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1.1 COMPUTER OVERVIEWS

1.1.1 Introduction

Figure 1.1-1

The basic purpose of the PTS 6000 System is to provide computerized terminals for the work positions in bank- and post offices etc. This requires, besides special equipment at each work position, a Terminal Computer which controls the transactions carried out and which either stores the transaction data (off-line systems) or transfers it via modems and telephone lines to a remote data centre (on-line systems).

Smaller offices, with 1-4 work positions, can share the computer with a bigger office. The work positions of the smaller office are then connected to the bigger office's computer in a way similar to the on-line connection, i.e. via modems and telephone lines. Such work positions are known as Remote Work Stations whilst the work positions at the computer site are known as Local Work Stations.

In certain cases, mainly when data exchange with other systems is required, it can be necessary to connect peripheral equipment (Magnetic Tape Unit, Disc Unit, Line Printer etc.) to the Terminal Computer.

This manual contains field service information for the Terminal Computers 6811 (also called 6810), 6812-6814 and 6824.

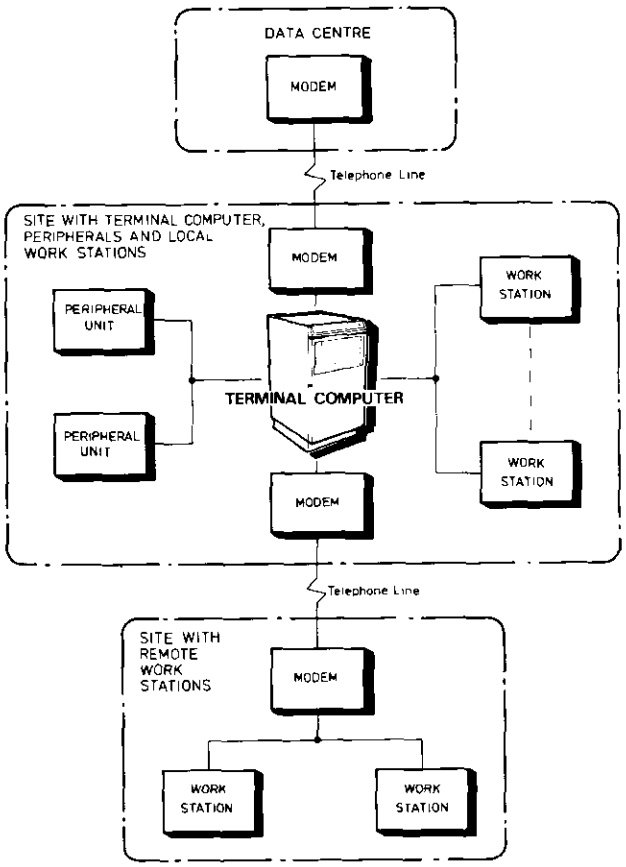


Figure 1.1-1 Basic System Configuration

1.1.2 Terminal Computer 6810/11

Figure 1.1-2

Physical Structure

The computer is contained in a cabinet where the logic modules are plugged into the backpanel of a 10-position rack. On this backpanel (1A) there is the General Purpose Bus that interconnects the logic modules. Smaller backpanels (1B, 1C) and some separate wires and flatcables are used for remaining interconnections.

Some of the additional interconnections are dependent on the specific computer configuration (master priority and break request wiring), and must often be made at the installation. This backpanel wiring is specified in section 2.5 of this manual.

Contained in the cabinet are also; one or two digital cassette recorders for program load and back-up, a control panel, a power supply unit and a cooling fan.

Processing Units & Memory System

The computer is based on a central processing unit (CPU) of type P852. An optional I/O processor (IOP 6827) can be added to increase the capacity of data transfers when heavy traffic is expected between memory and interface units along the GP bus.

The memory capacity is 8-32K 16-bit words, built to the desired range by plugging in one or two core memory modules. Two different modules are available; CMM 6822 with a capacity of 8K, and CMM 6823 with a capacity of 16K.

NOTE

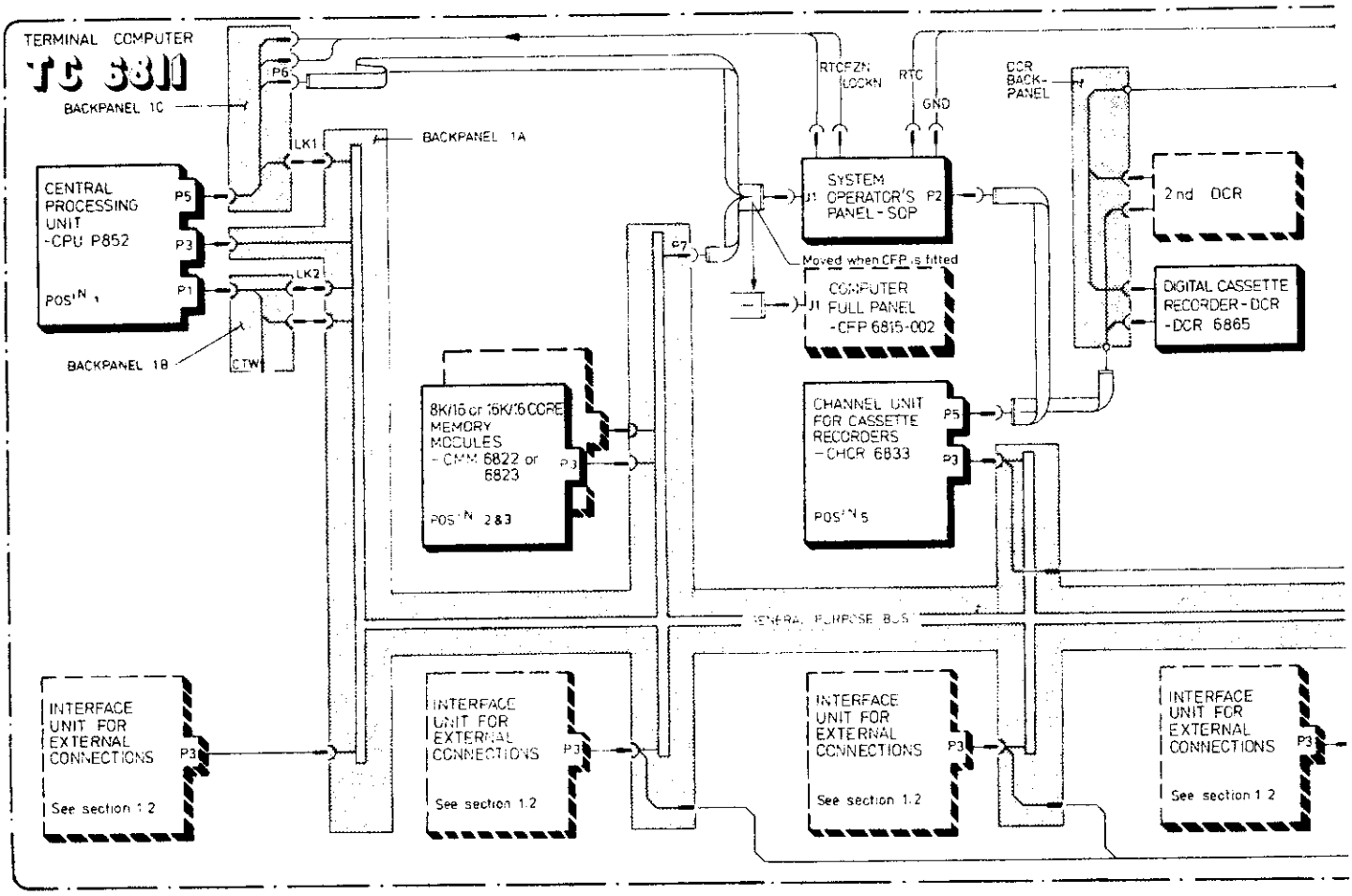
Some of the 6810/11 computers have been upgraded according to a modification kit known as UK01. These computers are using a CPU of type P857, two CMMs of type 6825 (each of 32K 16-bit words) and a memory management unit, MMU 6828. Processing and memory capacity has then been increased to the class of the TC 6813.

Program Load & Back-Up Medium

The cabinet is able to house up to two digital cassette recorders of type 6865 (6861 in earlier computer models). These recorders are controlled via the bus-connected interface unit CHCR 6833.

Control Panels

A system operator's panel (SOP) is always fitted to the computer. This panel provides the control and display facilities that are required for the daily routines and operates via the CHCR 6833. When extended control and display facilities are required, it is possible to add a computer full panel (CFP 6815-002).



External Interfaces

The interface units available for connecting work stations and peripherals to the computer, and for connecting the computer on-line to a data centre, are described in section 1.2; EXTERNAL CONNECTIONS.

Power Supply

The power supply unit (PSU) is available in two basic versions; one for mains sources of 100-127V/60Hz and another one for 200-240V/50Hz. Besides the required D.C. voltages the PSU also provides a real time clock signal (RTC), a power failure alarm (PWFN) and a system reset signal (RSLN).

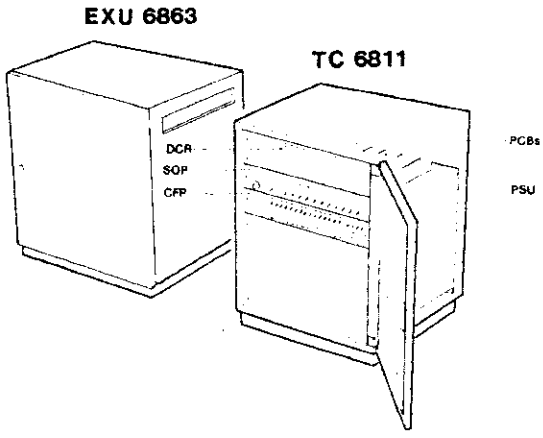
Extension Unit

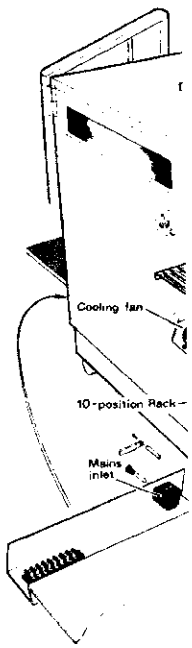
Interface units that (because of space, power or cabling reasons) cannot be contained in the computer cabinet, can instead be put into an extension unit, EXU 6863. This is a stripped computer cabinet where the rack with backpanel 1A and the PSU have been retained.

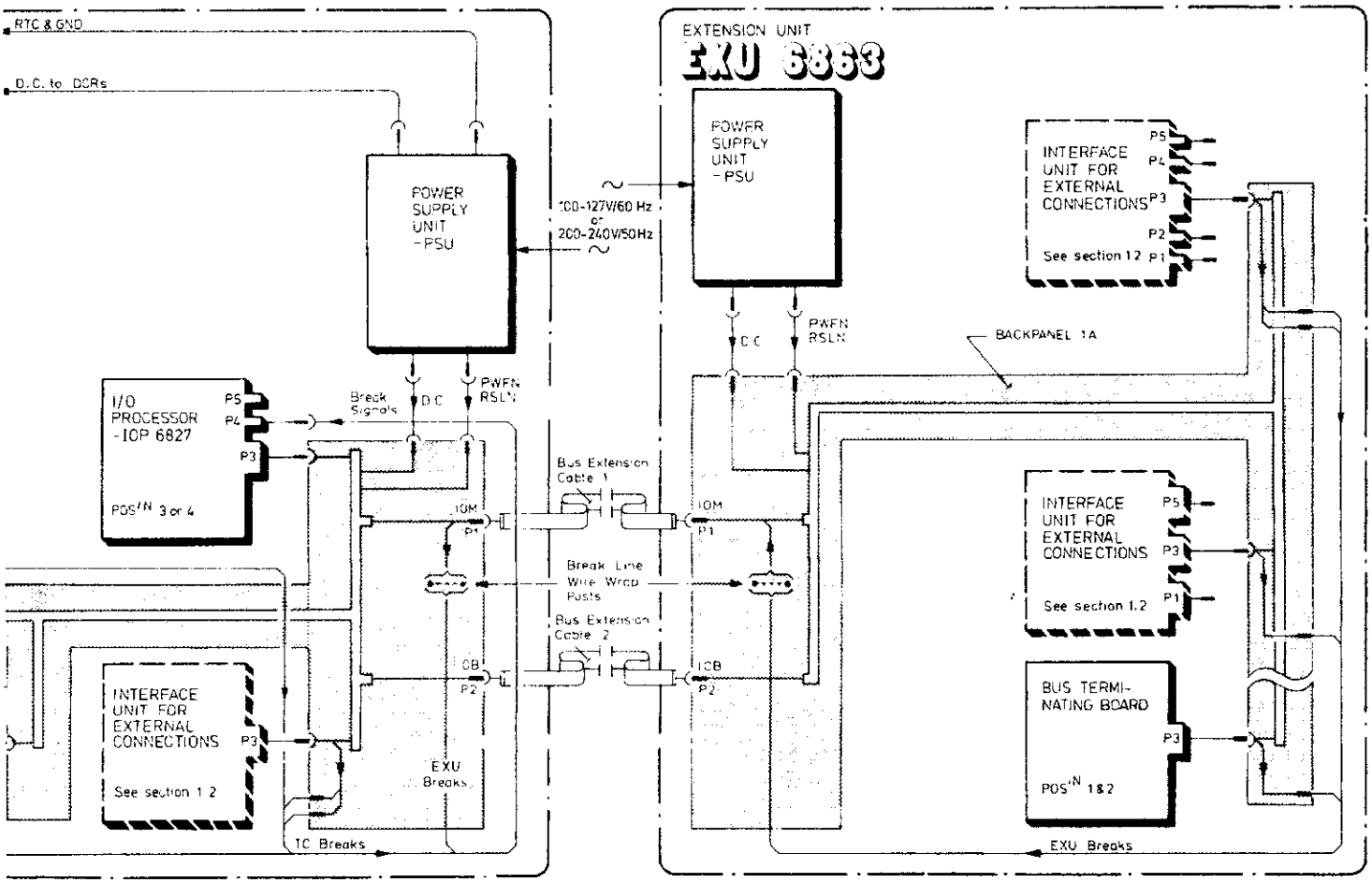
The TC and EXU cabinets are interconnected via two bus extension cables. Besides extending the bus to the EXU, these cables also provide a possibility to link other lines between the cabinets, e.g. break lines from the EXU to an IOP in the TC cabinet. Such lines are in both cabinets terminated on wire wrap posts close to the extension plugs on backpanel 1A.

The bus extension cables also interconnect each one of the PWFN and RSLN signals with corresponding signal from the other cabinet. Each twin-source signal then operates in a wired-or manner within the extended system.

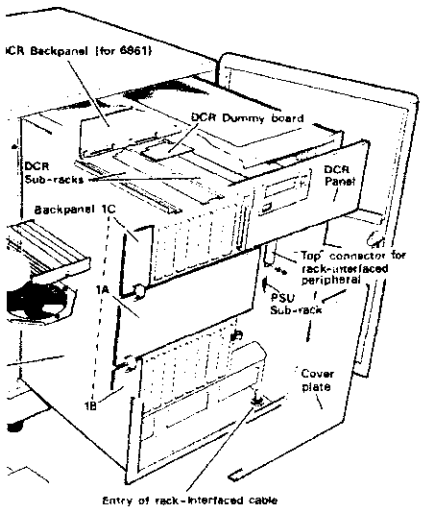
A limited outfit in the extension cabinet and limitations in the extended bus lead to some restrictions. The following computer sub-modules can NOT be placed in an extension unit; CPU, IOP, CMM, MMU and CHCR.







TC & EXU CABINETS — Front view of backpanels and connectors



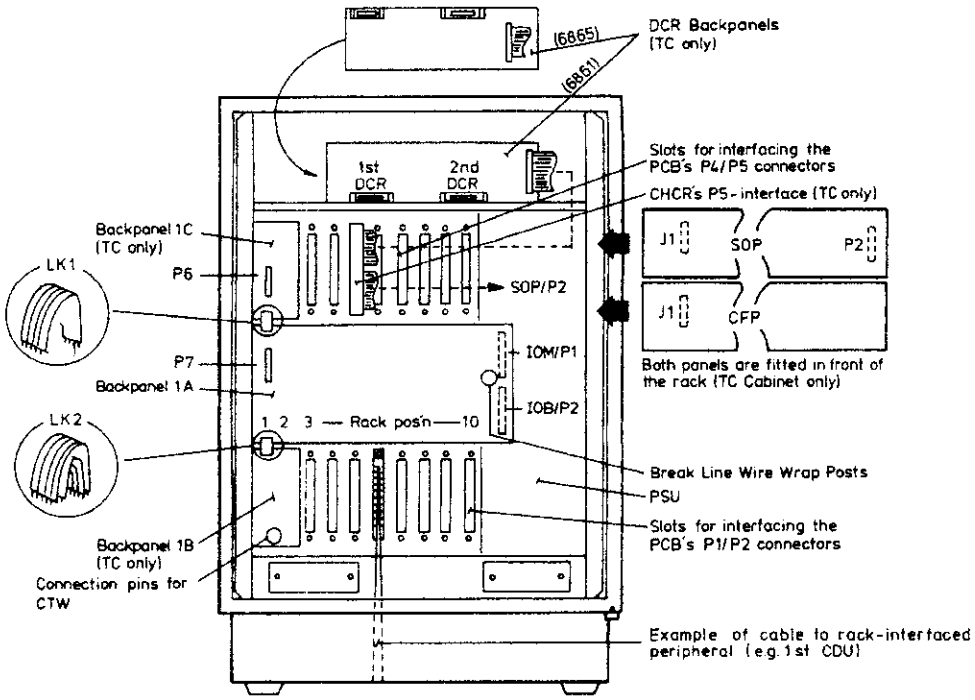


Figure 1.1-2 TC 6811/EXU 6863 - Basic Configuration

SUBNUMBER LIST

Subnumber	Description (main characteristics)	Comments
001	220/200–240 V, 50 Hz, DCR 1 (CPU P852)	Replaced by 6811–301 in the beginning of 1979.
101	100–127 V, 60 Hz, DCR 3, UL/CSA (CPU P852)	
102	= 101 excl. DCR unit	Special version.
201	220/200–240 V, 50 Hz, DCR 1 + UK01 (CPU P857)	Arise only in field. UK01 = Upgrading Kit 6810–601
301	200–240 V, 50 Hz, DCR 3 (CPU P852)	Present standard version. Replaces 6811–001.
401	200–240 V, 50 Hz, DCR 3 + UK01 (CPU P857) excl. CMM	6811–301 excl. CPU P852 and CMM, modified with Upgrading Kit 6810–601 UK01.
402	100–127 V, 60 Hz, DCR 3, UL/CSA + UK01 (CPU P857) excl. CMM	6811–101 excl. CPU P852 and CMM, modified with Upgrading Kit 6810–601 UK01.
501	200–240 V, 50 Hz, DCR 3 excl. CPU and CMM	Special version of 6811–301.

DCR 1 = PTS 6861 DCR
DCR 3 = PTS 6865 DCR

1.1.3 Terminal Computer 6812

Figure 1.1-3

Physical Structure

The computer is contained in a cabinet where the logic modules are plugged into the backpanel of a 10-position rack. On this backpanel (1A) there is the General Purpose Bus that interconnects the logic modules. Smaller backpanels (1B, 1C, 1D) and some separate wires and flatcables are used for remaining interconnections.

Some of the additional interconnections are dependent on the specific computer configuration (master priority and break request wiring), and must often be made at the installation. This backpanel wiring is specified in section 2.5 of this manual.

Contained in the cabinet are also; program load and back-up media (cassette recorders and/or flexible disc drives), a control panel, a power supply unit and a cooling fan.

Processing Units & Memory System

The computer is based on a central processing unit (CPU) of type P852. An optional I/O processor (IOP 6827) can be added to increase the capacity of data transfers when heavy traffic is expected between memory and interface units along the GP bus.

The memory capacity is fixed to 32K 16-bit words by a single core memory module, CMM 6825.

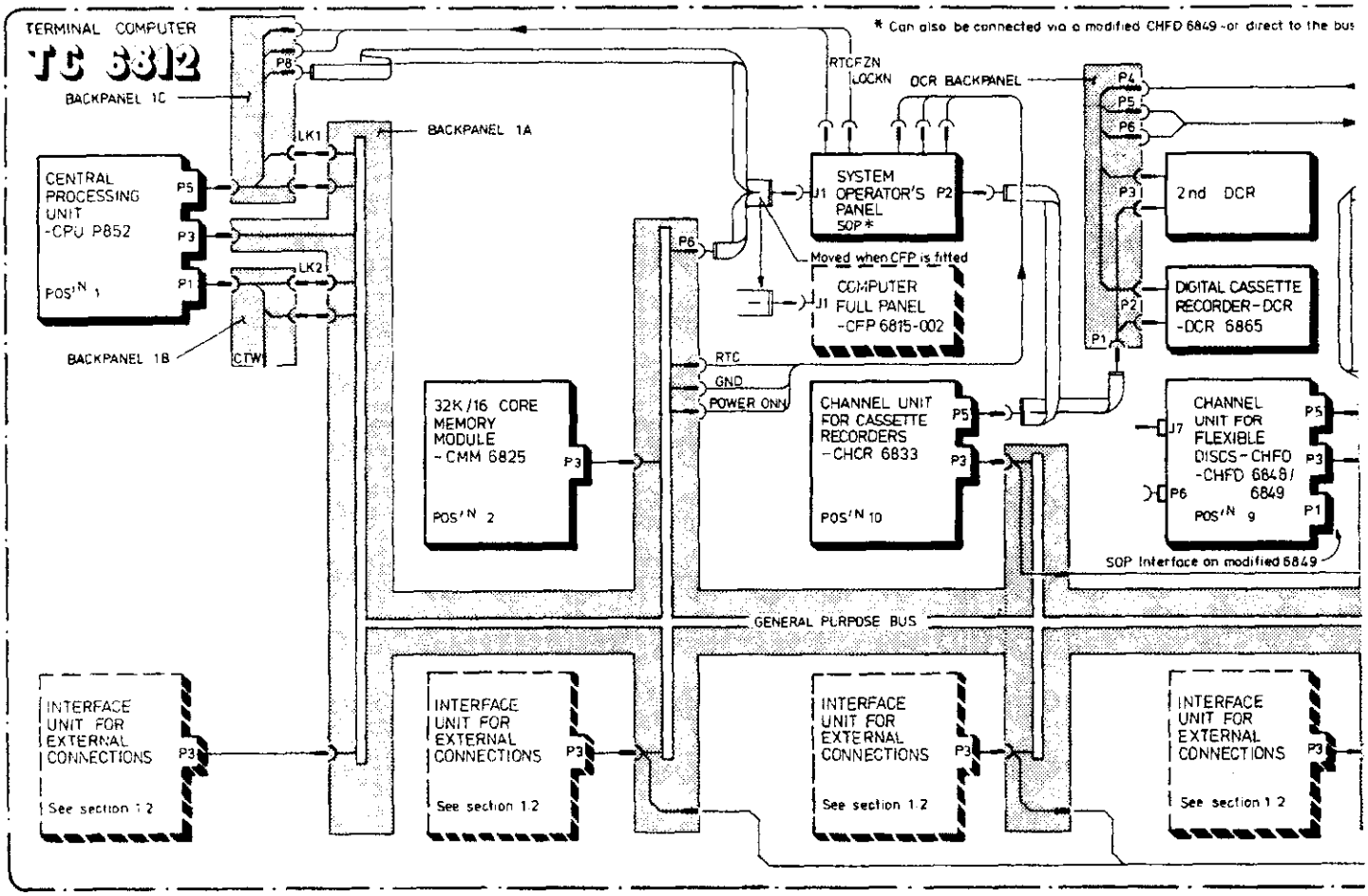
Program Load & Back-Up Media

The cabinet is able to house up to two digital cassette recorders, DCR 6865, and up to two flexible disc drives, FDD 6867 (250 Kbytes) or FDD 6791 (1 Mbyte). The recorders are controlled via the busconnected interface unit CHCR 6833, and the flexible disc drives via CHFD 6848 (for FDD 6867) or CHFD 6849 (for FDD 6791).

Control Panels

A system operator's panel (SOP), that provides the control and display facilities required for the daily routines, is always fitted to the computer. This panel can be connected in three different ways; via the CHCR 6833 as shown in figure, via a modified CHFD 6849 (in both cases a 'passive' SOP), or direct to the backpanel ('active' SOP, modified according to an upgrading kit to get an integrated interface logic, CUSOP).

When extended control and display facilities are required, it is possible to add a computer full panel (CFP 6815-002). However, this cabinet is not prepared for any permanent use of this panel (the size of cover plates adapted to the extended full panel, EFP, used in TC 6813).



External Interfaces

The interface units available for connecting work stations and peripherals to the computer, and for connecting the computer on-line to a data centre, are described in section 1.2; EXTERNAL CONNECTIONS.

Power Supply

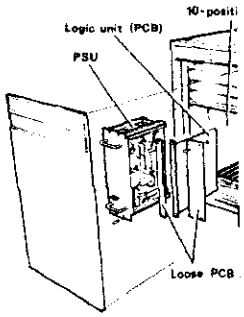
The power supply unit (PSU) can be adapted to either of the mains sources; 100-127V/60Hz, or 200-240V /50Hz. Besides the required D.C. voltages the PSU also provides a real time clock signal (RTC), a power failure alarm (PWFN), a system reset signal (RSLN) and a power on indication (POWER ONN).

Extension Unit

Interface units that (because of space, power or cabling reasons) cannot be contained in the computer cabinet, can instead be put into an extension unit, EXU 6864. This is a stripped computer cabinet where the rack with backpanel 1A and the PSU have been retained.

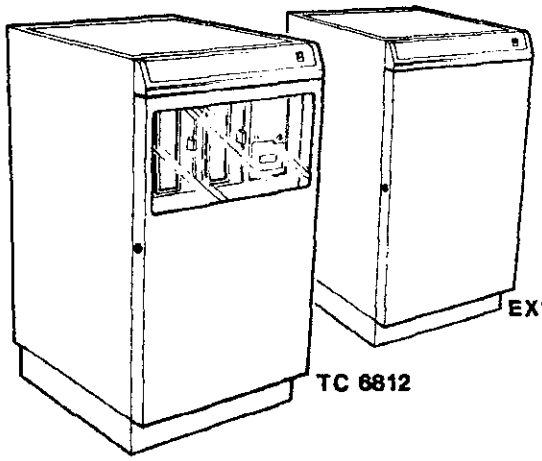
The TC and EXU cabinets are interconnected via two bus extension cables. Besides extending the bus to the EXU, these cables also provide a possibility to link other lines between the cabinets, e.g. break lines from the EXU to an IOP in the TC cabinet. Such lines are in both cabinets terminated on wire wrap posts close to the extension plugs on backpanel 1A.

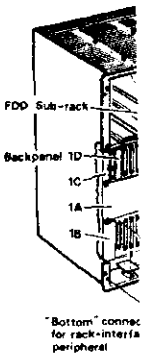
The bus extension cables also interconnect each one of the PWFN and RSLN signals with corresponding signal from the other cabinet. Each twin-source signal then operates in a wired-or manner within the extended system.

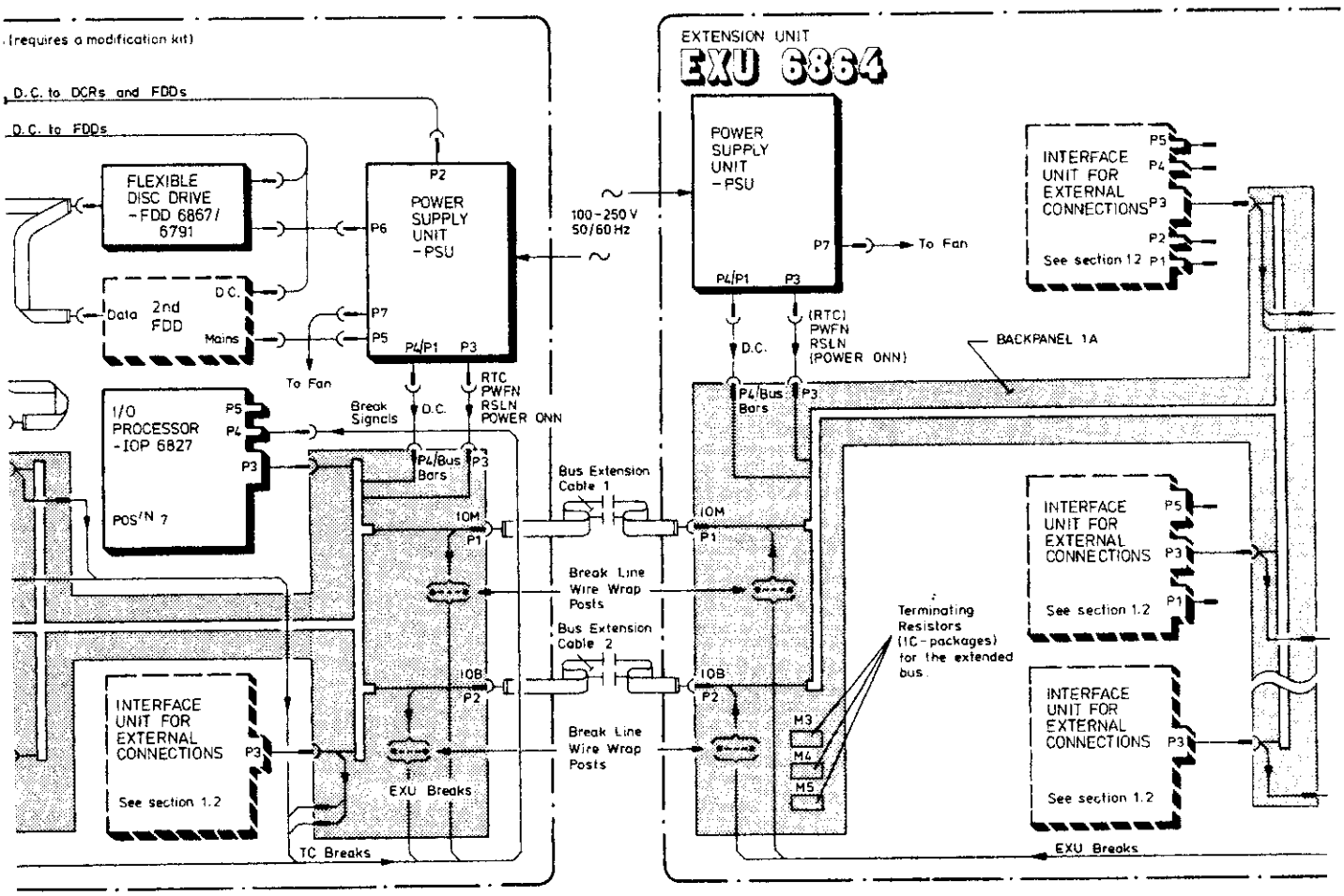


NOTE

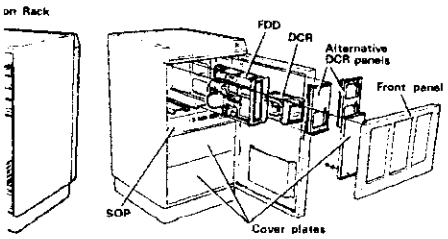
When required it is also possible to add a second EXU 6864. The extension cables are then further extended from the cable interface in the first EXU.

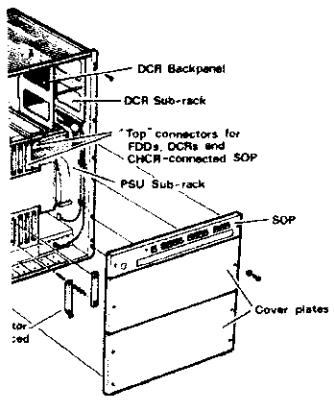






TC & EXU CABINETS - Front view of backpanels and connectors





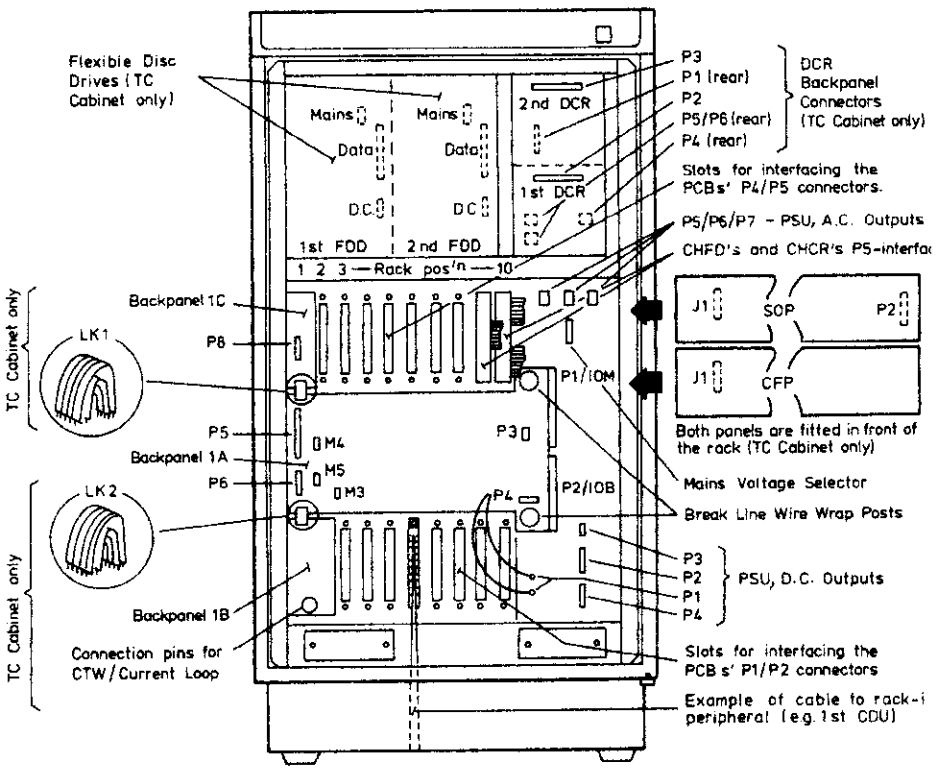


Figure 1.1-3 TC 6812/EXU 6864 - Basic Configur

SUBNUMBER LIST

Subnumber					
Mains connection			Configuration of back-up / progr. loading media		
European 200–240 V 50 Hz	UL/CSA 100–130 V 60 Hz	UL/CSA 200–240 V 60 Hz	FDD / DCR / CHFD		
001	101	201	1 FDD		CHFD
002	102	202		1 DCR	
003	103	203	1 FDD	1 DCR	CHFD
004	104	204	2 FDD		CHFD
005	105	205		2 DCR	
006	106	206	2 FDD	1 DCR	CHFD
007	107	207	1 FDD	2 DCR	CHFD

Special versions receive subnumbers starting with 5 = 6812 – 5XX

Subnumber	
501–507	Equal to 001–007 excl. CMM

1.1.4 Terminal Computer 6813

Figure 1.1-4

Physical Structure

The computer is contained in a cabinet where the logic modules are plugged into the backpanel of a 10-position rack. On this backpanel (1A) there is the General Purpose Bus that interconnects the logic modules. Smaller backpanels (1B, 1C, 1D) and some separate wires and flatcables are used for remaining interconnections.

Some of the additional interconnections are dependent on the specific computer configuration (master priority and break request wiring), and must often be made at the installation. This backpanel wiring is specified in section 2.5 of this manual.

Contained in the cabinet are also; program load and back-up media (cassette recorders and/or flexible disc drives), a control panel, a power supply unit and a cooling fan.

Processing Units & Memory System

The computer is based on a central processing unit (CPU) of type P857. One or two optional I/O processors (IOP 6827) can be added to increase the capacity of data transfers when heavy traffic is expected between memory and interface units along the GP bus.

The memory capacity is 32-128K 16-bit words, built to the desired range by plugging in 1-4 core memory modules of type 6825 (each of 32K). When more than one CMM are fitted, the computer must also be equipped with a memory management unit, MMU 6828.

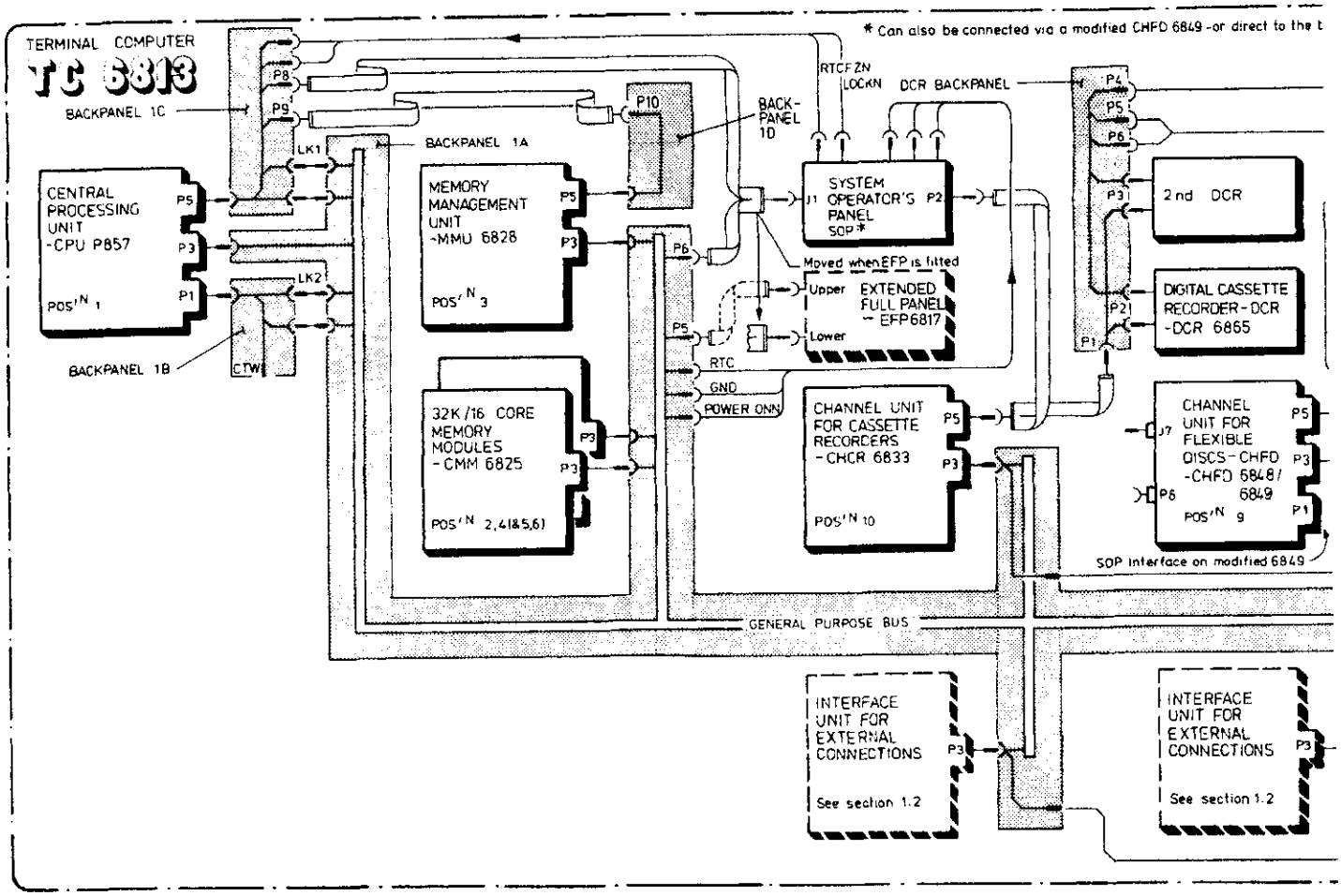
Program Load & Back-Up Media

The cabinet is able to house up to two digital cassette recorders, DCR 6865, and up to two flexible disc drives, FDD 6867 (250 Kbytes) or FDD 6791 (1 Mbyte). The recorders are controlled via the busconnected interface unit CHCR 6833, and the flexible disc drives via CHFD 6848 (for FDD 6867) or CHFD 6849 (for FDD 6791).

Control Panels

A system operator's panel (SOP), that provides the control and display facilities required for the daily routines, is always fitted to the computer. This panel can be connected in three different ways; via the CHCR 6833 as shown in figure, via a modified CHFD 6849 (in both cases a 'passive' SOP), or direct to the backpanel ('active' SOP, modified according to an upgrading kit to get an integrated interface logic, CUSOP).

When extended control and display facilities are required, it is possible to add an extended full panel (EFP 6817) in addition to the SOP.



External Interfaces

The interface units available for connecting work stations and peripherals to the computer, and for connecting the computer on-line to a data centre, are described in section 1.2; EXTERNAL CONNECTIONS.

Power Supply

The power supply unit (PSU) can be adapted to either of the mains sources; 100-127V/60Hz, or 200-240V /50Hz. Besides the required D.C. voltages the PSU also provides a real time clock signal (RTC), a power failure alarm (PWFN), a system reset signal (RSLN) and a power on indication (POWER ONN).

Extension Unit

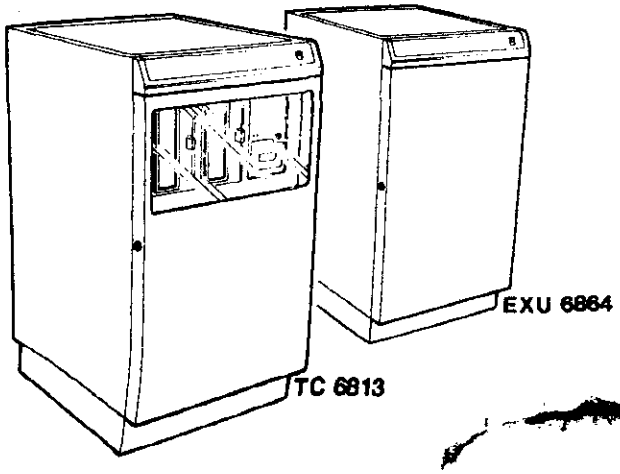
Interface units that (because of space, power or cabling reasons) cannot be contained in the computer cabinet, can instead be put into an extension unit, EXU 6864. This is a stripped computer cabinet where the rack with backpanel 1A and the PSU have been retained.

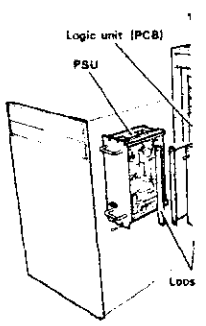
The TC and EXU cabinets are interconnected via two bus extension cables. Besides extending the bus to the EXU, these cables also provide a possibility to link other lines between the cabinets, e.g. break lines from the EXU to an IOP in the TC cabinet. Such lines are in both cabinets terminated on wire wrap posts close to the extension plugs on backpanel 1A.

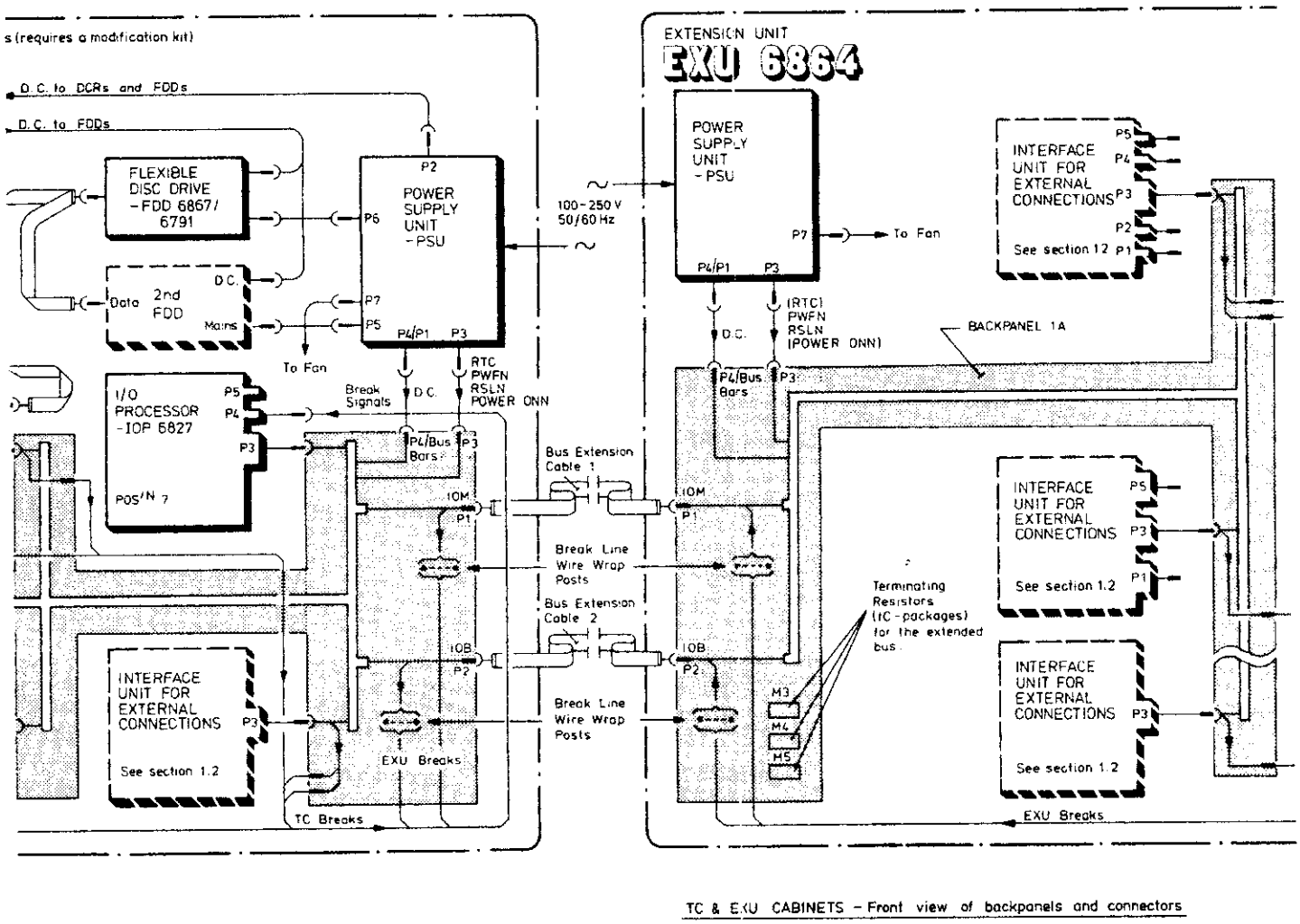
The bus extension cables also interconnect each one of the PWFN and RSLN signals with corresponding signal from the other cabinet. Each twin-source signal then operates in a wired-or manner within the extended system.

NOTE

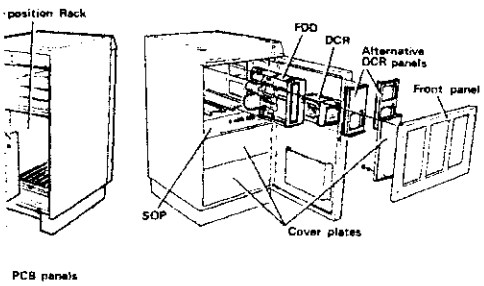
When required it is also possible to add a second EXU 6864. The extension cables are then further extended from the cable interface in the first EXU.

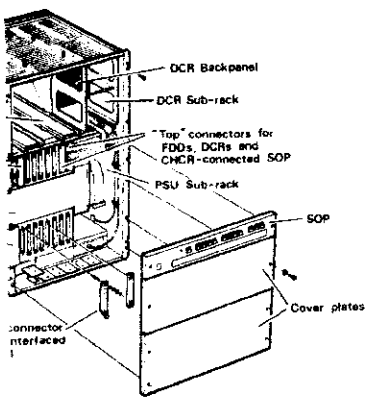






TC & EXU CABINETS – Front view of backpanels and connectors





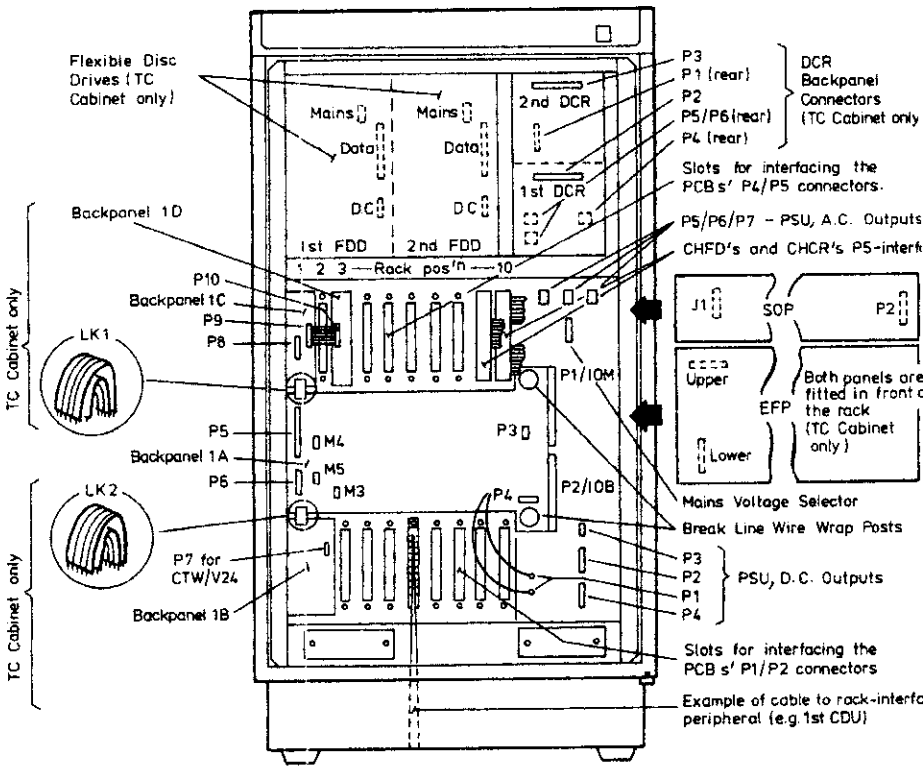


Figure 1.1-4 TC 6813/EXU 6864 - Basic Configurati

SUBNUMBER LIST

I TC 6813 basic unit incl. PSU, SOP, CPU

Subnumber			
Mains connection			Cabinet version
200–240 V 50 Hz Euro-plug	100–130 V 60 Hz US-plug	200–240 V 60 Hz US-plug	Cabinet prepared for
011	111	211	1 (or 1/4) MB FDD + DCR
012	112	212	1 (or 1/4) MB FDD (NO DCR)
013	113	213	1/4 MB FDD + DCR

II TC 6813 basic unit incl. PSU, SOP, CPU, CMM 6825, MMU 6828, CHCR 6833, CHLT 6831

Subnumber					
Mains connection			Configuration of back-up and progr. loading media		
200–240 V 50 Hz Euro-plug	100–130 V 60 Hz US-plug	200–240 V 60 Hz US-plug	FDD	DCR	CHFD
001	101	201	1 FDD		CHFD
002	102	202		1 DCR	
003	103	203	1 FDD	1 DCR	CHFD
004	104	204	2 FDD		CHFD
005	105	205		2 DCR	
006	106	206	2 FDD	1 DCR	CHFD
007	107	207	1 FDD	2 DCR	CHFD
	108				CHFD

501–507		Equal to 001–007 excl. CMM
551		Special version for the Hugin-project

1.1.5 Terminal Computer 6814

Figure 1.1-5

Physical Structure

The computer is contained in a cabinet where the logic modules are plugged into the backpanel of a 10-position rack. On this backpanel (1A) there is the General Purpose Bus that interconnects the logic modules. Smaller backpanels (1B and 1C) and some separate wires and flatcables are used for remaining interconnections.

Some of the additional interconnections are dependent on the specific computer configuration (master priority and break request wiring), and must often be made at the installation. This backpanel wiring is specified in section 2.5 of this manual.

Contained in the cabinet are also; one or two flexible disc drives, a control panel, a power supply unit and a cooling fan.

Processing Unit & Memory System

The computer is based on a central processing unit (CPU) of type P857R or P857RA. This CPU also includes an I/O processor and a memory management unit. The integrated IOP function has a capacity equal to two IOPs of type 6827, and the memory management is able to address 1Mbyte.

The memory capacity is 32-128K 16-bit words, built to the desired range by plugging in 1-4 core memory modules of type 6825 (each of 32K).

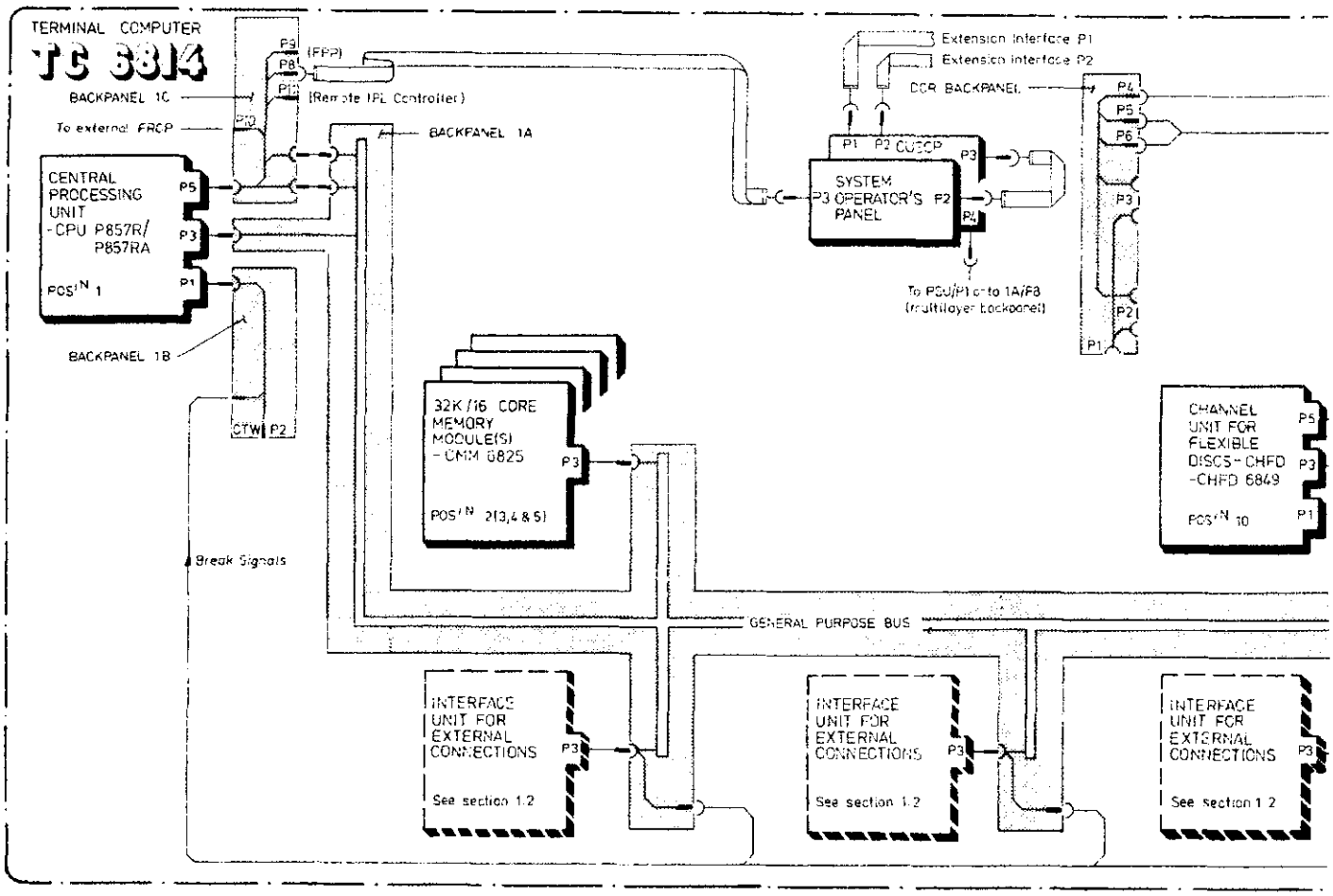
Program Load & Back-Up Media

The cabinet is able to house up to two flexible disc drives, FDD 6791 (1Mbyte). The drives are controlled via the busconnected interface unit CHFD 6849. However, if desired, the cabinet can instead be equipped with drives of type FDD 6867 (250 Kbyte) and a controller of type CHFD 6848. It is even possible to install up to two digital cassette recorders (DCR 6865) with necessary controller, CHCR 6833.

Control Panels

A system operator's panel (SOP), that provides the control and display facilities required for the daily routines, is always fitted to the computer. This panel has now got an integrated interface unit (Control Unit SOP, CUSOP) that makes it independent of other units like CHCR and CHFD.

When extended control and display facilities are required, it is possible to connect an external Full Refreshed Control Panel, FRCP 6981.



External Interfaces

The interface units available for connecting work stations and peripherals to the computer, and for connecting the computer on-line to a data centre, are described in section 1.2: EXTERNAL CONNECTIONS.

Power Supply

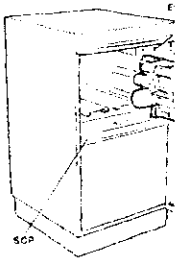
The power supply unit (PSU) can be adapted to either of the mains sources: 100-127V/60Hz, or 200-240V /50Hz. Besides the required D.C. voltages the PSU also provides a real time clock signal (RTC), a power failure alarm (PWFN), a system reset signal (RSLN) and a power on indication (POWER ONN).

Extension Unit

Interface units that (because of space, power or cabling reasons) cannot be contained in the computer cabinet, can instead be put into an extension unit, EXU 6864. This is a stripped computer cabinet where the rack with backpanel 1A and the PSU have been retained.

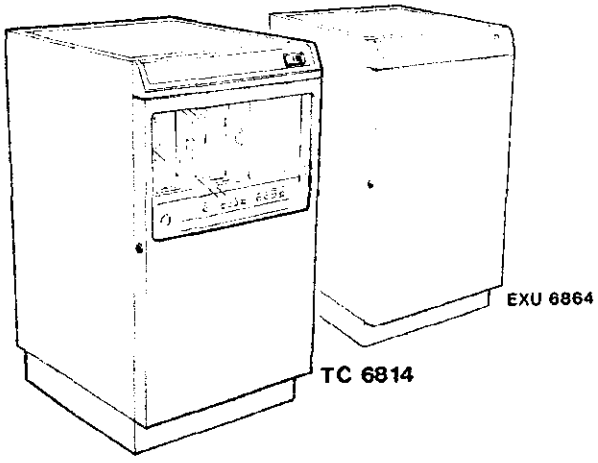
The TC and EXU cabinets are interconnected via two bus extension cables. Besides extending the bus to the EXU, these cables also provide a possibility to link other lines between the cabinets, e.g. break lines from the EXU to the CPU in the TC cabinet. Such lines are in both cabinets terminated on extension posts close to the extension plugs on backpanel 1A.

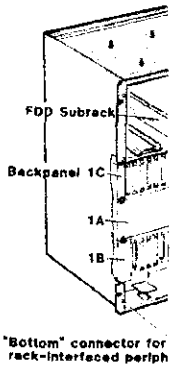
The bus extension cables also interconnect each one of the PWFN and RSLN signals with corresponding signal from the other cabinet. Each twin-source signal then operates in a wired-or manner within the extended system.

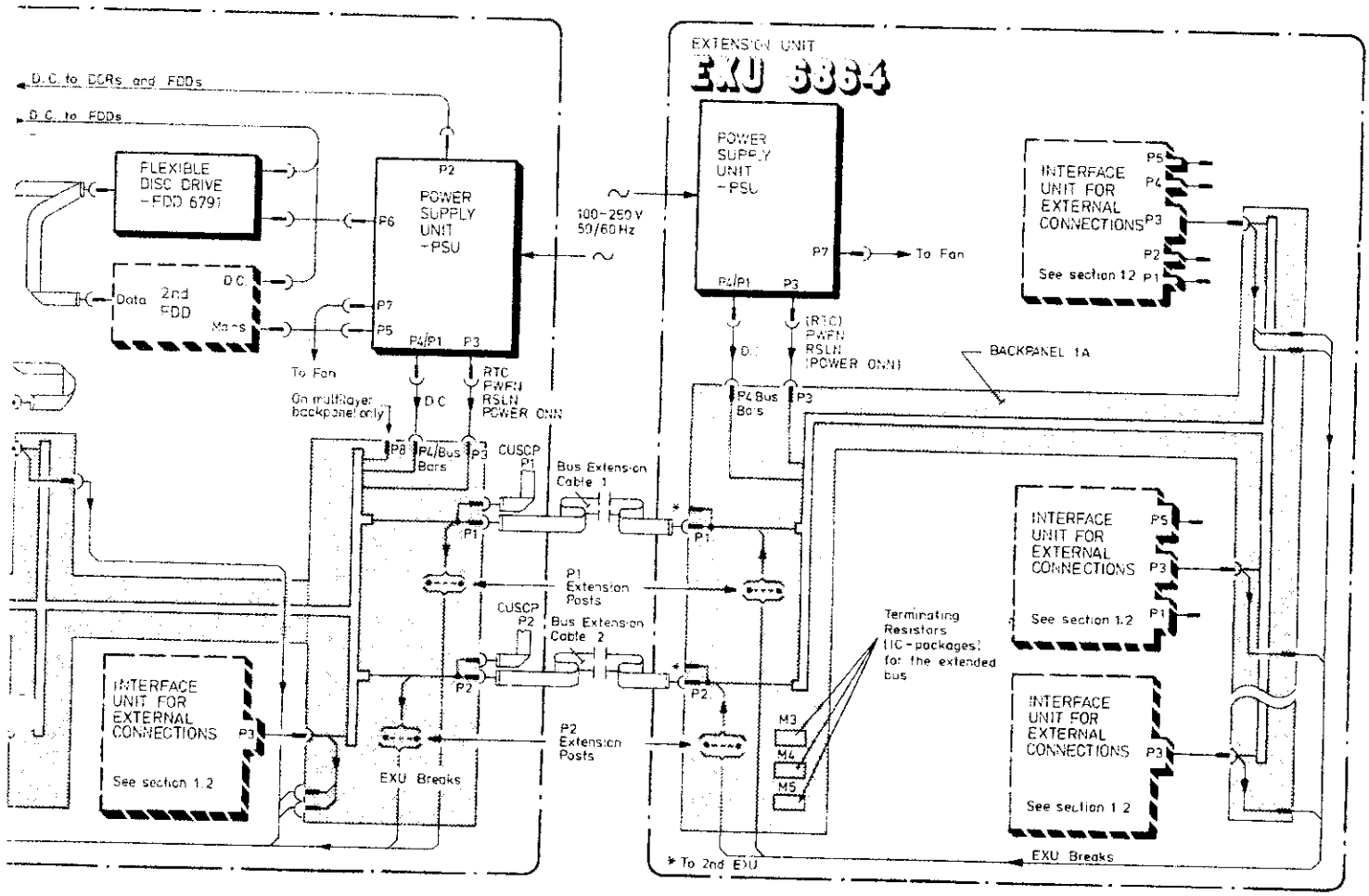


NOTE

When required it is also possible to add a second EXU 6864. The extension cables are then further extended from the cable interface in the first EXU.







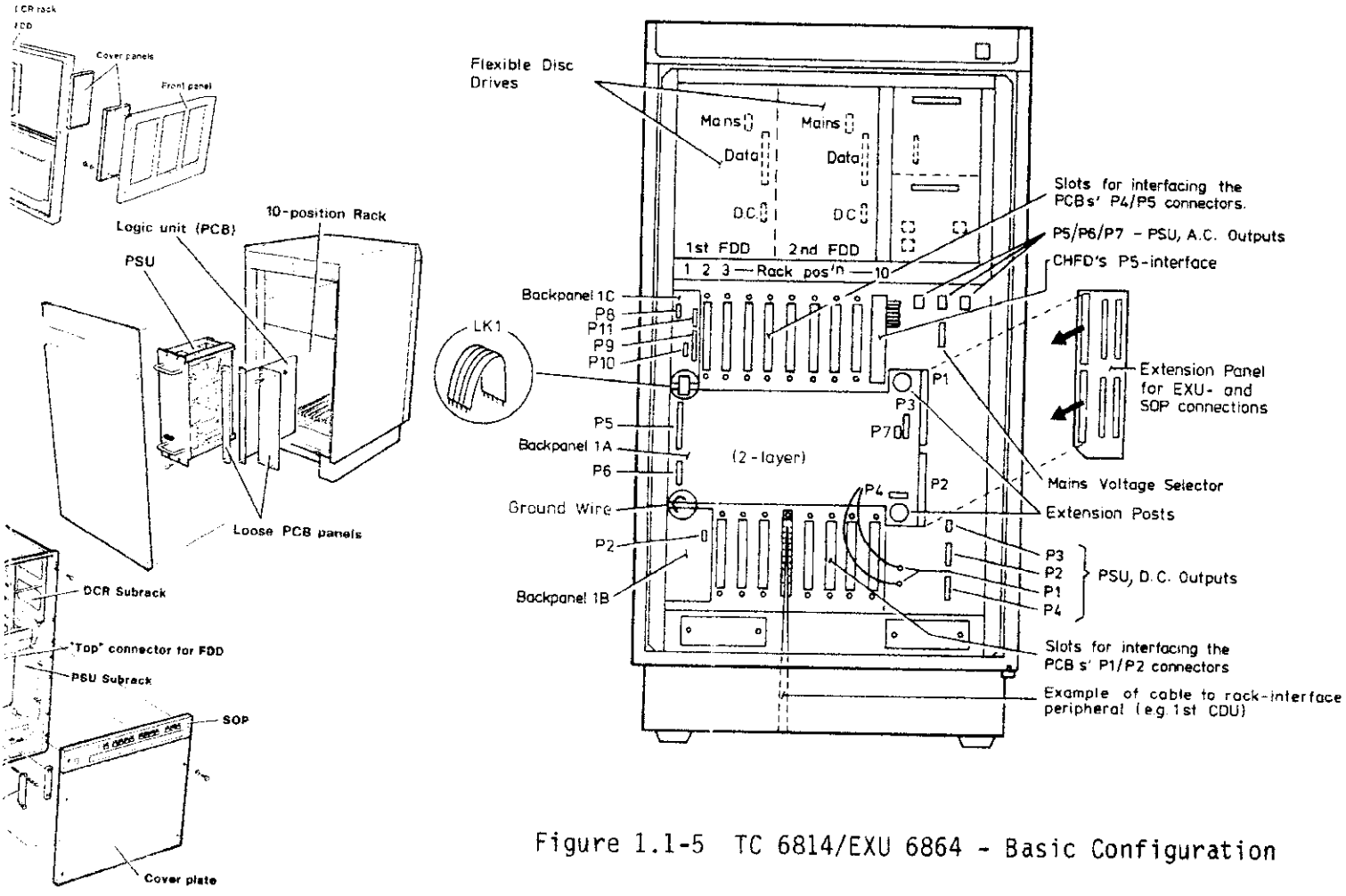


Figure 1.1-5 TC 6814/EXU 6864 - Basic Configuration

1.1.6 Terminal Computer 6824

Figure 1.1-6

Physical Structure

The computer is contained in a cabinet where the logic modules are plugged into the backpanel of a 10-position rack. On this backpanel (1A) there is the General Purpose Bus that interconnects the logic modules. Smaller backpanels (1B and 1C) and some separate wires and flatcables are used for remaining interconnections.

Some of the additional interconnections are dependent on the specific computer configuration (master priority and break request wiring), and must often be made at the installation. This backpanel wiring is specified in section 2.5 of this manual.

Contained in the cabinet are also; one or two flexible disc drives, a control panel, a power supply unit with battery back-up, and finally a cooling fan. The cooling system is here of a new type where the air enters and leaves the cabinet via the extended back section.

Processing Unit & Memory System

The computer is based on a central processing unit (CPU) of type P857RA. This CPU also includes an I/O processor and a memory management unit. The integrated IOP function has a capacity equal to two IOPs of type 6827, and the memory management is able to address 1Mbyte.

The memory capacity is 128-512K 16-bit words, built to the desired range by plugging in 1-4 semiconductor memory modules of type 6781 (each of 128K). The battery back-up provided is capable of maintaining a maximum memory configuration for at least 0.6 hours.

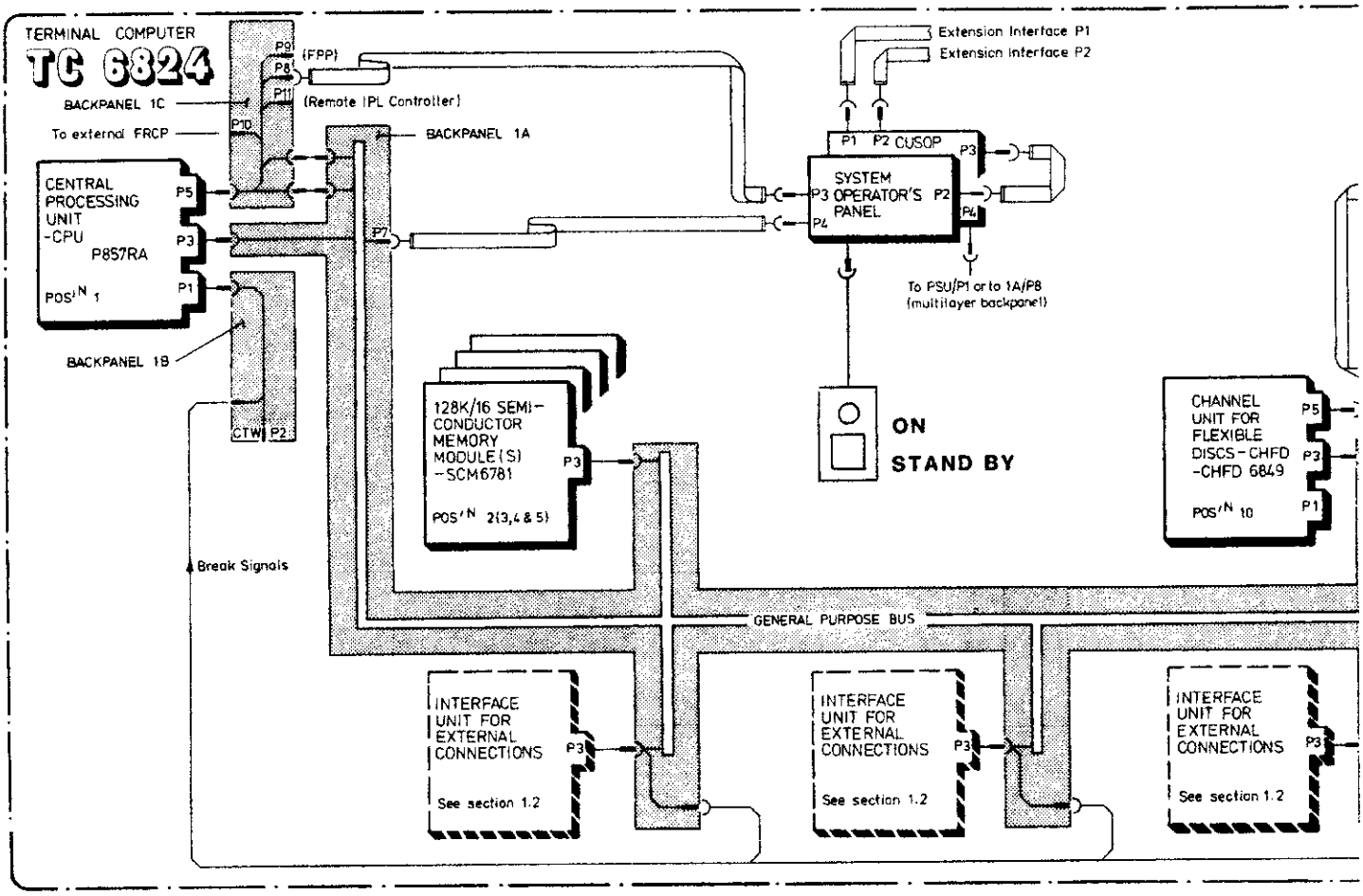
Program Load & Back-Up Media

The cabinet is able to house up to two flexible disc drives, FDD 6791 (1Mbyte). The drives are controlled via the busconnected interface unit CHFD 6849. However, if desired, the cabinet can instead be equipped with drives of type FDD 6867 (250 Kbyte) and a controller of type CHFD 6848.

Control Panels

A system operator's panel (SOP), that provides the control and display facilities required for the daily routines, is always fitted to the computer. This panel has an integrated interface unit (Control Unit SOP, CUSOP) that makes it independent of other units like CHCR and CHFD.

When extended control and display facilities are required, it is possible to connect an external Full Refreshed Control Panel, FRCP 6981.



External Interfaces

The interface units available for connecting work stations and peripherals to the computer, and for connecting the computer on-line to a data centre are described in section 1.2; EXTERNAL CONNECTIONS.

Power Supply

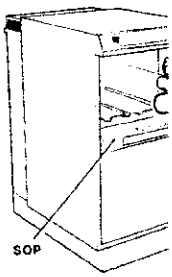
The power supply unit (PSU) can be adapted to either of the mains sources; 100-127V/60Hz, or 200-240V /50Hz. Besides the required D.C. voltages the PSU also provides a real time clock signal (RTC), a power failure alarm (PWFN), a system reset signal (RSLN) and a power on indication (POWER ONN). Battery back-up is provided for the semiconductor memory system. For maximum memory configuration the back-up time is more than 0.6 hours.

Extension Unit

Interface units that (because of space, power or cabling reasons) cannot be contained in the computer cabinet, can instead be put into an extension unit, EXU 6864. This is a stripped computer cabinet of type 6812/13/14 where the rack with backpanel 1A and the PSU have been retained.

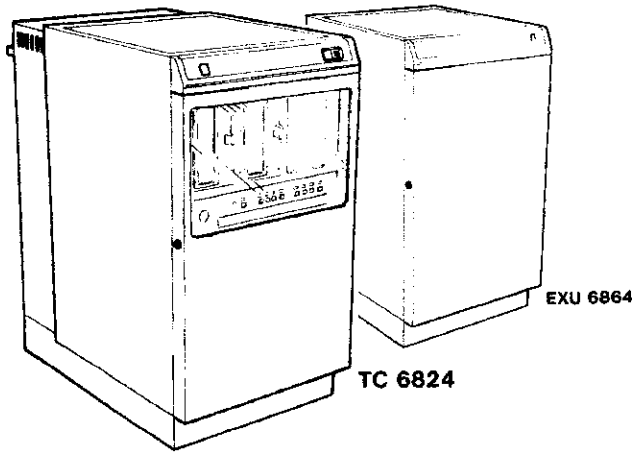
The TC and EXU cabinets are interconnected via two bus extension cables. Besides extending the bus to the EXU, these cables also provide a possibility to link other lines between the cabinets, e.g. break lines from the EXU to the CPU in the TC cabinet. Such lines are in both cabinets terminated on extension posts close to the extension plugs on backpanel 1A.

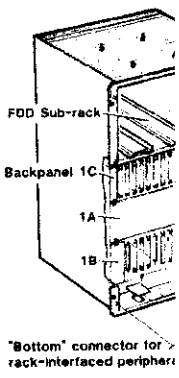
The bus extension cables also interconnect each one of the PWFN and RSLN signals with corresponding signal from the other cabinet. Each twin-source signal then operates in a wired-or manner within the extended system.

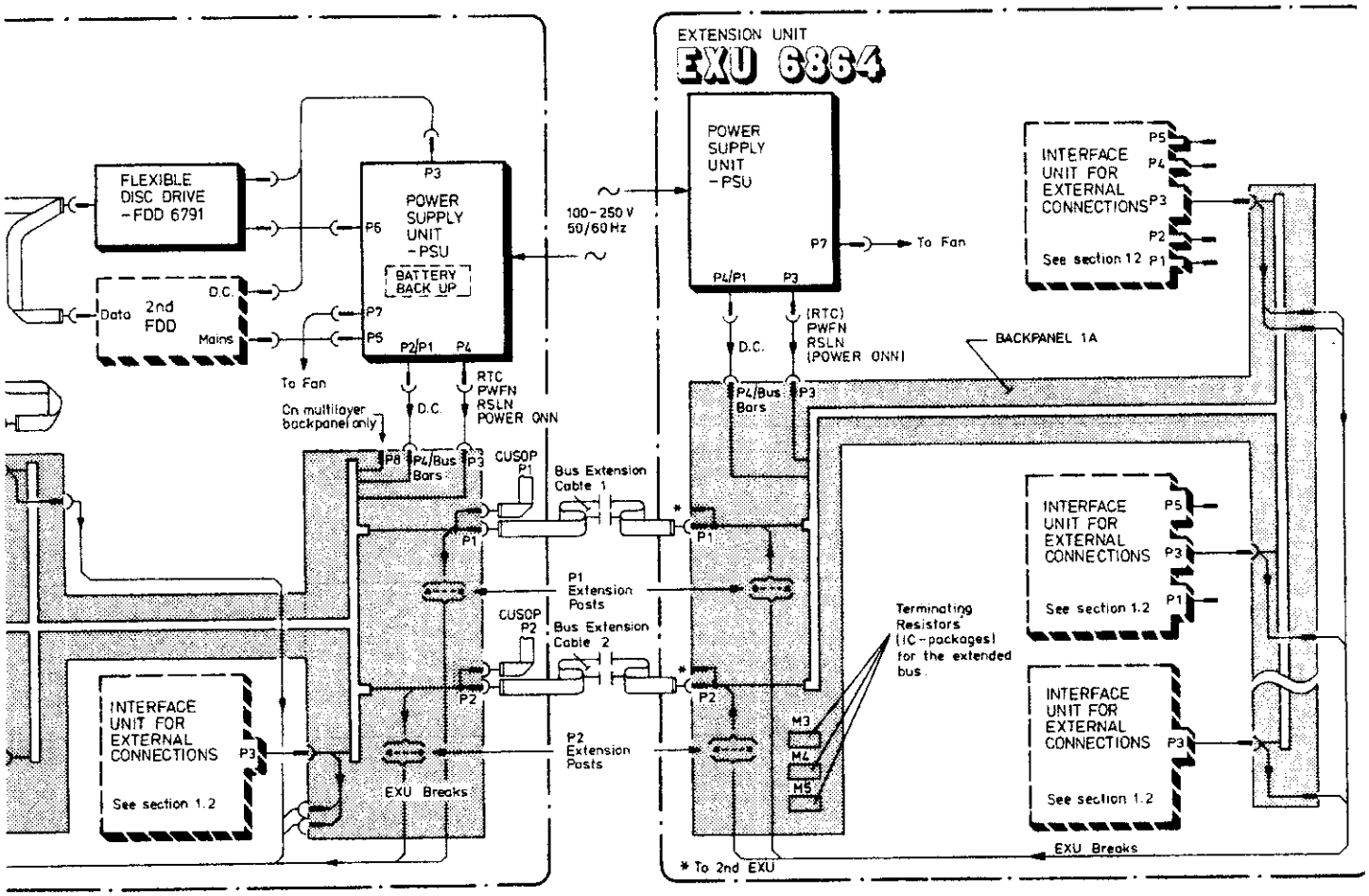


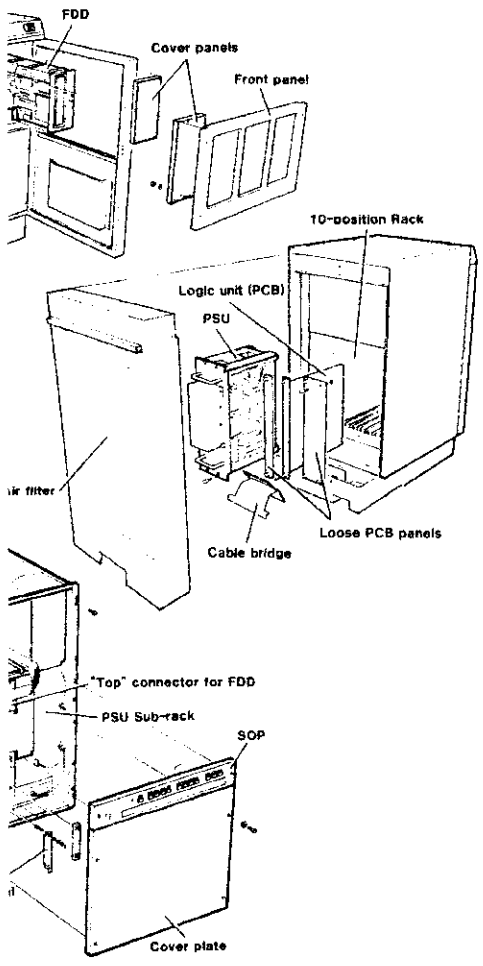
NOTE

When required it is also possible to add a second EXU 6864. The extension cables are then further extended from the cable interface in the first EXU.









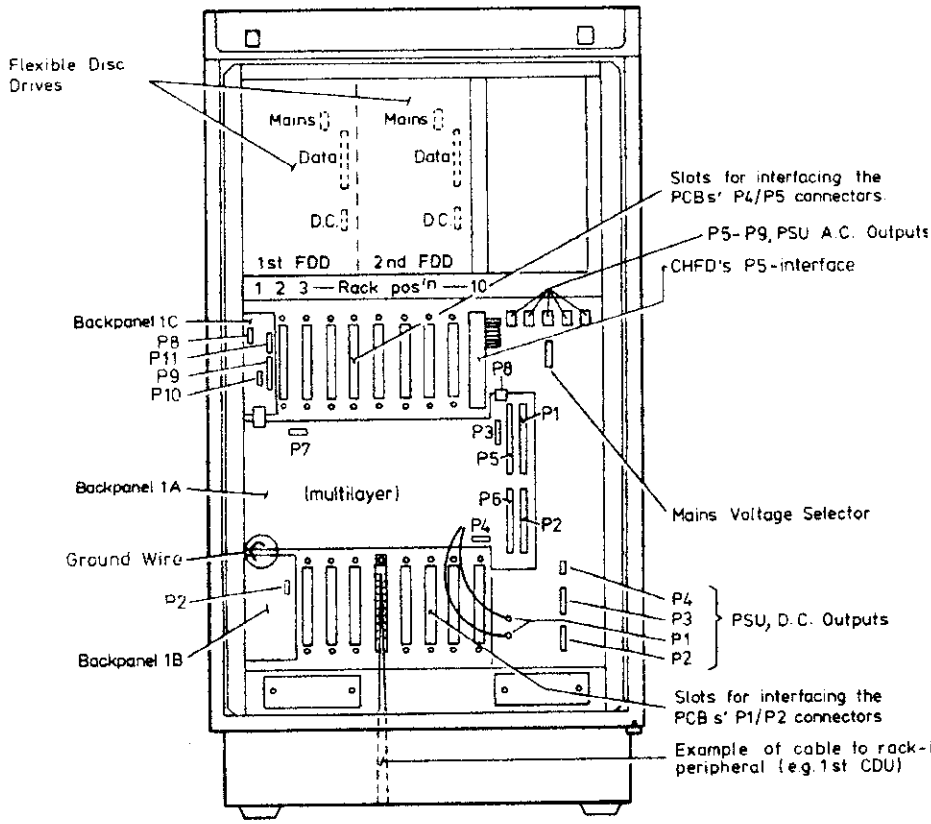


Figure 1.1-6 TC 6824/EXU 6864 - Basic Configuration

1.1.7 GENERAL PURPOSE (GP) BUS

All transfers of information between elements of the P852M/P856M or P857M system take place via the GP bus, and the lines of the bus comprise the input and output signal and address lines necessary for the data transfer requirements of the system. The GP bus can be extended outside the basic mounting box to further equipment shelves by using 125 Ohm, flexible, plug-in, transmission lines. The lines can be extended to convenient lengths between equipment shelves up to a total maximum length of 14.5 metres. Line termination facilities are provided in the basic mounting box and, it required, in the equipment shelves.

Two types of signal are used to bus: command signals and data signals. Command signals are those which will cause an immediate action according to their change of state: these signals have no unknown state but are always either logic "1" or "0". Data signals carry the actual information exchanged amongst the system elements: these signals are permitted to adopt indeterminate values except when the information is actually being used in the processing.

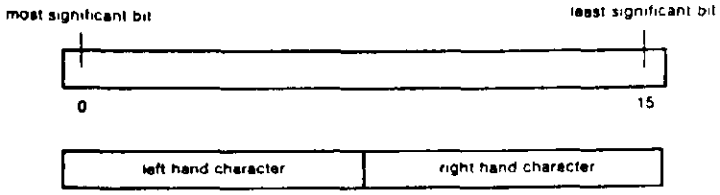
The signals carried by the GP bus lines are described below. When a mnemonic ends in "N" it means, in the case of a data signal, that the signal transmitted on the GP bus is the complementary value of the true signal. In the case of the control signal the "N" means that the signal performs its function on being set to "0" (active low). Most of the GP bus lines are used both inside and outside the basic mounting box. Where this does not apply it is indicated in the signal description given below.

GP Bus Signals

BI0 00N to BI0 15N

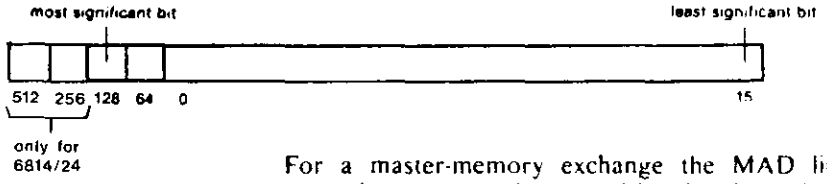
16 data lines which are used to carry data information between all system elements concerned with the transmission or reception of data signals.

The bit location is as follows:



MAD128, 64 and 00 to 15 (only MAD03, 04,08-15 used externally also)

18 address lines which carry different information according to the type of exchange. The bit location is as follows:



For a master-memory exchange the MAD lines carry the memory address and MAD15 is used as a character indicator. When set to 1 it indicates the right (least significant) character and when set to 0 the left (most significant) character.

For a master-control unit exchange the lines MAD10-15 carry the address of the control unit and lines MAD 04, 08 and 09 the function to be performed. MAD03 indicates whether or not the exchange in progress is the last. The functions are as listed below:

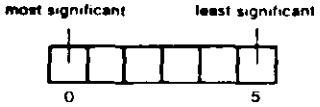
MAD04 = 0	exchange to control unit
MAD04 = 1	exchange to master
MAD08 = 0	data exchange (INR, OTR)
MAD08 = 1	command or status exchange
MAD09	special functions
MAD03 = 0	exchange not the last
MAD03 = 1	last exchange.

For a master-external register exchange the lines MAD08 to 15 carry the address of the external register. MAD04 is used to indicate whether it is a read or write operation as follows:

MAD04 = 0	write operation
MAD04 = 1	read operation.

BIEC 0 to BIEC 5

Six signal lines which represent in encoded form the interrupt raised (other than internal interrupts) having the highest priority. The format is as follows:



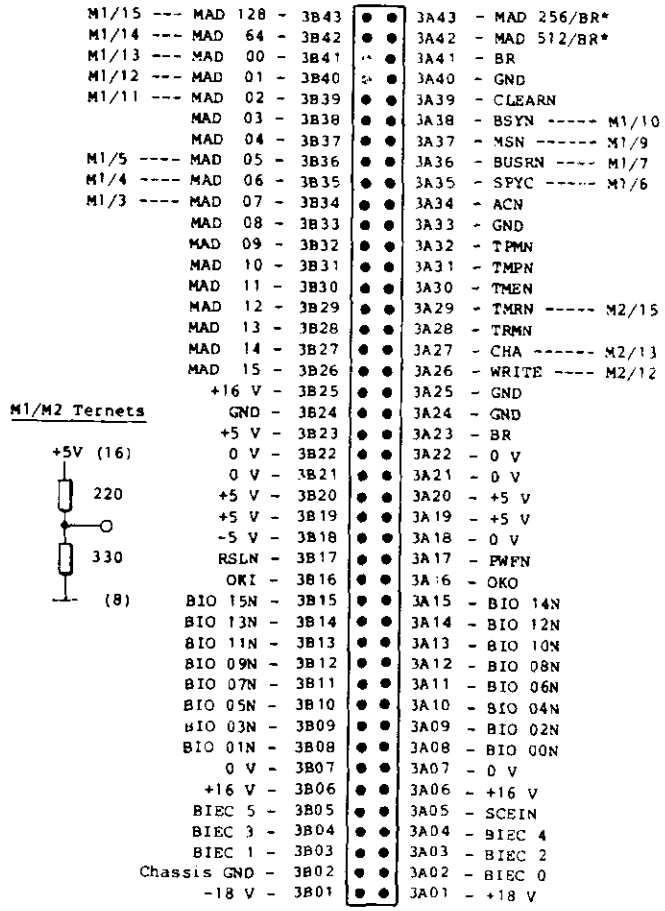
SCEIN		A signal *Scan External Interrupts* sent by the CPU to control units at the end of each instruction which places on the BIEC 0 to 5 lines the 6 bits representing the highest priority external interrupt detected.
ACN		A signal *function accepted* which is sent by a control unit to the CPU to indicate that the requested function is accepted by the control unit.
BUSRN	Internal use only	A signal *bus request* which is sent to the bus controller in the CPU by a master which requires control of the bus to effect an exchange.
BSYN	Internal use only	A signal *bus busy* which is shared by all masters. It is set to "0" by the master which has been given control of the bus so that the exchange can commence without interruption.
MSN	Internal use only	A signal *master selected* which is transmitted to all other masters by the master which has become master of the bus to block all activity of the priority selection chain. The signal is released when the master is ready for the next priority transaction.
SPYC	(active low)	A signal *scan priority chain* sent by the bus controller to all masters in response to a BUSRN signal. The signal enables the highest priority master which has transmitted BUSRN to block the priority chain at its level.
OKO (internal use only)		A signal generated by the bus controller after all masters have been alerted by SPYC. It is sent to the master having the highest priority (determined by hard wiring in the priority selection chain).
OKI (internal use only)		A master which receives signal OKO regards the signal as OKI. It then retransmits a further OKO to the next master in the priority chain. The first master to receive OKI set to '1' and to retransmit OKO reset to '0' is next master of the bus.
CHA (internal use only)		A signal *character* transmitted to the memory by the master which has control of the bus to indicate whether the exchange is to be by character or by word as follows: CHA = 1 character operation CHA = 0 word operation.
WRITE (internal use only)		A signal *write* transmitted to the memory by the master which has control of the bus to write information into memory or to read information from memory as follows: WRITE = 1 write into memory WRITE = 0 read from memory.
CLEARN		A signal *clear* transmitted by the CPU to all elements connected to the GP bus to cause a general reset to zero.

TMRN (internal use only)	A signal *master to memory* transmitted by a master to memory to validate the data on the BIO and MAD lines during an exchange. The signal also controls the timing of the exchange.
TMPN	A signal *master to peripheral* transmitted by a master to a peripheral CU to validate the address of the peripheral CU and to initialize the exchange.
TMEN	A signal *master to external register* transmitted by a master to a unit containing the addressed register to validate the address and data of the register and to control the timing of the exchange.
TRMN	A signal *register or memory to master* transmitted by a unit controlling a register or by memory in reply to TMEN or TMRN to indicate that the unit transmitting the signal is in a condition to be read. The signal is also used to terminate the exchange.
TPMN	A signal *peripheral to master* transmitted by the peripheral control unit concerned in reply to TMPN. It is also used to validate the response of the control unit and to terminate the exchange.
RSLN	An Earth signal *reset line* transmitted by the CPU power supply (or external rack power supplies) and used to protect the peripherals during the switching on and switching off power sequence. The signal is also used to generate CLEARN when switching on.
PWFN	A signal *power fail* transmitted by the CPU power supply (or external rack power supplies) to warn the CPU that power failure has been detected. The signal is also used as a facility to restart the system at the point where it has been stopped.
4 spare lines	There are 4 spare lines provided on the GP bus extension cable outside the CPU cabinet.

Backpanel 1A holds the signal-lines of the General Purpose Bus.

The following list shows the signal-names against the pin-numbers:

Note that the pins are numbered from bottom to top, the A-side at the right-hand side and the B-row at the left-hand side.



* Address lines in CPU and Memory positions,
Break outputs in other positions.

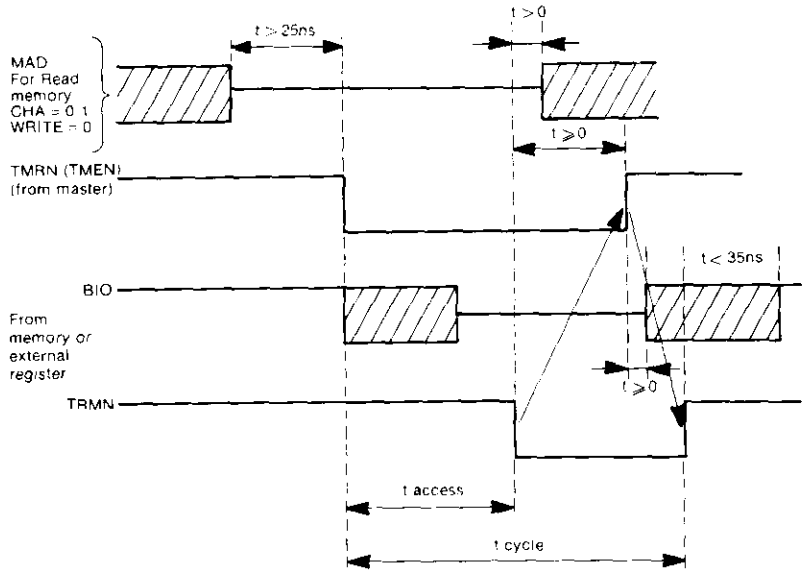


Figure 1.1-12 Timing Read Memory (or External Register)

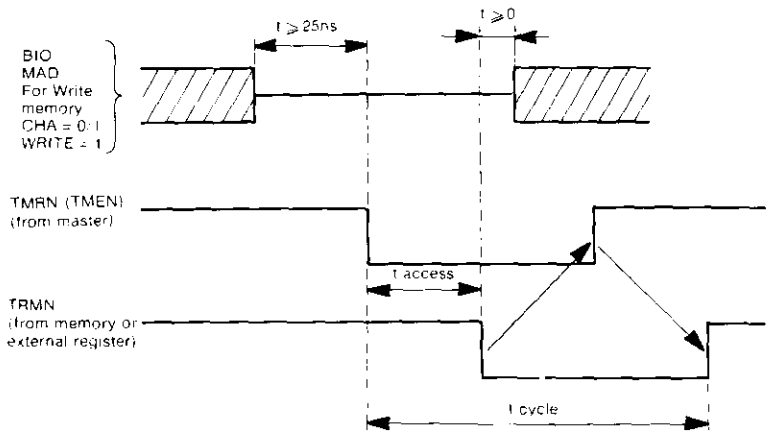
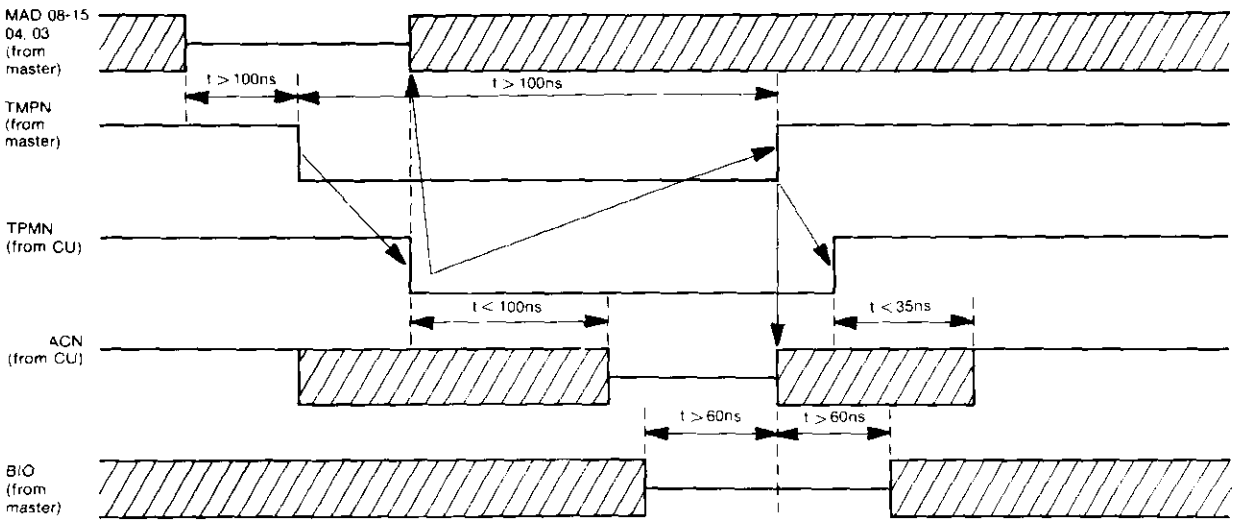


Figure 1.1-13 Timing Writing in Memory (or External Register)



Note: CU which recognises its address specifies accept or not accept function using ACN. If function accepted CU must statisize data presented at least 60 ns before TMPN goes high again. Data must remain present at least 60 ns after TMPN goes high.

Figure 1.1-14 Timing for an OTR Exchange

Priority level	Master	Remark
0	DMA (CURD 80 MDisc.)	Highest priority
1	IOP 1 (Dev. Addr. 08-0F)	
2	CHLW	
3	CHRW	
4	CPU (Except when PWF)	Not wired.

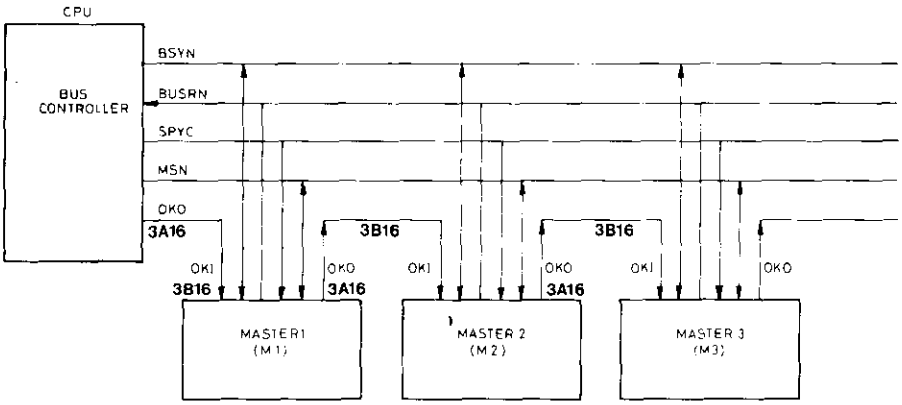


Figure 1.1-15 OKO-OKI WIRING

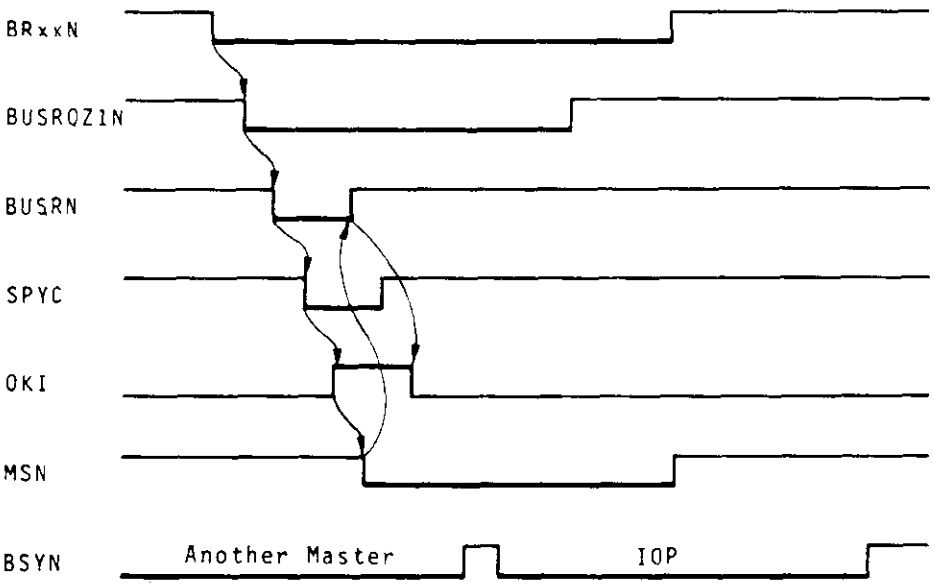
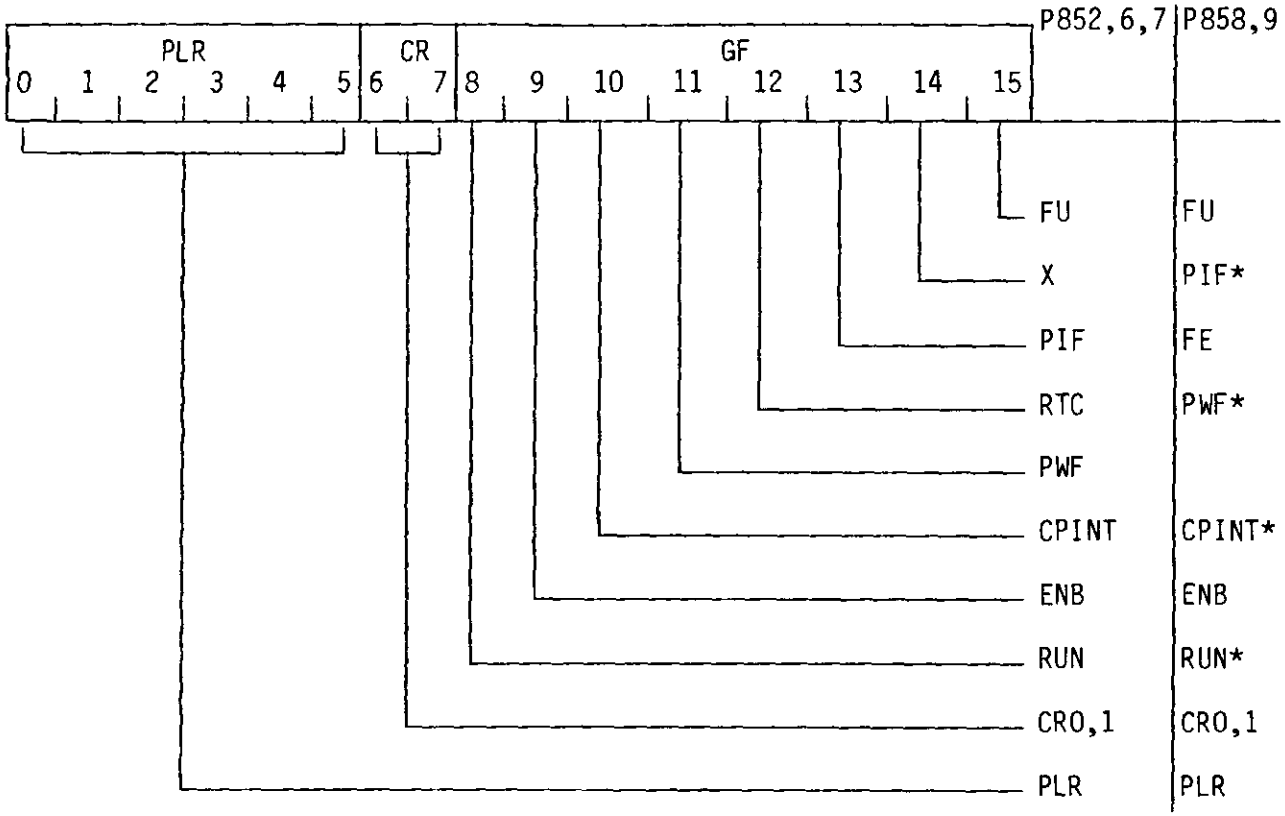


Figure 1.1-16 Busrequest and Selection

1.1.8 PROGRAM STATUS WORD (PSW)



FE : Extended System Mode
FU : User Mode
RTC : Real Time Clock
PWF : Power Failure Interrupt
CPint : Control Panel Interrupt
ENB : Interrupt ENable
RUN : CPU in RUN Mode
CR : Condition Register
PLR : Program Level Register
PIF : Program Interrupt, Stack Overflow**

* These bits are not displayable (blanked in microprogram).

CRO,1:

CRO CR1	ARITHMETIC	COMPARE	I/O
00	Zero	Equal	Accepted
01	Positive	Greater	Not Accepted
10	Negative	Less	--
11	Overflow	--	Device Address Unknown

** Stackoverflow if (A15) smaller than /100.

1.1.9 INTERRUPT SYSTEM

Interrupt levels internal

LEVEL HEX	DEC	Interr. control Address HEX	SOURCE
0	0	0	PF/AR
1	1	2	LKM/Stackoverflow;(A15),Less than /100
2	2	4	RTC
3	3	6	Not Used
4	4	8	Not Used
5	5	A	Not Used
6	6	C	Control Panel
7	7	E	Console Typewriter
.			
.			
.			
.			
1F	31	2E	Page Fault MMU for 6813 (depends on strap setting MMU)
.			
.	EXTERNAL LEVELS SEE CHAPTER 2.5		
.			
.			
.			
.			
.			
.			
.		7A*	TC6814/24 Page Fault Trap
		7C*	TC6814/24 D Type Trap
3E	63	7E*	Trap control address for invalid or priveleged instructions

* PLR not changed

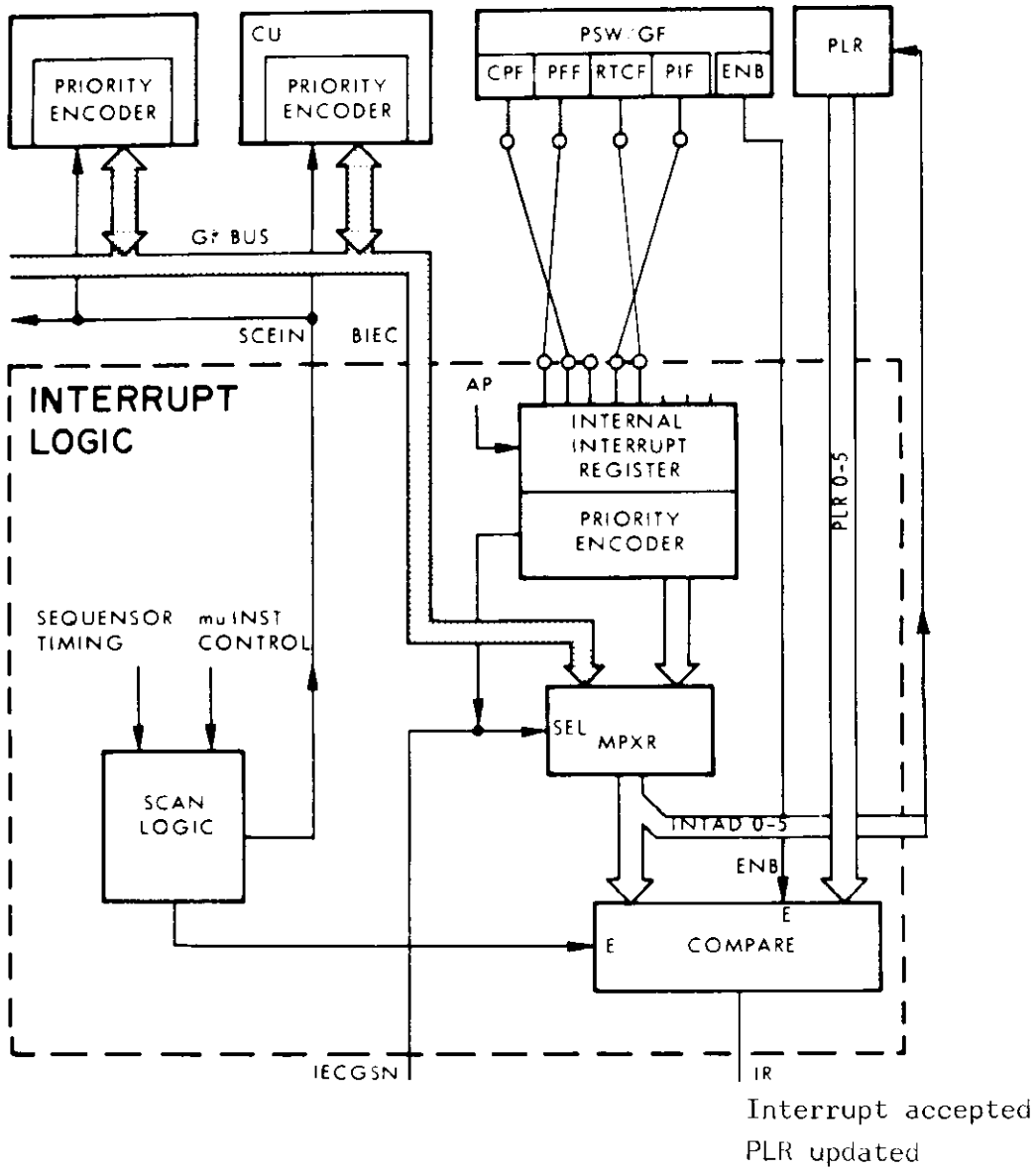
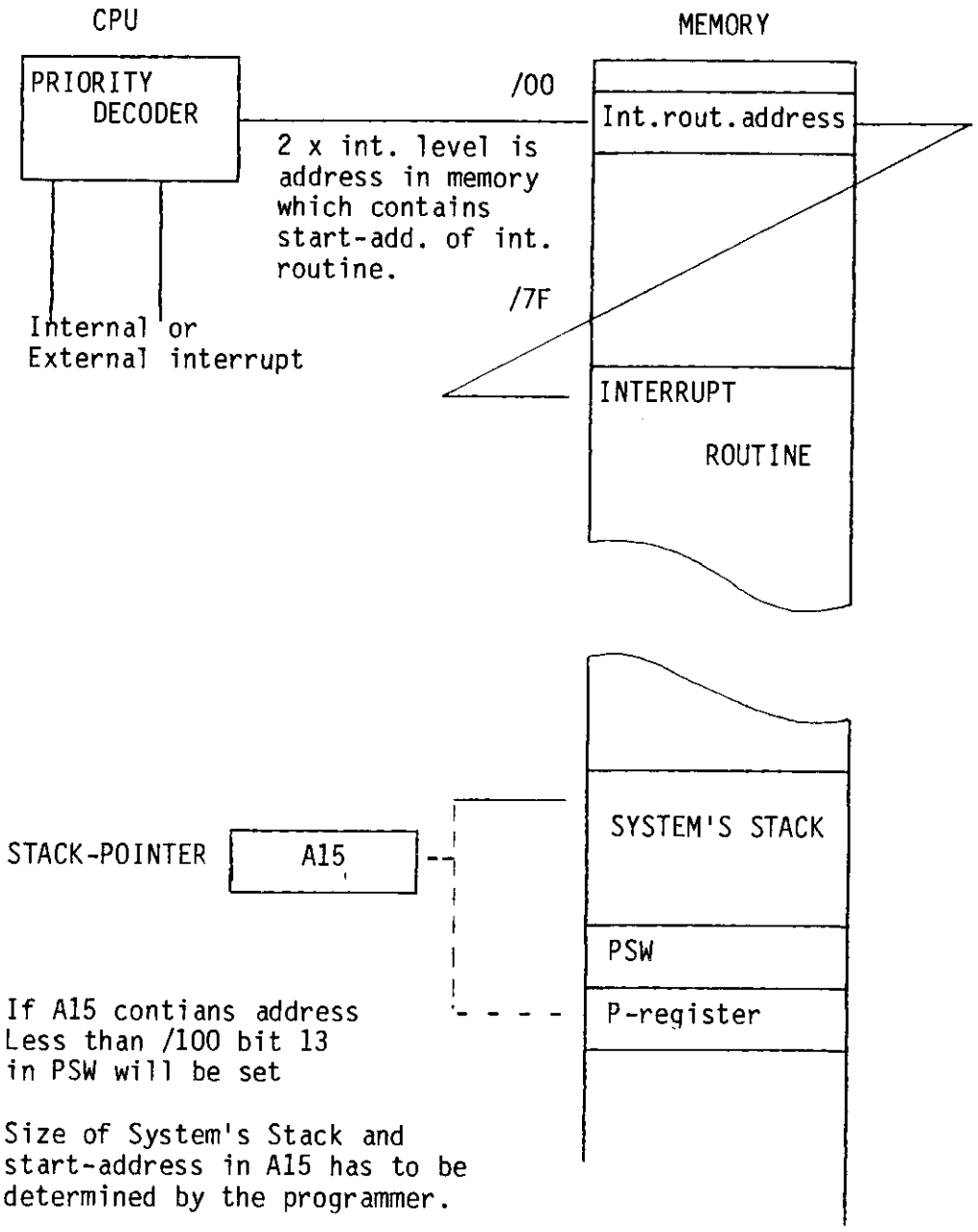


Figure 1.1-17 Interrupt System


CPU
MEMORY
PRIORITY
DECODER
/00
Int.rout.address
2 x int. level is
address in memory
which contains
start-add. of int.
routine.
/7F
Internal or
External interrupt
INTERRUPT
ROUTINE
SYSTEM'S STACK
STACK-POINTER
A15
PSW
P-register
If A15 contians address
Less than /100 bit 13
in PSW will be set
Size of System's Stack and
start-address in A15 has to be
determined by the programmer.

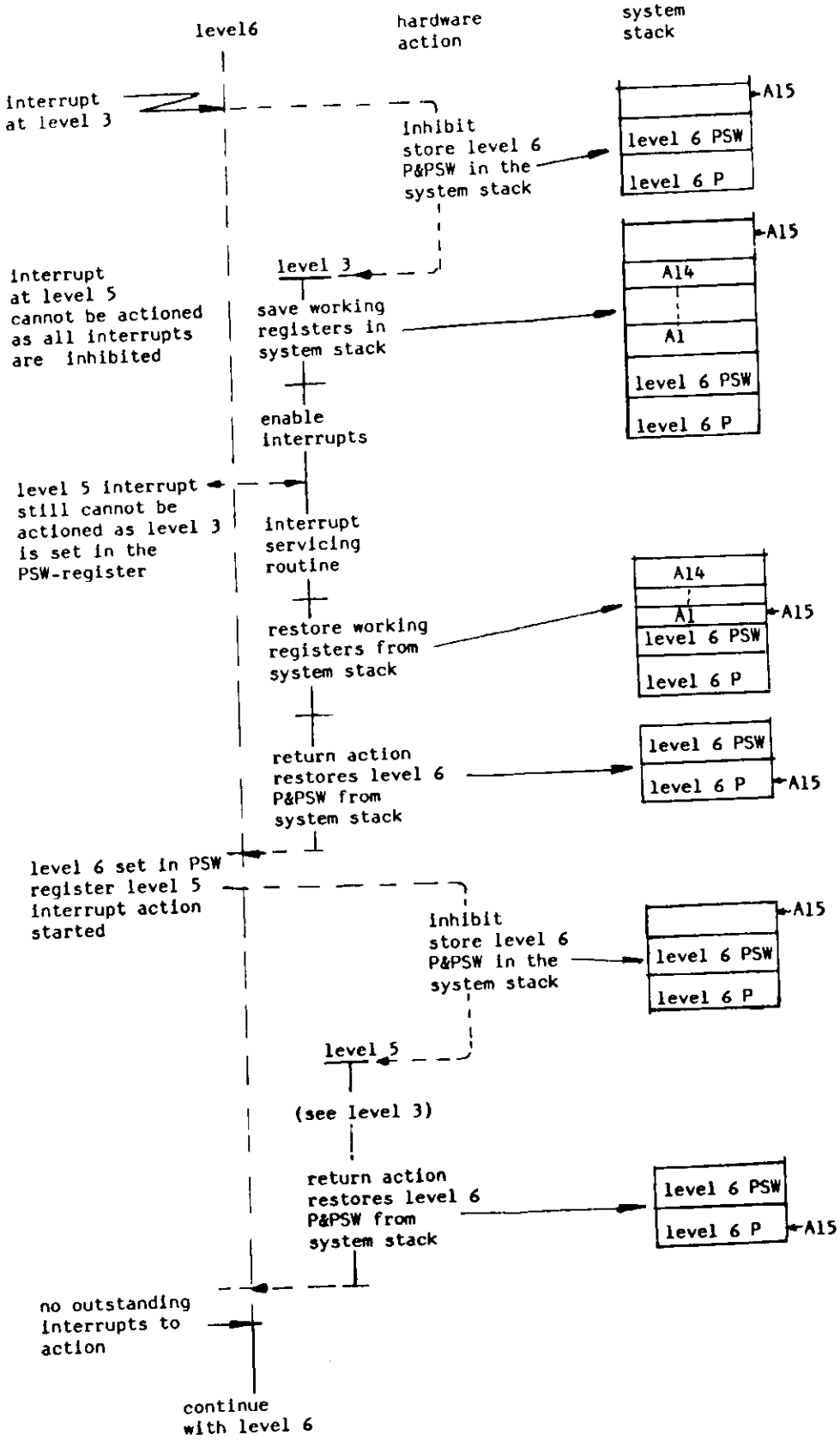


Figure 1.1-18 Diagram of Interrupt Sequence

1.1.10 I/O CHANNEL

Control Unit Modes:
Example:

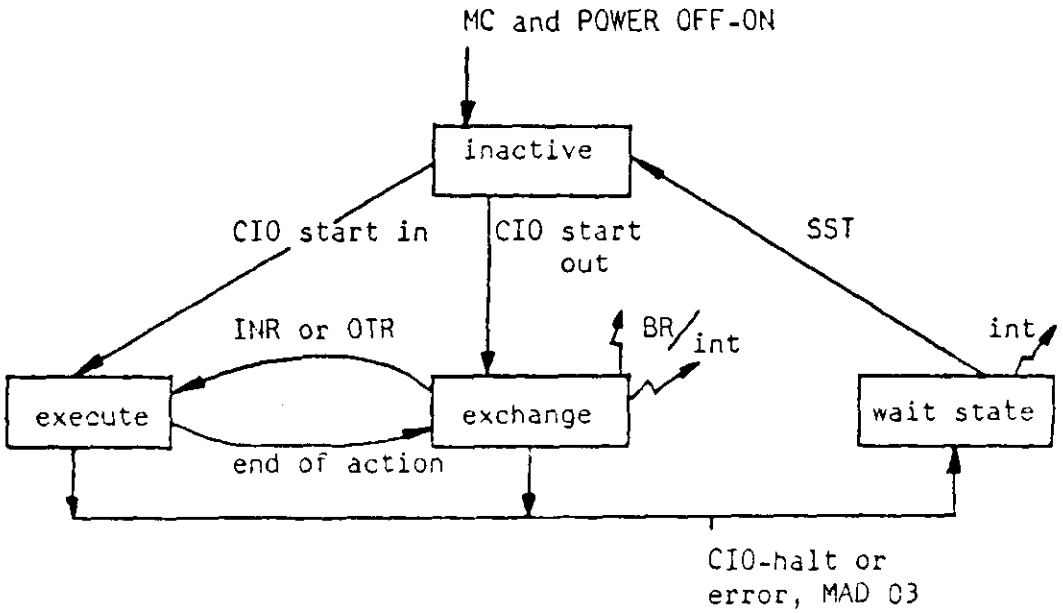
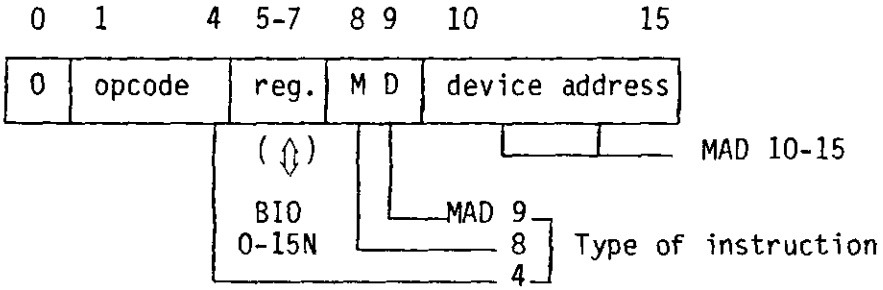


Figure 1.1-19 Control Unit Modes

I/O Instructions Format



Instruction Bits		4	8	9	
MAD Lines	03	04	08	09	Accepted in mode
CIO Start	0	0	1	1	Inactive
CIO Stop	0	0	1	0	Always
INR (Input Transfer)	0	1	0	0	Exchange
OTR (Output Transfer)	0	0	0	0	Exchange
TST (Test Status)	0	1	1	0	Always
SST (Send Status)	0	1	1	1	Wait state
INR (last) IOP	1	1	0	0	Exchange
OTR (last) IOP	1	0	0	0	Exchange

CONDITION REGISTER (DISPLAYS TPMN AND ACN - LINES)

0 0 = accepted
0 1 = not accepted
1 1 = device address not recognized

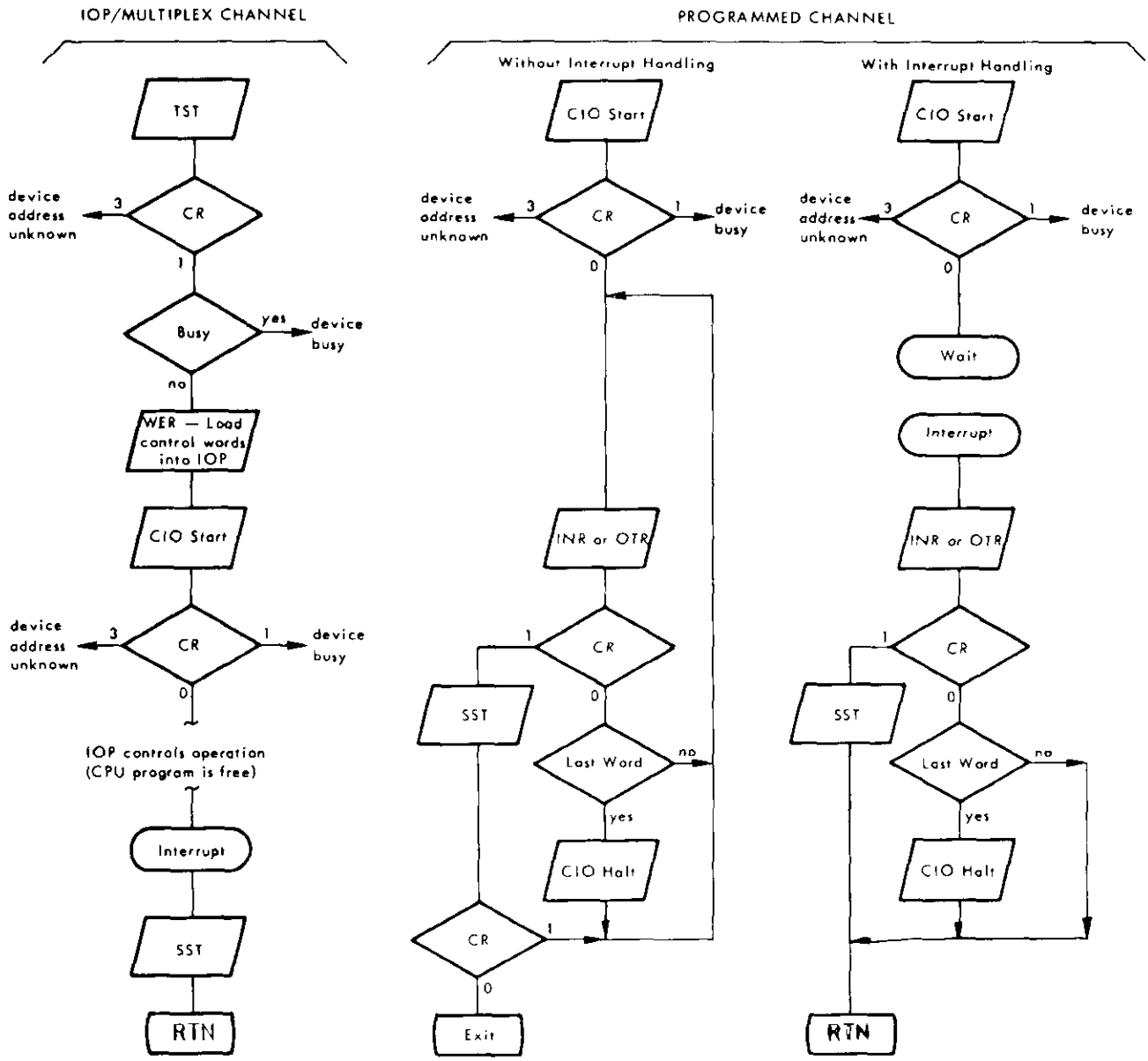


Figure 1.1-20 General Programming Sequence

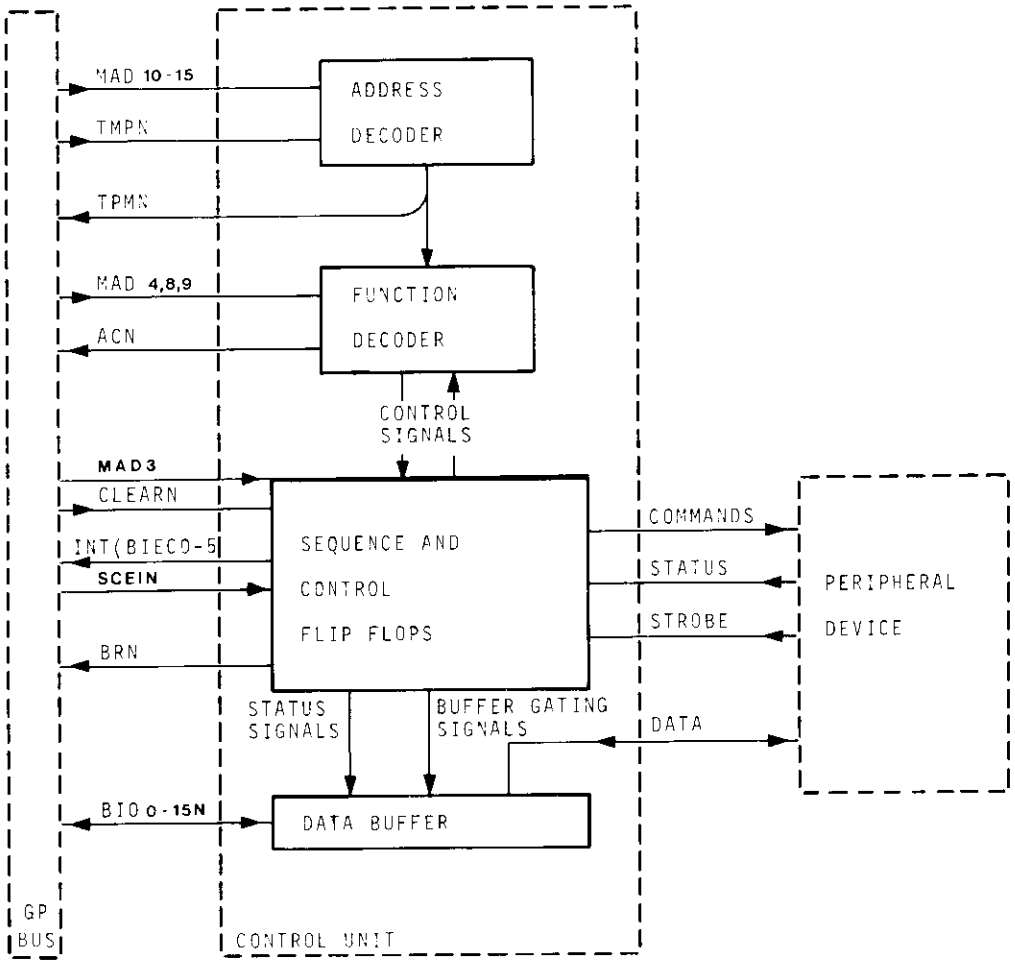
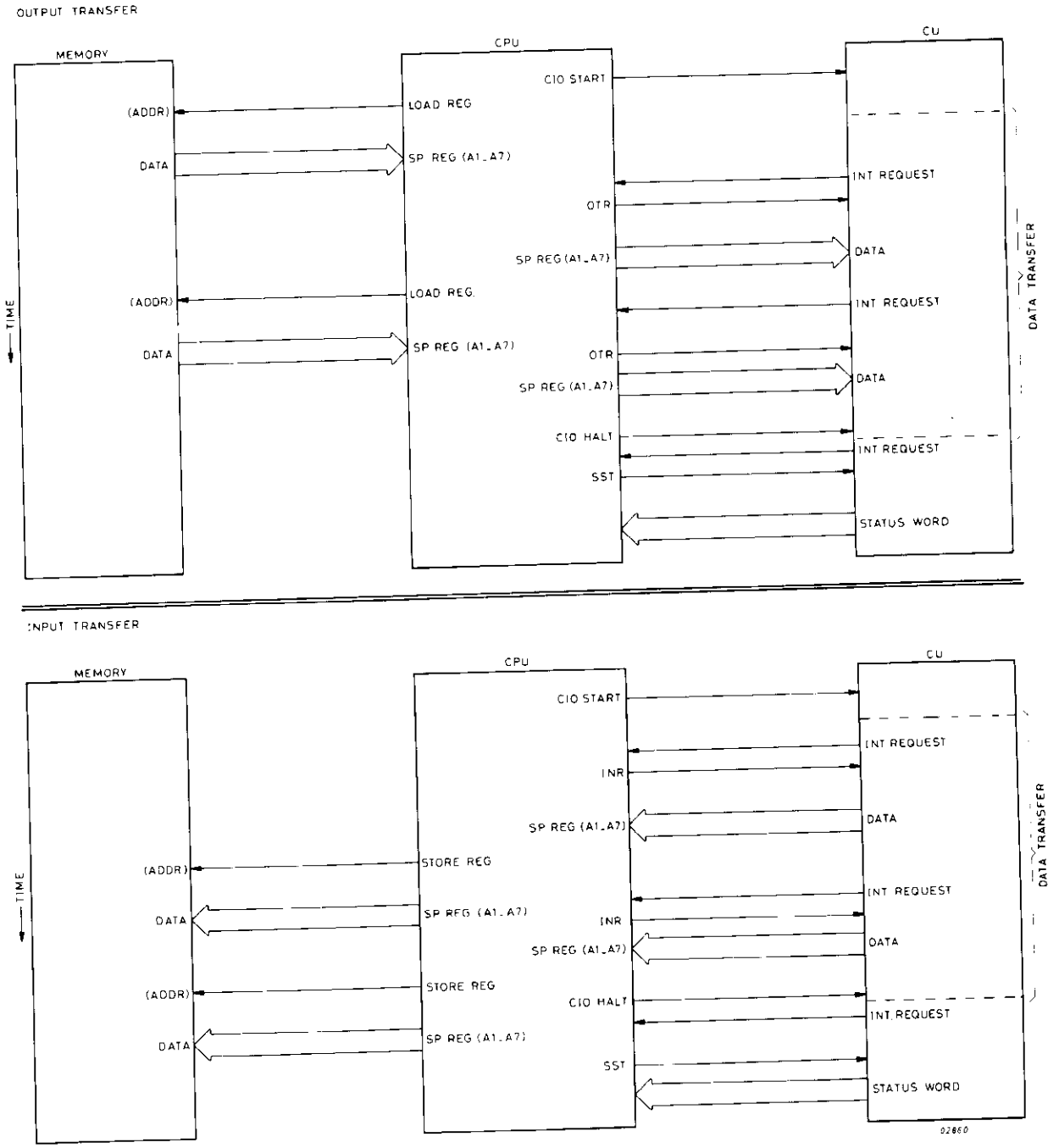
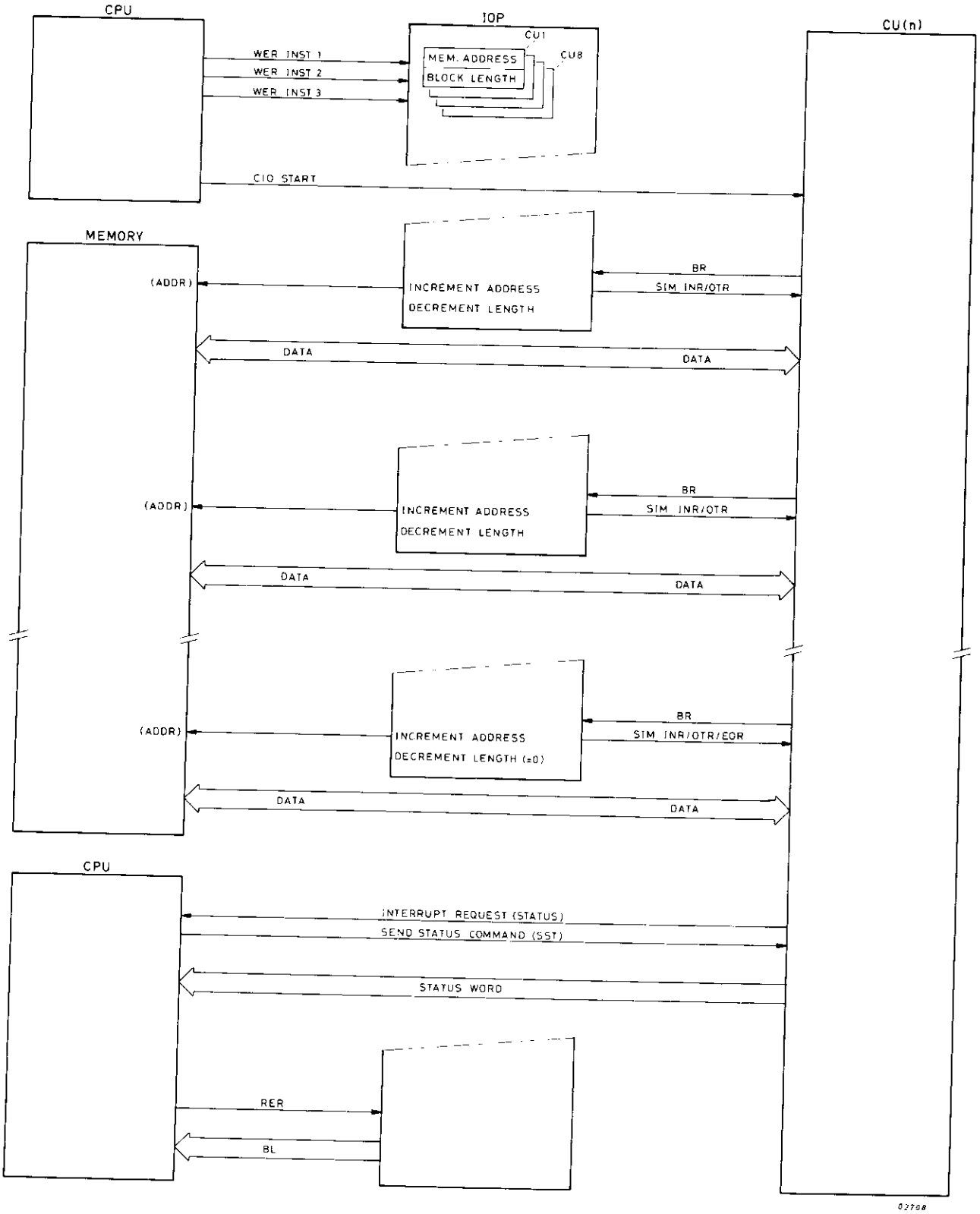


Figure 1.1-21 Block Diagram of Typical Control Unit



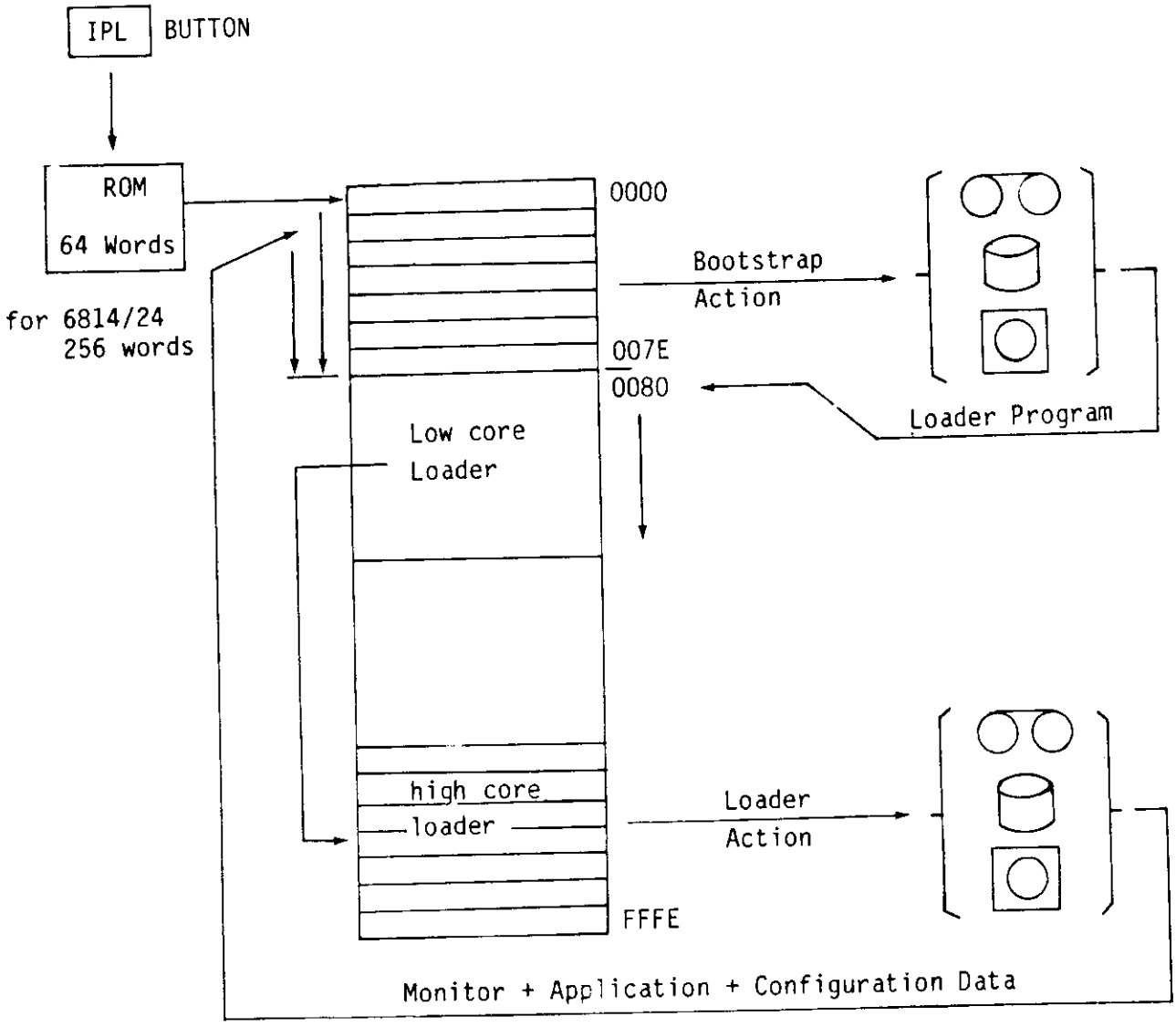
PROGRAMMED CHANNEL TRANSFERS

"Only 2 WER instructions for PTS6811/12/13"



Note-- This diagram shows the sequence for transferring a block of data between memory and single CU, (n). The IOP can multiplex up to eigth CUs; the operation shown is thus duplicated for each CU.

1.1.11 IPL PROCEDURE



Bootstrap, Loader.

```
        DATE  82-05-05        IDENT    LOWCOR

0000                          IDENT    LOWCOR
0001                    *DATE: 820505 FOR PTS
0002                    *      EXAMPLE LOW CORE LOADER CASSETTE
0003                           AORG     /80
0004
0005 0080 FFFE          FLAG   DATA     /FFFE
0006 0082 0000                 DATA     0
0007 0084 9041 0080     LOWSTA IM       FLAG                 INCREMENT FLAG
0008 0088 501A                 RF(0)    SECOND               IS IT FIRST OR SECOND TIME
0009                    *      FIND OUT MEMORY SIZE
0010 008A 8720 5555     FIRST  LDKL     A7,/5555
0011 008E 81A0 FF78            LDKL     A9,/FF78             ADDR HIGH CORE LOADER IF 32 KW MEM
0012 0092 8727          MSIZE  STR      A7,A9                STORE (A7)
0013 0094 EF26                 CWR*     A7,A9                CHECK IF MEM CONT IS (A7)
0014 0096 5006                 RF(0)    UPDREG               YES UPDATE REG FOR HIGH CORE LOAD
0015 0098 99A0 1000     NO     SUKL     A9,/1000             DECREMENT ADDR HIGH CORE
0016 009C 5F0C                 RB       MSIZE
0017                    *      UPDATE REGISTERS TO LOAD HIGH CORE LOADER
0018 009E 0588          UPDREG LDK      A5,/88               NUMBER OF CHARACTERS HIGH CORE LOADER
0019 00A0 8606                 LDR      A6,A9                FIRST ADDR HIGH CORE
0020 00A2 0F42                 AB       /42                  BRANCH TO BOOTSTRAP FOR HIGH CORE LOAD
0021                    *      START HIGHCORE LOADER
0022 00A4 8120 0400     SECOND LDKL     A1,/0400
0023 00A8 412E                 OTR      A1,0,/2E             LIGHT LOAD LAMP ON SOP
0024 00AA 8386                 LDR      A11,A9               SAVE HIGH CORE START ADDR
0025 00AC 9986                 SUR      A9,A9                CLEAR A9
0026 00AE 9C92                 SUR      A12,A12              CLEAR A12
0027 00B0 86A0 FFF8            LDKL     A14,/FFF8
0028 00B4 8F0E                 ABR      A11                  BRANCH TO HIGH CORE LOADER
0029                           END      FLAG
```

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          DATE  82-05-05        IDENT    HIGHCOR

0000                            IDENT    HIGHCOR
0001                      *DATE: 820505 FOR PTS
0002                            AORG     /FF78
0003                      *     EXAMPLE HIGH CORE LOADER FOR CASSETTE
0004
0005 FF78 8500            HIGHST LDR       A5,0                    SAVE HIGH CORE START ADDR
0006 FF7A 1D02                   SUK       A5,2
0007 FF7C 02C0                   LDK       A2,/C0
0008 FF7E 3864                   SRL       A3,4
0009 FF80 2301                   ANK       A3,/01
0010 FF82 920C                   ADR       A2,A3
0011 FF84 8306                   LDR       A3,A9
0012 FF86 0700                   LDK       A7,0
0013 FF88 0600            A3IA13 LDK       A6,0
0014 FF8A 840C                   LDR       A4,A3
0015 FF8C 010A            READH  LDK       A1,/0A                  READ BLOCK
0016 FF8E 41CE                   CIO       A1,1,/0E
0017 FF90 490E            INRH   INR       A1,0,/0E
0018 FF92 5408                   RF(4)     SSTH
0019 FF94 EC14                   CWR       A4,A5                   IS THERE MEMORY OVERFLOW
0020 FF96 505E                   RF(0)     MEMOFL
0021 FF98 E131            STPROG SCR       A1,A4
0022 FF9A 1401                   ADK       A4,1                    INCREMENT MEM ADDR
0023 FF9C 49CE            SSTH   SST       A1,/0E                  STATUS?
0024 FF9E 5C10                   RB(4)     INRH
0025 FFA0 A120 FCFF       CHSTAT ANKL      A1,/FCFF                CHECK ON STATUS ERROR
0026 FFA4 543A                   RF(4)     STATER
0027 FFA6 1C10                   SUK       A4,/10
0028 FFA8 8590                   LDR       A13,A4
0029 FFAA 1C02                   SUK       A4,2
0030 FFAC 1402                   ADK       A4,2
0031 FFAE 0610            A6ZERO LDK       A6,/10
0032 FFB0 871C                   LDR       A7,A7
0033 FFB2 501E                   RF(0)     A7ZERO
0034 FFB4 8130                   LDR*      A1,A4
0035 FFB6 5606            CHA1   RF(6)     A1NEG
0036 FFB8 82AC                   LDR*      A10,A3
0037 FFBA 9286                   ADR       A10,A9
0038 FFBC 5702                   RF        CONT
0039 FFBE 82AC            A1NEG  LDR*      A10,A3
0040 FFC0 82CD FFF8       CONT   ST        A10,/FFF8,A3
0041 FFC4 1302                   ADK       A3,2
0042 FFC6 EB16                   CWR       A3,A13
0043 FFC8 5842                   RB(0)     A3IA13
0044 FFCA 1E01                   SUK       A6,1
0045 FFCC 5820                   RB(0)     A6ZERO
0046 FFCE 3941                   SLL       A1,1
0047 FFD0 5F1C                   RB        CHA1
0048 FFD2 872C            A7ZERO LDR*      A7,A3
0049 FFD4 9706                   ADR       A7,A9
0050 FFD6 1308                   ADK       A3,8
0051 FFD8 1E04                   SUK       A6,4
0052 FFDA 8130                   LDR*      A1,A4
0053 FFDC 3944                   SLL       A1,4
0054 FFDE 5F2A                   RB        CHA1
0055 FFE0 39C3            STATER SLC       A1,3
0056 FFE2 5610                   RF(6)     ERROR
0057 FFE4 462E                   OTR       A6,0,/2E
0058 FFE6 1B08                   SUK       A3,8
0059 FFE8 818C                   LDR       A9,A3
0060 FFEA 859C                   LDR       A13,A7
0061 FFEC 8492                   LDR       A12,A12
0062 FFEE 5402                   RF(4)     BRA12
0063 FFF0 8F16                   ABR       A13
0064 FFF2 8F12            BRA12  ABR       A12
0065 FFF4 1601            ERROR  ADK       A6,1
0066 FFF6 1601            MEMOFL ADK       A6,1
0067 FFF8 E618                   ECR       A6,A6
0068 FFFA 462E                   OTR       A6,0,/2E                ERROR DISPLAY ONSOP
0069 FFFC 207F                   HLT                               ERROR STOP
0070 FFFE 5F88                   RB        HIGHST
*S     0000 5F88                                  *
*******
0071                            END      HIGHST
```

1.1.12 CONTENTS IPL PROM 5131 110 01142

```
          DATE  82-05-05        IDENT    B1142     820505


0000                            IDENT    B1142                  820505
0001                    *       FOR IPL FROM CASSETTE,2.5M AND 5M DISC AND MAGNETIC TAPE
0002                    *       CONTENTS OF A3 FOR SOP SWITCHES:
0003                    *SW1    /FE00    DCR DRIVE 0
0004                    *SW2    /FD00    DCR DRIVE 1
0005                    *SW3    /FC80    CARTRIDGE DISC DRIVE 0
0006                    *SW4    /FC40    FIXED DICS DRIVE 0
0007                    *SW5    /FC20    MAGNETIC TAPE DRIVE 0
0008                    *SW6    /FC10    NOT USED
0009                    *SW7    /FC08    NOT USED
0010                    *SW8    /FC04    NOT USED
0011                    *SW9    /FC02    NOT USED
0012                    *SW10   /FC01    NOT USED
0013
0014
0015 0000 41EE          BOOT    CIO      A1,1,/2E               START SOP
0016 0002 4B2E                  INR      A3,0,/2E               READ SOP SWITCH
0017 0004 5C04                  RB(NA)   *-2
0018 0006 41AE                  CIO      A1,0,/2E               STOP SOP
0019 0008 3BA4                  SRN      A3,A1                  WHAT SWITCH
0020 000A 1905                  SUK      A1,5                   IS THE SWITCH LEGAL?
0021 000C 5A0E                  RB(N)    BOOT                   NO READ NEXT SWITCH
0022 000E E444 0022 R           LC       A4,DEVADR,A1           LOAD DEVICE ADDRESS
0023 0012 243F                  ANK      A4,/3F
0024 0014 0278                  LDK      A2,SIOI-BOOT           ADDRESS OF CIO START
0025 0016 AC29                  ORRS     A4,A2                  CHANGE DEVICE ADDRESS IN CIO
0026 0018 027A                  LDK      A2,SSTI-BOOT           ADDRESS OF SST
0027 001A AC29                  ORRS     A4,A2                  CHANGE DEVICE ADDR IN SST
0028 001C 87A0 63C8             LDKL     A15,/63C8              INIT A15 FOR DISC IPL
0029 0020 AF90                  ORR      A15,A4                 MODIFY BY DA
0030 0022 0420          DEVADR  DATA     /0420                  USED FOR DEV ADDR EXECUTED AS LDK A2,/20
0031 0024 0806                  DATA     /0806                  EXECUTED AS AB(0) /06 IS NOP
0032 0026 0680                  LDK      A6,/80                 BASE ADDRESS LOW CORE LOADER
0033 0028 0278                  LDK      A2,EXCOM-BOOT          START ADDRESS COMMAND ROUTINE
0034 002A 1901                  SUK      A1,1                   IS IT MAGNETIC TAPE
0035 002C 5226                  RF(N)    MTAP
0036 002E 1902                  SUK      A1,2                   IS IT DISC
0037 0030 5234                  RF(N)    DISC
0038 0032 3101          CASS    XRK      A1,1                   SELECT DRIVE
0039 0034 F409                  CFR      A4,A2
0040 0036 0102                  LDK      A1,2                   LOCK SELECTED DRIVE
0041 0038 F409                  CFR      A4,A2
0042 003A 0108                  LDK      A1,8                   SEARCH BEGIN OF TAPE
0043 003C F409                  CFR      A4,A2
0044 003E 010C                  LDK      A1,/C                  SEARCH TAPE MARK
0045 0040 F409                  CFR      A4,A2
0046 0042 010A          CASS10  LDK      A1,/A                  READ 1 BLOCK
0047 0044 41CE                  CIO      A1,1,/0E               START CHCR
0048 0046 490E          CASS20  INR      A1,0,/0E               READ CHARACTER
0049 0048 5404                  RF(NA)   CASS30                 IF NOT ACCEPTED CHECK STATUS
0050 004A E139                  SCR      A1,A6                  STORE CHARACTER IN MEMORY
0051 004C 1601                  ADK      A6,1                   INCREMENT MEM ADDRESS
0052 004E 49CE          CASS30  SST      A1,/0E                 GET STATUS
0053 0050 5C0C                  RB(NA)   CASS20                 IF NOT ACCEPTED READ NEXT CHARACTER
0054 0052 0F84                  AB       /84                    START LOW CORE LOADER
0055 0054 0151          MTAP    LDK      A1,/51                 ON LINE
0056 0056 F409                  CFR      A4,A2
0057 0058 0124                  LDK      A1,/24                 SEARCH FILE MARK
0058 005A F409                  CFR      A4,A2
0059 005C 05FF                  LDK      A5,/FF                 FIRST CONTROL WORD IOP
0060 005E 7518                  WER      A5,/18                 WRITE FIRST CONTROL WORD
0061 0060 7619                  WER      A6,/19                 SECOND CONTROL WORD
0062 0062 0102                  LDK      A1,2                   READ 1 BLOCK
0063 0064 570E                  RF       EXIT
0064 0066 0103          DISC    LDK      A1,3                   SEEK TO ZERO
0065 0068 F409                  CFR      A4,A2
0066 006A B120 80CD             LDKL     A1,/80CD               FIRST CONTROL WORD
0067 006E 7110                  WER      A1,/10                 WRITE FIRST CONTROL WORD TO IOP
0068 0070 7611                  WER      A6,/11                 AND THE SECOND
0069 0072 010C                  LDK      A1,/C                  READ SECTOR NUMBER 3
0070 0074 F409          EXIT    CFR      A4,A2
0071 0076 0F84                  AB       /84                    START LOW CORE LOADER
0072      0078          EXCOM   EQU      *
0073 0078 41C8          SIOI    CIO      A1,1,8                 START CONTROLLER
0074 007A 4BC8          SSTI    SST      A3,8                   GET STATUS
0075 007C 5C04                  RB(NA)   *-2
0076 007E F030                  RTN      A4
0077
0078
0079
0080                            END      BOOT
```

1.1.13 CONTENTS IPL PROM 4011P

```
         DATE  82-05-05        IDENT    B4011P

0000                           IDENT    B4011P
0001                  *DATA: 820505 FOR PTS
0002                  *        FOR IPL FROM CASSETTE, FLEX DISC AND 2.5 AND 5M DISC
0003                  *        CONTENTS OF A5 FOR SOP SWITCHES
0004                  *SW1     /FE00    DCR DRIVE 0
0005                  *SW2     /FD00    DCR DRIVE 1
0006                  *SW3     /FC80    CARTRIDGE DISC DRIVE 0
0007                  *SW4     /FC40    FIXED DISC DRIVE 0
0008                  *SW5     /FC20    FLD DRIVE 0 (MUX)
0009                  *SW6     /FC10    FLD DRIVE 1 (MUX)
0010                  *SW7     /FC08    FLD DRIVE 0 (PC)
0011                  *SW8     /FC04    FLD DRIVE 1 (PC)
0012                  *SW9     /FC02    NOT USED
0013                  *SW10    /FC01    NOT USED
0014
0015
0016 0000 44EE        START    CID      A4,1,/2E              START SOP
0017 0002 4D2E                 INR      A5,0,/2E              READ SOP SWITCH
0018 0004 5C04                 RB(4)    *-2
0019 0006 44AE                 CID      A4,0,/2E              STOP SOP
0020 0008 3DB0                 SRN      A5,A4                 WHAT SWITCH IS DEPRESSED
0021 000A E350 001B            LC       A3,/1B,A4
0022 000E 233F                 ANK      A3,/3F
0023 0010 0256                 LDK      A2,/56                ADDR CID INSTR
0024 0012 AB29                 ORRS     A3,A2                 MODIFY CID START
0025 0014 0660                 LDK      A6,/60                ADDR SST INSTR
0026 0016 AB39                 ORRS     A3,A6                 MODIFY SST
0027 0018 8520 80CD            LDKL     A5,/80CD              FIRST CONTR. WORD IOP FOR DISC
0028 001C E719                 DATA     /E719                 EXECUTED AS ECR A7,A6
0029 001E 0911                 AB(1)    /11
0030 0020 0120                 LDK      A1,/20                STACKPOINTER
0031 0022 0806                 AB(0)    /6
0032 0024 0680                 LDK      A6,/80                FIRST ADDRESS OF LOW CORE LOADER
0033 0026 1C04                 SUK      A4,4                  IPL FROM WHAT DEVICE
0034 0028 5240                 RF(2)    FLDPC
0035 002A 1C02                 SUK      A4,2
0036 002C 5248                 RF(2)    FLDMUX
0037 002E 1C02                 SUK      A4,2
0038 0030 5214                 RF(2)    DISC
0039 0032 3401        CASS     XRK      A4,1                  DRIVE 0 OR 1
0040 0034 F109                 CFR      A1,A2                 SELECT CASS DRIVE
0041 0036 0402                 LDK      A4,2                  LOCK CASS DRIVE
0042 0038 F109                 CFR      A1,A2
0043 003A 0408                 LDK      A4,8                  SBOT SEARCH BEGIN OF TAPE
0044 003C F109                 CFR      A1,A2
0045 003E 040C                 LDK      A4,/C                 STMF SEARCH TAPE MARK FORW
0046 0040 F109                 CFR      A1,A2
0047 0042 040A                 LDK      A4,/0A                READ 1 BLOCK
0048 0044 570A                 RF       READ
0049 0046 0403        DISC     LDK      A4,3                  SEEK TO CYL 0
0050 0048 F109                 CFR      A1,A2
0051 004A 7510                 WER      A5,/10                IOP CW1
0052 004C 7611                 WER      A6,/11                IOP CW2
0053 004E 040C                 LDK      A4,/C                 READ SECTOR 3
0054 0050 F109        READ     CFR      A1,A2
0055 0052 AF8C                 ORR      A15,A3                PRESET REG A15
0056 0054 0F84        EXIT     AB       /84                   GOTO LOW CORE LOADER
0057 0056 44C8        CID      CID      A4,1,/08              SUBROUTINE
0058 0058 4C0E        INR      INR      A4,0,/0E              READ DATA
0059 005A 5404                 RF(4)    SST
0060 005C E439                 SCR      A4,A6                 STORE DATA IN MEMORY
0061 005E 1601                 ADK      A6,1                  INCREMENT MEMORY ADDRESS
0062 0060 4CC8        SST      SST      A4,/08                STATUS?
0063 0062 5C0C                 RB(4)    INR
0064 0064 87A0 63C8            LDKL     A15,/63C8             LOAD A15
0065 0068 F024                 RTN      A1
0066                  *        FLEX DISC PROGRAMMED CHANNEL
0067 006A 0459        FLDPC    LDK      A4,/59                ADDR BIT 8-15 INR INSTR
0068 006C E331                 SCR      A3,A4                 MODIFY INR INSTR
0069 006E 045C                 LDK      A4,/5C
0070 0070 B731                 XRRS     A7,A4                 CHANGE SCR IN STR INSTR
0071 0072 045E                 LDK      A4,/5E
0072 0074 9031                 IMR      A4                    CHANGE ADK A6,1 IN ADK A6,2
0073                  *        FLEX DISC HARDWARE CHANNEL(MUX)
0074 0076 7512        FLDMUX   WER      A5,/12                IOP CW 1
0075 0078 7613                 WER      A6,/13                IOP CW 2
0076 007A 8420 C020            LDKL     A4,/C020              READ 4 SEGMENT FROM SEGM 4
0077 007E 5F30                 RB       READ
0078                           END      START
```

1.1.14 CONTENTS IPL ROM B5300 (5131 194 35300/66)

```
          DATE  82-03-06        IDENT    B5300


0000                            IDENT    B5300
0001                    *       DATE: 82 06 02 FOR PTS 6814/24
0002                    *       FOR IPL FROM CASSETTE, FLEX DISC AND 2.5 AND 5M DISC
0003                    *       AND BIG DISC
0004                    *       CONTENTS OF A5 FOR SOP SWITCHES
0005                    *SW1     /FE00    DCR DRIVE 0
0006                    *SW2     /FD00    DCR DRIVE 1
0007                    *SW3     /FC80    CARTRIDGE DISC DRIVE 0
0008                    *SW4     /FC40    FIXED DISC DRIVE 0
0009                    *SW5     /FC20    BIGD DRIVE 0
0010                    *SW6     /FC10    BIGD DRIVE 1
0011                    *SW7     /FC08    FLD DRIVE 0
0012                    *SW8     /FC04    FLD DRIVE 1
0013                    *SW9     /FC02    CARTRIDGE DISC DRIVE 1
0014                    *SW10    /FC01    FIXED DISC DRIVE 1
0015
0016 0000 57FE          START    RF       BEGIN
0017 0002 0680          SORT     LDK      A6,/80                 BASE ADDR LOW COR LOADER
0018 0004 EC20 0004              CWK      A4,4                   IS IT CASSETTE?
0019 0008 503A                   RF(E)    CASS
0020                    *UPDATE DEVICE ADDRESS IN CIO AND SST
0021 000A 3C42          NOCASS   SLL      A4,2
0022 000C 9310                   ADR      A3,A4
0023 000E E34C 0134 R            LC       A3,DA,A3               GET DEVICE PARAMETER
0024 0012 E329                   SCR      A3,A2                  MODIFY CIO
0025 0014 E341 006D R            SC       A3,SST+1               MODIFY SST
0026 0018 1400                   ADK      A4,0                   IS IT BIG DISC
0027 001A 5056                   RF(E)    BIGD
0028 001C AB20 6300     NOBIGD   ORKL     A3,/6300               MAKE PARAMETER FOR A15 WITH DISC
0029 0020 0403                   LDK      A4,3                   SEEK 0 COMMAND FOR FL1M AND DISC
0030 0022 F109                   CFR      A1,A2                  DO SEEK 0 COMMAND
0031 0024 2710                   ANK      A7,/10                 IF A7=/10 THEN IT SI NOT FL1M BUT FL0.25
0032 0026 545A                   RF(NZ)   FL0.25M
0033 0028 8720 5706              LDKL     A7,/5706               LOAD RF(7) *48
0034 002C 8735                   STR      A7,A5                  CHANGE INR INTO RF
0035 002E A311                   TM       A3,A4                  IS IT FL1MCU OR DISC
0036 0030 540C                   RF(NZ)   FL1MCU
0037 0032 040C          DISC     LDK      A4,/C                  FOR READ SECTOR 3
0038 0034 7110                   WER      A1,/10                 FIRST CONTROL WORD IOP
0039 0036 7611                   WER      A6,/11                 SECOND CONTROL WORD IOP
0040 0038 878C                   LDR      A15,A3                 PARAMETER /63XX IN A15 (AS P800)
0041 003A F109          READ     CFR      A1,A2                  READ LOW COR LOADER OR ELSE
0042 003C 0F84                   AB       /84                    START LOW CORE LOADER
0043 003E 0410          FL1MCU   LDK      A4,/10                 READ FROM SECTOR 4
0044 0040 574C                   RF       CONT
0045 0042 5F0A                   RB       READ                   ?
0046 0044 E408          CASS     ECR      A4,A2
0047 0046 AC41 0068 R            ORS      A4,STR                 CHANGE STR INSTR
0048 004A 840C                   LDR      A4,A3
0049 004C 2401                   ANK      A4,1                   DRIVE 0 OR 1
0050 004E F109          SEL      CFR      A1,A2                  SELECT DRIVE
0051 0050 0402                   LDK      A4,2                   LOCK
0052 0052 F109          LOCK     CFR      A1,A2                  LOCK SEL CASS
0053 0054 0408                   LDK      A4,8                   SEARCH BEGING OF TAPE
0054 0056 F109          SBOT     CFR      A1,A2
0055 0058 040C                   LDK      A4,/C                  READ TAPE MARK
0056 005A F109          STMF     CFR      A1,A2
0057 005C 040A                   LDK      A4,/A                  READ BLOCK
0058 005E 5F26                   RB       READ                   READ LOW  CORE LOADER
0059 0060 0000                   DATA     0
0060 0062 44CE          CIO      CIO      A4,1,/0E               START CONTROLLER
0061 0064 4F0E          INR      INR      A7,0,/0E               READ CHAR OR WORD PC
0062 0066 5404                   RF(NA)   SST
0063 0068 8739          STR      STR      A7,A6                  STORE CHAR OR WORD
0064 006A 1601                   ADK      A6,1                   UPDATE ADDR
0065 006C 4FCE          SST      SST      A7,/0E                 ASK STATUS
0066 006E 5C0C                   RB(NA)   INR
0067 0070 F024                   RTN      A1
0068 0072 2701          BIGD     ANK      A7,1
0069 0074 3F44                   SLL      A7,4
0070 0076 851C                   LDR      A5,A7
0071 0078 AF41 012A R            ORS      A7,COMBIG+2
0072 007C 8420 0128 R            LDKL     A4,COMBIG              COMMAND BUFFER ADDR
0073 0080 5F48                   RB       READ                   READ SECTOR 0 FROM DISC
0074 0082 233F          FL0.25M  ANK      A3,/3F                 TAKE DEVICE ADDRESS
0075 0084 E335                   SCR      A3,A5                  UPDATE INR ISTR
0076 0086 046A                   LDK      A4,/6A
0077 0088 9031                   IMR      A4                     UPDATE ADK A6,1 IN ADK A6,2
0078 008A 8420 C020              LDKL     A4,/C020               READ 4 SEGMENTS FROM SEGM 4
0079 008E 7112          CONT     WER      A1,/12                 FIRST CONTROL WORD IOP
0080 0090 7613                   WER      A6,/13                 SECOND CONTROL WORD IOP
0081 0092 5F5A                   RB       READ                   READ LOW CORE LOADER
```

```
0082 0094 0000 0000                DATA    0,0,00,0,0,0,0,0,0
     0098 0000 0000
     009C 0000 0000
     00A0 0000 0000
     00A4 0000
0083 00A6 0000 0000                DATA    0,0,0,0,0,0,0,0,0
     00AA 0000 0000
     00AE 0000 0000
     00B2 0000 0000
     00B6 0000
0084 00B8 0000 0000                DATA    0,0,0,0,0,0,0,0,0
     00BC 0000 0000
     00C0 0000 0000
     00C4 0000 0000
     00C8 0000
0085 00CA 0000 0000                DATA    0,0,0,0,0,0,0,0,0
     00CE 0000 0000
     00D2 0000 0000
     00D6 0000 0000
     00DA 0000
0086 00DC 0000 0000                DATA    0,0,0,0,0,0,0,0,0
     00E0 0000 0000
     00E4 0000 0000
     00E8 0000 0000
     00EC 0000
0087 00EE 0000 0000                DATA    0,0,0,0,0,0,0,0,0
     00F2 0000 0000
     00F6 0000 0000
     00FE 0000
0088 0100 0263          BEGIN      LDK     A2,/63                 ADDR CIO DA
0089 0102 8120 8100                LDKL    A1,/8100               FIRST CW IOP READ 256 WORDS
0090 0106 44EE                     CIO     A4,1,/2E               START SOP
0091 0108 4D2E          READS      INR     A5,0,/2E               READ SOP SWITCH
0092 010A 5C04                     RB(NA)  READS
0093 010C 3DB0                     SRN     A5,A4                  WHAT SW
0094 010E 9C11                     NGR     A4,A4
0095 0110 1409                     ADK     A4,9
0096 0112 E350 014E R              LC      A3,NUMB,A4
0097 0116 23FF                     ANK     A3,/FF
0098 0118 E450 0144 R              LC      A4,NUM,A4
0099 011C 24FF                     ANK     A4,/FF
0100 011E 43AE                     CIO     A3,0,/2E               STOP SOP
0101 0120 4DC9                     SST     A5,9                   STATUS FLCU FLOPPY INSERTED AFTER IPL
0102 0122 0565                     LDK     A5,/65                 INR DA ADDR
0103 0124 870C                     LDR     A7,A3
0104 0126 0F02                     AB      2                      BRANCH TO SORT
0105 0128 E000          COMBIG     DATA    /E000                  SEEK TO 0
0106 012A 0800                     DATA    /0800                  READ SECTOR 0 HEAD 0
0107 012C 0180 0180                DATA    /180,/180              RECORD AND BLOCKLENGTH
0108 0130 0000 0000                DATA    /0000,/0000            BASE ADDRESS 0000
0109 0134 D7D7          DA         DATA    /D7D7                  BIG DISC DRIVE 0
0110 0136 F7F7                     DATA    /F7F7                  BIG DISC DRIVE 1
0111 0138 C9D9                     DATA    /C9D9                  FIRST AND SEC FLD
0112 013A E9F9                     DATA    /E9F9                  THIRT AND FOURTH FLD
0113 013C C8E8                     DATA    /C8E8                  DRIVE 0 DISC CARTR AND FIXED
0114 013E D8F8                     DATA    /D8F8                  DRIVE 1 DISC
0115 0140 D7F7                     DATA    /D7F7                  BIG DISC DRIVE 0,1
0116 0142 0000                     DATA    0
0117 0144 0404 0202     NUM        DATA    /0404,/0202,0,/0101,/0202
     014B 0000 0101
     014C 0202
0118 014E 0001 0001     NUMB       DATA    1,1,1,1,/203
     0152 0001 0001
     0156 0203
0119
0120
0121
0122                               END     START


          SYMBOL TABLE

  BEGIN   0100  R   BIGD    0072  R   CASS    0044  R   CIO     0062  R
  COMBIG  0128  R   CONT    008E  R   DA      0134  R   DISC    0032  R
  FL025M  0082  R   FL1MCU  003E  R   INR     0064  R   LOCK    0052  R
  NOBIGD  001C  R   NOCASS  000A  R   NUM     0144  R   NUMB    014E  R
  READ    003A  R   READS   0108  R   SBOT    0056  R   SEL     004E  R
  SORT    0002  R   SST     006C  R   START   0000  R   STMF    005A  R
  STR     0068  R

          ASS.ERR.    0000
:EOF
PROG ELAPSED TIME:  00H-00M-34S-380MS-
```

1.1.15 CONTENTS IPL ROM BOOT 6A (5131 194 25900)

```
          DATE  82-03-30        IDENT    BOOT6A    81-08-07  POHD

0000                            IDENT    BOOT6A                81-08-07  POHD
0001
0002
0003                    *       THIS BOOTSTRAP IS RELATED TO
0004                    *       TSB 506/80 - BOOTSTRAP 64
0005
0006
0007                    *
0008                    *       B O O T S T R A P   6 0 0 0
0009                    *
0010
0011
0012
0013
0014
0015                    *       SOP SWITCH 1 :  CASSETTE UNIT 1
0016                    *                  2 :           UNIT 2
0017
0018                    *       SOP SWITCH 3 :  CARTRIDGE DISC 6875,6876
0019                    *                  4 :  FIXED     DISC 6875,6876
0020
0021                    *       SOP SWITCH 5    BOMB DISC (OLD CU) UNIT 1
0022                    *                  6 :                     UNIT 2
0023
0024                    *       SOP SWITCH 7 :  FLOPPY DISC UNIT 1 (ALL TYPES)
0025                    *                  8 :              UNIT 2 (ALL TYPES)
0026
0027                    *       SOP SWITCH 9 :  NOT USED
0028                    *                 10 :  NOT USED
0029                            EJECT
0030       000E         CHCR    EQU      /0E
0031       002E         SOP     EQU      /2E
0032       0009         FDDA    EQU      9
0033       0012         FDIOP   EQU      /12
0034       0010         DKIOP   EQU      /10
0035       0084         IPLSTA  EQU      /84
0036                    *
0037                    *       READ SOP
0038                    *
0039       0000         BOOT    EQU      *
0040 0000 0680                  LDK      A6,/80                START ADDRESS OF IPL
0041 0002 0263                  LDK      A2,SIOI+1-BOOT        SUBROUTINE ADDRESS
0042 0004 8120 8100             LDKL     A1,/8100              WER REGISTER AND STACK ADDRESS
0043 0008 E308                  ECR      A3,A2                 A3:=/6300
0044 000A 44EE                  CIO      A4,1,SOP
0045 000C 4D2E                  INR      A5,0,SOP
0046 000E 5C04                  RB(NA)   *-2
0047 0010 44AE                  CIO      A4,0,SOP
0048 0012 3DB0                  SRN      A5,A4
0049 0014 0565                  LDK      A5,INRI+1-BOOT        ADDRESS TO INR INSTRUCTION
0050 0016 1C08                  SUK      A4,8
0051 0018 5630                  RF(NN)   CASS                  TAPE CASSETTE
0052 001A E350 0040             LC       A3,DEVADR-BOOT,A4     DEVICE ADDRESS
0053 001E E329                  SCR      A3,A2                 UPDATE ADDRESS IN CIO
0054 0020 6341 006D             SC       A3,SSTI+1-BOOT        UPDATE ADDRESS IN SST
0055                            EJECT
0056                    *
0057                    *       DISC
0058                    *
0059       0024         DISC    EQU      *
0060 0024 0403                  LDK      A4,3
0061 0026 F109                  CFR      A1,A2                 SEEK ZERO
0062 0028 2710                  ANK      A7,/10
0063 002A 5446                  RF(NZ)   FDPC                  0,25 MEG FLOPPY DRIVE
0064 002C A311                  TM       A3,A4
0065 002E 5410                  RF(NZ)   FD1M                  1 MEG FLOPPY
0066 0030 040C                  LDK      A4,/C                 SECTOR 3
0067 0032 7110                  WER      A1,DKIOP
0068 0034 7611                  WER      A6,DKIOP+1            BUFFER ADDRESS
0069 0036 878C                  LDR      A15,A3                PARAMETER TO IPL
0070 0038 570C                  RF       EXIT
0071                            EJECT
0072 003A D9C9                  DATA     /D9C9                 SOP SWITCH 8,7
0073 003C F7D7                  DATA     /F7D7                 SOP SWITCH 6,5
0074 003E EBC8                  DATA     /EBC8                 SOP SWITCH 4,3
0075       0040         DEVADR  EQU      *
0076                            EJECT
0077                    *
0078                    *       1 MEGABYTE FLOPPY
0079                    *
0080       0040         FD1M    EQU      *
0081 0040 0410                  LDK      A4,/10                FIRST SECTOR TO READ=2
0082       0042         FDWER   EQU      *
0083 0042 7112                  WER      A1,FDIOP
0084 0044 7613                  WER      A6,FDIOP+1            BUFFER ADDRESS
```

```
          DATE  82-03-30        IDENT    BOOT6A    81-08-07  POHO

0085                            EJECT
0086                    *
0087                    *       EXIT
0088                    *
0089        0046        EXIT    EQU      *
0090 0046 F109                  CFR      A1,A2                 READ
0091 0048 0F84                  AB       IPLSTA                GO TO IPL
0092                    *
0093                    *       EXIT TO IPLSTA
0094                    *
0095                    *       TAPE CASSETTE                 A4=/000A
0096                    *       BRANCH TO ADDRESS /42 IN BOOTSTARP FROM CASSETTE IPL,A4 UNCHANGED
0097                    *
0098                    *       PTS 6875 FIXED DISC           A15=/63E8
0099                    *       PTS 6875 CARTRIDGE DISC       A15=/63C8
0100                    *
0101                    *       FLOPPY DISC 1 P.C             A3=/0009
0102                    *       FLOPPY DISC 2 P.C             A3=/0019
0103                    *       1 MEGABYTE FLOPPY DISC 1      A3=/XXC9
0104                    *       1 MEGABYTE FLOPPY DISC 2      A3=/XXD9
0105                            EJECT
0106                    *
0107                    *       CASSETTE
0108                    *
0109        004A        CASS    EQU      *
0110 004A A841 0068             ORS      A3,SCRI-BOOT          STR CHANGED TO SCR IN READ ROUTINE
0111 004E 3401                  XRK      A4,1                  SELECT CASSETTE
0112 0050 F109                  CFR      A1,A2
0113 0052 0402                  LDK      A4,2                  LOAD
0114 0054 F109                  CFR      A1,A2
0115 0056 0408                  LDK      A4,8                  SEARCH BOT
0116 0058 F109                  CFR      A1,A2
0117 005A 040C                  LDK      A4,/C                 SEARCH TAPE MARK
0118 005C F109                  CFR      A1,A2
0119 005E 040A                  LDK      A4,/A                 READ ONE BLOCK
0120 0060 5F1C                  RB       EXIT
0121                            EJECT
0122                    *
0123                    *       SUBROUTINE TO READ
0124                    *
0125        0062        SIO1    EQU      *
0126 0062 44CE                  CIO      A4,1,CHCR
0127        0064        INRI    EQU      *
0128 0064 4F0E                  INR      A7,0,CHCR
0129 0066 5404                  RF(NA)   SSTI
0130        0068        SCRI    EQU      *
0131 0068 B709                  STR      A7,A6
0132        006A        ADKI    EQU      *
0133 006A 1601                  ADK      A6,1
0134        006C        SSTI    EQU      *
0135 006C 4FCE                  SST      A7,CHCR
0136 006E 5C0C                  RB(NA)   INRI
0137 0070 F024                  RTN      A1
0138                            EJECT
0139                    *
0140                    *       FLOPPY DISC
0141                    *
0142        0072        FDPC    EQU      *
0143 0072 233F                  ANK      A3,/3F
0144 0074 E335                  SCR      A3,A5                 UPDATE ADDRESS IN INR INSTRUCTION
0145 0076 046A                  LDK      A4,ADKI-BOOT
0146 0078 9031                  IMR      A4                    CHANGE TO ADK A6,2
0147 007A 8420 C020             LDKL     A4,/C020              4 PHYS. SECTORS A 128 BYTES,START IN SEC
0148 007E 5F3E                  RB       FDWER
0149
0150
0151        0080        BOOTEND EQU      *
0152                            END      BOOT

          SYMBOL TABLE

  ADKI    006A  R   BOOT    0000  R   BOOTEN  0080  R   CASS    004A  R
  CHCR    000E  A   DEVADR  0040  R   DISC    0024  R   DKIOP   0010  A
  EXIT    0046  R   FD1M    0040  R   FDDA    0009  A   FDIOP   0012  A
  FDPC    0072  R   FDWER   0042  R   INRI    0064  R   IPLSTA  0084  A
  SCRI    0068  R   SIO1    0062  R   SOP     002E  A   SSTI    006C  R


          ASS ERR.     0000
 EOF
PROG ELAPSED TIME.  00H-00M-22S-640MS-
```

1.1.16 CONTENTS IPL ROM BOOT 6C (5131 194 41700)

```
          DATE  82-03-30        IDENT    BOOT6C    81-10-07  POHO

0000                            IDENT    BOOT6C                81-10-07  POHO
0001
0002
0003                    *       THIS BOOTSTRAP IS RELATED TO
0004                    *       TSB 506/80 - BOOTSTRAP 65
0005
0006
0007                    *
0008                    *       B O O T S T R A P   6 0 0 0
0009                    *
0010
0011
0012
0013
0014
0015                    *       SOP SWITCH 1    CARTRIDGE 16MB OR 80MB UNIT 1
0016                    *                  2    FIXED 16MB DISC        UNIT 1
0017
0018                    *       SOP SWITCH 3 :  CARTRIDGE DISC 6875,6876
0019                    *                  4 :  FIXED     DISC 6875,6876
0020
0021                    *       SOP SWITCH 5 :  CARTRIDGE DISC 6875,6876 UNIT 2
0022                    *                  6 :  FIXED     DISC 6875,6876 UNIT 2
0023
0024                    *       SOP SWITCH 7    FLOPPY DISC UNIT 1 (ALL TYPES)
0025                    *                  8 :              UNIT 2 (ALL TYPES)
0026
0027                    *       SOP SWITCH 9 :  NOT USED
0028                    *                 10 :  NOT USED
0029                            EJECT
0030       000E         CHCR    EQU     /0E
0031       002E         SOP     EQU     /2E
0032       0009         FDDA    EQU     9
0033       0012         FDIOP   EQU     /12
0034       0010         DKIOP   EQU     /10
0035       0084         IPLSTA  EQU     /84
0036                    *
0037                    *       READ SOP
0038                    *
0039       0000         BOOT    EQU     *
0040 0000 0680                  LDK     A6,/80                  START ADDRESS OF IPL
0041 0002 0263                  LDK     A2,SIOI+1-BOOT          SUBROUTINE ADDRESS
0042 0004 8120 8100             LDKL    A1,/8100                WER REGISTER AND STACK ADDRESS
0043 0008 E308                  ECR     A3,A2                   A3 =/6300
0044 000A 44EE                  CIO     A4,1,SOP
0045 000C 4D2E                  INR     A5,0,SOP
0046 000E 5C04                  RB(NA)  *-2
0047 0010 44AE                  CIO     A4,0,SOP
0048 0012 3DB0                  SRN     A5,A4
0049 0014 0565                  LDK     A5,INRI+1-BOOT          ADDRESS TO INR INSTRUCTION
0050 0016 E350 0048             LC      A3,DEVADR-BOOT,A4       DEVICE ADDRESS
0051 001A E329                  SCR     A3,A2                   UPDATE ADDRESS IN CIO
0052 001C E341 006D             SC      A3,SSTI+1-BOOT          UPDATE ADDRESS IN SST
0053 0020 1C07                  SUK     A4,7
0054 0022 512E                  RF(P)   CDDISC                  16M OR 80M DISC
0055                            EJECT
0056                    *
0057                    *       DISC
0058                    *
0059       0024         DISC    EQU     *
0060 0024 0403                  LDK     A4,3
0061 0026 F109                  CFR     A1,A2                   SEEK ZERO
0062 0028 2710                  ANK     A7,/10
0063 002A 5446                  RF(NZ)  FDPC                    0,25 MEG FLOPPY DRIVE
0064 002C A311                  TM      A3,A4
0065 002E 540A                  RF(NZ)  FD1M                    1 MEG FLOPPY
0066 0030 040C                  LDK     A4,/C                   SECTOR 3
0067 0032 7110                  WER     A1,DKIOP
0068 0034 7611                  WER     A6,DKIOP+1              BUFFER ADDRESS
0069 0036 878C                  LDR     A15,A3                  PARAMETER TO IPL
0070 0038 5724                  RF      EXIT
0071                            EJECT
0072                    *
0073                    *       1 MEGABYTE FLOPPY
0074                    *
0075       003A         FD1M    EQU     *
0076 003A 0410                  LDK     A4,/10                  FIRST SECTOR TO READ=2
0077 003C 573C                  RF      FDWER
```

```
          DATE  82-03-30        IDENT    BOOT6C    81-10-07  PDHD


0078                              EJECT
0079                    *
0080                    *         READ TABLE FOR 16M AND 80M DISC
0081                    *
0082
0083       003E         SEEK      EQU      *
0084 003E  E000                   DATA     /E000                 SEEK TO ZERO
0085       0040         READ12    EQU      *
0086 0040  0800                   DATA     /0800                 READ LOGICAL SECTOR 0,1 AND 2
0087 0042  0180                   DATA     /0180                 TOTAL LENGTH
0088 0044  0180                   DATA     /0180                 NO TRANSFER LOG. SEC. 0
0089 0046  0000 0000              DATA     0,0                   DUMMY ADDRESS
0090                              EJECT
0091       0048         DEVADR    EQU      *-2
0092 004A  D9C9                   DATA     /D9C9                 SOP SWITCH 8,7
0093 004C  F8D8                   DATA     /F8D8                 SOP SWITCH 6,5
0094 004E  E8C8                   DATA     /E8C8                 SOP SWITCH 4,3
0095 0050  D7D7                   DATA     /D7D7                 SOP SWITCH 2,1
0096                              EJECT
0097                    *
0098                    *         16M OR 80M DISC
0099                    *
0100       0052         CDDISC    EQU      *
0101 0052  2401                   ANK      A4,1
0102 0054  3C44                   SLL      A4,4                  BIT IN POSITION DEVICE NUMBER
0103 0056  8510                   LDR      A5,A4                 FIX OR CARTRIDGE
0104 0058  AC41 0040              ORS      A4,READ12-BOOT        SET DEVICE NUMBER BIT
0105 005C  043E                   LDK      A4,SEEK-BOOT
0106                              EJECT
0107                    *
0108                    *         EXIT
0109                    *
0110       005E         EXIT      EQU      *
0111 005E  F109                   CFR      A1,A2                 READ
0112 0060  0F84                   AB       IPLSTA                GO TO IPL
0113                    *
0114                    *         EXIT TO IPLSTA
0115                    *
0116                    *         TAPE CASSETTE                 A4=/000A
0117                    *         BRANCH TO ADDRESS /42 IN BOOTSTARP FROM CASSETTE IPL,A4 UNCHANGED
0118                    *
0119                    *         PTS 6875 FIXED DISC           A15=/63E8
0120                    *         PTS 6875 CARTRIDGE DISC       A15=/63C8
0121                    *
0122                    *         FLOPPY DISC 1 P.C             A3=/0009
0123                    *         FLOPPY DISC 2 P.C             A3=/0019
0124                    *         1 MEGABYTE FLOPPY DISC 1      A3=/XXC9
0125                    *         1 MEGABYTE FLOPPY DISC 2      A3=/XXD9
0126                              EJECT
0127                    *
0128                    *         SUBROUTINE TO READ
0129                    *
0130       0062         SIOI      EQU      *
0131 0062  44CE                   CIO      A4,1,CHCR
0132       0064         INRI      EQU      *
0133 0064  4F0E                   INR      A7,0,CHCR
0134 0066  5404                   RF(NA)   SSTI
0135       0068         SCRI      EQU      *
0136 0068  8739                   STR      A7,A6
0137       006A         ADKI      EQU      *
0138 006A  1602                   ADK      A6,2
0139       006C         SSTI      EQU      *
0140 006C  4FCE                   SST      A7,CHCR
0141 006E  5C0C                   RB(NA)   INRI
0142 0070  F024                   RTN      A1
0143                              EJECT
0144                    *
0145                    *         FLOPPY DISC
0146                    *
0147       0072         FDPC      EQU      *
0148 0072  233F                   ANK      A3,/3F
0149 0074  E335                   SCR      A3,A5                 UPDATE ADDRESS IN INR INSTRUCTION
0150 0076  8420 C020              LDKL     A4,/C020              4 PHYS. SECTORS A 128 BYTES,START IN SEC
0151       007A         FDWER     EQU      *
0152 007A  7112                   WER      A1,FDIOP
0153 007C  7613                   WER      A6,FDIOP+1            BUFFER ADDRESS
0154 007E  5F22                   RB       EXIT
0155
0156
0157       0080         BOOTEND   EQU      *
0158                              END      BOOT

          SYMBOL TABLE

  ADKI     006A  R   BOOT     0000  R   BOOTEN   0080  R   CDDISC   0052  R
  CHCR     000E  A   DEVADR   0048  R   DISC     0024  R   DKIOP    0010  A
  EXIT     005E  R   FD1M     003A  R   FDDA     0009  A   FDIOP    0012  A
  FDPC     0072  R   FDWER    007A  R   INRI     0064  R   IPLSTA   0084  A
  READ12   0040  R   SCRI     0068  R   SEEK     003E  R   SIOI     0062  R
  SOP      002E  A   SSTI     006C  R

          ASS. ERR.     0000
 EOF
PROG ELAPSED TIME   00H-00M-23S-820MS~
```

1.2 EXTERNAL CONNECTIONS

1.2.1 Compatibility between Computers

All interface units described in this section are hardware - compatible with all computers covered by this manual. With other words; all interface units can, from a HARDWARE point of view, be used in any of the computers 6810-6814 and 6824. Interface units that are classified as masters should, as far as possible, be located in the computer cabinet of an extended system. However, when required, it is now allowed to locate masters in extension cabinets of type 6864.

1.2.2 Star-Connected Work Stations

Definition of Star Network Figure 1.2-1

A star network is defined as an interconnecting system where a number of external points (in this case; work stations) are connected to a central junction (computer interface unit) VIA SEPARATE LINES, see Figure 1.2-1. This method of connecting work stations to computers is well-known from earlier PTS 6000 installations.

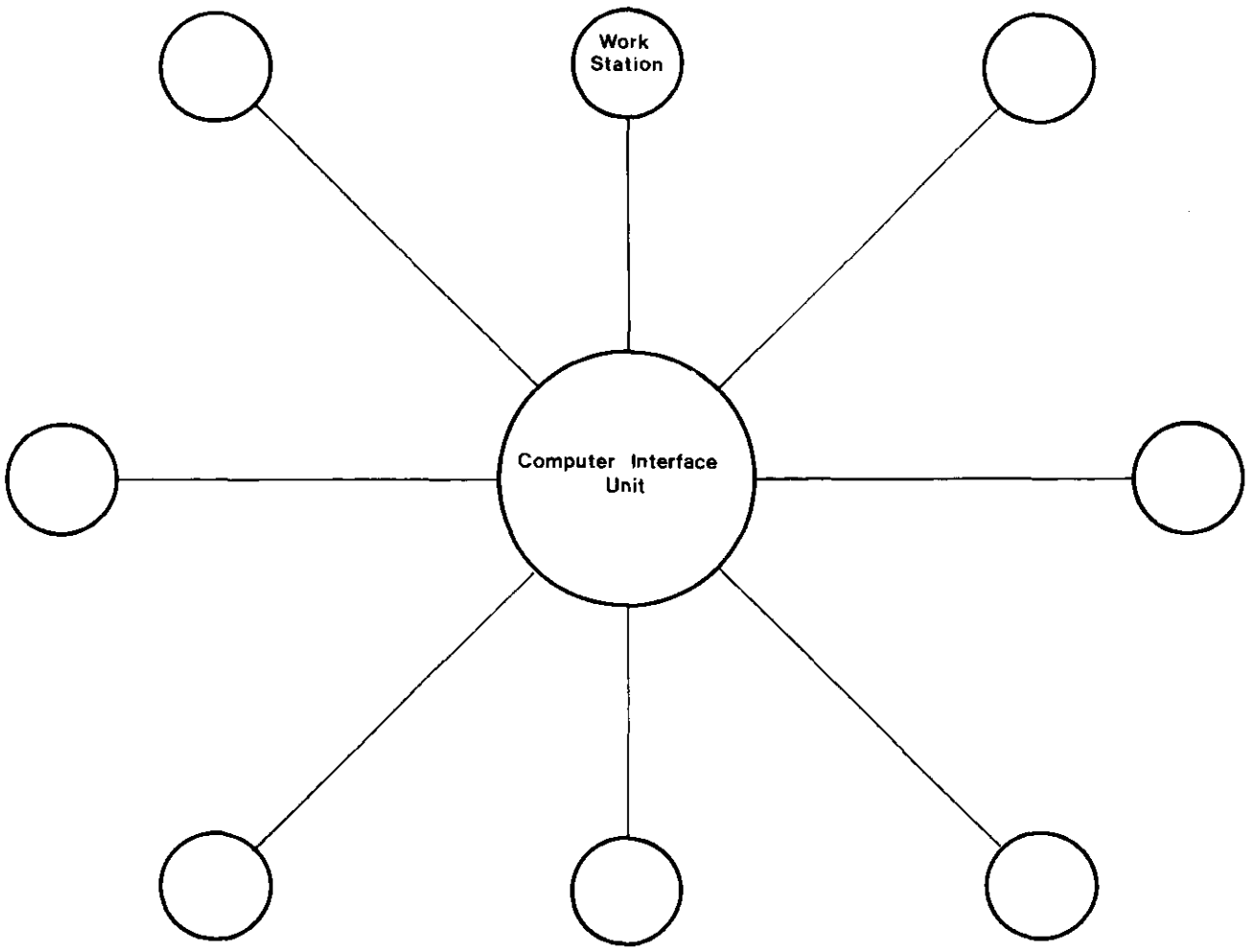


Figure 1.2-1 Definition of Star Network

Local Work Stations Figure 1.2-2

Up to eight local work stations can be connected via the computer interface unit CHLT 6831, located in a computer or an extension cabinet. The lines exit via eight plugs, vertically fitted at the front edge of the CHLT. These plugs are addressed as Terminal 0-7, from bottom to top. The system is prepared for having two CHLTs, (enabling the connection of 16 local work stations), but the number of CHLTs can be extended to four.

Figure 1.2-2 shows three different work stations connected to the CHLT. These work stations have been chosen with the purpose to indicate the development towards more and more compact work station units.

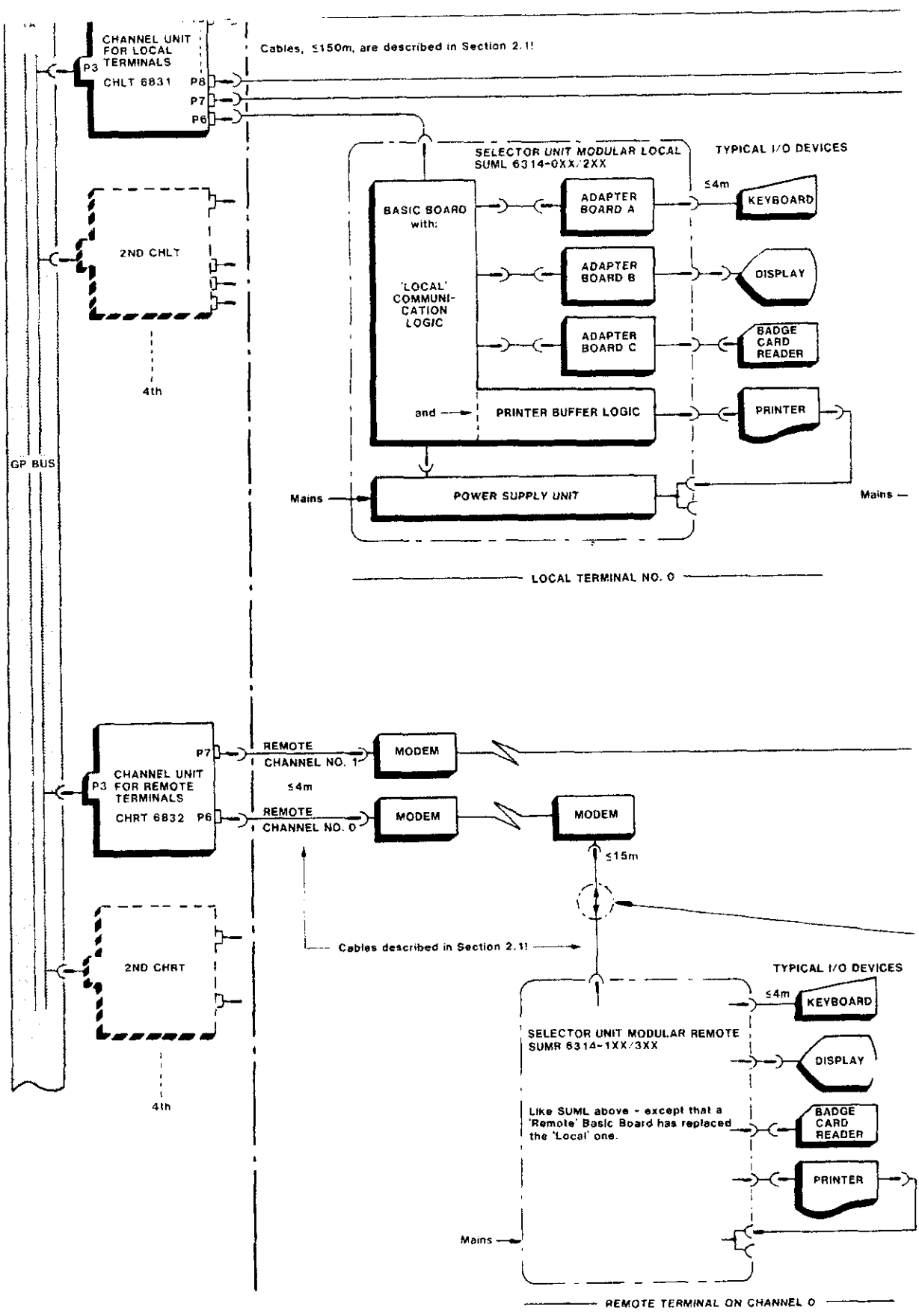
Work stations of earlier generations (terminal 0 in figure) had a separate communication unit (SUML) to which various I/O devices could be connected. In later generations of work stations (terminal 1 and 2 in figure) the communication part has been integrated in one of the I/O devices (TEP 6371/72) or together with several I/O devices in a compact desk top work station unit (CFT 6281/83).

Remote Work Stations Figure 1.2-2

One or two remote channels can be connected via the computer interface unit CHRT 6832, located in a computer or an extension cabinet. The channels exit via two plugs at the front edge of the CHRT; the bottom one being addressed as channel 0 and the top one as channel 1. The system is prepared for having two CHRTs. (enabling the connection of four remote channels), but the number of CHRTs can be extended to four.

Each channel is routed via a local modem, a telephone line and a remote modem to the remote work station. A remote work station of an earlier generation (on channel 0 in figure) is equipped with a separate communication unit (SUMR), similar to the local work station of the same generation. Remote work stations of later generations have the communication part integrated in one of the I/O devices, e.g. in a TEP 6371/72 as shown on channel 1.

The number of connectable work stations can be doubled if TFUs are used at the remote sites. Each TFU, connected after the remote modem, enables the connection of two work stations to each channel.


CHANNEL UNIT FOR LOCAL TERMINALS
CHLT 6831
P3
P8
P7
P6
Cables, ≤150m, are described in Section 2.1!
SELECTOR UNIT MODULAR LOCAL
SUML 6314-0XX/2XX
TYPICAL I/O DEVICES
BASIC BOARD with:
'LOCAL' COMMUNI-CATION LOGIC
ADAPTER BOARD A
ADAPTER BOARD B
ADAPTER BOARD C
≤4m
KEYBOARD
DISPLAY
BADGE CARD READER
and
PRINTER BUFFER LOGIC
PRINTER
Mains
POWER SUPPLY UNIT
Mains
2ND CHLT
4th
GP BUS
LOCAL TERMINAL NO. 0
CHANNEL UNIT FOR REMOTE TERMINALS
CHRT 6832
P3
P7
P6
REMOTE CHANNEL NO. 1
REMOTE CHANNEL NO. 0
≤4m
MODEM
MODEM
MODEM
≤15m
Cables described in Section 2.1!
2ND CHRT
4th
TYPICAL I/O DEVICES
SELECTOR UNIT MODULAR REMOTE
SUMR 6314-1XX/3XX
Like SUML above - except that a 'Remote' Basic Board has replaced the 'Local' one.
≤4m
KEYBOARD
DISPLAY
BADGE CARD READER
PRINTER
Mains
REMOTE TERMINAL ON CHANNEL 0

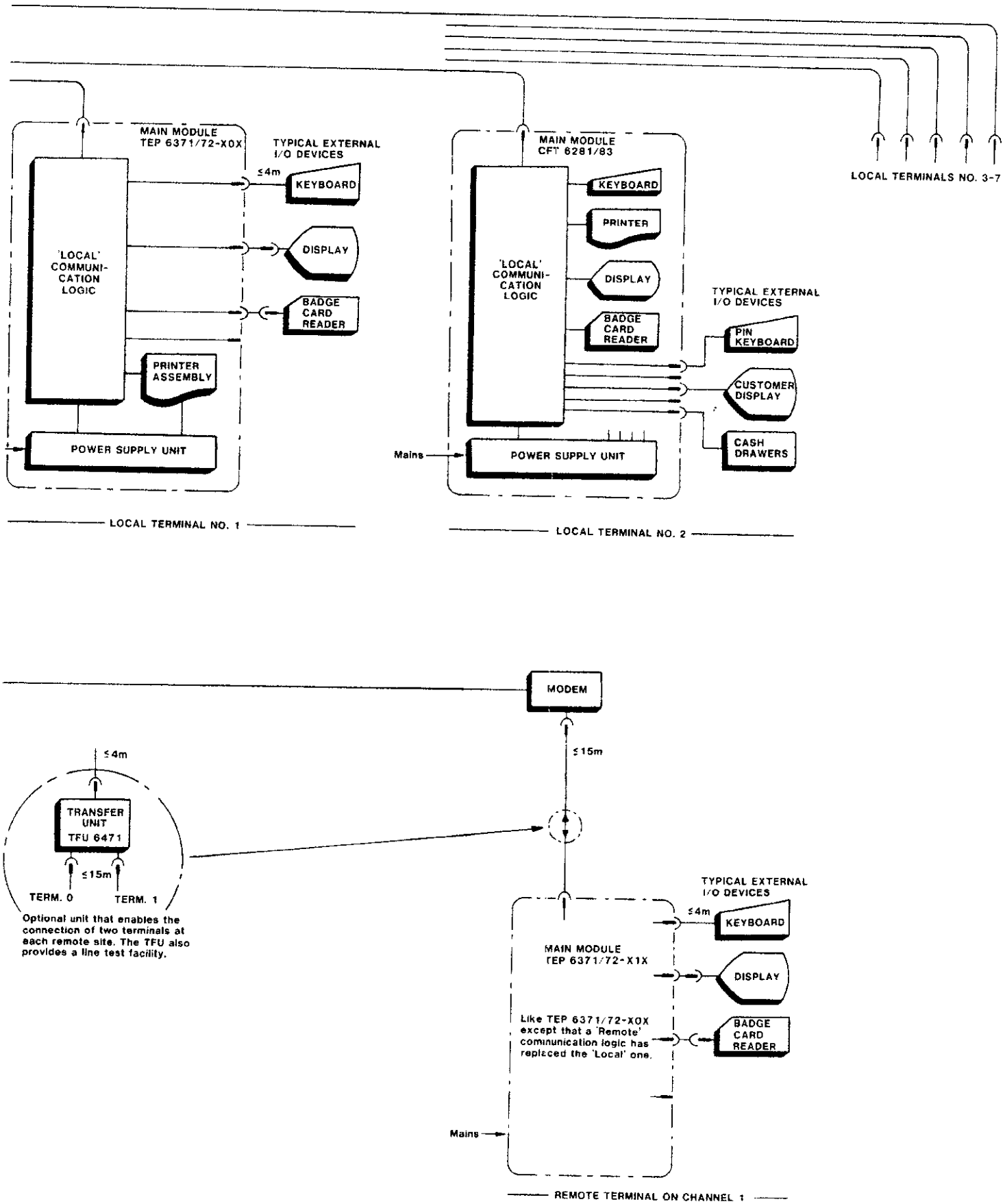


Figure 1.2-2 Star-Connected Work Stations

1.2.3 Multidrop-Connected Work Stations

Definition of Multidrop Network Figure 1.2-3

A multidrop network is defined as an interconnecting system where a number of external points (in this case; work stations) are connected to a central junction (computer interface unit) VIA A SINGLE LINE, see Figure 1.2-3. This method of connecting work stations, that will replace the former star method, has been introduced to increase the capacity and the reliability of the data transfers.

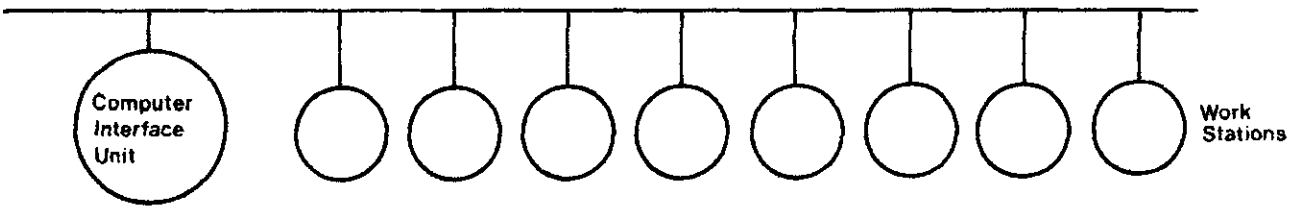


Figure 1.2-3 Definition of Multidrop Network

Local Work Stations Figure 1.2-4

Up to 32 work stations can be connected to the single multidrop line that is controlled by the computer interface unit CHLW 6895. However, in typical applications the number of work stations is limited to 6-8, due to performance reasons. The CHLW is classified as a master and should, if possible, be located in the computer cabinet (in TC 6810/11 systems it is absolutely necessary). The line exits via a plug at the front edge of the CHLW and can have a maximum length of 750 m. When being necessary the system can be equipped with more than one CHLW, up to a maximum of four.

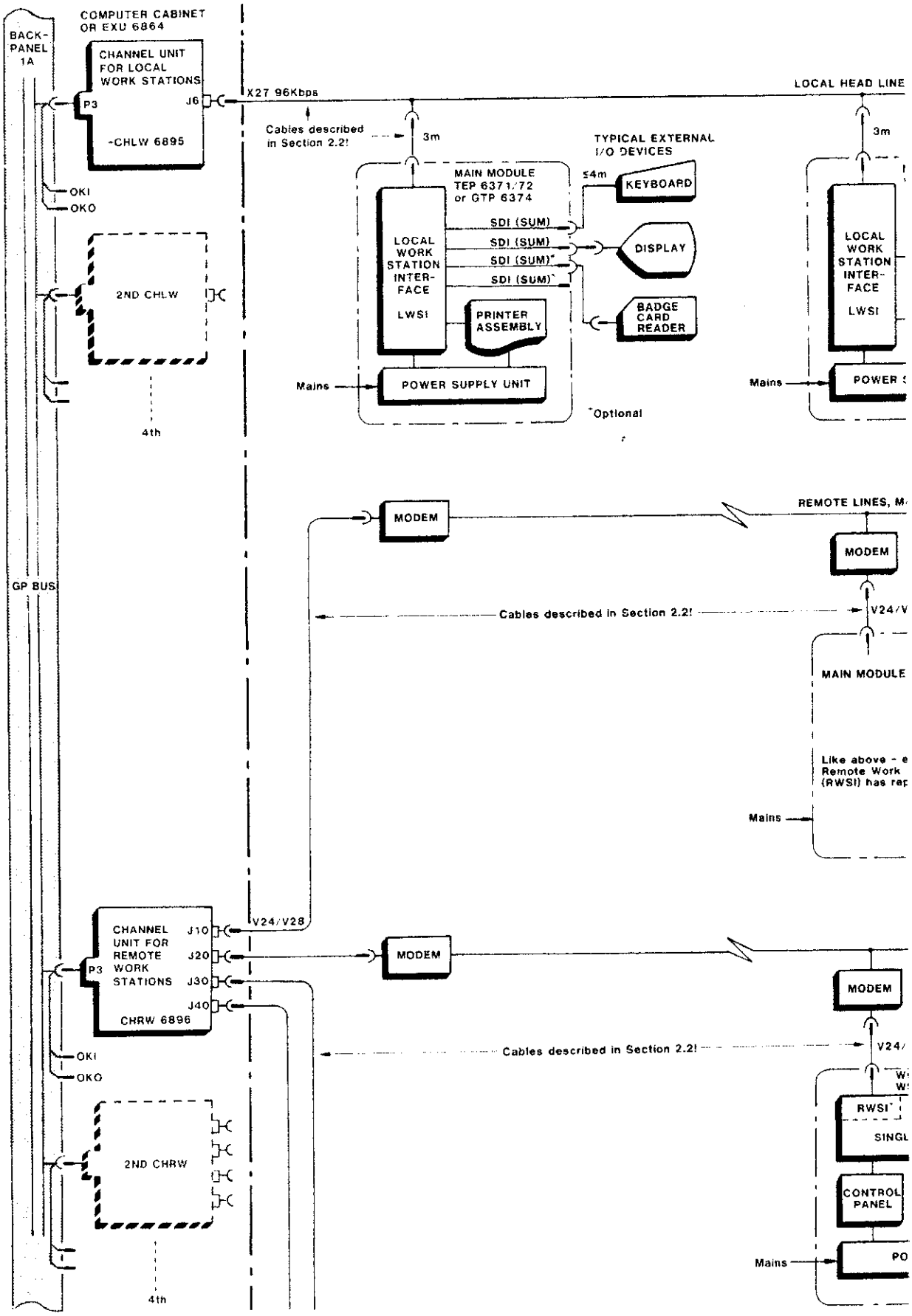
A work station connected to the multidrop line has usually an I/O device that includes the necessary communication interface, a Local Work Station Interface (LWSI). Such a device is known as the main module of the work station, and interconnects itself and other I/O devices with the multidrop line. Figure 1.2-4 shows the most common main modules.

A work station without any I/O main module is connected via a separate main module, a Modular Device Adapter - MDA 6411. The system function of this main module is similar to the former SUMLs; a communication interface interconnects line and I/O devices via adapter boards, and a power supply unit provides the necessary D.C. supply.

Remote Work Stations Figure 1.2-4

Up to four remote multidrop lines can be controlled by the computer interface unit CHRW 6896. This unit is classified as a master and should, if possible, be located in the computer cabinet (in TC 6810/11 systems it is absolutely necessary). The lines exit via four plugs at the front edge of the CHRW, the top one being addressed as line 0 and the bottom one as line 3. Line 0 can also be used for computer-to-computer communications. When being necessary the system can be equipped with more than one CHRW, up to a maximum of four.

Each line enters the PTT domain via a local modem that leads to a leased line. Up to eight drops are allowed on each line, either to single work stations or to work station controllers. However, in typical applications the number of drops is limited to 2-3, due to performance reasons.


COMPUTER CABINET
OR EXU 6864
BACK-
PANEL
1A
CHANNEL UNIT
FOR LOCAL
WORK STATIONS
P3
J6
-CHLW 6895
X27 96Kbps
LOCAL HEAD LINE
Cables described
in Section 2.2!
3m
TYPICAL EXTERNAL
I/O DEVICES
MAIN MODULE
TEP 6371/72
or GTP 6374
≤4m
KEYBOARD
SDI (SUM)
SDI (SUM)
SDI (SUM)*
SDI (SUM)*
DISPLAY
LOCAL
WORK
STATION
INTER-
FACE
LWSI
PRINTER
ASSEMBLY
BADGE
CARD
READER
Mains
POWER SUPPLY UNIT
*Optional
OKI
OKO
2ND CHLW
4th
LOCAL
WORK
STATION
INTER-
FACE
LWSI
Mains
POWER
MODEM
REMOTE LINES, M
MODEM
GP BUS
Cables described in Section 2.2!
V24/V
MAIN MODULE
Like above - e
Remote Work
(RWSI) has rep
Mains
CHANNEL
UNIT FOR
REMOTE
WORK
STATIONS
CHRW 6896
P3
J10
J20
J30
J40
V24/V28
MODEM
MODEM
Cables described in Section 2.2!
V24/
OKI
OKO
RWSI*
SINGL
CONTROL
PANEL
2ND CHRW
4th
Mains
PO

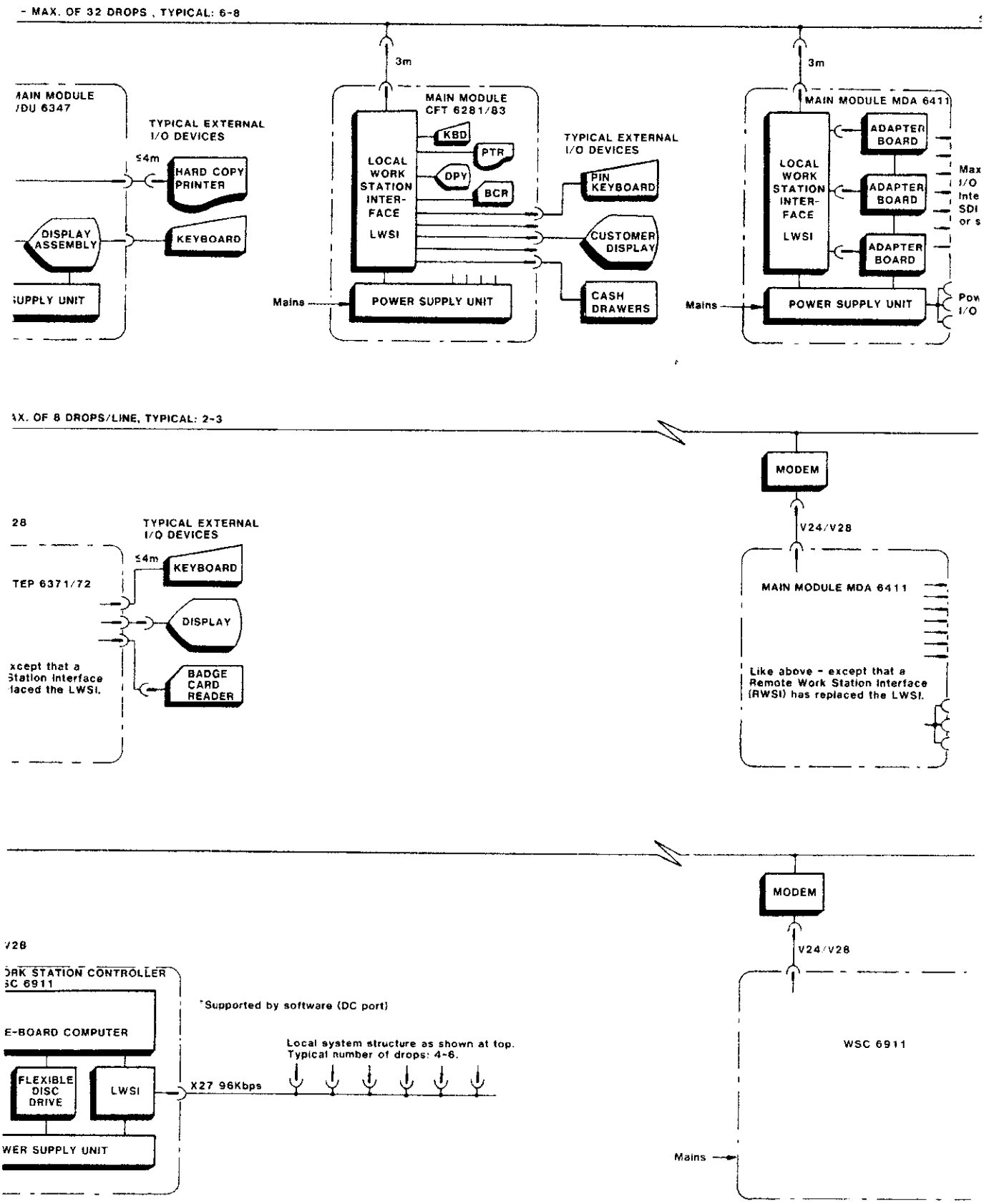


Figure 1.2-4 Multidrop-Connected Work Sta

A single work station has usually an I/O device that is classified as a main module, i.e. it includes the necessary communication interface; in this case a Remote Work Station Interface (RWSI). This interface connects the 'own' and other I/O devices to the line via a remote modem. A single work station without any I/O main module is connected via a separate main module, an MDA 6411 that is now equipped with an RWSI (compare with local work stations).

A work station controller is a small computer that can be used for converting a remote drop (via RWSI) into a local structure that is controlled via LWSI. This local structure is (except for performance) equivalent to the one controlled by CHLW at the site of the terminal computer.

1.2.4 Connection of Peripherals

Console Typewriter CTW 6862 Figure 1.2-5

A console typewriter of type 6862 can be connected to an interface circuit that is contained on the computers' CPU board. In the computers 6810-6812 (CPU P852) this interface operates according to the Current Loop method. The CTW must then be equipped with the same type of interface and is connected via a 2-wire cable (signal and ground) to fast-on pins on backpanel 1B.

An upgraded 6810/11 or computers of type 6813, 6814 or 6824 (CPU P857, P857R, P857RA) have instead a V24 interface. A CTW equipped with the same type of interface can then be connected via P7 on backpanel 1B.

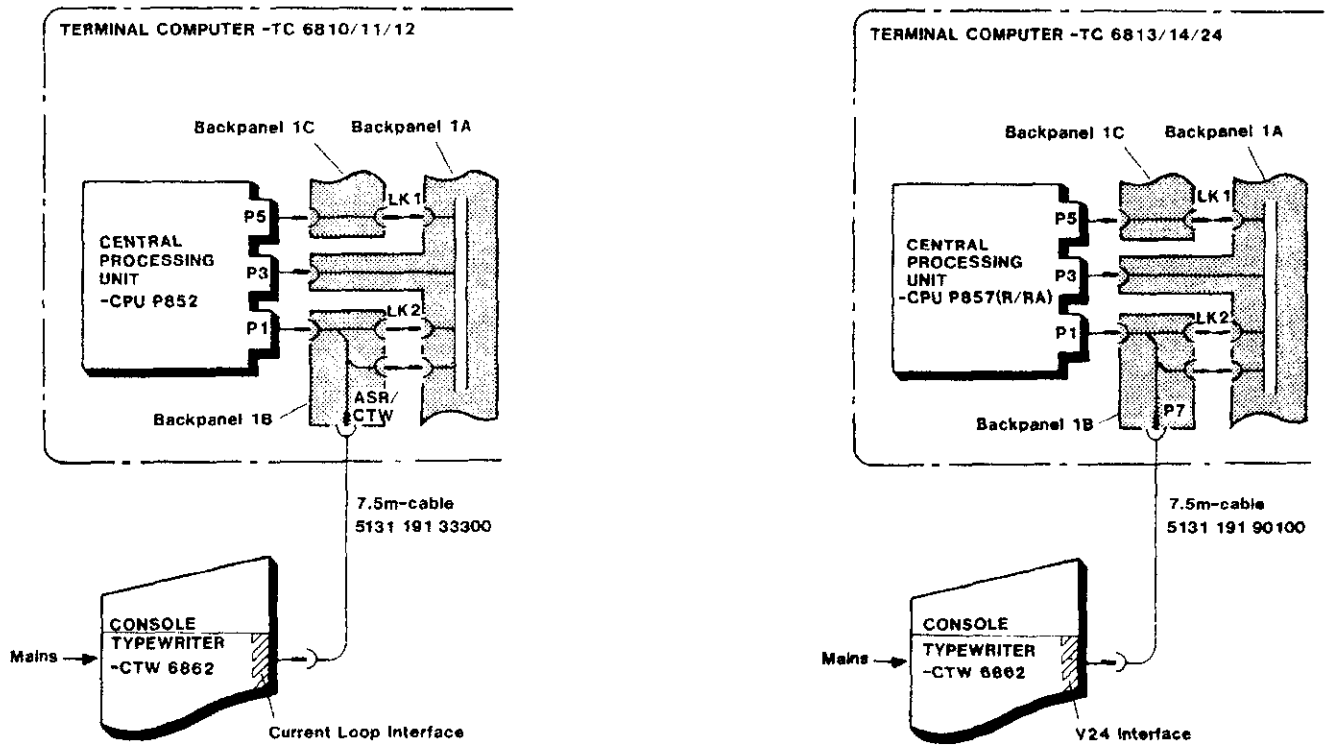


Figure 1.2-5 Connection of Console Typewriter

Flexible Disc Unit FDU 6879

Figure 1.2-6

An external flexible disc unit of type 6879 (primarily intended for TC 6810/11) can be controlled via the computer interface unit CHFD 6848. The FDU can be equipped with one or two flexible disc drives of type 6867 (each of 250 Kbytes) and is connected via two cables to front edge connectors on the CHFD.

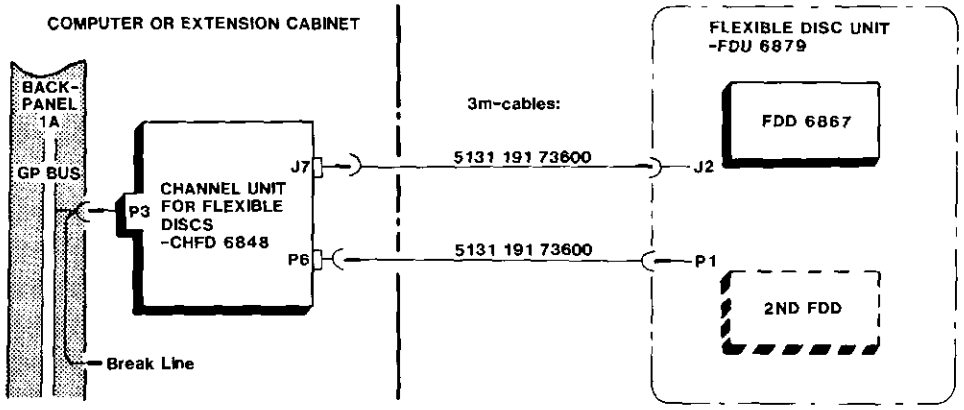


Figure 1.2-6 Connection of Flexible Disc Unit

Cartridge Disc Unit CDU 6875/76

Figure 1.2-7

Up to two cartridge disc units of type 6875/76 (2x3.1 Mbytes/2x6.25 Mbytes) can be controlled via the computer interface unit CHDU 6844. The CDUs are connected to the CHDU via two separate cables, terminated with sockets that are fixed to the rack for accepting the edge plugs P1 and P5 of the CHDU.

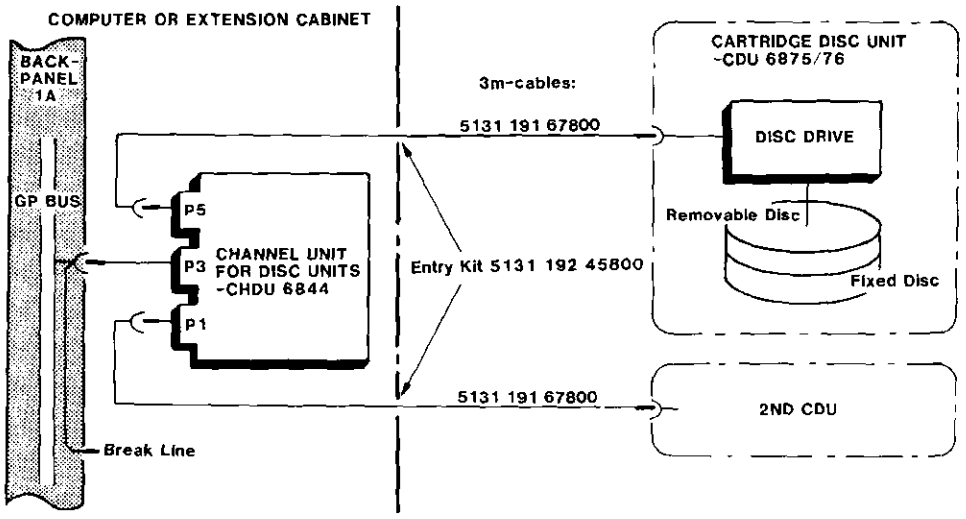


Figure 1.2-7 Connection of Cartridge Disc Unit(s), type 6875/76

Cartridge Disc Unit CDU 6877

Figure 1.2-8

One or two cartridge disc units of type 6877 (80 Mbytes) can be controlled via the computer interface unit CHDU 6845. This unit is classified as a master and should, if possible, be located in the computer cabinet (in TC 6810/11 systems it is absolutely necessary). The CDUs are connected via cables that are terminated with sockets, fixed to the rack for accepting the edge plugs P1, P2 and P5 of the CHDU.

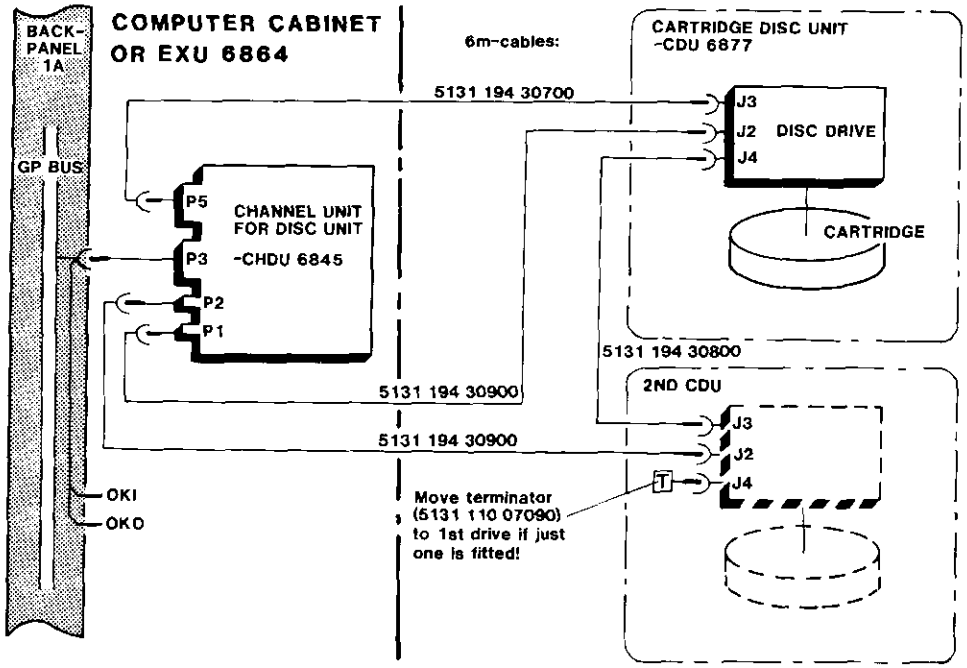


Figure 1.2-8
Connection of Cartridge Disc Unit(s), type 6877

Cartridge Disc Unit HDU 6961/62

Figure 1.2-9

Up to two cartridge disc units of type 6961/62 (16+16 Mbytes/16+80 Mbytes) can be controlled via the computer interface unit CHHD 6886. This unit is classified as a master and should, if possible, be located in the computer cabinet (in TC 6810/11 systems it is absolutely necessary). The HDUs are connected via cables that are terminated with sockets, fixed to the rack for accepting the edge plugs P1, P2 and P5 of the CHHD.

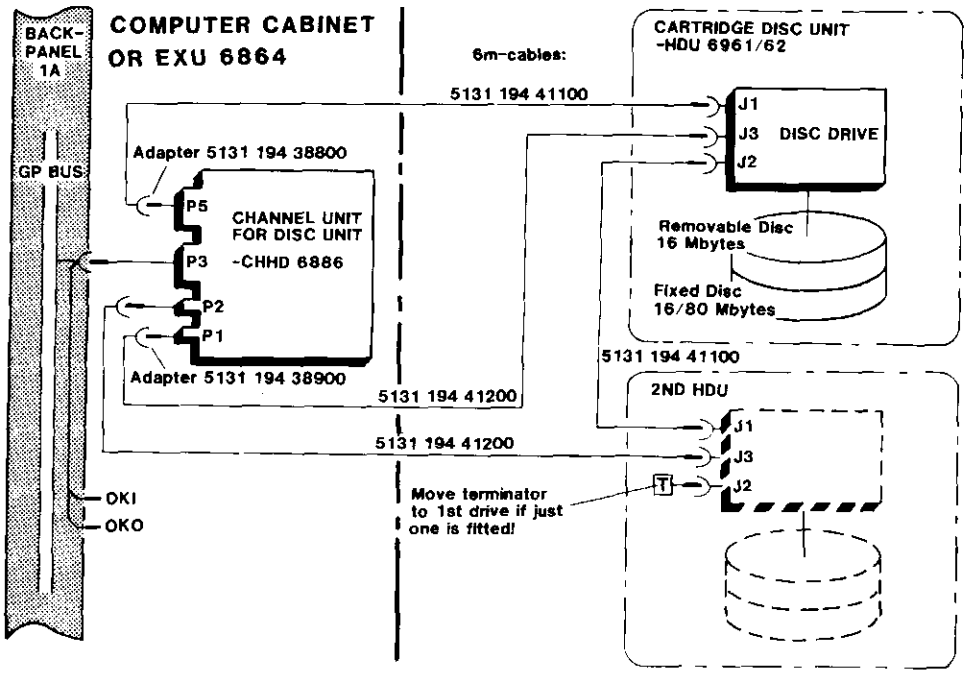


Figure 1.2-9
Connection of Cartridge Disc Unit(s), type 6961/6962

Matrix Line Printer MLP 6881/82
Card Reader CRD 6885

Figure 1.2-10

A matrix line printer of type 6881/82 (200/400 lpm) and a card reader of type 6885 can both be controlled via the computer interface unit CHCD 6847. Both units are connected via cables that are terminated with sockets, fixed to the rack for accepting the CHCD's edge plugs P1, P2 (CRD cable) and P4, P5 (MLP cable).

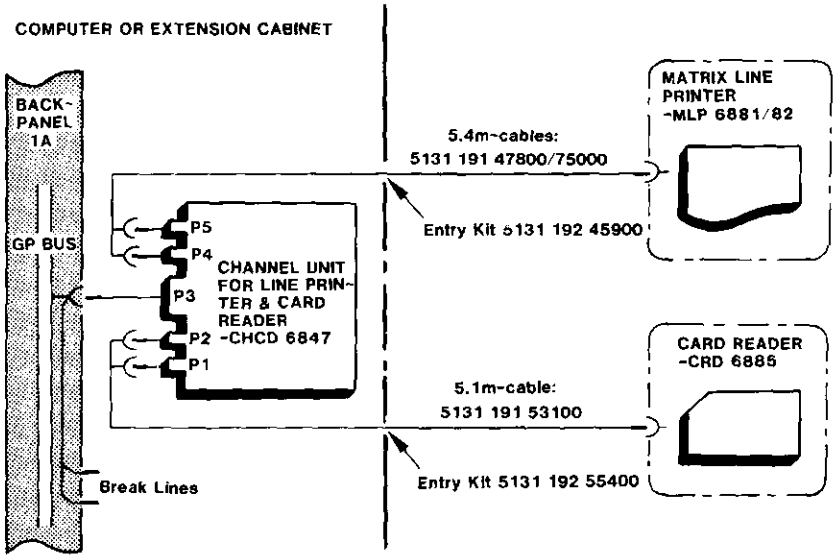


Figure 1.2-10 Connection of Matrix Line Printer and Card Reader

Magnetic Tape Unit MTU 6872

Figure 1.2-11

A magnetic tape unit of type 6872 can be controlled via the computer interface unit CHMT 6842. The tape unit is connected via four cables to front edge plugs on the CHMT. When required it is possible to connect a second MTU-cabinet with another tape transport.

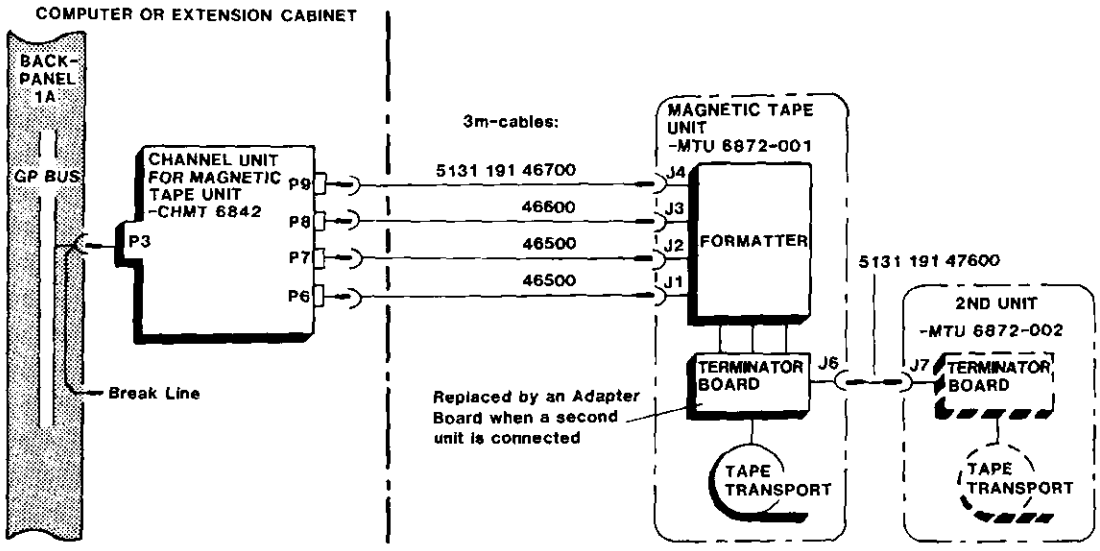


Figure 1.2-11 Connection of Magnetic Tape Unit(s)

1.2.5 On-Line Connections

General

There are several computer interface units available for communications with a remote data centre, each unit being designed for a specific line configuration and a certain communication procedure. The interface units can be separated in two categories; single-line controllers and multiple-line controllers.

Single-Line Controllers Figure 1.2-12

Four single-line controllers (CHLC 6834-6837) are available as single-board units, connecting to a local modem via a front edge plug. A fifth single-line controller (CHLC 6891) is composed of two parts:

- A line control unit designed in double Eurocard format
- A rack adapter board that enables the line control unit to be plugged into the computers 6810-6814 and 6824.

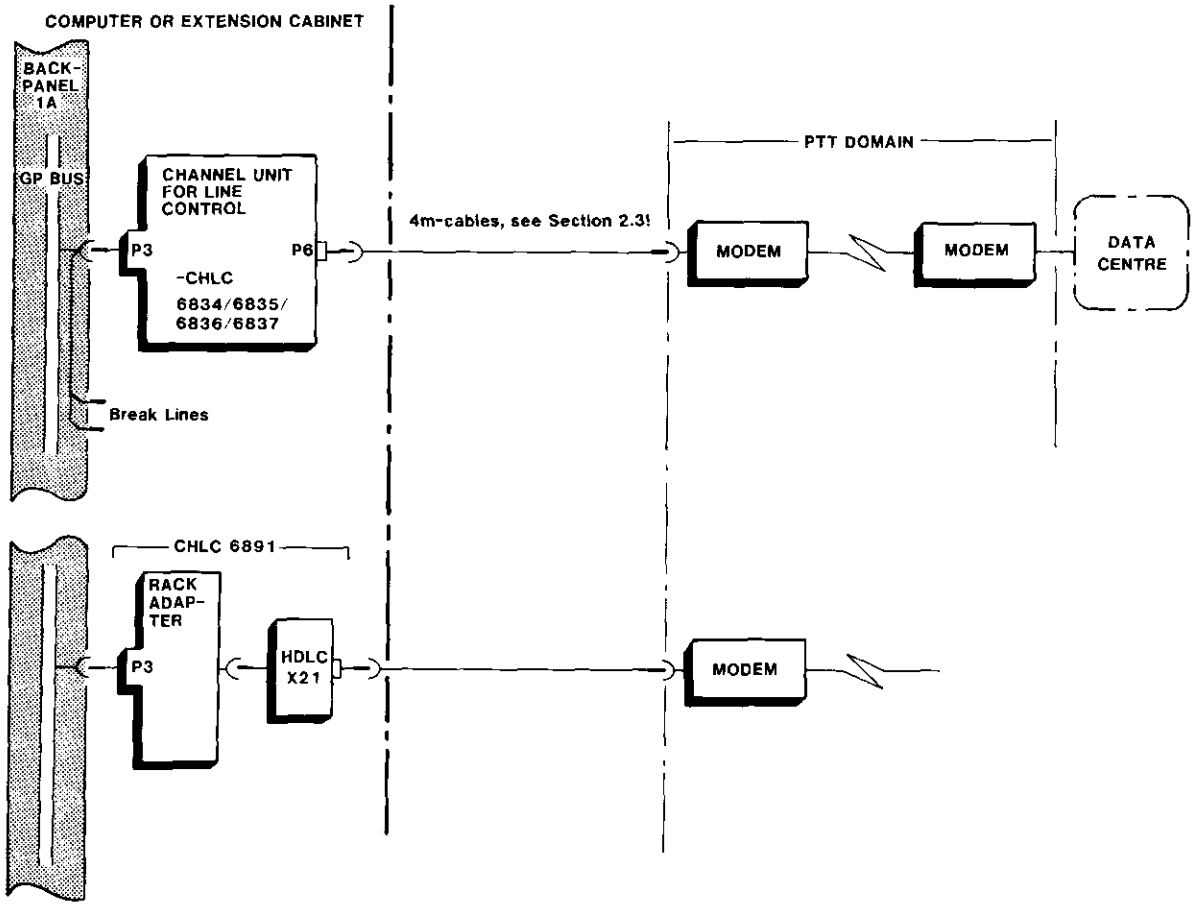


Figure 1.2-12 On-Line Connection via Single-Line Controllers

The main characteristics of the single-line controllers are:

- CHLC 6834, a synchronously operating unit for point to point or multidrop configurations. Line interface: V24/V28. Transfer rate: up to 4.800 bps. Possible procedures: Uniscope 100, BSC, ECMA 16 and others.

- CHLC 6835, a synchronously operating unit for loop configurations. Line interface: V24/V28. Transfer rate: up to 2.400 bps.

- CHLC 6836, a synchronously operating unit for point to point or multidrop configurations. Line interface: V24/V28. Transfer rate: up to 80.000 bps. Possible procedures: HDLC and SDLC.

- CHLC 6837, a synchronously operating unit for loop configurations. Line interface: V24/V28. Transfer rate: up to 4.800 bps. This unit is designed for a specific procedure known as the 'SHB Loop'.

- CHLC 6891, a synchronously operating unit for point to point or multidrop configurations. Line interface: X21/X24/X27. Transfer rate: up to 9.600 bps. Procedure: HDLC.

Multiple-Line Controllers Figure 1.2-13

There are two multiple-line controllers available (CHLC 6838/39), both being able to control two lines. However, in ordinary terminal computer applications there is usually just one line used.

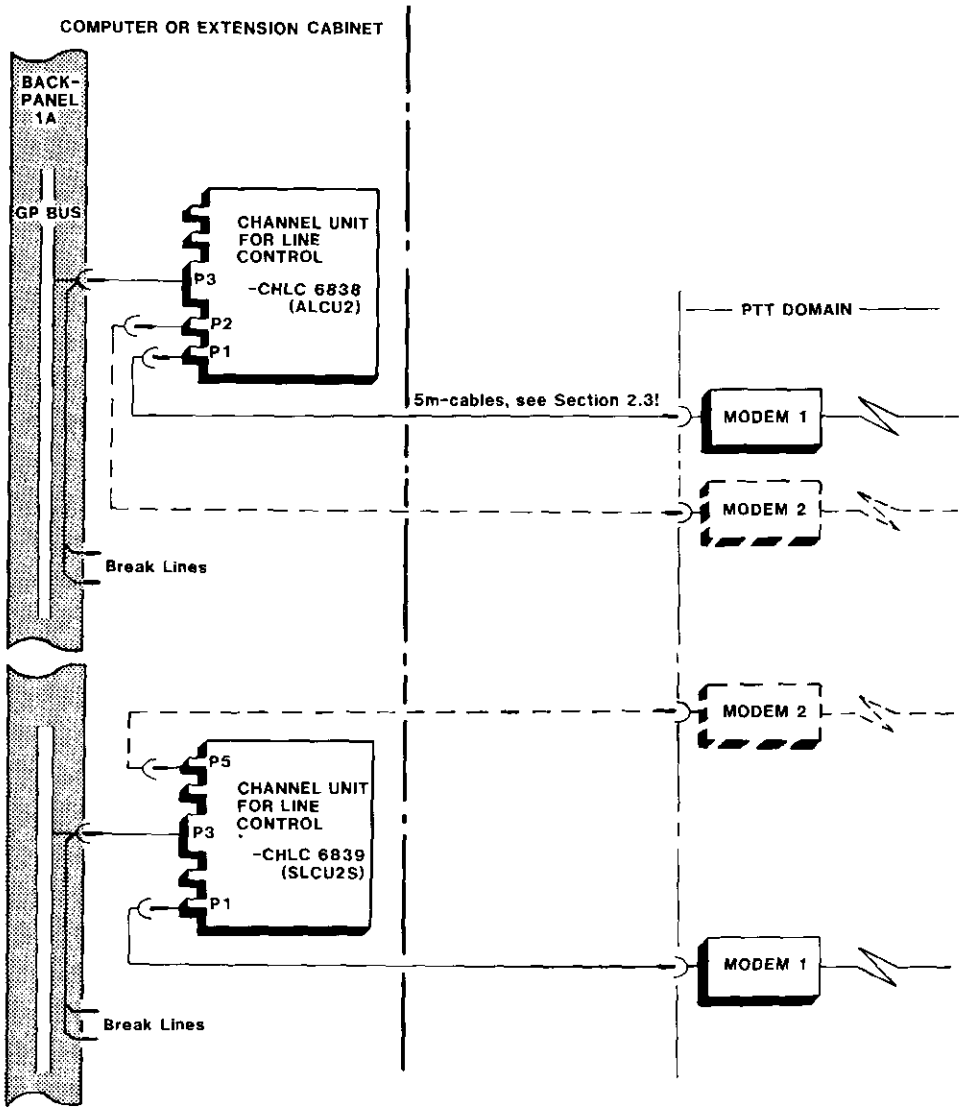
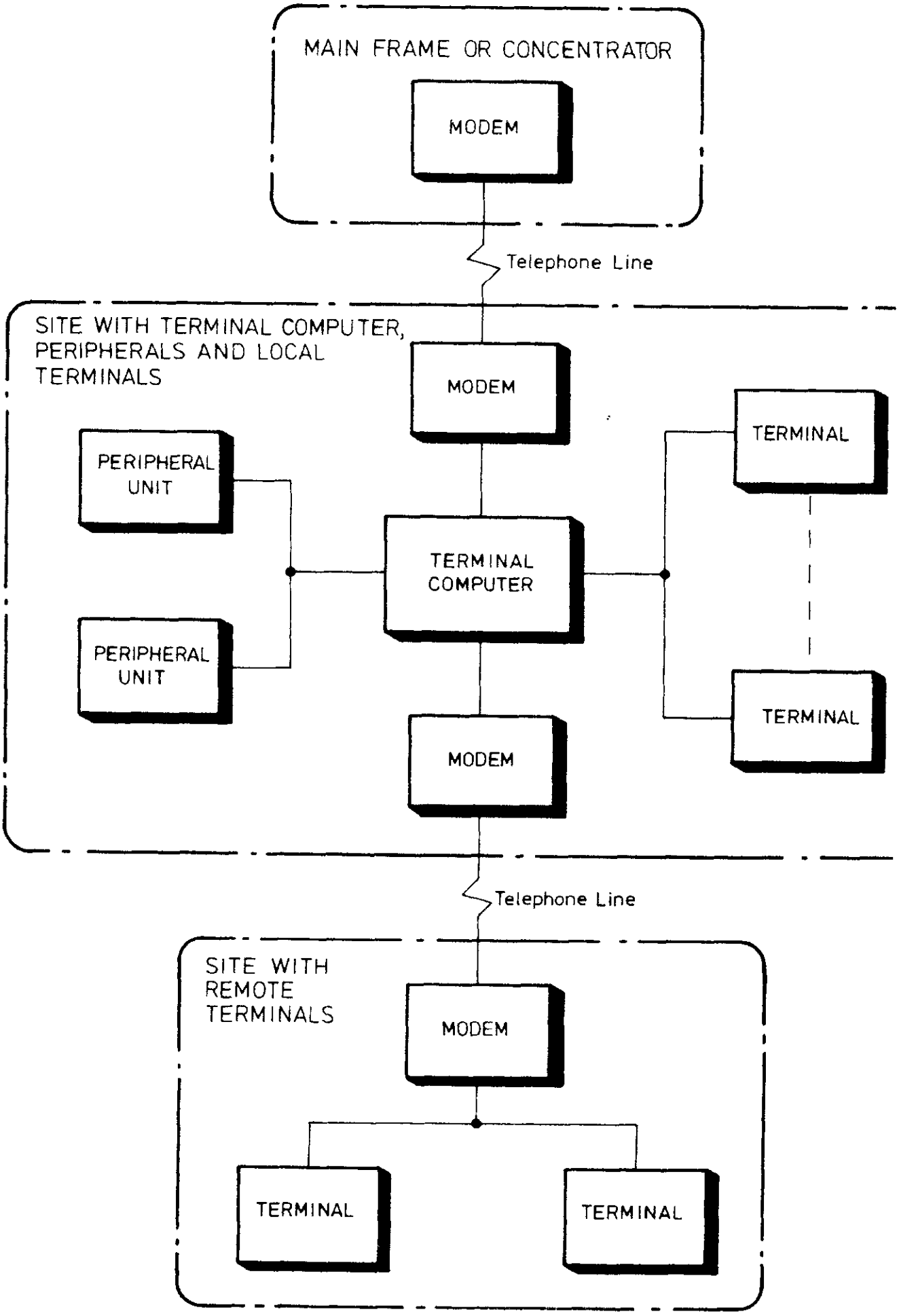


Figure 1.2-13 On-Line Connection via Multiple-Line Controllers

The local modems are connected via cables that are fitted with sockets, fixed to the rack for accepting the rear edge connectors of the controllers.

The main characteristics of the multiple-line controllers are:

- CHLC 6838, Asynchronous Medium Speed Line Control Unit (ALCU2). Line interface: V24. Transfer rate: up to 9.600 bps.
- CHLC 6839, Synchronous Line Control Unit (SLCU2S). Line interface: V24. Transfer rate: up to 9.600 bps.


MAIN FRAME OR CONCENTRATOR
MODEM
Telephone Line
SITE WITH TERMINAL COMPUTER, PERIPHERALS AND LOCAL TERMINALS
MODEM
TERMINAL
PERIPHERAL UNIT
TERMINAL COMPUTER
PERIPHERAL UNIT
TERMINAL
MODEM
Telephone Line
SITE WITH REMOTE TERMINALS
MODEM
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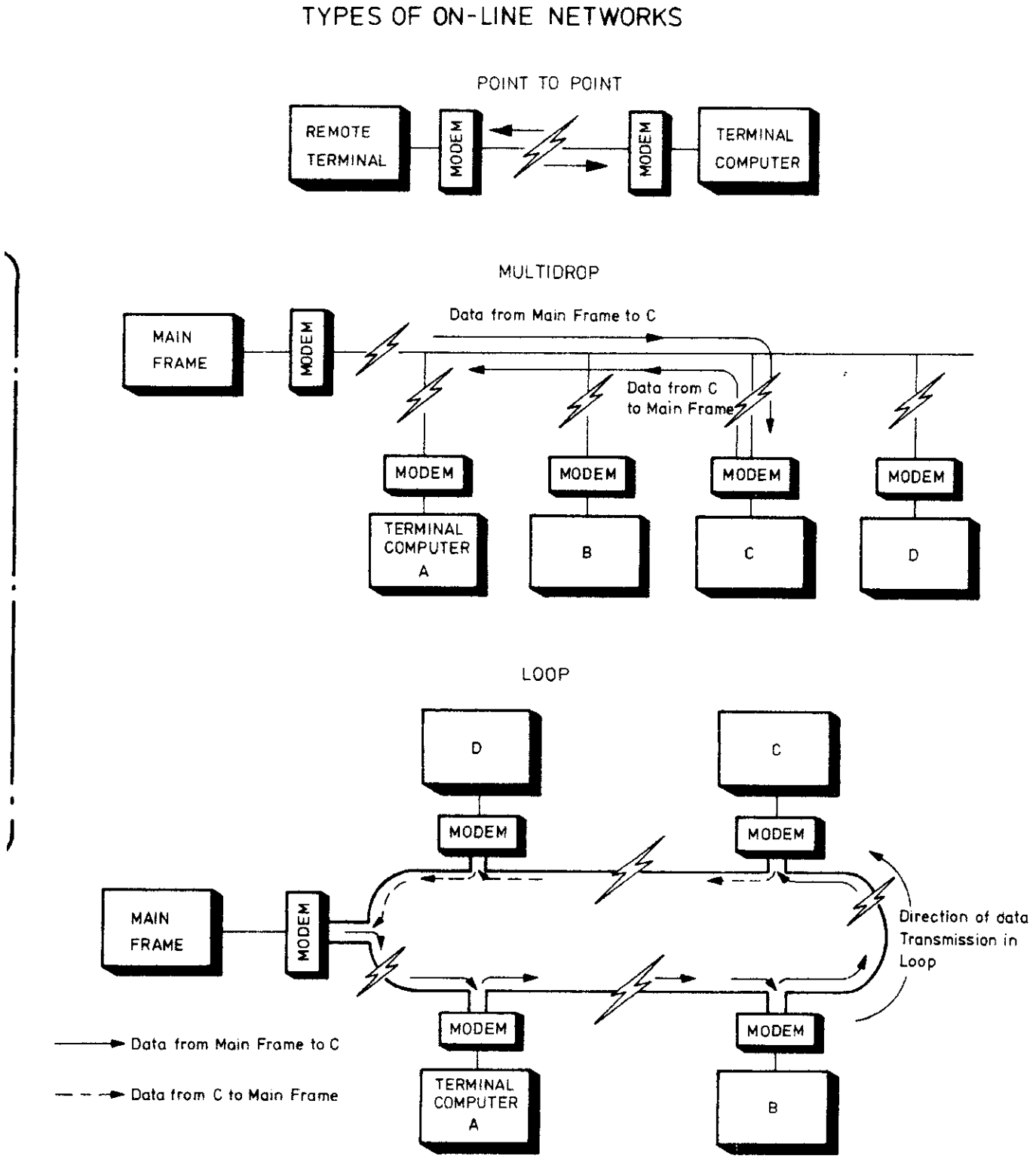

Figure 1.2-14 Basic Configuration and On-Line Networks

1.3 BASIC DATA TRANSMISSION TECHNOLOGY

1.3.1 Networks

Introduction

Modern data processing technics allow more data to be processed nowadays than was previously possible. To meet the requirement of transferring larger quantities of data faster the Public Data Network is added to the Public Telephone Network which is usually used for data transmission.

Public Telephone Network

Data transmitted over the Public Telephone Network is converted into analogue signals by means of modem and in the receiving end converted back to digital signals by another modem.

The maximum permissable transfer rate at present is 2400 bps using the 'switched' Public Telephone Network.

Using 'leased' telephone circuits it may be possible to attain rates upto 9600 bps and may be increased further on leased wideband circuits.

Public Data Network

The Public Data Network is designed for data transmission only. The network is a digital network providing synchronous data transmission, but it is possible to connect asynchronous data terminal equipment for lower transmission rate; 600 - 19.200 bps.

Data terminal equipment with CCITT X21 (X21 bis/X20 bis) interface may be connected to the network.

1.3.2 Transfer Techniques

HDLC Procedure (Protocol)

HDLC (High-level Data Link Control) is the procedure used in data communication