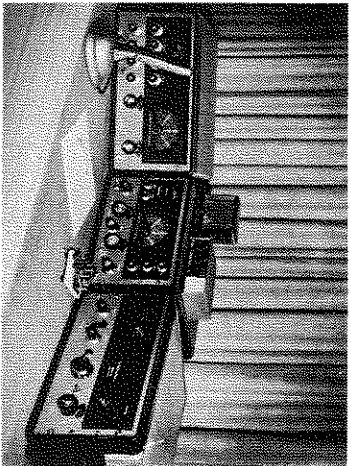


"Quality through Craftsmanship"

at... hallicrafters



Precision Amateur Radio ♦ One of the few remaining avenues of uncensored personal communication among the peoples of the world is amateur radio. Hundreds of thousands of individuals from all walks of life, in 92 nations of the world (over half in the United States alone) devote much of their spare time to this fascinating and useful activity. Far more than a hobby, "ham" radio is America's front line of defense in communication in times of national emergency or disaster. Hallicrafters manufactures more precision communications equipment for the amateur than any other company in the world. Its technological leadership has been acknowledged for 30 years.

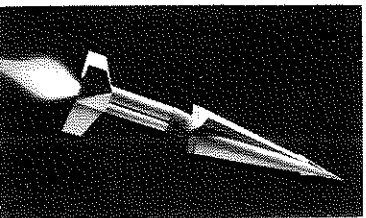


Personal Communication ♦ In this age of exotic communications, space probes and satellites, has come a simple but tremendously important opportunity for private citizens to communicate. It is called Citizens Band Radio.

Any adult with a need for personal two-way radio communication can own and operate a citizens band radio. No operator's license is required, only an easily-obtained station license, making it ideal for business and professional men who must be away from their phones frequently.

Nearly a million sets are now in use in homes, offices, cars, tractors, boats, and in industry. From its earliest stages, Hallicrafters has been

a pioneer in Citizens Band Radio. Many of the major technical developments have come from Hallicrafters electronic research laboratories. Today's Hallicrafters Citizens Band Radios are setting industry standards for compactness, for versatility, and outstanding performance. Here, once again, is a working demonstration of "Quality through Craftsmanship"



Acrospace Electronics ♦ For a quarter-century Hallicrafters has played a significant and special role in America's military defense. In addition to its widely used military communications equipment, Hallicrafters pioneered with the United States Air Force in the development of special research and development techniques known as "QRC," or Quick Reaction Capability, which have kept America ahead in the critical race for supremacy in electronic counter measures, reconnaissance, and other electronics warfare equipment. Today, advanced devices designed and manufactured by Hallicrafters aerospace division are at work in every phase of missile development from tracking system to nose cone.

OWNERS MANUAL TRANSISTORIZED CITIZENS BAND TRANSCIVER MODEL CB-20

the hallicrafters co.



A Subsidiary of Northrop Corporation

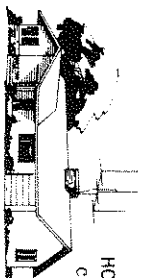
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the hallicrafters co.
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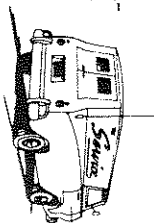
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**NEVER OUT OF TOUCH
WITH YOUR *hallicrafters* CITIZENS BAND RADIO
UNLIMITED APPLICATIONS . . . Business, Pleasure, Safety**



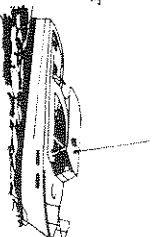
HOME Your Hallicrafters citizens band transceiver can be a valuable home convenience. Husband and wife need never be out of touch. Invaluable for salesmen, insurance adjusters, distributors, lawyers, anyone who uses their home as a primary or secondary office.

AUTO Doctors, business men, for all who must be in constant contact with his or her office or home while driving, can now escape the inconvenience of constantly stopping at the nearest phone to "check in". With your Hallicrafters transceiver, just talk or receive messages while driving.

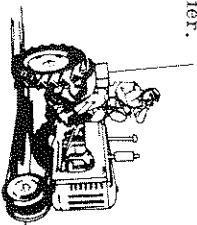


OFFICE A citizens band transceiver is ideal for office-to-field, or home-to-office. Project progress or problems can be dealt with quickly and conveniently, saving time and, therefore, money.

BOATING Keep in contact with land or other water craft with a citizens band transceiver. The unit can function as a convenience or as a two-way safety factor. With some form of radio contact with land, boating can be so much safer.



COMMERCIAL A citizens band transceiver can serve in commercial applications. . . . dispatcher to truck or taxi, tractor to home, plant to delivery vehicle, service station to tow truck, any of hundreds of practical business applications that will increase efficiency.



Where You Will Find It

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 Installing your transceiver Page 5
 Antennas Page 7
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 Specifications Page 8
 Accessories Page 8
 How to operate your transceiver Page 9
 The TEN signals Page 10
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 Alignment of your transceiver Page 12

WARRANTY

"The Hallicrafters Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extended to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

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 radio products."



The Hallicrafters Co.
A Subsidiary of Northrup Corporation

597-104578

CITIZENS BAND — A Few Facts About It

As its name implies, Citizens Band Radio (or "CB" for short) is a new low cost kind of two-way radio system which may now be purchased and operated by any citizen over 18 years of age for personal or business communications.

Until a few years ago, all radio communication was rigidly restricted for public service, broadcasting, amateur (ham) radio, and other specific uses. Ordinary citizens simply could not use two-way radio. However, the Federal Communications Commission (F.C.C.) recognizing the public's growing need for some means of communications while away from home, has set aside one radio "band" of 23 separate channels reserved exclusively for such necessary personal use. Technically, this is called the "27 megacycle" band; commonly referred to as the "Citizens Band."

Each CB radio (called a "transceiver") is actually a complete radio broadcasting station - both transmitter and receiver all in one compact cabinet. They are extremely simple to operate - actually easier to use than a TV set!

Each transceiver is equipped with a built-in loudspeaker, and a microphone. To talk, you pick up the mike, press a button and talk. To listen, you release the button and listen. It's really that simple.

WHO MAY USE CB RADIO? — Today people from all walks of life, are taking advantage of this new media of communication. Most frequently a user will install one radio in his home and another in his automobile. There are hundreds of uses for CB radio. Tens of thousands are being used in trucks, tractors, boats, - even airplanes! If you are a small business owner, you may keep in touch with your delivery trucks via CB. On the way home, you may "call" your wife enroute to put the dinner on. For your weekend boating trip, you'll use your CB unit for ship-to-shore communication. And when your daughter is out in the car at night, relax - she can reach help instantly by radio if she runs out of gas.

Anyone in your immediate family, or connected with your business, may use your equipment at any time, with your permission.

Most of your communication will, of course, be with other radios under your own license. However, it is perfectly permissible to talk to friends or associates who have their own equipment under different license. Such communication must, however, be conducted only on seven channels - channels 9 through 14, and channel 23. The remaining 16 channels are reserved for talking between stations of the same license only.

After establishing communication by using your call numbers (assigned by the F.C.C.) you may carry on a normal conversation, as though you were using a telephone. However, it is both courteous to others waiting, to use the channel, and time-saving for you, to be brief.

TALKING DISTANCES - LEGAL REQUIREMENTS — Citizens Band is intended specifically for local, rather than long distance, communications. For this reason, the F.C.C. restricts both antenna height (20 feet) and the input of power to a CB transceiver (5 watts). These determine primarily how far your signal will carry. Normally you get an effective range of 10-15 miles between a vehicle and a "base" station, and somewhat less (6-8 miles) between vehicles. Reason: the antennas used on vehicles are necessarily smaller and therefore less effective. From one base station to another (for the opposite reason) normal distance will be greater - perhaps 25 to 30 miles. Remember, these are generalizations. Many factors can affect your actual talking distance at a given time . . . such as the terrain, weather, antenna location, quality of your equipment, etc.

HOW MANY CHANNELS MAY BE USED — Legally you are allowed to use any of the 23 available channels, although you'll actually need only a few for normal operation. Most CB radios are capable of transmitting and receiving on a number of channels. The Channel Selector knob lets you choose the channel you want in much the same manner you would choose a channel on your TV set. It automatically switches both your transmitter and your receiver to the same desired frequency. What you are doing is selecting a set of crystals which are inside the radio.

F.C.C. RULES AND REGULATIONS — Your CB radio is operated under Part 95 of F.C.C. Rules and Regulations, which must be read and understood before you can receive your license. However, you will find these rules to be very logical, simple and helpful. They are designed to help rather than hinder you - far less restrictive than for any other radio service. The principal restrictions are common-sense rules like these:

Your must "call" another person by his call (license) number, and identify yourself by your own.

You may talk for five minutes only, and then you must wait five minutes before making another call. No abusive or obscene language permitted.

You may not use your radio to sell anything, nor may you charge anyone for using it.

You may not use your radio for merely "passing the time of day" - you should have a definite purpose in making the call.

Otherwise-in-general-you may use your CB radio freely, anytime you wish, for normal personal or business communication. However, be sure to read Part 95!

THE CITIZENS RADIO LICENSE

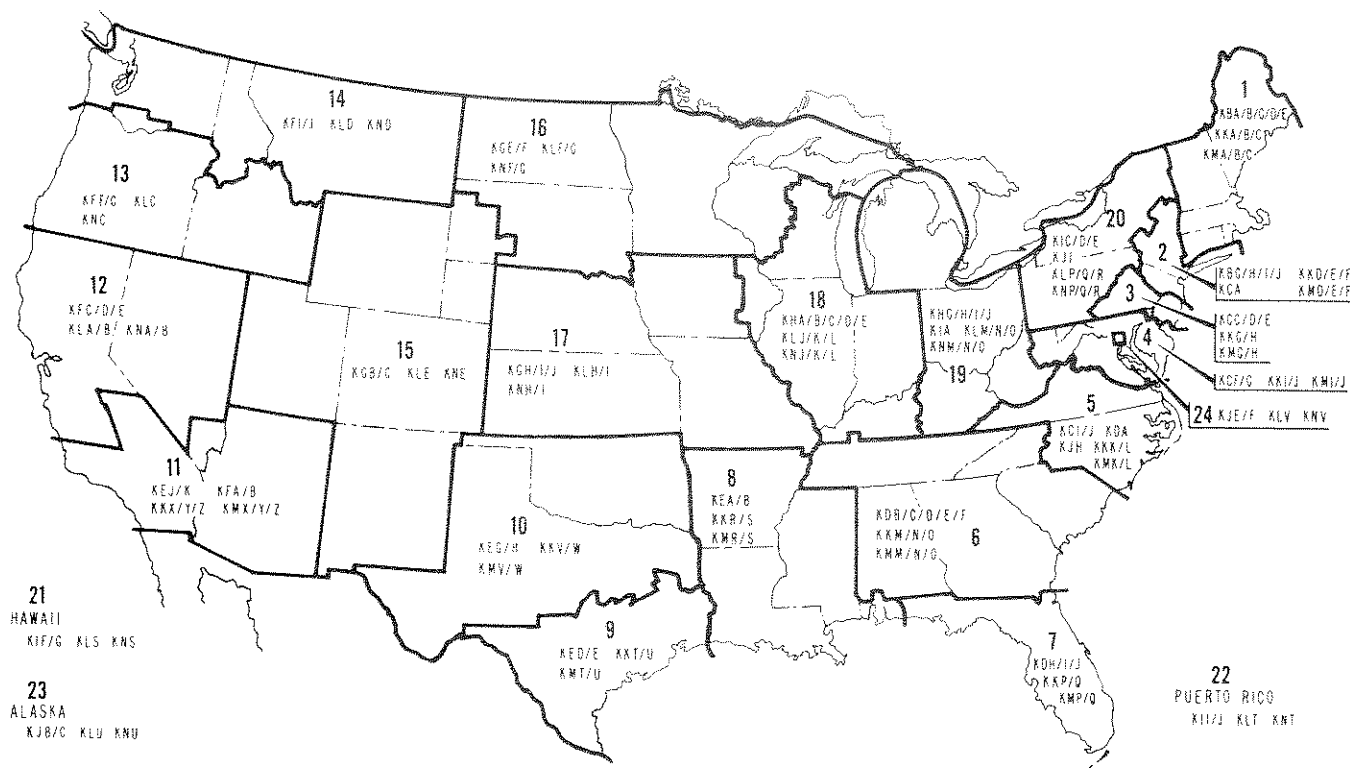
CAUTION

IT IS ILLEGAL TO OPERATE THE TRANSMITTER UNLESS A STATION LICENSE AND CALL SIGN HAVE BEEN ISSUED BY THE FEDERAL COMMUNICATIONS COMMISSION (F.C.C.).

Every citizens band radio transmitter must be licensed by the F.C.C. prior to its use. If you do not have a citizens band license, fill out the license applications (F.C.C. form 505) packed with your transceiver, or obtainable from any F.C.C. office, as soon as possible and forward it, along with the required license fee (See Part 95 F.C.C. Rules and Regulations), to Federal Communications Commission, Gettysburg, Pennsylvania, 17325. You will be assigned a call number, which is then used on the air for identification.

Before filling out form 505, read the instructions carefully - they are clear and easy to read. NOTE: When you sign F.C.C. form 505, you are affirming that you are in possession of, understand, and agree to abide by all of the rules and regulations of the Citizens Radio Service. Be sure you have a copy of them in your possession and, while waiting for the F.C.C. to process your license (normally about 3-8 weeks), take the time and thoroughly understand all of them.

CALL AREA MAP



156-0055068

UNPACKING YOUR TRANSCIEVER

Your Hallicrafters Model CB-20 is a Citizens Band Transceiver designed and manufactured to the most stringent quality standards. It has been packaged to insure safe arrival.

After unpacking the equipment, examine it for damage which may have occurred in transit. Should any sign of damage be apparent, immediately file a claim with the carrier stating the extent of the damage. The shipping carton will include the CB-20 transceiver, mounting bracket, and a separate envelope containing:

- F. C. C. License Application Form 505
- F. C. C. Transmitter Identification Card
- Warranty Registration Card
- Microphone Holder
- Bracket Mounting Screws
- Red Lead with Fuse Holder
- Black Lead
- Perforated Rear Mounting Strap

Examine all packaging material carefully to avoid discarding the above items. Carefully check all shipping labels and tags for instructions before removing them. Save the carton and packaging for future use (service return, etc.).

The F. C. C. Transmitter Identification Card should be filled out and then attached to the transceiver with the "stickyback".

INSTALLING YOUR TRANSCIEVER

Your transceiver as supplied provides mobile operation from 12 to 15 volts DC (14.0 volts nominal) as found in most cars, trucks, etc.

MOBILE INSTALLATION

Figures 1 and 2 show installation methods for mobile operation.

CAUTION

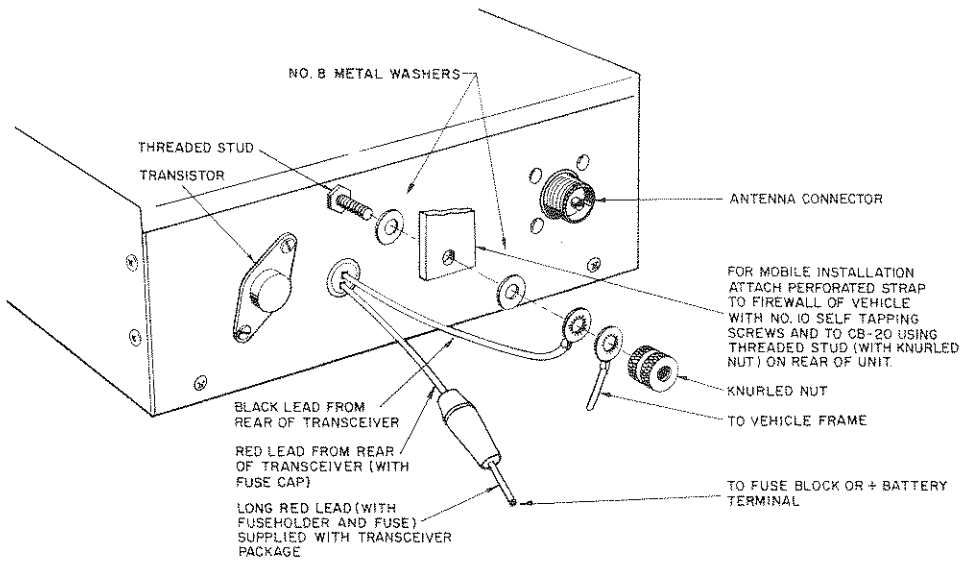
Before installing the transceiver, insure that the vehicle has a negative ground. The Model CB-20 is designed for negative ground applications only. The unit will not operate and will continue to blow fuses if the wiring polarity is incorrect. If the vehicle does not utilize distributed-resistance high tension wire, it may be necessary to install suppressors at each plug and on the distributor. A number of publications describe additional noise suppression techniques that may be desirable.

BASE STATION INSTALLATION

The Hallicrafters Co. has available an accessory Power Supply specifically designed for use with your transceiver operating as base-station equipment. This power supply provides the necessary D.C. potentials required to operate the transceiver.

NOTE

In base installations where RF feedback problems may be encountered, the transceiver case should be returned to an earth ground. This can be accomplished by attaching the black lead from the transceiver and the long black lead (supplied with unit) to the grounding stud (knurled nut at rear of unit). Connect the free black lead to an earth ground. Keep lead length as short as possible.



156-008558

Figure 1. Rear View Showing Installation and Electrical Connections.

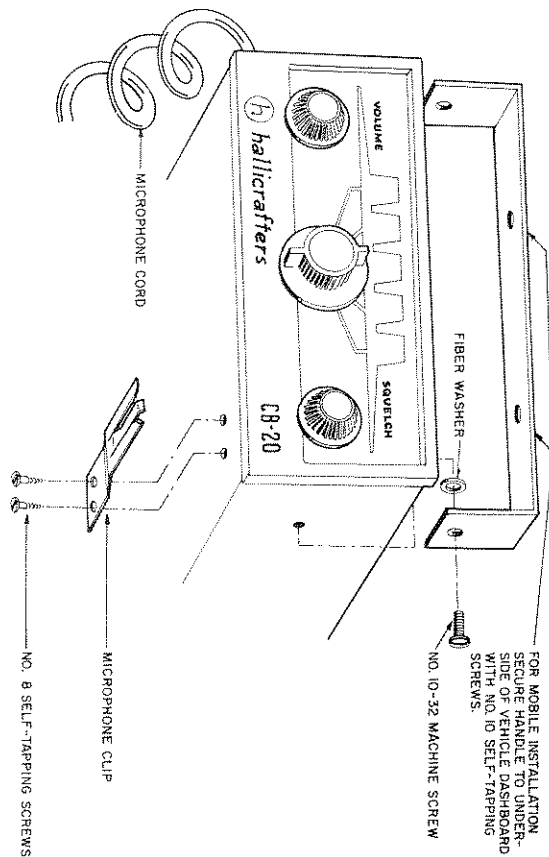


Figure 2. Mobile Installation of Transceiver Mounting Bracket and Microphone Clip.

156-008559

ANTENNAS

Your transceiver has been adjusted at the factory to give optimum performance using a 50-ohm antenna. There are a number of antennas of this type available for citizens band use. For base-station installations, a ground-plane or half-wave vertical antenna is recommended for good all-around performance. For mobile use, a quarter-wave vertical antenna, either helical wound or of a whip type mounted as high on the vehicle as possible, is generally satisfactory. The helical type, being considerably shorter, can be mounted on the trunk lid with good results. For limited range applications (1 or 2 miles), a short base-loaded whip antenna may be used.

Probably the most practical antenna for mobile use is the newly developed universal type antenna (i.e., it serves both the CB unit and the AM car radio). This type antenna can normally be installed in place of the existing AM broadcast antenna; thus, making it unnecessary to drill an additional hole in the vehicle.

The antenna should be connected to the antenna socket on the rear of the unit with RG-8/U or RG-58/U coaxial cable (RG-8/U is recommended for lengths in excess of 50 feet) and a shielded, PL-259 type connector.

Because of its compact size, the case of the CB-20 is inadequate for use as either a ground plane or counterpoise for a one-quarter wave-length antenna. Therefore, it is not recommended that the antenna be mounted above or on the rear of the cabinet.

Additional information concerning antennas may be obtained from your Hallicrafters dealer.

hallicrafters MODEL CB-20 CITIZENS BAND RADIO

Identification of features and controls

GENERAL DESCRIPTION

Your new Hallicrafters Model CB-20 Citizens Band Transceiver is a compact, self-contained, completely-transistorized transmitter-receiver, providing up to five-channel operation in the Class D, citizens-band service.

Two of these units can provide convenient, reliable voice communication between your home, car, or between your office and truck, at distances ranging up to eight or ten miles. Communication over longer distances is possible, depending upon local conditions, antennas and terrain. The compact size of the unit greatly facilitates installation and its economical power requirement when squelched minimizes the hazard of a discharged battery.

This equipment incorporates a three-stage, transistorized transmitter capable of the full authorized power limit (5 watts) with high-level modulation capabilities. It contains a completely transistorized superheterodyne receiver using single conversion, and a series-type noise limiter to reduce automobile and other local interference. It has electronic push-to-talk switching, high capacity ceramic microphone, a self-contained speaker, and is housed in a smartly-styled cabinet, permitting easy access to transistors and crystals.

Your transceiver is supplied ready for operation on channel 11. Operation on any one of five channels is possible by selecting additional transmitting and receiving crystals for the desired channels and installing these crystals in the sockets provided.

IMPORTANT: The crystals required for your unit are precision-ground, close-tolerance units. In order to achieve maximum performance and to avoid off-channel operation, additional crystals should be obtained from local Hallicrafters dealers.

SPECIFICATIONS

TRANSMITTER POWER INPUT	5 watts.
FREQUENCY RANGE26.965 MC to 27.255 MC.
RECEIVER SENSITIVITY	Less than one microvolt for a 10-DB signal and noise-to-noise ratio.
RECEIVER AUDIO POWER OUTPUT	2.0 watts.
TRANSMITTING CRYSTALS	Third overtone CR-81/U, 0.002% tolerance.
RECEIVING CRYSTALS	As in transmitter, except 455 KC lower in frequency.
OUTPUT CIRCUIT	50 ohms.
TVI SUPPRESSION	Bandpass matching network, 50 DB minimum.
POWER REQUIREMENTS	0.75 amperes in receive (unsquelched), 0.07 amperes (squelched), 1.3 amperes in transmit with maximum modulation.
OVERALL DIMENSIONS (HWD)	2-3/8 inches by 6 inches by 8-1/2 inches.
TRANSISTOR COMPLEMENT	12 transistors, plus 9 diodes and one zener voltage regulator.



OFF-ON VOLUME CONTROL. Turns power ON and OFF, also adjusts loudness of received signals. Volume increases as you turn clockwise.

CHANNEL SELECTOR. Is a five-position switch that sets both transmit and receive frequencies simultaneously. Operating frequencies are determined by quartz crystals installed in the unit, one for transmitting and one for receiving.

ACCESSORIES.

AC to DC base-station power supply supplies all necessary potentials needed to operate your transceiver.

The HA-3 Electrical Noise Suppression Kit eliminates electrical noise generated by your vehicle that may interfere with proper transceiver operation.

The base station power supply along with the Electrical Noise suppression Kit is available from your local Hallicrafters dealer.

SQUELCH CONTROL. Quiets background noise (static) in the absence of a signal. In the counterclockwise position the transceiver is unsquelched (i.e., no noise quieting). In the fully-clockwise position, the unit is squelched for even relatively strong signals; therefore, in practice this control should be carefully set slightly beyond the point that just quiets the noise. In this position, the SQUELCH control is properly set so that transmitted signals will be heard but the receiver will be quiet between transmissions. With such a SQUELCH setting, the receiver battery drain will be reduced to less than 0.1 ampere. When the transceiver is used with the base-station power supply for prolonged periods of time, it is again recommended that the SQUELCH control be properly adjusted, as described above, to reduce heating.

Hallicrafters MODEL

GENERAL DESCRIPTION

Your new Hallicrafters Model CB-20 Citizens Band Transceiver is a compact, self-contained, completely-transistorized transmitter-receiver, providing up to five-channel operation in the Class D, citizens-band service.

Two of these units can provide convenient, reliable voice communication between your home, car, or between your office and truck, at distances ranging up to eight or ten miles. Communication over longer distances is possible, depending upon local conditions, antennas and terrain. The compact size of the unit greatly facilitates installation and its economical power requirement when squelched minimizes the hazard of a discharged battery.

This equipment incorporates a three-stage, transistorized transmitter capable of the full authorized power limit (5 watts) with high-level modulation capabilities. It contains a completely transistorized superheterodyne receiver using single conversion, and a series-type noise limiter to reduce automobile and other local interference. It has electronic push-to-talk switching, high capacity ceramic microphone, a self-contained speaker, and is housed in a smartly-styled cabinet, permitting easy access to transistors and crystals.

Your transceiver is supplied ready for operation on channel 11. Operation on any one of five channels is possible by selecting additional transmitting and receiving crystals for the desired channels and installing these crystals in the sockets provided.

IMPORTANT: The crystals required for your unit are precision-ground, close-tolerance units. In order to achieve maximum performance and to avoid off-channel operation, additional crystals should be obtained from local Hallicrafters dealers.

SPECIFICATIONS

- TRANSMITTER POWER INPUT 5 watts.
- FREQUENCY RANGE 26.965 MC to 27.255 MC.
- RECEIVER SENSITIVITY Less than one microvolt for a 10-DB signal and noise-to-noise ratio.
- RECEIVER AUDIO POWER OUTPUT 2.0 watts.
- TRANSMITTING CRYSTALS Third overtone CR-81/U, 0.002% tolerance.
- RECEIVING CRYSTALS As in transmitter, except 455 KC lower in frequency.
- OUTPUT CIRCUIT 50 ohms.
- TVI SUPPRESSION Bandpass matching network, 50 DB minimum.
- POWER REQUIREMENTS 0.75 amperes in receive (unsquelched), 0.07 amperes (squelched), 1.3 amperes in transmit with maximum modulation.
- OVERALL DIMENSIONS (HWD) 2-3/8 inches by 6 inches by 8-1/2 inches.
- TRANSISTOR COMPLEMENT 12 transistors, plus 9 diodes and one zener voltage regulator.

HOW TO OPERATE YOUR TRANSCIEVER

The power cable and antenna cable should be connected prior to operation.

1. Turn the unit on by rotating the VOLUME control clockwise until a click is heard.
2. Set the CHANNEL SELECTOR switch to the desired position (if more than one channel is available).
3. Set the SQUELCH control counterclockwise (unsquelched). The receiver is instantaneous in operation and other citizens-band stations or atmospheric noise will be heard.
4. Adjust VOLUME control to the desired listening level.
5. With only noise present (no signals heard), turn the SQUELCH control slowly clockwise slightly beyond the point where noise just disappears. In this position, the SQUELCH control is properly set so that transmitted signals will be heard but the receiver will be quiet between transmissions.

IMPORTANT NOTE

Adjusting the SQUELCH control when signals are present will produce an erroneous setting of the proper level. DO NOT turn the SQUELCH control farther than is required as this could result in signals being missed that might otherwise be heard.

NOTE

Because of the CB-20's electronic switching, the Push-to-Talk bar must be fully depressed when going into the transmit mode.

6. To transmit, depress the microphone Push-To-Talk switch and speak in a normal voice one or two inches away from the microphone. To receive, release the Push-to-talk switch.

IMPORTANT NOTE

Because of the electronic switching employed in the CB-20, rather than the relay type, it is imperative that only the microphone (part number 085-000279) supplied with the unit be used. The switching sequence is as follows: red and black leads must short before, or at the same instant, but never after the microphone circuit is completed by activation of the Push-to-Talk switch. Conversely, upon deactivation of the Push-to-Talk switch, the microphone circuit must open first.

Since citizens-band channels are shared on a party-line basis, standard operating procedures and courtesies should be observed so that full utility of the service can be realized by all users.

Points to remember are:

1. Do not transmit if you hear other stations using the channel.
2. Limit your communication to the minimum possible time required to complete your business.
3. Announce the call sign of your station at the beginning and end of each communication (not each transmission). This is required by FCC rules and can be performed as follows:

(When initiating a call) "This is _____ (your call sign) unit 1 (2, 3, etc.) calling unit 2 (1, 3, etc.);" and (when completing a call) "This is _____ unit 1 off and clear with Unit 2."

THE TEN SIGNALS

The following is a list of the most commonly-used citizens-band code signals. Their use increases the efficiency and effectiveness of citizens radio communication by shortening transmission time and by helping to eliminate error in information transmitted, by being easy to understand even under crowded or noisy conditions.

- 10-1 I am receiving you poorly. Not completely understandable, weak signal, or being interfered with by noise and/or other stations.
- 10-2 I am receiving you well. Perfectly understandable — interference slight, if any.
- 10-4 OK acknowledge, understand, affirmative.
- 10-7 Out of service — leaving the air. Not subject to call.
- 10-8 In service, standing by. Subject to call.
- 10-9 Please repeat - I do not understand.
- 10-10 Transmission completed, standing by, subject to call.
- 10-20 What is your location? My location is _____.
- 10-23 Standby please.
- 10-41 I am changing to channel _____. Please change to channel _____.

CHASSIS REMOVAL

To remove the chassis from the cabinet, remove the front panel knobs and the mounting hardware on the front panel controls. Unscrew the eight screws on the sides and back of the cabinet. Remove the cabinet bottom plate, taking care not to break off the speaker lead wires. Remove the three screws holding the P.C. board to the top cover plate and slide off the top cover.

OPERATING AND SERVICE QUESTIONS

For further information regarding operation or servicing of this equipment, contact the Hallcrafters' dealer from whom it was purchased. The Hallcrafters Company maintains an extensive system of Authorized Service Centers where any required service will be performed promptly and efficiently at no charge if this equipment is delivered to the service center within 90 days from date of purchase by the original buyer and the defect falls within the terms of the warranty. It is necessary to present the Bill-of-Sale in order to establish warranty status. After the expiration of the warranty, repairs will be made for a nominal charge. All Hallcrafters Authorized Service Centers display the sign shown at right. For the location of the one nearest you, consult your dealer or your local telephone directory.

Service shipments should not be made to the factory unless instructed to do so by letter, as The Hallcrafters Company will not accept responsibility for unauthorized shipments.

The Hallcrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate such revisions in earlier models.



ADDING NEW CHANNELS

Two crystals are required for each channel, one for transmit and one for receive. Under no circumstances use other than standard military-type CR-81/U series-resonant, third-overtone crystals. Crystals should be ordered in pairs from your local dealer (see channel allocation chart). Model CB-20 transmitting crystals are stamped with part number 19-3484 and the receiving crystals with 19-3939. When ordering crystals, be sure to indicate: 1) the desired channel, 2) model number CB-20, and 3) the serial number found on the rear of the unit.

One crystal is stamped with the letter T followed by a number and the other crystal with the letter R followed by a number. The number indicates the channel. The T crystal is used in the transmitter circuit and should be inserted in the appropriate socket at the right front portion of the printed circuit board, when viewed from the bottom. In a similar manner the R crystal is used in the receiver and should be installed in the appropriate socket at the left front portion of the transmitter. A diagram showing a typical crystal socket assembly is shown below.

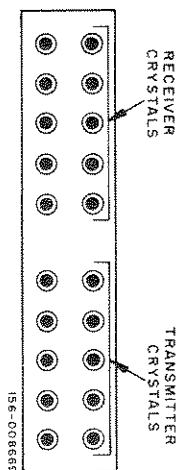


Figure 3. Crystal Socket Assembly.

IMPORTANT NOTE

No adjustments are necessary when adding crystals to this equipment. The FCC requires, however, that after the installation of new crystals, the transmitter frequency be checked by a person holding a first or second class commercial operators license.

CHANNEL ALLOCATIONS FOR U.S. CLASS D CITIZENS RADIO SERVICE AND CANADIAN GENERAL RADIO SERVICE

CHANNEL ALLOCATION			CRYSTAL ORDERING INFORMATION		
Frequency (MC)	U.S. Number	Condition	Transmitter Crystal	Receiver Crystal	Part Number
26.965	1	Do Not Use	019-003484.1	26.510	019-003939-1
26.975	2	Do Not Use	019-003484.2	26.520	019-003939-2
26.985	3	Do Not Use	019-003484.3	26.530	019-003939-3
27.005	4	Do Not Use	019-003484.4	26.550	019-003939-4
27.015	5		019-003484.5	26.560	019-003939-5
27.025	6		019-003484.6	26.570	019-003939-6
27.035	7		019-003484.7	26.580	019-003939-7
27.055	8		019-003484.8	26.600	019-003939-8
27.065	9		019-003484.9	26.610	019-003939-9
27.075	10		019-003484.10	26.620	019-003939-10
27.085	11		019-003484.11	26.630	019-003939-11
27.105	12		019-003484.12	26.650	019-003939-12
27.115	13		019-003484.13	26.660	019-003939-13
27.125	14		019-003484.14	26.670	019-003939-14
27.135	15		019-003484.15	26.680	019-003939-15
27.155	16		019-003484.16	26.700	019-003939-16
27.165	17		019-003484.17	26.710	019-003939-17
27.175	18		019-003484.18	26.720	019-003939-18
27.185	19		019-003484.19	26.730	019-003939-19
27.205	20		019-003484.20	26.750	019-003939-20
27.215	21		019-003484.21	26.760	019-003939-21
27.225	22		019-003484.22	26.770	019-003939-22
27.255	23		019-003484.23	26.800	019-003939-23

ALIGNMENT OF YOUR TRANSCEIVER

This equipment has been carefully aligned and adjusted at the factory by specially trained personnel using precision equipment. Alignment should not be attempted until all other possible causes of faulty operation have been investigated. Alignment should not be required unless the unit has been tampered with or component parts have been replaced in the RF or IF stages. Alignment should be performed only by persons familiar with transistorized communications equipment and experienced in its alignment.

NOTE

All alignment and performance specifications stipulated in the manual were performed at nominal dc input of 14.0 volts.

EQUIPMENT REQUIRED.

RECEIVER

1. Standard, AM-type signal generator covering the frequency range of at least 455 KC to 27,255 MC, modulated 30% with either 400 or 1000 CPS. Generator should be capable of being accurately adjusted to 455.0 KC.
2. Output meter (or AC vacuum tube voltmeter) connected across speaker terminals (or 8.0 ohm termination).
3. 0.1 μ F, 200V capacitor.

TRANSMITTER

1. 50-ohm non-reactive dummy load (two 100-ohm 2-watt resistors in parallel).
2. RF power output indicator connected across above load.

GENERAL

1. Plastic screwdriver, 1/8-inch tip.
2. Hexagonal alignment tool (GC NO. 8606 or equivalent) for transmitter and insulated screwdriver for receiver RF and IF.

ALIGNMENT PROCEDURE.

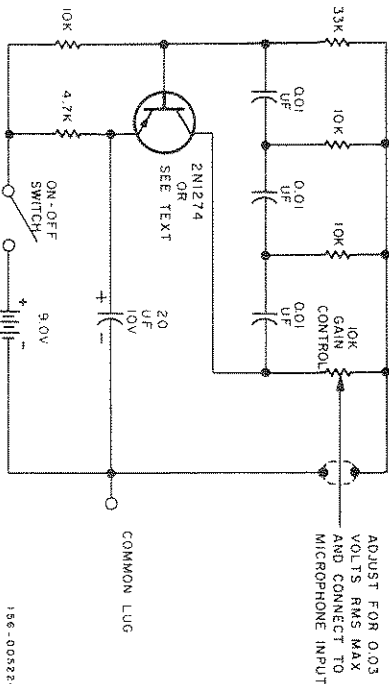
TRANSMITTER

The transmitter oscillator coil, T1, has been adjusted at the factory for series-resonant crystal operation. This coil should not be tampered with as off-frequency, illegal operation may result. The FCC requires that persons making transmitter frequency adjustments be licensed commercial radio-telephone operators, second class or higher, and that they have adequate frequency-measuring equipment. For proper on-frequency operation of this transceiver, use only standard military-type CR-81/U, third-overtone, series-resonant crystals.

The transmitter output circuit has been adjusted at the factory to match an antenna load impedance of 50 ohms. It is recommended that, after the unit has been completely installed as either a base or mobile unit and with the antenna to be employed connected to the unit, a VSWR measurement should be made. If this measurement indicates a VSWR in excess of 1.5:1, the antenna should be adjusted to provide the best possible match. If alignment of the driver coil (T2) or the output coils L6 and L7 is considered necessary, due perhaps to component replacement associated with this circuitry, THESE ADJUSTMENTS MUST BE MADE with modulation applied in

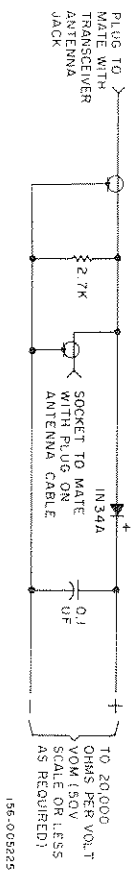
order to achieve the maximum positive modulation percentage. If these adjustments are made under carrier only conditions the modulation percentage will be lower than the maximum capability of the transceiver.

An audio generator set to approximately 1000 cycles and 5 to 10 millivolts (0.005-0.01 volts) maximum RMS output connected to the microphone input on the printed circuit board and a peak reading VTVM across the antenna output terminal are required to properly align T2, L6 and L7. If an audio oscillator is not available the following schematic shows a simple oscillator circuit that requires very few components for use during transmitter tune-up.



156-005224

A peak reading probe can also be simply assembled and used in conjunction with a VOM.



156-005225

With the test oscillator turned ON and connected to the microphone input terminal and shield grounded, the probe connected to the antenna terminal and chassis (Note antenna or load must also be connected), adjust T2, L6 and L7 with a hexagonal plastic tool for maximum deflection (highest reading) on the VOM. The transceiver bottom cover must be removed from its cabinet for this alignment.

IMPORTANT

The alignment procedure should be followed closely in order to produce proper overall performance. It is important that the signal generator employed be capable of being accurately adjusted to $\pm 0.2\%$ of 455 KC; if not, a heterodyne frequency meter should preferably be used to check the signal generator frequency. (Remove audio modulation from generator when checking frequency.)

CAUTION

The CB-20 employs electronic switching rather than the more conventional relay. The speaker leads are therefore at a positive potential above ground equal to the source voltage. DC isolation of the common ground associated with some types of test equipment, may be necessary when these speaker leads are terminated by such test equipment.

RECEIVER RF AND IF ALIGNMENT

ALIGNMENT	CONNECTIONS	GENERATOR FREQUENCY	CHANNEL CRYSTAL	ADJUST
455 KC IF Transformers	Signal Generator to first mixer base through 0.1 uF capacitor.	455 KC $\pm 0.2\%$	None	Top of T ₆ , T ₇ , T ₉ , and T ₁₀ . Keep reducing the generator output to maintain the output level below 1/2 watt (volume control fully clockwise).
RF Bandpass Coil	Signal generator to antenna input connector.	Tune for peak at 27.085 MC	11 (27.085 MC)	Top of T ₃ at 1 T ₅ with a low-level signal-generator input for maximum output.
Antenna Coil	Signal generator to antenna input connector.	Tune for peak at 27.085 MC	11 (27.085 MC)	Top of T ₃ with low-level signal-generator input for maximum output.

NOTE: Repeat both RF and antenna coil adjustments above to assure proper bandpass symmetry. T₈ slug is adjusted for best oscillator starting using a minimum activity channel 21 crystal.

TRANSMITTER RF ADJUSTMENT

ADJUSTMENT	CONNECTIONS	CHANNEL CRYSTAL	ADJUST
Power Output	Dummy load to antenna socket. Power output indicator across load.	11 (27.085 MC)	DO NOT ADJUST T ₁₁ . See previous detailed instructions for alignment of T ₂ , L ₆ and L ₇ .

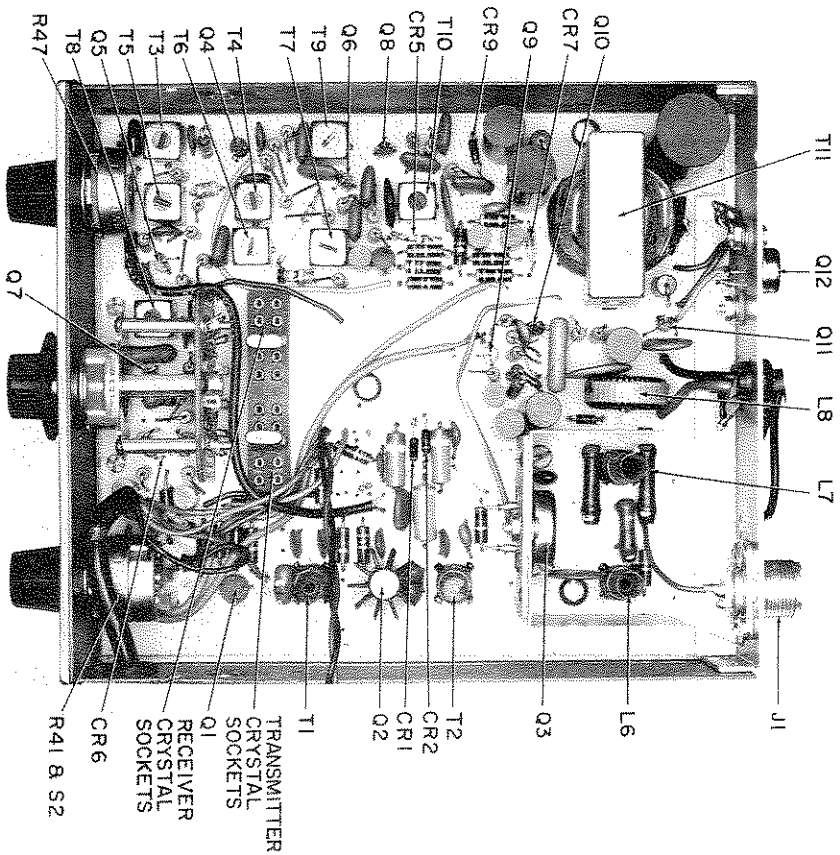
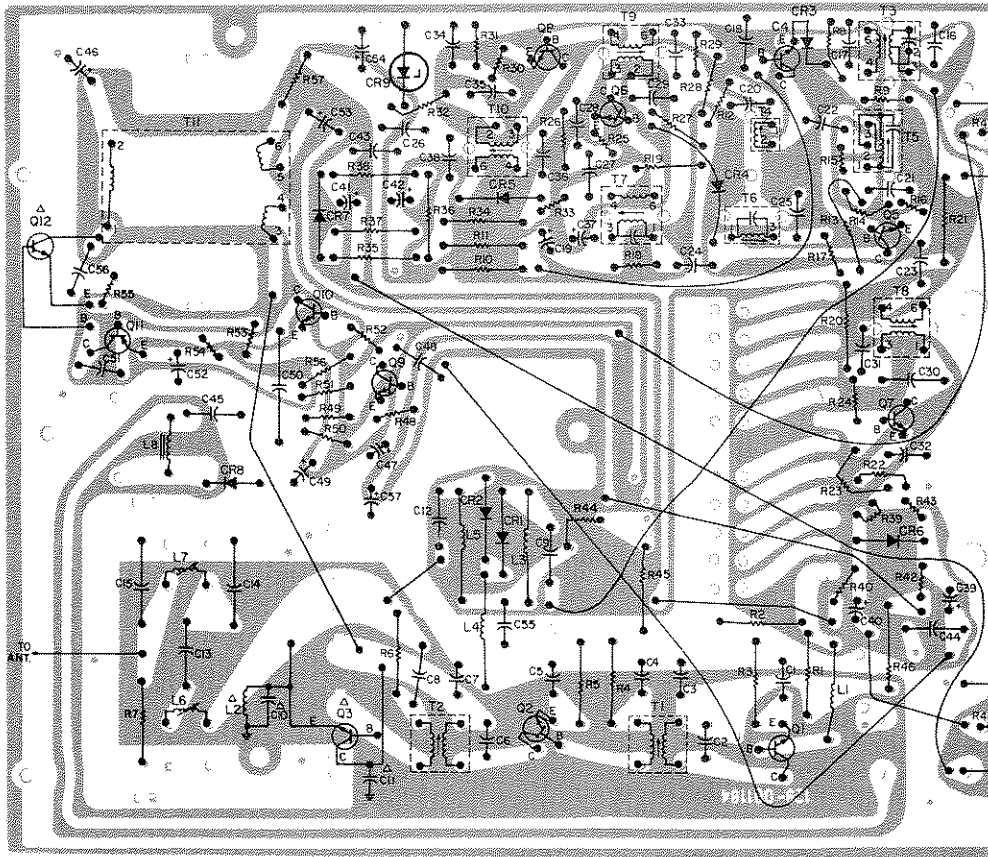


Figure 4. Bottom Chassis View.

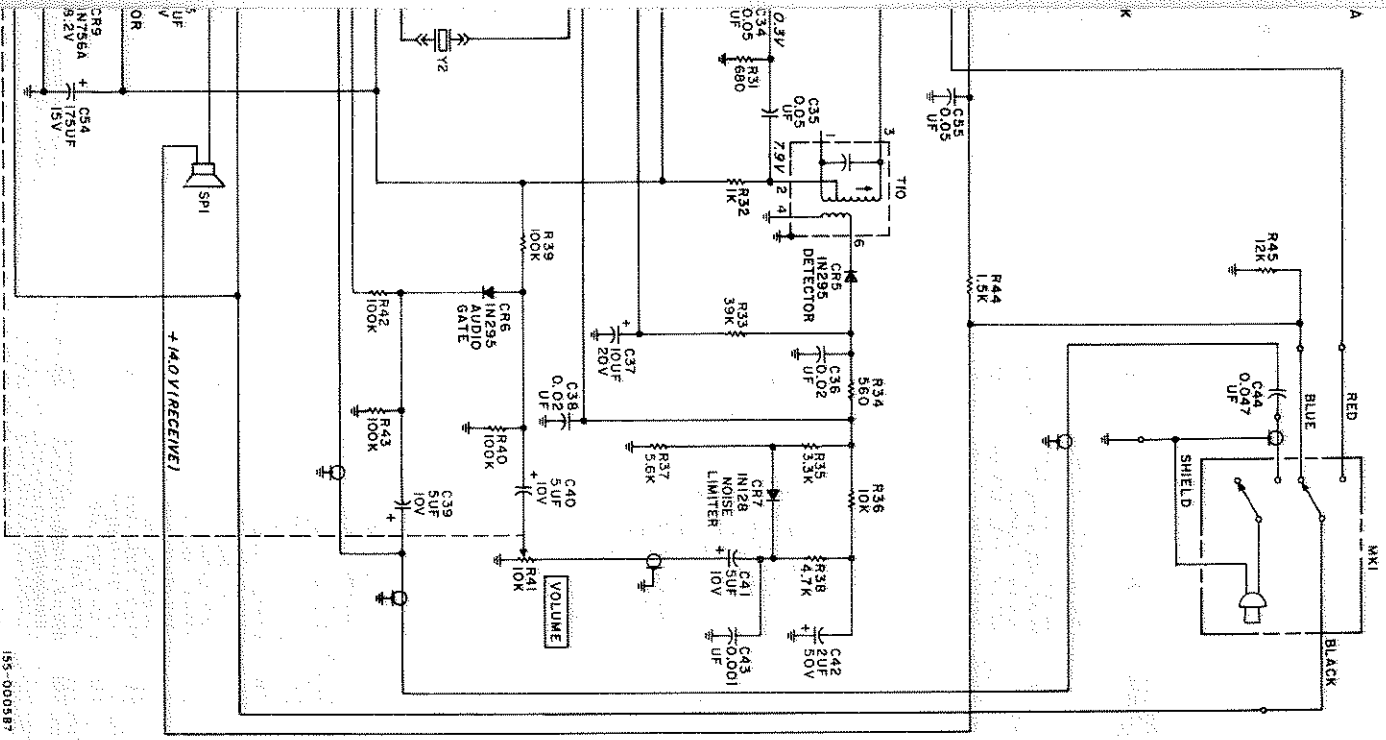
156-008623

TRANSCIVER PRINTED CIRCUIT BOARD

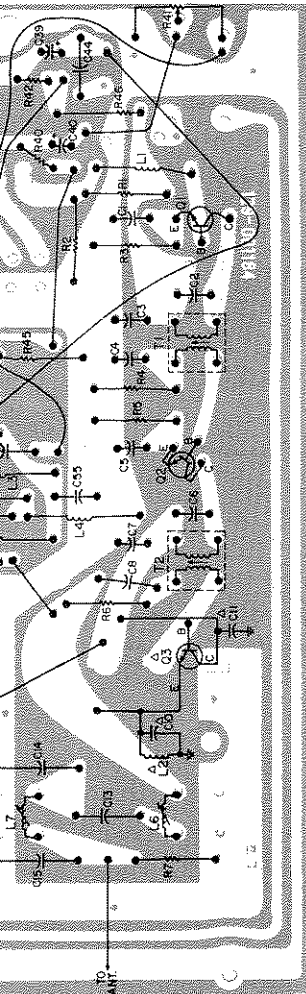


NOTES:
 1. WIRING SHOWN FROM FOIL SIDE OF BOARD.
 2. Δ INDICATES COMPONENT NOT PHYSICALLY LOCATED ON BOARD.

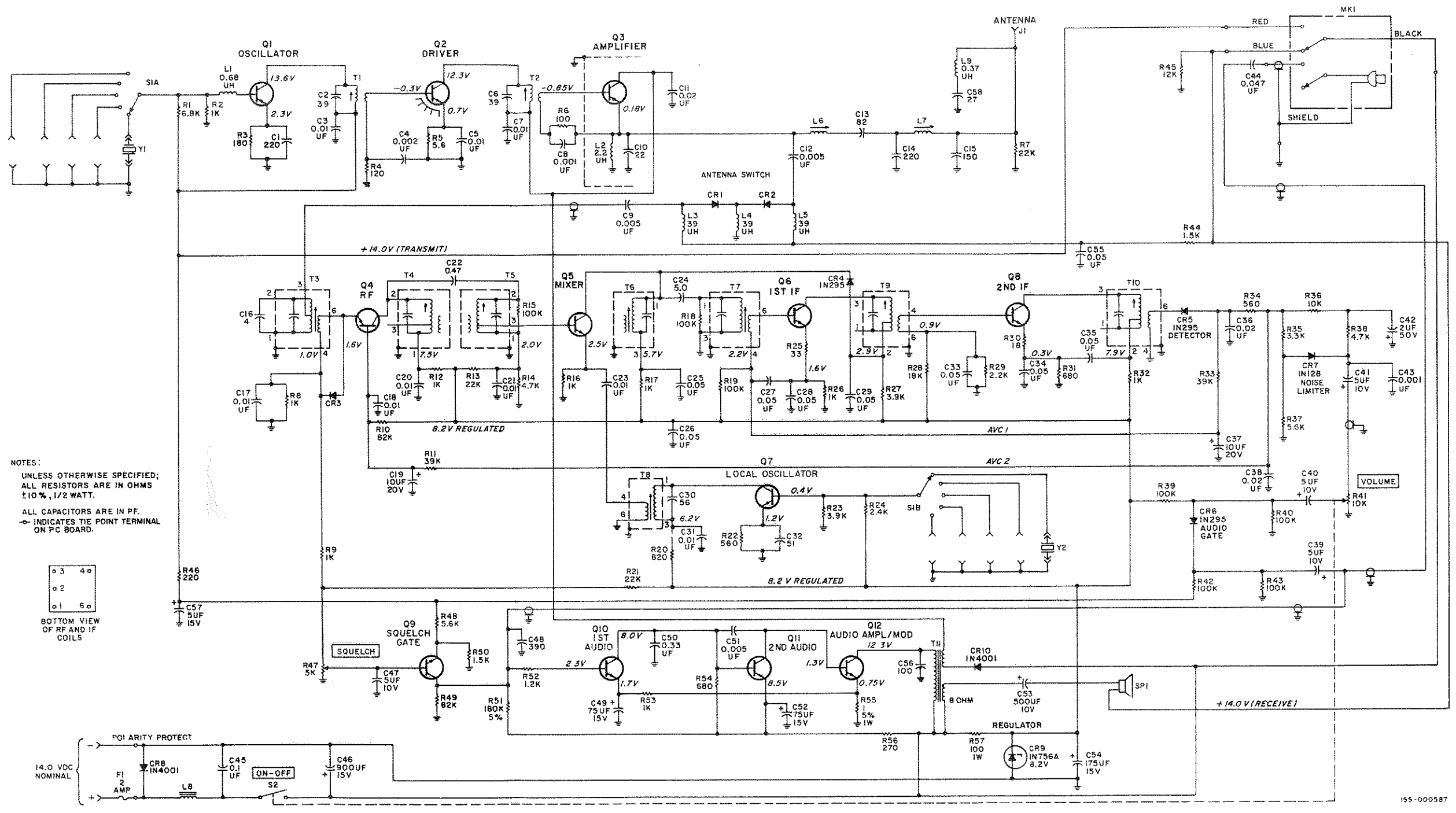
156-008622



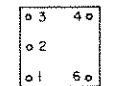
155-000587



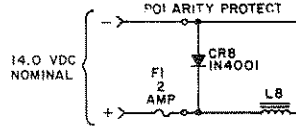
PCB BOARD



NOTES:
UNLESS OTHERWISE SPECIFIED;
ALL RESISTORS ARE IN OHMS
±10%, 1/2 WATT.
ALL CAPACITORS ARE IN PF.
→ INDICATES TIE POINT TERMINAL
ON PC BOARD.



BOTTOM VIEW
OF RF AND IF
COILS



Model CB-20 Schematic Diagram.

SERVICE REPAIR PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number	Schematic Symbol	Description	Hallicrafters Part Number	Schematic Symbol	Description	Hallicrafters Part Number
CAPACITORS								
C1	220 P.F. 2%, 100V, Mica	493-010221-314	C54	175 μ F, -10%, +100%, 15V, Electrolytic	045-001427	L1	Choke, R.F. 0.68 μ H	050-001860
C2	39 P.F. 10%, N-750 Ceramic Tubular	491-108390-095	C56	100 P.F., 2%, 100V, Mica	493-110101-314	L2	Choke, 2.2 μ H	053-000554
C3, 5, 7	0.01 μ F, +80%, -20%, 50V, Ceramic Disc	047-001140	C57	5 μ F, 15V, Electrolytic	045-001959	L3, 4, 5	Coil, Final Amp. Tune	050-002711
C4	0.002 μ F, 20%, 500V, Ceramic Disc	047-100395	*RESISTORS			L6	Coil, Final Amp. Load	050-002698
C6	39 P.F. 2%, 500V, Mica	493-110390-333	R1	6800 Ohm	451-252682	L7	Coil, Final Amp. Load	050-002698
C8, 43	0.001 μ F, 20%, 500V, Ceramic	047-001671	R2, 8, 9	1000 Ohm	451-252102	L8	Choke, Hash	050-001748
C9, 12,	0.0005 μ F, 20%, 500V, Ceramic Disc	047-000442	R3	180 Ohm	451-252181	L1, 2	Coil, Driver	050-002697
C10	22 P.F. 2%, 100 V, Mica	493-110220-311	R4	120 Ohm	451-252121	T3, 4, 5	Transformer, RF	050-002703
C11,	0.02 μ F, 20%, 500V, Ceramic Disc	047-000471	R5	5.6 Ohm	451-252056	T6, 7	Transformer, Mixer	050-002704
C13	82 P.F., 10%, N-750 Ceramic Disc	491-126820-095	R6	100 Ohm	451-252101	T8	Transformer, Local Osc.	050-002707
C14	220 P.F. 10%, N-750, Ceramic Tubular	491-156221-095	R7, 13	22 K Ohm	451-252223	T9	Transformer, 1st IF	050-002705
C15	150 P.F. 10%, N-750, Ceramic Tubular	491-126151-095	R10, 49	82 K Ohm	451-252823	T10	Transformer, 2nd IF	050-002706
C16	4 P.F., 2%, 100V, Mica	493-110040-311	R11, 33	39 K Ohm	451-252393	T11	Transformer, Audio	055-000579
C19, 37	10 μ F, -10%, +100%, 20V, Electrolytic	045-001425	R12, 34	560 Ohm	451-252152	DIODES, TRANSISTORS AND CRYSTALS		
C22	0.47 P.F. 10%, 500V, Composition	047-000403-015	R23, 34	560 Ohm	451-252152	CR1, 2, 3	Diode	019-005043
C24	5.0 P.F., +10%, NPO Ceramic Tubular	491-002050-025	R24, 27	3900 Ohm	451-252361	CR4, 5, 6	Diode, Type 1N295	019-001980
C28, 26	0.05 μ F, +80%, -20%, 50V, Ceramic Disc	047-001144	R24	2400 Ohm, 5%	451-252392	CR7	Diode, Type 1N128	019-002718
C27, 28,	29, 33,		R25	33 Ohm	451-252330	CR8, 10	Diode, Type 1N4001	019-003429
C34, 35,			R29	2200 Ohm	451-252222	CR9	Diode, Type 1N750A	019-003928
C30	56 P.F. 10%, N-750, Ceramic Tubular	491-126560-095	R30	18 Ohm	451-252180	Q1	Transistor, Type 2N3642	019-003932
C32	51 P.F. 10%, N-750 Ceramic Tubular	491-106510-095	R31, 54	680 Ohm	451-252681	Q2	Transistor, Type 2N3723	019-003934
C39, 40	51 μ F, -10%, +100%, 10V, Electrolytic	045-001424	R32	10 K Ohm	451-252193	Q3	Transistor, Type SE3034	019-003935
C42	2 μ F, -10%, +100%, 50V, Electrolytic	045-001423	R37, 48	5600 Ohm	451-252382	Q4	Transistor, Type 2N3584	019-003929
C44	0.047 μ F, 20%, 250V, Flat Foil	047-002141-005	R41	Variable, 10 K Ohm, +30%, 1/4 Watt, SQUELCH	025-002764	Q5, 6, 7,	Transistor, Type MPS6514	019-005006
C45	0.1 μ F, +80%, -20%, 50V, Ceramic Disc	047-001146	R45	12 K Ohm	451-252123	Q11	Transistor, Type MPS6534	019-005010
C46	900 μ F, -10%, +100%, 15V, Electrolytic	045-001428	R46	220 Ohm	451-252221	Q12	Transistor, Type 36634	019-003485
C48	390 P.F., 2%, 100V, Mica	493-110391-314	R47	Variable, 5 K Ohm, +30%, 1/4 Watt, SQUELCH	025-002765	Y1	Crystal, Transmit	019-003484-011
C49, 52	75 μ F, -10%, +100%, 15V, Electrolytic	045-001954	R51	180 K Ohm, 5%	451-251184	Y2	Crystal, Receive	019-003939-011
C50	0.33 μ F, 20%, 250V, Flat Foil	047-002141-010	R52	1200 Ohm	451-252122	MISCELLANEOUS		
C53	500 μ F, +100%, 10V, Electrolytic	045-001938	R55	1 Ohm, 5%, 1 Watt, Wire-wound	453-021010	J1	Bracket, Heat Sink	057-013482
*All RESISTORS are carbon type, 10%, 1/2 Watt unless otherwise specified.								

COILS AND TRANSFORMERS

L1	Choke, R.F. 0.68 μ H	050-001860	CR1, 2, 3	Diode	019-005043
L2	Choke, 2.2 μ H	053-000554	CR4, 5, 6	Diode, Type 1N295	019-001980
L3, 4, 5	Coil, Final Amp. Tune	050-002711	CR7	Diode, Type 1N128	019-002718
L6	Coil, Final Amp. Load	050-002698	CR8, 10	Diode, Type 1N4001	019-003429
L7	Coil, Final Amp. Load	050-002698	CR9	Diode, Type 1N750A	019-003928
L8	Choke, Hash	050-001748	Q1	Transistor, Type 2N3642	019-003932
L1, 2	Coil, Driver	050-002697	Q2	Transistor, Type 2N3723	019-003934
T3, 4, 5	Transformer, RF	050-002703	Q3	Transistor, Type SE3034	019-003935
T6, 7	Transformer, Mixer	050-002704	Q4	Transistor, Type 2N3584	019-003929
T8	Transformer, Local Osc.	050-002707	Q5, 6, 7,	Transistor, Type MPS6514	019-005006
T9	Transformer, 1st IF	050-002705	Q11	Transistor, Type MPS6534	019-005010
T10	Transformer, 2nd IF	050-002706	Q12	Transistor, Type 36634	019-003485
T11	Transformer, Audio	055-000579	Y1	Crystal, Transmit	019-003484-011

SP1 Speaker
S1 Switch, Rotary, CHANNEL Selector
F1 Fuse, 2.0 Ampere, 3AG, Fast Blow