



# Radio Test Set IFR 2975

P25 Trunking Option Manual

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Issue 2

# **OPERATION MANUAL**

## **P25 TRUNKING OPTION**

### **IFR 2975**

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# PREFACE

## SCOPE

This manual contains information to install and operate information for the 2975 P25 Trunking 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 P25 Trunking.

## ORGANIZATION

The P25 Trunking Option Manual is composed of the following sections:

### SECTION 1 - DESCRIPTION

Contains general information regarding the 2975 P25 Trunking functions, capabilities and descriptions.

### SECTION 2 - OPERATION

Contains function descriptions explaining how to operate the 2975 P25 Trunking Options.

### SECTION 3 - APPLICATIONS

Contains procedures and descriptions for using the 2975 P25 Trunking Options.

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# SECTION 1 - DESCRIPTION

## 1-1 FUNCTIONS AND CAPABILITIES

The 2975 P25 Trunking Option provides powerful test features for these radios and systems.

Included within the P25 Trunking Option is:

- the ability to emulate a P25 repeater station;
- the ability to perform mobile-initiated call function;
- the ability to perform RF and modulation parametric tests on the unit under test (UUT).

The 2975 P25 Trunking Option does not test all of the control channel messages; however it does verify major interactions between the RFSS and the SU. These are protocol messages in which the mobile (the SU) is verified to correctly respond to commands from the 2975 (the RFSS).

The 2975 P25 Trunking Option emulates some of the protocol (OSPs) of the RFSS. The 2975 responds to ISPs the mobile sends in order to get the mobile onto a traffic channel for parametric testing.

While operating on the traffic channel, the 2975 maintains communication with the mobile through P25 specified Logical Link Data Units (LDUs). These data units carry both voice and data information during the traffic channel session.

In addition to maintaining the traffic channel session, the 2975 simultaneously provides the capability to verify the parametric performance of the mobile, including frequency, power and modulation.

## 1-2 P25 SYSTEM OVERVIEW

### P25 STANDARD

P25, also known as APCO-25, Project 25 and other similar names, is the generic name for a radio system developed and used by federal, state and local public safety agencies for voice and data communications.

The Association of Public-Safety Communications Officials - International, Inc. (APCO-International) established and approved the initial Standard, with participation by several radio equipment manufacturers. This became the APCO Project 25 Standard for Public Safety Digital Radio.

The motivation to develop this common public safety standard includes:

- Enhanced functionality, with a focus on public safety needs;
- Improved spectrum efficiency;
- Competition among multiple vendors through Open System Architecture;
- Effective and reliable communication within and between various agencies.

The Project 25 Standard was adopted by the Telecommunications Industry Association and Electronic Industries Alliance (TIA/EIA) as TIA/EIA-102 Standard. The TIA/EIA organization facilitates the definition, interchangeability and maintenance for on-going developments relative to P25 standards.

### P25 COMMON AIR INTERFACE (CAI)

The P25 Standard defines common parametric and operational methods for the radio system in order to meet the various system requirements. This definition is known as the Common Air Interface, or CAI.

The P25 CAI includes several major items:

- RF Channel bandwidth: 12.5 kHz (Phase I), 6.25 kHz (Phase II)
- RF Channel bit rate: 9.6 kbps
- Modulation methods: QPSK-c, C4FM (Phase I) and CQPSK (Phase II)
- Channel access method: Frequency Division, Multiple Access (FDMA)
- Frame formats: Voice, Data and Control (defined within the Standard)
- Voice Encoding scheme: IMBE vocoder (defined within the Standard)

In addition, the P25 Standard defines other significant features:

- Identifier capability of up to 16 million radio units (24 bits);
- Supports 65,000 talk groups (16 bits);
- Non-encrypted or encrypted communications (multi-key and multi-algorithm operation);
- Trunked radio control (trunking control channel operation).

### 1-3 P25 TRUNKING OPERATION

As radio communication systems become more complex and as more users are added to radio networks, the implementation of control channel technology is often required

The control channel is an optional implementation for P25 systems. Using a dedicated control channel is desirable to provide additional control of the RF spectrum resources in larger systems. It also offers added features not available in conventional radio communications systems.

A control channel is normally a separate, dedicated frequency channel. It is different from a traffic channel in that it functions as the resource allocation and digital communication message handler between the RF Sub-System (RFSS) and the Subscriber Unit (SU).

The P25 trunking control channel is not specific to a P25 manufacturer or P25 RFSS configuration. All mobiles supporting P25 formats should be able to access a P25 trunking function as either standard configuration or as an option.

In the P25 standard, the control channel maintains compatibility between conventional operation and trunked operation. In P25 trunked operation, the control channel uses packet access techniques and requires a request process to a resource controller which coordinates the users access, while the conventional operation permits user's to control their own access.

An example of how a control channel operates is illustrated in the adjacent figure.

The repeater is sends an outbound control channel, ( $C_o$ ) that both mobiles monitor. In P25 Trunking systems, the outbound control channel sends information in "packets" called Outbound Signaling Packets or OSPs.

Assume that mobile "A" wants to place a call to another user on the systems. Mobile "A" transmits a request to the repeater on an inbound control channel ( $C_i$ ). In P25 Trunking systems, the inbound control channel sends information words called Inbound Signaling Packets or ISPs. The repeater station and network process the request, and then sends an alert on the outbound control channel to the desired user, mobile "B", as a call that is part of its group or that is only for mobile "B."

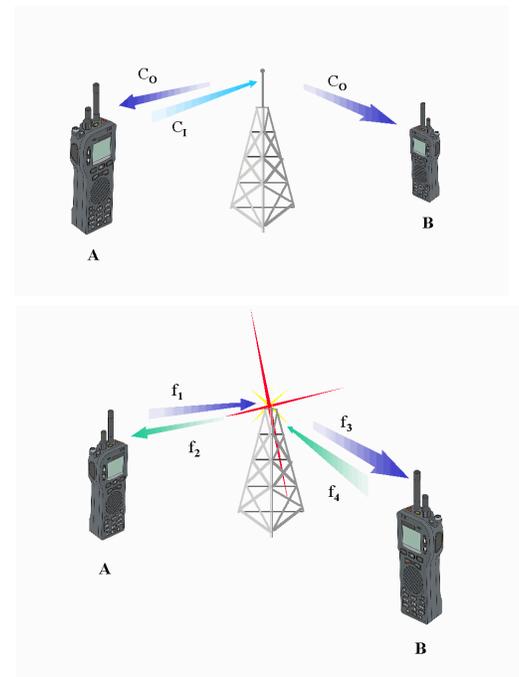
Next, the call is assigned to particular voice channel pairs that operate on separate frequencies ( $f_1$  and  $f_2$ ,  $f_3$  and  $f_4$  in the illustration to the right). The transmit and receive frequencies for each pair are offset (separated in frequency) to permit simultaneous, two-way communication. Control of these resources is accomplished through the control channel that the mobile units monitor continuously.

Whenever a SU is powered on, the SU searches the appropriate frequency band (dependent upon it's capabilities) looking for a valid control channel, then verifies the Network ID (NID) and decodes the control channel information.

Once the SU has acquired a control channel, the control channel communicates by signaling messages to and from the SU so that proper access to the system can be achieved.

One such system activity is called registration. Registration is performed whenever the SU is powered on or whenever the SU moves into a new zone within the coverage area. The primary purpose for registering a SU with the network is to ensure that only authorized users access the network, and that the network can track where the SU is located. This reduces the amount of time and resources that the network needs to locate the mobile, reducing call set up time and control channel loading.

There are two types of registration in a P25 Trunking network: full registration and location registration.



A full registration occurs when the SU, first powered on, enters a new registration area and the user selects a new network or when the RFSS requests registration. In a full registration the network checks the validity of the SU.

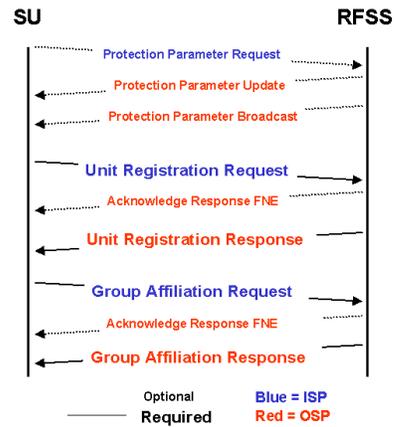
A location registration is performed whenever the SU has moved to another zone of coverage within the service area.

In both cases, the registration can be protected (encrypted) for enhanced security.

The illustration to the right shows the steps for a typical full registration process.

The blue messages are called Inbound Signaling Packets (ISP), and the red messages are called Outbound Signaling Packets (OSP).

Alternative control channel formats can also be used with P25, such as SmartNet™/SmartZone™. In this case, a 3600 baud control channel functions to service both a conventional channel as well as P25 digital traffic channels.



## SECTION 2 - OPERATION

The 2975 P25 Trunking 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.

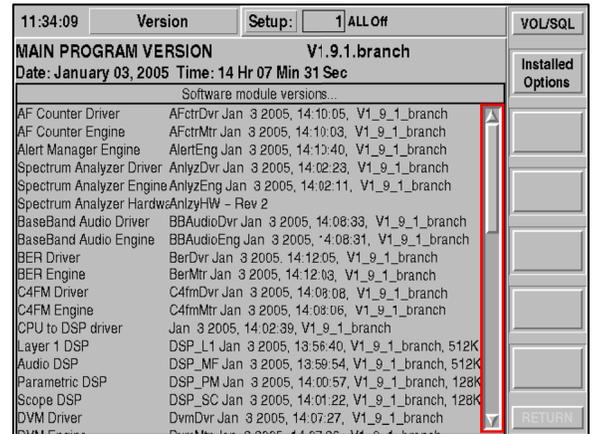
### 2-1 P25 TRUNKING OPTION SETUP

#### CHECKING P25 TRUNKING OPTION INSTALLATION

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

The P25 Trunking Option may be installed at the factory, or it may be customer-installed in the 2975 only with Software Versions 1.5.0 and on.

To check whether the P25 Trunking 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.



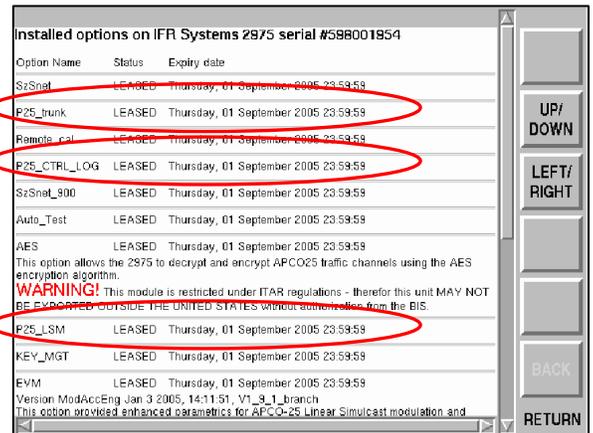
The **Installed Options** screen shows the 2975 serial number and the options that are installed.

If the P25 Trunking Option Status displays **ENABLED** or **LEASED**, the option is installed and the 2975 is set up and ready to use.

If the P25 Trunking Option (**P25\_trunk**) is **NOT** listed or is **NOT** shown as **ENABLED**, the option is not installed.

To install the P25 Trunking Option, proceed to the next section, "INSTALLING P25 TRUNKING OPTION."

If you wish to purchase the P25 Trunking Option, contact information is shown in **APPENDIX B**.



## INSTALLING P25 TRUNKING OPTION

If you have received the P25 Trunking Option from Aeroflex, the option must be installed into the 2975 before it is accessible.

*If the P25 Trunking Option is already installed, you may skip this section.*

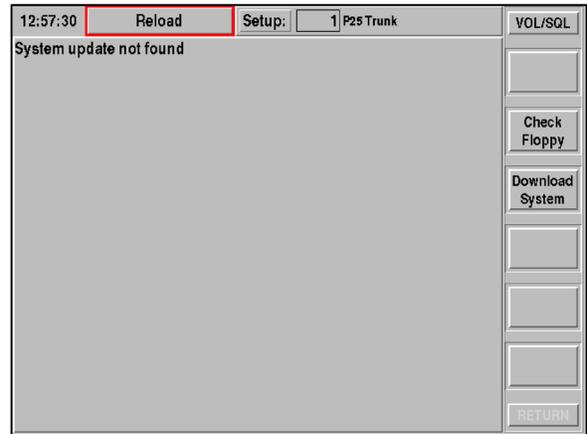
For customers who have 2975 Software Version 1.5.0 and on, the 2975 P25 Trunking Option File (“**options.new**”) is distributed by Aeroflex via email, floppy disk or CD-ROM.

The P25 Trunking 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 P25 Trunking 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 P25 Trunking 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 P25 Trunking Option is installed. Press the **INSTALLED OPTIONS** Soft Key to verify the P25 Trunking Option is **ENABLED**.



Installation of the P25 Trunking Option is only required once - it does not need to be reinstalled each time the system is upgraded with new software.

## 2-2 P25 TRUNKING OPERATION MODES

### SELECTING P25 TRUNKING OPTIONS

The P25 Trunking Option is accessed on the 2975 Duplex screen ([**MODE**] and [**3**]) or User screen ([**MODE**] and [**0**]).

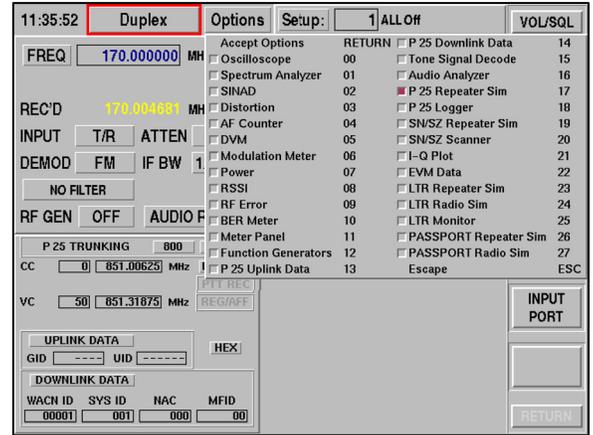
The Duplex Option menu shows the P25 Trunking Option selections:

**P25 Repeater Sim**

**P25 Logger**

P25 Uplink Data and P25 Downlink Data are standard features of the IFR 2975. For information on these features refer to the 2975 Operation Manual.

P25 Option tiles occupy one-fourth of the total user screen space. Duplex Mode occupies two tiles with the Receiver (Tx Test) and Generator (Rx Test) screens, therefore only two P25 Option tiles can be displayed at the same time.



## P25 TRUNKING REPEATER SIMULATOR

The P25 Trunking 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 various data fields are described in detail in the P25 Standard. Refer to the applicable P25 Standard if additional descriptions and explanations are required.

### FIELD DEFINITIONS

#### P25 BAND

This button selects and displays the frequency band of operation for the repeater simulation. The available P25 bands of operation are **700 MHz**, **800 MHz** or **VHF/UHF**. This control determines how channel numbers are associated with the frequency values.

#### P25 CONTROL CHANNEL OFF/ON

This toggle button turns 2975 P25 Trunking Simulator **ON / OFF**. **OFF** indicates the 2975 is not simulating a base station control channel. **ON** indicates the 2975 is simulating a base station control channel.

#### CC

This field displays the Control Channel used for the repeater simulation. The frequency that corresponds to the displayed Control Channel's transmit frequency is shown in the field to the right of **CC**. The channel ID associated with the entered channel is zero for 800 MHz bands. For 700 MHz and VHF / UHF bands the associated channel ID is the identifier number last selected from the configuration screen. User may edit field to define this value.

#### VC

This field displays the Voice Channel used for the repeater simulation. The frequency that corresponds to the displayed Voice Channel's transmit frequency is shown in the field next to **VC**. User may edit field to define this value.

#### PTT OFF/ON

This button activates the simulation of another radio attempting to contact the unit under test. The number of available call types is controlled by the options installed in the 2975. Group call types are the default mode of communication. Unit to Unit and dialing (PSTN Interconnect) calls are optionally enabled modes.

Group calls are permitted with **IMPLICIT** mode and **GROUP CALL**. Unit to Unit and PSTN calls are available with explicit mode when option enabled.

#### PTT REC

The **PTT REC** indicator is used to display a number of communication functions going to and from the unit under test. When in implicit mode, the **PTT REC** turns **GREEN** when a Group Voice Channel Request message is received from the unit under test.

When the Unit to Unit and PSTN option is installed, this section of the tile displays **UU REC** button for a unit to unit received call and **DIAL REC** for a dialing received call. **R\_WAIT** and **R\_GO** are displayed when initiating unit to unit or PSTN call from the 2975 to the unit under test.

## REG/AFF

This toggle button indicates when the simulator receives a mobile registration.

When radio REGISTRATION is successfully completed, this indicator turns **GREEN** and changes to **REG REC**. After 5 seconds, the indicator reverts back to **REG/AFF** and turns **GRAY**.

When radio AFFILIATION is successfully completed, this indicator turns **GREEN** and changes to **AFF REC**. After 5 seconds, the indicator reverts back to **REG/AFF** and turns **GRAY**.

## CONFIG

The **CONFIG** button opens the P25 Channel Configuration screen, enabling the user to configure the BASE FREQUENCY, BANDWIDTH, TRANSMIT OFFSET and CHANNEL SPACING of the P25 trunking messages used in the VHF / UHF and 700 MHz bands. This button is only available when VHF / UHF band is selected.

The configuration screen sets the parameters of the various messages in background messages. (IDEN\_UP\_VU) and other messages used in call processes. Refer to TIA/EIA-102-AABC-2 for more information on these processes.

**NOTE:** The configuration screen starts at Channel ID 0, which correlates to 1 in some manufacturer's radio programming software. Verify the channel ID before programming the radio.

## HEX / DEC

This button selects either **HEX** (hexadecimal) or **DEC** (decimal) for numeric data fields. CC, VC or frequency values are always displayed in decimal format.

## UPLINK DATA

This button opens the UPLINK CONFIGURATION screen for viewing additional UPLINK DATA fields.

## GID

This field displays the Group Identifier received from mobile. This is a display only field.

## UID

This field displays the Unit Identifier received from mobile. This is a display only field.

## DOWNLINK DATA

This button opens the DOWNLINK CONFIGURATION screen for viewing or editing more DOWNLINK DATA fields.

## WACN ID

This field displays the Wide Area Communication Network Identifier for the simulator control channel. User may edit field to define this value. Default value is 1. This field must be set to the same value as the WACN ID of the radio to be tested.

## SYS ID

This field displays the System Identifier for the simulator control channel. User may edit field to define this value. Default value is 734 (hex). This field must be set to the same value as the SYS ID of the radio to be tested.

P 25 TRUNKING **U/V** OFF

CC 0 150.00000 MHz PTT OFF

VC 50 150.31250 MHz REG/AFF

CONFIG

UPLINK DATA

GID ---- UID -----

DOWNLINK DATA

WACN ID SYS ID NAC MFID

00001 001 000 00

CHANNEL ID	BASE FREQUENCY (MHz)	BANDWIDTH (kHz)	TRANSMIT OFFSET (MHz)	CHANNEL SPACING (kHz)
1	150.000000	6.250	2.0000	6.250
0	150.000000	6.250	2.0000	6.250
1	150.000000	6.250	2.0000	6.250
2	150.000000	6.250	2.0000	6.250
3	150.000000	6.250	2.0000	6.250
4	150.000000	6.250	2.0000	6.250
5	150.000000	6.250	2.0000	6.250
6	150.000000	6.250	2.0000	6.250
7	150.000000	6.250	2.0000	6.250
8	150.000000	6.250	2.0000	6.250
9	150.000000	6.250	2.0000	6.250

CLOSE

## **NAC**

This field displays the Network Access Code sent out in the header and LCO data streams of the digital voice channel. User may edit field to define this value. Default value is 734 (hex). This field must be set to the same value as the NAC of the radio to be tested.

## **MFID**

This field displays the Manufacturer Identifier number sent out in the header and LCO data streams of the digital voice channel. This value is updated when uplink data is received from mobile. User may edit field to define this value. Default value is 00.

The MFID identifies the manufacturer for non-standard control channel messaging. For standard (normal) P25 Trunking operation, the MFID is defined as the number zero (00).

## **P25 CHANNEL CONFIGURATION**

The **CONFIG** button opens the P25 Channel Configuration screen to allow users to set basic channel values for use during repeater simulation. The user must enter a value in the CHANNEL ID field to indicate the row of data to be configured. Editing data fields in the top row updates the corresponding data in the display fields below.

**NOTE:** Radio configuration software often uses a Channel ID range of 1 to 16. The 2975 uses a Channel ID range of 0 to 15. If the radio software uses a range of 1 to 16, decrease Channel ID by 1 to obtain the corresponding 2975 Channel ID.

P 25 TRUNKING **U/V** OFF

CC   MHz PTT OFF

VC   MHz PTT REC

REG/AFF

**CONFIG**

UPLINK DATA

GID  UID  HEX

DOWNLINK DATA

WACN ID  SYS ID  NAC  MFID

### **CHANNEL ID**

This field allows user to select the channel data to be edited. User must enter a value in this field to edit channel data. CHANNEL ID range is 0 to 15.

### **BASE FREQUENCY**

This field displays the base repeater control channel Tx frequency of the specified channel. User may edit field to define this value. The entered value will be rounded to the nearest 5 Hz.

### **BANDWIDTH**

This field displays the bandwidth of the channel. User may edit field to define this value. When P25 Trunking VHF/UHF/700 MHz Option is installed user may also select from a drop down menu to define value.

### **TRANSMIT OFFSET**

This field displays the channel offset value. User may edit field to define this value. When 700 MHz band is selected this field is rounded to the nearest 0.250 kHz. When VHF / UHF band is selected this value is rounded to the nearest multiple of the current channel spacing value.

### **CHANNEL SPACING**

This field displays the channel spacing value. User may edit field to define this value. Value will be rounded to the nearest 0.125 kHz.

### **CLOSE**

This button closes the P25 Channel Configuration screen and returns user to the P25 Trunking tile.

CHANNEL ID	BASE FREQUENCY (MHz)	BANDWIDTH (kHz)	TRANSMIT OFFSET (MHz)	CHANNEL SPACING (kHz)
1	150.000000	6.250	2.0000	6.250
0	150.000000	6.250	2.0000	6.250
1	150.000000	6.250	2.0000	6.250
2	150.000000	6.250	2.0000	6.250
3	150.000000	6.250	2.0000	6.250
4	150.000000	6.250	2.0000	6.250
5	150.000000	6.250	2.0000	6.250
6	150.000000	6.250	2.0000	6.250
7	150.000000	6.250	2.0000	6.250
8	150.000000	6.250	2.0000	6.250
9	150.000000	6.250	2.0000	6.250

**CLOSE**

## P25 TRUNKING UPLINK CONFIGURATION FIELD DEFINITIONS

When the **UPLINK DATA** button is pressed, the P25 TRUNKING **UPLINK CONFIGURATION** screen is displayed.

The **UPLINK** is the RF path where information is transmitted from the radio (SU) and is received by the 2975 (RFSS).

The UPLINK DATA fields are display only fields and can not be edited by user.

MFID	SYS ID	WACN ID	OP CODE
--	---	-----	--
GID	UID	SRCE ADDR	SOURCE ID
----	-----	-----	-----
SVC OPT	GRP ADDR		
--	----		
CLOSE			HEX

### FIELD DEFINITIONS

#### MFID

This field displays the Manufacturer Identifier number received from mobile.

#### SYS ID

This field displays the System Identifier or System Address received from mobile.

#### WACN ID

This field displays the Wide Area Communication Network Identifier received from mobile.

#### OP CODE

This field displays the Operation Code received from mobile.

#### GID

This field displays the Group Identifier received from mobile.

#### UID

This field displays the Unit Identifier received from mobile.

#### SRCE ADDR

This field displays the Source Address received from mobile.

#### SOURCE ID

This field displays the Source Identifier received from mobile.

#### SVC OPT

This field displays the Service Option received from mobile.

#### GRP ADDR

This field displays the Group Address received from mobile.

#### CLOSE

This button closes the **UPLINK CONFIGURATION** screen and returns to the **P25 CONTROL CHANNEL** screen.

#### HEX / DEC

This button selects either **HEX** (hexadecimal) or **DEC** (decimal) for numeric fields.

## P25 TRUNKING DOWNLINK CONFIGURATION FIELD DEFINITIONS

When the **DOWNLINK DATA** button is pressed, the P25 TRUNKING **DOWNLINK CONFIGURATION** screen is displayed.

The **DOWNLINK** is the RF path where information is transmitted from the 2975 (RFSS) and is received by the radio (SU). The values for these data fields are dependent upon the P25 system or radio being tested.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR	
0	0	0	60	00	0000	
Auto Copy						
<input type="checkbox"/> Registration <input type="checkbox"/> Affiliation <input type="checkbox"/> Voice Request						
CLOSE    DEFAULTS    HEX						

### FIELD DEFINITIONS

#### RFSS ID

This field displays the RF Subsystem Identifier for the simulator control channel. User may edit field to define this value. Default value is 00.

#### SITE ID

This field displays the Site Identifier for the simulator control channel. User may edit field to define this value. Default value is 00.

#### WG ID

This field displays the Working Group Identifier for the simulator control channel. User may edit field to define this value. Default value is 0001.

#### WU ID

This field displays the Working Unit Identifier for the simulator control channel. User may edit field to define this value. Default value is 000001.

#### LRA

This field displays the Local Registration Area for the simulator control channel. User may edit field to define this value. Default value is 00.

#### P

This field displays the Protected bit value for the simulator control channel. User may edit field to define the protected bit in control channel messages, however the simulation does **NOT** encrypt the control channel information. 0 = No protection. 1 = Protected Mode. Default value is 0.

#### A

This field displays the Active Network value for the simulator control channel. User may edit field to define the Active Network in control channel messages, however, editing field does **NOT** affect the behavior of the repeater simulation. Default value is 1.

#### LG

This field displays the Local / Global Affiliation value for the simulator control channel. User may edit field to define the Local / Global Affiliation bit of control channel messages, however, editing field does **NOT** affect the behavior of the repeater simulation. Default value is 0.

#### GAV

This field displays the Group Affiliation Value for the simulator control channel. User may edit field to define the Group Affiliation status sent when a radio attempt to affiliate. These settings may affect how the radio receives messages; however, the repeater simulation always operates as if an "ACCEPT" message was sent for the affiliation. Available values are: 0 = Accept, 1 = Fail, 2 = Deny, 3 = Refused. Default value is 0.

## RV

This field displays the Registration Value for the simulator control channel. User may edit field to define the Registration status sent when a radio attempts to register. These settings may affect how the radio receives messages; however, the repeater simulation always operates as if an "ACCEPT" message was sent for the affiliation. Available values are: 0 = Accept, 1 = Fail, 2 = Deny, 3 = Refused. Default value is 0.

## SVC CLASS

This field displays the System Service Class for the simulator control channel. User may edit field to define this value. Default value is 00.

## SVC OPT

This field displays the Service Option field for the simulator control channel. User may edit field to define this value. Default value is 00.

## ANN GRP ADDR

This field displays the Announcement Group Address for the simulator control channel. User may edit field to define this value. Default value is 0001.

## AUTO COPY

**AUTO COPY** allows users to rapidly communicate with a radio. When **AUTO COPY** features are enabled, the 2975 updates key Downlink Data fields with information received from the radio, eliminating the need to manually configure the data fields. **AUTO COPY** features can be disabled to allow user control over the data to perform radio testing.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR	
0	0	0	60	00	0000	
Auto Copy						
<input type="checkbox"/> Registration <input type="checkbox"/> Affiliation <input type="checkbox"/> Voice Request						
CLOSE    DEFAULTS    HEX						

### Registration

During the radio registration process some repeaters assign a radio a working unit ID (WUID) based on the radio's internal ID (UID). Enabling **Registration** causes the 2975 to simulate this behavior. The WUID Downlink Data field is set to the UID value transmitted by the radio. This value is used when the repeater simulator transmits the WUID.

### Affiliation

During the radio registration process some repeaters assign a radio a working group ID (WGID) based on the radio's internal group ID (GID). Enabling **Affiliation** causes the 2975 to simulate this behavior. The WGID Downlink Data field is set to the GID value transmitted by the radio. This value is used when the repeater simulator transmits the WGID.

### Voice Request

When a radio requests access to a voice channel to establish a group call, it transmits the group it would like to connect with as well as service options. Enabling **Voice Request** causes the **SRC ADDR** and **SVC OPT** Downlink data fields to be updated to match the radios requested group and service option values. These values are sent when the repeater simulator grants a voice channel. If **Voice Request** is inactive, the WUID Downlink Data field is sent as the "group" in the voice channel grant: the WUID Downlink Data value may or may not match the group requested by the radio. The WGID Downlink Data field is not affected by this feature.

## AUTO COPY (EXPLICIT MODES OF OPERATION)

The following P25 Options provide users with two additional Auto Copy features:

- P25 Explicit Mode of Operation (2975OPT22)
- P25 Explicit Unit to Unit and PSTN Emulation (2975OPT23)
- P25 Explicit Adjacent Status Broadcast Channel Message (2975OPT24)

These fields are only visible when P25 options containing explicit modes of operation are installed.

**NOTE:** User screen layout changes when P25 options containing explicit modes of operation are installed.

### UU Req

Enabling **UU Req** updates the following Downlink Data fields with data from the radio: TGT ADDR, SRC ID, SRC ADDR and SVC OPT. The updated data is sent when the repeater simulator grants a voice channel.

### Dial Req

Enabling **Dial Req** updates the SVC OPT Downlink Data field with data from the radio. When the repeater simulator grants a voice channel, the SVC OPT and WUID requested by the radio are echoed back to the radio. The WUID Downlink Data field is not affected by this feature.

### CLOSE

This button closes the **DOWNLINK DATA** screen and returns to the **P25 CONTROL CHANNEL** screen.

### DEFAULTS

This button restores all fields within the **DOWNLINK CONFIGURATION** to the factory default settings.

### HEX / DEC

This button selects either **HEX** (hexadecimal) or **DEC** (decimal) for numeric fields.

### TYPE1 / TYPE2

The feature is only used for explicit message formats. This field is only visible when P25 options containing explicit modes of operation are installed.

**TYPE1** causes single data block packets to be expanded by nulls (0). This is the default value.

**TYPE2** causes single data block packets to be expanded by a standard "P25 Simple Terminator Data Unit" packets (TIA/EIA-102.BAAA, 8.2.3), which is simply an FS + NID.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A	
01	01	0001	000001	01	0	1	
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR		
0	0	0	60	00	0000		
SRC ID	SRC ADDR	TGT ADDR	TIMER	PHONE NUM			
000000	000000	000000	0000	0000000000			
Secondary Control Channel Broadcast (SCCB)							
SCCB1 Tx	0	0	851.00625	MHz	SVC CLASS	00	
Rx	0	0	806.00625	MHz			
SCCB2 Tx	0	0	851.00625	MHz	SVC CLASS	00	
Rx	0	0	806.00625	MHz			
Adjacent Repeater Site Configuration				Auto Copy			
MFID	RFSS ID	SYS ID	SITE ID	<input checked="" type="checkbox"/>	Registration		
00	00	000	00	<input checked="" type="checkbox"/>	Affiliation		
LRA	SVC CLASS	C	F	V	A	<input checked="" type="checkbox"/>	Voice Req
00	00	0	0	0	0	<input checked="" type="checkbox"/>	UU Req
ChanTx	0	0	851.00625	MHz		<input checked="" type="checkbox"/>	Dial Req
ChanRx	0	0	851.00625	MHz			
CLOSE    DEFAULTS    HEX <b>EXPLICIT</b> TYPE 1							

## SECONDARY CONTROL CHANNEL BROADCAST (SCCB) (2975OPT21)

The SCCB feature allows users to configure repeater messages (SCCB and SCCB\_EXP) to define the parameters of two secondary control channels. System Service Class fields for each channel can be used to control message transmission.

Implicit message format transmits all data to the repeater simulator as single block messages. This format is designed for simple networks operating on 700 MHz and 800 MHz bands where the repeater can provide a minimum amount of information. The radio uses the provided information to imply what the remaining data should be.

For example, since the 800 MHz band uses a standard -45 MHz transmit offset, the repeaters only need to inform the radio of the receive frequency when it assigns a voice channel. Because the receive channel has been identified, the radio can “imply” the transmit channel. Implicit Mode Operation is available with 2975 Opt 21. If the SCCB Option (OPT21) is enabled with Explicit Mode (OPT22), the 2975 also supports the SCCB Explicit mode of operation.

The SCCB fields are visible only when P25 Secondary Control Channel Broadcast Message Option (2975OPT21) is installed in the 2975.

### FIELD DEFINITIONS

#### SCCB TX

##### SCCB Transmit Channel ID

This field displays the Channel ID field of the Tx Channel in SCCB packets. The value selects the channel configuration associated with the channel number to determine the Tx frequency. Field values range from 0 to 15.

##### SCCB Transmit Channel Number

This field displays the Channel Number field of the Tx Channel in SCCB packets. The value sets the number of channel slots to offset the Channel ID from the selected base frequency to calculate the Tx Frequency. Field values range from 0 to 4095.

##### SCCB Tx Frequency

This field displays the Tx Channel frequency for information purposes only: this frequency is not transmitted. Users set the SCCB Tx frequency by entering a value in this field. The closest corresponding channel number is displayed in the Channel Number field. Changing this field does not affect the Channel ID setting.

#### SVC CLASS

This field displays the System Service Class of an SCCB channel. Zero indicates that a Channel is invalid, therefore a user can enter “0” in this field to block the transmission of SCCB message(s). Field values range from 0 to 255.

The screenshot shows a configuration window for the Secondary Control Channel Broadcast (SCCB). The window has several fields and buttons. Three red arrows point to specific fields: 'Tx Channel ID' points to the 'SITE ID' field (value 01), 'Tx Channel Number' points to the 'SVC CLASS' field (value 60), and 'Tx Frequency' points to the 'SVC CLASS' field (value 851.00625 MHz). The 'IMPLICIT' button is highlighted with a red box.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP	ADDR
0	0	0	60	00		0000

Secondary Control Channel Broadcast (SCCB)

SCCB1 Tx	0	0	851.00625	MHz	SVC CLASS	00
SCCB2 Tx	0	0	851.00625	MHz	SVC CLASS	00

Auto Copy

Registration  Affiliation  Voice Request

CLOSE DEFAULTS HEX **IMPLICIT**

## IMPLICIT / EXPLICIT

The **IMPLICIT / EXPLICIT** button allows users to access Implicit and Explicit message format data fields according to the options installed in the 2975.

In **IMPLICIT** mode the SCCB message is sent as long as at least one of the service class variables are values other than zero. No messages are sent when both channels are zero.

In **EXPLICIT** mode the SCCB\_EXP message is only sent for channels with a System Service Class field other than zero (zero indicates the channel is disabled). If both channels are values other than zero SCCB\_EXP messages are sent periodically, alternating between channels. If the SCCB Option (2975OPT21) is enabled with Explicit Mode (2975OPT22), the 2975 also supports the SCCB Explicit mode of operation.

Both **IMPLICIT** and **EXPLICIT** modes use main repeater simulation variables for the MFID, RFSS ID and SITE ID. Modifying SCCB variables does **NOT** affect similarly named fields on this or other 2975 screens.

### IMPLICIT MODE OPERATION

To enable Implicit Mode, select **DOWNLINK DATA** which opens the Downlink Data configuration screen. Select the **IMPLICIT** button, and then click **CLOSE** to return to the P25 Trunking screen.

Implicit Mode is only available when P25 Secondary Control Channel Broadcast Message Option (2975OPT21) is installed in the 2975.

02:48:27 Duplex Options Setup: 1 not used VOL/SOL

FREQ 806.006250 MHz SQU FREQ 851.006250 MHz

REC'D 806.006250 MHz

INPUT T/R ATTN 0 dB

DEMOM P25 IF BW 12.5kHz

RF GEN OFF AUDIO ROUTE

P 25 TRUNKING UV OFF

CC 0 150.00000 MHz PTT OFF

VC 50 150.31250 MHz

UPLINK DATA

GID UID HEX

DOWNLINK DATA

WACH ID SYS ID NAC MFID

00001 000 000 00

P 25 LOGGER START

Log Raw Symbols

Log Conventional P25 LCO

Log Trunked Control Channel OSP

Log Trunked Control Channel ISP

File Name: LOG1.TXT

VIEW LOG APPEND RETURN

### P25 EXPLICIT MODE OF OPERATION (2975OPT22)

Explicit message format uses multiple block messages to convey information. When the repeater assigns a voice channel it provides both receive and transmit channel information, allowing the offset of these channels to be arbitrary. P25 Explicit Mode Operation (2975OPT22) is required for this feature.

To enable Explicit Mode, open **DOWNLINK DATA** screen. Select **IMPLICIT** button at bottom of screen to open the Explicit message format screen. Select **EXPLICIT** button to enable Explicit message mode, then select **CLOSE** button to return to P25 Trunking screen. Explicit Mode is now enabled.

**NOTE:** Explicit message format should be used for VHF / UHF band for radios which conform to the latest P25 standards.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR	
0	0	0	60	00	0000	

Secondary Control Channel Broadcast (SCCB)

SCCB1 Tx	SVC CLASS
0 0	851.00625 MHz
0 0	851.00625 MHz

Auto Copy

Registration  Affiliation  Voice Request

CLOSE DEFAULTS HEX **IMPLICIT**

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR	
0	0	0	60	00	0000	
SRC ID	SRC ADDR	TGT ADDR	TIMER	PHONE NUM		
000000	000000	000000	0000	0000000000		

Secondary Control Channel Broadcast (SCCB)

SCCB1 Tx	SVC CLASS
0 0	851.00625 MHz
Rx 0 0	806.00625 MHz
SCCB2 Tx	SVC CLASS
0 0	851.00625 MHz
Rx 0 0	806.00625 MHz

Adjacent Repeater Site Configuration

MFID	RFSS ID	SYS ID	SITE ID		
00	00	000	00		
LRA	SVC CLASS	C	F	V	A
00	00	0	0	0	0
ChanTx	SVC CLASS	ChanRx	SVC CLASS		
0 0	851.00625 MHz	0 0	851.00625 MHz		

Auto Copy

Registration  Affiliation  Voice Req  UU Req  Dial Req

CLOSE DEFAULTS HEX **EXPLICIT** TYPE 1

## P25 EXPLICIT UNIT TO UNIT AND PSTN EMULATION (2975OPT23)

The 2975 optionally supports Unit to Unit and PSTN interconnect calls in the explicit mode of operation. This optional feature enables user to establish Unit to Unit and PSTN interconnect calls within the Explicit Mode of operation (2975OPT22). This feature allows users to verify that a radio can generate and receive Unit to Unit and PSTN calls.

**NOTE:** This option requires Option 22, Explicit Mode Operation.

### FIELD DEFINITIONS

The following fields are only visible when P25 Explicit Unit to Unit and PSTN Emulation (2975OPT23) is installed with Explicit Mode Operation (2975OPT22)

#### SRC ID

This field displays the Source ID used for Unit to Unit Explicit messages. The radio may compare this value to its transmitted value for some calls, therefore, Auto Copy can automatically copy the radio data into this field during call set up.

#### SRC ADDR

This field displays the Source Address used by the 2975 for specific explicit messages (Group, Unit and Dialing). The radio may compare this value to its transmitted value for some calls, therefore, Auto Copy can automatically copy radio data into this field during call set up. If expert control is desired disable Auto Copy.

#### TGT ADDR

This field displays the Target Address used for Unit to Unit Explicit Messages. The radio may compare this value to its transmitted value for some calls, therefore, Auto Copy can automatically copy radio data into this field during call set up. If expert control is desired disable **Auto Copy**.

#### TIMER

This field displays the Call Timer used for telephone Explicit messages. TIMER specifies the time (in 100 ms intervals) allocated for the call. A value of zero indicates that the information is not being provided.

#### PHONE NUM

This field indicates the phone number used for telephone Explicit messages. This field allows users to set a phone number to transmit to the radio when a simulated DIALing message request is initiated.

The screenshot shows a configuration window with the following sections:

- RFSS ID**: 01
- SITE ID**: 01
- WGID**: 0001
- WUID**: 000001
- LRA**: 01
- P**: 0
- A**: 1
- LG**: 0
- GAV**: 0
- RV**: 0
- SVC CLASS**: 60
- SVC OPT**: 00
- ANN GRP ADDR**: 0000
- SRC ID**: 000000
- SRC ADDR**: 000000
- TGT ADDR**: 000000
- TIMER**: 0000
- PHONE NUM**: 0000000000

**Secondary Control Channel Broadcast (SCCB)**

- SCCB1 Tx**: 0 0 851.00625 MHz
- SCCB1 Rx**: 0 0 806.00625 MHz
- SCCB2 Tx**: 0 0 851.00625 MHz
- SCCB2 Rx**: 0 0 806.00625 MHz

**Adjacent Repeater Site Configuration**

- MFID**: 00
- RFSS ID**: 00
- SYS ID**: 000
- SITE ID**: 00
- LRA**: 00
- SVC CLASS**: 00
- C**: 0
- F**: 0
- V**: 0
- A**: 0
- ChanTx**: 0 0 851.00625 MHz
- ChanRx**: 0 0 851.00625 MHz

**Auto Copy**

- Registration
- Affiliation
- Voice Req
- UU Req
- Dial Req

Buttons: CLOSE, DEFAULTS, HEX, **EXPLICIT**, TYPE 1

## P25 EXPLICIT ADJACENT STATUS BROADCAST CHANNEL MESSAGE (2975OPT24)

This optional feature provides users with the ability to configure control channel repeater messages. These variables are used to define the parameters of an adjacent repeater site. Modification of the Adjacent Site variables does **NOT** affect similarly named variables on this or other user screens. These variables are used to define the parameters of an adjacent repeater site. The adjacent site transmissions are **NOT** simulated.

**NOTE:** This option requires Explicit Mode Operation (2975OPT22).

### FIELD DEFINITIONS

Adjacent Repeater Site Configuration fields are only visible when P25 Explicit Adjacent Status Broadcast Channel Message (2975OPT24) is installed with Explicit Mode Operation (2975OPT22).

#### MFID

This field displays the Manufacturer Identifier sent out on adjacent site packets.

#### RFSS ID

This field displays the RF Sub-system ID sent out on adjacent site packets.

#### SYS ID

This field displays the System ID sent out on the adjacent site packets.

#### SITE ID

This field displays the Site ID sent out on the adjacent site packets.

#### LRA

This field displays the Local Registration Area sent out on the adjacent site packets.

#### SVC CLASS

This field displays the Service Class sent out on the adjacent site packets.

#### C

This field displays the “C” bit sent out on the adjacent site packets. Set this field to 1 if the adjacent site is advertising a conventional channel.

#### F

This field displays the “F” bit sent out on the adjacent site packets. Set this field to 1 to stimulate a site failure on the adjacent site.

#### V

This field displays the “V” bit sent out on the adjacent site packets. Set this field to 1 if all adjacent site message data is valid.

#### A

This field displays the “A” bit sent out on the adjacent site packets. Set this field to 1 if the adjacent site has a valid, active RFSS network connection.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A	
01	01	0001	000001	01	0	1	
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR		
0	0	0	60	00	0000		
SRC ID	SRC ADDR	TGT ADDR	TIMER	PHONE NUM			
000000	000000	000000	0000	0000000000			
Secondary Control Channel Broadcast (SCCB)							
SCCB1 Tx	0	0	851.00625	MHz	SVC CLASS	00	
Rx	0	0	806.00625	MHz			
SCCB2 Tx	0	0	851.00625	MHz	SVC CLASS	00	
Rx	0	0	806.00625	MHz			
Adjacent Repeater Site Configuration				Auto Copy			
MFID	RFSS ID	SYS ID	SITE ID	<input type="checkbox"/>	Registration		
00	00	000	00	<input type="checkbox"/>	Affiliation		
LRA	SVC CLASS	C	F	V	A	<input type="checkbox"/>	Voice Req
00	00	0	0	0	0	<input type="checkbox"/>	UU Req
ChanTx	0	0	851.00625	MHz	<input type="checkbox"/>		Dial Req
ChanRx	0	0	851.00625	MHz			
CLOSE    DEFAULTS    HEX <b>EXPLICIT</b> TYPE 1							

## ChanTx

### Adjacent Site Tx Channel ID

This field displays value used for the Channel ID field of the Tx Channel in adjacent site packets. The value selects the channel configuration associated with the channel number to determine the Tx frequency. Values range from 0 to 15.

### Adjacent Site Tx Channel Number

This field displays the Channel Number field of the Tx Channel in adjacent site packets. The value sets the number of channel slots to offset the Channel ID from the selected base frequency to calculate the Tx Frequency. Field values range from 0 to 4095.

### Adjacent Site Tx Frequency

This field displays the Tx Channel frequency of the adjacent site for information purposes only; this frequency is not transmitted. If the channel configuration settings of the adjacent channel is identical to those of the repeater simulator the user can enter a value in this field to set the adjacent site transmit frequency. The closest corresponding control channel number is displayed in the channel number field. Changing this field does not affect the Channel ID setting. If the channel configuration settings for the adjacent site and the repeater simulator are not identical settings the frequency selects an incorrect channel number because the channel computation is based upon the repeater simulator's configuration.

RFSS ID	SITE ID	WGID	WUID	LRA	P	A
01	01	0001	000001	01	0	1
LG	GAV	RV	SVC CLASS	SVC OPT	ANN GRP ADDR	
0	0	0	60	00	0000	
SRC ID	SRC ADDR	TGT ADDR	TIMER	PHONE NUM		
000000	000000	000000	0000	0000000000		
Secondary Control Channel Broadcast (SCCB)						
SCCB1 Tx	0	0	851.00625	MHz	SVC CLASS	00
Rx	0	0	806.00625	MHz		
SCCB2 Tx	0	0	851.00625	MHz	SVC CLASS	00
Rx	0	0	806.00625	MHz		
Adjacent Repeater Site Configuration				Auto Copy		
MFID	RFSS ID	SYS ID	SITE ID	<input checked="" type="checkbox"/>	Registration	
00	00	000	00	<input checked="" type="checkbox"/>	Affiliation	
LRA	SVC CLASS	C	F	V	A	<input checked="" type="checkbox"/> Voice Req
00	00	0	0	0	0	<input checked="" type="checkbox"/> UU Req
ChanTx	0	0	851.00625	MHz	<input checked="" type="checkbox"/> Dial Req	
ChanRx	0	0	851.00625	MHz		
CLOSE	DEFAULTS	HEX	EXPLICIT	TYPE 1		

Tx Frequency  
Tx Channel Number  
Tx Channel ID

## ChanRx

### Adjacent Site Rx Channel ID

This field displays value used for the Channel ID field of the Rx Channel in adjacent site packets. The value selects the channel configuration associated with the channel number to determine the Tx frequency. Field values range from 0 to 15.

### Adjacent Site Rx Channel Number

This field displays the Channel Number field of the Rx Channel in adjacent site packets. The value sets the number of channel slots to offset from the base frequency selected by the Channel ID. The determined frequency is only valid if the adjacent site uses the same configuration settings as the Repeater Simulator. If adjacent site settings differ from Repeater Simulator settings disregard the computed frequency because it is not part of the information transmitted in the adjacent site packet. Field values range from 0 to 4095.

### Adjacent Site Rx Frequency

This field displays the Rx Channel frequency of the adjacent site for information purposes only; this frequency is not transmitted. If the channel configuration settings of the adjacent channel is identical to those of the repeater simulator the user can enter a value in this field to set the adjacent site receive frequency. The closest corresponding control channel number is displayed in the channel number field. Changing this field does not affect the Channel ID setting. If the channel configuration settings for the adjacent site and the repeater simulator are not identical settings the frequency selects an incorrect channel number because the channel computation is based upon the repeater simulator's configuration.

## [CONTROL CHANNEL LOGGER \(2975OPT6\)](#)

The Control Channel Logger option allows users to capture and save over the air P25 control channel messages (OSPs). This provides users with the ability to verify messages generated from P25 RFSS infrastructures as well as verify encryption.

Refer to “Using the 2975 to Perform Control Channel Logging” (Aeroflex Application Note, 46891/917) for details on using the Control Channel Logger.

## FIELD DEFINITIONS

### START / STOP

This toggle button STARTS / STOPS logging of P25 data.

### RAW SYMBOLS

This toggle button ENABLES / DISABLES logging raw symbols. **Raw Symbols** may be simultaneously enabled with any of the control channels.

### OCTETS / MESSAGES

Enabling either of these toggle buttons allows P25 data to be captured and logged. User may simultaneously enable **Octets** and **Messages** for one type of control channel; however this feature does not allow users to simultaneously enable octets and/or message logging for various control channel groups. For example, a user can not simultaneously enable Log Trunked Control Channel OSP **Octets/Message** and Log Conventional P25 LCO **Octets/Message** in any combination.

### FILE NAME

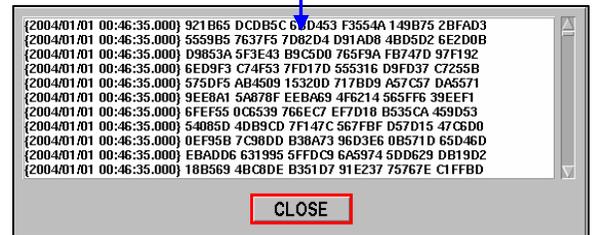
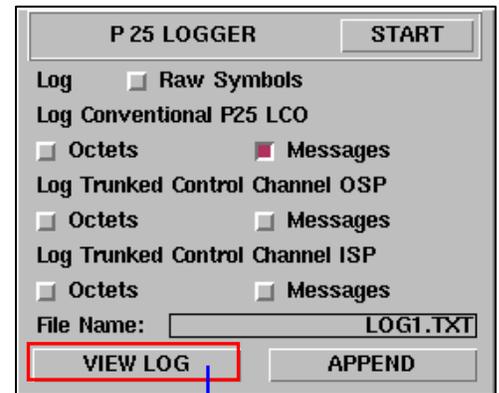
This field displays the file name used to save the P25 data. User may edit this field to specify file name.

### VIEW LOG

Selecting **VIEW LOG** opens a screen which opens the P25 Logging View dialog box. The P25 Logging View dialog box displays the current logged P25 data.

### APPEND / OVERWRITE

This toggle button displays the mode used to save P25 data to the file.



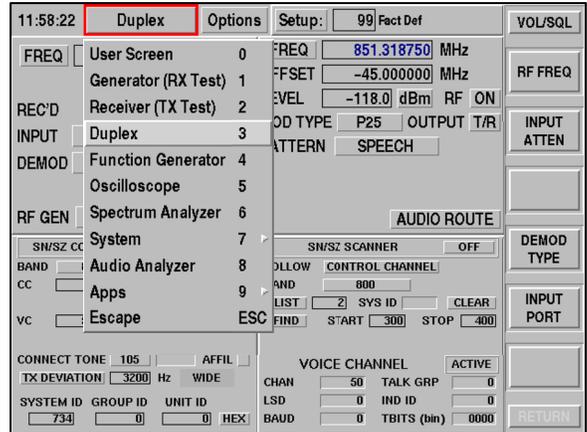
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## SECTION 3 - APPLICATIONS

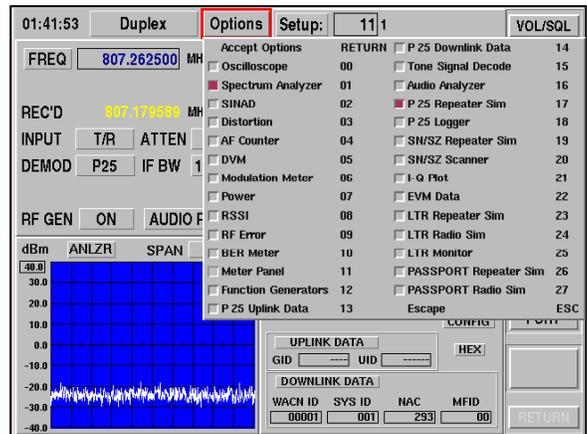
This section shows a few of the many ways to use the 2975 P25 Trunking Option.

### 3-1 P25 TRUNKING OPTION SETUP

To configure or view P25 Trunking tiles the 2975 must be operating in **DUPLEX** Mode [**MODE**] and [**3**] or **USER** screen [**MODE**] and [**0**]. Once P25 functions have been enabled and configured, user may select another mode of operation such as Receiver (Tx Test) and enabled P25 Trunking functions continue to operate.



To enable the Repeater Simulator and Spectrum Analyzer, click the **OPTION** label or press the [**SHIFT**] and [**MODE**] Keys, then select **P25 Repeater Sim** and **Spectrum Analyzer** and the [**RETURN**] Key.



To test a P25 Radio, connect the radio to the 2975 T/R port via a coaxial cable as shown.

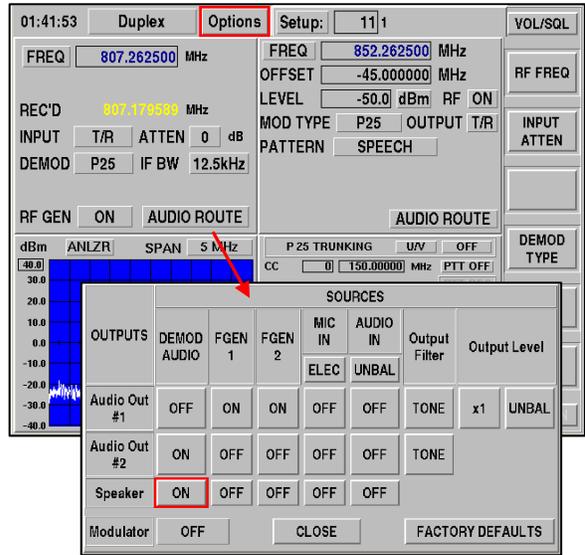


Set the 2975 **Receiver (Tx)** controls as follows:

INPUT	T/R
ATTEN	0 dB
EMOD	P 25

The receiver **FREQ** is controlled by the **P25 CONTROL CHANNEL** simulation and therefore does not need to be set.

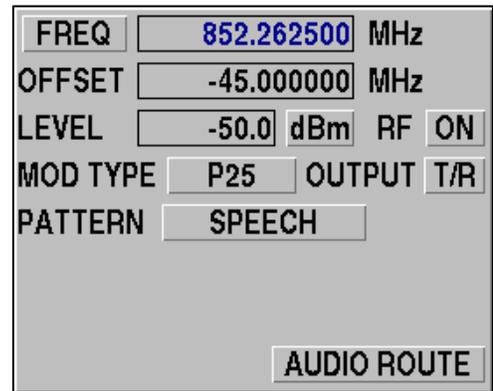
The **AUDIO ROUTE** should be set so that the **DEMOD AUDIO** to **SPEAKER** route is **ON**. This permits listening to the radio transmission (audio) on the 2975 speaker.



Now set the Generator (Rx) controls as follows:

LEVEL	-50 dBm (or as desired)
RF ON/OFF	ON
OUTPUT	T/R
PATTERN	SPEECH

The RF Generator **FREQ** and **OFFSET** is controlled by the **P25 CONTROL CHANNEL** simulation and therefore does not need to be set.

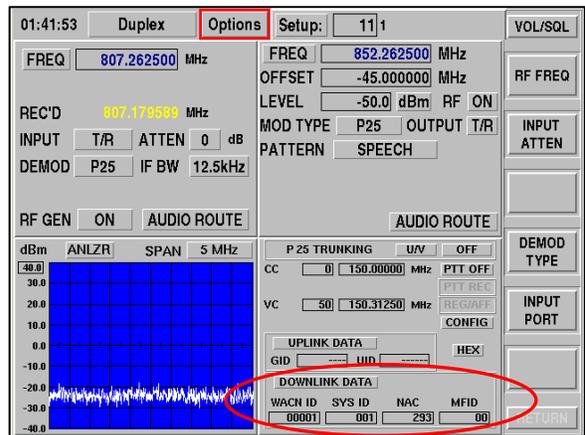


The control channel (CC) and voice (traffic) channel (VC) fields allow entry of valid channel numbers. Enter the desired channel numbers or, if preferred, the channel frequency into these data fields.

Next, configure the following **DOWNLINK DATA** fields:

<b>WACN ID</b>	Set same as the radio.
<b>SYS ID</b>	Set same as the radio.
<b>NAC</b>	Set same as the radio.
<b>MFID</b>	Set to 00 for P25 Trunking mode.

After performing the preceding steps, the 2975 P25 Trunking system is now ready to operate with a mobile radio.



### 3-2 USING P25 TRUNKING CONTROL CHANNEL OPTION

The 2975 is now configured to operate in P25 Trunking mode. To activate and begin P25 Trunking operation, press the **P25 CONTROL CHANNEL ON/OFF** button on the 2975 screen (turn to **ON**) and then power the mobile radio ON.

The mobile radio begins to scan, looking for a control channel. Since the 2975 is transmitting control channel data previously configured in para 3-1, the mobile registers and affiliates with the 2975.

The **REG/AFF** indicator shows mobile activity during the registration and affiliation process. When registration has been successfully completed, the **REG/AFF** changes to **REG REC**, then reverts back to **REG/AFF** after a few seconds.

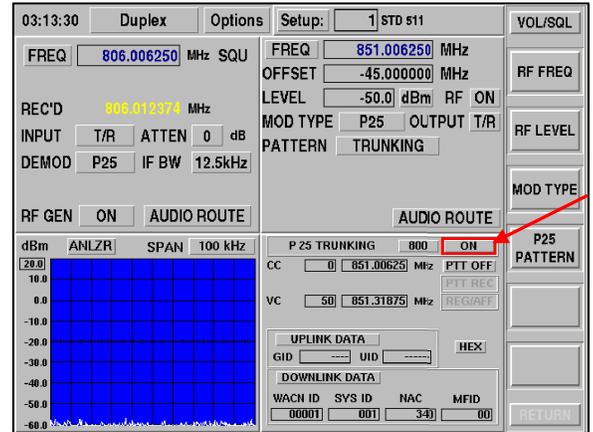
When affiliation has been successfully completed, the **REG/AFF** changes to **AFF REC**, then reverts back to **REG/AFF** after a few seconds.

If either registration or affiliation does not occur after a short period of time (<1 minute), turn the **P25 CONTROL CHANNEL** to **OFF**, power the radio OFF and check the 2975 and radio settings to verify the settings match. After correcting the settings, re-start as before.

After a successful registration and affiliation, either a mobile-originated call or a repeater-originated (user or dispatch-originated) call may be performed.

To perform a mobile-originated call, key the mobile radio and the 2975 automatically assigns the radio to the selected voice channel, and all selected instruments and settings track this voice channel as well.

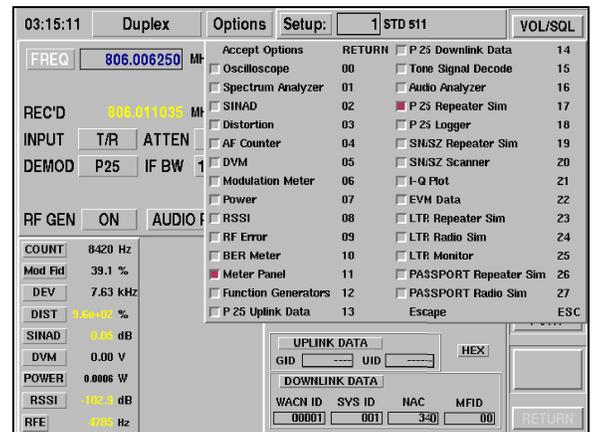
The **PTT REC** indicator switches to **PTT REC** whenever the mobile radio is keyed, then back to **PTT REC** after key release.



Instruments which may be used with P25 trunking option include the **Oscilloscope, Spectrum Analyzer, Meter Panel, Power Meter, Mod Fidelity Meter** and **RSSI Meter**. To enable an instrument, press the **[SHIFT]** and **[MODE]** Keys, then select the instrument(s) desired.

Not all selected instruments may be displayed at once; the limits are two individual Meter tiles, OR, either Oscilloscope or Spectrum Analyzer tile when the **P25 CONTROL CHANNEL** is displayed.

A convenient way to display multiple instruments simultaneously is to select the **Meter Panel** as shown in the example to the right.

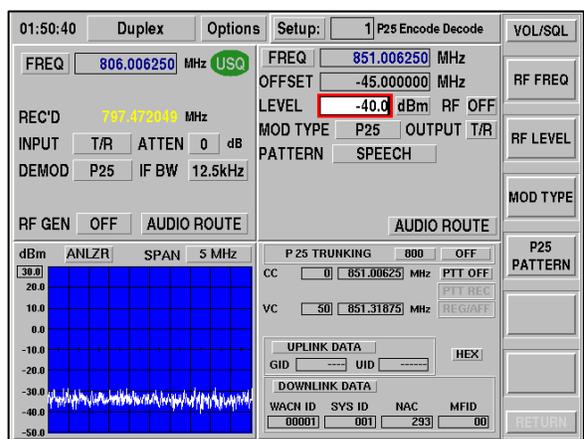
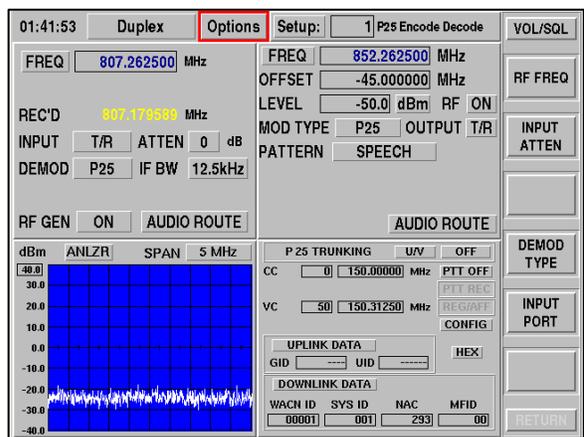


To perform a repeater-originated call, un-key the radio and press the **PTT ON / OFF** button to **PTT ON**. This causes a call request to be sent to the radio. The radio assigned to a voice channel in a “listen” (receive) mode.

A unique sensitivity check called the **SPEECH** mode may be performed. The speech mode is a special feature within the 2975 that sends pre-recorded voice messages so the test operator may listen to the radio's audio quality. This qualitative speech sensitivity check is accomplished by listening to the radio's audio output during a repeater-originated call, and then reducing the 2975 RF generator level until the voice becomes excessively distorted and/or slurred.

The RF level where the voice starts to become distorted is the speech sensitivity level.

If the voice audio stops due to low RF level, increase the RF level approximately 10 dB, and restart the repeater-originated call by pressing the **PTT ON / OFF** button to **PTT OFF** then back to **PTT ON**.



## APPENDIX A - TERMS / ACRONYMS

<b>ACK</b>	Acknowledgement
<b>ADDR</b>	Address
<b>AFF</b>	Affiliation
<b>ALGID</b>	Algorithm Identification (Identifier)
<b>APCO</b>	Association of Public-Safety Communications Officials
<b>BW</b>	Bandwidth
<b>C4FM</b>	Compatible 4-Level FM
<b>CAI</b>	Common Air Interface
<b>CC</b>	Control Channel
<b>CQPSK</b>	Compatible QPSK version of QPSK-c modulation
<b>CRC</b>	Cyclic Redundancy Check
<b>DEC</b>	Decimal
<b>DES</b>	Data Encryption Standard
<b>DUID</b>	Data Unit Identification (Identifier)
<b>EMG</b>	Emergency
<b>FDMA</b>	Frequency Division Multiple Access
<b>FM</b>	Frequency Modulation
<b>GAV</b>	Group Affiliation Value
<b>GID</b>	Group Identification (Identifier)
<b>HEX</b>	Hexadecimal
<b>ID</b>	Identification / Identifier
<b>IMBE</b>	Improved Multi-band Excitation (vocoder)
<b>ISP</b>	Inbound Signaling Packets
<b>LC</b>	Link Control Information
<b>LCO</b>	Logic Control Opcode
<b>LDU</b>	Logical Link Data Units
<b>LG</b>	Logical / Global Affiliation
<b>LRA</b>	Local Registration Area
<b>LSD</b>	Low Speed Data
<b>MFID</b>	Manufacturer Identification (Identifier)
<b>MFID</b>	Manufacturer Identification (Identifier)
<b>MI</b>	Message Identification (Identifier)
<b>NAC</b>	Network Access Code
<b>NID</b>	Network Identification (Identifier)
<b>OSP</b>	Outbound Signaling Packets
<b>OTAR</b>	Over-the-Air Re-keying
<b>P25</b>	Project 25 (APCO-25 Digital Trunking System)

<b>PSTN</b>	Public Switched Telephone Network
<b>PTT</b>	Push-to-Talk
<b>QPSK-c</b>	Quadrature Phase Shift Keying - continuous
<b>REG</b>	Registration
<b>RFSS</b>	Radio Frequency Sub-system
<b>Rx</b>	Receive
<b>SCCB</b>	Secondary Control Channel Broadcast
<b>SF</b>	State Flag
<b>SID</b>	System Identification (Identifier)
<b>SU</b>	Subscriber Unit
<b>SVC</b>	Service
<b>SYS</b>	System
<b>TGID</b>	Talk Group Identification (Identifier)
<b>TIA</b>	Telecommunications Industry Association
<b>Tx</b>	Transmit
<b>UID</b>	Unit Identification (Identifier)
<b>UUT</b>	Unit Under Test
<b>VC</b>	Voice Channel
<b>Vocoder</b>	Voice Encoder / Decoder
<b>WACN</b>	Wide Area Communication Network

## APPENDIX B - AEROFLEX CONTACT INFORMATION

For issues related to **Software or Option Loading:**

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

Telephone: (800) 835-2352 Ext. 449  
FAX: (316) 524-2623  
Email: [techsupport@aeroflex.com](mailto:techsupport@aeroflex.com)

For issues related to **Hardware Problems:**

**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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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.