

EXPRESS

INSTALLATION PLANNING GUIDE

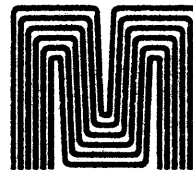
PRELIMINARY

March 1977

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Introduction

The objective of this guide is to aid in the planning and preparation of an installation site for a Microdata EXPRESS computer system. It contains information needed by you, the user, prior to delivery of the EXPRESS equipment.

The EXPRESS system is designed for ease and simplicity of installation. It requires a minimum of space for operation and servicing. It can operate properly in standard computer room environment. All elements of the central system are interconnected by a few easily handled cables. In other words, everything practical has been done to make pre-installation planning as simple and straight-forward as possible.

However, installation planning by you is extremely important. It is not a complex engineering task beyond your expertise; nor is it a cursory procedure to be treated lightly. You may require some advice from experts, but for the most part it is common-sense attention to the requirements of the individual pieces of equipment, the requirements of the system as a whole, and the relationship of the system to your particular facilities and operations.

Proper planning and site preparation before your equipment arrives will ensure the speediest installation, maximum long-term operational effectiveness, and smooth, economical expansion should your system requirements grow. A well planned and prepared installation site will obviate costly post-delivery system modifications or facility changes, and will avoid extended periods of system inoperation in extreme cases.

Topics covered in this guide include:

- Installation site selection
- Environmental requirements
- Electrical power requirements
- Telephone line arrangements (if any)
- Layout of system area
- Site preparation

Also included are detailed descriptions of the EXPRESS equipment as related to the installation phase, plus useful tools to make site planning as easy as possible. A site layout grid and equipment cutouts (drawn to scale) are provided to allow you to determine the suitability of your floorplan, and to position the equipment for most efficient operation and servicing. A pre-installation checklist is also provided at the back of this guide.

Microdata personnel will assist its customers during actual equipment installation and can also provide assistance during installation planning.

Site Selection

EXPRESS installation sites may vary from compact rooms to spacious, beautifully decorated, air-conditioned computer centers which double as "showcases" for benefit of customers and employees. They may be open and readily accessible, or have restricted access for security reasons. The complete system may be centralized in a single room, or data terminals may reach out to extend the system throughout the building, across town or across the country.

Whatever the scope of your system, the major area of concern during the site planning stage is the central computer site which must house the EXPRESS computer, disc/tape storage units, data printer, and one or more EXPRESS data terminals.

Topics covered in this section are:

- Site size
- Location
- Environment
- Security
- Data terminal location

Size

The size of the central computer site depends on four primary criteria:

System Size - The room or area must be large enough to accommodate the EXPRESS equipment with certain minimum clearances for operation and maintenance.

Personnel - Additional floor space may be required for personnel activities in the immediate area. For example, operators, programmers or clerks may require desks, tables or filing cabinets adjacent to the computer system.

Storage - Shelves, filing cabinets or closets should be provided for auxiliary storage (i.e., operation and technical manuals, printer paper, forms, spare disc cartridges, etc.).

Expansion - To protect the long-range economy of your system, provisions should be made to accommodate foreseeable future expansion at the central computer site. Additional electrical power and floor space may be required for equipment added or upgraded at a later time. Providing for future expansion during initial system installation can help avoid costly modifications and disruption of operations later.

Location

The physical location of the central EXPRESS computer site will most likely be determined by two main factors: proximity of the site to using departments, and availability of suitable space at your facility.

The first of these factors often is of secondary importance since the EXPRESS data terminals (through which most communication with the system takes place) can be conveniently and economically located just about anywhere they are needed. Generally, it is advisable to situate the offices of programmers, operators and other personnel who require direct physical access to the central system in close proximity to the central site. It is also highly desirable to locate the central site where all of the peripheral data terminals can be connected directly to the computer without using telephone lines and modems. Maximum cable length for direct connection is 500 feet, so the use of telephone lines within a building is seldom necessary except in extremely large facilities.

Normally, it is possible to select the central computer site from presently available space with a minimum of facility modification required. Certain costs should be expected to prepare the site for installation of the EXPRESS system; for example, electrical wiring modifications may be necessary, an air conditioner may be needed, or you may want to set up room partitions to separate the computer from adjacent work areas. The nature and extent of these preparations will depend on the present condition of your site, your specific EXPRESS system configuration, and your desires and requirements for decoration, security, etc..

Environment

All equipment in the EXPRESS system is designed to operate in a computer room environment which provides comfortable human habitation.

Security

To protect confidential or sensitive information, it may be desirable to restrict physical access to the central system (since it is conceivable for an unauthorized person possessing the knowledge to operate the CPU controls to obtain any information in the system or tamper with the data files). Maximum security can be achieved by locating the central system behind locked doors. Also, back-up programs and data files should be stored in a separate location under lock and key. The CPU front panel operations can be inhibited by removing the panel Lock Key.

Data Terminal Location

The EXPRESS data terminals which provide the users' communication link with the computer system can be located just about anywhere within your facility or elsewhere. The terminals are compact, and may be mounted on any desk or table-top in about the same space as an electric typewriter. However, cable length restrictions must be observed.

Environmental Control

Environmental factors of temperature, humidity and airborne dust in prospective installation sites should be evaluated during the planning stage and controlled before your EXPRESS system arrives.

Topics covered in this section are:

- Temperature
- Humidity
- Dust
- Static electricity
- Smoking

Temperature

Temperature control is probably the most important environmental factor because the EXPRESS equipment is cooled by the surrounding room air. A number of factors should be considered in order to determine the adequacy of existing temperature controls.

Heat Dissipated by the EXPRESS Equipment - All electrical equipment generates heat. In the EXPRESS system, this heat is discharged into the room and will tend to raise the ambient temperature unless the air conditioning system can handle it. (BTU ratings for all EXPRESS equipment are provided on the spec sheets in the back of this guide).

Heat Dissipated by Other Equipment - Heat will also be contributed by other equipment in the room (e.g., electric typewriters, lights and auxiliary data processing equipment). Figure approximately 3.4 BTU per watt of electrical power consumed by the equipment.

Body Heat - Individuals occupying the room will contribute approximately 400 BTU per person. This can be an important consideration if substantially more people will occupy the area after the computer is installed than before.

Direct Sunlight - A window or glass wall area provides virtually no insulation against radiant energy from direct sunlight. Drapes, shades, venetian blinds or the like should be employed to protect the EXPRESS equipment from direct sunlight, since this can raise the equipment temperature excessively without necessarily exceeding the allowable ambient air temperature. If a large glass area cannot be shaded, one of the commercially available glass tinting films that block heat-producing infrared rays is recommended.

If there is any question concerning the adequacy of your present temperature control system, a reputable air-conditioning specialist should be consulted. He can use the above information to determine the suitability of your present system, and can recommend any corrective measures that may be necessary.

Allowable operating temperature range is:

+62°F to +78°F (17°C to 25°C)

Recommended Temperature range is:

+68°F to +72°F (20°C to 22°C)

NOTE

Air conditioners generate a large amount of electrical noise on the AC power lines. This noise will interfere with the operation of your EXPRESS system unless proper steps are taken to isolate this noise from the power lines serving the computer equipment. If an air-conditioning unit is added, be sure to advise the air-conditioning specialist of the unacceptability of line noise. The necessary isolation steps are outlined in the Electrical Power section of this guide.

Humidity

High and low extremes of humidity can make paper documents, cards, etc. hard to handle, and can impair proper operation of EXPRESS equipment, particularly the disc and tape storage units. If your EXPRESS configuration employs paper-oriented data media (such as paper tape or punched cards) the humidity effects on such documents should be considered.

Low humidity levels can have the most serious affect on system operation and are more frequently encountered than excessively high humidity. Low humidity promotes static electricity buildup in the electronic equipment; proper equipment grounding minimizes this effect but will not eliminate it completely. The rapidly rotating magnetic disc and moving magnetic tape are particularly susceptible to static buildup which can destroy data stored thereon. Static charges are further increased if the system is installed in a carpeted area. Carpeting is discussed in the Site Layout and Preparation section of this guide, and equipment grounding is covered in the Electrical Requirements section.

High humidity extremes tend to prevent proper flight of the disc magnetic heads and smooth travel of the magnetic tape.

Most heating and air-conditioning systems have a drying effect. Most air-conditioners are rated for their ability to remove moisture as well as their ability to cool. In extremely humid environments with inadequate humidity controls it may be desirable to install a dehumidifying unit in the computer room. In very dry environments (such as desert areas) a humidifier may

be necessary to add moisture to the air. Once again, the effectiveness of your humidity controls can be best evaluated by a qualified air-conditioning specialist.

Allowable relative humidity range is: 30% to 70% (no condensation)

Recommended relative humidity range is: 40% to 60% (no condensation)

Dust

Airborne dust or dirt particles can cause equipment operation or maintenance problems. If a film of dust or dirt accumulates on internal surfaces, excessive wear of mechanical parts may occur and electronic components may become shorted (particularly with high humidity). Disc and tape storage units are especially vulnerable to damage from excessive dust. The disc heads ride on an air bearing that holds the heads 100 millionths of an inch (100 microinches) from the disc surface. Practically all dust particles exceed 100 microinches in size. Therefore, every possible effort must be made to maintain a dust-free environment. Heating, air-conditioning and ventilating systems should be equipped with adequate air filters and these filters should be cleaned or replaced at regular intervals to ensure proper temperature control as well as dust filtering. The computer cabinet and the individual disc drives contain dust filters which should be checked periodically by a knowledgeable computer field engineer. See illustration on page VIII.

Static Electricity

Static electricity is not only an annoyance to personnel but can cause equipment malfunction. Steps to eliminating the sources of static are necessary as well as ensuring that the equipment cabinets are well grounded.

Chairs, seats, or couches having plastic upholstery and rubber wheels should be prohibited in the computer system area. Furniture of this type builds up and stores a static charge, created through the floor covering. The discharge of this build-up will cause system malfunction when the furniture, or its occupants, contacts the system framework.

Static problems can be minimized by:

- Selecting chairs with anti-static upholstery and metal wheels to avoid static buildup.
- Maintaining room humidity above 40% relative
- If carpeting is used it should be of a type designed to minimize static electricity. This includes carpeting woven with imbedded copper wires and those treated with anti-static agents.
- Chemical sprays to eliminate static should be used on carpeting and furniture that is located near the computer equipment.
- Ensure that the computer is connected to a good earth ground (water pipe, etc.).

Smoking

Smoking of cigarettes, cigars or pipes should be very strongly discouraged within the vicinity of the central system. The discs and magnetic tape transports are particularly susceptible to smoke-film buildup which can cause data transfer problems and equipment damage.

THE CHRONOLOGY OF CONTAMINATION

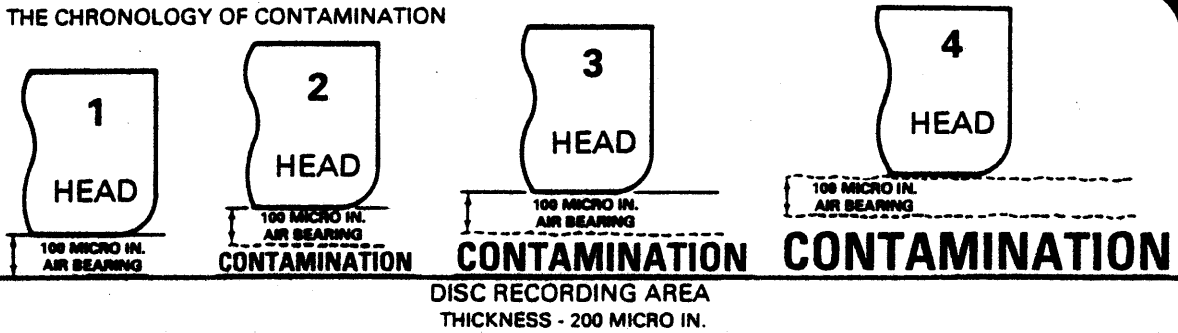
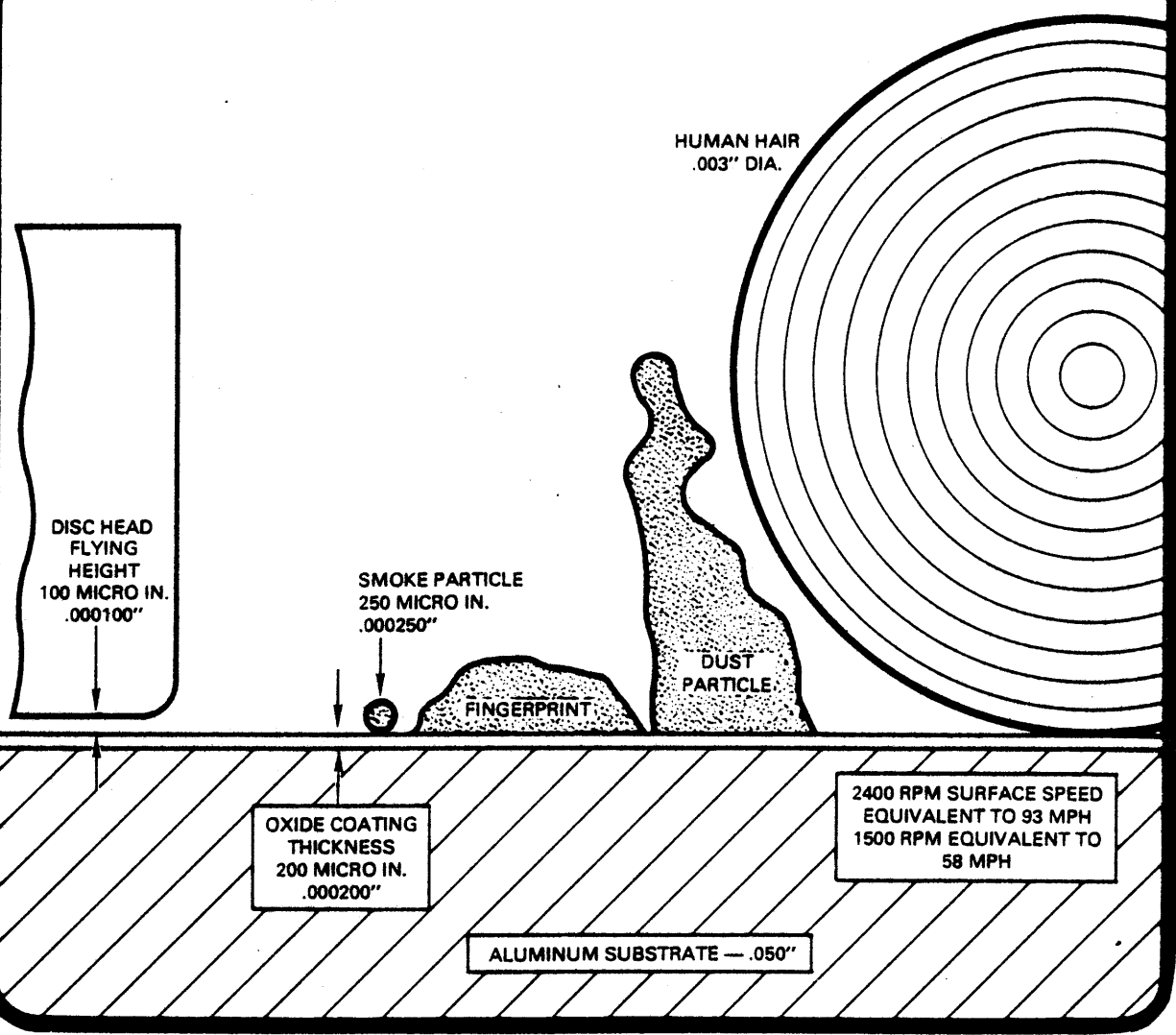


Fig. 1 Optimum Performance. Recording disc is perfectly clean and the gap between read-write head and recorded data is an ideal 100 micro inches.

Fig. 2 Re-try Level. Contamination (dust, dirt, smog, pollen, smoke, etc.) has started to build up on disc surfaces, forcing read-write head away from recording area, causing a problem recovering data. After several retries, data is recovered, and job proceeds.

Fig. 3 Data Check Level. Contamination build-up has forced read-write head so high it cannot recover data. Corrective cleaning action is mandatory at this time.

Fig. 4 Head Crash Level. Contamination builds up unevenly, resulting in erratic head flying pattern and eventual contact between read-write head and disc.



Electrical Requirements

Microdata EXPRESS systems sold for use in the United States operate from standard 115 VAC, 60 Hz power*. There are certain requirements which may necessitate modifications to existing power wiring or the installation of new power lines to the computer site.

Topics covered in this section are:

- Power requirements
- Electrical noise
- Circuit breakers
- Extension cords
- Grounding

Power Requirements

All elements of the EXPRESS control system (CPU and disc/tape storage units) connect together and a single three-wire power cable is provided for these units. EXPRESS data terminals contain separate three-wire power cables.

The data terminal power cables contain a standard three-prong plug which is compatible with your existing grounded wall outlets. The central system contains a 30 amp, 120 VAC twist and lock three-prong plug (Hubbell type 2611). This twist and lock plug will require installation of a compatible 30 amp, 120 VAC wall socket (Hubbell type 2610, or equivalent) if such a socket is not already present at the computer site.

All power supplied to the complete EXPRESS system must be three (3) wire circuits consisting of hot, neutral and ground wires. These three (3) wire circuits must be separate, isolated circuits connected directly to the primary power distribution box.

AC power at the outlet must be a 30 amp line between ^{2/23/79 120 Volts} 106 and 126 VAC, 59.5 to 60.5 Hz. Further, it must not fluctuate more than ± 2 percent from no-load to full-load conditions.

Actual power consumption and type of receptacles required may be determined from the information on the individual data sheets contained in the back of this booklet.

*European power configurations are also available for 220 or 230 VAC, 50 to 60 Hz.

Power supplied from any U.S. utility company should meet the above requirements. If power at the outlet is deficient, it is likely that the wiring between the outlet and the power lines is inadequate; or the problem may be an old or faulty circuit breaker causing an excessive voltage drop. In any case, the power company or a qualified electrician could be consulted to examine the wiring and recommend corrective measures.

Electrical Noise

Another factor which may require the attention of an electrician is electrical noise. Electrical equipment such as air conditioners, fans, typewriters, and fluorescent lights generate noise transients which will be fed back onto the AC power lines. For this reason it is mandatory that a separate power line be used for the EXPRESS system.

Electrical noise can sometimes be eliminated by repair, replacement, relocation or electrical filtering of the originating device. If not, a suitable noise filter may be installed in the AC line to the EXPRESS system by a qualified electrician. Microdata can assist in the selection of the noise filter. A noise filter is included as part of the EXPRESS cabinet to handle normal noise on power lines, but additional filtering may be required for extreme cases at the local site.

Circuit Breakers

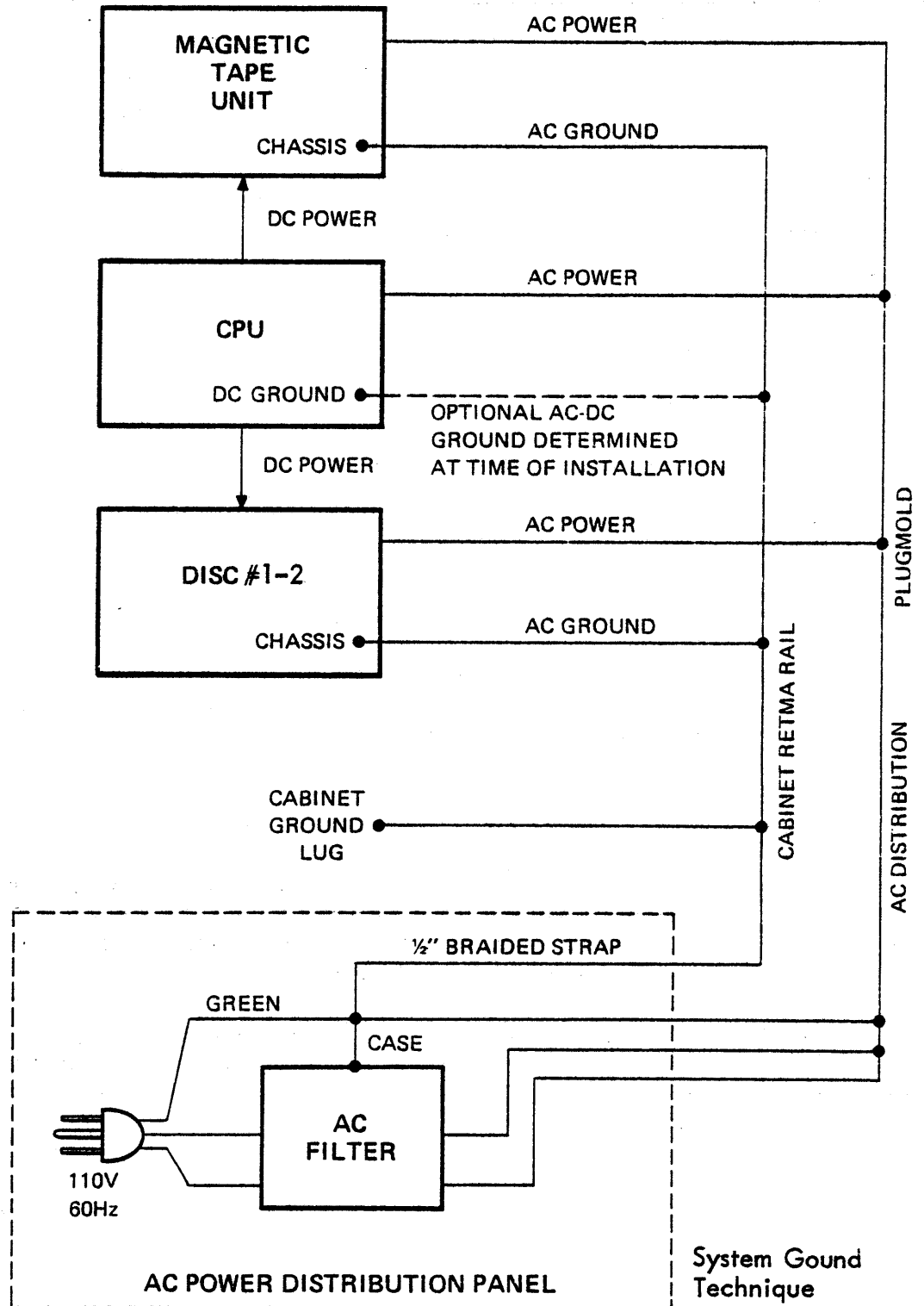
The central system equipment must be on a separate power line protected by a circuit breaker rated at 30 amperes or more. A 30 amp breaker will permit continuous system operation, and will tolerate the short-term start-up current surges without tripping.

The EXPRESS data terminals can be plugged into power lines serving other equipment so long as the line is free of electrical noise.

The EXPRESS equipment must be situated close enough to the power outlet that the 15-foot power cable supplied with the system will suffice without using an extension cord.

Grounding

A good electrical ground is mandatory for reliable equipment operation. In addition to the three-wire grounded outlet, an additional earth ground is required for the central system. Microdata requires a run of one inch braided strap from the EXPRESS system cabinet to a substantial earth ground. A large copper water pipe is usually sufficient. Some installations may require direct connection to a grounding stake or other high-quality earth ground. Operational difficulties are likely in the event of either a poor neutral or poor ground circuit. A grounding stud is located on the central system cabinet AC power distribution panel for connection to the customer-supplied earth ground strap. This grounding shall be accomplished such that in all cases no more than 0.25 VAC shall appear between neutral and ground wires at the equipment cabinet.



Site Layout and Preparation

After familiarizing yourself with the preceding sections of this guide, you should be aware of the many factors involved in selecting a site for your EXPRESS system. If you have chosen a location, you are ready to plan the layout of equipment, furniture and personnel work areas and begin site preparation. If you still have more than one site under consideration this section should provide the needed additional insight into the suitability and economy of each location to allow you to make the final decision. Topics covered in this section include:

- Layout of equipment and furniture
- Cabling
- Storage
- Telephones, lines and modems
- Carpeting
- Location of environmental control equipment
- Fire prevention

Site Layout

Layout of your EXPRESS computer site demands careful planning before the equipment and furniture are moved into place and connected for operation. Once the computer equipment is installed and interconnected, repositioning is likely to be more involved than simply moving a desk or typewriter.

Locations of equipment and furniture should be based on the operational requirements of the EXPRESS system and the efficiency, comfort and convenience of the personnel using the room. Because the individual pieces of equipment are interconnected by cables of limited length, and because of space limitations and the need for maintaining certain clearances for access, servicing and work space, you may need to consider several tentative layouts before selecting the one best suited to your needs.

At the back of this section you will find a Site Layout Worksheet and a page of line drawings representing the individual EXPRESS system elements, complete with the minimum clearances and work space requirements. A scale of 1/4 inch = 1 foot is used for both the Worksheet and the equipment drawings.

To plan your layout, photocopy both the Worksheet and the page of equipment drawings. Measure your computer site and draw it to scale on the worksheet. Cut out the photocopied equipment drawings and position them on the worksheet, pasting them in place when a desired layout is found. Desks, filing cabinets and other furniture can be drawn on the worksheet using the 1/4 inch = 1 foot scale. Repeat the procedure for layout variations and alternate installation sites.

Note that work areas and cabling/airflow/maintenance clearances (as applicable) are identified on the equipment drawings. Work areas shown are considered to be the minimum required for comfortable, efficient operation of the system. Space permitting, these work areas may be larger than indicated, but under no circumstances should they be smaller or overlap one another.

Another important consideration during site layout is the location and angular position of the EXPRESS data terminals with respect to light sources. Office desks and all other EXPRESS equipment should receive sufficiently high light levels to permit reading, writing, and operation and servicing of the system. Optimum use of the data terminals may require a somewhat lower light level for easy reading of the CRT display. If the CRT screen or the operator faces a high intensity light source or unshaded window the screen will be difficult to read. All terminals should be positioned at right angles to windows and any major light source. Ideally, the area would be somewhat darkened with lighting controls which can be adjusted by the operator.

Cabling

All EXPRESS system elements are supplied with interface cables which connect them to the CPU. It is the length of the interface cable which limits the distance between each piece of equipment and the CPU. The Equipment Cabinet contains a power cable and interface cables for the magnetic tape and/or disc storage units installed therein. The EXPRESS data terminals contain an interface cable to the CPU and a power cable which plugs into an outlet separate from the CPU. For purposes of site layout, standard and maximum cable lengths for all EXPRESS equipment are summarized in the table below. Non-standard cable lengths should be specified at the time of system ordering.

| Peripheral Equipment | Interface Cable(s) | | Power Cable |
|----------------------|--------------------|------|-------------|
| | Std. | Max. | Std. |
| Data Terminal(s) | 50' | 500' | 8' |
| Character Printer | 20' | 20' | 8' |
| Line Printer | 20' | 20' | 10' |

Power cables for peripheral equipments can be plugged into any isolated standard (3) prong 110V 60 Hz extension box.

Cables used in the EXPRESS system are small in size and few in number, obviating the need for raised false floors required in many systems. Plastic cable troughs are one way to increase the safety and neatness of your installation. They are inexpensively purchased from an electrical supply store in six-foot lengths which can be cut to size. The troughs are available in various widths and heights. An alternative method is overhead cable routing, generally employed to eliminate long cable trough runs when the computer is to be installed in the center of a large floor area. The cables are suspended across or above the ceiling, dropping down to the EXPRESS equipment.

Storage

Storage requirements vary depending on the EXPRESS system configuration and the individual application. As a minimum storage space should be provided for the following items:

- Spare/off-line disc cartridges
- Printer paper forms (bulk)
- Printed reports produced by the system
- Spare/off-line magnetic tape reels
- Technical and operator manuals
- Equipment cleaning supplies
- Trash container
- Work tables

Technical and operator manuals supplied with the system require a storage area of 12 by 12 by 18 inches. These items should be kept in a locked, fire resistant cabinet or container which is immediately available to operating personnel and service technicians. Combustible materials such as cleaning solvents should be stored in fire resistant containers in accordance with National Fire Protection Association standards. To minimize storage space requirements at the EXPRESS site, bulk items may be stored in a remote location. The environment of the remote area should be controlled within reasonable limits (less than 90° F and less than 70% relative humidity) to prevent damage to disc cartridges or tape reels.

Telephones, Data Lines, Modems

It is advisable to have all telephones and telephone data lines installed prior to installation of the EXPRESS equipment. Telephone company regulations require a Direct Access Arrangement (DAA) to be installed by the phone company on each telephone line which connects to a modem. Generally, arrangements for DAA installation must be made 6 to 8 weeks in advance; contact your local telephone company business office. Current EXPRESS software does not support modem control (auto answer and dial out) or BISYNC communications.

Carpeting

If your computer site is to be carpeted, be sure to select a carpet with good anti-static characteristics. Otherwise, static build-up will produce noise transients in the system interface lines which can cause degradation of system performance. Disc drives and printers are especially susceptible to static noise.

Wool and nylon carpeting have the worst static characteristics of all types, and should be avoided. Carpeting which is not anti-static must be treated with one of the commercially available anti-static fluids. Such fluids are usually sprayed onto the carpet, and require re-application at periodic intervals to maintain a static-free environment. Contact a reputable carpet supplier in your area.

Anti-static carpeting which contains imbedded wires to prevent static buildup is also commercially available. Microdata recommends this type if new carpeting is being installed.

Environmental Control Equipment

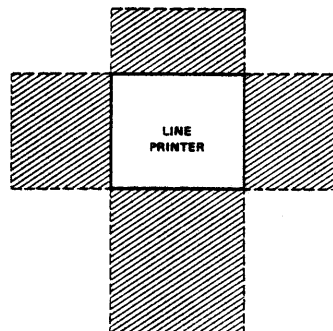
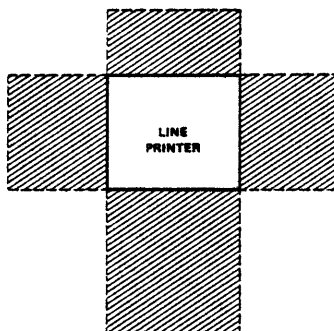
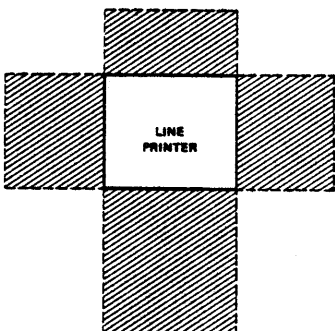
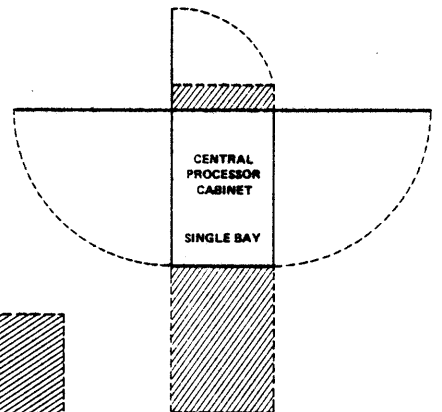
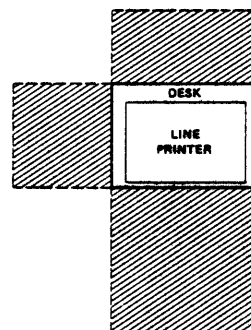
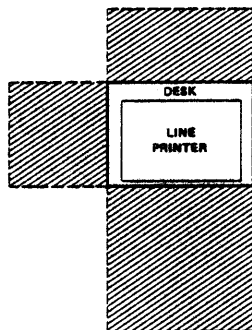
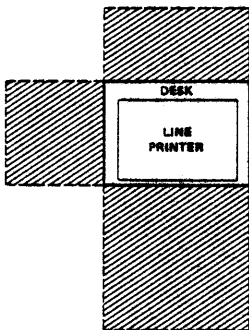
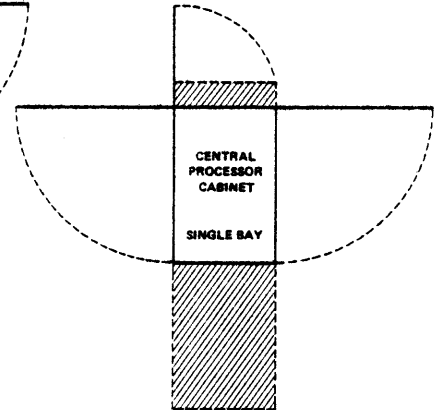
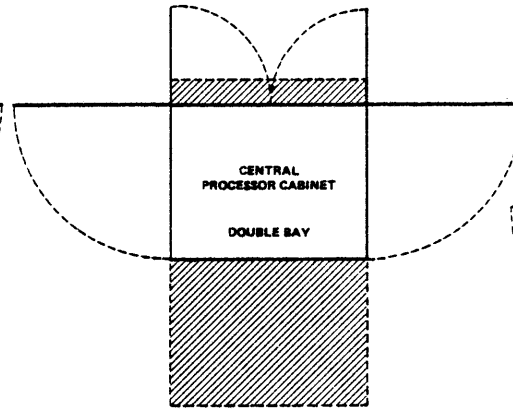
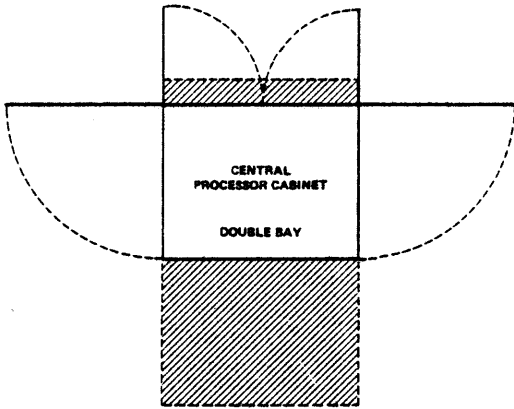
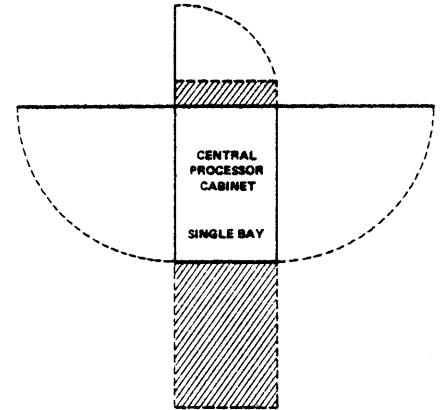
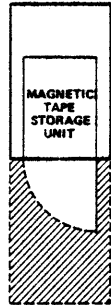
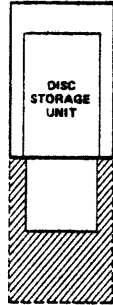
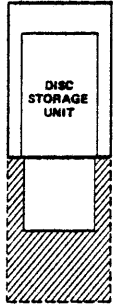
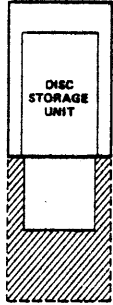
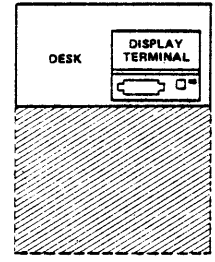
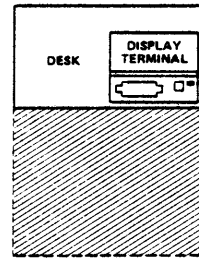
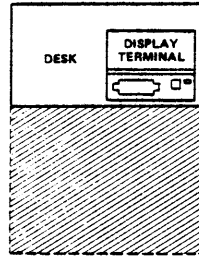
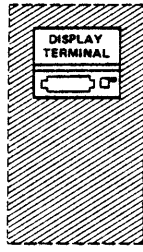
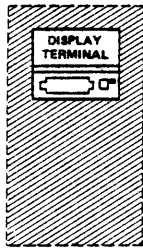
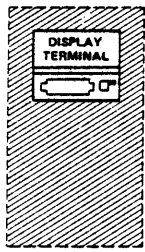
Ideally, air conditioning and other environmental control equipment should be located outside the computer site to minimize the acoustical noise level and to reduce the possibility of electrical interference. However, regardless of the physical location of the equipment, it must not be connected to the power lines serving the EXPRESS system. If an air conditioner, humidifier or dehumidifier is to be installed in the computer site, be certain to allow adequate space for proper operation and servicing of the unit (e.g., filter replacement, etc.).

Fire Prevention

Fire prevention measures should be reviewed and implemented before installation of your EXPRESS system in order to protect your capital investment and the safety of employees, as well as to satisfy the requirements of your insurance carrier and local fire department. Your insurance agent is perhaps the best source of information on this subject. He should be thoroughly familiar with all applicable regulations and can advise you of any insurance premium savings made possible by improved fire prevention measures.

Insurance or local regulations may require an overhead sprinkler system in the EXPRESS site. If so, any costs involved should be determined as early as possible and considered as a factor in site selection. Whether or not a sprinkler system is installed, most regulations require a number of portable CO₂ fire extinguishers to be located in or adjacent to the computer site. Your local fire department can advise you of the number and recommended type of extinguishers required, and the best locations for their placement.

Attention should also be given to protecting paper forms, reports, magnetic tapes and disc cartridges from possible destruction in event of fire. A fire resistant safe or file cabinet may be used for this purpose. And it is always a good practice to keep a duplicate back-up copy of important data and files in a separate fire resistant container.



OPERATING CLEARANCE
 SERVICE CLEARANCE
 SCALE 3/4" = 1 FOOT



Site Layout Worksheet

A large, empty grid of 20 columns and 30 rows, intended for drawing a site layout.