

**GEC COMPUTERS LIMITED**

**USER HARDWARE HANDBOOK  
– SYSTEM ENGINEERING  
(INSTALLATION)**

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A subsidiary of the General Electric Company Limited.

# INSTALLATION

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1.

## INTRODUCTION

The purpose of this manual is to provide information on the installation requirements of 4080 configurations together with electrical, mechanical and environmental characteristics.

A 4080 configuration is made up of a number of individual functional units mounted in six foot or four foot cabinets together with certain peripheral units such as line printer, teleprinter etc. which are classified as stand alone functional units. The arrangement of cabinets and stand alone units is dictated by cable length together with site and operator convenience. Cabinets of the same height can be bolted together to form a suite.

The information in this manual is presented as 'good engineering practice'. Any proposed deviation from the installation recommendations given in this manual should be discussed with GEC Computers Limited.

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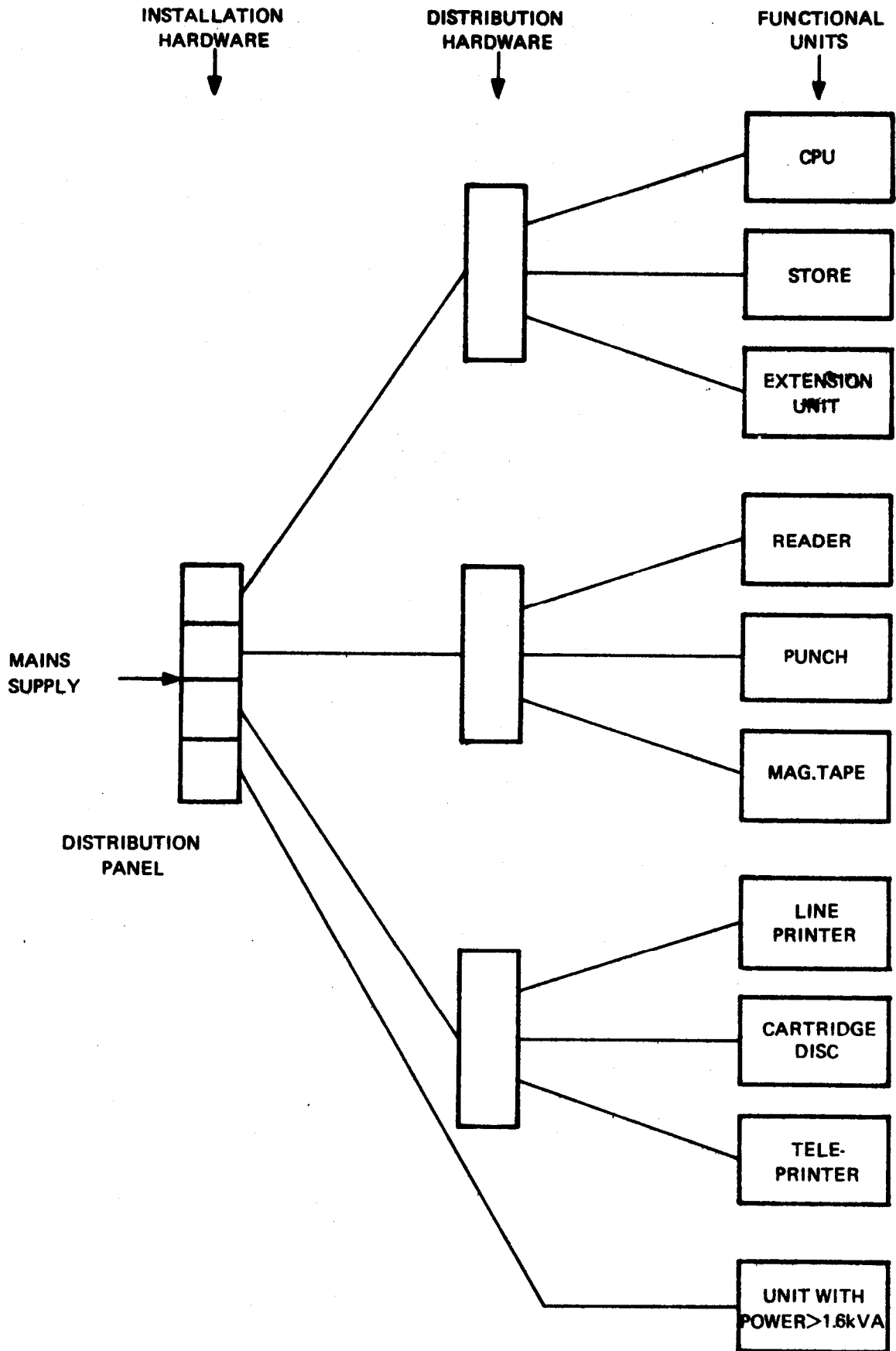


Figure 1: SCHEMATIC OF POWER DISTRIBUTION

## 2. ELECTRICAL REQUIREMENTS

### 2.1 POWER DISTRIBUTION

This sub-section describes the general principles and standards for a.c. power distribution in 4080 configurations operating from 240 volt 50 Hz single phase supplies. The design provides flexibility and enables the configuration to be powered-up from a single switch on the Central Processor Unit (CPU) control panel. The items of hardware used are described later.

In describing the overall distribution system the following terms are used:—

(a) *Functional Units*

These are units of the 4080 configuration which consume a.c. power.

(b) *Distribution Hardware*

This is hardware supplied as part of the 4080 configuration to perform the distribution of power to the Functional Units.

(c) *Installation Hardware*

This is that part of the overall power distribution system provided by the customer as part of the electrical system of the building in which the 4080 configuration is sited.

The above definitions are illustrated in Figure 1 opposite.

#### **Functional Units**

The units are supplied with a screened three core flexible cable terminated with a BS 1363 13 amp plug carrying a 13 amp fuse. For cabinet mounted units the length of this main lead is 6 feet; for stand alone units, e.g. the Teleprinter, the required length of mains lead is selected from a series of standard lengths.

The units are plugged into the Distribution Hardware mounted in the cabinets. The maximum power available for functional units connected to the Distribution Hardware is 3.0 VA. For units requiring power in excess of 3.0 VA arrangements must be made for direct connection to the Installation Hardware.

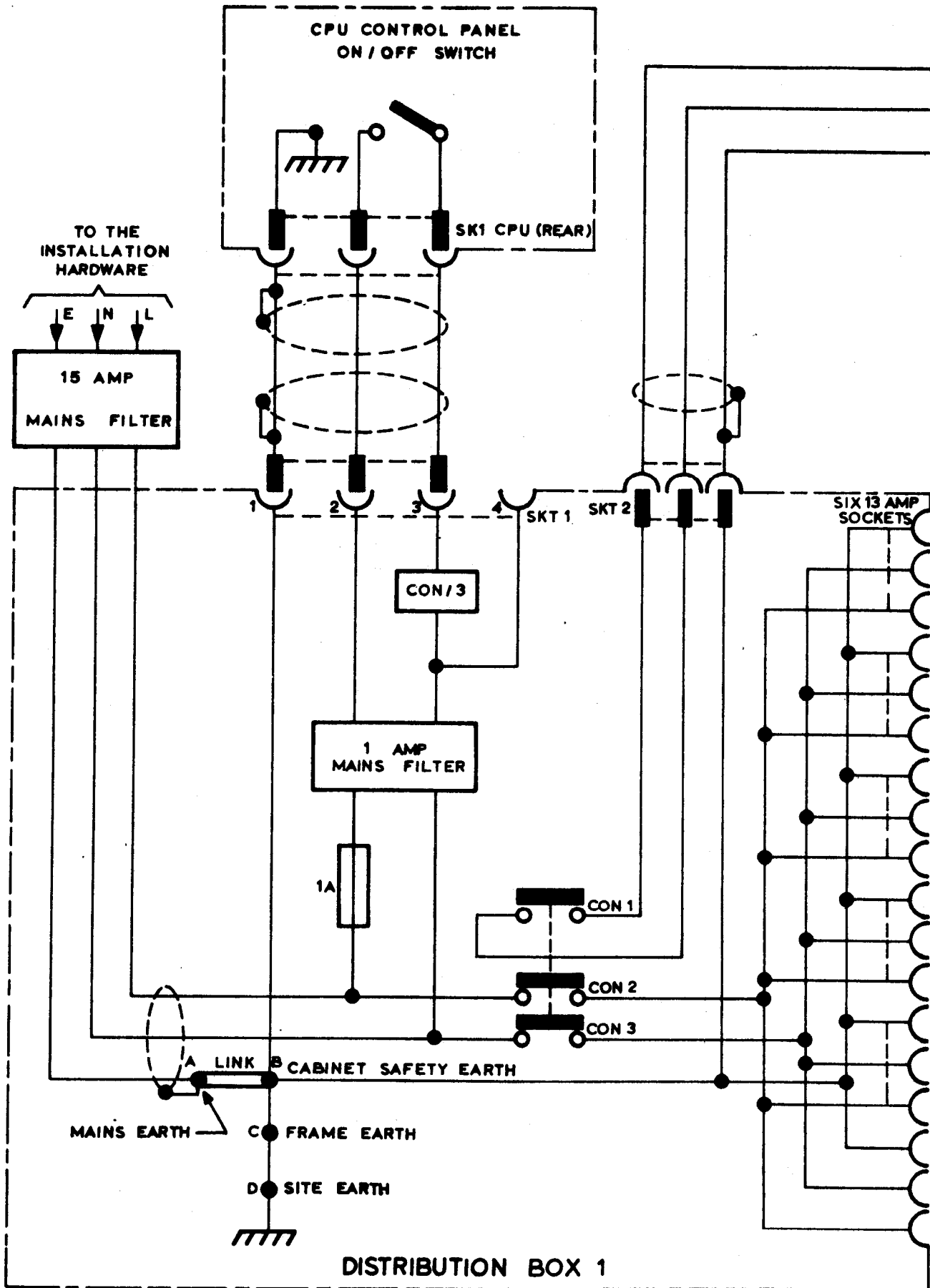
#### **Distribution Hardware**

This consists of three items which are fitted as required into the 4080 cabinets. The items are the Distribution Box, the Delay Box and the Mains Filter.

##### *Distribution Box*

This is a 19 inch rack mounted assembly with a panel height of 3½ inches (this is equal to 2 panel units each of 1¾ inches) and a front to rear depth of 4¼ inches. It carries six BS 1363 13 amp socket outlets for distribution of a.c. power to the functional units plugged into it. The Distribution Box is supplied with 16 feet of screened 3 core flexible cable for permanent connection to the Installation Hardware. Normally it is mounted at the rear of a cabinet behind either a functional unit not occupying the full cabinet depth or a blanking panel.

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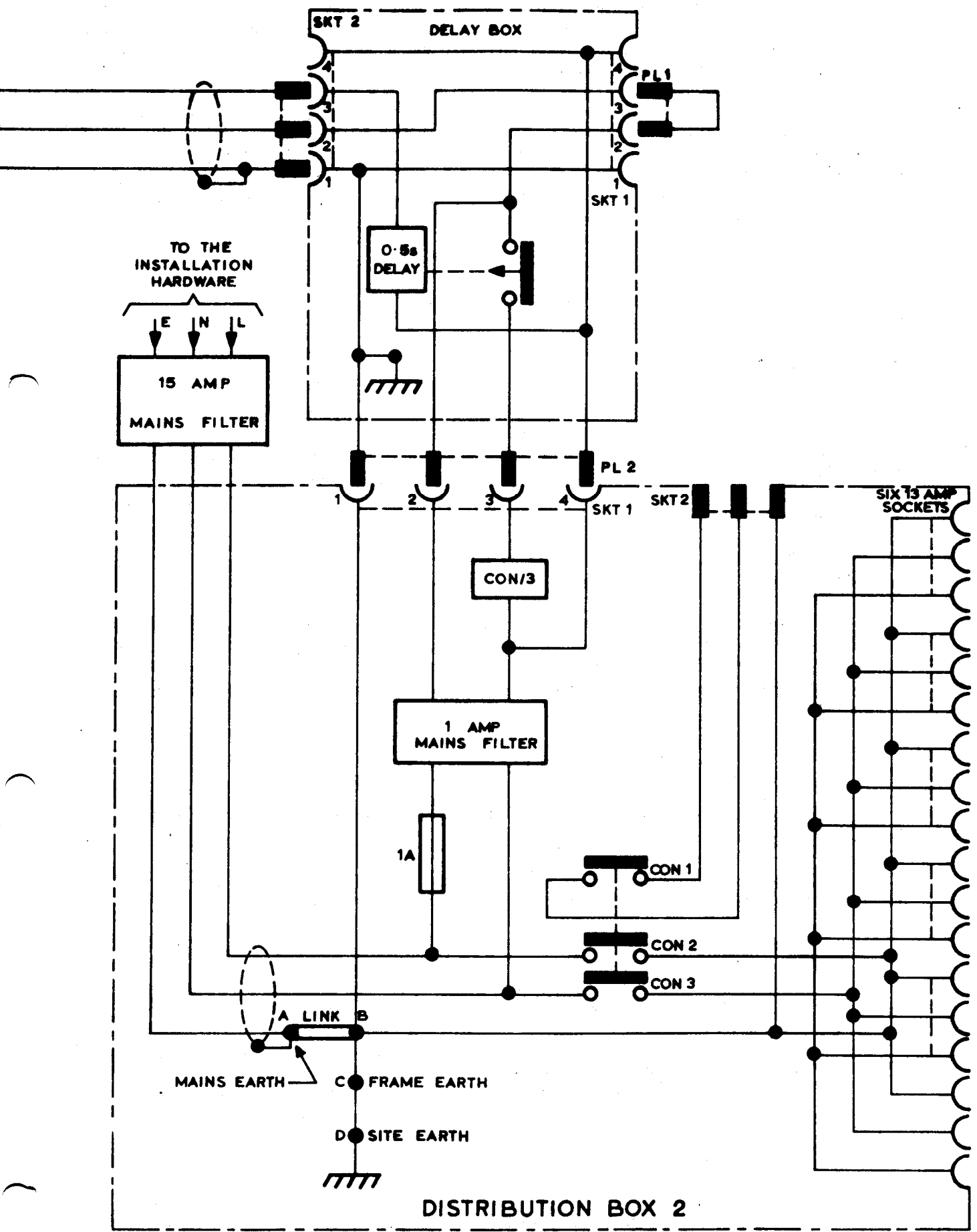


Figure 2: DISTRIBUTION/DELAY BOX INTERCONNECTION

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The box contains an a.c. contactor which is usually energised from the ON/OFF switch on the CPU control panel. Once energised, power is available at the six 13 amp distribution sockets. The contactor switches both line and neutral of the incoming a.c. supply to the distribution sockets whilst a further contact provides a switching link to energise a further Distribution Box in sequence.

The rear panel of the Distribution Box contains an eight way socket designated SK1, a three way socket designated SK2, one insulated stud, three bonded studs, and a 1 amp cartridge fuse. The two sockets are for connecting the Control and Sequence cables for switching on the Distribution Boxes in the 4080 configuration. The insulated and the bonded studs are provided to implement the earthing method described in sub-section 2.2. The 1 amp fuse protects the control cable connected to SK1. A 1 amp mains filter is fitted within the box to attenuate any interference generated by the control circuit.

Circuit details and the interconnection of Distribution Boxes are given in Figure 2.

With permanent connection to the Installation Hardware the maximum power available to be distributed by a Distribution Box is 3kVA.

### *Delay Box*

This is a 19 inch rack mounted assembly with a panel height of 3½ inches (2 panel-units) and 4½ inches mounting depth front to rear. Its function is to limit the instantaneous load applied when switching on a 4080 configuration. The Delay Box is connected in the sequence control circuit between adjacent Distribution Boxes providing a delay between the switch on of one Distribution Box and the next in sequence. The delay is set to 0.5 seconds. Normally the Delay Box is mounted at the rear of a cabinet directly above or below the Distribution Box whose switch-on it is delaying.

The Delay Box is supplied with 2 feet of screened 4 core flexible cable terminated by an 8 pin plug designated PL2 which connects into SK1 of the Distribution Box whose switch-on is to be delayed.

Connection from the preceding Distribution Box is to SK2 of the Delay Box fitted at the rear of the assembly. A further 8 pin socket designated SK1 is fitted at the rear of the Box which has pins 2 and 3 linked by a plug PL1. Two studs bonded to the Box's rear metal work are fitted for implementing the earthing requirements described in sub-section 2.2. SK1 is provided to enable a user to fit his own ON/OFF controls which might be a system requirement.

The connection and circuit details are as given in Figure. 2

### *Mains Filter*

This is a 15 amp rated device in the mains lead between a Distribution Box and the Installation Hardware. It is contained in a free standing die cast box.

It provides attenuation of symmetric and asymmetric noise over a frequency band covering 100kHz to 30 MHz and can withstand voltage transients up to 2.5 kV peak for a duration of 1µs.

## Installation Hardware

All Distribution Boxes in a 4080 configuration require connection to the site mains supply. The following recommendations are made for 4080 configurations connected to a single phase supply within the U.K.

- (a) A distribution panel should be provided containing a sufficient number of 15 amp miniature circuit breakers to connect each Distribution Box from the 4080 configuration to the mains supply. GEC Computers Ltd. should be consulted before Users finally select these circuit breakers.
- (b) The mains supply for the 4080 configuration should be a separate circuit from the customer prime main distribution board. Any ventilation equipment, lighting etc. associated with the installation must not be supplied from this circuit.
- (c) The mains supply cables must be run in earthed metal conduit or trunking unless mineral insulated copper covered cable (MICC) is used. The conduit, trunking or outer surfaces of a MICC cable must not be used as an earth return path and must not be bonded to earth other than at the main distribution board.



- (d) The conduit or trunking must not contain any cables which are not part of the 4080 configuration installation and must not contain any cables connected to ventilation equipment, lighting, convenience outlets etc. which may be associated with the installation.
- (e) The distribution panel should provide an earth busbar to which the earth conductor and screens of all connections to the 4080 configuration are bonded. The earth bus must be connected to the supply earth conductor. The conduit, trunking or MICC sheath of the supply cable must not be connected to the earth busbar or to the metalwork of the distribution panel unless the metalwork is isolated from the earth bus.
- (f) Generally the connection to earth is provided by the electricity supply authority in the form of the metal sheath of the incoming supply cable to the building. Where such an earth connection is not available the earth connection may be made instead to an earth electrode buried in the ground as described in BSCP 1013. Water pipes, gas pipes, or lighting conduit must not be used as an earth connection.
- (g) When the 4080 configuration is part of an instrumentation or other system which requires special earthing arrangements the configuration should be connected to this overall system earth and not the supply earth. The distribution Hardware is designed to facilitate this. The conductor which connects the 4080 configuration to the system earth must meet the following requirements as defined in IEE regulations:—
  - The regulations imply an earth loop impedance of less than 1 ohm.
  - The cross sectional area of the conductor must not be less than that of the mains supply cable.
  - It must not serve as an earthing conductor for other equipment and must be insulated.
  - The route taken by the conductor must be as direct as practicable in order to minimise its RF impedance.
- (h) The supply must be controlled by a master switch and either an associated HRC fuse or a circuit breaker installed in a readily accessible position in the computer area. A site mains filter may be fitted after the master switch and before the distribution panel.
- (i) The master switch and distribution panel are to be provided by the customer.

## 2.2 EARTHING

This section describes the general principles and method of safety earthing and signal earthing in 4080 configurations. The general scheme is similar to the Power Distribution network described in sub-section 2.1 Earth nodes are formed for each group of functional units which are connected via the Distribution Hardware to the installation mains earth or 'Star' connected to a site earth.

### Functional Unit Earthing

#### *Safety Earth*

All units having a.c. power input to them have a safety earth incorporated by bonding the earth core (green/yellow) of their mains cable to the framework of the unit via a stud bonded to the metalwork.

The Central Processor Unit and Store Units, which have their own power supplies, have an insulated braid connected between a bonded stud on the functional unit and a bonded stud on the power supply unit.

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### *Signal Earth*

The signal earth (logic 0V) and safety earth are segregated within each unit. They are connected together at a single point in the configuration. This point is a link at the rear of the CPU rack which connects an insulated stud to a framework bonded stud.

On functional units fitted with an externally mounted local mains filter the signal earth is taken to an insulated stud and the safety earth to a framework bonded stud. A 47 ohm resistor is connected between the two studs. Also provision is made for linking the two studs together if required.

### *Interconnection of Cables*

#### (i) 'Stand Alone' Peripherals

The screen of an interface cable joining a 'stand alone' peripheral to the racked units is connected to the safety earth at both ends of the cable. At the peripheral unit the screen is taken to the safety earth stud on the unit. At the racked units end a 'tail' is taken from the interface cable connector and bonded to the framework of the unit to which it is connected. Provision is made at the rear of the units, typically the CPU or Extension Unit, for bonding the tail to the framework. The unit's framework is bonded with an insulated earth braid to the configuration earth via the Distribution Hardware.

#### (ii) Communications Controllers

For single and multi-channel asynchronous and synchronous controllers connected to a modem the screen of the interface cable is connected to signal earth at the modem end. At the racked units end the screen is taken to the safety earth using a tail as described in (i) above.

## **Distribution Hardware Earthing**

### *Distribution Box*

This box has four studs fitted at the rear of the unit for use as earthing terminals. They are designated and connected as follows:

#### (i) Stud A – Mains Earth

This stud is insulated from the Distribution Box case and is the point where the earth core (green/yellow) and the screen of the incoming main supply cable from the Installation Hardware is connected.

#### (ii) Stud B – Cabinet Safety Earth

This stud is bonded to the case and is the point where the earth cores (green/yellow) and screens of the mains cables from the functional units are connected via their 13 amp plugs and sockets on the Distribution Box. A removable link is fitted which connects Stud A to Stud B and completes the earth circuit to the supply earth at the Installation Hardware. If a separate site earth is to be used then the link is removed at the time of configuration installation.

#### (iii) Stud C – Frame Earth

This stud is bonded to the case and provides the means whereby connections are taken from the Distribution Box to the cabinet framework and to link other Distribution Boxes as required. An insulated flexible earth braid is used for this purpose.

**(iv) Stud D**

This stud is bonded to the case and provides the point for connecting, via an insulated flexible earth braid, to a local site earth. In this instance the link between Stud A and Stud B is removed.

***Delay Box***

This unit has an Earth Stud and an Earth Bolt fitted at the rear and bonded to the case. The stud has the earth core and screen of the incoming and outgoing sequence control cable connected to it. The bolt is provided for connecting to the Distribution Box Stud C via a flexible earth braid.

***Cabinets***

All the metalwork of each cabinet is bonded together to provide a measure of RF screening and a safe discharge path for static electricity. The metalwork of the cabinet is bonded via a flexible insulated earth braid to the Distribution Box or Boxes fitted in the cabinet.

The Distribution Boxes are bonded to each cabinet and all the Distribution Boxes/Delay Boxes are bonded together by means of flexible earth braid.

**Installation Hardware Earth**

An earth bus is required at the Distribution Panel to which the earth cores (green/yellow) and screens of the mains cables from the 4080 configurations are connected.

**Summary of Earthing Method and Requirements**

**(a) When the configuration is connected to the Supply Earth:—**

The Mains Earth and the Cabinet Safety Earth are linked at all Distribution Boxes in the 4080 configuration.

The Distribution Boxes are bonded to their cabinet framework by flexible insulated earth braid.

All Distribution Boxes and Delay Boxes in the configuration, are bonded together by flexible insulated earth braid.

The Signal Earth is connected to the Safety Earth at one point only in the configuration.

The Interface cables from 'stand alone' peripherals and modems are connected to the main configuration framework via 'tails' on the interface cable connectors.

**(b) When the configuration is connected to an independent Site Earth:—**

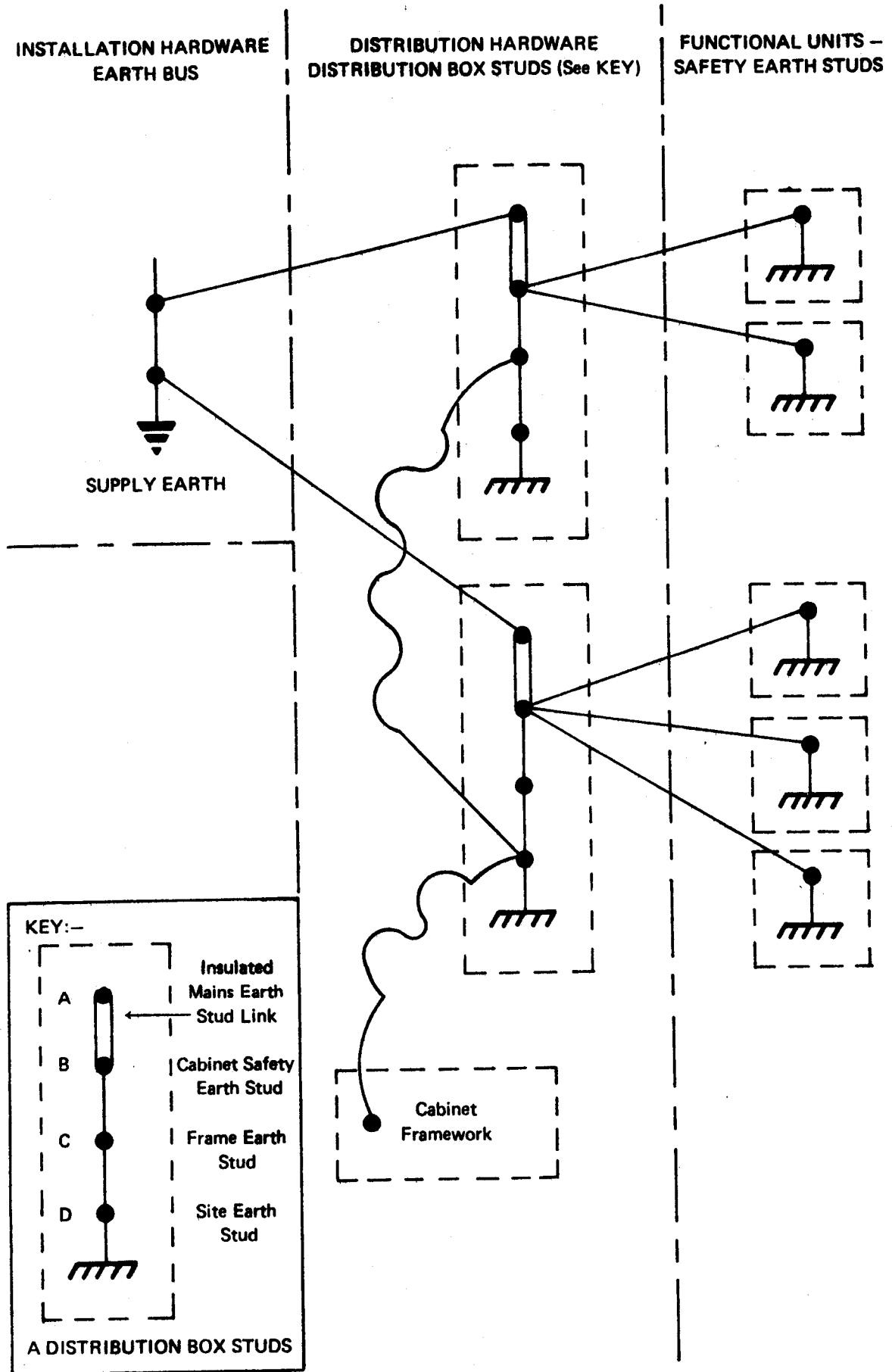
As in (a) above but with the link between the Mains Earth and the Safety Earth removed and a connection taken from each Distribution Box Stud D to the Site Earth via an insulated flexible earth braid.

**(c) Method of Connection:—**

The manner in which earth braids or links are connected should be such that the disconnection of a unit for servicing does not remove the earth connection to any other unit. This means that braids or links should not be connected to a common stud unless it is accepted that disconnection of a unit implies switching off the whole system.

The earthing methods as described above are illustrated in Figures 3 and 4.

**INSTALLATION**



**Figure 3: CONFIGURATION CONNECTED TO SUPPLY EARTH**

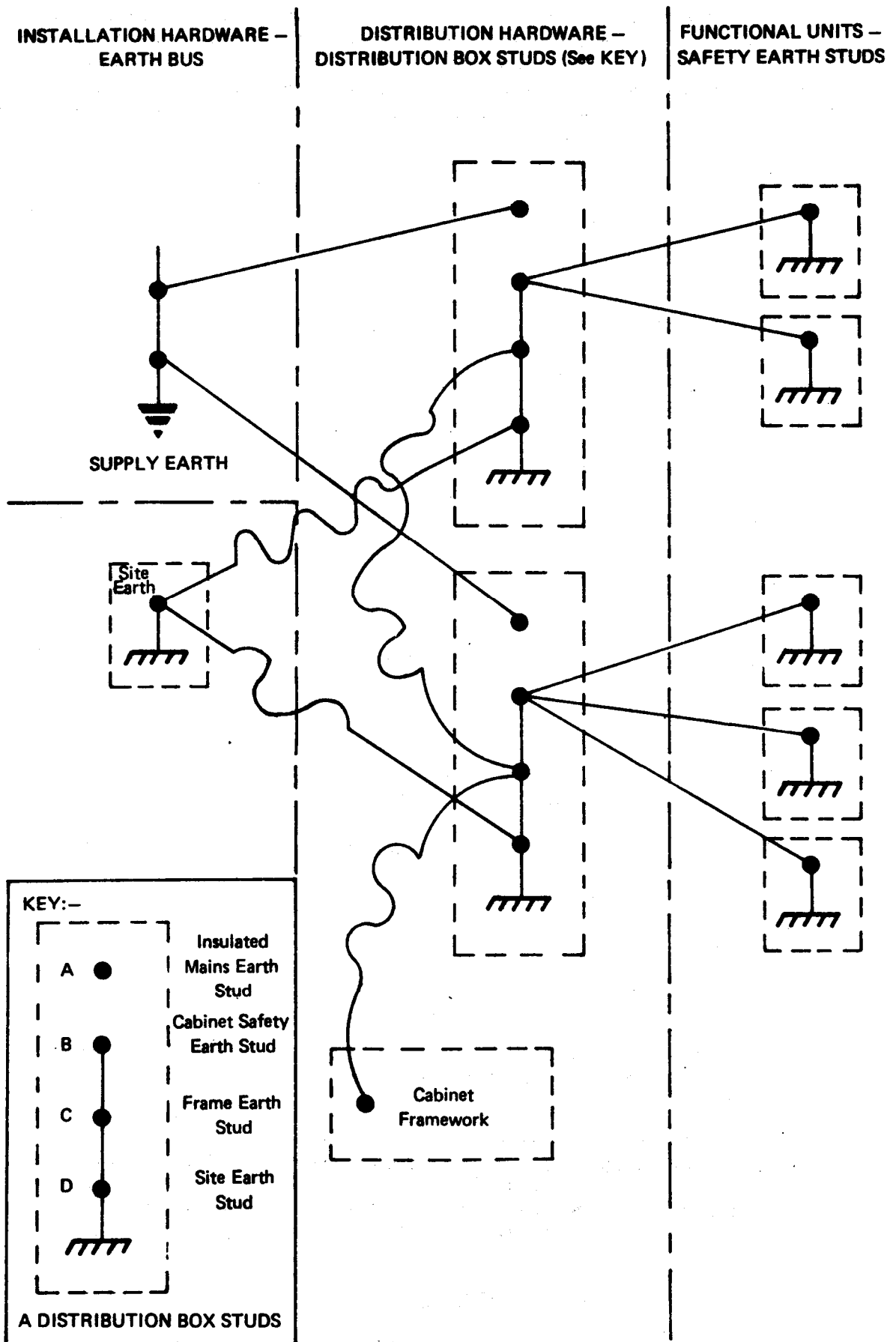


Figure 4: CONFIGURATION CONNECTED TO SITE EARTH

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### 2.3 4080 UNIT'S ELECTRICAL REQUIREMENTS

A 4080 configuration is made up of a number of functional units mounted in six foot or four foot cabinets. The electrical requirements and tolerances of the major standard units are summarised in the following list. It should be noted that for a particular 4080 configuration the working voltage range is restricted by the particular limitations of one or more of the units in the configuration. A reasonable overall voltage requirement for a 4080 system is 240V + 6 - 10%. Similar considerations apply to the tolerable frequency range. A reasonable frequency range for a system is 50 Hz  $\pm$  1 Hz.

UNIT NAME	VOLTAGE RANGE AND TOLERANCE	FREQUENCY RANGE (Hz)	LOAD (kVA)
CPU and PSU	200-250V $\pm$ 10%	48-55	1.0
Store and PSU	200-250V $\pm$ 10%	48-55	1.0
Extension Unit	220-250V $\pm$ 10%	48-52	1.0
Teleprinter ASR	200-240V $\pm$ 10%	49-51	0.4
Paper Tape Reader 500	240V $\pm$ 10%	48-52	0.2
Paper Tape Punch 110	240V $\pm$ 10%	49-51	0.6
Thermal Printer KSR	240V +6 - 15%	48-62	0.2
Line Printers	240V $\pm$ 10%	49-51	1.3
Cartridge Disc	240V +7 - 11%	49-51	0.5
Magnetic Tape Handler	220-250V +7 - 10%	48-52	1.3
Card Reader 400	240V $\pm$ 10%	49½-50½	0.4
Teleprinter Compatible Display	240V +4 - 13%	49-51	0.2
Simple Graphics Terminal	220-240V $\pm$ 10%	48-440	0.2
Visual Display Terminal	220-260V $\pm$ 10%	49-51	0.2
Head per Track Disc	220-245V $\pm$ 10%	48-52	0.5
Digital Plotter 300, 600	240V $\pm$ 10%	48-51	0.5

The power consumption figures quoted are average figures to be used for determining the supply rating required; the actual consumption by a particular unit can, under certain circumstances, temporarily exceed the quoted figure.

At the system configuration stage the total loading must be ascertained from the above list and the allocation of socket outlets on the Distribution Boxes detailed for the functional units. A distribution box should not be allocated a load of more than 3kVA. The total loading determines the Installation Hardware requirements and GEC Computers Limited will make recommendations to the customer of the provisions which should be made. If a system is to be supplied other than from the public supply mains it is strongly advised that GEC Computers Ltd. are consulted.

### 2.4 INSTALLATION REQUIREMENTS

After delivery to the site the configuration is assembled and set out as required. The power distribution and earthing are to be checked as follows:-

- (1) Check that all functional units are plugged into their allocated sockets.

## ELECTRICAL REQUIREMENTS

- (2) Check that the link between the Safety Earth stud and the Signal Earth stud on at the rear of the CPU is fitted and secure.
- (3) Check that all insulated flexible earth braids are connected correctly.
- (4) If the configuration earth is to be the Supply Earth ensure that the links between the Mains Earth (Stud A) and Cabinet Safety Earth (Stud B) at the rear of the Distribution Boxes are fitted and secure.
- (5) If the configuration earth is to be the local Site Earth ensure that the links referred to in (4) above are removed. Connect insulated flexible earth braid from Stud D of each Distribution Box to the Site Earth point.
- (6) Check the site ac voltage conforms with the equipment requirements.
- (7) Connect the mains cables from the Distribution Boxes to the Installation Hardware, and check that the earth cores and cable screens are connected to the Supply Earth.

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### 3.

## MECHANICAL CHARACTERISTICS

This section outlines dimensions, weights and general characteristics of the cabinets, cabinet mounted units and stand alone units making up a 4080 configuration.

Information is provided on layout and restrictions induced by the physical characteristics of the units and the permissible cable lengths between them.

### 3.1 CABINETS

Three cabinet sizes are available in which to mount the 19 inch cabinet mounted units making up a 4080 configuration.

The cabinet sizes are:—

6 foot, giving a capacity of 39 panel-units

4 foot, giving a capacity of 27 panel-units

where 1 panel-unit = 1.75 inches.

The cabinets have side covers, no front cover, and a hinged lockable rear cover.

The cabinet plinth allows cables to reach the rear vertical cable area which runs behind the rack mounted units. Egress can be made from the plinth to the sides, the front, the rear or downwards if there is a false floor. Adjustable feet, each approximately 4 square inches in cross sectional area, are fitted to each corner of the plinth. These are provided for levelling purposes and adjustment of the rack start height to approximately 4 inches above the floor.

Where required cabinets of the same height can be mounted side by side to form a suite. Securing bolts are used to hold the cabinets together, one pair of side covers being used for the suite. Cables may be run directly from cabinet to cabinet or vertically within the intercabinet space. A cabinet containing a disc mechanism must not form part of a suite.

A retractable working surface can be mounted in a cabinet rack. When fully open it provides a working area, 16.5 inches wide and 14.5 inches deep, to hold documents etc.

Any rack height not occupied by units should be filled with blanking panels. These are available in panel-units from 1 to 6.

#### Cabinet Dimensions (Nominal)

Internal Width	19 inch standard panel
Rack Mounting Height (4 ft.)	47.25 inches
Rack Mounting Height (6 ft)	68.25 inches
Start of Rack Mounting Height	4.2 inches above the floor
Internal Depths:	
Cabinet Front to Front Mounting Face	1.0 inches



Front Mounting Face to Rear Mounting Face	24 inches *
Rear Mounting Face to Rear Door	3.7 inches
Overall Height (4 ft.)	53.1 inches
Overall Height (6 ft.)	74.1 inches
Width with Side Covers	23.75 inches
Width without Side Covers	22.5 inches
Overall Depth	30.0 inches

\*This dimension is adjustable but is set, normally to 24 inches. An additional fixed rear mounting face also exists at a depth of 27.7 inches behind the front face.

Provision is made for the fixing of eyebolts to the tops of the cabinets for lifting purposes.

### 3.2 RACK MOUNTED UNITS

Certain basic rules apply to the placement of the rack mounted units in the cabinets.

- (a) Units requiring operator access and attention should be placed at a suitable height, e.g. the CPU should be positioned so that its control panel is between 4 and 5 feet from the ground.
- (b) Up to two Cartridge disc units may be placed in a 4 ft. cabinet together with their power supply. The power supply are normally mounted below the disc mechanisms.
- (c) Magnetic tape handlers are placed, singly, at the top of 6 ft cabinets.
- (d) Power supply units (PSUs) must be mounted immediately above or below the unit they supply.
- (e) The weight loading of a cabinet must not be exceeded. The maximum load that can be carried in a 6 ft. cabinet is 600 lbs, and in a 4 ft cabinet 400 lbs.
- (f) If a cabinet contains more than one H.P.T. Disc mechanism a ballast weight must be mounted in the cabinet.

Normally the positions of the various units in cabinets will be decided by GEC Computers Limited as part of their customer service. This does not preclude, of course, a customer having his own arrangement provided that rules (b), (d) and (e) above are followed.

The following table lists the major standard 4080 cabinet mounted units, their weight, and the space they occupy

INSTALLATION

UNIT NAME	HEIGHT (panel units)	MOUNTING DEPTH (inches)	WEIGHT (lbs)	REMARKS
Central Processor Unit (CPU)	7	21	75	Mounted on runners for extension clear of the cabinet.
CPU Power Supply Unit	3	21	70	
Core Store 64K	6	21	75	
Core Store 32K	6	21	70	
Store Power Supply Unit	3	21	93	Ventilation is front to rear
Paper Tape Reader 500	6	14	55	Mounted on brackets, secured by screws at the front.
Paper Tape Punch 110	7	22.5	100	
Magnetic Tape Handler	19	15	245	Secured by screws at the front. The mechanism swings out on hinges for maintenance access.
Cartridge Disc Drive (CDD)	6	28.5	142	Mounted on runners, extends clear of the Cabinet for changing the exchangeable disc.
CDD Power Unit (1 drive)	4	26	62	Mounted on runners extends for maintenance access.
CDD Power Unit (2 drives)	4	26	93	
Head per Track Disc 500K	9	20	96	Mounted on runners, extend for maintenance access.
Head per Track Disc 900K	11	20	105	
Distribution Box	2	4.25	7	Secured at the rear of the Cabinet by screws.
Delay Box	2	4.25	6	
Protection Unit for Multi-channel Communications	1	24	18	Secured at the front and rear of the Cabinet by screws.
Watchdog and External Interrupt Unit Signal Distribution Box	1	3.25	2	Secured at the rear of the Cabinet by screws.
Extension Unit	6	21	93	Mounted on runners for extension clear of the cabinet. Ventilation is front to rear.

### 3.3 STAND ALONE UNITS

The stand alone units can be arranged in any manner suitable to the customer provided that the signal and supply cable lengths permit ( see 3.4 for cable lengths). The position of stand alone units in relation to the cabinet or cabinets should be such as to make the supervision and control of the system as easy as possible within any restrictions that the allotted computer space may impose. Space must be provided round the units for operator and maintenance access. This is dealt with in sub-section 3.5.

The stand alone unit's dimensions are listed below:

UNIT NAME	WIDTH (inches)	DEPTH (inches)	HEIGHT (inches)	WEIGHT (lbs)	NOTES
Teleprinter ASR 33	22	19½	44	56	
Teleprinter DD 390	25	20	37	124	
Thermal Printer	21.25	19.5	7.25	38	A
Line Printer	40.5	29.25	48	450	B
Dot Matrix Printer	23	34.5	38	120	
Card Reader 400	23	12.5	13	65	A
Teleprinter Compatible Display	15	20.2	11.4	42	A
Simple Graphics Display	18.25	28.5	41.5	78	
Visual Display Terminal	20	26.5	16	32	A
Digital Plotter 300	24.25	12.5	41.5	70	
Digital Plotter 600	56.25	19.75	45.5	380	

Note A These units stand on a table top.

Note B: Dependent on type.

### 3.4 CABLING

4080 units are provided with a signal (interface) cable and a mains cable. The length of interface cable is selected from a range of standard lengths. The mains cable is of a fixed length for each unit. The cable lengths are given in the table overleaf.

INSTALLATION

UNIT NAME(S)	INTERFACE CABLE (ft)	MAINS CABLE (ft)	REMARKS
CPU Power Supply Unit	-	10	
Store Power Supply Unit	-	10	
Store link to CPU	8,14	-	
CPU to Extension Unit (EU) Intermediate Link	10,20,30, 40,55,70, 85,100	6	May also be used to connect to customer's own equipment.
Teleprinters ASR33 and DD390, and Thermal Printer to CPU or EU via a local controller.	14,20,30	25	
Teleprinters ASR33 and DD390 or Thermal Printer to CPU or EU via an Asynchronous V24 Interface.	20,30,40, 55,70,85, 100.	25	
Paper Tape Reader 500 to CPU or EU.	8,14	6	
Paper Tape Punch 100 to CPU or EU.	8,14	6	
Thermal Printer to CPU or EU via an Asynchronous V24 Interface.	20,30,40, 55,70,85, 100 then in 50 increments up to 1000.	to suit	
Line Printer, 300,600,700 or 1250 to CPU or EU	14,25	10 15	Chain, Line Printer Drum, Line Printer
Cartridge Disc Unit to CPU or EU	14,25	14,25	
Magnetic Tape Handler to CPU or EU.	8,14	6	
Magnetic Tape Handler to Magnetic Tape Handler.	2,5	-	
Thermal Printer to Modem	20,30,40 55,70,85, 100	to suit	

MECHANICAL CHARACTERISTICS

UNIT NAME	INTERFACE CABLE (ft)	MAINS CABLE (ft)	REMARKS
Asynchronous Modem Interface to Modem	20,30,40, 55,70,85, 100.	-	Max. operating speeds in Kilo baud 52.8 up to 40 feet of cable.
Synchronous Modem Interface to Modem	20,30,40, 55,70,85, 100.	-	38 for 55 feet. 30 for 70 feet. 27 for 85 feet.
16 channel Protection Unit to Modem	20,30,40, 55,70,85, 100.	-	22 for 100 feet.
Multichannel Asynchronous Modem Interface to 16 channel Protection Unit.	8	6	Controller mounted in Extension Unit (EU)
Card Reader 400 to CPU or EU	14,20,25	15	
Cable to Digital I/O Controller in CPU or EU	25 (max.)	-	The supply of the Interface Cable is a customer responsibility.
Watchdog and External Interrupt Unit to the Signal Distribution Unit	8	-	
Teleprinter Compatible Display to CPU or EU via a local controller.	14,20,30	to suit	
Teleprinter Compatible Display to CPU or EU via an Asynchronous Modem Interface	20,30,40, 55,70,85, 100 then at 50 increments up to 1000.	to suit	The interface cable length determines the maximum operating speed, i.e: Up to 500ft-2400 baud Up to 1000ft-1200 baud
Teleprinter Compatible Display to modem	20,30,40, 55,70,85, 100.	to suit	
Simple Graphics Display to CPU or EU via an Asynchronous Modem Interface	20,30,40, 55,70,85, 100 then at 50 increments up to 1000.	to suit	The interface cable length determines the maximum operating speed i.e: Up to 125ft-9600 baud Up to 250ft-4800 baud Up to 500ft-2400 baud Up to 1000ft-1200 baud
Simple Graphics Display to modem.	20,30,40,55, 70,85,100	to suit	

## INSTALLATION

UNIT NAME	INTERFACE CABLE (ft)	MAINS CABLE (ft)	REMARKS
Visual Display Terminal to CPU or EU via an Asynchronous V24	20,30,40, 55,70,85, 100 then at 50 increments up to 1000.	to suit	The interface cable length determines the maximum operation speed i.e. Up to 125ft-9600 baud Up to 250ft-4800 baud Up to 500ft-2400 baud Up to 1000ft-1200 baud
Visual Display Terminal to Modem	20,30,40, 55,70,85.	to suit	
Head per Track Disc to CPU or EU	25	6	
Plotter to CPU or EU via an Asynchronous V24 Interface	20,30	to suit	

### 3.5 INSTALLATION REQUIREMENTS

This sub-section deals with the floor loading demands of the 4080 units, floor space requirements and general configuration space demands.

#### Floor Loading

UNIT NAME	MOUNTING	CASTOR WIDTH or FOOT DIA.	No. OFF	MATERIAL	MAX. LOAD lbs/sq "
6 ft Cabinet fully loaded	feet	2.2 "	4	Plastic	50
4 ft or 3 ft Cabinet fully loaded	feet	2.2 "	4	Plastic	32
Teleprinter ASR 33	feet	.875"	4	Rubber	38
Teleprinter DD 390	feet	.875"	4	Rubber	52
Line Printers	feet	2.0 "	4	Nylon	36
Simple Graphics Display	feet	0.8"	4	Rubber	39
Digital Plotter	caster	.375"	4	Metal	To be specified.

#### Clearance Around Floor Standing Units

In general the units should be laid out to provide the maximum amount of room around each unit (or suite of cabinets) in relation to the space provided for the configuration remembering that space must be provided for trolleys holding cartridge discs, tapes, line printer stationery etc.

## MECHANICAL CHARACTERISTICS

The minimum clearance requirements are given below. It should be noted that there should be an access channel at least 24 inches wide at the end of any unit or suite.

UNIT NAME	FRONT (in)	REAR (in)	LEFT (in)	RIGHT (in)
Any Cabinet	40	30	.5	.5
Teleprinters	42	30	.5	.5
Line Printer	36	36	36	.5
Simple Graphics Display	42	1*	1*	1*

\* Applies if unit can be pulled forward for maintenance purposes.

False floors may be used to accommodate the configuration cabling. The position of cut-outs in the base of units is shown in Figure 5.

INSTALLATION

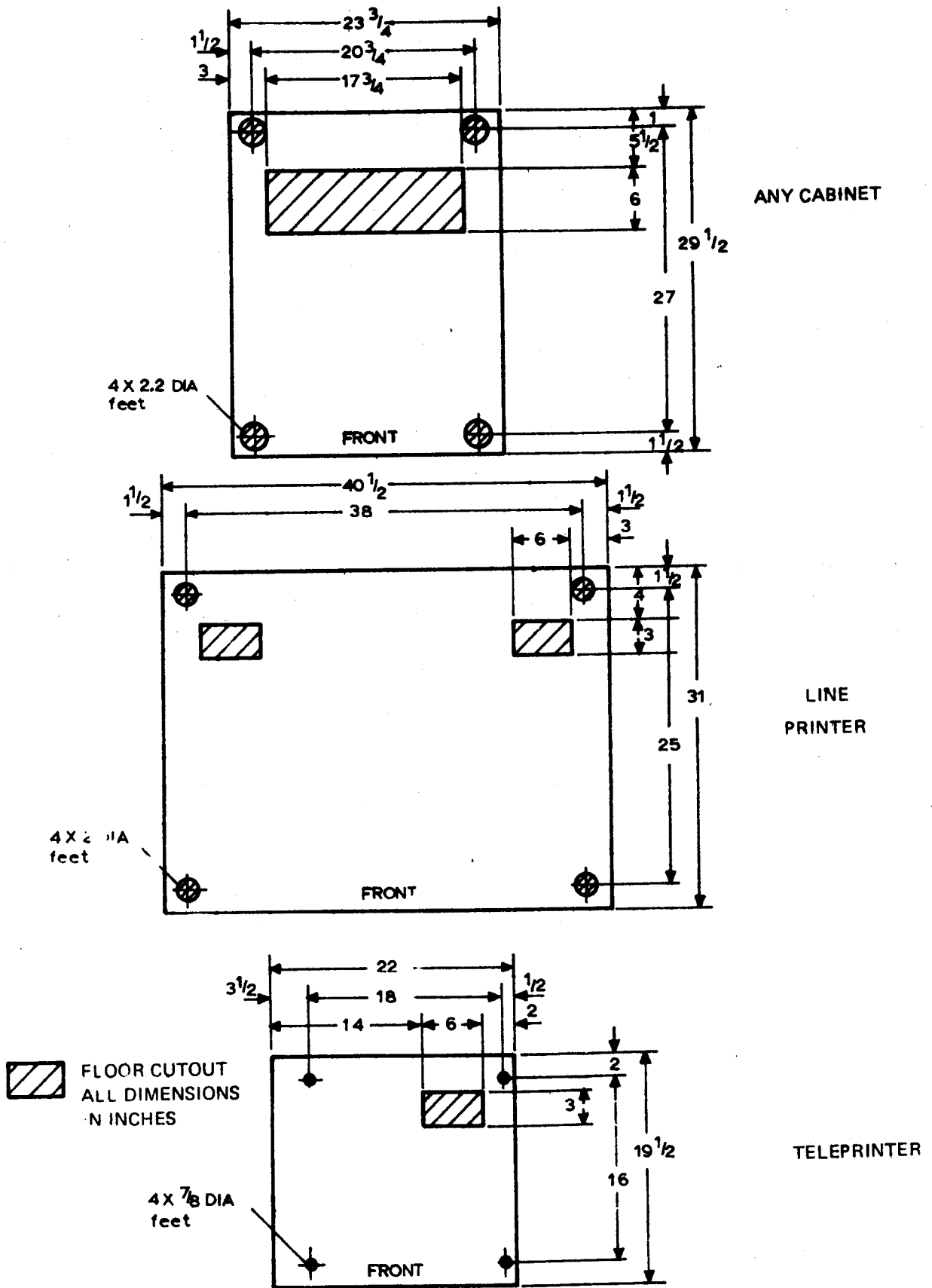


Figure 5. UNIT BASE CUTOUT POSITIONS



4.

**ENVIRONMENTAL CHARACTERISTICS**

This section outlines the operating ranges of temperature and relative humidity for each 4080 unit and makes some recommendations regarding the use and storage of any media which may be involved.

It should be noted that the environment required by a 4080 configuration is determined by the unit with the most demanding requirements.

This section does not detail the required cleanliness of the configuration area. To a large extent the effect of dust and other contaminants in the atmosphere are self evident, for although most units are protected from dust by filters these filters require more frequent replacement or cleaning in a dusty atmosphere than in a clean one. A more serious problem is contamination of recorded media, e.g. cartridge disc or magnetic tapes when mounting or demounting them with the possibility of subsequent temporary or permanent loss of information and/or damage to the media (see later table).

Similarly only slow changes in temperature or humidity can be tolerated by media (such as paper tape, punched cards etc.). A tolerable rate of change is one which enables the media to acclimatise itself to the new environment with any distortion which occurs not causing any noticeable reduction in the performance of the peripheral concerned.

The temperature and relative humidity ranges tolerated by the various units are listed below:

UNIT NAME	TEMPERATURE (°C)	RH % (NO CONDENSATION)
CPU + PSU	0 - 55	0 - 95
STORE + PSU		
EU (inc. PSU)		
Teleprinter ASR	5 - 35	5 - 95 *
Paper Tape Reader 500	5 - 40	30 - 80 *
Paper Tape Punch 110	0 - 40	40 - 60 *
Thermal Printer KSR	10 - 35	10 - 90
Line Printers	10 - 38	40 - 80
Dot Matrix Printer	5 - 38	5 - 90
Cartridge Disc	10 - 38	20 - 80
Magnetic Tape Handler	15 - 32	10 - 90*
Card Reader 400	10 - 35	30 - 65*
Teleprinter Compatible Display	10 - 40	10 - 90
Simple Graphics Display	10 - 40	10 - 90
Visual Display Terminal	10 - 40	5 - 80
Digital Plotters	15 - 35	45 - 75
H.P.T. Disc	5 - 50	0 - 95

\*Media require that these units be operated in the RH range 40-60%, with the minimum rate of humidity change possible for the best performance.

## INSTALLATION

### Atmosphere

Magnetic tape and cartridge disc units require air with dust particles less than as defined below:--

PARTICLE SIZE	NUMBER OF PARTICLES
0.5 to 1.0 micron	$4 \times 10^7$ particles/cubic metre
1 to 5 micron	$4 \times 10^6$ particles/cubic metre
over 5 micron	$4 \times 10^5$ particles/cubic metre