



COMMUNICATIONS SERVICE MONITORS

2945A, 2945B, 2946A, 2948, 2948B

for EDACS Repeaters



Operating Manual Supplement

Document part no. 46892/300

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19 April 2007

COMMUNICATIONS SERVICE MONITORS

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for EDACS Repeaters

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About this manual

This manual explains how to use the EDACS Repeater option of the Communications Service Monitors 2945A, 2945B, 2948, 2948B and Avionics Communication Service Monitor 2946A.

It applies to service monitors fitted with System software version 4.00 and greater.

Intended audience

People who need to test the performance of EDACS Repeaters. It is assumed that the reader has either a working knowledge of the Service Monitor mentioned above or access to the appropriate Operating Manuals, and is familiar with EDACS telecommunication terms.

Structure

Chapter 1

Introduction, overview and performance data

Chapter 2

Operating instructions for the EDACS Repeater option

Appendix A

Autotest error codes with definitions

Document conventions

The following conventions apply throughout this manual:-

Hard key titles are shown verbatim, using normal lettering in square brackets.	[Tx TEST]
Soft key titles are shown verbatim using italic lettering in italic square brackets.	[Tx freq]
Titles shown on the instrument panel are shown verbatim using capital letters.	RF IN/OUT
Text displayed on screen.	See below [†]

[†] References to text displayed on the screen of the Service Monitor are given verbatim, using a font that resembles the displayed text. e.g. GEN FREQ: , Ref Level: , **Ref Level**: .

Associated publications

Each service monitor is supplied at the time of delivery with the following manuals:

- Operating manual: 46882/311 (2945A), 46882/682 (2945B), 46882/312T (2946A) 46882/341 (2948), 46882/692 (2948B).
- Programming manual: 46882/318 (2945A, 2946A, 2948), 46882/683 (2945B, 2948B).
- Operating manual supplements for all installed systems:

EDACS Repeater (46882/300)
AMPS Supplement (46882/313)
PMR Supplement (46882/315)
MPT1327 Supplement (46882/317)
EDACS Radio Supplement (46882/301)
TACS Supplement (46882/314)
NMT Supplement (46882/316)

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Precautions

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GENERAL INFORMATION

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Introduction

EDACS is a trunked private radio system, used mostly in emergency services and utilities, which uses either 9600 or 4800 bits/second signaling on the control channel, and 150 bits/sec on the working channel, transmitted using FSK data. The EDACS system is proprietary to Ericsson GE. The EDACS system test software, for Service Monitors 2945A, 2945B, 2946A, 2948 and 2948B, is produced by Aeroflex under license from Ericsson GE.

The systems mode of the Service Monitor provides a means of testing radio communication equipment, such as cellular radio telephones and trunked system mobiles and repeaters.

To test a repeater, the Service Monitor simulates signaling transmitted by a radio, which is received by the repeater under test. Signaling transmitted by the repeater is received by the Service Monitor for measurement or analysis.

This manual refers to the use of the Service Monitor to test the performance of repeaters designed to operate on the EDACS system.

The Service Monitor and the repeater are connected using either suitable RF cables for connecting to the antenna sockets of the repeater, or to an aerial for testing off-air. AF connections are made to the audio input and output circuits of the repeater for tests such as signal to noise, modulation distortion etc.

Auto and manual testing

The AUTO mode allows you to run test programs that are resident within the Service Monitor and test the operational performance of the repeater for use on a EDACS system. User-defined programs can be loaded into the Service Monitor and run in the same way. The MANUAL mode offers manual control of the Service Monitor mobile simulation. This is useful for fault finding or adjusting of the repeater under test.

Auto

The AUTO mode provides a built-in test program that may be run on a channel to test the performance of the repeater.

The progress of tests, and the results obtained from them, are displayed on the screen and stored in memory within the Service Monitor for later analysis. Results can be printed on a suitable printer while the test program is running or at the end of the test program. The set-up menus allow many combinations of data presentation, storage, retrieval and printing. The use of the memory cards and remote control facilities extends this further.

Manual testing

Manual testing allows you the means of testing any part of the repeater's operation. The required signaling is generated as for the AUTO mode, but tests are allowed to run manually under your control.

Test programs

The built-in test programs are described as follows:

Quick testing

The QUICK TESTING program performs a series of tests, each of which can be enabled or disabled. These tests require only an RF connection between the Service Monitor and the repeater under test.

General testing

The GENERAL TESTING program performs a series of tests that can include all those available for the QUICK TESTING program, as well as additional tests, each of which can also be enabled or disabled. Most of the tests require an AF connection as well as the RF connection between the Service Monitor and the repeater under test.

User-defined test

The user-defined test program facility allows you to run your own test program. This is written on a PC or other programming equipment using the *MI-BASIC* language, then loaded into the Service Monitor via the GPIB or RS232 interface.

Pause facility

A feature of the AUTO mode is the pause facility. This allows you to select the conditions under which the test program pauses. The options are:

After every individual test in the program;

Following an individual test that fails;

At the end of any test, following a request by you.

When in the paused condition, the current parameters and results are displayed. Conversation is maintained between the Service Monitor and the repeater if applicable.

You can select other operating modes of the Service Monitor in order to carry out detailed analysis of repeaters' performance.

The test program can be resumed at any time.

Data displays

The data that passes between the Service Monitor and the repeater in either direction can be decoded, displayed and examined for content or errors.

Note...

Restricted access.

Access to this facility is protected by password control. Ericsson GE have imposed this restriction, due to the potentially confidential nature of the information that can be decoded

Connections

The connections required between the Service Monitor and the repeater are mentioned in each of the test program descriptions earlier in this chapter. A more detailed explanation of the requirements is given later.

Performance Data

General EDACS system information

Since EDACS systems have no common frequency plan, four user-defined variants are provided. These are configurable, as described in Chapter 2.

FM voice deviation	5.0 kHz
Data type	non return to zero FSK
Data rate	9600 bits per second (wideband), 4800 bits per second (narrowband)
Data deviation	3.0 kHz

System parameter settings

System type	As selected.	Default Repeater 1.
Control channel	1 to 24 (system dependent).	Default 1.
Tx Polarity	AUTO, NORMAL or INVERTED.	Default AUTO.

Radio parameter settings

Testset logical ID	Format xxxx	Default 0001
Radio logical ID	Format xxxx	Default 0001
Group ID	Format xxx	Default 001

Display format settings

Display format	SUMMARY or FULL.	Default SUMMARY.
Pause mode	ALWAYS, MANUAL ONLY or ON FAILURE.	Default MANUAL ONLY.
Print	ON, OFF	Default OFF

Program settings

Test programs	QUICK TESTING GENERAL TESTING USER DEFINED TEST	Default QUICK TESTING
---------------	---	-----------------------

Autorun parameter settings

These are the default parameters for all of the available auto tests for EDACS. These parameters are used by the tests (called from MI-BASIC), or they can be accessed directly by MI-BASIC. The list on the right-hand side of the page shows the equivalent MI-BASIC commands for the parameters. If you modify these parameters, these defaults can be restored by using the appropriate command in the HELP/SETUP menu.

Note that deviations returned in automatic tests are **peak** measurements only. Manual measurements can return peak or RMS results.

Call from radio		TEST RADIOCALL	
RF generator level	-30 dBm	RFGENLEVEL	<expr> [<units>]
Timeout	30s	TIMEOUT	<expr> [<units>]
Use accessory port	ON	USEACCPORT	{ON/OFF}
Set accessory port logic	1	ACCPORT	{LOGIC0/1/2/3}
Clear from radio		TEST RADIOCLEAR	
RF generator level	-30 dBm	RFGENLEVEL	<expr> [<units>]
Timeout	30s	TIMEOUT	<expr> [<units>]
Use accessory port	ON	USEACCPORT	{ON/OFF}
Set accessory port logic	2	ACCPORT	{LOGIC0/1/2/3}
Call from Testset		TEST TESTSETCALL	
RF generator level	-30 dBm	RFGENLEVEL	<expr> [<units>]
Timeout	5s	TIMEOUT	<expr> [<units>]
Use accessory port	ON	USEACCPORT	{ON/OFF}
Set accessory port logic	3	ACCPORT	{LOGIC0/1/2/3}
Call type	INDIVIDUAL	CALLTYPE	{INDIVIDUAL/GROUP/ EMERGENCY/ROTATE}
Clear from Testset		TEST TESTSETCLEAR	
RF generator level	-30 dBm	RFGENLEVEL	<expr> [<units>]
Timeout	5s	TIMEOUT	<expr> [<units>]
Use accessory port	ON	USEACCPORT	{ON/OFF}
Set accessory port logic	3	ACCPORT	{LOGIC0/1/2/3}
HS data deviation		TEST HSDEVN	
Status	ON	STATUS	{ON/OFF}
Reference	3.0 kHz	REF	<expr> [<units>]
Error tolerance	10%	ERROR	<expr> [<units>]
Data performance		TEST DATAPERFORM	
Status	ON	STATUS	{ON/OFF}
RF Gen Level	-113 dBm	RFGENLEVEL	<expr> [<units>]
Lower Limit	95%	LOWER	<expr> [<units>]
LS data deviation		TEST LSDEVN	
Status	ON	STATUS	{ON/OFF}
Reference	750 Hz	REF	<expr> [<units>]
Error tolerance	10%	ERROR	<expr> [<units>]

EDACS REPEATERS

RF SINAD		TEST RFSINAD	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/ LP300HZ/STDBP/ CCITT/CMESS}
Lower limit	20 dB	LOWER	<expr> [<units>]
RF distortion		TEST RFDISTN	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/ LP300HZ/STDBP/ CCITT/CMESS}
Upper limit	10%	UPPER	<expr> [<units>]
RF S/N		TEST RFSN	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/ LP300HZ/STDBP/ CCITT/CMESS}
Lower limit	30 dB	LOWER	<expr> [<units>]
Transmitter RF power		TEST TXLEVEL	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Upper limit	50W	UPPER	<expr> [<units>]
Lower limit	5W	LOWER	<expr> [<units>]
Tx frequency		TEST TXFREQ	
Status	ON	STATUS	{ON/OFF}
Error tolerance	5ppm	ERROR	<expr> [<units>]
Tx SINAD		TEST TXSINAD	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/ LP300HZ/STDBP/ CCITT/CMESS}
Lower limit	20 dB	LOWER	<expr> [<units>]
Tx Distortion		TEST TXSINAD	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/ LP300HZ/STDBP/ CCITT/CMESS}
Upper limit	10%	UPPER	<expr> [<units>]

(continued./...)

Automatic test parameters (continued)

Tx S/N		TEST TXSN	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Lower limit	30 dB	LOWER	<expr> [<units>]
Tx noise		TEST TXNOISE	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Tx Filter	300 Hz LP	TXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Upper limit	300 Hz	UPPER	<expr> [<units>]
Tx limiting		TEST TXLIMIT	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	15 kHz LP	TXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Overload factor	20 dB	OVERLOAD	<expr> [<units>]
Upper limit	2.5 kHz	UPPER	<expr> [<units>]
Tx compression (not normally used in EDACS)		TEST TXCOMPRESS	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Tx filter	0.3-3.4 kHz BP	TXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Reference	2	REF	<expr>
Error tolerance	10%	ERROR	<expr> [<units>]
Rx SINAD		TEST RXSINAD	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
RF level	-80 dBm	RFGENLEVEL	<expr> [<units>]
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Rx filter	0.3-3.4 kHz BP	RXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Lower limit	20 dB	LOWER	<expr> [<units>]
Rx distortion		TEST RXDISTN	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
RF level	-80 dBm	RFGENLEVEL	<expr> [<units>]
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Rx filter	0.3-3.4 kHz BP	RXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMES}
Upper limit	10%	UPPER	<expr> [<units>]

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Rx S/N		TEST RXSN	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
RF level	-80 dBm	RFGENLEVEL	<expr> [<units>]
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Rx filter	0.3-3.4 kHz	RXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMESS}
Lower limit	BP	LOWER	<expr> [<units>]
35 dB			
Rx sensitivity		TEST RXSENS	
Status	ON	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Rx filter	CMESS	RXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMESS}
RF upper limit	-113 dBm	UPPER	<expr> [<units>]
Reference SINAD	20 dB	REFSINAD	<expr>
Rx expansion (not normally used in EDACS)		TEST RXEXPAND	
Status	OFF	STATUS	{ON/OFF}
Averages	5	AVERAGES	<expr>
Modulation level	1.5 kHz	MODLEVEL	<expr> [<units>]
Rx filter	0.3-3.4 kHz	RXFILTER	{NONE/LP15KHZ/LP300HZ/ STDBP/CCITT/CMESS}
Reference	2	REF	<expr>
Error tolerance	10%	ERROR	<expr> [<units>]

MI-BASIC programs

This section defines what tests are to be run in the built-in test programs.

Quick Testing

```
if enabled TEST HSDEVN
if enabled TEST DATAPERFORM
TEST TESTSETCALL
if enabled TEST LSDEVN
if enabled TEST RFSINAD
if enabled TEST RFDISTN
if enabled TEST RFSN
if enabled TEST TXFREQ
if enabled TEST TXLEVEL
TEST TESTSETCLEAR
```

General Testing

```
TEST RADIOCALL
TEST RADIOCLEAR
if enabled TEST HSDEVN
If enabled TEST DATAPERFORM
TEST TESTSETCALL
if enabled TEST LSDEVN
if enabled TEST RFSINAD
if enabled TEST RFDISTN
if enabled TEST RFSN
if enabled TEST TXFREQ
if enabled TEST TXLEVEL
if enabled TEST TXSINAD
if enabled TEST TXDISTN
if enabled TEST TXSN
if enabled TEST TXNOISE
if enabled TEST TXLIMIT
if enabled TEST TXCOMPRESS
if enabled TEST RXSINAD
if enabled TEST RXDISTN
if enabled TEST RXSN
if enabled TEST RXSENS
if enabled TEST RXEXPAND
TEST TESTSETCLEAR
```

User-defined test

The user-defined test program facility allows you to run your own test program. This is written on a PC or other programming equipment using the *MI-BASIC* language, then loaded into the Service Monitor.

Chapter 2

OPERATION

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Introduction

This chapter deals with using the Service Monitor for testing repeaters operating on the EDACS trunking system. It is assumed that you are familiar with the operation of the Service Monitor in its various modes and that it has been prepared for use as described in the main operating manual supplied with it.

If you are unfamiliar with using the Service Monitor for EDACS system testing, it is suggested that a short time is spent exploring the various menus and displays before connecting to a repeater.

The operating details that you require when using the Service Monitor for EDACS System Repeater testing fall into two areas:

- Customization, where you prepare the Service Monitor before making tests. The *[SYSTEM]* and *[SET-UP]* keys, give access to the screens and menus required for this.
- Testing, where, with the Service Monitor customized to the requirements of the particular unit to be tested, it is connected to the Service Monitor, and automatic or manual tests are carried out. The *[PROGRAM]*, *[AUTO]*, *MANUAL* and *[DATA]* keys give access to the screens and menus required for this.

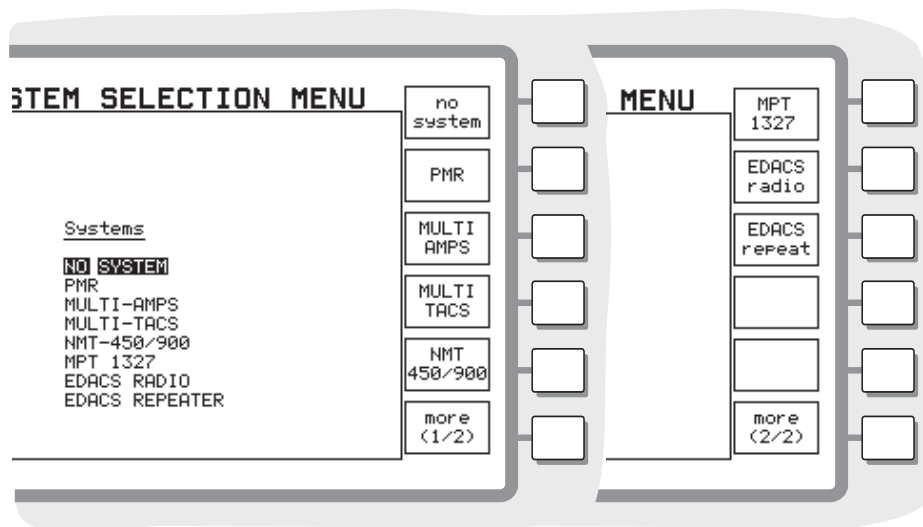
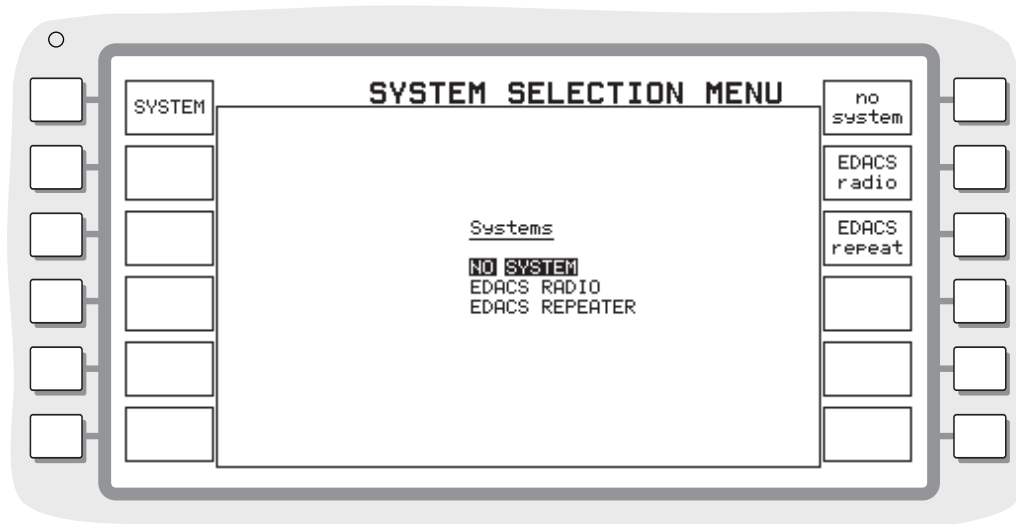
The set-up menus of the SYSTEMS mode give you control of the parameters of the test system. Once set to your requirements, the instrument retains the settings for both immediate and future use.

SYSTEMS mode selection

The EDACS system is one of the system options available with the Service Monitor. The *[SYSTEM]* key displays the menu of systems currently installed on the instrument. If more than five system options are installed, a second page of selection keys is provided. The bottom right key is designated *[more]*, which toggles between the pages. See Fig. 2-1, on page 2-3, *System selection menus*.

Note

The *[SYSTEM]* key on the Avionics Communication Service Monitor 2946A gives access to the Avionics Systems test facility as well as to the Cellular and Trunked radio communications system test facility. If a Cellular or Trunked system *is not* selected currently, pressing the *[SYSTEM]* key displays the untitled screen shown in Fig. 2-2 on page 2-3. Pressing the *[cell]* key displays the SYSTEM SELECTION MENU. If a Cellular or Trunked system *is* selected currently, pressing the *[SYSTEM]* key displays the SYSTEM SELECTION MENU directly.



B3349

Fig. 2-1 System selection menus



B3039

Fig. 2-2 Avionics/Cellular or Trunked system selection screen

Selecting the EDACS Repeater system

The SYSTEM SELECTION MENU lists all of the test systems that are installed in the instrument and designates one soft key to each. To select the EDACS repeater system, press the *[EDACS repeat]* key. Variants of the system are selected from the System Parameters menu, using the *[SYSTEM]*, *[EDACS repeat]*, *[SET-UP]* sequence.

With the EDACS *repeater* system selected, the six soft keys at the left of the screen are given to explicit functions or user operations. The six keys and the function of each is shown below:

<i>[SYSTEM]</i>	System selection menu
<i>[SET-UP]</i>	System set-up menus
<i>[PROGRAM]</i>	Test program menu
<i>[AUTO]</i>	AUTORUN test mode
<i>[MANUAL]</i>	Manual test mode
<i>[DATA]</i>	Data display screens

A description of the use of each menu or screen follows. The headings reflect the menu structure to assist in locating a particular key or function.

Customizing the EDACS Repeater system

Before you use the Service Monitor for automatic or manual testing, you may need to customize the system by changing some of the default test parameters. You can do this via the *[SYSTEM]*, *[SET-UP]*, and *[PROGRAM]* keys, as explained in this section.

[SYSTEM]

The *[SYSTEM]* key brings up the SYSTEM SELECTION MENU, allowing access to all of the test systems that are installed in the Service Monitor and an option *[no system]* to disable the selected system prior to leaving the Systems mode. The *[more]* key toggles between the two displays of system type keys.

[SET-UP]

The *[SET-UP]* key allows access to all of the set-up menus for the EDACS repeater system. There are four menus that allows access to the parameters of the system, each dealing with a different aspect of the system. These are:

SYSTEM PARAMETERS
RADIO PARAMETERS
AUTORUN CONTROL
AUTORUN PARAMETERS

Pressing *[SET-UP]* repeatedly, toggles through all four menus.

The four menus are:

<i>SYSTEM PARAMETERS</i>	Allows adjustments to control channel number, polarity etc.
<i>RADIO PARAMETERS</i>	Allows you to change or enter the logical and group identity numbers used by the Service Monitor, and the logical identity of any radio used with the Service Monitor.
<i>AUTORUN CONTROL</i>	Allows you to select the format of the test results displayed, the conditions that cause the test program to halt for user attention and to switch the print mode on or off.
<i>AUTORUN PARAMETERS</i>	Allows you to edit the parameters of each of the tests available in the test programs.

A detailed explanation of each menu and the parameters in it follows.

System parameters

When you select the SYSTEM PARAMETERS menu the EDACS Repeater system parameters are displayed and one of the soft keys on the right of the screen is dedicated to each parameter - see Fig. 2-3 *System parameters menu*.

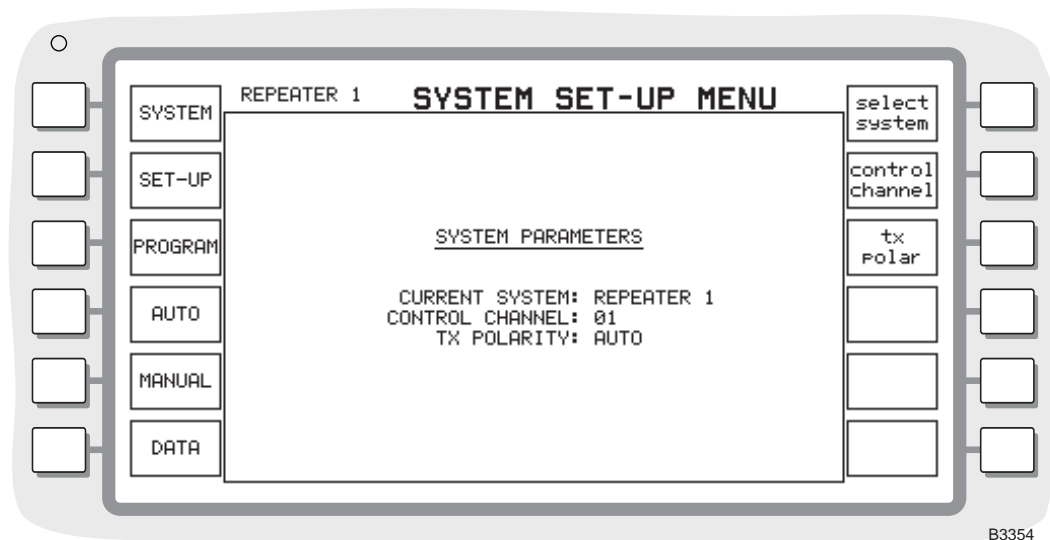


Fig. 2-3 *System parameters menu*

Changing system parameters

To change a system parameter, first press the soft key appropriate to the parameter to be changed. The selected parameter is highlighted on the listing. For example, pressing [*select system*] displays **CURRENT SYSTEM**, and pressing [*control channel*] displays **CONTROL CHANNEL**. There are then two methods for changing the parameter.

- For the SYSTEM TYPE and Tx POLARITY parameter, soft keys are shown for each system type or polarity option. Press the appropriate soft key.
- If the system type is being changed, the selected type name is shown against the CURRENT SYSTEM listing and also at the left of the screen heading. The soft keys revert to system parameter keys.
- If the polarity setting is being changed, the new selection is shown against the Tx POLARITY listing and the soft keys revert to system parameter keys.
- If the control channel setting is being changed, enter the required value using the data input keys and then press the [ENTER] data key or the [*control channel*] key.

The system parameters that you can modify are described below. Default values are shown in Chapter 1, General Information, under the heading *System parameter settings*.

SYSTEM TYPE

There are four different system settings which can be selected from within the SYSTEMS PARAMETERS menu. The operating channels/frequencies, the channel frequency spacing and the duplex offset between transmit and receive channels of each system are allocated by the appropriate authority.

The provision of four EDACS system settings, with an edit facility, allows access to these parameters. Once set up, each system setting remains available for future use. The RF channels and frequencies used for testing are defined within spot channels.

The required EDACS system is selected from the soft key list, which is displayed after pressing the *[select system]* key in the SYSTEM PARAMETERS menu. One of four user configurable variants can be selected by pressing the appropriate soft key. Selecting a system type causes the soft key list to return to the top level SYSTEM PARAMETERS menu keys. To return to the top level SYSTEM PARAMETERS menu keys without selecting a different system type, press the key for the *current system type*.

You can set up parameters for the currently selected variant. The *[edit current]* key allows access to the EDIT CURRENT menu, from where the parameters of the system are entered.

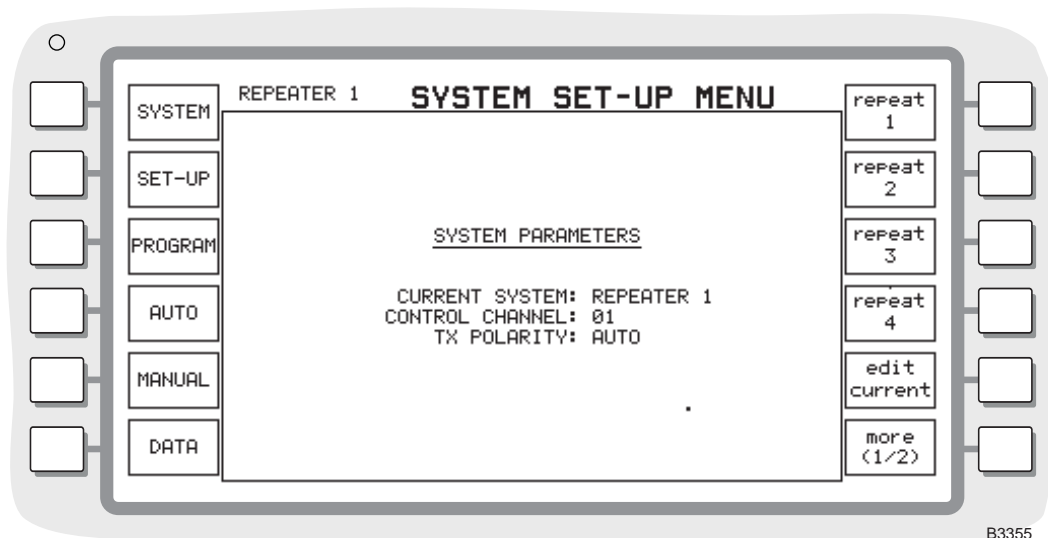


Fig. 2-4 Variant selection menu

You can set up parameters for the currently selected variant. The *[edit current]* key allows access to the 'EDIT CURRENT' menu, from where the parameters of the system are entered. See Fig. 2-5 *Edit current system type menu*.

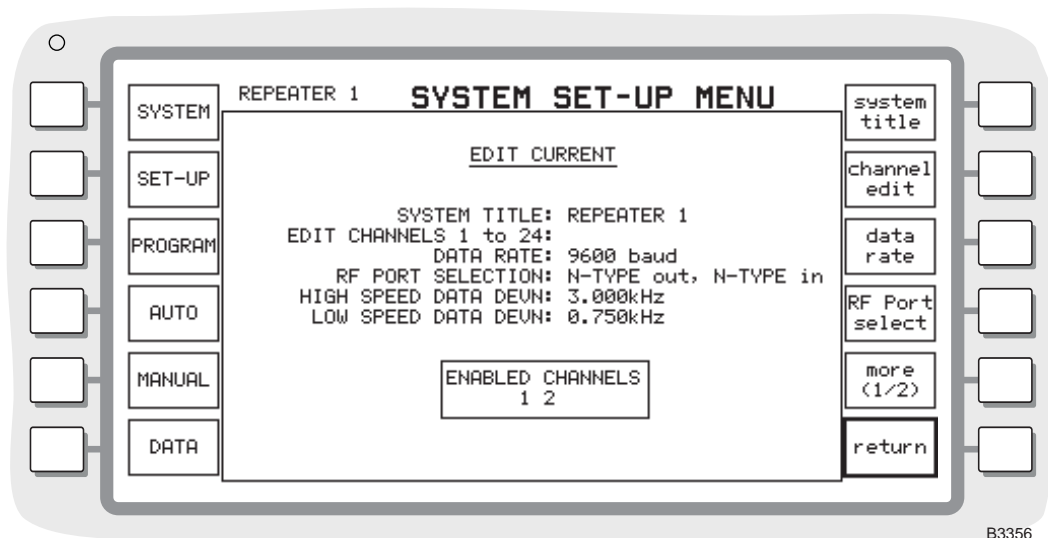


Fig. 2-5 Edit current system type menu

Copying system information

(from EDACS Radio system variant)

Pressing the *[more]* key gives access to further selections, enabling you to copy system information from an EDACS Radio variant. See Fig 2--6 *Copy system set-up menu*.

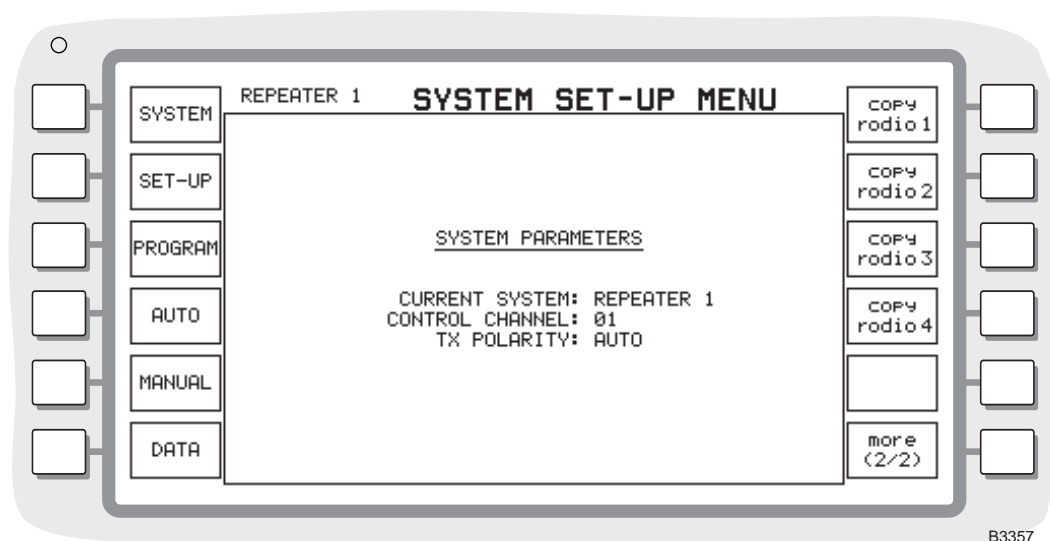


Fig. 2-6 Copy system set-up menu

If the EDACS Radio option is also installed in the Service Monitor, and you have entered system information into it, this can be copied to the EDACS Repeater option by pressing the soft key associated with that variant.

For example with the EDACS Repeater option active:

Pressing *[copy radio 1]* copies the frequency plan and information from the EDACS Radio 1 variant, EDIT CURRENT menu into the EDACS Repeater 1 variant, EDIT CURRENT menu

Note...

This causes information from the Radio variant to overwrite all the current SYSTEM information. **It cannot be retrieved.**

CONTROL CHANNEL

Before any testing can be carried out on a EDACS repeater the CONTROL CHANNEL in the SYSTEM PARAMETERS menu must be set to a value that the repeater is using. The required channel number is entered using the data keys.

TX POLARITY

The FSK modulation type used for EDACS signaling can have NORMAL or INVERTED polarity. You can select the polarity required to suit the equipment being tested.

The Service Monitor also has an AUTO polarity setting. This sets the polarity according to the data rate set from the EDIT CURRENT menu and on the direction of data transmission. The following table shows this.

Data rate	Radio Tx	Repeater Tx
9600 Baud	INVERTED	INVERTED
4800 Baud	INVERTED	NORMAL

POLARITY

The transmitted FSK modulation has the property of polarity, which you can select to be NORMAL or INVERTED

Radio parameters

The RADIO PARAMETERS menu, shown in Fig. 2-7, enables you to change the numbers within the Service Monitor for TESTSET LOGICAL IDENTITY, RADIO LOGICAL IDENTITY and GROUP IDENTITY.

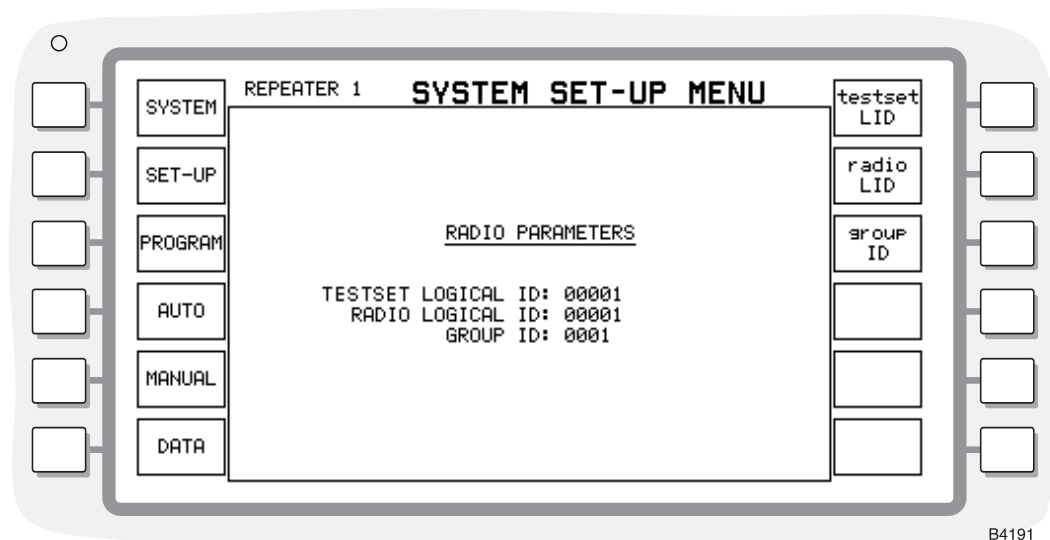


Fig. 2-7 Radio parameters menu

TESTSET LOGICAL IDENTITY

The Testset logical identity number is a unique number used by the Service Monitor. It is transmitted from the Service Monitor during signaling procedures. The Testset logical identity parameter allows you to change the number.

The logical identity consists of a decimal number between 0 and 16383.

RADIO LOGICAL IDENTITY

The radio logical identity number is the logical identity of a radio to be used in conjunction with the Service Monitor. It is transmitted from the Service Monitor during signaling procedures. The radio logical identity parameter allows you to change the number. Note that if the Service Monitor 'sees' a radio make a call to the group identity specified in the GROUP IDENTITY field, the radio's logical identity is set into this parameter.

The logical identity consists of a decimal number between 0 and 16383.

GROUP IDENTITY

The group identity number is a number allocated to a group of radios. The group number is used in a similar manner to the radio identity. It is used to call all the radios having the same number.

The Service Monitor responds to calls made to this group and places calls to this group.

The group identity consists of a decimal number between 0 and 2047.

Autorun control

The AUTORUN CONTROL menu, shown in Fig. 2-8 on page 2-9, allows you to select how the Autorun program responds to the results of tests. The soft keys on the right each give access to a further level of soft keys. This allows you to select options as to the running and results presentation of the autorun test programs.

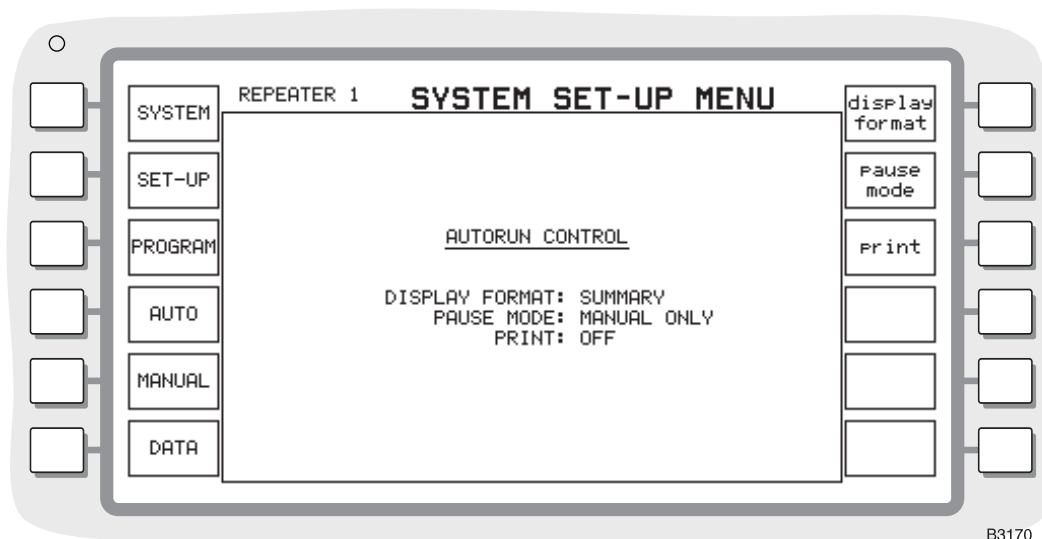


Fig. 2-8 Autorun control menu

DISPLAY FORMAT

This gives you control over the data displayed on completion of each test in the program. With FULL selected, the results of each test are printed in detail, with the results of each measured parameter listed. With SUMMARY selected, one line is displayed or printed for each test, containing the test title, then PASS or *FAIL* with a brief summary of the test.

PAUSE MODE

You can select the criteria that cause the test program to pause and wait for intervention.

Three options are available, displayed on a soft key menu after pressing the *[pause mode]* key. They are:

[manual only]. The AUTORUN program runs through all tests. If the *[pause]* key is pressed during a test the program pauses at the end of the current test.

[on failure]. The AUTORUN program pauses at the end of any test that fails.

[always] The AUTORUN program pauses at the end of every test.

Once the program has paused there are two available options. The program can be continued by pressing the *[cont]* key, or the operation of the repeater can be examined by selecting one of the other modes of the Service Monitor. The repeater remains active if the [DUPLEX] or [RX] modes are selected and all the settings of the basic instrument modes relate to the ongoing system test. By this means, the current state of the repeater can be examined for fault diagnosis or adjustment.

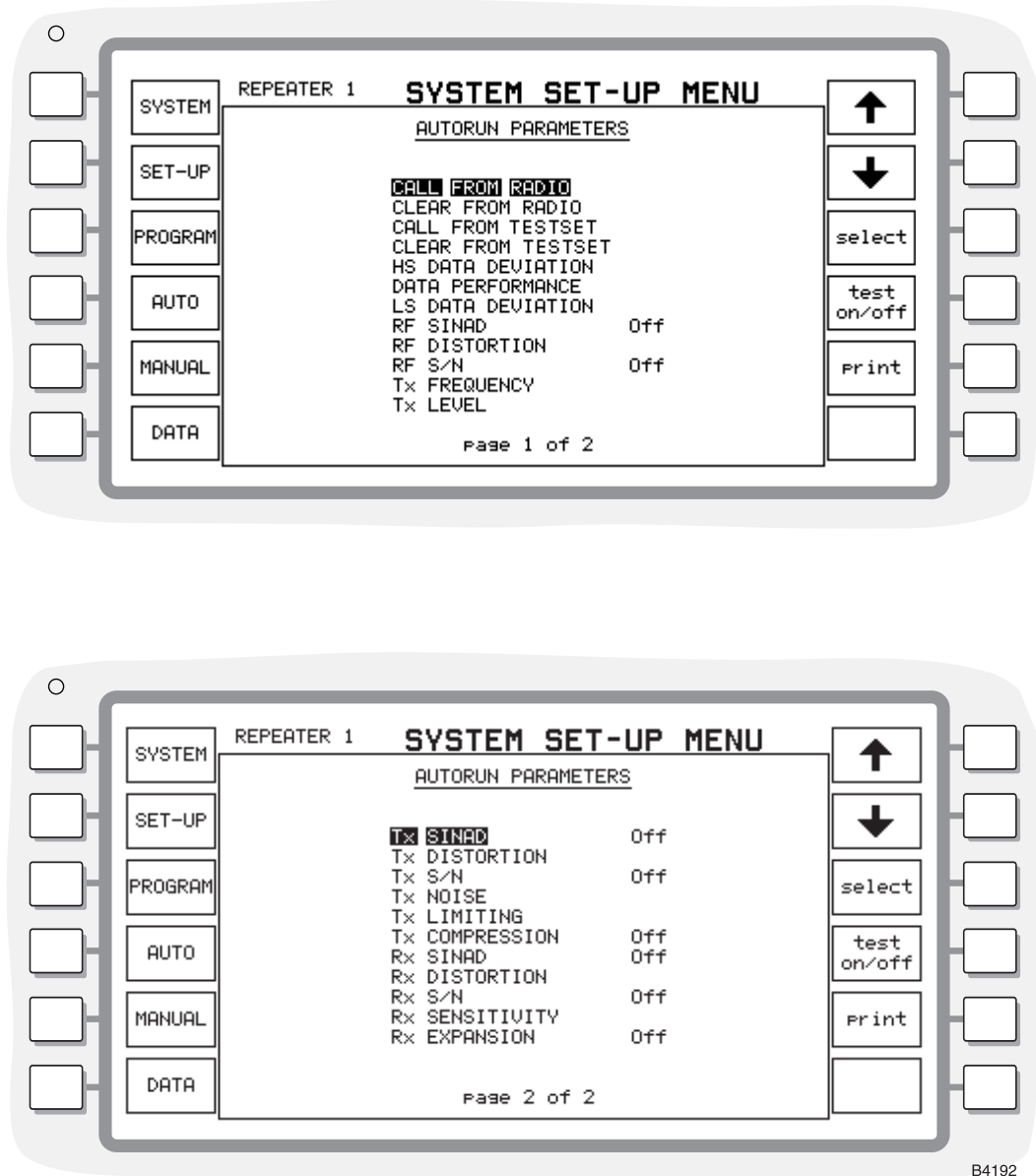
You can return to the test program at any time, by pressing the [SYSTEMS] key. The AUTORUN screen is displayed and pressing the *[cont]* key continues the program from the point where it paused.

PRINT

The *[print]* key gives access to *[on]* and *[off]* keys. When ON is selected, if a suitable printer is connected, the AUTORUN results are printed at the same time as they appear on the results screen.

Autorun parameters

The AUTORUN PARAMETERS menu, shown in Fig. 2-9, allows you access to the parameters of each of the tests that are available within the EDACS Repeater system. The default parameters for each test are listed in Chapter 1, General Information.



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Fig. 2-9 Autorun parameters menu

SYSTEM TYPE

There are a number of different system types (or Variants) that can be selected from within the SYSTEMS PARAMETERS menu. The operating channels of each system are allocated by the appropriate authority.

The provision of four EDACS system types, with an edit facility, allows access to these parameters. Once set up, each system type remains available for future use.

EDIT CURRENT

General

The system parameters for the selected variant are set up from this screen. The new values or selections are not effective until the *[return]* key is pressed to return to the SYSTEM PARAMETERS menu.

SYSTEM TITLE

This allows you to enter a title of up to ten characters. After a title has been entered as the SYSTEM TITLE and the system type re-selected, it is shown on the SYSTEM PARAMETERS menu and also at the top left of the main title area. The system type keys display the first seven characters of the new title. For example with a title changed to SUPER the soft key would be labeled *[SUPER]*, if it were changed to SUPEREDACS the soft key would be labeled *[SUPERED]*

When the *[SYSTEM TITLE]* key is pressed, a list of characters that can be used in the title is displayed at the bottom of the screen. A cursor, controlled by the variable rotary control, is used to select characters for the title. The right-hand soft keys are configured to control the entry of the title.

To clear the current SYSTEM TYPE title entry from the display either:

- Press the *[delete char]* key
- Press the [DELETE] key on the front panel
- Enter the first character of the new title

The first character of the title is selected from the character list by placing the cursor over it, then pressing the *[enter char]* key. Pressing the data entry keys, including the decimal point and minus sign, enters their character as the next in the title.

To delete the latest character placed in the title either:

- Press the *[delete char]* key
- Press the [DELETE] key on the front panel

Pressing the *[title complet]* key, enters the title as the CURRENT SYSTEM title. When the *[return]* key is next pressed, this becomes the system title, as described above.

Pressing the *[return]* key while the titling character list is displayed (i.e. before the *[title complet]* key has been pressed), aborts the title entry and displays the EDIT CURRENT screen.

EDIT CHANNELS

The allocation of frequencies to service providers for EDACS is not necessarily in continuous frequency bands. To make maximum use of allocated frequencies, some frequency plans for a system may be complex. To allow testing of repeaters programmed with such frequency plans, the Service Monitor has 24 channels each of which have a Tx frequency, and an Rx frequency offset associated with them.

Pressing the *[channel edit]* key gives access to a soft key list of possible channels. Any channel from 1 to 24 can be edited by pressing the *[more]* key until the soft key associated with that channel is displayed, then pressing that soft key, which displays the editchannel screen.

For example:

From the EDIT CURRENT menu, to edit channel 12, press *[channel edit]*, *[more]*, *[more]*, *[channel 12]*.

INCLUDING/EXCLUDING

Each channel can be INCLUDED or EXCLUDED in the current EDACS repeater frequency plan, from the edit channel screen. The *[include/exclude]* key toggles the channel between INCLUDED and EXCLUDED.

Tx FREQUENCY

Pressing the *[tx freq]* key highlights **TX FREQUENCY**, and allows the repeater transmitted frequency for this channel to be entered using the data entry keys.

DUPLEX OFFSET

Pressing the *[duplex offset]* key highlights **DUPLEX OFFSET**, and allows the duplex offset RF frequency for this channel to be entered using the data entry keys. A positive value places the transmitter frequency of the Radio higher than that of the Repeater, a negative value places the transmitter frequency of the Radio lower than that of the Repeater.

DATA RATE

The EDACS system specification allows for 9600 and 4800 baud, high speed signaling data, with 9600 being the default setting. Pressing the *[data rate]* key toggles between 9600 and 4800 baud.

RF PORT SELECTION

The RF ports of the Service Monitor can be configured to suit the requirements of the test procedures. This depends on whether measurements are being made 'OFF AIR' or by direct connection to the repeater.

Pressing the *[RF Port select]* key gives access to the RF port selection soft key list. The possible selections are:

- N out - N in
- N out - ANT in
- BNC out - ANT in
- BNC out - N in

Typical settings for direct testing are N out - N in. For off-air testing, BNC out - ANT in, with an antenna attached to each port.

CAUTION

Do not use the ANTENNA input for direct connection when in SYSTEM mode.

With SYSTEM mode selected, setting the ANTENNA port as the RF input port, causes the input sensitivity to switch to the most sensitive range and disables the automatic gain control.

HIGH SPEED DATA DEVIATION

The EDACS system specification high speed mean deviation level is 3.0 kHz. and is the default value for the EDIT CURRENT facility. A different value can be entered by you if required.

LOW SPEED DATA DEVIATION

The EDACS system specification low speed mean deviation level is 750 Hz. and is the default value for EDIT CURRENT facility. A different value can be entered by you if required.

Test details

A description of each test explains the system function that is being tested and describes the signaling between the Service Monitor and the repeater under test. The failure messages associated with each test are explained.

Description of tests

Call From Radio

The Service Monitor is called from another radio, repeater or dispatcher. This accepts individual, emergency or group call types.

Upon initialization, the test title is displayed.

The Service Monitor is tuned to the correct RF frequencies. The message ACTIVE **** PRESS PTT **** is displayed.

If the USE ACCESSORY PORT parameter is set to ON, the accessory port is set at this point in the test. Note that the accessory port is not cleared at the end of this test.

The Service Monitor waits to receive a call assignment frame from the repeater. If the correct frame is not received within the time specified in the TIMEOUT parameter, then the message *FAIL* NO RESPONSE is displayed and the test exits.

When all of the required address information has been received, the Service Monitor retunes to the working channel obtained from the call assignment message.

The number which the unit has been called by is displayed in the form of a logical identity.

Other messages are:

PASSED WORKING CHANNEL

Other failure messages are:

FAIL CHANNEL ASSIGNMENT	No working channel signaling detected.
FAIL NOT ON CONTROL CHANNEL	Repeater is not on control channel (i.e. still in conversation).
FAIL ABORTED BY USER	User halted program before test was complete.

Clear from Radio

The Service Monitor is cleared down by another radio or the dispatcher.

Upon initialization, the test title is displayed and the Service Monitor checks that it is in conversation. Otherwise, the message *FAIL* NOT ON WORKING CHANNEL is displayed.

The flashing message ACTIVE **** RELEASE PTT **** is displayed and the Service Monitor waits to receive a disconnect from the repeater.

If the USE ACCESSORY PORT parameter is set to ON, the accessory port is cleared at this point in the test.

If nothing is received within the time specified in the TIMEOUT parameter, the message *FAIL* NO RESPONSE is displayed and the test is terminated.

The Service Monitor is then re-tuned to the correct control channel.

The message 'PASSED CLEARED DOWN' is displayed.

Other failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
------------------------	---

Call from Testset

This test routine is used to simulate the placement of a call from the Service Monitor to the repeater under test using the identity in the MOBILE PARAMETERS MENU.

Upon initialization, the Service Monitor must be on the control channel.

If the USE ACCESSORY PORT parameter is set to ON, the accessory port is set at this point in the test. Note that the accessory port is not cleared at the end of this test.

If any of the responses are incorrect, then the message *FAIL* UNEXPECTED MESSAGE is displayed. Other messages are:

FAIL NOT ON CONTROL CHANNEL	Repeater is not on control channel (i.e. still in conversation).
FAIL ABORTED BY USER	User halted program before test was complete.
FAIL CHANNEL ASSIGNMENT	No working channel signaling detected.
PASSED WORKING CHANNEL	

Clear From Testset

The Service Monitor clears down from the current working channel and returns to the previous control channel.

If the USE ACCESSORY PORT parameter is set to ON, the accessory port is cleared at this point in the test.

Other messages are:

FAIL NOT ON WORKING CHANNEL	The previous call placement failed.
FAIL ABORTED BY USER	User halted program before test was complete.
PASSED CLEARED DOWN	

HS data deviation

The HS data deviation test measures the frequency deviation of the control channel signal from the repeater. This high speed data signal is transmitted continuously.

The only failure message for this test is:

FAIL ABORTED BY USER	User halted test before completion.
------------------------	-------------------------------------

Data performance

The data performance test checks the accuracy of the repeater's data reception under low signal conditions.

The test sequence is as follows. Upon initialization, the test title is displayed and the Service Monitor checks the control channel. If not on the control channel, the error message *FAIL* NO CONTROL CHANNEL is displayed.

The Service Monitor sets the RF generator level, sends a login request to the repeater and waits for an acknowledge message. If no response is received after this has been repeated ten times, the test is aborted and the message *FAIL* NO RESPONSE is displayed. Otherwise the test is repeated another 90 times.

If, after 100 tests, the percentage pass is above the specified limit, the message PASSED is displayed, together with the % bit error rate. The message *FAIL* xx% means that the percentage pass is below the specified limit.

Another possible failure message is:

FAIL ABORTED BY USER	User halted program before test was complete.
------------------------	---

LS Data Deviation

The working channel signal from the repeater contains a low speed, sub-audible data component, which is sent continuously. The LS data deviation test measures the frequency deviation of this component.

The only failure message for this test is:

FAIL ABORTED BY USER	User halted test before completion.
------------------------	-------------------------------------

RF SINAD

RF Path SINAD.

As the EDACS repeater re-transmits the signal from the transmitting radio, a SINAD measurement can be obtained from the RF path.

The RF path SINAD test is used to measure the SINAD level of the signal received and re-transmitted by the repeater.

The test fails if the measured SINAD level is below the prescribed level.

The Service Monitor is modulated with a 1 kHz signal at the nominal modulation level. The Service Monitor then measures the SINAD of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL NO MODULATION	No modulation has been received from the repeater.
FAIL UNSTABLE DEMOD	Demodulation was not within 5% after 3 readings or 1% after 10 readings.

RF distortion

RF Path distortion.

As the EDACS repeater re-transmits the signal from the transmitting radio, a distortion measurement can be obtained from the RF path.

The RF path SINAD test is used to measure the distortion level of the signal received and re-transmitted by the repeater.

The test fails if the measured distortion level is below the prescribed level.

The Service Monitor is modulated with a 1 kHz signal at the nominal modulation level. The Service Monitor then measures the distortion of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL NO MODULATION	No modulation has been received from the repeater.
FAIL UNSTABLE DEMOD	Demodulation was not within 5% after 3 readings or 1% after 10 readings.

RF S/N

RF Path S/N level.

As the EDACS repeater re-transmits the signal from the transmitting radio, a S/N measurement can be obtained from the RF path.

The RF path S/N test is used to measure the S/N level of the signal received and re-transmitted by the repeater.

The test fails if the measured S/N level is below the prescribed level.

The Service Monitor is modulated with a 1 kHz signal at the nominal modulation level. The Service Monitor then measures the S/N level of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

FAIL NO MODULATION

No modulation has been received from the repeater.

FAIL UNSTABLE DEMOD

Demodulation was not within 5% after 3 readings or 1% after 10 readings.

Tx Frequency

Transmitter RF frequency

The Tx frequency test is used to determine the accuracy of the RF frequency generated by the repeater on the current working channel. The test fails if the RF frequency is found to be outside of the prescribed limits. The message '*FAIL* OUT OF RANGE' is displayed.

Other messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

Tx Level

Transmitter RF power.

Measures the RF power output from the repeater.

Messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

Tx SINAD

Transmitter SINAD.

The Tx SINAD test is used to measure the SINAD level of the modulated transmission from the repeater.

The test fails if the measured SINAD level is below the prescribed level.

The Service Monitor AF generator frequency is set to 1 kHz and its level is adjusted until the repeater generates the nominal modulation level. The Service Monitor then measures the Tx SINAD of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

FAIL NO MODULATION

No modulation has been received from the repeater.

FAIL UNSTABLE DEMOD

Demodulation was not within 5% after 3 readings or 1% after 10 readings.

Tx Distortion

Transmitter distortion.

The Tx Distortion test is used to measure the distortion level of the modulated signal from the repeater.

The test fails if the distortion level is above the prescribed limit.

The Service Monitor AF generator frequency is set to 1 kHz and its level is adjusted until the repeater generates the nominal modulation level. The Service Monitor then measures the Tx distortion of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL NO MODULATION	No modulation has been received from the repeater.
FAIL UNSTABLE DEMOD	Demodulation was not within 5% after 3 readings or 1% after 10 readings.

Tx S/N

Transmitter S/N

The Tx S/N test measures the signal-to-noise level of the modulated signal from the repeater. The test fails if the signal-to-noise level is below the prescribed limit.

The Service Monitor AF generator frequency is set to 1 kHz and its level is adjusted until the repeater generates the nominal modulation level. The Service Monitor then measures the Tx S/N of the modulated signal of the repeater.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL NO MODULATION	No modulation has been received from the repeater.
FAIL UNSTABLE DEMOD	Demodulation was not within 5% after 3 readings or 1% after 10 readings.
FAIL UNSTABLE DEMOD	Signal-to-noise level is below the prescribed limit.

Tx Noise

Transmitter residual noise.

The Tx Noise test determines the level of 'FM noise' produced by the repeater. The test fails if the noise level is above the prescribed limit.

The Service Monitor measures the modulation level of the repeater in the absence of a modulating signal from the Service Monitor.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
------------------------	---

Tx Limiting

Transmitter modulation limiting.

The Tx Limiting test measures the level of carrier deviation from the repeater transmitter for differing levels of AF input, thereby establishing the effectiveness of the deviation limiting circuits of the transmitter.

The test fails if the deviation level is above the prescribed limit.

The Service Monitor adjusts the level of the AF generator until the repeater generates the nominal modulation level.

The Service Monitor then increases the AF level by the overload factor and checks that the result from the repeater is below the limit.

Failure messages are:

FAIL NO MODULATION	No modulation has been received from the repeater.
FAIL ABORTED BY USER	User halted program before test was complete.
FAIL UNSTABLE DEMOD	Demodulated signal was not within 5% after 3 readings or 1% after 10 readings
FAIL LOW MIC I/P SENS	AF level required to set the transmitter to reference modulation level was too high to overload by the factor given.

Tx Compression

Transmitter modulation compression.

The Tx Compression test measures the RF carrier deviation from the repeater at two levels to test the operation of the compression circuits.

The test fails if the compression ratio is outside the tolerance limit.

The Service Monitor adjusts the AF level until the repeater generates the nominal modulation level, then increases the AF level by 10 dB and measures the modulation level. The AF level is then decreased by 20 dB and the modulation level measured.

The compression ratio is the ratio of the two measured modulation levels.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL LOW MIC I/P SENS	AF level required to set the transmitter to +10 dB modulation level was too high to overload by the factor given
FAIL NO MODULATION	No modulation has been received from the repeater
FAIL UNSTABLE DEMOD	Demodulated signal was not within 5% after 3 readings or 1% after 10 readings

Rx SINAD

The Rx SINAD test measures the SINAD level of the signal received and demodulated by the repeater.

The test fails if the SINAD level is below the prescribed limit.

The Service Monitor RF carrier is modulated at a frequency of 1 kHz at the nominal modulation level. The demodulated audio from the repeater is fed to the AF INPUT of the Service Monitor, which measures the Rx SINAD.

Failure messages are:

FAIL OUT OF RANGE	SINAD level is below the prescribed limit.
FAIL ABORTED BY USER	User halted program before test was complete.
FAIL LOW DEMOD LEVEL	Receiver audio level <5 mV

Rx Distortion

Receiver distortion.

The Rx Distortion test measures the distortion level of the signal received and demodulated by the repeater.

The test fails if the distortion level is above the prescribed limit.

The Service Monitors RF carrier is modulated at a frequency of 1 kHz at the nominal modulation level. The demodulated audio from the repeater is fed to the AF INPUT of the Service Monitor, which measures the Rx distortion.

Failure messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

FAIL LOW DEMOD LEVEL

Receiver audio level <5 mV

Rx S/N

Receiver S/N.

The Rx S/N test measures the signal to noise level.

The test fails if the signal to noise level is below the prescribed limit.

The Service Monitors RF carrier is modulated at a frequency of 1 kHz at the nominal modulation level. The demodulated audio from the repeater is fed to the AF INPUT of the Service Monitor, which measures the Rx S/N.

Failure messages are:

FAIL ABORTED BY USER

User halted program before test was complete.

FAIL LOW DEMOD LEVEL

Receiver audio level <5 mV

Rx Sensitivity

The Rx Sensitivity test determines the sensitivity of the repeater receiver.

The test fails if the sensitivity is below the prescribed limit.

The Service Monitor generates an RF carrier, modulated with 1 kHz frequency at the nominal modulation level. The Service Monitor then reduces the RF level in steps, while measuring the Rx SINAD until the Rx SINAD threshold is passed.

Failure messages are:

FAIL ABORTED BY USER	User halted program before test was complete.
FAIL DROPPED OUT	Repeater has dropped the call because the RF generator level was too low.
FAIL LOW DEMOD LEVEL	Receiver audio level <20 mV
FAIL LOW SINAD LEVEL	Unable to reach reference SINAD level at -80 dBm

Rx Expansion

Receiver demodulation expansion.

The Rx Expansion test measures the audio output level from the repeater for various levels of carrier deviation to test the operation of the demodulated signal expander circuits. (Refer to Tx Compression test earlier in this section).

The Service Monitor generates an RF carrier modulated at the nominal modulation level. It increases the modulation level by 5 dB and measures the AF level from the repeater. It then decreases the modulation level by 10 dB and again measures the AF level. The expansion is the ratio of low to high AF level measurements.

Other failure messages are:

FAIL NO DEMODULATION	+10 dB change in modulation level produced insufficient change in received AF level.
FAIL ABORTED BY USER	User halted program before test was complete.

Selecting the AUTORUN test program

[PROGRAM]

The *[PROGRAM]* soft key gives you access to the selection of five test programs. Each test program is made up of selected tests. These tests have been described in detail earlier in this chapter under Description of Tests.

The three programs are:

QUICK TESTING

GENERAL TESTING

USER DEFINED TEST

Making tests on repeaters

Connections

RF connections

For most repeaters, the RF connection of the repeater is connected to the 'N type' RF connector of the Service Monitor using a suitable RF cable.

WARNING

HOT SURFACES

Take care when touching the RF Input Type N connector after the application of high levels of continuous power. If 50 W is applied for a prolonged period, the temperature of the connector can become excessive.

WARNING

RF BURNS

Before making connections to a repeater, ensure that the transmitter cannot be switched on inadvertently. High levels of RF power can cause electric shocks or skin burns which can have lasting effects.

CAUTION

RF Input Ports

Before making connections to a repeater, ensure that the output power from the repeater will not exceed the power handling capability of the Service Monitor. Use suitable attenuators or sampling equipment if necessary.

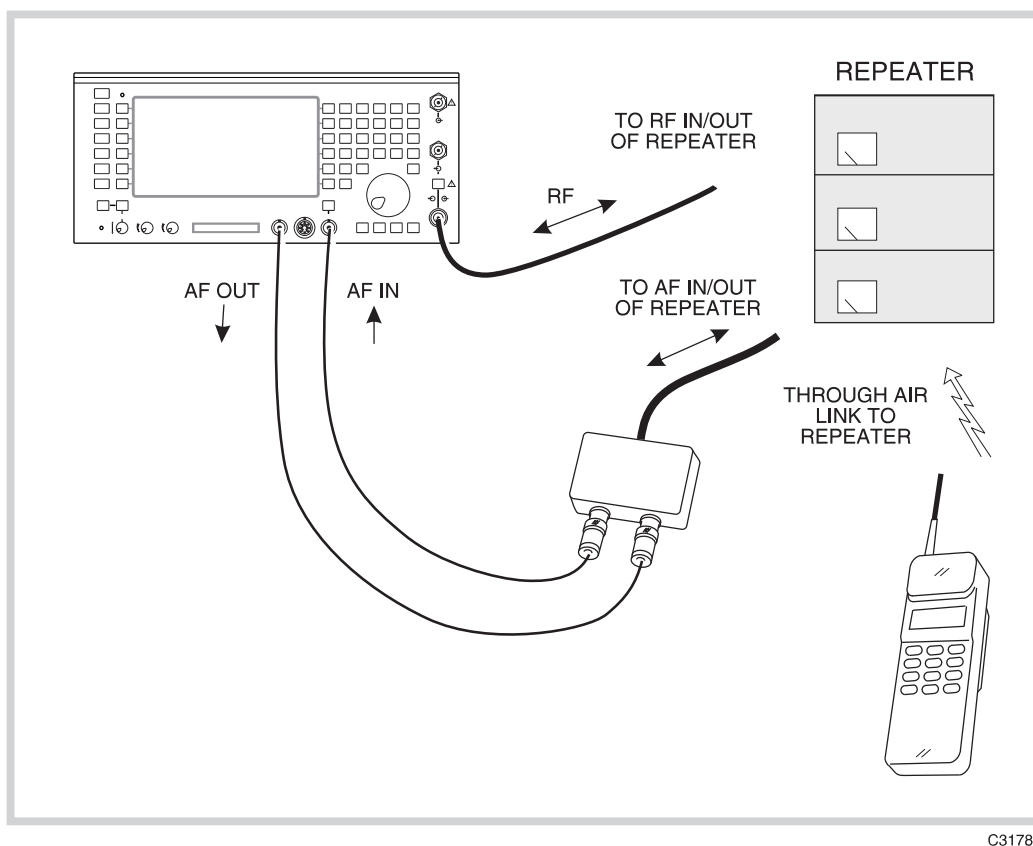
Antenna Port

Do not use the ANTENNA input for direct connection when in SYSTEM mode.

With SYSTEM mode selected, setting the ANTENNA port as the RF input port, causes the input sensitivity to switch to the most sensitive range and disables the automatic gain control.

AF connections

For tests which require parametric measurements to be made, connections must be made from the AF GEN OUTPUT connector of the Service Monitor to the audio input of the repeater and from the audio output of the repeater to the AF INPUT of the Service Monitor. See Fig. 2-10.



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Fig. 2-10 A typical test set-up showing connections to a Repeater

Automatic testing

With a repeater connected to the Service Monitor and with the 'SET-UP' configured to suit the repeater, an **automatic test** can be carried out.

Select the program to be run (e.g. GENERAL TESTING) by using the *[PROGRAM]*, *[general]*, *[AUTO]*, sequence. The selected program is shown at the top of the display.

The results of the test program are displayed and placed into the results store. To make a permanent record of the results when the program has finished, you can print out a hard copy using the *[print store]* key.

To run the program press the *[start]* key.

When an AUTORUN program is running, soft keys *[stop]* and *[pause]* are displayed.

Pressing the *[stop]* key stops the program immediately and aborts the current test. The STATUS message *FAIL* ABORTED BY USER is displayed and a *[cont]* key appears. Pressing this continues the AUTORUN program, commencing at the next test. Pressing the *[stop]* key rather than the *[cont]* key prevents the program continuing and prepares for the AUTORUN program to be started again.

Pressing the *[pause]* key while a program is running makes the program pause at the end of the current test. The program is then in the same condition as when paused due to your setting of the PAUSE MODE in the AUTORUN CONTROL menu.

Manual testing

The manual testing mode is provided to assist in fault location and repair. You are able to set system parameters for the test to be carried out independently from the values in the set-up, system parameters menu. From the mode selection soft key list, each aspect of the system operation can be selected for testing. If one of the other main modes of the Service Monitor is selected while in manual test, the repeater remains active and all the settings of the basic instrument modes relate to the ongoing system test. This allows measurements to be made to the receiver or transmitter of the repeater.

When the manual test mode is accessed the following system parameters require setting to the relevant values.

CHANNEL

Before any testing can be carried out on an EDACS repeater the CONTROL CHANNEL number must be set to the value that the system is using.

Note

IF THE CORRECT CONTROL CHANNEL NUMBER FOR THE REPEATER IS NOT ENTERED THE SERVICE MONITOR WILL NOT OPERATE WITH THE REPEATER.

RFGEN LEVEL

This allows the setting of the RF generator output in dBm either by manual entry or by using the rotary control.

HIGH SPEED DATA LEVEL

The high speed data modulation level should be set to the deviation level specified for the system unless the value is required to be different to perform a specific test. This is adjustable either by manual entry or by using the rotary control.

LOW SPEED DATA LEVEL

The low speed data modulation level should be set to the deviation level specified for the system unless the value is required to be different to perform a specific test. This is adjustable either by manual entry or by using the rotary control.

MODE selection

The *[mode]* key displays the test options available to you with the repeater in the current state. When first entering manual test mode, the options available are; terminal mode, individual call, group call, emergency call, data performance, measure HS deviation, and decode only mode. The *[more]* key must be pressed to access the last two modes.

Selecting each of the options has the action described below.

[term mode] The Service Monitor behaves as if it were an EDACS radio with IDs set up in the RADIO PARAMETERS menu.

In this mode, if another radio makes a call to the group ID or logical ID of the Service Monitor, or if it receives a relevant update message, it responds by transmitting to the working channel in conversation mode. It also displays the call type, the identity of the radio that placed the call, the group ID and the working channel.

[individ call] The repeater is called using the logical identity from the setup menus and goes into conversation mode on the working channel as defined by WORKING CHANNEL.

[group call] The Service Monitor places a call to the repeater using the stored GID set in the setup menus.

[emerg call] The Service Monitor places an emergency call to the repeater using the stored GID and LID.

[data perform] The Service Monitor continuously sends login requests and waits for the repeater to acknowledge them, displaying the percentage success rate.

[measure HS devn]

This test filters and measures the deviation of the high speed data. To exit this mode, press the *[mode]* key, then any of the displayed soft keys.

Note...

Restricted access.

Access to this facility is protected by password control. Ericsson GE have imposed this restriction, due to the potentially confidential nature of the information which can be decoded. The *[decode only]* key is not displayed until the facility is unlocked.

[decode only] (See note below.) The Service Monitor continuously decodes the selected channel but takes no action. Data is displayed on the screen, indicating actions occurring on the control channel being monitored.

In 'DECODE ONLY' mode the options have the action described below:

[term mode] The Service Monitor exits 'DECODE ONLY' mode and behaves as if it were an EDACS radio with IDs set up in the setup menus.

[log to printer] All messages displayed on the screen are also output to a connected printer.

[log to store] All messages displayed on the screen are output to the automatic test results store, accessible from the [AUTO] screen.

[stop log] Stops both printer and store logging.

[clear display] Clears the 5 line display on screen, but carries on logging.

When the Service Monitor is in conversation on a working channel, the MODE legend shows 'CONVERSATION' and the following actions are available:

[convers] The Service Monitor behaves as a radio in conversation.

[clear down] The Service Monitor sends the disconnect command to the repeater and the mode changes to 'CONTROL CHANNEL'.

[measure LS devn] Filters and measures the deviation of the low speed data. To exit this mode, press the *[mode]* key, then the *[convers]*. The mode also clears if the repeater clears down the channel.

When on a control channel, the quality of the received data is indicated. The number of good frames, in proportion to the number of corrupt frames, is shown as a percentage beside the SERVICE: legend. If the Service Monitor cannot detect any activity on the control channel, the legend SERVICE: NO SERVICE is shown. The site ID of the current control channel is also displayed on the screen. See Fig 2-11 *Manual test. Decode only display.*

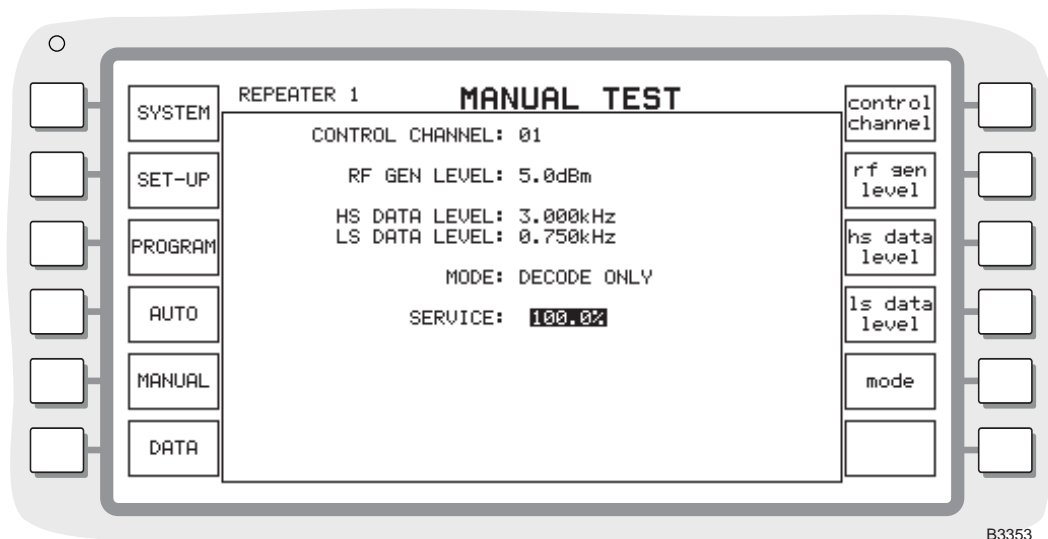


Fig. 2-11 Manual test. Decode only display

Using a microphone with PTT switch

The optional microphone with PTT switch (part number 44991/145) allows you to 'talk through' the Service Monitor onto the system. Pressing the PTT switch makes a call, releasing the PTT clears it. The microphone is plugged into the ACCESSORY socket on the front of the Service Monitor.

Data displays

Introduction

Note...

Restricted access.

Access to this facility is protected by password control. Ericsson GE have imposed this restriction, due to the potentially confidential nature of the information which can be decoded. The [DATA] key is not displayed until the facility is unlocked.

To enable the data display mode, press the [DATA] key at the left-hand side of the screen.

The data display mode allows you to view the data messages which are sent between the Service Monitor and the repeater. You can rapidly identify incorrect bits sent by the repeater, which may have caused a test to fail. The data displays can also serve as an educational or reference facility for users who are unfamiliar with trunking signaling.

Forward/reverse data

This screen has four active soft keys assigned to it on the right of the display. see Fig. 2-12.

The [↑] and [↓] keys select the word to be displayed in the expanded data window at the top of the screen.

The [clear] key removes the current information from the display. **IT CANNOT BE RETRIEVED.**

The [print] key causes the expanded data window to be printed if the printer is active.

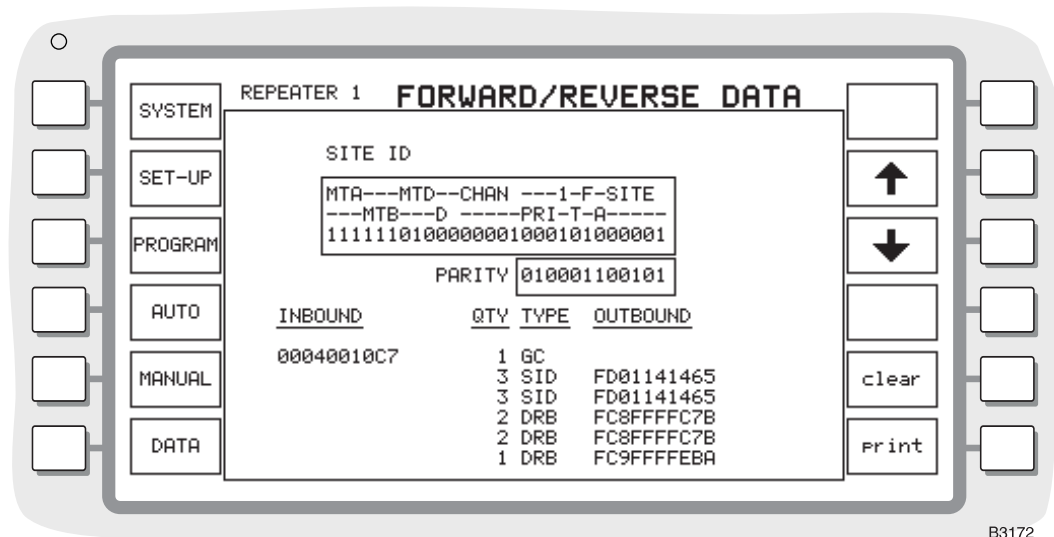


Fig. 2-12 Display of forward/reverse data

In the lower half, the display lists (in hexadecimal) the codewords that have been sent between the Service Monitor and the repeater.

The number of times the codeword has been sent and received, and the identity of the codeword are shown against each word.

The upper half of the display shows one of the codewords from the list in binary form. The codeword displayed is highlighted in the list and is selected by using either the *[up]* or *[down]* keys, or by using the variable rotary control. Above this window is shown the full title of the codeword.

The binary display of the codeword is presented in two parts.

The small window labeled 'PARITY' shows the contents of the parity field of the codeword. This field consists of the 12 least significant bits of the codeword.

The larger window, comprising of three character lines, displays the main part of the codeword which consists of 20 or 28 bits.

The lower line shows the contents of the codeword (without parity), with the most significant on the left. The upper two lines show the meaning of the bits.

Appendix A

ERROR CODES

Autotest error codes

Error codes returned as the first parameter when using the 'NUMRESULTS' MI-BASIC command or the PROG:NUMRESULTS? remote command are listed below, together with their meanings. These error codes are generated when a MI-BASIC 'TEST' command is executed.

Error Code	Error String
0	(test passed)
1	(undefined test failure)
101	"INVALID PARAMETERS"
102	"TIMED OUT",
103	"ABORTED BY USER"
104	"NOT ON CONTROL CHANNEL"
106	"NO RESPONSE"
107	"WRONG RESPONSE"
109	"CHANNEL ASSIGNMENT"
114	"OUT OF RANGE"
115	"LOW MIC I/P SENS"
116	"NO MODULATION"
117	"NO DEMODULATION"
118	"UNSTABLE DEMOD"
119	"LOW DEMOD LEVEL"
120	"LOW SINAD LEVEL"
128	"DROPPED OUT"
154	"NOT ON WORKING CHANNEL"

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