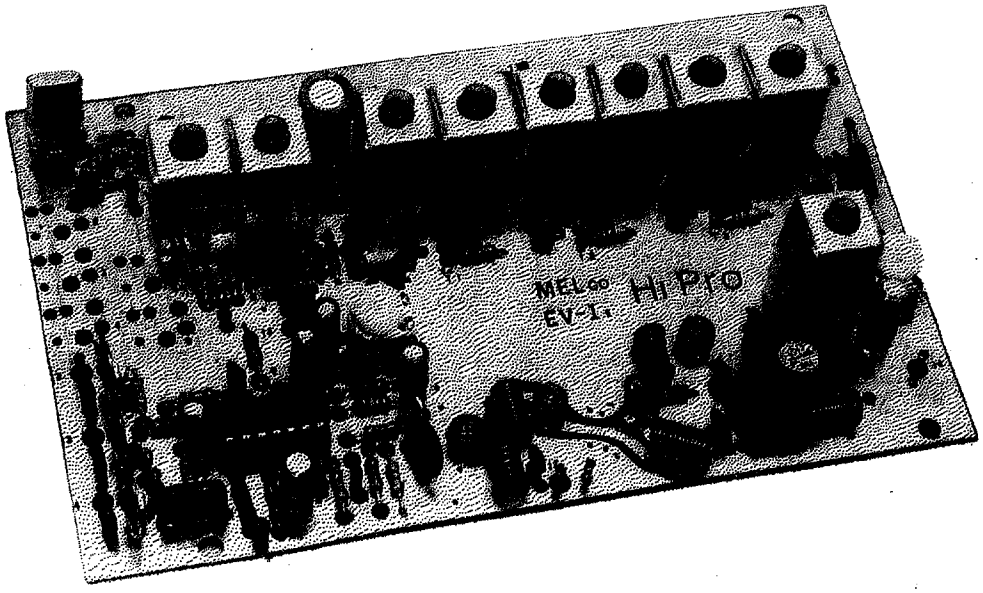
MAGGIORE ELECTRONIC LABORATORY

Hi Pro

OPERATING AND MAINTENANCE MANUAL



Hi Pro EV1 TRANSMITTER

CONTENTS

1-1 **DESCRIPTION.** The Maggiore Electronic Laboratory Model EV-1 is a solid-state, completely self-contained reliable and versatile FM (frequency modulated) communications in the specified frequency range. The transmitter is supplied in the narrow-band configuration from the factory. The construction of the board is designed for rugged commercial, 100% duty cycle service.

1-2 **APPLICATION.** The unit may be used with other FM equipment provided: (1) equipment is tuned to the same frequency, (2) equipment is adjusted to the same modulation deviation, and (3) equipment is operated in an FM system using common antenna polarization. This would insure maximum efficiency.

1-3. **PHYSICAL DESCRIPTION.** The dimensions of the board are 6 1/8" long x 3 7/8" wide x 7/8" deep.

1-4 **OPERATIONAL CHARACTERISTICS.** Communication coverage in the operating frequency of the transmitter is a function of the following characteristics: (1) antenna height above average terrain, (2) receiver sensitivity, (3) voltage source and power output. Maximum range can be obtained with both the transmitter and receiver antenna free from large intervening objects between them and the use of high gain antennas.

2-1 TRANSMITTER SPECIFICATIONS. Table 2-1 lists the performance specifications for the Model EV-1.

2-2 CRYSTAL SPECIFICATIONS. Crystal specifications for the EV-1 are provided in Table 2-2.

2-3 TRANSISTOR AND DIODE COMPLEMENT. Table 2-3 lists the transistors, IC's and Diodes used in the EV-1. The type and drawing number are listed for rapid identification.

TABLE 2-1 PERFORMANCE SPECIFICATIONS.

GENERAL

Operating Frequency*	VHF LOW 132 to 174 MHz VHF HIGH 200 TO 250 MHz
Input Voltage	13.8 VDC NOMINAL, 11 VDC MIN. 15 VDC MAXIMUM.
Current Drain	0.90 AMPS MAX. @ 5 WATTS OUTPUT.
Operating Temperature Range	-20°C to +60°C
Antenna Impedance	50 OHMS
Type Of Modulation	Frequency Modulation

TABLE 2-2 CRYSTAL SPECIFICATIONS

TRANSMITTER

Type	Minature Plug-in
Holder	Mil Type HC-25/U
Mode Of Operation	Fundamental, Parallel Resonance.
Load Capacity	40 pF.
Effective Resonance Resistance	20 Ohms Nominal.
Frequency Tolerance	Calibration: + 0.002% Of Exact Specified Frequency At Room Temperature. (25 °C Reference) Drift: Over Temperature Range (-30°C to +60°C) Within 0.002% (25°C Reference)
Crystal Frequency	Determined By Formula: VHF Low (144 - 170 MHz) Frequency ÷ 12 VHF High (220 - 250 MHz) Frequency ÷ 18

*NOTE: NOT ALL FREQUENCIES ARE AVAILABLE IN THE U.S.

TABLE 2-3 TRANSISTOR AND DIODE COMPLIMENT

TRANSISTORS

Q1	2N5770 or MPS918	Oscillator
Q2	2N5770 or MPS918	Buffer
Q3	2N5770 or MPS918	Multiplier
Q4	2N5770 or MPS918	Multiplier
Q5	2N5770 or MPS918	Multiplier
Q6	2N5770 or MPS918	Multiplier
Q7	2N4427	Driver
Q8	SD1127	Power Amplifier Output

IC

IC1	LM324	Audio Amplifier

DIODES

CR1	7.5 Volt Zener	Voltage Regulator
CR2 & CR3	MV840 or MV2209	Modulator

3-1 UNPACKING. The equipment may be shipped in either export or domestic packing cases. In either event, carefully unpack and check the contents against the shipping list before discarding any packaging materials. The unit has been thoroughly tested and inspected at the factory. Should any damage be apparent upon receipt of shipment, immediately report the damage to the carrier or responsible party. *DO NOT ATTEMPT TO PLACE DAMAGED EQUIPMENT INTO SERVICE.*

3-2 PRELIMINARY PROCEDURES. The unit is normally furnished completely aligned and tested with crystals installed. A general pre-installation checkout procedure should be followed to bench check the unit before placing it into service. Extensive system trouble shooting can be avoided if the equipment is bench-checked prior to installation to avoid impending malfunction or uncover invisible damage caused during shipping. If crystals are not included in the unit, then the proper crystals must be installed and the unit completely aligned as outlined elseware in this manual. Refer to Section 2 for crystal specifications. *DO NOT ATTEMPT TO USE OTHER TYPES OF CRYSTALS.*

3-3 PRE-INSTALLATION NOTES. Before installing the equipment, plan the installation ahead of time, and install the unit keeping in mind that all front panel and rear panel controls should provide easy access for the operator and service personnel. The following procedures should serve as a basic guide in planning the installation; it will vary, however, with the types and number of accessories used.

A. Select the location where the equipment will be installed. Carefully avoid where the equipment will be subject to excessive heat or cold or adverse weather conditions. This will avoid shortened and early equipment failure.

B. Determine the source of operating power from which the unit will be operating. Locate the unit close to a surge protected power source. Avoid lengthy power cables ,as this will cause excessive power loss and exposure to power surges.

C. For fixed-station installation, determine the antenna site and locate the unit in close proximity to the antenna to avoid excessive loss due to coaxial cable length. The antenna should be referenced to ground with no loose connections and water tight.

3-4 SITE SELECTION. For optimum results it will be necessary to select a location where the antenna will be free from obstructions and blocking. It is desirable to elevate the antenna as high as pratical to further increase the range of the equipment.

3-5 ANTENNAS AND ADJUSTMENTS. Antennas used with the EV-1 can be of two basic types: i.e., the single-frequency, pretuned, non-field adjustable and the field adjustable. The field adjustable types generaly have joints which after a period of time become noisy and develop an increase in SWR. With this type of antenna, as well as with the pretuned antenna, a proper match is essential. It is desirable, for proper measurement, to check the VSWR on the cable by using a thruline type VSWR bridge. A VSWR in excess of 2.1 generally indicates that the antenna had not been pretuned to the correct frequency. When using the unit in a repeater system it is important to keep the VSWR below 1.2 to reduce the effect of desensing.

4-1 INTRODUCTION.

The EV-1 Transmitter was specifically designed for repeater and critical service and provides features for this application.

THE FEATURES ARE:

1. 100% duty cycle at rated output.
2. Low sideband noise.
3. Adjustable power output.
4. Excellent attenuation of harmonics.
5. Master deviation control.
6. Three adjustable audio inputs.
7. Separate supply input to oscillator for added stability.
8. Extensive RF bypassing.
9. Excellent electrical and thermal stability. No oven needed in oscillator.
10. Expandable up to 6 channels.
11. Very cool operation.

4-2 TRANSMITTER WIRING CONNECTIONS.

J1. Supply to oscillator.	J1a. Supply input.	J2. Audio input -30db.
J3. Audio input -50db.	J4. Audio input 0 to +20db.	J5. Direct audio access to modulator.
J6. Alternate supply input.	J7. RF output.	TP1. !st mult. output test point.
TP2. 2nd mult. test point.	TP3. 3rd mult. test point.	TP4. 4th mult. test point.

4-3 GETTING IT TO WORK. Typical set-up procedures.

A. THE OSCILLATOR CIRCUIT. The crystal used in the oscillator should be a high grade to insure maximum stability and reliability. Be sure to use crystals conforming to specifications supplied. To net the crystal, adjust the trimmer capacitor located next to the crystal socket.

B. THE BOARD HAS TWO OPTIONS FOR SUPPLY VOLTAGE.

#1. Common supply of +13.8 volts for the oscillator and all other stages attached to "J1 & J1a". Transmitter will key-up when voltage is applied to these two terminals.

#2. A Separate supply to the oscillator to insure maximum stability is accomplished by applying a constant voltage to "J1" the oscillator and a switched (PTT) voltage to "J1a". The oscillator will run constantly and may be heard when a receiver on the same frequency is placed next to the transmitter housing.

C. The RF output circuit requires a load of 50 ohms into a unbalanced coaxial cable. The RF output power may be controlled by adjusting "R22". Use this control to reduce power by no more then 30%, especially if higher power amplifiers are used in the system. The board will work on a supply voltage of 11 volts, but there will be a noticable reduction in power.

D. Audio may be attached to any of 4 inputs: "J2, J3" (usually connected to a low impedance mic.), "J4" (usually connected to the 8 ohm receiver audio output through a decoupling resistor capacitor network, typically a .1 uf cap. across a 4.7K resistor) or "J5" (direct coupling to the modulator without any processing,, using a 1uf decoupling cap.) "J2, J3 & J4" have controls which are located adjacent to the corresponding pin inputs to adjust for audio level. Control "R44" adjusts for max. audio deviation.

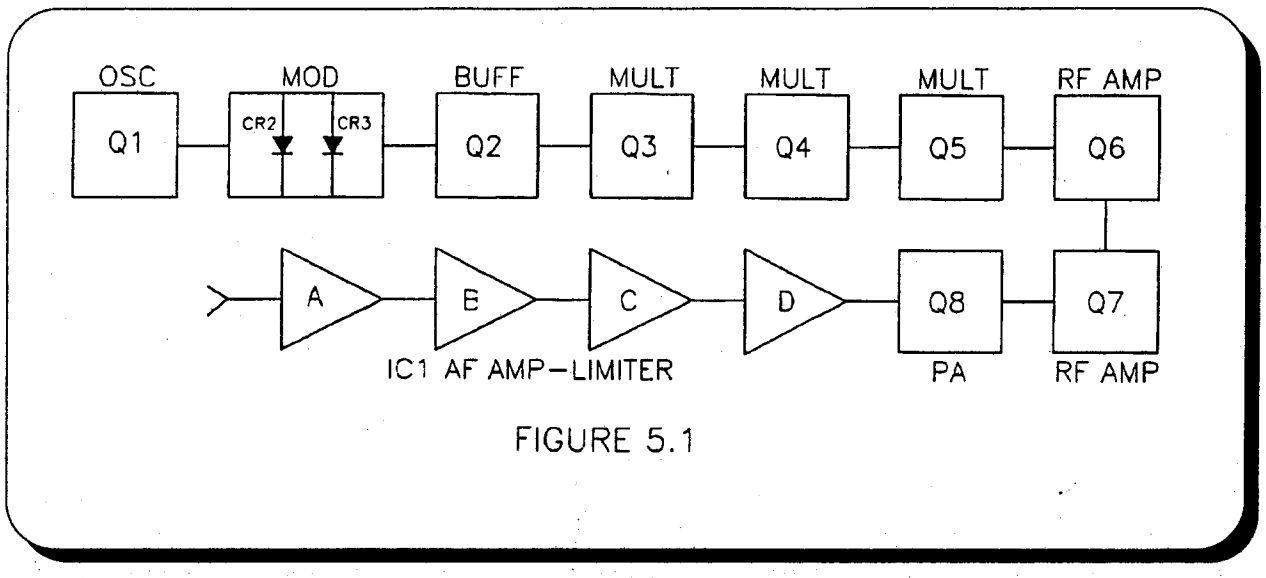


FIGURE 5.1

5-1 **INTRODUCTION.** Rapid and efficient application of service and maintenance techniques require complete and thorough understanding of the circuits used and the theory of operation. The subsequent paragraphs describe the theory of operation of the circuits used in the EV-1 transmitter. For ease of understanding, the circuits are described in the order of signal flow. References are made to the block diagram (fig. 5-1) and the schematic diagram (fig. 10-1).

5-2 **TRANSMITTER CIRCUITS.** The crystal oscillator employed in the unit is of the standard Miller configuration. It uses a fundamental mode crystal and compensation components to obtain a high degree of frequency stability. Over the temperature range of -20°C to +60°C the crystal and associated components provide temperature stability needed in repeater service. A small value trimmer capacitor is placed across the crystal for exact adjustment of the channel frequency. The channel determining crystal is multiplied by multiplier stages as follows: VHF LOW (144 MHz) x3 x2 x2 = x12
VHF HIGH (220 MHz) x3 x2 x3 = x18
This provides for the following outputs: VHF LOW 132 - 174 Mhz, VHF HIGH 200 - 250 MHz. The audio section consist of a four stage amplifier. The processed audio from the amplifier is fed to the modulator via an active filter designed to reduce the distortion generated by the limiting action. The modulator circuit is an advanced design. It consist of a pair of varactor diodes designed to produce modulation as a function of phase differences. The transistor "Q2" serves as a buffer to isolate the oscillator from the first multiplier. The Transistors "Q3", "Q4" and "Q5" multiply the determining frequency by "12" (by "18" on 220). "Q6" and "Q7" amplify the signal delivered to "Q8", the power output RF amplifier.

The RF power amplifier stage incorporates an output network comprised of two varable LC circuits, the first of which is variable to allow matching of the transistor impedance to the filter matching network and that networks into 50 ohms output impedance. The first variable section and the second section which follows also serves to attenuate harmonics. When used as the sole transmitting element in a station, the unit is connected to the antenna system via its own lowpass filter as indicated above to supress spurious outputs. This unit can be used as a driver for a higher power amplifier. In these instances an additional filter should be included as a part of that amplifier or subsequent thereto as is used in the Hi Pro PAV-1.

6-1 TRANSMITTER ALIGNMENT. Equipment required.

1. 5W RF wattmeter with coaxial 50 ohm load.

2. D.C. test meter with a range of 0 - 15 volts and 0 - 1 amps.

3. Frequency counter or service monitor covering the proper range being checked.

4. Deviation monitor.

5. Audio sine-wave generator.

6. Audio voltmeter.

7. Tuning tools.

8. Spectrum analyzer.

ALIGNMENT. The slug tuned coils in the exciter should always be adjusted with the proper tuning tool. A loosely fitting or rounded tool may crack the slugs. The variable capacitors should be adjusted with a small, insulated metal blade alignment tool. All adjustments should start with the cap or slug set at the middle of its range.

NOTE: The following are some ground rules to help avoid trouble. Adhering to these guidelines will net superior results.

1. Do not operate without a 50 ohm load.

2. For continuous duty, 100 % operation, do not exceed 5 watts output or a total current drain of 0.8 amps. Power is controlled by variable resistor "R22" and should be adjusted to limit the total output of the final transistor. Adequate heat sinking of the final output transistor is also required.

3. If unit goes into self oscillation or otherwise draws excessive current for any reason and reducing drive will not reduce excessive current draw, immediately remove power and resolve the problem.

4, Always follow alignment procedures exactly. Do not repeak previous stages unless directed to do so, as each stage has its own best operating point once tuned.

5. RF power transistors will run hot at full drive. They should run cold without drive or when the crystal is removed. Never run the unit without propper heat sinking.

6. There should be a heat sink on "Q7" and on "Q8" which is intentionally mounted on the bottom side of the board, is designed to make contact with the chassis by means of a small ammount of heat sink compound. Direct contact with the chassis is important, as this is how the final transistor is kept cool.

6-2 ALIGNMENT INSTRUCTIONS.

a. Connect a 50 ohm load and wattmeter to the antenna output terminals.

b. Install the crystal of the proper operating range.

c. Be sure power supply is off. Observe polarity and connect EV-1 to B+ of the supply. There should be a 0-1 amp meter in line with this lead to monitor current of the exciter. This is important to indicate potential trouble in the exciter.

d. Turn on the power supply, and confirm the voltage is +13.8 volts. With a volt meter, measure +7.5 volts at the top of "CR1", the voltage regulator.

NOTE: Meter readings may vary due to many factors not related to performance.

e. Connect meter to test point "TP1" (first multiplier). Adjust "L1" and "L2" for maximum reading on volt meter. Reading should be about 1 to 1.5 volts with crystal installed and the reading should drop considerably if crystal is removed. This change in level indicates crystal is oscillating. Using the proper tuning tool adjust coil "L3" for a dip. If there is no dip go to next step.

f. Connect meter to "TP2" (second multiplier). Peak "L4" (and "L3" if no dip occurred in previous step) for maximum indication, then adjust "L5" for a dip. Typical reading is about 1 to 1.5 volts. If there is no dip when adjusting "L5" then go to next step.

g. Connect meter to "TP3". Peak "L6" (and "L5" if no dip occurred in previous step) for maximum indication, then adjust "L7" for a dip. Typical reading is 1 to 1.5 volts and no voltage indication with crystal removed. If no dip when adjusting "L7" go to next step.

h. Connect meter to "TP4". Low side of "R22". Be sure "R22" is at mid range or mesurement can not be made. Adjust "L9" for maximum indication. When "L9" has been adjusted then rotate "R22" counter clock-wise to maximum position.

i. Observe output of transmitter on wattmeter. Alternately adjust "C35", "C38" and "C39" for maximum output. Connect a spectrum analyzer to to the transmitter output to monitor for spectral purity. At full drive, the total current drawn by the board should be approximately 0.8 amps. Under no circumstances should the current exceed 1.0 amps.

The PA is tuned for maximum output indicated on wattmeter and *NOT FOR MAXIMUM CURRENT* on amp meter. Current will dip somewat at resonance; but dip cannot be used for tuning, only output peak. As you get the feel of the results of adjusting the output, you will see that at one side of resonance, current may dip slightly and at the other side it will go up steeply. At proper tuning, maximum output will occur with moderate current.

Also, note that full output may not be possible with less than 13.8 volts. Power output falls rapidly as B+ is reduced. This does not necessarily mean that the unit cannot be used; however, since it is hard to distinguish even a 2:1 reduction in power on the air.

After tuning the exciter into a known good 50 ohm dummy load, it should not be retuned when later connected to the antenna or external power amplifier. Of course, the antenna or PA should present a good 50 ohm load to the exciter.

j. With crystals installed, adjust the corresponding oscillator trimmer to net each crystal to the proper frequency.

6-3 AUDIO ADJUSTMENTS.

a. Tune the deviation monitor to the transmitter output frequency. Connect audio signal generator output to "J4", audio input, and ground. Adjust "R25" audio input level control for maximum audio with minimum clipping, with the audio deviation control (R44) set at mid-range. Audio signal generator level to be set at 100 mV RMS at a frequency of 1000 Hz.

b. Adjust the deviation pot. (R44) for a maximum deviation of +5 KHz. Now increase audio input level (R25) to maximum and observe deviation. Deviation should not exceed +5 KHz. If deviation exceeds +5 KHz adjust "R44", the deviation control to +5 KHz maximum.

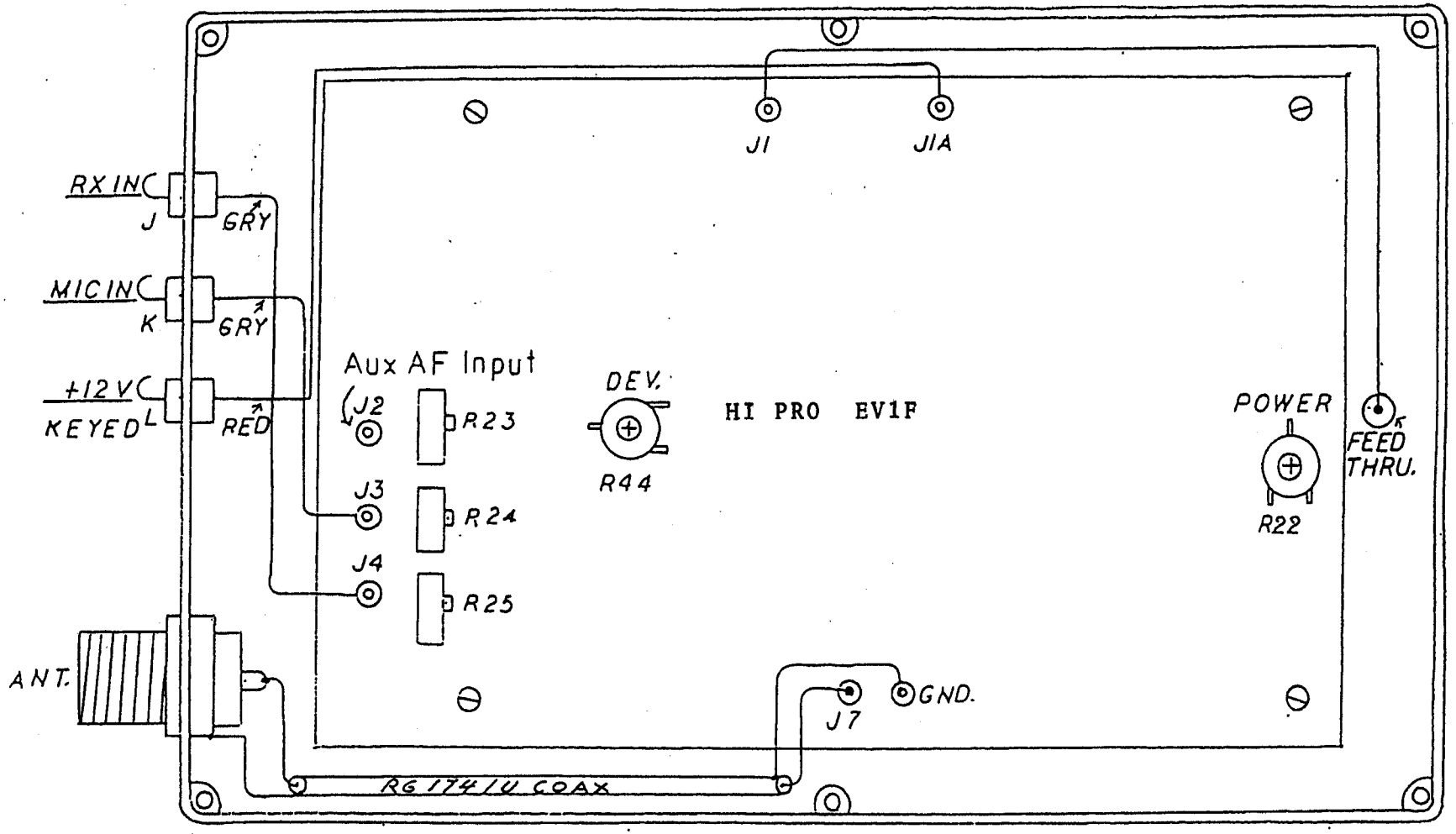
NOTE: It is possible to voice modulate the transmitter and make the deviation adjustment; however, this method will not produce results as reliable or uniform as those obtained with an audio generator.

Hi Pro EV-1 TRANSMITTER/ EXCITER PARTS LIST 140 to 174 MHz

C01	330 uF Elec.	C02	4-20 pF Var. Cap.	C03	Deleted
C04	62 pF DC NPO	C05	62 pF DC NPO	C06	47 pF DC NPO
C07	5 pF DC NPO	C08	.001 uF DC	C09	6.8 pF DC NPO
C10	.001 uF DC	C11	.001 uF DC	C12	.02 uF DC
C13	47 pF DC NPO	C14	Deleted	C15	.02 uF DC
C16	1 pF DC NPO	C17	47 pF DC NPO	C18	.001 uF DC
C19	33 pF DC NPO	C20	.001 uF DC	C21	1 pF DC NPO
C22	.02 uF DC	C23	33 pF DC NPO	C24	.001 uF DC
C25	10 pF DC NPO	C26	Deleted	C27	1 pF DC NPO
C28	15 pF DC NPO	C29	62 pF DC NPO	C30	.001 uF DC
C31	.001 uF DC	C32	10 pF DC NPO	C33	33 pF DC NPO
C34	5 pF DC NPO	C35	4-20 pF Var. Cap.	C36	.001 uF DC
C37	10 uF Elec.	C38	3-13 pF Var. Cap.	C39	5-30 pF Var. Cap.
C40	22 pF DC NPO	C41	.001 uF DC	C42	.001 uF DC
C43	.001 uF DC	C44	.001 uF DC	C45	47 uF Elec.
C46	.1 uF DC	C47	1 uF Elec.	C48	.02 uF DC
C49	.02 uF DC	C50	1 uF Elec.	C51	.1 uF Mylar
C52	.002 uF DC	C53	220 pF DC NPO	C54	.01 uF Mylar
C55	1 uF Elec.	C56	1 uF Elec.	C57	.001 uF DC
C58	47 pF DC NPO	C59	47 pF DC NPO	C60	Deleted
R01	120 Ohms 1/2 Watt.	R02	Deleted	R03	33K
R04	33K	R05	10K	R06	10K
R07	10K	R08	18K	R09	18K
R10	100K	R11	33K	R12	4.7K
R13	10K	R14	470 Ohms	R15	1K
R16	47K	R17	4.7K	R18	470 Ohms
R19	100 Ohms	R20	100 Ohms	R21	160 Ohms
R22	1K Pot.	R23	50K Pot.	R24	10K pot.
R25	5K Pot.	R26	10K	R27	10K
R28	100K	R29	2.7K	R30	47K
R31	330K	R32	1K	R33	1K
R34	47K	R35	62K	R36	10K
R37	3.9K	R38	1.8K	R39	5.6K
R40	4.7K	R41	56K	R42	56K
R43	4.7K	R44	1K Pot.	R45	Deleted
R46	10 Ohms	R47	33 Ohms	R48	Deleted
L01	Modulator Coil	L02	Modulator Coil	L03	Mult. Coil
L04	Mult. Coil	L05	Mult. Coil	L06	Mult. Coil
L07	Mult. Coil	L08	Mult. Coil	L09	RF Coil
L10	RF Coil	L11	RF Coil	L12	RF Choke
L13	PA Coil	L14	PA Coil	Z01	Ferrite
Z02	Ferrite	Z03	Ferrite	Z04	Ferrite
CR1	7.5V Zener	CR2	MV2209	CR3	MV2209
Q01	MPSA13/2N5770	Q02	MPSA13/2N5770	Q03	MPSA13/2N5770
Q04	MPSA13/2N5770	Q05	MPSA13/2N5770	Q06	MPSA13/2N5770
Q07	2N4427	Q08	SD1127	IC1	LM324

COMPONENT CHANGES FOR 220 MHz OPERATION

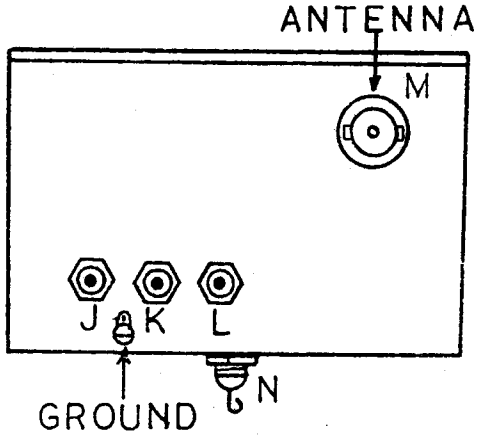
C13	62 pF DC NPO	C17	62 pF DC NPO	C25	6.8 pF DC NPO
C27	4.7 pF DC NPO	C28	27 pF DC NPO	C29	Deleted
C32	8.2 pF DC NPO	C33	2.2 pF DC NPO	C49	Deleted
C59	Deleted	R21	Ferrite Choke	R46	Ferrite Choke
R47	Ferrite Choke	L07	Mult. Coil	L08	Mult. Coil
L09	RF Coil	L10	RF Coil	L11	RF Coil
L12	RF Choke	L13	PA Coil	C61	2.2pF Across L8



FOR INCREASED STABILITY, CONNECT
J1A TO CONSTANT 13.8V SUPPLY.
BE SURE THAT THE LEADS ON J3 &
J4 ARE CLEAR TO REDUCE RF PICKUP.

SIZE	CODE IDENT NO.	DRAWING NO.
	R2405	TX VHF HOUSING EV1
SCALE		11/27/90 SHEET

Maggiore Electronic Laboratory



"J" High Level Audio Input

"K" Microphone Input

"L" P.T.T., Switched + 13.8 V.D.C.

"M" Antenna Connector, 50 Ohm Impedance

"N" P.A. And Oscillator Supply, Continuous + 13.8 V.D.C.

NOTE: When Exciter and Power Amplifier are mounted in an rf enclosure, the Exciter Model Number now is followed by an "H".

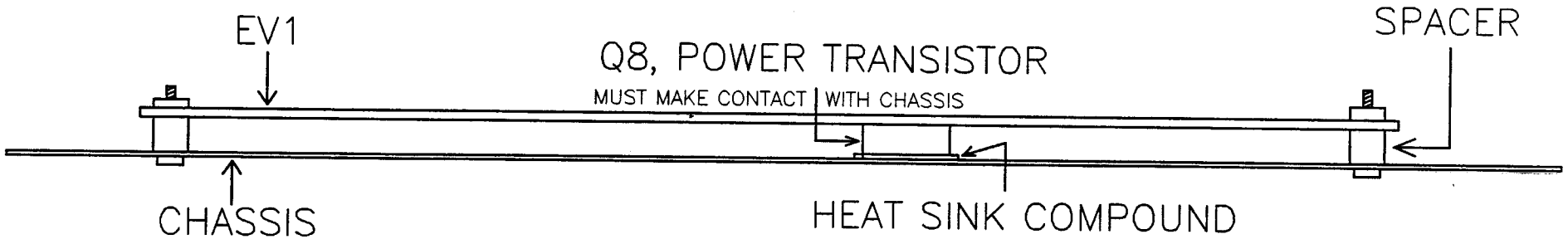
IMPORTANT. DO NOT OPERATE THE TRANSMITTER WITHOUT PROVIDING ADDITIONAL HEATSINKING OR COOLING. THE HOUSING IS NOT SUFFICIENT FOR STAND ALONE OPERATION. IT MUST BE MOUNTED DIRECTLY ON A CHASSIS TO ACHIEVE MAXIMUM HEATSINKING. IF THIS IS NOT SUFFICIENT THEN A FAN MUST BE USED. EXCESSIVE HEAT WILL BE GENERATED ESPECIALLY WHEN USING THE 30 WATT POWER AMP OPTION. WHENEVER THE TRANSMITTER IS REMOVED FROM THE HOUSING: SUCH AS REMOVAL FOR INSTALLATION OF HOUSING TO CHASSIS, BE SURE TO PLACE ALL WIRES BACK IN THE SAME ORIGINAL POSITION TO AVOID RF FROM GETTING INTO THE AUDIO LINES. IF THEY ARE NOT DRESSED IN THEIR ORIGINAL POSITION, THE RF FEEDBACK MAY CAUSE STRANGE THINGS TO HAPPEN, SUCH AS AUDIO SQUEAL, GROWLING AND IN SOME CASES, COMPLETE AUDIO WIPEOUT.

HI PRO TRANSMITTER HOUSING

SIZE	CODE IDENT NO.	DRAWING NO.
	EH-1	1B0683
SCALE	1. m.	SHEET 3

SPECIAL NOTICE

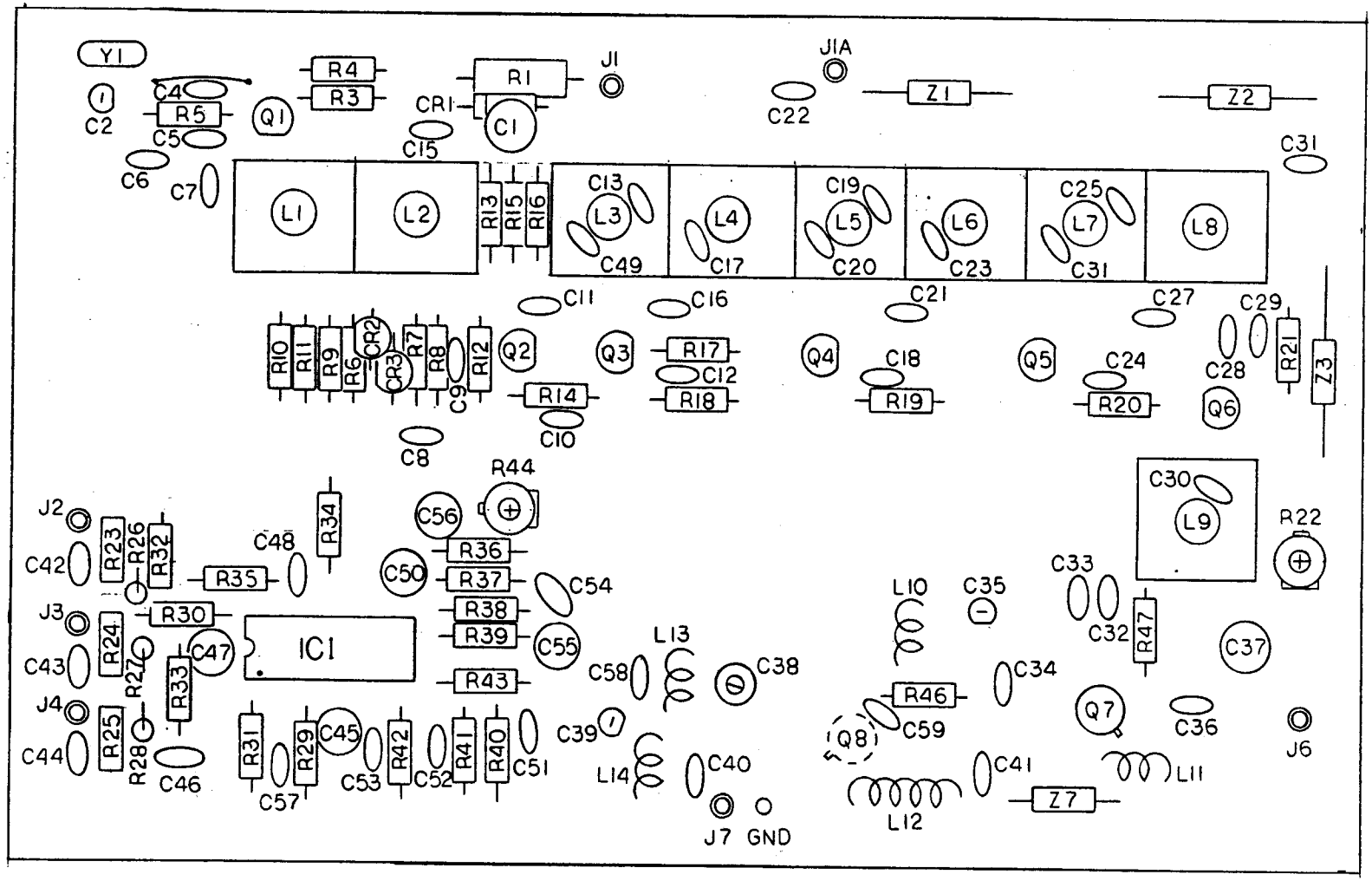
Q8, THE OUTPUT TRANSISTOR, MUST MAKE CONTACT WITH THE CHASSIS TO PROVIDE ADEQUATE HEAT SINKING. A HEAT SINK COMPOUND MUST BE USED BETWEEN THE TRANSISTOR AND THE CHASSIS.



THE EV1H IS DESIGNED TO USE A SWITCHED 13.8V TO FEEDTHRU "L" AND A CONSTANT 13.8V ON THE FEEDTHRU LOCATED ON THE BOTTOM OF THE CASE. FEEDTHRU "L" CONNECTS TO PIN "J1" ON CIRCUIT BOARD. CONSTANT VOLTAGE SUPPLY TO PIN "J1" ON CIRCUIT BOARD. A HIGHER RATE OF STABILITY IS ACHIEVED WITH THIS CONFIGURATION: HOWEVER, YOU MAY WANT TO ATTACH "J1" TO "J1A" ON THE EXCITER BOARD FOR CONVENIENCE OR TESTING.

Title	EV1 HEAT SINKING	
Size A	Number	Rev
Date		Drawn by F.P.M.
Filename		Sheet of

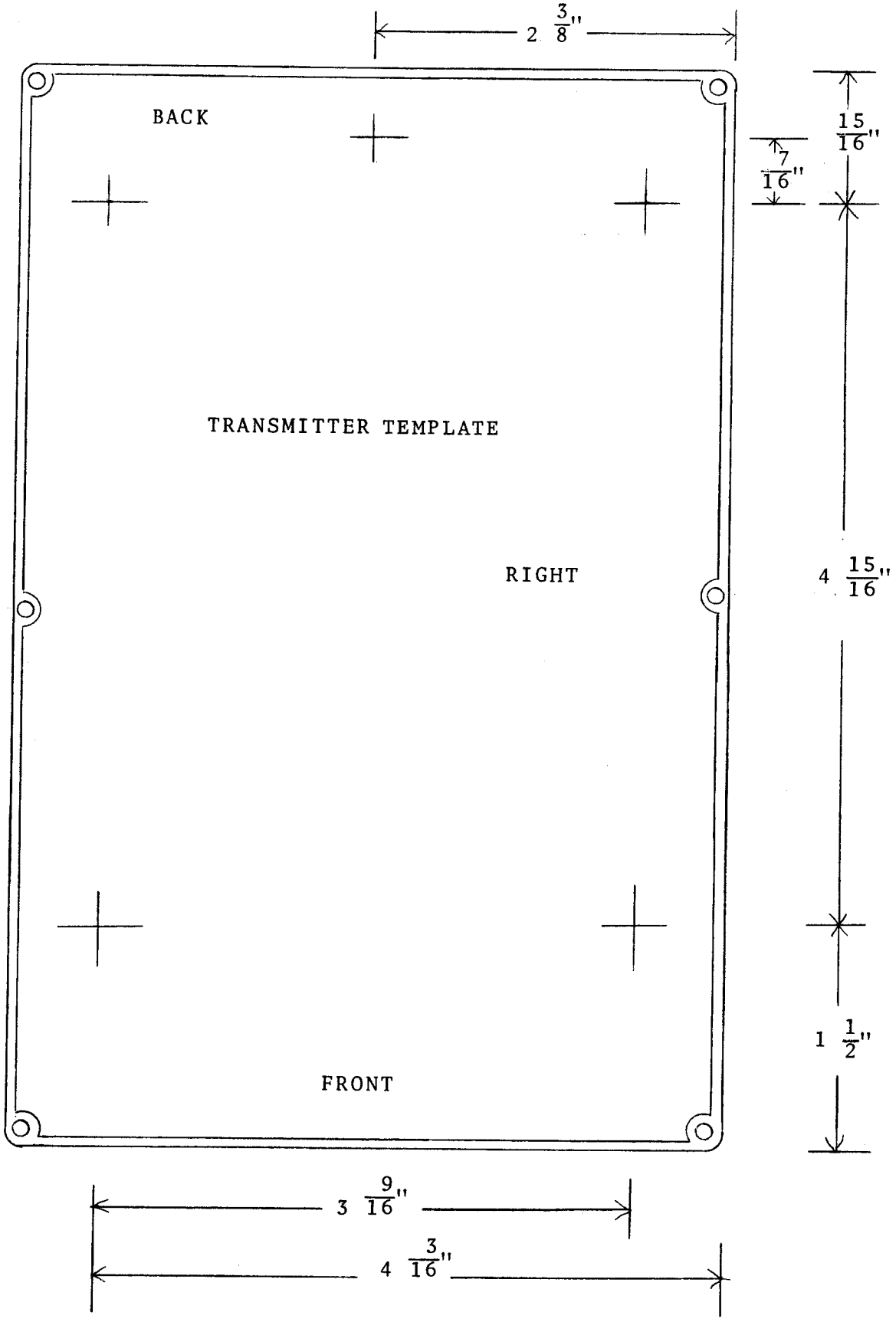
8.3

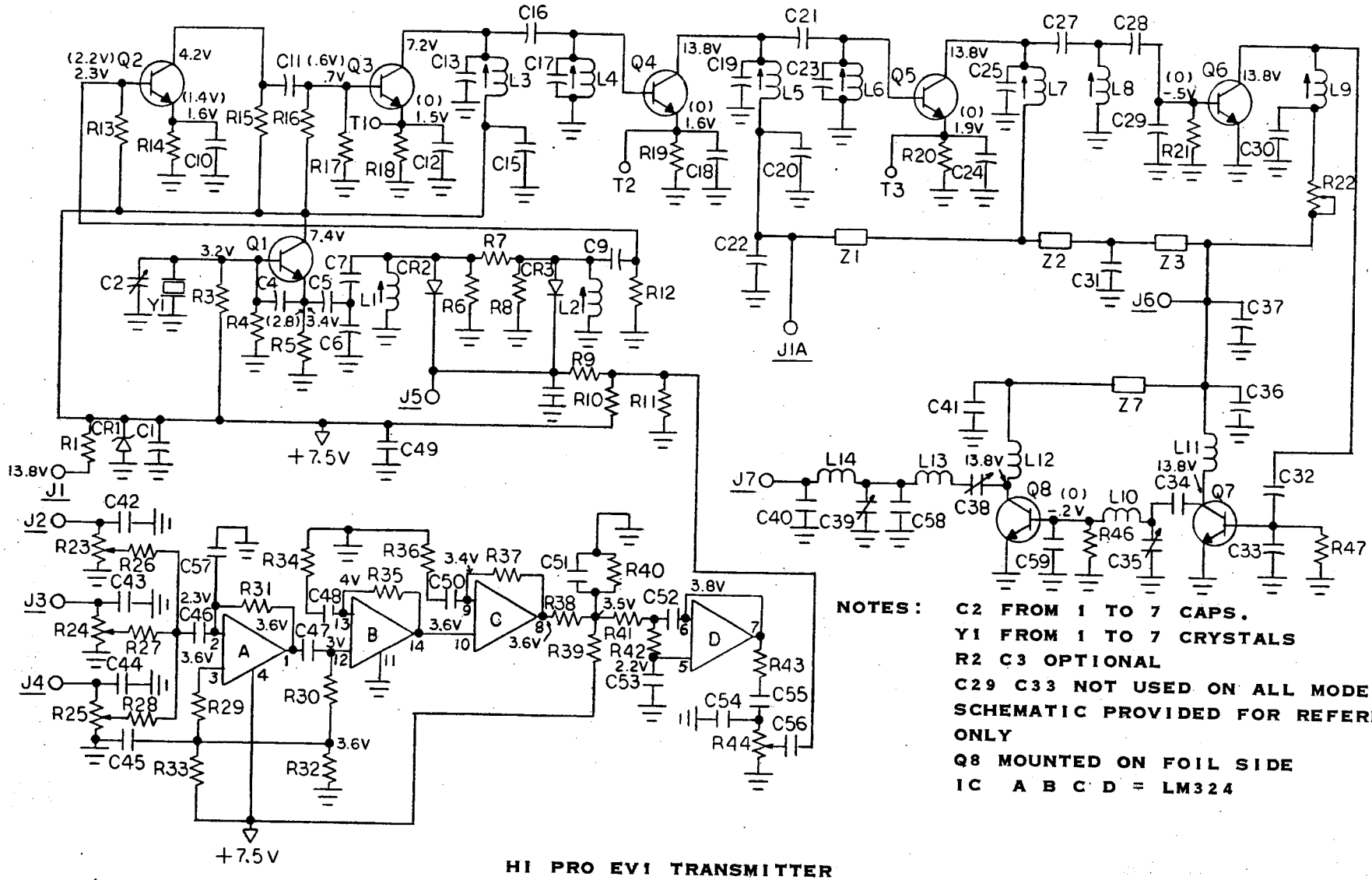


SIZE	CODE IDENT NO.	DRAWING NO.
	EV-1	2E0584
SCALE	W.S.	SHEET

BISHOP GRAPHICS, INC. REORDER NO. 1852

RIGHT SIDE AND FRONT OF BOX IS MOUNTED ABOUT ONE INCH FROM EDGE OF CHASSIS.





NOTES:
- C2 FROM 1 TO 7 CAPS.
- Y1 FROM 1 TO 7 CRYSTALS
- R2 C3 OPTIONAL
- C29 C33 NOT USED ON ALL MODELS
- SCHEMATIC PROVIDED FOR REFERENCE ONLY
- Q8 MOUNTED ON FOIL SIDE
- IC A B C D = LM324

HI PRO EV1 TRANSMITTER

SIZE	CODE IDENT NO.	DRAWING NO.
	EV1	2D0591
SCALE		SHEET

N O T E

The supply voltage input feedthru on the transmitter is now mounted together with the other feedthrus. This change was done to make it easier to apply power to the unit.

Another change is the studs on the bottom of the housing are provided for ease of mounting on the chassis without having to remove the board mounted internally.