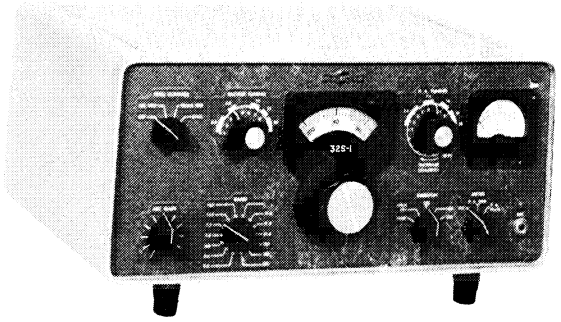
INSTRUCTION BOOK

TRANSMITTER

32S-1



COLLINS RADIO COMPANY

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(a) Buyer has completed and returned to Collins promptly following his purchase the Registration Card included in the Instruction Book furnished with the equipment.

(b) Notice of the claimed defect is given Collins within 90 days from the date of purchase and goods are returned in accordance with Collins' instructions.

(c) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins' designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

(d) No equipment or accessory shall be deemed to be defective if, due to exposure or excessive moisture in the atmosphere or otherwise after delivery, it shall fail to operate in a normal and proper manner.

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(A) Type number, name, and serial number of equipment
(B) Date of delivery of equipment
(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known
(G) Part number (9 or 10 digit number) and name of part thought to be causing trouble
(H) Item or symbol number of same obtained from parts list or schematic
(I) Collins' number (and name) of unit sub-assemblies involved in trouble
(J) Remarks

HOW TO ORDER REPLACEMENT PARTS. When ordering replacement parts, you should direct your order as indicated below and furnish the following information insofar as applicable. To enable us to give you better replacement service, please be sure to give us complete information.

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(A) Quantity required
(B) Collins' part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins' type number, name, and serial number of principal equipment
(E) Unit sub-assembly number (where applicable)

INSTRUCTION BOOK

32S-1
TRANSMITTER

520 5796 00
15 SEPTEMBER 1958

CEDAR RAPIDS, IOWA, U.S.A.

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SECTION I
INSTALLATION

1.1 UNPACKING.

Open carton carefully to avoid damaging transmitter. Carefully lift the transmitter out of the packing material. Examine for visible damage. If transmitter has been damaged in shipment, save box and packing material and notify the transportation company. Fill out and mail the guarantee card. Check that all tubes and crystals are properly seated in sockets. Check tuning controls and switches for freedom of action. Remove shipping blocks from 516F-2 Power Supply and plug in tubes.

1.2 MOUNTING AND CABLING.

Connect transmitter to receiver, power supply, and antenna as shown in figures 1-1, 1-2, or 1-3. Connect microphone or key as shown in figure 1-1. The 32S-1 is connected for use with a high impedance phone patch such as the one in the 312B-4 Station Control. If phone patch operation using low-impedance phone patch, such as Collins 189A-2, is desired, modify 32S-1 as follows: Disconnect the shielded wire (white with black tracer) from the MIC jack, and connect the center conductor to pin 8 of V1. Connect its shield to the center terminal on the terminal strip mounted near V1, pin 9. Check for continuity between PHONE PATCH jack J3 and pin 8 of V1.

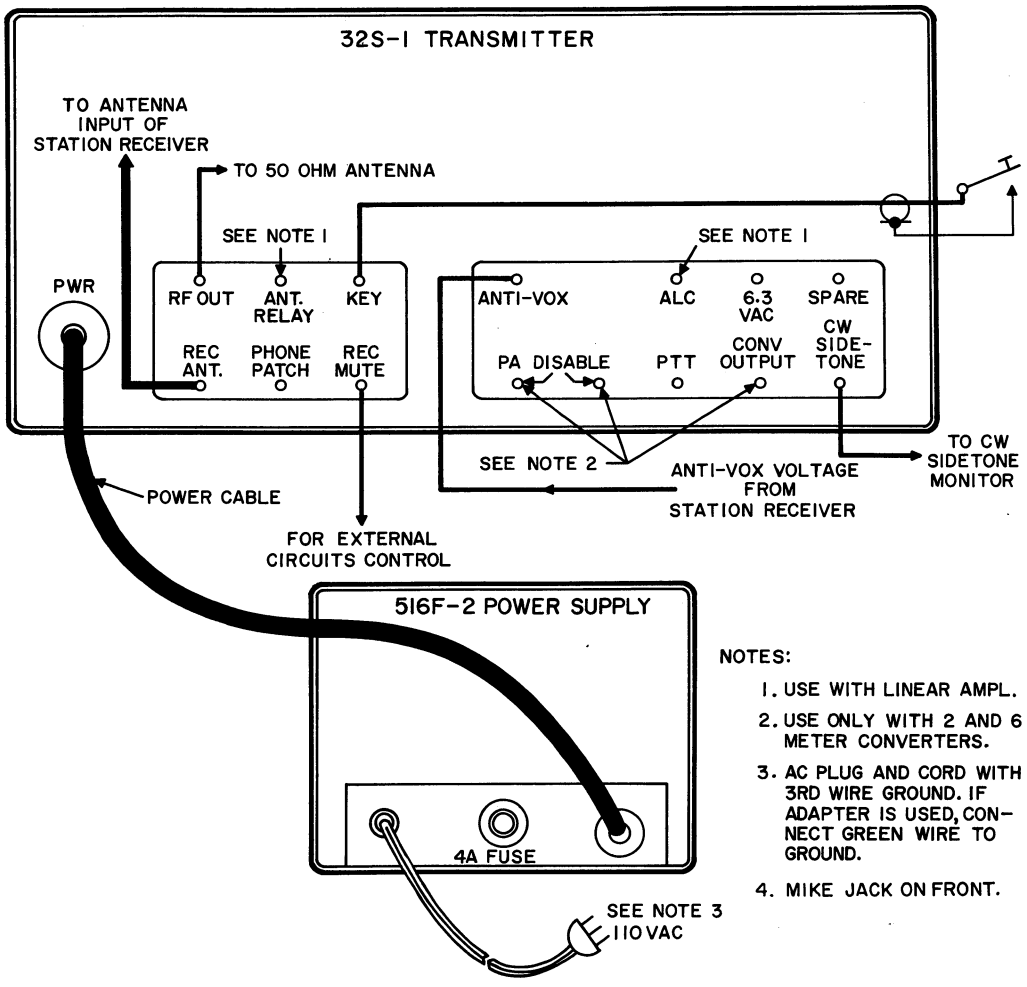

Figure 1-1. External Connections

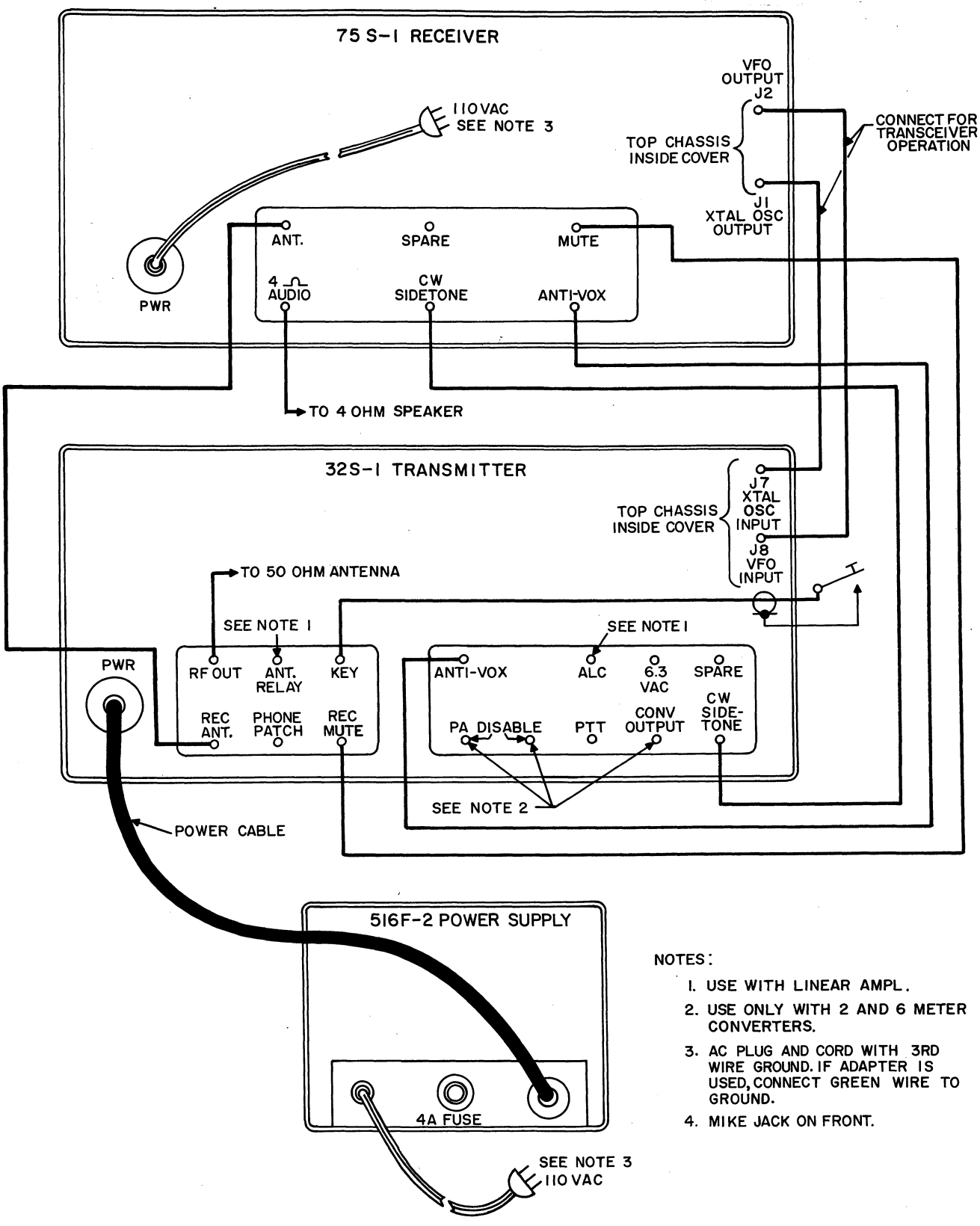

Figure 1-2. Receiver-Transmitter Interconnections

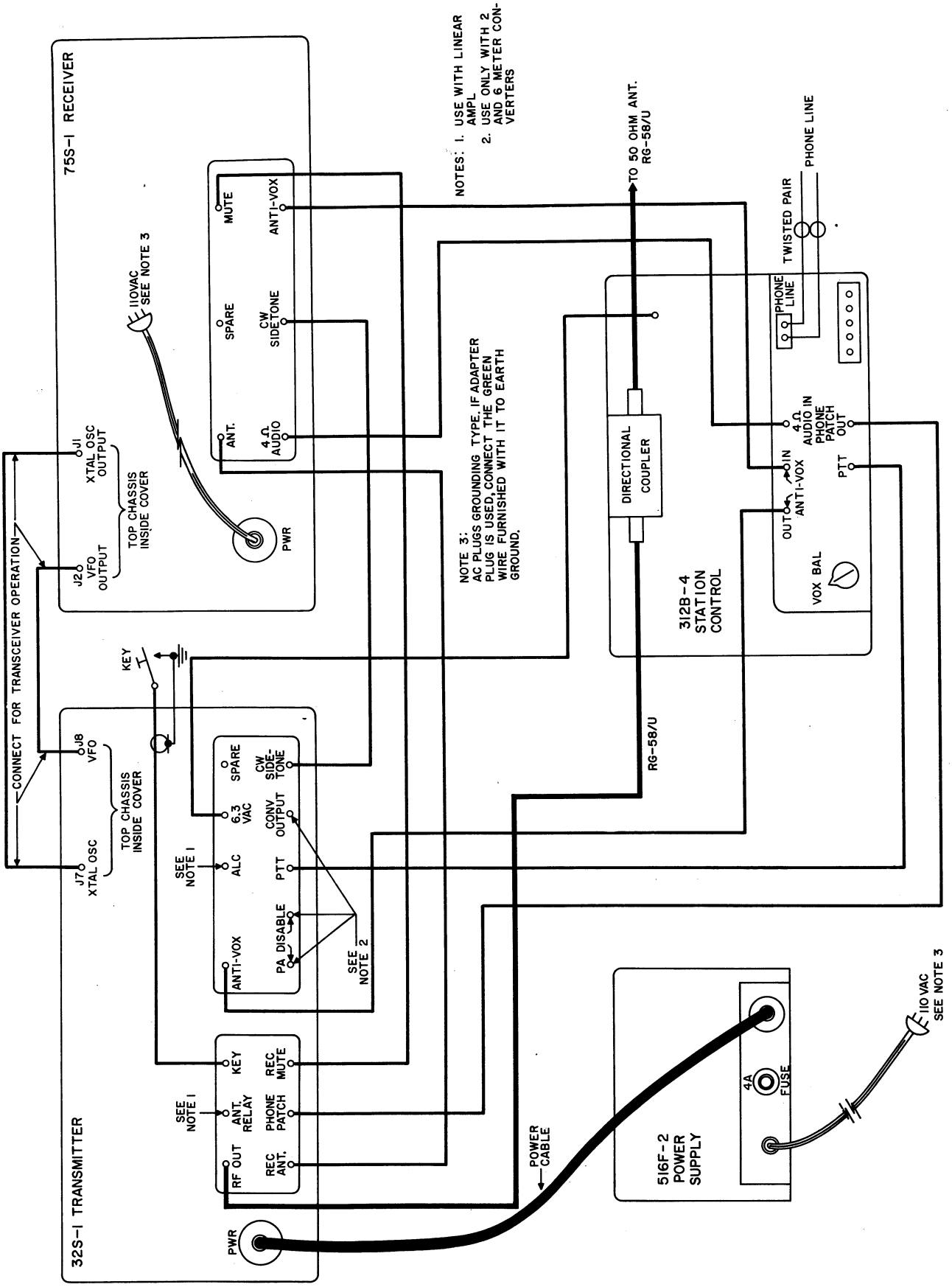

Figure 1-3. Station Interconnections

1.3 INITIAL CHECKS.

Set MIC GAIN control full counterclockwise, FREQ CONTROL switch to TRANS VFO, EMISSION switch to USB or LSB. Open top of transmitter, and set VOX GAIN control full counterclockwise until switch S10 closes. Set METER switch to P. A. PLATE position, and read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust the BIAS ADJUST potentiometer on power supply chassis to set plate current at 40 ma. When finished, open S10 by turning VOX GAIN clockwise until switch clicks.

CAUTION

Do not set no-signal PA plate current too low; amplifier linearity will be degraded. Do not set too high; PA plate dissipation will be exceeded and tubes damaged.

SECTION II
OPERATION

2.1 CW TUNING.

a. Set controls as shown in figure 2-1.
b. Set EXCITER TUNING (2) and P. A. TUNING (4) to desired band.
c. Set tuning dial (3) to desired frequency within band For example, if BAND switch (7) is set to 14.0, and desired frequency is 14.195 mc, set dial to 195. To read frequency, add the dial setting to the BAND switch setting. As an example, if the BAND switch is set to 3.8 and the dial is set to 5, the frequency is 3.805 mc. If the BAND switch is set to 3.8 and the dial to 170, the frequency is 3.970 mc.
d. Adjust MIC GAIN (6) and rock EXCITER TUNING (2) to peak PA grid current.
e. Set METER switch (9) to P. A. PLATE position, and dip plate current with P. A. TUNING control (4).

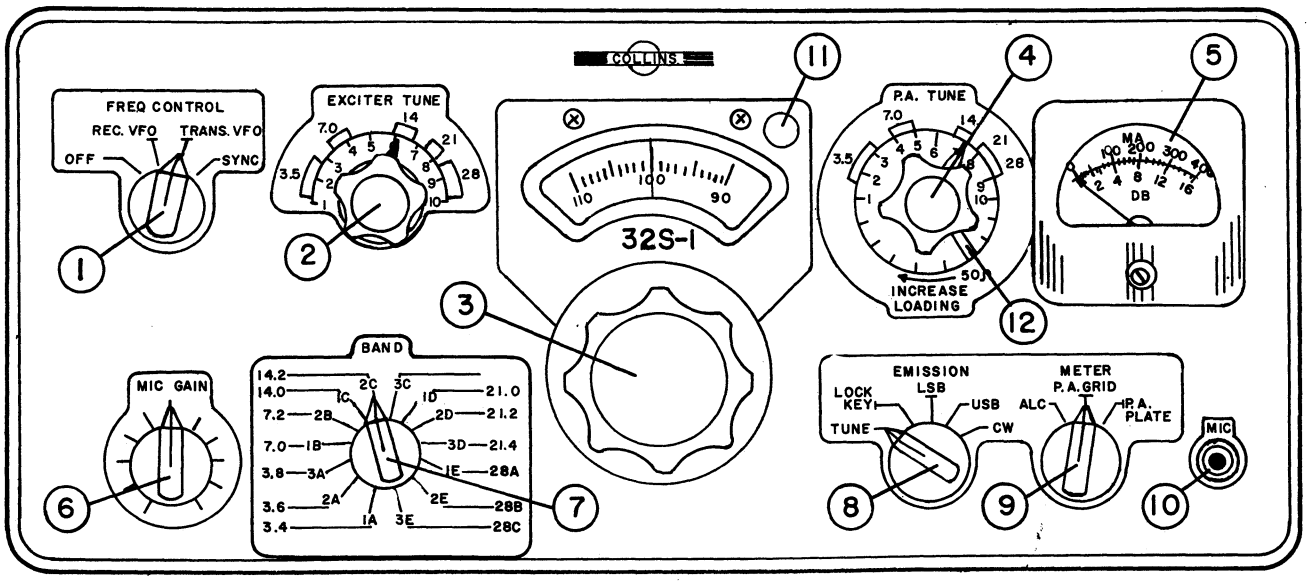

Figure 2-1. Panel Controls

f. Switch EMISSION switch (8) to LOCK KEY position, and redip plate current with P. A. TUNING control (4).

g. Set METER switch (9) to P. A. GRID, and advance MIC GAIN (6) to produce one-quarter scale (4 db) PA grid current indication on meter (5).

h. Set METER switch (9) to P. A. PLATE. Plate current should be 250 ma at dip if antenna is 50 ohms and feed line is flat. If the feed line does not present 50 ohms (resistive) to the transmitter, adjust the INCREASE LOADING control (12), redipping plate current with P. A. TUNING control (4) after each loading adjustment until the power amplifier loads to 250 ma.

i. Set EMISSION switch (8) to CW and the transmitter is ready for CW operation.

j. If break-in CW is desired, open the top cover and turn the VOX GAIN control clockwise until the vox relay operates with the key. For rapid, nonbreak-in CW, connect an external switch or foot switch to PTT jack J4.

k. If the transmitter is connected with a 75S-1 Receiver, as shown in figure 1-2, and it is desired to zero beat the transmitter to a frequency tuned on the receiver, proceed as follows:

Make sure the receiver vfo and high-frequency crystal oscillator are connected to the transmitter as in transceiver operation. Set receiver OFF-STBY-OPR-CAL switch (1) to STBY. Set transmitter FREQ CONTROL switch (1) to SYNC. position. Set both transmitter and receiver to same sideband. Slowly tune the transmitter vfo until the beat note sounds like a canary chirping. When the frequency of chirps is two or three per second, the transmitter is zero beat with the receiver within two or three cycles per second. Set zero set knob on 32S-1 to agree with receiver. Switch the receiver OFF-STBY-OPR-CAL switch (1) to OPR and the transmitter FREQ CONTROL (1) to TRANS VFO, and the receiver and transmitter are ready for operation.

2.2 SSB TUNING PROCEDURE.

a. Set up as in paragraph 2.1, steps a through i. Plug in microphone.

b. Set EMISSION switch (8) to desired sideband (USB or LSB).

c. Set METER switch (9) to ALC.

d. While talking into microphone, advance the MIC GAIN (6) until the meter indicates about 6 db (lower scale).

e. For push-to-talk operation, make sure the VOX GAIN control (under top cover) is turned clockwise until the switch just clicks open.

f. For vox operation, talk steadily into the microphone, and advance the VOX GAIN control until the vox relay operates with speech input to microphone.

g. To adjust anti vox, adjust receiver a-f gain for normal speaker operation with receiver tuned on signal.

h. If loudspeaker output causes transmitter vox circuits to operate, advance the ANTI-VOX GAIN control in clockwise direction, and set to a level just above point at which receiver loudspeaker output no longer keys transmitter circuits into operation.

i. It may be necessary to increase vox gain slightly after anti-vox is set.

j. The transmitter is ready for SSB operation.

k. If the transmitter is connected with a 75S-1 Receiver, as shown in figure 2-1, and it is desired to zero beat the transmitter to a frequency tuned on the receiver, proceed as in paragraph 2.1, step k.

2.3 OPERATION AS TRANSCEIVER WITH 75S-1 RECEIVER.

a. Connect 32S-1 and 75S-1 as shown in figure 1-1 or 1-2.

b. Set FREQ CONTROL (1) on 32S-1 to REC VFO position.

c. Set OFF-STBY-OPR-CAL switch (1) on 75S-1 to STBY position.

d. Set both BAND selectors to same desired band and both EMISSION switches (8) to same position (either USB, LSB, or CW).

NOTE

When the 32S-1 and 75S-1 are connected together in transceiver service and the FREQ CONTROL switch is in REC VFO position, transmitter frequency is controlled by receiver oscillators. *Both* receiver and transmitter *must* have BAND switches and EMISSION switches set to same position. If the transmitter FREQ CONTROL switch (1) is set to TRANS VFO position, the two units may operate on different frequencies within the same 200-kc band. Do not attempt operation in transceiver service with any other receiver not having the same frequency mixing scheme.

e. Adjust the PRESELECTOR (2) of the 75S-1 for maximum signal or noise output.

f. Place the EXCITER TUNING (2) and the P. A. TUNING (4) controls in approximate band position.

g. Set the transmitter EMISSION switch (8) to TUNE position. Sidetone will be heard in the speaker.

h. Set the METER switch (9) to P. A. GRID position.

i. Increase the MIC GAIN control (6) setting as necessary, and peak the grid current with the EXCITER TUNING control (2).

j. Set the METER switch (9) to P. A. PLATE position, and dip the PA plate current with P. A. TUNING (4).

k. Set the EMISSION switch (8) (on 32S-1) to LOCK KEY position, and complete the loading procedure as in paragraph 2.1, steps g through j.

l. During operation across the selected band, peaking the desired receive signal with the receiver PRESELECTOR will peak the high frequency oscillator injection signal to the second balanced mixer. Adjust transmitter EXCITER TUNING for peak PA grid current.

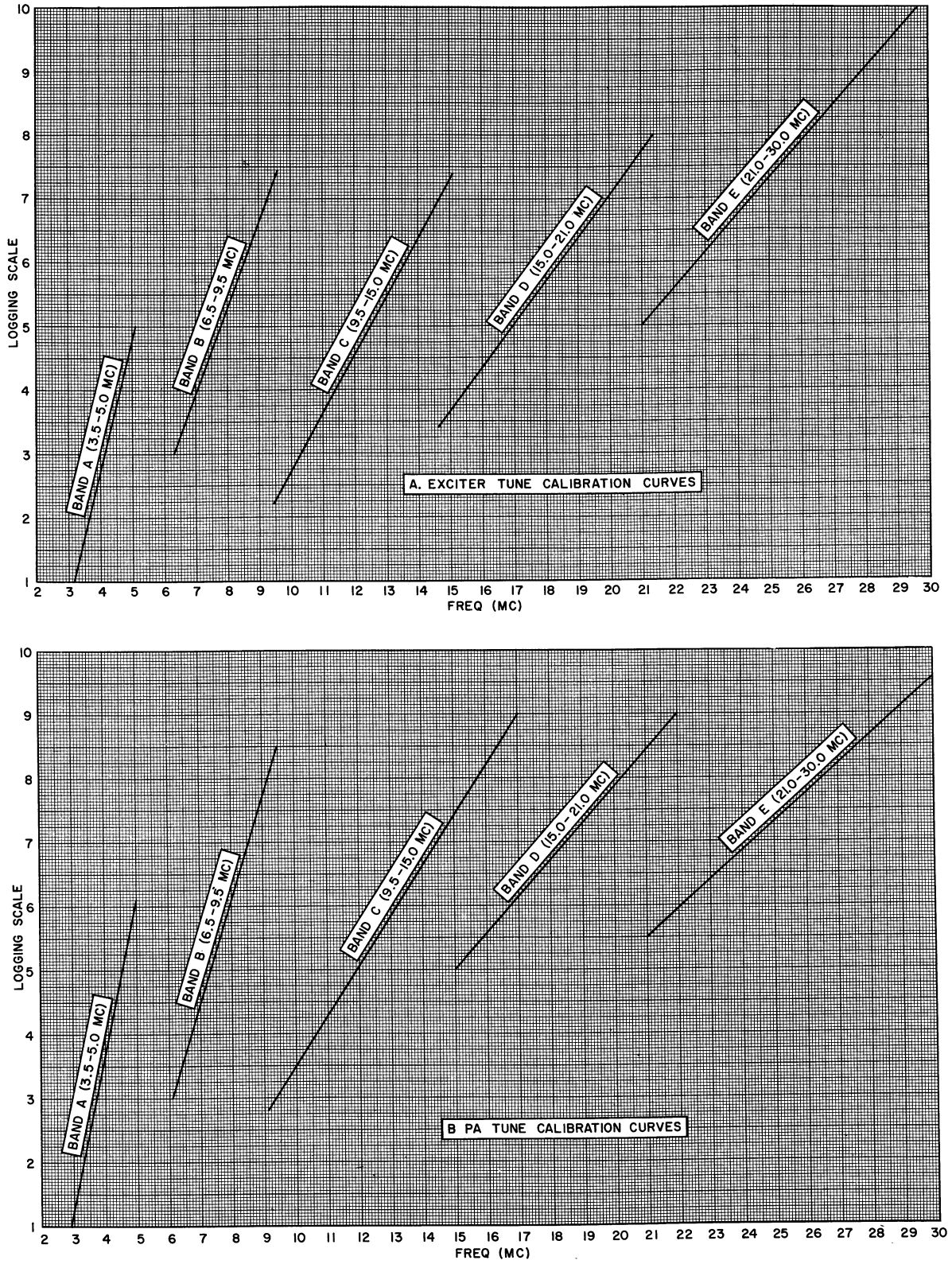

Figure 2-2. Calibration Curves

CAUTION

If transmitter frequency is changed by any great amount, be sure to redip the power amplifier plate current and check the loading. This will be most important on the 80- and 40-meter bands. Some operating experience will indicate the amount of frequency excursion possible without readjustment.

WARNING

When operating 32S-1 and 75S-1 in transceiver service, *do not* operate transmitter while receiver is tuned outside band limits; transmitted signal will be out of band. In this service, transmit frequency is always the same as receive frequency. Keep receiver tuned within the band, or return receiver to frequency within band before transmitting.

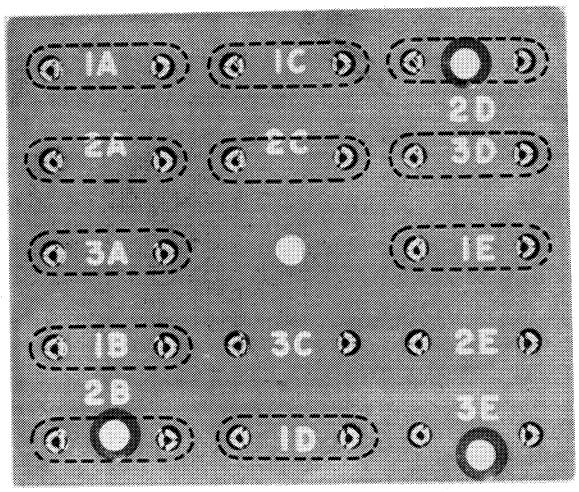

Figure 2-3. Crystal Socket Locations

m. To restore both units to normal operation, remove the two patch cables connecting oscillator signals, replace P1 in J7 on the transmitter chassis, and replace the 100-ohm load plug, P1, in the XTAL OSC OUTPUT jack, J1, on the receiver chassis.

2.4 OPERATION OUTSIDE AMATEUR BANDS.

All amateur bands are completely covered except the 10-meter band for which only one crystal is furnished (for 28.5 to 28.7 mc). Two extra sockets are provided for additional crystals in this band.

The transmitter can be operated at other frequencies outside the specified amateur bands (MARS frequencies) or at other 10-meter frequencies by plugging the proper crystals into the mounting board. Figure 2-2 shows calibration curves, and figure 2-3 shows crystal socket locations. Select these crystals as follows.

CAUTION

Avoid operation between 5.0 mc and 6.5 mc. In this range the second harmonic of the variable i-f frequency is nearly the same as desired frequency. Some of this energy will pass through the tuned circuits and become spurious emission.

a. If the lower edge of the desired 200-kc band is less than 11.80 mc, the required crystal frequency is equal to the lower edge of the desired band plus 3.155 mc. As an example, if the desired band is 4.0 to 4.2 mc, 4.0 mc plus 3.155 mc equals 7.155 mc.

b. If the lower edge of the desired 200-kc band is 12.000 mc or higher, the required crystal frequency is half the sum of the lower desired band edge and 3.155 mc. As an example, if the desired band is 14.4 mc to 14.6 mc,

$$\frac{14.4 + 3.155}{2} = 8.7775 \text{ mc.}$$

The plate circuit of the oscillator is tuned to twice the crystal frequency when required injection frequencies are this high.

c. Substitute or extra crystals should be plugged into the appropriate socket on the mounting board according to the best location in one of the five bands. The example cited in step b above should place the crystal in one of the sockets marked C. If two additional 10-meter crystals are used, they should be plugged into one of the sockets marked E. Table 2-1 lists crystal socket designations, switch positions (BAND), crystal frequencies furnished, and frequency range limitations. For extra coverage crystals available, see section VI, Parts List.

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS

BAND SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1A - 3.4	3.4 - 3.6 mc	6.555 mc	1A	
2A - 3.6	3.6 - 3.8 mc	6.755 mc	2A	A 3.4 - 5.0 mc
3A - 3.8	3.8 - 4.0 mc	6.955 mc	3A	
1B - 7.0	7.0 - 7.2 mc	10.155 mc	1B	B 6.5 - 9.5 mc
2B - 7.2	7.2 - 7.4 mc	10.355 mc	2B	
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	C 9.5 - 15.0 mc
Blank	As selected	Not furnished	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	D 15.0 - 21.0 mc
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8725 mc	1E	
2E - 28B	As selected	Not furnished	2E	E 21.0 - 30.0 mc
3E - 28B	As selected	Not furnished	3E	

SECTION III
PRINCIPLES OF OPERATION

3.1 BLOCK DIAGRAM.

Refer to figure 3-1. The transmitter uses heterodyne exciter principles with crystal-controlled bfo, high-frequency oscillator, and highly stable vfo. The low-frequency i-f is 455 kc, and the high-frequency i-f is a 200-kc wide band-pass circuit. The 32S-1 may be connected in transceiver service with the companion 75S-1 Receiver. Figure 7-1 is a schematic diagram of the transmitter, and figure 7-2 is a schematic diagram of the 516F-2 Power Supply.

3.2 A-F CIRCUITS.

Microphone or phone patch input is connected to the grid of first audio amplifier V1A, amplified, and coupled to the grid of the second audio amplifier, V1B. Output from V1B is coupled to the grid of cathode follower V2A across MIC GAIN control. Output from the cathode follower is fed to the resistive balance point of the balanced modulator. In TUNE, LOCK KEY, and CW positions of the EMISSION switch, output from the tone oscillator, V11B, is fed to the grid of the second audio amplifier. Amplified tone oscillator signal is taken from the plate of V1B to the grid of the vox amplifier and the CW sidetone jack, J19.

3.3 BALANCED MODULATOR AND LOW-FREQUENCY I-F CIRCUITS.

Audio output from the cathode of V2A and bfo voltage are fed to the slider of the carrier balance potentiometer, R14. Both upper and lower sideband output from the balanced modulator are coupled through i-f transformer T2 to the grid of the i-f amplifier, V3. Output from the i-f amplifier, V3, is fed to the mechanical filter, FL1. The pass band of FL1 is centered at 455 kilocycles.

This passes either upper or lower sideband, depending upon the sideband polarity selected when the EMISSION switch connects bfo crystal Y14 or Y15. The single-sideband output of FL1 is connected to the grids of the first balanced mixer in push-pull.

3.4 BALANCED MIXERS.

The 455-kc single-sideband signal is fed to the first balanced mixer grids in push-pull, the plates are connected in push-pull, and the vfo signal is fed to the grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal to a 2.955- to 3.155-mc single-sideband

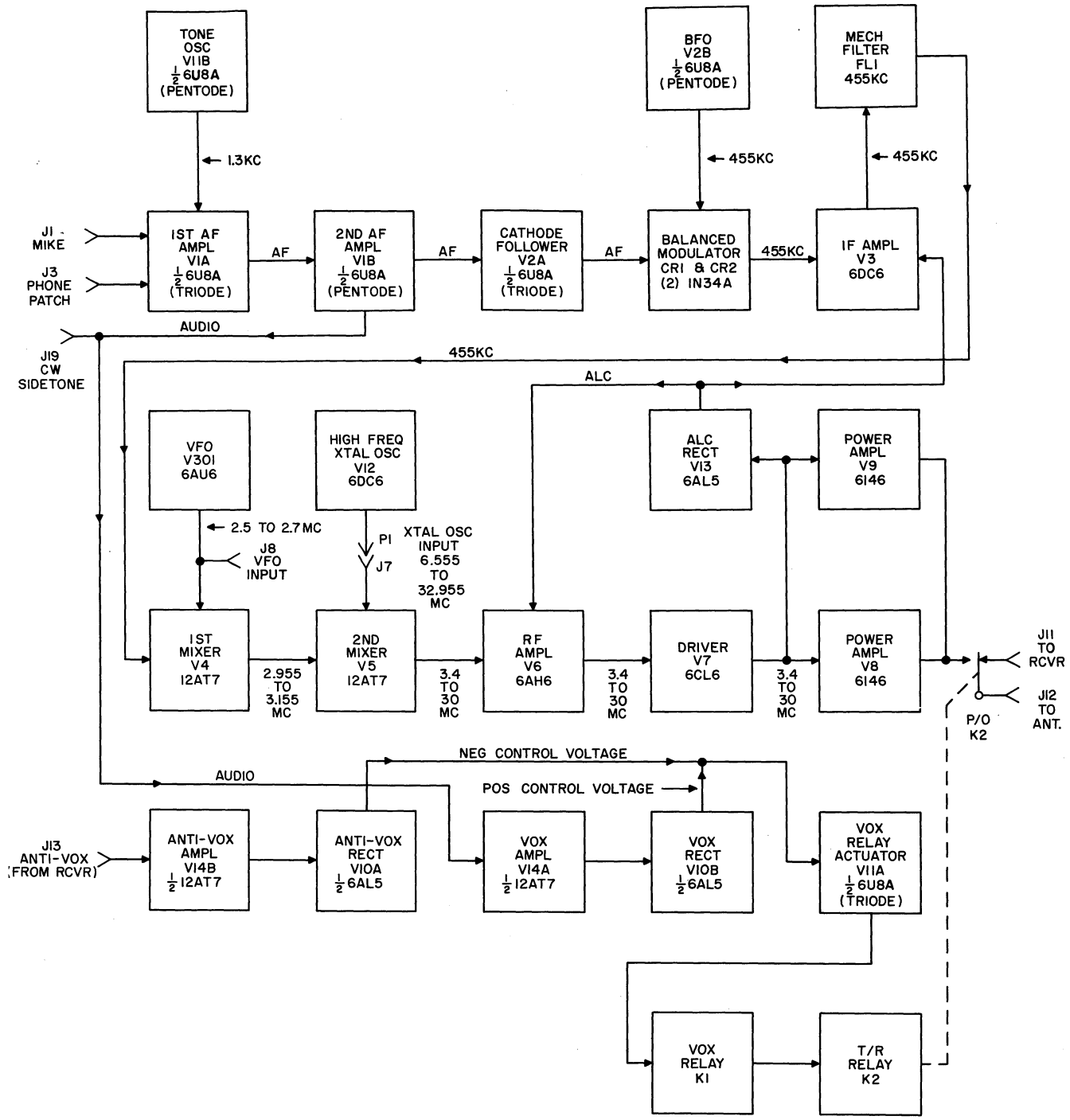

Figure 3-1. Block Diagram

carrier signal. This signal is the band-pass i-f frequency. The coupling network between the plate of the first mixer and the grid of the second balanced mixer is broadbanded to provide a uniform response to the band-pass i-f frequency. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal from the crystal oscillator V12 is fed to the signal input cathode and to the other grid. This arrangement cancels the high-frequency injection signal energy within the mixer and translates the band-pass i-f signal to the desired operating band.

3.5 R-F CIRCUITS.

The slug-tuned circuits coupling V5 to V6, V6 to V7, and V7 to the power amplifier are ganged to the EXCITER TUNING control. The signal is amplified by the r-f amplifier, V6, and the driver, V7, to drive the power amplifier, V8 and V9. Output from the parallel power

amplifiers is tuned by a pi-network and applied to the antenna through contacts of transmit-receive relay K2. Negative r-f feedback from the PA plate circuit to the driver cathode circuit permits a high degree of linearity at the high power level of the PA tubes. Both the driver and PA stages are neutralized to insure their stability.

3.6 CONTROL CIRCUITS.

3.6.1 ALC CIRCUIT.

Detected audio from the power amplifier grid circuit is rectified by V13, and the negative d-c output is fed to the alc bus. A fast-attack slow-release dual time constant is used to prevent overdriving on initial syllables and to hold gain constant between words. The fast time constant alc is applied to V6, and the slow time constant alc is applied to V3. If the companion 30S-1 Power Amplifier is used with the 32S-1, alc output from the 30S-1 is fed back to the alc bus.

3.6.2 VOX ANTI-VOX CIRCUITS.

Output from the second audio amplifier, V1B, is fed to the grid of the vox amplifier, V14A, through the VOX GAIN control, R74. This audio input is amplified by V14A and rectified by vox rectifier V10B. When the positive output of V10B is high enough to overcome the negative bias on V11A grid, the vox relay is actuated to turn the transmitter on. Receiver output is fed from J13 through the ANTI-VOX GAIN control, R85, to the grid of anti-vox amplifier V14B. Output from V14B is rectified by anti-vox rectifier V10A to provide the negative bias necessary to keep the transmitter disabled during receive periods. The anti-vox circuit provides a threshold voltage to prevent loudspeaker output (picked up by the microphone circuits) from tripping the vox circuits into transmit. ANTI-VOX GAIN control R85 adjusts the value of the anti-vox threshold so that loudspeaker output will not produce enough positive d-c output from the vox rectifier to exceed the negative d-c output from the anti-vox rectifier and cause V11A to actuate vox relay K1. Speech energy into the microphone will cause the positive vox voltage to overcome the negative anti-vox voltage and produce the desired action of K1. Contacts of relay K1 control relay K2, key line, PA and driver screens, receiver muting circuits, oscillator plate-voltages, and the high-voltage relay in the d-c supply.

3.7 OSCILLATORS.

3.7.1 TONE OSCILLATOR.

The tone oscillator is used for tuneup and CW operation and consists of an RC phase-shift oscillator operating at approximately 1350 cps. Its output is fed to the audio amplifier and is switched by the bfo signal in the balanced modulator to provide continuous wave r-f at the grids of the first mixer. The oscillator is turned on when EMISSION switch section S8C is in TUNE, LOCK KEY, or CW position.

3.7.2 BEAT-FREQUENCY OSCILLATOR.

The bfo is crystal controlled at either 453.650 kc or 456.350 kc, depending upon whether Y14 or Y15 is selected by EMISSION switch section S8F. These crystal frequencies are matched to the pass band of the mechanical filter, FL1, so the carrier frequency is placed approximately 20 db down on the skirts of the filter response. This 20-db carrier suppression is in addition to the 30-db suppression provided by the balanced modulator.

3.7.3. VARIABLE-FREQUENCY OSCILLATOR.

The vfo is a Colpitts oscillator operating in the range of 2.5 to 2.7 mc. The value of the cathode choke is selected so switching a small trimmer across it shifts the oscillator frequency. This compensates for switching bfo frequency and keeps dial calibration accurate no matter which sideband is selected. This vfo switching is done by applying a positive or negative bias to diode CR301. When the diode bias is positive, the diode impedance is lowered, and C308 is effectively in parallel with L304. When the bias is negative, diode impedance is high, and C308 is effectively switched out of the circuit.

3.7.4 HIGH-FREQUENCY CRYSTAL OSCILLATOR.

The high-frequency crystal oscillator, V12, is crystal controlled by one of 13 crystals selected by BAND switch S11. Output from the high-frequency crystal oscillator is fed to the second mixer. This frequency is always 3.155 mc higher than the lower edge of the desired transmit band. This high-frequency injection signal is crystal fundamental frequency for all desired output signals below 12 megacycles, but for operating frequencies higher than 12 megacycles, the crystal frequency is doubled in the plate circuit of the oscillator.

SECTION IV
SERVICE INSTRUCTIONS

4.1 GENERAL.

Included in this section are signal tracing procedures, alignment and neutralization procedures, and voltage and resistance measurements.

4.2 SIGNAL TRACING.

Table 4-1 lists significant test points and normal signal levels. Figure 4-1 shows location of adjustments. Before making measurements, set EMISSION switch to USB, and disable the power amplifier by disconnecting screen and plate voltages from both tubes. Set the METER switch to P.A. GRID. Peak EXCITER TUNING and turn VOX GAIN control counterclockwise until switch clicks. Connect signal generator output to test points indicated in table 4-1, and adjust signal generator output attenuator until PA grid current just begins to show on meter. Attenuator reading is signal voltage necessary at that point. Voltages given in the table are nominal and may vary plus or minus 20%. Be careful, each time, to set signal generator to frequency shown in table. Oscillator output voltage may be measured with a vacuum-tube voltmeter.

TABLE 4-1. SIGNAL LEVELS

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
V7-2 (grid)	3.6	3.7 mc	1.7 volts
or	7.0	7.1 mc	1.5 volts
V6-5 (plate)	14.0	14.1 mc	2.0 volts
	21.2	21.3 mc	2.0 volts
	10A	28.6 mc	2.0 volts
V6-1 (grid)	3.6	3.7 mc	80 millivolts
	7.0	7.1 mc	55 millivolts
	14.0	14.1 mc	80 millivolts
	21.2	21.3 mc	85 millivolts
	10A	28.6 mc	90 millivolts
	10B, 10C	According to crystal used	
V5-2 (grid)	14.0	3.055 mc	15 millivolts
V4-2 (grid)	14.0	3.055 mc	30 millivolts
V3-5 (plate)	14.0	455 kc	100 millivolts
V3-1 (grid)	14.0	455 kc	2.5 millivolts
For following, disconnect signal generator, set EMISSION switch to TUNE, and adjust MIC GAIN for grid current threshold. Measure with vtvm.			
V2A-8 (cathode)	Any	1350 cps	10 millivolts
V2A-9 (grid)	Any	1350 cps	20 millivolts
V1B-2 (grid)	Any	1350 cps	0.6 volt

TABLE 4-1. SIGNAL LEVELS (Cont)

TEST POINT	BAND-SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	SIGNAL VOLTAGE AT TEST POINT
For following, turn EMISSION switch to USB, and connect audio oscillator to J3. Adjust audio oscillator output for PA grid current threshold, and measure voltage at test point with vtvm. *Do not change MIC GAIN setting.*			
V1A-9 (grid) or J3 PHONE PATCH	Any	1350 cps	30 millivolts
For following, measure at test point with vtvm and r-f probe.			
V5-3	3.6 7.0 14.0 21.2 28.5		2.9 volts 3.0 volts 3.1 volts 1.5 volts 1.0 volt
V4-2 or 7	Vfo set at 100		3.0 volts
J2	Any		1.4 volts

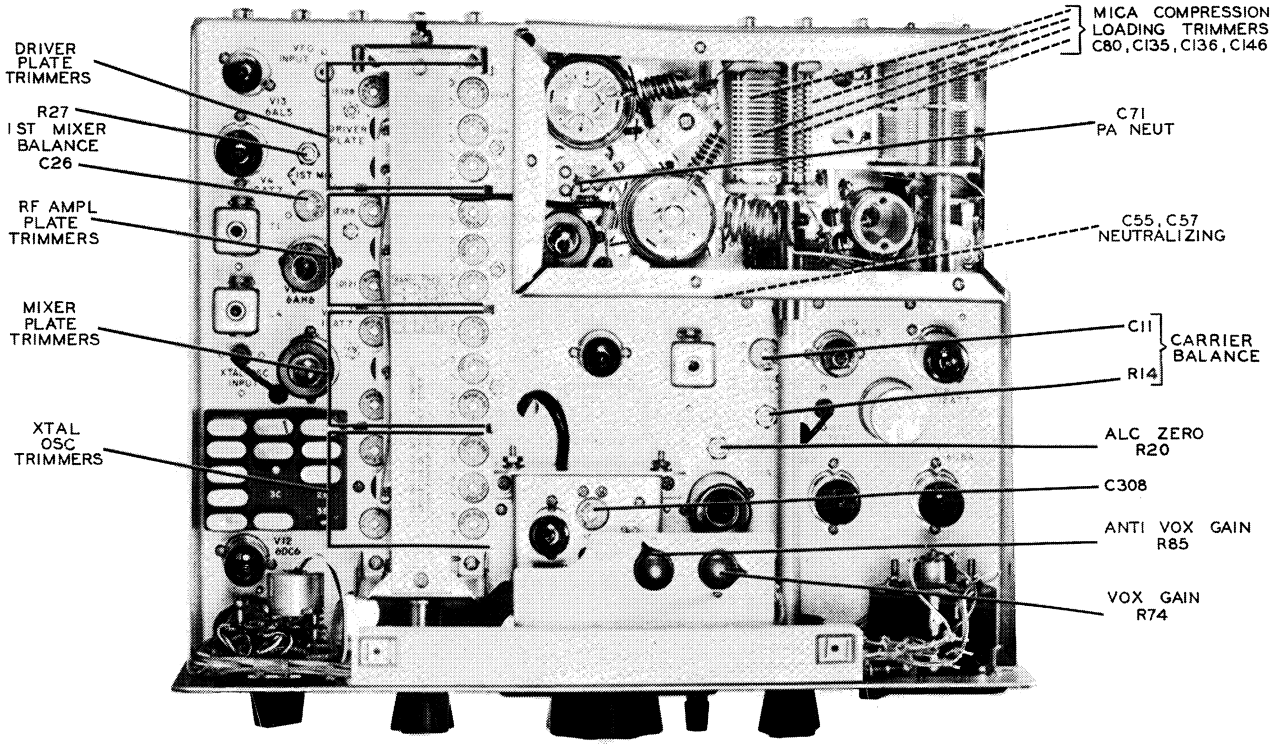

Figure 4-1. Location of Adjustments

4.3 VOLTAGE AND RESISTANCE MEASUREMENTS.

Table 4-2 lists voltage and resistance measurements on all tube sockets except that of V301. *Do not open* the oscillator can. Measurements were taken under following conditions:

a. All measurements with vtvm and with all tubes in sockets.
b. Resistances of less than one ohm listed as zero.
c. Voltage measurements made with the tube under test operating normally, vox switch S10 closed, no power output.
d. Resistance measurements made with power supply plug removed from J10.
e. All measurements made from socket pin to ground.

WARNING

Do not attempt any measurements of power amplifier plate voltage without special high-voltage test probe. Voltage here is 800 volts d-c. Do not make any other voltage or resistance measurements on 32S-1 with high voltage applied. Remove high-voltage rectifier from socket in power supply.

TABLE 4-2. VOLTAGE AND RESISTANCE MEASUREMENTS

		PIN NUMBER									
TUBE		1	2	3	4	5	6	7	8	9	PLATE CAP
V1	D-C V	80	0	160			130	4.0	2.0	0	
	A-C V				6.3						
	Ohms	80K	450K	130K	1.8	1.2	90K	1.5K	680	1 meg	
V2	D-C V	285	-20	110			205	0	135	125	
	A-C V				6.3	0					
	Ohms	35K	1 meg	300K	1.6	2.2	130K	0	16K	400K	
V3	D-C V	-018	+1.1			290	90	0			
	A-C V				6.3						
	Ohms	3 meg	170	1.2	1.8	100K	40K	0			
V4	D-C V	225	-0.2	4.2			230	-0.2	4.3		
	A-C V									6.3	
	Ohms	35K	50K	750	2.0	2.0	35K	50K	750	1.8	
V5	D-C V	230	-2.5	+1.0			230	-2.9	+1.2		
	A-C V									6.3	
	Ohms	35K	1 meg	220	2.1	2.1	35K	1 meg	220	1.8	
V6	D-C V	-1.0	0			225	160				
	A-C V				6.3						
	Ohms	380K	0	2.2	1.8	35K	130	180			
V7	D-C V	3.4	0	155			285	0	155	0	
	A-C V				6.3						
	Ohms	115	10K	110K	1.2	0.7	33K	0	110K	10K	
V8	D-C V	+0.1	0	+290	+0.1	-7.3	+0.1	0	0		800
	A-C V		6.3								
	Ohms	1.8	0.7	37K	1.8	580K	1.8	0	0		
V9	D-C V	+0.1	0	290	+0.1	-73	+0.1	0	0		800
	A-C V							6.3			
	Ohms	1.9	1.4	37K	1.8	580K	1.9	0	0		
V10	D-C V	0	0			+0.9	0	-0.8			
	A-C V			6.3							
	Ohms	100K	100K	1.7	1.3	18 meg		18 meg			

TABLE 4-2. VOLTAGE AND RESISTANCE MEASUREMENTS (Cont)

		PIN NUMBER									
TUBE		1	2	3	4	5	6	7	8	9	PLATE CAP
V11	D-C V	0	0	0			0	95	4.5	0	
	A-C V				6.3						
	Ohms	45K	240K	140K	1.7	1.3	80K	350	70K	10 meg	
V12	D-C V	-5.9*	0			285	85	0			
	A-C V			6.3							
	Ohms	100K	10	1.8	2.2	100K	140K	0			
V13	D-C V	-0.5	-0.5			0	0	-1.1			
	A-C V				6.3						
	Ohms			2.2	1.8	0		4 meg			
V14	D-C V	170	0	2.4			160	0	2.5	0	
	A-C V									6.3	
	Ohms	80K	1 meg	1K	1.2	1.3	80K	1.1 meg	1K	1.7	

*Varies with band

4.4 ALIGNMENT PROCEDURES.

4.4.1 TEST EQUIPMENT REQUIRED.

A signal generator, vacuum-tube voltmeter, and a 100-watt, 50-ohm dummy load are required for complete alignment and neutralization. If only touch-up alignment is necessary, and if transmitter develops 50 to 60 volts r-f at PA grids, alignment with PA grid current indication is satisfactory.

4.4.2 455-KC I-F ALIGNMENT. (Refer to figure 4-1 for location of adjustments.)

a. Disconnect the high voltage (800 volts) from the transmitter by removing the high-voltage rectifier tube from the power supply.

b. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between P.A. DISABLE jacks, J9 and J5.

c. Connect the r-f probe of a vtvm across mechanical filter input (junction of C140 and R106 on terminal strip near i-f amplifier V3).

d. Set FREQ CONTROL switch to TRANS VFO. Set EMISSION switch to TUNE position.

e. Set MIC GAIN full counterclockwise.

f. Any voltage appearing on the vtvm is due to carrier. Adjust carrier balance potentiometer R14 for minimum vtvm indication. This is a coarse adjustment.

g. Advance MIC GAIN until vtvm indicates approximately one volt.

h. Peak primary and secondary of T2. Disconnect vtvm.

4.4.3 BAND-PASS I-F ALIGNMENT.

a. Connect signal generator output between pin 2 of the first mixer, V4, and ground. Connect r-f probe of vtvm between junction of C30 and R32 and ground. This point is in the grid circuit of the second mixer, V5.

b. Tune the signal generator to 3.055 mc. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T1 and ground. This terminal is connected to the T1 end of coupling capacitor C3.

c. Turn on transmitter. Set FREQ CONTROL switch to REC VFO, and set EMISSION switch to TUNE.

d. Keep vtvm indication at about 0.5 volt by adjusting signal generator output, and peak the primary of T1 and peak L4 with tuning tool such as Walsco 2543. The primary slug for T1 is in the bottom of the can.

e. Remove the swamping tool from the secondary of T1, and connect it across the primary of T1 (between pins 1 and 6 of the first mixer, V4). Peak the secondary of T1 (top of shield can). Remove swamping tool.

4.4.4 R-F CIRCUITS ALIGNMENT.

a. Set the EXCITER TUNING control to 3.5 on the logging scale (lower edge of 40-meter band). Align the tops of the iron cores with the tops of the coil forms by screwdriver adjustments on slug rack.

b. Set the tuning dial to 0.

c. Set the BAND switch to 28A and the EXCITER TUNING control to 9 on the logging scale (midway in 28-mc band).

d. Connect r-f vtvm from pin 5 of V9 to ground.
e. Set FREQ CONTROL switch to TRANS VFO position. Set EMISSION switch to TUNE.
f. Advance MIC GAIN until vtvm indicates PA grid voltage.
g. Peak the trimmers marked (E)28 for maximum PA grid voltage indication on the vtvm. Keep the indication below 30 volts by adjusting the MIC GAIN as necessary.
h. Remove the r-f probe connection from pin 5 of V9. Set METER switch to P.A. GRID position. Repeak the driver plate circuit trimmer, using the PA grid current as peak indication.
i. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 7.5 on the logging scale (lower edge of 21.0-mc band). Set BAND switch to 21.0 position.
j. Peak the trimmers marked (D)21 for maximum PA grid indication on the vtvm. Keep the indication below 30 volts as in step g.
k. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.
l. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 6 on the logging scale (lower edge of 14-mc band). Set BAND switch to 14.0.
m. Peak the trimmers marked (C)14 for maximum PA grid voltage indication. Keep the indication below 30 volts as in step g.
n. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.
o. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 4.5 on the logging scale (upper end of 7-mc band). Set BAND switch to 7.2. Turn tuning dial to 200.
p. Peak the trimmers marked (B)7.0 for maximum PA grid voltage indication, keeping grid voltage below 30 volts.
q. Remove the r-f probe connection, and repeak the driver plate circuit trimmer, using PA grid current as peak indication.
r. Replace the r-f probe connection at V9-5. Set EXCITER TUNING control to 2.8 on the logging scale (upper end of 3.8-mc band). Set BAND switch to 3.8.
s. Peak the trimmers marked (A)3.8 for maximum PA grid voltage indication, keeping grid voltage below 30 volts.
t. Remove probe and repeak the driver plate circuit trimmer, using PA grid current as peak indication.

4.4.5 CRYSTAL OSCILLATOR ALIGNMENT.

a. This procedure is a refinement which peaks the oscillator plate circuit in the center of the 200-kc tuning range. Turn the tuning dial to 100.
b. Set BAND switch to 28A. Adjust EXCITER TUNING control for a peak on the PA grid current meter. Set EMISSION switch to TUNE. Increase MIC GAIN setting if necessary to obtain grid current indication.
c. Repeak the (E)28 trimmer in the crystal oscillator plate circuit.
d. Set the BAND switch to 21.2, and adjust EXCITER TUNING control for peak in grid current.
e. Repeak the (D)21 trimmer in the oscillator plate circuit.
f. Repeat this procedure with BAND switch settings of 14.0, 7.0, and 3.6.

4.4.6 PA NEUTRALIZING.

a. Disable PA plate and screen circuits as in paragraph 4.4.2, steps a and b.
b. Connect a 50-ohm, noninductive, 100-watt dummy load to R. F. OUT jack J12.
c. Remove the cover on the power amplifier shielded compartment, and connect the r-f probe of the vtvm at the top of PA plate choke L14.
d. Set FREQ CONTROL switch to TRANS VFO, BAND switch to 14.0, EMISSION switch to LOCK KEY, and METER switch to P. A. GRID.
e. Advance MIC GAIN setting as necessary, and adjust EXCITER TUNING for peak PA grid current.
f. Adjust P. A. TUNING control for maximum r-f voltage indication on vtvm. Adjust MIC GAIN as necessary to keep this indication below 0.5 volt.
g. From bottom chassis, adjust the PA neutralizing capacitor, C71, for a dip in the vtvm indication. This voltage is PA plate feedthrough.
h. Remove the r-f probe connection from the top of L14, and replace the PA compartment cover.

4.4.7 DRIVER NEUTRALIZING.

a. Connect the high-voltage plate supply to the PA tubes by replacing the rectifier tube. Connect the jumper between J5 and J9 PA DISABLE jacks to energize PA screens.
b. Remove the screen voltage to the driver tube, V7, by unsoldering the screen B+ lead connected to C104 and R41.
c. Connect the r-f probe of the vtvm across the dummy load at J12.
d. Set the FREQ CONTROL switch to TRANS VFO, BAND switch to 14.0, EMISSION switch to LOCK KEY, and METER switch to P. A. PLATE.
e. Adjust the bias control in the power supply for 40 milliamperes of no-signal PA plate current.
f. Increase MIC GAIN setting, and adjust EXCITER TUNING and P. A. TUNING controls for maximum voltage across the 50-ohm load. This level will be less than 0.3 volt.
g. Adjust the driver neutralizing capacitor, C57, for a voltage dip. This capacitor is located on the shield partition closest to the shield can. Refer to figure 4-1.
h. Restore driver plate and screen voltage.

4.4.8 FEEDBACK NEUTRALIZING.

a. Set FREQ CONTROL to TRANS VFO position, BAND switch to 28A position, EMISSION switch to TUNE, and METER switch to P. A. PLATE position.
b. Adjust EXCITER TUNING control for a peak in PA plate current.
c. Dip the PA plate current with the P. A. TUNING control.

d. Repeat steps b and c above.

e. Adjust the feedback neutralizing capacitor, C55, (below chassis) until the PA plate current dip and the power output peak coincide. Readjust the MIC GAIN as necessary to hold PA plate current below saturation during this adjustment.

f. Set BAND switch to 21.2, peak EXCITER TUNING control, and dip PA plate current with P. A. TUNING control.

g. Check that PA plate current dip and power output peak occur at same setting of P. A. TUNING control.

h. Repeat this check on bands 14.2, 7.0, and 3.6.

4.4.9 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

CAUTION

Do not make this adjustment unless switching from one sideband to the other makes readjustment of tuning dial necessary to keep output signal from shifting. It will always be necessary, after this adjustment, to make carrier balance (null) adjustment given in paragraph 4.4.10 following.

a. Set EMISSION switch to LSB, METER switch to P. A. PLATE, BAND switch to 14.0 and tuning dial to 100. Turn VOX GAIN (under top cover) full counterclockwise until switch clicks.

b. Rotate CARRIER BAL potentiometer R14 to one end to allow carrier feedthrough.

c. Adjust EXCITER TUNING control for maximum plate current, and dip the plate current with the P. A. TUNING control.

d. Tune the station receiver to zero beat with the transmitter.

e. Set EMISSION switch to USB, and adjust trimmer C308 (top of vfo can) for zero beat.

4.4.10 CARRIER BALANCE ADJUSTMENT.

a. Set BAND switch to 14.0. Connect dummy load to transmitter output. Tune and load transmitter.

b. Set EMISSION switch to LSB position, and turn MIC GAIN control full counterclockwise.

c. Connect an r-f vtvm across dummy load and set to lowest scale, or use lowest scale on an r-f wattmeter connected in series with load.

d. Key transmitter by turning VOX GAIN control counterclockwise until the switch clicks or by grounding the push-to-talk jack, J4. If vtvm indication is 0.2 volt or more, adjust CARRIER BAL potentiometer R14 and trimmer C11 until the vtvm indication is less than 0.2 volt. These adjustments interact, so adjust first one and then the other until neither produces any decrease in vtvm indication.

4.4.11 ALC ZERO ADJUSTMENT.

a. Set EMISSION switch to TUNE position. Tune and load the transmitter to 14.1 mc.

b. Turn MIC GAIN control to minimum, and set METER switch to ALC position.

c. Adjust ALC ZERO potentiometer (top chassis near V2) until meter indicates zero.

4.4.12 FIRST MIXER BALANCE ADJUSTMENT.

a. Tune and load the transmitter into dummy load at 14.1 mc. Loosely couple a general coverage communications receiver to the transmitter output. Tune the communications receiver back and forth across 14.555 mc until the signal is heard.

b. Adjust the mixer balance potentiometer, R27, and the trimmer, C26, for minimum output. These adjustments interact, so adjust first one and then the other until neither produces any decrease in output.

SECTION V
SPECIFICATIONS

5.1 32S-1 TRANSMITTER.

The 32S-1 Transmitter develops 100 watts output power (nominal) on all amateur bands between 3.5 and 29.7 mc. Input power is 175 watts PEP on SSB or 160 watts CW.

5.2 FREQUENCY COVERAGE.

The 32S-1 has band-switch positions and corresponding crystal sockets for 14 200-kc bands. Crystals are furnished for complete coverage of all amateur bands except 10 meters. One 10-meter crystal is furnished, and the crystal mounting block has extra sockets for two additional crystals. One other spare crystal socket and band-switch position are provided for an additional band between 9.5 and 15.0 mc. Other crystals may be substituted for those furnished to place the transmitter at other frequencies throughout the range.

5.3 REQUIREMENTS FOR OPERATION.

The transmitter requires the following power supply voltages:

+800 volts d-c at 200 ma for PA plates
+275 volts d-c at 175 ma for PA screens and low-voltage plates
Bias voltage adjustable between -60 and -80 volts d-c
6.3 volts a-c at 6.0 amperes or
6.0 volts d-c at 6.0 amperes or
12.0 to 14.0 volts d-c at 3.0 amperes or
24.0 to 28.0 volts d-c at 1.5 amperes

These voltages may be supplied with Collins Power Supplies 516F-2 (a-c source), 516E-1 (12-volt d-c source), 516E-2 (24-volt d-c source), or 516F-1 with adapter cable. The antenna and feed system must present a 50-ohm load with swr not exceeding 2.0 to 1. Any high-impedance crystal or dynamic microphone and any key may be used with the 32S-1 Transmitter.

5.4 SPECIFICATIONS.

Size	6-9/16 inches high, 14-3/4 inches wide, 11-1/2 inches deep.
Weight	16 pounds.
Frequency range	3.4 to 30.0 megacycles. With crystals furnished, bands are as follows: 80 meters - 3.4 to 3.6 mc, 3.6 to 3.8 mc, and 3.8 to 4.0 mc. 40 meters - 7.0 to 7.2 mc, and 7.2 to 7.4 mc. 20 meters - 14.0 to 14.2 mc, and 14.2 to 14.4 mc. 15 meters - 21.0 to 21.2 mc, 21.2 to 21.4 mc, and 21.4 to 21.6 mc. 10 meters - 28.5 to 28.7 mc.
Mode	Single sideband (either sideband selectable) or CW.
Type of service	SSB-continuous; CW -50% duty cycle.
Plate power input	175 watts PEP on SSB, 160 watts on CW.
Power output	100 watts PEP (nominal) into 50 ohms.
Microphone input impedance	High impedance.
R-f output impedance	50 ohms with not more than 2.0-to-1 swr.
Frequency stability	Total variation after warmup not more than 100 cps.

SECTION V
Specifications

Calibration accuracy	1 kilocycle.
Keying	Break-in.
Audio-frequency response	300-2400 cps ±6 db.
Carrier suppression	Carrier 50 db down on output signal.
Unwanted sideband	50 db down from output signal.
Oscillator feedthrough or mixer products (undesired)	50 db down from output signal.
Second harmonic	50 db down from output signal.
Third order distortion	30 db down from output signal.

5.5 TUBE, FUSE, AND SEMICONDUCTOR COMPLEMENT.

TABLE 5-1. TUBES, FUSES, AND SEMICONDUCTORS

SYMBOL	FUNCTION	TYPE
V1A	First audio amplifier	1/2 6U8A
V1B	Second audio amplifier	1/2 6U8A
V2A	Cathode follower	1/2 6U8A
V2B	Beat-frequency oscillator	1/2 6U8A
V3	I-f amplifier	6DC6
V4	First mixer	12AT7
V5	Second Mixer	12AT7
V6	R-f amplifier	6AH6
V7	Driver	6CL6
V9	Power amplifier	6146
V10	Vox/anti-vox rectifier	6AL5
V11A	Vox relay actuator	1/2 6U8A
V11B	Tone oscillator	1/2 6U8A
V12	Crystal oscillator	6DC6
V13	Automatic load control rectifier	6AL5
V14A	Vox amplifier	1/2 12AT7
V14B	Anit-vox amplifier	1/2 12AT7
V301	Vfo	6AU6
CR1 CR2	Balanced modulator	1N34A
CR301	Frequency shift switch	1N34A

5.6 AVAILABLE ACCESSORIES.

TABLE 5-2. AVAILABLE ACCESSORIES

ITEM	FUNCTION	COLLINS PART NUMBER
312B-4 Station Control	Speaker, phone patch directional wattmeter, and station control	522 1167 00
516E-1 DC Power Supply	Mobile power supply for 12-volt source	522 0846 005
516E-2 DC Power Supply	Mobile power supply for 24-volt source	522 0846 00
516F-2 AC Power Supply	A-c power supply	522 1170 00
*516F-1 AC Power Supply	A-c power supply	522 0847 00
Extra crystals	Additional band coverage	See Section VI, Parts List
351E-1 Mounting Frame	Mount for 32S-1	522 1479 00
351E-2 Mounting Frame	Mount for 312B-4	522 1480 00

*Use with special cable adapter.

SECTION VI
PARTS LIST

32S-1 Transmitter

ITEM	DESCRIPTION	COLLINS PART NO.
	32S-1 TRANSMITTER	522 1169 00
C1, C4, C7, C8, C10, C13, C14, C15, C20, C21, C22, C32, C43, C44, C58, C59, C68, C73, C74, C75, C85, C92, C104, C106, C108, C112, C114, thru C120, C139, C140, C145, C148, C150 thru C155, C157 thru C164, C169 thru C172, C174	CAPACITOR, FIXED, CERAMIC; 0.01 uf plus 100% minus 20%, 500 vdcw	913 3013 00
C2, C18, C19, C54, C70	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 vdcw	912 2840 00
C3, C31, C60, C84, C121	CAPACITOR, FIXED, CERAMIC: 4700 uuf plus 100% minus 20%, 500 vdcw	913 3012 00
C5	CAPACITOR, FIXED, CERAMIC: 0.02 uf plus 100% minus 20%, 500 vdcw	913 2142 00
C6	CAPACITOR, FIXED, DRY ELECTROLYTIC: dual section, 8 uf 300 vdcw, 25 uf 25 vdcw	183 1479 00
C9, C88, C173	CAPACITOR, PAPER: 0.5 uf plus 20% minus 10%, 200 vdcw	931 0169 00
C11, C36, C37, C39, C41, C47, C48, C50, C52, C55, C64, C65, C67, C69, C71, C97, C99, C101	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 vdcw	917 1075 00
C12	CAPACITOR, FIXED, MICA: 33 uuf ±10%, 500 vdcw	912 2781 00
C16	NOT USED	
C17	CAPACITOR, FIXED, MICA: 180 uuf ±10%, 500 vdcw	912 2835 00
C23, C33, C34, C93	CAPACITOR, FIXED, MICA: 10 uuf ±10%, 500 vdcw	912 2754 00
C24	CAPACITOR: part of T1	
C25	CAPACITOR: part of T1	
C26, C35, C46, C63, C95, C96	CAPACITOR, VARIABLE, CERAMIC: 5 to 37.5 uuf, 350 vdcw	917 1073 00
C27	CAPACITOR: included in L4 shield can	
C28	CAPACITOR, FIXED, CERAMIC: 3 uuf ±1/2 uuf, 500 vdcw	916 0145 00
C29	CAPACITOR: included in L4 shield can	
C30, C45, C124, C131, C133, C168	CAPACITOR, FIXED, CERAMIC: 1000 uuf plus 100% minus 20%, 500 vdcw	913 3009 00
C38, C49, C66, C149, C156	CAPACITOR, FIXED, MICA: 51 uuf ±10%, 500 vdcw	912 2796 00
C40, C102	CAPACITOR, FIXED, MICA: 270 uuf ±10%, 500 vdcw	912 2847 00

32S-1 Transmitter

ITEM	DESCRIPTION	COLLINS PART NO.
C42, C132, C138	CAPACITOR, FIXED, MICA: 330 uuf ±20%, 500 vdcw	912 2851 00
C51	CAPACITOR, FIXED, MICA: 240 uuf ±2%, 500 vdcw	912 2842 00
C53	CAPACITOR, FIXED, MICA: 360 uuf ±2%, 500 vdcw	912 2854 00
C56, C62, C137, C166, C167	CAPACITOR, FIXED, CERAMIC: 1000 uuf plus 80% minus 20%, 500 vdcw	913 1292 00
C57	CAPACITOR, VARIABLE, CERAMIC: 1.5 to 10.5 uuf 350 vdcw	917 1071 00
C61, C72	CAPACITOR, FIXED, CERAMIC: 5000 vdcw, 10 uuf ±10%	913 0972 00
C76, C123	CAPACITOR, FIXED, CERAMIC: 0.001 uf plus 100% minus 20%, 2000 vdcw	913 3537 00
C77	CAPACITOR, VARIABLE, AIR: 12.0 uuf min to 250.0 uuf max, 1000 v rms	920 0136 00
C78	CAPACITOR, FIXED, MICA: 20 uuf ±10%, 500 vdcw	912 2766 00
C79, C105	CAPACITOR, FIXED, MICA: 130 uuf ±5%, 500 vdcw	912 2825 00
C80, C135, C136	CAPACITOR, VARIABLE, MICA: 100 uuf to 500 uuf, 1000 vdcw	918 0006 00
C81	NOT USED	
C82	NOT USED	
C83, C87, C142	CAPACITOR, FIXED, PAPER: 0.1 uf plus 20% minus 10%, 200 vdcw	931 0165 00
C86	CAPACITOR: part of T2	
C89, C103	CAPACITOR, FIXED, MICA: 15 uuf ±10%, 500 vdcw	912 2760 00
C90, C94, C109, C175	CAPACITOR, FIXED, MICA: 15 uuf ±10%, 500 vdcw	912 2760 00
C91	CAPACITOR, FIXED, MICA: 1000 uuf ±5%, 500 vdcw	912 3001 00
C98	CAPACITOR: part of T1	
C100	CAPACITOR, FIXED, MICA: 200 uuf ±10%, 500 vdcw	912 2838 00
C107	CAPACITOR, FIXED, PAPER: 0.1 uf ±10%, 400 vdcw	931 0299 00
C110	CAPACITOR, FIXED, MICA: 390 uuf ±2%, 500 vdcw	912 2857 00
C111	CAPACITOR, FIXED, MICA: 430 uuf ±2%, 500 vdcw	912 2970 00
C113	NOT USED	
C122	CAPACITOR, FIXED, MICA: 470 uuf ±5%, 500 vdcw	912 2974 00
C125 thru C130	CAPACITOR, FIXED, CERAMIC: 500 uuf ±10%, 500 vdcw	913 0998 00
C134	CAPACITOR, FIXED, CERAMIC: 1.0 uuf ±1/4 uuf, 500 vdcw	916 0070 00
C141	CAPACITOR, TUBULAR, CERAMIC: 6.0 uuf ±1/2 uuf, 500 vdcw	916 0122 00
C143	NOT USED	
C144	CAPACITOR, FIXED, CERAMIC: 2 uuf ±1/2 uuf, 500 vdcw	916 0076 00
C146	CAPACITOR, VARIABLE, MICA: 15 uuf to 120 uuf, 1000 vdcw	918 0005 00
C147	CAPACITOR, VARIABLE, AIR: 13.5 uuf min to 452.3 uuf max ea section, 360 v ac, 60 cps min breakdown	920 0138 00
C165	CAPACITOR, FIXED, CERAMIC: 0.001 uf plus 100% minus 20%, 2000 vdcw	913 3537 00
CR1, CR2	DIODE: germanium, type 1N34A	353 0103 00
DS1	LAMP, INCANDESCENT: 6.3 v, 0.15 amp, min bayonet base, T-3-1/4 bulb, clear	262 3240 00
DS2	Part of M1	
FL1	FILTER, BAND PASS: 455.0 kc oper freq, 454.30 to 455.70 kc bandwidth, 17,000 ohms input & output; Collins	526 9337 00
J1	JACK, TELEPHONE: spring leaf, 2 conductor plug	358 1050 00
J2, J3, J4, J5, J7, J8, J9, J11 thru J20	JACK, TIP: accommodates 1/8 in. plug, ceramic insulation brass contacts	360 0088 00
J6	NOT USED	
J10	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 pin male, phenolic insulation, 5 amp, straight shape	372 1757 00
K1	RELAY: 14,000 ohm coil 115 v dc cont arr 2C and 2A	972 1353 00
K2	RELAY: 10,000 ohm coil, 115 v dc cont arr 2C	970 1914 00
L1, L5, L7, L10, L17 thru L20, L23, L27	COIL, RADIO FREQUENCY: 220 uh, 0.1 amp	240 0037 00
L2, L3, L26	COIL, RADIO FREQUENCY: 2.0 mh	240 0084 00
L4	TUNING UNIT, RADIO FREQUENCY: 2.945 to 3.165 kc 1 adjustment; includes C27 and C29	278 0275 00
L6, L8	COIL, RADIO FREQUENCY: single layer wound, 13 turns #28 AWG wire; Collins	544 3135 002
L9	COIL, RADIO FREQUENCY: 2.0 mh	240 0134 00
L11	COIL, RADIO FREQUENCY: single layer wound, 12 turns #28 AWG wire; Collins	543 8028 00
L12	COIL: part of Z1	
L13	COIL: part of Z2	
L14	COIL, RADIO FREQUENCY: single layer wound, 220 turns #32 AWG wire, wound on 1/2 in. dia by 3 in. lg ceramic form; Collins	543 8024 00
L15	COIL, RADIO FREQUENCY: 32 turns #18 AWG wire, ea turn tapped; 3 in. lg by 1 in. OD; Collins	506 7848 002
L16	COIL, RADIO FREQUENCY: single layer wound, 22 turns #28 AWG wire; Collins	543 8123 002
L21	COIL, RADIO FREQUENCY: single layer wound, 12 turns #28 AWG wire; Collins	544 3136 002
L22	NOT USED	
L24	COIL, RADIO FREQUENCY: 2.5 mh, 0.125 amp	240 2100 00
L25	COIL, RADIO FREQUENCY: 7-1/2 turns #14 AWG wire; Collins	543 8068 00
M1	MULTIMETER: 0-1 ma movement	458 0454 00
P1	CABLE ASSEMBLY: 8 in. lg, phono plug on one end	426 1809 00
P2	NOT USED	
P3	CABLE ASSEMBLY: 4 in. lg, phono plug on one end	426 1810 00
R1	RESISTOR, FIXED, COMPOSITION: 680 ohms ±10%, 1/2 w	745 1345 00
R2	RESISTOR, FIXED, COMPOSITION: 47K ohms ±10%, 1 w	745 3422 00
R3, R70, R71, R91, R96, R100, R111, R113	RESISTOR, FIXED, COMPOSITION: 470K ohms ±10%, 1/2 w	745 1464 00
R4, R88	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 1/2 w	745 1359 00
R5, R60, R76, R82	RESISTOR, FIXED, COMPOSITION: 47K ohms ±10%, 1/2 w	745 1422 00
R6, R16, R24, R25, R33, R37, R38, R47, R61 thru R64, R78, R80, R105, R114	RESISTOR, FIXED, COMPOSITION: 100K ±10%, 1/2 w	745 1436 00
R7	RESISTOR, FIXED, COMPOSITION: 10K ohms ±10%, 2 w	745 5694 00
R8	RESISTOR, VARIABLE, COMPOSITION: 500K ohms ±30%, 1/4 w, with SPST switch	376 7403 00
R9, R59, R99, R100	RESISTOR, FIXED, COMPOSITION: 220K ohms ±10%, 1/2 w	745 1450 00
R10, R35, R36, R73	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 1/2 w	745 1324 00
R11	RESISTOR, FIXED, COMPOSITION: 180K ohms ±10%, 1/2 w	745 1447 00
R12, R103	RESISTOR, FIXED, COMPOSITION: 15K ohms ±10%, 2 w	745 5701 00
R13, R15	RESISTOR, FIXED, COMPOSITION: 270 ohms ±10%, 1/2 w	745 1328 00
R14, R20	RESISTOR, VARIABLE, COMPOSITION: 250 ohms ±30%, 0.2 w	376 4602 00
R17	RESISTOR, FIXED, COMPOSITION: 33K ohms ±10%, 1 w	745 3415 00
R18	RESISTOR, FIXED, COMPOSITION: 56K ohms ±10%, 1 w	745 3426 00
R19	RESISTOR, FIXED, COMPOSITION: 120 ohms ±10%, 1/2 w	745 1314 00
R21	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1 w	745 3296 00
R22	RESISTOR, FIXED, COMPOSITION: 39K ohms ±10%, 1/2 w	745 1419 00
R23, R39	RESISTOR, FIXED, COMPOSITION: 180 ohms ±10%, 1/2 w	745 1321 00
R26, R28	RESISTOR, FIXED, COMPOSITION: 560 ohms ±10%, 1/2 w	745 1342 00
R27	RESISTOR, VARIABLE, COMPOSITION: 500 ohms ±30%, 0.2 w	376 4603 00
R29, R30	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 2 w	745 5680 00
R31	RESISTOR, FIXED, COMPOSITION: 12K ohms ±10%, 1/2 w	745 1398 00
R32	RESISTOR, FIXED, COMPOSITION: 33 ohms ±10%, 1/2 w	745 1289 00
R34	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w	745 1366 00
R40, R107, R108	RESISTOR, FIXED, COMPOSITION: 10K ohms ±10%, 1/2 w	745 1394 00
R41, R104	RESISTOR, FIXED, COMPOSITION: 22K ohms ±10%, 2 w	745 5708 00
R42, R92, R95	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R43	RESISTOR: part of Z1	
R44, R45, R46, R49, R50, R51	RESISTOR, FIXED, COMPOSITION: 12 ohms ±5%, 1/2 w	745 1271 00

32S-1 Transmitter

ITEM	DESCRIPTION	COLLINS PART NO.
R48	RESISTOR: part of Z2	
R52, R54, R66, R77, R83	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745 1352 00
R53	RESISTOR, FIXED, COMPOSITION: 18K ohms ±10%, 1/2 w	745 1405 00
R55	RESISTOR, FIXED, COMPOSITION: 680K ohms ±10%, 1/2 w	745 1471 00
R56	RESISTOR, FIXED, COMPOSITION: 3.3 megohms ±10%, 1/2 w	745 1499 00
R57, R65, R72, R75, R84, R101	RESISTOR, FIXED, COMPOSITION: 1.0 megohms ±10%, 1/2 w	745 1478 00
R58	RESISTOR, FIXED, COMPOSITION: 33K ohms ±10%, 1/2 w	745 1415 00
R67	RESISTOR, FIXED, COMPOSITION: 270K ohms ±10%, 1/2 w	745 1454 00
R68	RESISTOR, FIXED, COMPOSITION: 120K ohms ±10%, 1/2 w	745 1440 00
R69	RESISTOR, FIXED, COMPOSITION: 68K ohms ±10%, 1/2 w	745 1429 00
R74	RESISTOR, VARIABLE, COMPOSITION: 500K ohms ±30%, 1/4 w, incl spdt switch	376 7201 00
R79, R81	RESISTOR, FIXED, COMPOSITION: 8.2 megohms ±10%, 1/2 w	745 1517 00
R85	RESISTOR, VARIABLE, COMPOSITION: 500K ohms ±30%, 1/4 w	376 7202 00
R86	RESISTOR, FIXED, COMPOSITION: 10 megohms ±10%, 1/2 w	745 1520 00
R87	RESISTOR, FIXED, COMPOSITION: 470 ohms ±10%, 1/2 w	745 1338 00
R89, R112	RESISTOR, FIXED, COMPOSITION: 68K ohms ±10%, 2 w	745 5729 00
R90	RESISTOR, FIXED, COMPOSITION: 56K ohms ±10%, 1/2 w	745 1426 00
R93, R94	RESISTOR, FIXED, COMPOSITION: 8200 ohms ±10%, 2 w	745 5691 00
R97	RESISTOR, FIXED, COMPOSITION: 3900 ohms ±10%, 1/2 w	745 1377 00
R98	NOT USED	
R102	NOT USED	
R106	RESISTOR, FIXED, COMPOSITION: 22K ohms ±10%, 1/2 w	745 1408 00
R109	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1/2 w	745 1296 00
S1, S2, S3	SWITCH SECTION, ROTARY: 1 circuit, 14 position, 1 section, 1 moving contact, 8 fixed contacts	269 1980 00
S4	SWITCH SECTION, ROTARY: 2 circuit, 14 position, 2 moving contacts, 17 fixed contacts	269 1983 00
S5	SWITCH SECTION, ROTARY: 1 circuit, 14 position, 1 section, 2 moving contacts, 20 fixed contacts	269 1981 00
S6	SWITCH SECTION, ROTARY: 1 circuit, 14 position, 1 section, 2 moving contacts, 12 fixed contacts	269 1982 00
S7	SWITCH, ROTARY: 2 circuit, 3 position, 1 section, 2 moving contacts, 8 fixed contacts	259 0955 00
S8	SWITCH, ROTARY: 5 section, 5 position, 10 moving contacts, 60 fixed contacts	259 0954 00
S9	SWITCH, ROTARY: 8 circuit, 4 position, 2 section, 8 moving contacts, 32 fixed contacts	259 0953 00
S10	Part of R74	
S11	SWITCH, ROTARY: 1 circuit, 14 position, 1 moving contact, 15 fixed contacts	269 2023 00
S14	Part of R8	
T1	TRANSFORMER, INTERMEDIATE FREQUENCY: 2.945 to 3.165 kc frequency range; includes C24, C25 and C98	278 0274 00
T2	TRANSFORMER, INTERMEDIATE FREQUENCY: 455 kc nom; includes C86	278 0276 00
V1, V2, V11	ELECTRON TUBE: type 6U8A	255 0328 00
V3, V12	ELECTRON TUBE: 6DC6	255 0226 00
V4, V5, V14	ELECTRON TUBE: type 12AT7	255 0205 00
V6	ELECTRON TUBE: type 6AH6	255 0191 00
V7	ELECTRON TUBE: type 6CL6	255 0216 00
V8, V9	ELECTRON TUBE: type 6146	256 0101 00
V10, V13	ELECTRON TUBE: type 6AL5	257 0018 00
XDS1	LAMPHOLDER: miniature bayonet, clip mounting	262 1210 00
Y1 thru Y11	CRYSTALS: MIL-C-3098 type CR18/U, holder type HC-6 ±0.005% frequency tolerance	
	CRYSTAL FREQUENCY / FOR OPERATING FREQUENCY	
Y1	6.555 mc / 3.4 - 3.6 mc	290 8728 00
Y2	6.755 mc / 3.6 - 3.8 mc	290 8729 00
Y3	6.955 mc / 3.8 - 4.0 mc	290 8730 00
Y4	10.155 mc / 7.0 - 7.2 mc	290 8731 00
Y5	10.355 mc / 7.2 - 7.4 mc	290 8732 00
Y6	8.5775 mc / 14.0 - 14.2 mc	290 8733 00
Y7	8.6775 mc / 14.2 - 14.4 mc	290 8734 00
Y8	12.0775 mc / 21.0 - 21.2 mc	290 8736 00
Y9	12.1775 mc / 21.2 - 21.4 mc	290 8737 00
Y10	12.2775 mc / 21.4 - 21.6 mc	290 8738 00
Y11	15.8275 mc / 28.5 - 28.7 mc	290 8691 00
Y12	NOT SUPPLIED	
Y13	NOT SUPPLIED	
	CRYSTALS: MIL-C-3098 type CR46/U, holder type HC-6/U ±0.01% frequency tolerance	
Y14	453.650 kc	290 8705 00
Y15	456.350 kc	290 8706 00
Z1	SUPPRESSOR, PARASITIC: 6 turns no. 16 AWG wire, 47 ohm resistor, 2 w; includes L12 and R43; Collins	543 8022 002
Z2	SUPPRESSOR, PARASITIC: 6 turns no. 16 AWG wire, 47 ohm resistor, 2 w; includes L13 and R48; Collins	543 8022 002

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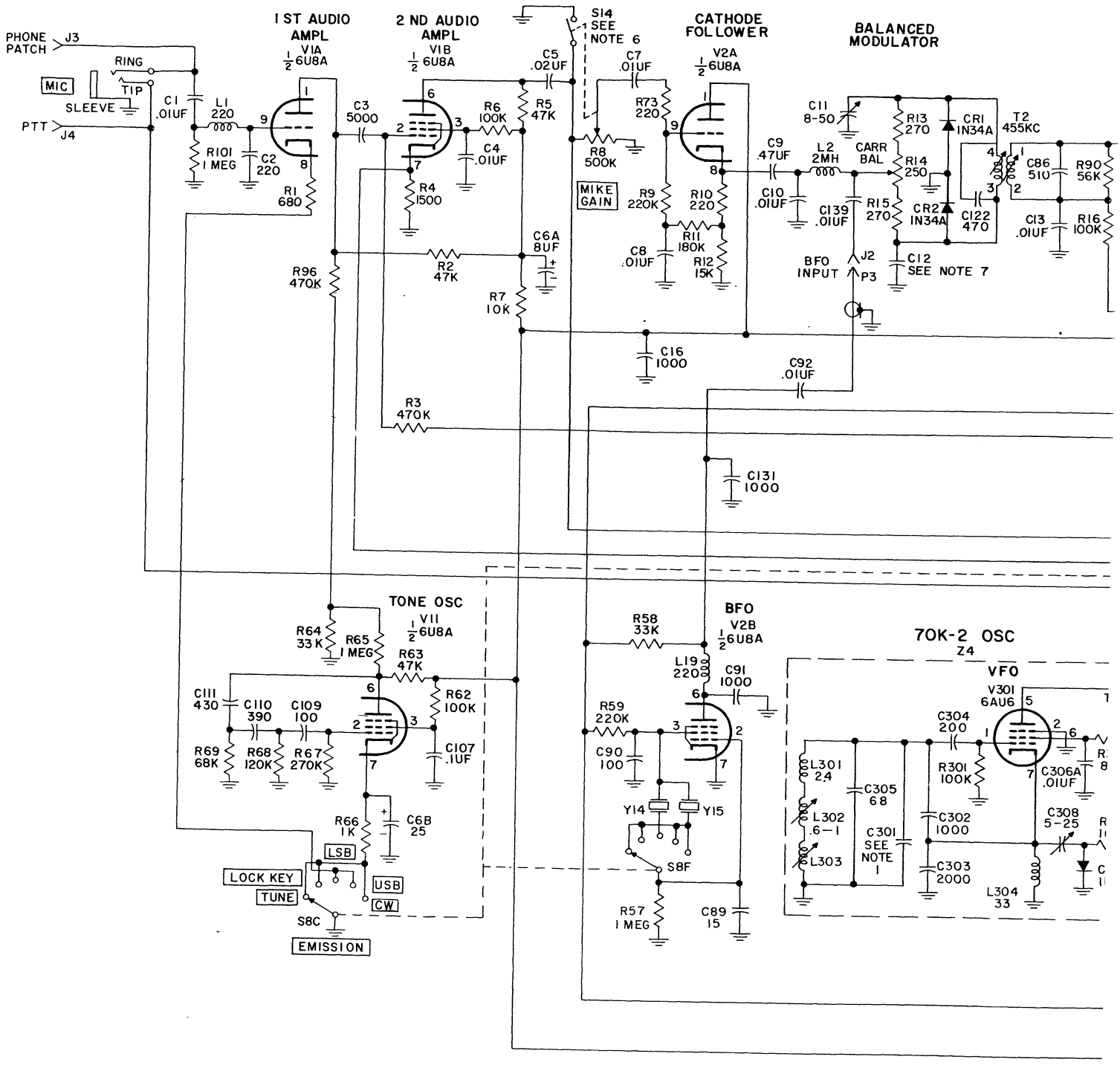
GENERAL COVERAGE CRYSTALS AVAILABLE

CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER	CRYSTAL FREQUENCY (kc)	FOR OPERATING FREQUENCY (mc)	PART NUMBER
6555.000	3.4-3.6	290 9009 00	8277.500	13.4-13.6	290 9059 00	12477.500	21.8-22.0	290 9101 00
6755.000	3.6-3.8	290 9010 00	8377.500	13.6-13.8	290 9060 00	12577.500	22.0-22.2	290 9102 00
6955.000	3.8-4.0	290 9011 00	8477.500	13.8-14.0	290 9061 00	12677.500	22.2-22.4	290 9103 00
7155.000	4.0-4.2	290 9012 00	8577.500	14.0-14.2	290 9062 00	12777.500	22.4-22.6	290 9104 00
7355.000	4.2-4.4	290 9013 00	8677.500	14.2-14.4	290 9063 00	12877.500	22.6-22.8	290 9105 00
7555.000	4.4-4.6	290 9014 00	8777.500	14.4-14.6	290 9064 00	12977.500	22.8-23.0	290 9106 00
7755.000	4.6-4.8	290 9015 00	8877.500	14.6-14.8	290 9065 00	13077.500	23.0-23.2	290 9107 00
7955.000	4.8-5.0	290 9016 00	8977.500	14.8-15.0	290 9066 00	13177.500	23.2-23.4	290 9108 00
9755.000	6.6-6.8	290 9025 00	9077.500	15.0-15.2	290 9067 00	13277.500	23.4-23.6	290 9109 00
9955.000	6.8-7.0	290 9026 00	9177.500	15.2-15.4	290 9068 00	13377.500	23.6-23.8	290 9110 00
10155.000	7.0-7.2	290 9027 00	9277.500	15.4-15.6	290 9069 00	13477.500	23.8-24.0	290 9111 00
10355.000	7.2-7.4	290 9028 00	9377.500	15.6-15.8	290 9070 00	13577.500	24.0-24.2	290 9112 00
10555.000	7.4-7.6	290 9029 00	9477.500	15.8-16.0	290 9071 00	13677.500	24.2-24.4	290 9113 00
10755.000	7.6-7.8	290 9030 00	9577.500	16.0-16.2	290 9072 00	13777.500	24.4-24.6	290 9114 00
10955.000	7.8-8.0	290 9031 00	9677.500	16.2-16.4	290 9073 00	13877.500	24.6-24.8	290 9115 00
11155.000	8.0-8.2	290 9032 00	9777.500	16.4-16.6	290 9074 00	13977.500	24.8-25.0	290 9116 00
11355.000	8.2-8.4	290 9033 00	9877.500	16.6-16.8	290 9075 00	14077.500	25.0-25.2	290 9117 00
11555.000	8.4-8.6	290 9034 00	9977.500	16.8-17.0	290 9076 00	14177.500	25.2-25.4	290 9118 00
11755.000	8.6-8.8	290 9035 00	10077.500	17.0-17.2	290 9077 00	14277.500	25.4-25.6	290 9119 00
11955.000	8.8-9.0	290 9036 00	10177.500	17.2-17.4	290 9078 00	14377.500	25.6-25.8	290 9120 00
12155.000	9.0-9.2	290 9037 00	10277.500	17.4-17.6	290 9079 00	14477.500	25.8-26.0	290 9121 00
12355.000	9.2-9.4	290 9038 00	10377.500	17.6-17.8	290 9080 00	14577.500	26.0-26.2	290 9122 00
12555.000	9.4-9.6	290 9039 00	10477.500	17.8-18.0	290 9081 00	14677.500	26.2-26.4	290 9123 00
12755.000	9.6-9.8	290 9040 00	10577.500	18.0-18.2	290 9082 00	14777.500	26.4-26.6	290 9124 00
12955.000	9.8-10.0	290 9041 00	10677.500	18.2-18.4	290 9083 00	14877.500	26.6-26.8	290 9125 00
13155.000	10.0-10.2	290 9042 00	10777.500	18.4-18.6	290 9084 00	14977.500	26.8-27.0	290 9126 00
13355.000	10.2-10.4	290 9043 00	10877.500	18.6-18.8	290 9085 00	15077.500	27.0-27.2	290 9127 00
13555.000	10.4-10.6	290 9044 00	10977.500	18.8-19.0	290 9086 00	15177.500	27.2-27.4	290 9128 00
13755.000	10.6-10.8	290 9045 00	11077.500	19.0-19.2	290 9087 00	15277.500	27.4-27.6	290 9129 00
13955.000	10.8-11.0	290 9046 00	11177.500	19.2-19.4	290 9088 00	15377.500	27.6-27.8	290 9130 00
14155.000	11.0-11.2	290 9047 00	11277.500	19.4-19.6	290 9089 00	15477.500	27.8-28.0	290 9131 00
14355.000	11.2-11.4	290 9048 00	11377.500	19.6-19.8	290 9090 00	15577.500	28.0-28.2	290 9132 00
14555.000	11.4-11.6	290 9049 00	11477.500	19.8-20.0	290 9091 00	15677.500	28.2-28.4	290 9133 00
14755.000	11.6-11.8	290 9050 00	11577.500	20.0-20.2	290 9092 00	15777.500	28.4-28.6	290 9134 00
14955.000	11.8-12.0	290 9051 00	11677.500	20.2-20.4	290 9093 00	15877.500	28.6-28.8	290 9135 00
7577.500	12.0-12.2	290 9052 00	11777.500	20.4-20.6	290 9094 00	15977.500	28.8-29.0	290 9136 00
7677.500	12.2-12.4	290 9053 00	11877.500	20.6-20.8	290 9095 00	16077.500	29.0-29.2	290 9137 00
7777.500	12.4-12.6	290 9054 00	11977.500	20.8-21.0	290 9096 00	16177.500	29.2-29.4	290 9138 00
7877.500	12.6-12.8	290 9055 00	12077.500	21.0-21.2	290 9097 00	16277.500	29.4-29.6	290 9139 00
7977.500	12.8-13.0	290 9056 00	12177.500	21.2-21.4	290 9098 00	16377.500	29.6-29.8	290 9140 00
8077.500	13.0-13.2	290 9057 00	12277.500	21.4-21.6	290 9099 00	16477.500	29.8-30.0	290 9141 00
8177.500	13.2-13.4	290 9058 00	12377.500	21.6-21.8	290 9100 00			

ITEM	DESCRIPTION	COLLINS PART NO.
	516F-2 POWER SUPPLY	522 1170 00
C1	CAPACITOR, FIXED, PAPER: 0.05 uf ±10%, 1000 vdcw	961 4646 00
C2, C3, C4	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf minus 10% plus 40%, 400 vdcw	183 1771 00
C5A, C5B	CAPACITOR, FIXED, ELECTROLYTIC: dual section, 15 uf minus 10% plus 40%, 400 v; 30 uf minus 10% plus 40%, 400 v	183 1781 00
C6	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf minus 15% plus 50%, 250 vdcw	183 1046 00
C7	CAPACITOR, FIXED, DRY ELECTROLYTIC: 10 uf minus 10% plus 100%, 150 vdcw	183 1040 00
CR1	RECTIFIER, METALLIC: selenium	
F1	FUSE, CARTRIDGE: 4 amps, 125 v, glass enclosed, 4 spares furnished	264 0217 00
L1, L2	REACTOR: 2 coils, 8.0 henrys, 150 ma d-c, 200 ohms resistance, ea reactor	668 0300 00
L3	REACTOR: 1 coil, 0.92 henrys, 180 ma d-c, 25 ohms resistance	668 0322 00
P1	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 female socket contacts	372 1759 00
P2	ADAPTER, CONNECTOR: 2 mating ends, 3 contacts ea end, plastic dielectric, a-c plug 110 v	368 0110 00

ITEM	DESCRIPTION	COLLINS PART NO.
R1 R2, R3	RESISTOR, FIXED, COMPOSITION: 270K ohms ±10%, 2 w	745 5754 00
R4, R5	RESISTOR, FIXED, WIRE WOUND: 25K ohms ±5%, 11 w	710 0080 00
R6	RESISTOR, FIXED, WIRE WOUND: 24K ohms ±5%, 25 w	710 0374 00
R7	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745 1310 00
R8	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 2 w	745 5680 00
R9	RESISTOR, VARIABLE, WIRE WOUND: 2500 ohms ±10%, 2 w	750 0522 00
R10	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 2 w	745 5684 00
T1	TRANSFORMER, POWER: pri 115 v 50/60 cps, sec 6.3 v, 5.0 v, 5.0 v, 275 v ct & tapped at 115 v, 800 v ct	662 0299 00
V1	ELECTRON TUBE: type 5R4GYA	257 0142 00
V2	ELECTRON TUBE: type 5U4GB	257 0109 00
XF1	FUSEHOLDER: extractor post type, 125 v, 5 amp, accommodates 3AG cartridge fuse	265 1002 00
XV1, XV2	SOCKET, ELECTRON TUBE: 8 contact, octal, phenolic insulation	220 1155 00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RING
MIC
TIP
SLEEVE
PTT J4
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L1 220
R101 1 MEG
C2 220
R1 680
1 ST AUDIO AMPL
V1A 1/2 6U8A
C3 5000
2 ND AUDIO AMPL
V1B 1/2 6U8A
R6 100K
R5 47K
C5 .02UF
C4 .01UF
R4 1500
S14 SEE NOTE 6
C7 .01UF
R8 500K
MIKE GAIN
CATHODE FOLLOWER
V2A 1/2 6U8A
R73 220
R9 220K
R10 220
R11 180K
R12 15K
C8 .01UF
C6A 8UF
R96 470K
R2 47K
R7 10K
C16 1000
C92 .01UF
R3 470K
C131 1000
C9 .47UF
C10 .01UF
L2 2MH
CARR BAL
C139 .01UF
C11 8-50
R13 270
R14 250
R15 270
CR1 IN34A
CR2 IN34A
C122 470
T2 455KC
C86 510
C13 .01UF
R90 56K
R16 100K
C12 SEE NOTE 7
BFO INPUT
J2
P3
TONE OSC
V11 1/2 6U8A
R64 33K
R65 1 MEG
R63 47K
C111 430
C110 390
C109 100
R62 100K
R69 68K
R68 120K
R67 270K
C107 .1UF
R66 1K
C6B 25
LSB
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LOCK KEY
TUNE
S8C
EMISSION
BFO
V2B 1/2 6U8A
R58 33K
L19 220
C91 1000
R59 220K
C90 100
Y14
Y15
S8F
R57 1 MEG
C89 15
70K-2 OSC
Z4
VFO
V301 6AU6
C304 200
L301 2.4
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C303 2000
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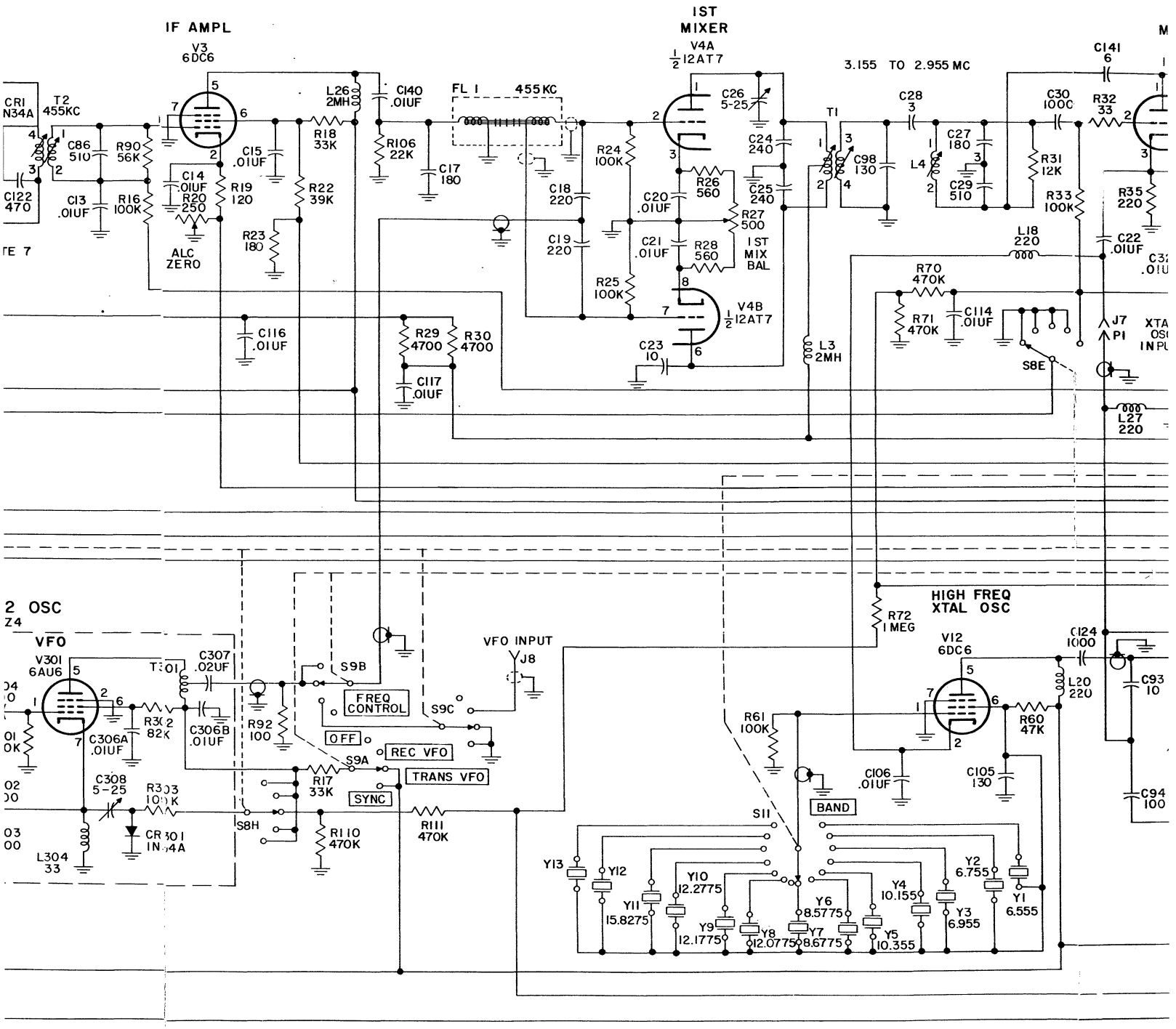
C308 5-25
L304 33



NOTES:

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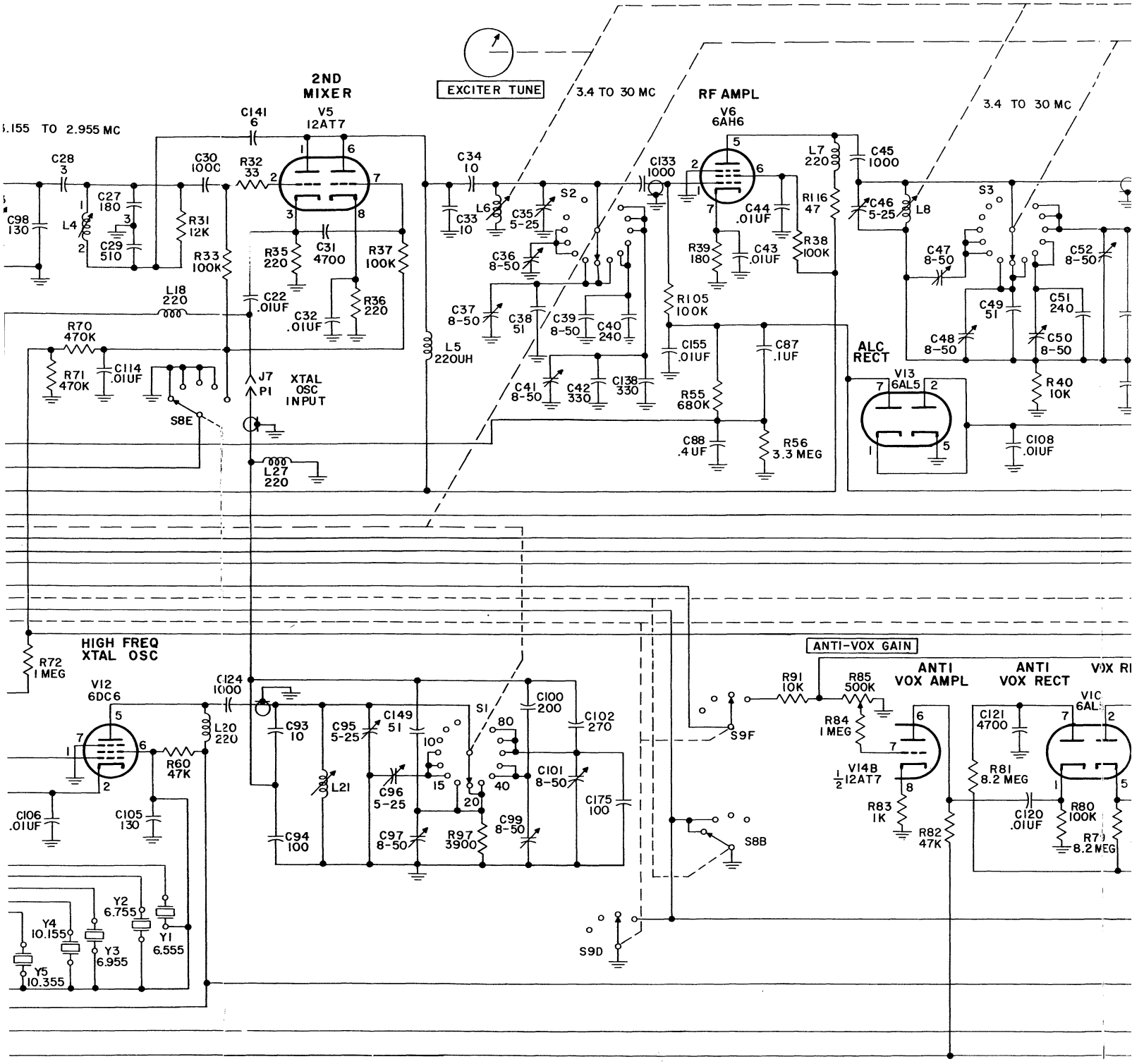
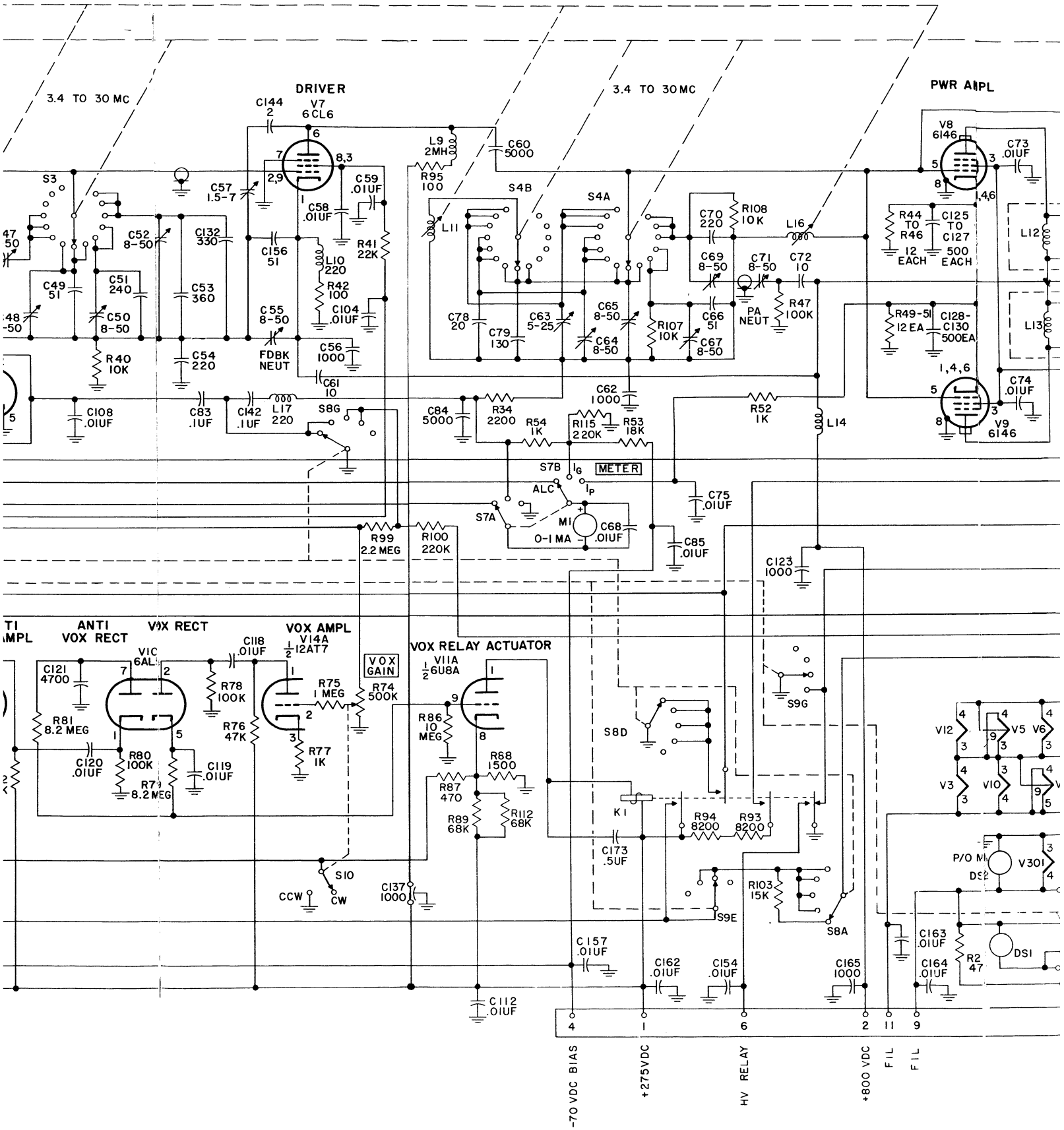


NOTES:

1. VALUE OF C301 SELECTED IN FINAL TEST.
2. FREQUENCIES OF CRYSTALS Y12 AND Y13 CHOSEN BY CUSTOMER NOT FURNISHED WITH EQUIPMENT.
3. SWITCH OPEN ONLY IN OFF POSITION.
4. ALL SWITCHES ARE VIEWED FROM KNOB OR DRIVEN END.
5. UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN UUF, AND ALL INDUCTANCE VALUES ARE IN UH.
6. S14 IS CLOSED WHEN R8 IS IN MAXIMUM COUNTERCLOCKWISE POSITION.
7. SELECTED IN PRODUCTION.


3.4 TO 30 MC
DRIVER
V7
6CL6
C144
2
L9
2MH
C60
5000
R95
100
S3
C57
1.5-7
C59
.01UF
C58
.01UF
C52
8-50
C132
330
C156
51
L10
220
R41
22K
C49
51
C51
240
C53
360
R42
100
C104
.01UF
C50
8-50
C55
8-50
FDBK
NEUT
C56
1000
C61
10
R40
10K
C54
220
C108
.01UF
C83
.1UF
C142
.1UF
L17
220
S8G
S4B
S4A
L11
C70
220
R108
10K
L16
C69
8-50
C71
8-50
C72
10
PA
NEUT
R47
100K
C78
20
C79
130
C63
5-25
C65
8-50
C64
8-50
R107
10K
C66
51
C67
8-50
C62
1000
C84
5000
R34
2200
R54
1K
R115
220K
R53
18K
R52
1K
L14
S7B
I_G
METER
ALC
I_P
S7A
M1
0-1 MA
C68
.01UF
C75
.01UF
C85
.01UF
R99
2.2 MEG
R100
220K
C123
1000
PWR AMPL
V8
6146
C73
.01UF
R44
TO
R46
12
EACH
C125
TO
C127
500
EACH
L12
R49-51
12 EA
C128-
C130
500EA
L13
1,4,6
C74
.01UF
V9
6146
ANTI
VOX RECT
VOX RECT
VOX AMPL
V14A
½12AT7
VOX RELAY ACTUATOR
V11A
½6U8A
VOX
GAIN
V1C
6AL
C121
4700
R81
8.2 MEG
C120
.01UF
R80
100K
R79
8.2 MEG
C119
.01UF
C118
.01UF
R78
100K
R76
47K
R77
1K
R75
1 MEG
R74
500K
R86
10
MEG
R88
1500
R87
470
R89
68K
R112
68K
S10
CCW
CW
C137
1000
C112
.01UF
S8D
S9G
K1
R94
8200
R93
8200
C173
.5UF
S9E
R103
15K
S8A
C157
.01UF
C162
.01UF
C154
.01UF
C165
1000
C163
.01UF
C164
.01UF
R2
47
DS1
P/O M1
DS2
V301
V12
V5
V6
V3
V10
4
1
6
2
11
9
-70 VDC BIAS
+275VDC
HV RELAY
+800 VDC
FIL
FIL

SECTION VII
ILLUSTRATIONS

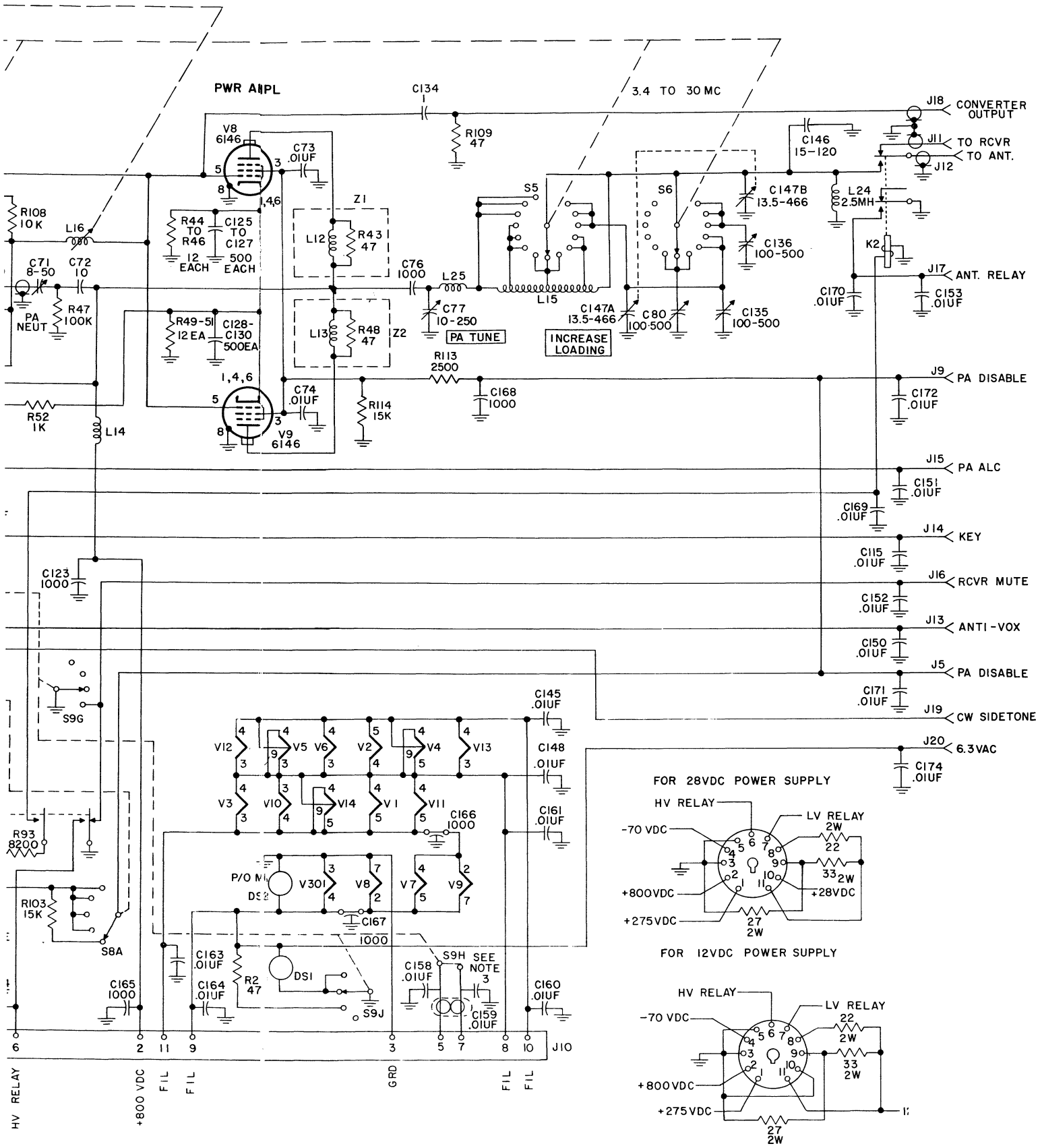


Figure 7-1. 32S-1 Transmitter, Schematic Diagram

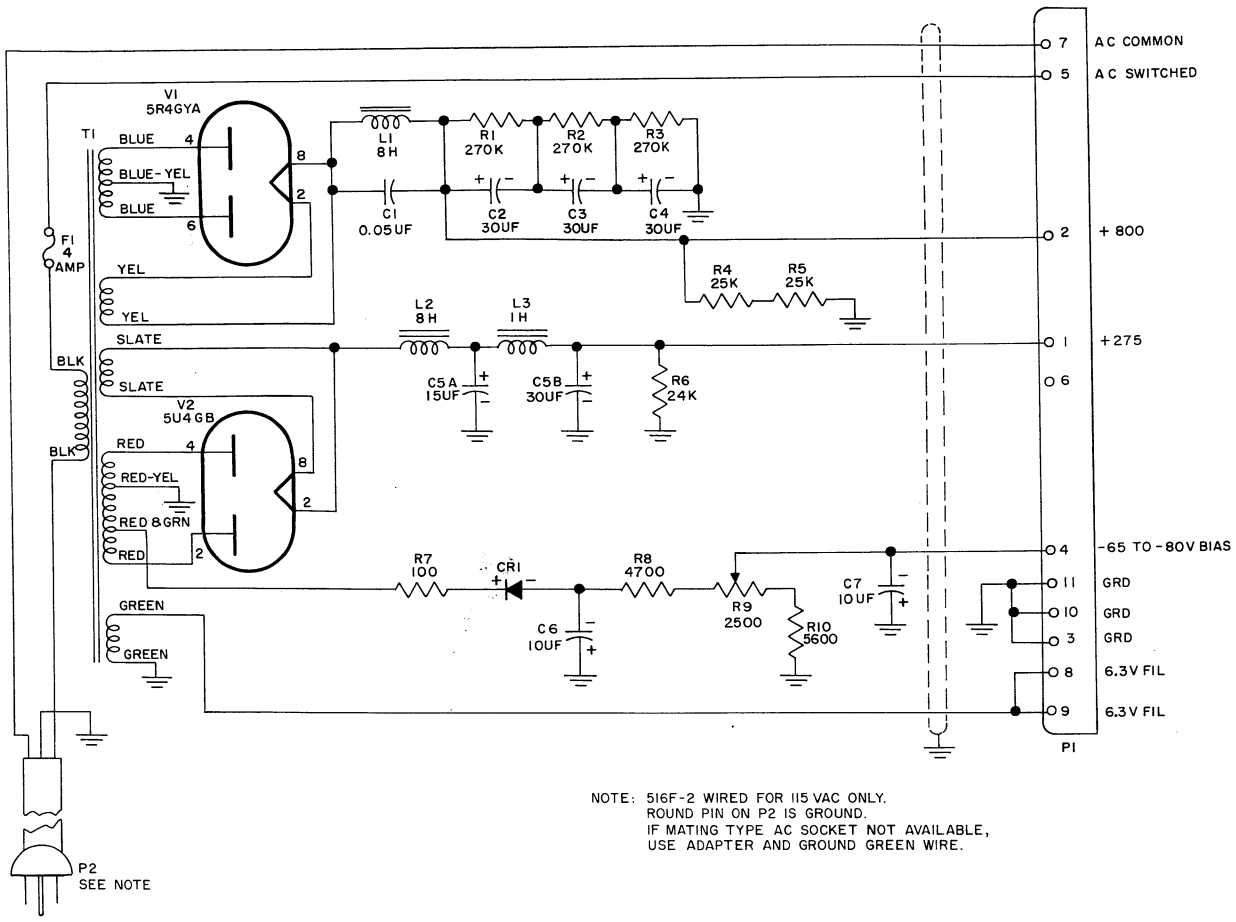


Figure 7-2. 516F-2 Power Supply, Schematic Diagram

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