

Leading Edge Technology

AM2 Niagara products feature a multiprocessor architecture, which guarantees that call volume is not affected by the number of operating channels or the nature of the tests that the user chooses to perform. Extensive use of high speed microprocessors and Digital Signal Processors (DSPs) make AM2 Niagara versatile, accurate and fast. All tone detectors are based on DSPs. Never needing calibration, AM2 Niagara systems will last well into the next generation of switching systems.

To maintain the maximum level of performance, functionality and flexibility, every AM2 Niagara is powered by a 32-bit RISC processor, controlled via user defined scripts and protocols and managed via FeatureCall, a Windows based graphical user interface. In addition, every line or channel in an AM2 Niagara is served by "local" DSPs to identify call progress tones, detect digits and to verify the voice path after a connection has been established. The combination of these capabilities allows the user of AM2 Niagara to create the complex call testing applications necessary to develop and test today's communication systems and applications.

The Ameritec Commitment

Ameritec Corporation has been manufacturing Bulk Call Generators for testing switches with analog, PCM, ISDN and SS7 interfaces, as well as other telecommunications test equipment, for over fifteen years. Ameritec test equipment is used by major telecommunication equipment manufacturers, telephone companies, network service providers and PTTs worldwide. Ameritec is an independent test equipment manufacturer, not owned or affiliated with any switch manufacturers or service providers -- your assurance of neutral and unbiased testing.



Ameritec

AM2-Niagara®



18B00021B-1995M

Portable Call Generators

AM2-A Analog
 AM2-B ISDN BRI
 AM2-P P-Phone (EBS)

AM2-D CAS
 AM2-DX ISDN-PRI
 AM2-S7 SS7

Ameritec

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Introduction

Ameritec's AM2 Niagara® family of products is comprised of fully self-contained portable test instruments designed to meet the rigid demands of today's telephony applications developer in both laboratory and field applications. The AM2 Niagara, simply put, makes telephone calls -- and lots of them! Each AM2 Niagara unit allows interfacing to different line types. One model interfaces to Analog POTS lines, another to Analog P-Phones lines, others to T1, E1, PRI, BRI, and SS7. The AM2 Niagara allows users to develop a test environment with the ability to test highly complex call scenarios.

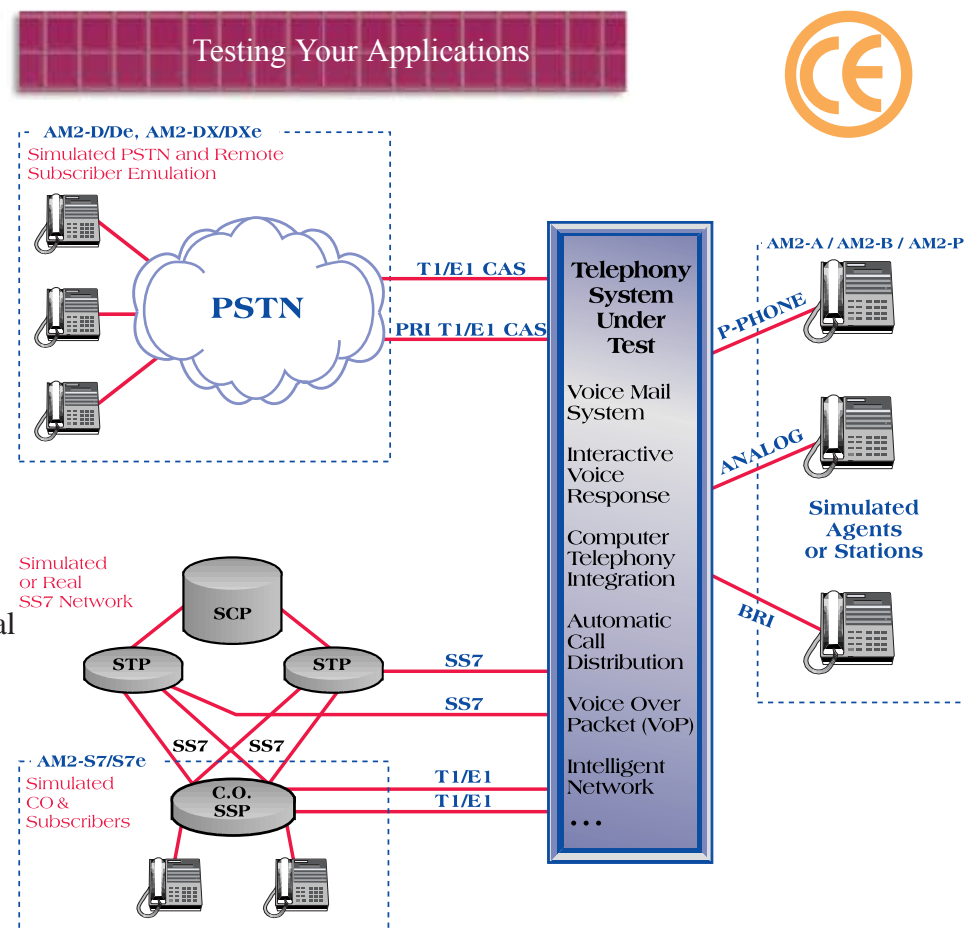
Test configurations can, via Ameritec's FeatureCall GUI, control up to 32 AM2 Niagara's via an Ethernet® TCP/IP LAN.

Through the use of user defined call scripts and line protocols, users can tailor test scenarios to meet a wide range of testing requirements. Whether the testing demand is focused on development, production testing, quality assurance or regression testing, the AM2 Niagara family provides the flexibility to satisfy your testing needs.

Models

The AM2 Niagara has the flexibility to serve a wide range of telephony testing requirements including both switch and network testing applications, in a captive lab or as a fully self-contained test tool. Whether your application calls for a single interface, or for multiple physical interfaces, the AM2 Niagara family provides a configuration that will meet or exceed your needs.

- AM2-A Analog Call Generator provides physical interfaces for 64 analog line and 160 total lines with the AM2E-A Expansion unit.
- AM2-P P-Phone Call Generator provides the physical interface for 32 EBS lines.
- AM2-B Basic Rate ISDN Call Generator provides physical interfaces for 32 BRI/BRA ISDN U-Interface (2B1Q) lines.
- AM2-D/De T1/E1 Digital Call Generators provide physical interfaces for four 1.544 Mbps T1 CAS trunks or four 2.048 Mbps E1 CAS trunks.
- AM2-DX/DXe Primary Rate ISDN Call Generators provide physical interfaces for four 1.544 Mbps T1 CCS trunks or four 2.048 Mbps E1 CCS trunks.
- AM2-S7/S7e SS7 Call Generators provide physical interfaces for one to four 1.544 Mbps T1 CCS trunks or 2.048 Mbps E1 CCS trunks and supports up to eight SS7 signaling links.



Testing Applications

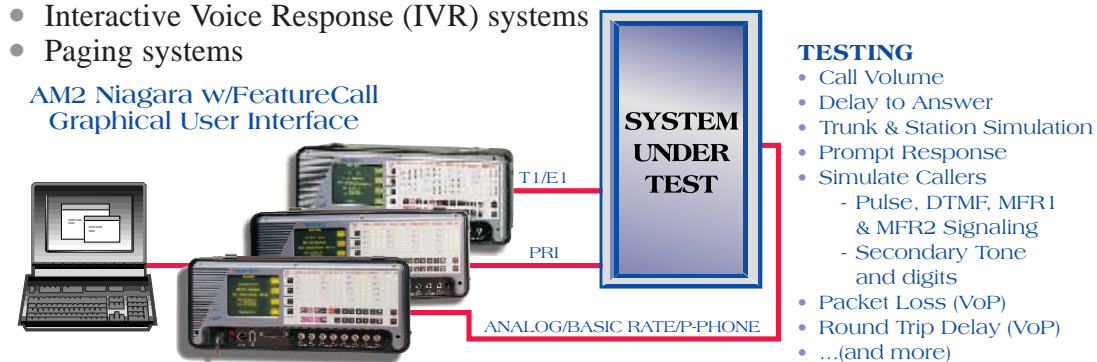
AM2 Niagara units are ideally suited for testing complex, interactive applications under high call loads on dozens of lines simultaneously in the field or a dedicated lab environment.

Applications that previously were too costly to test automatically can be easily automated with the AM2 Niagara.

Such test applications include:

- Central Office or PBX Switches and Networks
- Voice Over Packet (VoFR, VoIP) Systems
- Intelligent Network (IN) applications
- Voice Mail systems
- Computer Telephony Integration (CTI) systems and applications
- Automatic Call Distribution (ACD) systems
- Interactive Voice Response (IVR) systems
- Paging systems

AM2 Niagara w/FeatureCall Graphical User Interface



- TESTING**
- Call Volume
 - Delay to Answer
 - Trunk & Station Simulation
 - Prompt Response
 - Simulate Callers
 - Pulse, DTMF, MFR1 & MFR2 Signaling
 - Secondary Tone and digits
 - Packet Loss (VoP)
 - Round Trip Delay (VoP)
 - ... (and more)

Each AM2 Niagara can simulate one to hundreds of telephony subscribers. The actions of each simulated subscriber are independently controlled through unique parameter fields defined in user programmed Call Scripts.

Scripts define calling patterns and can simulate practically any action a live caller can perform. Scripts also simulate multiple subscribers allowing testing of multiple-party calls such as conference calling.

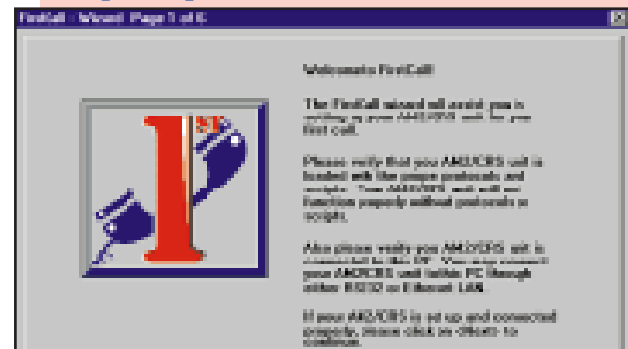
Capabilities in Call Scripts include:

- **Signaling:** All interface specific signaling functions supported through Call Scripts and user programmable signaling protocols.
- **Dialing:** Multiple unlimited length dial strings, multiple dialing types, including in-band end-to-end signaling (e.g. DTMF digits for interactive applications).
- **Digit decoding:** Decode in-band DTMF or MF digits.
- **Tone Send:** Send pre-programmed single frequency tones.
- **Tone Receive:** Detect any single frequency tone.
- **Path Verification:** Comprehensive two-way verification of multiple party voice and data path connections via in-band sequences, BERT patterns, X.25 packet data, or packet drop detection (VoP).
- **Voice Replay:** Optional feature allowing replay of pre-recorded audio samples on demand.
- **ADSI:** Optional feature permits the testing of caller ID functionality.
- **Delays:** Event-to-Event delay measurements, round trip delays (VoP).

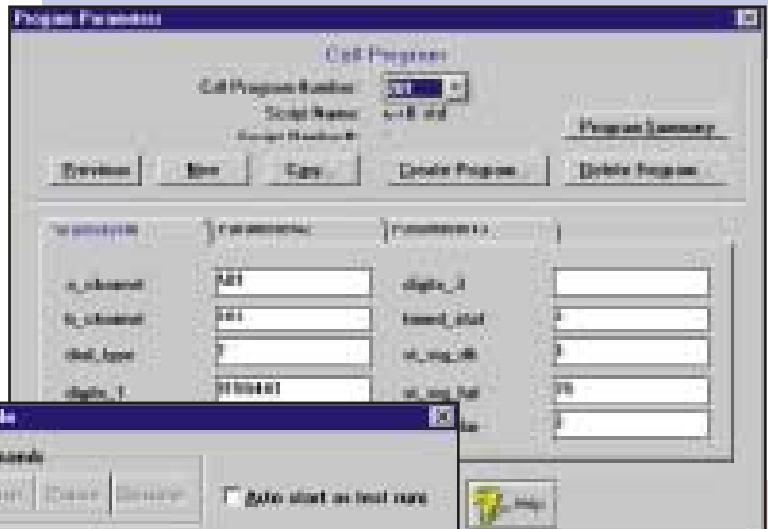
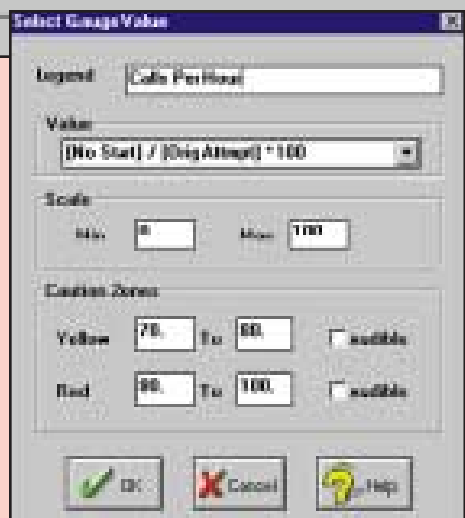
FeatureCall™ - Graphical User Interface

Each AM2 Niagara comes with FeatureCall, a Windows based Graphical User Interface (GUI) that provides control and management, via a personal computer, of one or more Ameritech Call Generators via a TCP/IP LAN or a single RS232 port. FeatureCall provides the user with simple, easy to use tools that allow you to:

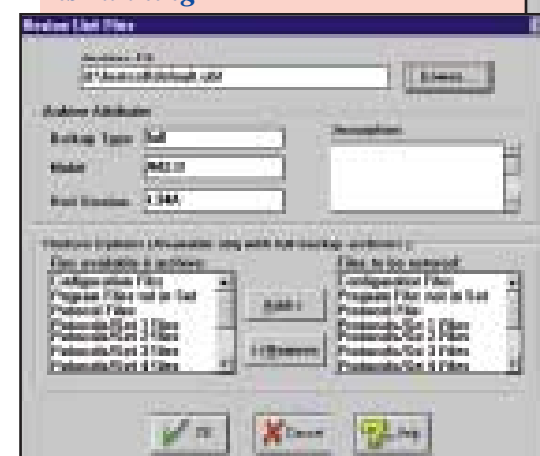
Create a test case in 5 simple steps



- Create a system of 1 to 32 AM2 Niagara Call Generators also (Crescendo®, and AM2S Squirt™)
- Create and start a test case in five easy steps using the FirstCall™ Test Case Wizard
- Using Test Case™ create batteries of tests that can be set to start on a schedule that you define days, weeks, or months in advance
- Create traffic profiles using TrafGen™
- Automatically load test cases into your AM2 Niagara from a test library that you build using the backup and restore function of FeatureCall
- See your test case results as they run via a Gauge field that allows you to define the areas of the test that are critical for you to monitor
- Create reports the way you like them using the Statistic Logging and Report Generation capability of FeatureCall



View the way the test is running



Make changes to the test case as it runs

Create reports that verify your test results

Manage your test cases with a test case repository

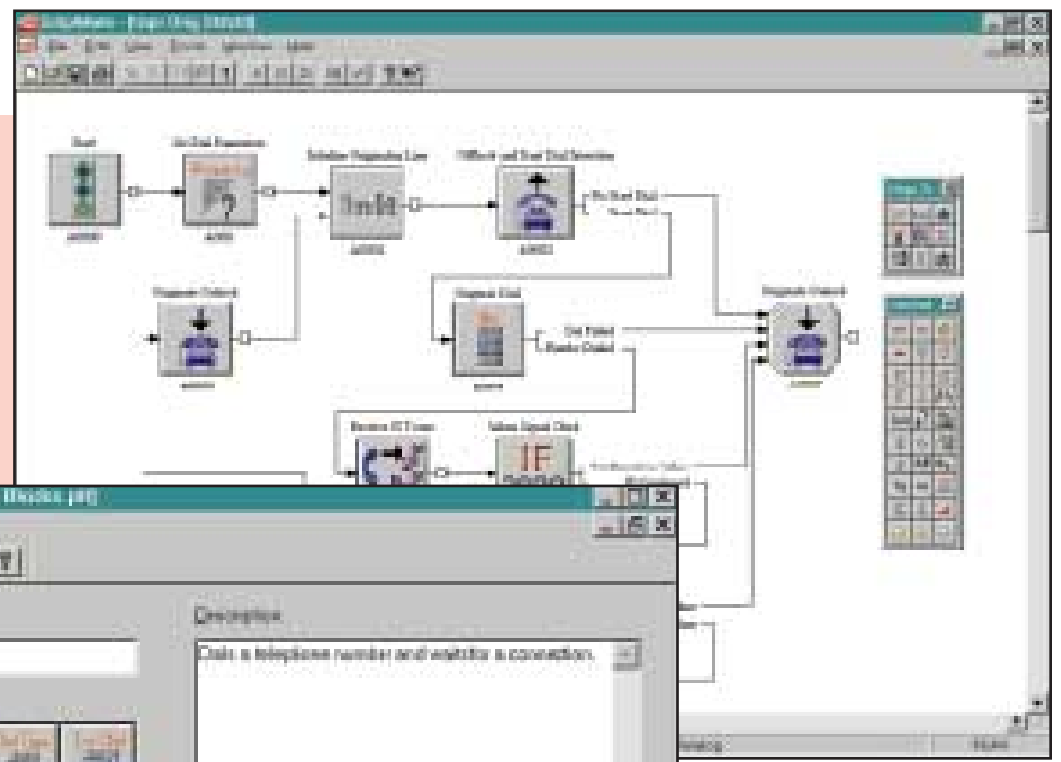
ScriptMate™ - Graphical Test Script Builder

Testing complex telephony applications requires you to develop many test cases. Limited programmability or learning a programming language used to be your choices - until ScriptMate! ScriptMate is a graphical tool that allows you to develop sophisticated test scripts by simply drawing the test sequence!

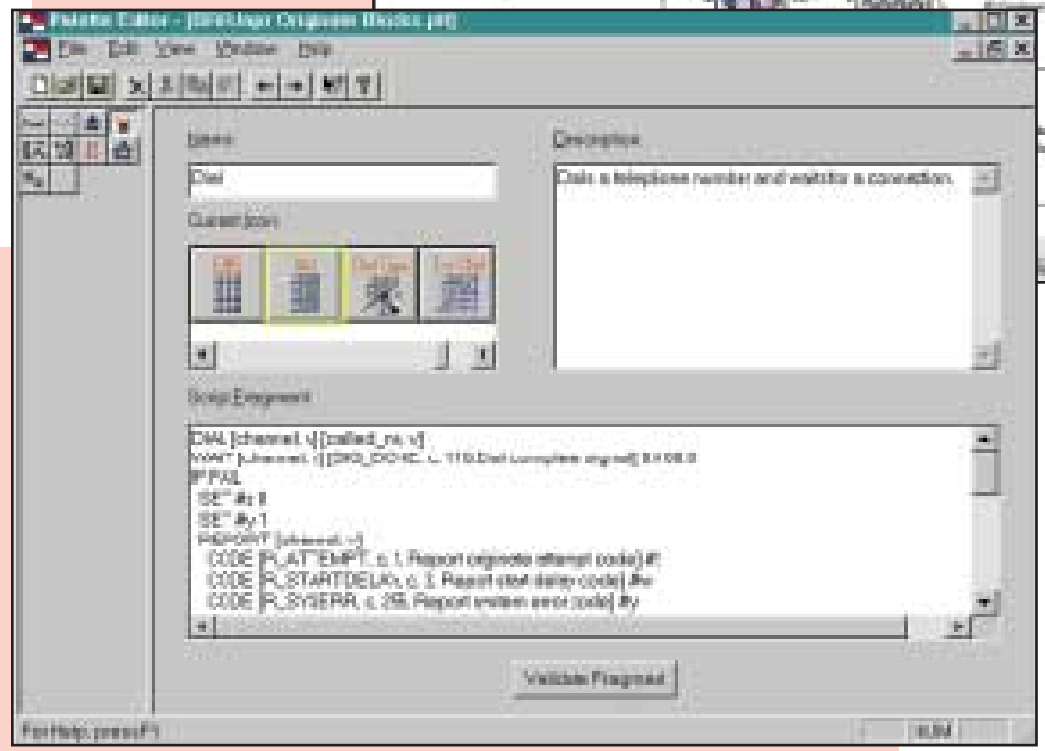
AM2 Niagara Call Generators offer you the ultimate in flexibility by providing powerful built-in test case scripting capabilities. This level of flexibility is what gives the AM2 Niagara its power. ScriptMate is a tool that unlocks this power with an intuitive, easy-to-use, graphical test script generation method.

ScriptMate is a companion program to FeatureCall and allows you to easily develop call test scripts by dragging, dropping and interconnecting simple icons to create a graphical Call Flow Diagram. With a single click of the mouse, the Call Flow Diagram is converted into a complete Script source file that can be loaded into your AM2 Niagara using FeatureCall.

Create or modify your call flow diagram interactively

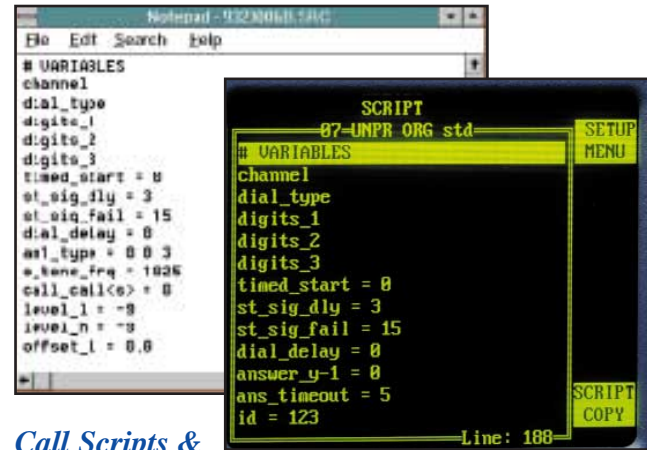


View script detail fragment whenever you wish



User Defined Functionality

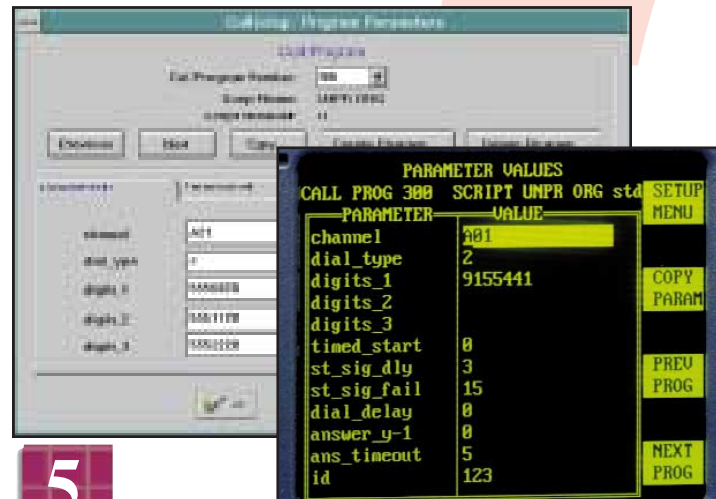
All AM2 Niagaras are furnished with front panel controls and FeatureCall, Ameritec's Windows based Graphical User Interface (GUI) that provides control for test applications with a single AM2 or multiple units via an RS232 port or over a TCP/IP LAN. FeatureCall provides an easy method to configure units, create tests parameters and run test cases.



Call Scripts & Call Programs

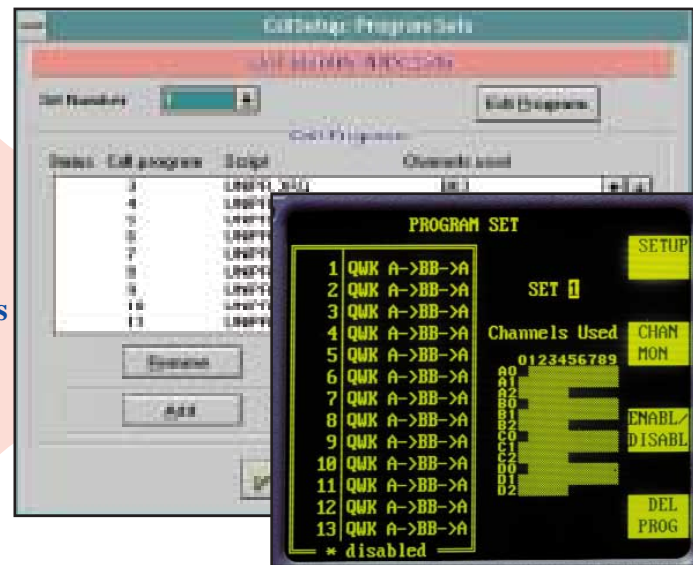
Call Scripts are templates defining the actions of a single caller. The Call Script defines calling patterns, voice path confirmation requirements and the supplemental tones and digits used in simple applications and complex calling scenarios. A number of scripts for common testing needs are provided with each unit.

Using the Call Script as a template, call variables (parameters) such as "dialed number" are added to create a Call Program. There is a separate Call Program for each line or channel in the unit. Call variables can be changed by the user to build new Call Programs, even with the unit running tests. All Call Programs are stored in non-volatile memory.



Call Program Test Sets
A Call Program Test Set consists of a collection of Call Programs that have been assigned to various lines or channels for convenient pre-programmed or automated testing.

Multiple Call Programs = Call Program Test Sets



Call Programs

Call Scripts (Template)

Call Variables (Parameters)

Customizing Call Scripts & Protocols

The AM2 allows users to develop scripts and protocols to meet their specific needs. Custom scripts and protocols may be developed by simply modifying the ones supplied with the unit, or new ones may be developed from the ground up using available tools.

Call Scripts are developed by using either ScriptMate, Ameritec's Graphical test script generator tool or in a standard Text Editor. Scripts can be automatically downloaded to a unit through FeatureCall's Call Setup Script window.

Protocols can be developed or customized using Ameritec's Protocol Development Kit. The kit runs on a personal computer and consists of a protocol development guide and an assembler/linker.

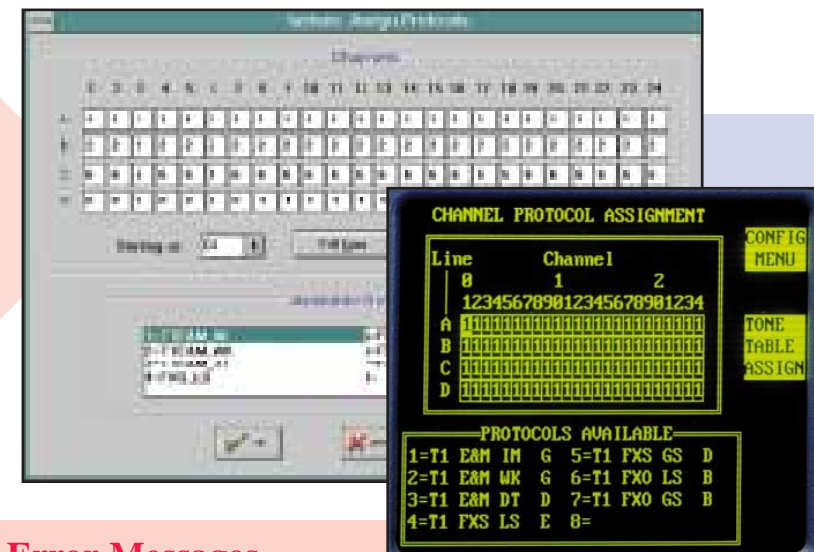
Automation Interface

As an alternative to the front panel control or FeatureCall, the AM2 provides a control interface for users with proprietary test systems software. The communication is a command line format that allows easy integration of the AM2 into an automated test system.

Protocol Assignments

The AM2 uses Protocol State Tables to translate the call instructions from the Call Program Test Set to a sequence of signaling events that are recognized by the network. The AM2 can support multiple protocols running simultaneously and the user has the ability to assign them to lines and channels as necessary. Each AM2 is supplied with protocols that are standard for their model type.

Protocol Assignments

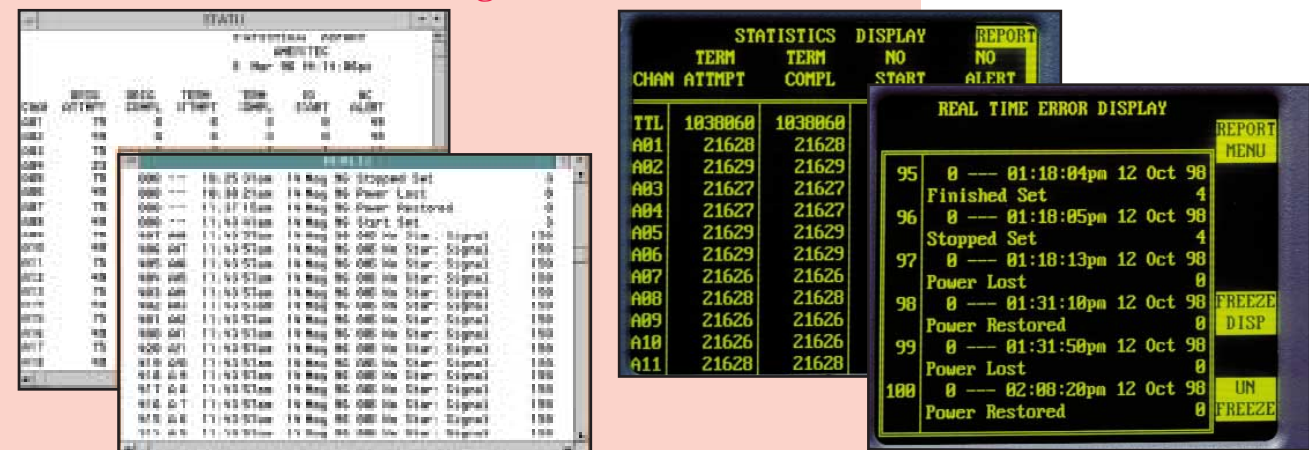


Call Signaling

Statistics & Error Messages

Statistics & Error Messages
Statistics are automatically accumulated in the unit. Reports include totals for each line/channel, the number of errors recorded as well as totals for the system. The amount of statistical information reported is at the control of the user. Reports may be output to a printer or computer.

The Real Time Error Log automatically records error conditions occurring in the running Test Set. Errors are reported on call setup, call completion and other conditions defined by Protocol State Table and Call Script. Each error record contains the Call Program name, line or channel affected, time and date of the error, the error type, and a short description of the error. The report also contains the start and stop times of the Test Set.



AM2 Niagara Unit Specifications



All Models Available in
CE Compatible Versions

The AM2 Niagara product line consists of different models providing physical interfaces for Analog P-Phone, T1/E1 CAS, ISDN PRI/BRI and SS7.

General Specifications: The general specifications define the features and capabilities that are common to all AM2 Niagara Models.

General Characteristics	
Audio Monitor Interface:	• Two volume controls adjust the stereo level of the internal loudspeaker
User Interface:	• FeatureCall Graphical User Interface • Command line control via RS232C or Telnet, (TCP/IP Ethernet)
RS232/V.24 Ports:	• Two Serial Ports: Main / Auxiliary. Full duplex on 3 wires. Provide GUI access, printer output, remote control and chaining operations.
Ethernet:	• 10 Base-T interface • Telnet • TCP/IP • Configurable addressing via RS232 port: IP, Subnet Mask, Gateway and Transmission Frame Type • IEEE 802.3 or Ethernet II packet format • Maximum Transmission Unit (MTU) limit 1492 for IEEE 802.3, or 1500 for Ethernet II • 48 bit Ethernet address • Class 1 Logical Link Control (LLC) • Address Resolution Protocol (ARP) • Internet Control Message Protocol (ICMP) • User Datagram Protocol (UDP)
PC Requirements FeatureCall (Customer provided):	• MS-DOS operating system 3.3 or higher • Microsoft Windows operating system version 3.x and/or Windows '95 • 486DX or higher microprocessor • 4 MB of memory, 8 MB recommended • Hard Disk space required for installation: 5 MB minimum • One 3.5" high density disk drive • SVGA or higher resolution monitor • Windows compatible mouse • RS232 19,200 Baud com:port • Ethernet TCP/IP Packet Driver (optional)
Dimensions:	• 16.8" Wide (730mm) x 7.2" High (185mm) x 11.5" Deep (295mm)
Power:	• 90 to 264 VAC, 47 to 65 Hertz, 65 Watts
Weight:	• 16.5 Pounds (7.5 Kilograms)

Call Programs	
Call Program Sets:	4 per unit, stored in non-volatile memory
Call Programs:	480 per unit, memory resident (640 for AM2-B)
Features:	• FeatureCall Graphical User Interface • Commonly used scripts supplied with unit • Custom scripts created and downloaded from FeatureCall
System Start Modes:	• Synchronous • Random • Manual
Trouble Encounter Response:	• Continue • Call stop • Unit stop on trouble

Voice Channel Functions	
Tone detectors and Circuit Switched Voice Functions	
Detectors:	• Tone detectors are based on Digital Signal Processors (DSPs) 1 per channel/line
Call Progress Detectors:	• One detector per line or B-channel • Detects: dial tone, busy, reorder, ring, ringback, supervision, wink
Path Confirmation Receiver:	• One receiver per line or B-channel • Frequency range: 10 to 2500 Hz • Accuracy: 1%, ± 10 Hz • Sensitivity: 0 dBm to -24 dBm • Response Time: 12.5 ms
Signaling Tone Decoders (AM2-D/De Only):	• One receiver per channel • Detects signaling tones for SOCOTEL and ITU-T (CCITT) #5 signaling schemes
MF Receiver:	• Decodes received MF digits DTMF, MFR1 MFR2 • Response time: under 40 ms • Dynamic range: 35 dBm

Voice Path Confirmation	
Line and channel path verification -- Circuit Switched Voice for Digital AM2 Models:	• 10 user selectable single tone signals to send unique channel ID tones • Encoding Scheme: 0:1025 Hz 1:1150 Hz 2:1275 Hz 3:1400 Hz 4:1525 Hz 5:1650 Hz 6:1775 Hz 7:1900 Hz 8:2025 Hz 9:2150 Hz • 64 user selectable single tone signals
Circuit Switched Data: (Digital AM2 Models only):	• 511 and 2047 BERT pattern test for 56 kbps or 64 kbps channels • 511-bits pattern conforms to CCITT 0.153 • 2047-bits pattern conforms to CCITT 0.152
Packet Switched Data: (AM2-DX/DXe and AM2-B only)	• Up to 5 user selectable X.25 packets for confirmation

Digit Generators	
Dialed digit strings are of unlimited length	
Dial Pulse Generator:	• Programmable dial speed: 1 pps to 999 pps • Dial break: 1 to 99% • Inter-digit time: 1 to 999 ms
Multitone Digit Generators:	• One digit generator per line • Dialing codes: MF R1, MF R2, DTMF • Default level: -9 dBm • Default frequencies: Nominal ± 0.005% • Programmability: Each line individually programmable for level 0 dBm to -50 dBm in 1 dB steps for each frequency component • Programmable frequency range: Up to 12.5% above or below nominal in 0.1% steps for each frequency component

Printouts and Reports - Call Statistics	
Data is internally stored	
Manual Reports:	• Call statistics for each line or channel • Totals for all lines and channels
Automatic Reports:	• Prints automatically on the hour or every half or quarter hour • Report categories are user selectable
Call Statistics for each originate line or channel:	• Call attempt count • Call completion count • Delayed dial tone (AM2-A only) • No dial tone count (AM2-B only) • Delayed start signal count (Except AM2-A) • No start signal count (Except AM2-A) • No alert signal count • No voice path or B-channel confirmation count • Busy signal encountered count • No answer signal count • Ring time-out count (Except AM2-B, AM2-DX/DXe) • Average dial tone delay • Average post dial delay • Custom code report count (programmable in test script)
Call Statistics for each terminate line or channel:	• Attempted calls count • Completed calls count • Custom code report count (programmable in test script)
For each packet switched originate channel (ISDN-BRI and ISDN-PRI only):	• Call Attempts • Completed Calls • Average connect acknowledge delay • Slow connect acknowledge delay • No connect acknowledge • Number of packets sent • Number of packets re-sent • Average packet delay • Custom code report count (programmable in test script)
For each packet switched terminate channel (ISDN-BRI and ISDN-PRI only):	• Attempted calls count • Completed calls count • Custom code report count (programmable in test script)

Real Time Error Reports:	<ul style="list-style-type: none"> • Displayed or printed as they occur • Details of the last 100 errors are stored • Error reports include: type, the line(s) or channel(s), time • Error types recognized and reported: <ul style="list-style-type: none"> • Slow dial tone (AM2-A only) • No dial tone (AM2-A only) • Slow start (Except AM2-A) • No start (Except AM2-A) • No alert tone • Path or B-channel confirmation failed • No answer signal • Ring time-out (Except AM2-B and AM2-DX/DXe) • Busy • Protocol cause values (ISDN-BRI, ISDN-PRI & SS7 only) • Custom code report count (programmable in test script)
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Voice Replay Option:

This option provides up to 64 two second recorded messages for AM2 Niagara Models AM2-A, AM2-B, AM2-D, AM2-De and AM2-P

Voice Replay Option	
Number of channels per option:	• 64
Length of each phrase:	• 2 seconds, repeated until a new phrase or quiet is selected
Number of phrases: (Voice Messages)	• 64 per option
Phrase selection: Voice output:	• SENDVOX command in script • Selected voice signal is output on the channel assigned in the Call Program
Output level: Recording:	• Determined at the time of recording • Created in a PC with a sound card and Ameritec software
Required recording hardware:	• Creative Labs Sound Blaster™ or equivalent, 16-bit audio card • EPROM Programmer • PC running DOS 3.x or higher

Voice Over Packet Option:

Adds VoP measurement capabilities to all models except AM2-B, AM2-P

Voice Over Packet Option	
Voice Path Confirmation:	• Golden Voice™ signal designed to pass through vocoder
Packet Drop Out Count:	• Count lost packets for frame sizes of 5, 10, 15, 20, 30, 40 and 100ms
Measure Delays Through Systems:	• Round Trip Delay • One Way Delays
Measure Clipping of Voice:	• Peak and average clipping of standard reference with ± 10ms accuracy



AM2-A and AM2E-A Specifications:

The AM2-A Analog Call Generator provides line interfaces for 64 analog lines and 160 total lines with the AM2E-A Expansion Unit.

System	
Capacity:	<ul style="list-style-type: none"> AM2-A 64 analog lines AM2E-A 96 analog lines
Call Volume:	<ul style="list-style-type: none"> AM2-A typically 16,000 confirmed calls per hour (DTMF dialing, tone ID confirmation, 64 paired lines) With AM2E-A expansion unit 40,000 confirmed calls per hour (80 paired lines)
Line Interface Options:	<ul style="list-style-type: none"> Loop Start, 2-wire (optional Ground Start) Pulse, DTMF, MF R1 & MF R2 dialing 900 ohm impedance (optional 600 ohm impedance) Optional 50Hz, 12Hz and 16kHz Meter Pulse Detection
Front Panel Indicators:	<ul style="list-style-type: none"> 64 LEDs, one per line Line Status Display: <ul style="list-style-type: none"> Dark: Idle line Green: Originate line off hook Yellow: Terminate line off hook Red: Line error

Dual Tone Alert Signal Detection	
US Signaling Protocols:	Low tone frequency: 2130 Hz \pm 0.5% High tone frequency: 2750 Hz \pm 0.5% Receive signal level: -14 dBm to -32 dBm per tone, off hook Signal reject level: -45 dBm Twist: Up to 6 dB Unwanted signals: Less than -7 dBm ASL near end of speech Duration: 75 to 85 ms Speech present: Yes
Non-US Signaling Protocols:	Low tone frequency: 2130 Hz \pm 1.1% High tone frequency: 2750 Hz \pm 1.1% Receive signal level: -2 dBV to -40 dBV per tone, off hook Signal reject level: -45 dBm Twist: Up to 7 dB Unwanted signals: Less than -20 dBm 300 to 3400 Hz Duration: 88 to 110 ms Speech present: No

FSK	
US Signaling Protocols:	Mark frequency (logic 1): 1200 Hz \pm 1% Space frequency (logic 0): 2200 Hz \pm 1% Received signal level mark: -12 dBm to -32 dBm Received signal level space: -12 dBm to -36 dBm Twist: Up to 10 dB Unwanted signals: Less than -25 dBm 200 to 3200 Hz Transmission rate: 1200 Baud \pm 1% Word format: 1 start bit = 0, 8-bit word (LSB first), 1 stop bit = 1
Non-US Signaling Protocols:	Mark frequency (logic 1): 1300 Hz \pm 1.5% Space frequency (logic 0): 2100 Hz \pm 1.5% Received signal level mark: -8 dBV to -40 dBV Received signal level space: -8 dBV to -40 dBV Twist: Up to 6 dB Unwanted signals: Less than -20 dBm 300 to 3400 Hz Transmission rate: 1200 Baud \pm 1% Word format: 1 start bit = 0, 8-bit word (LSB first), 1 stop bit = 1

ADSI Option:

Provides Analog Display Service Interface (ADSI)/Caller ID test functionality on AM2 Niagara Model AM2-A.

Expanded System Specifications for ADSI Option	
Capacity:	<ul style="list-style-type: none"> 64 Analog lines:
Signaling Protocols:	<ul style="list-style-type: none"> Bellcore TR-NWT-000030, or British Telecom (BT) SIN 227 and SIN 242, Cable Television Association (CTA) TW/P&E/312

AM2-P Specifications:

The AM2-P Analog Call Generator provides line interfaces for 16 to 64 analog lines.

System	
Capacity:	<ul style="list-style-type: none"> 32 P-Phone (EBS) originating/terminating lines Each line emulates up to: <ul style="list-style-type: none"> 1 primary set and 3 add-ons 1 extension set and 3 add-ons
Call Volume:	<ul style="list-style-type: none"> 7,500 confirmed calls per hour
Line Types:	<ul style="list-style-type: none"> Lines compatible with NIS S106-1 DTMF, MF R1 and MF R2 dialing 900 ohm impedance Simulated sets are not loop powered

Signaling Channel	
Message Format:	<ul style="list-style-type: none"> Amplitude Shift Keying (ASK), 16 Bit envelope
Carrier Frequency:	<ul style="list-style-type: none"> Transmit : 8,000Hz \pm200ppm Level: 1.3 volts peak-to-peak, \pm 0.2 volts Receive: 8,000Hz \pm200ppm Level: 1.5 volts peak-to-peak maximum 0.9 volts peak-to-peak minimum
Bit Rate:	<ul style="list-style-type: none"> 1,000 bits per second \pm2% half-duplex



AM2-B Specifications:

The AM2-B Basic Rate ISDN Feature Call Generator provides the line interfaces for 32 BRI/BRA-ISDN U-Interface (2B1Q) lines.

System	
Capacity:	<ul style="list-style-type: none"> 32 BRI/BRA ISDN U-Interface lines Each U-Interface port emulates 1 to 8 TEs
Call Volume:	<ul style="list-style-type: none"> Typically 48,000 confirmed calls per hour (depending on switch performance)(32Lines) X.25 Packets per second: Up to 2,024 packets per second
Front Panel Indicators:	<ul style="list-style-type: none"> B-channel: 64 LEDs, one per B-channel B-channel Status Displayed: <ul style="list-style-type: none"> Dark: Idle line Green: Originate call Yellow: Terminate call Red: Error D-channel: 32 LEDs, one per D-channel <ul style="list-style-type: none"> Dark: Idle line Green: Call in progress Red: Error
Trace Port:	<ul style="list-style-type: none"> One RJ-45 Trace/Insert Port 4-wire, ISDN-S/T Interface provides access to any U-Interface line Switch selectable: insert or trace
Test Loops:	<ul style="list-style-type: none"> Meets transmission requirements for Loop #1 through Loop #15 of ANSI's 15 telephone plant test loops
Warm and Cold Starts:	<ul style="list-style-type: none"> Warm Start: 300 ms synchronization Cold Start: 15 second synchronization

Signaling Systems	
Layer 1:	<ul style="list-style-type: none"> 2B1Q, ANSI T1.601-1992 ISDN Basic Access Interface for use on metallic loops for application on the network side of the NT Data Transmission: Full duplex at a rate of 160 kbps
Layer 2:	<ul style="list-style-type: none"> Q.921/LAPD and LAPB (X.25) Layer 3: Q.931 and equivalent standards Up to 8 different L3 protocols may be downloaded to unit Permits L3 protocol assignment for each U-Interface Various international protocols supported Additional protocols can be created and downloaded from Workstation or PC
Packet Data:	<ul style="list-style-type: none"> X.31 Case A and Case B BPS: B-channel X.25 packet data DPS: D-channel X.25 packet data
Circuit Switched:	<ul style="list-style-type: none"> CSD: Circuit switched data (BERT) CSV: Circuit switched voice
Supported Standard:	<ul style="list-style-type: none"> National ISDN (N1)-1 National ISDN (N1)-2 Euro-ISDN #5ESS Custom EKTS ETSI



AM2-D and AM2-De Specifications:

The AM2-D Digital Call Generator provides the interface for one to four 1.544 Mbps T1 or one to four 2.048 Mbps E1 trunks (AM2-De).

AM2-D System	
Capacity:	<ul style="list-style-type: none"> AM2-D: <ul style="list-style-type: none"> Four 1.544 Mbps PCM 24 channel T1 CAS trunks Menu selectable D3/D4 Framing or ESF Up to 96 simultaneous calls (4 spans) All channels can originate or terminate calls PCM timing may be sourced internally or from one of the four trunks within the group
Interface Options:	<ul style="list-style-type: none"> Bantam 100 ohm balanced input connectors Bantam 120 ohm balanced input connectors
Call Volume:	<ul style="list-style-type: none"> AM2-D: 48,000 confirmed calls per hour (4 spans)

AM2-De System	
Capacity:	<ul style="list-style-type: none"> AM2-De: <ul style="list-style-type: none"> Four 2.048 Mbps PCM 32 channel E1 CAS trunks Menu selectable CRC-4 Up to 120 simultaneous calls (4 Spans) All channels can originate or terminate calls PCM timing may be sourced internally or from one of the four trunks within the group
Interface Options:	<ul style="list-style-type: none"> Triple Banana 120 ohm, balanced input connectors BNC 75 ohm, unbalanced input connectors Siemens 1, 6/5, 6 (DIN 47295), 75 ohm, unbalanced input connector Bantam 120 ohm balanced input connectors
Call Volume:	<ul style="list-style-type: none"> AM2-De: 48,000 confirmed calls per hour (4 spans)

Indicators and Alarms	
Front Panel Indicators:	<ul style="list-style-type: none"> One per channel or time slot Channel Status Display: <ul style="list-style-type: none"> Dark: Idle line Green: Originate call Yellow: Terminate call Red: Error Layer 1 Indicators: <ul style="list-style-type: none"> PCM Sync (green: normal, red: out-of-sync) Frame Error, CRC Error, Slip (dark: normal, red: error) AM2-D Alarm Indicator: <ul style="list-style-type: none"> Dark: Normal Red: Indicates red, yellow or blue alarm received AM2-De: <ul style="list-style-type: none"> Provides status of TS16 (dark: normal, yellow: Distant multiframe alarm, red: signal all ones alarm)



AM2-DX and AM2-DXe Specifications

The AM2-DX Primary Rate ISDN Call Generator provides the interface for one to four 1.544 Mbps CCS T1 or one to four 2.048 Mbps CCS E1 trunks (AM2-DXe).

AM2-DX System	
Capacity:	<ul style="list-style-type: none"> AM2-DX: <ul style="list-style-type: none"> Four 1.544 Mbps PCM 24 channel T1 CCS trunks 24 timeslots (23B+D) per trunk AM1 and B8ZS Line Coding Menu selectable D3/D4 Framing or ESF formats
Interface Options:	<ul style="list-style-type: none"> Bantam 100 ohm balanced input connectors Bantam 120 ohm balanced input connectors
Call Volume:	<ul style="list-style-type: none"> AM2-DX: 48,000 confirmed calls per hour (4 spans)

Signaling System	
Signaling System Layer 1:	<ul style="list-style-type: none"> Complies with ANSI T1.408 Complies with ITU-T (CCITT) 1.412 and 1.431
Signaling System Layer 2:	<ul style="list-style-type: none"> Q.921/LAPD and LAPB (X.25) Signaling
Signaling System Layer 3:	<ul style="list-style-type: none"> Q.931 and equivalent standards Up to 8 different L3 protocols may be down loaded to unit Menu selection of L3 protocol for each B- and D-channel D- or signaling channel may be assigned to any physical time slot Various international protocols supported Additional protocols can be created and downloaded from Workstation or PC
Packet Data:	<ul style="list-style-type: none"> X.31 Case A and Case B BPS: B-channel X.25 packet data DPS: D-channel X.25 packet data
Circuit Switched: CSD:	<ul style="list-style-type: none"> Circuit switched data (BERT) CSV: Circuit switched voice

AM2-DXe System	
Capacity:	<ul style="list-style-type: none"> AM2-DXe: <ul style="list-style-type: none"> One to four 2.048 Mbps PCM 32 channel E1 CCS trunks 32 timeslots (30B+D) per trunk HDB3 Framing Menu selectable CRC-4 on/off
Interface Options:	<ul style="list-style-type: none"> Triple banana 120 ohm, balanced input connectors BNC 75 ohm, unbalanced input connectors Siemens 1, 6/5, 6 (DIN 47295), 75 ohm, unbalanced input connector Bantam 120 ohm balanced input connectors
Call Volume:	<ul style="list-style-type: none"> AM2-DXe: 60,000 confirmed calls per hour (4 spans)

Indicators and Alarms	
Front Panel Indicators:	<ul style="list-style-type: none"> One per channel or time slot Channel Status Display: <ul style="list-style-type: none"> Dark: Idle line Green: Originate call Yellow: Terminate call Red: Error Layer 1 Indicators: <ul style="list-style-type: none"> PCM Sync (Green: normal, red: out-of-sync) Frame Error, CRC Error, Slip (dark: normal, red: error) AM2-DX Alarm Indicator: <ul style="list-style-type: none"> Dark: Normal Red: Indicates red, yellow or blue alarm received AM2-DXe: Provides status of TS16 (dark: normal, yellow: distant multiframe alarm, red: signal all ones alarm)

AM2-S7 and AM2-S7e Specifications

The AM2-S7 Call Generator provides the interface for four 1.544 Mbps CCS T1 or one to four 2.048 Mbps CCS E1 trunks (AM2-S7e).

AM2-S7 System	
Capacity:	<ul style="list-style-type: none"> Signaling links: <ul style="list-style-type: none"> Eight 56/64K SS7 Signaling Links per unit. Modular Interface options include: <ul style="list-style-type: none"> Two x T1 1.544 Mbps (AM2-S7) Two x E1 2.048 Mbps (AM2-S7e) Eight x V.35 56/64 kbps Eight x DSOA 56 kbps Fully associated links using time slots in the voice/data circuits are supported AM2-S7 Voice & Data Circuits: <ul style="list-style-type: none"> Four 1.544 Mbps PCM 24 channel T1 CCS trunks AMI and B8Zs Line Coding D4 or ESF framing AM2-S7e Voice & Data Circuits: <ul style="list-style-type: none"> Four 2.048 Mbps PCM-30/PCM-31 E1 CCS trunks HDB3 line coding CRC4 framing
AM2-S7 Interface Option:	<ul style="list-style-type: none"> 1.544 Mbps Signaling Interface option with 8 SS7 signaling links. Bantam 100 ohm, balanced input 1.544 Mbps Signaling Interface option with 8 SS7 signaling links. Bantam 120 ohm, balanced input V.35 Signaling Interface Option with 8 SS7 signaling links on 8 V.35 Interfaces, T1, 100 ohm, unbalanced input V.35 Signaling Interface Option with 8 SS7 signaling links on 8 V.35 Interfaces, T1, 120 ohm, unbalanced input DSOA Signaling Interface Option with 8 SS7 signaling links on 8 DSOA Interface. T1, 100 ohm, balanced input DSOA Signaling Interface Option with 8 SS7 signaling links on 8 DSOA Interface. T1, 120 ohm, balanced input
Call Volume:	<ul style="list-style-type: none"> AM2-S7: 48,000 confirmed calls per hour (4 spans)

Signaling Systems	
Signaling Protocols AM2-S7	<ul style="list-style-type: none"> Bellcore Q.702 at level 1 Bellcore Q.703 at level 2 Bellcore Q.704 at level 3 Bellcore Q.761 to Q.766 ISUP signaling

AM2-S7e System	
Capacity:	<ul style="list-style-type: none"> AM2-S7e Voice & Data Circuits: <ul style="list-style-type: none"> Four 2.048 Mbps PCM-30/PCM-31 E1 CCS trunks HDB3 line coding CRC4 framing Modular interface options: <ul style="list-style-type: none"> Balanced 100 ohm or 120 ohm, Bantam Unbalanced 75 ohm, BNC
AM2-S7e Interface Option:	<ul style="list-style-type: none"> 2.048 Mbps Signaling Interface option with 8 SS7 signaling links. BNC 75 ohm, balanced input V.35 Signaling Interface option with 8 SS7 signaling links on 8 V.35 Interface. E1, 75 ohm, balanced input
Call Volume:	<ul style="list-style-type: none"> AM2-S7e: 60,000 confirmed calls per hour (4 spans)

Signaling Systems	
Signaling Protocols AM2-S7e:	<ul style="list-style-type: none"> VN4 CCITT Q.702 at level 1 CCITT Q.703 at level 2 CCITT Q.704 at level 3 CCITT Q.761 to Q.766 ISUP signaling BTNR 167 Regional TUP varieties

Indicators and Alarms	
Front Panel Indicators:	<ul style="list-style-type: none"> One per channel or time slot Channel Status Display: <ul style="list-style-type: none"> Dark: Idle line Green: Originate call Yellow: Terminate call Red: Error Layer 1 Indicators: PCM Sync (green: normal, red: out-of-sync) Frame Error, CRC Error, Slip (dark: normal, red: Error) AM2-S7 Alarm Indicator: <ul style="list-style-type: none"> Dark: Normal Red: Indicates red, yellow or blue alarm received AM2-S7e: Provides status of TS16 (dark: normal, yellow: distant multiframe alarm, red: Signal all ones alarm)