

Systems

**IBM 3740 Data Entry System
System Summary and
Installation Planning**

IBM

Preface

This manual, GA21-9152, is intended for use by customer executives, customer DP managers, key entry supervisors, and installation planning consultants. It should be used where general information about the system is required.

The manual contains descriptive information about the system and each unit. Discussions of available functions and features, information on the media, probable programming changes, and suggested operating procedures are included. Installation planning information is also part of this publication. In addition, a bibliography of applicable téléprocessing publications is included in the téléprocessing section.

Related publications include:

IBM 3740 Data Entry System, IBM 3741 Data Station, IBM 3742 Dual Data Station Reference Manual, GA21-9151.

IBM 3740 Data Entry System, IBM 3747 Data Converter Reference Manual, GA21-9153.

IBM 3740 Data Entry System Programmer's Guide, GC21-5071.

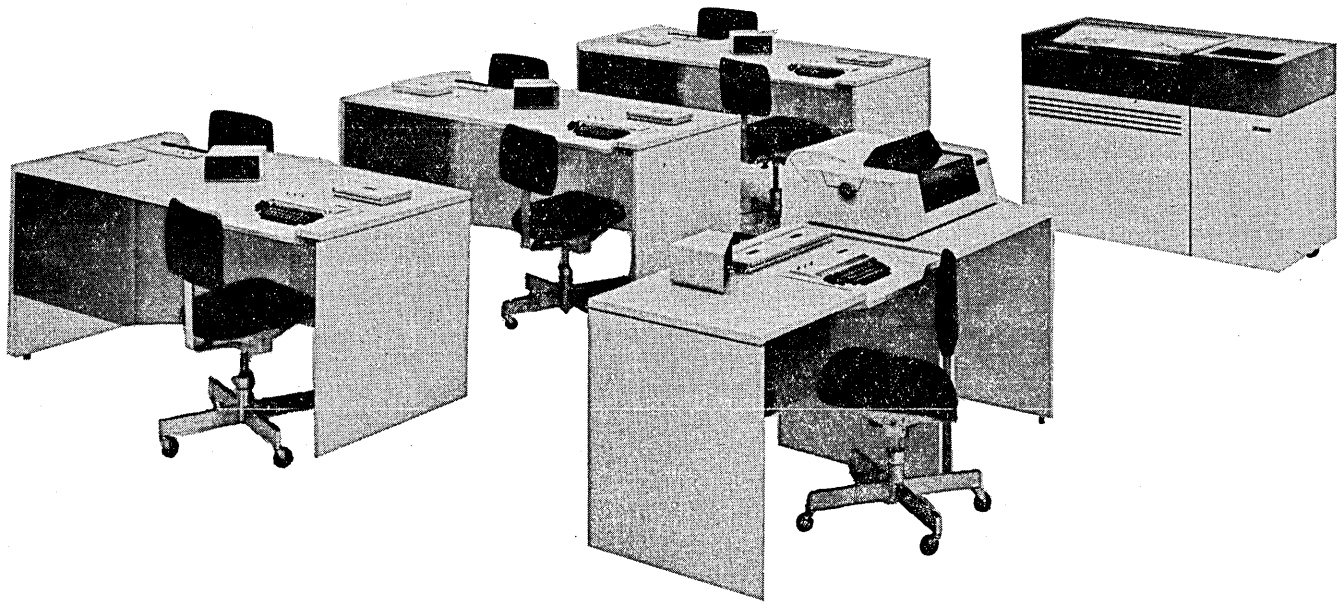
First Edition (January 1973)

This manual replaces GA19-0054.

Changes are continually made to the specifications herein; any such changes will be reported in subsequent revisions or Technical Newsletters.

A Reader's Comment Form is at the back of this publication. If the form is gone, address your comments to IBM Corporation, Publications, Department 245, Rochester, Minnesota 55901.

SYSTEM CONCEPT	1	SUGGESTED OPERATING PROCEDURES	27
3742 Dual Data Station	4	Recording in the Centralized Key Entry Room	27
Modes of Operation	5	Disk Internal Labels	27
Program Control	6	Key Entry Programs	27
Entering and Updating Data	7	Keying	28
Verification	7	Verifying	29
Search On Record Address	7	Using Field Totals	29
Search On End of Data	7	Adding Records to a Batch	29
Production Statistics	7	Production Statistics	29
Program Chaining	8	Recording in the Source Department	29
Self-Check (Special Feature)	8	Data Conversion	31
Offline Field Totals (Special Feature)	8	General Procedures	31
Search On Content and Search Sequential Content	8	Tape Labels	32
Disk Copy (Special Feature)	8	Teleprocessing Considerations	32
Disk Initialization (Special Feature)	8	Programming Support	32
128 Character Record (Special Feature)	8	Transmission	33
IBM 3741 Data Station	9	Teleprocessing Bibliography	33
Field Totals (Special Feature)	10	Configuring Your Teleprocessing System	33
Operator Guidance	10	3741 Transmission	41
Second Disk (Special Feature)	10	3747 Transmission	41
Printer Attachment (Special Feature)	11	System Programming Considerations	42
Binary Synchronous Communications Adapter	11	Card Replacement	42
IBM 3747 Data Converter	12	Tape Replacement	43
IBM 3713 Printer	13	PRE-INSTALLATION PLANNING	44
Media Concepts	17	Space Requirements	44
INSTALLATION GUIDE	18	Scheduling	44
PRE-INSTALLATION PLANNING CHECKLIST	19	Environmental Considerations	44
Physical Planning	19	Temperature and Humidity	44
Training and Education	19	Dirt and Air Pollution	45
Supplies	20	Lighting	45
Operating Procedures	20	Fire Protection Equipment	45
Programming Changes	20	Electrical Requirements	45
Communication Services (Where Required)	20	Grounding	45
Job Restructuring and Reorganization	21	Power Supply	45
Operational Readiness	21	Convenience Outlets	46
Contingency	21	UNIT SPECIFICATIONS	47
THE IBM DISKETTE	22	3713 PRINTER	48
Description	22	Plan View	48
External Labels	23	Specifications	48
Diskette Care	24	3741 DATA STATION MODELS 1 AND 2	49
Handling Newly Developed Bad Spots on a Disk	24	Plan View	49
Environmental Considerations	24	Specifications	49
Storage	24	3742 DUAL DATA STATION	50
Estimating Diskette Requirements	24	Plan View	50
Centralized Key Entry	24	Specifications	50
Local Source Department	25	3747 DATA CONVERTER	51
Remote Source Department	25	Plan View	51
General — All Locations	25	Specifications	51
Diskette Replacement	25	3740 CABLING INFORMATION	52
Damaged or Contaminated Diskettes	25	INDEX	53
Normal Surface Wear	25		



IBM 3740 Data Entry System

Rising costs, excessive errors, and long delays in the data entry cycle concern all computer users. The IBM 3740 Data Entry System is an integrated family of data entry products which helps the user answer these data entry problems.

The 3740 System consists of three units having a common structure and media, but each tailored to the job and environment of use. The 3740 System products and areas of use are:

- IBM 3742 Dual Data Station
For data entry use in a centralized or large volume key entry location. Enters data on a magnetic disk.
- IBM 3741 Data Station, Models 1 and 2
For data entry use as a stand alone station in a decentral or remote source location. Enters data on a magnetic disk.
- IBM 3747 Data Converter
Converts data from the magnetic disk to magnetic tape for use by a computer. Also converts data from tape to magnetic disk for updating by the 3741 or 3742.

The IBM 3713 Printer attaches to the 3741 to provide hard copy for remote or local data entry operations.

A key element of the 3740 System is a new magnetic media — the IBM diskette. This diskette consists of a flexible, Mylar* disk permanently enclosed in a protective, plastic package. The Mylar disk is an economical means for recording and storing data and, for most applications, replaces the punched card with a quieter, less expensive, high function media for volume data entry.

One disk holds 1898 records, roughly the equivalent of a box of cards, and is re-usable. Further, data which is written on the disk can easily be corrected and updated, eliminating the need to rekey the record and scrap the card.

Because the disk is a magnetic material, data can be written on and read off at high speed. This enables its use in data communications and greatly facilitates record handling

and operations such as machine searching of data. Sequential organization of data records on the disk parallels punch card methods and procedures, and the addition of random accessing of records permits new operations not previously feasible with card media.

Key entry operator labor is one of the prominent factors in rising data entry costs and therefore improvement of operator productivity is extremely important in controlling these costs. The 3740 keystations feature buffered input, ease of correction, right-adjust, and other features aimed at making volume keying in the centralized keypunch room a high productivity operation.

Another solution to the problems of excessive data entry costs, errors, and delays is to remove the data entry function from the keypunch room and move it out to the data source. In many applications, the data control section and functions such as preparation of keypunch worksheets and coding can be reduced or eliminated. Moreover, errors are reduced by eliminating hand transcription operations and having the data completely handled by those who are most familiar with it and have direct responsibility for its accuracy.

The successful decentralization of the data entry function usually required special functions not normally found in key entry devices. The 3740 System provides such commonly required functions as teleprocessing capability, large data storage for reference and entry, operator guidance, and a printer.

Data processing users may plan to gradually decentralize their data entry operations. Meanwhile costs must still be controlled today in centralized data entry areas. Here, the 3740 concept of an integrated family of devices covering both the centralized and source data entry environments provides the solution. The 3740 provides the features needed for increased productivity in today's keypunch room, while helping the decentralization of data entry applications to the source without changing to a new and possibly incompatible data entry system.

For example, in a centralized transcription environment, a typical installation includes a number of IBM 3742 Dual Data Stations for recording data on disk. An IBM 3747 Data Converter is included to convert the data to one-half inch tape for processing by the host CPU.

*Trademark of E. I. du Pont de Nemours and Co., Inc.

In a decentralized environment, several IBM 3741 Data Stations and IBM 3742 Dual Data Stations are scattered through large installations in the source departments. For instance, one might be in the accounts payable department to enter data directly from vendor invoices, eliminating further document handling or the creation of a key entry worksheet. Other 3741s might be in payroll to enter changes to salaried payroll. Diskettes are sent by interplant mail or messenger to some location having an IBM 3747 Data Converter.

In a typical remote environment, one or more IBM 3741 Data Stations are located at various offsite locations. In areas where the workload is heavy, these might be supplemented with some 3742s. For example, if parts are distributed from a warehouse to several divisions of a company, the inventory data is entered on disks as transactions occur. Periodically, the data is transmitted to the warehouse through an IBM 3741 Model 2 Data Station with Binary Synchronous Communications. The receiving device at the warehouse can be an:

- IBM 3741 Model 2 Data Station.
- IBM 3747 Data Converter with BSCA.
- IBM System/3 Model 6 or Model 10 Disk with BSCA.
- IBM System/370 via an
IBM 2701 Data Adapter Unit, or
IBM 2703 Transmission Control Unit, or
IBM 3705 Communications Controller, or
Integrated Communications Adapter (ICA).

The unique design concept of the 3740 Data Entry System makes the following advantages available to you:

1. Media Based Data Entry

Each station operates independently with its own media. This means:

- Unlimited data storage at the station.
- An audit trail for keyed data.
- Ability to easily handle small jobs as well as large jobs.
- Compatibility with existing key entry procedures of card punch installations.
- Complete unit independence for reliability and placement flexibility.

2. Single Station Configuration

The smallest data entry unit is the single station. This permits:

- Station independence and system reliability. Each station can continue to operate regardless of the status of other stations or down time of other facilities.
- Total configuration flexibility.
- Smooth growth by adding exactly as many stations as are needed.
- Stations can be placed in remote sites in exactly the needed quantities.

3. CRT Operator Display

- Reduces operator training requirements.
- Provides quick communication of errors to an operator.
- Facilitates scanning and searching of stored records.
- Permits source keying with operator guidance on the IBM 3741 Data Station.

4. Common Operator Interface

Both the 3741 and 3742 stations can be used in any installation to achieve the precise mix of stations and functions required. Operators find no difficulty in moving from one machine to the other because of the common interface presented to the operator; that is, the keyboard, function switches, display.

The chart on the following page (Figure 1) shows the standard and special features that are available for the data stations.

IBM 3741 Data Station and IBM 3742 Dual Data Station Function and Feature Summary

Standard Function or Feature	IBM 3741 Data Station, Models 1 and 2	IBM 3742 Dual Data Station
Entering and updating records	Standard	Standard
Search on record address	Standard	Standard
Search sequential content	Standard	Feature
Search on content	Standard	Feature
Search on end of data	Standard	Standard
Program chaining	Standard	Standard
Operator guidance	Standard	Not available
Levels of program control (per operator station)	Ten standard	Six standard, four additional available with feature
Verify	Feature	Standard
Record length	Standard 1 to 128 characters	Standard 80 characters, feature 1 to 128 characters
Production statistics	Feature	Standard
Self-checking number (modulus 10 and 11)	Feature	Feature
Offline field totals	Feature	Feature
Online field totals	Feature	Not available
Disk copy	Feature	Feature
Disk initialization	Feature	Feature
Second disk attachment	Feature	Not available
Printer	Feature	Not available
Binary synchronous communications:	Standard on the 3741 Model 2 and not available on Model 1	Not available
Keylock	Feature on Model 2	Not available
Terminal identification	Feature on Model 2	Not available
Synchronous clock	Feature on Model 2	Not available
Operator identification card reader	Feature on Model 2	Not available

Figure 1. Standard Functions and Available Features

IBM 3742 DUAL DATA STATION

The IBM 3742 Dual Data Station (Figure 2) is a key entry station with two operator stations. Each station has its own keyboard and disk drive. A common control unit and set of power supplies serve both operator stations. The CRT display is packaged so that both operators use one display.

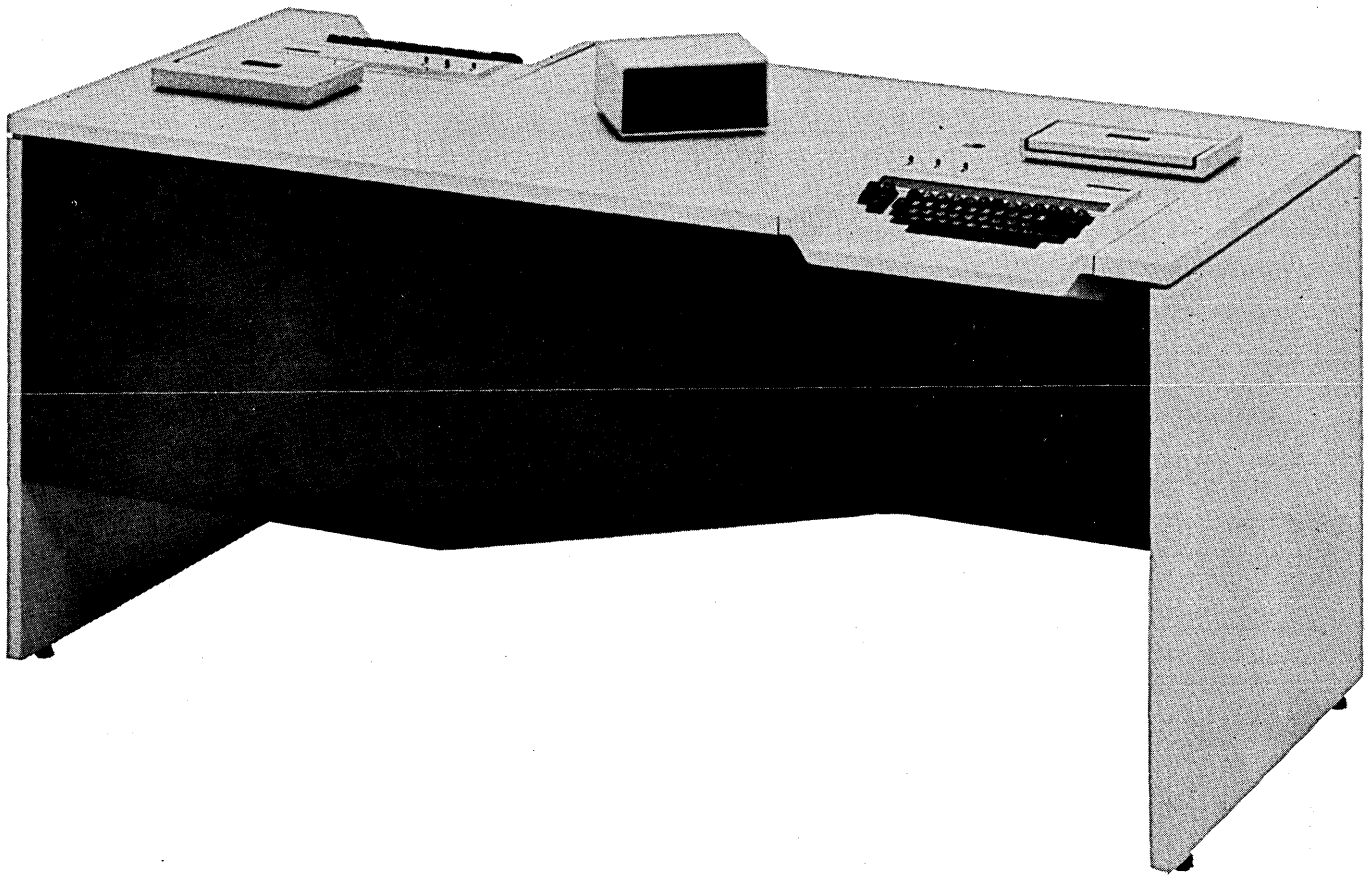


Figure 2. IBM 3742 Dual Data Station

Each operator sees a 40-character status line and two 40-character data lines that display data as it is keyed or reviewed. The status line displays information about the disk such as the position in the record, track and sector number, program level, and mode (Figure 3).

The following functions are standard:

- Entering original records.
- Updating records.
- Verifying records.
- Searching for records in a data set (batch) by record address.
- Searching for the end of data in a data set.
- Production statistics.
- Program chaining.

An available feature adds the following functions:

- Self-check, Modulus 10 and 11.
- Offline field totals.
- Search on Content.
- Disk Copy.
- Disk Initialization.

The 128-character feature adds variable record length for records up to 128 characters long.

Modes of Operation

The 3742 operates in the following modes:

- Enter.
- Update.
- Verify.
- Search.
- Read Index.
- Modify Index.
- Field Correct.
- Field Totals Offline.

The appropriate mode for a function is selected by using the function select keys (Figure 4). The current mode is indicated on the CRT in the mode indicator position.

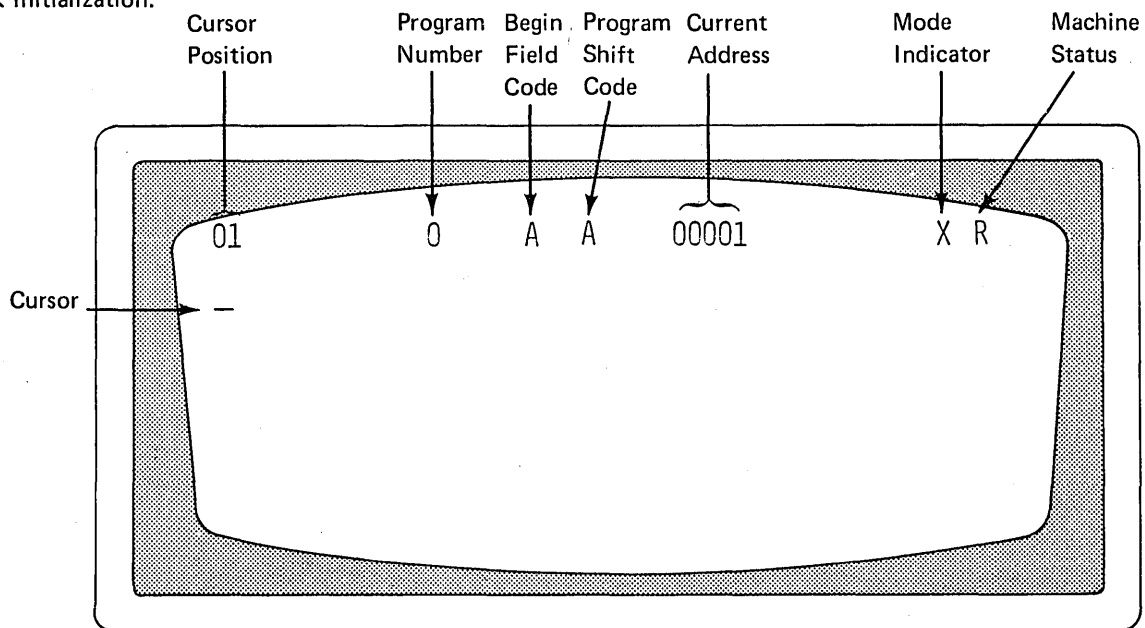


Figure 3. CRT Display of Status Line

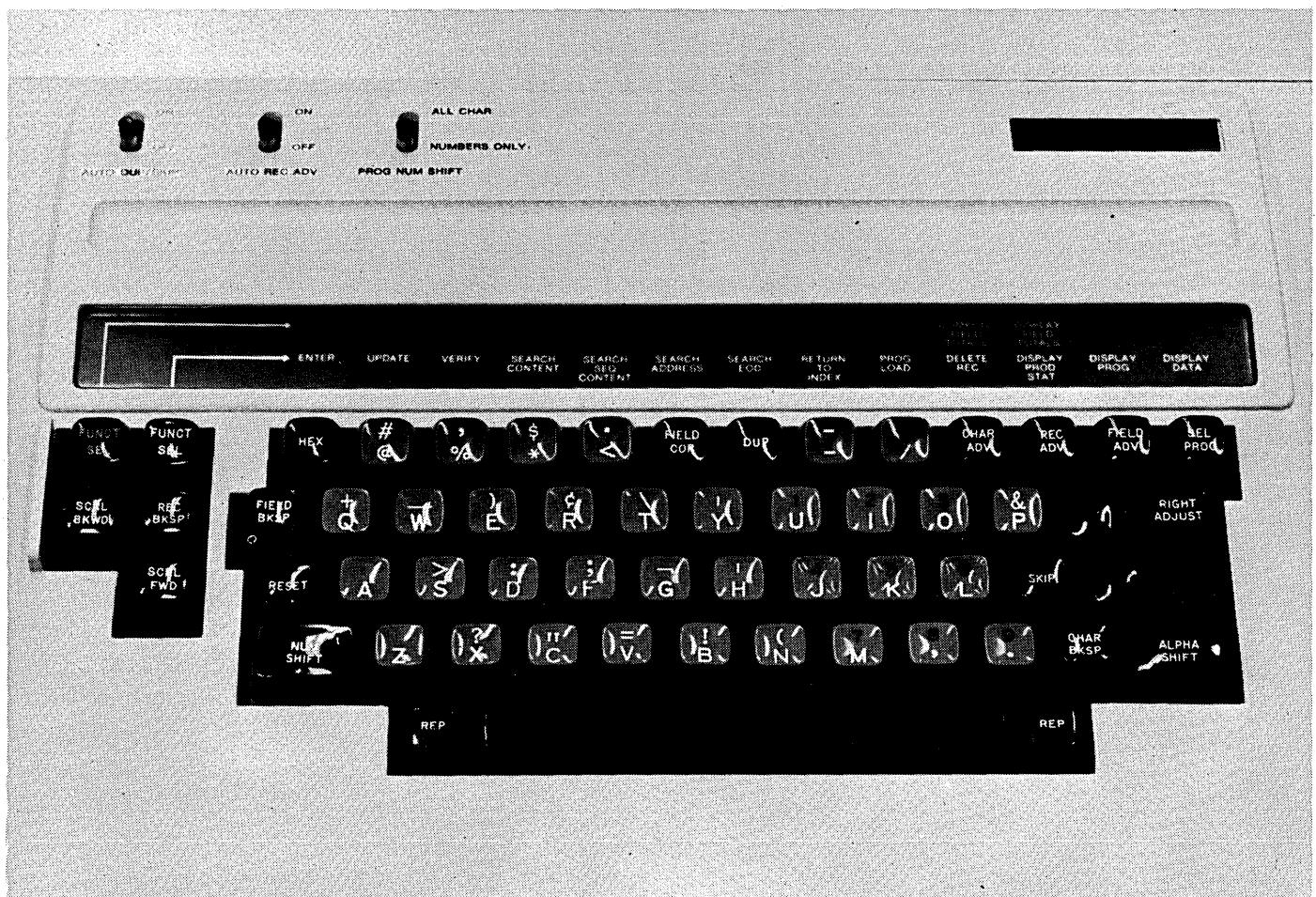


Figure 4. 3742 Keyboard

Program Control

Program control on the 3742 allows the operator to preset or program the machine for the normal key entry functions such as skip, duplicate, etc. The operator keys in the coding for the needed functions and then may store this coding on a disk. Up to six different program levels can be available for selection at one time. The operator selects the programs as needed to make use of the following standard functions:

- Duplication.
- Skipping.
- Right-Adjust.

- Numeric Fields.
- Alphabetic Fields.
- Bypass Fields.
- End Record.

Available features add these automatic functions:

- Self-Check, Modulus 10 and 11.
- Field Totals Entry (offline).
- Field Totals Readout (offline).

Entering and Updating Data

Original records are entered into the machine by manual keying. As a record is keyed, the characters are placed in a buffer and, at the same time, appear on the CRT. When the complete record is entered, the operator presses the record advance key which releases the record to the disk and blanks the screen. If the auto record advance switch is on, the record is automatically released when the last character is keyed. Once records are entered, they can be reviewed and modified by putting the 3742 in Update mode (either by selecting Update mode or by record backspacing). This might be used to change the amounts in a price field or to make changes to a payroll file.

Verification

Verify mode checks the accuracy of prerecorded records and permits the operator to make corrections to the records when errors are discovered. Verification is performed much as it is on a card verifier. In manual fields, keyed data must match the recorded data. The data is displayed up to, but not including, the cursor position. The entire record is displayed:

1. When the record is first entered.
2. After the record is completely keyed,
3. After any record backspace operation, or
4. When any error occurs.

If a verify error occurs, the keyboard is inactive, the display flashes, an error code is displayed on the status line, the cursor indicates the data position in error, and the entire record is displayed. Pressing the reset key unlocks the keyboard and lets you rekey the character that caused the error. This is accepted as the correct character if it matches either the original character on the disk or the character which caused the error. If this first correction character is not accepted, the error remains on the status line and subsequent data keys must match either the previous data key or the current data (the data on the disk) before the character is accepted. This verification and correction procedure replaces the error notch and repunching required with cards.

Duplication fields are compared character by character with corresponding data in the previous record. Skip fields are checked for all blank characters from the point of skip initialization to the end of the field. Duplication and skip errors are handled just as errors are in a manual field.

When the last record in data set is verified, a verify mark is inserted in the data set label; this mark is reset if a record is added to the data set.

Search On Record Address

Search on record address allows you to find a particular record by specifying its disk address, that is, its track and sector number. The search stops at the specified address and the CRT displays the record found there, even if the record is deleted. (A "deleted" record remains on the disk; a "D" is written in the first position of the record and a special address mark is written.)

Search On End of Data

In a similar manner, a search for end of data (EOD) finds the last record in a data set. This allows you to add additional records to a data set without knowing in advance where the end of the data set is or manually searching for the end of the data set.

Production Statistics

The 3742 production statistics uses three counters to accumulate:

1. The number of keystrokes,
2. The number of records processed, and
3. The number of characters corrected during Verify mode.

The keystroke counter counts normal, production keystrokes. It counts to 999,999 and then resets to zero. The record counter counts record advances in Enter, Verify, and Update modes except those that result in a error condition. The verify correction keystroke counter counts the number of characters corrected during Verify mode and all characters rekeyed during Field Correct mode.

These counters can be displayed on the CRT by using the display production statistics key, or the contents of the counters can be entered onto a disk.

Program Chaining

Program chaining provides automatic selection of the program to be used with the next record. When advancing, the program to be selected is designated by the last character (position 80 on the standard machine, position 128 with the 128 character feature installed) of the current program. When backspacing, the program to be selected is designated by the character in position 79 (127 with the 128 feature installed).

Self-Check (Special Feature)

Self-check checks the entry of numeric fields that have a last digit that was precomputed according to a modulus 10 or modulus 11 algorithm. When the field is keyed, the 3742 recomputes the self-check digit and compares it against the self-check digit that is entered. If the digits are not identical, an error is indicated. The machine goes into a wait state and waits for operator action to correct the error. Self-check fields can be entered manually or automatically under program control.

Offline Field Totals (Special Feature)

Offline field totals provides the ability to balance to a predetermined total, to create a batch control total for a group of records, or to crossfoot and enter totals into either the current or following record under program control. Offline field totals operation at one operator station inhibits any operation on the other station.

Search On Content and Search Sequential Content (Special Feature)

Search content and search sequential content provide methods of searching into data sets by using a record or partial record as a search mask. Search sequential content is a faster search method usable for records where the field searched contains alphametrics arranged in an increasing sequence. In either type of search, if the record is not found, a search no record found error is displayed.

Disk Copy (Special Feature)

The disk copy function provides for copying, merging, and pooling of data from one disk to another. Action is initiated from the primary station (the station controlling the disk to be copied onto). In addition, records can be merged both from disk two and the keyboard onto disk one.

Disk Initialization (Special Feature)

This feature allows the operator to re-initialize a disk if bad spots develop during disk usage. When a track is bad and re-initialization is necessary, this feature rewrites the track and sector addresses of each track so that the previously-identified bad tracks are automatically skipped. Each disk contains two spare tracks to take the place of any bad tracks.

128 Character Record (Special Feature)

The 128 character record feature permits the use of variable length records up to 128 characters long. Record length is variable between data sets, but fixed within each data set. The record length is set in the index track. The feature also adds four more program levels.

Data is displayed on the two 40-character data lines just as it is on the standard machine. After position 80 is keyed, the display scrolls upward and displays the last 40 positions shown before and the next 40 positions. At position 120, the same scrolling occurs. By using SCROLL FWD and SCROLL BKWD, the operator can change the display to look at any part of the record. SCROLL FWD will take you out of the record if AUTO REC ADV is on.

IBM 3741 DATA STATION

The IBM 3741 Data Station (Figure 5) is a single operator key entry station. Similar to the 3742, the 3741 has a keyboard, a disk drive, control unit, power supplies, and a six-line CRT display. The 3741 comes in two models, Model 1 and Model 2. Model 1 has the following standard functions:

- Entering original records.
- Updating records.
- Searching for records in a data set by record address or content.
- Search for end of data in a data set.
- Program chaining.

- Operator guidance.
- Variable record length, up to 128 characters.

In addition, available features add the following functions:

- Verify.
- Production statistics.
- Self-check, Modulus 10 and 11.
- Field totals, online and offline.
- Disk initialization.
- Second disk.
- Line printing (40 characters per second).

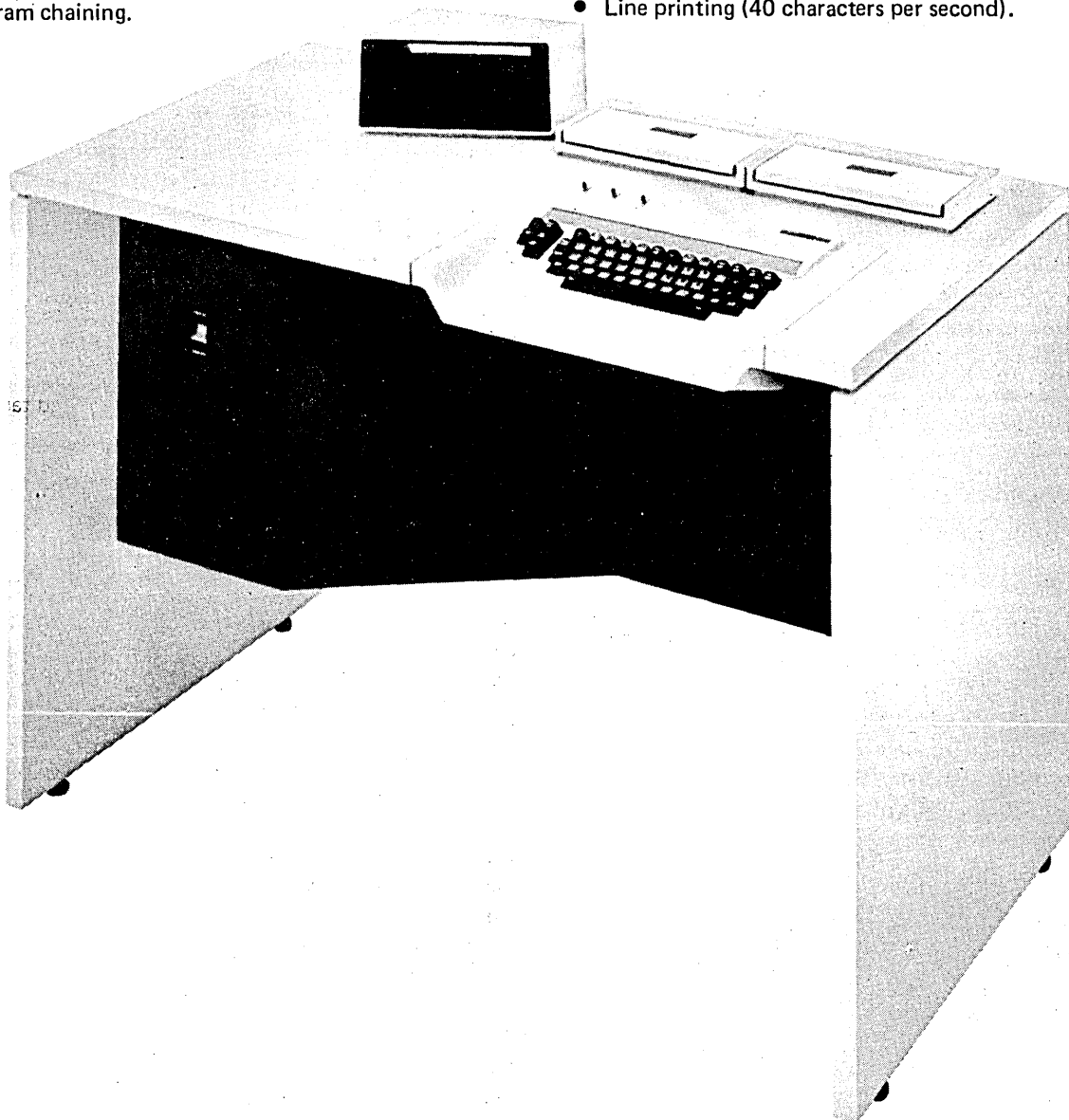


Figure 5. IBM 3741 Data Station

Model 2 is a communicating Data Station with all the standard features of a Model 1 and a Binary Synchronous Communications Adapter (BSCA). All features available for the Model 1 are available for the Model 2 with the following additions:

- Synchronous clock.
- Terminal identification.
- Keylock.
- Operator identification card reader.

All functions on both Models 1 and 2 that are on the 3742 operate as they do on the 3742. An explanation of these functions is given in the previous section describing the 3742; the discussion here deals primarily with the added functions.

Field Totals (Special Feature)

The field totals provides the ability to balance a field to a predetermined total, to create a batch control total, or to crossfoot and enter totals into the same record or a following record under program control. The 3741 can do this both offline, like the 3742, and online, while in Enter, Update, and Verify modes.

Under program control, data is summed algebraically and placed into one or more of the three 19-digit decimal accumulators that are provided with this feature.

The totals in these accumulators can be read into another record, for example, if the last record was the final total of a bill. These totals can also be compared to some predetermined total, for example, a batch audit total of catalog numbers, to determine that every record was entered. If a record was missed or incorrectly entered, the field totals capability helps the operator correct the error by keeping track of the net changes as the operator rekeys the records. For example, if the operator rekeys a '5' when she previously had a '6', the machine records '-1'. Thus, when the net difference in the accumulator matches the amount by which the batch was out of balance, the operator knows that the error is found and that no further corrections are necessary.

Operator Guidance

The operator guidance capability on the 3741 uses the display for interaction between the operator and the unit. Information displayed on the CRT prompts the operator through the required keying sequence. Thus the capability is helpful both for training new operators and for teaching the experienced operators a new job. To speed throughput and reduce errors, operator guidance may be permanently used on some complex jobs which are keyed infrequently. This prompting is especially useful in source departments where operators may perform data entry tasks as a secondary function on an occasional basis.

When operator guidance is used, up to five of the program levels can be used to store the prompting messages corresponding to five key entry programs. Program levels not used for operator guidance are available for normal programs.

Operator guidance functions on a field-by-field basis, displaying field guidance information for each field being keyed. Each data field may have its own prompting message up to 30 characters long. The message appears automatically in the last 30 positions of the line 5 display. The length of the data field is shown directly below the prompting message on line 6 as a series of slashes (/). As the data characters are keyed, they replace the slashes so the operator can see at a glance what is keyed and how many positions remain open in the field (Figure 6). When the field is completed, the next prompting message and its corresponding field of slashes appears automatically on the display. Concurrent with the field-by-field guidance, the full record is also displayed in the normal positions on the upper part of the display.

Second Disk (Special Feature)

The second disk adds the following capabilities:

- Disk copy.
- Pooling of data.
- Copying of records from a disk and inserting information from the keyboard.
- Expanded storage for both received and transmitted information for BSCA.

Writing functions of the second disk are used only with BSCA; all other second disk functions are read-only functions. All second disk functions are fully independent of and nonoverlapped with first disk functions.

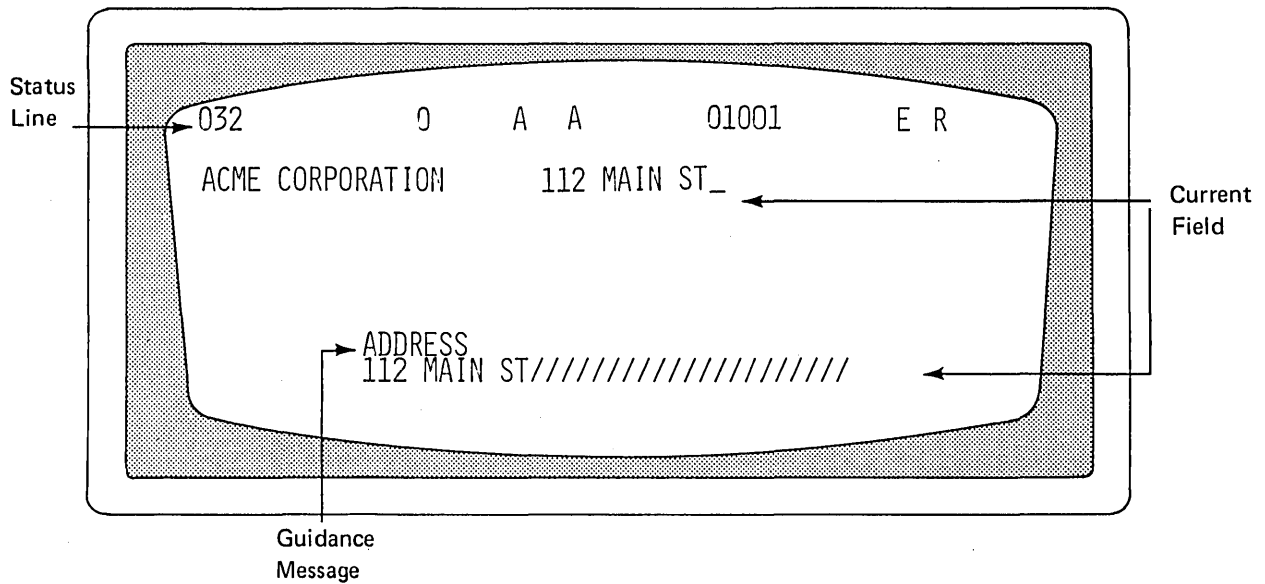


Figure 6. CRT with Operator Guidance

Printer Attachment (Special Feature)

The printer attachment feature allows attachment of the IBM 3713 Printer to a 3741. Printing can be either formatted or unformatted; format control characters can be either entered by the operator or received from the host CPU via telecommunications.

By using printer control programs, records can be reformatted during printing.

The data set being printed can be continued from the first disk to another disk without any print forms interruption.

For more detailed information concerning the operation of the printer, see "IBM 3713 Printer."

Binary Synchronous Communications Adapter

The binary synchronous communications adapter (BSCA) provides the 3741 Model 2 with the ability to function as a point-to-point terminal on switched or leased facilities. Operation is half-duplex, synchronous, serial-by-bit, serial-by-character. EBCDIC is used directly as the transmission code.

The following features are available with BSCA:

Synchronous Clock

The synchronous clock feature provides internal clocking for the BSCA for use with modems that do not provide their own clocking. The bit rate for this feature is 1200 bits per second.

Terminal Identification

The terminal identification feature provides the 3741 with BSCA with the ability to transmit a four-character terminal identification sequence, and compare a received identification sequence with a keyed-in sequence. The first character of the terminal identification sequence is the same for all machines; the next three characters are a factory installed sequence assigned by IBM and chosen from a random master list.

Keylock

The keylock feature prevents the 3741 from being placed in Communications mode until the keylock is unlocked. The keylock can be locked when the 3741 is in Communications mode and it remains in that mode unless the operator takes the machine out of Communications mode. Once removed from Communications mode, it cannot be returned until the keylock is unlocked. The key can be removed from the locked position only.

Operator Identification Card Reader

The operator identification card reader feature provides means of assuring that only authorized users operate the terminal in Communications mode. The operator ID sequence may be transmitted if desired.

For more information on teleprocessing and the BSCA feature, see "Teleprocessing Considerations."

IBM 3747 DATA CONVERTER

The function of the IBM 3747 Data Converter (Figure 7) is to transfer data from the magnetic disk to one-half inch computer compatible magnetic tape. The data on the disk is recorded in a serial-by-bit, serial-by-character format. The data is read from the disk and converted into a parallel-by-bit, serial-by-character format and written on nine-track tape compatible with System/360, System/370, and other nine-track tape systems. The 3747 can handle multiple data sets per disk and multiple disks per single data set.

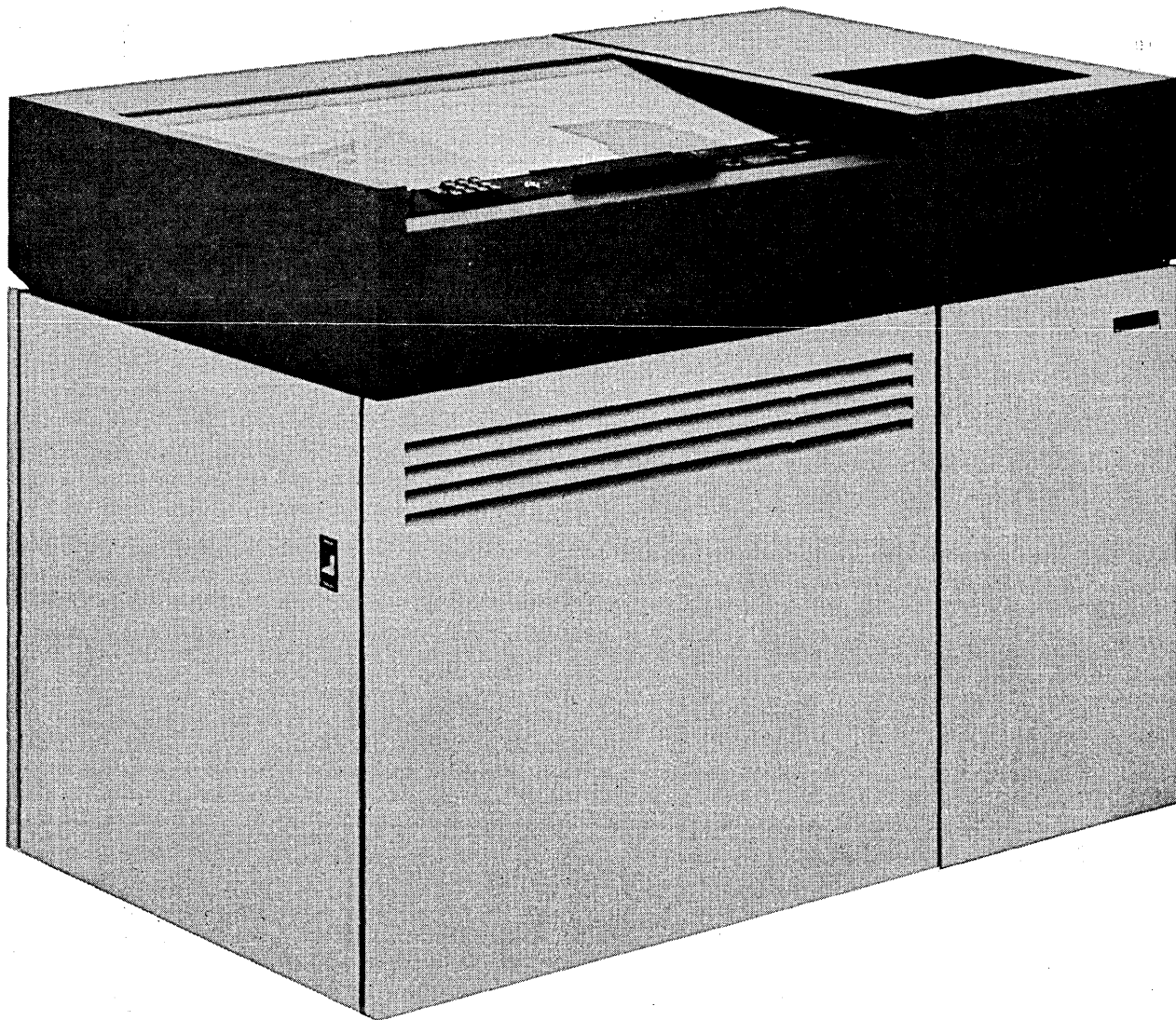


Figure 7. IBM 3747 Data Converter

Features are available that add the following functions:

- Reading compatible tape and writing on the disk.
- Writing the compatible tape in phase encoded or NRZI mode.
- Point-to-point telecommunications through a binary synchronous communications adapter.
- Handling IBM standard tape labels.

After the diskettes are loaded, the 3747 automatically feeds, reads, and stacks the diskettes, converts the data to computer compatible format and records it on one-half inch magnetic tape. The data is then in an acceptable format for use by other tape systems; no additional programming support other than normal tape processing is required. Operator intervention is necessary only when starting a job, ending a job, or during error recovery.

If an error occurs, the 3747 activates an automatic error recovery routine. If the automatic routine fails to correct the error, a message is displayed on the operator's panel and the operator initiates action from that point.

With the addition of a feature, the 3747 can take data from tape and write this data on a disk. The final format of the data is identical to the format of data on disks presented to the 3747 as input.

The 3747 can be featured to write out data for any one of the following types of nine-track tape drives:

- Phase encoded write only.
- Phase encoded read/write.
- NRZI read/write.

The tape labeling feature provides the capabilities to build IBM standard magnetic tape labels and to check the security byte before processing sensitive data.

The BSCA feature offers telecommunication capabilities for the 3747 to communicate point-to-point over switched and nonswitched networks. For more information on the BSCA feature, see "Teleprocessing Considerations."

IBM 3713 PRINTER

The IBM 3713 Printer (Figure 8) provides the 3741 with the ability to prepare hard copy offline. The matrix printer prints from disk serially at a maximum rate of 40 characters per second and a maximum line length of 128 characters. Three different pin feed platens, with pin-to-pin widths of 12-1/2", 13-1/8", and 13-7/8" are available. An adjustable margin feature is also available. This allows nine additional platen-widths ranging from 7-1/2" to 11-1/2" pin-to-pin. Forms with a maximum thickness of 0.018" (0.46 mm) — six-part forms — may be used, but for optimum feeding and stacking, IBM recommends using no more than three parts.

Refer to *IBM 1443, 2203 Forms Design Considerations*, GA24-3488 for more detailed information on forms.

The 3713 can print in four different modes (either with or without program control):

- Print record — The current record is printed.
- Print data set — The current data set is printed under format control.
- Print under mask — The records found under search on content are printed.
- Print under address control — The record found under search on record address is printed.

The 3713 has vertical forms control and horizontal print control capability. The data set being printed can be continued from the first disk to another disk without any print forms interruption. For maximum throughput, printing should be left-justified.

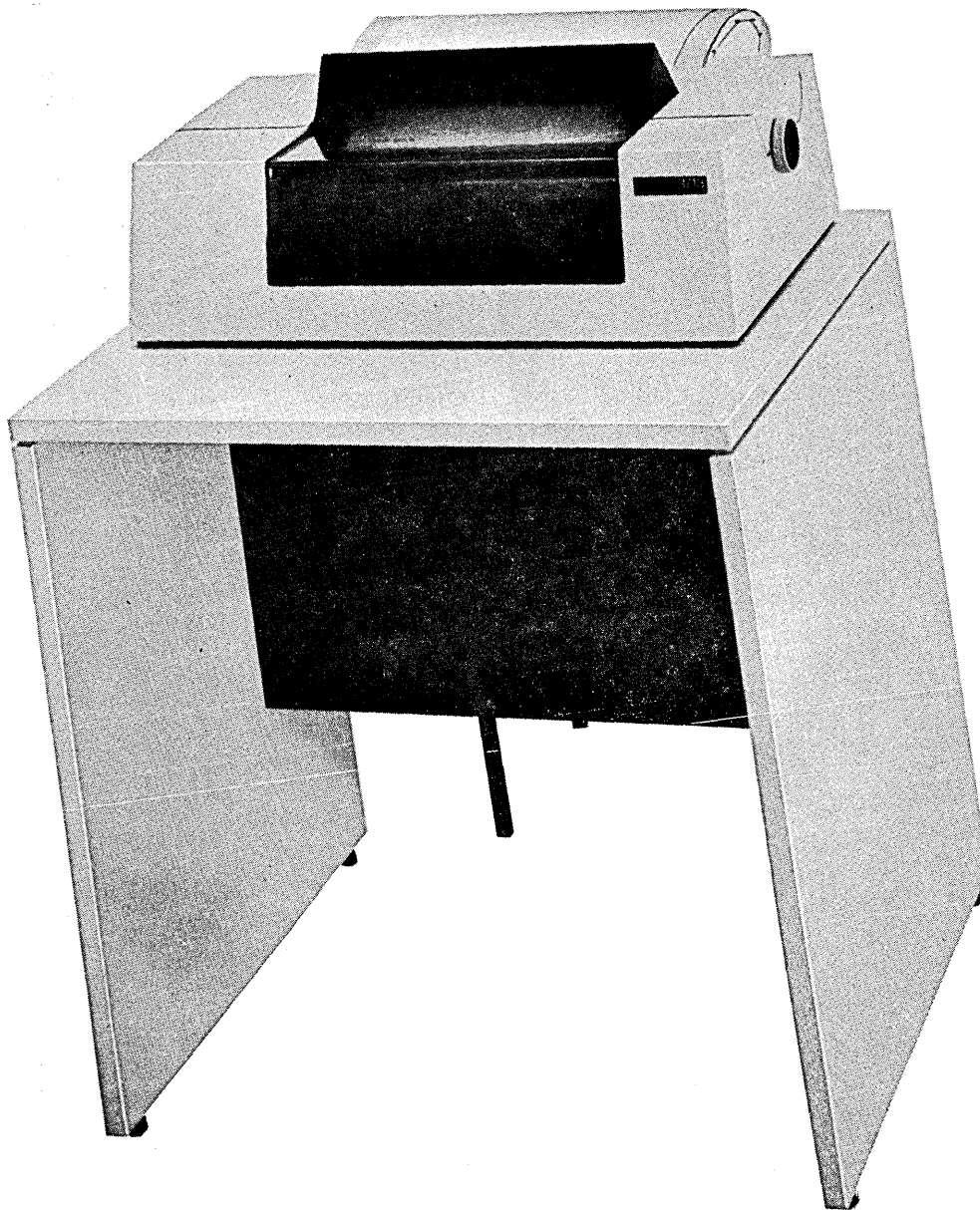


Figure 8. IBM 3713 Printer

The printing format can be either entered by the operator or received from the host CPU; up to nine formats can be loaded at one time. One program level (A) is reserved for horizontal and vertical forms control.

Figure 9 shows an example of format control printing. In this example, the remote location has keyed the daily transactions onto a disk and transmitted the data to a CPU at a central location. The central location has processed the information and transmitted the invoice data back to the remote location where the invoices are prepared. **A** illustrates the records as they are stored on the disk. **B** shows the printer control programs which are loaded into the program level buffers, and **C** shows the resulting printout.

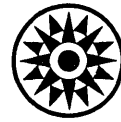
	1ABC ELECTRIC CO	1234 SNELLING AVE	MINNEAPOLIS MINN.	55401	
	1XYZ ELECTRIC INC	6553 WEST LAKE	MINNETONKA MINN.	55403	
	292354	PARCEL POST	21961404028006/07/72		
	3245-2890	INSULATOR	000002000.730001.4600092354		
	3917-0214	RELAY	000001012.300012.3000092354		
	3258-1478	BATTERY	000006001.010006.0600092354		A
	3369-2587	CHOKE	000010002.470024.7000092354		
	3987-6543	HEAT SINK	000003012.050036.1500092354		
	3654-3210	GENERATOR	000002003.620007.2400092354		
	40087.91070.40107.87010.700188.970276.88				
Program Level 1	2SY2T24AC2T24AC2T24AC2T5ACQ				
Program Level 2	3SYT8BT24AT6BT6BT8ACQ				B
Program Level 3	4SYT8AT24AT6BT6BT7BCQ				
Program Level 4	5SY6T7B2C3T6BT6BT6BT7BC6S6T7BCQ				
Program Level A	% T	2 K	3 4 4 4 4T4 4 4 4 4 4T4	5 0 E	T

Figure 9 (Part 1 of 2). Printer Format Control



ELBARISA

WEST FRONT STREET
WORLD WIDE



SOLD TO: ABC ELECTRIC CO
1234 SNELLING AVE
MINNEAPOLIS MINN.
55401

SHIP TO: XYZ ELECTRIC INC
6553 WEST LAKE
MINNETONKA MINN.
55403

Worldwide Distribution
of
Electronic
Parts and Instruments

TERMS 2% - 10 DAYS
NET 30 DAYS

CUSTOMER NO.	SHIPPED VIA	CUST. ORDER NO.	INVOICE NUMBER	INVOICE DATE
92354	PARCEL POST	219614	40280	06/07/72
PART NUMBER	DESCRIPTION	QUANTITY	UNIT PRICE	AMOUNT
245-2890	INSULATOR	2	.73	1.46
917-0214	RELAY	1	12.30	12.30
258-1478	BATTERY	6	1.01	6.06
369-2587	CHOKE	10	2.47	24.70
987-6543	HEAT SINK	3	12.05	36.15
654-3210	GENERATOR	2	3.62	7.24

TOTAL THIS INVOICE \rightarrow 87.91

PREVIOUS BALANCES

70.40	+	107.87	+	10.70	=	188.97
60 DAYS & OVER		30 DAYS		CURRENT		

TOTAL BALANCE DUE

276.88

420-0110-2

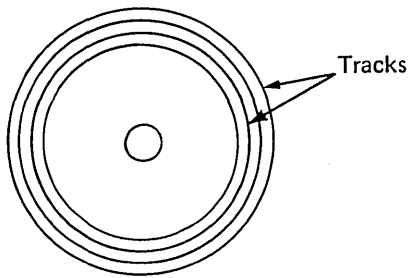
PRINTED IN U.S.A.

Figure 9 (Part 2 of 2). Printer Format Control

MEDIA CONCEPTS

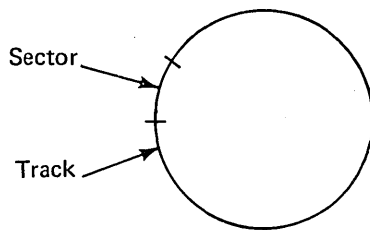
The IBM diskette is a packaged Mylar disk. Information is stored on the disk surface which is magnetic recording material very much like that used on standard recording tape for a stereo. If you could remove a disk from its protective package, you would see no grooves or other location markers. In fact, the surface would look just like the surface of stereo recording tape. The machine, however, easily recognizes locations and locates information through the use of a very simple scheme.

Information is arranged on the disk in tracks. A track is a circular section of the disk.



Each disk has 74 tracks, track 00 through track 73.

Tracks are divided into sectors. A sector is a predefined section of the track.



There are 26 sectors, numbered 01 through 26, on each track. One sector holds one record. The sector is 128 positions long; the record may occupy from 1 to 128 of these.

To locate information, the machine locates the record address, that is, the track and sector number.

The first track, track 00, is called the index track and is reserved for descriptive information about the data on the disk. This information on the index track is very comparable to the table of contents of a book. The index track contains labels which are simply names associated with the different data sets, or batches of records, on the disk. The data set is comparable to a chapter in a book and the label to the chapter title. Associated with these labels are addresses, comparable to the page numbers in a book. Instead of a page number, though, data on a disk has a track and sector number, written TTOSS, where TT stands for the track number and SS stands for the sector number. A zero separates the track and sector number.

Extents are also defined in the index track. Extents simply tell what track and sector numbers mark the beginning and end of each data set on the disk. Beginning of extent (BOE) tells the machine where to find the beginning of the data set, and end of extent (EOE) tells the machine that the data set cannot extend beyond that location. The data set may, however, not fill the space reserved for it and end before EOE. A position marker called EOD (end of data) tells the machine where the data set actually ends.

Installation Guide

The 3740 System is a media-based, data entry system which replaces punched card or other key-to-media systems with a minimum of procedural changes.

Just like punched cards, magnetic tape, or other familiar media, the IBM diskette offers:

- Offline data batching with unlimited data storage.
- Audit trail of keyed data.
- Portability.
- Ease of handling small jobs as well as large jobs.
- Data interchange between devices.

When installing a 3740 System, existing key entry procedures are usable, but you may want to make some changes to take advantage of the new features and capabilities. The following sections describe the use of the diskette-based system in detail and help you decide on the best procedures to use to take advantage of the 3740 System.

Pre-Installation Planning Checklist

Data entry systems and procedures vary with the user's needs and preferences, but common elements make it feasible to offer a checklist of items which should be considered in planning for a 3740 installation.

The following checklist is not intended to be all-inclusive, but should help to stimulate your thinking in this area of planning. Most of the items are discussed in more detail in other parts of this manual under suggested operation procedures and physical planning information.

PHYSICAL PLANNING

Layouts

- Best machine placement for the available space.

Electrical Power

- Available voltage and current capacity that meets requirements.
- Electrical outlet placement adequate for the planned layout.

Environment

- Temperature and humidity within limits specified on specification sheets.

Storage

- Sufficient environmentally-controlled storage located nearby for supplies and diskettes.

TRAINING AND EDUCATION

Supervisor or Lead Operator

- Attendance at an installation planning course is necessary for the person responsible for installation planning.
- If key entry procedures will be revised, the person responsible for this should have education on the 3740 System.
- The supervisor or lead operator needs a detailed understanding of machine operation in order to help operators set up difficult jobs, to answer operating questions, and to supervise operator training.

Systems Analysts

- The person who analyzes data entry requirements will probably benefit from education in 3740 features and functions. This is especially true if data entry is moved closer to the data source or if communications is involved.
- Restructure key entry jobs to take advantage of 3740 features. This involves systems people, particularly if programming changes are required.

Key Entry Operators

- Training time will vary if operators are experienced on a card punch or typist-skilled only.
- Some machines should be ordered on an earlier schedule for operator training.
- Operator self-study courses ordered for availability with the first machines.
- Supervisor or lead operator educated in time to supervise operator training.
- Diskettes and installation forms such as the "Key Entry Instructions" form available to begin training.

Data Converter Operators

- Plan for training primary and backup converter operators.
- Set up run sheets to guide operators on complex jobs.

SUPPLIES

Diskettes

- Diskette quantities estimated.
- Diskettes ordered for delivery prior to the start of operator training. (Delivery schedules vary; inquire now concerning current delivery lead time.)

Labels

- Use of adhesive external labels to identify disk contents. (See suggested procedures in following section.)
- Sufficient quantities of labels in correct colors.
- Special printing on the label may affect the lead time for procurement.

Printer Forms

- If the application is new and involves a 3741 with printer, forms may need to be designed and procured.

Installation Procedural Forms

- Existing forms may be adequate in many cases, but if new forms are needed they should be designed and ordered in time for machine delivery.

Operator Training Course

- If your training plans call for training two key entry operators at the same time, you will need two copies of the operator self-study course. Orders should be placed to assure delivery before the training is to begin.

OPERATING PROCEDURES

- Operating procedures in Key Entry and Systems Input should be examined and modified wherever necessary. Suggested new procedures are found in a later section.
- Many procedures may not actually require modification, but you may desire to change these procedures in order to take advantage of a new capability or feature now available through the 3740 System.

- Some areas to consider are:
 - a. Existing standards.
 - b. Operating forms and instructions.
 - c. Work flow patterns.
 - d. Error correction procedures.
 - e. Controls on batch and job totals.
 - f. Job and operator statistics.
 - g. Use of features such as Right-Adjust, Self-Check, Field Totals, Variable Record Length, etc.
 - h. Controls on data accuracy and security.
 - i. Job accounting.

PROGRAMMING CHANGES

(See specifics given later to determine if any changes are needed.)

JCL Cards

- Changes may be required because of change in media.

Editing Programs

- Input data may go to editing programs prior to processing.

Processing Programs

- Needed if input data goes directly to processing program.

Teleprocessing and Communications

- No changes required under most standard support. (See "System Programming Considerations.")

COMMUNICATION SERVICES (Where Required)

Communications Links, Modems

- WATS, leased lines, dialups. Communication services must be arranged by the user. (See "Teleprocessing Considerations," for teleprocessing bibliography and suggestions.)

JOB RESTRUCTURING AND REORGANIZATION

- Restructuring key entry jobs to take advantage of 3740 features.
- Re-organizing key entry areas for new applications involving source data entry.

OPERATIONAL READINESS

Disk Internal Labels

- Usually written once in general form by supervisor or lead operator.

Diskette Serial Number

- Assignment of customer's serial numbers prior to initial use helps to determine when replacement is needed.

Program Disk

- Preparing key entry programs in advance of job receipt at the key entry department.

Magnetic Tapes

- Be sure that the required types of tapes are available.

CONTINGENCY

Cut-over Period

- Source documents and keyed disk should be retained until the CPU processes the data. Equipment and operators may be phased in, cutting over one job at a time.

Backup

- Station outage affects, at most, only two stations. Converter outage does not affect the stations as long as additional disks are available to continue to accumulate and store data until the converter is returned to service. Impact of converter outages on computer runs may be minimized by scheduling, but consideration should be given to converter back-up arrangements with other users or data centers.

The IBM Diskette

DESCRIPTION

The IBM 3740 System introduces a new medium for batch key entry which permits increased key entry function and greater versatility in product applications.

The IBM diskette is a flexible, Mylar disk contained within a protective cartridge about 8 inches square (Figure 10). The disk has 73 magnetic recording tracks available for data entry. Each track can record 26 sectors of up to 128 characters each. The net capacity of the disk is 1898 128-character records.



Figure 10. IBM Diskette

Records may be written or read serially as on magnetic tape, or records can be accessed randomly as with system-attached magnetic disk drives. The IBM diskette falls between the punched card and one-half inch magnetic tape in terms of data storage capacity and functional characteristics. It combines the small batch data storage properties of punched cards with many of the features of computer tape.

When compared to the punched card, the disk has the following advantages:

- Re-useability to reduce media costs.
- Ease of erasure and error correction.
- Very favorable ratio of size and weight to data stored. One small disk can usually hold the entire day's output from the typical key entry station.
- Data readout at magnetic speeds (30,000 characters per second, instantaneous rate). This is particularly important for search operations.
- The ability to easily back up and re-read data for re-transmission in case of communications error.
- Portability and mailability of useful quantities of data.
- Machine-assisted random access to offline batch data files.

In addition, the disk fits easily into the procedures of most punched card installations, replacing cards with a minimum of changes.

EXTERNAL LABELS

External labels are a practical method to store and retrieve significant facts about the disk without using a machine to read the data. Some types of information which may be recorded on the labels are:

1. A serial number assigned to the diskette.
2. Date of disk acquisition or first use.

3. Whether or not the disk is formatted.
4. The location of any bad tracks.

These four items pertain to the disk itself and should be recorded on the permanent label which is affixed in the upper left corner of each disk.

5. What data is stored on the disk — job name and number.
6. Who entered the data.
7. If the data is verified.
8. Whether the data is dumped to magnetic computer tape.

These four items pertain to the data stored and its processing and usually change often. IBM recommends that these items are written on a removable adhesive paper label. This label can be up to 2 by 5.5 inches and may be affixed to the diskette just to the right of the permanent IBM label. This label may be designed to fit your procedures.

Write the information on the label while the disk is in the envelope; this prevents damage and contamination of the recording surface. The disk envelope is designed with a slot which exposes the label for access.

When a new job is begun, the old label information should be crossed out — not erased. In addition to keeping the disk clean, this process provides an audit trail. When the entire label is full, it should first be removed and *then* replaced by a new label. (If new labels are simply pasted on top of the old labels, the label buildup can affect machine performance.) Don't affix labels to the reverse side of the disk and don't cover any of the holes in the diskette.

Labels should be replaced every six months; otherwise the adhesive may harden and make label removal difficult.

IBM recommends using colored labels to convey certain information at a glance. Each installation can work out a system to increase the security of certain classes of disks and reduce handling time and other requirements. Color coding for a hypothetical insurance installation could be:

- Red Labels — Reserved for program storage; do not use for data.
- Green Labels — For general data use; available for data keying if the label shows that the previous job was dumped.
- Blue Labels — Reserved for keying claims, which are 65 percent of the installation workload. Keying program is repeated on each disk — information in the index track tells the converter to bypass the program when dumping disk to tape.
- Yellow Labels — Local or personal files not to be used for general data. (Operator or job statistics, lists of job charge numbers, etc.)

IBM recommends against writing information on the protective cardboard envelope to avoid mismatching the diskette and envelope.

DISKETTE CARE

The disk, like magnetic tape or mag cards, performs well when given reasonable care. Some helpful suggestions for protection and use are given here:

- When not in a machine, keep the diskette in the protective cardboard envelope which is provided with each new diskette. Place the diskette in the envelope before writing on the label so that the label is visible through the cut-away front of the envelope.
- Always handle the diskette by the label area to avoid touching the Mylar recording surface. Fingerprints on the surface may cause permanent diskette errors.
- Use a file folder or carrier envelope to carry the diskette.
- Keep office utility magnets away from the disk.

HANDLING NEWLY DEVELOPED BAD SPOTS ON A DISK

Disks rarely develop areas in which records cannot be written successfully, but a bad spot can occur while entering a job on the disk.

On the data stations, a disk error in the status line may indicate such a bad spot. The number '5' indicates that the machine failed to write a correct record after eleven attempts. The operator may already have started to key the next record. The record that could not be written, then, is the record in the sector immediately preceding the current record. Discontinue entering on this disk with the last record that was successfully written and continue on another disk, beginning with the record that failed.

The disk with the bad spot should be marked so that it is not re-used until it is re-initialized.

ENVIRONMENTAL CONSIDERATIONS

Diskettes may be used in the normal office environment and in most industrial environments which are not wet or dusty. They are relatively unaffected by climatic variables. If diskettes are mailed, they should be placed in a box or heavy cardboard mailer to prevent bending or contact with stray magnetic fields as may be encountered in normal shipping and handling equipment.

STORAGE

Diskettes should be stored in the protective envelope in an upright position. Use a storage rack like those used for magnetic tape reels. The stiff cardboard box (fivepack) in which the diskettes are shipped is excellent for storage. If the environment is dusty or storage will be lengthy, place the rack in a closed cabinet to avoid contamination with dust or dirt.

ESTIMATING DISKETTE REQUIREMENTS

The number of diskettes needed to support each data station of the 3740 System is dependent upon job parameters and installation policies. The following checklist will serve as a guide to estimating average requirements and to some of the factors which will tend to increase or decrease requirements from the average.

Centralized Key Entry

Batch Size: For proper control, source documents are usually batched. One diskette should normally be estimated for each separate batch which an operator keys in a day.

In some applications prompt customer service dictates that keying be broken into many small batches; this leads to increased diskette requirements.

Machines Used to Verify: Machines which are used steadily for verifying do not require additional disks and should be excluded from the estimates. However, each data station can also be used for keying. If you anticipate that, due to the nature and scheduling of jobs, all or most stations may be used for keying on some days of the month, then disks should be provided to support those machines when they are used for keying rather than verifying.

Retention Cycle: Commonly, you will retain the disk after keying for at least one day prior to reuse, just as cards are retained until processing is assured. Disks are then used only every other day, which is reflected in increased diskette life. Twice the daily disk quantities will be needed to satisfy data retention requirements.

Data Storage for Weekly Runs: In some cases, input for weekly computer runs arrives and is keyed daily but retained in key entry until the weekly computer run. Batches will be accumulated on disk and stored at the operator's work station as they are today with cards. This will have to be accounted for in your estimate.

Peakload: Monthly, quarterly, and annual peaks may result in overtime and an increase in data keyed. These requirements must be handled.

Local Source Department

When machines are placed in local source departments such as payroll or accounts payable, requirements can be estimated in the same manner as in centralized key entry. Batches are often larger in size, reducing diskette needs. This is partially offset by longer retention cycles because of diskette 'float' in the interdepartment mail system.

Remote Source Department

Units in remote locations usually create larger batches on a disk to facilitate data communications. Disks should be retained at least one day to assure that good data has been received by the home office computer.

Additional spare diskettes should be maintained at remote sites if it is difficult to obtain additional diskettes quickly.

General — All Locations

- At least one disk per machine should be allocated for storage of programs.
- An additional disk may be desired for recording of daily production statistics.
- Contingencies should be provided for if off-the-shelf delivery of purchased disks is not available locally.
- Additional disks may be needed if 3747 features are used (control).

DISKETTE REPLACEMENT

Damaged or Contaminated Diskettes

If diskettes are physically damaged (torn, folded, creased) they should be replaced. If the recording surface becomes contaminated with foreign material, the diskette should be replaced. It is particularly important that disks which are contaminated with sticky fluids (soft drinks, coffee with sugar, etc.) or abrasive substances (metal filings, etc.) *on the recording surface* should not be placed in the 3740 System. Placing a contaminated disk in a 3740 unit can contaminate the read/write head, damaging the equipment and causing operation errors. In addition, contaminants can be passed on to your clean disk. If a foreign substance is spilled on the diskette cartridge material, it may be carefully removed and the data recovered only if the contaminant does not reach the recording surface. After the data is recovered, the disk should be removed from service.

Normal Surface Wear

When disk errors begin to occur, you will have to make a decision regarding replacement of individual diskettes. To provide information to aid in this decision, the following procedures are suggested:

- When new disks are first used, assign a serial number to each and write it on both the external permanent label in the space provided and in the disk internal label (volume serial number). A log of disk serial numbers and the initial date of use should be kept so that the supervisor can estimate usage by age.

- When disk errors occur, they should be recorded by track number on the diskette external permanent label. As soon as all keyed data has been recovered from the disk, it should be re-initialized and the bad track flagged and excluded.
- The media indicator on the 3747 helps you determine when excessive errors are occurring.

Re-initialization on the 3740 System can compensate for up to two bad tracks. Once the disk has been re-initialized, bad tracks are automatically skipped as if they were not present.

Suggested Operating Procedures

RECORDING IN THE CENTRALIZED KEY ENTRY ROOM

A centralized key entry room is an area where diversified key entry functions are performed. A centralized room may be in either a home location or a branch office. All data to be keyed is collected from the source departments and brought to the centralized key entry area.

Suggested operating procedures given here are intended as examples; the actual procedures will be determined by your specific needs.

Source documents are collected at a central point and logged in by a clerk. If necessary, the documents are divided into batches with a balance tape attached. Each batch is assigned to an operator who will normally select a scratch disk for use; in a tightly controlled installation, the disk may be assigned to the specific batch by the control center and given to the key operator.

A single disk may hold multiple data sets, but most applications are best handled by keying only one data set on each disk.

Disk Internal Labels

The disk label for each data set is magnetically recorded on the index track. This label identifies the data that is on the disk.

Key Entry Programs

Programs are created for the 3741 and 3742 Data Stations in much the same manner as they are for card punches. Fields are coded for alphabetic or numeric shift, as well as for special functions such as automatic duplication, automatic skip, right adjust, and so forth. Creation of programs simply consists of keying the proper coding for each field of the record. Following is a sample program for a record to be keyed on a standard 3742:

A.....N----R-----
D-----N-----A.....S-----

In the above example, the 'A' denotes an alphabetic field, the 'N' numeric, 'R' a numeric right-adjust, 'D' a numeric auto dup, and 'S' a numeric skip field.

Job descriptions used for current card punch and verify jobs can still be used for the basis of creating program for 3742 and 3741. Thus, in many installations, the same job descriptions can be used; it is simply a matter of keying the programs onto a disk rather than program cards.

There are two basic approaches to creating programs, based on responsibility for creation. The first approach follows the procedure used in many of today's card punch installations, where each operator has the responsibility to make up and maintain her own program cards. With the 3740 system, an operator can simply key and maintain her programs on the disk, rather than program cards. One disk can hold as many as 1898 programs.

The second basic approach is that of having a supervisor, lead operator, or system engineer create all of the programs for every operator in the installation. Here the responsible person keys all of the programs for the installation, then makes copies of the master program disk for all operators. Each operator then has her own program disk, as in the first approach; the only difference is that it was prepared centrally.

Maintaining program disks which are prepared centrally is done by changing existing programs or adding new ones to the master program disk. Copies are then made and issued to each operator. The effective date of the program disk can be noted on the external label, thus indicating whether the program disk is the latest level.

With either method of program disk preparation, the programs must be organized in some manner so that they can be located again. The simplest approach is to key the programs on the disk in any desired sequence, keep track of the addresses, and then locate the record by using Search on Record Address.

Another method is to arrange each group of programs on a separate track, for example:

Address			Programs
Track	Sector		
01	0	01	Accounts Receivable
01	0	02	Accounts Receivable
02	0	01	Payroll
02	0	02	Payroll
02	0	03	Payroll
03	0	01	Accounts Payable
03	0	02	Accounts Payable

In this example, the Accounts Receivable job has two program levels, starting in Track 01, Sector 01. Payroll has three program levels, starting in Track 02, Sector 01, and so on. By arranging each group of programs on a separate track, allowance is made for adding new programs.

If, after keying these programs onto a disk, the operator wants to load the payroll programs, she performs a Search on Record Address, keys in 02 (track) 0 01 (sector), and presses the record advance key. Upon seeing the first of the three payroll programs on the CRT, she selects Program Load, followed by the number 1. This loads the first program into program level 1. By pressing Record Advance, selecting Program Load, and the number 2, the next program is loaded into program level 2. The third payroll program is loaded into program level 3 in the same way.

Another approach would be to organize the program disk as follows:

Address			
Track	Sector	Record	
01	0	01	Accounts Receivable (Header)
01	0	02	Accounts Receivable Program 1
01	0	03	Accounts Receivable Program 2
02	0	01	Payroll (Header)
02	0	02	Payroll Program 1
02	0	03	Payroll Program 2
02	0	04	Payroll Program 3
03	0	01	Accounts Payable (Header)
03	0	02	Accounts Payable Program 1
03	0	03	Accounts Payable Program 2

In this example, each job has a header record recorded on the disk preceding the actual program. A header record contains descriptive information about the programs. A typical header record for payroll programs would be as follows:

PAYROLL PROGRAMS-EMPLOYEE MASTER, DAILY TIME, DEDUCTIONS.

Messages can also be included in the header program. To find the payroll program using this approach, the operator performs a Search on Content, keys in the word "Payroll," followed by pressing the record advance key. This causes the data station to search for the "Payroll" header record. The operator then presses Record Advance and selects Program Load, and loads as many programs as have to be loaded for that job.

Note: To use the Search on Content approach on the 3742, the special feature group is required.

Thus far, the methods of creating and storing programs have assumed a program disk for each operator. The other basic system approach is to include programs on the same disks that are to contain data.

For simplicity, assume an installation that has only 20 programs for all of the jobs to be performed on the 3741 or 3742. Each disk in the installation can have a bypass data set label established for track 1 (26 sectors), in which programs are to be recorded. The second data set label can be established for data which reserves tracks 2 through 73.

Thus, an operator can insert a diskette, search for the desired program, load it, and proceed to enter data on the same diskette. The procedure would be as follows:

1. Insert diskette.
2. Search for a program (Record Address or Search on Content).
3. Load program(s).
4. Press the return to index key. (This returns the read/write head to the index track, the label for the program data set.)
5. Press the record advance key. (This increments to the next sector on the index track, which in this case would be the data set label for the data portion of the disk.)
6. Select a mode. (The read/write head is positioned at the first sector of the data portion of the disk, and the data station is placed in the selected mode.)

Keying

When the disk is ready, the data is keyed. After all the data is keyed, the diskette is removed, the adhesive label updated with operator initials, record count, and so forth, and the diskette placed with the source documents and returned to the control center. If the programs are set up to accumulate field totals, these totals can be verified against the balance tape before removing the disk.

Verifying

After the diskette is returned to the control center, the batch is assigned to a verify operator. The verify operator sets up the job just as the key operator did and verifies the batch, completes the label, and returns the diskette and source documents to the control center. The control center collects the various diskettes that make up a complete job or application and places them together for input to the next step. The source documents are either collected and held for initial CPU output or are returned immediately to the originating department.

Note: If the records keyed on a 3741 or 3742 with 128 character feature are to be verified on a standard 3742 unit, the record length in the label must be set to 080 *prior* to keying the records on the 3741 or 3742 with 128 character feature.

Using Field Totals

The most important application of the field totals feature is for batch auditing. A total from at least one field in every record or in specified records of the batch is kept in one of the three 19-digit decimal accumulators that are supplied with this feature. When the entire batch is keyed, this total is compared to a precomputed total for the batch. Equality between the two numbers indicates that all of the records in the batch are keyed. If the batch is out of balance, the amount of the mismatch between the two sums is often a clue to locate the missing or erroneous record.

The 3741 and 3742 can compute the totals in an offline pass after the batch is keyed; online field totals exist only on the 3741. If an operator on the 3742 finds that a batch is out of balance, the batch may be taken to a 3741 operator for correction. This allows the 3742 operator to continue production keying while the 3741 operator, who is specially trained in balancing, uses the online field totals capability to correct the batch.

The 3741 operator rekeys the batch of records which was out of balance. When the net difference in the accumulators matches the amount by which the batch was out of balance, the operator knows that all error records are corrected and thus she does not need to check the rest of the batch.

The field totals accumulators may be read out by displaying them on the CRT or they may be automatically written into a record under program control.

Adding Records to a Batch

If an error is discovered during verification, batch totals, or a count of the number of records in a batch, one or more records may have to be added. The best way to do this is to add the records to the end of a batch. This is simply done by searching to the end of data and adding the records.

Production Statistics

The 3741 and 3742 count the number of records processed, the number of keystrokes used in entering data, and the number of keystrokes used in verify corrections; these totals are stored in three separate counters. The counters may be displayed on the CRT either with or without reset. This data can then be written onto a statistics sheet for weekly or monthly analysis. The contents of the accumulators can also be written out onto a disk.

RECORDING IN THE SOURCE DEPARTMENT

A decentralized or source department keying area is usually characterized by a relatively small number of key entry stations located in the data source area. Source departments may be either local, in the vicinity of the data processing systems and using messenger service or internal mail for delivery of data; or remote, relying on mail or teleccommunications for delivery of data.

Because of the limited number of applications keyed in a decentralized area, the operator is usually knowledgeable of the application. For example, where a clerk is keying parts distribution information from a warehouse, data entry is a secondary part of his job. In these instances, the keying skill of the operator may be lower than usual.

In other situations, the operator is expected to key directly from a complex source document such as an insurance policy file. She selects and enters the proper fields in the correct order out of a large number of possible data fields on the document.

In both of these instances, operator guidance on the 3741 helps the operator to key the correct information at the correct time. Prompting information can be stored in advance and displayed on the CRT to lead the operator through the keying operation. Line 5 of the display shows the prompting messages for the current data field such as CUSTOMER NAME or ADDRESS, and line 6 contains 'slashes' (/) to represent the number of positions available in the field for characters. As the operator keys the characters, they appear both in the display of the keyed record in the usual location on lines 2 through 5 and also on line 6, where they replace the slashes so that the operator may see at a glance how many positions remain in the field she is keying (Figure 11). When a field is completed, the next prompting message appears.

Knowledge of both the source document format and the data record layout is needed to set up operator guidance.

After the data is recorded at the source department, it must be made available to the central data processing system for appropriate processing. Data recorded in remote locations may be transmitted directly to a teleprocessing CPU, or offline to a 3747 Data Converter with

BSCA or a 3741 Model 2 Data Station at the data processing location. In this case, all disks should be retained until the remote site is certain that the data was correctly received and processed.

For more detailed information on telecommunications, see "Teleprocessing Considerations."

If time is not a factor or communications facilities are not available, the diskettes themselves may be transported to the data processing location by mail or private courier system.

If the disks are keyed in a source department which is local, the data may, for convenience, be transmitted over local communication lines but more likely the diskettes will be hand carried or sent by interoffice mail to a 3747 Data Converter. A log of the job and batch numbers and time dispatched should be kept. Since the source department is responsible for input data accuracy and validity, diskettes should be returned to their original departments after processing.

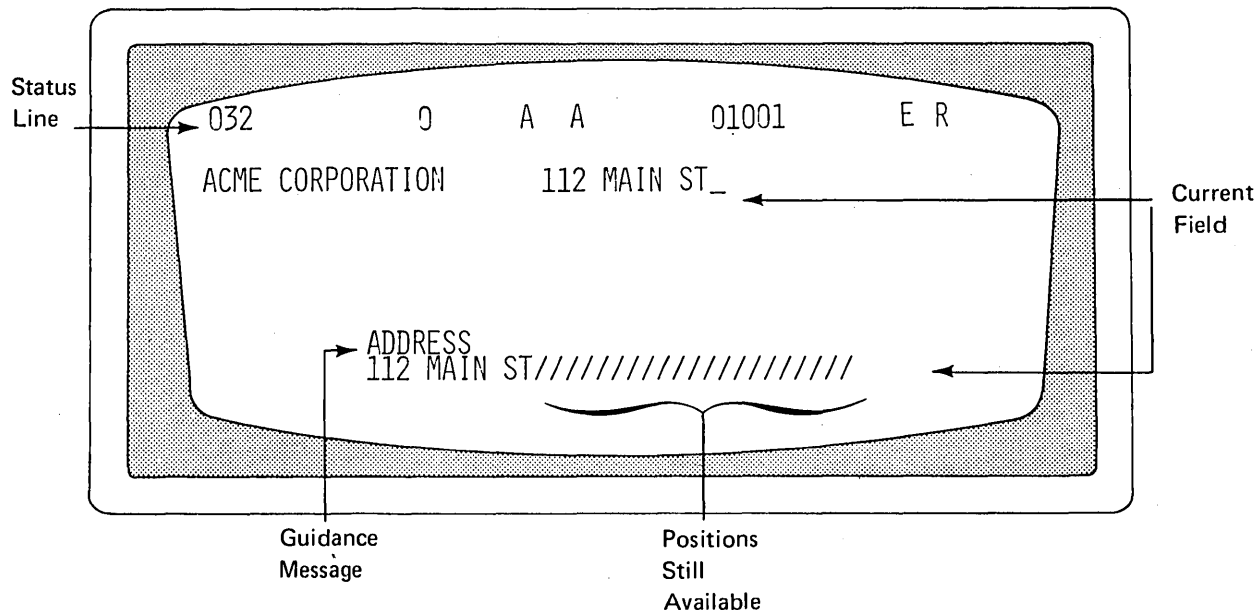


Figure 11. Operator Guidance

DATA CONVERSION

General Procedures

All disks to be converted to tape are delivered (normally hand carried) to the converter. The converter operator selects the batch of disks to be converted and, if needed, places a control record disk with them. The disks are prepared for insertion into the converter and the proper one-half inch tape selected and mounted. (These may have been picked up from a central facility which matched the tape with the specific application or job.) A control record disk is not used if the job is simple transcription to unlabeled tape; multiple data sets may also be transcribed to a tape without the use of the control record.

A control record is required for any job that uses the special features of the converter. These features include:

- Tape Label Processing — Checking and building standard IBM header and trailer records. Current and expiration dates are entered through the keyboard. Operator access to tapes and disks with sensitive data is controlled by a cipher code entered through the keyboard and keylock.
- Erasing tape to the end-of-tape marker following the last data set.
- Tape to Disk Conversion — Writes data from tape onto disk. By using the batching capability, a fixed number of records can be copied to any one disk.
- Bypass Job Totals — If totals are not required, they may be bypassed between multiple data sets. This keeps the converter from stopping between data sets when several are to be transcribed onto the same tape.
- Verify Option — Selected if the disk data sets must be verified before conversion to tape. The verify byte in the data set label is checked before the disk data set is converted.
- Communications — You may select from the following options:
 - Auto answer or manual answer.
 - Nontransparent or transparent text.
 - Identification verification through the terminal or far end device ID codes. These ID codes are specified as part of the control records and are checked automatically by the converter on a switched line.

Job information is available for each data set transcribed. This information includes the number of disks processed, the number of input records, and the number of output records. The record counts can verify that all records were transcribed. Any balance tapes that have already been verified at the key station can again be verified on the CPU if necessary.

This job information is also available if errors occur in the data or on the media and can isolate the record in error; thus aiding in the decision to cancel the job and correct the problem, or to continue and bypass the error record. The address of the last record read on the disk is also available.

The converter employs automatic error recovery procedures whenever error conditions arise. If the automatic recovery attempts fail to correct the problem, the operator is notified through the display lights and is given the option of cancelling the job or bypassing the record identified as in error. Error recovery procedures depend upon the installation, the severity of the error, and the significance of the error to the job.

Once the disks have been transcribed to tape they are returned to the central facility. The tape is scheduled for CPU usage and the disks are either held for results of the initial CPU pass or immediately returned to the key entry area for holding. As soon as the job is accepted by the CPU, the disks can be placed back into circulation and the source documents destroyed or filed. The tape then continues through the normal tape library procedures.

If all records in a job must be accepted before the job is accepted, the control facility should hold the disks until the results of the CPU run are known. These results are then placed with the disks and everything is sent back to the key entry operation for re-use or correction.

Tape Labels

The 3747 can build and check IBM standard tape labels. Tape labels contain information that defines and describes the data on the tape. Each tape label is 80 characters long. This information is organized on the tape as follows:

1. Volume identifier (VOL1) — Contains the serial number assigned to the physical tape reel by the installation.
2. Header labels (HDR1 and HDR2) — Identifies the data set.
3. Tape mark (TM) — Identifies the end of the header records.
4. Data.
5. Tape mark — Identifies the end of the data.
6. Trailer labels — Similar to header labels but the first four characters are end-of-file (EOF) which tells the CPU that there is no more information in that file. The trailer labels also contain a block count; the count does not include the header labels. The 3747 neither builds nor processes end of volume (EOV) labels.

The 3747 handles labeled tapes in the following manner.

When transcribing from disks to tape:

- If a labeled tape is used for a labeled job, tape labels are checked and the security byte is honored. The 3747 builds the needed labels (HDR1, HDR2, EOF1, EOF2) and copies the data sets.
- If a labeled tape is used for an unlabeled job, the job is canceled (VOL1 is not destroyed).
- If an unlabeled tape is used for a labeled job, the job is canceled (no VOL1 is found).
- If an unlabeled tape is used for an unlabeled job, the data is transcribed as in a basic job.

When transcribing from tape to disk:

- If a labeled tape is used for a labeled job, the tape labels are checked and verified. The security byte is honored. Only the data set is transcribed to the disks.
- If a labeled tape is used for an unlabeled job, an error message is displayed and the operator may either cancel the job, or bypass the error by pressing START. If the error is bypassed, the 3747 checks the security of the tape and transcribes all files as data sets; that is, the labels are treated as though they are a file.
- If an unlabeled tape is used for a labeled job, the job is canceled.
- If an unlabeled tape is used for an unlabeled job, all data is transcribed.

TELEPROCESSING CONSIDERATIONS

The IBM 3740 Data Entry System telecommunications facilities allows the user to send and receive binary synchronous data over common carrier facilities or equivalent. The BSC (binary synchronous communications) adapters used by the 3740 perform all functions necessary to establish line connections, exchange identification sequences, send and receive data, and execute the correct termination or disconnect sequences.

The units of the 3740 System may use a switched or non-switched network for point-to-point communications.

Programming Support

In addition to the programming support shown below, the 3741 Model 2 can communicate with either a 3747 with BSCA or another 3741 Model 2, and the 3747 with either the 3741 Model 2 or another 3747 with BSCA.

Teleprocessing programming support will be provided for the 3741 Model 2 and the 3747 with BSCA by the following access methods and operating systems:

System/370

DOS/VS BTAM
OS/VS1 BTAM
OS/VS2 BTAM
OS/VS1 TCAM
OS/VS2 TCAM

System/3 Model 6 or Model 10 Disk

RPG II (3741 Model 2 only)

The 3741 Model 2 and the 3747 with BSCA are transparent to the teleprocessing support which exists in System/360-370 DOS BTAM and System/360-370 OS BTAM and TCAM (level 5). The 3740 units with BSCA are transparent through the device classes of BSC1 and BSC2 in the above access methods.

Because of this capability, the following support is provided:

<i>System/370</i>	<i>System/360</i>
DOS BTAM	DOS BTAM
OS BTAM	OS BTAM
OS TCAM	OS TCAM

Communications with System/360-370 can be via an:

- IBM 2701 Data Adapter Unit
- IBM 2703 Transmission Control Unit
- IBM 3705 Communications Controller

In addition, communication with System/370 can take place via the Integrated Communications Adapter (ICA).

In BTAM and TCAM, the terminal designation is BSC1 or BSC2 depending on whether a leased or switched facility is being used. In System/3 RPG II, the terminal designation is BSCA on the file description specification and blank in the remote device field of the telecommunications specifications.

The 3740 communication units are supported as standard BSC terminals for point-to-point communications on switched or leased facilities. Operation is half-duplex, synchronous, serial-by-bit, serial-by-character. The BSC allows data transmission using EBCDIC directly as the communications line code.

Transmission

An external modem (data set) is used to attach to the telephone lines. The bit rates available are 1200, 2000, and 2400 bits per second (bps). A selectable 600 bps transmission rate is available except in Canada, the United States, and Japan.

The BSC adapter is compatible with the IBM 3872 modem.

Teleprocessing Bibliography

More detailed information appropriate to the system and language support being used is found in the corresponding SRLs as defined in Figure 12.

Configuring Your Teleprocessing System

In deciding what equipment is needed for your teleprocessing network, several factors must be considered and evaluated. The following discussion is meant to help you make some of the decisions involved in configuring your system.

Equipment

Both the 3741 and the 3747 operate at the same bit rate. The 3747, however, because it transmits from tape, minimizes the number of line connections and thus is better suited for locations having large quantities of data to transmit.

If you use a 3741, you may want to pool all data onto two disks. To do this, you can use either both stations of a 3742 or the second disk attachment of a 3741.

If hard copy output is required at remote locations, use a 3713 printer attached to the 3741.

Pooling on Disks

- All data will fit onto two disks.
- You want to minimize the number of line connections.
- You want to minimize line time.
- You plan to operate in unattended mode.

You will probably not pool if you:

- Want one data set per disk.
- Want to avoid the time required for pooling.

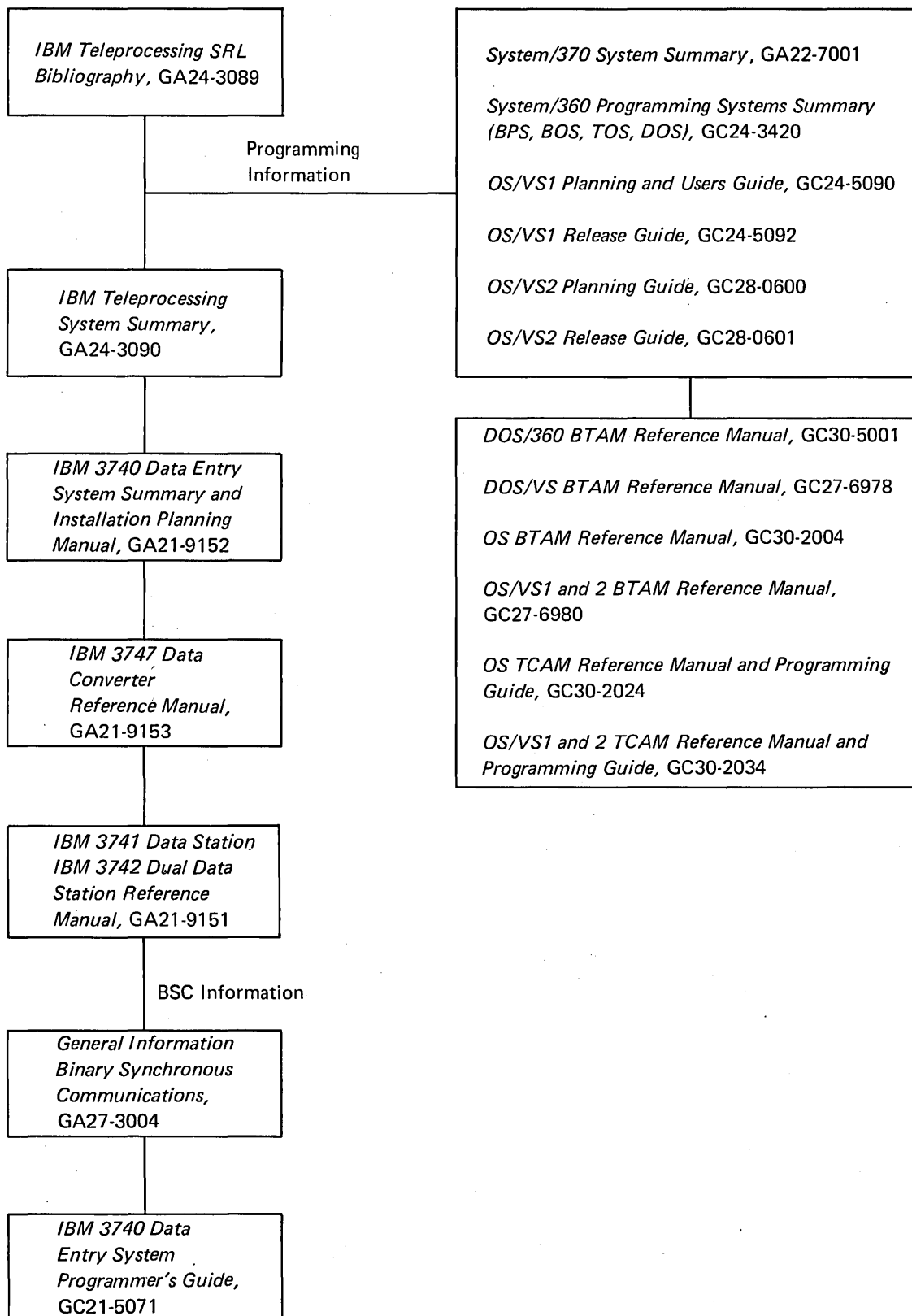


Figure 12. Teleprocessing Bibliography

Attended or Unattended Mode

You will probably operate in unattended mode if:

- You plan to operate on second or third shift because:
 - The receiving CPU is not available on first shift, or
 - You plan to take advantage of lower line costs.
- You pool and all data fits on two disks.
- The receiving location establishes the line connection.

You will probably operate in attended mode if you:

- Use a 3747 to transmit.
- Use a 3741 Model 2 to transmit and all the data will not fit on two disks.

Facilities Considerations

The communications facilities used by the 3740 BSCA must have appropriate modulation/demodulation capability. (Refer to *IBM Teleprocessing Systems Summary*, GA24-3090, for common carrier equipment and services that may be used.) The communications facilities can either be leased, common carrier private line services (channels), common carrier switched telephone networks, or equivalent privately owned facilities.

When transmission speed is a primary consideration on private line facilities, using a four-wire (full-duplex) channel can significantly reduce the time required to reverse the direction of transmission for control. Although use of a four-wire (full-duplex) communications line can minimize turnaround delay, the 3741 Model 2 and the 3747 BSCA cannot receive and transmit data simultaneously; they can perform half-duplex data transmission only.

The exact configuration of 3741s, 3742s, and 3747s at both the remote and central locations depends upon the application and work load. Some typical configurations are shown in the Figures 13 through 16.

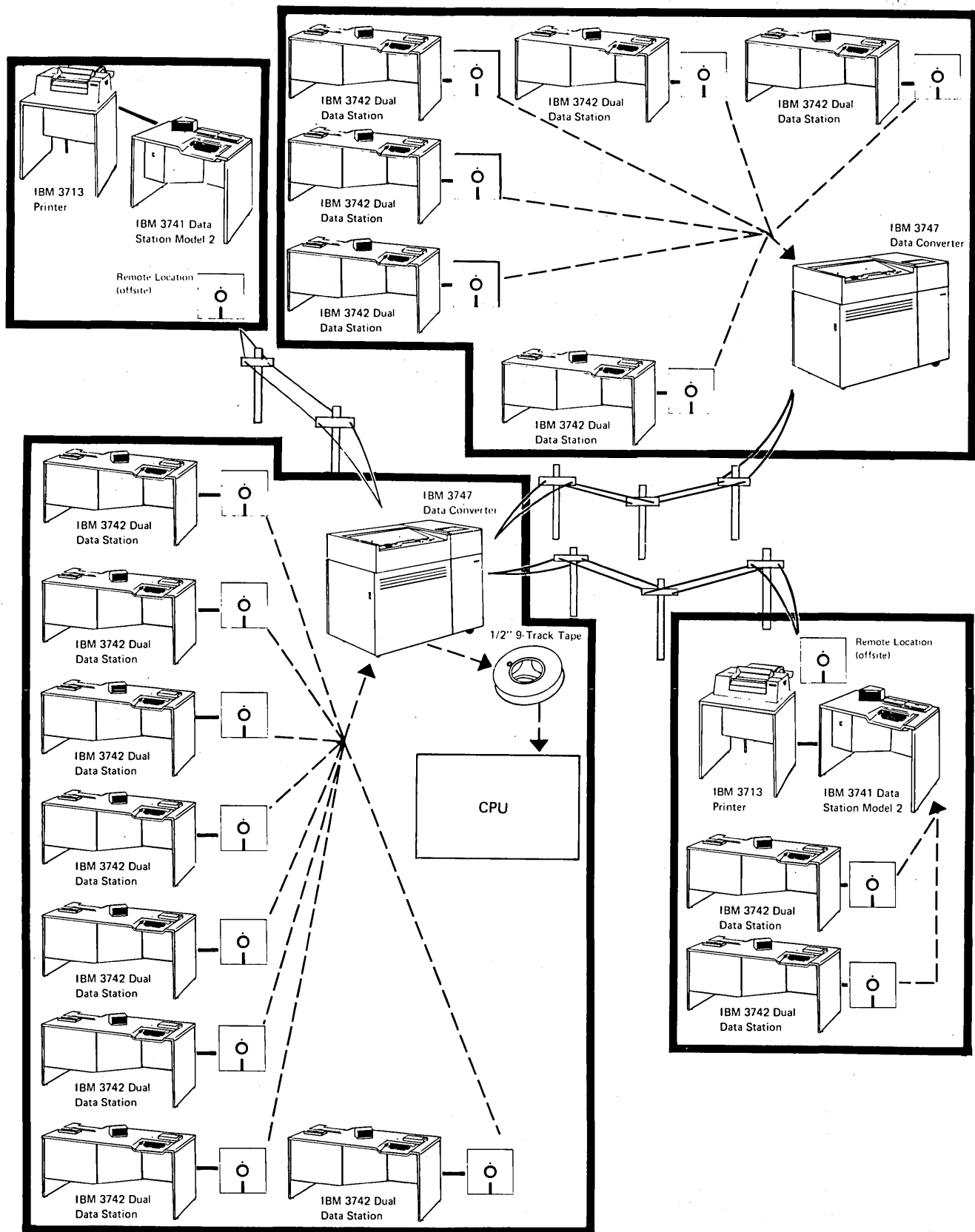


Figure 13. Possible 3740 Telecommunications Configuration

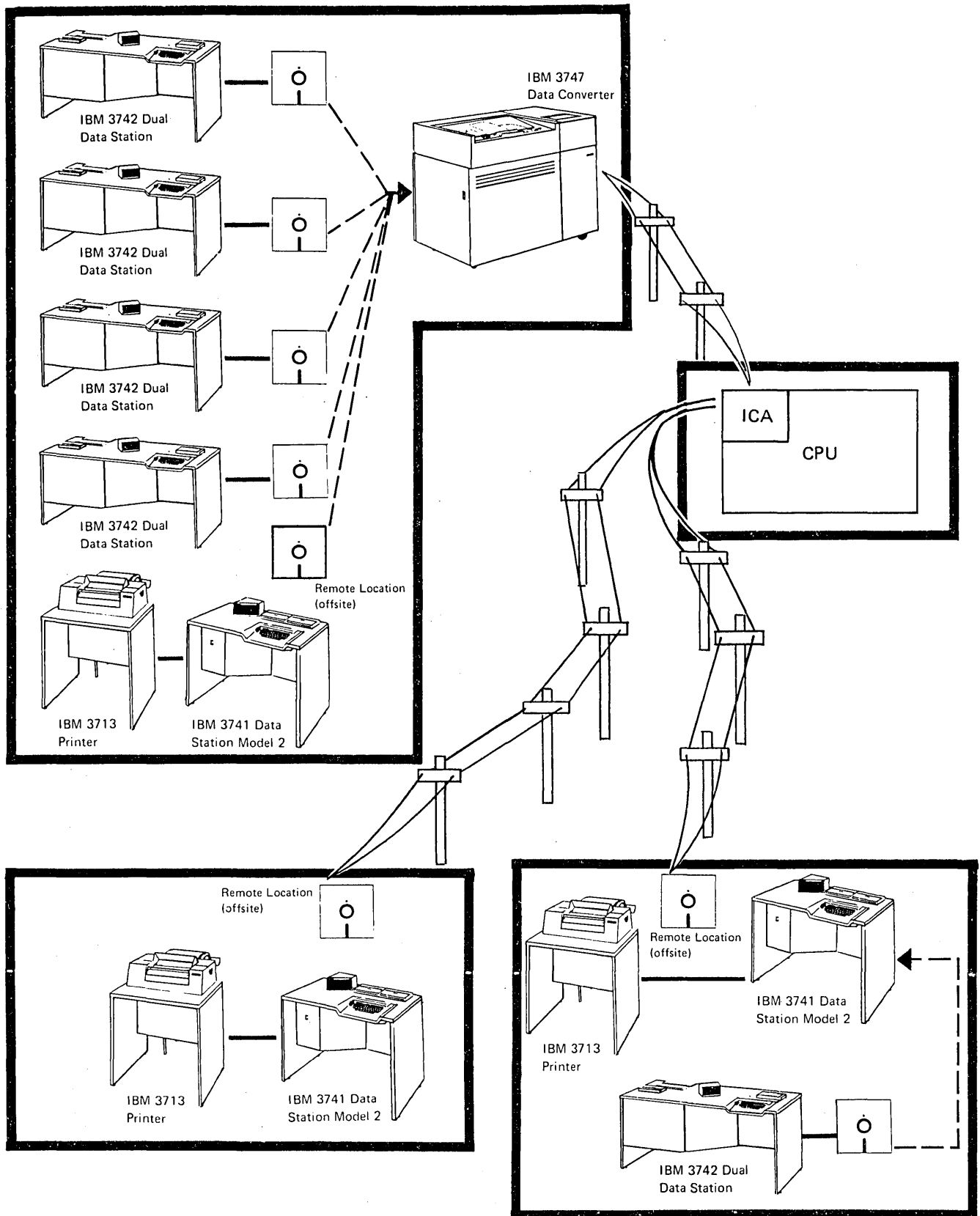


Figure 14. Possible 3740 Telecommunications Configuration

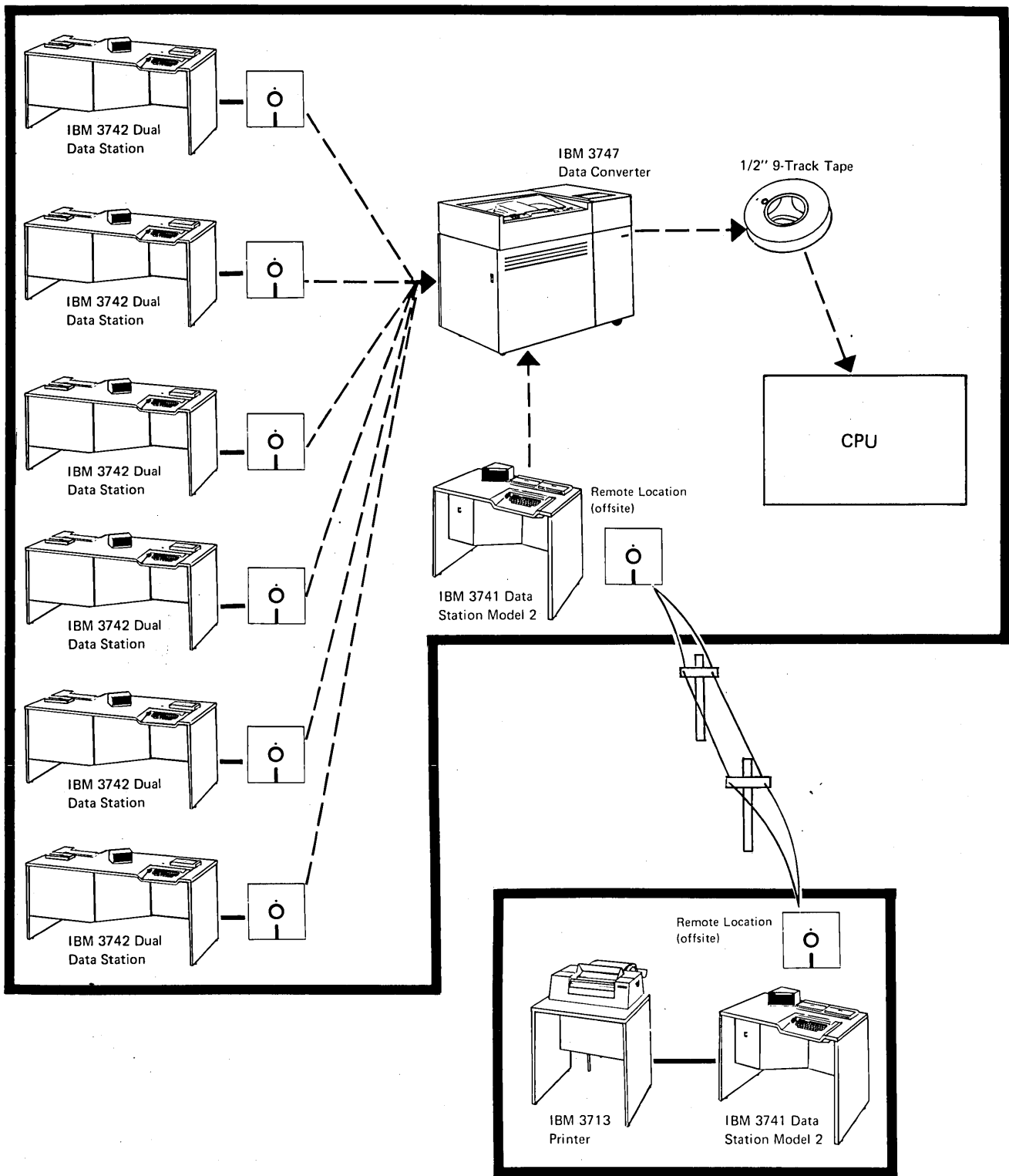


Figure 15. Possible 3740 Telecommunications Configuration

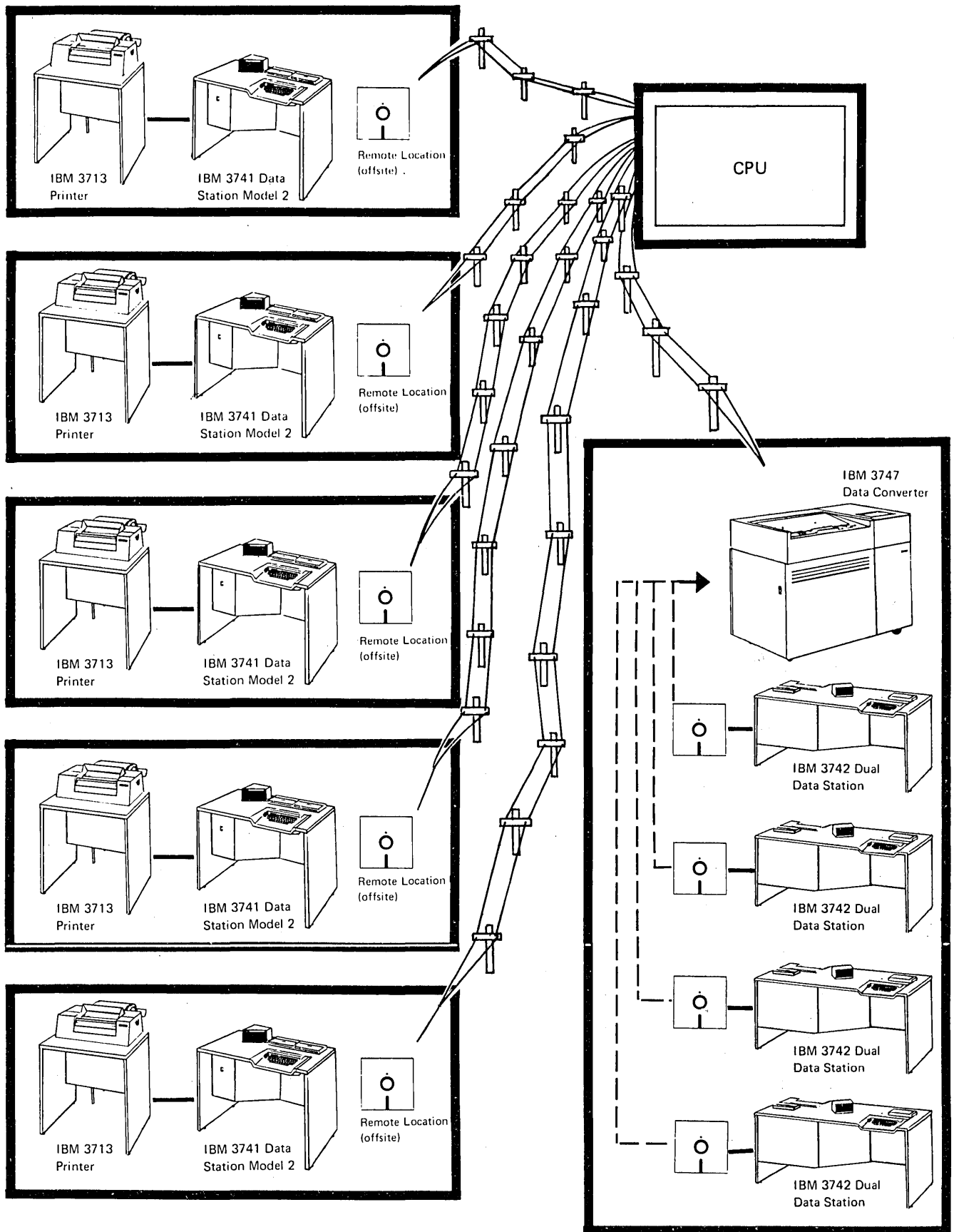
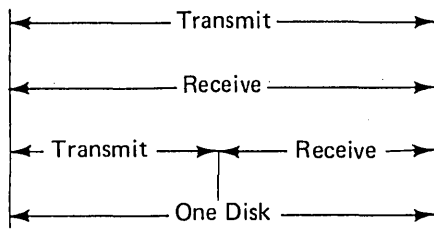


Figure 16. Possible 3740 Telecommunications Configuration

3741 Transmission

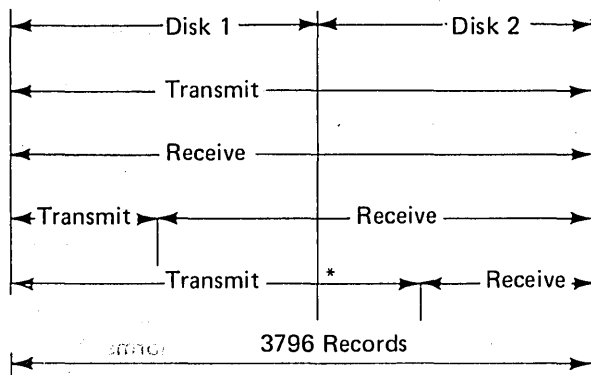
Preparation for Transmission

The 3741 can either transmit or receive information at any given time. It can transmit all the information on a disk; receive the information on a disk; or transmit the information on part of a disk and then receive information on the rest of the disk. The 3741 cannot receive information and then transmit. All transmit and receive segments can consist of single or multiple data sets.



(1898 Records Maximum)

With the second disk feature, the same types of functions as offered with one disk are available. However, when operating in the combined transmit/receive mode and transmitting from disk 2, the data can only be a continuation of a previous data set on disk 1.



*This data must be a continuation of the data set on disk 1.

Disk Data Set Labels

The data set label indicates, by use of a character, the status of the data set. The three types of labels, active, bypass, and delete are indicated by characters in different positions in the label. Active (indicated by a blank) indicates that the data set addressed by that label is to be transmitted when operating in transmit mode. Bypass (B) indicates that any information associated with that label is not to be transmitted, but the label may be later associated with received data sets. Delete (D) indicates that the data set label is deleted, hence, data addressed by that label is neither sent nor received.

When operating in transmit/receive mode, the 3741 Model 2 transmits all data sets with active labels and receives and writes data after the last actively labeled data set. The first bypass label after the last active label is associated with the first received data set, the second with the next, and so forth. Thus, data sets with bypass labels which are placed prior to the last active label are neither transmitted nor written into and may be used to store programs and other information that should not be transmitted. The labels themselves are not transmitted.

Data which is received is written compactly on disk so that, when several data sets are involved, each is written starting in the space adjacent to the previous one. The machine updates the extents in the bypass labels that are associated with received data.

CRT Line 6

During BSC operations, line 6 of the CRT displays diagnostic information that is used by the Customer Engineer during trouble calls.

3747 Transmission

General Procedures

The 3747 can either send or receive data during a single line connection.

The BSC job must be set up by a disk control record. This record defines the functions of the 3747 such as:

- Labeled tape.
- Transmit or receive mode.
- Nontransparent or transparent mode of transmission.
- Auto answer or manual answer.
- An identification of terminal or far end device for switched line job.

Tape labels are neither created nor checked when receiving. They may be bypassed (not sent) when transmitting.

The 3747 can receive calls from multiple remote station and pool the data onto a single tape. Multiple control records are required for this type of operation.

Empty data sets are received as double tape marks on the tape. This will imply end of volume if the 3747 is to read back this tape, that is, tape-to-disk or tape-to-BSC operation. Therefore, every data set should contain some data to avoid an incorrect end of volume.

When sending, the 3747 transmits to a terminal until a double tape mark (end of volume) is detected.

SYSTEM PROGRAMMING CONSIDERATIONS

Data received from the IBM 3740 Data Entry System for input to a CPU is in the form of one-half inch magnetic tape. No special tape programming support is required to process this input. The input will be unblocked data; either unlabeled or labeled depending on the application.

Because of the tape medium, the following considerations may exist where the 3740 is replacing an existing data entry installation:

- No changes.
- JCL changes only.
- Application program changes.

The considerations discussed here refer to both OS and DOS unless otherwise noted. They are broken into two categories of media replacement: card and tape.

Card Replacement

There are normally two modes of entering card data to a system; staged through the SYSIN facility or directly to a processing program. The latter mode may simply be a preprocessing program which provides a labeled tape for direct input to the main processing program.

No changes are required to the operating procedures if the input data is currently entered through a SYSIN file or a card to tape utility.

If a SYSIN file is used, the IBM 3747 Data Converter can create the SYSIN file on tape. The operator assigns the system reader to a tape instead of to a card reader. The SYSIN file is created by pooling disks with JCL records with the data disks or by including the JCL records with the data keyed onto the disk. The SYSIN procedures assume that all records are 80 characters long.

If the job is being run in OS using a cataloged procedure, each new collection of data on the SYSIN tape must begin with a record of the form:

```
//procstepname.ddname DD *
```

When a card to tape utility pools data and creates a tape file for input to the system, the 3747 can do the same job and thus save system time. The 3747 can create an unlabeled or labeled tape for direct input to the application program. If the utility program did more than transcribe data, then additional considerations must be evaluated as outlined below.

Only JCL changes are required if (a) the tape is input directly to a job (private volume concept), or (b) labels are added to the input file. These will be the most common changes in an installation.

When only a change in medium is involved (that is, tape instead of card), the device assignment is all that needs to be changed. The DOS change is:

```
From: // ASSGN SYSIPT,X'00C' or  
      ASSGN SYSIN,X'00C'
```

```
To:   // ASSGN SYSIPT,X'181' or  
      ASSGN SYSIN,X'181'
```

This change assumes that the input is part of the SYSIN (SYSRDR/SYSIPT) file.

From: //DATA DD *

These changes assume that the application program does not have a device dependent code (such as stacker select) and is not using a card DTF or DCB control block.

- For DOS, add the statement:

```
// TLBL ---
```

```
//DATA DD ---,LABEL=(,SL), ---
```

In DOS, if the input is currently assigned to a programmer unit (for example, SYS001 – SYSXXX) this generally implies a device dependent control block is used and additional programming changes are required. When an application is modified in any way; such as, combining record types to use the 128 character records, program changes are required. The changes range from simple control block and buffer size changes to partial or total rewrite of the application. In OS, if these changes are size changes only, they may be made through the DCB parameters in the JCL statements.

simple pre-edit functions can be combined with the main edit program and thus eliminate the need for the pre-edit run.

Tape Replacement

JCL changes may, however, be required if, for example, you are switching from seven-track to nine-track tape or from 800 bpi to 1600 bpi. In DOS, this change would be:

To: // ASSGN SYS001,X'181,X'C0" nine-track
tape drive

From: //DATA DD ---,UNIT=2400-1--- seven-track
tape drive

For changes needed to input a labeled tape instead of an unlabeled tape, see the example under "Card Replacement."

Pre-Installation Planning

Customers planning an IBM 3740 Data Entry System installation should use this manual as a guide to determine how they can best prepare their property for the arrival and installation of the system. Careful advance planning makes it possible for a customer to install his equipment with little or no interruption of the daily office routine.

SPACE REQUIREMENTS

Since the data entry areas may differ in room size, column spacing, location of electrical outlets, other equipment, and work areas, it may be advisable to prepare a floor plan of the area showing the location of all the equipment to be included.

If a floor plan is used, IBM provides a plastic template (GX21-9155) of each of the 3740 units. The templates are scaled as 1/4 inch = 1 foot (1 mm = 50 mm), and show the floor space, and working clearance for each unit. When room size permits, additional operator space is recommended. In some cases, clearances shown on the templates may be overlapped as long as the larger clearance is maintained.

The following items should be considered:

- Work space.
- Storage space.
- Aisle space.
- Service clearance.
- Heat dissipation.
- Electrical outlets and communication facilities.
- Doorway sizes and loading facilities used in getting machines to their locations.

SCHEDULING

To be sure that the machine area is ready when the system is delivered, a physical planning schedule might be helpful. Because each installation will differ in some respects from any other, it is not possible to provide a precise schedule in this publication.

If building alterations such as painting, expansion of electrical service or installation of communication facilities are necessary, plans should be complete and ready for work to begin approximately four months before scheduled machine delivery.

All alterations should be complete a week before machine delivery.

ENVIRONMENTAL CONSIDERATIONS

Temperature and Humidity

The temperature and humidity of a data entry area are influenced by many factors. These include heat produced by mechanical and electrical equipment, amount of fresh air entering the area, personnel body heat, and heat introduced or dissipated through walls, ceilings, and floors. As these factors change, varying amounts of heat and humidity may need to be deliberately introduced or dissipated to maintain an acceptable operating environment.

Humidity-Associated Problems

Extremes in relative humidity, if maintained for long periods of time, may have an adverse affect on the overall operating efficiency of the installation and should be avoided whenever possible. High relative humidity may cause operator discomfort. Humidity levels approaching the minimum limit aggravate problems associated with static electricity. Static charges, which are usually dissipated without any adverse effects, tend to build into significant charges when the humidity is low. High voltage static discharges from moving people, carts, furniture, paper, etc., can be objectionable to operating personnel and, in extreme cases, can interfere with the correct operation of electronic equipment.

Tape and Disk Storage

Both tape and disks should be stored in dust proof containers in a vertical position. They should never come in contact with magnetic material since field strengths greater than 50-oersted can cause loss of information or introduction of noise.

Storage facilities should be within the following limits:

	Tape	Disk
Dry Bulb Temperature	40° to 90° F (4° to 32° C)	50° to 120° F (10° to 49° C)
Wet Bulb Temperature (maximum)	80° F (26° C)	85° F (29° C)
Relative Humidity	20 to 80%	8 to 80%

If stored outside the above conditions, both tape and disk should be conditioned in the operating environment to ensure proper performance. Conditioning time for disks is at least five minutes and for tape the same length of time it was beyond the recommended limits up to a maximum of 24 hours.

Dirt and Air Pollution

The amount of contamination usually found in air within a normal business environment will not interfere with the operation of IBM equipment. However, take normal precautions to keep dust, dirt, and other foreign matter away from the machines. If the system must be installed in an area having a high dust content or where there is an exposure to abrasive materials or corrosive gases, contact an IBM Installation Planning Engineer for advice and recommendations.

LIGHTING

Adequate illumination of a data entry area for operator personnel and for service personnel is important. The recommended light level is 50-55 foot-candles (538-592 lumens/m³) at a height of 30 inches (762 centimeters) above the floor.

Direct sunlight is not recommended on either the 3741 or 3742 since it would impair the readability of the CRT as well as the comfort of an operator facing the light.

Fire Protection Equipment

The machine room should be equipped with portable, carbon dioxide fire extinguishers of suitable size for quick, efficient use. These, of course, are subject to local building code and fire insurance requirements. A non-wetting extinguishing agent for electrical equipment (Class C hazard) is recommended.

ELECTRICAL REQUIREMENTS

All reasonable efforts have been made in the machine design to ensure satisfactory operation from the normal power supplied by most power companies.

Power should not be supplied from the same electrical circuit that supplies power to machines that may create electrical noise. Some machines having start-stop motor action can cause transient electrical noise signals. If there is a question of electrical noise affecting machine operation, an IBM Installation Planning engineer should be consulted.

Branch circuits should be protected by circuit breakers suitable for motor load application and should contain wiring that will handle the same load.

Grounding

Power cords supplied with each IBM unit have a green (or green with yellow trace) wire grounding conductor for equipment ground. The receptacles recommended provide for connection of this equipment ground. Each customer-supplied branch circuit must have an insulated wire conductor, equal to the size of the phase conductors, for the purpose of grounding equipment. All branch circuit grounding wires must be tied to a common ground point at the distribution panel, and a single grounding wire should run from the distribution panel to service ground or suitable building ground. *This is a non-current carrying ground, not a neutral.* Conduit must not be used as the only grounding means.

Power Supply

Power is provided through a separate power cord, 8 feet long, connected to each machine (unless otherwise noted on the unit specification page).

On 50 hertz machines, power cords are provided without plugs to accommodate installing a local standard plug. The power cord consists of 3 AWG #16 conductors, no shielding, and has an outside diameter of 0.39 inch (1 centimeter).

The following electrical specifications apply:

	50 Hertz	60 Hertz
Voltage (single phase)	100,110,123.5* 200,220,235	115*,208,230 (100*,200 Japan only)

Voltage Tolerance: $\pm 10\%$








Frequency Tolerance: $\pm 1/2$ Hz

*The Operator Identification Card Reader feature operates only at these voltages and frequencies.

Convenience Outlets

A suitable number of convenience outlets should be available in the area for use by building maintenance personnel, Customer Engineers, etc. The same general rules for electric power environment apply for the wiring of the convenience outlets.

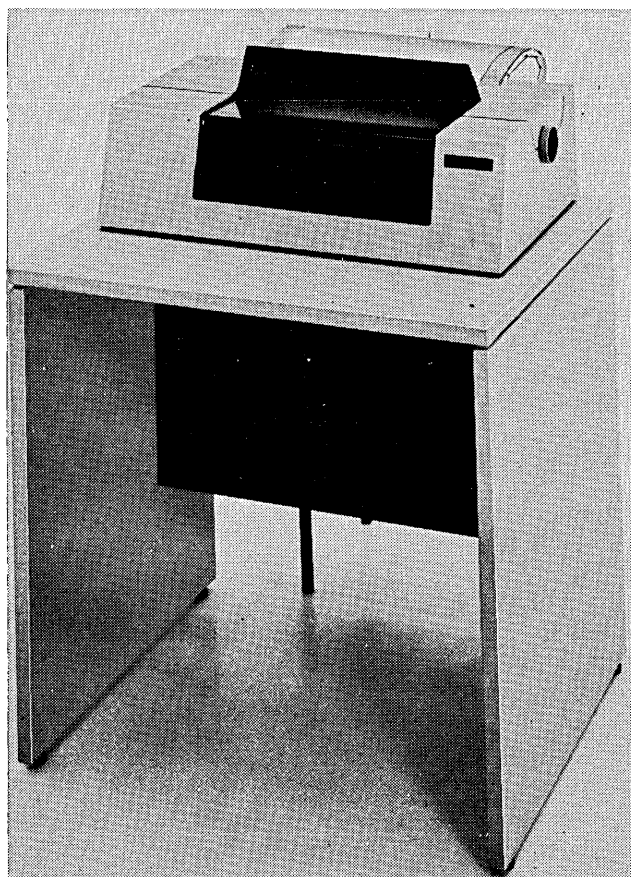
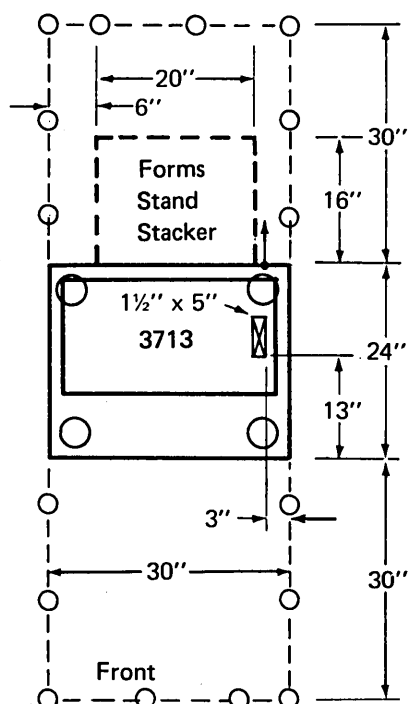
This section of the manual contains individual pages of information about the basic system. Standard symbols used on the unit specifications pages and physical planning templates are:

-  Power Cord Exit (power cords are measured from power cord exit)
-  Gate Swings
-  Service Area Boundary
-  Casters
-  Leveling Pads or Glides
-  Cable Entry and Exit
-  Non-Raised Floor Cable Exit

Plug types (or equivalent) shown are supplied with the machine. Customer provides matching receptacle.

3713 Printer

PLAN VIEW



SPECIFICATIONS

Dimensions:

	F	S	H
Inches	30	24	38
Centimeters	76	61	97

Service Clearances:

	F	R	Rt	L
Inches	30	30	0	0
Centimeters	76	76	0	0

Weight: 150 lb (68 kg)

Heat Output: 260 Btu/hr (66 kcal/hr)

Air Flow: convection cooled

Power Requirements (powered from the 3741):

kVA	0.2
Phases	1

Environment Operating:

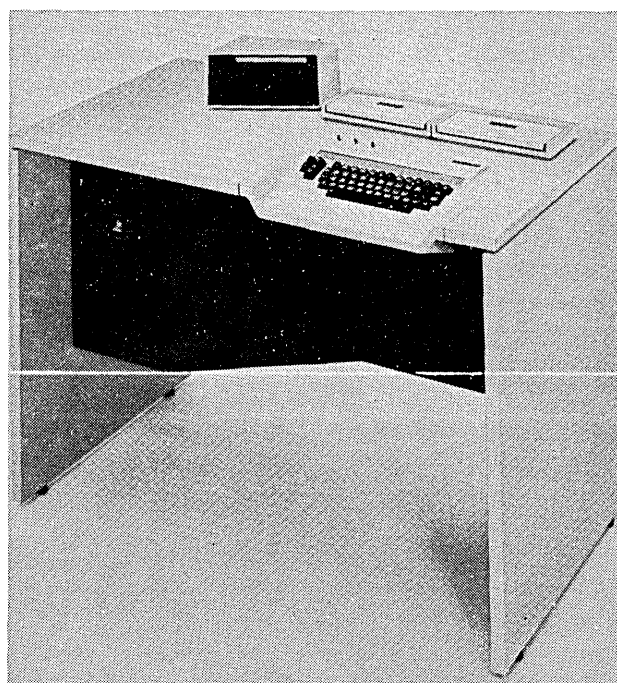
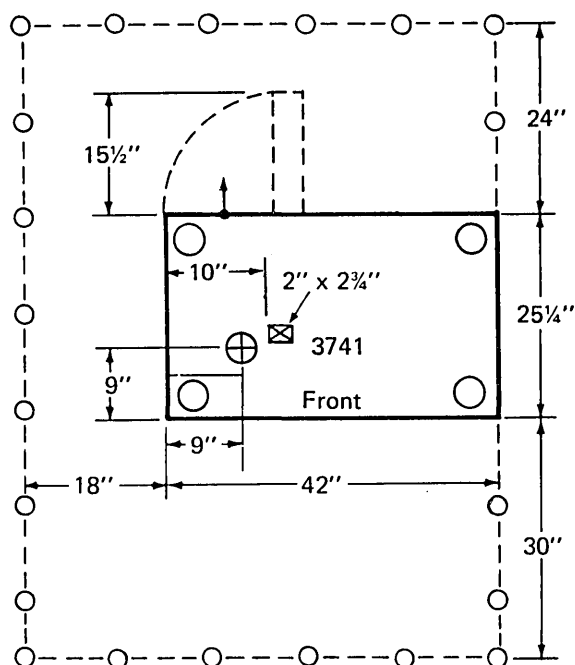
Temperature	50° to 110° F (10° to 43° C)
Relative Humidity	8 to 80%
Maximum Wet Bulb	85° F (29° C)

Environment Nonoperating:

Temperature	50° to 125° F (10° to 51° C)
Relative Humidity	8 to 80%
Maximum Wet Bulb	85° F (29° C)

3741 Data Station Models 1 and 2

PLAN VIEW



SPECIFICATIONS

Dimensions:

	F	S	H
Inches	42	25 1/4	34
Centimeters	107	64	87

Service Clearances:

	F	R	Rt	L
Inches	30	24	0	18
Centimeters	76	61	0	46

Weight: 240 lb (109 kg)

Heat Output: 850 Btu/hr (215 kcal/hr)

Air Flow: 150 cfm (4 m³/min)

Power Requirements:

kVA	0.4
Phases	1
Plug*	5266 (115V), 5666 (208/230V) 4720 (115V), 4770 (208/230V)**

Environment Operating:

Temperature	60° to 90° F (16° to 32° C)
Relative Humidity	8 to 80%
Maximum Wet Bulb	73° F (23° C)

Environment Nonoperating:

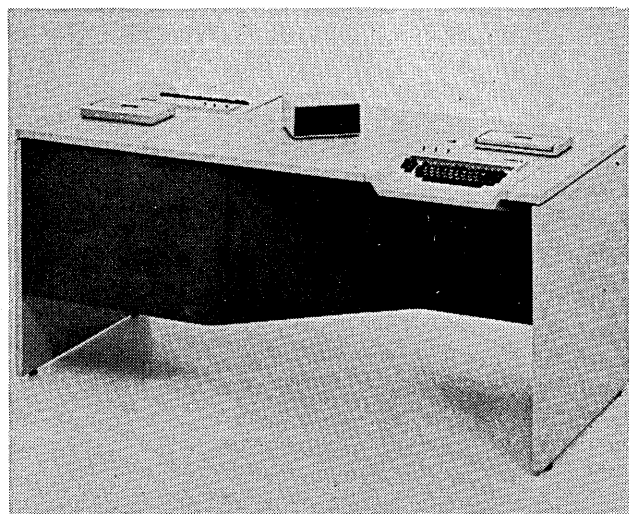
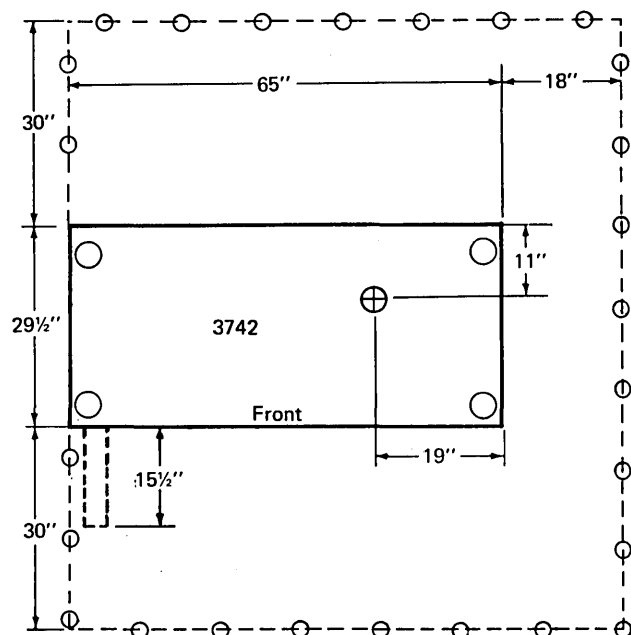
Temperature	50° to 110° F (10° to 43° C)
Relative Humidity	20 to 80%
Maximum Wet Bulb	80° F (27° C)

*Numbers given are the catalog numbers for both Hubbell and Pass & Seymour.

**Locking type.

3742 Dual Data Station

PLAN VIEW



SPECIFICATIONS

Dimensions:

	F	S	H
Inches	65	29 1/2	33
Centimeters	165	75	84

Service Clearance:

	F	R	Rt	L
Inches	30	30	*	*
Centimeters	76	76	*	*

Weight: 300 lb (136 kg)

Heat Output: 850 Btu/hr (215 kcal/hr)

Air Flow: 150 cfm (4 m³/min)

Power Requirements:

kVA	0.4
Phases	1
Plug**	5266 (115V), 5666 (208/230V) 4720 (115V), 4770 (208/230V)***

Environment Operating:

Temperature	60° to 90° F (16° to 32° C)
Relative Humidity	8 to 80%
Maximum Wet Bulb	73° F (23° C)

Environment Nonoperating:

Temperature	50° to 110° F (10° to 43° C)
Relative Humidity	20 to 80%
Maximum Wet Bulb	80° F (27° C)

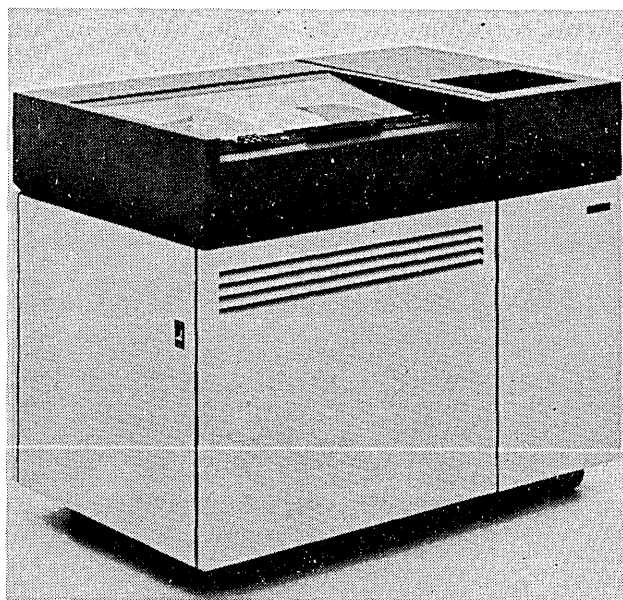
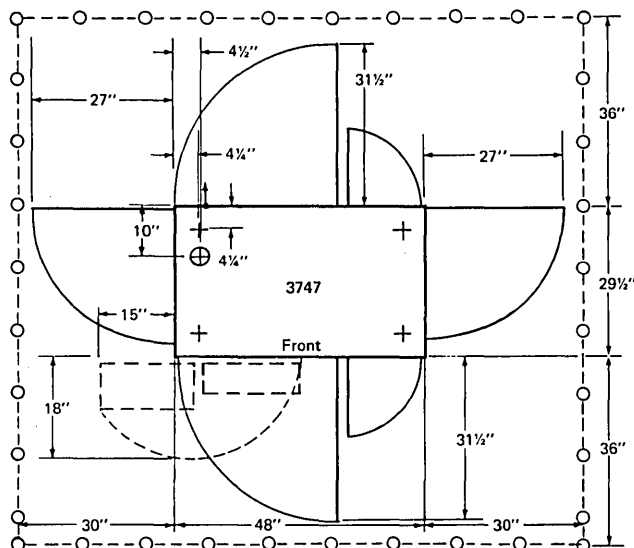
*18 inches (46 centimeters) service clearance required on one side only.

**Numbers given are the catalog numbers for both Hubbell and Pass & Seymour.

*** Locking type.

3747 Data Converter

PLAN VIEW



SPECIFICATIONS

Dimensions:

	F	S	H
Inches	48	29½	38
Centimeters	122	75	97

Service Clearances:

	F	R	Rt	L
Inches	36	36	30	30
Centimeters	91	91	76	76

Weight: 540 lb (245 kg)

Heat Output: 2045 Btu/hr (515 kcal/hr)

Air Flow: 225 cfm (6 m³/min)

Power Requirements:

kVA	0.7
Phases	1
Plug	5266 (115V), 4720 (115V locking type)* 5666*, FS 3720** (208/230V)

Environment Operating:

Temperature	60° to 90° F (16° to 32° C)
Relative Humidity	20 to 80%
Maximum Wet Bulb	78° F (26° C)

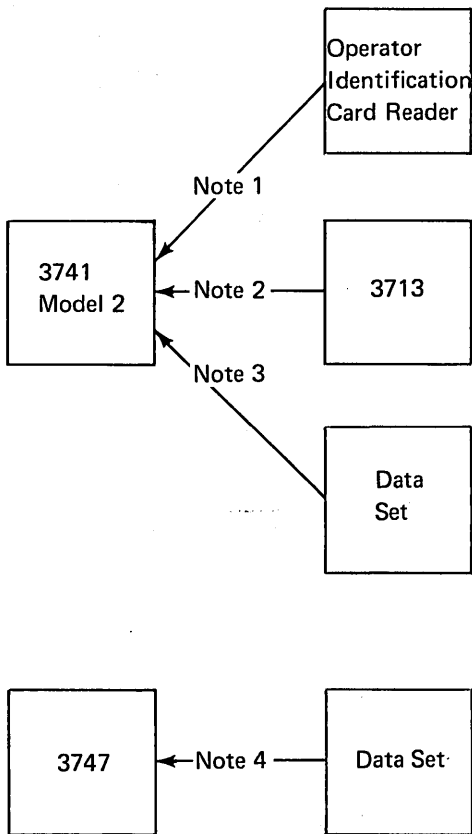
Environment Nonoperating:

Temperature	50° to 110° F (10° to 43° C)
Relative Humidity	8 to 80%
Maximum Wet Bulb	80° F (27° C)

*Numbers given are catalog numbers for both Hubbell and Pass & Seymour.

**Number given is catalog number for Russell & Stoll; used for raised floor application.

3740 Cabling Information



Notes:

1. 3½ foot cable supplied with Operator Identification Card Reader.
2. 10 foot cable supplied with the 3713 Printer.
3. 20 foot cable supplied with Data Set Adapter. Attaches to communication facility with EIA RS 232 C connector.
4. A 20 foot cable from the 3747 to the data set will be provided as standard unless a different length is specified at the time of the order. A maximum length of 40 feet is available.

- access methods 32
- adding records 29
- adjustable margin feature 13
- air pollution 45
- application program changes 42
- attended mode 35
- automatic error recovery 13, 31
- auto record advance switch 7
- backup 21
- bad spots 24
- batch control total 8
- beginning of extent 17
- bibliography, teleprocessing 34
- binary synchronous communications 2
- binary synchronous communications adapter 10, 11
- BOE 17
- BSCA
 - 3741 10, 11
 - 3747 13
- cabling information 52
- card replacement 42
- capacity, disk 22
- care, diskette 24
- centralized key entry room 27
- changes, programming 20
- colored labels 24
- communications 31
 - links 20
 - services 20
- concepts
 - media 17
 - system 1
- configurations 33, 36-39
- contaminated diskettes 25
- content, search 8
- contingency 21
- control record 42
- convenience outlets 46
- conversion, data 31
- copy 8
- CRT display
 - 3741 9
 - 3742 5
- CRT line 6 41
- CRT operator display 2
- cursor 5
- damaged diskettes 25
- data conversion 31
- data converter 12
- data converter operators, education 19
- data set labels 41
- decentralization 1
- decentralized department 29
- deleted record 7
- design concept 2
- dirt 45
- disk
 - capacity 1, 22
 - copy 8
 - data set label 41
- diskette
 - care 24
 - damaged or contaminated 25
 - description 22
 - IBM 1, 17, 20
 - replacement 25
 - requirements 24
 - serial number 21
- disk
 - initialization 8
 - internal labels 21, 27
 - storage 24, 25
- display production statistics key 7
- duplication fields 7
- editing programs 20
- education 19
 - data converter operators 19
 - key entry operators 19
 - supervisor 19
 - system analyst 19
- electrical power 19
- electrical requirements 45
- end of data 7, 17
- end of extent 17
- entering data 7
- environment 19
- environmental considerations 24, 44
- EOD 17
- EOE 17
- EOF 32
- equipment 33
 - fire protection 45
- estimating diskette requirements 24
- external labels 23
- facilities 35
- features 3
 - adjustable margins 13
 - 3747 13
- field totals
 - offline
 - 3741 10
 - 3742 8
 - online 10
 - using 29
- fire protection equipment 45
- format control
 - source department 15
 - host CPU 15
- forms thickness 13
- functions 3

grounding 45

HDR 32

header labels 32

header records 28

horizontal print control 13

humidity 44

IBM diskette 1, 17

description 22

IBM 3713 Printer 1, 13

IBM 3741 Data Station 1, 9

IBM 3742 Dual Data Station 1, 4

IBM 3747 Data Converter 1, 12

index track 17

initialization 8

installation guide 18

installation procedural forms 20

internal labels 27

JCL cards 20

JCL changes 42

job totals 31

key entry operators, education 19

key entry programs 27

keyboard, 3742 6

keying 28

keylock 12

keystroke counter 7

labeled tape 32

labels 17, 20

colored 24

disk data set 41

external 23

layouts 19

lighting 45

line code 33

line 6, CRT 41

magnetic tape 21

media concepts 17

merging records 8

Model 2, 3741 10

modems 21, 33

modes of operation 5

normal surface wear 26

NRZI tape drive 13

offline field totals 8, 10

operating procedures 20, 27

operating systems 32

operational readiness 21

operator guidance 10, 30

operator identification card reader 12

operator interface 2

operators

data converter 19

key entry 19

operator training course 20

phase encoded tape drive 13

physical planning 19

plan views

3713 48

3741 49

3742 50

3747 51

preinstallation planning 44

checklist 19

primary station 8

print continuation 11

printer 13

attachment 11

forms 20

print format 15

print modes 13

processing programs 20

production statistics 7, 29

program chaining 8

program control 6

program disks 21, 27

programs, key entry 27

program level A 15

programming changes 20

programming support 32

programming, system 42

prompting messages 10

pooling 33

pooling to tape 42

power supply 45

record address 17

record counter 7

records, header 28

reformatting 11

reinitialization 8

replacement, diskette 25

requirements, diskette 24

restructuring, job 21

scheduling 44

search mask 8

search on content 8

search on end of data 7

search on record address 7

search sequential content 8

second disk 10

sector 17

self-check 8

sequential content, search 8

skip fields 7

source department 29

space requirements 44

spare tracks 8

- specifications
 - unit 47
 - 3713 48
 - 3741 49
 - 3742 50
 - 3747 51
- standard functions 3
- status line 5
- storage 19
 - disk 24, 45
 - tape 45
- suggested operating procedures 27
- supervisor, education 19
- supplies 20
- synchronous clock 11
- system concept 1
- system programming 42
- system analyst, education 19
- tape
 - labeling 13
 - labels 31, 32
 - mark 32
 - replacement 43
 - storage 45
- tape to disk 13, 31
- telecommunications 2
- teleprocessing 20, 32
- teleprocessing bibliography 34
- temperature 44
- terminal designation 33
- terminal identification 11
- TM 32
- track 17
- track 00 17
- trailer labels 32
- training 19
- transmission
 - 3741 41
 - 3747 41
- unattended mode 35
- unit specifications 47
- updating data 7
- verification 7
- verify 7
- verify correction keystroke counter 7
- verifying 29
- verify option (3747) 31
- vertical forms control 13
- volume identifier 32
- VOL1 32
- wear, normal 26
- 3713 13
 - plan view 48
 - specifications 48
- 3741 9
 - Model 2 10
 - plan view 49
 - specifications 49
 - transmission 41
- 3742 4
 - plan view 50
 - specifications 50
- 3747 12
 - plan view 51
 - specifications 51
 - transmission 41
- 3872 33

READER'S COMMENT FORM

IBM 3740 Data Entry System
System Summary and
Installation Planning

GA21-9152-0

YOUR COMMENTS, PLEASE . . .

Your comments assist us in improving the usefulness of our publications; they are an important part of the input used in preparing updates to the publications. All comments and suggestions become the property of IBM.

Please do not use this form for technical questions about the system or for requests for additional publications; this only delays the response. Instead, direct your inquiries or requests to your IBM representative or to the IBM branch office serving your locality.

Corrections or clarifications needed:

<i>Page</i>	<i>Comment</i>
-------------	----------------

Please include your name and address in the space below if you wish a reply.

- Thank you for your cooperation. No postage necessary if mailed in the U.S.A.

102 704056

Cut Along Line

Fold

Fold

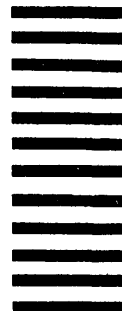
FIRST CLASS
PERMIT NO. 387
ROCHESTER, MINN.

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY . . .

IBM Corporation
General Systems Division
Development Laboratory
Rochester, Minnesota 55901



Attention: Publications, Dept. 245

Fold

Fold

IBM

International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)

IBM

**International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)**

**IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)**