OWNER'S MANUAL

21-1566

TRC-453

AM/SSB CB TRANSCEIVER

PLEASE READ BEFORE USING THIS EQUIPMENT

REALISTIC®*

Your REALISTIC TRC-453 is a compact 2-way AM/SSB Transceiver designed for the Citizen's Band radio service. Though small in size, it's big in performance!

The unit uses a frequency synthesizing circuit with digital phase lock loop techniques to provide crystal-controlled transmit and receive operation on all 40 CB channels. The PLL circuitry assures ultra-precise frequency control.

You can use your TRC-453 Transceiver on any one of the 40 channels in the conventional AM mode, plus the same 40 channels in either upper or lower single side band mode. This flexibility not only doubles the effective number of channels from 40 to 80, but SSB also increases the effective range of communication because all the power is concentrated in one sideband to provide 100% talk-power.

Single sideband reception also adds advantages in sensitivity and selectivity, plus lower signal-to-noise. This of course also contributes to an increase in operating range.

The TRC-453 has been carefully designed for ease of operation. You can select AM, upper sideband or lower sideband with the simple change of a three-position switch. Transmission is simple, too— just press the microphone button. Ordinarily an SSB signal will reach further and be heard more clearly than an equivalent AM signal. SSB reception is simple —merely adjust the CLARIFIER control to bring in the voice transmissions.

We've also added all the other most wanted features for optimum communications — RF GAIN control to prevent overloading due to strong signals, SQUELCH control to cut out unwanted noises, switchable NB/ANL to reduce noise interference, digital channel display, LED meter to indicate the relative RF output power and relative signal strength, external speaker jack and public address facility.

READ ME FIRST

Our repair centers receive many returned products which are actually working perfectly. Maybe the owner just didn't read the instructions, or overlooked something. Or perhaps the problem was a blown fuse that the owner could easily replace.

So read this manual carefully and be sure you understand all the basic features of this CB — and the special ones, too! And before you assume your Transceiver needs repair, refer to the Maintenance section of this manual, to see if the problem is something you can eliminate.

Enjoy your Realistic TRC-453!

For your personal record, 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 No.:

SPECIFICATIONS

GENERAL

Channels: 40 channels for AM, upper sideband and lower sideband, utilizing digital circuitry

Frequency Range: 26.965 MHz to 27.405 MHz

Frequency Control: Digital phase lock loop synthesizer

Frequency Accuracy: ±135 Hz

Operating Temperature Range: -4° F to +122° F

Power Requirements: 13.8V DC (12–16 volts DC, negative or positive ground)

Antenna: 52 ohm (coaxial connector)

Microphone: 600 ohm dynamic type

Speaker: 16 ohm, 3 watt

Dimensions: 6-1/16" x 2-3/64" x 7-15/32" (154mm x 52mm x 190mm)

Weight: 2.6 lbs (1.18 kg)

Accessories: DC cord with in-line fuse, microphone, microphone hanger and mounting bracket

RECEIVER

Max Sensitivity: AM 0.5μV, SSB 0.25μV

Sensitivity for 10 dB S/N: AM 0.5μV or better, SSB 0.25μV or better

AGC Figure of Merit 100 mV for 10 dB change in Audio Output: AM 90 dB, SSB 90 dB

Overload AGC Characteristics from 100 mV to 1000 mV: AM ±3 dB, SSB ±3 dB

Overall Audio Fidelity at 6 dB Down: 300 – 2100 Hz

Adjacent Channel Selectivity: AM 70 dB, SSB 70 dB

Image Rejection (5.6 MHz): Typically better than 90 dB

IF Rejection: 85 dB or better

Maximum Audio Output Power: 4 watts

Squelch Range: Adjustable from 0.5 μV to 1 mV

Battery Drain at no signal: 500 mA

Battery Drain at Max. Output Power: 1.5A

Receiver Clarifier Range: ±1.25 kHz variable

TRANSMITTER

Max. Output Power: AM 4 watts, SSB 12 watts

Spurious Emission: -65 dB or better

Battery Drain: At no modulation – AM/ Less than 3.0 A SSB/Less than 1.0A
At max. output power – AM/Less than 3.0A SSB/Less than 3.0A

Modulation Frequency Response (1 kHz, 0 dB reference: Lower, at 450 Hz, EIA – AM -6 dB, SSB -6 dB,
Upper, at 2.5 kHz, EIA – AM -6 dB, SSB -6 dB

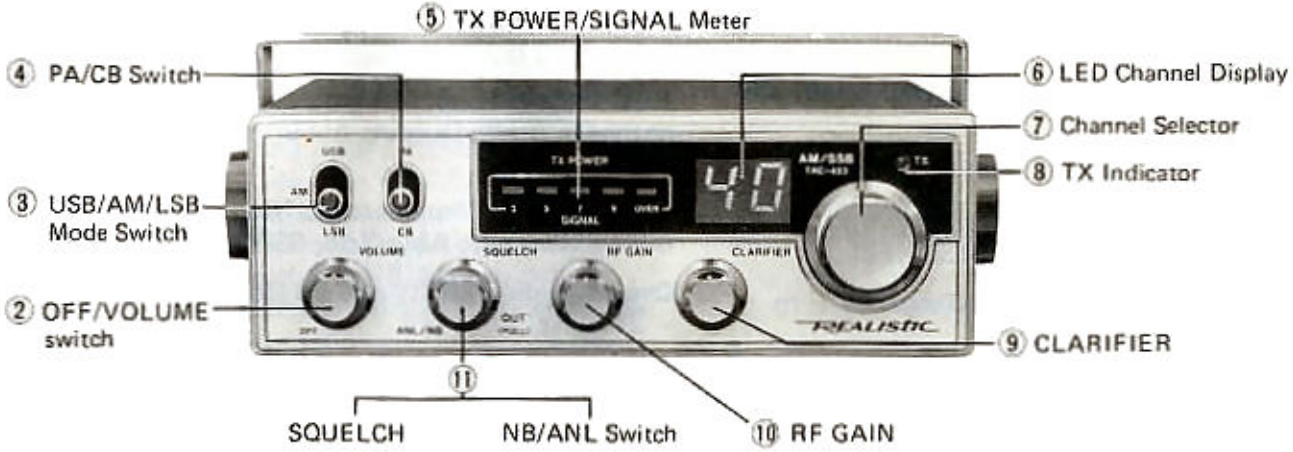
Microphone Sensitivity: AM 0.4 mV for 50% mod., SSB 0.4 mV for 4 watts PEP

Microphone Amplifier Circuit Dynamic Range: AM 60 dB (between 98% and 80% modulation), SSB 60 dB (between 12W PEP and 10W PEP)

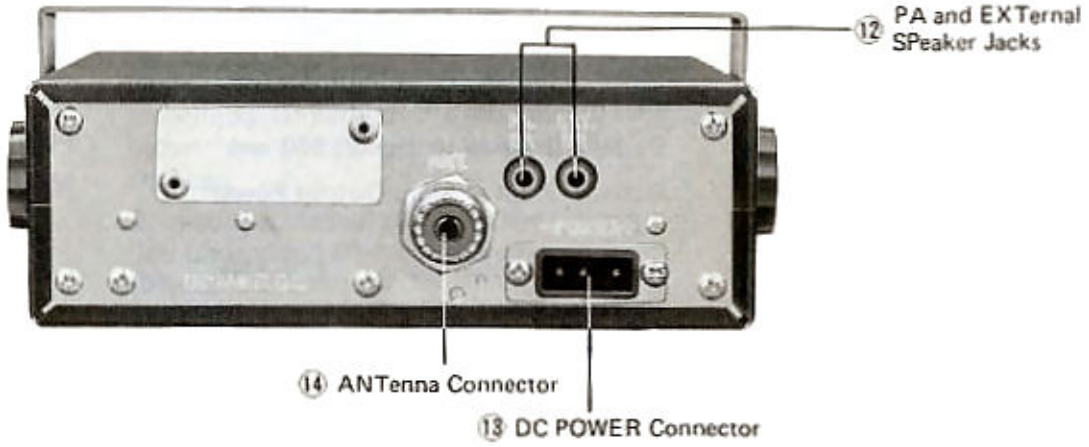
PUBLIC ADDRESS AMPLIFIER

Maximum Output Power: 4 watts

Front Panel



Rear Panel



Front Panel

① **Microphone on the side**
High-quality dynamic microphone designed specifically for communications use. To transmit, press the button on the microphone.

② **OFF/VOLUME Switch**
Turn clockwise to apply power to the Transceiver. Then adjust for the desired sound level. When using PA it controls the level of the PA out put.

③ **USB/AM/LSB Mode Switch**
Set this switch to the desired mode of operation for both transmission and reception.

④ **PA/CB Switch**
Set to CB for normal Transceiver use. Or set to PA for Public Address Amplifier function if you have installed an external PA speaker.

⑤ **TX POWER/SIGNAL Meter**
Indicates the relative strength of signal for reception or output power from the transmitter.

⑥ **LED Channel Display**
Indicates your operating channel.

⑦ **Channel Selector**
Selects any one of the 40 channels available.

⑧ **TX Indicator**
Lights when you transmit.

⑨ **CLARIFIER Control**
Functions as fine tuning for SSB reception.

⑩ **RF GAIN Control**
Use to prevent an overload when receiving strong signals. When the signal meter indicates OVER (such as receiving strong local broadcasts), reduce the RF GAIN control setting. Increase the RF GAIN control when receiving weak or distant broadcasts.

⑪ **SQUELCH/ANL/NB**
Permits you to cut out annoying background noise between messages. When properly set, your radio will remain silent until an audible message comes through.

Press in to activate the Noise Blanker/ Automatic Noise Limiter function. NB is particularly effective for ignition noise, while ANL aids in reducing impulse type noise.

Rear Panel

⑫ **PA SPeaker Jack**
Connect an 8 ohm speaker to this jack for PA use.

EXTernal SPeaker Jack
Connect an 8 ohm external speaker here. When connection is made to this jack, the TRC-453 internal speaker is automatically disconnected. You will need a miniature phone plug, available from any Radio Shack store, for connection.

⑬ **DC POWER Jack**
Connect the supplied DC power cable to this jack and the source of 12 volt DC negative or positive ground.

⑭ **ANTenna Connector**
Connect your CB antenna to this terminal. It accepts a PL-259 male type coaxial connector.

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 any 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. (For example, will they have adequate leg room?).

Another extremely important requirement is the ease of installation and removal for security, 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 air-conditioning air stream.

Take your time and plan your installation carefully. When you have determined the best location for mounting, use the mounting bracket as a template to mark mounting holes. Take care you do not drill into wiring, trim or other accessories. Mount in position with lock washers and self-threading screws.

Mount the microphone clip on the right side of your Transceiver, in a horizontal or vertical position to suit your convenience.

Attach the unit to the mounting bracket using thumb screws and washers.

Your Transceiver features a locking type microphone connector. This ensures that you won't accidentally pull out or loosen the plug connection when extending the mic cable while moving about.

To connect the mic plug, press the tab on the mic plug and then press it into the socket. To release, press the tab on the mic plug, then push the plug in to release the lock and then pull the mic out.

Plug in the supplied power cord jack to the DC POWER connector on the rear panel.

With Negative Ground
Connect the red wire with in-line fuse holder to the ACCessory terminal on the ignition switch of your vehicle. Make a good mechanical and electrical connection to the frame (ground) of the vehicle for the black negative wire.

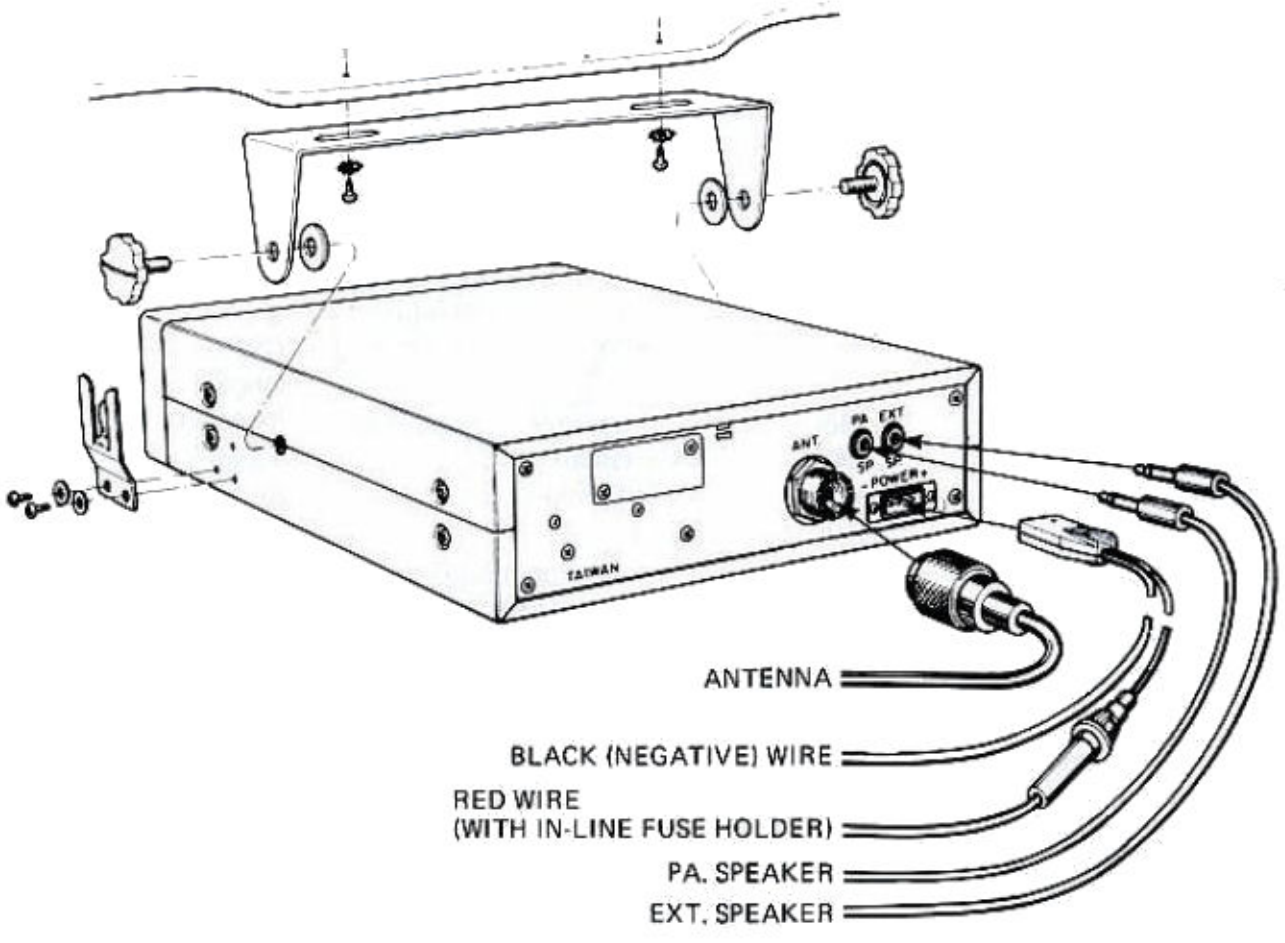
With Positive Ground
Connect the black wire to the ACCessory terminal on the ignition switch of your vehicle and connect the red wire to the metal frame (ground) of the vehicle.

Note: You can install this Transceiver in any location where 12 volts DC power is available. It can be connected to either positive or negative ground systems. Just be sure you connect the red wire to the (+) terminal and the black wire to the (–) terminal.

If you are using an external speaker and/or PA speaker, connect the speaker(s) to the corresponding speaker jack(s).

Now all that is left for you to do is to install and connect the antenna system. Connection of the antenna down lead should be made to ANTenna coax connector.

Caution: Do not attempt to transmit without either a dummy load or properly installed antenna connected. Doing so will likely damage the output of your transceiver.


ANT
PA
EXT
SP
SP
-POWER+
TAIWAN
ANTENNA
BLACK (NEGATIVE) WIRE
RED WIRE
(WITH IN-LINE FUSE HOLDER)
PA. SPEAKER
EXT. SPEAKER

ANTENNA SYSTEM

The term "antenna system" includes the transmission line. It is important that you use the correct type of transmission line. The line should be a coaxial type having in impedance equal to the antenna impedance.

Because your Transceiver is designed to operate most efficiently with a 50 ohm load, it is best to use coaxial cable with an impedance of 50 ohms. Typically, type RG-58/U is used.

Generally speaking, you should keep the length of the transmission line to a minimum. Remember that transmission line loss increases with frequency which can translate into lost transmitting power. 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 circuit will be defeated.

Mobile Antennas

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. Keep it as far from the engine as possible to reduce noise pickup.
4. During operation, it must be vertical. So, it should be rigid enough to remain as close to vertical when the vehicle or boat is in motion.
5. 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 good ground connection. This can be either a metal hull or a ground made of tin-foil or copper sheeting. This ground should cover an area of at least 12 square feet (1 m^2) or more. Be sure the Transceiver also has an adequate ground. Your Radio Shack store can supply an antenna especially designed for use on fiberglass or wooden boats that requires no additional ground. If you can use this antenna, it will save you a bit of extra work.

There are many types of mobile CB antennas: a full quarter-wave length whip or center-loaded whip – top loaded whip and base loaded whip. Radio Shack has a complete line of antennas, and the salesperson 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, which will allow a physically shorter antenna, or the more efficient, 102 inch (2.6m) long, full quarter-wave. Antenna length is directly related to efficiency: the longer the better.

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

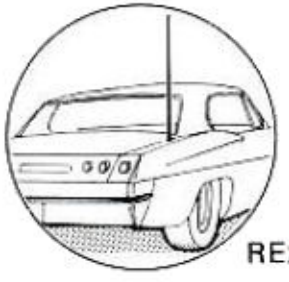
Roof Mount – In this position the antenna radiates equally in all directions. Since the normal 1/4 wavelength whip antenna is too long (102" or 2.6m) for roof mounting on a vehicle, the antenna is shortened and a loading coil is used to provide the proper electrical length.

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, the front position offers several 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 complete line of antennas.

Rear Deck Mount – 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 one of the full 102" (2.6m) whips.

ROOF MOUNT

FRONT COWL MOUNT



REAR DECK MOUNT

Base Station Antenna

While your Transceiver is designed for mobile operation, you might wish to use it for a base station unit, in conjunction with a 120 volt AC/12 volt DC power supply (available also from Radio Shack).

WARNING WARNING WARNING

When installing or removing base station CB antennas, use extreme caution. If the antenna starts to fall, let it go! It could contact overhead power lines. **If the antenna touches the power line, contact with the antenna, mast, cable or guy wires can cause electrocution and death!** Call the power company to remove the antenna. Do not attempt to do so yourself.

The antenna mast should be adequately grounded.

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

Do not transmit without a suitable antenna or 50 ohm load connected to the ANTenna connector.
For installation, refer to that section.

To Receive

1. Set the CB-PA switch to CB.
2. Rotate the RF GAIN control maximum clockwise.
3. Rotate the SQUELCH control maximum counterclockwise.
4. Select the mode of operation – AM, LSB or USB.
5. Turn power on by rotating VOLUME clockwise.
6. Set channel selector to the desired channel.
7. Adjust VOLUME for comfortable listening level.
8. Adjust SQUELCH to cut out annoying background noise when no signal is being received. To do this, set the channel selector to a channel where no signals are present or wait until signal ceases on your channel. Then, rotate SQUELCH in a clockwise direction to the point where the background noise stops. Now, when a signal is present, you will hear it, but you will not be disturbed by noise on the channel between signals.

When properly set, SQUELCH will keep the receiver quiet until a signal comes in on that channel. Do not set SQUELCH too high, or a weak signal will not be able to "open" the squelch circuit. To receive a weak signal, it is best to leave SQUELCH set to the point at which the receiver just goes quiet.

9. Use CLARIFIER to tune in slightly off-frequency stations, or to tune out adjacent channel interference caused by a station on the next channel.
10. If your reception is disturbed by interference from impulse-type noise (ignition noise and other man-made electrical noise), push in the NB/ANL knob. This should reduce or eliminate the noise.

Receiving Notes

SSB tuning takes practice. It is not difficult, it just takes a little experience. When first listening to an SSB signal, it probably will not be understandable; the voice may sound like Donald Duck, or just a low guttural sound. In either case, very slowly adjust CLARIFIER to bring the signal into its natural voice tonal range.

If the signal is a Donald Duck type tone tune so the signal tones become lower: careful tuning will make the voice sound natural. If the signal is low and guttural, tune for higher tones.

If you try the above procedure and are not able to make the signal intelligible, it may be an SSB signal operating on the other sideband – try the other SSB mode (LSB or USB as the case may be).

An SSB signal will produce a fluttering, unintelligible sound when received in the AM mode. In such instances, use either the LSB or USB mode and adjust the CLARIFIER control.

You can tune AM signals when the mode switch is in the USB or LSB position. Tune CLARIFIER to eliminate the steady tone caused by the AM carrier. ("Zero-beat" the tone so it disappears.)

Remember that adjustment of the CLARIFIER only shifts the receiving frequency, not the transmitting frequency.

When receiving an extremely strong signal, you will find it best to use the RF GAIN to vary the overall volume rather than using the VOLUME control.

To Transmit

1. Be sure every control is in proper position (CB-PA, USB-AM-LSB).

2. Select the channel desired for operation.

3. Press the push-to-talk button on the microphone and hold it an angle about 2 to 3" (5 to 7.5 cm) from your mouth and speak in a normal voice.

Using the Public Address Amplifier

You can also use your Transceiver to provide 4 to 5 watts of audio power as a public address amplifier. To use this function, you must connect an 8-ohm PA speaker to the PA SPKR jack on the rear of the unit. Radio Shack's weatherized 4" (10cm) speaker, specifically made for PA use is ideal. Follow these steps.

1. Be sure an 8-ohm speaker is connected to the PA SPKR jack.

2. Set CB-PA to PA.

3. Turn the Transceiver on with the VOLUME control.

4. Press the push-to-talk button and talk into the mic. Adjust VOLUME as required for the appropriate level of sound.

You can monitor CB reception even while using the PA function. When you release the push-to-talk button, CB signals will be heard through your PA speaker.

We thought you'd be interested in knowing and understanding something about the SSB function and capability of your Transceiver.

To understand SSB, we need to know what an AM (Amplitude Modulation) signal is.

Amplitude Modulation is a form of heterodyning – mixing 2 signals together electrically. In the process of mixing, 3 signals result.

Example.
An RF signal at 27.005 MHz (channel 4 CB) is mixed with or, as is usually said, modulated by a 1000 Hz tone.

The resulting signals: -

27.005 MHz = "original" or "carrier" signal.

27.005 MHz – 1000 Hz (27,005,000 minus 1000) = 27.004 MHz, the lower sideband

27.005 MHz + 1000 Hz (27,005,000 plus 1000) = 27.006 MHz, the upper sideband

Notice that the communication or intelligence (the 1000 Hz tone) is contained in each sideband. The carrier contains no intelligence. This fact is vital!

For the sake of communication, all we need to receive is the 1000 Hz tone. The receiver only needs to recover one signal, and yet we are transmitting 3 signals. Not only we are sending 3 signals, but also we are wasting most of our power in one of them, the carrier, that carries none of the intelligence (27.005 MHz) and the other **two signals duplicate each other!**

Thus, if we can eliminate the carrier not needed for communication and can send only one of the sidebands since they duplicate each other's information anyway, we could concentrate all of the transmitting power into one sideband. This is exactly what single sideband accomplishes.

Single sideband transmissions incorporate only one of the sidebands – i.e. in our example only the upper sideband 27.006 MHz or only the lower sideband 27.004 MHz. The second sideband and the carrier is eliminated in the early stage of the transmitter circuitry.

When only one sideband is transmitted, we can concentrate all of the available power in this one sideband, greatly increasing the effective power of an SSB signal as compared to an AM signal.

A theoretically perfect AM transmitter used in the Citizen's Band radio service as permitted by the Department of Communications will have as a maximum output power specification, a carrier transmitted at 4 watts with the capability of slightly less than 100% modulation.

In order to fully amplitude modulate a 4 watt carrier, a full 2 watts of audio power is required. In this case, only 1 watt of power can exist in each sideband. Since the carrier contains no intelligence, and the sidebands duplicate each other, really only one sideband is required to transmit the required intelligence.

If we take the above transmitter and convert it to double sideband operation (eliminate the carrier power), we can increase the power in the sidebands to 2 watts each, without overloading the circuitry. Further, if we eliminate one of the two sidebands, we can put the full 4 watts of power into the remaining sideband.

Thus, while an AM transmitter has only 1 watt of power in one sideband, an SSB transmitter can have 4 watts of power in one sideband – or **4 times the power of an AM transmitter.**

Thus, effectively an SSB transmitter with the same power limitations is 4 times more powerful than an AM transmitter.

One further advantage, which is not often mentioned. Not only does the SSB signal take up only 1/2 of the frequency spectrum space of an AM signal (only 1 sideband instead of 2), thus permitting twice the number of stations to be in the same amount of band space – but also, at the receiving end, the receiver only picks up 1/2 of the total AM bandwidth. This means that 50% less noise is amplified along with the signal. This result in a 50% improvement in signal-to-noise figures; or, in more technical terms, a 3 dB improvement. Given equal limitations and conditions, an SSB signal will be 4 times more powerful and will have 2 times the signal-to-noise advantage of an AM signal – 8 times as effective. In technical terms, a 9 dB advantage. Thus, for an AM transmitter to be equivalent in effectiveness it would have to be rated at 32 watts!

Enough said! We hope you're enthused.

10-CODES

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

NOISE

In mobile operation, 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 signals and amplify them. Any noise that you hear in the transceiver is, for the most part, from external sources. The receiver itself is exceptionally quiet. If the noise is continuous and fairly loud, it cannot be totally eliminated by the Automatic Noise Limiter (ANL) Circuit. You must solve the problem at its source.

To find out if the noise is from your ignition system, try this simple test. Rotate your ignition switch to ACC (accessories). This turns off the ignition, but continues to supply power to the Transceiver. Most of the noise will probably disappear, indicating that the source of noise is your vehicle's ignition or other electrical systems.

IGNITION SYSTEM

Ignition noise can be identified by the fact that it varies with the speed of the engine. It consists of a series of popping sounds. There are a number of things that can be done to reduce this type of noise:

1. Use only "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 harsh, hissing sounds.

3. if the noise still persists, replace the spark plugs with those that have suppressor resistors built-in. Be sure to use the correct type for your vehicle.

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

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 during reception:
- Check the VOLUME On/Off setting.
- Be sure SQUELCH is adjusted properly. Is it over-squelched?
- Check to see if the unit is switched to an active channel.
- Check for an improper antenna connection.

2. If trouble is experienced during transmission:
- Is the transmission line securely connected to the ANTenna connector?
- Is the antenna properly installed?
- Are all transmission line connections secure and free of corrosion?
- Make sure the Push-To-Talk button on the Microphone is fully depressed.
- Be sure the microphone connector is firmly pressed into its jack.

3. If the Transceiver is completely inoperative:
- Check the power cable and in-line fuse (Replace only with an identical 3-amp fuse).

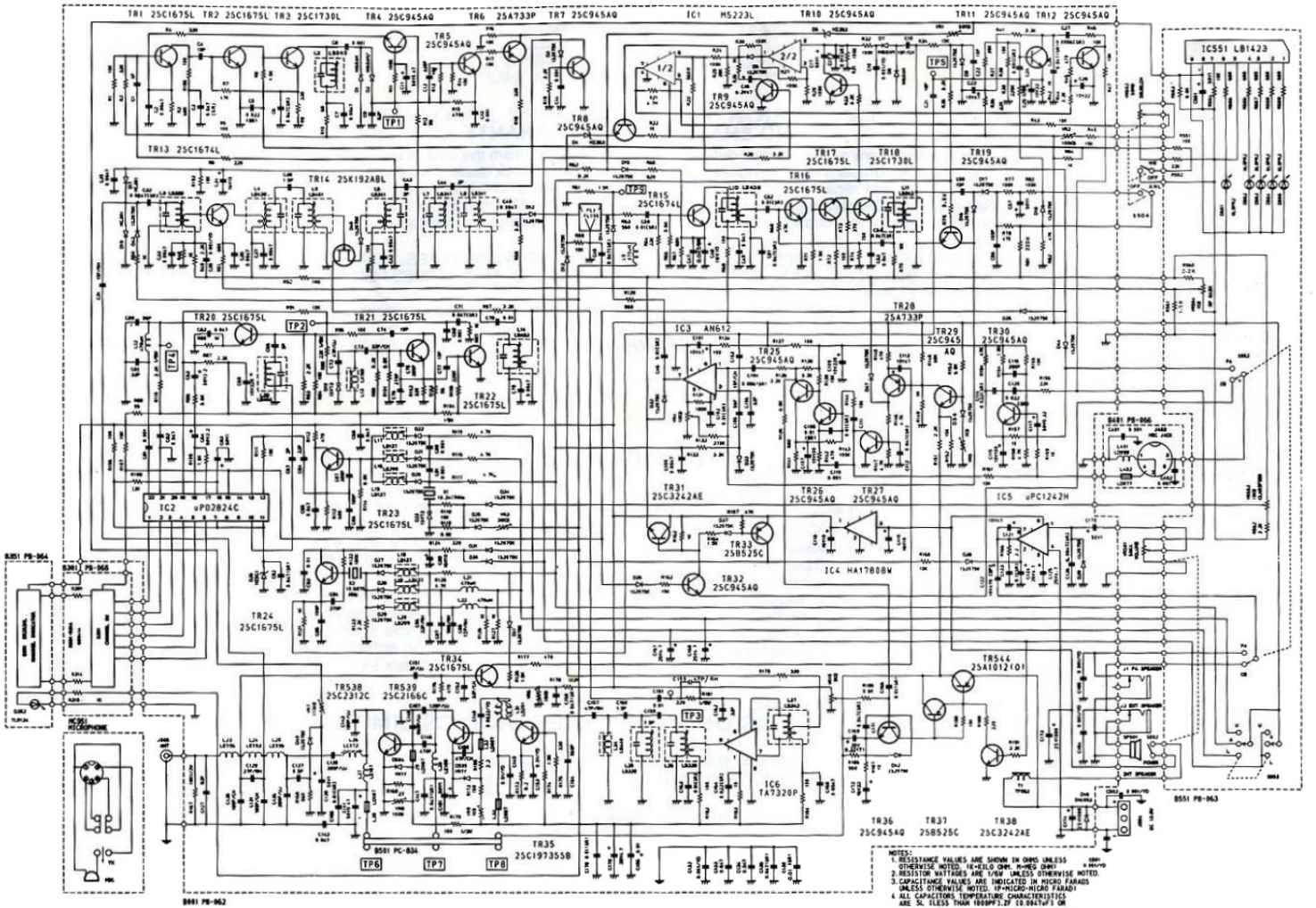
If these checks don't solve the trouble, do NOT attempt repairs or adjustment yourself. The unit should be serviced only by a qualified radio technician. Whenever possible, return the unit to the store from which it was purchased.

TO BE SAFE AND SURE

1. You should never open the case of your Transceiver.

2. Never change or replace anything in your Transceiver.

SCHEMATIC DIAGRAM



RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for ninety (90) days from the date of purchase from Radio Shack company-owned stores and authorized Radio Shack dealers. Within this period Radio Shack will repair the product without charge for parts and labour. Simply **bring your Radio Shack sales slip as** proof-of-purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

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