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Alpha System Controller Manual V1.5

Revision History

Version	Modifications	Date
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1.1	Updated From Comments	4/8/99
1.2	Revised to include modifications for V1.02 software	22/9/99
1.3	Revised document layout	25/2/00
1.4	Revised & additional LVD safety instructions CN3311	30/11/00
1.5	Add Virtual SIU functional description	21/7/03

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DISCLAIMER

This manual contains information that is correct to the best of Audix Systems knowledge. It is intended to be a guide and should be used as such. It should not be considered as a sole source of technical instruction, replacing good technical judgement, since all possible situations cannot be anticipated. If there are any doubts as to exact installation, configuration and/or use, call Audix Systems at +44 (0)1799 540888

ACKNOWLEDGEMENTS

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Models Covered

This user manual covers the following equipment

- *Alpha* System Controller
- ITP100 Input Termination Panel

Alpha System Controller:

- AL1000 – standard *Alpha* System Controller.
- AL1100 – with 1 message card
- AL1200 – with 2 message card
- AL1300 – with 3 message card

Technical Support

In the unlikely event of you having problems with your *alpha* system controller please contact our Customer Services Department.

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Development

Our Research and Development Department are continuously improving the operation and functionality of our products. If you have any comments on future requirements of our products please contact our R & D department at the above address

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1 Specification

1.1 Specification

Model	Alpha & Alpha network System Controller
Matrix Capacity	15 x 16 Analogue Audio Switching Matrix
Audio input	12 x Electronically balanced line level, 0dBu 10K ohm
Message Card (optional)	3 x Cards with max of 10 messages/card, 0dBu 40 ohm
Audio output	16 x Electronically balanced line level
Audio output monitoring point (front panel)	3.5mm jack socket (output select via LCD control panel)
Frequency Response ($\pm 1/2$ dBu)	20Hz to 20kHz
EQ controls	
Bass	± 10 dBu at 100Hz
Treble	± 10 dBu at 10kHz
Distortion	Better than 0.05% THD
Signal/Noise (0dBu input)	Better than -80dBu (22Hz-22kHz)
Sensitivity (0dBu output)	-30dBu to +25dBu
Control panel data port	8 x serial RS485 data links (unique protocol)
I/O control input port (switch-in)	16 x input port 0V to 5V (configurable active high or low)
I/O control output port (switch-out)	16 x output port open collector (configurable active state) (wake up feature utilises output port 16)
I/O control output port sink current	200mA max
I/O control output port open circuit voltage	50V max
General:	
Mains supply (V)	230V AC. +/- 10%, 50-60Hz
Backup supply input	24V DC (nominal). To be fused at source 10A max.
Supply output (external equipment)	24V DC (nominal) 2 Amp max
Power Consumption (W) (with 3 message cards)	19W (excluding auxiliary power output)
Heat Dissipation (W) (with 3 message cards)	19W
Dimensions(length, width, Height in :mm)	19" Rack Width 2 U High (89mm x 432mm x 325mm)
Weight (kg)	7 kg
Operating temperature range (°C)	0°C to 40°C
Standards	Meets or exceeds the requirements of BS5839.
	Compliant with EMC standards, EN 50081-1:1992, EN 50082-1:1998, EN 60555-2:1987
	Compliant with LVD safety standards; BS EN60065:1998

Back up Supply Consumption (with mains disconnected)

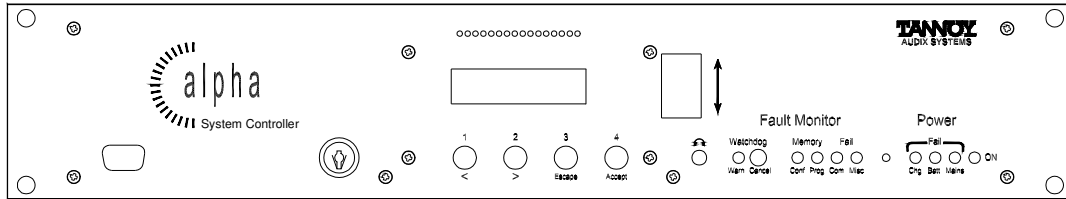
This is current drawn from the 24V battery supply under quiescent conditions.

Current drawn from the auxiliary supply output **must** also be taken into consideration.

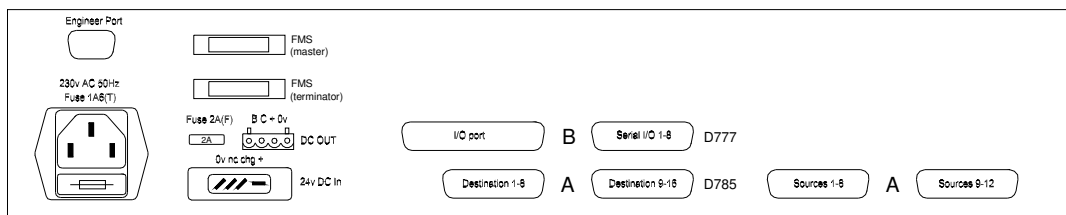
AL1000 - 218mA	AL1100 - 250mA	AL1200 - 282mA	AL1300 - 314mA
Approximate current requirements from standard desk microphone units.			
SMU8 – standard	75mA quiescent	145mA maximum (LED's illuminated)	
SMU16 – standard	80mA quiescent	220mA maximum (LED's illuminated)	

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1.2 Front View



1.3 Back View



1.4 Brief Description

The purpose of *Alpha* System Controller is to switch or 'route' Public Address / Voice Alarm signals from an announcement station i.e. a microphone to a speaker zone or zones.

The *Alpha* can interface various announcement stations and other line level audio inputs such as a CD or cassette player.

The audio switching matrix with digitally controlled input volume, bass and treble controls, switches or 'routes' the audio signals to the power amplifiers.

Requests for a 'route' from the announcement stations are made to the microprocessor within the *Alpha*.

The microprocessor manages these requests with regard to their priority.

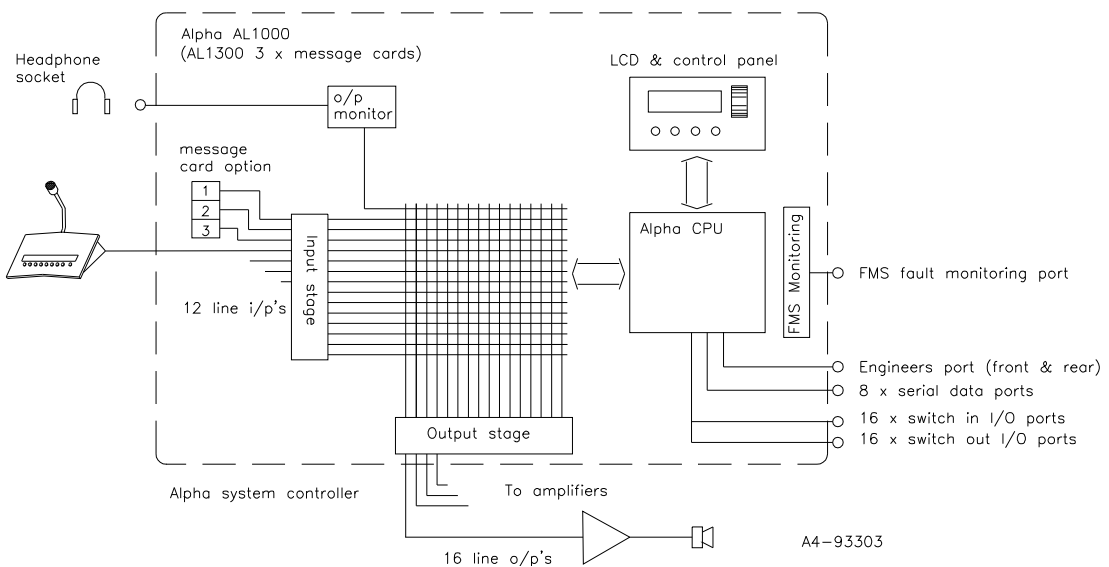
On a request being valid i.e. no request of a higher priority is being made for the same outputs or 'destinations' the audio switching matrix is 'routed'.

The announcement station may have one or multiple zone (routing) selectors.

The configuration of these selectors can be programmed with regard to the input source, output destination or destinations and their priority.

This configuration is held in memory within the *Alpha*.

1.5 Alpha Block Schematic



1.6 Audio Features

- The D774 audio card provides circuitry for all audio switching and conditioning.
- Routing is achieved by a 15 x 16 audio cross-point matrix.
- Up to 3 optional "plug in" D776 message cards may be fitted without loss of user inputs.
- 12 Line level inputs each with digital Volume, Bass, and Treble EQ controls.
- 16 Balanced Line (0dBu) outputs with a frequency response of 20Hz - 20kHz.
- Monitoring of the matrix outputs via front panel headphone socket.
- Control of the matrix card is performed by the D777 *alpha* CPU.

1.7 Controller Features

- The D777 CPU card provides control of all the *alpha*'s operations.
- The CPU card features a 32-bit processor with RAM and Flash memory.
- The Flash memory contains the *alpha* firmware and the *alpha* configuration which can be downloaded from a PC via the engineers port
- 'D' type plugs located on the rear panel provide connection for I/O and serial data ports.

1.7.1 Parallel I/O Ports

- The *alpha* has 16 open collector switched outputs. These can typically be used to provide volume control override (VOR), channel live, busy or to control 3rd party equipment.
- Output 16 is typically reserved for the WAKE UP signal to the vector amplifiers.
- Systems using SMU16 Mk1 and PMCV microphone units one output must be used to provide a chime/enable signal.
- The *alpha* has 16 x 5volt logic level switch inputs
- These inputs maybe used as PTT's inputs from SMU1, fist mic, non-monitored alarm contacts, timer contacts etc.
- The configuration of both input and output ports is programmable via the ACS *alpha* Configuration Suite.
- Each I/O port maybe configured as either active high or active low.

1.7.2 Serial Data Ports

- The *alpha* has eight RS485 Serial data ports. These data ports are designed to interface to Audix SMU's (8 and 16), VMU's and MSL multiple selector microphone/control units.
- The microphone/control unit zone selectors activate routing configurations held within the *alpha*.
- Each serial link port maybe configured to report microphone/control unit and data link faults to the FMS system.

1.7.3 Engineers Port.

- RS232 engineers 'ENG' ports are provided at both the Front and Rear panels.
- An *alpha* configuration PC maybe connected to this port via a standard 9 way Null modem cable.
- Using the PC based Audix Configuration Suite, current configuration settings can be uploaded and interrogated or new system configurations written and downloaded.
- Firmware upgrades are also possible on-site via the engineers port.

1.8 Message Cards - D776 (OPTION)

Each Message Card fitted to the *alpha* features:

- Digital Volume, Bass & Treble controls on each message card.
- 20kHz surveillance tone generator on message cards.
- Either SIU's or alpha I/O ports (switch-in) may control the message playback and routing.
- Each message card provides single audio channel playback. If two simultaneous audio signals are required, for example "evacuate" and "alert", then two message cards are required.
- Up to two EPROM's maybe fitted each with 4 or 8 Megabits of memory
- This memory space maybe configured with up to 10 messages or 'segments', the sum of the time required by all the segments determines the amount of memory required.

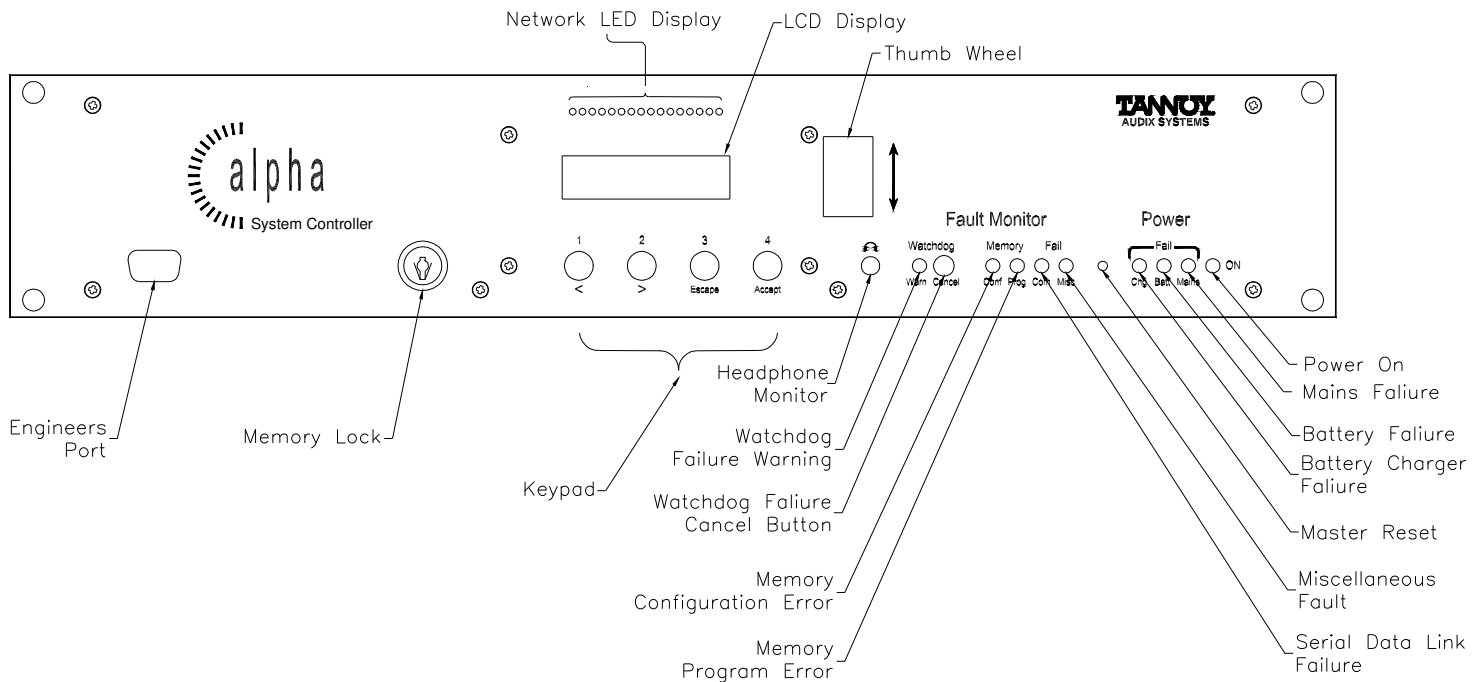
Record Times at supported sample rates (reproduced bandwidth)	8kHz (~3.5kHz bw)	12kHz (~5.5kHz bw)	16kHz (~7kHz bw)
16bit recording on 2 x 8 Mbit EPROM	130 sec	86 sec	65 sec
16bit recording on 2 x 4 Mbit EPROM	65 sec	43 sec	32 sec

- Each message segment can be configured as a 'Message' with independent Volume, bass, treble and playback modes (play while held, play to end.)
- It is possible to configure each message with a silent 'gap' of 0 to 255 seconds after playing, before the message is repeated
- Messages can be selected by a source button, and then separately routed by a zone selector on a SIU i.e. from a control panel one of a number of messages maybe selected using the source selector. This can then be routed by the zoning keys.
- Where this type of operation is configured the user can elect to use the 'normal' input source such as the microphone by selecting the zone and PTT (press to talk) button, but not selecting a message source.
- Message cards can be configured as surveyed sources, this is essential for critical path monitoring. The message card would be configured to produce an inaudible continuous 20kHz tone. The matrix is activated every 30 seconds to switch this and other surveyed sources (message card or input) in turn to the surveyed outputs, resulting in an output pulse every 30 seconds, this is detected by the FMS monitoring equipment. If more than three inputs are programmed for surveillance, the FMS monitoring response time will exceed the 100second limit specified by BS5839.
- Audix Systems offers a service to prepare, record and programme the messages on to EPROM

Engineers note: It important to note that adjusting the volume of the emergency messages, after a system has been accepted by a Fire Officer should be under taken with great care. Adjustment of these controls will effect the sound pressure level at all the speaker zones.

2 General User Facilities

2.1 Front Panel Controls and indicators.



2.1.1 LCD and control panel:

The majority of the controls may be accessed via the LCD using 4 buttons and a thumb wheel:

- Menus of control and utility functions.
- Inspection and adjustment of Audio control settings.
- Display of CPU fault reports and warnings.
- Configuration changes via the control panel (**non-network alpha units only**).
- Activation of embedded program firmware download to Flash memory (via PC).
- A means to verify configuration and firmware file names held in the flash memory.
- Access to these settings is restricted by a number of PIN access levels.

2.1.2 Diagnostic Facilities.

The LCD and control panel also provides built in diagnostic facilities:

- Test functions are built into front panel menus.
- Echo of serial unit button status.
- Activation (overriding) control of serial unit button status.
- Echo of I/O port status to the display
- Activation (overriding) control of I/O port states.

2.1.3 Memory Protection Facility.

A front panel mounted key switch provides a memory write-protect lock to prevent accidental reprogramming or erasing of the *alpha* settings. The key switch also allows access to the set-up menus without the need to enter the PIN code).

2.1.4 Reset Facility.

A non-latching master reset switch accessible only with a small implement resets all of the cards within the *alpha*.

2.1.5 LED Indications

The front panel of the *alpha* is equipped with LED indications for fault warnings and PSU status (FMS).

Front panel LED Indicators as shown from right to left are described below.

LED Name	Colour	Description
ON	Green	This indicates the <i>alpha</i> is running either from Mains or Battery.
Fail Mains	Yellow	Indicates the mains supply to the <i>alpha</i> has failed.
Fail Batt	Yellow	Indicates battery supply failure.
Fail Chg	Yellow	Indicates battery charger failure or disconnect.
Fail Misc	Yellow	Indication of miscellaneous faults.
Fail com	Yellow	Indicates communications errors or failure between the <i>alpha</i> and serial data control panels. Utilising the LCD menu system the faulty serial link can be located.
Memory Conf	Yellow	Indicates configuration memory error (resulting in a CRC error).
Memory Prog	Yellow	Indicates embedded program (firmware) memory error.
Watchdog Warn	Yellow	A latched indication of processor reset or 'watchdog'. A button is provided to cancel this fault indication.

The *alpha* also provides an opto-isolated bus interface to the Audix Fault Monitoring System (FMS).

Failures relating to the *alpha* are indicated at the FMS master panel along with faults from other system equipment, relating to that suite of equipment racks. A 'one-shot' pulse to the FMS is provided on each fault occurring within the *alpha* and displayed as a "New Fault".

3 Accessing controls and programming the *alpha*.

Restriction of un-authorised tampering is a prime consideration in *alpha* based systems. A progressive series of access restrictions has been designed into the *alpha*. These access level restrictions directly correspond with the requirements of the UK Code of Practice BS5839 and are listed in the table.

Access Type	Access Level	Alpha Protection	Config. Suite Protection
Passer By	Level 1	Locked cabinet	Software Issued to registered users only
Operator	Level 2	Password 1 (1383)	Password 1 (1383)
Engineer	Level 3	Password 2 (1039)	Password 2 (1039)
Engineer	Level 4	Key switch	
Super User	Level 5	Hardware	Firmware requires (controlled software) Passwords Set In config suite (OLDA11)

The actions allowed to users at each level are detailed in the following table, with important points described in more detail in the following paragraphs of section 3.

Menu	Level 1 access	Level 2 access	Level 3 access	Level 4	Level 5
Vol/EQ/surv	No access	View	View	Change	Change
Virtual SMU	No access	View	Operate	Operate	Operate
Headphone monitor	No access	Use	Use	Use	Use
View/edit Configuration	No access	View	View	Edit	Edit
Upload Config	No	Yes	Yes	Yes	Yes
Download Config	No	No	No	Yes	Yes
Clear faults	No access	Clear FMS faults	Clear SIU counters	Clear SIU counters	Clear SIU counters
I/O port control	No access	View	Operate	Operate	Operate
Live inputs	No access	View	View	View	View
Modify Firmware	No	No	No	No	Yes
Modify Hardware	No	No	No	No	Yes
Set Password	No	No	No	No	Yes

3.1 Access Level 1. “Passer by”

Level 1 access is achieved by installing the *alpha* behind glass doors, making fault indications visible, but restricting tampering.

Similarly a ‘Passer By’ should not be allowed access to the PC based configuration suite.

3.2 Access Level 2 “Operator”

Password 1 allows the user to inspect configuration, volume, EQ and Surveillance setting from the *alpha* front panel, and to Upload the *alpha* configuration to a PC and view it with the configuration suite.

There is no effect on system operation, even if left accidentally open.

3.3 Access Level 3 “Maintenance Engineer”

Using password 2 will allow most of the “Engineer” functions, with the exception of downloading configuration changes to the *alpha*, or making changes from the front panel.

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Configuration changes can be made in the configuration suite, but the file cannot be downloaded.

This level allows the Maintenance Engineer to operate the diagnostic 'Virtual SIU' and I/O port controller. Note that these operations may intrude on the normal operation of the system.

3.4 Access Level 4 “Commissioning Engineer”

On turning the key switch the password is bypassed and full level 4 access is granted to the user.

This allows downloading of configuration changes to the *alpha*. Configuration changes to Volume, EQ and surveillance settings can also be made from the front panel at this level. Upgrading of Firmware in the *alpha* at ‘access level 4’ is generally not allowed in BS5839 compliant systems. However for other systems it may be appropriate and the ability to perform firmware upgrade at ‘access level 4’ may be permitted by the “Level 5” user, and is described below.

Note: For Level 4 User access a Key is required, but not a password.

3.5 Access Level 5 “Super-user - OEM”

By use of the key switch and an internal jumper J1 (accessible only with the use of special tools) ‘Level 4 user’s can be restricted from performing a firmware download.

A firmware upgrade is achieved by downloading new embedded software via the ENG port into the flash memory.

To prevent any firmware changes it is possible to fit Flash ROM devices with “Sector Protection” set.

This is carried out the use of an external programming device.

This action cannot be reversed by any actions to the *alpha* at access levels 4 or below. This is not considered a standard feature and should only be implemented when absolutely necessary.

Note that “Sector Protection” is only available when AMD Flash ROM chips are used in the *alpha*.

Level 5 Access to the configuration suite allows the user to change the lower level passwords and download them to the *alpha*. Password can only be modified from the *alpha* configuration suite at Super-user level. Changes to the passwords cannot be made from the front panel.

In essence these level 5 privileges allow the Engineer access level 4 to make use of distinct advantages of the *alpha*’s Flash Memory system in applications where restrictions of BS5839 are not appropriate.

“OEM” access requires the removal of the cover from the *alpha*, which in turn requires the unit to be slid out of its normal location within the equipment rack.

Setting the Jumper J1 on the D777 CPU Card configures the level of memory write protection the key switch.

*	OMIT	Key enables writing to configuration memory only
	FIT	Key enables writing to program (Firmware) and configuration memory

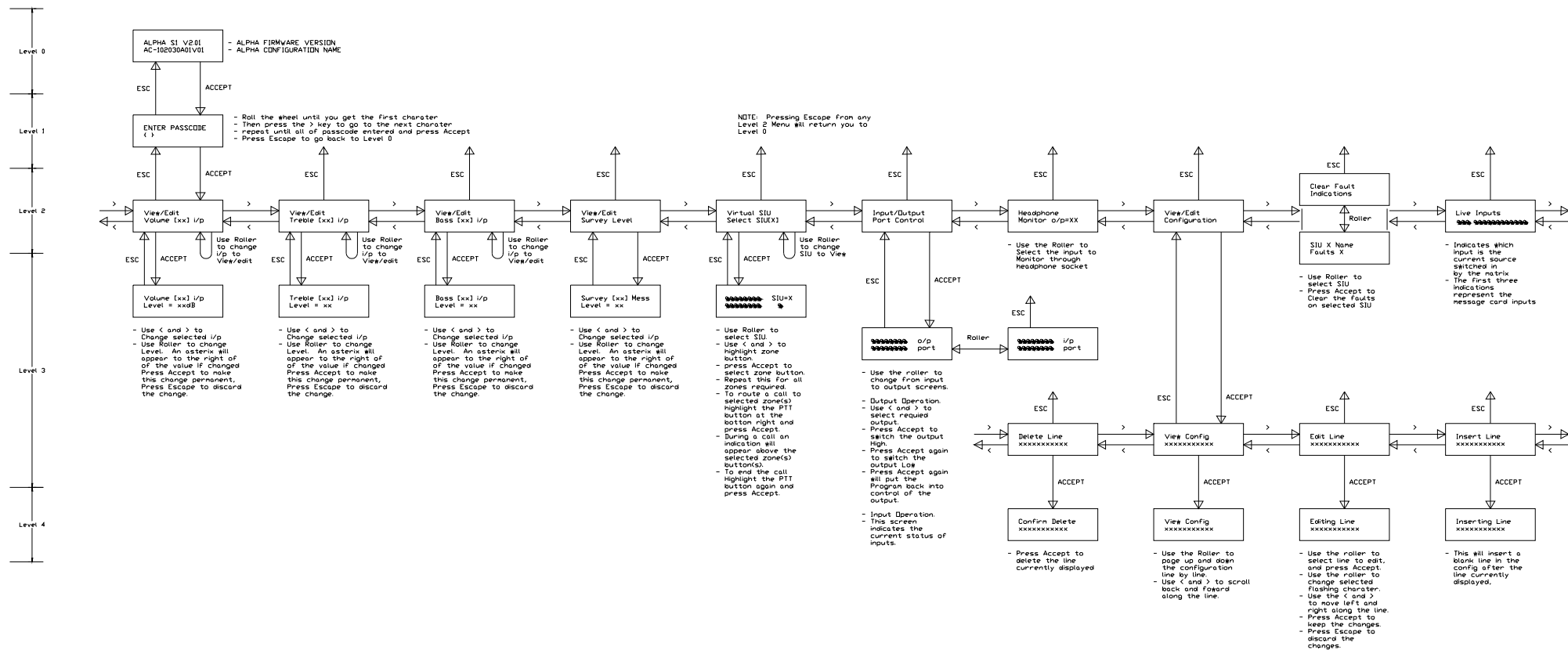
Default Position *

Level 5 User access, Key and special tools required (but No password).

Note:

For BS5839 compliant systems J1 on the D777 CPU Card MUST be removed.

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alpha Menu Descriptions (Super-user Access)

4 Configuration & operational Features

4.1 *alpha* Configuration Suite (ACS)

Before the *alpha* can be used in a 'system' it must be configured using the *alpha* configuration suite.

The *alpha* system maybe engineered and configured to meet specific customer requirements. Refer to the *alpha* Configuration Suite user manual.

The *alpha* is a fully configurable switching matrix, allowing the user to configure zone selectors with sources, destinations, priorities, volume, EQ levels, and messaging facilities.

The ACS is a Windows based programme that allows the user to configure the various settings available within the ACS. The ACS generates an ASCII text file from these settings.

The ASCII text file can be downloaded to the *alpha* or uploaded to the configuration PC for interrogation and modification.

The ACS also checks for syntax errors within the configuration.

Programming from the PC is performed using a standard Null modem cable between a spare comms port on the PC and the *alpha*'s ENG port.

Uploading and downloading files is possible while the *alpha* is operating with no significant loss of functionality, other than any programming changes.

The *alpha* MUST be restarted for downloaded changes to take effect. This will occur automatically on completion of the download.

On the front panel dedicated menus are provide to allow easy adjustment of settings such as volume, bass and treble etc.

More advanced programming is also possible using the built in *alpha* text line editor. Any changes made to the configuration from the front panel WILL NOT be checked for syntax errors. This option is disabled on the Network *alpha* versions.

When the *alpha* is rebooted the configuration is read in to the CPU and compared against a template, any line not compatible with the template will be ignored.

The *alpha* maybe sold without the ACS but the advantages of this software programmer far outweigh the difficulty of programming the simplest systems from the *alpha* front panel.

The ACS software is protected from illegal copying by use of a hardware "dongle"

4.2 I/O and 'Button' Features

Inputs	
AUDIO in (Source)	Line Level
	Message
CONTROL (Serial Link)	Serial control unit
	i.e. SMU8 microphone
CONTROL(PTT) (I/O port switch-in)	N/O Switching Contact
	N/C Switching Contact

Outputs	
AUDIO out (Destination)	Line Level O/P to Amplifier(s) etc.
CONTROL (LIVE) (I/O port switch-out)	Output pin enabled when audio input channel active 'LIVE'
CONTROL (BUSY) (I/O port switch-out)	Output pin enabled when audio output or destination active 'BUSY'
CONTROL(TRIGGER) (I/O port switch-out)	Output pin enabled when Button (serial unit) or switch-in pin active 'TRIGGER' (operates separately to matrix routing)

4.2.1 Priorities

Both PTT type I/O ports and buttons of a serial input unit are configured with priority settings. Busy thresholds within the alpha can be configured at any priority level.

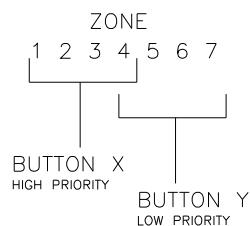
There are two busy thresholds, one of which is the level at which the busy indicators are activated on the SIU serial interface units. The other is the level at which the busy I/O output ports are activated.

Where buttons are configured below the busy threshold busy outputs are not generated. This type of configuration would typically used for background music applications.

TYPICAL PRIORITY LEVEL SETTINGS	
BUSY LEVEL	
250	FIRE MIC
220	EMERGENCY MESSAGE CARD
100	PAGING MIC
20	BUSY THRESHOLD
15	BACKGROUND MUSIC

4.2.2 Button Over-ride

This is a configurable feature of the *alpha* routing selectors i.e. either a serial control unit button or the switch-in 'PTT' ports.



Where button X is pressed the signal is routed to Zones 1-4
 Button Y will appear busy, this is because it shares Zone 4
 If Button Y user has a lower priority 'his' call can NOT be made.

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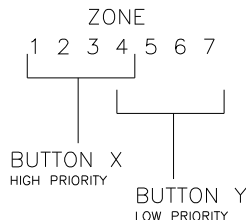
Where button Y is pressed and the signal is routed to Zones 4-7

Button X will appear busy, this is because it shares Zone 4

If Button X user activates 'his' button then Button Y will be overridden i.e. Button Y audio will be disconnected from zones 4-7 and Button X audio will be connected to Zones 1-4.

4.2.3 Zone Over-ride

This is a configurable feature of the *alpha* routing selectors i.e. either a serial control unit button or the switch-in 'PTT' ports.



Zone override is where only conflicting zones of a low priority user are overridden. Unlike button override where a single conflicting zone on button overrides the whole of the lower priority button.

Where button X is pressed the signal is routed to Zones 1-4

Button Y will appear busy, this is because it shares Zone 4

If Button Y user has a lower priority, the call will only appear at Zone 5,6 & 7 (Button X has zone 4).

Where button Y is pressed the signal is routed to Zones 4-7

Button X will appear busy, as it shares Zone 4

If Button X user activates 'his' button then Button Y will be overridden on zone 4 only i.e. Button Y audio will be disconnected from zone 4 and Button X audio will be connected to Zones 1-4.

4.2.4 Zone Selector Button Indications

Serial control units such as the SMU8 microphone have busy (red) and Confirm (green) indicator above each zone selector button.

When broadcasting to selected destinations the LED indications are as follows:

- Busy only - All destinations are being utilized by a higher priority user.
- Confirm only - All selected destinations have been achieved.
- Busy & Confirm - Only some of the selected destinations have been achieved.

i.e. If button Y is pressed and routed to Zones 4-7

Button Y will show Confirm

Button X will appear Busy

When button X is pressed it will route zones 1-4 and show the X button Confirm light.

The Y button will now only route to zones 5-7 and will show both the Confirm and Busy lights, indicating that some, but not all of the possible routes are made.

4.3 I/O Control Inputs

4.3.1 PTT

Each PTT input pin may be configured to route a specific source to a destination or destinations.

The source may be a line level input or a message card input.

In effect the PTT input may be used to interface SMU1 microphone units or switch panels.

Each PTT Input pin can be configured on a specific 'switch-in' pin of the I/O, and can be configured to accept either a normally open or normally closed contact.

The priority of the PTT is set in the configuration.

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As with the serial link controls the PTT can be over-ridden by either button or zone override.

4.3.2 Trigger

An I/O port switch-out maybe 'triggered' by an I/O port switch-in, this can be either within the *alpha* or across the Network to any number of *alpha*'s.

4.4 I/O Control Outputs

4.4.1 BUSY

Where a route is active and the priority of that route is higher than the Output Busy Threshold level an I/O port switch-out pin can be activated.

This is achieved by configuring the switch-out pin to mirror the state of an audio destination or destinations (it's busy status).

4.4.2 LIVE

An I/O port switch-out maybe configured to activate on an input source going LIVE i.e. the input channel is routed to at least one destination.

4.4.3 TRIGGER

An I/O port switch-out maybe 'triggered' by an I/O port switch-in or by a serial control unit button.

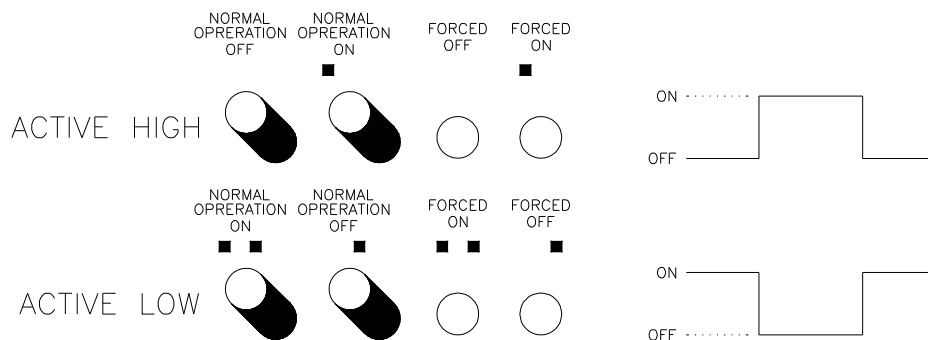
These can be either within the *alpha* or across the Network from any number of *alpha*'s.

4.5 I/O Port Controller PIO Operation

The status of each input and output I/O port can be monitored from a menu on the LCD control panel on the *alpha* front panel.

The I/O ports can be manually controlled at level 3 User access and above. This where the port state can be forced high or low irrespective of it's operational state.

This can be achieved by Selecting the I/O port required from the menu and press the ACCEPT button to set the selected state.



Live Input Monitoring

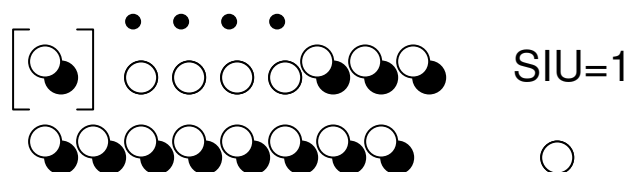
The status the audio inputs and message cards can be observed via the Live Inputs menu on the LCD control panel of the *alpha*.

Shown below Message Card 1 and Line Input 3 are Live



4.6 Virtual SIU

The status of each Serial Interface Unit (SIU), in other words an SMU8/16 or MSL1000, can be monitored from a menu on the LCD control panel on the alpha front panel. This function allows



the routing and configuration to be tested without physically connecting serial port microphone. The buttons on programmed serial input units can be manually controlled at level 3 User access and above.

This can be achieved by Selecting the virtual SIU port required from the menu and press the ACCEPT button to set the selected state.

This presents the screen shown above. Each of the 16 “buttons” represents the 16 buttons on a microphone panel. The far right hand “button” is the PTT. Each button has a Busy and Confirm indication (ie the diagram above shows buttons 2, 3, 4, 5 selected, the PTT pressed and 4 Confirm lights for the selected buttons).

Select the button you want to press by using the < > keys and press Accept.

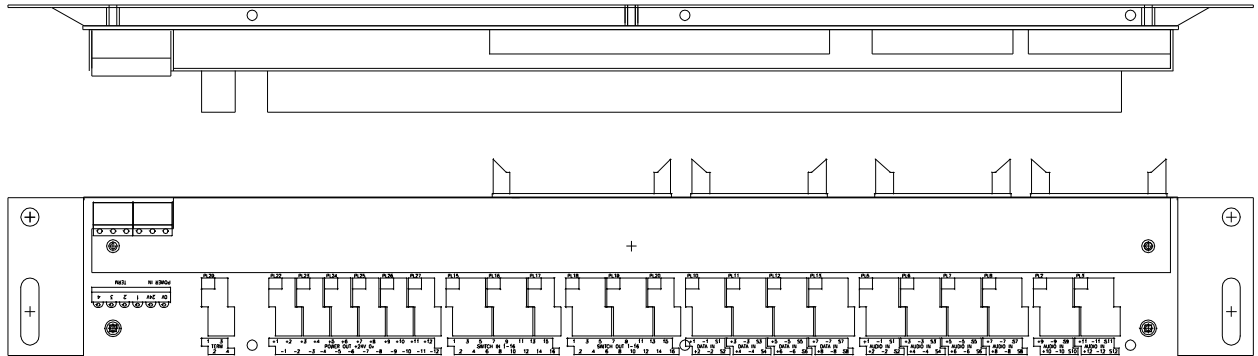
To activate the “microphone” press the “PTT” button

This will have the effect of routing the selected microphone or message input to the selected zones AS DETERMINED BY THE CONFIGURATION. Only SIU channels that have been configured can be operated from the front panel.

Note; You can use the Virtual SIU screen to monitor actual microphones on the Alpha. If a user operates the zone select and PTT on their mic, the Alpha screen shows the zone buttons and confirm and busy indications of that mic.

5 Additional System Hardware

5.1 ITP100 Termination Panel



The ITP100 termination panel allows connection of audio input and control signal site cabling to 2.5mm² screw terminals.

These screw terminals are connected to the audio inputs and control ports of the *alpha* via twisted ribbon cables and connectors

The ITP100 includes a 19" rack mounting chassis, which is approximately 2U high.

The unit may be mounted horizontally across the rear of an equipment rack on the standard fixings.

A steel cover provides protection of a small number of electronic components and fuses. This cover may also be used to mount wiring designations specific to that system.

Connection of the *alpha* audio outputs is **not** provided by the ITP100. These 16 line level outputs are via two 25way D-type male sockets on the back of the *alpha*.

The ITP100 provides 12 distributed, fused 24V outputs. These are typically used for powering SMU's but can also be used to power other 24V equipment. Each output is protected by a 500mA (T) 20mm fuse. Total Current across all of these outputs must not exceed 2A Max.

When interfacing to Vector power amplifiers a 5 Volt pulse is required as a wake up signal. The ITP100 provides interface hardware at switched output 16 to implement this. A jumper on this output can select output 16 to operate as either an open collector or as a 5V output.

A green LED shows the status of switched output 16 indicating operation of the wake up signal.

Engineers Note: When programming output 16 in the programming suite it should be set HI.

Using the alpha it is possible to force the wake up signal ON. This is achieved by the PIO function of the alpha control panel. A level 3 and above access level is required - go to the switched O/P's and select output 16. Press Accept twice to force the output ON. Press Accept once more to return the output to normal operation.

4 additional 'through' terminal blocks are provided for other site connections (wired 1 : 1).

5.2 Input Controller Panels

Audix offers a range of standard and purpose built Input Control Panels.

Generally these units may include a number of the following options:

- Desk, wall or equipment rack mounting.
- Single or multiple selection buttons generally used for zoning.
- General zone selector configurations 1, 8, 16, 32 and 96
- Single button unit (PTT press to talk) using switched pair to *alpha* (I/O switch-in).
- Multi button units using *alpha* serial data link (reducing cable cores).
- Zone selection buttons PTT and microphone (microphone consoles).
- Zone selectors without PTT and microphone (BGM or message controllers).
- Control of microphone or audio source such as a CD player.
- Control of pre recorded messages within Alpha system.
- Control of pre recorded messages from an external source.
- Built-in microphone pre-amplifiers (Note *alpha* audio input is **line level**).
- Pre announcement chime and audio limiter available with Pre amplifier option.

For instance the standard range of SMU desk mounted microphone consoles offer:

SMU1

- Goose neck microphone.
- Single PTT button.
- Speak and busy LED indication.
- Microphone level output.

SMU8

- Goose neck microphone
- 8 zone selectors with busy and confirm LED indication per selector
- PTT button and speaker indicator
- Microphone to line level pre amplifier
- Digital audio stage offering audio limiter, digital chime and 20KHz-surveillance generator.
- Button, confirm and busy data received and transmitted over RS485 serial link pair.
- Button designations protected by a clear cover.

SMU16 (as SMU8 with)

- 16 zone selection buttons

SMU32 (as SMU8 with)

- 32 zone selection buttons

VMU96

- Generally used on Networked systems
- Based on PC system with VDU screen, mouse and desk mounted microphone unit (SMU1).
- Up to 96 zone selectors with busy and confirm indication.
- Buttons selectable on screen via mouse/touch screen.
- PTT button selectable on screen via mouse/touch screen or on microphone unit.
- Button, confirm and busy data received and transmitted over RS485 serial link pair.
- Interface unit connecting microphone, PC and serial link.

6 Fault Monitoring Features

Audix offers the opportunity to monitor the audio path of public address and voice alarm systems.

This monitoring is carried out using the Fault Monitoring System or 'FMS'.

The FMS system offers a wide range of monitoring options:

- Audio path.
- Serial data link.
- Control contacts.
- Amplifier.
- Mains and battery supplies

For voice alarm systems that comply with BS5839 require all of the above to be monitored on critical paths and components. Critical paths are those paths through the voice alarm system that rely on equipment and the connections between them to achieve a voice alarm broadcast.

As the *alpha* forms a major part of the signal control and routing, it is a critical component and therefore requires monitoring. The *alpha* can also be configured to perform monitoring on other critical paths and components connected to it.

Each voice alarm system that is to comply to BS5839 and other standards requires to be specifically designed to achieve that end.

6.1 Supply Monitoring

The *alpha* provides fault monitoring of the primary and secondary power supplies.

- Mains
- 24 Volt Battery

Indication of supply failure is in the form of front panel LED's

- Mains supply failure
- Battery supply low voltage/failure
- Charger failure (fault line from external charger)

Detection of these supplies is repeated at the FMS unit.

Indication that 'power' is present from either of the supplies is in the form of a green 'power on' LED.

6.2 Audio monitoring

Monitoring of the critical audio path generally requires the signal path through the following components and connections:

- Microphone capsule.
- Microphone pre amplifier.
- *alpha* audio stages including the switching matrix.
- Power amplifiers.
- End of speaker line.

The input source that is to be monitored may be a line level input from another voice alarm system or messages stored internally/externally to the *alpha*.

The audio fault monitoring system relies upon generation of a 20Khz surveillance tone.

This tone is injected or mixed into the audio input source.

alpha User Manual

The signal from this input source including the surveillance tones is routed to the speaker circuit. A 20KHz FMS detector module at the end of the speaker circuit detects the presence of the surveillance signal.

On a fault occurring in this path a fault indication is displayed at the FMS unit (once the detector timeout has been reached).

Under both broadcast and non-broadcast conditions the signal from the surveyed input source is routed to the speaker circuit detector in a short burst or pulse (the route is 'made' for approximately 20ms).

Where a number of input sources are to be surveyed, each source is sequentially routed to the speaker circuit detector. This surveillance 'routing' occurs every 30s. If a fault occurs in any one of the critical input sources, one of the 'pulses' in that sequence will not emerge from the *alpha* matrix, thus causing a fault to be detected.

6.2.1 Microphone Unit Surveillance

Standard SMU range of microphone units *Except the SMU1*.

A 20KHz surveillance tone is automatically generated within the SMU.

This signal is injected or 'mixed' into the critical route within the SMU.

Failure in any part of the audio circuit, including open or short circuit of the microphone capsule will result in the level of surveillance tone being reduced to an undetectable level.

The FMS will detect the failure of the surveillance signal to emerge from the microphone unit. This is generally achieved by the speaker circuit detectors, although line level detectors maybe connected at the microphone input to the equipment rack to aid fault diagnostics.

Surveillance of the serial data from the SMU's is carried out by the *alpha*. This is described under the heading 'Data Path Surveillance' below.

6.2.2 Microphone Surveillance (using pre amplifier)

Microphone units without a built-in surveillance generator *i.e. SMU1* maybe connected to a MPAB3 or equivalent device.

The MPAB3 a wall mounted microphone pre amplifier features a 20kHz surveillance tone generator.

This signal is injected or 'mixed' into the critical route which includes the (external) microphone capsule

Failure in any part of the audio circuit, including open or short circuit of the microphone capsule will result in the level of surveillance tone being reduced to an undetectable level.

The FMS will detect the failure of the surveillance signal to emerge from the microphone unit. This is generally achieved by the speaker circuit detectors, although line level detectors maybe connected at the microphone input to the equipment rack to aid fault diagnostics.

6.2.3 Message Card Surveillance

alpha controller with message card option only.

The alpha message card features a 20kHz-surveillance tone generator.

The tone is digitally generated by the DSP processor and mixed with the digital audio message.

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Failures of any part of the digital or audio circuit will result in the level of tone being reduced to an undetectable level.

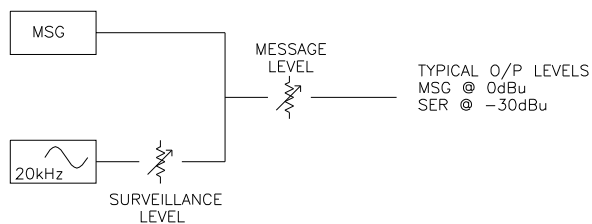
The FMS will detect the failure of the surveillance signal to emerge from the message card. This is generally achieved by the speaker circuit detectors.

Engineers Note:

Each message should be configured to have an audio output of approximately 0dBu.

The surveillance should be configured at approximately -30dBu.

If the message level is adjusted the surveillance will automatically be adjusted to maintain the -30dBu output level.



6.2.4 Surveillance & Audix Amplifiers

In order to allow the surveillance through the system, Output 16 the *alpha*'s I/O port should be configured to send a wake up signal to power amplifiers. The purpose of this signal is to command Audix MOSFET Power blocs to change from their low power consumption mode (asleep) to quiescent state (awake). This allows the surveillance tone to pass through amplifiers without missing the first part of the signal.

6.3 Data Comm's Monitoring

Fault monitoring of data communication and Input Controllers (microphone processor).

The *alpha* controller continually polls SIU's (serial interface unit) connected to it.

On failing to receive a valid response from the SIU, the alpha can be configured to report a comm's fault.

Failure or corrupted memory within the input controller can also be detected.

These faults are indicated on the front panel and repeated to the FMS.

Engineers Note

If the alpha is being used to replace another, old Vector matrix in a system, it is important to modify the SL8 and MSL8 for Data Path Surveillance.

A link must be fitted between E1 and E2 on the D439 Board.

7 Trouble Shooting

7.1.1 The alpha is not working

Is the power ON indication lit?			
No	<ul style="list-style-type: none"> Check the mains lead to the <i>alpha</i>. Check mains supply voltage. Check Fuse & breaker If system is battery backed. Check connection between battery pack and <i>alpha</i>. Check battery voltage. 		
Yes	Are any Fault indications lit on the <i>alpha</i> ?	Yes. Which indications are lit?	Mains Fail <ul style="list-style-type: none"> Check the Mains lead to the <i>alpha</i>. Check mains supply voltage. Check Fuse & breaker Is there a power outage on any other equipment
			Battery Fail <ul style="list-style-type: none"> Check connection between battery pack and <i>alpha</i> Check battery voltage
			Battery Charge Fail <ul style="list-style-type: none"> Check mains lead to battery charger Check mains supply voltage Check Fuse & breaker Check connections to battery
			Misc Fault <ul style="list-style-type: none"> Contact Audix Customer Services Department.
			Comms Fault <ul style="list-style-type: none"> Use LCD to find SIU at fault Check SIU serial comms connection
			Watchdog Warn <ul style="list-style-type: none"> Press Cancel button If the fault indication appears immediately again, Contact Audix Customer Services Department.
			Config Mem <ul style="list-style-type: none"> Re download the configuration from the PC If the problem persists re check the config on the PC, and download again
			Prog Mem <ul style="list-style-type: none"> Press system master reset If problem persists turn off power to <i>alpha</i> and leave for 30 seconds and turn on If problem still persists Contact Audix Customer Services Department.
		No	Contact Audix Customer Services Department.

8 Warranty

8.1 Performance

Any performance figures given by the Company are based upon Company experience and as expected from on test. The Company will, however, accept no liability if those figures are not obtained unless specifically guaranteed, subject to the tolerance and rejection limits applicable to such figures.

8.2 Delays in Delivery

If delivery is delayed at Customer request the Company reserves the right to increase its price to cover the extra cost of storage, insurance and interest. Interest will be at the rate of 3% above Bank of England base rate per month calculated on a day to day basis for the value of the goods held.

8.3 Storage

Where equipment is stored on Site prior to installation, it is the Purchasers' responsibility to ensure the safety and good condition of the equipment. Any damage to equipment on Site shall not prejudice payment by the due date.

8.4 Damage or Loss in Transit (UK)

When the price quoted includes delivery or where this is specifically charged, the Company will repair or replace free of charge goods damaged in transit provided that the Company and the carriers receive written notification within 3 days of delivery. The Company must be informed in writing within 14 days of your receipt of our Advice of dispatch if any goods are not delivered.

8.5 Damage or Loss in Transit (Export)

The Company will not be responsible for any loss or damage to goods which occur beyond the point of shipment in the case of F.O.B., F.A.S. and C & F contracts, or beyond the point of delivery stated in the quotation in C.I.F. Contracts.

8.6 Liability for Defects

Liability in respect of any defect in or failure of the goods or equipment supplied or for any loss damage or injury attributed thereto is limited to replacement or repair of defective design materials or workmanship, within a period of 12 months of despatch or commissioning by the Company provided that the commissioning takes place within 6 months after dispatch and PROVIDED THAT such defected parts are promptly returned carriage paid by the Customer to the Company unless otherwise arranged. The right to make a charge for labour, handling expenses and return carriage on the repaired or replacement parts is reserved.

The Company shall be under no liability in contract, tort or otherwise for any personal injury, loss or damage or whatsoever kind of howsoever caused or for anything done or omitted in connection with the goods or equipment or any work in connection therewith.

8.7 Installation and Commissioning

In the case of contracts involving installation and commissioning, it is understood that good and materials will be unloaded, stacked and stored by the Purchaser at the Purchaser's risk. Unless otherwise stated in the tender, it is assumed that:

- The site is accessible, clear, before the arrival of our installers, level and dry, and where floor and/or wall fixing is necessary that there is no circumstances to prevent this

- Electricity supply is available for light and power tools
- That sufficient working space is allocated to ensure maximum output, sufficient secure storage space is provided free of charge for our immediate use on or adjacent to the Site for plant.
- That our engineers are given every facility to complete their work without undue hindrance.

The Company reserves the right to charge extra should these conditions not be adhered to. Where other Contractors are also involved, it is assumed that their programme will be such as to permit our work to be carried out with continuity and with the specified number of visits to Site. Should we be subject to delays or require to make a return visit to Site, this will involve additional charge. Detailed Method Statements are available on request

8.8 Environment

The Company cannot be held responsible for any defects arising from humidity and excessive temperatures.

The products are designed for use at normal room temperatures, typically in the range 15°C to 21 °C.

8.9 Title of Goods

All items remain property of the Company until payment for the goods is made in full. The Company reserves the right to repossess unpaid goods. Title of goods may not be transferred until all monies owing are paid, full details of our retention of title clause are displayed in our Sales Office.

8.10 Laws

These conditions shall be governed and construed in accordance with English Law and shall be subject to the exclusive jurisdiction of English courts

9 SAFETY CONSIDERATIONS

9.1 *Safety Considerations for System Design and Installation.*

The electrical installation of which the *alpha Controller* unit is part must incorporate an all-pole mains isolating switch, with contact separation of at least 3mm.

The mains power supply connecting cord to the *alpha Controller* unit must have conductor area at least 0.75 mm². The power cord must be BASEC or HAR approved with connectors complying with EN60320 and must provide a safety earth.

The Tannoy-Audix standby battery supply units (Models SBS241, SBS242, or SBS481) all include a separate fuse on each 24V dc output. The fuse rating on the feed to the *alpha Controller* should be 10A Fast acting (F 10A H)

Where 24V DC standby supply other than Tannoy-Audix range listed are used, The DC feed to the *alpha Controller* should be fused at source with a supply fuse rating of 10A Fast acting (F 10A H).

Systems that employ standby battery supply units within the rack enclosures should ensure adequate ventilation to avoid accumulation of flammable gases which may occur under abnormal charging conditions.

Battery units must be located at lowest positions in the racks such that any leakage of electrolyte will not cause damage to any equipment insulation.

The *alpha Controller* should not be exposed to dripping or splashing"

9.2 *Safety Considerations for System Maintenance*

Only a qualified and trained electronics engineer should be permitted to make any type of adjustment or repair to the Public Address or Voice Alarm System.

The following safety factors should be considered before attempting to maintain or repair the *alpha Controller*.

- Electrical
- Heat
- Weight

9.2.1 *Electrical Hazards*

High Voltages exist within this apparatus:

- 230 volt mains

The *alpha's* primary supply is 230v AC 50-60Hz. This is connected by means of an IEC fused inlet.

This equipment does not include a mains isolation switch therefore the:

Mains must be disconnected from the apparatus before any part of the casing is removed.

Insulated shrouds protect the mains supply within the apparatus. No part of the mains supply can be easily touched unless these internal covers are removed.

Battery Backup

Where the *alpha* has a secondary supply i.e. 24Volt Battery backup:

The battery supply must be also be disconnected before any part of the casing is removed.

9.2.2 Heat Hazards.

Generally this apparatus generates little heat.
But heating of some internal components may occur under fault conditions.

9.2.3 Weight Hazards.

If the *alpha* is to be moved the appropriate lifting code of practice should be followed.

Approximate frame weight in kilograms: 8Kg

10 Maintenance

Although the *alpha* requires little or no maintenance the Public Address or Voice Alarm system to which it is installed may require regular scheduled maintenance.

For BS5839 compliant Voice Alarm systems please refer to BS5839 Part 1 (Code of practice for system design, installation and servicing) for recommend maintenance levels.

It is recommended that all members of staff should be urged to report problems with the PublicAddress or Voice Alarm system (i.e. distortion, speakers not operating, poor coverage) to the department responsible for the maintenance of such equipment.

For assistance, please contact our Customer Services Department to obtain advise on planned maintenance and Service Contracts

11 Glossary

The following descriptions define the terms in this manual, most of the terms have evolved over a period of time and represent PA system language unique to Audix Systems.

Source

A source is any audio input to the switching matrix e.g. Microphone, CD player.

Destination

A destination is an audio output from the switching matrix which can be connected to an amplifier etc.

Audio Switching Matrix

The Audio switch matrix allows any one of the source inputs to be switched to any output destination or destinations. With the *alpha* this switching is configured using software, and is controlled by the embedded processor.

SIU - Serial Interface Unit

The SIU remotely controls the switching of the matrix, routing sources to destinations. The operation of each SIU is configured in the *alpha* configuration suite.

There are three main types of Serial Interface Unit:

- SMU
- BGM Selector
- MSL

SMU – Serial Microphone Unit

There are 3 variants of SMU

Name	Description	Features
SMU 1	Single button microphone unit	Optional Chime
SMU 8	8 button microphone unit	Chime Digitally recorded on EPROM. Built in Surveillance Tone Generator. Built in compressor/limiter. Line Level Output.
SMU 16	16 button microphone unit	Chime Digitally recorded on EPROM. Built in Surveillance Tone Generator. Built in compressor/limiter. Line Level Output.

The SMU 8 and 16 are microprocessor based remote control microphone units.

To route an audio source to a destination or destinations an operator presses one of the buttons to select the required route and then presses a 'PTT' button to make the route;

Each button has a pair of LED's associated with it to indicate a call status. The Red 'BUSY' LED informs the operator that one or more of the destinations selectable by the button are in use. The Green 'CONFIRM' LED informs the operator of the call status.

An SMU may be configured for the CHIME/SPEAK LED to indicate when a chime is running. When the operator presses the PTT button the chime will start to play and the CHIME/SPEAK LED will flash for the duration of the chime.

BGM Selector

The Back Ground Music selector can be either desk mounted or rack mounted. The BGM selector has buttons for zone selection for background music broadcast.

The Background Music Selector is available in two desk mounted versions SMU8BGM and SMU16BGM, providing 8 and 16 zone selection button respectively.

MSL – Monitored Serial Link Interface

This interface is effectively a SMU in a 19" rack mount chassis. Typically the PCB is jumpered to disable the 'PTT' button.

The MSL is used to interface to a Fire Alarm System, which requires that the input line is tested for failure.

PTT – Push To Talk

Push To Talk button, activates selected destinations.

Busy Line

The Busy line is generally an open collector output, which becomes active when the audio destination port it is associated with is in use.

Live Output

The *alpha* Live output is an open collector output, which becomes active when the audio source it is associated with is in use

Wakeup Output

A Wakeup output is a Logic Level Output (+5V), which precedes the surveillance tone by 1.6sec and is used to 'Wakeup' an amplifier from its quiescent state. PA Systems sometimes require a standby battery source in case of power failure, to reduce power consumption the amplifiers are put to sleep when not in use. The amplifiers will normally 'Wakeup' on their own when a signal is applied.

For correct operation the *alpha* should be used with the ITP100 Termination Panel.

FMS - Fault Monitoring System

FMSX

Fault Monitoring System Slave Chassis

PA/VA

Public Address/Voice Alarm

VPA

Vector Power Amplifier

VMU

Virtual Microphone Unit. This comprises a PC with zone/message selection buttons configured on screen with a separate Mic unit to take the audio signal. Messages held as WAV files can be played directly from the PC's hard disk.

BS5839 – Fire detection and alarm systems for buildings

Part 1. Code of practice for system design, installation and servicing.

Part 8. Code of practice for the design, installation and servicing of voice alarm systems.

BS7443 (BS EN 60849)

Specification for Sound systems for emergency purposes

RASTI

Rapid Assessment of Speech Transmission Index

12 Rear panel pin-outs

All I/O on D-type have internal EMC filtering

Parallel I/O port 37 way 'D' plug

Pin No	Function
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9	Input 9
10	Input 10
11	Input 11
12	Input 12
13	Input 13
14	Input 14
15	Input 15
16	Input 16
17	Output 1
18	Output 2
19	Output 3
20	Output 4
21	Output 5
22	Output 6
23	Output 7
24	Output 8
25	Output 9
26	Output 10
27	Output 11
28	Output 12
29	Output 13
30	Output 14
31	Output 15
32	Output 16
33	
34	+5V (protected by self resetting fuse)
35	0v
36	+24V (protected by self resetting fuse)
37	0v

All inputs are switched to 0V from 5V

All outputs are Open Collector

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Serial Data Links RS485 (25 way 'D' plug)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 1	2	15	14
Channel 2	3	16	4
Channel 3	5	18	17
Channel 4	6	19	7
Channel 5	8	21	20
Channel 6	9	22	10
Channel 7	11	24	23
Channel 8	12	25	13

Audio Outputs / Destination 1-8 (25 way 'D' plug)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 1	2	15	14
Channel 2	3	16	4
Channel 3	5	18	17
Channel 4	6	19	7
Channel 5	8	21	20
Channel 6	9	22	10
Channel 7	11	24	23
Channel 8	12	25	13

Audio Outputs / Destination 9-16 (25 way 'D' plug)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 9	2	15	14
Channel 10	3	16	4
Channel 11	5	18	17
Channel 12	6	19	7
Channel 13	8	21	20
Channel 14	9	22	10
Channel 15	11	24	23
Channel 16	12	25	13

Audio Inputs / Sources 1-8 (25 way 'D' socket)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 1	2	15	14
Channel 2	3	16	4
Channel 3	5	18	17
Channel 4	6	19	7
Channel 5	8	21	20
Channel 6	9	22	10
Channel 7	11	24	23
Channel 8	12	25	13

alpha User Manual

Audio Inputs / Sources 9-12 (25 way 'D' socket)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 9	2	15	14
Channel 10	3	16	4
Channel 11	5	18	17
Channel 12	6	19	7

Engineers Port (front and rear) 9 way 'D' plug

Pin No	Function
1	DCD
2	Rx
3	Tx
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Note:

For connection between the Engineering port of the *alpha* and the configuration PC use a 9 way null modem cable with plug and socket connectors.

DC supply output 4 way socket

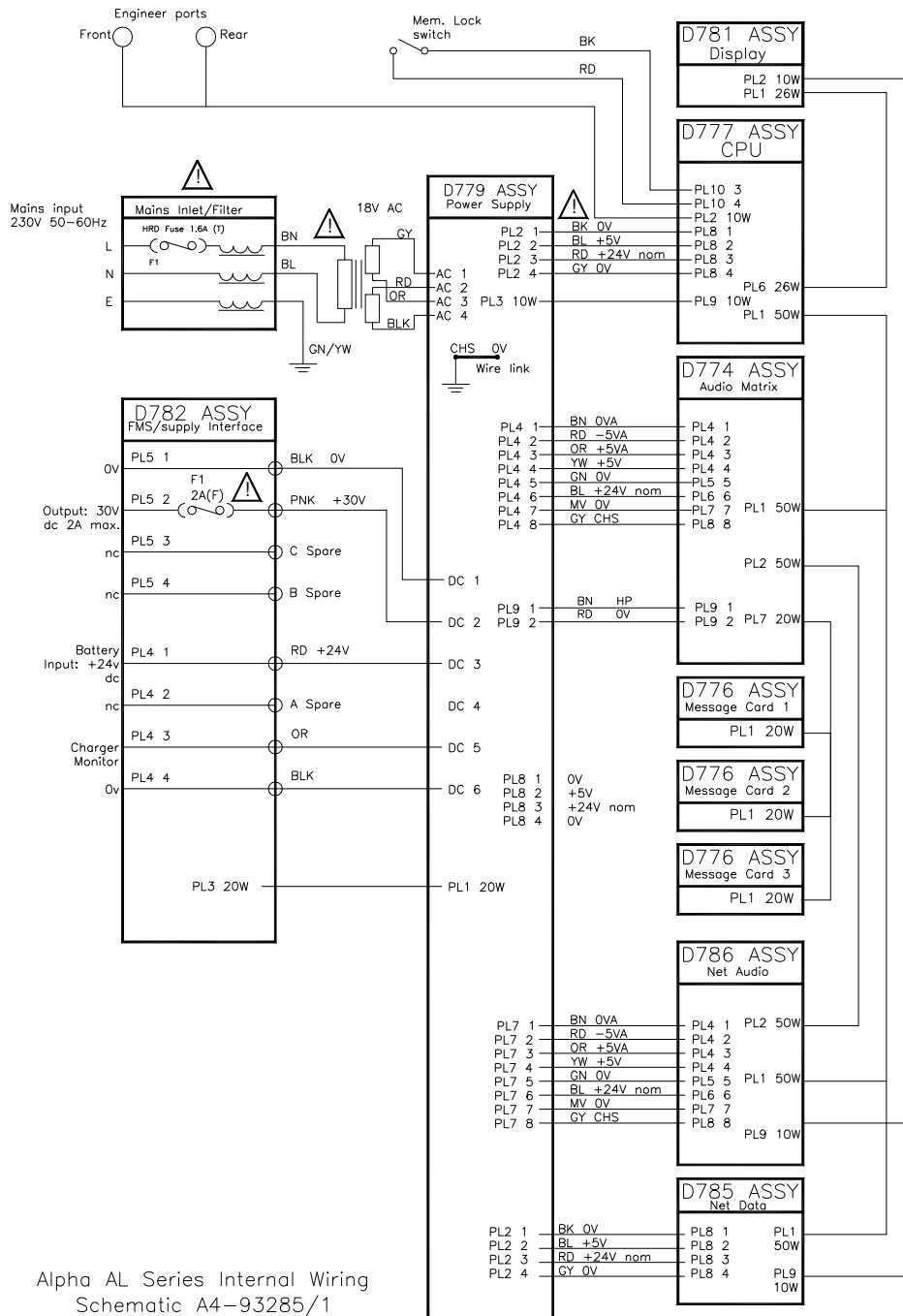
Pin No	Function
1	0V
2	+30V
3	nc
4	nc

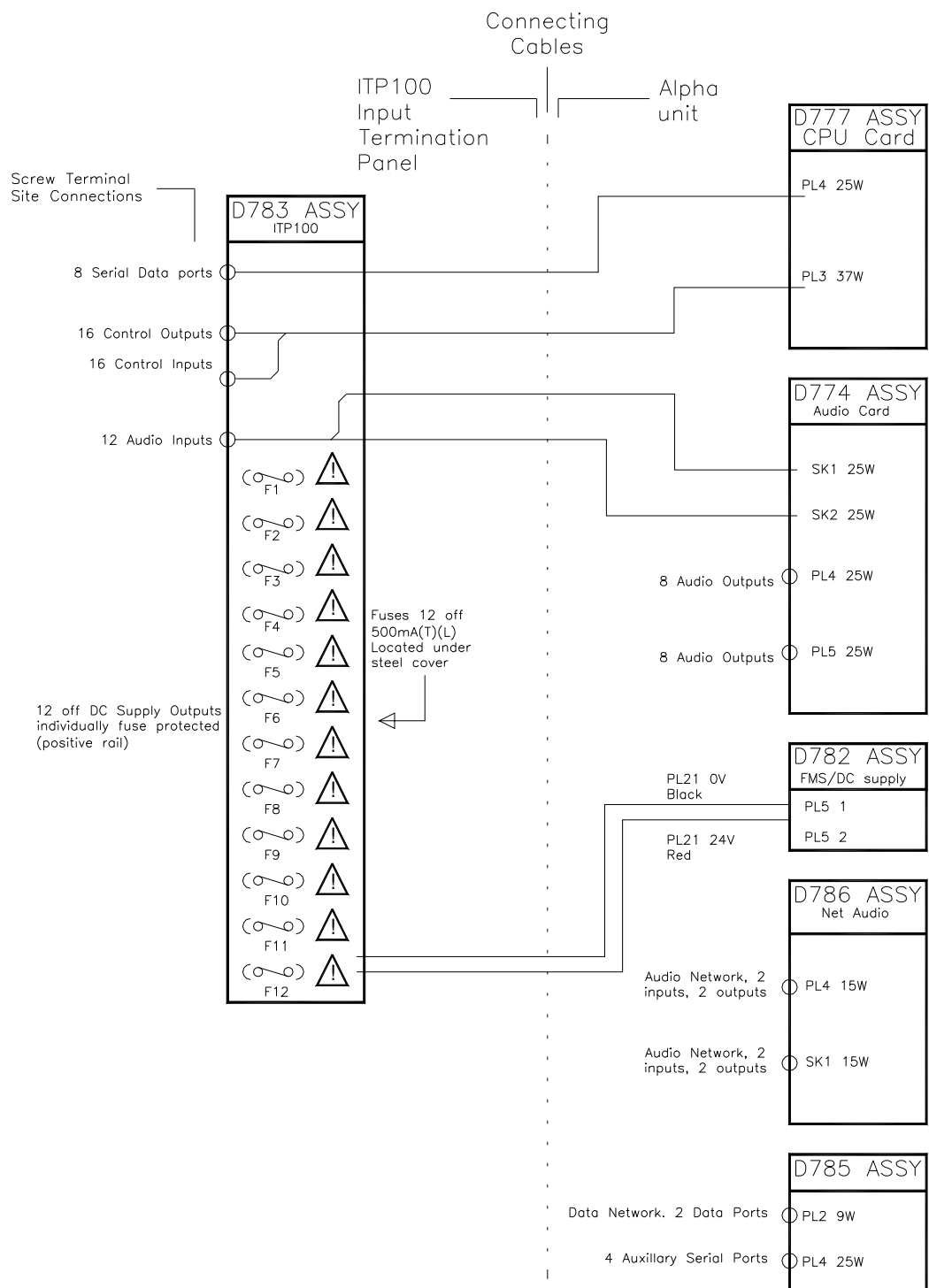
13 Electrical Schematics

The following schematics describe the connections between the PCB's and external connectors.

Schematics:

- *alpha* overall - A4-93285 sheet 1
- *alpha* & ITP100 connections - A4-93285 sheet 2





Alpha AL Series Connections to
ITP100 Schematic A4-93285/2