



ELCO

MAGGIORE ELECTRONIC LAB.

Hi Pro Repeater

Owner's Operating And Maintenance Manual

Maggiore Electronic Laboratory

DESCRIPTION

This Repeater is an extremely rugged completely solid state Repeater.

State of the art devices such as ICs, FETs, Varactor and Zener diodes are engineered into tight knit straightforward electronic design throughout both transmitter and receiver. Reliability, low current demand, compactness, unexcelled performance and ease of operation are the net result.

The dual conversion receiver with its FET front end and high-Q circuits boasts low noise and sensitivity of 0.3 uv or less. Signal gain of 90 db or more is accomplished from the IF amplifier. The need for additional front end RF amplification is thus eliminated. Zener regulated crystal-controlled oscillator produces unmatched stability. Audio reproduction is of an unusually high order of distortion free clarity. Advanced squelch prevents chopping.

The transmitter section on the MkI will produce a nominal of 15 watts RF output (25 watts VHF, 18 watts UHF on the MkII). Again, a Zener regulated crystal oscillator is employed for initial frequency stability. High-Q and shielded stages provide minimum interstage spurious reaction. A low pass filter is placed at the output to further insure undesirable frequency products not being emitted. On battery backup, output power drops to 10 watts to conserve battery power.

All circuitry is constructed in a series of modules which are easily removable for servicing.

A modern style, small size and low profile design compliment the unit.

SECTION 1 INSTALLATION

1.1 Unpacking.

Carefully remove your Repeater from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier immediately, stating the full extent of the damage. It is recommended you keep the shipping carton in the event storage, moving, or reshipment becomes necessary.

1.2 Location.

Where you place the Repeater is not very critical and should be governed by convenience and accessibility. Since the unit is so compact, many possibilities present themselves. BE SURE TO ALLOW FOR PLENTY OF VENTILATION BOTH ABOVE AND BELOW THE REPEATER. A FAN MOUNTED IN THE REAR WITH AIR FLOW DIRECTED TOWARD THE POWER AMPLIFIER WOULD BE ADVANTAGEOUS, BUT NOT NECESSARY IF TEMPERATURES REMAIN BELOW 90° FARENHEIT.

1.3 Power Requirements.

The Standard Repeater is supplied ready to operate from any 110v ac 60 cy source. A 12 volt battery negative ground system may also be incorporated. Some precautions must be taken however to the condition of the electrical system. Items such as low battery, poor voltage regulation, etc., will impair operation of your Repeater.

Maggiore Electronic Laboratory

- 1.3 High noise generation or low power delivery and hum can be traced to these deficiencies. Low voltage while under load will not produce satisfactory results from your Repeater receiver, and transmitter output will be greatly impaired.

CAUTION: Excessive Voltage (above 130v ac - 15v dc) will cause damage to your Repeater. Be sure to check the source voltage before connecting the power cord. Do not defeat ground pin on power cord. Always use a grounded outlet.

- 1.4 Antenna
The most important single item that will influence the performance of any communication system is the antenna. For that reason, a good high quality gain antenna of 50 ohms impedance is recommended. When adjusting your antenna, by all means, follow the manufacturer's instructions. There are some pitfalls to be aware of. For example, do not attempt to adjust an antenna for lowest VSWR with the Repeater Transmitter. Rather use a low power transmitter and an in line watt meter similar to the Drake WV-4 or Bird Model 43 with proper cartridge.

The RF coaxial connectors on the rear chassis mates with a standard PL-259 connector.

SECTION 2 OPERATION

2.1 Initial Preparations.

- Connect the microphone to the microphone jack.
- Connect the antennas or duplexer cables, to the antenna coax connectors. Make sure the coax lines are of the correct impedance (50 ohms) and is neither shorted nor open circuited.
- Make sure the function switch is in the simplex position.
- If deluxe auto patch or basic auto patch is used, connect phone line and on deluxe auto patch interconnecting cable.

2.2 Operation.

When the function switch is set to simplex position, the repeat mode is disabled. Keying the local microphone will be the only way to operate the transmitter, other than in auto patch mode.

2.3 Reception.

- Adjust the volume control on front panel to a comfortable listening level with squelch control on rear open.
- Adjust rear volume control only if necessary.
- Carefully adjust the squelch control on rear panel clockwise, (with no receiver input) until the noise just disappears. This is the proper squelch threshold setting and must be done when no signal is present. Your Repeater will now remain silent until an incoming signal is received which opens the squelch. If the squelch is unstable due to the reception of weak or unstable signal, adjust the squelch control further until the desired threshold is obtained.

Maggiore Electronic Laboratory

- 2.3 d. The meter indicates the signal strength and proper frequency setting of the incoming stations and is calibrated in S units and plus or minus of center frequency.
- 2.4 Transmitting.
Excessive audio compression is adjusted by exciter board audio adjustment, excessive repeater deviation is adjusted by deviation control on transmitter exciter board.
- 2.5 Transmitter power adjustment.
Final power output may be changed by adjusting power level control on exciter board.

SECTION 3 MAINTENANCE

- 3.1 The necessity of completely realigning the unit is unlikely. The most common cause of breakdown is component failure. It is felt that the average owner would not have the necessary equipment and facilities to accomplish realignment in any case, if it did become necessary. If one did have such facilities and instruments, it is highly likely he would be a FM technician and instructions for alignment would be unnecessary. All of the foregoing is to say that this Repeater is a complicated and electronically speaking, delicate machine. Great care and precision are employed in its manufacture and warranty service is provided to insure that it meets specifications. Adjustments not outlined herein should not be undertaken unless the owner is skilled as a technician.
- 3.2 Transmitter Alignment.
 - a. Connect a dummy load (50 ohms) or a wattmeter to transmitter coax connector.
 - b. Connect the microphone to the microphone jack
 - c. To align the transmitter frequency, slowly adjust the trimmer capacitor frequency adjust, until the desired frequency is achieved. The trimmer should be adjusted very slowly while the transmit frequency is observed on suitable measuring equipment.
 - d. Align exciter per alignment instructions. (See alignment chart)
 - e. The driver and power output stages should be aligned for maximum output.

Be careful not to transmit for more than 5 seconds during each alignment step, as damage could be caused to the transistors due to overload during this procedure.

- 3.3 Receiver Alignment.
 - a. Remove the microphone from the Repeater and place Repeater in simplex mode to prevent accidental transmission during receiver alignment.
 - b. Allow the test oscillator or generator to stabilize frequency drift.
 - c. Connect the test oscillator or generator to the receiver antenna coax connector. Set the test oscillator or generator to the desired frequency. Set the squelch control to the maximum counter clockwise position.
 - d. Align the receiver according to the chart provided. (See Alignment chart)
 - e. Calibrate discriminator meter by injecting a 10.7 Mhz signal to the

Maggiore Electronic Laboratory

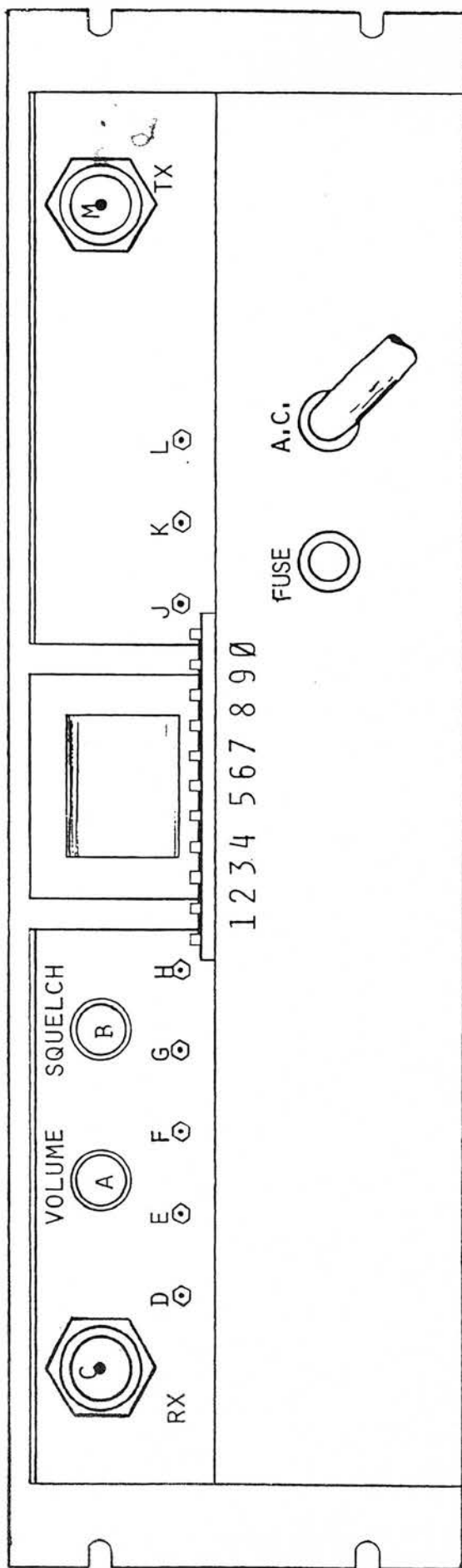
first I.F. and with meter switch in discriminator position locate the discriminator meter calibration control on bottom side of repeater and adjust for zero center on meter.

SAFETY INSTRUCTIONS

1. READ ALL THE INSTRUCTIONS- ALL OPERATING INSTRUCTIONS SHOULD BE READ BEFORE OPERATING EQUIPMENT.
2. RETAIN ALL INSTRUCTIONS- RETAIN FOR FUTURE REFERENCE.
3. HEED WARNINGS- ALL WARNINGS IN THE OPERATING INSTRUCTIONS SHOULD BE ADHERED TO.
4. FOLLOW INSTRUCTIONS- ALL OPERATING AND USE INSTRUCTIONS SHOULD BE FOLLOWED.
5. WATER AND MOISTURE- THE EQUIPMENT SHOULD NOT BE USED NEAR WATER- FOR EXAMPLE NEAR A WASHBOWL, SINK, LAUNDRY TUB, BATH TUB, IN A WET BASEMENT, OR NEAR A SWIMMING POOL, ETC.
6. HEAT- THE EQUIPMENT SHOULD BE SITUATED AWAY FROM HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, OR OTHER EQUIPMENT (INCLUDING AMPLIFIERS) THAT PRODUCE EXTREME HEAT.
7. POWER SOURCES- THE EQUIPMENT SHOULD BE CONNECTED TO A POWER SUPPLY ONLY OF THE TYPE DESCRIBED IN THE OPERATING INSTRUCTIONS OR AS MARKED ON EQUIPMENT. ALWAYS MAINTAIN A PROPER GROUND.
8. POWER CORD PROTECTION- POWER SUPPLY CORDS SHOULD BE ROUTED SO THAT THEY ARE NOT LIKELY TO CRUSHED OR PINCHED BY ITEMS PLACED UPON OR AGAINST THEM. PAYING PARTICULAR ATTENTION TO CORDS AND THERE CONNECTIONS. KEEP CORDS AWAY FROM EXTREME HEAT AND FLAME.
9. OBJECT AND LIQUID ENTRY- CARE SHOULD BE TAKEN TO PREVENT OBJECTS FALLING AND LIQUIDS SPILLING INTO THE ENCLOSURE.
10. DAMAGE REQUIRING SERVICE- THE POWER SUPPLY OR PROTECTION CIRCUITS DAMAGED, OR OBJECTS FALLEN, OR LIQUIDS HAVE ENTERED THE EQUIPMENT, OR EXPOSED TO RAIN, OR THE EQUIPMENT DOES NOT APPEAR TO OPERATE NORMALLY OR EXHIBITS MARKED CHANGE IN PERFORMANCE, OR THE EQUIPMENT HAS BEEN DROPPED, OR THE ENCLOSURE HAS BEEN DAMAGED.
11. SERVICING- THE USER SHOULD NOT ATTEMPT TO SERVICE THE EQUIPMENT BEYOND THAT DESCRIBED IN THE OPERATING INSTRUCTIONS. ALL OTHER SERVICING SHOULD BE REFERRED TO QUALIFIED SERVICE PERSONNEL OR SENT BACK TO THE FACTORY.

REPEATER

REAR VIEW



- A- MAIN VOLUME CONTROL
- B- RECEIVER SQUELCH
- C- RECEIVER ANTENNA CONNECTOR
- D- C.O.R. OUT

- F- RECEIVER DISCRIMINATOR OUTPUT
- E- RECEIVER SIGNAL LEVEL OUTPUT
- G- RECEIVER AUDIO OUTPUT 8 OHMS
- H- + 13.6 V. REGULATED INPUT

- J- LOW IMPEDANCE INPUT
- K- HIGH IMPEDANCE INPUT
- L- + 13.6 V INPUT C.O.R. SWITCHED
- M- TRANSMITTER OUTPUT CONNECTOR

TERMINAL STRIP IDENTIFICATION

- 1- GROUND

- 2- SPEAKER

- 3- C.O.R. CONTROL

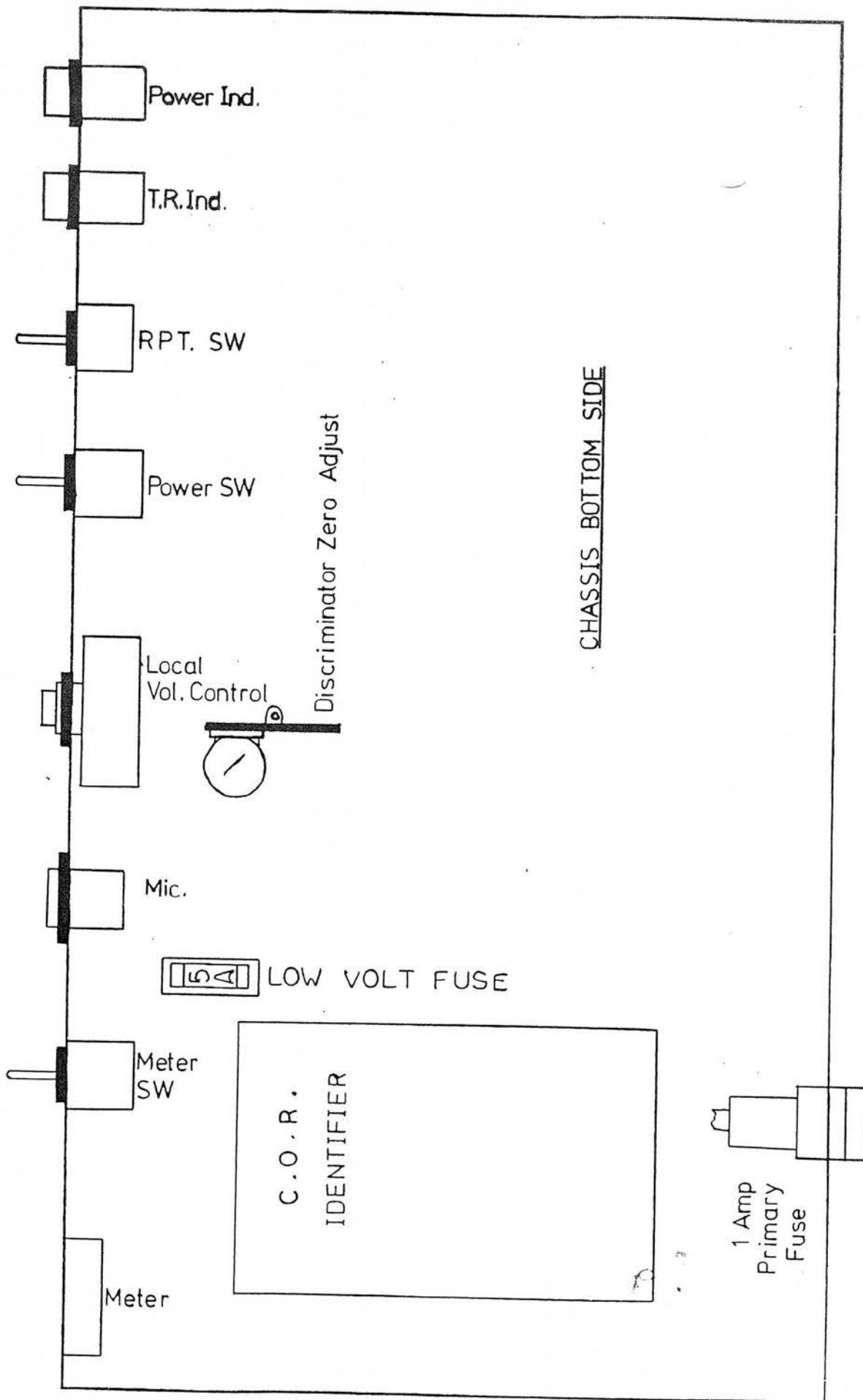
- 4-5-6-7 SPARES

- 8- + 13.6 V. REG. DO

- NOT EXCEED 300MA

- 9- UNSWITCHED POSITIVE TERMINAL OF EXTERNAL BATTERY. FOR TRICKLE CHARGE OF BATTERY.

- 10- GROUND



Adjustments and Fuse Location Chart for the Hi Pro Mk 1

Hi Pro
RECEIVER

Hi Pro
TRANSMITTER

SPKR.

ext. spkr.

8 Ω

audio coupling
10K \parallel .01MF

13.6v

D E F G H

J K L

microphone input

M1

RPT. Control

DISC.

SIG.

R25
25K

Hi Pro Repeater
Interconnect Wiring

I.D.er
COR

COR

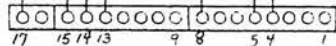
P.T.T.

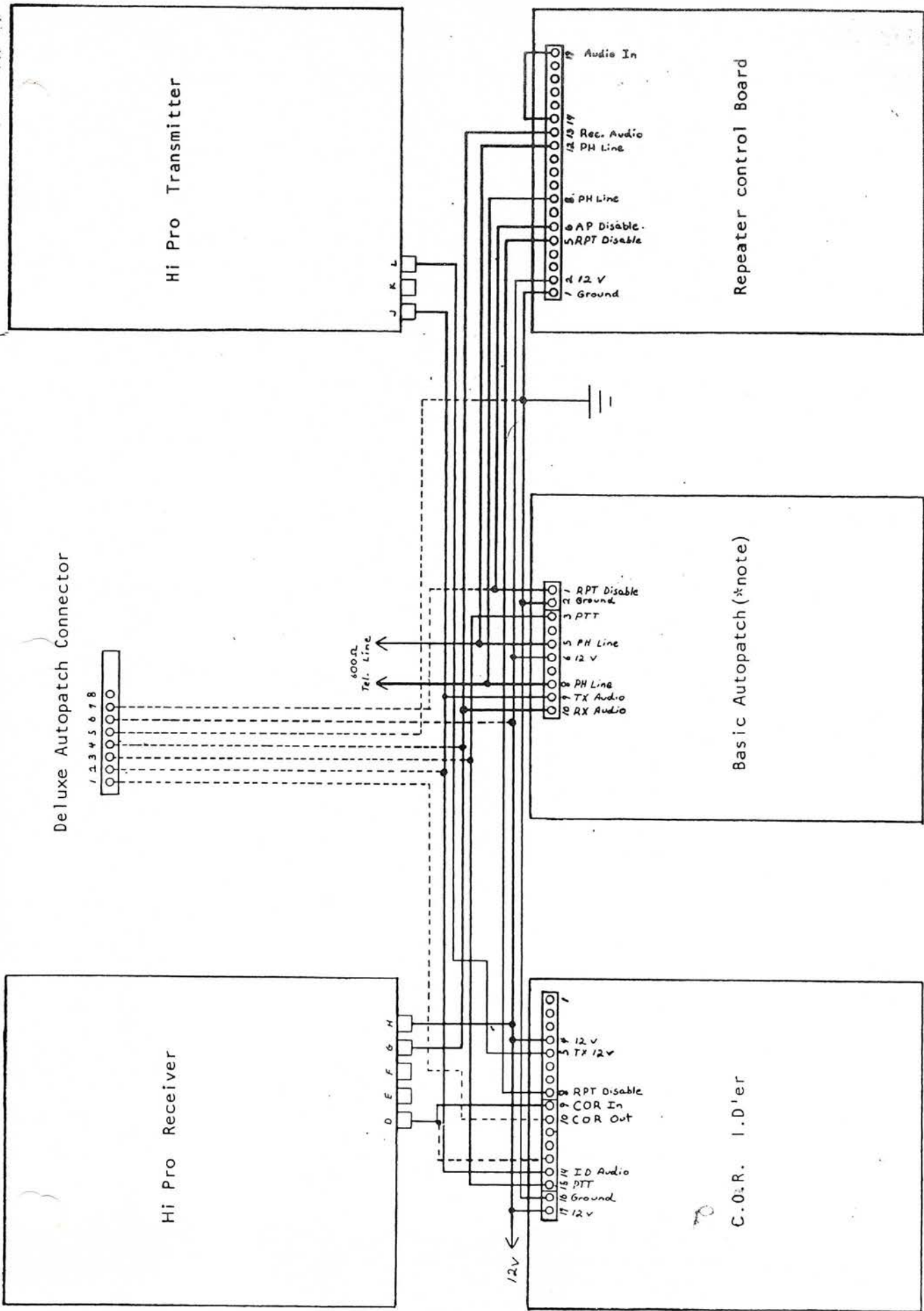
TX. +13.6 switched
+13.6 i.d. audio

S3



+13.6

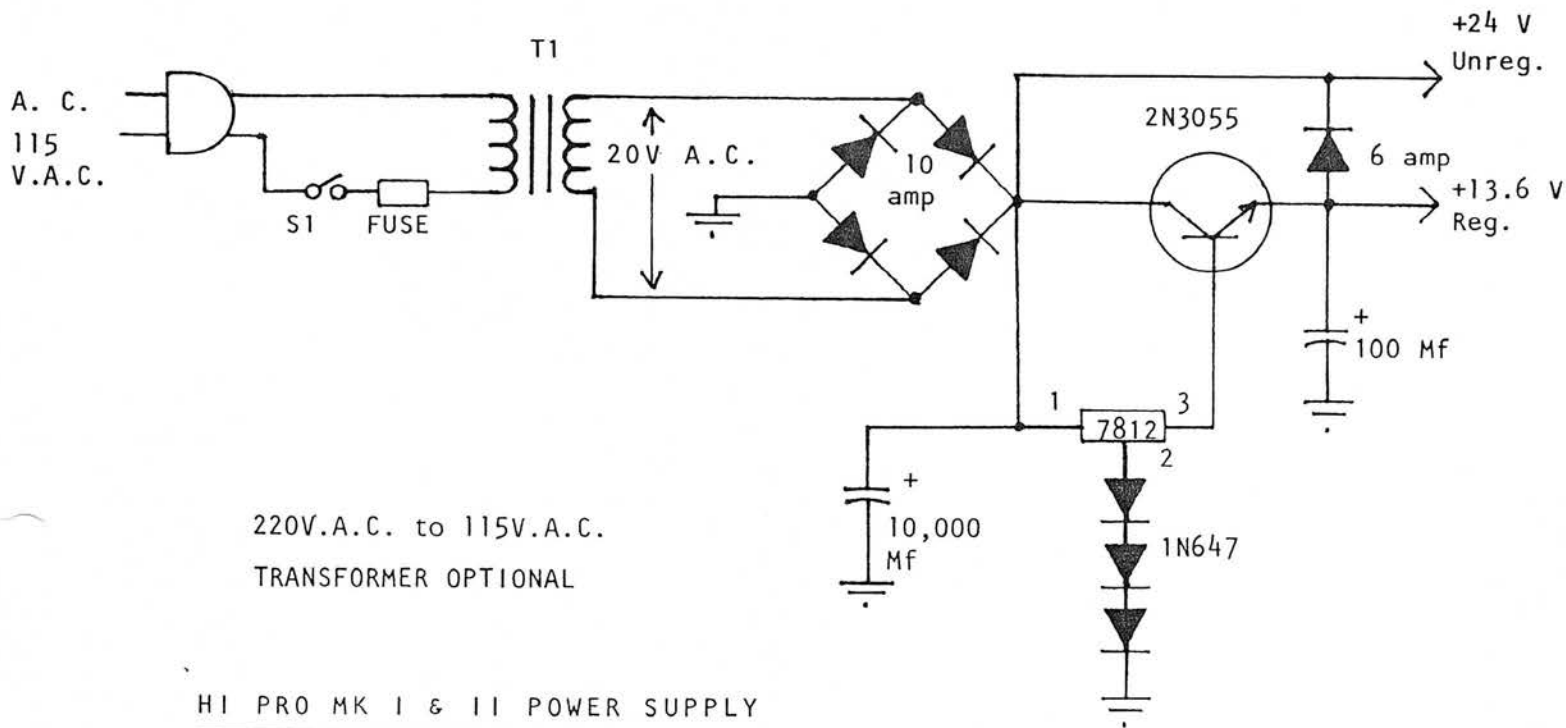




(*note) Not used with Deluxe autopatch

Typical Hi Pro Repeater Connections

Maggiore Electronic Laboratory



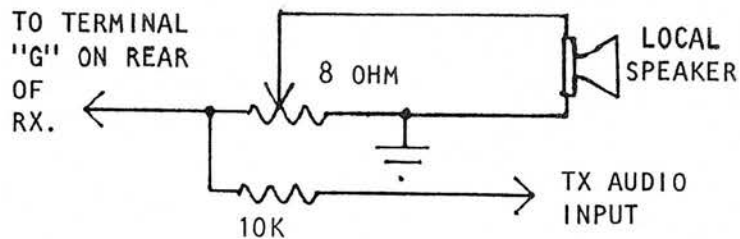
OPERATION

SYSTEM OPERATION CONSISTS OF MERELY TURNING ON ALL POWER SWITCHES AND USING THE REPEATER IN THE MANNER YOU DESIRE; HOWEVER, WE STRONGLY RECOMMEND THAT YOU READ ALL OF THE MANUALS PERTAINING TO EACH COMPONENT PRIOR TO SYSTEM OPERATION, THUS FAMILIARIZING YOURSELF WITH THE OPERATION AND CAPABILITIES OF THE SEPARATE COMPONENTS AND ENABLING YOU TO RECOGNIZE ANY OPERATIONAL PROBLEMS.

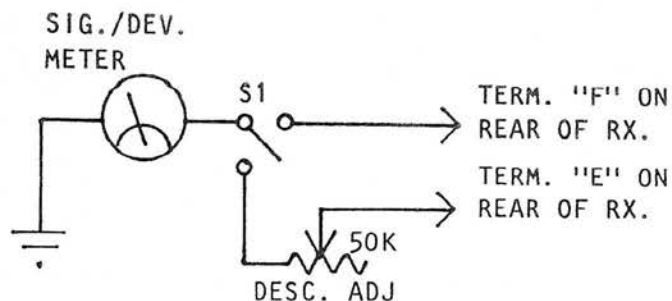
MAINTENANCE

MAINTENANCE OF EACH SYSTEM COMPONENT IS DETAILED IN THE SEPARATE SERVICE MANUALS INCLUDED WITH YOUR REPEATER SYSTEM, AND REFERENCE SHOULD BE MADE TO THEM WHEN CORRECTIVE MAINTENANCE IS REQUIRED.

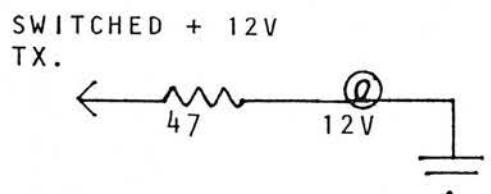
Maggiore Electronic Laboratory



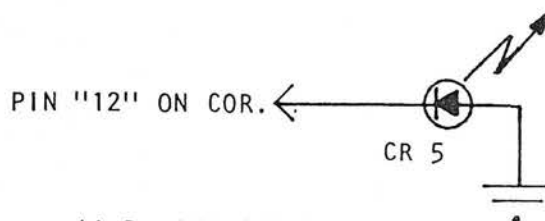
LOCAL SPEAKER AND AUDIO COUPLING



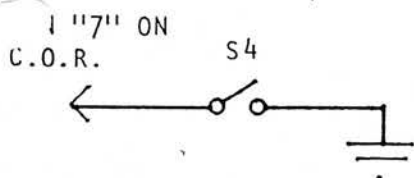
METER CIRCUIT



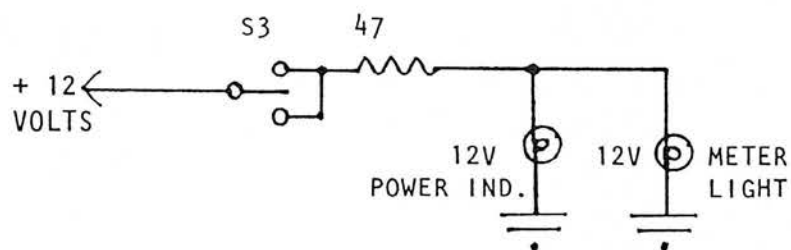
TRANSMITTER INDICATOR



*I.D. INDICATOR

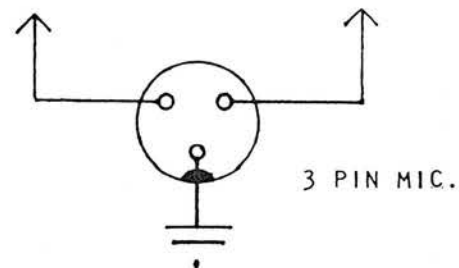


*I.D. ACTIVATE



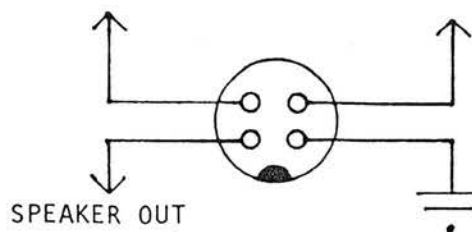
P.T.T. TERM. "15" ON C.O.R.

LOW IMPEDANCE TERM. "K" ON REAR OF TX.

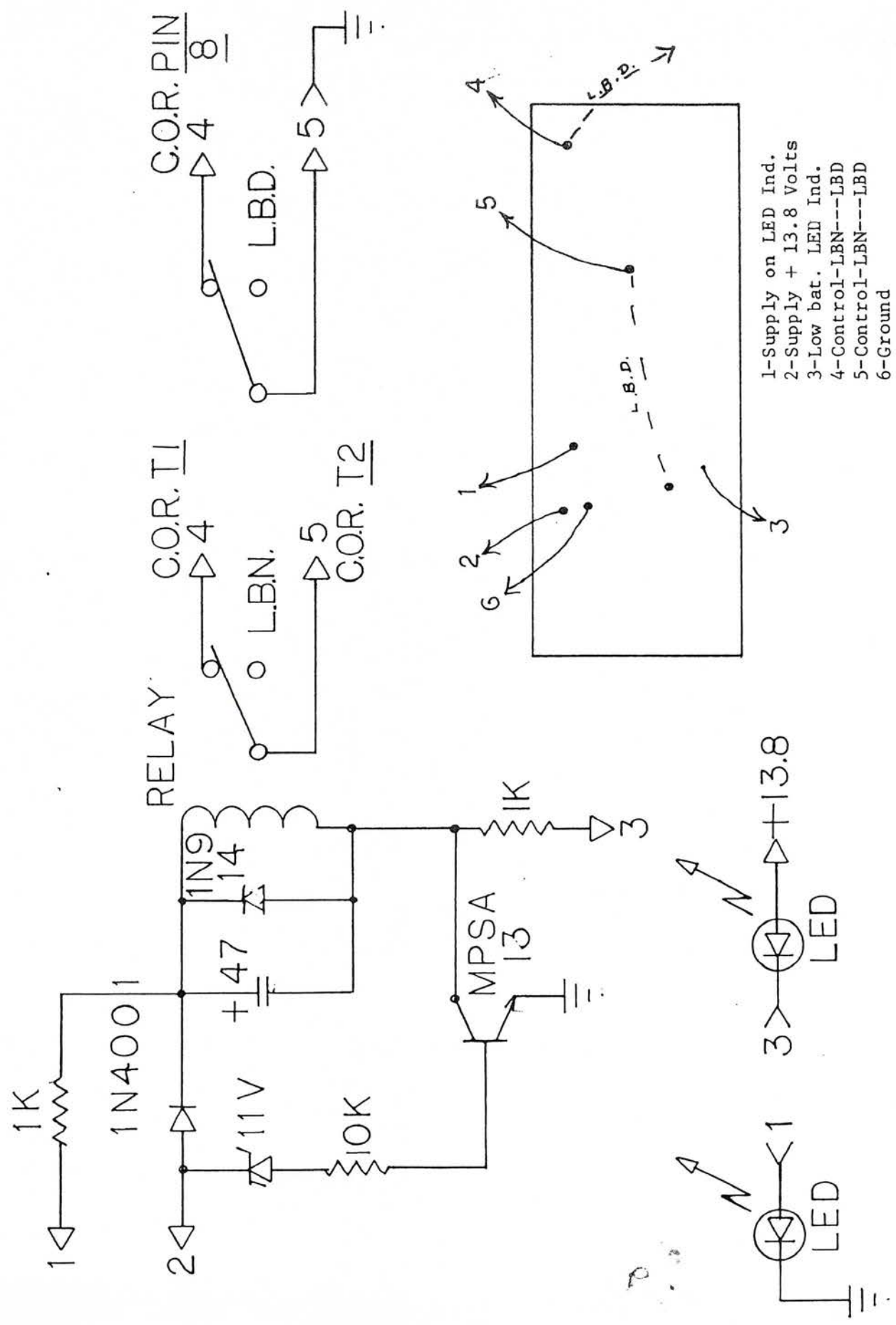


P.T.T. TERM, "15" ON C.O.R.

LOW IMPEDANCE TERM. "K" ON REAR OF TX.



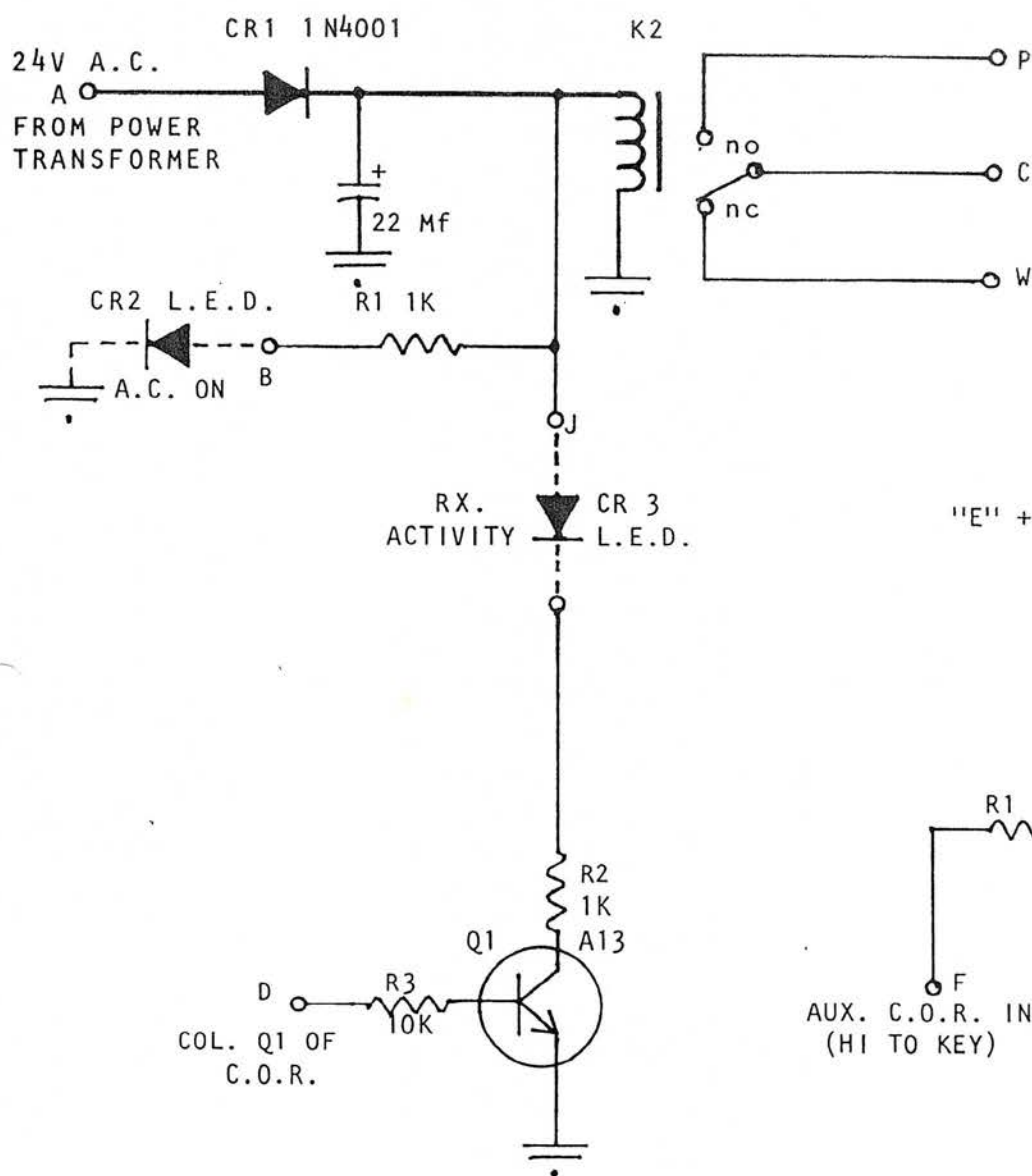
* NOT ON Hi Pro MK I



SIZE	CODE IDENT NO.	DRAWING NO.
	LBN/LBD	
SCALE		SHEET

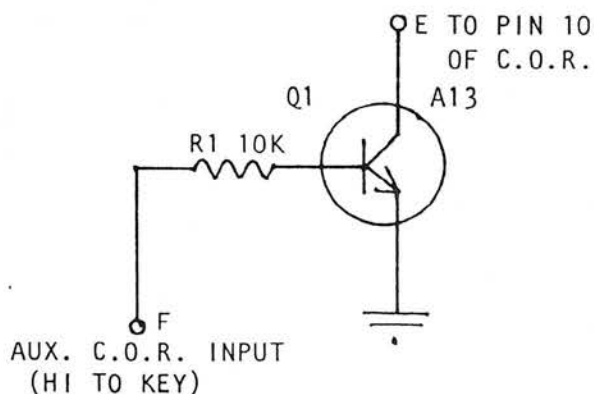
BISHOP GRAPHICS, INC.

Maggiore Electronic Laboratory



SEE BELOW

"E" + "F" - USED TO PARALLEL C.O.R. INPUTS FOR LINKS, AUX. RECEIVERS ETC.



MARK II OPTION BOARD

- A - A.C. INPUT FROM TRANSFORMER. WHEN A.C. SUPPLY IS PRESENT THE RELAY WILL BE ACTIVATED ALONG WITH THE A.C. ON L.E.D. AND THE RECEIVER ACTIVITY L.E.D. WILL BE FUNCTIONAL.
- B - TO A.C. ON L.E.D.
- H&J - TO RECEIVER ACTIVITY L.E.D.
- D - COLLECTOR Q 1 OF C.O.R. (HI TURNS ON "RECEIVER ACTIVITY" L.E.D.)
- C&P&W - RELAY CONTACTS. THE RELAY CONTACTS CAN BE USED FOR AUDIBLE INDICATION OF EMERGENCY BATTERY BACK UP, DISABLING TIME OUT TIMER FOR EMERGENCY OPERATIONS DURING POWER FAILURE, ETC.

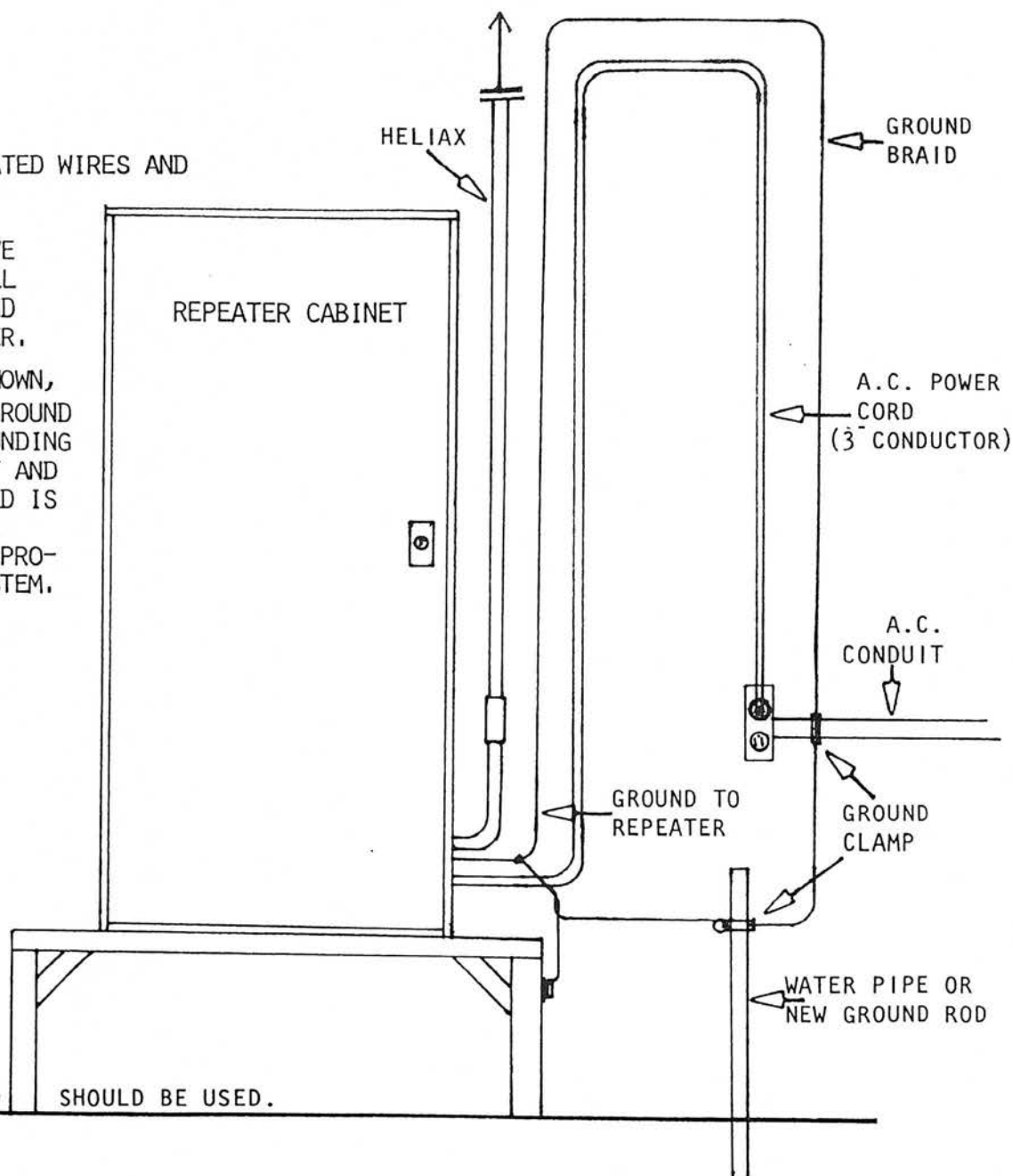
Maggiore Electronic Laboratory

NOTE: THE ILLUSTRATED WIRES AND CABLES SHOULD BE CONNECTED TO THE REPEATER FROM ABOVE AS SHOWN. THIS WILL MAKE WORKING AROUND THE REPEATER EASIER.

TWO GROUNDS ARE SHOWN, HOWEVER ONLY ONE GROUND IS NECESSARY. GROUNDING THE SYSTEM CABINET AND THE A.C. POWER CORD IS VERY IMPORTANT FOR SAFETY REASONS AND PROTECTION OF THE SYSTEM.

THE REPEATER SYSTEM SHOULD NOT SIT DIRECTLY ON THE FLOOR. A STAND

SHOULD BE USED.



TYPICAL REPEATER INSTALLATION