY WITH 4-WIRE INPUTS; R204 ONLY FOR 2 & 3-WIRE
R209 IS BUSSED FOR 2 & 3-WIRE INPUTS. SEE LIST OF MAT'L'S FOR VALUES & P.I.N.'S.

16 J201 & J203 ARE USED UNLESS UNIT HAS "RO" OPTION, IN WHICH CASE J202 &
J204 ARE USED INSTEAD.

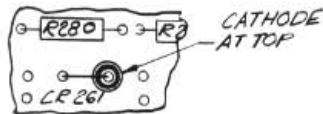
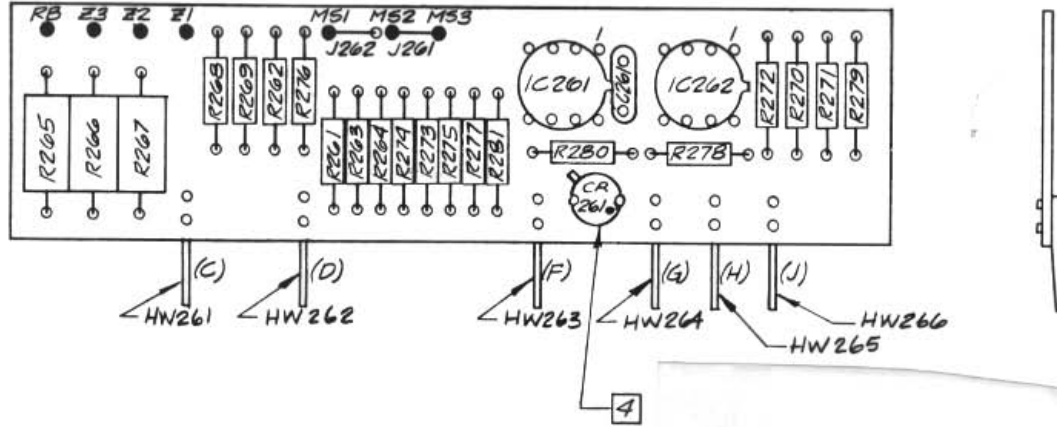
15 ON UNITS WITH RANGES A-F OR LSA & HAVING 24VDC POWER, LEADS
9 & 12 OF T2 ARE REVERSE (LEAD 12 IS NOT USED).

14 J7 IS USED FOR ALL 2-WIRE INPUTS (WITHOUT-DT OPTION ONLY).

NOTES - CONTINUED:

Figure 9. RBT-EU Schematic (page 2 of 2)

RBT-EU

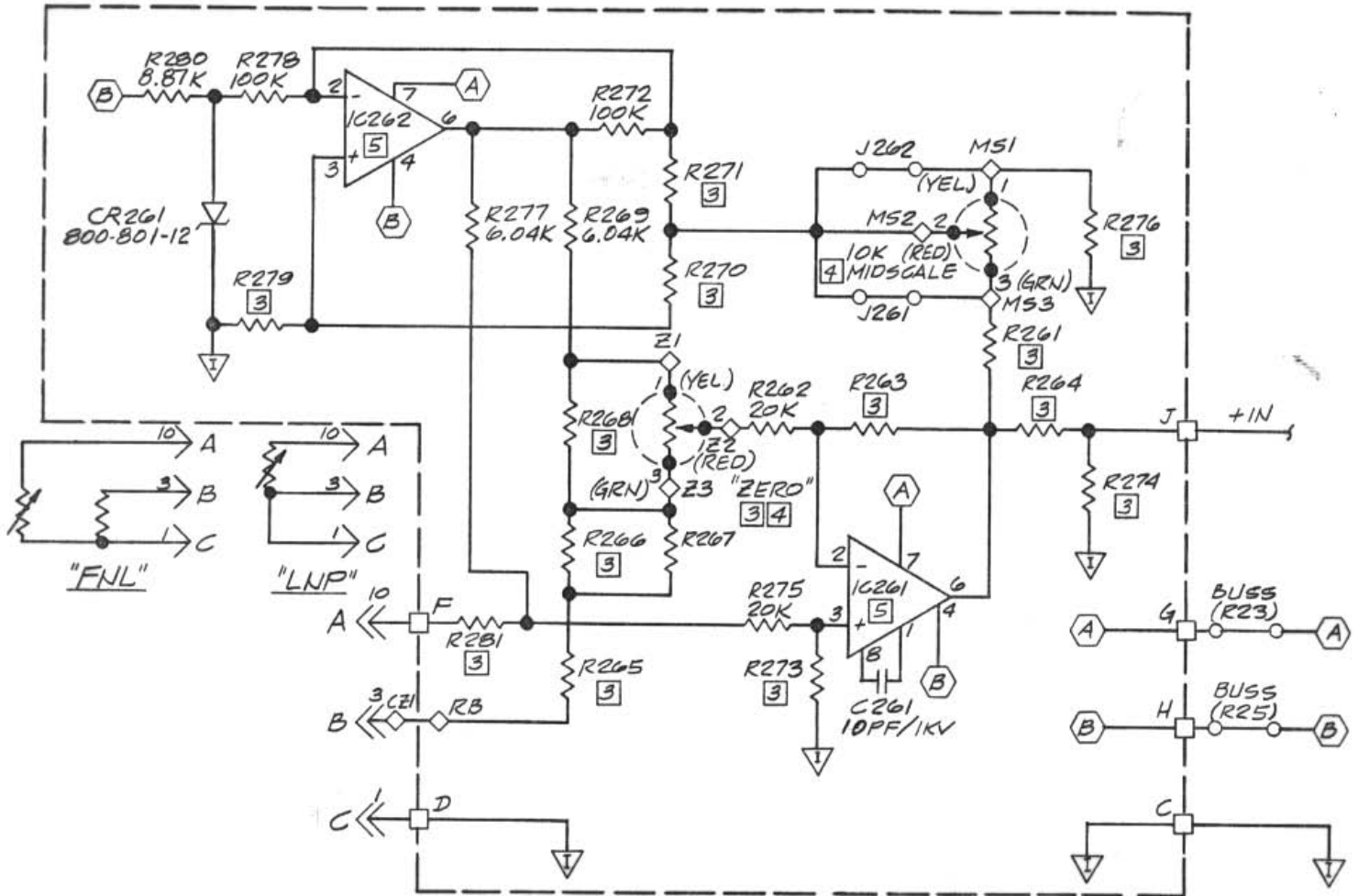


DETAIL A
ALTERNATE CR261

- 4. NOTE POLARITY DOT OR SEE DETAIL A
- 3. CUT OFF CENTER LEAD OF Q261 BEFORE INSTALLATION.
- 2. ALL JUMPERS ARE 22 AWG.
- 1. ALL LEADS MUST BE SOLDERED TO PADS.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 10. PC 2 Assembly, FNL/LNP Options

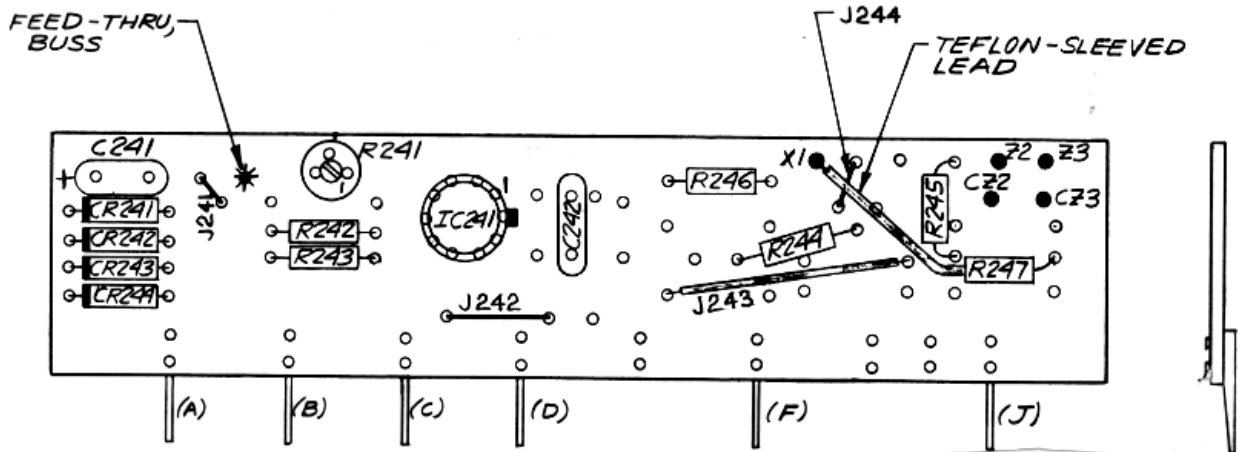


- 5 IC261 15 P/N 800-895-31
IC262 15 P/N 800-852-31
- 4 ITEM NOT MOUNTED ON
P.C. BOARD.
- 3 SEE LIST OF MATERIALS
FOR VALUE & P/N.
- 2. METAL FILM RESISTOR
(RN55C), $\pm 1\%$.
- 1. DIODES ARE M.I.I. P/N 800-
4148-11; RESISTORS ARE 1/4W.
CARB. COMP., $\pm 10\%$.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 11. PC2 Schematic, FNL/LNP Options

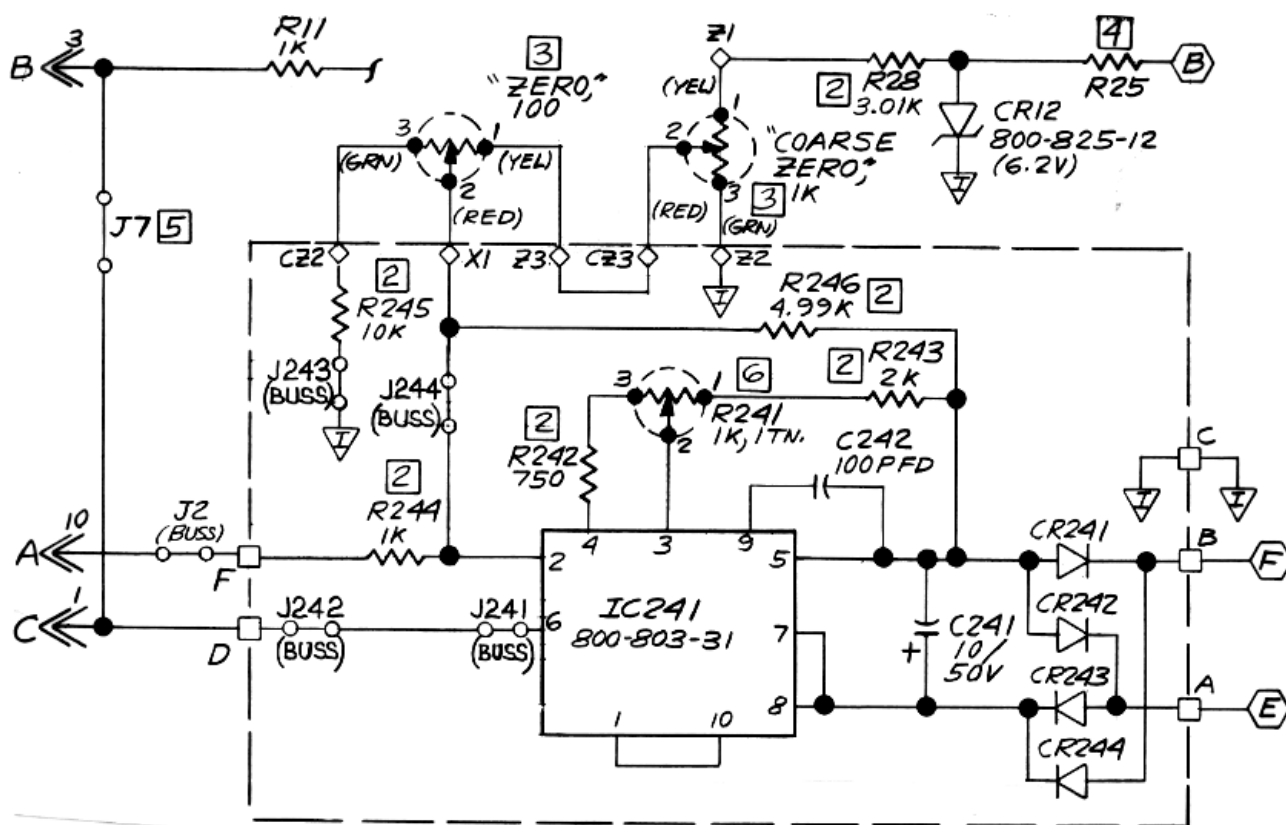
RBT-EU



1. ALL JUMPERS ARE 22 AWG BUSS, TEFLON SLEEVED AS REQUIRED.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 12. PC2 Assembly, Range G

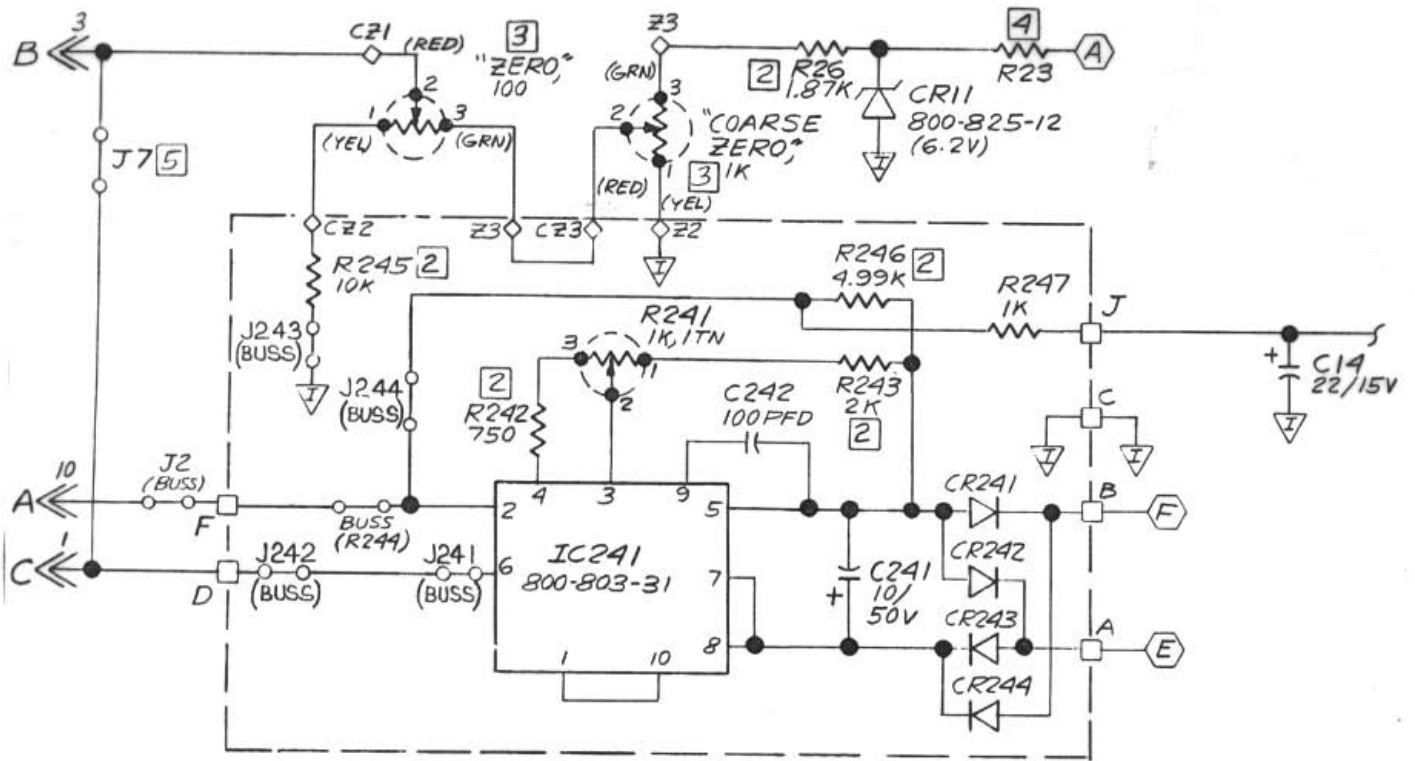


- [6] ADJUST R241 FOR 5V MEASURED ACROSS PINS 5 & 2 OF IC241.
- [5] J7 USED ONLY WITH 2-WIRE INPUT.
- [4] SEE LIST OF MAT'L'S FOR VALUE & P/N.
- [3] ITEM NOT MOUNTED ON P.C. BD.
- [2] METAL FILM RESISTOR (RN55C), $\pm 1\%$.
1. DIODES ARE M.I.I. P/N 800-4148-11; RESISTORS ARE $\frac{1}{4}$ W CARB. COMP., $\pm 10\%$.

NOTES: UNLESS OTHERWISE SPECIFIED

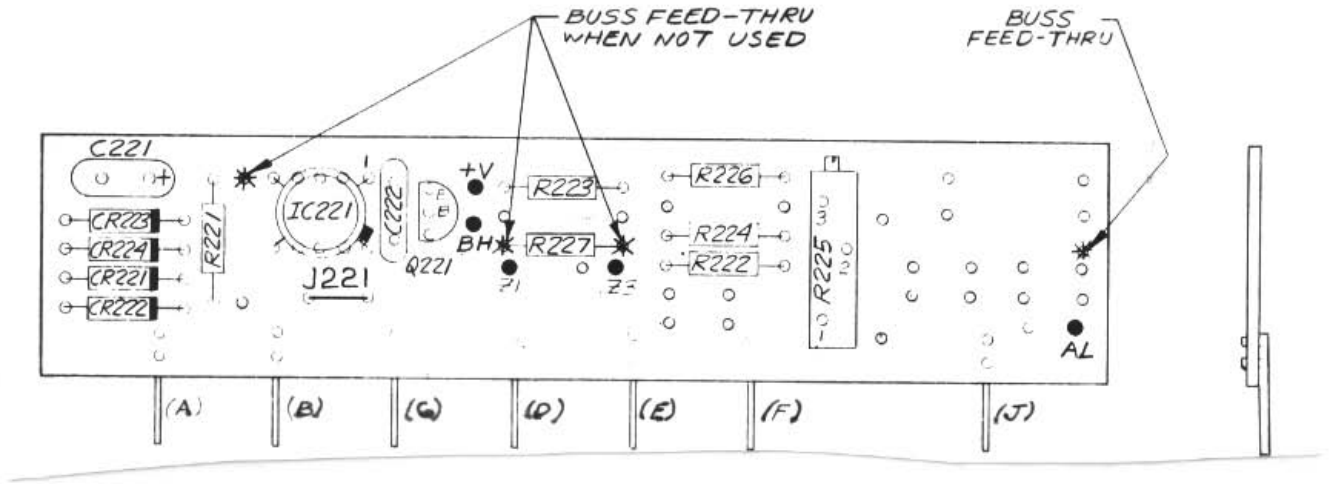
Figure 13. PC2 Schematic, Range G

RBT-EU



- ⑥ ADJUST R241 FOR 5V MEASURED ACROSS PINS 5 & 2 OF IC241.
 - ⑤ J7 USED WITH 2-WIRE INPUT ONLY.
 - ④ SEE LIST OF MAT'L'S FOR VALUE & P/N.
 - ③ ITEM NOT MOUNTED ON P.C. BD.
 - ② METAL FILM RESISTOR (RNSSC), ±1%.
1. DIODES ARE M.I.I. P/N 800-4148-11; RESISTORS ARE 1/4 W CARB. COMP., ±10%.
- NOTES: UNLESS OTHERWISE SPECIFIED

Figure 14. PC2 Schematic, Range G and RO Option

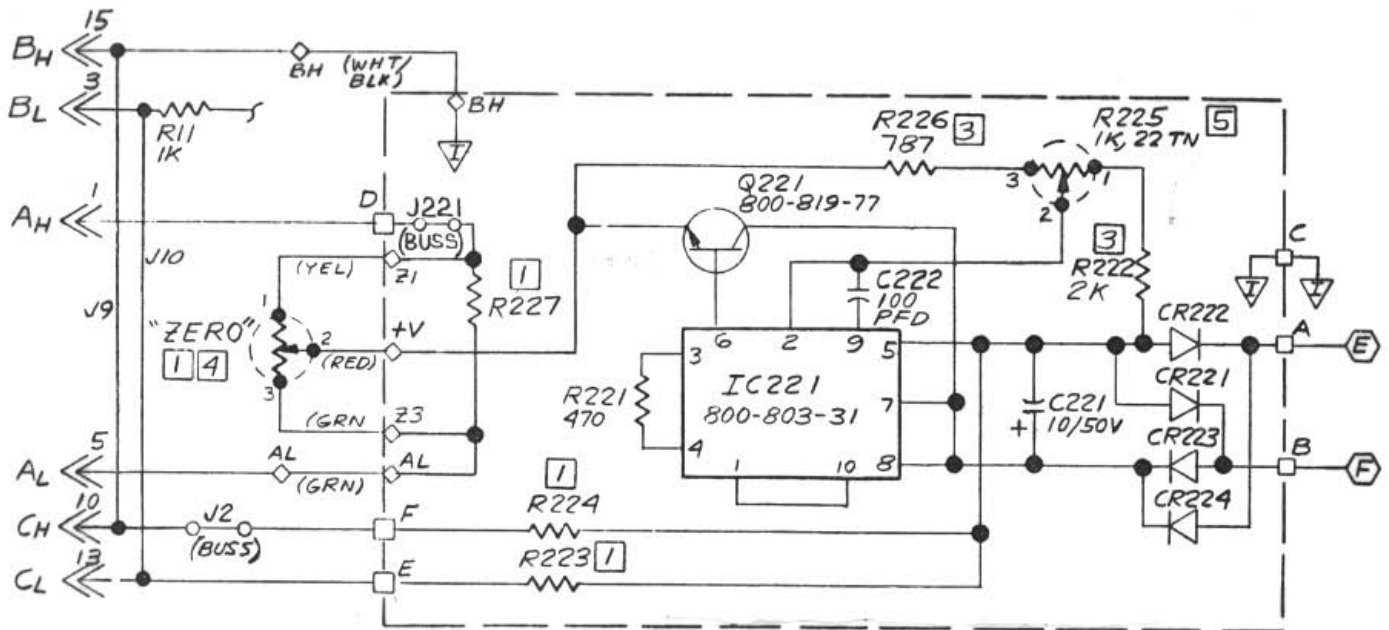


1. ALL JUMPERS 22 AWG BUSS, TEFLON SLEEVED AS REQ'D.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 15. PC2 Assembly, DT Option

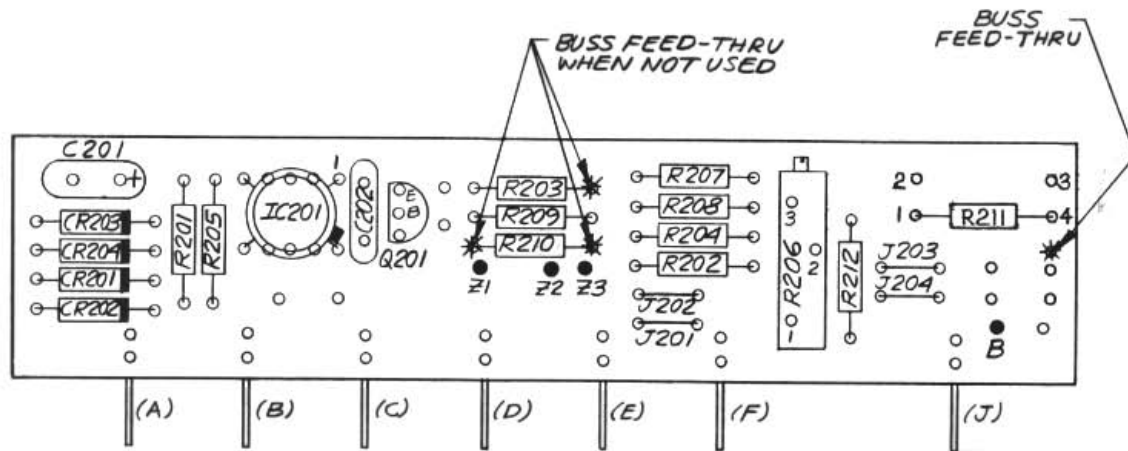
RBT-EU



- [5] ADJUST R225 FOR VOLTAGE AS FOLLOWS, MEASURED FROM IC221-5 TO Q221-E; RANGES LSA, A+B, 10V; RANGES C-F, 12.5V.
- [4] ITEM NOT MOUNTED ON P.C. B.D.
- [3] METAL FILM RESISTOR (RN55C), $\pm 1\%$.
2. DIODES ARE M.I.I. P/N 800-A148-11; RESISTORS ARE 1/4W CARB. COMP., $\pm 10\%$.
- [1] SEE LIST OF MAT'L'S FOR VALUE & P/N.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 16. PC2 Schematic, DT Option



1. ALL JUMPERS 22 AWG BUSS, TEFLON SLEEVED AS REQ'D.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 17. PC2 Assembly, Ranges A-F and LSA Option

RBT-EU

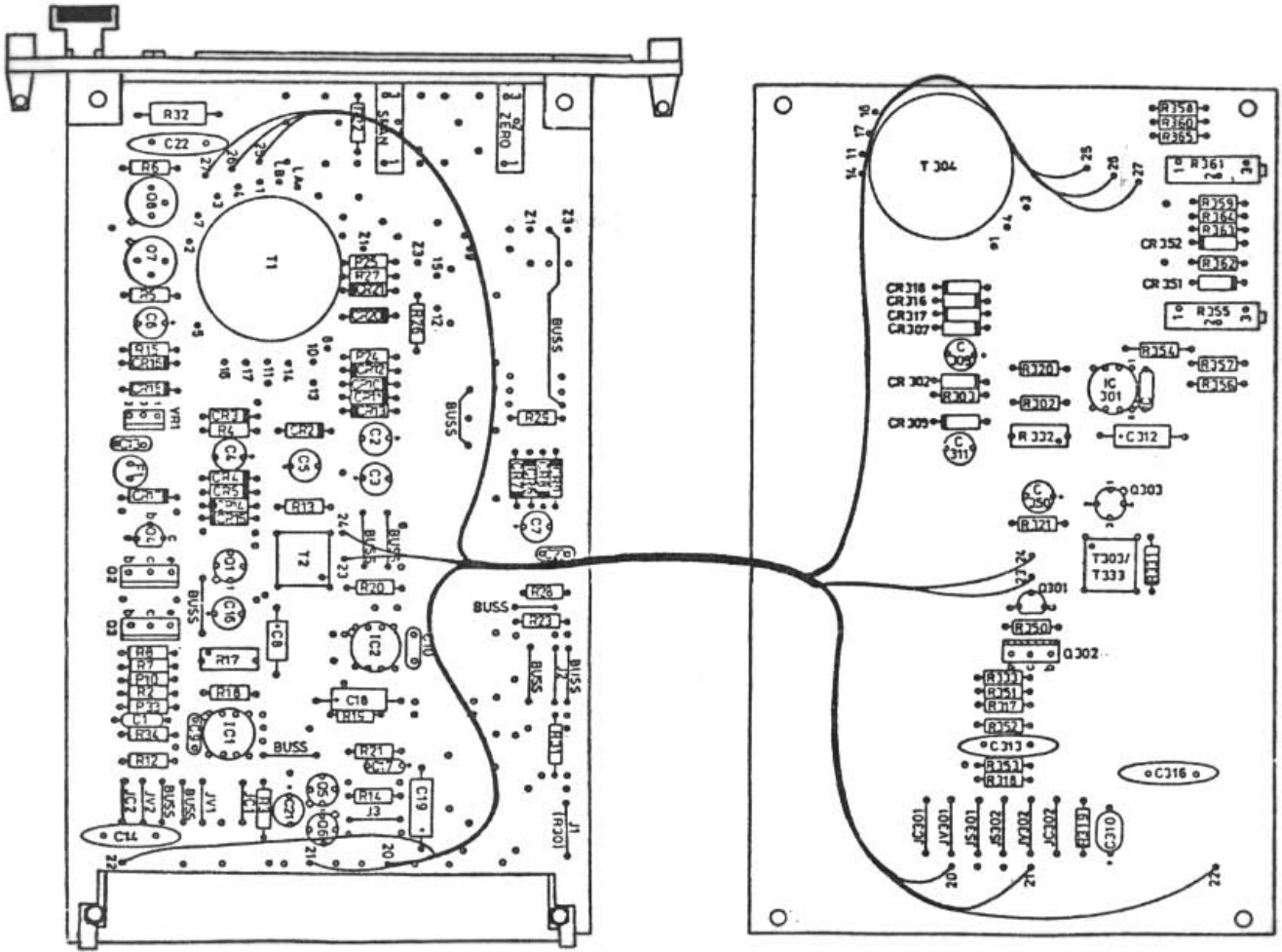


Figure 18. Dual Output Eurocard Connections

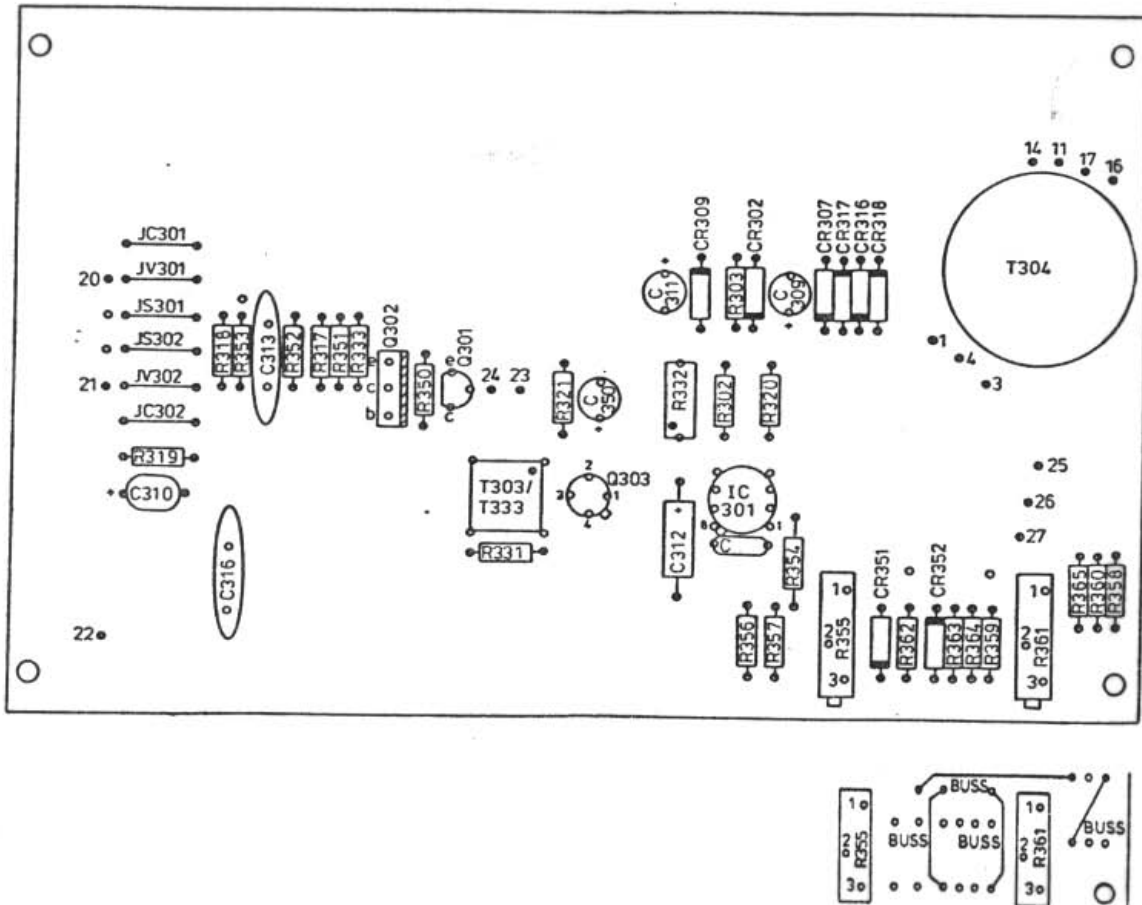
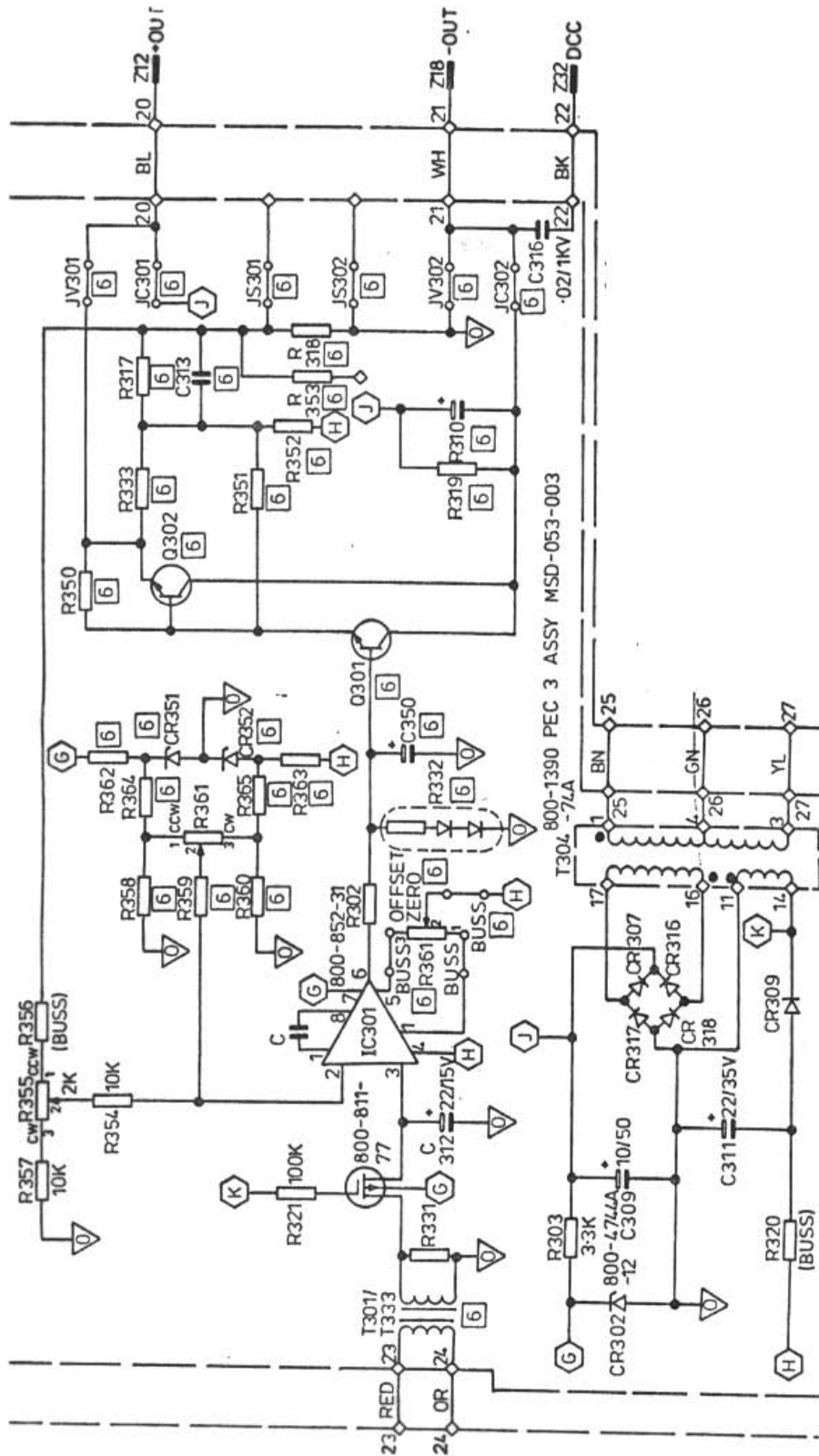


Figure 19. Dual Output Assembly

RBT-EU



- NOTES (UNLESS OTHERWISE STATED):
1. RESISTANCE VALUES ARE IN OHMS; CAPACITANCE IN MICROFARADS.
 2. DIODES ARE IN4148; RESISTORS ARE CARBON COMP (RC07G) ±10% TOL.
 3. POTENTIOMETERS INCREASE CLOCKWISE FROM PIN 1 TO PIN 3.
 4. ○ INDICATES ELECTRICAL COMMON (SAME LETTER).
 5. ITEM MOUNTED EXTERNAL OF PC BOARD.
 6. SEE LIST OF MATERIALS FOR USAGE, VALUE AND PART N°.
 7. ○ INDICATES PC1/PC2 INTERCONNECT PIN.
 8. ○ INDICATES OUTPUT SECTION COMMON (GROUND).
 9. ■ INDICATES PLUG-IN CONNECTOR POSITIONS.

Figure 20. Dual Output Schematic

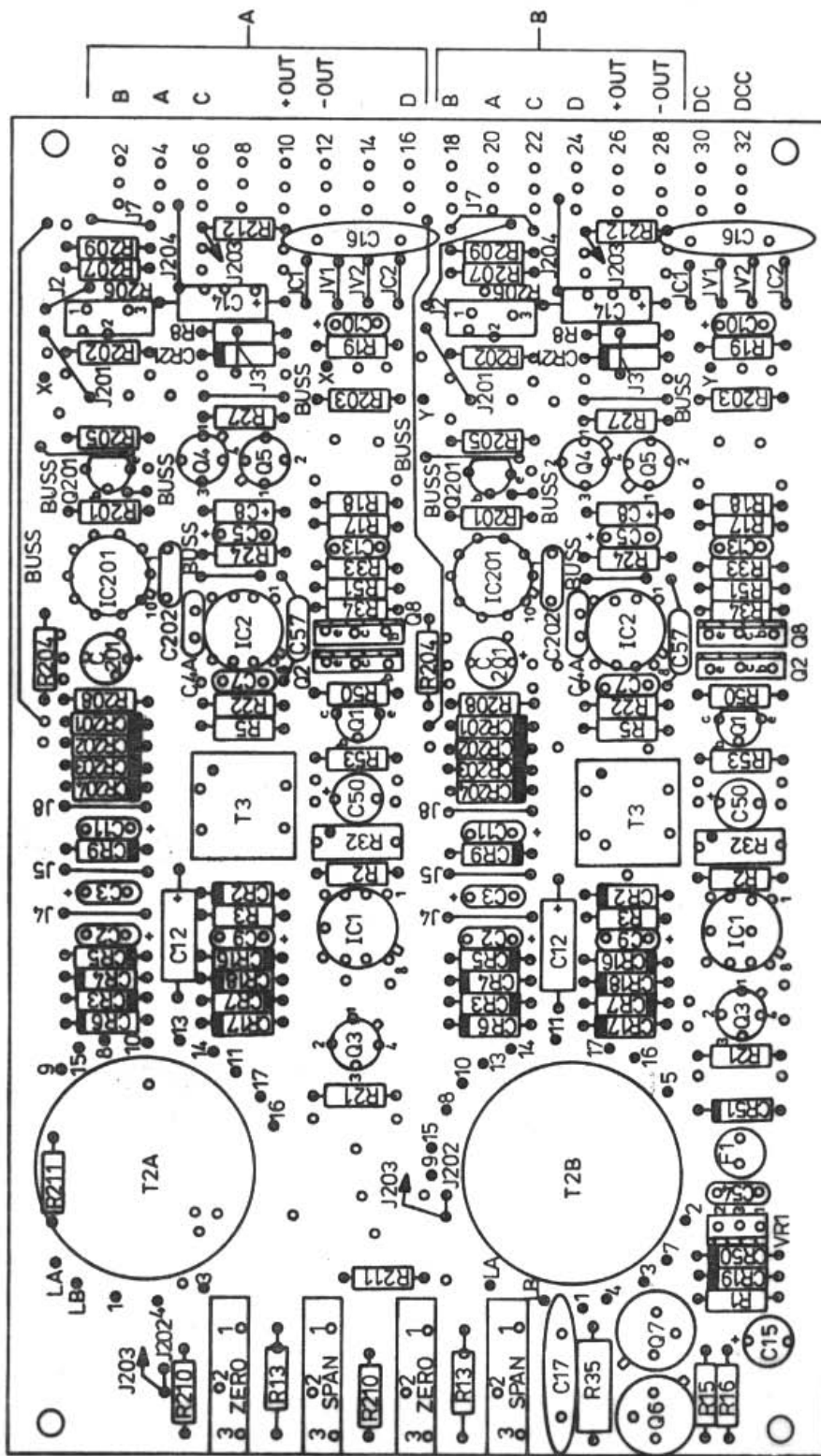
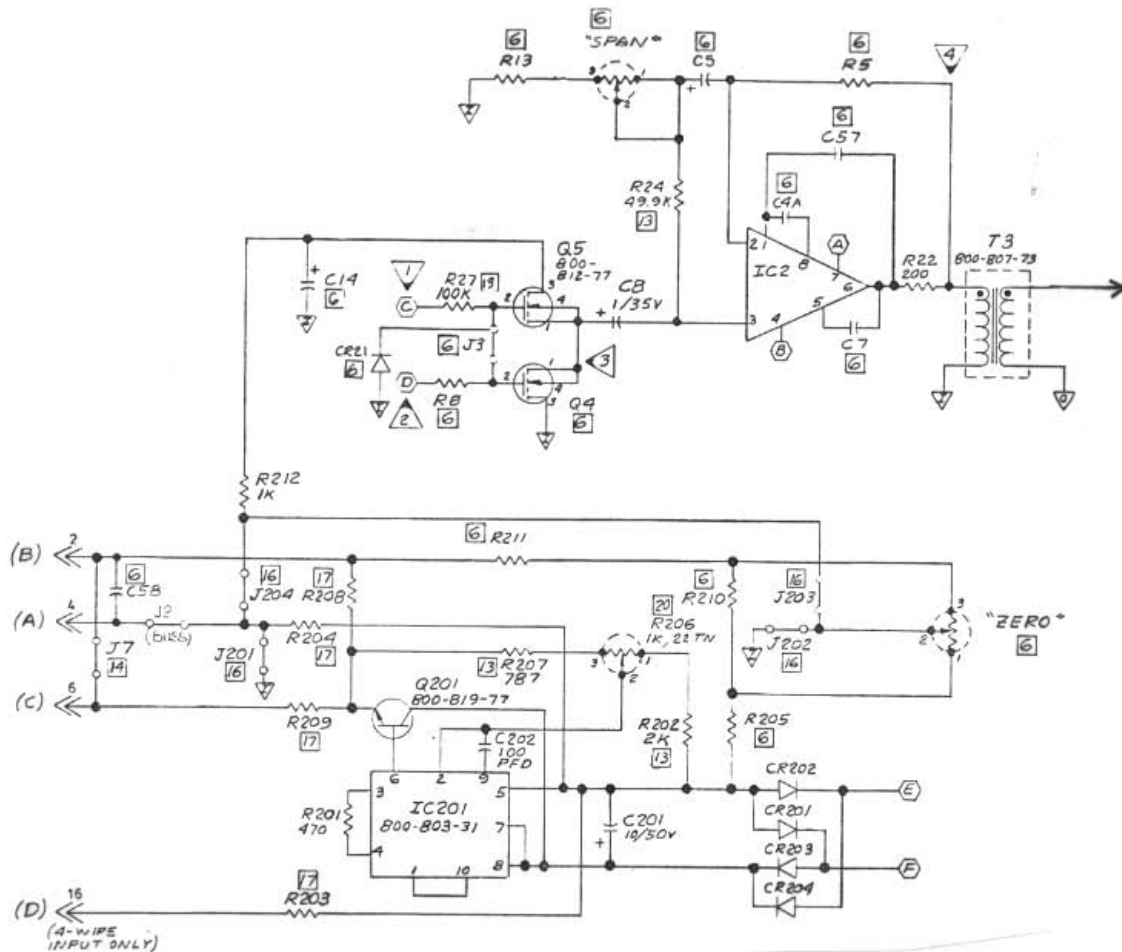


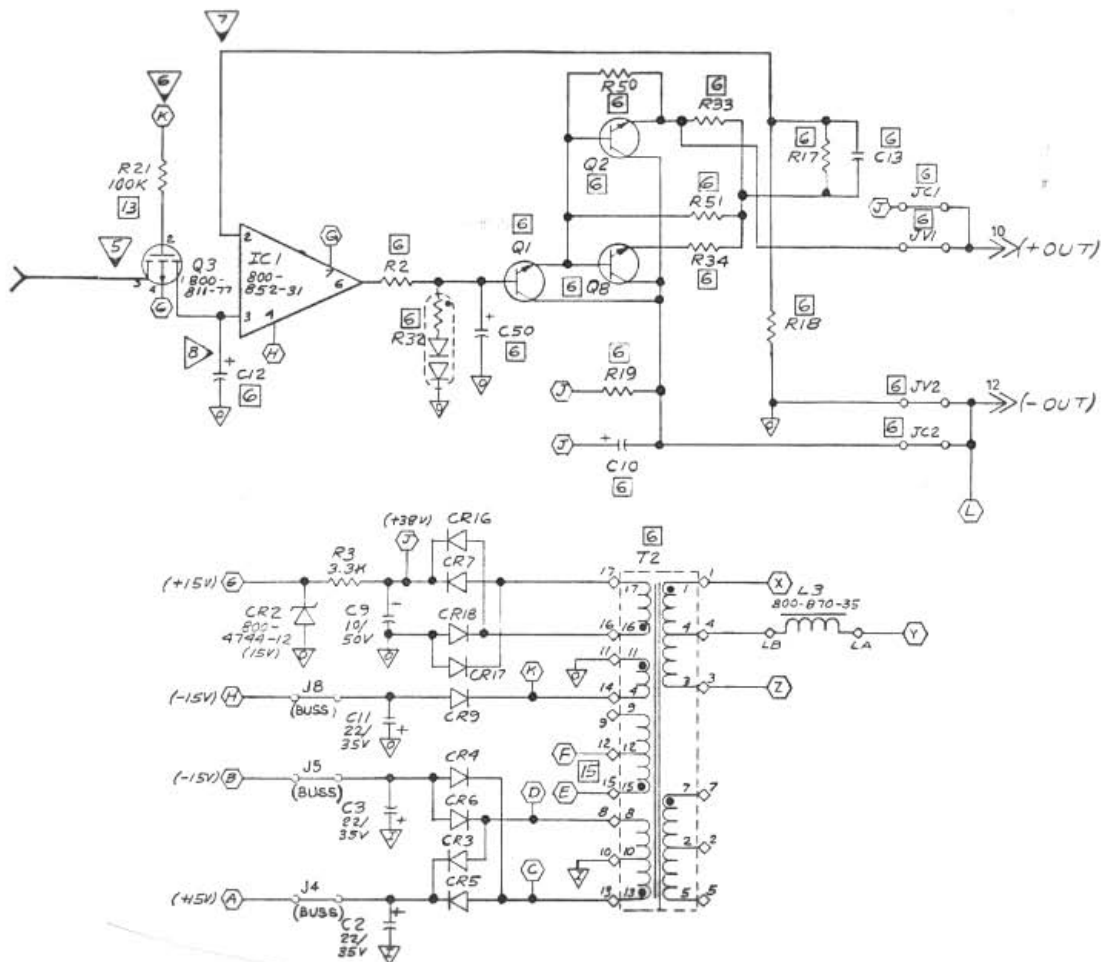
Figure 21. Dual Channel Assembly

RBT-EU



- 5. [G] METAL FILM RESISTOR, KN55C, ±1% TOL.
- 12. [▶] TEST POINTS; FILLED END IS POINTER. REFER TO SECTION 5 OF MANUAL, "MAINTENANCE."
- 11. [▽] INDICATES INPUT SECTION COMMON (GROUND).
[▽] INDICATES OUTPUT SECTION COMMON (GROUND).
- 9. [■] INDICATES PLUG-IN CONNECTOR POSITION.
- 8. [◇] INDICATES IDENTIFIED WIRING PAD ON P.C. BD.
- 7. [□] INDICATES PC1/PC2 INTERCONNECT PIN.
- 6. [G] SEE LIST OF MAT'L'S FOR USAGE, VALUE & P/N.
- 5. [○] INDICATES ELECTRICAL COMMONS (SAME LETTERS); LETTERS DO NOT APPEAR ON P.C. BD. OR ASS'Y DWG.
- 4.
- 3. ALL POTENTIOMETERS INCREASE C.W. FROM 1 TO 3.
- 2. ALL DIODES ARE M.I.I. P/N 800-4148-11; ALL RESISTORS ARE 1/4W CARBON COMP, ±10% TOL.
- 1. RESISTANCE VALUES ARE IN OHMS; CAPACITANCE VALUES ARE IN MICROFARADS.

Figure 22. Channel A Schematic (page 1 of 2)



20 ADJUST R206 FOR VOLTAGE AS FOLLOWS, MEASURED FROM C201(-) TO Q201-E: 10V, RANGES A & B; 12.5V, RANGES C-F.

19. - FOR "FNL" OPTION SEE ASS'Y 149-559-00 & SCHEMATIC 149-459-00.

- FOR "G" RANGE 2 & 3-WIRE INPUTS SEE ASS'Y 149-555-00 & SCHEMATIC 149-455-01; IF UNIT HAS "RO" OPTION ALSO SEE SCHEMATIC 149-455-02 INSTEAD.

- FOR "G" RANGE 4-WIRE INPUT SEE ASS'Y 149-557-00 & SCHEMATIC 149-457-00.

- FOR "DT" OPTION, 3-WIRE INPUTS, RANGES A-F SEE ASS'Y 149-558-00 & SCHEMATIC 149-458-00.

- FOR "LNP" OPTION, 3-WIRE INPUT, SEE ASS'Y 149-554-00 & SCHEMATIC 149-454-00.

17 R203 & R208 ARE USED ONLY WITH 4-WIRE INPUTS; R204 ONLY FOR 2 & 3-WIRE R209 IS BUSSED FOR 2 & 3-WIRE INPUTS. SEE LIST OF MAT'LS FOR VALUES & P/N'S.

16 J201 & J203 ARE USED UNLESS UNIT HAS "RO" OPTION, IN WHICH CASE J202 & J204 ARE USED INSTEAD.

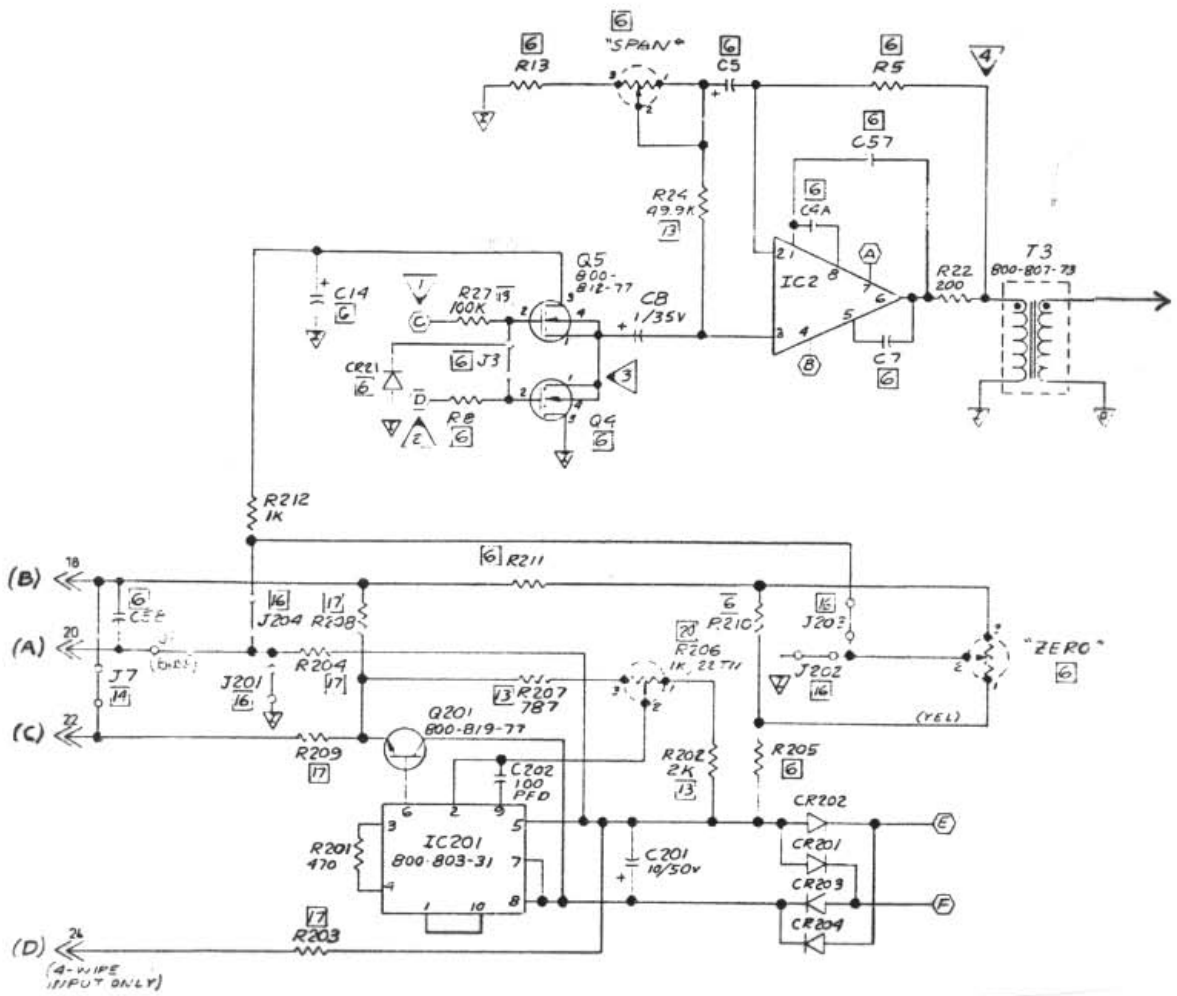
15 ON UNITS WITH RANGES A-F OR LSA & HAVING 24VDC POWER, LEADS 9 & 12 OF T2 ARE REVERSE (LEAD 12 IS NOT USED).

14 J7 IS USED FOR ALL 2-WIRE INPUTS (WITHOUT-DT OPTION ONLY).

NOTES - CONTINUED:

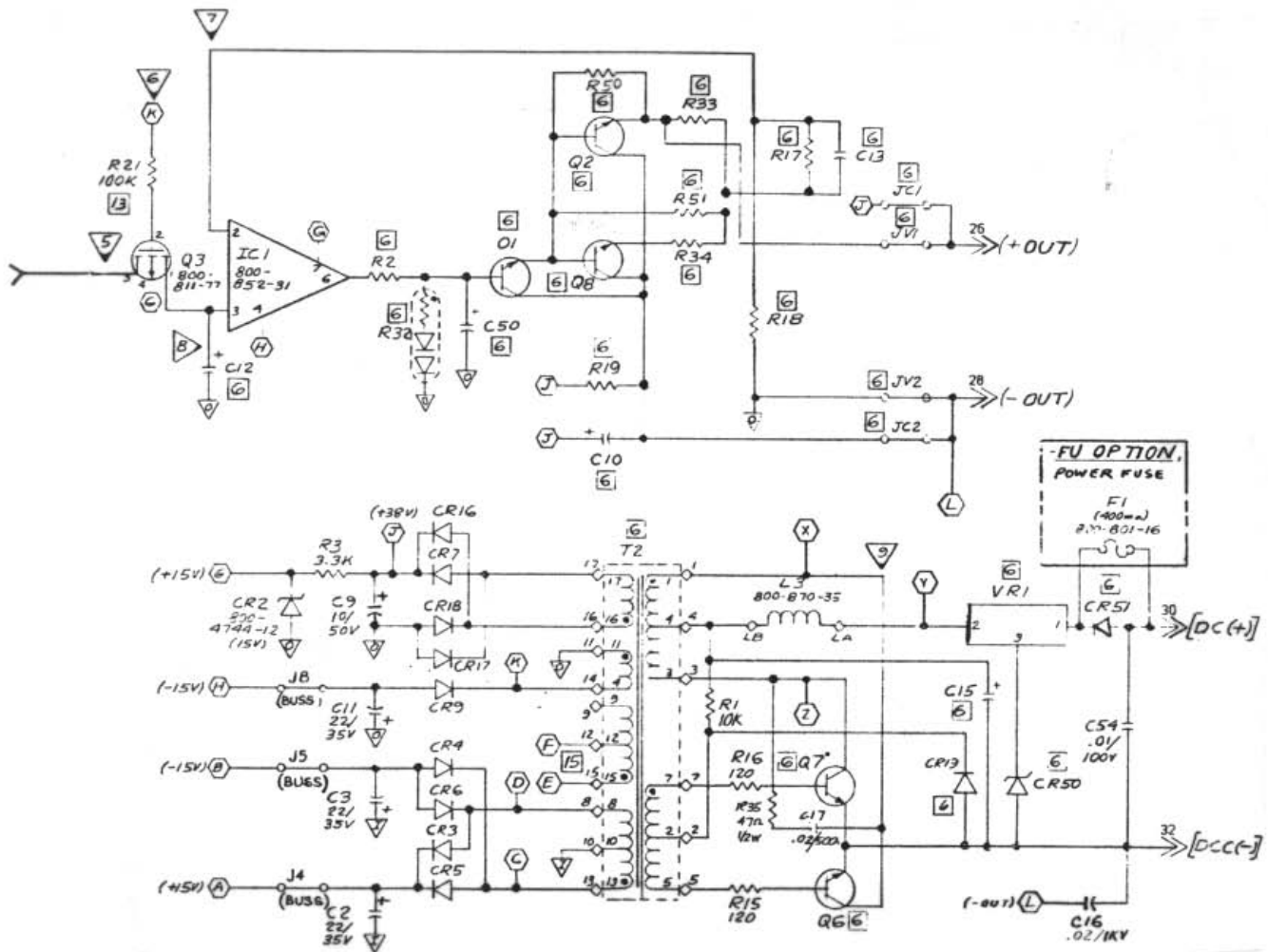
Figure 22. Channel A Schematic (page 2 of 2)

RBT-EU



- 3. METAL FILM RESISTOR, KN55C, ±1% TOL.
- 12. TEST POINTS; FILLED END IS POINTER. REFER TO SECTION 5 OF MANUAL, "MAINTENANCE."
- 11.
- 10. INDICATES INPUT SECTION COMMON (GROUND).
INDICATES OUTPUT SECTION COMMON (GROUND).
- 9. INDICATES PLUG-IN CONNECTOR POSITION.
- 8. INDICATES IDENTIFIED WIRING PAD ON P.C. BD.
- 7. INDICATES PC1/PC2 INTERCONNECT PIN.
- 6. SEE LIST OF MAT'L'S FOR USAGE, VALUE & P/N.
- 5. INDICATES ELECTRICAL COMMONS (SAME LETTERS); LETTERS DO NOT APPEAR ON P.C. BD. OR ASS'Y DWG.
- 4.
- 3. ALL POTENTIOMETERS INCREASE C.W. FROM 1 TO 3.
- 2. ALL DIODES ARE M.I.I. P/N 800-4148-11; ALL RESISTORS ARE 1/4W CARBON COMP, ±10% TOL.
- 1. RESISTANCE VALUES ARE IN OHMS; CAPACITANCE VALUES ARE IN MICROFARADS.

Figure 23. Channel B Schematic (page 1 of 2)



20 ADJUST R206 FOR VOLTAGE AS FOLLOWS, MEASURED FROM C201(-) TO Q201-E: 10V, RANGES A & B; 12.5V, RANGES C-F.

19. - FOR "FNL" OPTION SEE ASS'Y 149-559-00 & SCHEMATIC 149-459-00.

- FOR "G" RANGE 2 & 3-WIRE INPUTS SEE ASS'Y 149-555-00 & SCHEMATIC 149-455-01; IF UNIT HAS "RO" OPTION ALSO SEE SCHEMATIC 149-455-02 INSTEAD.

- FOR "G" RANGE 4-WIRE INPUT SEE ASS'Y 149-557-00 & SCHEMATIC 149-457-00.

- FOR "DT" OPTION, 3-WIRE INPUTS, RANGES A-F SEE ASS'Y 149-558-00 & SCHEMATIC 149-458-00.

- FOR "LNP" OPTION, 3-WIRE INPUT, SEE ASS'Y 149-554-00 & SCHEMATIC 149-454-00.

17 R203 & R208 ARE USED ONLY WITH 4-WIRE INPUTS; R204 ONLY FOR 2 & 3-WIRE. R209 IS BUSSED FOR 2 & 3-WIRE INPUTS. SEE LIST OF MATLS FOR VALUES & P/N'S.

16 J201 & J203 ARE USED UNLESS UNIT HAS "RO" OPTION, IN WHICH CASE J202 & J204 ARE USED INSTEAD.

15 ON UNITS WITH RANGES A-F OR LSA & HAVING 24VDC POWER, LEADS 9 & 12 OF T2 ARE REVERSE (LEAD 12 IS NOT USED).

14 J7 IS USED FOR ALL 2-WIRE INPUTS (WITHOUT-DT OPTION ONLY).

NOTES - CONTINUED:

Figure 23. Channel B Schematic (page 2 of 2)

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
 - a) A note listing the symptoms that indicate the unit needs repair
 - b) Complete shipping information for return of the equipment after repair
 - c) The name and phone number of the person to contact if questions arise at the factory
3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.
4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

WARRANTY DISCLAIMER

THE COMPANY MAKES NO EXPRESS, IMPLIED OR STATUTORY WARRANTIES (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY GOODS OR SERVICES SOLD BY THE COMPANY. THE COMPANY DISCLAIMS ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR TRADE USAGE, AND ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY ACKNOWLEDGES THAT THERE ARE NO WARRANTIES IMPLIED BY CUSTOM OR USAGE IN THE TRADE OF THE BUYER AND OF THE COMPANY, AND THAT ANY PRIOR DEALINGS OF THE BUYER WITH THE COMPANY DO NOT IMPLY THAT THE COMPANY WARRANTS THE GOODS OR SERVICES IN ANY WAY.

ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY AGREES WITH THE COMPANY THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY CONCERNING THE GOODS OR SERVICES SHALL BE FOR THE COMPANY, AT ITS OPTION, TO REPAIR OR REPLACE THE GOODS OR SERVICES OR REFUND THE PURCHASE PRICE. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES EVEN IF THE COMPANY FAILS IN ANY ATTEMPT TO REMEDY DEFECTS IN THE GOODS OR SERVICES, BUT IN SUCH CASE THE BUYER SHALL BE ENTITLED TO NO MORE THAN A REFUND OF ALL MONIES PAID TO THE COMPANY BY THE BUYER FOR PURCHASE OF THE GOODS OR SERVICES.

ANY CAUSE OF ACTION FOR BREACH OF ANY WARRANTY BY THE COMPANY SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALLEGED DEFECT OR BREACH WITHIN TEN DAYS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH, AND NO ACTION FOR THE BREACH OF ANY WARRANTY SHALL BE COMMENCED BY THE BUYER ANY LATER THAN TWELVE MONTHS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH.

RETURN POLICY

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.



WORLDWIDE • www.miinet.com

United States • info@miinet.com Tel: (818) 894-7111 • FAX: (818) 891-2816	Belgium • info@mooreind.be Tel: 03/448.10.18 • FAX: 03/440.17.97	China • sales@mooreind.sh.cn Tel: 86-21-62491499 • FAX: 86-21-62490635
Australia • sales@mooreind.com.au Tel: (02) 8536-7200 • FAX: (02) 9525-7296	The Netherlands • sales@mooreind.nl Tel: (0)344-617971 • FAX: (0)344-615920	United Kingdom • sales@mooreind.com Tel: 01293 514488 • FAX: 01293 536852