

Optional Console Shown

## Multi-Line Telephone System

**System Overview** The Model 104A is a complete, stand-alone telephone system for use in radio and television talk shows, teleconferencing systems, instructional television programs, remote IFB systems, financial trading networks, on-line "hoot and holler" paging systems—any program environment that calls for audience participation or direct listener response. Specialized line handling functions, color-coded keys and easy to see LED indicators, make this system ideal for fast-paced live production. Engineers who have installed the 104A tell us it's so easy to use "even talent can learn it in a matter of minutes."

The 104A is an integrated product comprised of two major sub-systems: 1) a stand-alone electronic telephone system, and 2) an interface network that matches telephone lines to professional audio equipment. Neither an add-on nor an adaptation of existing telephone equipment, the 104A is a complete self-contained system. There are no hidden extras, no odd-ball A leads, KSU's, or hard-to-find connectors. Just plug in the phone lines, hook up the audio, and balance the hybrids. The 104A is ready for work.

Noted for its reliability, ease of use, and exceptional value, thousands of 104A systems are in service around the world, on high visibility prime time talk shows, high-tech corporate conferencing networks, in community college instructional systems, and even cost-conscious small market radio stations.

**Unique Control Functions** Symetrix engineers created an electronic telephone system like no other, a logical system that takes the sweat out of handling multiple phone lines, even in a high pressure live production atmosphere. Praised for its intuitive simplicity, the 104A provides facilities not found on any other phone system.

- The order in which calls are received is automatically stored in the 104A's memory, so the call screener can tell at a glance who's next.
- Conferenced callers can be transferred as a group, from AIR to HOLD and back again, or from AIR to CUE and back again. The system keeps track of which lines are included in the conference group, so nobody gets lost, even through the longest break.
- Talent is guided to the next call by a flashing LED.
- Audio-on-hold feeds program audio to all callers while they wait.
- The caller is alerted by a "beep" that's sent to his phone when the AIR key for his line is pressed.
- If the caller hangs up before you get him on, the line will be released. There's no dial tone on the air, and the line is opened up for another caller.
- With the auto-answer function you can have incoming calls seized automatically to HOLD.

**Remote Control Consoles** The 104A system receives its operating commands from a telegenic remote control console that's as easy to use as a normal business phone. With a "Y" adapter and additional cables, two control consoles can be used in separate locations.

All operations may be executed from the remote control console: seize, release, transfer to air, transfer to cue, and group transfers to air and cue, caller override, and headphone level, auto-answer and ringer defeat.

The standard 104A system configuration includes one remote console with one 25 foot length of cable. A second console, with adapter and cables, is optional.

The remote consoles are connected to the main electronics package with a 25-pair telco style "fat cable," which carries all the control signals and supplies power to the remote consoles. A 25 foot cable is included with the 104A system, and with each optional remote console. Up to 300 feet of cable may be used, if necessary.

**Rack Mounted Electronics** All phone line and audio connections are made to the rack mountable electronics package, which may be conveniently located near other audio gear and/or phone line terminations. Included in the rack unit are phone line connectors, FCC approved telephone interface circuitry, audio inputs and outputs, as well as the microprocessor, digital switching and crossbar circuitry for the electronic telephone system.

Modular connectors are provided for up to four loop-start telephone lines. Two electronic hybrids provide two-wire to four-wire conversion, delivering a separate caller output signal. The hybrids are followed by an automatic gain matching system that allows lines to be conferenced with no appreciable loss.

**Electronic Hybrids** Professional and broadcast audio lines carry signals in one direction only—from the microphone or, to the speaker. On the other hand, telephone lines operate bi-directionally, carrying signals in *both directions at once*, but using only 2 wires.

When telephone calls are used on the air, the 2-wire telephone signal will, by definition, include studio originated audio. After going through the phone circuits, the talent's voice comes back sounding like a phone caller. To remove the host signal from the phone line, the 104A utilizes two electronic hybrids, which must be adjusted to match your phone line. When the hybrids are properly adjusted, trans-hybrid loss is maximized. The hybrids need only one adjustment, when the system is first installed.

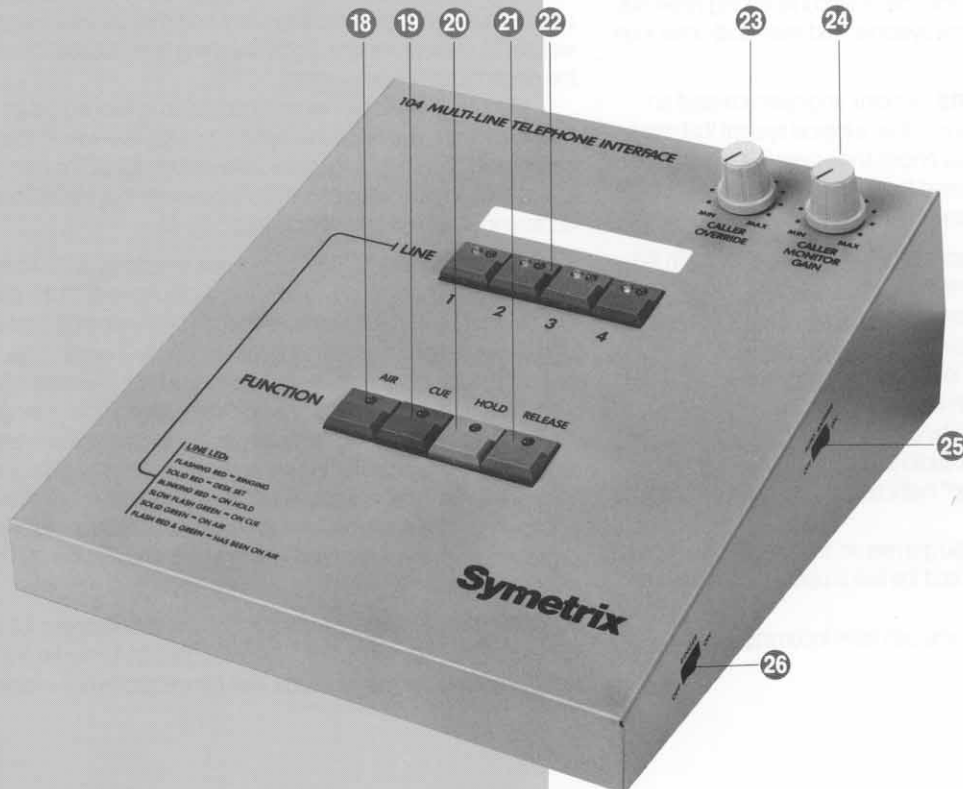
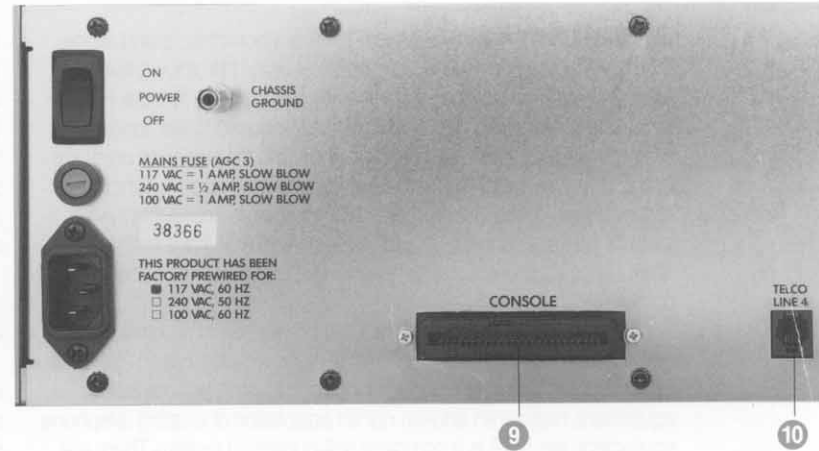
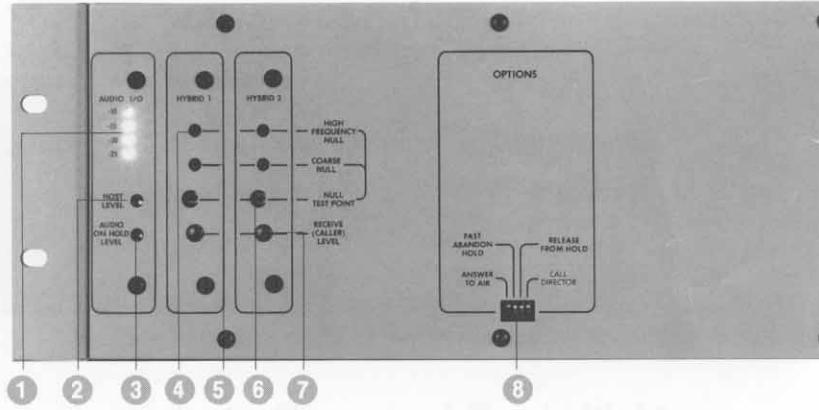
**Half-Duplex Option** For situations where simultaneous full-duplex conversation is not needed or not wanted, the 104A may be equipped with one or two half-duplex cards. Half-duplex allows conversation in

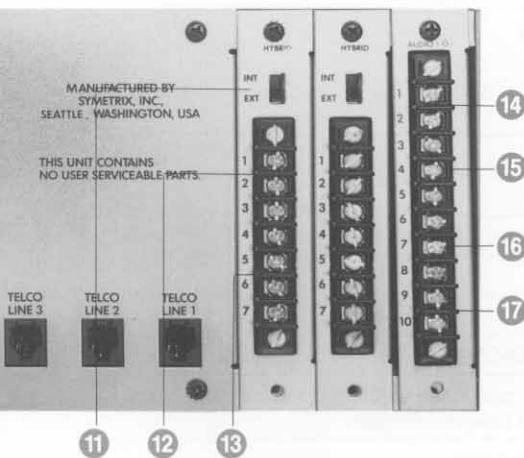
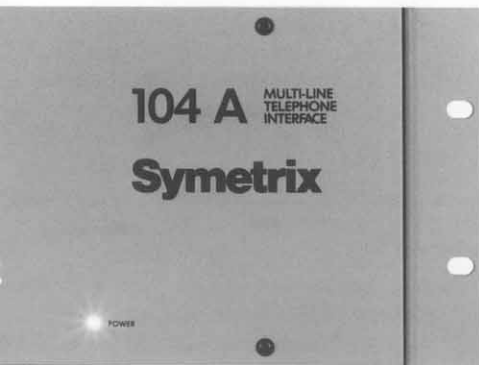
both directions, but only one at a time.

Because the transmit (host) and receive (caller) signal paths are never connected directly together, half-duplex cards perform superbly with any line. No null balancing is required.

In areas where phone line impedance varies greatly from line to line, performance may be improved by equipping the 104A with one hybrid and one half-duplex card. The program's guest is brought in via the full-duplex hybrid, and the listeners are brought in via the half-duplex hybrids. The guest and the host can therefore have a simultaneous full-duplex conversation, yet maintain complete control of the program. The host side of the half-duplex card takes precedence, so anytime the guest or the host speak, the caller is muted.

**External Hybrids** Connections for user-supplied external hybrids are provided. When the absolute maximum trans-hybrid loss is essential, use the Symetrix Model 111 Adaptive Hybrid. A fully automatic digital hybrid, the Model 111 provides the best possible host/caller isolation under all conditions, yet requires no null balancing.





## Front

- 1 **Host Output Meter**  
Indicates the host level output to the phone line.
- 2 **Host Level**  
Adjusts the host (transmit) level output to the phone line.
- 3 **Audio on Hold Level**  
Adjusts the program backfeed level output to all callers on hold.

### Hybrid 1/2

- 4 **High Frequency Null**  
Works in conjunction with the course null to match local phone lines.
- 5 **Course Null**  
Provides overall impedance matching adjustment to match local phone lines.

- 6 **Null Test Point**  
Provides easy access for measuring the signal level received from the phone line.
- 7 **Receive (Caller) Level**  
Sets caller signal level (factory pre-calibrated).
- 8 **Options**

Switch	Position	Functions
1	UP	Incoming calls may be answered directly to air without having to be received on either the LINE or CUE areas.
	DOWN	Incoming calls may NOT be answered directly to AIR.
2	UP	50 millisecond abandon hold time.
	DOWN	450 millisecond abandon hold time. In the majority of domestic locales the DOWN (factory pre-set) position is the proper choice.
3	UP	Denies release from hold. The operator must first return a line from hold to AIR, CUE, or LINE before RELEASE is allowed.
	DOWN	Allows the operator to release a caller from HOLD.
4	UP	Allows operation of the desk set while lines are already on AIR.
	DOWN	Operation of the telephone desk set is disabled if any line is on the AIR.

## Rear

### Console Connections

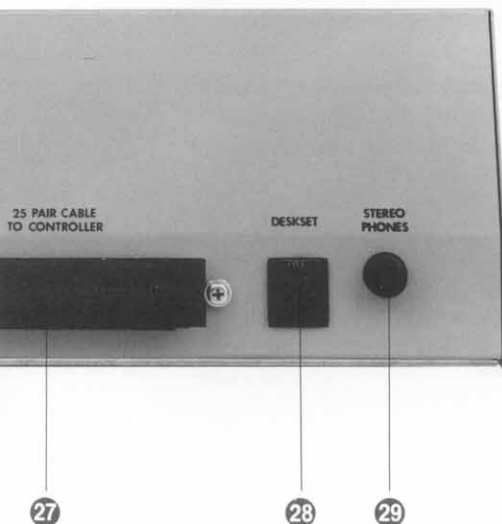
- 9 **Console**  
50-pin D-connector for "fat cable" interface to remote console.
- 10 **Phone Lines**
- 10 **Telco 1 – Telco 4**  
RJ-11 modular connectors for up to 4 loop-start telephone lines. Must be connected directly to C.O., may be paralleled with other phone systems or PBX.

### Electronic Hybrid Modules

- 11 **Int/Ext**  
Facilitates the use of external (user-supplied) hybrids.
- 12 **External Hybrid**  
Tip/ring and in/out connections for an external hybrid.

### Audio I/O Module

- 13 **Caller Audio Out**  
Balanced low impedance output contains only those callers assigned to each hybrid.
- 14 **Audio on Hold Input**  
RFI protected balanced transformerless line level input for program backfeed.
- 15 **Host Input**  
RFI protected balanced transformerless input for the host signal (mix-minus). Switchable for either line level (nom. +4) or mic level (nom. -50) signals.
- 16 **Caller Output**  
Balanced low impedance line level output (+4dBm nominal). Signal contains all callers that are on the air.
- 17 **Cue Output**  
Balanced low impedance line level output (+4dBu nominal). Signal contains all callers that are on cue.



## Remote Console

- 18 **Air**  
Used with the line keys to put callers on air.
- 19 **Cue**  
Used with the line keys to put callers on cue.
- 20 **Hold**  
Used with the line keys to put callers on hold.
- 21 **Release**  
Used with the line keys to release lines.
- 22 **Line**  
Used to seize, hold and release, and transfer phone lines.  
Red LED's: ring, hold and "oldest" call on hold.  
Green LED's: indicate call on hold or cue.  
Both LED's: call is on hold after being on air.
- 23 **Caller Override**  
Adjusts caller attenuation (ducking) from off to full muting.

- 24 **Caller Monitor Gain**  
Sets signal level at the rear panel headphone jack (caller only).
- 25 **Auto Answer**  
Allows incoming calls to be automatically seized and put on hold.
- 26 **Ringer Defeat**  
Enables/disables remote console's internal ringer.
- 27 **To Controller**  
50-pin D-connector for "fat cable" interface to main electronics unit.
- 28 **Deskset**  
RJ-11 modular connector for DTMF type telephone set. Used in conjunction with the line keys to answer and originate calls.
- 29 **Stereo Phones**  
Headphone driver output, contains only the caller signal.

# 104A *Multi-Line Telephone System*

## Specifications

Telephone Line Connections	Standard loop start, dial-up telephone lines, FCC approved under Part 68 and Part 15 for direct connection to telephone lines
Transmit (host) Audio Input	Electronically balanced differential input switchable between mic level (nominal -50dBm) and line level (nominal -10dBm to +4dBm) Line input impedance: >10k ohms Mic input impedance: >600 ohms
Audio-on-Hold Input	Electronically balanced differential input accepts nominal input levels from -10dBm to +8dBm Input impedance: 46.3k ohms
Receive (caller) Outputs	Electronically balanced differential Output impedance: <100 ohms Nominal output level: +4dBm
System Frequency Response	300Hz to 3kHz, nominal
Telephone Connectors	RJ-11 (modular)
Audio I/O Connectors	#6 barrier terminals
Dimensions, Controller	19" x 5.25" x 10.75"
Dimensions, Desk Console	8" x 10" x 3.5"
Shipping Weight	36 lbs.
Power Requirements	Factory pre-wired for nominal 120VAC/60Hz
User Adjustable Controls	Transmit level, audio on hold level, caller return level, course hybrid null, HF hybrid null, caller override level, caller monitor gain
Console to Controller Cable	25 feet, 25 pair, pre-wired with connectors

## System Configuration, Ordering Information

### 104A Multi-Line Telephone Interface

Includes one remote console, one 25/25 cable. Equipped two full duplex hybrids unless otherwise specified. May be ordered with one or two half-duplex cards.

### 104 CTRL

Optional extra control console for two station operation of the 104 or 104A. Includes Bridged-T adapter, two 25/25 cables.

### Half-Duplex Card

User installed replacement for the standard full-duplex hybrid.

### 25/25 Cable

25 pair 25 foot "fat cable." Female 50-pin D-connector one end, male 50-pin D-connector on the other end (may be used as extension).

### Bridged-T Adapter

Y-adapter for connecting two control consoles to a 104 or 104A. Two male 50-pin D-connectors, one female 50-pin D-connector.

## Other Telephone Interface Products From Symetrix

**Model 111 Adaptive Hybrid**—a digital hybrid that "learns" signal characteristics, adapts to maintain maximum trans-hybrid loss even as conferenced lines are added and removed. May be connected directly to C.O. line, or used with any PBX, key, electronic key system, or any two wire audio line. Delivers more gain before feedback in systems where live loudspeaker monitoring is used.

**TI-101 Telephone Interface**—a single line electronic hybrid with send limiter, caller equalization, caller compressor/ expander to control levels and reduce noise. Course and fine null balancing controls. Jacks provided for user supplied remote mute switch and conference link (for two units, two lines). Requires telephone set or holding coil to hold line.

**SX203 Telephone Interface**—a single line half-duplex interface that requires no null balancing. Modular jacks for phone line and telephone set, with front panel push button selection. Mic and line level inputs and outputs.

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