

C.B. 4-WATT SOLID-STATE TRANSCEIVER

TRC-424



OWNER'S MANUAL

PLEASE READ BEFORE
USING THIS EQUIPMENT

REALISTIC[®]

CAT. NO.
21-1522

Your Realistic TRC-424 Citizens Band Transceiver is a quality piece of electronic equipment, skillfully constructed from the finest solid-state components.

It is loaded with state-of-the-art circuitry to give you a highly selective, sensitive receiver combined with an efficient 4-watt output transmitter. The circuitry is all solid-state, on rugged printed circuit board construction. 2 Field Effect Transistors, 28 Transistors, 1 Large Scale Integrated Circuit (LSI), plus 3 standard IC's, 28 Diodes and 1 Thermistor are used to insure optimum performance on both Receive and Transmit.

Your TRC-424 features an innovative PLL (Phase Lock Loop) frequency control system to generate the multiple frequencies necessary to operate the 40 channels authorized by FCC. This PLL circuit uses only three crystals which assures ultra-precise frequency control (as compared to conventional multi-crystal synthesized transceivers) and results in greater reliability.

FEATURES

- * Full 40 channel operation from an innovative "Phase Lock Loop" frequency system.
- * Two ceramic filters provide superior selectivity and freedom from adjacent channel interference.
- * Digital readout indicates channel selection in bright L.E.D. numerals.
- * Variable Squelch control eliminates background noise between calls.
- * Delta Tune zeros in on signals which are slightly off-frequency and reduces adjacent channel interference.
- * Blanker eliminates noise interference.
- * RF Gain control lets you adjust the sensitivity of the Receiver circuitry (good for avoiding overloading your Receiver with powerful, local signals).
- * RF/S Meter shows the relative strength of signals in Transmit and Receive modes.
- * Useful Public Address System for paging and announcements.
- * Detachable Low Impedance Dynamic Microphone for clear transmissions—easy to replace too.
- * A special jack lets you use an external speaker for remote monitoring.
- * Universal Mounting Bracket fits almost any type of vehicle or boat.
- * Coaxial type antenna connector.
- * Use with either negative or positive ground electrical systems.

For your own protection, we urge you to record the Serial Number of this unit in the space provided. You'll find the Serial Number on the back panel of the unit.

Serial number

F.C.C. LICENSE(U.S.A.)

Before transmitting with your Transceiver, you must have an FCC Class D Citizens Radio Service License. If you don't have a license yet, you can fill out the Temporary Permit Form 555-B for a temporary license. Also, fill out and mail in FCC Form 505 CB License Application to:

Federal Communications Commission
P.O. Box 1010
Gettysburg, Penn. 17326

You must also read and know Part 95 of the FCC Rules and Regulations; they apply to the operation of a Class D Citizens Band unit. We've provided a copy of this regulation (along with the forms noted above).

In addition, you must fill out Form 452-C and attach it to your Transceiver. This too has been provided.

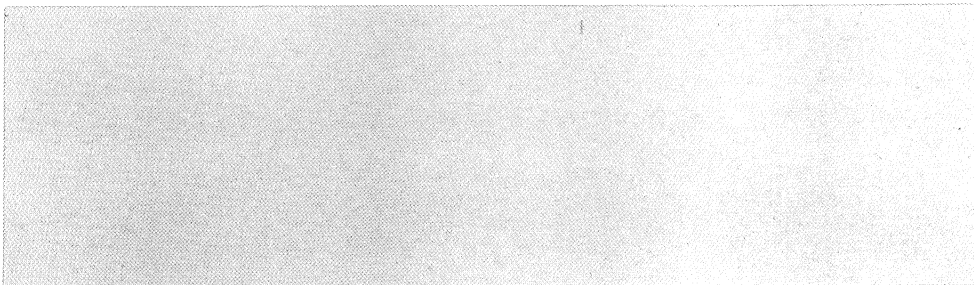
NOTE: Units manufactured for sale in the U.S.A. can not legally be used in Canada. Canadian models have been D.O.C. approved and carry a D.O.C. approval label with its approval number.

D.O.C. LICENSE(CANADA)

Before transmitting with your Transceiver, you must obtain a Department of Communications (D.O.C.) General Radio Service license. We've provided such an application form with your unit—complete the form and mail with the appropriate fee to the Radio Regulations Office nearest you.

D.O.C. Approved Number: _____

NOTE: Units manufactured for sale and use in Canada are not identical to units type-accepted by the FCC. Canadian models have been approved by D.O.C. and are to be used only in Canada.



SPECIFICATIONS

RECEIVER

Frequency Coverage:	All 40 channels 26.965 to 27.405 MHz
Sensitivity:	Better than 0.5 μ V for 10 dB S/N
Selectivity:	\pm 3 kHz at -6 dB
Adjacent Channel Rejection:	60 dB
Audio Distortion at 1000 Hz:	Less than 10% at 3.5 watts output
Spurious Response:	-65 dB
Spurious Signal Radiation:	Less than 5 μ V
I.F.:	9.785 MHz 455 kHz
Squelch:	Adjustable from 0.25 μ V to 2 mV

TRANSMITTER

Frequency Coverage:	All 40 channels 26.965 to 27.405 MHz
Power Output:	4 watts maximum
Modulation:	+90%, -100%
Spurious Signal Radiation:	60 dB down or better
Emission:	6A3
Frequency Tolerance:	0.002%
Antenna Impedance:	50 ohms
Power Requirements:	13.8 Volts, DC: 20 watts
Current Drain:	250-1700 mA (from no signal receive to full modulation on transmit)
Dimensions:	8-1/2"x6-5/8"x2-3/16" (21.5 cmx16.7 cmx5.5 cm) (HWD)
Weight:	3 lbs. 5 ozs. (1.5 kg)



CONTROLS AND THEIR FUNCTIONS

This short description of the function of each control and jack supplies background information for proper operation.

For actual Operating Instructions, refer to **USING YOUR TRANSCEIVER**.

VOLUME with On/Off switch turn clockwise to apply power to the unit and then adjust for the desired level of sound from the speaker.

SQUELCH sets the level of the internal Squelch circuitry to cut out the background noise when no signal is being received. When properly set, it allows signals to come through, but cuts off the receiver sound when no signal is being received, thus eliminating annoying background/atmospheric noise during standby and monitoring conditions.

If you set **SQUELCH** too "high" (rotate too far in clockwise direction), you may miss some of the weaker signals. Operating conditions will determine the best setting.

This control also permits you to cut out incoming CB calls while using PA function. To do so, rotate **SQUELCH** maximum counterclockwise till it clicks to CB OUT position.

RF GAIN varies the sensitivity of the RF amplifier stage of the Receiver circuitry. For normal operation, set **RF GAIN** to maximum and adjust **VOLUME** for a suitable listening level. Under high-signal conditions, you may want to turn **RF GAIN** down a little and raise **VOLUME** as required.

Channel Selector selects one of the 40 CB channels as indicated in the Channel Indicator window.

PA push-button in the "out" position (button out), your Transceiver operates in the normal manner. To use the Public Address function, press this button in. This disables the transmitter and lets you use the power amplifier circuitry as a 4–5 watt Public Address amplifier — but, you must have an external speaker connected to the PA SP jack on the back.

If you leave **SQUELCH** in the maximum counterclockwise position — **but not switched to CB OUT position** — you can continue to monitor CB signals on the channel you have selected. If you do not want this constant background noise, set **SQUELCH** to CB OUT position.

BLANKER push-button activates a "blanker type" automatic noise limiter circuit. When impulse-type noise is a problem, press **BLANKER** (button in); it will aid in reducing noise interference. When in the "out" position (button out) the noise blanker is out of the circuit.

DELTA TUNE functions as a "fine tuning" control. If you receive a signal that is not clear because it is "off-frequency", set to "+" or "-" as required to achieve best signal quality. It is also helpful to reduce adjacent channel interference caused by another station on an adjacent channel operating slightly off frequency. Use the position which in best signal and/or least adjacent channel interference.

Channel Indicator shows the selected channel in a large, easy-to-read 7-segment LED display.

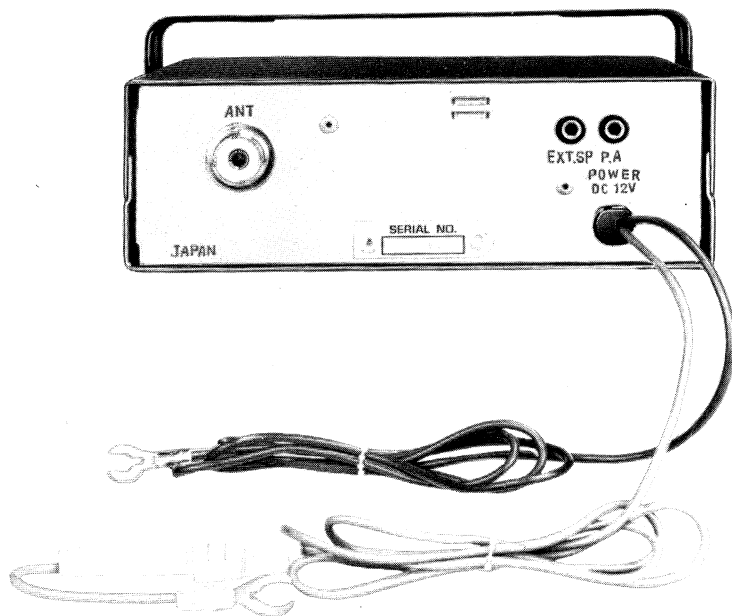
RF/S Meter When receiving, indicates the relative strength of the incoming signal on RX SIGNAL scale. When you transmit, it shows the relative RF power output from your transceiver (it is not a precisely calibrated wattmeter — it provides only a relative indication of RF output power).

A Modulation Indicator Lamp is built into the meter; as you talk into the Microphone, the meter will fluctuate in brilliant red as your talk power increases.

Universal Mounting Bracket is designed for easy installation in almost any situation — vehicle, boat or base station. It provides for quick removal if you want to relocate the unit, or remove for security.

Microphone this high-quality dynamic microphone must be connected to the jack on the side (be sure the plug is pressed firmly and securely into the jack). To Transmit, press the button on the microphone. To Receive, release the button.

When Transmitting (or using the PA function), hold the microphone at an angle, 2"(5 cm) or 3"(7.5 cm) from your mouth and speak clearly, in a normal voice.



Rear Panel

ANTenna Coax Connector connect your CB antenna to this (SO-239 type, accepts PL-259 connectors).

P.A. Speaker Jack to use the Public Address function, you must connect an external speaker to this jack. We recommend Radio Shack Catalog Number 40-1236, a weatherized PA speaker; to make the connection, use a miniature-type phone plug such as Catalog Number 274-288.

EXTernal SPeaker Jack if you want to use an external speaker in conjunction with the CB operation of your Transceiver, plug it into this jack. Use a standard 8 ohm type, either the PA type noted above or other high-quality communications-type. We suggest Radio Shack's 21-549. Use a standard miniature phone plug such as suggested above. When a plug is inserted into this jack, the built-in speaker is automatically disconnected.

Power Cable with In-Line Fuse connect these cables to a source of 12-16 volts DC. The Red wire with the in-line fuse must be connected to the + side and the Brown wire to the - side.

USING YOUR TRANSCEIVER

Do not Transmit without a suitable antenna or load connected to the ANTenna connector. For installation, refer to that section.

TO RECEIVE

1. Set **PA** push-button to the "out" position (button out).
2. Set **RF GAIN** control maximum clockwise.
3. Set **SQUELCH** control maximum counterclockwise.
4. Turn power "on" by rotating **VOLUME** clockwise.
5. Select the desired channel by rotating Channel Selector to the desired position as indicated in the Channel Indicator window.
6. Adjust **SQUELCH** to cut out annoying background noise when no signal is being received. To do this, set Channel Selector to a channel where no signals are present (or wait till signals cease on your channel). Then, rotate **SQUELCH** in a clockwise direction to the point where the background noise just stops. Now, when a signal is present, you will hear it, but will not be disturbed by noise on the channel in between signals.

When properly set, **SQUELCH** will keep the receiver "dead" until a signal comes in on that channel. Do not set **SQUELCH** too high, or weak signals will not be able to "open" the Squelch circuit. To receive weak signals, it is best to leave **SQUELCH** set to the minimum position (maximum counterclockwise).

7. Use **DELTA TUNE** to tune in slightly off-frequency stations, or to tune out adjacent channel interference caused by a station on the next channel (which may be too close to your channel). Use the switch position which results in best reception.
8. Adjust **VOLUME** for a suitable listening level.

TO TRANSMIT

1. Be sure the Microphone is firmly connected to the jack on the side.
2. Select the desired channel of operation.
3. Press the push-to-talk button on the Microphone and hold it at an angle 2"(5 cm) to 3"(7.5 cm) from your mouth and speak in a normal voice.
4. To Receive, release the push-to-talk button.



USING THE PUBLIC ADDRESS AMPLIFIER FEATURE

You can use your Transceiver to provide 4-5 watts of audio power as a Public Address Amplifier. To use this function, you must connect an 8 ohm public address type speaker to the PA jack on the rear of the unit. Radio Shack has a number of suitable PA type speakers.

1. Be sure an 8 ohm speaker is connected to the PA jack.
2. Set **SQUELCH** to any point except CB OUT position.
3. Press PA push-button (button in).
4. Rotate **VOLUME** in a clockwise direction to turn power "on".
5. Be sure the microphone is connected. Press the push-to-talk button on the microphone and talk into the microphone.
6. Adjust **VOLUME** as required.
7. Even though you have your Transceiver set for PA operation, CB signals can still be monitored. Since the Receiver is operating (when you are not using the PA amplifier), you will hear CB signals through the PA speaker.

This feature assures that you will not miss important calls even while using the PA function. If you don't want to hear the CB signals, set **SQUELCH** to CB OUT position.
8. To return to normal Transceiver operation, press PA push-button to release the function (button out).

INSTALLATION

Safety and convenience are the primary considerations for mounting any piece of mobile equipment. All controls must be readily available to the operator without interfering with the movements necessary for safe operation of the vehicle. Be sure all cables are clear of the brake, clutch and accelerator. Also, thought must be given to the convenience of passengers (will they have adequate leg room?).

Another extremely important requirement is the ease of installation and removal (for service and maintenance). Mount the transceiver so it can be slipped in and out very easily.

The most common mounting position for a transceiver is under the dashboard directly over the driveshaft hump. Do not mount the transceiver in the path of the heater or airconditioning air stream.

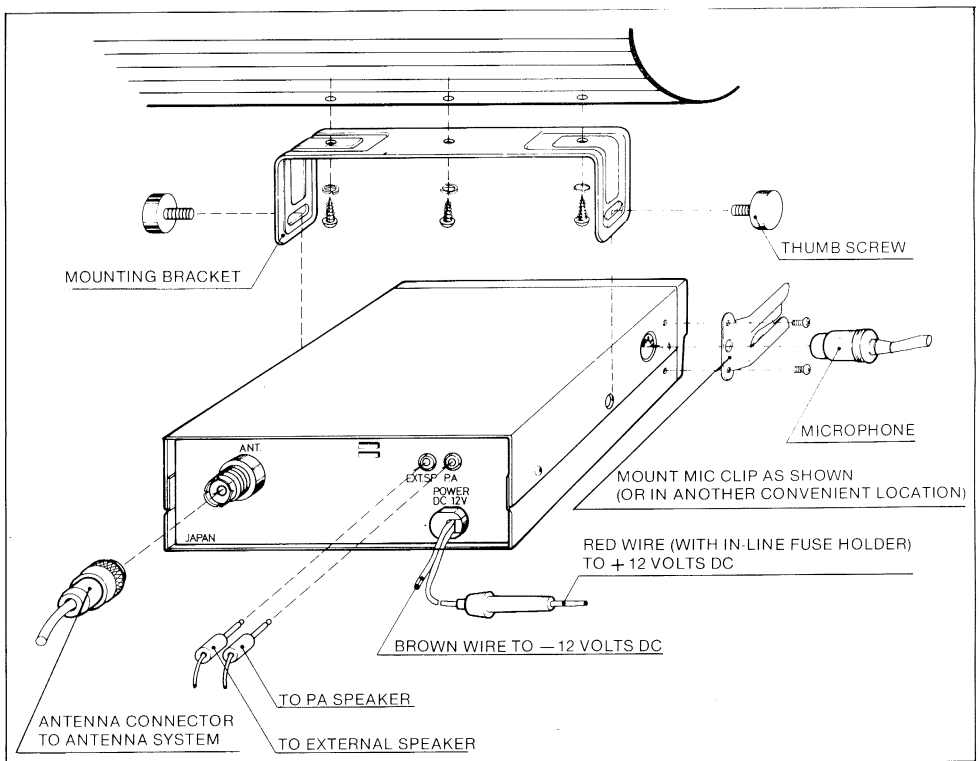
The TRC-424 is designed for use with either Negative or Positive Ground Electrical Systems.

Negative Ground Systems

Connect the red fused wire of the power cable to the positive (+) battery terminal (or to a fuse block or ignition switch or other convenient + connection point). The brown wire is negative and should be connected to the metal part of the vehicle body or (-) battery terminal.

Positive Ground Systems

Connect the red fused wire of the power cable to the positive terminal (+) of the battery (or to the metal part of the vehicle's body). The brown wire is negative and should be connected to the "hot" side of the ignition switch or directly to the negative terminal of the battery.



You can use an auto accessory plug (Radio Shack Catalog Number 274-331) to connect your transceiver to the vehicle's power source. However, it is better to connect the DC power cord directly to the accessory terminal of the ignition switch. This will prevent unauthorized usage of the transceiver, and will also prevent you from leaving the transceiver on unintentionally.

Connect the Antenna system to the ANTenna coax connector. If you are using an external speaker or PA speaker, connect them to the appropriate jacks.

ANTENNA SYSTEM

The antenna system includes the transmission line, and it is very important that you use the correct type of transmission line. The transmission line should be of the coaxial type and should have an impedance equal to the antenna impedance.

Since your Transceiver is designed to operate most efficiently into a 50 ohm load, it is best to use a type of coaxial cable with an impedance of 50 ohms. We suggest type RG-58/U for short lengths and RG-8/U for long lengths.

Generally speaking, you should keep the length of the transmission line to a minimum. Remember that transmission line losses increase with frequency. Use foam-insulation coax for best results.

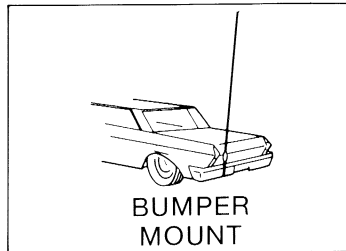
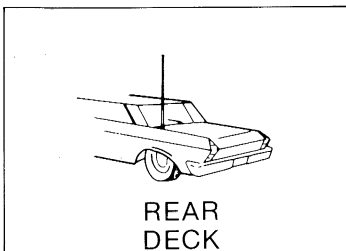
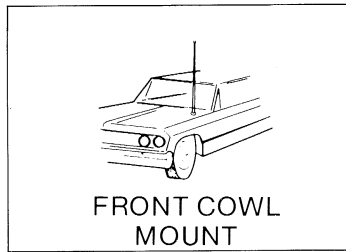
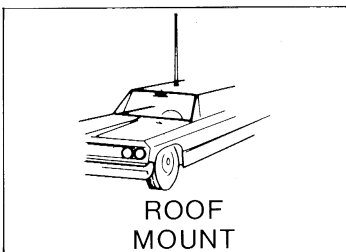
The above discussion is as important for reception as it is for transmission. If a mismatch exists between the antenna and the receiver, the excellent sensitivity and signal-to-noise ratio of the receiver circuitry will be defeated.

MOBILE ANTENNAS

There are two types of mobile CB antennas: a full-length whip or a loaded whip. Your local Radio Shack store has a complete line of both types and the salesman can help you choose the best antenna for your needs.

A vertically polarized whip antenna is best suited for mobile service. It is omni-directional and can be the loaded type or a full quarter-wave (quarter-wave being more efficient).

There are many possible antenna locations on a car. Four of the most popular are shown.



ROOF MOUNT — In this position the antenna radiates equally in all directions. Since the normal $\frac{1}{4}$ wavelength whip antenna is too long (102'' [2.6m]) for roof mounting on a vehicle, the antenna is shortened and a loading coil is utilized to provide the proper electrical length. Our Fiberglass Roof-Mount catalog number 21-925, is a good durable antenna.

FRONT COWL MOUNT — The radiation pattern is slightly greater in the direction of the rear fender opposite the side on which the antenna is mounted. However, this position offers a number of advantages. The CB antenna can be easily mounted. It can double as both the CB and the standard auto radio antenna by employing a two-way coupler. Ask about our catalog number 21-930 Front Cowl Mount antenna which is designed for CB, AM and FM operation.

REAR DECK — The radiation pattern is strongest in the direction of the front fender opposite the side on which the antenna is mounted. In this position you can use a full quarter-wave antenna or a shorter, loaded whip. Here you might consider Radio Shack's catalog number 21-926 or 21-908, or one of the full 102'' (2.6m) whips.

BUMPER MOUNT — The antenna radiates in a pattern directly in front of and to the rear of the vehicle, with maximum radiation directly away from the vehicle, in a horizontal plane. Despite its fairly irregular pattern, a bumper mounted full-length whip antenna will normally give the best results. Removing the antenna is simple and will leave no holes in the car. We suggest you try our bumper-mount fiberglass whip, catalog number 21-927.

A few general rules should help you install any mobile antenna properly.

1. Keep it as far as possible from the main bulk of the vehicle.
2. Keep as much of it as possible above the highest point of the vehicle or boat.
3. During operation, it must be vertical. Thus, it should be mechanically rigid so it will remain vertical when the vehicle or boat is in motion.
4. Mount it as far as possible from sources of noise (ignition system, gauges, etc.) and keep the transmission line away from these noise sources.

An antenna mounted in a boat requires a ground. This can be either a metal hull or a ground made of tin-foil or copper sheeting. This ground should cover an area of 12 square feet (1.1 m²) or more. Be sure the transceiver also has an adequate ground.

FIXED STATION ANTENNAS

The most popular fixed-station antenna is a complex colinear or ground plane.

Beam antennas provide maximum gain and maximum directivity. The directivity can be a disadvantage unless a rotor is used. Since a beam antenna is directional, it greatly reduces noise and interference from all other directions. This can be a decided advantage on the CB bands where man-made noise and interference from other CB signals is a problem.

Your Radio Shack store carries a complete line of base station CB antennas and accessories. For maximum efficiency, we strongly recommend using an SWR meter to aid in the proper matching of your antenna and Transceiver.

The antenna system should be adequately grounded.

Always use a static discharge unit on your antenna system.

HINTS

NOISE

Your vehicle or boat can be the cause of much noise interference. Since the receiver section of your transceiver is very sensitive, it will pick up even the smallest noise signals and amplify them. Any noise that you hear in the transceiver is almost totally from external sources. The receiver itself is exceptionally quiet. Steady high noise levels can not be totally eliminated by the internal Automatic Noise Limiter circuit (BLANKER). Noise problems can not be solved internally (in the transceiver); they must be solved at the source of the noise.

If you wonder if the noise is from your ignition system, the transceiver or an external source, try this simple test. Turn your ignition switch off and set it to ACC (accessories). This turns off the ignition, but supplies power to the transceiver. Most of the noise will disappear—indicating that the source of noise is your ignition system.

This interfering noise can be generated anywhere in the electrical system of the vehicle or boat. The first step in reducing or eliminating this noise is to locate the source of the noise.

IGNITION SYSTEM

The most common source of noise is the ignition system. This noise can be identified by the fact that it varies with the speed of the engine. It consists of a series of popping sounds occurring at a regular rate that will vary with the speed of the engine and stop when the ignition is turned off.

There are a number of things that can be done to reduce this type of noise:

1. Use only the "radio suppression type" high voltage ignition wire. Most new cars come already equipped with this type of wire.
2. Inspect the high voltage ignition wire and all connections made with this wire. Old ignition wire may develop leakage, resulting in hash.
3. If noise still persists, replace the spark plugs with spark plugs that have suppressor resistors built-in. Be sure to use the correct type for your vehicle.

Other sources of noise are: generator/alternator, regulator, gauges and static discharge. Most of these types of noise can be effectively reduced or eliminated by using bypass capacitors at the various output voltage points. We suggest you check your Radio Shack store for a wide selection of noise reduction accessories.

SERVICE AND MAINTENANCE

Your transceiver has been built in accordance with Radio Shack's exacting quality control standards. However, it should be treated with reasonable care accorded any electronic equipment. Avoid exposing it to severe shock, dirt or moisture.

If you run into problems with the unit, we recommend you check the following:

1. If trouble is experienced with receiving.
 - * Check VOLUME On/Off switch setting.
 - * Be sure SQUELCH is adjusted properly. Is it over-squelched?
 - * Check if the unit is switched to an operating channel.
2. If trouble is experienced with transmitting.
 - * Be sure the Microphone is firmly connected to the Microphone jack on the unit.
 - * Check if the transmission line is securely connected to ANTenna Coax Connector.
 - * Check if the antenna is fully extended for proper operation.
 - * Are all transmission line connections secure and free of corrosion?
 - * Make sure you are fully depressing the push-to-talk button on Microphone.
 - * Check PA push-button setting. It must be in "out" position.

3. If the transceiver is completely inoperative.

- * Check the power cable and fuse (2A).

If these checks don't solve the trouble, do NOT attempt repair or adjustments yourself. The unit should be serviced only by a qualified radio technician. Whenever possible, return the unit to the store from which it was purchased.

10-CODES

Citizen band radio operators have largely adopted the 10-code for standard questions and answers. Its use permits faster communication and better intelligibility in noisy areas. The following table lists some of the more common codes and their meanings.

Code	Meaning	Code	Meaning
10-1	Receiving poorly	10-10	Standing by
10-2	Receiving well	10-13	Advise road/weather conditions
10-3	Stop Transmitting	10-20	What is your location?
10-4	OK	10-33	Emergency traffic
10-7	Out of Service	10-36	Correct time
10-8	In service	10-41	Switch to Channel
10-9	Repeat	10-62	Cannot copy you

WARNING

Do not open up the Transceiver to make any internal adjustments.

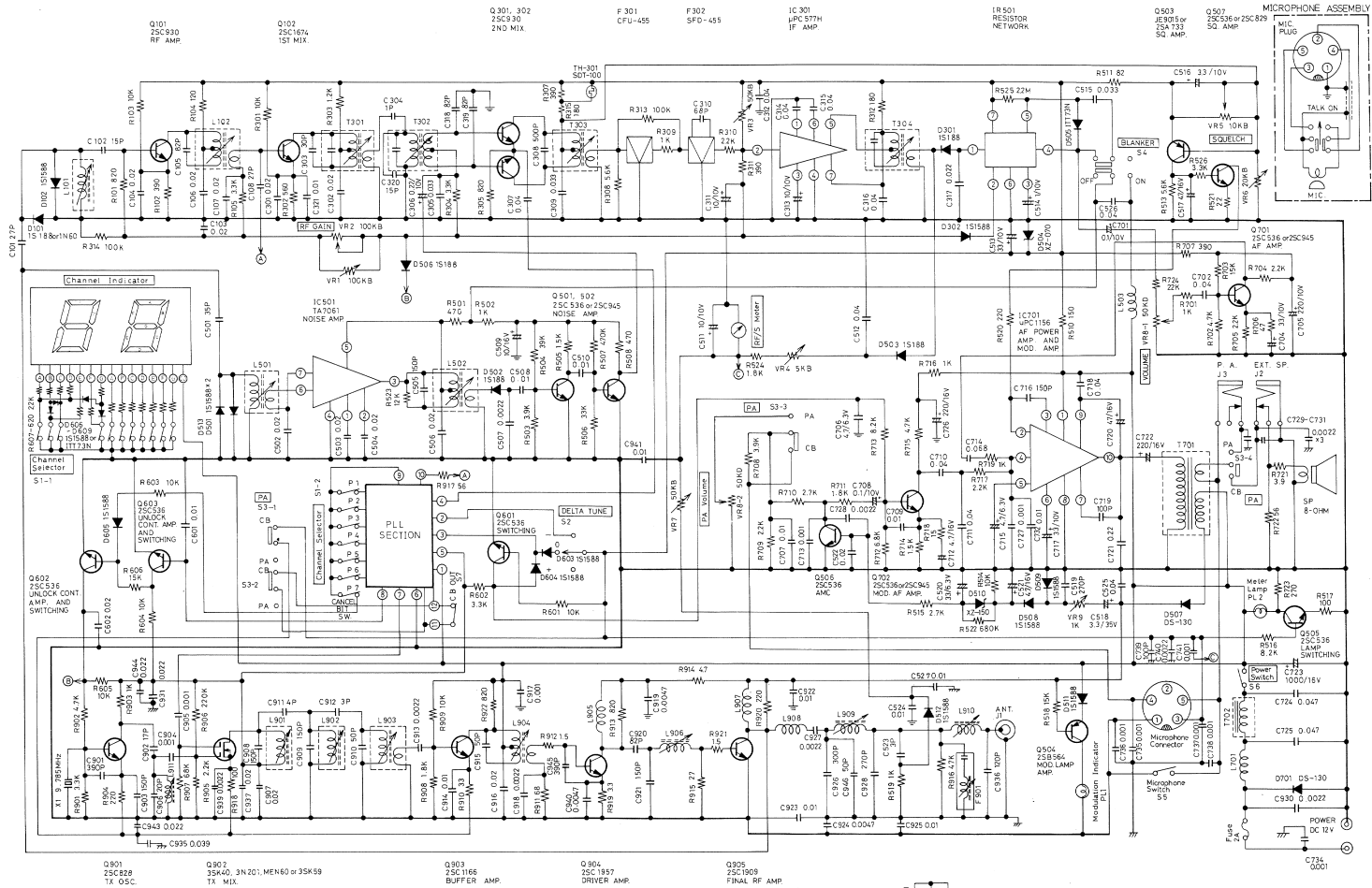
Any internal adjustments can be made only by (or under the direct supervision of) a person holding an FCC 1st or 2nd Class Radio Operator's License.

Internal adjustments and/or modifications can lead to illegal operation as defined by FCC Rules and Regulations, Part 95. Such illegal operation can lead to very serious consequences.

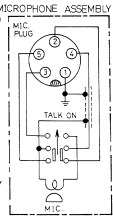
TO BE SAFE AND SURE:

1. You should never open up the case of your Transceiver.
2. Never change or replace anything in your Transceiver.

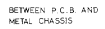
SCHEMATIC DIAGRAM



- Q301, 302 2SC330 2ND MIX.
- F301 CPU-455
- F302 5F0-455
- IC301 MP3.57H IF AMP
- R501 RESISTOR NETWORK
- Q501 2SC336 or 2SC845 SO. AMP
- Q507 2SC336 or 2SC845 SO. AMP
- Q901 2SC536 3N201; M6N60 or 35K59 TX MIX.
- Q902 2SC1166 BUFFER AMP.
- Q904 2SC1957 DRIVER AMP.
- Q225 25C1909 FINAL RF AMP

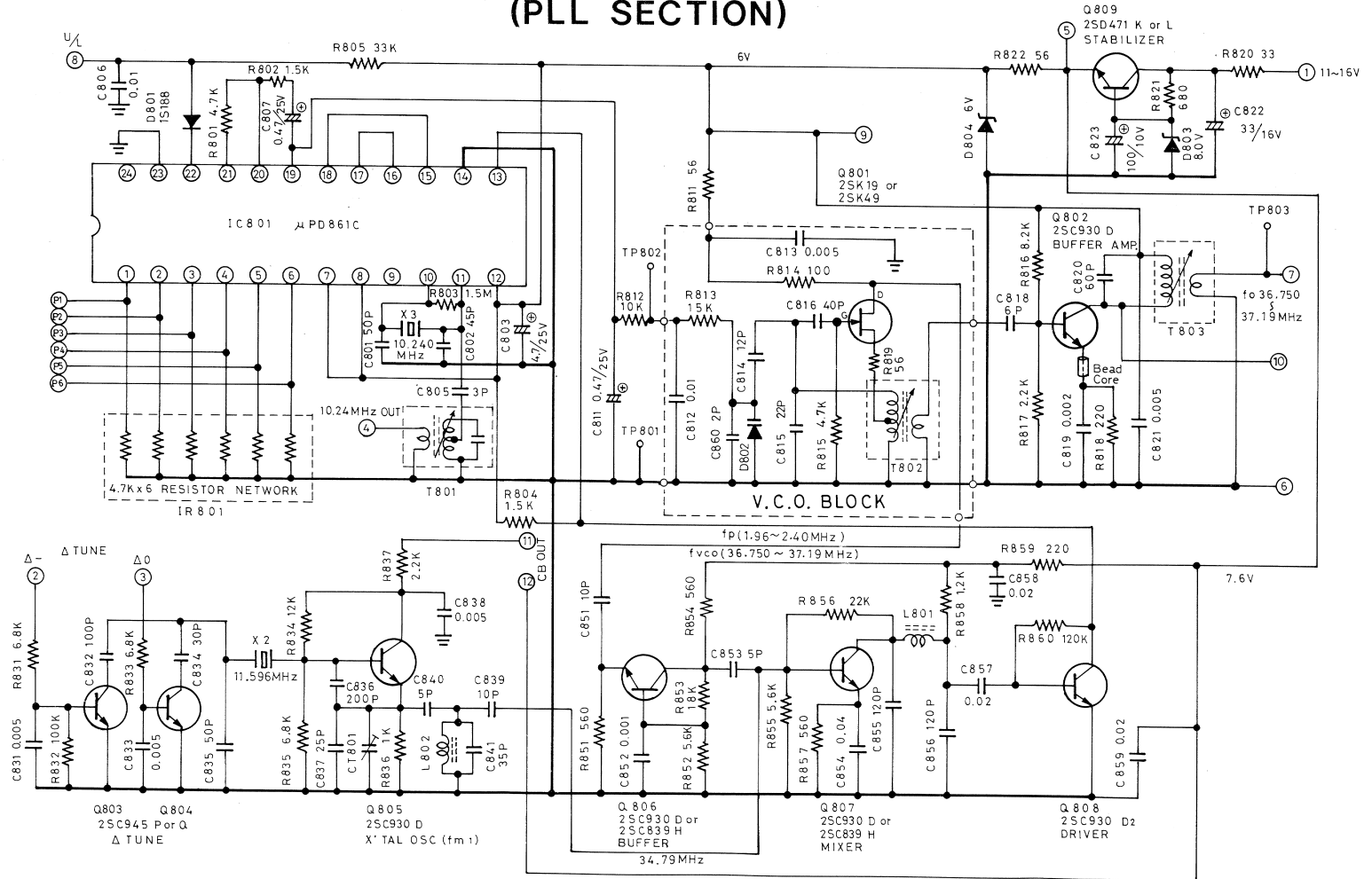


NOTES:
 1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED (K = 1,000 OHMS, M = 1,000 K OHMS).
 2. CAPACITANCE VALUES ARE SHOWN IN MICROFARADS UNLESS OTHERWISE NOTED (P = MICRO-MICROFARADS).
 3. ALL VALUES AND RATINGS ARE SUBJECT TO CHANGE FOR IMPROVEMENT WITHOUT NOTICE.



BETWEEN P.C.B. AND METAL CHASSIS

SCHEMATIC DIAGRAM (PLL SECTION)



RADIO SHACK LIMITED WARRANTY

This equipment is warranted against defects for 90 days from date of purchase. Within this period, we will repair it without charge for parts and labor. Simply **bring your sales slip** as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover equipment subjected to misuse or accidental damage.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

We Service What We Sell

RADIO SHACK  A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

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280-316 VICTORIA ROAD
RYDALMERE, N.S.W. 2116

BELGIUM
PARC INDUSTRIEL DE NANINNE
5140 NANINNE

U.K.
BILSTON ROAD
WEDNESBURY STAFFS WS10 7JN