

SVR-P255 EVRS



P Y R A M I D
COMMUNICATIONS

Includes:

- Specifications
- Operation
- Installation
- Alignment
- Circuit Description
- Schematic
- Parts List

Enhanced Vehicular Repeater Solution

VHF 136 - 174 MHz
UHF 450 - 530 MHz
800 764-870 MHz



Service Manual



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Foreword

Scope of This Manual

This manual contains the specifications, functional description, operating instructions, schematic, parts locator and parts list for the SVR-P255 synthesized vehicular repeater.

This manual is intended for use by qualified service technicians to aid them with installation, interfacing, alignment and trouble shooting of the SVR-P255 when used with other land mobile radios.

Service Manual Revisions

Component changes, additions and deletions may occur in the circuit design to improve operation and will be reflected in future releases of this service manual. Specifications and circuit changes are subject to change without prior notice or obligation by Pyramid Communications.

Safety Information

The SVR-P255 is designed to operate within all applicable Federal regulations at the time of manufacture. Proper operation and service procedures will assure continued compliance with these regulations:

- Do not operate the SVR-P255 without an antenna or appropriate RF load connected to the antenna connector.
- Do not operate the SVR-P255 in the presence of unshielded electrical blasting caps or explosive environmental conditions.
- Do not operate the SVR-P255 while refueling the vehicle or in the presence of explosive fumes.
- Do not operate the SVR-P255 with persons standing closer than 2 feet from the mobile or repeater antenna.

FCC Information

The SVR-P255 complies with the FCC rules parts 90 and 22 for radio frequency transmitters. The user must apply for a license to operate the SVR-P255 transmitter pursuant to parts 90.243 and 90.247. Other FCC rules may apply depending on the class of service the user qualifies for. A complete listing of FCC rules and regulations may be ordered from:

Superintendent of Documents
Government printing office
Washington DC 20402

The following information pertaining to the SVR-P255 should be included in the FCC license application:

	VHF	UHF	700/800 MHz
Type Acceptance:	LRUSVR-P250V	LRUSVR-P250U	LRUSVR-P250M
Output Power:	0.25-2.0W	0.25-2.0W	0.25W-2.0W
Emission designators: 10K0F1D, 10K0F1E, 10K0F7D, 10K0F7E, 11K0F3E, 12K3F1D, 16K0F3E, 4K8F2D 7K6F1D, 8K1F1D, 8K1F1E, 8K1F7D, 8K1F7E, 8K4F2D			
Frequency band:	136-174 MHz	450-530MHz	764-870 MHz
Number of Channels:	20	20	20

Specifications

Transmitter:	VHF	UHF	700/800 MHz
Frequency Range:	136-174 MHz	450-530 MHz	764-776 + 850-870 MHz
Rf power out:	500mW - 2W	500mW - 2W	500mW - 1W
Spurious emissions:	-70dBc	-70 dBc	-70dBc
Freq stability -30°~+60°C:	1.5 PPM	1.5 PPM	1.5 PPM
Hum and Noise:	-43/-38dB (25/12.5kHz)	-43/-38dB (25/12.5kHz)	-40/-33dB (25/12.5kHz)
Audio response (300-3kHz):	Flat or +6dB/octave	Flat or +6dB/octave	Flat or +6dB/octave
Audio distortion:	<3% @ 60% deviation	<3% @ 60% deviation	<3% @ 60% deviation
Local mic sensitivity:	300mV-5VPP	300mV-5VPP	300mV-5VPP
FCC Type Acceptance:	LRUSVR-P250V	LRUSVR-P250U	LRUSVR-P250M
Industry Canada Approval:	2390A-SVRP250V	2390A-SVRP250U	2390A-SVRP250M

Receiver:

Frequency Range:	136-174 MHz	450-530 MHz	764-776 + 850-870 MHz
RF sensitivity Analog:	.28µV	.28µV	.28µV
Digital (5% BER):	.20µV	.20µV	.20µV
Squelch sensitivity:	.2µV to 2µV adjustable	.2µV to 2µV adjustable	.2µV to 2µV adjustable
Selectivity:	75/65dB (30/15 kHz)	75/65dB (25/12.5 kHz)	75/65dB (25/12.5 kHz)
Spurious/image rejection:	75db	75db	75db
IMD response:	75db	75db	75db
Frequency stability:	1.5 PPM	1.5 PPM	1.5 PPM
Audio response (300-3kHz):	Flat or -6db/octave	Flat or -6db/octave	Flat or -6db/octave
Audio output:	0-5VPP AC coupled	0-5VPP AC coupled	0-5VPP AC coupled
Local Rx Audio:	400 mW 8 Ohms	400 mW 8 Ohms	400 mW 8 Ohms

Power Requirements:

DC Supply	13.6 VDC	13.6VDC	13.6VDC
Standby	170 mA	170mA	170mA
Receive	250 mA	250mA	250mA
Transmit	1.5 A @ 2W	1.75A @ 2W	2A @ 1W

Physical:

Dimensions:	5.75"W x 8"L x 2.25"H
Weight:	36 oz.
Case:	One piece extruded aluminium

Intellectual Property Rights

This product may be protected by one or more patents or designs of Tait Electronics Limited together with their international equivalents, pending patents or design applications and registered Trade Marks: NZ409837, NZ409838, NZ508806, NZ508807, NZ509242, NZ509640, NZ509959, NZ510496, NZ511155, NZ511421, NZ516280, NZ519742, NZ520650, NZ537902, NZ521450, NZ522236, NZ524369, NZ524378, NZ524509, NZ524537, NZ524630, NZ530819, NZ534475, NZ534692, NZ535471, NZ537434, NZ546295, NZ547713, NZ569985, AU2003281447, AU2004216984, AU2005207405, AU2005267973, AO200811677, CA2554213, CA2574670, CN200830113833.4, EU1,532,866, EU1,599,792, EU0574655.9, EU000915475, GB23865476, GB23860110, GB2413249, GB2413445, US11/232716, US10/597339, US10/520827, US5,745,840, US10/547653, US10/546696, US10/546697, US10/520827, US10/547964, US10/523952, US11/572700, US29/306491.

This product may also be made under license under one or more of the following U.S. Patents: 4,590,473, 4,636,791, 4,716,407, 4,972,460, 5,146,497, 5,148,482, 5,164,986, 5,185,795, 5,185,796, 5,271,017, 5,377,229, and 5,502,767. The IMBE™ voice decoding Technology embodied in this product is protected by Intellectual Property Rights including patent rights, copyrights, and trade secrets of Digital Voice Systems, Inc. This voice coding Technology is licensed solely for use within this Communication Equipment. The user of this Technology is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the Object Code, or in any other way convert the Object Code into a human-readable form. Protected by U.S. Patents 5,870,405, 5,826,222, 5,754,974, 5,701,390, 5,715,365, 5,649,050, 5,630,011, 5,581,656, 5,517,511, 5,491,772, 5,247,579, 5,226,084, and 5,195,166.

Functional Description

Generally, vehicular repeaters are used as mobile extenders in cross-band operation: the link is VHF/UHF/800 MHz simplex and the mobile is Lo-band, VHF, UHF or trunking. In-band operation is possible, but care must be taken to prevent interference between the mobile's higher power transmitter and the repeater receiver. Proper frequency selection and antenna placement are important even in cross-band operation, but especially for inband use. Low power pre-selector cavities may be placed in line with the repeater antenna cable since it is simplex and low power.

Important Note Analog Operation

The SVR-P255 is designed to operate on simplex frequencies; part of the multi-vehicle format dictates that all of the SVR-P255s must be able to monitor all link traffic on site and be able to determine if a handheld is transmitting, or if other repeaters are transmitting. In Analog mode, the handhelds must transmit CTCSS, but should be carrier squelch receive. ***The handhelds do not use CTCSS decode if the repeater is utilizing the multi-vehicle format***, as this will interfere with the priority sampling which is essential for multi-vehicle operation. Also, the handhelds would have to have different encode and decode tones in order for the repeater to be able to tell the difference between handhelds and other repeaters, so the handhelds would not be able to hear each other. ***The repeaters will not transmit CTCSS unless used only in a single vehicle environment.***

Important Note P25 Operation

In P25 mode, the SVR-P255 must also operate on simplex frequencies. The handhelds must transmit a different NAC code than the SVR-P255 transmit NAC code, and the ***Handheld Receive NAC code must be F7Eh (all call)*** in order to hear the other handhelds and the SVR-P255's which transmit different NAC codes for different functions.

When the user leaves the vehicle, they activate the SVR-P255 via their mobile radio front panel or a separate switch. When the mobile radio is receiving carrier and proper tone, the SVR-P255 will begin transmitting on the handheld's receive frequency. The user is able to hear and respond to all radio traffic, including other handhelds at the site. In analog mode the SVR-P255 can be programmed to give the handhelds priority in a conversation by periodically sampling for handheld activity (carrier and proper tone) during base-to-portable transmissions. During sampling, if the SVR-P255 detects a handheld transmission, it will cease transmissions, key the mobile radio and repeat portable-to-base. This allows the handheld to respond during repeater hang time or during full duplex interconnect calls. Priority sampling can be enabled/disabled through PC programming and the interval can be programmed between .25 seconds and 2.5 seconds in .25 second increments. ***Priority sampling is not available in P25 mode.***

The SVR-P255 has a programmable time out timer for base-to-portable transmissions. If the mobile COR is active for more than the programmed time (and the SVR-P255 is the priority unit) it will send a double blip and cease transmission until the mobile COR is inactive. The time-out is in affect regardless of whether the SVR-P255 is programmed for priority sampling or not.

Multi-Vehicle Operation

The SVR-P255 has 2 different multi-vehicle priority formats; both are compatible with the existing SVR-200 and Motorola PAC/RT formats. The new SVR-P255 with ESP™ logic has enhanced features that ensures a priority vehicle is selected and ready to transmit during the idle time rather than during voice transmissions. If EVRS is enabled, ESP must be used. The ESP Beacon is used for the "out of range" function of EVRS mode. The 2 formats are explained below:

SVR-200 Legacy Format

When the SVR-P255 is first activated, it will transmit a short "lock tone" that alerts the user that the system is functioning. It will then assume the priority status and be ready to repeat any base-to-portable or portable-to-base transmissions. If another unit arrives on scene and is activated, it too will transmit the "lock tone"; when

the first SVR-P255 detects the lock tone from the second unit, it will increment a “priority counter” and will no longer repeat any transmissions. The recently arrived unit will be the priority repeater, and the first unit will be 1 count away from priority. This process will continue for each unit that arrives at the site, creating a priority hierarchy for up to 256 vehicles, each with a unique count and only one unit at priority status. The SVR-P255 will not transmit its lock tone if the radio channel is busy when first enabled. It will wait in non-priority status until all transmissions cease, then send its lock tone and become the priority unit.

Even though the other SVR-P255s are not at priority status, they will continue to monitor the channel for activity. If the priority unit were to leave the scene or become disabled, the other units will detect the condition to repeat and determine that there is no priority unit repeating the transmission. They will then begin to decrement their priority counters until one of them reaches the priority status and begins repeating the transmission. Since the SVR-P255s are all at different counts, only one will reach priority status and begin transmitting. The other units will sense the new priority repeater and cease counting down, preserving the priority hierarchy.

If another unit were to arrive from a different scene and it is still the active priority, there will be two active repeaters on the air when a condition to repeat exists. When one of the SVR-P255s unkeys to check for handheld activity (analog mode only), it will detect the presence of the other active SVR-P255 and increment its priority counter and cease transmission. This is the self clearing mode to prevent radio collisions.

ESPTM Priority

The SVR-P255 Enhanced Sensor Priority works similar to the SVR-200 and PAC/RT formats and is completely backward compatible with those systems. The SVR-P255 determines if there is a priority (and re-establishes the priority if missing) during idle time between conversations rather than at the critical start of a conversation. When a condition to repeat exists, the SVR-P255 is always ready.

The priority SVR-P255 will transmit a short tone burst every 10 seconds. This serves 2 purposes: It informs the handheld operator that they are still within range of the vehicle and it alerts the non-priority units that a priority vehicle is still on scene. As long as the non-priority units hear this "beacon" every 10 seconds, they preserve their counts and maintain the priority hierarchy. If the priority vehicle leaves the scene, after 10 seconds, the non-priority vehicles will not hear the "beacon" and begin counting down. When one of the counts=0, that SVR-P255 will send lock tone for 800 mS, assume priority and begin sending the "beacon" tone every 10 seconds as before. Since the "beacon" tone must be heard every 10 seconds, it does not have busy carrier lock out and will send the tone if 2 handhelds are communicating directly or in the presence of co-channel interference.

The ESP Beacon is also an integral part of the EVRS functionality. ESP must be enabled if EVRS is enabled. This beacon is used to notify the portable radio of the status of the trunking system as well as keep the portable radio RSSI indication up to date and provide an out of range function to the EVRS enabled Viking portable radio.

EVRS Operation

When the SVR-P255 is connected to a Kenwood Viking mobile radio, EVRS mode can be enabled. EVRS (Enhanced Vehicular Repeater Solution) mode is a proprietary enhancement to the SVR-P255 operation that creates a seamless trunking experience (talk permit, busy, denied call status) to the portable radio user. It also provides emergency functionality, out of range notifications to the portable radio.

EVRS options must be enabled in the Viking mobile and portable radio. In addition, the EVRS mode must be enabled on the SVR-P255 to turn on this enhanced feature set.

When enabled, the SVR-P255 uses a proprietary trunking protocol between the SVR-P255 and Viking portable radio to create on scene trunking handshake between the portable radio and the SVR-P255, which is contingent on the mobile radio acquiring a trunked channel. If the call is successful on the mobile radio/trunked network call, the portable radio will get a talk permit tone as expected. If the call fails on the mobile radio, the portable radio user will be notified of the status of the failure (busy, denied or out of range).

With this solution, the user keys their handheld once, with no special behavior to access the SVR-P255 enhanced trunking protocol and initial each call.

Emergency Operation (EVRS mode Only)

When EVRS mode is enabled, the SVR-P255 will support Emergency Calls with Hot Mic. The SVR-P255 uses the P25 Common Air Interface (CAI) to decode the portable's emergency status and initiate the emergency call on the Viking mobile radio. Additionally, there is a solder jumper on the main logic PCB that determines if the Emg output signal pulls to ground (NO) or breaks ground (NC). For Viking mobile radios, ensure this jumper is set for NC.

Wide Band / Narrow Band Channels (Analog Mode Only)

The SVR-P255 can be programmed for Wide/Narrow band operation on a per channel basis. Wide band operation is 25kHz for UHF and 800 MHz, 30kHz for VHF. Narrow band is 12.5kHz for UHF and 800 MHz, 15kHz for VHF. In addition to changing the receiver bandwidth and transmitter modulation characteristics, the audio levels into and out of the SVR-P255 are automatically adjusted so the levels at the mobile will be correct with either bandwidth selected. *Note: Wideband operation is disabled for US sales.*

Power Up Channel

The SVR-P255 can be programmed to revert to the last channel used when powered down or a pre-programmed "Home" Channel.

LEDs

The SVR-P255 has a 2 digit channel display as well as eight status LEDs:

- CPU: Flashes at a 1 Hz rate to indicate proper operation of the microprocessor.
PRI: When on, indicates that the unit is at priority count zero and will repeat all transmissions.
RCOR: Repeater Carrier detect.
RTONE: Repeater sub-audible decode; when on, indicates a condition to repeat portable-to-base.
RTX: Repeater transmit indicator.
MCOR: Mobile unmute detector indicating a condition to repeat base-to-portable.
MTX: Mobile transmit indicator.
OPT: Emergency Tone/Code Decode.

☞ If the decimal point is illuminated in the 2 digit channel display it indicates a P25 channel is selected.



Installation

Before installing the SVR-P255, ensure that the mobile radio is properly aligned per the manufacturer's tuning instructions. Additionally, ensure that the SVR-P255 jumpers are properly configured for use with the particular mobile radio that it will be connected to:

- J1 Controls the maximum drive level of the transmit audio output to the mobile radio. If J1 is installed, output amp U1A will have an adjustment range of 0-100 mVPP. If J1 is removed, U1A can be adjusted between 0-5VPP.
- J2 Controls the output impedance of the transmit audio line to the mobile radio. If connected to a low impedance point in the mobile, installing JP2 sets the output impedance to 600 ohms. If JP2 is open, the output impedance is 2.2Kohms. Install the jumper for radios that require a lot of modulation drive or that have low impedance microphone circuits. Remove the jumper if the SVR-P255 installation decreases local microphone audio at the mobile.
- J4 Used to internally tie the local mic input of the SVR-P255 to the transmit audio output line which is usually connected to the mic hi line in the mobile.
- J5 Used to internally tie the on-air detect input of the SVR-P255 to the PTT output. Do so *only on conventional radios*; trunking radios *must have the on-air detect line connected to a line indicating that the radio is transmitting*.
- J6 Changes the maximum gain of the local mic input amp from unity (Out) to 10x (In).
- J7 Changes the maximum gain of the receive audio line input from unity (Out) to 7x (In).
- J8 Adds a pull up (+ position) or pull down (- position) resistor to the remote enable line (blue).
- J9 Adds a pull up resistor (10K to 5VDC) to mobile COR line (violet)
- J10 Connects the front panel on-off control to the remote enable line to enable the SVR-P255 from the front panel.
- J11 Adds (Out) or removes (In) a 100KOhm resistor in series with the Tx audio line for applications with low level mic audio and alternator whine problems (see Service Bulletin 113).
- J13 Selects the Emergency output polarity: NO=pull to ground during Emg NC=break ground during Emg.

Make the connections between the mobile radio and the SVR-P255 cable as follows:

**Pin 1:
Black/Shield** **Ground.** Connect to the radio's chassis or ground plane.

**Pin 2:
White** **Mobile transmit audio.** Connect to the mobile transmit audio path or tone input. If connected to the mobile mic input, ensure that the SVR-P255 is programmed for flat (common data). If connected after pre-emphasis, ensure that the SVR-P255 transmit audio path is programmed for pre-emphasis. Pin 2 is AC coupled and has an output impedance of 600 or 2.2Kohms (determined by J2). RV3 sets the transmit audio output level and J1 sets the adjustment range between 0-5VPP (J1 open) or 0-100mVPP (J1 shorted).

**Pin 3:
Blue** **Remote enable/disable.** Connect to the radio's auxiliary output or a separate switch to remotely enable or disable the repeater. If this line goes high to activate the repeater, ensure that JP1 is set to the “+” position. If this line goes to ground, set JP1 to the “-” position. J8 has two positions to add a pull up (+) or pull down (-) resistor to this line if used with an open collector or dry contact output. J10 connects this line to the front panel on/off control.

Pin 4: <i>Green</i>	Mobile PTT output. Connect to mic PTT on the mobile radio, or a line that goes active low to transmit. Pin 4 is an open drain output rated at 2A at 15VDC.
Pin 5: <i>Red</i>	12 VDC input. Connect to the radios 12V switched supply or a point capable of supplying at least 2A of current.
Pin 6: <i>Yellow</i>	Mobile receive audio. Connect this line to the mobile receive audio path before the volume control. If pin 6 is connected to the mobile discriminator, ensure that the SVR-P255 receive path is programmed for de-emphasis (common data). If connected after de-emphasis, program the receive path for flat. Pin 6 is AC coupled and high impedance ($>15K$ ohm). RV5 sets the receive audio level sensitivity; this input should be between 30mVPP and 5VPP. J7 sets the gain of the receive input amp. If open, the input has a maximum gain of one; if installed, the input has a maximum gain of 7.
Pin 7: <i>Violet</i>	Mobile COR detect. This line is used to indicate when the SVR-P255 should repeat the transmission to the handheld. Connect to a logic point in the radio that indicates proper tone and carrier have been detected or the audio unmute line. If this line goes more positive during an unmute condition, program the mobile COR line as active high (common data). If the line goes more negative during an unmute condition, program the mobile COR line as active low. The input from pin 7 is high impedance and does not have to go rail to rail. The SVR-P255 uses a voltage comparator as a COR threshold detector and is factory set at 1.6VDC. The COR input must go at least 0.5VDC on either side of this threshold.
Pin 8: <i>Brown</i>	Not used.
Pin 9: <i>Gray</i>	EVRS-C/TXS This line is used as part of the communications between the SVR-P255 and the Viking mobile radio for EVRS communications.
Pin 10: <i>Black/White</i>	Emergency Output. Connect to the Emergency input on the mobile radio. On Motorola radios, the Emergency input opens from ground on activation and jumper J13 should be in the "NC" position. On all other radios, the Emergency input pulls to ground on activation and jumper J13 should be in the "NO" position.
Pin 11: <i>Teal</i>	EVRS-A This line is used as part of the communications between the SVR-P255 and the Viking mobile radio for EVRS communications.
Pin 12: <i>Coral</i>	EVRS-B This line is used as part of the communications between the SVR-P255 and the Viking mobile radio for EVRS communications.

Install the SVR-P255 in the vehicle using the supplied mounting bracket and hardware. Install the unit where it will be easily visible by the driver and will not interfere with the drivers vision or constitute a hazard during a vehicle collision. The SVR-P255 mounts in the bracket using the four 8-32 x $\frac{1}{4}$ " machine screws. Do not use longer screws to mount the SVR-P255 to the bracket or circuit damage may result.

Alignment

Before aligning the SVR-P255, ensure that the mobile radio is aligned per the manufacturer's service procedure; Ensure that the SVR-P255 is properly programmed and the jumpers are set per the previous section.

In order to properly align the SVR-P255, you will need two service monitors and the mobile radio that the repeater will be installed with.

Dis-assemble the repeater by removing the two cap screws on the front panel; disconnect the front panel from the main chassis by removing the 2 connectors. Remove the two cap screws from the rear panel and slide the main circuit board out of the housing with the rear panel attached. Re-connect the front panel to the main PCB. Connect one service monitor to the SVR-P255 TNC jack and the other to the mobile antenna jack. Connect the cable from the mobile radio to the SVR-P255 (See figure 4 on page 11). Turn on the mobile and activate the SVR-P255.

Adjust the repeater squelch control (RV9) so that the repeater COR led is off. Adjust the mobile so that the audio is squelched.

SVR-P255 Transmitter

1. ***Maximum deviation/lock tone deviation:*** Press S3 (Test) and adjust RV7 (Lock Tone) for maximum. Adjust RV8 (repeater deviation) until the wave form just enters clipping; adjust RV7 for total 60% deviation . Release S3.
2. ***Mobile COR:*** Measure the voltage at TP2 (R11) on the SVR-P255 main PCB and record. Ensure the mobile COR LED on the front panel is off. Set the mobile service monitor for the mobile receive frequency, 1mV RF output and CTCSS modulation of 15% deviation. Measure the voltage again at TP2 and record. Ensure the mobile COR LED on the front panel is on. The 2 voltages at TP2 must be at greater than 2.1VDC and less than 1.1 VDC.
3. ***RX audio sensitivity/CTCSS deviation:*** Set the service monitor connected to the mobile for the mobile receive frequency and 1mV RF output. Modulate the signal generator with a 1kHz tone at 60% deviation and CTCSS tone at 15% deviation. Ensure that the SVR-P255 mobile COR and repeater PTT LED's are on. Adjust RV5 on the SVR-P255 main board for 75% deviation if CTCSS/DCS transmit is programmed, adjust for 60% deviation if carrier squelch transmit, as read on the service monitor connected to the SVR-P255. Turn the RF output from the mobile service monitor off and ensure that the SVR-P255 mobile COR and repeater PTT LEDs are off.

SVR-P255 Receiver

1. **Repeater squelch:** Adjust the service monitor RF output for $2\mu\text{V}$. Adjust RV9 on the SVR-P255 main board so the repeater COR LED is just on. Decrease the service monitor RF output to $.75\mu\text{V}$ and ensure that the repeater COR LED is off.
2. **Transmit audio output:** Adjust the service monitor RF output for 1mV . Turn the CTCSS modulation on and set for 15% deviation. Confirm that the repeater COR, CTCSS and mobile PTT LED's are on. Adjust RV3 on the SVR-P255 main board for 60% deviation as read on the service monitor connected to the mobile radio. Turn off the CTCSS modulation of the service monitor connected to the SVR-P255. Confirm that the repeater CTCSS and mobile PTT LED's are off.
3. **Lock Tone/Code Decode:** Change the 1kHz tone modulation to the lock tone frequency or proper NAC in P25 mode. Confirm that the PRI LED goes off after approximately .5 seconds.

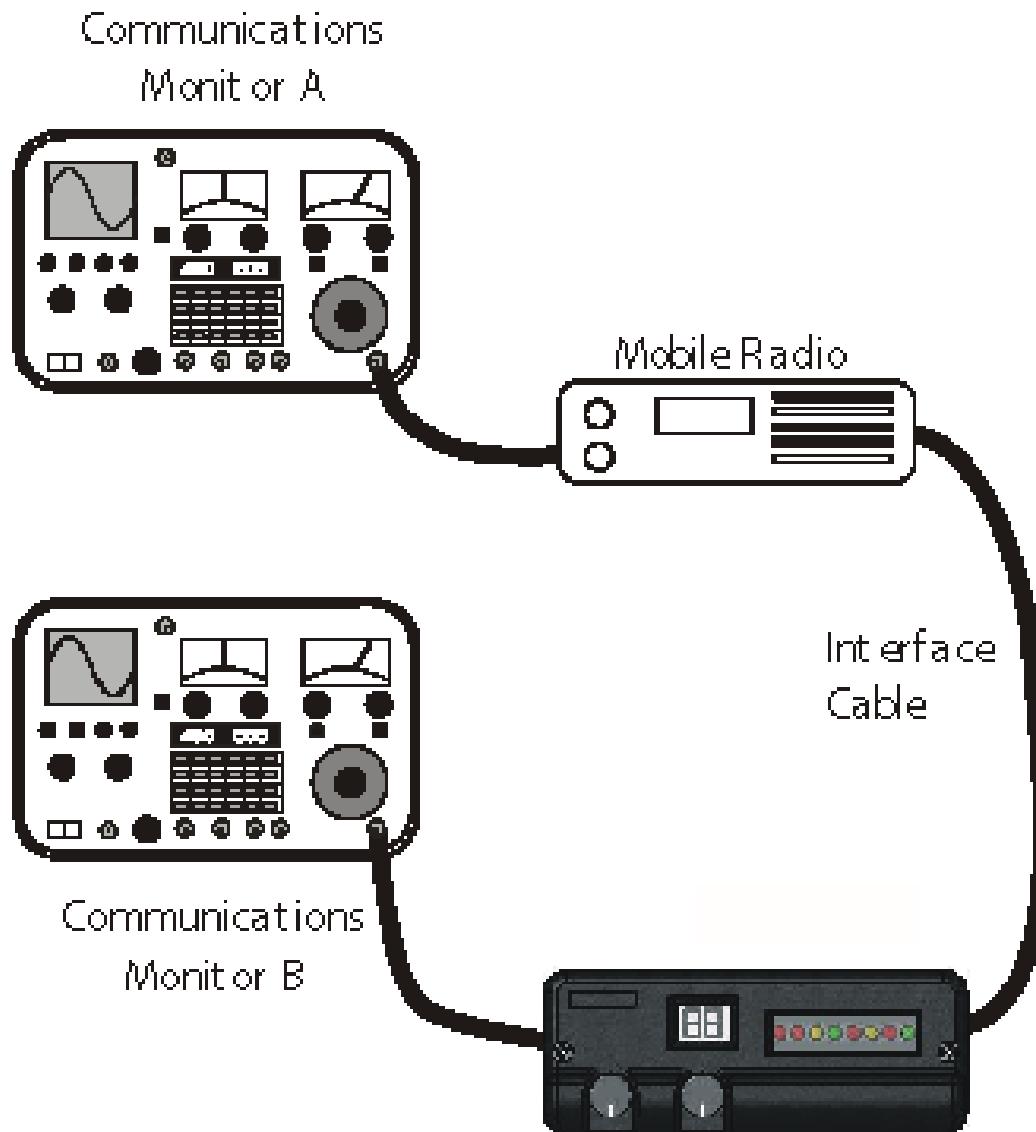


Figure 4

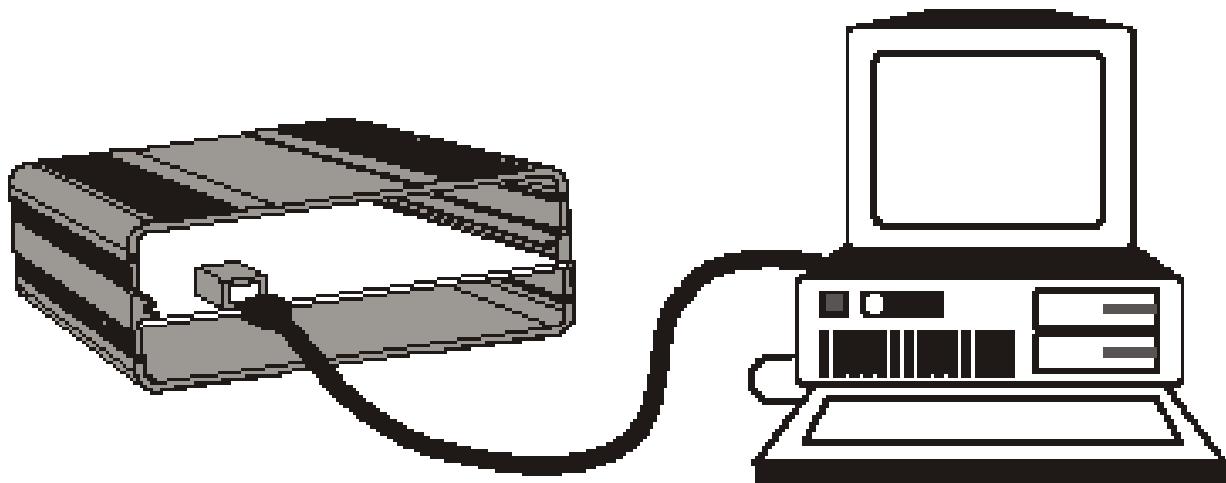
Programming

Using the Software

The SVRP255CPS personalization software is used to program the SVR-P255 for all of the operating parameters and options. The software is compatible with Windows 2000 and later operating systems. The software is menu driven and on-line help is available at any time by clicking the left mouse button on the HELP icon on the right side of the tool bar.

Important Note:

Before attempting to program the SVR-P255 start the software and ensure the FY-4 programming cable is plugged into the correct serial port. The com port may be selected under the "Transfer" menu. Plug the FY-4 programming cable into P7 on the front of the SVR-P255; the channel indicator should show "PC".



Menu selections

File

Open: Allows you to load a previously saved file from disk. Enter the file name or select from the Windows Dialog box. Only files with the .P25 extension can be loaded.

Save: Allows you to save the current configuration to disk. Enter the file name to save as or select a previous file from the Windows Dialog box to overwrite. The .P25 extension is automatically added to the file name. The program will prompt you before overwriting an existing file.

Print: Sends the current configuration to the selected printer. Make sure the printer is on line and paper is loaded before executing this command.

Exit: You will be asked to confirm before exiting the program. The software will also prompt you if the configuration has changed since program start up and data has not been saved to disk.

Common Data

File Name: 15 character name for this profile stored in E2PROM.

Number of Channels: Select 1-20 channels

Radio Unit ID: Used for P25 channels only, each SVR-P255 should have a unique Radio ID. Range is 0000001-9999999.

Band: Select the frequency band to match your SVR-P255. Changing bands resets all data to default values (confirmation req.)

COR Polarity: Determines if the COR signal from the mobile is active high or low.

On-Air Polarity: Determines if the Tx indication from the mobile is active high or low.

Radio Type: Select either Conventional or EVRS mode. In Conventional mode, the SVR-P255 will operate in a traditional mode. EVRS mode is only applicable when interfaced to Viking mobile radios with the EVRS option enabled.

Tx Audio: If the mobile Tx audio from the SVR-P255 to the mobile is connected to the mic input, select Flat response. If connected after pre-emphasis, select Pre-Emp.

Rx Audio: If the Rx audio from the mobile to the SVR-P255 is connected to the discriminator, select De-Emp. If connected after de-emphasis, select Flat response.

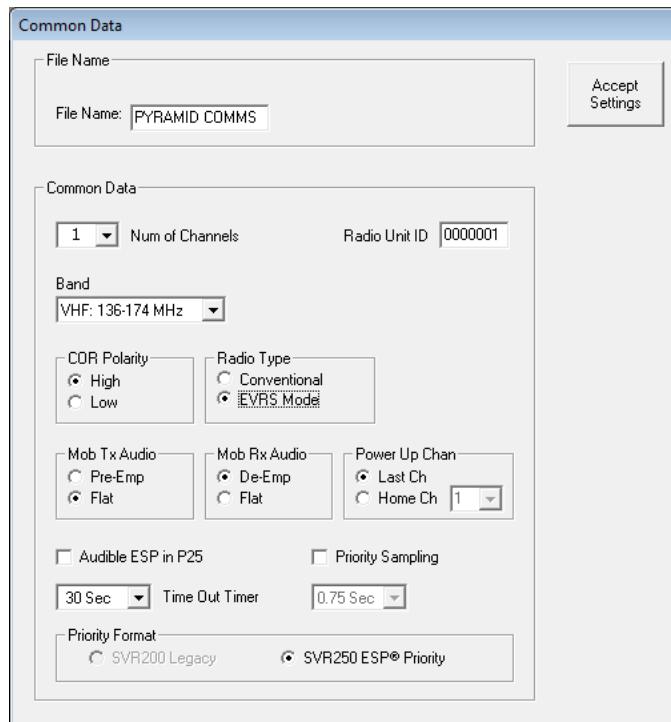
Power Up Channel: Select either Last Channel or Home Channel.

Priority Sampling: If the SVR-P255 is used in a multi-vehicle environment, priority sampling must be enabled for proper operation. Priority sampling is in effect for **Analog Channels Only**.

Sampling Rate: If Priority sampling is enabled, this selects the sampling interval. Range is 0.25 seconds to 2.5 seconds in .25 sec increments. The higher this setting, the longer the handheld operator must wait before speaking after pressing PTT during base-to-portable sampling.

Time Out Timer: This is the maximum duration of a single base to portable transmission that will be allowed.

Priority Format: The SVR-P255 has an enhanced signalling format to determine if the priority vehicle has left the scene during idle time. Select SVR-200 legacy to turn off this feature. Both formats are fully SVR-200 compatible.



Channel Data

 **Note:** The number of channels available is determined by the setting in Common Data.

Tx and Rx Frequency: Enter the Transmit and Receive frequencies for each channel. The frequency must be in the range for the band selected under Common Data and will be rounded to the nearest channel step.

Squelch Type: Select either CTCSS or DCS (NAC for P25). These can be selected on a per channel basis, but cannot be mixed within a channel.

Rx Code: The primary tone/code, when received will put the SVR-P255 into portable-to-base repeat mode.

Tx Code(s): Not programmable, however, in Analog mode the SVR-P255 does not transmit sub-audible signalling. Analog portables should be set to decode carrier squelch. In P25/EVRS mode, the SVR-P255 must transmit a pre-defined set of NAC codes depending on the mode of operation. The portable radio should be setup to receive NAC F7E, which is an ALL CALL receive code and will decode all P25 signaling.

Lock Tone: This is the tone burst (Analog Mode) or NAC code (P25 mode) first transmitted when the SVR-P255 is enabled and sent every 10 seconds if ESP™ priority mode is selected. The tone must be the same in all vehicular repeaters in the system.

Encryption Key: In P25 mode this specifies which stored Encryption key is used. Range 1-16.

P25: If selected the channel will be P25 phase 1 CAI compliant. If not selected, the channel is analog.

Encryption: If selected the channel will be encrypted (P25 mode Only).

PL Encode: If selected, sub-audible transmit is enabled for that channel (Analog Mode Only).

NB: If selected, the channel BW is 12.5/15 kHz. If not selected the channel BW is 25/30kHz (Analog Mode Only, only available on export units with export firmware).

Courtesy Beep: If selected, a short beep will be sent to the handheld user at the end of each portable-to-base transmission to confirm they are still within range.

Tx Pwr: The transmitter power can be set on a per channel basis. Select 0.5W, 1W or 2W.

SVR-P255 Channel Data										
Ch #	Rx Frequency	Tx Frequency	Squelch Type	Rx Code	Encrypt Key	P25	Encryption	NB	Courtesy Beep	Tx Pwr
1	160.61000	160.61000	NAC	293	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.0W
<input type="button" value="Accept Settings"/>										

Transfer

Send: Downloads the current configuration to the SVR-P255. The program will prompt you to make the FY-4 connection before downloading. Download takes approx 2 seconds.

Receive: Uploads the current configuration from the SVR-P255. The program will prompt you to make the FY-4 connection before uploading. Download takes approx 1 second.

Com Port: Selects the serial port to use for uploading and downloading between the PC and the SVR-P255. Comm ports 1-8 are supported.

Help

On-line context sensitive help is available for all entry fields by selecting the field on a form and clicking on the Help Icon on the tool bar.

Additional help menu items:

About: Gives you version information about the software and contact information for Pyramid Communications.

Remote Tech Support: Remote Tech Support is a utility that allows the Customer Service Technicians at Pyramid Communications to remotely access your computer via the internet in order to troubleshoot any problems you might be having with the software or to assist you in operation of the program. Please call Pyramid Communications during normal business hours prior to selecting remote support. The Technician will give you a password to enter and the remote connection screen will appear:



Once the internet connection is made, the Technician will be able to see your computer screen at their location and assist you with the program. The remote connection is only active when this item is selected and can only be enabled by the local PC user.

Flash Programming

The SVR-P255 uses an Atmel 89C51RB2 microprocessor which contains the operating system. The chip can be reprogrammed in-circuit using Atmel's FLIP software and a PC running Windows 2000 or XP. The FLIP software can be downloaded from Pyramid's web site:

www.pyramidcomm.com/support



Warning- Do not attempt to re-flash the SVR-P255 μP unless you are familiar with operation of the SVR-P255 and reasonably competent using Windows software. If the μP is not programmed correctly, it can render the SVR-P255 inoperable.

Install the software onto your PC; the download will include several config (.cfg) and hex data (.hex) files. Ensure these are copied into the `\Program Files\Atmel` directory on your computer. Perform the flash programming in the **EXACT** steps as outlined below:

Prior to starting the FLIP software, disassemble the SVR-P255 by removing the 2 cap screws on the front panel. Disconnect the front panel from the main PCB by unplugging the 2 cables. Remove the 2 cap screws from the rear panel and carefully slide the entire assembly out of the extrusion. Reconnect the front panel to the main PCB.

Connect the radio cable to the SVR-P255 and apply power. Connect the FY-4 DB9 connector to your computer and the modular connector to P7 at the front of the SVR-P255 main PCB; the channel indicator should show "PC". Start the FLIP software. Install a shorting jumper onto J12.

Flash Program U3:

1. Press the Reset switch S2. In the FLIP software, press F4 (load config) and locate the Atmel directory on your computer; select and load the ***SVRP255.cfg*** file. The FLIP software will automatically establish communications with the IC in the SVR-P255. If it does not, wait until it times out, click OK to close the error message, check the com port, cable etc., and start at the beginning of step 1. When FLIP is successful, it will populate the device data fields on the right side of the PC screen. ***Do not change any of these settings!***
2. On the left side of the screen, confirm the *Erase*, *Blank Check*, *Program* and *Verify* boxes are checked. In the center of the screen, confirm the ***SVR-P255.HEX*** file is loaded. Click the ***Run*** button to flash U3 with the hex file. Each of the checked boxes will turn green in series as things progress. If any of them fail, verify all of the connections as above and start over at step 1.

Encryption Key Loading

Key loading is accomplished by using our standard FY-4 programming cable, a Motorola KVL-3000 *Plus* key loading device and the Pyramid Communications KLA-250 key loader adapter as shown in figure 1.

 The SVR-P255 cannot be loaded with encryption keys unless ordered with AES / DES capability. Please contact Pyramid Communications technical support for more information.

Entering Key Load Mode:

Remove the SVR-P255 from its chassis and connect the control head to the unit so the channel display is visible. Do not connect the FY-4 cable at this time.

Ensure Jumper J17 on the SVR-P255 controller PCB is set to the "RF" position. Apply power to the SVR-P255 while holding the S3 (TEST) switch down. The display of the SVR-P255 will indicate "LL". **Keep holding** the S3 (Terset) switch down and momentarily press the Reset Button. The display of the SVR-P255 will indicate "..." during the initialization of key load mode.

Loading Keys:

The SVR-P255 display will indicate "LL" when it is ready to accept a key load device. Connect the FY-4 to the SVR-P255 P7 programming jack within 15 seconds of seeing the "LL" appear AFTER the "..." was displayed.

You can view and write keys as long as the display shows "LL". If "Er" is displayed, a time out or communications error has occurred with the key load device. Start the process over from power up.

 The SVR-P255 must use encryption key CKR numbers between 1-16. The CKR(s) is referenced in the SVR-P255 CPS programming.

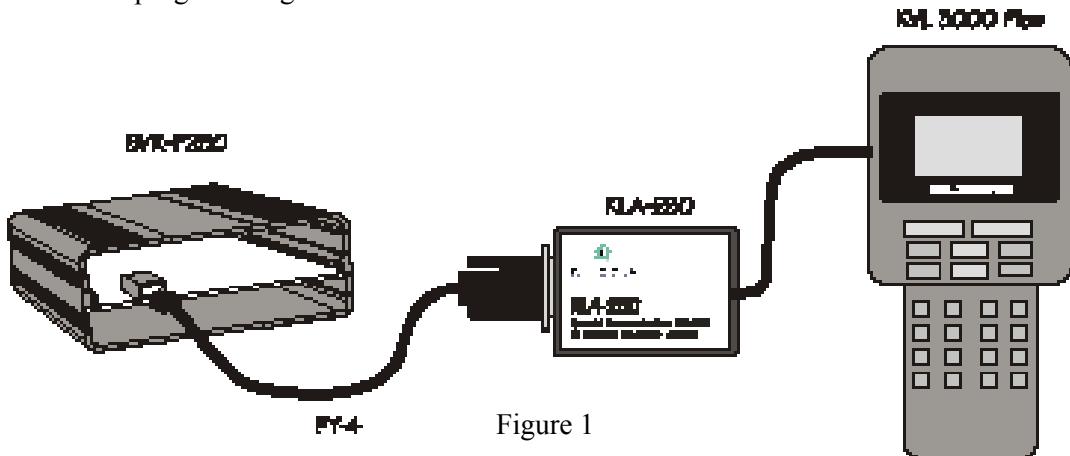


Figure 1

 Return J17 to the "U3" position for normal programming operation.

