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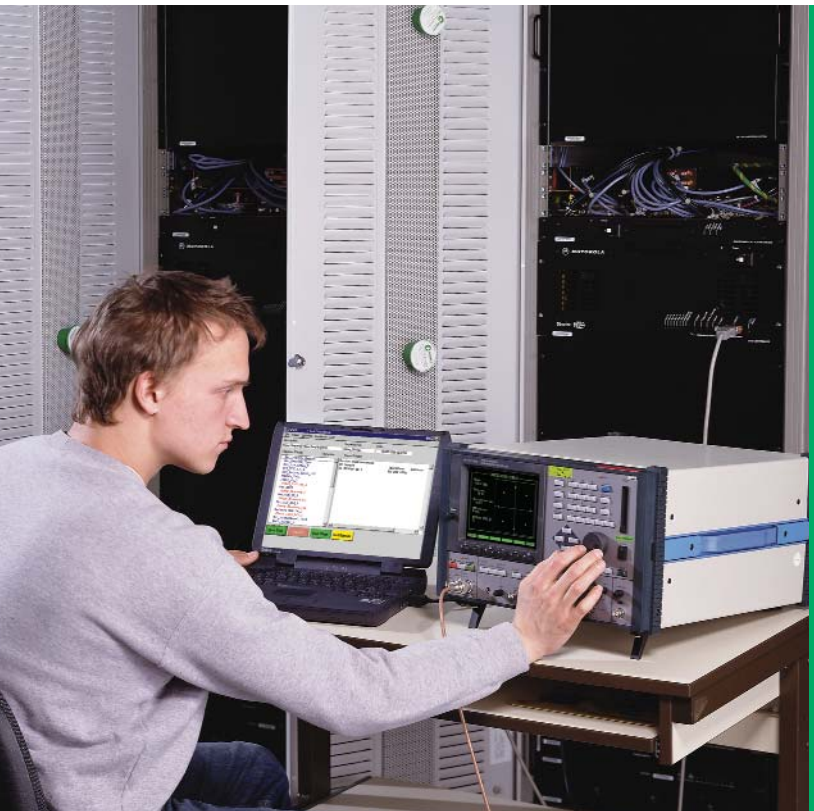
Willtek 4032

STABILOCK® TETRA Base Station Testing



All in one instrument:
Hand-carry signal generator and analyzer to base stations.

Easy fault finding:
Find problems and their sources quickly through graphical representation of measurements:
constellation diagram, modulation spectrum, power display.

Test analog and digital trunking base stations using the same instrument:
Just load the test software option for MPT 1327 or LTR systems to check base stations for these systems!

Installing and maintaining TETRA base stations (BS) correctly is key to the success of operating a network for emergency services, private access mobile radio or even military: When profit or safety rely on fully operational equipment, you will want to ensure proper installation at reasonable cost.

Comprehensive validation of RF performance

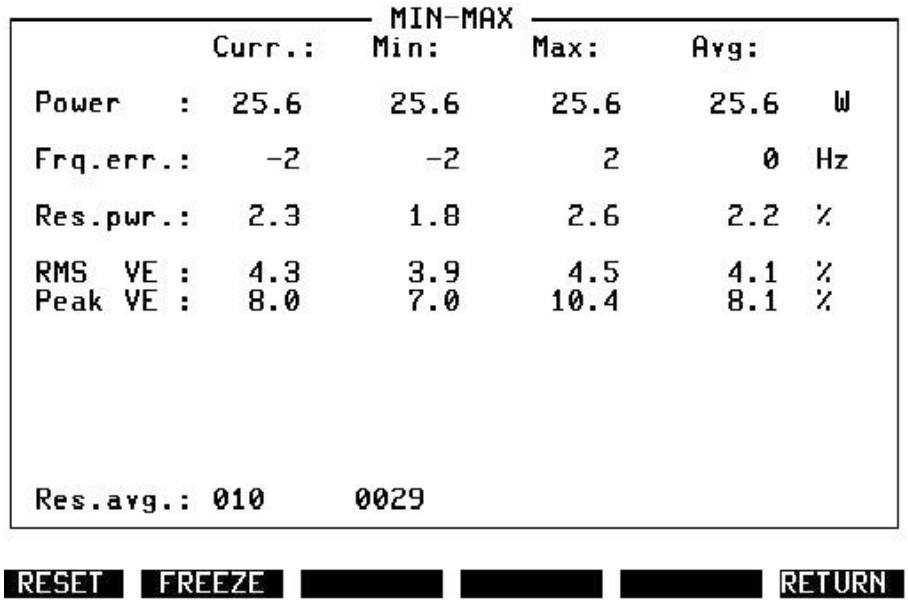
The most important RF parameters and their variations over time can be viewed easily on the MIN-MAX mask. Intermittent spurious signals can be identified from the base station transmitter. The constellation display shows how the transmitter of a TETRA base station matches the specified symbol points. Regarding the power display, the power ripple can be checked against a user-definable power/time template.
The receiver is tested using bit error rate (BER) measurements with variations of power level. This is supported by 4032 transmitting appropriate test signals (patterns).
The built-in wideband spectrum analyzer allows you to easily identify the base station carriers and any eventual spurious emissions. When the carriers have been found, TETRA measurements can be made on the selected frequency channels: power frequency error and modulation characteristics can be examined.

While the basic mask allows to enter the relevant parameters and shows all numerical results at a glance, there are more screens available for additional detailed analyses: Variations of results over time, variations of the power level over time (within a timeslot and at the edges) either for continuous or bursted signals.

The constellation display gives an easy overview of the modulation quality and allows to identify potential sources for errors, such as I/Q imbalance or DC offset.

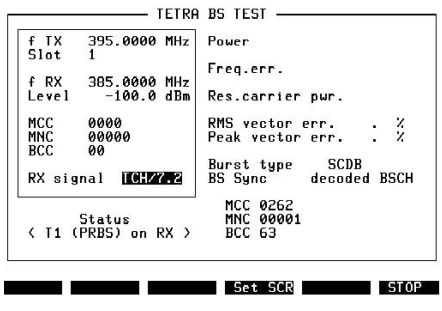
Alignment & repair

Tracing the result does not stop at fault finding. The 4032's power level accurate measurement capability allows AGC and output power amplifier of the base station to be calibrated. The constellation display helps in determining the position of the scattered measurement points and gives you an indication whether the I/Q modulator has a DC offset, a phase shift of more or less than 90° between I and Q or different amplitude between I and Q.



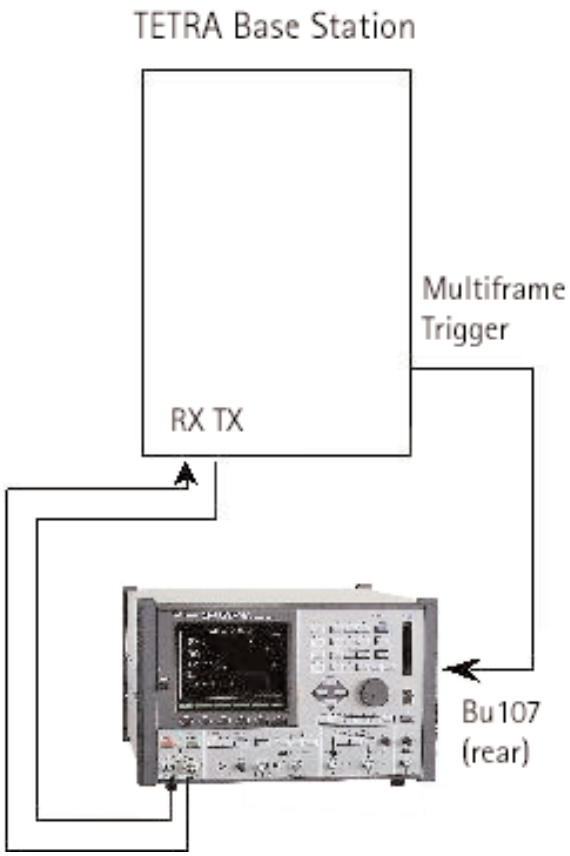
Fault detection in depth

For a fast Go/NoGo result, the TETRA BS Test option offers a test screen where all major quality parameters are combined. In case of a failure, the STABILOCK 4032 can be used to trace the fault and its cause.



Receiver sensitivity

Any duplex RF system requires testing of the transmitter as well as the receiver. The latter is usually tested by applying a signal with a known characteristics at very low (or very high) power levels, and trying to find that characteristics again in the received signal. In the case of systems transmitting digital signals, this is usually done with a pseudo-random bit sequence (PRBS). The receiver may return the received bit sequence to the test equipment, or count the erroneous bits itself. The latter method is supported by the 4032, by providing the PRBS signal required to take the BER measurement within the base station under test. Additional bit patterns are available for test purposes and receiver alignment.



Synchronisation to a base station not a reliability issue!

Taking transmitter measurements from a base station is only a key press away – there is no need for synchronisation, call setup and the like. But when it comes to receiver testing, the test set must adjust its timing to that of the base station. This can be achieved in two ways:

1) Software synchronisation

The 4032 reads the BS timing, together with the scrambling parameters (MCC, MNC, BCC) off the RF interface, without the need of an additional interface.

2) Hardware synchronisation

Makes use of a trigger signal (TTL) usually available at the base station. The trigger signal indicates the start of a new multi-frame and so the STABILOCK can base its timing on this TTL signal, which can be assumed to be very stable.

The TETRA BS Test option gives you the choice of selecting either hardware or software synchronisation.

Universal communication test set

If you previously purchased a STABILOCK 4032 for tests on equipment conforming to MPT 1327, your decision to buy the STABILOCK still proves right: You can upgrade your test set to TETRA without losing the analog test capabilities. Switching between the two systems is possible by loading the appropriate system software available on a memory card. The same applies if you want to switch between TETRA BS and MS Test.

Specifications

Temperature range	+10 °C to +45 °C

TETRA Signal Generator:

Frequency range

with TETRA-FEX Package	100 to 1000 MHz
Resolution	0.1 dB

Output power

RF socket (N-type)	–130 to –20 dBm
RF DIRECT socket (TNC)	–110 to 0 dBm
Resolution	0.1 dB
Accuracy (N-type socket, P > –115 dBm)	1.5 dB

Modulation

π/4 differential quadrature phase shift keying (DQPSK)	
Roll-off factor α	0.35
Symbol rate	18 k symbols/s
RMS vector error	< 0.12
Generated patterns (bursted)	T1:TCH/7.2 T1:SCH/F
Generated patterns (continuous)	PN-9 various (0000, 1111, etc.)

TETRA Analyzer[1] :

Frequency range

10 MHz coupling with generator frequency	100 to 1000 MHz

Power measurement

(N-type connector only)	
Range	+15 to +45 dBm
Resolution	0.1 dB
Accuracy (P > 20 dBm)	1.0 dB
Indications	current, min., max., average

Frequency error measurement

Resolution	1 Hz
Accuracy (P > 15 dBm)	5 Hz + ref. osc. accuracy
Indications	current, min., max., average

Vector error measurement

Resolution	0.001
Accuracy (rms meas.)	0.03
Indications	current, min., max., average

Residual carrier measurement

Resolution	0.1 %
Accuracy	0.3 %
Indications	current, min., max., average

Constellation display

Display modes:	dots, lines, statistics continuous, freeze

Additional measurements

power
RMS vector error
residual carrier power
frequency error

Burst power display

Reference	average power over burst
Template	user-definable with pass/fail indication
Horizontal range	350 symbols
Display modes	continuous, freeze TETRA-filtered, unfiltered

Modulation spectrum display

Reference	average power over burst
Display modes	TETRA-filtered, unfiltered
Additional measurements	absolute power over burst relative power at 0, ±12.5, ±25 kHz

TETRA Synchronisation:

Software Synchronisation

Synchronises to Main Control Channel, reads MCC/MNC/BCC

Hardware Synchronisation

Synchronises to Frame or Multiframe TTL trigger signal	
Manual timing adjustment	±510 symbols

Ordering Details:

STABILOCK 4032	M 108 802
Option TETRA-FEX Package Base Station Test	M 248 366

[1] Analyzer specifications only valid for test signals on
N-type socket with
- Frequency error < 1 kHz
- RF power 0 to 46 dBm
- RMS vector error < 0.10
- Residual carrier power < 10%
- At least 20 symbol changes available

Note: Specifications, terms and conditions are subject to change without prior notice.

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