

BOB WQYVA
BOB W2RWD

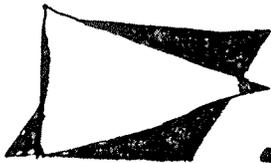
CX-11 HF TRANSCEIVER



signal/one®

Black Canyon Industrial Park
Phoenix, Arizona 85021

OPERATING INSTRUCTIONS AND SCHEMATICS



SIGNAL/ONE

Franklin Lakes, New Jersey, 07417
201-831-0459

INTERIM
INSTRUCTION MANUAL

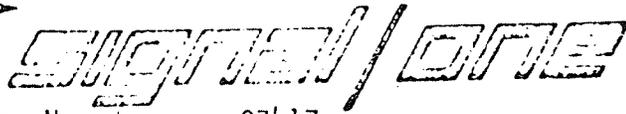
CX-11, SERIES II
HF SSB DELUXE INTEGRATED STATION

IMPORTANT

BEFORE APPLYING POWER IT IS ABSOLUTELY ESSENTIAL TO READ AND OBSERVE CLOSELY ALL INSTALLATION AND OPERATING INSTRUCTIONS IN THIS MANUAL.

THE CX-11, SERIES II DIFFERS IN IMPORTANT RESPECTS FROM OTHER TRANSCEIVERS.

POSSIBLE SERIOUS DAMAGE TO THE EQUIPMENT WHICH MAY RESULT FROM FAILURE TO COMPLY WITH ALL INSTALLATION AND OPERATING INSTRUCTIONS HEREIN WILL NOT BE COVERED BY WARRANTY.



Franklin Lakes, New Jersey, 07417
201-891-0459

** Please see reverse side
for important information
regarding warranty. *

LIMITED WARRANTY

SIGNAL/ONE agrees to repair or replace without charge any equipment, parts or accessories which are defective as to workmanship or materials to the original purchaser for a period of 6 months from the date of purchase. Provided that:

1. The purchaser returns the defective unit to SIGNAL/ONE factory service department, transportation prepaid when directed to do so.
2. Notice of failure is provided SIGNAL/ONE factory service department, in writing within 6 months of date of purchase.
3. The equipment was purchased from a factory authorized distributor and the warranty card validated at the time of purchase. Warranty void when passed to a third party.

This warranty is void if equipment is altered, modified or repaired by other than authorized SIGNAL/ONE factory service department.

SIGNAL/ONE reserves the right to make any changes in design or to make additions to, or improvements in, SIGNAL/ONE products without imposing any obligations upon SIGNAL/ONE to install them in previously manufactured SIGNAL/ONE products.

No other warranties expressed or implied shall be applicable to SIGNAL/ONE equipments and the foregoing constitutes the sole liability of the company with respect to its manufactured products.

WARRANTY REPAIRS

Equipment to be returned under the guarantee should be preceded by notification giving full particulars of the defect. SIGNAL/ONE factory service department will provide instructions with respect to returning unit for service.

Serial No. 

OUT OF WARRANTY REPAIRS

if equipment is to be repaired or modified after expiration of warranty, correspondence should be directed as above. SIGNAL/ONE will provide service instructions direct from the factory. Correspondence should be directed to:

SIGNAL/ONE Corporation
Franklin Lakes, New Jersey, 07417

UNDER THE REGULATIONS OF THE MAGNUSON-MOSS WARRANTY ACT, THE SIGNAL/ONE WARRANTY POLICY IS CLASSIFIED AS A LIMITED WARRANTY.



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..... BOARD CONNECTING DRAWINGS.

SIGNAL ROUTING - COAX. CABLE NUMBERING.
CHASSIS LAYOUT.
FINAL TEST AND ALIGNMENT.

SIGNAL ONE CORPORATION
 BLACK CANYON INDUSTRIAL PARK
 8146 N. 23RD. AVE.
 PHOENIX, ARIZONA 85021

PREPARED BY DON ROEHRS
 DRAWN BY NORMAN AYRES
 PRINTED IN U.S.A.
 6/1/79



MODEL CX-11 deluxe integrated station



SPECIFICATIONS

General

- a. Frequency Coverage. All amateur bands 1.8 to 30.0 MHz in full 1 MHz ranges. An additional 1 MHz band may be added in any of the ~~three~~^{four} ranges, 2.0 to 3.0, 4.0 to 7.0, 8.0 to 14.0 and 15.0 to 21.0 MHz, by installing appropriate crystals.
- b. VFO's. Two identical, permeability - tuned precision oscillators; 1 MHz tuning range with nominal 25 kHz per knob revolution.
- c. Readout. Accuracy, linearity, and resetability to 80 Hz at any point in any band after calibration at any 100 kHz checkpoint in that band. Integrated circuit digital frequency counter with miniature, high-intensity long life amber or red LED. 43" Hewlett Packard display instantly shows actual frequency being received or transmitted, 42 ms. gate time.

- d. Spotting. Push button provides audio beat note for spotting when using separate VFO's or Transmit Offset/Transceive Mode.
- e. T/R Switching. Push-to-talk or fast-attack VOX; instantaneous break-in CW; fast key-up receiver recovery independent of AGC decay. Isolated terminals for control of external amplifier.
- f. CW Keyer. Built-in electronic keyer with independent speed and weight control, 5 to 60 wpm. Separate jacks for keyer paddle and manual key.
- g. Frequency Control Modes. Transceive with either VFO, "split" using both VFO's, transceive on either VFO plus independent receive-only on the other, or "Transmit and Receive Offset" transceive (transmit and receive frequencies track and may be instantly offset up to plus or minus .3 kHz from nominal frequency).
- h. Emission Modes. SSB, CW, FSK, compatible AM.
- i. Power Supply. Built-in heavy-duty supply for 115/230 volts, 50 to 400 Hz. Sillectron transformer for exceptional regulation and power with very small size and weight. Requires approximately 100 watts receive, 600 watts peak at full input.
- j. Construction. All critical circuitry (except large power supply components) is modular on glass epoxy etched circuit boards utilizing gold plated sockets and pins for easy removal of all transistors, integrated circuits and circuit boards.
- k. Size and Weight. 16- $\frac{1}{4}$ "W, x 7- $\frac{1}{4}$ "H, x 14" deep overall, less feet. 40 pounds.

Receiving System

- a. Active Devices. 20 digital integrated circuits, 14 linear integrated circuits, 110 transistors (both bipolar, MOS FET and J FET). Two double active Quad J-FET balanced mixers.
- b. Sensitivity. Better than .35 uv for 10 dB SINAD at 10 meters (2.4 KHz bandwidth).
- c. Selectivity.
Standard (SSB) - dual matched 2.4 kc 8 pole crystal bandpass filters deliver 16 pole, 1.4:1 shape factor performance (6 dB/60 dB).

Receiving System (continued)

- d. Post Detection Selectivity. 2.4, 1.5, 1.0, 0.4, 0.1 kHz.
- e. Post Detection Peak/Notch Filter. With adjustable center frequency.
- f. IF Rejection. Greater than 100 dB for both 40 and 8 MHz IF. 8 MHz IF rejection reduced to -70 dB for 7-10 MHz reception.
- g. Image Rejection. Greater than 80 dB.
- h. AGC. Fast attack with selectable 10 ms decay or 300 ms hang time; less than 6 dB audio output change for signal level from 1 uv to 100 mv.
- i. Front End Dynamic Range.
 - 1. Intermodulation. Two signals .005 volts each (-33DBM) spaced 10 KHz apart required to produce 3rd order products equivalent to 1 uv (-108 DBM) at antenna jack. i.e. -75 dB intermodulation distortion.
 - 2. Blocking. Better than 100 dB difference between a desired signal at rated sensitivity and an unwanted signal 100 kHz away which causes a degradation of 6 dB SINAD.
- j. Audio Output. 2 watts.
- k. IF Shift. Second IF adjustable up to plus or minus 2 kHz with respect to IF filter passband for interference rejection and receiver audio passband selection. Tracking error, zero.
- l. Dual Receive. Two channels usable separately or simultaneously; continuously variable relative RF gain control. Either channel may be used for transceiving and the other for receive-only.
- m. Noise Blanker. Pre-IF blanker with adjustable threshold.

Transmitting System

- a. Tuning. Pretuned bandpass output filter requires no adjustment. Nominal 50 ohm output impedance, will operate into any VSWR without damage. Driver and final broadband 1.8 to 30 MHz.
- b. Power Amplifier. Solid-state, completely broad-band driver and final; two rugged, silicon RF power transistors MRF 422, linear power amplifier conduction-coupled to massive extruded heat sink 150 watts dissipation rating at 25° C ambient. Complete thermal protection.
- c. Power Level. Nominal 350 watts DC/PEP input, 150 watts CW/PEP output all bands and modes. Output continuously adjustable down to less than 1 watt.
- d. Carrier and Unwanted Sideband Supression. 60 dB.
- e. Distortion. Typical Third-order intermodulation products more than 35 dB below each of two equal tones at full rated output.
- f. Speech Processing. RF envelope clipper plus cascaded 8 pole crystal filters in SSB and compatible AM (USB with carrier) modes. Clipping adjustable 0 to 20 dB nominal.
- g. Metering. PA current, PA voltage, clipping, drive level, forward and reflected RF power.

We reserve the right to improve specifications as technology advances.

Manufactured by:

Signal/One Corp.
Box 127
Franklin Lakes, New Jersey 07417
Phone: (201) 891-0459



WARNING

LINEAR AMPLIFIER OPERATION The CX-11 external reed relay has a contact rating of 10. VA max., 100 VDC max., 0.5 AMP max. switching current, and 1.5 AMP max. carry current rating. Linear Amplifier unprotected T/R relay coils can produce an inductive voltage kick as high as several thousand volts on relay opening.*

The majority of Amateur Linear Amplifiers are not designed for high speed T/R switching transceivers that feature full QSK break in, i.e. Vacuum Reed Relays required both in the transceiver and linear. The Alpha 77D and 77S are the only linears currently manufactured that can utilize the full QSK capability of the CX-11

ADDITIONAL OPERATING INFORMATION The clipping internal adjustment has been set and with the clipping pot at 0, whistling into the microphone with the meter function in the clipping position the meter should not exceed S-1 with the output control at 10 giving full power output.

EXTERNAL KEYER OPERATION To key the CX-11, an external keyer must supply a ground to the Key Jack; open circuit voltage is -15. VDC, 0 VDC keyed in transmit.

* Exceeding the contact rating will void the warranty for the CX-11 external reed relay. *OPTIONAL MERCURY WETTED RELAY WITH SPECIAL SOCKET FOR VERTICAL MOUNTING (USED IN CX-11A) IS RATED AT 25 VA MAX., 100 VDC MAX., 1.0 AMP MAX. SWITCHING, AND 2.0 AMP MAX CARRY CURRENT.*



WARNING

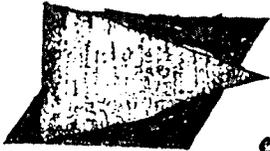
Back Panel The BNC Coaxial Connector is an intrigal part of the CX-11 used for all RF and input/output connections. Type BNC is of a superior quality and is standard throughout the communications industry. Should these connectors be removed or changed, the CX-11 warranty will be void. Signal One can supply additional connectors and cable for complete station conversion. Write for details.

Linear Amplifier Operation The CX-11 external Reed Relay has a contact rating of 10VA Max, 100VDC Max or a .5AMP resistive carry load .5AMP. Linear Amplifier unprotected T/R relay coils can produce an inductive voltage kick as high as several thousand volts on relay opening, example, the principle that produces the spark in the ignition of an automobile.

Note: You must solder a 1N4003 (included) directly across each of the linear amplifier relay coils, Band side of the diode facing toward the plus (source voltage side of the relay coil). Failure to do this, and in addition, exceeding the contact rating will void the warranty for the CX-11 external Reed Relay.

The majority of Amateur Linear Amplifiers are not designed for high speed T/R switching transceivers that feature full QSK break in, i.e. Vacuum Reed Relays required both in the transceiver and linear. The Alpha 77D and 77S are the only linears currently manufactured that can utilize the full QSK capability of the CX-11.

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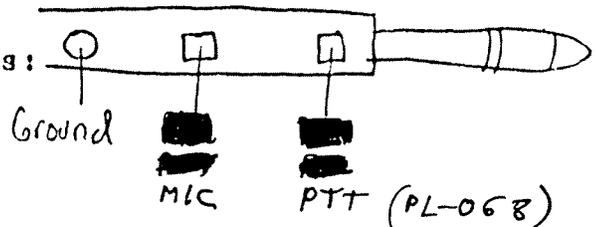
SIGNAL ONE

CONNECTOR ASSEMBLY PROCEDURES

Mic Jack Assembly PJ-068

Solder Mic cable to Jack as follows:

1. Tip of jack - PTT circuit
2. ~~Tip~~ of jack - Mic audio
RING
3. SLEEVE OF JACK - COMMON GROUND



Assembly of BNC Cable Connectors

1. Slide white wedge cap over coaxial cable
2. Strip back jacket of the RG-58C/U coaxial cable $\frac{1}{8}$ in.
3. Cut shield back $\frac{1}{8}$ in flush with jacket
4. Strip center conductor $\frac{1}{8}$ in.
5. Solder tip jack to center conductor
6. Insert center conductor of cable into BNC connector and force under braid causing jacket to expand and rise up over tapered end of the BNC connector.
7. Hold center portion of the BNC connector with long nose pliers in one hand and twist wedge cap clockwise, securely, on to rear of BNC connector utilizing spiral threads for a positive wedge lock of cable to connector.

ALPHA 77S INSTRUCTIONS

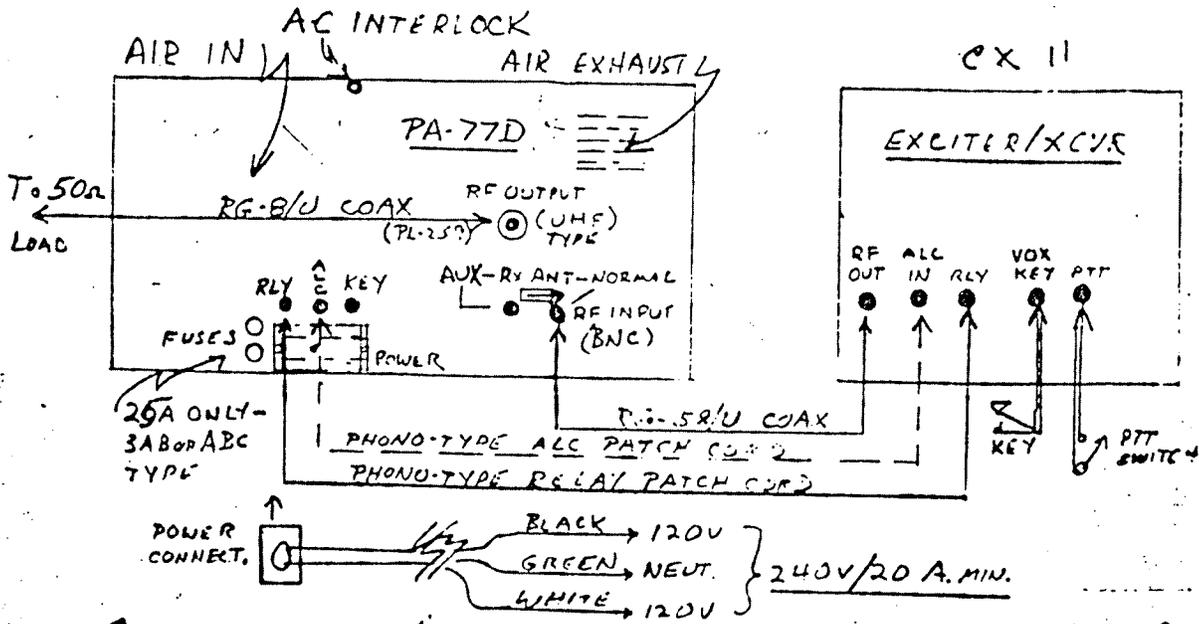


FIG. 1 - PA-77D Interconnections for VOX or PTT Operation

*NOTE! CX-11 ACCESSORY JACK NORMAL OPERATION JUMPER PINS V TO NN AND ϕ
 FIG. 2 - OPERATION JUMPER PINS V TO C AND N
 (USE AMP PIN REMOVAL TOOL #305183)

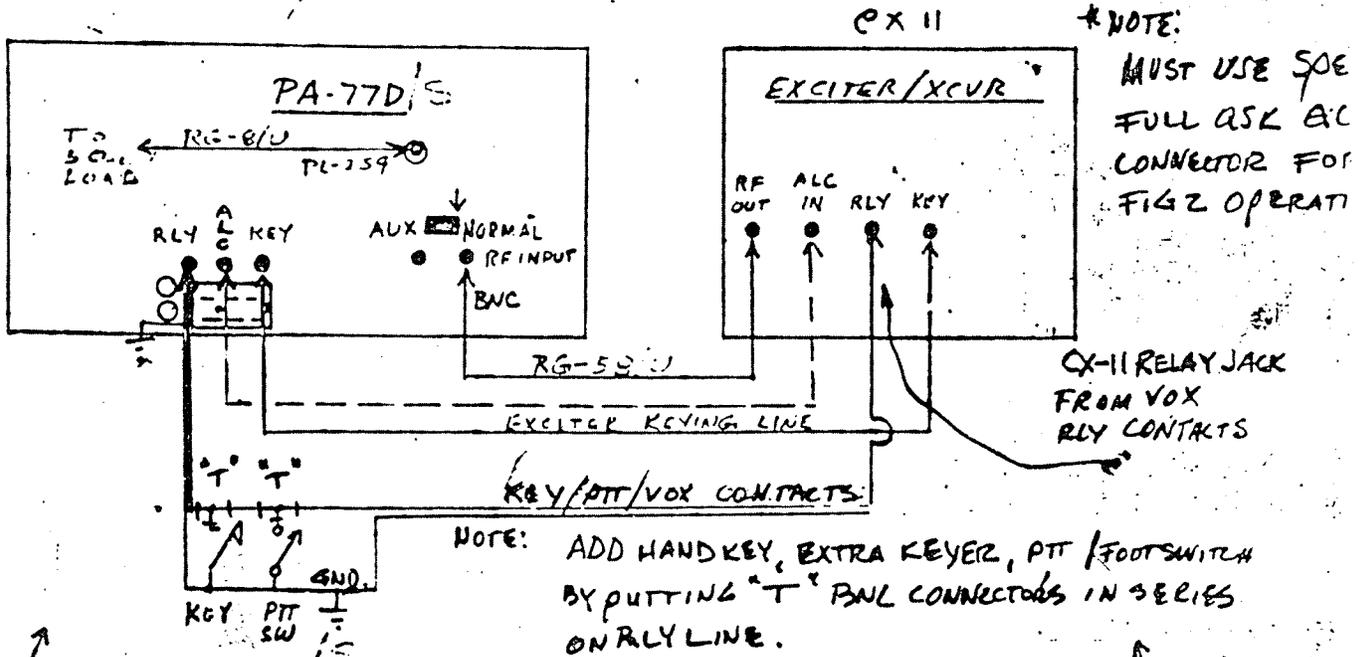


FIG. 2 - PA-77D Interconnections for CW Break-In, Fast VOX, RF Interlocking of T/R System to Insure Proper Sequence

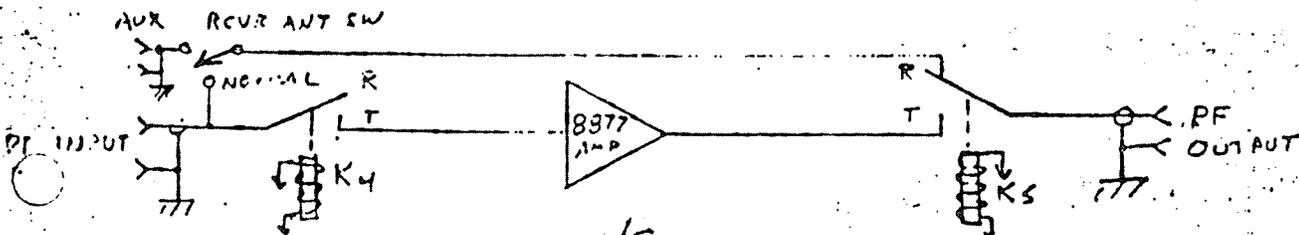


FIG. 3 - Simplified PA-77D Transmit-Receive Antenna Switching Diagram



BASIC CONTROL SETUP

Control

Setting

AC		Off (Button Out)
Audio Filter		Off
Selectivity		2.4
Keyer		Any Position
Sidetone Level		Mid-Range
Calibrate		In
FSK Shift		<input checked="" type="checkbox"/> MIN
Mode		USB or LSB
Clipping		3
TX Drive		0
AGC		Slow
TX Offset		Mid-Range
Meter		FWR PWR
TX VFO		A
Control		PTT
RX Channel		A, Center Knob Any Position
RX Shift		0, Both Knobs
Noise Blanker		Off
MHZ		1, 3, 7, 14, 21, 28 or 29 (OR 10, OPTIONAL)
RF Gain		10
Audio Gain		3
Anti Vox	(REAR PANEL)	<input checked="" type="checkbox"/> FULL C.C.W.
Vox Gain	(REAR PANEL)	<input checked="" type="checkbox"/> FULL C.C.W.
Vox Delay	(REAR PANEL)	<input checked="" type="checkbox"/> FULL C.C.W.
PRE SELECTOR		1-2
ANT Slide Switch (Rear Panel)		Comm
SPOT LEVEL	(REAR PANEL)	MID-RANGE

Connector Assembly Procedure

Mic Jack Assembly PJ-068

Solder Mic cable to Jack as follows:

1. Tip of jack - PTT circuit
2. of jack - Mic audio RING
3. SLEEVE OF JACK - COMMON GROUND



Check for the following conditions before energizing the radio:

1. Antenna connected to rear panel jack.
2. Fuses installed per rear panel markings.
3. Dummy plug installed in accessory jack (radio will not operate without plug). Note - ~~reversing plug will cause damage.~~ reversing plug will cause damage.
4. A.C. Power Cord connected.
5. Loudspeaker connected to rear panel "spkr". Jack or earphones plugged into front panel "audio" jack.

The CX-11 may now be energized by depressing the AC pushbutton-- you will now be able to receive some signals by tuning VFO A.

To Transmit, depress the tune button and advance the TX drive control until the amber warning light on the meter face just begins to turn on, or until the forward power meter indication ceases to increase. The amber light marks the point of excessive drive. A red warning light is also included on the meter face, it shows that the high current power supply is out of regulation when lit--under no circumstances should the drive control be advanced to the point at which this red light turns on. The out-of-regulation condition is usually caused when trying to operate with inadequate station wiring and/or excessively low line voltage.

Depress the "PTT" or "VOX" pushbutton to cancel the "tune" button; the CX-11 is now ready for normal full-power transmission on either Single Sideband or CW. It is not advisable to remain in "tune" for more than one minute; long periods of this type of transmission could allow the amplifier or power supply to activate the automatic high temperature cut-off circuitry. When this happens, the transmitter will become inoperative until the heat sinks have been allowed to cool sufficiently. (The red meter light will indicate during thermal cut-off; also, the meter will indicate zero with the "P.A. Volt" button depressed).



"Explanation Of Control Functions"

Note: All controls only associated with the receive function are marked with green lettering; transmit with red. Any controls which affect both receive and transmit are marked with yellow lettering.

1. AC On/Off--self explanatory
2. Mode Every CX-11 will operate in the AM, LSB, USB, and CW 1 positions; the CW2, FSK1/CW3 & FSK 2 positions represent modes requiring the installation of optional crystal filters.
3. Control Pushbuttons
 - a) PTT; Push-To-Talk: Depressing the button sets up the condition in which the transmitter can only be actuated by an external switch, such as a microphone pushbutton, footswitch--while in AM, LSB, USB, or FSK modes. In the CW mode, the transmitter is automatically actuated by keying either a standard hand key or auto key paddle.
 - b) VOX; voice actuation: Transmitter will be automatically actuated upon speaking into microphone.
 - c) Tune: Actually a misnomer--creates a "key down" CW transmit condition regardless of mode switch position; useful in setting or measuring RF output power.
 - d) Transmit: Depressing this button forces a transmit condition. To return to receive simply depress PTT or VOX. In the CW mode, the effect is to provide standard non-break-in operation.
4. MHZ Used to select the desired one-megahertz-wide range of operation.
5. Preselector Tuneable receiver bandpass filter. Further enhances the receive circuitry's excellent linearity in the presence of strong out-of-band signals.
6. VFO A Precision permeability tuned oscillator provides 1 MHz + tuning range for both transmit and receive; approx 25 KHZ/knob revolution.
7. VFO B Identical to VFO A. Dual VFO's provide simultaneous reception of two different frequencies, if desired.
8. Receive Channel Selector
 - a) Large outer knob selects which VFO determines the receive frequency; A, B, or both A & B.
 - b) Small knob is a balance control which can be used to modify the relative signal levels of two different stations being received in the A+B receive mode.
9. RX Shift
 - a) The larger outer knob provides the operator with a means of moving the IF passband up or down relative to the "Zero-Beat" frequency. (Used for placing selectivity skirt at optimum point for rejecting interfering signals).



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 - d) Transmit: Depressing this button forces a transmit condition. To return to receive simply depress PTT or VOX. In the CW mode, the effect is to provide standard non-break-in operation.
4. MHZ Used to select the desired one-megahertz-wide range of operation. Separate low-pass and high-pass filters are selected for six ranges covering 1.8 - 30 MHz. The selectivity of the receive band pass filters further enhance the receive circuitry's excellent linearity in the presence of strong out of band signals.
6. VFO A Precision permeability tuned oscillator provides 1 MHz + tuning range for both transmit and receive; approx 25 KHZ/knob revolution.
7. VFO B Identical to VFO A. Dual VFO's provide simultaneous reception of two different frequencies, if desired.
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RX Shift (cont'd.)

b) The small center knob is used to offset the frequency of VFO A during receive. This feature is activated by pulling out on the knob and rotating it while watching the results on the read-out. The offset is automatically cancelled during transmit.

10. Noise Blanker

Very effective in reducing pulse noise. The control should only be advanced far enough to reduce noise to an acceptable level. Be sure to return the knob to the full off position when the noise blanker is not required; otherwise, strong signals within 15 KHZ may appear to cause receiver distortion.

11. RF Gain (Outer Knob)

Normally left in the full clockwise position; this control may be rotated counter clockwise to manually override the automatic Gain Control circuitry. Many operators reduce the RF Gain to eliminate annoying background interference while receiving relatively strong stations.

12. AF Gain (Inner Knob)

Use this knob to control the audio output level of the receiver. Notice that the control has no effect on the CW Sidetone or Spot Tone levels (for which separate controls are provided).

13. Calibrate

Caution: Allow 5 min. warm-up before making adjustments. Switching the knob "OUT" causes a signal to appear every 100 KHz. Using the appropriate VFO, set the readout to indicate any exact multiple of 100 KHz (last three digits are zero). Then insert a thin blade screwdriver into the calibrate **CAP.**; adjust to obtain zero beat.... this is best heard by manipulating the IF shift control to obtain good audio response near zero beat. The calibration procedure need only be performed once at WWV 15.0 MHz to insure accurate frequency readouts on any selected band.

14. Audio Filter

The CX-11 is equipped with a versatile peak/notch/filter. When switched to the "notch" position, a narrow segment of the receivers audio response is greatly attenuated. Switching to "peak" provides a condition which is exactly opposite to that provided in "notch"; that is, all but a narrow bandwidth is greatly attenuated. The center frequency about which a "notch or peak" is located is governed by the position of the "center frequency" knob.



RX Shift (cont'd.)

b) The small center knob is used to offset the frequency of VFO A during receive. This feature is activated by pulling out on the knob and rotating it while watching the results on the read-out. The offset is automatically cancelled during transmit.

10. Noise Blanker

Very effective in reducing pulse noise. The control should only be advanced far enough to reduce noise to an acceptable level. Be sure to return the knob to the full off position when the noise blanker is not required; otherwise, strong signals within 15 KHZ may appear to cause receiver distortion.

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Use this knob to control the audio output level of the receiver. Notice that the control has no effect on the CW Sidetone or Spot Tone levels (for which separate controls are provided).

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Caution: Allow 5 min. warm-up before making adjustments. Switching the knob "OUT" causes a signal to appear every 100 KHz. Using the appropriate VFO, set the readout to indicate any exact multiple of 100 KHz (last three digits are zero). Then insert a thin blade screwdriver into the calibrate **CAP.**; adjust to obtain zero beat.... this is best heard by manipulating the IF shift control to obtain good audio response near zero beat. The calibration procedure need only be performed once at WWV 15.0 MHz to insure accurate frequency readouts on any selected band.

14. Audio Filter

The CX-11 is equipped with a versatile peak/notch/filter. When switched to the "notch" position, a narrow segment of the receivers audio response is greatly attenuated. Switching to "peak" provides a condition which is exactly opposite to that provided in "notch"; that is, all but a narrow bandwidth is greatly attenuated. The center frequency about which a "notch or peak" is located is governed by the position of the "center frequency" knob.



15. Selectivity
Normally, this switch should remain in the ~~OFF~~^X position. Narrower bandwidths down to only 100 HZ are provided to optimize the reception of weak signals in the presence of noise and/or strong interfering signals.
16. AGC
Receiver Automatic Gain Control; normally left in the "slow" position. The RF Gain Control must be used to manually set the Receiver Gain if this control is turned to "off".
17. TX VFO
These pushbuttons specify what controls will be used to determine the transmit frequency:
A; transmit frequency set by VFO A.
A.T.O.; transmit frequency set by VFO A and by the position of the "A TX Offset" control. A green dot will appear in the readout to remind the operator that this offset mode has been selected.
B; transmit frequency set by VFO B.
18. VFO Spot
Serves two purposes:
 - 1) Allows an audible beat tone to be produced--used to synchronize the two VFO's to a higher resolution than provided by the readout, (See "Spot Level" Control description).
 - 2) When depressed, the frequency shown on the readout is exactly equal to the transmit frequency--useful in avoiding having to transmit in order to check transmission frequency.
19. Spot Level (Located on Rear Panel)
The loudness of the VFO spot tone is independent of the AF gain control. Set the spot level control for the desired loudness.
20. VOX Gain (Located on Rear Panel)
Used to set the minimum level at which the operators voice will actuate the VOX circuit.
21. Anti Trip (Located on Rear Panel)
Clockwise rotation of this control increases the VOX circuits immunity to being actuated by receiver audio output.
22. Delay (Located on Rear Panel)
Controls the amount of time that the VOX circuit remains actuated after the operator has stopped talking into the microphone.
23. Meter Pushbuttons
Meter reads received signal strength during receive except when "P.A. VOLT" or "P.A. CUR." buttons are depressed.
a) P.A. VOLT: Press to monitor the power amplifier voltage. Note that



15. Audio Selectivity

Normally, this switch should remain in the 2.4 KHZ position. Narrower bandwidths down to only 100 HZ are provided to optimize the reception of weak signals in the presence of noise and/or strong interfering signals.

16. AGC

Receiver Automatic Gain Control; normally left in the "slow" position. The RF Gain Control must be used to manually set the Receiver Gain if this control is turned to "off".

17. TX VFO

These pushbuttons specify what controls will be used to determine the transmit frequency:

A; transmit frequency set by VFO A.

A.T.O.; transmit frequency set by VFO A and by the position of the "A TX Offset" control. A green dot will appear in the readout to remind the operator that this offset mode has been selected.

B; transmit frequency set by VFO B.

18. VFO Spot

Serves two purposes:

- 1) Allows an audible beat tone to be produced--used to synchronize the two VFO's to a higher resolution than provided by the readout. (See "Spot Level" Control description).
- 2) When depressed, the frequency shown on the readout is exactly equal to the transmit frequency--useful in avoiding having to transmit in order to check transmission frequency.

19. Spot Level (LOCATED ON REAR PANEL)

The loudness of the VFO spot tone is independent of the AF gain control. Set the spot level control for the desired loudness.

20. VOX Gain (LOCATED ON REAR PANEL)

Used to set the minimum level at which the operators voice will actuate the VOX circuit.

21. AntiTrip (LOCATED ON REAR PANEL)

Clockwise rotation of this control increases the VOX circuits immunity to being actuated by receiver audio output.

22. Delay (LOCATED ON REAR PANEL)

Controls the amount of time that the VOX circuit remains actuated after the operator has stopped talking into the microphone.

23. Meter Pushbuttons

Meter reads received signal strength during receive except when "P.A. VOLT" or "P.A. CUR." buttons are depressed.

- a) P.A. VOLT: Press to monitor the power amplifier voltage. Note that



Addendum to Page 6, Item # 26 A TX Offset:

A/T.O. CW Transceive Operation

1. Depress A/T.O.
2. Depress Spot Button and set A/T.O. offset control 800 Hz high in relation to receiver frequency displayed on digital counter. (Approx. 7 o'clock on A/T.O. knob).
3. When set, no additional adjustments are necessary for any frequency tuned by PTO A unless a shift of the transmit CW frequency is desired, for example, during a DX pile up a slight shift of 100 Hz up or down.

A PTO Transceive Operation

1. Pull RX Shift knob and depress Spot button. Set for 800 Hz low in relation to the receive frequency. displayed on digital counter. (Approx. 11 o'clock on A/T.O. knob).



DETERMINING ACTUAL FORWARD AND REFLECTED POWER

TABLE 1

METER INDICATION	EQUIVALENT WATTS
0.0	0
0.2	1
0.4	2
0.6	4
0.8	7
1.0	10
1.2	14
1.4	19
1.6	25
1.8	33
2.0	40
2.2	48
2.4	57
2.6	66
2.8	75
3.0	85
3.2	100
3.4	108
3.6	118
3.8	130
4.0	140
4.2	150
4.4	170
4.6	190
4.8	200
5.0	210



Meter Pushbuttons (cont'd.)

signal strength indications cannot be observed with this function selected. Approximately **50** volts full scale.*

- b) P. A. Cur.: Press to monitor power amplifier current consumption. Approximately **50** amps full scale.* Note that signal strength indications cannot be observed whenever this button is depressed.
- c) Clipping: When this button is depressed, the meter will give a relative indication of the amount of RF clipping present during voice transmissions.
- d) Drive: When this button is depressed, the meter will indicate the activity of the ALC (Automatic Level Control) circuitry during transmit. The meter reading should never be allowed to rise above 20% deflection. A condition of excessive drive will usually result in distorted transmissions. The yellow warning light on the left side of the meter face is also an indicator of excessive drive, but responds much faster than the meter movement.
- e) FWR PWR: When this button is depressed, the meter shows a relative indication of forward power during transmit. An 80% meter deflection corresponds to 150 watts output (see manual for calibration data). **150 WATTS = 1.2 ON METER.**
- f) REV PWR: When this button is depressed, the meter shows a relative indication of reverse power.

24. TX Drive (Center Knob)

Controls the power output of the transmitter; always follow these rules when adjusting this control:

- 1) Do not advance TX drive any further than the point at which the power output ceases to increase.
- 2) Do not advance TX drive beyond the point at which the yellow warning light just begins to indicate and/or the drive meter shows a higher than 20% deflection.
- 3) Reduce drive if the red warning light shows the slightest indication (power supply overload condition).

25. Clipping

RF speech clipping may be used to increase the average output power without increasing peak output power during voice transmissions. This feature is extremely effective in extending ones readability under marginal conditions. Use only as much clipping as necessary-- as with any clipping process, audio distortion is an unavoidable by-product. The knob is usually left at 2 or 3 during normal operating conditions.

26. A TX Offset

Allows the operator to offset the transmit frequency as much as 3 KHZ with respect to the receive frequency when using VFO A for



Signal/One

A TX Offset (cont'd.)

both transmit and receive. Pressing the "A,T.O." pushbutton activates this feature. The offset is observed directly in the readout either by actually transmitting or by depressing the spot button. At first, this may seem redundant in view of the fact that a similar offset feature is included in receive (ref. RX Shift, VFO A); however, advanced operating techniques show the inclusion of both to be a valuable asset. Additional references to the feature and its uses are contained in the instruction manual.

27. Keyer

The CX-11 is unique in that it includes a sophisticated Morse code keyer circuit featuring variable speed, variable "weight" and partial or full dot memory selection.

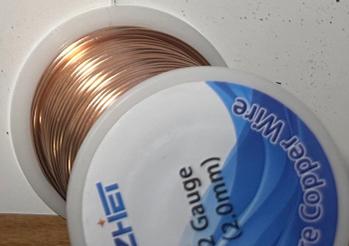
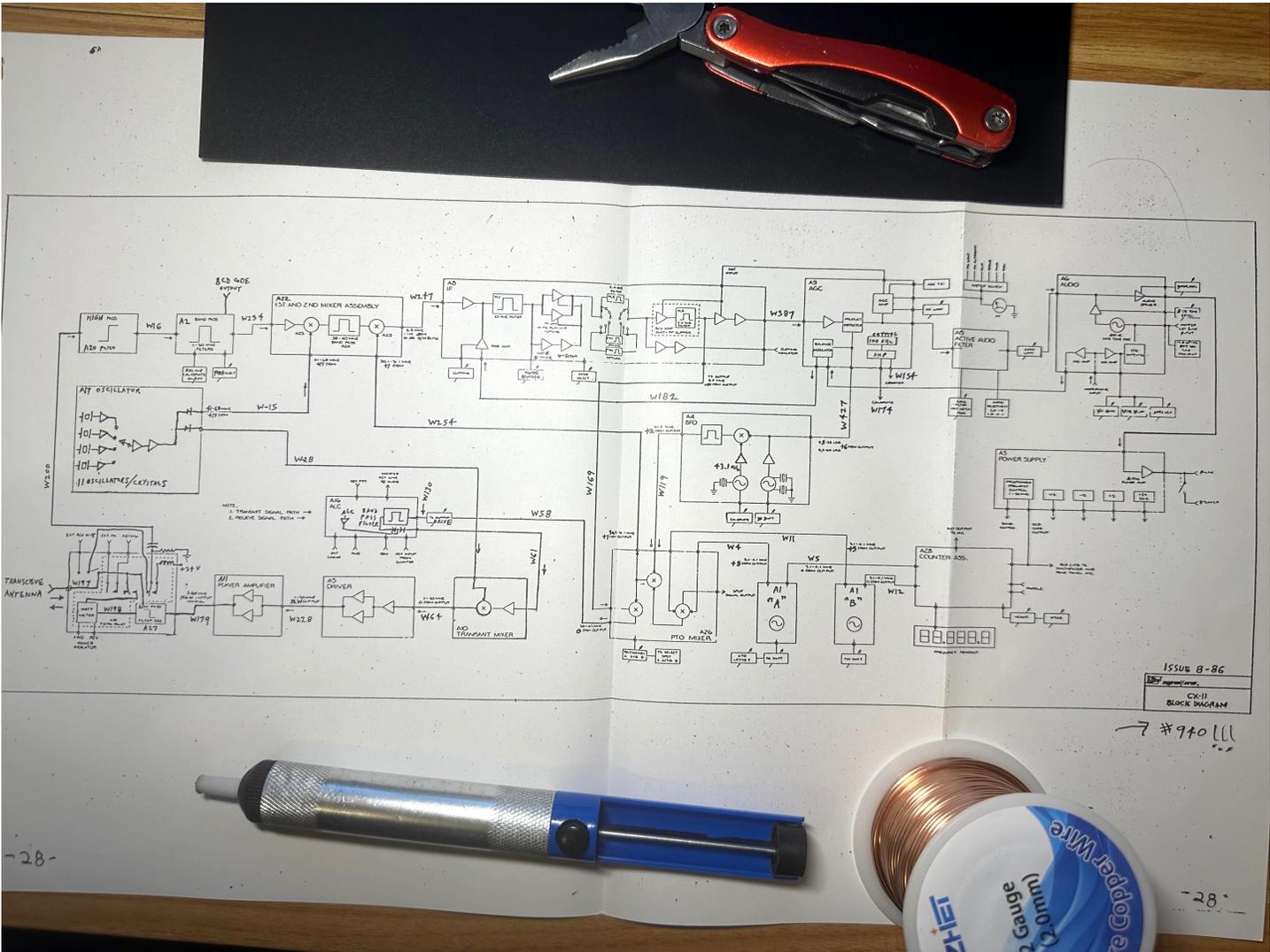
- a) Speed: Advance clockwise (large outer knob) to increase speed.
- b) Weight: Full counter-clockwise is best for slower speeds--
Increasing weight as speed increases helps improve readability.
- c) Dot Memory: Pull out center (weight) knob for full dot memory--
push in for partial memory.

28. Sidetone Level

Sets loudness of CW sidetone; which is independent of the AF Gain control setting.

29. FSK Shift

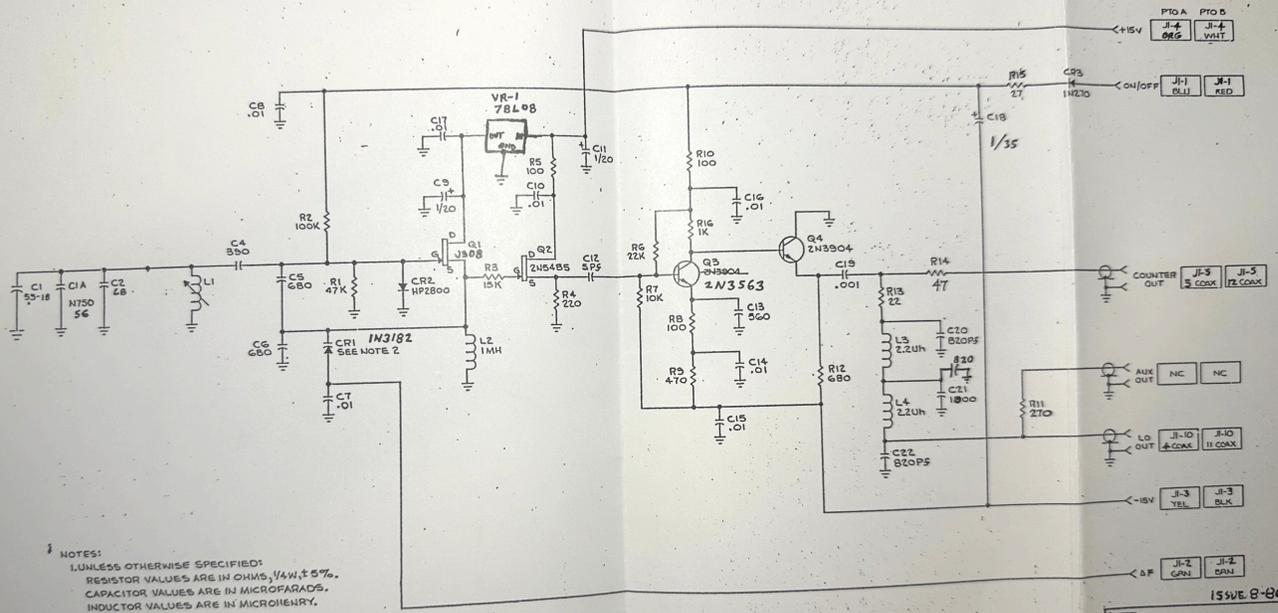
Sets mark to space frequency difference for operating radio teletype. VFO B must be used for transmit in this mode.



-28-

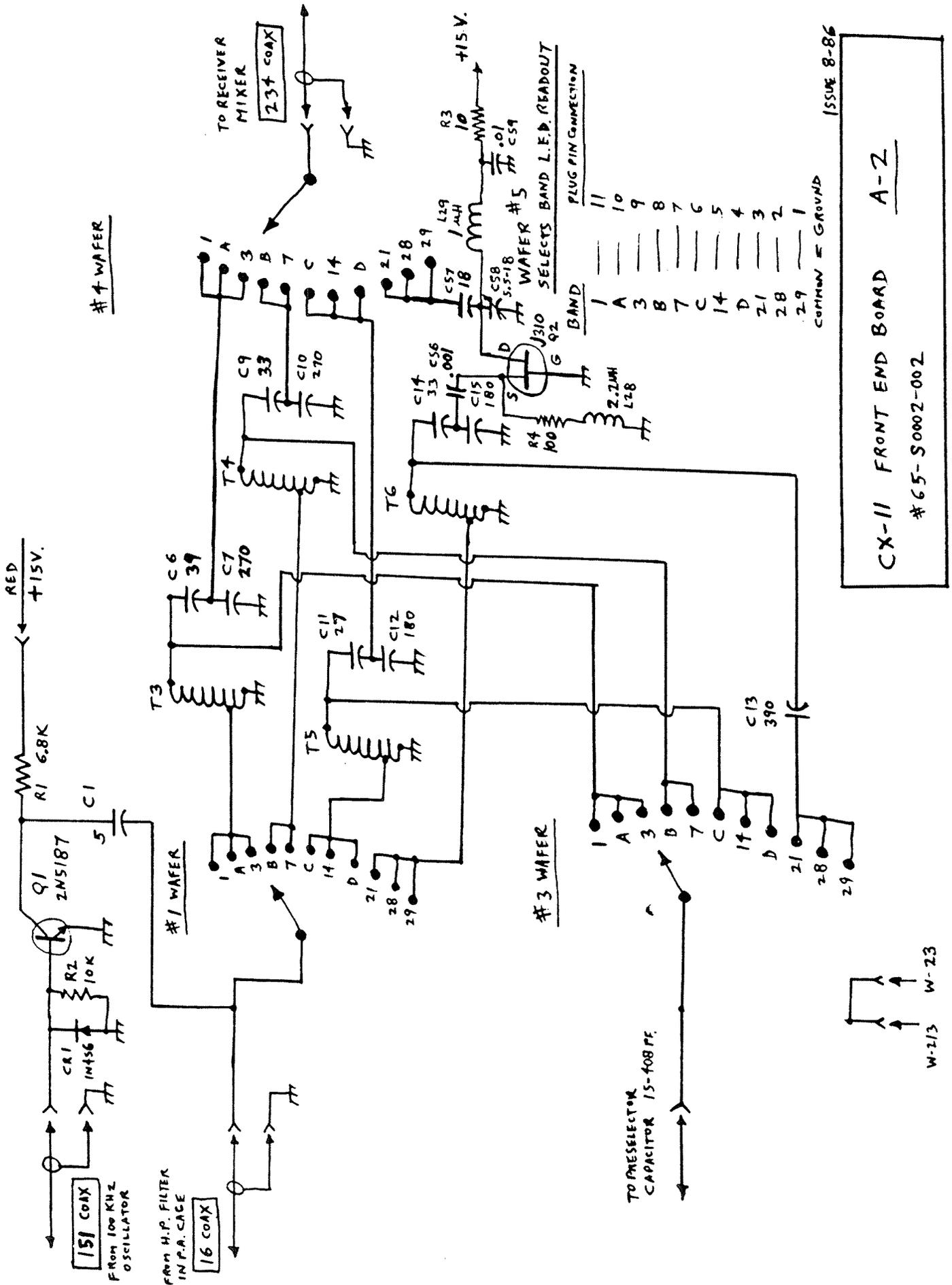
-28-

-29-



- NOTES:
1. UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS, $\frac{1}{4}$ W, $\pm 5\%$.
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTOR VALUES ARE IN MICRohenry.
 2. CRI POLARITY FOR (A) VERSION SHOWN,
REVERSE POLARITY FOR PTO (B).
 3. Q1 MAY BE J310.
 4. SELECT C18 FOR TRAILING EDGE CW SHAPING.
 5. *940 - Q1 = E310 IN PTO (A), J310 IN PTO (B) IN 940 ONLY
 6. R3 = 22K IN PTO (A), 10K IN PTO (B) IN 940 ONLY

ISSUE 8-86
signal/cor. CX-11
A1
PERMEABILITY TUNED OSC.



ISSUE 8-86

A-2

CX-11 FRONT END BOARD

#65-S0002-002

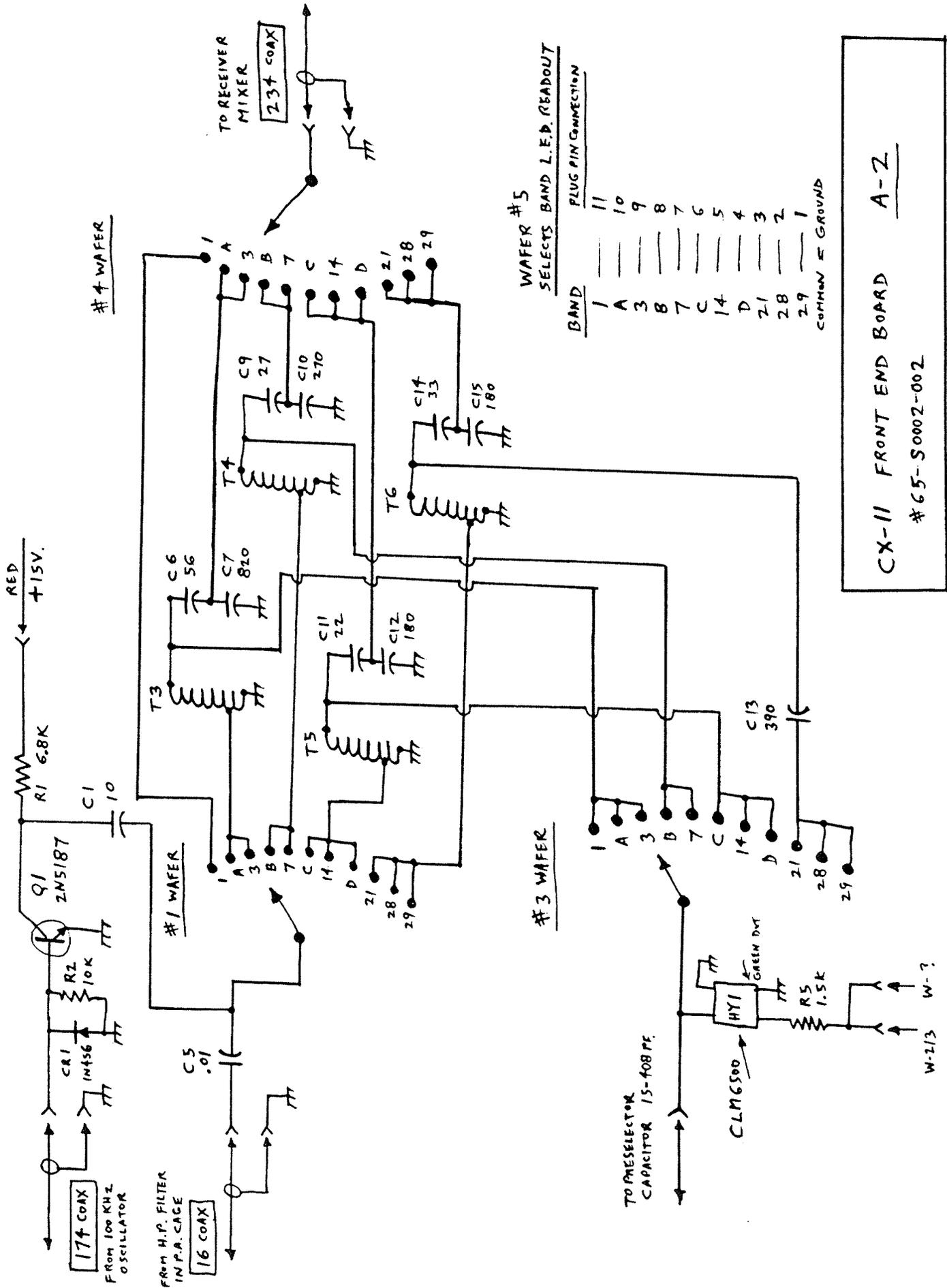
#940

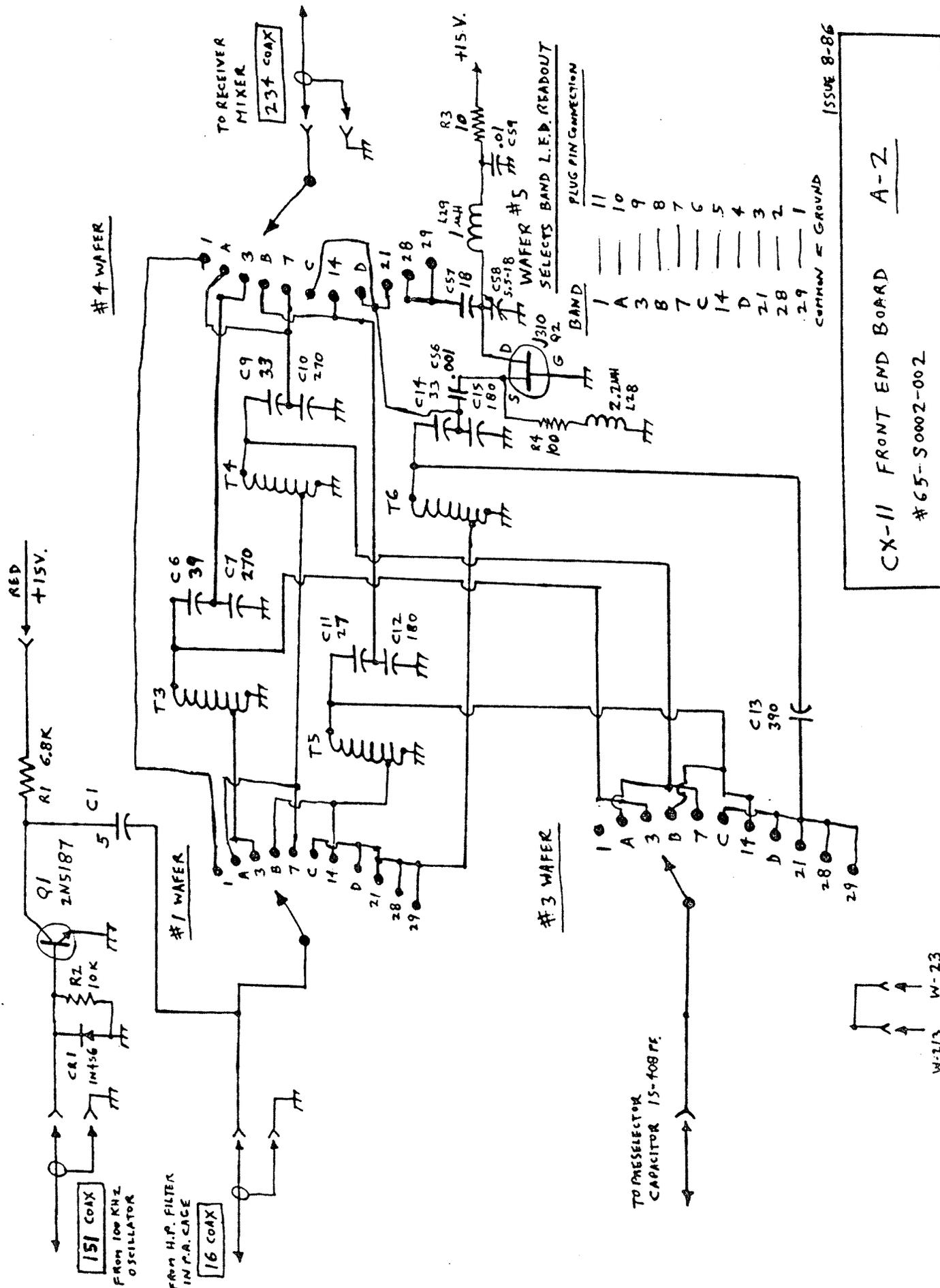
1301

1301

TO PRESELECTOR CAPACITOR 15-408 PF.

W-2/3 W-23

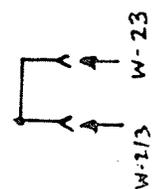




ISSUE 8-86

CX-11 FRONT END BOARD A-2

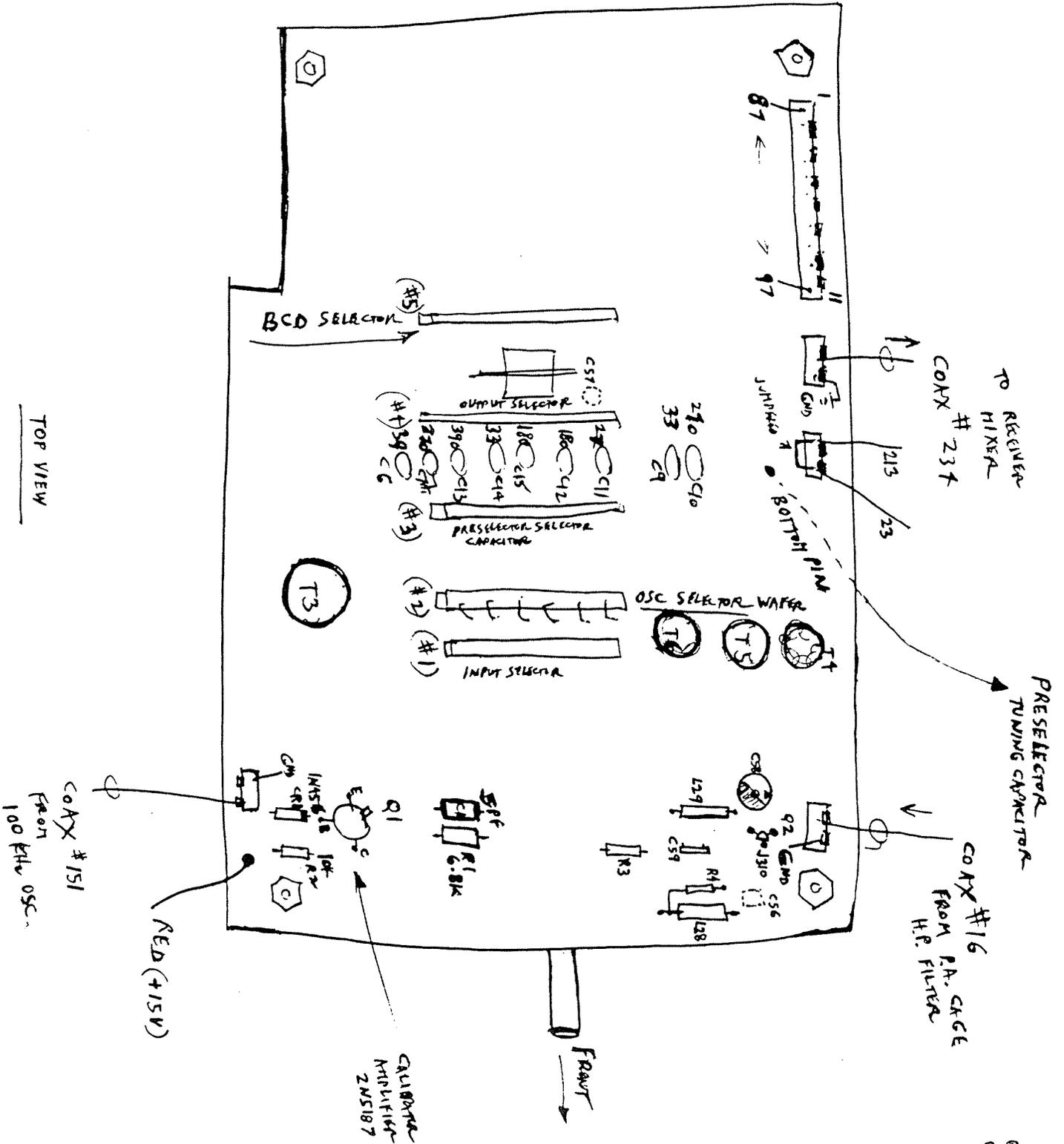
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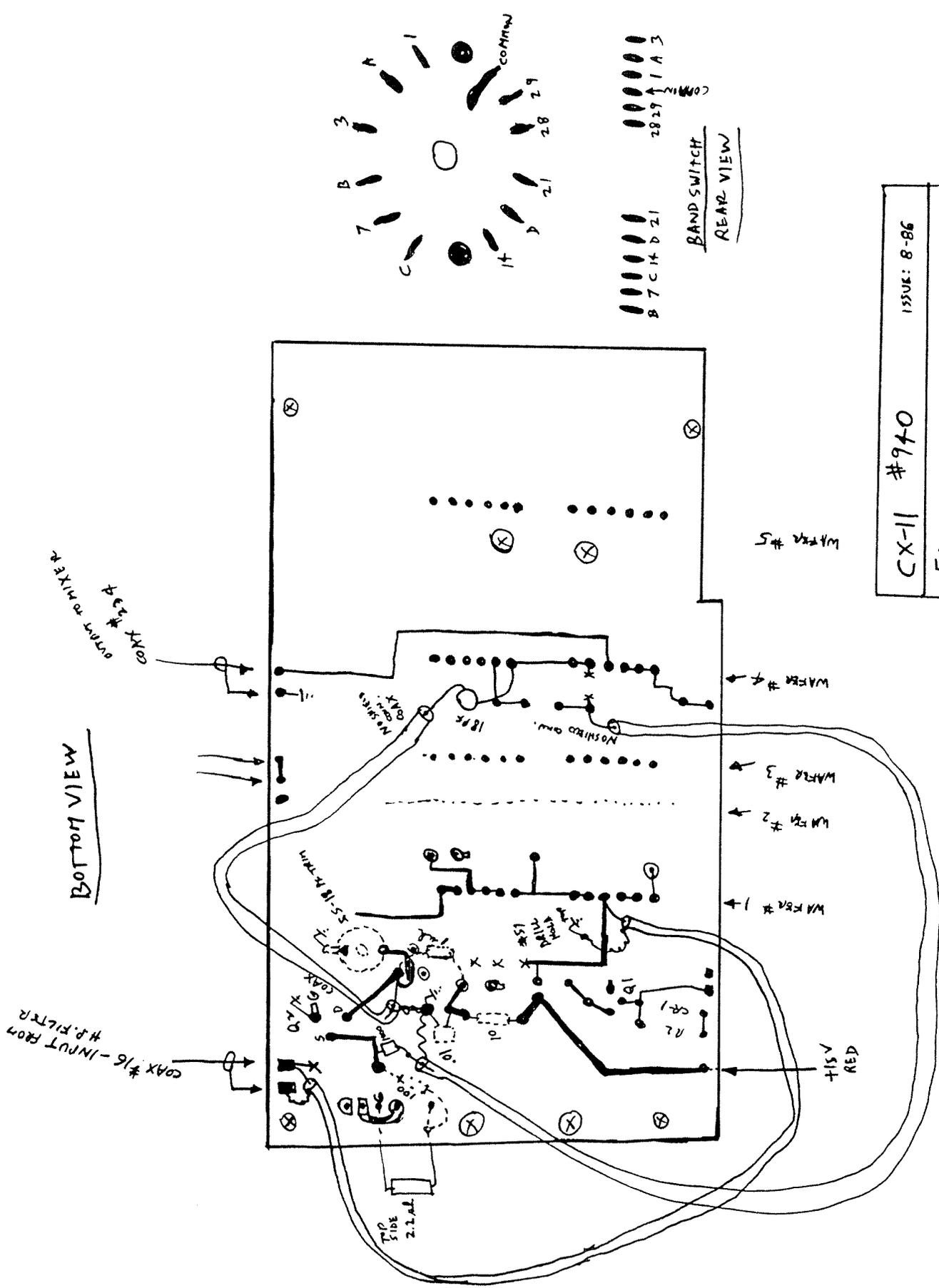


FRONT END BAND SWITCH BOARD CX-11
 # 61-5002-002

(A-2)

#940 MODIFIED





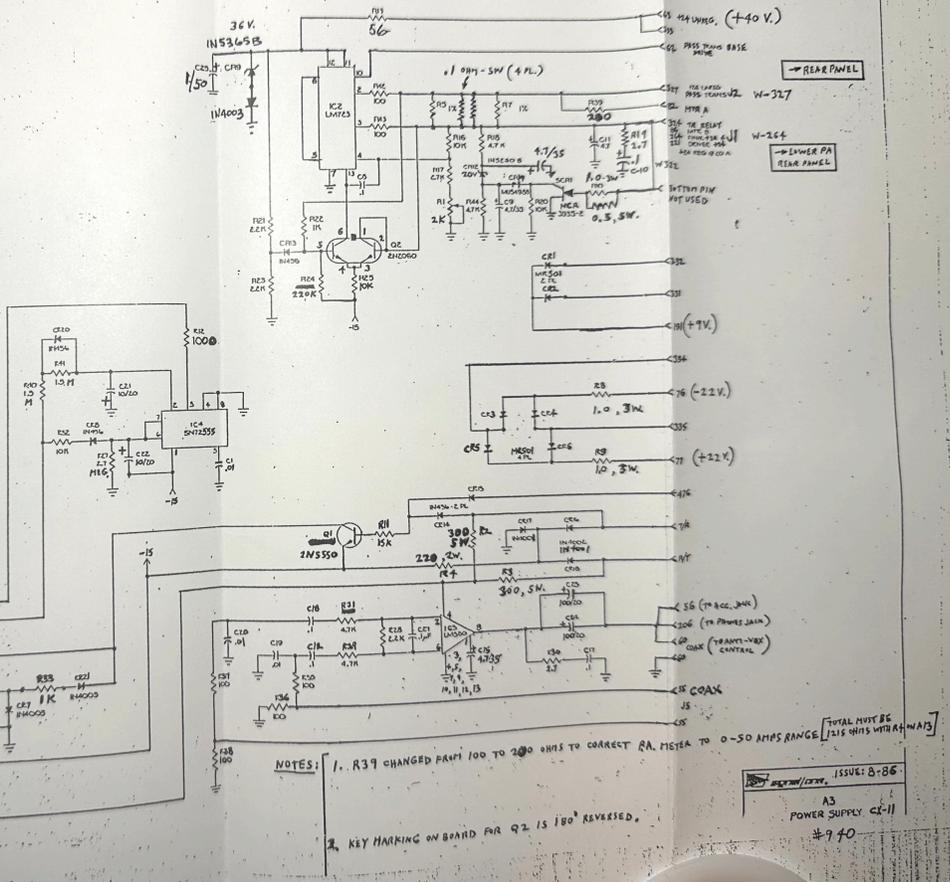
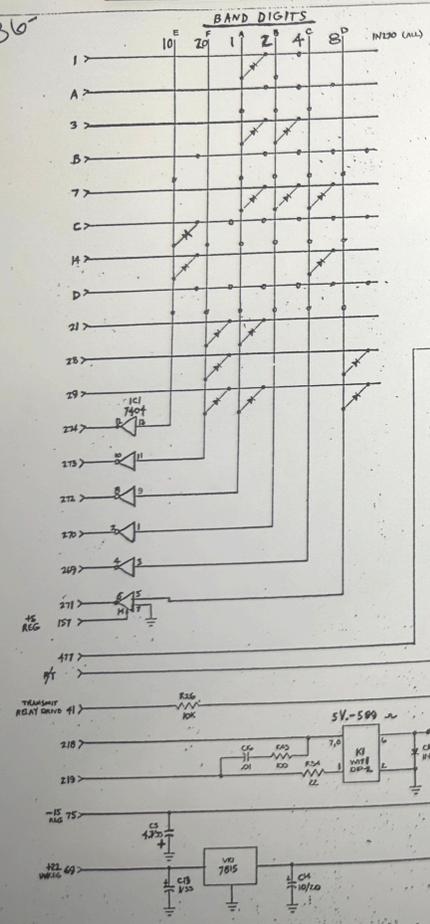
BOTTOM VIEW

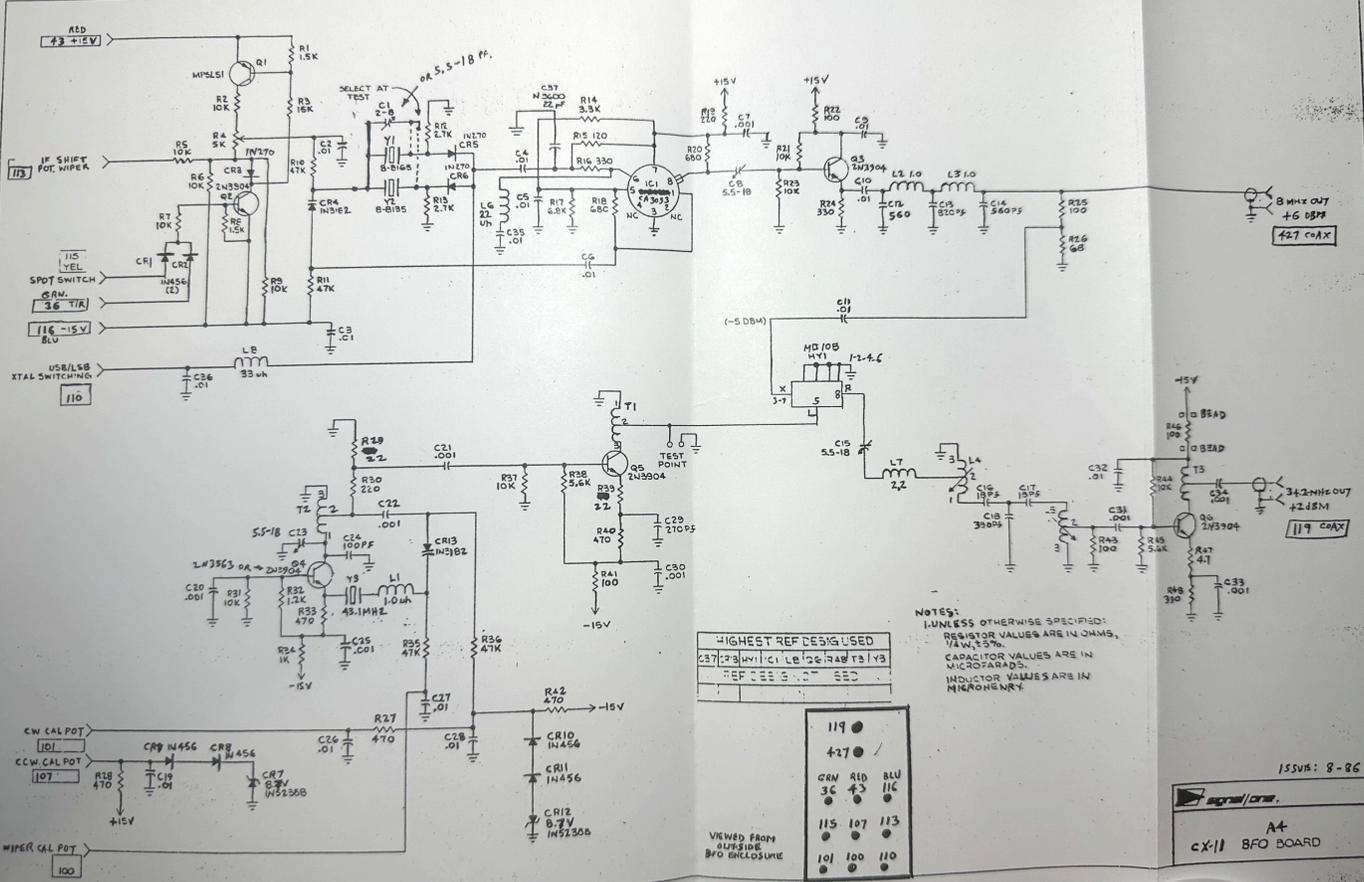
BAND SWITCH
REAR VIEW

CX-11 #970	ISSUE: 8-86
FRONT END BOARD - A2	
ADD R.F. STAGE FOR 21-28-29 BANDS	

1 uF = RED DOT - 8000V DOT
COAX = 30 PF/FOOT

-36-





HIGHEST REF DESIG USED
 C27: 33WV 10% 1000PF 10%
 REF DESIG USED

119	●
427	●
CR8	RED BLU
3C	43
115	107 113
101	100 110

NOTES:
 1-UNLESS OTHERWISE SPECIFIED:
 RESISTOR VALUES ARE IN OHMS,
 VAL, 5%
 CAPACITOR VALUES ARE IN
 MICROFARADS.
 INDUCTOR VALUES ARE IN
 MICROHENRY.

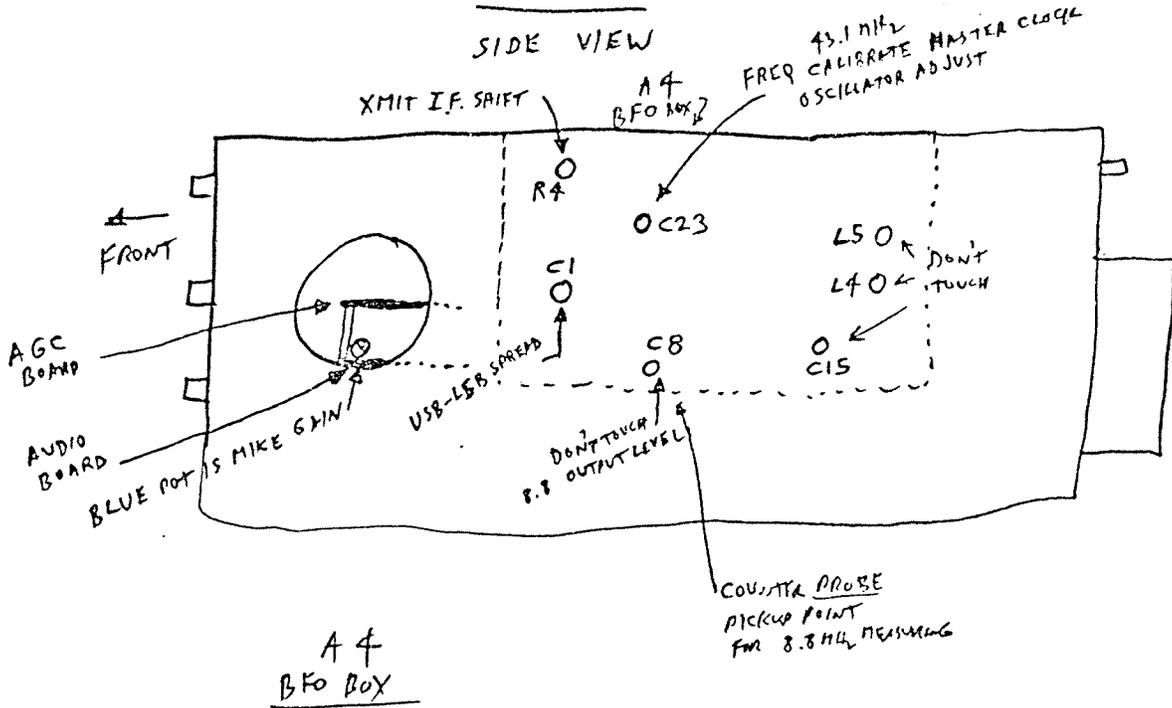
ISSUA: 8-86

signal/cor.
 A4
 CX-11 BFO BOARD

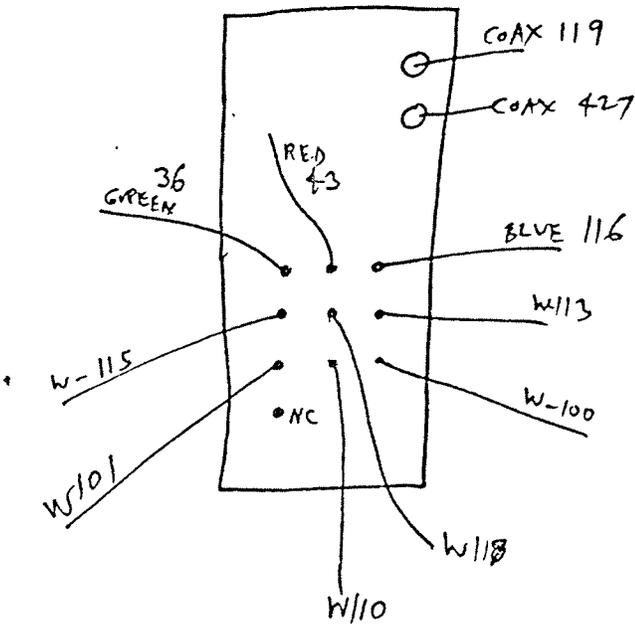
VIEWED FROM
 SURFIDE
 BFO ENCLOSURE

CX-11

SIDE VIEW

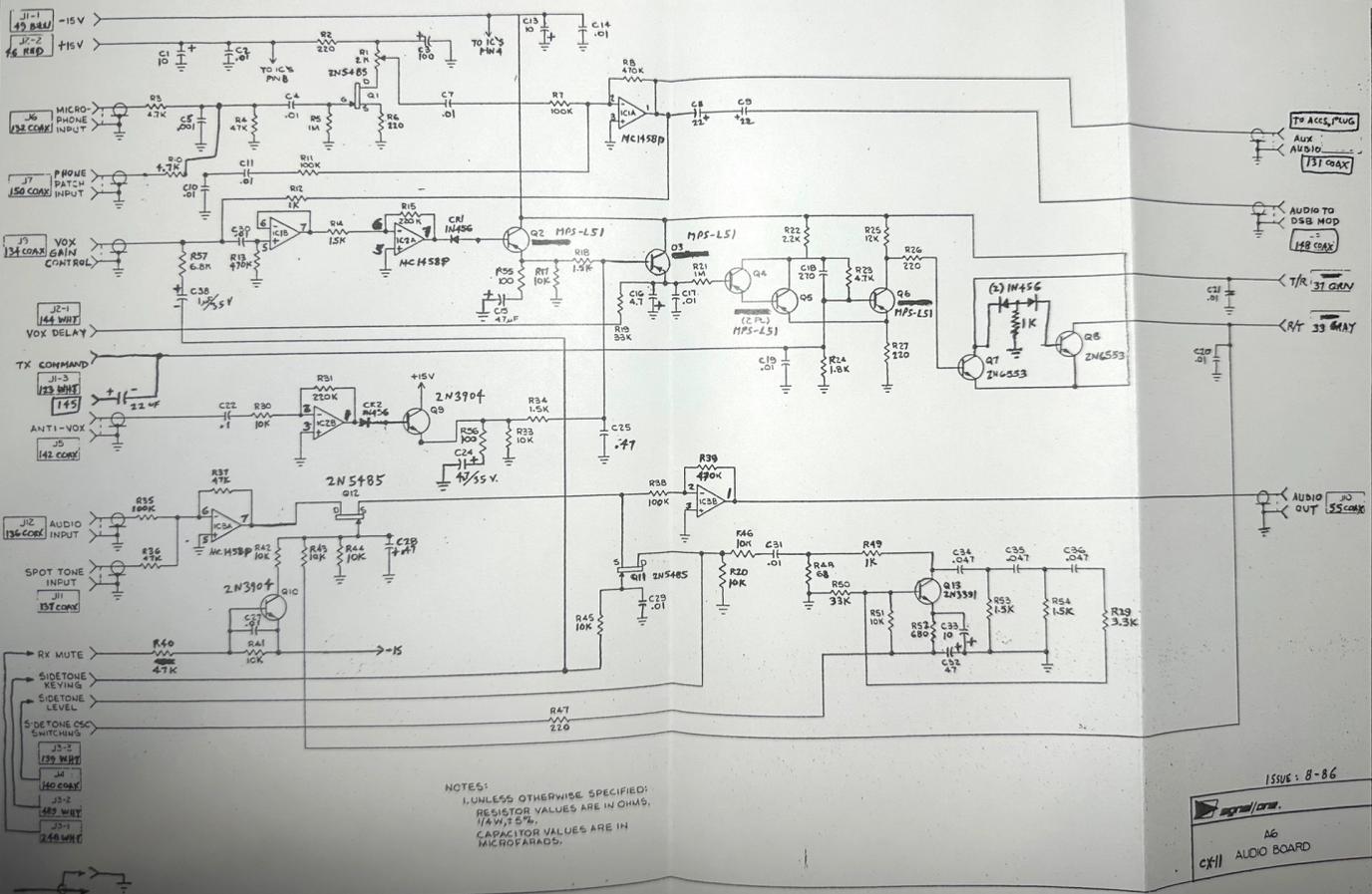


A4 BFO BOX

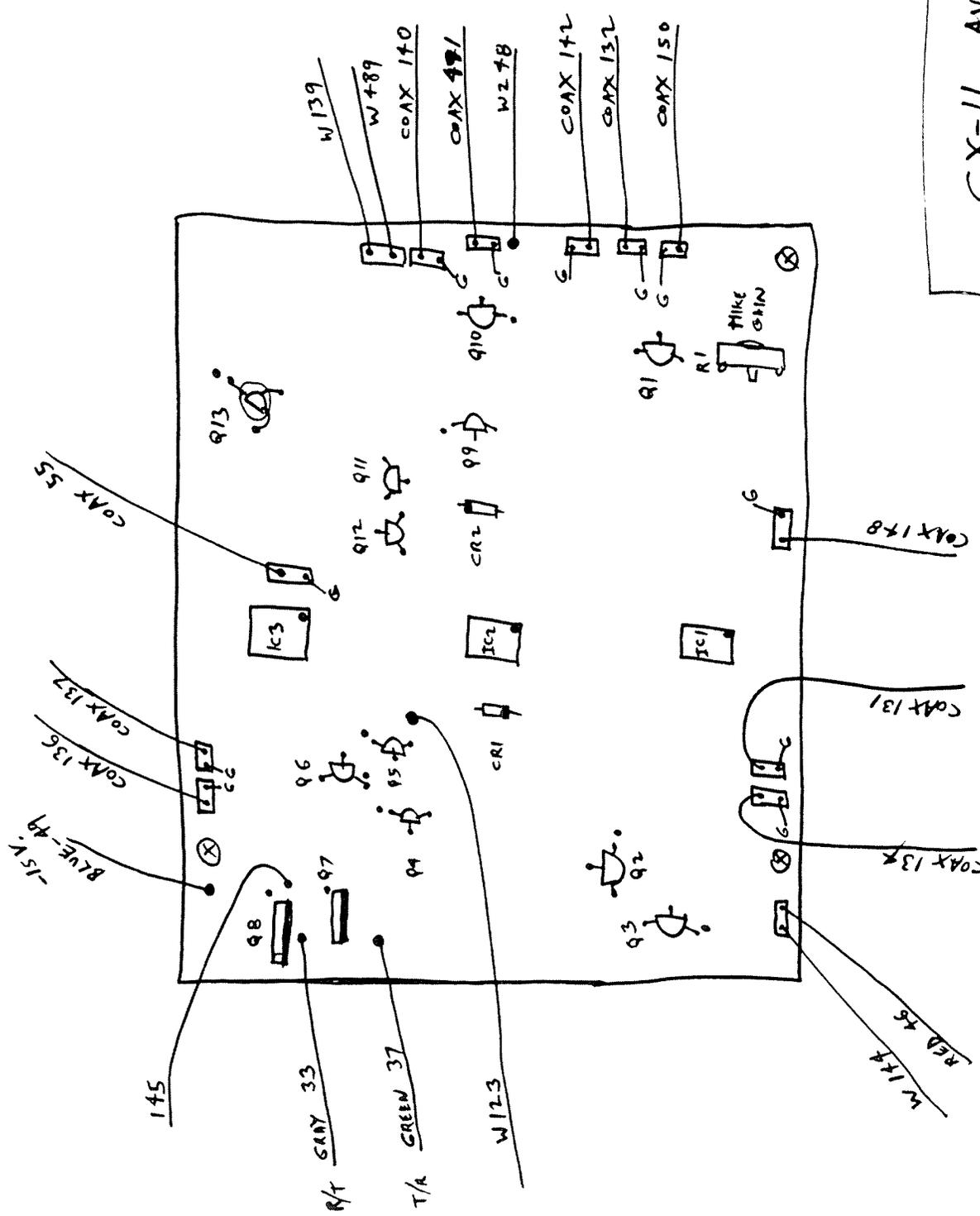


- NOTES:
- ① C1 TRIMMER IS ON USB CRYSTAL
 - ② OUTPUT AT COAX # 427 READS SAME AT 50 OHM TERM AS ON BRIDGE AT AGC BOARD PINS. $.446 \text{ VOLTS} = +6 \text{ dBm}$
RMS
 - ③ OUTPUT AT COAX # 119 @ 50 OHM TERM = .282 V. $\pm 2 \text{ dB}$ OR BALANCED AT COAX # 119 ON APT MIXER BOARD IS SAME.
 - ④ ON APT MIXER BOARD OUTPUT SET AT .35 V. RESET FULL RANGE .42 V. ON A + B BRIDGE COAX # 254 R14 R13.
 FREQ. RUN SWL=0 = .365 V
 50 = .386
 100 = .400
 200 = .420
 300-550 = .440
 600 = .430
 700 = .420 (ADJ. POINT)
 800 = .400
 900 = .385
 1000 = .365 V.

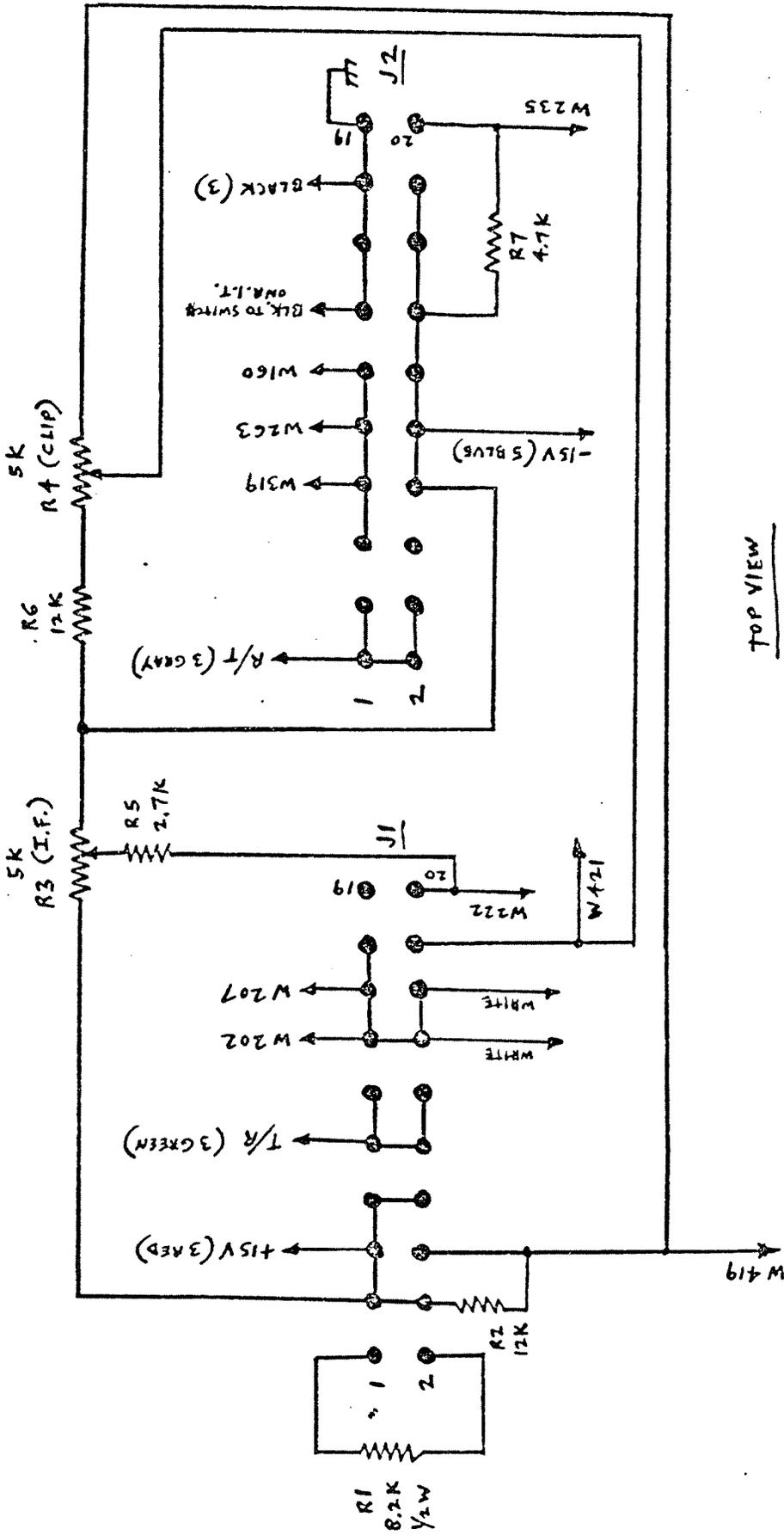
-42-



ISSUE: 8-86
A6
CX11 AUDIO BOARD



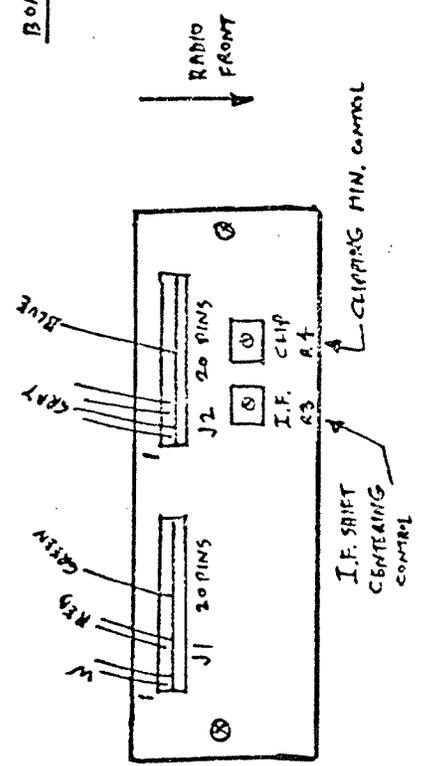
CX-11 AUDIO BOARD A-6
 # 61-50006-002



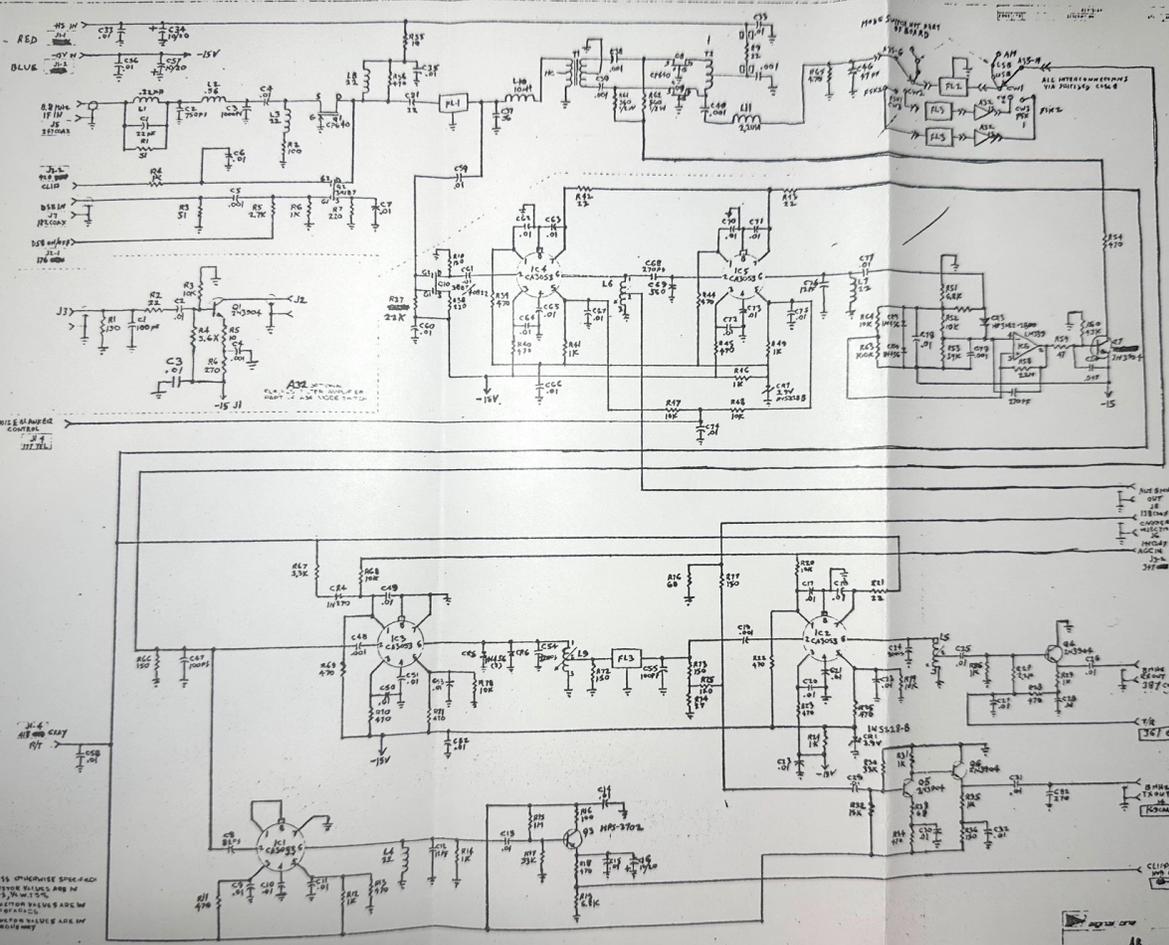
TOP VIEW

BOARD LOCATED ON CHASSIS TOP, RIGHT FRONT, UNDER A/C SWITCH

CX-11 TERMINAL BOARD A-7
#62-S0007-002



-46-



NOTES:
 1. UNLESS OTHERWISE SPECIFIED
 RESISTOR VALUES ARE IN
 OHMS, 2. UNLESS OTHERWISE
 SPECIFIED CAPACITOR VALUES ARE IN
 PICO FARADS, 3. UNLESS OTHERWISE
 SPECIFIED ALL COMPONENTS ARE IN
 WIRE-WOUND FORM.

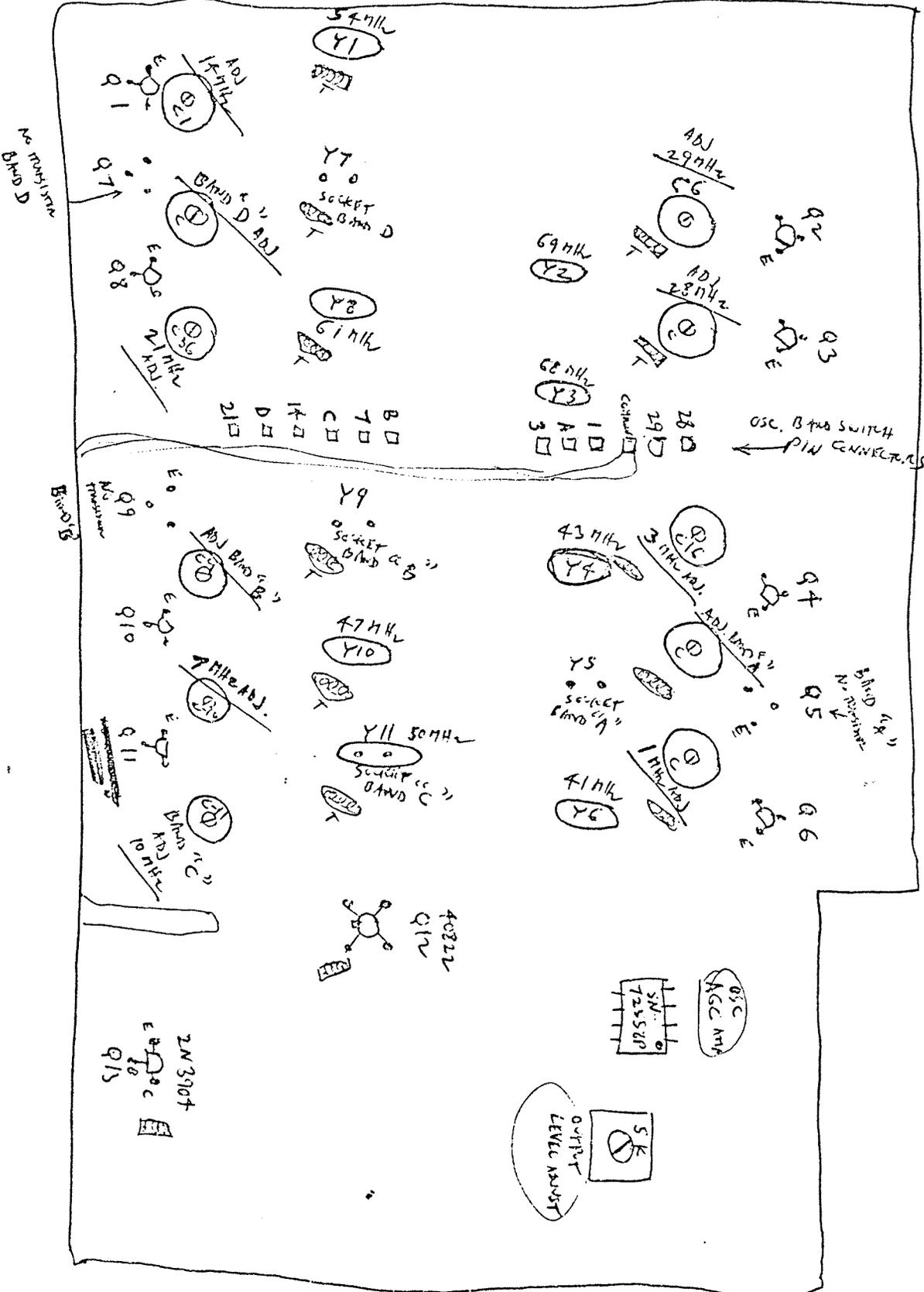
AB
 CK11 IF BOARD

-46-

CX-11 OSCILLATOR - BOARD # 61-50017-002

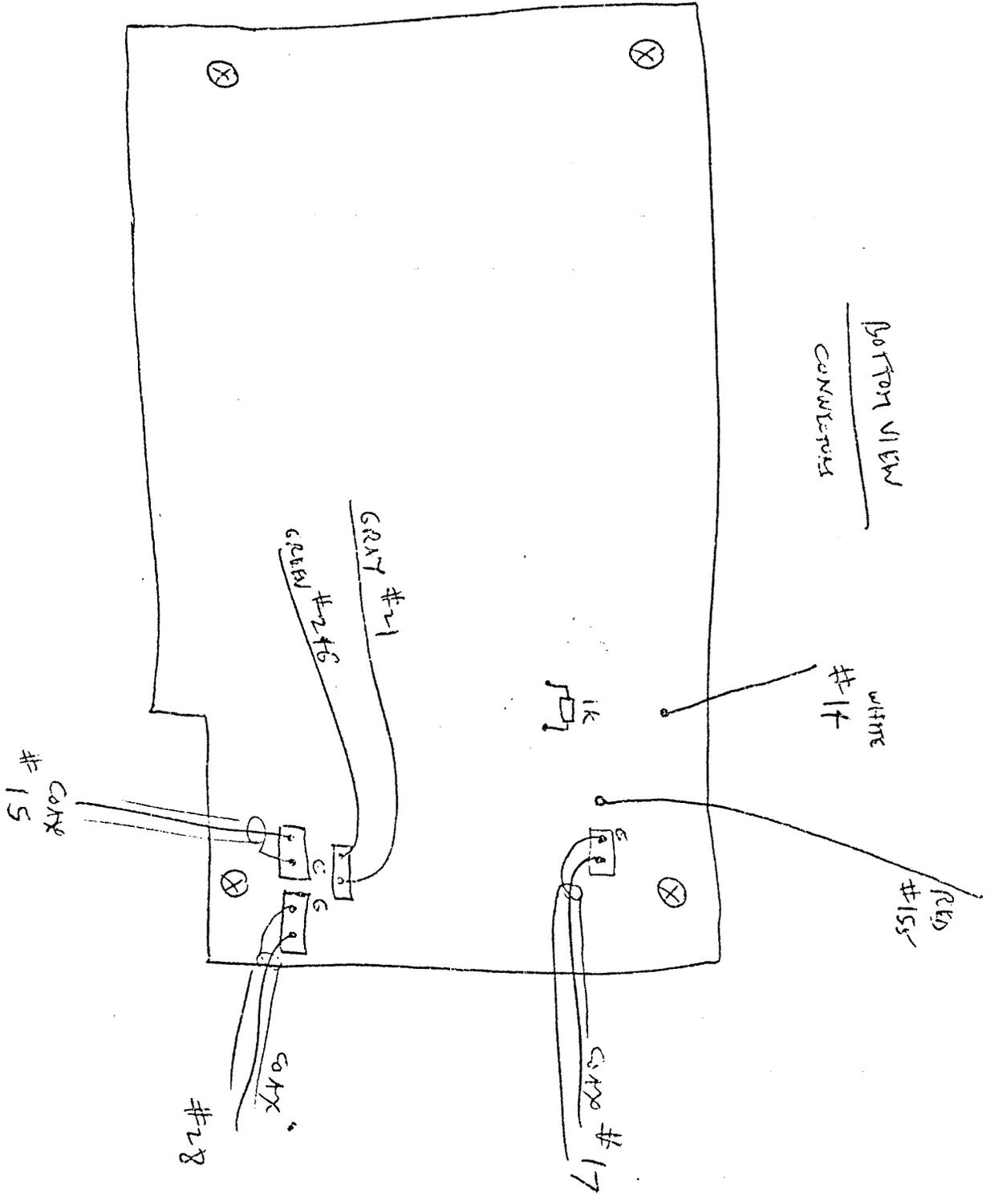
A-17

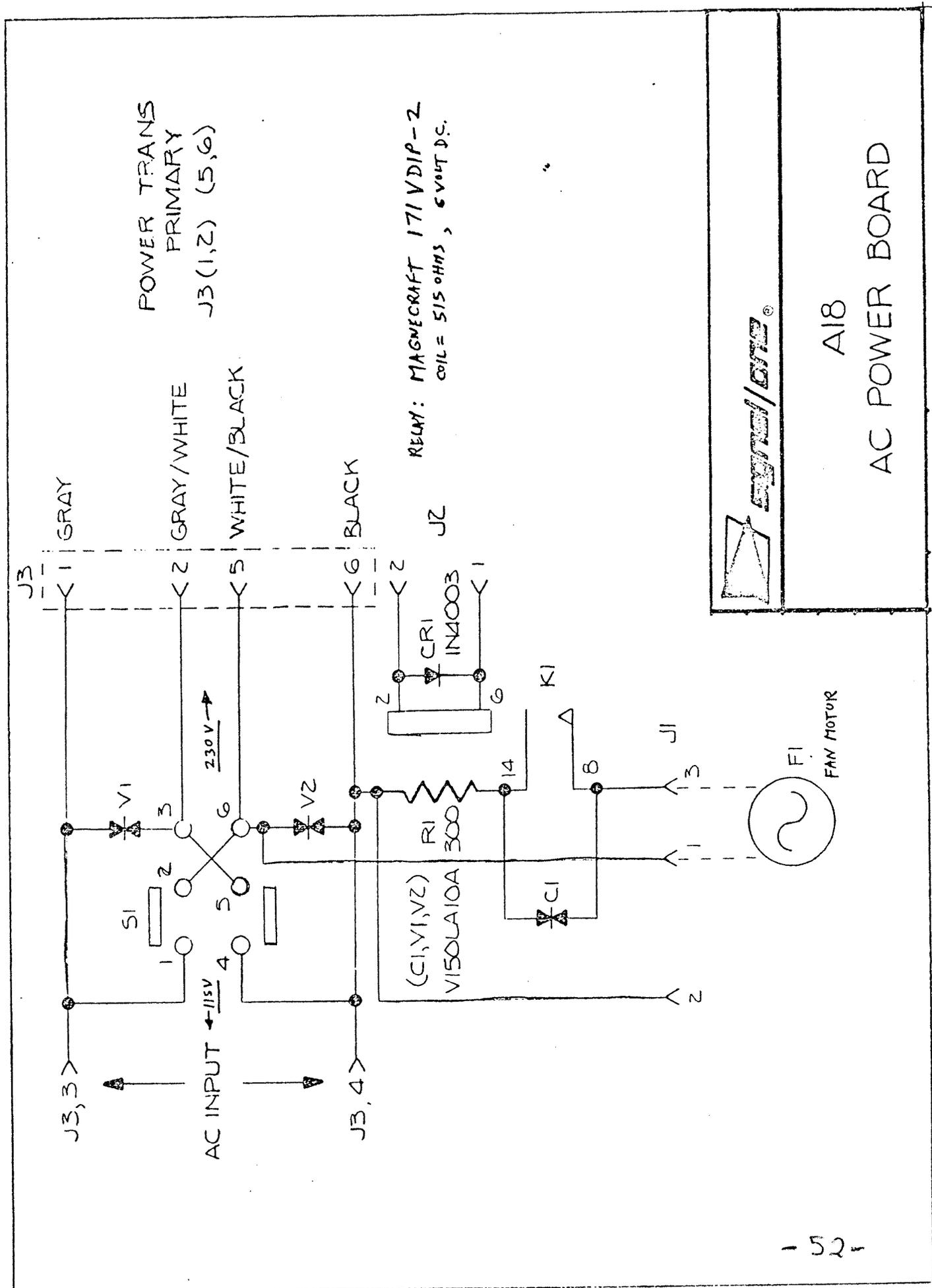
Q1, Q2, Q3, etc. = 2N3563 (MAY USE 2N3904)



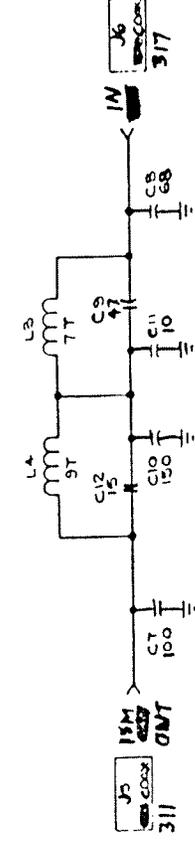
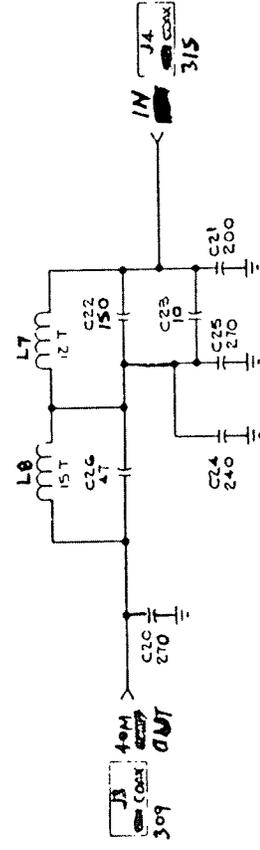
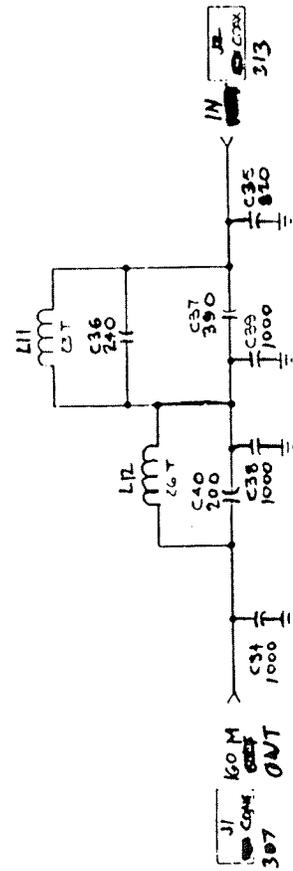
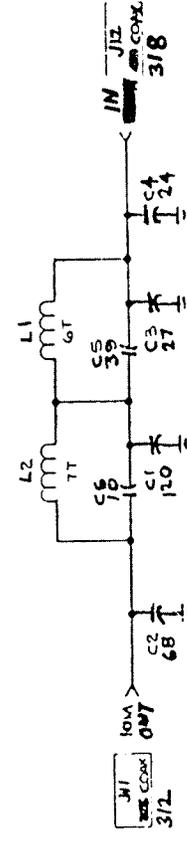
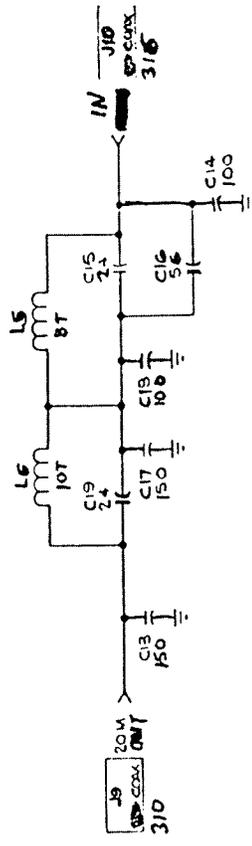
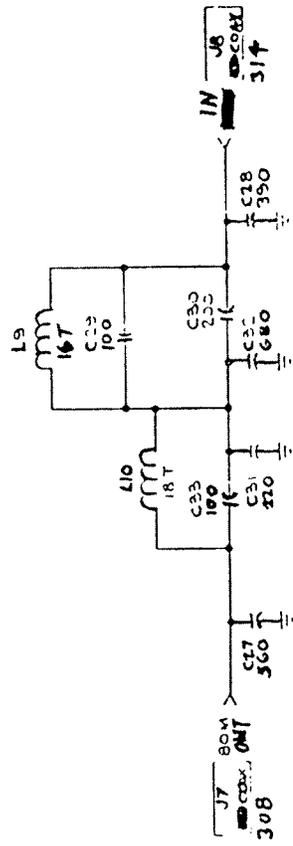
CX-11 OSCILLATOR ~~BOARD~~ BOARD A-17

#61-50017-002

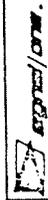




A18
 AC POWER BOARD



ISSUE: 8-86

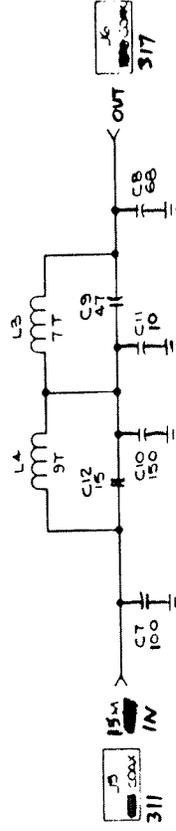
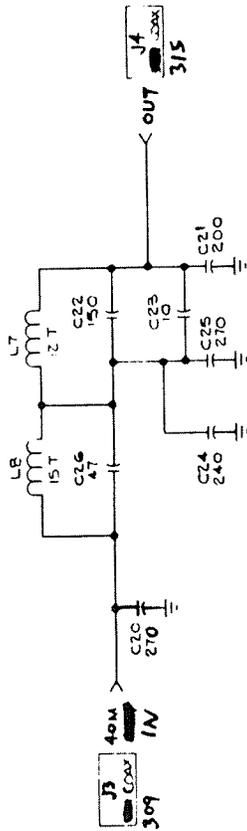
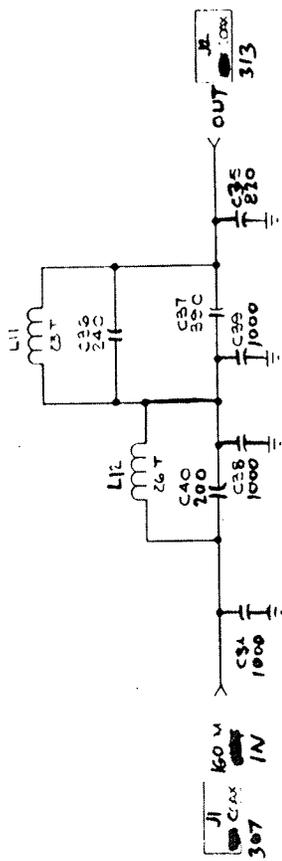
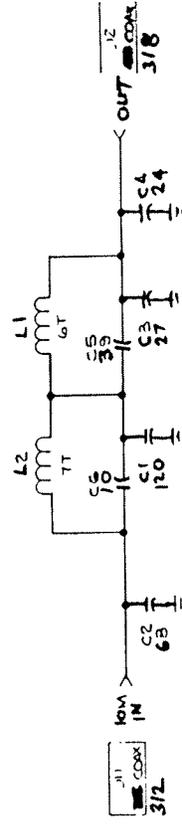
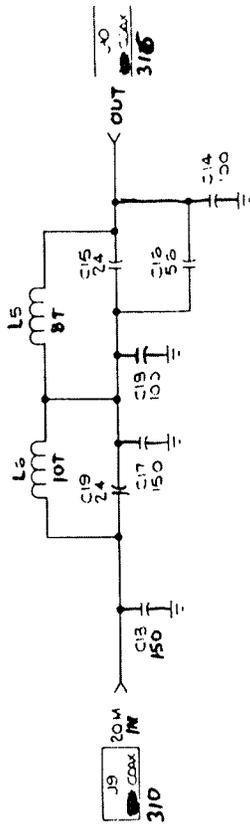
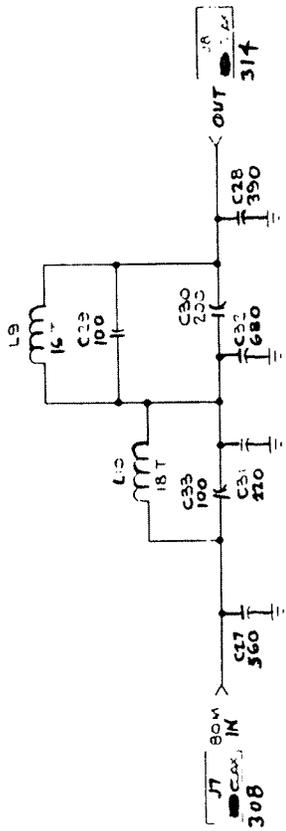


CX-11 A19
T/X LOW PASS FILTER BOARD

NOTES:
UNLESS OTHERWISE SPECIFIED:
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTOR VALUES ARE IN MICROHENRY.

HIGHEST REF DESIGN USED
C40/L12
REF DESIGN'S NOT USED

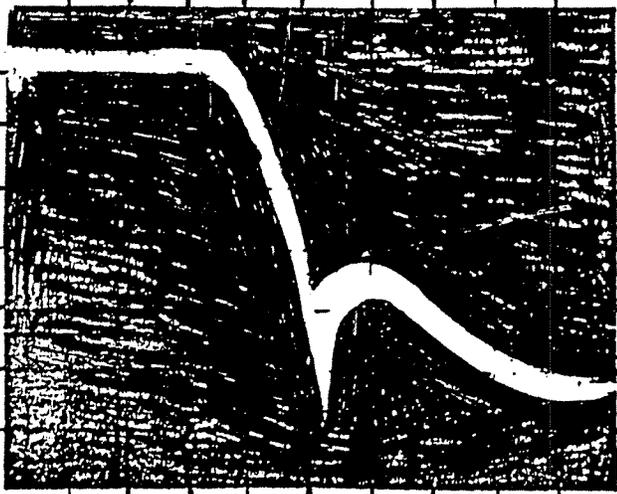
1 2 3 4



NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 CAPACITOR VALUES ARE IN MICROFARADS.
 INDUCTOR VALUES ARE IN MICROHENRY.

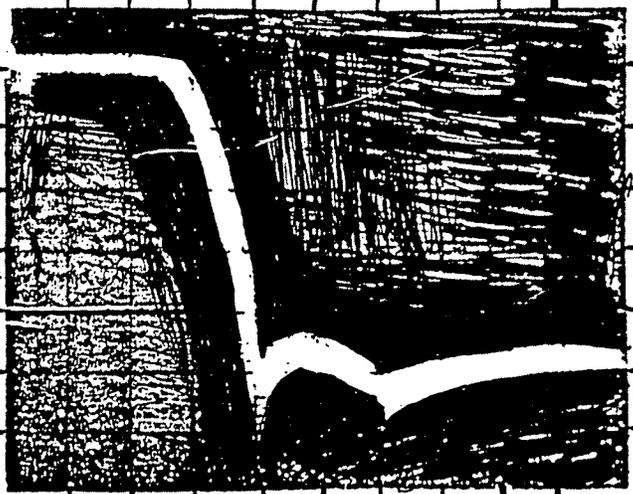
HIGHEST REF DESIG. USED
CAO L12
REF DESIG. NOT USED


 CX-11 A19
 T/X LOW PASS FILTER BOARD



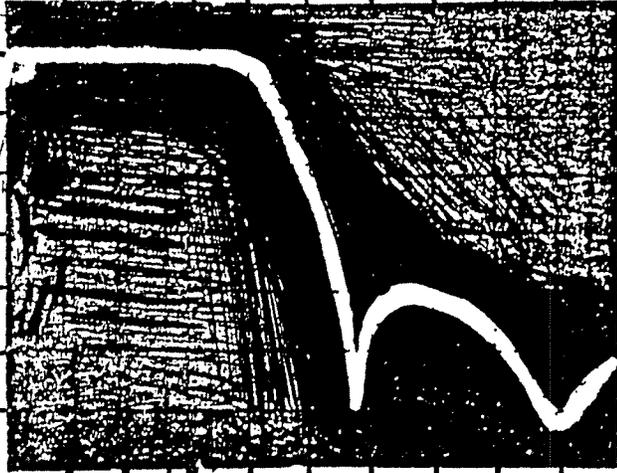
30 - 25 MHz.
10 MHz/DIV. MARKER 30 MHz.

20, 19, D - 22 THRU 29 MHz



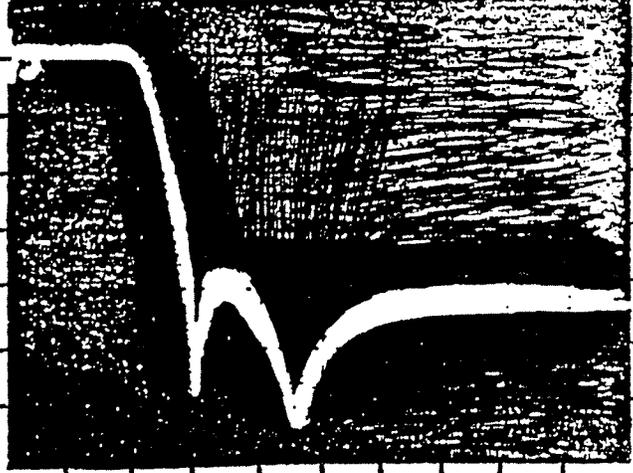
25 - 15 MHz.
10 MHz/DIV. MARKER 30 MHz.

21, C - 15 THRU 20 MHz.



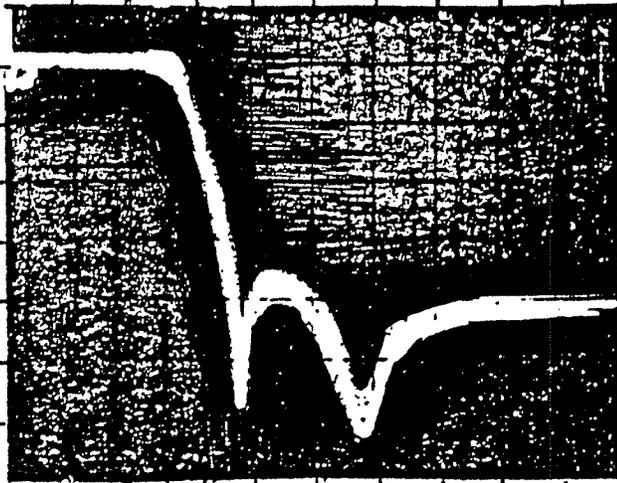
15 - 9 MHz.
5 MHz/DIV. MARKER 20 MHz.

14, B - 8 THRU 13 MHz



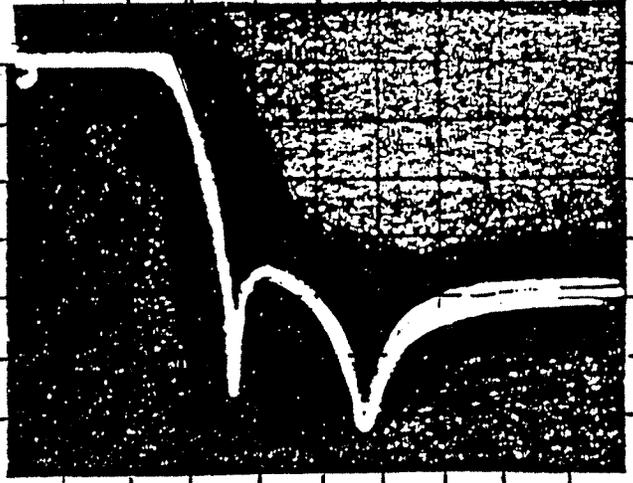
9 - 5 MHz.
5 MHz/DIV. MARKER 20 MHz.

7 MHz



5 - 3 MHz.
2 MHz/DIV. MARKER 5 MHz.

3, A - 4.5, 6

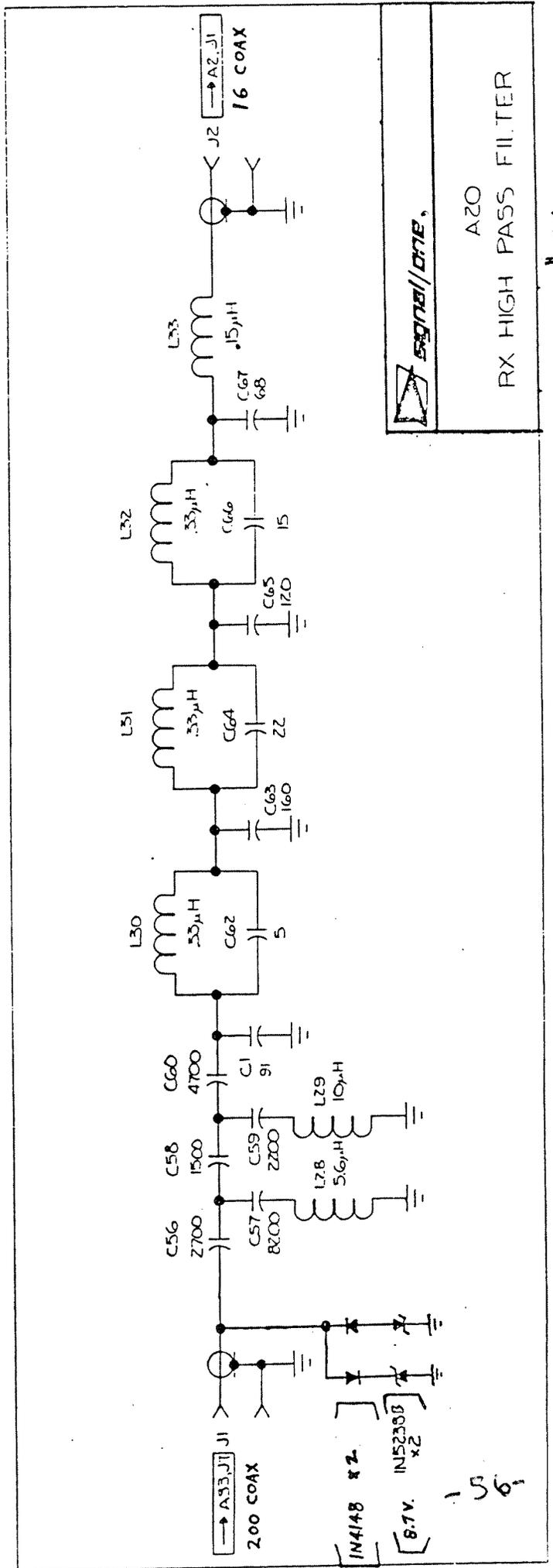


3 - 0 MHz.
1 MHz/DIV. MARKER 2.5 MHz.

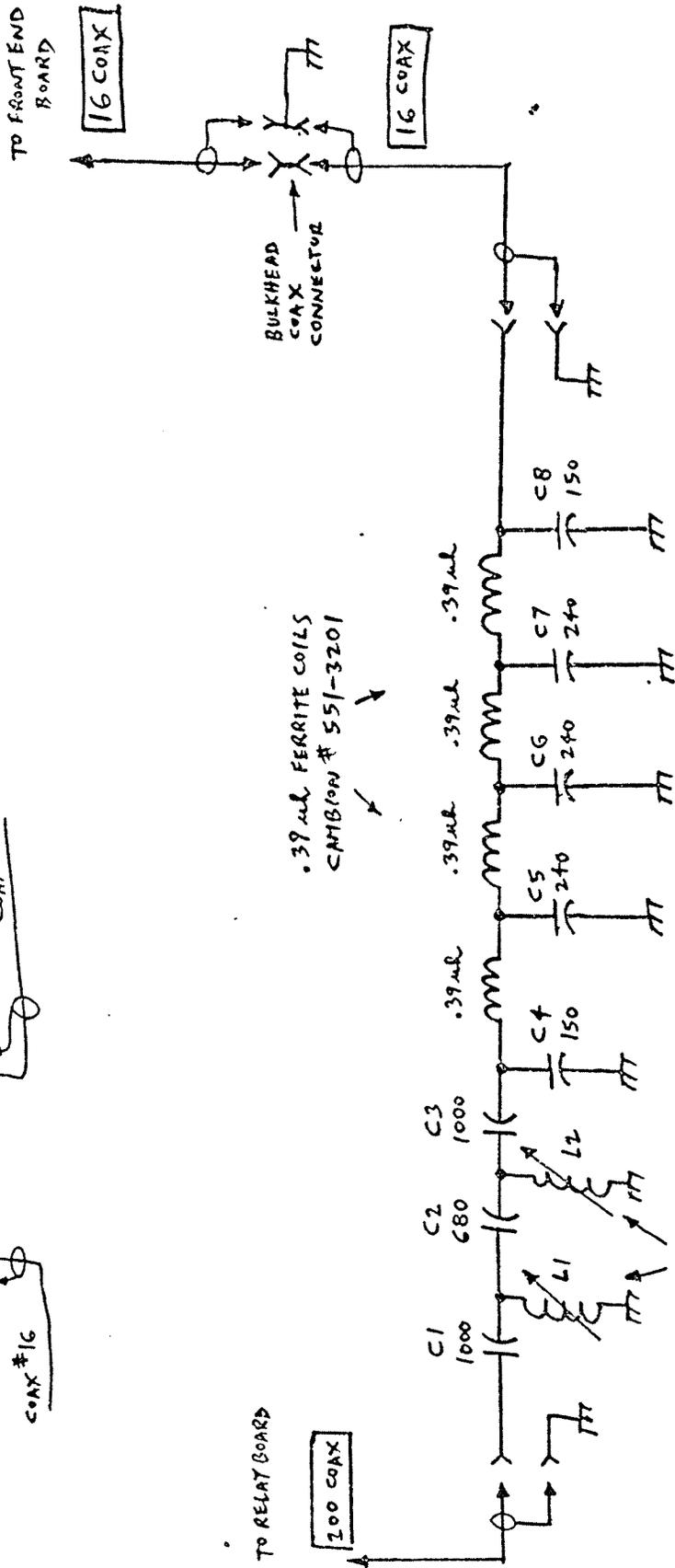
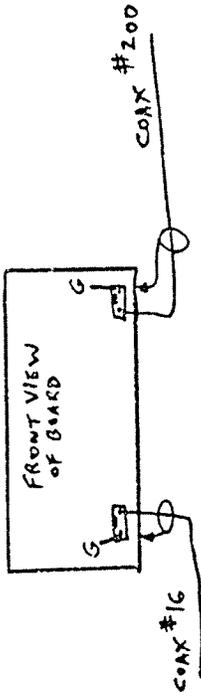
1022 MHz

- 55 -

56

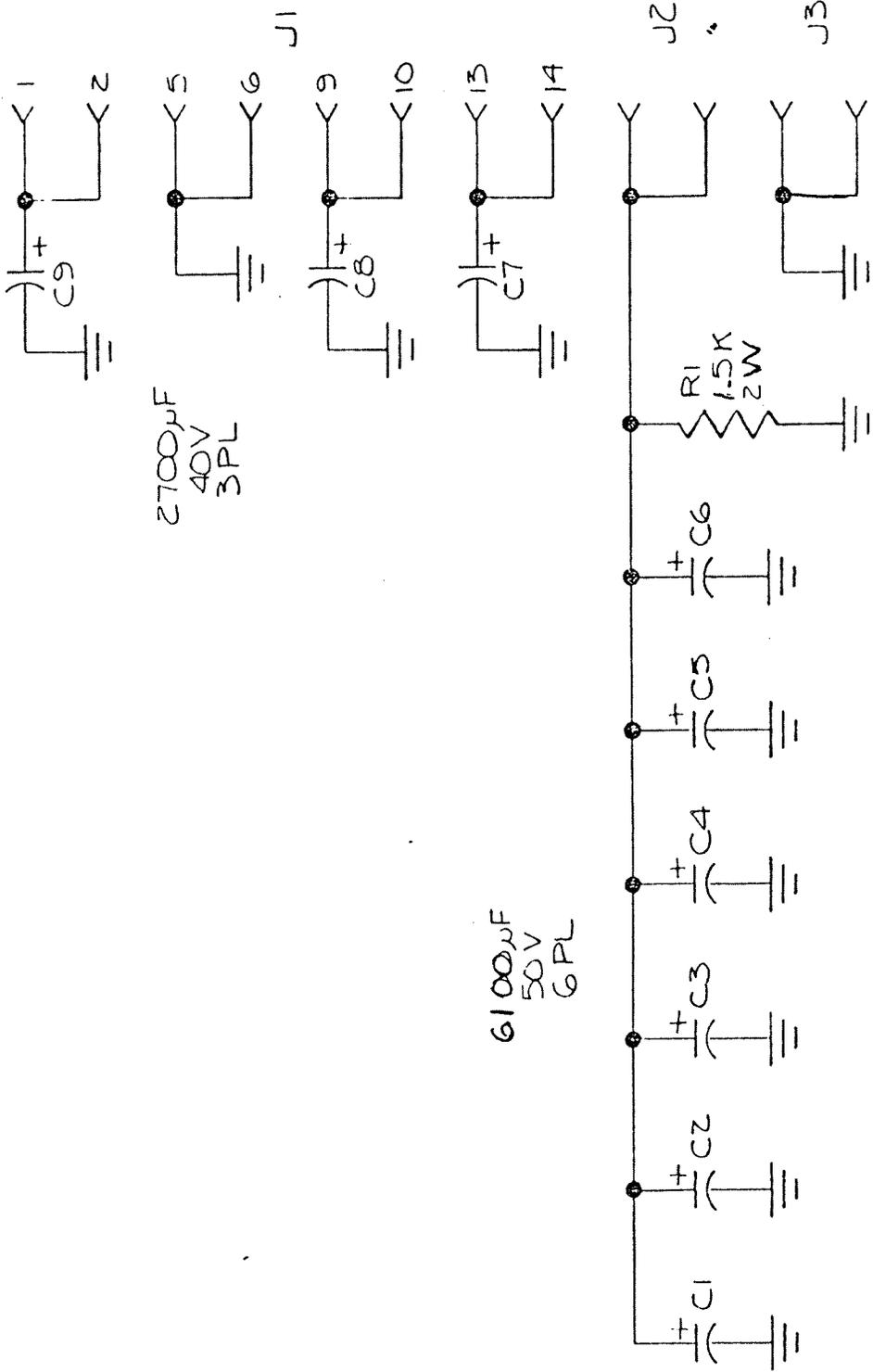


LOCATED INSIDE LOWER P.A. CAGE



CAMBION SHIELDED COILS

RECEIVER HIGH PASS FILTER BOARD
A-20
CX-11 (BOARD # 61-S0020-002)



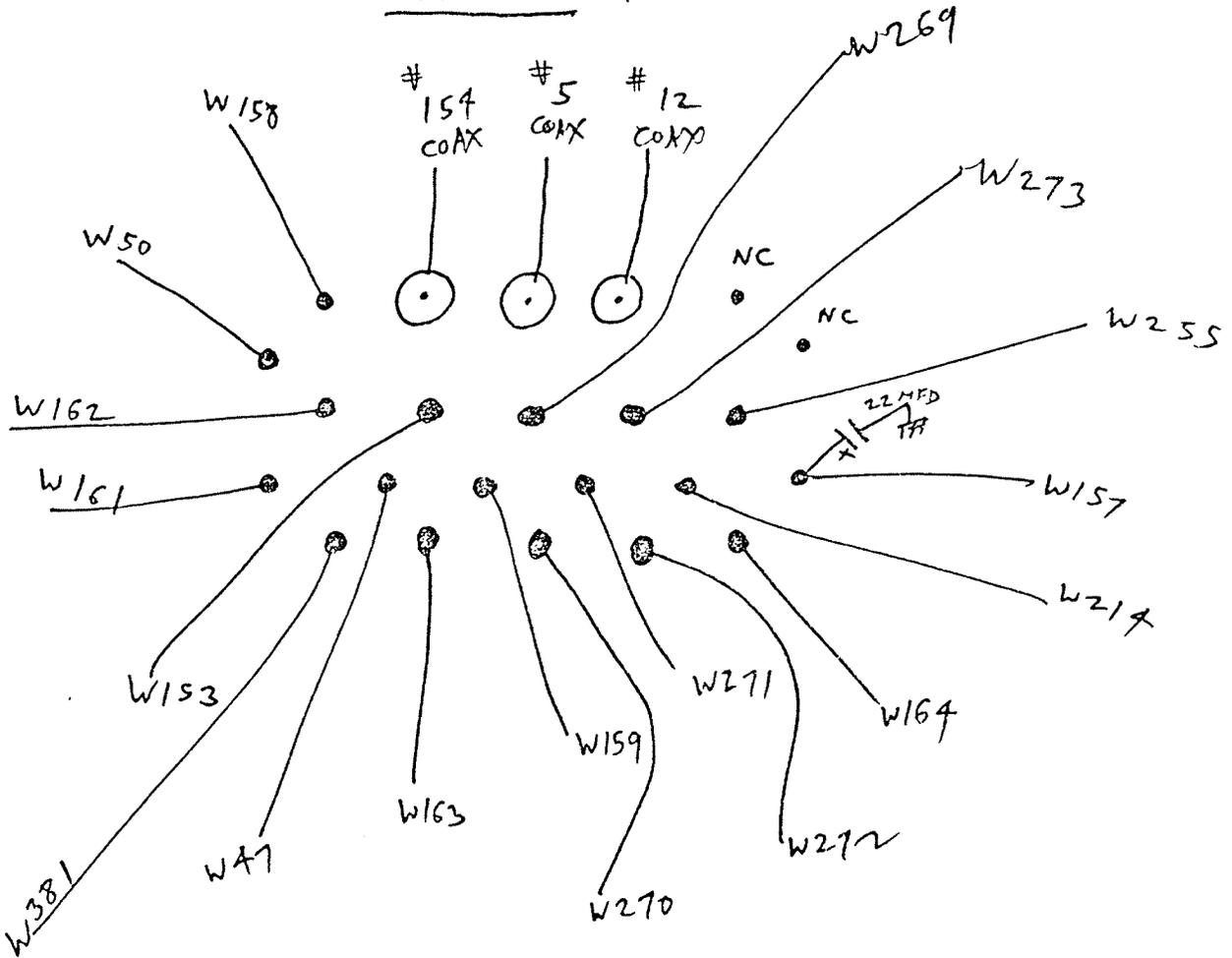
SIMILAR TO CX-11 (CIRCUIT NOT
 TRACED OUT - POSSIBLE ERRORS
 IN CONNECTIONS OF C7, C8, C9)



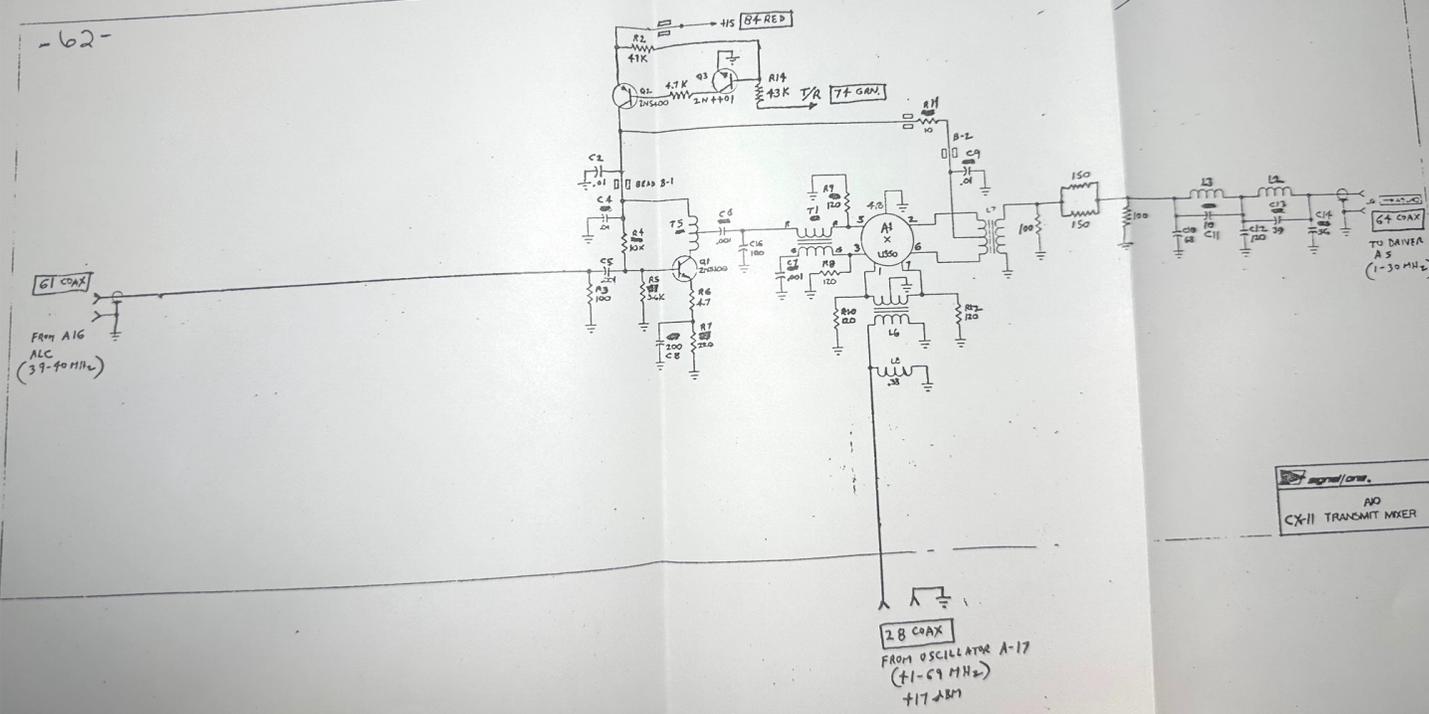
AZI
 POWER SUPPLY FILTER BOARD

CX-11 COUNTER CAGE (A28)

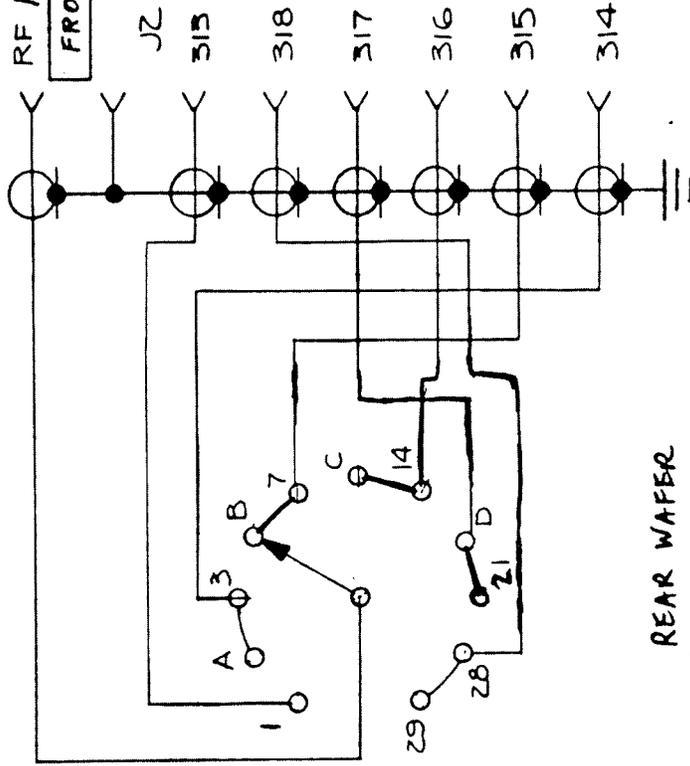
REAR VIEW ↑ TOP



- 62 -

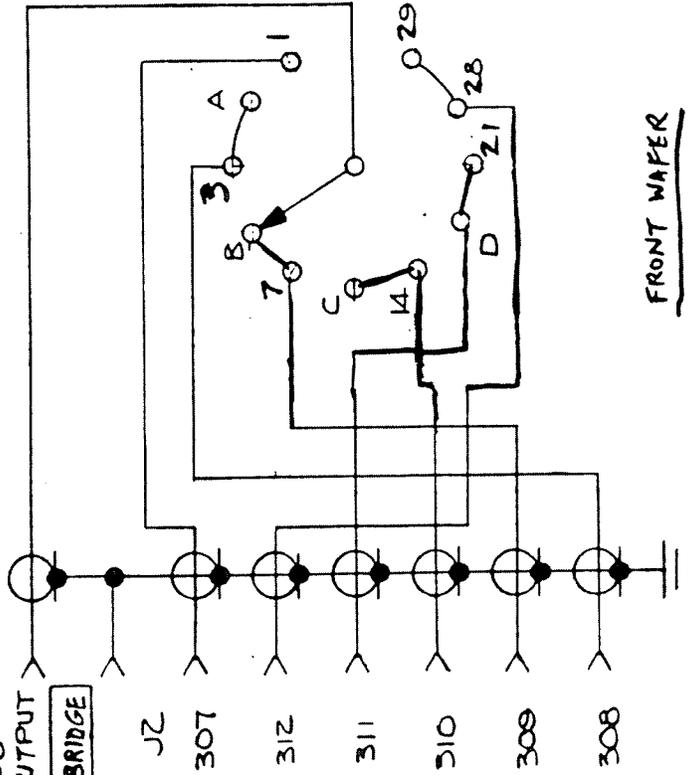


J1 179
RF INPUT
FROM P.A.



REAR WAFER
B

J1 198
RF OUTPUT
TO SWR BRIDGE



FRONT WAFER
A

307-318 → A19, J1-12

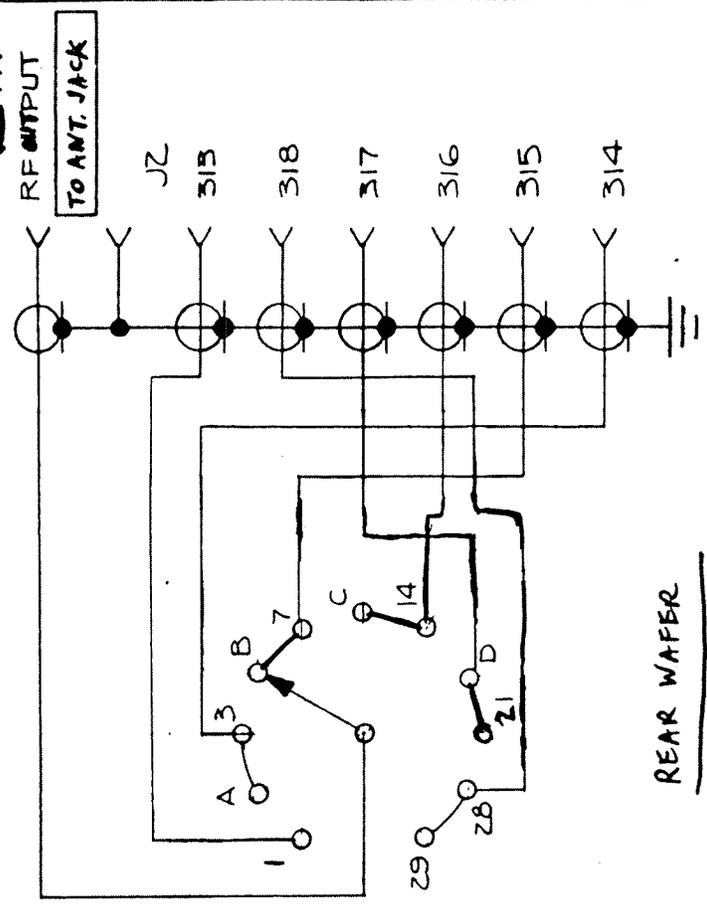


ISSUE: 8-86

A27 CX-11 TX FILTER SWITCH

(ALL MAX.)

J1 197

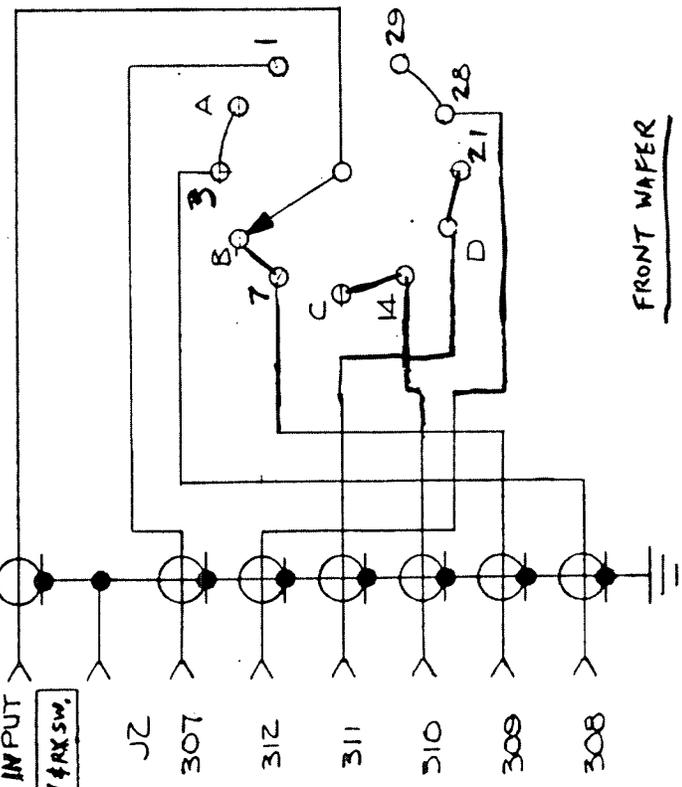


REAR WAFER

B

J1 198

RF INPUT TO RELAY & RX SW.



FRONT WAFER

A

307-318 → A19, J1-12

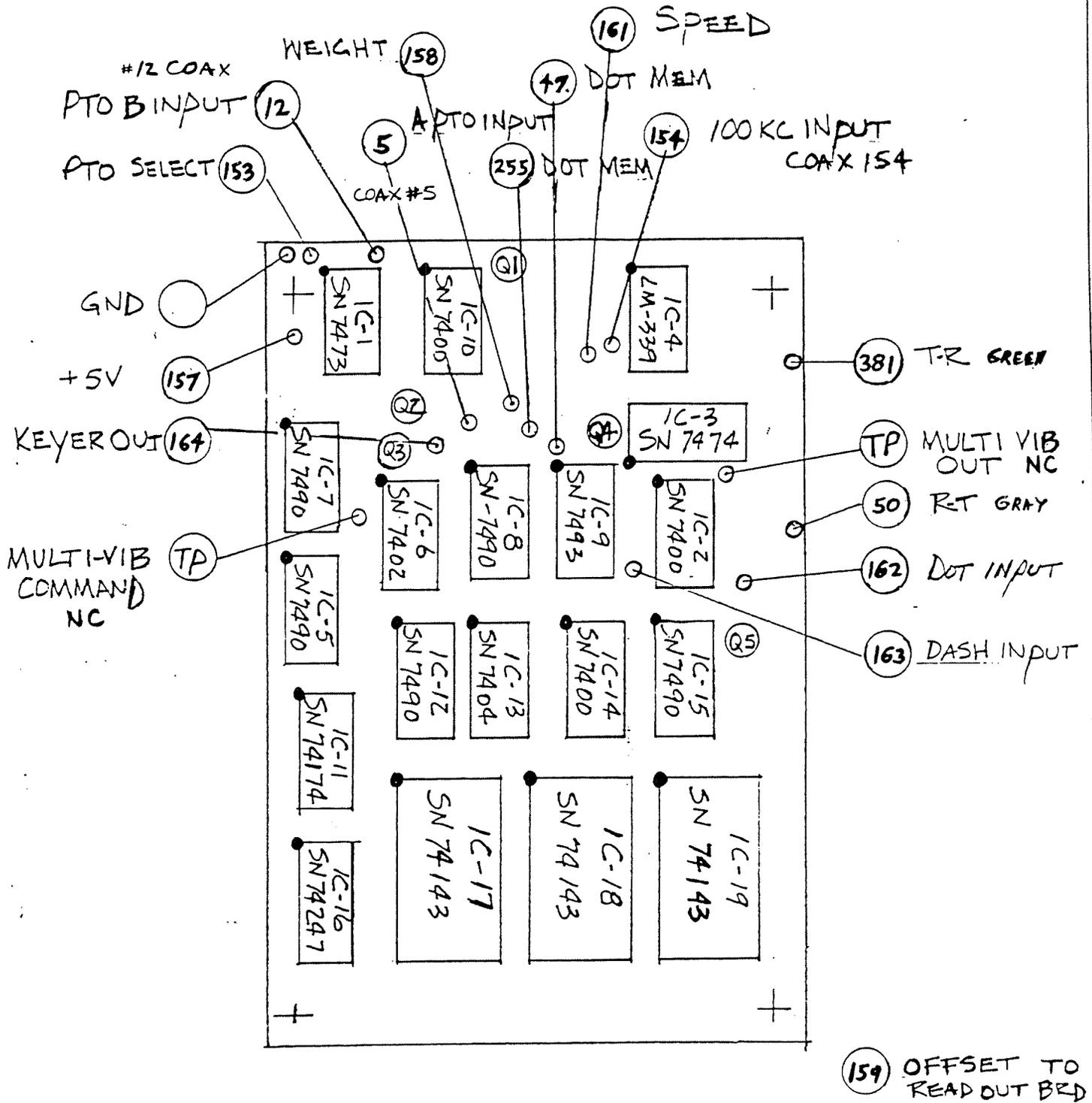


A27

CX-11 TX FILTER SWITCH

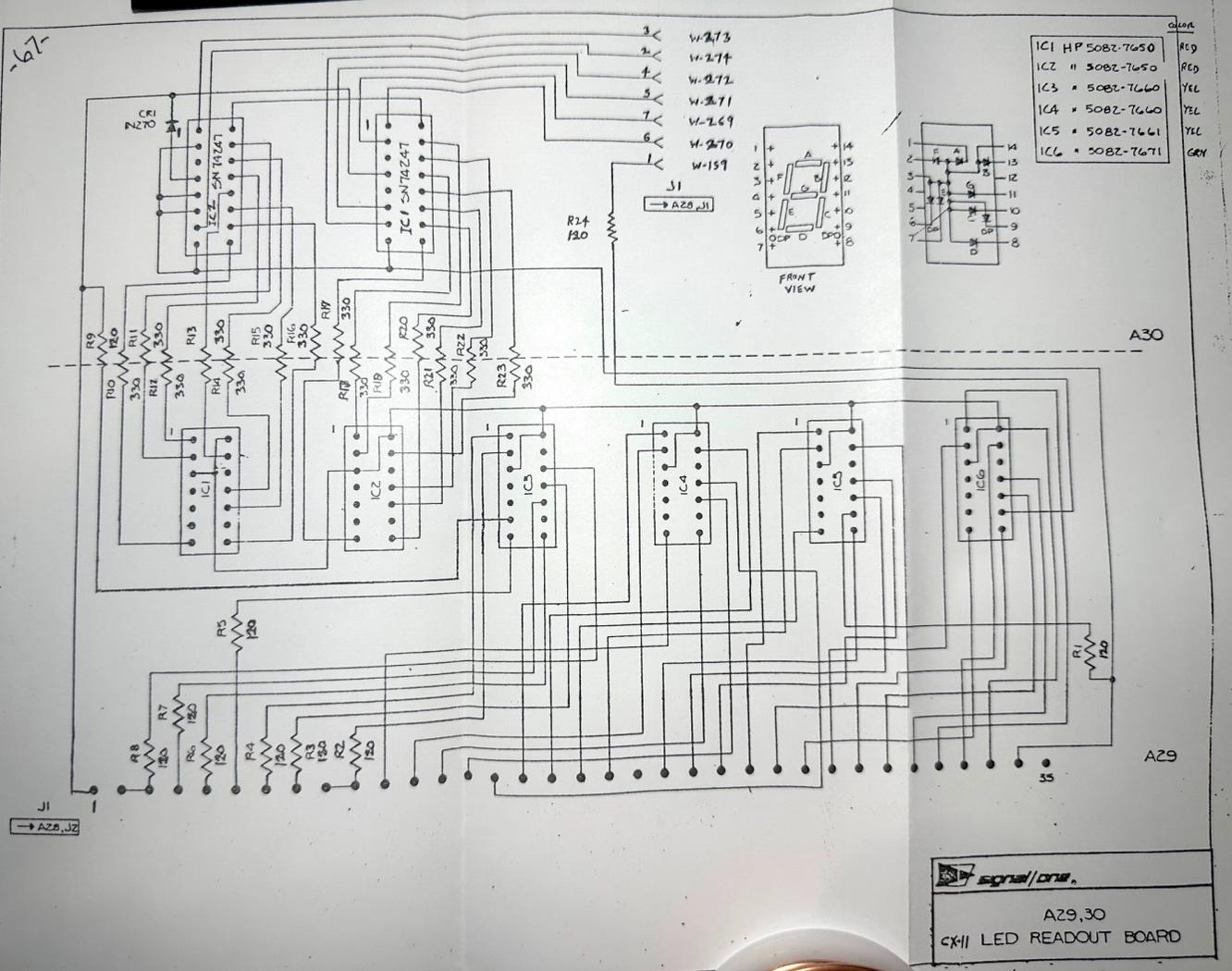


SIGNAL ONE

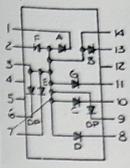
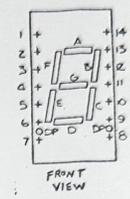


CX-11 SIGNAL ONE COUNTER KEYS

19-67



IC#	Part Number	Color
IC1	HP 5082-7650	RED
IC2	5082-7650	RED
IC3	5082-7660	YEL
IC4	5082-7660	YEL
IC5	5082-7661	YEL
IC6	5082-7671	GRY



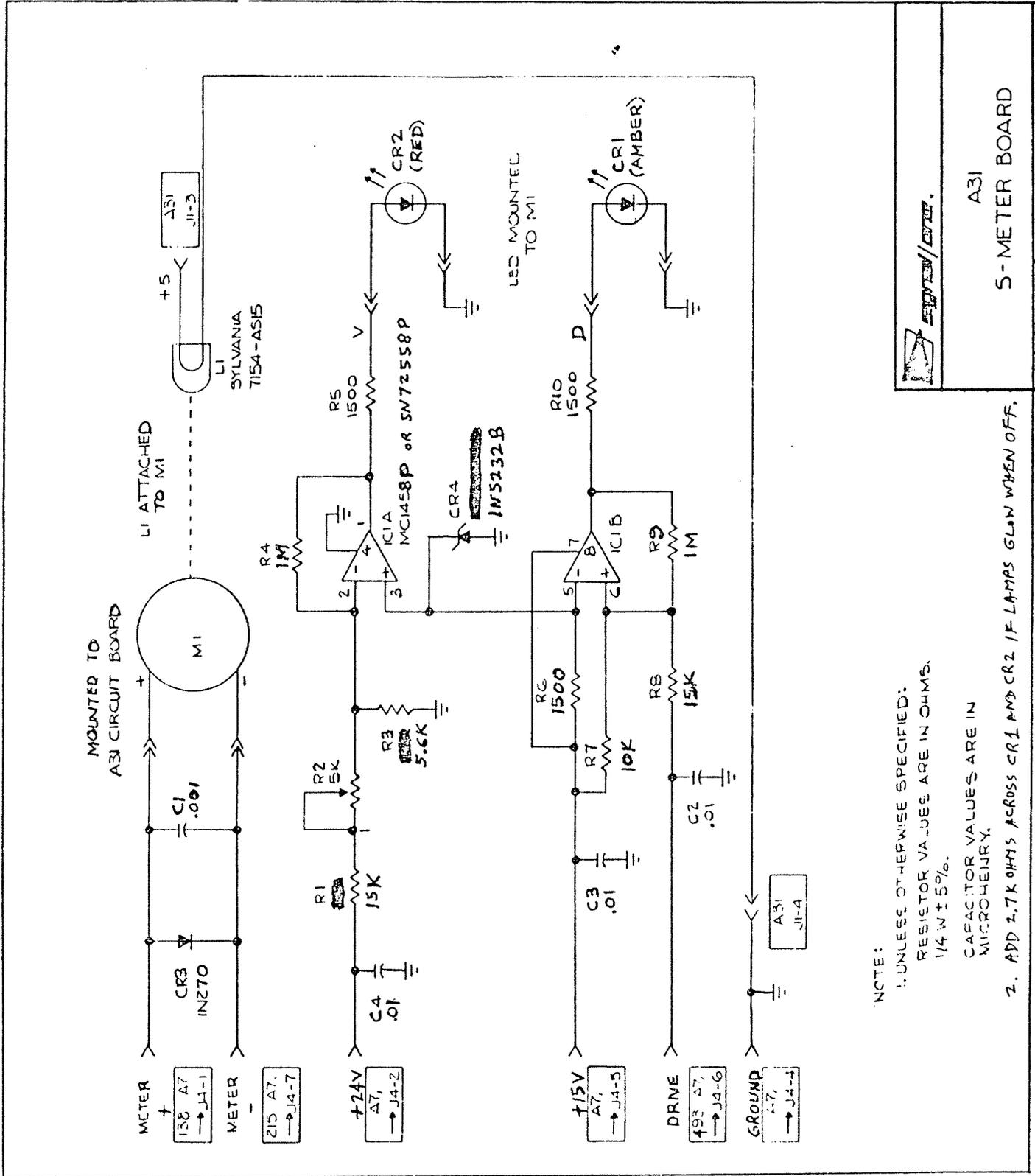
A30

A29

Signal/one

A29,30

CX-11 LED READOUT BOARD



NOTE:
1. UNLESS OTHERWISE SPECIFIED:
RESISTOR VALUES ARE IN OHMS,
1/4 W ± 5%.
CAPACITOR VALUES ARE IN
MICROHENRY.

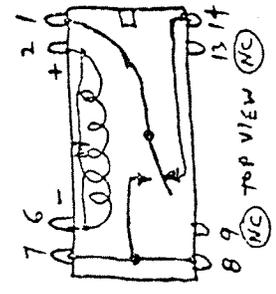
2. ADD 2.7K OHMS ACROSS CR1 AND CR2 IF LAMPS GLOW WHEN OFF.



A31
S-METER BOARD

160

A-33
CX-11 RELAY BOARD (SAME AS CX-11A) #940

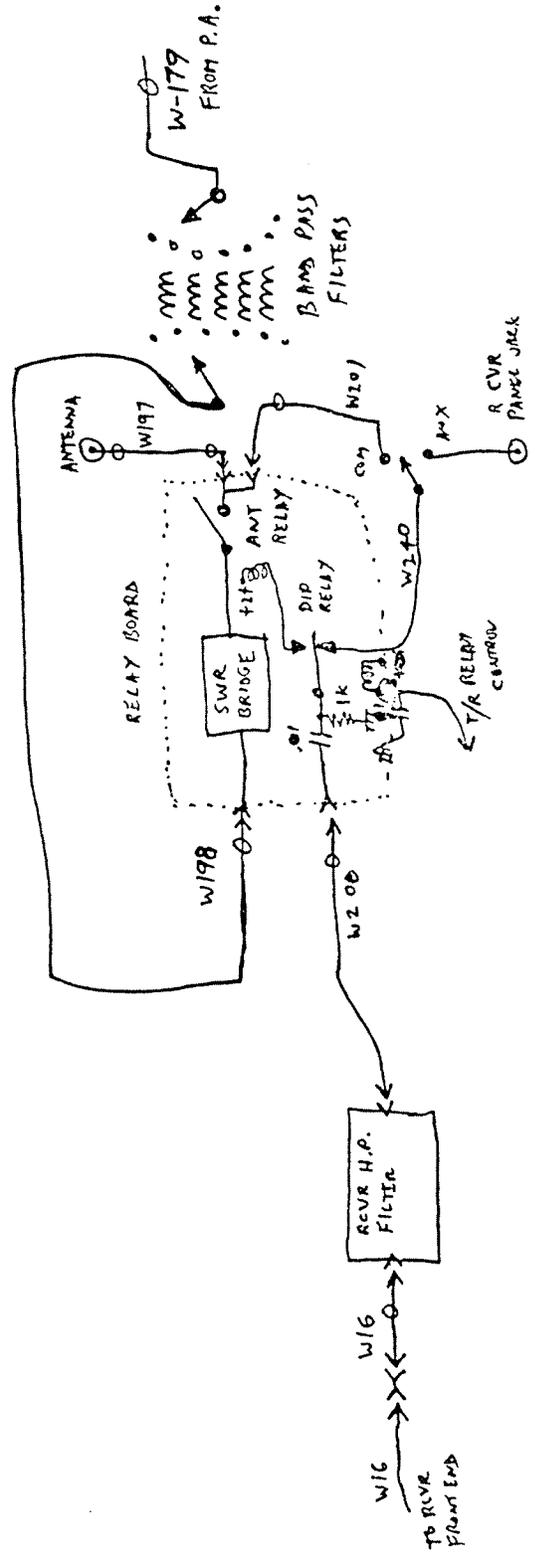
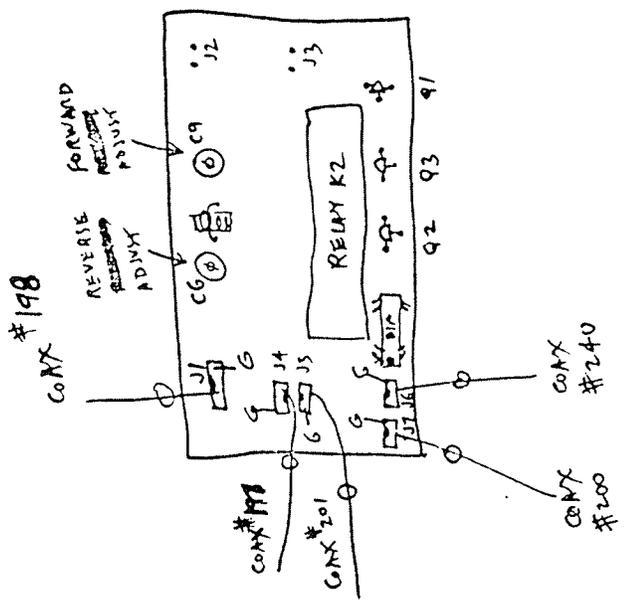
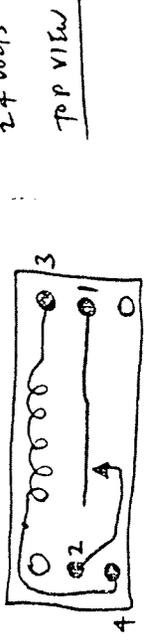


PINS BENT TOWARD CENTER FOR CLOSE SPACED SOCKET 2100 24 VOLTS E/A INTERNAL CLAMP BUDGE

MAGNECRAFT W172DIP-8



MAGNECRAFT W102RMP-CX-3 POWERED RELAY 24 VOLTS 1000 OHMS

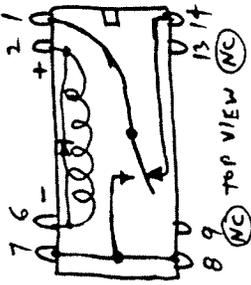


A-33

CX-11 RELAY BOARD (SAME AS CX-11A)

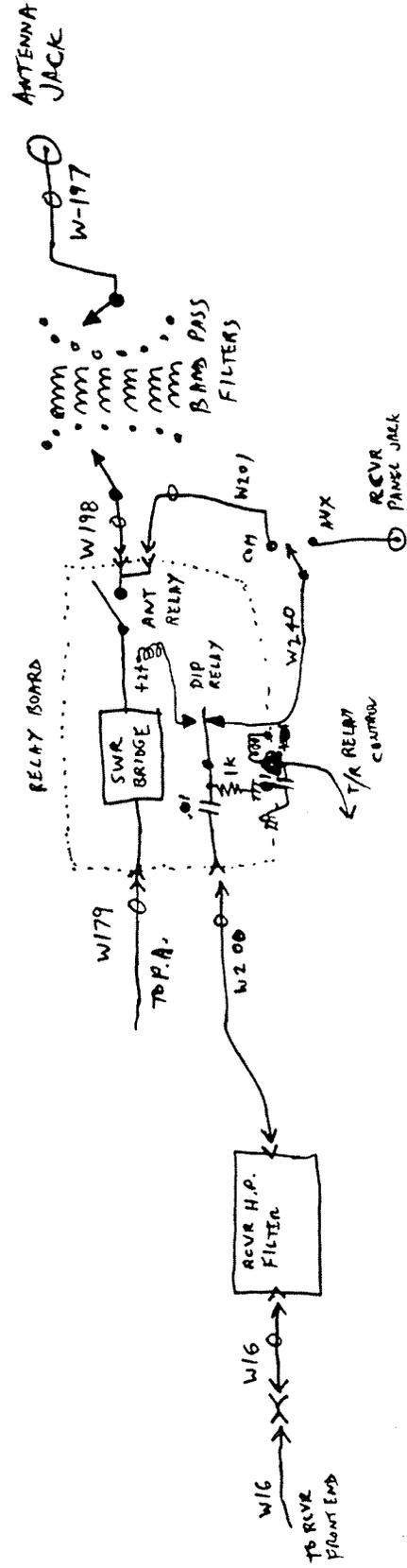
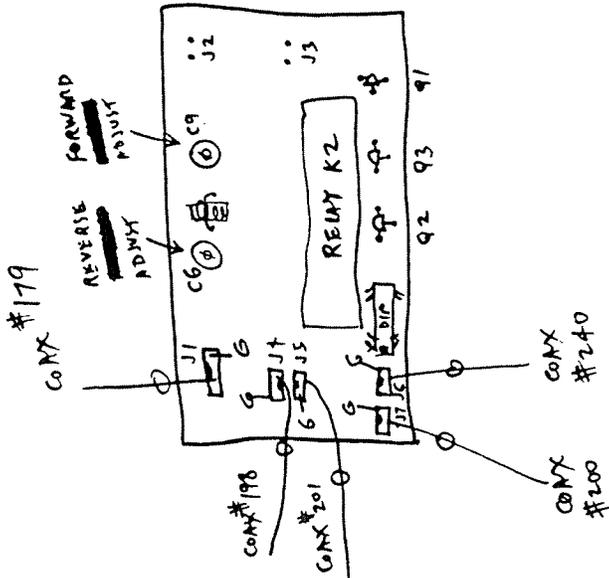
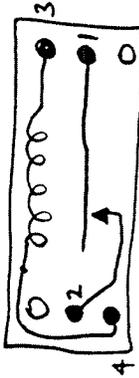
MAGNECRAFT W172-DIP-8

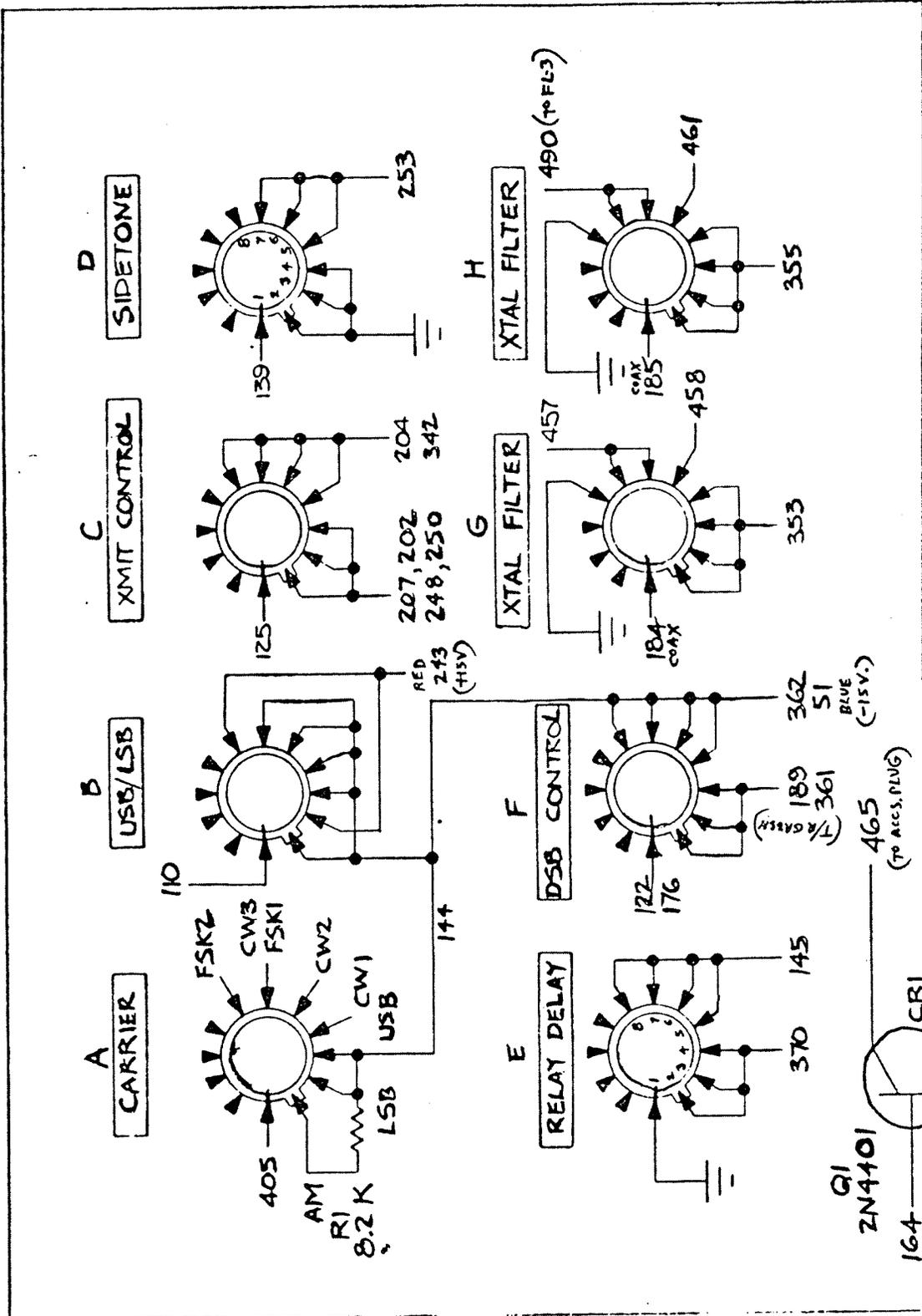
PINS BENT TO WIND
CENTER FAR CLOSE
SPACED SOCKET 2100 OHMS
2.4 VOLTS
E/W INTERNAL CLAMP BLOCK



MAGNECRAFT W102-RMP CX-3 POWERED RELAY

2.4 VOLTS 1000 OHMS



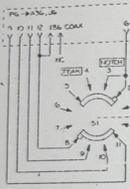


SIGNAL/DOME CX-11

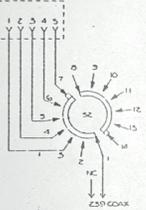
A35, A, B, C, D, E, F
MODE SWITCH WAFER BOARDS

- NOTES:
1. A35 BOARDS PART OF A34 ASSEMBLY.
 2. CIRCUITRY SHOWN FOR CLARIFICATION.

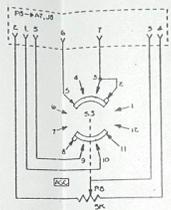
-74-



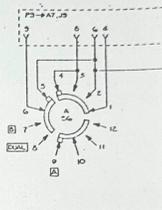
AUDIO FILTER



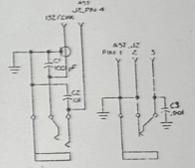
AUDIO SELECTIVITY



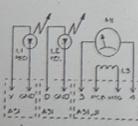
TRANSMIT OFFSET



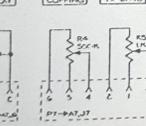
RX CHANNEL



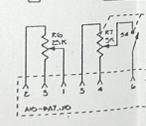
METER



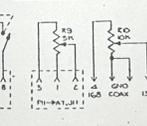
VCC COAX



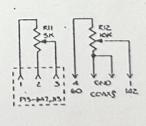
VCC GREAT



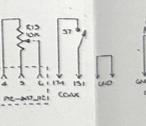
CLIPPING



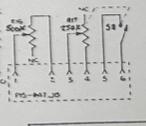
TV DRIVE



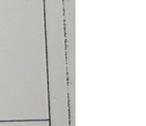
RX SHFT



VFO A (FILL)



NOISE BARRIER



SPOT LEVEL



EXK SHFT

WHIT VOX

SYNTHESIZER

CAL/VOLV

SENSING LEVEL

SFTED

DEPTH

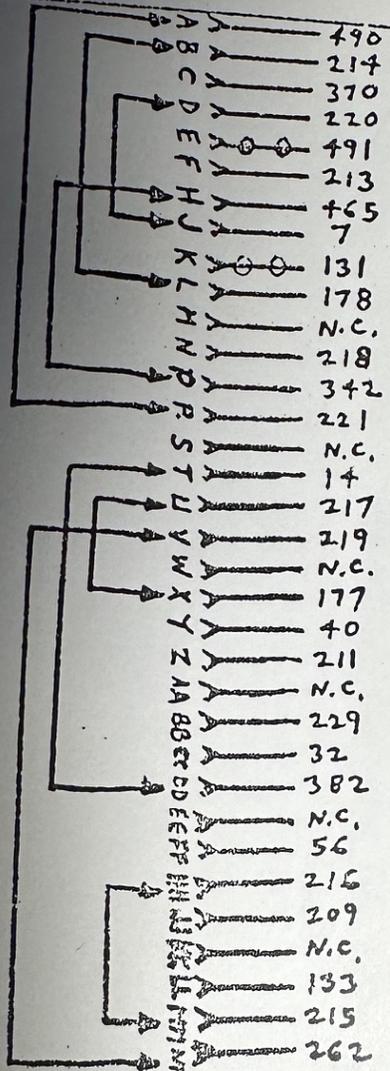
MONGRY TRAD

FRONT PANEL INTERFACE

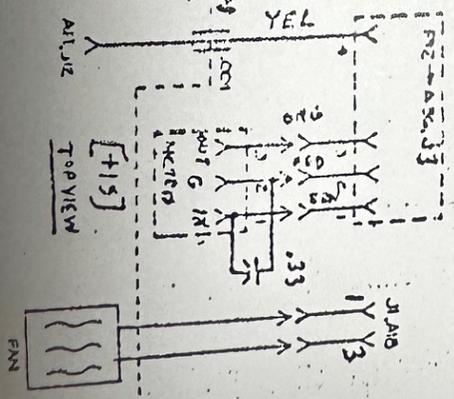
-74-

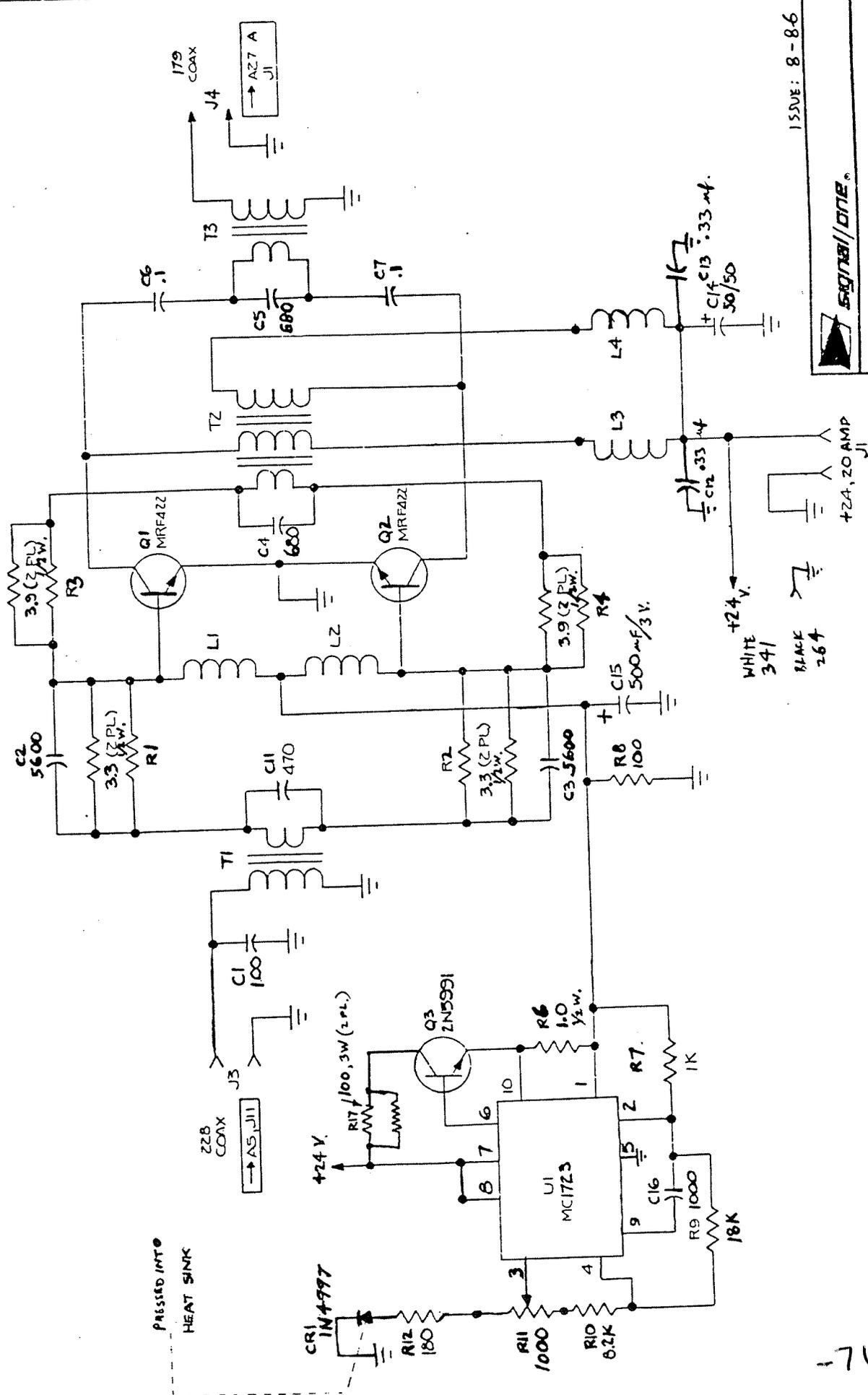


JUMPERS IN REAR 34 PIN ACCESSORY PLUG



- 490 +24V REG FROM A3.
- 214 RCVR RF. GAIN CONTROL.
- 370 MODE SW. "E" RELAY DELAY.
- 220 PTO "A" SELECTOR FROM A12.
- 491 COAX TO AG-MOT USED.
- 213 TO HY1 ON A2.
- 465 CW KEYING CIRCUIT.
- 7 PTO "A" TURN ON.
- 131 COAX - AUX AUDIO FROM AG.
- 178 A9 R.F. GAIN CIRCUIT.
- N.C.
- 218 EXT. AMP RELAY.
- 342 CW KEY JACK - MODE SWITCH "C".
- 221 +24V. TO A5 DRIVER.
- N.C.
- 14 -15V INPUT TO A17.
- 217 NOISE BLANKER CONTROL.
- 219 EXT. AMP RELAY.
- N.C.
- 177 AB - NOISE BLANKER CIRCUIT.
- 40 T/R VOLTAGE - GREEN.
- 211 +5 V. SUPPLY - YELLOW.
- N.C.
- 229 FSK LINE FOR PTO "B".
- 32 R/T VOLTAGE - GRAY.
- 382 -15 V. SUPPLY - BLUE.
- N.C.
- 56 A3 AUDIO OUTPUT - LOUDSPEAKER.
- 216 A13 METER SWITCH OUTPUT.
- 209 +15V. SUPPLY - RED.
- N.C.
- 133 ALC INPUT - MULT. TO REAR JACK.
- 215 (-) ON "S" METER
- 262 GROUND - BLACK





PRESSED INTO
HEAT SINK

176



CX-11 ALL
FINAL AMPLIFIER

ISSUE: 8-86

+24 V.
WHITE 341
BLACK 264

+ C14 C13 .33µF.
30/50

+ C12 .33µF

+ C15 500µF/3V.

R6 1.0
1/2 W.

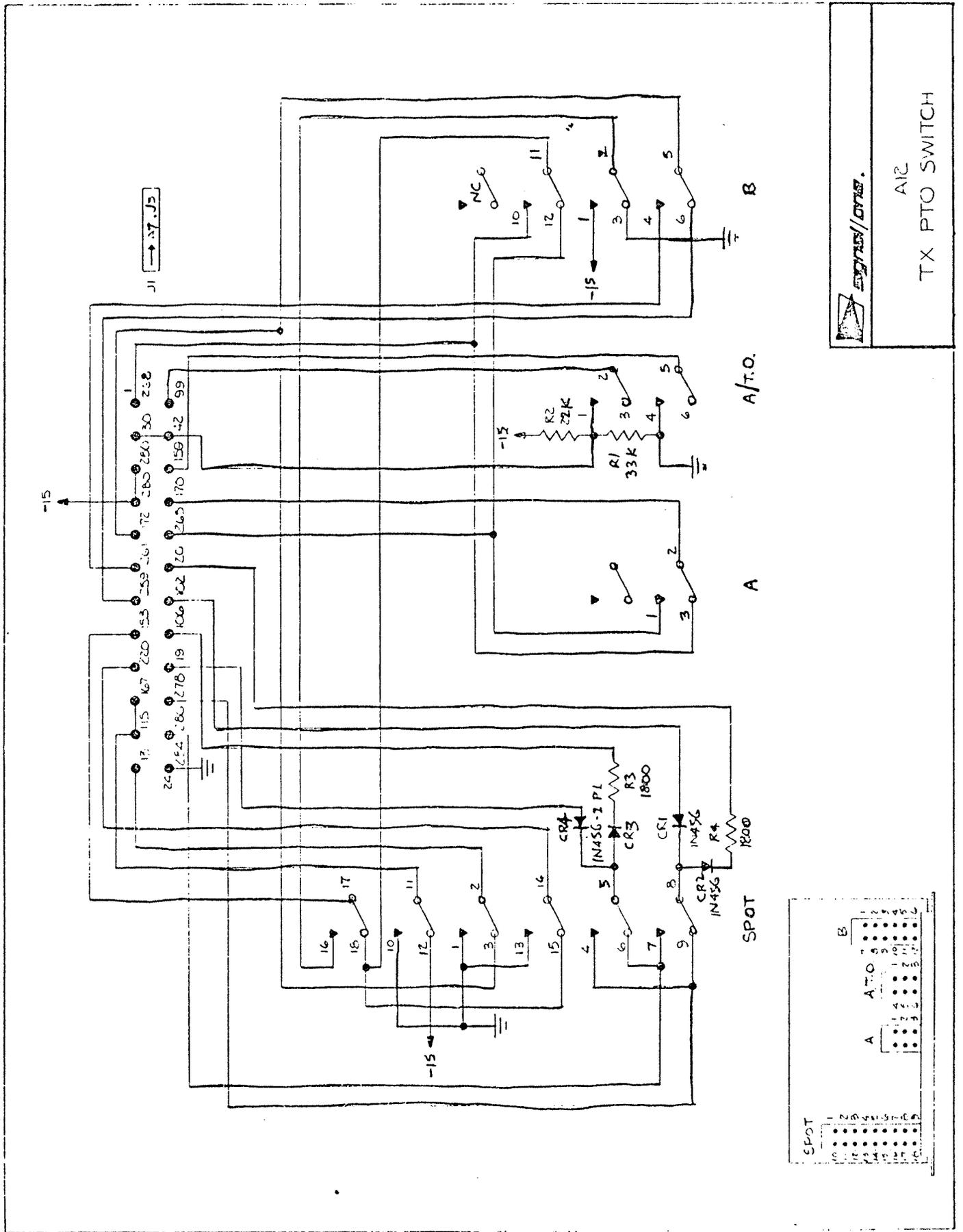
Q3 2N5951

CR1 1N4997

228 COAX
→ AS J11

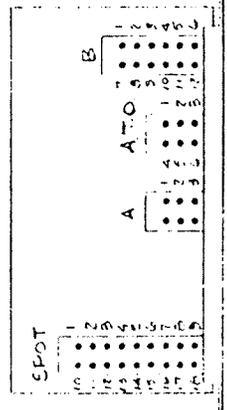
179 COAX
→ AZ7 A
J1

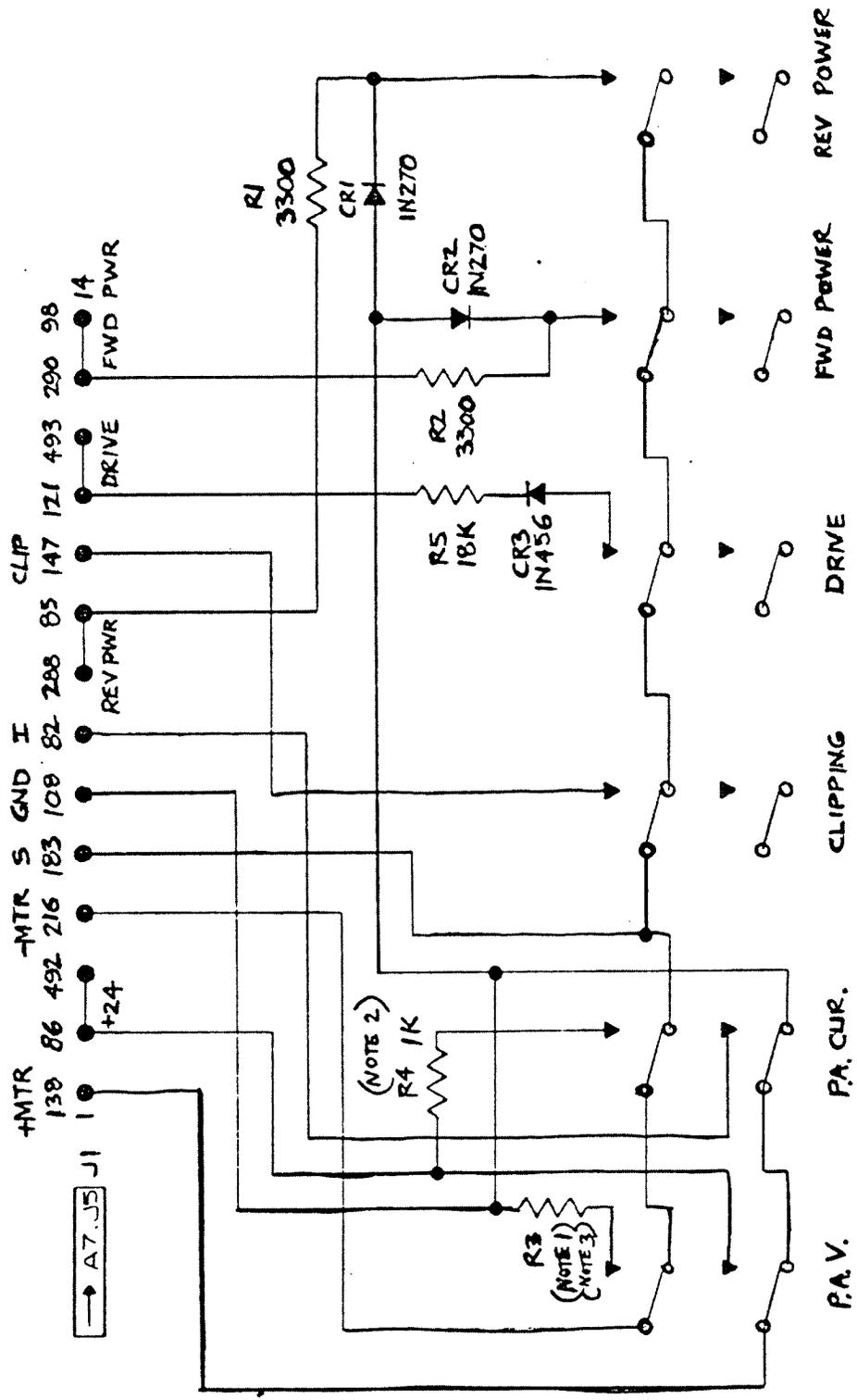
+24, 20 AMP
J1





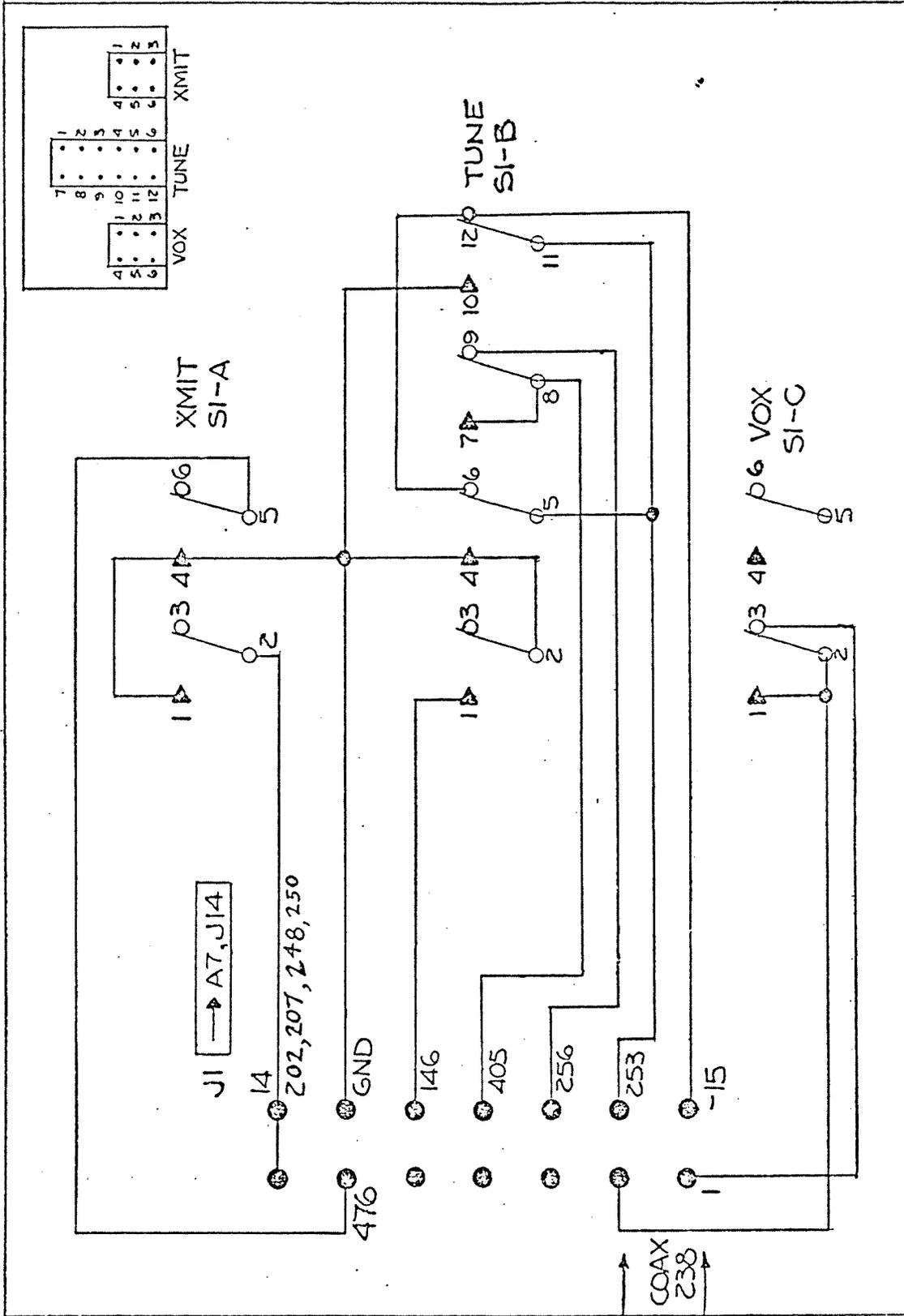
 TX PTO SWITCH





A13
CX-11 METER SWITCH

- NOTES:**
- R3 consists of 100K + 100K + 1MΩ IN PARALLEL TO COMPENSATE FOR SLIGHTLY (THIS UNIT ONLY), NON-LINEAR METER AND GIVE P.A. VOLTS RANGE OF 0-50 VOLTS (SHOULD HAVE BEEN 50K OHMS).
 - R4 SELECTED FOR 0-50 AMP (P.A. CURRENT RANGE) (NORMAL CX-11 IS 470 OHMS).
 - IN NORMAL CX-11, R3 IS 33K OHMS.

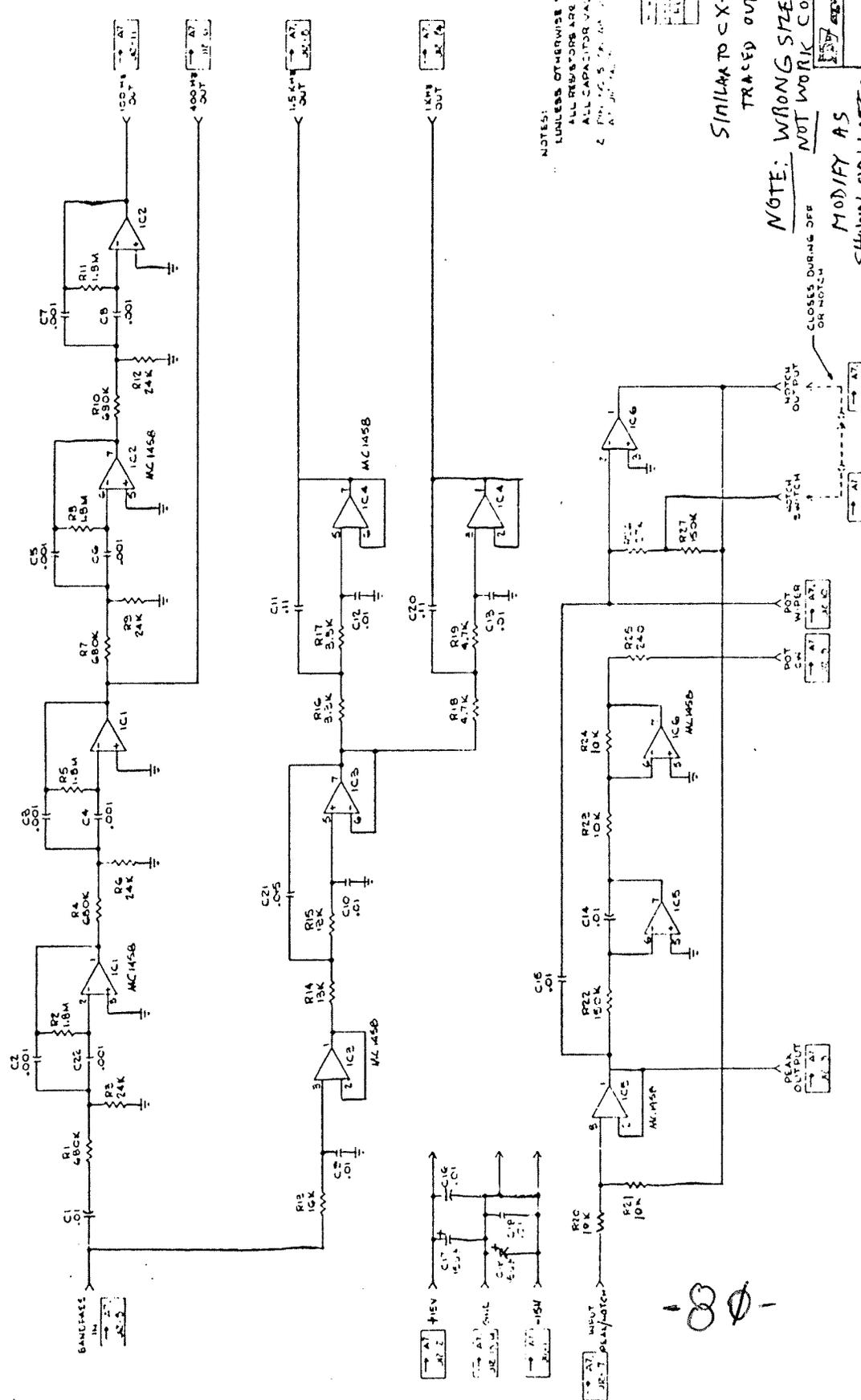


- NOTE:
1. PTT BLANK POSITION RELEASES SI-A, B, C
 2. BOARD PLUGS DIRECTLY INTO A7.
 3. SIMILAR TO CX-11 (NOT DRAWN OUT)



A14
TRANSMIT MODE SWITCH

179-



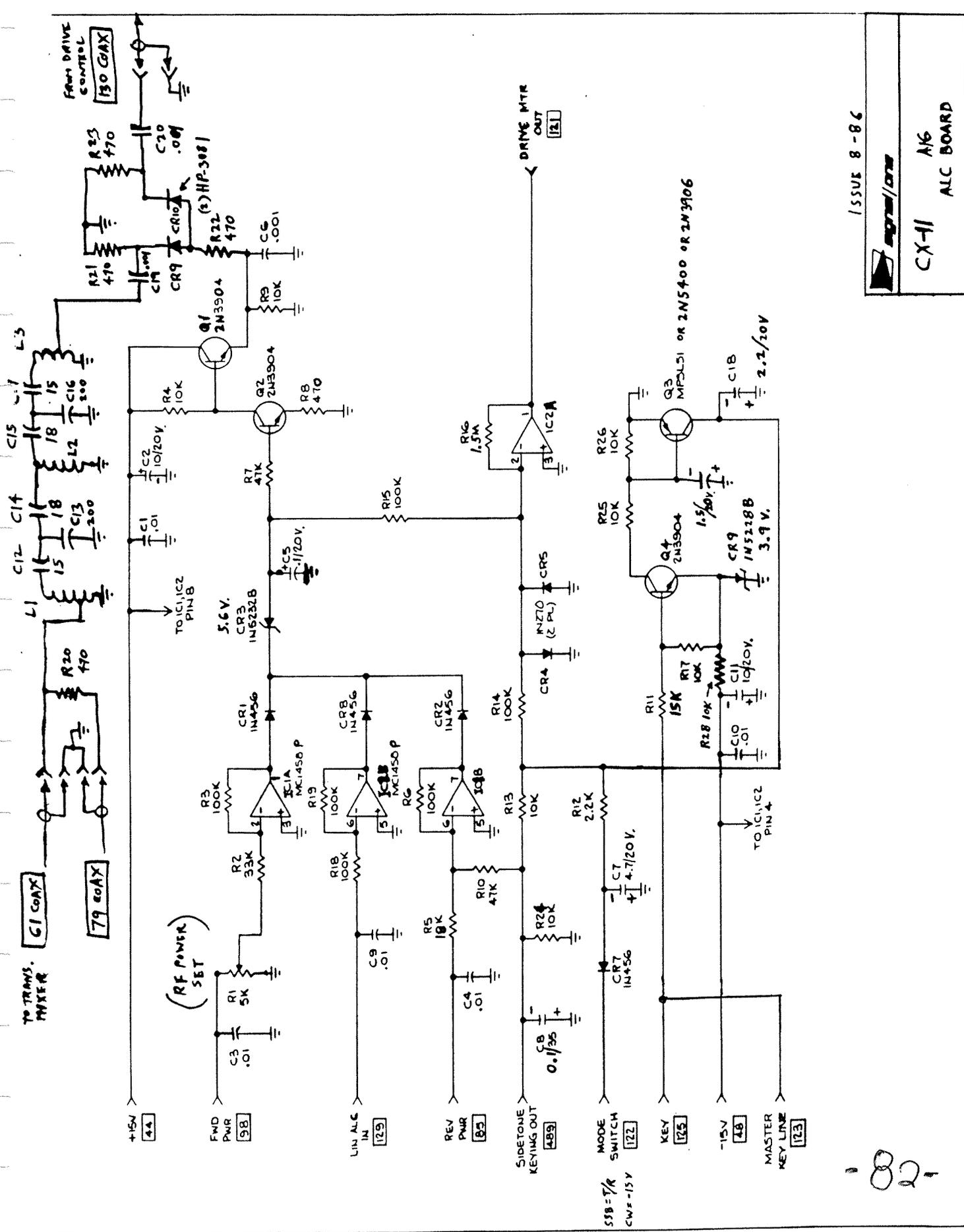
NOTES:
 UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS ARE 1/4W 5% TOLERANCE
 ALL CAPACITOR VALUES ARE IN MICROFARADS
 2. PREFERRED PARTS LIST IS ATTACHED

IC1	741C
IC2	741C
IC3	741C
IC4	741C
IC5	741C
IC6	741C

SIMILAR TO C-X-11 (CIRCUIT NOT TRACED OUT)
 NOTE: WRONG SIZE PARTS - DOES NOT WORK CORRECTLY.
 MODIFY AS SHOWN ON LATTER DRAWING (6-90)

CLOSES DURING OFF OR NOT-EM
 A15
 AUDIO FILTER BOARD

100-1



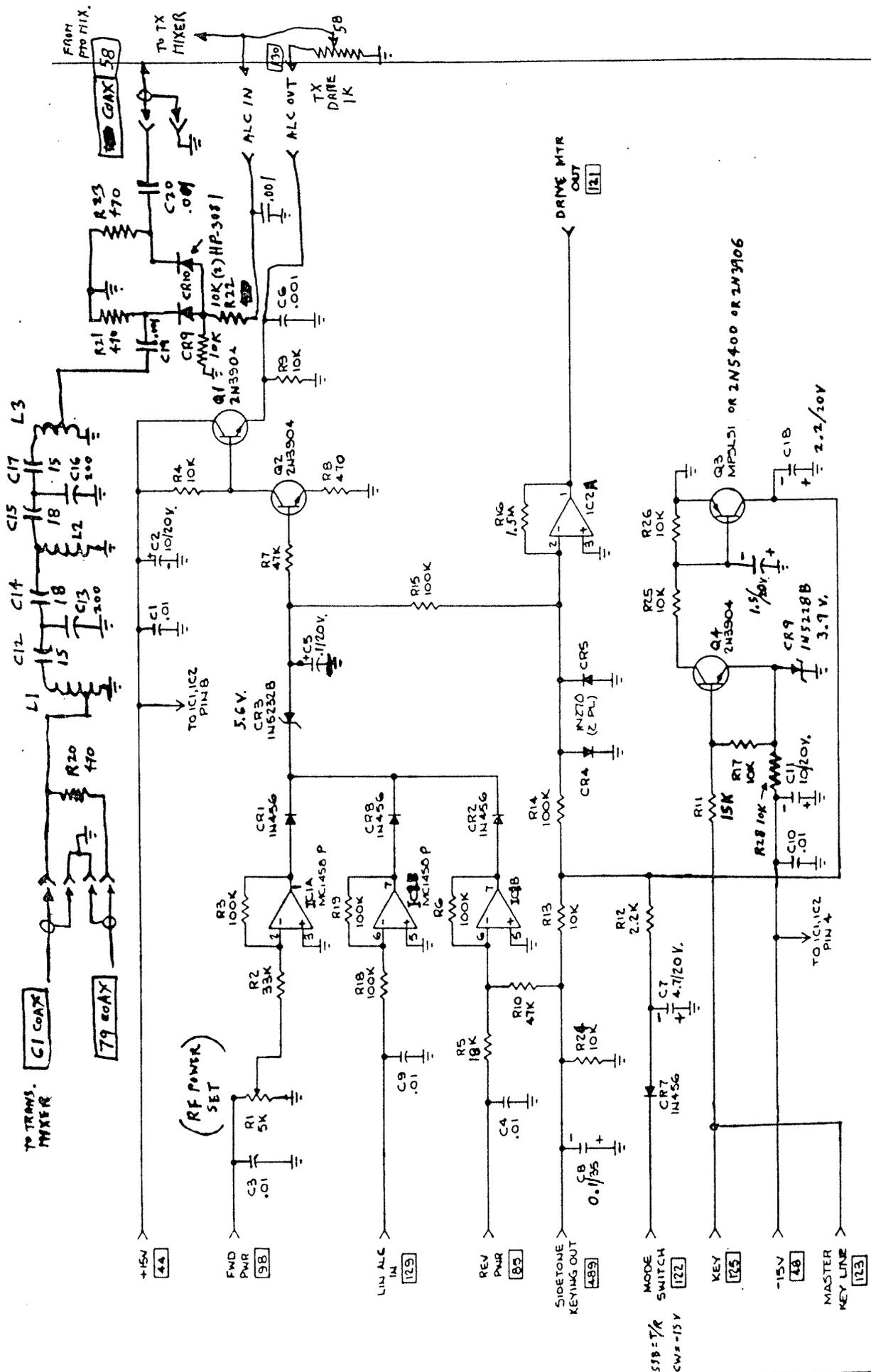
1001

ISSUE 8-86



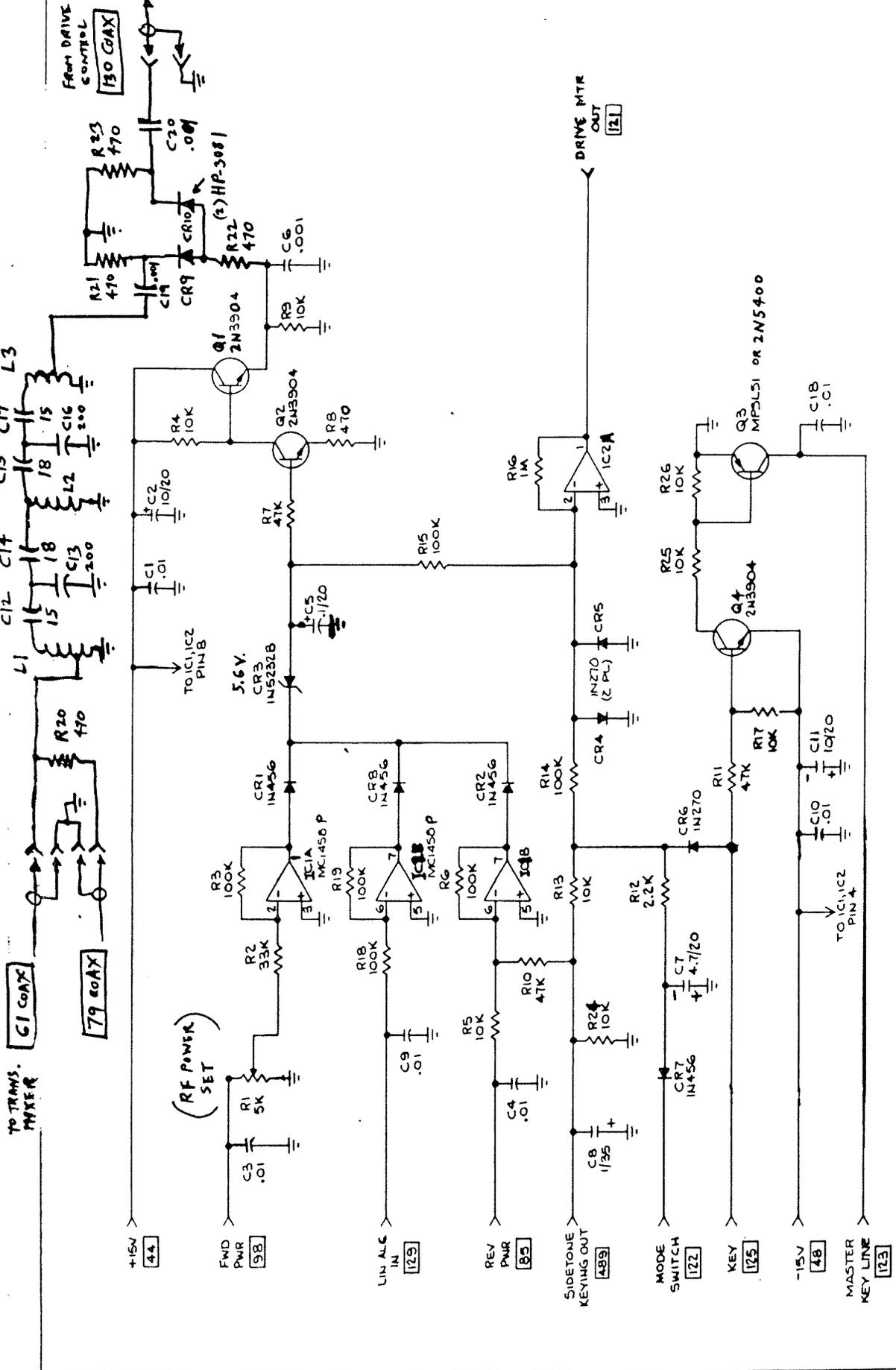
CX-11 ALC BOARD
AG

#940



ISSUE 8-86
 CX-11 ALC BOARD

1003

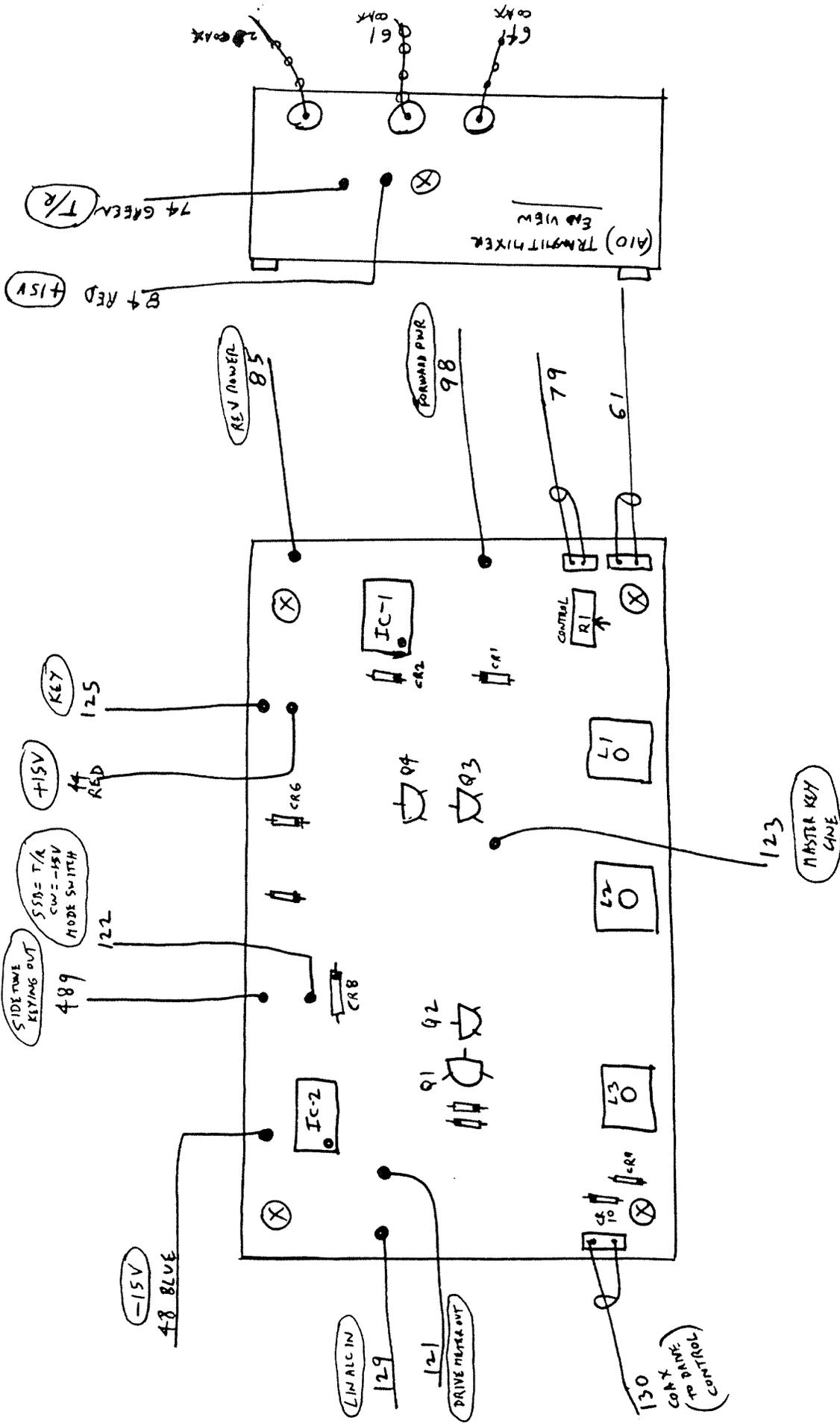


ISSUE 8-86



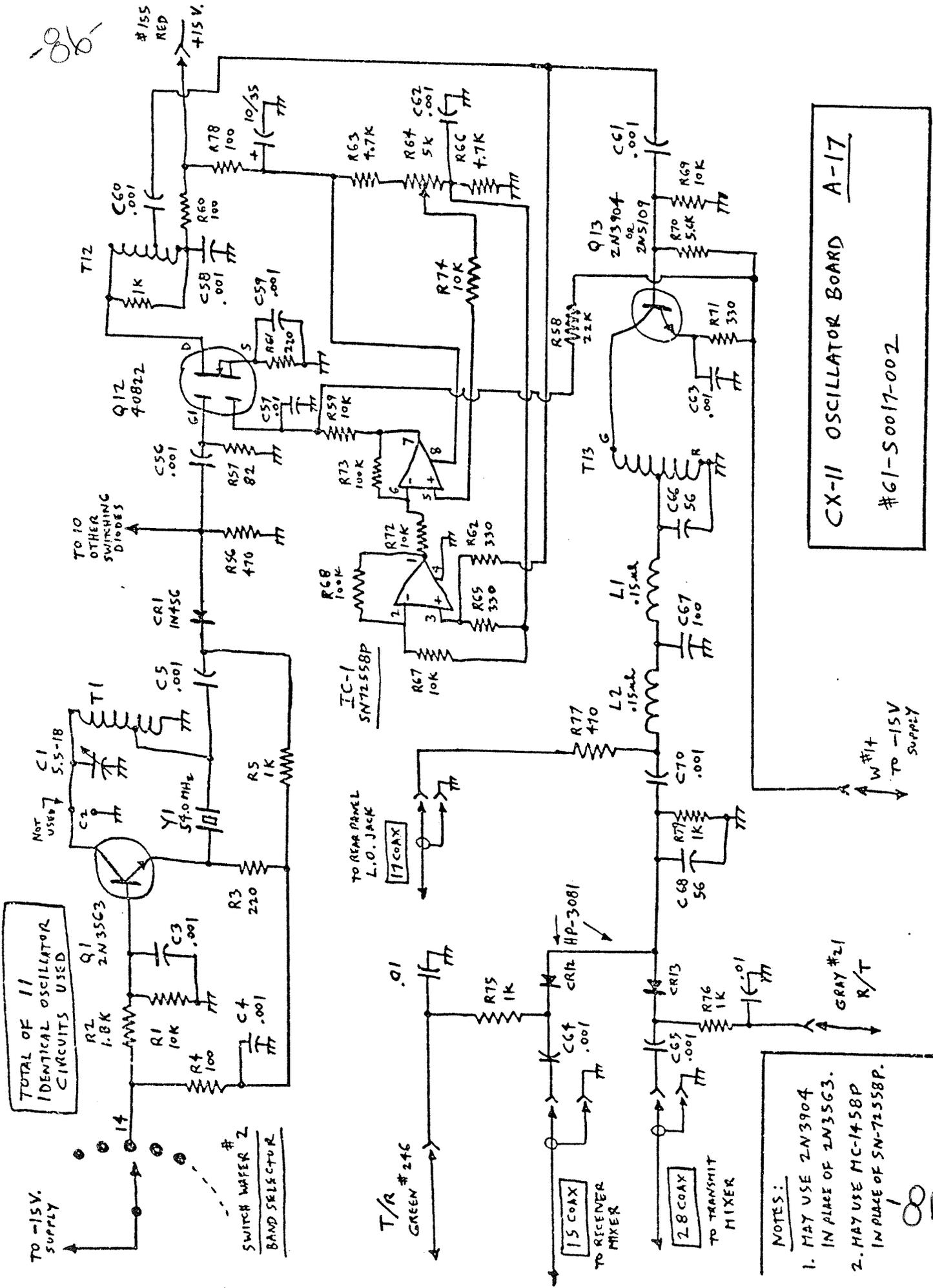
CX-11 A/6 ALC BOARD

10041



CX-11 ALC BOARD A-16

1051



CX-11 OSCILLATOR BOARD A-17

#G1-S0017-002

- NOTES:
- MAY USE 2N3904 IN PLACE OF 2N3563.
 - MAY USE MC-1458P IN PLACE OF 5N-72558P.

86

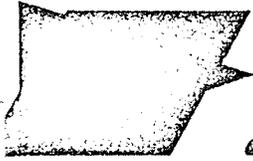


SIGNAL ROUTING, COAXIAL CABLE

CX-11

WIRE #

- 4 Coax PTO A out to PTO Mixer Brd.(A 26).
- 5 Coax PTO A out to Counter(A 28).
- 11 Coax PTO B out to PTO Mixer Brd.(A 26).
- 12 Coax PTO B out to Counter(A 28).
- 15 ~~OSCILLATOR~~ LO (A17) out ~~OSCILLATOR~~ to Front End (A 22).
- 16 Antenna in from H.P. Filter (A20) Lower P A Box to RX L.P. Filter(A 20).
- 17 Coax Synthesizer L.O. out from(A 10)to Rear Panel Jack.
- 55. Coax RX Audio from Audio Brd. (A6) to Power Supply(A 3).
- 58 Coax 40 MHz out from PTO Mixer (A26) to TX ~~OSCILLATOR~~ DRIVE CONTROL.
- 60 Coax Audio out from Power Supply to Anti Vox Pot.
- 61 COAX RF OUT FROM ALC (A16) TO TX MIXER (A10).
- 64 Coax RF out from TX Mixer (A10) to Driver (A5) input.
- 79 Coax Aux 40 MHz out from TX Mixer (A10) to "Hi-IF" Jack.
- 119 Coax 34.2 MHz out from BFO Box (A4) to PTO Mixer (A26).
- 130 COAX RF OUT FROM TX DRIVE CONTROL TO ALC (A16).
- 132 Coax from Mike Jack to Audio Brd. (A6).
- 134 Coax from Vox Gain Control to Audio Brd. (A6).
- 136 Coax RX Audio in to Audio Brd.(A6) from Audio Gain Control.
- 137 Coax Spot Tone input to Audio Brd. (A6) from Spot Level Control.
- 140 Coax to Sidetone Level Control from Audio Brd. (A6).
- 141 Coax 8 MHz Carrier out from AGC Brd. (A9) to IF (A8).
- 142 Coax from Anti Vox Control to Audio Brd. (A6).
- 148 Coax Double Side Band Audio input to AGC Brd. (A9) from Audio Brd. (A6).
- 150 Coax Phone Patch input to Audio Brd. (A6) to Patch Jack.
- 151 Coax 100KHz Cal. Signal to RX Filter Brd. (A2) from Cal. Switch.
- 154 Coax 100 KHz to Counter (A28) from AGC (A9).
- 168 Coax Spot Tone output from PTO Mixer (A26) to Spot Tone Level Control.
- 169 Coax 8 MHz TX input to PTO Mixer (A26) from IF (A8).
- 174 Coax 100 KHz from AGC (A9) to Cal. ON/OFF Switch.
- 179 Coax PA (A11) out to RX/TX Relay Brd. (A33).
- 182 Coax Double Side Band input to IF (A8) from AGC (A9).

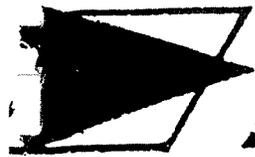


SIGNAL ONE

CX-11

WIRE #

- 186 Coax Product Det. Audio out from AGC (A9) to Audio Filter Switch.
- 188 Coax Aux. 8 MHz out from IF (A8) to "L.O.-IF" Jack.
- 197 Coax from TX/RX Relay (A33) to Antenna Jack.
- 198 Coax from TX L.P. Switch (A27-A) to TX/RX Relay (A33).
- 200 Coax TX/RX Relay (A33) to RX H.P. Filter (A20).
- 201 Coax RX Line from TX/RX Relay (A33) to Ant. Switch.
- 203 Coax 40 MHz Aux. input to Front End (A22) from "Hi-IF" Jack.
- 228 Coax RF out from Driver (A5) to P.A. (A11).
- 234 Coax RX Signal from RX Filter (A2) to Front End (A22).
- 238 Coax Vox Gain Control to S1 TX Control Switch (A14).
- 239 Coax input to Audio Gain Control from Selectivity Switch.
- 240 Coax input to RX/Tx Relay (A33) from Antenna Switch.
- 247 Coax 8 MHz RX input to IF (A8) from Front End (A22).
- 254 Coax 31 MHz L.O. out from PTO Mixer (A26) to Front End (A22).
- 307 Coax LPF #1 RF ^{IN}put to Bandswitch Wafer (A27-A).
- 308 " " #2 " " " " "
- 309 " " #3 " " " " "
- 310 " " #4 " " " " "
- 311 " " #5 " " " " "
- 312 " " #6 " " " " "
- 313 Coax LPF #1 RF ^{output FROM} Bandswitch Wafer (A27-B).
- 314 " " #2 " " " " "
- 315 " " #3 " " " " "
- 316 " " #4 " " " " "
- 317 " " #5 " " " " "
- 318 " " #6 " " " " "
- 387 Coax 8 MHz RX IF out from IF (A8) to AGC (A9).
- 427 Coax 8 MHz L.O. Signal from BFO Box (A4) to AGC (A9).



SIGNAL ONE

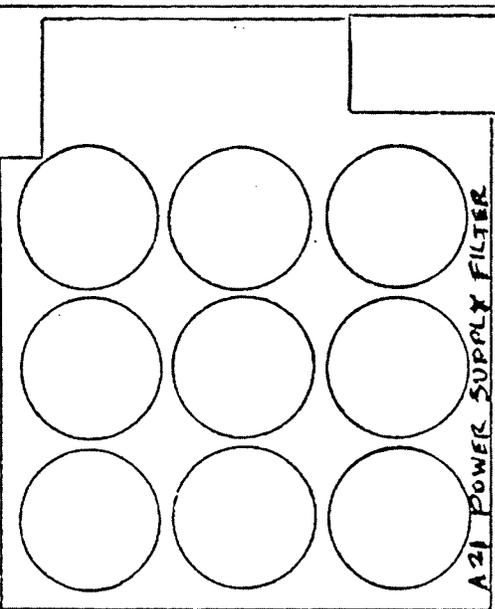
BOARD LAYOUT - CX11

" UPPER CHASSIS "

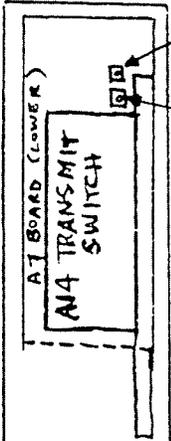
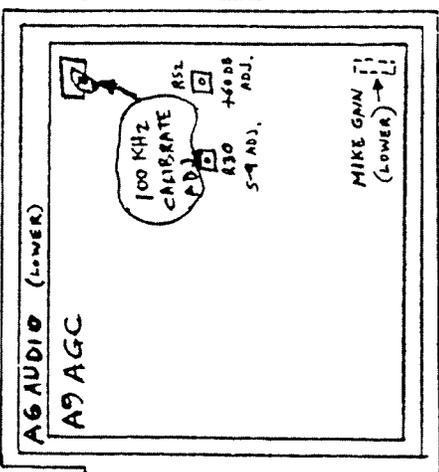
-89-

A38 POWER SUPPLY PASS TRANSISTOR ASSEMBLY

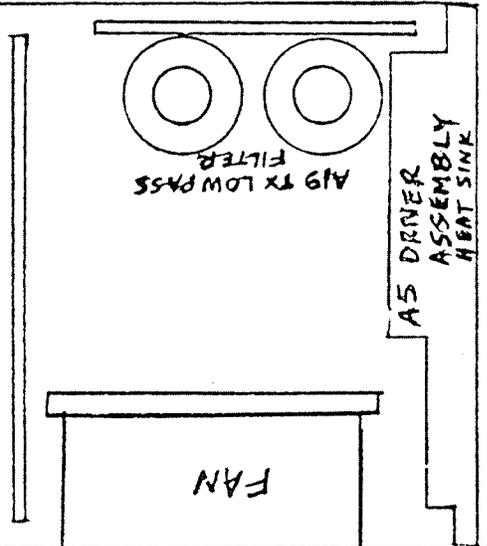
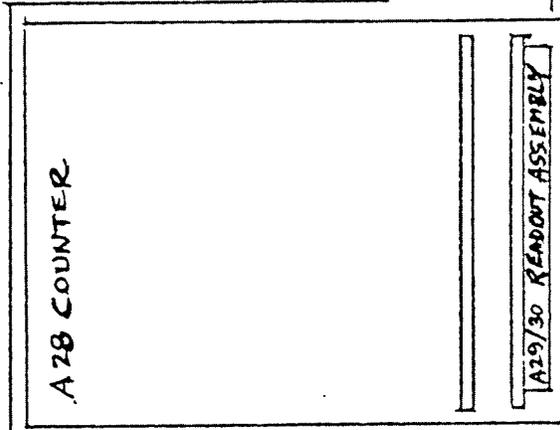
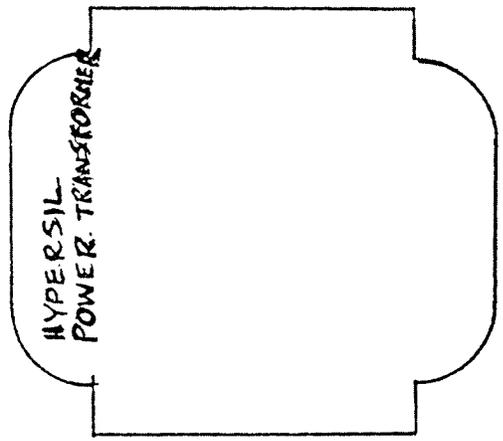
ALL FINAL AMPLIFIER ASSEMBLY



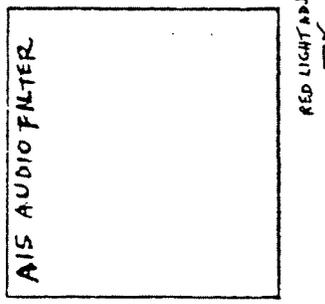
A4 BFO



I.F. SHIFT COARSE ADJ.
CLIPPING MINIMUM ADJ.



A5 DRIVER



A16 ALC (POWER R-1)

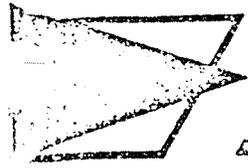
A10 TRANSMIT MIXER

RED LIGHT ADJ.

A13 METER

A13 METER SWITCH

-89-

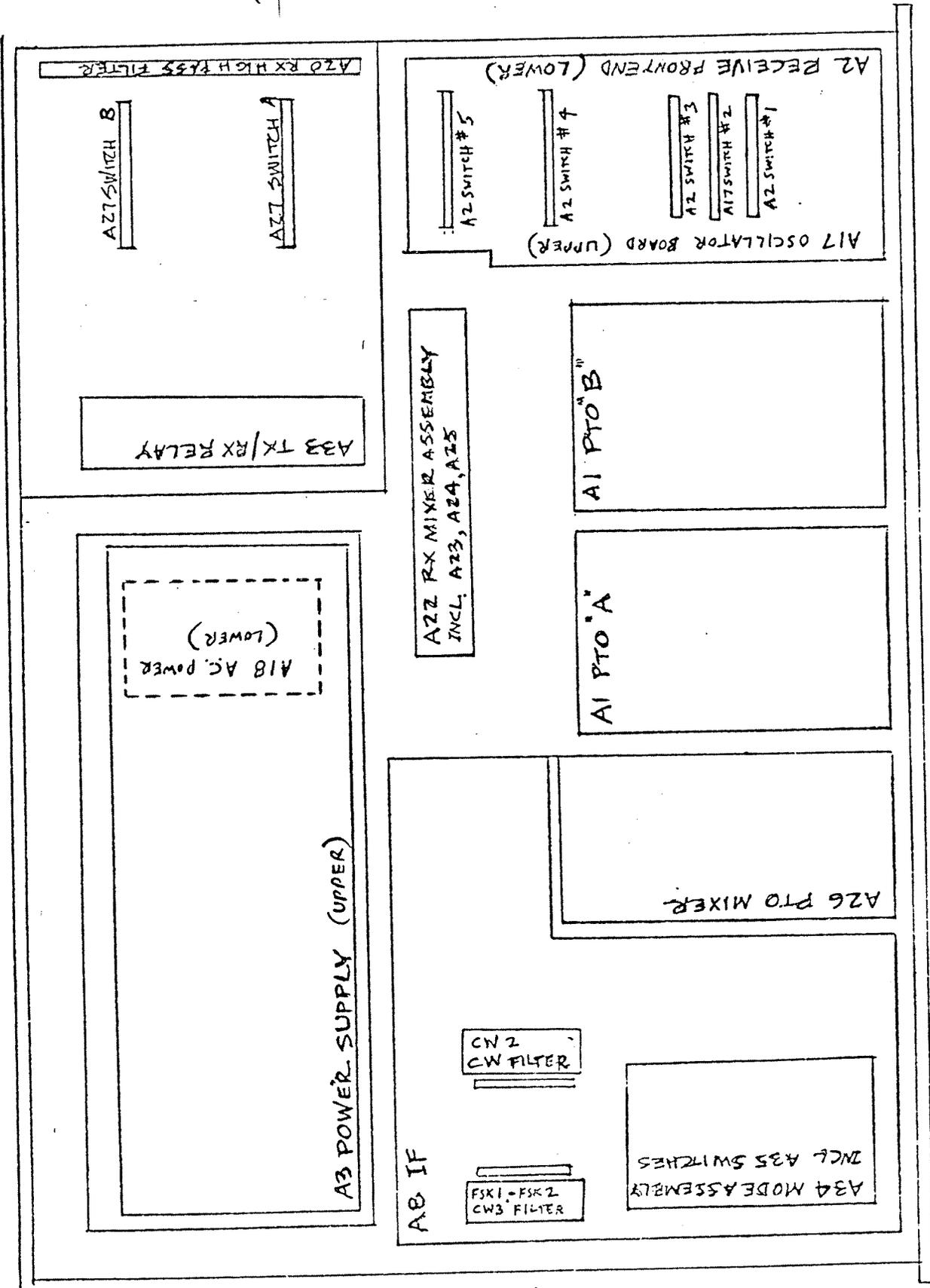


SIGNAL/OTR

BOARD LAYOUT - CX11

" LOWER CHASSIS "

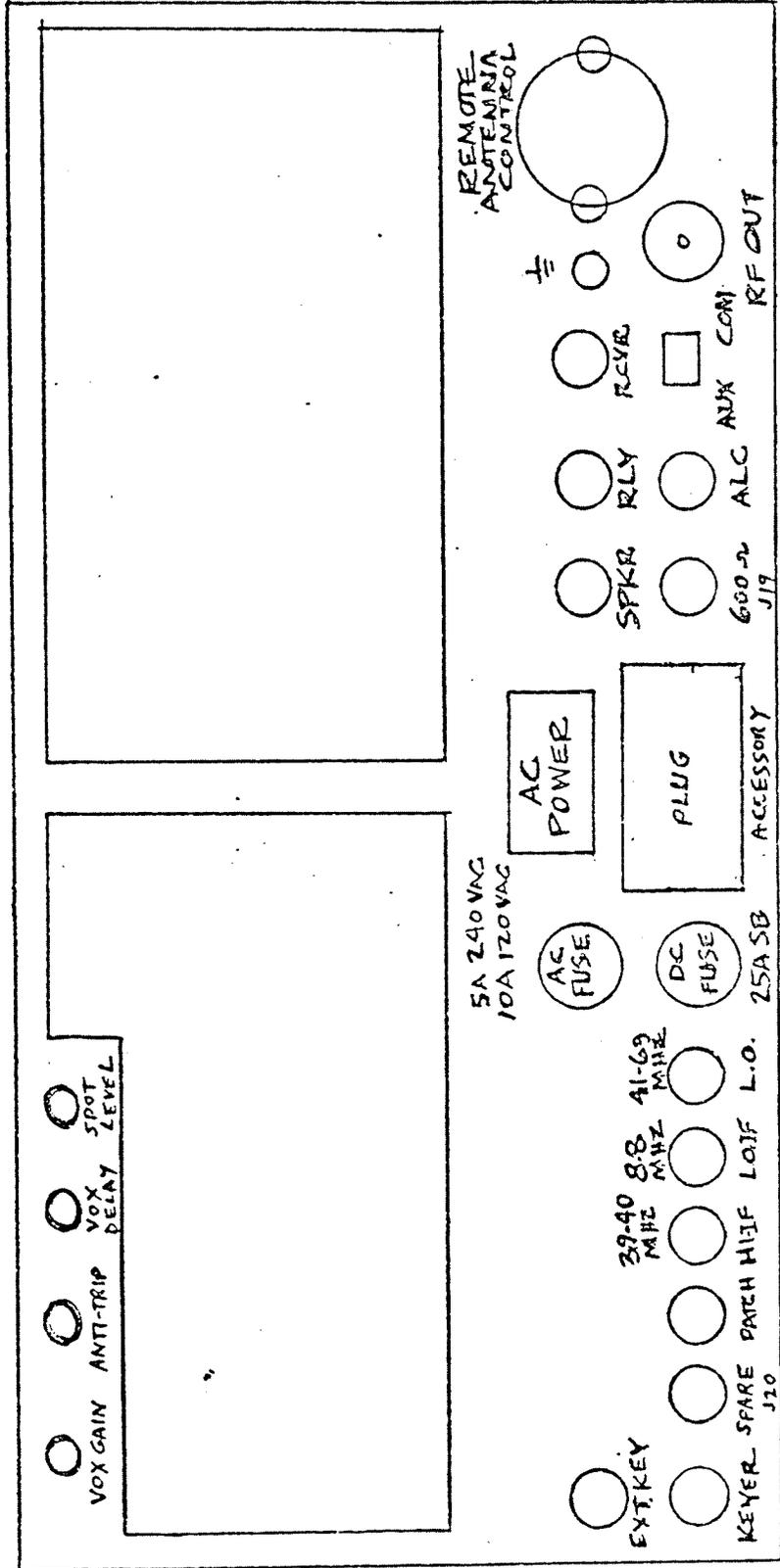
-90-



-90-

CX-11

" REAR PANEL CONNECTIONS "



* Voltages Supplied to J10 on rear panel:

- pin 14, +15 vdc @ 100 mA. pin 12, + 24 vdc @ 1 amp.
- 11, -15 vdc @ 100 mA. 7, T/R -15/0 @ 50 mA.
- 9, + 5 vdc @ 50 mA. 8, R/T 0/-15 @ 50 mA.

BCD CODE:

(capable of driving one TTL load)

- 1 MHz A,B,C,D
- 10 MHz A,B

Refer to Rear Panel Chassis Interface Schematic for pin out and voltage locations.



FINAL TEST AND ALIGNMENT PROCEDURE

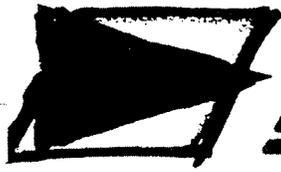
1. Install 10 amp ^{6/458. F.B.} fuse in the 110 volt AC line. Set switch on Brd.(A18) to 115 volts. Install power and accessory plugs.

2. Before powering radio, the following resistance checks should be made; Readings are approximate:
 - A. Violet wire to +15 volt regulator, 33 ohms.
 - B. Yellow wire to -15 volt regulator, 260 ohms.
 - C. Grey wire to +5 volt regulator, 4 ohms.
 - D. Junction of R2 and R3 on Brd.(A3), 850 to 1K ohm.
 - E. Other end of R2, 800 ohms.
 - F. Other end of R3, 650 ohms.
 - G. Either end of R5 or R7, 450 to 1.5K ohm.

3. Use Variac to slowly bring up voltage to the radio. Check for high current draw and check voltages on the +15, -15 and +5 volt regulators as voltage comes up. Check that readouts, meter light and red LED come on. Red LED will come on with no fuse in 24 volt DC line or with low supply voltage. If there is normal current draw, disconnect Variac and use line voltage for remainder of tests.

4. Check for +15, -15 and +5 volts on their respective regulators. The junction of R2 and R3 will always have +15 volts. In PTT check that the other end of R2 has -15 volts and R3 has 0 volts. In TUNE, check that that R2 has 0 volts and R3 has -15 volts.

5. Adjust BFO Brd. (A4). With the ribbon cable connected and the power on, make sure there is always at least one of the two coax cables connected as there is no ground return on the ribbon and highcurrent will flow. Adjust BFO with radio in TUNE. Check that fan comes on in about 20 sec. Locate group of 3 pins near 8.8135 MHz crystal. Solder center pin to pinnearest crystal. Connect frequency counter to Jack 427 on BFO Box.



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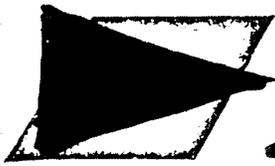
Switch mode to LSB. Adjust C1 for 8.8135 MHz. Switch to USB. Adjust R4 for 8.8165 MHz. Repeat C1 and R4 adjustments because of interaction. If signals cannot be brought on frequency, solder center pin to other pin. Now C1 will adjust the USB signal and R4 the LSB signal.

With radio in PTT and RX SHIFT at center, adjust ^{R3} on Mother Brd. (A7) for 8.8165 MHz in USB and 8.8135 MHz in LSB.

Connect Spectrum Analyzer to Jack 427 and adjust C8 for +6 dBm at 8.8 MHz. Check frequencies in previous steps because of interaction.

Connect Coax 427 and connect Spectrum Analyzer to Jack 119. Peak L4. L5 and C23 for maximum output at 34.2 MHz. Adjust C15 for +2 dBm. Connect Coax 119. Install BFO in radio.

6. Check Audio Output. Remove Coax 186 from J 10 on Brd. (A9). Inject audio signal to Coax and check that it is audible in speaker.
7. Check AGC and "S" Meter. Turn on AGC. Turn RF GAIN control full CCW and check that "S" Meter goes full scale. Remove Coax 387 from J 11 on Brd. (A9). Inject 8.8 MHz signal from RF generator to J 11 and check that the "S" Meter moves. With a level up to -30 dBm, vary frequency thru zero beat and listen for a clean, distortion free tone. Reconnect Coax 387 to J 11.
8. Adjust IF. With an AC Voltmeter at the speaker output, peak ^{L9} and L5 on Brd. (A8).
9. IF Sensitivity. Set AGC control to off. Remove Coax 247 from Brd. (A22) and connect to RF generator. Set reference noise level at -10 dB on AC voltmeter using AF GAIN control. Turn on RF signal and peak signal. Adjust output of generator for 0 dB on AC voltmeter and read output level of generator. This is the sensitivity of the IF and should be approx. .12 - .15 uV.
10. Initial "S" Meter Calibrate. Mechanically zero meter with screw.



SIGNAL ONE CX-11

-107 dBm = 1 μ w.
 -73 dBm = 50 μ w.
 -30 dBm = 7071 μ w.
 -13 dBm = 50K μ w.

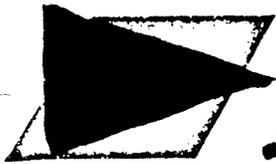
PAGE 3

Turn AGC to SLOW. With Coax 247 connected to RF Generator as in step 9, inject a

-73 dBm signal, adjust R30 ^{ON BRD A-9} for "S9". With ⁻¹³ dBm signal adjust R52 for +60 dB "S" Meter reading. Repeat procedure due to interaction. Reconnect Coax 247.

R44 & R46 on CX11 #15

11. RX PTO Adjust. Set both PTO's at 14.700 MHz. Set RX CHANNEL to "A". Remove Coax 254 and connect Spectrum Analyzer to J 6 on Brd. (A26). Peak L2, L3 and L4 for maximum output at 31.2 MHz. Adjust R14 for +6 to +7 dBm maximum level. Switch RX CHANNEL to "B". Adjust R13 for +6 to +7 dBm maximum level. Reconnect Coax 254.
12. TX PTO. Remove Coax 58 and connect Spectrum Analyzer to J 8 on Brd. (A26). With radio in TUNE, check for -2 to 0 dBm maximum level on 40 MHz signal. Return radio to PTT.
13. 24 Volt Supply. Set R1 CCW on Brd. (A3). Turn radio on, then off and quickly install 25 amp fuse in 24 volt line. Read voltage at junction of R5 and R7 as the filter capacitors discharge. Check that R1 adjusts this voltage. If okay, turn radio on and adjust R1 for 24 V. Seal pot. Check that there are 38 volts on the cathode end of CR9. Adjust R2 on A31 ("S" Meter Brd.) until front panel red LED goes out. Adjust additional 60 degrees.
14. OSCILLATOR BOARD, A-17.
 Set bandswitch to 29 MHz. AT RX MIXER A22, Remove Coax 15
 and connect frequency counter to CONNECTOR OF COAX 15.
Frequency at COAX 15
 should be 69.0000 MHz. Connect Spectrum Analyzer and check for +17 dBm level at 69 Mhz. *ADJUST R64 ON BRD. A-17 FOR +17 DBM.*
15. TX LOW PASS FILTERS. Remove Coax 198 and connect Tracking Generator to J1, ^{FRONT} Switch, Brd. (A19). Remove Coax ¹⁹⁷ and connect Spectrum Analyzer to J1, ^{REAR} Switch, Brd. (A19). Check frequency response against manual in all bandswitch positions. Reconnect Coax 198 and ¹⁹⁷.



16.

17. RECEIVE MIXER ADJUST. Inject 14 MHz, .5uV signal to antenna jack. Connect AC voltmeter to speaker output. Set reference noise level at -10 dB on meter. Adjust frequency of generator for highest reading. Peak L1, L2 and L3 on Brd. (A24) for maximum reading. Set audio output for -10 dB reference level. Adjust output level of generator for 0 dB reading. 10 dB SN+N ratio. This should be .35 uV or less. Install mixer in radio. Check that there is +15 volts in PTT and 0 volts in TUNE on the land next to the Signal/One Logo.

18. TX MIXER ADJUST. Remove short Coax and connect Spectrum Analyzer to J9 on Brd. (A10). On 14 MHz and with radio in TUNE, turn TX DRIVE CW and adjust L1, L2 and L3 for 0 to +2 dBm level at 14.5 MHz. Reconnect Coax.

19. Calibrate Reflectometer and ALC. Connect dummy load through a watt meter to the antenna jack. Set TX DRIVE CCW. Set R1 on Brd. (A16) ^{CW} ~~CCW~~. Push REV.PWR. button. With radio in TUNE, increase TX DRIVE for a low power output. Null reading with C6 on Brd. (A33).

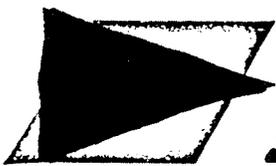
Push FWR.PWR. button. Increase TX DRIVE for watt meter reading of 150 watts. Adjust C9 (A33) for 4.1 reading on panel meter 0 to 5 scale.

[86.6 Volts R.F. @ 50 Ohms]

Reset TX DRIVE CCW. Simultaneously advance TX DRIVE and R1 on Brd. (A16). Adjust R1 for 150 watts output with TX DRIVE CW. Forward power reading will drop slightly. Check for 150 watts output on all bands and readjust R1 if necessary. In the 1 MHz position, read power output with PTO's at 1.8 MHz.

[79 Volts ^{R.F.} @ 50 Ohms]

Check that the amber LED comes on indicating limiting action around 125 W output and the TX DRIVE control about the 10 to 12 o'clock position. The DRIVE indication should be approx. 2 on the 0 to 5 scale.



With the High Power Option only, set C9 for forward reading of 4.6 and set R1 for 200 watts output on all bands.

20.

21. CLIPPING Adjust. While looking from side of radio, adjust vertical MIC GAIN pot on Brd. (A6) so that the notch is in the 1 o'clock position. Push CLIPPING button. Set CLIPPING control CCW. Connect microphone to MIC jack. While whistling into MIC, adjust R4 on Brd. (A7) to "S1" reading.

22. VOLTAGE ON BIAS FEEDTHRU CAPACITOR. Check that there is 2.5 to 3 volts on the bias feedthru capacitor in receive. In SSB transmit there should be 24 volts.

23. DRIVER BIAS. Remove ~~SSB~~^{POWER} connector from J2 on Brd. Use jumpers and connect +24 volts ~~THRU METER~~. Bias current from supply in receive and CW AND In SSB transmit, adjust R22 on Brd. (A5) for 420 to 440 mA. Seal pot. Reconnect ^{POWER} connector.

24. FINAL BIAS. Remove Coax 179 from J4 and Coax 228 from J3 on Brd. (A11). Remove Final Amplifier heat sink from chassis. Disconnect +24 wire from J1. THRU A METER, connect +24 volts to J1. Bias current from supply in receive and CW transmit AND In SSB transmit adjust R11 on Brd. (A11) for 340 mA. Seal pot. Reconnect Coax 179 and 228; +24 volt wire to J1 and reinstall heat sink.

25. 2 TONE IMD TEST. Connect dummy load to antenna jack and Spectrum



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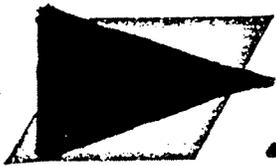
Analyzer to attenuator on dummy load. Switch radio to USB and push VOX button. Set VOX GAIN control to 3. Connect a 400 Hz audio tone to one end of a 1K ohm pot and a 1400 Hz tone to the other end. Connect the center tap to the MIC jack. Set the pot at the middle. Increase levels of both tones until they just trigger the VOX, keeping both levels about equal. Keeping the CLIPPING control below about 2, increase TX DRIVE for an output of about 75 watts. The amber LED should be on. Look at the output with the Spectrum Analyzer (300 Hz resolution and 1KHz/div. Adjust the 1K ohm pot for equal primary sideband levels. The secondary sideband levels should be 25 dB down. For high power radios, make test at 100 watts output.

26.

27. PTO SWITCHING. Leave radio and scope as in Step 26. Remove Coax 4 from J2 on Brd. (A26). Push TX"A" button and set RX CHANNEL at B. There should be no output while keying radio. Reconnect Coax 4 and remove Coax 11 from J4 on Brd. (A26). Push TX"B" button and set RX CHANNEL at A. There should be no output while keying radio. Reconnect Coax 11. Display should switch between A and B when keying.

28. KEYER. Plug keyer paddle in rear panel KEYER jack and check SPEED,WEIGHT DOT MEMORY and SIDETONE LEVEL controls. Check for full break-in (QSK) in the PTT mode and VOX delay in the VOX mode. Plug straight key in rear panel KEY jack and check manual keying. Check for full power output in the CW mode.

29. PTT and VOX. Switch radio to USB or LSB. Plug microphone into MIC jack. Push PTT button and key microphone. Radio should go into transmit mode.



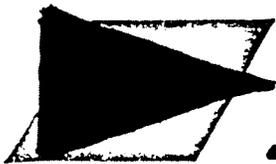
Push TRANSMIT button. Radio should go into transmit mode like a PTT lock. Push VOX button. Check VOX GAIN, VOX DELAY and ANTIVOX controls. Check that there is no carrier output in the CW mode when the PTT or VOX circuits are activated

- 30. RELAY and ALC REAR PANEL JACKS. With the radio upright and in TUNE, there should be 22 ohms across the RELAY jack. Using a variable supply, a 0 to -6 volts on the center pin of the ALC jack should reduce the output from 150 watts to 0.
- 31. FINAL "S" METER CALIBRATE. Repeat Step 10.
- 32. METER and FREQUENCY CONTROL FUNCTIONS. Use dummy load or antenna as necessary.

<u>METER FUNCTION</u>	<u>0 to 5 relative scale reading.</u>
P.A. VOLT	2.4 [SCALE MODIF. FOR 0-50 VOLTS] [NORMAL CX-11 = 3.3 ±10%]
P.A. CUR	.1 idle. 1.7 in Tune at 150 watts output. [WITH SCALE MODIF. FOR 0-50 AMPS]
CLIPPING	.25 whistling into mic with CLIPPING fully CCW.
DRIVE	3.2 at 150 watts output.
FWR.PWR.	4.2 at 150 watts.
REV.PWR.	Dependent on SWR and output power.

<u>TX VFO</u>	<u>RX CHANNEL</u>	<u>READOUT, SPOT out</u>	<u>READOUT, SPOT in</u>
A	A	A	A
A	A+B	A	A
A	B	B	A
A/TO	A	A	A(+/-)2 KHz <u>A TX OFFSET</u>
A/TO	A+B	A	A "
A/TO	B	B	A "
B	A	A	B
B	A+B	A	B
B	B	B	B

Check RX A+B function. Check for RX (+/-)1.5 KHz shift on VFO A control. Check spot level control. Check OVERANGE and OFFSET indicators on readouts.



Push TRANSMIT button. Radio should go into transmit mode like a PTT lock. Push VOX button. Check VOX GAIN, VOX DELAY and ANTIVOX controls. Check that there is no carrier output in the CW mode when the PTT or VOX circuits are activated

- 30. RELAY and ALC REAR PANEL JACKS. With the radio upright and in TUNE, there should be 22 ohms across the RELAY jack. ^(MODIFIED CX-11 ONLY) Using a variable supply, a 0 to -6 volts on the center pin of the ALC jack should reduce the output from 150 watts to 0. (NORMAL CX-11 HAS 47 OHMS ACROSS RELAY JACK.)
- 31. FINAL "S" METER CALIBRATE. Repeat Step 10.
- 32. METER and FREQUENCY CONTROL FUNCTIONS. Use dummy load or antenna as necessary.

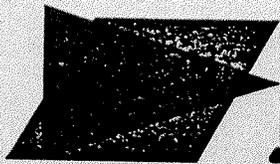
<u>METER FUNCTION</u>	<u>0 to 5 relative scale reading.</u>
P.A. VOLT	2.4 [SCALE MODIF. FOR 0-50 VOLTS] [NORMAL CX-11 = 3.3 ±10%]
P.A. CUR [NORMAL CX-11 = .4 IDLE]	.2 idle. 1.7 in Tune at 150 watts output. [SCALE MODIF. FOR 0-50 AMPS WITH]
CLIPPING	.25 whistling into mic with CLIPPING fully CCW.
DRIVE	3.2 at 150 watts output.
FWR.PWR.	4.2 at 150 watts. [REDACTED]
REV.PWR.	Dependent on SWR and output power.

<u>TX VFO</u>	<u>RX CHANNEL</u>	<u>READOUT, SPOT out</u>	<u>READOUT, SPOT in</u>
A	A	A	A
A	A+B	A	A
A	B	B	A
A/TO	A	A	A(+/-) 2 KHz A TX OFFSET
A/TO	A+B	A	A "
A/TO	B	B	A "
B	A	A	B
B	A+B	A	B
B	B	B	B

Check RX A+B function. Check for RX (+/-)1.5 KHz shift on VFO A control. Check spot level control. Check OVERANGE and OFFSET indicators on read-outs.



33. PTO. From cold start, the PTO's should not drift more than 200 Hz/hour. Check for backlash.
34. NOISE BLANKER. Set Noise Blanker at mid-range. Adjust ^{L6} on Brd. (A8) for null noise.
35. Check AUDIO FILTER, NOTCH, PEAK and CENTER FREQUENCY controls. Check AUDIO SELECTIVITY control. Check CW1 filter if one is installed. Check AGC control. Check that the 100 KHz marker signal is received on all bands. Check AUDIO jack using headphones.
36. WWV CALIBRATE. Set radio in USB and RX SHIFT at -2. Set PTO for 15.000.0 KHz. Adjust C8 ON BRD. A9 for zero beat on WWV. Make sure there is about (+/-)2.5 KHz range either side of zero beat. If not, adjust C23 on Brd. (A4) thru lower hole in side of chassis **IF ALL BANDS ARE OFF. IF ONLY SOME BANDS ARE OFF, ADJUST CRYSTAL TRIMMER CAPACITORS ON BRD. A-17 FOR ZERO BEAT.**
37. Spray light coat of Filtercoat on fan filter and install in radio.
38. For High Power Option, check external fan bracket and thermal turn on switch. Switch should turn on approx. 60 degrees C.
39. Check that all circuit board screws and front and rear panel nuts are tight. Put on cabinet, first centering the bottom half with the front panel. Check for blemishes and clean skirt of all knobs.
40. Serial number on rear heatsink.
41. Run final check in transmit and receive with radio in cabinet.



SIGNAL/ONE

LIMITED WARRANTY

Signal/One agrees to repair or replace without charge any equipment parts or accessories which are defective as to workmanship or materials to the original purchaser for a period of 6 months from the date of purchase. Provided that:

1. The purchaser returns the defective unit to Signal/One factory service department, transportation prepaid when directed to do so.
2. Notice of failure is provided Signal/One factory service department, in writing within 6 months of date of purchase.
3. The equipment was purchased from a factory authorized distributor and the warranty card validated at the time of purchase. Warranty void when passed to a third party.

This warranty is void if equipment is altered, modified or repaired by other than authorized Signal/One factory service department.

Signal/One reserves the right to make any changes in design or to make additions to, or improvements in, Signal/One products without imposing any obligations upon Signal/One to install them in previously manufactured Signal/One products.

No other warranties expressed or implied shall be applicable to Signal/One equipments and the foregoing constitutes the sole liability of the company with respect to its manufactured products.

WARRANTY REPAIRS

Equipment to be returned under the guarantee should be preceded by notification giving full particulars of the defect. Signal/One factory service department will provide instructions with respect to returning unit for service.

Serial No. _____

OUT OF WARRANTY REPAIRS

If equipment is to be repaired or modified after expiration of warranty, correspondence should be directed as above. Signal/One will provide service instructions direct from the factory. Correspondence should be directed to:

SIGNAL/ONE CORPORATION
Black Canyon Industrial Park
Phoenix, Arizona 85021

UNDER THE REGULATIONS OF THE MAGNUSON-MOSS WARRANTY ACT, THE SIGNAL/ONE WARRANTY POLICY IS CLASSIFIED AS A LIMITED WARRANTY.

ALL SIGNAL ONE PRODUCTS MANUFACTURED IN THE UNITED STATES OF AMERICA