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in order to simulate a ground plane. On shallow draft or open top boats, a "clip-on" antenna may be conveniently used or a mobile antenna may be installed on the inside of the boat as close to the unit as possible and a ground plate fastened on the outside of the craft below the water line.

In any case and particularly where truck bodies are involved, the antenna should be mounted as high as possible consistent with overhead obstruction normally encountered and should not be closely parallel to vertical metal portions of the craft or vehicle.

For best coverage the full 109" whip is recommended. Frequently the antenna base is mounted on a gas cap cover and backup light plates in order to preserve the trade-in value of the car. Replaceable bumper guards may also be used.

(a) UNIVERSAL ANTENNA MOUNT

Use the template supplied with the antenna and drill the appropriate holes and mount accordingly. To provide a firm ground for the antenna shield, scrape clean the area around the hole where the grounding ring will bear against the metal body. Be sure to plan the hole locations so that the antenna spring may be swivelled to vertically position the whip.

Screw the whip into the antenna.

(b) ANTENNA CLIP

An antenna clip is supplied with each full length antenna mount to hold down the antenna when the vehicle is to be driven into a garage or under a low overhead obstruction. The clip is designed to be attached to the rain gutter or equivalent over the front door of the vehicle.

After the antenna has been installed in the antenna spring and mount, pull it down to a point just over the front door. Locate the clip so that the antenna will fit under the top band of the clip with the end ball just forward of it. Check to be sure that the door will open with the antenna held in position.

(c) ANTENNA CABLE

For best results on land or water, the RG58/U 50 ohm coaxial transmission line should be 11 ft. 9 inches, or 23 ft. 6 inches in length. Lengths other than multiples of 11 ft. 9 inches can be used, but may result in a slight sacrifice in performance.

If the antenna is located within 18 inches of the unit, the transmission line may be omitted and stranded #16 gauge insulated lead may be connected between the center terminal on the antenna base and the center pin of the coax connector. In such instances, the case of the Courier Traveller connects directly via heavy braid, to the nearest good vehicular ground in the case of a car. On boats the case is to be connected directly to a fair size ground plate fastened to the outside of the boat below the water line.

When using the transmission line prepare as follows:

1. Wire the UHF connector to one end of the transmission line coaxial cable.
2. Snake the free end of the cable through whatever holes, compartments, etc., are required in order to reach the antenna base.
3. Remove 2 inches of the vinylite jacket and 1/4 inch of the braid shield and inner conductor insulation. Tin the center conductor and solder to the lug supplied with the antenna mount.
4. Loosen the shield braid from the dielectric and slide it back toward the vinylite jacket.
5. Separate the individual strands of the shield with a pick or other pointed instrument and gather them to one side of the cable so that a pigtail may be formed and soldered directly to the ground lug on the antenna mount.
6. Place the center conductor terminal lug over the center stud of the antenna mount. Tighten the nut to hold the lug securely.

After connecting the transmission line to the antenna mount, wind any excess line into a neat coil not less than 8 inches in diameter. Connect the line to the Courier Traveller and dress the cable safely out of the way of tools, luggage and people.

When the Courier Traveller is intended for use with a base station antenna that requires a coaxial cable length of 50 feet or more, it is recommended that type RG8-U cable be used. For short run type RG58-U is adequate.

(d) ANTENNA MATCHING

Your Courier Traveller may be connected to any 50 or 70 ohm base, mobile, or marine antenna without the necessity of making

any adjustments within the unit, provided the antenna load is between 35 and 100 ohm. Should a VSWR meter used between the antenna and the Courier Traveller indicate the presence of a high standing wave ratio, the trouble will most likely lie in the antenna. It is impossible to make an adjustment within the Traveller to compensate for a mismatch in the antenna.

5. NOISE SUPPRESSION

A normally operating Courier Traveller will produce a rushing sound when unscelched. This shot-noise is a result of random electron bombardment of the elements within the transistors in the front end of the receiver. The high gain of the unit amplifies this noise, thus yielding the characteristic rush associated with all good receivers. As long as the Radio Frequency Amplifier stage amplifies the received signal enough to overcome this noise, then the sensitivity of the unit will be better than .5 uv for 10 db S/N.

The shot noise also serves as a reference level for the automatic gain control, squelch circuit and the noise limiter. Without this necessary shot noise, the remarkable Courier Traveller specifications would not be possible.

A unit with low gain and no noise would yield psychologically pleasant operating conditions, but would be poor in range, AGC squelch and ANL operation.

At the present state of the art, it is impossible to produce a .5 uv receiver with good-overall performance without the presence of shot noise on weak signals. Therefore, this noise is intentional and beneficial and should not be confused with the noise picked up by the antenna system which can usually be minimized if not eliminated.

The Priva-Call accessory unit is intended to eliminate the annoying squelch openings that might otherwise occur during heavy traffic jams, diathermy reception, skip conditions and continual channel use in highly populated areas.

Many present day vehicles are factory equipped with resistor type spark plugs or resistance high tension leads which minimize the need for additional noise suppression components.

After the Courier Traveller has been placed in operation and tested, the installation should be analyzed for noise pickup. This check should be made while receiving a very weak signal so that normal receiver noise is reduced to a very low value, but not quite eliminated. If any ignition noise is present, it will then be noticed as a "popping" effect against the receiver noise in the background. If the noise is present and is originating in the ignition or generating system, it would disappear

when the engine is turned off. If this is the case, any one or combination of the following remedies should provide a cure. Apply singly to discover which is causing the trouble, although all may be necessary in stubborn cases.

(a) Remove the center high tension lead from the distributor and plug a carbon distributor suppressor (available at local auto accessory stores) into the distributor. Insert the high tension wire into the suppressor. (In some cases, it may be necessary to install suppressors at each of the spark plugs.)

(b) Frequently, a severe source of interference is the generator which produces a whining and frying sound. Usually such noise will cause the receiver to awaken when the engine speed is increased and can frequently be reduced by connecting a .5 uf 50 to 200 volt capacitor from generator output (armature) terminal to ground. Do not connect to generator field terminal. Such a capacitor can be obtained from any auto store or from your auto dealer. (Sprague 48P18 or equiv.)

Generator noise may make it appear that the squelch circuit is defective when actually a generator filter coil is required. If a commercial generator filter * is unavailable, such a filter can be easily made by close winding 9 turns of #14 enamel wire on a 1" diameter form. Strip, tin and form each end into a closed loop. Remove all leads from the armature terminal (large bolt) on the generator and connect one end firmly to this terminal. Use a nut, bolt, 2 flat washers and a lock washer of appropriate size to fasten together all remaining loose ends plus the end of the .5 uf generator capacitor. Position the self-supporting coil in the clear and parallel to the generator.

(c) Connect another capacitor to the hot side of the ammeter, the ignition switch, or the ignition coil. Further ignition noise problems may require bonding as follows:

- Hood to the firewall or install grounding wipers around the hood periphery.
- Tailpipe to the body (not the chassis) at the rear of vehicle.
- Some or all of the metallic cable jackets between the engine and drivers' compartment. Do this at the engine side of the firewall.

- Other noise sources and their remedies are as follows:

Voltage regulator noise - connect a .01 uf ceramic disc capacitor in series with a 100 ohm, 1 watt composition resistor between the field terminal and ground. Install these components inside the regulator cover if possible.

*Morrow type GC-10
Cesco Model 330

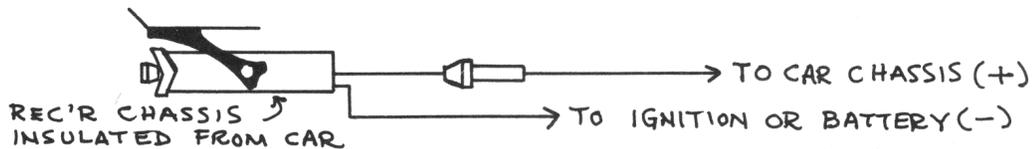
Bartlett RH/D etc.

Tire static - use an inner-tube powder as recommended by the individual car manufacturer.

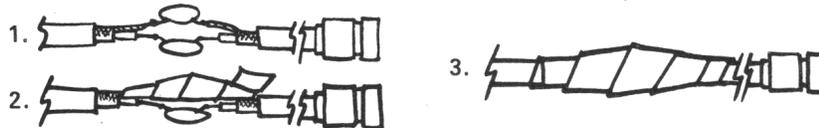
Electrically controlled gauge noise (gas, oil temperature, etc. - cut the leads as close to the actuating element as possible and install a Sprague Type.48P18 bypass capacitor. Be sure the capacitor case is well bonded to the body or engine block of the car.

6. INSTALLATION IN POSITIVE GROUND VEHICLES

(a) The Traveller II is designed to operate in negative ground systems. The cabinet is commonly connected to all B minus potentials in the transceiver. Therefore, in order to operate correctly, the potential of the chassis must always be 12 volts lower than the potential of the fused dc supply line. In order to accomplish this (in a Positive Ground electrical system), the radio's chassis must be isolated, at all times, from the automobile's chassis.



(b) Obtain a pair of .01 mfd. @ 500V ceramic disc capacitors (such as Courier #CC-5). Cut the antenna coaxial cable approximately 3 inches from the male connector (PL-259). Connect one of the .01 capacitors in line with the center copper wire of the coax and solder to both wires. Tape your connections. Add the second .01 capacitor in line with the shielded wires of the coax and solder. You now tape the entire exposed braid and capacitor to insulate. These capacitors, in line with each conductor, isolate the antenna ground from the set ground.

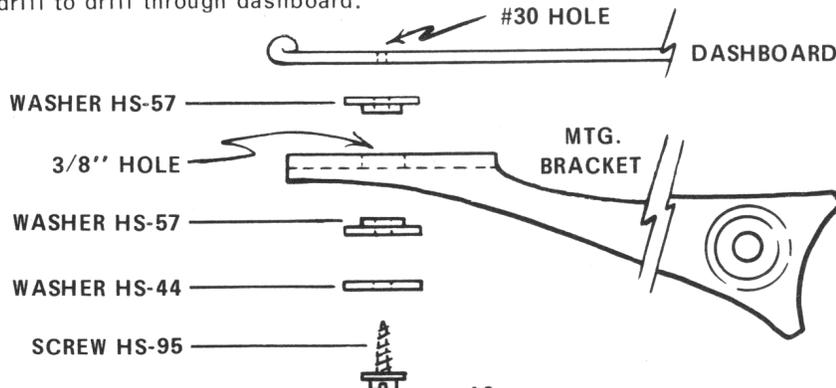


(c) Obtain 6 insulated extruded washers (General Cement 6528M) or (Courier #HS-57).

(d) Obtain 3 flat washers #6 x .144 x .437 (Courier #HS-44).

(e) Obtain 3 slotted head #8 x 1/2" length Type A self tapping washer head screws. (Courier #HS-95).

(f) Secure mounting bracket to dashboard as shown. Use #30 drill to drill through dashboard.



B. OPERATING YOUR COURIER TRAVELLER AS A PORTABLE UNIT

The Courier Traveller, used in conjunction with items supplied in the Port-a-Pak accessory kit, may be operated as a self-contained 23 channel transceiver. Refer to instructions supplied with the Port-A-Pak for installation and operation.

C. OPERATION OF YOUR COURIER TRAVELLER AS A BASE STATION

The Courier Traveller, in conjunction with power charger model PS1 or Charg -A-Pak model CP1, incorporating the Port-A-Pak accessory kit described above may be used as a base station operating from the 117 VAC mains. The Courier Traveller may be operated on a desk or shelf or out in the open using extension cords. Do not connect to a DC power main.

1. OPERATING REQUIREMENT

Upon receipt of valid citizens band station license, the licensee must post the license at the main control (fixed) station location, then fill out and attach a 452C transmitter identification card to each mobile unit (as described previously).

If only mobile or craft operated units are to be used, a photocopy of the original license (plus the 452C ID card) can be carried in the "master" station. The original must be retained at the location so stated on the ID cards.

It is best for technical as well as personal reasons, to abide by the FCC request for SHORT TRANSMISSION. Learn to say a lot with a little and everyone concerned will be grateful. The maximum legal channel use time is 5 minutes per contact and at least 2 minutes off time.

Once the station or system is licensed anyone may speak over it and use it for any purpose not contrary to FCC rules and regulations Part 95, provided the station or system is under control and supervision of the licensee.

When a licensed system contains several cars, boats or planes, etc., it is common to designate the control station by the assigned call letters and arbitrarily assign numbers or names of each unit. It is not necessary to give the call letters every single time, actually it is more feasible to give the calls upon establishing initial contact and then occasionally thereafter.

It is customary, however, to announce that the station is entering or leaving radio service. Most dispatchers will find it advantageous to arrange some signalling system as the "10-code".

D. OPERATING PROCEDURE

1. RECEIVER OPERATING

After completing the installation in accordance with previous instructions, your Courier Traveller is now ready to operate.

- a. Connect the properly matched antenna to the antenna connector.
- b. Ascertain that the primary power system is in readiness, either:
 1. Ignition switch turned on, or;
 2. Power Charger PS-1 plugged in and turned on, or;
 3. Charg -a-Pak CP-1 plugged in and turned on.
- c. Rotate the volume control "V" clockwise until a slight click is heard, at which time the pilot lamp behind the channel selector knob should become lighted.
- d. Rotate the squelch control "S" clockwise until the characteristic shot noise (rushing sound) is heard. The squelch circuit is an electric switch which electrically awakens the audio/speaker systems during the reception of signals. The squelch circuit serves to silence the receiver during the absence of signal thus eliminating the annoying internally generated shot noise and the externally received man-made noise. It is advisable to operate the squelch control at the "threshold" point for the most sensitive awakening. The further CCW the squelch control is rotated, the stronger the incoming signal must be to awaken the receiver.
- e. Adjust the volume control to comfortable listening level.
- f. During the absence of a signal, rotate the squelch control counterclockwise until the receiver just silences.
- g. Select the desired channel by rotating the channel selector in either direction. Note: the PA position between channels 22 and 23 is inactive for transmit purposes.
- h. The "S" meter, during receive, indicates the strength of the incoming signal. During transmit the "S" meter reads *rel. xmtr RF output*.

OPERATING THE TRANSMITTER

Prior to pressing the microphone button the following must be done:

- a. A valid Class D citizens band equipment license shall be posted at the main control (fixed) station location.
- b. A properly filled out and SIGNED mobile identification card, 452C, must be affixed to the unit.

c. Rules Part 95 must be obtained, read, and understood. In obtaining a license, the applicant swears to do so.

In order to place the transmitter on the air, proceed as follows:

- a. Follow the instructions pertaining to the receiver.
- b. Select the desired channel.
- c. Monitor the desired channel to avoid interruptions.
- d. When the channel is cleared, depress the microphone button and speak into the microphone. When speaking, the microphone should be held at a 45° angle in the corner of the mouth. When speaking into the microphone, avoid shouting; best results will be obtained by speaking clearly and projecting the voice forward.
- e. Whenever the microphone button is depressed, the red carrier indicator lamp should become lighted, signifying the transmission of a carrier. While speaking, the brilliance of the lamp should increase as the talk power (modulation) is impressed upon the carrier. When the transmitter is placed on the air, the receiver is automatically silenced. Reception is impossible while transmitting and likewise your signal cannot be heard by another receiver while they are transmitting. Each must take turns.

The internal circuitry of the Traveller is so arranged that 100% modulation of the carrier is achieved when the operator speaks in a normal voice as directed above.

ACCESSORIES

1. PRIVA-CALL (EE 2) - A selective call adapter which allows only your calls to come through your unit.
2. PORT-A-PACK (PP 1) - Converts your unit to portable operation.
3. CHARG-A-PAK (CP 1) - Charger for the Port-a-pak.
4. AC POWER CHARGER (PS 1) - Allows you to operate your unit on AC power line. Also will charge portable battery.

SERVICING

Your Courier Traveller is supplied completely aligned, adjusted, and tested and is warranted for one year. Should a failure or tampering result in the need for servicing, the Courier Traveller should be serviced by a competent Warranty Station.

WARNING

RULES PART 95 REQUIRES THAT THE TRANSMITTER SECTION BE ADJUSTED OR SERVICED BY, OR UNDER THE IMMEDIATE SUPERVISION OF, A SERVICE TECHNICIAN WHO POSSESSES A VALID 1ST OR 2ND CLASS RADIO TELEPHONE OPERATOR'S LICENSE.

RULES PART 95 REQUIRES THAT CRYSTALS OR COMPONENTS IN THE TRANSMITTER SECTION BE REPLACED BY, OR UNDER THE IMMEDIATE SUPERVISION, OF A SERVICE TECHNICIAN WHO POSSESSES A VALID 1ST OR 2ND CLASS RADIO TELEPHONE OPERATOR'S LICENSE.

TVI

The double π output circuit in the Traveller transmitter serves to attenuate all spurious and harmonic signals to a value well below the FCC prescribed minimum. Should the Courier Traveller be received on nearby television, radio or other electronic devices, chances are that

the fault lies at the receiver and can be cured by the addition of a high-pass filter to the unit picking up the signal. In any event, a duly licensed citizens band station is not required to suspend, curtail, or in any way abstain from operating a normally functioning Courier Traveller unless so ordered to do so by the FCC. In all cases of interference, courteous cooperation usually results in a happy compromise.

MAINTENANCE

A. REMOVAL OF UNIT FROM ITS CASE:

1. Remove the screws in the rear.
2. Tilt the case slightly and slide the unit out of the case.

B. ALIGNMENT

The Courier Traveller is supplied aligned and should not require alignment in the field. Transistors and parts may be replaced with the exception of tuned circuits without having to realign the Traveller. Sensitivity measurements to locate a weak or defective transistor or component, as well as the level of the signal generator connected to the base of each transistor required to yield the required output voltage at the AGC test point is indicated next to the base symbol of each transistor and Note #9 shown on schematic LI-159.

The use of Heathkit or Eico generators, etc. will yield widely varying values. Such generators may be used if individual levels are first established by measuring a normal unit.

Generator output is 50 ohm with a 6 db pad inserted. Levels listed are open-circuit values measured after the pad. Signals may be supplied by Measurements Model 65B terminated with Boonton Radio Model 505B pad or may be supplied by Hewlett-Packard Model 605 with measurements Model 80ZH3 pad.

DETAILED RECEIVER ALIGNMENT

Should it become necessary to align the receiver, place the receiver in operating position as outlined in the receiver operation section after removing the unit from its case as outlined in the maintenance section. Connect a VTVM to the AGC bus pad. The

bus pad and all future test points can be located by referring to the phantom pictorial appearing with the schematic LI-39. The phantom depicts all parts and circuitry simultaneously as would be seen from the top of the unit if the bottom was transparent.

When viewing the board from the bottom, it will be seen that the etched number represents the base of each individual transistor. The normal operating voltage of each element can be found on the schematic.

455 KHz IF ALIGNMENT

If the receiver is working and it is desired simply to touch up the 455 KHz, this may be accomplished in two ways:

1. While receiving a weak signal on the air around S-4 in signal strength, adjust A5 and A6 for maximum reading on the VTVM set to the -1.5v scale, or:

2. Connect the output of the 455 KHz signal generator in accordance with Note #9 on the schematic to the base of Q3. Set the output of the signal generator to approximately 800 uv and adjust A5 and A6 for maximum reading on the VTVM set to the -1.5v scale.

10.6 MHz IF ALIGNMENT

Similarly, while receiving a weak signal as previously described, adjust A3 and A4 for maximum deflection of the VTVM or connect the output of the signal generator tuned to 10.625 MHz, set to 50 uv, and with the channel selector switch set to the channel 2 position, adjust A3 and A4 for maximum deflection of the VTVM.

MASTER OSCILLATOR Q6

The master oscillator Q6 runs continuously and is used both to transmit and receive. This oscillator operates between 37.60 and 37.85 MHz as shown by the channel selector. A normally functioning oscillator will develop +.1 to +.4 base volts at Q6. An abnormally high positive base voltage would indicate a non-oscillating condition. Difference in individual crystal activity will cause a variance in the measured base voltage from crystal to crystal.

These crystals are of the 3rd mode overtone type and are ground to a tolerance of +.003%. The frequency of an overtone crystal is determined by the crystal manufacturer and is usually difficult to change by padding and attempts to do so are definitely not recommended.

The local oscillator is tuned by adjusting L1 for minimum base voltage with the channel selector switch set to channel 23, then back off from peak in a counter clockwise direction (unscrew) for a rise of approximately 15% in the base voltage reading. A defective crystal will show up as an abnormally high base voltage reading in four consecutive channel positions.

CRYSTAL SYNTHESIS

The Courier Traveller II is supplied with 14 crystals which when combined in groups of two produce 23 crystal controlled carriers for transmitting and 23 crystal controlled injection voltages for receiving. These 14 crystals are mounted in individual sockets and can be found on the pictorial. The schematic shows the actual operating frequency required to produce the desired channels. The chart below can be used to identify a defective crystal if the need should ever arise. Examination of the circuitry will indicate that every crystal is responsible for four channels. Each 37 MHz crystal controls four adjacent channels, whereas each 10 MHz crystal controls every fourth channel. The crystal frequency at the top of each column and the crystal frequency at the left of that column, are the two crystals which determine that channel. For example, channel 6 transmit is determined by the 10.625 and 37.65 crystal.

TRANSMIT

	37.60	37.65	37.70	37.75	37.80	37.85
10.635	1	5	9	13	17	21
10.625	2	6	10	14	18	22
10.615	3	7	11	15	19	-
10.595	4	8	12	16	20	23

RECEIVE

	37.60	37.65	37.70	37.75	37.80	37.85
10.180	1	5	9	13	17	21
10.170	2	6	10	14	18	22
10.160	3	7	11	15	19	-
10.140	4	8	12	16	20	23

RECEIVER FRONT END ALIGNMENT

After it has been ascertained that all oscillators are functioning normally, connect the output of a Model 80 signal generator to the antenna connector, J1, via a 6 db pad. Use RG58/U or equivalent 51 ohm cable. Set the channel selector switch to channel 11. Set the attenuator to approximately 50 uv and search around 27.085 MHz until the signal is found. Tune in the signal and adjust the attenuator to yield an AGC level between -1 and -2 volts.

Adjust A13, A14 and A15 for maximum AGC, decreasing the output of the generator as required. Retouch A3, A4 and A5 for maximum AGC reading. At this point, the receiver should be completely aligned. The performance of the receiver can be measured by connecting an AC db meter across the loudspeaker and with the channel 11 signal modulated 30% at 1 KHz, adjust the volume control to obtain a convenient reference level on the db meter. Remove the modulation and observe the change in the db shown on the meter. A normally functioning receiver should produce a 6 db and change in output when the modulation is removed at a carrier signal strength of .5 uv.

If the receiver is working and it is desired to perform a "touch up alignment", a skilled technician may do so as follows; while receiving a signal over the air on channel 11, known to be accurately on frequency, that has a signal strength of approximately S-3, adjust A13, A14, A15, A3, A4, A5, and A6 for maximum AGC reading on the VTVM.

It should be noted that this alignment is given for a working unit. In the event that trouble is encountered, please refer to the service manual available from Courier Communications at a cost of \$1.00 plus 25¢ for postage and handling. This service manual outlines the trouble, cause, and cure for most malfunctions.

DETAILED TRANSMITTER ALIGNMENT

The detailed operation of the local oscillator has been described in the receiver alignment section.

When the microphone button is pressed, the keying line is grounded. During receive, this keying line should measure between +6 and +9 volts which when applied to the emitters of Q9, Q18, Q10, Q11 and Q19 causes these transistors to be cut off. When the emitters of Q9, Q18, Q10, Q11, and Q19 are grounded, the transmitter and microphone pre-amp are activated.

In order to align the transmitter, it will be necessary to press the microphone button and while observing the VTVM, set to the -1.5 v scale, adjust A8 and A9 for maximum reading on channel 14. Connect a 50 ohm watt meter to the antenna connector and while pressing the microphone button, adjust A10 and A11 for maximum reading on the watt meter. A normally functioning transmitter should produce a minimum of 3.0 watts output with a supply voltage of 12.6 VDC. The RF indicator light should become lighted at this time and should increase in brilliance and the watt meter should indicate an upward deflection when speaking into the microphone. A normally functioning transmitter should produce zero output on the blank position between channel 22 and 23.

If a watt meter is not available, an antenna known to be a good match may be substituted in which case A10 and A11 should be adjusted for maximum brilliance of the carrier indicator bulb. When on the air, tests are made into an antenna, these tests must be performed in accordance with the current Rules Part 95 procedure concerning duration, channel, and time.

MODULATION

While pressing the microphone button and holding the microphone at a 45° angle and speaking in a normal speaking voice, a Courier Traveller delivering 3 watts of power should be modulated 100% on peaks. Since the audio and modulation circuitry is fixed, it is impossible to increase the modulation gain. Adjusting the transmitter for power output in excess of 4 watts is illegal and can result in having the modulator incapable of producing 100% modulation.

TROUBLESHOOTING

In the event of trouble not covered herein, troubleshooting help may be obtained by writing to Courier Communications, Inc., 100 Hoffman Place, Hillside, N.J. 07205 to the attention of the Service Manager or calling prepaid -- 201-399-3400 person to person to the Courier Service Manager. Whether writing or calling, be prepared to state serial number, model number, schematic issue letter (A, B, C, etc.) and be prepared to give a complete list of symptoms.

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has the **ANSWERS** to your
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In either **BASE** or **FIELD** location
YOU CAN NOW CHECK:

- STANDING WAVE RATIO
 - RF POWER (TRUE) TO 50 WATTS!
 - MODULATION PERCENTAGE
 - MODULATION DISTORTION BY MONITOR
 - RELATIVE FIELD STRENGTH
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