

Sabre

by
browning®



ALL CHANNEL PHASE LOCK LOOP
AM CITIZENS BAND TRANSCEIVER
INSTALLATION & OPERATING INSTRUCTIONS

BROWNING LABORATORIES
LACONIA, NEW HAMPSHIRE 03246
PHONE (603) 524-5454

**WITH
PLL
CIRCUITRY**

W A R R A N T Y

Browning Laboratories, Inc. warrants each new inter-communicating device manufactured by it to be free from defective material and workmanship and agrees to remedy such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service, discloses such defect—provided the unit is delivered by the owner to us or to our authorized distributor or dealer from whom purchased within one (1) year from the date of sale to original purchaser, and provided the unit is delivered by the owner to us or to our authorized distributor or dealer from whom purchased within one (1) year from the date of sale to original purchaser, and provided that such examination discloses in our judgment that it is thus defective. Labor is warranted for ninety (90) days.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect application, improper installation, or use in violation of instructions furnished by us.

This is not an all-encompassing or performance guarantee (see instructions) and this Warranty is in lieu of all other Warranties expressed or implied; and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

Browning Laboratories, Inc. reserves the right to make any change in design, or to make additions and improvements in its products without imposing any obligation on itself to install them in its products previously manufactured.

BROWNING LABORATORIES, INC.

1269 Union Avenue

LACONIA, N. H. 03246

GENERAL INFORMATION

The SABRE Transceiver is designed to comply with necessary requirements to operate in the Class "D" Citizens Radio Service in the 27MHz (11 meter) Band. The user is required to be cognizant with, and comply with, Part 95 of the FCC Rules which defines operation in this service.

A valid station license and call letters are necessary before operation is permissible. The station license is obtained by submitting a properly and fully completed Form 505, Station License Application. After receipt of the license, the user must attach to the transmitter a Form 452-C, Transmitter

Identification Card. Form 452-C has been included for your convenience.

Anyone may operate a duly licensed transmitter, but the licensee is responsible for violations or infractions of the regulations. Browning Laboratories cannot be held responsible for improper technical adjustments where any unauthorized person has performed any adjustment or used any other than our authorized crystals, components, etc.

PRE-INSTALLATION

To those readily familiar with transistorized CB radio equipment, there is a tendency to install the equipment without reading the details of the Instruction Manual. However, to avoid equipment damage, a few precautions are necessary.

DO NOT

—Attempt to connect the power cord to a primary power source with the power switch on. Determine system polarity before connection. The SABRE is wired for negative or positive ground connection. MOST MODERN CARS ARE NEGATIVE GROUND. IN ANY EVENT THE RED wire always goes to the + (positive hot) on the battery and the BLACK wire always goes to the - (negative Ground) on the battery.

DO NOT

—Connect the antenna with the power on. Accidental contact with the rear speaker jacks on the rear panel will blow the line fuse.

DO NOT

—Key the transmitter without an antenna connected.

DO NOT

—Replace the fuse with any other type (3AG-2amp.)

DO NOT

—Attempt alignment of the transmitter to the antenna. Loss of modulation power and inefficient operation possibly resulting in transistor burn-out will occur unless the factory prescribed tuning procedure is fol-

lowed. Maximum efficiency of an installation will result when the antenna has a VSWR of less than 1.5:1. The antenna should be tuned, trimmed or replaced, if necessary, to achieve this.

GENERAL DESCRIPTION

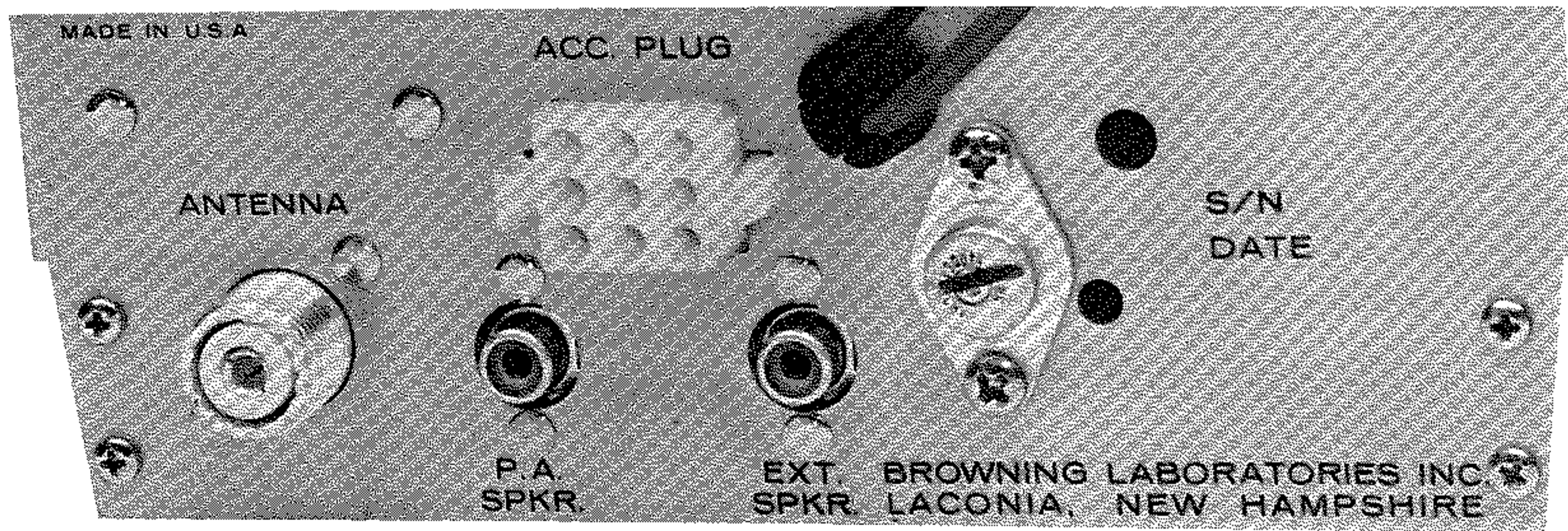
The Eaglette embodies the latest in high frequency transceiver design techniques. Only the most modern silicon transistors are used throughout.

Twenty-three channel operation is made possible with 14 crystals in a highly stable synthesizing circuit.

Receiver voltages are zener regulated to maintain sensitivity and squelch operation over a wide input voltage excursion.

All transmitter transistors are oversized silicon units.

The Eaglette is designed to operate from a nominal 12-volt DC negative ground source. (Consult your dealer for a special kit of instructions to convert the Eaglette to positive ground). The Eaglette will operate over a nominal input voltage range of 10.5 to 16 volts without damage or serious loss of communication.



TECHNICAL SPECIFICATIONS

Receiver

Sensitivity - $10\text{DB} \frac{s+n}{n}$ @ 40% ~ modulation 0.35uV

Selectivity - 6.0KC bandwidth, 5.5KC minimum,
50DB bandwidth, 20KC minimum

Image rejection - major image—55DB
all others—40DB

Squelch - minimum sensitivity—0.25uV, maximum
signal stop, factory setting, 20uV
(adjustable)

Noise Limiter - Series gate approximately 65%
clipping level.

Audio Output - 2.25 watts

Transmitter

Power Output - 2.90 watts min @ 12.5 volts
3.30 watts min @ 13.8 volts

Modulation - 85% minimum guaranteed sine-wave
100% average speech

Audio

Power Output - Max in receive—2.25 watts, Max in
transmit—3.5 watts, Max in P.A.
(3.2 Ω)—3.25 watts

Microphone - Hi impedance ceramic

Speaker - 2'' x 6'' 3.2 Ω dynamic

Weight

5½ lbs with microphone

Size

2.6''h x 6.9''w x 8.4''d

Circuit Board

Lifetime guaranteed glass-fibre (See warranty on
inside front cover).

INSTALLATION

Observe that the radio can be mounted either side up in mounting bracket. It is preferable to position the bracket so that it will be near the center of the radio in the final installation.

Select a suitable mounting position keeping the following in mind.

- Controls must be convenient and visible.
- The location should not interfere with driver or operators normal functions.
- The transceiver should not be in the way of heater ducts, air conditioning outlets or direct blast air inlets.
- The transceiver should be protected from rain and spray. In some commercial vehicles and in marine

applications, vertical mounting may prove more convenient. The Eaglette may be mounted in any position without performance change.

Connect the power cord to a well regulated source such as an ammeter terminal, ignition accessory terminal or cigar lighter. "Tapping off" of dome or convenient light wires is not recommended as these circuits are usually wired very lightly and some power loss would be encountered. Always install the black wire between the radio chassis and vehicle chassis or system ground to reduce noise pickup.

Install the radio in the mounting bracket and connect the antenna. It is essential for maximum performance that a good antenna be used. See ANTENNAS for a discussion of antenna types.

OPERATION

Operation of the Eaglette Transceiver is simple and self-explanatory to those familiar with CB equipment.

After power is connected, set the front panel switches to CB and DISTANCE. Turn the Squelch knob to turn power on. With the volume at about one-half setting and the squelch control counter-clockwise, noise and/or signals should be heard. If the unit is inoperative, determine that the pilot lamp is on, if not, recheck power connections and line fuse.

The SQUELCH control should be rotated slowly clockwise to silence background noise, or weak or undesirable signals.

In the LOCAL position most extraneous noises are vastly reduced (as well as skip interference). This position is useful when the desired signal is strong. For maximum sensitivity (weak signal reception) place the switch in DISTANCE. The squelch control should be reset whenever the LOCAL-DISTANCE switch is changed.

Public Address or Loud Hail Functions

Auxiliary circuitry provided in the Eaglette enables it to be used as a public address system or loud hailer.

A trumpet or horn speaker of 3 to 8 ohms impedance is desirable for this purpose. Connect the speaker to a suitable length of cable using a standard "phono" plug at the radio end. The phono plug is inserted in the P.A. jack. Placing the "PA CB" switch in "PA" will silence the receiver. When it is desired to speak, depress the mike key. Feedback effects which cause "ringing" or "howling" are reduced by placing the P.A. speaker as far from the microphone as possible. Avoid having the speaker and microphone facing each other.

The EXT SPKR jack functions in the CB position and can be used to operate an external speaker for receiving purposes. Any suitable speaker of 3 to 8 ohms is satisfactory.

MOBILE NOISE SUPPRESSION

- (6) (a) REGULATOR FIELD TERMINAL: Connect a 39 ohm resistor in series with a 0.01 mfd. ceramic capacitor between the field terminal and ground.
 - (b) ARMATURE TERMINAL: Insert 0.02 mfd. coaxial capacitor. (Sprague No. 48P 18 or equivalent).
 - (c) BATTERY TERMINAL: Repeat (b).
 - (7) GAUGES: Install 0.5 mfd. 200 volt capacitors from terminals to ground.
 - (8) WHEELS AND TIRES: Inject special graphite powder (available at automobile parts suppliers) into the tires.
- CAUTION: Do not connect any capacitor alone from the field terminal of the generator to ground. Observe (+) (-) carefully.

- C. ALTERNATORS: The prime cause of alternator whine is dirty slide-rings and faulty diodes. If further whine is encountered;
- (1) Install 0.5 mfd. coaxial capacitor at the alternator terminals.
 - (2) Install 0.25 mfd. coaxial capacitor at the regular terminals.
 - (3) For extreme cases of whine; install a shielded lead between the alternator and regulator field terminals.

OPERATION

Operation of the SABRE Transceiver is simple and self-explanatory to those familiar with CB equipment.

After power is connected, set the front panel switches to CB and NB Off or Down. Turn power on. With the volume at about one-half setting and the squelch control counter-clockwise, noise and/or signals should be heard. If the unit is inoperative, determine that the pilot lamp is on, if not, re-check power connections and line fuse.

The SQUELCH control should be rotated slowly clockwise to silence background noise, or weak or undesirable signals.

The variable Delta Tune enables you to tune the receiver $1\frac{1}{2}$ kHz plus or minus the crystal frequency to clear up signals which may be off frequency.

The noise blanker operation greatly reduces ignition-type noise when receiving weak signals. Some words of caution concerning the use of the noise blanker [NB] are in order. Some conditions can occur which may make the NB seem ineffective or defective. For example if a strong signal is on an adjacent channel the NB may be inoperative. This condition is quite normal and the NB effectiveness will be restored once the strong signal disappears.

NOISE SUPPRESSION

When installed in a vehicle whose ignition system proves to be an unusually noisy one, local measures can be taken on the vehicle to reduce such noise. Consult your distributor to determine the most economical method of suppressing the ignition noise. Usually simple suppression of spark plugs may suffice. However, more difficult cases may require special techniques. Sometimes generator and voltage regulator "hash" may be troublesome. Special capacitors and/or complete kits are available depending upon requirements. Little can be done to reduce noise interference

from other mobile sources. Your Eaglette has the finest noise suppression circuitry available today regardless of cost. Only special and expensive noise blankers can improve upon its noise rejection. "Outboard" noise suppressors available from \$20 to \$50 on the market cannot improve the Eaglette as noise is already suppressed beyond the capability of such devices. If noise is experienced in base station operation from fluorescent lamps, motors, etc., suppression devices are available from radio distributors specifically designed for radio noise suppression of these appliances.

MAINTENANCE

No maintenance is required on the unit other than to give it the care and treatment accorded any quality electronic equipment. The entire radio may be cleaned and waxed to preserve its exterior appearance. Use a rag moistened with water and household detergent and finish with an overall wipe with an alcohol soaked cloth. If the unit is used in dusty conditions the interior can be blown out occasionally with a low pressure air hose or vacuum cleaner. To remove excessive soil

on the interior, clean carefully with a soft brush and alcohol and then dry thoroughly before operating.

In the event difficulty occurs, a qualified serviceman with proper instrumentation and service procedures should be engaged. An authorized Browning distributor, warranty station or the factory should perform any service work.

OPERATION

Use of Channels

In accordance with recent FCC regulations, all 40 channels may be used for communication between units of different license. The exception is that Channel 9 be reserved exclusively for emergency situations.

PLL CIRCUIT

The SABRE incorporates a highly efficient Phase-Locked-Loop circuit. The ON-THE-AIR lite may flash green when changing channels, this is a normal condition. However, should the ON-THE-AIR LITE GLOW GREEN STEADILY, this indicates that the PLL IS OUT OF LOCK AND NO RF WILL BE GENERATED.

ANTENNAS

No other single part of the system can be as significant a factor in complete success or total failure of performance as the antenna installation.

It is advisable not to experiment but rather to use performance proven antennas. Many new "miracle" antennas appear on the market from time to time, but most of them disappear after a short period.

If a shortened antenna is desirable there are several successful types that the Browning distributor will recommend. Shortened types are very successful mounted in the center of the roof and somewhat less efficient when mounted on or near the front or rear fender or rear quarter deck.

Bumper mounts are inadvisable because of their extreme directivity.

The length of the cable from the antenna to the radio is, contrary to popular belief, not important. What is important is that the antenna have low VSWR. If a shortened type of antenna is used, it is mandatory that the VSWR be checked. If the VSWR is greater than 1.5:1 the antenna must be adjusted in accordance with the manufacturers instructions.

Do not attempt VSWR checks if the vehicle is parked closer than 35 feet from a large fence, metal building, etc.

The transmitter has been factory tuned for optimum performance under all conditions. Improper adjustment may cause off-frequency operations, spurious or parasitic oscillations and generally poor modulation. Adjustment of the transmitter to deliver maximum power to the antenna without regard to input power will usually result in poor modulation and excessive dissipation in the power amplifier. As an example, suppose that a transmitter is delivering 3.0 watts output with 5.0 watts input. It may be possible to adjust the transmitter tuning to 3.7 watts output. The input power will probably increase to 6.5 watts. The efficiency is now $3.7/6$ or 57%. The original efficiency was $3.0/5.0$ or 60%.

The efficiency decreased because the transmitter is not operating at its design center. The driver stage is working harder, the oscillator is working harder and the increased load will cause it to change frequency slightly. The modulation percentage drops to 70% and it was originally 95%, almost 3DB of modulation power is sacrificed for a 1DB gain in output power.

Whether tubes or transistors, the best transmitter adjustment is the one that produces the highest percentage modulation because it is the talking power that is going to get the job done at the receiver.

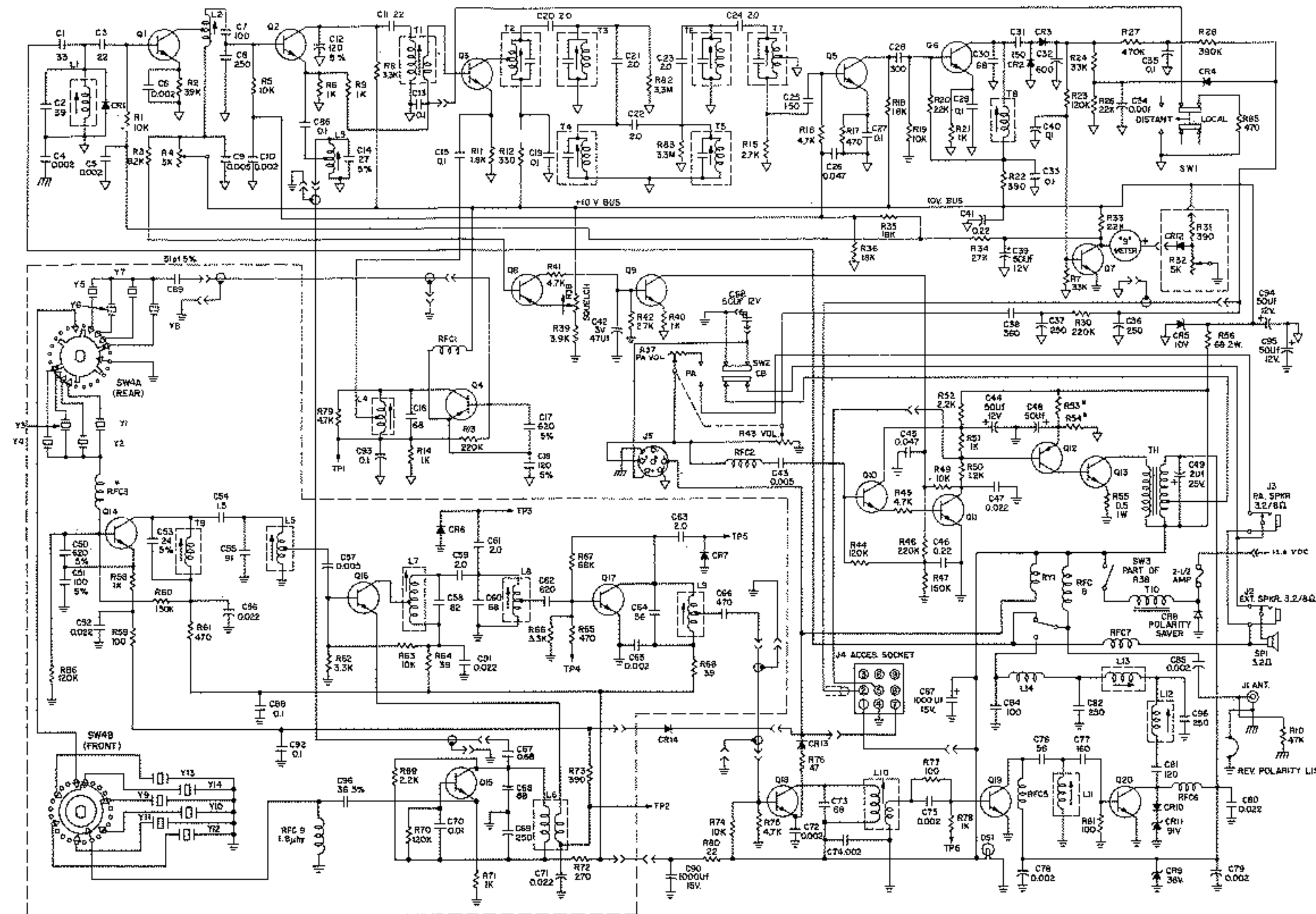
3. Another common fallacy is that antenna mismatch can be corrected by transmitter tuning. This would be partly true if the antenna were mounted at the transmitter with no feed line. If an antenna with a 2:1 VSWR (50 ohm reference) is connected to a 50 ohm cable and the transmitter end of the cable has a tuning device to make it look flat, the VSWR in the cable is still 2:1 and the cable loss will be higher than normal. When the VSWR in the cable is 3.8:1 the cable loss will be twice normal and no amount of adjustment at the transmitter will reduce the loss. The correct approach is to have the matching device at the antenna end to make certain the feed cable sees 50 ohms. Now the only additional loss will be the small amount in the matching device.

If an antenna is properly matched either by adjusting its length and/or loading coils or by an auxiliary network at its base, the coaxial feed cable will be completely non-critical, i.e., it can be any length and its losses will be extremely low. It is not necessary nor even helpful to cut the feed line in 12-foot lengths as is commonly believed. Only the poorest antenna can be helped by feed line trimming.

The answer is simplicity, and simplicity means to use an antenna that is known to be close to 50 ohms with no nonsense. Antenna location also affects the

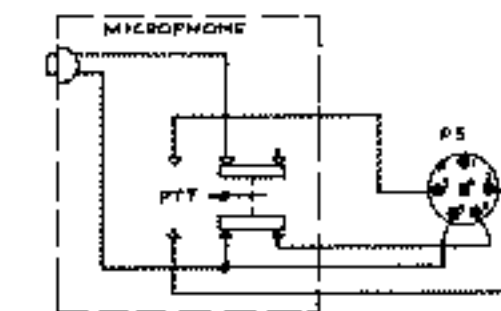
NOTES

impedance, particularly in mobile installations. Most transmitters designed today to meet the full FCC requirements have some type of additional network to filter out harmonic frequencies generated by the transmitter. This includes commercial, amateur, broadcast and CB. Some use a tunable series or parallel trap, some a double pi, and most higher priced types use a multiple section m-derived filter. For effective performance, this filter must work into a load of 35-75 ohms. The same is true of all filter types and this strengthens the argument that an antenna should be made to look like the correct load for the transmitter rather than tuning the transmitter to correct for antenna deficiencies.



- NOTES:
1. $\perp$ DENOTES AUDIO, SYNTHESIZER AND XMITT GROUND.
 2. ∇ DENOTES RCVR GROUND.
 3. CH DENOTES CHASSIS GROUND.
 4. DECIMAL CAPACITOR VALUES OF UFD. ALL OTHERS IN PF UNLESS OTHERWISE SPECIFIED. ALL RESISTOR VALUES IN OHMS.
 5. SW4 SHOWN IN CHANNEL 23 POSITION.
 6. * SELECTED VALUES, SEE SERVICE INFO.
 7. AREA ENCLOSED IN DASHED LINES ARE COMPONENTS LOCATED ON FREQUENCY SYNTHESIZER P.C. BOARD.
 8. FREQUENCY SYNTHESIZER CRYSTAL FREQUENCIES ARE AS FOLLOWS:

Y1-8.008 MHz	Y8-8.421 MHz
Y2-7.996 MHz	Y9-34.971 MHz
Y3-7.986 MHz	Y10-35.021 MHz
Y4-7.966 MHz	Y11-35.071 MHz
Y5-8.451 MHz	Y12-35.121 MHz
Y6-8.451 MHz	Y13-35.171 MHz
Y7-8.441 MHz	Y14-35.221 MHz



SCHEMATIC DIAGRAM MODEL EAGLE II
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H-0031