

## **An Introductory Overview of the Pyramid SVR-200, SVR-250, and SVR-P250 Vehicular Repeaters**

The Pyramid SVR-200, SVR-250 and SVR-P250 are microprocessor-controlled, synthesized low-power vehicular repeaters. They are designed to interface between a high power mobile radio and a low power handheld radio. If the radio operator is out of the vehicle and the mobile radio is receiving a transmission, the SVR will repeat the received signal to the user's handheld on a different frequency. The user may also transmit back to the SVR-200 via their handheld, and the transmission will be repeated back to the base by the high power mobile radio. The SVR repeaters effectively extend the range of the low power handheld to that of the mobile radio.

Motorola and General Electric Public Safety Systems had equivalent compatible products. The Pyramid repeaters in analog mode are Motorola PAC/RT and General Electric AVR compatible.

The Pyramid SVR-200, SVR-250 and SVR-P250 repeaters operate as a standard half duplex transceiver with outbound transmissions briefly interrupted ("sampled") to allow for detection of received low power handheld radio signals. Operation is similar to amateur and commercial radio simplex auto-patch or telephone interconnects. SVR-200 models are single-frequency; SVR-250 and SVR-P250 models are multi-frequency, up to 20 channels, user and optionally remotely selected. All frequency, CTCSS/DCS and P-25 signaling and control parameters are programmed using a PC computer and the proper (FY1 or FY4) cable inserted into the mating jack behind the front cover. The SVR-250 is PC programmable for up to 20 channels, wide-band or narrow-band, CTCSS/DCS, and emergency signaling on a per-channel basis.

The SVR-P250 is compliant with the APCO Project 25 Phase 1 Digital Common Air Interface (CAI) protocol. Advanced features include secure communications with P25 portable radios, AES and DES encryption, and emergency signaling from portable to dispatch. The SVR-P250 is PC programmable for up to 20 channels, with P25, wide-band/narrow-band, CTCSS/DCS, and emergency signaling on a per channel basis.

The SVR-250 is optionally available in a full duplex version with many of the same features as the SVR-252. A special production two-channel version of the SVR-200 was made for the California Highway Patrol and other agencies as a replacement for the General Electric RANGR AVR System. Programming these special production models is done using the same software and toggling it to a hidden options section using the mouse and certain key and display button location selects (clicks). Standard known Pyramid SVR frequency ranges include the 150-174, 450-470, high 750-800 and 900 MHz bands.

Older SVR-200s were sold by various manufacturers ("Erickson"). Some were identified by labeling and/or the front panel being a clear flat plastic plate covering a label underneath. Later SVR-200s have the current beveled front panel and the FY1 (mini-phone) programming cable jack underneath the front cover. A rear mounted DB9M connector is found on the SVR-200 models; the SVR-250/P250 models use a DB15M jack. An optional local speaker jack is also mounted on the rear panel. Power is provided through the DB9/DB15 jack from the connected radio or an external source. SVR-250 models require the FY4 "modular plug" program cable.

Pyramid repeaters sample for on-channel activity, in analog mode detecting and broadcasting an audible lock tone to establish a level of priority for multiple units as the master with slaves queued in sequence at the same location. Other variants and software methods of collision avoidance and priority queuing are used with P-25 and enhanced feature models. The P-25 method of master and slave selection can often appear to be "a bit cumbersome".

Pyramid Products can be used with Commercial, Public Safety, GMRS, and Amateur Radio services.

Commercial, Public Safety, and GMRS operation with a UHF band Pyramid SVR is relatively straightforward. The Pyramid is interfaced to the mobile or even base station radio through a properly constructed interface cable. Most commercial radios have external accessory jacks and Pyramid offers interface PDF Application Notes for the most popular brands and models. The Pyramid Repeater is programmed for the desired frequencies and signaling (CTCSS), sampling time, parameters and the priority for multiple unit option can be enabled if desired. The default parameters are traditionally excellent for all radio services; only the desired frequencies need to be programmed. The Pyramid SVR does require software programming, alignment and level adjustment per the service manual and application note instructions, available free from the Pyramid Web Page.

Amateur Radio operation with a Pyramid SVR is possible near the band edge next to the adjacent commercial range. In the case of the earlier SVR-200 models, the limiting factor is the radio module receiver pre-selector alignment. Ham-band programming can be done with an early DOS version software or modified data file using newer Windows PC software. The DOS software can still be obtained from the online "Wayback Machine" web page archive of the [www.pyramid.com](http://www.pyramid.com) web site.

As an example, the 450-470 MHz SVR-200-U can be programmed and aligned to operate at 449.975 MHz as an extender/repeater for Amateur Radio Operation. The ability to move down further in to the high end of the Amateur band is related to the generation of the RF transceiver model supplied with the SVR you have. You will find different SVR-200 RF modules and PC board versions with relatively minor differences, but the current service manual and application notes are quite usable for all SVR generations.

If someone is extremely good at modifications, the RF modules can be modified for further out of normal band operation. One could even use frequency conversion (transverter) systems.

Typical RF power level of extender repeater operation is often limited to less than a few watts output. Digital P-25 systems offer surprising coverage over miles using fractional power (less than 300 milli-watts).

Actual repeat or extender operation relies on adequate frequency separation and antenna line filtering between the higher power mobile and the SVR repeater. An example "same" or "in-band" commercial mobile radio receiving a Taxi Dispatcher on 152 MHz and reply transmitting on 157 MHz would have the Pyramid repeater operating up at 173 MHz. The user's hand-held portable radio would operate simplex on 173 MHz. Both the mobile radio and Pyramid repeater require filtering, a notch filter on 173 MHz is T-connected into the antenna coax line of the mobile radio, and a band-pass 173 MHz filter is placed in series with the Pyramid repeater. The mobile radio can efficiently operate at any programmed location except on (or next to) the 173 MHz in-line notch filter (repeater) frequency. Cross band operation can often be done without the additional in-band filtering requirements.

Repeater/Extender operation is not restricted to band or mode. The mobile radio and repeater can be digital or analog, same or different band, trunking and or conventional.

Surplus Pyramid SVR products are widely available on Ebay. The programming cable can be made or purchased from Ebay or even directly from Pyramid; their customer service is fairly good. Pyramid does not offer or maintain available copies of the original SVR DOS software that allows ham band programming; use the above information to obtain the software from the Wayback Machine site or by Email contacting [skipp025 at yahoo dot com](mailto:skipp025@yahoo.com).

I hope this information helps you with any Pyramid SVR Repeater / Extender questions you might have.