



# Radio Test Set IFR 2975

SmartNet™ /SmartZone™ Option Manual

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Issue-4

# OPERATION MANUAL

## SMARTNET™/SMARTZONE™ OPTION

### IFR 2975

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# PREFACE

## SCOPE

This manual contains information to install and operate information for the IFR 2975 SmartNet™/SmartZone™ Option. This manual is provided as an addition to the IFR 2975 Operation Manual.

Refer to the IFR 2975 Operation Manual for operational descriptions of items other than SmartNet™/SmartZone™.

## ORGANIZATION

The SmartNet™/SmartZone™ Option Manual is composed of the following sections:

### SECTION 1 - DESCRIPTION

Contains general information regarding the 2975 SmartNet™/SmartZone™ functions, capabilities and descriptions.

### SECTION 2 - OPERATION

Contains function descriptions explaining how to operate the 2975 SmartNet™/SmartZone™ Option.

### SECTION 3 - APPLICATIONS

Contains procedures and descriptions for using the 2975 SmartNet™/SmartZone™ Option.

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# SECTION 1 - DESCRIPTION

## 1-1 FUNCTIONS AND CAPABILITIES

The 2975 SmartNet™/SmartZone™ option provides powerful test features for SmartNet™/SmartZone™ radios and systems.

Included within the SmartNet™/SmartZone™ option is:

- the ability to emulate a repeater station operation (not locked to a specific "test sequence" for the radio);
- the ability to "find" and monitor a SmartNet™/SmartZone™ control channel and then "follow" the channel, the group or the individual unit;
- the ability to perform full analog (FM) parametric tests.

## 1-2 SMARTNET™/SMARTZONE™ SYSTEMS OVERVIEW

### SMARTNET™

The SmartNet™ Systems are two-way trunked radio systems that are marketed by Motorola under the ASTRO name. The SmartZone™ Systems are simply a number of SmartNet™ Systems tied together allowing a larger system deployment.

Encrypted SmartNet™ systems are known as SecureNet Systems. All of these systems operate in a 25 kHz Channel BW (Conventional) or a 12.5 kHz BW (Narrowband).

The Motorola Type I Systems refer to the original Motorola Systems that were based on Fleets and Sub-Fleets. The Motorola Type I Systems are not scalable because they limit the amount of IDs any Fleet or Sub-Fleet can support.

The Motorola Type II Systems refer to the second generation Motorola Trunking Systems that replaced the Fleets and Sub-Fleets with the concept of talk groups and individual radio IDs. There are no dependencies on Fleet maps; therefore there are no limitations to the number of radio IDs that can participate on a talk group.

The Motorola Hybrid Systems have "blocks" of the system that are Type I Fleets / Sub-Fleets and Type II Talk Groups.

The following are characteristics of a Type II SmartNet™ System:

- Up to 28 System Channels
- Up to 65535 Unique Radio IDs
- Up to 4000 Talk Groups
- APCO 16 Compliant

### SMARTZONE™

The SmartZone™ Systems are SmartNet™ Type II Systems that are networked together via a Microwave or Land-Line to provide multi-site wide area communications. Radios affiliate with a particular site and also affiliate with a talk group. This allows a radio to talk on a talk group with other radios at other sites.

Many large public safety and state agencies use the SmartZone™ System for wide area communications.

The following are characteristics of a Motorola SmartZone™ System:

- Up to 28 Channels per Site
- Up to 65535 Unique Radio IDs
- Up to 48 Sites
- Analog and/or Digital Voice Traffic Channels
- APCO 16 Compliant

## **OMNILINK**

The SmartZone™ OmniLink provides a broad range of system features and utilizes a distributed call processing architecture that links up to four multi-site SmartZone™ Systems together into one network, supporting up to 192 sites.

## **ASTRO**

ASTRO is the trademark name for Motorola's Digital Communications Solution. The original Motorola ASTRO implementation has a SmartZone™ 3600-baud data channel, and the digital voice solution is based on a proprietary vocoder (voice coder/decoder). There are other variants of the ASTRO system, including ASTRO-25.

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## SECTION 2 - OPERATION

The 2975 SmartNet™/SmartZone™ Option operates within the 2975 to provide new protocol and test capabilities.

Refer to the 2975 Operation Manual for details regarding general operation of the 2975.

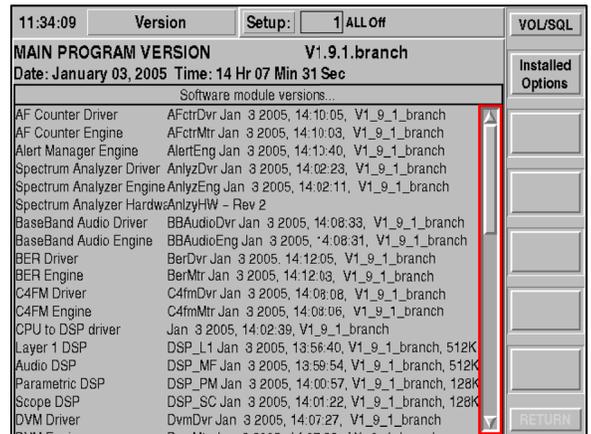
### 2-1 SMARTNET™/SMARTZONE™ OPTION SETUP

#### CHECKING SMARTNET™/SMARTZONE™ OPTION INSTALLATION

The 2975 Option Control System permits addition of new software options and for checking the status of the installed options.

The SmartNet™/SmartZone™ Option may be installed at the factory, or it may be customer-installed in the 2975 only with Software Versions 1.4.0 and on.

To check whether the SmartNet™/SmartZone™ Option is installed in the 2975, select the **VERSION** screen [**MODE**], [**7**], [**3**] and then press the **Installed Options** Soft Key to go to the **Installed Options** screen.



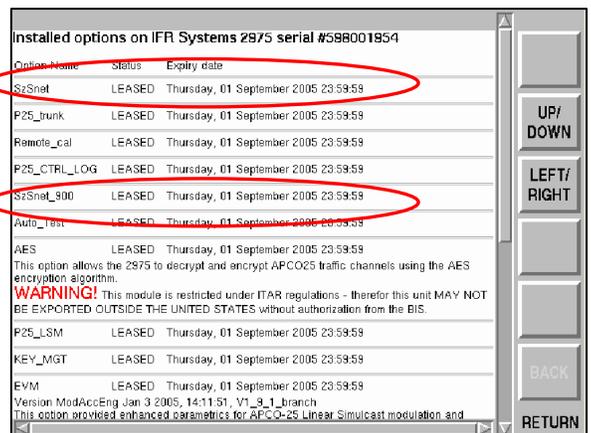
The **Installed Options** screen shows the 2975 serial number and the options that are installed.

If the SmartNet™/SmartZone™ Option Status displays **ENABLED** or **LEASED**, the option is installed and the 2975 is set up and ready to use.

If the SmartNet™/SmartZone™ Option (**SzSnet**) is NOT listed or is NOT shown as **ENABLED**, the option is not installed.

To install the SmartNet™/SmartZone™ Option, proceed to the next section, "INSTALLING SMARTNET™/ SMARTZONE™ OPTION."

If you wish to purchase the SmartNet™/SmartZone™ Option, contact information is shown in **APPENDIX B**.



## INSTALLING SMARTNET™/SMARTZONE™ OPTION

If you have received the SmartNet™/SmartZone™ Option from Aeroflex, you will need to install the option into the 2975 before it is accessible.

*If the SmartNet™/SmartZone™ Option is already installed, you may skip this section.*

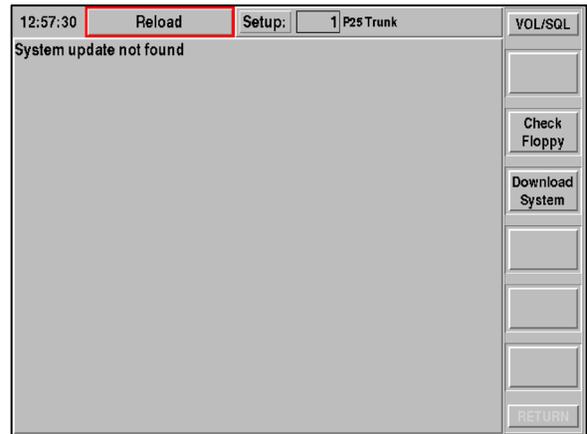
For customers who have 2975 Software Version 1.4.0 and on, the 2975 SmartNet™/ SmartZone™ Option File (“options.new”) is distributed by Aeroflex via email, floppy disk or CD-ROM.

The SmartNet™/SmartZone™ Option File (“options.new”) must be placed onto a blank, formatted floppy disk (if received by email or CD-ROM) for installation into the 2975. Use a PC to copy the file onto a blank floppy disk.

The SmartNet™/SmartZone™ Option File (“options.new”) is 2975 serial number specific, so label the disk (if not already labeled) for the particular 9-digit serial number for which it is made and ***KEEP IT IN A SAFE PLACE.***

### OPTION INSTALLATION:

1. Power ON the 2975.
2. After the 2975 has booted, press **[MODE]**, **[7]** and **[4]** to display the RELOAD screen.
3. Insert the SmartNet™/SmartZone™ Option floppy disk for this 2975 (serial number specific) into the floppy drive.
4. Press the **CHECK FLOPPY** Soft Key.
5. The floppy disk is accessed and the **INSTALL OPTION FILE** Soft Key appears. Press the **INSTALL OPTION FILE** Soft Key.
6. When the red warning screen appears, press the **START INSTALL** Soft Key.
7. When installation is completed and the 2975 has been rebooted, go to the **VERSION** screen (**[MODE]**, **[7]** and **[3]**) to verify the SmartNet™/ SmartZone™ Option is installed. Press the **INSTALLED OPTIONS** Soft Key to verify the SmartNet™/SmartZone™ Option is **ENABLED**.



Installation of the SmartNet™/SmartZone™ Option is only required once - it does not need to be reinstalled each time the system is upgrade with a new software.

## 2-2 SMARTNET™/SMARTZONE™ OPERATION MODES

### SELECTING SMARTNET™/SMARTZONE™ OPTION

The SmartNet™/SmartZone™ Option is accessed on the 2975 Duplex screen ([MODE] and [3]) or User screen ([Mode] and [0]).

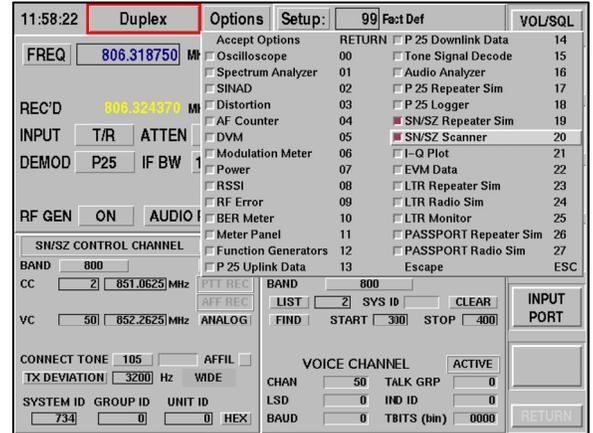
The Duplex Option selections show the SmartNet™/SmartZone™ Options:

#### **SN/SZ Repeater Sim**

SmartNet™/SmartZone™ Repeater Simulator

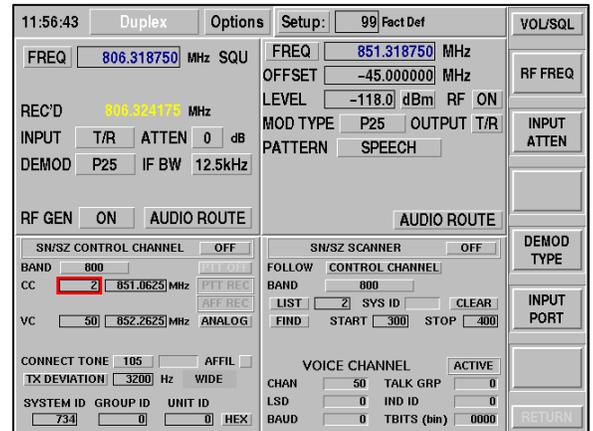
#### **SN/SZ Scanner**

Intelligent SmartNet™/SmartZone™ Scanner



Each SmartNet™/SmartZone™ screen tile occupies one-fourth of the total screen space.

This permits one or two of SmartNet™/SmartZone™ functions to be on-screen simultaneously, as the Duplex screen always has the Receiver (Tx Test) and Generator (Rx Test) screens present.



## SMARTNET™/SMARTZONE™ REPEATER SIMULATOR

The SmartNet™/SmartZone™ Repeater Simulator screen displays current Control Channel parameters, and permits these parameters to be changed for the specific radio system being tested.

The 2975 uses these settings and controls while simulating the base station repeater.

The screenshot shows the control interface for the SmartNet/SmartZone Repeater Simulator. At the top, there is a toggle for 'SN/SZ CONTROL CHANNEL' set to 'OFF'. Below this are several rows of controls: 'BAND' is set to '800'; 'CC' (Control Channel) is set to '2' (highlighted with a red box) with a frequency of '851.0625 MHz'; 'VC' (Voice Channel) is set to '50' with a frequency of '852.2625 MHz'; 'CONNECT TONE' is set to '105' and 'AFFIL' is unchecked; 'TX DEVIATION' is set to '3200 Hz' and 'WIDE' is selected; and 'SYSTEM ID' is '734', 'GROUP ID' is '0', and 'UNIT ID' is '0' with a 'HEX' indicator.

## FIELD DEFINITIONS

### ON/OFF

This toggle button selects and displays the **ON / OFF** state of the repeater simulation.

### BAND

This button selects and displays the user defined SmartNet™ /SmartZone™ frequency band of operation. Available selections are **800 MHz**, **800 MHz Splinter**, **900 MHz**, **VHF / UHF**, or **USER**.

### PTT ON/OFF

This button is the push-to-talk **ON/OFF** used to start/stop a system initiated call during voice channel repeater simulation. This button is disabled during mobile initiated calls. The PTT button on the optional microphone may also be used.

### PTT REC

When the push-to-talk button on the radio is pressed the Simulator receives a request for voice channel message from the mobile. During this process this indicator turns **GREEN** and remains **GREEN** until the radio's push-to-talk button is released. This button is **GRAY** for Simulator initiated calls or when the Simulator is idle.

### AFF REC

This indicator turns **GREEN** when the Simulator receives a mobile affiliated call. After 5 seconds the indicator changes back to **GRAY**.

### ANALOG / DIGITAL

This button selects the **ANALOG** (SmartNet™/SmartZone™) or **DIGITAL** (P25) choice of voice traffic channels for the Simulator. The fields displayed on the user screen change depending on the voice channel mode selected.

### CONNECT TONE

This button displays the connect tone for the voice channel. User may select a value from the drop-down menu to select the frequency value of the analog voice channel connect tone. This field is not displayed when digital voice channel mode is selected. The received connect tone value is displayed in the field next to the right.

### TX DEVIATION

This button displays the transmit deviation of the control channel. User may edit field to define this value. The following three bands are available:

- **NARROW** 900 to 1500 Hz
- **MEDIUM** 2100 to 2700 Hz
- **WIDE** 2750 to 3500 Hz

## NAC

This field displays the NAC value decoded from the last Uplink message received from the mobile. The user can click on the **SET DOWNLINK DATA** button to set the downlink digital channel NAC field. This field is only displayed when digital voice channel mode is selected.

## MFID

This field displays the MFID value decoded from the last Uplink message received from the mobile. The user can click on the **SET DOWNLINK DATA** button to set the downlink digital channel MFID field. This field is only displayed when digital voice channel mode is selected.

## SET DOWNLINK DATA

Sets the Downlink digital voice channel NAC and MFID to the NAC and MFID currently being displayed in these fields. This field is only displayed when digital voice channel mode is selected.

## CC

This field indicates the Control Channel selected by user for the repeater simulation. The frequency that corresponds to the selected Control Channel's transmit frequency is shown in the display only field located next to the CC field. This field is only displayed when 800 or 900 MHz bands are selected.

## CCTx

This field displays the transmit control channel number of the Simulator. The user can enter a value into this field to define the transmit control channel. The display only field located to the right of the CCTx field indicates the frequency value of the channel number. This field is only displayed when VHF / UHF band is selected.

## CCRx

This field displays the receive control channel number of the Simulator. The user can enter a value into this field to define the receive control channel. The display only field located to the right of the CCRx field indicates the frequency value of the channel number. This field is only displayed when VHF / UHF band is selected.

## VC

This field indicates the Voice Channel selected by the user for the repeater simulation. The frequency that corresponds to the selected Voice Channel's transmit frequency is shown in the display only field located next to the VC field. This field is only displayed when 800 or 900 MHz bands are selected.

## VCTx

This field displays the transmit voice channel number of the Simulator. The user can enter a value into this field to define the destination transmit voice channel. The display only field located to the right of the VCTx field indicates the frequency value of the channel number. This field is only displayed when VHF / UHF band is selected.

## VCRx

This field displays the receive voice channel number of the Simulator. The user can enter a value into this field to define the destination receive voice channel. The display only field located to the right of the VCRx field indicates the frequency value of the channel number. This field is only displayed when VHF / UHF band is selected.

The screenshot shows a control panel for a repeater simulation. At the top, there is a toggle for 'SN/SZ CONTROL CHANNEL' set to 'ON'. Below this, the 'BAND' is set to 'VHF/UHF' (highlighted with a red box), and 'CONFIG' is set to 'PTT OFF'. There are four rows of fields: 'CCTx' with value '380' and frequency '403.0000 MHz'; 'CCRx' with value '0' and frequency '404.0000 MHz'; 'VCTx' with value '390' and frequency '403.2500 MHz'; and 'VCRx' with value '10' and frequency '404.2500 MHz'. To the right of these rows are buttons for 'PTT REC', 'AFF REC', and 'DIGITAL'. Below these fields are 'NAC' (000), 'MFID' (00), and 'AFFIL' (checkbox). A 'SET DOWNLINK DATA' button is located below the NAC and MFID fields. At the bottom, there are fields for 'SYSTEM ID' (734), 'GROUP ID' (0), and 'UNIT ID' (1), with a 'HEX' button to the right.

## AFFIL

This toggle button enables the affiliation bit in the 2975's transmitted outbound status word. The affiliation bit instructs the radio to send an affiliated request when it is first turned on and locates the control channel.

**GREEN** indicates that the affiliation request mode of the control channel is ON. Some radios may require this bit to be set in order to affiliate. **GREY** indicates that the affiliation request mode of the control channel is OFF.

## SYSTEM ID

This field sets the System Identification Number used by the repeater simulator to establish a call. The value is displayed in decimal or hexadecimal format as selected with the HEX / DEC toggle button.

The screenshot shows a configuration window with the following elements:

- SN/SZ CONTROL CHANNEL**: OFF (toggle)
- BAND**: 800
- CC**: 2 (highlighted with a red box), 851.0625 MHz
- VC**: 50, 852.2625 MHz
- CONNECT TONE**: 105,  AFFIL
- TX DEVIATION**: 3200 Hz, WIDE
- SYSTEM ID**: 734,  GROUP ID: 0,  UNIT ID: 0, HEX (toggle)
- Buttons: PTT OFF, PTT REC, AFF REC, ANALOG

## GROUP ID

This field indicates the Group Identification Number used by the Simulator analog control channel and the TGID value for the digital voice channel data stream. This field also displays the Group Identification Number from an affiliation or radio initiated call. User may edit field to define this value. The field is updated when the Simulator receives a mobile initiated call.

## UNIT ID

This field indicates the Unit Identification Number for the Simulator analog control channel. This field also displays the Unit Identification Number from an affiliation or radio initiated call. User may edit field to define this value. The field is updated when the Simulator receives a mobile initiated call.

## HEX / DEC

This toggle button selects **HEX** (hexadecimal) or **DEC** (decimal) for the SYSTEM ID, GROUP ID or UNIT ID fields.

## CONFIG

The **CONFIG** button opens the **VHF / UHF CONFIGURATION** screen, enabling the user to configure the START, STOP and SPACE of the VHF / UHF frequency table. This button is only available when **VHF / UHF** band has been selected.

## **SMARTNET™/SMARTZONE™ SCANNER**

The SmartNet™/SmartZone™ Scanner is a powerful tool used for finding and tracing radio traffic in the radio system. The SmartNet™/SmartZone™ Scanner is set up with channel and system values which then starts to scan according to the setup values. Whenever radio traffic occurs, the Scanner follows the radio traffic as it is assigned and transferred within the system.

The radio traffic audio is available at the speaker for monitoring purposes.

### **FIELD DEFINITIONS**

#### **ON/OFF**

This toggle button is the master ON / OFF control for the Scanner function.

#### **FOLLOW**

This field displays the FOLLOW mode of the scanner. Available FOLLOW modes are:

**CONTROL CHANNEL** follows any conversation.

**GROUP ID** only follows conversations for the specified Group ID.

**UNIT ID** only follows conversations for the specified radio.

#### **BAND**

This field displays the Scanner's trunking system frequency band setting. User selections are **800 MHz**, **800 MHz Splinter** and **VHF / UHF**.

#### **CONFIG**

The **CONFIG** button opens the VHF / UHF CONFIGURATION screen, enabling the user to configure the START, STOP and SPACE of the VHF / UHF frequency table. This button is only available when VHF / UHF band has been selected.

#### **LIST**

This button displays a list of control channels identified during a FIND procedure. "NONE" is displayed when no control channels are found. The field to the right of the **LIST** button indicates the Scanner's current control channel setting. Users may select a control channel from the list or enter a value in the field to define the control channel. This field is only present with CONTROL CHANNEL FOLLOW mode is selected.

#### **SYS ID**

This field displays the System Identification Number used by the Scanner. The field is always displayed in hexadecimal and can not be edited by user. This field is only present with CONTROL CHANNEL FOLLOW mode is selected.

#### **GRP ID**

Displays the current Group ID used by Scanner to monitor voice channel activity. User may edit field to define this value. This field is only present when GROUP ID FOLLOW mode is selected.

#### **UNIT ID**

This field displays the present Unit ID used by Scanner to monitor voice channel activity. User may edit field to define this value. This field is only present when UNIT ID FOLLOW mode is selected.

SN/SZ SCANNER		OFF		
FOLLOW	CONTROL CHANNEL			
BAND	VHF/UHF	CONFIG		
LIST	380	SYS ID	CLEAR	
FIND	START	300	STOP	400
VOICE CHANNEL		ACTIVE		
CHAN	50	TALK GRP	0	
LSD	0	IND ID	0	
BAUD	0	TBITS (bin)	0000	

## **CLEAR**

This button **CLEAR**S the Scanner List (reset) of control channels. This field is only present with **CONTROL CHANNEL FOLLOW** mode is selected.

## **FIND**

This toggle button activates the **FIND** feature that **STARTS / STOPS** the scanning for control channels. Control channels identified during the **FIND** procedure are added to the **LIST** menu. This field is only present with **CONTROL CHANNEL FOLLOW** mode is selected.

## **START**

This field displays the **START** channel number used for scanning by the **FIND** procedure. User may edit field to define this value This field is only present with **CONTROL CHANNEL FOLLOW** mode is selected.

## **STOP**

This field displays the **STOP** channel number used for scanning by the **FIND** procedure. User may edit field to define this value This field is only present with **CONTROL CHANNEL FOLLOW** mode is selected.

## **VOICE CHANNEL ACTIVE**

This indicator turns **GREEN** whenever a Voice channel is active (transmitting) during the Follow process.

## **CHAN**

This field is the Voice **CHANNEL** number currently being monitored.

## **LSD**

This field is the Low Speed Data value of the current channel being monitored.

## **BAUD**

This field is the baud rate for the current channel being monitored.

## **TALK GRP**

This field is the Talk Group Identification of the current channel being monitored.

## **IND ID**

This field is the individual ID of the radio under test. Also known as Unit ID.

## **T-BITS**

This field shows the T-Bits that are used in the OSW to select the site's connect tone and wide/narrow information or to convey other information depending on the OSW's command code.

## VHF / UHF CONTROL CHANNEL CONFIGURATION

The VHF / UHF Configuration screen allows users to configure the frequency START, STOP and SPACE values to create a channel / frequency table.

### FIELD DEFINITIONS

#### UUT Rx START

This field displays the start receive frequency for the channel / frequency table. User may edit field to define this value.

#### UUT Rx STOP

This field displays the stop receive frequency for the channel / frequency table. User may edit field to define this value.

#### UUT Rx SPACE

This field displays the receive frequency spacing for the channel / frequency table. User may edit field to define this value.

#### UUT Tx START

This field displays the start transmit frequency for the channel / frequency table. User may edit field to define this value.

#### UUT Tx STOP

This field displays the stop transmit frequency for the channel / frequency table. User may edit field to define this value.

#### UUT Tx SPACE

This field displays the transmit frequency spacing for the channel / frequency table. User may edit field to define this value.

#### RESTORE DEFAULTS

Selecting this button sets configuration values for all channels back to their predefined values.

#### CLOSE

Selecting this button closes the VHF / UHF Configuration screen and returns to the SN/SZ Control Channel screen.

SN/SZ CONTROL CHANNEL  ON

BAND **VHF/UHF** CONFIG  PTT OFF

CCTx   MHz  PTT REC

CCRx   MHz  AFF REC

VCTx   MHz  DIGITAL

VCRx   MHz

NAC  MFID  AFFIL

SYSTEM ID  GROUP ID  UNIT ID   HEX

CHANNELS				
BLOCK		START (MHz)	STOP (MHz)	SPACE (KHz)
1	UUT Rx	<b>403.0000</b>	406.1500	25.0000
	UUT Tx	404.0000	407.1500	25.0000
2	UUT Rx	406.1750	409.3250	25.0000
	UUT Tx	407.1750	410.3250	25.0000
3	UUT Rx	409.3500	412.4750	25.0000
	UUT Tx	410.3500	413.4750	25.0000

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## SECTION 3 - APPLICATIONS

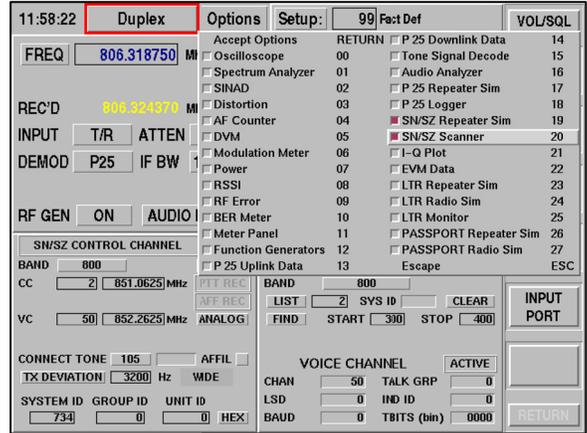
This section shows a few of the many ways to use the 2975 SmartNet™/SmartZone™ Option.

### 3-1 CONTROL AND VOICE CHANNELS

To begin testing SmartNet™/SmartZone™ Systems the control and voice channel must first be configured.

To enable the Repeater Simulator, click the OPTION key or press the [SHIFT] and [MODE] Keys and then select **SN/SZ Repeater Sim.**

This particular selection allows user to enter valid control and voice channel parameters. If these parameters are not known, find the control channel for a particular area by monitoring it off the air with the **SN/SZ Scanner**, and then use the information retrieved from system found.

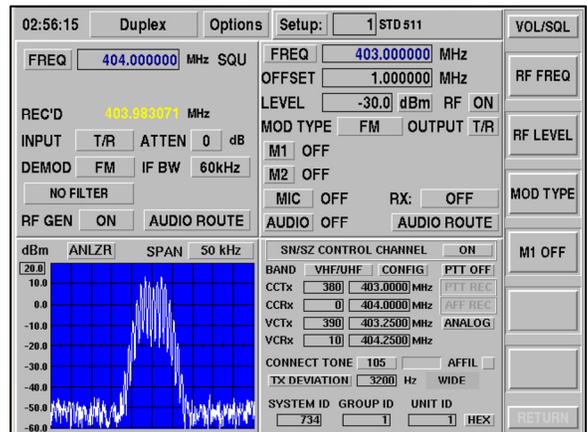


Next, set up the proper control and voice channel numbers.

For **800 MHz** or **800 MHz Splinter** band operation, the channels are defined with a set frequency assignment. The duplex offset is also standard at 45 MHz. Enter the proper channel number or frequency in the **CC** (Control Channel) and **VC** (Voice Channel) data fields.

For **VHF / UHF** band operation, the Transmit and Receive parameters must be defined. This utilizes a concept of an "open" band. This band can be configured to any frequency.

The only restriction is that the Rx channel (down link) always starts at 380 and goes up to 759. The corresponding Tx channels range from 0 to 379. The offset is entirely user defined. The screen to the right shows the **VHF / UHF** control channel screen enabled.



The screen to the right shows the Channel configuration settings for three particular frequency blocks. Selecting the **CONFIG** Button on the VHF / UHF Repeater screen, when the band selected is VHF / UHF, calls up this screen.

With this screen, users may set up the channel start and stop frequencies for the various blocks within the allocated spectrum. Not all blocks need to be used. Three blocks are provided so the user may have split bands. These settings must match the channel programming of the radio under test.

Control and voice channels are designated within the defined frequency ranges. Once this configuration is setup, the appropriate control and voice channel information may be entered.

For both analog and digital operation, a valid system ID and appropriate group ID for the network that the mobile is accessing are required.

This is the minimum configuration for testing the mobile unit. The 2975 automatically decodes the Group ID from the mobile when a radio affiliates with the 2975, but user must provide the System ID. Additionally, user can add the mobile unit ID, however this is not required. This information can be entered in either hexadecimal or decimal.

Before performing a radio initiated call in the ANALOG Mode, the **CONNECT TONE** must be set up for analog operation. The **CONNECT TONE** is the low frequency tone that is broadcast by the radio during a radio initiated call.

Once the mobile verifies the **LSD** and the repeater sees the **CONNECT TONE**, the repeater and the mobile can carry on a conversation.

Another feature is the Affiliation Enable Mode.

By enabling the affiliation button (enabled by clicking on the box next to **AFFIL**, which turns **GREEN**), the mobile is requested to affiliate with the 2975.

The 2975 sets the affiliation status bit in the control channel information being sent to the mobile. When the mobile first accesses the control channel, whether because it was just turned on or because it just located the control channel, it sends a two word **ISW** that includes the individual ID and Talk Group ID and information.

The 2975 responds to the mobile with the same information (acknowledge), along with **CONNECT TONE** select information supplied in the T-Bit portion of the Response message.

When the control channel is configured, the control channel may be enabled by selecting the **ON / OFF** Button on the Repeater Simulator screen.

CHANNELS			
BLOCK		START (MHz)	STOP (MHz) SPACE (KHz)
1	UUT Rx	403.0000	406.1500 25.0000
	UUT Tx	404.0000	407.1500 25.0000
2	UUT Rx	406.1750	409.3250 25.0000
	UUT Tx	407.1750	410.3250 25.0000
3	UUT Rx	409.3500	412.4750 25.0000
	UUT Tx	410.3500	413.4750 25.0000

RESTORE DEFAULTS    CLOSE

SN/SZ CONTROL CHANNEL  ON

BAND  VHF/UHF  CONFIG  PTT OFF

CCTx   MHz

CCRx   MHz

VCTx   MHz

VCRx   MHz

CONNECT TONE   AFFIL

TX DEVIATION  0

SYSTEM ID GR   NIT ID

- 76 1
- 83 2
- 90 3
- 97 4
- 116 5
- 128 6
- 138 7

SN/SZ CONTROL CHANNEL  ON

BAND  VHF/UHF  CONFIG  PTT OFF

CCTx   MHz

CCRx   MHz

VCTx   MHz

VCRx   MHz

CONNECT TONE   AFFIL

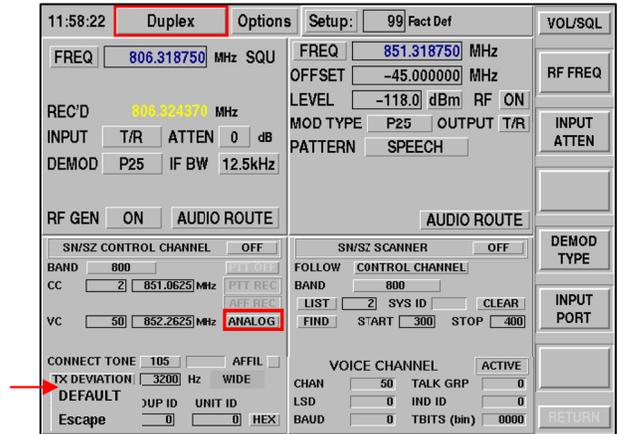
TX DEVIATION  Hz

SYSTEM ID GROUP ID UNIT ID

The 2975 provides the ability to set the TX deviation of the control channel for either analog or digital mode. The 2975 allows for complete user control of the deviation; however only three modes are shown:

- **NARROW:** 900 to 1500 Hz
- **MEDIUM:** 2100 to 2700 Hz
- **WIDE:** 2750 to 3500 Hz

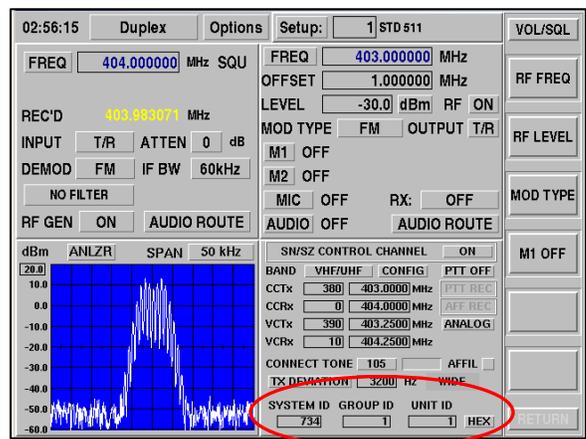
To access the deviation setting, select the analog mode of operation. The TX Deviation field is displayed. The TX Deviation button is used to select between **DEFAULT** (3125 Hz) and **Escape**, which keeps the entered deviation in the field when using the 2975.



The 2975 generates a control channel with the **System ID** and **Group ID** information. The voice channel is configured with the **Group ID** or **Unit ID** in the LSD.

A mobile-originated call or a repeater-originated (user or dispatch originated) call may be accomplished.

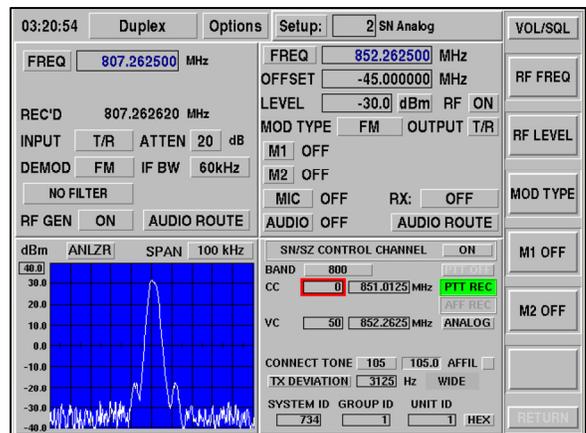
To perform mobile radio transmitter tests, simply key the mobile unit and the 2975 automatically assigns the unit to the proper voice channel for performing parametric measurements.



The 2975 SmartNet™/SmartZone™ option also allows for **800 MHz** band operation.

As with **VHF/UHF** operation, the proper **System ID** and **Group ID** need to be entered before the unit can operate with the 2975.

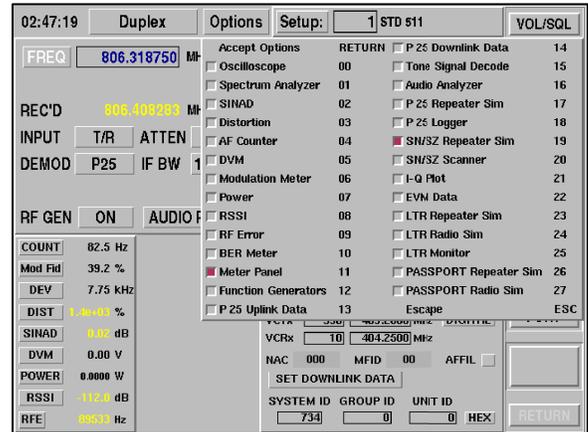
The **800 MHz** band is easier to set up, since the offset and channels are already associated by definition.



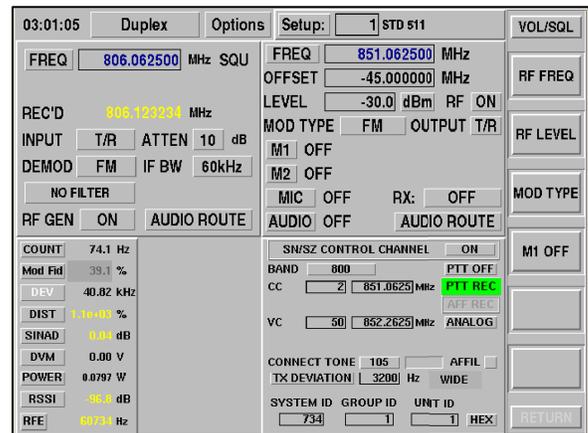
Once the control channel is set up and running, and the mobile is communicating with the 2975, any number of functions may be selected to run in conjunction with the simulator. This includes the Oscilloscope, Spectrum Analyzer, Meter Panel, Power Meter, RSSI Meter and other instruments.

For example, to review transmitter performance, select **Receiver (Tx Test)** mode and enable the Spectrum Analyzer, Modulation Meter, Power Meter, RF Frequency Error Meter and Function Generators from the **Receiver (Tx Test) Options** menu.

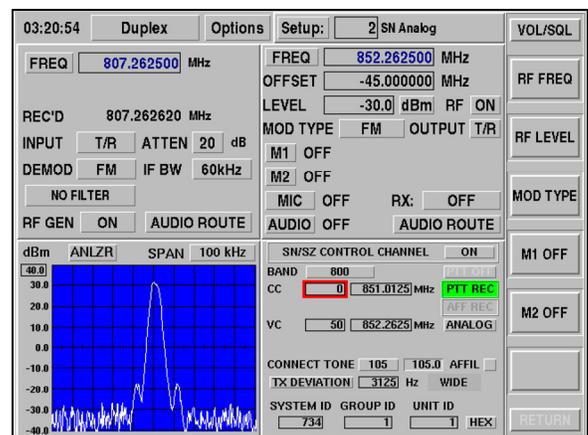
To enable these functions, select the **OPTIONS** Button or select **[SHIFT]**, **[MODE]** and select the desired instruments from the menu.



Enable the **METER PANEL** to view multiple instruments simultaneously. Other combinations of displays, such as Spectrum Analyzer operation may be used as well.



To perform mobile receiver measurements, enable the system initiated mode by selecting the **PTT** Button on the SN/SZ Control Channel screen or use the PTT button on the optional microphone if it is being used. This action causes a repeater originated call request to be sent to the mobile and the mobile is assigned to a voice channel in a "listen" (receive) mode, permitting additional tests to be performed. If desired, use the **OPTIONS** menu to enable the Spectrum Analyzer as shown in the example screen to the right.



### 3-2 SMARTNET™/SMARTZONE™ - P25 TRAFFIC CHANNEL INTEROPERATION

The 2975 permits unique tests for SmartNet™/SmartZone™ systems that allow P25 Traffic Channel Interoperation with conventional FM SmartNet™/SmartZone™ systems.

Included within the SmartNet™/SmartZone™ Option is the ability to select the digital (P25) voice traffic channel. Be aware that a valid **System ID** is required.

A test unique to P25 is the Mod Fidelity Meter and the use of speech patterns for P25 digital mode. The Mod Fidelity Meter shows the FSK error of the desired C4FM signal.

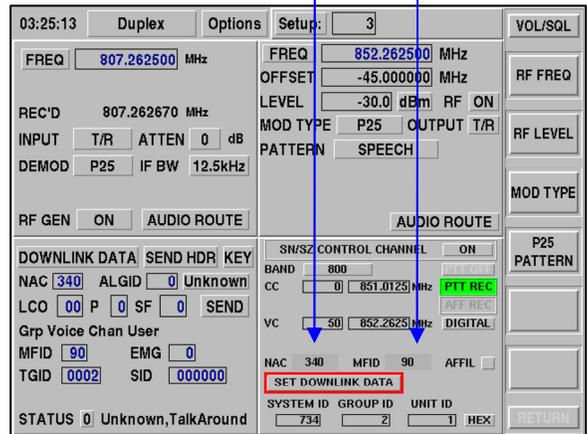
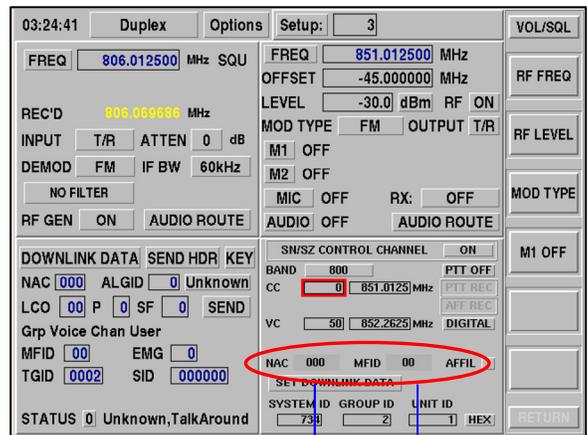
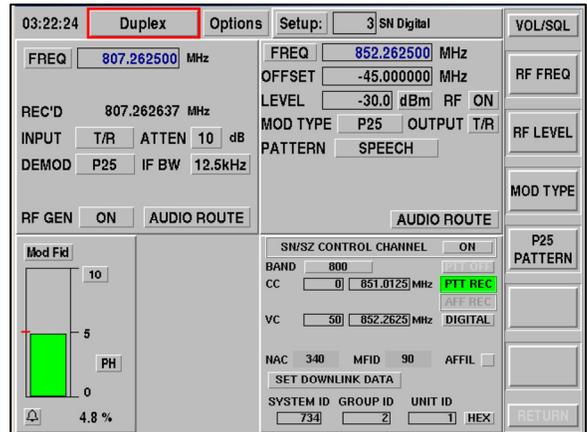
The 2975 receiver requires a few additional setup parameters.

The two setup parameters that the mobile requires to support the call are the **NAC** (Network Access Code) and the **MFID** (Manufacturer ID).

If you do not know the **NAC** and **MFID**, then you can use the 2975 to display these parameters easily. Simply key the mobile and the 2975 decodes this information from the mobile.

When the P25 downlink screen is active, a unique receiver sensitivity test called the **SPEECH** mode may be used.

The speech mode is a special electronic voice that provides prerecorded voice to allow user to determine the receiver's sensitivity. This is accomplished by listening to the prerecorded audio voice patterns and then reducing the RF Level until the voice starts to break up or sounds slurred.



### 3-3 SMARTNET™/SMARTZONE™ SCANNER

If the SmartNet™/SmartZone™ control channel information is not known, the 2975 provides a unique function for tracking and monitoring the control channels.

With the scanner function, the user can monitor off-the-air control channels and track the channel number and **System ID**.

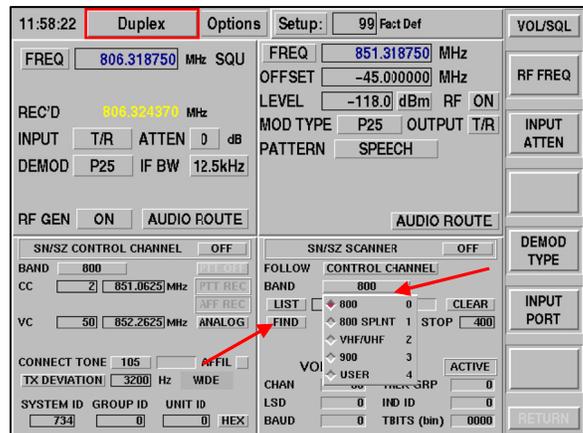
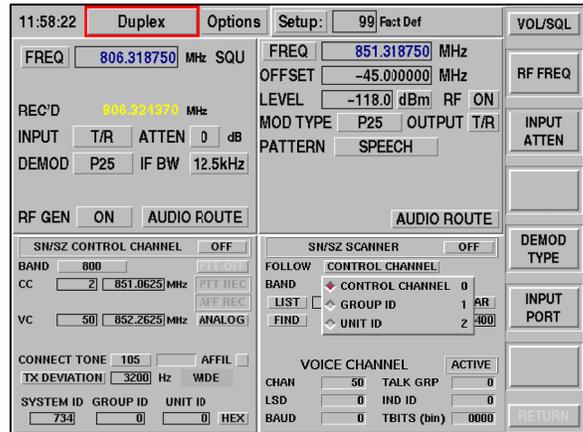
Once a control channel has been located, the 2975 can lock onto and follow the control channel, the **Group ID** or the **Unit ID**.

This feature allows system managers the ability to monitor traffic, and also allows verification that a particular mobile is on the network.

To find a control channel, the user simply enters the band and the channel number range to find the control channel.

Turning on the scanner and then selecting **FIND** starts the search for a control channel. (Reminder; use the antenna input for best sensitivity.)

Once found, the 2975 **FOLLOWS** valid control channels.



## APPENDIX A - TERMS / ACRONYMS

<b>AFF</b>	Affiliate
<b>ALGID</b>	Algorithm Identification
<b>BW</b>	Bandwidth
<b>C4FM</b>	Compatible 4-Level FM
<b>CC</b>	Control Channel
<b>DEC</b>	Decimal
<b>EMG</b>	Emergency
<b>FM</b>	Frequency Modulation
<b>FSK</b>	Frequency Shift Keying
<b>HEX</b>	Hexadecimal
<b>ID</b>	Identification
<b>ISW</b>	Inbound Status Word
<b>LCO</b>	Link Control Op-Code
<b>LSD</b>	Low Speed Data
<b>MFID</b>	Manufacturer Identification
<b>ms</b>	Milliseconds
<b>NAC</b>	Network Access Code
<b>OSW</b>	Outbound Status Work
<b>P25</b>	Project 25 (APCO-25 Digital Trunking System)
<b>PTT</b>	Push-to-Talk
<b>Rx</b>	Receive
<b>SF</b>	State Flag
<b>SID</b>	System Identification
<b>SN/SZ</b>	SmartNet™/SmartZone™
<b>SYS</b>	System
<b>TGID</b>	Talk Group Identification
<b>Tx</b>	Transmit
<b>UHF</b>	Ultra-High Frequency
<b>UUT</b>	Unit Under Test
<b>VC</b>	Voice Channel
<b>VHF</b>	Very High Frequency

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## APPENDIX B - AEROFLEX CONTACT INFORMATION

For issues relating to **Software or Option Loading**, contact our Sales Support Department:

**CONTACT:** Aeroflex  
Sales Support Department  
10200 West York Street  
Wichita, Kansas 67215

Telephone: (800) 835-2352 (Dial Option 4)  
FAX: (316) 524-2623  
Email: [techsupport@aeroflex.com](mailto:techsupport@aeroflex.com)

For issues related to **Hardware Problems or General Issues**, contact our Customer Service Department:

**CONTACT:** Aeroflex  
Customer Service Department  
10200 West York Street  
Wichita, Kansas 67215

Telephone: (800) 835-2350  
FAX: (316) 524-2623  
Email: [service@aeroflex.com](mailto:service@aeroflex.com)

On-Line Return Authorization: <http://www.aeroflex.com/services/rma.htm>

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As we are always seeking to improve our products, the information in this document gives only a general indication of the product capacity, performance and suitability, none of which shall form part of any contract. We reserve the right to make design changes without notice.

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FRANCE	Tel: [+33] 1 60 79 96 00	Fax: [+33] 1 60 0177 69 22
HONG KONG	Tel: [+852] 2832 7988	Fax: [+852] 2834 5364
SCANDINAVIA	Tel: [+45] 9614 0045	Fax: [+45] 9614 0047
SPAIN	Tel: [+34] (91) 640 11 34	Fax: [+34] (91) 640 06 40
UNITED KINGDOM	Tel: [+44] (0) 1438 742200 Toll Free: 0800 282388 (UK only)	Fax: [+44] (0) 1438 7276
USA	Tel: [+1] (316) 522 4981 Toll Free: 800 835 2352 (US only)	Fax: [+1] (316) 522 1360

The logo for AEROFLEX features a stylized 'A' with a blue triangle at its base, followed by the word 'AEROFLEX' in a bold, sans-serif font. The logo is set against a white background with a blue swoosh underneath.

Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven, customer-focused.