

Please read before using this equipment

OWNERS MANUAL

REALISTIC® COMMUNICATIONS

PATROLMAN PRO-3 VHF/UHF 3 BAND MONITOR RECEIVER

Catalog No.
20-450

\$199.50



Engineered by Radio Shack, Division of Tandy Corporation

THE BRAND WITH OVER 1,000,000 CUSTOMERS

In choosing this fine Realistic product you have demonstrated a rather acute awareness of the good old American axiom "getting the most for your money." With Realistic this is not an idle boast.

Realistic products are the proud result of Radio Shack engineering, research, development, and over 47 years of experience in electronics. Laboratories are maintained in Boston, Fort Worth, Los Angeles and abroad. In every sense a national brand, the Realistic label is worn with equal distinction by our highly original Communications and Citizens Band (two-way radio) products, and numerous other items including: tape, headphones, antennas, intercoms and tubes.



Contents

- Page 1. Specifications and general description
2. The front panel
 3. How to operate the PRO-3
 4. The rear panel
 5. PRO-3 antennas
 6. Block diagram of the PRO-3 circuits
 7. General schematic of the PRO-3
 8. The PRO-3 front-end circuits

PRO-3 Monitor Receiver

General Description

Your PRO-3 Patrolman Receiver tunes three bands allocated by the FCC to service and business communications. They are:

VHF LO	30-50 MHz
VHF HI	152-174 MHz
UHF	450-470 MHz

These bands carry a remarkable variety of business and emergency radio services. Best known are Fire and Police, but others include Forestry/Conservation, Hospitals, Physicians, Emergency Communications. A list of sixteen general classes appearing in the FCC regulations is given on page 3, and every class includes several users. No individual allocations are given there because generally all bands are used by all services.

Designed for the user, the PRO-3 offers more ability than any other receiver in its class. It is large enough for base station operation, and has all necessary features of SQUELCH, narrow-band filter, and several band operation. But it is light enough to be carried into hard-to-reach areas or mounted in cars, trucks, boats or airplanes. And it uses a remarkably small amount of power. For example, a single car battery should power the PRO-3 for better than 200 hours of continuous operation before needing a recharge.

The PRO-3 is an extremely sensitive receiver. With a full complement of circuits and components, it is nearly as sensitive as any receiver for its tuning ranges can be. Its natural noise level is comparable to a one-third microvolt signal and that listening noise can be heard merely by turning up the audio volume control.

This great sensitivity is necessary for remote areas and in emergency operating conditions. But circuits designed for high sensitivity are often subject to intermodulation problems if used in very strong-signal areas. Also, adjacent-channel transmitters are more likely to be operating in urban and metropolitan areas than in remote regions. The PRO-3 features a really effective 10.7 MHz filter, placed in its IF input circuit. This reduces or eliminates adjacent-channel or strong-signal interference.

Another filter is included to improve the readability of very weak signals. A low-pass audio filter, also controlled from the front panel, can be switched in to reduce the effects of inherent circuit noise when listening to a voice signal that is "buried in the noise." By reducing the audio bandwidth of the receiver, the filter emphasizes the desired audio signal.

The PRO-3 is remarkably easy to use. But it is an up-to-date, complex circuit consisting of 21 separate transistors plus nine more in its integrated-circuit IF section, nine diodes and two thermistors. All are mounted in a steel chassis, which in turn is installed in a steel cabinet provided with a mounting bracket designed for mobile installation. The PRO-3 is an important engineering achievement, but designed for practical applications.

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.

PRO-3 Monitor Receiver

General Specifications

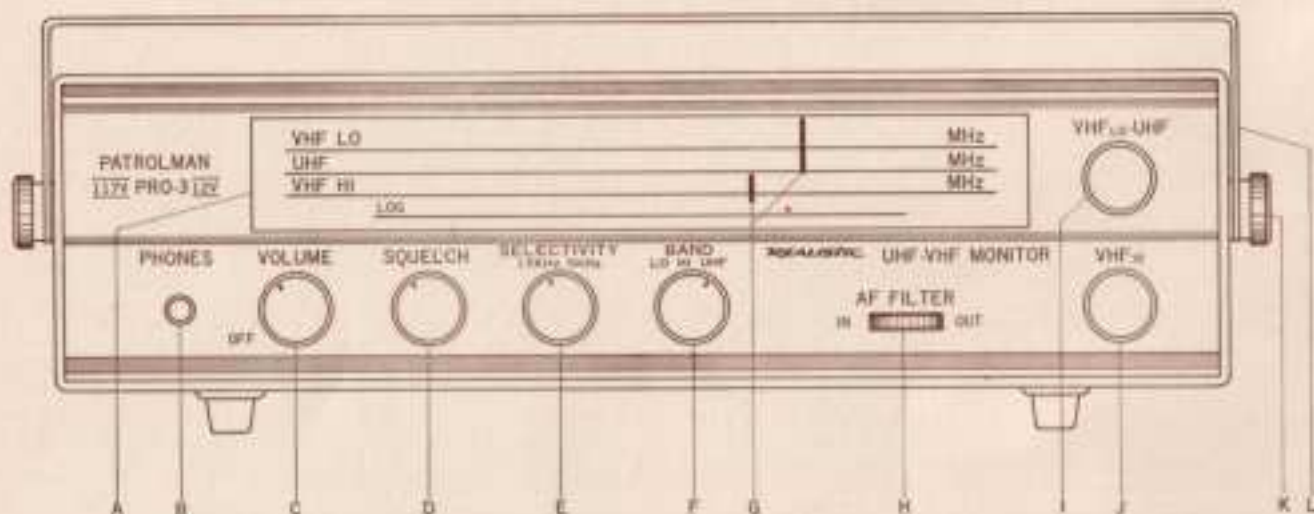
Note: These are given in general form only, since REALISTIC does not believe in buying to or designing to numerical specifications. The latter are subject to variables not clearly related to performance, just as selectivity, the number of transistors or IC's indicate in an average way the quality of 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 test 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 117 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-3 receiver to a DC power supply, check the voltage polarities. Attempting to operate the negative-ground PRO-3 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 expensive and time-consuming repairs are necessary before the PRO-3 can be used again. The Radio Shack warranty does not apply to any damage caused by this, inadequate lightning protection, or other improper connections.

General Specifications List

- Tuning Ranges: VHF LO, 30-50 MHz; VHF HI, 152-174 MHz; UHF, 450-470 MHz.
- Antenna Connections: 50-ohm coax. One for VHF LO and HI bands. Another for UHF band.
- Sensitivity: 1 microvolt for 10 dB S+N/N ratio.
- Selectivity: Filter out, 15 KHz deviation. Filter in, 5 KHz deviation.
- IF frequency: 10.7 MHz.
- Audio Output: 2 watts into 8 ohms. The PRO-3 will operate into a 4 thru 16 ohm load.
- Solid-state Components: 21 transistors, 1 IC, 9 diodes and 2 thermistors.
- Power Input: 117 VAC 60 Hz or 12-15 VDC, negative ground only.

Model PRO-3 Front Panel Controls: Identity and Locations



A—Illuminated slide-rule dial.

B—Up to 2 watts low impedance audio for phones or external speaker.

C—Power switch and audio volume control.

D—Squelch eliminates no-signal noise.

E—Selectivity switch chooses broad or sharp characteristic.

F—Band switch.

G—Separate dial pointers for 30-50MHz/450-470MHz and 152-174MHz.

H—Audio filter improves weak signal readability.

I—Tuning knob for 30-50MHz and 450-470MHz band.

J—Tuning knob for 152-174MHz band.

K—Easily removed knurled steel mounting screws.

L—Steel mounting bracket.

How To Operate The PRO-3 Monitor Receiver

The PRO-3 Monitor Receiver is a remarkably easy receiver to use. Basically, it is an FM receiver, and works like one. Its additional SQUELCH and filter controls, bandswitching capability, and antenna and power requirements are easily met. Highly stable, the PRO-3, once mastered, is a reliable and useful communications tool.

A good installation will make the most of the PRO-3's capabilities. Loss of the tiny signal at the antenna is avoided by correct antenna adjustments and by installing a good quality foam coax cable. Where noise problems must be overcome, the PRO-3's audio output can be fed to low-impedance audio headphones or to an external loudspeaker.

The PRO-3 is powered by either 12-15 volts DC or by 117 VAC 60 Hz, whichever is most convenient. In case of difficulty or uncertainty, the installation problems are best handed over to an experienced technician or engineer. The following assumes a good PRO-3 installation, and is appropriate for first-time operation or for determining if a possible malfunction might actually be a result of improper control settings.

The first step is a quick check of the installation. Antenna jacks are checked for connections to the correct antennas. The AC or DC power source should be operating, and providing the correct voltage. If DC is to be used, it must be of the correct polarity. The AC/DC selector switch on the back panel is set to the type of power being used.

On the front panel the controls are preset before turning on the receiver. Tuning controls are at any setting. The VOLUME control, SQUELCH, SELECTIVITY controls are full counterclockwise. The AF FILTER switch is pushed down on the OUT side.

It is suggested if one can anticipate the frequency band to be used at turn-on time, that the band switch be preselected to this LO HI or UHF position as even when the power switch is turned OFF, the tuning section for this band is electrically energized and will thus provide lowest frequency drift possible when the receiver is turned ON.

Turning the VOLUME control clockwise should result in a mechanical click as the knob goes past the power switch detent, and the power goes on. Gradually advancing the knob clockwise will result in a soft and then increasingly loud rattling hiss from the PRO-3's monitor speaker or from the external headphone or speaker. After getting the feel of this control, it should be turned back to a setting that gives a perceptible but quiet hiss from the speaker.

The next step is to tune the band for a signal. Several passes may be necessary, since stations in the communications bands transmit only when they have a message and do not radiate even a carrier between transmissions. At this point other stations should be sought out, and their positions logged using the G-100 logging scale. These stations can be identified later.

The familiarization with tuning can be repeated on all bands. Slight variations in noise level will be noted as the PRO-3 is tuned over its ranges.

Next, the PRO-3 should be tuned to any station and the SQUELCH control slowly advanced by turning it clockwise. Two key settings will be found. The first is the setting at which receiver noise is no longer heard but the station is heard at normal volume when it comes on the air. And the second setting will be one at which the station is not heard at any time.

These settings change with receiving conditions and with the band in use. For a strong station they are far apart, coming close together for weak signals. And a too-high accidental setting of the SQUELCH control will cause the PRO-3 to act as if it is not working. In case of trouble the first step is to return the SQUELCH knob to its full counterclockwise position. After practicing with this control it should be returned to its fully off position.

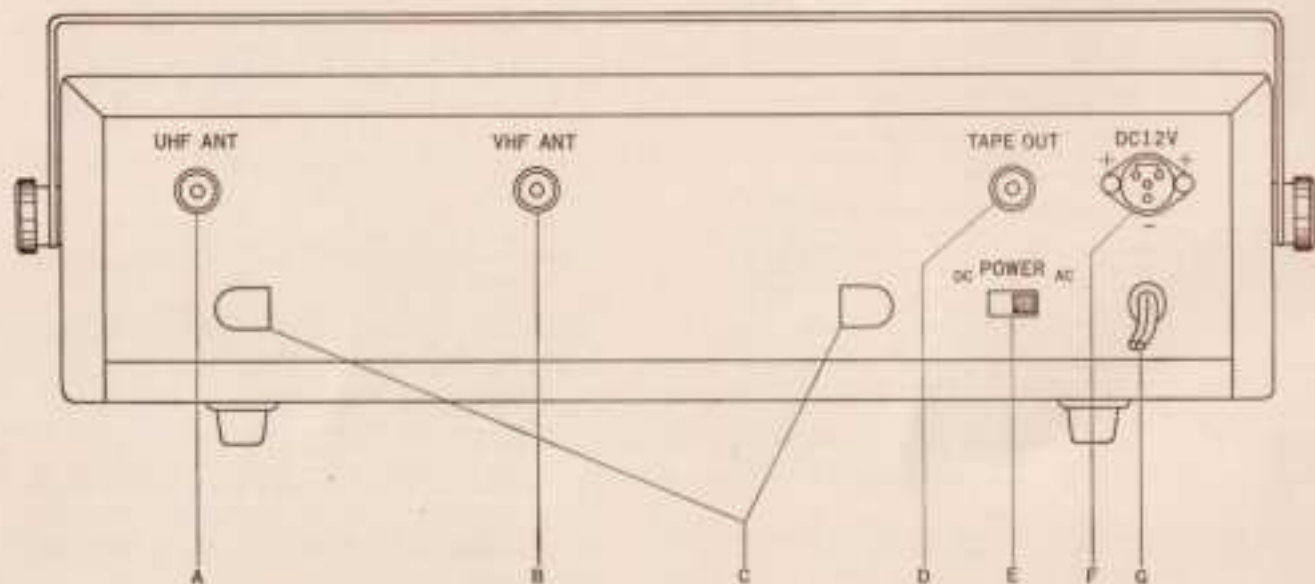
To practice with the SELECTIVITY control, tune in a station with this control in its 15 KHz position. Then advance this control to its SHARP or 5 KHz position. If the signal disappears the receiver tuning should be corrected. The PRO-3's tuning is now very sharp, an indication of how close an unwanted signal can be without causing interference. This filter should also be tried if the PRO-3 is troubled by noises of uncertain origin. If these originate in strong-signal intermodulation, this setting should remove them. The 5 KHz position of this switch may also be tried when listening to an extremely weak signal.

This completes the "guided tour" of the PRO-3 receiver. In practice, all controls are used whenever their functions seem to be required.

Table of FCC Listed Services Using VHF and UHF Bands.

- | | |
|------------------------------|---------------------------|
| • Highway Maintenance Radio | • Motion Picture |
| • Forestry/Conservation | • Relay Press |
| • Special Emergency | • Special Industrial |
| hospitals | • Business Radio |
| ambulances and rescue | • Manufacturers Radio |
| physicians and veterinarians | • Telephone Maintenance |
| disaster relief | • Motor Carrier |
| communications standby | • Railroad Radio |
| school buses | • Taxicab |
| beach patrols | • Automobile Emergency |
| • Power Radio | • ESSA Weather Broadcasts |
| • Petroleum Radio | on 162.55 MHz and |
| • Forest Products | 163.275 MHz |

Rear Panel Inputs and Outputs: Identity and Locations



- A—Antenna connection for 450-470MHz band.
- B—Antenna connection for 30-60MHz and 152-174MHz band.
- C—Line cord storage brackets.
- D—For P.A. or Tape Input.
- E—Power Source Selector Switch.
- F—DC Power Connection Socket.
- G—AC Power Cord.

Cutting instructions for UHF and VHF Antennas

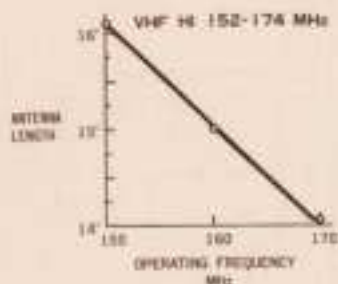
The Radio Shack No. 20-177 antenna is a one quarter (152-174 MHz) or five eighths (450-470 MHz) wave vertical designed for automotive trunk lid mounting. A special clamp in the antenna base fits into the space between lid and car body so that no hole cutting is required. Complete installation instructions are supplied with the antenna.

Minimum distance from antenna to edge of the metal mounting surface is preferably five or more antenna lengths. The two charts at the right indicate most efficient lengths, as measured from the tip of the antenna to the top of the car screw fitting.

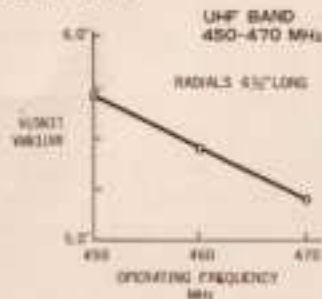
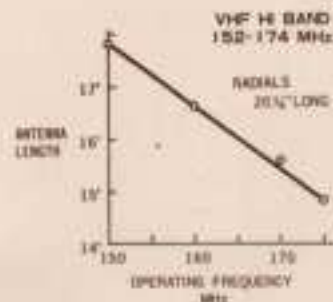
The antenna length is adjusted to 5/8 wavelength at 450-470 MHz to improve its horizontal gain at a slight cost in high-angle gain. Its practical effect is about equal to a doubling of the transmitter power.

Antenna reliability will be improved if, at assembly, all contacting metal surfaces are cleaned and then coated with a thin layer of water pump grease or equivalent. The base fittings should be disassembled, cleaned, and checked about once per year.

CUTTING 20-177 ANTENNA FOR



CUTTING 20-176 FOR



The Radio Shack No. 20-176 antenna is a whiplash quarter-wave ground-plane antenna for 152-174 MHz or 450-470 MHz. It is designed to be used at fixed or portable stations. For best performance at a given frequency its whip and radials should be cut as follows.

During installation all four radials are cut to 20 1/4" (152-174 MHz) or 5 1/2" (450-470 MHz). They are removed from the assembly, the four end caps pulled off, and each radial is cut to the correct over-all length. Then the caps are tapped back on.

Next, the vertical radiator top plug is removed, and the radiator overall length trimmed to the value given in the cutting chart. After cutting, the antenna is ready for assembly and installation.

For best performance this antenna should be installed ten or more vertical radiator lengths away from any large metal objects. When lightning protection systems, metal roofs, and large vehicles moving or stored nearby may influence quality of the received signal, if performance of the receiver system seems poor compared with that of other similar installations, the antenna should be moved.



UHF and VHF Antennas



Dual Band Ground Plane

For outdoor use. 3 heavy duty, low resist aluminum elements. 3-section vertical radiator, matching transformer. Mounting bracket. Accepts PL-259. 20-015, 6 lbs.



Indoor Hi-Low Antenna

Plug-in type. For indoor use. Flagged construction, center loaded coil. Telescoping whip, 40" extended, 16" collapsed. Terminates with pin-type plug. 21-161, 2 lbs.



Dual Band Cow-Mount

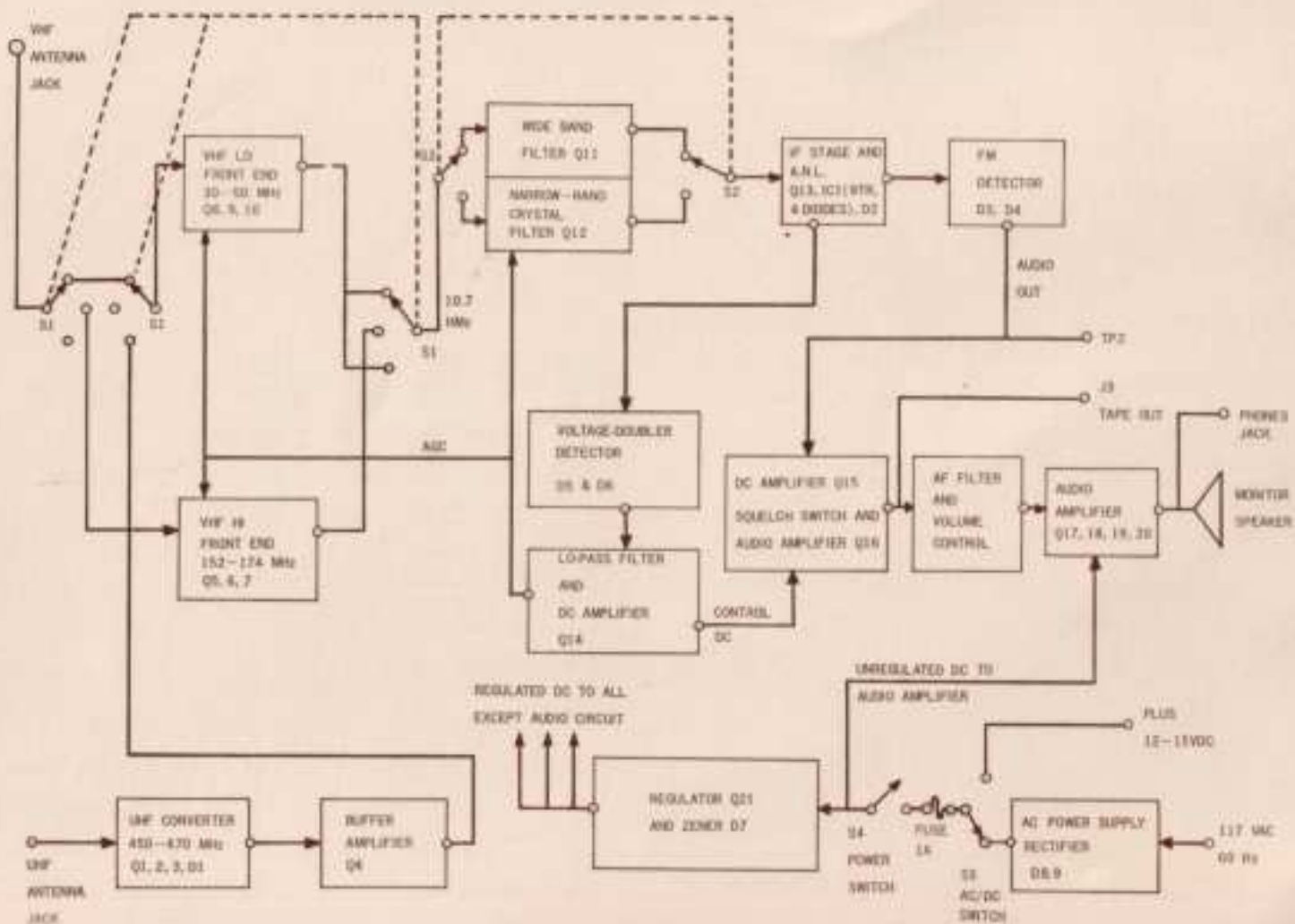
For mobile use. Chrome telescoping whip 50" extended, 30" collapsed, mounted on chrome base. Center loaded waterproof coil. 5' RG-58/U cable. Terminates with pin-type plug.



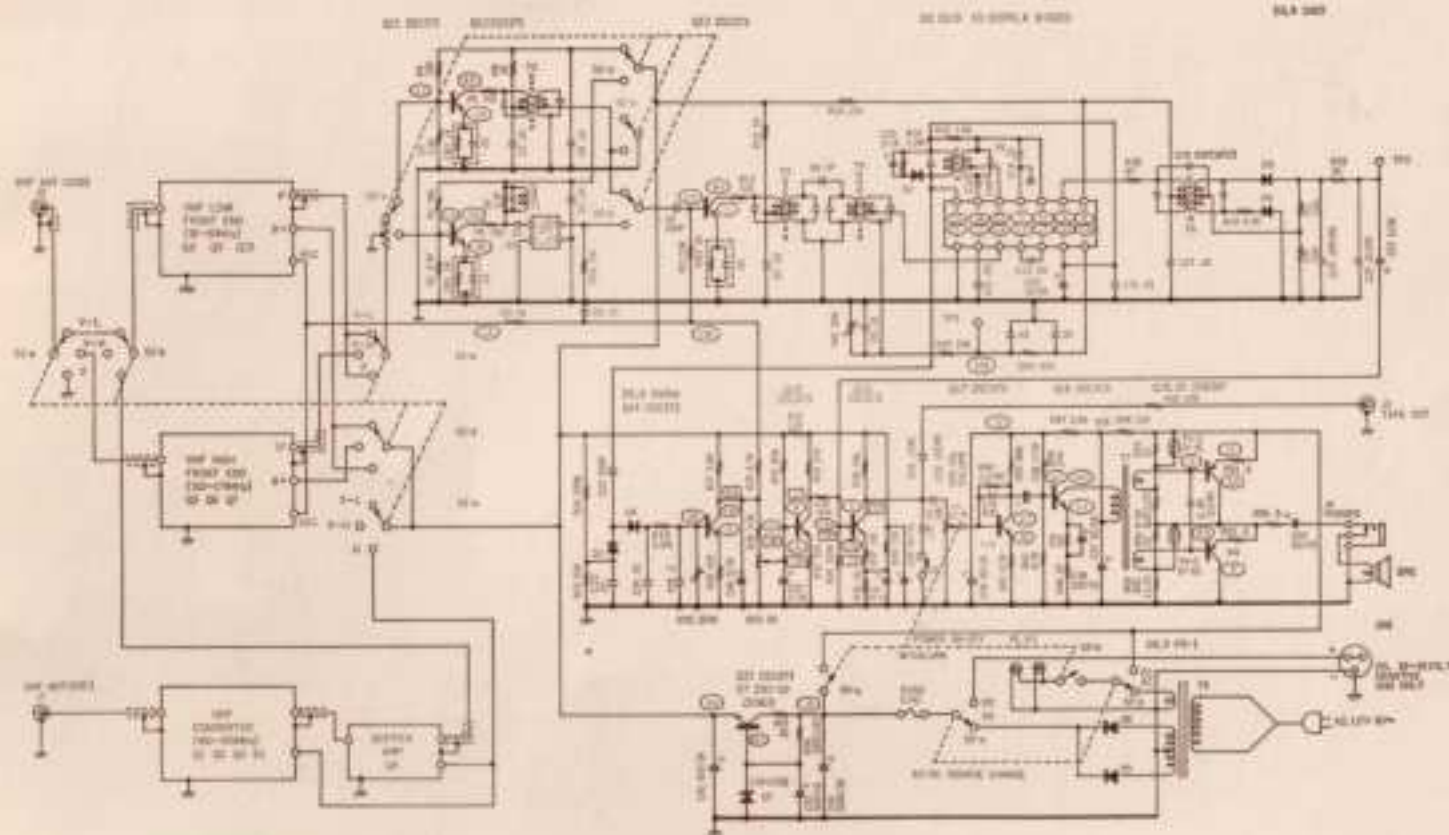
Omnidirectional Indoor Antenna

For indoor or portable use. Plug directly in to back of PRO-3 receiver, 22" overall. Decoupling stud improves efficiency. Chrome-plated. 20-401, 1 1/2 lbs.

Model Pro-3 Block Diagram Pro-3



Model Pro-3 General Schematic



1. Shaping (ref. 1986-1991 & 1992-1993 studies)
2. Control (ref. 1994-1995 study)
3. Self (ref. 1996-1997 study)
4. Shaping (ref. 1998-1999 study)
5. Control (ref. 2000-2001 study)
6. Self (ref. 2002-2003 study)
7. Shaping (ref. 2004-2005 study)
8. Control (ref. 2006-2007 study)
9. Self (ref. 2008-2009 study)
10. Shaping (ref. 2010-2011 study)
11. Control (ref. 2012-2013 study)
12. Self (ref. 2014-2015 study)
13. Shaping (ref. 2016-2017 study)
14. Control (ref. 2018-2019 study)
15. Self (ref. 2020-2021 study)
16. Shaping (ref. 2022-2023 study)
17. Control (ref. 2024-2025 study)
18. Self (ref. 2026-2027 study)
19. Shaping (ref. 2028-2029 study)
20. Control (ref. 2030-2031 study)
21. Self (ref. 2032-2033 study)
22. Shaping (ref. 2034-2035 study)
23. Control (ref. 2036-2037 study)
24. Self (ref. 2038-2039 study)
25. Shaping (ref. 2040-2041 study)
26. Control (ref. 2042-2043 study)
27. Self (ref. 2044-2045 study)
28. Shaping (ref. 2046-2047 study)
29. Control (ref. 2048-2049 study)
30. Self (ref. 2050-2051 study)
31. Shaping (ref. 2052-2053 study)
32. Control (ref. 2054-2055 study)
33. Self (ref. 2056-2057 study)
34. Shaping (ref. 2058-2059 study)
35. Control (ref. 2060-2061 study)
36. Self (ref. 2062-2063 study)
37. Shaping (ref. 2064-2065 study)
38. Control (ref. 2066-2067 study)
39. Self (ref. 2068-2069 study)
40. Shaping (ref. 2070-2071 study)
41. Control (ref. 2072-2073 study)
42. Self (ref. 2074-2075 study)
43. Shaping (ref. 2076-2077 study)
44. Control (ref. 2078-2079 study)
45. Self (ref. 2080-2081 study)
46. Shaping (ref. 2082-2083 study)
47. Control (ref. 2084-2085 study)
48. Self (ref. 2086-2087 study)
49. Shaping (ref. 2088-2089 study)
50. Control (ref. 2090-2091 study)
51. Self (ref. 2092-2093 study)
52. Shaping (ref. 2094-2095 study)
53. Control (ref. 2096-2097 study)
54. Self (ref. 2098-2099 study)
55. Shaping (ref. 2100-2101 study)
56. Control (ref. 2102-2103 study)
57. Self (ref. 2104-2105 study)
58. Shaping (ref. 2106-2107 study)
59. Control (ref. 2108-2109 study)
60. Self (ref. 2110-2111 study)
61. Shaping (ref. 2112-2113 study)
62. Control (ref. 2114-2115 study)
63. Self (ref. 2116-2117 study)
64. Shaping (ref. 2118-2119 study)
65. Control (ref. 2120-2121 study)
66. Self (ref. 2122-2123 study)
67. Shaping (ref. 2124-2125 study)
68. Control (ref. 2126-2127 study)
69. Self (ref. 2128-2129 study)
70. Shaping (ref. 2130-2131 study)
71. Control (ref. 2132-2133 study)
72. Self (ref. 2134-2135 study)
73. Shaping (ref. 2136-2137 study)
74. Control (ref. 2138-2139 study)
75. Self (ref. 2140-2141 study)
76. Shaping (ref. 2142-2143 study)
77. Control (ref. 2144-2145 study)
78. Self (ref. 2146-2147 study)
79. Shaping (ref. 2148-2149 study)
80. Control (ref. 2150-2151 study)
81. Self (ref. 2152-2153 study)
82. Shaping (ref. 2154-2155 study)
83. Control (ref. 2156-2157 study)
84. Self (ref. 2158-2159 study)
85. Shaping (ref. 2160-2161 study)
86. Control (ref. 2162-2163 study)
87. Self (ref. 2164-2165 study)
88. Shaping (ref. 2166-2167 study)
89. Control (ref. 2168-2169 study)
90. Self (ref. 2170-2171 study)
91. Shaping (ref. 2172-2173 study)
92. Control (ref. 2174-2175 study)
93. Self (ref. 2176-2177 study)
94. Shaping (ref. 2178-2179 study)
95. Control (ref. 2180-2181 study)
96. Self (ref. 2182-2183 study)
97. Shaping (ref. 2184-2185 study)
98. Control (ref. 2186-2187 study)
99. Self (ref. 2188-2189 study)
100. Shaping (ref. 2190-2191 study)
101. Control (ref. 2192-2193 study)
102. Self (ref. 2194-2195 study)
103. Shaping (ref. 2196-2197 study)
104. Control (ref. 2198-2199 study)
105. Self (ref. 2200-2201 study)
106. Shaping (ref. 2202-2203 study)
107. Control (ref. 2204-2205 study)
108. Self (ref. 2206-2207 study)
109. Shaping (ref. 2208-2209 study)
110. Control (ref. 2210-2211 study)
111. Self (ref. 2212-2213 study)
112. Shaping (ref. 2214-2215 study)
113. Control (ref. 2216-2217 study)
114. Self (ref. 2218-2219 study)
115. Shaping (ref. 2220-2221 study)
116. Control (ref. 2222-2223 study)
117. Self (ref. 2224-2225 study)
118. Shaping (ref. 2226-2227 study)
119. Control (ref. 2228-2229 study)
120. Self (ref. 2230-2231 study)
121. Shaping (ref. 2232-2233 study)
122. Control (ref. 2234-2235 study)
123. Self (ref. 2236-2237 study)
124. Shaping (ref. 2238-2239 study)
125. Control (ref. 2240-2241 study)
126. Self (ref. 2242-2243 study)
127. Shaping (ref. 2244-2245 study)
128. Control (ref. 2246-2247 study)
129. Self (ref. 2248-2249 study)
130. Shaping (ref. 2250-2251 study)
131. Control (ref. 2252-2253 study)
132. Self (ref. 2254-2255 study)
133. Shaping (ref. 2256-2257 study)
134. Control (ref. 2258-2259 study)
135. Self (ref. 2260-2261 study)
136. Shaping (ref. 2262-2263 study)
137. Control (ref. 2264-2265 study)
138. Self (ref. 2266-226

Radio Shack offers you a choice of 3 other selections in Patrolman® 117/12V receivers — the first properly designed low-cost VHF band radios. The Pro-2 dual band (152-174 MHz and 30-50 MHz) receiver, the Pro-1 high band (152-174 MHz) and the Pro-1 low band (30-50 MHz) receivers each offer base or mobile operation, give you FM or AM reception, manual or crystal-option tuning, and built-in or external speaker listening.



PATROLMAN Professional Series Police Receivers

Thousands of "Pro" receivers are already in use! Each allows you to tune the fascinating police, fire, weather, business, civil defense and government bands. Each has color-coded scales for each band, plus slide-rule tuning, adjustable squelch control, tuned RF and mixer stages, OTL output and a 8-ohm headphone or external speaker jack. Handsome brushed aluminum extruded front panel. Sized only 12¼ x 9 x 3¼". Available only at Radio Shack.

Guaranteed Quality from the builders of the famous **REALISTIC** Communications and CB Equipment.

High Performance **REALISTIC** Engineered Systems



DX-150A

Big, exciting, very professional...our very best! Now even better than before! Includes 4 FET's plus mechanical filter. Continuous coverage from 535 KHz to 30 MHz. Accurate tuning on 12 1/4" 5-color shadow dial. Sensitivity of 0.5 μ V at 30 MHz. Product detector for SSB/CW. Fast and slow AVC. Variable pitch BFO—plus many other features. 11 front panel controls. 100% solid state. Runs on route current or batteries. Size 14-1/2" \times 9-1/4" \times 6-1/2" —with a massive brushed aluminum extruded front panel. Cat. No. 20-150.



TRC-23B

Our Rayado solid-state transceiver was built especially for the CB'er who wants base and mobile operation. It is a 2-way 23-channel radio station. Its dual IF system and automatic modulation level control ensure maximum performance under difficult communications conditions. Features dual function indicator —ON-THE-AIR and MODULATION. Small uses 18 transistors and 10 diodes. Operates from 12-14 VDC or 105-125 VAC. Simple, attractive modern panel design. Size 11-13/32" \times 3-17/32" \times 6-7/8". Area Cat. No. 21-123.

Printed in Japan