

THE RADIO SHACK PRO-2005 PROGRAMMABLE SCANNER

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Manufactured in Japan by General Research Electronics, the Radio Shack PRO-2005 is a 400 channel, wide coverage scanner radio, incorporating NBFM, WBFM, and AM modes. It is the successor to the PRO-2004, the super scanner which put Radio Shack out in front of its competition in the base station scanner market.

The 2005 is basically a 400 channel PRO-2004, built using surface mount components, and housed in a smaller package.

Frequency Coverage

Radio Shack's last minute decision to remove cellular telephone frequency coverage from the PRO-2004 caused a 7 week delay in its introduction. The PRO-2005 appeared in the stores promptly on the heels of the 2004 closeout sale. Both the PRO-2004 and PRO-2005 cover 25-520 and 760-1300 MHz, except for 2 gaps in the cellular telephone bands. The two gaps in the 800 MHz range can be restored in either scanner by clipping a diode.

A matrix of diodes, attached to the microprocessor's input port, is often used to configure radios for sale in different markets. The diode matrix on new the PRO-2005 is located on the vertical circuit board just behind the front panel. There are 2 diodes present, and holes drilled for 2 more.

Lots of Memory

The PRO-2005 has the usual features that scanner buffs have come to expect: individual channel lockouts, selectable rescan delay, an external speaker jack, etc. But, the 400 channel capacity of the PRO-2005 sets another an industry record, just as the 300 channel PRO-2004 did! Casual scanner users may scoff at the usefulness of having so many channels, but seasoned monitorists can have those channels filled up in no time flat, espe-

cially with frequencies in the vast 225-400 MHz military air band, and other federal government allocations.

With so many channels to program, one dreads the thought of a power failure, which could clear memory in a hurry. Not to worry, the PRO-2005 memory is backed up by a

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conventional 9 volt alkaline battery (not supplied). The 400 channels are divided into 10 banks of 40 channels each, and one can select or deselect any channel bank from the scan list. Individual channels can be locked out in the customary way, but the PRO-2005 maintains the handy feature introduced in the PRO-2004, a LOCKOUT REVIEW. Successive depressions of this key step through the locked out channels.

Scanners worth their keep have a priority feature, with channel 1 usually designated the priority channel. The PRO-2005 is more flexible; any of the 400 channels may be designated the priority channel. When the PRIORITY key is depressed, that channel will be sampled every 2 seconds, and the radio will stay there if a signal is heard.

The PRO-2005 has two scan speeds, approximately 8 and 16 channels/second, although one would probably use the faster speed in most instances. This is the same speed as the stock PRO-2004, as measured by your reviewer. A diode could be added to the PRO-2004 diode matrix to speed up the scan and search rates by 25%. The provision for extra diodes in the diode matrix makes one hopeful that the same speedup trick can be applied to the newer PRO-2005.

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When programming a channel, the PRO-2005 firmware sets the mode automatically, based on its idea of what mode is most prevalent on that frequency. This feature saves extra keystrokes, and makes one appreciate the thought that went into the design of this radio. The default mode can be overridden easily, if need be, like to listen to a NBFM satellite in the 225-400 MHz range, which is mainly populated with AM signals.

Searching

The SEARCH facility found on most programmable scanners allows the entry of a pair of frequencies, then by pressing a key, the radio searches frequencies between those limits. The PRO-2005 allows for 10 pairs of limits! These pairs of limits are stored in their own memory, and don't use up any of the conventional 400 memory channels. One can set up several search pairs, for instance:

- 46.610-46.970 MHz: cordless telephones
- 144-148 MHz: the 2 meter ham band

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- 30.01-30.56, 32-33, 36-37 MHz: US Govt

Another unique feature is the MONITOR key, which stops the search and stores the frequency in one of ten special monitor memories. These memories are separate from the 400 main memory channels. The search can be restarted from where it left off by striking the up or down arrow key.

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The user can select the search direction (up or down), and step size of 5, 12.5, or 50 kHz, although the PRO-2005 is intelligent enough to select a default step size based on the frequencies being searched. As on the PRO-2004, there is a hidden step size of 30 kHz, but apparently this step size was disabled when the cellular telephone frequency coverage was removed.

The selected parameters are displayed on the LCD panel, smaller than the panel in the PRO-2004. Search speed is switchable between slow and fast, with fast search being about 14 increments/second (versus 12 for the Uniden/Bearcat 800XLT). For a 12.5 kHz increment, this translates to 11.2 MHz/minute (versus 9.6 MHz/minute for the 800XLT).

The DIRECT key allows one to start searching up or down from whatever frequency is on the display. Let's say the scanner is in MANUAL mode, and set at channel 26, which contains 460.100 MHz. Striking the DIRECT then UP-ARROW keys starts the PRO-2005 searching upwards from 460.100. This is a nice feature.

The PRO-2005 contains a "window detector" circuit, which is called into play during a SEARCH operation. This circuit tries to detect when the radio is tuned close to the center frequency of a station, and prevents the search from halting prematurely, off to the side of the signal.

The AFC (automatic frequency control) circuit of the Bearcat 800XLT often causes a search of 850 MHz signals to halt prematurely. Even though the signal sounds on frequency, the display reads the wrong frequency. Neither the PRO-2004 nor the PRO-2005 have this problem.

The PRO-2005 includes a SOUND SQUELCH, resembling the VSC circuit on the Icom R-7000, which may be used during scan or search operations. With the the sound squelch enabled, signified by a red lamp above the pushbutton, the scanner will skip over unmodulated signals. This is handy for skipping over "birdies", or link signals with a constant carrier.

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The manual warns that the sound squelch may be fooled by signals with low modulation, and skip over them. The PRO-2005 SOUND SQUELCH tries to detect the presence or absence of modulation (not human speech), so unfortunately, it thinks that noisy dead carriers, digital data signals, and paging tones are worth monitoring and will stop the scanner to listen to them.

Taping Facility

A tape recorder can be connected to the TAPE phono jack on the rear panel, which provides 600 mV of audio at a 10,000 ohm impedance. An audio filtering circuit rolls off the high frequency components before they reach the TAPE jack, which makes it impossible to use it for picking off FM subcarrier signals. In addition to a rear mounted external speaker jack, there is a miniature headphone jack on the front of the scanner.

The PRO-2005 lacks a COR (carrier operated relay) output, like ICOM R7000 and older Bearcat 300 have, which would be useful for actuating a tape recorder.

Basic Performance

To evaluate sensitivity, the PRO-2005 was compared with it's father, the PRO-2004. Since a signal generator was not used, quantitative measurements could not be made. Instead, an Antenna Specialists AV-801 antenna was switched between radios, signals from stations were compared by ear, and the results tabulated.

Simply put, the PRO-2005 proved moderately more sensitive than the PRO-2004 on most bands tested, and just slightly more sensitive on a few bands. The cost one pays for the 2005's increased sensitivity is having to put up with hearing 800 MHz trunked systems and cellular telephone

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conversations while searching the 118 - 132 MHz commercial aircraft band. The 800 MHz interference was heard only on the 2005, not the 2004. Other than that, intermodulation interference from paging affected both scanners to the same degree, and on the same frequencies.

Although both the 2004 and 2005 can suffer the effects of intermod, they are much more immune than the overly sensitive, image laden Bearcat 800XLT. The PRO-2005 has a 10 dB attenuator, operable by a slide switch on the rear.

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The up conversion design of both the ICOM R-7000 and Radio Shack PRO-2005 allows use of a very high IF (intermediate frequency), which helps avoid image problems. The PRO-2004 owner's manual contains a frequency allocation chart and a section on images. This section appears in the manuals for other Radio Shack models, and was thoughtlessly thrown into the 2005 manual. It babbles on about images being 21.4 MHz away from the real frequency -- true for simpler models, but not so for the PRO-2005.

The audio output quality is good, although the top mounted speaker directs the sound at the ceiling, but adding an external speaker would allow the sound to be directed at the user.

Unfortunately, the audio level of AM signals is somewhat below that of NBFM signals, requiring a different setting of the volume control. When scanning both AM and NBFM modes, one has to find a compromise position of the volume control.

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The PRO-2005 squelch control has a wee bit too much hysteresis, a trait inherited from its ancestors. It's like having too much play in a car's steering wheel, or backlash in a gear set. This hysteresis forces one to keep the squelch at a tighter setting, missing weaker signals when scanning or searching. It's not as sloppy as in the early PRO-2004s. I've successfully eliminated this problem completely by replacing a single resistor on the 800XLT, as well as the PRO-2002, PRO-2003, PRO-2004 and PRO-24 scanners.

Mechanical Construction

The PRO-2005 is lighter than the 2004. It is enclosed in a gray plastic cabinet, with a plastic front panel. If one is going to pay \$420, one deserves to own some metal, but several stages are internally shielded in their own metal compartments. The entirely plastic cabinet of the older PRO2003 allowed wideband noise to radiate out of the scanner and into nearby shortwave receivers.

The PRO-2005 vertical front panel is an advancement over the sloping panel of the 2004. Now you can stack the scanner on top of other equipment and see the controls without standing up. If sitting directly on a table, two hinged plastic feet, padded with rubber bumpers, can fold out from under the front of the radio to tilt it at a good viewing angle.

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There is a single BNC antenna connector on the rear of the PRO-2005, and a single telescoping antenna is supplied.

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Internal construction is excellent, and the internal shielding is commendable. Interstage shielding is very important in a wide band receiver, to prevent it from "hearing itself", an undesirable phenomena which results in birdies. The PRO-2005 owner's manual lists the birdie frequencies. The shielding is much better in the PRO-2005 than in the 800XLT, which uses no shielding around the 800 MHz converter stage, and probably accounts for some of the birdies in the Bearcat.

Frequencies and other indicators are displayed on a backlit LCD (liquid crystal display) panel, and the level of backlighting can be dimmed by a pushbutton switch.

Vision impaired scanner buffs will appreciate the conventional raised rubber keyboard in the PRO-2005, which replaced the flat membrane keyboard in the PRO-2004. Only moderate pressure is required for actuation, and key depressions are confirmed by a mild "beep" audio tone.

The PRO-2005 is the right size to fit under the dashboard of intermediate sized cars. Although it can be operated on 12 VDC, neither a mobile power cord nor mounting bracket are provided. These items were included with earlier, pre-PRO-2004 Radio Shack models. The AC power cord is not detachable, and would have to be bundled up to keep it out of the way in a mobile installation.

Owner's Manual

The user manual is outstanding compared with the fold out sheet furnished with Uniden scanner.

A single page frequency allocations chart is included, but is not current. There is no schematic. Thankfully, detailed service manuals for Radio Shack scanners are usually available for \$7.50 or \$10.00.

The PRO-2005 is warranted for 1 year, which is reassuring.

What's Missing?

So with all these neat features, what's missing from the PRO-2005? A "search and store" mode, like that on the

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ICOM R7000 and older Bearcat 250 would have been nice. A lighted keyboard and a signal strength meter would also be welcome, as would a mobile mounting bracket and SCA output jack.

Summary

If all one wants is a scanner to monitor local police and fire, there are certainly cheaper and simpler models than the PRO-2005. This scanner is for those who enjoy actively exploring voice communications in the VHF/UHF spectrum. If you already own a PRO-2004 and have added the diode to expand it to 400 channels, there is little to be gained by purchasing a new PRO-2005 -- unless, of course, you are a passionate scanner collector.

The PRO-2005 has the right features and performance, especially for scanning the wide 225-400 MHz military aircraft band. Good design should not to be taken for granted. GRE engineers used the power of the microprocessor to implement useful features in the PRO-2005. Similar processing horsepower was not used so wisely in the Yaesu FRG-9600.

At about \$420, the PRO-2005 provides a good alternative to those not wishing to spend \$1050 for an ICOM R7000.