

## **Instructions to use PRO-96 as a 9600 BPS Control Channel Monitoring Receiver**

The PRO-96 features a special test mode that permits the analysis of P25 9600 BPS control channel data streams using a properly designed PC application.

This document describes the protocol commands and responses sent and received using the RS232 PC/IF serial data link between the radio and the PC application to allow monitoring of a P25 9600 BPS trunking system control channel. It is intended for use by those with PC programming experience to develop applications that monitor control channel data and display system activity on the PC monitor. Programmers should refer to the applicable TIA102 APCO Project 25 specification documents to learn more about the various P25 Outbound Signaling Packets and their functions.

Please note that this is a special test mode and should be considered an “unsupported feature”. Do not contact Customer Support with questions about this mode. They will not be able to assist you.

### **Communications format over PC/IF port when in “V-Scanner Remote Mode” to facilitate the 9600CC packet dump operations:**

Serial Data Format: 19,200 BPS, 8 bits , no parity

Definitions for command/response packets:

<nnn> = one byte.

<stx> = 0x02, <etx> = 0x03, <enq> = 0x05, <ack> = 0x06,

<nak> = 0x15, <V> = 0x56, <9D> = two bytes 0x39 / 0x44

General Command Format = <stx>[DATA]<etx><check8>

General Response Format = <stx>[DATA]<etx><check8>

check8 = 8 bit packet checksum, start with 0x00, <stx> and <check8> not included.

### **General rules for communicating with the Pro-96:**

The application initiates and controls all communication. The <enq> command will put the radio into V-Scanner mode (from the general “clone” mode), and the <enq> should be attempted up to 3 times with a 500mS delay between each try. The application should look for the <ack> response after sending <enq>. An error condition should be assumed if the radio does not reply with <ack> after 3 <enq> tries + 500 mS. The radio should be power cycled if this occurs.

Each command (sent by the application) is answered by either an <ack> or <nak> based on the radio properly receiving the command (or not). See above “Sample Command / Response Session” below. The application must also <ack> or <nak> the radio based as shown in this sample session.

The PC to radio cable is half duplex. This means that data sent to the radio will be instantly (bit for bit in real time) echoed back to the PC. The PC program should be designed to read and bit-bucket this echoed data from the radio immediately after each byte is sent to the radio.

**Sample Command / Response Session. See next page for command detail:**

<u>PC</u>	<u>Radio</u>	
<enq>		** Doubles as a “cancel” function
	<ack>	
<9D>		
	<nak>	
<9D>		
	<ack>	
	Response to 9D	
<nak>		
	Response to 9D	
<ack>		

The radio does not allow its receive buffer to overflow under any circumstances; but will “bit bucket” commands in the unlikely event that this should occur.

The application can use the <enq> command until the radio responds with an <ack> command to “reset” the radio’s communication.

**NOTE:** It is recommended that the application use the <enq> / <ack> handshake to make sure the radio is ready to receive the new command before all new communication with the radio.

When asking for control channel packets from the radio, the PC application should send the 9D commands and process responses at a rate that is fast enough to keep pace with the rate that the OSPs are sent by the trunked system. This will ensure that no OSPs are missed by the application. Again, it is important to note that the radio will only respond with a control channel packet when a 9D command is sent by the application. It does not “stream” control channel data on its own. If the PRO-96 does not have a new 9600 CC packet to send to the PC, then the 12 bytes of data will be all zeroes. The same CC packet will not be sent twice. Users may notice what appear to be duplicate CC packets from time to time, however this is a function of the control channel signaling and not duplicate data from the PRO-96.

**Miscellaneous handshake commands:**

Command	<enq>	Are you there? and change clone mode to V-Scanner remote mode
Response	<ack>	Yes, I am here

**9600CC Data dump command:**

Command	<stx>9D<etx><check8>	Send last control channel packet
Response	<stx><b1><b2>...<b12><etx><check8>	The 12 bytes of the last control channel packet
or	<stx><0> ... <0>< etx><check8>	If no packet is available, then all 12 bytes are zero (or null – NOT ASCII zero)

**NOTE:** At times the 9600 CC data bytes can contain <etx> (0x03), depending on the type of OSP and the data contained therein. The PC application should only interpret the <etx> that appears after all 12 bytes as the end of packet marker.

## Preparing the PRO-96 for P25 9600 BPS CC monitoring:

Before using the PRO-96 as a P2 9600 BPS CC monitor receiver, it must be prepared by tuning it to an active P25 9600 BPS CC and placing it into V-Scanner Remote Mode so the PC application can begin sending the commands necessary to retrieve the control channel data. The user should follow these steps to prepare the radio:

Step 1: Enter an active 9600CC frequency into the Pro-96 using Manual Mode or Tune Mode.

Step 2: Set Pro-96 to V-Scanner Remote mode via one of two methods:

Step 2A) Press PGM FUNC PGM PGM on keyboard and then plug Radio Shack PC/IF cable from Pro-96 PC/IF port to the COMn port on the PC.

-or-

Step 2B) Plug Radio Shack PC/IF cable from Pro-96 PC/IF port to the COMn port on the PC. Send two <enq> characters to the radio while the clone screen is displayed. See "General Rules for Communicating with the PRO-96" above for more information.