Maintenance Manual

EDACS®
C3 MAESTRO™
DISPATCH CONSOLE
FOR WINDOWS NT®

WITH ENHANCED AUDIO ENCLOSURE

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SPECIFICATIONS *

GENERAL

AC Power Operating Voltage Range	100 — 127 and 200 — 240 Vac (auto 115/230 Vac selection)
AC Power Operating Frequency Range	47 — 63 Hz
AC Power Consumption	
Complete Console System	375 watts maximum
Enhanced Audio Enclosure & Speakers	80 watts maximum
Personal Computer System	(See manufacturer's specifications)
Temperature Range (ambient air temperature)	
Operating	+50° to +104° Fahrenheit (+10° to +40° Celsius)
Storage	-30° to +122° Fahrenheit (-34° to +50° Celsius)
Relative Humidity Range	
Enhanced Audio Enclosure, Spkrs. & Disp. Keyboard	
Operating	20% to 80%, non-condensing
Storage	10% to 90%, non-condensing
Personal Computer System	(See manufacturer's specifications)
Dimensions (height x width x depth; approximate)	
Enhanced Audio Enclosure	3.25 x 15 x 9.8 inches (8.26 x 38.10 x 24.98 cm)
Speaker, Desk-Top (less volume knob)	6.38 x 6.25 x 3.69 (16.3 x 15.8 x 9.3 cm)
Speaker, Rack-Mount (less volume knob)	5.25 x 19 x 3.38 (13.34 x 48.26 x 8.59 cm)
Personal Computer System	(See manufacturer's specifications)
Rack-Mount Height; Optional (EIA 19-inch std.)	
Enhanced Audio Enclosure	2 rack units (3.5 inches / 8.89 cm)
Speaker	3 rack units (5.25 inches / 13.34 cm)
Weight (approximate)	
Enhanced Audio Enclosure	11.7 lbs. (5.31 Kg)
Enhanced Audio Enclosure w/ Rack Mount Option	14.0 lbs. (6.35 Kg)
Speaker, Desk-Top	2.1 lbs. (0.95 Kg)
Speaker, Rack-Mount with two Speaker Assemblies	4.2 lbs. (1.91 Kg)
Cabling (standard supplied)	6.0 lbs. (2.72 Kg)
Personal Computer System	(see manufacturer's specifications)
Enhanced Audio Enclosure Case Construction	0.060-inch sheet metal construction capable of supporting up to 80 pounds (36.3 kilograms) when free-standing on a flat surface (not rack mounted)

REGULATORY

Power Supply Safety and Performance	
115 Vac Operation	Meets ANSI/UL 1950 and CSA C22.2 No. 950-M89 requirements
230 Vac Operation	Meets EN 60950-1992 and BS 7002 requirements
Leased Line Interface	Meets UL 1459, IEC 950, EN 60950 and BS 7002 requirements
Radio Frequency Interference (RFI)	Meets EN 55022 and FCC Part 15 Class A requirements
Electro-Magnetic Immunity (EMI)	Meets IEC 801 Parts 2, 3 and 4 for ESD, radiated RF immunity and power line bursts respectively

CONTROL DATA LINKS

CEC/IMC ⇔ Personal Computer (PC)	9.6k or 19.2k baud RS-232 or RS-422 full-duplex serial connection between the console's Personal Computer (PC) and the Console Interface Module (CIM) within the CEC/IMC. Full-duplex 4-wire data modems may be employed between the PC and CIM in a remote console installation.
Personal Computer ⇔ Enhanced Audio Enclosure	9600 baud RS-232 full-duplex serial connection
Enhanced Audio Enclosure ⇔ Optional Equipment	RS-422 serial I/O port provided at rear panel of Enhanced Audio Enclosure for control data interfacing to optional equipment (for future expansion use)

AUDIO INPUTS

Microphones

Supervisor and Operator Headsets	Inputs for two simulated carbon telephone-style headset microphones similar to Plantronics model HS-0309-1. Approx. input impedance = 150 ohms. Typical input = 100 mV rms (-12 dBm). Nominal input range = -18 to -6 dBm. ALC controlled. DC mic bias = 3.0 ±0.5 Vdc with 50-ohm load.
Desk Mic	Input for an electret-type microphone similar to part number 19C851086P10 or P11. Approx. input impedance = 600 ohms. Typical input = 70 mV rms (-21 dBm). Nominal input range = -27 to -15 dBm. ALC controlled. DC mic bias = 3.7 ±0.5 Vdc with 1000-ohm load.
Boom or Gooseneck Mic	Input for a dynamic microphone similar to Shure Bros. model VR300 (part number 19C337100P1). Approx. input impedance = 10K ohms. Typical input = 5 mV rms (-56 dBm). Nominal input range = -68 to -44 dBm. ALC controlled. No dc mic bias present.
Line 1, 2, 3 & 4	Balanced 2-wire 600-ohm inputs each designed to receive voice bandwidth audio from one pair of a 4-wire 600-ohm twisted-pair transmission system provided by the CEC/IMC. Transformer isolated. Typical input = 436 mV rms (-5 dBm). Nominal input range = -20 to +10 dBm. Ground isolation = greater than 1500 Vdc.
Call Director	Balanced 2-wire 600-ohm input designed to accept audio from a Call Director device similar to Plant Equipment model 3780-L1-TT-010. Transformer isolated. Typical input = 78 mV rms (-20 dBm). Nominal input range = -26 to -14 dBm.
Paging Encoder	Balanced 2-wire 600-ohm input designed to accept audio from an external paging tone encoder or similar device. Typical input = 436 mV rms (-5 dBm). Nominal input range = -11 to +1 dBm. Ground isolation = greater than 1500 Vdc.

OTHER INPUTS

Microphone PTT And Monitor Switch	Active-low inputs used to detect "dry-contact" switch closures of the type found in standard microphones, footswitches and headset jacks. (Also see * below.)
Microphone Sense	Active-low inputs used to sense the connection of a microphone. (Also see * below.)
Page PTT	Active-low input used to signal presence of paging signal on paging audio input. (Also see * below.)
*** Microphone PTT, Microphone Sense, Monitor Switch And Page PTT Active-Low Inputs**	
Open-circuit voltage	12 Vdc typical; 16 Vdc maximum
Short-circuit current	30 mA maximum
Filtering/Response Time	Low-pass filtering prevents undesirable signals such as switch contact bounce or static charges from triggering microcontroller circuits; typical microcontroller response time = input must be valid greater than 5 milliseconds
Call Director Hook Sense & Jack Sense	Single-ended logic inputs used to sense CD off-hook and handset connection status. Each internally pulled to +12 Vdc via 470-ohm resistor.

AUDIO OUTPUTS

Earphones

Supervisor and Operator Headsets	Outputs for telephone-style headset earphones similar to Plantronics model HS-0309-1 or ACS model XW/AT. Approx. output impedance = 300 ohms. Unbalanced. Typical output level = 100 mV rms. (-15 dBm). Nominal output range = -21 to -9 dBm. Sidetone provided.

Speakers

Select and Unselect(s)	Typical Enhanced Audio Enclosure output level to Speaker Assembly = 436 mV rms (-5 dBm). Maximum speaker audio output power = 2 or 5 watts; selectable via internal switch at each Speaker Assembly. Each Speaker Assembly is equipped with a volume control. Minimum volume level provided; enable/disable switch provided at each Speaker Assembly. Maximum number of unselect speakers = 3.
Line 1, 2, 3 & 4	Balanced 2-wire 600-ohm outputs each designed to transmit voice bandwidth audio to one pair of a 4-wire 600-ohm twisted-pair transmission system provided by the CEC/IMC. Transformer isolated. Typical output = -5 dBm. Nominal output range = -20 to +10 dBm. Ground isolation = 1500 Vdc and greater than 5M ohms.
Call Director	Balanced 2-wire 600-ohm output designed to deliver audio to a Call Director device similar to Plant Equipment model 3780-L1-TT-010. Typical output = -5 dBm. Nominal output range = -11 to +1 dBm.
Select & Unselect Recorders	Unbalanced outputs each designed to drive audio inputs of an external recording device. Approx. output impedance = 350 ohms. Capacitively coupled. Typical output = -5 dBm. Nominal output range = -8 to -2 dBm.

AUDIO INPUTS AND OUTPUTS

Total Harmonic Distortion	Less than 1% from 300 to 3000 Hz
Hum and Noise	Less than or equal to -55 dB at 1 kHz
Cross-talk	Less than or equal to -55 dB at 1 kHz
Level Adjustment	All audio input and output levels adjustable via digital potentiometers using application program running on PC

RELAY CONTACT OUTPUTS

Standard	Form-C (SPDT dry contacts) relay connections isolated from ground and all other signals. One relay activates on console PTTs. Two others are activated via reserved keystrokes at the dispatch keyboard. Contact rating = 0.75 amps at 26 Vdc. Ground isolation = 500 Vrms (60 Hz). Open contact isolation = 500 Vrms (60 Hz).
Call Director On-Hook	Form-A (SPST normally-open dry contacts) relay connections isolated from ground and all other signals. Activates (closes) when console disconnects CD from CEC/IMC. Contact rating = 0.75 amps at 26 Vdc. Ground isolation = 500 Vrms (60 Hz). Open contact isolation = 500 Vrms (60 Hz).

* These specifications are intended primarily for the use of the serviceman. See the appropriate Specifications Sheet for complete specifications.

INTRODUCTION

The EDACS® C3 Maestro™ dispatch console for Windows NT® is a state-of-the-art CRT-based dispatch console system designed to interface to an EDACS® CEC/IMC Digital Audio Switch. By leveraging the benefits of IBM® PC-compatible computer hardware and Microsoft's Windows NT® operating system software, the C3 Maestro™ provides advanced console dispatch features for EDACS radio system networks. Major system components include:

- an IBM® PC-AT™ compatible Personal Computer (PC) system running Microsoft's Windows NT operation system software and custom console application software developed by Ericsson Inc.;
- a standard color video display monitor ("CRT"), or optionally, a touch-screen color video display monitor for "mouse-less" dispatch operations;
- a specialized dispatch keyboard (sometimes referred to as the "custom keyboard");
- an Enhanced Audio Enclosure which provides audio conditioning, routing and amplification functions for the console's audio signals, and interface/control of external devices such the dispatch keyboard and for example, if the console is so equipped, a Call Director (optional equipment) for telephone patch operations;
- desk-top or rack-mounted speakers (typically two – one "select" and one "unselect");
- other optional accessories such as headsets, microphones and footswitches;
- cabling which interconnects the Enhanced Audio Enclosure to the PC and speakers;
- cabling which interconnects the PC to the CEC/IMC (control data links: 100-foot cables supplied);
- cabling which interconnects the Enhanced Audio Enclosure to the CEC/IMC (audio links: 100-foot cables supplied); and,
- if the console is a remote console (not co-located with the CEC/IMC), optional data modem equipment for the CEC/IMC⇔C3 Maestro control data link is required.

NOTE

Refer to LBI-38662 for a complete description of the EDACS CEC/IMC Digital Audio Switch.

The C3 Maestro console's video display monitor and keyboard replace the array of controls and indicators found on traditional modular/desktop-type consoles. A typical installation is shown on page 26. Standard console-type headsets, microphones, and footswitches can be connected to the C3 Maestro. Also, a variety of other external inputs and outputs are supported from items such as a paging tone encoder, call-check recorders and Call Director telephone patch equipment.

Using the C3 Maestro, a dispatcher can easily monitor and communicate with a large number of radio unit-equipped personnel within the EDACS CEC/IMC wide area (and/or distributed multisite) network. Like an EDACS mobile or portable radio unit within the network, each EDACS C3 Maestro console is assigned a unique "logical ID" (LID) number. This number is sometimes referred to as a "unit ID" number. Therefore, a dispatcher can perform trunked group and individual calls throughout the EDACS radio system as privileged. Calls may also be made on and received from conventional radio frequency channels if the CEC/IMC is interconnected to conventional base station equipment. In addition, calls may also be placed to and received from other consoles in the CEC/IMC network either via the intercom or the individual call functions.

The PC's video display monitor displays graphical representations of the trunked talk groups, radio units, etc. being monitored or controlled by the dispatcher. This graphical user interface (GUI) is highly configurable, thus providing great custom configuration flexibility for various dispatch environments. This flexibility not only enhances the console's basic dispatch features such as its group call, individual call and patch capabilities but, if employed, it greatly enhances the console's advanced features such as its ability to monitor and control CEC/IMC auxiliary input/output events and its radio unit status monitoring capabilities.

Using any one (1) of three (3) possible user input devices, a console user/dispatcher can issue commands to control receive and transmit audio signal routing between the CEC/IMC and audio devices connected to the C3 Maestro such as microphones and speakers. The C3 Maestro console application software program running on the PC in-turn communicates with circuitry inside the Enhanced Audio Enclosure. This is accomplished via an RS-232 serial link between the PC and the Enhanced Audio Enclosure. The three possible user input devices include the specialized dispatch keyboard, a pointing device such as a mouse or track-ball, and an optionally available touch-screen monitor.

The following three (3) subsections list the basic, advanced and optional capability of the console. All basic and advanced functions are provided with a standard console equipment package. Each optional function, listed in the third subsection, is purchased on a per console basis by obtaining a software license for the respective feature licensed option.

BASIC DISPATCH CAPABILITY

Basic dispatch functions provided by the C3 Maestro console for Windows NT are listed below. Most of these functions involve the console's standard communication modules. Each standard communication module is programmable with a single entity for incoming call monitoring and outgoing console call transmission functions. The standard communication module is the console's fundamental communication indication and console-originated transmission control display item:

- **Group Call Capability**—Any standard communication module can be programmed with a privileged trunked talk group entity for communication via trunked group calls.

- **Individual Call Capability**—Any standard communication module can be programmed with a privileged individual radio unit entity (or another console) for personal console-to-radio unit (or console-to-console) communication via a trunked individual call.

  Individual call communication may also be accomplished via the console's individual call panel. Using this panel and its respective unit selection/set-up panel, many console-originated individual calls may be quickly set-up and made in a short period of time, and without disturbing standard communication module programming. This panel also displays incoming individual call indications from a radio unit which is not programmed into a standard communication module for individual call communications.

- **Conventional Channel Call Capability**—Any standard communication module can be programmed with a privileged conventional channel entity for console-to-conventional radio unit(s) communication via conventional base station equipment, if interconnected to the CEC/IMC. (Also see "Conventional Base Station Control Capability" on page 9.)

NOTE

If the CEC/IMC network is equipped with a System Manager computer, entity privileging is performed on a per-entity basis at the CEC/IMC Manager computer. If the CEC/IMC network is *not* equipped with a System Manager computer, such as a "System Manager-less" C3 Advantage dispatch system, all entity database configuration, including privileging on a per-entity basis, is performed locally at each console.

- **Emergency Operations Capability**—Emergencies may be declared and cleared from the console on trunked talk groups. Another important emergency function performs automatic programming of a standard communication module if the console has supervisory status when an emergency is declared from a radio unit (or another console) on a trunked talk group which is not programmed into any module at the supervisory console. If desired, via a configuration setting performed at the CEC/IMC Manager, unprivileged groups may be disabled from automatic module programming.

- **Standard Communication Module Programming Capability**—The console user/dispatcher may program each standard communication module within the console's current set-up with a desired entity (group, individual unit, conventional channel or another console). When programming, entity selection can be accomplished either from an alphabetically-sorted entity alias/name listing or via direct numeric entry of the desired entity's ID number. (Also see "Set-Up Change Capability".)

- **Select and Unselect Audio Routing Capability**—The console can route incoming audio to two, three or four separate speakers (and/or up to two headsets). The "selected" entity/module is the entity/module selected for primary monitoring and transmission; incoming audio from this entity is always routed to the "select" speaker (and a headset, if utilized). Incoming audio from all "unselected" entities is routed to the "unselect" speaker(s). The console user/dispatcher can easily choose any programmed module as the select entity/module. The user/dispatcher can also, on a per standard communication module basis, send a module's unselect speaker audio to one of the three possible unselect speakers. (Also see Simulselect Capability.)

- **Continuous Call History Indications**—Continual real-time call indications for all incoming calls are displayed in two separate scrolling-type call history lists within a call history panel. One list displays past calls on/to the selected entity/module and the other displays past calls on/to all unselect entities/modules. On a per call basis, indications include the caller's alias/name (or conventional channel's alias/name if not a trunked unit) and the trunked talk group or conventional channel alias/name upon which the unit is calling upon. Like caller indications in modules, the unit's logical ID number is displayed in place of the alias/name text if the alias/name text is not available at the console. Each list displays the last four (4) callers.

- **Detailed Call History Indications**—Three (3) separate operator-activatable dialog boxes provide detailed call history indications for the select entity/module (or entities/modules if selected entity changes are made), for the unselected entities/modules, and for all modules on a per module basis. Indications include the caller, the callee, call time, call type and the site number which the call is originating from.

- **Set-Up Change Capability**—Using the console's "change setup" function, the console user/dispatcher can select one (1) of ten (10) available set-ups. Each set-up may have unique module programming since this programming is stored on a per set-up basis. Various other configurable parameters such as console user profile configurations established at the CEC/IMC Manager are also stored and change on a per set-up basis. Typically, a set-up change is accomplished at each console user/dispatcher shift change.

- **Console Intercom Capability**—A console user/dispatcher can call other privileged consoles in the system using the console intercom function.

- **Patch Capability**—Up to fifteen (15) different trunked sub-fleet talk groups and/or conventional channels programmed into standard communication modules may be patched together, when necessary, for common communications as one group. From a given console, up to five (5) active patches can simultaneously exist within the EDACS network. At an EDACS trunked site, only one radio frequency working channel is required for groups which are patched together.

- **Simulselect Capability**—Up to fifteen (15) different trunked sub-fleet talk groups and/or conventional channels programmed into standard communication modules may be simultaneously selected at the console for concurrent dispatch transmission, and monitoring via the select speaker (or headset).

- **Mute Module**—Each programmed standard communication module may muted to silence incoming audio from the respective programmed entity.

- **Mute All Modules**—All unselected standard communication modules (those not selected for transmission as the selected entity) and incoming individual call audio may be muted via the console's mute all function. This silences incoming audio from the respective entities. Mute all is a timed function; the timer's setting is established at the CEC/IMC Manger on a per set-up basis.

ADVANCED DISPATCH CAPABILITY

- **Digital Dispatch Capability**—If the CEC/IMC includes Digital Voice Interface Unit (DVIU) hardware for secure voice and/or data communications, the console can communicate with Aegis-capable radio units within the EDACS trunked radio system network. As necessary, the console user/dispatcher can switch each standard communication module's transmit mode between clear mode (no digitization/encryption) and an Aegis digital voice mode. Console receive mode switching for incoming calls is automatically performed by the CEC/IMC and DVIU equipment. Per radio and DVIU equipment utilized and CEC/IMC configurations, possible Aegis digital voice modes include a digitized-only mode ("Aegis digital") and/or a more secure mode which is both digitized and encrypted ("Aegis private").

- **Conventional Base Station Control Capability**—In addition to the basic ability to transmit on conventional channels, conventional base station control functions provided by the console include all remote control functions normally performed by a conventional base station remote controller. Examples include channel selection for a multi-channel base station, monitor (squelch) enable/disable, Channel Guard decoder enable/disable and repeater enable/disable. In accordance with wiring of the conventional interface equipment, the console can also be utilized to enable/disable remote controllers which are wired in parallel with the CEC's/IMC's conventional interface *or* to toggle between two different sets of conventional base station channels, each of which is typically located at two different sites (for main/standby operations).

- **Console Disable Capability**—If the console has supervisory status, it can be utilized to disable other non-supervisory consoles interconnected to the CEC/IMC.

- **Paging Capability Via An External Paging Tone Encoder**—If an external paging tone encoder is connected to the console, the console can send paging tone signals to any entity programmed into a standard communication module. Multiple entities can also be simultaneously paged by creating a simulselected between the desired entities/modules just prior to the page transmission. (Also see "Integrated Tone/Voice Paging Capability Via Internal Paging Tone Encoder Circuits" in the following section.)

- **Call Director Capability**—If external Call Director (CD) telephone equipment is connected to the

console, the console can be utilized to patch a telephone line to a talk group, a unit, a conventional channel or a talk-group patch in the CEC/IMC network. At the console, the CD may also be utilized like a standard telephone by the console user/dispatcher if radio patch operations are not transpiring. The console uses a secondary unit/logical ID (LID) number for the CD patch channel requests, thus allowing CD patch operation to work separately from and concurrently with normal console-to-radio dispatch communications. This LID is typically referred to as the "Call Director ID" number.

FEATURE LICENSED OPTIONS

Optional functions are available at the console if the respective feature licensed software options are purchased and installed on the console. Each feature licensed option is purchased on a per console basis by obtaining a software license for the respective option. Current feature licensed options include:

- **CEC/IMC Auxiliary Input/Output (I/O) Monitoring and Control Capability**—From the console, CEC/IMC auxiliary input events' states can be monitored and CEC/IMC auxiliary output events' states can be monitored and controlled. A special console module type—auxiliary I/O modules—are utilized for auxiliary I/O indications and control functions at the console. Each auxiliary I/O module is assigned to a specific CEC/IMC auxiliary I/O event.

- **Integrated Tone/Voice Paging Capability Via Internal Paging Tone Encoder Circuits**—The console's audio system includes tone generation circuits which can generate many standard paging tone formats; therefore, an external paging tone encoder is *not* required. Supported integrated paging tone formats ("code plans") include GE Type 99X, Y and Z, Motorola Quik-Call II™, Reach, 5/6 and DTMF. Both manual and preprogrammed (automatic) integrated paging operation is provided.

  For manual integrated paging operations each button on the console's graphical user interface reserved for this use (6 total) is preset with a specific code plan such as Type 99X but, when paging, the user/dispatcher must first select a broadcast entity—typically a conventional channel—to page on and enter a specific code number before the paging tones are transmitted. Voice transmissions to the paged entity may follow.

  For preprogrammed integrated paging operations each button on the console's graphical user interface reserved for this use (144 total) is preprogrammed with a specific code plan, a specific code number and a broadcast entity, and the user/dispatcher transmits a page by simply pressing the respective preprogrammed button(s). Voice transmissions to the paged entity(ies) may follow. After consecutively paging multiple entities via two (2) or more preprogrammed buttons, a simulselect consisting of the paged entities automatically activates for subsequent console voice transmission(s) to the paged entities.

- **Radio Status Message Capability**—The RSM feature licensed option provides EDACS radio unit transmitted status monitoring at the console. Indications are displayed in one or more of the console's RSM modules. Per off-line configuration, each RSM module is assigned a status code number which corresponds to a unique radio unit-transmitted status code utilized throughout the EDACS radio system. 128 status codes are available for RSM and RTT operations.

- **Request-To-Talk Capability**—The RTT feature licensed option is similar to the RSM option except the dispatcher may, as desired, individually reply to a unit requesting communications with dispatch via a radio status transmission. Dispatcher reply is accomplished via an trunked individual call to the unit with the dispatcher being the caller and the requesting-to-talk unit being the callee. The individual call is initiated directly from the respective RTT module holding the queued-up requesting-to-talk unit(s). RTT queue status is indicated by displaying radio units' aliases/names or logical ID (LID) numbers within the particular RTT module.

DESCRIPTION

PERSONAL COMPUTER SYSTEM

The PC within the C3 Maestro console system provides most computer processing functions for the console. Software includes Microsoft's Windows NT Workstation operating system and custom console application software developed by Ericsson Inc. Typically, the console application software automatically starts just after the Windows NT operating system boot-up process completes; although, various start-up options are available based on dispatch center/system requirements.

PC-related system components include the Central Processing Unit (CPU) enclosure, the video display monitor

(the "CRT"), a standard PC keyboard and a pointing device such as a mouse. A diagram illustrating equipment interconnections is shown in the *Installation And Set-Up Manual* included within this manual set.

CPU Enclosure

Like all standard PC systems, the PC's CPU enclosure utilized within a C3 Maestro console system houses all microprocessor and logic-related components. Currently, Intel Pentium-class systems are employed:

- **Main/System ("Mother") Board**—The main/system board contains all primary PC logic circuits including the Pentium® microprocessor chip, system read-write random-access memory (RAM), basic input/output system (BIOS) memory, cache memory, video drive circuits, video memory circuits, control logic, PC keyboard interface circuits, serial and parallel port interface circuits, expansion connectors, etc.
- **Hard Disk Drive**—The hard disk drive within the CPU enclosure stores all Windows NT operating system software files, all C3 Maestro console application and configuration software files, and other factory- or customer-installed PC-compatible software files.
- **Floppy Disk Drive**—Typically, each CPU enclosure is equipped with a 3½-inch floppy disk drive to provide file transfer capability between other PC-compatible systems via 3½-inch floppy disk media. This drive may also be utilized at the factory during software installations.
- **Disk Drive Interface Logic Circuits**—Disk drive interface logic circuits may be an integral part of the main/system board or they may be located on a separate expansion card/board installed in one of the PC expansion slots.
- **Power Supply**—The CPU enclosure's internal power supply delivers direct current (dc) operating power to all circuits within the enclosure. It converts externally-supplied 115/230-Volt (nominal) ac power into several different dc power sources required by the CPU enclosure's internal electronic logic circuits.
- **RS-422-Compatible Serial Communications Interface Board**—Normally, an RS-422-compatible serial communications interface board is installed in a PC expansion slot. It provides a highly-reliable RS-422 serial port for the console-to-CEC/IMC serial control data link.

NOTE

For detailed PC hardware-related system specifications, refer to the C3 Maestro console for Windows NT *Administrator's Manual*, AE/LZB 119 1897.

Optional hardware devices may also be installed within the PC's CPU Enclosure. This hardware includes:

- **Touch-Screen Monitor Controller Board**—If the console is equipped with a touch-screen monitor, a special controller board may be installed in one of the PC expansion slots. This board receives screen touch data from the connected touch-screen monitor and passes the data to the Windows NT operating system via the PC's expansion bus interface. Windows NT interprets the data as mouse point-and-click user input actions. The interpreted data is then passed to the currently active Windows-based application, typically the console application. In some cases, the touch-screen monitor is serially interfaced to the PC; therefore, this controller board is not required and it is not installed to support the touch-screen monitor.
- **Network Interface Board**—If the PC system requires access to a computer network, a network interface board will be installed in one of the PC expansion slots. Network interface boards are available from the factory as optional equipment.

Video Display Monitor ("CRT")

The PC's video display monitor provides all visual dispatch control indications to the console user/dispatcher. It is the output device for the console's Graphical User Interface (GUI). See page 14 for additional information on the GUI, including a sample screen display.

Many different video display monitor types may be used with the console, including touch-screen units. All monitors available from the factory are CRT-type (cathode-ray tube) monitors; hence, the C3 Maestro console is sometimes referred to as a "CRT console."

Standard Monitor

A C3 Maestro console for Windows NT standard equipment package includes a standard PC-AT compatible 14-inch monitor. Optionally, a 17-inch monitor may be substituted for the smaller monitor when the console equipment package is ordered from the factory. Resolution on a factory-supplied 14-inch monitor is typically VGA or super-VGA and all 17-inch monitors are super-VGA units. As of the writing of this manual, monitors larger than 17 inches are not available from the factory. A standard

monitor may be optionally substituted with a touch-screen monitor.

Touch-Screen Monitor (Optional)

A touch-screen monitor allows the user to control the console/computer by directly touching the monitor's screen surface with a finger or any small pointer-like object. Basically, a touch is equivalent to a mouse point-and-click action in the same approximate area of the screen. The C3 Maestro console for Windows NT graphical user interface was designed for 100% touch-screen dispatch operability *without* the need of any other user input device such as a mouse or the dispatch keyboard. In addition, since mouse and dispatch keyboard operation is *not* disabled when a touch-screen monitor is added to a console, the addition of the touch-screen monitor adds user input redundancy to the console. *In summary, the addition of a touch-screen monitor greatly enhances the console's operational value*. As of the writing of this manual, both 14- and 17-inch monitors are available from the factory.

Touch-screen monitors utilized with the C3 Maestro console employ a nearly invisible sensor matrix embedded on the monitor's screen surface. Touch-screen monitor-to-PC interfacing electronics consist of either a standard RS-232 serial link from the monitor to one of the PC's COM ports or, as previously mentioned, a special controller board installed in one of the PC's expansion slots. An interface cable between the monitor and the PC carries touch data from the monitor to the PC. As of the writing of this manual, touch-screen monitors are factory-supplied and configured for COM port serial interfacing; therefore, no special touch-screen controller board is required.

Standard PC Keyboard

A standard 101/102-key PC-compatible keyboard is supplied with the console equipment package. During normal dispatch operations, this keyboard is not used. However, during the console set-up process, access to this keyboard is required for custom configuration of both Windows NT and the console application, and for basic file management tasks.

Pointing Device (Mouse/Track-Ball)

Normally, the pointing device supplied from the factory with the console is a standard 2-button PS/2-compatible bus mouse. Optionally, other pointing devices may be utilized such as a track-ball.

A pointing device is utilized to speed and ease user input operations to the console application's graphical user interface. It is also beneficial for similar operations within other Windows NT applications such as Program Manager, File Manager and the console's Configuration Editor program.

CEC/IMC Serial Link

Normally, a C3 Maestro console equipped with an Enhanced Audio Enclosure uses the plug-in RS-422-capable board's serial port configured as COM3 for control data interfacing to the Console Interface Module (CIM) within the CEC/IMC. This serial data link can be wired for RS-232 (3-wire) or RS-422 (4-wire) operation. Typically, a C3 Maestro is co-located with the CEC/IMC and wired to the CEC/IMC via RS-422 interconnections operating at a 19,200 baud rate. In a co-located installation, console ⇔ CIM serial control data links up to 4000 feet (1219 meters) in length may be employed if RS-422 interfacing is utilized.

If the console is not co-located with the CEC/IMC, full-duplex 4-wire data modems and dedicated 4-wire data grade phone lines (or equivalent) may be employed between the CEC/IMC and the remote C3 Maestro console. In an installation of this type, both the local serial link at the console (COM3 port ⇔ console's modem) and the local serial link at the CEC/IMC (CIM ⇔ CIM's modem) are typically wired via RS-232 hook-ups. Normally, these RS-232 links are configured for 9600 baud operation.

Detailed console ⇔ CEC/IMC wiring and configuration information is contained within the *Installation And Set-Up Manual* included within this manual set.

Enhanced Audio Enclosure Serial Link

In most cases, the PC's COM1 serial port is utilized for control data communications between the PC and the Enhanced Audio Enclosure. This serial port is wired for RS-232 operation at 9600 baud. Control data transferred over this duplex serial link includes Enhanced Audio Enclosure-to-PC messages such as dispatch keyboard keystrokes and VU meter data, and PC-to-Enhanced Audio Enclosure messages such as start-up initialization commands, recorder audio switching commands, and Call Director audio switching commands.

See the *Installation And Set-Up Manual* included within this manual set for wiring and configuration information.

Touch-Screen Serial Link (Optional)

As previously stated, if the C3 Maestro console is equipped with a touch-screen monitor the console is normally factory-supplied and configured for PC COM port touch data serial interfacing (vs. PC expansion bus interfacing via a specialized touch-screen controller board). In this case, touch data is typically interfaced via the COM2 serial port operating at RS-232 levels. No specialized touch-screen controller board is required when standard COM port interfacing is employed for the touch-screen monitor's interface.

SOFTWARE

Microsoft Windows NT Workstation

The C3 Maestro console for Windows NT product utilizes Microsoft's Windows NT Workstation operating system software (version 3.51 or later). This operating system was chosen primarily for its built-in graphical user interface support, advanced networking ability including server/client operation and PC-AT computer platform operating capability.

For a factory-new console system, Windows NT is installed on the PC's hard disk drive by Ericsson or by an Ericsson-approved vendor. In some cases, the Ericsson-approved vendor may also be the manufacturer of the personal computer.

For additional information on Windows NT, including custom configurations which influence how the console application operates, refer to the *Installation And Set-Up Manual* included within this manual set or see the *Administrator's Manual*, AE/LZB 119 1897.

Console Application On-Line Programs

The C3 Maestro console application software consists of three (3) main executable programs. All three are utilized when the console is on-line with the CEC/IMC Digital Audio Switch (the console-to-CIM serial control data link is active); therefore, they are considered the "on-line" programs. The following block diagram illustrates program interaction. For specific program file names and detailed information, refer to the *Administrator's Manual*, AE/LZB 119 1897.

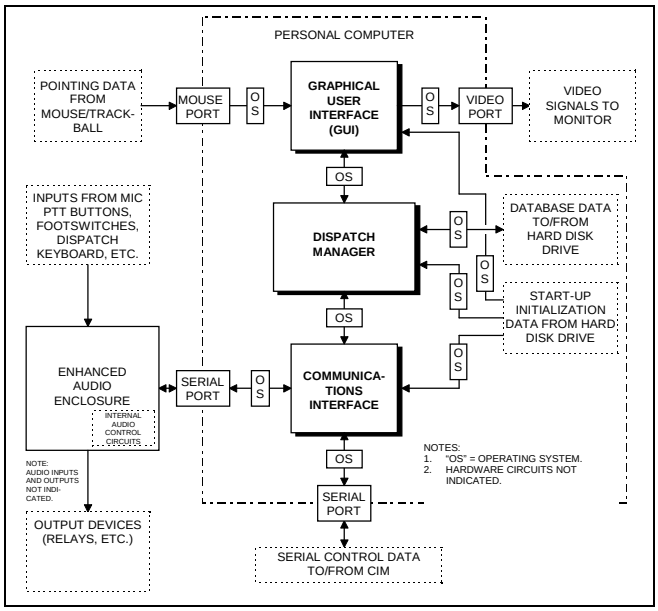


Figure 1 – C3 Maestro On-Line Program Interaction

NOTE

In some specialized cases, the GUI on-line program may be replaced by or connected to a third-party software application such as a Computer-Aided Dispatch (CAD) peer-to-peer application. Cases of this type are beyond the scope of this manual.

Dispatch Manager

The Dispatch Manager is the console's main executable on-line program. It links the other two on-line programs—the GUI and the Communications Interface—together, it maintains console databases and it performs many other important functions for the console application.

The Dispatch Manager directly communicates with the GUI and the Communications Interface by sending and receiving data messages via operating system "pipes." In most all cases, the Dispatch Manager processes messages, as needed, before passing data to the GUI or to the Communications Interface.

Typically, data messages sent to the GUI are messages which the Dispatch Manager has received from the Communications Interface which originated from either the console's CIM within the CEC/IMC or from the console's audio system. Examples include, respectively, a radio-originated call message from the CIM, and a console desk microphone PTT button pressed message from the Enhanced Audio Enclosure. Other messages sent to the GUI from the Dispatch Manager include unit/group/conventional/console entity database information and system error messages.

Data messages which the Dispatch Manager receives from the GUI are primarily user input-type messages which the Dispatch Manager must process and act upon accordingly. The GUI receives mouse/track-ball (and/or touch-screen) actions from the Windows NT operating system, processes them as needed and then, if required passes a corresponding user input-type message to the Dispatch Manager. Examples include a module/entity select action, a selected module/entity PTT action, module/entity volume change actions, and many actions which involve PC hard disk drive database file reads. Not all mouse/track-ball actions which the GUI receives from the operating system are passed on to the Dispatch Manager. Examples include module picks, module page changes and command panel changes.

Data messages which the Dispatch Manager sends to the Communications Interface are primarily user input-type messages which it has received from the GUI, processed, and must be passed on to the CIM and/or the Enhanced Audio Enclosure for processing. Examples include mouse/track-ball generated console-originated call request (PTT key/unkey) messages which must pass to the CIM and

Enhanced Audio Enclosure, and mouse/track-ball generated headset sidetone volume change messages which must pass only to the Enhanced Audio Enclosure.

The Dispatch Manager also receives many different type data messages from the Communications Interface. Examples of messages which pass from the CIM through Communications Interface to the Dispatch Manager include radio-originated call messages, entity database transfer messages, entity privilege list database transfer messages, auxiliary input/output data messages and CEC/IMC network status messages. Examples of messages which pass from the Enhanced Audio Enclosure through the Communications Interface to the Dispatch Manager include PTT key/unkey messages, headset connected/unconnected messages, audio level messages, and dispatch keyboard keystroke messages.

Communications Interface

The Communications Interface program provides data support to the Dispatch Manager program for both the PC-to-CIM and the PC-to-Enhanced Audio Enclosure serial data links. Basically, it is a control data message translator and router with three (3) main input/output data paths. The Dispatch Manager program automatically starts this program when it starts.

For console diagnostic/troubleshooting periods, the Communications Interface program also includes a simple built-in real-time data message monitor. This monitor displays receive and transmit serial data link messages in a hexadecimal (base 16) format. To enhance user monitoring, receive data messages are displayed in a different color from transmit data messages on the same serial link. Displayed data messages can also be logged to the PC's hard disk drive in the hexadecimal format for non-real-time monitoring.

Graphical User Interface (GUI)

The Graphical User Interface on-line program controls all console screen information displayed on the monitor. Since the monitor is the console's only visual output indication device, it is the key hardware component to the GUI's design. As previously described, the GUI also receives user input mouse/track-ball (and/or touch-screen) actions from the Windows NT operating system and processes them as needed. Normally, when the Dispatch Manager program starts it automatically starts this program; however several different start-up options are possible.

Figure 2 thru Figure 5 are screen snap-shots from typical dispatch sessions. Call-outs above and below each screen identify major display items which are controlled by the GUI.

At console start-up, the GUI reads a screen initialization file stored on the PC's hard disk drive to configure the screen accordingly. This screen initialization file is highly-configurable thus allowing a great deal of customization to the console's GUI appearance. However, a separately purchased software configuration program—the User-Definable Screen (UDS) Configurator program—is required to generate custom screen configurations/initialization files; see page 17 for additional details. Figure 2 is a snap-shot of the factory-supplied screen configuration (subject to change) and Figure 3, Figure 4 and Figure 5 are snap-shots of custom screen configurations which were generated with the UDS Configurator program. Each figure shows only one module page within the respective screen configuration.

After the GUI initializes the screen at start-up, it switches to a normal operating mode in which it processes incoming messages from the Dispatch Manager and mouse/track-ball (and/or touch-screen) actions from the operating system. As needed, it acts accordingly by updating the screen via the operating system and/or by sending corresponding data messages to the Dispatch Manager. When needed, the GUI also periodically updates non-user influenced areas on the screen such as the clock/time panel.

As previously stated, Figure 2 shows the factory-supplied screen configuration (subject to change). This configuration consists of a total of eight (8) module pages as indicated by the number of buttons on the page button panel. Module page A contains fourteen (14) standard communication modules; page A is the currently chosen module page. All standard communication modules on this page are programmed per the entity names/aliases displayed in the modules' title bars, and the Dispatch Menu command panel is chosen. Other notable items in this screen snap-shot include a current console transmission on entity "POLICE 1" programmed in module A1 per the "XMT" indication in the module, and a simultaneous incoming radio-originated call from unit "JONES_SG" on entity "POLICE 4" programmed in module A4. In this example EDACS radio system, entities "POLICE 1" thru "POLICE 7" are EDACS trunked talk groups, entities "FIRE 1" and "FIRE 2" are conventional channels and entities "RESCUE 1" thru "RESCUE 5" are also EDACS trunked talk groups.

Primary GUI display items are described briefly in the following text. If necessary, refer to the console's *Operator's Manual* for additional details on these items or on secondary display items which are not discussed such as the pop-up ("general") dialog boxes:

- **Module Pages**—Each module page can contain one or more standard communication modules, RSM modules, RTT modules and/or auxiliary input/output (I/O) modules. Modules are considered dynamic display items because they appear and disappear when the chosen module page changes; they are set-up on a per module page basis. Module page selection is performed by the page button panel located on the console's screen

using mouse/track-ball/touch-screen actions, or by the page up/down keys on the dispatch keyboard using keystroke actions. Up to eight (8) module pages, identified page A thru page H, can co-exist in each screen configuration. The maximum number of modules (all types) on a single module page is basically limited by the available screen display area. This area changes as monitor resolution changes are made and as other display items are added/deleted.

- **Standard Communication Modules**—The standard communication module is the console's fundamental communication indication and console-originated transmission control display item. Each is console user/dispatcher programmable with a single entity (trunked talk group, individual radio unit, conventional channel or another console) for incoming call monitoring and outgoing console-originated call transmission functions. Like module page A shown in Figure 2, many of the factory-supplied screen configuration module pages have fourteen (14) standard communication modules each, with the modules positioned in two rows of seven. As shown in Figure 6, this positioning reflects the pick and instant transmit key layout on the dispatch keyboard. Up to 112 standard communication modules can exist across multiple module pages (within a single screen configuration).

- **Radio Status Message (RSM) Modules** (see Figure 4)—The RSM feature licensed option provides EDACS radio unit transmitted status

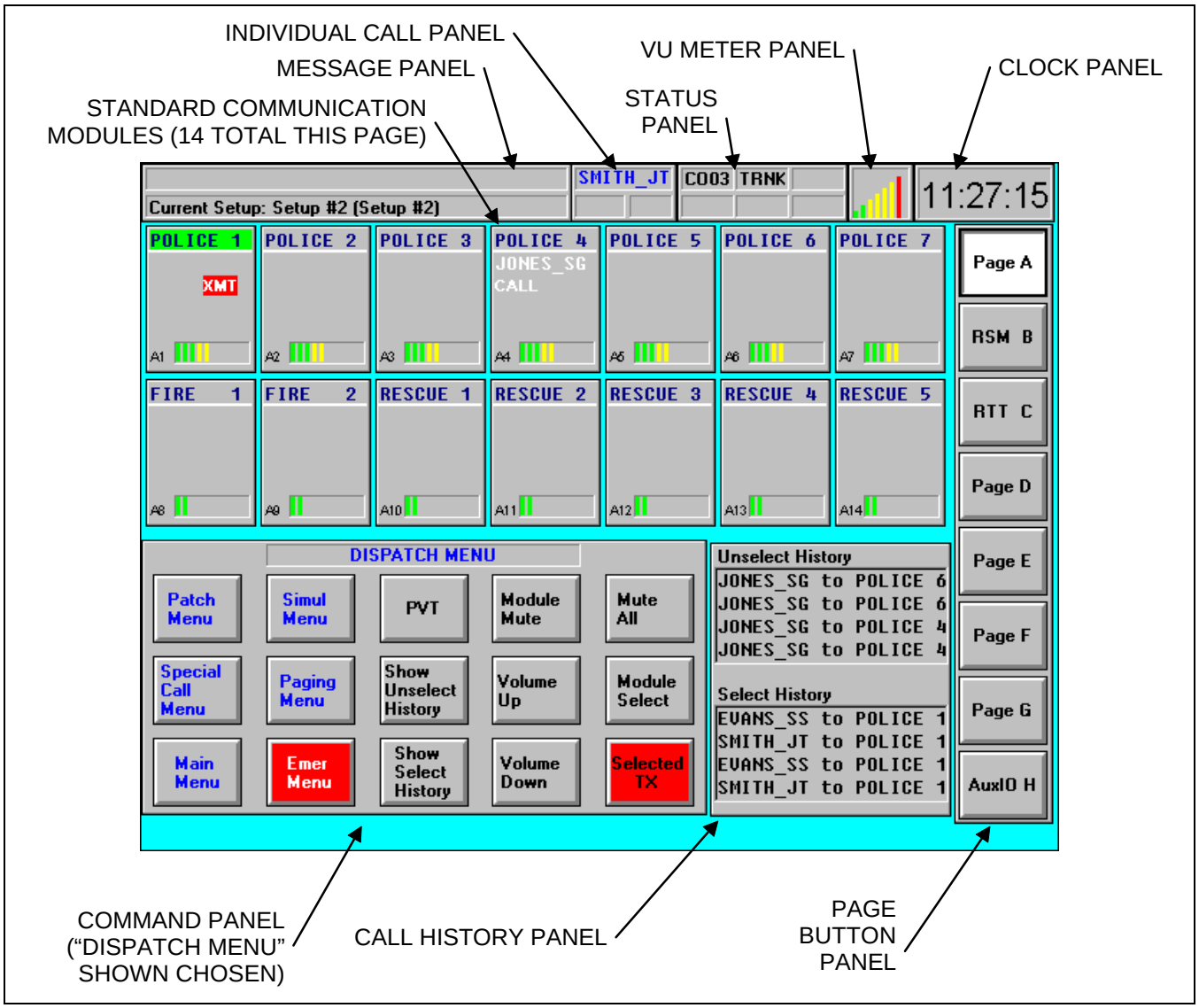


Figure 2 — Typical Console Screen with 14 Standard Communication Modules on Module Page A (Resolution = 640 x 480 Pixels)

monitoring at the console. Indications are displayed in one or more RSM modules. Each RSM module is assigned a status code number which corresponds to a unique radio unit-transmitted status code utilized throughout the EDACS radio system. 128 status codes are available for RSM and RTT operations. Using a scrolling-type user interface, each RSM module can display up to sixty-four (64) radio units' names/aliases which have transmitted an equal status code (assigned to the RSM module). Each listed name/alias is time-stamped when the status code message is received by the console.

- **Request-To-Talk (RTT) Modules** (see Figure 3)—The RTT feature licensed option is similar to the RSM option except the dispatcher may, as desired, individually reply to a unit requesting communications with dispatch via a radio status code transmission. Dispatcher reply is accomplished via an individual call to the desired/chosen unit with the dispatcher being the caller and the requesting-to-talk unit being the callee. The individual call is initiated directly from the respective RTT module holding the queued-up requesting-to-talk unit(s). RTT queue status is indicated by displaying radio units' aliases/names or logical ID (LID) numbers within the particular RTT module. Using a scrolling-type user interface, each RTT module can display up to sixty-four (64) radio units which have transmitted an equal status code. Unlike RSM modules, RTT modules *do not* time-stamp each radio unit listing.

- **Auxiliary Input/Output (I/O) Modules** (see Figure 5)—Using auxiliary I/O modules at the console, a console user/dispatcher can monitor and control the state of CEC/IMC auxiliary I/O events. Auxiliary I/O is a feature licensed option at the C3 Maestro console for Windows NT. Each module is assigned to a specific CEC/IMC auxiliary I/O event. Each has a large button at the top and a small text line at the bottom. The large button provides a text label identification area for the assigned event, output control via the mouse/track-ball/touch-screen if the assigned event is an output type, and/or acknowledged control via the mouse/track-ball/touch-screen if the assigned event is an acknowledge input type. The small text line at the bottom indicates the current event state (active or inactive) via user-friendly text labels. As the system requires, both the button labels and the text line labels are customizable on a per-module basis.

- **Page Button Panel**—The console's page button panel—a static display item—provides two (2) basic functions for the console's module pages. First, it is the GUI screen display item which provides module page selection via the mouse/track-ball/touch-screen; each button on the panel can be pressed to select the corresponding module page. Secondly, for all pages which are not currently selected, each button highlights to indicate an incoming call exists or an emergency has been declared on at least one entity programmed into a standard communication module on the respective page.

- **Message Panel**—The message panel—a static display item—consists of two text lines which indicate various messages to the console user/dispatcher. The bottom-most line primarily displays system and operator error messages. The top-most line displays system-wide related messages such as emergency declarations, CEC/IMC auxiliary input/output (I/O) event state transitions, and RSM and RTT radio status-related messages. In most cases system-wide indications are also displayed in another area of the screen. For example, indication of an emergency declaration on a trunked talk group also occurs in the standard communication module programmed with the respective group entity upon which the emergency was declared.

- **Status Panel**—The console's status panel—a static display item—contains six (6) small dedicated text areas for various system status indications. These indications include the console's number (CEC/IMC console assignment number), the lowest-level EDACS trunked site operational status of all trunked sites connected to the CEC/IMC (full-feature trunking, failsoft trunking, etc.), Call Director status (off hook), audio system off or headset connected status (a shared area), CEC/IMC database download status, and speaker audio mute all status (of all unselected standard communication modules).

- **Volume Units (VU) Meter Panel**—Basically, the VU meter panel—a static display item—displays relative audio levels of transmit and receive audio to and from the selected entity/module. Indication is in a bar graph format. When the console is receiving a call from the selected entity, the panel displays the relative level of the audio incoming from the CEC/IMC. When the console is transmitting to the selected entity (or to any unselected entity via an "instant" transmit function), the panel displays the relative level of transmit audio level being sent to the CEC/IMC.

- **Clock Panel**—The clock panel—a static display item—displays the current time in an

hours:minutes:seconds digital-type format. Typically, this time is set and maintained at the CEC/IMC Manager. Time update messages are periodically sent from the CEC/IMC to all consoles connected to it via the respective CIM serial control data links. Therefore, all consoles' clock indications are synchronized to the CEC's/IMC's time. Thus consistent time indications are displayed at all consoles interconnected to the CEC/IMC. Also, any CEC/IMC time-stamped logging corresponds with console time displays.

- **Call History Panel**—The call history panel—a static display item—continuously displays the last four (4) select calls and the last four (4) unselect calls received by the console. Each call is indicated on a caller-to-callee basis in a respective select or unselect list within the panel. When an incoming call is received, the oldest call in the respective list scrolls off the list.

NOTE

Extended and detailed call history information is available from three (3) separate pop-up ("general") dialog boxes (not show in a figure). One displays select call history for the last forty-eight (48) callers, one displays unselect call history for the last forty-eight callers, and one displays call history on a per standard communication module basis for the last twenty-four (24) callers. See the console's *Operator's Manual* for additional information.

- **Command Panels**—The command panels, each identified with a specific "menu" name, are the GUI's primary display items for console user/dispatcher control via mouse/track-ball and/or touch-screen actions. Only one is displayed (chosen) at a time. Each command panel has fifteen (15) buttons which are organized in a very user-friendly and simplistic manner for quick dispatch operating versatility. On each command panel, most buttons activate specific console operating functions such as module volume up/down control or transmit to (PTT) the selected entity; these buttons are located mostly to the right and bottom portions of each command panel. Other buttons on each command panel are utilized to switch to other command panels; these buttons are located mostly to the left and top portions of each command panel.

  Many command panels such as the Main Menu command panel and the Dispatch Menu command panel have common buttons to reduce panel-to-panel switching requirements during typical dispatch operations. Other command panels such as the Emergency Menu command panel, the Patch Menu command panel and the Simulselect Menu command panel group buttons which control specific functions which console can perform; these panels also share some common/widely used buttons such as the volume control buttons.

User-Definable Screen (UDS) Configurator Off-Line Program (Optional)

As previously stated, the UDS Configurator program is a separately purchased software program which allows generation of custom screen configurations for the console application's graphical user interface. Generation is performed by editing the factory-supplied screen initialization file and then saving the edited file as required. The UDS Configurator edit session utilizes a graphical user interface which approximately mirrors how display item changes will appear in the console application. Typically, one UDS Configurator program is purchased per CEC/IMC and the program is shared among all consoles connected to the CEC/IMC.

Almost all screen display-related parameters can be changed via the UDS Configurator. Examples include the positioning of each and every display item on the screen, the number and type of modules on each module page, the total number of module pages (8 maximum), color settings for nearly all display items' elements (including most text colors), the screen's background color, text labels on certain buttons such as the buttons on the page button panel and the buttons on auxiliary I/O modules, "setup" (console user profile) aliases/names, and full screen console GUI operation enabled/disabled. Refer to the *Installation and Set-Up Manual* included within this manual set for a complete overview of the screen-related changes possible with this program.

For complete details on the use of the UDS Configurator program, refer to its *User's Manual* (AE/LZB 119 1896). This manual is included with the UDS Configurator software package.

Up to ten (10) different screen initialization files are maintainable via the UDS Configurator at a given console/computer. Only one is active (utilized) when the console application is on-line. The active screen initialization file is selected within a UDS Configurator edit session. If done *carefully*, a screen initialization file may be shared among (copied from/to) other consoles in the CEC/IMC network system; see the UDS Configurator *User's Manual* for complete details.

Sample Screen Configurations Generated with the UDS Configurator

The screen configuration snap-shots shown in Figure 3 thru Figure 5 were generated with the UDS Configurator.

Again, Figure 2 shows the factory-supplied screen configuration (with module page A chosen).

The UDS Configurator-generated screen configuration shown in Figure 3 has significant differences from the factory-supplied screen configuration. First, as indicated by the number of buttons on the page button panel, it consists of only two (2) module pages—page A and page B. Reducing the screen configuration in this manner may be beneficial purely for simplicity sake when many module pages are not required. Second, only four (4) standard communication modules exist on page A, the module page chosen when the snap-shot was taken (notice the highlighting on the Page A button). Third, two (2) RTT modules exist on the page to provide request-to-talk operations. Other notable differences from the Figure 2 snap-shot include the following repositioned display items: call history panel, command panel (Main Menu chosen), VU meter panel and the individual call panel.

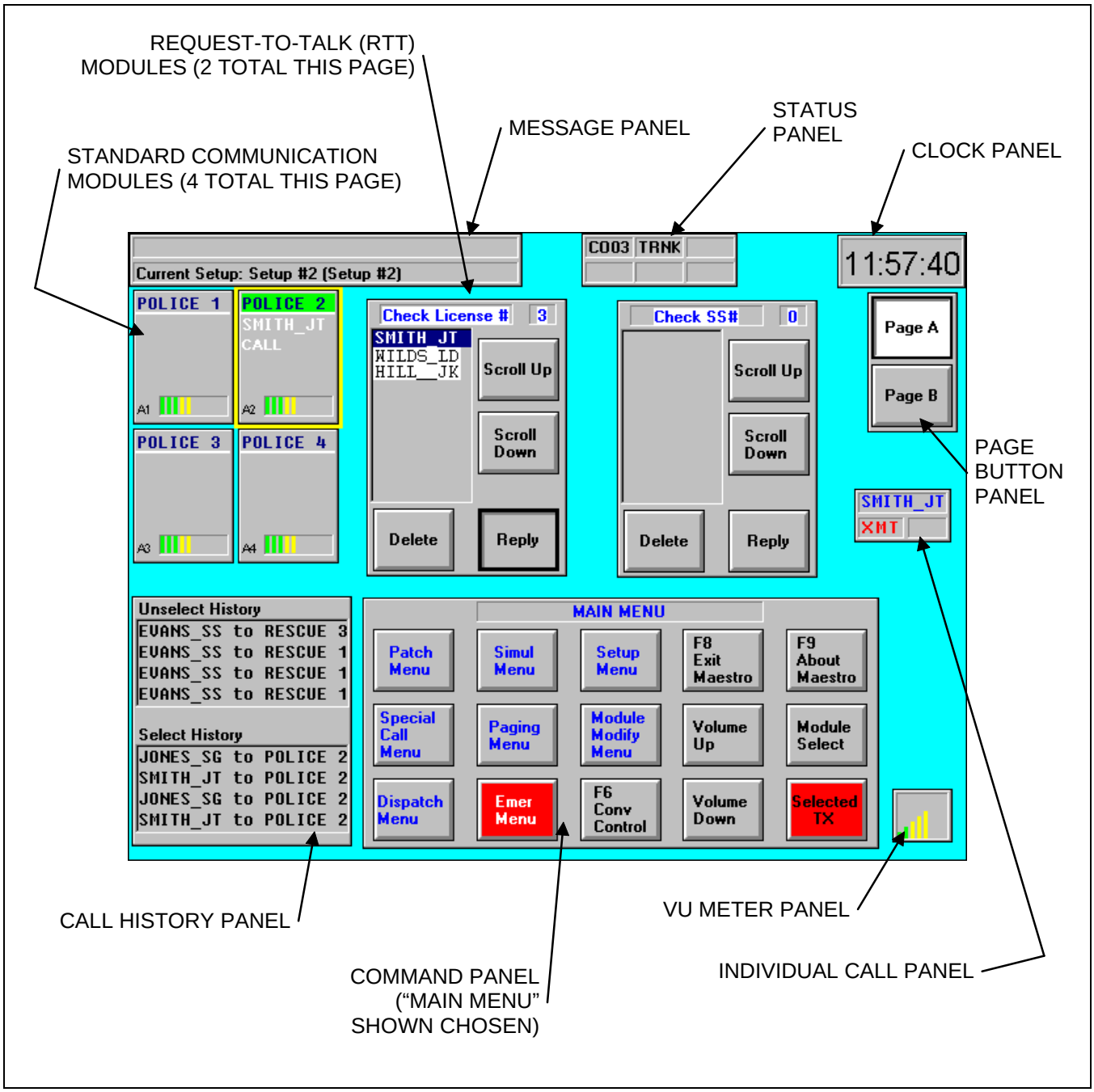


Figure 3 — Typical Console Screen with 4 Standard Communication and 2 RTT Modules on Module Page A (Resolution = 640 x 480 Pixels)

Figure 4 snap-shot shows two (2) RSM modules on page B. This screen configuration is the same configuration utilized to take the Figure 3 snap-shot—only the chosen page differs; notice equal positioning of the static display items. Page A (Figure 3) has four standard communication modules organized in two rows of two and two (2) side-by-side RTT modules; whereas page B (Figure 4) has seven (7) standard communication modules organized in one row of seven and two (2) side-by-side RSM modules.

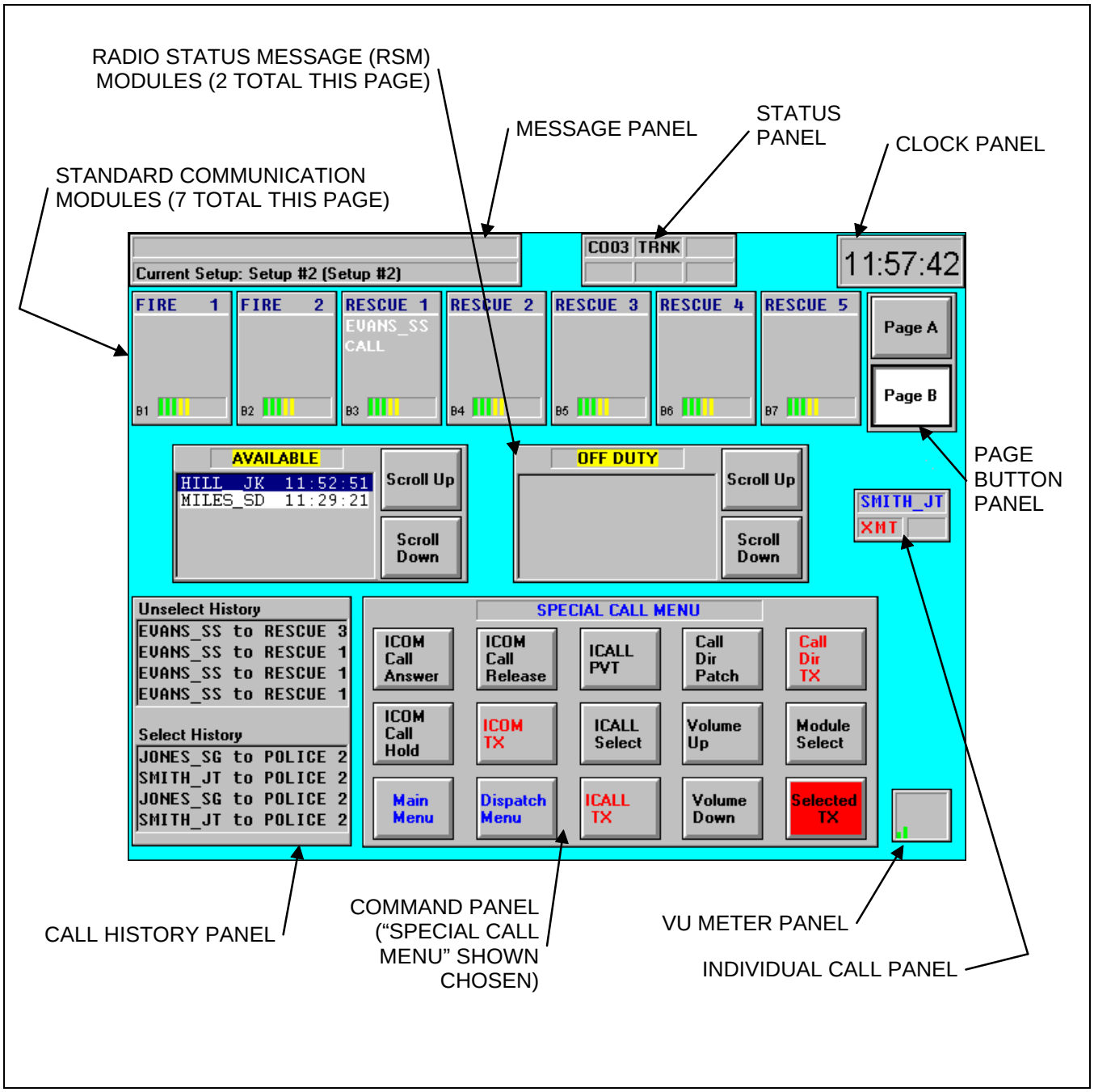


Figure 4 — Typical Console Screen with 7 Standard Communication and 2 RSM Modules on Module Page B (Resolution = 640 x 480 Pixels)

The screen snap-shots shown in Figure 2 thru Figure 4 have one notable common aspect—they all utilize a screen resolution of 640 x 480 pixels. Higher resolutions allow more display items per module page.

The snap-shot shown in Figure 5 illustrates this concept. It utilizes a screen resolution of 800 x 600 pixels. With this higher resolution, more screen area is available since each display item appears smaller on the screen at the higher resolution setting.

Other notable differences between the Figure 5 screen configuration and the screen configurations shown in the earlier figures include the relative repositioning of nearly all display items, seven (7) total module pages, the addition of more standard communication modules, and the addition of auxiliary I/O modules. Also, standard communication modules A11 thru A21 are not programmed.

Configuration Editor Off-Line Program

The C3 Maestro's Configuration Editor program is an off-line program utilized to configure many console application settings. Configuration functionality includes the ability to change hardware-related settings such as the baud rate of the PC's COM port utilized for CIM interfacing, configure manual and preprogrammed (automatic) paging buttons for integrated paging operations, define RSM/RTT status codes prior to module addition via the UDS Configurator, change start-up options of the Communication Interface program's monitor, and configure miscellaneous settings such as various console application start-up options.

For detailed information on the Configuration Editor, refer to *Administrator's Manual* AE/LZB 119 1897 and/or the program's built-in help.

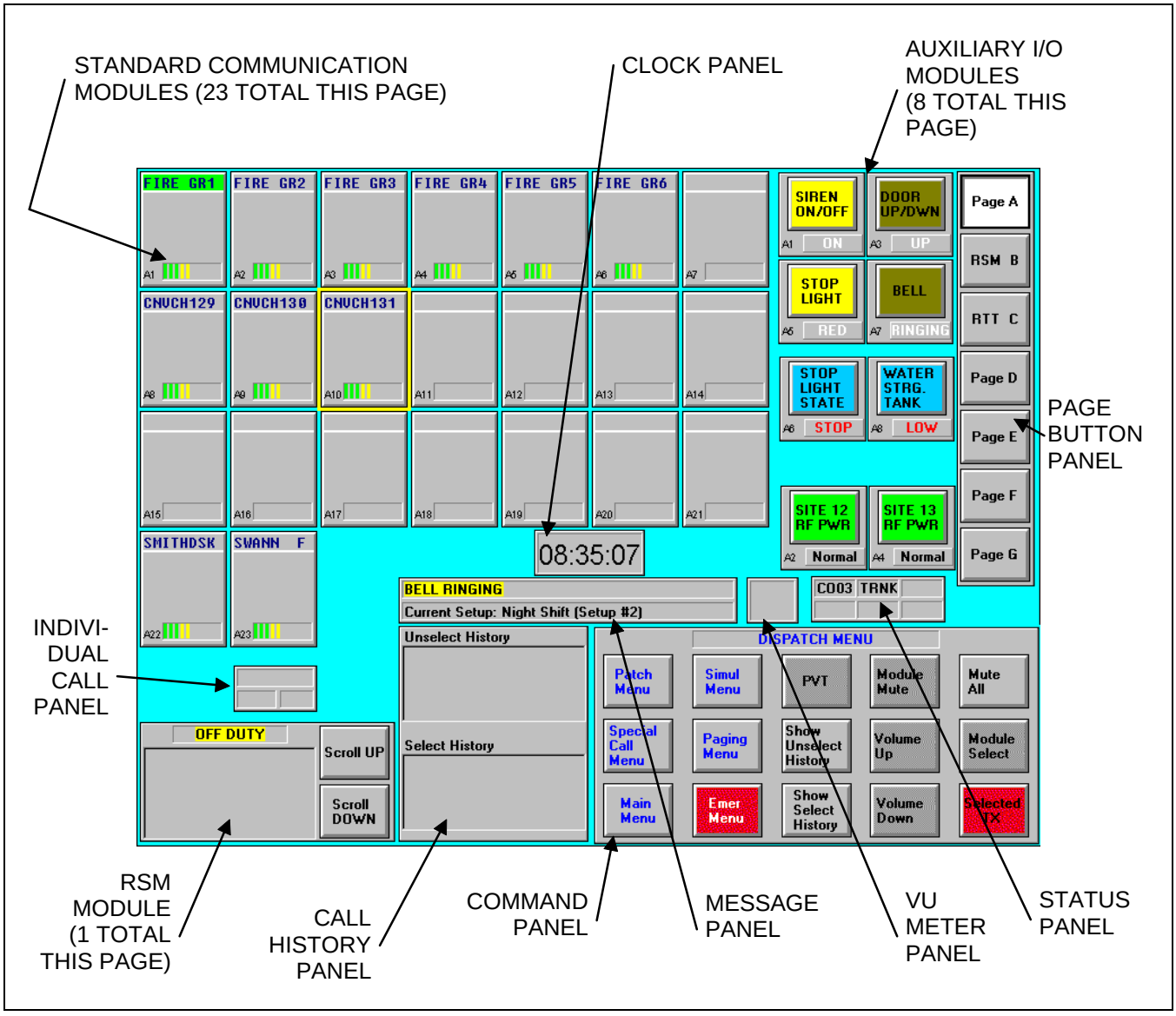


Figure 5 — Typical Console Screen at a Screen Resolution of 800 x 600 Pixels

DISPATCH KEYBOARD

The C3 Maestro's specially designed dispatch keyboard, shown in Figure 6, adds tactile-feel keyboard operation to the console thus providing dispatch speed capability equal to a modular-type console. It provides easy control for the advanced features of the C3 Maestro console. Keys with similar functions are grouped together and the most frequently used key groups are located near the bottom of the keyboard for quick and easy access. For example, transmit and module pick keys are located at the bottom. Seldom used keys are located near the top of the keyboard. Key groups include:

- a selected module transmit (PTT) key
- fourteen (14) module pick keys
- fourteen (14) module instant transmit keys
- nine (9) module control keys
- three (3) emergency keys
- nine (9) edit control keys
- three (3) tone transmission keys
- a numeric keypad (telephone style)
- eight (8) common control function keys
- five (5) simulselect keys
- eleven (11) patch keys
- five (5) telephone/intercom keys
- ten (10) function keys and an escape key

Dispatch keyboard operation works in parallel with the GUI user input pointing devices (mouse/track-ball/touch-screen). All common dispatcher actions can be performed both at the dispatch keyboard and with a pointing device. In most cases the console user/dispatcher can switch between the different input devices when performing sequential actions in a multi-action operation. For example, a standard communication module programming operation can be started with the dispatch keyboard and completed with the mouse.

Some console installations may not utilize the dispatch keyboard. With the exception of PTT devices connected to the console's audio system such as a desk microphone and a footswitch, these installations rely strictly on the console's pointing device(s) for user inputs to the console. In these cases, user input redundancy is lost because the dispatch keyboard is usually stored out of the console user's/dispatcher's reach or it is not connected to the console at all. This loss of input redundancy may not be an issue in many installations such as those which employ both a mouse/track-ball *and* a touch-screen monitor.

The dispatch keyboard interfaces to the Enhanced Audio Enclosure via a serial data link. When power is applied to it from the Enhanced Audio Enclosure, a small built-in speaker simulates key clicks upon key activations. The keyboard is ***not*** classified as a field-serviceable unit.

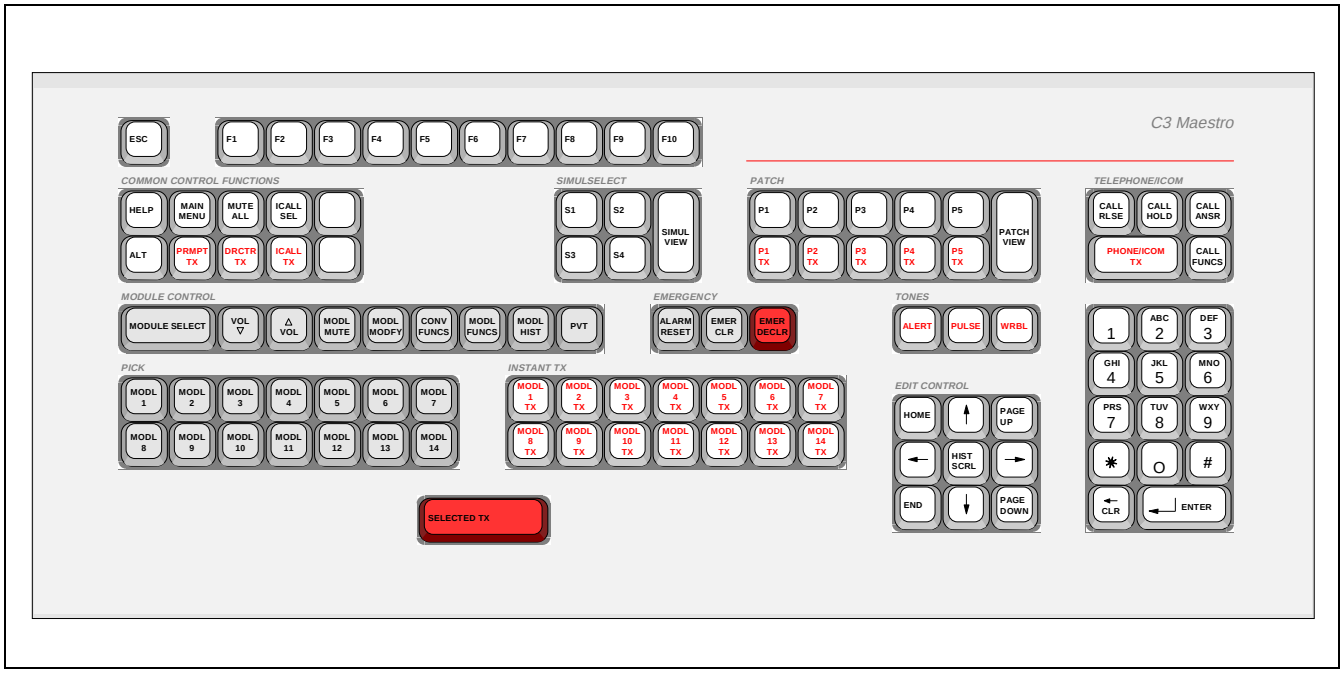


Figure 6 — Dispatch Keyboard

ENHANCED AUDIO ENCLOSURE

The C3 Maestro console's Enhanced Audio Enclosure contains all audio interface, audio routing and dispatch keyboard interface circuitry for the console system. Basically, the unit consists of:

- a metal case assembly
- an ac-to-dc switching power supply located inside the case assembly
- an I/O Backplane Board located inside the case assembly
- an Audio System Board located inside the case assembly
- operating firmware which is part of the Audio System Board
- 19-inch EIA rack-mount hardware (optional)

Typically, as shown in the photo on the front cover of this manual, the Enhanced Audio Enclosure is placed on the console furniture's desk-top and the video display monitor is set on top of it. However, it may be rack mounted in a standard 19-inch cabinet or case; an optional rack-mount kit is available. When rack mounted, the Enhanced Audio Enclosure occupies two (2) vertical rack units (3.5 inches/8.89 cm).

Case Assembly

The Enhanced Audio Enclosure's case assembly provides housing for all major components within the unit. As shown in the exploded-view assembly diagram in this manual (page 27) the case assembly basically consists of a lower steel frame assembly which includes the rear panel, a upper steel frame (top cover), a molded plastic front panel and miscellaneous assembly hardware. The case is constructed with heavy-gauge sheet metal so heavy items such as the console's video display monitor can be placed on its top without causing case distortion.

Assemblies inside the case include the I/O Backplane Board mounted on the rear panel, the power supply unit mounted to the bottom of the case, and the Audio System Board. With the top cover removed, the Audio System Board slides into and out of the case between two (2) plastic printed circuit board guides attached to the left and right inner sides of the case. When fully-inserted, rectangular 96-pin DIN-type connectors on the Audio System Board mate with 96-pin DIN connectors on the I/O Backplane Board.

All cable interconnections to and from external equipment are made via connectors at the Enhanced Audio Enclosure's rear panel. Openings in the rear panel expose the I/O Backplane Board's connectors so they may be mated with connectors on the cables to and from external equipment. For example, the desk mic's cable is equipped with a male DB-9 connector which mates with a female DB-9 connector labeled "DESK MIC" at the Enhanced Audio Enclosure's rear panel. This female DB-9 connector is J5 on the I/O Backplane Board.

Power Supply

As shown in the exploded-view assembly diagram (page 27), the power supply is mounted to the bottom of the Enhanced Audio Enclosure's case. This switching-type power supply converts ac line power (nominal 115 Vac or 230 Vac, 50/60 Hz) to well-regulated 12 Vdc power for use by the Audio System Board and the Speaker Assemblies attached to the Enhanced Audio Enclosure. Other than fuse replacement, the supply is ***not*** classified as a field-serviceable unit.

The ac on/off power switch is located on the Enhanced Audio Enclosure's rear panel just above the detachable IEC-320 type ac power cord connector. As viewed from the back of the case, this switch and connector are located on the left-hand side of the Enhanced Audio Enclosure's rear panel.

A two-wire power cable between the power supply and the I/O Backplane Board delivers twelve-volt dc (12 Vdc) power to the I/O Backplane Board. The I/O Backplane Board distributes this power to the Audio System Board via the 96-pin DIN connectors and to its four (4) DB-9 speaker connectors at the Enhanced Audio Enclosure's rear panel. Consequently, the power supply unit within the Enhanced Audio Enclosure supplies dc operating power to all Speaker Assemblies connected to the Enhanced Audio Enclosure. As described later in this manual and in the speaker assemblies manual included with this manual set, this dc power is utilized by the audio power amplification circuitry within each connected Speaker Assembly.

I/O Backplane Board

Inside the Enhanced Audio Enclosure, the I/O Backplane Board is vertically-mounted on the enclosure's rear panel. This board is the junction point for all audio interconnections into and out of the Enhanced Audio Enclosure to and from external audio devices. Microphones, headsets, speakers, CEC/IMC audio lines, etc., all terminate at the I/O Backplane Board. In addition other interconnections made at the I/O Backplane Board include control-type connections such as the PC's serial control data link, the dispatch keyboard serial link and, optionally, interconnections to Call Director telephone equipment.

The I/O Backplane Board consists of twenty-one (21) connectors, nineteen (19) of which extend through Enhanced Audio Enclosure's rear panel for external device connec-

tions. Of the three (3) internal connectors, two directly mate with the Audio System Board. These two 96-pin rectangular DIN-type connectors carry all audio and control signals between the Audio System Board and the I/O Backplane Board's externally exposed connectors. The remaining internal connector provides the dc input connection from the power supply located under the Audio System Board. As previously described, the I/O Backplane Board distributes this dc power to the Audio System Board via DIN interconnections and to the four (4) DB-9 speaker connectors on the rear panel. See LBI-39102 which is included with this manual set for I/O Backplane Board connector pin-out details.

Audio System Board

The Audio System Board is the heart of the Enhanced Audio Enclosure. It accommodates all audio and logical processing circuitry. Major circuits and functions:

- **Audio Input Circuits**—These circuits provide amplification, filtering and level-adjustment for all audio signals applied to the Enhanced Audio Enclosure's audio inputs. Input signals include mic audio signals, balanced-line audio signals from the CEC/IMC, balance-line audio signals from Call Director equipment, and audio signals from optional audio output devices such as an external paging tone encoder (pager).

- **Audio Switching Matrix Circuits**—The audio switching matrix routes conditioned (amplified, filtered, level-adjusted) input audio signals to the appropriate audio output circuits using ten (10) 8 x 8 cross-point switch matrix integrated circuits. All console audio signals are routed through the matrix chips. Input audio signals are applied to the "y" side of the matrix and output signals are sent out from the "x" side. The audio matrix chips are controlled (switched) via digital logic signals from the on-board microcontroller circuits.

- **Audio Output Circuits**—Prior to application to the appropriate Enhanced Audio Enclosure output, each audio signal on the output side of the audio matrix (a switched-in signal) is applied to an audio output circuit. Each audio output circuit provides amplification/attenuation, impedance matching and/or level-adjustment in the output path. Output paths include headset earphone audio, low-power speaker audio ("select" and "unselect" audio), balanced-line audio signals to the CEC/IMC, balance-line audio signals to Call Director equipment (optional), and single-ended audio signals to call-check recorders (optional).

- **Microcontroller Circuits**—80C32-based microcontroller circuits on the Audio System Board control and process all logical data signals to and from the Audio System Board's I/O logic circuits. These circuits include (non-inclusive listing) the audio switching matrix, several serial ports, bi-state logical inputs, and bi-state logical outputs. The microcontroller circuits also read the on-board analog-to-digital converter circuits used for volume-unit (VU) meter indications and they control the tone generation circuits.

- **PC Serial Port Circuit**—An RS-232 serial port for control data communication with the PC.

- **Dispatch Keyboard Serial Port Circuit**—This serial port receives keystroke data from the dispatch keyboard. Operating power for the keyboard’s internal logic circuits is also delivered to the keyboard via this serial port.

- **Expansion Serial Port Circuit**—An RS-422 serial port which permits interfacing to external serially-interfaced equipment. (Reserved for future use.)

- **Bi-State Logic Input Circuits**—These circuits interface bi-state logical sense lines from external equipment connected to the Enhanced Audio Enclosure to the Audio System Board's microcontroller circuits. Examples include microphone PTT sense lines, microphone connected/not connected sense lines, headset connected/not connected sense lines, and Call Director off hook and Call Director jack sense lines. Each logic input line includes a pull-up resistor and a low-pass filter circuit.

- **Bi-State Logic Output Circuits**—These circuits interface the microcontroller circuits to bi-state logical output devices such as relay contacts. The Audio System Board has a total of seven (7) on-board relays.

- **Analog-to-Digital Converter Circuit**—The analog-to-digital (A/D) converter circuit's primary function is to provide VU (Volume-Unit) data to the PC on the selected module/entity transmit and receive signal levels. The microcontroller reads the A/D converter and it sends the read data to the PC via the serial control data link. VU indications are displayed in the console GUI’s VU meter panel in a bar graph format. The A/D converter circuit is also utilized during automated test and alignment procedures.

- **Tone Generation Circuits**—Tone generation circuits on the Audio System Board include two (2) sinewave generators which give the Enhanced Audio Enclosure the ability to generate tones for integrated paging operations. Therefore, an external

paging tone encoder is *not* required if the appropriate feature licensed software option is available at the console. The tone generation circuits are also utilized during automated test procedures performed at the factory.

Firmware

The operating program code for the microcontroller circuits within the Enhanced Audio Enclosure is stored on a factory-programmed 128K x 8-bit read-only memory (ROM) chip located on the Audio System Board. Occasionally, code stored on this chip may change as circuit improvements occur and/or as new features are added to the Enhanced Audio Enclosure. The chip is socketed which allows simple removal if replacement is necessary. Refer to the console's Software Release Notes (SRN-1000-xx) for specific details.

SPEAKERS KITS AND ASSEMBLIES

Speaker Kits used with the Enhanced Audio Enclosure consist of mechanical hardware, one or more Speaker Assemblies, and cables which interconnect each Speaker Assembly to the Enhanced Audio Enclosure. For a given enclosure, one Speaker Assembly is the "select speaker" and the remaining are the "unselect speakers."

Speaker Kit mechanical hardware may be of several different varieties providing either desktop speaker operation in the form of a self-contained single-speaker case or a rack-mount version in the form of a standard 19-inch EIA rack mount assembly. Normally, rack-mount Speaker Kits are factory equipped with two (2) Speaker Assemblies—one select speaker and one unselect speaker. If additional unselect speakers are required for a given console, up to two additional Speaker Assemblies may be added for a total of four (4) speakers in a 3-rack-unit-high assembly.

NOTE

See the table and parts lists in LBI-39104 for Speaker Kits' contents.

Each Speaker Assembly consists of a high-quality magnetically-shielded speaker, a Speaker Amp Board which accommodates audio power amplification circuitry, a front panel, a panel-mounted volume control potentiometer, and mechanical hardware. This unit may be installed in the desktop case or in the rack-mount frame. Since a magnetically-shielded speaker is employed, this assembly may be located near a video display monitor without causing monitor distortion. The difference between the select and unselect Speaker Assemblies is front panel labeling.

The Speaker Amp Board is mounted just behind the speaker on long metal stand-offs fastened to the assemblies front panel. It amplifies low-power speaker audio signals from the Enhanced Audio Enclosure and drives the speaker with the amplified signal. It can drive the speaker with up to five (5) watts of audio power. The interconnect cable between the Enhanced Audio Enclosure and the Speaker Assembly delivers both twelve-volt dc operating power and the low-power speaker audio to the Speaker Amp Board.

OPERATING PROCEDURES

For complete operating procedures on the C3 Maestro console for Windows NT, refer to *Operator's Manual* AE/LZT 123 1892.

INSTALLATION AND SET-UP

The *Installation And Set-Up Manual* included within this manual set contains board-level configuration, cable interconnection information and console application start-up information. The manual also contains a detailed overview of the advanced configurations possible for the console including, including information on the feature licensed options.

ADMINISTRATOR'S INFORMATION

System administration information for the C3 Maestro console for Windows NT is available in a separately-supplied manual. *Administrator's Manual* AE/LZB 119 1897 includes detailed information on the console application such as program file names and functions, the optional console GUI-related configurations which are possible, and the Configuration Editor off-line program. It also includes in-depth information on the console's feature licensed options and configuration information on Windows NT-related settings which influence how the console application operates. Typically, knowledge of the information presented in the *Administrator's Manual* is only required by administrative personnel in the CEC/IMC network system who are responsible for the system's dispatch consoles.

MAINTENANCE

Enhanced Audio Enclosure and Speaker Assembly disassembly instructions follow. Refer to the appropriate maintenance manual included with this manual set for detailed board-level maintenance information. These maintenance manuals contain board outline and schematic

diagrams, parts lists and detailed circuit analysis descriptions.

DISASSEMBLY INSTRUCTIONS

Enhanced Audio Enclosure

Disassemble an Enhanced Audio Enclosure in accordance with the following instructions:

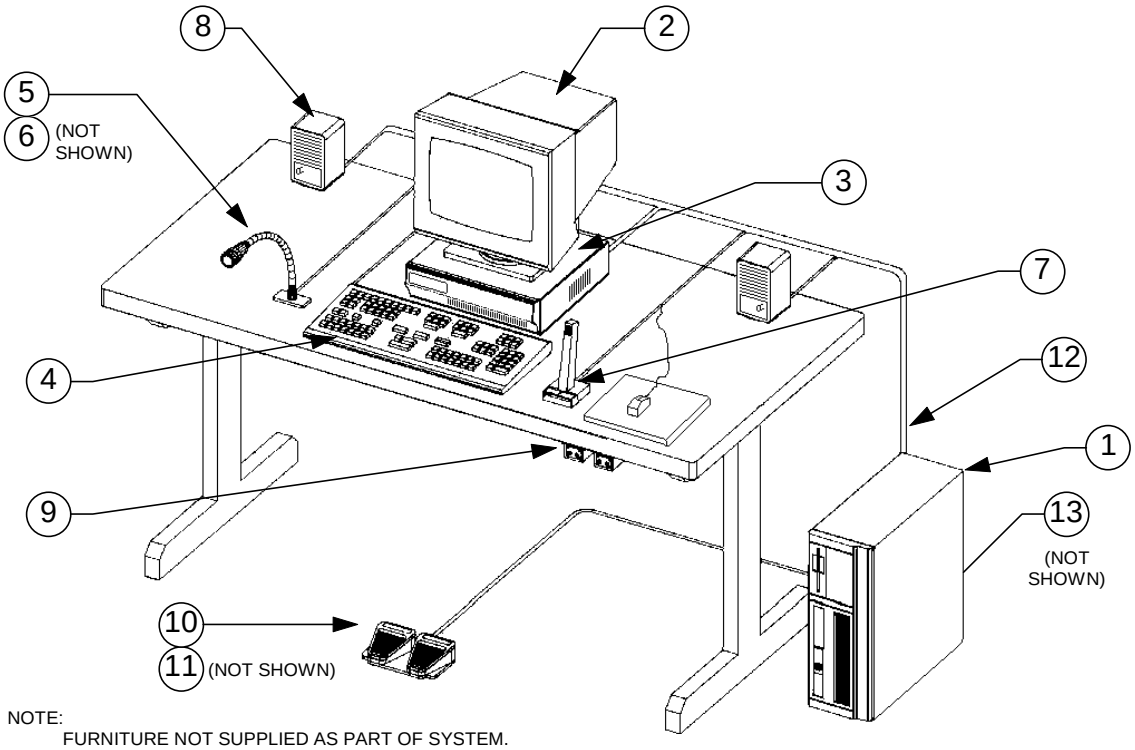
- ❑ **Power-down the Enhanced Audio Enclosure by turning the on/off power switch on the back of the unit to the OFF position.**
- ❑ **Disconnect the detachable ac power cord from the back of the unit.**
- ❑ Disconnection of other cables from the back of the Enhanced Audio Enclosure is optional, as the top cover may be removed with these cables connected.
- ❑ Lay the unit upside-down on a flat surface with the front panel facing you.
- ❑ Using both index fingers, simultaneously depress the two (2) recessed latching buttons on the sides of the unit.
- ❑ With the latching buttons fully depressed, slide the bottom of the unit approximately one (1) inch by pushing the two (2) rubber feet nearest the front panel ***away from*** the front panel.
- ❑ Carefully return the unit to an upright position. Use caution as the top cover and front panel assembly may easily separate (slide) from the bottom assembly at this time.
- ❑ Remove the top cover and front panel assembly away from the bottom assembly by sliding the two assemblies apart.
- ❑ Refer to LBI-39103 for Audio System Board service information. Refer to LBI-39102 for I/O Backplane Board service information. The power supply is a non-serviceable unit; it should be replaced in whole if a failure occurs (other than fuse replacement).

Speaker Assembly

Disassemble a Speaker Assembly in accordance with the following instructions:

- ❑ If necessary, disconnect the Speaker Assembly from the Enhanced Audio Enclosure by unplugging the cable at the rear of the Speaker Assembly. If tightened, the cable's DB-9 connector securing screws may need to be loosened using a small screwdriver.
- ❑ If the Speaker Assembly is a desktop version, disassemble it to gain access to the Speaker Amp Board as follows: Remove the four (4) screws from the back of the case and separate the case's front and rear sections.

  If the Speaker Assembly is a rack-mount version, removal of the assembly from the rack-mount frame is recommended: Remove the screws that secure the Speaker Assembly to the rack-mount frame.
- ❑ Refer to LBI-39104 for service information.



NOTE:
FURNITURE NOT SUPPLIED AS PART OF SYSTEM.

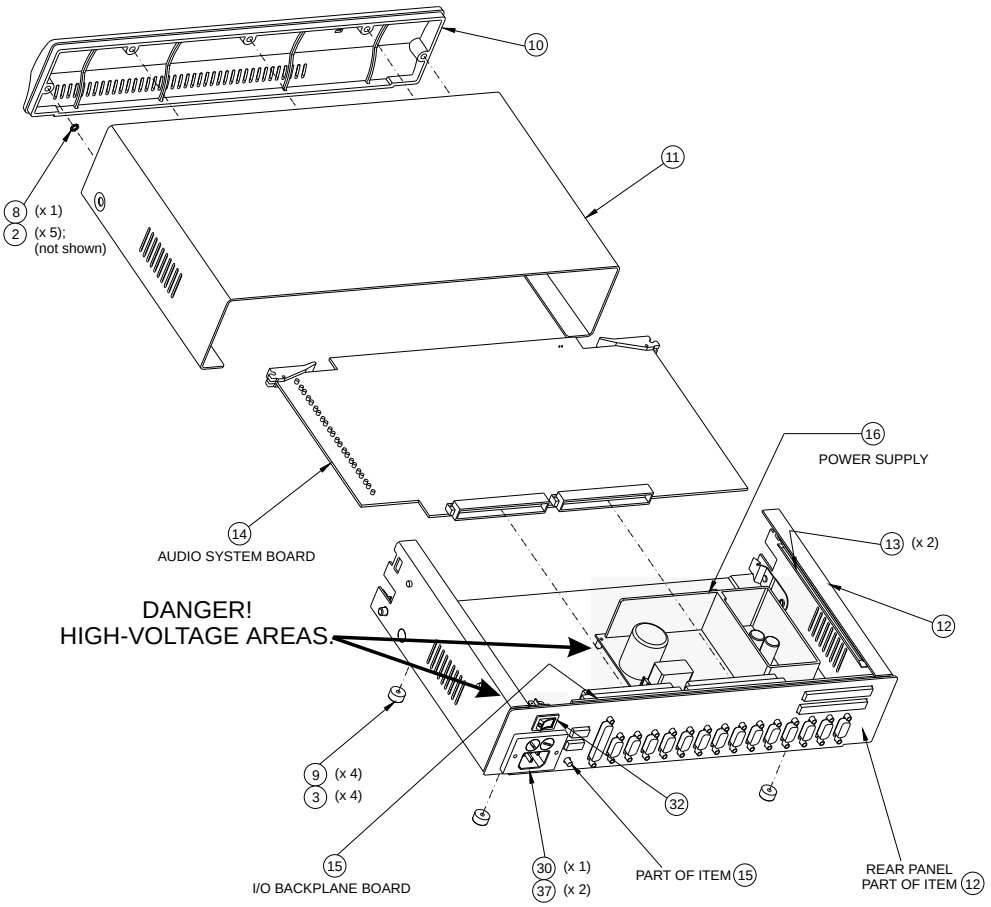
C3 MAESTRO CONSOLE SYSTEM WITH ENHANCED AUDIO ENCLOSURE

(Made from 903-0001-000 Rev. 0)

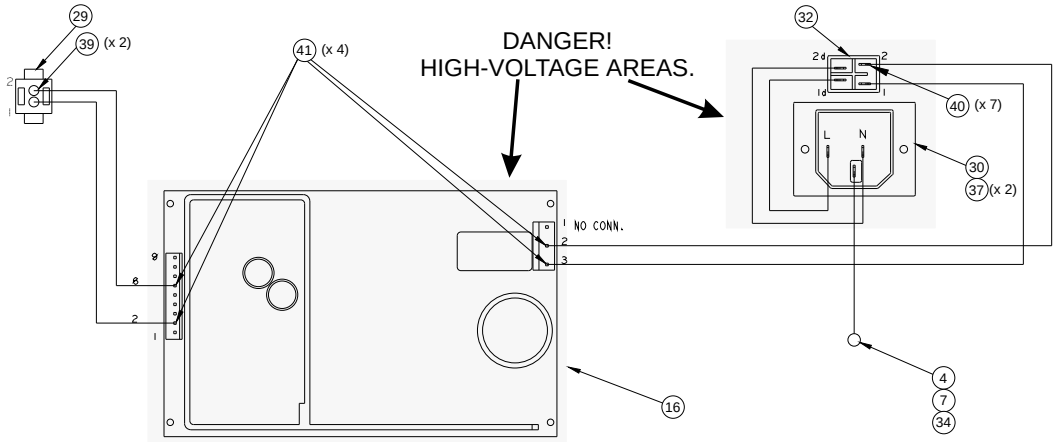
C3 MAESTRO CONSOLE FOR WINDOWS NT

ISSUE 1

DIAGRAM ITEM	PART/OPTION NUMBER	DESCRIPTION
1	350A1371P13	Personal Computer, C3 Maestro: Includes PC CPU enclosure, RS-422 board, PC keyboard, 2-button mouse, mouse pad, Windows NT operating system software (installed and configured to factory defaults), C3 Maestro console application software (installed and configured to factory defaults). Less monitor.
2	350A1371P14	Monitor, standard PC: 14-inch VGA.
2	350A1371P15	Monitor, standard PC: 17-inch SVGA.
2	350A1371P16	Monitor, touch-screen: 14-inch SVGA.
2	350A1371P33	Monitor, touch-screen: 17-inch SVGA.
3	350A1371P4 (P29/7720040001)	Enhanced Audio Enclosure: Includes EAE and one (1) 350A1371P29 cable for PC-to-EAE serial link interconnection.
4	350A1371P17 (P29/7590182003)	Keyboard, Dispatch: with DB-9 connector.
5	CRMC3F	Microphone, Gooseneck: 16-inch.
6	CRMC3E	Microphone, Boom (not shown in diagram).
7	CRMC5F	Microphone, Desk.
8	(See LBI-39104 for part numbers)	Speaker, Desktop. (Rack-mount speakers are not shown in diagram; see LBI-39104.)
9	CRCN1W	Jack Box, Headset.
10	CRSU3C	Footswitch, Dual.
11	CRSU3B	Footswitch, Single (not shown in diagram).
12	344A1371P29	Cable: 9-foot, male DB-9-to-female DB-9. (Used for EAE-to-speaker audio interconnection and PC-to-EAE serial data link interconnection.)
12	19B804083P2	Cable: 100-foot (Used for Console-to-CEC/IMC audio interconnections).
12	19B804083P3	Cable: 100-foot (Used for Console-to-CEC/IMC RS-422 control data interconnections).
12	350A1371P43	Cord Kit: International AC.
13	P29/7590289000 (350A1371P30)	RS-422 Board (ESD protected).



POWER SUPPLY INTERCONNECTIONS



ENHANCED AUDIO ENCLOSURE
350A1371P4 (P29/7720040001)

(Made From 772-0040-XXX-HD, Rev. A)

ENHANCED AUDIO ENCLOSURE
350A1371P4 (P29/7720040001)

ISSUE 1

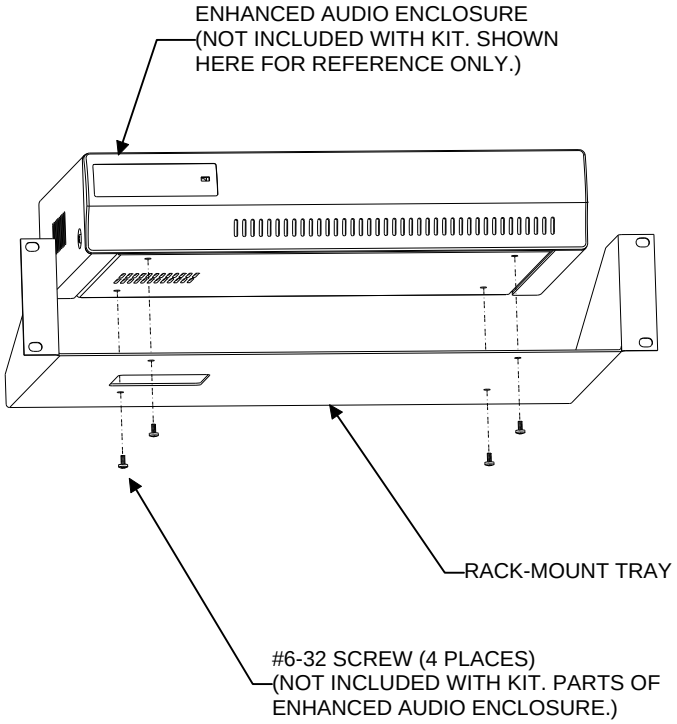
ITEM	PART NUMBER	DESCRIPTION
1	P29/2A104C2404	Screw, machine: 4-40 x 1/4-inch, pan head Phillips. (Qty. required = 4)
2	P29/2A106C2403	Screw, machine: 6-32 x 3/16-inch, pan head Phillips. (Qty. required = 5)
3	P29/2A106C2404	Screw, machine: 6-32 x 1/4-inch, pan head Phillips. (Qty. required = 9)
4	P29/2A104C2402	Screw, machine: 4-40 x 1/8-inch, pan head Phillips. (Secures ground wire.)
5	P29/208A104020	Washer, lock: No. 4, spring, stainless steel. (Qty. required = 4)
6	P29/208A106020	Washer, lock: No. 6, spring, stainless steel. (Qty. required = 5)
7	P29/2080106000	Washer, lock: No. 4, internal tooth, stainless steel. (Qty. required = 3)
8	P29/2080028000	Washer, lock: No. 6, external tooth.
9	P29/6110101000	Feet, rubber. (Qty. required = 4)
10	P29/6050030000	Panel, front: molded.
11	P29/6090546000	Enclosure, top.
12	P29/6090547000	Enclosure, bottom.
13	P29/6110100000	Guides, PCB: 6-inch (Qty. required = 2)
14	(See LBI-39103 for part number)	Board, Audio System.
15	(See LBI-39102 for part number)	Board, I/O Backplane.
16	P29/3860036000	Supply, Power: 12 Vdc @ 4.3 amp output.
17	P29/6140231001	Label, Ericsson.
29	P29/3800133000	Connector: 2-position plug.
30	P29/3800188000	Receptacle: Fused IEC.
32	P29/3650049000	Switch, rocker: Lighted green.
34	P29/3710088000	Terminal, ring: No. 6 stud, 18-14 AWG.
35	P29/2010116000	Screw, machine: 4-40 x 1/4-inch, flat head Phillips, stainless steel. (Qty. required = 2)
36	P29/2070073000	Nut, keeper: No. 4. (Qty. required = 2)
37	P29/3250077000	Fuse: 2.5 amp slow-blow, 5 x 20 mm. (Qty. required = 2)
38	P29/3820021000	Cord, ac power: Right-angle IEC-320.
39	P29/3710007000	Terminal. (Qty. required = 2)
40	P29/3250003000	Terminal, quick disconnect: 0.187-inch. (Qty. required = 7)
41	P29/1050034000	Tubing, heat shrink: 1/8-inch x 0.75-inch (Qty. required = 4)
42	P29/5010150000 (350A1371P29)	Cable: DB-9 male/DB-9 male, 10-feet. (Used for PC-to-EAE control data link.)

C3 MAESTRO CONSOLE
FOR WINDOWS NT

OPTIONAL HARDWARE & SOFTWARE
NOT INDICATED IN OUTLINE DIAGRAM ON PAGE 26

ISSUE 1

PART/OPTION NUMBER	DESCRIPTION
350A1371P19 (P29/7720044000)	Kit, Rack-Mount: 19-inch (for Enhanced Audio Enclosure).
350A1371P34	Track-ball.
350A1371P35	Card, PC Ethernet Combo.
350A1371P36	Memory: 256K Byte Cache (for HP P5/75 PC).
350A1371P38	Memory: 8M Byte System RAM (for HP P5/75 PC)
350A1371P39	Kit, External CD-ROM SCSI Disk Drive w/ SCSI-to-EPP Interface Cable.
350A1371P48	UPS (Uninterruptible Power Supply), external: 110 Vac.
350A1371P49	UPS (Uninterruptible Power Supply), external: 220 Vac.
350A1371P40	Software: Windows NT Resource Kit Version 3.51.
350A1371P41	Software: Windows NT Workstation Version 3.51 (CD-ROM).
350A1371P50	Software: Windows NT Service Pack.
350A1371P44	Software: RSM Feature Licensed Option. (Requires factory licensing.)
350A1371P45	Software: Request-To-Talk Feature Licensed Option. (Requires factory licensing.)
350A1371P46	Software: Integrated Tone/Voice Paging Feature Licensed Option. (Requires factory licensing.)
350A1371P47	Software: CEC/IMC Auxiliary I/O. (Requires factory licensing.)
350A1371P42	Kit, Retrofit: C3 Maestro for DOS to C3 Maestro for NT upgrade package for HP P5/75 PC. Includes 256K byte cache memory (350A1371P36), 8M byte RAM (350A1371P38), Windows NT Workstation (350A1371P41), C3 Maestro console application software for Windows NT, mouse and mouse pad. (Requires CD-ROM drive for software installation: 350A1371P39 or equivalent.)



INSTALLATION INSTRUCTIONS

1. MOUNT TRAY (P29/6090561000) IN 19-INCH CABINET OR CASE USING FOUR (4) #10-24 x 3/4 PHILLIPS PAN-HEAD SCREWS (P29/2040011000), FOUR (4) #10 LOCK-WASHERS (P29/2080005000), AND FOUR (4) #10 SPRING NUTS (P29/2070098000). THESE ITEMS ARE NOT SHOWN IN DIAGRAM.
2. REMOVE FOUR (4) #6-32 PHILLIPS-HEAD SCREWS SECURING RUBBER FEET TO BOTTOM OF ENHANCED AUDIO ENCLOSURE. RETAIN THESE SCREWS. DISCARD RUBBER FEET UNLESS REVERSION BACK TO DESK-TOP USE MAY BE NECESSARY IN FUTURE.
3. MOUNT ENHANCED AUDIO ENCLOSURE TO TRAY USING FOUR (4) SCREWS REMOVED IN STEP 2.

ENHANCED AUDIO ENCLOSURE RACK-MOUNT KIT; OPTIONAL 350A1371P19 (P29/7720044000)

(772-0044-XXX-HD)

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1-800-528-7711 (Outside U.S.A., 804-528-7711)

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