

Digital ISDN Switching Platform ECS-FD

Installation Manual ECS-FD



Digital Trunk Switching System ECS-FD

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BlueCom Ltd.
Giessenstrasse 15
8953 Dietikon
SWITZERLAND

Telephone +41 044 748 48 18
Telefax +41 044 748 48 19
E-mail sales@bluecom.ch
Internet <http://www.bluecom.ch>

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1 Introduction

1.1 General

The ECS-FD family of ISPBX is a digital ISDN Switching platform offering fully integrated voice, data, image and text services. It can be used as a local exchange as well as an ISPBX in multi-site private networks.

The system is designed to be totally flexible and versatile, featuring numerous sophisticated services such as corporate networking, computer telephony integration and mobility. Special features have been incorporated to make the ECS-FD family of ISPBX an ideal switching platform for any power, gas or transportation utility company. The efficient operation of a comprehensive supply network is a vital task of any utility company. The ECS-FD provides speech communication between dispatchers and the operations personnel at distribution and generation points. It is the most important system in the management of operations and it enables rapid intervention in case of faults.

Designed according to EURO ISDN standards and therefore fully compatible with the ISDN world the ECS-FD family allow new and powerful applications to users.

Utilizing S0 access and terminals the subscriber may create a multimedia platform capable of exchanging data at 64kBit/s. Fast data file transfers applications, high definition documents faxing, personal video-communications or video conference applications are now feasible.

The connection of IP Routers/Bridges via the S0 internal interface allows local LAN terminals to open sessions with other local data terminals or even with remote terminals creating a 64kBit/s back up corporate wide area network.

1.2 Private Networking

Private network connectivity evolution has shown recently the abandoning of proprietary signalling networking solutions. Thanks to the ETSI Q-Sig protocol corporations are able to form multivendor networks capable of advanced call processing features. The ECS-FD family of ISPBX have been Euro Q-Sig certified and can therefore be used as nodes in single vendor networks or as a node in multivendor networks. Several types of connectivity among nodes are available in a networked ISPBX environment. Either a G.703 2MBit/s or an analogue interface together with a Modem for the D-channel signalling protocol can be employed to interconnect the ISPBXs. PVN over the public ISDN network is also available to reduce call costs.

In existing private networks where the PABX are interconnected via traditional analogue lines the ECS-FD supports special features used in utility and railway networks such as the intrusion, forced release and section dialling feature compatible to ECS-F/FX, Siemens VDZ , DNS or the Philips iS3000 (DCS-255) series of PABX.

The ECS-Fd family of PABX conform to the European Community recommendations EMC 89/336/EEC, 73/23/EEC and the European standards EN 50082-1, EN 55022, EN 60950 for electromagnetic compatibility and electrical safety.

To guarantee that the equipment to satisfy these recommendations, the installation must be commissioned and operated by specialized personnel, following the recommendations in force and the instructions contained in this document.

1.3 Hardware Configuration

A system consist of the following hardware components:

- system cabinets
- main distribution frame
- internal interfaces
- external peripheral interfaces
- power supply units

TABLE 1-1 TYPICAL INSTALLATION			
TYPE	TRUNKS LINES	INTERNAL LINES	MAXIMUM NUMBER OF PORTS
ECS-FD96	8	80	96
ECS-FD224	24	196	224
ECS-FD300	32	240	272
ECS-FD500	48	448	528
ECS-FD1000	96	960	1088

1.4 ECS-FD Racks

The ECS-FD family of PABX have a modular structure and come with different configurations. Below are some possible configurations:



**Fig. 1-1
ECS-FD96 19" rack**



Fig. 1-2
ECS-FD96 in wall mount cabinet



Fig. 1-3
ECS-FD224 19" rack



Fig. 1-4
ECS-FD300 19" Rack

1.5 Printed Circuit Boards

The peripheral interfaces and centralized units use a printed circuit board (PCB) of standard dimensions (Fig. 1-4):

The front of the board is fitted with two small levers to help with its insertion and extraction from the subframe; on the lower lever there is the unit identity plate with the abbreviated PCB name (GT, US, CAU, etc).

The rear of the board is fitted with two IDC insertion connectors (the lower M2 and the upper M1); these connectors are identical, 64 pin male plugs (DIN standard 41612).

All groups and centralized units with the exception of the GT, use connector M1 for their connection to the main distribution frame.

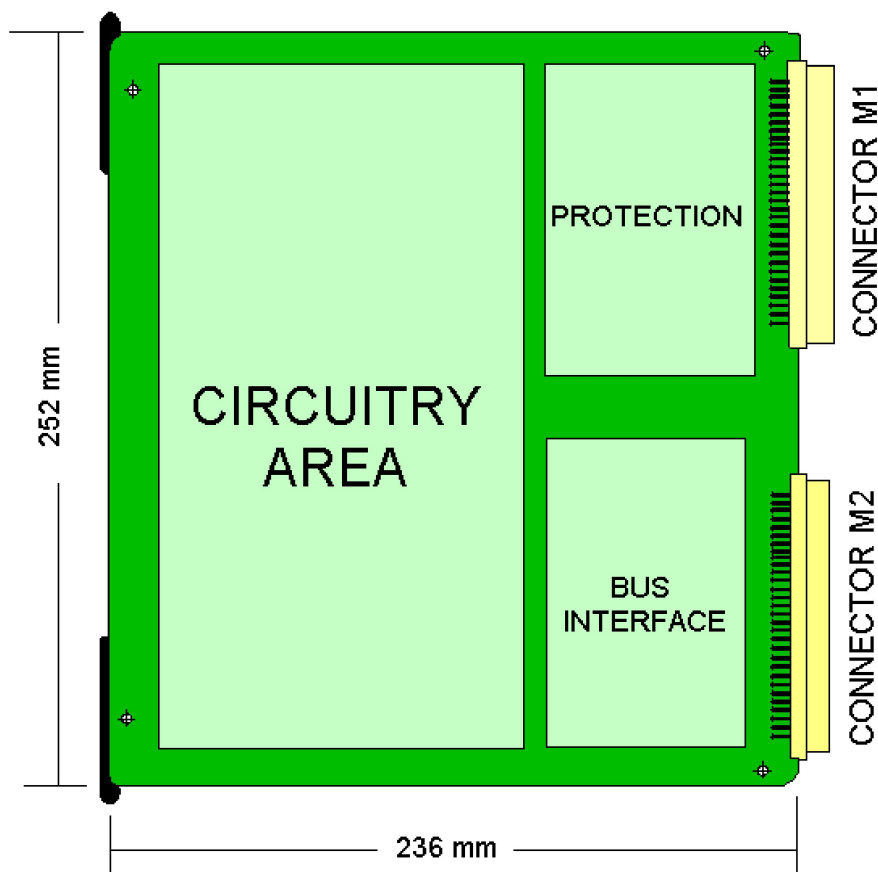


Fig. 1-4
Printed Circuit Board

The lower connector M2 is inserted within the corresponding back plane socket; the pin layout of this connector is the same for all groups within the system.

1.6 External Interfaces and Equipment

Description of equipment that can be connected to the ECS-FD family of PABX:

Analogue telephone sets	Any telephone set that employs pulse or multifrequency type dialling .
Digital telephone sets	Attendant console, SAEFON LE/T/TK (voice and data)
Personal computer and/or printer	Any personal computer and/or printer that has a V24 serial port for data transfer
Paging system with amplifier	Any amplifier with low sensitivity input
Radio paging system	Any type provided it is able to interface with a bi-directional trunk line
Voice mail equipment	Any computer/ host with software and multifrequency user interface
Centralized recording	Any cassette recorder with low sensibility input equipment and with remote control to start the tape
Background music equipment	Any sound source that has a high impedance output and a signal not greater than 135mV
Telephone answering machine	Any pulse or multi-frequency type

G3/G4 fax terminals and terminals with S0 interface.

telephone answering machine
Any G3/G4 FAX that is either stand alone or integrated within a Personal computer. Also any terminal having a EURO-ISDN S0 interface.

"MB408S" Braille system

Terminal that normally interfaces with a Personal Computer through a serial interface, makes information displayed on the monitor available to "blind" people.

1.7 Power Supply

There are various possibilities to power the ECS-FD system. Basically 48V DC connection for the ECS-FD racks are recommended. However for the small system (ECS-FD96) a 110/220V AC supply is available.

Below the power supply rack for the ECS-FD500 and ECS-FD1000.

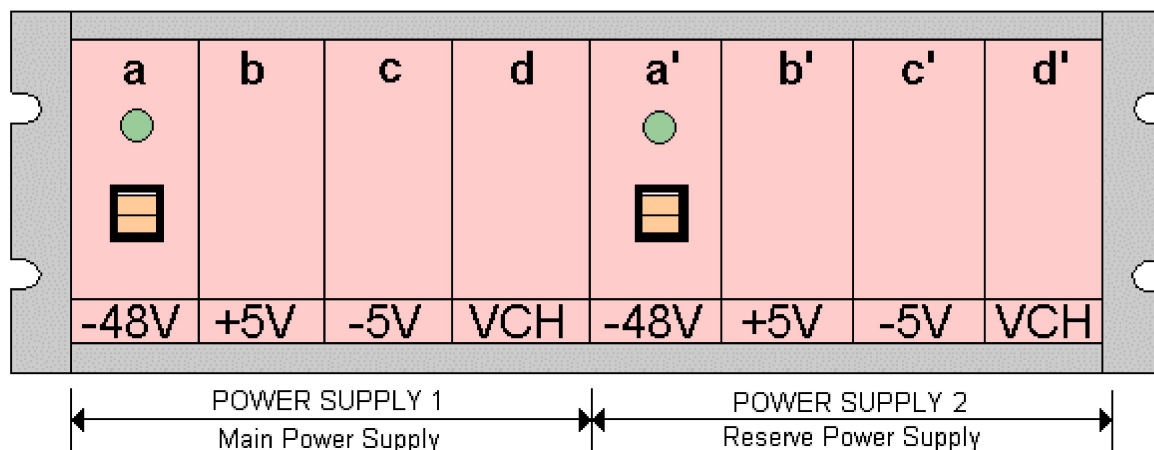


Fig. 1-5
ECS-FD500 or ECS-FD1000

2 Packing

The ECS-FD is packed for transport with a surrounding cellophane covering and polystyrene packing cushions secured within a robust cardboard box in order to guarantee that the contents arrive in perfect condition.

This packing procedure protects the contents against:

- mechanical damage
- thermal damage
- other forms of damage caused by humidity, pollution in the atmosphere etc.

The packing however does not protect the contents against immersion in liquid. The system must reach the installation site with the packing undamaged.

The goods when closed in their box must be conserved in the correct position according to the instructions on the exterior of the box. The packing and contents must be protected from heavy rain and also from prolonged exposure to direct sunlight.

The box and its contents must be kept at least 20 cm from the ground in order to avoid the stagnation of any water coming into contact with the base of the box; while awaiting installation the system should be kept in a safe place in order to avoid the possibility of damage caused by tampering by non-authorized persons.

2.1 Recommendations for First Time Installation

Verify the presence of all material necessary for the installation, using the packing list that accompanies the goods.

Verify the suitability of the area chosen for the installation, (see following paragraph) define exactly:

- the position of the mains outlet;
- the position of the earth connection;
- the position of the ECS-FD ;
- the position of the attendant console;
- the position of the telephones and the exact route of the internal network wiring, reducing if possible any magnetic and electric coupling with the mains wiring;
- the position of the incoming trunk lines;
- the position of the main distribution frame of the network (internal lines);
- the final configuration of the ECS-FD;

Check the mains voltage and the system ground;

Upon completing the installation **carefully** document all the information regarding the system configuration and network wiring for future reference.

2.2 Tools and Instruments Required for Installation

The tools advised in order to implement a correct system installation are described below:

- number of cables for power supply and ground
- flat point screwdriver
- Philips type (cross) screwdrivers
- wire cutters
- Set of Spanners
- tester or multimeter to measure voltage, current and resistance
- drill with hammer action
- Set of bits for cement
- expansion insertion for cement (type "FISCHER" M8-14 diameter)
- 8 mm nylon raw plugs with TX M6 x 45 self threading screws
- 6 mm nylon raw plugs with TX M4 x 35 self threading screws
- pliers
- clamping screw
- crimping tool for cable ends
- lug for 25 mm sq. diameter cable having a 6.5 mm diameter hole
- lug for 6 mm sq. diameter cable having a 6.5 mm diameter hole
- heat gun and heat shrink sleeving
- PVC cable guides 200 x 80

2.3 Items Required for Mounting on Raised Floors

- support bracket;
- 10 mm drill bit for metal;
- M8 x 120 fixing bolts with 13 mm hexagonal head;
- 8 mm wing nuts or 13 mm hexagonal nuts for the bolts;
- washers for M8 bolts;
- toothed washers for M8 bolts;
- metal/ wood cutting hack-saw

2.4 Mounting the Rittal Cabinet

Mounting on normal flooring (Fig. 2-1)

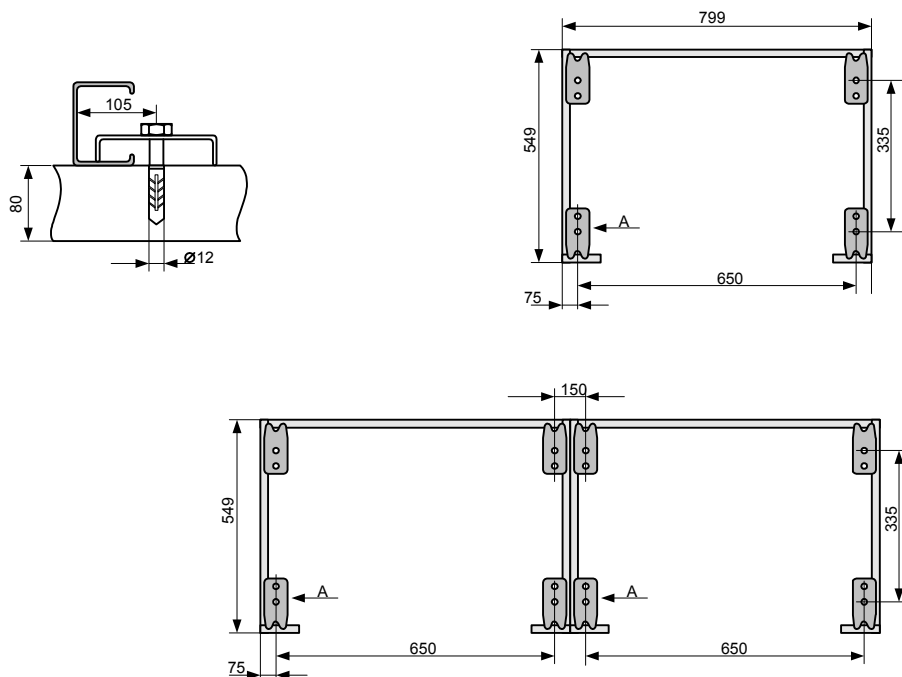
- position the cabinets in the chosen position;
- mark the floor with the position of where the holes are to be drilled;
- move the cabinets and drill the holes using a 14 mm drill bit, to a depth of 65 mm;
- clean the area of the floor which will support the cabinets;
- remove the 8 mm diameter screws and washers from the raw plugs;
- place the raw plugs in the holes;
- position the cabinets such that they are correctly positioned above the drilled holes
- insert the 8mm screws with their washers
- tighten the 8mm screws with the 13mm key
- cut out to measure a length of PVC cable guide 200 x 80
- it is advised to drill the holes with the 8 mm bit to a depth of 45 mm
- clean the surface to which it is to be attached
- insert the 8 mm nylon raw plugs and the TX M6 x 45 self threading screws
- tighten the screws with the appropriate screwdriver.

Mounting on raised flooring:

- position the cabinets in the chosen position
- mark the floor with the position of where the holes are to be drilled

- move the cabinets and drill the holes using a 12 mm drill bit
- in the case when the cables enter the cabinet from underneath, it is necessary to cut a hole in the flooring, smaller than the internal floor area occupied by the cabinet, enabling the ease of cable entry
- re-position the removed flooring and position the cabinets such that they are correctly positioned for the drilled holes
- remove the cut out flooring from within the cabinet in order to gain access to the cabling from under the cabinet
- insert the M10 x 120 fixing bolts and position the support bracket such that the bolts pass through the bracket
- insert the washer, the toothed washer and finally the wing or 13 mm hexagonal nut
- tighten the bolt heads with the 13 mm key

Var. 1



Var. 2

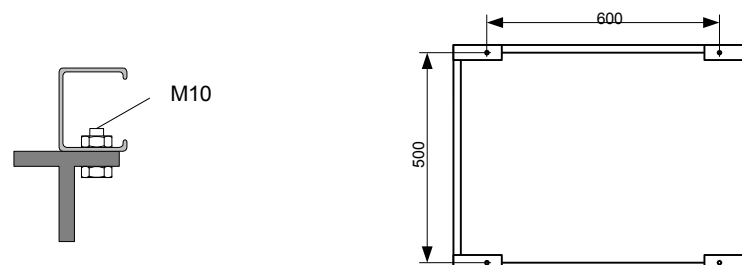


Fig. 2-1
Floor mounting template

2.5 Environmental Characteristics

The ECS-FD is a system that is completely electronic, with low power consumption, and low power dissipation

ECS-FD96:	min. 30W	max.70W
ECS-FD224:	min. 55W	max.190W

The ECS-FD does not require air conditioning:

Temperature:	-5° C ... +45° C
Relative Humidity	5% ... 90%

It is advised to take the following precautions during the installation:

- situate the ECS-FD distant from heat sources;
- avoid direct sunlight;
- avoid dusty or very humid environments;
- install in internal environment in which there are no corrosive chemical vapours (chlorine, sulphur etc);
- situate in a sufficiently illuminated location (at least 100 lux) where there is enough space to gain access to all parts of the system;
- avoid environments having high electromagnetic fields (i.e. locations where electric devices, motors etc. are present); if it is not possible, then fit the cable terminations with EMI standard antidisturbance filters;
- place an anti-static mat in the area surrounding the system;
- avoid decorating the walls and carpeting the floor with synthetic material that is not anti-static;

2.6 Installation Standard Summary

The following space must be provided for cabinets installed in the centre of a room: at least 100 cm on the front face and 60 cm for the other faces, except for one of the faces which can be reduced to 30 cm, provided that system access is not gained from this side.

For wall mounted cabinets and cabinets placed against or fixed to the wall, a space of 100 cm must be provided on the front face and 60 cm on each of the side faces, hence allowing ease of access to internal modules from these sides. This lateral distance can be reduced to 15 cm in the cases when system access is not gained from these sides.

In order to reduce space, the cabinets can be placed side by side and back to back if there is access to the front face of the system.

The attendant console can be installed in the same or in a different area to that of the ECS-FD provided that the ECS-FD is fitted with a local socket allowing the connection of the attendant console near to the ECS-FD for maintenance purposes.

2.7 ECS-FD Positioning

The ECS-FD do not have any moving mechanical parts and are very silent; for this reason it is possible to install the system in a working environment.

The ECS-FD must not be located under windows, near pipes etc, or anything that could allow water to penetrate the system.

For maintenance reasons it is advisable to place the Main Distribution Frame as close as possible to the ECS-FD.

The minimum space advisable to access the PBX is shown below:

ECS-FD:

- front side: 100 cm
- rear side: 60 cm
- right or left side: 30 cm
- other side: 60 cm

Mains panel:

A dedicated MCB should be provided for the ECS-FD PABX.

Attendant console:

can be located in the same area as the ECS-FD or in another room
The dimensions of the OP2 console are as follows:

- height: 21cm
- width: 43 cm
- depth: 31cm;

Administration terminal:

is a personal computer whose size depends upon the model and type used.

The following illustrates two examples for positioning the ECS-FD within a room

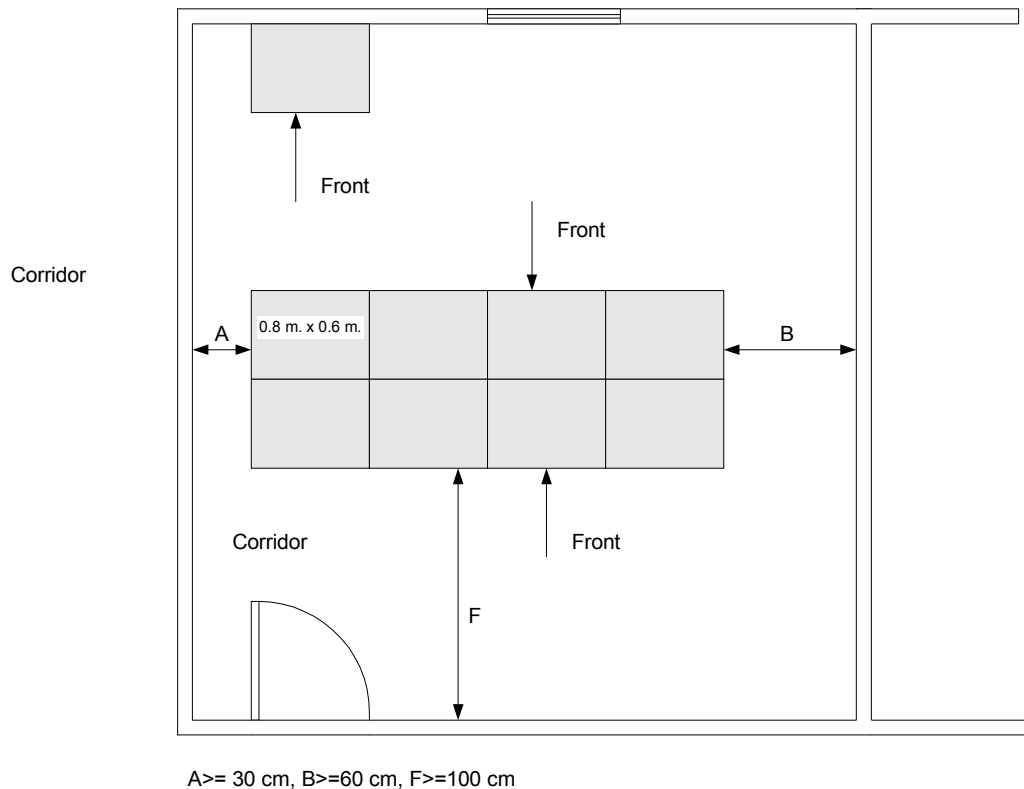


Fig. 2-2
Example of the space required for floor mounted cabinets

2.8 Telephone Network System

Wires and cables

The characteristics of the wires and cables must conform to the national standards. The cables must be made from electrolytic copper wire, each completely isolated along their whole length, grouped in pairs, three, four, five or multi-pairs and covered by a protective sheath.

When laying cables within buildings, only cables formed by wires insulated by synthetic materials must be used, which have adequate and stable electrical characteristics (e.g. polyvinylchloride and polyethylene), protected by a sheath of a synthetic material. In particular conditions it is obligatory to use a metallic sheath that conforms to the relative requirements of the particular national specifications

For the choice of cables, refer to the national standards for PVC coated telecommunication cables or to the national specifications for trunk and subscriber networks.

The use of multiuse cables (e.g. telecommunication cables and special cables for data transmission) is allowed if the implementation of the network necessitates it, provided that the electrical characteristics of the telecommunication cables are equivalent to the characteristics defined by the above mentioned standards and the transmission quality of the network is not degraded beyond the limits.

Junction boxes

The specified telephone junction boxes or sockets when wall mounted, must be positioned at a height of at least 17.5cm (according to national standards) above the floor, with respect to their lower rim and for safety reasons should not be positioned above mains sockets if present.

The telephone junction boxes or sockets for normal or special telephone equipment must be positioned at a height (with respect to their mid-way line) of at least:

- 17.5 cm if wall mounted (for an encased or protruding mounting)
- 7 cm if mounted in a duct (or on a plinth)
- 4 cm if mounted on a pod or under a covered plate (on the floor)

and for safety reasons should not be positioned above mains sockets if present.

Permitted resistances

The maximum resistance allowed for a twisted pair connecting any type of normal equipment to the main distribution frame, or internal network sectioning component, must satisfy the following regulations:

if the equipment is directly powered from the public exchange, the maximum resistance allowed is 150 Ohm , which includes the resistance of any components in series with the line, provided that the overall resistance between the equipment and exchange does not exceed the limits defined for the trunk network.

if the equipment is powered from an internal system and the exchange's resistance value is part of that for the actual system, the resistance limits must be indicated by the manufacturer for each type of switching system.

Where it is necessary, special power supply and repeater devices should be provided.

Wires of diameter 0.4, 0.5 and 0.6mm can be used in the construction of the internal network.

**A TELECOMMUNICATION NETWORK WITH VISIBLE OR HIDDEN CABLES
MUST BE COMPLETELY SEPARATE FROM ELECTRICAL CABLES AND
SHOULD ALSO BE RUN IN DIFFERENT CABLE GUIDES IF USED.**

2.9 System Earthing

The ECS-FD, like all telephony equipment, must be earthed. Where it is possible the system ground should have a good connection with an appropriately sized conductor, connected to earth.

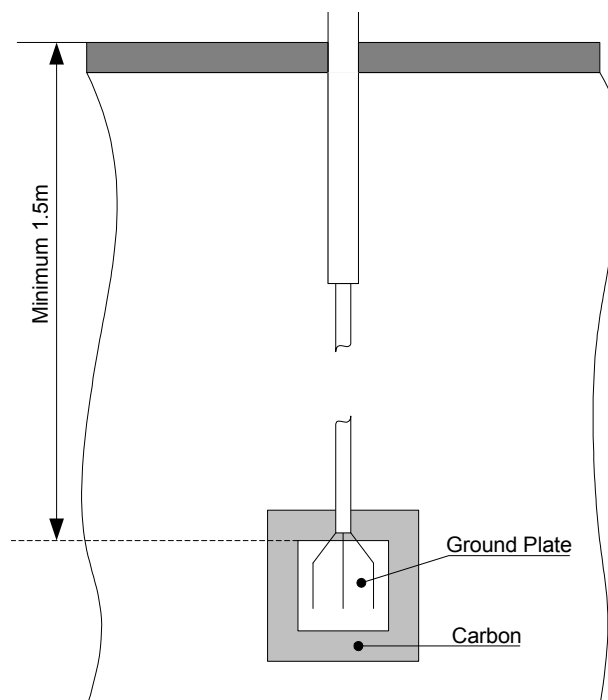
The shape, size and material of the conductor depends upon the nature of the soil, such that the resistance between conductor and soil is as low as possible.

THE RESISTANCE TO EARTH MUST NOT EXCEED 20 OHM

DURING THE INSTALLATION PHASE THE ECS-FD AND THE BATTERY BACK-UP POWER STATION MUST BE CONNECTED TO GROUND.

The earth conductor can have the following forms:

- plate
- electrode
- metal mesh



2-3
Ground plate conductor

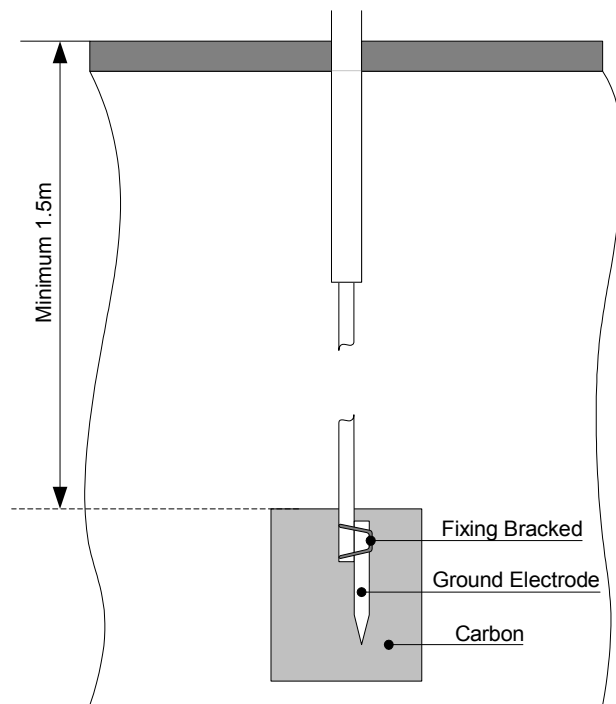


Fig. 2-4
Ground electrode conductor

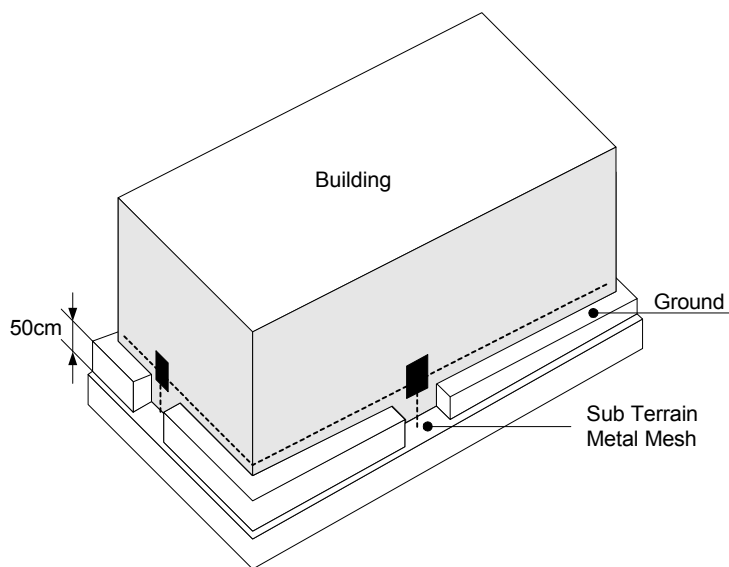


Fig. 2-5
Sub-terrain metal mesh conductor

Water and gas pipes can not be used as earth conductors.

For further details refer to the national standards.

THE MANUFACTURER, IN THE CASE WHEN THE ABOVE REGULATIONS ARE NOT FOLLOWED, WILL ASSUME NO RESPONSIBILITY FOR THE EVENTUAL INJURY TO PERSONS OR DAMAGE TO PROPERTY

2.10 Cable Diameters

TABLE 2-1 Cable Diameters			
TYPE	110-230VAC Supply	48V DC Supply	Ground Wire
ECS-FD96 / 224	2.5 mm ²	4mm ²	>16 mm ²

The wires to be used for the battery back up power station remote signalling facility (i.e. no mains, battery discharge, battery discharging, battery charger fault) must have a diameter of 1 mm².

The ground conductors must be made of a single core copper cable with a green / yellow colour PVC coating.

The earth conductors must be connected directly to the ground hole. They must have a diameter of at least **16 mm²** and must be appropriately protected from chemical corrosion.

Ground conductors must be separated from the mains live and neutral wires.

THE CONNECTION PROTECTION RESISTANCE TO GROUND MUST NOT EXCEED 1 OHM

2.11 Mains Panel

It is necessary to prepare in advance, a mains panel close to the ECS-FD which has the following characteristics:

16A thermal circuit breaker switch connected to the battery back-up power station
at least 4 MCBs with a rating of 10A.

The mains power supply powering the ECS-FD must not be used to power other equipment.

The 110-230Vac mains protection is not supplied with the ECS-FD; it is the job of the system installer to ensure that mains protection is connected to the ECS-FD.

2.12 Mains Supply

Mains voltage: 110-230Vac +10%/ -15%

Mains frequency: 50/ 60 Hz

2.13 Cables for Power and Ground Cables

The connection of the power cables and ground must be implemented as illustrated in Fig.1-10.

DURING THE SYSTEM INSTALLATION PHASE IT IS NECESSARY TO ENSURE THAT BOTH THE ECS-FD PBX AND BATTERY BACK-UP POWER STATION HAVE A GOOD CONNECTION TO GROUND

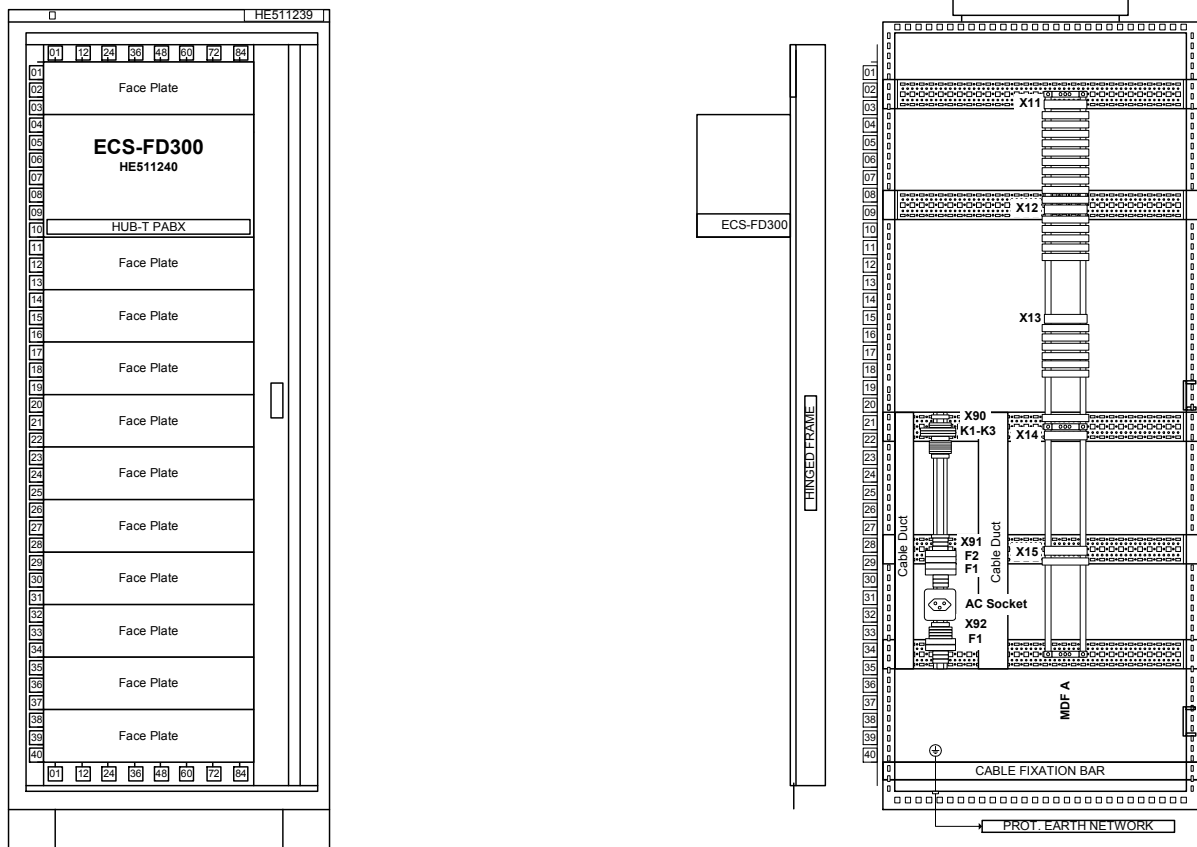


Fig. 2-6
ECS-FD cabinet

Check the integrity of the earth connection to the system frame.

3 ECS-FD Rack Configurations

3.1 ECS-FD96 Rack

The ECS-FD96 can be delivered either in a 19" rack or a wall mount version.

The ECS-FD96 can be delivered with a 110V AC/ 220V AC or a 48V DC supply

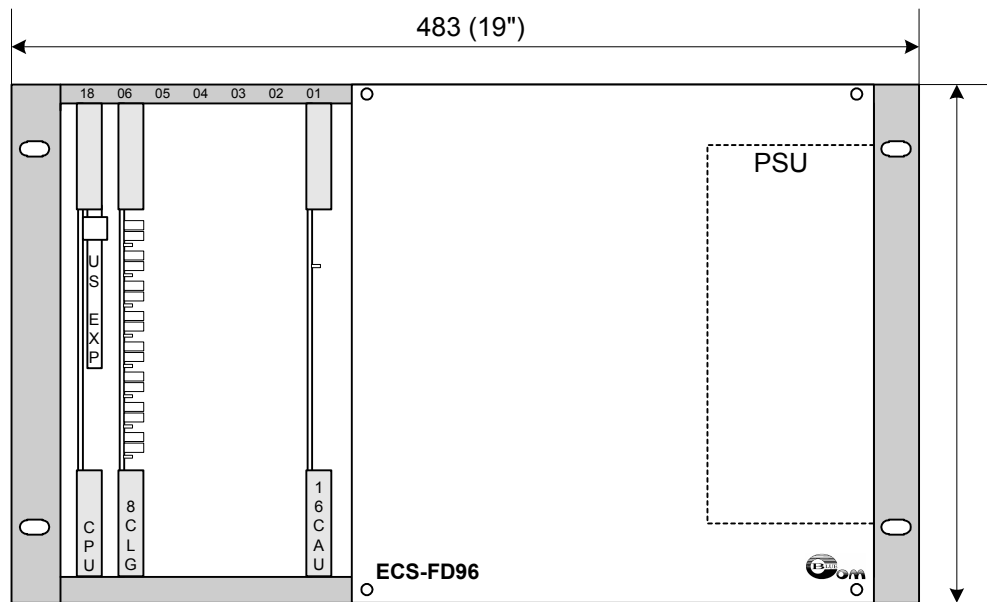


Fig. 3-1
ECS-FD96: rack version with 220V AC supply

For the correct installation of the subframe within the cabinet, the rear view diagram is shown in Fig. 1-12.

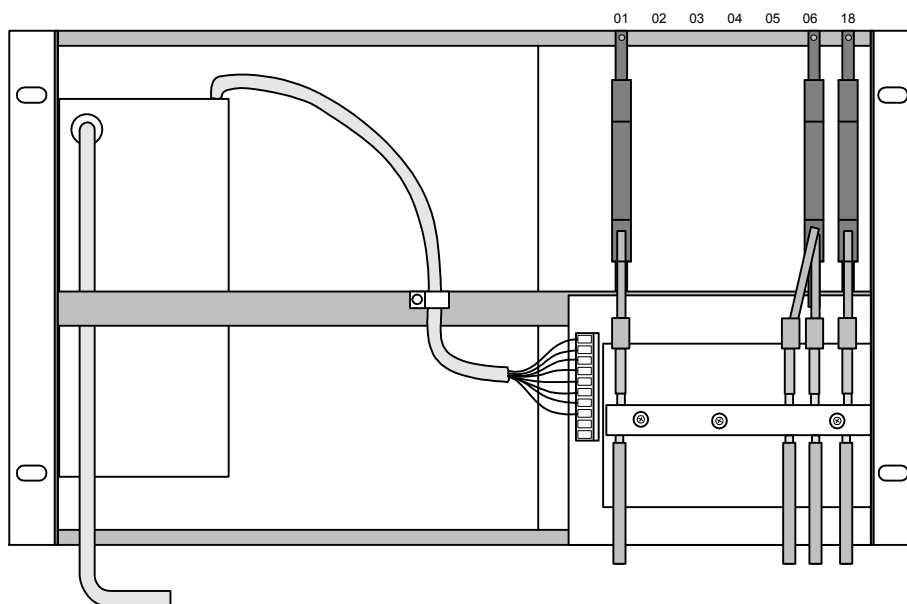


Fig. 3-2
ECS-FD96: rack rear view with 220V AC supply

Twenty cards can be inserted within the subframe; each position (card slot) is defined by a number (Fig. 1-13).

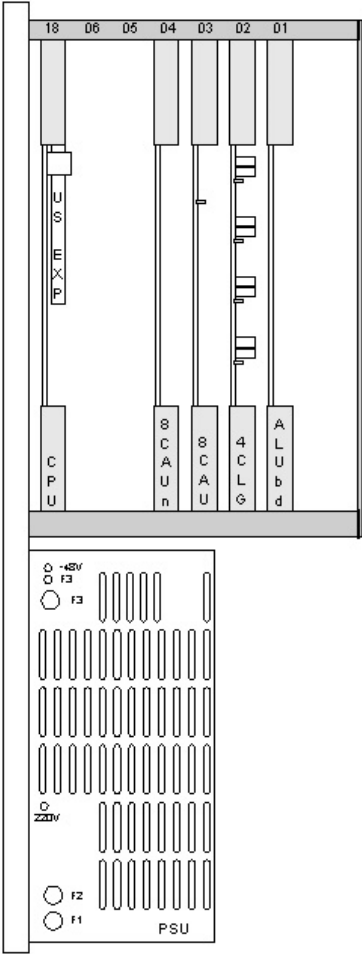


Fig. 3-3
ECS-FD96 Wall mount version

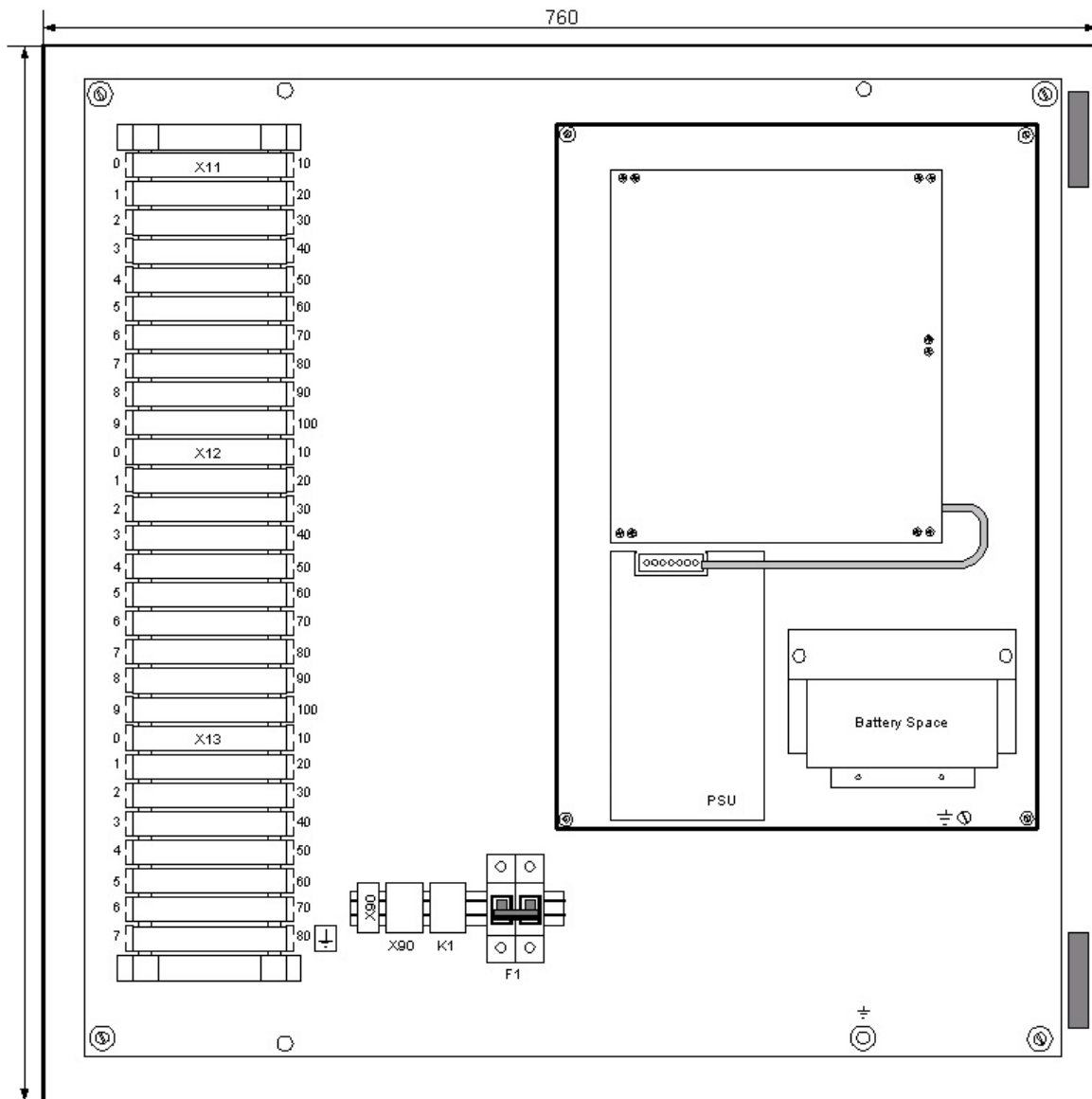


Fig. 3-4
ECS-FD96 built in wall cabinet

3.2 Peripheral Boards ECS-FD96

Normally the ECS-FD exchange is supplied with the base cards already inserted within the subframe; it is advised to maintain this configuration. For any eventual expansion, consult the following installation tables.

- Subframe

The ECS-FD96 rack has 7 card slots available. The first position on the left is used for the CPU (Pos. 18). The other 6 slots can be used for any of the peripheral boards.

TABLE 3-1
ECS-FD96 SUBFRAME INSTALLATION

BC Order No.	BOARD	DESCRIPTION	CARD SLOT
	DC/DC	Converter	CONV 1
	PAR CONVER	Parallel Converter	PAR CONV
	GT	Traffic Management EURO-ISDN	GT 1
	GTQSIG	Traffic Management Q-SIG	GT 1
	US	Service Unit	1 ÷ 6
Card slots 1 to 6 can be used by the following groups:			
	8 ALUbid	8 Bidirectional analogue trunk interface circuits	1 ÷ 6
	4 ALUbid	4 Bidirectional analogue trunk interface circuits	1 ÷ 6
	4 ALUbEM	4 Bidirectional analogue trunk interface circuits with Emergency	1 ÷ 6
	8 ALUsp	8 Direct Inward dialling trunk interface circuits	1 ÷ 6
	ALUa	1 2Mbit/s digital trunk interface circuit with channel associated signalling	1 ÷ 6
	ALUnc	1 EURO-ISDN Primary Rate access (30B+D) interface circuit at 2Mbit/s	1 ÷ 6
	4 ALUnb	4 EURO-ISDN Basic access (2B+D) T interface circuits (2 with emergency)	1 ÷ 6
	ALUna	1 2Mbit/s digital trunk interface circuit with channel associated signalling (%)	1 ÷ 6
	2 ALUnb	2 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency)	1 ÷ 6
	8 CLG	8 Tie-line interface circuits	1 ÷ 6
	4 CLG	4 Tie-line interface circuits	1 ÷ 6
	16 CAU	16 Analogue extension interface circuits	1 ÷ 6
	8 CAU	8 Analogue extension interface circuits	1 ÷ 6
	16 CAUn	16 Digital extension interface circuits (SAEfon, OP2)	1 ÷ 6
	8 CAUn	8 Digital extension interface circuits (SAEfon, OP2)	1 ÷ 6
	4 CAUnSO	4 EURO-ISDN basic access (2B+D) S0 interface circuits	1 ÷ 6
	8 CGQSIGA	8 Analogue tie-line interface circuits with Q-SIG signalling	1 ÷ 6
	4 CGQSIGA	4 Analogue tie-line interface circuits with Q-SIG	1 ÷ 6

		signalling	
	CGQSIGN	1 2MBit/s digital tie-line interface circuit with Q-SIG signalling	1 ÷ 6
	3T01S0	3 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency); 1 EURO-ISDN Basic access (2B+D) S0 interface circuit	1 ÷ 6
	AV	Voice Announcements and messages card (#)	1 ÷ 6
	4 EM	4 Emergency circuits	1 ÷ 6
	8 EM	8 Emergency circuits	1 ÷ 6
	CGVPN14	1 VPN single digital tie-line	1 ÷ 6
	CGVPN28	1 VPN redundant digital tie-line (\$)	1 ÷ 6

(%) Foreign markets only

(\$) occupies two card slots

3.3 ECS-FD224 Rack

The ECS-FD224 is available in the single or redundant version. The redundant version is illustrated as follows and is fitted with two power supply converter cards (Main and Redundant) and one parallel converter card, whereas the single version has a single power supply converter card (positioned in the slot indicated for the parallel converter card).

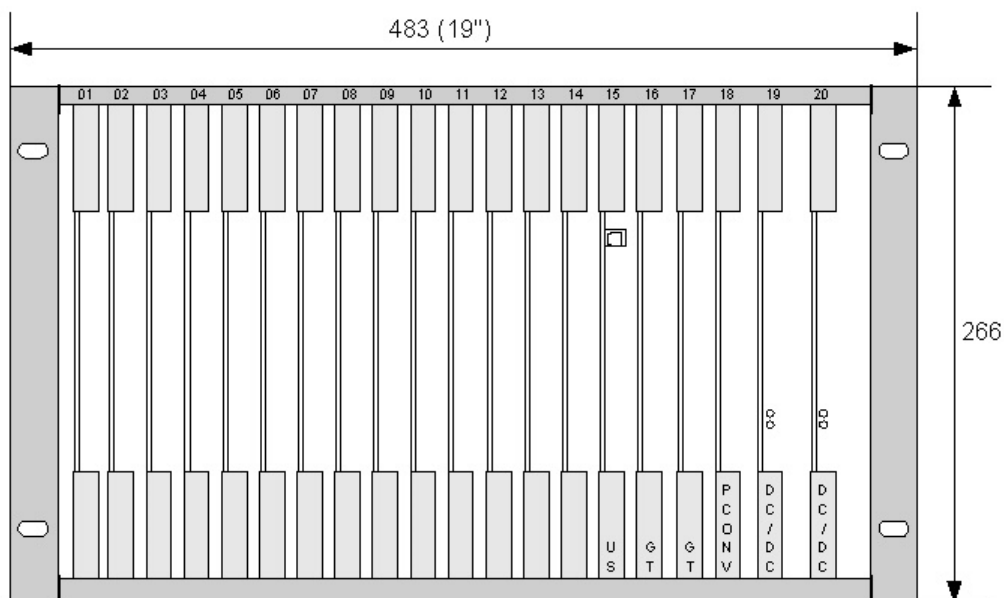


Fig. 3-5
ECS-FD224: Peripheral Boards

For the correct installation of the subframe within the cabinet, the rear view diagram is shown in Fig. 3-6.

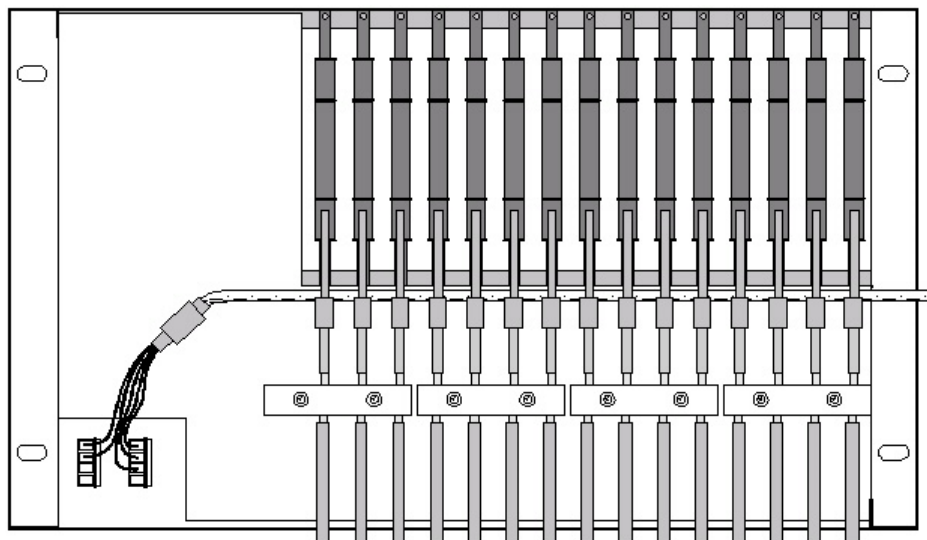


Fig. 3-6
ECS-FD Rear View

Twenty cards can be inserted within the rack; each position (card slot) is defined by a number (Fig. 3-5).

3.4 Peripheral Boards ECS-FD224

Normally the ECS-FD exchange is supplied with the base cards already inserted within the subframe; it is advised to maintain this configuration. For any eventual expansion, consult the following installation tables.

Within the base rack of the ECS-FD224 there are 20 card slots available. Five of these (Pos. 15-20) are dedicated to the centralized units, the Service Unit (US) card and to the parallel converter card.

TABLE 3-2			
ECS-FD224 Board Positions			
BC Order No.	BOARD	DESCRIPTION	CARD SLOT
	DC/DC	Converter (redundant)	CONV 2
	DC/DC	Converter	CONV 1
	PAR CONV	Parallel Converter	PAR CONV
	GT	Traffic Management EURO-ISDN (redundant)	GT 2
	GTQSIG	Traffic Management Q-SIG (redundant)	GT 2
	GT	Traffic Management EURO-ISDN	GT 1
	GTQSIG	Traffic Management Q-SIG	GT 1
	US	Service Unit	US

Card slots 1 to 14 can be used by the following groups:			
	8 ALUbid	8 Bidirectional analogue trunk interface circuits	1 ÷ 14
	4 ALUbid	4 Bidirectional analogue trunk interface circuits	1 ÷ 14
	4 ALUbidEM	4 Bidirectional analogue trunk interface circuits with Emergency	1 ÷ 14
	8 ALUsp	8 Direct Inward dialling trunk interface circuits	1 ÷ 14
	ALUa	1 2Mbit/s digital trunk interface circuit with channel associated signalling	1 ÷ 14
	ALUnc	1 EURO-ISDN Primary Rate access (30B+D) interface circuit at 2Mbit/s	1 ÷ 14
	4 ALUnb	4 EURO-ISDN Basic access (2B+D) T interface circuits (2 with emergency)	1 ÷ 14
	ALUna	1 2Mbit/s digital trunk interface circuit with channel associated signalling	1 ÷ 14
	2 ALUnb	2 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency)	1 ÷ 14
	8 CLG	8 Tie-line interface circuits	1 ÷ 14
	4 CLG	4 Tie-line interface circuits	1 ÷ 14
	16 CAU	16 Analogue extension interface circuits	1 ÷ 14
	8 CAU	8 Analogue extension interface circuits	1 ÷ 14
	16 CAUn	16 Digital extension interface circuits (SAEfon, OP2)	1 ÷ 14
	8 CAUn	8 Digital extension interface circuits (SAEfon, OP2)	1 ÷ 14
	4 CAUnSO	4 EURO-ISDN basic access (2B+D) S0 interface circuits	1 ÷ 14
	8 CGQSIGA	8 Analogue tie-line interface circuits with Q-SIG signalling	1 ÷ 14
	4 CGQSIGA	4 Analogue tie-line interface circuits with Q-SIG signalling	1 ÷ 14
	CGQSIGN	1 2Mbit/s digital tie-line interface circuit with Q-SIG signalling	1 ÷ 14
	3T01S0	3 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency); 1 EURO-ISDN basic access (2B+D) S0 interface circuit	1 ÷ 14
	AV	Voice Announcements and messages card	1 ÷ 14
	4 EM	4 Emergency circuits	1 ÷ 14
	8 EM	8 Emergency circuits	1 ÷ 14
	CGVPN14	1 VPN single digital tie-line	1 ÷ 14

	CGVPN28	1 VPN redundant digital tie-line (\$)	1 ÷ 14
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For the ECS-FD224 with a single power supply card, the Converter group is inserted in the PAR CONV position, in the place of the Parallel Converter group, while the CONV1 and CONV2 positions remain empty.

3.5 ECS-FD300 Rack

The ECS-FD300 has 17 Interface card slots. In position 5 and 15 a packet processor for VoIP telephone traffic can be installed. The CPU (TDM PROC) is installed in position 18 and the DC Power Supply in position 19.

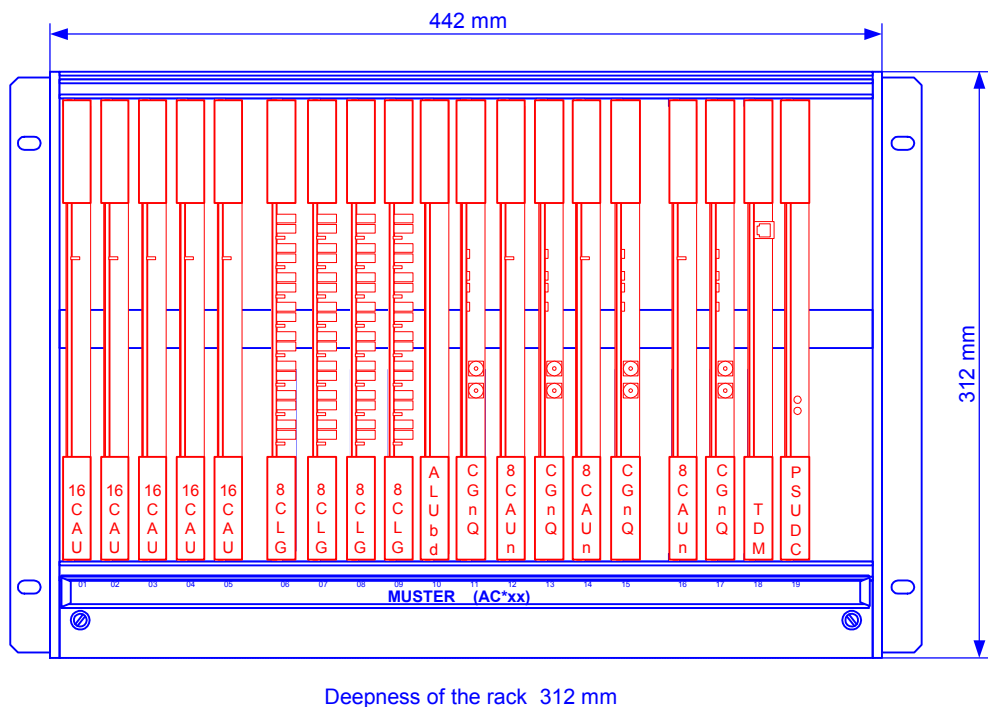


Fig. 3-7
ECS-FD300: Peripheral Boards

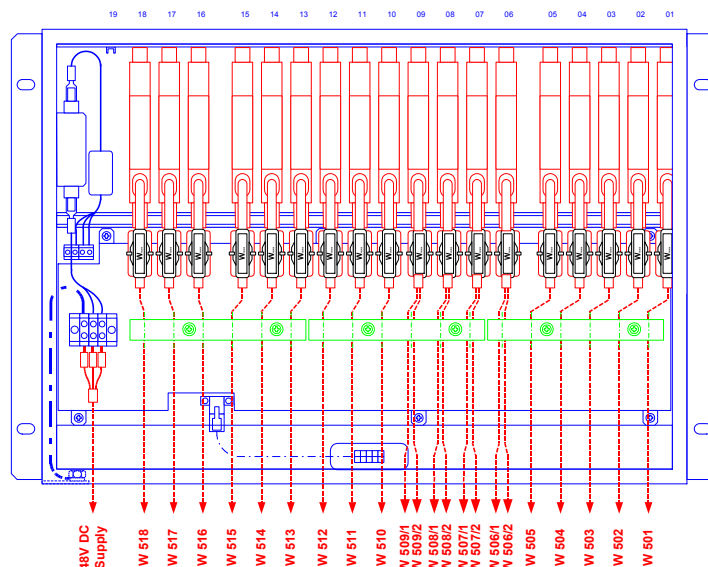


Fig. 3-8
ECS-FD Rear View

3.6 Peripheral Boards ECS-FD300

Normally the ECS-FD exchange is supplied with the base cards already inserted within the rack; it is advised to maintain this configuration. For any eventual expansion, consult the following installation tables.

Within the base rack of the ECS-FD300 there are 19 card slots available. Position 18 is used for the CPU, position 19 for the 48V power supply and slot 1...17 for peripheral boards.

TABLE 3-2			
ECS-FD300 Board Positions			
BC Order No.	BOARD	DESCRIPTION	CARD SLOT
	DC/DC	48V Power Supply	19
	TDM PROC	CPU (TDM PROC)	18
	PACKET	Packet Processor (VoIP)	5,15
Card slots 1 to 17 can be used by the following groups:			
	8 ALUbid	8 Bidirectional analogue trunk interface circuits	1 - 17
	4 ALUbid	4 Bidirectional analogue trunk interface circuits	1 - 17
	4 ALUbidEM	4 Bidirectional analogue trunk interface circuits with Emergency	1 - 17
	8 ALUsp	8 Direct Inward dialling trunk interface circuits	1 - 17
	ALUna	1 2Mbit/s digital trunk interface circuit with channel associated signalling	1 - 17
	ALUnc	1 EURO-ISDN Primary Rate access (30B+D)	1 - 17

		interface circuit at 2Mbit/s	
	4 ALUnb	4 EURO-ISDN Basic access (2B+D) T interface circuits (2 with emergency)	1 - 17
	ALUna	1 2Mbit/s digital trunk interface circuit with channel associated signalling	1 - 17
	2 ALUnb	2 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency)	1 - 17
	8 CLG	8 Tie-line interface circuits	1 - 17
	4 CLG	4 Tie-line interface circuits	1 - 17
	16 CAU	16 Analogue extension interface circuits	1 - 17
	8 CAU	8 Analogue extension interface circuits	1 - 17
	16 CAUn	16 Digital extension interface circuits (SAEfon, OP2)	1 - 17
	8 CAUn	8 Digital extension interface circuits (SAEfon, OP2)	1 - 17
	4 CAUnSO	4 EURO-ISDN basic access (2B+D) S0 interface circuits	1 - 17
	8 CGQSIGA	8 Analogue tie-line interface circuits with Q-SIG signalling	1 - 17
	4 CGQSIGA	4 Analogue tie-line interface circuits with Q-SIG signalling	1 - 17
	CGQSIGN	1 2Mbit/s digital tie-line interface circuit with Q-SIG signalling	1 - 17
	3T01S0	3 EURO-ISDN Basic access (2B+D) T interface circuits (1 with emergency); 1 EURO-ISDN basic access (2B+D) S0 interface circuit	1 - 17
	AV	Voice Announcements and messages card	1 - 17
	4 EM	4 Emergency circuits	1 - 17
	8 EM	8 Emergency circuits	1 - 17
	CGVPN14	1 VPN single digital tie-line	1 - 17
	CGVPN28	1 VPN redundant digital tie-line (\$)	1 - 17

3.7 ECS-FD500 Rack

The ECS-FD500 consists of 3 racks. The first rack is the power supply rack with 3HE height. Rack 2 and 3 are used to equip the ECS-FD500 with

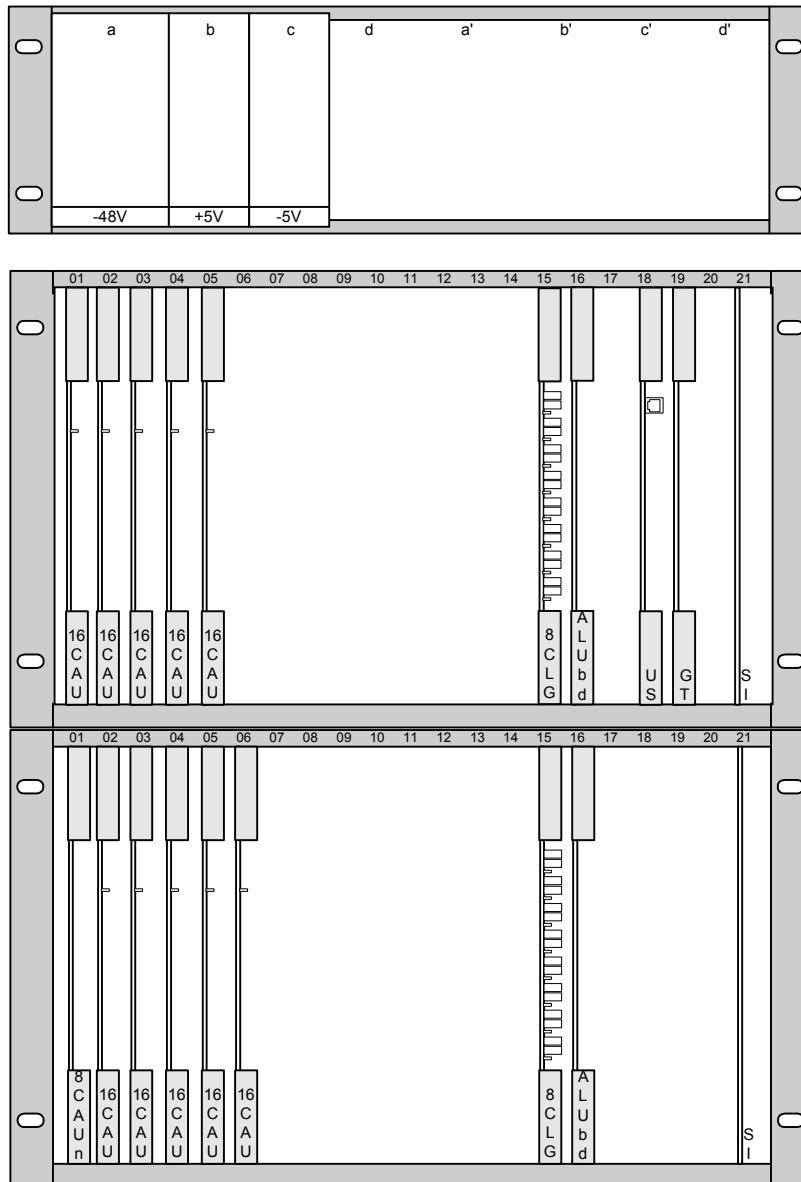


Fig. 3-9
ECS-FD500 19" Rack Layout

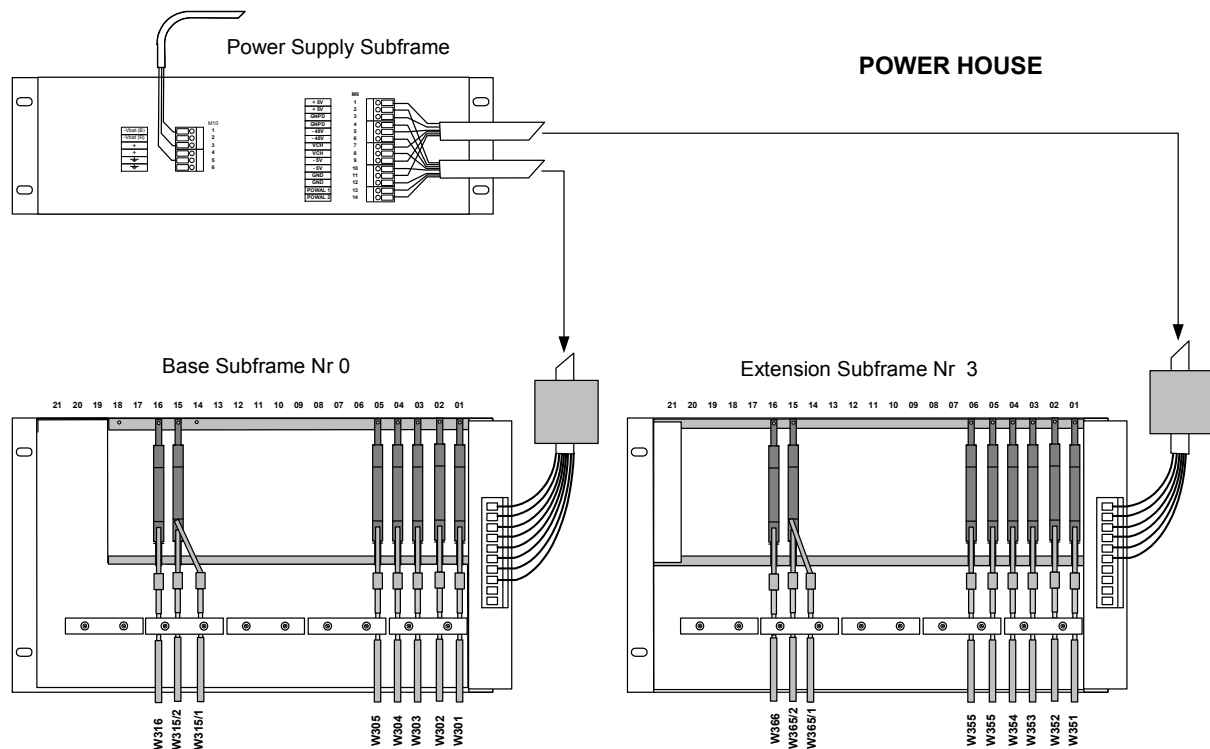


Fig. 3-10
ECS-FD500 Rear View Rack Layout

3.8 Distance Limits between ECS-FD and External Equipment

- **Analog Equipment**

Telephones, recorders, answering machines, fax G3, etc.
Twisted pair resistance without equipment: < 2x500 Ohm
Maximum line length (Ø 0.6): circa 8000 m

- **Digital SAEFON B /T /TK /LE telephones**

Twisted pair resistance without telephone: < 110 Ohm
Maximum line length (Ø 0.6): circa 800 m

- **Digital attendant consoles**

Twisted pair resistance without telephone: < 82 Ohm
Maximum line length (Ø 0.6): circa 600 m

- **Serial port cable to printer or personal computer**

Maximum line length: circa 15 m

- **2MBit/s digital trunks with channel associated signalling (ALUna) and 2MBit/s EURO-ISDN trunks (ALUnc)**

Maximum line length:
With 120 Ohm balanced twisted pair (Ø 0.6): circa 150 m
With 75 Ohm coaxial cable: circa 300 m

- **144Kbit/s EURO-ISDN trunks (ALUnb)**

Maximum length of bus:
With 120 Ohm balanced twisted pair (Ø 0.6): circa 200 m

- **EURO-ISDN S0 Interface (CAUnS0)**

Maximum length of bus:

Short bus: circa 150 m
Point-to-point long bus: circa 800 m
Point-to-multi-point long bus: circa 450 m

3.9 Cables to the Main Distribution Frame

In order to connect the peripheral board of the ECS-FD to the Main Distribution Frame (MDF), screened cables having a length of 5m containing 16 or 32 twisted pairs are supplied which are filtered with ferrites at the connector end of the cable.

The cables contain 16 or 32 twisted pairs in the form of a multi-pair semi-rigid cable; the individual wires are made of copper, have a diameter of 0.4 mm and are insulated from each other via a PVC plastic coating. They have a built-in ferrite terminated on one side by about 30cm of screened braid. The use of these cables is necessary in order to respect the electromagnetic compatibility standards.

The end of the cable attached to the ECS-FD is connected to a DIN connector, having 32 wire-wrap connections in 2 rows, enclosed in a plastic casing and with fixing screws that enable it to be mounted to the back of the ECS-FD racks. The screened cable must be fixed by cable clamp blocks at the position of the "screened braid", to the internal walls of the cabinet.

In order to execute the correct wiring of the screened cables between the main distribution frame and the external lines, the installer must

- remove all the fixing screws from the cable clamp blocks at all positions;
- wire screened cables from an external main distribution frame, inserting them in the appropriate guides of the cable clamp block, maintaining a tidy cable form (see Fig. 2-15);
- Replace all the fixing screws in the cable clamp blocks, making sure that the screened casing makes electrical contact with cable clamp blocks and maintains the mechanical polarity of the blocks.

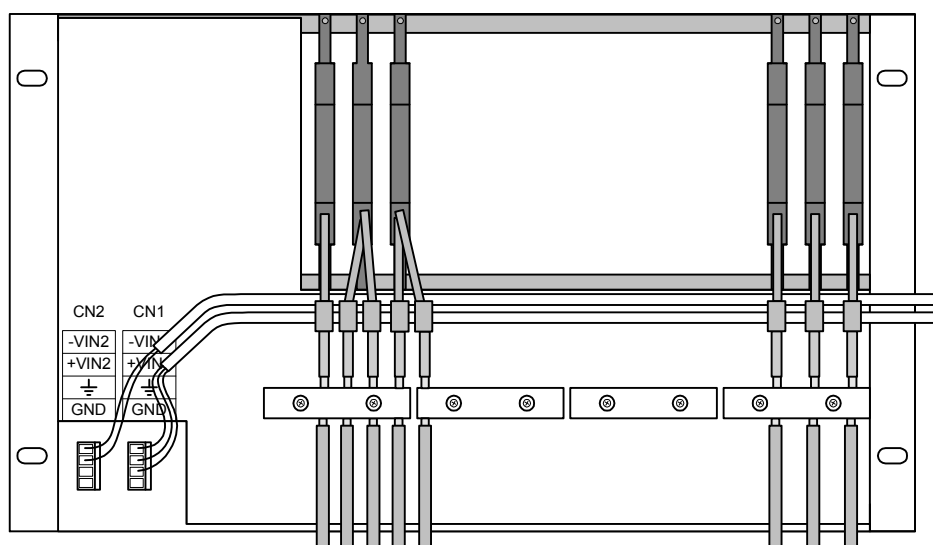


Fig. 3-7
Screened cables wiring details

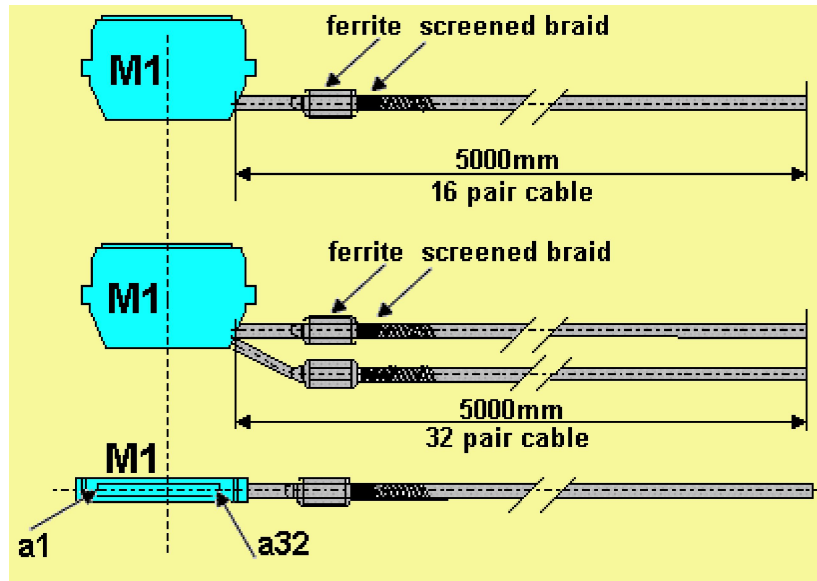


Fig. 3-8
Main distribution frame connection cable illustration

The following list describes the first 16 pin connections that the 16/32 pair cabled connector makes with the M1 DIN connector:

PAIR No.	WIRE A	PIN	WIRE B	PIN
1 white/blue	white	c1	blue	c2
2 white/orange	white	c3	orange	c4
3 white/green	white	c5	green	c6
4 white/brown	white	c7	brown	c8
5 white/grey	white	c9	grey	c10
6 red/blue	red	c11	blue	c12
7 red/orange	red	c13	orange	c14
8 red/green	red	c15	green	c16
9 red/brown	red	c17	brown	c18
10 red/grey	red	c19	grey	c20
11 black/blue	black	c21	blue	c22
12 black/orange	black	c23	orange	c24
13 black/green	black	c25	green	c26
14 black/brown	black	c27	brown	c28
15 black/grey	black	c29	grey	c30
16 yellow/blue	yellow	c31	blue	c32

The following list describes the remaining 16 pin connections that the 32 pair cabled connector makes with the M1 connector:

PAIR No.	WIRE A	PIN	WIRE B	PIN
1 white/blue	white	a1	blue	a2
2 white/orange	white	a3	orange	a4
3 white/green	white	a5	green	a6
4 white/brown	white	a7	brown	a8
5 white/grey	white	a9	grey	a10
6 red/blue	red	a11	blue	a12
7 red/orange	red	a13	orange	a14
8 red/green	red	a15	green	a16
9 red/brown	red	a17	brown	a18
10 red/grey	red	a19	grey	a20
11 black/blue	black	a21	blue	a22
12 black/orange	black	a23	orange	a24
13 black/green	black	a25	green	a26
14 black/brown	black	a27	brown	a28
15 black/grey	black	a29	grey	a30
16 yellow/blue	yellow	a31	blue	a32

4 Peripheral Boards

4.1 General

Some Interfaces are equipped with signalling LEDs that are positioned on the front edge of the card. The LEDs help to get information from the ECS-FD and makes trouble shooting easier.

4.2 CPU Board GT

4.2.1 LED Indications ECS-FD224

- The red led indicates an alarm state and has the following meaning:

OFF	regular functioning
ON PERMANENT	group out of service

- The green led indicates the GT state and has the following meaning:

OFF	GT out of service
FLASHING	GT in service

4.3 Service Unit US (ECS-FD224)

4.3.1 LED Indications (ECS-FD224)

- The green led indicates the modem state and has the following meaning:

OFF	modem not being used
ON PERMANENT	modem in use

- The upper red led indicates the state of the major alarm and has the following meaning:

OFF	no alarm present
ON PERMANENT	major alarm present

- The lower red led indicates the state of the minor alarm and has the following meaning:

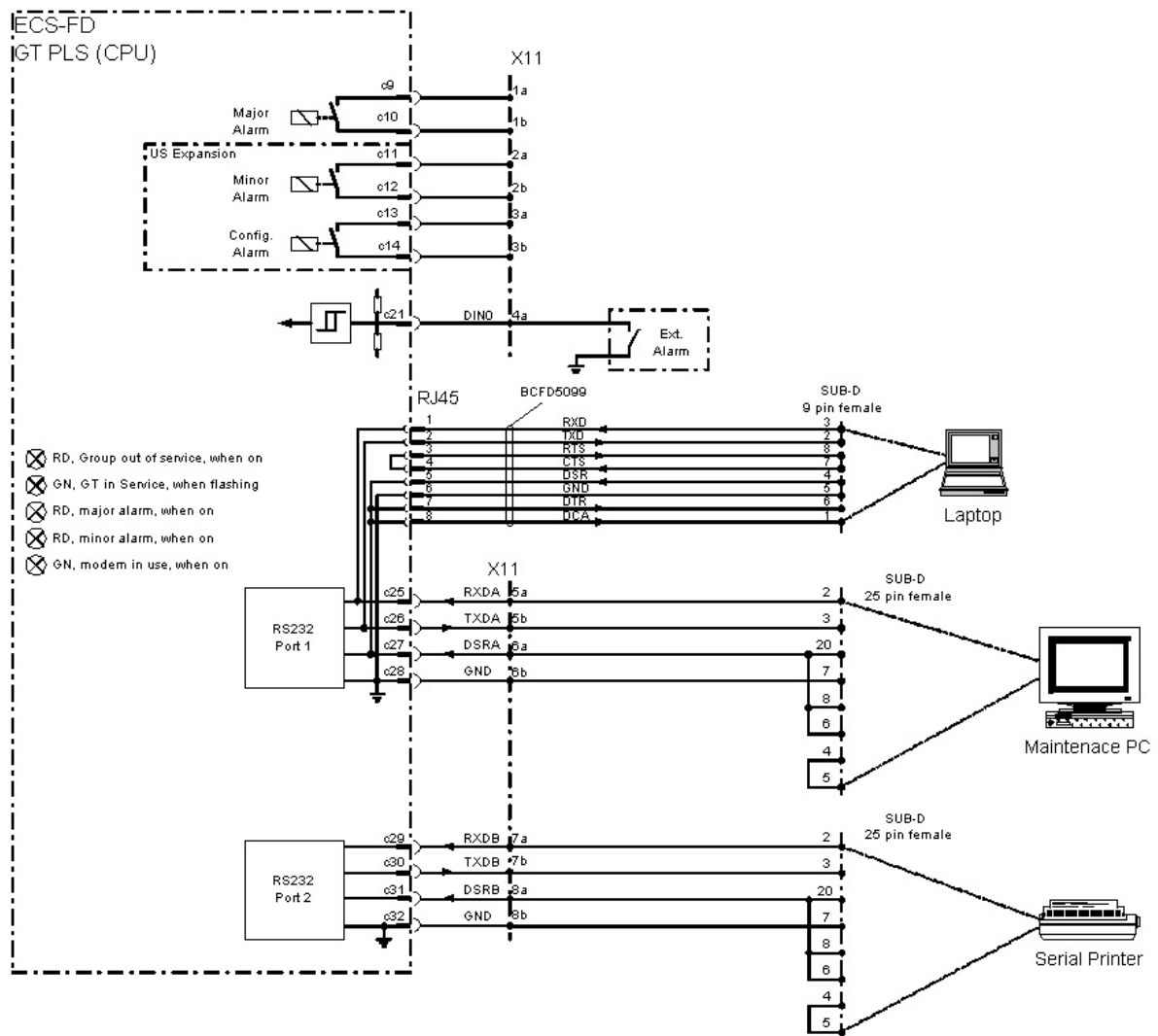
OFF	no alarm present
ON PERMANENT	minor alarm present

4.3.2 Connection of Printer / Host

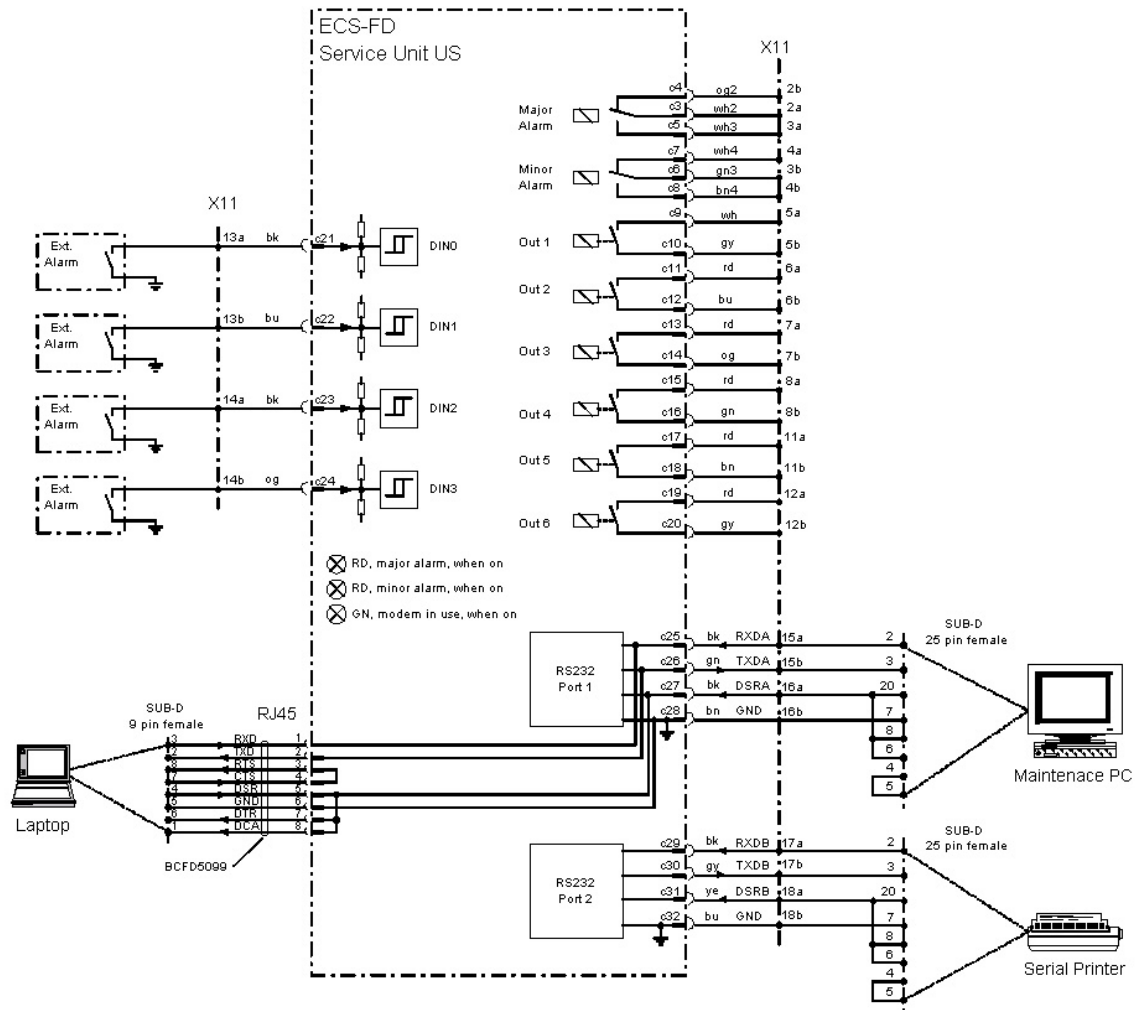
The serial interface port of the printer/ host can be connected to the ECS-FD via the serial port B on the US group dedicated for this function:

For a tidy interconnection it is recommended that a shielded telephone junction box is placed between the printer and the ECS-FD, as illustrated below:

4.3.3 Diagram GT PLS ECS-FD96

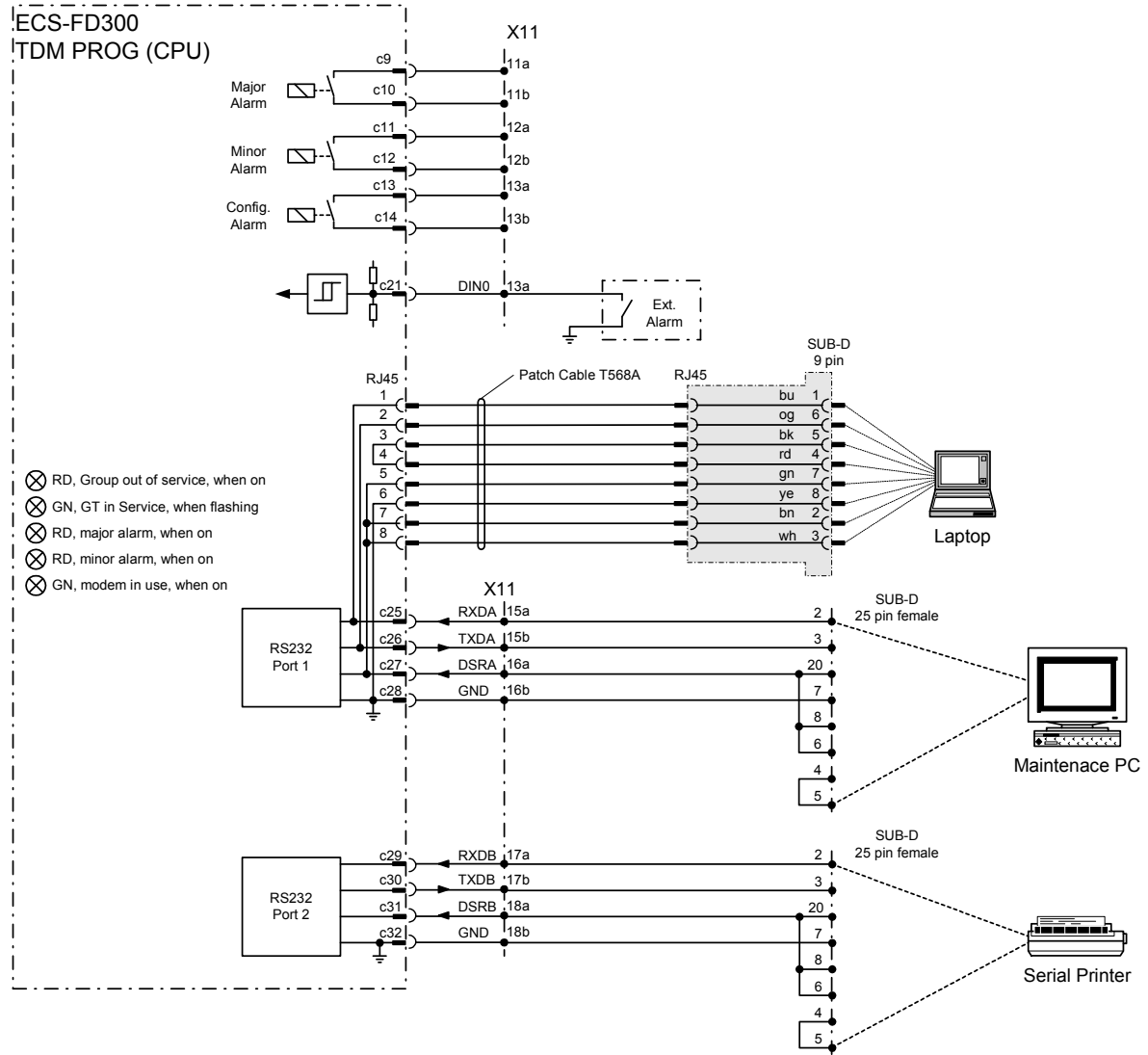


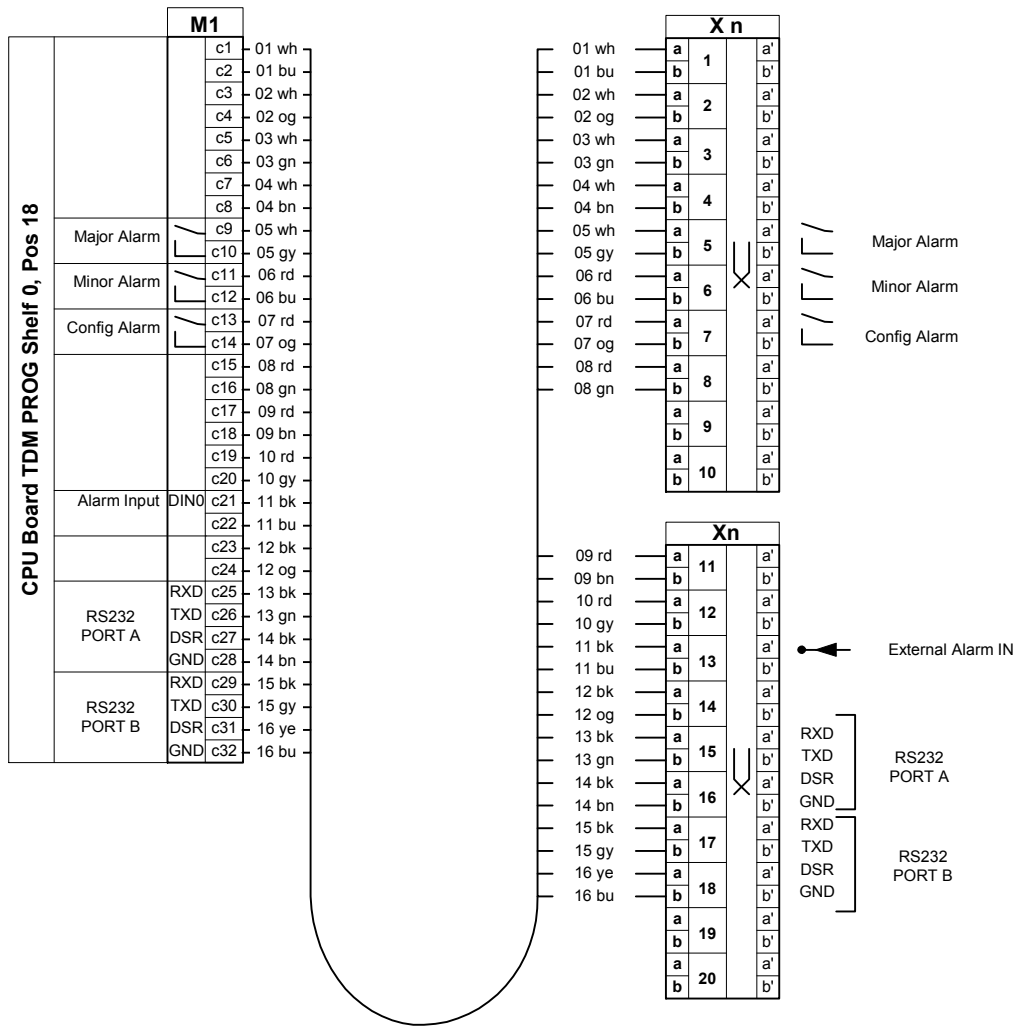
4.3.4 Diagram Service Unit US for ECS-FD224



4.3.5 PIN Layout Connector M1 Service Unit US

TABLE 4-1 US GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	Description	PINS	DESCRIPTION
a1		c1	
a2		c2	
a3		c3	MAJ.AL-COM
a4		c4	MAJ.AL-NC
a5		c5	MAJ.AL-NO
a6		c6	MIN.AL-COM
a7		c7	MIN.AL-NC
a8		c8	MIN.AL-NO
a9		c9	OUT 1
a10		c10	OUT 1
a11		c11	OUT 2
a12		c12	OUT 2
a13		c13	OUT 3
a14		c14	OUT 3
a15		c15	OUT 4
a16		c16	OUT 4
a17		c17	OUT 5
a18		c18	OUT 5
a19		c19	OUT 6
a20		c20	OUT 6
a21		c21	DIN 0
a22		c22	DIN 1
a23		c23	DIN 2
a24		c24	DIN 3
a25		c25	RXDA
a26		c26	TXDA
a27		c27	DSRA
a28		c28	GNDA
a29		c29	RXDB
a30		c30	TXDB
a31		c31	DSRB
a32		c32	GNDB





The connections for the printer are as following:

Printer (25 Pole Male)			Tel. Junc.Box (RJ45 8/8) terminal		Main Dist. Frame
signals	Pin				
PG	1	GNDPROT	8 (BL)		
RX	3	<	2 (BR)	<	M1-c30 (grey wire-15th pair)
TX	2	>	1 (WH)	>	M1-c29 (black wire-15th pair)
DTR	20	>	5 (RD)	>	M1-c31 (yellow wire-16th pair)
SG	7	GND	6 (BK)	GND	M1-c32 (blue wire-16th pair)
DSR	6	<	7 (OR)		
CTS	5	<	3 (YL)		
	Others		not connected (N.C.)		

As for the printer connection, remember that in the telephone junction box the 3rd terminal (CTS signal - yellow wire) and the 8th terminal (PG signal - blue wire) remain vacant.

On some types of printer it is necessary to drive the DSR input signal (pin 6 of the 25 pole male plug), which in the above described procedure remains free.

If this requirement should arise, proceed as follows:

- open the 25 pole male connector of the "Data transmission cord" (note that the 25 pole male connector is connected to a RJ45 connector within);
- insert the terminal 2 (brown wire) within the RJ45 connector into pin 6 of the 25 pole male connector;

The connections to the host are the following:

Host (25/9 Pole Female)			Tel. Junc.Box (RJ45 8/8)			Main Dist. Frame
Signal	Pin		Terminal			
CD	8/1	<	8 (BL)			
RX	3/2	<	2 (BR)		<	M1-c30 (grey wire-15th pair)
TX	2/3	>	1 (WH)		>	M1-c29 (black wire-15th pair)
DTR	20/4	>	5 (RD)		>	M1-c31 (yellow wire-16th pair)
SG	7/5	GND	6 (BK)		GND	M1-c32 (blue wire-16th pair)
DSR	6/6	<	7 (OR)			
RTS	4/7	>	4 (GR)			
CTS	5/8	<	3 (YL)			
	22/9 N.C.					

4.3.6 Administration Terminal (SAEMANAGER) Connection

The interfacing of the administration terminal (SAEMANAGER) is achieved by connecting the serial port of the US group, dedicated to the administration terminal, in one of the following two ways:

- by inserting into the socket (8 pin) situated on the front edge of the card, either the cable with jack plug connection for 9 pole or for 25 pole connectors

The signal association is as following:

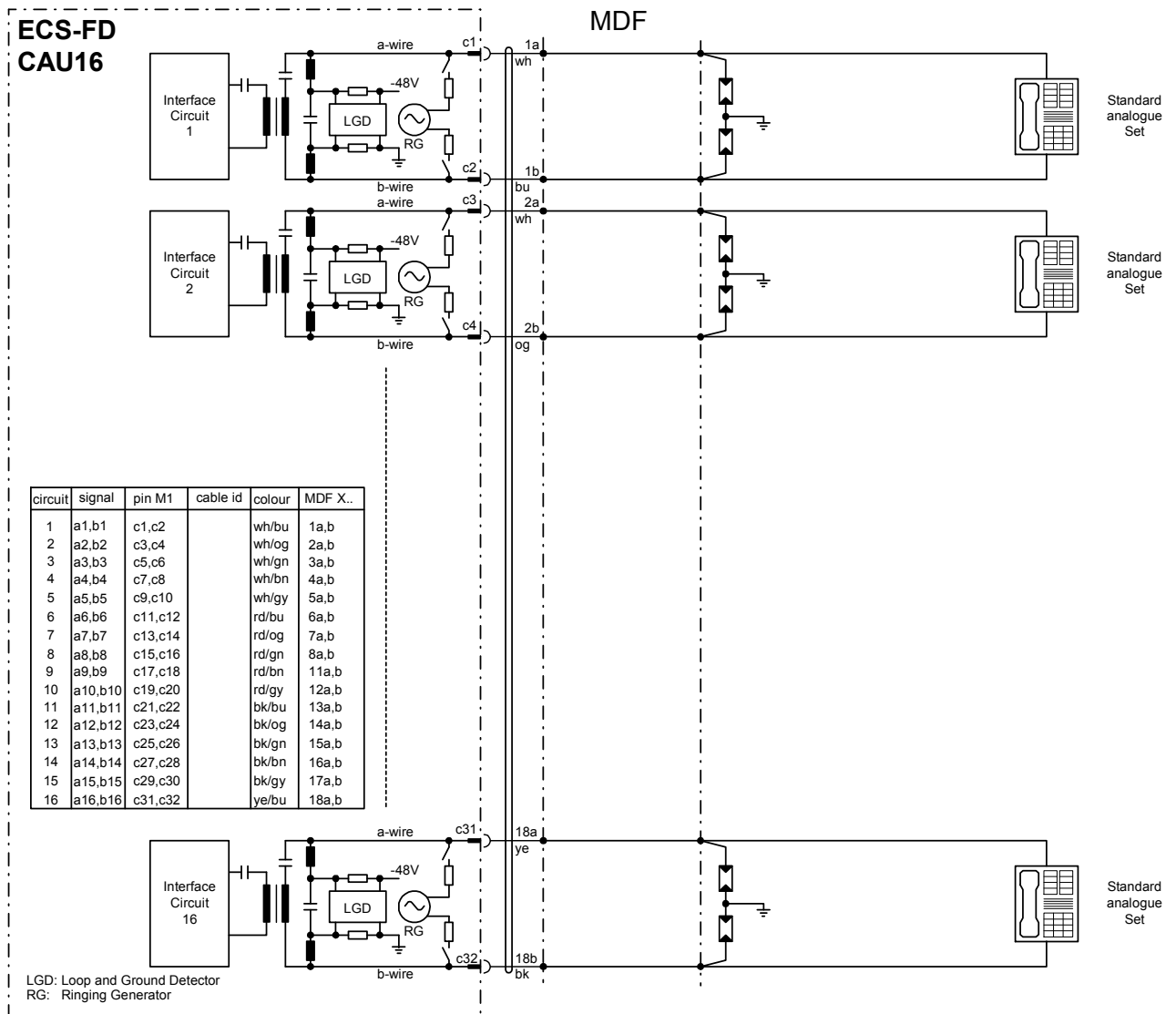
Administration terminal (25/9 Pole Female)			ECS-FD PBX (RJ45 8/8)	
Signals	pin		pin	signals
CD	8/1	<	8	CD
RX	3/2	<	2	TX
TX	2/3	>	1	RX
DTR	20/4	>	5	DSR
SG	7/5	GROUND	6	SG
DSR	6/6	<	7	DTR
RTS	4/7	>	4	CTS
CTS	5/8	<	3	RTS
	22/9 N.C.			

- connecting directly to the main distribution frame at the position where the US group is inserted

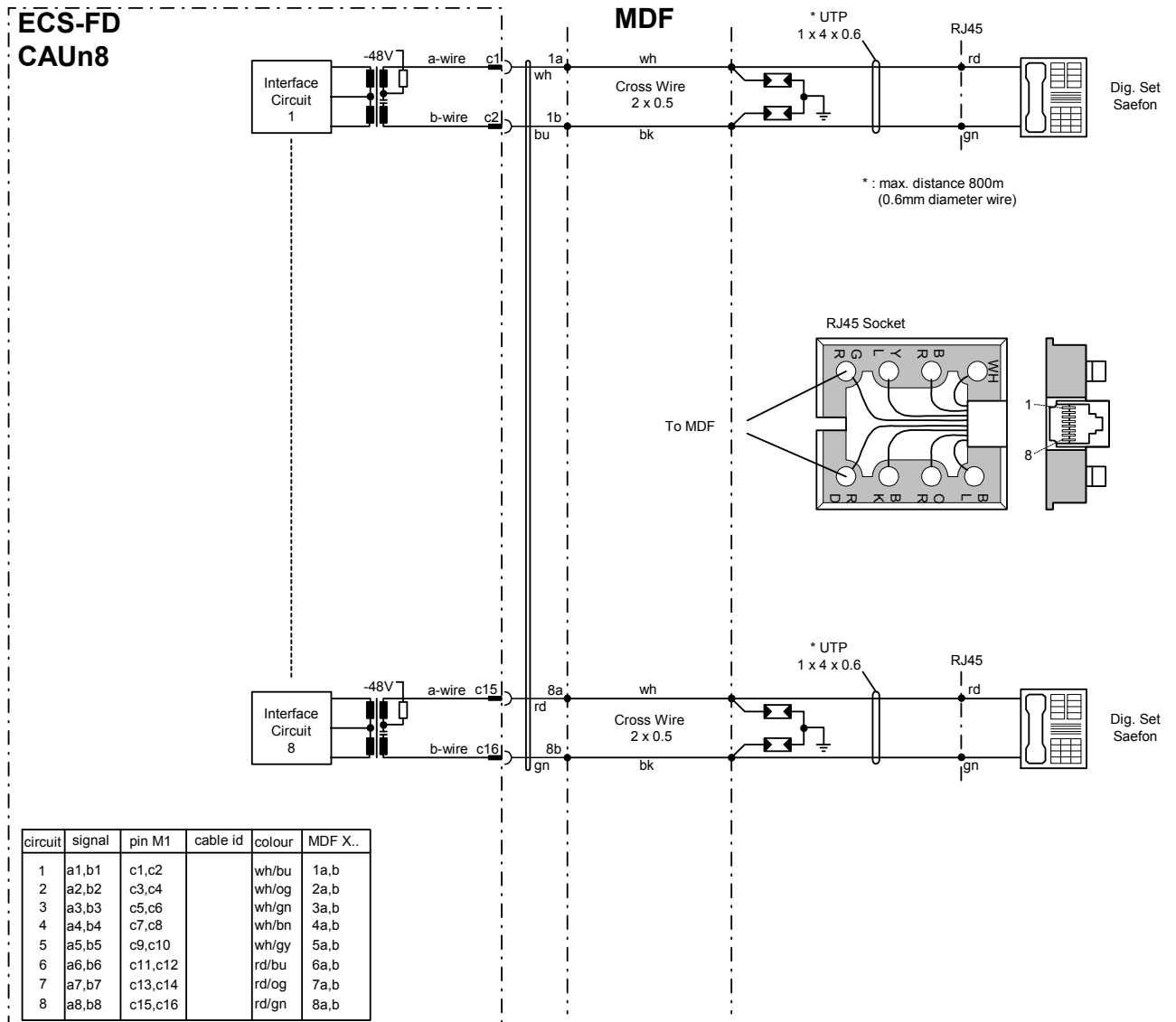
M1	- c25	data transmitted from the administration terminal (SAEMANAGER)
M1	- c26	data received by the administration terminal (SAEMANAGER)
M1	- c27	DSR signal, administration terminal ready to transmit
M1	- c28	data ground reference for administration terminal

4.4 Extension Interface 16CAU, 8CAU, 16CAUn, 8CAUn

4.4.1 Diagram CAU16



4.4.2 Diagram CAUn16



4.4.3 PIN Layout Connector M1 PSTN Interface 16CAU/16CAUn

PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TEL. A
a2		c2	TEL. A
a3		c3	TEL. B
a4		c4	TEL. B
a5		c5	TEL. C
a6		c6	TEL. C
a7		c7	TEL. D
a8		c8	TEL. D
a9		c9	TEL. E
a10		c10	TEL. E
a11		c11	TEL. F
a12		c12	TEL. F
a13		c13	TEL. G
a14		c14	TEL. G
a15		c15	TEL. H
a16		c16	TEL. H
a17		c17	TEL. I (*)
a18		c18	TEL. I (*)
a19		c19	TEL. J (*)
a20		c20	TEL. J (*)
a21		c21	TEL. K (*)
a22		c22	TEL. K (*)
a23		c23	TEL. L (*)
a24		c24	TEL. L (*)
a25		c25	TEL. M (*)
a26		c26	TEL. M (*)
a27		c27	TEL. N (*)
a28		c28	TEL. N (*)
a29		c29	TEL. O (*)
a30		c30	TEL. O (*)
a31		c31	TEL. P (*)
a32		c32	TEL. P (*)

The attendant consoles can be connected to the first four terminations only.

(*) The 8CAU and 8CAUNn groups use only terminations A,B,C,D,E,F,G and H.

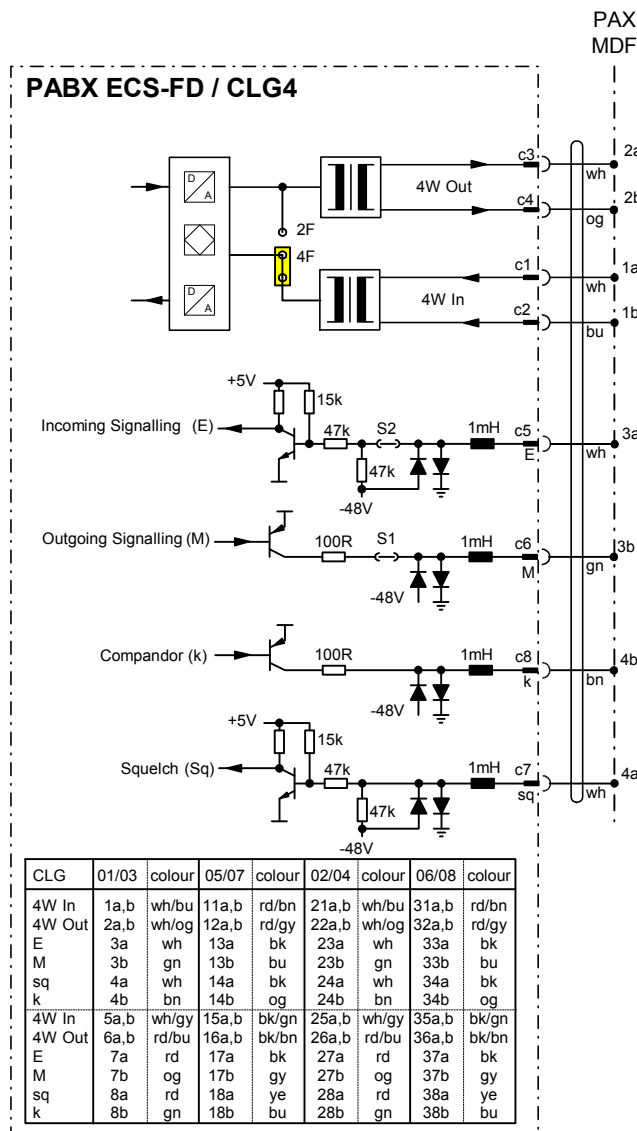
4.5 Analogue 4W Tie-Line Interface 4/8 CLG

4.5.1 LED Indications 4W CLG

It is fitted with 4 green LEDs each associated with a tie line. A LED indicates the state of the line and has the following meaning:

OFF	line not seized
SLOW FLASHING	line seized on output
FAST FLASHING	line seized on input
PERMANENT ON	line out of service

4.5.2 Diagram 4W E&M CLG



* Circuit 02, 04, 06, 08 only for board CLG8

The following defines the link positions on the CLG group to configure it as a 2 wire or 4 wire E&M tie-line.

Zp 1, 2, 4 and 5 closed in position "4F" 4 wires mode

Zp 1, 2, 4 and 5 closed in position "2F" 2 wires mode, bidirectional voice on 2 wires

The links are set to the "4F" positions as default.

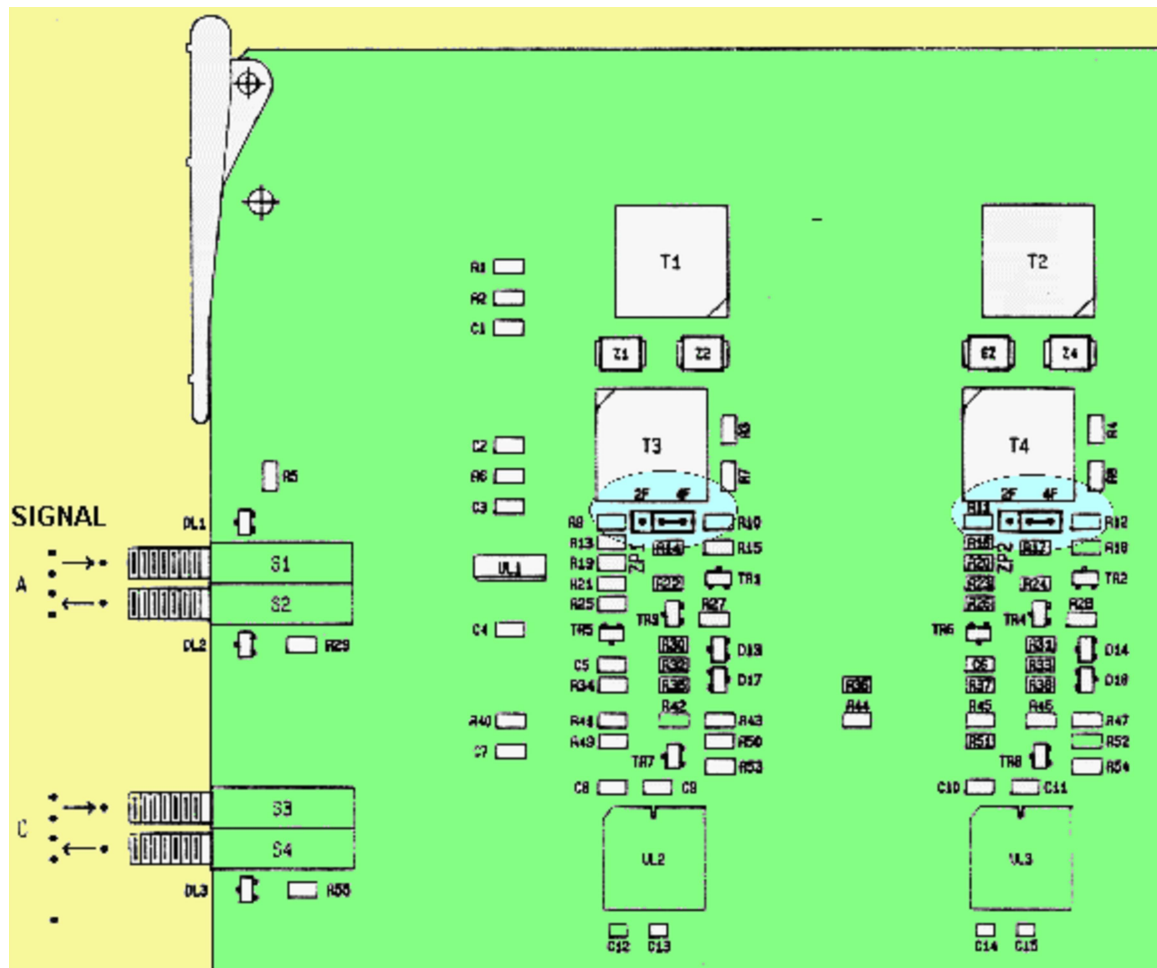


Fig. 4-1
CLG (E&M): link details

4.5.3 PIN Layout Connector M1 Interface 8CLG 2Wire

TABLE 4-3 8 CLG 2 WIRE GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	
a2		c2	
a3	CLG B txrx voice (*)	c3	CLG A txrx voice
a4	CLG B txrx voice (*)	c4	CLG A txrx voice
a5	CLG B rec (*)	c5	CLG A rec.
a6	CLG B trans. (*)	c6	CLG A trans.
a7	CLG B al. vect. (*)	c7	CLG A al.vect.
a8	CLG B excl.com (*)	c8	CLG A excl.com
a9		c9	
a10		c10	
a11	CLG D txrx voice (*)	c11	CLG C txrx voice
a12	CLG D txrx voice (*)	c12	CLG C txrx voice
a13	CLG D REX. (*)	c13	CLG C rec.
a14	CLG D trans. (*)	c14	CLG C trans.
a15	CLG D al.vect. (*)	c15	CLG C al.vect.
a16	CLG D excl.com. (*)	c16	CLG C excl.com
a17		c17	
a18		c18	
a19	CLG F txrx voice (*)	c19	CLG E txrx voice
a20	CLG F txrx voice (*)	c20	CLG E txrx voice
a21	CLG F REX. (*)	c21	CLG E rec.
a22	CLG F trans. (*)	c22	CLG E trans.
a23	CLG F al.vect. (*)	c23	CLG E al.vect.
a24	CLG F excl.com. (*)	c24	CLG E excl.com
a25		c25	
a26		c26	
a27	CLG H txrx voice (*)	c27	CLG G txrx voice
a28	CLG H txrx voice (*)	c28	CLG G txrx voice
a29	CLG H REX. (*)	c29	CLG G rec.
a30	CLG H trans. (*)	c30	CLG G trans.
a31	CLG H al.vect. (*)	c31	CLG G al.vect.
a32	CLG H excl.com. (*)	c32	CLG G excl.com

The wire links Zp 4, 5, 6, 7, 8, 9, 10 and 11 must be placed in position "2F" (by default they are placed in position "4F").

(*) The 4 CLG 2 wire group uses only terminations A, C, E and G

4.5.4 PIN Layout Connector M1 Interface 8CLG 4Wire

TABLE 4-4 8 CLG 4 WIRE GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1	CLG B rx voice (*)	c1	CLG A rx voice
a2	CLG B rx voice (*)	c2	CLG A rx voice
a3	CLG B tx voice (*)	c3	CLG A tx voice
a4	CLG B tx voice (*)	c4	CLG A tx voice
a5	CLG B rec. (*)	c5	CLG A rec.
a6	CLG B trans: (*)	c6	CLG A trans.
a7	CLG B al. vect. (*)	c7	CLG A al. vect.
a8	CLG B excl.com. (*)	c8	CLG A excl.com.
a9	CLG D rx voice (*)	c9	CLG C rx voice
a10	CLG D rx voice (*)	c10	CLG C rx voice
a11	CLG D tx voice (*)	c11	CLG C tx voice
a12	CLG D tx voice (*)	c12	CLG C tx voice
a13	CLG D rec. (*)	c13	CLG C rec.
a14	CLG D trans: (*)	c14	CLG C trans.
a15	CLG D al. vect. (*)	c15	CLG C al. vect.
a16	CLG D excl.com. (*)	c16	CLG C excl.com.
a17	CLG F rx voice (*)	c17	CLG E rx voice
a18	CLG F rx voice (*)	c18	CLG E rx voice
a19	CLG F tx voice (*)	c19	CLG E tx voice
a20	CLG F tx voice (*)	c20	CLG E tx voice
a21	CLG F rec. (*)	c21	CLG E rec.
a22	CLG F trans: (*)	c22	CLG E trans.
a23	CLG F al. vect. (*)	c23	CLG E al. vect.
a24	CLG F excl.com. (*)	c24	CLG E excl.com.
a25	CLG H rx voice (*)	c25	CLG G rx voice
a26	CLG H rx voice (*)	c26	CLG G rx voice
a27	CLG H tx voice (*)	c27	CLG G tx voice
a28	CLG H tx voice (*)	c28	CLG G tx voice
a29	CLG H rec. (*)	c29	CLG G rec.
a30	CLG H trans: (*)	c30	CLG G trans.
a31	CLG H al. vect. (*)	c31	CLG G al. vect.
a32	CLG H excl.com. (*)	c32	CLG G excl.com.

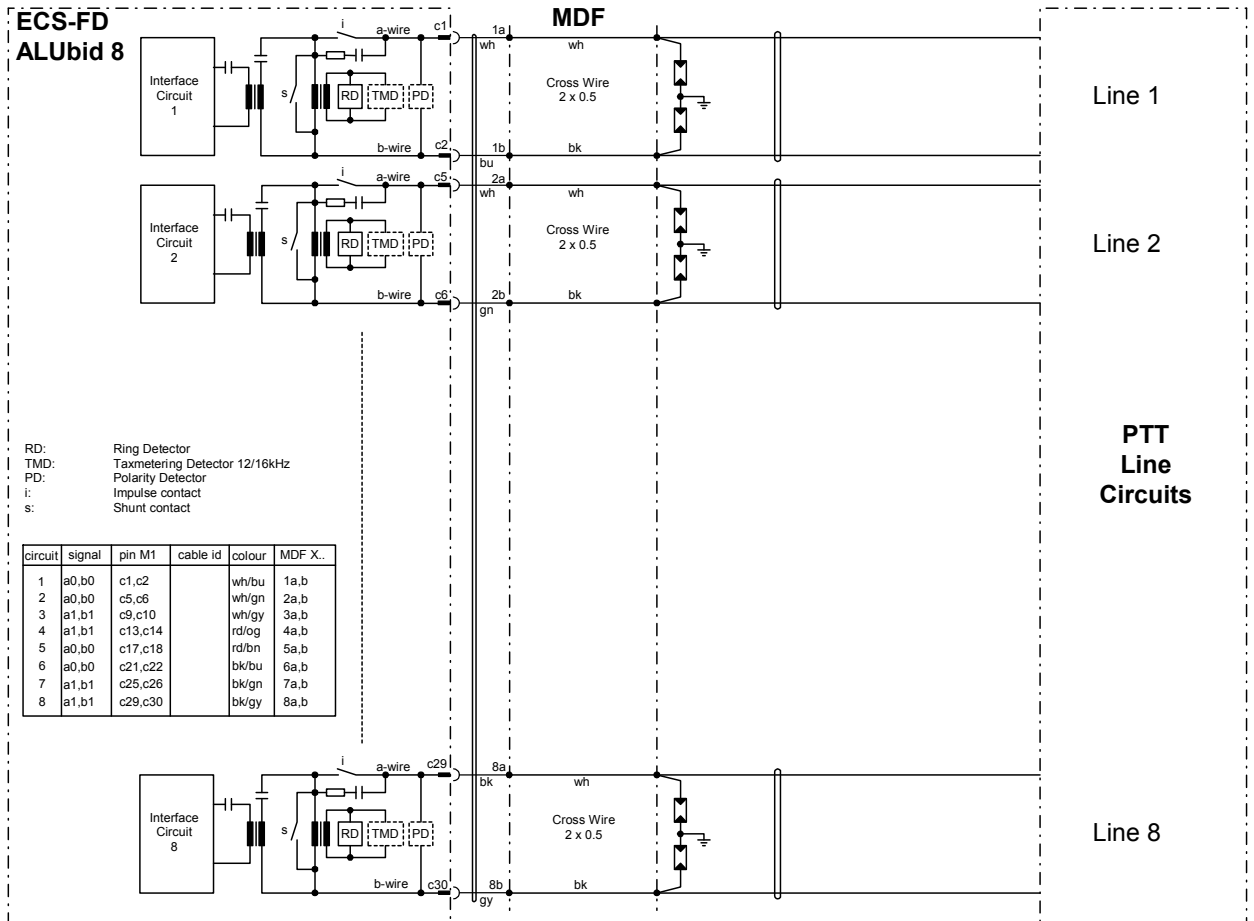
The wire links Zp 4, 5, 6, 7, 8, 9, 10 and 11 must be placed in position "4F" (the default position).

(*) The 4 CLG 4 wire group uses only terminations A, C, E and G

4.6 Analogue Trunk Interface 8ALUbid, 4ALUbidEM

This boards are used to connect the ECS-Fd to the PSTN network.

4.6.1 Diagram ALUbid8



4.6.2 PIN Layout Connector M1 PSTN Interface 8ALUbid

PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TRK A (-) *
a2		c2	TRK A (+) *
a3		c3	
a4		c4	
a5		c5	TRK B (-) *
a6		c6	TRK B (+) *
a7		c7	
a8		c8	
a9		c9	TRK C (-) *
a10		c10	TRK C (+) *
a11		c11	
a12		c12	
a13		c13	TRK D (-) *
a14		c14	TRK D (+) *
a15		c15	
a16		c16	
a17		c17	TRK E (-) *
a18		c18	TRK E (+) *
a19		c19	
a20		c20	
a21		c21	TRK F (-) *
a22		c22	TRK F (+) *
a23		c23	
a24		c24	
a25		c25	TRK G (-) *
a26		c26	TRK G (+) *
a27		c27	
a28		c28	
a29		c29	TRK H (-) *
a30		c30	TRK H (+) *
a31		c31	
a32		c32	

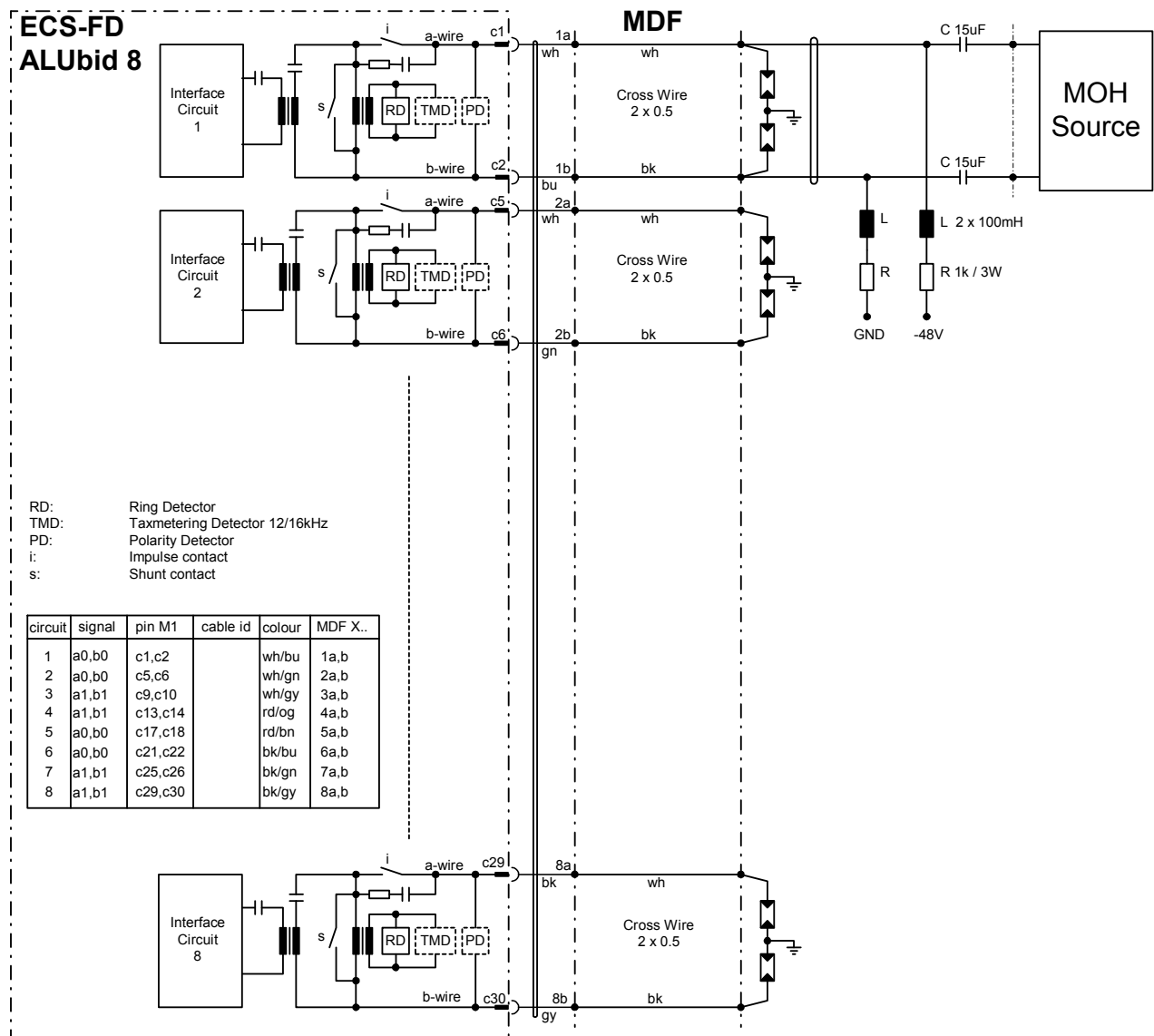
The 4 ALUbid group uses only terminations A, B, C D.

(*) In the case of Direct Inward dialling trunk connections (ALUsp), the voltage polarity from the public exchange must be connected as indicated in the above table.

4.6.3 Connection of the external phonic device

The connection of the external phonic device for the "music on hold" service and similar functions is achieved by utilizing an appropriately customized analogue trunk or tie-line termination as an input port to the ECS-FD exchange.

The output connection from the external phonic device can be connected either directly to the tie-line interface or indirectly, via the hold circuit, to the trunk interface as indicated in the following figure, (particular attention must be paid to the type of inductor connected: the B82724 - B2501 - N1 from Siemens or equivalent is recommended).

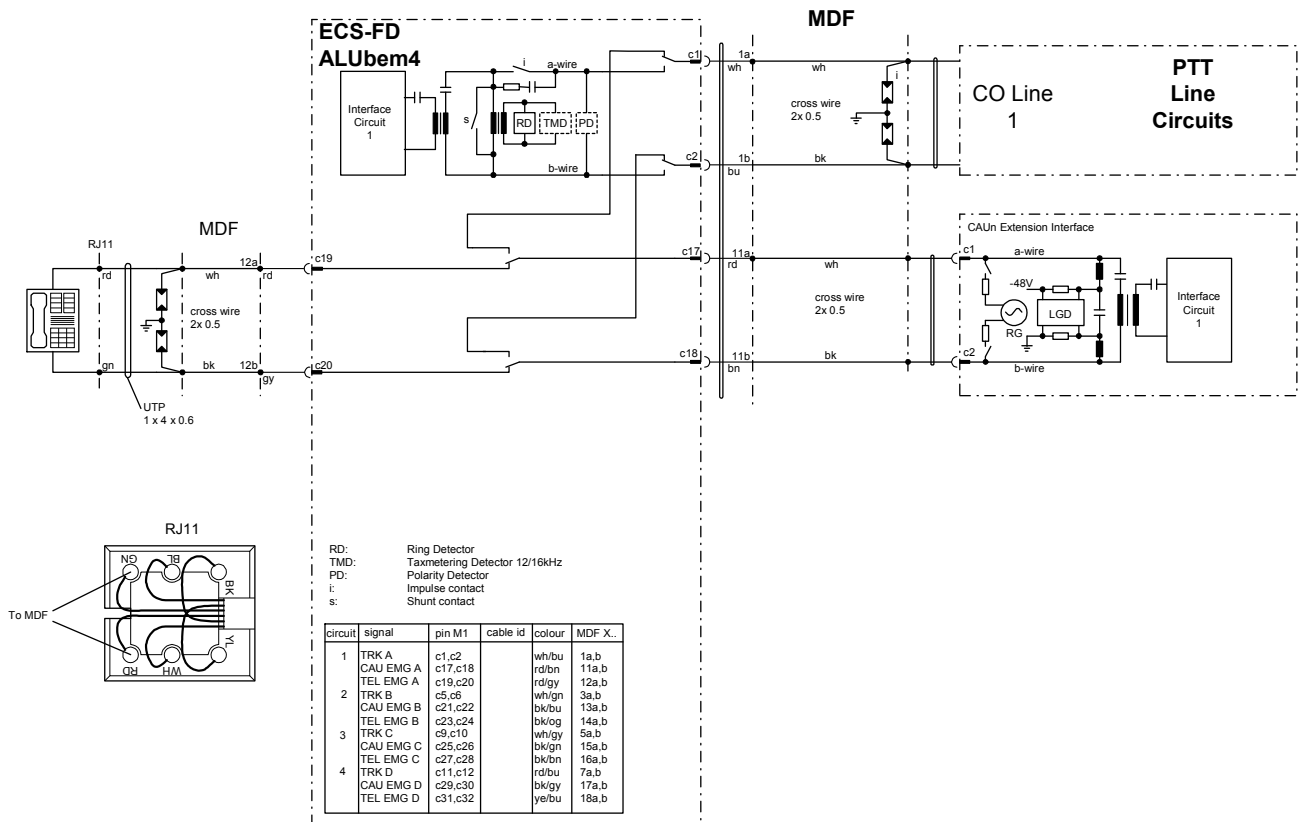


4.6.4 Call metering circuit installation

The 4 circuit 12/ 16 KHz call metering daughter card (TAX12) cod. 640934017 can be inserted into connectors M3 or M5 on the 8ALUbid group or in connector M3 on the 4ALUbid and 4ALUbidEM groups.

To monitor the call metering pulses on all 8 trunk lines of the 8ALUbid group, it is possible to insert two call metering cards simultaneously in the same group.

4.6.5 Diagram ALUbem4



4.6.6 PIN Layout Connector M1 PSTN Interface 4ALUbEM

TABLE 4-6 4ALUbEM GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TRK A
a2		c2	TRK A
a3		c3	
a4		c4	
a5		c5	TRK B
a6		c6	TRK B
a7		c7	
a8		c8	
a9		c9	TRK C
a10		c10	TRK C
a11		c11	
a12		c12	
a13		c13	TRK D
a14		c14	TRK D
a15		c15	
a16		c16	
a17		c17	CAU EMG. A
a18		c18	CAU EMG. A
a19		c19	TEL EMG. A
a20		c20	TEL EMG. A
a21		c21	CAU EMG. B
a22		c22	CAU EMG. B
a23		c23	TEL EMG. B
a24		c24	TEL EMG. B
a25		c25	CAU EMG. C
a26		c26	CAU EMG. C
a27		c27	TEL EMG. C
a28		c28	TEL EMG. C
a29		c29	CAU EMG. D
a30		c30	CAU EMG. D
a31		c31	TEL EMG. D
a32		c32	TEL EMG. D

4.7 Digital Trunk Interface ALUna, ALUnc, 4ALUnb, 2ALUnb

4.7.1 LED Indications ALUna with Channel Associated Signalling

- The lower green led indicates whether the group has the "MASTER" or "SLAVE" state and has the following meaning:

OFF	SLAVE
ON PERMANENT	MASTER

- The upper red led indicates the group alarm state and has the following meaning:

OFF	normal group operation
ON PERMANENT	group out of service

- The central red led in the permanent ON state indicates the presence of non-serious alarms on the line, whereas the simultaneous permanent ON state of the upper and lower red leds indicates the presence of serious alarms on the line.

Possible serious alarms are:

MIR	lack of received impulses on the line
AIS	alarm on local line termination (LT)
FAT	frame synchronization loss received
EPAT	bit error rate above 10^{-3} on the received frame synchronization word

Possible alarms which are not serious are:

ATLRX	frame synchronization loss received from the remote line termination
FAMT	multi-frame synchronization loss received
FAMTRX	multi-frame synchronization loss from remote line termination.

For any alarm the communication is maintained for 4 minutes, after which the communication is released if the alarm persists. In the presence of an alarm, all attempts to seize the line are refused. The minor alarm symbol is displayed on the attendant console and the relative "Minor alarm" relay on the US group is energized.

4.7.2 LED Indications QSIG BRA Interface ALUnb

- The red led indicates the group alarm state and has the following meaning:

OFF	normal group operation
ON PERMANENT	group out of service

- The lower green led indicates whether the group has the "MASTER" or "SLAVE" state and has the following meaning:

OFF	SLAVE
ON PERMANENT	MASTER

4.7.3 LED Indications Interface ALUnc

- The lower green led indicates whether the group has the "MASTER" or "SLAVE" state and has the following meaning:

OFF	SLAVE
ON PERMANENT	MASTER

- The upper red led indicates the group alarm state and has the following meaning:

OFF	normal group operation
ON PERMANENT	group out of service

- The central red led ON and the lower red led OFF indicate the presence of a remote alarm:

RAI	remote termination alarm indication
CRC	RAI alarm and CRC error warning

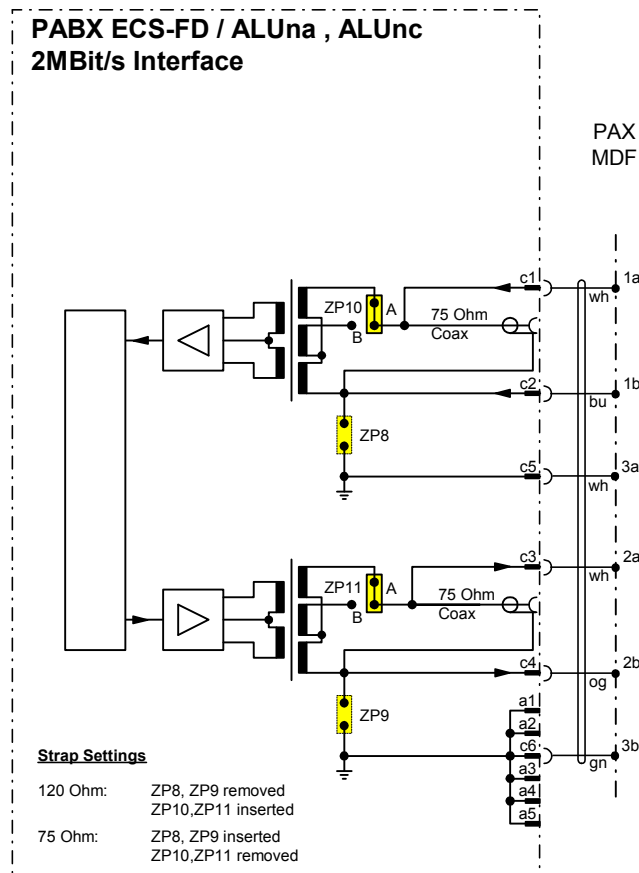
- The simultaneous permanent ON state of the upper and lower red leds indicate the presence of serious alarms on the line.

Possible serious alarms are:

LOS	lack of received impulses on the line
AIS	received frame synchronization loss
BER	error rate above 10^{-3} on the received frame synchronization word.

For any alarm the communication is maintained for 90 seconds, after which the communication is released if the alarm persists. In the presence of an alarm, all attempts to seize the line are refused. The minor alarm symbol is displayed on the attendant console and the relative "Minor alarm" relay on the US group is energized.

4.7.4 Diagram ALUna, ALUnc



The connection of the ALUna group (2MB with channel associated signalling) and the ALUnc group (2MB EURO-ISDN Primary Rate Access) are identical.

For balanced twisted pair cable the characteristics are as follows:

PVC coated twisted pair

impedance characteristic 120 Ω +/- 20% between 200KHz & 1 MHz
120 Ω +/- 10% at 1 MHz

For co-axial cable the characteristics are as follows:

Co-axial cable (75 Ω) for connection to the front edge of the group via a 75 Ω "L" type co-axial connector.

4.7.5 PIN Layout Connector M1 Interface ALUna, ALUnc

TABLE 4-7 ALUna & ALUnc (2Mbit/s) GROUPS M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1	GNDP	c1	2MBIT IN
a2	GNDP	c2	2MBIT IN
a3	GNDP	c3	2MBIT OUT
a4	GNDP	c4	2MBIT OUT
a5	GNDP	c5	GNDP
a6	GNDP	c6	GNDP

The pins not indicated are not used.

Link settings for the ALUna and ALUnc board:

Zp 8 & 9 open
 Zp 10 & 11 in position "A" when using twisted pair with 120 Ω line impedance

Zp 8 & 9 closed
 Zp 10 & 11 in position "B" when using co-axial cable with 75 Ω line impedance

By default the line impedance is 120 Ω . When using co-axial cable connection is made on the front edge of the card.

The maximum length of the co-axial cable (for both configurations) between ECS-FD exchange and LT, must not exceed a maximum attenuation of 6dB at 1MHz.

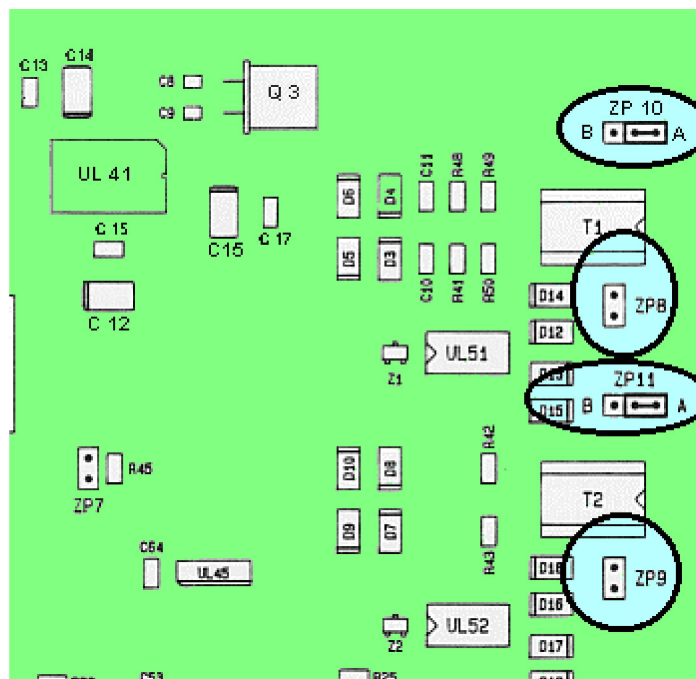


Fig. 4-2
 ALUna group: link details

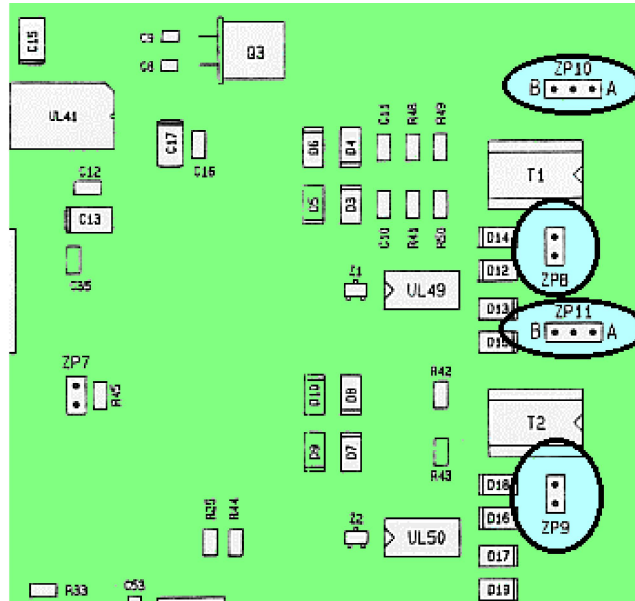


Fig. 4-3
ALUnc group: link details

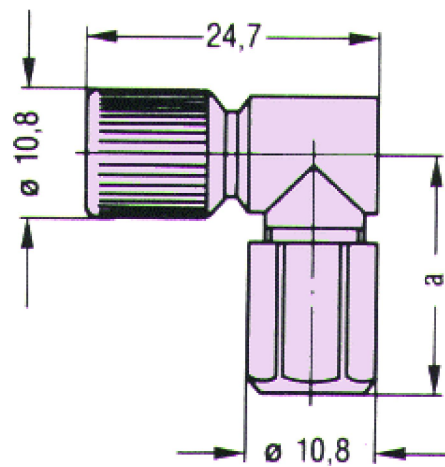


Fig. 4-4
75Ω "L" type co-axial connector

Assembly instructions MV 41

- 1 Body
- 2 Insulator
- 3 Inner conductor
- 4 Insulator
- 5 Ferrule
- 6 Clamping Plate
- 7 Ring nut
- 8 Screw plug
- 9 Ferrule

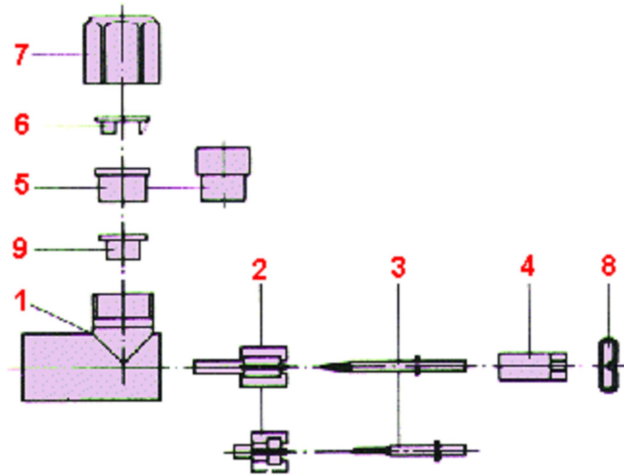


Fig. 4-5
75Ω "L" type co-axial connector assembly diagram

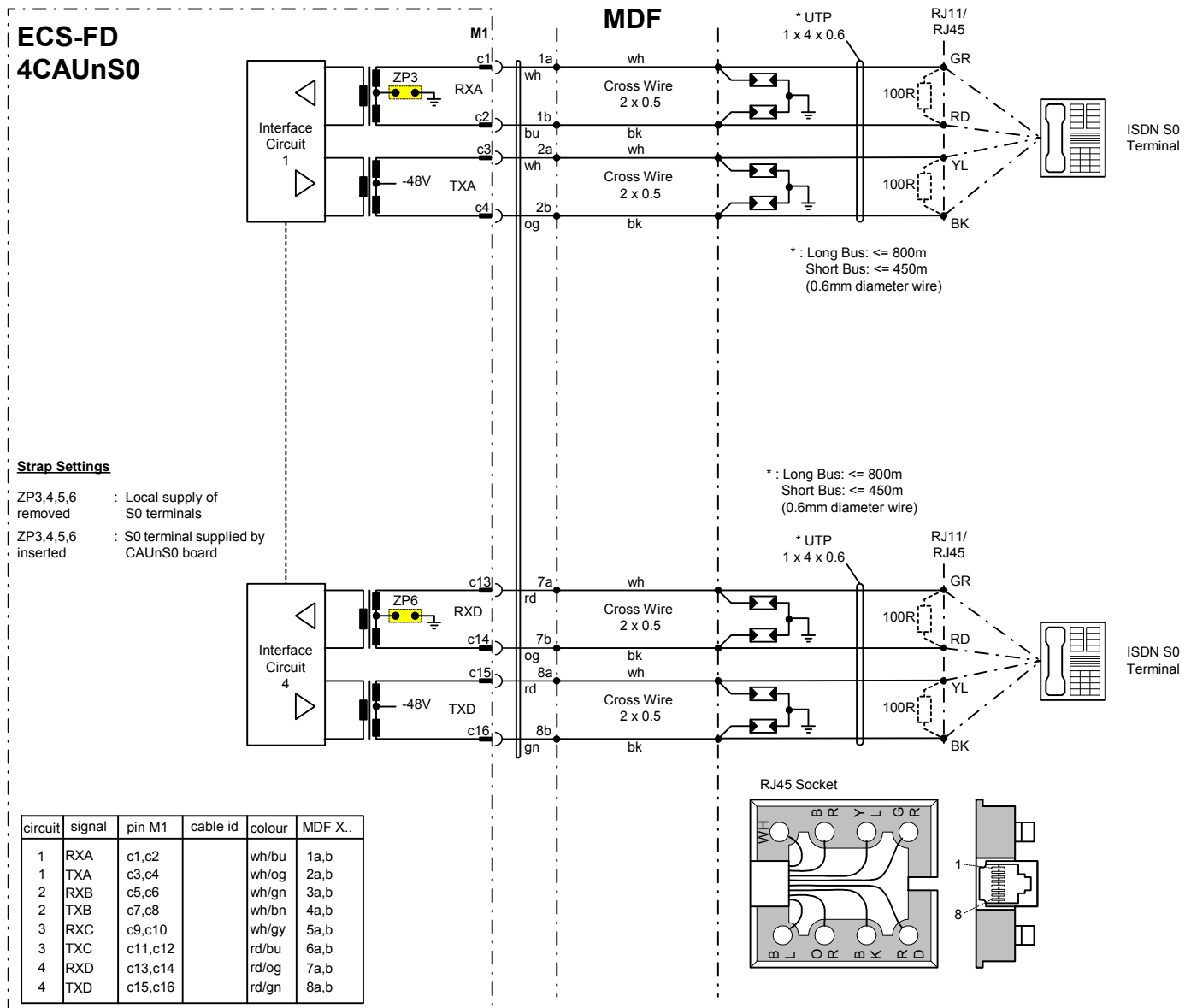
4.7.6 PIN Layout Connector M1 Interface 4ALUnb

TABLE 4-8 4ALUnb GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TRK.RXA
a2		c2	TRK.RXA
a3		c3	TRK.TXA
a4		c4	TRK.TXA
a5		c5	TRK RXB (*)
a6		c6	TRK RXB (*)
a7		c7	TRK TXB (*)
a8		c8	TRK TXB (*)
a9		c9	TRK RXC
a10		c10	TRK RXC
a11		c11	TRK TXC
a12		c12	TRK TXC
a13		c13	TRK RXD (*)
a14		c14	TRK RXD (*)
a15		c15	TRK TXD (*)
a16		c16	TRK TXD (*)
a17		c17	CAU EMG RXA
a18		c18	CAU EMG RXA
a19		c19	CAU EMG TXA
a20		c20	CAU EMG TXA
a21		c21	CAU EMG RXB
a22		c22	CAU EMG RXB
a23		c23	CAU EMG TXB
a24		c24	CAU EMG TXB
a25		c25	TEL. EMG TXA
a26		c26	TEL. EMG TXA
a27		c27	TEL. EMG RXA
a28		c28	TEL. EMG RXA
a29		c29	TEL. EMG TXB
a30		c30	TEL. EMG TXB
a31		c31	TEL. EMG RXB
a32		c32	TEL. EMG RXB

(*) The 2 ALUnb group uses only terminations A and C.

4.8 EURO-ISDN S0 Interface Board 4CAUnS0

4.8.1 Diagram 4CAUnS0



4.8.2 PIN Layout Connector M1 Interface 4CAUnS0

TABLE 4-9 4CAUnS0 GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TERM. RXA
a2		c2	TERM. RXA
a3		c3	TERM. TXA
a4		c4	TERM. TXA
a5		c5	TERM. RXB
a6		c6	TERM. RXB
a7		c7	TERM. TXB
a8		c8	TERM. TXB
a9		c9	TERM. RXC
a10		c10	TERM. RXC
a11		c11	TERM. TXB
a12		c12	TERM. TXB
a13		c13	TERM. RXD
a14		c14	TERM. RXD
a15		c15	TERM. TXD
a16		c16	TERM. TXD
a17		c17	
a18		c18	
a19		c19	
a20		c20	
a21		c21	
a22		c22	
a23		c23	
a24		c24	
a25		c25	
a26		c26	
a27		c27	
a28		c28	
a29		c29	
a30		c30	
a31		c31	
a32		c32	

4.8.3 Installation Remarks CAUnS0

The telephone line coming from the ECS-FD can be connected to one or more (maximum 8) data terminals with the standard EURO-ISDN S0 interface.

The connections can be according to two topologies:

- point to point
- point to multi-point

and are relative to the following bus lengths:

- long bus
- short bus

After having configured the ECS-FD and the S0 terminal (TE), it is necessary to connect the TE to the ECS-FD.

For this connection, one of the configurations in the following figure is respected.

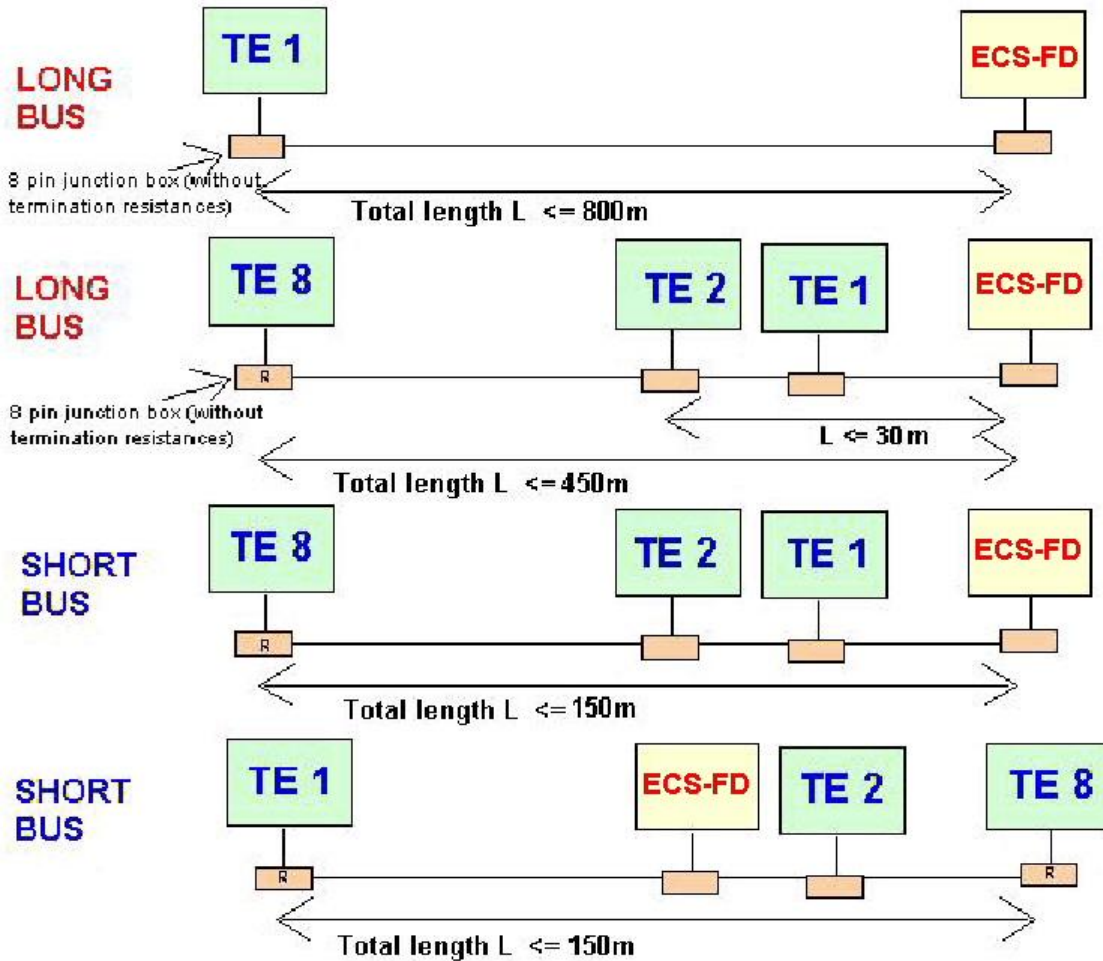


Fig. 4-5
Configuration of the 4CAUnSO Interface

The termination resistances have a value of 100 Ohm , one being inserted between the "RD" terminal and the "GR" terminal and the other between the "BK" terminal and the "YL" of the 8 terminal telephone junction box.

The previously defined lengths are maximum values.

TABLE 4-10 LINE CONFIGURATION PARAMETERS			
Total attenuation	R (96 KHz)	C (1 KHz)	Zo (96 KHz)
6 dB	160 Ω /Km	120 nF/Km	75 Ω

4.9 Emergency Interfaces 8EM , 4EM

4.9.1 PIN Layout Connector M1 Interface 8EM/4EM

PINS	DESCRIPTION	PINS	DESCRIPTION
a1	ALU B (*)	c1	ALU A
a2	ALU B (*)	c2	ALU A
a3	CAU EMG B (*)	c3	CAU EMG A
a4	CAU EMG B (*)	c4	CAU EMG A
a5	TRK B (*)	c5	TRK A
a6	TRK B (*)	c6	TRK A
a7	TEL EMG B (*)	c7	TEL EMG A
a8	TEL EMG B (*)	c8	TEL EMG A
a9	ALU D (*)	c9	ALU C
a10	ALU D (*)	c10	ALU C
a11	CAU EMG D (*)	c11	CAU EMG C
a12	CAU EMG D (*)	c12	CAU EMG C
a13	TRK D (*)	c13	TRK C
a14	TRK D (*)	c14	TRK C
a15	TEL EMG D (*)	c15	TEL EMG C
a16	TEL EMG D (*)	c16	TEL EMG C
a17	ALU F (*)	c17	ALU E
a18	ALU F (*)	c18	ALU E
a19	CAU EMG F (*)	c19	CAU EMG E
a20	CAU EMG F (*)	c20	CAU EMG E
a21	TRK F (*)	c21	TRK E
a22	TRK F (*)	c22	TRK E
a23	TEL EMG F (*)	c23	TEL EMG E
a24	TEL EMG F (*)	c24	TEL EMG E
a25	ALU H (*)	c25	ALU G
a26	ALU H (*)	c26	ALU G
a27	CAU EMG H (*)	c27	CAU EMG G
a28	CAU EMG H (*)	c28	CAU EMG G
a29	TRK H (*)	c29	TRK G
a30	TRK H (*)	c30	TRK G
a31	TEL EMG H (*)	c31	TEL EMG G
a32	TEL EMG H (*)	c32	TEL EMG G

(*) The 4EM group uses only terminations A, C, E and G.

4.10 Voice Announcement and Messages Group AV

4.10.1 PIN Layout Connector M1 Interface AV

PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	SIGNAL IN
a2		c2	SIGNAL IN
a3		c3	
a4		c4	
a5		c5	
a6		c6	

4.11 Analogue Tie-Line Interface with QSIG 4/8CGQSIGA

4.11.1 LED Indications CGQSIGA

It is fitted with 2 red leds for the voice channels and 4 green leds for the data channels.

- The 1st red led for voice indicates the following:

ON PERMANENT group out of service

- The 2nd red led for voice indicates the following:

ON PERMANENT Layer 2 disactivated

- The 1st green led for data indicates the following:

ON TX

- The 2nd green led for data indicates the following:

ON RX

- The 3rd green led for data indicates the following:

ON DCD

- The 4th green led for data indicates the following:

ON DTR

4.11.2 PIN Layout Connector M1 Interface 8CGQSIGA/4CGQSIGA 4W

PINS	DESCRIPTION	PINS	DESCRIPTION
a1	CLG E rx voice (*)	c1	CLG A rx voice
a2	CLG E rx voice (*)	c2	CLG A rx voice
a3	CLG E tx voice (*)	c3	CLG A tx voice
a4	CLG E tx voice (*)	c4	CLG A tx voice
a5	CLG E al. vect. (*)	c5	CLG A al. vect.
a6	CLG E excl.com. (*)	c6	CLG A excl.com.
a7	CLG F rx voice (*)	c7	CLG B rx voice
a8	CLG F rx voice (*)	c8	CLG B rx voice
a9	CLG F tx voice (*)	c9	CLG B tx voice
a10	CLG F tx voice (*)	c10	CLG B tx voice
a11	CLG F al. vect. (*)	c11	CLG B al. vect.
a12	CLG F excl.com. (*)	c12	CLG B excl.com.
a13	CLG G rx voice (*)	c13	CLG C rx voice
a14	CLG G rx voice (*)	c14	CLG C rx voice
a15	CLG G tx voice (*)	c15	CLG C tx voice
a16	CLG G tx voice (*)	c16	CLG C tx voice
a17	CLG G al. vect. (*)	c17	CLG C al. vect.
a18	CLG G excl.com. (*)	c18	CLG C excl.com.
a19	CLG H rx voice (*)	c19	CLG D rx voice
a20	CLG H rx voice (*)	c20	CLG D rx voice
a21	CLG H tx voice (*)	c21	CLG D tx voice
a22	CLG H tx voice (*)	c22	CLG D tx voice
a23	CLG H al. vect. (*)	c23	CLG D al. vect.
a24	CLG H excl.com. (*)	c24	CLG D excl.com.
a25		c25	CLGI I rx data
a26		c26	CLGI I rx data
a27		c27	CLGI I tx data
a28		c28	CLGI I tx data
a29		c29	
a30		c30	
a31		c31	
a32		c32	

The wire links Zp 2, 3, 4, 5, 6, 7, 8, 9 and 10 must be placed in position "4F" (the default position).

(*) The 4 CGQSIG 4 wire group uses only terminations A, B, C, D and I

4.11.3 PIN Layout Connector M1 Interface 8CGQSIGA/4CGQSIGA 2W

TABLE 4-14 8 CGQSIGA 2 WIRE GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	
a2		c2	
a3	CLG E txrx voice (*)	c3	CLG A txrx voice
a4	CLG E txrx voice (*)	c4	CLG A txrx voice
a5	CLG E al.vect. (*)	c5	CLG A al.vect.
a6	CLG E excl.com (*)	c6	CLG A excl.com
a7		c7	
a8		c8	
a9	CLG F txrx voice (*)	c9	CLG B txrx voice
a10	CLG F txrx voice (*)	c10	CLG B txrx voice
a11	CLG F al.vect. (*)	c11	CLG B al.vect.
a12	CLG F excl.com (*)	c12	CLG B excl.com
a13		c13	
a14		c14	
a15	CLG G txrx voice (*)	c15	CLG C txrx voice
a16	CLG G txrx voice (*)	c16	CLG C txrx voice
a17	CLG G al.vect. (*)	c17	CLG C al.vect.
a18	CLG G excl.com (*)	c18	CLG C excl.com
a19		c19	
a20		c20	
a21	CLG H txrx voice (*)	c21	CLG D txrx voice
a22	CLG H txrx voice (*)	c22	CLG D txrx voice
a23	CLG H al.vect. (*)	c23	CLG D al.vect.
a24	CLG H excl.com (*)	c24	CLG D excl.com
a25		c25	
a26		c26	
a27		c27	CLGI txrx data
a28		c28	CLGI txrx data
a29		c29	
a30		c30	
a31		c31	
a32		c32	

The wire links Zp 2, 3, 4, 5, 6, 7, 8, 9 and 10 must be placed in position "2F" (by default they are placed in position "4F").

(*) The 4 CGQSIG 2 wire group uses only terminations A, B, C, D and I

4.12 2Mbit/s Digital Tie-Line Interface with QSIG CGQSIGN

4.12.1 LED Indications CGQSIGN

- The lower green led indicates whether the group has the "MASTER" or "SLAVE" state and has the following meaning:

OFF	SLAVE
ON PERMANENT	MASTER

- The upper red led indicates the group alarm state and has the following meaning:

OFF	normal group operation
ON PERMANENT	group out of service

- The central red led ON and the lower red led OFF indicate the presence of a remote alarm:

RAI	remote termination alarm indication
CRC	RAI alarm and CRC error warning

- The simultaneous permanent ON state of the upper and lower red leds indicate the presence of serious alarms on the line.

Possible serious alarms are:

LOS	lack of received impulses on the line
AIS	received frame synchronization loss
BER	error rate above 10^{-3} on the received frame synchronization word.

For any alarm the communication is maintained for 90 seconds, after which the communication is released if the alarm persists. In the presence of an alarm, all attempts to seize the line are refused. The minor alarm symbol is displayed on the attendant console and the relative "Minor alarm" relay on the US group is energized.

4.12.2 PIN Layout Connector M1 2Mbit/s Interface CGQSIGN

TABLE 4-15 CGQSIGN GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1	GNDP	c1	2MBIT IN
a2	GNDP	c2	2MBIT IN
a3	GNDP	c3	2MBIT OUT
a4	GNDP	c4	2MBIT OUT
a5	GNDP	c5	GNDP
a6	GNDP	c6	GNDP

The pins not indicated are not used.

Link positioning within the CGQSIGN group:

Zp 8 & 9 open
 Zp 10 & 11 in position "A" when using twisted pair having a 120 Ω line impedance

Zp 8 & 9 closed
 Zp 10 & 11 in position "B" when using co-axial cable having a 75 Ω line impedance

By default the line impedance is 120 Ω .
 The connection is made on the front edge of the card when using 75Ohm Coax connection.

4.13 EURO-ISDN 3T0 Interfaces + 1S0 Interface 3T01S0

4.13.1 PIN Layout Connector M1 Interface 3T01S0

TABLE 4-16 3T01S0 GROUP M1 CONNECTOR PIN DESCRIPTION			
PINS	DESCRIPTION	PINS	DESCRIPTION
a1		c1	TRK. RXA
a2		c2	TRK. RXA
a3		c3	TRK. TXA
a4		c4	TRK. TXA
a5		c5	TRK. RXB
a6		c6	TRK. RXB
a7		c7	TRK. TXB
a8		c8	TRK. TXB
a9		c9	TRK. RXC
a10		c10	TRK. RXC
a11		c11	TRK. TXC
a12		c12	TRK. TXC
a13		c13	TERM. RXA
a14		c14	TERM. RXA
a15		c15	TERM. TXA
a16		c16	TERM. TXA
a17		c17	CAU EMG RXA
a18		c18	CAU EMG RXA
a19		c19	CAU EMG TXA
a20		c20	CAU EMG TXA
a21		c21	
a22		c22	
a23		c23	
a24		c24	
a25		c25	TEL. EMG TXA
a26		c26	TEL. EMG TXA
a27		c27	TEL. EMG RXA
a28		c28	TEL. EMG RXA
a29		c29	
a30		c30	
a31		c31	
a32		c32	

4.14 Courtesy Announcements

The courtesy announcements AC daughter card, is optional and is inserted in connectors M3 and M4 of the traffic management card (GT).

For its correct insertion refer to the arrows printed on GT card and on the courtesy announcement printed circuit board.

The following table shows the association between recorded messages, the memory I.C. position on the card and the output timeslot on the PCM wire 0.

MESSAGE	MEMORY I.C. POSITION	PCM0 TIME SLOT
1	uL 6	12
2	uL 7	13
3	uL 29	14
4	uL 28	15

4.15 Trouble Shooting on ISDN Lines

Prior to executing the checks described in this section, the verification of the correct customization data entry, wiring and connections is essential.

In case of ISDN line failure implement the following procedure:

- Check that the ECS-FD is synchronized with the PSTN's digital network; this implies that a **single** digital termination must be configured as "master" (green led "ON PERMANENT").
- Check the state of the **red led** (upper led in case of ALUnc); if it is "ON PERMANENT" it indicates that the group is out of service in which case its substitution is necessary.
- Check the state of the **central red led** (only for ALUnc); if it is "ON PERMANENT" it indicates the presence of one of the following alarms, which can also be displayed using the administration terminal (SAEMANAGER) maintenance program (SAEBUILDER) by selecting "**peripheral group alarms**" from the principle menu:
 - AL_RAI, verifies the integrity of the connections between the ECS-FD and the public exchange;
 - AL_CRC4, verifies the configuration (CRC enabled during D channel customization).
- Check the state of the **central and lower red leds** (only for ALUnc); if they are both "ON PERMANENT" it indicates the presence of one of the following alarms, which can also be displayed using the administration terminal (SAEMANAGER) maintenance program (SAEBUILDER) by selecting "**peripheral group alarms**" from the principle menu:
 - AL_LOS, verifies the presence of a signal on the line from the public exchange to the ECS-FD
 - AL_AIS, verifies the line termination (LT) operation
 - AL_BER, verifies the quality of the connection between the public exchange and ECS-FD.

In addition to these "**peripheral group alarms**" the checks on "termination alarms" are also added, indicated as follows:

- AL_B_CH_L1 (ISDN physical layer alarms)
- AL_B_CH_DLC (ISDN data layer alarms)

In the case that **no leds are alight** check the **"terminations alarms"** using the administration terminal (SAEMANAGER) maintenance program (SAEBUILDER).

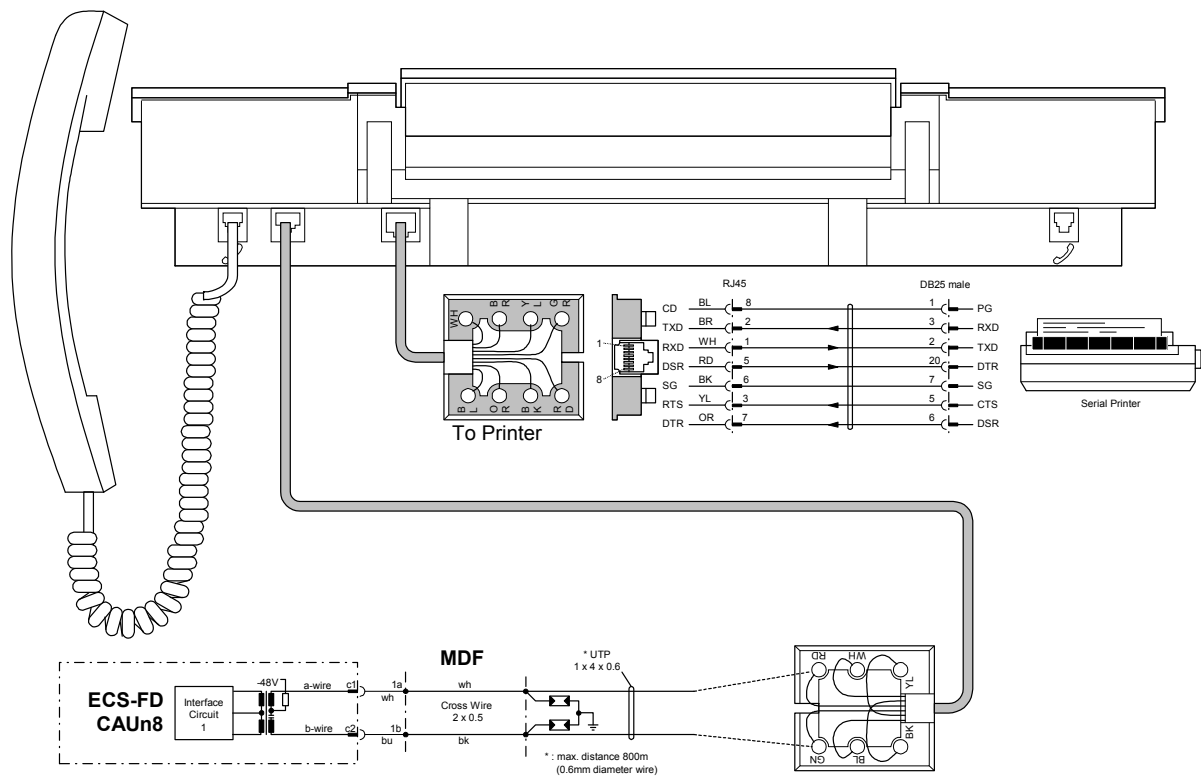
in the case when the AL_B_CH_DLC alarm is present

- check the configuration of the termination (e.g. point-to-point -public exchange side);
- check that the **"D channel customization"**, is the same as the public exchange;
- during **"ISDN group inspection"** see if the D channel associated with the group under examination is in an active state (see Help-on-line).

5 Operator Console OP2

A detailed description of the operator console can be found in the Operating Instruction for the Operator Console Document no: BCFD5036.SD

5.1 Diagram OP2



6 Installation of Test Equipment

The test equipment is not supplied with the ECS-FD.

It is advised to use approved devices which satisfy the following requirements.

- Simulation of the private telephone exchange towards the public telephone exchange:
 - checking that line is available
 - dialling on line
 - conversation
 - line release

- Simulation of the public telephone exchange towards the private telephone exchange:
 - checking that line is available
 - sending the ring signal
 - answering
 - conversation
 - release

- Simulation of an internal extension towards the private telephone exchange:
 - checking that line is available
 - dialling on line
 - conversation
 - line release

- Simulation of the private telephone exchange towards an internal extension:
 - checking that line is available
 - sending the ring signal
 - answering
 - conversation
 - release

Moreover it must be possible to measure resistance, insulation and line insulation to ground.

6.1 ECS-FD 224 Power-Up and Initialization

The installation phase should be completed by performing the following checks:

- the power cable is correctly positioned;
- the equipment is well earthed;
- the group positions within the subframe conform to the system customization data for the installation;
- the cables and going to the internal and external terminations are correctly positioned;
- the cable between the administration terminal (SAEMANAGER) and the US card has been inserted correctly.

To start the system execute the following actions in the order listed:

- unplug all groups from the subframes' backplanes, leaving them in their respective positions
- check that the mains voltage to the battery back-up power station (S.E.) is 110-230Vac
- connect the mains cable to the battery back-up power station and switch on the power according to instructions provided within the battery back-up power station's manual
- check the battery back-up power station's battery voltage, the rectifier's voltage and current being output
- allow its batteries to charge for at least 12 hours
- check that the battery back-up power station outputs a voltage of 54 Vdc +/- 2%
- connect the power cables to the PBX as explained in "Connection of power cables and earth" paragraph.
- power-up the ECS-FD via the switch located on the power supply subframe within the ECS-FD cabinet
- check the output voltages on the terminal block situated on the rear side of the power supply subframe
- switch off the power supply subframe within the cabinet and re-insert all the groups within their respective sockets located on the subframes' backplanes

- power-up the ECS-FD again via the switch located on the power supply subframe within the ECS-FD cabinet and observe the behaviour of the leds on the front edge of the Traffic Management unit (GT)

For almost five minutes the ECS-FD now executes an initialization phase, indicated by the following led states on both the GT unit and US groups.

GT1 group	green led	FLASHING
	red led1	OFF
GT2 redundant group	green led	ON
	red led	OFF
US group	upper red led	ON
	lower red led	ON
	green led	OFF

When the initialization has been completed successfully, the following led states are observed on the GT card and US groups.

GT1 group	green led	FLASHING
	red led1	OFF
GT2 redundant group	green led	ON
	red led	OFF
US group	upper red led	OFF
	lower red led	OFF
	green led	OFF

When the green led on the US group is ON it implies that the ECS-FD is in communication with a remote administration terminal "SAEMANAGER".

Further information regarding led signalling from the various groups can be found in the "Group monitoring leds" section.

To have access to detailed diagnostic information and corrective action when there is a malfunction, a maintenance program (SAEBUILDER) is supplied which runs on a personal computer used as the Administration terminal (SAEMANAGER).

Once the ECS-FD has been powered up, it is necessary to transfer the previously prepared customization data for the system in question, using the SAEMANAGER customization program, from the Administration terminal to the ECS-FD.

Bear in mind that in the case of total customization data transfer, the ECS-FD will reset itself and restart in the same mode as if it were powered-up.

Check external/ internal terminations are working correctly and then close the door of the ECS-FD cabinet.

To switch off the system, turn-off the power switches in the reverse order to that described previously, having firstly shut-down any work sessions in course on the administration terminal.

In order to power down the battery back-up power station, proceed as follows:

- switch off the ECS-FD via the switch located on the power supply subframe within the ECS-FD cabinet
- switch off the battery back-up power station
- remove the unplug the 110-230 Vac mains from the battery back-up power station.
- remove the fuses within the battery back-up power station
- disconnect the power cable between the battery back-up power station and ECS-FD

6.1.1 Warnings and Regulations

The ECS-FD is structured in such a way as to allow a complete inspection of the cabling and rear connections, even though it is firmly fixed to the wall.

The structure and flexibility of the connections allow such manoeuvres to be implemented even during normal system operation.

The maintenance personnel must take particular care when dealing with the electrical connections, not to use metallic instruments that could cause short-circuits on the various points of the ECS-FD, and this includes the framework.

On the visible parts there are no dangerous voltages present while access to the protected parts may be implemented only after switching off the voltage to the apparatus.

The handling of the circuit boards themselves must be implemented without the generation of static charges on the circuits due to the friction of synthetic materials. It is highly recommended that maintenance personnel take care to "discharge" potential residue on the framework of the equipment before directly handling the circuits.

Particular attention must be given to solderers, whom must always have a connection with earth.

Circuit boards must not be placed on carpet or transported in what are considered as electrically active packing materials.

The substitution of any circuit board is subjected to the above mentioned precautionary measures, while incorrect circuit board insertion is impossible, for example inserting a card that has been turned over from top to bottom in error.

Battery backed RAM memory is present on the GT card. These batteries are external to the RAM and have a capacity of 1800 mA/h; that is they can guarantee data storage for a period of 8 years (in the hypothesis of seasonal use of an exchange, with 6 months active and 6 months disactive).

During system installation and when the system is functioning, the link ZP1 located near the battery should be closed in order to guarantee customization data storage within the RAM in the absence of the mains power supply.

In order to guarantee the integrity of data stored in the RAM, it is recommended that the battery should be replaced at regular periods by firstly connecting the new battery in parallel with the old before removing the old battery.

It is advised to perform the above battery substitution operation taking the same precautions as when handling circuit boards (i.e. antistatic wrist straps, antistatic mats, solderers with connection to earth).

In the case when the ECS-FD is converted from an analogue to a digital EURO-ISDN system, the analogue trunk protection must be removed, because it can be used only for analogue trunks.

7 Documentation

It is the job of the system installer to leave all the latest system manuals at the site of the system installation and the documentation necessary to implement system maintenance; the information should also include the following items:

- latest main distribution frame sheet
- network configuration diagram
- wiring diagram of connections made within the telephone junction boxes
- print of ECS-FD customization data
- copy of ECS-FD customization data on floppy disc
- description of the internal telephone line network