MAINTENANCE MANUAL

CEC/IMC DIGITAL AUDIO SWITCH
INSTALLATION, SET-UP AND TROUBLESHOOTING

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GENERAL

The intent of this manual is to guide field installation and test personnel through installation of the Ericsson GE CEC/IMC Digital Audio Switch and subsequent maintenance of the CEC/IMC. Installation, set-up and troubleshooting information is presented. In addition, the recommended CEC/IMC power-up procedure and the Controller Board live insertion procedure is included.

INSTALLATION

FLOOR PLAN

In most CEC/IMC installations, the co-located CEC/IMC cabinet(s) and GETC uplink cabinet(s) are within several feet of each other. This floor plan minimizes the length of the Telco cables that join the cabinets together. Servicing is also eased since the CEC/IMC equipment and the GETC uplink equipment may be concurrently monitored by a single individual.

Cabinets that contain any optional equipment ordered or planned for the installation should also be included on the original floor plan. Optional equipment includes logging recorders, CTIS, DVIU, CAL and RSM equipment In addition, floor plan provisions should be made for any planned UPS equipment.

Punch blocks are usually installed in a dedicated cabinet or in a closet located near the CEC/IMC equipment.

EQUIPMENT ROOM GROUNDING

Proper grounding techniques should be observed in order to protect the equipment and service personnel from lightening and other sources of electrical surges. All cabinets, lightening arrestors, and associated equipment should be connected to a common grounding point that is provided as a part of the building and/or tower structure. This common grounding point must be within 25 feet of all cabinets (or ground buses) and it should have an impedance of less than 10 ohms to earth ground.

Insulated 6-gauge copper wire should be used between each cabinet and the common ground point or ground bus. If ground busses are used in a multiple cabinet installation, insulated 4-gauge copper wire should be used between each ground buss and the common ground point. All ground bus-to-common ground point connections should be 25 feet or less.

AC POWER AND UPS EQUIPMENT

The CEC/IMC power supply structure in based on the use of a separate Redundant Power Supply (RPS) unit for each Card Cage (rack) assembly. Normally, all RPS units within a CEC/IMC cabinet are plugged into two separate ac power strips horizontally-mounted just above the RPS units. The cabinet fan is also plugged to one of the power strips.

All cabinets require UPS-protected 120 or 230 Vac (47 to 63 Hz) power sources. Each fully-loaded CEC/IMC Card Cage consumes approximately 600 watts; UPS equipment should be rated accordingly. In addition, UPS hold-up time should meet the specific installation requirements. Typically, the UPS equipment should provide power until a back-up generator can be brought on-line.

AC-line circuit breakers should be located within four (4) feet of the UPS equipment. The breakers can be housed in cable trays above the cabinets or in wall-mounted breaker boxes.

An entire CEC/IMC cabinet can be protected by a single UPS rated at 1800 watts minimum. This cabinet requires only a single ac receptacle and 20-amp circuit breaker. In this installation, cords from both of the ac power strips are plugged into the UPS. The complete cabinet is powered by a single UPS and circuit breaker. UPS or circuit breaker failure would affect the entire CEC/IMC.

Every GETC uplink cabinet has a single power supply and power cord. A full-loaded GETC uplink cabinet (18 GETCs) requires approximately 550 watts of ac power. The UPS equipment should be rated accordingly.

IN-CABINET DC POWER CABLES

Power Cable 19D903309P1 provides the dc power interconnections between a CEC/IMC Card Cage and its respective RPS unit. One cable is required per Card Cage and RPS set. These cables are factory installed and should not normally require any changes during the installation process. Simply verify each cable is connected between the Backplane connectors as shown in LBI-38662.

DC power cabling in the GETC uplink cabinets are also factory installed. Separate interconnections for each GETC are provided by Power/Phone Line Cable 19D902759P1 between the Fuse Panel and the GETCs. Verify the connectors have not come loose during shipment and they are connected as shown in the applicable assembly diagrams in LBI-38662.

LOCAL BUS CABLES

The Local Bus Cables join digital buses between adjacent Card Cage board slots so data can be transferred between the Controller Board and Audio Board(s) within a given interface module. These cables are factory installed and should not normally require any changes during the installation process. Repositioning of a Local Bus Cable may affect board-to-slot positioning and the connection location of the Concentrator Card Cable at the Backplane. **Therefore, changes to these cables should not be performed.** Simply verify each cable is connected between two (2) Backplane connectors in accordance with the customer-specific system documentation. If necessary, see LBI-38662 for cable length and assembly details.

INTER- AND INTRA-RACK CABLES

All primary CEC/IMC Backplanes are interconnected or "daisy-chained" together using multi-conductor ribbon cable pairs referred to as "intra-rack" and "inter-rack" cables. Intra-Rack Cables join the Backplanes in an individual cabinet together and Inter-Rack Cables join the Backplanes between cabinets in a dual-cabinet installation.

The Intra-Rack Cables used in the CEC/IMC are installed at the factory. No changes to these cables should be required at installation. Verify each cable has not become loose during shipment and it is connected to a Backplane connector as specified by the customer-specific system documentation.

If the CEC/IMC uses four (4) or more primary Card Cages there will be two (2) Inter-Rack Cables that join the primary Card Cages together between the two cabinets. These cables pass through openings in adjacent sides of the cabinets which are placed to minimize the Inter-Rack Cable length. During installation, each cable must be routed through the openings and connected to the appropriate Backplane connector in each cabinet as specified by the customer-specific system documentation. See LBI-38662 for cable length and assembly details.

TERMINATOR BOARDS

Terminator Boards are plugged onto the appropriate Backplane connectors at the factory. No changes to these boards should be required at installation. Simply verify each board has not become loose during shipment and it is connected to the Backplane connectors in accordance with the customer-specific system documentation. The primary Card Cage "daisy-chain" has Terminator Boards on each end of the chain – two Terminator Boards per chain. In addition, if the CEC/IMC is so equipped, each CIA rack has two Terminator Boards per rack – one on each end of the Backplane.

CONCENTRATOR CARD CABLES

Each Concentrator Card Cable in the CEC/IMC cabinet interconnects a 24-pin dual-row connector on the rear of the Backplane to a Concentrator Card. Twisted-pair shielded cabling is utilized on all of these factory-installed cables. During the installation process, no changes should normally be required. Simply verify none of the cables have become loose during shipment and they are all connected in accordance with the customer-specific system documentation.

In the GETC uplink cabinet, a Concentrator Card Cable is required for each GETC installed in the cabinet. These cables interconnect the GETCs to the Concentrator Card. Up to ten (10) GETCs can be connected to a single Concentrator Card. Verify all GETCs are properly connected to a Concentrator Card as shown in the assembly diagram in LBI-38662.

EXTERNAL CONNECTIONS

Telco Cables

All audio/modem signal and data connections at the CEC/IMC cabinet are made with standard 25-pair Telco cables. These cables have 50-pin Champ (D-style) male connectors on both ends with the connectors' pins wired in a straight-through pin-to-pin fashion – pin 1 to pin 1, pin 2 to pin 2, etc.. Each cable joins a 50-pin Champ female connector on a Concentrator Card to the external punch block or other associated equipment. Typically, the punch blocks are located in a separate cabinet or closet. Table 1 lists the Telco cable part numbers available from Ericsson GE. These Telco cables have each pair individually shielded.

The GETC uplink control data Telco cables are not routed to the punch blocks. These Telco cables pass directly to the co-located GETC uplink cabinet(s) and plug into the female 50-pin Champ connectors on the Concentrator Cards in the GETC uplink cabinet(s).

Concentrator Card Pin-Outs

Since every CEC/IMC installation is unique, the pin-out for the Concentrator Cards can vary greatly from one installation to another. The customer-specific system documentation identifies the Concentrator Card pin-outs. This documentation is included with the CEC/IMC when it is shipped from the factory. It lists unique details about the **as-shipped** CEC/IMC.

TABLE 1 - TELCO CABLE LENGTHS

PART NUMBER	CABLE LENGTH
19D903880P120	5 feet
19D903880P121	15 feet
19D903880P122	7 feet
19D903880P123	10 feet
19D903880P124	20 feet
19D903880P125	25 feet
19D903880P126	30 feet
19D903880P127	35 feet
19D903880P128	40 feet
19D903880P129	50 feet

External Cable Length And Shielding

Maximum audio line length is limited only by the line loss and induced noise. All lines should be twisted-pairs.

Local audio lines should not require shielded pairs unless noise is a problem. Shielded pairs are recommended for all local lines that carry modem signals.

Twisted-pair shielded cabling should be used for all control data connections between a CEC/IMC cabinet and the external equipment. RS-232 interfaces should be limited to 50 feet and RS-422 interfaces should be limited to 4000 feet.

Telephone Lines

The CEC/IMC audio channels should employ high-quality low-noise phone lines or equivalent microwave circuits. All audio channels will require 4-wire (duplex) circuits except channels to 2-wire remote controlled conventional stations. Channels that carry modem signals (mobile data or Aegis calls) require 3002-conditioned phone lines.

All control data uplink/downlink phone lines to/from EDACS sites, CNI systems, etc. should employ 4-wire 3002-conditioned phone lines or equivalent microwave circuits. Lines of this type guarantee low bit-error data transfer rates for the 9600 baud GETC uplink/downlink data. At the GETC uplink cabinet, phone line connections are made at the connector panel mounted near the top rear of the cabinet. This connector panel has two (2) 50-pin Champ connectors (J21 and J22) allowing Telco cable pin-to-pin interconnections to punch blocks. See the cable assembly diagram in LBI-38662 for connector pin-out details.

Punch blocks at the equipment room entry/exit point should employ surge-protection for lightening and other electrical surges. It is highly recommended that the channels for EDACS sites and tone controlled conventional stations be equipped with ±27-volt clamp protection. However, ±27-volt clamp protection cannot be employed on the transmit pair to a dc controlled conventional station. This pair may have up to a 135 Vdc potential when a dc control current is sent out from the CI Board to the conventional station.

3002 Data Grade Phone Line Specifications

The GETC uplink-to-downlink connections require 4-wire type 3002 data-grade telephone lines or equivalent microwave links. In addition, if other remote data connections are needed, 4-wire 3002 data-grade lines are also required for these data links. Equipment requiring 3002 data-grade lines if remotely located includes dispatch consoles, the System Manger and the CEC/IMC Manager. Specifications for type 3002 lines are:

- Frequency Response (1 kHz reference)
  - 300 - 2700 Hz: -2 to +6 dB
  - 500 - 2400 Hz: -1 to +3 dB
- Maximum Frequency Error: ±5 Hz
- Maximum Net Loss: 16 dB
- Group Delay (800 - 2400 Hz): 2000 µS
- Minimum S/N Ratio: 24 dB
- Special Conditioning (C1, C2, C4): not required
- Special Conditioning (D1): not recommended

AUXILIARY I/O OPTION MSDE3U

Every Controller Board has eight (8) bi-level input lines and eight (8) bi-level output lines that can be used for auxiliary I/O control. This section lists internal CEC/IMC cabinet hardware installation details for auxiliary I/O option MSDE3U. The option includes:

- Auxiliary I/O Concentrator Card 19C852221P1
- Concentrator Card Mounting Panel 19D903268P1
- Concentrator Card Cable 19D903628P52

If the CEC/IMC installation includes this option, it may be beneficial to review the related information in the "**SET-UP PROCEDURES**" section (Step 15) at this time.

Internal CEC/IMC cabinet aux. I/O hardware installation is as follows:

1. Attach Concentrator Card Mounting Panel 19D903268P1 to the rear cabinet rail just below the existing Mounting Panels. Use the extra mounting hardware supplied with Hardware Kit 19A130031G12. Blank positions in any existing Mounting Panel (the upper three) should not be used to mount the Concentrator Card. These positions should be reserved for future CEC/IMC expansion.

2. Mount the Concentrator Card supplied with the option onto the CC Mounting Panel that was just installed. Connectors J3 and J6 should face outwards and J1, J2, J4 and J5 should face inwards. Use four (4) No. 6-32 x 5/16-inch pan-head screws and four (4) No. 6 lock-washers.

3. A Concentrator Card Cable is required for each Controller Board that will handle aux. I/O. Connect a cable to the PA1xx connector on the Backplane that corresponds to the respective Controller Board's Card Cage slot. The PA1xx connectors are the upper row of 24-pin dual row header connectors on the rear of the Backplane.

4. Connect the other end of the cable to appropriate connector on the Aux. I/O Concentrator Card. Each Aux. I/O Concentrator Card will provide aux. I/O connections for up to four (4) Controller Boards.

Installation of the Aux. I/O related hardware internal to the CEC/IMC is now complete. Step 15 in the "**SET-UP PROCEDURES**" section of this manual details external pin-outs of the Champ connectors on the Concentrator Cards. Step 15 also includes programming related details.

CABLE INTERCONNECTION FIGURES

Figures 1 thru 10 in this manual show cable interconnection details for selected CEC/IMC interface modules. Both internal CEC/IMC cabinet interconnections and interconnections external of the CEC/IMC cabinet are shown for each interface module.

The figures are not intended to detail the connector pin-outs at the Concentrator Cards or the Backplanes. See the customer-specific system documentation for connector pin-out details.

POWER-UP PROCEDURE

This section describes the recommended CEC/IMC power-up procedure. It also gives details that can resolve minor problems that may occur during the power-up process.

1. **Simultaneously** switch on the two (2) RPS units that supply power to the two "end-chain" or "end node" Card Cages (racks). These Card Cages have Terminator Boards installed on their Backplanes. The MOM will always be located in one of these "end-chain" racks and the other rack typically houses the LRIM and/or VMIM Controller and Audio Boards. The entire CEC/IMC must be powered-up simultaneously if it has two (2) or less Card Cages.

   Even though a CIA rack has Terminator Boards on each end, it is not a part of the primary Backplane structure and it should not be powered-up simultaneously with the "end-chain" Backplanes.

2. Switch on all other RPS units including the CIA rack's RPS units (if present).

3. Verify **both** switches on **all** RPS units are turned on. Also verify the green "STATUS" indicators on the front panels of all RPS units are illuminated. All "TEMP" indicators should be off.

4. All cabinet fans should be tested. With a heat gun, trip each fan's thermostat and verify the fan pulls air up and out of the cabinet.

5. From the CEC/IMC Manager's (MOM PC's) "SYSTEM DISPLAY screen, verify every installed primary interface module's Controller Board (MIMs, CIMs, XLTRs, NIMs, LRIMs, VMIMs, RIMs, CTIMs, CAMs, DATA, DVIM and the MOM) is active by observing the one- or two-letter symbol reference. This screen is accessed by selecting "View System/Diagnostics" from the main menu. One or more of the symbol references may be flashing to indicate errors.

   If an interface module does not have a symbol reference displayed, reset the respective Controller Board by pressing the reset button on its front panel. At this point, if the "RUN" LED on Controller Board 19D903299P3 is not lit solid (blinking on 19D903299P1), momentarily remove the board from the from the Backplane and verify all DIP switch settings. Now, reinsert the board into the same slot. **If necessary, follow the Controller Board live insertion procedure presented in this manual.**

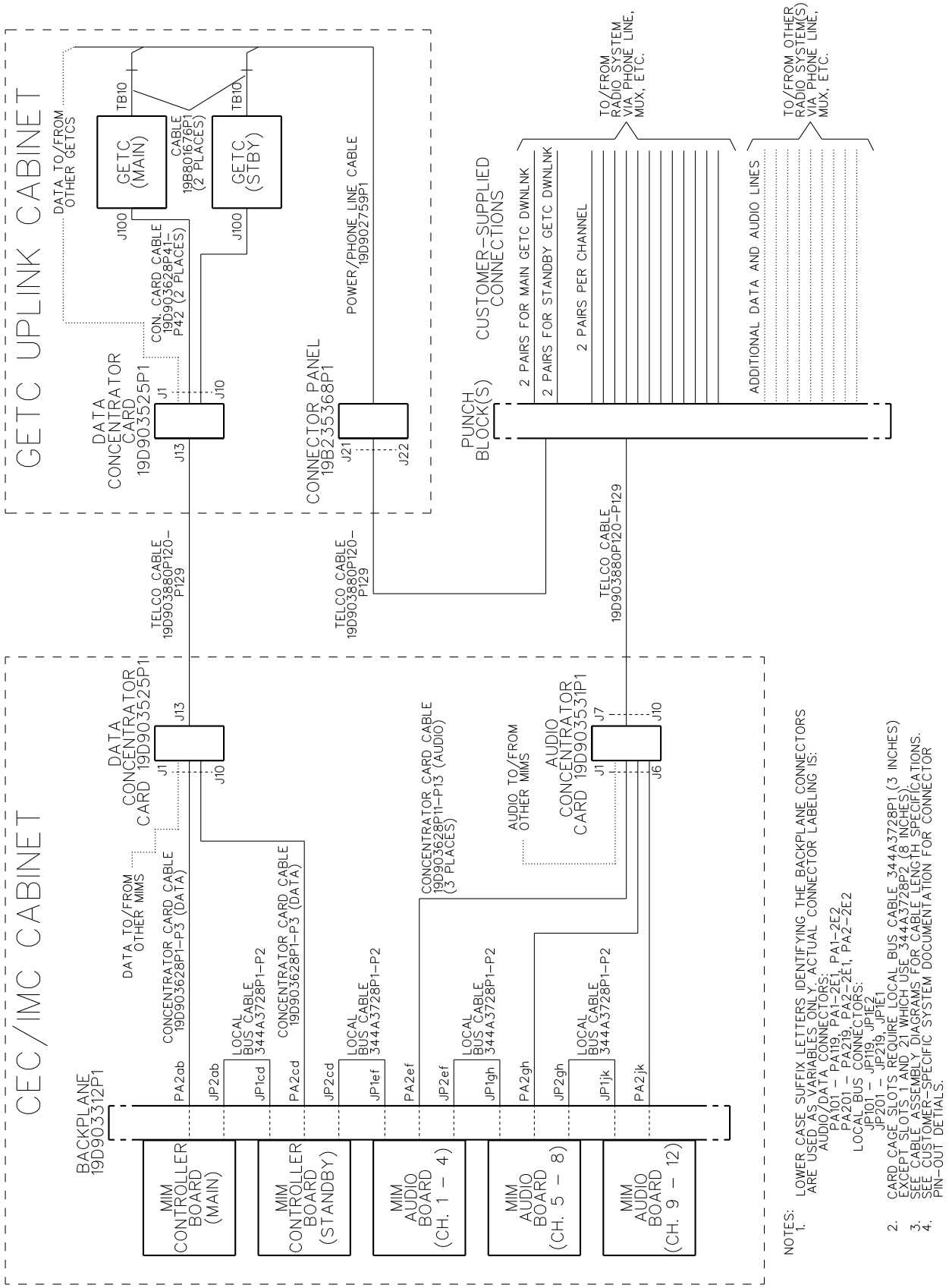
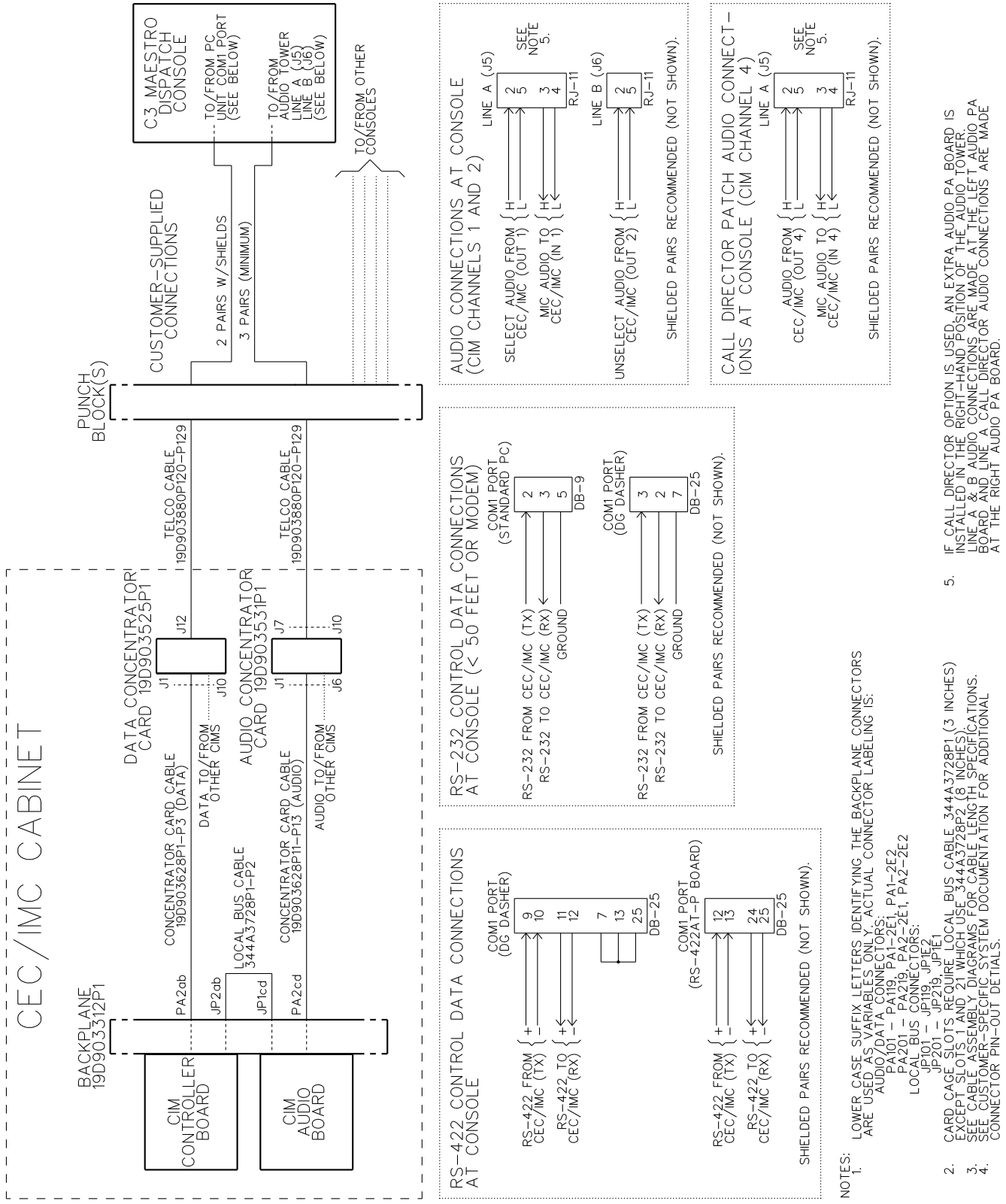


Figure 1 - Typical MIM Cable Interconnections (12 Channels Shown)



NOTES:
1. LOWER CASE SUFFIX LETTERS IDENTIFYING THE BACKPLANE CONNECTORS ARE USED AS VARIABLES ONLY. ACTUAL CONNECTOR LABELING IS:
   AUDIO/DATA CONNECTORS:
   PA101 – PA119, PA1–2E1, PA1–2E2
   PA201 – PA219, PA2–2E1, PA2–2E2
   LOCAL BUS CONNECTORS:
   JP101 – JP119, JP1E2
   JP201 – JP219, JP1E1
2. CARD CAGE SLOTS REQUIRE LOCAL BUS CABLE 344A3728P1 (3 INCHES) EXCEPT SLOTS 1 AND 21 WHICH USE 344A3728P2 (8 INCHES).
3. SEE CABLE ASSEMBLY DIAGRAMS FOR CABLE LENGTH SPECIFICATIONS.
4. SEE CUSTOMER-SPECIFIC SYSTEM DOCUMENTATION FOR ADDITIONAL CONNECTOR PIN-OUT DETIALS.
5. IF CALL DIRECTOR OPTION IS USED, AN EXTRA AUDIO PA BOARD IS INSTALLED IN THE RIGHT-HAND POSITION OF THE AUDIO TOWER. LINE A & B AUDIO CONNECTIONS ARE MADE AT THE LEFT AUDIO PA BOARD AND LINE A CALL DIRECTOR AUDIO CONNECTIONS ARE MADE AT THE RIGHT AUDIO PA BOARD.

Figure 2 - Typical CIM Cable Interconnections

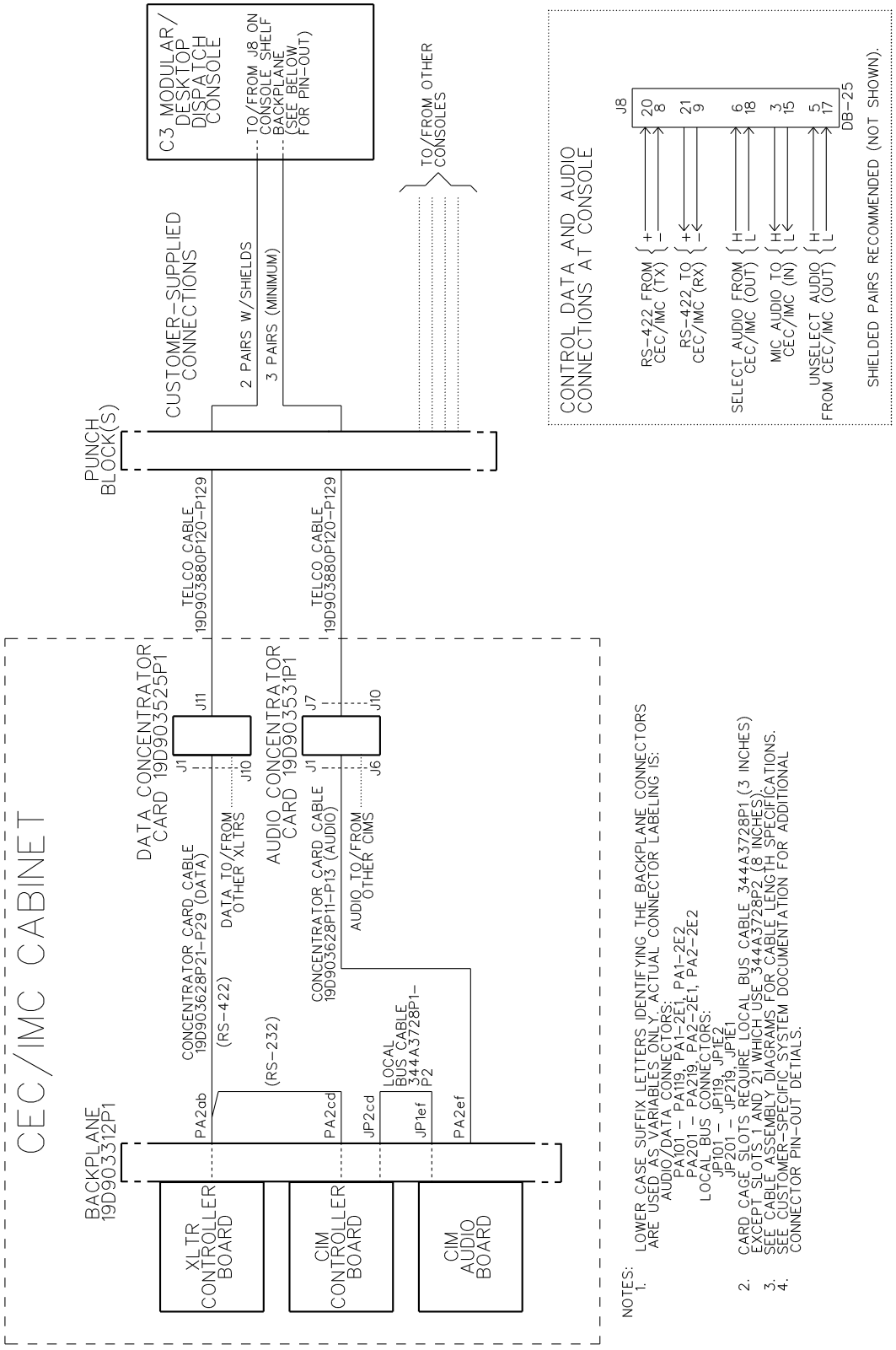


Figure 3 - Typical XLTR Cable Interconnections

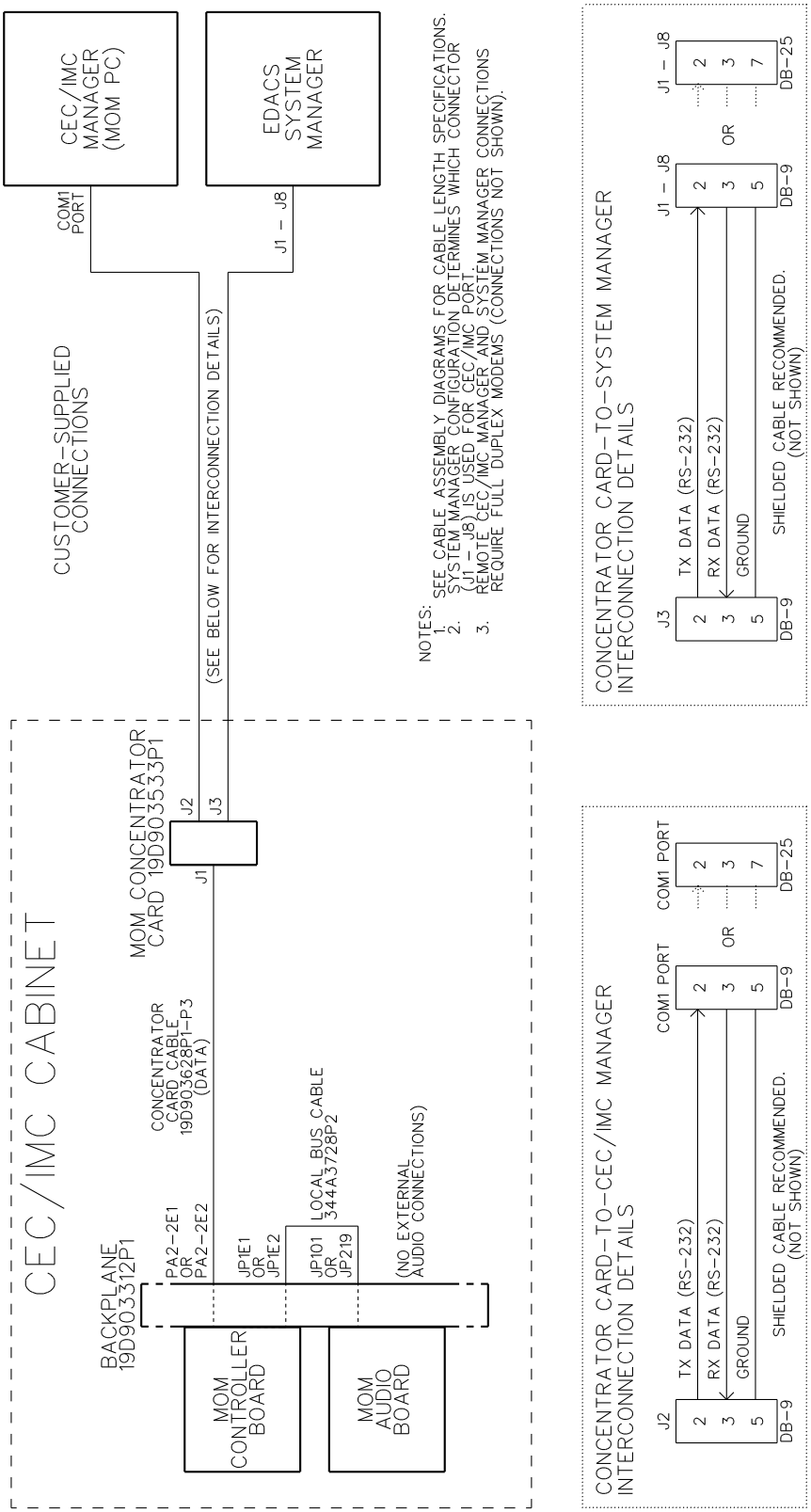


Figure 4 - MOM Cable Interconnections

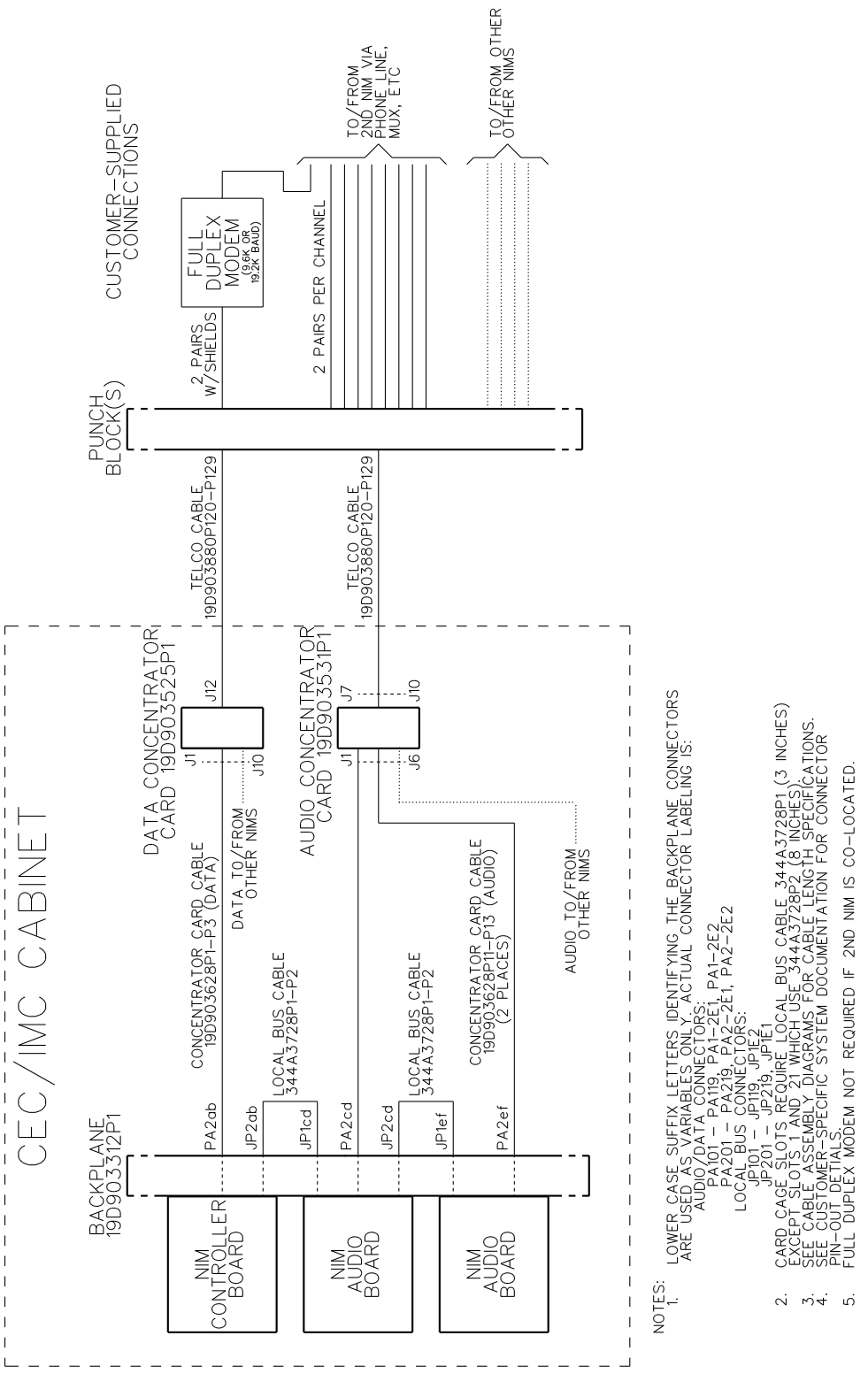


Figure 5 - Typical NIM Cable Interconnections (8 Channels Shown)

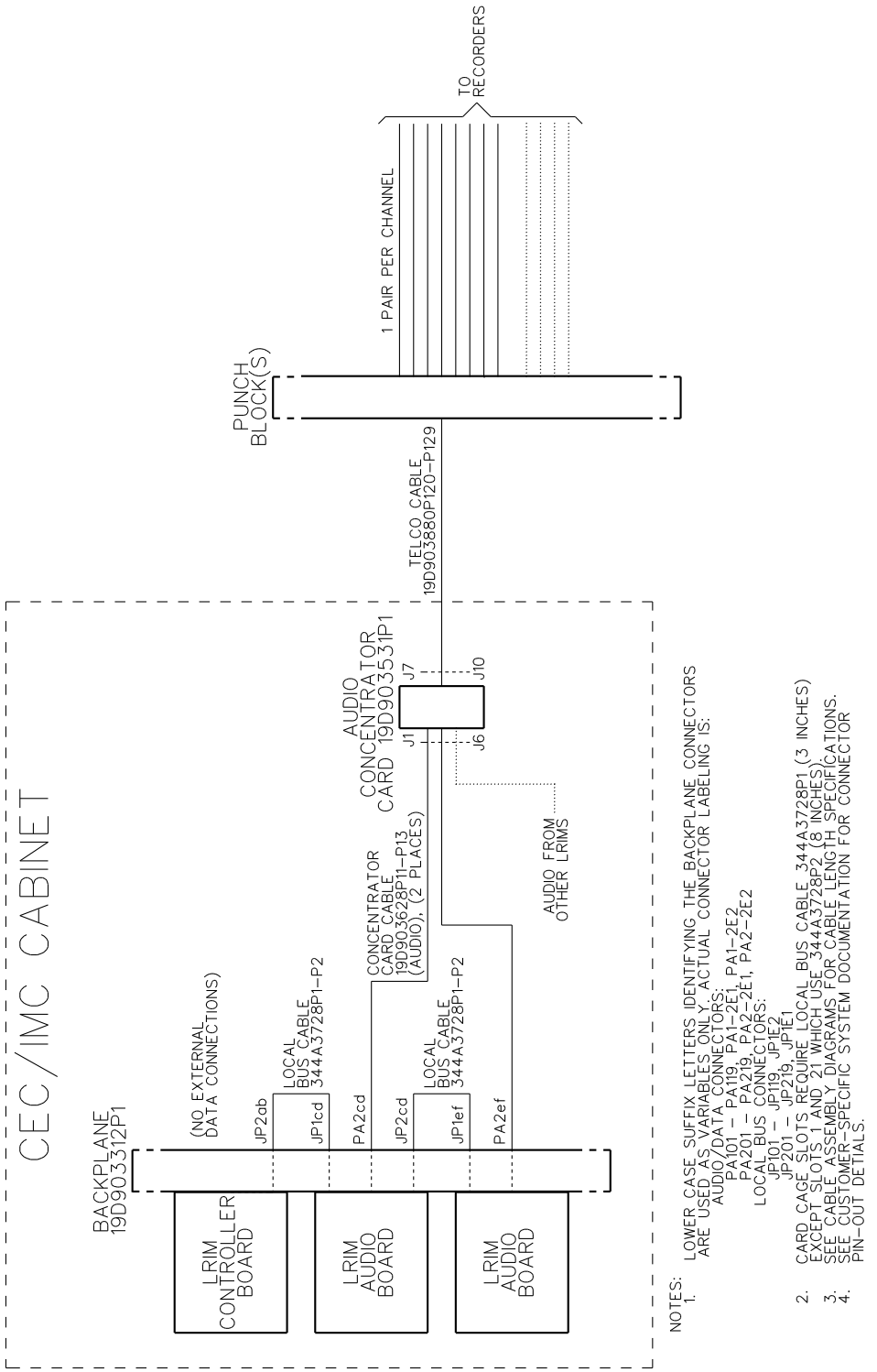


Figure 6 - Typical LRIM Cable Interconnections (8 Channels Shown)

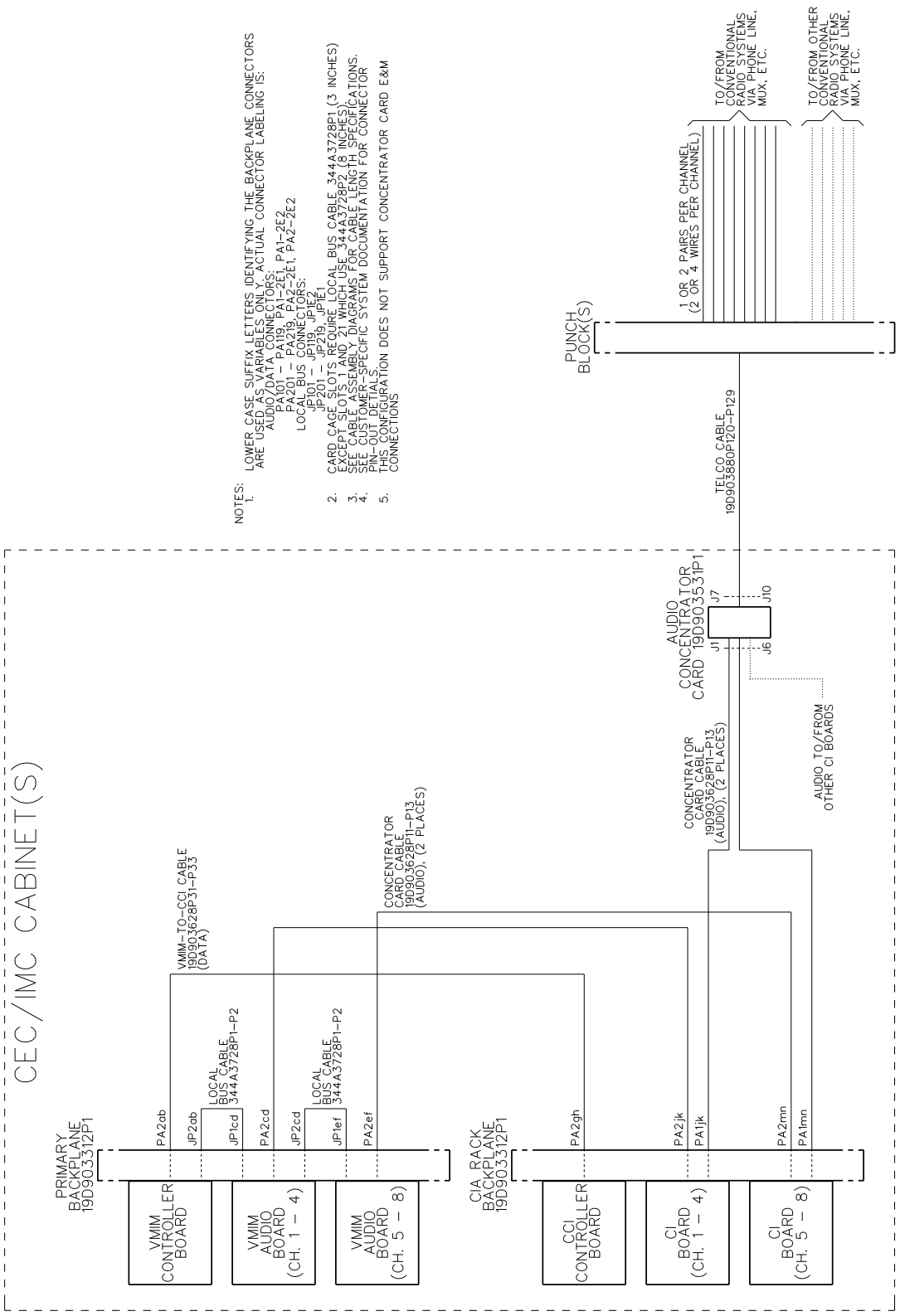


Figure 7 - Typical VMIM/CIA Rack Cable Interconnections Using Audio Concentrator Card 19D903531P1 (8 Channels Shown)

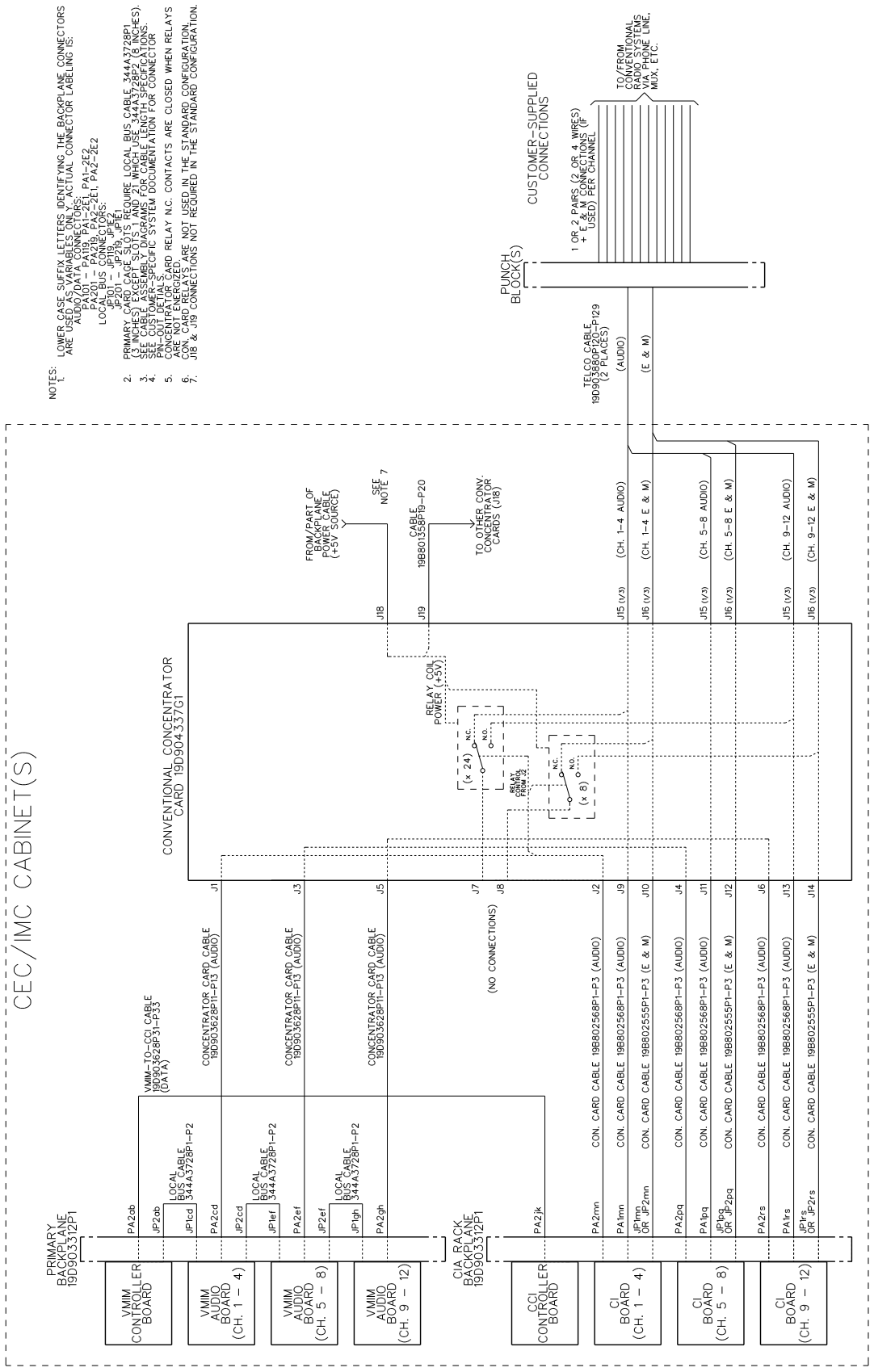


Figure 8 - Typical VMIM/CIA Rack Cable Interconnections Using Conv. Concentrator Card 19D904337G1 (12 Channels Shown, Standard Configuration)

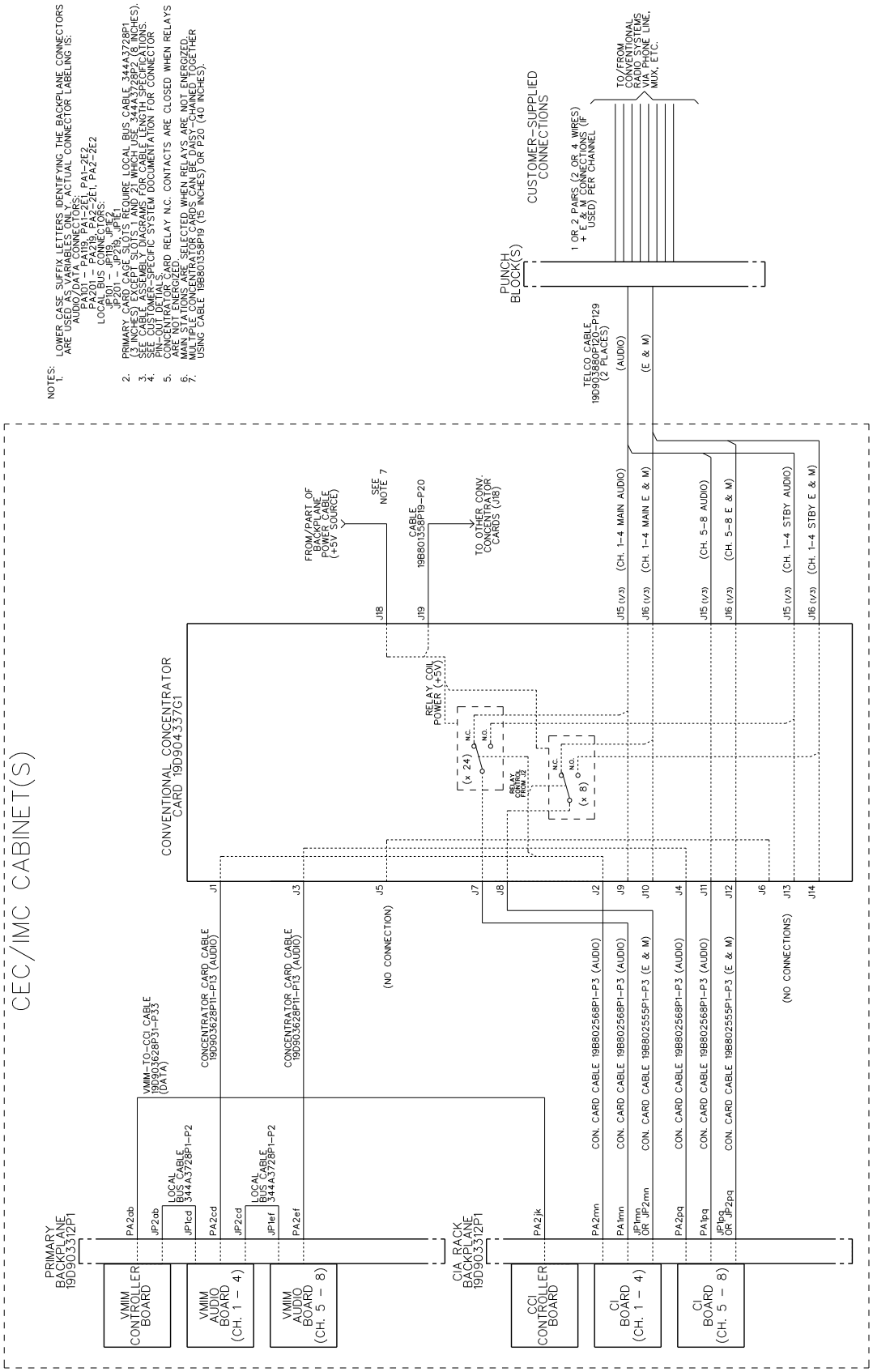


Figure 9 - Typical VMIM/CIA Rack Cable Interconnections Using Conv. Concentrator Card 19D904337G1 (8 Channels Shown, Main/Standby Configuration)

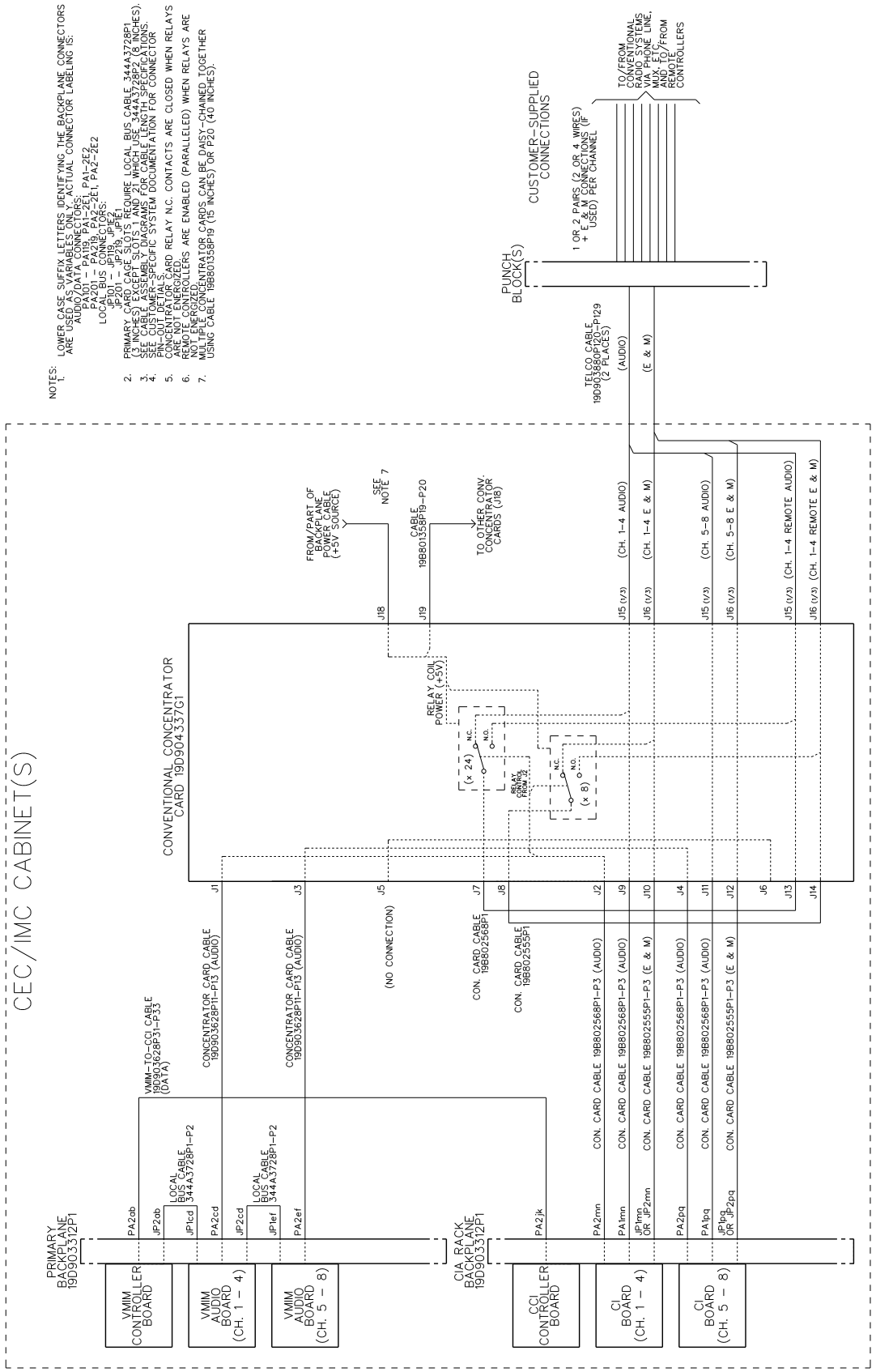


Figure 10 - Typical VMIM/CIA Rack Cable Interconnections Using Conv. Concentrator Card 19D904337G1 (8 Channels Shown, Remote Controller Enable/Disable Configuration)

6. Verify the number of "Total Nodes" displayed on the "SYSTEM DISPLAY" screen matches the number of primary interface modules installed in the CEC/IMC. The node or interface module count includes all active Controller Boards connected to the primary GSC bus including the MOM, active MIMs, CIMs, XLTRs, LRIMs, CTIMs, VMIMs, etc.. Controller Boards with an inactive or secondary status such as back-up MIM Controller Boards and the CCI Controller Board in the CIA rack do not add to the "Total Node" count.

7. The MOM symbol reference should be "O" in its FB (hex) reserved position on the "SYSTEM DISPLAY" screen.

   The MOM Controller Board and "end" Controller Board are referred to as "end nodes" since they are the far-most Controller Boards on the ends of the daisy-chained Backplanes. These two (2) Controller Boards have a special DIP switch setting to identify them as "end nodes". If **all** interface modules' symbol references are flashing, verify SW1 position 2 on the "end" Controller Board is set to the "1" or "OPEN" position.

NOTE

If the "end" Controller Board is removed, the Controller Board closest to it should be set as a temporary end node by setting SW1 position 2 to the "1" or "OPEN" position. When the normal end node is reinstalled, the temporary end node should be turned off by setting SW1 position 2 back to the "0" or "CLOSED" position. The Controller Board must be reset after each DIP switch change.

8. If an EDACS site uses a redundant MIM, reset the MIM Controller Board whose "SEC" or "2ND" LED is off (the active Controller Board) while simultaneously observing the MIM on the "SYSTEM DISPLAY" screen. This MIM should disappear and the back-up MIM should become active and appear in a different location on the "SYSTEM DISPLAY" screen.

   If this does not occur, temporarily remove the back-up Controller Board and then reinsert it. **If necessary, follow the Controller Board live insertion procedure presented in this manual.** Reset the back-up Controller Board and repeat the first part of this step.

   Repeat this step for all redundant MIMs.

9. If the CEC/IMC has only one Clock Board, check the panel-mounted toggle switches on the board and verify the **"A" clock is off and the "B" clock is on**.

   If the CEC/IMC has two or more Clock Boards, verify **all "A" clocks are off and only one "B" clock is on**.

NOTE

If the redundant clock feature can be used, it may be enabled at a later time in accordance with the instructions outlined in the "**SET-UP PROCEDURE**" section.

10 On each Audio Board, verify the "RUN" LED is flashing, the "RST" LED is off and all other LEDs are on and not flashing.

11. Now verify each Audio Board is active by viewing its status on the "HDLC STATISTICS", "CHANNEL B" screen at the CEC/IMC Manager. This screen can be accessed using the function keys and the structured window selection method from the "SYSTEM DISPLAY" screen or by using hot-key "H" from this same screen. Note that the cursor should be on (selecting) the desired interface module in the "SYSTEM DISPLAY" matrix before entering the "HDLC STATISTICS", "CHANNEL B" screen.

CONTROLLER BOARD LIVE INSERTION PROCEDURE

The following Controller Board live insertion procedure should be followed for all Controller Boards that do not have extended power pins on the 96-pin DIN connectors. These earlier Controller Boards include **all 19D903299P1 boards** and **19D903299P3 Rev. B and earlier boards**.

1. Place the Controller Board partially in the correct Card Cage slot. **DO NOT** allow the DIN connectors to make contact with the Backplane at this time.

2. Connect either end of Live Insertion Cable 19B802612P1 to the DB-9 connector located on the front panel of the Controller Board being inserted.

3. Connect the other end of the Live Insertion Cable to the DB-9 connector on any Controller Board

that is already "live". The "+5V" LED should light.

4. Slide the Controller Board being inserted into the Card Cage until its DIN connectors fully engaged into the Backplane DIN connectors.
5. Disconnect the Live Insertion Cable from both DB-9 connectors.
6. Reset the Controller Board by pressing the recessed reset button on the board's front panel.
7. Verify the Controller Board is operating by observing the LEDs on its front panel and observing the CEC/IMC Manager's "SYSTEM DISPLAY" screen. See LBI-38911 Chapter 3 (section 3.5.) for CEC/IMC Manager operating details.

It is recommended that this procedure should be used for **all** Controller Boards if the CEC/IMC has **any** of the earlier Controller Boards that lack the extended power pins. This will establish a insertion routine and will thus prevent accidental Controller Board damage.

SET-UP PROCEDURE

This section summarizes procedures that must be performed to set-up the CEC/IMC after the hardware installation is complete. Most of the set-up procedures are accomplished at the CEC/IMC Manager (MOM PC). See LBI-38911 for specific CEC/IMC Manager operating details.

There is also limited information in this section devoted to System Manager set-up procedures and recommendations. This information highlights specific System Manager unit, group and site database settings that influence wide area (multisite) communications. See LBI-38704 for detailed System Manger set-up and operating procedures.

IMPORTANT NOTE

All set-up procedures presented in this manual should be performed in the order presented.

Unless otherwise noted, all of the set-up procedures assume the following has already been accomplished:

- all local and remote audio and control data connections are in-place
- all DIP switch settings are set in accordance with the configuration print-out supplied with the equipment
- all CEC/IMC boards are installed in the proper slots as specified in the configuration print-out supplied with the equipment
- all equipment related to the CEC/IMC is powered-up and operating

STEP 1 - INITIAL CONFIGURATION

A. CEC/IMC Manager Users

Up to twelve (12) different users can access the CEC/IMC Manager (MOM PC) at different times. Each user is assigned an access level from 1 to 4. The access levels are "System Administrator" (level 1), "Console Administrator" (level 2), "General Maintenance" (level 3) and "User" (level 4). The System Administrator (level 1 access) has all CEC/IMC Manager privileges and a User (level 4 access) has minimum privileges. Password protection guarantees only valid users can access the CEC/IMC Manager.

NOTE

The default user name is "MOMUSER" and the default password is "GUEST".

Adding users should be the first step in the CEC/IMC Manager set-up process. If necessary, additional users can be added and/or existing users can be deleted at later times.

Select the "User Account Maintenance" from the CEC/IMC Manager's main menu and add all initial users. Assign each user an access level and a password. See LBI-38911 Chapter 3 (section 3.6.) for specific details.

B. MOM Parameters

Several MOM Controller Board parameters must be set-up from the CEC/IMC Manager (MOM PC) before any other CEC/IMC functions are configured. From the main menu, select "System Configuration" and then from the sub-menu select "MOM Configuration". Set/verify the following parameters from the "MOM CONFIGURATION" screen (see LBI-38911 section 3.2.1.):

Set Baud Rates

Set the MOM's baud rate to 9.6k or 19.2k baud, as required. A MOM Controller Board with version 3.0 (and later) software has "auto-baud" sensing; it does not require a DIP switch change when the baud rate is changed at the CEC/IMC Manager. The 19.2k baud setting should be used unless CEC/IMC-to-CEC/IMC Manager cable length is excessive or induced noise causes data errors. In addition,

the 9.6k baud setting may be required if the CEC/IMC Manager is remotely located and the full-duplex modem link does not support 19.2k baud.

Set the MOM's port for the System Manager to the required baud rate – either 9.6k or 19.2k baud. The System Manager's baud rate may also need to be changed to match this setting. The 19.2k baud setting should be used unless cable length limits the data rate.

Disable Data Logging

Disable data logging. Data logging of the GSC bus traffic may be enabled at a later time to allow tracing of calls and/or lost-call troubleshooting.

Enable/Disable Printer Status

If a printer is connected to the CEC/IMC Manager (MOM PC), enable printer status. Otherwise, disable the selection.

Disable Redundant Clocks

Disable redundant clocks. It may be possible to enable this option later as outlined in STEP 20. **Do not** skip to STEP 20 at this time.

NOTE

If two or more Clock Boards are installed, corresponding clocks ("A" and "A" for example) on different Clock Boards should **not** both be turned on via the toggle switches on the front panel of the Clock Boards. Only one clock "A" and one clock "B" should be turned on concurrently.

Disable Unit Logout Timers

Disable the multisite unit logout timers. This insures radio units will not be automatically logged off the wide area (multisite) network until these timers can be correctly set-up as described in STEP 17. **Do not** skip to STEP 17 at this time.

C. System Time And Date

Set the system time and date from the "SET SYSTEM TIME" and "SET SYSTEM DATE" screens as described in LBI-38911 Chapter 3 (section 3.2.2.) These screens are accessed by selecting "System Configuration" from the main menu and "Set System Time and Date" from the sub-menu. Verify the time is entered in a 24-hour format.

Set-up details for the WWVB Netclock option are included in STEP 18. **Do not** skip to STEP 18 at this time.

STEP 2 - SYSTEM MANAGER WIDE AREA CONFIGURATION

The CEC/IMC uses data from the System Manager's unit (individual) and group databases to control routing of all wide area (multisite) calls. These databases must be set-up correctly at the System Manager before the System Manager's data is transferred or "uploaded" to the CEC/IMC. This section highlights the System Manager database settings that will directly influence wide area operation and therefore must be set-up very carefully.

With the exception of the "valid site mask" field, all fields described are used by the CEC/IMC for wide area **and** console call routing. The valid site mask field is only used by the EDACS Site Controllers for unit/group validation.

See LBI-38704 for detailed System Manger set-up and operating procedures.

A. Group Call Parameters

Wide Area Enable/Disable

Each group that will operate as a wide area group must be enabled for wide area operation at the System Manager. If wide area operation for a group is disabled, a console can only call the group if the console's "default home site" matches the System Manager's "default home site". For additional information on CEC/IMC firmware V3.0 (and later), review the sub-section entitled "Default Home Site/Home Group" under the section "**CEC/IMC Firmware V3.0 (And Later)**" (STEP 2 C).

Each console's default home site is initially set at the CEC/IMC Manager (MOM PC). The default home site for a group is set to the default home site of the **last** unit record received with the group as the default home group. A C3 Maestro dispatcher can change a module's default home site; however, subsequent System Manager uploads will reset it.

Automatic Tracking Enable/Disable

When automatic tracking for a wide area group is enabled, the CEC/IMC will only route wide area group calls to radio systems that have at least one unit logged on to the group being called.

If automatic tracking is disabled, the CEC/IMC will only route wide area group calls to "forced sites". Forced sites are the radio systems that will always have the wide area group call routed to them.

Enable or disable automatic tracking on a per group basis as required.

Confirmed Call Enable/Disable

The confirmed call option ensures all EDACS radio systems being called have working channels available before the caller is given a channel access (talk permit) tone. When enabled, a wide area group call is queued until all applicable sites have assigned a working channel for the call. Note that even if this confirmed call group setting is enabled, a group call will not confirm on radio systems ("sites") that have confirmed call disabled via the CEC/IMC Manager. See STEP 5 D for information on confirmed call enable/disable on a per "site" basis.

Enable or disable each wide area group for confirmed call as required. Normally, confirmed call is disabled for CNI and SCAT radio systems.

Valid Site Mask Enable/Disable

Each wide area group must be assigned to one or more radio systems ("sites") using the valid site mask field. For each wide area group, enable the group for operation on the applicable radio system(s). A radio system will deny a group call request to it if the group is not a valid (enabled) group as defined in the valid site mask field.

Forced Site Mask Enable/Disable

The CEC/IMC will unconditionally route wide area group calls to radio systems that have been enabled in the forced site mask field. Enable or disable the forced site mask option on a per radio system basis as required.

B. Individual Call Parameters

Wide Area Enable/Disable

The caller **or** the callee **must** have wide area capability before the CEC/IMC will route a wide area individual call. Therefore, each unit that must have wide area individual call capability must be enabled for wide area operation at the System Manager.

If wide area operation for a unit is disabled, a console can only call the unit if the console's default home site for the unit matches the System Manager's default home site.

Automatic Tracking Enable/Disable

When automatic tracking for an individual unit is enabled, the CEC/IMC will only route wide area calls to the radio system that the unit is logged into. If a unit's automatic tracking is disabled, the CEC/IMC will only route wide area calls to the unit if the radio system ("site") is a "forced site". Enable or disable each unit for automatic tracking as required.

Confirmed Call Enable/Disable

If the confirmed call option for a particular unit is enabled, all individual calls made to and from the unit will be confirmed. When enabled, a call is queued until the called unit has been assigned a working channel. Note that even if this confirmed call unit setting is enabled, an individual call will not confirm on radio systems ("sites") that have confirmed call disabled via the CEC/IMC Manager. See STEP 5 D for information on confirmed call enable/disable on a per "site" basis.

Enable or disable each unit for confirmed call as required.

Valid Site Mask Enable/Disable

Each unit that has wide area capability must be assigned to two (2) or more radio systems ("sites") using the valid site mask field. Wide area calls can only be made if both the caller and the callee are valid (enabled) on the secondary (receiving) radio system. However, during failsoft periods, all units can make wide area calls.

For each unit, enable or disable each radio system ("site") as required.

Forced Site Mask Enable/Disable

The CEC/IMC will unconditionally route wide area individual calls to all radio systems ("sites") that have been enabled in the forced site mask field.

For each unit, enable or disable each radio system ("site") for forced site operation as required.

Home Site Assignment

Each unit must be assigned a home radio system ("site") at the System Manger. The CEC/IMC uses this home radio system as a default when initializing the tracking database. A System Manger upload will reset the CEC/IMC database, tracking the unit to its home site assignment.

Home Group Assignment

The CEC/IMC also tracks which group a unit is logged into. It uses this group as a default when resetting the tracking database. A System Manager unit database upload will reset the unit's current group to the home group assignment. At the System Manager, assign each unit a home group.

C. Additional Recommendations And Firmware Notes

Patching A Conventional Channel To A Group

When a conventional channel is patched to a trunked group, the following database items must be correctly set before the patch will function:

- The trunked group must be enabled for wide area operation.
- The trunked group must have automatic tracking enabled.
- The conventional channel must be defined as an individual unit and the LID number must match the conventional channel number assigned at the CEC/IMC Manager (MOM PC).

Verify MIM Site Assignment Number Matches Site Number

A MIM will issue a single warning if its site assignment number does match the site number reported from the Site Controller. Since the CEC/IMC uses the MIM site assignment number and not the site number reported from the Site Controller, differences will cause problems with the forced site mask function. For example, a unit is set valid on site "2" and forced to site "2", but the MIM is actually set for site "1", then the MIM will use site "1" and it may not set the forced site mask correctly.

Disable Patches/Simul-Selects Before Upload

A patch or simul-select uses a special group ID called a SAID. Tracking information for a SAID is built from the tracking information of the entities in the patch/simul-select upon activation. A System Manager full upload while the SAID is active will reset the tracking data for the SAID. To avoid problems, all SAIDs should be defined in the System Manager's database with wide area and automatic tracking enabled. In addition, each SAID should be valid on all sites. With these settings, a SAID may lose tracking information on an upload like a normal group, but communication will resume as units on the SAID are re-tracked.

CEC/IMC Firmware Prior To V.30

CEC/IMC firmware prior to V3.0 requires special attention to certain database parameters. The following text highlights the related issues. This firmware is located in the PROMs on the Controller Board.

Database Clears At Upload

In firmware releases prior to V3.0, the CEC/IMC completely clears its database at the start of a full System Manager database upload. The database is also cleared when the CEC/IMC Manager's copy of the database is uploaded. This is done to ensure any deleted entries will have a clear database entry after the upload.

During an upload, MIMs lose their wide area, forced and automatic tracking field settings until a new record for that entry is received. This may disrupt wide area communication during the upload.

Database Tracking Reset After Upload

After an upload with firmware releases prior to V3.0, the CEC/IMC resets its tracking data in accordance with the unit's default home site and default home group settings. If a unit was tracking to a different site before the upload, it will have to key or auto-login for a group or site change before the CEC/IMC will re-track the unit. This may also disrupt wide area communication after the full upload until the unit has re-established tracking.

If the default home site or home group is incorrectly set, problems may occur in CNI and paging radio systems after a full upload. Communication to CNI and/or paging units will be disrupted since the tracking data is lost. It is very important in this case to set the default home site/group for a device of this type to the actual MIM assignment number; otherwise, the CEC/IMC will not route wide area or console calls to CNI and/or paging systems since no units ever log on these radio systems.

Partial Upload (Failed Upload)

If the System Manager-to-CEC/IMC link fails during a full System Manager upload with firmware prior to V3.0, database entries for the records that were not received will be cleared. Consequently, wide area communications for the cleared units and/or groups will not be possible.

Before an upload is started, a back-up copy of the current database should be stored in a backup directory on the CEC/IMC Manager (MOM PC). Then, if the System Manager link fails the database can be copied back to the CEC/IMC Manager's main directory (C:\MOMPC) and a full unit/group upload from the CEC/IMC Manager will restore operation. Backup the database as follows:

1. If necessary, exit the CEC/IMC Manager (MOM PC) program.
2. Create a backup sub-directory (C:\MOMPC\BACKUP for example) to store the current (existing) database files in.
3. From the DOS prompt in the MOMPC directory, copy the UNIT_REC.DAT and GRP_REC.DAT files to the backup directory so they cannot be modified by the upload routine.
4. Re-enter the CEC/IMC Manager program.

CEC/IMC Firmware V3.0 (And Later)

CEC/IMC firmware V3.0 (and later) virtually eliminates the database clearing, tracking reset and partial upload issues in the prior firmware versions as previously described. This firmware is located in the PROMs on the Controller Board.

Defaults To Wide Area And Automatic Tracking

With firmware V3.0 (and later), wide area communication can proceed after the Controller Board's NOVRAM is cleared. Unit and group records default to wide area enabled and automatic tracking enabled when the NOVRAM is cleared. Therefore, a System Manager unit/group upload is not required before the unit and group entities can proceed with wide area communication.

Database Does Not Clear At Upload

Firmware V3.0 (and later) does not clear the database at the start of a full System Manager upload. This allows wide area communication to continue during a full upload. At the completion of the upload, any record that did not receive a new data is deleted. This ensures deleted System Manager records will be cleared in the CEC/IMC database, as before the upload occurred.

Saves Current Tracking Data

Firmware V3.0 (and later) saves the current tracking information during a full upload. This prevents an upload from interrupting wide area communications to a unit/group until that unit/group keys or logs in.

Default Home Site/Home Group

Since firmware V3.0 (and later) does not reset the tracking data on a unit/group upload, the default home site and home group fields are basically not used. In addition, the console call processing function does not use the default home site. A console call will be routed to a site whenever the CEC/IMC has a unit tracked or forced to that site. This is true for wide area and non-wide area entities. The default home site is not required to reach a non-wide area entity from a console.

CNI/Paging Radio Systems

Since the CEC/IMC with firmware V3.0 (and later) no longer logs a unit to its default home site/home group after a System Manager unit/group upload, any unit or group ID that will always be located on a particular site (such as a CNI assigned group ID) should be forced to that site. This is especially important for CNI or paging systems where radios only monitor the channel and typically do not key on the channel. If a radio does not key, it will not be logged into the CEC/IMC.

STEP 3 - SYSTEM MANAGER UPLOAD

After all System Manager related data is entered the database should be transferred to the CEC/IMC by selecting "System Manager Data" from the CEC/IMC Manager's main menu and then "Request From System Manager" from the sub-menu. Upload unit, group and site data from the System Manager to the CEC/IMC Manager using the "Unit Upload", "Group Upload" and "Site Upload" functions. Upload all data using the "Full Upload" option. See LBI-38911 Chapter 3 (section 3.4.) for specific operating details.

NOTE

Review all information in STEP 2 **before** uploading.

After completing the uploads, the data will be distributed to all Controller Boards in the CEC/IMC and it will also be stored in the CEC/IMC Manager's hard disk. Distribution of the data to all Controller Boards prevents CEC/IMC failures in the event of a MOM or CEC/IMC Manager failure.

STEP 4 - TDM BUS AND TIME SLOT CONFIGURATION

A. TDM Bus Configuration

The MOM must now be told if the CEC/IMC has the older 4-bus or the newer 8-bus TDM Audio Boards. Since the 4-bus Audio Board is an older design, most CECs/IMCs will use (and will be configured for) 8-bus Audio Boards.

NOTES

Since the default number of TDM audio busses is eight (8), this section can normally be bypassed during set-up of an 8-bus CEC/IMC.

Note that 8-bus Audio Boards will operate correctly in a CEC/IMC configured for 4 buses; however, approximately one-half of audio slots cannot be used.

The 4-bus Audio Boards will not route audio/modem signals correctly if they are installed in a CEC/IMC configured for 8-buses.

The 8-bus Audio Boards can be identified by Audio Board 19D903302P1 Rev. F (and later) with 344A3561G3 (and later) firmware.

Set the number of TDM audio buses to four (4) or eight (8) by selecting "System Audio Configuration" from the main menu, "TDM Bus and Slot Configuration" from the first sub-menu and "System Bus Configuration" from the second sub-menu. See LBI-38911 Chapter 3 (section 3.1.1.2.) for specific operating details. Again, most CECs/IMCs will be set for the 8-bus system.

Send the selected configuration to the MOM by selecting the "Send Bus Configuration" function. Note that this process must be repeated in a 4-bus CEC/IMC if the MOM Controller Board's non-volatile RAM (NOVRAM) is cleared.

B. Time Slot Configuration

TDM bus time slots must be allocated to all interface modules that input audio/modem signals into the CEC/IMC. Consoles, radio systems ("sites") and digital voice interface modules must each be allocated one or more slots. Radio system allocations include all "site"-type interface modules (MIM, NIM, VMIM, CTIM, etc.). Digital voice allocations are specifically for DVIM channels connected to the DVIU equipment. The following time slot allocations are recommended:

- Consoles should normally be allocated a single slot since they usually have only one microphone that can apply audio to the TDM bus via a CIM.
- Radio systems should be allocated a slot per channel. For example, a 20-channel EDACS site should be allocated 20 slots.
- One digital voice slot must be allocated for each DVIM-DVIU channel.
- EDG interface modules require one time slot for each EDG transmit data channel needed.
- Since LRIMs do not apply audio to the TDM bus, no LRIM time slot allocations are required.

Configure all time slot allocations by selecting "System Audio Configuration" from the main menu, "TDM Bus and Slot Configuration" from the first sub-menu and then "System Slot Configuration" from the second sub-menu. Configure console slots, radio system slots and digital voice slots using the "Configure Slots" function. Send the slot data to the MOM using the "Send Slots" function. See LBI-38911 Chapter 3 (section 3.1.1.1.) for details.

C. Reset The CEC/IMC

No interface modules will receive the new bus and slot settings stored in the MOM until each one is reset. This can be done by cycling power or by individually resetting each interface module's Controller Board. This should be done **after both the bus and slot** configurations have been sent to the MOM.

If the CEC/IMC is equipped with firmware V3.0, this can be done automatically from the CEC/IMC Manager by selecting the "Activate TDM Bus Slots" function from the "TDM Bus and Slot Configuration" sub-menu. Selecting this function will command the MOM to automatically reset all other Controller Boards in the CEC/IMC.

LINE LEVEL ADJUSTMENT OVERVIEW

All CEC/IMC line level adjustments are made from the CEC/IMC Manager (MOM PC). These adjustments include input and output level adjustments for the radio systems and input (CIM input) level adjustments for the consoles.

Line Level Input Adjustments

An audio/modem signal applied to an Audio Board's channel must be amplified or attenuated to standard reference level before the board digitizes and applies it to the TDM network. An amplifier and an EEPOT circuit built into each channel is used to accomplish this level adjustment process. Line level input values must be carefully set (entered) for all active channels; the entered value for a particular channel must match the voice peak (test tone) signal level that is applied to the channel's input line. This process sets the EEPOT's attenuation level and thus prevents the digitization circuitry from being over or under driven. Each input level is entered as a dBm level at the CEC/IMC Manager.

For example, if the voice peak input signal level to a channel is -15 dBm the channel's input level should be set to -15 dBm at the CEC/IMC Manager. The Audio Board will then amplify a signal applied to this channel by 15 dB so it can be digitized and applied to the TDM bus as a 0 dBm reference signal. If a -5 dBm signal was applied to this channel, the 0 dBm referenced TDM bus would be overdriven by 10 dBm. Overdriving an input will result in clipped (distorted) audio which may lead to dropping of the channel at the radio systems.

Input signal levels should be set to the actual measured voice peak (test tone) levels. These settings should **not** be adjusted to set transmitter deviation. If each input signal level is carefully measured and set all audio/modem signal levels on the TDM bus will be relatively equal. This will result in equal output signals from the CEC/IMC regardless of the origination point. Note that non-wide area radio-to-radio calls are not routed through the CEC/IMC and they are therefore not influenced by input level settings.

An EDACS MASTR II/IIe/III station is normally factory adjusted for a line output of 0 dBm when the station is receiving an RF signal deviating ±3.0 kHz. The output

line level and the line loss between the station and the CEC/IMC will determine the input level setting for the respective channel.

Line Level Output Adjustments

Each Audio Board channel output line level to a radio system ("site") must be set to achieve the desired signal level at the radio system. Factors that must be considered include the maximum allowable signal level that can be applied to the line (or MUX), line loss and the signal level required at the radio system. Each channel's output signal level is adjustable from -25 to +10 dBm at the CEC/IMC Manager. Improper output level adjustment may cause a radio system ("site") to drop the RF channel. Normally, the output line level signal should not exceed 0 dBm since this is the maximum allowable signal level for most telephone circuits.

An EDACS MASTR II/IIe/III station is generally factory adjusted to provide ±3.0 kHz transmit deviation with a -10 dBm line input level. This ±3.0 kHz deviation setting can be changed at the station's control shelf and it may be necessary to do this if, for example, excessive line loss prevents the audio from arriving at the station at -10 dBm. Consult the station's control shelf maintenance manual for station deviation adjustment details.

Since consoles are equipped with volume controls and they are usually co-located, no output signal level adjustment is provided for consoles. Volume level at a particular console's speaker is set by volume adjustment at the respective module.

STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION

Channel parameters for all "site"-type interface modules must now be configured at the CEC/IMC Manager. "Site"-type interface modules include MIMs, NIMs, VMIMs and CTIMs. Parameters include input and output signal levels, channel signalling (tone, dc, E & M, none) and ALC enable/disable. A NIM interface module does not require a channel signalling type setting but it does require individual enabling of the installed channels.

These parameters are set-up by selecting "System Audio Configuration from the main menu, "Trunked Channel Configuration" from the from the first sub-menu and "Site Channel" from the second sub-menu. This action will display the "SITE CHANNEL CONFIGURATION" screen. See LBI-38911 Chapter 3 (section 3.1.2.) for specific operating details.

This section also includes details on confirm call enable/disable on a per radio system ("site") basis. Disabling a radio system's confirmed call option will disable confirmation of all calls (individual and group) to it.

NOTE

Many "site"-type interface modules do not actually interface with EDACS sites; however, they are assigned "site" numbers based on the Controller Board's site assignment number DIP switch settings and the System Manager's database site assignment number. The site assignment number for each interface module can easily be obtained from the CEC/IMC Manager's "SYSTEM DISPLAY" screen. Alternately, the site assignment number can be obtained by reading the 5-bit binary equivalent DIP switch setting of SW2 on the interface module's Controller Board. SW2 position 4 is the most significant bit and SW2 position 8 is the least significant bit.

A. Input And Output Line Levels

Input Level And ALC Enable/Disable

From the "SITE CHANNEL CONFIGURATION" screen, set every active channel's input signal level to the required value. This must be done on a per-channel basis for each "site" in the CEC/IMC. For example, a 20-channel MIM assigned site number 1 must have all twenty (20) channels set **and** a 10-channel MIM assigned site number 2 must have all ten (10) channels set **and** an 8-channel VMIM assigned "site" number 3 must have all eight (8) channels set. The valid input signal level range is -25 to +12 dBm. Review the previous section entitled "**LINE LEVEL ADJUSTMENT OVERVIEW**" if necessary.

Enable or disable ALC for each channel as required. If ALC for the channel is disabled, change the input signal level so it is 1.5 dBm less than the actual input signal value. For example, if -10 dBm is actually applied to the channel, enter -11.5 dBm.

NOTE

DO NOT enable the ALC circuit if Audio Board 19D903302P1 controls the channel.

Output Level

Output signal levels are also set from the "SITE CHANNEL CONFIGURATION" screen. Set the required output signal levels for all active channels. As with the input signal levels, this must be done for each "site" in the

CEC/IMC. Output signal range is -25 to +10 dBm. Review the previous section entitled "**LINE LEVEL ADJUSTMENT OVERVIEW**" if necessary.

NOTE

Since the CI Boards used in the CIA racks have unity gain channels, all VMIM **input and output** levels should be set in accordance with the line level requirements at the respective CI Board.

B. Channel Control Signalling

Channel control signalling type is also set from the "SITE CHANNEL CONFIGURATION" screen. On a per channel basis, set the required control signalling type needed. Selections are "M" for E & M-lead signalling, "Tone" for tone control signalling, "Both" for tone and E & M lead signalling, and "Off" if no signalling is needed.

NOTE

VMIM audio channels should have "Channel Signalling" set to "Off". Signalling levels for the conventional channels are set in STEP 8. **Do not** skip to STEP 8 at this time.

If "Tone", "M" or "Both" is selected, a small window will appear allowing enabling/disabling of the channel's 2175 Hz notch filter.

NOTE

DO NOT enable the channel's 2175 Hz notch filter circuit if Audio Board 19D903302P1 controls the channel.

This small window also allows setting of the Secur-It™ /function/hold tone levels on a per Audio Board basis. These tone control sequences, together with the uplink, are used to control the base station. The Secur-It tone level is always +10 dBm above the function tone and +30 dB above the hold tone. Only the Secur-It tone level must be adjusted. Set the Secur-It tone level based on the level required at the base station and line loss between the CEC/IMC and the conventional base station. The Secur-It tone range is -10 dBm to +11 dBm.

C. NIM "Sites"

If NIM "site" channels are displayed on the "SITE CHANNEL CONFIGURATION" screen, the "Channel Signalling" column is replaced with a "Channel Equipped" column. This allows NIM channels to be enabled or disabled, on a per-channel basis, for distributed multisite operation. All NIM "site" channels must be enabled using the "Channel Equipped" screen. See LBI-38911 Chapter 3 (section 3.1.2.1.1.) for specific details.

D. Confirmed Call

If confirmed call is enabled for the group/unit at the System Manager, a unit initiating a wide area (multisite) call cannot transmit until all calling units have been assigned working channels **or** until a timeout period expires. A particular radio system ("site") can be disabled from the call confirmation process by disabling its confirmed call option. Disabling confirmed call for a particular radio system can prevent delays in the call process. For example, it may be desirable to disable confirmed call for a SCAT radio system since its single channel could cause unacceptable delays in confirmed wide area (multisite) group calls. Note that if this confirmed call "site" setting is disabled, unit and group calls to the "site" will not be confirmed even if the confirmed call unit/group setting is enabled at the System Manager; the "site" confirmed call setting has priority over the unit and group settings.

Set the confirmed call parameters by selecting "System Configuration from the main menu and then "Confirmed Call Parameters" from the sub-menu. From the "Confirmed Call Parameters" screen, disable "sites" that should not participate in the call confirmation process. Also, enable/disable the "Auto Confirmed Call Database Fix" as desired. See LBI-38911 Chapter 3 (section 3.2.9.) for specific details.

NOTE

At this point in the set-up process, basic wide area (multisite) calls between EDACS sites can be placed. This assumes the applicable EDACS sites are operating, configured, and linked to the CEC/IMC via the MIMs.

STEP 6 - CONSOLE CONFIGURATION

A. CIM Channels

Input Level And ALC Enable/Disable

Since each console normally has a single mic (transmit) line to its respective CIM, usually only a single input channel must be set-up for each console. Each active channel must have its CIM input signal level set and the ALC circuit enabled or disabled. Both parameters set-up

the CIM mic audio channel for the respective console. The valid range for the input signal is -25 to +12 dBm.

Set-up these console channel parameters by selecting "System Audio Configuration" from the main menu, "Trunked Channel Configuration" from the first sub-menu and "Console Channel" from the second sub-menu. This action will display the "CONSOLE CHANNEL CONFIGURATION" screen. See LBI-38911 Chapter 3 (section 3.1.2.2.) for specific operating details.

NOTE

DO NOT enable the channel's ALC circuit if Audio Board 19D903302P1 controls the channel.

NOTE

If ALC for the channel is disabled, change the input signal level so it is 1.5 dBm less than the actual input signal value. For example, if -10 dBm is actually applied to the channel, enter -11.5 dBm.

B. Console User Profiles

Configure User Profiles

User profiles for each console should now be configured. These profiles include various options such as shift supervisor selection (yes/no), default volume settings for various modes, unselect speaker audio channel, minimum alarm levels, and caller label vs. LID display. Up to ten (10) user profile shifts can be entered per console.

Careful attention should be given to the settings that affect the speaker, volume and tone settings. These settings include:

- **Default Unselect Volume** – This field sets the default volume of the unselect module/speaker. Unprogrammed individual calls to the console will also use this setting.
- **Default Speaker** – This field sets the default speaker that unprogrammed individual calls to the console will be heard on. Normally, this will be set to "2" so the unprogrammed individual calls will be heard on the unselect speaker. However, consoles that are equipped with three (3) or more speakers may use speakers "3" or "4". The unprogrammed individual call can also be routed to the select speaker by entering a "1" in this field.
- **Minimum Alarm Level** – This sets the minimum emergency alarm tone volume level. Emergency tone volume will be the maximum of the module volume, mute volume or this setting (whichever is greater).
- **Force Tones to Select Speaker** – Enabling this option ("Y" in field) will force the confirmation tones (queued, grant, busy, denied) to the select speaker. Disabling ("N") it will route the confirmation tones to the speaker associated with the console module. Dispatchers that wear headsets usually prefer the "Y" setting.
- **Beep On Error** – Error tones are sounded at the console if this field is enabled ("Y"). Error tones notify the dispatcher that an invalid keystroke has been made.
- **Display Failsoft Indicator** (Firmware V3.0 and later only) – Enabling ("Y") this option will cause the failsoft tones to be sounded at the console. If it is disabled ("N"), no failsoft tones will sound and no failsoft indicators will be displayed.
- **Tone Volume Offset** (Firmware V3.0 and later only) – Console tone volume levels are determined by subtracting this setting (dBm) from the volume of the current console module associated with the tone. For example, if the field is set to 5 dBm, the tones will be 5 dBm less than the voice audio at the current module. Headsets equipped with AGC circuits may defeat this feature.

Configure the console user profiles by selecting "Console Configuration" from the main menu and "Console User Profile" from the sub-menu. This action will display the "CONSOLE USER PROFILE CONFIGURATION" screen. See LBI-38911 Chapter 3 (section 3.3.1.) for specific details.

Save User Profiles

Each user profile configuration should be saved on the CEC/IMC Manager's hard disk using the "Save" option. This option will be automatically activated if an attempt is made to exit a specific user profile that has not been saved.

Send User Profiles

Each console user profile configuration must now be sent to its respective console using the "Send" option. From the "CONSOLE USER PROFILE CONFIGURATION" screen, send each user profile to its console as it is created.

C. C3 Modular/Desktop Console

Configure Console Modules

A special configuration procedure should now be performed at this point to set-up each C3 Modular/Desktop console's Translator. This procedure configures the console's module database stored in the Translator Controller Board. Configurable parameters for each module include module type (trunked or conventional), display type (alphanumeric or fixed) and module present (yes or no). Each C3 Modular/Desktop console can be equipped with up to sixty-four (64) total modules.

Configure each C3 Modular/Desktop console module at the CEC/IMC Manager by selecting "Console Configuration" from the main menu and "C3 Modular/Desktop Configuration" from the sub-menu. This action will display the "C3 CONSOLE CONFIGURATION" screen. See LBI-38911 Chapter 3 (section 3.3.3.) for specific details.

Save Console Configuration

After all necessary parameters are configured for a particular C3 module, save the console configuration to the CEC/IMC Manager's (MOM PC's) hard disk using the "Save" option.

Send Console Configuration

The new configuration for each C3 Modular/Desktop console must be sent to the respective Translator Controller Board before it will become active. Use the "Send" option to transfer the new data from the CEC/IMC Manager (MOM PC) to the Translator.

D. Console Privilege Lists

Configure Privilege Lists

Each console has a privilege list that defines its specific privileges. From this list, a CEC/IMC Manager (MOM PC) user can grant or deny a console access to specific units, groups, conventional channels and/or phone lines. For example, a non-supervisory C3 Maestro console which is denied access to a group will not be able to add the group to a module.

It should be noted that at this point in the set-up process, conventional channels cannot be added to the privilege list for a console; they are not yet defined/programmed. Conventional channels are programmed in STEP 8. They can only be added to the privilege lists and consoles' modules after they are programmed.

Configure each console's privilege list by selecting "Console Configuration" from the main menu and "Console Privilege List" from the sub-menu. This action will display the "CONSOLE PRIVILEGE LIST UPLOAD" screen. See LBI-38911 Chapter 3 (section 3.3.2.) for specific details.

Save Privilege List

Each privilege list should be saved on the CEC/IMC Manager's hard disk using the "Save List" option. This option will be automatically activated if an attempt is made to exit a specific console privilege list that has not been saved.

Send Privilege List

Send each privilege list to its console as it is created using the "Send List" option. This option will transfer the new privilege list from the CEC/IMC Manager to the respective console.

E. Set-Up At The Consoles

C3 Maestro Consoles

C3 Maestro consoles should now be set-up. Build modules by adding a unit, group or a phone line to each module as required. See the C3 Maestro Operator's Manual, LBI-38660, (section ECR-4489) for specific details.

C3 Modular/Desktop Consoles

C3 Modular/Desktop modules must also be built. See C3 Modular/Desktop Operator's Manual LBI-38802 for specific details.

NOTE

At this point in the set-up process, basic console-to-EDACS site communication is possible. This assumes the applicable consoles are operating and linked to the CEC/IMC via the CIMs.

STEP 7 - DISTRIBUTED MULTISITE / STARGATE CONFIGURATION

A. NIM Channel Configuration

Verify all NIM channels are correctly configured as outlined in "**STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION**".

B. NIM Control Link Baud Rate

Set the control link baud rate for each NIM in the IMC by selecting "System Configuration" from the CEC/IMC Manager's main menu and then "NIM Configuration" from the sub-menu. See LBI-38911 Chapter 3 (section 3.2.3.) for specific operating details. NIM baud rates at all respective IMC locations must match before distributed multisite communication can occur.

C. NIM Link-Up

The NIM control links between IMCs can now be verified. Monitor the control link state by viewing the "NIM STATISTICS" screen and observing that the "Link State" is "UP".

Access the "NIM STATISTICS" screen as follows: Select "View System/Diagnostics" from the main menu and then highlight the appropriate NIM. Now select the "Diagnostics" option and then select "Statistics" from the "DIAGNOSTICS OPTIONS" window. At this point, select "NIM" from the "STATISTICS DISPLAY OPTIONS" window. See LBI-38911 Chapter 3 (section 3.5.4.2.3.) for additional details.

NOTE

At this point in the set-up process, distributed multisite/StarGate communication is possible. This assumes the IMCs are operating and all the applicable NIMs are set-up.

STEP 8 - CONVENTIONAL CHANNEL CONFIGURATION

The CEC/IMC can support up to sixty-four (64) conventional channels using two (2) VMIMs and two CIA racks. Conventional channel configuration is as follows:

A. VMIM Channel Configuration

Verify all channels for each VMIM have been configured as outlined in "**STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION**". Configurable parameters include input and output signal levels, channel signalling type and ALC enable/disable. All VMIM audio channels should have "Channel Signalling" set to "Off".

B. Conventional Channel Programming

CI Board channels used in the CEC/IMC should now be programmed. This procedure sends programming information to the CCI Controller Board in the CIA rack. The CCI programs each CI Board channel accordingly.

Each channel must have its "high-level" and "low-level" characteristics programmed. High-level characteristics include entry of an 8-character alphanumeric channel alias, the VMIM assignment number, control signal configuration, and 2 or 4-wire selection. Low-level characteristics for each channel include specific tone control frequency or dc control current offset values. These offset values program the state tables stored in the CI Boards.

NOTE

It is recommended that the conventional channel help screens and the applicable CEC/IMC Manager's programming manual section be carefully reviewed before any conventional channels are programmed.

To set the high and low-level characteristics for each channel, select "System Configuration" from the main menu and then select "Program Conventional" from the sub-menu. Set the characteristics for all active channels as required. See LBI-38911 Chapter 3 (section 3.2.6.) for details.

C. VOX Threshold And Secur-It™/ Function/2175 Hz Hold Tone Levels

The VOX threshold level and the Secur-It™, function and hold tone levels for each conventional channel must now be set. This action also sends programming information to the CCI Controller Board in the CIA rack, thus programming each CI Board's channel accordingly.

The VOX threshold level adjustment sets the VOX turn-on or trip point. The turn-off point is approximately 4 dBm less than the turn-on point. Normally, a channel's VOX threshold level should be set just above (approximately 3 dBm) the noise floor of the respective line so the VOX circuit will not trip when the station is squelched. With this setting, the VOX circuit will immediately trip from the increase in line noise when the station unsquelches.

Alternately, the VOX threshold may be set much higher than the noise floor (10 dBm or more) so it will only trip on voice signals. The VOX circuits have fast attack times and a long decay time which prevent turn-off between spoken words.

NOTE

It is not possible to set a channel's VOX threshold level if it has been programmed for COR operation.

The Secur-It™, function and 2175 Hz hold tones are used for conventional base station remote control. These tone control sequences are generated by the CI Boards installed in the CIA rack(s). The Secur-It tone level is always +30 dBabove the hold tone and the function tone is always +20 dB above the hold tone. The 2175 Hz hold tone level is the only required setting and it should be set in accordance with the level required at the conventional base station and line loss between the CEC/IMC and the base station. Each conventional channel can be individually set to the required level. If necessary, see the applicable tone control shelf maintenance manual for additional details on tone remote controlled base stations.

To set the VOX threshold and the 2175 Hz hold tone levels at the CEC/IMC Manager, select "System Audio Configuration" from the main menu and then select "Conventional Level Adjustment" ("Conv EE POT control" in earlier software) from the sub-menu. Set each channel's VOX threshold level and 2175 Hz hold tone level as required. See LBI-38911 Chapter 3 (section 3.1.3.) for details.

D. System Manager Database Upload And Console Updating

After all conventional channels have been programmed, perform a System Manager database upload of the conventional channel information. The upload should be performed at the CEC/IMC Manager (MOM PC).

The privilege lists for all consoles that may require access to conventional channels should now be updated by adding the necessary conventional channels to the lists. See LBI-38911 Chapter 3 (section 3.3.2) for specific details.

Each console module can now be "built" or "modified" as required by adding a conventional channel. See the applicable console operator's manual for details on building a module for conventional operation.

NOTES

At this point in the set-up process, basic conventional channel wide area communication is possible via the VMIM(s) and CIA rack(s). This assumes the applicable conventional base station(s) are operating, configured, and linked to the CEC/IMC.

STEP 9 - CTIS/CTIM CHANNEL VERIFICATION

The CEC/IMC can provide up to twenty (20) channels for CTIS equipment. Verify all active CTIM channels have been configured as outlined in "**STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION**". Configurable parameters include input and output signal levels, channel signalling type and ALC enable/disable. All CTIM channels should have ALC disabled and "Channel Signalling" set to "Off".

NOTE

At this point in the set-up process, CTIS calls can be made via the CTIM. This assumes the CTIS equipment is operating, configured, and linked to the CEC/IMC.

STEP 10 - DIGITAL VOICE CHANNEL CONFIGURATION

The CEC/IMC supports up to four (4) DVIMs with a maximum of thirty-two (32) channels on each. DVIM channels are either pooled (dynamically assigned) or dedicated to a particular group. Each DVIM channel should be programmed for either pooled or dedicated operation by selecting "System Configuration" from the main menu and "Program Digital Voice Interface" from the sub-menu. Transfer the data to the DVIM(s) using the "UPLOAD Database" option. See LBI-38911 Chapter 3 (section 3.2.7.) for details.

The fundamental DVIM channel characteristics are permanently set and cannot be changed at the CEC/IMC Manager. Input and output signals levels are set to 0 dBm, ALC is always disabled, and channel signalling is always off.

NOTE

DVIM channels require Audio Board 19D903302P3.

The DVIU equipment should now be programmed and configured in accordance with the DVIU maintenance manual. Encrypt/Decrypt (E/D) DVIUs should also have a valid cryptographic key loaded into the E/D module.

NOTE

At this point in the set-up process, digital voice calls can be made via the DVIM. This assumes the DVIU equipment is operating, configured, and linked to the CEC/IMC.

STEP 11 - EDACS DATA GATEWAY INTERFACE VERIFICATIONS

Each EDG channel should be allocated a TDM time slot as outlined in STEP 5. In addition, EDG channel related configurations should be set-up in accordance with the procedures outlined for C3 Maestro consoles in STEP 6.

STEP 12 - REQUEST STATUS MONITOR VERIFICATION

No special CEC/IMC configurations are required for the RSM equipment. Simply verify the RIM Controller Board DIP switch settings are correctly set and connect the RSM-to-RIM cable as specified in the RSM equipment manual.

STEP 13 - CENTRALIZED ACTIVITY LOGGER CONFIGURATION

CAL configuration includes setting/verifying the proper DIP switch settings on the CAM Controller Board and interconnecting the CAM to the CAL computer.

A. DIP Switch Settings

The default or "normal" CAM DIP switch settings are shown in the diagrams near the end of this manual. CAM Controller Boards are shipped from the factory with these default settings and they usually do not require any changes with standard CAL/BCU installations. The following text describes the optional settings:

SW2 position 8 is normally set to "1" or "OPEN" to enable HDLC channel A. If channel A should be disabled, set this switch to "0" or "CLOSED".

SW2 position 7 is normally set to "0" or "CLOSED" to disable HDLC channel B. If channel HDLC B should be enabled, set this switch to "1" or "OPEN". Using channel B will require rewiring of the standard CAM-to-CAL interconnect cable.

SW2 position 5 is normally shipped so the Controller Board is set as a DTE device. Change this switch to "1" or "OPEN" if a DCE device setting is required.

The CAM-to-CAL HDLC serial link can be set to operate at 60k or 360k baud. The CAM supplies a clock signal to the CAL computer so the CAL's synchronous serial port can communicate with the CAM. When SW1 position 5 is in the "1" or "OPEN" position the HDLC serial port operates in the low-speed mode (60k baud). This setting must be used if excessive CAM-to-CAL cable length limits the transmission rate. Otherwise, use the high-speed mode (360k baud) by setting SW1 position 5 to the "0" or "CLOSED" position.

The 60k baud rate may not transfer the CAM/CAL data fast enough during busy periods. This will result in data loss between the CAM and CAL; I-frame errors will be recorded at the CEC/IMC Manager.

B. Interconnect Cable

The CAM-to-CAL interconnect cable is normally supplied with the CAL equipment. At the CEC/IMC, this cable does not connect to a Concentrator Card but instead it connects directly to the lower connector (24-pin) on the rear of the Backplane that corresponds to the CAM slot.

STEP 14 - LOGGING RECORDER CONFIGURATION

Up to four (4) LRIMs can be installed in a CEC/IMC for logging recorder interfacing. Each LRIM can supply thirty-two (32) output channels to logging recorders. A maximum of sixty-four (64) "modules" can be defined per LRIM. Each module assigns a unit, group, or conventional channel to a specific LRIM channel. Volume levels are set on a per module basis. Table 2 lists the volume level output settings.

The following items should be noted:

- Wide area and non-wide area calls are recorded.
- With respect to modules programmed with an individual unit or a conventional channel, both the transmit and receive audio is applied to the logging recorder channel, not just the transmit audio.
- If two (2) or more modules are assigned to a single channel, audio summation will occur. Normally, this is not a desirable configuration unless logging recorder channels are limited. Up to eight (8) modules can be assigned to a single channel.
- Digital voice (Aegis) calls are decoded/decrypted by the DVIU before the LRIM pulls the audio from the TDM bus.

To define the required modules for each LRIM, select "System Configuration" from the main menu and then select "Program Logging Recorder" from the sub-menu. Define the alias(source) for each module as a unit, group, or conventional channel and set the LRIM channel and the volume level as required. See LBI-38911 Chapter 3 (section 3.2.5.) for details

After completing each LRIM's module definitions, send the configuration to the LRIM using the

"REPROGRAM LRIM" option ("PROGRAM ALL" in earlier software").

TABLE 2 - LRIM MODULE VOLUME LEVELS

VOLUME SETTING	OUTPUT LEVEL (dBm)	VOLUME SETTING	OUTPUT LEVEL (dBm)
0	-25.0	17	-0.5
1	-14.0	18	0
2	-12.0	19	0.5
3	-10.0	20	1.0
4	-8.0	21	1.5
5	-7.0	22	2.0
6	-6.0	23	2.5
7	-5.5	24	3.0
8	-5.0	25	3.5
9	-4.5	26	4.0
10	-4.0	27	5.0
11	-3.5	28	6.0
12	-3.0	29	7.0
13	-2.5	30	8.0
14	-2.0	31	9.0
15	-1.5	32	10.0
16	-1.0		

NOTE

At this point in the set-up process, logging recorder audio is available at the LRIM channels.

STEP 15 - AUXILIARY I/O CONFIGURATION

Every Controller Board has eight (8) input lines and eight (8) output lines that can be used for auxiliary I/O interfacing to two-state external devices. Controller Board 19D903299P1 has eight optocoupler inputs (LED with limiting resistor) and eight optocoupler outputs (NPN open-collector). Controller Board 19D903299P3 has eight optocoupler inputs (LED with limiting resistor), four optocoupler outputs (NPN open-collector), and four relay outputs (Form-A / SPST normally-open contacts). Auxiliary I/O external connections are made at Auxiliary I/O Concentrator Card 19C852221P1 which is included with option MSDE3U.

Each I/O line can be individually defined at the CEC/IMC Manager (MOM PC) for console I/O use. For example, an output can be used to turn a siren on when a console operator presses a key and an input could be used for alarm monitoring. Up to thirty (30) different I/O "events" can be defined at the CEC/IMC Manager.

Basically, an output event sets a specific output bit to respond to a console trigger such as a certain button/key activation and input events cause a specific message to be displayed at the console when the respective input bit transitions to its active state. Each event is assigned to a specific interface module (MIM, CIM, LRIM, etc.) within the CEC/IMC and to a specific auxiliary input or output line on the interface module's Controller Board. All Controller Boards support auxiliary I/O except XLTR Controller Boards.

Auxiliary I/O Concentrator Card 19C852221P1 interconnects the auxiliary I/O lines to the external devices. Table 3 lists the I/O bit-to-I/O pin mapping for the Concentrator Card and the Backplane. Also see the tables in Concentrator Card maintenance manual LBI-38872.

A. Aux. Input Connections

All eight (8) auxiliary inputs on a Controller Board use optocouplers to connect the input line to the microprocessor. As shown in Figure 11, the external side of each input circuit consists of a 1.2KΩ resistor in series with the optocoupler's LED.

Every two (2) inputs share a common line that is connected to the anode side of both optocoupler LEDs. The common connections are listed in Table 3. Normally, these common lines should be connected to an external power source so 5 - 10 milliamps of dc current will flow through the input when the external switch/open-collector output/etc. pulls the input line to ground. Depending upon CEC/IMC input event programming, this may or may not be the active state.

Most external devices will supply a ground potential via a switch, relay or open-collector output to the input line when activated. For example, a normally-open SPST switch can be wired to ground an input line when activated. When current flows through the input (logic 0 applied) the input event is low. In this example, the corresponding input event for this line is programmed at the CEC/IMC Manager for a active low state.

The CEC/IMC Manager allows input events to be programmed active high **or** active low. No external logic inversion circuitry is required.

Wire the optocoupler auxiliary input connections as required. See Table 3 for specific Auxiliary I/O Concentrator Card connections.

B. Optocoupler Aux. Output Connections

The NPN open-collector auxiliary outputs can be used for low-current dc control of external devices. Figure 12 shows the basic optocoupler output structure. Current through an open-collector output should be limited to 20 mA (maximum) by the customer-supplied pull-up resistor or the pull-up component in the external device. Current flows through the open-collector output when the output event is in a low state. Output events can also be programmed via the CEC/IMC Manger for high **or** low active states on a per event basis.

In addition, each output event can be programmed for a momentary or a toggle-type activation. An output event programmed for momentary activation will hold the output line in the active state only while the respective console key is depressed. An output event programmed for toggle operation will toggle the output line to the active programmed state on the first console key press and toggle it back to the inactive state on the second key press. Note that one console can toggle an output to its active state and a different console can toggle the same output back to its inactive state.

Wire the optocoupler auxiliary output connections as required. See Table 3 for specific Auxiliary I/O Concentrator Card connections.

C. Relay Aux. Output Connections

The four relays on Controller Board 19D903299P3 each provide a Form-A contact. These contacts are specified to switch ac or dc currents up to 1 ampere at 24 volts. As show in Table 3, output bits 0 - 3 are used to control the relays.

Each Form-A contact is open when the respective output event is in a low state (relay not energized) and closed when the output event is in the high state (relay energized). Relay output events can be programmed via the CEC/IMC Manger for high **or** low active states and for momentary or toggle activation.

Wire the auxiliary output relay connections as required. See Table 3 for specific Auxiliary I/O Concentrator Card connections.

D. I/O Loop-Back Connections

In addition to connecting an output line to its external device the output line may be simultaneously tied back to an input line. This loop-back or feedback arrangement will allow monitoring of the output state by one or more consoles. For example, an output line used to toggle a siren on could be wired back to an input line and the corresponding input event could be programmed to broadcast a "SIREN ON" message to all consoles in the system. Carefully observe current and voltage specifications and logic level requirements if outputs are looped back to inputs.

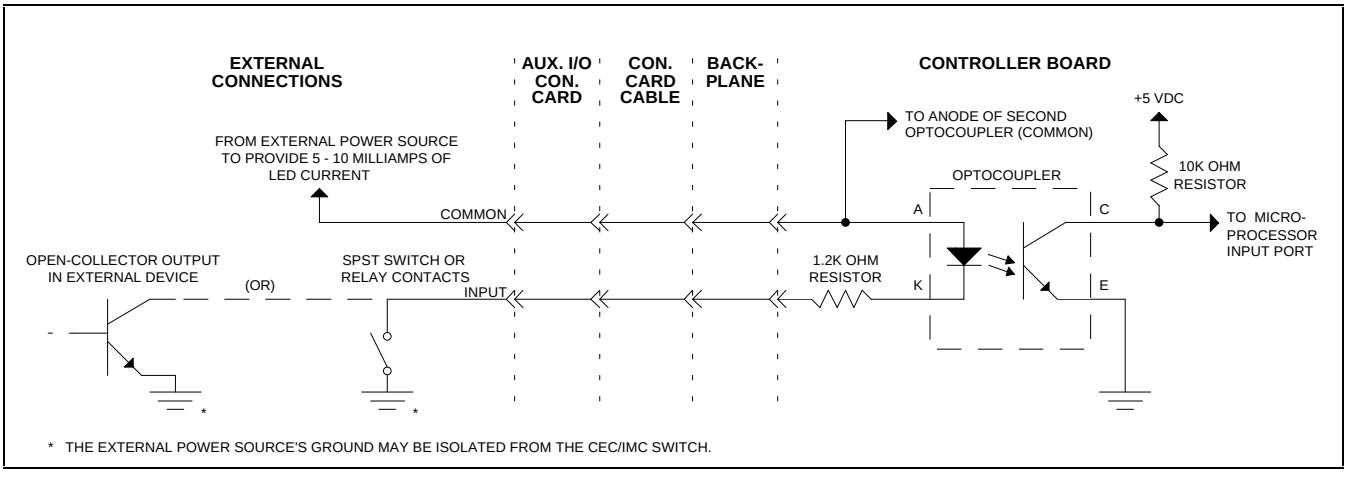


Figure 11 - Auxiliary Input Connection

TABLE 3 - AUXILIARY I/O BACKPLANE AND CONCENTRATOR CARD CONNECTIONS

CNTRLR BD. I/O LINE		TYPE	BACKPLANE CONNECTORS		CONCENTRATOR CARD CONNECTORS *			
I/O	**Bit**	**Optocplr/Relay**	**PA101-PA119, Etc. Pin No.**	**PA101-PA119, Etc. Pin Name**	**J1 / J3**	**J2 / J3**	**J4 / J6**	**J5 / J6**
I	0	Optocoupler	22	OPT IN A1	22 / 1	22 / 13	22 / 1	22 / 13
		(In. Bit 0 & 1 common)	24	OPT IN COM 1	24 / 26	24 / 38	24 / 26	24 / 38
I	1	Optocoupler	19	OPT IN B1	19 / 2	19 / 14	19 / 2	19 / 14
I	2	Optocoupler	21	OPT IN A2	21 / 27	21 / 39	21 / 27	21 / 39
		(In. Bit 2 & 3 common)	13	OPT IN COM 2	13 / 3	13 / 15	13 / 3	13 / 15
I	3	Optocoupler	23	OPT IN B2	23 / 28	23 / 40	23 / 28	23 / 40
I	4	Optocoupler	11	OPT IN A3	11 / 4	11 / 16	11 / 4	11 / 16
		(In. Bit 4 & 5 common)	7	OPT IN COM 3	7 / 29	7 / 41	7 / 29	7 / 41
I	5	Optocoupler	9	OPT IN B3	9 / 5	9 / 17	9 / 5	9 / 17
I	6	Optocoupler	5	OPT IN A4	5 / 30	5 / 42	5 / 30	5 / 42
		(In. Bit 6 & 7 common)	1	OPT IN COM 4	1 / 6	1 / 18	1 / 6	1 / 18
I	7	Optocoupler	3	OPT IN B4	3 / 31	3 / 43	3 / 31	3 / 43
O	0	Relay **	2	OPT OUT A1	2 / 7	2 / 19	2 / 7	2 / 19
		(Out. Bit 0 & 1 common)	6	OPT OUT COM 1	6 / 32	6 / 44	6 / 32	6 / 44
O	1	Relay **	4	OPT OUT B1	4 / 8	4 / 20	4 / 8	4 / 20
O	2	Relay **	8	OPT OUT A2	8 / 33	8 / 45	8 / 33	8 / 45
		(Out. Bit 2 & 3 common)	12	OPT OUT COM 2	12 / 9	12 / 21	12 / 9	12 / 21
O	3	Relay **	10	OPT OUT B2	10 / 34	10 / 46	10 / 34	10 / 46
O	4	Optocoupler	14	OPT OUT A3	14 / 10	14 / 22	14 / 10	14 / 22
		(Out. Bit 4 & 5 common)	15	OPT OUT COM 3	15 / 35	15 / 47	15 / 35	15 / 47
O	5	Optocoupler	16	OPT OUT B3	16 / 11	16 / 23	16 / 11	16 / 23
O	6	Optocoupler	18	OPT OUT A4	18 / 36	18 / 48	18 / 36	18 / 48
		(Out. Bit 6 & 7 common)	20	OPT OUT COM 4	20 / 12	20 / 24	20 / 12	20 / 24
O	7	Optocoupler	17	OPT OUT B4	17 / 37	17 / 49	17 / 37	17 / 49

* Connectors J1, J2, J4 and J5 are the 24-pin dual-row connectors on the Backplane-side of the Concentrator Card. Connectors J3 and J6 are the 50-pin Champ-type connectors that the external connections are wired to. If, for example, the Concentrator Card Cable is connected to J1, the Champ connection for input bit 1 is J3 pin 2.

** Open-collector optocoupler-type outputs on Controller Board 19D903299P1.

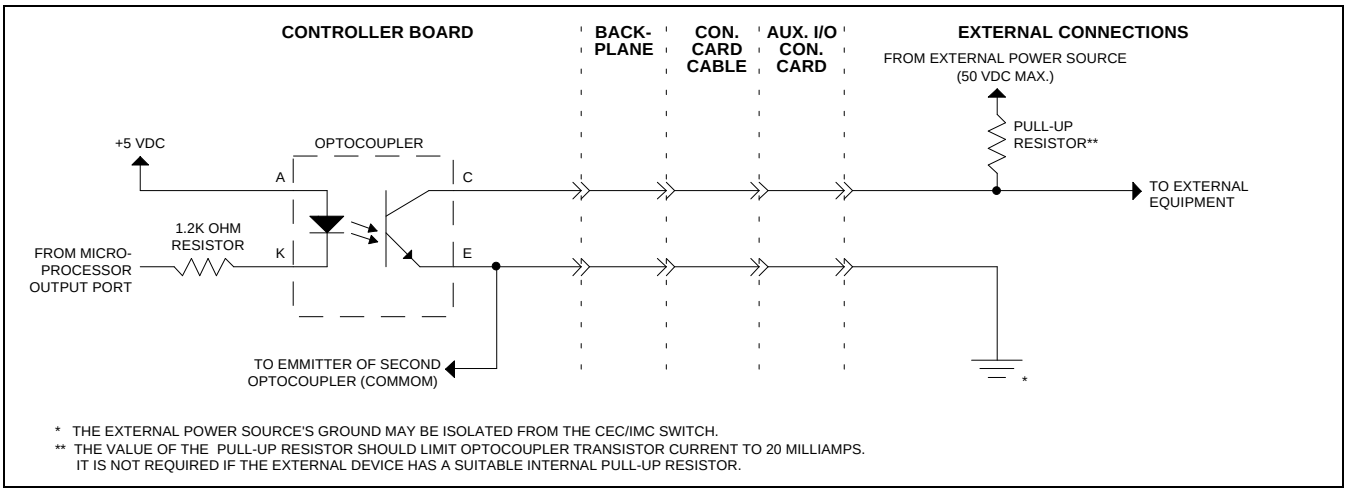


Figure 12 - Auxiliary Output Connection

E. Redundant MIM Controller Boards

In a redundant MIM configuration, only the active MIM Controller Board has control of the auxiliary I/O lines. The output lines on the inactive Controller Boards remain in the open (high-impedance) state. Therefore, since either board may become the active board, corresponding lines can be wired in parallel between the two Controller Boards. For example, the primary Controller Board's input line 0 would be paralleled with the secondary Controller Boards input line 0 and the primary Controller Board's output line 0 would be paralleled with the secondary Controller Board's output line 0. When paralleling inputs, verify the power source can supply sufficient current for both inputs and also verify the switching device (switch, relay, open-collector output, etc.) can sink sufficient current to pull both inputs to the low state.

F. CEC/IMC Manager Configuration

The following parameters must be set at the CEC/IMC Manager (MOM PC) for each auxiliary I/O event that will be used:

- Type – input or output
- State – high or low active logic state
- Device Type – MIM, CIM, LRIM, etc.
- Device Assignment – interface module assignment number (1 - 32) of the Device Type
- Bit – Controller Board auxiliary I/O bit (0 - 7) assigned to the event
- Message (inputs only) – text string sent to console when the input transitions to the active state
- Console Mask – specific console or consoles assigned to monitor the input event or control the output event

Configure all required auxiliary I/O events by selecting "System Configuration" from the main menu and "I/O Configuration" from the sub-menu. See LBI-38911 Chapter 3 (section 3.2.4.) for details. Note that the current state (high or low) of the configured I/O events can be monitored from this configuration screen.

With firmware previous to V3.0, a input event text string of up to twenty-five (25) characters in length can be defined. Since the C3 Modular/Desktop consoles only have 8-character displays, only the first eight in the defined text string are displayed; all others are truncated.

Firmware V3.0 (and later) allows an input event text string of only eight (8) characters in length.

NOTE

At this point in the set-up process, the auxiliary I/O lines will operate as wired and configured.

STEP 16 - CONFIRMED CALL VERIFICATIONS

The confirmed call option ensures all EDACS radio systems being called have working channels available before the caller is given a channel access (grant) tone. This software feature is enabled or disabled on a per unit and group basis at the System Manger and on a per radio system ("site") basis at the CEC/IMC Manager.

Verify confirmed call for all groups and units has been enabled or disabled at the System Manger as outlined in

STEP 2 A. and STEP 2 B. respectively. Note that if any System Manager confirmed call settings are changed at this point, a new System Manger upload will be required.

Verify confirmed call for all radio systems has been enabled or disabled as outlined in STEP 5 D.

STEP 17- MULTISITE UNIT LOGOUT CONFIGURATION

The multisite unit logout feature can improve call routing efficiency by logging inactive radio units out of the multisite system. Basically, this prevents wide area (multisite) call routing to inactive units which would otherwise unnecessarily delay certain wide area group calls. The multisite unit logout feature has several different options as described in LBI-38911 Chapter 3 (section 3.2.8.). It is controlled by the MOM Controller Board.

A. Multisite Logout Timers

The timer-based multisite unit logout option should now be set-up if this option will be used. With the timer-based option, each unit has a count-down timer in the MOM that is initialized at radio login and re-initialized at each radio PTT. The MOM periodically decrements each timer and when the timer for a particular unit times-out the CEC/IMC will automatically log the unit off. Each unit's timer can be programmed in 15-minute increments up to 24 hours. Typically, most timers will be set in the 8 to 10-hour range. Set the timers to the required amount. See LBI-38911 Chapter 3 (section 3.2.8.) for details.

B. Enable Timers

The MOM timers must be enabled if the timer-based multisite unit logout option is used. From the CEC/IMC Manager's main menu, select "System Configuration" and then "MOM Configuration" from the sub-menu. Enable the timers from this screen.

STEP 18 - WWVB TIME STANDARD CONFIGURATION

A coordinated universal time standard option is available that allows the CEC/IMC to be synchronized to WWVB located in Fort Collins, Colorado. WWVB operates on a frequency of 60 kHz. This option uses the Spectracom Netclock II WWVB receiver which interfaces to the CEC/IMC via a serial port at the CEC/IMC Manager (usually COM2). If the CEC/IMC is equipped with the WWVB option, the Netclock should now be set-up.

A. Netclock II Set-Up

Install, wire and configure the hardware items as described in the Netclock documentation and LBI-38911 Chapter 5. Special attention should be given to the section entitled "5.1.3 Additional Considerations".

B. CEC/IMC Manager Set-Up

The Netclock II software must now be installed on the CEC/IMC Manager. Follow the procedures in LBI-38911 Chapter 5.

STEP 19 - E & M SIGNALLING VERIFICATIONS

Verify E & M signalling for all applicable radio systems has been configured as described in STEP 5 B and STEP 8 B of this manual.

STEP 20 - REDUNDANT CLOCK CONFIGURATION

Two (2) identical but completely separate clock circuits – "A" and "B" – on each Clock Board provide redundant (back-up) clocking capability for the Audio Boards. Clock pulse outputs from both circuits are applied to the Audio Boards via the FUTUREBUS transceivers and the Backplane(s). The MOM Controller Board controls clock selection by sending clock select command signals to all other Controller Boards within the CEC/IMC. Clock monitoring circuitry on the Audio Boards signal the MOM Controller via their respective Controller Boards if any of the selected clock pulses fail.

NOTE

The redundant clock feature should only be used if the CEC/IMC is equipped with Audio Boards 19D903302P1 Rev. K (and later) and/or 19D903302P3. **DO NOT enable the redundant clock feature if the CEC/IMC uses 19D903302P1 Rev. J or earlier Audio Boards.**

The initial start-up or default clock circuit is "B". If the MOM and two other Controller Boards report a "B" clock circuit problem, the MOM will switch clock operation to the "A" clock. Similarly, the MOM will also switch back to the "B" clock if a problem exists with the "A" clock. This redundant clock circuit selection can be enabled and disabled via the CEC/IMC Manager (MOM PC).

Panel-mounted toggle switches on the Clock Boards allow independent enable/disable control of the

FUTUREBUS transceivers so multiple Clock Boards can be installed. Generally, two (2) Clock Boards are installed per CEC/IMC so uninterruptible operation can be achieved when a single Clock Board must be removed for servicing. If two Clock Boards are installed and the redundant clock feature is enabled, the toggle switches are normally set at the factory as follows:

- Clock Board 1 – Clock "A" is turned off and clock "B" is turned on.
- Clock Board 2 – Clock "A" is turned on and clock "B" is turned off.

With the toggle switches set in this manner, clock "B" on Clock Board 1 will be the active clock when the CEC/IMC is powered-up. If a clock failure occurs, the MOM will switch all Audio Boards to the "A" clock and thus the "A" clock on Clock Board 2 will become the active clock. Clock Board 1 can then be removed for service and the "B" clock on Clock Board 2 can be turned on via the toggle switch so redundant clock operation will continue.

If the redundant clock feature will be used, first verify the toggle switches on the Clock Board(s) are correctly set as previously described. Now, select "System Configuration" from the CEC/IMC Manger's main menu and then "MOM Configuration" from the sub-menu. Enable the redundant clock feature from this screen.

NOTE

If two or more Clock Boards are installed, corresponding clocks ("A" and "A" for example) on the different Clock Boards should **never** be turned on.

If only a single Clock Board is installed, both clocks ("A" and "B") should be turned on when the redundant clock feature is enabled.

If the CEC/IMC is equipped with the earlier Audio Boards (19D903302P1 Rev. J or before), the CEC/IMC may begin toggling between the two clock circuits if the redundant clock feature is enabled. Errors will be logged at the CEC/IMC Manager and audio problems will occur that may or may not be noticeable. The audio problems are more noticeable in larger CECs/IMCs. If no backup clock is turned on during the clock toggles, distinct periods of good audio then no audio will occur as the CEC/IMC toggles between the clocks. **To restore correct operation if this feature is accidentally enabled with the earlier Audio Boards, perform one of the following procedures:**

If Audio Boards Are Not Mixed: (19D903302P1 up to Rev. J and no 19D903302P1 Rev. K or later and no 19D903302P3 boards)

1. Turn all "B" clocks off at the Clock Board(s). All clock-related LEDs on all Audio Boards (BCLK, SSYNC, FSYNC, 2175) should turn off and stay off.
2. At the CEC/IMC Manager (MOM PC), disable the redundant clock feature.
3. Turn one "B" clock on. All clock LEDs on all Audio Boards should turn on.

If Audio Boards Are Mixed:

1. From the CEC/IMC Manager (MOM PC), disable the redundant clock feature.
2. If only one Clock Board is installed, turn both clocks ("A" and "B") on via the panel mounted toggle switches. If multiple Clock Boards are installed, turn all "A" clocks off except for one and turn all "B" clocks off except for one.
3. Clear the MOM Controller Board's non-volatile RAM (NOVRAM). This can be done as follows: Change the MOM Controller Board's DIP switches to a different interface module type (CIM or MIM for example), reset the Controller Board and then wait at least three (3) seconds. Now, change the DIP switches back to the MOM setting and reset the board again.
4. From the CEC/IMC Manager, send the TDM bus and slot assignments to the CEC/IMC.
5. Reset each Controller Board by pressing the reset switch on the front panel. If the CEC/IMC is equipped with firmware V3.0, this can be done automatically from the CEC/IMC Manager by selecting the "Activate Bus Slots" option.

TROUBLESHOOTING

Unless otherwise stated, the troubleshooting information presented in this section assumes the CEC/IMC has been correctly installed and set-up as specified in the previous sections.

RECOMMENDED TEST EQUIPMENT

- EDACS Portable Radios – M-PA, M-RK or M-PD (at least two needed for wide area calls)
- Audio (Test Tone) Signal Generator
- Audio Level Meter
- Volt-Ohm Meter or Digital Multimeter
- Protocol Analyzer – HP 4951 (or equivalent)

- Oscilloscope (50 MHz minimum bandwidth)
- CEC/IMC Extender Board 19B802578P1
- Controller Board Test Point Extender 19D904176P1
- Live Insertion Cable 19B802612P1
- Controller Board Monitor Cable 19B802286P1 and P2

OVERVIEW

MIM Problems

If a MIM does not have a redundant Controller Board, failure of its single Controller Board will result in a loss of wide area (multisite) and dispatch console communication with the respective radio system. This will also be the result if a failure occurs in the respective GETC uplink/downlink equipment. Non-wide area calls within the radio system will continue normally as controlled by the Site Controller, CNI system, etc. Other radio systems within the wide area network are not affected by the MIM Controller Board or GETC uplink/downlink failure except users in these radio systems cannot communicate with the users in the failed radio system.

The redundant MIM configuration provides a standby Controller Board that will automatically become active if a problem occurs with the primary Controller Board. This automatic switch-over will also occur if a problem is sensed in the primary GETC uplink/downlink equipment.

Failure of a MIM Audio Board can cause loss of up to four (4) audio/modem signal channels between the radio system and the CEC/IMC. Wide area and console communication over the lost channels will not be possible. Typically, this failure can be identified by calls being routed (via the control data uplink/downlink) but no audio/modem signal is received.

CIM Problems

If a CIM Controller Board fails all communications with the respective dispatch console will be lost. Essentially, the console is completely disabled. Other consoles are not affected by the single CIM failure.

Failure of the computer equipment at the console location or a problem with the control data link between the CIM Controller Board and the console will usually not completely disable the console's receive (speaker) audio. If the control data connection at the console is lost, receive audio over the select and unselect speakers will remain on the last selected modules (groups or individuals).

Failure of a CIM Audio Board will cause loss of audio communication at the respective console. However, control information handled by the Controller Board such as "CALL" and "XMT" information which is displayed at the console will continue. Failure of a single audio channel will result in the loss of the respective audio device(s) at the console. For example, if the CIM's channel 2 audio output fails the unselect speaker will not operate.

XLTR Problems

As with CIM Controller Board failures, XLTR Controller Board failures will also result in complete failure of the respective C3 Modular/Desktop console. Other consoles are not affected by the XLTR failure.

Control data is transferred between the XLTR and the CIM Controller Boards via 2 pairs (one TX and one RX) in the Concentrator Card Cable. This cable also connects to the Concentrator Card to transfer the control data into and out of the XLTR to and from the console.

MOM Problems

If the MOM Controller Board completely fails, the following will occur:

- communications between the CEC/IMC and the System Manger will be lost
- communications between the CEC/IMC and the CEC/IMC Manger (MOM PC) will be lost
- consoles will not be able to perform patch or simul-select operations
- EDACS trunking system status (trunked, failsoft 1, failsoft 2) will not be updated at the consoles if a status change occurs
- other Controller Boards in the CEC/IMC will not be properly initialized if their NOVRAM is cleared
- redundant MIM switching will not function
- redundant clock feature will not function if it is enabled
- redundant GSC feature will not function
- data logging of the calls will not occur

MOM Audio Board failure will result in a loss of console emergency and ring tones. During normal operation, these tones are continuously applied to several TDM bus slots specifically reserved for this application. Other Audio Boards in the CEC/IMC extract the tones from the slots as needed.

These tones are the only function provided by the MOM Audio Board. If the MOM Controller Board is not operating correctly when the CEC/IMC is powered-up, these tones will not exist. This will also be the result if the HDLC/HSCX channel B link between the MOM Controller Board and the Audio Board is not operating at power-up. The HDLC/HSCX signals are transferred from the MOM Controller Board to MOM Audio Board via the Local Bus Cable between the two boards.

Failure of the MOM Controller Board after the tone initialization sequence is complete will not usually affect the Audio Board tone generation. This initialization sequence occurs at power-up.

NIM Problems

Loss of a NIM Controller Board will result in a lack of distributed multisite capability between the respective IMCs. Similarly, if a NIM Controller Board within a StarGate Controller fails, distributed multisite operation between the StarGate Controller and the respective IMC will be terminated.

A NIM Audio Board problem may result in a loss of up to four (4) audio/modem channels between the IMCs. Typically, this failure can be identified by distributed multisite calls being routed (via the control data link) but no audio/modem signal is received at the destination radio system or console.

VMIM/CIA Rack Problems

VMIM or CCI Controller Board problems may cause all communications to cease between the CEC/IMC and the conventional base stations connected to the respective CIA rack. If this occurs, all conventional channel operations, including patches, will not be possible. In addition, console communications with the conventional stations will not function.

Problems with a VMIM's Audio Board or the CI Board may cause up to four (4) channels of conventional station audio to be lost.

Since the CI Board generates tone and dc control signals for remote base station control, CI Board failures may result in a loss of remote conventional base station control for functions such as transmit keying, Channel Guard enable/disable, channel switching, etc. In addition, E & M control functions may be lost.

Tone Generation

Knowledge of where various tones are generated within the CEC/IMC network can be a very useful troubleshooting asset, particularly in regards to audio problems at the consoles. This section specifies where each tone is generated and it lists the specific tone frequencies, durations and where applicable, the number of repetitions.

NOTE

The tone volume levels may be adjusted on a per console basis using the "Minimum Alarm Level" and "Tone Volume Offset" options. These options are set in the "CONSOLE USER PROFILE CONFIGURATION" screen at the CEC/IMC Manager. Large values in the "Tone Volume Offset" option (only in firmware V3.0 and later) may attenuate the tones to the point where they will not be heard at the console. See STEP 6 in the "**SET-UP PROCEDURE**" section for details on the console user profile settings.

Confirmation Tones

Confirmation tones are generated by channel 1 of the CIM's Audio Board. They are sent out to the console when the CIM Controller Board receives the radio system's response (from MIM, NIM, VMIM, etc.) to the initial console PTT. These tones include the busy, denied, grant and queued tones. Normally, the speaker that a confirmation tone is routed to (select or unselect) is determined by the state of the module containing the group/channel/individual being called. However, confirmation tones may be forced to the select speaker at the CEC/IMC Manager if the "Forced Tones to Select Speaker" option is enabled. This option is a part of the console user profile configuration. Tone specifications are:

- **Busy Tone** – 500 Hz tone for 80 milliseconds then no tone for 20 milliseconds; three (3) repetitions
- **Denied Tone** – 500 Hz tone for 20 milliseconds
- **Grant Tone** – 1000 Hz tone for 20 milliseconds
- **Queued Tone** – 2000 Hz tone for 20 milliseconds

Using the confirmation tones, basic console receive audio operation can be verified between the CIM and console. If the tones are present at the console, the CIM Controller Board, most of CIM Audio Board's channel 1 output circuitry (to console) and the console receive paths are good. Simply transmit on a test group or channel and listen for one of the confirmation tones from the CIM Audio Board. Presence of the confirmation tones also indicates the control data link between the CEC/IMC and the radio system is good.

Alert Tones

Alert tones are also generated by channel 1 on the CIM's Audio Board. Each specific tone is generated when

an alert key at the console is pressed with the console transmitting. The alert tones are routed to the group/channel/individual being called (via the MIM, VMIM, NIM, etc.). Firmware V3.0 (and later) also routes the alert tones to the console's select or unselect speaker. Tone specifications are:

- **Alert Tone** – 1000 Hz tone; exists for as long as an alert key is depressed with the console transmitting
- **Pulsed Alert Tone** – 1000 Hz tone for 260 milliseconds then no tone for 240 milliseconds; exists for as long as a pulsed alert key is depressed with the console transmitting
- **Warble Tone** – 1600 Hz for 200 milliseconds then 2000 Hz for 200 milliseconds; exists for as long as a warble alert key is depressed with the console transmitting

Emergency And Ring Tones

Emergency and ringtones are generated continuously by the MOM Audio Board's channels 1 and 2 respectively. The emergency tone is applied to TDM bus 0, slot 0 and the ring tone is applied to TDM bus 1, slot 0. Any CIM in the CEC/IMC can extract either tone as required. Tone specifications are:

- **Emergency Tone** – 500 Hz for 500 milliseconds then no tone for 500 milliseconds; continuously generated
- **Ring Tone** – 1000 Hz for 20 milliseconds then 500 Hz for 20 milliseconds, twenty (20) repetitions of this then silent for 1200 milliseconds; continuously generated tone sequence

Failsoft Tones (Firmware V3.0 And Later Only)

Failsoft tones are generated by channel 1 on the CIM's Audio Board when a MIM notifies the CIM(s) of a site status transition. The CIM channel 1 output applies the tone to the console. Tone specifications are:

- **Failsoft Tone** – 1000 Hz tone for 60 milliseconds then 500 Hz for 60 milliseconds; eight (8) repetitions

Error Tones

Error tones notify the console operator that an invalid keystroke has been made. For example, an error tone sounds if no module is selected when the PTT key is pressed. These tones are generated by channel 1 on the CIM Audio Board.

- **Error Tone** – 1000 Hz for 40 milliseconds then 500 Hz for 40 milliseconds

SELECTED DIAGNOSTIC PROCEDURES

Clearing Controller Board NOVRAM

Clear a Controller Board's non-volatile RAM as follows:

1. Remove the Controller Board.
2. Change board's DIP switches to a different interface module type. For example, change a MIM to a CIM.
3. Reinsert the Controller Board. Use the live insertion procedure if necessary. Now, wait at least three (3) seconds so the board will reinitialize itself.
4. Remove the board again.
5. Change the DIP switches back to the original settings.
6. Reinsert the board again. If necessary, use the live insertion procedure.

Monitoring Controller Board Serial Data Flow

Serial data flow between a Controller Board and the external data device(s) can be easily monitored by connecting an oscilloscope or protocol analyzer to the appropriate pins at RJ-11 MONitor connector (J3) on the board's front panel. Serial data coming into (RX) and going out of (TX) a Controller Board is buffered and applied to J3. The pin-out for J3 is shown in Table 4. Use Controller Board Monitor Cable 19B802286P1 with Controller Board 19D903299P1. Use Cable 19B802286P2 with Controller Board 19D903299P3.

The serial data signals at J3 are at RS-232 levels of approximately ±12 Vdc referenced to J3 pin 6. It should be noted that there are separate input receivers and output drivers that buffer the signals between the external serial data lines and the modem circuits on the Controller Board; therefore, if an output line driver on the Controller Board fails, RS-232 serial data signals will continue to appear on the TX pins at J3.

Using an oscilloscope, an output polling signal can be periodically observed on the TX serial line to the radio system. PTT activity will add additional data bits.

TABLE 4 - RJ-11 MONITOR CONNECTOR J3

PIN	CONTROLLER BD. SIGNAL NAME	SERIAL DATA DIRECTION
1	Y_TXD0_232_MON	MIM to GETC Uplink, CIM to C3 Maestro Console, MOM to System Manager, etc.
2	Y_RXD0_232_MON	GETC Uplink to MIM, C3 Maestro Console to CIM, System Manager to MOM, etc.
3	Y_TXD1_232_MON	XLTR to C3 Modular/Desktop Console & MOM to CEC/IMC Manager Only
4	Y_RXD1_232_MON	C3 Modular/Desktop Console to XLTR & CEC/IMC Manager to MOM Only
5	none	n/a
6	GND	(common)

Console Re-Initialization

Perform the following procedure if console re-initialization is necessary. This will be required if power has been cycled at a console or if some other console failure has previously occurred.

1. Verify power has been restored at the console.
2. Verify correct LED status on all associated Controller and Audio Boards. Monitor the CEC/IMC Manager's "SYSTEM DISPLAY" matrix screen and observe the CIM and XLTR (C3 Modular/Desktop console only) symbol references are present and not flashing.
3. From the CEC/IMC Manager (MOM PC) send the console's user profile data to the console.
4. If the console is a C3 Modular/Desktop console, send the its configuration data from the CEC/IMC Manager.
5. Send the console's privilege list data from the CEC/IMC Manager.
6. If the console's input channel (mic audio) level setting is not the same as the default setting of 0 dBm, reset the input level setting via the CEC/IMC Manager as required. See STEP 6 in the "**SET-UP PROCEDURE**" section of this manual for specific details.
7. From the CEC/IMC Manager, perform a System Manager "site" upload, conventional channel upload and a console upload.
8. Send the auxiliary I/O configuration from the CEC/IMC Manager to the MOM.
9. Verify console operation. If a C3 Modular/Desktop console incorrectly indicates the system is in failsoft mode, reset the respective CIM Controller Board.

INITIAL CHECKS

1. Verify all boards are fully inserted into the Card Cage slots.
2. Verify all LEDs on all Terminator Boards are lit. If not, troubleshoot the Terminator Board failure or the +5 Vdc external power supply failure before proceeding.
3. At each Clock Board, verify both "PWR" LEDs are lit. This guarantees the fuses on the Clock Board(s) are good and the +5 Vdc supply power is present on that Backplane.
4. Inspect the toggle switches on all Clock Boards. Only one "A" clock and one "B" should be on.
5. Verify the LEDs on all Controller Boards are in their normal state as indicated in Table 5. 19D903299P1 Controller Boards have red LEDs and 19D903299P3 Controller Boards have green LEDs. Special attention should be given to the MOM Controller Board's LEDs since all other Controller Boards communicate with the MOM Controller Board. **DO NOT** clear the NOVRAM on any Controller Board if a problem is suspected with the MOM Controller Board. Doing so could cause a loss of data at the reset Controller Board which may result in loss of operation of the interface module.

NOTE

The IDentify LED does not function on Controller Board 19D903299P1. In addition, this LED remains lit on an XLTR using Controller Board 19D903299P3 with PROM firmware 344A3569/3570G3 and earlier; it cannot be enabled to blink via the CEC/IMC Manager.

If LEDs on any Controller Board indicate problems, reset the board and monitor the LEDs again. If the problem continues, remove the board and verify the following:

- all fuses are good
- DIP switches are correctly set – see the customer-specific system documentation and/or the drawings at the end of this manual for details
- firmware (PROMs U58 and U59) part number is correct – the XLTR firmware (U58 = 344A3569 and U59 = 344A3570) is different from all other firmwares (U58 = 344A3567 and U59 = 344A3568)
- firmware (PROMs U3, U58 and U59) chip insertion – verify none of the PROMs are in backwards and each pin is fully inserted into its respective hole

TABLE 5 - CONTROLLER BOARD LED INDICATIONS

LED NO.	FRONT PANEL NAME	NOR-MAL STATE	NOTES
1	RST* RUN**	Off On	Off = board not in reset condition; On = processors in operation
2*	ERR	Off	Off = no errors
3*	RUN	Blinking	Blinking = processors in operation
4	WDEN	On	On = watch-dog circuit is enabled
5	-12V	On	On = -12 Vdc on-board power supply & -15 Vdc ext. power supply present
6	+12V	On	On = +12 Vdc on-board power supply & +15 Vdc ext. power supply present
8	ID	On or Off	Blinks when board placed in identify mode from CEC/IMC Manager (MOM PC)
9	+5V	On	On = +5 Vdc on-board & ext. power supply present
12	2ND* SEC**	On or Off	Off = board is active (applies to redundant MIM configuration only)

* only present on Controller Board 19D903299P1
** only present on Controller Board 19D903299P3

TABLE 6 - AUDIO BOARD LED INDICATIONS

CR/ LED NO.	FRONT PANEL NAME	NOR-MAL STATE	NOTES
CR1	+5V	On	On = +5 Vdc on-board & ext. power supplies present
CR2	+12V	On	On = +12 Vdc on-board power supply & +15 Vdc ext. power supply present
CR3	-12V	On	On = -12 Vdc on-board power supply & -15 Vdc ext. power supply present
CR4	-5V	On	On = -5 and -12 Vdc on-board power supplies & -15 Vdc ext. power supply present
LED 1	FSYN	On	On = Frame Sync clock pulses present
LED 2	SSYN	On	On = Slot Sync clock pulses present
LED 3	BCLK	On	On = Bit Clock clock pulses present
LED 4	2175	On	On = 2175 Hz clock pulses present
CR5	RST	Off	Off = board not in reset condition
CR6	RUN	Blinking	Blinking = processor in operation

Reinsert the board. **If necessary, follow the Controller Board live insertion procedure presented in this manual**. Controller Board replacement is recommended if LED problems remain at this point.

6. Verify all LEDs on all Audio Boards are in their normal state. See Table 6 for details.

   If LEDs on any one Audio Board indicate problems, reset the board and monitor the LEDs again. If the problem continues, remove the board and verify PROM U99 insertion and the condition of the 96-pin DIN connectors. At this point, if the LED problem has not been located, Audio Board replacement is recommended.

   If the clock-related LEDs ("BCLK", "SSYNC", "FSYNC", "2175") on many of the Audio Boards are off or flashing, the redundant clock feature is enabled. Review STEP 20 in the "**SET-UP PROCEDURE**" section for further information.

7. Although incorrect Audio Board DIP switch settings will not influence the LED indications, these settings should be verified before any problem Audio Board is reinstalled or replaced. **Each Audio Board within a particular interface module has a unique board number based on the settings of DIP switch SW1 positions 5 (MSB) through 8 (LSB).** For example, within an 8-channel MIM, SW1 on the Audio Board for channels 1 - 4 will be set to number one (binary 0001) and SW1 on the Audio Board for channels 5 - 8 will be set to number two (binary 0010). See the customer-specific system documentation and/or the drawings at the end of this manual for details on Audio Board DIP switch settings.

From this point forward, the MOM Controller Board must be operating correctly and the MOM-to-CEC/IMC Manager (MOM PC) control data serial link must be established.

8. From the CEC/IMC Manager's (MOM PC's) "SYSTEM DISPLAY screen, verify every installed primary interface module's Controller Board (MIMs, CIMs, XLTRs, NIMs, LRIMs, VMIMs, RIMs, CTIMs, CAMs, DATA, DVIM and the MOM) is active by observing the one- or two-letter symbol reference in the matrix. This screen is accessed by selecting "View System/Diagnostics" from the main menu.

   If a Controller Board is not active from this screen, reset the board and monitor the screen again. If the problem continues, remove the board and verify its DIP switch settings, firmware version and chip insertion. Reinsert the board. **If necessary, follow the Controller Board live insertion procedure presented in this manual.** Controller Board replacement is recommended if the problem persists at this point.

9. Now verify each Audio Board is active by viewing its status on the "HDLC STATISTICS", "CHANNEL B" screen at the CEC/IMC Manager. This screen can be accessed using the function keys and the structured window selection method from the "SYSTEM DISPLAY" screen **or** by using hot-key "H" directly from the matrix screen. Note that the cursor should be on (selecting) the desired interface module in the "SYSTEM DISPLAY" matrix before entering the "HDLC STATISTICS", "CHANNEL B" screen.

   If an Audio Board is not active, see the following section entitled "**Audio Board Not Active Per CEC/IMC Manager's HDLC Statistics**".

10. At the CEC/IMC Manager (MOM PC), monitor the errors and warnings – current and logged – for each interface module.

    Warnings are logged for all Audio Boards which have been assigned TDM time slots but no active HDLC/HSCX channel B link is present. This will occur if an Audio Board that has slots assigned to it is not installed or if the HDLC/HSCX channel B link between the Controller Board and the Audio Board has failed. Since most CECs/IMCs are designed for expansion, warnings will normally occur because expansion TDM bus slots are assigned to the interface module but the Audio Board(s) are not present. For example, warnings will be logged for a MIM that is assigned six (6) time slots – four (4) current and two (2) for expansion – until the second (expansion) Audio Board is installed.

SYMPTOM/CAUSE OUTLINE

Audio Problems After Bus Or Slot Changes

Bus and slot assignments for each interface module are stored in the MOM Controller Board's NOVRAM. These assignments, made at the CEC/IMC Manager, are not distributed to each interface module until the respective Controller Board is reset. Therefore, when the bus or slot assignments are changed and sent to the MOM, every Controller Board in the CEC/IMC should be reset so the new bus and slot assignments will be distributed correctly. **It is very important to reset all Controller Boards after a bus or slot change.**

If the CEC/IMC is equipped with firmware V3.0 (and later), the Controller Board resets can be done automatically from the CEC/IMC Manager by selecting the "Activate TDM Bus Slots" function from the "TDM Bus and Slot Configuration" sub-menu. Selecting this function will command the MOM to automatically reset all other Controller Boards in the CEC/IMC.

Unequal Audio Levels

Unequal audio levels between different channels most likely indicates incorrect input and/or output line level settings at the CEC/IMC Manager. Review the "**LINE LEVEL ADJUSTMENT OVERVIEW**" and "**STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION**" information in the "**SET-UP PROCEDURE**" section for correct level setting procedures.

Controller Board "RUN" LED Not On Or Not Blinking

This problem may occur when the live insertion procedure is not used when installing an earlier Controller Board. Earlier boards include **all 19D903299P1 boards** and **19D903299P3 Rev. B and earlier boards**. The following procedure may restore operation:

1. Remove the Controller Board from the Card Cage. Verify it has the correct firmware PROMs installed.
2. Reinsert the board. Follow the live insertion procedure specified in this manual.
3. From the CEC/IMC Manager's (MOM PC's) "SYSTEM DISPLAY" screen, verify the Controller Board is displaying its interface module type by observing the one- or two-letter symbol reference in the matrix.

Controller Board replacement will most likely be required if this process does not restore operation. See Table 5 for additional LED status information.

Controller Board "SEC" Or "2ND" LED On

Normally, only MIM Controller Boards in the backup mode should light the "SEC" or "2ND" LED.

Not following the live insertion procedure may cause non-MIM Controller Boards and active MIM Controller Boards already installed in the CEC/IMC to enter this standby condition. To restore normal operation, reset the Controller Board(s) by pressing the recessed reset button on the front panel.

If the LED continues to light, check DIP switch settings; other Controller Boards in like interface modules may have the same site assignment number setting. Site assignment numbers can be quickly viewed at the CEC/IMC Manager's (MOM PC's) "SYSTEM DISPLAY" matrix by pressing the F5 function key. See the customer-specific system documentation for correct DIP switch settings.

Audio Board(s) LEDs Are Not Indicating Normal Operation

If the clock-related LEDs on many Audio Boards indicate abnormal operation (either all off or all blinking), verify the Clock Board(s) toggle switches are correctly set as specified in STEP 20 of the "**SET-UP PROCEDURE**" section. Also verify the redundant clock feature is enabled/disabled as specified.

If this condition occurs on a single Audio Board, reset the board by pressing the recessed reset button on the front panel. This should restore normal operation. Table 6 lists normal LED states. If resetting the board does not restore normal operation, remove the board and perform the following checks.

1. Check the fuses.
2. Inspect the pins on the DIN connectors.
3. Verify PROM U99 insertion.

Audio Board Not Active Per CEC/IMC Manager's HDLC Statistics

If the "HDLC STATISTICS", "CHANNEL B" screen at the CEC/IMC Manager indicates an Audio Board is not active, remove and reinsert the board. This screen can be accessed using the function keys and the structured window selection method from the "SYSTEM DISPLAY" screen or by using hot-key "H" from this same screen. Note that the cursor should be on (selecting) the desired interface module in the "SYSTEM DISPLAY" matrix before entering the "HDLC STATISTICS", "CHANNEL B" screen.

If the above process does not restore the Audio Board to active status, remove the applicable Controller Board and reinstall it using the live insertion procedure. Next, inspect the Local Bus Cable(s) between the Controller Board and the Audio Board(s). Verify the board is installed in the correct Card Cage slot; the Local Bus Cable(s) should join the Audio Board(s) to a Controller Board.

No Receive Call Indications At All Consoles

This symptom most likely identifies a problem with control data from a radio system or processing of this data by the respective MIM/VMIM/NIM/etc. Generally, wide area (multisite) calls to/from the problem radio system will

also not function when this symptom occurs. The problem **is not** Audio Board related.

1. Monitor call data logging at the CEC/IMC Manager (MOM PC) using the CALLS.EXE program. See LBI-38911 Chapter 4 for details on using CALLS.EXE. Verify calls from the problem radio system are being logged at the CEC/IMC Manager. The Controller Board and the control data link are good if calls from the problem radio system (EDACS site, CNI system, etc.) are being logged. If the calls are logging, skip Step 2 below and proceed with Step 3.
2. Perform all Controller Board related checks listed in the previous section entitled "**INITIAL CHECKS**". No errors should exist.
3. Inspect the Telco cable connections for all of the failed consoles. Up to ten (10) consoles can share a single Telco cable for control data connections. Verify the Telco cable is properly connected at both ends – at the Data Concentrator Card and at the punch block.
4. Verify the consoles have been programmed correctly.

No Receive Call Indications At A Single Console

This symptom indicates a problem with control data from the respective CIM and/or XLTR Controller Board or a control data related problem at the console. The problem could also be related to the control data connections between the CIM/XLTR and the console. It **is not** Audio Board related.

1. At the console, attempt a module reprogram (modify). If the reprogram is successful, the control data connection between the CIM/XLTR and the console is good; Step 2 below can be bypassed.

NOTE

C3 Maestro consoles will flash a COMM error on the CRT screen within 10 seconds after the control data connection is lost.

Volume level changes and module selection will also cause data transfers to occur between the CIM and the C3 Maestro console.

2. Using a protocol analyzer connected to the RJ-11 MONitor connector (J3) on the CIM Controller Board's front panel, check for control data activity on the TX and RX serial lines during an attempted module reprogram. This test should also be repeated at the XLTR if the problem is with a C3 Modular/Desktop console. The pin-out for the MONitor connector is given in Table 4.

   If TX data is not present at the output of a console, troubleshoot the related console control data failure. Similarly, if TX data is not present at the output of the CIM and/or XLTR, replace the CIM and/or XLTR.

   If the problem is with a C3 Modular Desktop console and there appears to be a loss of control data between the CIM and the XLTR, verify the Concentrator Card Cable is properly connected. There are two (2) twisted pair control data connections between the CIM and the XLTR – one TX and one RX.
3. Check console programming.

No Receive Audio At All Or Many Consoles

This symptom most likely indicates a possible audio problem with the MIM/NIM/VMIM/etc. that is receiving the call from the radio system.

1. Verify call indications appear at the problem consoles when a call is made from the problem radio system. If not, see the foregoing section entitled "**No Receive Call Indications At All Consoles**"; the problem is not Audio Board related.
2. Perform all Audio Board related checks listed in the previous section entitled "**INITIAL CHECKS**".
3. At one of the problem consoles, select the group being used for test monitoring. Now, at the respective CIM Audio Board, monitor the audio output test point for the select speaker (channel 1). If audio is present at this test point and other problem CIM Audio Board test points but not at the consoles, inspect the Telco cable connections. Many consoles may share a single connector at a Concentrator Card and punch block.
4. This step applies to MIMs only. Verify downlink data is being received at the **main** MIM Controller Board for the radio system being tested. Use a protocol analyzer and check for channel assignments. New installations may have the GETC control data links reversed between two or more site interfaces. Reversal of this type will result in call indications but no audio routing.

5. At the problem MIM/VMIM/NIM/etc. Audio Board, monitor the audio input test point for the problem channel.

   If audio is not present when a call comes through, monitor the 600-ohm balanced line input for audio. If no audio is present here, suspect the phone line, MUX equipment, etc. The problem is not CEC/IMC related.

6. If audio is present on the 600-ohm balanced line input at the CEC/IMC Backplane and not at the respective test point on the Audio Board, there is a failure in the audio input circuit on the Audio Board. Board replacement or repair is required.

7. At the CEC/IMC Manager, check the TDM bus slot allocations for the problem MIM/VMIM/NIM/etc. See LBI-38911 if the TDM bus slot allocations must be reconfigured.

8. At this point, MIM Audio Board replacement is recommended. Verify DIP switches are correctly set before replacing any board.

No Receive Audio At One Or More (But Not All) Consoles

This symptom indicates a problem with the console's CIM Audio Board, an audio failure at the console, or a problem with the twisted pair/MUX link between the CEC/IMC and problem console.

1. Verify the TX and the RX control data connections between the CIM/XLTR and the console are good.

2. Perform all Audio Board related checks listed in the previous section entitled "**INITIAL CHECKS**".

3. At the CIM Audio Board, monitor the problem channel's output test point (select speaker = channel 1, unselect speaker channel = channel 2, 3 or 4).

   If no audio is present on the output test point first suspect the Local Bus Cable on the Backplane between the Controller Board and the Audio Board. If the cable is good the problem is most likely in the Audio Board; however, there is some parallel I/O control circuitry on the Controller Board that can fail and cause this symptom.

4. If audio is present at the test point, monitor the balanced audio output at the Backplane connector.

   If no audio exists on the 600-ohm balanced line, suspect either a short on the twisted pair or a failure in the Audio Board's output circuitry. Temporarily disconnect the audio line's Concentrator Card Cable to eliminate any short and retest for balanced audio out.

5. The Audio Board is good if audio exists at the Backplane connector with no shorts on the twisted pair. At this point, suspect an open in the Concentrator Card Cables or the twisted pair/MUX connections between the CEC/IMC and the problem console. At the punch blocks, check for the balanced audio signal from the CEC/IMC to the problem console.

6. At the console, check for audio from the CEC/IMC.

7. Troubleshoot the console for an audio failure.

Transmit Indication Good At Console, But No Receive Audio And No Confirmation/Alert Tones At Console

The presence of the transmit (XMIT or XMT) indicator reveals the following:

- CIM-to-console control data link is good
- CEC/IMC-to-radio system being called control data link is good.
- the radio system (EDACS site, CNI equipment, etc.) has assigned a channel for the call

The absence of the receive audio and the confirmation/alert tone indicates there is a problem with the CIM-to-CIM Audio Board connections (possibly the Local Bus Cable), the CIM Audio Board's channel 1 output or the channel 1 connections between the CIM Audio Board and theconsole. The following steps list items that should be checked if the console control data connection is good, but no confirmation tones are being heard. If the CEC/IMC is equipped with firmware V3.0 (and later), this troubleshooting procedure also applies to a lack of alert tones. With V3.0 (and later), the alert tones are generated at the CIM, not at the console.

1. Check the module(s) volume; it may be set too low.

2. Check the Local Bus Cable between the CIM Controller Board and the CIM Audio Board. Unless the original CEC/IMC system has been modified, all of the Local Bus Cables should be installed in accordance with the customer-specific system documentation.

3. Verify the CIM Audio Board is in the correct Card Cage slot. It should be in the slot just to the right of the CIM Controller Board (as viewed from the front).

4. Verify all audio connections from the Backplane connector, through the Concentrator Cards, punch blocks, etc. to the console are good.

5. The HDLC/HSCX Channel B link may be inoperative. See the previous section entitled "**Audio Board Not Active Per CEC/IMC Manager's HDLC Statistics**" for troubleshooting details.

6. Ensure no uninitialized Audio Boards are installed in the CEC/IMC. Audio Boards will not be initialized if they are not connected to a Controller Board, if the HDLC/HSCX Channel B link has failed, or if their Controller Board was not reset after changing the TDM bus or slot assignments at the CEC/IMC Manager.

7. Suspect an audio problem at the console.

One Or More Consoles Cannot Initiate A Call

This symptom indicates site channel activation problems in response to a console PTT. Typically, no XMIT indication will appear at the console.

1. Verify the console(s) to CIM control data connections are good by reprogramming a module or by (C3 Maestro only) changing the volume level.

2. Using a protocol analyzer connected to the RJ-11 MONitor connector (J3) at the problem MIM/VMIM/NIM/etc. Controller Board's front panel, check for control data activity on the TX and RX serial lines during an attempted console call to the problem radio system. The pin-out for the MONitor connector is given in Table 4.

   If no control data is present, monitor the console's call data logging at the CEC/IMC Manager (MOM PC) using the CALLS.EXE program. See LBI-38911 Chapter 4 for details on using CALLS.EXE. Verify the console's channel requests are being logged.

3. Test the CEC/IMC-to-radio system control data link by placing a radio originated call from a known good radio system to the problem radio system. This test will also check audio connections.

4. Suspect console(s) programming.

5. If the transmitter site keys and then drops check for the presence of the 2175 Hz tone keying sequence at the output of the MIM Audio Board. The sequence should occur when a console PTTs. See LBI-38664 for tone keying sequence specifications.

   If no tone keying sequence occurs, suspect the Controller Board, Audio Board or the Local Bus Cable(s) that interconnects the two.

6. Verify the tone keying sequence is present at the Site Controller/CNI equipment/etc. If not, suspect the phone line, MUX equipment, etc.

No Transmit Audio From All Consoles

This symptom most likely indicates an Audio Board problem at the MIM/VMIM/NIM/etc.

1. Verify XMIT indicator is present at the consoles during PTT. If not, see the previous section entitled "**One Or More Consoles Cannot Initiate A Call**". Troubleshoot the control data problem first.

2. At the Backplane, check for the presence of the balanced audio output from the problem MIM/VMIM/NIM/etc. Audio Board's channel.

   If the balanced audio is not present, check the output test point on the Audio Board. If audio exists on the test point, troubleshoot the output circuit failure or replace the Audio Board.

3. Inspect the Telco cable connections for all of the failed consoles. Many consoles can share a single Telco cable for audio connections. Verify each Telco cable is properly connected at both ends – at the Audio Concentrator Card and at the punch block.

4. Check for the presence of mic audio into channel 1 of at least one of the problem CIM Audio Boards. Troubleshoot the console failure if audio is not present.

No Transmit Audio From A Single Console

This symptom indicates a problem with the respective CIM Audio Board, an audio failure at the console, or a problem with the twisted pair/MUX link between problem console and the CEC/IMC.

1. Verify the console can activate and hold the transmitter. If not, see the previous section entitled "**One Or More Consoles Cannot Initiate A Call**" for troubleshooting information. Monitor the console's call data logging using the CALLS.EXE program. See LBI-38911 Chapter 4 for details.

2. Verify the console will receive audio from one or more sources. If not, it is recommended that the receive audio problem be found before the transmit

audio problem. There may be a common cause. See the previous section entitled "**No Receive Audio At One Or More (But Not All) Consoles**" for details.

3. Verify the console's input signal level setting is correct.

4. At the CIM Audio Board, monitor channel 1's input test point when transmitting. Channel 1 is the microphone (input) and the select speaker (output) channel.

   If audio is present at the test point, either the CIM has not been set-up correctly or the Audio Board has failed.

5. If audio is not present at the test point, monitor the balanced audio input at the respective Backplane connector.

   If audio exists on the 600-ohm balanced line, suspect a failure in the CIM Audio Board's channel 1 input.

Wide Area (Multisite) Call Problems

Assuming console-to-radio system and radio system-to-console calls are operating properly, this problem will only show-up due to incorrect or inadequate System Manager programming. Groups and individuals must have wide area capability. See STEP 2 in the "**SET-UP PROCEDURE**" section for correct programming information.

No Receive Audio At Console(s) From Conventional Channel

1. Ensure the console(s) can receive calls from a trunked site.

2. Verify the conventional base station receiver is indeed unsquelching and applying audio to the phone line. If it is not, the problem is not CEC/IMC related. Troubleshoot the conventional base station receiver or control shelf problem.

3. Verify all required conventional channel programming has been accomplished in accordance with the set-up procedures presented in this manual and in LBI-38911.

4. Verify VMIM Controller Board, VMIM Audio Board(s), CCI Controller Board and CI Board(s) DIP switch settings are correct.

5. At the console, verify a call indication is displayed when a call is attempted from the conventional base station. This indication must be displayed before any audio will be routed to the console.

   If the conventional channel call indication is not present check the VMIM-to-CCI control data link via the CEC/IMC Manager. No VMIM errors should be reported. If errors are reported, suspect the VMIM or CCI Controller Board or the serial data interconnect cable between the two.

6. At the CI Board, observe the "VOX" LED for the problem channel. This LED should light when audio is received from the conventional station. It lights on VOX (voice activated) or E & M (COR) activations, in accordance with the channel's programming.

   If no VOX indication is present, check the 600-ohm balanced line input at the Backplane for receive audio from the station. If no audio is present on the balance line troubleshoot the Concentrator Card connections, punch blocks, telephone line from the station, E & M equipment, etc.

7. Assuming the "VOX" LED is operating, trace the audio through the CEC/IMC to locate the failed component or board. Test for audio at the following locations:

   - CI Board output test point (output to VMIM Audio Board)
   - audio cable between the CI Board and the VMIM Audio Board (600-ohm balance line connection)
   - VMIM Audio Board input test point

8. If audio is present on the VMIM Audio Board's input test point, suspect a VMIM Audio Board problem, the Local Bus Cable(s) that connects it to the VMIM Controller Board, or improper TDM slot allocations.

No Transmit Audio From Console(s) To Conventional Channel

1. Verify the console(s) can transmit calls to a trunked site.

2. Verify the conventional base station transmitter can be keyed from a paralleled remote controller. If not, the problem is not CEC/IMC related. Troubleshoot the conventional base station transmitter or control shelf problem.

3. Verify all required conventional channel programming has been accomplished in accordance with the set-up procedures presented in this manual and in LBI-38911.

4. Verify VMIM Controller Board, VMIM Audio Board(s), CCI Controller Board and CI Board(s) DIP switch settings are correct.

5. Verify the conventional station is being keyed by the CEC/IMC.

   If the station is not being keyed, check the CI Board's output at the Backplane for the correct tone, dc, or E & M keying signal. The CI Board's outputs should be tested as if they are outputs from a standard remote controller (observe impedance loading). If good, troubleshoot the Concentrator Card connections, punch block connections, E & M equipment, phone lines, etc.

   If the CI Board's output is bad, check the VMIM-to-CCI control data link at the CEC/IMC Manager. No VMIM errors should be reported. If errors are reported, suspect the VMIM or CCI Controller Board or the serial data interconnect cable between the two.

6. If the station is keying but no modulation exists, monitor the 600-ohm balanced line audio output from the CI Board.

   If no audio is present, trace the audio path to locate the failed component or board:

   - VMIM Audio Board output test point
   - audio cable between the VMIM Audio Board and the CI Board (600-ohm balance line connection)
   - CI Board input test point (from VMIM Audio Board)
   - CI Board output test point (to conventional station)
   - 600-ohm balance TX line at Backplane

7. Verify the 2-wire (simplex) or 4-wire (duplex) connections between the CEC/IMC and the conventional base station are good. If 4-wire, ensure the pairs are not reversed.

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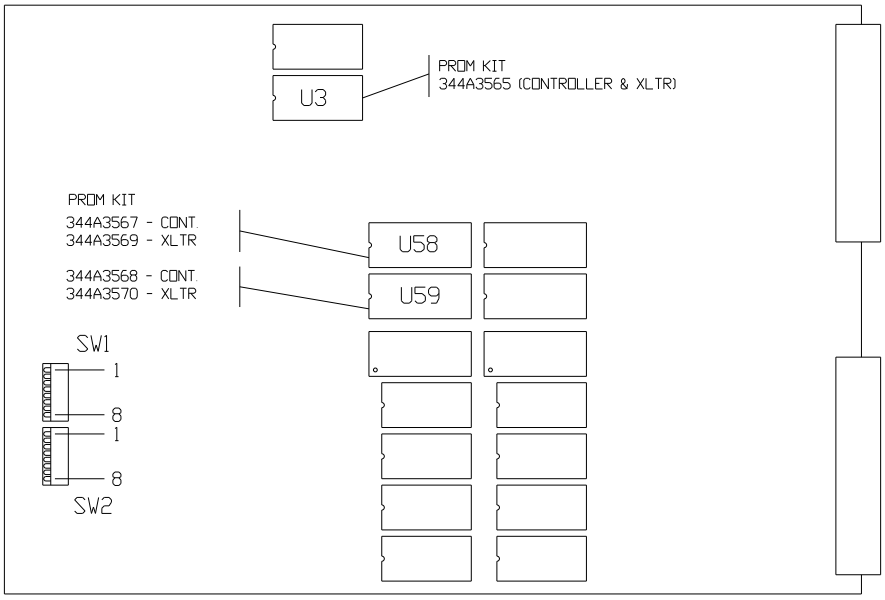
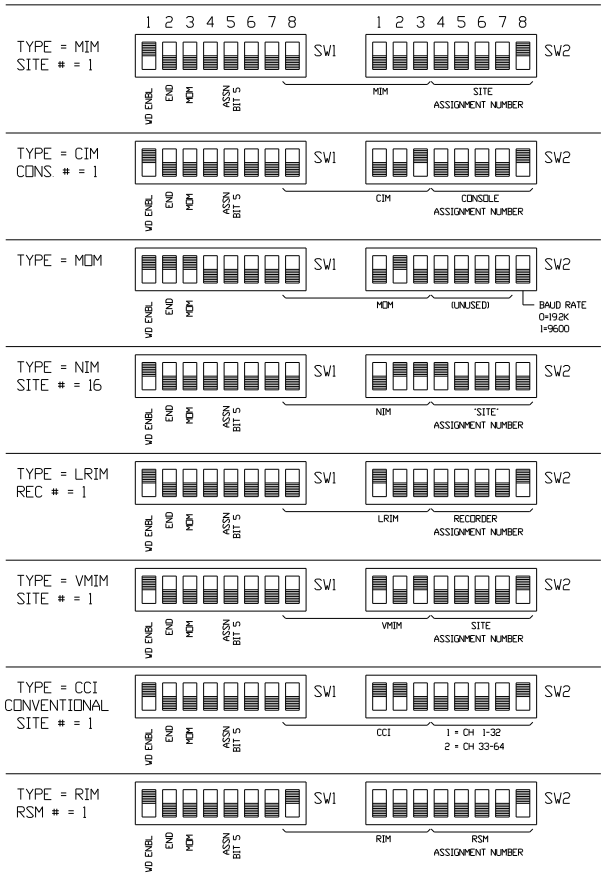
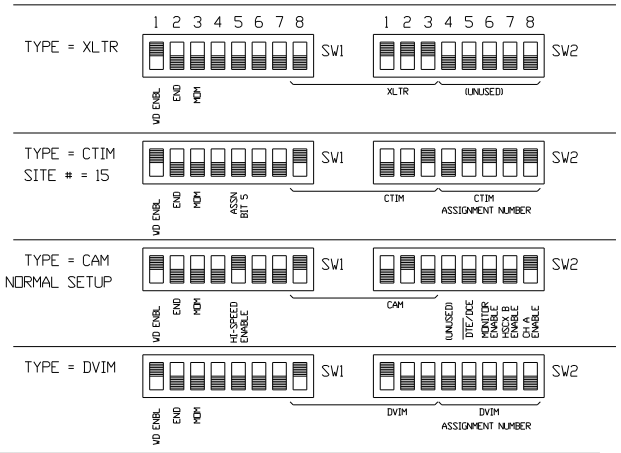
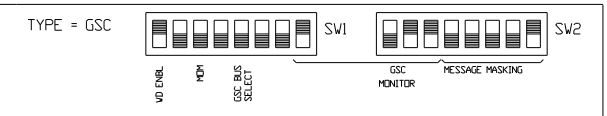
CONTROLLER BOARD
19D903299P1,P3



CEC/IMC CONTROLLER BOARD SWITCH SETTINGS





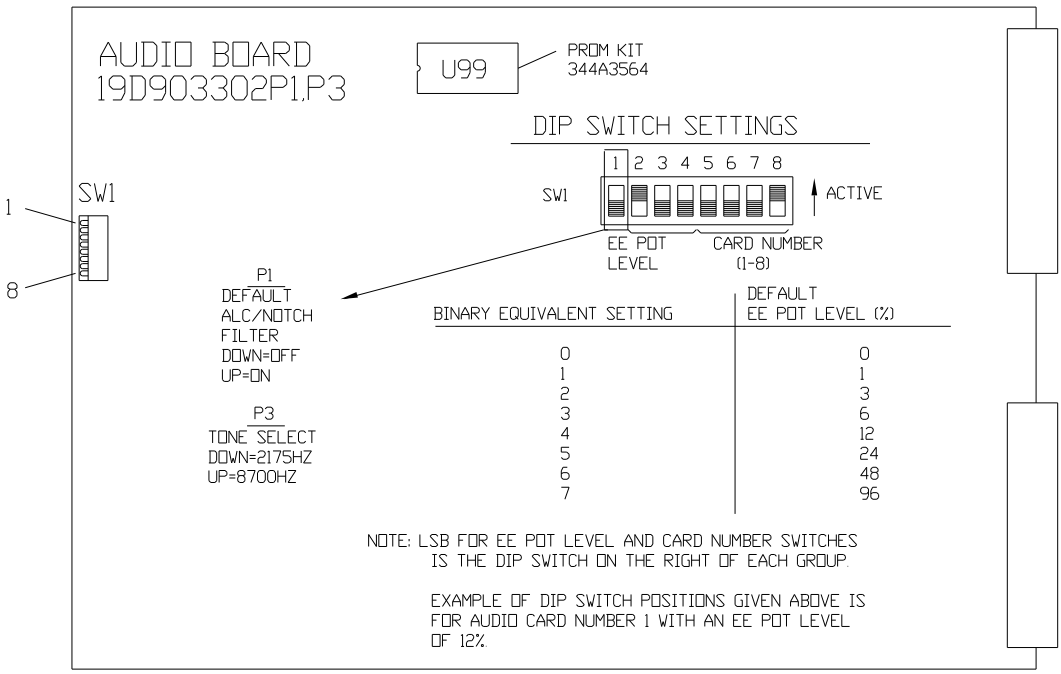


GSC BUS SELECT SWITCH - DOWN = GSC BUS 1
UP = GSC BUS 2

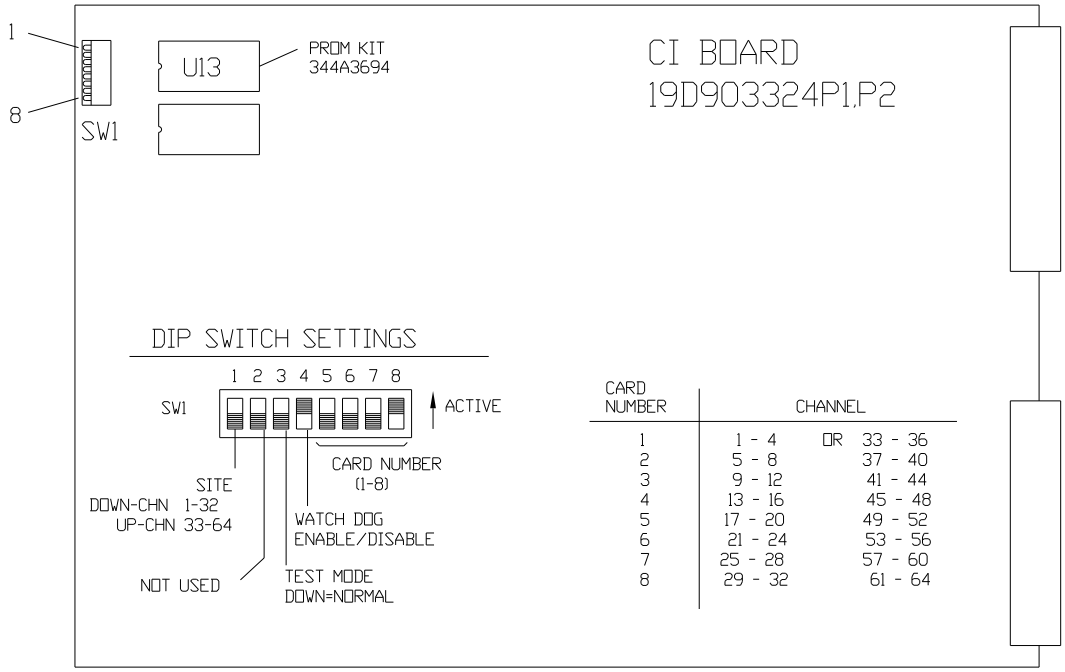
MESSAGE MASKING

SW2 BIT #	FUNCTION (WHEN SWITCH IS ON)
8	DISABLE SLOT ASSIGNMENTS. SECONDARY ASSIGN. CHANNEL PRIM.
7	DISABLE SLOT UPDATES AND IDLES
6	DISABLE DATABASE REQUEST AND DOWNLOAD. UNIT AND GROUP LOCATION
5	DISABLE NODE POLL, STATUS, DYNAMIC ADDRESSING, START-UP
4	DISABLE PATCH/SIMULSELECT

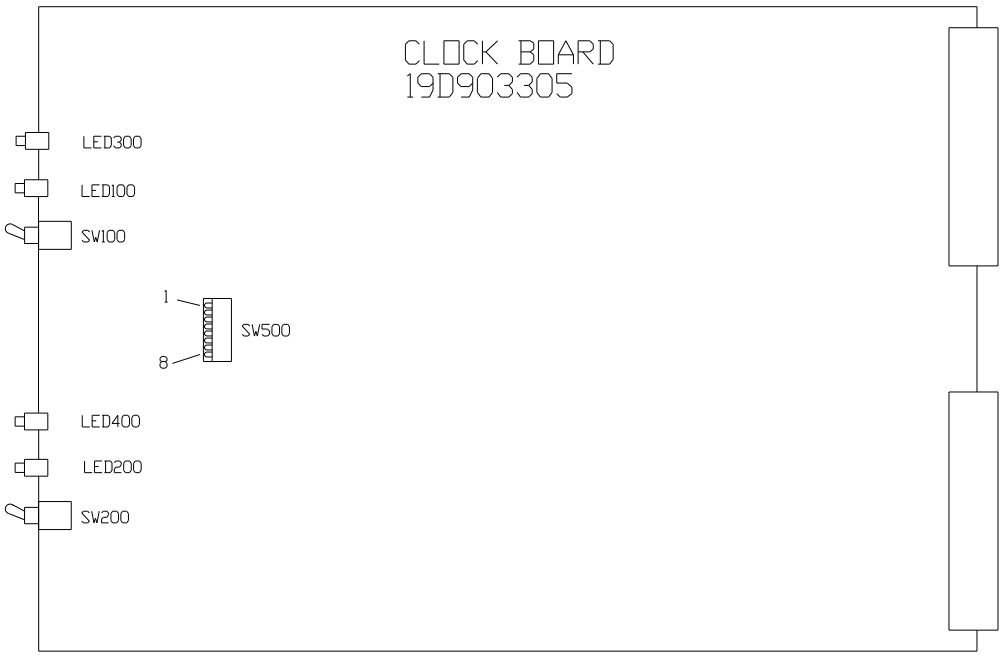
CONTROLLER BOARD
19D903299P1 & P3
(19D903515 Sh. 3, Rev. 4)



AUDIO BOARD
19D903302P1 & P3
(19D903515 Sh. 3, Rev. 4)



CI BOARD
19D903324P1 & P2
(19D903515 Sh. 3, Rev. 4)



DIP SWITCH SETTINGS

SW500 SHOWN IN DOWN POSITION

SWITCH 1 DOWN TONE B=2175HZ UP TONE B=8700HZ
SWITCH 8 DOWN TONE A=2175HZ UP TONE A=8700HZ
SWITCHES 2 THRU 7 NOT USED

CLOCK BOARD
19D903305P1 (Rev. E And Later)
(19D903515 Sh. 5, Rev. 0)

This addendum adds new information and corrects several minor errors that appear in the manual. The changes are sequentially listed below:

Page 5

In the section entitled "**AC POWER AND UPS EQUIPMENT**", add the following information to the second paragraph:

UPS equipment used with the CEC/IMC should have a specified switch-over time of less than 20 milliseconds. See the specifications in LBI-38662 for additional recommended UPS ratings.

Page 12

In the "CONCENTRATOR CARD-TO-CEC/IMC MANAGER INTERCONNECTION DETAILS" section of Figure 4, the DB-25 pin connector is incorrectly labeled. Pins 2 and 3 should be reversed.

Page 13

Figure 5 does not indicate the optional connections to the System Manager that can be made for NIM channel assignment monitoring at the System Manager. These connections are made at J11 on the Data Concentrator Card. J11 is a 50-pin Champ-type connector. A full-duplex modem is required if the System Manager is not co-located. In addition, the part number of the cable from the NIM Controller Board to the Data Concentrator Card is incorrect. It should be labeled "19D903628P61 - P63". In addition, "J12" at the Data Concentrator Card should be labeled "J13".

Page 21

Replace the first paragraph in the "**Wide Area Enable/Disable**" section (part of STEP 2 A – "**Group Call Parameters**") with the following paragraph (The change is *italicized.*):

Each group that will operate as a wide area group must be enabled for wide area operation at the System Manager. If wide area operation for a group is disabled, a console can only call the group *on its "default home site"*. For additional information on CEC/IMC firmware V3.0 (and later), review the sub-section entitled "Default Home Site/Home Group" under the section "**CEC/IMC Firmware V3.0 (And Later)**" (STEP 2 C).

Replace the first paragraph in the "**Automatic Tracking Enable/Disable**" section (part of STEP 2 A – "**Group Call Parameters**") with the following paragraph (The change is *italicized.*):

When automatic tracking for a wide area group is enabled, the CEC/IMC will only route wide area group calls to radio systems that have at least one unit logged on to *(tracked on) the group being called **or** if the group is forced to the radio system(s).*

Page 22

Add the following note concerning confirmed call:

NOTE

When the primary site is in Failsoft mode, digital calls will be confirmed and clear voice calls will not be confirmed.

Replace the second paragraph in the "**Wide Area Enable/Disable**" section (part of STEP 2 B – "**Individual Call Parameters**") with the following paragraph (The change is *italicized.*):

If wide area operation for a unit is disabled, a console can only call the unit if the console's default home site for the unit matches the *site that the unit is currently logged into.*

The "**Home Site Assignment**" and "**Home Group Assignment**" paragraphs (parts of STEP 2 B – "**Individual Call Parameters**") apply only to firmware prior to V3.0. See the section entitled "Default Home Site/Home Group" on page 24 for firmware V3.0 (and later) related information.

ADDENDUM NO. 1 TO LBI-38938

Page 25

Replace the first bullet paragraph on this page (part of STEP 4 B – "**Time Slot Configuration**") with the following paragraph (The change/addition is *italicized.*):

- Consoles should normally be allocated a single slot since they usually have only one microphone that can apply audio to the TDM bus via a CIM. *C3 Maestro consoles equipped with the Call Director patch option should be allocated 4 slots (each console).*

Page 26

In the section entitled "**STEP 5 - RADIO SYSTEM ("SITE") CONFIGURATION**", add the following note immediately after the first paragraph:

NOTE

The CNI systems are connected to the CEC/IMC via a MIM. Each CNI's MIM is limited to one (1) Audio Board.

Page 28

In the bullet paragraph entitled "• **Display Failsoft Indicator**" (part of STEP 6 B – "**Console User Profiles**"), delete the last phrase which states "and no failsoft indicators will be displayed". Failsoft indications at the consoles are supported in firmware prior to V3.0.

In the "**Send User Profiles**" paragraph, add the following sentence:

Verify the console is on-line before sending its console user profile configuration data.

Page 30

Change Step 7 "C." to Step 7 "D." and insert the following new information (new Step 7 C):

C. Set Switch Assignment Number

Before NIM call arbitration will operate correctly, special DIP switch settings are necessary ***at all MOM Controller Boards in the NIM or StarGate network****. These settings identify each Digital Audio Switch with a unique assignment number. At each MOM, six (6) DIP switch positions are used to assign the IMC or StarGate Controller a "switch assignment number". This number must be different at every Digital Audio Switch in the network. In addition, each number must be between 33 to 63 (decimal). DIP switch positions are set identically to the MIM site assignment numbers by setting the binary equivalent at SW1 position 8 (LSB = 2^0 = 1 decimal) through SW1 position 4 (2^4 = 16 decimal) and SW2 position 5 (MSB = 2^5 = 32 decimal). Set all MOM DIP switches as required.*

NOTE

The DIP switch drawings at the end of this manual and the customer-specific system documentation do not indicate the special MOM Controller Board DIP switch settings which are necessary if a NIM is installed in the Digital Audio Switch.

Page 39

Add the following information to the "**MOM Problems**" bullet list on this page:

- *Smart Call will not function*

Page 44

The statement "From this point forward" between steps 7 and 8 refers to steps 8, 9 and 10.

Complete Manual

All references to Spectracom® Corporation's "Netclock II" should be changed to "NETCLOCK/2™" or simply, "NETCLOCK/2".

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Page 28

In the bullet paragraph entitled "• **Display Failsoft Indicator**" (part of STEP 6 B – "**Console User Profiles**"), delete the last phrase which states "and no failsoft indicators will be displayed". Failsoft indications at the consoles are supported in firmware prior to V3.0.

In the "**Send User Profiles**" paragraph, add the following sentence:

Verify the console is on-line before sending its console user profile configuration data.

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Change Step 7 "C." to Step 7 "D." and insert the following new information (new Step 7 C):

C. Set Switch Assignment Number

Before NIM call arbitration will operate correctly, special DIP switch settings are necessary ***at all MOM Controller Boards in the NIM or StarGate network****. These settings identify each Digital Audio Switch with a unique assignment number. At each MOM, six (6) DIP switch positions are used to assign the IMC or StarGate Controller a "switch assignment number". This number must be different at every Digital Audio Switch in the network. In addition, each number must be between 33 to 63 (decimal). DIP switch positions are set identically to the MIM site assignment numbers by setting the binary equivalent at SW2 position 8 (LSB = 2^0 = 1 decimal) through SW2 position 4 (2^4 = 16 decimal) and SW1 position 5 (MSB = 2^5 = 32 decimal). Set all MOM DIP switches as required.*

NOTE

The DIP switch drawings at the end of this manual and the customer-specific system documentation do not indicate the special MOM Controller Board DIP switch settings which are necessary if a NIM is installed in the Digital Audio Switch.

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Add the following information to the "**MOM Problems**" bullet list on this page:

- *Smart Call will not function*

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The statement "From this point forward" between steps 7 and 8 refers to steps 8, 9 and 10.

Complete Manual

All references to Spectracom® Corporation's "Netclock II" should be changed to "NETCLOCK/2™" or simply, "NETCLOCK/2".

This addendum adds information on remote control data connections for the C3 Maestro console. A revised Figure 2 is incorporated. Note that Figure 2 has been expanded to two (2) sheets – Figure 2A and Figure 2B. Figure 2B (sheet 2) incorporates the required modem hook-up information.

REMOTE CONTROL DATA INTERCONNECTIONS VIA A 4-WIRE MODEM

Remote C3 Maestro Console

When a C3 Maestro is installed at a remote location from the CEC/IMC, serial control data must be routed via RS-232 connections and 4-wire modems. Since the C3 Maestro requires a dedicated or continuous serial link (non dial-up), a 4-wire leased line (or equivalent) meeting 3002 data grade specifications must be employed between the CEC/IMC and the C3 Maestro in a remote console installation.

Figure 2B shows typical control data interconnections for a remote console installation using RS-232 connections and full-duplex 4-wire modems. At the CEC/IMC Data Concentrator Card, RS-232 connections are made at J13, *not* J12. *Observe all notes listed in the figure if wiring an installation of this type.* Recommended modem settings are shown below.

See the *C3 Maestro Console System – Installation, Set-Up And Testing* maintenance manual, LBI-39055 for additional details on the C3 Maestro console.. LBI-39055 is included with the *C3 Maestro Console System* top-level maintenance manual, LBI-39062.

Recommended Modem Settings For Dedicated Line Control Data Interconnections

Modem Options

DCE Rate = 9600
Originate/Answer = Originate (CEC/IMC modem)
Originate/Answer = Answer (C3 Maestro modem)
V.32 Fast Train = Enabled
Auto Retrain = Enabled
Internal/External Clock = Internal
Dial-Up/Leased Line = Leased
2-Wire/4-Wire = 4 Wire
TX Level = (as required; use -15 dBm if line loss is 0 dB)
Dial Backup = Manual
Loop Back Time = 15 minutes
Dial Line = RJ11
Line Current Disconnect = Long
Long Space Disconnect = Enabled
V.22 Guard Tone = Disabled

MNP Options

MNP Protocol = Enabled
Auto Fallback = Enabled (or Normal)
Flow Control = CTS Only
XON/XOFF Pass Through = Enabled
Data Compression = Disabled
Inactivity Timer = Off
Break Control = 5

DTE Options

Synchronous/Asynchronous Data = Asynchronous
DTE Rate = 9600
Character Length = 8 Bits
Parity = None
Commanded Dialer = Asynchronous
AT Command Set = Disabled
DTR Control = Disabled
DSR = Forced High
DCD = Normal
CTS = Forced High
DTE Fallback = Disabled
Options = Retained At Disconnect

Test Options - All Disabled (or factory defaults)

Dial Line Options - (not applicable; leave at factory defaults)

Speaker Options

Volume Control = Low
Control = On Until Carrier Detect

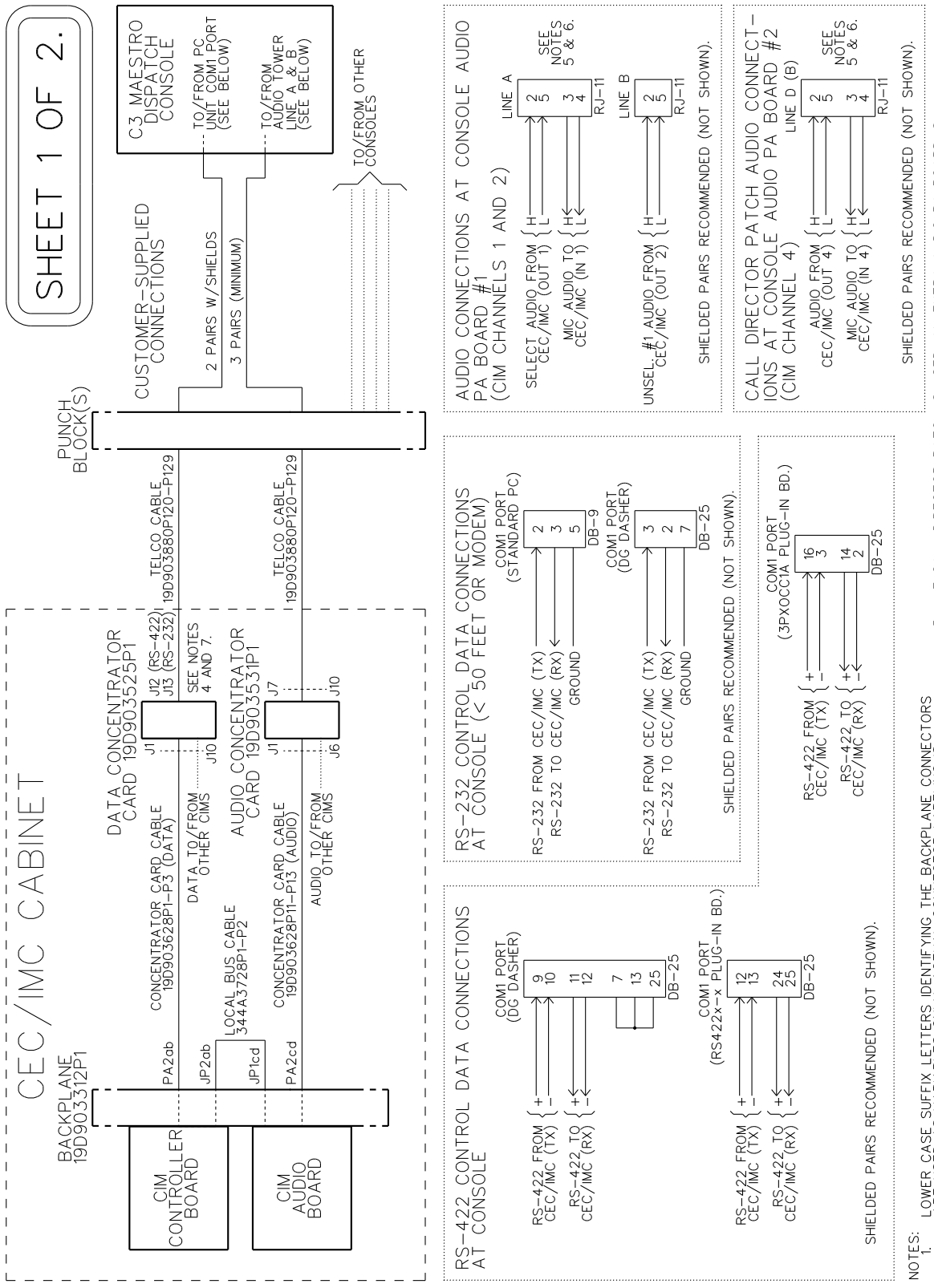

Figure 2A – Typical CIM Cable Interconnections (Co-Located Console)

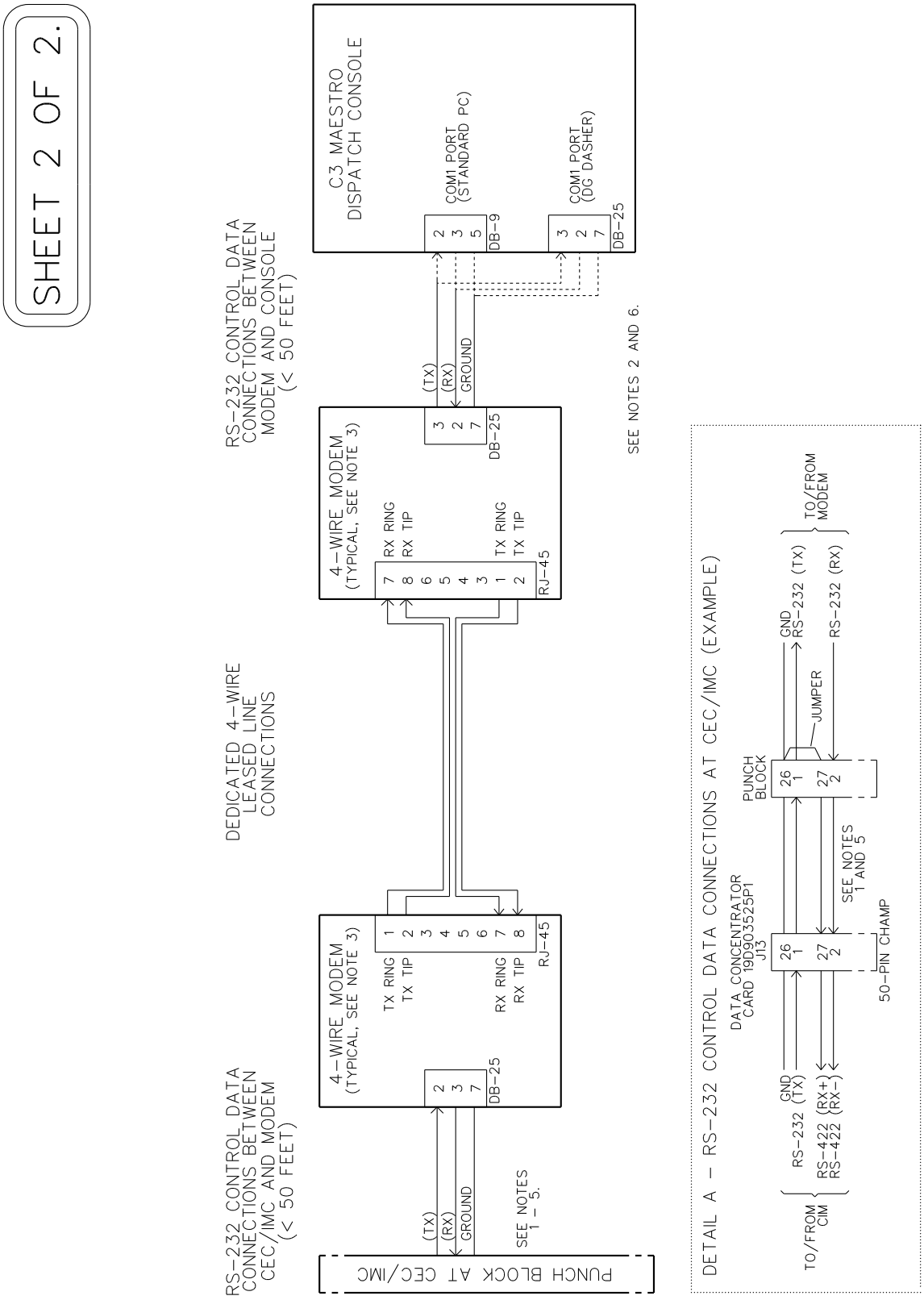

Figure 2B – Typical CIM Cable Interconnections (Remote And/Or RS-232 Connected Console)

This addendum updates DIP switch setting (DTE/DCE selection) information for CAM Controller Boards. The changes are sequentially listed below:

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The fifth paragraph in STEP 13 should be changed to:

SW2 position 5 should be set so the Controller Board operates as a DCE device by setting it "1" or "OPEN". The "0" or "CLOSED" setting selects DTE operation.

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On the CAM DIP switches (right side of page), SW2 position 5 should be shown in the up position ("1" or "OPEN"). This selects DCE operation.