drake

■ Products ■ Systems ■ Automation

EASi-COM Guide

Installation

Operation

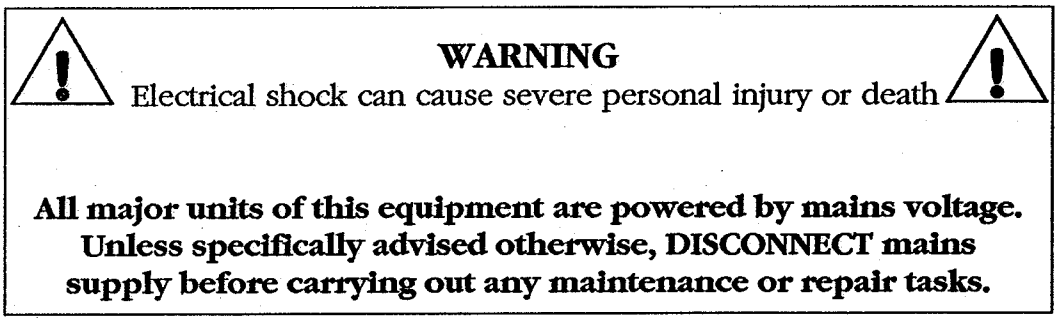
Applications

PREFACE

This guide provides information concerning the EASi-COM Intercom/Talkback system. The information covers the topics of installation, setup, operation and applications.

Notice

The information contained in this document is subject to change without notice and does not constitute a warranty or agreement of any kind.



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How to Use the EASi-COM Installation, Operation and Applications Guide

Section 1 Introduction to EASi-COM
Provides a System overview with a brief description of features. It also details the system parts and provides a summarized system specification.

Section 2 Setup Instructions - As Supplied
Describes the configuration set at the factory and therefore 'As Supplied'. It also provides installation instructions and installation wiring information for the supplied configuration.

Section 3 System Operation - As Supplied
Describes the operation of the system in it's As Supplied configuration.

Section 4 Alternative Applications - Inbuilt Options
Describes the options available through use of the Matrix front panel option switches, the associated Control Panel options and the associated interconnections.

Section 5 Other Applications and Options
Describes the additional options and applications available through the Control Panel additional features. This section provides assistance in adapting the system to meet non-standard applications.

Section 6 Troubleshooting Guide
Gives a guide to system operating problems and how to solve them.

Appendix A details the Matrix switch settings.

Appendix B includes Ident Strips which can be used in the Control Panels.

Appendix C gives the Control Panel control functionality.

A **Glossary of Terms** and an **Index** are also provided.

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1 Introduction to EASi-COM

1.1 System Overview

EASi-COM is an Intercom/Talkback system using a central Matrix for routing calls between Control Panels and other circuits in a star format.

The system has been designed specifically to meet the wired communication needs of the small Broadcast facility in the most space and cost efficient manner. Audio interfaces supplied as add-on facilites in other intercom/talkback systems of this type are built into the EASi-COM matrix, thus avoiding the need for additional equipment supply and accomodation space.

The system is designed around two standard Control Panel types, which can be configured by the user using simple switch selection. The two Control Panel types, 1U and 2U high, allow for the maximum facilities in the most space-efficient packages.

Control Panels utilise lever key switches with LED indication both of key position and incoming calls. In addition, multiple level controls are provided to give Panel incoming signal level separation to match the signal separations provided by the Matrix.

The system is bounded in terms of its maximum size, but it has expansion capability within its size through the switched options available on the Matrix front panel. All controls which may be varied in normal use are also available on the Matrix front panel.

An extensive range of user-selectable options are built in to the system components to take account of more comprehensive application selection.

All audio inputs and outputs are balanced with floating interfaces provided for external circuits.

Control Panels to Matrix wiring is identical for all Panel ports, with similar connection philosophies applied for other ports, to keep the wiring simple.

The EASi-COM system meets Electro-Magnetic Compatibility (EMC) regulations provided that the installation instructions are correctly followed in full.

The EASi-COM system gives the customer an easy to install system with a wide flexibility range to match most requirements.

1.2 EASi-COM System Features - Matrix

- EASi setting of system configuration via DIL switches.
- In-built 4-wire/IFB transformer isolation.

- Camera Ports individually selectable to suit a wide range of camera Intercom interfaces including 2- and 4-wire.
- All Panels connect with identically wired 7 pair screened cable.
- Matrix powers up to eight Control Panels and eight Drake HANDi-COM Beltpacks.
- 14 Ports, with interface choice from the following:
  - Up to eight Control Panels,
  - Up to two Drake HANDi-COM Beltpack Ring interfaces,
  - Up to four Cameras, each selectable 2-/4-wire with input and output gain control and 2-wire balance presets,
  - Up to four IFB/4-wire circuits, each with inbuilt input/output gain control, VOX input detectors, and transformer isolation.
- Separate 4-wire IFB Listen inputs on two of the IFB/4-wire Ports.
- Stereo Programme Sound input.
- External Production Talkback input.
- Production Talkback outputs.
- All inputs and outputs electronic balanced.
- Panel Port DC and data verification LED's.
- All controls, setup switches, fuses,and indicators front panel mounted for EASi access.
- Power supply failure alarm output.

1.3 EASi-COM System Features - Control Panels

- 2U and 1U Panel types to suit space availability.
- Panel types easily programmed via rear panel mounted DIL switches to suit Port identity and operational requirements.
- Panels fitted with lock up/centre off/non-lock down lever keyswitches each with input and output control.
- Each keyswitch has associated green LED to indicate keyswitch position and incoming call.
- Pre-marked Ident Strips provided.
- Separate gooseneck and headset microphone amplifiers, each with own preset level control.
- Headset/Mic Mute Select keyswitch with red indicator LED's.
- Microphone amplifier output limiter, switch selectable +8dB/+12dB.
- Adjustable sidetone for headset use.
- External loudspeaker connector.
- Four mix channels with additional post mix input on 2U Panel, two mix channels with additional post mix input on 1U Panel.
- Intercom level control off limit preset control.
- External Dim and Cut control inputs.
- Additional option features

1.4 System Parts and Configuration

1.4.1 Matrix 1200

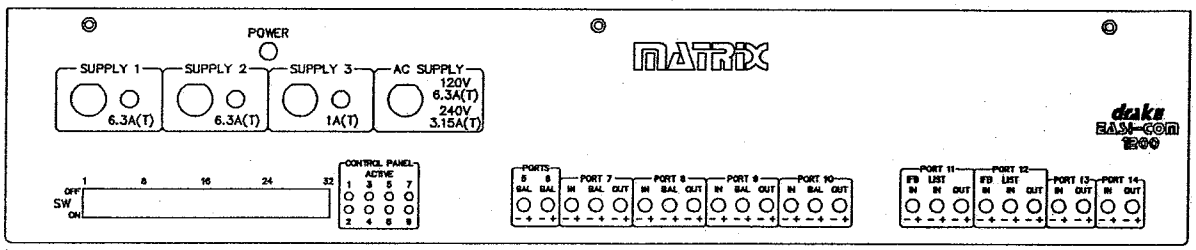


Figure 1.1 1200 Matrix Front Panel 1200fp.eps

1.4.2 Control Panels

2U Control Panel 1210

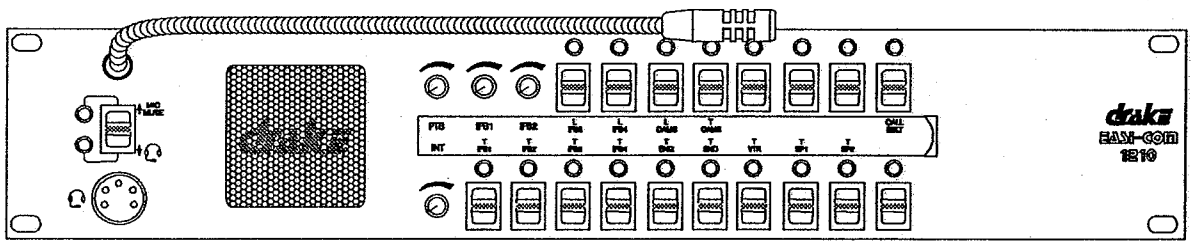


Figure 1.2 1210 (2U) Control Panel - Front Panel 1210fp.eps

1U Control Panel 1220

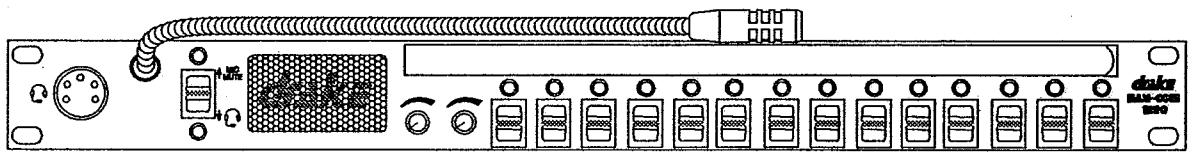


Figure 1.3 1220 (1U) Control Panel - Front Panel 1220fp.eps

1.4.3 System Audio Facilities

The system as supplied offers a wide range of facilities and interfaces as shown in the associated Audio Block Diagram below (See Figure 1.5).

Matrix Ports are available for a wide variety of purposes as suggested in the following table:

Port	Control Panel	Beltpack	4-Wire Camera	2-Wire Camera	4-Wire External/IFB
1	✓	×	×	×	×
2	✓	×	×	×	×
3	✓	×	×	×	×
4	✓	×	×	×	×
5	✓	✓	×	×	×
6	✓	✓	×	×	×
7	✓	×	✓	✓	✓
8	✓	×	✓	✓	✓
9	×	×	✓	✓	✓
10	×	×	✓	✓	✓
11	×	×	✓	×	✓
12	×	×	✓	×	✓
13	×	×	✓	×	✓
14	×	×	✓	×	✓
15	External Production Talkback Input / Production Talkback Output				
16	Stereo Programme Sound Input				
✓ ×	- available - not available				

Additional Beltpack Rings and 2-wire cameras can be supported with additional external interfaces.

4-wire applications include:

- Loudspeaker/Public Address systems
- Radio Talkback
- Outside Broadcasts
- Additional Studios
- Production Floor Presenters

Non-television communications applications include Theatre, Live Shows, Public Address/Paging.

The applications connections are shown in Figure 1.4 EASi-COM - System Overview

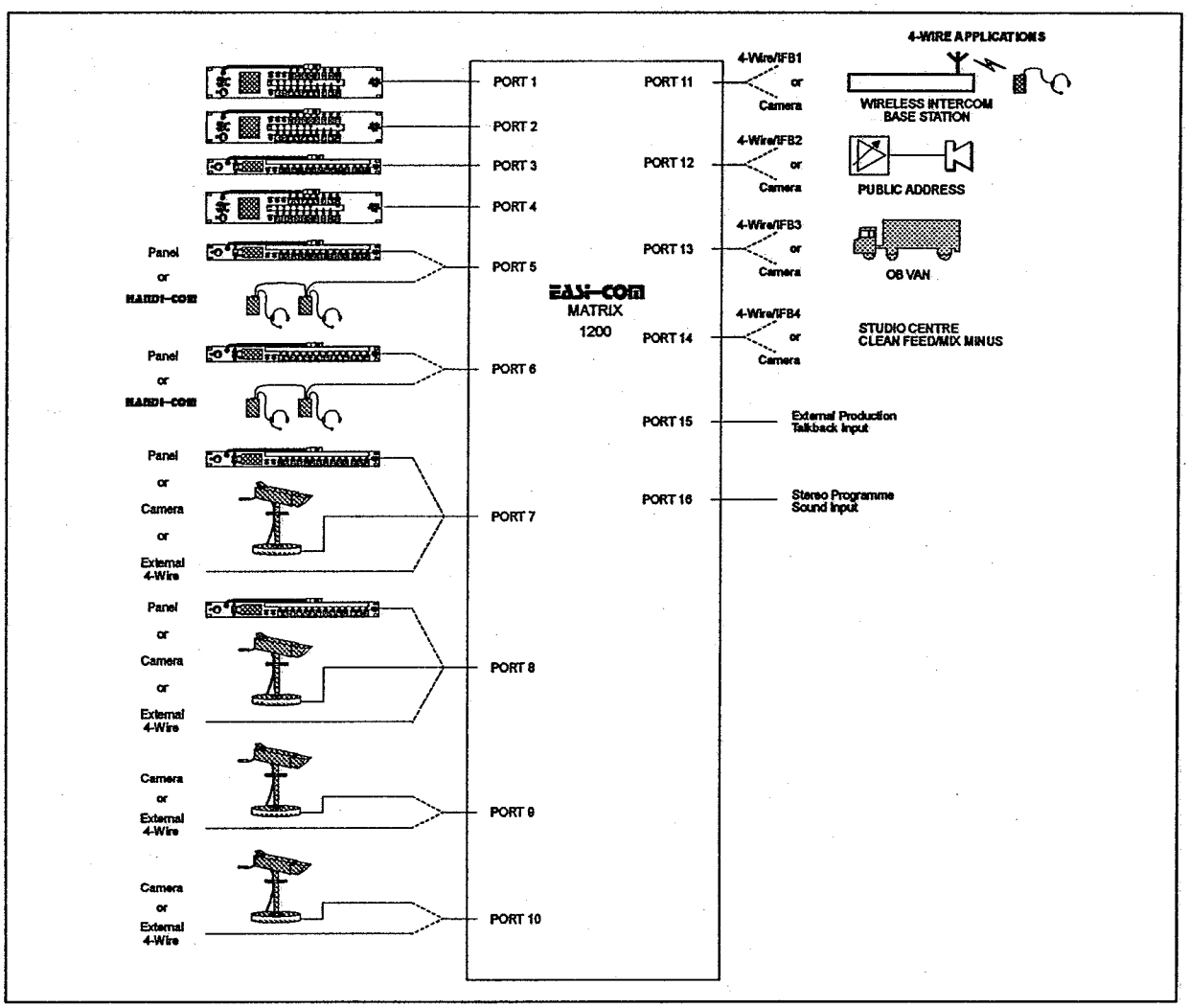


Figure 1.4 EASi-COM - System Overview ecsysov1.eps

The full range of facilities and interfaces are shown in Figure 1.5 Easi-com - Audio Block Diagram

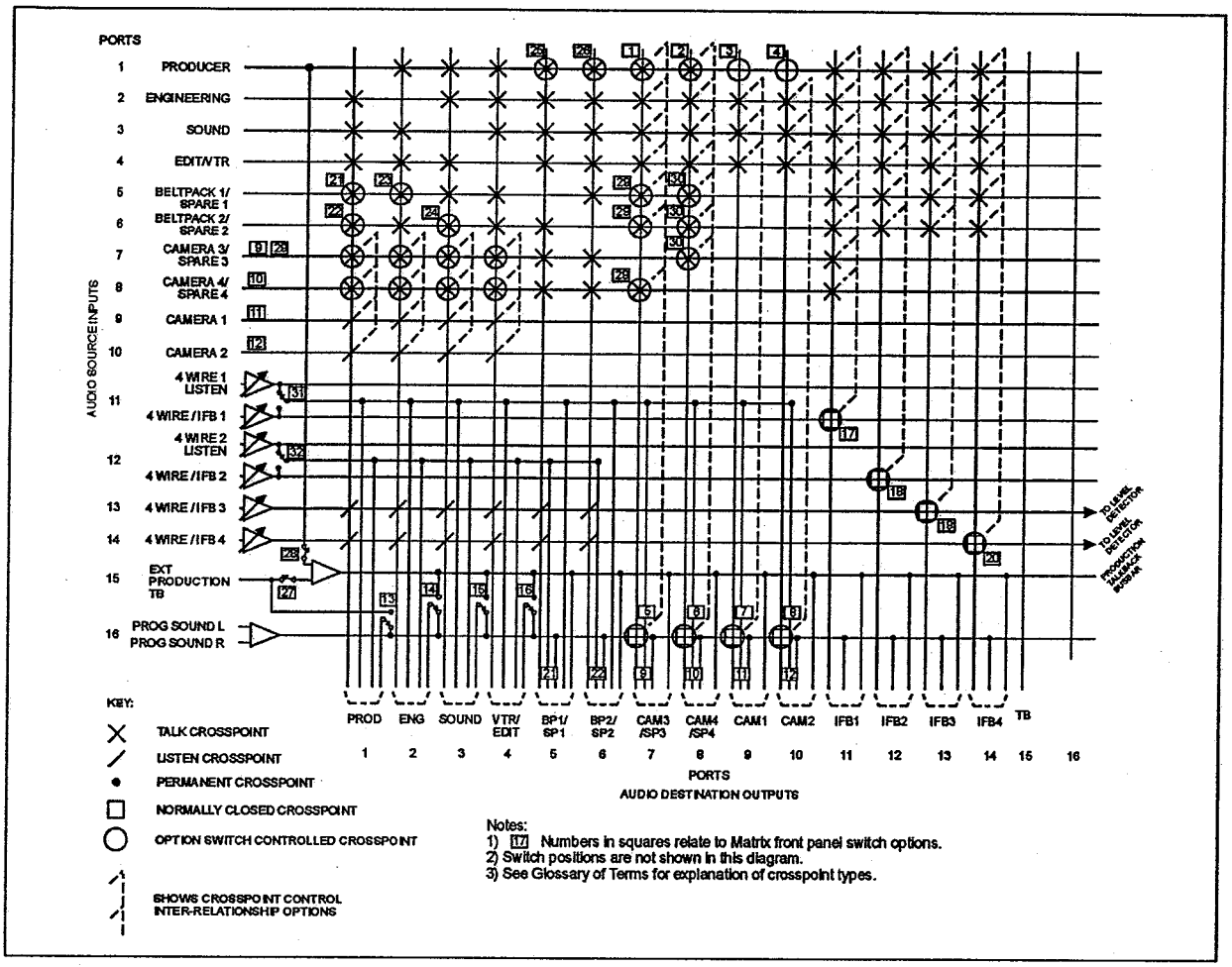


Figure 1.5 Easi-com - Audio Block Diagram ecsysapp.eps

See Figure 2.10 System Block Diagram (As Supplied) for the facilities provided as factory set.

1.5 System Parts

1.5.1 Matrix 1200

The EASi-COM Matrix is a 2U by 19 inch rack mounting unit which forms the centre of the system. The unit contains all electronics necessary to control all audio and control signal routing between Control Panels and external devices.

The Matrix contains a single processing and switching board with a rear panel connector board and power supply.

All Option Switches and Level Set controls are available on the Matrix front panel along with Panel connection LED indicators. The AC and DC fusing and DC LED indication is

also available on the front panel. All DC outputs are protected by polyfuse switches which reset automatically in the event of a fault.

Items provided:

Matrix 1200	1 Unit
AC Connector and cord	1 * IEC

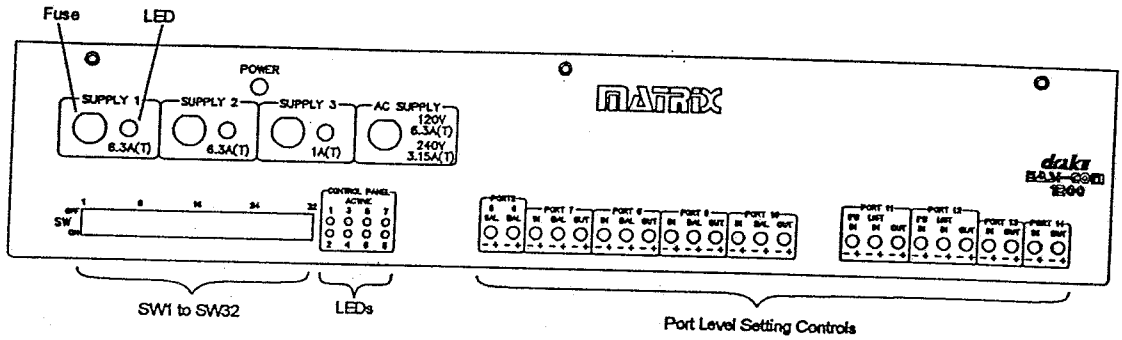


Figure 1.7 1200 Matrix Front Panel - Detail

1200fan.eps

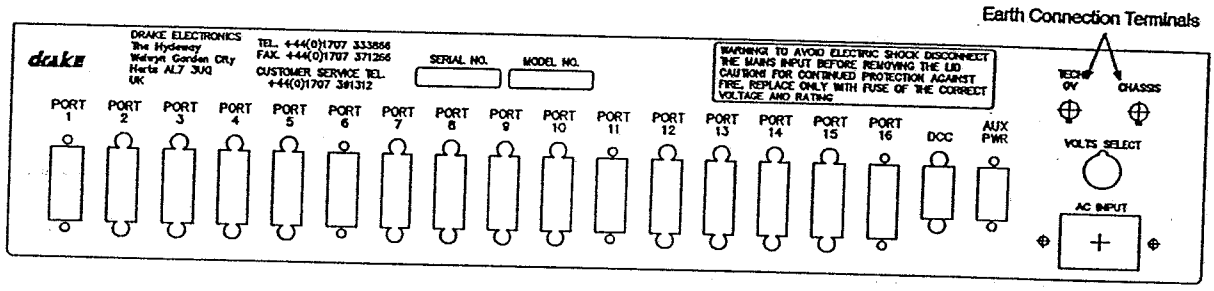


Figure 1.6 1200 Matrix Rear Panel - Detail

1200ran.eps

1.5.2 Control Panel 1210, 2U high

This Panel provides the most comprehensive facilities of the two Panel types available. It offers superior audio quality in addition to its 18 keys plus 4 level controls in a 2U high package.

Items provided:

Panel 1210	1 Unit
Front Panel Ident Strips	8 Ident 1 - 8 inclusive
	4 blank

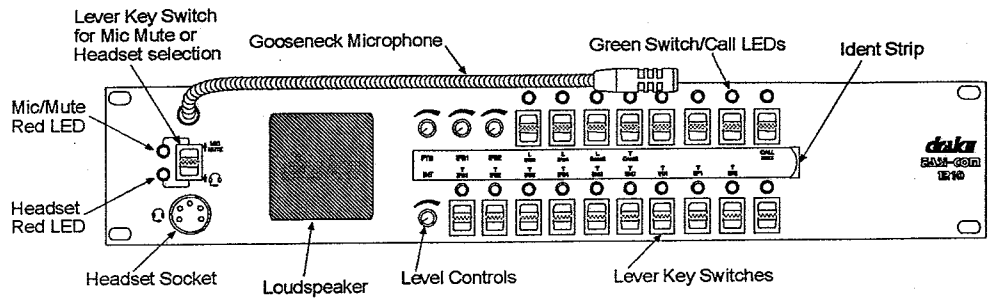


Figure 1.9 1210 Control Panel (2U) Front Panel -Detail 1210fann.eps

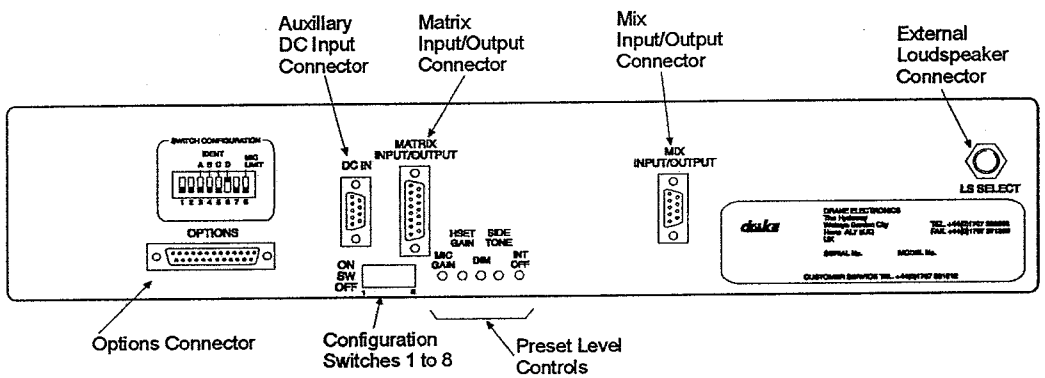


Figure 1.8 1210 Control Panel (2U) Rear Panel - Detail 1210rann.eps

1.5.3 Control Panel 1220, 1U high

This Panel provides 14 keys and 2 level controls in a space-saving 1U rack mounting package.

Items provided:

Panel 1210	1 Unit
Front Panel Ident Strips	8 Ident 1 - 8 inclusive
	4 blank

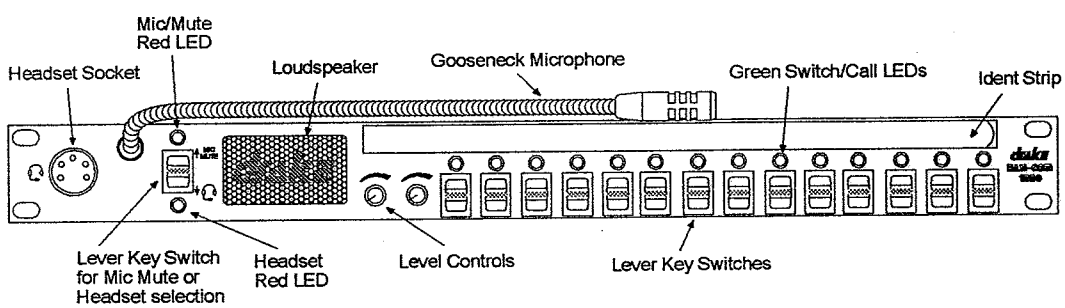


Figure 1.10 1220 Control Panel (1U) Front Panel -Detail

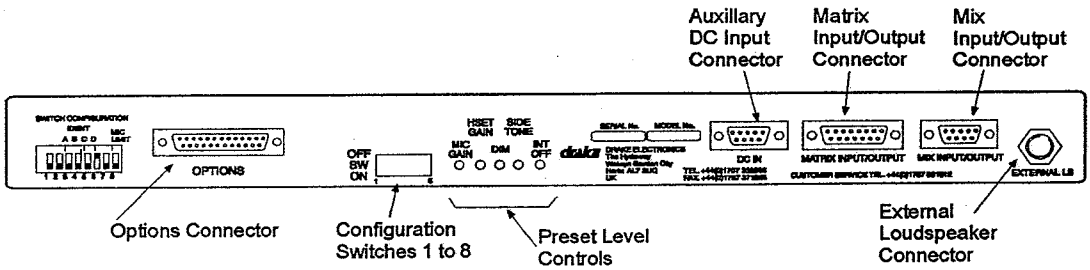


Figure 1.11 1220 Control Panel (1U) Rear Panel -Detail

1.5.4 Interconnect Packages

The System is offered with a range of Interconnect packages to suit customer needs. A multi-length range of pre-terminated Panel interconnect cables is offered along with connector only packages to suit the needs of the user.

Important The Interconnect items provided by Drake will ensure that the system package will meet EMC regulations when connected as per the instructions utilising approved cables. Failure to use the recommended items may result in EMC regulations not being met.

- Panel Connector Package - PD1275
  - 1 x 15-way D-type free plug Matrix Port Connector
  - 1 x 15-way D-type free socket Panel Port Connector
  - 1 x 25-way D-type free plug Options Connector
  - 1 x 9-way D-type free socket Auxiliary Power Connector
  - 1 x 9-way D-type free plug Audio Mix Connector
  - 1 x 6.35mm Jack free plug External Loudspeaker Connector

- Matrix Connector Package - PD1270
  - 12 x 15-way D-type free plug Matrix Port Connector
  - 1 x 9-way D-type free socket DC and Alarm Connector (Note: 4 Amp minimum rated contacts)
- Matrix to Panel Interconnect Cable, 5 Metres length - PD1280
- Matrix to Panel Interconnect Cable, 10 Metres length - PD1285
- Matrix to Panel Interconnect Cable, 20 Metres length - PD1290
- Matrix to Panel Interconnect Cable, 40 Metres length - PD1295

1.6 System Specification Summary

1.6.1 Overall System Performance

Maximum System Gain	92dB Microphone to Loudspeaker
Frequency Response	100Hz - 11KHz (-3dB points) Panel to Matrix
Maximum Number of Panels	8
Power Consumption	100VA (Matrix only), 360VA maximum (with 8 Control Panels fitted operating at maximum loudspeaker output level)

1.6.2 Matrix Performance

Size	482mm (19 inches) wide including rack mount ears 89mm (2U) high 305mm (12 inches) deep (maximum) excluding connectors and cabling
Weight	8.5kg
Balanced Port Input Impedance	>10kΩ (except Beltpack and Cameras in 2-wire mode)
Balanced Port Output Impedance	<50Ω (except Beltpack and Cameras in 2-wire mode)
Bussed Output Impedance	600Ω (Programme Sound/Production Talkback and 4-Wire 1 and 4-Wire 2 outputs to Panels)
Frequency Response	100Hz to 11kHz (-3dB points)
Max Gain (IFB Input-Output)	+20dB
Max Output Level	+18dB
Crosstalk	>-65dB
Distortion	<0.3% THD
Line Impedance:	
- 2-Wire Camera Mode	600Ω balanced
- Beltpack	330Ω unbalanced

1.6.3 Control Panel Performance

Size	482 (19 inches) wide including rack mount ears 1210 - 89mm (2U) high, 100mm deep 1220 - 44.4mm (1U) high, 115mm deep Panel depths exclude connectors and cabling
Weight	3kg
Balanced Input Impedance	10kΩ
Balanced Output Impedance	<50Ω
Microphone Amplifier Gain	50dB to 80dB for gooseneck microphone 50dB to 80dB for headset microphone
Microphone Amplifier Noise	<-120dB EIN
Frequency Response - Microphone to Output - Input to Loudspeaker	 200Hz to 12kHz (3dB points) 60Hz to 12kHz (3dB points)
Distortion (no limiter operation)	<0.5% THD

1.6.4 Interconnect Cable Specification

The Panel to Matrix interconnection cables comprise seven individually foil-screened pairs with a drain wire within an overall braided screen to meet EMI/RFI requirements.

The following colour coding is assumed for the cable pairs:

B-W, O-W, G-W, Bn-W, S-W, B-R and O-R;

where:
B = Blue, W = White, O = Orange, G = Green, Bn = Brown, S = Silver and R = Red.

1.6.5 Fixed Connector Types

Matrix

Ports 1 to 16	PORT n	-	15-way D-type Female
DCC	DCC	-	9-way D-type Female
Auxilary Power	AUX	-	9-way D-type Male
Mains	AC INPUT	-	IEC Mains Inlet Male

1210 and 1220 Control Panels

Mix	MIX INPUT/OUTPUT	-	9-way D-type Female
Matrix	MATRIX INPUT/OUTPUT	-	15-way D-type Male
DC	DC IN	-	9-way D-type Male
Options	OPTIONS	-	25-way D-type Female
Loudspeaker	LS SELECT	-	1/4" PO-style Jack Socket
Headset Socket (Front Panel)		-	5 Pin XLR Female

2 Setup Instructions - As Supplied

The EASI-COM system is provided from the factory with pre-configuration as a 6 Panel, 4 Camera (each configured for 4-wire operation), 4 External 4-wire/IFB system. This involves the system components set as detailed below.

2.1 Matrix Settings

The setup of the factory-set switch on the front of the Matrix is shown below:

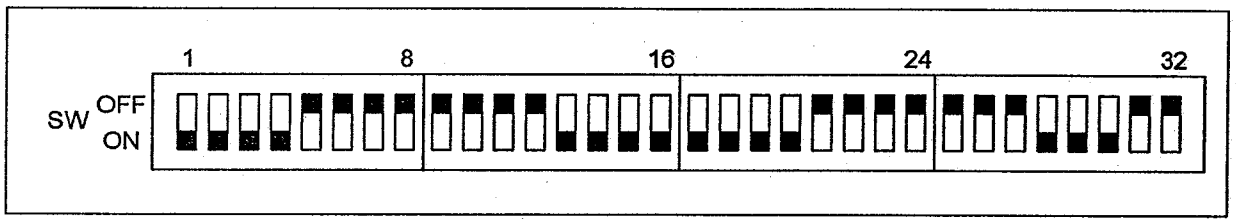


Figure 2.1 Matrix Options Switches (SW1 to SW32) (Factory Setting) ecsw1_32.eps

This setup allows switching facilities as shown in Figure 1.4 EASi-COM - System Overview

2.1.1 Port Level Settings (Matrix Front Panel)

Port 5	Beltpack Ring 1 Channel A Balance	50%
Port 6	Beltpack Ring 2 Channel A Balance	50%
Port 7	Camera 3/Spare Panel 3 Input Gain	0dB
Port 7	Camera 3/Spare Panel 3 Output Gain	0dB
Port 7	Camera 3 2 Wire Balance	50%
Port 8	Camera 4/Spare Panel 4 Input Gain	0dB
Port 8	Camera 4/Spare Panel 4 Output Gain	0dB
Port 8	Camera 4 2 Wire Balance	50%
Port 9	Camera 1 Input Gain	0dB
Port 9	Camera 1 Output Gain	0dB
Port 9	Camera 1 2 Wire Balance	50%
Port 10	Camera 2 Input Gain	0dB
Port 10	Camera 2 Output Gain	0dB
Port 10	Camera 2 2 Wire Balance	50%

Port 11	4-wire 1 Listen Input Gain	0dB
Port 11	4-wire/IFB 1 Input Gain	0dB
Port 11	4-wire/IFB 1 Output Gain	0dB
Port 12	4-wire 2 Listen Input Gain	0db
Port 12	4-wire/IFB 2 Input Gain	0db
Port 12	4-wire/IFB 2 Output Gain	0dB
Port 13	4-wire/IFB 3 Input Gain	0dB
Port 13	4-wire/IFB 3 Output Gain	0dB
Port 14	4-wire/IFB 4 Input Gain	0dB
Port 14	4-wire/IFB 4 Output Gain	0dB

2.1.2 AC Input Voltage Switch

Set at 240 Volts AC

2.1.3 Earth Terminal Connections

Set with Chassis Earth connected to Technical 0V Earth with earth strap

2.1.4 Port Utilisation

The Matrix is set up with Port utilisation as follows:

Port	Function	Mnemonic	Panel Ident Switch A	B	C	D
1	Producer Panel	PROD	Off	Off	Off	On
2	Engineer Panel	ENG	Off	Off	On	Off
3	Sound Panel	SND	Off	Off	On	On
4	Edit/VTR Panel	VTR	Off	On	Off	Off
5	Spare 1 Panel	SP1	Off	On	Off	On
6	Spare 2 Panel	SP2	Off	On	On	Off
7	Camera 3, 4 Wire	CAM3				
8	Camera 4, 4 Wire	CAM4				
9	Camera 1, 4 Wire	CAM1				
10	Camera 2, 4 Wire	CAM2				
11	IFB 1, 4 Wire Listen	IFB1				
12	IFB 2, 4 Wire Listen	IFB2				
13	IFB 3, 4 Wire listen	IFB3				
14	IFB 4, 4 Wire listen	IFB4				
15	Producer Panel Talkback Input	PTB				
16	Stereo Programme Sound Input	PROG				

See Section 2.2.3

2.2 Control Panels 1210 and 1220

2.2.1 Front Panel Operational Controls

Refer to Figure 1.9 1210 Control Panel (2U) Front Panel -Detail.

Level Controls	- 0dB gain
Control keyswitches	- Centre Off

2.2.2 Front Panel Ident Strips

None fitted - See Appendix B.

2.2.3 Rear Panel Controls

Panel Configuration Switches

These are set for Ident 1, Producer Panel, as supplied.

Switch settings are Down for OFF, Up for ON.

SW 1	Not Used	OFF
SW 2	Not Used	OFF
SW 3	Ident Switch A	OFF
SW 4	Ident Switch B	OFF
SW 5	Ident Switch C	OFF
SW 6	Ident Switch D	ON
SW 7	Not Used	OFF
SW 8	Mic Limiter Set	ON for +8dB

The panel DIL switch configuration settings are factory set as shown in Figure 2.2 1210 Control Panel (2U) Rear Panel.

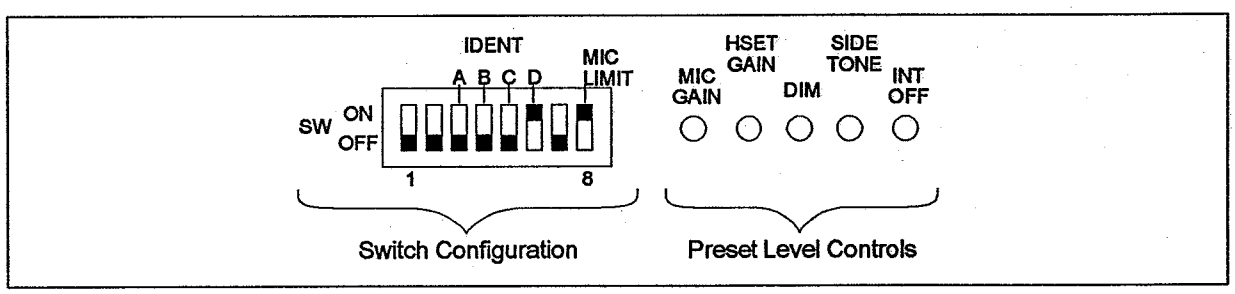


Figure 2.2 1210 Control Panel (2U) Rear Panel ecswfact.eps
Factory Switch Configuration Settings

Preset Level Controls

VR1	Gooseneck Microphone Gain	MIC GAIN	+60dB
VR2	Headset Microphone Gain	HSET GAIN	+60dB
VR3	Loudspeaker Dim Level	DIM	-12dB
VR4	Sidetone Adjust	SIDE TONE	Off
VR5	Intercom Level Control Off level	INT OFF	-30dB

2.2.4 Control Panel Ident Strips

A complete set of Control Panel Ident Strips, each identified with the Port number, are supplied in Appendix A for Port 1 to 8 Panels for both **1210** and **1220** Panel types, using the mnemonics given in the previous section. These should be fitted to the Panels as required. These strips are reproduced in an Appendix to this manual full sized for copying. Should alternative names be required, the strips can be modified or blank ones (also supplied) used.

2.2.5 Control Panel Setup Steps

- ☐ Choose the Ports appropriate to the system operational requirements as shown in Figure 2.4 System Interconnection Diagram.
- ☐ Select the Panel Ident Number switches on the Panel rear to match the Port number.
- ☐ Insert the appropriate Ident strips on the Panel.
- ☐ Connect the Panel to the appropriate Matrix Port via the Interconnect Cable.

Caution The Ident switches should only be changed with the mains power OFF

Refer to Sections 2.3.3 through to 2.3.10 for details of the interconnection cable wiring.

2.3 Equipment Setup for Use

2.3.1 Matrix

The Matrix is supplied to operate out of its box. The following precautions should be observed:

- ☐ ensure that the correct AC input voltage is selected to either 120V or 240V.
- ☐ ensure that the correct fuse values are fitted as follows:
  - ☐ AC Supply 6.3A for 120V
    3.15A for 240V
  - Supply 1 6.3A
  - Supply 2 6.3A
  - Supply 3 1A

- change the Technical Earth arrangements in accordance with the installation requirements, bearing in mind the requirement to provide a safe, correctly earthed installation

2.3.2 Control Panels

Control Panels are supplied to operate out of the box when powered from the Matrix. In order to achieve the correct key operation in line with the block diagram, it is only necessary to set the Panel Ident switches A - D to match the appropriate Port number and to fit the appropriate Panel Ident Strips which are numbered to match the Port number. The Panel Ident Number is the binary equivalent of the Panel Port number, which is printed on the upper and lower Panel Ident Strips.

Headset Connection

A standard Drake headset can be connected to the Control Panels via a 5 pole XLR connector on the Panel front.

The headset wiring is as shown in the diagram:

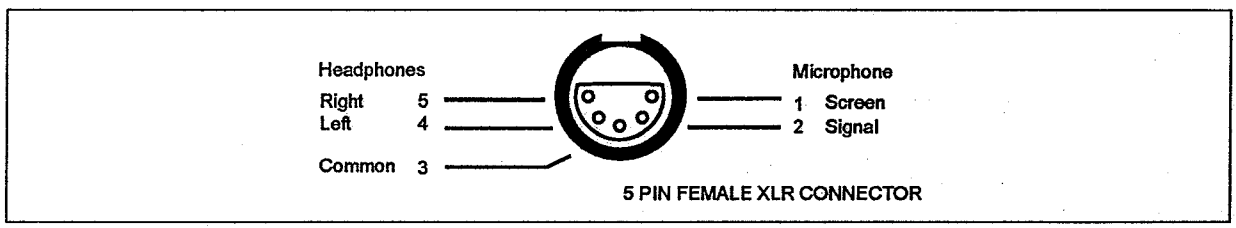


Figure 2.3 Headset Wiring Diagram 3khstcon.eps

2.3.3 System Interconnection

The Matrix will power up to 8 Control Panels, each at up to 150 Metres distant from the Matrix when utilising the recommended cable type. Panels may be connected and disconnected from the Matrix with the Matrix power on without damage. Note that if the Panel Ident switches are changed with the power on, then it is necessary to power down and re-power the panel before the new setup will take effect.

Figure 2.4 System Interconnection Diagram shows the scheme of system interconnection. Details of individual connectors are given in the following paragraphs.

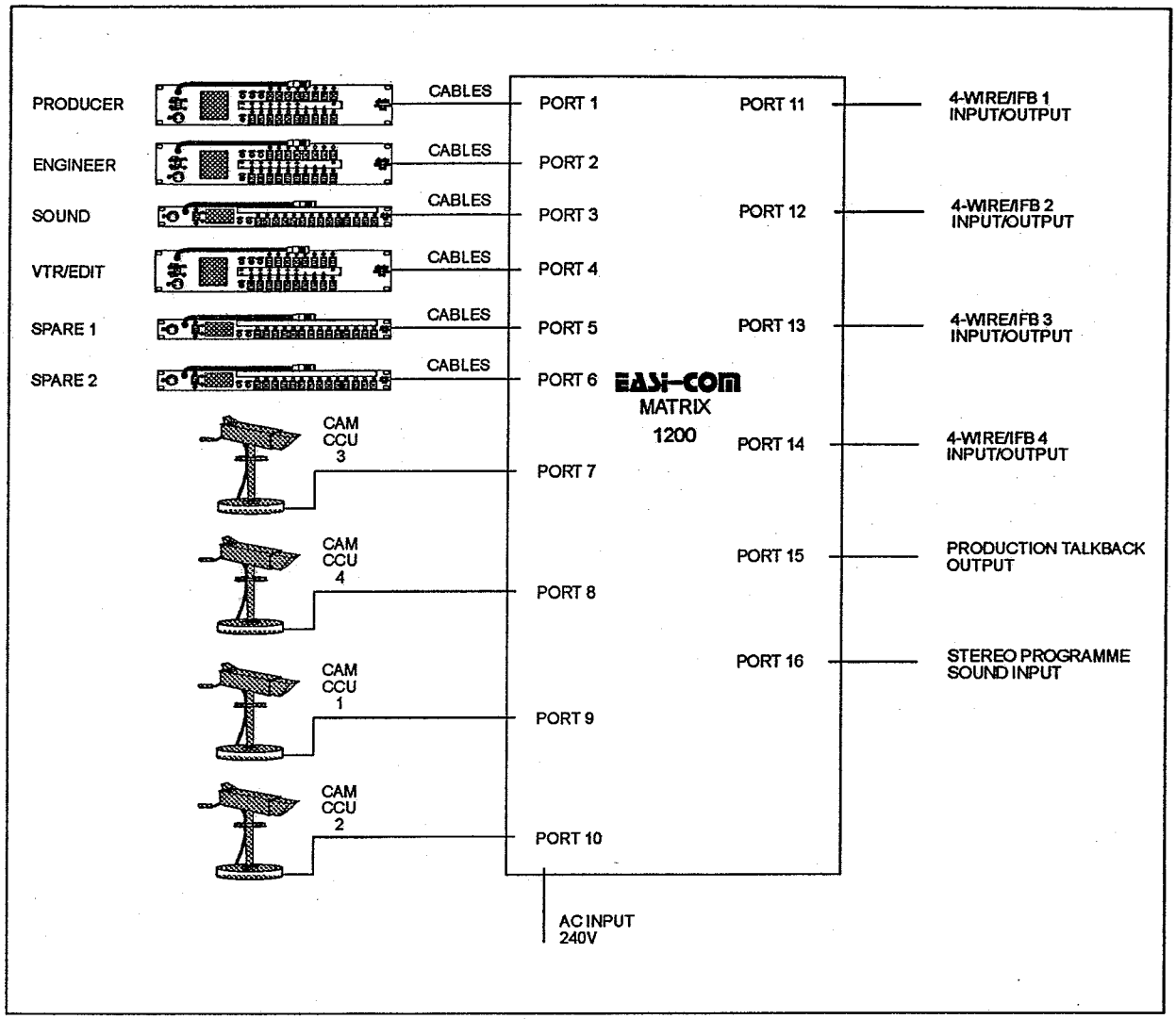


Figure 2.4 System Interconnection Diagram ecsysic1.eps

Notes: 1) All cameras are set for 4-wire operation.
2) See below for corresponding connector wiring diagrams:

		Refer to:
Ports 1 to 6	Panel to Matrix	Figure 2.5
Ports 7 to 10	4-Wire Cameras	Figure 2.6
Ports 11 to 14	IFB 1 to 4	Figure 2.7
Port 15	External Producer TalkBack Input	Figure 2.8
Port 16	Stereo Programme Sound Input	Figure 2.9

2.3.4 EMC

It is important to note that the Matrix front panel controls cover strip must be kept in place on the front panel for the system to operate within EMC regulations.

2.3.5 Ports 1 to 6, Panel to Matrix Interconnect Cable Wiring

All Panel Ports utilise the same wiring. The wiring information is shown below in both written and diagram form.

Matrix Port Cable Connector 15-way D-type free male
Panel Cable Connector to Matrix 15-way D-type free female

Wiring information:

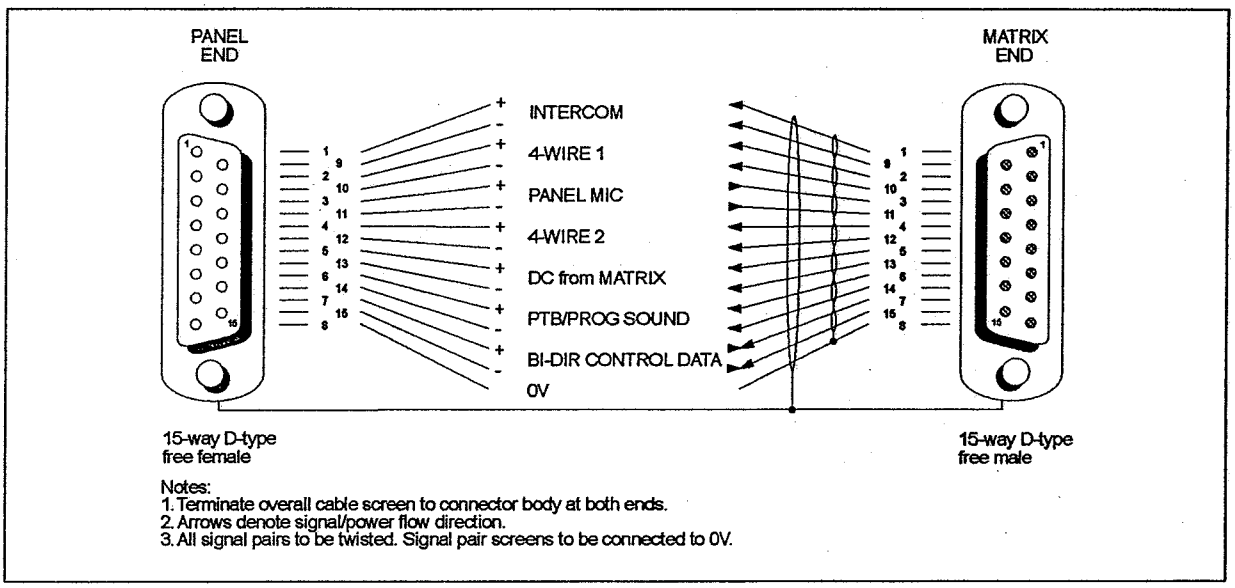


Figure 2.5 Panel to Matrix Interconnect Cable Wiring (Ports 1 to 6) ecwir4.cps

Connect each end pin to pin utilising twisted pair cable in the following pairs:

Pins 1/9 Intercom +/- output from Matrix
Pins 2/10 4-wire 1 +/- output from Matrix
Pins 3/11 Panel Microphone +/- input to Matrix
Pins 4/12 4-wire 2 +/- output from Matrix
Pins 5/13 DC +/- output from Matrix
Pins 6/14 PTB/Programme Sound +/- output from Matrix
Pins 7/15 Bi-directional Control Data
Pin 8 0 volts
Cable screen terminated to connector body at both ends

2.3.6 Ports 7 to 10, 4-wire Cameras Cable Wiring

All Camera Ports utilise the same wiring as set up. The wiring information is shown below in both written and diagram form.

Matrix Port Cable Connector	15-way D-type free male
Camera CCU Cable Connector	refer to Camera Manufacturer information

Wiring information:

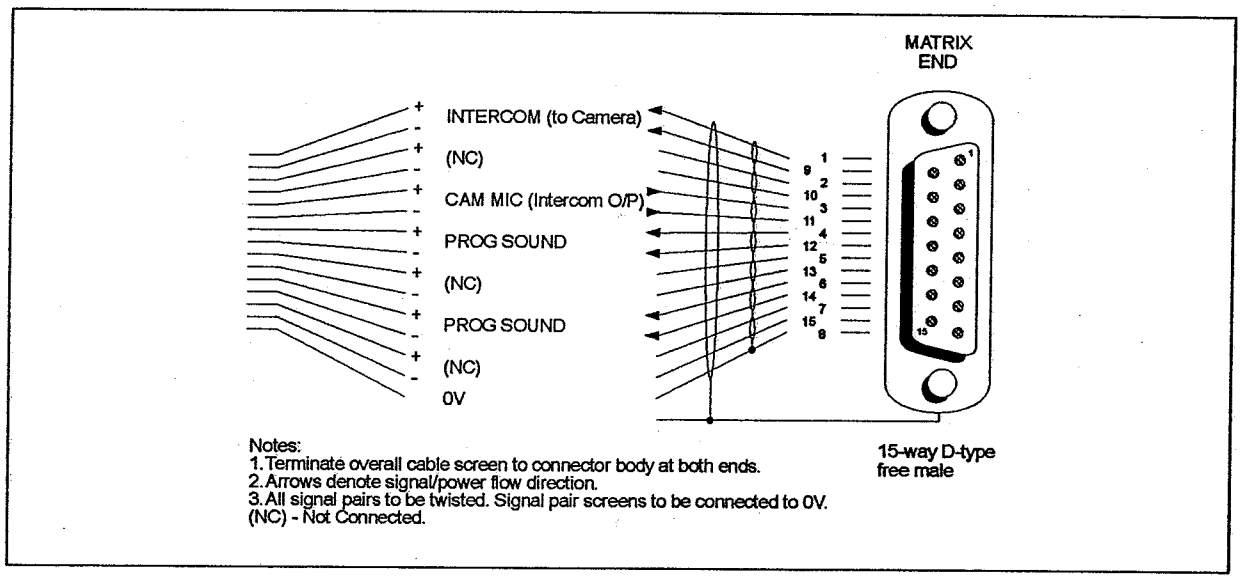


Figure 2.6 4-Wire Camera Cable Wiring (Ports 7 to 10)

ecwir5.eps

Pins 1/9	Intercom to Camera +/- (output from Matrix)
Pins 2/10	(not connected)
Pins 3/11	Camera Microphone (Intercom Output) +/- (input to Matrix)
Pins 4/12	Programme Sound +/- (output from Matrix)
Pins 5/13	(not connected)
Pins 6/14	Programme Sound +/- (output from Matrix)
Pins 7/15	(not connected)
Pin 8	0 volts

Cable screen terminated to connector body

See Section 4.3 for alternative camera wiring interconnections.

2.3.7 Ports 11 to 14, IFB 1-4 Cable Wiring

All IFB Ports utilise the same wiring as set up. The wiring information is shown below in both written and diagram form.

Matrix Port Cable Connector 15-way D-type free male

Wiring information:

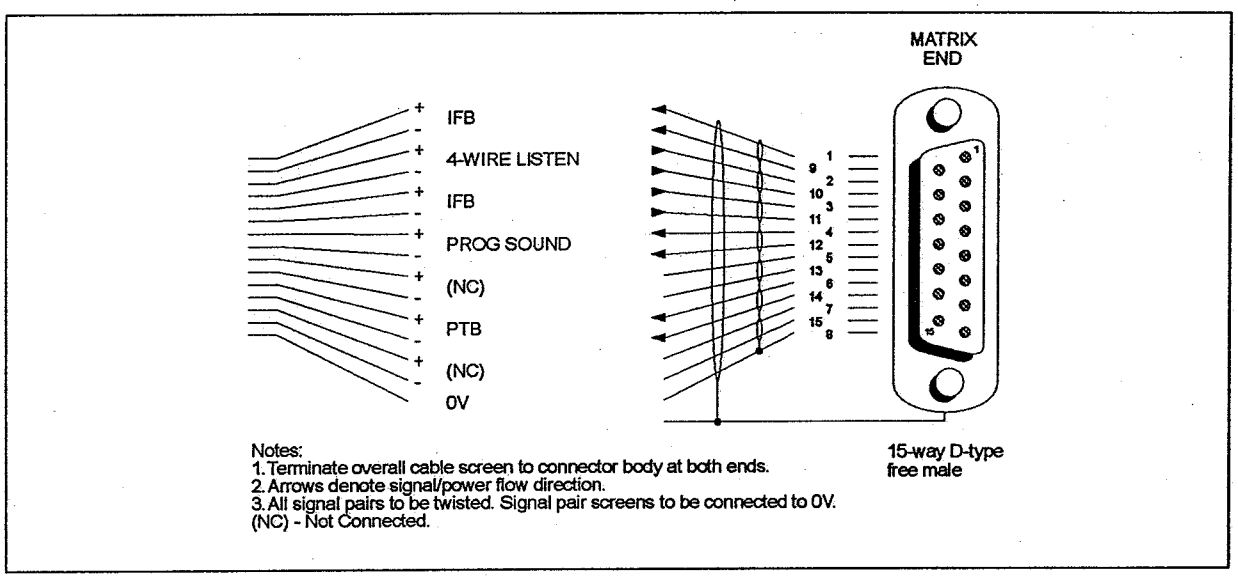


Figure 2.7 IFB 1 to 4 Cable Wiring (Ports 11 to 14) exwir6.eps

Pins 1/9 IFB +/- output from Matrix
Pins 2/10 4-wire Listen Input (if selected)
Pins 3/11 IFB +/- input to Matrix
Pins 4/12 Programme Sound output from Matrix (not normally used)
Pins 5/13 (not used)
Pins 6/14 PTB +/- output from Matrix (not normally used)
Pins 7/15 (not used)
Pin 8 0 volts
Cable screen terminated to connector body.

2.3.8 Port 15, External Producer Talkback Input Cable Wiring

The wiring information is shown below in both written and diagram form.

Matrix Port Cable Connector 15-way D-type free male

Wiring information:

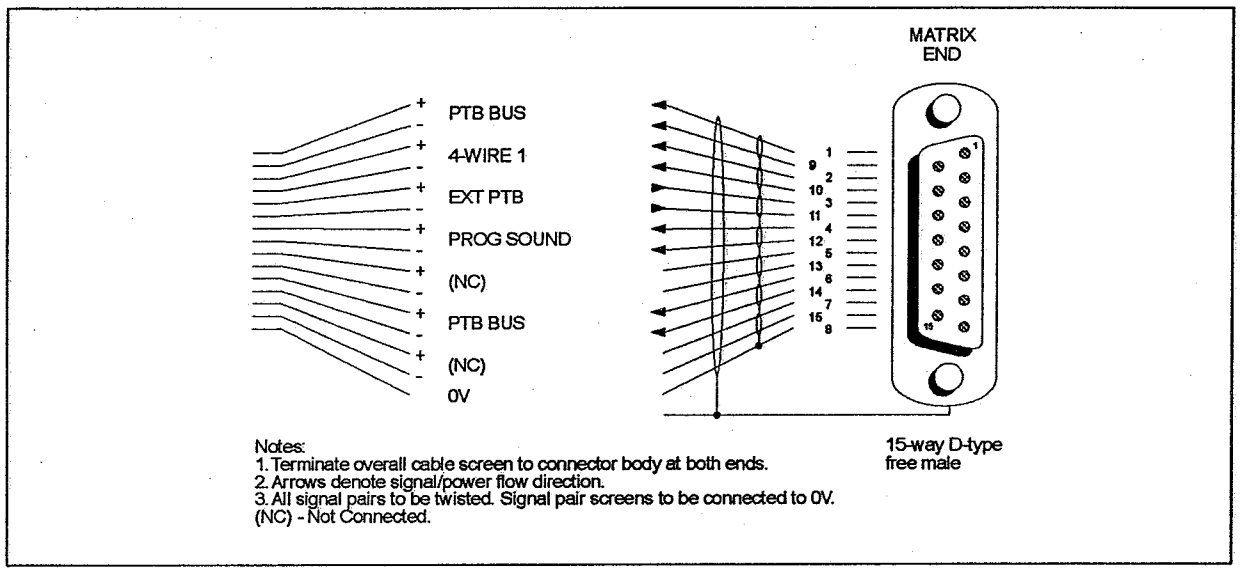


Figure 2.8 External Producer TB Input Cable Wiring (Port 15) exwir7.eps

Pins 1/9 PTB Bus +/- output from Matrix
Pins 2/10 4-wire 1 output (not normally used)
Pins 3/11 External PTB +/- input to Matrix
Pins 4/12 Programme Sound output from Matrix (not normally used)
Pins 5/13 (not used)
Pins 6/14 PTB bus +/- output
Pins 7/15 (not used)
Pin 8 0 volts
Cable screen terminated to connector body.

2.3.9 Port 16, Stereo Programme Sound Input Cable Wiring

The wiring information is shown below in both written and diagram form.

Matrix Port Cable Connector 15-way D-type free male

Wiring information:

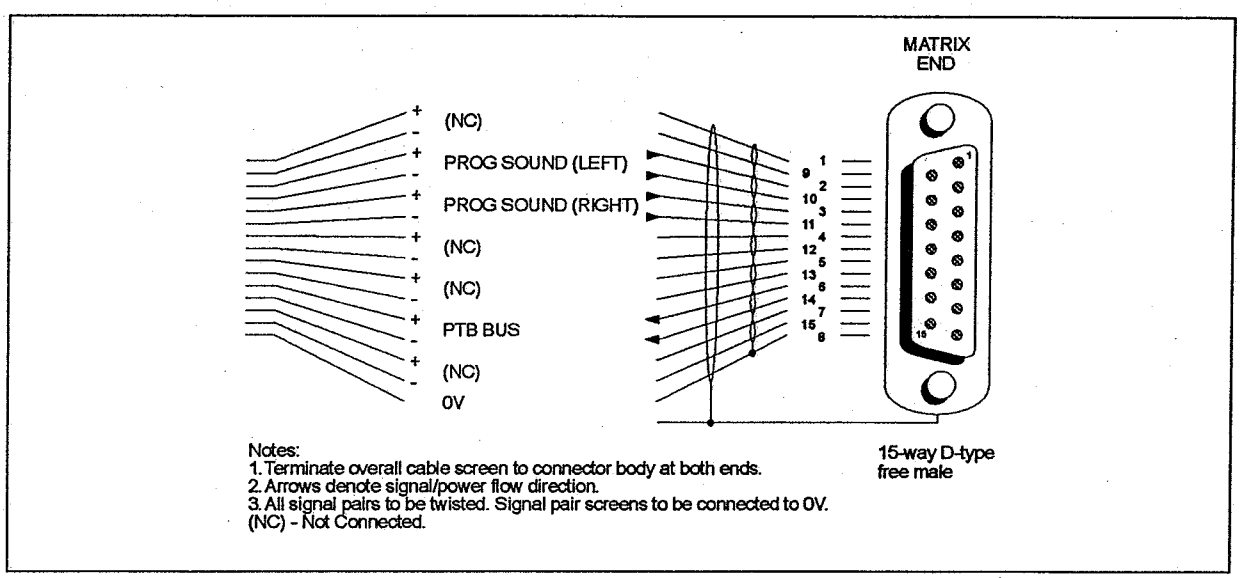


Figure 2.9 Stereo Programme Sound Input Cable Wiring (Port 16) exwir8.eps

Pins 1/9 (not used)
Pins 2/10 Programme Sound Left Channel input
Pins 3/11 Programme Sound Right Channel input
Pins 4/12 (not used)
Pins 5/13 (not used)
Pins 6/14 PTB bus +/- output from Matrix
Pins 7/15 (not used)
Pin 8 0 volts
Cable screen terminated to connector body.

2.3.10 AC Power Input IEC Cable Connector wiring and AC Voltage Input Selector

The AC connector supplies AC input to the internal Matrix power supply. The Voltage Selector switch selects 120 Volt (110-130 Volt range) or 240 Volt (220-250 Volt range) AC input to the internal power supply.

WARNING: Do not apply AC Power until all installation operations are complete. Check that the Voltage Selector switch is set to the correct supply voltage and that correct fuses are fitted before applying AC power.

2.4 System Power-On

When all Panels are set up and connected, connect AC power to the Matrix and switch the power on.

- Normal power supply operation will be denoted by the illumination of the four green Power LED's on the Matrix front panel.
- Successful panel DC and Data connection will be indicated by the illumination of the appropriate numbered Port LED's on the Matrix front panel behind the front cover.

The system will operate as shown in Figure 2.10 System Block Diagram (As Supplied).

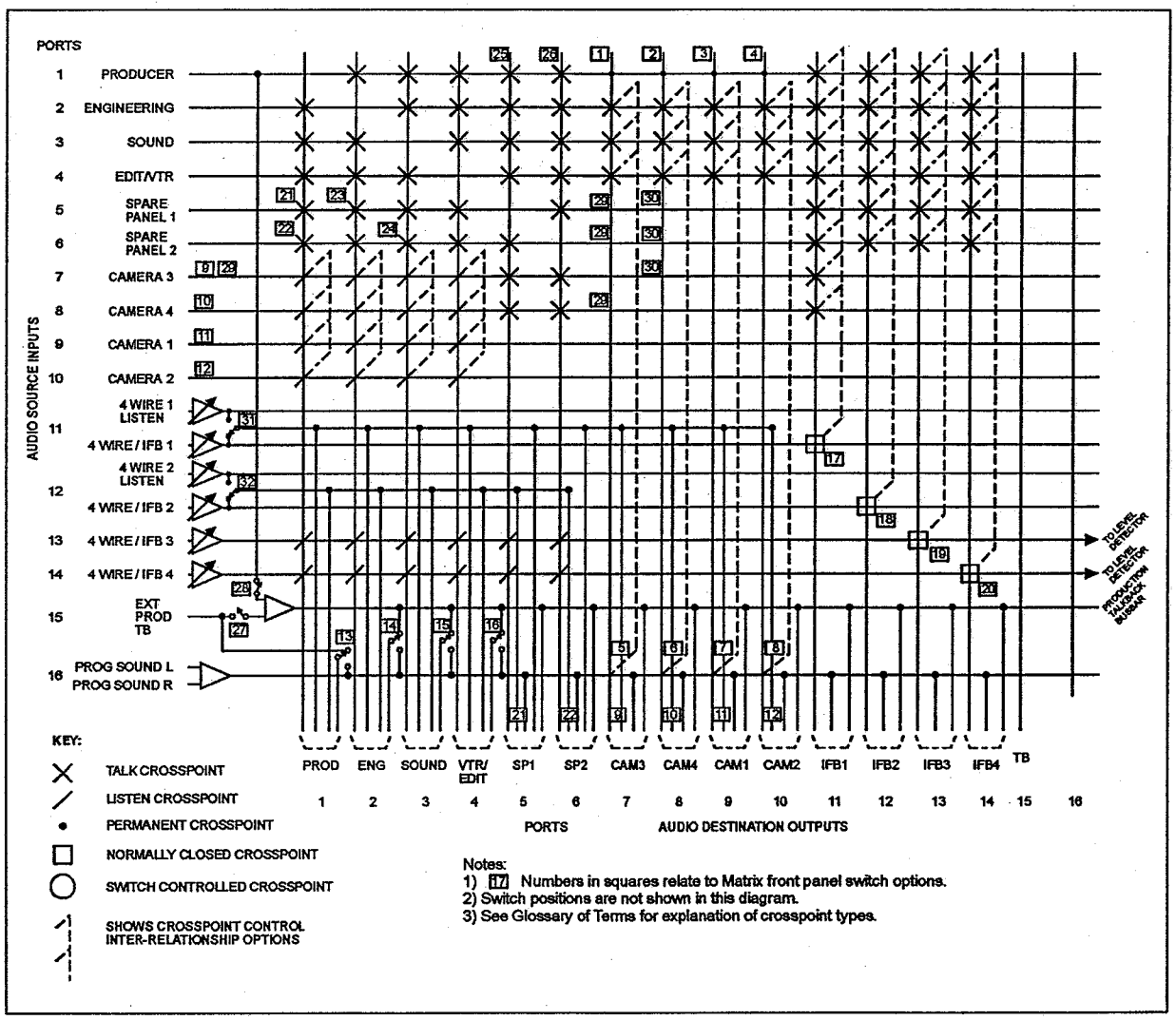


Figure 2.10 System Block Diagram (As Supplied) ecsyssup.eps

2.4.1 Matrix Power Indications

The Matrix is equipped with fuses and green LED indicators as follows:

AC Supply Fuse	
Supply 1 fuse and LED	- Internal +28V DC supply
Supply 2 fuse and LED	- Internal -28V DC supply
Supply 3 fuse and LED	- Beltpack DC supply
Power LED	- Matrix Card Electronics supply.

In normal operation, all four LED's are On, indicating that all internal supplies are operating. Refer to Section 6, the troubleshooting section of the handbook for a full description of the Power Supply fusing and indication arrangements.

2.4.2 Matrix Control Panel Active Indications

The Matrix contains eight Control Panel Active green LED's behind the front panel cover plate. In normal operation, each one of these is activated On for the connection of a correctly functioning Control Panel. Refer to Section 6, the troubleshooting section of the handbook for a full description of the Matrix Control Panel indication arrangements.

3 System Operation - As Supplied

The panels as supplied operate with gooseneck microphone and inbuilt loudspeaker when the Mic Mute / Headset Select Key is in the centred position.

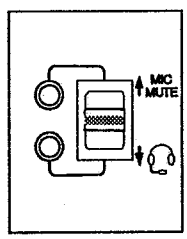
3.1 Control Panel Operation

3.1.1 Mic Mute/Headset Select Key

The functionality of the Mic Mute/Headset Select Key is shown in Table 3.1 Mic Mute/Headset Select Key Positions.

Table 3.1 Mic Mute/Headset Select Key Positions

Key Position	Gooseneck Microphone	Loudspeaker	Headset Microphone	Headset Earpieces
MIC MUTE Up (LED On)	OFF	ON	OFF	ON
Centre	ON	ON	OFF	ON
HEADSET Down (LED On)	OFF	OFF	ON	ON



Both Mic (microphone) Mute and Headset changeover functions are contained on one Lock Up/Centre/Lock Down switch.

Mic Mute is selected in the Up position. In this mode the loudspeaker and the headset earpiece amplifier remain operative with no output from the Panel gooseneck or headset microphones. The associated Red LED is illuminated.

The Centre position allows operation of the Panel gooseneck microphone, the loudspeaker, and the headset earpiece amplifier.

The Down position selects operation of the headset microphone and earpiece amplifiers whilst muting the Panel gooseneck microphone and loudspeaker amplifiers. The associated Red LED is illuminated.

The headset earpiece signals are undimmed by any key operation.

3.1.2 Talk/Listen/Call Keys

Talk, Listen and Call keys are defined by the system's inbuilt setup, and as defined by the Panel identity and Port connection. All keys provide the same functionality in the up and down positions, with no outgoing functionality in the centre Off position. Each key has an associated green LED indicator.

3.1.3 Panel Talk Key Operation

Selection of a Talk key operates the Matrix crosspoint(s) to the key destination(s) and dims the Panel loudspeaker as shown in the following table:

Key Destination	Loudspeaker Dim
Panel	ON
Camera	OFF
4-Wire/IFB	ON
Beltpack	OFF

3.1.4 Panel Listen Key Operation

Selection of a Listen key operates the Matrix crosspoint from that key source to the panel loudspeaker and headset earpieces. The panel loudspeaker is not dimmed by operation of the listen keys.

3.1.5 Call Key Operation

Selection of the Call key has no functionality in the factory setup for the system. Refer to Section 4 for Call key operation.

3.1.6 Green LED Operation

The LEDs operate as shown in the following table:

LED	Condition
OFF	Quiescent state with switch OFF (Centre)
Flashing	Incoming call if switch not selected ON
ON	Switch selected ON (Up or Down)

The LEDs have two functions:
- to indicate key position
- to indicate incoming calls.

Incoming calls are indicated from other panel Talk keys and from 4-wire/IFB circuits via the signal detectors. Note that on the 1210 Panel, the four LEDs associated with the talk to 4-wire/IFB, 1 to 4 circuits will flash when incoming audio signals are detected.

3.1.7 Level Controls

Level controls all operate from Off to +12dB gain. For the intercom level control, the Off level is preset via an adjustable control accessible from the rear of the control panel; the level can be set to -30dB to permit incoming signals to still be heard if the Intercom level control is inadvertantly turned off. The panels are supplied with the Off level set to -30dB. See Section 4.6 for level control functionality.

3.2 Matrix Operation

There are no active Matrix controls required for normal system operation. However, the Matrix front panel contains preset level adjustments for incoming and outgoing IFB/4-wire levels for Ports 11 to 14 to make allowance for external line gain and level variations.

The level adjustment controls are single turn potentiometers accessible with a screwdriver.

The level presets for Ports 5 to 10 are for setup purposes only and should not be varied in normal use.

4 Alternative Applications - Inbuilt Options

The EASi-COM system is designed to support a number of alternative applications through use of the Option switch selection on the Matrix front panel.

The following options are available:

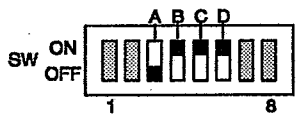
Section 4.1 - Additional Control Panel selections
Section 4.2 - Beltpack Rings selections
Section 4.3 - Cameras Type and Operating selection
Section 4.4 - 4-Wire/IFB options
Section 4.5 - Production Talkback options
Section 4.6 - Control Panel Listen selections.

4.1 Additional Control Panel Selections

The system is supplied preset for Ports 5 and 6 as Spare 1 and Spare 2 Control Panels respectively. Matrix Ports 5, 6, 7 and 8 can all support additional Control Panels.

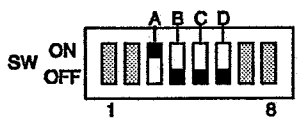
Control panel functionality is selected via the appropriate Matrix Option switches as listed in Table 4.1 Control Panel Switch Functionality and illustrated in Figure 2.1 Matrix Options Switches (SW1 to SW32).

The Panel Ident Switch (on the rear of the Control Panels) settings needed to identify Control Panels as Spare 1 and Spare 2 are as follows:



Spare 3 Control Panel Ident Switch Setting

idswsp.vpo



Spare 4 Control Panel Ident Switch Setting

idswsp4.vpo

The interconnect wiring for the Control Panels is identical to the other Control Panels as detailed in Section 2.3.5.

Control Panel Ident switches must be set as shown in Table 4.1 Control Panel Switch Functionality for correct operation.

Table 4.1 Control Panel Switch Functionality

Port	Control Panel	Functionality	SW21	SW22	SW23	SW24	SW29	SW30	Panel Ident
5	Spare 1	Control Panel On	OFF	-	OFF	-	-	-	5
		Control Panel Off (Beltpack 1 On)	ON OFF ON	-	OFF ON ON	-	-	-	
6	Spare 2	Control Panel On	-	OFF	-	OFF	-	-	6
		Control Panel Off (Beltpack 1 On)	-	ON OFF ON	-	OFF ON ON	-	-	
7	Spare 3	Control Panel On	-	-	-	-	OFF	-	7
		Control Panel Off (Camera 3 On)	-	-	-	-	ON	-	
8	Spare 4	Control Panel On	-	-	-	-	-	OFF	8
		Control Panel Off (Camera 4 On)	-	-	-	-	-	ON	

'-' denotes a switch which is irrelevant to the Control panel functionality.

Appropriate Ident strips should be chosen for fitting in the respective Control panels. Note that the key labels should be changed according to the functionality.

4.2 Beltpack Rings Selections

The system is preset for Ports 5 and 6 as Spare 1 and Spare 2 Control Panels respectively. These Ports 5 and 6 can support Beltpacks.

Beltpack functionality is selected by switches as listed in Table 4.5 Beltpack Functionality at the end of this section.

SW21 ON for Beltpack Ring 1 selected to Port 1 Producer Panel
SW23 ON for Beltpack Ring 1 selected to Port 2 Engineering Panel

Selection of either SW21 or SW23 ON will cause Port 5 interface operation to change to Beltpack. Selection of both switches will enable the Beltpack Ring to work with both Ports 1 and 2 Panel.

SW22 ON for Beltpack Ring 2 selected to Port 1 Producer Panel
SW24 ON for Beltpack Ring 2 selected to Port 3 Sound Panel

Selection of either SW22 or SW24 ON will cause Port 6 interface operation to change to Beltpack. Selection of both switches will enable the Beltpack Ring to work with both Ports 1 and 3 Panel.

Operation of these switches enables the following facilities:

- Permanent crosspoint from Beltpack to associated Port Intercom output.
- Call keyswitch on 1210 Panels operative - selection of this key will illuminate Beltpack Call light or operate the Beltpack Mic Mute as selected within the Beltpack.
- Port configured for Beltpack A DC on plus Channel termination resistors placed in circuit on Channels A and B.
- Talk key/permanent crosspoints to Beltpacks do not dim panel loudspeaker.

Option switches are provided to select Producer crosspoints to Beltpack outputs to be either operated from the Panel keyswitches or permanently on. These are selected as follows:

SW25 ON for Port 1 Producer Panel to Port 5 Beltpack 1 output if SW21 also ON
SW26 ON for Port 6 Producer Panel to Port 6 Beltpack 2 output if SW22 also ON

The Beltpack power supports up to 4 Beltpacks on each Ports 5 and 6. Use of additional Beltpacks will require the addition of a HANDi-COM Power Supply.

4.2.1 Beltpack Wiring

Both Beltpack Ports utilise the same wiring. The wiring information is shown below in diagram form.

Matrix Port Cable Connector	15-way D-type free male
Beltpack Ring Connector	6-way XLR-type free female

Wiring information:

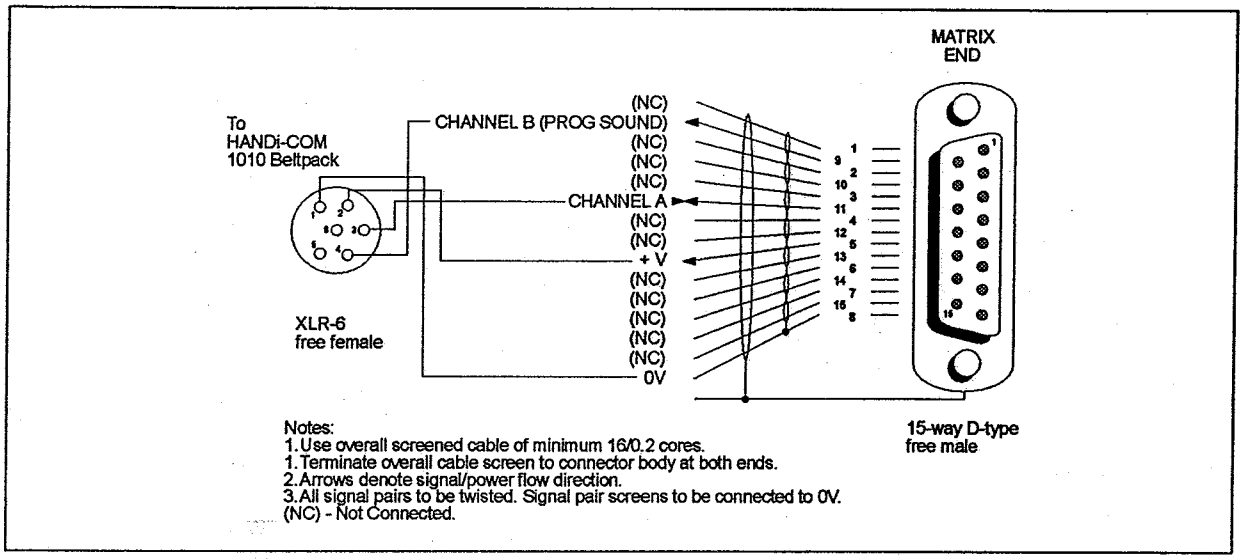


Figure 4.1 Beltpack Wiring ecwir9.eps

If Channel B is required to be used as an intercom channel only without Programme Sound, then no connection should be made between the Matrix and the Beltpack (i.e. do not wire Matrix Pins 9 and Beltpack Pin 4).

Note: In this mode it is necessary to provide a termination for Ring B either in a Beltpack or in an additional Power Supply (if provided)

4.2.2 Beltpack Operation

The EASi-COM system is set up to provide the Programme Sound Matrix input on Port 16 to Channel B of the Beltpack, with listen level set at the Beltpacks via the Channel B level control. Channel B may be used as an Intercom Channel with superimposed Programme Sound, with no talk and listen capability to Channel B at the Matrix Control Panels.

4.3 Camera Port Options

Options available cater for the following Camera Intercom facilities types:

- 4-wire Intercom to camera single Intercom input/output with additional Programme Sound input to camera
- 4-wire Intercom to camera single Intercom input/output with no Programme Sound input at Camera Control Unit
- 2-wire Intercom

Each Camera port can be separately selected for each facilities to allow for mixed camera types to be used with the system.

Important Note:
If the Camera CCUs offer a choice of 4- or 2-wire Intercom operation, the 4-wire operation setup should always be chosen for its superior performance, particularly with respect to Intercom input/output crosstalk which can have a degrading effect on the whole Intercom system performance, particularly with respect to howlround. Care should be taken to set for optimum input/output rejection as detailed in Section 4.3.4 to minimise the howlround possibility in 2-wire camera mode.

The system is preset for Ports 7 and 8 as Cameras 3 and 4 respectively. Ports 9 and 10 are permanently available as Camera or similar interfaces.

Note that in Camera mode, Talk to Cameras will not dim the Panel loudspeaker.

4.3.1 As Supplied Standard Setup

The standard setup allows for connection of identical camera types to Ports 7 -10 with the following specifications:

- 4-wire camera single intercom input/output and Programme Sound input to camera

Talk to Cameras is achieved from Panels by the use of Talk keys as supplied except for Port 1 Producer Panel, where the talk output is permanently on to the Cameras. Listen to Cameras is achieved by operation on of the Cameras Listen key at Panels. It is assumed that all Cameras are equipped with Press-to-Talk keys for camera operator use.

Note: In this mode the Producer disconnection of Talk to Cameras is via the Mic Mute key operation.

This is shown in the following diagram:

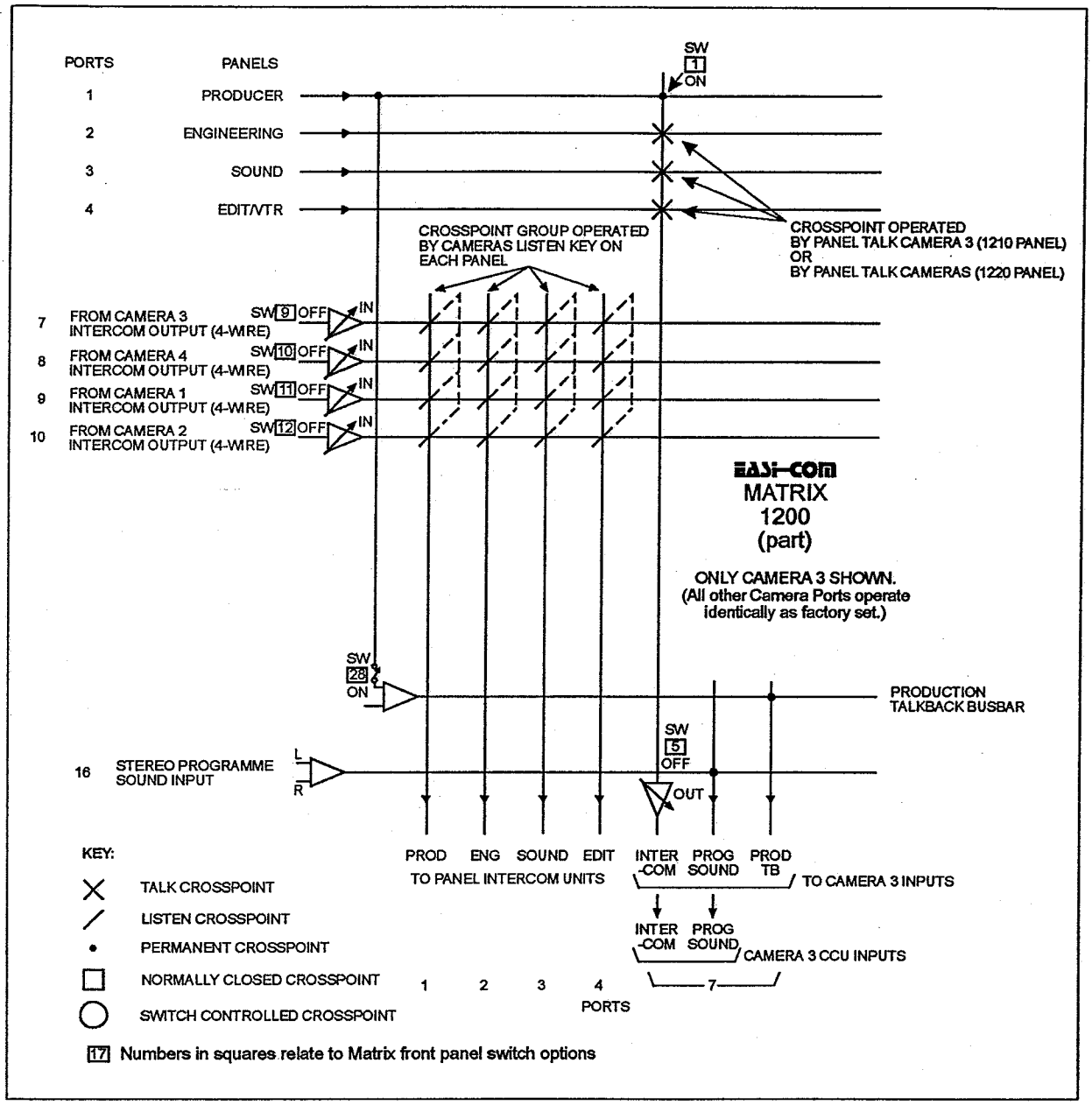


Figure 4.2 Camera - Panel Operation (Factory Setup) ccmat1.cps

4.3.2 Permanent Producer Talk to Cameras

A normal variation on this setup is to provide a permanent output of Producer Intercom to the camera operator with an IFB-switched output of Programme Sound interrupted by individual Panel keyed Talk to individual cameras. This is achieved by utilising the Matrix Intercom output as the connection to the camera Programme Sound input with the Matrix Production Talkback output connected to the camera Intercom input. This permits the Producer to be heard with no interruptions.

In this mode, the Port 1 Producer Cameras Talk key needs to be in the centre Off position. If there is concern that the Producer may operate this key and hence disable Programme Sound IFB to Cameras, then the Port 1 Producer Cameras Talk key can be disabled via the Options Connector - see Section 5.

This is shown in the following diagram:

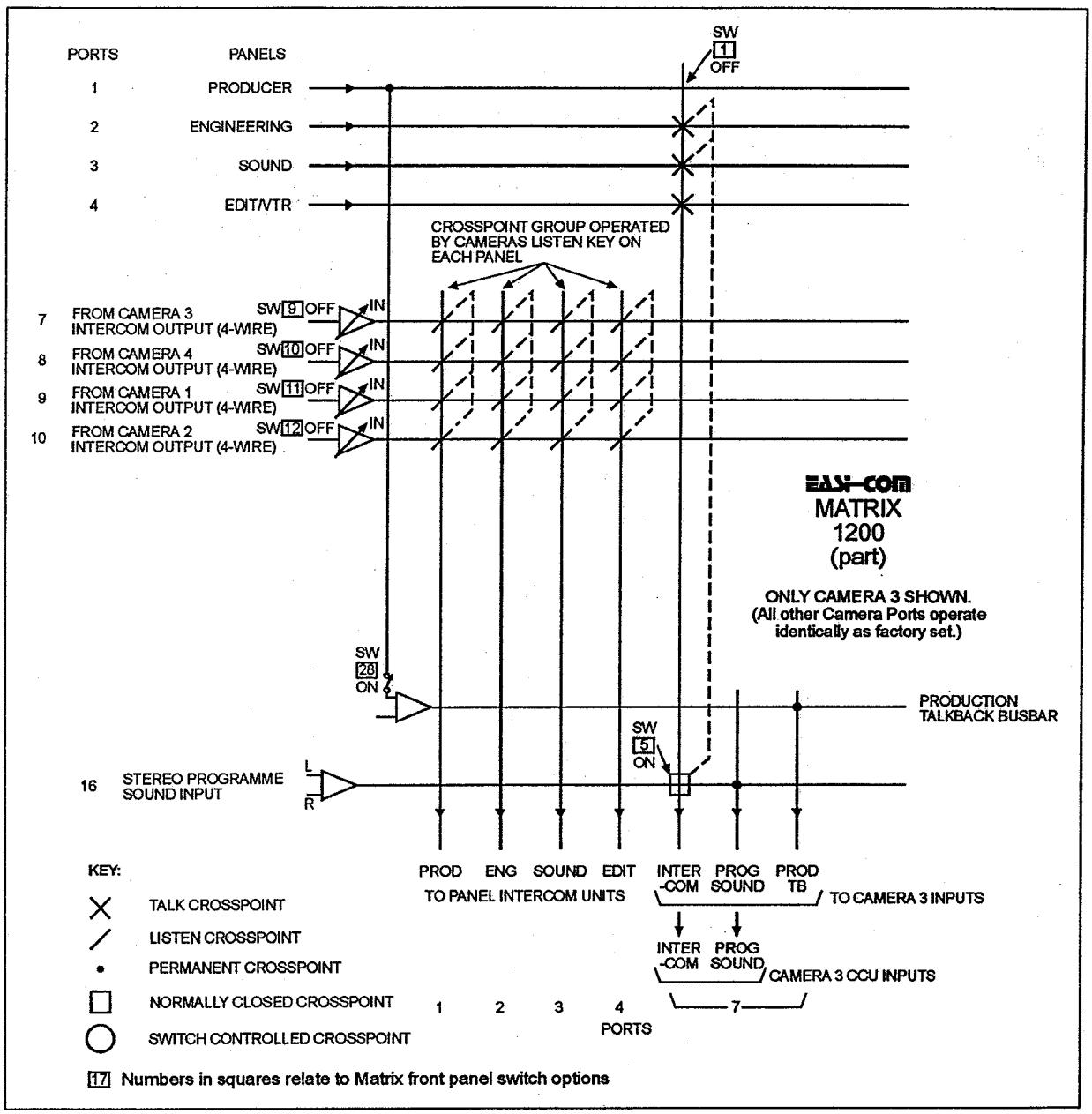


Figure 4.3 Camera - Panel Operation (Permanent Producer Talk to Cameras) ecmat2.eps

4.3.3 CCU 4-wire Intercom Input/Output Only

This operation is for cameras with 4-wire Intercom input/output only and no additional Programme Sound input. The setup allows the camera operator to choose to listen only or mix Intercom and Programme Sound.

This operation can be left exactly as the standard setup, but no Programme Sound will be heard by the camera operator. If it is required that Programme Sound is heard by the camera operator, then selection of switches SW5 - SW8 to ON places a Programme Sound IFB on to Ports 7 - 10 Intercom output respectively. Talk to Camera from Panel Ports 2, 3, and 4 will disconnect Programme Sound to Camera and replace it with appropriate Panel Talk output.

Note: In this mode, Producer Talk and Programme Sound to Camera are mixed together.

Alternative operation with this CCU configuration is to provide keyed Talk from Producer Panel with the Programme Sound IFB's ON as above. This will allow either Programme Sound or Intercom to Intercom output to Camera. Note that in this mode, selection of Talk from Port 1 Producer Talk Cams key will disconnect Programme Sound to all cameras selected to have keyed Talk from Port 1 Producer Panel.

Removal of Port 1 Producer Panel permanent Intercom to Matrix Camera 1 Intercom Output - move SW1 to OFF

Removal of Port 1 Producer Panel permanent Intercom to Matrix Camera 2 Intercom Output - move SW2 to OFF

Removal of Port 1 Producer Panel permanent Intercom to Matrix Camera 3 Intercom Output - move SW3 to OFF

Removal of Port 1 Producer Panel permanent Intercom to Matrix Camera 4 Intercom Output - move SW4 to OFF

If it is important to have individual Talk to Cameras from Producer Panel, then the system should be designed around the use of an alternative Port to Port 1 as Producer Panel.

This Option is shown in the following diagram:

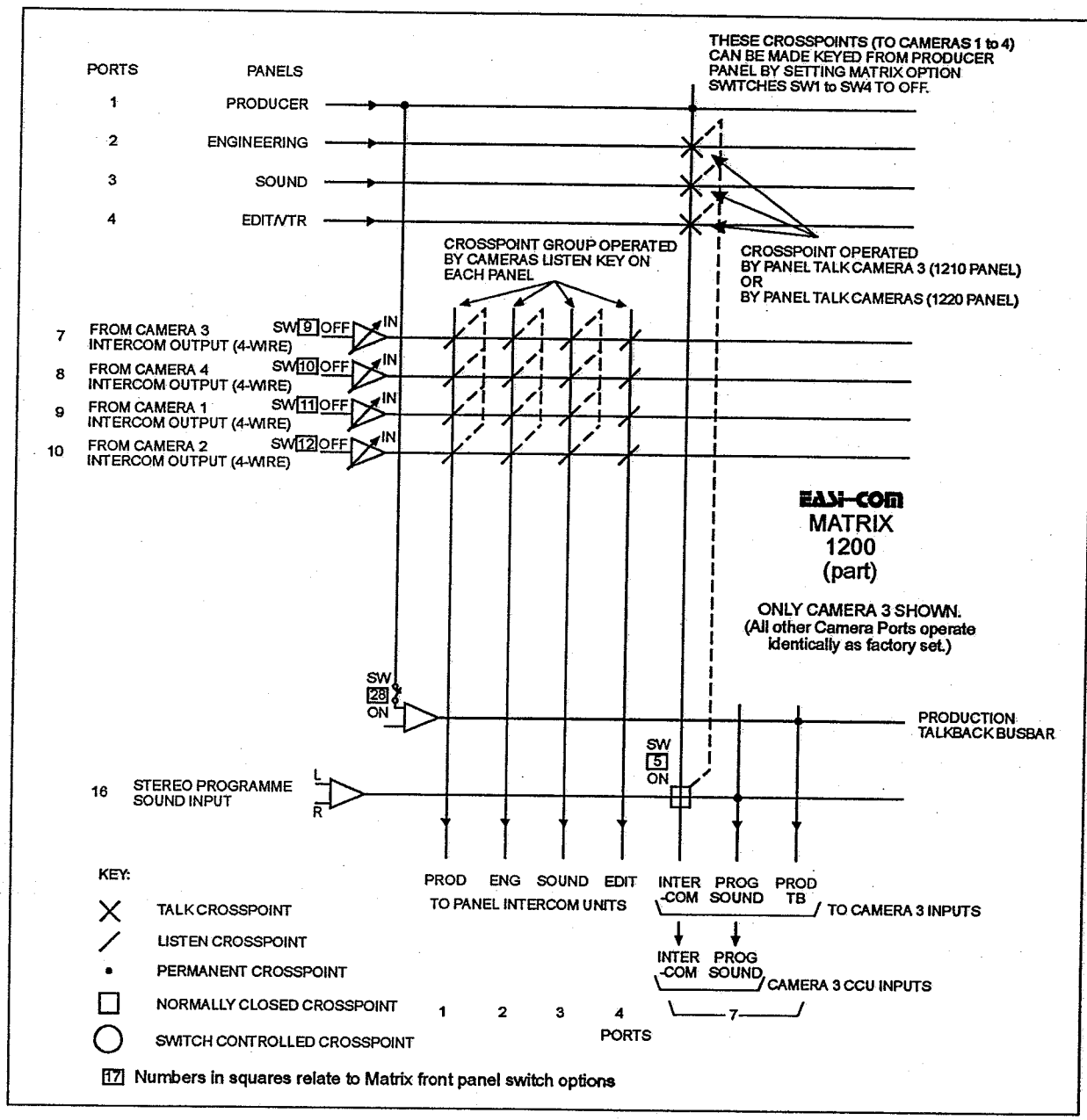


Figure 4.4 Camera - Panel Operation
(CCU 4-Wire Intercom Input/Output Only)

ccmat3.cps

4.3.4 CCU 2-Wire Intercom Input/Output Only

If the Camera CCU offers only 2-wire operation, there is often no Programme Sound input to the CCU. If there is Programme Sound input available, then Matrix Programme Sound should be connected to the Camera CCU Programme Sound input, first ensuring that the input is balanced or connected in an unbalanced mode.

For the Intercom signals, the Matrix setup is recommended as follows.

For Port 7 Camera 3:

SW9 ON for Port 7 Camera 3 2 Wire mode selected.
SW5 OFF for Programme Sound IFB to Port 7 Camera 3 Intercom output deselected.
SW1 ON for Port 1 Producer Panel to Port 7 Camera 3 Intercom output permanent crosspoint On

For Port 8 Camera 4:

SW10 ON for Port 7 Camera 3 2-wire mode selected.
SW6 OFF for Programme Sound IFB to Port 7 Camera 3 Intercom output deselected.
SW2 ON for Port 1 Producer Panel to Port 7 Camera 3 Intercom output permanent crosspoint On

For Port 9 Camera 1:

SW11 ON for Port 7 Camera 3 2 Wire mode selected.
SW7 OFF for Programme Sound IFB to Port 7 Camera 3 Intercom output deselected.
SW3 ON for Port 1 Producer Panel to Port 7 Camera 3 Intercom output permanent crosspoint On

For Port 10 Camera 2:

SW12 ON for Port 7 Camera 3 2 Wire mode selected.
SW8 OFF for Programme Sound IFB to Port 7 Camera 3 Intercom output deselected.
SW4 ON for Port 1 Producer Panel to Port 7 Camera 3 Intercom output permanent crosspoint On

In this setup, Producer Panel is permanently connected to camera intercom input, with other Panels keyed to talk to cameras as before. The Camera's Listen function is keyed as before.

It is vital to ensure that the Balance controls on the Matrix Front Panel are set for optimum input/output rejection. This is undertaken through the following procedure for each Camera:

a) select listen to individual Camera with all talks disconnected, one at a time, and set In control on associated Port for similar Intercom listen level at a Panel as from other Panels.

b) set talk to the same individual Camera from one Panel only, and set Out control to achieve an undistorted maximum listen level in the Camera headset with Camera intercom level control at maximum.

c) select talk and listen to the Camera at a Panel, then listen to the Camera at the Panel with gooseneck microphone and loudspeaker selected, and set Balance control for maximum rejection of Panel microphone signal at the loudspeaker by talking into the microphone and listening to the loudspeaker output.

This setup option is shown in the following diagram:

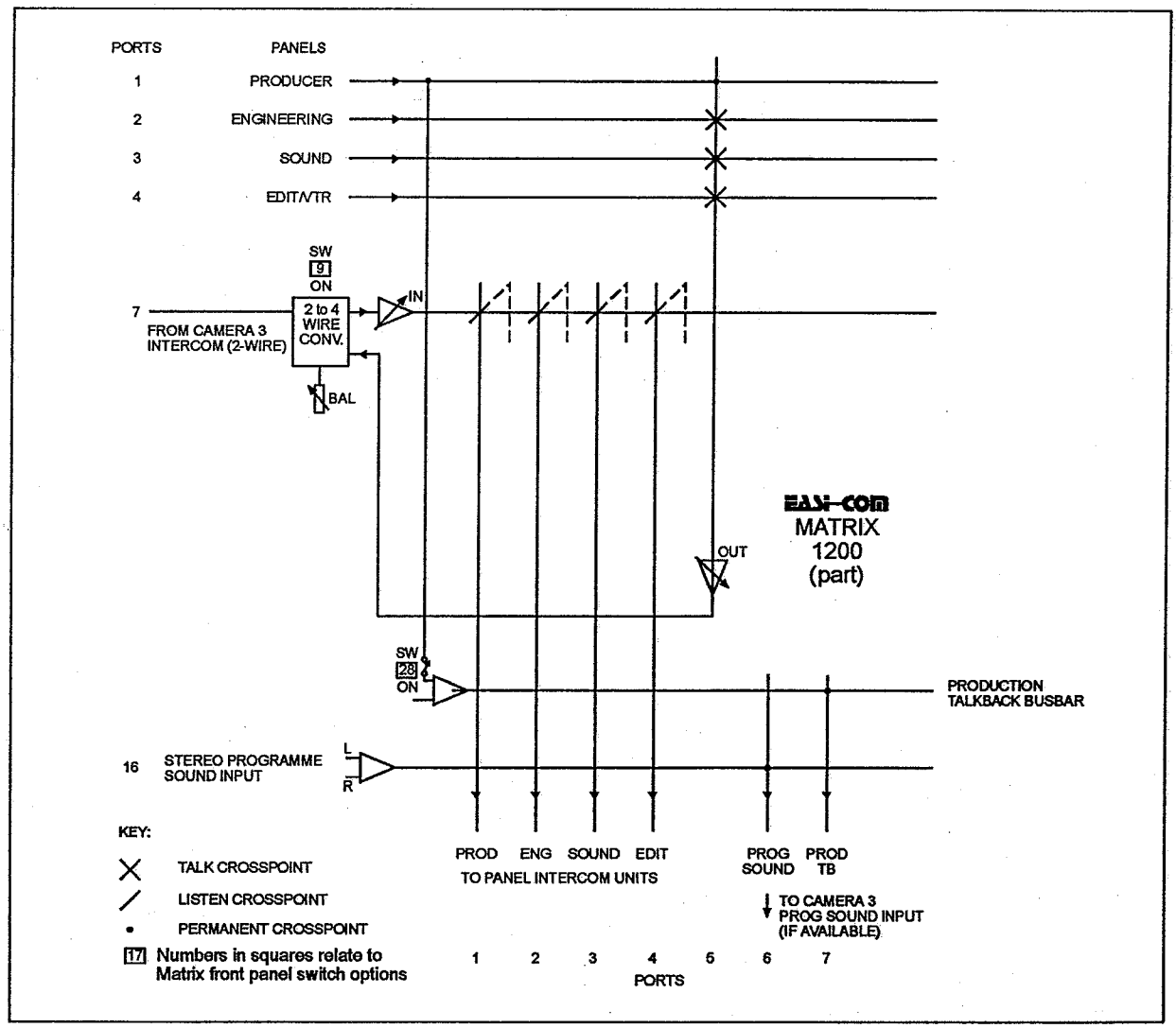


Figure 4.5 Camera - Panel Operation
(CCU 2-Wire Intercom Input/Output Only)

eciat4eps

4.3.5 Camera Intercom Wiring Diagrams

Typical Camera Wiring Diagrams are shown in Figure 4.6 Camera Intercom Wiring:

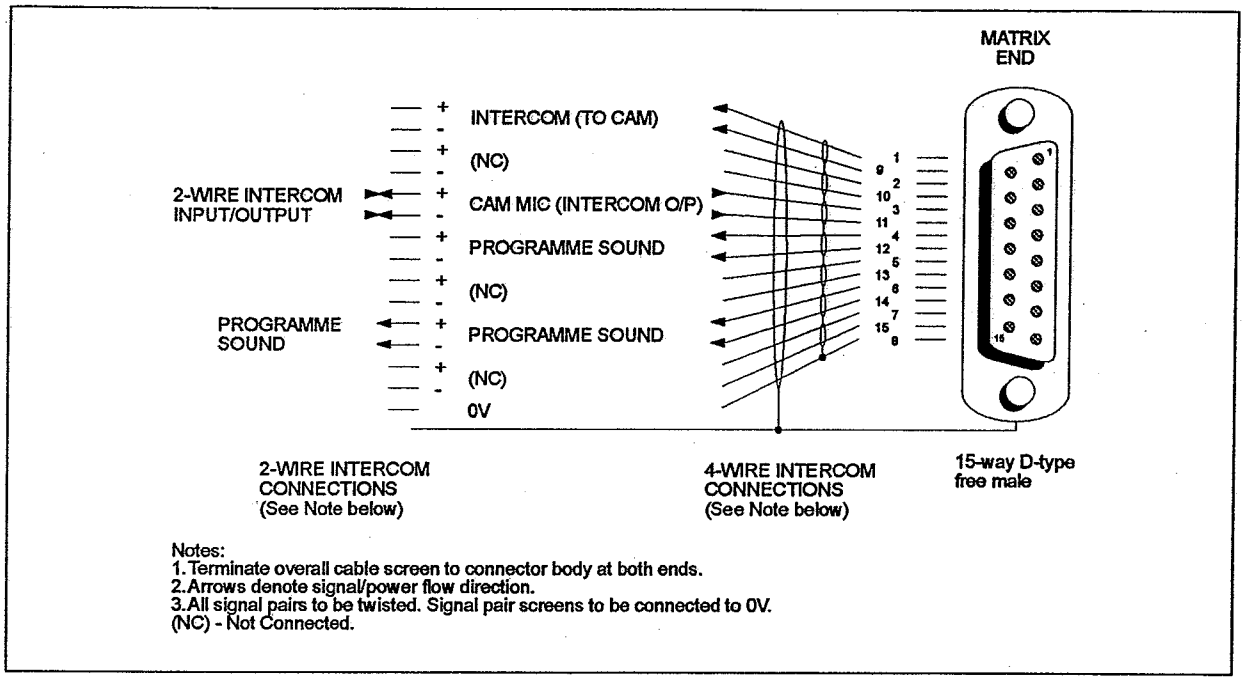


Figure 4.6 Camera Intercom Wiring ecwir10.eps

2-Wire Intercom Connections: See Figure 4.5.
4-Wire Intercom Connections: See Figures 4.2, 4.3 and 4.4.

4.4 4-Wire/IFB Options

The system is set up for normal IFB operation, with each IFB circuit input being routed to the same circuit IFB output through a normally closed crosspoint, that crosspoint being deselected with Talk from Panels being substituted as selected. Panels can listen to the incoming IFB signal via a Panel level control.

Inputs and outputs are tranformer balanced with level set controls on the Matrix Front Panel. The level controls should be set for listen levels equivalent to the Panel listen levels at loudspeakers for the same level control positions (for 4-wire 1 and 4-wire 2 listening).

4-Wire/IFB options are selected by switches as listed in Table 4.2 4-Wire/IFB Switches Options:

Table 4.2 4-Wire/IFB Switches Options

Port	4-Wire /IFB	Functionality	Switch Number	
			SW17	**SW31**
11	1	Panels Listen to 4-Wire/IFB 1 input	-	OFF
		Panels Listen to 4-Wire/IFB 1 Listen input	-	ON
		4-Wire/IFB 1 input IFB crosspoint On	ON	-
		4-Wire/IFB 1 input IFB crosspoint Off	OFF	-
			SW18	**SW32**
12	2	Panels Listen to 4-Wire/IFB 2 input	-	OFF
		Panels Listen to 4-Wire/IFB 2 Listen input	-	ON
		4-Wire/IFB 2 input IFB crosspoint On	ON	-
		4-Wire/IFB 2 input IFB crosspoint Off	OFF	-
			SW19	
13	3	4-Wire/IFB 3 input IFB crosspoint On	ON	
		4-Wire/IFB 3 input IFB crosspoint Off	OFF	
			SW20	
14	4	4-Wire/IFB 4 input IFB crosspoint On	ON	
		4-Wire/IFB 4 input IFB crosspoint Off	OFF	

Note that selection of any Talk key to 4-Wire/IFB output will dim that Panel's loudspeaker.

4.4.1 Separate IFB 1 and 2 Listen Circuits

The standard setup assumes Ports 11-14 operating as IFB's, that is, that the signal input to the Port is normally output to the Port output, interrupted by Control Panel Talk to that output. Panels are listening to the Port inputs.

For IFB operation, there is often a requirement to listen to a separate IFB return rather than the IFB signal input to the Matrix. This can be achieved for Ports 11 and 12 through the selection of switches 31 and 32 for 4-wire/IFB's 1 and 2 respectively to ON for selection of the Listen input to the Matrix to the Matrix output.

Note that the placement of the VOX signal detection circuits at the Panels for the 4-wire/IFB circuits 1 and 2 Panel Level Controls ensures that any signal input to the Panels on those circuits will operate the LED's in the correct manner.

This Listen facility is not provided for Ports 13 and 14, 4-Wire/IFB 3 and 4-Wire/IFB 4 respectively.

These options are illustrated in the following diagram:

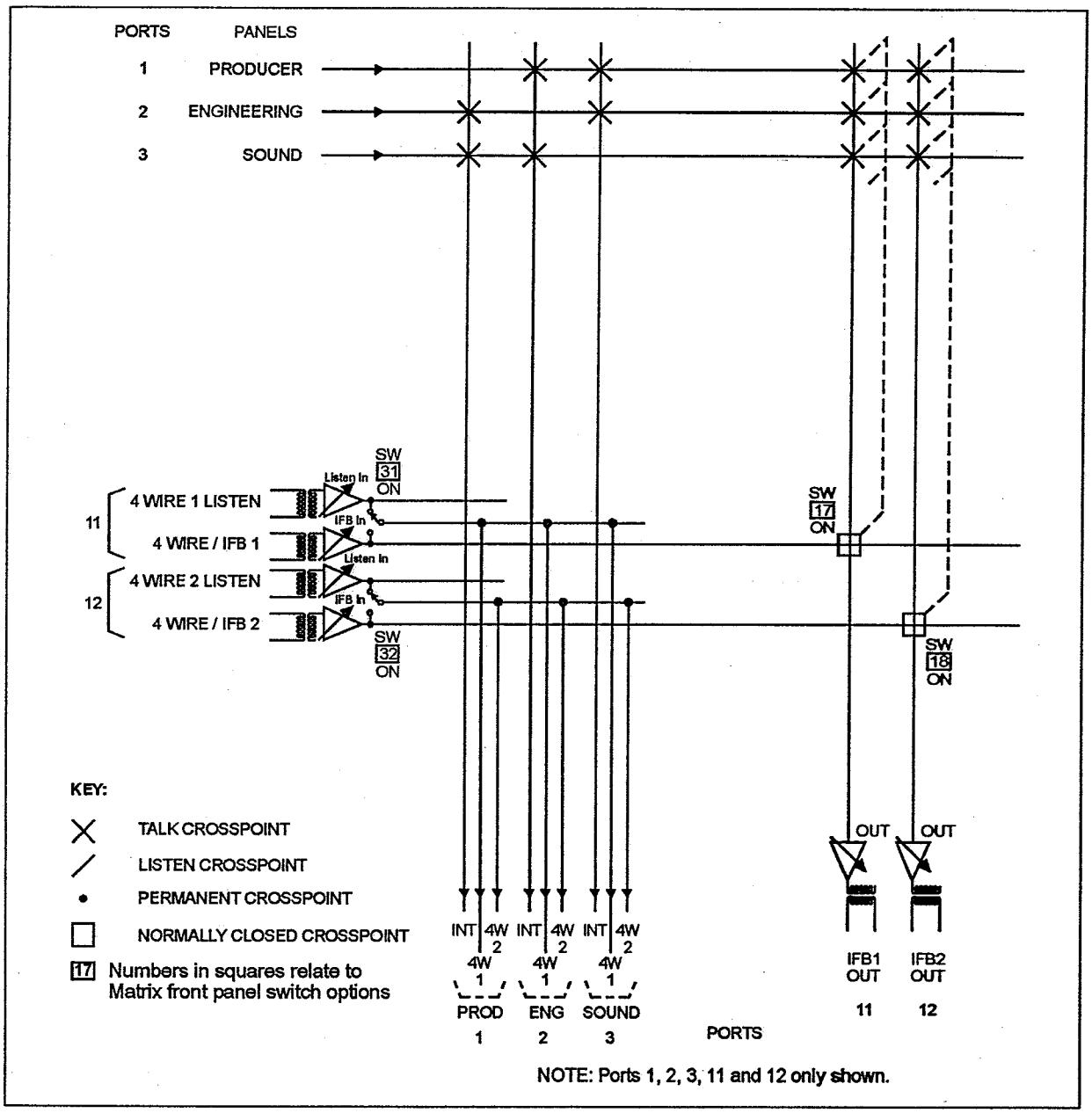


Figure 4.7 Separate IFB1 and IFB2 Listen Circuits ecmat5.eps

4.4.2 4-wire Circuits

Many 4-wire circuit applications require only to communicate with the 4-wire destination on the basis of talking to the destination and listening to the return circuit. This can be achieved by switching off the IFB crosspoints to each 4-wire/IFB outputs as follows:

SW17 OFF for IFB 1 crosspoint off
SW18 OFF for IFB 2 crosspoint off
SW19 OFF for IFB 3 crosspoint off
SW20 OFF for IFB 4 crosspoint off

In this mode the return circuit may be either the 4-wire/IFB input or the 4-wire Listen input for circuits 1 and 2 on Ports 11 and 12 respectively.

4.5 Production Talkback Options

The system as provided creates an internal Production Talkback busbar using Port 15. Port 1 Producer Panel output to the Matrix is fed via SW28 ON to the busbar for distribution to all Port outputs except Port 1. All of these outputs are for use with bridging impedance (10KΩ) balanced input local amplifiers and are not for line driving.

Port 1 is fed with Port 15 External Production Talkback input only. In normal setup with Port 1 as Producer Panel, the Producer will not want to hear own derived Intercom, which anyway will cause howlround.

Production Talkback options are selected by switches as listed in Table 4.3 Production Talkback Switch Options.

Table 4.3 Production Talkback Switch Options

SW27	SW28	Functionality
OFF	OFF	No input to Production Talkback Busbar
OFF	ON	Port 1 Producer Panel routed to Production Talkback Busbar
ON	OFF	Port 15 External Production Talkback input routed to Production Talkback Busbar
ON	ON	Both Ports 1 and 15 inputs mixed to Production Talkback Busbar

See Section 4.6 for use of the Control Panel Listen options in conjunction with Production Talkback Busbar input selections.

4.5.1 Operation as Master Intercom System

In Master mode, the Producer may be controlling other picture and sound sources through this Studio or Outside Broadcast Intercom system. In this mode, a distributed output of Production Talkback may be fed to contributing (Slave) studios. A Slave studio may reply to the Producer via the External Production Talkback input with SW27 OFF as supplied and SW13 ON as supplied.

Additional operator Control Panels may communicate with contributing (slave) studios via the 4-wire circuits connected externally to the system.

4.5.2 Operation as Slave Intercom System

In Slave mode, the local production is controlled by an external Studio. To hear the incoming controlling Production Talkback, select SW27 ON for routing of Port 15 External Production Talkback to Production Talkback Busbar within the Matrix. Producer Panel will continue to hear only External Production Talkback, and all other Control Panels will hear Producer Control Panel mixed with External Production Talkback.

Talkback to the external Master Studio may be via the 4-wire circuits as above.

This setup includes operation with a local Producer. If no local Producer is required, then either the Producer Panel microphone output is muted via the Mic Mute key, or SW28 is selected OFF to disable Port 1 Producer Panel output from connection to Production Talkback Busbar. In this latter mode the Producer Panel can be used as a normal Intercom Panel source without contributing to the Production Talkback Busbar which may cause confusion to operators with permanent Production Talkback feeds such as Cameras.

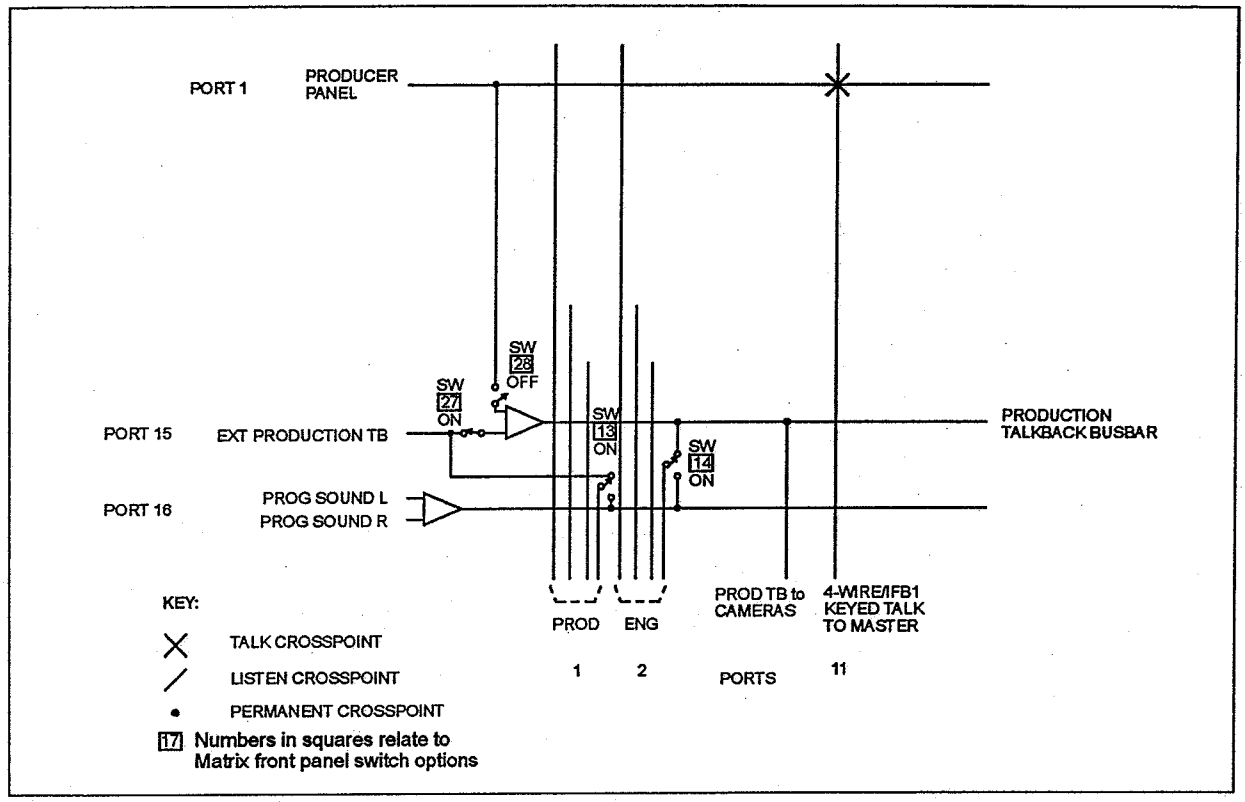


Figure 4.8 Operation as Slave Intercom System without Local Producer ecmat6.eps

4.6 Control Panel Listen Options

Control Panel type 1210 has four listen Level Control inputs, connected to the Matrix as per the standard cables and wiring as follows:

Ports 1 to 4	Intercom (INT) IFB 1 IFB 2 Programme Sound (PROG)
Ports 5 and 6	Intercom (INT) IFB 1 IFB 2 Production Talkback (PTB)
Ports 7 and 8	Intercom (INT) IFB 1 Production Talkback (PROG) Programme Sound (PTB)

Control Panel type 1220 has two Listen Level Control inputs, connected to the Matrix as per the standard cables and wiring as follows:

Ports 1 to 4	Intercom (INT) Programme Sound (PROG)
Ports 5 to 8	Intercom (INT) Production Talkback (PTB)

Ports 1 to 4 each have the option of switching the Programme Sound Listen input to Production Talkback by using the switches as shown in Table 4.4 Control Panel Listen Switch Options:

Table 4.4 Control Panel Listen Switch Options

SW13	OFF	Programme Sound input selected to Port 1 Producer Panel Listen
	ON	External Production Talkback input selected to Port 1 Producer Panel Listen
SW14	OFF	Programme Sound input selected to Port 2 Engineer Panel Listen
	ON	Production Talkback busbar selected to Port 2 Engineer Panel Listen
SW15	OFF	Programme Sound input selected to Port 3 Sound Panel Listen
	ON	Production Talkback busbar selected to Port 3 Sound Panel Listen
SW16	OFF	Programme Sound input selected to Port 4 Edit/VTR Panel Listen
	ON	Production Talkback busbar selected to Port 4 Edit/VTR Panel Listen

Refer to Appendix C for the relationship between the Control Panel level controls and their functionality.

Table 4.5 Beltpack Functionality

Port	Beltpack	Functionality	SW21	SW22	SW23	SW24	Functionality	SW25	SW26
5	1	Beltpack 1 On to Port 1 Producer	ON	-	-	-	Producer Panel Talk key to Beltpack 1	OFF	-
							Producer Panel Permanent On to Beltpack 1	ON	
		Beltpack 1 On to Port 2 Engineer	-	-	ON	-		-	-
		Beltpack 1 On to Port 1 and Port 2	ON	-	ON	-	Producer Panel Talk key to Beltpack 1	OFF	-
							Producer Panel Permanent On to Beltpack 1	ON	
		Control Panel Spare 1 selected On Port 5	OFF	-	OFF	-		-	-
6	2	Beltpack 2 On to Port 1 Producer	-	ON	-	-	Producer Panel Talk key to Beltpack 1	-	OFF
							Producer Panel Permanent On to Beltpack 1		ON
		Beltpack 2 On to Port 3 Sound	-	-	-	ON		-	-
		Beltpack 2 On to Port 1 and Port 3	-	ON	-	ON	Producer Panel Talk key to Beltpack 1	-	OFF
							Producer Panel Permanent On to Beltpack 1		ON
		Control Panel Spare 2 selected On Port 6	-	OFF	-	OFF		-	-

Table 4.6 Camera Port Options

Port	Camera	Functionality		SW29	SW1	SW5	SW9	Notes
7	3	For Camera with 4-wire Intercom facilities - 2 inputs (Intercom and Programme) - 1 output (Intercom)		ON	ON	OFF	OFF	See Figure 4.2
		Matrix permanent Producer Talkback plus Panels keyed Talk from Matrix Intercom output to Camera Intercom input						
		Matrix Programme Sound output to Camera Programme Sound input						
		For Camera with 4-wire Intercom facilities - 2 inputs (Intercom and Programme) - 1 output (Intercom)		ON	OFF	ON	OFF	See Figure 4.3
		Matrix Production Talkback output to Camera Intercom input						
		Matrix Programme Sound IFB to Intercom output overridden by Panel's keyed Talk						
		For Camera with 4-wire Intercom facilities - 1 input (Intercom) - 1 output (Intercom)	No Programme Sound	ON	ON	OFF	OFF	See Figure 4.4
		Matrix permanent Producer Talkback plus Panel keyed Talk from Matrix Intercom output to Camera Intercom input	with Programme Sound IFB	ON	ON	ON	OFF	
			with keyed Producer Talk	ON	OFF	ON	OFF	
		For Camera with 4-wire Intercom facilities	No Programme Sound	ON	ON	OFF	ON	See Figure 4.5
		Matrix permanent Producer Talkback plus Panel keyed Talk from Matrix Intercom output to Camera Intercom input	with Programme Sound IFB	ON	ON	ON	ON	
			with keyed Producer Talk	ON	OFF	ON	ON	
		Control Panel Spare 3 selected		OFF	-	-	-	-

5 Other Options and Applications

5.1 Matrix

5.1.1 Power Supply

The Matrix is equipped to power the system maximum of eight Control Panels over 150 metres of specified cable. If longer cables or cables of a higher than specified impedance are being used, additional power should be injected at the appropriate Control Panels via the Panel Auxiliary Power connector.

The Matrix DC and Alarm connector provided to give 2 additional functions:

backup power input
Power Supply failure alarm output

Backup Power Supply

The Matrix requires +24V and -24V DC unregulated at 7.5A for full backup capability. These inputs are diode gated with the internal supply to allow power sharing and immediate, automatic backup takeover in the event of Matrix power supply failure.

Note: This input cannot be used for power output from the Matrix.

DC Failure Alarm Output

A high impedance output of the +24V and -24V DC internal rails is provided. This is for use with an external alarm system.

The outputs are taken before the input of external backup power, and indicates failure of the internal Matrix supply only.

Note: This output cannot be used for power input to the Matrix.

DC and Alarm Connector pinouts

Connector: 9-way D-type socket (4A rated contacts minimum)

Pinout	Signal
1	Unregulated DC + input
2	0 volts
3	Unregulated DC - input
4	Not Used
5	Alarm Output 1
6	Unregulated DC + input
7	0 volts

8 Unregulated DC - input
9 Alarm Output 2

Note: Both input pins for each of +, -. and 0V DC inputs must be used to avoid overloading the pin current ratings.

5.1.2 DC Control connector

This function is not available in this Matrix configuration.

5.2 Control Panels

The Control Panels have 4 additional Panel connectors:

- Options
- Auxiliary Power
- Audio Mix
- Loudspeaker

5.2.1 Options Connector

This connector gives access to additional facilities which can be used to tailor system performance to suit specific requirements and applications. Examples are described later in this section.

Connector:25-way D-type socket

Pinout	Signal		
1	+5V output		
2	Panel keyswitch 17 in/out		
3	Panel keyswitch 15 in/out		
4	Panel keyswitch 13 in/out	16	Panel keyswitch 14 in/out
5	Panel keyswitch 11 in/out	17	Panel keyswitch 12 in/out
		18	Panel keyswitch 10 in/out
6	Panel keyswitch 9 in/out	19	Panel keyswitch 8 in/out
7	Panel keyswitch 7 in/out	20	Panel keyswitch 6 in/out
8	Panel keyswitch 5 in/out		
9	Panel keyswitch 3 in/out	21	Panel keyswitch 4 in/out
10	Panel keyswitch 1 in/out	22	Panel keyswitch 2 in/out
		23	Loudspeaker Mute input
11	Mic Mute input	24	Dim output
12	Loudspeaker Dim input	25	Talk On output
13	0V output		
14	Panel keyswitch 18 in/out		
15	Panel keyswitch 16 in/out		

The functionality of the keyswitches in relation to the Control Panel 1210 (18 Keyswitch Panel) and the 1220 Control Panel 1220 (14 Keyswitch Panel) is given in Appendix C.

Options Control Operations

Panel keyswitches	These operate as 3 state as follows: - no external connection allows the switches to operate as normal. - pin connection to logic 1 (+5V to +15V DC) will disable the switch function operation. - pin connection to a logic 0 (0V DC) will activate the switch function irrespective of the switch position.
Talk On output (pin 25)	This output is normally logic 1, and is changed to logic 0 when any Talk crosspoint instruction is activated on, either by keyswitch or externally through the options connector.
Mic Mute output (pin 11)	This output is normally logic 1 for microphones unmuted, and activated to logic 0 for selection of the Panel Mic Mute switch to On (Mic output muted). This external control input will override the Panel keyswitch control and can be used in applications where it is important to have a separate external key for this function.
Loudspeaker Mute input (pin 23)	This input is normally logic 1 for loudspeaker unmuted. Activation to logic 0 by application of 0V DC will mute the loudspeaker.
Dim input (pin 12)	This input is normally logic 1 for loudspeaker dim not operated. Activation to logic 0 by application of 0V DC will dim the loudspeaker to the level preset at the Panel rear.
Dim output (pin 24)	This output is normally logic 1 for loudspeaker dim not operated. Activation of any Talk keyswitch will activate the output to logic 0 for loudspeaker dimmed.

Note that only one connection should be made to each pin in order to prevent 'back door' function operation. If more than one operation is required for a function, for example, two Talkback keyswitches are both required to operate one Loudspeaker Dim function, then blocking diodes should be used to prevent operation of the second talk function from the first Talk keyswitch and vice-versa.

5.2.2 Auxiliary Power Connector

This connector is used for inputting local DC Volts where cable length is over 150 metres or where cable type dictates the use of a local DC supply.

The panel requires ±18V DC to ±35V DC unregulated at 1A for maximum loudspeaker power output.

Connector: 9-way D-type socket

Pinout	Function
1	unregulated +18 to +35 Volt DC input
2	0 V input
3	unregulated -18 to -35 Volt DC input
4	0 V input
5	Not Used
6	unregulated +18 to +35 Volt DC input
7	0 V input
8	unregulated -18 to - 35 Volt DC input
9	O V input

5.2.3 Audio Mix Connector

This connector provides additional audio facilities as follows:

- fixed 0dB balanced Auxiliary audio mix input to the Panel level control mixer. This enables additional inputs to mix into the Panel listening facilities using external mix level control.
- unbalanced 0dB Panel level control mixer output.
- post limiter, post Mic mute, unbalanced 0dB microphone output. This enables Panel microphone output to be mixed into another Panel via its microphone input or to be used for other purposes.
- post limiter, post Mic mute, post microphone output, unbalanced 0dB microphone input. This enables another Panel microphone to be mixed into the Panel microphone output to the Matrix.

The Panel audio block diagram is reproduced below to show the signal paths.

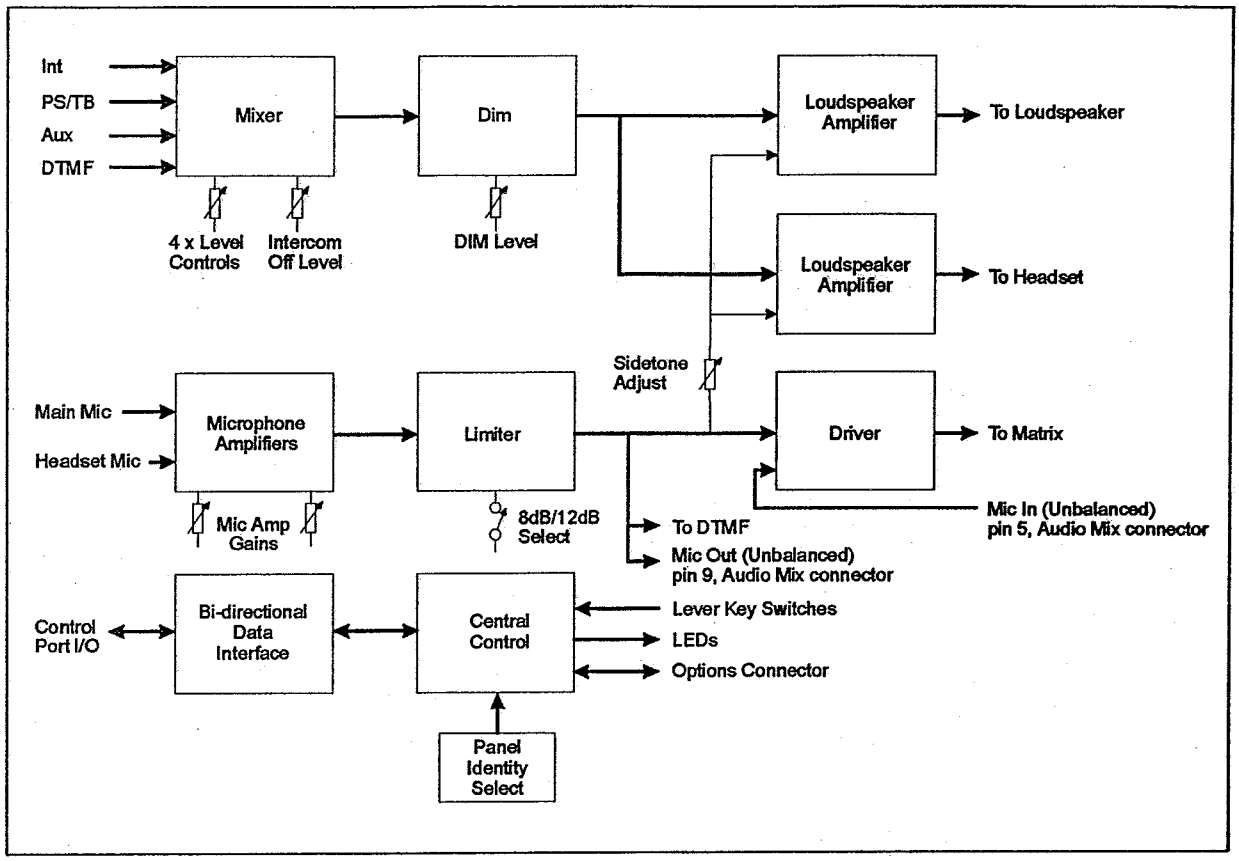


Figure 5.1 Control Panel Audio Block Diagram ecaudbd.eps

Connector: 9-way D-type plug

Pinout	Function
1	balanced Mix + input
2	0 V
3	Mix output
4	0 V
5	Microphone input
6	balanced Mix - input
7	0 V
8	0 V
9	Microphone output

5.2.4 Loudspeaker Connector

This connector is provided for use with an external loudspeaker, which may be used to improve the listening howlround performance and quality. Use of the jack socket will disconnect the Panel internal loudspeaker.

Connector: 1/4" Mono Jack

Wiring: Tip - loudspeaker +
Ring - loudspeaker -

5.3 Use of System Options

This section gives examples of alternative system connections to give improved facilities and performance. The customer is free to utilise other system connections within the bounds of the system facilities provision to achieve further performance improvements.

5.3.1 Use of Jackfields

The system flexibility can be improved through the use of audio jackfields to allow signal overplugging. For example, this will permit the 4-wire/IFB Panel Talk outputs and level control inputs to be used with other circuits such as Radio communications and additional 4-wire circuits on an as needed basis in a fast moving Outside Broadcast situation. It will also give access to level controls which are not used on some Panels.

Programme audio and other programme related signals can also be added in via the Panel level controls and the Mix input through the jackfields. This can save space and additional loudspeaker monitor equipment in a cramped environment such as a small control room. Note that use of the Mix input in this manner requires the use of external level controls.

Examples of this are shown in the diagram below.

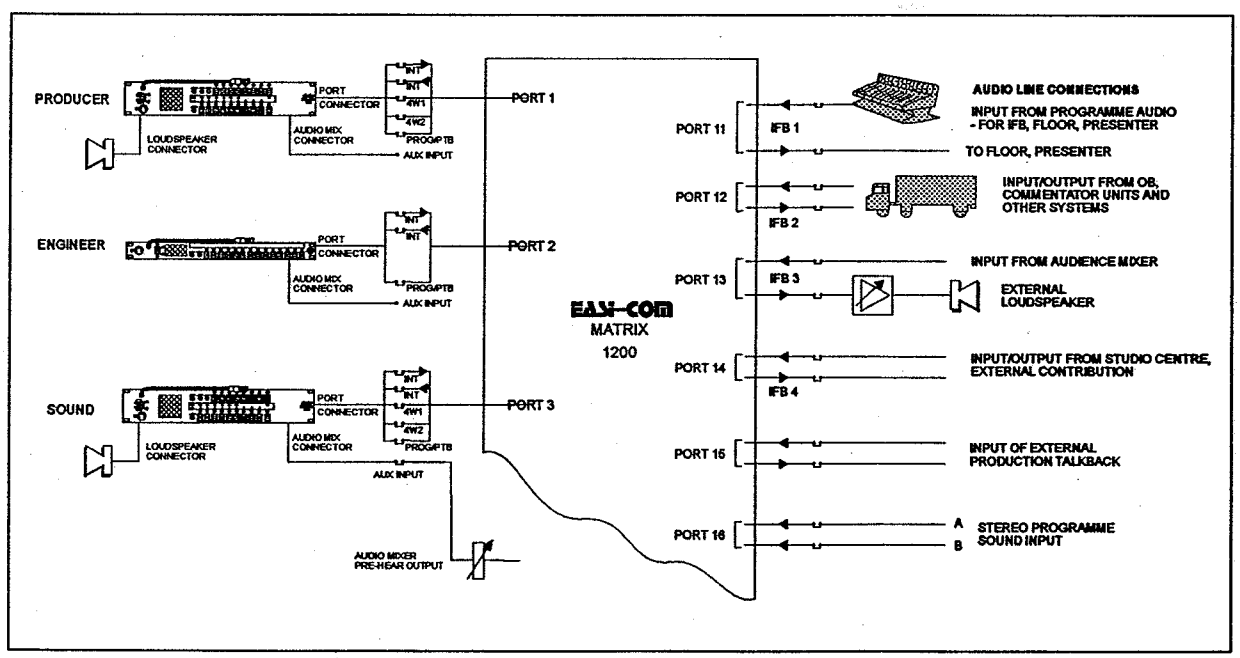


Figure 5.2 Audio Jackfield Use (Example) ecsys3.eps

5.3.2 Creation of Production Talkback Busbar

The system as provided has no specific setup to allow Control Panels to talk onto the Production Talkback busbar. However, this can be achieved by utilising a spare Control Panel, Camera, or 4-wire/IFB Matrix Port, along with use of the Panel Options connector.

The Panels required to Talk to Production Talkback busbar will utilise the appropriate keyswitch, for example Spare 2 Panel (Port 6 with Matrix Option SW22 and SW24 selected OFF for Control Panel) with appropriate switch labelling. The Port intercom output is connected to Port 15 External Production Talkback input with Matrix Option SW27 ON to route the signal to the Production Talkback busbar. In this mode the Producer Panel can hear the External Production Talkback audio with Matrix Option SW13 ON for Production Talkback without hearing his own contribution to the busbar - this avoids howlround.

Improvements to the system performance in the above example can be made as follows:

- to avoid howlround at Panels which are listening to Production Talkback as they speak to Production Talkback, connect Port 6 Talk switch output (Panel switch 17, pin 2) to either Dim input (pin 12) or Loudspeaker Mute input (pin 23) on the Panel Options connector.
- to prevent any Panel from talking to Production Talkback busbar, connect Port 6 Talk switch output (panel switch 17, pin 2) to logic 1 (+5 Volt) to inhibit the crosspoint operation.

It is necessary to refer to the Control Panel keyswitch diagrams in Appendix C to establish the keyswitch pin numbers on the Options connector (see Section 5.2.1) to suit the chosen Panels and Ports.

5.3.3 Parallel Production Control Room Panels Connection

Matrix Ports can be made available for other uses if Control Panels can be operated in parallel. It is often the case that there is a requirement in the Production Control areas for the Producer/Director control postion to have an audio input mixed in from the Producer's Assistant so that instructions can be heard by the other programme operators. This can be achieved through the Audio Mix and Options connectors at the interconnected Control Panels.

The simplest requirement could be to mix an additional microphone into the Producer Control Panel output to the Matrix. A microphone amplifier with adjustable gain is necessary to bring the additional microphone gain up to 0dB for mixing into the Panel Microphone Input on the Audio Mix connector.

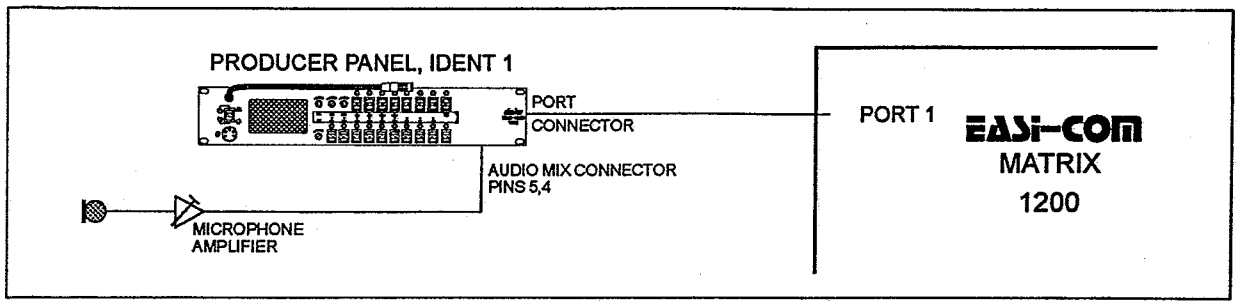
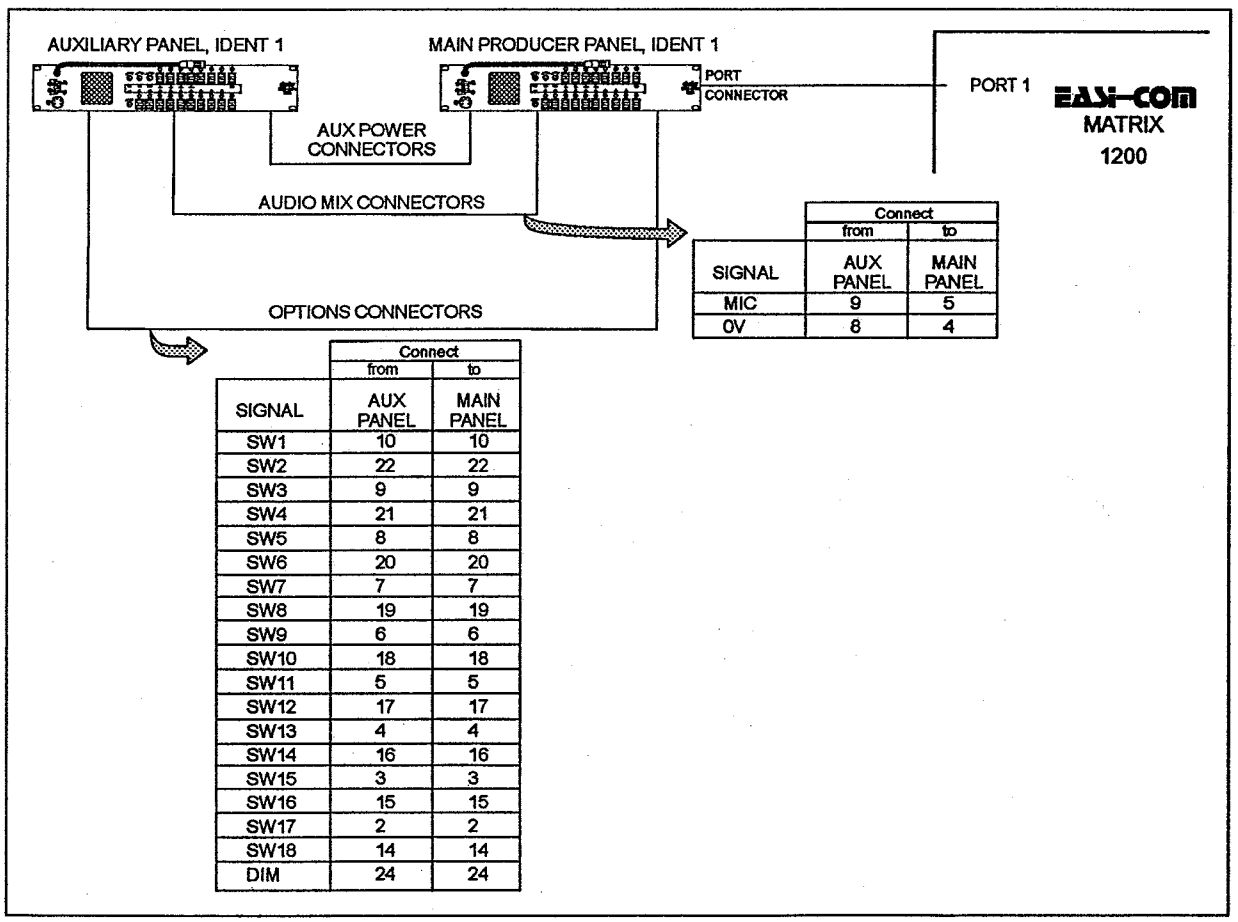


Figure 5.3 Production Control Example 1 ecwir1.eps

If there are two Drake Panels which are required to operate with parallel microphones, it is possible to interconnect the keyswitches to operate in parallel to the Matrix such that either Panel can operate crosspoints. In order to achieve this, it is necessary to connect the microphone output from the auxiliary Panel to the main Panel microphone input via the Audio Mix connectors, with the control switches connected from one Options connector to the other along with the auxiliary Panel Dim output connected to the main Panel Dim input. The main Panel only is connected to the Matrix. Panel Ident switches should be set to the same Port number. Power for the auxiliary Panel can be taken from the main Panel Auxiliary Power connector.

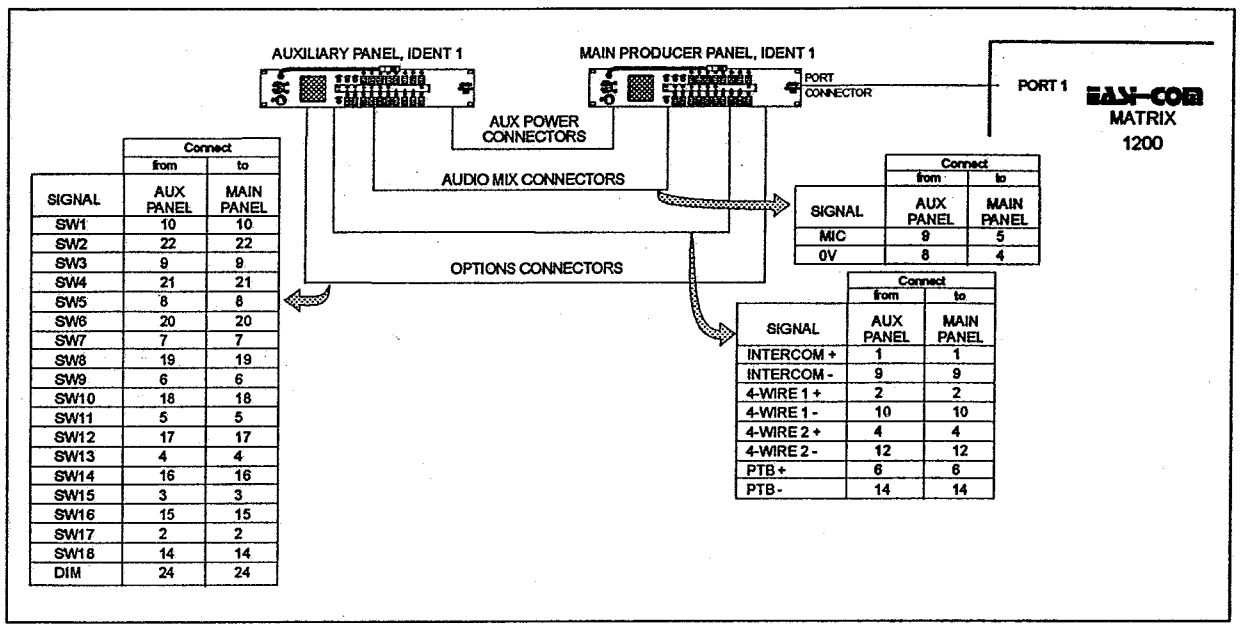


	Connect	
	from	to
SIGNAL	AUX PANEL	MAIN PANEL
MIC	9	5
0V	8	4

	Connect	
	from	to
SIGNAL	AUX PANEL	MAIN PANEL
SW1	10	10
SW2	22	22
SW3	9	9
SW4	21	21
SW5	8	8
SW6	20	20
SW7	7	7
SW8	19	19
SW9	6	6
SW10	18	18
SW11	5	5
SW12	17	17
SW13	4	4
SW14	16	16
SW15	3	3
SW16	15	15
SW17	2	2
SW18	14	14
DIM	24	24

Figure 5.4 Production Control Example 2 ecwir2.eps

If additionally it is required that the auxiliary Panel loudspeaker is to be used, the appropriate main Panel signal inputs can be paralleled to the auxiliary loudspeaker inputs. It is important to note that in this mode the power draw from the Matrix will exceed the available power if eight Panels are already connected to the eight Panel Ports.



SIGNAL	Connect from AUX PANEL	Connect to MAIN PANEL
SW1	10	10
SW2	22	22
SW3	9	9
SW4	21	21
SW5	8	8
SW6	20	20
SW7	7	7
SW8	19	19
SW9	6	6
SW10	18	18
SW11	5	5
SW12	17	17
SW13	4	4
SW14	16	16
SW15	3	3
SW16	15	15
SW17	2	2
SW18	14	14
DIM	24	24

SIGNAL	Connect from AUX PANEL	Connect to MAIN PANEL
MIC	9	5
0V	8	4

SIGNAL	Connect from AUX PANEL	Connect to MAIN PANEL
INTERCOM +	1	1
INTERCOM -	9	9
4-WIRE 1 +	2	2
4-WIRE 1 -	10	10
4-WIRE 2 +	4	4
4-WIRE 2 -	12	12
PTB +	6	6
PTB -	14	14

Figure 5.5 Production Control Example 3 ecwir3.eps

5.3.4 Additional Howlround Protection Measures

In the cramped Control Room conditions which may occur in a small Outside Broadcast vehicle, it is important to ensure that howlround conditions are minimised. This could involve the interlinking of Dim and Cut facilities on Panels in adjacent Control areas, especially where control facilities are in the same room.

For example, if the Engineer Panel on Port 2 is listening to the Producer Panel Production Talkback via the Engineering Panel level control with SW14 selected ON, then selection by the engineer of the Talk to Producer Key can cause howlround if there is an acoustic path between the two Control Rooms; an open door for example or both panels are in the same room.

To avoid the example given above, the options connector on the Engineering Panel can be used to mute the loudspeaker when the Talk to Producer Key is selected. In this example, this would require connection of pin 4 for panel keyswitch 13 to pin 23 for Loudspeaker Mute input.

5.4 Mono Programme Sound Input

The Matrix accepts a Stereo Programme Sound input, with a mix level of -3dB to give approximately 0dB mono input from a 0dB stereo signal input. If a mono signal only is available for Programme Sound input, it is recommended that it is connected to both Left and Right Port inputs to give a higher internal signal level.

6 Troubleshooting Guide

6.1 Matrix Power Supply

Normal Matrix operation has all four green Power LED's illuminated. These indicate Power as follows:

Supply 1 indicates that internal +28V DC supply output is on

Supply 2 indicates that internal -28V DC supply output is on

Supply 3 indicates that Beltpack DC supply output is operating regardless of the selection of Beltpack Ports

Power indicates that Matrix board electronics supply is on

Supplies 1 and 2 provide power to the Matrix board and Control Panels. Both must be on for operation of the System. The Control Panel supply is distributed to the Panel Ports via polyswitch fuses. A pair of fuses is provided for each Panel Port of Ports 1 to 8. The fuses provide auto-reset protection against short and open circuit faults in Panels or Panel cables.

There is no normal external condition which can be applied except the input of incorrect voltages on the Auxiliary Power Connector which can cause the LED's to extinguish. In the event of Matrix failure, first check and replace faulty fuses. If the fault persists, contact Drake or their Representatives.

An individual Panel failure will not cause any of the above LED's to extinguish. See Matrix Control Panel Active LED's.

Supply 3 provides +28V DC power to the Beltpack Ports 5 and 6.

The LED indicators indicate the condition of the internal supplies only. Use of the Auxiliary Power input will not affect the operation of the LED's.

The Matrix is protected by a Thermal Switch against overheating. This device will automatically reset when the temperature is within normal operating range. Overheating may be caused by internal component failure or by operation within an excessive temperature environment.

6.2 Matrix DC Alarm Output

The Matrix DC Alarm Output is taken before the input of external volts via the Auxiliary Power Connector, and is a high impedance output of the Matrix power supply internal

+ and - volt DC rails. Normal operation has approximately 25V on each output, with 0V being the fault condition output.

6.3 Auxiliary Power Supply Indications

If an auxiliary Power Supply is connected in the correct manner, the failure of the Matrix AC input or AC fuse failure is indicated in that the Power LED will remain illuminated.

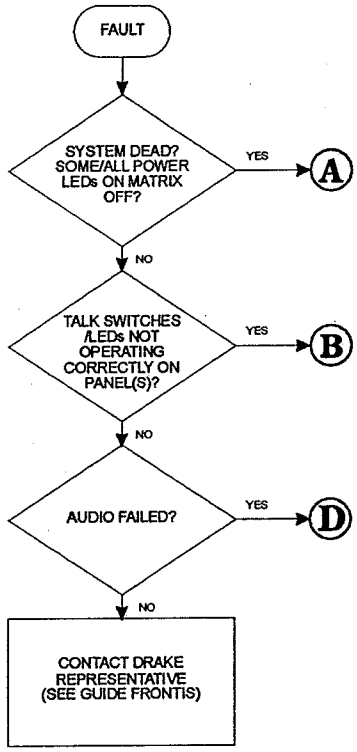
6.4 Matrix Control Panel Active LEDs

These LED's are illuminated On for the correct connection and operation of DC and Data lines. The LED is indicating that a correct, error-free handshake has taken place between Matrix and Control Panel. If a LED is Off, then the following may be the case:

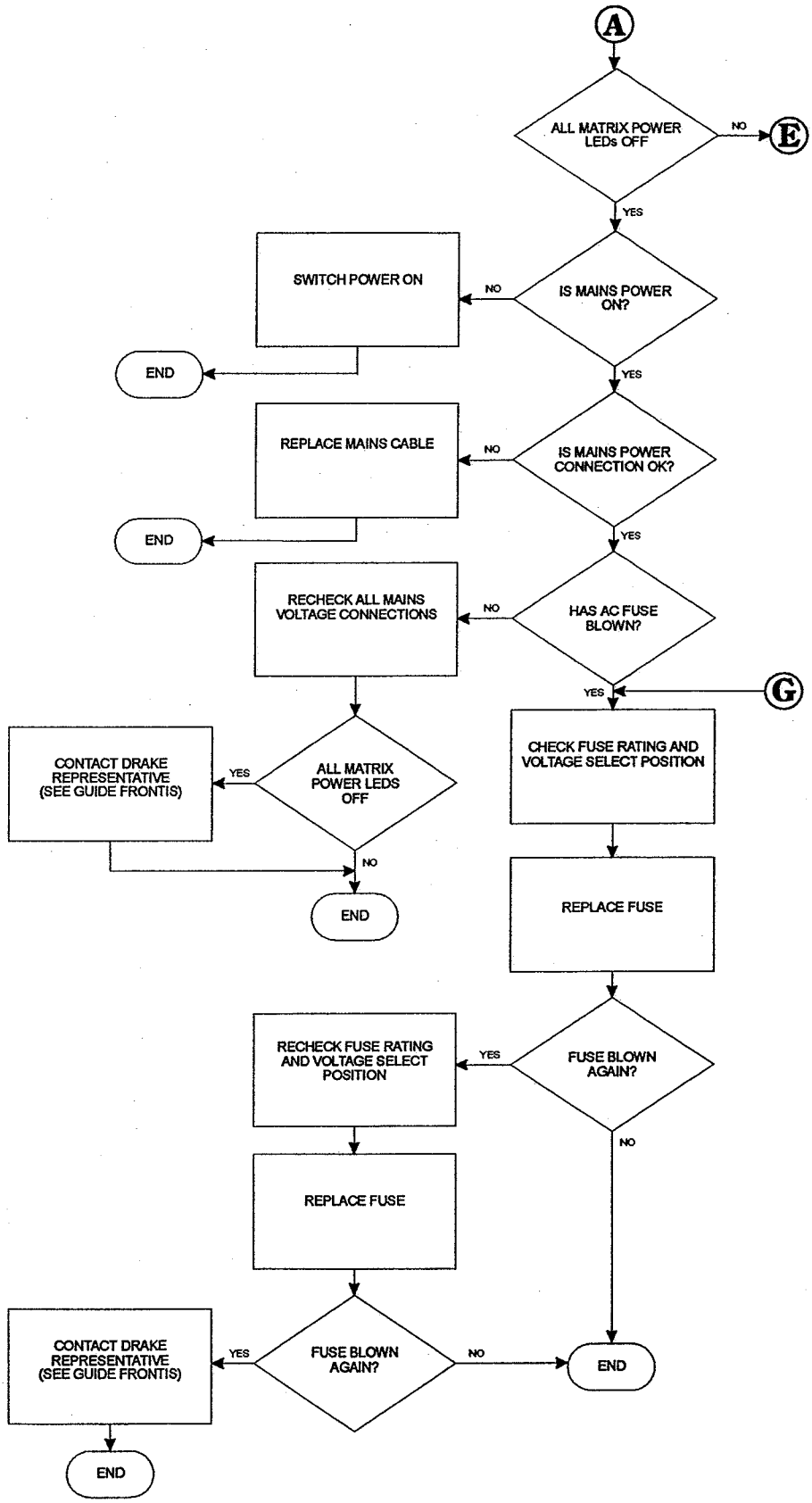
- Panel is not connected
- Panel DC is not connected or incorrectly connected
- Panel Data is not connected or incorrectly connected
- Panel has developed a fault
- Matrix to Panel cable has developed a fault

6.5 Troubleshooting Flow Diagrams

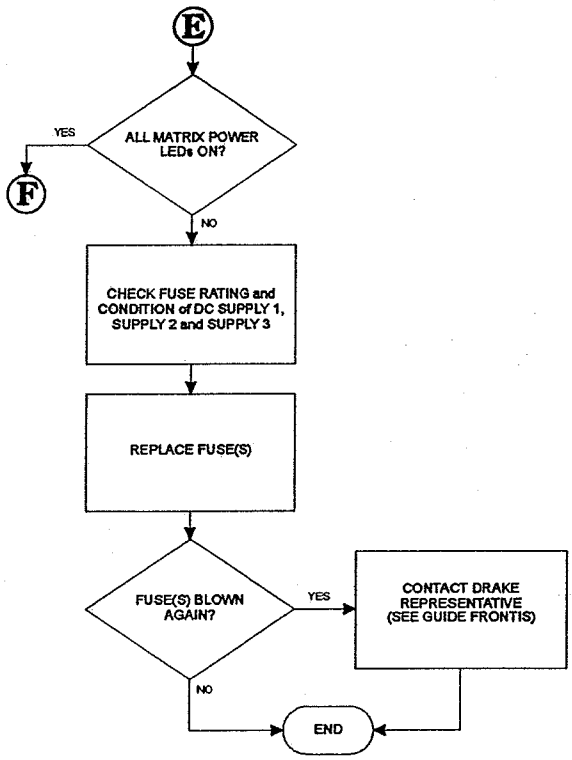
The remaining pages of this section contain a series of flow diagrams which will aid first level troubleshooting.



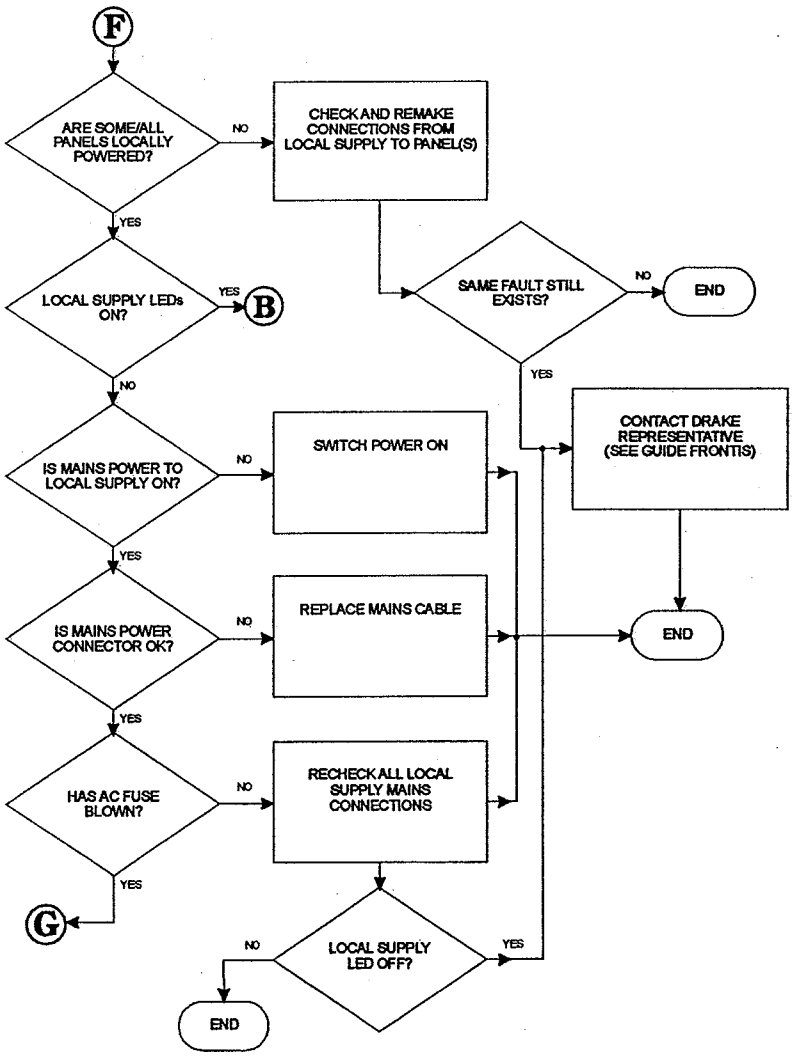
ecflo1.eps


A
ALL MATRIX POWER LEDs OFF
NO
E
YES
SWITCH POWER ON
NO
IS MAINS POWER ON?
END
YES
REPLACE MAINS CABLE
NO
IS MAINS POWER CONNECTION OK?
END
YES
RECHECK ALL MAINS VOLTAGE CONNECTIONS
NO
HAS AC FUSE BLOWN?
YES
G
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
YES
ALL MATRIX POWER LEDS OFF
CHECK FUSE RATING AND VOLTAGE SELECT POSITION
NO
END
REPLACE FUSE
RECHECK FUSE RATING AND VOLTAGE SELECT POSITION
YES
FUSE BLOWN AGAIN?
NO
REPLACE FUSE
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
YES
FUSE BLOWN AGAIN?
NO
END
END

ecflo2.eps



ecflo3.cps



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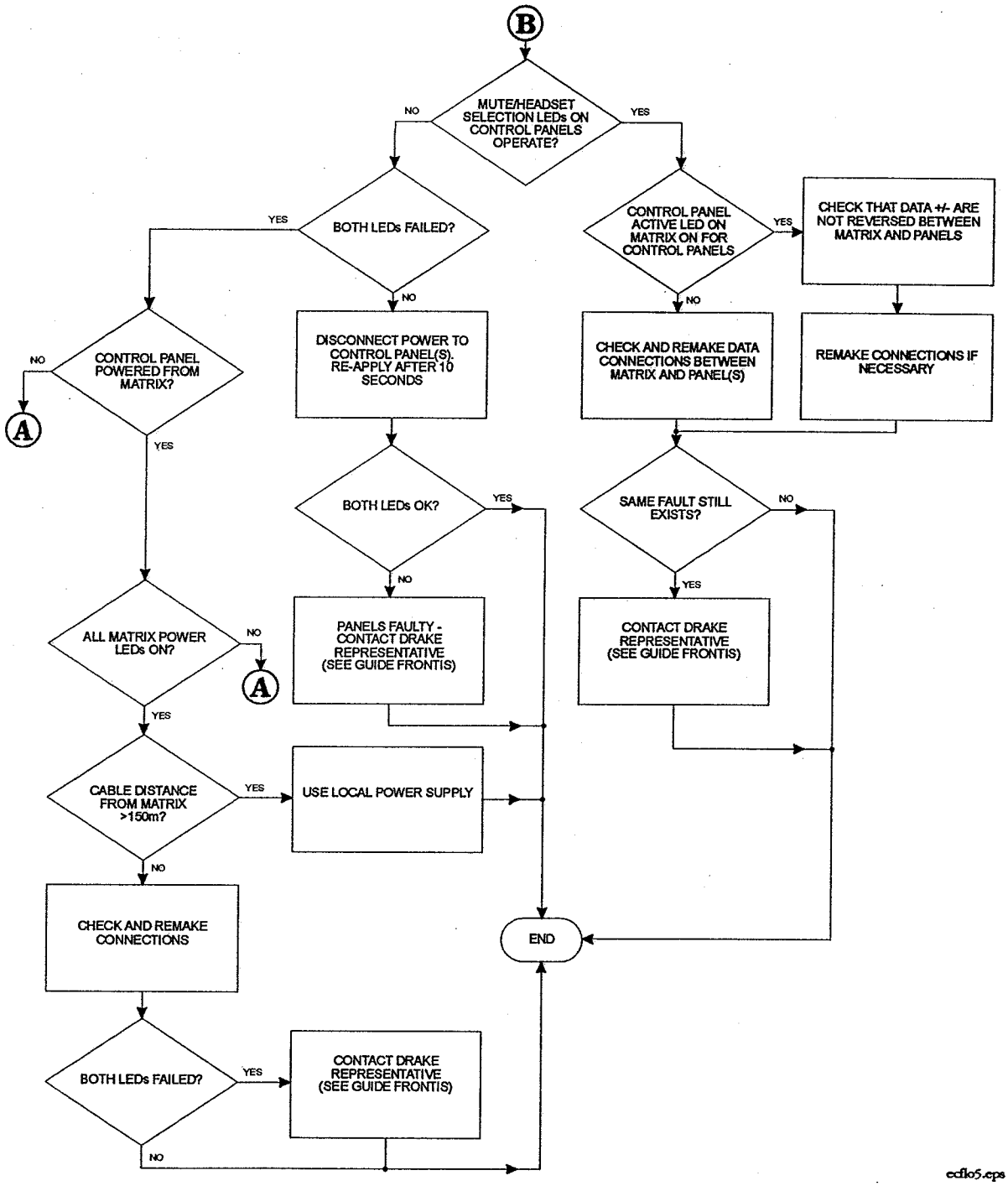
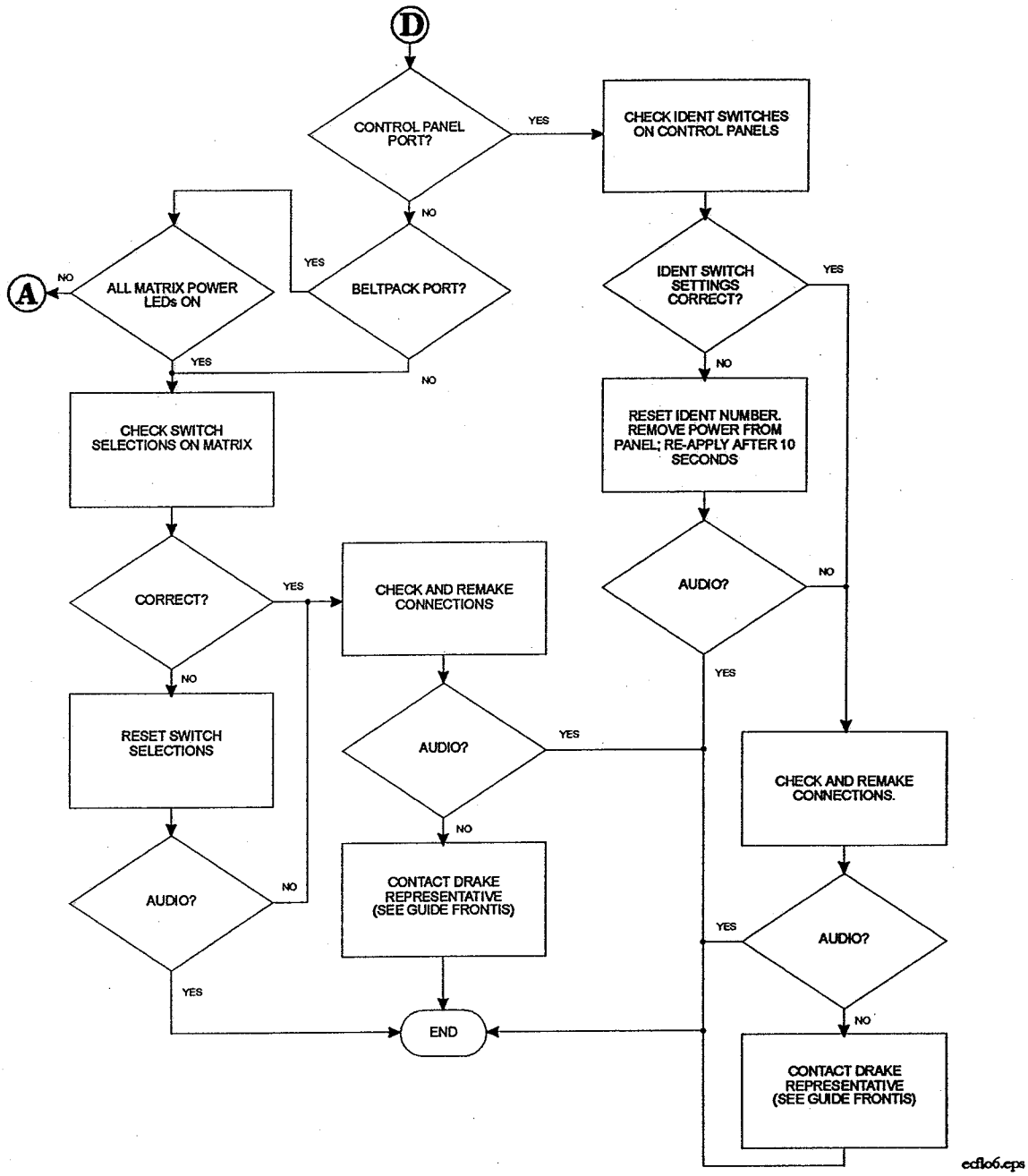

B
MUTE/HEADSET SELECTION LEDs ON CONTROL PANELS OPERATE?
NO
YES
BOTH LEDs FAILED?
YES
NO
CONTROL PANEL POWERED FROM MATRIX?
NO
A
YES
DISCONNECT POWER TO CONTROL PANEL(S). RE-APPLY AFTER 10 SECONDS
BOTH LEDs OK?
YES
NO
PANELS FAULTY - CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
ALL MATRIX POWER LEDs ON?
NO
A
YES
CABLE DISTANCE FROM MATRIX >150m?
YES
USE LOCAL POWER SUPPLY
NO
CHECK AND REMAKE CONNECTIONS
BOTH LEDs FAILED?
YES
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
NO
CONTROL PANEL ACTIVE LED ON MATRIX ON FOR CONTROL PANELS
YES
CHECK THAT DATA +/- ARE NOT REVERSED BETWEEN MATRIX AND PANELS
NO
CHECK AND REMAKE DATA CONNECTIONS BETWEEN MATRIX AND PANEL(S)
REMAKE CONNECTIONS IF NECESSARY
SAME FAULT STILL EXISTS?
NO
YES
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
END

ecflo5.eps


D
CONTROL PANEL PORT?
YES
CHECK IDENT SWITCHES ON CONTROL PANELS
NO
A
NO
ALL MATRIX POWER LEDs ON
YES
BELTPACK PORT?
YES
NO
IDENT SWITCH SETTINGS CORRECT?
YES
NO
CHECK SWITCH SELECTIONS ON MATRIX
RESET IDENT NUMBER. REMOVE POWER FROM PANEL; RE-APPLY AFTER 10 SECONDS
CORRECT?
YES
CHECK AND REMAKE CONNECTIONS
AUDIO?
NO
YES
NO
RESET SWITCH SELECTIONS
AUDIO?
YES
CHECK AND REMAKE CONNECTIONS.
NO
AUDIO?
NO
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)
YES
AUDIO?
YES
NO
END
CONTACT DRAKE REPRESENTATIVE (SEE GUIDE FRONTIS)

ecflo6.eps

Appendix A Matrix Switch Settings

Switch	OFF	ON
SW1	Port 1 Producer to Port 7 Camera 3 crosspoint operated by Port 1 Panel Spare 3 Talk Key	Port 1 Producer to Port 7 Camera 3 crosspoint Permanent on regardless of Panel key operation
SW2	Port 1 Producer to Port 8 Camera 4 crosspoint operated by Port 1 Panel Spare 4 Talk Key	Port 1 Producer to Port 8 Camera 4 crosspoint Permanent on regardless of Panel Key operation
SW3	Port 1 Producer to Port 9 Camera 1 crosspoint Permanent on	Port 1 Producer to Port 9 Camera 1 crosspoint off
SW4	Port 1 Producer to Port 10 Camera 2 crosspoint Permanent on	Port 1 Producer to Port 10 Camera 2 crosspoint off
SW5	Port 16 Programme Sound to Port 7 Camera 3 IFB crosspoint off	Port 16 Programme Sound to Port 7 Camera 3 IFB crosspoint on
SW6	Port 16 Programme Sound to Port 8 Camera 4 IFB crosspoint off	Port 16 Programme Sound to Port 8 Camera 4 IFB crosspoint on
SW7	Port 16 Programme Sound to Post 9 Camera 1 IFB crosspoint off	Port 16 Programme Sound to Port 9 Camera 1 IFB crosspoint on
SW8	Port 16 Programme Sound to Port 10 Camera 2 IFB crosspoint off	Port 16 Programme Sound to Port 10 Camera 2 IFB crosspoint on
SW9	Port 7 Camera 3 2 wire mode Selected	Port 7 Camera 3 4 wire mode Selected
SW10	Port 8 camera 4 2 wire mode Selected	Port 8 Camera 4 2 wire mode Selected
SW11	Port 9 Camera 1 2 wire mode Selected	Port 9 Camera 1 4 wire mode Selected
SW12	Port 10 Camera 2 2 wire mode Selected	Port 10 Camera 2 4 wire mode Selected
SW13	Port 1 Programme Sound output Selected	Port 1 external Production Talked output Selected
SW14	Port 2 Programme Sound output Selected	Port 2 Production Talkback Busbar output Selected
SW15	Port 3 Programme Sound output Selected	Port 3 Production Talkback Busbar output Selected
SW16	Port 4 Programme Sound output Selected	Port 4 Production Talkback Busbar output Selected
SW17	Port 11 4 wire 1 input to Port 11 Intercom output IFB crosspoint off	Port 11 4 wire 1 input to Port 11 Intercom output IFB crosspoint on

Switch	OFF	ON
SW18	Port 12 4 wire 2 input to Port 12 Intercom output IFB crosspoint off	Port 12 4 wire 2 input to Port 12 Intercom output IFB crosspoint on
SW19	Port 13 4 wire 3 input to Port 13 Intercom output IFB crosspoint off	Port 13 4 wire 3 input to Port 13 Intercom output IFB crosspoint on
SW20	Port 14 4 wire 4 input to Port 14 Intercom output IFB crosspoint off	Port 14 4 wire 4 input to Port 14 Intercom output IFB crosspoint on
SW21	Port 5 Control Panel operation Selected unless SW23 Selected on	Port 5 Beltpack 1 operation with Port 1 Producer Selected
SW22	Port 6 Control Panel operation Selected unless SW24 Selected ON	Port 6 Beltpack 2 operation with Port 1 Producer Selected
SW23	Port 5 Control panel operation Selected unless SW21 Selected ON	Port 5 Beltpack 1 operation with Port 2 Engineer Selected
SW24	Port 6 Control Panel operation Selected unless SW22 Selected ON	Port 6 Beltpack 2 operation with Port 3 Sound Selected
SW25	Port 1 Producer Panel to Port 5 Spare 1 Panel output crosspoint controlled by Producer Panel Talk Key	Port 1 Producer Panel to Port 5 Beltpack 1 permanently on if SW21 ON
SW26	Port 1 Producer Panel to Port 6 Spare 2 Panel output crosspoint controlled by Producer Panel Talk Key	Port 1 Producer panel to Port 6 Beltpack 2 permanently on if SW22 ON
SW27	Port 15 External Production Talkback Busbar deselected	Port 15 External Production Talkback input to Production Talkback Busbar selected
SW28	Port 1 Producer Panel input to Production Talkback Busbar deselected	Port 1 Producer Panel input to Production Talkback Busbar Selected
SW29	Port 7 spare 3 Control Panel interface Selected	Port 7 Camera 3 interface Selected
SW30	Port 8 spare 4 Control Panel interface Selected	Port 8 Camera 4 interface Selected
SW31	Port 11 4 Wire/IFB 1 input Selected	Port 11 4 Wire Listen 1 input Selected
SW32	Port 12 4 Wire/IFB 2 input Selected	Port 12 4 Wire Listen 2 input Selected

Appendix B Control Panel Ident Strips

PROG	IFB1	IFB2	L IFB3	L IFB4	L CAMS	T CAMS		T SP3	T SP4	CALL BELT
INT	T IFB1	T IFB2	T IFB3	T IFB4	T ENG	T SND	T VTR	T SP1	T SP2	

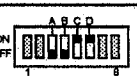
Panel Type: PRODUCER PORT Port: 1 Ident Strip: 1 Panel Ident Switch:

PROG	IFB1	IFB2	L IFB3	L IFB4	L CAMS	T CAM1	T CAM2	T CAM3	T CAM4	CALL BELT
INT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T SND	T VTR	T SP1	T SP2	

Panel Type: ENGINEER ENG Port: 2 Ident Strip: 2 Panel Ident Switch:

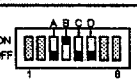
PROG	IFB1	IFB2	L IFB3	L IFB4	L CAMS	T CAM1	T CAM2	T CAM3	T CAM4	CALL BELT
INT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T VTR	T SP1	T SP2	

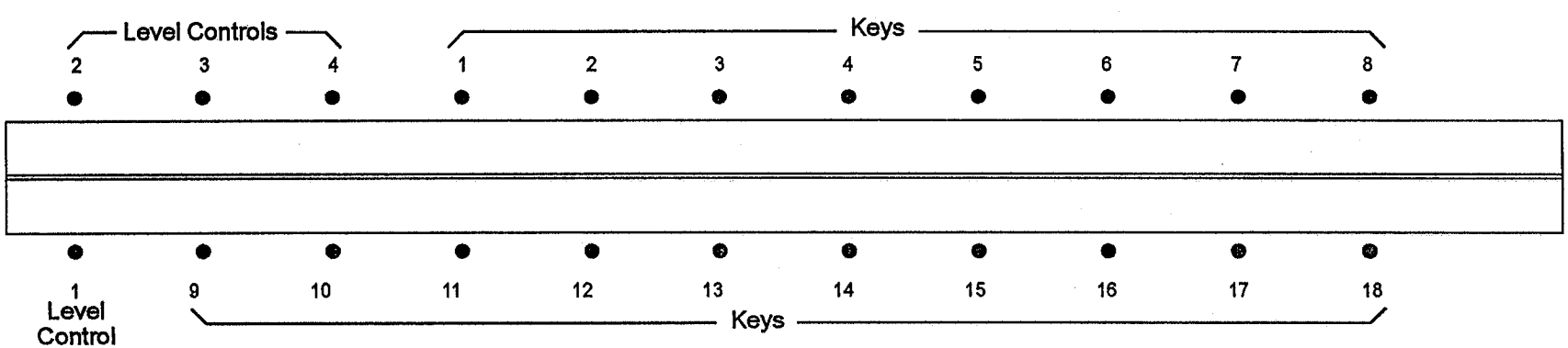
Panel Type: SOUND SND Port: 3 Ident Strip: 3 Panel Ident Switch:



PROG	IFB1	IFB2	L IFB3	L IFB4	L CAMS	T CAM1	T CAM2	T CAM3	T CAM4
INT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T SP1	T SP2

Panel Type: EDIT/VTR VTR Port: 4 Ident Strip: 4 Panel Ident Switch:





Panel Type: BLANK

PTB	IFB1	IFB2	L IFB3	L IFB4				T SP3	T SP4
INT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T VTR	T SP2

Panel Type: SPARE 1 SP1 Port: 5 Ident Strip: 5 Panel Ident Switch:

PTB	IFB1	IFB2	L IFB3	L IFB4				T SP3	T SP4
INT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T VTR	T SP1

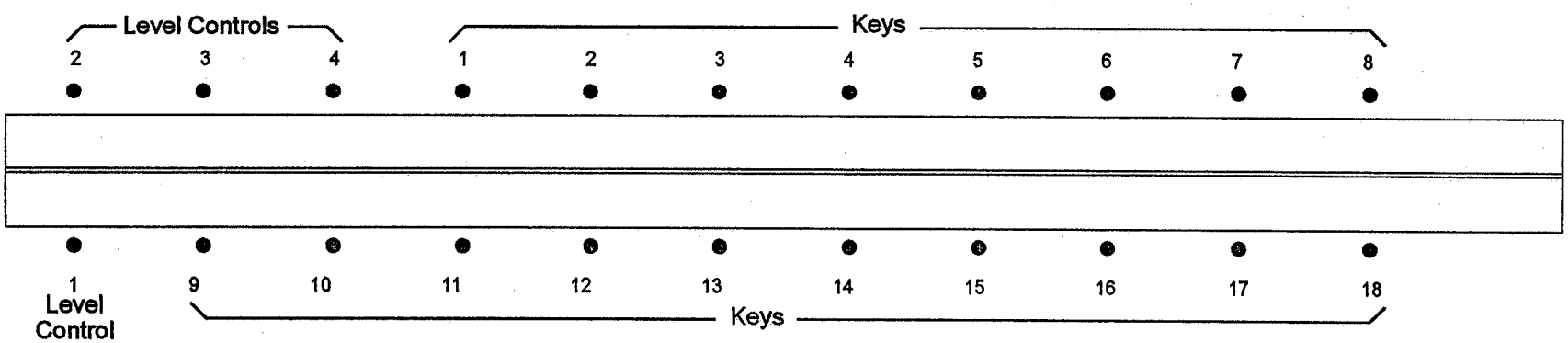
Panel Type: SPARE 2 SP2 Port: 6 Ident Strip: 6 Panel Ident Switch:

PTB	IFB1	PROG					T SP2		T SP4
INT	T IFB1				T PROD	T ENG	T SND	T VTR	T SP1

Panel Type: SPARE 3 SP3 Port: 7 Ident Strip: 7 Panel Ident Switch:

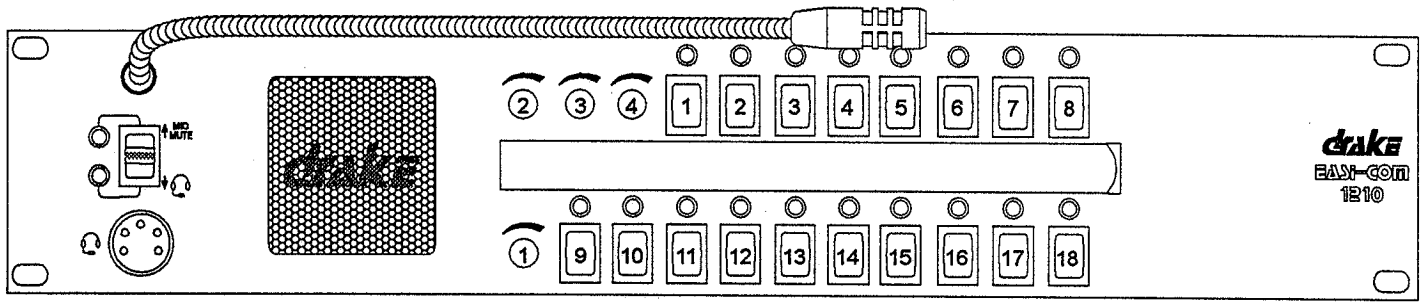
PTB	L IFB1	L PROG					T SP2	T SP3	
INT	T IFB1				T PROD	T ENG	T SND	T VTR	T SP1

Panel Type: SPARE 4 SP4 Port: 8 Ident Strip: 8 Panel Ident Switch:



Panel Type: BLANK

Appendix C Control Functionality

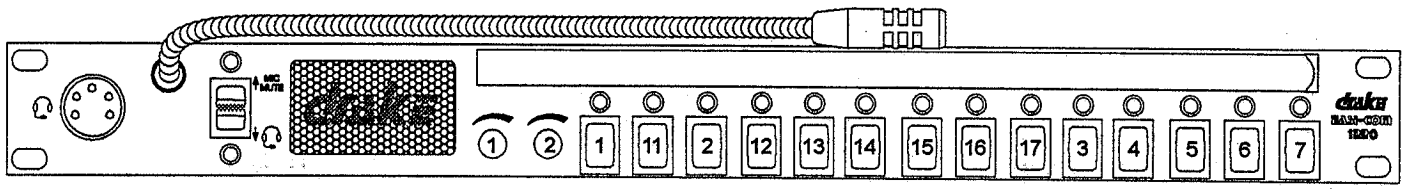


Control Panel 1210 Keyswitch Functionality

Panel Type	Port No.	Ident No.	Keyswitch																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Producer	1	1	L IFB3	L IFB4	L CAM5	T CAM5		T SP3	T SP4	CALL BELT	T IFB1	T IFB2	T IFB3	T IFB4	T ENG	T SND	T VTR	T SP1	T SP2	
Engineer	2	2	L IFB3	L IFB4	L CAM5	T CAM5	T CAM2	T CAM3	T CAM4	CALL BELT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T SND	T VTR	T SP1	T SP2	
Sound	3	3	L IFB3	L IFB4	L CAM5	T CAM5	T CAM2	T CAM3	T CAM4	CALL BELT	T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T VTR	T SP1	T SP2	
Edit/VTR	4	4	L IFB3	L IFB4	L CAM5	T CAM5	T CAM2	T CAM3	T CAM4		T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T SP1	T SP2	
Spare 1	5	5	L IFB3	L IFB4				T SP3	T SP4		T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T VTR	T SP2	
Spare 2	6	6	L IFB3	L IFB4				T SP3	T SP4		T IFB1	T IFB2	T IFB3	T IFB4	T PROD	T ENG	T SND	T VTR	T SP1	
Spare 3	7	7					T SP2		T SP4		T IFB1				T PROD	T ENG	T SND	T VTR	T SP1	
Spare 4	8	8					T SP2	T SP3			T IFB1				T PROD	T ENG	T SND	T VTR	T SP1	

Control Panel 1210 Level Control Functionality						
Panel Type	Port No.	Ident No.	Level Control Number			
			1	2	3	4
Producer	1	1	INT	PROG	IFB 1	IFB 2
Engineer	2	2	INT	PROG	IFB 1	IFB 2
Sound	3	3	INT	PROG	IFB 1	IFB 2
Edit/VTR	4	4	INT	PROG	IFB 1	IFB 2
Spare 1	5	5	INT	PTB	IFB 1	IFB 2
Spare 2	6	6	INT	PTB	IFB 1	IFB 2
Spare 3	7	7	INT	PTB	IFB 1	IFB 2
Spare 4	8	8	INT	PTB	IFB 1	IFB 2

Control Panel 1220 Level Control Functionality				
Panel Type	Port No.	Ident No.	Level Control Number	
			1	2
Producer	1	1	INT	PROG
Engineer	2	2	INT	PROG
Sound	3	3	INT	PROG
Edit/VTR	4	4	INT	PROG
Spare 1	5	5	INT	PTB
Spare 2	6	6	INT	PTB
Spare 3	7	7	INT	PTB
Spare 4	8	8	INT	PTB



Control Panel 1220 Keyswitch Functionality

Panel Type	Port No.	Ident No.	Keyswitch													
			1	11	2	12	13	14	15	16	17	3	4	5	6	7
Producer	1	1	L IFB3	T IFB3	L IFB4	T IFB4	T ENG	T SND	T VTR	T SP1	T SP2	L CAM5	T CAM5		T SP3	T SP4
Engineer	2	2	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T SND	T VTR	T SP1	T SP2	L CAM5	T CAM1	T CAM2	T CAM3	T CAM4
Sound	3	3	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T VTR	T SP1	T SP2	L CAM5	T CAM1	T CAM2	T CAM3	T CAM4
Edit/VTR	4	4	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T SP1	T SP2	L CAM5	T CAM1	T CAM2	T CAM3	T CAM4
Spare 1	5	5	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T VTR	T SP2				T SP3	T SP4
Spare 2	6	6	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T VTR	T SP1				T SP3	T SP4
Spare 3	7	7					T PROD	T ENG	T SND	T VTR	T SP1			T SP2		T SP4
Spare 4	8	8					T PROD	T ENG	T SND	T VTR	T SP1			T SP2	T SP3	

Glossary and Abbreviations

2-Wire	Bi-directional audio communication on two wires. Sometimes referred to in USA as 'Dry' circuit (without power), also *Telco.*
2-Wire Phantom	Bi-directional audio on two wires including power (usually DC). In the case of Handicom, this is a misnomer - Handicom is operated on three wires, two for audio with +VDC referred to cable screen. The two wire audio with polarised DC is sometimes referred to in the USA as a 'wet' circuit. An example of a 2-wire audio path with DC is a telephone circuit.
4-Wire	Bi-directional audio on four wires, carried as separate go and return circuits on two balanced circuit pairs. Preferred to 2-wire because separate circuits give grearly improved performance.
Announcer	Similar to a Presenter or *Commentator.*
Announcer Unit	Similar to a Commentator Unit, as a part of a Studio or Transmission Suite. The announcer usually can talk to the Producer, and he/she hears both Programme Audio and talkback, either interrupted or separately in each ear (out of vision) or one ear (in vision). (See also *Commentator Unit*)
Auxiliary	See *External*
Beltpack	Personal communications outstation, connected by wire. May be a *Matrix* outstation or parallel connected to other beltpacks in a ring. Power is usually supplied via the audio wires - see *2-Wire Phantom.*
Camera	The equipment which derives the video signal. It is usually in three pieces, the Camera Head, the Camera Control Unit (*CCU*) and the Remote Control Panel (*RCP*).
CCU (Camera Control Unit)	This takes in signals from the TV system (viewfinder video, synchronising communications and control) and gives out signals, to the TV system (video, communications, control). The CCU codes, decodes, and adds power for the Camera Head. It is usually

	housed in the Studio CAR (Control Apparatus Room), or the *OB Van* Vision Racks.
Channel	Name given to a *Ring* audio path. With Handicom, each Ring has two independent channels; Channel A and Channel B. Channel A carries the DC to power the *Beltpacks* etc, between the audio pair and cable screen.
Commentator	Presenter who provides continuous commentary, usually on a sports, political or state events.
Commentator Unit	Equipment which is for *Commentator* operation. Provides connection both to the programme audio system and the commentator microphone. The equipment usually provides a multiple source mixer for a combination of signals to the commentator. Usually part of an *OB Van* equipment.
Crosspoint	Route connection between communication source and destination.
DCC	Drake's terminology for control inputs and outputs - means DC control. Other terminology includes General Purpose Interface (GPI), General Purpose Input (GPI), or General Purpose Output (GPO).
Duplex	Communication in both directions simultaneously.
Duplex RT	Uses separate Radio Frequency (RF) channels for go and return circuits. This system supports continuous and separate transmission for go and return circuits.
EMC	Electro-Magnetic Compatibility.
European Intercom Philosophy	Has been based on 4-wire technology due to the provision of separate communication paths from the outset of systems design and growth. This has led to the development of matrices, originally analogue relays and now digital under software control. *Matrix* 4-wire quality permits the use of microphone and loudspeaker at panels in duplex mode with minimum howlround which is dependent solely on microphone and loudspeaker performance.
External	A line connection to a signal destination/source external to the Talkback/Intercom System. Sometimes referred to as an Aux (Auxiliary) circuit.
External Production Talkback	Production Talkback (*PTB*) derived from outside the Production Area, usually from another Production centre acting as a master control centre. Usually

	replaces Production Talkback for feeding to cameras, Floor Managers, etc.
Foldback	Sending of an audio signal to the presenter or people concerned with making a programme - the audio signal is usually a part of the programme, sometimes the audio from an audio or videotape insert to a programme.
GPI	See DCC
Ident Strip	Control Panel key and level control label.
IFB (Interrupted Foldback)	Literally an interruption of the Foldback signal. The interruption is usually from an operator position in the Control Room Suite or OB Van. The signal input may be from an external source which may itself be interrupted. Usually controlled and operated from an executive control position, e.g. Producer.
Individual Camera Talkback	Generic term for all communications between cameras and other panel operators. Sometimes refers specifically to the communication from cameras to operators. The form of communication depends on the camera facilities in addition to the Talkback System facilities, and there are many combinations, some listed below: **2-wire:** go and return intercom/talkback only. **2-wire with Programme Sound to Camera:** Operator, usually to separate earphone from intercom/talkback signal **4-wire (usually with Programme Sound addition):** 4-wire version of above. This gives much better clarity and crosstalk improvement due to the go and return circuit separation. **2 balanced signals from the camera:** usually designated Talk to Producer and Talk to Engineer, and three balanced signals to the Camera, usually designated Production Talkback, Engineering Talkback, and Programme Sound. Some cameras have no intercom, and these can be operated either with beltpacks with their cables wound around the camera cable or with RT systems.
Intercom	Usually the conversation paths which are created in making and transmitting TV programmes but not vital to the process. Customers may accept some blocking limitations in this implementation.

Intercom System	The hardware and software which make up the system used for communication. Can be blocking in some implementations.
Interrupted Foldback	See *IFB*
ISO Camera Intercom	Alternative terminology for the facility of communicating with each camera separately from any other intercom channel, literally Isolated Camera Intercom. This stems from the original USA 2-wire communications system where only a single channel existed for all communications, and everyone heard everything. This created a need for separate, individual communications blocks for additional facilities including ISO Camera Intercom.
Jackfield	See *Patchfield*
Listen Crosspoint	Crosspoint controlled by 'Listener' (destination of Talkback signal)
LSTB (Loudspeaker Talkback)	UK (BBC) term for a Talkback System output to a Studio Loudspeaker, only available for rehearsal use so as not to interrupt a live transmission or recording through accidental use. Sometimes referred to as Studio Loudspeaker.
Matrix	Central switching and connection point for *Panels*.
Mixed Camera Talkback	Usually refers to the practice of placing all camera communications on one mixed busbar for Talk to Camera and Talk from Camera. This involves one matrix input and output only for all cameras, plus some form of mixing of signals for input and distribution of signal for output. It saves matrix inputs and outputs over Individual (or ISO) Camera Talkback.
Normally Closed Crosspoint	Crosspoint which is normally on (closed), and is changed to off by some switching condition. This crosspoint type is used for an IFB connection.
OB Van	Mobile control room suite, for TV or Radio. Also referred to as 'Mobile' (USA), and CMCR (Colour Mobile Control Room - BBC).
PA	Producer's Assistant. Operator who assists the Producer or Director controlling the programme transmission or recording, usually by calling the camera selections, timing in the external and local contributions (graphics, VTR).

Panel	Audio input/output and control point for Intercom/Talkback System. Also referred to as Control Panel and Outstation.
Patchfield	Insertion/Break point for signals. Usually recommended in a Comms system to give a level of reconfigurability plus some over plugging in the event of failure.
Permanent Crosspoint	Crosspoint which remains on regardless of any switching conditions around it.
Power Supply	Unit which provides systems or equipment power. This is either built into equipment or provided as an external unit.
Power Supply Backup	Unit which provides backup power which takes over in the case of main Power supply failure. In Drake's case, all such supplies for its communication systems are operated in parallel and that changeover is seamless and automatic. It is for this reason that Power Supply Alarming is important, as it is necessary to know of the failure so that the faulty supply can be repaired before the backup unit fails.
Presenter	Person presenting or hosting or chaining the programme. May or may not be seen (in - or out of - vision). Also referred to as Talent.
Production Talkback	See PTB.
Programme Audio	The audio signal which is recorded or transmitted as the programme. Also referred to as Programme Audio (USA). Now is usually a stereo signal. Is an input to the Talkback System for Cameras and Studio Floor Operators.
PTB	Production Talkback. European term for unidirectional command Talkback from the Producer/Director and the PA.
Public Address	Sometimes abbreviated to PA. A set of loudspeakers to provide a listen output for an audience. This is not usually fed from the Talkback system.
RCP	Remote Control Panel for Camera. Provides control of camera electronics (colour balance, gain, black level) and lens (iris). These are located (if provided) at the Vision Engineer control position.
Ring	Name given to the interconnection between the Handicom elements. With Handicom, each Ring has

	2 independent channels, Channel A and Channel B. Channel A carries the DC to power the Beltpacks etc, between the audio pair and the screen.
RT	Stands for Radio-Telephony. Is usually a base station plus battery powered receivers and transmitters.
Simplex	Communication in one direction only at one time.
Simplex RT	Utilises the same frequency for go and return circuits. Cannot support continuous transmit or receive as this will block out the other circuit. System usually operates with keyed transmit (Talk), otherwise receive (Listen).
Talent	Name given to a studio floor programme contributor usually the linking personality for some form of speach programming eg. sports event. Also known as Presenter.
Talkback	UK term, usually referring to the Talkback System, or Intercom System. Talkback is sometimes the conversation itself. Conversations are utilised in the making and transmitting of TV programmes. Such conversations are 'command' orientated and must not normally be blocked.
Talk Crosspoint	Crosspoint controlled by 'Talker' (source of Talkback signal).
Talkback System	The hardware and software which make up the system used for communication. Usually non-blocking in implementation.
Telco	North American term for a telephone external connection.

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EASIi-COM 1220 Control Panel Ident Strips

1	2	1	11	2	12	13	14	15	16	17	3	4	5	6	7
INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T ENG	T SND	T VTR	T SP1	T SP2	L CAMS	T CAMS		T SP3	T SP4

Panel Type: PRODUCER PROD Port: 1 Ident Strip: 1 Panel Ident Switch:

INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T SND	T VTR	T SP1	T SP2	L CAMS	T CAMS	T CAM2	T CAM3	T CAM4

Panel Type: ENGINEER ENG Port: 2 Ident Strip: 2 Panel Ident Switch:

INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T VTR	T SP1	T SP2	L CAMS	T CAM1	T CAM2	T SP3	T SP4

Panel Type: SOUND SND Port: 3 Ident Strip: 3 Panel Ident Switch:

INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T SP1	T SP2	L CAMS	T CAM1	T CAM2	T CAM3	T CAM4

Panel Type: EDIT/VTR VTR Port: 4 Ident Strip: 4 Panel Ident Switch:

INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T VTR	T SP2				T SP3	T SP4

Panel Type: SPARE 1 SP1 Port: 5 Ident Strip: 5 Panel Ident Switch:

INT	PROG	L IFB3	T IFB3	L IFB4	T IFB4	T PROD	T ENG	T SND	T VTR	T SP1				T SP3	T SP4

Panel Type: SPARE 2 SP2 Port: 6 Ident Strip: 6 Panel Ident Switch:

INT	PROG					T PROD	T ENG	T SND	T VTR	T SP1			T SP2		T SP4

Panel Type: SPARE 3 SP3 Port: 7 Ident Strip: 7 Panel Ident Switch:

INT	PROG					T PROD	T ENG	T SND	T VTR	T SP1			T SP2	T SP3	

Panel Type: SPARE 4 SP4 Port: 8 Ident Strip: 8 Panel Ident Switch:

Level Controls: 1 2 — Keys: 1 11 2 12 13 14 15 16 17 3 4 5 6 7

Panel Type: Blank