

# Model AM2 *Squirt*



**AM2**  
**Squirt**

Ameritec Corporation is an ISO 9001:2000 Certified Company

Affordable Call Generation Tools for  
Testing Complex Telephony Applications

**Ameritec**

# Introduction

Ameritec's AM2 Squirt™ family of products is designed to meet the rigid testing demands of today's telephony applications developer. Simply put, Squirt makes telephone calls.... and lots of them! Each different Squirt unit allows for interfacing to different line types. One model interfaces to Analog POTS lines, another to T1 spans, others to E1, PRI, BRI and SS7. The AM2 Squirt allows users to develop a test environment with low or high line counts, incremental growth, multiple interfaces and the ability to test highly complex call scenarios under the control of FeatureCall™, Ameritec's Windows™ based graphical user interface.

Test configurations can be developed by chaining up to fifteen units together and controlling them via a single RS232 port, or multiple units can be controlled via an Ethernet® LAN.

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

## Basic Configuration

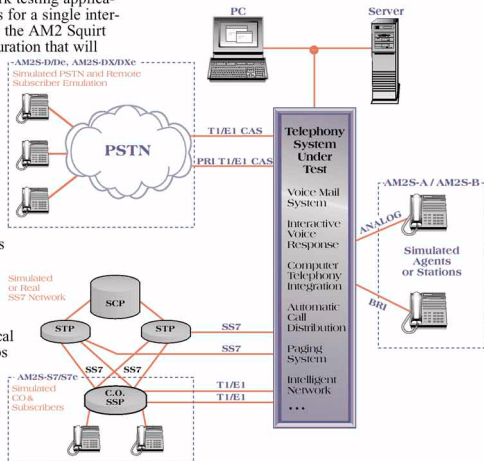


## Models

The AM2 Squirt has the flexibility to serve a wide range of Computer Telephony Integration testing requirements as well as traditional switch and network testing applications. Whether your application calls for a single interface, or multiple physical interfaces, the AM2 Squirt family of products provides a configuration that will meet or exceed your testing demands.

- AM2S-A Analog Call Generator provides physical interfaces for 16 to 64 analog lines.
- AM2S-B is a Basic Rate ISDN Call Generator that provides physical interfaces for 8 to 32 BRI/BRA ISDN U-Interface (2B1Q) lines.
- AM2S-D/De T1/E1 Digital Call Generators provide physical interfaces for one to four 1.544 Mbps T1 CAS trunks or one to four 2.048 Mbps E1 CAS trunks.
- AM2S-DX/DXe Primary Rate ISDN Call Generators provide physical interfaces for one to four 1.544 Mbps T1 CCS trunks or one to four 2.048 Mbps E1 CCS trunks.
- AM2S-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 Your Applications



# Testing Applications

The AM2 Squirt units are ideally suited for testing complex, interactive applications under high call loads on dozens of lines simultaneously.

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

## Such test applications include:

- Computer Telephony Integration (CTI) systems and applications
- Voice Mail Systems
- Interactive Voice Response (IVR) systems
- Wireless MSC & BSC Testing
- Automatic Call Distribution (ACD) systems
- Central Office or PBX Switches and Networks
- Paging systems
- Intelligent Network (IN) applications

## Voice Mail Testing

AM2 Squirt w/FeatureCall  
Graphical User Interface



### VOICE MAIL SYSTEM

#### TESTING

- Latent Call Volume
- Delay to Answer
- Prompt Response
- Simulate Callers
  - Pulse, DTMF Signaling
  - Secondary Tone and digits
- ...(and more)

## Call Center or Switch Testing

AM2 Squirt w/FeatureCall  
Graphical User Interface



### SYSTEM UNDER TEST

#### TESTING

- Latent Call Volume
- Delay to Answer
- Trunk & Station Simulation
- Prompt Response
- Simulate Callers
  - Pulse, DTMF Signaling
  - Secondary Tone and digits
- ...(and more)

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

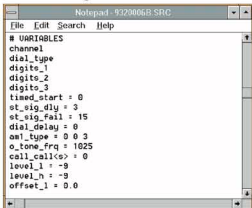
Scripts define calling patterns and can simulate practically any action a live caller can perform. Scripts also simulate multiple subscribers allowing testing of multiple-party calls such as conference calling.

## The capabilities included in the Call Scripts are:

- **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 or X.25 packet data.
- **Voice Replay:** Optional feature allowing replay of pre-recorded audio samples on demand.

# User Defined Functionality

All AM2 Squirts are furnished with FeatureCall, a Windows based Graphical User Interface (GUI) that provides control for test applications with a single AM2 Squirt or multiple units via an RS232 port, or optionally, over TCP/IP LAN. FeatureCall provides an easy method to configuring units, creating tests parameters and running a test case.



```
Notepad - 9329066R SRC
File Edit Search Help
# VARIABLES
channel
dial_type
digito_1
digito_2
digito_3
timed_start = 0
st_sig_dly = 3
st_sig_fail = 15
dial_delay = 0
on_type = 0 0 3
o_tone_freq = 1025
call_callcs = 0
level_l = -9
level_h = -9
offset_1 = 0.0
```

## Creating Calls

Establishing an automated call in an AM2 Squirt is done by selecting a Call Script to simulate the actions of a caller and then creating a Call Program by adding variables to the script. Test Sets are then created by assigning Call Programs to lines or channels.

## 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.

## Call Scripts & Call Programs

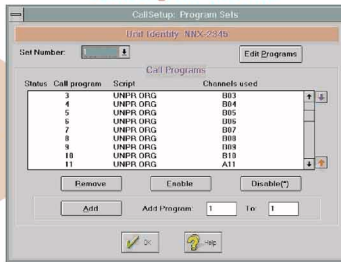
Call Scripts are templates defining the actions of a single caller. The Call Script defines calling patterns, voice path confirmation requirements and the supplemental tones and digits used in simple applications and complex calling scenarios, such as voice mail testing, and interactive voice response (IVR) unit testing. 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 Scripts (Template)

## Call Programs

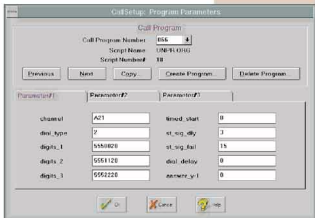
## Call Variables (Parameters)

## Multiple Call Programs = Call Program Test Sets



## 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.



## Customizing Call Scripts & Protocols

The AM2 Squirt 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 in a standard Text Editor such as Windows Notepad. Scripts can be automatically downloaded to a unit through FeatureCall's Call Setup Script window.

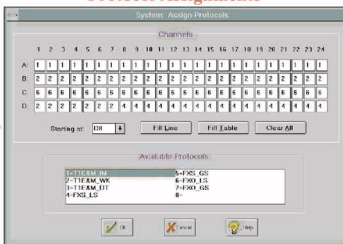
Protocols can be developed or customized using Ameritech's Protocol Development Kit. The kit runs on a personal computer and consists of a protocol development guide and a third party assembler/linker.

## Automation Interface

As an alternative to FeatureCall, the AM2 Squirt 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 Squirt into an automated test system.

## Protocol Assignments

Call  
Instructions



Call  
Signaling

## Statistics & Error Messages

STATISTICS

STATISTICAL REPORT

01 Mar 98 04:14:06pm

CHAN	ATTEMPT	COMPL	ATMPF	TERM	NO	NO SIG	ALERT	
002	75	0	0	0	0	0	0	
002	75	0	0	0	0	0	0	
004	23							
005	75	000	---	10:25:21am	14	May 98	Skipped Set	3
006	49	000	---	10:26:21am	14	May 98	Power Lost	0
007	75	000	---	11:27:10am	14	May 98	Power Restored	0
008	45	000	---	11:42:10am	14	May 98	Start Set	3
009	75	407	400	11:43:57am	14	May 98	005 No Start Signal	150
010	45	406	407	11:43:57am	14	May 98	005 No Start Signal	150
011	75	405	406	11:43:57am	14	May 98	005 No Start Signal	150
012	45	404	405	11:43:57am	14	May 98	005 No Start Signal	150
012	75	403	404	11:43:57am	14	May 98	005 No Start Signal	150
014	45	402	403	11:43:57am	14	May 98	005 No Start Signal	150
015	75	401	402	11:43:57am	14	May 98	005 No Start Signal	150
016	45	400	401	11:43:57am	14	May 98	005 No Start Signal	150
017	75	430	421	11:43:57am	14	May 98	005 No Start Signal	150
018	45	419	420	11:43:57am	14	May 98	005 No Start Signal	150
018	75	418	419	11:43:57am	14	May 98	005 No Start Signal	150
018	45	417	418	11:43:57am	14	May 98	005 No Start Signal	150
018	75	416	417	11:43:57am	14	May 98	005 No Start Signal	150
018	45	415	416	11:43:57am	14	May 98	005 No Start Signal	150
018	75	414	415	11:43:57am	14	May 98	005 No Start Signal	150

## Protocol Assignments

The AM2 Squirt 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 Squirt can support multiple protocols running simultaneously and the user has the ability to assign them to lines and channels as necessary. Each AM2 Squirt is supplied with protocols that are standard for their model type.

## AM2 Squirt Unit Specifications

The AM2 Squirt product line consists of different platforms providing physical interfaces for Analog, T1/E1 CAS, ISDN PRI/BRI and SS7.

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

General Characteristics	
Audio Monitor Interface:	<ul style="list-style-type: none"> <li>Two volume controls adjust the stereo level of the internal loudspeaker</li> </ul>
User Interface:	<ul style="list-style-type: none"> <li>FeatureCall Graphical User Interface</li> <li>Command line control via RS232C or Telnet, (TCP/IP Ethernet)</li> </ul>
RS232/V.24 Ports:	<ul style="list-style-type: none"> <li>Two Serial Ports: Main / Auxiliary. Full duplex on 3 wires. Provide GUI access, printer output, remote control and chaining operations.</li> </ul>
Ethernet (optional):	<ul style="list-style-type: none"> <li>10 Base-T interface</li> <li>Telnet</li> <li>TCP/IP</li> <li>Configurable addressing via RS232 port: IP, Subnet Mask, Gateway and Transmission Frame Type</li> <li>IEEE 802.3 or Ethernet II packet format</li> <li>Maximum Transmission Unit (MTU) limit 1492 for IEEE 802.3, or 1500 for Ethernet II</li> <li>48 bit Ethernet address</li> <li>Class 1 Logical Link Control (LLC)</li> <li>Address Resolution Protocol (ARP)</li> <li>Internet Control Message Protocol (ICMP)</li> <li>User Datagram Protocol (UDP)</li> </ul>
PC Requirements FeatureCall (Customer provided):	<ul style="list-style-type: none"> <li>MS-DOS operating system 3.3 or higher</li> <li>Microsoft Windows operating system version 3.x and/or Windows '95</li> <li>486DX or higher microprocessor</li> <li>4 MB of memory, 8 MB recommended</li> <li>Hard Disk space required for installation: 5 MB minimum</li> <li>One 3.5" high density disk drive</li> <li>VGA or higher resolution monitor</li> <li>Windows compatible mouse</li> <li>RS232 19,200 Baud com.port</li> <li>Ethernet TCP/IP Packet Driver (optional)</li> </ul>
Dimensions:	<ul style="list-style-type: none"> <li>16.8" Wide (730mm) x 7.2" High (185mm) x 11.5" Deep (295mm)</li> </ul>
Power:	<ul style="list-style-type: none"> <li>90 to 264 VAC, 47 to 65 Hertz, 65 Watts</li> </ul>
Weight:	<ul style="list-style-type: none"> <li>16.5 Pounds (7.5 Kilograms)</li> </ul>

Call Programs	
Call Program Sets:	4 per unit, stored in non-volatile memory
Call Programs:	480 per unit, memory resident (640 for AM2S-B)
Features:	<ul style="list-style-type: none"> <li>FeatureCall Graphical User Interface</li> <li>Commonly used scripts supplied with unit</li> <li>Custom scripts created and downloaded from FeatureCall</li> </ul>
System Start Modes:	<ul style="list-style-type: none"> <li>Synchronous</li> <li>Random</li> <li>Manual</li> </ul>
Trouble Encounter Response:	<ul style="list-style-type: none"> <li>Continue</li> <li>Call stop</li> <li>Unit stop on trouble</li> </ul>

Voice Channel Functions	
Tone detectors and Circuit Switched Voice Functions	
Detectors:	<ul style="list-style-type: none"> <li>Tone detectors are based on Digital Signal Processors (DSPs) 1 per channel/line</li> </ul>
Call Progress Detectors:	<ul style="list-style-type: none"> <li>One detector per line or B-channel</li> <li>Detects: dial tone, busy, reorder, ring, ringback, supervision, wink</li> </ul>
Path Confirmation Receiver:	<ul style="list-style-type: none"> <li>One receiver per line or B-channel</li> <li>Frequency range: 10 to 2500 Hz</li> <li>Accuracy: 1% <math>\pm</math> 10 Hz</li> <li>Sensitivity: 0 dBm to -24 dBm</li> <li>Response Time: 12.5 ms</li> </ul>
Signaling Tone Decoders: (AM2S-D/De Only)	<ul style="list-style-type: none"> <li>One receiver per channel</li> <li>Detects signaling tones for SOCOTEL and ITU-T (CCITT) #5 signaling schemes</li> </ul>
MF Receiver:	<ul style="list-style-type: none"> <li>Decodes received MF digits DTMF, MFR1 MFR2</li> <li>Response time: under 40 ms</li> <li>Dynamic range: 35 dBm</li> </ul>

Voice Path Confirmation	
Line and channel path verification -- Circuit Switched Voice for Digital AM2S Models):	<ul style="list-style-type: none"> <li>10 user selectable single tone signals to send unique channel ID tones</li> <li>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</li> <li>64 user selectable single tone signals</li> </ul>
Circuit Switched Data: (Digital AM2S Models only):	<ul style="list-style-type: none"> <li>511 and 2047 BERT pattern test for 56 kbps or 64 kbps channels</li> <li>511-bits pattern conforms to CCITT 0.153</li> <li>2047-bit pattern conforms to CCITT 0.152</li> </ul>
Packet Switched Data: (AM2S-DX/DXe and AM2S-B only)	<ul style="list-style-type: none"> <li>Up to 5 user selectable X.25 packets for confirmation</li> </ul>

Digit Generators	
Dialed digit strings are of unlimited length	
Dial Pulse Generator:	<ul style="list-style-type: none"> <li>Programmable dial speed: 1 pps to 999 pps</li> <li>Dial break: 1 to 99%</li> <li>Inter-digit time: 1 to 999 ms</li> </ul>
Multitone Digit Generators:	<ul style="list-style-type: none"> <li>One digit generator per line</li> <li>Dialing codes: MF R1, MF R2, DTMF</li> <li>Default level: -9 dBm</li> <li>Default frequencies: Nominal <math>\pm</math> 0.005%</li> <li>Programmability: Each line individually programmable for level 0 dBm to -50 dBm in 1 dB steps for each frequency component</li> <li>Programmable frequency range: Up to 12.5% above or below nominal in 0.1% steps for each frequency component</li> </ul>

## Printouts and Reports - Call Statistics

Data is internally stored

Manual Reports:	<ul style="list-style-type: none"> <li>• Call statistics for each line or channel</li> <li>• Totals for all lines and channels</li> </ul>
Automatic Reports	<ul style="list-style-type: none"> <li>• Prints automatically on the hour or every half or quarter hour</li> <li>• Report categories are user selectable</li> </ul>
Call Statistics for each originate line or channel:	<ul style="list-style-type: none"> <li>• Call attempt count</li> <li>• Call completion count</li> <li>• Delayed dial tone (AM2S-A only)</li> <li>• No dial tone count (AM2S-B only)</li> <li>• Delayed start signal count (Except AM2S-A)</li> <li>• No start signal count (Except AM2S-A)</li> <li>• No alert signal count</li> <li>• No voice path or B-channel confirmation count</li> <li>• Busy signal encountered count</li> <li>• No answer signal count</li> <li>• Ring time-out count (Except AM2S-B, AM2S-DX/DXe)</li> <li>• Average dial tone delay</li> <li>• Average post dial delay</li> <li>• Custom code report count (programmable in test script)</li> </ul>
Call Statistics for each terminate line or channel:	<ul style="list-style-type: none"> <li>• Attempted calls count</li> <li>• Completed calls count</li> <li>• Custom code report count (programmable in test script)</li> </ul>
For each packet-switched originate channel (ISDN-BRI and ISDN-PRI only):	<ul style="list-style-type: none"> <li>• Call Attempts</li> <li>• Completed Calls</li> <li>• Average connect acknowledge delay</li> <li>• Slow connect acknowledge delay</li> <li>• No connect acknowledge</li> <li>• Number of packets sent</li> <li>• Number of packets re-sent</li> <li>• Average packet delay</li> <li>• Custom code report count (programmable in test script)</li> </ul>
For each packet-switched terminate channel (ISDN-BRI and ISDN-PRI only):	<ul style="list-style-type: none"> <li>• Attempted calls count</li> <li>• Completed calls count</li> <li>• Custom code report count (programmable in test script)</li> </ul>
Real Time Error Reports:	<ul style="list-style-type: none"> <li>• Displayed or printed as they occur</li> <li>• Details of the last 100 errors are stored</li> <li>• Error reports include: type, the line(s) or channel(s), time</li> <li>• Error types recognized and reported:               <ul style="list-style-type: none"> <li>• Slow dial tone (AM2S-A only)</li> <li>• No dial tone (AM2S-A only)</li> <li>• Slow start (Except AM2S-A)</li> <li>• No start (Except AM2S-A)</li> <li>• No alert tone</li> <li>• Path or B-channel confirmation failed</li> <li>• No answer signal</li> <li>• Ring time-out (Except AM2S-B and AM2S-DX/DXe)</li> <li>• Busy</li> <li>• Protocol cause values (ISDN-BRI, ISDN-PRI &amp; SS7 only)</li> <li>• Custom code report count (programmable in test script)</li> </ul> </li> </ul>

## Voice Replay Option:

This option provides up to 64 two second recorded messages for AM2 Squirt Models AM2S-A, AM2S-B, AM2S-D, and AM2S-De

### Feature Specifications

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:	• SENDVOX command in script
Voice output:	• Selected voice signal is output on the channel assigned in the Call Program
Output level:	• Determined at the time of recording
Recording:	• Created in a PC with a sound card and Ameritac software
Required recording hardware:	<ul style="list-style-type: none"> <li>• Creative Labs Sound Blaster™ or equivalent, 16-bit audio card</li> <li>• EPROM Programmer</li> <li>• PC running DOS 3.x or higher</li> </ul>



## AM2S-A Specifications:

The AM2S-A Analog Call Generator provides line interfaces for 16 to 64 analog lines.

System	
Capacity:	<ul style="list-style-type: none"> <li>16 to 64 analog lines expandable in 16 line increments</li> </ul>
Call Volume:	<ul style="list-style-type: none"> <li>Typically 16,000 confirmed calls per hour (DTMF dialing, tone ID confirmation, 64 paired lines)</li> </ul>
Line Interface Options:	<ul style="list-style-type: none"> <li>Loop Start, 2-wire (optional Ground Start)</li> <li>Pulse, DTMF, MF R1 &amp; MF R2 dialing</li> <li>900 ohm impedance (optional 600 ohm impedance)</li> <li>Optional 12/16 kHz Meter Pulse Detection</li> </ul>
Front Panel Indicators:	<ul style="list-style-type: none"> <li>64 LEDs, one per line</li> <li>Line Status Display:               <ul style="list-style-type: none"> <li>Dark: Idle line</li> <li>Green: Originate line off hook</li> <li>Yellow: Terminate line off hook</li> <li>Red: Line error</li> </ul> </li> </ul>

## ADSI Option:

Provides Analog Display Service Interface (ADSI)/Caller ID test functionality on AM2 Squirt Model AM2S-A.

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

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





## AM2S-B Specifications

The AM2S-B Basic Rate ISDN FeatureCall Generator provides the line interfaces for 8 to 32 BRI/BRA-ISDN U-Interface (2B1Q) lines.

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

## Signaling Systems

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



## AM2S-D/De Specifications

The AM2S-D Digital Call Generator provides the interface for one to four 1.544 Mbps T1 or one to four 2.048 Mbps E1 trunks (AM2S-De).

System	
Capacity:	<ul style="list-style-type: none"> <li>AM2S-D:               <ul style="list-style-type: none"> <li>One to two 1.544 Mbps PCM 24 channel T1 CAS trunks expandable in 1 span increments</li> <li>Menu selectable D3/D4 Framing or ESF</li> <li>Up to 96 simultaneous calls (4 spans)</li> </ul> </li> <li>AM2S-De:               <ul style="list-style-type: none"> <li>One to four 2.048 Mbps PCM 32 channel E1 CAS trunks expandable in 1 span increments</li> <li>Menu selectable CRC-4                   <ul style="list-style-type: none"> <li>Up to 120 simultaneous calls (4 Spans)</li> </ul> </li> </ul> </li> <li>All channels can originate or terminate calls</li> <li>PCM timing may be sourced internally or from one of the four trunks within the group</li> </ul>
Interface Options:	<ul style="list-style-type: none"> <li>Bantam 100 ohm balanced input connectors</li> <li>Triple Banana 120 ohm, balanced input connectors</li> <li>BNC 75 ohm, unbalanced input connectors</li> <li>Siemens 1, 6/5, 6 (DIN 47295), 75 ohm, unbalanced input connector</li> <li>Bantam 120 ohm balanced input connectors</li> </ul>
Call Volume:	<ul style="list-style-type: none"> <li>AM2S-D: 48,000 confirmed calls per hour (4 spans)</li> <li>AM2S-De: 60,000 confirmed calls per hour (4 spans)</li> </ul>
Front Panel Indicators:	<ul style="list-style-type: none"> <li>One per channel or time slot</li> <li>Channel Status Display:               <ul style="list-style-type: none"> <li>Dark: Idle line</li> <li>Green: Originate call</li> <li>Yellow: Terminate call</li> <li>Red: Error</li> </ul> </li> <li>Layer 1 Indicators:               <ul style="list-style-type: none"> <li>PCM Sync (green: normal, red: out-of-sync)</li> <li>Frame Error, CRC Error, Slip (dark: normal, red: error)</li> </ul> </li> <li>AM2S-D Alarm Indicator:               <ul style="list-style-type: none"> <li>Dark: Normal</li> <li>Red: Indicates red, yellow or blue alarm received</li> </ul> </li> <li>AM2S-De:               <ul style="list-style-type: none"> <li>Provides status of TS16 (dark: normal, yellow: Distant multiframe alarm, red: signal all ones alarm)</li> </ul> </li> </ul>



## AM2S-DX/DXe Specifications

The AM2S-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 (AM2S-DXe).

System	
Capacity:	<ul style="list-style-type: none"> <li>AM2S-DX:               <ul style="list-style-type: none"> <li>One to four 1.544 Mbps PCM 24 channel T1 CCS trunks expandable in single span increments</li> <li>24 timeslots (23B+D) per trunk</li> <li>AM1 and B8ZS Line Coding</li> <li>Menu selectable D3/D4 Framing or ESF formats</li> </ul> </li> <li>AM2S-DXe:               <ul style="list-style-type: none"> <li>One to four 2.048 Mbps PCM 32 channel E1 CCS trunks expandable in single span increments</li> <li>32 timeslots (30B+D) per trunk</li> <li>HDB3 Framing</li> <li>Menu selectable CRC-4 on/off</li> </ul> </li> </ul>
Interface Options:	<ul style="list-style-type: none"> <li>Bantam 100 ohm balanced input connectors</li> <li>Triple banana 120 ohm, balanced input connectors</li> <li>BNC 75 ohm, unbalanced input connectors</li> <li>Siemens 1, 6/5, 6 (DIN 47295), 75 ohm, unbalanced input connector</li> <li>Bantam 120 ohm balanced input connectors</li> </ul>
Call Volume:	<ul style="list-style-type: none"> <li>AM2S-DX: 48,000 confirmed calls per hour (4 spans)</li> <li>AM2S-DXe: 60,000 confirmed calls per hour (4 spans)</li> </ul>
Signaling System Layer 1:	<ul style="list-style-type: none"> <li>Complies with ANSI T1.408</li> <li>Complies with ITU-T (CCITT) 1.412 and 1.431</li> </ul>
Signaling System Layer 2:	<ul style="list-style-type: none"> <li>Q.921/LAPD and LAPB (X.25) Signaling</li> </ul>
Signaling System Layer 3:	<ul style="list-style-type: none"> <li>Q.931 and equivalent standards</li> <li>Up to 8 different L3 protocols may be down loaded to unit</li> <li>Menu selection of L3 protocol for each B- and D-channel</li> <li>D- or signaling channel may be assigned to any physical time slot</li> <li>Various international protocols supported</li> <li>Additional protocols can be created and downloaded from Workstation or PC</li> </ul>
Packet Data:	<ul style="list-style-type: none"> <li>X.31 Case A and Case B</li> <li>BPS: B-channel X.25 packet data</li> <li>DPS: D-channel X.25 packet data</li> </ul>
Circuit Switched: CSD:	<ul style="list-style-type: none"> <li>Circuit switched data (BERT)</li> <li>CSV: Circuit switched voice</li> </ul>

### Front Panel Indicators:

- One per channel or time slot
- Channel Status Display:
  - 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)
- AM2S-DX Alarm Indicator:
  - Dark: Normal
  - Red: Indicates red, yellow or blue alarm received
- AM2S-DXe: Provides status of TS16 (dark: normal, yellow: distant multiframe alarm, red: signal all ones alarm)



## AM2S-S7/S7e Specifications

The AM2S-S7 Call Generator provides the interface for one to four 1.544 Mbps CCS T1 or one to four 2.048 Mbps CCS E1 trunks (AM2S-S7e).

System	
Capacity:	<ul style="list-style-type: none"> <li>• Signaling links:               <ul style="list-style-type: none"> <li>• Eight 56/64K SS7 Signaling Links per unit. Modular Interface options include:                   <ul style="list-style-type: none"> <li>• Two x T1 1.544 Mbps (AM2S-S7)</li> <li>• Two x E1 2.048 Mbps (AM2S-S7e)</li> <li>• Eight x V.35 56/64 kbps</li> <li>• Eight x DSOA 56 kbps</li> </ul> </li> <li>• Fully associated links using time slots in the voice/data circuits are supported</li> </ul> </li> <li>• AM2S-S7 Voice &amp; Data Circuits:               <ul style="list-style-type: none"> <li>• One to four 1.544 Mbps PCM 24 channel T1 CCS trunks expandable in single span increments</li> <li>• AMI and B8Zs Line Coding</li> <li>• D4 or ESF framing</li> </ul> </li> <li>• AM2S-S7e Voice &amp; Data Circuits:               <ul style="list-style-type: none"> <li>• One to four 2.048 Mbps PCM-30/PCM-31 E1 CCS trunks expandable in single span increments                   <ul style="list-style-type: none"> <li>• HD33 line coding</li> <li>• CRC4 framing</li> </ul> </li> </ul> </li> <li>• Modular interface options:               <ul style="list-style-type: none"> <li>• Balanced 100 ohm or 120 ohm, Bantam</li> <li>• Unbalanced 75 ohm, BNC</li> </ul> </li> </ul>
AM2S-S7 Interface Option:	<ul style="list-style-type: none"> <li>• 1.544 Mbps Signaling Interface option with 8 SS7 signaling links. Bantam 100 ohm, balanced input</li> <li>• 1.544 Mbps Signaling Interface option with 8 SS7 signaling links. Bantam 120 ohm, balanced input</li> <li>• V.35 Signaling Interface Option with 8 SS7 signaling links on 8 V.35 Interfaces, T1, 100 ohm, unbalanced input</li> <li>• V.35 Signaling Interface Option with 8 SS7 signaling links on 8 V.35 Interfaces, T1, 120 ohm, unbalanced input</li> <li>• DSOA Signaling Interface Option with 8 SS7 signaling links on 8 DSOA Interface, T1, 100 ohm, balanced input</li> <li>• DSOA Signaling Interface Option with 8 SS7 signaling links on 8 DSOA Interface, T1, 120 ohm, balanced input</li> </ul>
AM2S-S7e Interface Option:	<ul style="list-style-type: none"> <li>• 2.048 Mbps Signaling Interface option with 8 SS7 signaling links. BNC 75 ohm, balanced input</li> <li>• V.35 Signaling Interface option with 8 SS7 signaling links on 8 V.35 Interface, E1, 75 ohm, balanced input</li> </ul>
Call Volume:	<ul style="list-style-type: none"> <li>• AM2S-S7: 48,000 confirmed calls per hour (4 spans)</li> <li>• AM2S-S7e: 60,000 confirmed calls per hour (4 spans)</li> </ul>
Signaling Protocols AM2S-S7	<ul style="list-style-type: none"> <li>• Bellcore Q.702 at level 1</li> <li>• Bellcore Q.703 at level 2</li> <li>• Bellcore Q.704 at level 3</li> <li>• Bellcore Q.761 to Q.766 ISUP signaling</li> </ul>

Signaling Protocols AM2S-S7e:	<ul style="list-style-type: none"> <li>• CCITT Q.702 at level 1</li> <li>• CCITT Q.703 at level 2</li> <li>• CCITT Q.704 at level 3</li> <li>• CCITT Q.761 to Q.766 ISUP signaling</li> <li>• BTNR 167</li> <li>• Regional TUP varieties</li> </ul>
Front Panel Indicators:	<ul style="list-style-type: none"> <li>• One per channel or time slot</li> <li>• Channel Status Display:               <ul style="list-style-type: none"> <li>• Dark: Idle line</li> <li>• Green: Originate call</li> <li>• Yellow: Terminate call</li> <li>• Red: Error</li> </ul> </li> <li>• Layer 1 Indicators: PCM Sync (green: normal, red: out-of-sync) Frame Error, CRC Error, Slip (dark: normal, red: Error)</li> <li>• AM2S-S7 Alarm Indicator:               <ul style="list-style-type: none"> <li>• Dark: Normal</li> <li>• Red: Indicates red, yellow or blue alarm received</li> </ul> </li> <li>• AM2S-S7e: Provides status of TS16 (dark: normal, yellow: distant multiframe alarm, red: Signal all ones alarm)</li> </ul>

## Leading Edge Technology

AM2 Squirt 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 Squirt versatile, accurate and fast. All tone detectors are based on DSPs. Never needing calibration, AM2 Squirt systems will last well into the next generation of switching systems.

To maintain the maximum level of performance, functionality and flexibility, every AM2 Squirt 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 Squirt 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 Squirt 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 PT.Ts 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.



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