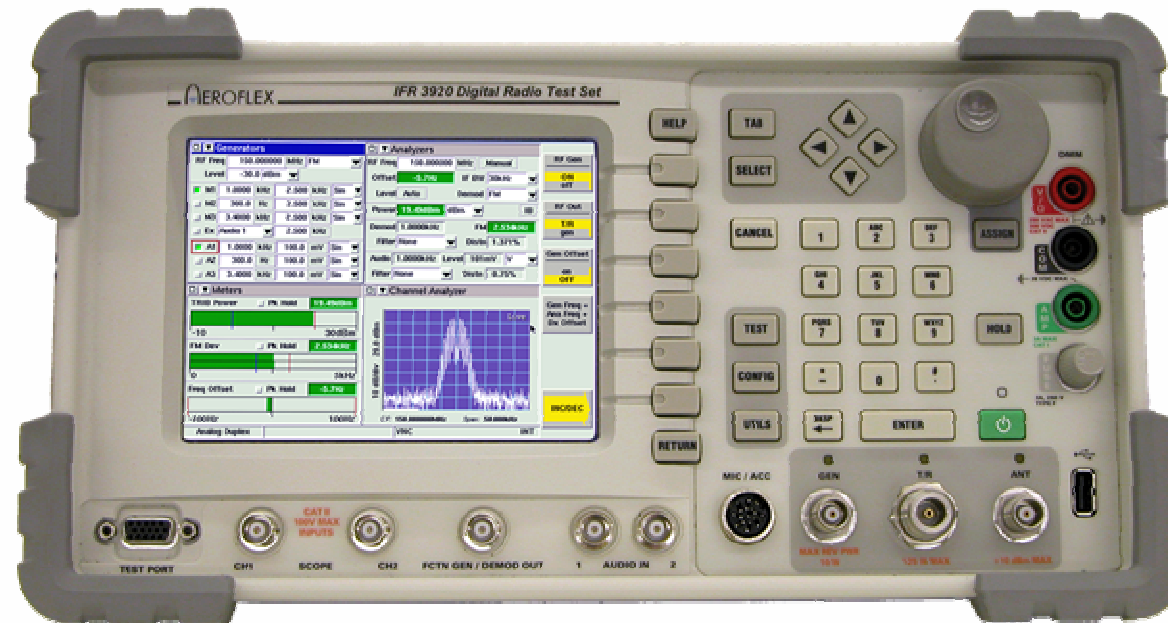


Aeroflex 3920 Series

AEROFLEX

Ready for the Future

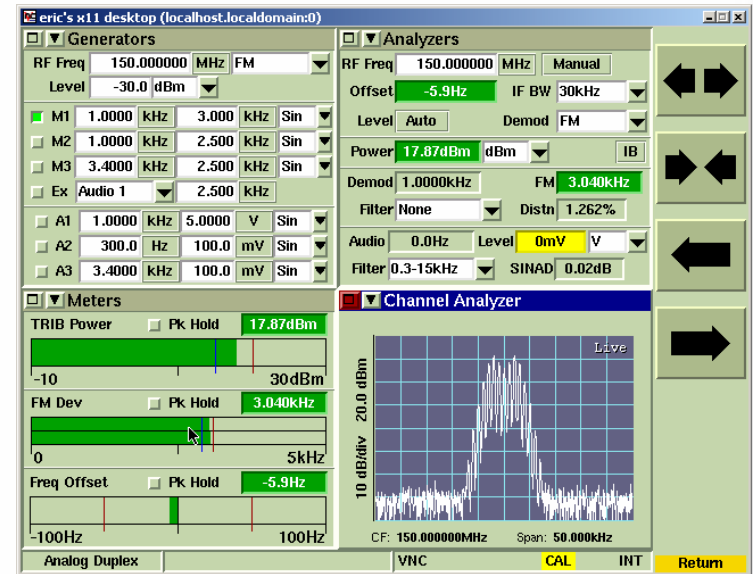


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Electronic Measurement Technology

Aeroflex 3920 Series - Overview



Product Overview



Aeroflex 3920 Series - Overview

AEROFLEX

The 3920 is a platform that is **SOFTWARE DEFINED** for a variety of radio applications.

- In the Field for >3 years
- ~700 Systems Built and Fielded
- Current Digital Systems Supported
 - ◆ P25
 - ◆ TETRA
 - ◆ HPD
 - ◆ Others as they develop ...
- Analog Systems
 - ◆ AM
 - ◆ FM
 - ◆ SSB



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Electronic Measurement Technology



Aeroflex 3920 Series - Overview

AEROFLEX

HIGH PERFORMANCE ANALOG STANDARD FEATURES

- ◆ **AM/FM/SSB RF signal generator**
- ◆ **AM/FM RF signal analyzer**
- ◆ **Full HP/Agilent 8920A and 8920B Tests Emulation**
 - Front Panel and GPIB 8920 Emulation Mode
- ◆ **Calibrated High Accuracy Test System**
 - Signal Generator – 0.6dB Accuracy Typical
 - Power Measurements – 0.6dB Typical
 - Time Base – 0.01PPM Accuracy
- ◆ **GO/NO GO Color Coded Meters with Pass/Fail Parameters**



ELSINCO
Electronic Measurement Technology

Aeroflex 3920 Series - Overview

AEROFLEX

HIGH PERFORMANCE ANALOG STANDARD FEATURES

- ◆ **Dual Channel Oscilloscope**
 - 4MHz Bandwidth
- ◆ **2.7GHz Full Span Spectrum Analyzer**
 - -140 DANL (with Preamp)
- ◆ **5 MHz Wide Channel Spectrum Analyzer**
 - “Look and Listen” Capable
- ◆ **Full Meters for Transmitter Tests**
 - Power
 - ◆ Broadband
 - ◆ Inband (RSSI)
 - Frequency Error
 - Modulation Accuracy
- ◆ **Full Meters for Receiver Tests**
 - SINAD and Distortion, Hum and Noise
- ◆ **Optional DMM**



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Aeroflex 3920 Series - Overview

AEROFLEX

ADDITIONAL STANDARD FEATURES

- ◆ **LINUX Operating System**
- ◆ **5MHz Wide IF**
 - Instantaneous Bandwidth
 - Instant Frequency Hopping within Band
- ◆ **Color display with easy to use graphical user interface**
- ◆ **GPIB, Ethernet, RS-232, USB Interfaces**
 - RCI Commands for GPIB and Ethernet
- ◆ **MIL28800 Class III Certified**
- ◆ **MTBF – 10,000+ Hours**
- ◆ **Built In Military Grade Hard Drive (-20 - + 70 C)**
- ◆ **Software upgrades via USB, CD-ROM or Internet**

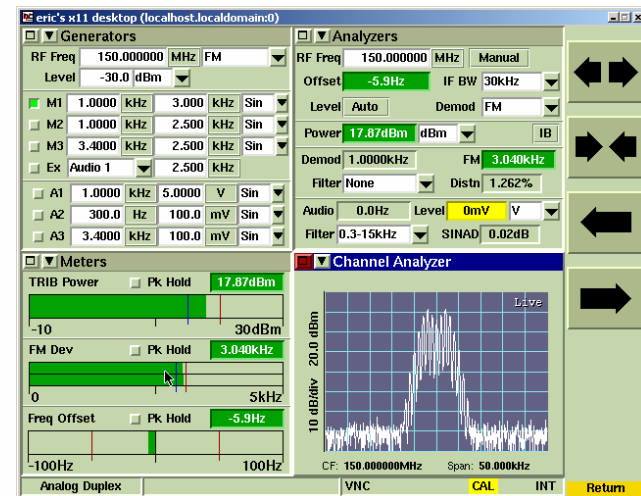


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Aeroflex 3920 Series - Overview

AEROFLEX

Product Options

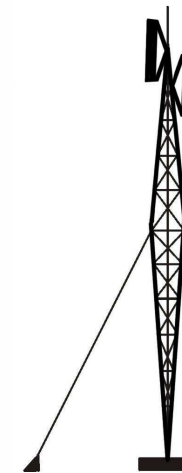


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TETRA System Options

AEROFLEX

- ◆ **Option 110**
Terminal (MS & MST1)
- ◆ **Option 111**
Base station (BS & BST1)
- ◆ **Option 112**
Tetra Direct Mode
- ◆ **Option 114**
Tetra Energy Economy Mode



TETRA

ELSINCO
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Testing of TETRA Terminals



Overview of 3920 TETRA features

AEROFLEX

- ◆ Tx and Rx on-channel measurements as per ETSI EN 300 394-1
- ◆ Supports all TETRA call and messaging modes
- ◆ TETRA T1 test mode and T1 RF loopback
- ◆ TETRA TT registration and TT loopback
- ◆ AutoTest for MS
- ◆ TIP Compliant,
 - core services, SDS and testing requirements

Testing TETRA terminals

AEROFLEX

- ◆ **Radio Test Set simulates a TETRA Base Station**
 - ◆ **Must match configuration expected by mobile**
- ◆ **Mobile registers to the test set**
 - ◆ **Mobile's identity is obtained**
- ◆ **Mobile sets up a call to the test set or vice versa**
 - ◆ **Enables mobile to transmit and / or receive**
- ◆ **Many other functional tests can be performed**
 - ◆ **Checks the configuration and capability of the mobile**



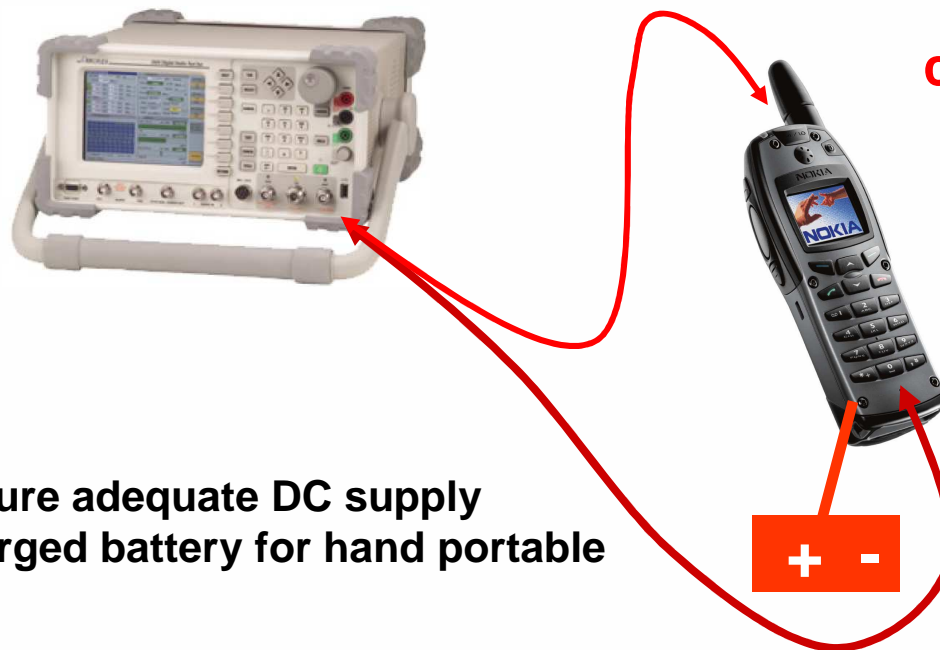
Testing terminals: RF and DC connections

- ◆ **Testing is performed at the Air Interface**
 - The only connection required is to the antenna socket

Either remove the antenna and connect to the socket

..... or connect to a special socket for test

**Ensure adequate DC supply
Charged battery for hand portable**



Checking the terminal configuration

AEROFLEX

- ◆ **Configured using manufacturer's programming tool**
 - MCC, MNC, subscriber identity (SSI), group identities (GSSIs)
 - PSTN gateway SSI, status values
 - Call options e.g. simplex / duplex, hook / direct
- ◆ **Check configuration using functional tests on test set**
 - Registration and group attachments (MCC, MNC, SSI, GSSIs)
 - Send and receive SDS status and text messages
 - Send and receive Group / Private / Phone / Emergency calls



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Essential network parameters

AEROFLEX

- ◆ **Common channel plans are pre-defined in the 3920**
 - ◆ 380-400 MHz (Europe public safety)
 - ◆ 410-430, 450-470, 870-876, 915-921 (Europe commercial)
 - ◆ 800 MHz TETRA channel plan for Asia Pacific
- ◆ **Different offset values are supported**
 - ◆ 12.5 kHz offset, -6.25 kHz offset and zero offset variants
- ◆ **ETSI standard channel numbering is supported**
 - ◆ Maps channel numbers to frequencies
 - ◆ e.g. channels 3600 - 4000 are 380-390 MHz / 390-400 MHz
- ◆ **User defined channel plans can be set up**
 - ◆ Allows testing of TETRA radios with non-standard plans
 - ◆ User defines band, offset, duplex spacing, numbering

Information about the terminal's configuration is essential to allow the test set to simulate a valid TETRA base station



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TETRA Terminals Configuration Tiles

◆ TETRA Channel Plan

TETRA signalling protocol uses Channel Numbers rather than explicit frequencies to assign TETRA Mobiles to frequency channels. TETRA Systems use Channel Plans to map the uplink (MS Tx) frequency and the downlink (MS Rx) frequency to these Channel Numbers.

Channel Plan

Channel Plan **TETRA 380-400 +12.5** ▼ New Plan

Sys Info - Only required for MS modes

Frequency Band **3 (300.000 MHz)**

Offset **3 (+ 12.5 kHz offset)**

Duplex Spacing **0 (10 MHz)**

Reverse Operation **0 (Normal)**

Channel Block 1

Lowest Channel **3600**

Highest Channel **3999**

Lowest Chan. Downlink Freq **390.012500 MHz**

Duplex Offset **10.000000 MHz**

Channel Spacing **25.000 kHz**

Channel Block 2

Not Selected

TETRA MS | TETRA 380-400 +12.5 | INT

TETRA Channel Plan

TETRA Terminals Configuration Tiles

◆ System ID and Access Parameters

The correct MCC and MNC must be set to allow the mobile to recognize the downlink signalling from the Test Set.

System ID & Access Params

Base Station Identity Parameters

Mobile Country Code (MCC) 234 United Kingdom

Mobile Network Code (MNC) 1

Base Station Color Code (BCC) 1

Location Area Code (LA) 1

Access Parameters

Min Rx Level For Access -125 dBm

Max Tx Level 30 dBm 1W

Access Parameter -45 dBm

TETRA MS TETRA 380-400 +12.5 INT

TETRA BS Identity Parameters

Testing a TETRA terminal

- ◆ The following steps are involved in testing a TETRA terminal

Making **RF** and **DC** connections

Setting **essential network parameters**

Registering to the test set

Placing calls to or from the test set

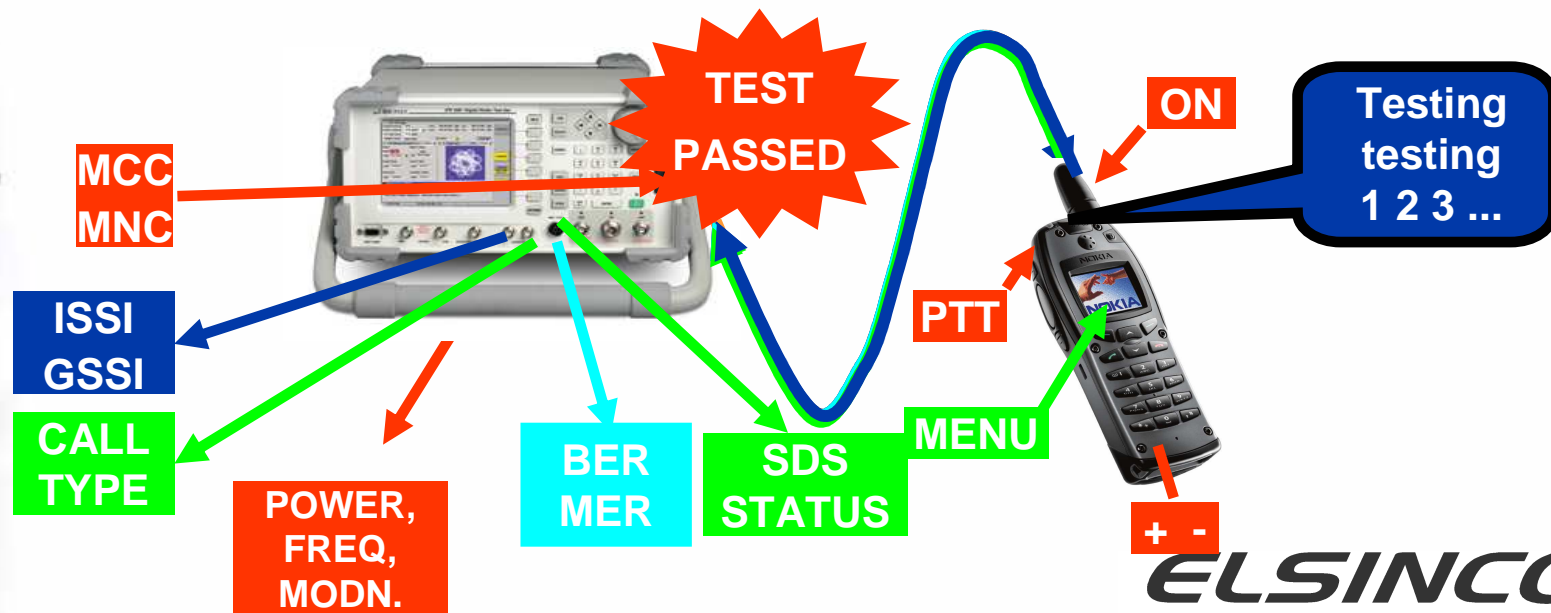
Testing the **transmitter** performance

Testing **receiver** performance

Testing **audio** performance

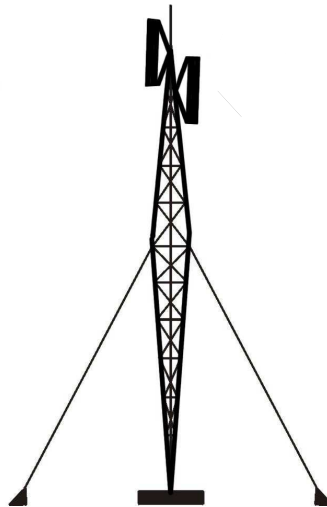
Testing **functional** behaviour

Automatic testing



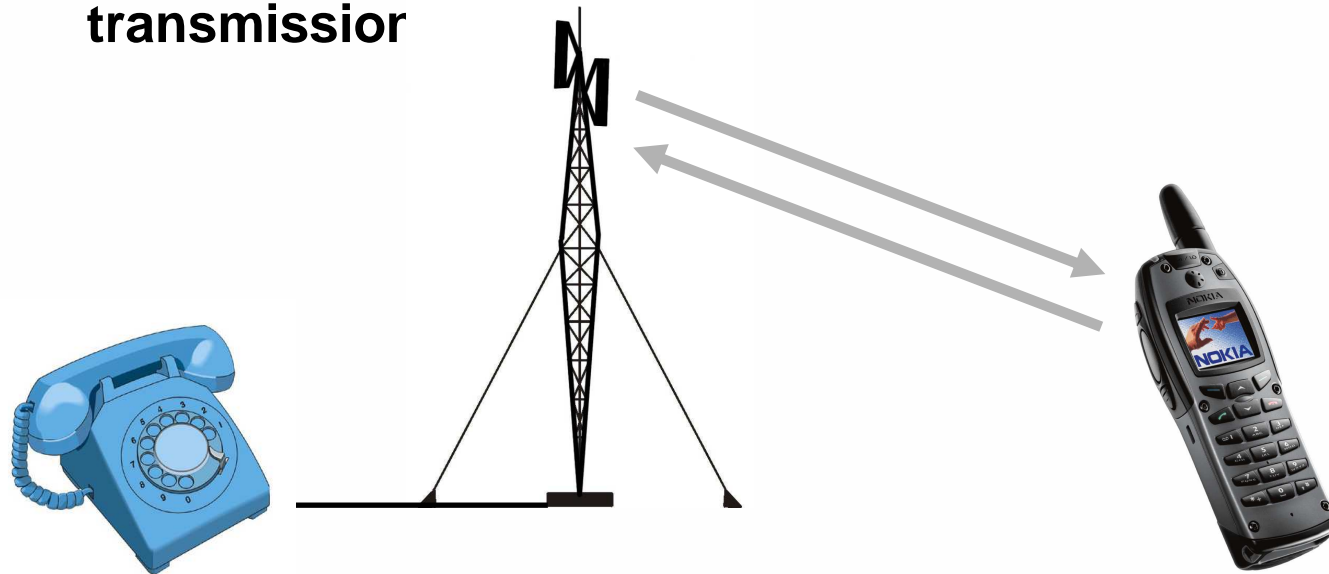
Set up a call to test the terminal - simplex ?

- ◆ **Simplex Calls**
 - Group calls are always simplex, private calls may be simplex
 - Easy call set up but inconvenient for measurement analysis
 - **PTT** switch (Push To Talk) has to be held pressed



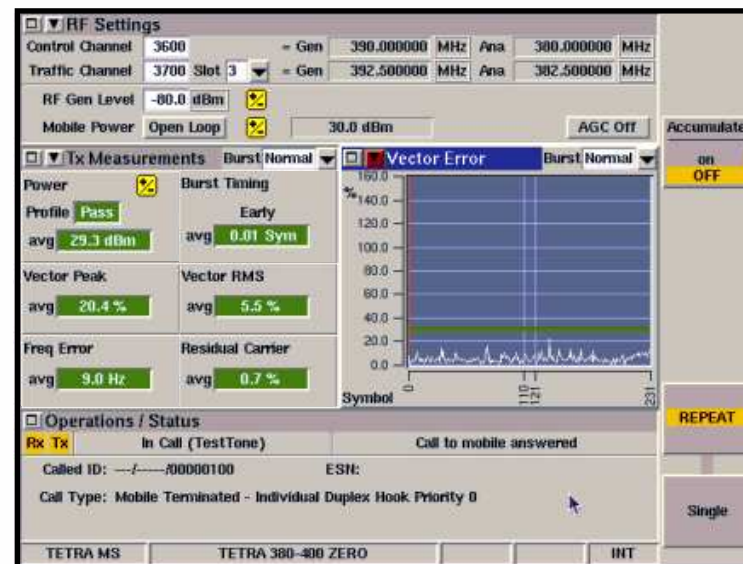
Duplex call

- ◆ **Duplex Calls e.g. Phone Call via PSTN Gateway**
 - Phone calls are usually but not always duplex
 - Mobile is transmitting and receiving (like GSM phone call)
 - Does not require holding PTT to continue transmission



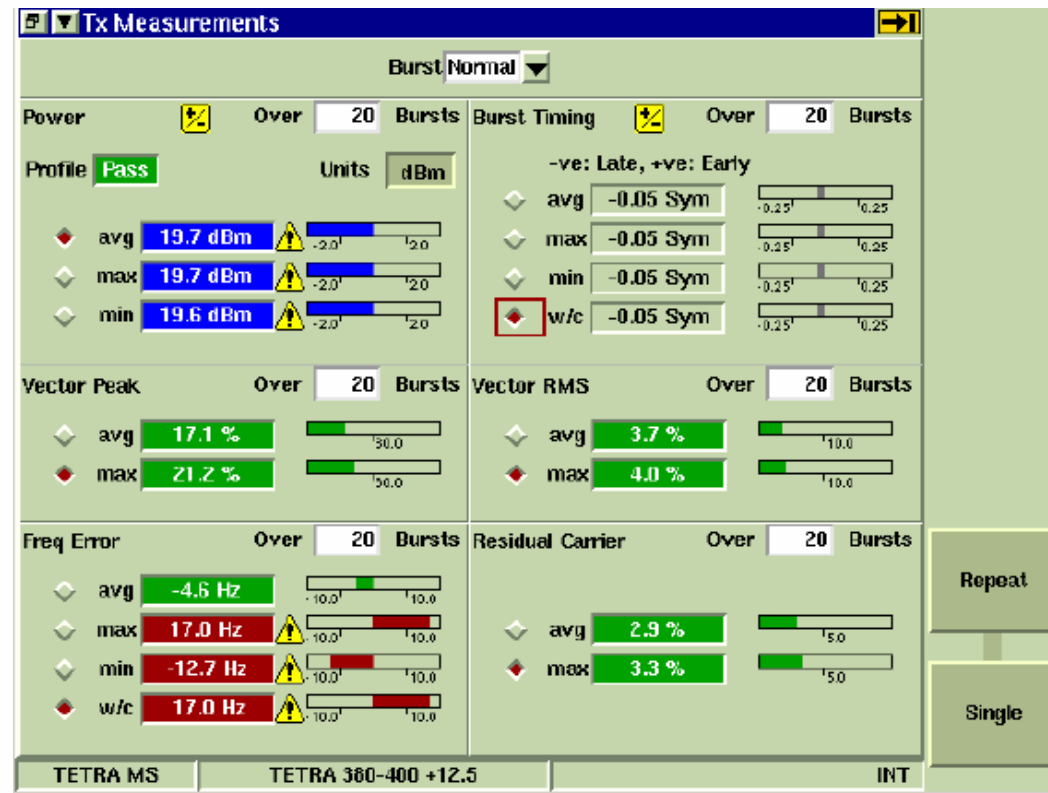
Transmitter Tests

- ◆ Tested as per ETSI EN 300 394-1
- ◆ Burst Power
- ◆ Power Profile
- ◆ Modulation Accuracy
- ◆ Residual Carrier
- ◆ Frequency Error
- ◆ Timing Error
- ◆ Burst display



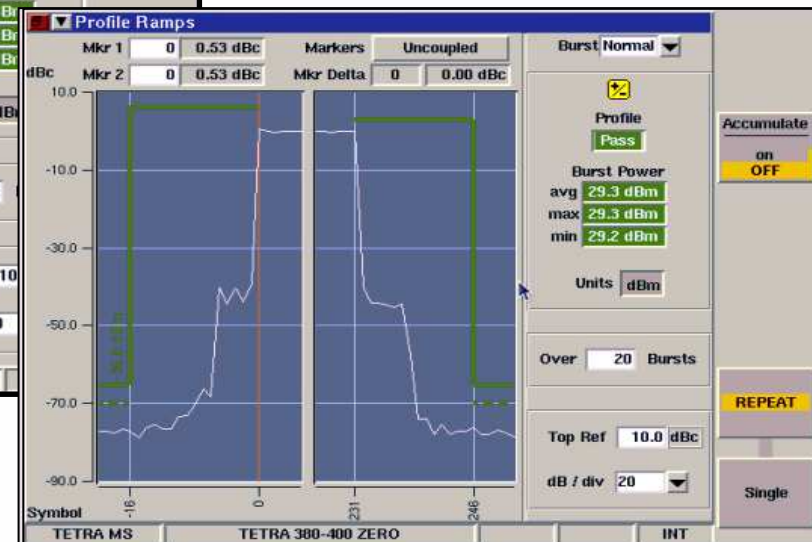
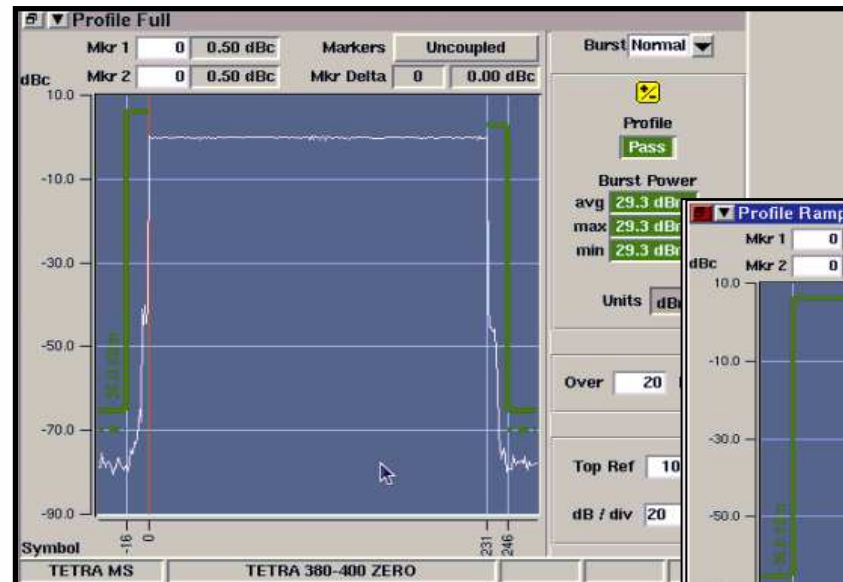
Transmitter Tests : TX Measurements

- ◆ The Tx Measurements Tile shows the results of measurements made to the signal received from the mobile under test. The results are given in numeric and graphical form.



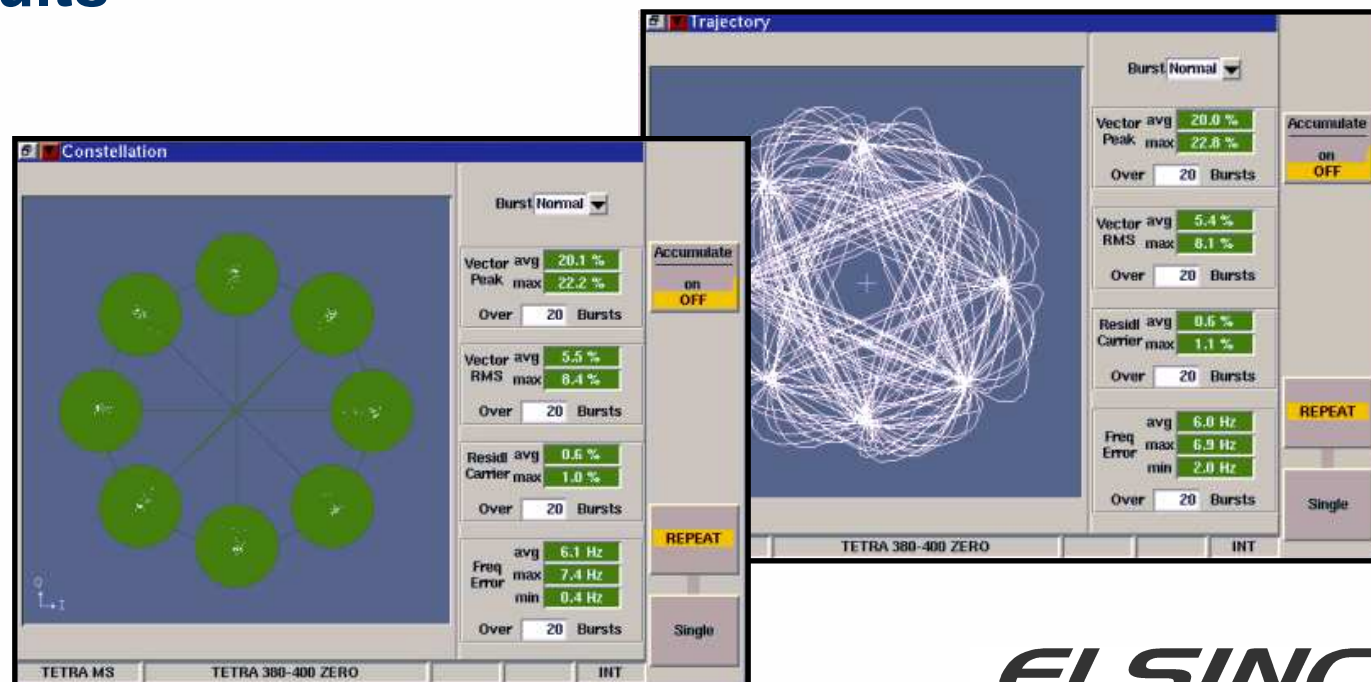
Tx tests: Power Profile

- ◆ Full 70 dB burst dynamic range
- ◆ Pass / Fail assessed against TETRA / user mask
- ◆ Can be averaged over up to 250 bursts



Tx tests: Phase & constellation diagrams

- ◆ The phase trajectory and constellation diagrams allows manual inspection of phase and amplitude
- ◆ The test set indicates the numerical vector error results



Open Loop Power Control

- TETRA radios operate at defined power ratings
 - MS power level is variable in defined steps
- A TETRA radio determines optimum power level itself
 - This requires measurement by MS of received signal strength
 - Received signal becomes weaker further from base station
 - MS reduces transmitter power for a stronger received signal
- MS power is optimized
 - Reduces interference
 - Increases battery life



Controlling the terminal's transmit power

- ◆ Set signal generator level to change terminal power

Calculated power depends on system parameter settings

Power is constrained to discrete 5dB power level steps

RF GEN
-75dBm

POWER
+30dBm



I think
I should use
+30dBm

Controlling the terminal's transmit power

- ◆ **Or set power level in 'Maximum Tx level' parameter**

Set low signal generator level to achieve high terminal power

Power is constrained by 'Maximum Tx level' parameter

However, terminal may not expect this parameter to change

This method should work in T1 test mode

**Max Tx level
+20dBm**

**POWER
+20dBm**



**I'm only
allowed up to
+20dBm**

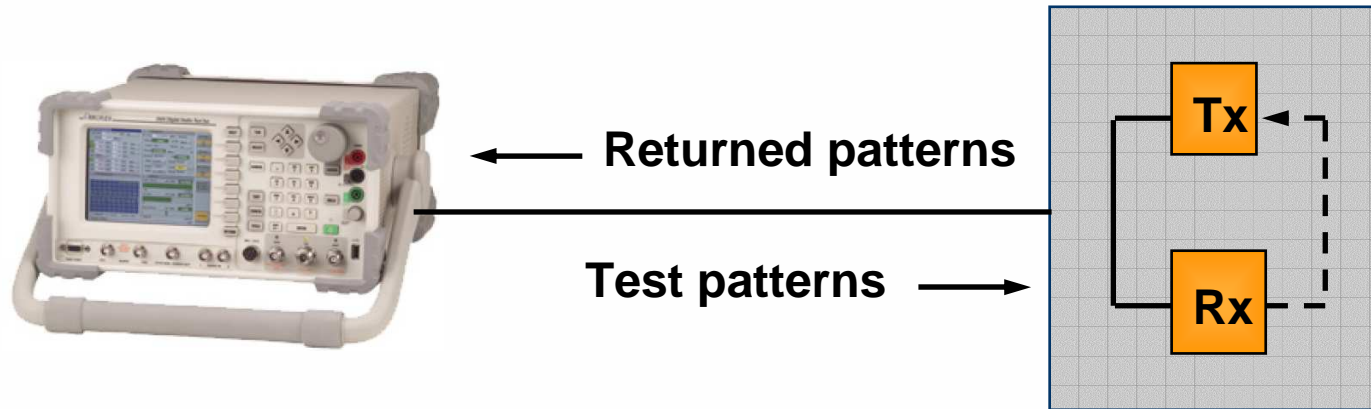


Receiver Sensitivity Using TT Loopback

AEROFLEX

Aeroflex 3920

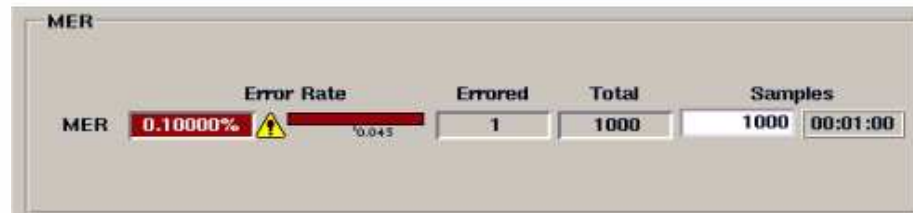
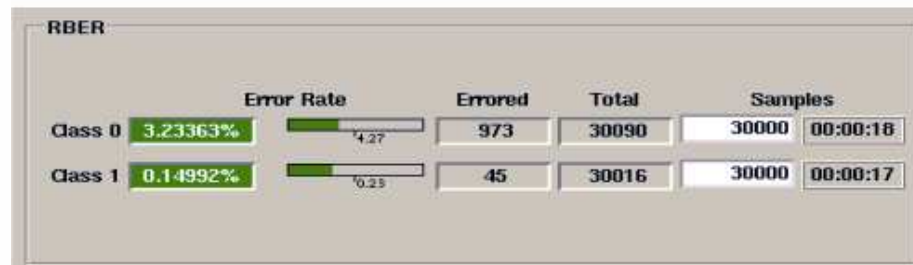
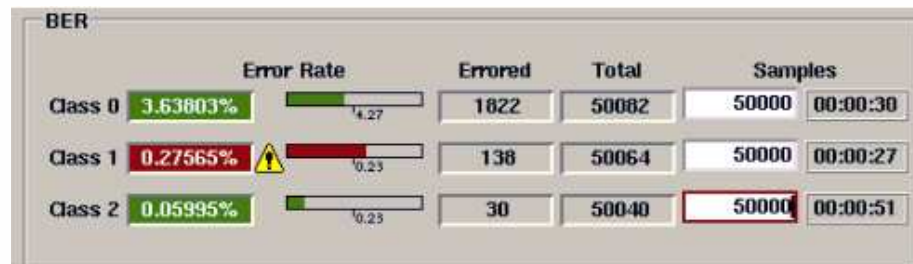
TETRA mobile



- ◆ Optimized for manufacturing and service testing
- ◆ TT loopback - equivalent to GSM
- ◆ Eliminates need for proprietary interfaces and test modes
- ◆ T1 loopback for R&D and conformance testing

Receiver Sensitivity Using TT Loopback

- ◆ 3920 uses 'TT' loopback for automatic BER, RBER, MER tests
 - Complete automated control via the RF connection only



Receiver Sensitivity Using T1 Loopback

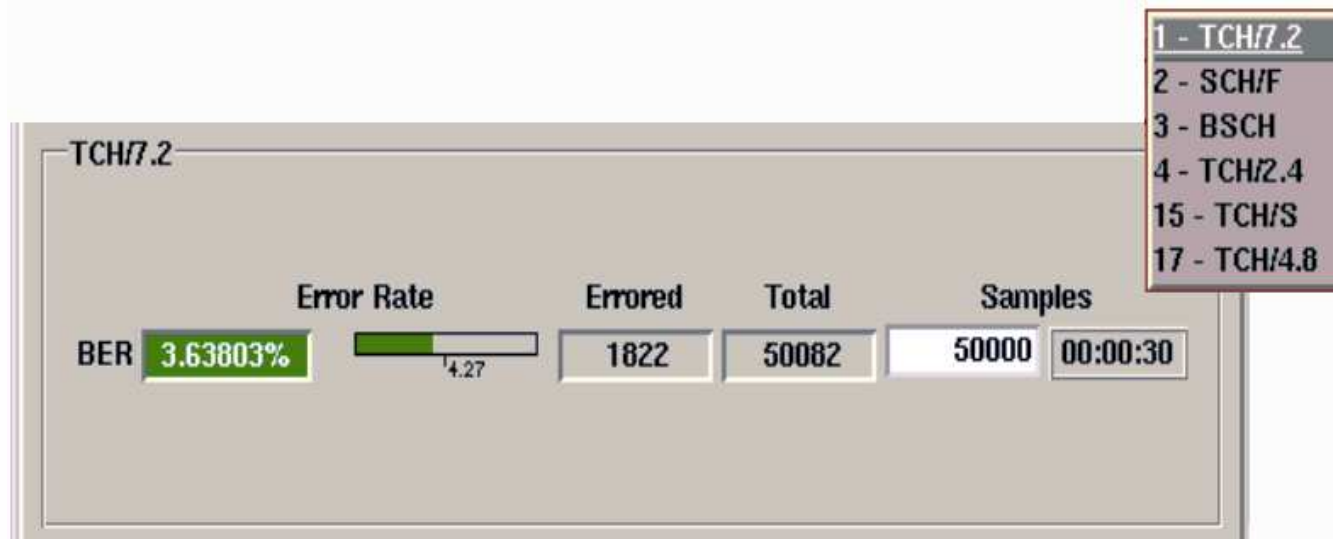
- ◆ 3920 also supports T1 loopback BER measurement
 - ◆ Manual testing of radios in special test modes
 - ◆ T1 test signals generated complying with ETSI EN 300 394-1
 - ◆ Loopback on / off control included in 3920's T1 test mode
 - ◆ Measurement of BER of loopback signal from radio



Receiver Sensitivity Using T1 Loopback

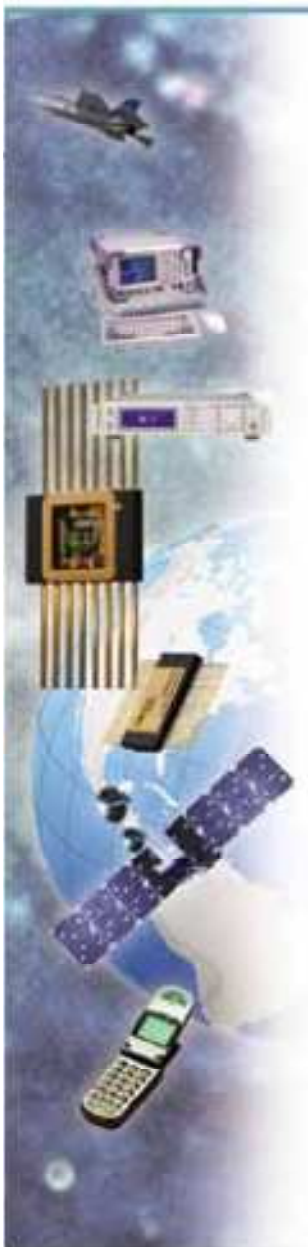
AEROFLEX

- ◆ **3920 supports T1 loopback BER measurement**
 - Manual testing of radios in special test modes



Functional tests - SDS Short Data

- ◆ **3920 tests TETRA SDS functions:**
- ◆ **Status Messaging**
 - Mobile Originated and Mobile Terminated Status
- ◆ **Short Data Service (SDS) Types 1 to 4**
 - Mobile Originated and Mobile Terminated SDS
- ◆ **SDS-TL Text Messaging**
 - SDS Transport Layer (SDS-TL) protocol supported
 - Text messages up to 120 characters
 - 8-bit and GSM-compatible 7-bit text coding
 - Delivery reports sent and received
 - Mobile Originated and Mobile Terminated SDS-TL
 - SDS-TL User applications
 - Standard and short reports



SDS Text Message Configuration

Messages

Message Type **SDS Type 4 - SDS-TL Text**

SDS Type 4 - SDS-TL Text Message

Group/Individual **Individual**

Calling Party SSI **742200** = **B5338** Hex = **Test Set**

Report Type **Received**

Report Size **Short**

Text Coding **ISO 1 Latin 1 (8 Bit)**

Time Stamp **Included**

Message **This SDS type 4 SDS-TL text message was sent by the Test Set and is one hundred and twenty characters long and ends here**

Calling Party ESN **01438742200** **Included**

Text Message Protocol History

AEROFLEX



08:10:20 Sending SDS-TL Type4 Msg to MS
 SSI: 1006754
 Calling Party SSI: 742200
 Calling Party ESN: 01438742200
 Report Type: Received
 Report Size: Short
 Message Number: 000003
 Text Coding: ISO1
 Time Stamp: 08:10 04/08
 This SDS type 4 SDS-TL text message was sent by the Test Set and is one hundred and twenty characters long and ends here

08:10:20 Status/SDS sent to MS
 08:10:20 SDS std report from MS received
 08:10:20 Type 4 (SDS TL TEXT)
 08:10:20 Message Received by MS

The screenshot shows the AEROFLEX test equipment interface. At the top, it displays configuration for the Control Channel (20.40 MHz) and Traffic Channel (21.40 Slot 3, 853.512500 MHz). The RF Gen Level is set to -100.0 dBm, and Mobile Power is Expected at 30.0dBm / 1W. Below this is a 'Profile Full' section with a graph showing a signal pulse between -10 and -30 dBm. The 'History' section contains a log of events, including the sending of the SDS-TL Type4 message and the receipt of the status report. The 'Operations / Status' section at the bottom shows the current status of the test set, including the status message from the MS received.

Status Message Acknowledgement Report



RF Settings

Control Channel: 2040 = Gen 851.012500 MHz Ana 806.012500 MHz

Traffic Channel: 2140 Slot 3 = Gen 853.512500 MHz Ana 808.512500 MHz

RF Gen Level: -100.0 dBm

Mobile Power: Expected 30.0dBm / 1W AGC Off

Profile Full Burst Control

Profile Pass avg 26.5 dBm

History

Sending Status Msg to MS
 SSI: 1006754
 Calling Party SSI: 742200
 Calling Party ESN: 01438742200
 Message: 65279 (dec) FEFF (hc)
 Status/SDS sent to MS
 Status message from MS received

Call Mobile

TETRA Test Mode Confirm

Other Protocol Actions

Status Message

Hex: FE00

Decimal: 65024

Translation: General Status Acknowledge

Called ID: 00742200

ESN:

Close
Delete

Operations / Status

Rx	Tx	MCCH
ITSI: ---/-----/01006754		
TEI: -----/---/-----/---		

Status Msg: FE00, (65024), General Status Acknowledge

TETRA MS	TETRA 805-870 +12.5			
----------	---------------------	--	--	--

Testing the Audio Components

AEROFLEX

- ◆ Talk-back provides a quick test of the complete path from microphone to transmitter and from receiver to earpiece or speaker

Sounds familiar!

Blah
blah
blah

Blah
blah
blah

TALKBACK
Test Tone
Silence

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Testing the audio components

AEROFLEX

- ◆ **Digitised test sound produces 1 kHz tone in the earpiece of a working mobile**
 - Enables any talkback failure to be isolated as a receive or transmit side audio fault.
 - Digitised silence allows testing for audio noise



**Sounds
like 1 kHz**

**Talkback
TEST TONE
Silence**

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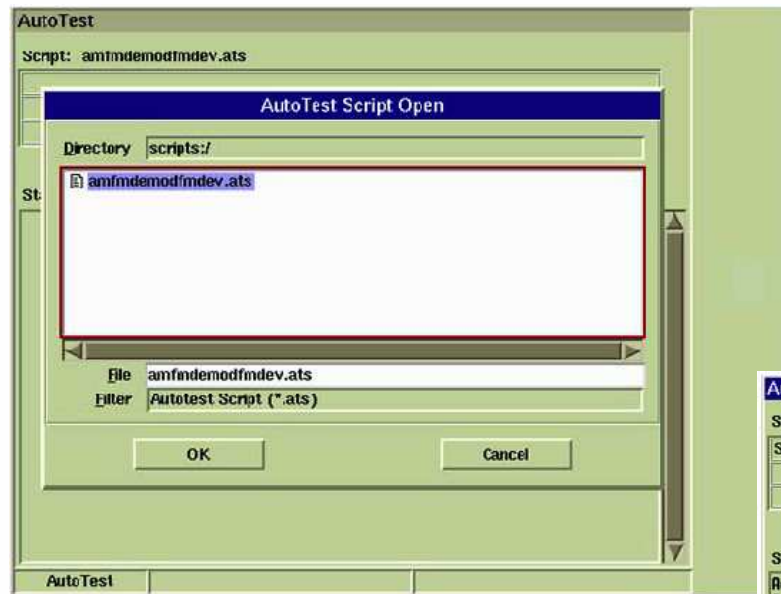
3920 Automatic Test Programs

AEROFLEX

- ◆ **Perform routine testing of TETRA terminals automatically**
 - Saves time, de-skills and standardizes procedure, records results
- ◆ **Flexible Test Scripts for Automated Testing**
 - **Functional tests**
 - ◆ Registration, call set-up, call clear down
 - **Transmitter Measurements**
 - ◆ power, power profile, frequency, timing, Modulation accuracy: vector error RMS, peak, residual carrier
 - **Receiver Measurements**
 - ◆ BER, MER, RBER
 - **Audio Measurements**
 - ◆ Talk-back, test tone, silence

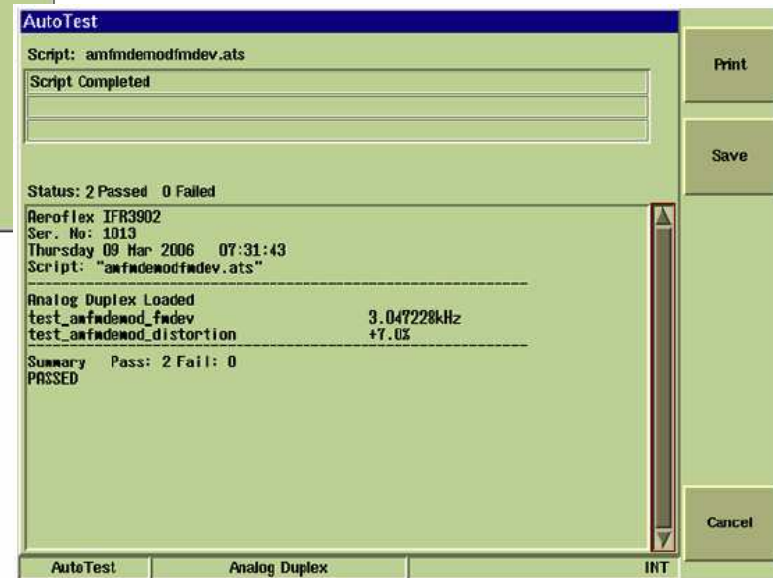
3920 Automatic Test Programs

- ◆ Flexible Test Scripts for Automated Testing :



AutoTest script loading

AutoTest script completed



3920 AutoTest Results Summary

AEROFLEX

Testpage

Script: 3901 SimpleMStest_5.scr

Script Completed

Status Pass: 11 Fail: 1

Wednesday 04 Aug 2004 09:40:26
Script: "3920SimpleMStest_5.scr"

TETRA MS Loaded
Registration

ITSI: 400/00003/00742200
GSSI: 16777215 Selected

Mobile Call ACCEPTED CH3600/3 PL04
SSI:12345678 ESN:

Audio Speech CH3600/3 -80.0dBm

Burst Timing WC CH3600/3 PL04 +0.04SYM (0.25)

Power Profile CH3600/3 PL04 (-70.0/-36.0/+06.0/+03.0)

Power Level Avg CH3600/3 PL04 +10.6dBm (+11.0/+15.0) FAIL

Freq Error WC CH3600/3 PL04 +023Hz (100)

Vect Err RMS Max CH3600/1 PL04 2.6% (10.0)

Vect Err Pk Max CH3600/1 PL04 21.2% (30.0)

Residual Carrier Avg CH3600/3 PL04 02.3% (5.0)

Test Set Clear CLEARED DOWN

Summary Pass: 11 Fail: 1
FAILED

Print

Save

Cancel

Auto Test TETRA 380-400 +12.5

Testing of TETRA Base Stations



3920 Base Station Test Option 111

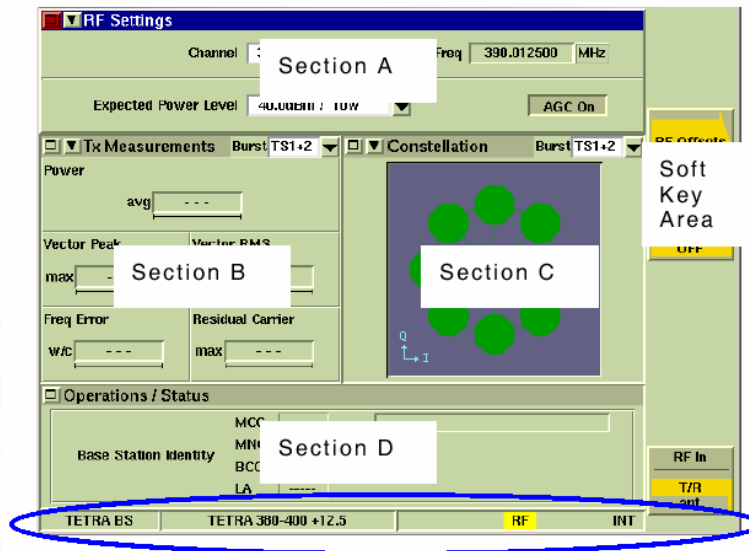
AEROFLEX

- ◆ **Tests Base Station transmitters**
 - Power, vector and frequency error, residual carrier
- ◆ **Tests Base Station receivers**
 - Generates various uplink T1 signals for BER, MER and PUEM measurement
 - Automatic synchronisation to BS Tx signal
 - External sync input allows Rx-only test
- ◆ **Off-air reception**
 - Locates and identifies base station
 - 3920 decodes BS identity: MCC, MNC, BCC and LA
 - Capture, demodulate and channel decode all four slots continuously for up to 16s

TETRA Base Station Test Tiles

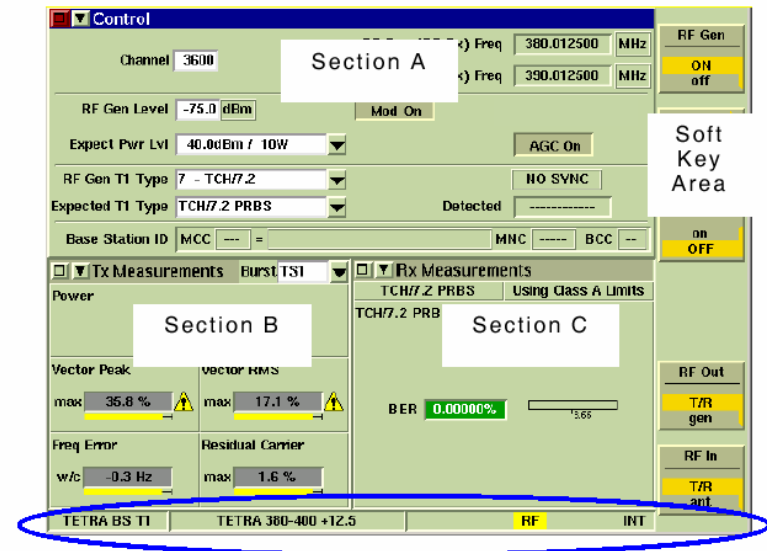


- ◆ **3920 Manual Tiled Display Mode**
 - Section A always shows the RF Settings or Control Tile .
 - Sections B and C can be configured to display Measurements Tiles
 - Section D always shows the Operations/Status Tile .
 - Section E is the information bar



Section E

TETRA BS Test Tiles



Section E

TETRA BS T1 Test Tiles

TETRA Transmitter Test

◆ BS Transmitter Test Tiles

- RF Settings Tile : configuration of the input signal
- Measurement Tiles : TX, Modulation, Channel Analyser...
- Operations/Status Tile : shows system Identity details

The screenshot displays the software interface for TETRA Transmitter Test, organized into several functional tiles:

- RF Settings:** Channel 3600, Analyzer (BS Tx) Freq 390.012500 MHz, Expected Power Level 40.0dBm / 10W, AGC On.
- Tx Measurements:** Burst TS1+2, Power avg ---, Vector Peak max ---, Vector RMS max ---, Freq Error w/c ---, Residual Carrier max ---.
- Constellation:** Burst TS1+2, a menu is open showing options: Tx Measurements, Mod Accuracy, Oscilloscope, Channel Analyzer, Audio, Debug, Vector Error, Phase Error, Magnitude Err, Trajectory, Constellation, and Rotated Vector.
- Operations / Status:** Base Station Identity fields: MCC ---, MNC ----, BCC --, LA ----.

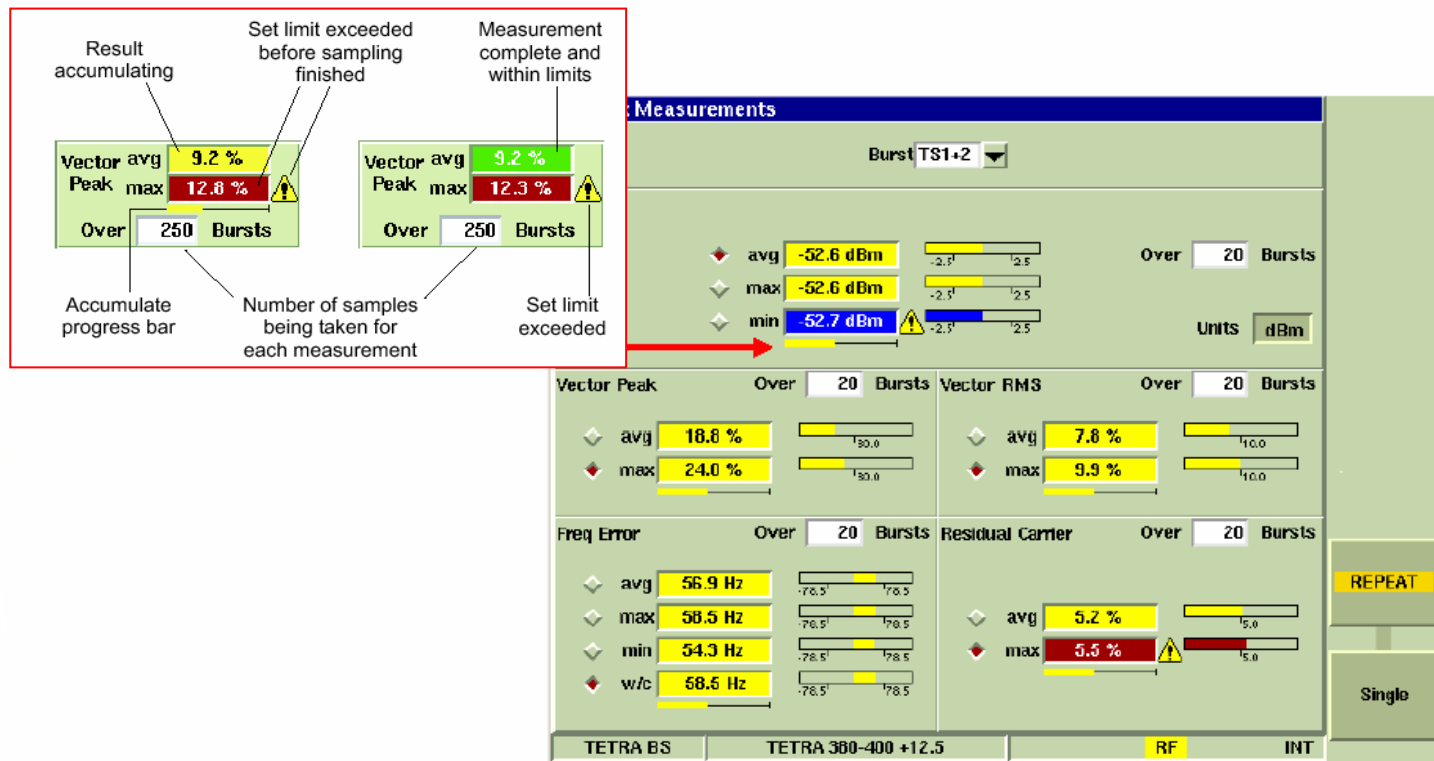
Additional controls include an 'Accumulate' button (on/OFF), a 'REPEAT' button, and a 'Single' button. The status bar at the bottom shows 'TETRA BS', 'TETRA 380-400 +12.5', 'RF', and 'INT'.

TETRA Transmitter Test



◆ TX Measurement Tile

- Shows results of Power, Vector, Frequency and Residual carrier measurements
- Maximized view can give avg, min, max values

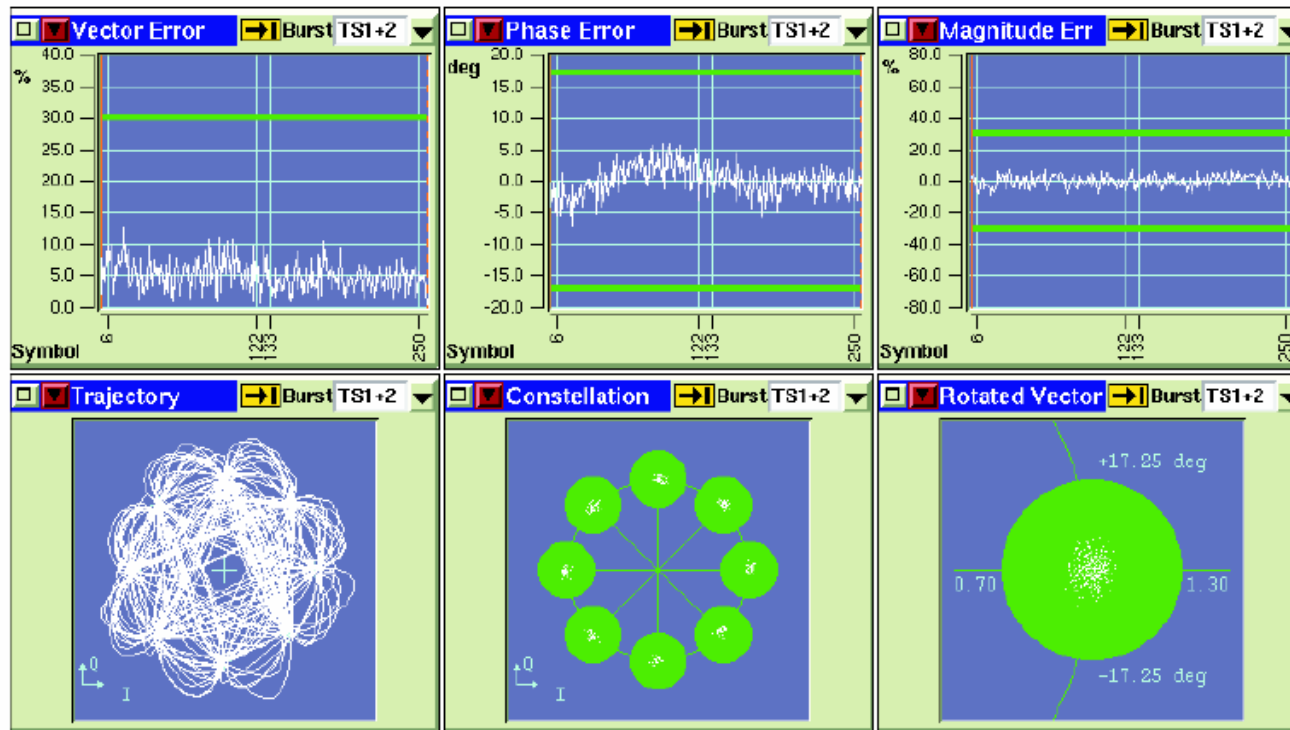


TETRA Transmitter Test

AEROFLEX

◆ Modulation Tile

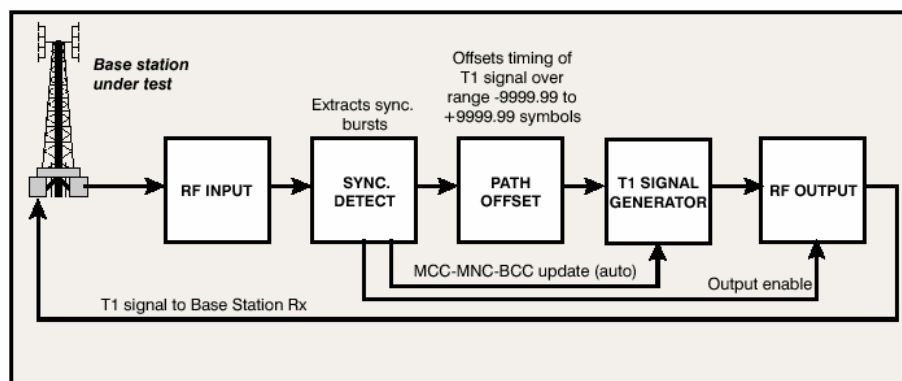
- Shows graphs of Vector error, Phase error, Magnitde error, Trajectory, Constellation and Rotated vector
- Maximized view can give avg, min, max values



TETRA Receiver Test

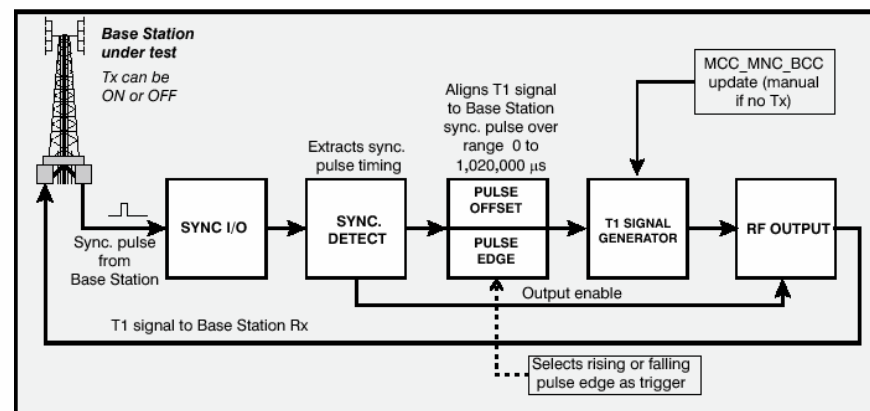
◆ T1 Synchronization Modes

The T1 Test System provides Signals (T1 Type 7, TCH/7.2 Uplink) which allow BER tests to be carried out on the receiver of the base station under test. The Test Set must be synchronized to the base station frame structure to perform BER testing.



AUTO MODE

The Test Set has two synchronization modes, Auto and Pulse



PULSE MODE

TETRA Receiver Test

◆ Control Tile

The Control Tile is used to enter the Frequency or Channel and Type of the generated T1 signal, and the Type of the expected received Signal.

Control	
Channel	3600
RF Gen (BS Rx) Freq	380.012500 MHz
Analyzer (BS Tx) Freq	390.012500 MHz
RF Gen Level	-75.0 dBm
Expect Pwr Lvl	40.0dBm / 10W
RF Gen T1 Type	7 - TCH/7.2
Expected T1 Type	TCH/7.2 PRBS
Base Station ID	MCC --- = MNC ----- BCC --

Tx Measurements	
Power	avg -23.0 dBm
Vector Peak	max 35.8 %
Vector RMS	max 17.1 %
Freq Error	w/c -0.3 Hz
Residual Carrier	max 1.6 %

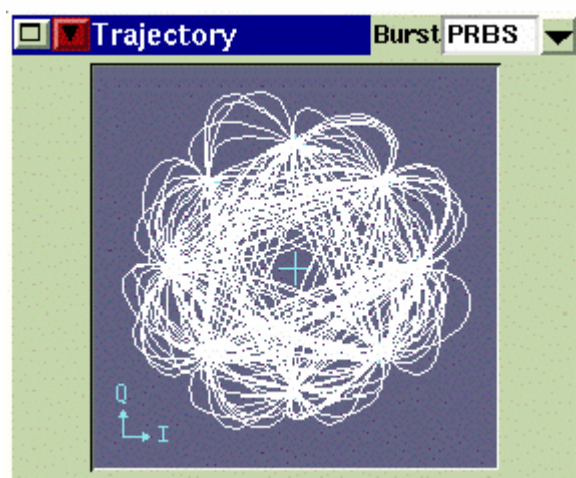
Rx Measurements	
TCH/7.2 PRBS	Using Class A Limits
BER	0.00000%

Status			
TETRA BS T1	TETRA 380-400 +12.5	RF	INT

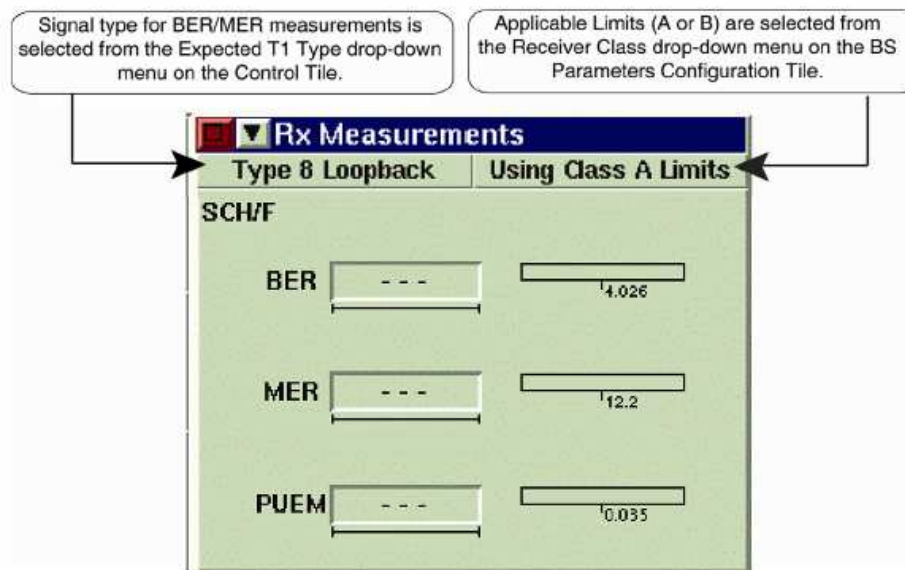
TETRA Receiver Test

◆ Measurement Tiles

There are three types of Measurement Tiles within the BS T1 Test Mode. These are the Tx Measurements Tile, the Rx Measurements Tile and the Modulation Accuracy Tiles.



Example of Modulation Tile



Rx Measurement Tile

Testing of TETRA Terminals in Direct Mode



Testing TETRA Terminal Direct Mode

AEROFLEX

- ◆ **3920 simulates a TETRA Mobile**
- ◆ **Mobile to Mobile functionality**
- ◆ **Mobile sets up a call to the test set or vice versa**
 - Private, Group, Emergency, Open Group
- ◆ **Many other functional tests can be performed**
 - Audio, SDS Text Messages Type 1,2,3,4
- ◆ **Parametric measurements on transmitter can be performed**
 - Power, burst, modulation, frequency

TETRA Direct Mode Test



◆ Operation/Status Tile

The Operation/Status Tile provides operation for call placing and message sending functions.

The Protocol History Tile records all information displayed in this Tile

RF Settings

Channel: 3600 = Gen/Ana. Freq: 380.012500 MHz

RF Gen Level: -130.0 dBm Mod On

Expect Pwr Lvl: 55.0dBm / 300W AGC On

Tx Measurements Burst: Master

Power Profile: Pass	Burst Timing: Not Applicable
avg: 29.5 dBm	
Vector Peak: avg 14.7 %	Vector RMS: avg 4.7 %
Freq Error: avg 193.5 Hz	Residual Carrier: avg 3.8 %

History

Advanced Link: No
 Minimum Mode: No
 Carrier Signaling Channel: No
 Authentication: Yes
 SCK Air I/F Encryption: No
 V-D Air Standard: ED1
 Security Standard: N/A
 Detaching All Groups
 Group Attached: 00000101 Usage: 5 - Selected
 Mobile SSI: 12345789
 Registered (ITSI Attach)
 MCCH

Operations / Status

Rx Tx MS Occupation MO call setup complete

(Mobile)ITSI: 234/00075/12345789 (True) GTSI: 234/00075/00000101

Call Type: Group, Clearmode, Pri 0 Normal, Pre-empt Not Allowed

Called ID: 234/00075/00000101

TETRA DM | TETRA 380-400 +12.5 | VNC | INT

History

Power Control: Allowed
 Encrypt. Class: Clearmode

14:42:04 MS Transmission Started
 14:42:05 Released, MS requested disconnect
 14:42:05 MS Transmission Ceased

14:42:05 Quiet Channel
 14:42:05 MO call setup complete

14:42:05 MS Occupation

Call Type: Group, Clearmode, Pri 0 Normal, Pre-empt Not Allowed
 Called TSI: 234/00075/00000101
 MS-ITSI: 234/00075/12345789 (True)
 GTSI: 234/00075/00000101
 Power Class: 4
 Power Control: Allowed
 Encrypt. Class: Clearmode

14:42:05 MS Transmission Started
 14:52:09 Released, MS requested disconnect
 14:52:09 MS Transmission Ceased
 14:52:09 Quiet Channel
 14:53:44 MO call setup complete
 14:53:44 MS Occupation

Call Type: Group, Clearmode, Pri 0 Normal, Pre-empt Not Allowed
 Called TSI: 234/00075/00000101
 MS-ITSI: 234/00075/12345789 (True)
 GTSI: 234/00075/00000101
 Power Class: 4
 Power Control: Allowed
 Encrypt. Class: Clearmode

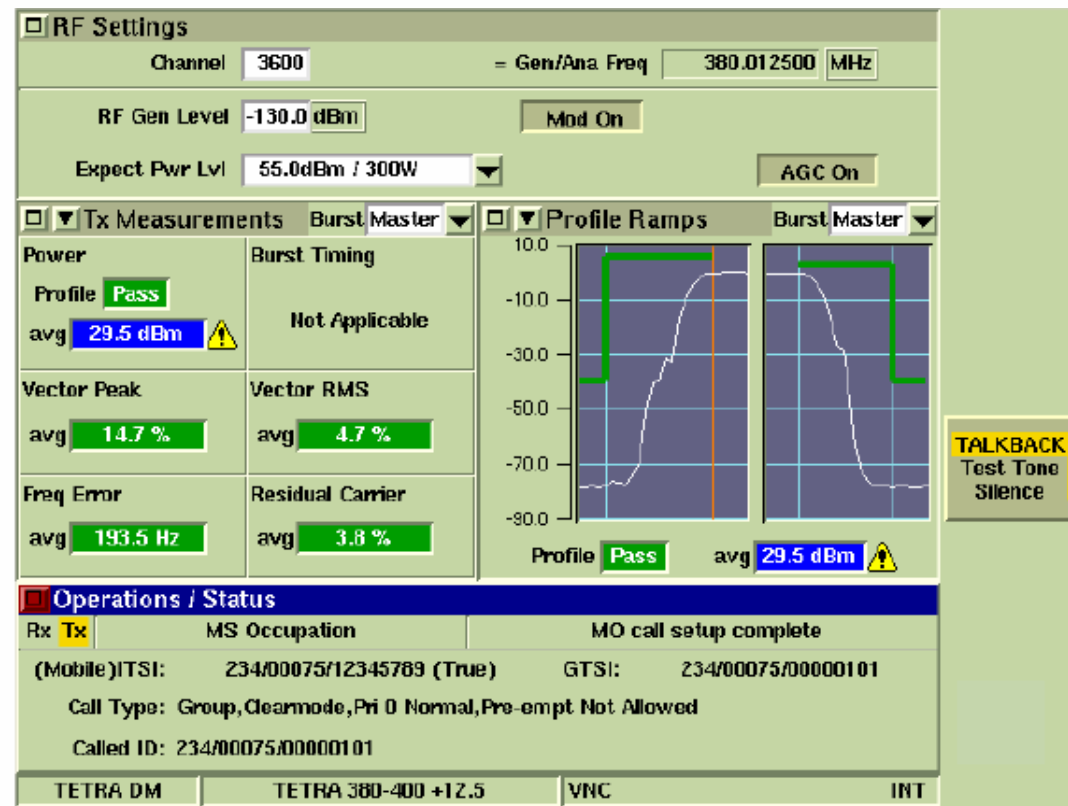
14:53:44 MS Transmission Started

TETRA DM | TETRA 380-400 +12.5 | VNC | INT

TETRA Direct Mode Test

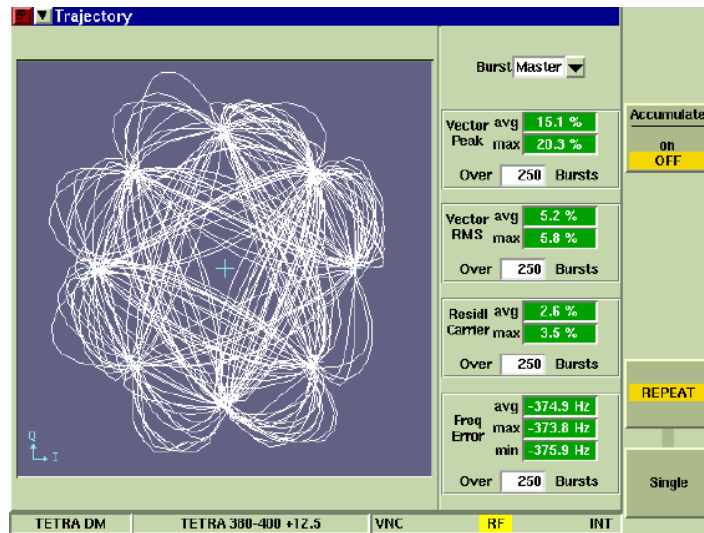
◆ Measurement Tiles

- TX Measurements
- Power : Profile Full, Ramps, Initial

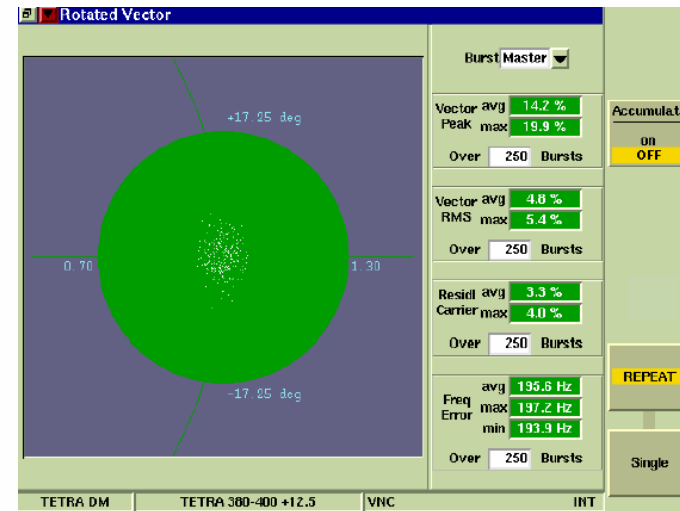


TETRA Direct Mode Test

- ◆ **Measurement Tiles**
 - Modulation Accuracy



Trajectory Tile



Rotated Vector Tile

<http://www.aeroflex.com/...>



- ◆ **Data sheet, brochures**

- ◆ **Manuals (PDF)**
 - Operating manual
 - Programming manual

- ◆ **Software downloads**
 - Latest versions
 - Installation instructions

- ◆ **Online Training**

Online Training

Description	Date	Version	Part Number
3900 Series Interactive Courseware	05/04/2008	1.0	
Online Training: Capturing Screen Shots from the Aeroflex 3920	11/19/2007		
Online Training: Measuring CTCSS (PL) on FM Radios	11/19/2007		
Online Training: Measuring Voice Modulation on FM Radios	11/19/2007		
Online Training: Using the Tracking Generator to Sweep a Duplexer	11/19/2007		

<http://www.aeroflex.com/...>



- ◆ **Application notes**

Description	Date	Version	Part Number
Evaluating and Operating the IFR 3901 - a guide for existing users of the IFR 2968 TETRA Radio Test Set (236 kb)	01/01/2005	Issue 1	46891/940
Example AutoTest Scripts for the IFR 3900 Series Test Set (7 kb)	06/22/2005		
IFR 3901 Frequently Asked Questions (405 kb)	10/01/2004	Issue 1	46891/932
PXI-based Radio Communications Testing (436 kb)	05/01/2008	Issue 1	46891/970
Testing TETRA mobiles with the IFR 3901 (287 kb)	10/01/2004	Issue 1	46891/931
TETRA MS AutoTest Scripting for Aeroflex IFR 3900 Series Test Sets (247 kb)	06/22/2005	Issue 1	46891/945
Using the Aeroflex 3900 Series for Remote Site Monitoring (735 kb)	04/20/2006	Issue 1	46891/951

- ◆ **Articles, News, Product information**
 - TETRA backgrounder