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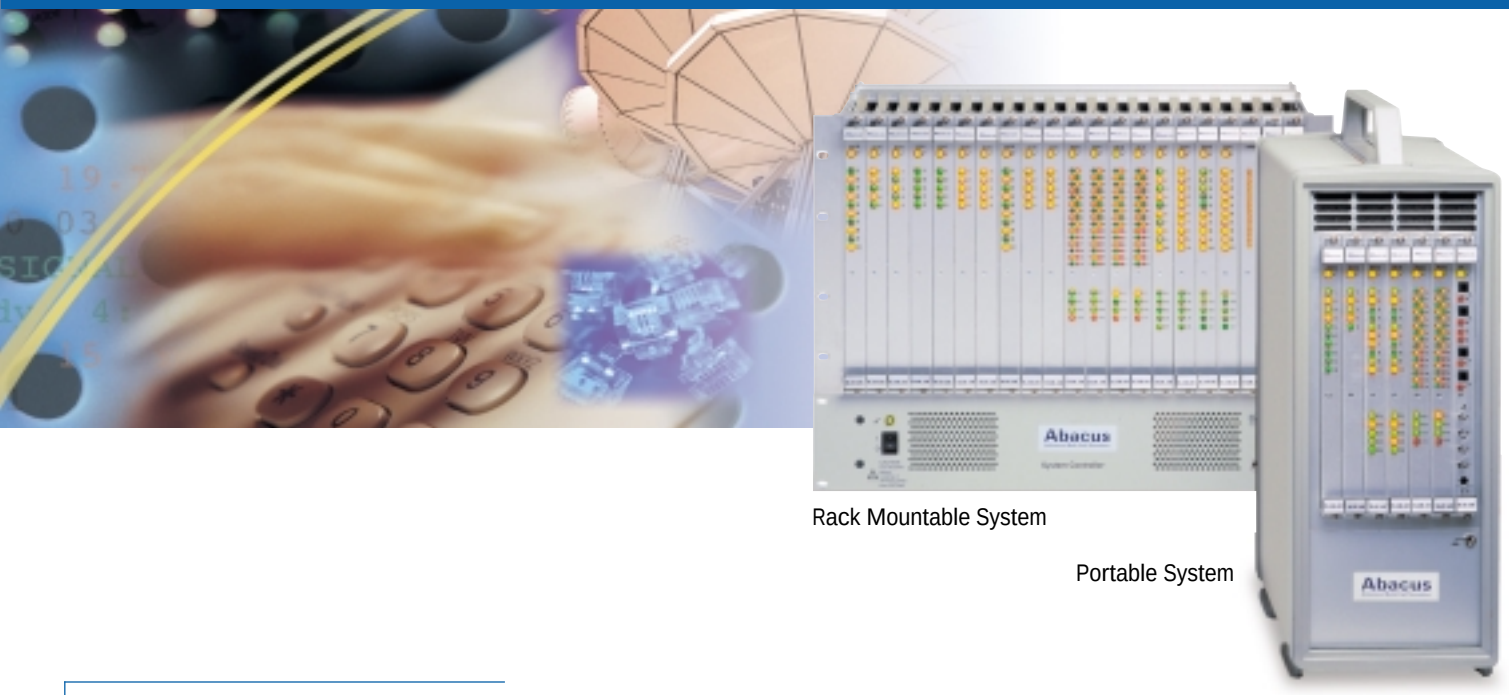
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Abacus™ System



Rack Mountable System

Portable System

Communications Test System

Call Generation

Call Switching

Multiple Interfaces

Modular and Expandable

Graphical User Interface

Integrated Testing

The Abacus™ system is designed and manufactured by Zarak Systems Corporation in the USA. Abacus is sold, serviced, and supported worldwide.

Features

- Test analog, ISDN, T1, E1, GR-303, SLC-96, V5.1, V5.2, and SS7
- Expandable from 5 to 1023 channels
- Mix circuit types in the same system
- Same cards perform call generation and call switching
- User interface runs under Windows
- Compatibility with or emulation of telephone systems worldwide
- DTMF, MF R1, MF R2, R1½, SS5, pulse dialling
- Flexible call sequences
- Generate or switch over 200k BHCA
- Results are automatically and continuously gathered and presented in tables and graphs
- Programmable protocols
- Built-in protocol analyzers

Applications

PBXs, switches and central offices
- Create traffic and verify routing
- Determine capacity

Voice over IP, satellite, WLL
- Verify connectivity
- Tolerate and measure duration of interruptions in speech path
- Measure round trip delay
- Measure Quality of Service
- Measure jitter

Transmission equipment
- End-to-end tests
- Verify transmission quality

Voicemail and IVR
- Transmit and receive account codes
- Create traffic to leave messages
- Replay messages and verify

Modems and routers
- Switch analog to analog
- Switch analog to ISDN
- Switch ISDN to ISDN

Switching
- Switch any interface to any interface
- Emulate switches worldwide

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Overview

Purpose

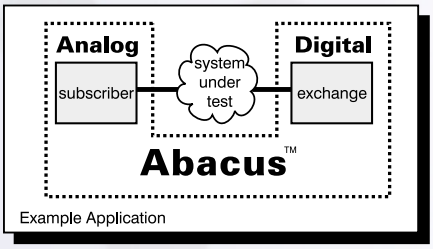
Abacus is a modular and expandable test system that creates telephone traffic (bulk call generator) or switches telephone traffic (central office emulator). Abacus can perform the functions of a call generator and a call switch simultaneously in the same system. The Abacus hardware is controlled by an external PC running the Abacus user interface software under Windows.

Functions

Call Generation

Call Generation is one of two modes in which a circuit type can operate on the Abacus system. In this mode, Abacus creates telephone traffic by executing compiled call sequences (scripts). Abacus can originate and terminate a call through a switch or similar equipment. The circuit type of the originating channel can be the same as or different from that of the terminating channel. You can add call generation to an interface subsystem that already does switching. You can also mix the functions of call generation and switching on a single system. As a call generator, Abacus can:

- create multiple telephone calls
- answer calls
- confirm that calls are correctly established
- create and respond to unique tones
- measure and display call statistics in real time
- generate calls on one circuit type and terminate calls on another circuit type

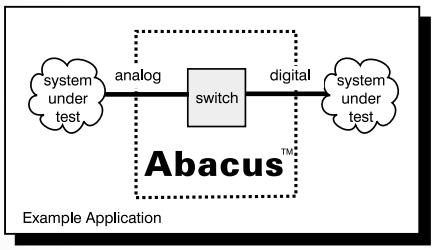


Example Application

Switching

Switching is one of two modes in which a circuit type can operate on the Abacus system. In this mode, Abacus receives a dialled number on an incoming channel and routes the call to an outgoing channel. The circuit type of the incoming channel can be the same as or different from that of the outgoing channel. You can add switching to an interface subsystem that already does call generation. You can also mix the functions of call generation and switching on a single system. As a switch, Abacus can:

- receive a dialled number
- route call to another channel on Abacus
- forward dialled number and caller ID
- provide clear speech path for traffic
- measure and display call statistics in real time
- create call progress tones such as dial tone, ringback, busy
- route calls among channels of the same circuit type or of different circuit types
- convert between A-law and μ-law



Example Application

System Capacity

Rack Mountable System

- 1 to 40 subsystems or maximum of 1023 channels
- Over 200k BHCA (see table below)

Portable System

- 1 to 6 subsystems or maximum of 672 channels
- Over 54k BHCA (see table below)

Modularity

- Mix and match circuit types in same system
- 1 to 4 users on any system
- Options for additional features are available for most subsystems
- Add more interfaces or options at any time

Documentation

Online Help

- Click on Help button or press F1 for context-sensitive topics
- Useful illustrations
- Comprehensive index and glossary

User's Manual

- Over 750 pages
- Useful illustrations
- Comprehensive index and glossary

Other

- Individual data sheet on each interface
- Comprehensive data sheet on entire system
- Various application notes
- Latest information and application assistance available on web site

Warranty, Service, and Support

Warranty

- One year on parts and labor included with system
- Option to extend warranty in increments of two years

Software Subscription

- One year free subscription of software updates
- Option to extend subscription in increments of two years
- Intermediate software releases available on Zarak's web site

Technical Support

- Included with software subscription
- Via email (support@zarak.com), telephone, or fax

Training

- 2-day course on theory and use of Abacus
- Each class 1 to 4 students
- Customized courses available

Available Interfaces

Analog

- **ACG:** 2-wire; subscriber; 10 circuits per card
- **ECG:** 2-wire; enhanced subscriber; 5 circuits per card
- **XCG:** 2-wire; exchange; 5 circuits per card
- **MCG:** 2-wire or 4-wire voice path; E&M Type I to V; trunk or signalling; 5 circuits per card

ISDN BRA

- **BCG:** 2-wire; subscriber or exchange; U-interface; 5 circuits per card
- **SCG:** 4-wire; subscriber or exchange; S/T-interface; 5 circuits per card

PCM

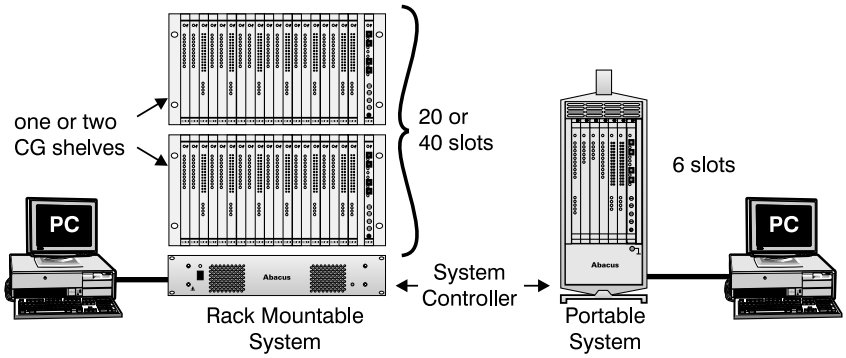
- **PCG:** 4-wire; subscriber or exchange; one circuit per card; software selectable between: T1 CAS, E1 CAS, T1 PRA, E1 PRA, SLC-96, GR-303, V5.1, V5.2

Miscellaneous

- **SRG:** 9-pin asynchronous serial; EIA-232; V.24; 6 circuits per card; software selectable between creating traffic over modems and SMDI
- **DRG:** send and receive WAV files (for example, speech)
- **PRG:** SS7 resource for one to four datalinks
- **MRG:** V.90 and fax; client and server; 10 circuits per card

Circuit Type	Portable *			Rackmount, 1 CG shelf *			Rackmount, 2 CG shelves *		
	circuits	channels	BHCA	circuits	channels	BHCA	circuits	channels	BHCA
Analog exchange	30	30	27k	100	100	90k	200	200	180k
Analog subscriber	60	60	54k	200	200	180k	400	400	360k
ISDN BRA	30	60	54k	100	200	180k	200	400	360k
T1 – PRA	6	143	129k	20	479	90 / 430k	40	958	180 / 860k
T1 – CAS	6	144	130k	20	480	100 / 430k	40	960	200 / 860k
T1 – GR-303	5	1023	50 / 70k	19	1023	50 / 270k	38	1023	100 / 540k
E1 – CAS, PRA, V5.1	6	180	130k	20	600	100 /430k	34	1020	200 / 730k
E1 – V5.2	5	1023	50 / 90k	18	1023	50 / 320k	34	1020	100 / 610k
Asynchronous serial	36	36	6k	120	120	22k	240	240	43k

* Where two numbers are given, the first is for switching, and the second is for call generation



About Architecture

The Abacus hardware is controlled by an external PC running the Abacus user interface software under Windows. The minimum Abacus system is one base subsystem and one interface subsystem. The base subsystem contains all components required to support interface subsystems.

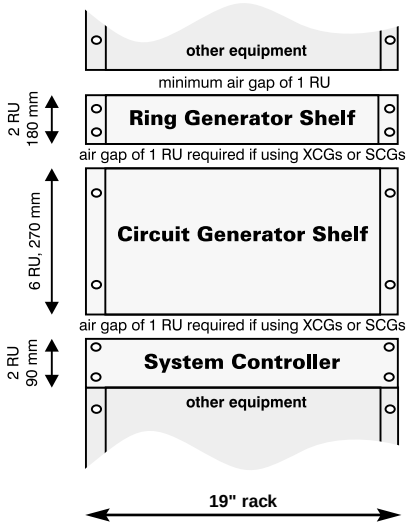
The Abacus base subsystem has a midplane that houses a front card and a rear card for each Circuit Generator (CG) or Resource Generator (RG) subsystem. The front card carries active electronics to perform tests, while the rear card carries connectors to provide a physical interface to the system under test (SUT). This approach allows the front of the system to have a tidy appearance, free of dangling cables.

The rack mountable system and the portable system use the same plug-in cards, use the same user interface software, and have identical functionality.

Rack Mountable System

Components of Base Subsystem

- **System Controller (SC):** provides dc power to, distribute test parameters to, and gathers test data from one or two CG shelves
- **Circuit Generator (CG) Shelf:** houses 1 to 20 CG or RG subsystems on a common midplane



- **Power and Interface (PI) Subsystem:** distributes power and data to the Abacus midplane
- **Cables:** intra-system and to connect to serial port on user's PC
- **User interface software:** 32-bit application that runs under Windows

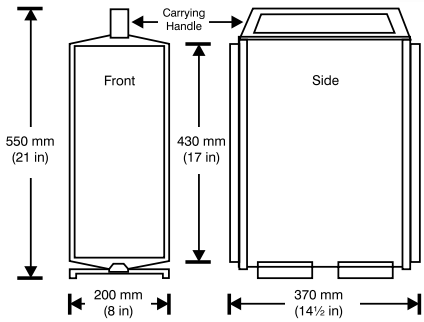
User PC Control

- Asynchronous serial control
- LAN (TCP/IP)

Environmental

- **AC input:** 90 to 264 Vac, 50 to 60 Hz
- **Power consumption:** maximum 300 W for entire system
- **Operating range:** 0°C to 40°C
- **CE marked**
- **Weight:** 5 to 35 kg

Portable System



Components of Base Subsystem

- **Portable chassis:** has SC and CG shelf built in
- **Power and Interface (PI) Subsystem:** distributes power and data to the Abacus midplane
- **Cable:** to connect to serial port on user's PC
- **User interface software:** 32-bit application that runs under Windows

User PC Control

- Asynchronous serial (COM port)
- LAN (TCP/IP)

Environmental

- **AC input:** 90 to 264 Vac, 50 to 60 Hz
- **Power consumption:** maximum 85 W for entire system
- **Operating range:** 0°C to 40°C
- **CE marked**
- **Weight:** 11 to 13 kg

Minimum PC Requirements

- Pentium-class 133 MHz
- 32 MB RAM
- SVGA (800 x 600) resolution
- 15" color monitor
- CD-ROM
- 30 MB free disc space
- 2-button mouse
- Free COM port or LAN
- Windows 95, 98, or NT4.0

Clock Sources for Digital Circuits

- Internal crystal oscillator on the PI subsystem
- External PCM signal (T1 or E1) connected to the PI subsystem
- External sine wave at 8192 kHz or 10 MHz connected to the PI subsystem
- Receive signal on a digital card in the CG shelf
- For PCGs, independently recovered and looped from the receive signal

Audio Monitor on PI Subsystem

- Listen to speech of any four channels simultaneously (transmit or receive direction)
- 3.5 mm stereo headphone output
- Two bantam outputs for external monitoring equipment
- Two bantam inputs for injecting tones into any two channels in the CG shelf
- Listen to A-law or μ-law companded speech
- Alter volume from PC or from CG shelf

Working Off-Line (Demo Mode)

- Run user interface without Abacus hardware
- Emulate any hardware configuration of the Abacus system
- Create test configurations for later use with hardware

Expandability and Modularity

- 32-bit processor on each card
- DSPs on each card – non-blocking tone creation and tone detection for every channel
- Flash memory on each card – upgradeable in the field
- Firmware options enable additional functionality

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Features

Starting and Stopping a Test

Starting a Test

- **Call generation:** all channels can initiate calls simultaneously or individually (timing is user programmable)
- **Switching:** all channels can answer simultaneously or individually (timing is dependent on your system under test)
- **Delayed start:** start a test at a specific date and time
- **Batch mode:** configure a batch of tests to run in sequence

Length of a Test

- **Call generation:** select continuous, fixed period of time, certain number of scripts, or until specific date and time
- **Switching:** continuous or until call generating channels on the same system stop

Stopping a Test

- **Methods:** manually at anytime; automatically after the specified length of test has elapsed; automatically after a specific type of error
- **Graceful stops:** all channels finish executing their scripts at the stop of a test
- **Immediate stop:** all channels stop executing scripts regardless of status

Phone Numbers

Configuration

- Phone book method makes configuration easy
- Organize by circuit type, slot position, or mixture
- Number used for call generation (calling and called numbers) or switching (to determine routing)
- Specify own number, external number, and SPIDs (ISDN BRA)
- 1 to 20 digits for each number
- Supports same phone numbers on many channels (test ACDs with call generation or create hunt groups for switching)

Circuit Type

- Specify phone numbers independent of slot position
- Specify by channel, circuit, or card
- Sequential numbers or from a file

Slot Position

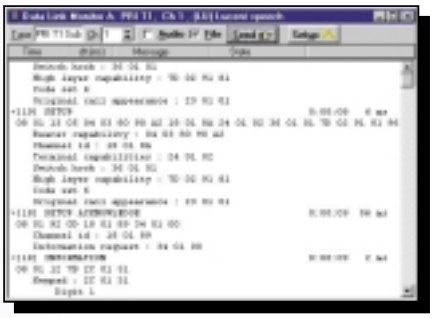
- Specify phone numbers independent of circuit type
- Easily configure hunt groups across multiple circuits

Protocol Development

- **Functions:** view, edit, or create protocols
- **CAS protocols:** modify states, signalling bits transmitted, and reaction to received signalling bits; graphical editor for state diagrams
- **ISDN protocols:** modify dialling method, information elements included in SETUP message, and maintenance
- **V5.1 and V5.2 protocols:** modify link startup procedure, country variances, behavior of call termination
- **Asynchronous serial data:** modify modem initialization string and bit rates

Protocol Analysis

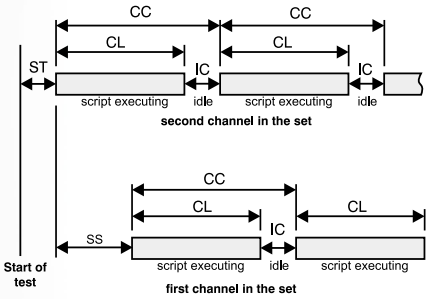
- Monitor data links of any 2 digital channels simultaneously
- Trace and decode channel associated signalling



- Trace and decode ISDN PRA or BRA
- Trace and decode GR-303 (TMC and signalling bits)
- Trace and decode V5.1 and V5.2
- Save trace files of any length

Test Timing – Call Generation

- Channels are grouped sequentially or randomly into sets
- Each channel of a set has common timing parameters and execute same script



- Sets can be linked across circuit types to facilitate end-to-end tests
- Timing comprises start time (ST), start to start (SS), call length (CL), inter-call (IC), and call to call (CC)

Tone Capabilities

- Each channel can send or receive one or two frequencies simultaneously
- Programmable call progress tones verify that speech path is established (call generation) using a variety of path confirmation types
- Dial using DTMF, pulse, MF R1, MF R2, R1½, SS5
- Send or receive strings of digits
- Send and receive speech and music

Test Environments

- Current test configuration is automatically saved to disc on exit of user interface, and automatically restored when user interface is rerun
- Save entire test configuration into a single file on user's PC
- Restore any environment file
- Specify a batch of environments to run sequentially

Reports

Formatted Report

- Print graphs
- Import graphics and logos
- Customize text and layout
- Customize contents
- Select frequency of report generation
- Save and view later

Text Report

- Customize format
- Customize contents
- Save as text file (read by any text editor)
- Select frequency of report generation
- Save and view later

Ordering

The Abacus system can support various interfaces: T1 CAS, E1 CAS, ISDN PRA, ISDN BRA, analog, SLC-96, GR-303, V5.1, V5.2, and SS7. You can purchase the interface cards (subsystems) as required. Most subsystems have a range of firmware options that enable special features. You can order the firmware options individually or in combination. Once the options are installed on a subsystem, you can select in software between the different functions.

About Zarak

Zarak Systems Corporation designs and manufactures products that are used to test communications systems and equipment. Zarak's products are sold worldwide to businesses that develop, manufacture, install, and support products for the communications infrastructure.

ZARAK

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