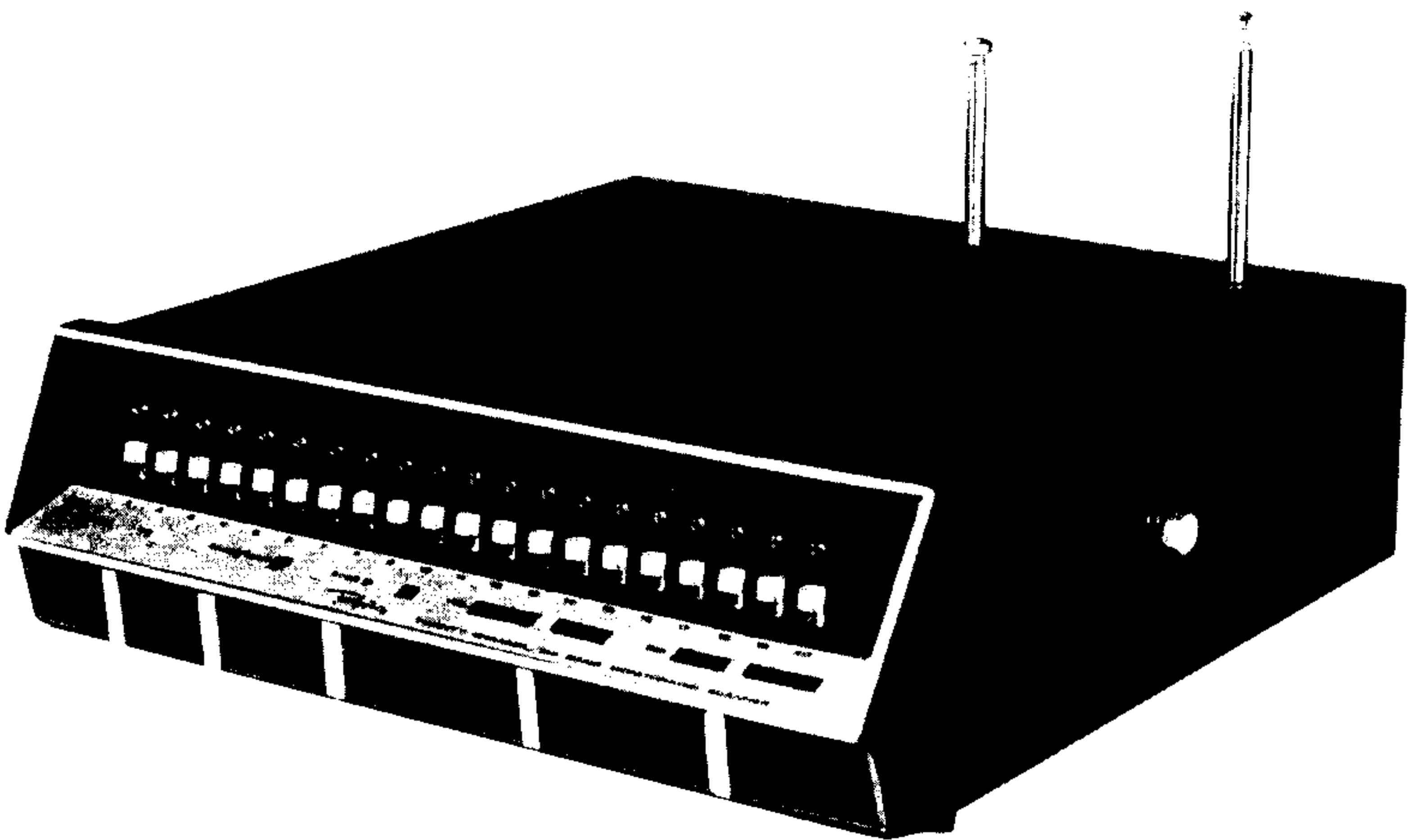




MONITORADIO RECEIVER



MODEL ACT-R20/6 INSTRUCTION MANUAL

UNPACKING

- 1 - Receiver Unit
- 1 - AC Power Cord
- 1 - DC Power Cord
- 2 - Telescopic Antennas
- 1 - Instruction Manual
- 1 - Frequency/Service Label
- 1 - Warranty Card; To be filled out and returned to:
Regency Electronics, Inc.
7707 Records Street
Indianapolis, Indiana 46226

OPERATION

It is highly recommended that the sections on Installation and Operation be read before the initial usage of this unit. A few minutes spent in reading these instructions will certainly reduce the number of questions, and problems, that may arise concerning optimum performance and proper usage.

MAINTENANCE

It is recommended that the services of a qualified electronic technician be used for troubleshooting.

DO NOT TAMPER WITH INTERNAL ADJUSTMENTS.
DAMAGE TO THE EQUIPMENT AND/OR IMPROPER
OPERATION MAY RESULT.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO
NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

DESCRIPTION

The ACT-R 20/6 is a programmable, 20-channel, crystal-controlled multi-band FM Monitor. It is a double-conversion, super-heterodyne receiver designed for use in the narrow-band FM channels of the public service VHF and UHF communications bands. Police, fire, civil defense, and radio telephone are just a few of the numerous services included in the communications bands.

This unit can be programmed internally for any combination (up to twenty channels) of Low VHF (30-38 MHz and 38-50 MHz); High VHF (148-160 MHz and 160-174 MHz); or UHF (450-480 MHz and 480-512 MHz).

Any combination of one to twenty channels can be scanned automatically. Slide switch controls permit the listener to monitor only those channels of immediate interest, or all twenty if he so desires. Manual selection of channels is also provided in case the listener wants to continuously monitor a particular channel.

The ACT-R 20/6 utilizes silicon transistors throughout for dependability. The use of eight Integrated Circuits provides compactness and circuit reliability. A crystal filter employed in the first I.F. and a ceramic filter in the second I.F. ensures optimum performance in areas of the country where many of the services are very closely grouped together. In addition, an Automatic Frequency Control (AFC) circuit (on UHF only) provides automatic adjustment to the receiver's local oscillator frequency in order to compensate for any small change in the station's carrier or receive frequency.

Some extra features include: connections for an external or remote speaker and two outside antennas.

SPECIFICATIONS

(Subject To Change Without Notice)

Frequency Range;

VHF (Low).....	30-38 MHz
VHF (Low).....	38-50 MHz
VHF (High).....	148-160 MHz
VHF (High).....	160-174 MHz
UHF Band.....	450-480 MHz
UHF Band.....	480-512 MHz

Frequency Separation;

VHF Band (Low).....	20 MHz usable sensitivity
VHF Band (High).....	26 MHz usable sensitivity
UHF Band.....	62 MHz usable sensitivity

NOTE: Varactor tuning of RF and oscillator tuned circuits provides the extra feature of maximum extended frequency separation.

Sensitivity (at Tune-Up);

VHF Band (Low).....	0.5 Microvolt for 20 DB Quieting
VHF Band (High).....	0.5 Microvolt for 20 DB Quieting
UHF Band.....	0.7 Microvolt for 20 DB Quieting

Squelch Sensitivity (Threshold);

VHF Band (Low).....	0.3 Microvolt
VHF Band (High).....	0.3 Microvolt
UHF Band.....	0.5 Microvolt

Selectivity..... 6 DB @ ± 7 KHz
50 DB @ ± 18 KHz

Spurious Rejection (except Primary Image)..... 50 DB

Modulation Acceptance..... ± 7 KHz

AFC Range (UHF Only)..... Approx. 10 KHz (± 5 KHz)

I.F. Frequencies..... 1st I.F.: 10.7 MHz
2nd I.F.: 455 KHz (ceramic filter)

Scanning Rate..... Approx. 15 channels per sec.

Audio Output..... 1 Watt @ 5%, or less, distortion;
2 Watts maximum

Power..... 105-130 VAC, 60 Hz @ 15 Watts maximum
11-15 VDC @ 9 Watts maximum

INSTALLATION

117 VAC Installation:

Plug the AC power cable into any 117 VAC, 60 Hz receptacle. The ACT-R 20/6 needs very little ventilation; however, it is good practice to avoid excessively warm locations such as near radiators or heating vents.

For areas with moderate signal strength, the telescopic antenna will be adequate receiving antennas. Insert them through the holes in the cabinet and screw them onto the 6-32 bolts projecting upward. The short (UHF) antenna should be inserted in the hole on the left (as viewed from the front of the unit).

In areas of low signal strength, it may be necessary to use a better antenna system for proper reception. An antenna, such as a ground plane type, mounted as high above the ground as practical will greatly increase the signal strength.

If it is determined that both bands will require an outside antenna, then it is suggested that a dual-band VHF antenna (it covers both 30-50 MHz and 148-174 MHz) be mounted at the top of the mast or whatever is used to vertically support the antennas. The UHF antenna should then be mounted on a cross arm or cross bar several feet below the VHF antenna and at least one foot away from the mast or vertical support. Several manufacturers make special clamps for attaching cross bars or arms to a mast (Antenna Specialists Co. No. ASP-617, for example).

For proper input matching, 50 Ω lead-in coaxial cable such as RG 58/U should be used. A Motorola type antenna plug (Cinch-Jones No. 13B or H. H. Smith No. 1200) will have to be installed on the receiver end of the cables in order to utilize the antenna connectors located on the rear (back) panel of the unit.

An external (or remotely mounted) speaker can be used by first opening the link between terminals No. 2 and No. 3. Then, connect one lead of the external speaker to terminal No. 1 and its other lead to terminal No. 3. An 8 Ω speaker is recommended for optimum performance.

Mobile (12 VDC) Installation:

NOTE: Mobile reception of a POLICE frequency by UN-AUTHORIZED personnel is ILLEGAL in some areas. It is the responsibility of the person making the installation to be sure that the user of this receiver is authorized or cleared through the local police department. Under no conditions can Regency Electronics, Inc., the manufacturer of this set, be held responsible for its unauthorized installation or use.

The ACT-R 20/6 receiver may be used in any car, truck, boat, etc. that has a 12 VDC negative ground system. The red lead with the fuse holder must be connected to the positive terminal side of the battery. The negative or ground connection is normally made through the mounting bracket. If the mounting bracket is not fastened to the metal frame or dash of the vehicle, a separate ground wire will have to be utilized. An 18 gauge conductor, preferably stranded, should be connected to terminal #1 of the rear panel and ran to the nearest negative or ground point of the system.

A "mobile" antenna, with a Motorola type plug on the coax cable, will provide suitable reception and still permit easy removal or installation of the receiver.

OPERATION

Programming Switches:

NOTE: The Scan/Manual, and the Channel Switches are slide type switches. The Channel Selector (STEP), is a momentary, spring return slide switch.

The Scan/Manual Switch is pushed to the left for automatic scanning. To activate a particular channel (provided there is a crystal installed for that channel), the Slide Switch directly above the channel number must also be pushed up. In addition, the receiver must be squelched off for proper scanning action. Slide the Squelch Control to the left until all of the "noise" from the speaker is eliminated.

When the Scan/Manual Switch is pushed to the right, the channel may be selected manually. First, activate the channel you want to monitor. Then push the Channel Selector (STEP) to the right momentarily. Repeat pushing this switch momentarily to the right until the red light above the desired channel number is lighted. Each time the switch is pushed to the right and released, the Scanner moves over one channel. The Scanner automatically skips over channels that are not activated. The receiver can either be squelched or unsquelched when manual selection is used.

Volume Control:

This control varies the audio output level for the internal speaker. It also varies the level of audio present at the external speaker connections. Sliding this control to the right increases the volume.

Squelch Control:

This control eliminates background noise in the absence of a signal. Sliding this control to the right removes all squelch action. Sliding this control to the left until the noise disappears permits the receiver to be "quiet" until an actual signal is received.

OFF/ON Switch:

The OFF/ON Switch is pushed to the right to turn the unit on.

Crystal Installation and Band Programming:

Due to the numerous frequencies or channels involved, the crystal is not normally installed by the factory, but by the seller or owner of the unit. Miniature, plug-in crystals are simply installed by inserting them in the receptacles on the circuit board. Because of the accuracy required, Shepherd Industries' crystals are recommended. They are usually available at the source from which the radio was purchased. Specify exact frequency.

Miniature plug-in crystals are utilized in the receiver. Because of the high accuracy (close tolerance) required, Shepherd Industries' crystals are recommended. If the crystals are ordered from Regency, it is only necessary to specify Part No. 301-532 for High Band crystals and the desired receive frequency, or Part No. 301-542 for Low Band crystals and the desired receive frequency, or Part No. 301-603 for UHF (450-480 MHz) crystals and the desired receive frequency, or Part No. 301-187 for UHF (480-500 MHz) crystals and the desired receive frequency.

If desired, the crystals may be purchased from other manufacturers. The following information must be included in the order.

A. UHF Band Crystal (450-480 MHz):

1. Crystal frequency, determined as follows:

$$\text{Crystal frequency} = \frac{\text{Channel frequency} - 10.7 \text{ MHz}}{9}$$

Example:

Crystal frequency =

$$\frac{458.00 \text{ MHz} - 10.7 \text{ MHz}}{9} = \frac{447.30 \text{ MHz}}{9} = 49.7000 \text{ MHz}$$

2. Frequency tolerance of .001%
3. 3rd overtone; load capacity of 18 PF; drive level of 2 milliwatts.
4. Maximum impedance of 35 ohms
5. Holder is an HC-25/U with pin leads (plug-in type)

UHF Band Crystal (480-500 MHz):

- a. Crystal frequency = $\frac{\text{Receive frequency} - 10.7 \text{ MHz}}{10}$

EXAMPLE:

$$\text{Crystal frequency} = \frac{485.10 \text{ MHz} - 10.7 \text{ MHz}}{10}$$

$$\text{Crystal frequency} = 47.44000 \text{ MHz}$$

- b. Frequency Tolerance of .001%
- c. 3rd Overtone

- d. Parallel resonance - 18 PF load capacity
- e. Maximum equivalent series resistance of 35 ohms
- f. Drive Level of 2 MW
- g. Holder: HC-25/U

B. High VHF Band Crystals:

- 1. Crystal frequency, determined as follows:

$$\text{Crystal frequency} = \frac{\text{Channel frequency} - 10.7 \text{ MHz}}{3}$$

Example:

Crystal frequency =

$$\frac{155.55 \text{ MHz} - 10.7 \text{ MHz}}{3} = \frac{144.85 \text{ MHz}}{3} = 48.2833 \text{ MHz}$$

- 2. Frequency tolerance of .001%
- 3. Series resonance - 450 Hz; 3rd overtone
- 4. Maximum impedance of 35 ohms
- 5. Holder is an HC-25/U with pin leads (plug-in type)

C. Low VHF Band Crystals:

- 1. Crystal frequency, determined as follows:

$$\text{Crystal frequency} = \text{Channel frequency} + 10.7 \text{ MHz}$$

Example:

$$\text{Crystal frequency} = 39.5 \text{ MHz} + 10.7 \text{ MHz} = 50.2 \text{ MHz}$$

- 2. Frequency tolerance of .002%
- 3. Series resonance - 450 Hz; 3rd overtone

4. Maximum impedance of 35 ohms
5. Holder is an HC-25/U with pin leads (plug-in type)

Prior to installing a crystal, the receiver's cover will have to be removed. To remove the cover, first remove the telescopic antennas if they are installed. Second, unscrew the two large bolts located at the sides of the unit. The cover may then be slipped off by sliding it toward the rear of the unit.

Insert the crystal in the proper socket pins as indicated on the crystal location drawing. See page 18. The number by each pair of sockets matches the channel number on the front panel.

Glossary:

1. Frequency - Cycles per second (Hertz - Hz). An example would be 60 Hz or 60 cycles per second.
2. MHz - (Megahertz) A frequency that is expressed in millions of cycles per second. An example could be 30 MHz, which is a short notation for 30 million cycles per second.
3. VHF - (Very High Frequency) Frequencies within the 30-50 MHz and 148-174 MHz bands. Bands 1, 2, 3 and 4.
4. UHF - (Ultra High Frequency) Frequencies within the 450-512 MHz band. Bands 5 and 6.
5. Band - A range of frequencies between two definite limits.

EXAMPLE:	30-38 MHz	Band 1
	38-50 MHz	Band 2
	148-160 MHz	Band 3
	160-174 MHz	Band 4
	450-480 MHz	Band 5
	480-512 MHz	Band 6

6. Crystal - A miniature electromechanical device which determines what frequency will be received by the receiver.

Frequency is usually marked on top of crystal.

7. Band Programming - Instructing the receiver to switch to a particular BAND on each channel, corresponding to the frequency marked on the crystal. This is

accomplished by connecting Channel Programming Wires to the proper BAND Selector pins.

Programming Procedure:

NOTE: ALL CHANNELS MUST BE PROGRAMMED FOR THE RECEIVER TO WORK PROPERLY. If a particular channel is not used (in other words, there is not a crystal installed for that channel), the programming wire must still be connected to a Band Selector pin or Channel Programming pin.

For ease in programming, group all of the crystals into Bands, and install the crystals in this manner in the receiver.

Insert the crystal in the proper socket pins as indicated on the Crystal Location Drawing on page 18 . It is extremely important that VHF crystals be installed in their designated row of socket pins, and UHF crystals be installed in their proper row of socket pins.

There is one row of Band Selector pins (6 pins), and one row of Channel Programming pins (20 pins).

The Band Selector pins determine the frequency range (Band) the receiver will work on for each channel.

The Channel Programming pins, when connected to a Band Selector pin by way of Channel Programming Wires, determine the Band a particular channel will operate on.

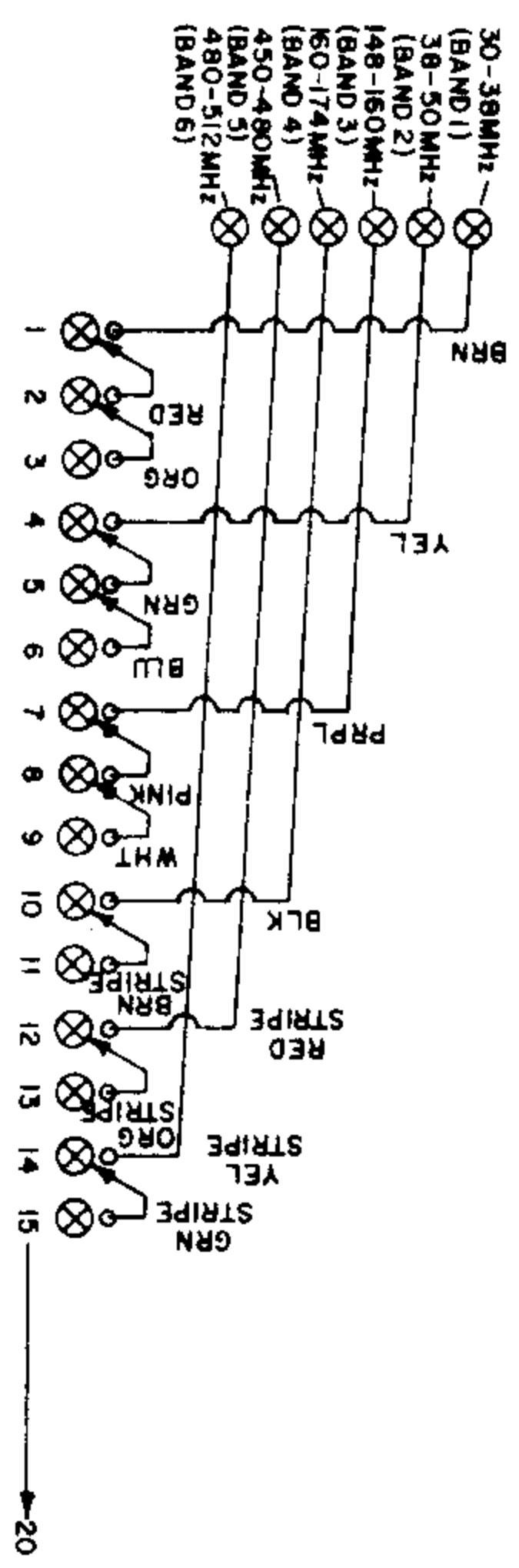
To avoid confusion, channels should be programmed from Left to Right. Channel 1 is on the left.

Starting with Channel 1, connect the Programming Wire for Channel 1 to the appropriate Band Selector pin (look at the frequency marked on the crystal installed in Channel 1 to determine the proper Band Selector pin). If Channel 2 is to be programmed for the same Band as Channel 1, merely connect the Programming Wire for Channel 2 to the Programming pin on Channel 1. If Channel 2 is to be programmed for a different Band than Channel 1, then connect the Programming Wire for Channel 2 to the proper Band Selector pin. This procedure is followed for the remainder of the 20 channels. This is essentially a stacking method of programming.

NOTE: Frequencies on Band edges (such as 38.000 MHz) can be Band Programmed to either adjacent Bands for usable sensitivity.

Programming Example:

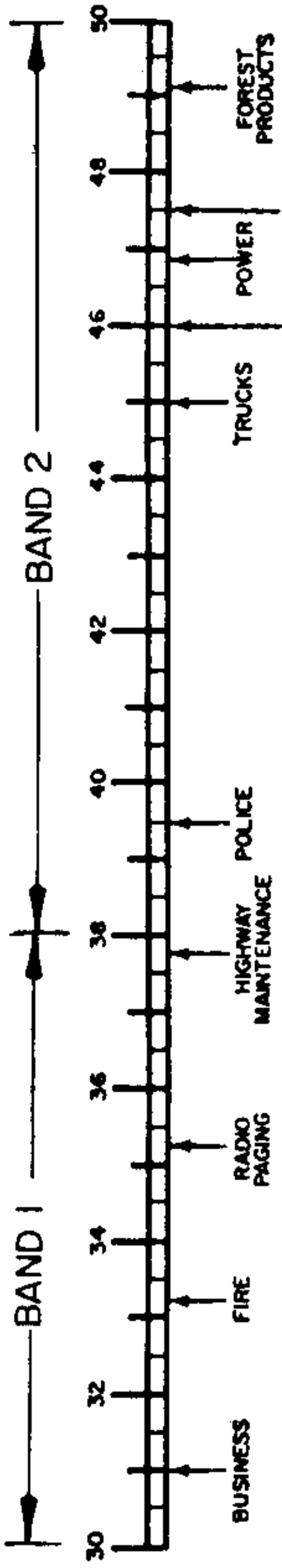
CH. No.	Crystal Frequencies	Program in this Band:
1	35.02 MHz	Band 1 (30-38 MHz)
2	35.19 MHz	Band 1 (30-38 MHz)
3	35.68 MHz	Band 1 (30-38 MHz)
4	42.42 MHz	Band 2 (38-50 MHz)
5	42.26 MHz	Band 2 (38-50 MHz)
6	44.00 MHz	Band 2 (38-50 MHz)
7	155.01 MHz	Band 3 (148-160 MHz)
8	155.19 MHz	Band 3 (148-160 MHz)
9	158.85 MHz	Band 3 (148-160 MHz)
10	162.55 MHz	Band 4 (160-174 MHz)
11	170.15 MHz	Band 4 (160-174 MHz)
12	452.000 MHz	Band 5 (450-480 MHz)
13	460.025 MHz	Band 5 (450-480 MHz)
14	488.00 MHz	Band 6 (480-512 MHz)
15	512.00 MHz	Band 6 (480-512 MHz)



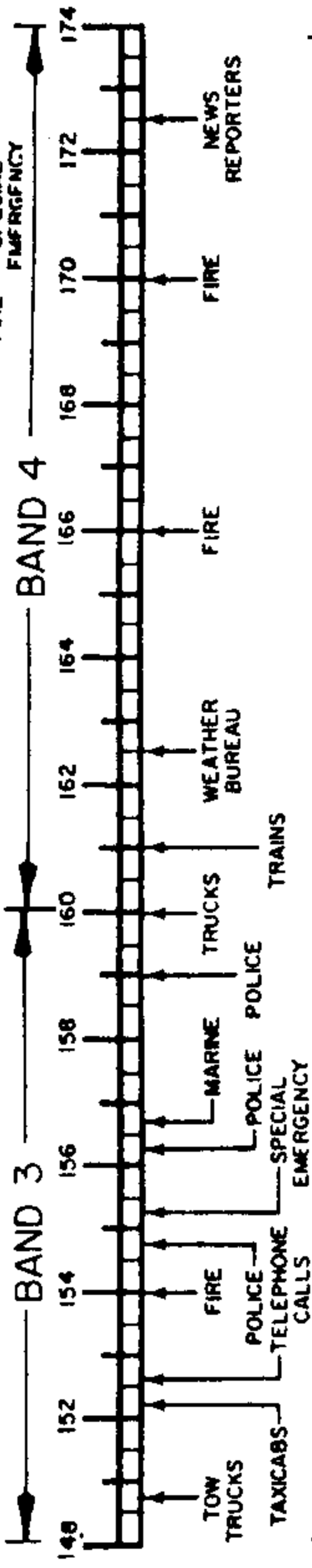
FRONT OF UNIT

EXAMPLE PROGRAMMING DIAGRAM

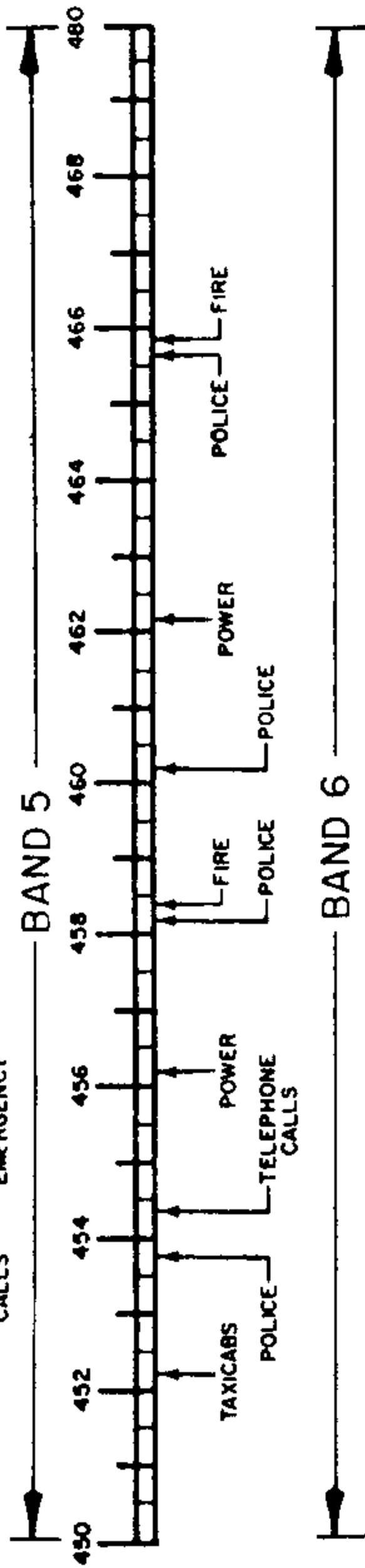
**VHF
LOW BAND
(MHZ)**



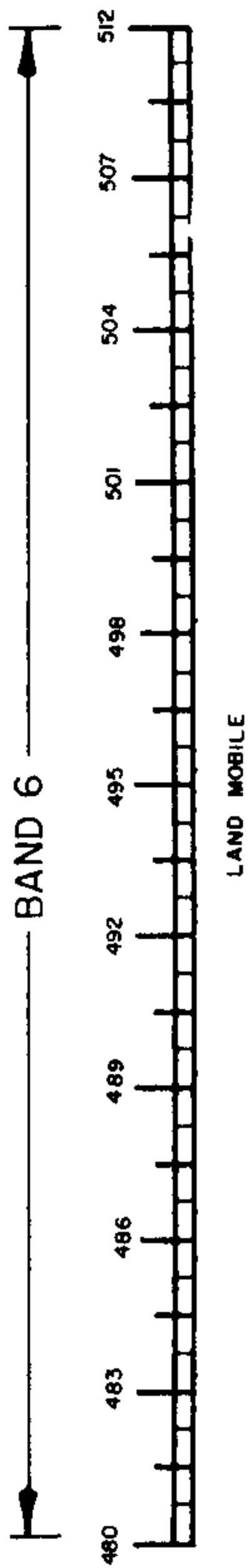
**VHF
HIGH BAND
(MHZ)**



**UHF
BAND
(MHZ)**



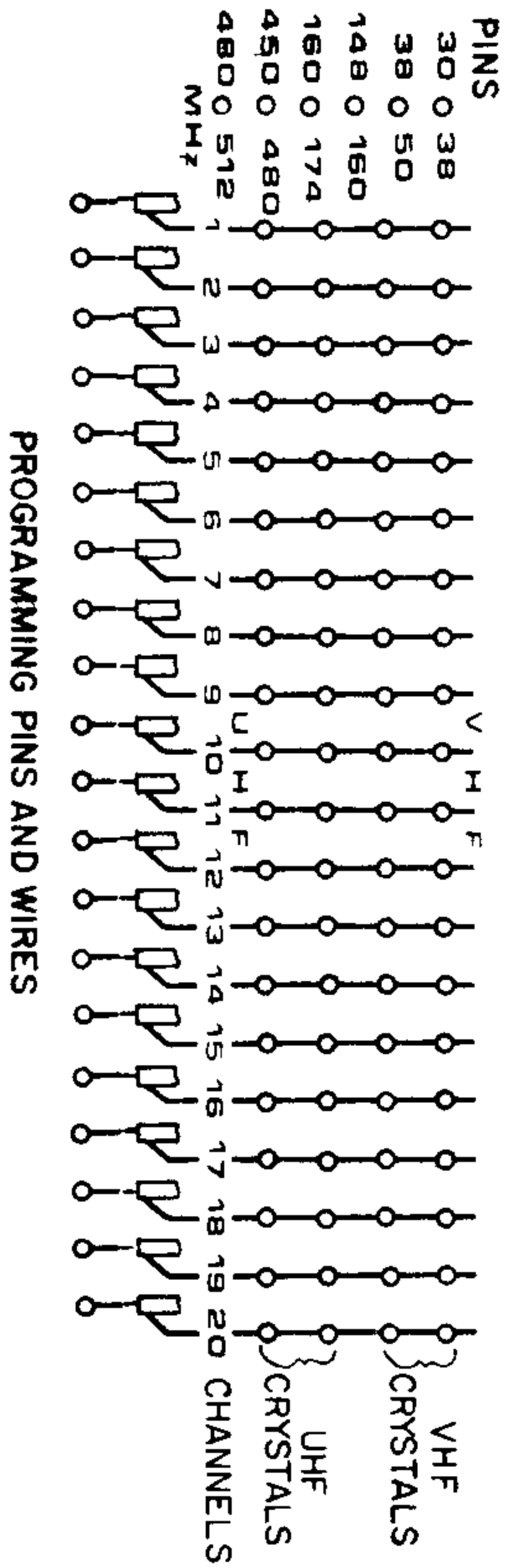
**UHF
BAND
(MHZ)**



Above is a graphical description of how the ACT-R20/6 bands are arranged in the frequency spectrum.

BAND SELECTOR

CRYSTAL SOCKETS



CRYSTAL LOCATION DIAGRAM

Weather Alert Stations in Operation:

Akron, Ohio KD094 162.400 MHz
Anchorage, Alaska KEC43 162.550 MHz
Astoria, Oregon KEC91 162.400 MHz
Atlanta, Georgia KEC80 162.550 MHz
Atlantic City, New Jersey KHB38 162.40 MHz
Baltimore, Maryland KEC83 162.40 MHz
Boston, Massachusetts KHB35 162.40 MHz
Brownsville, Texas KHB33 162.55 MHz
Buffalo, New York KEB98 162.55 MHz
Charleston, South Carolina KHB29 162.55 MHz
Chicago, Illinois KW039 162.55 MHz
Cleveland, Ohio KHB59 162.550 MHz
Corpus Christi, Texas KHB41 162.55 MHz
Dallas, Texas KEC56 162.400 MHz
Denver, Colorado KEC76 162.550 MHz
Des Moines, Iowa KEC75 162.550 MHz
Detroit, Michigan KEC63 162.550 MHz
Eden, Maryland KEC92 162.400 MHz
Erie, Pennsylvania KEC58 162.400 MHz
Eugene, Oregon KEC42 162.400 MHz
Eureka, California KEC82 162.400 MHz
Fort Worth, Texas KEC55 162.550 MHz
Galveston, Texas KHB40 162.55 MHz
Honolulu, Hawaii KBA99 162.55 MHz
Houston, Texas KGG68 162.400 MHz
Hyannis, Massachusetts KEC73 162.55 MHz
Indianapolis, Indiana KEC74 162.550 MHz
Jacksonville, Florida KHB39 162.55 MHz
Kansas City, Missouri KID77 162.55 MHz
Kauai, Hawaii KBA99 162.400 MHz
Lake Charles, Louisiana KHB42 162.55 MHz
Los Angeles, California KW037 162.55 MHz
Maui, Hawaii KBA99 162.400 MHz
Miami, Florida KHB34 162.55 MHz
Milwaukee, Wisconsin KEC60 162.400 MHz

Weather Alert Stations in Operation:

Minneapolis, Minnesota KEC65 162.550 MHz
Mobile, Alabama KEC61 162.550 MHz
Monterey, California KEC49 162.400 MHz
Myrtle Beach, South Carolina KEC95 162.400 MHz
Newbern, North Carolina KEC84 162.400 MHz
New London, Connecticut KHB47 162.400 MHz
New Orleans, Louisiana KHB43 162.55 MHz
New York, New York KW035 162.55 MHz
Norfolk, Virginia KHB37 162.55 MHz
Oahu, Hawaii KBA99 162.550 MHz
Panama City, Florida KGG67 162.550 MHz
Pensacola, Florida KEC86 162.400 MHz
Pharr, Texas KHB33 162.400 MHz
Phoenix, Arizona KEC94 162.550 MHz
Portland, Maine KD095 162.55 MHz
Portland, Oregon KEB97 162.55 MHz
Sacramento, California KEC57 162.400 MHz
Saint Joseph, Missouri KEC77 162.400 MHz
Saint Louis, Missouri KD089 162.550 MHz
San Diego, California KEC62 162.400 MHz
Sandusky, Ohio KHB97 162.400 MHz
Salt Lake City, Utah KEC78 162.550 MHz
San Francisco, California KHB49 162.550 MHz
Savannah, Georgia KEC85 162.40 MHz
Seattle, Washington KHB60 162.55 MHz
Seward, Alaska KEC81 162.550 MHz
Tampa, Florida KHB32 162.55 MHz
Washington, D.C. KHB36 162.55 MHz
West Palm Beach, Florida KEC50 162.400 MHz
Wichita, Kansas KEC59 162.550 MHz
Wilmington, North Carolina KHN31 162.550 MHz

THE LAW concerning possession and use of monitor receivers is embodied in Federal regulations based on Section 605 of the Communications Act of 1934. This FCC regulation does not prohibit listening to Public Service Band frequencies. It does prohibit persons from making use of information heard broadcast on Public Service Bands, for private gain. Some States' law prohibits the use of mobile monitors except by authorized vehicles.

OFFICIAL NATIONAL TEN CODE SIGNALS

- | | | | |
|-------|--|-------|--|
| 10-0 | Caution | 10-41 | Beginning tour of duty |
| 10-1 | Unable to copy - change location | 10-42 | Ending tour of duty |
| 10-2 | Signals good | 10-43 | Information |
| 10-3 | Stop transmitting | 10-44 | Request permission to leave patrol . . . for . . . |
| 10-4 | Acknowledgement | 10-45 | Animal carcass in . . . lane at |
| 10-5 | Relay | 10-46 | Assist motorist |
| 10-6 | Busy - stand by unless urgent | 10-47 | Emergency road repairs needed |
| 10-7 | Out of service (Give location and/or telephone number) | 10-48 | Traffic standard needs repairs |
| 10-8 | In service | 10-49 | Traffic light out |
| 10-9 | Repeat | 10-50 | Accident - F, PI, PD |
| 10-10 | Fight in progress | 10-51 | Wrecker needed |
| 10-11 | Dog case | 10-52 | Ambulance needed |
| 10-12 | Stand by (Stop) | 10-53 | Road blocked |
| 10-13 | Weather and road report | 10-54 | Livestock on highway |
| 10-14 | Report of prowler | 10-55 | Intoxicated driver |
| 10-15 | Civil disturbance | 10-56 | Intoxicated pedestrian |
| 10-16 | Domestic trouble | 10-57 | Hit and run - F, PI, PD |
| 10-17 | Meet complainant | 10-58 | Direct traffic |
| 10-18 | Complete assignment quickly | 10-59 | Convoy or escort |
| 10-19 | Return to . . . | 10-60 | Squad in vicinity |
| 10-20 | Location | 10-61 | Personnel in area |
| 10-21 | Call . . . by telephone | 10-62 | Reply to message |
| 10-22 | Disregard | 10-63 | Prepare to make written copy |
| 10-23 | Arrived at scene | 10-64 | Message for local delivery |
| 10-24 | Assignment completed | 10-65 | Net message assignment |
| 10-25 | Report in person to (Meet) . . . | 10-66 | Message cancellation |
| 10-26 | Detaining subject, expedite | 10-67 | Clear to read net message |
| 10-27 | Drivers license information | 10-68 | Dispatch information |
| 10-28 | Vehicle registration information | 10-69 | Message received |
| 10-29 | Check records for wanted | 10-70 | Fire alarm |
| 10-30 | Illegal use of radio | 10-71 | Advise nature of fire (Size, type, and contents of building) |
| 10-31 | Crime in progress | 10-72 | Report progress on fire |
| 10-32 | Man with gun | 10-73 | Smoke report |
| 10-33 | Emergency | 10-74 | Negative |
| 10-34 | Riot | 10-75 | In contact with |
| 10-35 | Major crime alert | 10-76 | En Route |
| 10-36 | Correct time | 10-77 | ETA (Estimated Time of Arrival) |
| 10-37 | Investigate suspicious vehicle | 10-78 | Need assistance |
| 10-38 | Stopping suspicious vehicle (Give station complete description before stopping). | 10-79 | Notify coroner |
| 10-39 | Urgent - use light and siren | 10-80 | Chase in progress |
| 10-40 | Silent run - no light or siren | 10-81 | Breathalyzer report |
| | | 10-82 | Reserve lodging |
| | | 10-83 | Work school xing at . . . |
| | | 10-84 | If meeting . . . advise ETA |
| | | 10-85 | Delayed due to . . . |
| | | 10-86 | Officer operator on duty |
| | | 10-87 | Pick up checks for distribution |
| | | 10-88 | Advise present telephone number of . . . |
| | | 10-89 | Bomb threat |
| | | 10-90 | Bank alarm at . . . |
| | | 10-91 | Pick up prisoner/subject |
| | | 10-92 | Improperly parked vehicle |
| | | 10-93 | Blockade |
| | | 10-94 | Drag racing |
| | | 10-95 | Prisoner/subject in custody |
| | | 10-96 | Mental subject |
| | | 10-97 | Check (Test) signal |
| | | 10-98 | Prison or jail break |
| | | 10-99 | Records indicate wanted or stolen |