RAL

DESIGN & DISCOVERY

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RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

Mass storage devices

These devices hold large quantities of data on media, usually cartridge tape, that can be handled easily by robots. The robots move the cartridges between their storage slots and read/write stations, from where the data can be transferred between the cartridge and the computer.

MASSTOR M860

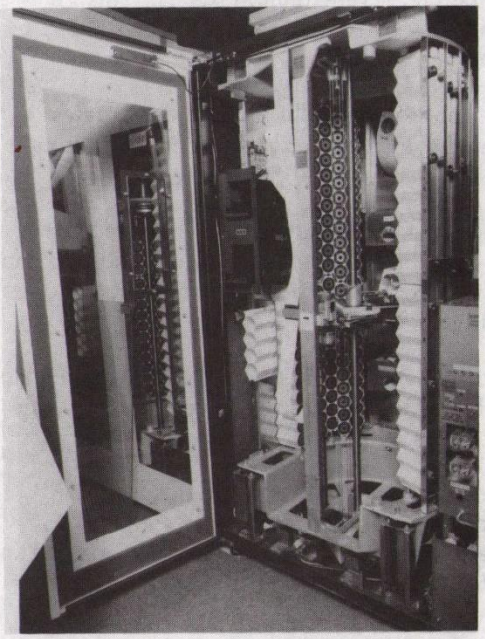
Data is contained on cylindrical cartridges which consist of 66 feet of magnetic tape, 2.75 inches wide.

These cartridges are stored in a honeycomb arrangement and, when requested, are picked up by a robot arm, fed into one of two drives called Data Recording Devices (DRDs) where they are either read or written to, after which the arm will replace the cartridge into its home location within the honeycomb.

We have two Storage Modules at RAL, each of which has two DRDs and storage for up to 352 cartridges, only 316 of which are available for user data. The remainder are for internal housekeeping etc.

The overall capacity of one Storage Module is 55 GBytes (55 thousand million bytes) so our two modules give a total backing storage capacity of 110 GBytes.

This device does not occupy much floor space and can be extended by the addition of one or two further storage modules.



MASSTOR M860

StorageTek 4400 Automated Cartridge System

The ACS is also shared by the Cray and IBM systems. Its main function is to mount **AUTOMATICALLY** a requested cartridge into a drive where data can be read from or written to that cartridge. No manual intervention is required except to enter cartridges in the first place or eject them when they are no longer required.

The largest element of the device is the Library Storage Module (LSM). It is within this unit that cartridges are stored and used.

There is a single door to provide access into the LSM. Within this main door, is a smaller Cartridge Access Port (CAP), through which cartridges are entered and ejected. In normal operation, there is never any need to use the main access door.

Cartridge racking covers the inside of the external wall and the inside of the internal wall. This racking can hold up to 5,500 "3480" type cartridges.

Each cartridge can hold up to 200 Megabytes (1 Megabyte = One million bytes). This gives a total capacity of just over 1 Terabyte - (1 Terabyte = one million million bytes).

The robot is centrally pivoted and rotates around the space between the inner and outer walls.

It has two cameras to enable it to read the bar-coded labels on the cartridges and two hands for picking the cartridges from the racks, one for each wall.

Cartridges to be entered into the ACS are placed in the CAP which can hold up to twenty-one cartridges at a time.

The robot selects a cartridge from the CAP, reads its serial number, allocates a "home" location for it and then moves the cartridge to that location. The "address" of this location is now stored in the ACS memory so that whenever the cartridge is requested, the ACS knows where it is. Only when the cartridge has been ejected, will that location become free to be allocated to another cartridge.

StorageTek 4400 Automated Cartridge System

At RAL, we have eight drives contained in two units (4 to each unit). However, the number of drives can vary according to the needs of each individual installation and can be added or removed according to need.

The robot is capable of loading/unloading well over 100 cartridges per hour into these drives.

If it transpires that extra capacity is needed, additional LSMs can be added. In a multi-LSM configuration, each LSM is attached to its neighbour with a pass-through port which allows the robots to pass cartridges to each other.