

*F A S T   A C C E S S   C O M M U N I C A T I O N*

# *Installation Manual Ring-Master System CB901*



*Ring-Master Communication &  
Security Systems*

from **Alpha Communications**

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**CHAPTER 1.****CB901-1**

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# 1. INTRODUCTION

## 1.1. GENERAL SYSTEM DESCRIPTION

Ring-Master system CB 901 is an all-to-all direct speech system, controlled by a fully electronic central exchange. Similar to a mini-computer, all its functions are microprocessor controlled. This enables the customer to select from a wide range of programmable features designed to achieve flexibility and optimal efficiency in internal communication.

### FAIL-SAFE POWER SUPPLY

A built-in Lithium battery will secure all programmed information up to 10 years when power to system is switched off.

### STATION CAPACITY

2 - 2.170

The modular structure of the central permits easy expansion, station by station, from 2 up to a capacity of 7.170 subscribers and beyond. Moreover, a wide variety of station types, matching the needs of almost any user, whether institutional, industrial or commercial applications, increases the flexibility of the system.

### SIMPLIFIED CABLING

The unique cabling concept provides the advantages of both centralized and decentralized cabling arrangements. Each station requires one single pair for dialling and conversation. Power can either be individual to each station or, using a single reference pair, remote groups of stations can be supplied from local mains power units. The cabling between master unit and each slave is ordinary telephone wires or optical fibre.

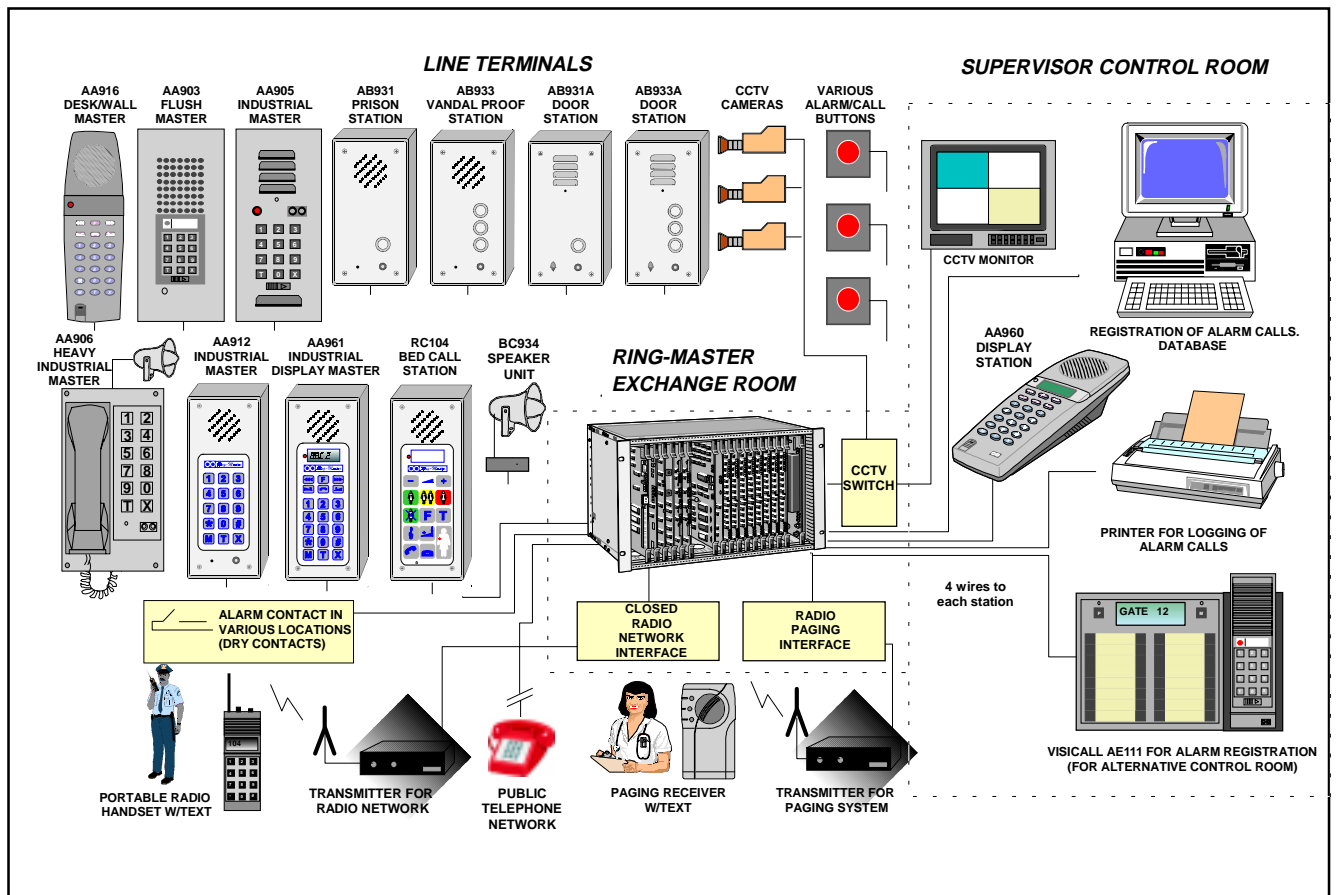


Fig. 1.1. System CB901, Layout.

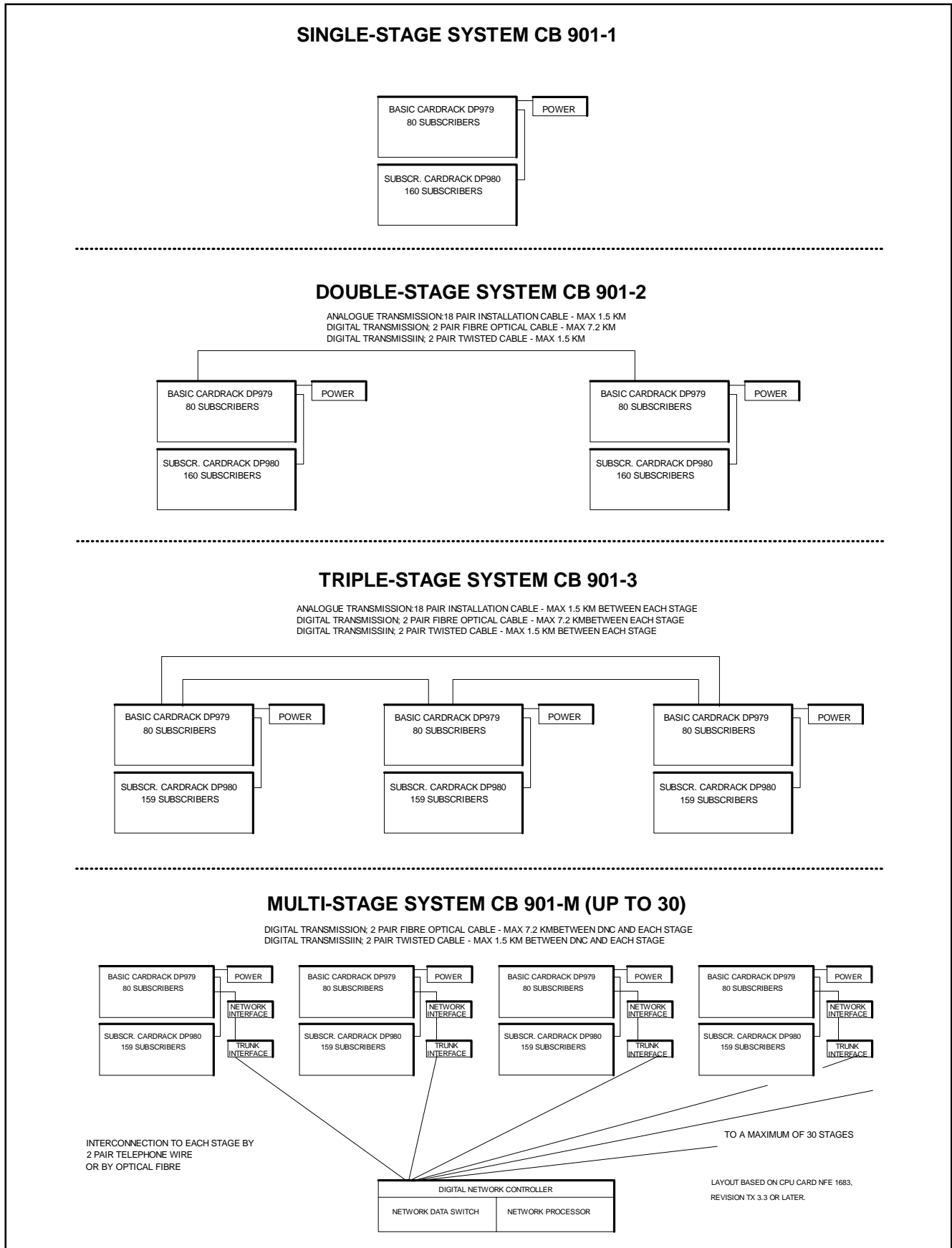


Fig. 1.2. CB901, System Configuration

**COMPACT SIZE**

The central unit is compact. A standard basic cardrack equipped for 96 subscribers measures only 256 mm x 570 mm x 271 mm (10.1" x 22.4" x 10.9"). Silent in operation, once fitted with its cover, the central can operate inconspicuously in almost any location.

**SYSTEM CONFIGURATIONS**

The Ring-Master CB 901 system is divided into four categories based on the number capacity:

- Single-Stage System CB 901-1            - up to maximum 240 subscribers
- Double-Stage System CB 901-2 - above 240 and up to 480 subscribers
- Triple-Stage System CB 901-3            - above 480 and up to 717 subscribers
- Multi- Stage System CB 901-M            - above 717 up to maximum 7.170 subscribers

*In a single-Stage system*, the central unit consists of a Basic Cardrack DP 979 containing the Basic Cardset and Subscriber Cards, totalling 96 subscribers. If the number requirements exceed this, an additional Subscriber Cardrack DP 980 is necessary, giving a maximum capacity of 240 subscribers in a single-stage system.

*In a Double-Stage system CB 901-2*, two Single Stage systems CB 901-1 are interconnected by:

- A. Analog Transmission on Multi-pair cable;
  - a 18-pair installation cable. The system is equipped for 8 interlinks between the stages. Maximum distance between the stages is 1.5 KM. Each stage can have 240 subscribers, giving a maximum capacity of 480 in a Double-Stage system.
- B. Digital Transmission on one pair fibre optical cable or two pair twisted data cable.
  - The system is equipped for 8 interlinks between the stages. Maximum distance between the stages is 7.2 KM. Each stage can have 240 subscribers, giving a maximum capacity of 480 in a Double-Stage system.

*The Triple-Stage system CB 901-3* configuration consists of three Single Stage systems CB 901-1 interconnected by:

- A. Analog Transmission on Multi-pair cable;
  - a 18-pair installation cable in a triangle configuration. The system is equipped for 8 interlinks between each stage. Maximum distance between the stages is 1.5 KM. Each stage can have 239 subscribers, giving a maximum capacity of 717 in a Triple-Stage system.
- B. Digital Transmission on one pair fibre optical cable or two pair twisted data cable in a triangle configuration. The system is equipped for 8 interlinks between each stage. Maximum distance between the stages is 7.2 KM. Each stage can have 239 subscribers, giving a maximum capacity of 717 in a Triple-Stage system.

*The Multi-Stage system CB 901-M* configuration consists of one control unit called DNC (Digital Network Controller) and up to 30 slave stages. The DNC unit has no subscriber connection itself, all slave stages are wired to this unit and it handles all traffic between them. For interconnection, fibre optic or standard telephone cable (2 pair) can be used. Each slave stage contains maximum 239 call numbers - which gives a total capacity of 7.170 subscribers in a system. A Multi-Stage system CB 901-M system gives 8 interlinks (audio channels) between the DNC unit and each node slave stage.

**LINK CAPACITY**

Each slave-stage of 240 numbers is equipped with 15 internal links. Each Digital Network Controller (DNC) is equipped with 1024 internal links. Between each slave stage and the DNC unit 8 interlinks are available.

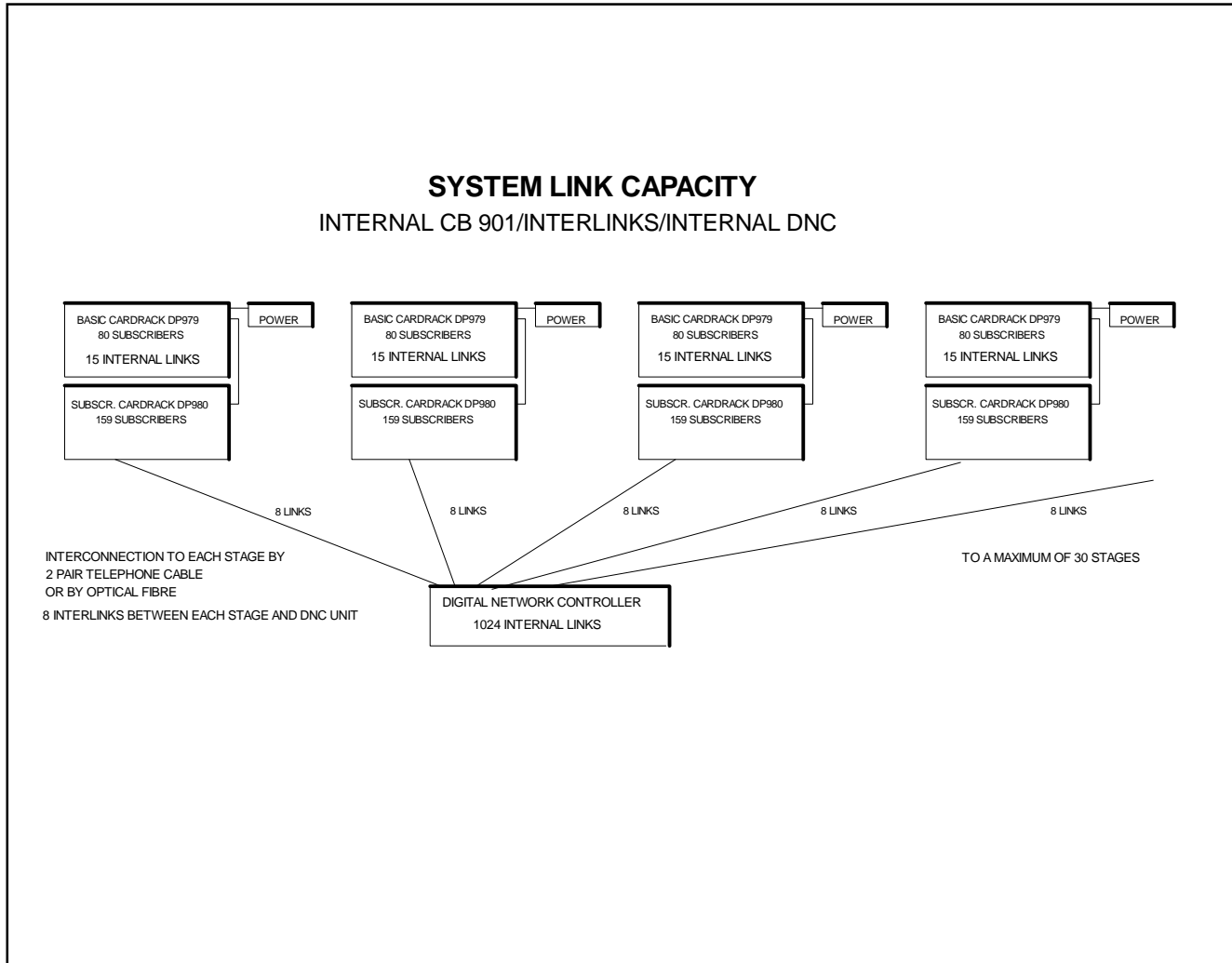


Fig. 1.3. Link Capacity

## 1.2. CENTRAL LAYOUT.

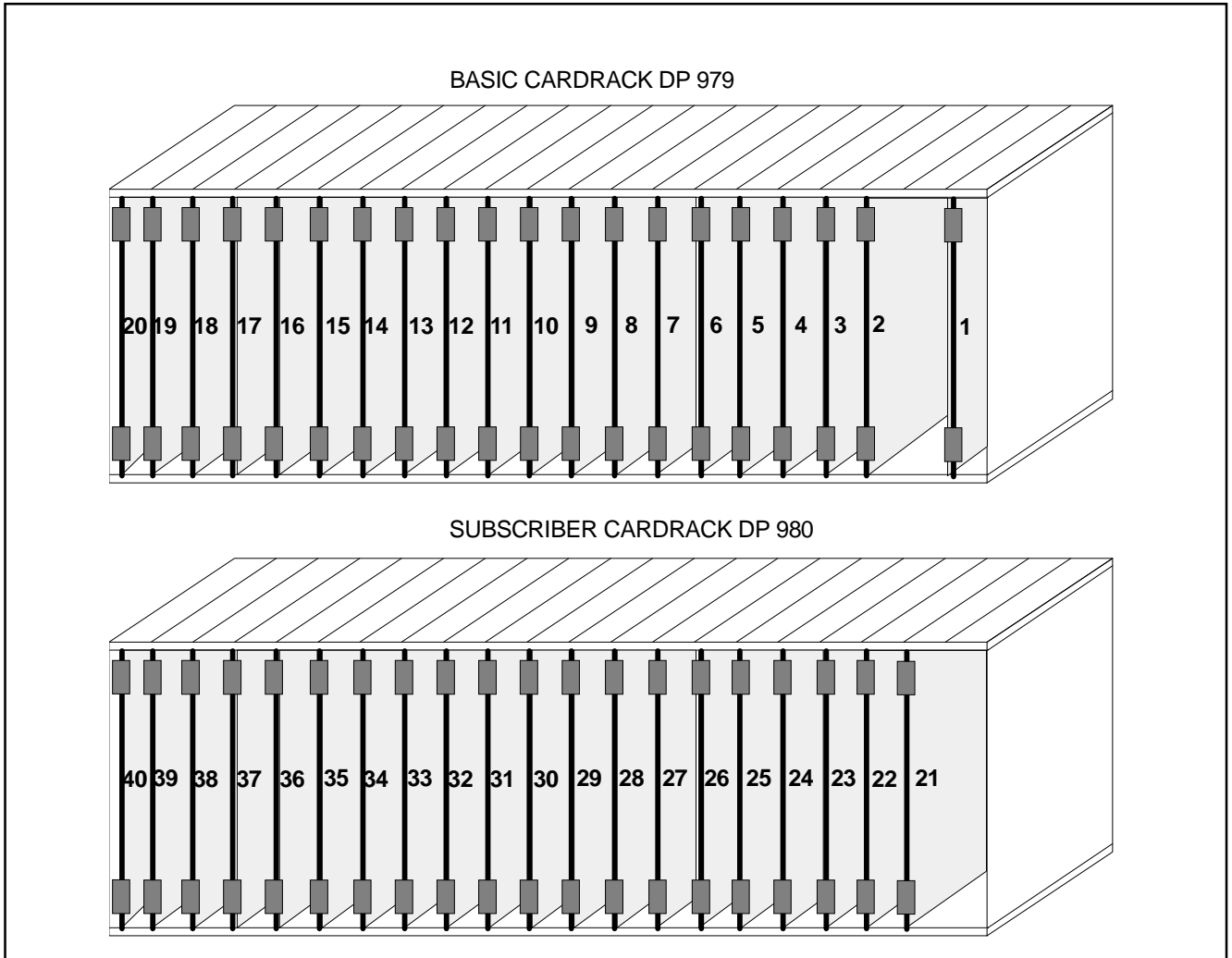


Fig. 1.4. CB901-1, PCB Layout

THE CB 901-1 SYSTEM CONTAINS THE FOLLOWING PRINTED CIRCUIT CARDS:

- |       |   |
|-------|---|
| 19    | Processor Card NFE 1683                             |
| 18    | Timing Control Card NFE 1606                        |
| 17    | Switch Control Card NFE 1519                        |
| 16    | Audio Control Card NFE 1607                         |
| 15-14 | Link Control Cards - 2 pcs. - 15 links NFE 1521     |
| 1     | Power card NFE 1528                                 |
| 2-13  | Subscriber Cards (8 subscribers per card) NFE 1625  |
| 21-40 | Subscriber Cards (8 subscribers per card) NFE 1625  |
| (10)  | Programme Distribution Card NFE 1626, if required). |

The number of subscribers in a CB 901-1 system may be expanded in steps of 8, plugging in subscriber cards.

The basic cardrack            10 subscriber cards = 80 subscribers

The subscriber cardrack 20 subscriber cards = 160 subscribers

Giving a maximum capacity of 239 subscribers, each with access to the 15 links.

Each stage in the central unit consists of a basic cardrack for the common basic cardset, and according to the number capacity, an additional subscriber cardrack.

All cards in a CB 901 system are of plug-in type, interwired via the motherboard in each cardrack.

The common basic cardset comprises 7 different types of printed circuit cards, which are briefly described in the following:

**PROCESSOR CARD**

This card contains the microprocessor (MC 68000 series), its programme and memory. The 512K bytes programme, which controls all computer operations is located in 4 PROMs (Programmable Read Only Memories). The operating system is MTOS and the programme is written in high level language C.

**TIMING CONTROL CARD**

It contains the main oscillator (10.7 MHz) and provides all timing signals in the central unit. In this way the system is synchronized all the way through, which minimizes noise generation on the audio links.

**SWITCH CONTROL CARD**

This card sets up/disconnects links, directed by the processor. It handles the PAM (Pulse Amplitude Modulation) sampling control for all links. There are 32 time-slots in the sytem. One time-slot is allocated by the subscriber scanner and one for the tone receiver, leaving 30 time-slots for audio connections. This means that there is room for 15 simultaneous audio links.

**AUDIO CONTROL CARD**

The duplex voice control circuits are located on this card, together with the reciever and tone transmitter. The processor fully controls the tone receiver/transmitter.

The duplex control circuit operates individually for each time-slot, which is much faster than the processor can manage. Therefore, a separate control system is included on this card.

**LINK CARD**

It connects the audio signals between the subscribers. Each card handles 8 links and there are always 2 link cards in the central unit.

**POWER CARD**

It contains a switching power supply, synchronized with the main oscillator to minimize noise. Input to the card is 25 - 28V DC.

**SUBSCRIBER CARD**

It terminates the lines for 8 subscribers, and is the interface card between the stations and the central unit. The card splits up the audio/signalling information to/from the subscribers. All subscriber cards are identical.

*In a fully equipped CB 901 system there is room for 2 more card types, which are:*

**PROGRAMME DISTRIBUTION CONTROL CARD**

It interfaces the intercom system to an external programme source and allows the subscribers to activate and connect programme- (music) and alarm channels. Implementing this feature to the system will reduce the total number of subscribers by 8 per stage.

**ANALOG INTERLINK CARD/DIGITAL NETWORK INTERFACE (FOR EXPANSION TO CB 901-2, CB 901-3 AND CB901-M SYSTEMS).**

The distance between Digital Network Interface Card (installed in the Basic Cardrack in a stage) is up to 7.2 km. For analog configuration the Analog Interlink Card NFE1545 is used. The distance between each stage is 1.5 km. Both type of cards contain 8 audio links used between stages in a Double-Stage System CB 901-2 (one card in each stage) and Triple-Stage System CB 903 (two cards in each stage).

Two different types of CB901 cardrack configurations are available from Ring Master:



## 2. STATIONS

The stations are basically divided into two categories; Master Stations and Sub Stations.

**Master Stations** - able to make calls or to receive calls from any other call number.

**Sub Stations** - for receiving calls only, from any master station. Some substations have keypad with limited call access (station with auto-dialling and stations with direct access feature).

### MODELS

A variety of models are available. These include two Master Stations designed for desk or wall-mounting;

- AA960, station with 8-character alphanumeric display
- AA904 station without display, but utilizing the same standard features as the AA960 model,

a flush-mounted unit AA903, an industrial heavy-duty station AA906, one light industrial station AA905, ex-proof station AA908 and substations for desktop or wall-mounted use, and remote microphone units and door substations.

### OPERATING THE STATION

Each master station is equipped with a keyboard with full international standards, simple push-button dialling process places all the features at the user's finger tips.

Making a call, the user presses the button corresponding to the first digit of the desired call number. Dial access is virtually instantaneous since all station positions are scanned continuously. On receiving a steady dialling tone, the user continues dialling.

Call connection is indicated in both the initiating and the receiving station by a warning tone and a station lamp which remains lit until the call is cancelled by either party pressing X. Should the link be busy, the caller receives an intermittent tone. A continuous warbling tone indicates, that a station is placed in privacy, wishing to remain undisturbed.

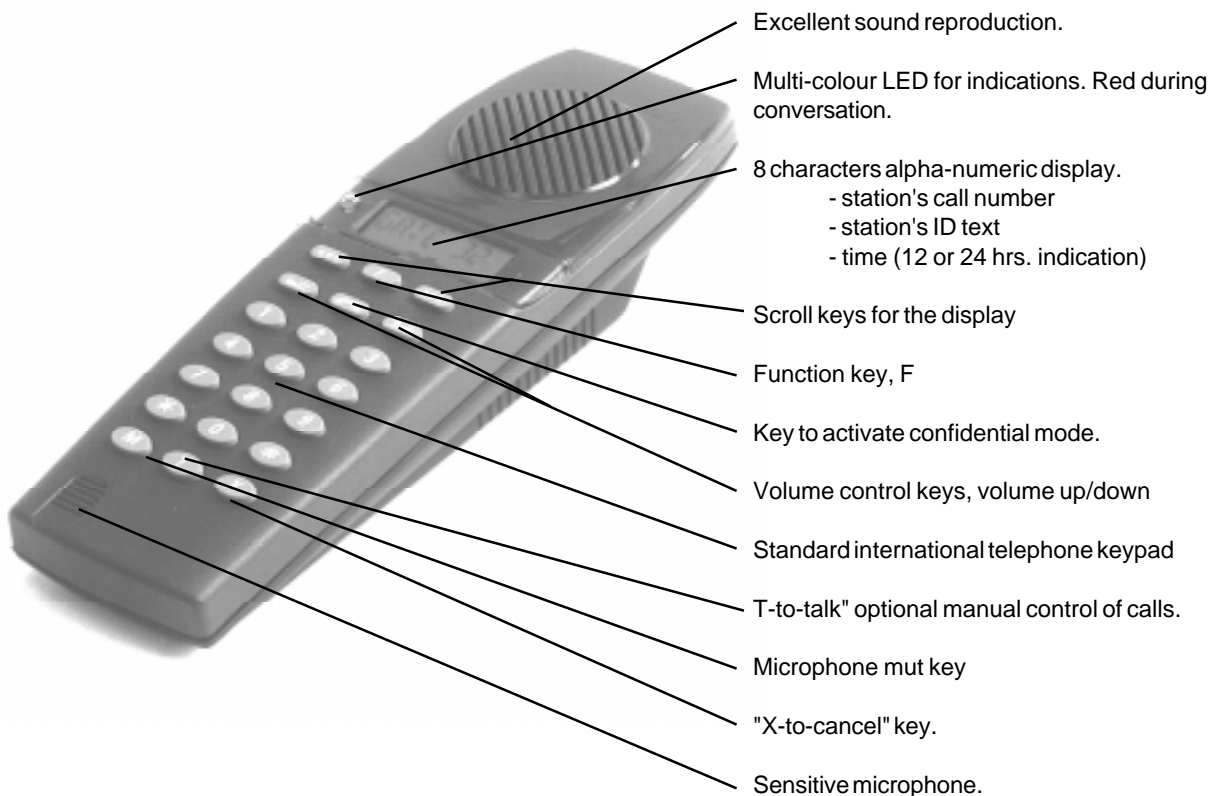


Fig. 1.5. Display Station AA960

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The following station models are available, please see the *GUIDE TO RING-MASTER SYSTEM RM5000* or *TECHNICAL MANUAL, OPTIONAL EQUIPMENT* for more details:

AA903	Flush-mounted Master Station
AA905B	Light Industrial Master Station, Surface
AA905C	Light Industrial Master Station, Flush
AA906	Heavy-Duty Industrial Master Station
AA911-F	Master Station w/polyester film front, Flush
AA912	Light Industrial Master Station, Surface
AA912-F	Light Industrial Master Station, Flush
AA916	Desk/Wall Master Station without display
AA960	Desk/Wall Master Station with display
AA961	Industrial Master Station with display, Surface
AA961-F	Industrial Master Station with display, Flush
AB923	Substation w/3 call buttons, Surface
AB923-F	Substation w/3 call buttons, Flush
AB931	Vandal-proof station w/1 call button, Surface
AB931-F	Vandal-proof station w/1 call button, Flush
AB933	Vandal-proof station w/3 call button, Surface
AB933-F	Vandal-proof station w/3 call button, Flush
AB931A	Door station w/1 call button, Surface
AB931A-F	Door proof station w/1 call button, Flush
AB933A	Door station w/3 call button, Surface
AB933A-F	Door station w/3 call button, Flush
AE111	VISICALL, Direct Dialling Unit
AF103	Explosion-proof Master Station

## 3. INSTALLATION

- Standard Cardrack configuration, Basic Cardrack DP978 and Subs. Cardrack DP980
- EMC Approved Cardrack configuration, Basic Cardrack DP991 and Subscriber Cardrack DP992.

The units are CE marked and complies with these standards in the EMC Directive: *EMISSION*; EN-50081-1 (EN 55022/CISPR 22, Class b), and *IMMUNITY*; EN-50082-1, (IEC 801-2, IEC 801-3 and IEC 801-4).

The 19" card cassetts used in the EMC approved cardracks are produced by ELMA. The Motherboard and all Subscriber- and Interface Cards are identical to those used in the standard configuration.

Please see paragraph 1.14: *Installing EMC approved cardracks DP991 and DP992* for installation details.

### 3.1. INSTALLATION PLANNING

Proper planning minimizes the time required and costs incurred during an installation. In the long term, maintenance, changes and expansion can be accomplished efficiently when planned for prior to the initial installation. This results in customer satisfaction and goodwill through a minimum disruption of their business activities. Ultimately, customer satisfaction results in additional sales.

Each customer's facility is different, and requires a tailored approach to ensure that the job runs smoothly. Each facility will have its own combination of circumstances which must be addressed. Table below summarizes the major stages of a typical intercom installation. The sequence in which the stages are accomplished, or the work accomplished in each stage itself, can be modified to reflect the particular circumstances of each intallation. However, the general approach should include the installation stages listed below:

STEP	INSTALLATION
1.	Site survey and data collection.
2.	Plan major equipment layout. (Central, system power supply, and position of the variuos stations, speakers, etc.)
3.	Plan cable routing.
4.	Preparation and preassembly of central and power supply at shop facility.
5.	Site work: <ol style="list-style-type: none"> <li>a. Running of station cables</li> <li>b. Equipment mounting (central, power supply, etc.)</li> <li>c. Station and speaker installation</li> <li>d. System programming and adjustment</li> </ol>
6.	System checkout and commissioning
7.	Customer introduction and training.

### 3.2. CENTRAL LOCATION

A summary of the environmental factors affecting the Ring-Master CB901 system is presented in the listing below. These factors must be considered when developing a detailed system plan.

Site preparation is dependent upon the customer's facilities. In many cases, there may be only one location where the central and power supply (or transformer) can be mounted. However, when several locations are possible, the advantages and disadvantages of each location should be considered. Consider each of the following factors:

**NON-STRUCTURAL  
CONSIDERATIONS:**

- A. The central and power supply must be wall mounted.
- B. Location of the majority of stations, locate the central strategically, so that you can minimize the length of cable runs.
- C. Location of existing telephone ducts or conduit.
- D. The AC line should be dedicated exclusively to the system. If the line is equipped with a circuit breaker at the service entrance panel, the circuit breaker switch should be labeled «DO NOT TURN OFF».
- E. The equipment should be installed in an area that has adequate ventilation. A temperature range of 0°C (32°F) to 25°C (77°F) and humidity range of 30% to 90% relative must be maintained.
- F. Appropriate lighting conditions and adequate working space should be provided for future service calls.
- G. Consideration must be given to those conditions that may cause damage to the equipment. For example, dust or vapor from flammable or corrosive solvent may cause damage. The installation site should not be located in an area likely to be flooded or likely to be damaged by moving objects nearby.
- H. The central should NOT be installed in an area near electrical noise including equipment, i.e., heavy motors, welders, dimmers, radio transmitters etc.
- I. The power supply (or transformer) must be mounted ABOVE the central. This is to prevent overheating the central.

**3.3. CABLING REQUIREMENTS**

Each station is connected to the central by 4 leads (in two twisted pairs). See Fi1. 3.8.

***Leads No. 1 and No. 2. Audio and signalling.***

Individual leads i.e., a separate twisted pair is required for each station. Galvanically connected to 3M subscriber terminals of flat cables BF 925 in the central, these pairs carry tone-signalling (CCITT norm.) for dialling, audio transmission and DC control signals for stations.

The maximum loop-resistance of this pair is 240 ohm corresponding to approx. 2km cable-length from station to central, using normal telephone cabling with 0.6 mm diam. wiring. If the actual distance is more than 2 km. (loop resistance more than 240 ohm) doubling this audio pair (or using heavier cable) can cause incorrect dialing transmission, since the capacitance in the cable is also increased. Doubling is not recommended. If cable to a station passes close to radio aerials or other interference sources, the leads to the actual station should be shielded.

***Leads No. 3 and No. 4. Station Operating Voltage.***

These leads carry operating voltage to the stations. The maximum/ minimum station voltage for proper operation is 28,5 - 21V. This allows a loop resistance between each station and power supply (centralized or local) of 40 ohm, giving a distance of 350 meters on 0.6 mm copper wire and 600 m on 0.8 mm. (based on power supply output of 27V DC).

The wire dimensions for stations located further from the central must be increased accordingly. However, independent local DC power supplies can be used for distant stations. No reference wiring between local and central power supplies is required.

**Important Note:** If a number of stations are powered from a common/parallel DC power pair, voltage fluctuations can result in incidental crosstalk. Therefore it is essential that a separate power pair **is always used** for each station.

### 3.4. INSTALLATION OF CENTRAL EXCHANGE.

Each basic cardrack and subscriber cardrack consists of two main parts: a metal backplate and a front cardrack (which secures to the backplate with 2 screws) that swivels outward, giving access behind the motherboard during maintenance.

Check for signs of physical damage when unpacking the central. In particular check the long contact-pins on the rear of the motherboards NFE 1522, NFE 1523A and NFE 1524A for possible distortion that may cause short-circuiting.

**NOTE:** To facilitate station cable connections and installation of cards, it is recommended that the cardrack is unscrewed and separated from the backplate during the initial installation procedures.

### 3.5. MOUNTING THE CARDRACK BACKPLATE.

Four holes in the backplate are provided for mounting on a wall or 19" rack. The position of the cardracks should allow for easy access of incoming station cables.

Check that the following components are mounted on the backplate:

- a. Two brackets for station connection terminals.
- b. One bracket, in which a printed circuit card is mounted. This board provides fuse holders (1.6 amp), connecting lugs for station power, and screw terminals for voltage from external power supply.

Now mount the backplate, as follows:

- a. Drill holes corresponding to the backplate in the wall.
- b. Mount the backplate (see note).

**NOTE:** The four screws required for wall mounting the central unit are not provided. Be certain that the screws used can support the central unit.

When using two cardracks for a central unit, two 20-pair flat cables (NMF6002) is supplied with DP 980 Cardrack to connect the two units together. The cables have a fixed length, thus limiting the distance between the cardracks to approximately 10-12 cm (4-4,5 inches). (See Fig. 1.6, 1.7). The top pin of Cable no. 1 in each pin row will not be connected.

The backplate is now ready for station wiring.

### 3.6. CABLE TERMINATION IN STATION SOCKETS (See Fig. 1.8.)

**Station type: Master Station AA960 w/display - modular 8 pin RJ45 socket.**

**Leads No. 1 and No. 2 - Audio Signalling Leads**

Lead No. 1 to be connected to pin No. 5 in the RJ45 station socket.

Lead No. 2 to be connected to pin No. 4 in the RJ45 station socket.



**Leads No. 3 and No. 4 - Station Operation Voltage.**

Lead No. 3 is positive and must be connected to pin No 3 in the RJ45 socket.

Lead No. 4 is negative and must be connected to pin No. 6 in the RJ45 socket.

**Station type: All station types (Sub- and Master) using Hirschmann 6 pin socket****Leads No. 1 and No. 2 - Audio Signalling Leads**

Lead No. 1 to be connected to pin No. 1 in the Hirschmann socket.

Lead No. 2 to be connected to pin No. 5 in the Hirschmann socket.

**Leads No. 3 and No. 4 - Station Operation Voltage.**

Lead No. 3 is positive and must be connected to pin No 3 in the socket.

Lead No. 4 is negative and must be connected to pin No. 6 in the socket.

**NOTE:** Always use a separate power pair for each station to the DC power source, to avoid crosstalk.

If an **extra loudspeaker** is required in parallel to the station's speaker, connect to pins 1 and 2 on the RJ45 wall socket or to pin 5 and 6 on the Hirschmann wall socket.

Note, min. impedance 16 ohm.

**NOTE:** It is stressed that the station's built-in output amplifier shall not be overloaded. Therefore, when an extra speaker is used, the station's volume control shall not be set higher than half-way. If extra power is needed, an extra booster amplifier (e.g. FC 420/10W with independant power supply) must be inserted between pins 1 and 2 on RJ45 (or pin 5 and 6 on the Hirschmann plug) and the one or more parallel speakers.

### 3.7. CABLE TERMINATION IN CENTRAL CARDRACK(S).

**Connection of stations' speech/signalling pair (leads 1 and 2).**

Connect to the 3M terminal blocks of the flat cable straps BF 925. The 3M blocks are clipped vertically into brackets on the central's backplate and the other ends of the flat cables are plugged into corresponding vertical pin-rows on the rear of the central's motherboard. See Figure 3.9.

The 3M blocks are fitted with «knife-type» terminals requiring a special connecting tool 3M/4055 (RM cat. no QHF 1027).

To start the connections, the first 3M block will be clipped into the top/left bracket position on the backplate. This will correspond to the positions for stations with hex.pos.nos. 00-07. Each 3M block has a vertical row of 20 «knife-terminals». The first 4 (or upper) terminals are not to be used. Connecting the 1/2 leads for the first of the 8 stations on the 3M block, plug into terminals 5 and 6 for station no. 00, the second to 7 and 8 for station 01, and so on up to no. 07.

Removing the mounting bracket and plugging in the 3M block of BF 925 to the top left backplate position, the next 3M block will be located at the lower-left backplate position, corresponding to the wiring positions for stations with hex.position 08-0F. Once again, leaving the upper 4 terminals of the 3M block unused, repeat the procedure described above for the next 8 station's 1/2 leads.

The next 3M block will be in the second from left upper position for subscriber with hex.positions 10-17, and the second lowerleft for 18-1F etc. until all subscribers are connected.

The connection positions for leads 1 and 2 in the central have hexadecimal numbering. See Fig. 1.9. for terminal layout.

See Fig. 1.10. for conversion from hexadecimal position number to decimal call number.

This basic cardrack can be reduced providing only 88 or 80 subscribers, but positions 12 and 13 have parallel card positions 21-22 in subscriber cardrack. Subscribers must either be connected in position 12/13 or 21/22. The subscriber cardrack will then consist of 160 subscribers (20 subscriber cards). See Figure 1.10.

**Connection of stations' 24V power pairs (leads 3 and 4).**

These wire-pairs shall be connected to the terminals of the horizontal row of fuse holders on the fuse-board NFE 1560 which is fixed to the base of the central's backplate.

There are two horizontal rows of AMP-type «knife» terminals. The lower row is for leads 3 (positive) from stations, the upper row for leads 4 (negative). These are divided into blocks of 8, serving 8 subscriber power pairs. A 1.6 Amp fuse is provided for each block of 8 subscribers, (each subscriber card). Starting on the left, the 3/4 leads for the first subscriber connect the first 4-lead (negative) to the first terminal on the left of the upper row, and the 3-lead (positive) to the first terminal on the left of the lower row. A special AMP connecting tool no. 229373-4 ( R.M. Cat no. QHF 1026), is required for terminal connections.

### 3.8. INSTALLATION OF THE CARDRACK.

When cable connections are completed, mount the rack to the backplate with the 2 (swivel) screws. Two magnets are fixed to the rear of the rack to hold it in closed position. Swivel the rack open to permit the BF 925 flat cables to be plugged into their relative pin-row positions on the rear of the motherboard. Take care when folding the flat cable i.e., that they remain clear of motherboard pins when the central is closed. See Figure 3.11.

Fasten the empty cardrack to the backplate with the two screws in the right hand corner. The cardrack can now be swung open to the right. The two magnets on the left hand side will lock the cardrack to the backplate when it is swung to closed position.

### 3.9. POWER UNIT SPECS, CENTRAL AND STATION POWER NEEDS AND CONNECTION OF POWER UNITS.

Although Ring-Master systems normally function on 24 VDC, power units shall be adjusted to 27 VDC which is the correct charging voltage when systems are connected to batteries for group/ all-call or no-break battery back-up. Using 27 V also permits longer cabling from stations to central with a 3 V tolerance to 24 V central voltage drop on longer cable runs. Ring-Master AS supplies a standard DC power unit LA 924 which is factory-adjusted to 27 V and can supply 4 Amp. It is adjustable between 20 and 30 Volt, using the potentiometer R28. A smaller power unit NLA 1037 is also available for local use with remote stations, giving 0.5 Amp DC, i.e., adequate for max. 3 stations. Power units can also be purchased locally provided that they meet the specifications for supplying Ring-Master systems,- e.g., regulated, and with a max. ripple/noise level of 30 mV peak to peak.

Note. The power unit should be equipped with overvoltage protection.

## POWER REQUIREMENTS.

These can basically be divided as follows:

- A. Power for central units.
- B. Power for stations.
- C. Power for systems with «stand-by» battery back-up.

Central unit and stations can be supplied from a common 27 VDC power source, but it is strongly recommended that two separate power supplies are used. This is to prevent eventual voltage fluctuations or distortions that can occur in station cabling, (inductive voltage with spikes etc.) and which can cause incidental interference in the centrals' computer functions.

### A. Power for central units:

Central power needs for a single stage CB 901 equipped with the Basic Cassette DP979 only (max. 96 subscribers), will need one LA 925, (4 Amp.). See Fig. 1.12. If a Subscriber Cassette DP 980 is added to the central or stage, 4 Amp. is needed, and a second LA 925 is required per central or stage. See Figure C13.

Power is connected to screw terminals on the motherboard NFE 1523A (in DP 979) marked + and - 12 Volt. Note,- 0 terminal is not used. It is stressed that the power supplies for centrals/stages quoted above will always be needed in addition to the power units for stations below.

### B. Power for stations:

Power needs for stations are based upon the basic figure of 150 mA per station. Station power needs can be divided into 3 categories as follows:

1. If a central or stage is not equipped for Alarm/Progr.distr. and shall not be using all-call or group-call, the max. current need for stations will be:
  - a. With Basic Cardrack DP 979 only (96 subscr.) = 4 Amp,- one LA 925.
  - b. With both Basic and Subscriber Cardrack (239 subscr.) = 8 Amp,- two LA 925.
2. Centrals or stages not equipped for Alarm/Progr.distr., but using all or group-call. Since such calls are of short duration, the central or stage can be equipped with max. 2xLA 925 for normal calls, plus one or more extra LA 925's to charge a suitable battery which is used during all-calls or group-calls. Naturally, the requirements of power units and battery capacity will vary in relation to the number of stations in a system, number of stations receiving all-call or group call and the frequency of all-call or group-call messages. Refer to table Fig. 1.14. for number of LA 925s and relative battery capacity. All LA 925 shall be connected in parallel and adjusted to 27 Volt.
3. Centrals equipped for Alarm/Programme Distribution: A CB 901 system with 239 stations will have a max. current need of  $240 \times 150 \text{ mA} = 36 \text{ Amp} = 9 \text{ LA } 925$  or appropriate local power supply.

Power to stations is connected to screw terminals on the fuse board NFE 1560 (DP 979 and DP 980) marked + and -.

Remote local power supply to stations. A station or a group of stations can be connected to remote power units. If the central is programmed with all or group call, all stations in such a group can be switched on simultaneously and the power unit must be dimensioned accordingly, i.e., at 150 mA per station.

**C. Power for systems with «stand-by» battery back-up.**

In case of mains failure, both the central unit and all stations must function from a common battery. Consequently the capacities of the battery and the charger (power supply) are totally dependent upon several factors, - station capacity, traffic density, discharging and recharging period of battery. See Fig .3.16. an 13.17. for details.

*Power Check.*

Turn on the mains and check the polarity on the +12V and -12V screw terminals. Check also the polarity on the power connections to the stations. Turn off mains again.

**3.10. PLUGGING IN PRINTED CIRCUIT CARDS.**

Plug the cards into the cardracks according to the actual central size. See Fig. 1.10 for correct card positioning. Make sure that all cards are properly pressed into the plugs on the motherboard when using two cardracks for a complete stage. Note that card positions 12/13 and 21/22 have the same station equipment number (50-57 and 58-5F). You must therefore only plug subscriber cards into one of the positions 12/13 or 21/22.

We advise positions 21/22 to be used, this leaving room in the basic cardrack for the future connection of interlink cards in CB 901-2 / CB 901-3 / CB 901-M systems.

**3.11. INSTALLATION OF PROGRAMME DISTRIBUTION CARD DP977.  
TERMINATION OF AUDIO SIGNALS FOR THIS FEATURE.**

The Programme Distribution Control Card DP 977 is installed in the Basic Cardrack DP 979. This card distributes the Alarm/programme audio signal to all the subscribers from the selected programme sources, - 2 alarmchannel and 8 programme channels. Observe that in CB 901-2/CB 901-2/CB 901-M systems a DP 977 (NFE 1626) must be installed in each stage. Each slave stage can distribute different programme sources. No extra cabling between slave stages, or MCA unit and slave stages is necessary for the Alarm/ Progr.distr. facility. To make use of the Alarm/Program.distr. feature a subscriber must be terminated to a subscriber card of the type NFE 1625. The previous subscriber card NFE 1525 can be used in DP 979/ DP 980, but will not give access to this facility. These subscriber cards can be mixed in the system.

Additional cabling is needed for the Alarm/Program.distr. facility in each stage.

***INTERCONNECTION CABLE, INTERNAL ON MOTHERBOARD NFE 1523A.***

The Programme Distribution Card NFE 1626 is normally installed in card position 10 (plug.pos XA11) in the Basic Cardrack DP 979. If the central is fully equipped with subscriber cards (30 cards), this feature card is to be installed in pos. 12 or 13.

In CB 901-2/CB 901-3/CB 901-M systems the card positions 12 and 13 are used for Interlink B Card NFE 1545. In CB 901-1, the Subscriber Card NFE 1625 can be installed in these positions, giving a total of 88 subscribers in the Basic Cardrack. If subscribers in these positions want to make use of the Alarm/programme Distribution Feature, a special flat cable, 20 pair with 4 connectors, must be installed between cardpos. 10, 11, 12 and 13 - plug P1, pins 1A/B to 20 A/B at the back of the Motherboard NFE 1523A. This cable NMF 6012 is included in DP 977 together with the Program Distribution Card NFE 1626. When this cable is installed, to utilize plug positions for subscriber connection, the Programme Distribution Card NFE 1626 can be installed in any position from 10 to 13 incl. If no cable is installed this card must be placed in card pos. 10. This cable must not be used in CB 901-2/CB 901-3/CB 901-M systems. See Figure 3.18. for cable location.

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**TERMINATION OF AUDIO AND CONTROL SIGNALS TO PROGRAMME DISTRIBUTION CARD NFE 1626.**

Two Subscriber Cables BF 925 are used for termination to the Programme Distribution Card NFE 1626, at the back of the Motherboard NFE 1523A.

**Cable no. 1** for audio signals to alarm- and programme channels. See Fig 3.18. for cable location and wiring details. The max. input level on alarm channel is 770 mV RMS (cable no. 1, pins 9A/B - 10A/B).

**Cable no. 2** for control signals to alarm- and programme channels. See Fig. 1.18. for cable location and wiring details. The max. input level on programme channels is 100 mV RMS (cable no 1, pins 1A/B - 8A/B)

To activate alarm channel no. 1 (top priority) 24V DC must be supplied to pins 32 A/B on cable no. 2, positive to pin 32A. Audio signal from alarm source no. 1 (cable no. 1, pins 9A/B) will be transmitted to all stations.

To activate alarm channel no. 2, 24V DC must be supplied to pins 31 A/B on cable no 2, positive to 31A. Audio signal from alarm source no. 2 (cable no. 1, pin 10 A/B) will be transmitted to all stations.

Alarm channels have top priority in the system. All other activity, programme distribution, all-call, group-call and normal calls will be overridden. Alarm channel no. 1 has priority over alarm channel no. 2. To deactivate an alarm channel the 24V DC «enable signal» must be disconnected (back to open circuit on «alarm enable» input).

Battery Operation Function - cable no. 2. When CB 901-1 Systems are installed as no-break system (connected to emergency power - battery bank) it is important to cut out the Programme Distribution Feature when there is a mains power failure. During this period, all stations using this feature must be suspended from the programme channels, otherwise the emergency battery could be overloaded. Alarm channels will operate. Each station has a current consumption of approx. 150 mA. When mains voltage returns, the stations will automatically be reconnected to the programme channels. If the Programme Distribution «cut out» function is required, do the following:

1. Disconnect Diode D1 on Programme Distribution Card NFE 1626.
2. Install a separate small power supply/rectifier of 5 - 24V DC. Connect the output voltage to the Battery Operation function, cable no. 2 - pins 30A/B, positive to pin 30A. See Fig. 1.18. for details.

When there is a mains power failure, the voltage (5-24DC) from the separate power supply is missing and the Programme Distribution function is disabled. Stations connected to the programme channels are canceled, but will be reconnected when mains power is restored.

NOTE. This function may also be operated by the management to allow for programme listening during lunch time, coffe-brakes etc.

**CENTRAL POWER SUPPLY.**

The power requirement for a system with Alarm/Programme Distribution facility is similar to an ordinary CB 901-1 system without programme distribution feature.

**STATION POWER SUPPLY.**

When a Ring-Master System CB 901/2/3 is equipped with Alarm/ Programme Distribution feature, the station power supply has to be dimensioned accordingly. In a fully equipped ordinary (without Alarm/Programme Distr.) Ring-Master System CB 901-1 a maximum of 30 stations can be connected simultaneously in conversations - all 15 links engaged. In an Alarm/ Programme Distribution System all stations can simultaneously be connected to programme channels - 240 stations. The total power consumption will then be approx. 36 Amp. (240 x 0,150 A).

**IMPORTANT — STATION POWER CALCULATION.**

Each station with access to Alarm/Programme Distribution Feature requires 150 mA.  
 Each station in normal conversation requires 150 mA  
 Each station in rest condition requires 15 mA.

**IMPORTANT NOTES:**

1. Check the + 5V fuse on Power Card NFE 1528. The fuse is named F1 and **must** be 1 Amp - not 0,5 Amp as on the original version of this card.
2. Function of All/Group call in systems with Alarm/Programme feature (equipped with Subscriber Card NFE 1625).

To initiate these features the Programme Distribution Card NFE 1626 must be installed in the system, or if not - make a strap on the back side of Motherboard NFE 1523A in card position 10 (plug pos. XA11) between

Plug P1, pin 10A and  
 Plug P2, pin 16B.

***In addition:***

To transfer all/group call signals to subscribers connected to cards in position 11, 12 and 13 the flat cable NMF 6012 (part of DP 977) must be installed on the back side of the Basic Cardrack DP 979. If no cable is available, make a jumper between:

Plug P1, pin 10A on card no. 10 to  
 Plug P1, pin 10A on card no. 11 to  
 Plug P1, pin 10A on card no. 12 to  
 Plug P1, pin 10A on card no. 13.

**3.12. POWER ON AND SYSTEM CHECK.**

**NOTE:** Always turn OFF the central power (NFE 1528) before plugging the cards in or out of the cardracks.

- A. Pull all NFE1625/NFE 1525 cards out of the plugs (approx. one inch) except the card in position No. 2. Test one card position at a time.
- B. Plug the flat cable, which is fixed to the 3M terminal mounted in the upper left hand corner of the backplate, into positions 00 - 07 on the back of the cassette motherboard.
- C. Switch on mains.
- D. Ensure that the standard programme is written into the memory on

the CPU Card NFE 1683 when power is switched on. Set switch no. 8 (switch package U49) in position ON. See SVT Programming Manual.

- E. Switch on the central power by operating the switch on the power card NFE 1528 (in card position 1).

Any number of LEDs may light up. This is normal and they will extinguish after a few seconds.

Only a few LEDs will be indicating in accordance with the following list, starting with the processor card to the left.

NFE 1683	The upper LED will be ON The lower LED will be blinking
NFE 1606	The lower LED will be blinking
NFE 1521 No. 1	All LEDs stay dark
NFE 1521 No. 2	The upper LED will be steady on All the others will stay off
NFE 1525/1625	All LEDs on all subscriber cards stay off
NFE 1528	The four upper LEDs will be steady on The lowest one will be off

If these indications are not present, switch off power on the central power card and check that all cards are properly pressed into the plugs on the motherboard. Switch on power again. If still not normal, restart the system. Put switch no. 8 on switchpackage U49 on CPU card NFE 1683 in position ON. Press the Reset button (SW9, located on the edge of the card). This will restart the processor manually. We will now assume that the indications are normal.

Make a call between, for example, the two stations in positions 00 and 01. They will have call numbers depending on the number of digits selected in the system (U19 on NFE 1606)  
This is the first check to see if the system is «alive».

Plug in the rest of the NFE1625/NFE 1525 cards, one by one and connect the corresponding flat cable to the back of the motherboard in the cardrack. Make a call between the stations in positions 00 and 01.

### 3.13. ADJUSTMENT

Normally no adjustments are necessary, but it is advisable to check status of:

- A. *The -5V Level* Measure on the motherboard, on the plug of the programming card (card position 20) that the exact value of the -5V. 0V is on pin No. 3a/b and -5V is on pin 1a/b. Both on plug P1 (the lower plug). The correct voltage to measure is between 5,0 and 5,1V. If adjustment is necessary, turn pot.meter R17 on power card NFE1528.
- B. *Duplex Switching.* It is necessary to check the audio control card NFE 1607 for proper duplex switching.
  1. Set up a conversation to a station in a room (office) with normal ambient noise level.
  2. Press down the microphone cut-off switch (privacy switch) on the initiating station. The background noise from the receiving station should now be heard in the loudspeaker of the initiating station.

3. Turn pot. meter R 56 on NFE 1607 card (on front of the card) until the noise just disappears.

**NOTE:** This adjustment cannot of course compensate for noise from machinery, noisy airconditioners etc.

*C. Adjustment of warning tone level.*

Adjust pot. meter R57 to a pleasant volume on the warning tone.

### 3.14. INSTALLING EMC APPROVED CARDRACKS DP991 AND DP992.

When required, the CB901 system can be delivered with EMC approved cardracks:

- Basic Cardrack DP991 (replacing standard cardrack DP979)

- Subscriber Cardrack DP992 (replacing standard cardrack DP980).

These cardracks are produced by ELMA and are EMC tested to comply with the standards: (see Fig. 1.20 for CB901 EMC Layout).

The units are CE marked and complies with these standards in the EMC Directive:

*EMISSION*; EN-50081-1 (EN 55022/CISPR 22, Class b), and

*IMMUNITY*; EN-50082-1, (IEC 801-2, IEC 801-3 and IEC 801-4).

The Motherboard and all Subscriber- and Interface Cards are identical to those used in the standard configuration.

*WARNING: It is extremely important to follow the instruction in this chapter in detail, otherwise the EMC approval will not be valid. All equipment supplied must be used, no replacement will be accepted*

The following is a list of the equipment used in a EMC approved CB901 system.

DP991 Basic Cardrack

DP992 Subscriber Cardrack

BF950 Internal Subscriber Cable (between two subscriber positions on the Motherboard NFE1523A/NFE1524A and one Filter Adaptor BF951 in the backplate. Adequate for 2 Subscriber Cards/16 subscriber lines).

BF951 Filter Adaptor for Subscriber-, Programme Distribution/Alarm- and RS232 connections.

BF952 External Subscriber Cable (between Filter Adaptor BF951 in the backplate and the MDF distribution frame. Length 3 meter.

BF952A External Subscriber Cable (between Filter Adaptor BF951 in the backplate and the MDF distribution frame. Length 10 meter.

BF954 Internal System Cable for Program Distribution/Alarm Signals, (from the Mother-board NFE1523A to the backplate).

BF955 Internal System Cable for Data Signals and Power Supply, (from the Motherboard NFE1523A and the back plate).

BF956 External Interconnection Cable for System and Program Distribution/Alarm signals.

BF957 Internal RS232 Cable, (between the Motherboard NFE1523A (CPU position) and the Filter Adaptor BF951 in the back plate).

BF958 Internal Programme Distribution/Alarm Signal Cable (between the Filter Adaptor BF951 in the back plate and the subscriber position in the Motherboard NFE1523A for the Programme Distribution/Alarm Card DP977.

Reference is made to paragraphs 3.1 to 3.13 for general installation details. The EMC approved configuration required the following special installation adjustments:

**INSTALLING THE CARDRACKS DP991 AND DP992.**

The Cardracks DP991 and DP992 must be installed in a 19" rack. The position of the 19" rack should allow for easy access of incoming station cables.

**INSTALLING THE FILTER ADAPTER BF951 IN BASIC CARDRACK DP991.**

The Filter Adapter BF951 is used for termination in the cardrack DP991's backplate for:

- subscriber lines
- program distribution/alarm signals
- RS232 signals from CPU card

The cardracks are supplied with blind covers for all filter adapter positions and for the positions for the interconnection cables between the two cardracks DP991 and DP992. Remove the blind cover and install the corresponding filter adapter. Note that one filter adapter can support two subscriber cards (16 subscribers).

See Fig. 1.21 for Filter Adaptor BP951 layout in the Basic Cardrack DP991.

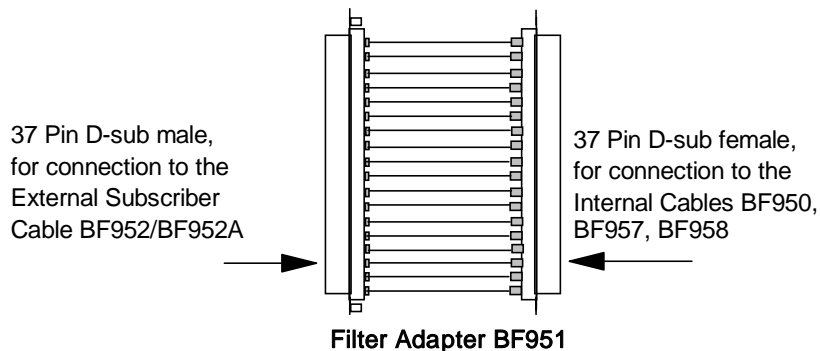
**INSTALLING THE FILTER ADAPTER BF951 IN SUBSCRIBER CARDRACK DP992.**

The Filter Adapter BF951 is used for termination in the cardrack DP992's backplate for:

- subscriber lines

The cardracks are supplied with blind cover for all filter adapter positions. Remove the blind cover and install the corresponding filter adapter. Note that one filter adapter can support two subscriber cards (16 subscribers).

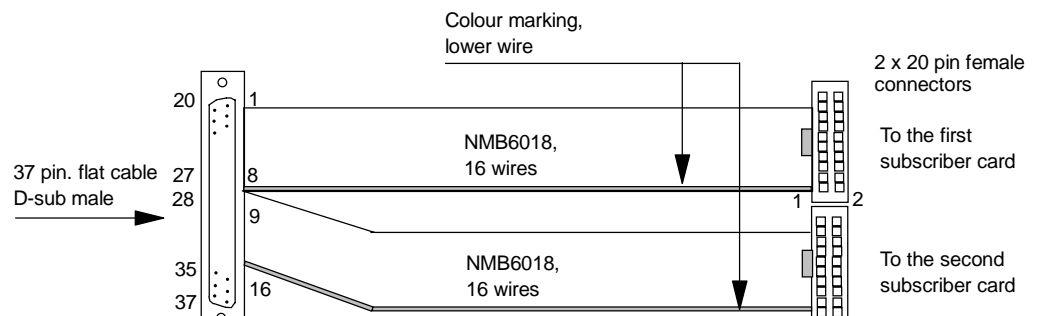
See Fig. 1.21 for Filter Adapter BP951 layout in the Subscriber Cardrack DP992.



**INSTALLING THE INTERNAL SUBSCRIBER CABLE BF950 IN CARDRACKS DP991 AND DP992.**

Install Filter Adapter(s) BF951. Each adapter supports two subscriber cards. Plug the

37 pin D-sub male connector into the Filter Adapter BF951 in the back plate. The upper 20 pin flat cable connector (D-sub pin nos. 1/20-8/27) should be plugged into the first subscriber card position on the Motherboard NFE1523A/NFE1524A. The lower 20 pin flat cable connector (D-sub pin nos. 9/28-16/35) should be plugged into the second subscriber card position on the Motherboard NFE1523A/NFE1524A. The colour marking of the flat cable must be facing down. See Fig. 1.22 for installation details.

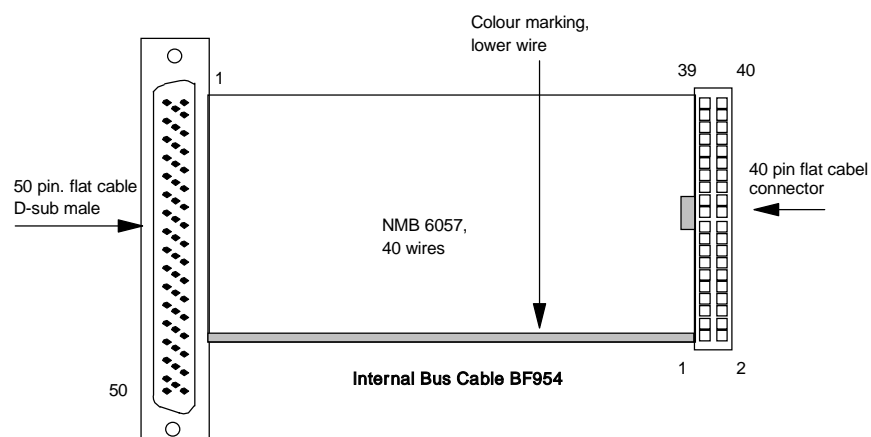


#### INSTALLING THE INTERNAL SYSTEM CABLE BF954 FOR PROGRAMME DISTRIBUTION/ALARM SIGNALS IN BASIC CARDRACK DP991.

When a CB901 system requires the additional Subscriber Cardrack DP992 (more than 96 subscribers), the cardracks DP991 and DP992 must be interconnected, (data and programme distribution signals) via the system cable BF954. Remove the blind cover in the back plate (see Fig. 1.21). Install the 50 pin D-sub male connector into the back plate. Plug the 40 pin flat cable connector into the dedicated position on the Motherboard NFE1523A, (plug position marked XA19, lower plug row, on the pcb.). The 40 pin connector should be plugged in between pin row 1 A/B and 20 A/B of the 32 pin rows in card position XA19. The colour marking of the flat cable must be facing down.

The BF954 cable is delivered from factory as a part of the Subscriber Cardrack DP992. See Fig. 1.23 for installation details.

Note. The Subscriber Cardrack DP992 is prewired from the factory. The internal bus cable for programme distribution is installed between the Motherboard NFE1524A (plug position XA21, lower plug row) and the cardrack's back plate.



**INSTALLING THE INTERNAL BUS CABLE BF955 FOR SYSTEM SIGNALS IN BASIC CARDRACK DP991.**

When a CB901 system requires the additional Subscriber Cardrack DP992 (more than 96 subscribers), the cardracks DP991 and DP992 must be interconnected, (data signals) via the cable BF955. Remove the blind cover in the back plate (see Fig. 1.21). Install the 50 pin D-sub male connector into the back plate. Plug the 40 pin flat cable connector into the dedicated position on the Motherboard NFE1523A, (plug position marked XA21, upper plug row, on the pcb.).

The 40 pin connector should be plugged in between pin 12 A/B and 31 A/B of the 32 pin rows in card position XA19. The upper pins 32 A/B MUST not be used.

The colour marking of the flat cable must be facing down.

See Fig. 1.23 for details.

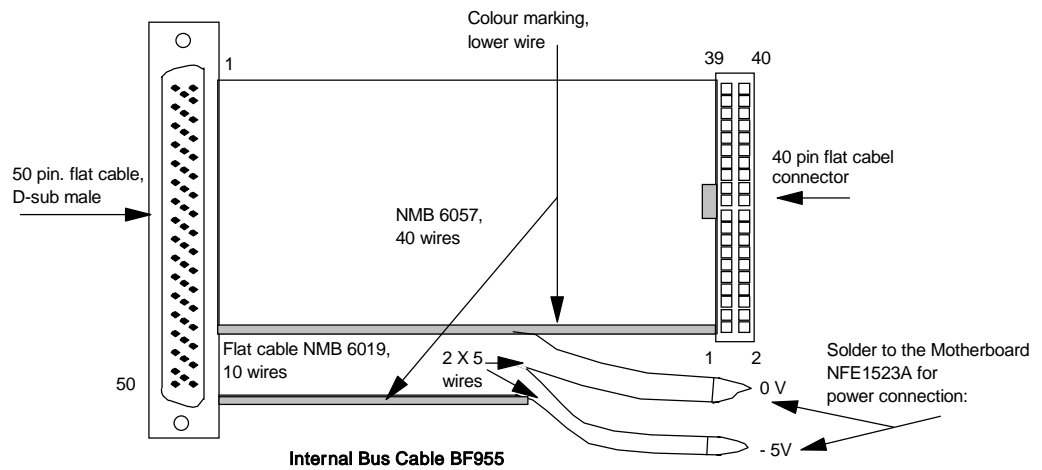
The first 5 wires of the 10 wire flat cable must be soldered to the 0 Volt on the Motherboard NFE1523A. 0 volt is pins 1A/B to 4A/B on the card connector in position XA21, lower plug row (P1).

The last 5 wires of the 10 wire flat cable must be soldered to the -5 Volt on the Motherboard NFE1523A. -5 volt is pins 8A/B to 10A/B on the card connector in position XA21, lower plug row (P1).

See Fig. 1.23 for details.

The BF955 cable is delivered from factory as a part of the Subscriber Cardrack DP992.

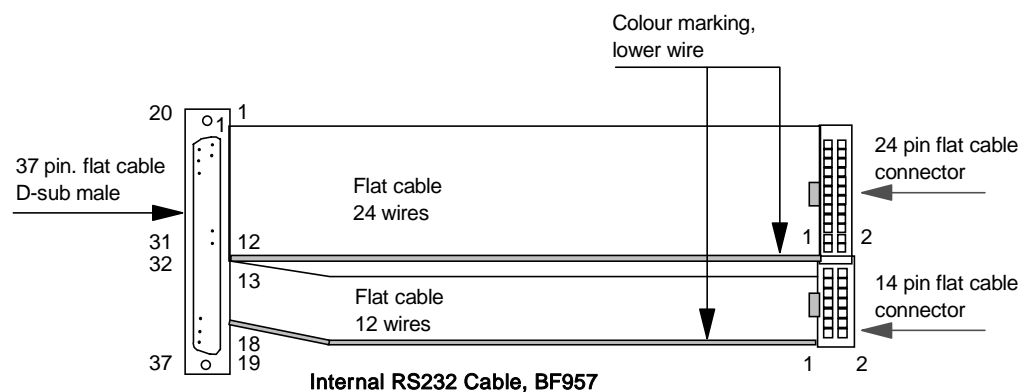
Note. The Subscriber Cardrack DP992 is prewired from the factory. The internal bus cable for programme distribution is installed between the Motherboard NFE1524A (plug position XA21, upper plug row) and the cardrack's back plate.



### INSTALLING THE INTERNAL RS232 CABLE BF957 IN BASIC CARDRACK DP991.

When a CB901 system requires connection to external devices (computer, printer, paging etc) the internal RS232 cable BF957 must be installed. Remove the blind cover in the back plate (see Fig. 1.21). Install a Filter Adapter BF951. Plug the 37 pin D-sub male connector into the Filter Adapter. Plug the 24 pin flat cable connector into the Motherboard NFE1523A, plug position of the CPU Card NFE1683, (plug position marked XA2, upper plug row P2, on the pcb). The connector should be plugged in between pin row 16A/B and 27A/B. Plug the 14 pin flat cable connector into the same plug position, but between pin row 1A/B and 7A/B. The colour marking of the flat cables must be facing down.

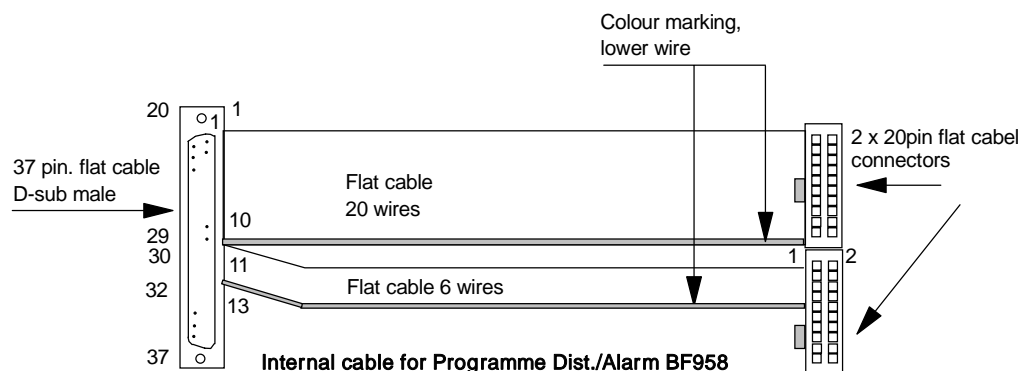
See Fig. 1.24 for installation details.



### INSTALLING THE INTERNAL CABLE BF958 FOR PROGRAMME DISTRIBUTION/ALARM IN BASIC CARDRACK DP991.

When a CB901 system operates with the Programme Distribution/Alarm feature the internal cable BF958 must be installed. Remove the blind cover in the back plate (see Fig. 1.21). Install a Filter Adapter BF951. Plug the 37 pin D-sub male connector into the Filter Adapter. Plug the upper 20 pin flat cable connector into the Motherboard NFE1523A, plug position of the Programme Distribution/Alarm Card NFE1626, (card position marked XA11, upper plug row P2, on the pcb). Plug the lower 20 pin flat cable connector into the same card position, but to the lower plug row P1, between pin row 32A/B and 23A/B. The colour marking of the flat cables must be facing down.

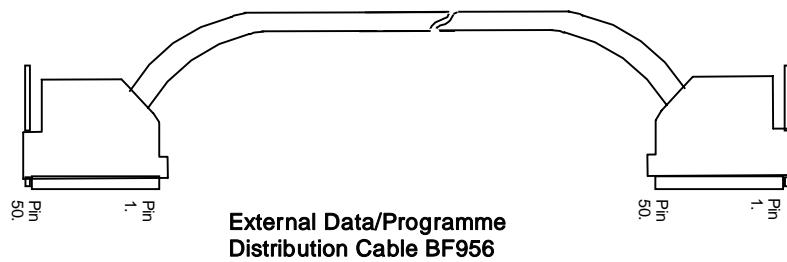
See Fig. 1.25 for installation details.



**INSTALLING THE EXTERNAL SYSTEM BUS CABLE BF956 FOR DATA AND PROGRAMME DISTRIBUTION/ALARM SIGNALS BETWEEN BASIC CARDRACK DP991 AND SUBSCRIBER CARDRACK DP992.**

When a CB901 system requires the additional Subscriber Cardrack DP992 (more than 96 subscribers), the cardracks DP991 and DP992 must be interconnected, (data and programme distribution signals) via system bus cables BF956. Two cables are needed, one for interconnecting the data signals and for the programme distribution/alarm signals.

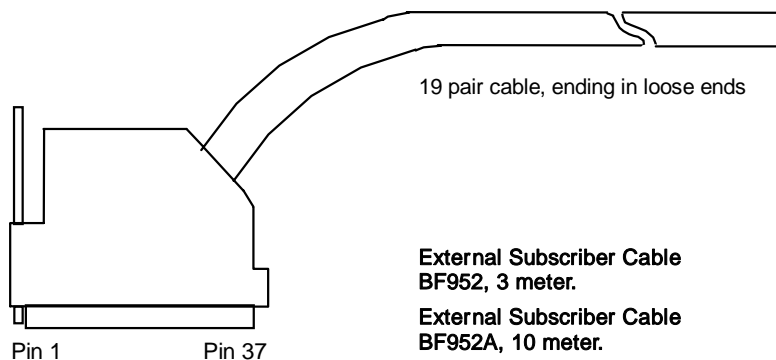
The BF956 cables are delivered from factory as a part of the Subscriber Cardrack DP992.  
See fig 3.26



**INSTALLING THE EXTERNAL RS232 CABLE BF952/BF952A IN BASIC CARDRACK DP991.**

When a CB901 system requires connection to external devices (computer, printer, paging etc) the External Subscriber Cable BF952 (3 meter) or BF952A (10 meter) must be installed. These cables are the same as used for subscriber termination and for programme distribution/data. Plug the 37 pin D-sub female connector into the Filter Adapter BF951 in the back plate. See Fig. 1.21. The other end of the cable is ending in loose ends, where the termination is done to the external devices (or to a MDF - distribution frame).

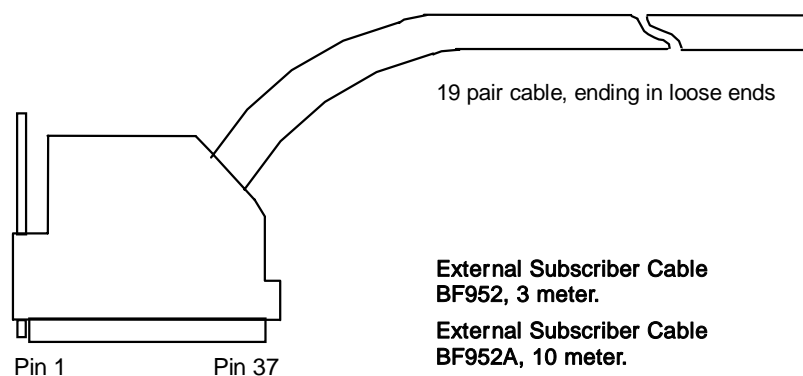
See Fig. 1.27 for termination details.



### INSTALLING THE EXTERNAL PROGRAMME DISTRIBUTION/ALARM CABLE BF952/BF953 IN BASIC CARDRACK DP991.

When a CB901 operates with the Programme Distribution/Alarm feature the External Subscriber Cable BF952 (3 meter) or BF952A (10 meter) must be used for connection to the external programme sources (radio, tapes etc.). These cables are the same as used for subscriber termination. Plug the 37 pin D-sub female connector into the Filter Adapter BF951 in the back plate. See Fig. 1.21. The other end of the cable is ending in loose ends, where the termination is done to the external devices (or to a MDF - distribution frame).

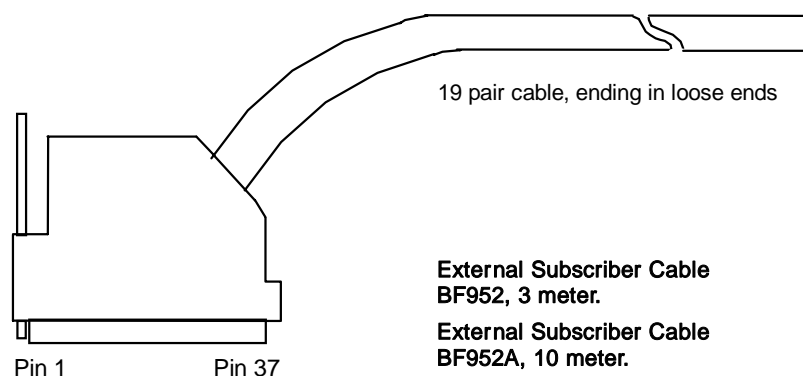
See Fig. 1.28 for termination details.



### INSTALLING THE EXTERNAL SUBSCRIBER CABLE BF952/BF953 IN BASIC CARDRACK DP991 AND IN SUBSCRIBER CARDRACK DP992

The External Subscriber Cables BF952 (3 meter) and BF952A (10 meter) are used for subscriber termination. Plug the 37 pin D-sub female connector into the Filter Adapter BF951 in the back plate. Each cable is supporting 16 subscribers, 2 subscriber card. See Fig. 1.21. The other end of the cable is ending in loose ends, where the termination is done to the external MDF - distribution frame.

See Fig. 1.29 for termination details.



**INSTALLING THE EMC APPROVED POWER SUPPLY LA925.****TERMINATING THE POWER LEADS IN BASIC CARDRACK DP991.**

Ring-Master AS supplies a EMC approved power unit LA 925 which is factory-adjusted to 27 V and can supply 5 Amp. It is adjustable between 20 and 30 Volt.

The leads from the Power Unit LA925 should be wired directly into the power screw terminal mounted in the back plate of Basic Cardrack DP991.

See Fig. 1.22 for installation details.

**INSTALLING THE VENTILATION UNIT DP993.**

The CB901 system should be installed in an area that has adequate ventilation. A temperature range of 0°C (32°F) to 25°C (78°F) and humidity of 30% to 90% relative must be maintained. Under such condition no additional ventilation is needed. When required, a ventilation unit DP993 with two blowers can be supplied. This is a 19" module and should be mounted on top of the Basic Cardrack DP991 and Subscriber Cardrack DP992 (if installed) The unit operates on 24V DC.

See Fig. 1.20

### 3.15. DISPLAY MASTER STATION AA960, CONNECTION OF EXTERNAL FUNCTIONS.

The Display station AA960 can be modified for the following functions

- connection to external loudspeaker
- remote control
- external alarm input (closing contact)

***Connection of external loudspeaker:***

Dismantle the station. Check that a jumper is installed between pin 3 and 4 in the relay K1 position. The jumpers J1, J2 and J3 should be installed between terminals 1 and 2. Using the station in softspeaking mode, if the speech should be muted, the relay K1 must be mounted. The relay must be ordered separately, the order no. is NRD9077. Remove the jumpers between pins 3 and 4. Connect the external loudspeaker to pins 1 and 2 in the wall socket RJ45.

A station AA960 modified for external loudspeaker can not be modified for the "remote control" function.

***Remote control: (control of external device)***

Dismantle the station. Install the relay K1, the jumper between pin 3 and 4 must be removed. The jumpers J1, J2 and J3 should be installed between terminals 2 and 3. The relay must be ordered separately, the order no. is NRD9077. The relay output will be between pin 2 and 7 in the wall socket RJ45. Do not load the relay with more than 1.2 Amp.

A station AA960 modified for "remote control" can not be modified for external loudspeaker.

***External alarm input:***

By closing an external alarm contact, a signal is transferred via the AA960 station to the central unit for activating the feature Direct Access (f.inst for the CAS function). A call will be established to a predetermined subscriber.

No modification in the AA960 station is required. Signal from the alarm device (from a closing contact) must be terminated to the RJ45 wall socket, pin 3 and 8.

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## 4. PROGRAMMING

Reference is made to the techn. manual: SVT PROGRAMMING MANUAL.  
This manual is a guide to programming the Ring-Master system CB 901-1 equipped with the Processor Card NFE 1683.

If the central is equipped with the previous Processor Card NFE 1628 or NFE 1592, use the PROGRAMMING MANUAL, TRICON 3.

If the standard number series and standard features only are required, then a service terminal is not needed.

Programming of individual call numbers can be carried out using a master station AA 904, thus eliminating the need of a service terminal to program the number series.  
See SVT Programming Manual.

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## 5. FINAL CHECKOUT AND COMMISSIONING THE SYSTEM

### INTRODUCTION

When the system has been installed and programmed, perform the following checks to verify the operation of the system and related equipment. If the system is found to be faulty, use the following guidelines to locate the faulty station or printed circuit board(s) and replace the part. This gives minimum system downtime for the customer.

### FINAL CHECK AND COMMISSIONING OF THE SYSTEM

When all cables are connected to their corresponding terminal blocks, check that these terminal blocks are properly plugged into the circuit boards. Check for 24V DC before the system is switched on (minimum/maximum voltage is 21V DC - 29V DC). Turn system switch ON and check the four upper front LEDs on the Power Card NFE 1528. All should be lit. Prepare a list of all individual programs utilized.

Once the cable connections and the central exchange voltages are verified, perform the following station tests:

- a. Station receives warning tone and light when called.
- b. Sound quality - in handsfree and handset modes.
- c. «Handsfree» voice switching.
- d. T-button manual control, press side strip for duplex mode.
- e. Press privacy switch down for microphone cut-off.
- f. X-button, released for cancelling.
- g. Check station's privacy switch function and 0-button to accept a call, also call back to the test station while in the privacy position.
- h. Check all standard and system features.
- i. Check all individual programmes allotted to stations.
- j. Finally, before leaving, make sure that all users have been instructed in the correct use of their station and obtain the signature of the client's responsible representative, accepting the system in full working order.

### SERVICE INFORMATION

**CAUTION:** Always turn power OFF before changing subscriber boards in the central exchange.

The CB 901-1 system is a microprocessor controlled system and for servicing/maintenance a certain level of such knowledge is needed together with some understanding of the software.

Remember that the system is bus organized. This means that all subscriber boards are

«wired» in parallel, except the master station connections. A fault on one of the subscriber boards may therefore cause the whole system to malfunction. For troubleshooting, follow the steps below:

- a. Disconnect all the NFE 1625 (NFE 1525) Subscriber Boards.
- b. Install one board at a time into the different plug positions until the faulty board is located.

A master station fault may be located in the station itself, or one the subscriber board. Check both with a known good station to pin point where the fault is.

The user can be requested NOT to use the system until an all-call announces that the system is ready for use.

**CONVERTION TABLE - STATION POSITION NO./CALL NO.****BASICCARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
00		1000	1256	1512	1768	2024	2280	2536	2792
01		1001	1257	1513	1769	2025	2281	2537	2793
02		1002	1258	1514	1770	2026	2282	2538	2794
03	2	1003	1259	1515	1771	2027	2283	2539	2795
04		1004	1260	1516	1772	2028	2284	2540	2796
05		1005	1261	1517	1773	2029	2285	2541	2797
06		1006	1262	1518	1774	2030	2286	2542	2798
07		1007	1263	1519	1775	2031	2287	2543	2799
08		1008	1264	1520	1776	2032	2288	2544	2800
09		1009	1265	1521	1777	2033	2289	2545	2801
0A		1010	1266	1522	1778	2034	2290	2546	2802
0B	3	1011	1267	1523	1779	2035	2291	2547	2803
0C		1012	1268	1524	1780	2036	2292	2548	2804
0D		1013	1269	1525	1781	2037	2293	2549	2805
0E		1014	1270	1526	1782	2038	2294	2550	2806
0F		1015	1271	1527	1783	2039	2295	2551	2807
10		1016	1272	1528	1784	2040	2296	2552	2808
11		1017	1273	1529	1785	2041	2297	2553	2809
12		1018	1274	1530	1786	2042	2298	2554	2810
13	4	1019	1275	1531	1787	2043	2299	2555	2811
14		1020	1276	1532	1788	2044	2300	2556	2812
15		1021	1277	1533	1789	2045	2301	2557	2813
16		1022	1278	1534	1790	2046	2302	2558	2814
17		1023	1279	1535	1791	2047	2303	2559	2815
18		1024	1280	1536	1792	2048	2304	2560	2816
19		1025	1281	1537	1793	2049	2305	2561	2817
1A		1026	1282	1538	1794	2050	2306	2562	2818
1B	5	1027	1283	1539	1795	2051	2307	2563	2819
1C		1028	1284	1540	1796	2052	2308	2564	2820
1D		1029	1285	1541	1797	2053	2309	2565	2821
1E		1030	1286	1542	1798	2054	2310	2566	2822
1F		1031	1287	1543	1899	2055	2311	2567	2823

**CONVERTION TABLE - STATION POSITION NO./CALL NO.**

**BASIC CARD RACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
20		1032	1288	1544	1800	2056	2312	2568	2824
21		1033	1289	1545	1801	2057	2313	2569	2825
22		1034	1290	1546	1802	2958	2414	2570	2826
23	6	1035	1291	1547	1803	2059	2315	2571	2827
24		1036	1292	1548	1804	2060	2316	2572	2828
25		1037	1293	1549	1805	2061	2317	2573	2829
26		1038	1294	1550	1806	2062	2318	2574	2830
27		1039	1295	1551	1807	2063	2319	2575	2831
28		1040	1296	1552	1808	2064	2320	2576	2832
29		1041	1297	1553	1809	2065	2321	2577	2833
2A		1042	1298	1554	1810	2066	2322	2578	2834
2B	7	1043	1299	1555	1811	2027	2323	2579	2835
2C		1044	1300	1556	1812	2068	2324	2580	2836
2D		1045	1301	1557	1813	2069	2325	2581	2837
2E		1046	1302	1558	1814	2070	2326	2582	2838
2F		1047	1303	1559	1815	2071	2327	2583	2839
30		1048	1304	1560	1816	2072	2328	2584	2840
31		1049	1305	1561	1817	2073	2329	2585	2841
32		1050	1306	1562	1818	2074	2330	2586	2842
33	8	1051	1307	1563	1819	2075	2331	2587	2843
34		1052	1308	1564	1820	2076	2332	2588	2844
35		1053	1309	1565	1821	2077	2333	2589	2845
36		1054	1310	1566	1822	2078	2334	2590	2846
37		1055	1311	1567	1823	2079	2335	2591	2847
38		1056	1312	1568	1824	2080	2336	2592	2848
39		1057	1313	1569	1825	2081	2337	2593	2849
3A		1058	1314	1570	1826	2082	2338	2594	2850
3B	9	1059	1315	1571	1827	2083	2339	2595	2851
3C		1060	1316	1572	1828	2084	2340	2596	2852
3D		1061	1317	1573	1829	2085	2341	2597	2853
3E		1062	1318	1574	1830	2086	2342	2598	2854
3F		1063	1319	1575	1831	2087	2343	3599	2855



**CONVERTION TABLE - STATION POSITION NO./CALL NO.****BASICCARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
40		1064	1320	1576	1832	2088	2344	2600	2856
41		1065	1321	1577	1833	2089	2345	2601	2857
42		1066	1322	1578	1834	2090	2346	2602	2858
43	10	1067	1323	1579	1835	2091	2347	2603	2859
44		1068	1324	1580	1836	2092	2348	2604	2860
45		1069	1325	1581	1837	2093	2349	2605	2861
46		1070	1326	1582	1838	2094	2350	2606	2862
47		1071	1327	1583	1839	2095	2351	2607	2863
48		1072	1328	1584	1840	2096	2352	2608	2864
49		1073	1329	1585	1841	2097	2353	2609	2865
4A		1074	1330	1586	1842	2098	2354	2610	2866
4B	11	1075	1331	1587	1843	2099	2355	2611	2867
4C		1076	1332	1588	1844	2100	2356	2612	2868
4D		1077	1333	1589	1845	2101	2357	2613	2869
4E		1078	1334	1590	1846	2102	2358	2614	2870
4F		1079	1335	1591	1847	2103	2359	2615	2871

**SUBSCRIBER CARDRACK**

50		1080	1336	1592	1848	2104	2360	2616	2872
51		1081	1337	1593	1849	2105	2361	2617	2873
52		1082	1338	1594	1850	2106	2362	2618	2874
53	21 (12)	1083	1339	1595	1851	2107	2363	2619	2875
54		1084	1340	1596	1852	2108	2364	2620	2876
55		1085	1341	1597	1853	2109	2365	2621	2877
56		1086	1342	1598	1854	2110	2366	2622	2878
57		1087	1343	1599	1855	2111	2367	2623	2879
58		1088	1344	1600	1856	2112	2368	2624	2880
59		1089	1345	1601	1857	2113	2369	2625	2881
5A		1090	1346	1602	1858	2114	2370	2626	2882
5B	22 (13)	1091	134	1603	1859	2115	2371	2627	2883
5C		1092	1348	1604	1860	2116	2372	2628	2884
5D		1093	1349	1605	1861	2117	2373	2629	2885
5E		1094	1350	1606	1862	2118	2374	2630	2886
5F		1095	1351	1607	1863	2119	2375	2631	2887

**CONVERTION TABLE - STATION POSITION NO./CALL NO.**

**SUBSCRIBER CARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
60		1096	1352	1608	1864	2120	2376	2632	2888
61		1097	1353	1609	1865	2121	2377	2633	2889
62		1098	1354	1610	1866	2122	2378	2634	2890
63	23	1099	1355	1611	1867	2123	2379	2635	2891
64		1100	1356	1612	1868	2124	2380	2636	2892
65		1101	1357	1613	1869	2125	2381	2637	2893
66		1102	1358	1614	1870	2126	2382	2638	2894
67		1103	1359	1615	1871	2127	2383	2639	2895
68		1104	1360	1616	1872	2128	2384	2640	2896
69		1105	1361	1617	1873	2129	2385	2641	2897
6A		1106	1362	1618	1874	2130	2386	2642	2898
6B	24	1107	1363	1619	1875	2131	2387	2643	2899
6C		1108	1364	1620	1876	2132	2388	2644	2900
6D		1109	1365	1621	1877	2133	2389	2645	2901
6E		1110	1366	1622	1878	2134	2390	2646	2902
6F		1111	1367	1623	1879	2135	2391	2647	2903
70		1112	1368	1624	1880	2136	2392	2648	2904
71		1113	1369	1625	1881	2137	2393	2649	2905
72		1114	1370	1626	1882	2138	2394	2650	2906
73	25	1115	1371	1627	1883	2139	2395	2651	2907
74		1116	1372	1628	1884	2140	2396	2652	2908
75		1117	1373	1629	1885	2141	2397	2653	2909
76		1118	1374	1630	1886	2142	2398	2654	2910
77		1119	1375	1631	1887	2143	2399	2655	2911
78		1120	1376	1632	1888	2144	2400	2656	2912
79		1121	1377	1633	1889	2145	2401	2657	2913
7A		1122	1378	1634	1890	2146	2402	2658	2914
7B	26	1123	1379	1635	1891	2147	2403	2659	2915
7C		1124	1380	1636	1892	2148	2404	2660	2916
7D		1125	1381	1637	1893	2149	2405	2661	2917
7E		1126	1382	1638	1894	2150	2406	2662	2918
7F		1127	1383	1639	1895	2151	2407	2663	2919



**CONVERTION TABLE - STATION POSITION NO./CALL NO.****SUBSCRIBER CARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
80		1128	1384	1640	1896	2152	2408	2664	2920
81		1129	1385	1641	1897	2153	2409	2665	2921
82		1130	1386	1642	1898	2154	2410	2666	2922
83	27	1131	1387	1643	1899	2155	2411	2667	2923
84		1132	1388	1644	1900	2156	2412	2668	2924
85		1133	1389	1645	1901	2157	2413	2669	2925
86		1134	1390	1646	1902	2158	2414	2670	2926
87		1135	1391	1647	1903	2159	2415	2671	2927
88		1136	1392	1648	1904	2160	2416	2672	2928
89		1137	1393	1649	1905	2161	2417	2673	2929
8A		1138	1394	1650	1906	2162	2418	2674	2930
8B	28	1139	1395	1651	1907	2163	2419	2675	2931
8C		1140	1396	1652	1908	2164	2420	2676	2932
8D		1141	1397	1653	1909	2165	2421	2677	2933
8E		1142	1398	1654	1910	2166	2422	2678	2934
8F		1143	1399	1655	1911	2167	2423	2679	2935
90		1144	1400	1656	1912	2168	2424	2680	2936
91		1145	1401	1657	1913	2169	2425	2681	2937
92		1146	1402	1658	1914	2170	2426	2682	2939
93	29	1147	1403	1659	1915	2171	2427	2683	2939
94		1148	1404	1660	1916	2172	2428	2684	2940
95		1149	1405	1661	1917	2173	2429	2685	2941
96		1150	1406	1662	1918	2174	2430	2686	2042
97		1151	1407	1663	1919	2175	2431	2687	2943
98		1152	1408	1664	1920	2176	2432	2688	2944
99		1153	1409	1665	1921	2177	2433	2689	2945
9A		1154	1410	1666	1922	2178	2434	2690	2946
9B	30	1155	1411	1667	1923	2179	2435	2691	2947
9C		1156	1412	1668	1924	2180	2436	2692	2948
9D		1157	1413	1669	1925	2181	2437	2693	2949
9E		1158	1414	1670	1926	2182	2438	2694	2950
9F		1159	1415	1671	1927	2183	2439	2695	2951

**CONVERTION TABLE - STATION POSITION NO./CALL NO.**

**SUBSCRIBER CARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
A0		1160	1416	1672	1928	2184	2440	2696	2952
A1		1161	1417	1673	1929	2185	2441	2697	2953
A2		1162	1418	1674	1930	2186	2442	2698	2954
A3	31	1163	1419	1675	1931	2187	2443	2699	2955
A4		1164	1420	1676	1932	2188	2444	2700	2956
A5		1165	1421	1677	1933	2189	2445	2701	2957
A6		1166	1422	1678	1934	2190	2446	2702	2958
A7		1167	1423	1679	1935	2191	2447	2703	2959
A8		1168	1424	1680	1936	2192	2448	2704	2960
A9		1169	1425	1681	1937	2193	2449	2705	2961
AA		1170	1426	1682	1938	2194	2450	2706	2962
AB	32	1171	1427	1683	1939	2195	2451	2707	2963
AC		1172	1428	1684	1940	2196	2452	2708	2964
AD		1173	1429	1685	1941	2197	2453	2709	2965
AE		1174	1430	1686	1942	2198	2454	2710	2966
AF		1175	1431	1687	1943	2199	2455	2711	2967
B0		1176	1432	1688	1944	2200	2456	2712	2968
B1		1177	1433	1689	1845	2201	2457	2713	2969
B2		1178	1434	1690	1946	2202	2458	2714	2970
B3	33	1179	1435	1691	1947	2203	2459	2715	2971
B4		1180	1436	1692	1948	2204	2460	2716	2972
B5		1181	1437	1693	1949	2205	2461	2717	2973
B6		1182	1438	1694	1950	2206	2462	2718	2974
B7		1183	1439	1695	1951	2207	2463	2719	2975
B8		1184	1440	1696	1952	2208	2464	2720	2976
B9		1185	1441	1697	1953	2209	2465	2721	2977
BA		1186	1442	1698	1954	2210	2466	2722	2978
BB	34	1187	1443	1699	1955	2211	2467	2723	2980
BC		1188	1444	1700	1956	2212	2568	2724	2981
BD		1189	1445	1701	1957	2213	2469	2725	2982
BE		1190	1446	1702	1958	2214	2470	2726	2983
BF		1191	1447	1703	1959	2215	2471	2727	2984



**CONVERTION TABLE - STATION POSITION NO./CALL NO.****SUBSCRIBER CARDRACK**

STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
C0		1192	1448	1704	1960	2216	2472	2728	2984
C1		1193	1449	1705	1961	2217	2473	2729	2985
C2		1194	1450	1706	1962	2218	2474	2730	2986
C3	35	1195	1451	1707	1963	2219	2475	2731	2987
C4		1196	1452	1708	1964	2220	2476	2732	2988
C5		1197	1453	1709	1965	2221	2477	2733	2989
C6		1198	1454	1710	1966	2222	2478	2734	2990
C7		1199	1455	1711	1967	2223	2479	2735	2991
C8		1200	1456	1712	1968	2224	2480	2736	2992
C9		1201	1457	1713	1969	2225	2481	2737	2993
CA		1202	1458	1714	1970	2226	2482	2738	2994
CB	36	1203	1459	1715	1971	2227	2483	2739	2995
CC		1204	1460	1716	1972	2228	2484	2740	2996
CD		1205	1461	1717	1973	2229	2485	2741	2997
CE		1206	1462	1718	1974	2230	2486	2742	2998
CF		1207	1463	1719	1975	2231	2487	2743	2999
D0		1208	1464	1720	1976	2232	2488	2744	3000
D1		1209	1465	1721	1977	2233	2489	2745	3001
D2		1210	1466	1722	1978	2234	2490	2746	3002
D3	37	1211	1467	1723	1979	2235	2491	2747	3003
D4		1212	1468	1724	1980	2236	2492	2748	3004
D5		1213	1469	1725	1981	2237	2493	2749	3005
D6		1214	1470	1726	1982	2238	2494	2750	3006
D7		1215	1471	1727	1983	2239	2495	2751	3007
D8		1216	1472	1728	1984	2240	2496	2752	3008
D9		1217	1473	1729	1985	2241	2497	2753	3009
DA		1218	1474	1730	1986	2242	2498	2754	3010
DB	38	1219	1475	1731	1987	2243	2499	2755	3011
DC		1220	1476	1732	1988	2244	2500	2756	3012
DD		1221	1477	1733	1989	2245	2501	2757	3013
DE		1222	1478	1734	1990	2246	2502	2758	3014
DF		1223	1479	1735	1991	2247	2503	2759	3015

**CONVERTION TABLE - STATION POSITION NO./CALL NO.**

**SUBSCRIBER CARDRACK**

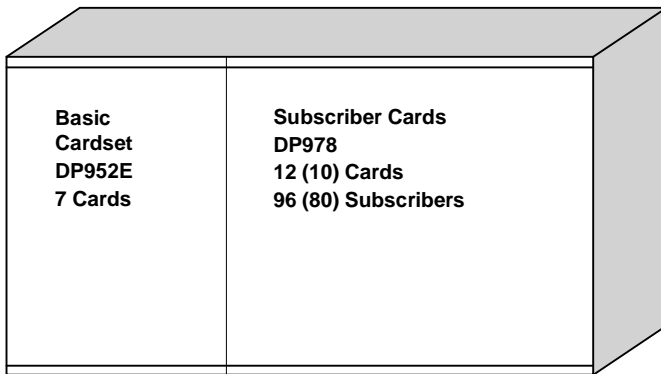
STATION POS. NO.	CARD POS. NO.	1	2	3	4	5	6	7	8
E0		1224	1480	1736	1992	2248	2504	2760	3016
E1		1225	1481	1737	1993	2249	2505	2761	3017
E2		1226	1482	1738	1994	2250	2506	2762	3018
E3	39	1227	1483	1739	1995	2251	2507	2763	3019
E4		1228	1484	1740	1996	2252	2508	2764	3020
E5		1229	1485	1741	1997	2253	2509	2765	3021
E6		1230	1486	1742	1998	2254	2510	2766	3022
E7		1231	1487	1743	1999	2255	2511	2767	3023
E8		1232	1488	1744	2000	2257	2512	2768	3024
E9		1233	1489	1745	2001	2258	2513	2769	3025
EA		1234	1490	1746	2002	2259	2514	2770	3026
EB	40	1235	1491	1747	2003	2260	2515	2771	3027
EC		1236	1492	1748	2004	2261	2516	2772	3028
ED		1237	1493	1749	2005	2262	2517	2773	3029
EE		1238	1494	1750	2006	2263	2518	2774	3030
EF		1239	1495	1751	2007	2264	2519	2775	3031

## 6. TECHNICAL SPECIFICATIONS

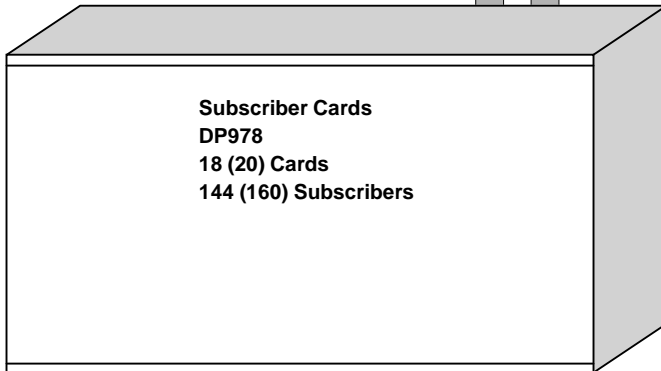
Power requirements:	24V DC regulated
Internal operating voltages:	
CMOS integrated circuits:	+/- 5V reg.
TTL integrated circuits:	+/- 5V reg.
Power consumption, Basic Cardset DP 952E 1 amp.	
Power consumption, subscriber card:	100 mA per card
Max. power consumption:	approx. 50W
Cable specifications:	
2 individual leads per station for speech and signalling 2 leads for power supply. Normal telephone cable, twisted pairs, standard 0,5 - 0,6 mm/22 gauge	
Line specifications:	
Frequency range:	300-5000 Hz
Galvanic:	0 dBm (1 mW/600 ohm)
Speech level, normal:	- 12 dBm
Speech level, max:	+ 4 dBm
Tone signalling level:	- 10 dBm
Tone signalling frequencies in accordance with CCITT norms	
Switching principle:	Time Division Multiplex (TDM) with analog transmission based on Pulse Amplitude Modulation (PAM)
Programme organization:	Microprocessor (MPU) 16 bit processor MC68000.
Memories:	
EPROM	512 kbyte
RAM	192 kbyte
Cassette dimensions (complete with cover):	
Height:	265 mm - 10.4"
Width:	483 mm - 19.0"
Depth:	262 mm - 10.3"
Colour:	Pearl grey

**Ring-Master System CB901  
Standard Cardrack Configuration**

**BASIC CARDRACK DP979**



**SUBSCRIBER CARDRACK DP980**



**POWER  
SUPPLY LA924**

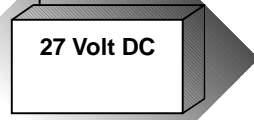


Fig. 1.6. System CB901-1 Layout

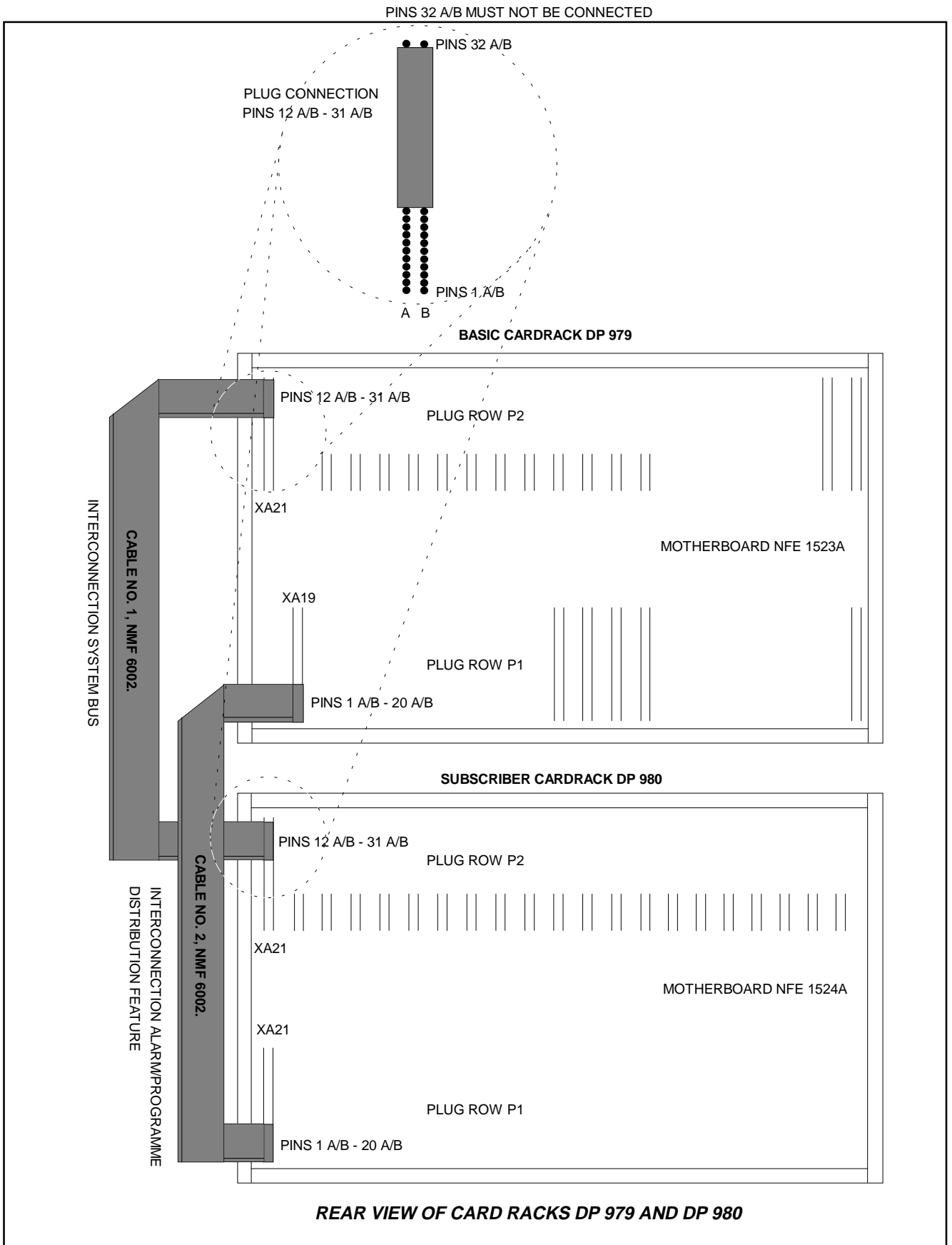
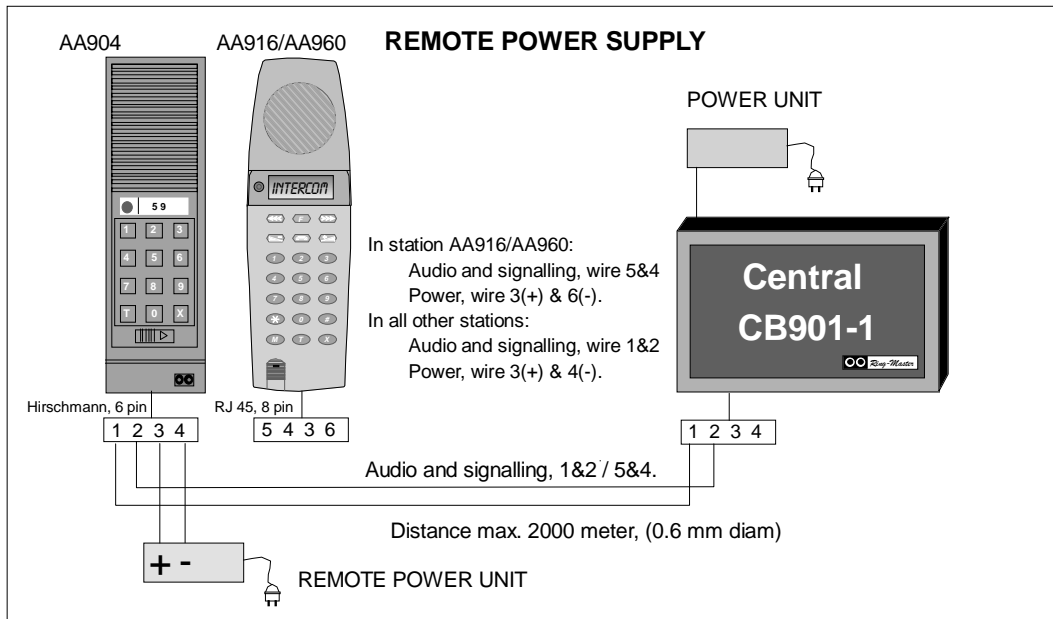
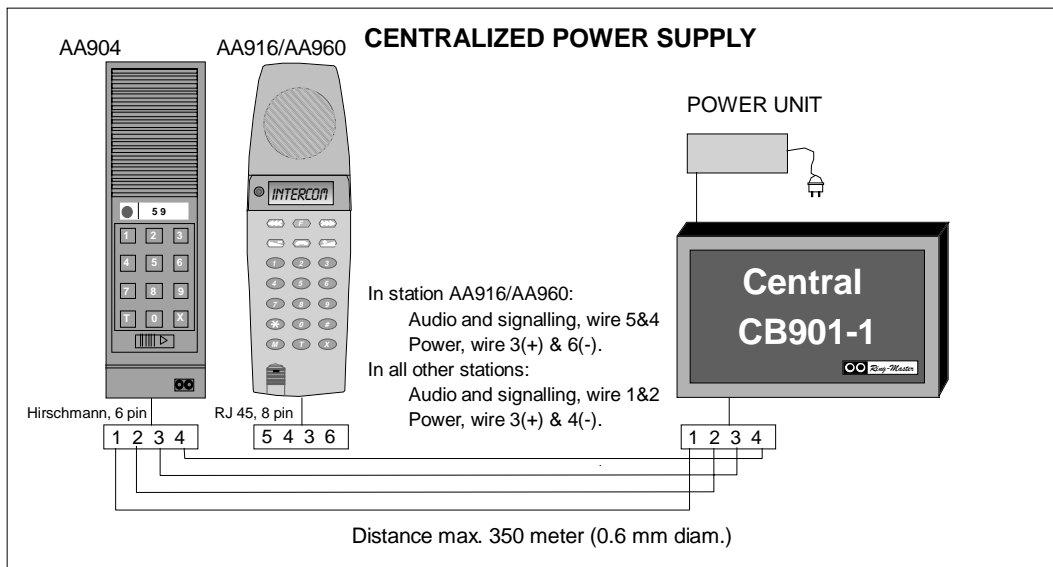
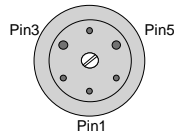


Fig. 1.7. Interconnection Cardracks DP979 - DP980

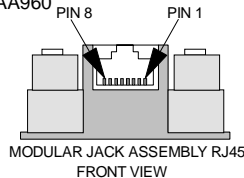


**Termination to installation cable:**  
 Stations using 6 pin Hirschmann plug:  
 AA904, AB911, AB917, AB918  
 and AB919.



- Pin 1: wire 1, audio & signalling
- Pin 2: wire 2, audio & signalling
- Pin 3: wire 3, power 24VDC, (+)
- Pin 4: wire 4, power 24VDC, (-)
- Pin 5: external loudspeaker
- Pin 6: external loudspeaker

**Termination to installation cable:**  
 Stations using 8 pin modular RJ45 plug:  
 AA916/AA960



- Pin 1: external loudspeaker
- Pin 2: external loudspeaker, remote output
- Pin 3: wire 3, power 24VDC (+), remote input
- Pin 4: wire 2, (B), audio & signalling
- Pin 5: wire 1, (A), audio & signalling
- Pin 6: wire 4, power 24VDC, (-)
- Pin 7: remote output
- Pin 8: remote input

Fig. 1.8. Cable termination in station sockets

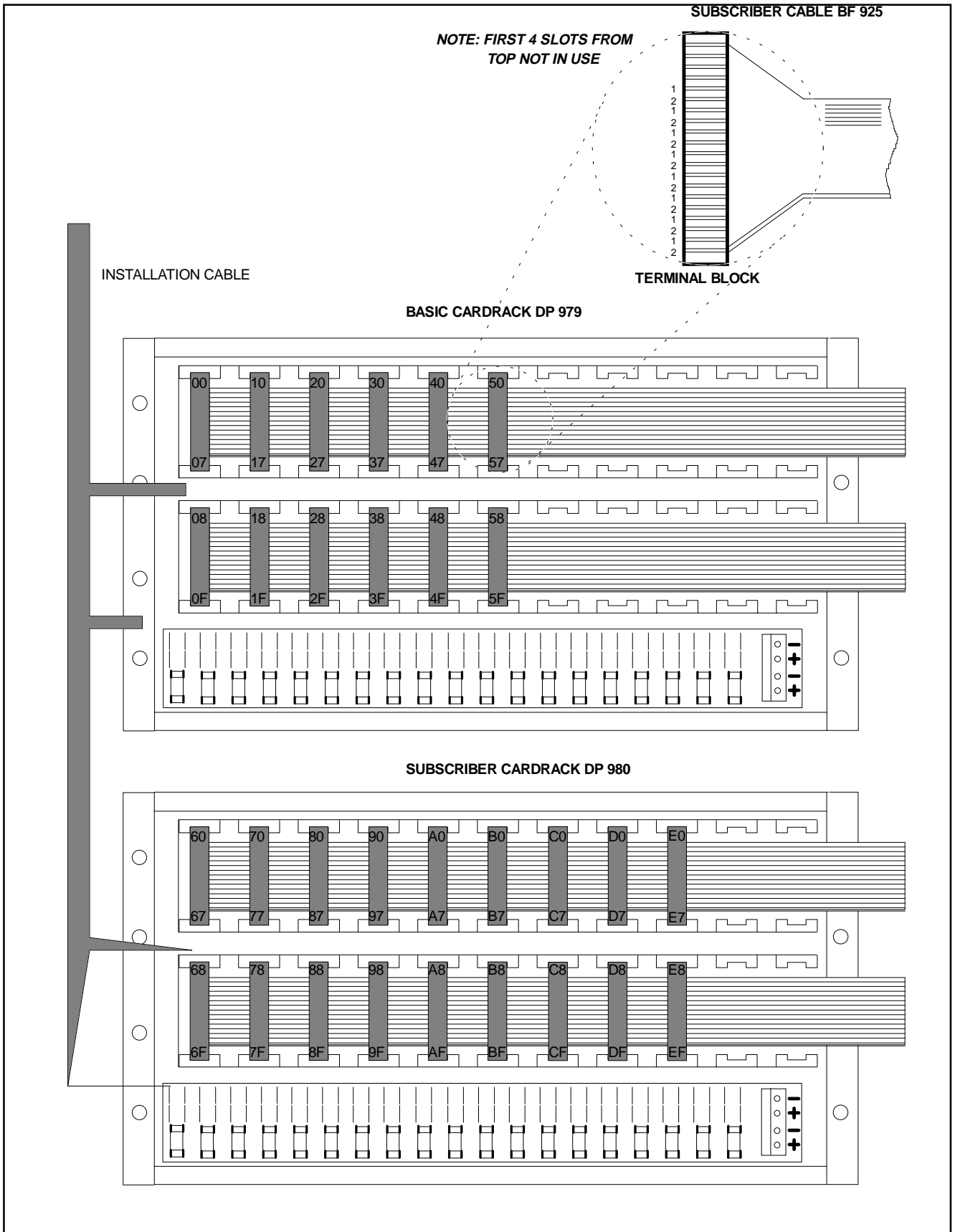


Fig. 1.9. Location of Subscriber Cable BF925.

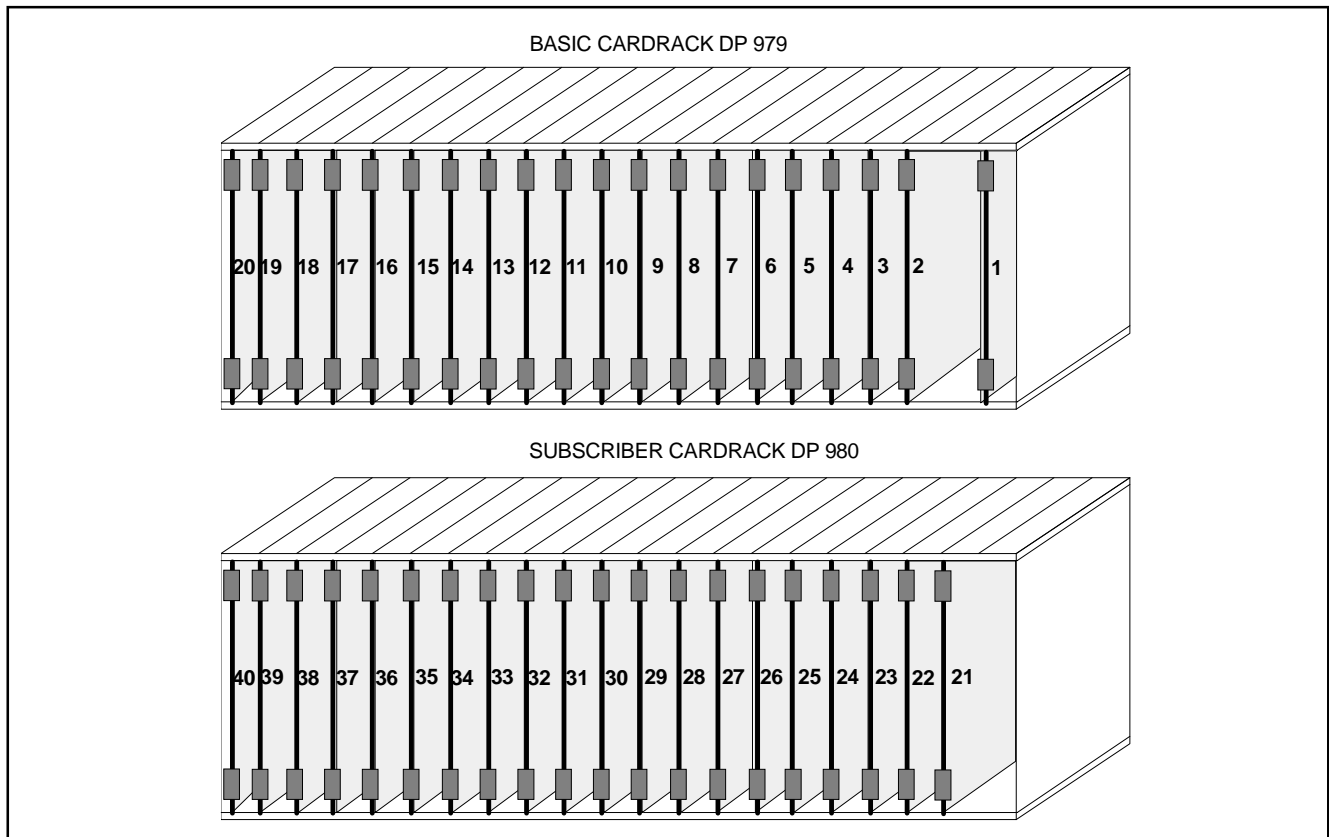
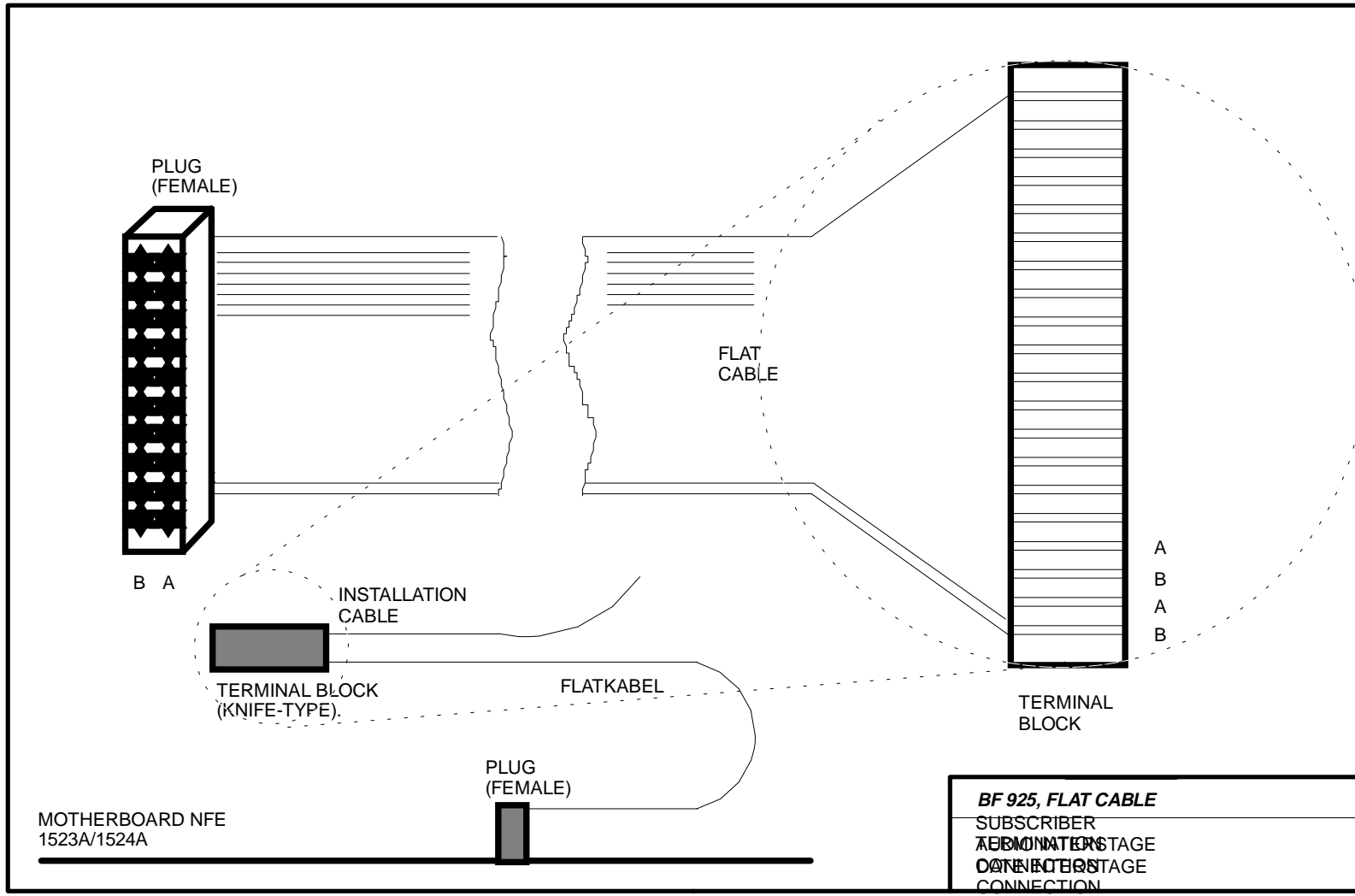


Fig. 1.10. CB901-1, Printed circuit board layout

CARD POS.	PCB-CODE	DESCRIPT.	SUB.POS.NOS.	CARD POS.	PCB-CODE	DESCRIPT.	SUB.POS.NOS.
1	NFE 1528	POWER CARD		21	NFE 1625	SUBSCR.CARD	50-57
2	NFE 1625	SUBSCR.CARD	00-07	22	NFE 1625	SUBSCR.CARD	58-5F
3	NFE 1625	SUBSCR.CARD	08-0F	23	NFE 1625	SUBSCR.CARD	60-67
4	NFE 1625	SUBSCR.CARD	10-17	24	NFE 1625	SUBSCR.CARD	68-6F
5	NFE 1625	SUBSCR.CARD	18-1F	25	NFE 1625	SUBSCR.CARD	70-77
6	NFE 1625	SUBSCR.CARD	20-27	26	NFE 1625	SUBSCR.CARD	78-7F
7	NFE 1625	SUBSCR.CARD	28-2F	27	NFE 1625	SUBSCR.CARD	80-87
8	NFE 1625	SUBSCR.CARD	30-37	28	NFE 1625	SUBSCR.CARD	88-8F
9	NFE 1625	SUBSCR.CARD	38-3F	29	NFE 1625	SUBSCR.CARD	90-97
10	NFE 1625	SUBSCR.CARD	40-47	30	NFE 1625	SUBSCR.CARD	98-9F
11	NFE 1625	SUBSCR.CARD	48-4F	31	NFE 1625	SUBSCR.CARD	A0-A7
12	NFE 1625	SUBSCR.CARD	50-57	32	NFE 1625	SUBSCR.CARD	A8-AF
13	NFE 1625	SUBSCR.CARD	58-5F	33	NFE 1625	SUBSCR.CARD	B0-B7
14	NFE 1521	LINK CONTROL CARD		34	NFE 1625	SUBSCR.CARD	B8-BF
15	NFE 1521	LINK CONTROL CARD		35	NFE 1625	SUBSCR.CARD	CO-C7
16	NFE 1607	AUDIO CONTROL CARD		36	NFE 1625	SUBSCR.CARD	C8-CF
17	NFE 1519	SWITCH CONTROL CARD		37	NFE 1625	SUBSCR.CARD	D0-D7
18	NFE 1606	TIMING CONTROL CARD		38	NFE 1625	SUBSCR.CARD	D8-DF
19	NFE 1683	PROCESSOR CARD		39	NFE 1625	SUBSCR.CARD	E0-E7
20				40	NFE 1625	SUBSCR.CARD	E8-EF

PROGRAMME DISTRIBUTION CARD NFE 1626 WILL OCCUPY ONE SUBSCRIBER CARD POSITION, 10, 11, 12 OR 13. NORMALLY CARD POSITION 10 IS USED, BUT IF THE CENTRAL IS FULLY EQUIPPED (30 SUBSCRIBER CARDS) USE 12 OR 13.

Fig. 1.11. Subscriber Cable BF925



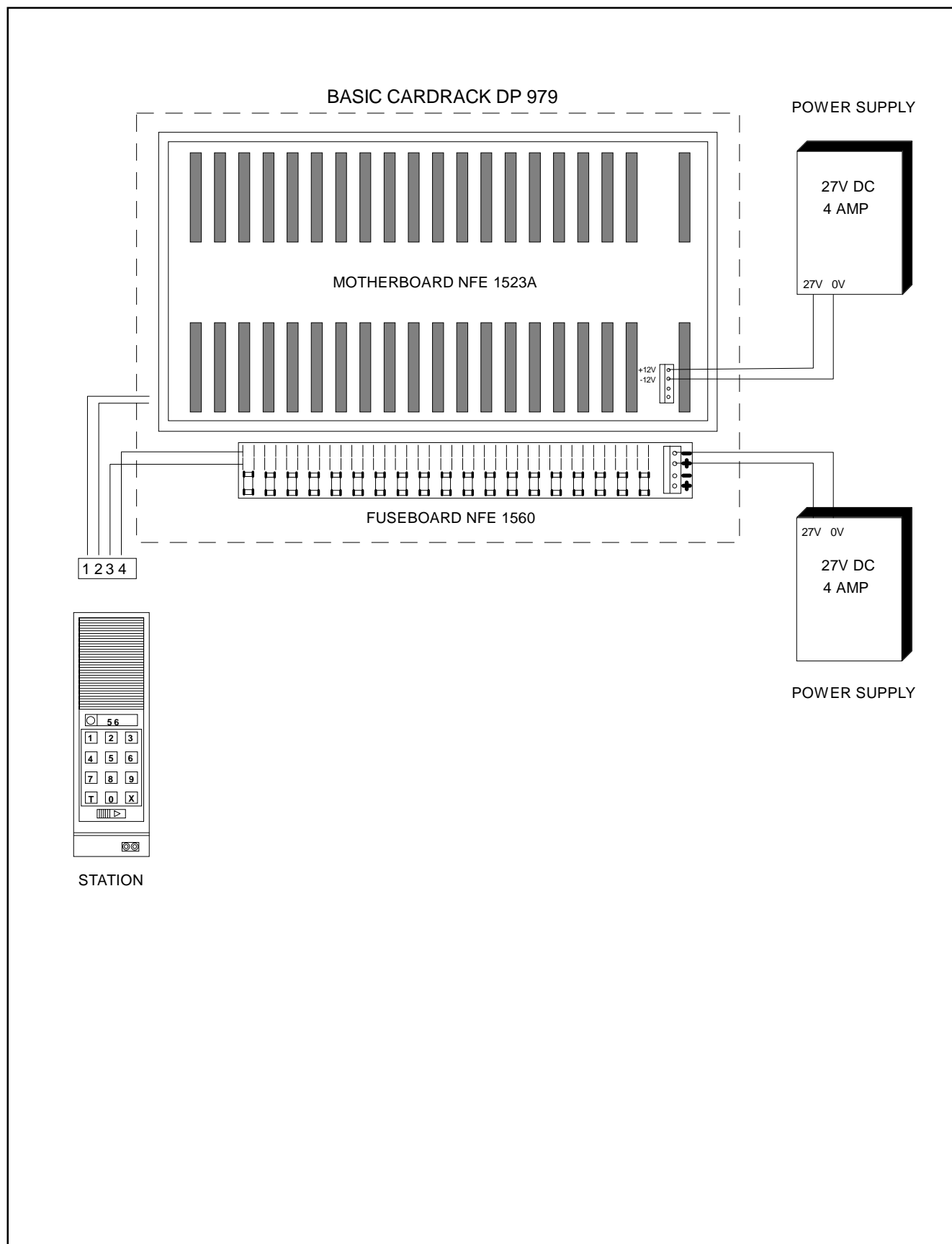


Fig. 1.12. Power Layout. System with Basic Cardrack DP979 only.

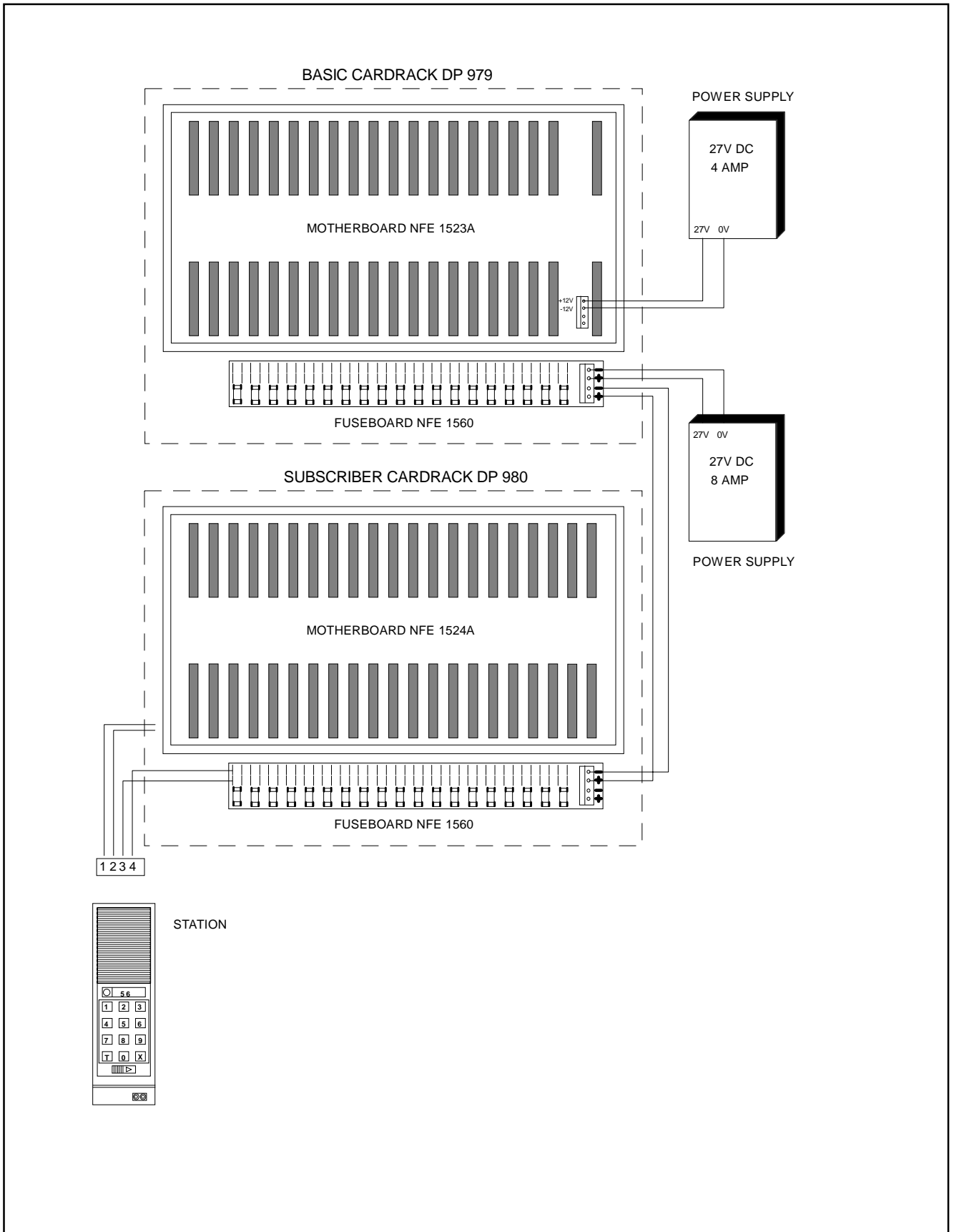


Fig. 1.13. Power Layout. System with DP070 and DP980.

Number of Subscribers		56	96	144	240
One all-call every 5 min.	PU2	x	x	x	x
	PU3		x	x	x
	PU4			x	x
One all-call every 30 min.	PU2	x	x	x	x
	PU3		x	x	x
	PU4				x
One all-call every 1 hour	PU2	x	x	x	x
	PU3		x	x	x
	PU4				
One all-call every 24 hour	PU2	x	x	x	x
	PU3		x	x	x
	PU4				
One all-call every 168 hour	PU2	x	x	x	x
	PU3		x	x	x
	PU4				
Battery capacity: 2 x 12 V		20 Ah	36 Ah	12 + 36Ah	36+ 36Ah

Fig. 1.14. Power Layout. System with All/Group-call, Battery capacity.



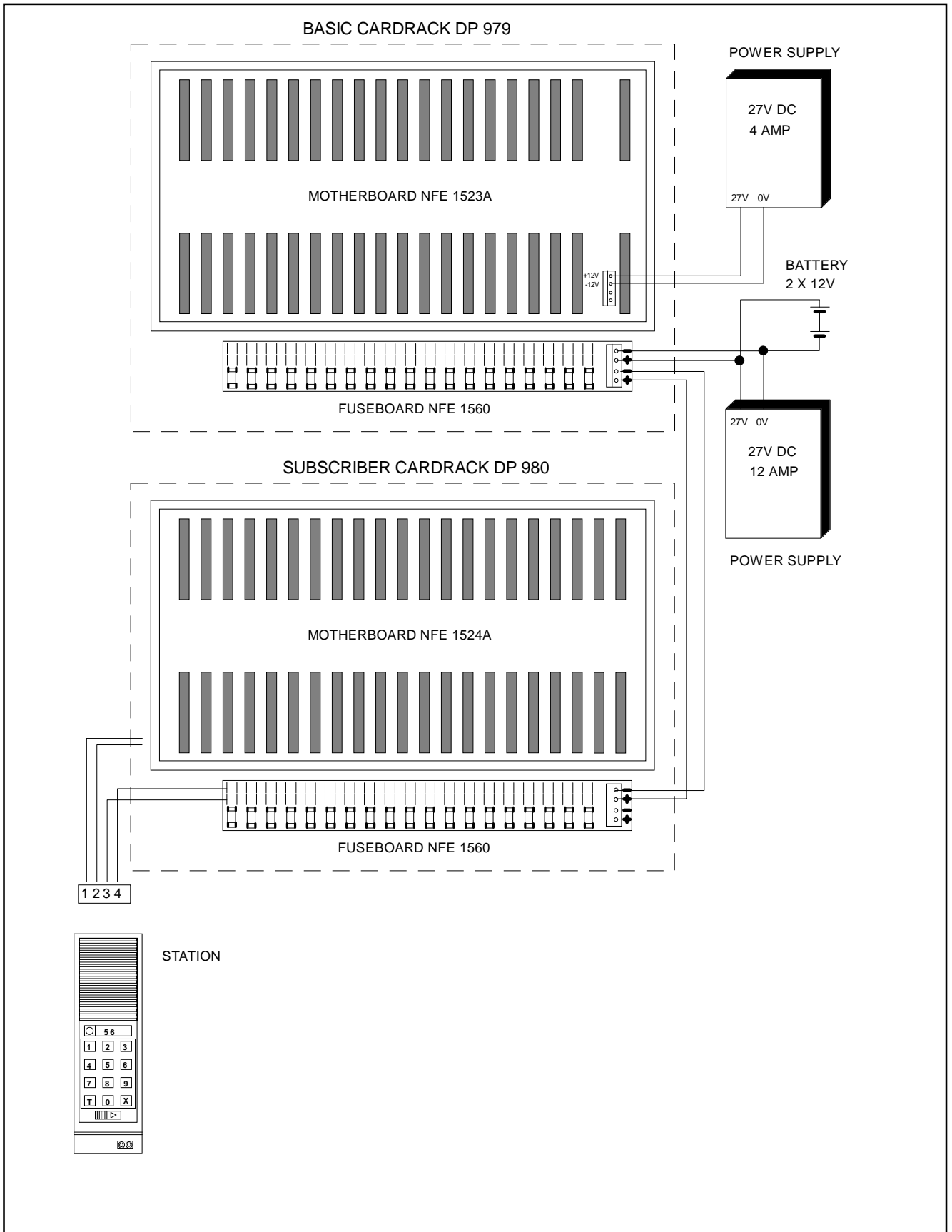


Fig. 1.15. Power Layout. System with all/Group-call.

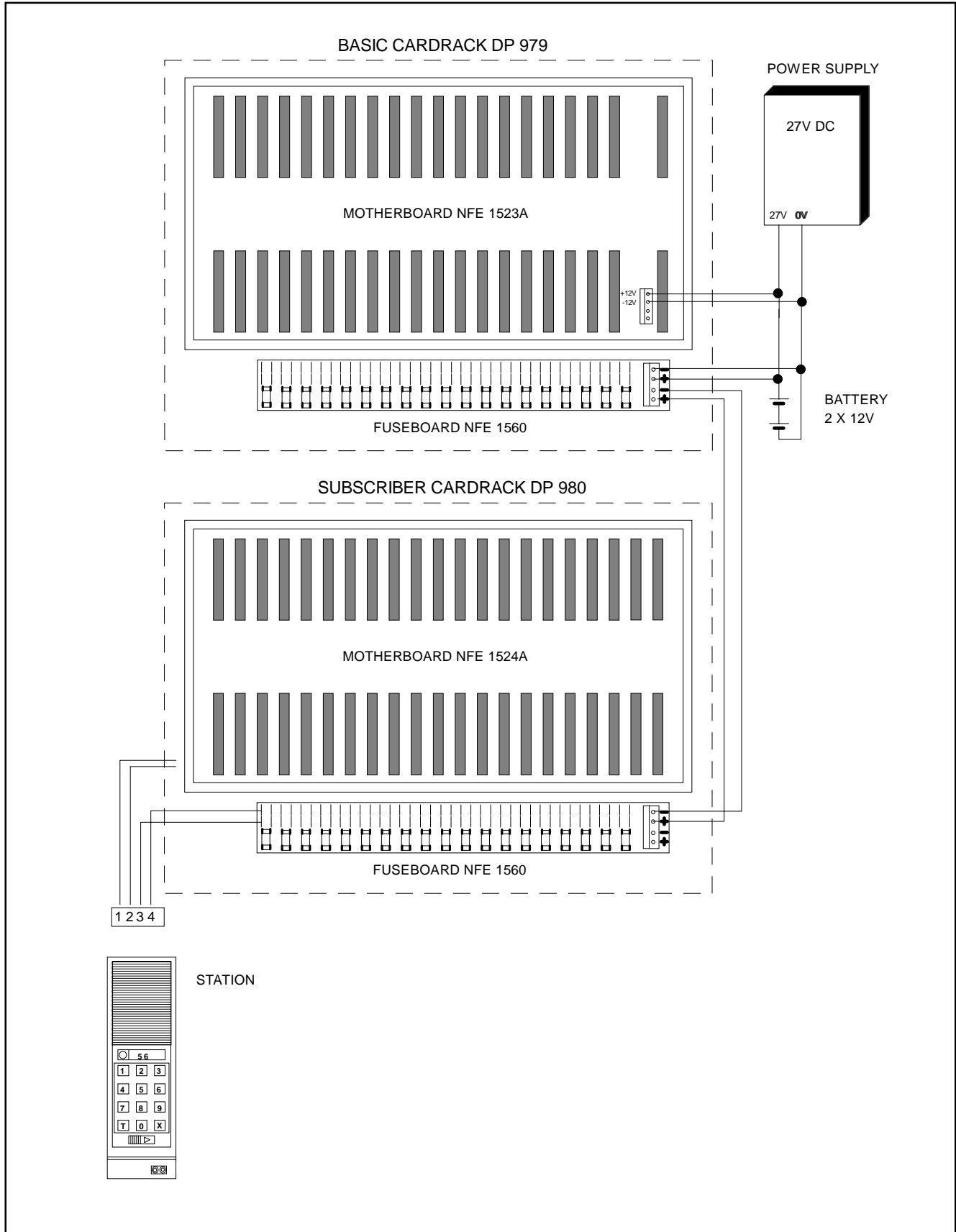


Fig. 1.16. System with Back-up Batteries. Layout.

## ***Emergency power operation of Ring-Master intercom systems.***

The CB901 system is as standard operating at 27vDc.

When calculating the power cable distance between the stations and the power supply, we are normally using this value as a reference. When using this value, we can accept a loss of 6vDc in the cable.

This is equivalent to approximately 350 meters for an AA960 station, when using 0.6mm cable.

When the system is connected to an emergency battery, the charging voltage will normally be 27.2 vDc.

However, when the system is supplied from the battery during mains failure, the voltage will drop to 24vDc, and slowly decrease from this value.

The cable distance to the stations will immediately be reduced to approximately 180 meters.

The operating voltage of a system operating on battery, should therefore be calculated for 24vDc operation, not 27vDc.

But it is not easy to keep the battery voltage at 24vDc during the entire emergency periode.

The battery voltage will start to drop, after a discharge periode, and this periode will again be depending on the battery capacity.

### *Example:*

A system is specified for 4 hours battery operation.

The power consumption is 100AH.

To maintain 24vDc for the entire 4 hours periode, with the specified load, we will need a battery with capacity between 250 and 300AH.

This will give a high cost for the battery and charger.

Recommendation:

We will therefore recommend the use of a 48vDc battery and charger for larger systems.

Between the battery and the installation you must install a DC/DC converter, which will supply a steady 27vDc.

The output will be stable 27vDc, for inputs normally between 36vDc and 76vDc.

The units are delivered in the following current ranges:

7A, 10A, 14A, 16A and 21A.

The units can easily be connected in parallel for increased power output.

The converter must be calculated to deliver the current required for the complete installation.

If All/Call and Group/Call is used, but not programme distribution, then a small dryfit battery can be installed between the DC/DC converter and the installation.

The extra current required during the short time for All/Call, will then be delivered from this battery.

A normal capacity of such a battery is 16 Ah for a 240 numbers central.

### ***System current consumption:***

<b>Basic Cardset:</b>	<b>1 A</b>
<b>Each Subscriber Card:</b>	<b>0.1 A</b>
<b>Station in idle:</b>	<b>0.02 A</b>
<b>Station ON, talking:</b>	<b>0.1 A</b>
<b>Station ON, listening normal level:</b>	<b>0.15 A</b>
<b>Station ON, listening max. level:</b>	<b>0.2 A</b>
<b>Station ON, listening w/16 ohm parallel speaker:</b>	<b>0.4 A</b>

Fig. 1.17. Table for charger and battery capacity. System with Back-up Battery.

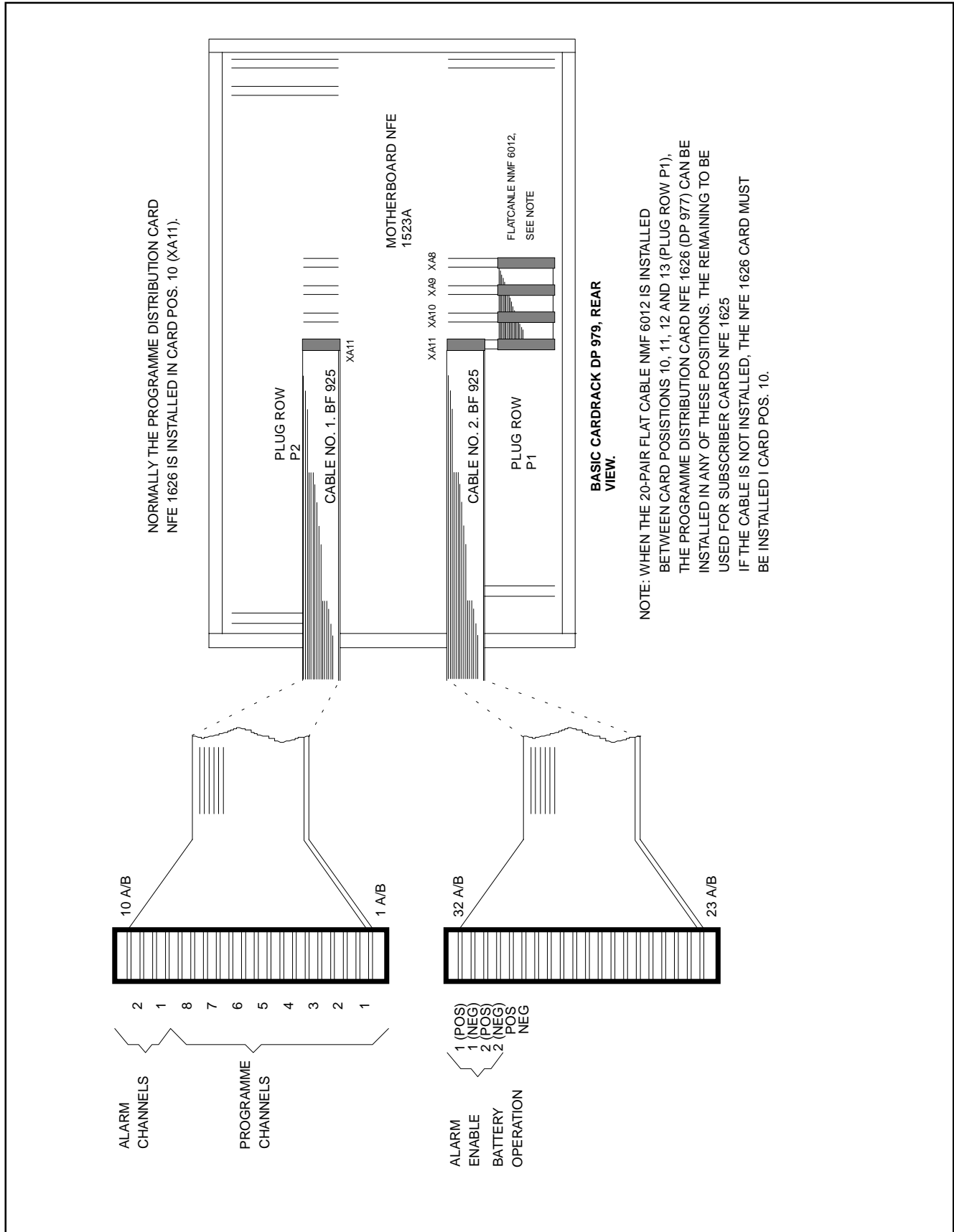


Fig. 1.18. Connection of Alarm/Programme Distribution signals.

CONNECTION OF EXTERNAL DEVICES TO 3M TERMINALS OF FLAT CABLE. THE FLAT CABLE IS TERMINATED TO THE 64 PIN ROW OF THE CPU CARD, PINS 1A/B TO 32A/B:

27A	RTS	- - - -	
27B	CTS		
26A	RX	RS 232	<i>PORT NO. 5 (fixed)</i>
26B	GND	Service terminal connection (SVT)	
25A	TX		
25B	DTR	- - - -	
24A	RTS		
24B	CTS		
23A	RX	RS 232	<i>PORT NO. 6 (fixed)</i>
23B	GND	Printer	
22A	TX		
22B	DTR	- - - -	
21A	RTS		
21B	CTS		
20A	RX	RS 232	<i>PORT NO. 4</i>
20B	GND	Pocket Paging Connection	
19A	TX		
19B	DTR	- - - -	
18A	RTS		
18B	CTS		
17A	RX	RS 232	<i>PORT NO. 3</i>
17B	GND	Display Driver	
16A	TX		
16B	DTR	- - - -	
		Service Terminal	
		9-pin D-connector in front of the NFE 1683. RS 232 serial port	
		pin:	
		2	RX
		3	TX
		4	DTR
		5	GND
		7	RTS
		8	CTS
7A	+ RX	20 mA current loop.	Serial input
7B	-	- - - -	
6A	+ RX	20 mA current loop.	Serial input
6B	-	- - - -	
5A	+ TX	20 mA current loop.	Serial output
5B	-	- - - -	
4A	+		
4B	- RX	20 mA current loop.	Stage interconnection. <i>PORT NO. 2.</i>
3A	+		(Analog link)
3B	- TX	- - - -	
2A	+		
2B	- RX	20 mA current loop.	Stage interconnection. <i>PORT NO. 1.</i>
1A	+		(Analog link)
1B	- TX		

Fig. 1.19. Connector Layout, CPU Card NFE1683.

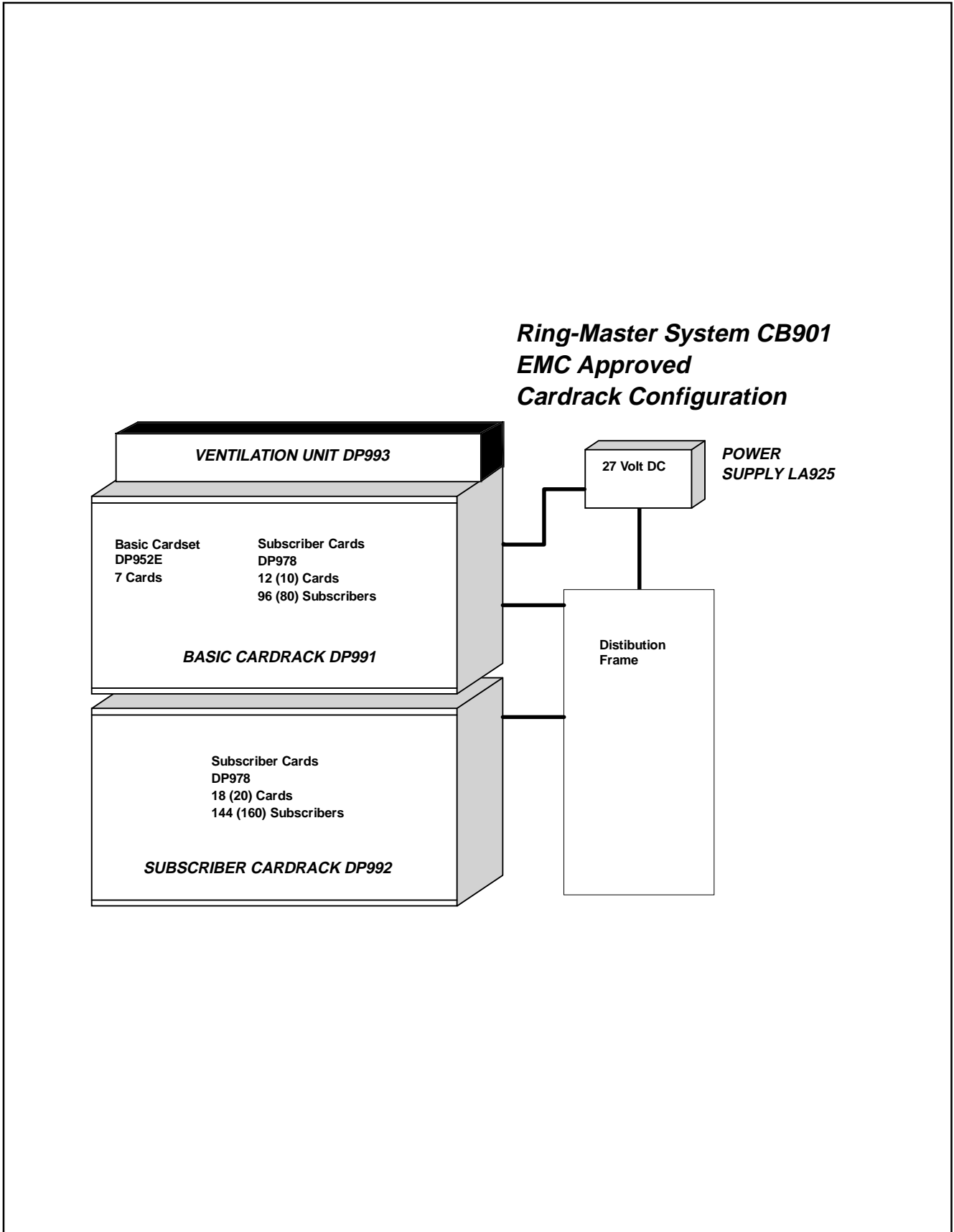
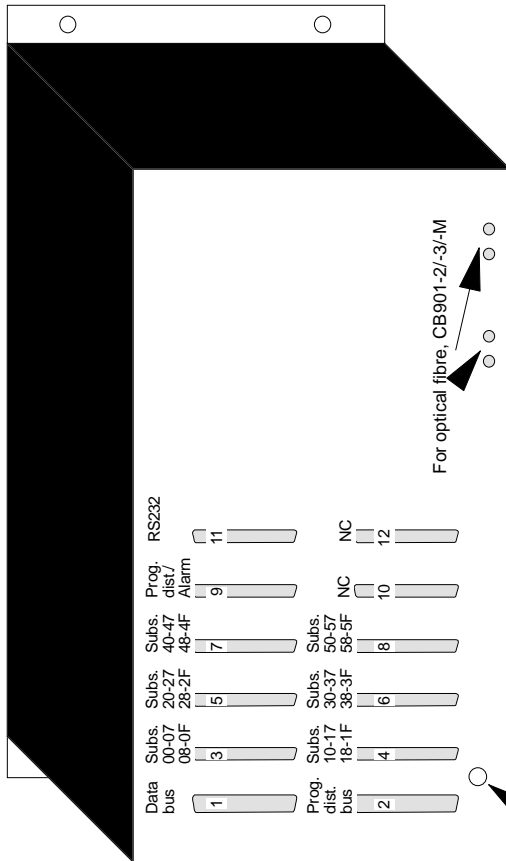


Fig. 1.20. System CB901-1, EMC approved configuration.

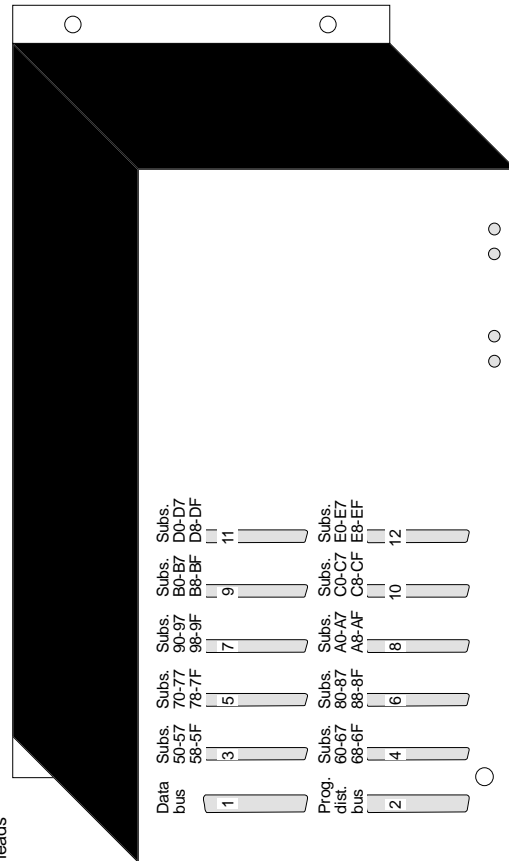
**BASIC CARDRACK DP991**



**In BASIC CARDRACK DP991:**

- The Filter Adapter BF951 must be installed in the following positions; 3,4,5,6,7,8,9 and 11. All 37 pin D-sub type.
- Position no. 1: Bus cable for data signals, 50 pin D-sub.
  - Position no. 2: Bus cable for Programme Distribution/Alarm signals, 50 pin D-sub
  - Position no. 3: Subscriber card no. 1 and 2, line equip. no. 00-07,08-0F
  - Position no. 4: Subscriber card no. 3 and 4, line equip. no. 10-17,18-1F
  - Position no. 5: Subscriber card no. 5 and 6, line equip. no. 20-27,28-2F
  - Position no. 6: Subscriber card no. 7 and 8, line equip. no. 30-37,38-3F
  - Position no. 7: Subscriber card no. 9 and 10, line equip. no. 40-47,48-4F
  - Position no. 8: Subscriber card no. 11 and 12, line equip. no. 50-57,58-5F
  - Position no. 9: Programme Distribution/Alarm card
  - Position no. 10: Not connected
  - Position no. 11: RS232 Serial data interface cable
  - Position no. 12: Not connected

**SUBSCRIBER CARDRACK DP992**



**In SUBSCRIBER CARDRACK DP992:**

- The Filter Adapter BF951 must be installed in the following positions; 3,4,5,6,7,8,9,10,11 and 12. All 37 pin D-sub type.
- Position no. 1: Bus cable for data signals, 50 pin D-sub
  - Position no. 2: Bus cable for Programme Distribution/Alarm signals, 50 pin D-sub
  - Position no. 3: Subscriber card no. 21 and 22, line equip. no. 50-57,58-5F
  - Position no. 4: Subscriber card no. 23 and 24, line equip. no. 60-67,68-6F
  - Position no. 5: Subscriber card no. 25 and 26, line equip. no. 70-77,78-7F
  - Position no. 6: Subscriber card no. 27 and 28, line equip. no. 80-87,88-8F
  - Position no. 7: Subscriber card no. 29 and 30, line equip. no. 90-97,98-9F
  - Position no. 8: Subscriber card no. 31 and 32, line equip. no. A0-A7, A8-AF
  - Position no. 9: Subscriber card no. 33 and 34, line equip. no. B0-B7, B8-BF
  - Position no. 10: Subscriber card no. 35 and 36, line equip. no. C0-C7, C8-CF
  - Position no. 11: Subscriber card no. 37 and 38, line equip. no. D0-D7, D8-DF
  - Position no. 12: Subscriber card no. 39 and 40, line equip. no. E0-E7, E8-EF

Fig. 1.21. Filter Adaptor Layout, DP991 and DP992..

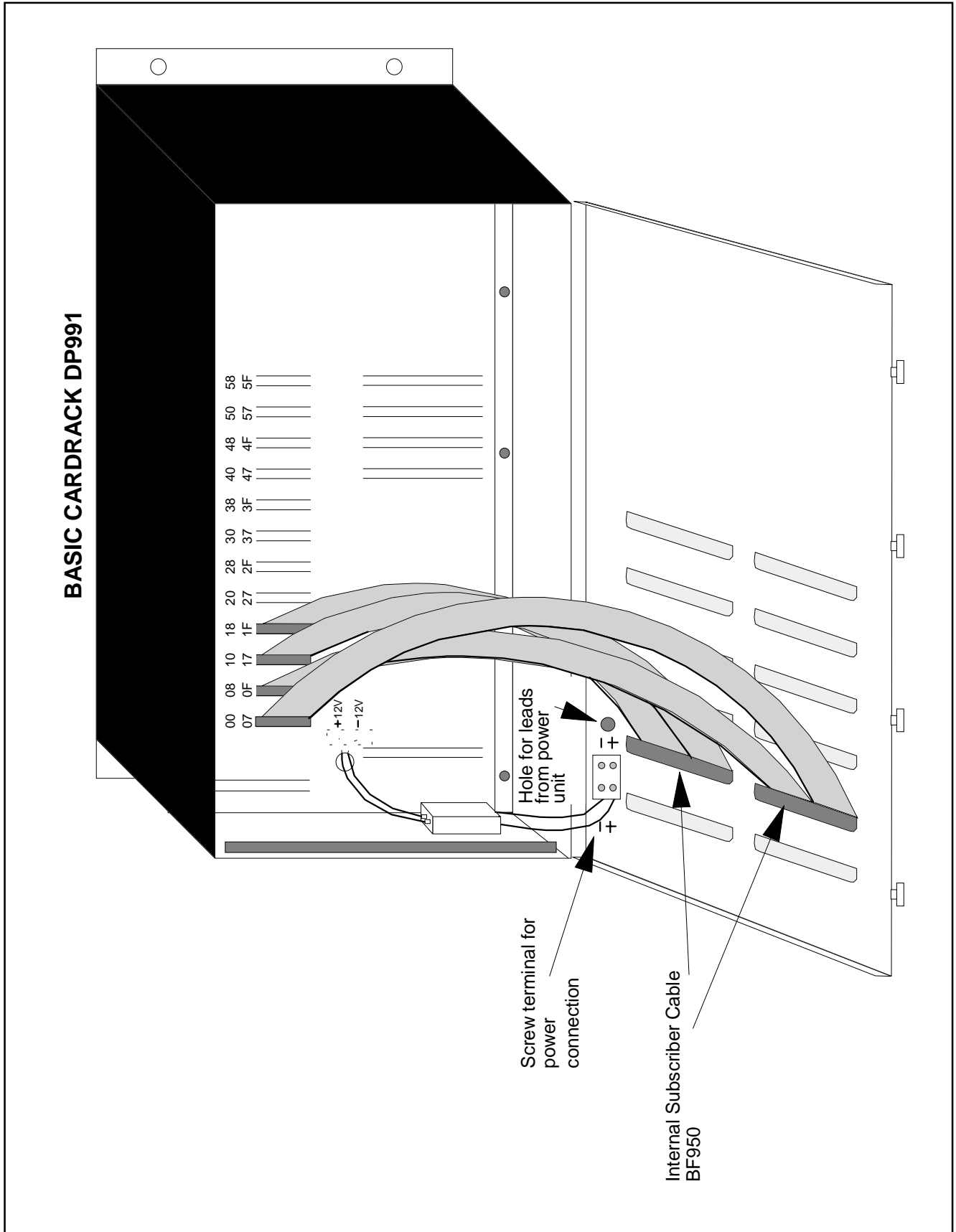


Fig. 1.22. Installation Internal Subscriber Cable BF950 in DP991 and DP992.

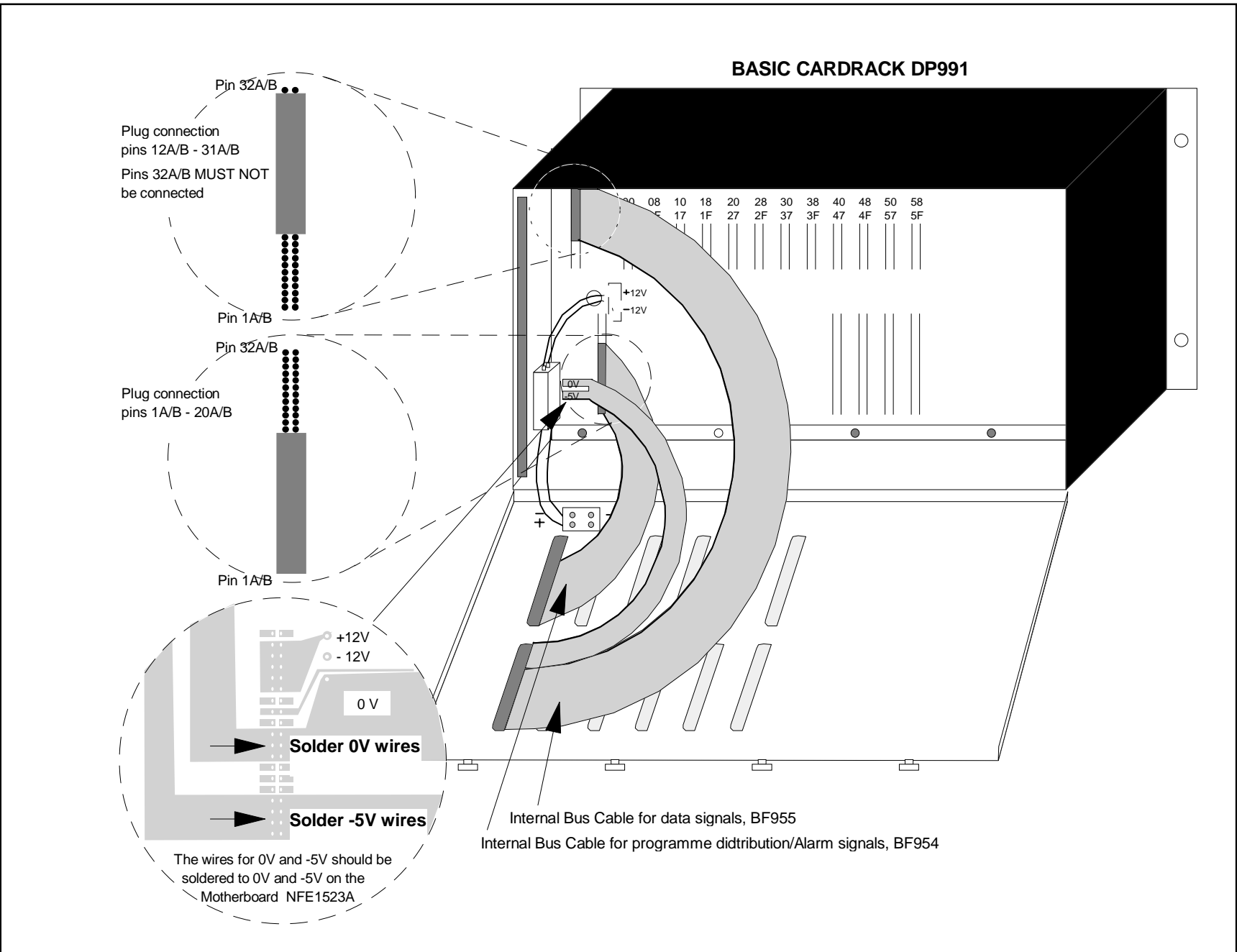


Fig. 1.23. Installation Internal Bus Cable BF954 for Programme Distribution/Alarm feature.



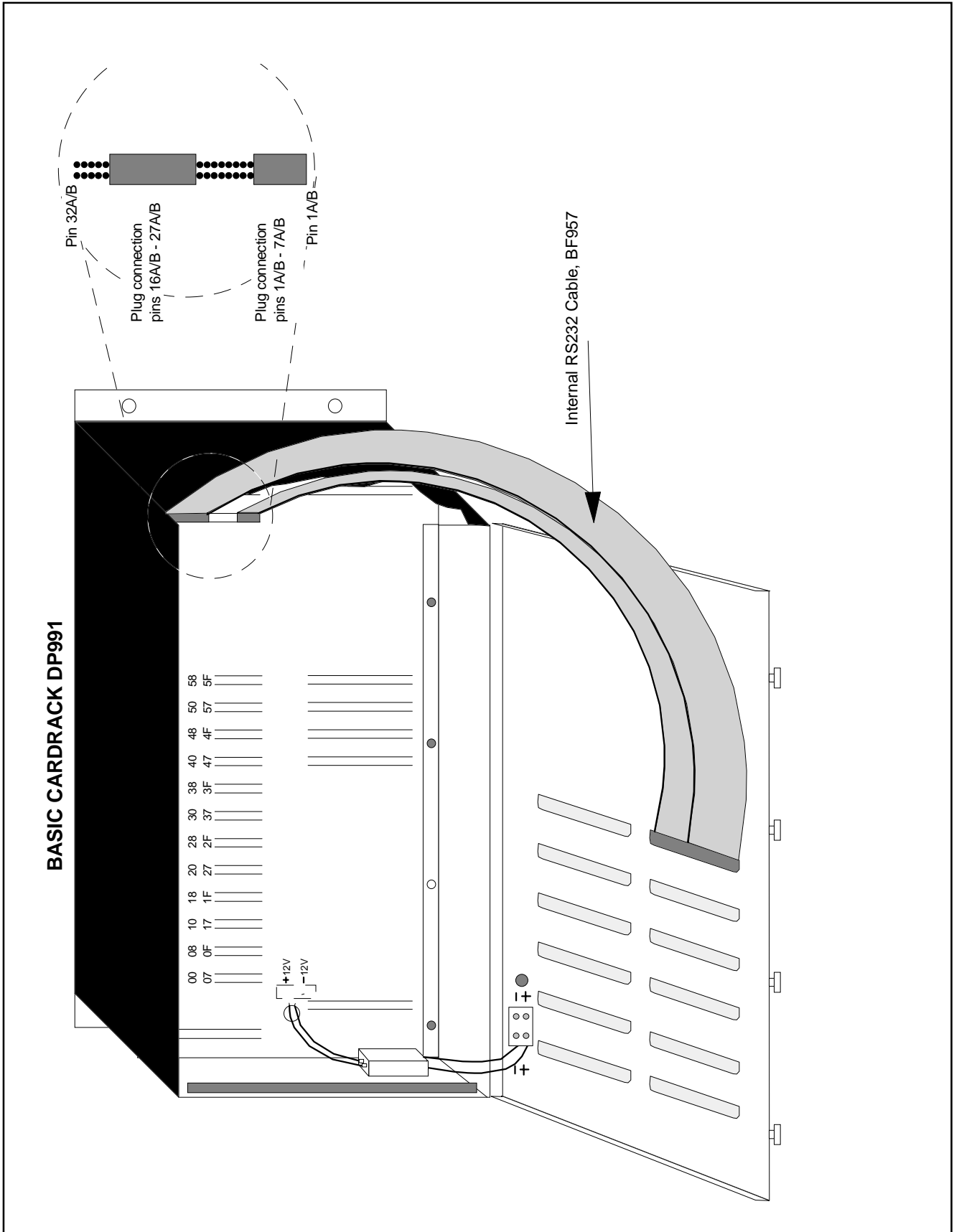


Fig. 1.24. Installation Internal RS232 Cable BF957 in DP991.

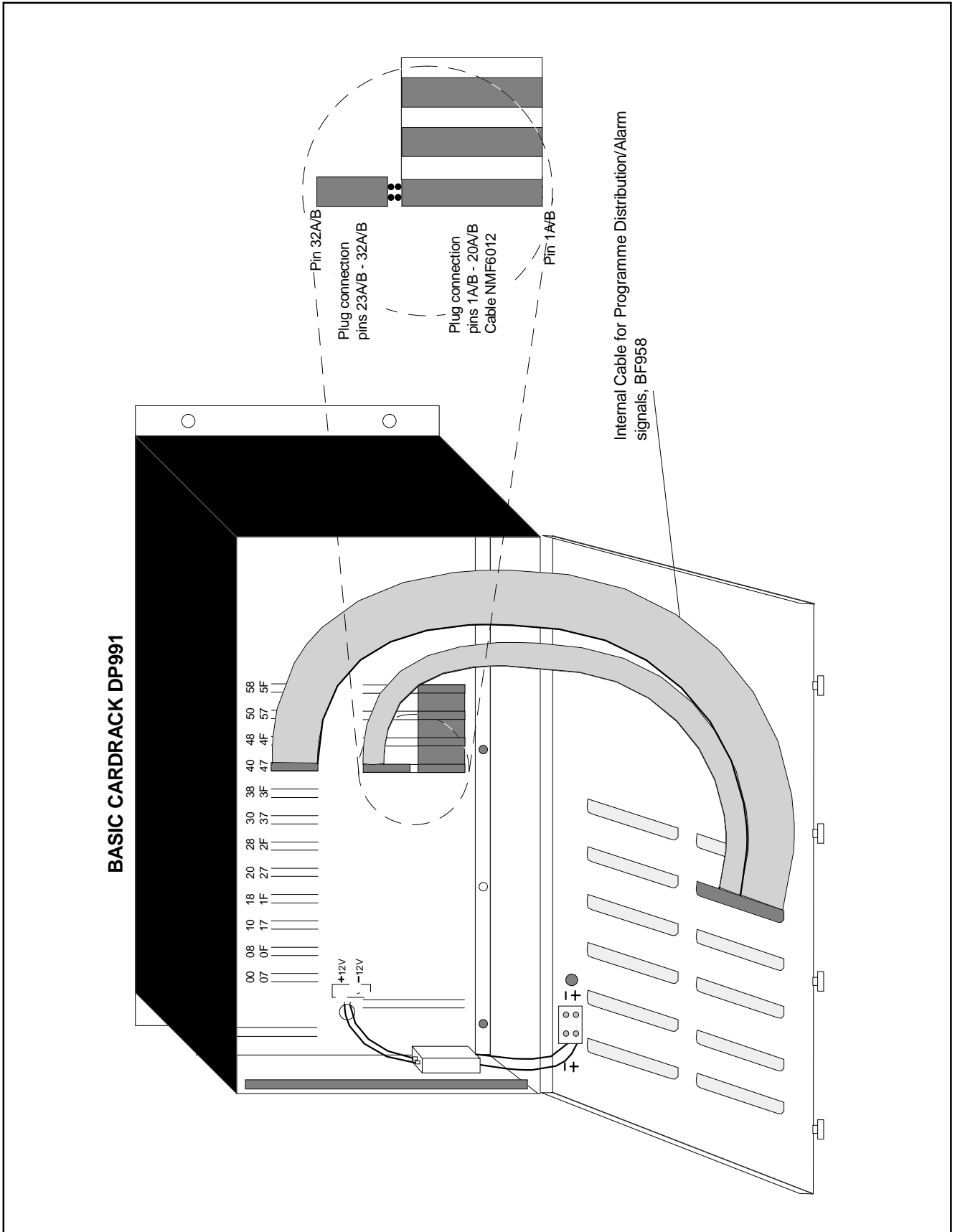


Fig. 1.25. Installation Internal Cable BF958 for Programme Distribution/Alarm in DP991

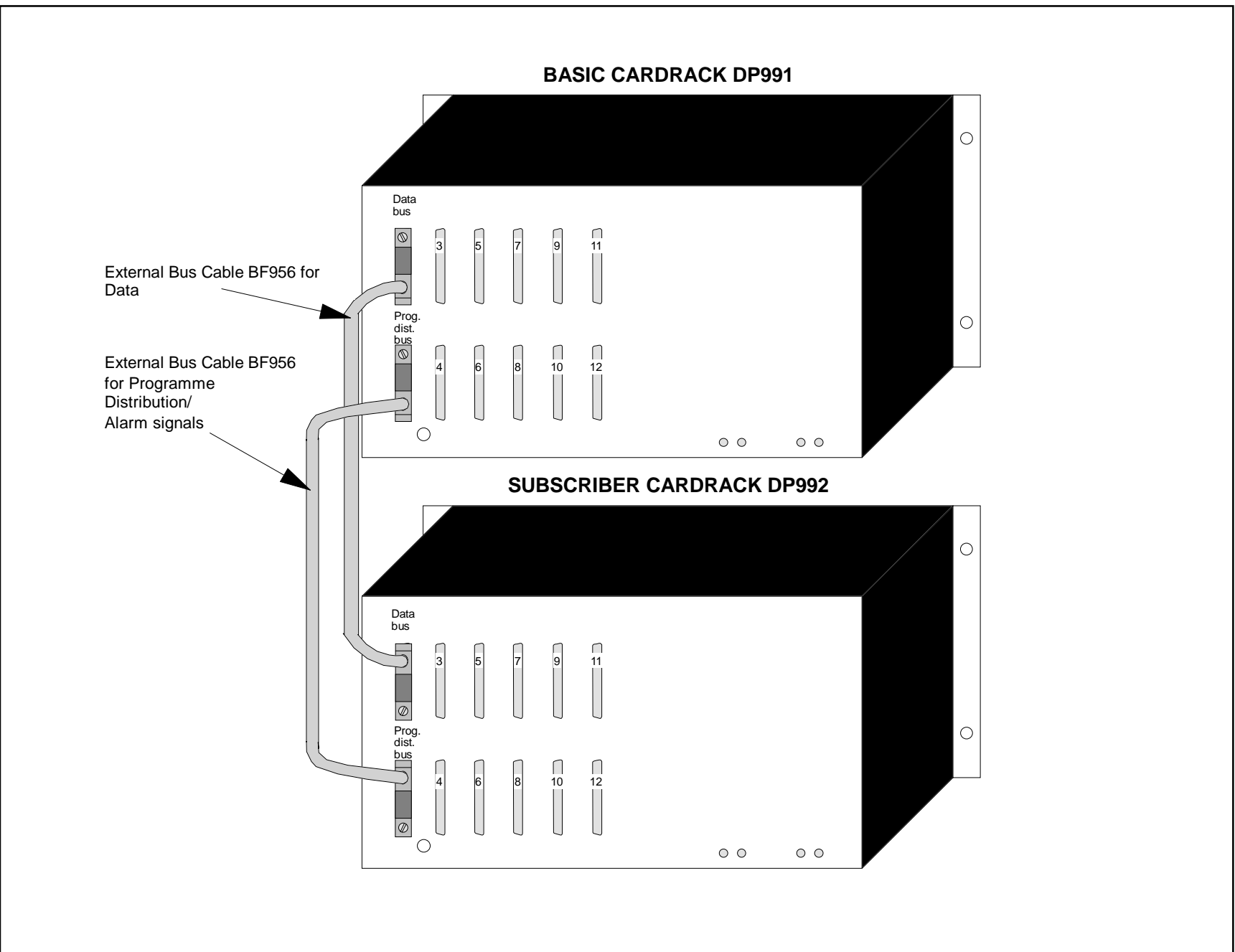
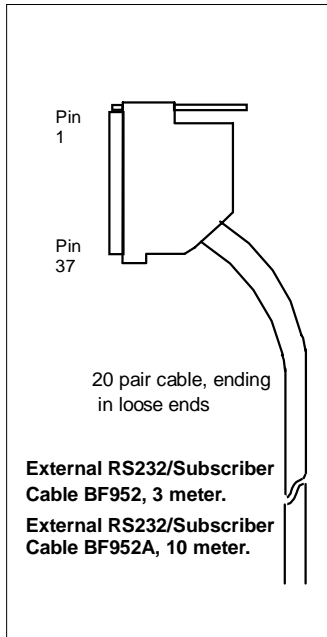


Fig. 1.26. Installation External Bus Cable BF956 for Data and Programme Distribution/Alarm.

**Termination of External RS232 Cable BF952/BF952A, 20 pair cable with 37 pin D-sub connector. The IEC colour coding standard is used.**

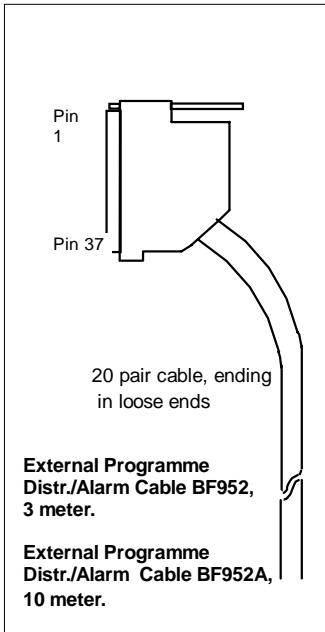


Pair no:	Colour A-wire	Pin nos. D-sub:	RS232 signal:	Colour B-wire:	Pin nos. D-sub:	RS232 signal:	Functional description:
1	white	1	RTS	blue	20	CTS	PORT NO. 5
2	white	2	RX	orange	21	GND	Service Terminal RS232
3	white	3	TX	green	22	DTR	connection (SVT)
4	white	4	RTS	brown	23	CTS	PORT NO. 6
5	white	5	RX	grey	24	GND	Printer RS232
6	red	6	TX	blue	25	DTR	
7	red	7	RTS	orange	26	CTS	PORT NO. 4
8	red	8	RX	green	27	GND	Radio Paging RS232
9	red	9	TX	brown	28	DTR	
10	red	10	RTS	grey	29	CTS	PORT NO. 3
11	black	11	RX	blue	30	GND	(SVIM)
12	black	12	TX	orange	31	DTR	
13	black	13	RX+	green	27	RX-	Serial input 20mA current loop
14	black	14	TX+	brown	33	TX-	Serial output 20mA current loop
15	black	15	RX+	grey	34	RX-	PORT NO. 2
16	yellow	16	TX+	blue	35	TX-	Stage interconnection
17	yellow	17	RX+	orange	36	RX-	PORT NO. 1
18	yellow	18	TX+	green	37	TX-	Stage Interconnection
19	yellow	19		brown	nc		
20	yellow	nc		grey	nc		

Fig. 1.27. Installation External RS232 Cable BF952/BF952A in DP991.



**Termination of External Programme Distribution/Alarm Cable BF952/BF952A,  
20 pair cable with 37 pin D-sub connector.  
The IEC colour coding standard is used.**



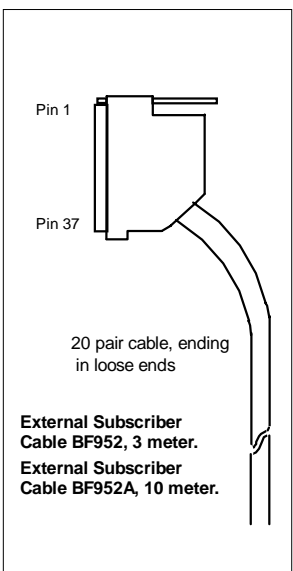
Pair no:	Colour A-wire	Pin nos. D-sub:	Prog. Dist. signal:	Colour B-wire:	Pin nos. D-sub:	Prog. Dist. signal:
1	white	1	Alarm ch. 2	blue	20	Alarm ch. 2
2	white	2	Alarm ch. 1	orange	21	Alarm ch. 1
3	white	3	Prog. dis. 8	green	22	Prog. dis. 8
4	white	4	Prog. dis. 7	brown	23	Prog. dis. 7
5	white	5	Prog. dis. 6	grey	24	Prog. dis. 6
6	red	6	Prog. dis. 5	blue	25	Prog. dis. 5
7	red	7	Prog. dis. 4	orange	26	Prog. dis. 4
8	red	8	Prog. dis. 3	green	27	Prog. dis. 3
9	red	9	Prog. dis. 2	brown	28	Prog. dis. 2
10	red	10	Prog. dis. 1	grey	29	Prog. dis. 1
11	black	11	AEC1,Pblue		30	AEC1,N
12	black	12	AEC2,Porange		31	AEC2,N
13	black	13	Batt. op. pos	green	27	Batt. op. neg
14	black	14		brown	33	
15	black	15		grey	34	
16	yellow	16		blue	35	
17	yellow	17		orange	36	
18	yellow	18		green	37	
19	yellow	19		brown	nc	
20	yellow	nc		grey	nc	

Alarm Enable Channel no. 1, positive = AEC1,P  
 Alarm Enable Channel no. 1, negative = AEC1,N  
 Alarm Enable Channel no. 2, positive = AEC2,P  
 Alarm Enable Channel no. 2, negative = AEC2,N  
 Battery operation, positive = Batt. op.pos  
 Battery operation, negative = Batt. op.neg

Fig. 1.28. Installation External Programme Distribution/Alarm Cable BF952/BF952A in DP991.



**Termination of External Subscriber Cable BF952/BF952A, 20 pair cable with 37 pin D-sub connector. The IEC colour coding standard is used.**



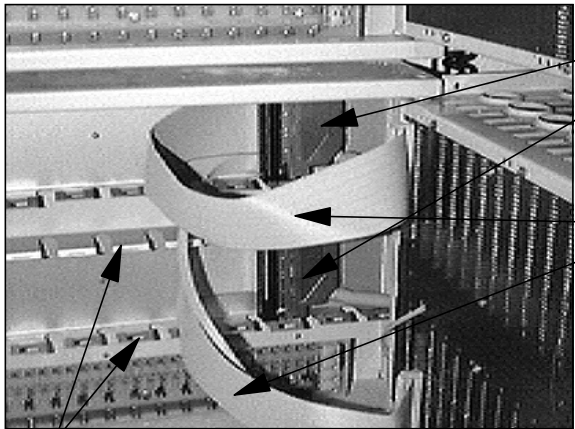
	Pair no:	Colour wire 1:	Pin nos. D-sub:	Colour wire 2:	Pin nos. D-sub:	Station line pos. nos:
First subscriber card	1	white	1	blue	20	00/10/20/30/40/50/60/70/80/90/A0/B0/C0/D0/I
	2	white	2	orange	21	01
	3	white	3	green	22	02
	4	white	4	brown	23	03
	5	white	5	grey	24	04
	6	red	6	blue	25	05
	7	red	7	orange	26	06
	8	red	8	green	27	07
Second subscriber card	9	red	9	brown	28	08
	10	red	10	grey	29	09
	11	black	11	blue	30	0A
	12	black	12	orange	31	0B
	13	black	13	green	27	0C
	14	black	14	brown	33	0D
	15	black	15	grey	34	0E
	16	yellow	16	blue	35	0F
	17	yellow	17	orange	36	
	18	yellow	18	green	37	
	19	yellow	19	brown	nc	
	20	yellow	nc	grey	nc	

Fig. 1.29. Installation External Subscriber Cable BF952/BF952A in DP991 and DP992.



## Expanding Ring-Master System CB901.

Expanding an existing CB901 system with a new EMC approved Subscriber Cardrack DP992.



D-Sub connector on interconnect cable BF956 (for internal data and audio).

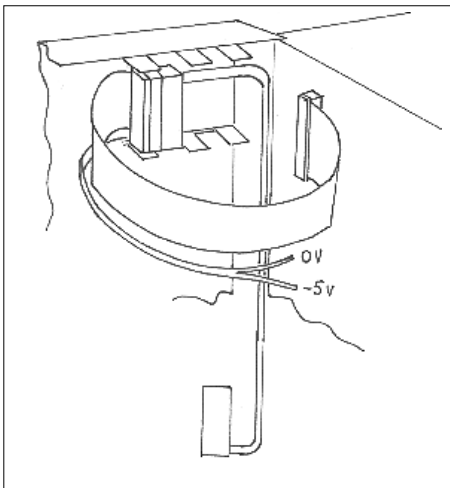
D-Sub connector on interconnect cable BF956 (for programme distribution and all-call audio).

Flat cable BF955

Flat cable BF954

Mounting brackets for 3M terminals in backplate

**Subscriber Cardrack DP979 with installed interconnect cables BF956 for EMC Subscriber Cardrack DP992**



*The Subscriber Cardrack DP980 is no longer delivered in areas where EMC approved equipment is required.*

*RingCom AS will only supply the EMC approved Subscriber Cardrack DP992 when expanding an existing CB901 system, where the (not EMC approved) cardrack DP979 is already installed. The DP992 includes all necessary interconnect cables.*

*See the photo/drawing to the left which indicate where to locate the D-Sub connectors on the backplate of DP979.*

*Please see the Ring-Master Installation Manual (WWT-50E), page 76 and 111 for termination of Internal Bus Cable BF955 (power wires to the L motherboard NFE1523A).*

*F A S T   A C C E S S   C O M M U N I C A T I O N*

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**The company reserves the right to modify designs and alter specifications  
without notice, in pursuance of a policy of continuous improvement.**



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