

Please read before using this equipment

OWNERS MANUAL

REALISTIC[®] COMMUNICATIONS

**PATROLMAN PRO-9
VHF 148-175 MHz FM TUNABLE/SCANNING
MONITOR RECEIVER**

PROFESSIONAL
SERIES

Catalog No.
20-164



Sold, serviced and
guaranteed from
coast-to-coast

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Manufactured in Japan for Radio Shack  A Tandy Corporation Company, Fort Worth, Texas 76107

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GENERAL DESCRIPTION

Your Patrolman PRO-9 Tunable Scanning Receiver is a completely transistorized VHF FM single conversion superheterodyne receiver capable of automatically switching 7 crystal-controlled channels. Its special circuit features consist of a crystal filter, priority circuit, squelch control, channel lock-out circuit, scan delay circuit and AC or DC operation.

It is designed for use in the narrow-band FM channels of public service communications VHF band—police, fire, civil defense, forestry, weather and other emergencies are just a few of the numerous services included in this band that covers 148 to 174 MHz.

The PRO-9 Features both high sensitivity and selectivity, and a sophisticated circuit which includes a 10.7 MHz filter which reduces or eliminates adjacent-channel or strong-signal interference which is experienced when operating in urban and metropolitan areas or where very strong and closely placed signals are present.

An important engineering achievement designed for practical applications, the PRO-9 is remarkably easy to use, yet its up-to-date, complex circuit consists of 41 separate transistors (one of which is an FET), seven integrated circuits are used in the IF and Scanning sections along with 40 diodes and 2 zeners.

GUARANTEE: The REALISTIC guarantee is stated on the Fact Tag packed with the equipment. It is in effect from coast to coast. At any time, REALISTIC equipment may be restored to new condition with original parts with MINIMUM delay anywhere in the U.S.A., usually in your own neighborhood. It is NOT necessary to return REALISTIC equipment to our laboratories in 98% of the cases.

GENERAL SPECIFICATIONS

Note: These are given in general form only, since REALISTIC does not believe in buying to or designing to numerical specifications. The latter are subject to variables not clearly related to performance, just as selectivity, the number of transistors or IC's indicate in an average way the quality of a circuit but do not prove one circuit will outperform another in real operating conditions. Our philosophy is that a piece of equipment should be evaluated in terms of what it does for the purchaser, its quality and relative value being based upon merit and observed performance in real life. Thus REALISTIC designs toward achieving a certain result regardless of cost, regardless of lab measurements, regardless of competitive advertising claims. Results are determined by your application of our finished result. Good installation is extremely important since a poorly installed or a wrongly placed antenna can result in a 90% or even greater signal loss. And an inadequate speaker system can be almost as effective in reducing equipment performance. The following figures are offered only as a guide, not as a guarantee of equipment performance.

This equipment is designed to operate from either 120 VAC or 12 VDC negative ground. If it fails to operate, and there is no clear reason for the failure, first check the supply switch. This switch entirely disconnects the supply components that are not in use. Also, before connecting the PRO-9 receiver to a DC power supply, check the voltage polarities. Attempting to operate the negative-ground PRO-9 from one of the rare positive-ground automotive or boat electrical systems, or from a wrongly connected battery, will at least blow a fuse. It may do further damage, so that the expensive and time-consuming repairs are necessary before the PRO-9 can be used again. The Radio Shack warranty does not apply to any damage caused by this, inadequate lightning protection, or other improper connections.

SPECIFICATIONS

- Frequency Range 148 – 174 MHz
- Frequency Coverage 8 MHz, max. sensitivity (156 MHz \pm 4 MHz)
- Tunable operation 148 – 174 MHz
- Scanning Speed 10 ch/sec.
- Sensitivity 0.7 microvolt for 20 dB quieting
- Selectivity -6 dB \pm 9 KHz
-40 dB \pm 20 KHz
- Spurious Rejection More than 50 dB
- Image Ratio More than 30 dB
- Modulation Acceptance \pm 7 KHz
- IF Frequency 10.7 MHz
- Filter 10.7 MHz Crystal Filter
- Squelch Sensitivity 1 μ V
- Audio Power 2.0 Watts
- Power 120 VAC or 12-15V DC,
Negative Ground Only
- Accessories Supplied Mounting Bracket, Bracket Screws, DC Power Cable, and Instruction Manual

SEMICONDUCTOR COMPLEMENT

Transistors

Q1	183015	RF. Amplifier
Q2	183016	Mixer
Q3	183016	Local Oscillator
Q4, 6	2SC373	Switching
Q5, 7	2SC735	Switching
Q8, 9	2SC373	Switching
Q10, 11	2SC535	Cascade RF Amplifier
Q12	2SK19	Mixer (FET)
Q13	2SC394	Local Oscillator
Q14, 15	2SC371	Switching
Q16, 42	2SC371	IF Amplifier
Q17, 18	2SC373	Noise Amplifier
Q19	2SC373	DC Amplifier for Squelch
Q20	2SC373	Delay Circuit

Q21	2SC373	Audio Amplifier
Q22	2SC373	Squelch Control
Q23	2SC373	Audio Amplifier
Q24	2SC735	Audio Amplifier
Q25	2SD235	Audio Power Amplifier
Q26	2SB435	Audio Power Amplifier
Q27 to 34	2SC373	Switching
Q35	2SC373	Switching
Q36	2SC735	Switching
Q37, 38	2SC373	Multivibrator
Q39	2SC373	Delay Circuit
Q40, 41	2SC1173	DC Voltage Regulator

IC (Integrated Circuit)

IC1, 2	TA7060	IF Amplifier
IC3	N7404A	DC Amplifier for Squelch, DC Amplifier for Switching Circuit
IC4	N7400A	Multivibrator
IC5,6	N7473A	Flip-Flop
IC7	N7408A	Switching

Diodes

D1 to 4	HV-80	Switching
D5	O2Z6.2A	Voltage Regulator
D6	O2Z7.5A	Voltage Regulator
D7 to 13	1S73	Switching
D14, 15	HV-80	Detector
D16, 17	1N60	Noise Detector
D18	1N60	Switching
D19	HV-80	Regulator
D20 to 31	1N60	Switching
D32	1S1885	Switching
D33, 34	1N60	Switching
D35 to 37	HV-80	Switching
D38	O2Z10A	Voltage Regulator
D39 to 42	1S1885	Power Rectifier
D43	1S1885	Polarity Protector
D44	O2Z10A	Voltage Regulator

INSTALLATION

A good installation will make the most of the PRO-9's capabilities. Loss of the tiny signal at the antenna is avoided by correct antenna adjustments and by installing a good quality foam coaxial cable. The antenna that you choose, and how you install it, will have a great effect on how well your unit will work.

BASE INSTALLATION:

An antenna, such as a ground-plane (Cat. No. 20-176) mounted as high above the ground as practical will greatly increase the signal strength. For proper input matching, a 50 ohm lead-in coaxial cable such as RG 58/u (Cat. No. 278-970) should be used. A Motorola type antenna adapter plug (Cat. No. 278-208, or equivalent to Cinch-Jones No. 13B or H.H.Smith No. 1200) will have to be installed on the receiver end of the cable in order to utilize the antenna connector located on the rear (back) panel of the unit.

To install the PRO-9 in a base installation, simply connect the AC line cord into a 110 - 120V AC 60 Hz power source.

MOBILE INSTALLATION:

Safety and operating convenience are the primary factors to consider when mounting any piece of equipment in an automobile. Be sure that the Receiver controls may be easily reached by the operator. Also be sure that connecting cables do not interfere with the operation of the brake, accelerator, etc.

The Receiver may be mounted to the underside of the instrument panel or dashboard of a car, truck, boat, etc., by means of the special bracket that is supplied with the Receiver.

Mobile Station: **CAUTION: BE AWARE OF THE BATTERY POLARITY.** For a vehicle with a 12V DC negative ground system, use the DC power cable supplied with the unit. Simply connect the cable into the cigarette lighter receptacle (Cat. No. 274-331) or directly to the DC power supply source.

IMPORTANT: If your car has been burning out headlamps and other bulbs at a rapid rate, have the voltage regulator checked for proper output. Excessive voltage (more than 16 volts) may cause serious damage to your Receiver.

MOBILE ANTENNA

Keep the following points in mind when installing your mobile antenna.

1. Mount the antenna as high as possible, mounting in the center of the roof is the best possible location.
2. Mount it rigidly, so it will remain vertical while in motion.
3. Mount as far as possible from the engine compartment; mounting on the rear of the car is preferable to mounting in place of the AM antenna.



VHF Mobile Mount

Complete with cutting chart. Covers 130-174 MHz. Snap grip mounting. Fits top or side of trunk lid. Omni-directional capability avoids fading as vehicle changes direction. Waterproof. Specific frequency adjustment. 17-7PH stainless steel whip. 17' cable. 20-177



Dual Band Cowl-Mount

For mobile use. Chrome telescopic whip (55" extended, 36" collapsed), mounted on swivel base. Center loaded weatherproof coil. 5' RG-58/U cable. Terminates with pin-type plug.

MOBILE NOISE SUPPRESSION

Noise:

This receiver is very sensitive, and will pick up signals that are extremely weak. With this extreme sensitivity, you will find that the receiver will amplify weak signals, along with any noise that may be present.

When operating a receiver in a vehicle, you will find that the vehicle generates noise, and this noise can become very objectionable. Mobile operation will not be as quiet as base station operation, but steps can be taken that will greatly improve the noise situation.

Electrical System:

Generally speaking, noise can be generated by any device or connection that carries electrical current. Any device that generates a spark should also be suspected. Bypass any suspected wire to ground with a high quality 1 μ f coaxial capacitor.

Probably the next most common source of noise is the generator, or alternator. This type of noise will sound like a musical whine, and will also vary with speed of the engine. Generator and alternator noise can usually be reduced by placing a coaxial-type capacitor from the armature terminal to the metal case.

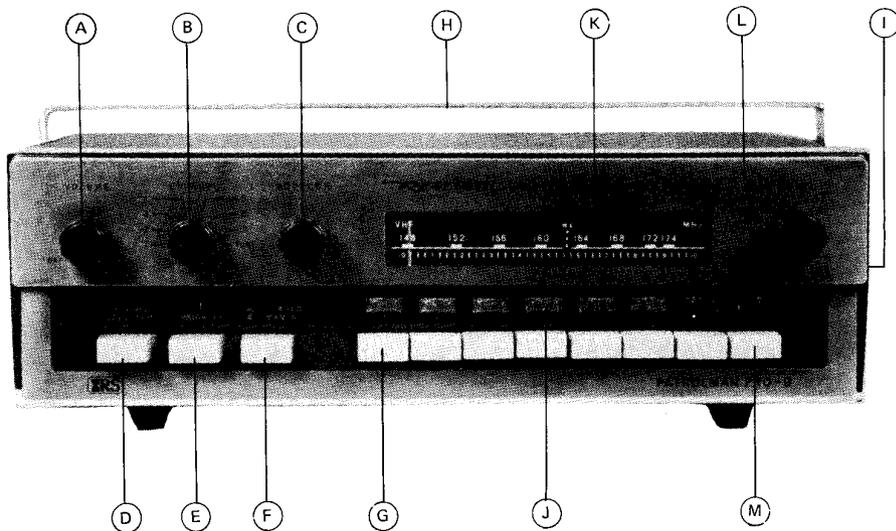
Ignition System:

The ignition system is the most common source of noise. This noise can be identified by the fact that its speed varies with the engine speed. Ignition noise will sound like a series of "popping" sounds, while that engine is idling, and will speed up to a buzzing sounds as engine speed is increased.

There are a number of things that can be done for this type of noise.

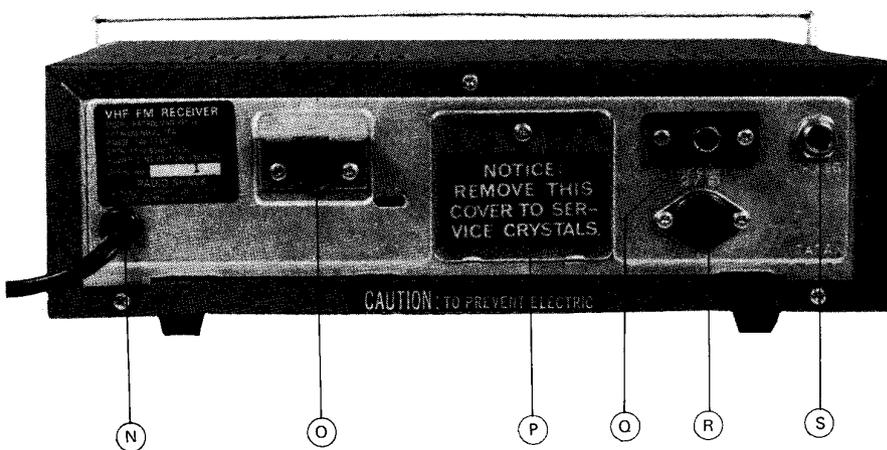
1. Use radio suppression-type ignition wire, and resistor spark plugs.
2. Check high-tension leads etc. for leakage, cracks, etc. Replace any old wiring.
3. In extreme cases, kits may be purchased, that will completely shield all ignition wiring. This will provide maximum noise suppression.

FRONT AND REAR PANEL CONTROLS



FRONT VIEW FIG-1

- A —Power Switch and Audio Volume Control
- B —Priority Channel Selector
- C —Squelch Control
- D —Manual Channel Selector Switch
- E —Priority Switch
- F —Auto or Manual Selector Switch
- G —Channel Switch (Ch. 1 — Ch. 8)
- H —Mobile Mounting Bracket
- I —Easily Removable Knurled Mounting Screws
- J —Channel Indicator
- K —Tuning Dial & Pointer
- L —Tuning Knob
- M —Tuner Switch



REAR VIEW FIG-2

- N —AC Line Cord
- O —Motorola Type Antenna Jack
- P —Crystal Compartment
- Q —RCA Type Tape Output Jack
- R —DC Power Jack
- S —External Speaker/Phones Jack

OPERATING INSTRUCTION

Set controls as follows: (Ref. FIG.-1 & FIG.-2)

1. VOLUME (A): OFF position
2. SQUELCH (C): Minimum position (Counter-clockwise)
3. AUTO/MANUAL (F): AUTO (pushed in)
4. PRIORITY CHANNEL SELECTION (B): Any suitable position
5. PRIORITY (E): OFF (pushed out)
6. CHANNEL SWITCH (G): ALL ON (all 8 switches pushed in)
7. ANTENNA JACK (O): Connect antenna to antenna jack
8. AC LINE CORD (N): Line Cord into AC outlet (110-120V AC 60 Hz)

Volume Control with Power Switch (A):

The main power switch is located on the Volume Control. By rotating the control in a clockwise direction, the set is turned "ON" and the volume can be set to a comfortable listening level by continuing the clockwise rotation. No waiting time is necessary for warm-up.

Squelch Control (C):

The squelch eliminates background noise output until a signal is received. Slowly rotate the control clockwise (making sure there is no station transmitting on the frequency) until the background noise just disappears. If the control is increased past this point (clockwise), it will take a much stronger signal to override the squelch, thereby not permitting weaker signals to be heard. Your unit will now start to scan.

Scan Delay Circuit:

The Pro-9 has a built-in 2 second delay feature which virtually eliminates missed replies. This circuit holds the monitor on the channel you are monitoring for a period of 2 seconds after the signal has gone off the air before resuming normal scanning operation. This circuit is fully automatic and can not be disabled.

Automatic Operation:

The Auto/Manual button (F) is pushed in for automatic scanning. To activate a particular channel (provided there is a crystal installed for that channel), the push button switch directly below the channel number (G) must also be pushed in. In addition, the receiver must be squelched for proper scanning action. Turn the squelch control clockwise until all the background noise is just eliminated from the speaker.

Manual Operation:

When the Auto/Manual button is out, the channel is selected manually. First, activate the channel you want to monitor. Then, push in, momentarily and release the Manual Channel Selector button (D). Repeat pushing in the Manual Selector Button until the desired channel number is lighted. Each time the Manual Selector Button is pushed in, the Scanner moves over one active channel, unless there are inactive channels (button out). The scanner will skip over these and go to the next active channel. The receiver can be either squelched or unsquelched when manual channel selection is used.

TUNABLE OPERATION:

Set the Auto/Manual switch (F) in the Manual (out) position. Activate the tuner section of the PRO-9 by pushing the Tuner Switch (M) in. Push and release the channel selector button until the indicator light over tune and the dial light come on. Set the Squelch Control (C) fully counter-clockwise, and adjust volume Control (A) to a comfortable noise level. You can now tune manually from 148-174 MHz using the Tuning Knob (L) and by observing the tuning dial (K). Since most VHF-FM stations do not transmit continuously, tuning should be done very slowly to avoid missing a station.

After locating the station you wish to monitor, wait for a NO-signal condition, then adjust the Squelch Control clockwise until the background noise just disappears.

The tunable receiver in the PRO-9 now acts like a crystal-controlled channel and can be used to monitor stations you do not have a crystal for. Once you have tuned in the station you wish to monitor, you can also operate your scanner in the automatic mode once you have selected a station. Press the Auto/Manual Switch (F) in to the automatic position and the PRO-9 will scan all 8 channels; the seven crystal controlled and one tuned channel.

PRIORITY OPERATION:

Priority is an optionally selected mode of operation.

In most areas there is usually one channel which you will want to monitor consistently. The priority function allows you to do this while still enabling you to scan the other channels on the monitor.

When the Priority Switch (E) is depressed the scanner will operate as usual in scanning across channels 1 thru 8 looking for an active channel. However, if it should stop on any channel other than the priority channel for more than two seconds, it will automatically scan back and check the priority channel.

The priority channel number is selected with priority switch B.

This priority channel sampling occurs virtually instantaneously and if the priority channel is not active, the scanner returns to the channel being monitored previously. This scan-back takes only six-hundredths of a second, so there is scarcely a noticeable interruption to the signal you were monitoring.

If the priority channel is active the scanner will continue to monitor it until it clears, and then return to the channel previously being monitored.

A unique feature of your PRO-9 monitor receiver is that it provides not only manual crystal-controlled channel selection and automatic scanner operation, but continuous tuning as well.

Crystal Installation:

Due to the numerous frequencies or channels available, crystals are not installed by the factory, but by the seller or owner of the unit. Because of the accuracy required it is recommended that the crystals be ordered from Radio Shack Stores, specifying the model number of the set and the frequency you wish to receive. Allow 3 to 4 weeks delivery. Order crystals under Catalog No. 20-002. Crystal sockets are provided inside the front end of the unit. Unscrew the plate at the Rear of the cabinet to insert the crystals. To receive a signal on a specific channel, insert proper crystal into the proper socket (Channel 1 = socket marked 1 on the circuit board, and so on). Refer to Fig. 3.

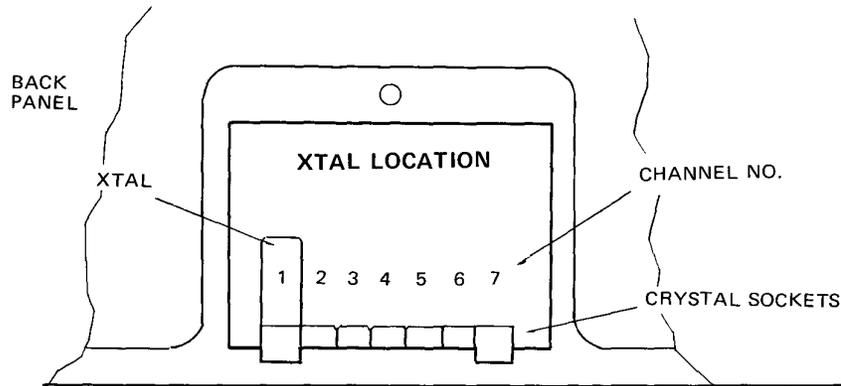


FIG-3

Crystals should be ordered from Radio Shack stating channel frequency and model number.

Radio Shack is not responsible for poor operation when crystals of another manufacturer are used.

Frequency Coverage: (IMPORTANT)

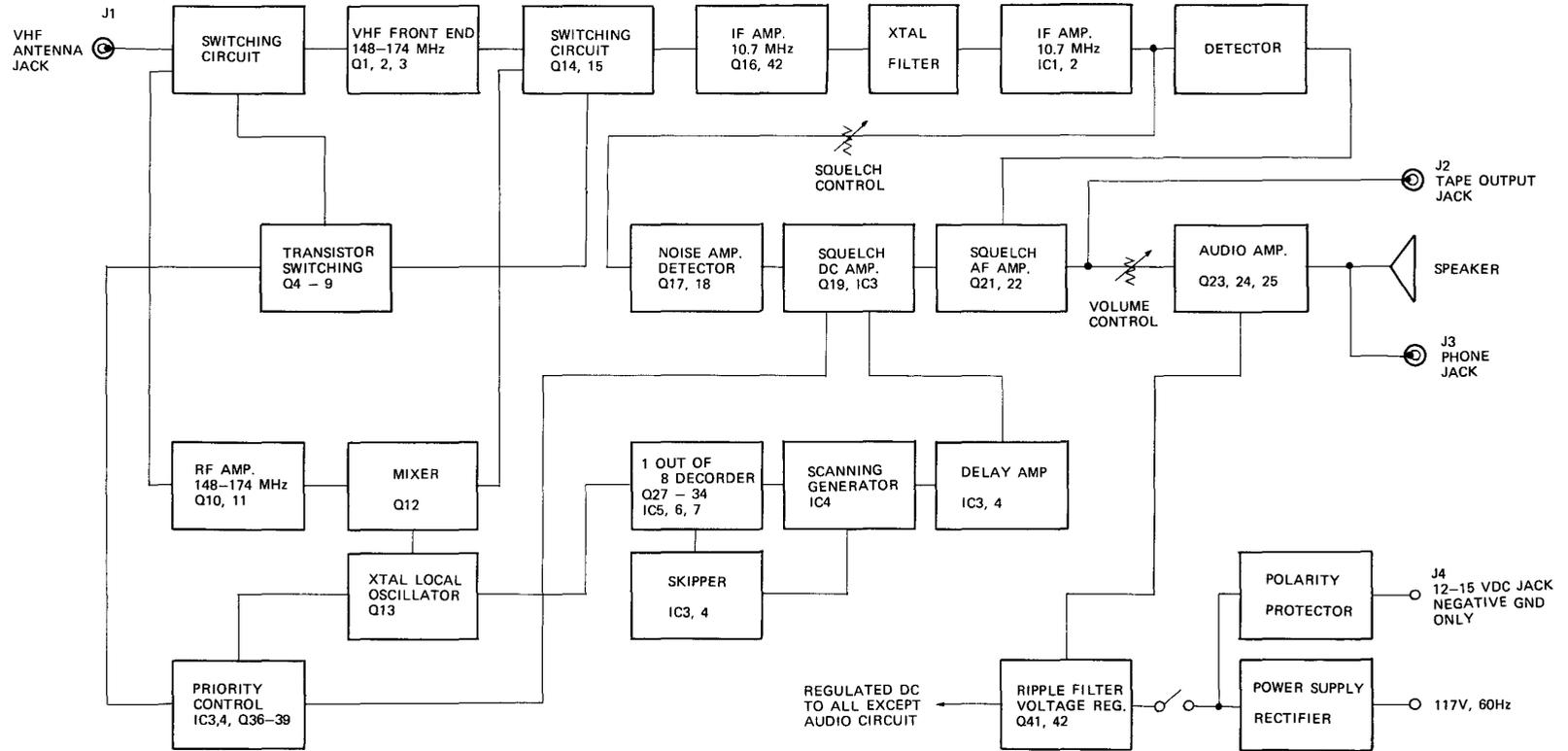
For maximum sensitivity, the channel frequencies specified should be within plus or minus 4 MHz of 153 MHz. However, for channel frequencies outside of this range, the unit will still operate, but with some loss in sensitivity. This 8 MHz range can be moved up, or down, in the band, in which case the RF section (Front End) of the receiver would have to be realigned.

Special Instructions for 162.55 MHz Weather Channel:

The 162.55 MHz weather channel broadcasts a continuous 24 hour carrier signal. When set for automatic scan, your PRO-9 will stop and remain on weather channel until manually "stepped" to another frequency. To prevent automatic locking on the weather channel, deactivate the channel by releasing the push button control for the channel to the "out" position. then, when you want the weather report, reactivate the channel with the push button control.

Note: In some areas more than one transmitter is operating and because they are so close an alternate frequency may be used for weather.
The alternate frequency is 162.400 MHz.
Check with your local Weather Bureau or local FCC office.

Model PRO-9 Block Diagram



Model PRO-9 Schematic Diagram

