PHILIPS

Service Manual

X1215

Cartridge Disk Drive Unit

Data Systems

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Great care has been taken to ensure that the information contained in this handbook is accurate and complete. Should any errors or omissions be discovered, however, or should any user wish to make a suggestion for improving this handbook, he is invited to send the relevant details to:

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X1215
Cartridge Disk Drive Unit
Vol.I: Introduction

Data Systems

Fig. 1-1 Disk Drive Unit

1.1 GENERAL DESCRIPTION. (figure 1-1, 1-2)

The X1215 Disk Drive Unit is a random access data storage device especially designed for use in a star configuration, it is suitable for rack-cabinet installations or stand alone situation. The purpose of a Disk Drive Unit is to provide for the storage of data in a form which allows easy retrieval of these data when required. These requirements are satisfied by the use of disks which are provided with a magnetic coating.
The X1215 Disk Drive Unit is equipped with two independent disks, one of which is permanently mounted in the unit, the second disk is a top loading, operator interchangeable disk cartridge, on which can be written 204 data per side tracks at a nominal speed of 2400 r.p.m.
The data is stored on the disks (write operation) and recovered when required (read operation) by means of magnetic heads which float just clear of the disk surfaces.
To allow the complete disk surfaces to be used the disks are made to rotate and the magnetic heads are attached to a positioning mechanism which can move them in and out accross the disk surfaces.
The disk unit receives instructions about positioning and data handling from a Control Unit and supplies status information to the Control Unit via an assymetric interface.
As it is possible to use more than one Disk Drive Unit on one Control Unit a Unit Select line is used to indicate which Disk Drive Unit is being addressed.

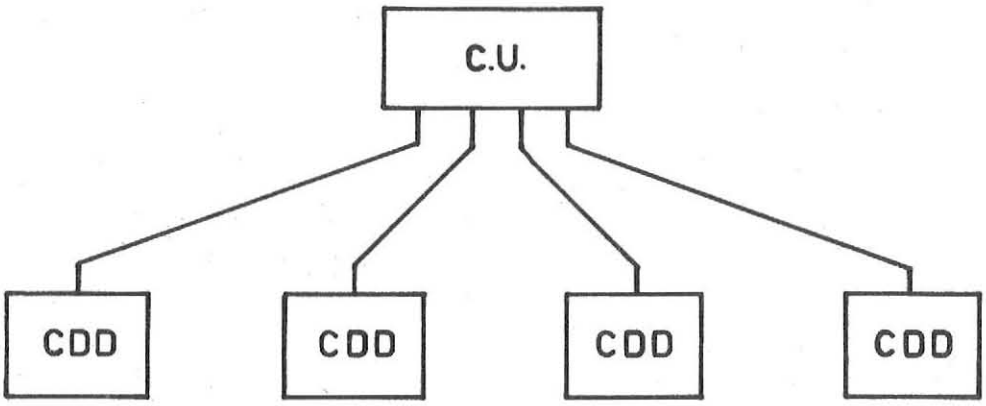

Figure 1-2 STAR CONFIGURATION

1.2 FIXED DISK AND SINGLE DISK CARTRIDGE (figure 1-3)

The disk used has a diameter of fourteen inches and is organised in the following way:

On each surface there are 204 tracks and as both sides of the disk are oxide coated and can consequently be used, it can be said that a disk has 204 cylinders each containing 2 tracks. The maximum storage capacity being 50×10^6 bits.

Mounted on the spindle is the index and sector ring which indicates the sectors by slots. Different types of cartridges can have a different number of slots.
The speed of a rotating disk is 2400 revolutions per minute and an average access time of 33 milliseconds is realised.
A magnetic ring keeps the cartridge in a fixed position. The fixed disk is permanently mounted inside the unit.

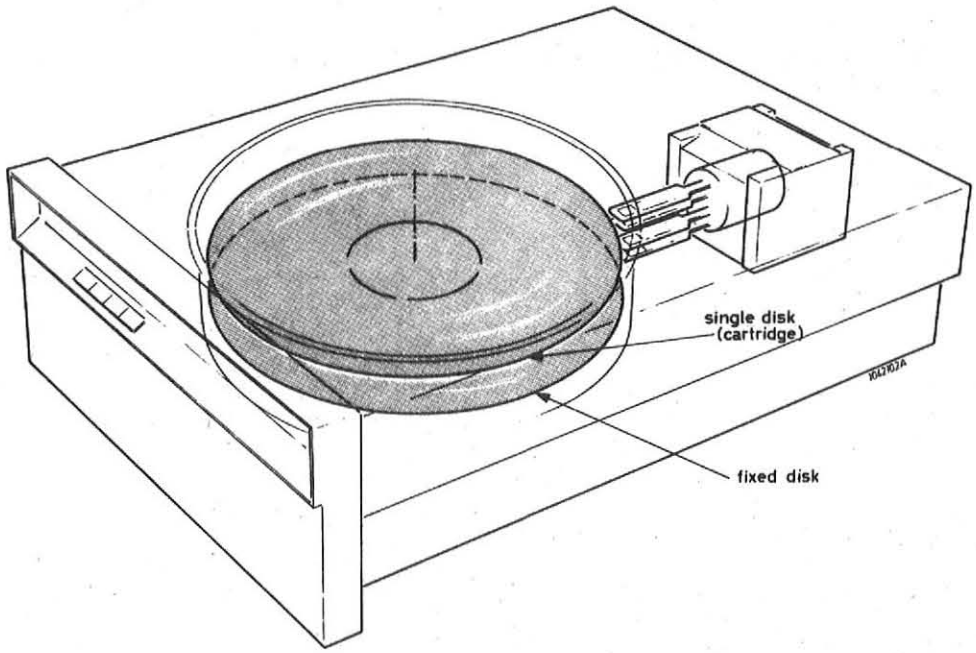

Figure 1-3 Fixed disk and single cartridge

Operation of the Power-on switch on the rear of the unit activates the power supplies, retracts the positioner and unlocks the right clamp to load the cartridge as well as the positioner lock magnet. If the Start/Stop button is now pressed the disk drive motor starts and the brushes move in to clean the disk surfaces; when the cleaning cycle is completed the positioner moves in towards cylinder 000 and the heads are loaded. This is the First Seek and is used to position the heads on cylinder 000 before sending a Ready signal to the Control Unit.
On a Normal Seek the Control Unit supplies the number of the required cylinder and the positioner begins moving towards it. Each time the positioner passes a cylinder the track count system generates a pulse which is used to determine whether the required cylinder has been reached.
When the heads are on the selected cylinder the Control Unit gives a signal to select one of the four heads, after this a write or read command is sent to the Disk Drive Unit by the Control Unit.

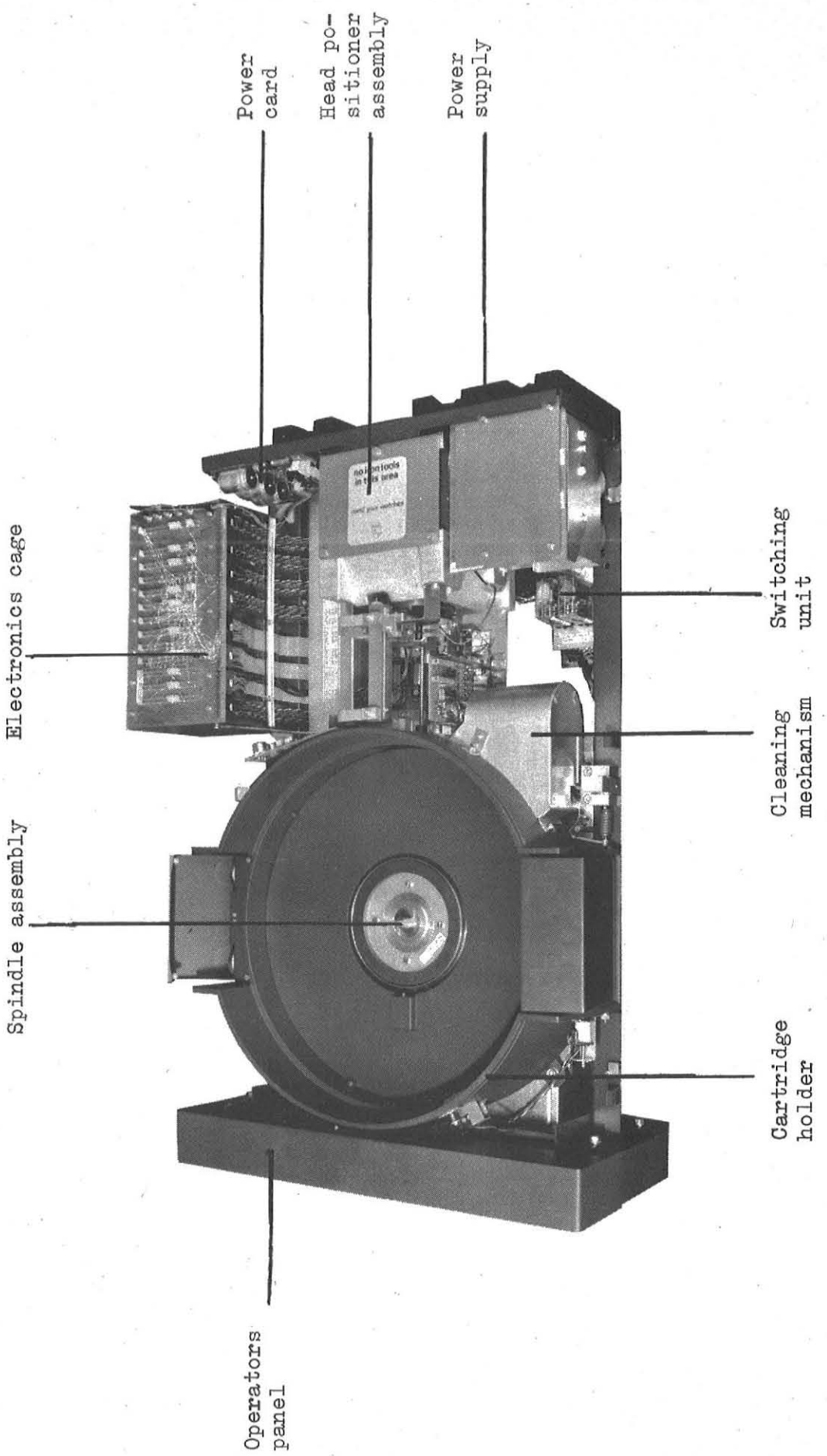

Fig. 1-4 Assembly locator

The Cartridge Disk Drive consists of several main parts. These major items are described in the following paragraphs.
For the several assemblies see figures 1-4 and 1-5.

3.1 COVERS

A total of three covers are present, two on top and one on the bottom.
All these covers are removable.

3.2 CARTRIDGE HOLDER

The cartridge holder consists of three parts, namely:
a) A cartridge holder ring which includes two clamps. One of the clamps has associated with it a protection unit (solenoid).
b) The first bottom plate at the centre of the cartridge holder ring is attached to the ring with three screws.
c) The second bottom plate is held in position by the cartridge holder.

3.3 FIXED DISK

The fixed disk is mounted between the two cartridge holder bottom plates and located on the spindle.

3.4 SPINDLE

The spindle is coupled to the drive motor via a belt.
The spindle incorporates a metal disk with blades, which, when the spindle is rotating, sucks in external air via two filters. This air is used for cooling purposes and also keeping the disks clean. The spindle is earthed to eliminate static electricity acquired by the movement of the spindle.

3.5 HEAD POSITIONER ASSEMBLY

The positioner mechanism selectively positions the read/write heads over the data track of any particular address on the fixed or removable disk. The positioner assembly contains the following components: a voice-coil actuator, which moves a

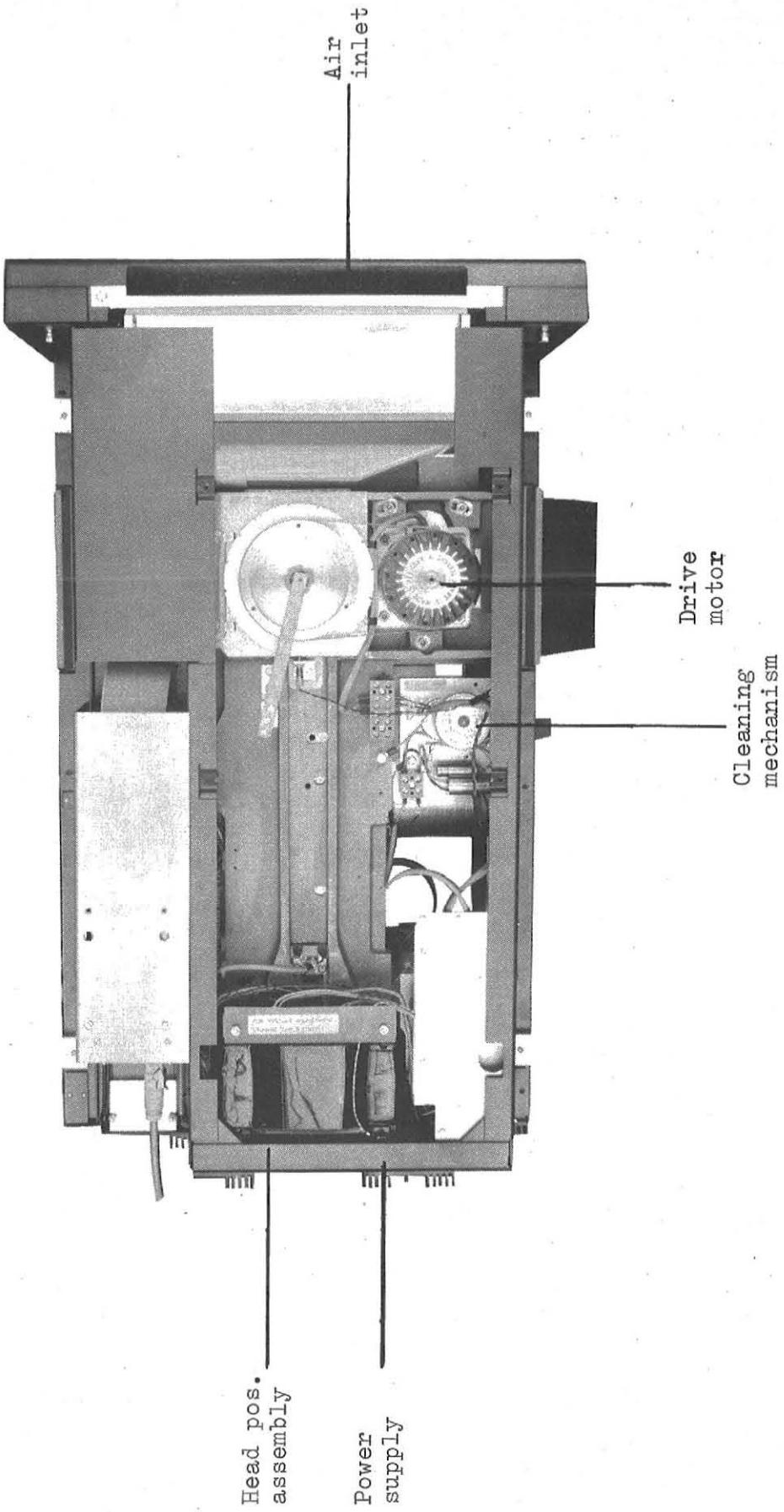

Fig. 1-5 Assembly locator lower.

carriage: the carriage which supports the heads, and carriage guides, on which the carriage moves; head loading/unloading cam, which engage the head arms; a velocity transducer and a position transducer.

3.6 SWITCHING UNIT

The switching unit contains a time meter, one fuse, three relays and the Power on/off switch.

The relays are:
- The brush motor relay.
- The drive motor relay.
- The brake motor relay, used to brake the main drive motor.

3.7 ELECTRONIC ASSEMBLIES

The main electronic assemblies are the power supply and an electronic cage.
The power supply is situated in the rear of the Disk Drive Unit and furnishes the operating voltages for all electronic assemblies, the positioner and the spindle and brush motor.
The logics, servo-electronics, read/write electronics and interface-circuits are mounted together in an electronics cage.

3.8 ELECTRONICS CAGE

The electronic cage contains all the electronics and logic needed for the unit except the read pre-amplifier and meander card.
The read pre-amplifier is located against the cartridge holder and is placed as close as possible to the heads.
The meander card is screened to prevent electrical interference to other circuits, and is positioned as close as possible to the meanders.
Plugs and cabling connect the power supply, read pre-amplifier and the meander circuit to the electronics cage.

3.9 CLEANING MECHANISM

Each time a cartridge is installed the disks must be cleaned. This is done by a cleaning mechanism which consists of four brushes driven by a cleaning motor.

3.10 OPERATORS' PANEL

The Operators' panel is located at the front of the unit. The functions of each indicator are explained in Volume II.

4.1 PERFORMANCE CHARCTERISTICS

Details Disk (both disks are the same)

Disk diameter	356 mm (14 inches)
recording surfaces	2
tracks per side	204
track pitch	0,254 mm (0,01 inch)
tracks per cylinder	2
recording method	double frequency
sectors	optional
index pulse	1 per revolution
disk speed	2400 rpm. counter clockwise
storage capacity	50 x 10^6 bits maximum

Details unit

data transfer rate	2.5M bits/s
average access time	33 $\pm$ 2 m sec.

4.2 PHYSICAL CHARACTERISTICS

Width	480 mm
height	262 mm
depth	797 mm
weight	66 kg approximately

4.3 ELECTRICAL REQUIREMENTS

Mains voltage	240, 220*, 115, 110 AC single phase with earth
mains frequency	50 Hz; 60 Hz (optional)
power consumption	500 W

* normally installed.

4.4 ENVIRONMENTAL REQUIREMENTS

	Operating	Non-operating
Temperature	+16°C to +38°C	-15°C to +65°C
Thermal shock	0,2°C per minute	1°C per minute
Relative humidity	8% to 80%	5% to 90%
Air pressure	1 BAR + 5 to -30%	1 BAR + 5 to 50%

Input signals		Output signals	
pin	signal	pin	signal
48	$\overline{\text{AB 0}}$	24	$\overline{\text{IPC}}$
51	Ground	27	Ground
47	$\overline{\text{AB 1}}$	35	$\overline{\text{IPF}}$
50	Ground	38	Ground
46	$\overline{\text{AB 2}}$	23	$\overline{\text{SPC}}$
49	Ground	26	Ground
54	$\overline{\text{AB 3}}$	30	$\overline{\text{SPF}}$
57	Ground	33	Ground
53	$\overline{\text{AB 4}}$	29	$\overline{\text{CON}}$
56	Ground	32	Ground
52	$\overline{\text{AB 5}}$	02	$\overline{\text{UR}}$
55	Ground	05	Ground
60	$\overline{\text{AB 6}}$	34	$\overline{\text{USA 1}}$
64	Ground	37	Ground
59	$\overline{\text{AB 7}}$	03	$\overline{\text{USA 2}}$
63	Ground	07	Ground
36	$\overline{\text{USL}}$	28	$\overline{\text{AT}}$
39	Ground	31	Ground
10	$\overline{\text{CS}}$	01	$\overline{\text{RDDA}}$
13	Ground	04	Ground
11	$\overline{\text{HS}}$		
14	Ground		
17	$\overline{\text{CTS}}$		
21	Ground		
58	$\overline{\text{SUS}}$		
62	Ground		
08	$\overline{\text{WRDA}}$		

Table 1-1