

Highlights

- Rugged, Lightweight & Hand-Held Universal Analog/Digital Test Set
- Analog/Wideband TIMS, Signaling/Digit Capture, Digital Subscriber Line (DSL), Digital Data Services (DDS), DS0, BRI-ISDN & T1/FT1
- Basic and Wideband Transmission Impairment Measuring Set (TIMS) to 1.5MHz with Nyquist Tones, Load Coil Detection, E, F and G Filters for DSL/High bit-rate Digital Subscriber Line (HDSL) Noise/Impulse Noise Measurements and Return Loss
- Signaling Package for DID-PBX, Station & Central Office (CO) Emulation, Digit Analysis & Wink Timing with Optional Types I-V E & M. Ideal for E911 and related services
- Enhanced "Class Services" Caller & Name ID Package
- Versatile DDS Test Package with 4-Wire DEMARC, DS0-OCU and DS0-DP, T1 and DTE/DCE Test Interfaces, including RS-232, V.35, RS-449 and RS-530
- T1/FT1 Test Package features single keystroke BERT Testing Setup

Unique Features

All Models (704A-PKG2, -PKG3, -NTS1 & -NTS2)

- Load Coil Testing
- Pre-Programmed DSL Nyquist Frequency Tones
- Single-screen readout of both TX & RX Frequencies and levels
- CO & PBX Switch Emulation
- Includes E, F & G Filters for DSL/HDSL Noise/Impulse Noise Measurements

704A-PKG2, 704A-NTS1 & 704A-NTS2

- Package includes OCU Emulation
- Tests all DS0 logical network elements
- Provides sealing current
- Bursty-mode BERT for intermittent faults
- 4-Wire DDS Interface
- Built-in CSU/DSU

704A-PKG3, 704A-NTS1 & 704A-NTS2

- Quick-view of T1 signal power level
- All required BERT patterns & loopbacks, including HDSL, Fractional T1 testing interface, jitter buffer and CSU line build-out
- DSX Equalizer "At-A-Glance" circuit analysis
- CO & PBX Switch Emulation
- Comprehensive T1/FT1 Test Functions with CSU Emulation
- One keystroke setup for Monitoring or BERT Testing
- CSU, NIU, V.54 & ADTRAN HDSL/PairGain Loop Codes with Automatic Arming

704A-NTS1 & 704A-NTS2

- Performs full Analog Transmission and Signaling, DDS CO, DDS Field, Fractional T1 and Broadband TIMS
- Built-in CSU for T1/DDS in single package without changing modules
- All capabilities already installed and ready for use
- Perfect for roving CO technicians and Special Services field technicians



Additional Features

All Models

- Send/Receive Tones manual or Pre-Programmed
- 3-Tone or Broadband Sweeps
- Message Noise
- Notched Noise
- Signal-to-Noise
- Impulse Noise
- Analyze MF/DTMF Signals
- Filters: C-MSG; 3KHz; 15KHz; Program, E, F & G
- Measure Loop Voltage/Current
- Measure Sealing Current
- Dial & Hold
- Return Loss, 105/110 Responder Automated Trunk Testing, One-Touch 2713Hz Loopback Tone Mode, 23-Tone Auto-Test for Signal Level, Envelope, Gain Slope, Envelope Delay, Intermodulation Distortion, Signal-to-Total Distribution, Signal-to-Noise Ratio
- Emulates CO or PBX switch at the MDF or NID
- TX/RX Nyquist tones and load coil detect from 4-Wire DDS interface

The **Halcyon 704A Packages™ Universal Data Test Sets (704A-PKG2, 704A-PKG3, 704A-NTS1 and 704A-NTS2)** are hand-held integrated test sets optimized for analog and digital telecommunications. The users for all models consists of DS0/DS1, Central Office (CO), Digital Operations Group (DOG), Special Services, and CO/OSP Construction Technicians. The Test Set for all models are digital and analog with real digital emulation, digital loop qualification features and emulation for CO and PBX switches. All models perform full-service broadband TIMS and data tests. Each model's primary purpose is data testing and qualification of facilities for DSL Services, Analog Special Services and DID trunk testing, including Single-screen measurements for Pre-Wink, Wink and Answer Delay parameters.

Halcyon 704A Packages

The **704A-PKG2**, **704A-PKG3** and **704A-NTS1** include the above mentioned functions; the 704A-PKG2 also functions as a DDS Test Set; 704A-PKG3 functions as a T1/FT1 Test Set and the 704A-NTS1 functions as a DDS and T1 Test Set.

Applications Services Tested

All models perform the following Services Tested: DSL Circuits (E, F and G Filters for Noise/Impulse Noise Measurement), DDS (2.4kb to 56/64kb), POTS, Analog Special Services and PBX Trunks (with CO/PBX Emulation). The **704A-PKG2**, **704A-NTS1/-NTS2** can be substituted for a Central Office (CO) switch or PBX. These models include OCU Emulation with sealing cur-

rent and test Switched 56 Services. The **704A-PKG3** and **704A-NTS1/704A-NTS2** include the addition of testing comprehensive T1/FT1 test functions.

Facilities Tested/Qualified

All models perform Facilities Tested/Qualified. These categories include the following: Cable Pairs, DS0 Crossconnects, HDSL, ADSL, ISDN and POTS Facilities Testing, Smartjack testing, customer wiring and CSU (cross-office and inter-office) testing. The **704A-PKG2** includes Office Channel Unit (OCU) testing. The unit also test all active circuit elements (even into other Telco CO) from the OCU.

Specifications

IMPEDANCES

- Analog: 100, 135, 600, 900, 1200 Ohms and Bridged
- DDS/T1: 135 Ohms, Monitor
- T1/FT1: 100 Ohms Terminated, Monitor and Bridged

INTERFACES

- All Models: 2- or 4-Wire RJ-11, Dual Bantam (210) connector
- 704A-PKG2: Include 4-Wire RJ-48S, DS0 Bantam, DB9 for Bit/Byte Clock
- 704A-PKG3 & 704A-NTS1: Dual Bantam and RJ-48C. Two receivers for timing slip testing

INTERFACES (DDS ONLY)

- OCU Emulation: 4-Wire Loop 8-pin modular RJ-48S
- Sealing Current Supply: -24 VDC, limited to 20mA_{max}
- 4-Wire Interface: DDS standard 8-pin modular RJ-48S
- RS-232 Interface: OPT-H3/H5
- V.35 Interface: OPT-H3/H5
- RS-449 Interface: OPT-H3/H5
- RS-530 Interface: OPT-H5
- Operating Modes: CSU/DSU emulation, SW56K, 64K Clear, Primary and Secondary channels (fully independent)
- Primary Channel: DDS standard 8-pin modular RJ-48S
- Secondary Channel: Bellcore TR-NPL-000157
- Loop Rates: 2.4, 3.2, 4.8, 6.4, 9.6, 12.8, 19.2, 25.6, 56.0 and 72 (64)Kbps
- Termination: 135 Ohms impedance (AT&T Publication 62310)
- Cable Gauge: 19 to 26 AWG

CLEI CODES

- DDS: TETMAAG7AA, DDETEAFFJAA
- TIMS: TETMAAE7AA, TETMAAF7AA

PHYSICAL

- Dimensions (L x W x H): 9.5-in x 6.33-in x 3.31-in
- Weight: 4 lbs.
- Battery: 4 Hours continuous operation from the internal 7.2 VDC NiMH pack. Charge time: 14 hours
- Battery Charger/AC Adapter: Input 120 VAC, Output 9 VDC, 1A, Power connector negative shell, positive center conductor
- Power: Input 120 VAC or Internal NiMH Rechargeable battery. Operate Time > 4 Hrs.
- Operating Environment: 32° to 122°F (0° to 50°C), 0 to 95% R.H. (Non-Condensing)
- Power Requirements: 4 Watts at 115 VAC, 60Hz nominal; Output 9 VDC external DC power supply. Internal 7.2 VDC NiMH pack
- Audio & Display: Built-in speaker with volume control. Display is LCD (4 line x 20 character)

PHYSICAL (TIMS ONLY)

- Longitudinal Balance: Better than 60dB from 200Hz to 1.5MHz
- Line Hold: Electronic, internally current limited to 24mA on either the 2W or 4W-XMT port when Off-Hook

PHYSICAL (TIMS ONLY) (CONTINUED)

- Dial: 16 Character DTMF generation, 12 character MF generation, 10 digit Dial Pulse generation
- Measurements: Level (dBm), Frequency, Weighted Noise, Notch Noise, Signal to noise ratio, Impulse Noise, Return Loss, 23-Tone Sequence (RMS level/frequency, individual level/frequency, IMD, EDD, S/TD, SNR), Advanced Caller ID CND/CNAM (optional), Line voltage, current and ring voltage, Load Coil Detect, MF/DTMF/Dial Pulse analysis

TIMS

SIGNALING

- Signaling Interfaces: Emulate network and terminal end of Loop Start, Ground Start, Direct Inward Dial, E&M I-IV, Originate or terminate call, Analyze digits, perform transmission tests
- Signaling Modes: MF/DTMF/Dial Pulse analysis
- CO Emulation: Wink start or immediate start
- Measurements: Pre-wink, wink duration and answer delay for up to 999ms with 1ms resolution
- Loop Current Detection: Loop current detector must exceed 20ms to detect a valid off-hook state
- DTMF Generation: Transmit level of -7 ±0.2dBm, with 1.5dB twist
- MF Generation: Transmit level of -7 ±0.2dBm
- Dial Pulse Generation: -10 Pulses per second with 60% break and 250mS inter-digit time
- PBX Emulation Mode: Wink start or immediate start with pre-wink time of 1 sec and wink duration of 250mS ± 2mS
- Measurements: Up to 9999mS maximum post wink time with 1mS resolution and ± 1mS accuracy
- Battery Feed: -48 VDC 400 ohm DC feed limited to 24mA
- MF Receiver: All 15 valid MF tones received at levels as low as -30dBm
- DTMF Receiver: 16 digit receiver (1-9, 0, A, B, C, D, *, #)
- Dial Pulse Receiver: 12 digit receiver (1-9, 0, *, 3) Range is from 3 to 29 pulses per second with a 10 to 90% break

DTMF ANALYSIS

- Frequency Meas: A high/low group frequency accuracy of ±3Hz with 1Hz resolution
- Level Meas: A high/low tone group range accuracy of +1.5 to -28dB with 0.1dB resolution and ±0.5dB accuracy
- Timing Meas: 1mS to 65.5 seconds with 1mS resolution and ±1mS accuracy
- Tone Acceptance: Maximum twist of ±10 dB with 35 mS minimum tone duration. 18 dB maximum dial tone level tolerance

CLASS SERVICES TESTING (OPTIONAL)

- Enhanced Caller/Name ID: Test Functions
- Timing Measurements: 1mS to 60 seconds with 1mS resolution and ±1mS accuracy
- Receiver Sensitivity: Carrier must be received at -45dB minimum receiver sensitivity
- FSK Data Detection: Continuous phase coherent FSK detection (1200/2200Hz ±1%) @ 1200 BPS
- Ring Voltage Measurements: 40 to 140 VAC with 1 volt resolution and ±2V accuracy

Halcyon 704A Packages

GENERATOR

- Variable Tone: Frequency adjustable from 50Hz to 1.5MHz in 1Hz steps; accurate to within ± 0.5 Hz
- Fixed Tones: Program 50Hz, 100Hz, 1kHz, 5kHz, 8kHz, and 15kHz. (transmit level fixed at 0.0dBm)
- ADSL Tones: 28kHz, 40kHz, 48kHz, 82kHz, 196kHz, 392kHz (level adj. +13dBm to -40dBm)
- Wideband Sweep: 400Hz to 3200Hz in 200Hz steps, 4800Hz, 8000Hz, 28kHz, 32kHz, 36kHz, 48kHz, 80kHz, 82kHz. Level adjustable from +13dBm to -40dBm
- 3-Tone Slope: 404Hz, 1004Hz, 2804Hz, each at ± 0.5 Hz. Level adjustable in 4 steps of 0, -10, -13 and -16dBm ± 0.2 dBm
- 2713Hz Loop Back: Generated at ± 0.5 Hz. Level adjustable as in 3-Tone Slope
- Level Accuracy: 600/900/1200 Ohms mode ± 0.1 dB from 400 to 10,000Hz; ± 0.5 dB from 200 to 30,000Hz
- 100/135 Ohm 4W Mode: ± 0.2 dB from 400 to 30,000. Optional wideband 135 Ohms; ± 0.5 dB from 250 to 1.5MHz. Level adjustable from +13dBm to -40dBm in 0.1dB steps
- 23-Tone Test: Generate 23-Tone sequence per IEEE-1995 at -6dBm to -40dBm. Measures individual frequencies and level, RMS composite tone, IMD, EDD, S/TD and S/NR
- Return Loss: Continuous generation of band limited noise signal sent at -6 ± 1.0 dBm in each of three bands
- DTMF Generation: XMT level of -7 ± 0.2 dBm, w/1.5dB twist: freq Accurate to -0.5 Hz, 75mS on, 75mS off

RECEIVER

- Level Accuracy: +13 to -72 dBm
For 600, 900 and 1200 Ohms impedance:
 ± 0.2 dB from 200Hz to 20,000Hz
For 135 and 100 Ohms impedance:
 ± 0.5 dB from 1,000Hz to 600,000Hz and ± 1 dB from 600,000Hz to 1,500,000Hz
- Frequency: For 50 to 1,500,000 Hz, frequency measurement accuracy is ± 1 Hz resolution with 0.005% accuracy with 1Hz resolution
- Noise: 15 to 95dBm with 1dBm resolution and ± 1 dBm accuracy from 20 to 90dBm
- Noise Filters: C-MSG, 3KHz Flat (D), Program, 15KHz Flat and E, F and G
- Notched Noise: 1010Hz notch, with a minimum of 50dB attenuation in the band of 995 to 1025Hz
- Signal to Noise Ratio: Holding tone (1004Hz) must be in the range of +6 to -45dB: Measured S/N ratio range from 10 to 55dB with 1dB resolution and ± 2 dB accuracy
- 3-Level Impulse Noise: Threshold can be set from 30 to 90dBm: 3 level difference fixed at 4dBm with a measurement accuracy of ± 1 dBm. Blanking interval fixed at 125ms with 3 independent counters
- 23-Tone Test: Generate 23-Tone sequence per IEEE-743 (1995 Edition) at -6dBm to -40dBm. Measures individual frequencies and level, RMS Composite Tone, IMD, EDD, S/TD and S/NR
- Return Loss: Three bands: ERL, SRL-HI, SRL-LO; Range of 0 to -30dB with 1dB resolution and ± 1 dB accuracy. Continuous generation of band limited noise signal sent at -6 ± 1.0 dBm in each of 3 bands
- Line Voltage Measurement: 2 to 85 VDC; 0.1 V resolution and ± 1 V accuracy
- Line Current Measurement: 10 to 80mA; 0.1mA res. and ± 1 mA accuracy

DDS

DSO/DTE INTERFACE

- DSO & Bipolar Interface: Dual 'Bantam'
- DSO & Bipolar Clock Interface: 15-pin HD D-sub
- DSO Rates: 2.4, 4.8, 9.6, 19.2, 38.4, 56.0, 64Kbps
- DSO Transmit Signal: '0': $0.7 V_{max}$, '1': $3.5 V_{min}$
- DSO Receive Signal: '0': $0.9 V_{max}$, '1': $1.6 V_{min}$
- Bipolar Rate: 64Kbps
- Bipolar RCV & XMT Signals: '0': $0.9 V_{max}$, '1': ± 3.5 to ± 5.5 V

DDS (CONTINUED)

DSO/DTE INTERFACE (CONTINUED)

- DTE Interface: *OPT-H3* provides RS-232, RS-530 and CCITT V.35 Interface; *OPT-H5* provides RS-449, adapter, in addition to RS-232, RS-530 and CCITT V.35 Interface
- Receiver Sensitivity: Subrates: -34, -40dB, 56 and 72 (64)Kbps: -48dB
- Signal amplitude: 9.6 and 12.8Kbps: $1.66 V_{max}$; All other rates: $3.32 V_{max}$
- Band Rejection: C-message filter (AT&T Publication 62310)

FREQUENCY

- Frequency Generator: 10 to 90kHz $+0.5$ %
- Frequency Measurement: 0 to 90kHz $+0.25$ %
- Frequency Jitter Tolerance: $+5$ %

MISCELLANEOUS

- Cable Lengths: 0 to 1500 feet
- Pulse Width: 15.6ms nominal
- Pulse Amplitude & Wide Ratios: ± 5 %
- Clock Modes: Network (slave), Internal (master) and External (DTE)
- Metallic Test Aids: Short, R-R1 and T-T1, R1-T1 and 135 Ohms quiet termination
- Load Coil Detect: Auto Detect up to 3 Load Coils, Range: Facility Loss < 45 dB

T1/FT1

TRANSMITTER

- T1 Interface: *SIDEA* - Bantam Transmit and Receive in parallel w/ RJ-45
SIDEB - (Reference Input) Bantam jacks
- T1 Signal Format: DS1 PCM, 1.544MHz ± 50 Hz
- Operating Modes: Full T1 or Fractional T1 Nx56/64 DS0 DS1 Signal
- Waveshape: Meets T1.403 specifications
- DS1 Line Level: 0 ± 0.2 dBdsx (6.0 V p-p)
- Line Codes: AMI, B8ZS
- Clocksource: Recovered from Receiver or internally generated 1.544MHz ± 30 Hz
- Framing: SF, ESF, SLC-96, Unframed
- FT1 Fill Date: Idle code (7F) sent in unused DS9 time slots
- Test Patterns: QRSS, 2047, 2¹⁵-1, 2²⁰-1, 2²³-1, 3 in 24, All 1s, All 0s, Alt 1/0, 2 in 8, 1:7, 63 and 511
- Error Injection: Single bit or streamed BER at 1e-3, 1e-4, 1e-5, 1e-6 or 1e-7
- Line Build Out: 0, -7.5, -15, 22.5dB
- DSX Pre-Equalizer: 5 steps for cable lengths to 655 feet

ANALYSIS MODES

- BERT Analysis: Bit Errors (BE), Errored Seconds (ES), Bit Error Rate (BER), %Error Free Seconds (%EFS), Severely Errored Seconds (SES), % Severely Errored Seconds (%SES), Elapsed time

Halcyon 704A Packages

Ordering Configurations

| Model | Description |
|------------------|---------------------------------------------------------------------------------------------------------------------------|
| 704A-PKG2 | Wideband 1.5MHz TIMS & Signaling Package with enhanced DDS Test Functions. |
| 704A-PKG3 | Wideband 1.5MHz TIMS & Signaling Package with T1/FT1 Test Functions. |
| 704A-NTS1 | Wideband 1.5MHz TIMS & Signaling Package with enhanced DDS Test Functions and T1/FT1 Test Package. |
| 704A-NTS2 | Wideband 1.5MHz TIMS & Signaling Package with enhanced DDS Test Functions, T1/FT1 Test Package and BRI-ISDN Test Package. |

| Option | Description |
|---------------|-----------------------------------------------------------------------------------------------------------|
| OPT-C | Adds T1/FT1 Test Functions to 704A-PKG2. (Factory Retrofit) |
| OPT-H | Adds enhanced DDS Test Functions to 704A-PKG3. (Factory Retrofit) |
| OPT-H3 | Adds DTE/DCE Test Suite with RS-232, V.35 & RS-530 Test Functions to 704A-NTS1/NTS2 & 704A-PKG2. |
| OPT-H4 | Adds Remote Control Test Interface to 704A-xxx Test Set platforms. |
| OPT-H5 | Adds DTE/DCE Test Suite with RS-232, V.35, RS-449 & RS-530 Test Interfaces to 704A-NTS1/NTS2 & 704A-PKG2. |
| OPT-N | Adds BRI-ISDN Test Functions to 704A-NTS1 Test Set. (Factory Retrofit) |

Please contact CXR Telcom for any further clarification on any of the 704A Universal Data Test Set packages.