

**TECHNICAL MANUAL**  
**CIRCUIT DIAGRAMS**

**KWM-2A TRANSCEIVER**  
**30L-1 RF LINEAR POWER AMPLIFIER**  
**30S-1 RF LINEAR POWER AMPLIFIER**  
**AND ACCESSORY EQUIPMENT**

(COLLINS)

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## INTRODUCTION

**PURPOSE.** The purpose of this manual is to identify the various circuits and components of the following equipments:

- a. KWM-2A Transceiver
- b. 30L-1 RF Linear Power Amplifier
- c. 30S-1 RF Linear Power Amplifier
- d. PM-2 Power Supply
- e. MP-1 Power Supply
- f. 312B-4 Station Control
- g. 302C-3 Directional RF Wattmeter
- h. 180S-1 Antenna Tuner

Each circuit diagram will give you a better understanding of the equipment and help in trouble shooting and maintaining the equipment. Personnel seeking detailed operating or maintenance information should refer to the service manual, T.O. 31R2-4-183-2.

**SCOPE.** The scope of this manual extends to the presentation of schematic diagrams for the equipments listed above; block diagrams illustrating the over-all function of the KWM-2A, 30L-1, and 30S-1; simplified power distribution and control circuit diagrams for the KWM-2A, 30L-1, and 30S-1; and cabling diagrams illustrating the interconnecting cabling for the equipments.

REF DES		PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V1	V(R) V(T) R	+290V -0.2 TO -10V 9000	+200V -0.2 TO -10V 34K	+2.6V +2.6V 10 TO 1K	6.3V AC 6.3V AC 0	0 0 0	-1.4V -18V 4.7 MEG	+0.45V +0.45V 180	+33V +30V 80K	-0.3V -0.35V 1 MEG
V2	V(R) V(T) R	+290V +255V 9000	0 6.5V AC 650K	+150V* +150V* 110K	6.3V AC 6.3V AC 0	0 0 0	+140V* +140V* 58K	+4.2V* +4.2V* ∞	+125V +105V 6500	+125V +105V 52K
V3	V(R) V(T) R	+230V -0.2 TO -10V 14K	+120V -0.2 TO -10V 39K	+0.5V 0 47	6.3V AC 6.3V AC 0	0 0 0	-1.4V -18V 4.7 MEG	+0.15V +0.2 TO -10V 10K	-0.4V +210V 10K	0 0 0 TO 250K
V4	V(R) V(T) R	-0.3V -260V 8000	0 +95V 23K	+0.1V +0.7V 130	6.3V AC 6.3V AC 0	0 0 0	-1.0V -1.0V 1.5 MEG	+18V +90 21K	+290 +90 21K	0 -0.7V 0
V5	V(R) V(T) R	+290V +250V 9000	-55V -0.05V 480K	0 +2.1V 240	0 0 0	0 0 0	+285 +245 9000	-55V -0.05V 480K	0 +2.2V 240	6.3V AC 6.3V AC 0
V6	V(R) V(T) R	+0.3V +220V 10K	-2.0V 0 98K	0 +1.9V 225	6.3V AC 6.3V AC 0	6.3V AC 6.3V AC 0	-0.3V +1.9V 10K	-1.9V 0 98K	0 +1.9V 220	0 0 0
V7	V(R) V(T) R	-1.5V -1.5V 3.6 MEG	0 0 0	6.3V AC 6.3V AC 0	0 0 0	+250V +230V 10K	+108V +100V 27K	0 0 0	0 0 0	0 0 0
V8	V(R) V(T) R	0 +4V 150	-55V 0 15K	-0.4V +145V 30K	0 0 0	6.3V AC 6.3V AC 0	+300V +285V 8300	0 0 0	-0.4V +145V 30K	-55V 0 15K
V9	V(R) V(T) R	0 +0.02V 2	0 0 0	-0.4V +240V 7800	0 2 2	-55V +240V 27K	0 +0.02V 2	6.3V AC 6.3V AC 0	0 0 0	0 0 0
V10	V(R) V(T) R	0 +0.02V 2	0 0 0	-0.4V +240V 7800	0 2 2	-55V +240V 27K	0 +0.02V 2	6.3V AC 6.3V AC 0	0 0 0	0 0 0
V11	V(R) V(T) R	+96V +86V 55K	-5.3V -4.7V 95K	+70V +65V 230K	6.3V AC 6.3V AC 0	0 0 0	+195V +185V 17K	0 0 0	+2V +1.8V 1000	0 0 480K
V12	V(R) V(T) R	+285V -0.2 TO -10V 9000	+0.1V -0.4V 1 MEG	+300V -0.2 TO -10V 120K	6.3V AC 6.3V AC 0	0 0 0	+300V +285V 240K	+110V +0.7V 1 MEG	+100V +1.2V 55K	+100V -0.2 TO -10V 55K
V13	V(R) V(T) R	+155V +250V 20K	-10V 1 MEG	+230V +200V 51K	6.3V AC 6.3V AC 0	0 0 0	+300V +285V 8000	0 0 150	+1.8V 0 200K	0 0 0
V14	V(R) V(T) R	-0.5V DC -0.5V DC	+0.9V DC +0.9V DC 0 TO 500K	+1.8V +2.2V 0	6.3V AC 6.3V AC 0	0 0 0	-0.1V -0.1V 270K	+80V +72V 120K	-0.1V -0.1V 0 TO 250K	+0.65V +0.6V 330
V15	V(R) V(T) R	-1.8V -19V 3.4 MEG	+2.8V +2.5V 5600	+2.8V +2.5V 5600	6.3V AC 6.3V AC 0	0 0 0	-1.8V +130V +180V 43K	-0.4V -58V 1 MEG	+1.5V 0 820	0 0 0
V16	V(R) V(T) R	+3V +2.8V 5600	+1.8V +1.5V 2.3 MEG	+92V +88V 220K	6.3V AC 6.3V AC 0	0 0 0	+2.2V +2.0V 68	+110V +105V 22K	+200V +180V 10K	0 0 0
V17	V(R) V(T) R	-0.8V -0.8V ∞	+2.65V +2.4V 2300	-0.8V 0 ∞	6.3V AC 6.3V AC 0	6.3V AC 6.3V AC 0	-1.5V -1.6V 2.3 MEG	+300V -58V 8500	0 -0.2 TO -10V 100K	+3.8V +0.2V 1000

\* EMISSION SWITCH SET TO TUNE.

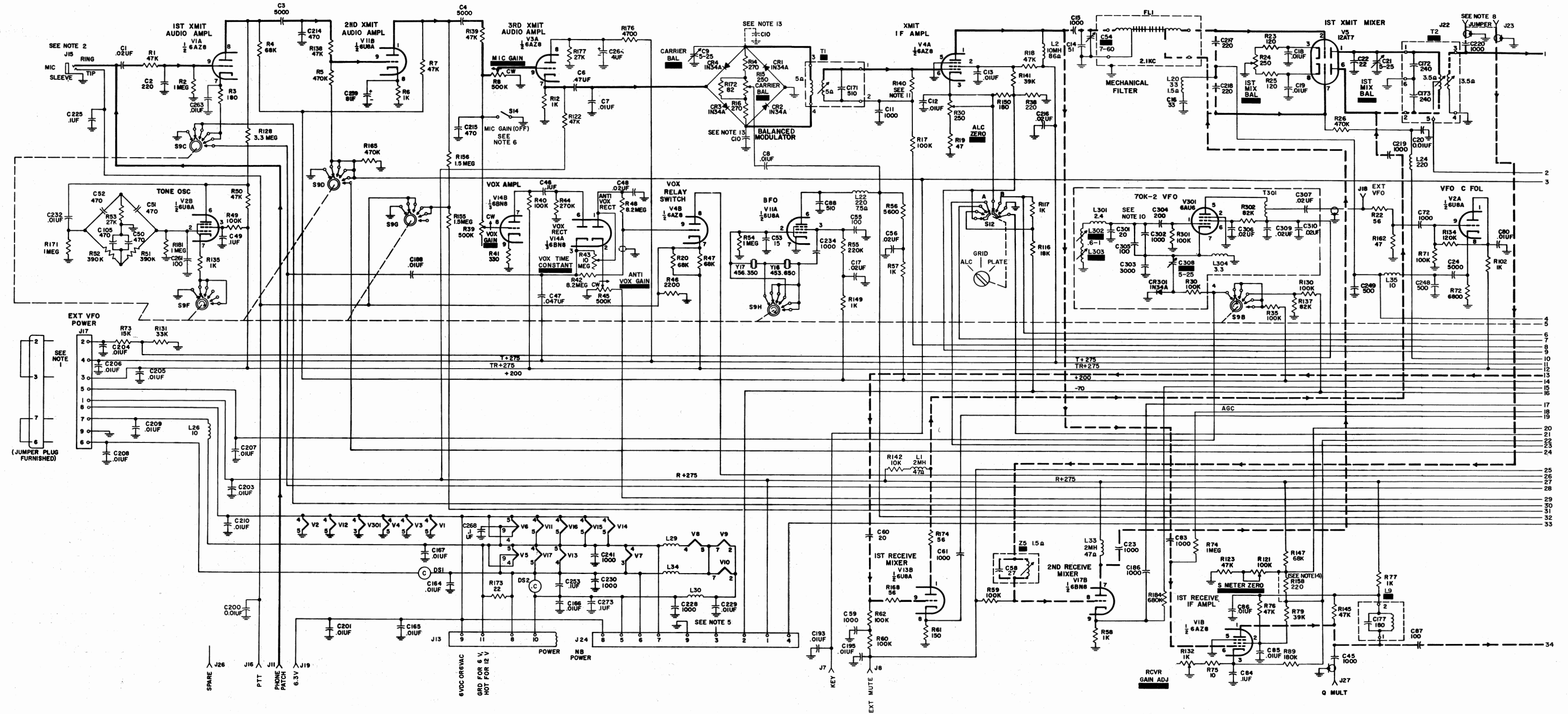
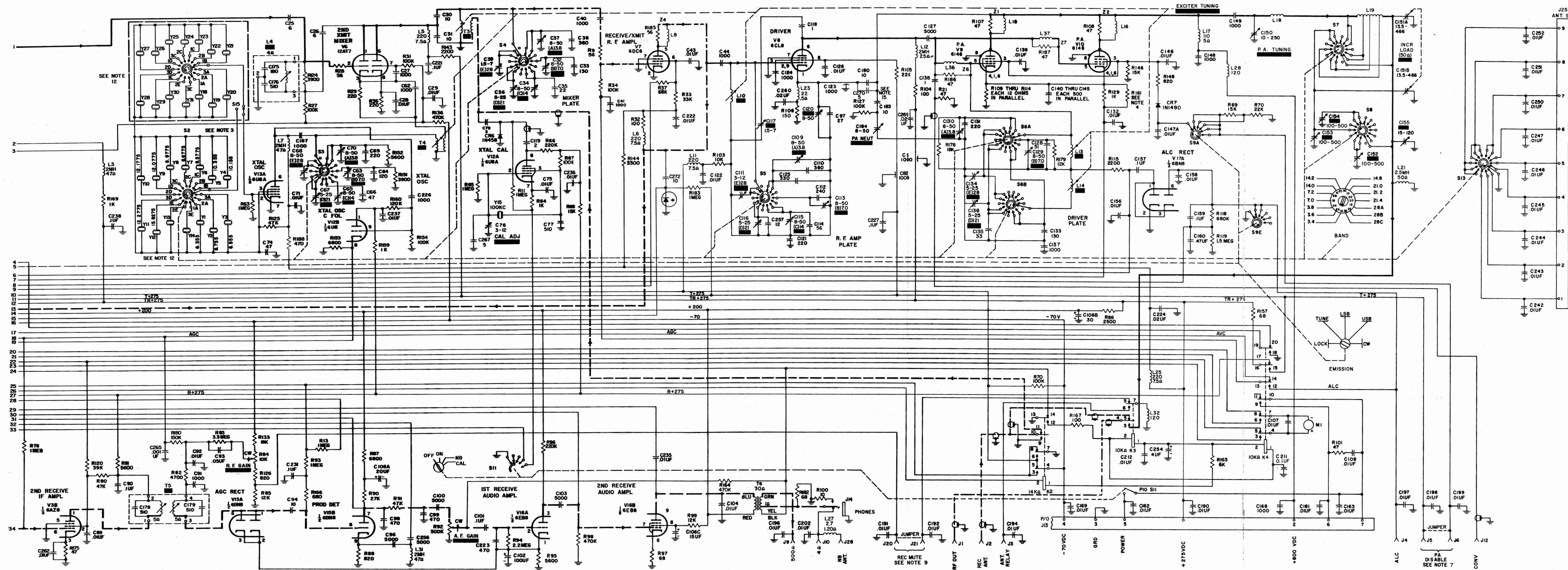


Figure 1. KWM-2A Transceiver, Schematic Diagram (Sheet 1 of 2)



- NOTES:
1. WHEN EXTERNAL VFO IS NOT USED, JUMPER J7 PINS 2, 3 & 8.
  2. MIKE JACK J15 MATES WITH PLUG PL-68 OR EQUIVALENT.
  3. BAND SWITCHES ARE SHOWN AT 3.4 MC.
  4. R161 SELECTED FOR METER CALIBRATION.
  5. MAKE CONNECTIONS TO J26 ON CHASSIS AND PIN 3 ON J24 WHEN NOISE BLANKER IS INSTALLED.
  6. S14 CLOSED AT MAXIMUM CCW POSITION OF R8.
  7. J5 AND J6 JUMPERED UNLESS VHF CONVERTERS ARE USED.
  8. J22 AND J23 JUMPERED UNLESS NOISE BLANKER IS USED.
  9. J20 AND J21 JUMPERED UNLESS EXTERNAL SWITCH IS USED TO MUTE RECEIVER.
  10. C301 SELECTED IN MANUFACTURE.
  11. R140 SELECTED IN MANUFACTURE.
  12. Y13, Y14, AND Y18 THRU Y31 NOT FURNISHED. THESE CRYSTALS TO BE SELECTED BY USER.
  13. VALUE OF C10 SELECTED IN MANUFACTURING. IN SOME UNITS, C10 IS CONNECTED IN PARALLEL WITH C9.
  14. R155 MAY BE SHUNTED TO LOWER VALUE IN MANUFACTURE.
  15. C270 ADDED IN SOME UNITS DURING FINAL TESTS.
  16. SIGNAL PATH LEDGEND:  
 TRANSMIT ———  
 RECEIVE - - - - -  
 TRANSMIT & RECEIVE - - - - -
  17. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS, AND ALL INDUCTANCE VALUES ARE IN MICROHENTYS.
  18. T AND R DESIGNATIONS ON SUPPLY VOLTAGE LINES INDICATE THAT VOLTAGE IS PRESENT DURING TRANSMIT AND/OR RECEIVE.
  19. ALL INDUCTOR AND TRANSFORMER DC RESISTANCE VALUES BELOW 1Ω ARE NOT SHOWN.

Figure 1. KWM-2A Transceiver, Schematic Diagram (Sheet 2 of 2)



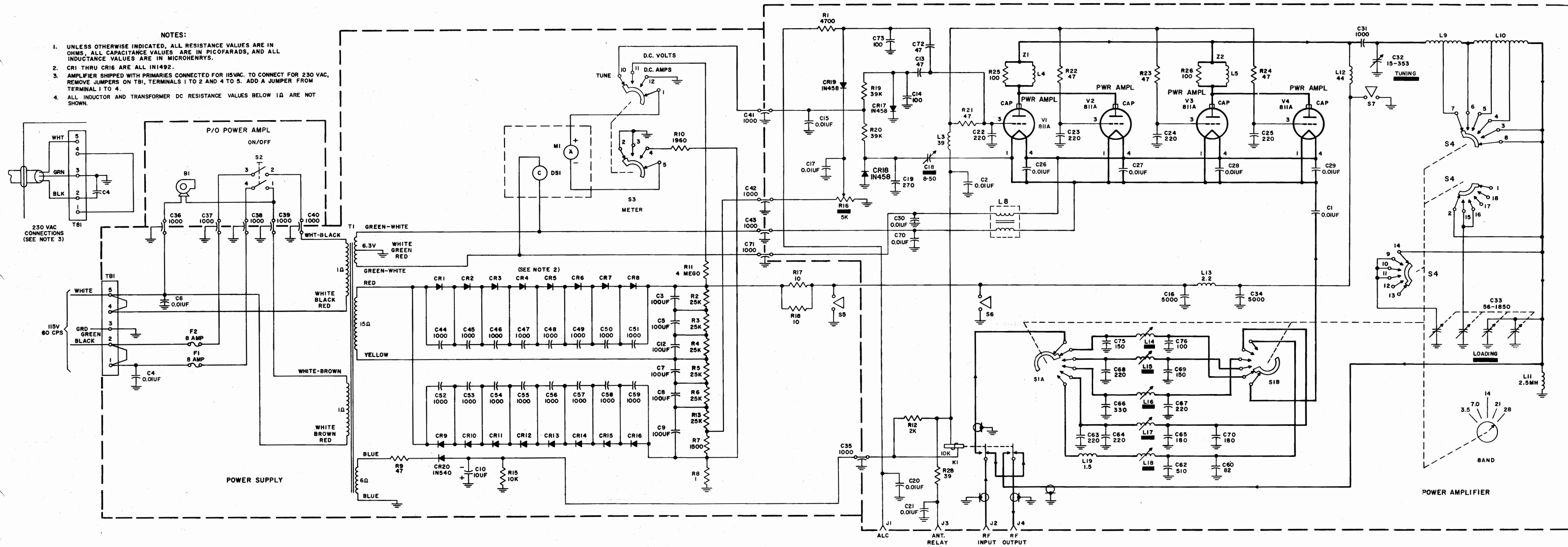
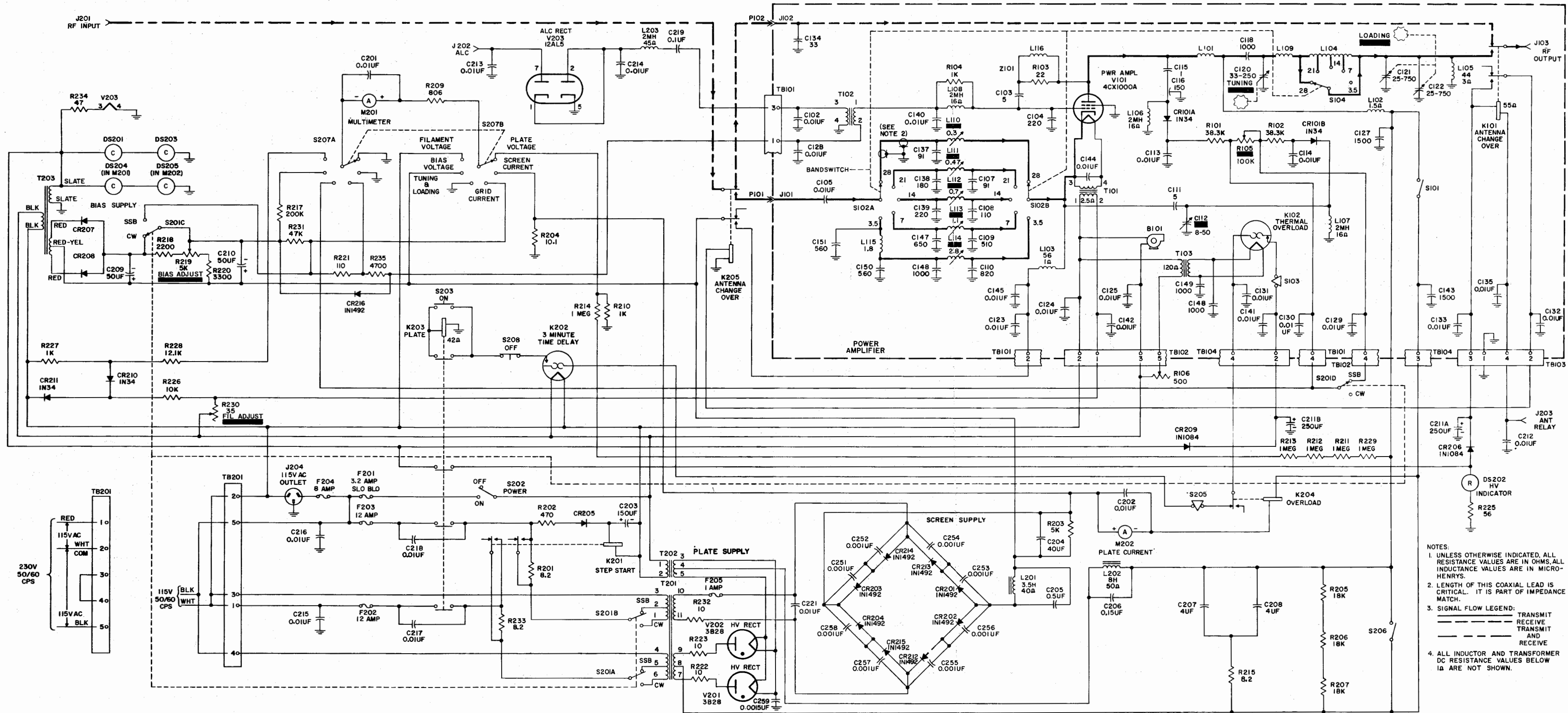


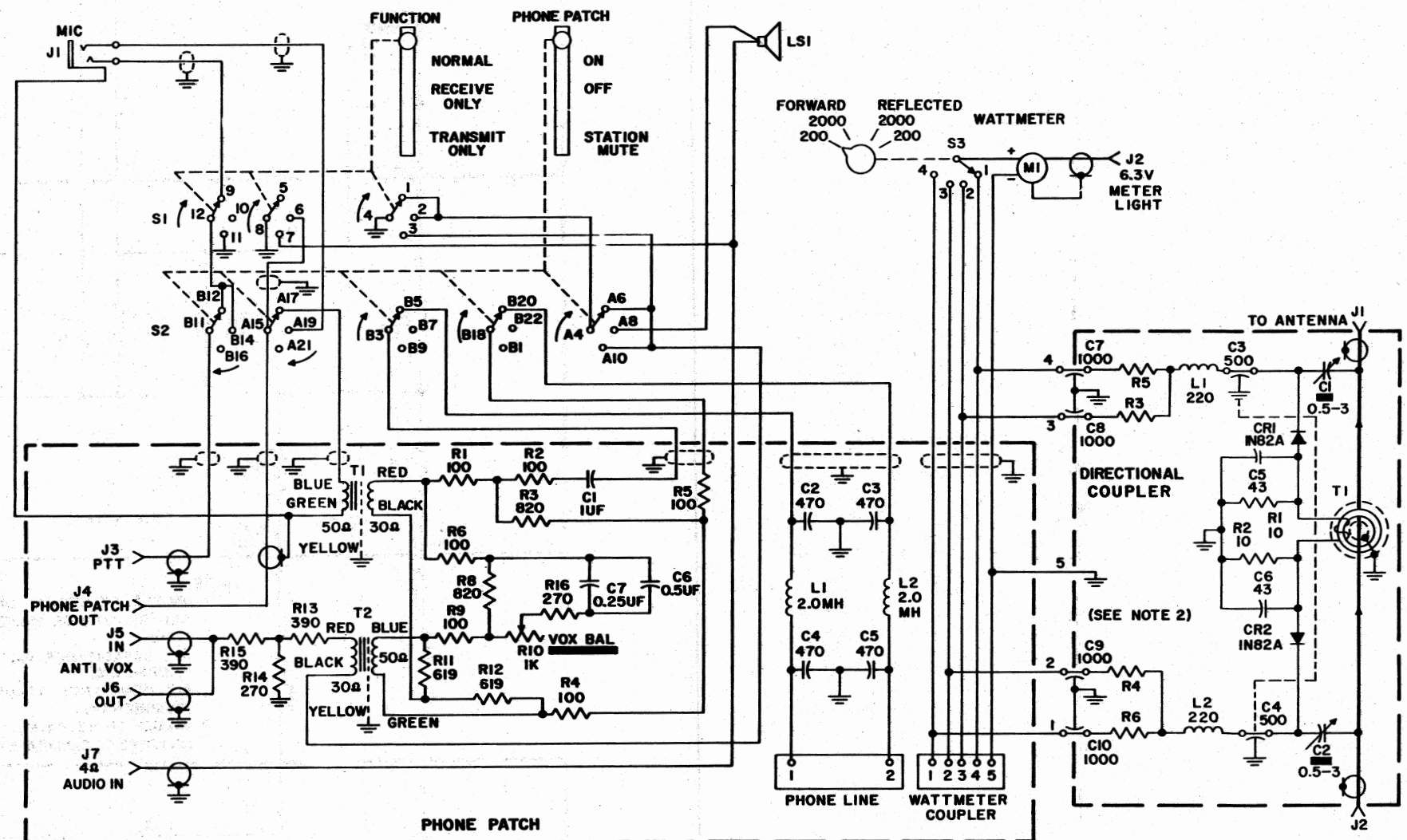
Figure 2. 30L-1 RF Linear Power Amplifier, Schematic Diagram



- NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL INDUCTANCE VALUES ARE IN MICRO-HENRYS.
  2. LENGTH OF THIS COAXIAL LEAD IS CRITICAL. IT IS PART OF IMPEDANCE MATCH.
  3. SIGNAL FLOW LEGEND:  
 — TRANSMIT  
 - - - RECEIVE  
 - · - · TRANSMIT AND RECEIVE
  4. ALL INDUCTOR AND TRANSFORMER DC RESISTANCE VALUES BELOW 1Ω ARE NOT SHOWN.

Figure 3. 30S-1 RF Linear Power Amplifier, Schematic Diagram





- NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS, AND ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
  2. VALUES OF R3, R4, R5 AND R6 SELECTED TO CALIBRATE COUPLER.
  3. ALL INDUCTOR AND TRANSFORMER DC RESISTANCE VALUES BELOW 10HM ARE NOT SHOWN.

Figure 6. 312B-4 Station Control, Schematic Diagram

Figure 7

T.O. 31R2-4-183-3

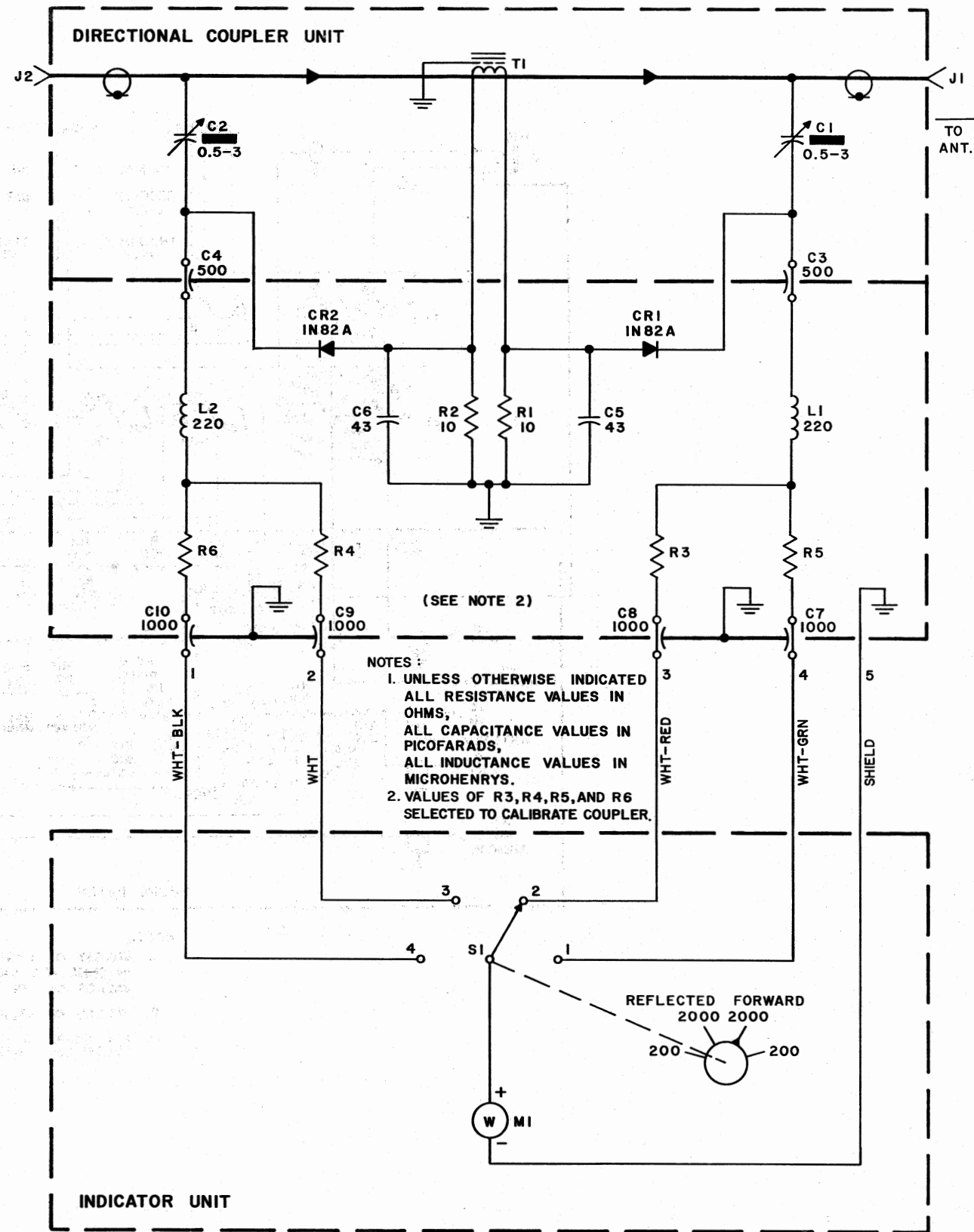


Figure 7. 302C-3 Directional RF Wattmeter, Schematic Diagram

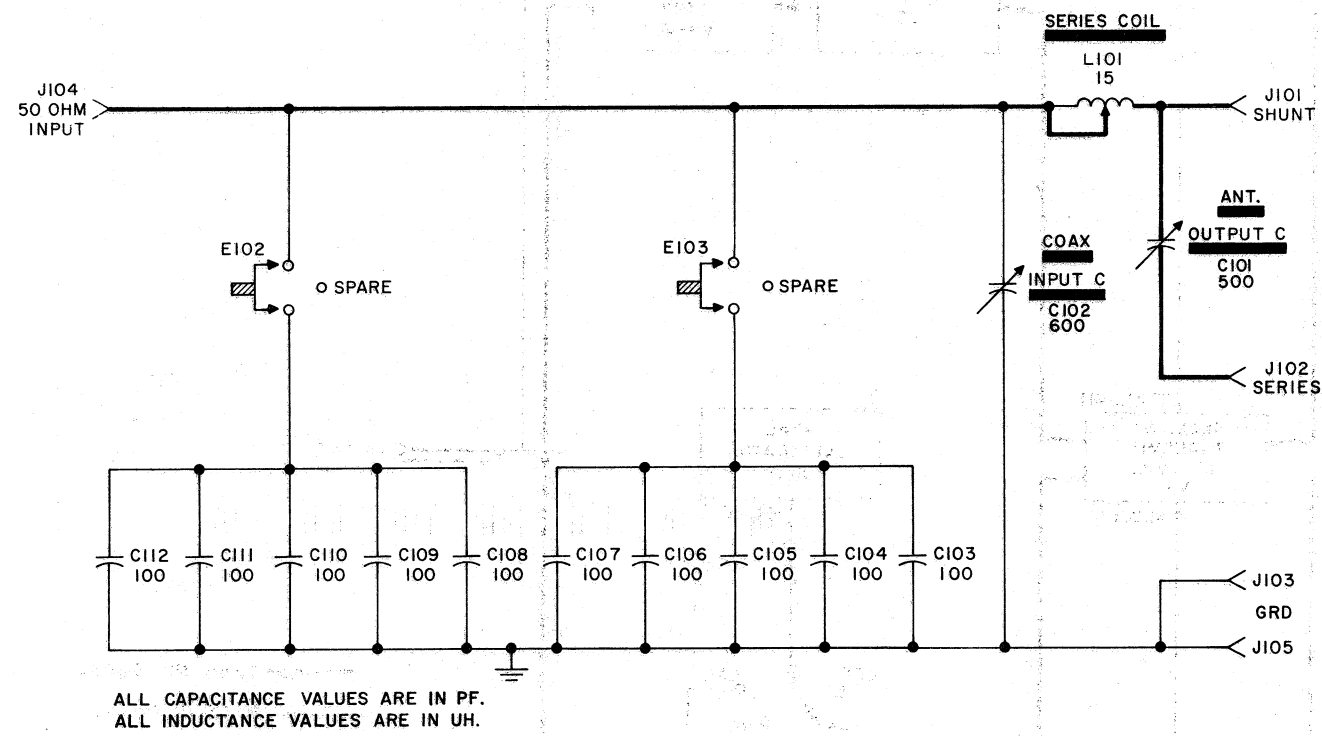
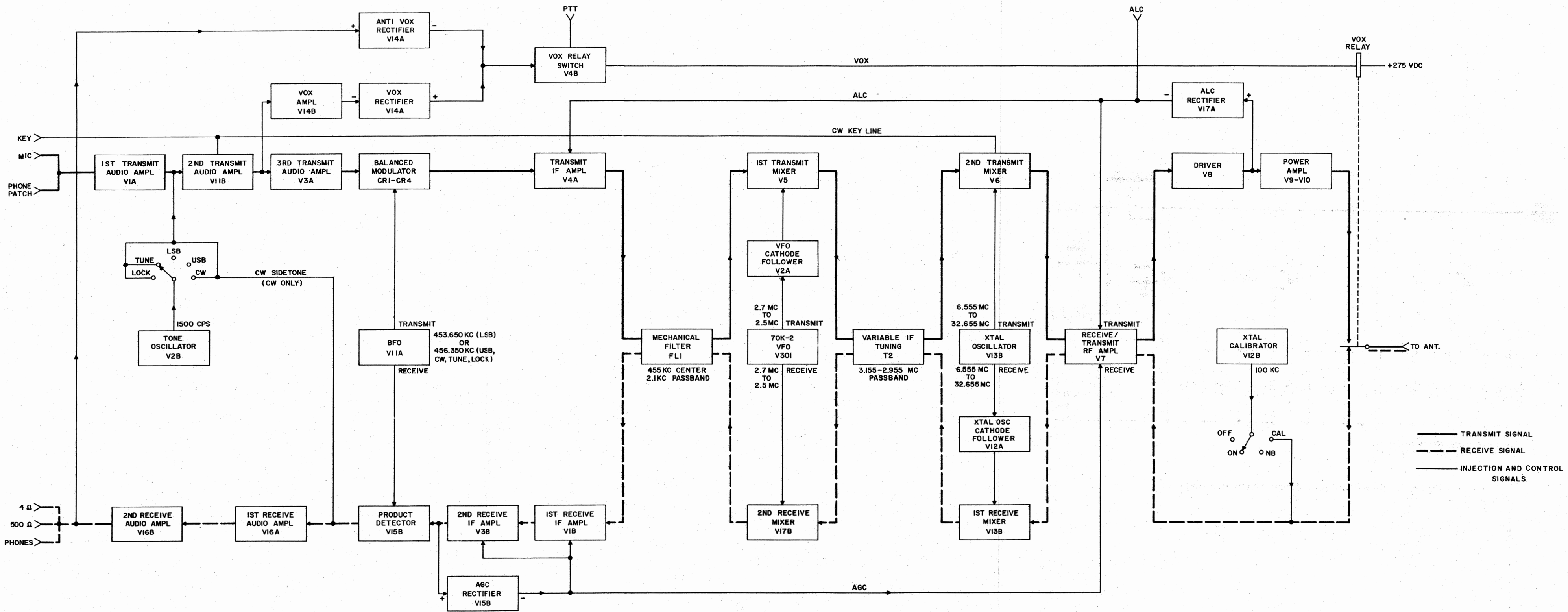


Figure 8. 180S-1 Antenna Tuner, Schematic Diagram



— TRANSMIT SIGNAL  
 - - - RECEIVE SIGNAL  
 — INJECTION AND CONTROL SIGNALS

Figure 9. KWM-2A Transceiver, Block Diagram

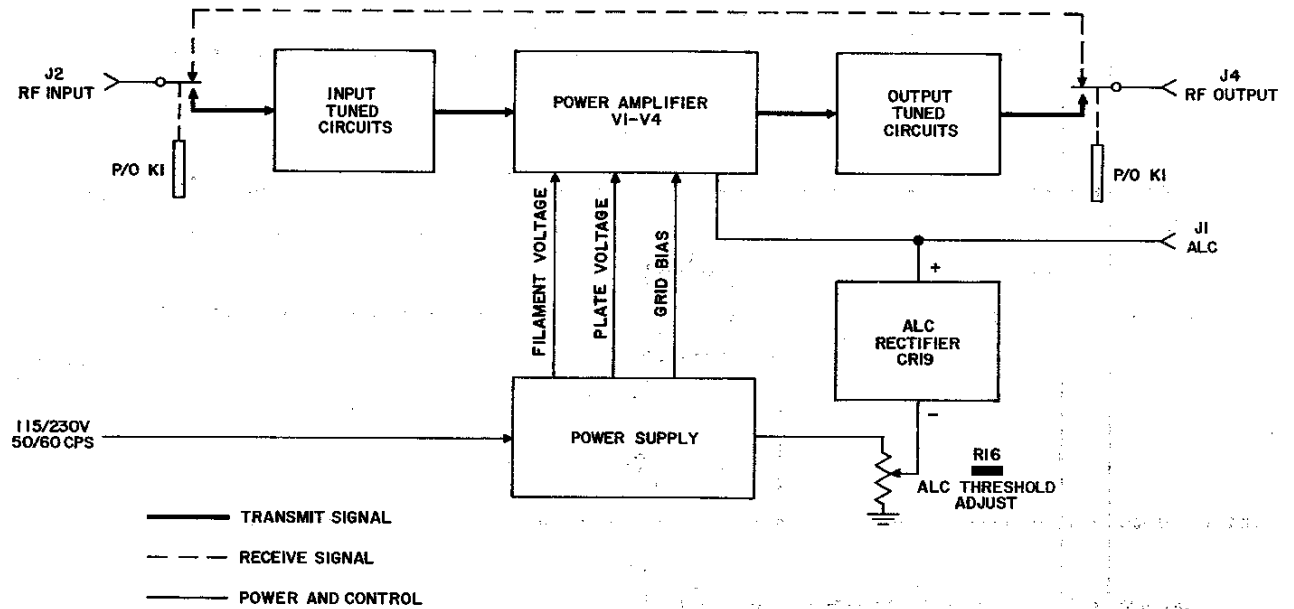


Figure 10. 30L-1 RF Linear Power Amplifier, Block Diagram

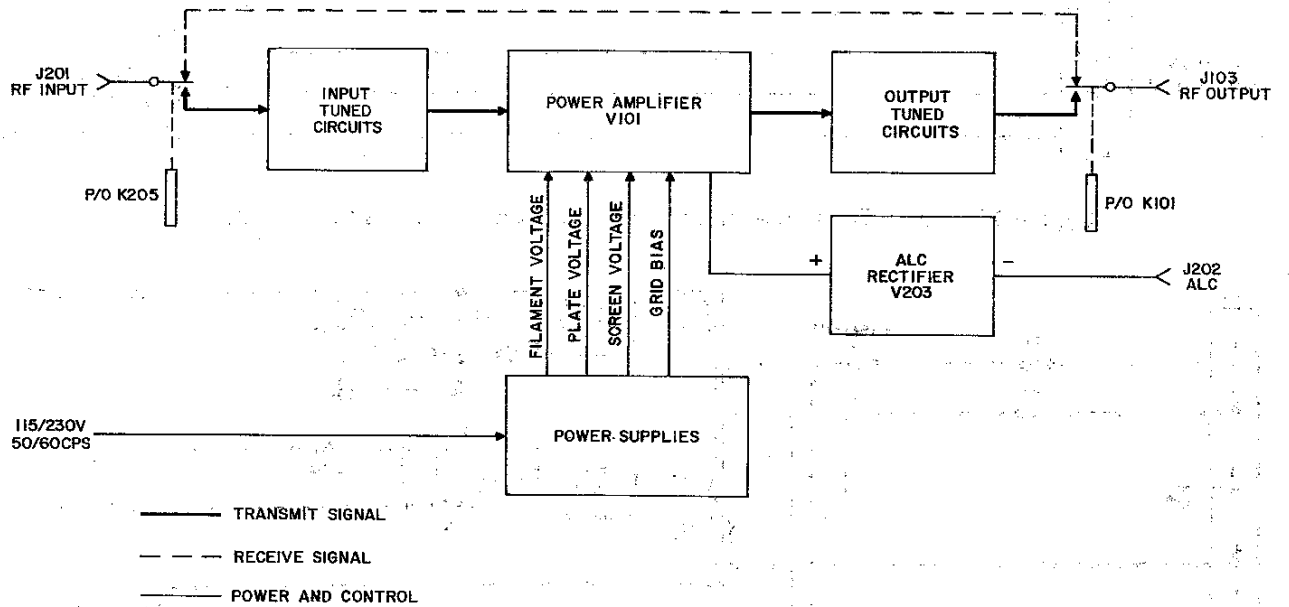


Figure 11. 30S-1 RF Linear Power Amplifier, Block Diagram

Figure 12

T.O. 31R2-4-183-3

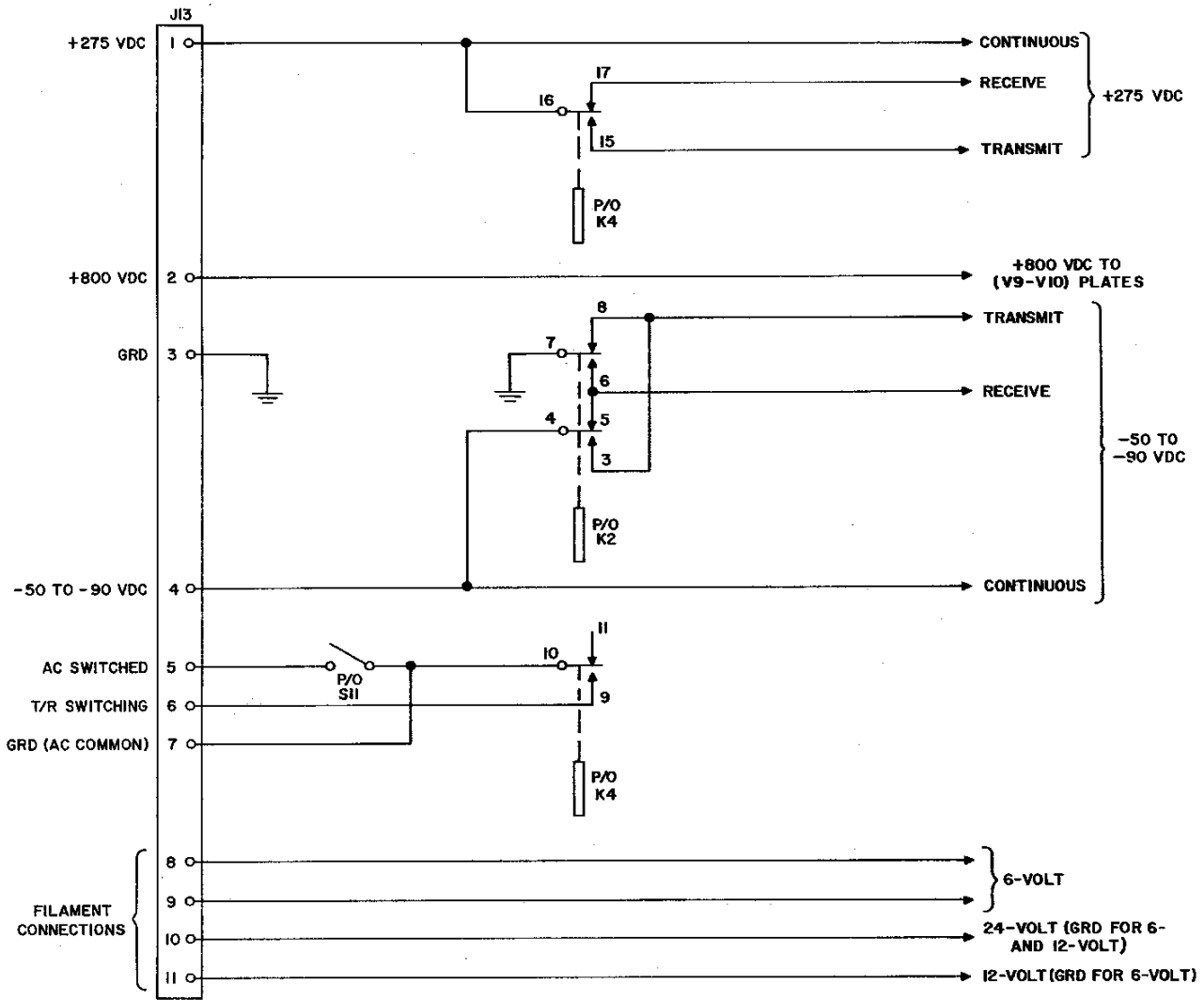


Figure 12. KWM-2A Transceiver, Power Distribution and Control Circuits

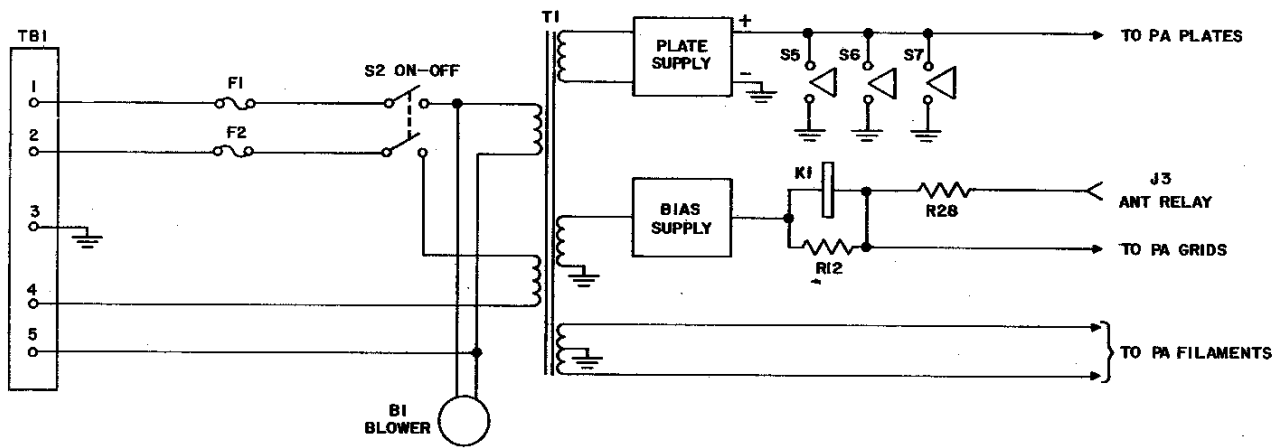


Figure 13. 30L-1 RF Linear Power Amplifier, Power Distribution and Control Circuits



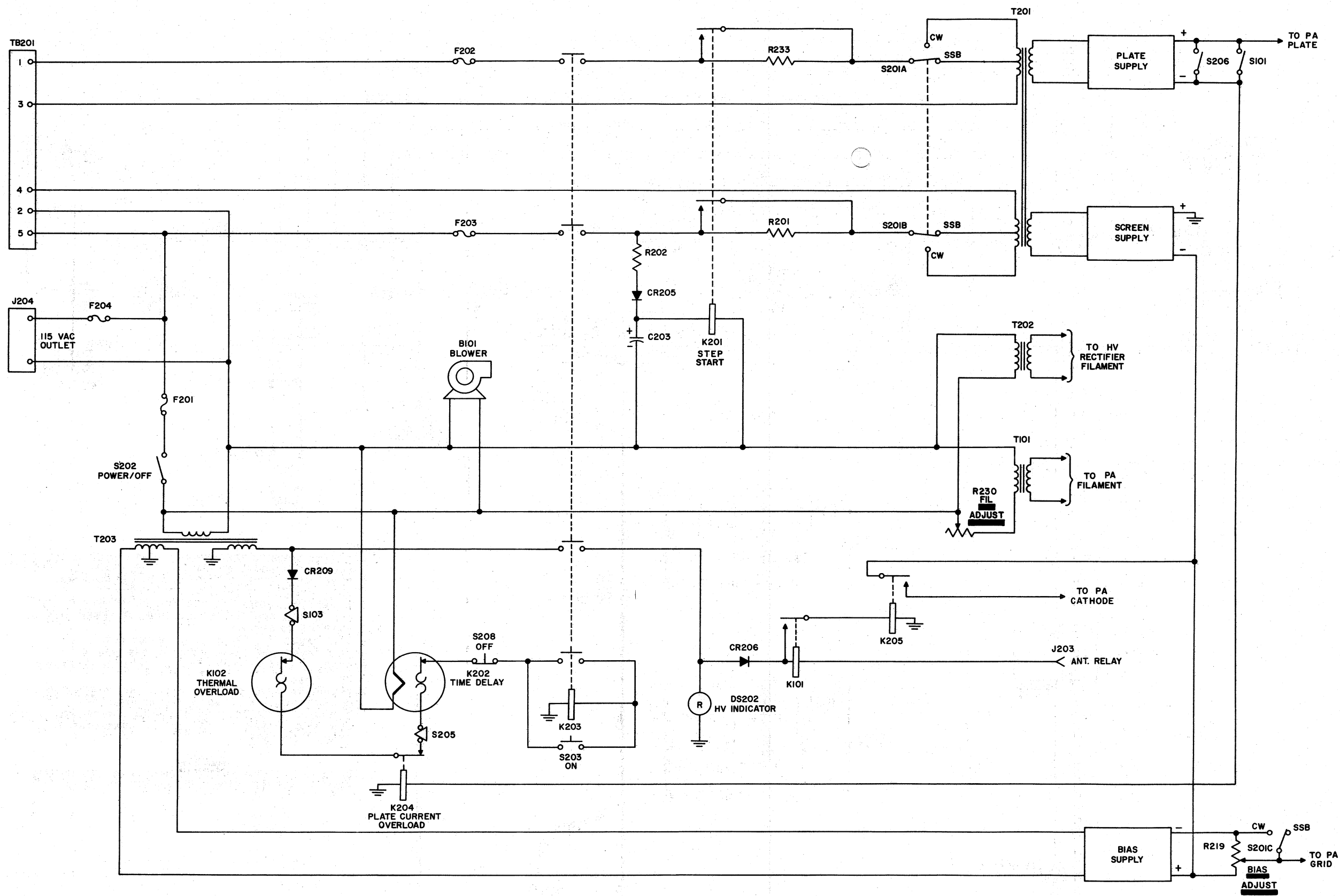
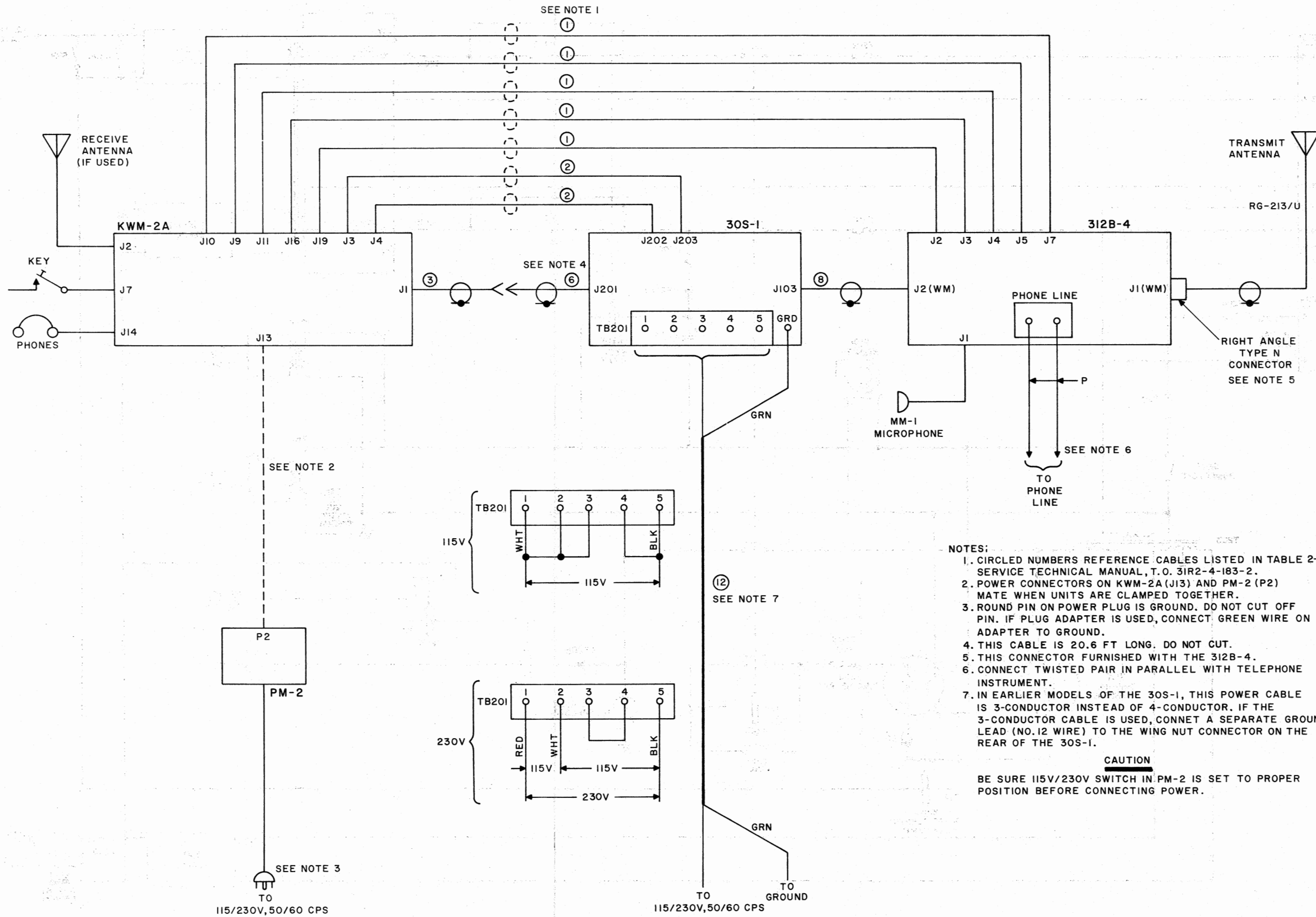


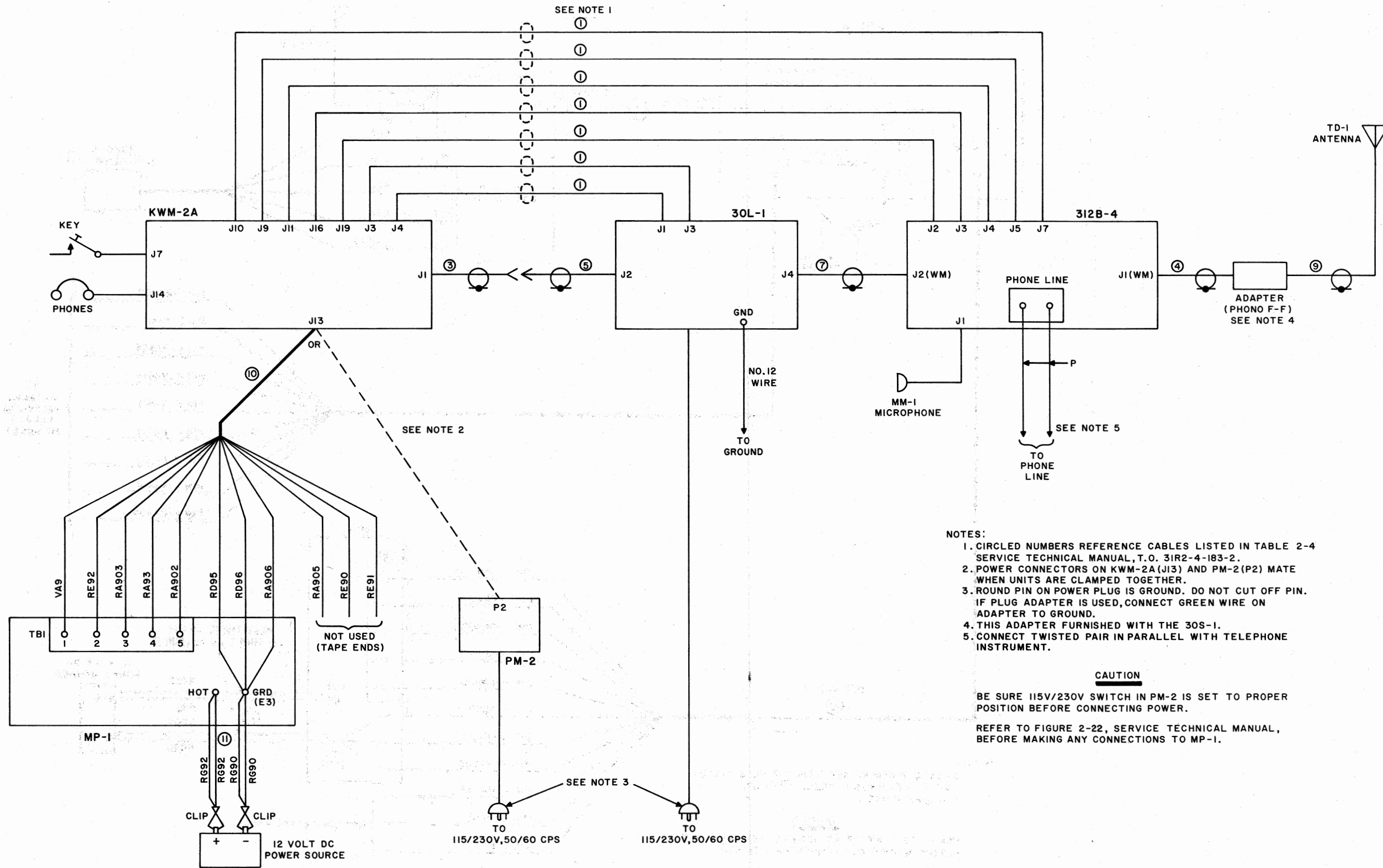
Figure 14. 30S-1 RF Linear Power Amplifier, Power Distribution and Control Circuits



- NOTES:
1. CIRCLED NUMBERS REFERENCE CABLES LISTED IN TABLE 2-4 SERVICE TECHNICAL MANUAL, T.O. 31R2-4-183-2.
  2. POWER CONNECTORS ON KWM-2A (J13) AND PM-2 (P2) MATE WHEN UNITS ARE CLAMPED TOGETHER.
  3. ROUND PIN ON POWER PLUG IS GROUND. DO NOT CUT OFF PIN. IF PLUG ADAPTER IS USED, CONNECT GREEN WIRE ON ADAPTER TO GROUND.
  4. THIS CABLE IS 20.6 FT LONG. DO NOT CUT.
  5. THIS CONNECTOR FURNISHED WITH THE 312B-4.
  6. CONNECT TWISTED PAIR IN PARALLEL WITH TELEPHONE INSTRUMENT.
  7. IN EARLIER MODELS OF THE 30S-1, THIS POWER CABLE IS 3-CONDUCTOR INSTEAD OF 4-CONDUCTOR. IF THE 3-CONDUCTOR CABLE IS USED, CONNET A SEPARATE GROUND LEAD (NO. 12 WIRE) TO THE WING NUT CONNECTOR ON THE REAR OF THE 30S-1.

**CAUTION**  
 BE SURE 115V/230V SWITCH IN PM-2 IS SET TO PROPER POSITION BEFORE CONNECTING POWER.

Figure 15. Fixed Installation Cabling Diagram

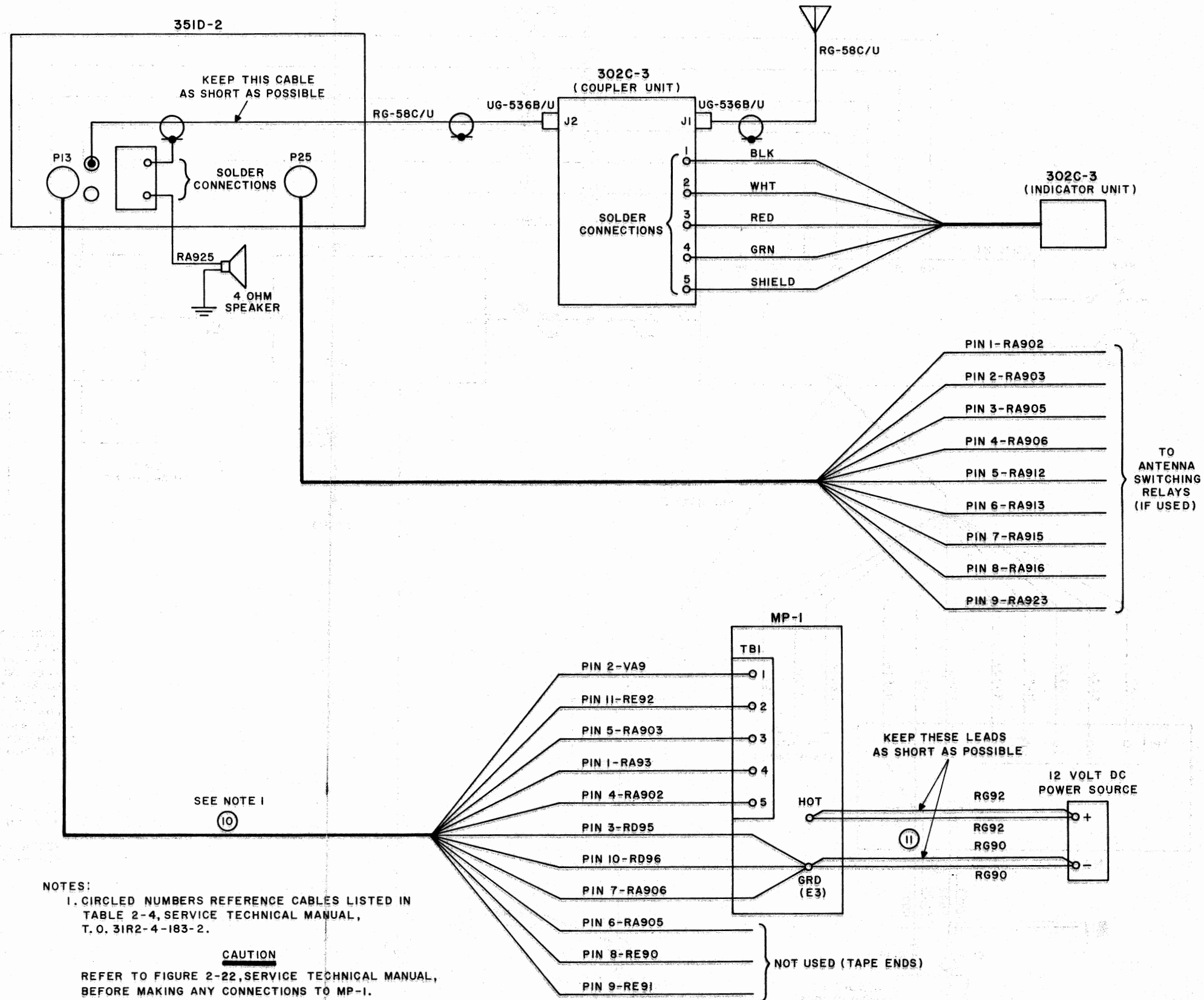


- NOTES:
1. CIRCLED NUMBERS REFERENCE CABLES LISTED IN TABLE 2-4 SERVICE TECHNICAL MANUAL, T.O. 31R2-4-183-2.
  2. POWER CONNECTORS ON KWM-2A (J13) AND PM-2 (P2) MATE WHEN UNITS ARE CLAMPED TOGETHER.
  3. ROUND PIN ON POWER PLUG IS GROUND. DO NOT CUT OFF PIN. IF PLUG ADAPTER IS USED, CONNECT GREEN WIRE ON ADAPTER TO GROUND.
  4. THIS ADAPTER FURNISHED WITH THE 30S-1.
  5. CONNECT TWISTED PAIR IN PARALLEL WITH TELEPHONE INSTRUMENT.

**CAUTION**

BE SURE 115V/230V SWITCH IN PM-2 IS SET TO PROPER POSITION BEFORE CONNECTING POWER.  
REFER TO FIGURE 2-22, SERVICE TECHNICAL MANUAL, BEFORE MAKING ANY CONNECTIONS TO MP-1.

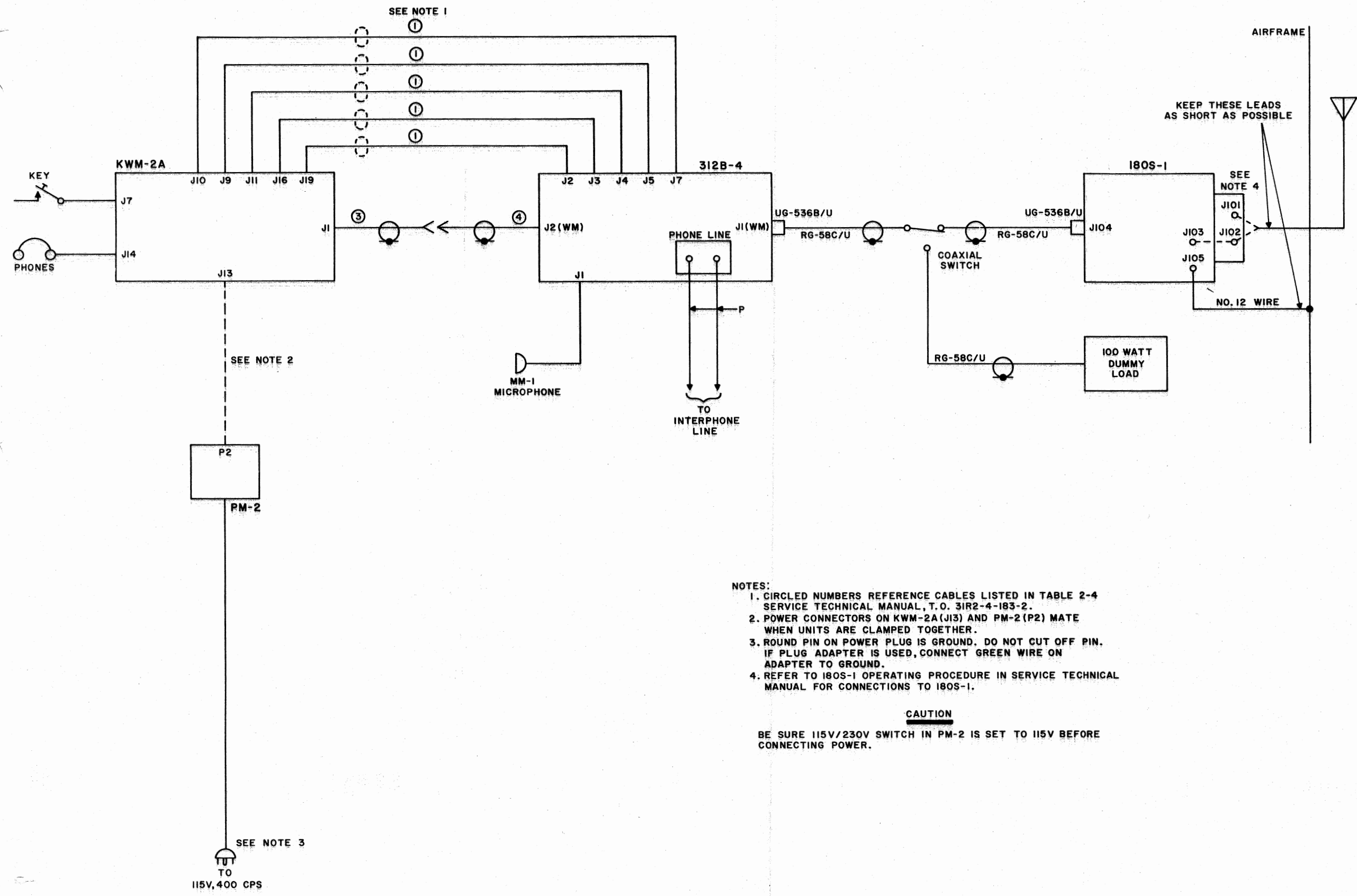
Figure 16. Portable Installation Cabling Diagram



NOTES:  
 1. CIRCLED NUMBERS REFERENCE CABLES LISTED IN TABLE 2-4, SERVICE TECHNICAL MANUAL, T.O. 31R2-4-183-2.

**CAUTION**  
 REFER TO FIGURE 2-22, SERVICE TECHNICAL MANUAL, BEFORE MAKING ANY CONNECTIONS TO MP-1.

Figure 17. Vehicular Mobile Installation Cabling Diagram



- NOTES:
1. CIRCLED NUMBERS REFERENCE CABLES LISTED IN TABLE 2-4 SERVICE TECHNICAL MANUAL, T.O. 31R2-4-183-2.
  2. POWER CONNECTORS ON KWM-2A (J13) AND PM-2 (P2) MATE WHEN UNITS ARE CLAMPED TOGETHER.
  3. ROUND PIN ON POWER PLUG IS GROUND. DO NOT CUT OFF PIN. IF PLUG ADAPTER IS USED, CONNECT GREEN WIRE ON ADAPTER TO GROUND.
  4. REFER TO 180S-1 OPERATING PROCEDURE IN SERVICE TECHNICAL MANUAL FOR CONNECTIONS TO 180S-1.

**CAUTION**

BE SURE 115V/230V SWITCH IN PM-2 IS SET TO 115V BEFORE CONNECTING POWER.

Figure 18. Aircraft Mobile Installation Cabling Diagram