Instructions

Model 16S400

RCA Scanning Monitor
Home and Mobile
10 Channel - 4 Band
VHF-LO • VHF-HI • UHF • UHF "T"

Important: Read instructions thoroughly before operation

RCA Scan-Aire

GENERAL DESCRIPTION

The RCA 16S400 Scan-Aire is an all solid state, dual conversion FM receiver designed to monitor public service broadcasts in the low VHF (30-50 MHz), high VHF (150-174 MHz), UHF (450-470 MHz), and UHF-T (470-512 MHz) communications bands. These bands include police departments, fire departments, ambulance services, civil defense, local government, radio telephone, forestry, marine channels, weather, and various industrial services.

The receiver features ten crystal-controlled channels which can be selected manually or by automatic scanning action. The manual mode permits the operator to select and hold any one channel of particular interest.

The scan mode provides continuous automatic switching to each channel in sequence. When an incoming signal is received on any one of the scanned channels, the receiver will stop scanning and lock-on to the "active" channel. A variable scan-delay control located on the front panel of the receiver can be adjusted to keep the channel locked from 0 to 4 seconds after the signal transmission ends so that the listener can hear the replying station. If no reply is received within the set time, the receiver will start scanning again. A two position switch located on the rear panel of the receiver permits the listener to select either a fast or slow scan speed.

Each of the ten channel positions can be programmed (by internal slide switches) to receive any combination of low VHF, high VHF, or UHF/UHF-T channels. Lock-out switches are provided for each channel to prevent undesired channels from receiving signals. This feature is useful when the listener wants to by-pass a very active channel that dominates reception and prevents the receiver from scanning less active channels.

Other features include a squelch control which eliminates background noise when no signal is present, an external speaker (or earphone) jack, and two antenna jacks (one for VHF-one for UHF) for use with the antennas provided or with external antennas. The receiver is designed to operate from a 120 volt ac outlet or a 12 volt battery by means of power cords supplied. For mobile installations, a mounting bracket is provided.

FEATURES

- Automatically monitors public safety broadcasts
- Each channel programmable for every band
- Separate lock-out switch for each channel
- LED Channel indicator Lights
- Easy access to crystal compartment
- Operates on 120 volt ac or 12 volt dc
- Noise squelch control
- Automatic and Manual scan control
- Variable scan delay control – 0 to 4 seconds
- Solid state with integrated circuits
- Dual conversion I.F. – 10.7 MHz and 455 kHz
- Crystal filters for selectivity
- Drift free ceramic discriminator
- Built-in speaker
- External speaker jack
- External antenna jacks
- Separate VHF and UHF telescoping antennas included
- Two power cords – 12V dc and 120V ac
- Mobile mounting bracket
- Varactor tuned for full UHF coverage
- Two-speed scan control

SPECIFICATIONS

Channels ..... 10 Crystal Controlled

Frequency Range	
VHF-Lo	30-50 MHz
VHF-Hi	150-174 MHz
UHF/UHF-T	450-512 MHz
RF Alignment (6 dB Bandwidth)	
VHF-Lo	33-47 MHZ
VHF-Hi	153-163 MHz
UHF/UHF-T	450-508 MHz
Sensitivity (20 dB Signal/Noise)	
VHF	0.4 μV
UHF	0.8 μV
Squelch Sensitivity	Variable from less than 1.0μV
Selectivity	6 dB @ ± 8 KHz 50 dB @ ±20 KHz
Intermediate Frequencies	
1st I.F.	10.7 MHz
2nd I.F.	455 KHz
Modulation Acceptance	±7 KHz
Scan Rate (Nominal)	10 Channels/Sec or 20 Channels/Sec
Scan Delay (Variable)	0-4 Sec
Audio Output	2 Watts
External Speaker Impedance	4-8 ohms
Antenna Impedance	50 ohms
Crystal Type	HC-25/U
AC Power Requirements	
Voltage	110-125 volts ac
Frequency	60 Hz
Power	13 Watts
DC Power Requirements	
Voltage (Negative ground only)	12 to 16 volts dc
Current (Squelched-Full Volume)	180-600 mA

Size: 7-3/4 (W) x 2-5/8 (H) x 8-1/2 (D) (20 cm x 7 cm x 22 cm)

Weight: 4 lbs. 5 oz. (1.96 kilograms)

ACCESSORIES SUPPLIED

VHF telescoping antenna
UHF telescoping antenna
AC power cord
DC power cord
Mounting bracket (with hardware)
Owner's manual

CONTROL AND CONNECTOR FUNCTIONS

On-Off/Volume: Turns the receiver power on or off, and also varies the audio output level.

Squelch: This control eliminates the annoying "rushing" sound that is present between transmissions when no signal is being received. Proper setting of this control keeps the receiver "quiet" and allows scanning until a signal is received.

Scan Delay: This control permits the listener to vary the delay time (0 to 4 seconds) before scanning resumes following the end of a transmission. Delay allows time for a replying station to be heard. Zero delay permits immediate switching when stations are operating duplex (base on one frequency and mobile on another).

Auto/Manual: This push-button switch selects either the manual or automatic scan mode of operation.

Channel Select: This push-button selects the desired channel in the manual mode of operation.

Channel Indicator Lights: The indicator lights (light emitting diodes) located on the front panel above the lock out switches show which channel is "on" at any particular instant. During automatic scan operation, these lights will flash in sequence from left to right until a signal is received on one of the channels.

Channel Lock-Out Switches: These switches are used to turn each individual channel on or off. When a channel lock-out switch is set to the off position (down), the corresponding channel is by-passed and will not light or receive signals in either the manual or automatic scan mode.

Scan Speed Switch: This slide switch, located on the rear panel allows selection of fast or slow scan speed.

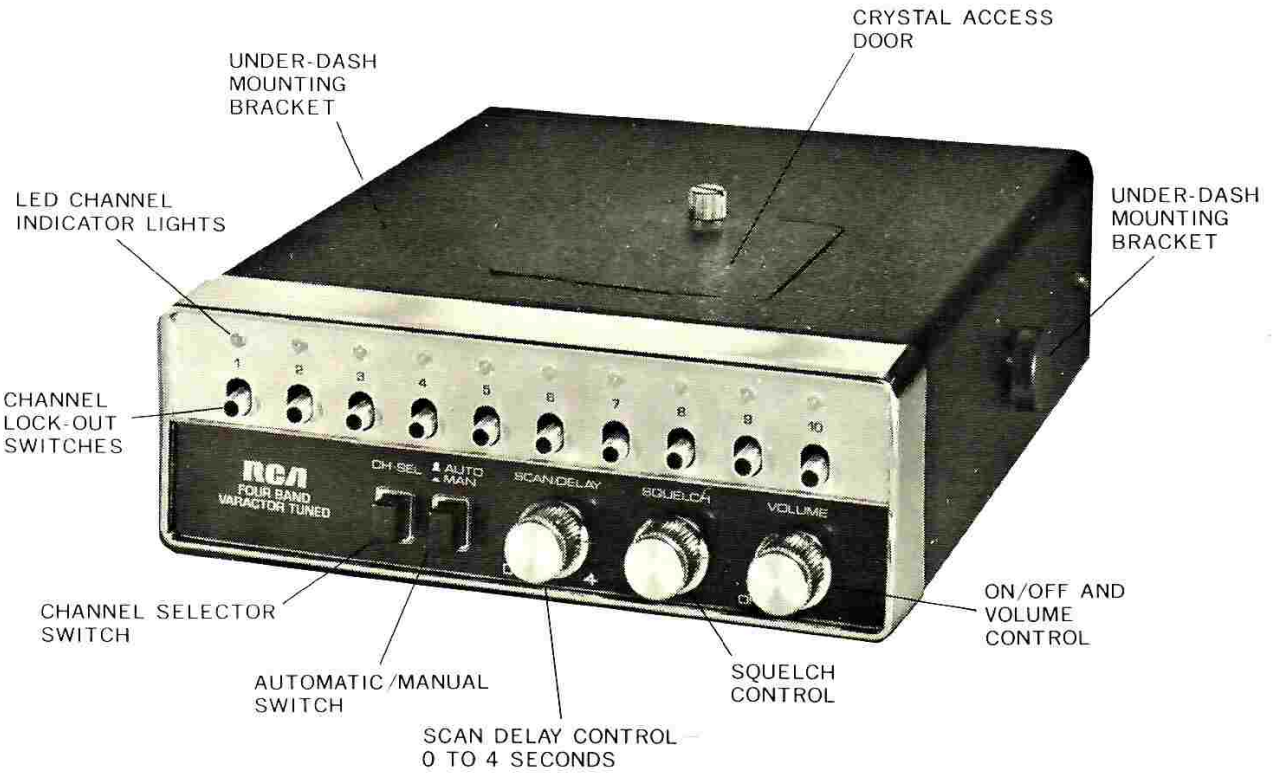
Antenna Jacks: Two antenna jacks are provided on the rear panel of the receiver — one for VHF and one for UHF. These may be used to connect the VHF and UHF telescoping antennas provided, or, for increased listening range, outdoor-type antennas available from your dealer.

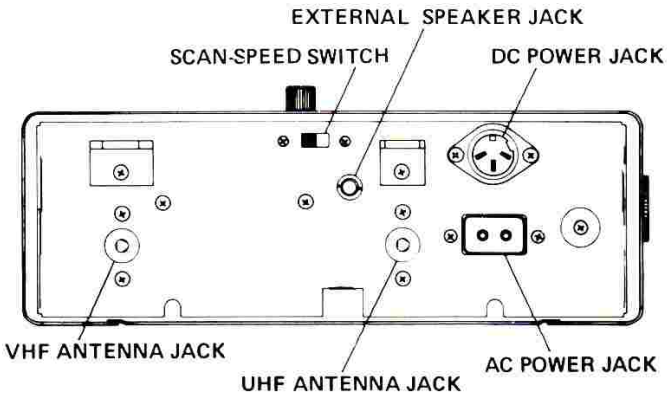
AC Power Jack: This jack connects the ac power cord (provided) to the receiver to permit operation from a standard 120 volt ac outlet.

DC Power Jack: This jack connects the two-wire power cable (provided) to the receiver to permit operation from a 12 volt negative ground battery supply. The red (+) wire of this cable contains a fuse holder (1.5 amp fuse).

External Speaker Jack: This jack permits a 4 to 8 ohm external speaker or miniature earphone to be connected to the receiver.

Crystal Compartment: Plug-in type crystal sockets and band program switches are located in this compartment.





INSTALLATION AND PREPARATION

Crystal Selection and Installation: Crystals are not included with the Scan Aire receiver because of the thousands of different frequencies which your scanner can accept. Your dealer can help you select the low VHF, high VHF, and UHF crystals which are active in your area.

To install the crystals in the receiver, remove the crystal compartment door and insert one to ten crystals in the sockets as illustrated. Each crystal socket position can be used for

low VHF (L), high VHF (H), or UHF/UHF-T (U/T) crystals (in any combination). To program the receiver for the combination of crystals selected, set the program switches (inside the crystal compartment) to the proper one of the three positions "L", "H", or "U/T", for each channel number in accordance with the operating band of the installed crystal.

Should you find it necessary to order crystals for your Scan Aire receiver, the following information should be specified:

A. Crystal Frequency Determination

1. Low VHF crystal frequency = channel frequency (MHz) +10.7
2. High VHF crystal frequency = $\frac{\text{channel frequency (MHz)} - 10.7}{3}$
3. UHF/UHF-T crystal frequency = $\frac{\text{channel frequency (MHz)} - 10.7}{9}$

B. Crystal Specifications:

1. Frequency tolerance (Min)

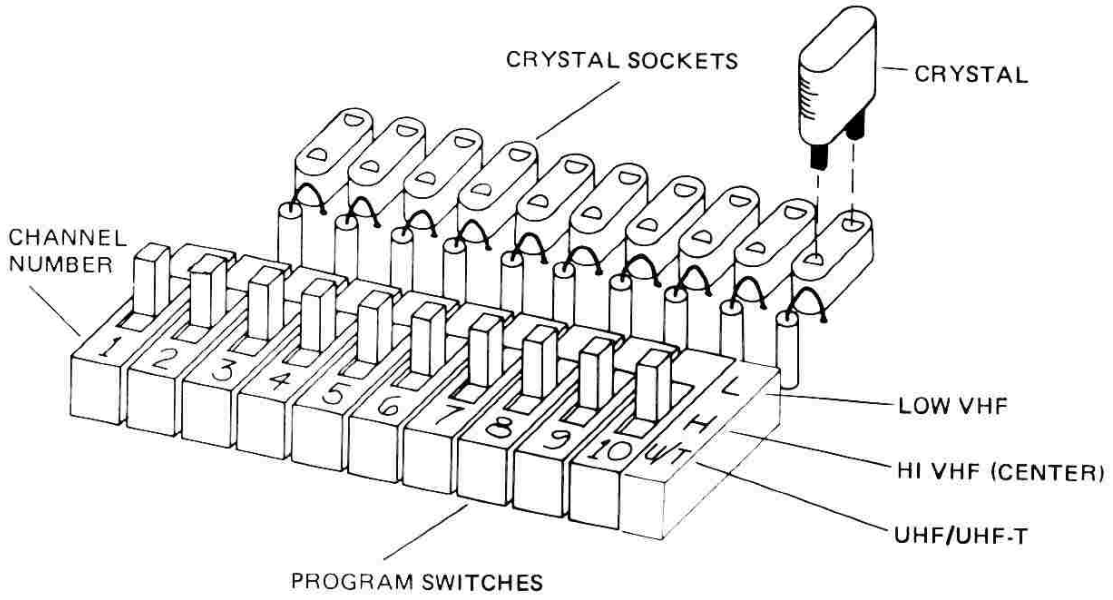
Low VHF	.002%
High VHF	.002%
UHF/UHF-T	.001%

2. Mode of oscillation ..... 3rd overtone
3. Load capacity for Oscillator Correlation

Low VHF	Series resonance – 450 Hz
High VHF	Series resonance – 450 Hz
UHF/UHF-T	18 pf

4. Crystal Unit Shunt capacity (max) ..... 6 pf
5. Series resistance (max) ..... 35 ohms
6. Drive level (max)..... 2 milliwatts
7. Crystal plug-in holder HC-25/U

CRYSTAL COMPARTMENT



Home Installation: No special mounting is required for indoor use. The scanner is designed for shelf or table-top operation.

Power Cord: For operation from a 120 Volt ac outlet, connect the power cord (provided) into the jack located on the rear panel of the receiver.

Antennas: Separate VHF and UHF antenna jacks are located on the rear panel of the receiver. For local signal reception, plug the VHF (long) and the UHF (short) telescoping antennas provided into their respective jacks. Extend the telescoping sections to the length providing the best performance.

To receive weak signals from distant stations, an outdoor-type external antenna may be required. An antenna tuned to the desired frequency bands is recommended. For best performance the antenna should be mounted as high as practical. See your dealer for available antenna models.

External Speaker: If remote or private listening is desired, an external speaker of 4 to 8 ohms impedance or earphone may be plugged into the "EXTSP" jack located on the rear panel of the receiver.

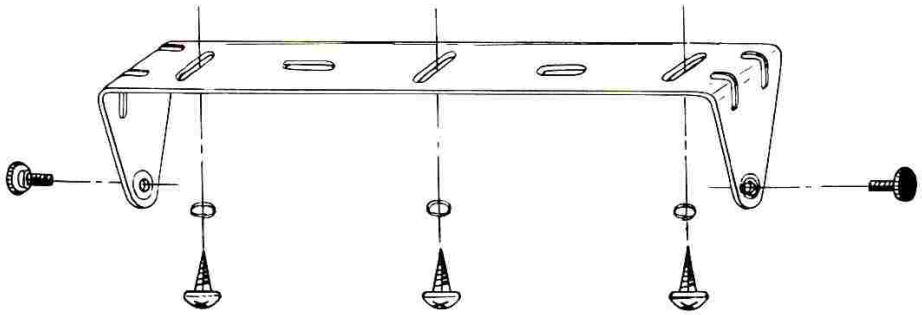
Mobile Installation

Mounting: A mounting bracket and hardware are included for mobile installations. Follow illustration for details.

Power Connection (Negative Ground): Connect the red fused wire of the dc power cable (provided) to the positive terminal of the 12 Volt dc supply. The cable's brown wire should be connected to the negative terminal or chassis ground.

Antennas: For mobile operation, various types of mobile antennas are available from mobile radio suppliers. Follow the installation directions provided with the antenna.

BRACKET MOUNTING



OPERATION

NOTE: YOUR USE OF YOUR RCA SCANNER MAY BE SUBJECT TO FEDERAL, STATE OR LOCAL LAWS. RCA CANNOT BE RESPONSIBLE FOR ANY USE WHICH IS LIMITED OR RESTRICTED BY SUCH LAWS.

1. Set all lock-out switches to "on" (up).
2. Turn the squelch control fully clockwise.
3. Turn the receiver on with the On-Off/Volume control. Adjust the volume control to a comfortable listening level.

4. With no signal present (between transmissions) adjust the squelch control counter-clockwise (CCW) until the "rushing" background noise stops. Important: Do not turn the squelch control any further counterclockwise than the point required to stop the background noise. To do so will decrease the receiver's signal pick-up sensitivity.

   After the squelch control is adjusted properly, the receiver will now scan and operate normally in the manual or the automatic mode.
5. For single channel manual operation depress the AUTO/MANUAL button to "MAN", then select the channel desired by pressing the channel selector button momentarily one or more times until the desired channel is obtained. A channel indicator light will indicate the channel that has been activated.
6. For automatic scan operation, press and release the AUTO/MANUAL button to the "AUTO" position. The receiver will automatically switch to each channel in sequence as indicated by the channel indicator lights. Scanning will continue until an active channel is received.
7. Set the Scan Speed Switch to FAST (Hi) or SLOW (Lo) as desired.

If it is desired by-pass one or more channels in the scanning sequence, the lock-out switch for the unwanted channel(s) should be set in the "off" position (down). This feature is particularly useful when one of the channels being received is from a continuous transmission type station such as the national weather service (162.40 MHz and 162.55 MHz).

LIMITED WARRANTY

RCA warrants this product against defects in material and workmanship for a period of one year from date of purchase.

In case of failure of this product within one year following purchase, simply return the unit properly packed to prevent damage, freight prepaid to:

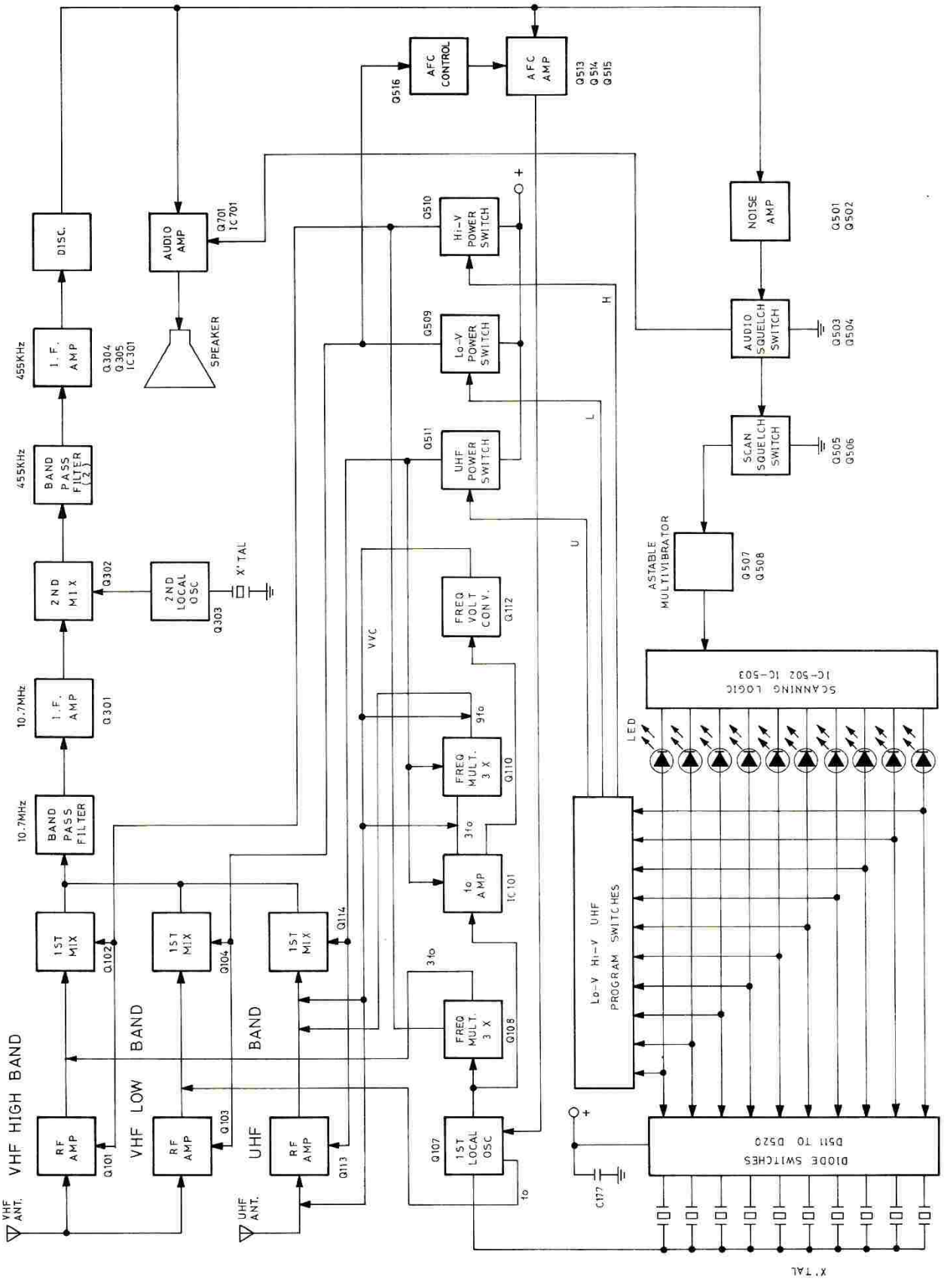
RCA Repair Center
Bee Tree Road
Swannanoa, NC 28778

The unit will be repaired or replaced (at RCA's option) at no cost to you.

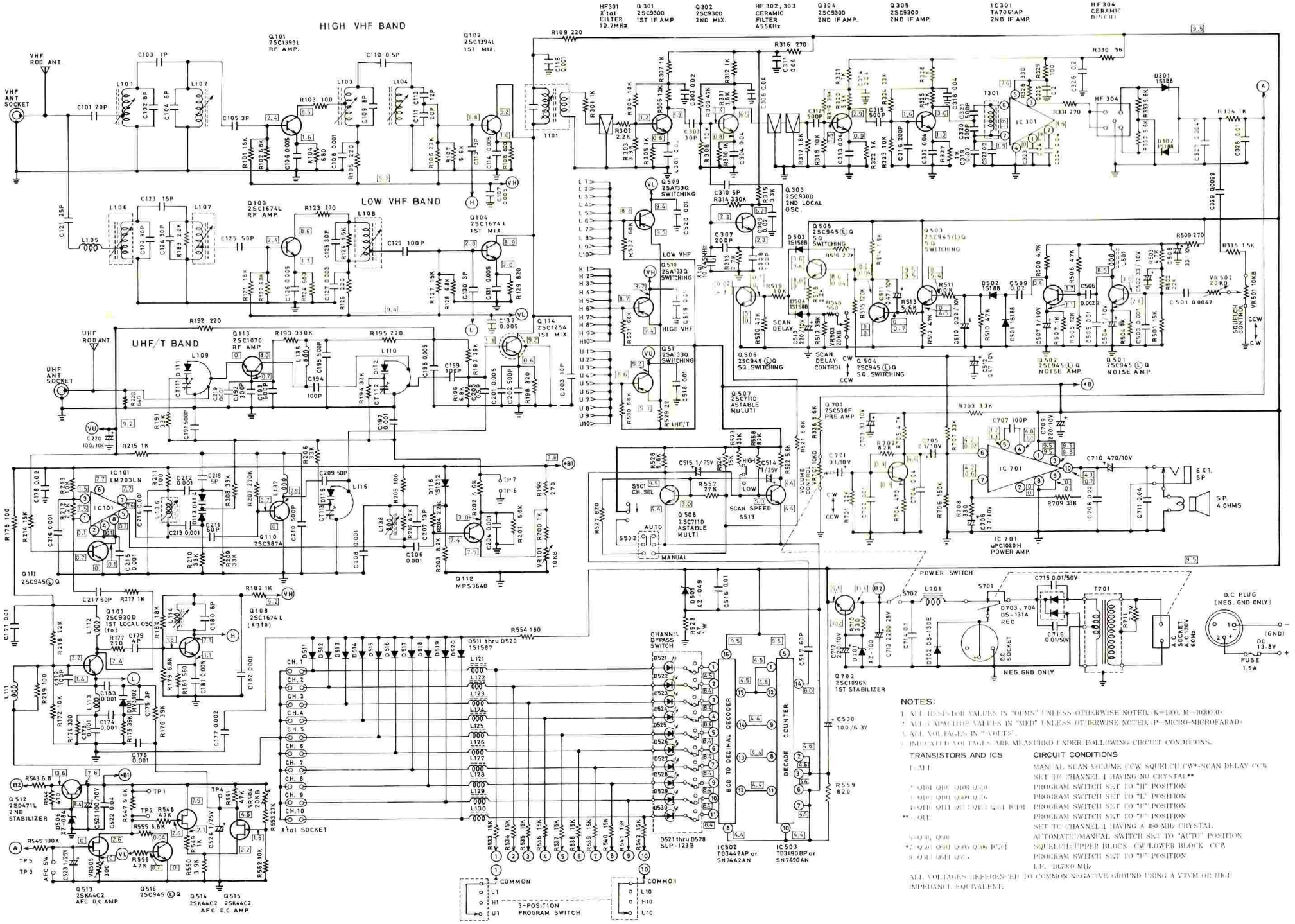
Warranties implied by law are limited to the duration of this written warranty.

The above warranty does not apply to damage caused by Acts of God, misuse or mishandling of the product, nor shall RCA be liable for indirect, incidential, consequential or special damages.

BLOCK DIAGRAM



SCHEMATIC DIAGRAM



NOTES:

1. ALL RESISTOR VALUES IN "OHMS" UNLESS OTHERWISE NOTED. (K=1000, M=1000000)
2. ALL CAPACITOR VALUES IN "MFD" UNLESS OTHERWISE NOTED. (P=MICRO-MICROFARAD)
3. ALL VOLTAGES IN "VOLTS".
4. INDICATED VOLTAGES ARE MEASURED UNDER FOLLOWING CIRCUIT CONDITIONS.

TRANSISTORS AND ICS	CIRCUIT CONDITIONS
[1] ALL	MANUAL SCAN-VOLUME CCW SQUELCH CW*-SCAN DELAY CCW SET TO CHANNEL 1 HAVING NO CRYSTAL**
* Q101 Q102 Q103 Q303	PROGRAM SWITCH SET TO "H" POSITION
[2] Q104 Q301 Q309 Q506	PROGRAM SWITCH SET TO "L" POSITION
[3] Q110 Q111 Q511 Q701 IC101	PROGRAM SWITCH SET TO "1" POSITION SET TO CHANNEL 1 HAVING A 180-MHz CRYSTAL.
** Q113	AUTOMATIC/MANUAL SWITCH SET TO "AUTO" POSITION
[5] Q305 Q308	SQUELCH: UPPER BLOCK - CW/LOWER BLOCK - CCW
*2 Q305 Q501 Q505 Q506 IC701	PROGRAM SWITCH SET TO "1" POSITION
[8] Q511 Q511 Q512	I.F. 10.7000 MHz

ALL VOLTAGES REFERENCED TO COMMON NEGATIVE GROUND USING A VTVM OR HIGH IMPEDANCE EQUIVALENT.

RCA Distributor and Special Products Division

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