Optical Disk trials at the ST–ECF

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As reported in a previous issue, we are conducting experiments with optical disks (WORM type) and their interfaces for VAX computers.

We have recently finished the tests for the interfaces, conducted on three brands:

1. U.S. Design 1108,
2. Emulex UC04 and
3. TD Systems TDL-12.

While all these interfaces (the proper name should be *host adapters*) provide the possibility to connect SCSI devices, they differ in the emulation for the host computer. The first two support the DEC MSCP protocol and are used through standard software drivers while the latter uses special software. In terms of reliability, performance and ease of installation and configuration, we found the U.S. Design clearly superior to the others. In particular, the TD System interface and the associated software, although able to provide full VMS support, does this by remapping all disk writes to consecutive sectors on the disk, starting from the beginning and thus treating the optical disk as a tape more than a disk. Moreover, although we use a μVAX computer for the archive, we do not intend to write onto optical disks in the VMS format (known as the ODS-2), for reasons of interchangeability and portability.

We have therefore selected the U.S. Design host adapter for use at ESO/ST–ECF.

Concerning the optical disks themselves, in addition to the GIGADISC mentioned in the previous note, we have now also a MAXTOR RXT–800S. This device uses pocket–size ($5\frac{1}{4}$ inches) disk platters, with a storage capacity of 800 *Mbytes* (divided between two sides) at a cost of less than $100 per disk. Disks are easily exchangeable in the drive in a few seconds. The software on–line disk structure we use was easily implemented on such a device, and performance comparable to the GIGADISC was achieved. We plan to use this device for data distribution and will provide software to read the disks written with our format. Data within the files are written in FITS format, but the MIDAS `BDF` format is also accepted. We also plan to buy a LMSI (formerly OSI) Laserdrive 1200 optical disk, which is the one selected at ST ScI.

However, optical disk is not the only technology we are experimenting with at ESO/ST–ECF. We have now under test the Gigastore unit, manufactured by Digi–Data corp. This device uses as a storage medium standard T–120 VHS cartridges, which hold 2.5 *Gigabytes* of data. The device is now used on the ESO VAX cluster for the daily backup operations which can now run overnight without operator intervention. Five hours of elapsed time and twenty minutes of CPU time are needed to backup five full RA81 disks; comparable with a high speed conventional tape but at a lower cost for the drive and at a much lower price for the medium — a high-quality T–120 cassette costs about DM 30 compared with DM 800 for twelve magnetic tapes.

Several other tests have been made to investigate the possibility of using such devices for data transport. The tape initialization is very slow (90 *seconds*) as well as rewind or tape-mark search operations. Writing on a cassette is also limited to append operations (start writing behind the last existing file) or rewrite from tape beginning, i.e., rewriting existing files is not allowed.

The embedded interface is a standard SCSI, like the optical disk one, but via a host adapter the unit looks like a tape to the operating

system. The host adapter may be either a DILOG one, or the same U.S. Design 1108 we selected for optical disks: switches on the board allow configuration of the 1108 in several ways. In both cases the standard DEC–supplied MS driver is used.

'HST observations' of galaxies at high redshift

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The high angular resolution of HST will allow observations of the structure of small objects. Prime candidates for this type of research are galaxies at moderate or high redshifts. These galaxies are expected to be approximately 1 *arcsec* in size and will be imaged over many resolution elements of the ST cameras. The exact resolution will depend on the wavelength of the observation and on the mode in which the observations are made, the highest being obtained with the FOC at f/288. Most imaging modes will, however, provide a resolution better than $\sim 0.1 arcsec$. Galaxies at large redshift will therefore use more than about 100 resolution elements, the worst case being near infrared observations with the WFC.

The potential of the WFC for this type of work has been tested in a programme of simulations, using the HST Model developed at the ST–ECF (Rosa & Baade 1987), of galaxies whose images were derived from ground-based observations of nearby objects. The aim was to evaluate the possibilities offered by 'parallel mode' observations and to serve as test images for the preparation of the European Medium Deep Survey key project proposal. In addition to the study of individual objects, we have also simulated a field of galaxies with a random distribution in the sky plane and in redshift.

The high redshift objects were simulated by shifting the nearby galaxies according to a standard cosmological model and applying K-corrections on a pixel by pixel basis, with a value depending only on their colour. No spectral evolution of the galaxies has yet been considered. This approach allows an estimate of how redshift modifies the appearance of the galaxies with this instrument and will help in the interpretation of actual observations by allowing the separation of the effects of evolution from the mere colour dependent redshift corrections.

One of the obvious results from our simulations of individual galaxies is that at high redshift they appear to be of later type than at low redshift. This trend is more pronounced for the late type galaxies and for U and B images than for early type galaxies and V and R images. The Hubble classification of galaxies also does not match the high redshift galaxies as well as it matches nearby systems.

The field of galaxies was constructed on the basis of a random field generated by Cappi et al. (1987). We have not attempted to simulate clusters since our field is supposed to be in a random position of the sky. For each galaxy in the field, we used the one in our sample of local galaxies corresponding best to the prescribed type, shifting it to the proper redshift and scaling its intensity to the prescribed magnitude. The resulting field was then observed using the HST Model, taking into account photon and readout noise, blooming (not important for weak extended ob-