RCA

Broadcast Equipment

BTE-115
FM Exciter

MI-561060

IB-8025256-1

WARNING

VOLTAGES THAT ARE DANGEROUS TO LIFE ARE INVOLVED IN THE OPERATION OF THIS ELECTRONIC EQUIPMENT. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH VOLTAGES APPLIED. DANGEROUS CONDITIONS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM TO AVOID PERSONAL INJURY OR LOSS OF LIFE.

EMERGENCY
FIRST AID INSTRUCTIONS

Personnel engaged in the installation, operation, or maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and practice. It is the duty of all operating personnel to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

RESCUE BREATHING

1. Find out if the person is breathing.

   You must find out if the person has stopped breathing. If you think he is not breathing, place him flat on his back. Put your ear close to his mouth and look at his chest. If he is breathing, you can feel the air on your cheek. You can see his chest move up and down. If you do not feel the air or see the chest move, he is not breathing.

2. If he is not, open the airway by tilting his head backward.

   Lift up his neck with one hand and push down on his forehead with the other. This opens the airway. Sometimes doing this will let the person breathe again by himself. If it does not, begin rescue breathing.

3. If he is still not breathing, begin rescue breathing:

   Keep his head tilted backward.
   Pinch his nose shut.
   Put your mouth tightly over his mouth.
   Blow into his mouth once every five seconds.
   Do Not Stop Rescue Breathing Until Help Comes.

LOOSEN CLOTHING – KEEP WARM

Do this when the victim is breathing by himself or help is available. Keep him quiet as possible and from becoming chilled. Otherwise, treat him for shock.

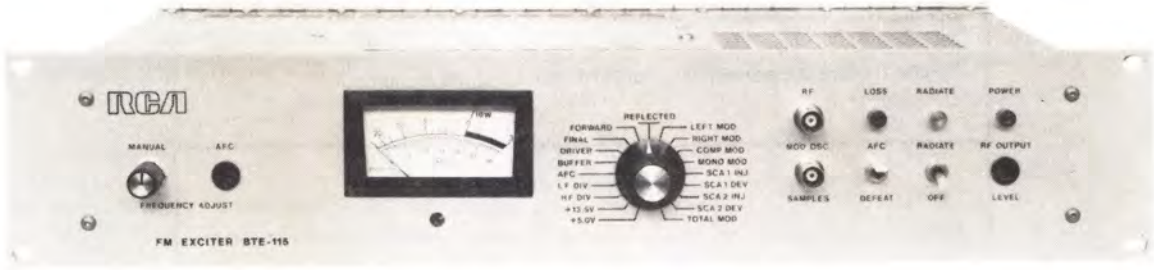
BURNS

SKIN REDDENED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Consult a physician.

SKIN BLISTERED OR FLESH CHARRED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

EXTENSIVE BURN-SKIN BROKEN: Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

Broadcast Equipment



IK209

Instructions

BTE-115

FM Exciter

MI-561060

Commercial Communications Systems Division/Front and Cooper Streets/Camden, New Jersey, U.S.A., 08102

PRINTED IN U.S.A.

IB-8025256-1

SAFETY PRECAUTIONS

This equipment is designed to fully safeguard all personnel from operating hazards. Labels on the equipment and caution notices in the instruction book clearly point out these potential hazards.

Any module or Printed Wiring Board may have hazardous voltages exposed, so caution must be exercised.

Follow the recommended procedures provided in the Instruction Book for care and maintenance of the equipment.

Always replace the protective covers after servicing the equipment.

WARRANTY ITEMS

Particular parts and/or equipment covered by warranty are specifically stated as such in the warranty or contract given to the customer at the time of sale. The warranty or contract also stipulates the conditions under which the warranty may be exercised.

To obtain a new replacement for such warranty items, contact your local RCA sales office and please supply Product Identification (including the Original Invoice Number, MI Number, Type Number, Model Number, and Serial Number) and Replacement Part Identification (including Stock Number and Description). Requests for warranty replacements may be unduly delayed if all this information is not supplied.

EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or if evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Report all shortages and damages to RCA, Commercial Communication Systems Division – Camden, New Jersey 08102.

RCA will file all claims for loss and damage on this equipment so long as the inspection report is obtained. Disposition of the damaged item will be furnished by RCA.

FIELD ENGINEERING SERVICE

RCA Field Engineering Service is available at current rates. Requests for field engineering service may be addressed to your RCA Broadcast Field Representative or the RCA Service Company, Incorporated – Broadcast Service Division – Camden, New Jersey 08102. Telephone (609) 338-3434.

TECH ALERT

Emergency 24 hour telephone consultation service for technical problems is available. Call TECH ALERT at (609) 338-3434. Telex messages will be forwarded to the addressee upon receipt. Western Union telex number is 83-4450.

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BTE-115 FM EXCITER SYSTEM OPTIONS

The BTE-115 FM Exciter System is available in several forms as follows:

1.	Mono System, ES-560982, includes	
	(A) 1 Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(D) 1 Connector, Audio Input	MI-561067-1
2.	Mono and 1 SCA System, ES-560983, includes	
	(A) 1 Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 1 BTX-101 SCA generator less audio LPF (Specify freq. 41 or 67 kHz. std.)	MI-561062
	(D) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(E) 1 Plug-in 5 kHz audio LPF for SCA unit	MI-561065
	(F) 1 Interconnecting cable	MI-561067-2*
3.	Mono and 2 SCA System, ES-560984, includes	
	(A) 1 Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 2 BTX-101 SCA generators, less audio LPF	MI-561062
	(D) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(E) 2 Plug-in 5 kHz audio LPF for SCA units	MI-561065
	(F) 1 Interconnecting cable for BTE-115 Mono and 2 SCA systems	MI-561067-3*
4.	Stereo System, ES-560985, includes	
	(A) 1 Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 1 BTS-101 Stereo generator less 2 audio LPFs	MI-561061
	(D) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(E) 1 Pair of plug-in 15 kHz audio LPF for BTS-101	MI-561064
	(F) 1 Interconnecting cable for BTE-115 Stereo system	MI-561067-4*
5.	Stereo and 1 SCA System, ES-560986, includes	
	(A) Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 1 BTS-101 Stereo generator less 2 audio LPFs	MI-561061
	(D) 1 BTX-101 SCA generator less audio LPF	MI-561062
	(E) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(F) 1 Pair of plug-in 15 kHz audio LPFs for BTS-101	MI-561064
	(G) 1 Plug-in 5 kHz audio LPF for SCA unit	MI-561065
	(H) 1 Interconnecting cable for BTE-115 Stereo and 1 SCA system	MI-561067- 6
6.	Stereo and 2 SCA System, ES-560987, includes	
	(A) 1 Exciter, less audio LPF, 5 MHz crystal and oven (Specify frequency)	MI-561060
	(B) 1 5 MHz reference crystal and oven (Installed in Exciter)	MI-561066
	(C) 1 BTS-101 Stereo generator less 2 audio LPFs	MI-561061
	(D) 2 BTX-101 SCA generator less audio LPF	MI-561062
	(E) 1 Plug-in 15 kHz audio LPF for BTE-115	MI-561063
	(F) 1 Pair of plug-in 15 kHz audio LPFs for BTS-101	MI-561064
	(G) 2 Plug-in 5 kHz audio LPFs for SCA units	MI-561065
	(H) 1 Interconnecting cable for BTE-115 and 2 SCA systems	MI-561067-6

The following optional items are available for use with the BTE-115 FM Exciter System:

1.	Spare 5 MHz crystal and oven	MI-561066
	5 MHz crystal only	MI-561066X
	crystal oven only	MI-561066A
2.	Complete set of connector plugs for the BTE-115 Exciter	MI-561068**
3.	Complete set of connector plugs for the BTX-101 SCA Generator	MI-561070**
4.	Complete set of connectors plugs for the BTS-101 Stereo Generator	MI-561069**
5.	Blank aluminum panel, 1-3/4"	MI-561072
6.	Set of chassis slides for servicing	MI-561073
7.	Interface and Radiate Panel	MI-561071
8.	Connector Kit for Interface Panel	MI-563485
9.	Drilling Template for mounting exciter system	3742738

* In some cases an MI-561067 Interconnect Cable having a higher dash number than that specified may be supplied.

** Required only when interface panel MI-561071 and/or Interconnection Cable MI-561071 are not used.

TECHNICAL SUMMARY

PERFORMANCE

Type of Emission	F3 and F9
Frequency Range (programmable in 50 kHz steps)	87.5 to 108 MHz
Power Output (adjustable from front panel)	4 to 17 watts
VSWR	Open or direct short
Output Impedance	50 ohms
Output Connector	Type BNC
Frequency Deviation - 100% modulation	±75 kHz
Modulation Capability	±100 kHz
Carrier Frequency Stability	±500 Hz max.
Modulation	Direct carrier FM

MONAURAL OPERATION

Audio Input Impedance	600 ohms, balanced
Audio Input Level (100% modulation)	+10 dBm ±2 dB, referred to 400 Hz
Audio Frequency Response (30-15000 Hz)	±1.0 dB max.
Harmonic Distortion	.0.3% or less
Intermodulation Distortion	0.3% or less
FM Noise Level (referred to 100% modulation)	-70 dB
AM Noise Level (referred to 100% modulation)	-60 dB
Pre-emphasis Network Time Constant	0, 25, 50 or 75 µsec as desired

WIDE BAND OPERATION

Input Connector	Type BNC
Input Impedance	>5000 ohms resistive, unbalanced
Input Level	3.5 VRMS nominal for 100% modulation referred to 400 Hz

ELECTRICAL

Power Line Requirements	120, 208 or 240 volts, single phase, 50/60 hertz
Combined Line Voltage Variation and Regulation	±10%
Power Consumption	80 watts max.

MECHANICAL

Dimensions, inches (cm) (overall):	
Width	19 (48.3)
Height	3-1/2 (8.9)
Depth	9 (22.9)
Weight, pounds (kg)	.40 (18.1)
Altitude, feet (meters)	7500 (2286) max.
Ambient Temperature	-20°C to + 70°C (-4F° to + 140°F)

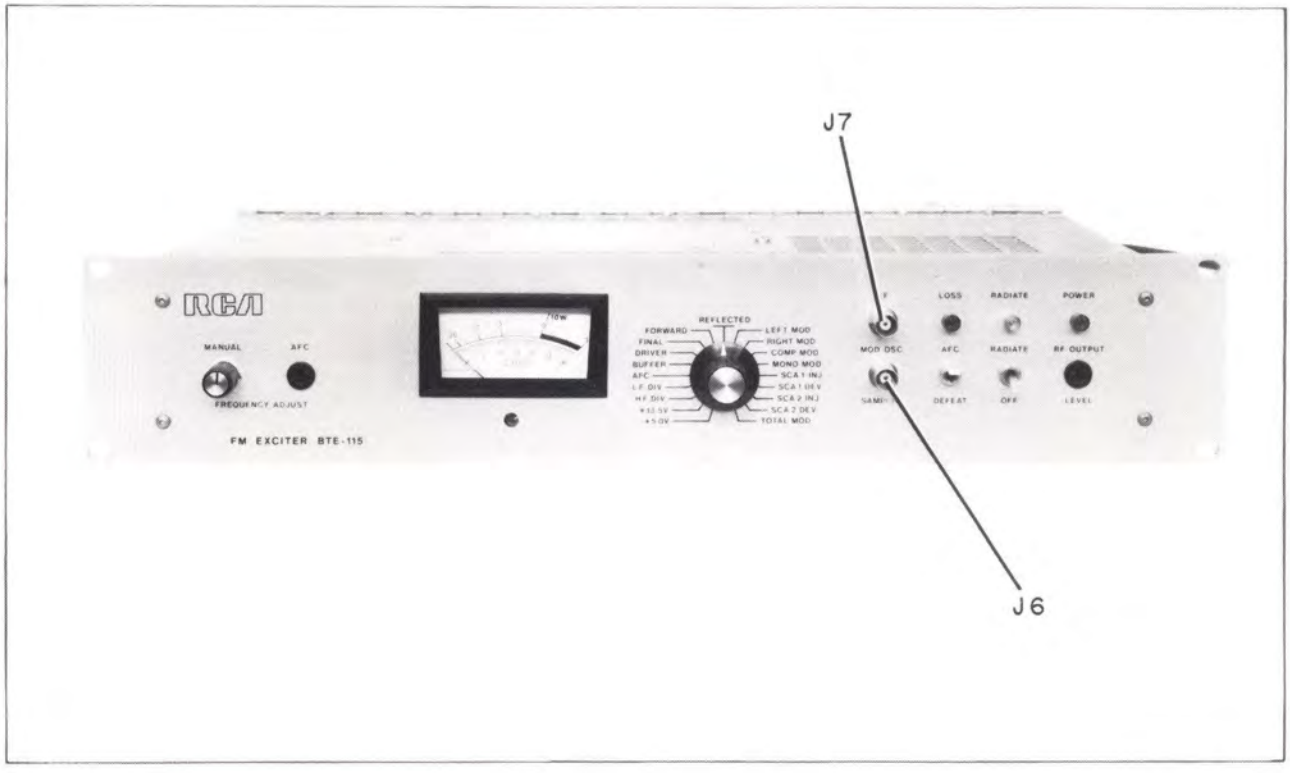


Figure A. BTE-115 Front Panel

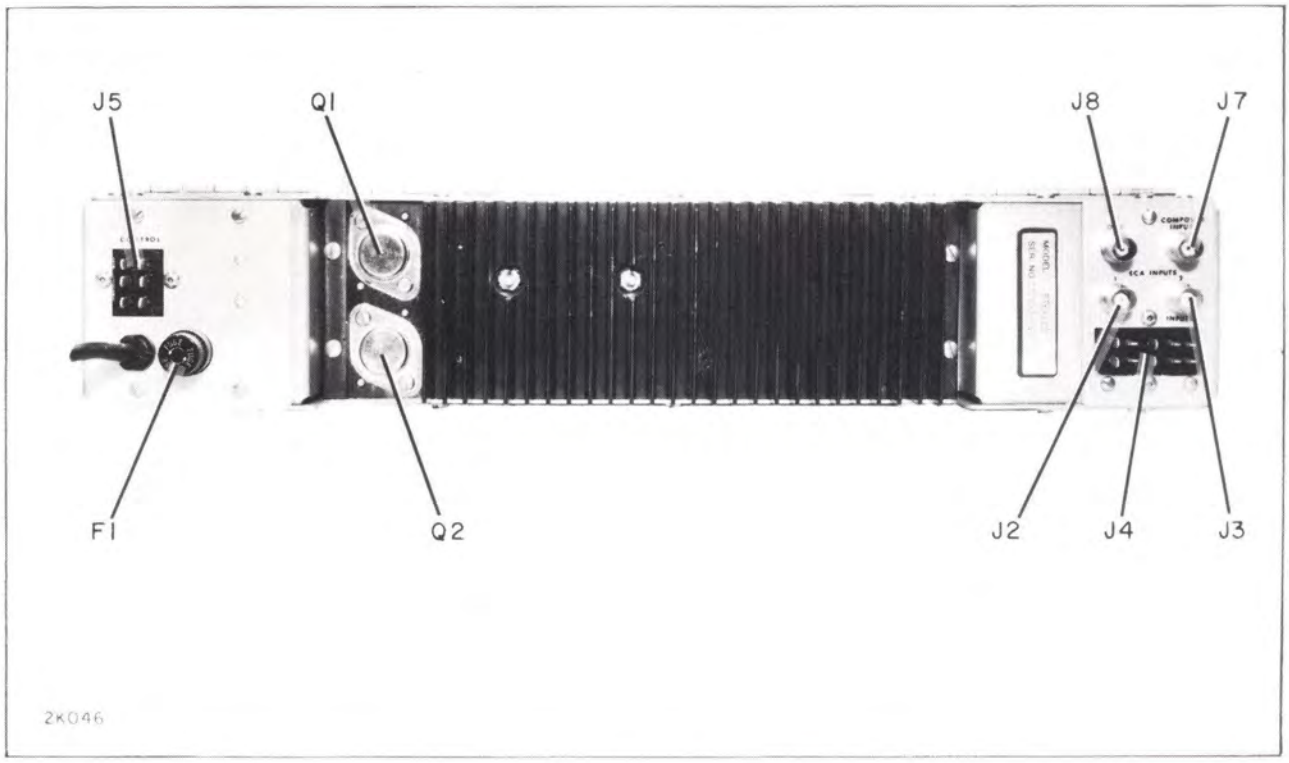


Figure B. BTE-115 Rear View

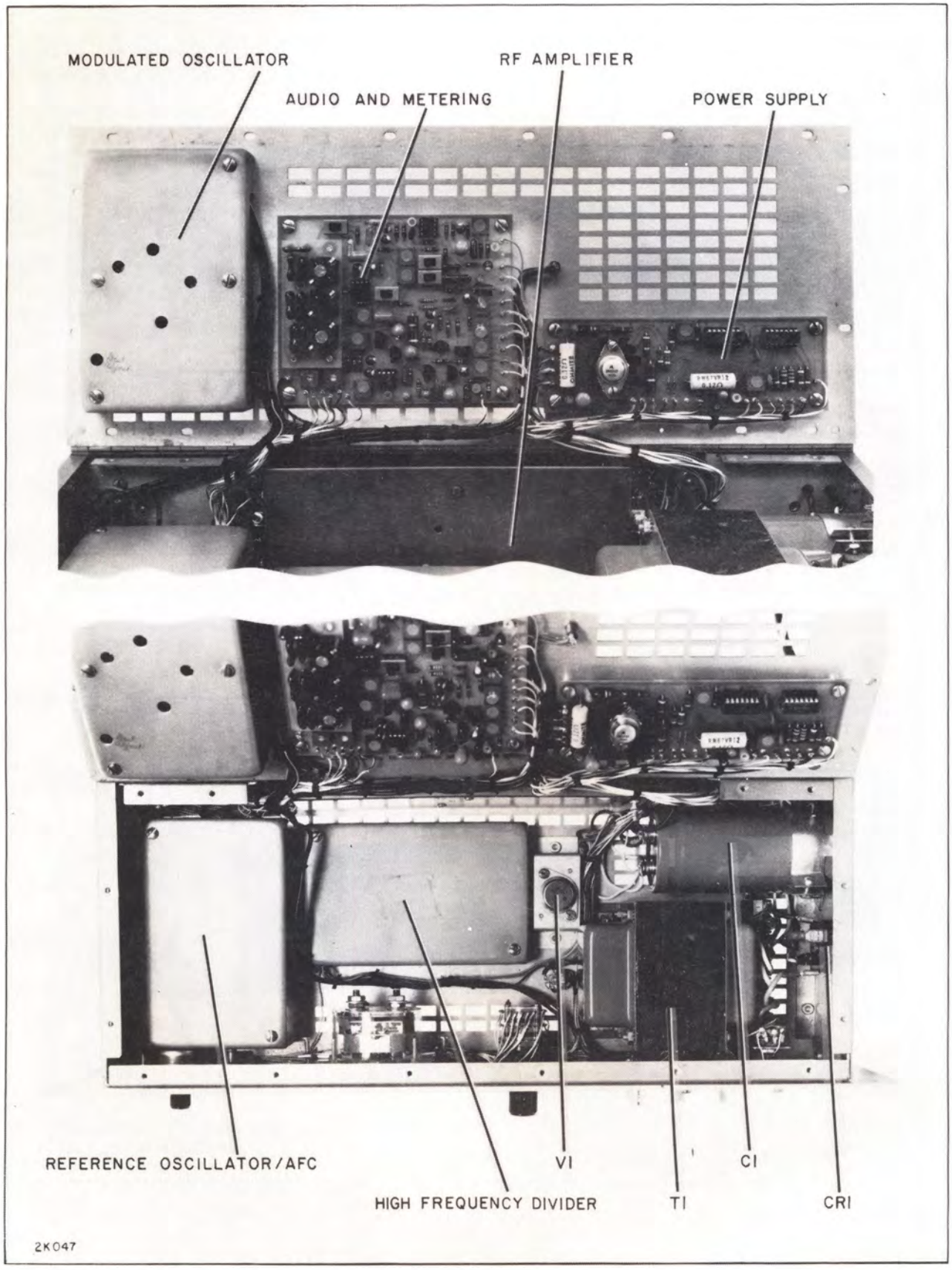


Figure C. PW Board Locator

GENERAL DESCRIPTION

As shown in figure 1, the BTE-115 consists of six basic assemblies; an audio and metering module, a modulated oscillator module, an rf power amplifier module, two modules for automatic frequency control, (the programmable HF divider and the reference oscillator/AFC) and a power supply assembly.

The exciter will accept, as the primary modulating input, either monaural audio or a composite stereophonic signal. In addition, the BTE-115 will accept one or two FM subcarrier (SCA) signals from an external subcarrier generator.

When the companion RCA stereo (BTS-101) or subcarrier, (BTX-101) generators are used, the metering system in the BTE-115 exciter will allow full metering of all important signal parameters.

All of the above-mentioned modulating and metering signals are routed to the audio and metering module. The summed modulating signals are passed on to the modulated oscillator, while the metering system output is applied to the front-panel meter.

The modulated oscillator module generates an on-frequency signal at a power level of 200 milliwatts. The summed modulating signal from the audio and metering module is applied to the modulated oscillator module, as is a frequency-controlling voltage from the AFC system. The output from the modulated oscillator module is applied to the rf power amplifier module. Low-power samples of rf are applied to a front-panel connector and to the AFC system.

The rf power amplifier accepts the signal from the modulated oscillator module and amplifies it to the desired power level. As with the modulated oscillator module, a low-power sample of rf is routed to a front-panel connector.

The AFC system consists of two modules. The first is a programmable divider. The input to this module is a sample of the carrier-frequency modulated oscillator. The output of the divider is 1562.5 Hz square wave. The second module in the AFC system contains the remainder of the circuitry required to maintain the carrier on the correct frequency. This includes a 5 MHz crystal oscillator of very high stability, dividers to develop a second 1562.5 Hz square wave, and phase comparison and loop-stabilizing circuitry. Sophisticated monitoring circuitry is also included in this module to assure on-frequency operation.

The power supply assembly includes electronic regulation of all voltages in the exciter as well as voltage adjustment for control of power output.

The front panel of the BTE-115 has been simplified by the elimination of all controls not needed for routine operation. A single meter will measure all important operating parameters, both dc and ac. The AFC system is switch-defeatable, whereby a front-panel control will permit the operator to maintain the exciter on the correct frequency.

The exciter power output is controllable from the front panel, with a switch to cease radiation and a variable control for level adjustment. Front panel samples of the modulated oscillator and rf amplifier outputs, both at a level suitable for direct connection to a typical modulation or frequency monitor, are also available.

The rear of the BTE-115 contains the necessary connections for interfacing with the entire line of RCA transmitters, as well as the external modulation and metering sample inputs from the affiliated RCA stereo and SCA generators.

DETAILED CIRCUIT DESCRIPTION

AUDIO AND METERING MODULE

Program audio, preferably processed by a frequency-conscious limiter, such as the RCA BA-147 or equivalent, is applied to pins 7 and 8 of the input connector, J4, on the rear of the BTE-115 exciter. From this connector, it is routed through the input attenuator pad, to the audio input transformer T2. After filtering by inductor L8 and feedthrough capacitor C9, it is routed to the audio and metering module pin 1. Refer to figure 4.

Resistor R101, in conjunction with potentiometer R102 and resistor R103, terminate the input transformer. MONO GAIN TRIM control R102 serves as a means of standardizing the modulation sensitivity of the exciter in the monaural mode. R104 and C101 provide on-board rf bypassing of the program signal. U101, biased by R105, R106 and R107, provides audio signal amplification and pre-emphasis. Low-frequency gain is set by the ratio of R110 to R114, while R113 and capacitors C108 and C109 provide phase correction for low-frequency square-wave transmission. The pre-emphasis time-constant is determined by the sum of resistor R111 and PRE-EMPHASIS TRIM control R112 operating in conjunction with

capacitors C104 and C105. C104 and C105 may be individually switched in or out of the circuit to allow flat, 25, 50 or 75 microsecond pre-emphasis. R109 and C107 provide phase compensation for U101.

The output of this stage is applied via terminating resistor R115 to the audio lowpass filter. The filter may be bypassed with switch S104. The filter output is applied to the summing amplifier stage, U102. Resistor R117 terminates the audio lowpass filter. Capacitor C114 provides a sample of the audio to MONO CAL potentiometer R152. Amplifier U102 is biased by R125 and R126. The output of this summing amplifier is applied via decoupling resistor R129 and inductor L101 to the modulated oscillator module. A sample of this same signal is applied to the TOTAL CAL potentiometer R130.

FM subcarrier signals, such as those from the RCA BTX-101, are applied to the summing amplifier via resistors R121 and R123. Samples of the subcarriers are applied to SCA 1 INJ. CAL and SCA 2 INJ. CAL potentiometers R122 and R124.

When operating in the stereophonic mode, an external stereo signal, such as from the RCA BTS-101, is applied via the rear-panel COMPOSITE INPUT connector J1 and rf filtering with L1 and C2 to the audio and metering module pin 7. A sample of this composite stereo signal is applied to the COMP CAL potentiometer R120 as well as to the series resistor R118. In the monaural mode, the load side of R118 is shorted to ground by MONO-COMPOSITE switch S101 and operation is in the monaural mode. In the stereo mode, the output of the audio lowpass filter is shorted out by S101 while the composite stereo signal is allowed to pass via R118 and R119 to the summing amplifier, U102.

The gain of the summing amplifier in the stereo mode is set by the ratio of R127 and R128 to R118 and R119. WIDEBAND GAIN TRIM potentiometer R128 provides a means of standardizing the gain of this amplifier such that a 3.5 volt peak-to-peak composite stereo signal at J1 provides 3.5 volts peak-to-peak at the output of U102.

One metering sample is selected by the front-panel meter switch S1. This sample is routed to the audio and metering module pin 13. On-board rf filtering is provided by R132 in conjunction with C118. Q101 and Q102 provide push-pull signals to the full-wave rectifier using Q105 and Q106. Q104 provides temperature-sensitive forward bias for the rectifiers. The rectifiers charge C125 to the peak value of the signal in question.

R144 determines the meter fall time. U103 provides the necessary high impedance load for the rectifiers and low impedance source necessary to drive the meter movement. C127 and C128, with R148 and R151, provide meter acceleration. Additional acceleration, adjustable to provide critical damping, is provided by R146 and R147 together with C126 and R145. The meter movement is connected to pins 14 and 15 of this module whenever this metering system is in use.

MODULATED OSCILLATOR

The summed total modulating signal (monaural or stereo, plus optional subcarriers) is applied to the modulated oscillator module pin 1. Refer to figure 6. The standard signal level at this point is 3.5 volts peak-to-peak total for 100% modulation. R201 and C201 provide on-board rf bypassing to the modulating signal. The sensitivity of the modulator is adjustable with R202, MODULATOR SENSITIVITY, whose range is limited by R203. Modulation of the oscillator is accomplished by the voltage-variable capacitor CR203. This capacitor is reverse-biased by R206 and R208. CR203 is coupled into the oscillator circuity via fixed capacitor C208 and variable capacitor C207, DISTORTION ADJUST.

Also connected to the oscillator circuit is a second modulator using voltage-variable capacitor CR202. The effective capacity of this element is determined by the voltage applied to pin 3 of this module. CR202 is coupled into the oscillator circuitry with C214. The modulated oscillator itself is formed using transistor Q201 and associated components. This is in a Hartley configuration operating at carrier frequency with biasing provided by R210 and R211; collector current is limited by R212. The basic tank circuit is formed by inductor L204 and capacitors C209, C210, C211 and C218.

The output of the oscillator is applied to buffer stage Q202. This stage is biased by R215 and R217; R219 sets the collector current. This is a tuned amplifier with C225, L208 and C226 determining the bandpass.

Both of these stages are supplied power by on-board regulator U201. The output of this regulator is set to about 9 volts as determined by R222 and R223.

The output amplifier of the modulated oscillator module utilizes transistor Q203 and associated components. This stage operates without forward bias. It is tuned by L211, C231 and C232.

Most of the output from Q203 is applied to the rf power amplifier via pin 7 of the modulated oscillator module. A lesser sample is applied to the front-panel test connector via the resistive attenuator formed by R229 and R230. Another sample is applied to the programmable high-frequency divider via C235 and R231. A final sample is applied to rectifier CR204. The output of this rectifier is applied to the BUFF CAL potentiometer R234.

RF AMPLIFIER

The on-frequency carrier from the modulated oscillator module is applied to the input of the rf power amplifier. Refer to figure 8. The input to this amplifier is tuned by C301, L301 and C302. The first stage, utilizing Q301, operates class C. It is tuned by C308, C309, C310 and L305.

The second stage, Q302, also operates class C. It is tuned with L309, C317 and C318. Harmonics are removed by a fixed-tuned lowpass filter using C319, L310, C320 through C324, L311 and L312. A directional coupler provides front-panel indications of forward and reflected power.

HIGH-FREQUENCY DIVIDER

A sample of the rf from the modulated oscillator module is applied to pin 4 of this module. Refer to figure 9. Here, it is amplified by Q401, Q402 and Q403. Q401 operates nearly class A; is biased by R402 and R401, and collector current is determined by R403. The second stage operates in a similar manner using R407 and R406 for biasing and R409 for collector current determination. The third stage using Q403 is used for level translation into integrated circuit U401. Q403 is forward biased and temperature-compensated by CR401, which has a current through it via R411. Integrated-circuit divider U401 divides the carrier frequency by four; its output is a square wave at one-quarter of the carrier frequency, regardless of frequency.

The output from U401 is applied to a second divider using part of U407. This divider's input is at pin 6 and its output, divided again by four to one-sixteenth of carrier frequency, is at pin 2.

The output from U407 pin 2 is applied to a series of dividers whose division ratio can be controlled by means of straps. Referrred to as programmable dividers, as implemented in this

design, they can divide by any division ratio between 1770 and 2158. This will accommodate any carrier frequency from 87.5 to 107.9 MHz. The outputs from these four dividers are applied to a four-input gate using U406. The output from this gate, which is a narrow pulse at a fixed rate of 3125 Hz, is applied to a second part of U407 for further division to a square wave of 1562.5 Hz. Regardless of the carrier frequency chosen, the output from this module will be a square wave at 1562.5 Hz. This square wave is routed via inductor L402 to the other module involved in the automatic frequency control system, the reference oscillator and AFC module. The output from U407 is also available via pin 7 to the front-panel meter switch H F DIV position.

REFERENCE OSCILLATOR AND AFC

A very stable 5 MHz signal is generated by the reference oscillator using Q501. See figure 11. Unlike other exciters which are rated over a limited temperature range, the reference oscillator in the RCA BTE-115 is not only temperature compensated, but is controlled by an efficient proportional control crystal oven. The combination of these techniques, together with the use of a field-effect transistor, provides excellent frequency stability over the full -20^{o} to $+70^{o}$ C range. The load for Q501 is R503. C503, the crystal, C501 and C502 form a Pierce oscillator. C501, FREQ, is used to vernier the frequency of the 5 MHz signal. All of the sensing and driving circuitry for the oven is self-contained as a part of the oven assembly.

A sample of the 5 MHz oscillation is applied to buffer Q502 via resistive divider R504 and R505. Q502 is used to interface to the digital circuitry, with its output coupled to integrated circuit U501. The output of U501 is a 5 MHz pulse. This 5 MHz signal is subsequently divided down to a frequency of 1562.5 Hz by integrated circuits U502 through U505. The output of U505 is available via pin 6 to the front-panel meter switch L F DIV position.

The 1562.5 Hz square wave from the 5 MHz reference oscillator is also routed to pin 5 of U501. The 1562.5 Hz square wave signal from the programmable divider module is routed to U501, pin 4, via module pin 5. U501 is used as a phase detector. Its output is a signal at a repetition rate of 3125 Hz, and a duty cycle that varies from 0% to 100%, dependent upon the phase error between the divided-down carrier and the divided-down reference oscillator.

The output of U501 is applied via resistive divider R510 and R511 to amplifier stage Q503. The output from this amplifier is a waveform similar to that from U501 save for a much higher amplitude. This signal is applied to three different circuits; the automatic frequency control system, a loss-of-lock system, and a unique divider/miscount monitor.

The automatic frequency control system accepts the signal from the collector of Q503 and first passes it through a 60 Hz lowpass filter. The resultant dc signal is then applied to a dc amplifier, with U507 and associated components. The output from this stage is applied to the modulated oscillator module frequency-controlling input; it is also available via pin 9 to the front-panel meter switch AFC position.

Should the AFC system lose lock, there will be a low-frequency ripple riding on the output of the signal from Q503. This signal is extracted by the 250 Hz lowpass filter using U509 and associated components.

Comparator U510 generates a single pulse at its output for each cycle of the previously-mentioned low-frequency ripple. This pulse is rectified by CR504 and is used to charge C532 via R542. The resulting dc is used to operate Darlington transistor pair Q505 and Q506. This excites the loss-of-lock relay K1 via terminal 11.

Should the carrier-frequency oscillator, the reference oscillator or any of the dividers fail, or should any stage miscount, then the 3125 Hz signal at the collector of Q503 will disappear. The tuned amplifier stage composed of U508 and its associated circuitry monitors the presence of this 3125 Hz tone. The output of U508 is coupled via capacitor C526 to the rectifier circuit involving CR501, CR502 and capacitor C527. When the system is functioning correctly, a dc voltage will be developed across C527. This voltage is applied via R534 and R535 to transistor Q504, which is normally kept in saturation; the voltage at its collector is low.

Should any of the previously-mentioned oscillator or divider failures occur, the voltage at the collector of Q504 will rise, allowing CR503 to charge capacitor C532. This will energize the loss-lock relay K1.

It should be noted that, when the front-panel AFC-DEFEAT switch is operated to the DEFEAT position, relay K1 is made inoperative. In addition, a substitute AFC voltage is applied

to the modulated oscillator module. This substitute voltage is derived from the front-panel MANUAL FREQUENCY ADJUST potentiometer, enabling the operator to set the carrier frequency regardless of any AFC system failure.

POWER SUPPLY

All of the circuitry in the BTE-115 operates from precisely regulated power supply voltages. These are derived from a bridge rectifier supplying primary unregulated power to a single countergrade filter capacitor. Refer to figure 13. The normal voltage across this capacitor is about 20 volts dc. It is applied to a series of regulators for the various circuits. All of the digital integrated circuits are powered by a 309-type regulator whose output is 5 volts dc. Most of the remaining circuitry is regulated by a 723-type integrated circuit (U601) operating in conjunction with PNP transistor Q601 and NPN series pass transistor Q1. The output of this regulator system is adjustable by means of +13.5 V ADJ potentiometer, R607, whose range is limited by R606 and R608. Current sensing for short circuit protection is provided by R604. An adjustable voltage is provided by a second regulator using U602 and Q2. This regulator provides a front-panel variable voltage for the rf amplifier as a means of adjusting the power output. The front-panel RF OUTPUT LEVEL control has its range restricted by the internal MAX SET control, R617. R615 provides current sensing for short circuit protection.

INSTALLATION

GENERAL

This procedure covers installation of the BTE-115 Exciter in the following RCA transmitters:

BTF-3ES1 BTF-5ES2	Referred to in text as BTF-3/5
BTF-5ES1 BTF-10ES1 BTF-20ES1	Referred to in text as BTF-5/10/20

This procedure specifies use of the optional MI-561071 Exciter/Transmitter Interface and Radiate Panel. This panel provides ac outlets for connection of the Exciter Unit (and Stereo and SCA Generator) Power Cord(s), and also contains a relay which deactivates the Exciter RF Power Amplifier when the main transmitter is shut down.

Although this procedure applies to the above mentioned transmitters, it can generally be applied to other FM transmitters as well.

In addition to the Exciter Unit and Interface Panel, the Exciter System may include a Stereo Generator and one or two SCA Generators. Provisions for mounting these are covered below. Complete installation instructions for these units are included with the instruction manuals supplied with the units.

SELECTION OF MOUNTING LOCATION

A complete Exciter System (Exciter, Interface, Stereo Generator, 2 SCA Generators) requires 10 1/2 inches (26.7 cm) of rack mounting space in the transmitter. A drilling template, drawing no. 3742738, is available with the Exciter which shows the required mounting holes, and the location of the various units within this 10 1/2 inches (26.7 cm). Blank panels are mounted in place of equipment not used.

In the BTF-3/5 transmitter, the Exciter System is located in the 10 1/2 inch (26.7 cm) space provided near the center of the transmitter rack. In the BTF-5/10/20 transmitter, the Exciter System normally mounts in the 10 1/2 inch (26.7 cm) space provided between the blank panels in the lower left side of the transmitter (as viewed from front).

However, if the optional slider rails are used with the Exciter System, the Exciter may have to be relocated to prevent interference between the sliders and other components in the BTF-5/10/20 transmitter. Refer to separate instructions supplied with the slider rails for details.

DRILLING HOLES

Using the rack template, mark, then drill and tap the #10-32 holes, if they are not already provided. These holes will be needed in all cases, since they will be used to mount either the appropriate unit, or a blank panel. In transmitters that are already drilled for the older RCA BTE-15A Exciter System, the bottom (3) of the (4) existing tapped holes will line up with tapped holes specified by the template.

The counter bored holes may not be required. They are used primarily to mount the optional slider rails to the cabinet, and should be drilled for all units to be equipped with slides. In systems utilizing the stereo or SCA generators, these holes are used to mount the system interconnecting cable to the cabinet. In this case, one counter bored hole at each unit location, on the left side only (as viewed from front) should be sufficient for securing the cable.

INTERFACING THE EXCITER TO THE TRANSMITTER

It is recommended that the Exciter and Interface Panel be temporarily mounted or held in place so that the ultimate location of the various connectors can be determined. Wiring is then accomplished as follows:

Control Circuits

Connections are made to the 4 pin plug (5J1) located on the Interface/Radiate Panel. A normally closed set of contacts is provided between pins 1 and 2 of this connector. These contacts open upon failure of the AFC circuit in the Exciter, providing a shut down signal to the transmitter. 220 volts ac is required between pins 3 and 4 of this connector when rf output is required from the Exciter. Absence of this voltage when the main transmitter is shut down de-energizes the interface board relay, resulting in removal of power from the exciter rf amplifier, reducing power consumption by the exciter while maintaining it in a state of readiness.

If the transmitter is already equipped with the mating four pin plug, proceed to AC POWER INPUT TO THE EXCITER SYSTEM, below. Otherwise, proceed as follows:

A. BTF-3/5 Transmitter - Remove existing plugs from control wires. Connect to 4 prong plug (supplied as Interface Panel Connector Kit MI-563485, item 2) as follows:

Wire #	To Pin #
86	1
87	2
42	3
43 or 330	4

B. BTF-5/10/20 Transmitter - Remove existing plugs and associated cable harness from 1TB6 and 1Z8. Remove the 4 wires specified from this cable and connect to 1TB6 and the 4 prong plug (supplied as Interface Panel Connector Kit MI-563485, item 2) as follows:

Wire #	From	To Pin #
508	1TB6-9	1
509	1TB6-10	2
500	1TB6-1	3
501	1TB6-2	4

Retain remainder of cable for possible use with Stereo or SCA Generators.

AC Power Input to the Exciter System

117 volts ac is applied to the twist-lock connector on the Interface Panel. From there it is distributed via the four standard convenience outlets provided for the exciter, stereo generator, and SCA units.

If transmitter is already equipped with the proper mating plug, proceed to EXCITER RF OUTPUT, below. Otherwise, proceed as follows:

A. BTF-3/5 Transmitter - Connect mating twist-lock plug (supplied with the transmitter as MI-56101Z, Item 5) to the 117 volt ac power source, using suitable three wire cable.

B. BTF-5/10/20 Transmitter - Remove existing two wire twist-lock connector from wire numbers 115 and 116. Connect these wires, plus an added safety ground wire, to the new twist-lock supplied as Interface Panel Connector Kit MI-563485, Item 1. Connect the safety ground wire, which should be at least #16 AWG, to the main transmitter cabinet using the mounting screw adjacent to 1TB1 terminal 13 (located in wiring trough on top of cabinet).

Wire #	From	To Pin Color
115	1TB1-13	Silver
116	1TB1-14	Gold
New	1TB1-Chassis	Green

Exciter RF Output

The rf output jack on the rear of the exciter unit is connected to the driver input of the transmitter.

A. BTF-3/5 Transmitter - Using the rf cable supplied with the transmitter, connect the exciter output to J101 on the main transmitter cabinet, or to J3 on the optional directional coupler (DC1) if used.

B. BTF-5/10/20 Transmitter - Using the rf cable supplied with the transmitter, connect the exciter output to 1J101 on the main transmitter cabinet. Route this cable in front of the metal cabinet member behind the exciter so the exciter may be easily removed for servicing. The directional coupler, 1Z8 (if provided) is used with the BTE-115 exciter only in the case of parallel transmitters.

Audio Input Signals

For monaural systems without SCA, the audio signal is connected to the 10 pin plug on the rear of the exciter, pin numbers 7 and 9. Pin 6 is used as the shield ground. Two conductor shielded cable is required. For systems utilizing a stereo generator or SCA generator(s), this connection is not used. In this case, skip the rest of this installation procedure, and go to the Installation section of the stereo generator instruction manual (or SCA manual if stereo is not used).

A. BTF-3/5 Transmitter - Connect audio input line directly to the 10 pin plug MI-561067-1. Use pins 7 and 9 for signal, ground shield to pin 6.

B. BTF-5/10/20 Transmitter - Locate wire number 201 in the area where the exciter will be installed. Cut off two prong connector (if attached) and connect this wire to the 10 pin plug MI-561067-1 as follows:

#201 Color	Pin #
Red	7
Black	9
Shield	No Connection

Wire numbers 202-204 are not used.

Final Mounting

Mount Interface/Radiate Panel in place, and connect 4 pin plug and ac twist-lock connector to panel. Dress associated cables so as to not interfere with removal of the exciter unit for servicing. Connect umbilical cord extending from interface unit to the 6 pin connector on rear of exciter. Connect audio input (10 pin plug) rf output, and ac power cables to the exciter, and mount exciter in place. Fill unused space(s) with blank panels.

INTERNAL ADJUSTMENTS

The following adjustments are not meant to be accomplished routinely, but rather after component replacement or to correct long-term aging, unless otherwise noted.

POWER SUPPLY

NOTE: Unless otherwise specified, voltage measurements are made to chassis ground.

+13.5 Volt Adjustment: R607 is set for a reading of +13.5 volts dc while monitoring the 13.5 volt line, pin 1 of the power supply board, or the 13.5 volt line tie-point immediately behind the power supply board. Refer to figure 12 and figure 21.

Maximum Power Set: R617 controls the upper power level from the exciter. Operate R1, the front-panel RF OUTPUT LEVEL control, to maximum and adjust R617 to the desired upper power level. Do not exceed 17 watts; a lower value is preferred. Following this adjustment, return the front-panel RF OUTPUT LEVEL control to that setting yielding the desired output power level.

MODULATED OSCILLATOR

Oscillator Frequency: C211 is used to set the natural or free-running frequency of the modulated oscillator. Note that slightly changing the setting of this capacitor from its optimum position will cause an equal but opposite correction factor to be applied from the AFC system. For this reason, the method of setting C211 is to monitor the AFC voltage with the front-panel

meter and set C211 for a midscale meter deflection. Refer to figures 5 and 17

Distortion Adjust: C207 is set for minimum harmonic or intermodulation distortion when modulating the exciter with a suitable test tone. Harmonic distortion measurements may be made using a 400 Hz or 1000 Hz test tone. Alternatively, intermodulation testing measurements may be made using a standard 60/6000 Hz test signal.

> NOTE: Readjustment of DISTORTION control, C207, may require a slight readjustment of C211 to keep the front panel meter AFC position at midscale. In addition, the MODULATOR SENSITIVITY control, R202, may have to be reset slightly.

Modulator Sensitivity: R202 is set for the desired peak frequency deviation, normally 75 kHz for 100% modulation, when a modulating signal of 3.5 volts peak-to-peak is present at pin 1 of the modulated oscillator module.

Buffer Tuning: C225 is tuned for maximum meter reading while monitoring TP201 with an external dc voltmeter. A slightly less accurate method is to monitor the BUFFER position with the front-panel meter.

Amplifier Tuning: C231 is tuned for maximum meter reading on the BUFFER position of the front-panel meter.

Buffer Calibration: After C225 and C231 are correctly calibrated, adjust R234 for a reading of 20 with the front-panel meter in the BUFFER position.

RF AMPLIFIER

> NOTE: The adjustments on this module will need to be rechecked when the carrier frequency is changed.

Input Tuning: C301 is tuned for maximum indication on the front-panel meter in the DRIVER position. Refer to figures 7 and 18.

Driver Tuning: C308 and C310 are tuned for maximum indication on the front-panel meter in the FINAL position.

Final Tuning: C317 is tuned for maximum power output. C318 is then tuned for maximum power output consistent with minimum or near-minimum meter readin in the FINAL position.

> NOTE: These controls interact to some extent; each time C318 is adjusted, then C317 should be readjusted for maximum power output. In addition, C317 may be fine-tuned for minimum incidental amplitude modulation at the conclusion of this process.

Forward Power Calibration: R310 allows the front-panel meter to be calibrated in the FORWARD position. Set the exciter power output level to 10 watts as read on an external calibrated wattmeter. Adjust R310 for a reading on the "10 W" mark.

Reflected Power Calibration: R313 allows the front-panel meter to be calibrated in the REFLECTED position. Check the forward power calibration as outlined in the previous step. Then switch the front-panel meter to the REFLECTED position. Momentarily remove the external rf load. Adjust R313 for a reading on the "10 W" mark. Immediately reinstall the external load.

REFERENCE OSCILLATOR AND AFC

Frequency Adjustment: C501 is adjusted to place the carrier at the desired frequency. This control has about a plus and minus 2 kHz range. It is best adjusted using the station's frequency monitor. Alternatively, a high-frequency radio receiver may be used to compare the frequency of the 5 MHz oscillator to that of a standard-frequency transmission. Refer to figures 10 and 20.

3125 Hz Tuning (Divider/Miscount Monitor Tuning): R530 is adjusted by monitoring the white test point TP507 and tuning for maximum meter reading. Between 6 and 10 volts dc should be achieved.

AFC Loss Idle Adjustment: R519 is adjusted to return the AFC system to its normal operating point should there be a problem with the reference oscillator or any of the divider circuits. Stop the oscillation of the 5 MHz reference oscillator by touching its frequency vernier capacitor C501. Note that the AFC loss light will come on. Under these conditions, adjust R519 for a mid-scale reading on the front-panel AFC metering position. Allow the 5 MHz reference oscillator to restart and observe that the AFC system is again operational.

AFC/Defeat Switch: In order to prevent K1 from energizing and removing transmitter output momentarily when the AFC/DEFEAT switch is restored to the AFC position, the following procedure should be followed:

With meter switch S1 in the AFC position, adjust the front-panel MANUAL FREQUENCY ADJUST control for maximum sweep indication (at a reduced sweep rate of approximately 60 sweeps per second) on the meter. The meter will show the AFC sweeping.

Switch S2 to the AFC position as the meter reading is increasing and reads approximately 15 on the meter AFC scale. This should restore the BTE-115 to AFC operation without the transmitter being removed from the air.

AUDIO AND METERING MODULE

Meter Zero:

NOTE: Prior to making the following

adjustment, place a short across the front-panel meter movement and confirm that it is mechanically zeroed. If it is not zeroed, use a small screwdriver and zero meter. Remove the short.

Remove all modulation input to the exciter. Rotate the front-panel meter switch to the TOTAL MOD position. If there is a deflection at this time, adjust METER ZERO control R150 to electrically zero the meter movement. Refer to figures 3 and 16.

Wideband Gain Trim: Apply a 3.5 volt peak-to-peak sinusoidal signal to the COMPOSITE INPUT on the rear of the exciter. Be sure the exciter is in the stereophonic mode by operating switch S101 to the COMPOSITE position (see figure 3). Adjust WIDEBAND GAIN TRIM control R128 for a modulation level of 100% as read on a modulation monitor.

Composite Modulation Meter Calibration: With the system set up for the previous step, rotate the front-panel meter switch to the COMP MOD position. Adjust COMP CAL control R120 for a meter deflection to the 0 dB mark.

Total Modulation Meter Calibration: With the system set up for the previous step, rotate the front-panel meter switch to the TOTAL MOD position. Adjust TOTAL CAL control R130 for a meter deflection to the 0 dB mark.

SCA 1 Injection Meter Calibration: Apply a subcarrier or audio generator sinusoidal signal to the left SCA input (SCA INPUT 1) on the rear of the exciter. The level of this signal should be that which causes 9% modulation (injection) of the exciter as read on a subcarrier modulation monitor. Rotate the front-panel meter switch to read SCA 1 INJ. Adjust SCA 1 INJ CAL control R122 for a 0 dB meter deflection.

SCA 2 Injection Meter Calibration: Apply the signal as in the previous step to the right SCA input (SCA INPUT 2) on the rear of the exciter. Rotate the front-panel meter switch to read SCA 2 INJ. Adjust SCA 2 INJ CAL control R124 for a 0 dB meter deflection.

Left Modulation Meter Calibration:

NOTE: The following two adjustments require the use of the RCA BTS-101 Stereo Generator to generate the stereo signal. Refer to IB-8025127.

Apply a 400 Hz test tone to the left channel (J101 pins 6 and 3) of the BTS-101 Stereo Generator. Set the level to that which modulates the system 100%. Rotate the BTE-115 front-panel meter switch to the LEFT MOD position. Adjust LEFT CAL control R154 for a meter reading of 0 dB.

Right Modulation Meter Calibration: As in the previous step, apply a 400 Hz test tone to the right channel (J101 pins 4 and 1) of the BTS-101. Set the tone level to that which modulates the system 100%. Rotate the BTE-115 front-panel meter switch to the RIGHT MOD position. Adjust RIGHT CAL control R153 for a meter reading of 0 dB.

Monaural Gain Trim: Prior to making this adjustment, be sure the exciter is in the monaural mode by operating S101 to the MONO position (see figure 3). Apply a test tone of 400 Hz at a level of +10 dBm to the BTE-115 audio input, J4 pins 7 and 9. Adjust MONO GAIN TRIM control R102 for 100% modulation.

Monaural Meter Calibration: With the exciter set up as in the previous step, rotate the front-panel meter switch to the MONO MOD position. Adjust MONO CAL control R152 for a meter deflection to the 0 dB mark.

Pre-emphasis Trim:

> NOTE: Prior to adjustment of this control, ascertain that the BTE-115 is operating in the monaural mode.

Apply an audio generator to the monaural audio input terminals, J4 pins 7 and 9. Set the frequency of the audio generator to 3183 Hz for 50 microsecond service, or 2122 Hz for 75 microsecond service. When the pre-emphasis capacitors C104 and C105 are switched into the circuit by switches S102 and S103, the audio response will be pre-emphasized. When both switches are on, the response will have a 75 microsecond characteristic. When only S103 is on, the response will have a 50 microsecond characteristic. Switch in the desired pre-emphasis capacitor(s) and adjust PRE-EMPHASIS TRIM control R112 for a 3 dB rise in modulation sensitivity at the pre-emphasis breakpoint frequency.

Meter Damping: While varying the level of an audio modulating test tone (any audio frequency - but without switching it on and off), adjust METER DAMPING control for rapid response with a minimum overshoot.

ROUTINE OPERATION

Due to the modern, all solid-state design of the BTE-115, system stability is outstanding. The absence of a cooling fan eliminates routine maintenance of that item, and the all-electronic oven for the frequency-controlling crystal eliminates oven contact maintenance problems. There are no controls which need to be routinely readjusted.

METER READINGS

It should be considered good operating practice to weekly (or as often as deemed necessary) observe the front-panel meter readings and record them. Typical readings are indicated below:

Position	Typical Reading
+5.0V	Between 4.5 and 6
+13.5V	Between 12 and 15

Position	Typical Reading
HF DIV	Between 12 and 18
LF DIV	Between 12 and 18
AFC	Between 10 and 20 (between the "AFC" marks)
BUFFER	Between 15 and 25
DRIVER	Between 8 and 12
FINAL	Between 15 and 20
FORWARD	Dependent on exciter output power setting; Approximately 20 is typical
REFLECTED	Dependent on exciter output power setting and VSWR of load; between 0 and 5

Failure of the modulated oscillator module or of the programmable high-frequency divider will result in the HF DIV reading going to either less than 5 or greater than 20. This peculiarity is due to the bistable nature of the stage driving the metering system. During normal operation, that stage delivers a square wave, with its 50% duty cycle resulting in a nominal mid-scale meter deflection.

Failure of the reference oscillator or the associated low-frequency divider will result in the LF DIV reading going to less than 5 or greater than 20, as described above for the high-frequency system.

The AFC meter reading should be approximately midscale. Drift of this reading is harmless unless it approaches the "AFC" marks on the meter scale. Should the reading go outside of this range, then corrective action should be taken, as outlined in the INTERNAL ADJUSTMENT section. Loss of AFC lock or deliberately operating the exciter in the manually-controlled mode will result in the AFC meter position showing a meter swing.

If the AFC/DEFEAT switch is switched to the DEFEAT position, certain precautions must be taken to prevent the AFC-loss lock circuit from momentarily removing transmitter output when this switch is returned to the AFC position. For this procedure, refer to the AFC/DEFEAT switch procedure in the REFERENCE OSCILLATOR section under INTERNAL ADJUSTMENTS.

The buffer meter position has an internal adjustment located within the modulated oscillator module to set the nominal meter reading to 20. This is simply a relative reading to confirm that the modulated oscillator module has a normal output.

It should be noted that the Driver, Final, Forward and Reflected readings all drop to zero when the radiate switch is in the OFF position.

Due to component tolerances, these readings will vary from exciter to exciter. The actual readings for a particular exciter are indicated on the checkout sheet supplied with that exciter. Variations of a particular meter reading from normal are of far greater importance than the meter reading itself.

The remaining positions are dependent upon program or injection levels at the time of reading and are read on the dB scale. Full modulation or normal subcarrier injection will normally cause a meter deflection to the 0 dB mark. Although the design of the internal metering system has been done with great care to assure both stability and accuracy, bear in mind that it is intended as a maintenance aid, and that the actual modulation and injection levels should always be measured with an approved modulation monitor.

POWER ADJUSTMENT

The rf output power level may be adjusted by means of the level control on the front panel of the BTE-115. This will normally be accomplished by observing the value of drive current in the transmitter's IPA stage, or by observing the power level in an external wattmeter, or by noting the "10 W" marking on the forward metering position on the BTE-115 (in the case of a 10-watt educational operation). Radiation may be stopped by operating the radiate switch to the "Off" position.

FREQUENCY CONTROL

Failure of any significant component in the AFC system may require operation of the AFC switch to the defeat position. In this position, the entire AFC system is totally disconnected, including the loss-of-lock relay K1. Under these conditions, the exciter may be kept on frequency by means of the front-panel MANUAL FREQUENCY ADJUST control. This control has an approximate range of plus and minus 2 MHz.

When the AFC system is normally operational, the carrier frequency may be set with precision by using the front-panel AFC FREQUENCY ADJUST control. This control has an approximate range of plus and minus 2 kHz.

INDICATORS

The green POWER lamp CR3 will be on whenever the primary power is applied. This lamp monitors the unregulated voltage from the rectifier assembly. The amber RADIATE lamp CR5 will be on whenever the exciter is operational; this lamp monitors the regulated voltage from the power supply when the radiate switch is on. The red LOSS lamp CR4 is in parallel with the drive coil of K1. It will be on when the AFC system is not operational, regardless of whether or not the AFC system has been defeated.

RF SAMPLES

Two Type BNC connectors are located on the front panel of the BTE-115. The top one, RF MOD OSC, provides a sample of rf from the modulated oscillator module. The level is suitable for direct connection to most modulation and frequency monitors. The bottom one, SAMPLES, provides a similar sample derived from the rf power amplifier. These samples provide a convenient method of proving the exciter's performance on a stand-alone basis.

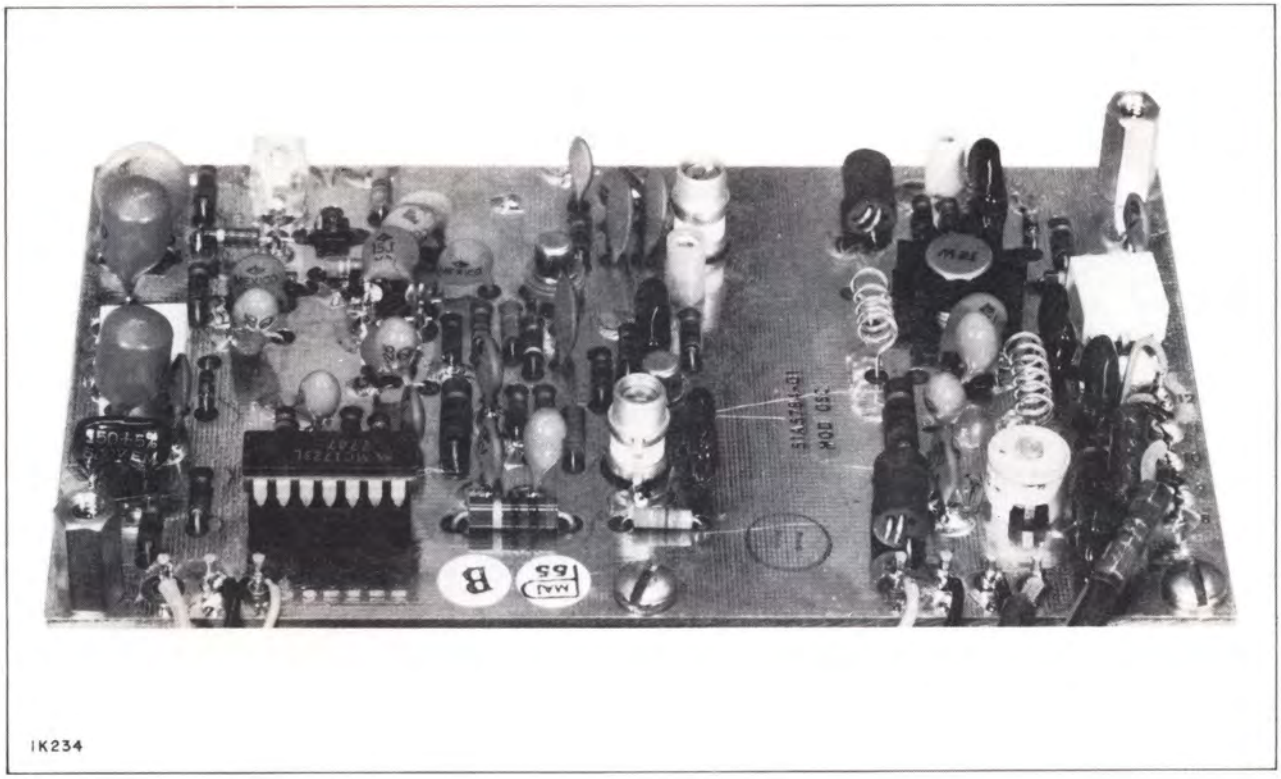


Figure D. Modulated Oscillator PW Board

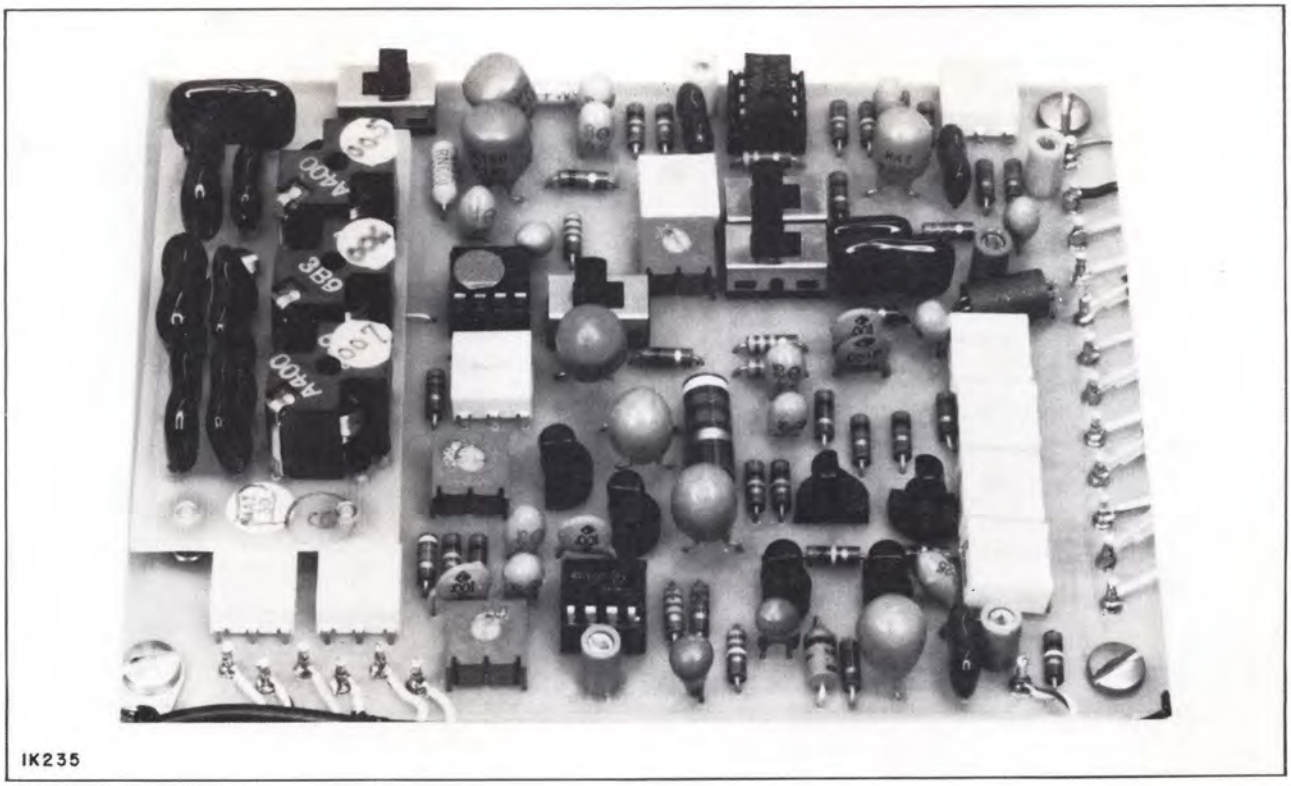


Figure E. Audio and Metering PW Board

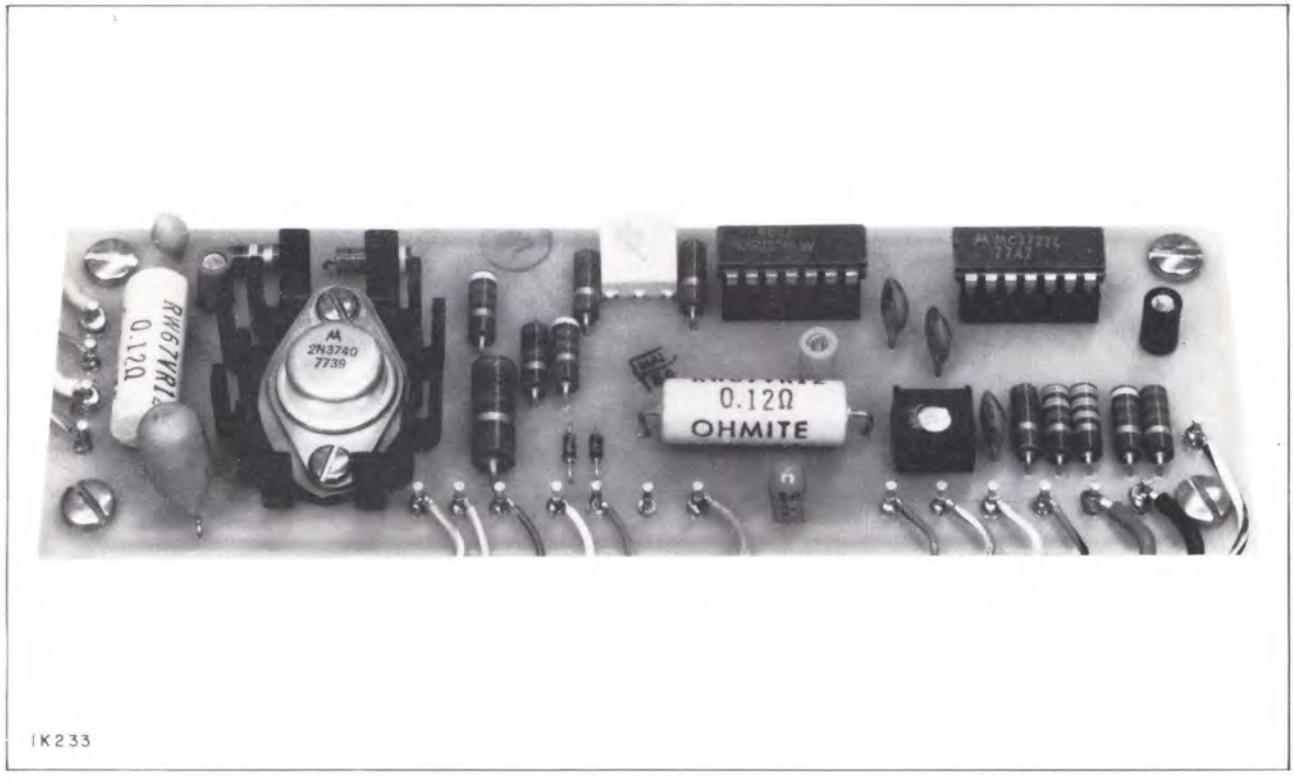


Figure F. Power Supply PW Board

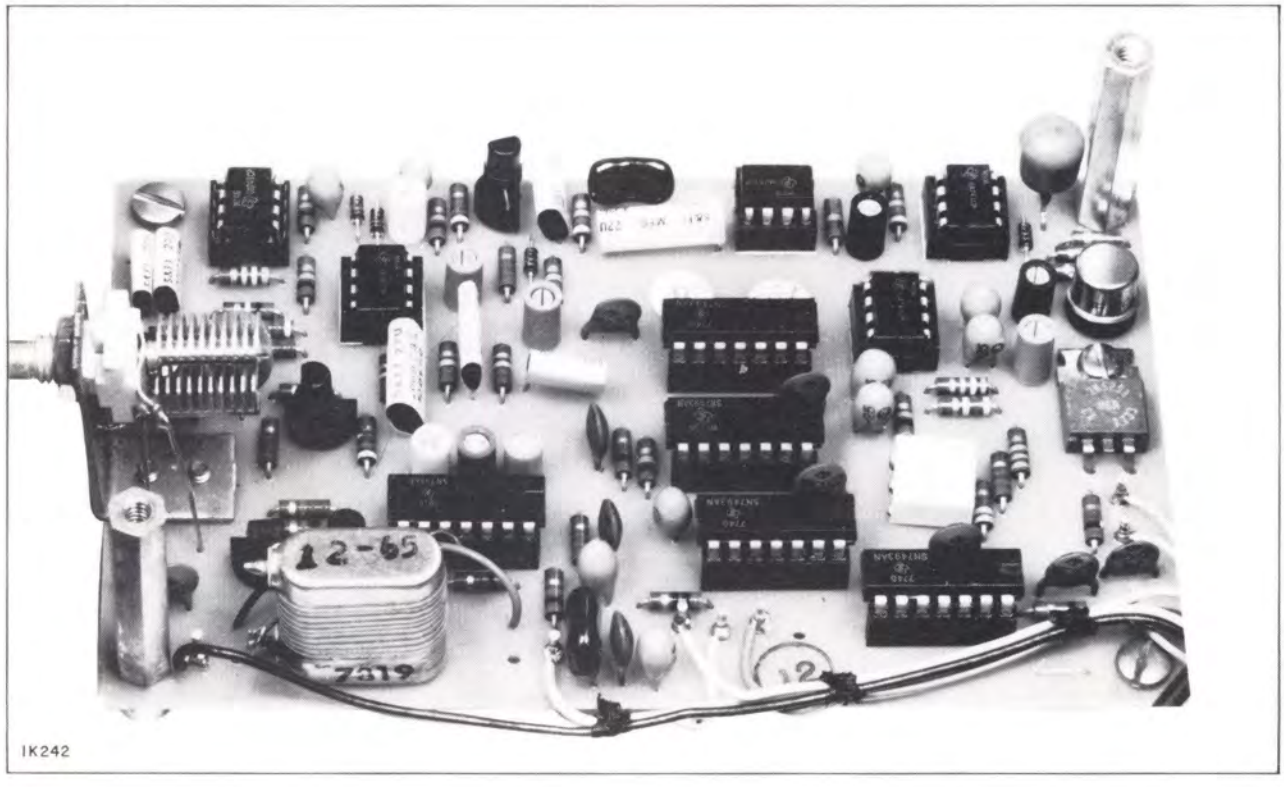


Figure G. Reference Oscillator/AFC PW Board

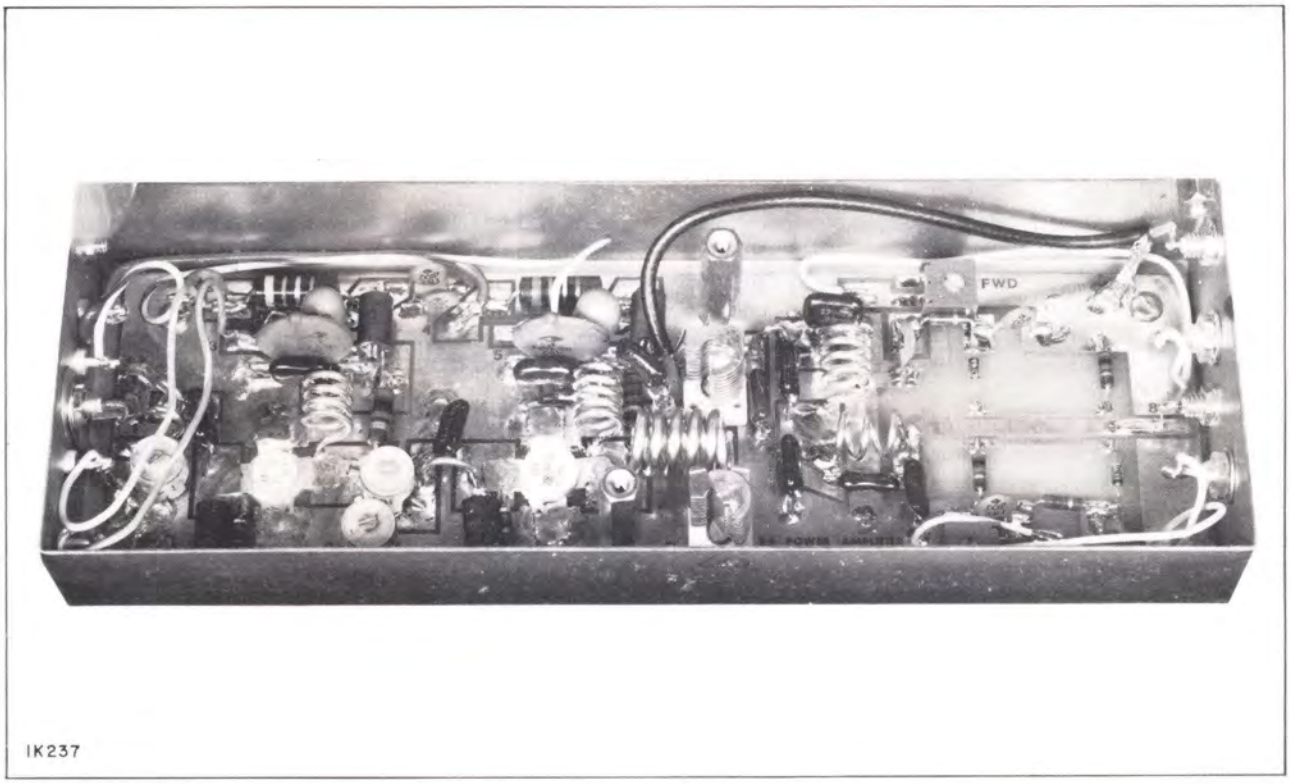


Figure H. RF Amplifier PW Board

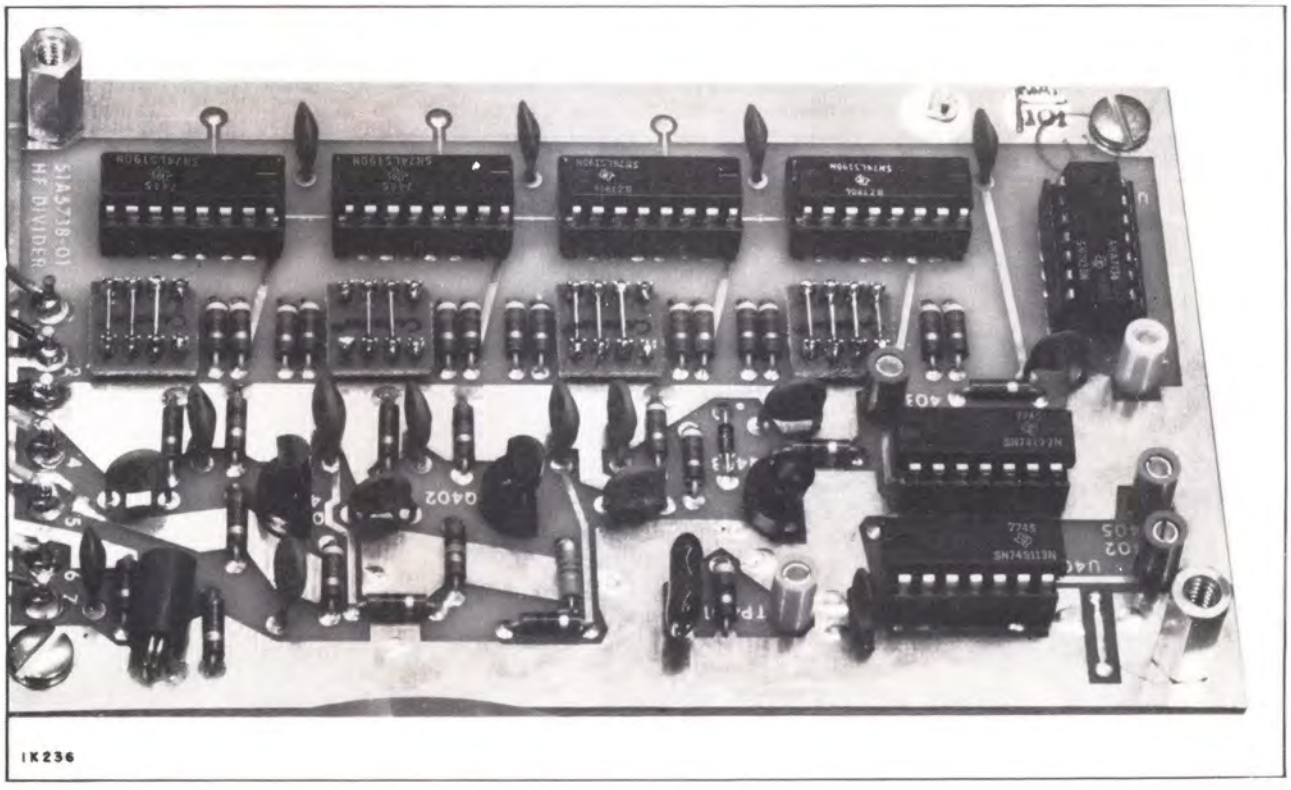


Figure I. High Frequency Divider PW Board

PARTS ORDERING INFORMATION

REPLACEMENT PARTS

Replacement parts bearing a Stock Number should be ordered by Item, Description, and Stock Number from RCA, Distributor and Special Products Division, Deptford, New Jersey 08096. Items listed under a Master Item (MI) Number should be ordered from RCA, Commercial Communications Systems Division, Camden, NJ 08102.

Because of possible products modifications and/or the unavailability of parts, the item which will be supplied against an order for a replacement part may not be an exact duplicate of the original part. As a result, some of the replacement parts received may require a mounting modification of the customer's design. In some cases, parts and/or instructions for adapting the substitute parts will be supplied. In no way will the substitute parts impair the operation or performance of the equipment.

For information regarding the use of any parts received, write RCA, Tech Alert, Bldg. 2-8, Camden, NJ 08102, or call (609) 338-3434.

EMERGENCY PART SERVICE

For emergency part service during working hours, contact RCA Distributor and Special Products Division, telephone (609) 848-5900 or (609) 541-3636 extension 2234 or 2235. After working hours (Eastern time) telephone (609) 853-0560.

LOCATION	ORDERING INSTRUCTIONS
Continental United States, including Alaska and Hawaii	Replacement Parts bearing a STOCK NUMBER should be ordered from RCA Distributor and Special Products Division – 2000 Clements Bridge Road – Deptford, NJ 08096.
	Replacement Parts bearing a MASTER ITEM (MI) NUMBER should be ordered from RCA, Commercial Communcations Systems Division – Camden, NJ 08102 or your nearest RCA Regional Office.
	Replacement Parts with NO STOCK or MASTER ITEM (MI) NUMBER are standard components. They are not stocked by RCA and should be obtained from your local electronics distributor.
Dominion of Canada	Order from your local RCA Sales Representative or his office or from: RCA Victor Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, Hawaii, and the Dominion of Canada	Order from your local RCA Sales Representative or from: RCA International Division, Clark, New Jersey – U.S.A. – Wire: RADIOINTER
	Emergency: Cable RADIOPARTS, DEPTFORD, NJ

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
			BTE-115 FM EXCITER
			MI-561060
			MAIN FRAME
C1	424873		CAPACITOR - 12,000UF 40V
C2 THRU C14	241490		CAPACITOR - 470PF FEED THRU
C15	426979		CAPACITOR - .001UF 20% 1000V CERAMIC DISC
C16	426979		CAPACITOR - .001UF 20% 1000V CERAMIC DISC
CR1	426606		RECTIFIER - TYPE 980-2
CR2	234552		DIODE - TYPE 1OD2
CR3	441636		DIODE - LED GREEN
CR4	441634		DIODE - LED RED
CR5	441635		DIODE - LED AMBER
F1	426231		FUSE-2A
J1	223973		JACK-COMPOSITE INPUT
J2	223973		JACK-SCA INPUT 1
J3	223973		JACK-SCA INPUT 2
J4	442913		CONNECTOR-10 CONTACTS
J5	442914		CONNECTOR- 6 CONTACTS
J6	223973		JACK-MOD DSC SAMPLE
J4	223973		JACK-RF SAMPLE
J8	223973		JACK-RF OUTPUT
K1	431716		RELAY
L1 THRU L9	425969		REACTOR-10UH RF CHOKE
L10 THRU L13	423803		REACTOR-10UH
M1	441654		METER-0-200UA
Q1	2N3055		TRANSISTOR - TYPE 2N3055
Q2	2N3055		TRANSISTOR - TYPE 2N3055
R1	441659		RESISTOR-10000 OHM VARIABLE, RF OUTPUT LEVEL
R2	441658		RESISTOR-1000 OHM VARIABLE, MANUAL FREQ ADJUST
R3	512210		RESISTOR-1000 OHM 10% 1W
S1	442904		SWITCH-METERING
S2	441651		SWITCH-TOGGLE AFC/DEFEAT
S3	441651		SWITCH-TOGGLE OFF/RADIATE
T1	423785		TRANSFORMER-POWER
T2	426792		TRANSFORMER-INPUT
U1	441655		REGULATOR LM309K
XK1	426041		SOCKET-RELAY
	425875		CLAMP-CAPACITOR FOR C1
	441652		KNOB-CONTROL FOR R2
	441653		KNOB-CONTROL FOR S1
	246418		RETAINER-FOR RELAY K1
	248368		SOCKET-FOR Q1,Q2,U1
	429892		SOCKET-FUSE
			AUDIO AND METERING BOARD
			CAPACITORS
C101	230245		150PF 5% 500V

Symbol	Stock No.	Drawing No.	Description
C102	42C073		47UF 10% 20V TANTALUM
C103	425983		10UF 20V TANTALUM
C104	223554		910PF 5% 100V MICA
C105	441643		1800PF 1% 500V MICA
C106	425983		10UF 20V TANTALUM
C107	223038		2PF 500V MICA
C108	425983		10UF 20V TANTALUM
C109	425983		10UF 20V TANTALUM
C110	441627		150UF 10% 15V
C111	441627		150UF 10% 15V
C112	426979		.001UF 20% 1000V CER DISC
C113	426979		.001UF 20% 1000V CER DISC
C114	441627		150UF 10% 15V
C115 THRU			
C117	425983		10UF 20V TANTALUM
C118	23C245		150PF 5% 500V MICA
C119	425983		10UF 20V TANTALUM
C120	42C073		47UF 20V TANTALUM
C121	42C073		47UF 20V TANTALUM
C122	425983		10UF 20V TANTALUM
C123	425983		10UF 20V TANTALUM
C124	42C073		47UF 20V TANTALUM
C125	42C492		2.2UF 10% 35V TANTALUM
C126	42C492		2.2UF 10% 35V TANTALUM
C127	425983		10UF 20V TANTALUM
C128	425983		10UF 20V TANTALUM
C129	426979		.001UF 20% 1000V CERAMIC DISC
C130	426979		.001UF 20% 1000V CERAMIC DISC
CR101	423780		DIODE - ZENER TYPE 1N4734
FL101			LOW PASS AUDIO FILTER - SEE SEPARATE LISTING FOR MI-561063
L101	245741		REACTOR - RF CHOKE
Q101 THRU			
Q106	248024		TRANSISTOR - TYPE 2N2924
			RESISTORS
R101	426234		820 OHM 10% 1/4W
R102	426851		1000 OHM VARIABLE MONO GAIN TRIM
R103	219459		1500 OHM 10% 1/4W
R104	108865		1000 OHM 10% 1/4W
R105	108865		6800 OHM 10% 1/4W
R106	108868		12000 OHM 10% 1/4W
R107	426112		22000 OHM 10% 1/4W
R108	108865		1000 OHM 10% 1/4W
R109	219458		330 OHM 10% 1/4W
R110	218499		10000 OHM 10% 1/4W
R111	426112		22000 OHM 10% 1/4W
R112	436791		10000 OHM VARIABLE PRE-EMPHASIS TRIM
R113	218499		10000 OHM 10% 1/4W
R114	108865		1000 OHM 10% 1/4W
R115	248518		4990 OHM 1% 1/8W
R116	23C605		27 OHM 10% 1/4W
R117	248518		4990 OHM 1% 1/8W
R118	108865		1000 OHM 10% 1/4W
R119	218499		10000 OHM 10% 1/4W
R120	436791		10000 OHM VARIABLE COMPOSITE CAL.
R121	426219		33000 OHM 10% 1/4W
R122	436791		10000 OHM VARIABLE SCA 1 INJ. CAL.
R123	426219		33000 OHM 10% 1/4W
R124	436791		10000 OHM VARIABLE SCA 2 INJ. CAL.
R125	425219		33000 OHM 10% 1/4W
R126	218500		39000 OHM 10% 1/4W
R127	108867		6800 OHM 10% 1/4W
R128	436791		10000 OHM VARIABLE WIDEBAND GAIN TRIM
R129	218758		220 OHM 10% 1/4W

Symbol	Stock No.	Drawing No.	Description
R130	436791		10000 OHM VARIABLE TOTAL CALIBRATE
R131	223769		100000 OHM 10% 1/4W
R132	108865		1000 OHM 10% 1/4W
R133	223769		100000 OHM 10% 1/4W
R134	108865		1000 OHM 1/% 1/4W
R135	108861		100 OHM 10% 1/4W
R136	108861		100 OHM 10% 1/4W
R137	108865		1000 OHM 10% 1/4W
R138	223769		100000 OHM 10% 1/4W
R139	219459		1500 OHM 10% 1/4W
R140	218499		10000 OHM 10% 1/4W
R141	218499		10000 OHM 10% 1/4W
R142	512147		470 OHM 10% 1W
R143	426233		22 OHM 10% 1/4W
R144	426249		330000 OHM 1/% 1/4W
R145	108867		6800 OHM 10% 1/4W
R146	426219		33000 OHM 10% 1/4W
R147	436795		100000 OHM VARIABLE METER DAMPING
R148	108865		1000 OHM 10% 1/4W
R149	218499		10000 OHM 10% 1/4W
R150	436795		100000 OHM VARIABLE METER ZERO
R151	108864		470 OHM 10% 1/4W
R152	436795		100000 OHM VARIABLE MONO CAL.
R153	436791		10000 OHM VARIABLE RIGHT MOD CAL.
R154	436791		10000 OHM VARIABLE LEFT MOD CAL.
S101	422416		SWITCH-MONO-COMPOSITE
S102	422416		SWITCH-PRE-EMPHASIS 0-25
S103	422416		SWITCH-PRE-EMPHASIS 0-50
S104	422416		SWITCH-FL101 AUDIO LPF IN-OUT
TP101	425993		TEST POINT - ORANGE
TP102	425992		TEST POINT - YELLOW
TP103	425994		TEST POINT - GREEN
TP104	425990		TEST POINT - BLUE
TP105	425989		TEST POINT - VIOLET
U101	435504		INTEGRATED CIRCUIT - TYPE 318
U102	435504		INTEGRATED CIRCUIT - TYPE 318
U103	423797		INTEGRATED CIRCUIT - TYPE 72741P
			MISCELLANOUS
	422416		SOCKET TRANSISTOR
			MODULATED OCILLATOR BOARD
			CAPACITORS
C201	230245		150PF 5% 500V MICA
C202	424800		220UF 10V ELECTROLYTIC
C203	424800		220UF 10V ELECTROLYTIC
C204	426229		100PF N750 5% 500V MICA
C205	426027		.01UF 20% 50V CER DISC
C207	249238		2-20PF VARIABLE DISTORTION ADJUST
C208	442906		39PF N470 1000V
C209	428055		22PF 5% 500V MICA
C210	217378		15PF 5% 500V MICA
C211	441644		1.16PF VARIABLE
C212	435312		10UF 20V ELECTROLYTIC
C213	426027		.01UF 50V
C214	426030		6.8PF NPO 600V
C215	435312		10UF 20V ELECTROLYTIC
C216	105778		.001UF 1000V
C217	219215		22PF NPO 5% 600V CERAMIC DISC
C218	426029		15PF NPO 5% 600V CERAMIC DISC

Symbol	Stock No.	Drawing No.	Description
C219 THRU			
C221	245166		33PF NPO 5% 600V CERAMIC DISC
C222	435312		10UF 20V ELECTROLYTIC
C223	105778		.001UF 1000V
C224	79191		330PF 5% 500V MICA
C225	441644		1-16PF VARIABLE
C226	230052		82PF 1% 500V MICA
C227	105778		.001UF 1000V
C228	435312		10UF 20V ELECTROLYTIC
C229	105778		.001UF 1000V
C230	435770		820PF 5% 500V MICA
C231	424968		8-25PF VARIABLE
C232	219744		56PF 5% 500V MICA
C233	435312		10UF 20V ELECTROLYTIC
C234	105778		.001UF 1000V
C235	426230		12PF 5% 500V MICA
C236	219668		10PF 5% 500V MICA
C237	105778		.001UF 1000V
CR201	242220		DIODE - TYPE 1N4154
CR202	441631		DIODE - TYPE BB105A
CR203	441631		DIODE - TYPE BB105A
CR204	242220		DIODE - TYPE 1N4154
L202	441647		REACTOR - RF CHOKE .22UH
L203	421415		REACTOR - RF CHOKE 3.9UH
L205	421415		REACTOR - RF CHOKE 3.9UH
L207	425968		REACTOR - RF CHOKE 4.7UH
L208	441648		REACTOR - RF CHOKE .27UH
L209	245741		REACTOR - RF CHOKE
L212	245741		REACTOR - RF CHOKE
Q201	2N5179		TRANSISTOR - TYPE 2N5179
Q202	2N5179		TRANSISTOR - TYPE 2N5179
Q203	442905		TRANSISTOR - TYPE 2N4428
			RESISTORS
R201	108861		100 OHM 10% 1/4W
R202	436791		10000 OHM VARIABLE MODULATOR SENS.
R203	426213		4700 OHM 10% 1/4W
R204	108866		2200 OHM 10% 1/4W
R205	108866		2200 OHM 10% 1/4W
R206	219459		1500 OHM 10% 1/4W
R207	108861		100 OHM 10% 1/4W
R208	219459		1500 OHM 10% 1/4W
R209	426112		22000 OHM 10% 1/4W
R210	108867		6800 OHM 10% 1/4W
R211	108866		2200 OHM 10% 1/4W
R212	227744		150 OHM 10% 1/4W
R213	502010		10 OHM 10% 1/2W
R214	108860		47 OHM 10% 1/4W
R215	108867		6800 OHM 10% 1/4W
R216	108861		100 OHM 10% 1/4W
R217	108865		2000 OHM 10% 1/4W
R218	502010		10 OHM 10% 1/2W
R219	227744		150 OHM 10% 1/4W
R220	108865		1000 OHM 10% 1/4W
R221	502010		10 OHM 10% 1/2W
R222	108866		2200 OHM 10% 1/4W
R223	218499		10000 OHM 10% 1/4W
R224	502010		10 OHM 10% 1/2W
R227	426232		10 OHM 10% 1/4W
R228	108865		1000 OHM 10% 1/4W
R229	426216		68 OHM 10% 1/4W
R230	218758		220 OHM 10% 1/4W
R231	108865		1000 OHM 10% 1/4W
R232	426213		4700 OHM 10% 1/4W
R233	426233		22 OHM 10% 1/4W
R234	426851		1000 OHM VARIABLE BUFFER CALIBRATE

Symbol	Stock No.	Drawing No.	Description
TP201	425993		TEST POINT-ORANGE
TP202	425992		TEST POINT-YELLOW
U201	439143		INTEGRATED CIRCUIT TYPE 723
			MISCELLANEOUS
	241962		SOCKET-TRANSISTOR FOR Q201,Q202
	248259		SOCKET-TRANSISTOR FOR Q203
			RF AMPLIFIER BOARD
			CAPACITORS
C301	241284		15-60PF VARIABLE
C302	435770		820PF 5% 500V MICA
C303	420073		47UF 20V ELECTROLYTIC
C304	434912		.1UF 75V DISC
C305	435770		820PF 5% 500V MICA
C306	426623		.001UF 1000V DISC
C307	426623		.001UF 1000V DISC
C308	241284		15-60PF VARIABLE
C309	221678		47PF 5% 500V MICA
C310	241284		15-60PF VARIABLE
C311	420073		47UF 20V ELECTROLYTIC
C312	434912		.1UF 75V DISC
C315	426623		.001UF 1000V DISC
C316	428055		22PF 5% 500V MICA
C317	441645		3-24PF VARIABLE
C318	441645		3-24PF VARIABLE
C319	224287		27PF 5% 500V MICA
C320	224287		27PF 5% 500V MICA
C321	433046		5PF 5% 500V MICA
C322	228368		43PF 2% 500V MICA
C323	217378		15PF 5% 500V MICA
C324	122136		20PF 5% 500V MICA
C325 THRU C328	426623		.001UF 10% 1000V DISC
C329 THRU C334	241490		470PF 20% 500V FEED THRU
CR301	242220		DIODE - TYPE 1N4154
CR302	242220		DIODE - TYPE 1N4154
J301	441650		CONNECTOR - RT ANGLE COAX
J302	441650		CONNECTOR - RT ANGLE COAX
J303	441650		CONNECTOR - RT ANGLE COAX
L302	245741		REACTOR - RF CHOKE
L303	245741		REACTOR - RF CHOKE
L306	245741		REACTOR - RF CHOKE
L307	245741		REACTOR - RF CHOKE
Q301	441638		TRANSISTOR - TYPE B3-12
Q302	441637		TRANSISTOR - TYPE 2N6082
			RESISTORS
R301	108860		47 OHM 10% 1/4W
R302	219460		1800 OHM 10% 1/4W
R303	113152		0.47 OHM 10% 2W
R304	502110		100 OHM 10% 1/2W
R305	108860		47OHM 10% 1/4W
R306	219460		1800 OHM 10% 1/4W
R307	429847		0.16 OHM 10% 2W
R308	502122		220 OHM 10% 1/2W
R309	219459		1500 OHM 10% 1/4W

Symbol	Stock No.	Drawing No.	Description
R310	436791		10000 OHM VARIABLE FWD CAL.
R311	108861		100 OHM 10% 1/4W
R312	219459		1500 OHM 10% 1/4W
R313	436791		10000 OHM VARIABLE REFL. CAL.
R314	108861		100 OHM 10% 1/4W
			HIGH FREQUENCY DIVIDER BOARD
C401 THRU			
C409	426979		.001UF 1000V
C410	428055		22PF 5% 500V MICA
C411	426979		.001UF 1000V
C412			NOT USED
C413 THRU			
C415	426027		.01UF 20% 50V CERAMIC DISC
C416			NOT USED
C417 THRU			
C420	426027		.01UF 20% 50V CERAMIC DISC
CR401	242220		DIODE - TYPE 1N4154
L401	441647		REACTOR .22UH
L402	245741		REACTOR RF CHOKE
Q401	241778		TRANSISTOR - TYPE 2N3563
Q402	241778		TRANSISTOR - TYPE 2N3563
Q403	236267		TRANSISTOR - TYPE 2N3640
Q403	237840		TRANSISTOR - TYPE 2N3646
R401	108866		2200 OHM 10% 1/4W
R402	219465		8200 OHM 10% 1/4W
R403	108861		100 OHM 10% 1/4W
R404	108864		470 OHM 10% 1/4W
R405	426232		10 OHM 10% 1/4W
R406	108866		2200 OHM 10% 1/4W
R407	218499		10000 OHM 10% $\frac{1}{4}$W
R407	439708		5600 OHM 10% $\frac{1}{4}$W
R408	426232		10 OHM 10% $\frac{1}{4}$W
R409	108861		100 OHM 10% $\frac{1}{4}$W
R410	426213		4700 OHM 10% $\frac{1}{4}$W
R410	108864		470 OHM 10% $\frac{1}{4}$W
R411	426213		4700 OHM 10% $\frac{1}{4}$W
R411	108865		1000 OHM 10% $\frac{1}{4}$W
R412	426232		10 OHM 10% $\frac{1}{4}$W
R413	108860		47 OHM 10% $\frac{1}{4}$W
R413	108866		2200 OHM 10% $\frac{1}{4}$W
R414	108866		2200 OHM 10% $\frac{1}{4}$W
R415 THRU			
R428	426213		4700 OHM 10% 1/4W
R429	108866		2200 OHM 10% 1/4W
R430	108865		1000 OHM 10% 1/4W
R431	219465		8200 OHM 10% 1/4W
TP401	425993		TEST POINT-ORANGE
TP402	425992		TEST POINT-YELLOW
TP403	425994		TEST POINT-GREEN
TP404	425990		TEST POINT-BLUE
TP405	425989		TEST POINT-VIOLET
U401	441632		INTEGRATED CIRCUIT - TYPE 74S113
U402 THRU			
U405	441633		INTEGRATED CIRCUIT - TYPE 74LS190
U406	428183		INTEGRATED CIRCUIT - TYPE 7420
U407	434473		INTEGRATED CIRCUIT - TYPE 74197
	422416		SOCKET-FOR TRANSISTORS

Symbol	Stock No.	Drawing No.	Description
			REFERENCE OSCILLATOR /AFC BOARD
			CAPACITORS
C501	441644		3-24PF VARIABLE
C502	441626		15PF 5% N750 CERAMIC
C503	435770		820PF MICA
C504	426027		.01UF 50V
C505	425983		10UF 20V ELECTROLYTIC
C506 THRU			
C510	426027		.01UF 50V
C511	425983		10UF 20V ELECTROLYTIC
C512	425983		10UF 20V ELECTROLYTIC
C513	426027		.01UF 50V
C514	435338		150UF 15V ELECTROLYTIC
C515	42C552		.068UF 3% 100V
C516	423899		.1UF 3% 100V
C517	426768		.0182UF 3% 100V
C518 THRU			
C521	425983		10UF 20V
C522	426027		.01UF 50V
C523	426027		.01UF 50V
C524	423894		.0047UF 3% 100V
C525	423894		.0047UF 3% 100V
C526	42C492		2.2UF 35V
C527	42C492		2.2UF 35V
C528	426760		.031UF 3% 100V
C529	423902		.2UF 3% 100V
C530	435770		820PF MICA
C531	425983		10UF 20V
C532	435338		150UF 15V
CR501 THRU			
CR504	242220		DIODE - TYPE 1N4154
Q501	42C558		TRANSISTOR - TYPE 2N3819
Q502	241778		TRANSISTOR - TYPE 2N3563
Q503	248024		TRANSISTOR - TYPE 2N2924
Q504	248024		TRANSISTOR - TYPE 2N2924
Q505	2N3053		TRANSISTOR - TYPE 2N3053
Q506	2N5293		TRANSISTOR - TYPE 2N5293
			RESISTORS
R501	218762		1MEG OHM 10% 1/4W
R502	108861		100 OHM 10% 1/4W
R503	108865		1000 OHM 10% 1/4W
R504	108861		100 OHM 10% 1/4W
R505	218758		220 OHM 10% 1/4W
R506	108866		2200 OHM 10% 1/4W
R507	426232		10 OHM 10% 1/4W
R508	218499		10000 OHM 10% 1/4W
R508	108865		1000 OHM 10% 1/4W
R510	426213		4700 OHM 10% 1/4W
R511	108866		2200 OHM 10% 1/4W
R512	108864		470 OHM 10% 1/4W
R513	108866		2200 OHM 10% 1/4W
R514	426215		680 OHM 10% 1/4W
R515 THRU			
R517	426112		2200 OHM 10% 1/4W
R518	113524		2700 OHM 10% 1/4W
R519	426851		1000 OHM VARIABLE AFC LOSS IDLE ADJ
R520	107972		3300 OHM 10% 1/4W
R521	427566		6800 OHM 10% 1/4W
R522	218499		10000 HM 10% 1/4W
R523	218500		39000 OHM 10% 1/4W
R524	232389		470000 OHM 10% 1/4W

Symbol	Stock No.	Drawing No.	Description
R525	426219		33000 OHM 10% 1/4W
R526	108865		1000 OHM 10% 1/4W
R527	502210		1000 OHM 10% 1/2W
R528	223769		100000 OHM 10% 1/4W
R529	108862		180 OHM 10% 1/4W
R530	441657		200 OHM VARIABLE 3125HZ TUNING
R531	232388		390000 OHM 10% 1/4W
R532	218499		10000 OHM 10% 1/4W
R533	218499		10000 OHM 10% 1/4W
R534	218499		10000 OHM 10% 1/4W
R535	426213		4700 OHM 10% 1/4W
R536	108866		2200 OHM 10% 1/4W
R537 THRU R539	108871		47000 OHM 10% 1/4W
R540	218499		10000 OHM 10% 1/4W
R541	108871		47000 OHM 10% 1/4W
R542	107972		3300 OHM 10% 1/4W
R543	426213		4700 OHM 10% 1/4W
R544	108866		2200 OHM 10% 1/4W
TP501	425993		TEST POINT-ORANGE
TP502	425992		TEST POINT-YELLOW
TP503	425994		TEST POINT-GREEN
TP504	425990		TEST POINT-BLUE
TP505	425989		TEST POINT-VIOLET
TP506	425988		TEST POINT-GREY
TP507	425997		TEST POINT-WHITE
TP508	425995		TEST POINT-BLACK
TP509	425991		TEST POINT-BROWN
U501	435152		INTEGRATED CIRCUIT - TYPE 7486
U502 THRU U505	425797		INTEGRATED CIRCUIT - TYPE 7493
U506 THRU U510	423797		INTEGRATED CIRCUIT - TYPE 72741P
Y501			CRYSTAL-SEE SEPARATE LISTING FOR MI-561066
			MISCELLANEOUS
	422416		SOCKET-TRANSISTOR
	442916		SOCKET-INTEGRATED CIRCUIT FOR U506 THRU U510, 8 PIN
	442915		SOCKET-INTEGRATED CIRCUIT FOR U501 THRU U505, 14 PIN
			POWER SUPPLY BOARD
			CAPACITORS
C601	441628		27UF 35V ELECTROLYTIC
C602	426979		.001UF 1000V
C603	420492		2.2UF 35V ELECTROLYTIC
C604	426979		.001UF 1000V
C605	426979		.001UF 1000V
C606	420492		2.2UF 35V ELECTROLYTIC
CR601	242220		DIODE - TYPE 1N4154
CR602	242220		DIODE - TYPE 1N4154
Q601	241250		TRANSISTOR - TYPE 2N3740

Symbol	*Stock No.*	*Drawing No.*	*Description*
			RESISTORS
R601	512210		1000 OHMS 10% 1W
R602	502147		470 OHM 10% 1/2W
R603	502110		100 OHM 10% 1/2W
R604	441656		.12 OHM 5W WIRE WOUND
R605	502147		470 OHM 10% 1/4W
R606	502215		1500 OHM 10% 1/2W
R607	426851		1000 OHM VARIABLE 13.5V ADJ.
R608	502215		1500 OHM 10% 1/2W
R609	502410		100000 OHM 10% 1/2W
R610	502222		2200 OHM 10% 1/2W
R611	502333		33000 OHM 10% 1/2W
R612	502133		330 OHM 10% 1/2W
R613	502268		6800 OHM 10% 1/2W
R614	502222		2200 OHM 10% 1/2W
R615	441656		.12 OHM 5W WIRE WOUND
R616	502215		1500 OHM 10% 1/2W
R617	436795		100000 OHM VARIABLE MAX. SET
TP601	425996		TEST POINT - RED
TP602	425993		TEST POINT - ORANGE
TP603	425995		TEST POINT - BLACK
U601	439143		INTEGRATED CIRCUIT - TYPE 723
U602	439143		INTEGRATED CIRCUIT - TYPE 723
			MISCELLANEOUS
	442915		SOCKET - FOR U601, U602
			5 MHZ CRYSTAL AND OVEN MI-561066
Y501	441629		CRYSTAL - 5MHZ
	441661		OVEN - CRYSTAL
			15 KHZ LOW PASS FILTER MI-561063
C1	441639		CAPACITOR - 1930PF
C2	227692		CAPACITOR - 360PF
C3	441641		CAPACITOR - 2530PF
C4	441642		CAPACITOR - 1815PF
C5	441640		CAPACITOR - 220PF
C6	218590		CAPACITOR - 1300PF
C7	218590		CAPACITOR - 1300PF
			CONNECTOR KIT FOR THE BTE-115 MI-561068
	442943	449614-0006	CONNECTOR - 10 CONTACT
	95555	449614-0007	CONNECTOR - 6 CONTACT
	921359	1510013-0109	CONNECTOR - BNC FOR RG-58U CABLE

SUGGESTED STATION SPARES

Description	Symbol	Quantity		Stock Number
		Domestic	*Foreign	
Capacitor, 12,000 UF 40V	C1	1	1	425873
Diode, 1N4154	CR201, CR204, CR301, CR302, CR401, CR501 thru CR504, CR601, CR602	2	2	242220
Diode, 1N4734, 5.6V 1W Zener	CR101	1	1	423780
Diode, 980-2	CR1	1	1	429606
Diode, BB105A	CR202, CR203	2	2	441631
Diode, Green LED	CR3	0	1	441636
Diode, Red LED	CR4	0	1	441634
Diode, Amber LED	CR5	0	1	441635
Fuse, MDL 2A	F1	5	5	426231
Relay	K1	0	1	431716
Transistor, 2N2924	Q101 thru Q106, Q503, Q504	5	5	248024
Transistor, 2N3053	Q505	1	1	2N3053
Transistor, 2N3055	Q1, Q2	1	2	2N3055
Transistor, 2N3563	Q401, Q402, Q502	1	3	241778
Transistor, 2N3640	Q403	1	1	236267
Transistor, 2N3740	Q601	1	2	241250
Transistor, 2N3819	Q501	1	1	420558
Transistor, 2N4428	Q203	1	1	442905
Transistor, 2N5179	Q201, Q202	1	2	2N5179
Transistor, 2N5293	Q506	1	1	2N5293
Transistor, 2N6082	Q302	1	1	441637
Transistor, B3-12	Q301	1	1	441638
Potentiometer, 1000 ohm	R102, R234, R519, R607	1	1	426851
Potentiometer, 10,000 ohm	R112, R120, R122, R124, R128, R130, R153, R154, R202, R310, R313	1	1	436791
Potentiometer, 100,000 ohm	R147, R150, R152, R617	1	1	436795
Potentiometer, 200 ohm	R530	1	1	441657
Transformer, Power	T1	0	1	423785
Transformer, Input	T2	0	1	426792
Integrated Circuit, 723	U201, U601, U602	1	3	439143
Integrated Circuit, 7420	U406	1	1	428183
Integrated Circuit, 7486	U501	1	1	435152
Integrated Circuit, 7493	U502 thru U505	1	1	425797
Integrated Circuit, 72741P	U103, U506 thru U510	2	6	423797
Integrated Circuit, 74LS190	U402 thru U405	1	4	441633
Integrated Circuit, 74S113	U401	1	1	441632
Integrated Circuit, 74197	U407	1	1	434473
Integrated Circuit, LM309K	U1	1	1	441655
Integrated Circuit, LM318	U101, U102	2	2	435504
Crystal, 5 MHz	Y501	0	1	441629
Oven, Crystal	----	0	1	441661

*Or Remote Locations

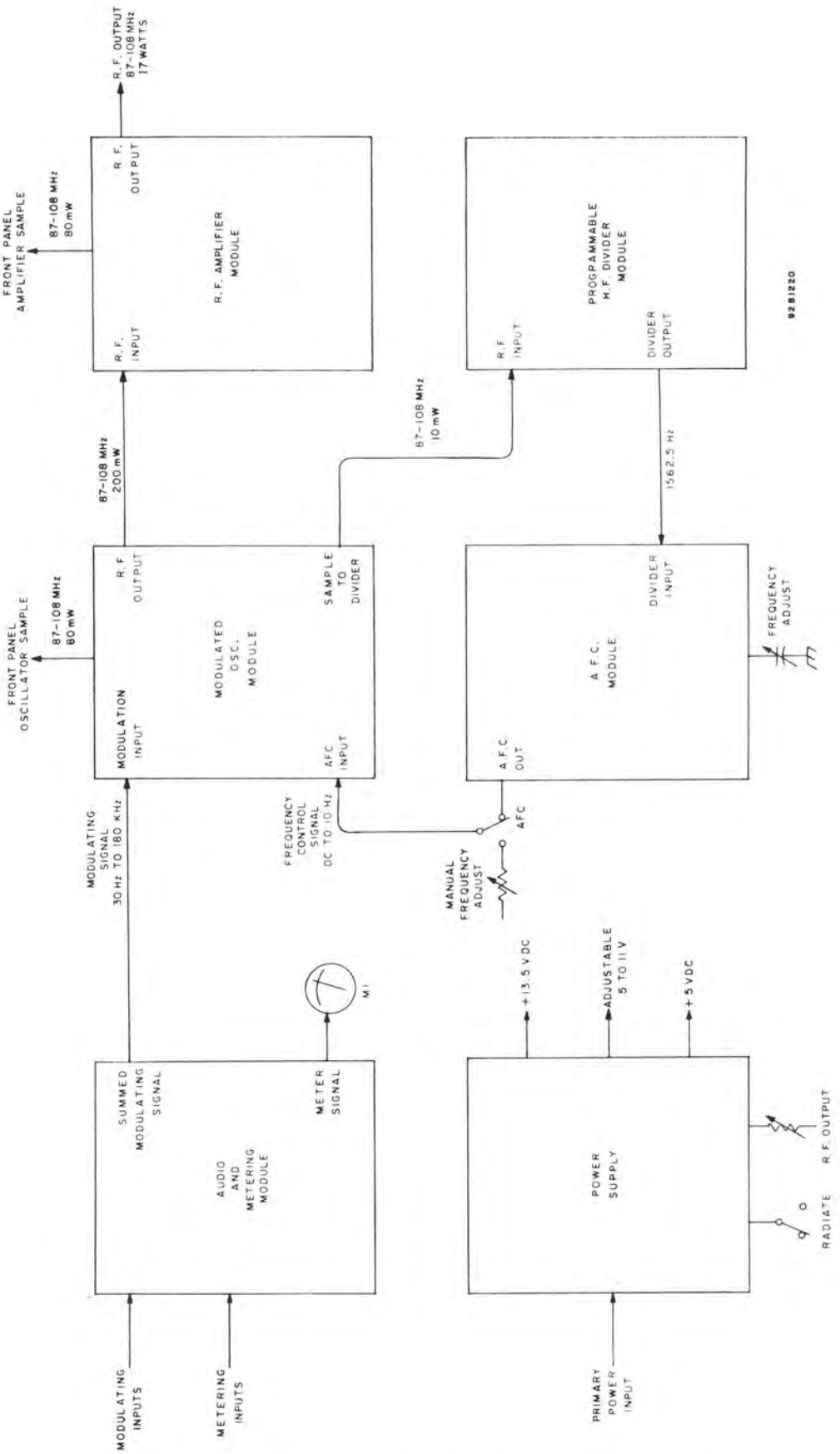
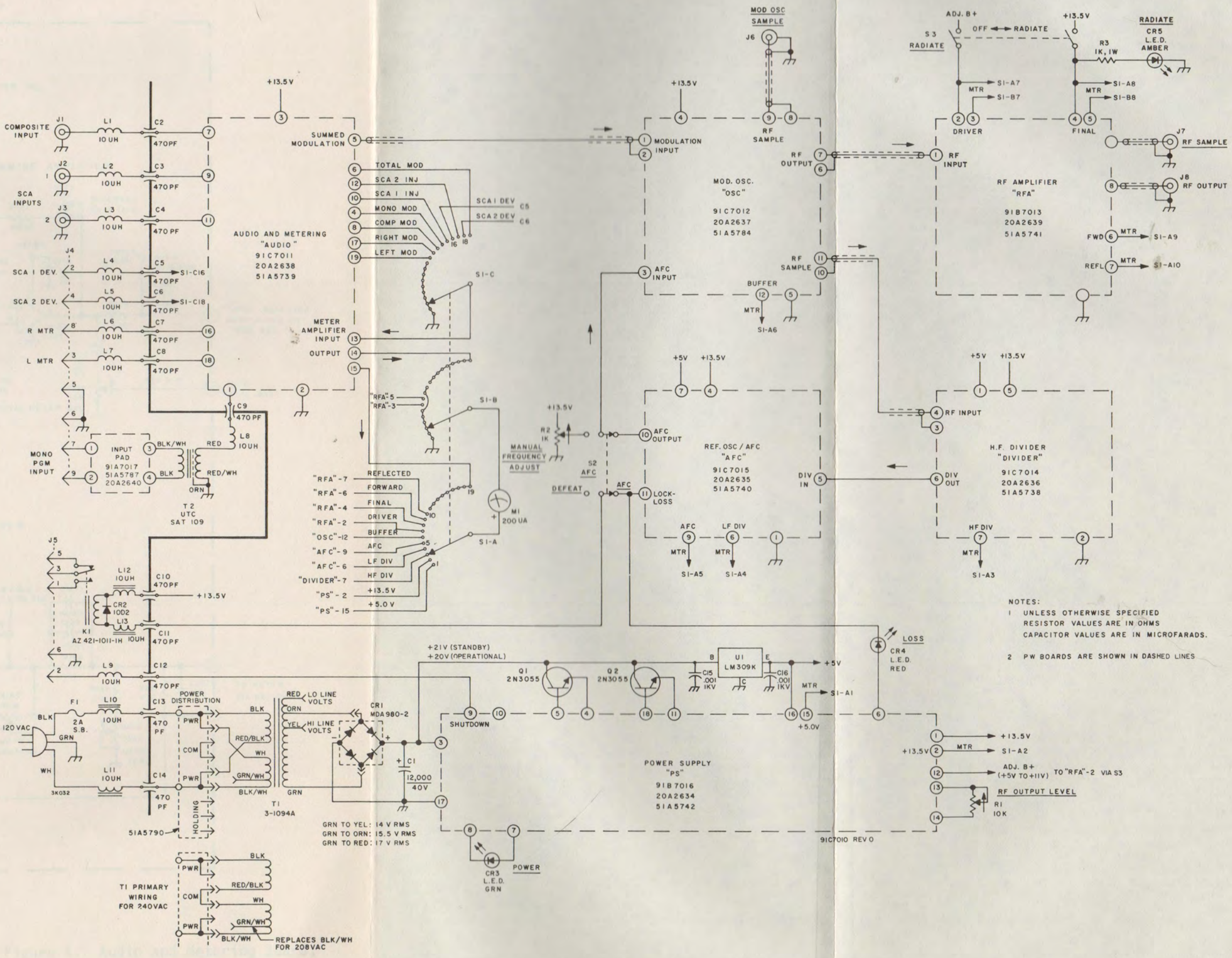


Figure 1. BTE-115 FM Exciter, Block Diagram

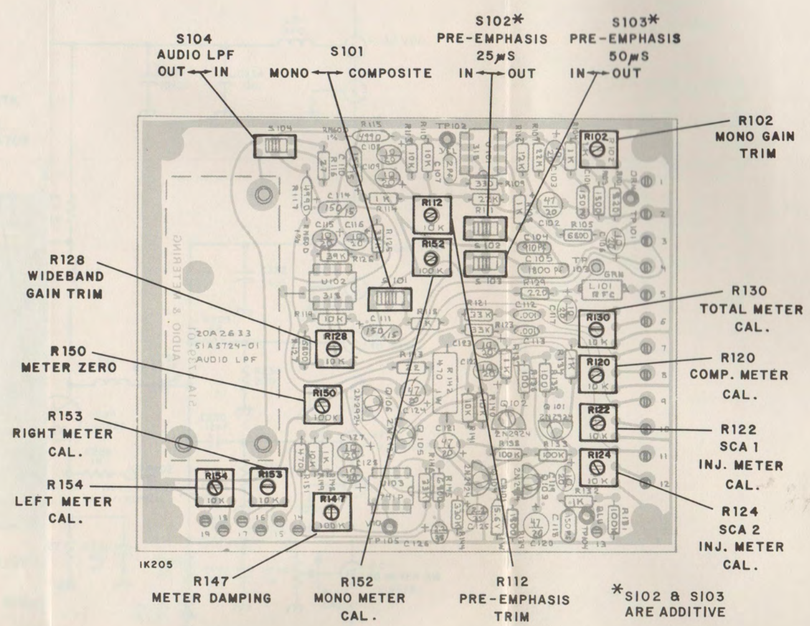


NOTES:

1 UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS.

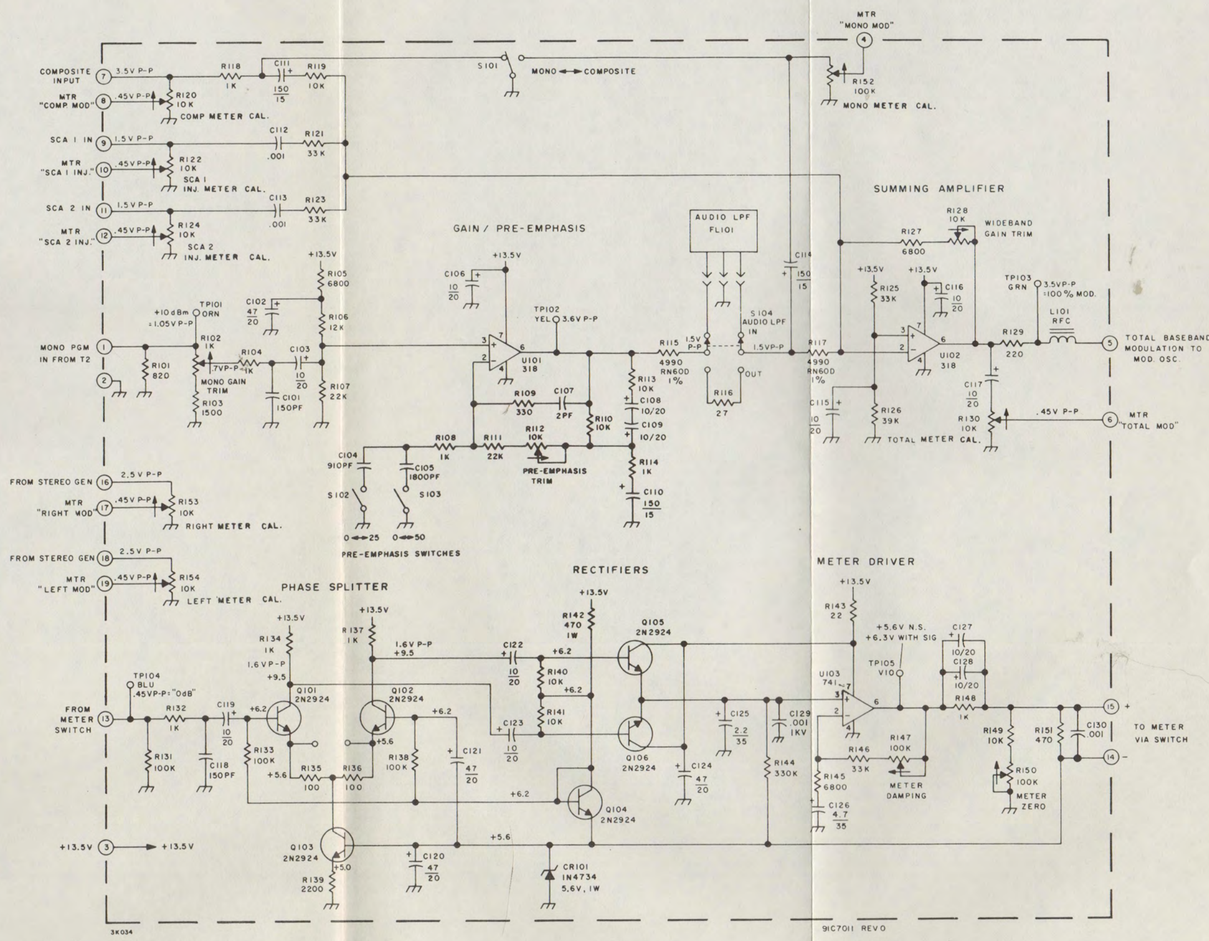
2 PW BOARDS ARE SHOWN IN DASHED LINES

Figure 2. Main Frame, Schematic



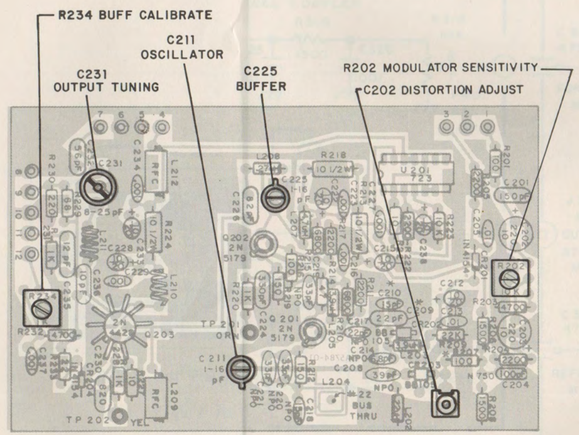
NOTE: For PWB Layout, See Figure 19.

Figure 3. Audio and Metering Board, Controls and Adjustments



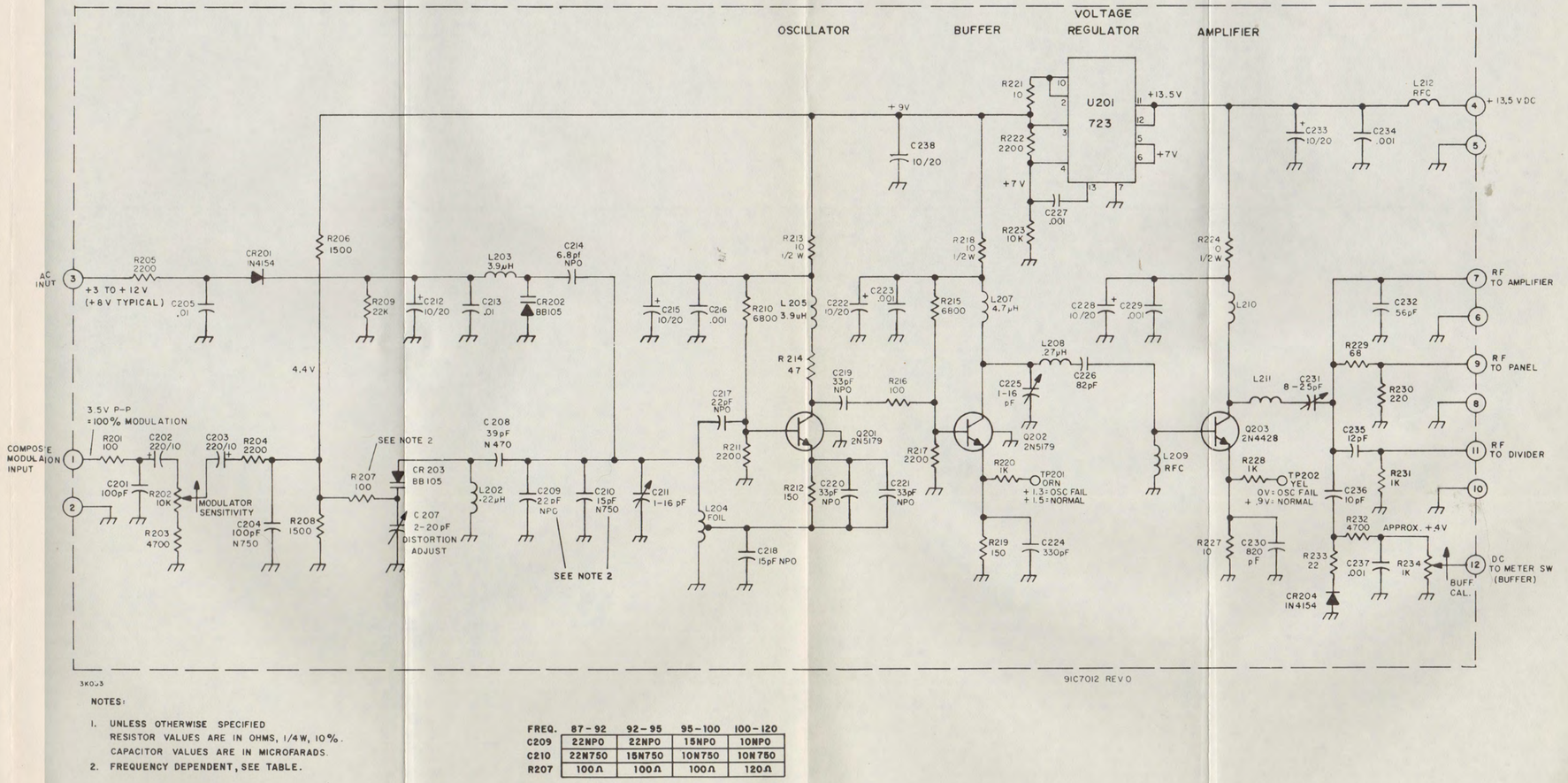
NOTES:
1 UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS, 1/4 W, 10%
CAPACITOR VALUES ARE IN MICROFARADS.

Figure 4. Audio and Metering Board, Schematic



NOTE: For PWB Layout, See Figure 17.

Figure 5. Modulated Oscillator, Adjustments

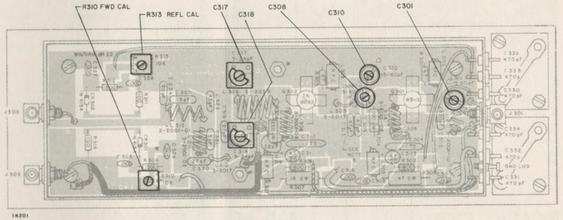


NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4W, 10%. CAPACITOR VALUES ARE IN MICROFARADS.
2. FREQUENCY DEPENDENT, SEE TABLE.

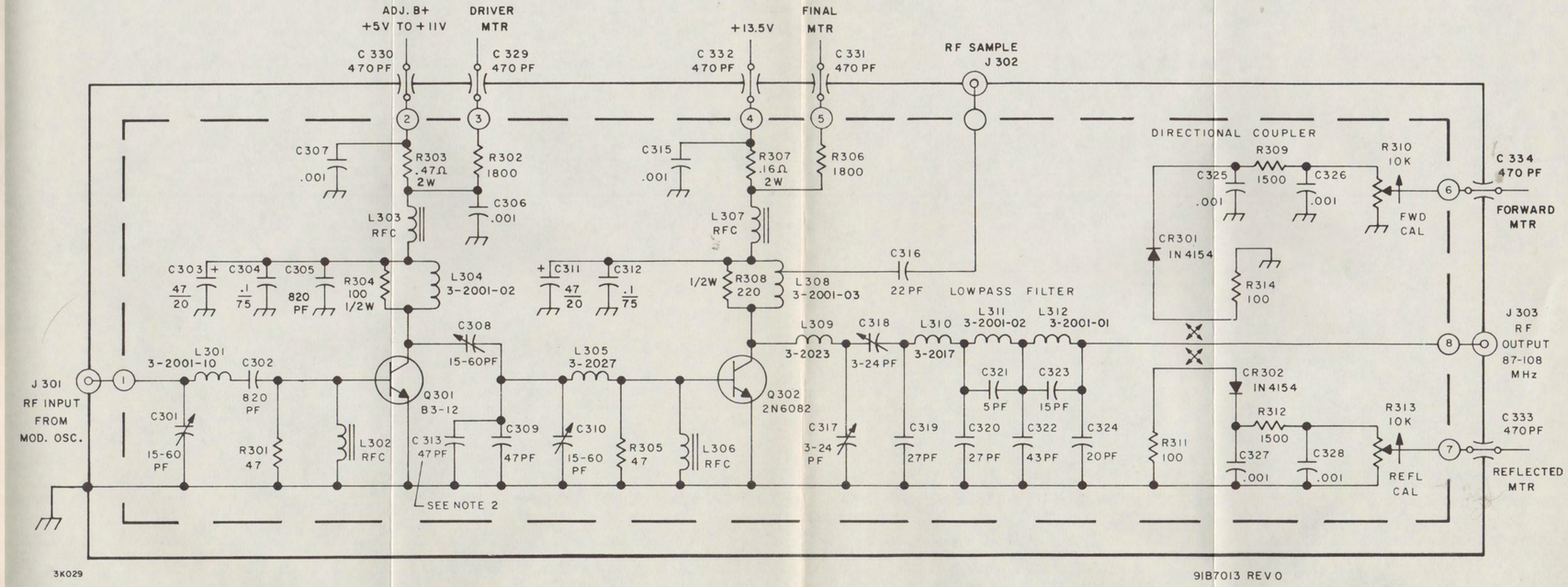
FREQ.	87-92	92-95	95-100	100-120
C209	22NPO	22NPO	15NPO	10NPO
C210	22N750	15N750	10N750	10N750
R207	100Ω	100Ω	100Ω	120Ω

Figure 6. Modulated Oscillator, Schematic



NOTE: For PWB Layout, See Figure 18.

Figure 7. RF Amplifier, Adjustments



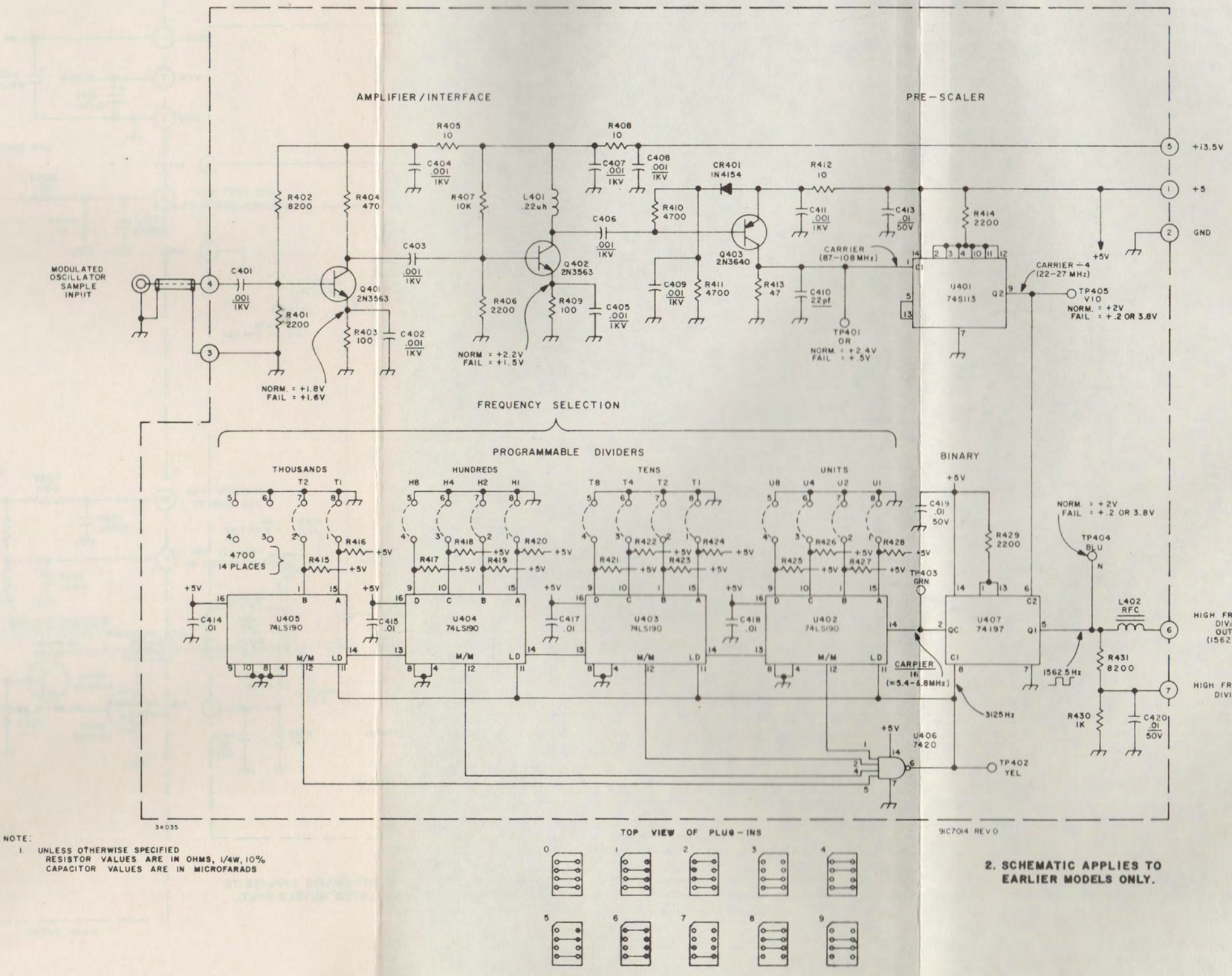
NOTES

1 UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS, 1/4W, 10%
CAPACITOR VALUES ARE IN MICROFARADS.

2 C313 USED BELOW 100 MHz ONLY.

3. PW BOARD IS SHOWN WITHIN DASHED LINES.

Figure 8. RF Amplifier, Schematic



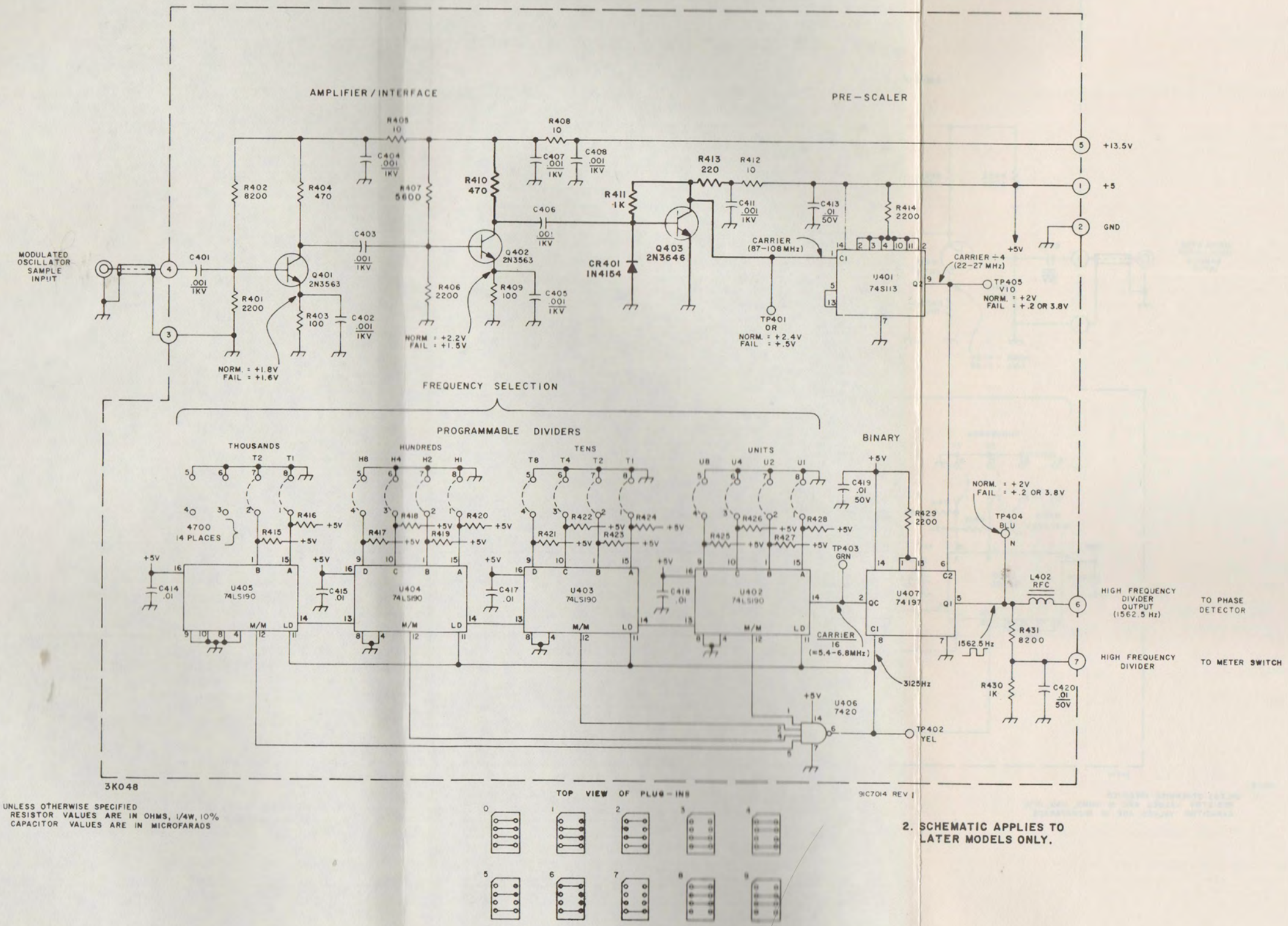
NOTE:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4W, 10% CAPACITOR VALUES ARE IN MICROFARADS

2. SCHEMATIC APPLIES TO EARLIER MODELS ONLY.

NOTE: For PWB Layout, See Figure 19.

Figure 9. High Frequency Divider, Schematic

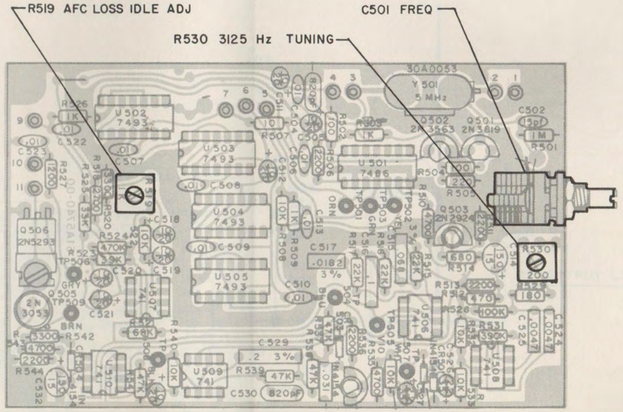


NOTE:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4W, 10% CAPACITOR VALUES ARE IN MICROFARADS

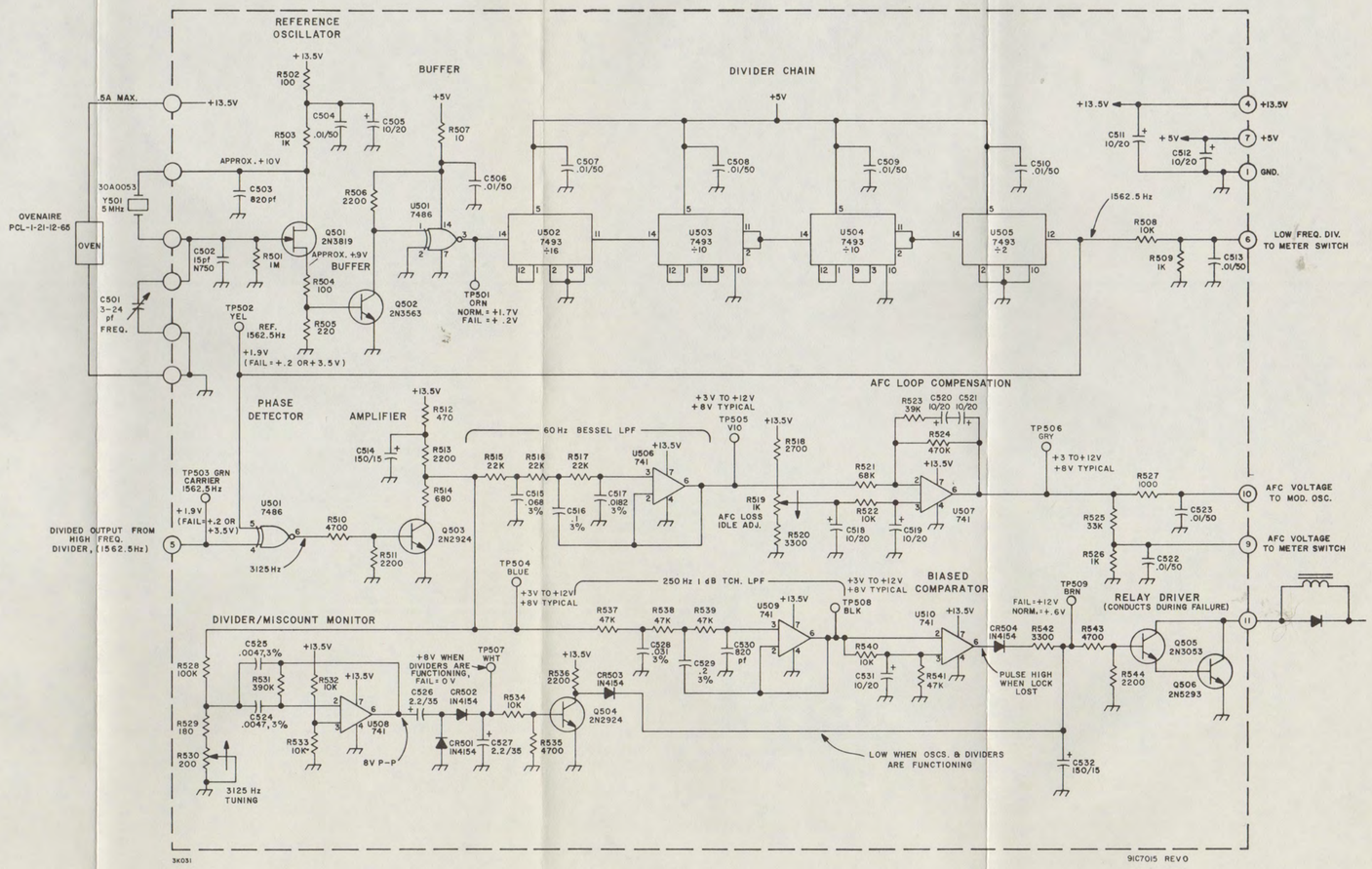
2. SCHEMATIC APPLIES TO LATER MODELS ONLY.

Figure 9A. High Frequency Divider, Schematic



NOTE: For PWB Layout, See Figure 20.

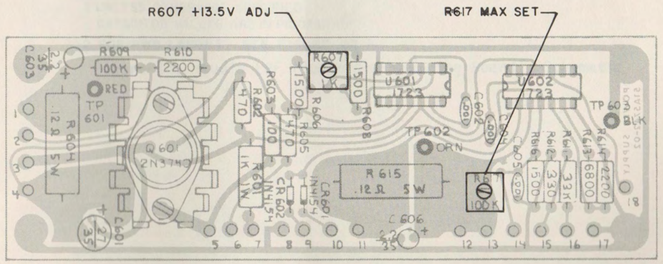
Figure 10. Reference Oscillator/AFC, Adjustments



NOTES:

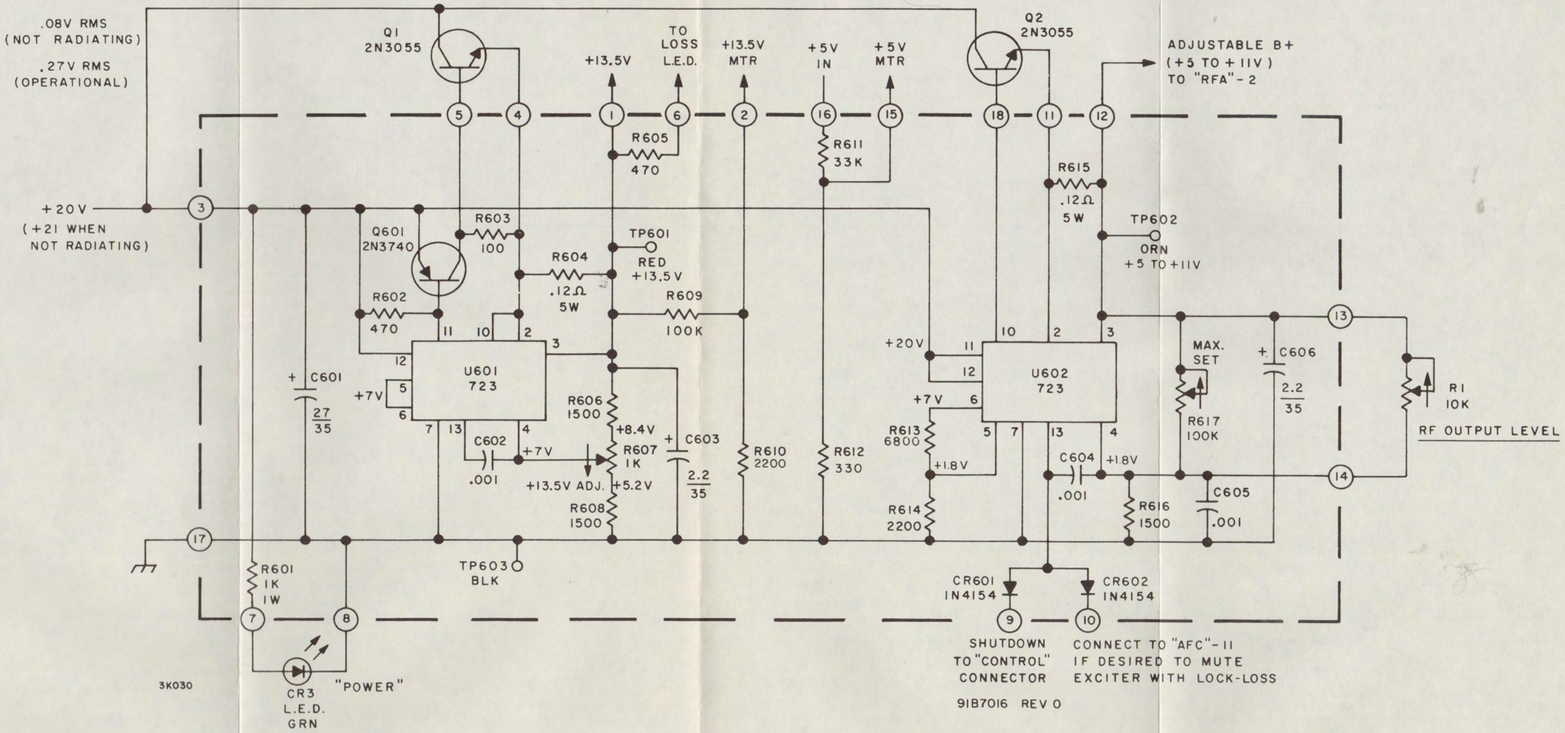
1. UNLESS OTHEWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4W, 10% CAPACITOR VALUES ARE IN MICROFARADS
2. P.C. BOARD 51A5740.
4. COMPONENT LAYOUT 20A2635.

Figure 11. Reference Oscillator/AFC, Schematic



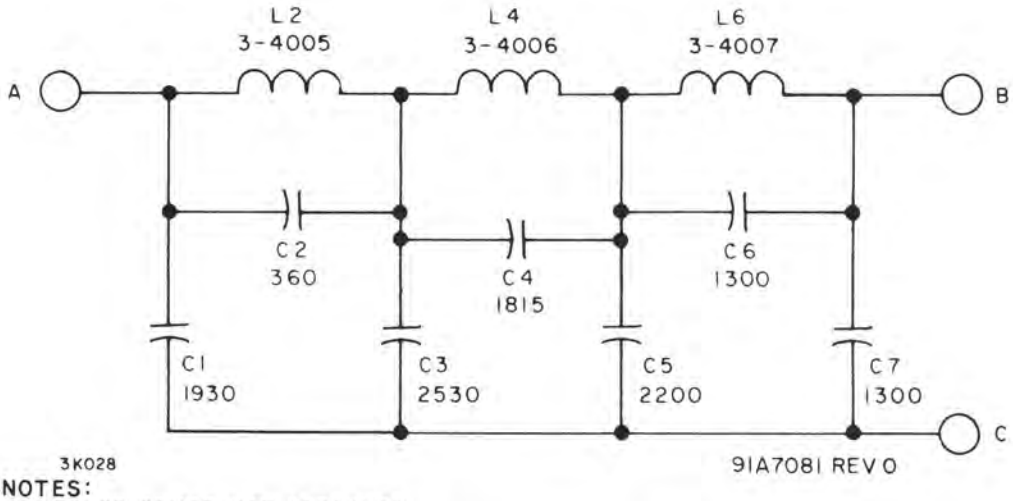
NOTE: For PWB Layout, See Figure 21.

Figure 12. Power Supply, Adjustments



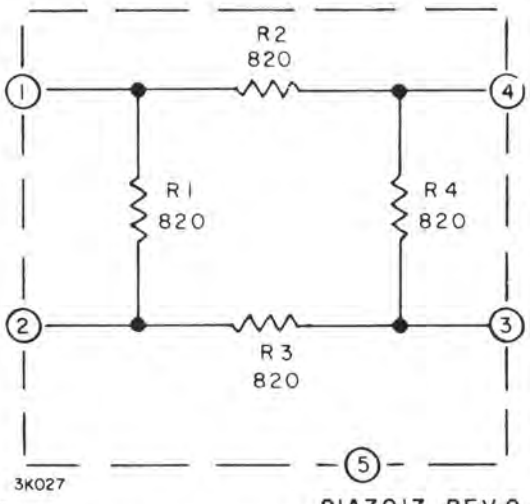
NOTES
1. UNLESS OTHERWISE SPECIFIED
   RESISTOR VALUES ARE IN OHMS, 1/2W, 10%.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. PW BOARD IS SHOWN WITHIN DASHED LINES

Figure 13. Power Supply, Schematic



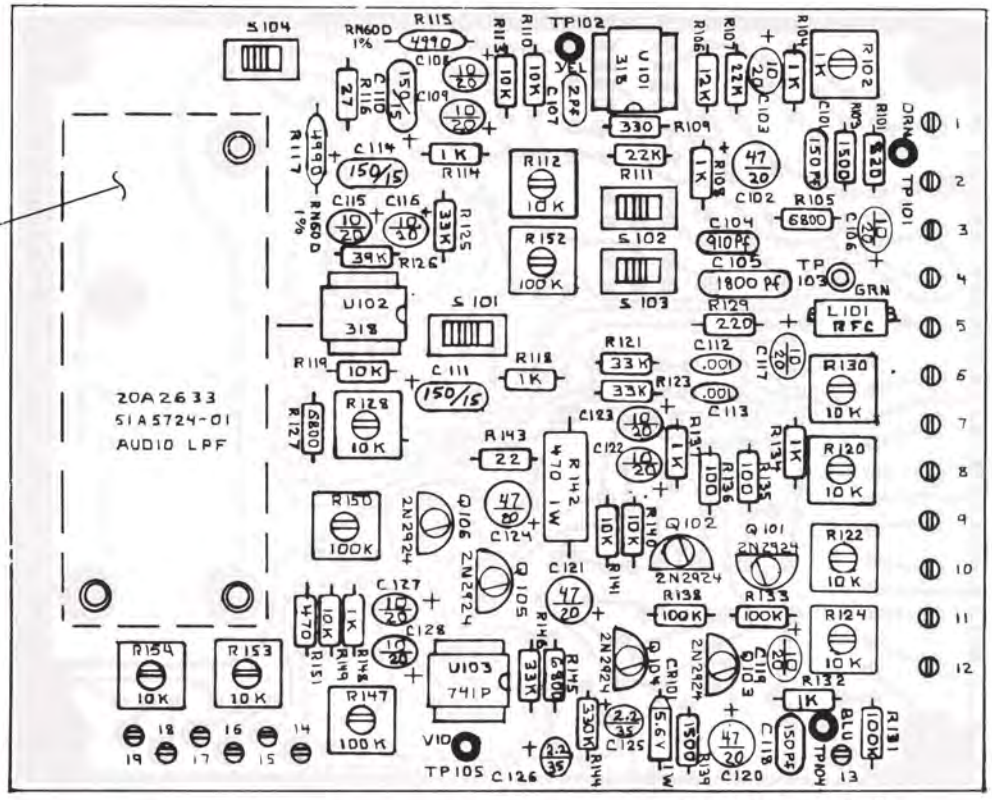
NOTES:
1. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN PICOFARADS.
2. FOR PWB LAYOUT, SEE FIGURE 22

Figure 14. Audio LPF (Audio and Metering Board), Schematic



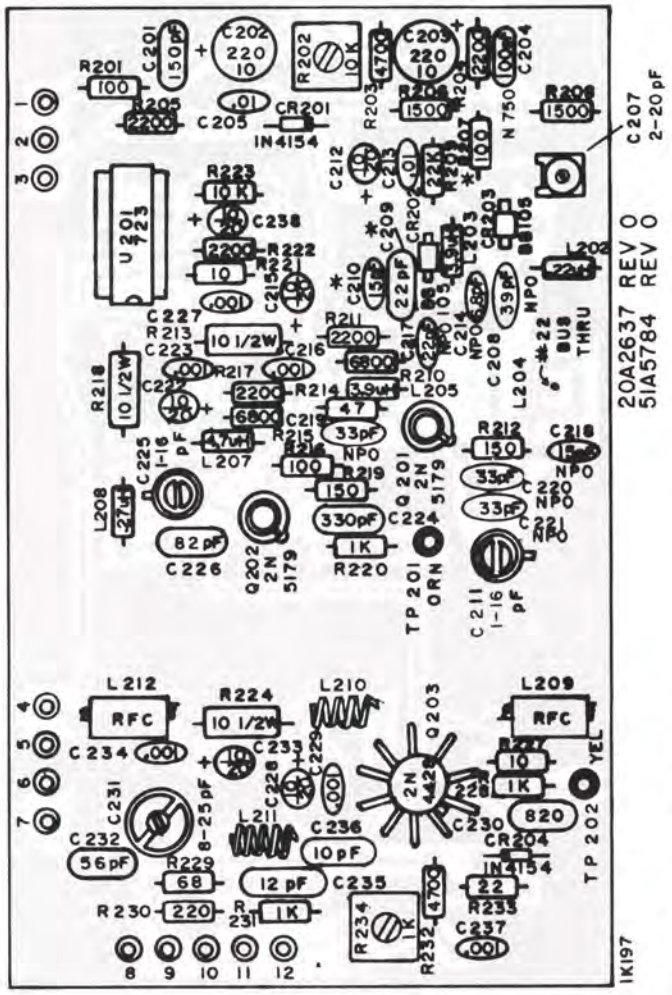
NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4 W, 10%.
2. FOR PWB LAYOUT, SEE FIGURE 23.

Figure 15. Input Pad (Main Frame), Schematic



NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS, 1/4W, 10% CAPACITOR VALUES ARE IN MICROFARADS.
2. ◎ STIMPSON GS-4-6 INSTALL THIS SIDE SOLDER ON FAR SIDE.

Figure 16. Audio and Metering Board, PWB Layout



NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE OHMS, 1/4 W, 10%. CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL COMPONENTS TO GND PLANE MUST BE SOLDERED ON BOTH SIDES OF BOARD.
3. * FREQUENCY DEPENDENT PARTS – INSTALLED IN FINAL TEST

	87-92	92-95	95-100	100-120 MHz
C209	22 NPO	22 NPO	15 NPO	10 NPO
C210	22 N750	15 N750	10 N750	10 N750
R207	100 Ω	100 Ω	100Ω	120 Ω

Figure 17. Modulated Oscillator, PWB Layout

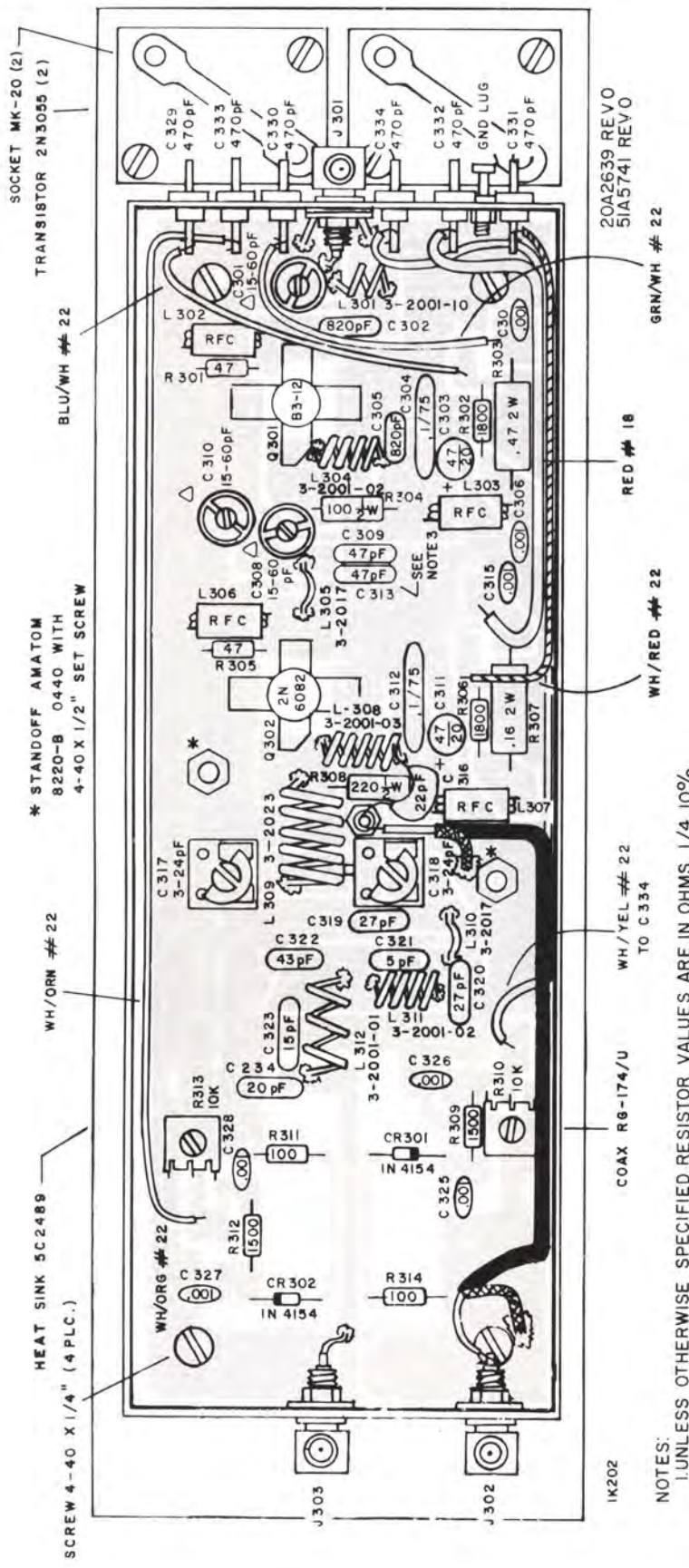
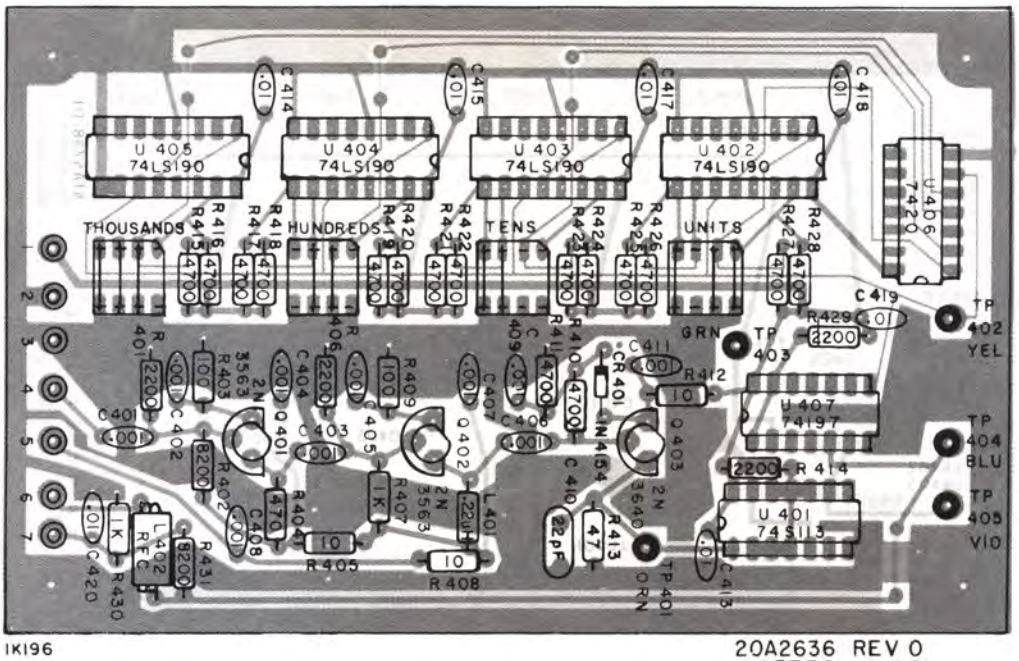


Figure 18. RF Amplifier, PWB Layout



20A2636 REV 0
51A5738 REV 0

NOTES:

1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE OHMS, 1/4 W, 10%. CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL COMPONENTS TO GND PLANE MUST BE SOLDERED ON BOTH SIDES OF BOARD.

Figure 19. High Frequency Divider, PWB Layout

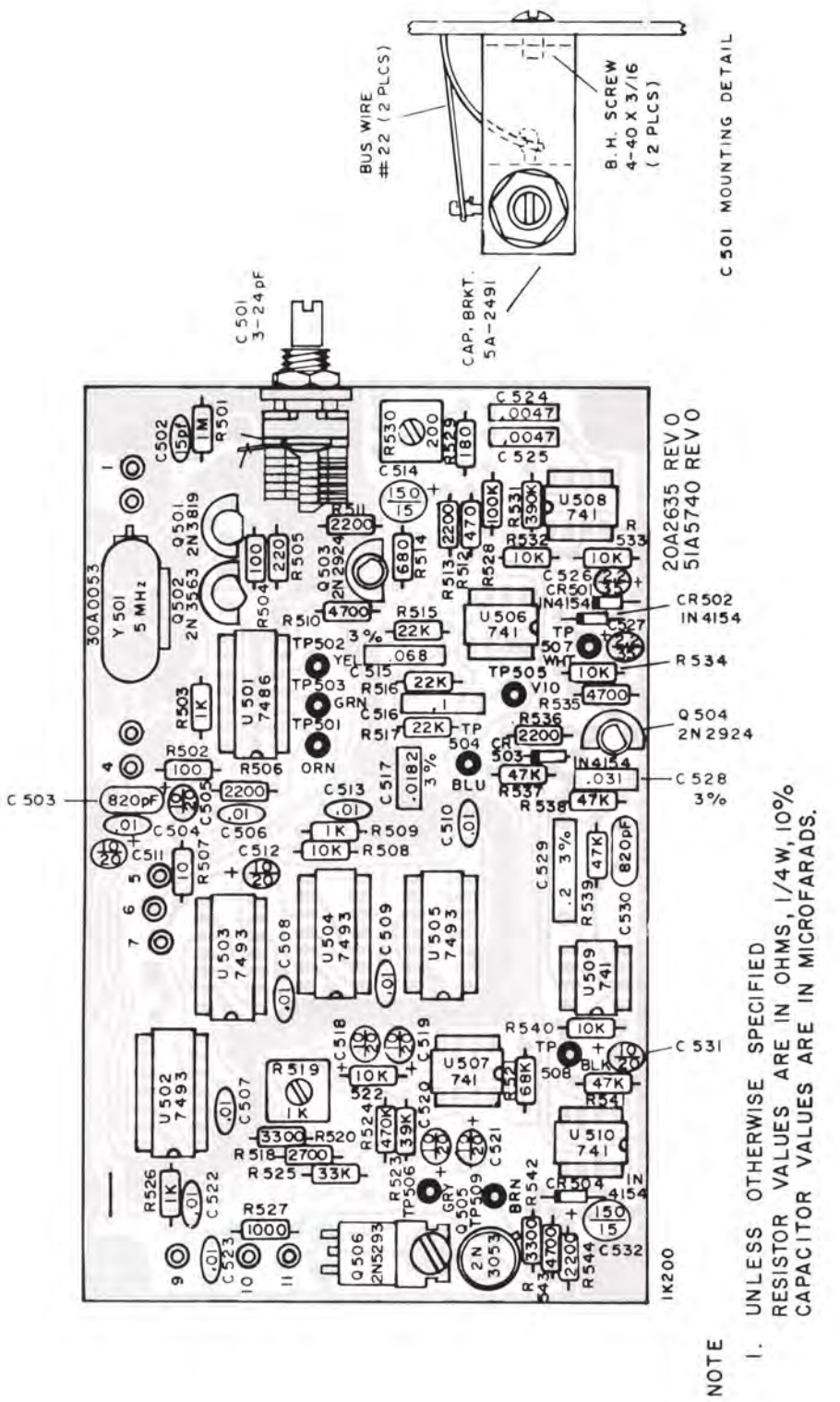


Figure 20. Reference Oscillator/AFC, PWB Layout

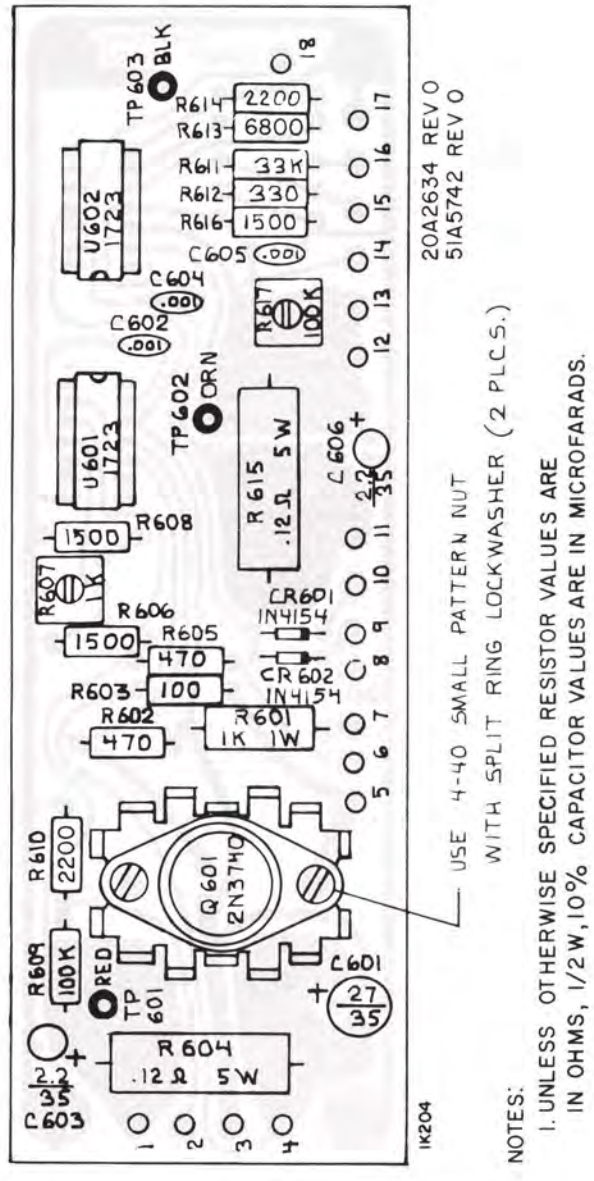
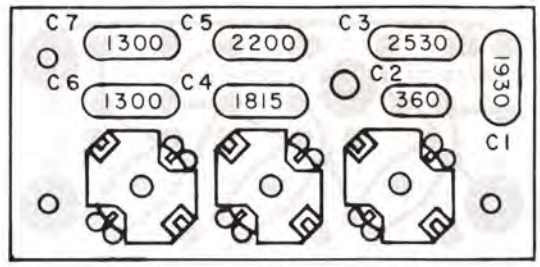
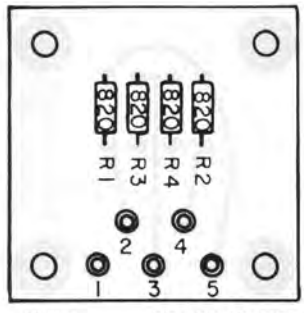


Figure 21. Power Supply, PWB Layout



NOTE
1 UNLESS OTHERWISE SPECIFIED
CAPACITOR VALUES ARE IN PICOFARADS

Figure 22. Audio LPF, PWB Layout



NOTES:
1. UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS, 1/4 W, 10%

Figure 23. Input Pad, PWB Layout

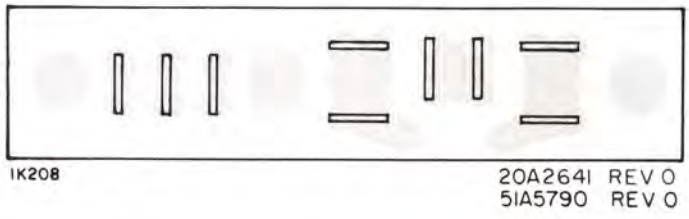


Figure 24. Power Distribution PWB

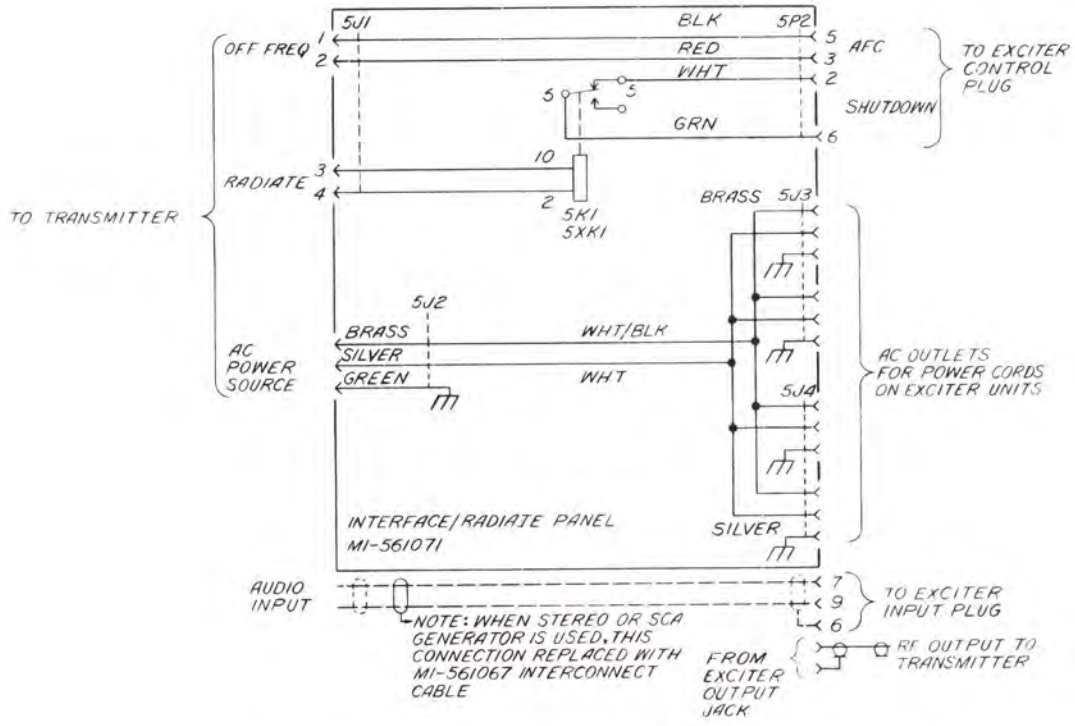


Figure 25. Interface Panel Schematic

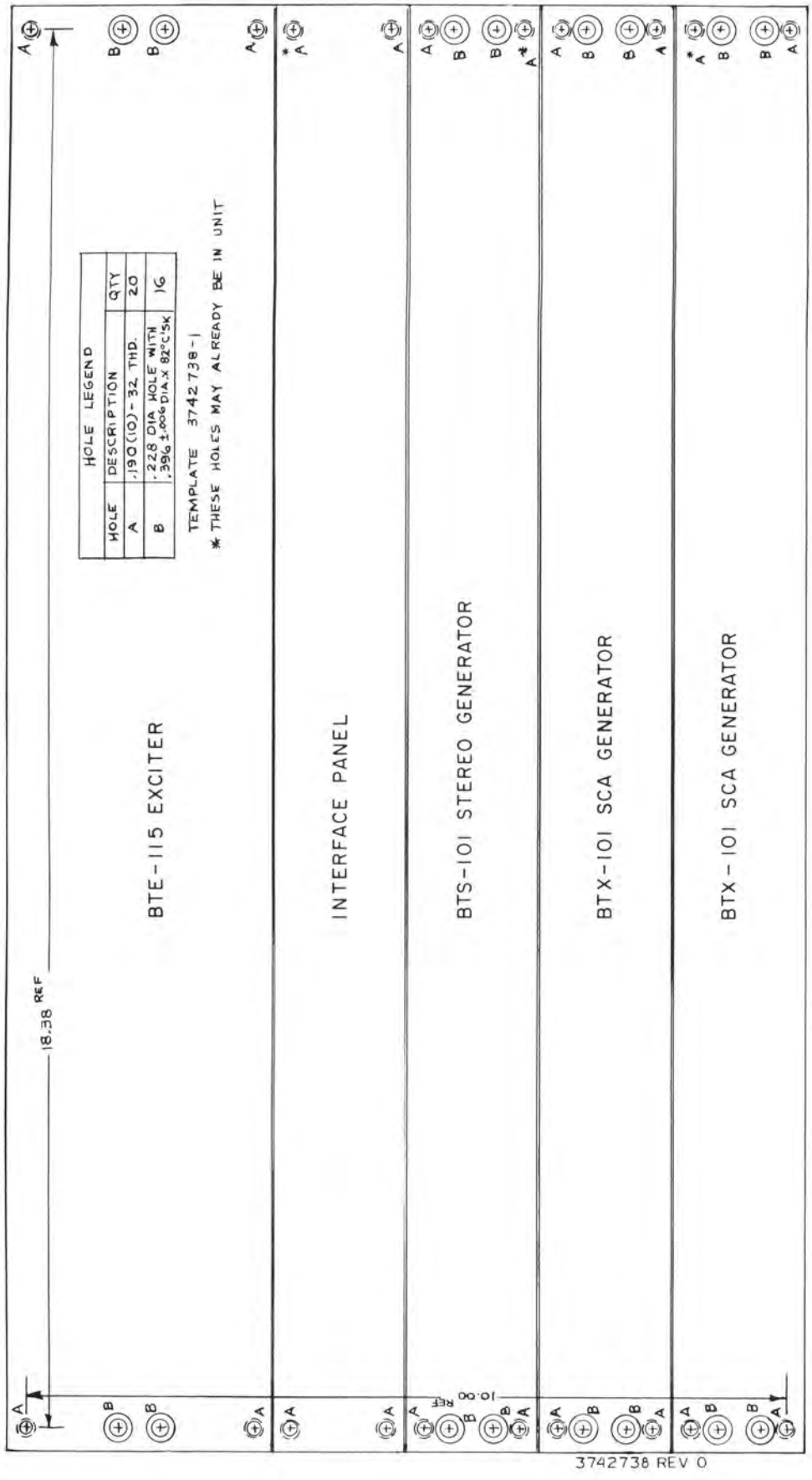


Figure 26. Exciter System Layout and Template

RCA Commercial Communications Systems Division

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BB739M