

XIV GE 12-POCKET DOCUMENT HANDLER (1200 Documents Per Minute)

GENERAL DESCRIPTION

The GE 12-Pocket Document Handler Subsystem is designed for input to the GE-225 Information Processing System. It consists of one or two document handlers (sometimes called sorter units) and an adapter (which is a controller). The document handler (Figure XIV-1) accepts random-sized documents encoded with a

special font of magnetic ink character recognition characters (abbreviated as MICR). It reads the magnetically-encoded information into the memory of the computer via the adapter and the controller selector. From memory, the information is often transferred to magnetic tape where it can be used in updating master files, for other calculations, and for storage. On-line document reading and sorting can

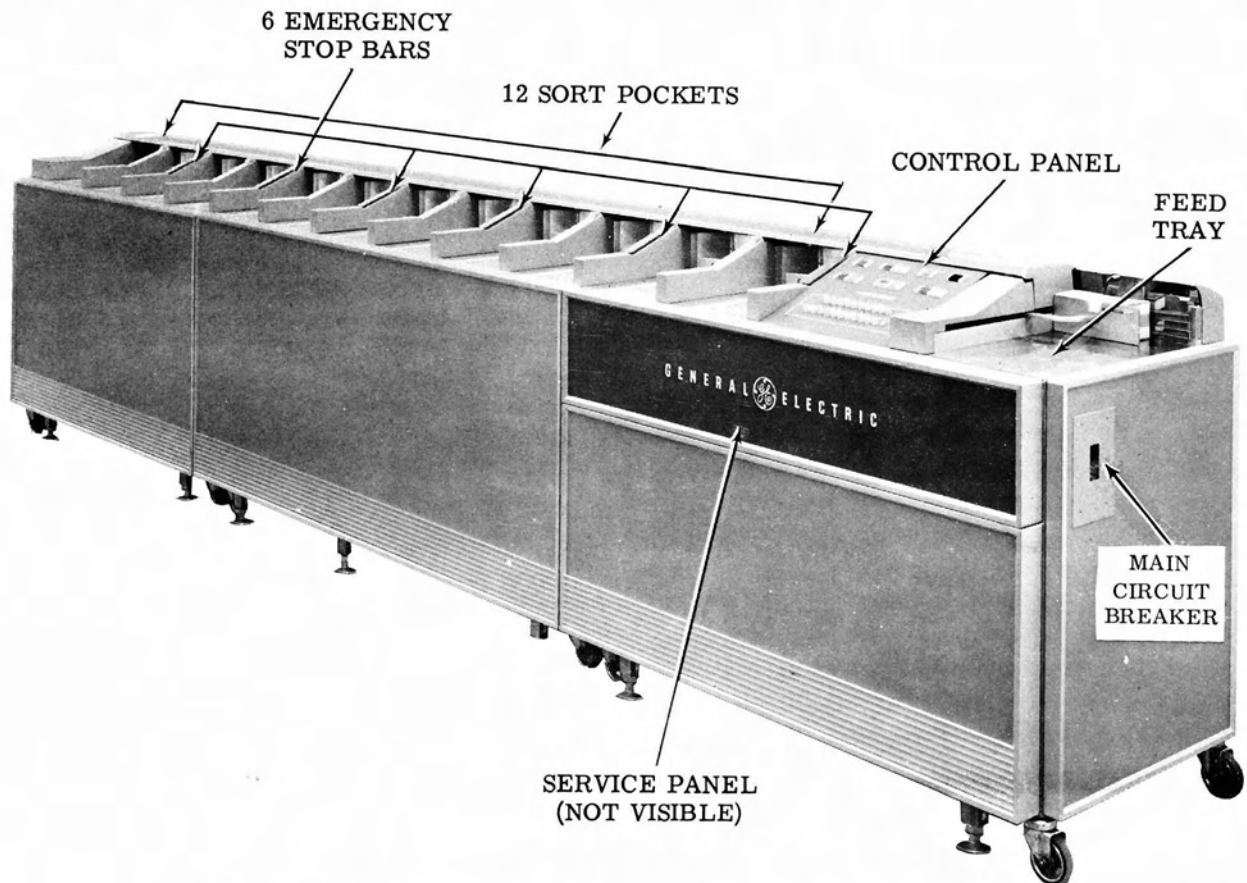


Figure XIV-1. GE 12-Pocket Document Handler (1200 Documents/Minute)

GE-225

proceed concurrently with other peripheral operations and with central processor computation. Documents may be sorted into any or all twelve pockets in an order determined by the computer program at the rate of 1200 documents per minute. The document handler may also be used off line as a separate unit to sort documents. When sorting off line, the adapter is not used, and a wired plugboard and controls set by the operator determine the order of sorting.

Document handler applications often consist of a combination of on-line and off-line operations. Off-line sorting can be carried on after the information has been read into the computer, during computer computation. For example, the documents may be sorted off line into account-number sequence.

Two models of 12-pocket document handler subsystems are used with the GE-225 System. The 1200 document-per-minute handler described in this section is model number S12B. The other model, the 750 document-per-minute handler, is described in Section XV.

The Document Handler

The document handler illustrated in Figure XIV-1 is an electromechanical device which has two functional categories of components: Those associated with feeding, transporting, and stacking documents; and those associated with reading document content. These functions are aimed at achieving two ultimate objectives: to get the desired information from magnetically encoded characters into the memory of the computer for processing; and to automatically separate or sort batches of intermixed documents into a desired sequence for filing or other purposes.

Document Feeding, Transporting, and Stacking. The mechanical feed and transport system is comprised of the feed tray or hopper, the drive motors, the stacker drums, a complex of friction belts and pulleys, a vacuum system, and twelve stacking pockets or trays into which the sorted documents are stacked. Figure XIV-2 shows the location of some of the document handler components.

The feed hopper, located at the top right end of the handler, is twelve inches long and can hold approximately 2,500 documents of varying sizes. The twelve stacking pockets are identified as Special, 0, 1, 2, 3,

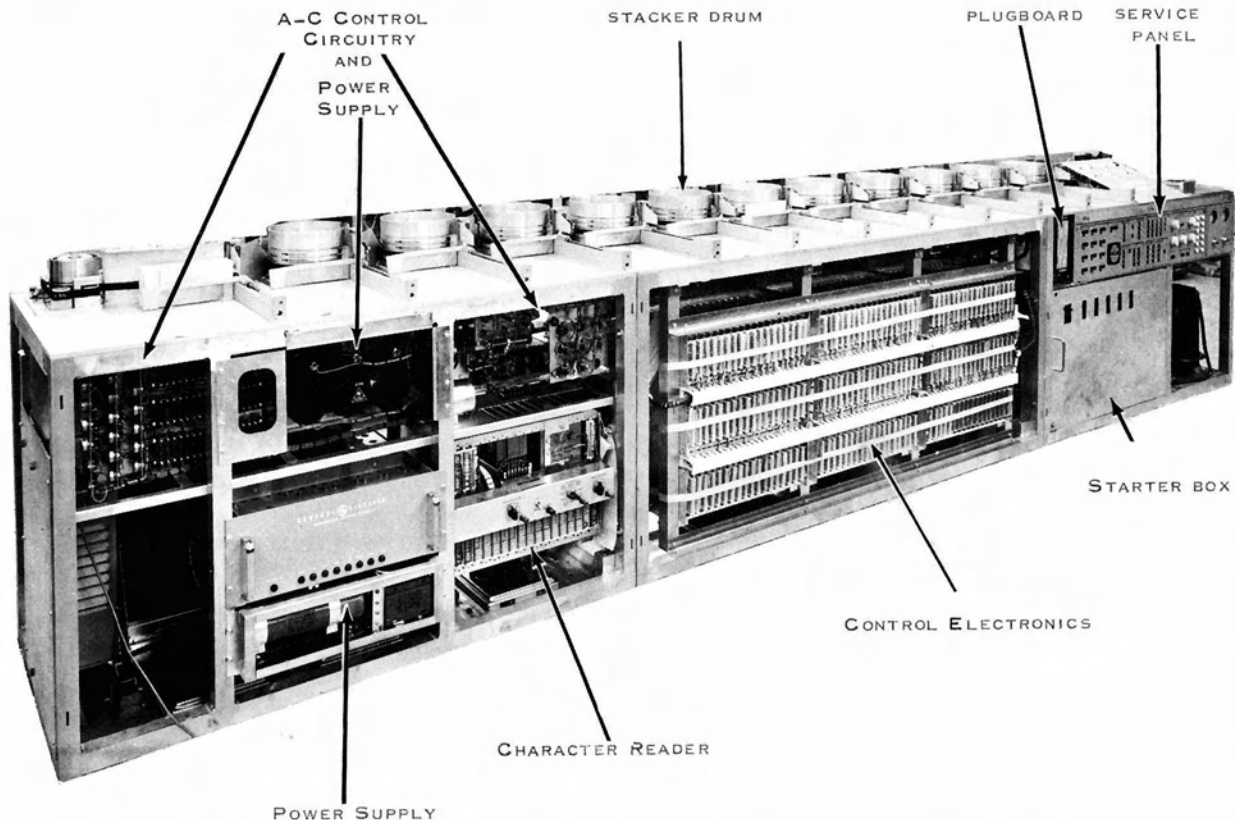


Figure XIV-2. Exposed Front View of GE 12-Pocket Document Handler

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4, 5, 6, 7, 8, 9, and Reject, in that order starting from the feed end. Each pocket is seven inches long and has a capacity of approximately 1,500 documents. The pockets are each connected electrically to a display lamp on the operator control panel which notifies the operator when a pocket is full.

When ready for processing, the encoded documents are inserted by the operator into the feed tray. By means of a precisely controlled vacuum, the documents are pulled out of the feed tray (individually and automatically) into contact with friction belts. The belts transport the documents serially past a reading area where the MICR encoding on each document is read electronically. After a particular document has been read, it proceeds, via belts and pulleys, to the pocket area. When a document reaches its assigned pocket, another vacuum draws it into that pocket and stacks it. While the document is being transported, it is held tightly against the friction belt by sections of the transport mechanism called 'bogies.' These bogie sections are released automatically at the time of a jam.

Character Reading. During transit through the reading area, each document passes a magnetizing head, a photocell, and a read head (see Figure XIV-3). The magnetizing head magnetizes each MICR character; the photocell, after sensing the presence of a document, turns on the character reader circuitry; the read head reads each character, produces an electrical signal corresponding to the character read, and sends it to a pre-amplifier where it is amplified about 240 times.

The character reader picks up the electrical signal generated as the document is transported past the read head and amplifies it again. The electronic reader

control identifies the signal with the character it represents, using a special correlation technique. It then converts the signal for input to the computer during on-line operation, or to the document handler input register during off-line operation.

Electronic Memory. The GE 12-Pocket Document Handler is equipped with an electronic memory which stores or 'remembers' the correct pocket destination (pocket decision) for each document. The output signal from this memory energizes a solenoid¹ which activates a vacuum valve or gate at the proper time so the document will enter the correct pocket. There are eleven such solenoids -- one for each pocket except the reject pocket.

During on-line sorting, the pocket decision signals are generated by the program in the central processor and sent to the document handler sorter control circuitry. Prior to entering the electronic memory, the pocket decision signals are processed through an input and an output register and are decoded.

The Document Handler Adapter

During on-line operation with the GE-225 System, all data transferred between the document handler and the central processor must pass through a common control unit called the 'adapter.' The adapter, shown in Figure XIV-4, is a separate module having its own display panel. During on-line operation, it is connected to a channel of the controller selector. Broadly speaking, the unit acts as a controlling and buffering device. Specifically, it converts the biquinary coded

¹ A solenoid is a spiral-shaped, tubular coil for the production of a magnetic field. When traversed by a current, the solenoid acts in general like a magnet.

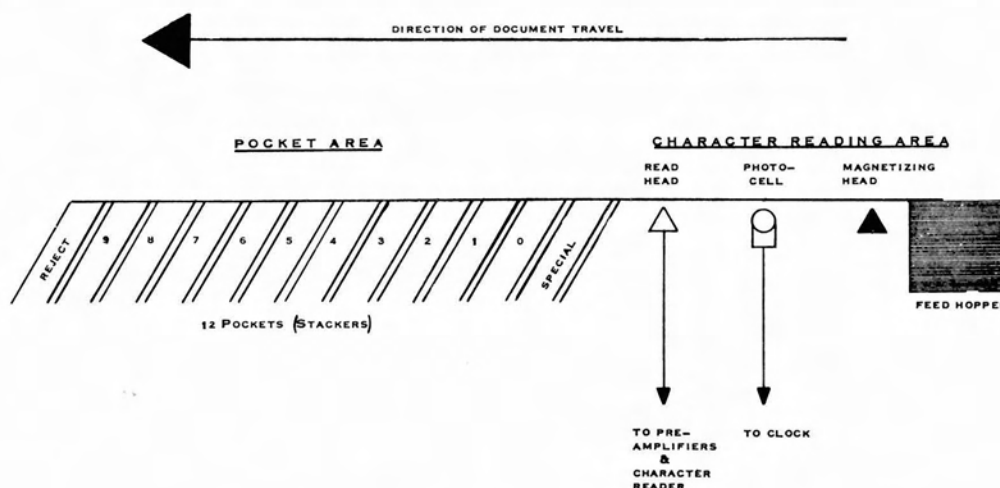


Figure XIV-3. Document Feed Path

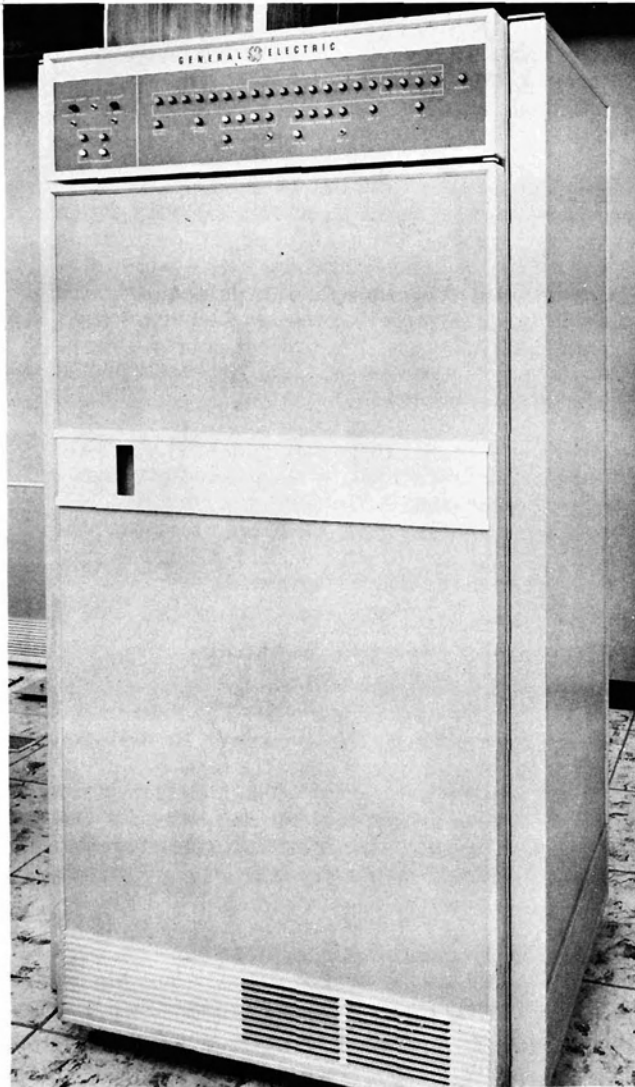


Figure XIV-4. Document Handler Adapter

output from the document handler to the BCD notation required by the computer memory. When a character read from a document is ready for input into memory, the adapter requests memory access. The priority control of the central processor evaluates this request for access in relation to other peripheral units. In the adapter, parity is generated on all data going to memory from a document handler.

The document handler adapter is normally assigned plug address 4 or 5 which gives it a higher priority than a high speed printer or an auxiliary arithmetic unit but a lower priority than, for example, a mass random access file. The adapter is capable of con-

trolling two 12-pocket document handlers operating on line simultaneously. If characters are received from both document handlers simultaneously, data from only one document handler accesses memory at a time. This is controlled by a built-in priority circuit.

DOCUMENTS AND DOCUMENT LANGUAGE

Characters and Symbols

The document handler can recognize fourteen characters: digits 0 through 9 and four special symbols called 'cue symbols.' (See Figure XIV-5.)

<u>Numerals</u>									
0	1	2	3	4	5	6	7	8	9
<u>Cue Symbols</u>									
Amount (or Slant)					Dash (or Hyphen)				
Transit Number (or Window)					On Us (or Paragraph)				

Figure XIV-5. MICR Characters

Stylized numerals are necessary to create waveforms of a distinctive shape, both to allow recognition and to prevent incorrect identification. The four cue symbols are used to separate information into groups, called 'fields,' since the document handler does not detect the end of a meaningful group of characters or distinguish one group from another by space separation.

The cue symbols shown in Figure XIV-5 identify the fields on a document. When encoding bank checks (see Figure XIV-6), the symbols are called Amount, Dash, Transit Number, and On Us, as approved by the American Bankers Association. In non-banking applications, the four symbols can be used to identify other types of data as dictated by the user's requirements.

In other than banking applications, the cue symbols are referred to as Slant, Hyphen, Window, and Paragraph.

Figure XIV-6. Sample Bank Check Using A.B.A. Format

Document Specifications

Although documents may be read and sorted in inter-mixed sizes, there are maximum and minimum limits to the size. The following table prescribes these limits.

Dimension	Minimum	Maximum
Length	5-1/4"	9"
Width	2-1/2"	3-3/4"
Thickness	0.0027"	0.007"

A 5/8-inch band along the bottom of each document is reserved for the magnetically-encoded information. This band, referred to as the 'clear band,' must be free of all magnetic ink except that used in printing the MICR characters. The clear band extends from the right edge of the document to one-fourth inch beyond the printing band, or the last printed character, as shown in Figure XIV-7. This format applies to paper documents. For card formats, refer to ABA specifications as given in Bank Management Publication 147R.

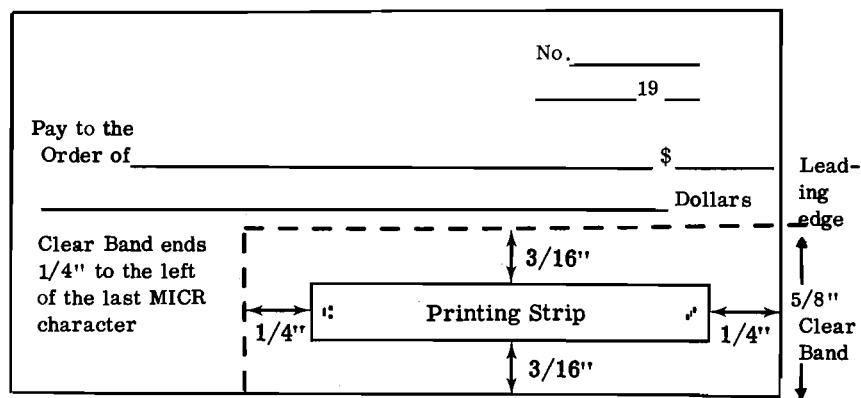
SPECIAL CONSIDERATIONS IN OFF-LINE SORTING

Normal Sorting

Documents may be sorted offline on as many as twelve separate fields (Figure XIV-6). When document format has been defined by proper wiring of the plugboard, any field and digit may be selected for sorting by depressing the desired FIELD and DIGIT select buttons on the handler control and indicator panel. The document handler examines one digit position within a field at a time and pockets the documents in accordance with the number in that position. This means that documents must be put through the document handler sorting procedure once for each digit of the field on which the documents are being sorted. For example, a 4-digit field requires four 'passes' through the handler.

Zero Suppression (Special Sort)

In normal sorting, as just described, sorting is done in an order of right to left within a field. The zero suppress feature automatically causes documents to go into the 'special' pocket whenever remaining digits



Bottom Edge of Paper Document

Figure XIV-7. The Clear Band of a Document

to the left of the one being sorted are all zeros. For example, a five-digit field having the number 00026 is said to have three leading zeros. During the third pass, the sorter control senses that the remaining digits to the left are all zeros, and sends the document to the special pocket. This eliminates the need to include the document in the fourth and fifth passes.

Multiple Digit Selection

This feature allows a particular class of documents to be identified for special treatment. Plugboard wiring determines which characters are to be compared. A comparison may be made with as many as ten digits within one field. By setting the EQUAL/UNEQUAL switch on the control and indicator panel, the operator determines which documents go to the "special" pocket as a result of comparison with plugboard wiring.

Documents not directed to the special pocket are sorted in the normal manner with the exception that documents which would otherwise go to the special pocket as a result of the zero suppress feature now go to the zero pocket.

Check of Cue Symbols

The document handler makes two checks on cue symbols. One check causes a document to go to the reject pocket if one of its cue symbols preceding the sorting area is read incorrectly. The other check is made when the plugboard is wired to detect either of two specified formats. The plugboard designates the number of each kind of cue symbols used for each of

two formats. If, during reading of the document, the configuration of cue symbols does not match either of the formats of the wired plugboard, the document is sent to the reject pocket.

Long Character and Multiple Read

Small particles of magnetic ink just preceding or just following the printed character can alter the document handler's interpretation of the character. This condition is termed a 'long character.' When the reader is unable to determine exactly which character it is reading, the condition is termed 'multiple read.' When either of the conditions just described occurs, before the field and digit position being sorted, the document goes to the reject pocket. Plugboard wiring can restrict long character and multiple read errors to the field and digit selected for sorting.

Missing Digit Detection

The missing digit detector (MDD) is a space detector that makes a decision following a space in the document's encoding greater than one character length. This decision is used to reject the document provided one of the following does not exist:

1. The blank area is between the last character of one field and the cue symbol of the next field.
2. The 'NO' missing digit detection portion of the plugboard is wired to inhibit the circuit during the reading of this blank area.

Transposition Check Digit (TCD)

Optional circuitry may be added to the document handler to cause it to make a special check on the accuracy of all of the digits in a particular field. Plugboard wiring (in both on-line and off-line use) determines the field selected for this special TCD check. The field may contain as many as nine data digits. Documents determined to be incorrect as a result of a TCD check are sent to the reject pocket, even though the TCD field appears after the digit position selected for sorting.

SPECIAL CONSIDERATIONS IN ON-LINE READING

Long Character and Multiple Read

If a long character is detected during on-line reading of a document, an error code is sent into memory. The program determines the action taken, including a determination of the pocket to which the document is sent.

Missing Digit Detection

During on-line operations, an error code is sent to memory at the time a missing digit is detected. The program can determine the action to be taken, including a determination of the pocket to which the document is sent. The plugboard NO MDD hubs can be wired to inhibit this error check in fields containing legitimate spaces.

Transposition Check Digit (TCD)

During on-line operation, the TCD check circuit sends a signal to the central processor to indicate an error. The program determines the action to be taken, including a determination of the pocket to which the document is sent. The wired plugboard must be used to define the field upon which the TCD calculation is to be performed.

PROGRAM INSTRUCTIONS

A complete understanding of on-line operation is not possible without learning the nature and structure of the program instructions which control the document handler. When preparing programs for the on-line use of the document handler, there are a number of timing requirements that must be taken into consideration. Pocket decisions must be made within the time constraints of the system. For program instructions and timing data refer to GE-225 Programming Reference Manual.

As is true of other peripheral units connected to the controller selector, the first instruction is SEL (octal 2500P20) which selects the address (P) of the controller to which one or two document handlers are attached. The following is a partial list of instructions used in programming for document handler input. The octal codes for the second sorter instructions are different from those for the first sorter on a controller.

Instruction	Mnemonic Code	Octal Code
Read Single Document	RSD	0420000 1020000*
Read Single Document & Continue Feed	RDC	0440000 1040000*
Halt Continuous Feed	HLT	0500000 1100000*
Pocket Select	PKT	0460000 1060000*
End Read Busy	ERB	0520000 1120000*

* These octal codes apply to sorter #2.

OPERATOR CONTROLS AND INDICATORS

Main Circuit Breaker. This switch, located at the right side of the document handler, turns the main power supply (AC) ON or OFF. The up position is ON.

Control and Indicator Panel

The controls and indicators on the control and indicator panel are shown in Figure XIV-8.

POWER ON. This indicator, located at the extreme upper left of the panel, glows green shortly after the main circuit breaker switch has been turned ON, indicating that the document handler power is on.

MOTOR ON-OFF. These adjacent buttons contain indicator lamps which glow when depressed (ON-green, OFF-white). The ON button is depressed after the main circuit breaker has been switched on to start the motors. The OFF button is depressed to stop the motors. Motors require approximately 10 seconds to warm up when they are first turned on. The FEED READY indicator glows when the necessary motor warmup time has elapsed.

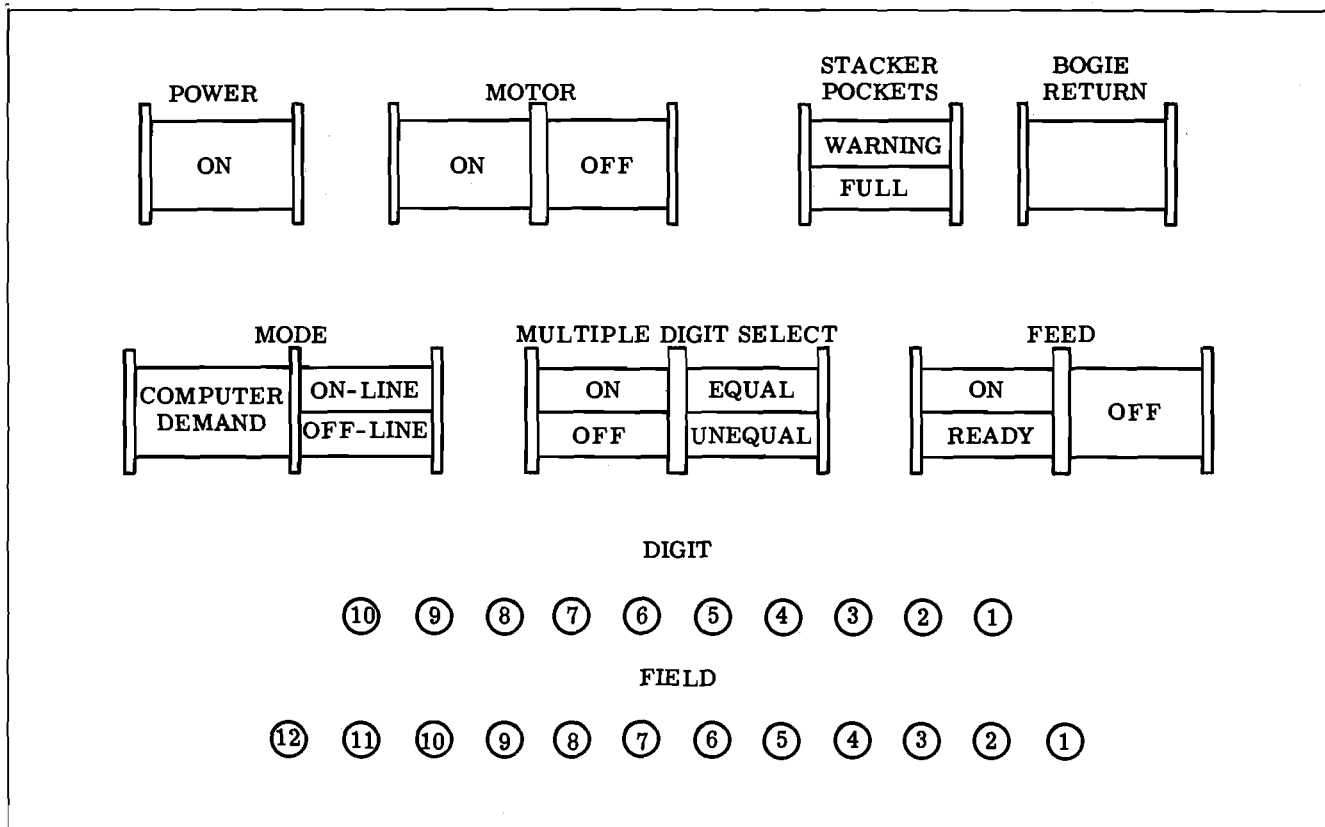


Figure XIV-8. Document Handler Control and Indicator Panel

STACKER POCKETS, WARNING - FULL. The upper WARNING half of this indicator lights if any of the twelve pockets approaches a full condition. The lower FULL half glows amber when a pocket has reached its capacity, at which time the feeding of documents automatically stops.

BOGIE RETURN. If documents jam while in transit, this indicator glows red and all moving force on the documents is released. Depressing this button engages the bogies which supply the force on the documents, and causes the indicator light to go out.

COMPUTER DEMAND MODE. This indicator glows blue when the document handler is connected electrically to the computer. It lights up when the ON LINE/OFF LINE switch is set to the ON LINE position.

ON LINE - OFF LINE MODE. This switch consists of an illuminated pushbutton switch with two indicator lights. The upper half is lit for on-line mode of operation; the lower half is lit for off-line mode of operation. Depressing the button reverses the mode of operation.

MULTIPLE DIGIT SELECT, ON-OFF, EQUAL-UNEQUAL. This is a double switch with four indicator lamps. The left switch, ON-OFF, is used to enable or disable the multiple digit select circuitry during off-line operations. The EQUAL-UNEQUAL switch determines whether multiple digit selection will be based on equal or unequal digits. When depressed, both of these switches reverse their existing conditions.

FEED ON-READY. The ON and READY feed controls consist of one illuminated pushbutton and two indicator lights. The READY half (lower portion) of the indicator glows when the document handler is ready to sort documents. There is a 10-second delay between the time MOTOR ON is depressed and the time the feed READY light is lit. When the pushbutton is depressed, feeding of documents begins, and the ON half (upper portion) of the indicator glows during the time of document feed.

FEED OFF. This pushbutton, located just to the right of the feed ON-READY switch, is depressed to stop the feeding of documents.

DIGIT. These ten illuminated buttons, when individually depressed, select a particular digit position to be sorted upon. They are used in combination with the FIELD select buttons during off-line sorting to send documents to the pockets indicated by the number occupying the selected digit position on the document.

FIELD Selection. The twelve illuminated buttons located nearest to the bottom of the panel are used to select a specific field upon which off-line sorting is desired. The document field assigned to each FIELD select button is controlled by the plugboard. Thus, when sorting on a specific field, the physical location of the field on the document need not necessarily correspond to the FIELD select buttons on the control and indicator panel.

Emergency Stop Bars. These six emergency switches are distributed at intervals along the top of the document handler (see Figure XIV-1) so as to be readily available to the operator. Depressing one of these switches turns all motors off and thereby causes complete document handler shutdown. Documents in the transport track go to the reject pocket; otherwise, no damage is done to the program when operating on line.

Maintenance Panel

The maintenance panel, shown in Figure XIV-9 consists of a group of switches, indicators, and jacks used primarily for maintenance purposes. It is also equipped with pocket counters which are used by both the operators and service personnel. These controls and indicators are described below.

POCKET Counters. The twelve pocket counters are used to determine the number of documents entering each pocket. Labels above the counters indicate which pocket they count. These counters must be reset to zero by the operator when counting is required.

TOTAL Document Counter. This six-digit counter gives a running total of the number of documents sorted. It must be set to zero by the operator when counting is to commence.

HOURL Meter. This meter displays the running total, in hours, of document handler operation.

INDICATOR LIGHTS. These five groups of lights are used for maintenance purposes by service personnel.

PRESSURE-VACUUM. The pressure and vacuum gauges and controls (at the right side of the panel but not shown in Figure XIV-9) are for use by service personnel only.

TEST SWITCHES. The service panel contains the following two-position test switches for use primarily by service personnel. However, these switches can also be used by the operator for checking the quality of the MICR printing on documents. Notice that all except the TCD switch must be left in the NORMAL position during all but testing operations.

MDD (Missing Digit Detection Switch): In the NORMAL position documents are checked for missing digits. The TEST position disables the circuit, allowing defective documents to pass undetected.

ONE SHOT Button. When the ONE SHOT button is used, the FEED switch must be in the OS position. As the name implies, ONE SHOT allows only one document to enter the transport each time the button is depressed.

FEED Switch. As just specified, the switch must be in the OS position when the ONE SHOT button is used. For a continuous feeding operation, the switch must be in the NORMAL position.

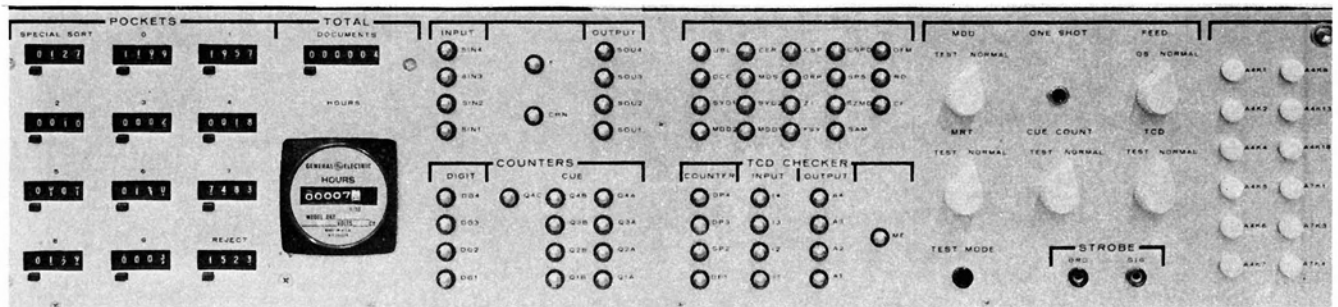


Figure XIV-9. Document Handler Maintenance Panel

MRT Switch. When this switch is placed in the TEST position, all no-character-error documents are sent to the special pocket, while those producing read conditions (defective printing) are sent to the reject pocket. If all of the encoding is to be tested for defects, the special or delay section of the plugboard must remain unplugged during testing. For all routine operations, the switch must be in the NORMAL position.

CUE COUNT Switch. The NORMAL position of this switch checks the accuracy of the information appearing on documents during off-line operation. A double set of hubs is provided to wire the plugboard for recognition of either of two total cue counts. In the TEST position, the total cue count circuit is disabled. For all routine operations, the switch must be in the NORMAL position.

TCD Switch. This switch is placed in the NORMAL position to examine the transposition check digit when this optional checking feature is incorporated in the unit. Otherwise, it should be left in the TEST position.

Adapter Control and Indicator Panel

Most of the buttons and indicator lights on the adapter control and indicator panel, shown in Figure XIV-10, are designed for use by service personnel. The operator's prime concern are the two indicator lights and three buttons at the upper left portion of the panel described as follows:

PARITY ALERT. This indicator light glows when the character being transferred to the computer contains an incorrect parity. The program usually tests for this parity error, and the next SEL instruction in the program turns off the parity alert light. The program can also cause document feed to halt at time of a parity error.

PARITY RESET. Depressing this button resets the circuitry of the adapter following a parity error. This also turns out the PARITY ALERT indicator light.

I/O ALERT. This indicator light glows if a character is transferred into the read buffer before the preceding character is placed in memory. Information is lost when this happens. The program usually tests for this condition and the next SEL instruction in the program turns off the I/O alert light. The program can also cause document feed to halt at the time of an I/O alert.

I/O RESET. By depressing this button the operator is able to reset the circuitry of the adapter following an I/O type error. This also turns out the I/O ALERT indicator light.

CLEAR. When depressed, this button clears the circuitry of all error conditions and turns off the PARITY and I/O alert indicator lights. This button may be used to clear error conditions before the program starts, but never during the running of a program.

SETUP PROCEDURE, OFF-LINE MODE

The off-line mode is used for applications requiring the sorting of documents for filing purposes. During off-line sorting, the electronic circuitry of the document handler provides the pocket decision. No program is involved. The operator sets controls on the document handler control and indicator panel and determines the wiring of the plugboard which defines the desired sorting sequence. The techniques for wiring the plugboard are discussed at the end of this section.

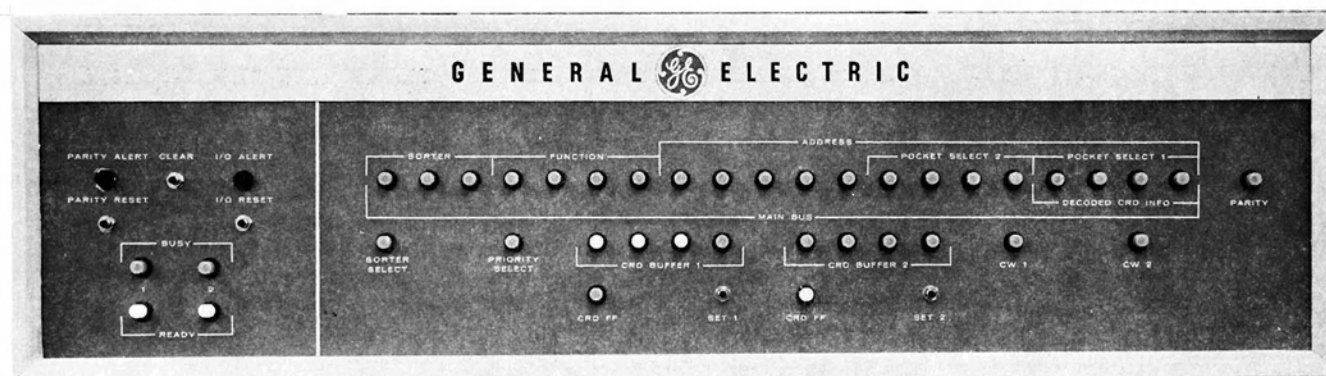


Figure XIV-10. Document Handler Adapter Control and Indicator Panel

The following steps should be taken to initiate off-line continuous feeding of documents. See Table XX for a summary of controls and indicators. All switches and indicators referred to in the following steps are on the document handler control and indicator panel unless specified otherwise.

1. Place the documents to be sorted in the jogger (Figure XIV-11) face-first and MICR printing down. Joggle them long enough to insure that they are stacked firmly, with the bottom and leading edges aligned.



Figure XIV-11. Jogger Used to Align Documents

2. Pull the feed backup plate (Figure XIV-12) back until it contacts a retaining catch.
3. Place the documents in the feed tray face-first and with MICR printing down. Make sure they are flush against the feed fence at the rear of the feed tray.

4. Release feed backup plate.
5. Insert the properly wired plugboard as designated in programmer instructions. Plugboard wiring is described at the end of this section under the heading of 'Special Procedures.' The plugboard is held in position by a hinged 'U' shaped bracket which is grooved on the inside. The plugboard fits into this grooved bracket. When properly positioned, the entire unit is moved in and up into place by pushing in the handle located at the lower end of the 'U' shaped bracket. Care should be exercised at all times to prevent bending the contacts located in the plugboard assembly.
6. Turn on the main power circuit breaker switch (Figure XIV-1).
7. Check to see that all maintenance panel switches (except the TCD switch) are in the NORMAL position. If the TCD optional feature is not incorporated in the unit, the TCD switch should be in the TEST position.

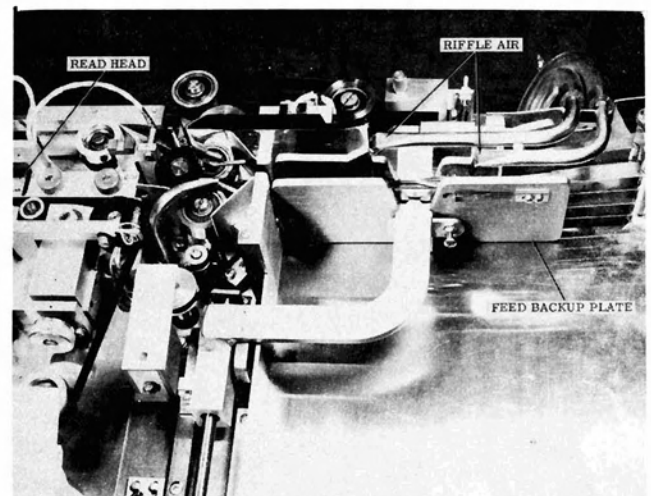


Figure XIV-12. Document Feed Area

8. Check to see that the POWER ON indicator is lit (Figure XIV-13). This indicator should light shortly after the main circuit breaker has been switched on.
9. Make certain that the BOGIE RETURN indicator is not lit. If this indicator is lit, depress it to bring all bogies in.
10. Depress the MOTOR ON button (it should glow green).
11. Place the mode switch in the OFF-LINE position.

12. If multiple digit select sorting is desired, set the MDS switch to the ON position, and set the EQUAL-UNEQUAL switch to the desired position. If multiple digit select sorting is not desired, make certain that the MDS switch is in the OFF position.
13. If documents are to be counted, set the pocket counters at the left side of the maintenance panel to zero.
14. Depress the desired DIGIT and FIELD buttons.
15. Make certain that WARNING and FULL lights are out.
16. Check to see that the FEED READY indicator is lit. (There is a ten second delay between the time MOTOR ON is depressed and the time feed is ready.)
17. If the FEED READY indicator is lit, depress the FEED ON button on the operator control panel to initiate off-line continuous feeding of documents.

Operator Action and Feed Interruption

Off-Line sorting of documents is an automatic operation requiring operator intervention only for the removal or insertion of documents. While the machine is operative, the operator should maintain a visual check to insure that there is always an adequate number of documents in the feed hopper, that none of the pockets are nearing a full condition, and that no jam has occurred. If, for any reason, it is desired to temporarily stop the feeding of documents, the operator should depress the FEED OFF button on the control and indicator panel. To resume feeding, depress the FEED ON button.

Empty Feed Hopper Condition. If the feed hopper should become empty during operation, documents will automatically stop feeding. When this occurs, the operator should refill the feed hopper with documents and depress the FEED ON button on the control and indicator panel to resume operation.

Full Pocket Condition. When any one of the pockets is approaching a full condition, the 'WARNING' half of the pocket indicator on the control and indicator panel will glow white. When the pocket has reached its capacity, the 'FULL' half of this indicator will glow amber, at which time the feeding of documents automatically stops. When this occurs, the operator should empty the full pocket and depress the FEED ON button to resume operation.

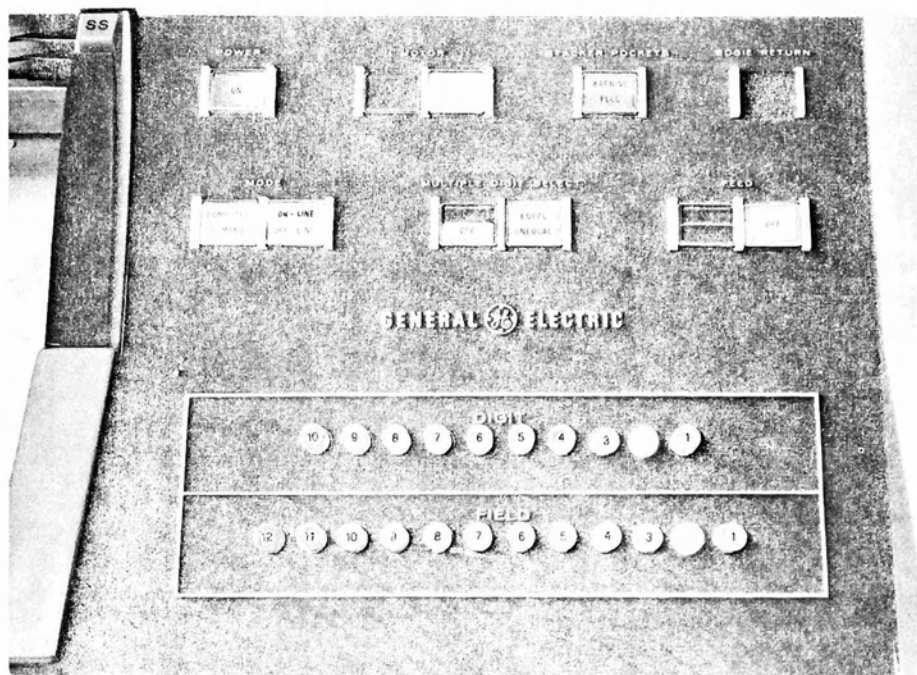


Figure XIV-13. Document Handler Control and Indicator Panel

To maintain continuous reading and reduce machine stoppage, the operator may remove documents from the pockets while the machine is operating. However, while documents are being removed from a pocket, other documents may be delivered to that pocket. Therefore, the operator should make certain that incoming documents are not hindered in any way. This can be done by removing documents from the pockets in the following manner:

1. Insert one hand (fingers flat and straight) into the stack of documents so that the hand substitutes for the backup plate which holds documents upright in place. Leave a few documents to guide others that may be delivered to the pocket.
2. With the other hand, remove the stack of documents and allow the backup plate to slide into place against the documents not removed.

SORT COMPLETION AND DOCUMENT PICKUP

Documents must be removed from the pockets in sequence to preserve order. Otherwise sorting will be to no avail. Ascending sort starts with the least-significant digit of a group and proceeds to the most-significant digit. This kind of a sort requires the pickup order to be from pocket nine through pocket zero.

Documents must be sorted (put through the handler) once for each digit to be sorted upon. For example, if documents are to be sorted off line on an account number field which has six digits, they must be sorted six times. In sorting, a document having an account number 312 486 would be sorted first on the 6 (digit select button 1), second on the 8 (digit select button 2), third on the 4 (digit select button 3), fourth on the 2 (digit select button 4), fifth on the 1 (digit select button 5), and last on the 3 (digit select button 6).

Each time the documents are sorted, the following steps must be repeated:

1. Joggle the document in the jogger.
2. Load the documents properly into the feed tray.
3. Depress the correct DIGIT button.
4. Depress the FEED ON button.
5. Remove documents from the stacking pockets in the order nine through zero (ascending sort only).

It is not necessary to remove documents from the special pocket until a particular sort has been completed, unless, of course, the pocket becomes full. Rejected documents require special handling, since they have not been read correctly.

Jam Detection and Operator Action

Documents are under positive control from the time they leave the feed area until they enter one of the pockets. Thirteen sensing stations along the conveyor belt register the disposition of the documents in transit. They are jam-detecting photocells which check for stopping of documents in front of the cells. The jam-sensing feature eliminates the possibility of document pile-ups. At the first indication of document stoppage in the transport system, the bogie return indicator on the operator control panel glows red and the document handler halts. Feeding is discontinued immediately, and all moving force on the paper is removed to prevent damage to the documents. All documents in transit during detection of a jam should be removed manually and placed in the reject pocket. To resume operation, depress in sequence the bogie return button, the MOTOR ON button, and the FEED ON button.

Shutdown Procedure

When the last of the documents to be processed has been read:

1. Remove all documents from the pockets (in the correct order).
2. Record pocket counters displayed, if required.
3. Depress MOTOR OFF.
4. Set main circuit breaker to OFF position.
5. Remove and store the plugboard.

SETUP PROCEDURE, ON-LINE MODE

During on-line operation, information from MICR encoding on the documents such as account number and dollar amount is fed into the memory of the computer after passing through the document handler adapter. The program checks the validity of the information read in and determines the pocket destination of the documents.

Because the program determines document destination, the operator does not use the digit select and field select buttons on the control and indicator panel when

he originates document feed. Likewise, the plugboard is not usually used in on-line operation. There are exceptions, though. When the special and delay turnoff, no missing digit detection, and transposition check digit functions are desired, their respective hubs on the plugboard can be wired for plugboard use during on-line operation. The programmer has a choice of using the plugboard for the functions just mentioned or of performing the same functions by program instructions.

The following steps and precautions should be taken to initiate on-line continuous feeding of documents. See Table XX for a summary of controls and indicators. All switches and indicators referred to in the following steps are on the document handler control and indicator panel unless specified otherwise.

1. Place the documents to be sorted in the jogger, face first and MICR printing down, to insure that they are stacked firmly with the bottom and leading edges aligned.
2. Pull the feed backup plate (Figure XIV-12) back until it contacts a retaining catch.
3. Place the documents in the feed tray face-first and MICR printing down. Make sure they are flush against the feed fence at the rear of the feed tray.
4. Release the feed backup plate.
5. Insert the properly wired plugboard as designated by the programmer. If no plugboard instructions are given, remove the presently inserted board and leave the holder open.
6. Turn on the main power circuit breaker.
7. Check to see that all maintenance panel switches (except the TCD switch) are in the NORMAL position. If the TCD optional feature is not incorporated in the unit, the TCD switch should be in the TEST position.
8. Check to see that the POWER ON indicator is lit. This indicator should light shortly after the main circuit breaker has been switched on.
9. Depress the MOTOR ON button (it should glow green).
10. Make certain that the BOGIE RETURN indicator is not lit. If it is lit, depress it to bring all bogies in.

11. Set the AUTO/MANUAL switch on the computer control console to the MANUAL position.
12. Depress the CLEAR button on the document handler adapter display panel.
13. Set the MODE switch to the ON-LINE position.
14. Set the pocket counters at the left side of the service panel to zero, if required.
15. Return the AUTO/MANUAL switch on the computer control console to the AUTO position.
16. Check to see that the FEED READY indicator is lit.
17. If the FEED READY indicator is lit, depress the FEED ON button.
18. Depress the START button on the computer control console to initiate on-line feeding of documents under control of the stored program.
19. Make certain that the COMPUTER DEMAND indicator is lit. If it is not lit, correct this condition before proceeding further. (Reference Error Indication and Recovery Procedures.)

Shutdown Procedure

When the last document has been read and the program is completed:

1. Remove all documents from pockets.
2. Set AUTO/MANUAL switch on the computer control console to the MANUAL position.
3. Depress the MOTOR OFF button on the operator control panel.
4. Set the main circuit breaker switch to the OFF position.
5. Record pocket counters displayed, if required.
6. Remove and store the plugboard.

TABLE XX
SUMMARY OF CONTROLS AND INDICATORS

Location	Control or Indicator	Function
Right side of the document handler (Figure XIV-1)	Main circuit breaker switch	Turns main power ON or OFF.
Document handler control and indicator panel (Figure XIV-13)	POWER ON indicator	Glow green to indicate when main power has been turned on (by the circuit breaker).
	MOTOR ON-OFF switch and indicator	Depressing ON starts the motors (ON glow green). Depressing OFF stops the motors (OFF glow white). Circuit breaker must first be on.
	Stacker Pockets WARNING-FULL indicator	When the WARNING half of the indicator glow white one or more pockets are approaching a full condition. When the FULL half of the indicator glow amber, one or more pockets are full, and feeding stops.
	BOGIE RETURN switch and indicator	Glow red to indicate a jam condition and the automatic release of pressure against documents and the friction belt. Depressing the pushbutton returns pressure on the documents and turns out the indicator light.
	COMPUTER DEMAND MODE indicator	Glow blue during document feed when the handler is connected for on-line operation.
	ON-LINE, OFF-LINE mode switch and indicators	Reverses the mode of operation alternately from on line to off line. The half of the indicator which applies to the mode in operation is illuminated white.

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TABLE XX (CONT.)

Location	Control or Indicator	Function
Document handler control and indicator panel (Figure XIV-13)	MULTIPLE DIGIT SELECT ON, OFF switch and indicator	The ON-OFF switch enables or disables the multiple digit select circuitry; the ON indicator glows green when enabled. The OFF indicator glows white when disabled.
	MULTIPLE DIGIT SELECT EQUAL UNEQUAL switch and indicators	When depressed, alternately determines whether multiple digit selection will be based on EQUAL or UNEQUAL comparisons. The indicator EQUAL or UNEQUAL is illuminated to indicate which type of comparisons are selected.
	FEED ON, READY switch and indicator	The READY indicator glows green when the document handler is ready to sort. When the pushbutton is depressed, document feed begins and the ON indicator glows.
	FEED OFF switch	Stops document feed when depressed.
	DIGIT select switches and indicators	Select the digit positions to be sorted upon. The pushbuttons glow when depressed.
	FIELD select switches and indicators	Select the field to be sorted upon. The pushbuttons glow when depressed. Plugboard wiring determines field relationship to pushbuttons.
Document handler maintenance panel (Figure XIV-9)	POCKET counters	Count and indicate the number of documents entering a pocket. Must be reset to zero each time counting begins.
	TOTAL document counter	Counts and indicates total number of documents entering all pockets. Must be reset to zero each time counting begins.
	HOUR meter indicator	Totals and indicates the total hours of document handler operation. (Cannot be reset.)

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TABLE XX
SUMMARY OF CONTROLS AND INDICATORS

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Document handler control and indicator panel (Figure XIV-13)	POWER ON indicator	Glow green to indicate when main power has been turned on (by the circuit breaker).
	MOTOR ON-OFF switch and indicator	Depressing ON starts the motors (ON glow green). Depressing OFF stops the motors (OFF glow white). Circuit breaker must first be on.
	Stacker Pockets WARNING-FULL indicator	When the WARNING half of the indicator glow white one or more pockets are approaching a full condition. When the FULL half of the indicator glow amber, one or more pockets are full, and feeding stops.
	BOGIE RETURN switch and indicator	Glow red to indicate a jam condition and the automatic release of pressure against documents and the friction belt. Depressing the pushbutton returns pressure on the documents and turns out the indicator light.
	COMPUTER DEMAND MODE indicator	Glow blue during document feed when the handler is connected for on-line operation.
	ON-LINE, OFF-LINE mode switch and indicators	Reverses the mode of operation alternately from on line to off line. The half of the indicator which applies to the mode in operation is illuminated white.

TABLE XX (CONT.)

Location	Control or Indicator	Function
Document handler maintenance panel (Figure XIV-9) (cont)	Five groups of indicator lights	Provide information of use only to service personnel.
	VACUUM and PRESSURE gauges	Provide information of use only to service personnel.
	MDD switch	Checks documents for missing digits. Must be used in the NORMAL position.
	ONE SHOT switch	Feeds one document at a time when button is depressed. FEED switch must be in OS position.
	FEED switch	Must be in the NORMAL position for continuous operation. When in the OS position, permits feed of one document at a time.
	MRT switch	Must be in the NORMAL position for routine operation. Can be used to test for defective printing in the TEST position.
	CUE COUNT switch	Must be in the NORMAL position for routine operation. It checks the accuracy of information on the documents. In the TEST position, checking circuitry is disabled.
	TCD switch	When the document handler does not have optional transposition check digit feature, switch should be left in TEST position. If optional checking feature is installed, must be in the NORMAL position.
Adapter control and indicator panel (Figure XIV-10)	PARITY ALERT indicator	Glows when parity error detected in information transfer from the document handler to memory. Light may be turned off by the program or by the PARITY RESET or CLEAR buttons.
	PARITY RESET switch	Clears circuitry after a parity error and turns out the PARITY ALERT light.

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TABLE XX (CONT.)

Location	Control or Indicator	Function
Adapter control and indicator panel (Figure XIV-10) (cont)	I/O ALERT indicator	Glows when one character overlaps another in the adapter read buffer. Information is lost. May be cleared by the program or by the I/O ALERT or CLEAR buttons.
	CLEAR switch	Clears the circuitry of both parity and I/O type errors, and turns out the PARITY ALERT and I/O ALERT indicator lights.

SPECIAL PROCEDURES

Plugboard Wiring Techniques

General. The programmer specifies the plugboard wiring for each program, and the operator needs only to follow the directions provided. A plugboard (Figure XIV-14) will usually be wired for each document handler application, and after initial wiring, the operator will need only to select the correct prewired board for his particular run. The instructions which follow mainly provide background information to permit the operator to better understand how to follow programmer instructions for plugboard wiring.

The plugboard is used to connect the various circuits of the sorter control so that one or all of the following functions can be accomplished:

1. Field selection
2. Cue character check
3. Delay and special turn off
4. Inhibit missing digit detection
5. Auxiliary OR gate provision
6. Long character and multiple read check
7. Multiple digit selection
8. Mod 11 transposition check digit (TCD) checking (optional feature).

The only functions applicable during on-line operation are missing digit detection, delay and special turn off, and Mod 11 TCD checking (provided the TCD checking circuitry has been built into the equipment).

At a typical installation prewired plugboards are changed as jobs or document formats vary. For example, one plugboard may be wired so that the docu-

ment is sorted on the first field when FIELD select button number 3 is depressed. A second plugboard might define the document's first field as that corresponding to FIELD select button number 1. The ability to determine at a glance the operations wired on the plugboard will come with experience. However, a basic knowledge of the various sections of the plugboard will help to understand the functions for which it was wired.

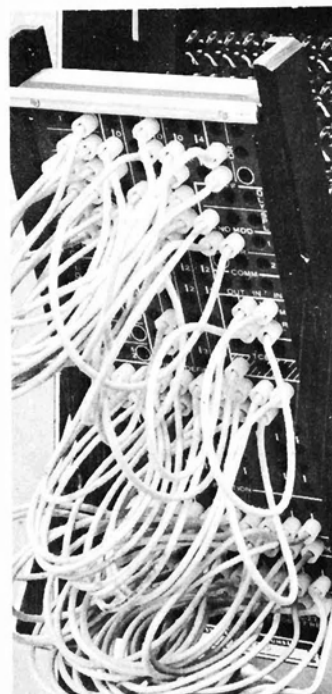


Figure XIV-14. Plugboard in Rack

Most of the hubs which control the operating and checking features of the document handler are located in the upper half of the plugboard. Hence, this half is discussed first. The lower half is wired when multiple digit select sorting is desired.

Cue Counters. Since there are more than four fields (maximum of 12) on each document, the cue symbols which identify the fields are repeated. Four individual cue counters are provided (one for each cue symbol) for recognizing and counting the respective fields on each document. Each of three counters [cue 1 (I:) or window, cue 2 (I') or slant, and cue 3 (I") or paragraph] counts up to a binary three, and the fourth counter [cue 4 (I''' or hyphen] counts up to a binary four.

Window Counter. The window counter (I:) is a binary counter which is set to the count of zero as a document enters the read area. Each window symbol (I:) advances the counter. If more than three window symbols exist on a particular document, the counter will count to three and remain in that state until reset to zero.

Slant Counter. The slant counter (I') is a binary counter which is set to zero as the document enters the read area. Each slant symbol (I') advances the counter. If more than three slant symbols exist on a particular document, the counter will count to three and remain in that state until reset to zero.

Paragraph Counter. This counter is a binary counter which functions the same as the slant and window counters by counting the paragraph symbols (I").

Hyphen Counter. The hyphen (I''') counter is a binary counter which, like the others, is cleared automatically as the document enters the read area. Unlike the others, it is reset by the appearance of any other cue symbol. Only when hyphen symbols follow in sequence on a document does this counter count above one. This restricts the application of hyphen symbols to the division of minor or subfields of data. The other cue counters are not affected by unlike symbols and therefore are used to separate the major fields of data on a document. The plugboard allows for the transmittal of a maximum of four hyphen counts.

Cue Counter Hubs. The cue counter hubs are located in the upper midsection of the plugboard (Figure XIV-15). This is the control center of the board. The signals sent from these hubs switch the various operating and checking circuits of the document handler on and off. The counter hubs for all four cue symbols

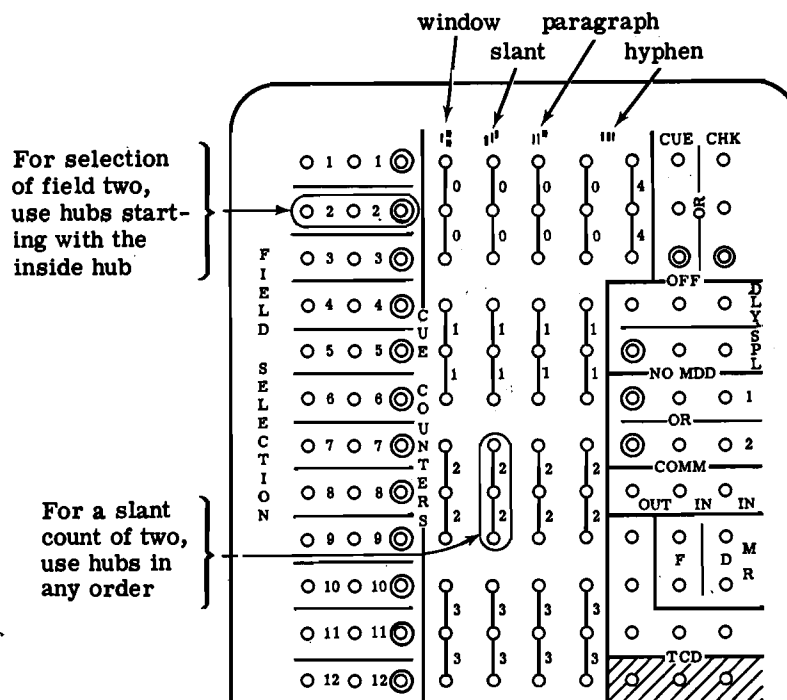


Figure XIV-15. Cue Counter and Field Selection

are arranged into columns and groups. For example, there are three hubs indicating a two count in the column below the slant symbol (encircled on Figure XIV-15). Any one of these three hubs may be used in any order.

Field Selection Hubs. In sorting off line, depressing the **FIELD** select button on the control and indicator panel enables the field select circuitry to be connected to the corresponding field selection hubs on the plugboard. Any desired field selection can be made for a specific field select button by connecting the cue count (indicating a field selection) to the respective field selection hubs of the plugboard. Each of the twelve fields has three field-selection hubs. In Figure XIV-15, the three hubs for field two are encircled. Notice that the inside hub of each group of three hubs for a field has a double circle around it. This double circled hub must always be used, so it is good practice to use it first (of the three in that field).

When wiring the plugboard for use with the 750 document per minute handler, the connections are the same with one exception. Because the control and indicator panel of the 750 document per minute handler has only six **FIELD** select buttons, only the first six groups of field selection hubs on the plugboard are used, and the remaining six groups of hubs are not used.

During on-line operations, this portion of the plugboard is not used and is inhibited.

Plugboard Wiring Examples of Field Selection. The two examples which follow use information from Figure XIV-16. The information in the illustration is divided into seven fields. The vertical column indicates the cue counts for each of the seven fields. Cue symbols are counted from right to left, and the count for all but the hyphen symbol increases by one each time the symbol is encountered. The hyphen count, as has been described, goes to zero each time another symbol interrupts the count.

Example Number One

The plugboard wiring described in this example is illustrated in Figure XIV-17. Assume that it is desired to sort only within field number 3. It is necessary to isolate field number 3. The cue count configuration that identifies document field number 3 must be connected to the field selection hubs representing the document field number 3. In the sample document of Figure XIV-16, the paragraph symbol precedes field number 3 and will cause the paragraph counter to count one. Connect any of the paragraph hubs labeled 1 (indicating a paragraph count of one) to one of the field selection hubs to represent document field number 3 (in this example the hubs labeled 1 of Figure XIV-17 were selected). Notice that the hub indicated by a double circle is connected first from the group of hubs representing a field.

		6		4		2			
		2 3 4 5		1 2 2 1		0 2 9 1		0 1 5 3	
		1 2 2 1		0 2 9 1		0 1 5 3		0 0 8 1	
		0 0 0 0 0 4		2 3 1 5					
		7		6		5		3	
FIELD	CUE COUNT							FIELD	CUE COUNT
1	" = 1							5	" = 1 " = 0
2	" = 2 " = 0							6	" = 1 " = 1
3	" = 1 " = 0 " = 0							7	" = 2
4	" = 1 " = 0								

Figure XIV-16. Field Identification and Cue Count

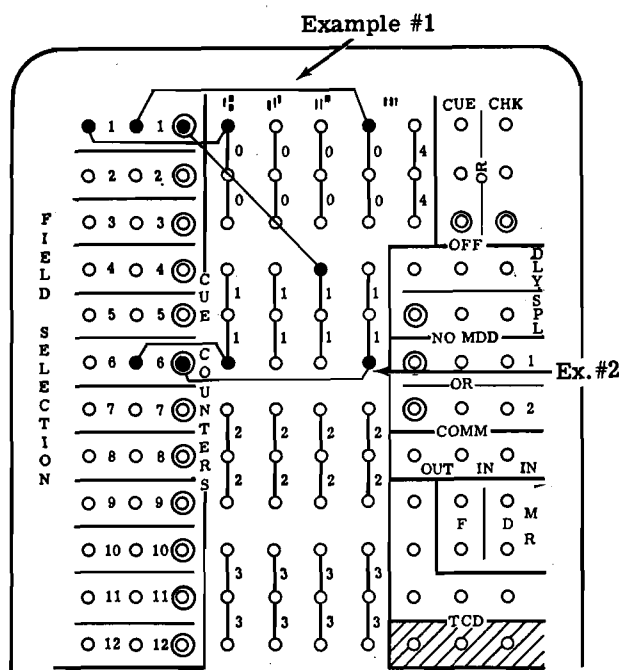


Figure XIV-17. Connecting Cue Counter to Field Selection Hubs

The cue symbol following field number 3 is a hyphen; therefore, to isolate field number 3 from the other fields, the hyphen count of zero must be connected to a number 1 field selection hub. The window symbol preceding field number 5 will reset the hyphen counter to zero enabling the sorting of field number 5. To avoid this, the window count of zero must be connected to one of the field selection number 1 hubs.

Since the field selection hubs labeled 1 were used, the corresponding FIELD select button 1 on the control panel must be depressed to enable sorting within field number 3.

Example Number Two

The plugboard wiring described in this example is also illustrated in Figure XIV-17. Assume that it is desired to sort within field number 6. Referring to Figure XIV-16, a hyphen symbol precedes field number 6 and also field number 4. Since any cue symbol (other than the hyphen) resets the hyphen counter to zero, a method must be used to determine which hyphen symbol set the hyphen counter to one. Since field number 6 is denoted by the second hyphen, additional information must be connected to the field selection hubs representing field number 6. When the window counter registers a count of one, this indicates that the first hyphen has passed, and when the hyphen

counter registers a count of one again, field number 6 is approaching. Therefore, connections on the plugboard are a hyphen count of one and a window count of one to the field selection terminals representing field number 6 as shown in example number 2 of Figure XIV-17.

Total Cue Count Check. The total cue count check is used during off-line operations to determine if the correct number of individual cue characters were read from the document. Since the hyphen counter is reset by the other cue symbols, only the slant, paragraph, and window symbols are checked. To establish the correct plugboard connections for the cue count check, the total cue count for the slant, paragraph, and window counters must be determined. Again, the double-circled hubs must be plugged first. Notice that a line divides the two groups of CUE CHK hubs. Each total count must be wired to one group of three vertically aligned hubs.

In the following example there are two slant symbols, one paragraph symbol, and two window symbols.

1: 155 1- 25 10: 753- 263- 653 2- 1234567890

TRANSIT FIELD ON US FIELD AMOUNT FIELD

Therefore, the following counter configurations must be connected to the CUE CHK hubs on the plugboard as indicated by example number 1 in Figure XIV-18:

Slant Counter = 2

Paragraph Counter = 1

Window Counter = 2

The three remaining CUE CHK hubs may be used to allow recognition of a second and different total cue count; both may now be recognized as correct. For example, some documents may contain more fields as shown in the following example:

02345- 1: 8796- 1 12: 05- 1 32 15- 6346- 1023456789

AUXILIARY ON US TRANSIT FIELD ON US FIELD AMOUNT FIELD

The addition of one field increases the paragraph count by two. The total cue count is now:

Slant Counter = 2

Paragraph Counter = 3

Window Counter = 2

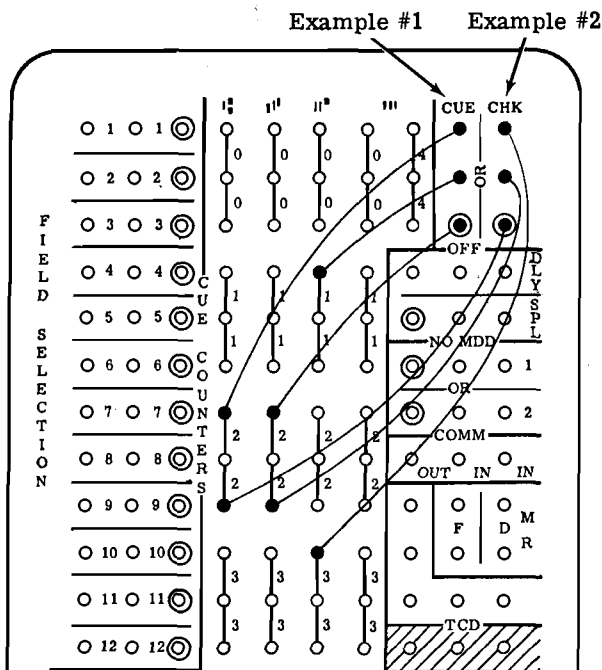


Figure XIV-18. Cue Check Connections

This total cue count is connected to the remaining CUE CHK hubs as shown in the second example of Figure XIV-18. With both groups of CUE CHK hubs connected as shown, documents with or without the auxiliary on us field will not be rejected if they contain a correct cue count.

Delay Turn Off. The Delay Turn Off hubs are plugged during on-line or off-line operation when it is desired to turn the character reader OFF after all usable data on the document has been read. This prevents the character reader from reading erroneous or meaningless information which may be on the document following the last field of data.

For example, assume that intermixed documents (some containing an Auxiliary On Us field and some not) are being read by the character reader. The following example illustrates a possible format which may or may not contain the Auxiliary On Us field.

3 2 3 4 5 1 2 3 4 5 1 2 2 0 1 0 9 4 3 2 3 8 7 6 6 0 0 0 0 0 0 7 8 9 0 1

AUXILIARY ON US TRANSIT FIELD ON US FIELD AMOUNT FIELD

The DLY and SPL hubs are connected Window (1) = 2, and Paragraph (1) = 3 as shown in Figure XIV-19.

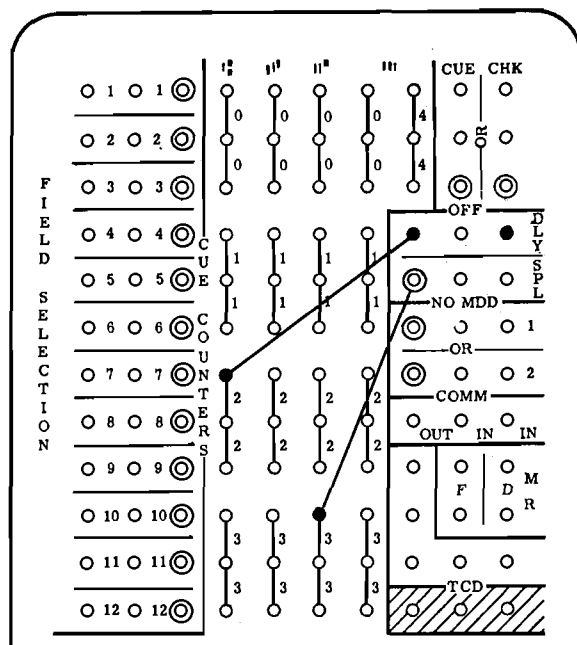


Figure XIV-19. DLY Hub Connections

These connections will cause the character reader to be turned OFF after all data has been read on a document as follows:

With Window (1) number 2 plugged to the DLY hub (indicating the end of the transit field), the character reader will be turned OFF if no character is read 0.25 inches after the window equals two. When no character is read, the sorter control assumes that the transit field is the last field on the document and turns the character reader OFF. However, if a character is read within 0.25 inches following window number 2, the character reader will continue to read until 0.25 inches past the third paragraph symbol.

Special Turn Off (SPL). The Special Turn Off hubs are used during either on-line or off-line operation to turn the character reader OFF at any point during the reading of the document.

For example, if it were desired to read only the information preceding Window symbol number 1 (which indicates the end of the On Us field), the Window number 1 hub would be connected to the double circled SPL hub on the plugboard.

Inhibiting the Missing Digit Detection Circuitry (No MDD). The No MDD hubs on the plugboard are used during both on- and off-line operation to inhibit the missing digit detection circuitry when one of the fields contains a legitimate missing digit. This is done by connecting the cue count configuration on the field containing the missing digit to the No MDD hubs,

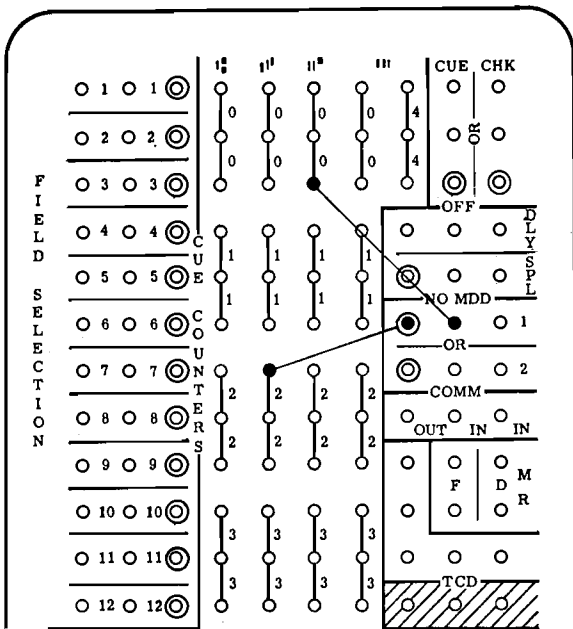


Figure XIV-20. Inhibit Missing Digit Detection

thereby inhibiting the missing digit detection for this particular field or fields.

For example, assume that it is desired to inhibit the missing digit circuitry during the time field number 2 in the following illustration is being read. A paragraph (¶) count of zero and slant (^) count of two identifies field number 2. This count is connected to the No MDD hubs as shown in Figure XIV-20.

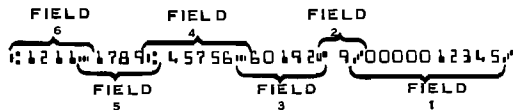


Figure XIV-21. Use of Auxiliary OR (COMM) Hubs

field number 4. The whole ON-US area could be covered regardless of number of fields by a slant count = 2 and a window count = 0.

Auxiliary OR (COMM). The three hubs at the right of the plugboard under the heading of COMM expand the cue count capability by permitting a choice of two different cue counts to be recognized as valid. The hubs are used for situations where an end result is desired from either of two different cue count conditions -- for example, when two different types of documents are sorted at the same time. The two conditions of cue count may pertain to total cue count check, no missing digit detection, or special turn off. Figure XIV-21 illustrates the use of auxiliary OR hubs with the total cue count check hubs. In the example, the plugboard is wired so that documents are recognized as valid when they have a cue count of window equal to two, slant equal to two, and paragraph equal to either one or three. Documents which don't have either of those cue counts are sent to the reject pocket during a sort.

The additional group of No MDD hubs provides a means of inhibiting the missing digit detector for a second field, if desired. Additional hubs can be plugged in the same manner as described for

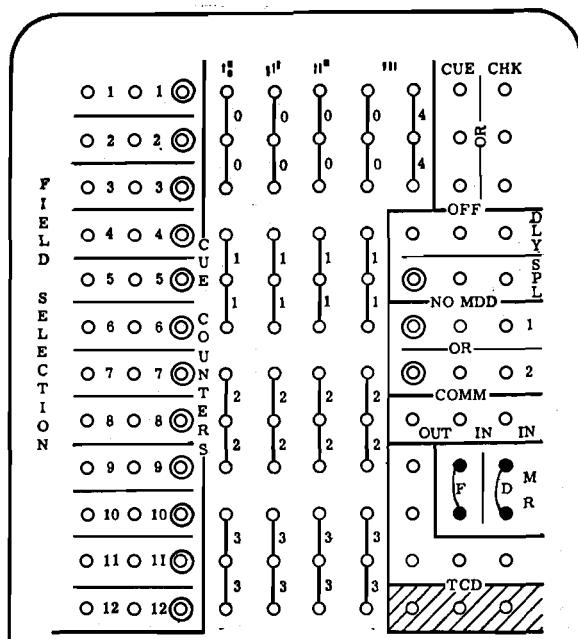


Figure XIV-22. Long Character and Multiple Read Detection

Long Character and Multiple Read Detection. This portion of the plugboard is wired when sorting documents off-line to detect long characters or a multiple read. The plugboard hubs labeled 'F' and 'D' (indicated in Figure XIV-22), when properly connected, provide the following three checks:

1. With both the 'F' and 'D' hubs connected as shown in Figure XIV-22, only the selected digit in the selected field will be checked. If a long character or multiple read occurs in this digit position, the document will be sorted to the reject pocket.
2. When only the 'F' hubs are connected, only the digits in the field up to the digit selected will be checked. If a long character or multiple read occurs on any of these digits, the document will be sorted to the reject pocket.
3. When only the 'D' hubs are connected, the digit position being checked will be checked in each field on the document up to the sorting area. If a long character or multiple read occurs in this digit position of any field, the document will be sorted to the reject pocket.

Multiple Digit Select. The multiple digit select portion of the plugboard is used during off-line operation to allow sorting out particular documents on a single pass. As many as ten digits on a document may be compared with the digits defined by the connections on the plugboard.

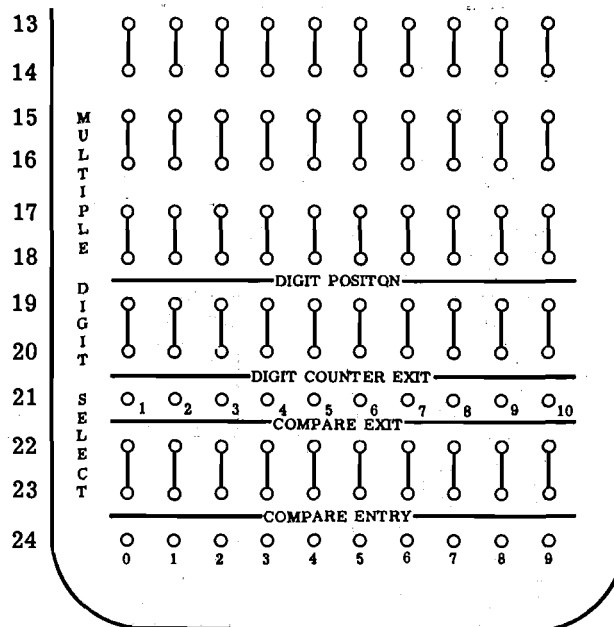


Figure XIV-23. Multiple Digit Select (lower half) of Plugboard

Documents which contain the specified character in each of the locations, as defined on the plugboard, are called 'equal' documents; while those which do not compare are called 'unequal.' The multiple digit select switch on the document handler control and indicator panel has two positions:

1. EQUAL
2. UNEQUAL

With the Switch in the EQUAL position, documents which compare are sent to the special pocket and all other documents are sorted in the conventional off-line method. When in the UNEQUAL position, documents that do not compare are sent to the special pocket, and all other documents are sorted in the conventional off-line method. All hubs in this section are in pairs (connected on the board by lines). This means that either of each pair of connected hubs may be used for any connection. For example, hubs in either rows 19 or 20 may be used to wire digit positions.

For an example of multiple digit selection, assume that it is desired to separate from a group of documents those which contain the number 60192 in the third field as shown in the following sample format:

1211 17891 15756 60192 9700000 12345

FIELD
3

The cue count configuration which identifies field number 3 is:

<u>Cue Counter</u>	<u>Count</u>
Paragraph	1
Hyphen	0
Window	0

The plugboard should be wired as follows:

1. Connect the cue count hubs, which identify the field, to the field definition hubs. The cue count (paragraph = 1, hyphen = 0, and window = 0) is connected to field definition hubs 13J, 15J and 17J respectively. The next four field definition digit hubs to the left of the cue count connections are connected together, representing the five digits of field number 3. (See Figure XIV-24.)
2. Establish the digit position for each digit by connecting the digit position hubs (19J through 19F or 20J through 20F) to the digit counter exit hubs (21E through 21A) as illustrated in Figure XIV-24.
3. Connect compare exit and compare entry hubs so that the digits 60192 of field number 3 are compared with field number 3 of every document read by the character reader. Since digit positions are counted from right to left, the following is a list of the order and wiring of the digits in field number 3.

Digit position #1 contains a '2'
Digit position #2 contains a '9'
Digit position #3 contains a '1'
Digit position #4 contains a '0'
Digit position #5 contains a '6'

Since digit position #1, as defined by 19F, contains a '2', the compare exit hub 22F or 23F is connected to compare entry hub representing the numeral '2.' When the wiring of field #3 (60192) is completed, every document having 60192 in the third field will go to the SPECIAL pocket when MULTIPLE DIGIT SELECT on the control and indicator panel is set to EQUAL.

If desired, additional fields may be sorted on until all ten digit positions are used. For example, assume that field number 2 (containing the numeral '9') must also be sorted on. The field identification (slant = 2 and paragraph = 0) is connected to the field definition hubs. Since this field contains only one digit, no additional field definition digit connections are made.

In establishing the digit position for field number 2, a connection is made from digit position hub, thereby designating this digit as digit position number 1 of field number 2. The last connection for field number 2 is to

connect the compare exit hub (22E) to the compare entry hub, representing the numeral '9.' However, this compare entry hub is already connected to compare exit hub 22G; hence, another method must be used. The compare exit hub (23G), in this case, is connected to compare exit hub 22E thereby making a connection to the numeral '9.' A missing digit is not considered a digit position.

An alternate method of wiring the plugboard to perform the same function is illustrated in Figure XIV-24. In comparing Figure 25 with 24, it will be seen that field definition hubs are wired to the left side of the plugboard instead of to the right. However, the rightmost hubs must always be used for the most significant digit position. Thus, in Figure XIV-25, hubs in column J are used even though the remaining hubs used are at the left of the board. Another difference in the wiring of Figure XIV-25 is that row 23 is used instead of row 22. Since hubs in both rows perform the same function, this makes no difference in the final results.

The following general rules apply to wiring for use of the multiple digit select portion of the plugboard.

1. The digit position on a document is counted from right to left, and the plugboard hubs are counted from left to right.
2. Under field definition, plug across only the number of digits in the field to be compared. Also plug the most significant digit in row J.
3. In field definition, plug each field separately for each digit.
4. The 0-9 numbers on the bottom of the plugboard refer to digit values for compare entry.
5. The numbers 1-10 under digit counter exit represent the digit position in the field.

Transposition Check Digit (Optional Feature). A total of three plug-in connections are allocated for the transposition check digit (TCD) optional feature. The TCD is a number added to any field to make sure a digit in that field has not been misread. The number is based on an arithmetic calculation on the numbers in the field known as "Mod Eleven."

When the TCD circuitry is to be used, plug the cue count configuration for the field to be checked into the TCD hubs 12H, 12I, and 12J on the plugboard.

ERRORS AND OPERATOR CORRECTIVE ACTION

Errors occur when the operator neglects to:

1. Set the main circuit breaker switch to the ON position.

2. Maintain sufficient documents in the feed hopper.
3. Empty stacker pockets before they become full.
4. Insert the properly wired plugboard.

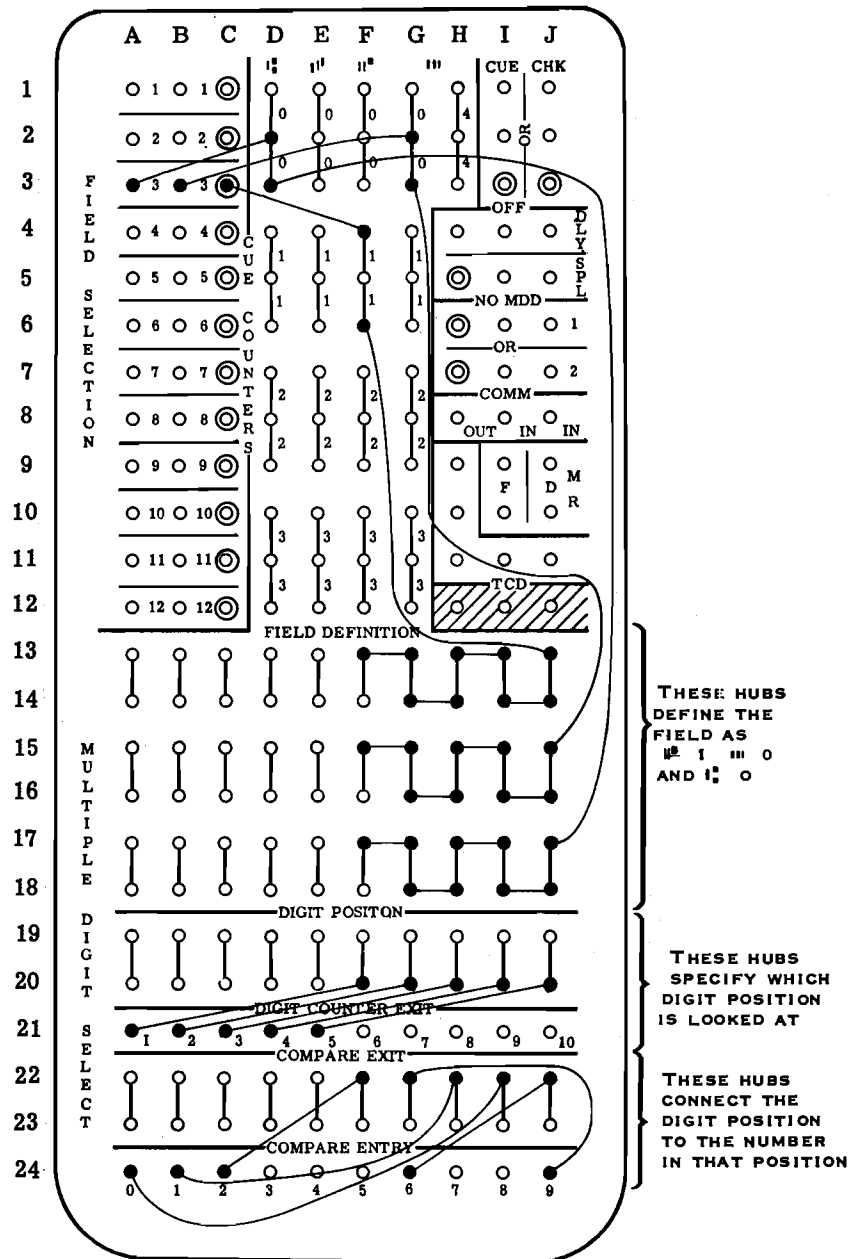


Figure XIV-24. Multiple Digit Select Plugboard Wiring

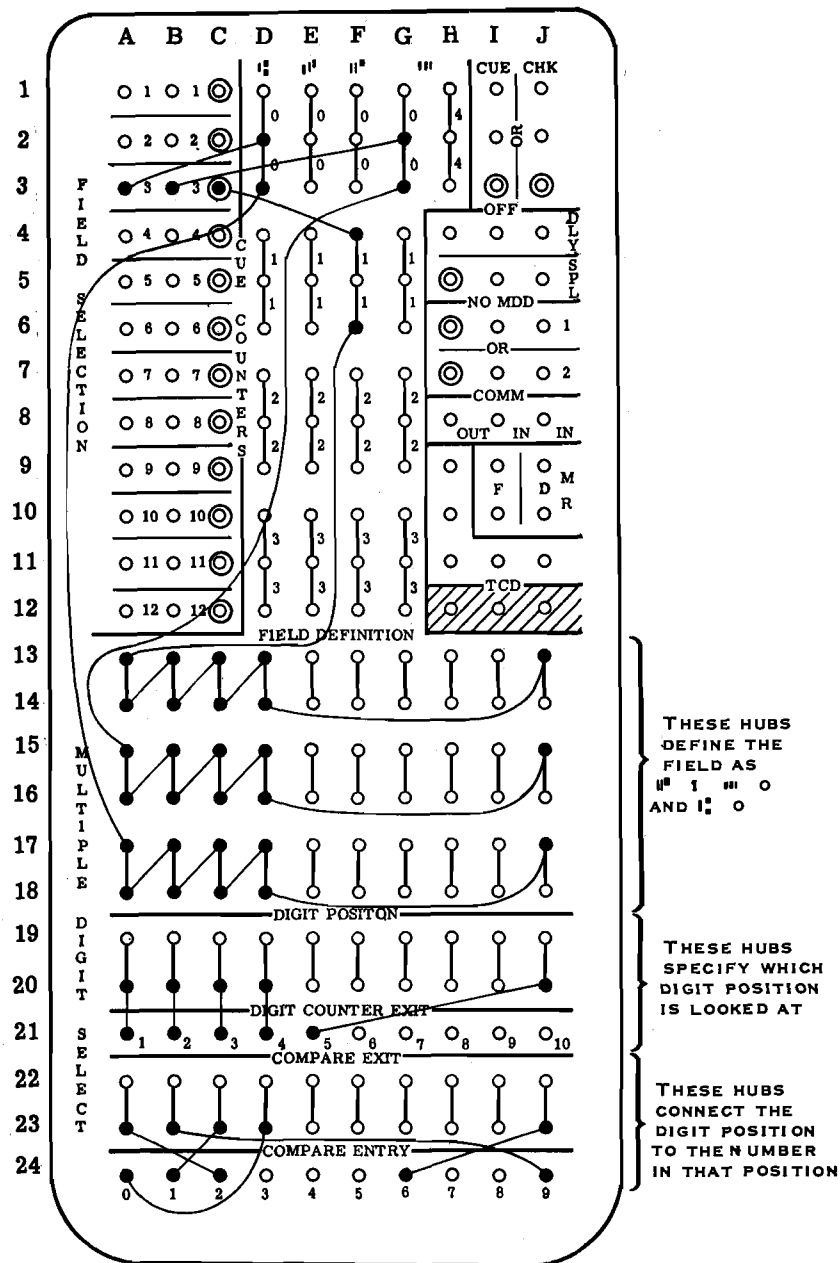


Figure XIV-25. Multiple Digit Select Plugboard Wiring

PROGRAM ERRORS

An error occurs whenever the computer does not send a pocket decision for a given document, in which case the affected document goes to the reject pocket. This condition is called "no pocket decision" (NPD).

Possible errors, their probable causes, and the action required by the operator are outlined in Table XXI.

As is true in all operations, the operator should turn to the service engineer for assistance whenever difficulties in document handler operation cannot be understood or resolved.

TABLE XXI
DOCUMENT HANDLER ERROR CONDITIONS

Error Condition	Possible Cause	Corrective Action
Stacker Pocket WARNING indicator on control panel lights	One or more pockets are approaching a full condition	Remove documents from near-capacity pocket or pockets.
Stacker Pocket FULL indicator on control panel glows amber and documents stop feeding	One or more pockets are full	<ol style="list-style-type: none"> 1. Remove documents from full pocket or pockets. 2. Depress FEED ON button on operator control panel.
BOGIE RETURN indicator light on control panel glows red, and document handler halts	Documents in transport system have jammed	1. Remove documents from transport path and place them in reject pocket.
		2. To resume operation, depress BOGIE RETURN, MOTOR ON, and FEED ON buttons on control panel in that order.
		3. If operating on line, consult programmer instructions for recovery procedures.
FEED ON indicator on control panel refuses to light when depressed, even though FEED READY indicator is lit	Feed hopper is empty or a stacker is full	<ol style="list-style-type: none"> 1. Load feed hopper. 2. Or empty stacker 3. Depress FEED ON button.
MOTOR ON indicator on control panel will not light when depressed, motors will not run, and BOGIE RETURN indicator remains lit when depressed	Document jam has caused mechanical difficulty in the apparatus (or bogies) which supplies the moving force on documents in transit.	Notify the service engineer of the difficulty.
COMPUTER DEMAND indicator on control panel remains off, and ON-LINE mode indicator will not light when ON-LINE button is depressed	Several possible causes. Possibly cables between document handler, adapter, and/or computer are not connected	Notify the service engineer of the difficulty.
Documents stop feeding during a sorting operation	Feed hopper is empty or one or more pockets are full	Load feed hopper and depress FEED ON button, or empty full pockets and depress FEED ON button.

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TABLE XXI (Cont.)

Error Condition	Possible Cause	Corrective Action
ECHO ALARM indicator on control console lights (on line only)	Plug not connected in document handler adapter cabinet	<ol style="list-style-type: none"> 1. Consult programmer instructions for plug numbers. 2. Set AUTO/MANUAL switch on control console to MANUAL position. 3. Notify the service engineer of the difficulty.
All documents are entering reject pocket (on line only)	The desired FIELD and/or DIGIT select buttons on the control panel were not depressed prior to the off-line sorting operation or the plugboard was not wired correctly	<ol style="list-style-type: none"> 1. Depress FEED OFF button on control panel. 2. Depress the desired DIGIT and FIELD Select buttons upon which sorting is desired. 3. Remove documents from reject pocket and replace in feed bin. 4. Check the plugboard. 5. Depress FEED ON button.
	Position selected for sorting does not appear on documents	<ol style="list-style-type: none"> 1. Depress FEED OFF button. 2. Reload feed hopper. 3. Select correct position. 4. Depress FEED ON button.
	TCD switch on maintenance panel was erroneously placed in NORMAL position when TCD optional feature is not incorporated in machine	<ol style="list-style-type: none"> 1. Depress FEED OFF button. 2. Set TCD switch on maintenance panel to TEST position. 3. Reload feed hopper. 4. Depress FEED ON button.
	CUE COUNT switch on maintenance panel in NORMAL position; plugboard is wired incorrectly	<ol style="list-style-type: none"> 1. Depress FEED OFF button. 2. Correct CUE CHK wiring on plugboard. 3. Reload feed hopper. 4. Depress FEED ON button.

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TABLE XXI (Cont.)

Error Condition	Possible Cause	Corrective Action
All documents are entering reject pocket (cont)	MDD switch on maintenance panel in NORMAL position; plugboard is wired incorrectly	<ol style="list-style-type: none"> 1. Depress FEED OFF button. 2. Correct wiring in NO MDD section of plugboard. 3. Reload feed hopper. 4. Depress FEED ON button.
Documents entering the reject pocket for no apparent reason		Notify service engineer of difficulty.
Documents are feeding and stacking irregularly		Notify engineer of difficulty.
FEED ON indicator on control panel refuses to light when depressed, even though FEED READY indicator is lit. Feed hopper is full and pockets are not full	FEED switch on maintenance panel is in the OS position	<ol style="list-style-type: none"> 1. Depress FEED OFF button. 2. Set FEED switch on maintenance panel to NORMAL position. 3. Depress FEED ON button.
I/O ALERT indicator on document handler adapter display panel lights. PARITY ALERT indicator on document handler adapter display panel lights (on line)	New character is read into the read buffer before preceding character is transferred to memory. A command word has been received with incorrect parity	Notify the service engineer