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**THANK YOU AND 73 FROM ALL OF US AT TEN-TEC**

**TEN-TEC**

**OPERATOR'S  
MANUAL**

**CORSAIR II**



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## SECTION I

### INTRODUCTION

Carefully remove your Model 561 CORSAIR II from the packing carton and examine it for signs of shipping damage. Should any shipping damage be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended that you keep the shipping cartons. In the event that storage, moving, or reshipment becomes necessary, they come in handy. An accessory packet, warranty card and manual are packed with the CORSAIR II. Make sure that you have not overlooked anything.

The CORSAIR II is a medium power transceiver employing the latest techniques in solid state technology. It features digital frequency readout which inherently contains a crystal oscillator for accuracy.

As shipped from the factory, the CORSAIR II contains all necessary crystals for transceiver operation in the 160, 80, 40, 30, 20, 17, 15, 12 and 10 meter bands.

The CORSAIR II is extremely versatile. Although...

When other supplies or a battery are used, pin connections to the power socket are:

Pin 1, bottom - Negative 12-14 volts (GND)

Pins 2 & 3 - Power Switch

Pin 4, Top - Positive 12-14 volts.

Power switch contacts, Pins 2 and 3, should not be used to switch the high current dc directly, due to switch contact ratings and voltage drop across the switch. If it is desired to switch power on and off from the front of the transceiver, use these pins to switch the primary ac voltage in cases where an ac power pack is used, or to actuate an intermediate relay such

- 6.) Set MODE switch to CW or SB-N.

#### INITIAL TRANSMITTER CONTROL SETTINGS

- 1.) Select desired band or band segment with band switch.
- 2.) Tune dial to frequency of operation.
- 3.) Set ALC control fully clockwise.
- 4.) Push POWER switch, located on AF GAIN control, in.
- 5.) Rotate MODE switch to LOCK position.
- 6.) Rotate DRIVE control until ALC light glows.
- 7.) Observe SWR reading on meter. For efficient operation, SWR should be less than 2 to 1. If it isn't, make alteration to antenna system to reduce SWR.
- 8.) Switch MODE switch to desired mode -- SB-N or CW. In SB-N

POWER REQUIRED: 12-14 V dc., 850 mA receive, 18.5 A max transmit.

DIMENSIONS: HWD 5-1/4" x 15" x 14" (13 x 38 x 36 cm), bail retracted.

NET WEIGHT: 14 lbs. (6.4 kg).

RECEIVER

SENSITIVITY: 0.25 μV for 10 dB SINAD at 1 kHz 0.0 μV at 10 kHz

## TRANSMITTER

DC POWER INPUT: Maximum 200 watts @ 14 V dc cw and ssb. 100% duty cycle for up to 20 minutes.

RF POWER OUTPUT: 85-100 watts, typical.

OUTPUT IMPEDANCE: 50 ohms, unbalanced.

MICROPHONE INPUT: High impedance. Accepts high or low impedance microphones with 5 mV output. Polarizing voltage available for electrets.

T/R SWITCHING: VOX or PTT on ssb. Instant break-in or semi-break-in on cw.

CW SIDETONE: Internally generated. Adjustable tone and volume independent of af gain control. Operates only in cw mode.

PROGRAMMABLE IAMBIC KEYER: 8-50 wpm with 40 character memory.

SSB GENERATION: 9 MHz, 8-pole crystal ladder filter. Balanced modulator.

CARRIER SUPPRESSION: 60 dB typical.

UNWANTED SIDEBAND SUPPRESSION: 60 dB typical at 1.5 kHz tone.

SPURIOUS OUTPUT: Better than -45 dB relative to full output.

METER: Forward power, collector current, SWR, audio processing level. Selectable 4 position switch.

CW OFFSET: 750 Hz, automatic.

ALC CONTROL: Front panel adjustable. 30 to 100 watts output, LED indicator.

## FRONT PANEL CONNECTIONS AND CONTROLS

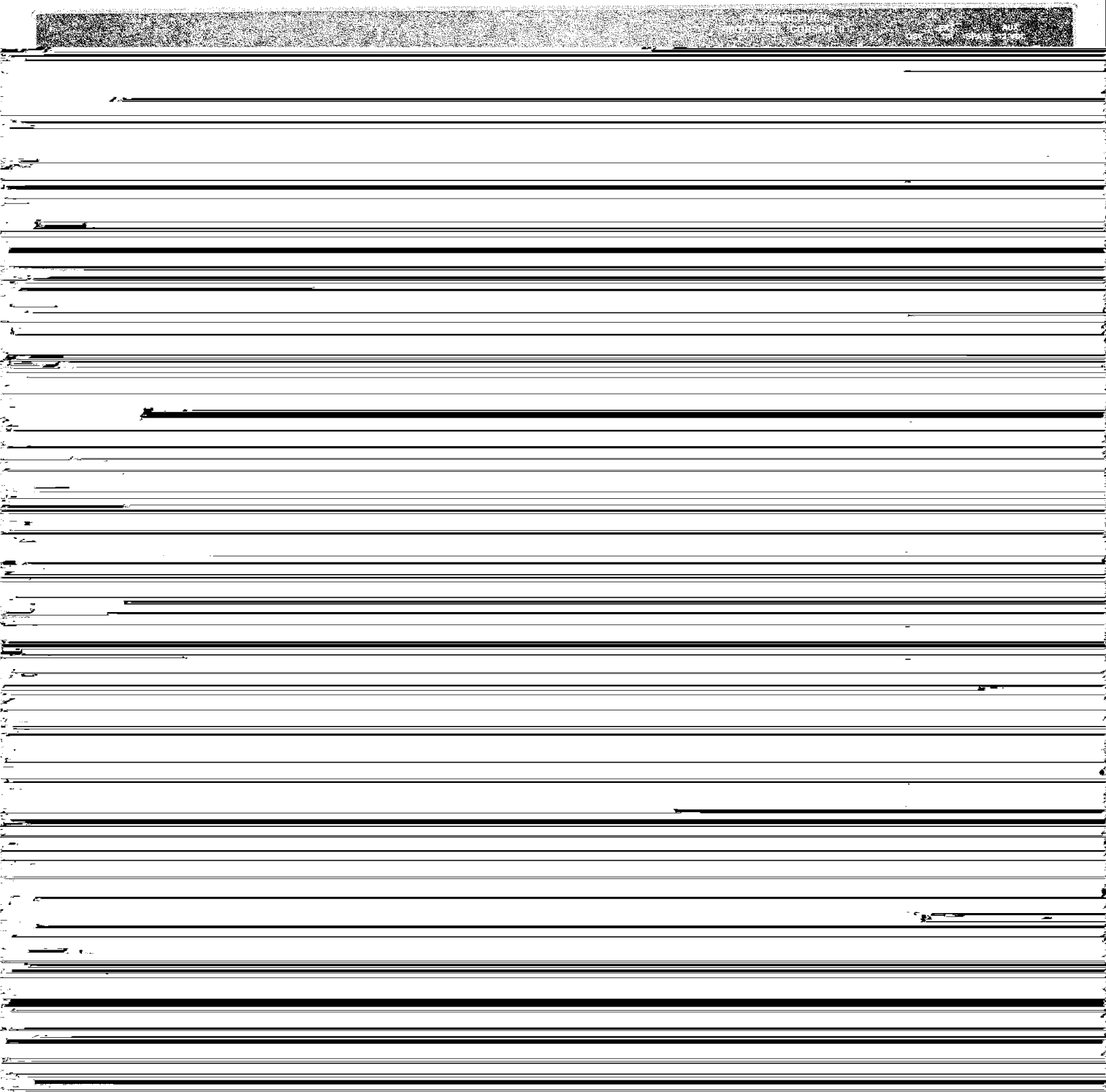
BP FILTER; PBT; OFFSET; NOTCH; AF GAIN/POWER; RF GAIN/ATTN; DRIVE; Bandswitch; Main Tuning Knob; MODE; METER Switch; KEYER SPEED; N.B. LEVEL; N.B. WIDTH; ALC threshold; PROCESS level; QSK/VOX switch; AGC switch; XTAL switch; OFFSET SELECT switches (2); SPOT push-button; PHONES; MIC.

## REAR PANEL CONNECTIONS AND CONTROLS

High speed QSK output jack (open collector); EXT.T/R jack (relay closure); SPARE jack (uncommitted RCA phono); AUX. 12 VDC jacks (2); KEYER MEM. jack for controlling keyer memory; KEY jack; PTT jack; VFO IN jack; VFO OUT jack; AUDIO IN jack; AUDIO OUT jack; ACCESSORIES socket; GND terminal; EXT. SPKR jack; KEYER PADDLE jack; POWER socket; 50 OHM ANTENNA connector (SO-239); RX ANTENNA jack (RCA phone); RX-TRX switch for separate receive antenna; DELAY, GAIN, ANTI-VOX CONTROLS.

SECTION II  
DETAILED OPERATING  
INSTRUCTIONS

REAR PANEL CONNECTIONS



115/230 volt primary lead to the supply if switching function is desired from the front panel. In this case, the power supply switch should permanently be positioned in the "on" position. The Model 260 power supply which is designed for use with the CORSAIR II already has provisions for this mode of switching.

For dc operation, the contact rating of the switch on the AF GAIN/POWER control is NOT sufficiently high to carry the 18 amperes required. Switch contact resistance will result in an appreciable voltage drop across the switch. The insertion of Model 1140 circuit breaker in series with the 12 V dc supply line will protect the final amplifier from over-current conditions and provide an external on-off switch.

Pin connections for the power socket are: Pin 1, bottom of rig = GND; Pins 2 and 3 = ON-OFF switch; Pin 4 = 12-14 V dc. Pin 1 has a rib on the plastic part of the cable connector and Pin 4 has a rib on the chassis connector.

The +12 volt line is internally fused with a 20 ampere fast-blo fuse, and a high power diode is connected across the line to ground in a normally reverse-biased polarity. Under these circumstances, the diode does not conduct. If reverse polarity is applied, the diode conducts heavily and blows the fuse, thereby protecting the transistors and electrolytic capacitors.

#### GROUND STRAP

To reduce the possibility of stray rf pickup on interconnecting cables which may cause parasitic oscillations, all station equipment should be well grounded to earth. It is also important to strap all equipment chassis together with short, heavy leads, preferably with braid. The strap between the power supply and the transceiver also serves to reduce voltage drop on the negative 12 volt lead caused by resistance in the wire and connector contacts. In mobile installations, connect a ground strap between the rear panel ground lug and the automobile chassis.

#### ANTENNA

Any antenna presenting 50 to 75 ohms impedance will load satisfactorily. Random length antennas and open wire feed systems will require a matching system. Most popular mobile antennas will operate at their resonant frequency without special matching. When they are used as portable antennas, a good ground system or counterpoise should be provided. The CORSAIR II is designed for use with an unbalanced feed system. Coaxial shield is connected to the shell and the center conductor to the pin of the PL-259 connector.

#### EXT I/R

This jack is intended to actuate a high power linear amplifier. It is derived from a set of normally open contacts on the auxiliary relay located on the Control Board. One side of this switch is also at ground potential and therefore should not be used to switch the 115/230 volt line. When operating cw, a drop-out delay is incorporated in the relay circuit and is adjustable with a thumb potentiometer located on the CONTROL BOARD. When operation esb, this drop-out delay is switched out of

the circuit. Since this relay does not control any of the internal  
switching of the transceiver, delay is factored out to be constant value

either or both of the AUX 12 V dc jacks.

#### ACCESSORIES\_SOCKET

A nine pin female chassis-mounted MOLEX connector is available for interfacing an external VFD or other peripheral equipment with the CORSAIR II. Refer to main chassis schematic diagram for pin identifications. As shipped from the factory, a jumper is plugged into this socket which connects the PTO enable to the + regulated line. This jumper is necessary

suit the individual operator's needs. To adjust proceed as follows:

- 1) Adjust the AF GAIN to a comfortable level.
- 2) While speaking into the mic at normal level, adjust the GAIN for reliable VOX action.
- 3) Adjust the DELAY so that T/R switching does not occur between words when speaking into the microphone.
- 4) Set the ANTI VOX to the point where receiver audio will not trip the VOX circuit at moderate volumes.

### FRONT PANEL CONTROLS



More than just a radio.



Ten-Tec is more than just a manufacturer of Amateur Radio equipment. Our legendary service department repairs almost everything we've ever built. Customer support representatives are active hams that can provide the advice you need to obtain the right equipment and set up your station the way it should be. No one in the industry matches our risk-free trial period for new equipment. When you buy Ten-Tec, you get our entire company in the box with your new radio. Ask a friend who owns "us". Proudly MADE IN USA!

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effect is a 20 dB reduction in signal to the rf mixer but with more dynamic range and greater sensitivity than would be the case with a simple 20 dB rf attenuator. A front panel RF ATTN LED indicates that the attenuator is selected.

#### METER SWITCH

In receive mode, the meter will automatically read S units when the METER switch is in any position except IC. When transmitting the meter indicates the following:

IC position measures the current drawn by the final amplifier module. Use the scale marked 0 to 20 amperes.

SWR position provides a reading of power reflected from the antenna. When the forward power is 100 watts, the SWR can be read from the scale.

The band switch selects the amateur bands of 1.8, 3.5, 7.0, 10.0, 14.0, 18.0, 21.0, 24.5 and 28.0 to 30.0 MHz. With approximately 600 kHz range per band. The marine band in the 1.8 to 2.3 MHz range is covered.

#### MAIN TUNING

In the Model 561, megahertz, kilohertz, and hundreds of hertz are displayed on the six digit LED display. Hundreds of hertz are in green to easily separate the fraction of kHz from the rest of the reading. When using Model 2636 Remote VFD, the display will read the frequency in use at the time. The counter can be accurately set to WWV as outlined in SECTION III. The main tuning knob skirt has 1 kHz markings to facilitate quick, relatively small excursions, such as used when QSYing to avoid QRM, or when passing traffic in net operation. (Up to four 5 to 10 kHz excursions)

The offset tuning has two selectable range choices, MIN and MAX, plus an OFF position. In the MAX position, excursion is about  $\pm 4$  kHz. In the MIN position, excursion is about  $\pm 1.5$  kHz, for fine tuning. No matter what position the OFFSET control is in or what type of offset is selected, moving the selector switch to the OFF position will cancel the

#### OFFSET functions.

The OFFSET LED indicator lights whenever the offset circuitry is in use. For instance, if TX offset is selected the OFFSET LED will be on only during transmit. Also, the digital frequency display will show the actual frequency including the offset when in use.

#### NOTCH

The NOTCH filter control adjusts the frequency of the audio notch across the passband. The NOTCH depth is at least 50 dB and will reduce carrier interference by this amount or more since the notch is inside the AGC loop. The notch circuit is effectively removed by turning the control fully cw.

#### BP\_FILTER

The BP\_FILTER control fades from normally flat receiver audio response to a sharp 750 Hz bandpass response.

seconds FAST, 2 seconds in SLOW, or defeats the AGC, OFF. When the AGC is off, the i-f gain is controlled by the rf gain control and the S-meter will be inoperative.

#### XTAL\_SWITCH

This switch selects the optional crystal filters installed on the PBT board. If none are installed, this switch must remain in position 3. The switch position numbers are proportional to bandwidth; 3 is widest. There are four possible filters: 2.4, 1.8, 0.5 and 0.25 kHz. The first three, if installed, are selectable in ssb mode, the last three are selectable in cw mode. The 2.4 kHz filter is standard while the 1.8 kHz (Model 288), 500 Hz (Model 285) and 250 Hz (Model 282) are optional.

#### KEYER\_SPEED

Keyer speeds from 8 to 50 WPM can be selected with the KEYER SPEED control. Also sets the memory clock rate.

#### N.B. LEVEL

requires a readjustment of the DRIVE setting .

#### MICROPHONE

The microphone input circuit has been designed for high or low impedance microphones with maximum 5 mV output. Transistorized microphones may also be used, providing their output level is set so that the input stage is not overdriven. The cable, which preferably should provide shielding for all leads, is terminated with a standard 4 pin microphone plug. The shield and/or ground lead are connected to pin 2, the PTT switch to pin 3, and the microphone signal lead to pin 1. Pin 4 is a polarizing voltage for electret heads. Failure to shield both microphone and PTT leads may result in rf getting into the audio circuits.

FRONT VIEW

PIN ASSIGNMENTS:

## MOBILE OPERATION

The CORSAIR II is ideally suited for mobile operation in a car, boat plane, or other vehicle. It operates directly from a 12 volt battery source and is self-contained except for key, microphone, and antenna. When operating from any power source other than a TEN-TEC power supply, the protective circuitry for the final amplifier is not present. Model 1140 Circuit Breaker is required in series with the +12 volt supply line. The Model 1140 Circuit Breaker will function as both an external on-off switch and an over-current protection device for the final amplifier.

The SWR meter is especially useful in setting mobile whip antenna lengths to the operating frequency.

When using an alternator charged battery, start and stop the vehicle's engine with the CORSAIR II turned off. This prevents any high voltage transients, caused by momentarily open regulator contact, from being applied to the transceiver circuits.

## FIXED STATIONS

The CORSAIR II, with conventional antennas, will perform with distinction in any ham shack. With a linear amplifier, power can be increased to any value desired up to the legal limit. For an emergency or stand-by station, it will operate for long periods of time with a 12 volt automobile storage battery. Increased operating time can be achieved by setting the ALC control down from its maximum position.

## BAIL STAND

The movable bail is primarily intended to raise the front panel to a convenient slanting position. In this position, the speaker output is effectively radiated forward due to the "V" formed by the transceiver bottom and the table top.

The bail may also be used as a carrying handle, but care should be taken to prevent deforming it.

## OPERATING HINTS

- 1.) When setting up the station, provide adequate ventilation for the heat sinks on the transceiver and power supply. Do not confine units to a small volume without forced ventilation to circulate cool air around the heat sinks.
- 2.) When operating RTTY, SSTV, or other high duty-cycle modes, it is recommended that a small fan be directed on the heat sink. The sink temperature may reach as high as 200 degrees Fahrenheit, which is still within the rating for the transistors, but certainly hot enough to cause a serious burn if touched.
- 3.) The CORSAIR II may be operated as a QRPp transceiver simply by adjusting the DRIVE control downward. To determine input power, observe the collector current meter, IC. For every ampere increase over the no-drive quiescent level in the LOCK position of the MODE switch, the power input to the final amplifier is increased by

about 13 watts. For example, assuming that the quiescent current is 2 amperes, a 4 ampere reading on the ammeter indicates 26 watts input.

- 4.) The S-Meter will be accurate only when rf control is fully clockwise. The meter is factory calibrated for a 50 uV reading at S9 on the 14 MHz band.
- 5.) To determine SWR, set MODE switch to LOCK position, ALC control fully clockwise, and advance DRIVE control until ALC indicator lights. Read SWR on lower scale with METER switch in SWR position.
- 6.) Sidetone level and pitch controls are accessible through finger hole located on bottom plate.
- 7.) In the cw mode the indicated frequency is the unmodulated frequency.

necessary to zero beat the signal, not peak it on the S Meter.

installation.

- 11.) Due to the possibility of high voltage transients being generated in the output rf amplifier during bandswitching, changing bands should not be done while transmitting power to the load. Either place the CORAIR II in the receive mode or be certain of a key-up condition in cw. YOU RISK THE POSSIBILITY OF DESTROYING THE OUTPUT TRANSISTORS IF THIS PRECAUTION IS NOT OBSERVED.
- 12.) Although improper antennas will not damage the finals, we suggest an SWR below 2 to 1 be achieved for maximum performance. In cases where the antenna cannot be matched to a better SWR, and the TEN-TEC Power Supply repeatedly shuts down due to over-current conditions, the CORASIR II can be operated at reduced input power by rotating the ALC control counterclockwise to a position where the supply does not trip out. Be sure to readjust DRIVE control after reducing the ALC control.

#### AN IMPORTANT MESSAGE

To obtain top performance from your CORASIR II we feel that you should be briefed on new technology such as solid state no-tune rf amplifiers. Misconceptions sometimes arise from incomplete knowledge which results in erroneous conclusions being drawn that the equipment is faulty, erratic, or not performing to specifications. It is the purpose of this message to inform you in these areas so that you can knowledgeably approach and correct any apparent improper performance characteristic.

#### Ten Points to Observe When Installing The CORSAIR II

- 1.) The transmitter will give best performance when properly loaded.
- 2.) Even though the output transistors are resistant to damage from improper loads, they will not operate satisfactorily under all load conditions and will not operate to specifications.
- 3.) The output transistor dissipation will increase if the CORSAIR II is not properly loaded.
- 4.) Reactive impedance components in the antenna are applied to the transistors and may cause parasitic oscillations.
- 5.) A given SWR reading does not tell you anything about the reactive components and is not accurate unless the load is a pure resistance.

power. It may not light even though the power supply is delivering enough current to trip the breaker.

- 9.) If the breaker repeatedly trips, it is an indication that the load is enough removed from optimum so as to cause high transistor dissipation.
- 10.) It is possible for the power supply regulator to drop out of regulation just prior to its tripping the breaker with low ac line voltages, (brown-outs or long ac power runs). Under these conditions, hum modulation will appear on the transmitted signal. With proper load and line voltage, the current drain will be considerably below the tripping point so no hum should appear on the carrier.

### Technical Facts of Life

Although vacuum tubes and transistors both can be made to amplify rf power, there are some fundamental differences in how this is accomplished. A better understanding of what we can expect under various operating conditions will aid in recognizing correct or incorrect results.

## TEN-TEC MODEL 238B



# Lowest loss tuner

The Ten-Tec model 238B is a 2000 watt roller inductor antenna tuner featuring the lowest insertion loss of any commercially available antenna tuner today. Our use of an "L" network configuration assures a low Q match. Low Q means low circulating currents, hence low loss, and provides the widest frequency bandwidth of operation before retuning is necessary. 2000 watts PEP or CW, 4 position antenna switch, power/SWR metering, built-in 4:1 balun for ladder line use. See antenna tuner comparison article in Feb. 2003 QST for an objective report.

**Backed by a 3 year parts and labor warranty!**

Call or email for additional information! **\$649**

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applied in a transformed way to the collector circuit. Certain reactances at this point, especially inductive, give rise to parasitic oscillation. To correct for this, the antenna impedance should be changed to remove this reactance, or a matching network should be inserted between antenna and transceiver. It is important to remember that any antenna changes its impedance with frequency, so that one that resonates well at one end of the band may well cause oscillations to trip the circuit breaker on the other end. If entire band operation is desired, especially on the lower bands, the adjustable matching network would be the better choice, rather than to try to make the antenna behave over the entire band on a cut-and-try basis.

A final point to bring out regarding broadband vs tank systems is that there is a limit to the amount of current that you can draw from an emitting filament, and this saturation current will limit the amount of power drawn from the supply. In the case of transistors, where the collector internal impedance is only a fraction of an ohm, extremely high currents can be demanded of the power supply, especially with mismatched loads well below 50 ohms. A fuse is provided in the CORSAIR II for protection when operating from a power source that is not limited.

2.1 SWR - Two Kinds - The standing wave ratio is defined as

the ratio between two impedances, i.e. a SWR of 3 to 1 tells us that one impedance is three times the other. Therefore, the unknown impedance can be either three times as large or three times as small of the known one. If the desired impedance that the transceiver wants to see is 50 ohms, SWR of 3 to 1 on the line may mean a load impedance of either 150 ohms or one of 17 ohms. If it is 150 ohms, the transmitter will act differently than if it is 17 ohms. In the first case, the power demanded from the power supply will be much lower, and will not be large enough to trip the supply. In the second case even though the SWR reads 3 to 1,

4.) Protective Circuitry and ALC - ALC serves three major functions. It assures the maximum power from the transmitter without careful adjustment of the input drive, it prevents the amplifier from being overdriven into the non-linear, distortion-producing area, and it serves as a power limiting device which protects the output transistors. It does the first two very well, but the third only partially. To absolutely protect the system, we add the current limiting circuitry to the power supply, or a fast acting magnetic circuit breaker in the dc supply line.

The ALC system senses the power output and adjusts the

## SECTION III

### ALIGNMENT AND SERVICE

#### GENERAL

This section covers maintenance and service of the CORSAIR II transceiver. It includes information on trouble analysis, signal tracing and alignment procedures. Connector and transistor voltages are given for most subassemblies. Readings should be within 15% of the listed value when measured with a dc voltmeter with at least 20,000 ohms-per-volt impedance. All readings are dc and positive with respect to chassis ground unless stated otherwise. Except for occasional touch up to compensate for possible component aging, alignment normally will be necessary only if frequency determining components have been replaced.

When removing a particular assembly, note the orientation of the board in the chassis so that it can be replaced correctly. Many assemblies can be inadvertantly inserted incorrectly if care is not taken.

L.O. mixer null  
PROCESSOR Gain  
PROCESS meter calibrate  
Noise blanker width

OSCILLATOR/MIXER, 80975  
VOX, 80981  
VOX, 80981  
NOISE BLANKER, 80977

Bottom  
Top  
Top  
Top

FAST LIST

## REMOVAL OF THE FRONT PANEL

First remove the top. Remove the bandswitch knob using the 6-32 allen wrench provided. Then remove the main tuning knob, dial skirt and remaining knobs using the 4-40 allen wrench. Remove the small control knobs by pulling forward. Using an appropriate wrench or a large pair of pliers, remove the nuts from the PHONES and MIC jacks. Now remove the four screws holding the front to the sub-panel. Be sure to save the black decorative washers that are in front of the 5 toggle switches. Remove the decorative nut around the spot switch. Unplug the meter from the socket on the meter switch.

## PILOT LAMP REPLACEMENT

The CORSAIR II uses a single pilot lamp mounted behind the meter. It is a standard 14 volt bayonet type #1892. Access to this bulb is by removing the top cover.

## FUSE REPLACEMENT

The fuse is located on the inside of the low pass filter compartment and protects the CORSAIR II from heavy overload and reverse polarity conditions. Replace with a type 3AG fast-blo 20 ampere type.

## ROTARY SWITCH CARE

The bandswitch wafers are specially lubricated by their manufacturer for maximum useful life. Brushing on or dipping or spraying the switch with solvents will wash away the special lubricant and dramatically shorten the life of the switch. Cleaning rosin from soldered connections is not recommended since there is a hazard of the desolved resin flowing into the switch causing intermittent problems. Never use commercial contact cleaners on these switches unless proper lubrication is restored

MODEL 561 TOP VIEW

TIME BASE ADJUSTMENT

PRT

AUDIO PROCESSOR



MODEL 561 BOTTOM VIEW

BANDPASS FILTER

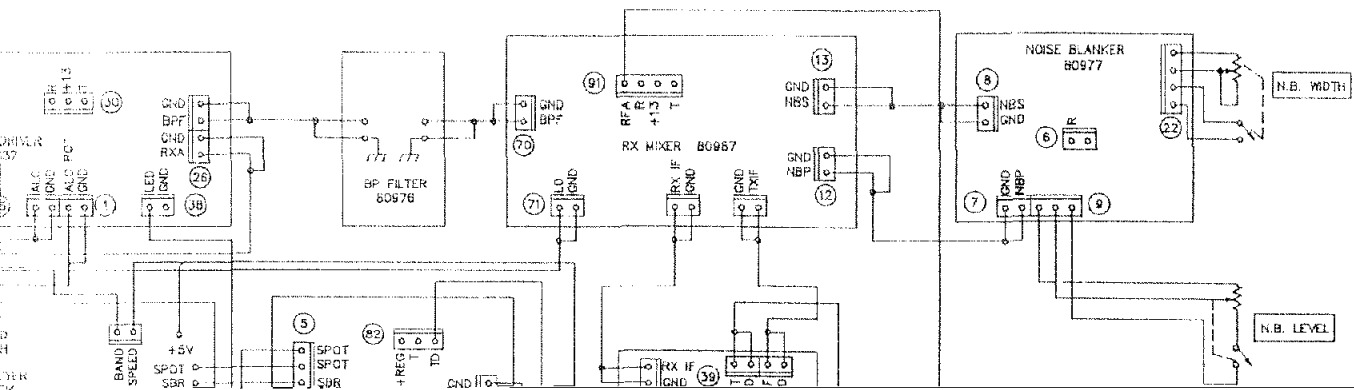
OSCILLATOR MIXER

LOWPASS FILTER

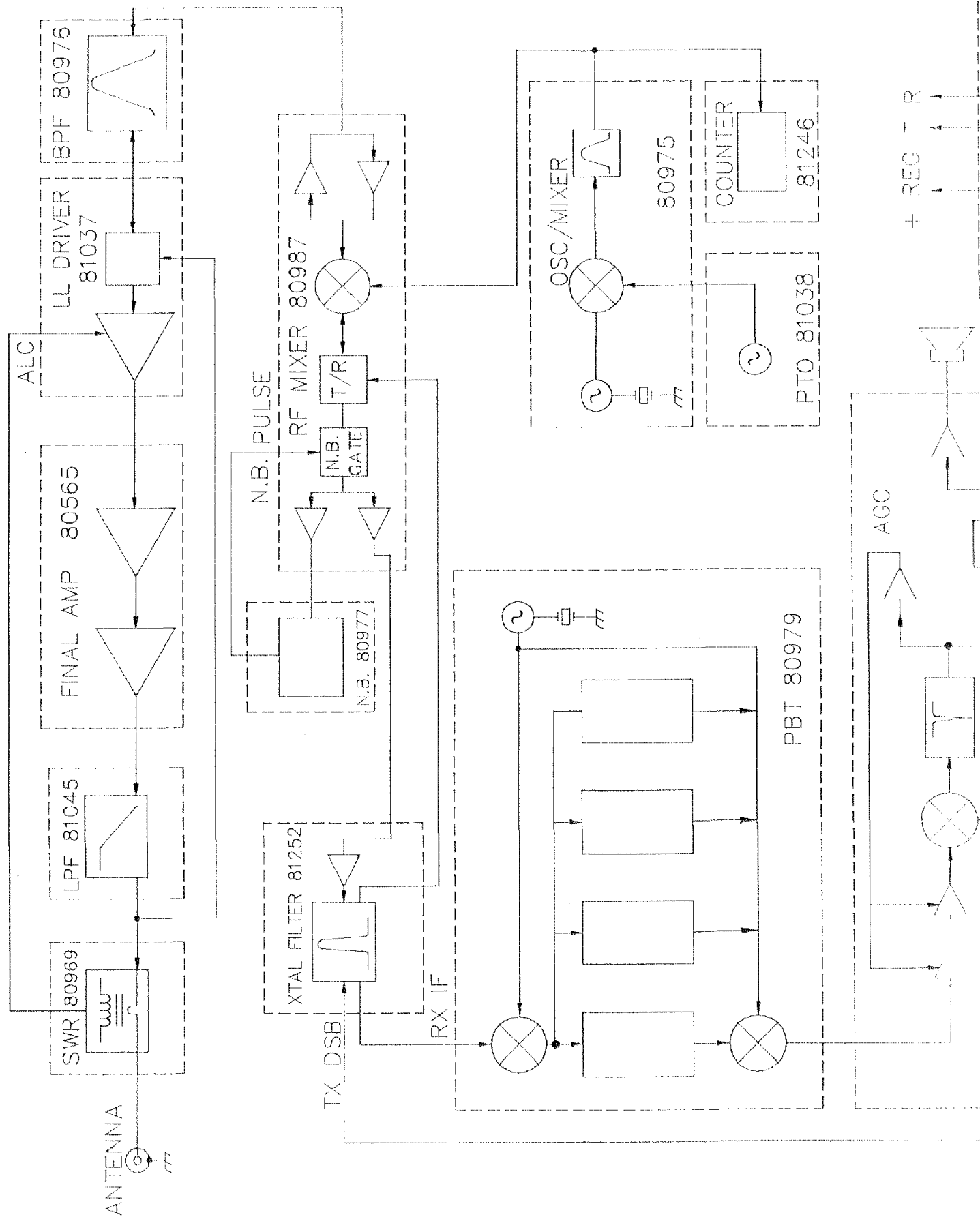




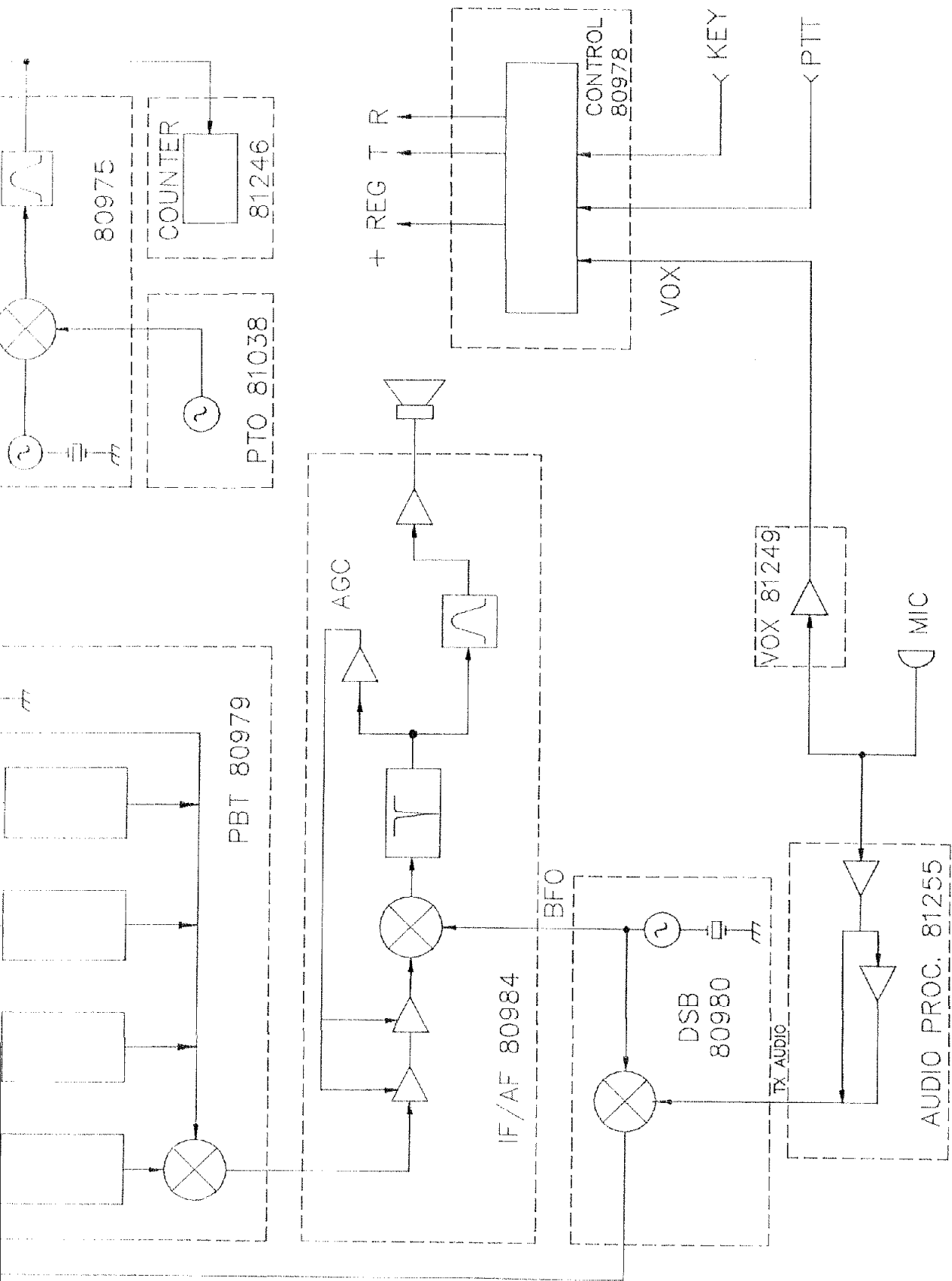






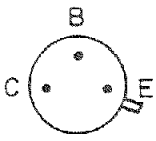




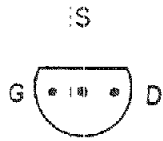




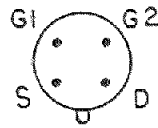
SEMICONDUCTOR PIN IDENTIFICATION



2N3866 2N5109



2N5486



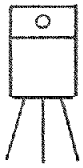
FET 3N201



CA3053



MPN3404  
MBD101



B C E  
MRF 476



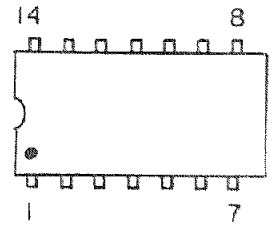
ECB  
MJE 1520  
MJE 1370



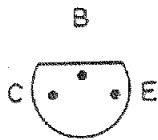
IGO  
MC7805CP



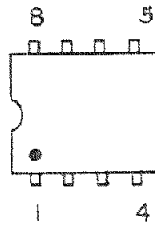
EBC  
MPS U01



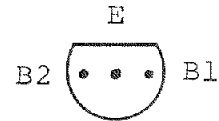
14 PIN IC



MPS 6514 MPS 3693  
2N5087  
MPS 6512 2N6519



8 PIN IC



2N4870

PINS VIEWED FROM TOP  
OF PC BOARD.

PTO 81038

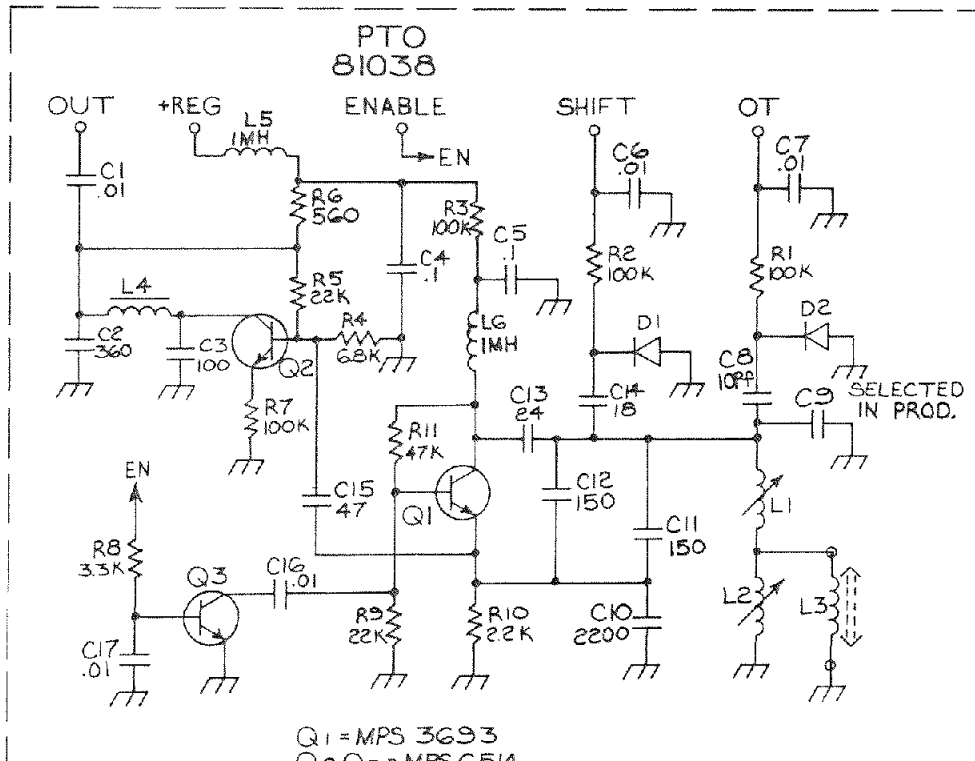
The Permeability Tuned Oscillator (PTO) provides the variable part of the local oscillator signal in both receive and transmit. Its 5.0 to 5.5 MHz output is mixed with a crystal oscillator, selected by the BAND switch, for translation to the proper LO frequency. The PTO is housed in an extruded aluminum housing and mounted to the front sub-panel. The PTO tuning coil, L3, is in series with L1 and in parallel with L2. Adjustment of these two slug-tuned coils, which are both wound on the same coil form, determines the linearity and band edge points.

## PTO\_ALIGNMENT

To test the alignment of the PTO turn the OFFSET function switch OFF, set the BAND switch to 14.0 MHz and set the MODE switch to SBN.

- 1.) Run the tuning knob fully counterclockwise and check that the display indicates approximately 13.960 MHz. The CORSAIR II PTO will normally tune from 35 to 45 kHz below each band.
- 2.) Next tune up to exactly 14.000 MHz and align the dial skirt "0" marking with the front panel bezel. The dial skirt is friction mounted on the tuning shaft and can be rotated independently from the tuning knob.
- 3.) Tune up the band and compare the display to the dial skirt every 100 kHz. The frequency display should correspond to the dial skirt markings within  $\pm 4$  kHz. If the final display reads above or below 14.500 MHz the PTO range can be corrected by trimming L1 and L2.
- 4.) If the PTO range is compressed i.e. the display reads less than 14.500 MHz, tune back to 14.000 MHz and adjust L2 a fraction of a turn clockwise. (L2 is controlled by the slug nearest the PTO cover). Bring the display back up to 14.000 MHz with a clockwise adjustment of L1. (The L1 slug is in the same coil form and can be reached with the reduced shank tuning tool provided with the CORSAIR II.) Now tune back up to 14.500 MHz, according to the dial skirt, and check the display again. Within two or three iterations both upper and lower band edges can be set almost exactly.
- 5.) If the PTO range is expanded according to the display return to

14.000 MHz as in Step 4 and adjust L1 and L2 counterclockwise.



## OSCILLATOR MIXER 80975

This assembly generates the proper local oscillator frequency for each band. The PTO 5.0 to 5.5 MHz signal is mixed with a crystal oscillator in the TL442CN integrated circuit double balanced mixer. Crystals are selected by the bandswitch except on 14.0 MHz where the PTO signal is used directly. The mixer output is filtered for each band with a double-tuned resonant circuit selected by the bandswitch. These are overcoupled tuned circuits that are best aligned using a swept oscillator. Because they are wide band however realignment is seldom necessary except when a tuned circuit component is replaced.

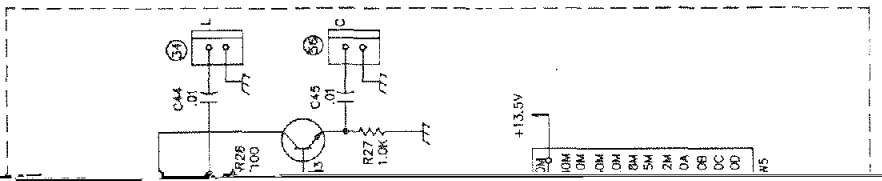
To eliminate band edge birdies on the 10, 21 and 28 MHz bands, the crystal oscillator frequencies are chosen 10 kHz lower than what normally would be needed. The OSC/MIXER board compensates for this 10 kHz deviation by changing the bias on a varactor diode in the PTO circuit by means of switch S1E. As a result, the kHz portion of the dial reading will not change when switching from band to band. The amount of capacitance inserted by the varactor diode is controlled by the value of the dc voltage obtained from potentiometer R3. This resistor is adjacent to connector 88. To set this adjustment, proceed as follows:

- 1.) With power removed from the transceiver follow the instruction for removal of the bottom cover and remove the cover from the oscillator mixer itself.
- 2.) Apply power to the transceiver and set the bandswitch to 10.0 and the frequency dial to 10.0000.
- 3.) Switch the bandswitch to 14 MHz and without touching the main tuning dial adjust R3 so that the display reads 14.0000.

01

PIN	VOLTAGE		PIN	VOLTAGE	
	RECEIVE	TRANSMIT		RECEIVE	TRANSMIT
1	0	0	8	0	0
2	10.5	12.0	9	4.2	4.2
3	10.0	10.0	10	5.2	5.2
4	6.1	6.1	11	6.2	6.2
5	4.1	4.1	12	6.3	6.3
6	0	0	13	10.0	10.0
7	0	0	14	10.0	10.0

TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	8.0	8.0	0	0	2.2	2.2
Q2	9.5	9.5	4.2	4.2	3.9	3.9
Q3	11.0	11.0	11.0	11.0	10.0	10.0
Q4	9.5	9.5	3.9	3.9	3.0	3.0
Q5	12.0	12.0	2.4	2.4	1.8	1.8



# INTRODUCING OMNI-VII

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RF MIXER 80987

This assembly contains the RF amplifier, transmit/receive mixer, first IF amplifier and the low level transmit amplifier. The selection of these amplifiers and the direction in which the signals flow is determined by the R and T voltages applied to pin diode switches D1 through D8. On receive Q1 and Q2 route the bandpassed receive signals through the

attenuator or RF preamp Q3. The signals are mixed with the LO to 9 MHz and amplified again in Q6. Q7 is a buffer for the noise blanker output and Q5 is the noise gate switching transistor. On transmit the 9.0 MHz TX IF is mixed with the LO, amplified by Q4 and applied to the bandpass filters.

The mixer balance controls are adjusted as follows:

- 1.) Tune in the receiver birdie at 21.320 MHz.
- 2.) Center the balance controls C18, C19 and R28.
- 3.) Terminate the antenna with 50 ohms and adjust in order R28, C19 and C18 to null the birdie.

Coil L6 and red trimmer capacitors C25 and C31 should be adjusted for maximum received signal strength.

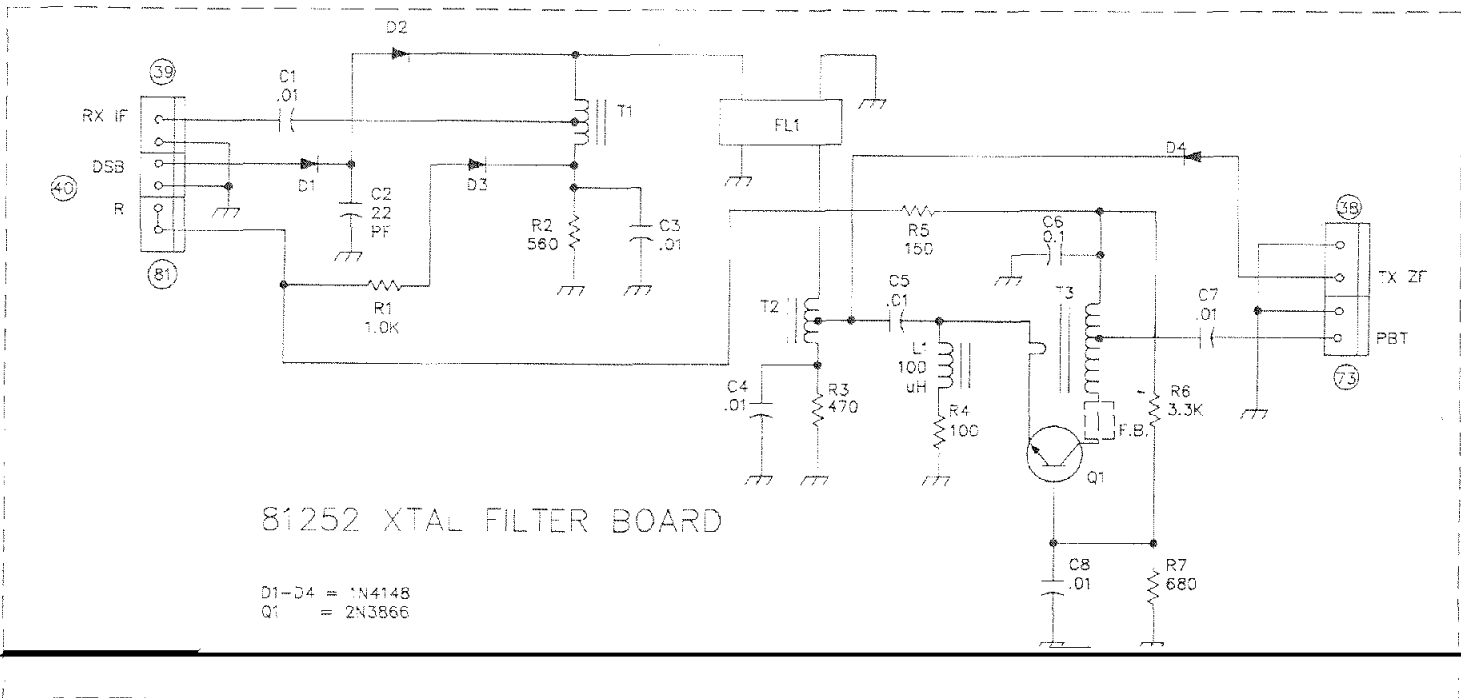
TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	0	0	.7	0	0	0
Q2	6.0	0	0	0	0	0
Q3	5.5	0	.9	0	.2	0



## XTAL\_FILTER\_BOARD 81253

The XTAL filter board with its 9.000 MHz 8 pole filter sets the IF bandwidth on receive and removes the undesired sideband on transmit. T/R switching of the IF signals is done with D1 through D4.

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	9.5	0	1.6	0	.5	0



NOISE BLANKER 80977

The noise blanker board receives a sample of the 9.0 MHz receiver IF from the RF mixer board. Q1, U1 and U2 make up a 9.0 MHz AGC'd amplifier

the emitter bias on Q2. For every noise pulse which exceeds the front panel N.B. LEVEL setting Q2 triggers one-shot U3B.

With the N.B. WIDTH control off pin 9 of U3 opens the noise gate on

the RF mixer board for 400 mS. This blanking period is set by R24 and is sufficient for most types of ignition and line related noise. If the noise pulses are unusually long, for example like those caused by over-the-horizon, OTH, radar broadcasts, the blanking width can be extended for up to 5 mS with the N.B. WIDTH control. Since these long blanking pulses tend to create "holes" in the received signal U3A, R23 and D6 allow only one long pulse every 80 to 100 mS. Not accidentally this is also the repetition rate of the Russian "woodpecker" radar.

U1

PIN      RECEIVE      TRANSMIT



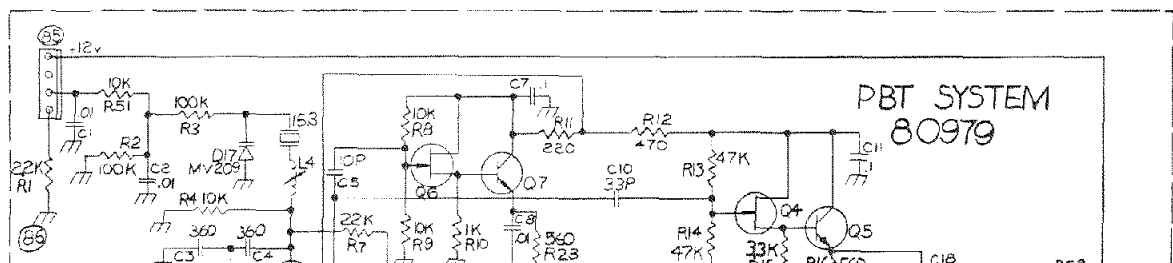
PBT, PASS BAND TUNING 80979

This board allows the operator to sweep one of the passband crystals across the passband of the receiver. The standard filter supplied with this board is an 8 pole 2.4 kHz unit. Optional 1.8, 0.5 and 0.25 kHz filters can be installed and selected electronically from the front panel. Coils L1, L2 and L3 are adjusted for maximum received signal strength. L4 sets the passband filter oscillator frequency. To adjust L4 center the front panel PBT control and while switching from SBN to SBR tune L4 such

If the Model 288 1.8 kHz optional filter is to be installed, cut or remove the jumper located in the center of the 1.8 kHz socket.

TRANSISTOR	SOURCE		DRAIN		GATE 1		GATE 2	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q2	.27	.27	13.0	13.0	.25	.25	0	0

TRANSISTOR	COLLECTOR (drain)		BASE (gate)		EMITTER (source)	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	13.0	12.95	.56	.56	1.55	1.55
Q3	5.7	5.7	2.6	2.6	2.1	2.1
Q4	9.5	9.4	4.8	4.8	5.7	5.7
Q5	9.5	9.4	5.7	5.7	5.2	5.2
Q6	8.0	8.0	4.0	4.0	6.0	6.0
Q7	8.0	8.0	6.0	6.0	5.1	5.1



IF/AF BOARD 80984

This board handles most of the receive functions including RF gain

control, notch and bandpass filters, AGC response and S-meter, audio amplification and CW sidetone. Coils L1 and L2 which peak the gain in the two 9.0 MHz IF amplifiers can be aligned using any low level received signal. The 21.320 MHz receiver spur is useful for this. The S-meter calibration however requires an accurate 14.000 MHz 50 uV signal. With the RF ATTN off and the 50 uV signal applied to the antenna jack adjust R59 for an S9 reading. Sidetone level and pitch are set by two controls centered just inside the access hole in the bottom cover.

U1

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	4.1	4.1
2	4.1	4.1
3	4.1	4.1
4	4.1	4.1
5	4.1	4.1
6	4.1	4.1
7	0	0
8	4.1	4.1
9	4.0	4.0
10	4.1	4.1
11	8.0	8.0
12	4.1	4.1
13	4.1	4.1
14	4.1	4.1

U2

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	4.0	4.0
2	4.0	4.0
3	4.0	4.0
4	0	0
5	0	0
6	0	0
7	0	0
8	8.0	8.0

U3

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	2.2	2.2
2	4.1	4.1
3	4.0	4.0
4	4.0	4.0
5	4.0	4.0
6	2.2	2.2
7	0	0
8	4.2	4.2
9	1.0	1.0
10	4.2	4.2
11	8.0	8.0
12	4.0	4.0
13	4.0	4.0
14	4.0	4.0

U4

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	2.4	2.4
2	4.1	4.1
3	4.0	4.0
4	4.0	4.0
5	4.0	4.0
6	2.5	2.5
7	0	0
8	4.0	4.0
9	4.0	4.0
10	4.0	4.0
11	8.0	8.0
12	4.5	4.5
13	1.0	1.0
14	4.5	4.5

U5

PIN	VOLTAGE	
	RECEIVE	TRANSMIT
1	6.2	6.2
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	6.2	6.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	12.5	12.5

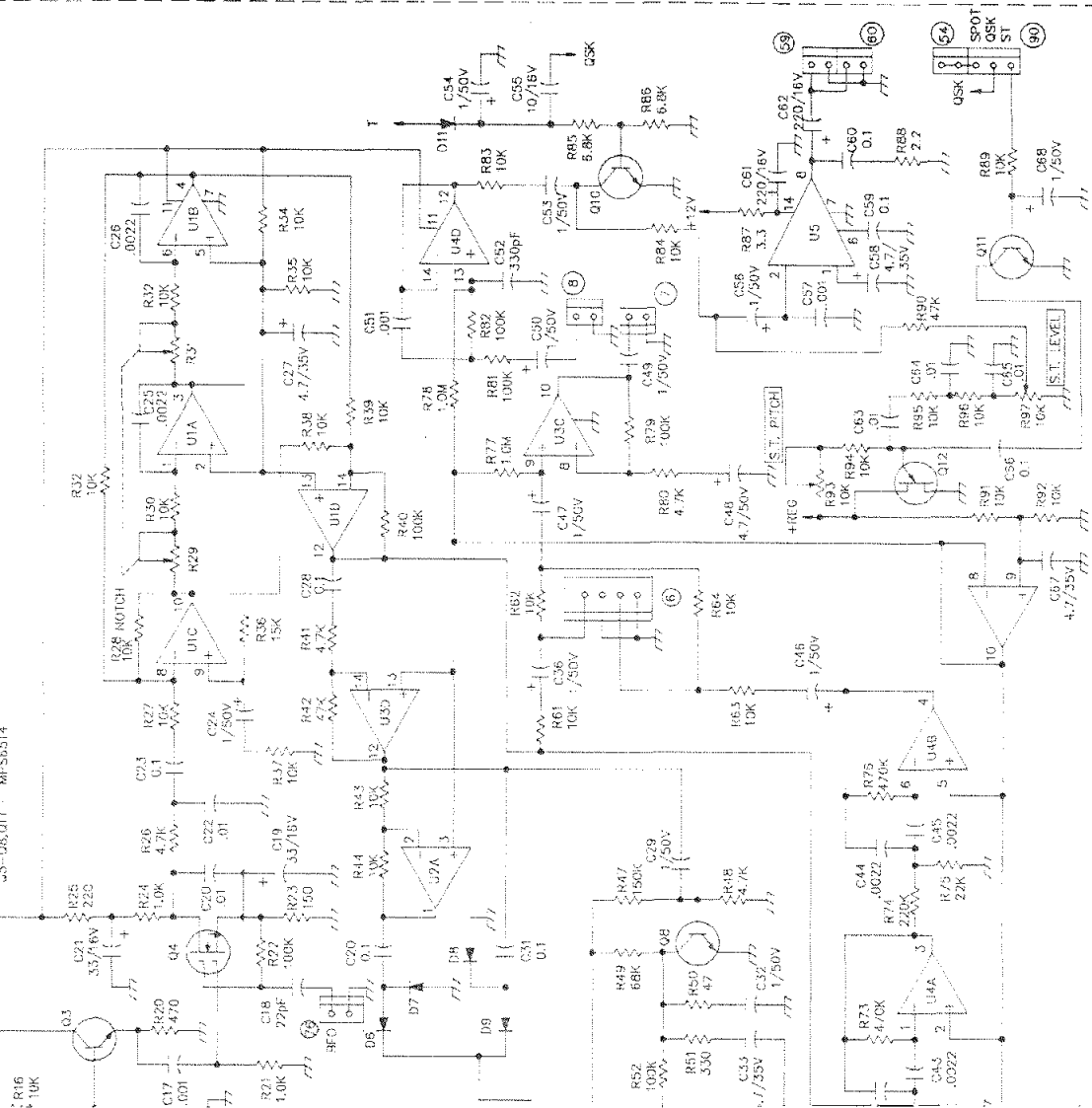
TRANSISTOR	SOURCE		DRAIN		GATE 1		GATE 2	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q4	.6	.6	3.4	3.4	.1	.1	0	0

TRANSISTOR	EMITTER		BASE 1		BASE 2	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q12	3.0	3.0	0	0	8.0	8.0

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	12.0	12.0	2.2	0	1.5	0
Q2	10.0	12.0	2.1	4.6	1.4	0
Q3	10.0	12.0	4.3	4.6	3.6	4.2
Q5	8.0	8.0	8.7	0	8.0	0
Q6	8.0	8.0	0	0	0	0
Q7	0	0	0	.7	0	0
Q8	12.0	12.0	.4	.4	0	0
Q9	0	0	12.0	12.0	13.0	13.0
Q10	0	0	0	.7	0	0
Q11	0	0	0	0	0	0

# 80984 IF/AT BOARD

C1, D2, J3 - 1N5757  
 C4 - D11 - R4148  
 C1, D2, J3 - MF5269J  
 C4 - 30201  
 C5 - 28, 011 - MFS6514  
 Q6 - 2N5087  
 Q7 - MFS101  
 Q7 - 2N4870



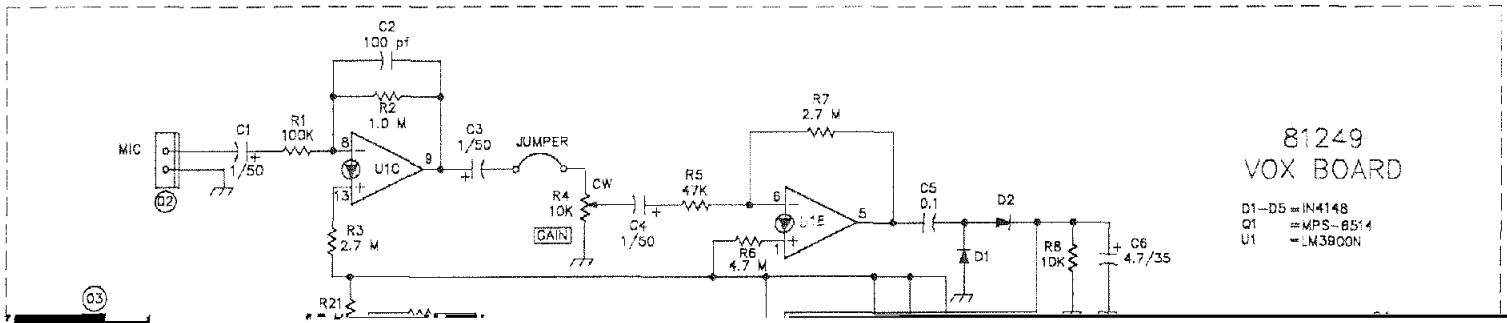
VOX BOARD 81249

The VOX board mounted on the back panel samples microphone and speaker signals and produces the VOX keying signal for the transmitter. Positive and negative voltages corresponding to microphone and speaker levels are summed and compared by U1D. When the sum exceeds a preset level the vox is activated. VOX GAIN, ANTI-VOX and DELAY adjustments are available at the back panel.

U1

PIN	RECEIVE	TRANSMIT
1	.4	.4
2	.4	.4
3	.6	.6
4	3.4	3.4
5	4.9	4.9
6	.2	.2
7	0	0
8	.6	.6
9	3.6	3.6
10	.1	.1
11	.6	.6
12	.4	.4
13	.5	.5
14	8.0	8.0

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	0	0	0	0	0	0



AUDIO\_PROCESSOR\_B1255

The audio processor amplifies and conditions microphone and patch/TU signals for the transmitter. Diodes D1 and D2 select either an amplified audio signal from U2A or a peak clipped and compressed version from U2B. Transistor Q1 is the compressor shunt element, D3 and D4 are the clipping elements. Also resident on the board is a CMOS oscillator for setting the built-in keyer speed. U1 receives +5 v from the counter/display assembly and returns a clock signal related to the KEYSER SPEED front panel control.

U1			U2		
PIN	RECEIVE	TRANSMIT	PIN	RECEIVE	TRANSMIT
1	2.6	2.6	1	4.2	4.2
2	2.6	2.6	2	4.2	4.2
3	2.8	2.8	3	.9	.9
4	2.8	2.8	4	0	0
5	0	0	5	.9	.9
6	2.2	2.2	6	1.0	1.0
7	0	0	7	4.3	4.3
8	0	0	8	8.0	8.0
9	0	0			
10	5.0	5.0			
11	2.2	2.2			
12	2.8	2.8			
13	2.8	2.8			
14	5.0	5.0			

U3		
PIN	RECEIVE	TRANSMIT
1	4.2	4.2
2	4.2	4.2
3	4.0	4.0
4	0	0
5	4.2	4.2
6	4.2	4.2
7	4.2	4.2
8	8.0	8.0

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	0	0	0	0	0	0
Q2	0	0	.7	.7	0	0
Q3	12	0	0	.7	0	0
Q4	0	12	.8	0	0	0



## DOUBLE SIDEBAND GENERATOR B0980

This assembly contains the carrier/BFO crystal oscillator Q1 and a balanced modulator U1 for double sideband generation. The exact frequency of the 9.0 MHz oscillator is determined by the trimmer capacitors C1, C2 and C3.

trimmer capacitors C1, C2 and C3 are placed in series with the crystal.

In the SBR mode only C1 is in series with the crystal and sets the oscillator frequency to 9.003 MHz. This positions the lower sideband of the modulator output just inside the passband of the XTAL FILTER board's 9.000 MHz crystal. In SBN, C2 and C3 are switched in and pull the oscillator on down to 9.000 MHz. Now only the upper sideband passes through the XTAL FILTER board. In CW and LOCK modes C1 and C2 set the oscillator to 9.00750 MHz, while Q2 upsets the balance in the balanced modulator. The level from the modulator is a function of the voltage at pin 7 which comes from the DRIVE control.

**Carrier Oscillator Alignment:** Proper alignment of C1, C2 and C3 requires the use of a frequency counter. These capacitors should not be readjusted on general principles but only after it has been determined that the carrier is not where it should be on the passband curve, or the cw frequency is not 750 Hz up from the sideband normal carrier position. To make these adjustments proceed as follows:

- 1.) Connect the counter to the junction R3 and R4 in the emitter of Q1.
- 2.) Set the MODE switch to the SB-R position and DRIVE control fully counterclockwise. Adjust C1 for a frequency reading of 9.00300.



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## FINAL AMP ASSEMBLY - 80565

The high power rf amplifier and its push-pull drive stage are housed in a metal box which is an integral part of the heat sink assembly. The unit is attached to the back panel with four screws.

Q1 and Q2 constitute a Class AB linear push-pull driver stage of wide band design. Impedance matching into and out of this stage is by means of transformers T1 and T2. Bias is applied whenever "T" voltage is applied to

the terminal so marked, and quiescent current in the collector circuit is adjusted to a value of between 4 and 8 mA with potentiometer R11. Access to this control is by means of the small hole in the brass box as shown on Figure 1 of this section. To adjust bias, unsolder the small jumper red wire connecting the second small feed through terminal to the large +12 volt lug. Insert a dc milliammeter between the two, set DRIVE control fully CCW and MODE switch to LOCK position. If driver collector current is not between the recommended limits, readjust trimpot (clockwise to increase current) by rotating the trimpot plastic serrated knob through the shield box hole with the aid of a small awl type probe.

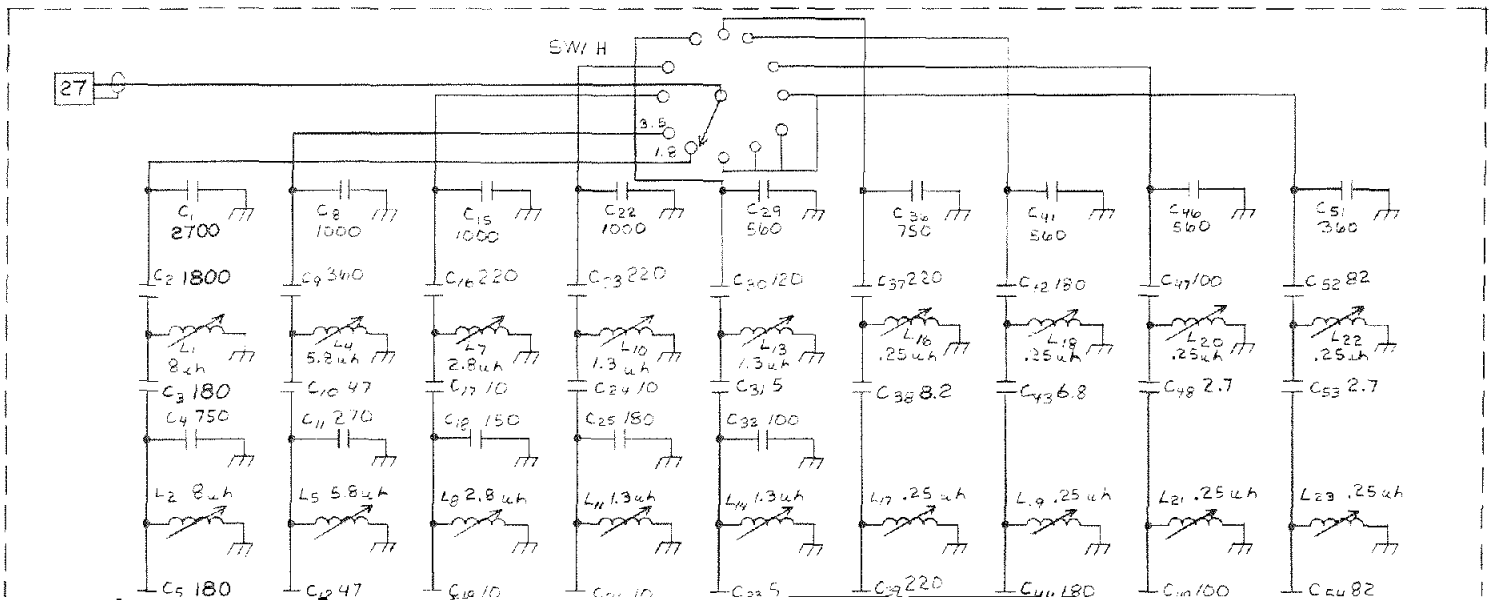
Driver collector current is adjusted by R11 and Q1 and Q2 are Class AB push pull



# BANDPASS FILTER - 80976

This assembly contains individual bandpass circuits for each band. They consist of critically or over-coupled tuned circuits. 3 poles on each band

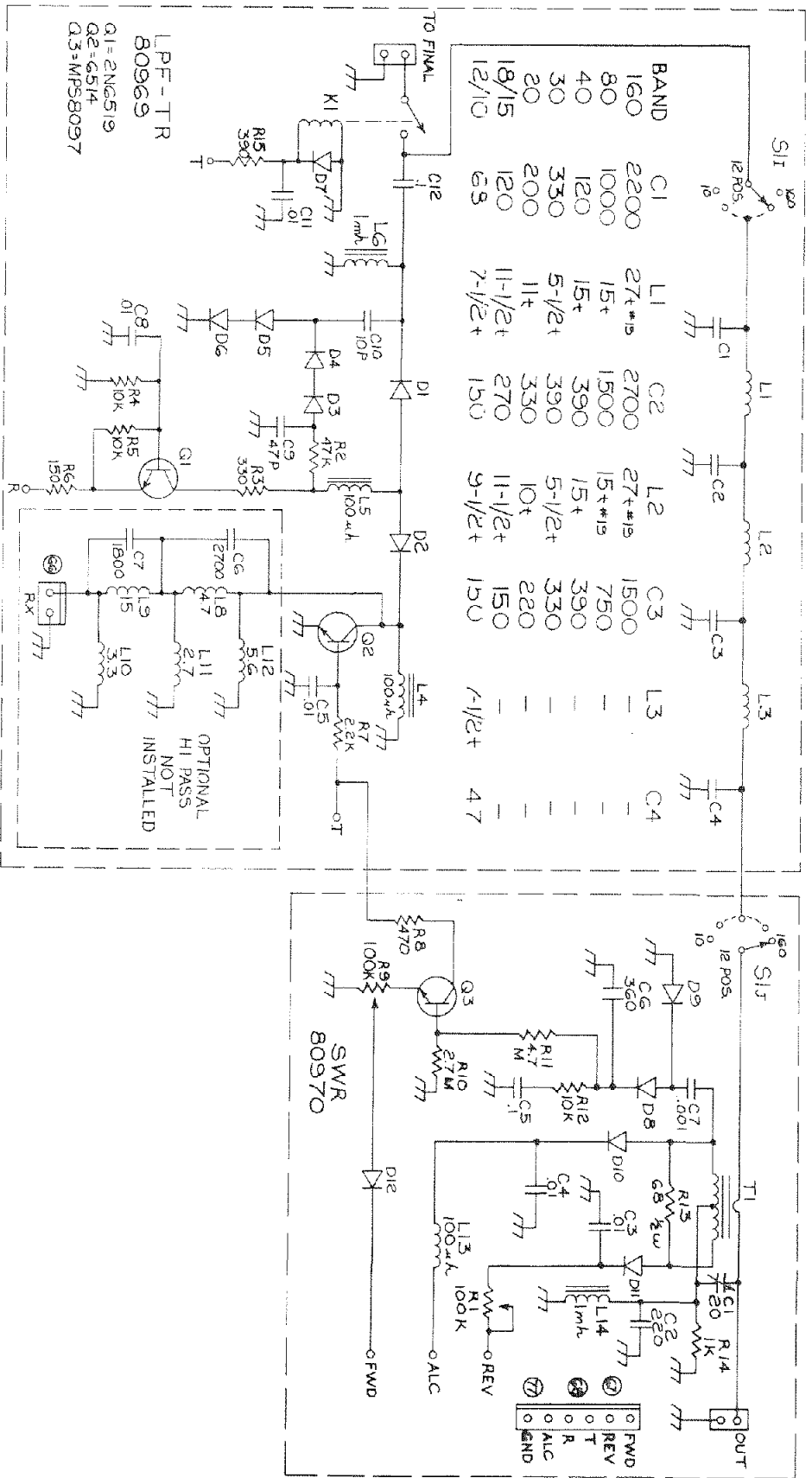
except 10 and 15 meters. Because the tuning of these circuits is critical and they are used both when receiving and transmitting, these resonant circuits are best aligned using a sweep oscillator system. Realignment is seldom necessary except when a tuned circuit component has been replaced. Since all of the component are passive, no voltage measurements are required.



## LOW PASS FILTER - 80969

This assembly contains the low pass output filters and the electronic TR switch. The output signal from the final rf amplifier contains harmonic components above the desired level. To attenuate these harmonics to a

amplifier is disconnected from the antenna circuit during receive by relay K1. Switching of the receive antenna is performed by switch Q1 and diodes D1 and D2. This allows extremely fast switching of the antenna and permits full break-in operation on cw. PIN diodes D1 and D2 connect the antenna to



## DIGITAL READOUT

The frequency counter and digital display section of the CORSAIR II consists of two interconnected printed circuit assemblies located in an aluminum enclosure which is secured to the front subpanel. The large scale integrated circuit, display interface circuitry, a 10-1 prescaler, and a 5 volt regulator are mounted on the counter logic board 80973. The remaining circuits for the counter timebase and pre-amp are mounted on the pre-amp board 80974.

This portion of the transceiver is highly complex and contains MOS and CMOS integrated circuits that are susceptible to damage from static burnout if improperly handled. There are no user servicable components inside.

The counter counts the actual VFO frequency being applied to the first mixer, and assumes that the BFO frequency is either 9 or 9.003 MHz. This is the case for sideband normal and sideband reverse, respectively. Since the VFO signal is either 9 MHz above or 9 MHz below the output frequency, the counter must understand which band is being used and make the appropriate arithmetic correction. If the frequency of the BFO is properly set, and the counter is properly preset, the resulting frequency displayed will be within  $\pm 100$  Hz of the actual frequency after proper adjustment of the counter timebase. The counter preset can be checked by removing the VFO jumper and comparing the preset information with that in the table below.

COUNTER PRESETS (VFO jumper removed)

BAND	MODE	DISPLAY
1.8, 3.5, 7.0	SBN	-1.000 0
	SBR	-0.997 0
10, 18	SBN	91.000 0
	SBR	90.997 0
14, 21, 24.5 28-30	SBN	09.000 0
	SBR	09.003 0

To adjust the counter timebase, turn the bandswitch to 10 MHz and adjust the WWV at 10.0000 MHz. Tune the signal for maximum voice clarity during the time announcement. After adjusting the tuning, if the frequency display in SB-N mode is not 10 MHz exactly, then adjust capacitor C1 through the access hole on the left side of the counter enclosure to adjust the display so it reads 10.000.0 MHz.



## CONTROL BOARD - 80978

This assembly contains a set of synchronous transistor switches for controlling the "I" and "E" voltages that switch the unit from transmit to

receive mode. It also contains an integrated circuit voltage regulator which powers the frequency and voltage sensitive circuits in the VFO, sideband generator, product detector, and offset control circuits.

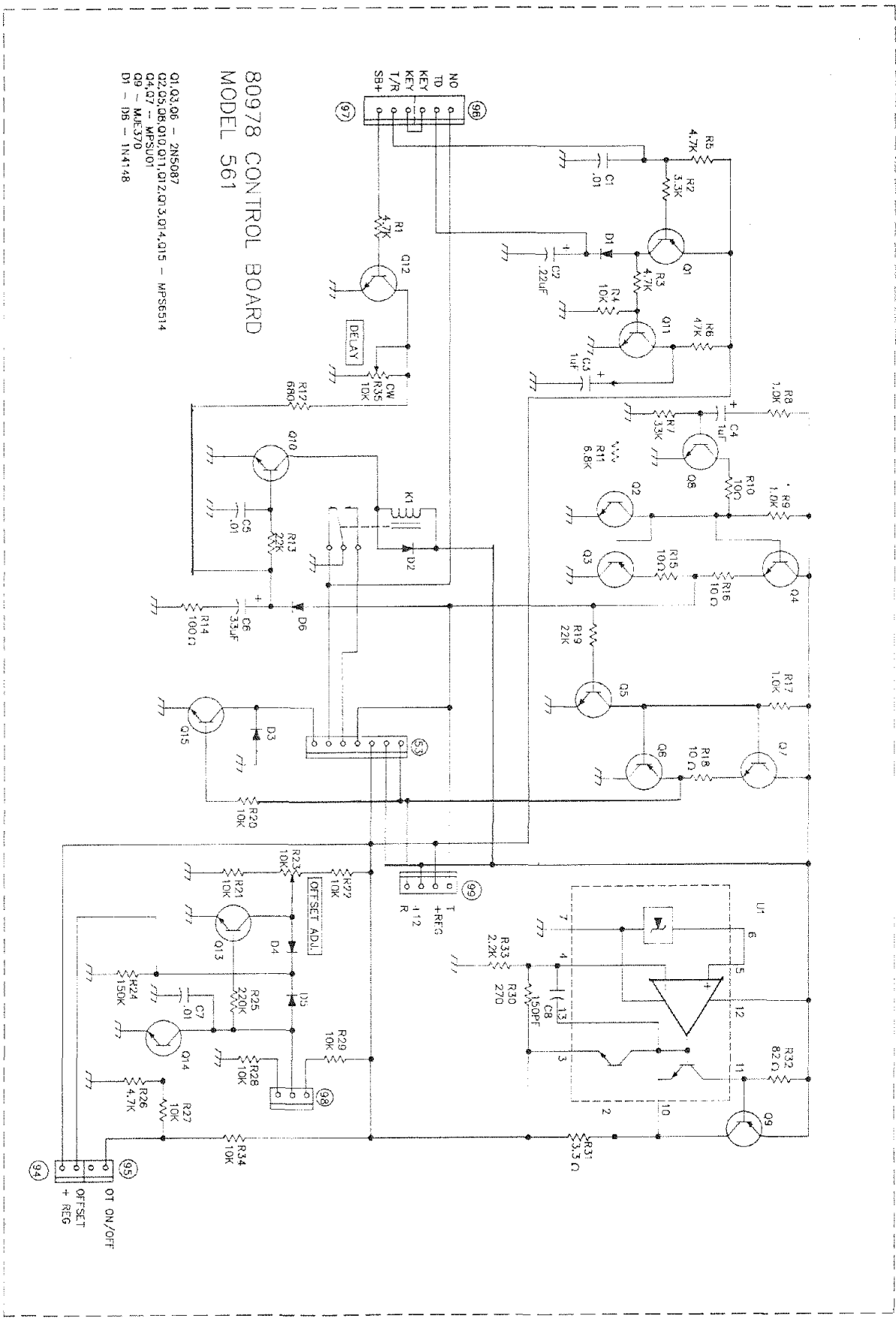
Transistors Q1 through Q5 and Q11 generate the I and R voltages. Transistor Q9 and IC Q1 are the voltage regulator. Transistors Q13 and Q14 plus diodes D3 and D4 perform the offset tuning switch functions.

Control relay K1 is operated by T voltage and provides interlocking

of accessory equipment such as an external linear amplifier. In the cw mode only, the delay of this relay is controlled by the setting of R10. In esb mode the "hang" of this relay is determined by the VOX delay control on the front panel.

The offset tuning zero adjustment is accomplished by centering the offset tuning control and noting the frequency display. Turn the offset select switch to off and adjust the potentiometer R12 so the display returns to its former state. Final adjustment of this control can be made by alternately switching from OFF to MIN and back again while adjusting R12 for no change in received signal pitch.

TRANSISTOR	COLLECTOR		BASE		EMITTER	
	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT	RECEIVE	TRANSMIT
Q1	0	8.0	7.9	7.7	8.0	8.0
Q2	.2	13.0	.7	0	0	0
Q3	0	0	0	12.5	0	1.0
Q4	13.0	13.0	0	12.5	0	1.0
Q5	13.0	0	0	.75	0	0
Q6	0	0	13.0	0	12.0	0
Q7	13.0	13.0	13.0	0	12.5	0
Q8	.2	12.5	0	0	0	0
Q9	8.4	8.4	12.5	12.5	13.0	13.0
Q10	13.0	1.8	0	.8	0	0
Q11	2.0	0	0	.75	0	0
Q12	0	8.5	0	0	0	0
Q13	4.0	4.0	0	0	0	0
Q14	0	0	.65	.65	0	0
Q15	0	0	0	.75	0	0



80978 CONTROL BOARD  
MODEL 561

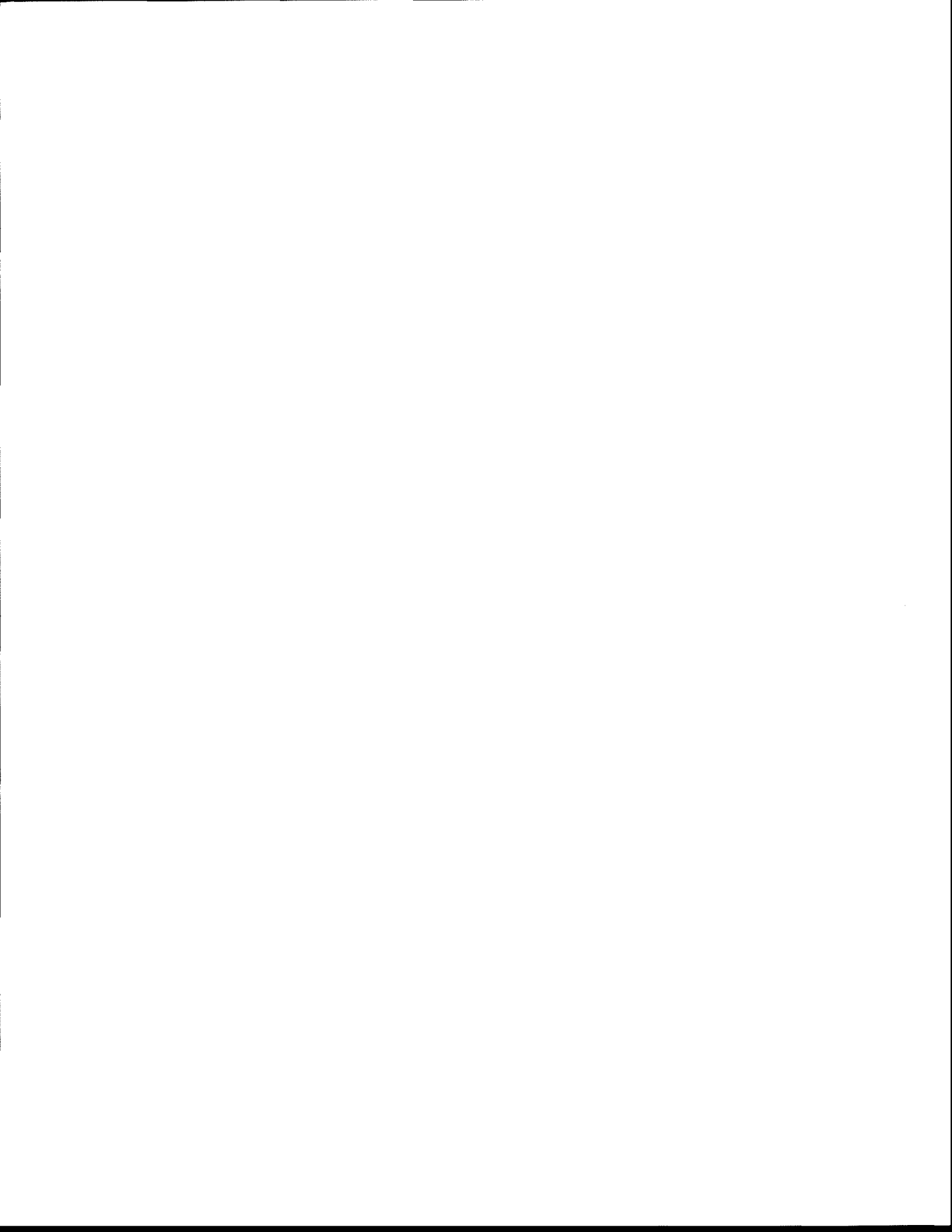
Q1,Q3,Q6 - 2N5087  
Q2,Q5,Q8,Q10,Q11,Q12,Q13,Q14,Q15 - MFS5614  
Q4,Q7 - MFSJ01  
Q9 - MFC370  
D1 - D6 - 1N4148

SB/TR O

SBN

CW

R6

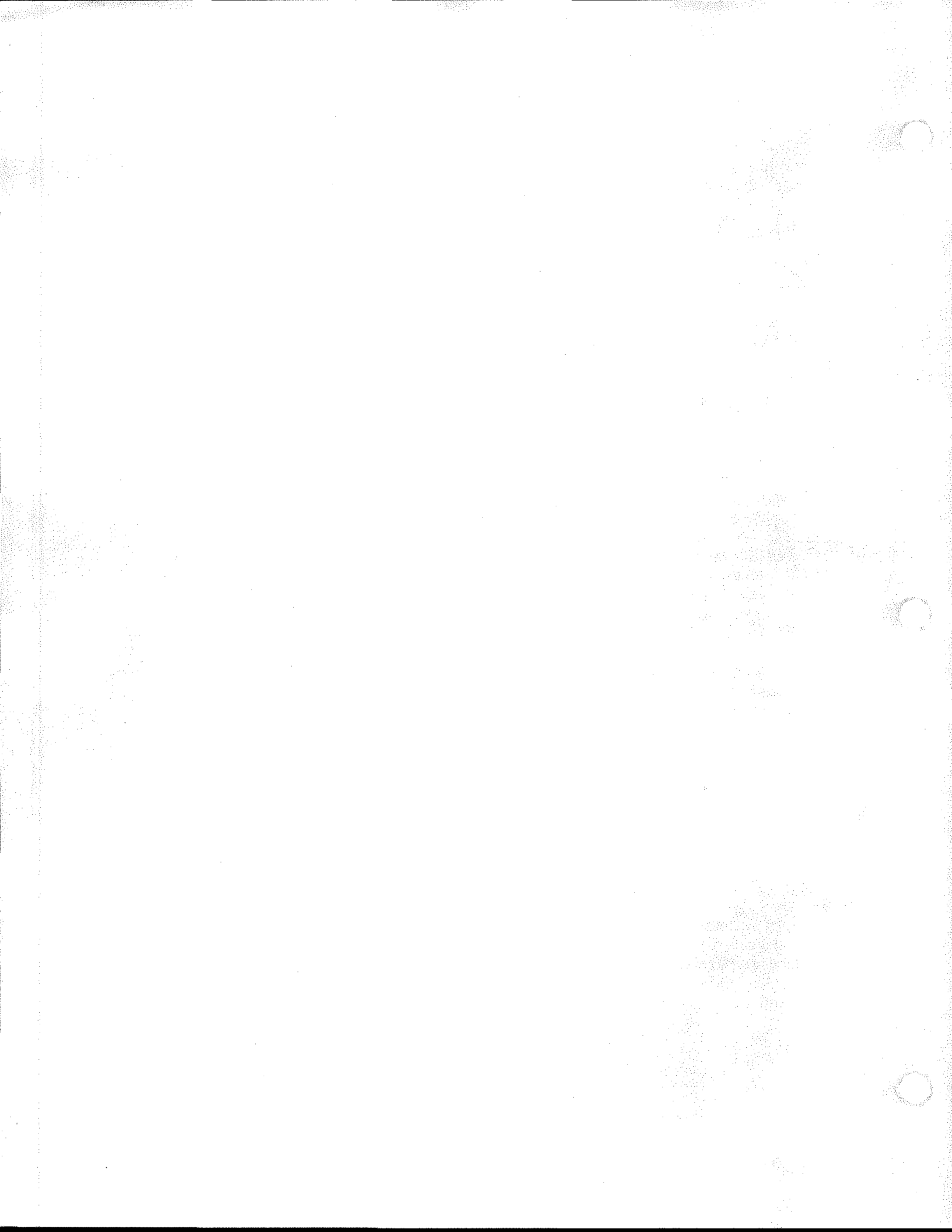


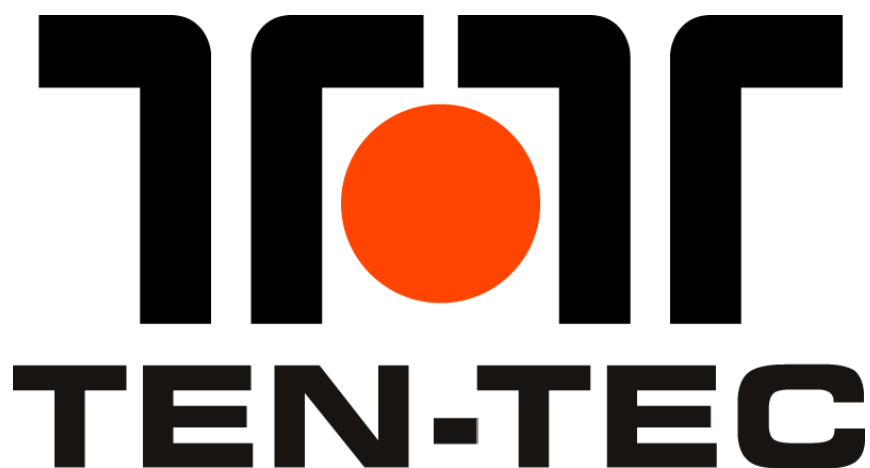
Ten-Tec, Inc.  
1185 Dolly Parton Parkway  
Sevierville, TN 37862  
Repair Service: (865) 428-0364

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1. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL OWNER. It is important that the warranty registration card be sent to us promptly.
2. READ THE MANUAL THOROUGHLY. This warranty does not cover damage resulting from improper operation. Developing a thorough understanding of this equipment is your responsibility.
3. IF TROUBLE DEVELOPS we recommend you contact our customer service group direct at the address or phone number shown above. It has been our experience that factory direct





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**THANK YOU AND 73 FROM ALL OF US AT TEN-TEC**