TECHNICAL MANUAL

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IMPORTANT NOTICE

THIS TECHNICAL MANUAL IS SUPPLIED WITH DOCUMATION CARD READER SERIAL NUMBER

THIS MANUAL SHOULD REMAIN WITH THAT CARD READER.

Technical Manual Change Record

This Technical Manual has been updated to reflect Customer Specifications. Minor changes to text or schematics are marked on the pages affected. Major changes to text or schematics are corrected by direct replacement of pages affected, or are contained in an Addendum.

Customer:	DIGITAL EQUI	PMENT CO	ORP.		
Model:	M200 Voltage	230	Frequency	50	
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Addendums:	RECOMMENDED FIELI		LIST		
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	C. Card Location .				
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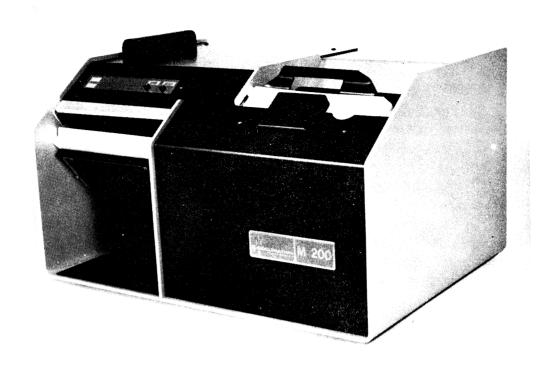


Figure 1-1. Card Reader, Three-Quarter Front View (Typical)



Figure 1-2. Card Reader, Three-Quarter Rear View (Typical)

SECTION 1 INTRODUCTION

1.1 GENERAL

This technical manual contains operation, maintenance, interface, and repair information to properly set up, operate, and maintain the Documation Model M200 Card Reader. An Illustrated Parts Breakdown is included in Section 12 to aid in locating and identifying parts if replacement becomes necessary.

The M200 Card Reader shown in figures 1-1 and 1-2 is designed to read standard 12-row, 80 column punched cards. The hopper capacity is adequate to hold approximately 550 cards of .007" thickness. These are separated from the stack sequentially and moved past a phototransistor read station where the data is recognized in a serial, column-by-column manner. The cards are then stacked into the output hopper in the same order as they were originally put into the reader. The reading cycle is externally controlled for single card selection or continuous run. In the continuous mode, the reader will read 285 cards per minute.

1.2 DESCRIPTION

The entire reader is constructed around a mainframe, figure 1-1. Mounted within the mainframe are the input hopper and output stacker, card track mechanism and control and indicator panel and printed circuit card cage. All logic circuitry is contained on printed circuit boards within the card cage. Located on the underside of the mainplate assembly are the drive motor, drive train, and a portion of the card pick mechanism. The bottom area of the mainframe contains the vacuum pump motor assembly and the remainder of the electronics.

Located on the rear of the reader, figure 1-2, are three controls, a circuit breaker, the power input, the I/O connector, and a cooling fan.

1.3 SPECIFICATIONS

READING SPEED: 285 cards per minute maximum in continuous run.

Single Card Cycle: 200 milliseconds.

CARD TYPE: Standard 80 column cards.

CONTROL: Demand feed, one card-at-a-time under external

program control. Reader will continuous run as

long as the Pick Command remains TRUE.

INPUT:

Pick Command (PC) Logic True for 1µsec

-15 MaDC @ 0.8 VDC Max.

OUTPUT:

Data Lines and TTL Type 7404 or Equivalent.

Interface Signals I Source 2.2 MaDC

I Sink -15 MaDC @ 0.4 VDC Max.

HOPPER SIZE: 4.0 inches (approximately 550 cards of 7 mil

thickness).

STACKER SIZE: 4.0 inches (approximately 550 cards of 7 mil

thickness).

POWER REQUIREMENTS:

Voltage: 115 VAC \pm 10%, single phase, 60 Hz (standard model).

230 VAC ± 10%, single phase, 50 Hz (export model).

Power: 1650 VA (MAX) starting load for 3 sec

570 VA (MAX) running load

SIZE:

Height: 11 inches 27.9 cm

Width: 19-1/4 inches 48.9 cm

Depth: 14 inches 35.5 cm

WEIGHT: 60 pounds 27.3 Kg

OPERATING ENVIRONMENT:

Dry Bulb Temperature 50 to 100°F.

Relative Humidity 30 to 90% non-condensing

Wet Bulb Temperature 80°F. maximum Thermal Shock 15°F. per hour

Altitude 1000 feet below to 6000 feet above sea level

STORAGE ENVIRONMENT:

Dry Bulb Temperature -25 to +135°F.

Relative Humidity 5 to 95% non-condensing

Altitude 1000 feet below to 12,000 feet above sea level

CARD STOCK

The card must meet American National Standard's specification ANSI X3.11-1969, Specification for General Purpose Paper Cards for Information Processing.

PUNCH DATA

Punch data must meet American National Standard ANSI X3. 21-1967 specifications.

SECTION 2 UNPACKING AND INITIAL CHECKOUT

2.1 UNPACKING

The M Series Card Readers are packed in a cardboard container, figure 2-1, with cushioning and padding to protect the equipment from damage during shipment. Inspect the outside of the container and report any physical damage to the carrier immediately.

Included in the container are the power cord and technical manual. After removing these items, lift the card reader straight up and place on a flat, sturdy, support area. Inspect the reader for any physical damage and report any damage to Documation Incorporated. Locate a Phillips screwdriver and with the reader tilted in an upright position, remove the two red 8 x 32 screws in the bottom plate. These screws lock the blower motor plate in a solid position to prevent damage to the motor plate vibration isolators during shipment. If the reader is reshipped, these screws must be installed.

2.2 INITIAL CHECKOUT

Use the following instructions to test reader readiness.

- a. Make sure input voltage and frequency are correct. Plug in the AC power cord.
- b. Set the MODE switch (rear panel) to LOCAL.
- c. Set the SHUTDOWN switch (rear panel) to AUTO.
- d. Place the AC power (rear panel, top left) to ON to energize the reader. The POWER indicator illuminates and, after approximately a 3-second delay, the STOP and HOPPER CHECK indicators illuminate.
- e. Depress and hold momentarily the LAMP TEST switch (rear panel) and observe that all front panel indicators illuminate. Release switch.
- f. Pull the hopper follower back with one hand and load approximately 3 inches of unpunched cards into the hopper area.
- g. Depress the RESET switch. The RESET indicator will illuminate and the STOP indicator will extinguish. The drive motor and vacuum/blower should come on and, after approximately a 3-second delay, the cards should be picked and stacked. The drive motor and vacuum/blower will then shut off and the STOP and HOPPER CHECK indicators illuminate.
- h. Place the AC power to OFF. All indicators are extinguished.
- i. Pull the stacker plate down with one hand and remove the cards.
- j. This completes the initial off-line test.

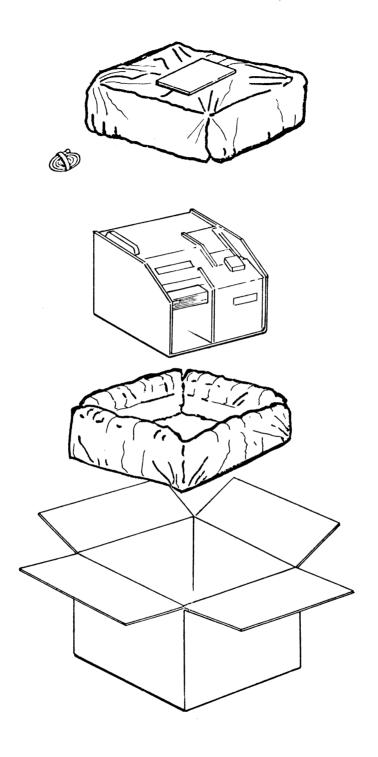


Figure 2-1. Unpacking

SECTION 3 OPERATION

3.1 LOADING THE INPUT HOPPER

Load the input hopper with punched cards to be read as follows:

a. Remove the hopper follower and load the card deck into the hopper area; the first card to be read must be placed at the front with the 9" edge down, column "1" to the left. Continue placing cards into the hopper until it is loosely filled (approximately 550 cards). Replace follower.

CAUTION

DO NOT PACK THE INPUT HOPPER SO FULL THAT THE RIFFLE ACTION AT THE AIR RIFFLE CAP IS INHIBITED

- b. The hopper may be loaded while cards are being read if the operator is careful to keep tension on the front portion of the deck while loading additional cards at the rear. This is accomplished with the input hopper approximately one-half to one-third full. Use just enough pressure to maintain the riffle action.
- c. Unloading the input hopper is the reverse of the loading procedure. Normally all cards are processed through the reader; however, if it is necessary to unload the hopper, remove the follower and remove the card deck. If the cards are arranged in a particular order, exercise care in repacking them in their storage container so that the order is maintained.

3.2 UNLOADING STACKER

To unload the stacker, perform the following steps:

- a. Pull stacker follower down and remove the front or rear portion of the card deck from the stacker area, being careful that deck order is maintained.
- b. To unload stacker during operation, pull stacker down and remove portion of deck taking care to allow stacker plate to return to its normal position gradually.

3.3 CONTROL AND INDICATOR DESCRIPTION

Reader controls and indicators, figure 3-1, are located on the front control panel, the rear of the card cage, and the rear subframe. Control and indicator descriptions are as follows:

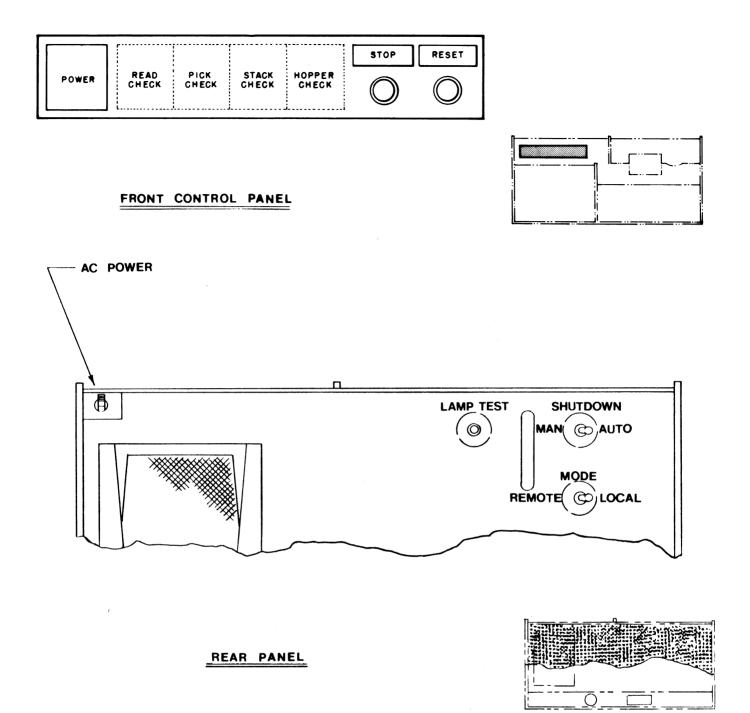


Figure 3-1. Switch and Indicator Location

3.3.1 FRONT PANEL CONTROLS AND INDICATORS

Located on the front panel are two pushbutton type switches; STOP and RESET.

Located above these switches are lighted indicators showing reader status; they are RESET (green), and STOP (red).

Five other indicators are located on the front panel.

POWER
READ CHECK
PICK CHECK
STACK CHECK
HOPPER CHECK

3.3.2 REAR READER CONTROLS

Located on the rear of the reader are two mode switches, a LAMP TEST switch and the main AC power circuit breaker. The two mode switches are:

SHUTDOWN - MAN/AUTO MODE - REMOTE/LOCAL

3.4 OPERATIONAL PROCEDURES

The following procedures explain both the operational sequence and some of the theory associated with the controls and indicators.

- a. Select the mode of operation, MANUAL or AUTO. When the MANUAL mode is selected, the drive motor and vacuum/blower will run continuously when AC power is applied. When the AUTO mode of operation is selected, all motors will turn off after the last card is read.
- b. The second mode switch is used to select either REMOTE or LOCAL operation. When LOCAL operation is selected, card reader operations are controlled from the operator's control panel. In normal operation the card reader is connected to the appropriate interface logic and the switches should be in AUTO and REMOTE positions.
- c. With the LOCAL mode of operation established, place the AC power circuit breaker on the rear panel to ON to apply primary power to the reader. The drive motor and vacuum/blower will not come on at this time due to the input hopper being empty and AUTO shutdown selection. The POWER indicator illuminates.
- d. Depress the LAMP TEST switch and check that all front panel indicators are lighted.

- e. Load the input hopper and depress the RESET switch. The RESET switch is a momentary action pushbutton switch used to clear any error conditions and establish the card reader "ready" condition. When the "ready" condition is established, the RESET indicator will light green. All motors will start and riffling action begins on the first half inch of cards.
- f. As the cards are being read, the PICK CHECK indicator will light if a card has failed to reach the read head after a pick command has been given. Inspect the cards in the input hopper for excessive leading edge damage, interlocked webs or cards stapled together. If no apparent card damage is present, check for excessive card warpage.
- g. The READ CHECK indicator will light and the "stop" condition will be established when any of the following conditions are detected.
 - 1. Failure of leading or trailing edge dark check.
 - 2. Failure of trailing edge light check.
 - 3. Card slippage.
 - 4. Control logic failure.
- h. The STACK CHECK will light if the previous card read has not reached the output stacker. Check the card track to make sure it is clear and check the output stacker for incorrectly stacked cards.
- i. The HOPPER CHECK indicator will light when the input hopper is empty or when the output stacker is full. This is normal operation.
- j. The STOP switch is a momentary action pushbutton switch used to terminate card reader operation at the end of a read cycle. The STOP indicator will light red when the "stop" condition is established.

3.5 OPERATIONAL FLOW CHART

Figure 3-2 shows a flow chart of the sequence of events which may be encountered in operating the reader. If trouble is experienced, refer to this check list before calling for maintenance.

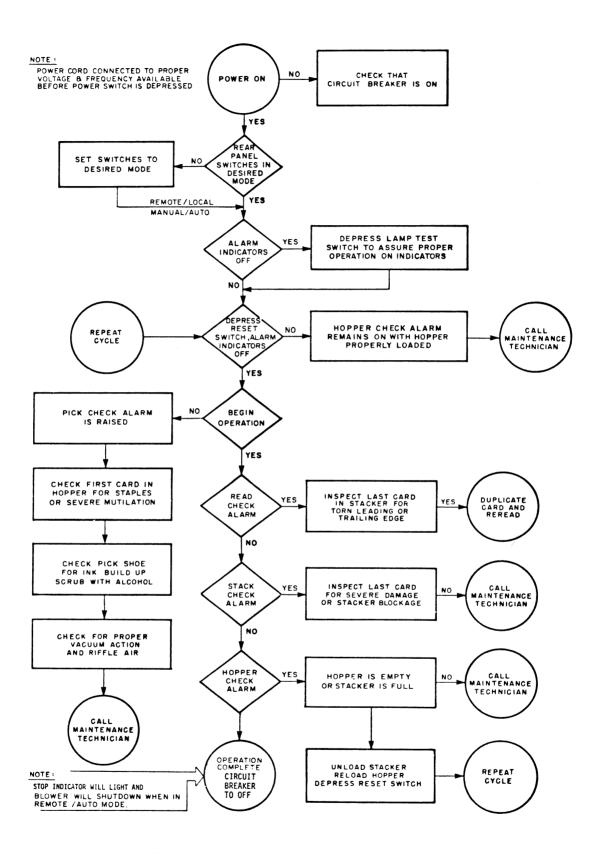


Figure 3-2 - Operational Flow Chart

SECTION 4 THEORY OF OPERATION

4.1 CARD FEEDING MECHANISM

The card feeding mechanism, figure 4-1, is designed around an air flow system that uses air pressure to separate the cards and a vacuum to pick the cards. Pressurized air riffles the first half inch of cards in the input hopper so that they stand apart, individually "air cushioned" from the rest of the card deck and each other. This prevents the cards from sticking together in case of static electricity, hole locking, or torn webs and eliminates frictional forces between the cards. The vacuum picker pulls the bottom card in and holds it against the picker's rubber surface. When a pick command is received, the reader's electronics drives a rotary solenoid coupled to the picker sector causing it to rotate. As the solenoid moves the picker sector, the card is accelerated due to the friction forces caused by the vacuum between the picker's rubber surface and the card. The picker sector rotates pulling the card toward and into the drive rollers. When the leading edge of the card reaches the drive rollers, the rollers pull the card into the card track. The picker is now returned to its rest position by spring tension. As the card in the track clears the picker's surface, the next card is sucked down ready for the next pick command.

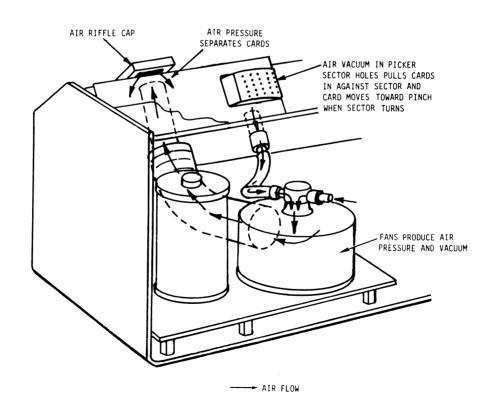


Figure 4-1. Card Feeding Air Flow

4.2 DATA RECOVERY

The logic block diagram for the M Series Card Reader is shown in Figure 4-2.

Data recovery is accomplished by the functions of Reader Control, Data Detection and Data Storage. Reader Control synchronizes the electronic scanning of the card with the mechanical actions of the reader. This provides card picking, card movement through the read station, data flow control and card stacking. Data Detection converts the light/dark conditions of the read station into usable digital signals for Data Storage. Data Storage provides the data synchronization, buffering and retainment required for data transfer from the reader.

4.2.1 READER CONTROL

Primary control timing is established by the 4.8 MHz Crystal Oscillator and the Four-Phase Generator. These are used to shift, store and control other logic operations.

When a PICK COMMAND is received from the controlling device, card processing will begin provided no alarm conditions exist. The Pick Logic produces a PICK signal to the Solenoid Driver, a PCLK signal, and a pick-command reset (PCR) to the Control Logic. These actions initialize the various control circuits and energize the solenoid to pick a card from the input hopper. If a card does not reach the read station, the PICK CHECK alarm is raised.

The Read Station and Stacker utilize phototransistor sensors to read the card's hole pattern and to monitor the card's movement. When a card is picked and moved into the card track, the leading edge interrupts the light to the Read Station. This produces a ONE DARK signal that is used by the Control Logic to generate a Good Pick Reset (GPR) which initializes the synchronization of the card's movement through the Read Station. The Column Counter then counts columns via the Data Control and Sync Logic as the card moves past the Read Station, thus synchronizing the mechanical card movement with the electronic circuits. The Column Counter generates a DARK CHECK at Column 0 and 81 and a Light Check at Column 84. Figure 4-3, Timing Relationship for Standard Card, shows these check positions. These checks provide a quality check on both the Read Station and the mechanical card movement.

4. 2. 2 DATA DETECTION

As the card passes between the Light Emitting Diodes (LEDs) of the Light Station and the Phototransistors of the Read Station the light and dark conditions are sensed and amplified by the Read Station's phototransistors. The light (punched hole) and dark conditions are converted to electronic signals at the Phototransistor's

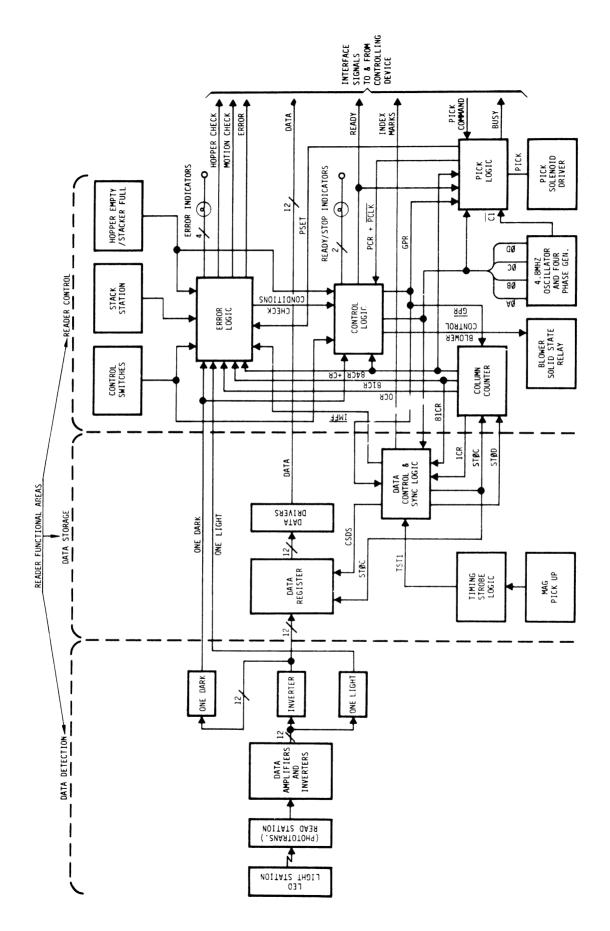


Figure 4-2. Block Diagram, M Series Card Reader

emitters and used to drive the Data amplifiers and inverters. Outputs of the Data Amplifiers and Inverters pass through the One Light/One Dark inverters and provide detected data to the Data Register.

4.2.3 DATA STORAGE

To accomplish Data Storage, the Data Control and Sync Logic sends Synchronized Data Strobes (CSDS) to the Data Register at predetermined punched column positions. Synchronization is accomplished by a notched ferrous timing disc attached to one of the drive roller shafts. As the timing disc rotates, a reluctance pickup senses the movement of the disc's notches past the pickup producing timing signals. These signals are used by the Data Control and Sync Logic to generate Data Strobes (CSDS) for each of the 80 columns. Data Storage includes Data Drivers that provide buffering between the Data Register and the interface lines.

4.3 DETAIL OPERATIONAL DESCRIPTION

The following gives a detailed description of each block shown in Figure 4-2, Block Diagram - M Series Card Reader. The description is designed to give the reader an indepth understanding of how the card reader works without the usual logic gate-by-gate description.

The reader should familiarize himself with the signal mnemonics used in the text description and contained in Section 11 since it will aid in interpreting both the description that follows and the logic schematics in Section 10.

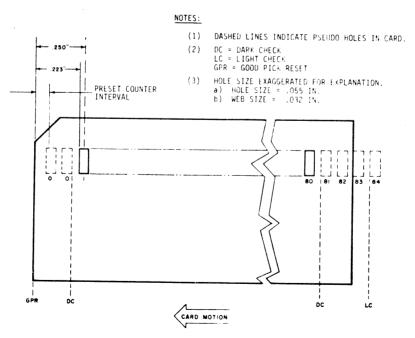


Figure 4-3 - Timing Relationship for Standard Punched Card

4.3.1 READER CONTROL

The following is a detailed description of each block shown under Reader Control in Figure 4-2, Block Diagram, M Series Card Reader.

4.3.1.1 4.8 MHz Oscillator and Four-Phase Generator

The block diagram and timing diagram for the 4.8 MHz Oscillator and Four-Phase Generator is shown in Figure 4-4. The oscillator is crystal controlled and provides a TTL compatible 4.8 MHz squarewave as an output. The 4.8 MHz output is divided by ten in a decade counter and the counter's 480 KHz output used to drive the Four-Phase Generator. The Generator then divides the 480 KHz by four, generating signals ØA, ØB, ØC, ØD and C1 as shown by the timing diagram of Figure 4-4.

 $\emptyset A$, $\emptyset B$, $\emptyset C$, $\emptyset D$ and $\overline{C1}$ are used throughout the reader as a timing source.

4.3.1.2 Control Logic

The Control Logic (Figure 4-5) contains the Ready/Stop Logic, Power On Reset, Blower Control, Reset Control and Good Pick Sync Control. At reader power turn on, a three-second Power On Reset (POR) is initiated. See timing of Figure 4-5. The long POR allows the blower to come up to speed before the controlling device or an operator can initiate a reader

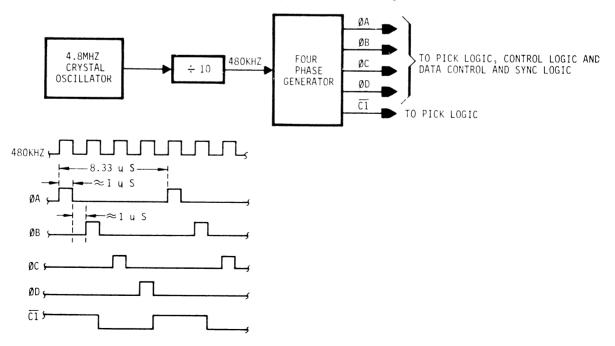


Figure 4-4 - Block and Timing Diagram, 4.8 MHz Oscillator and Four-Phase Generator

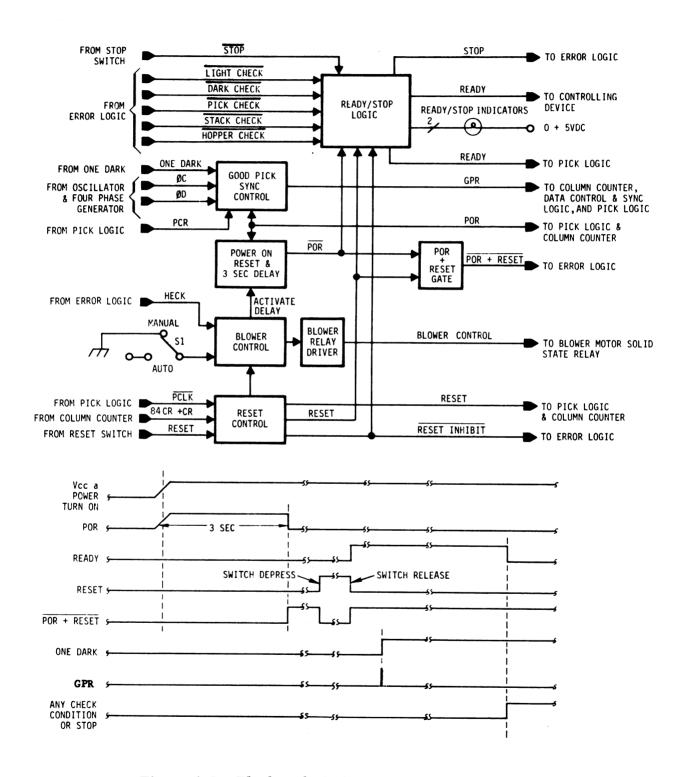


Figure 4-5 - Block and Timing Diagram, Control Logic

operation. POR is also used to initialize the Pick Logic and Column Counter. POR OR'ed with RESET to form POR + RESET resets the Error Logic. The reader is now brought to the ready state by the operator depressing and releasing the RESET switch. Note that while the RESET Switch is depressed, RESET is routed to initialize the Pick Logic and Column Counter and RESET activates the POR + RESET signal to the Error Logic. The Reset Control is designed to ignore all RESET switch signals while a read cycle is in progress. Signals PCLK and 84CR or CR identify the beginning and end of a read cycle.

Reader READY is signalled to the controlling device by the Ready/Stop Logic when the RESET Switch is released provided HOPPER CHECK is not being presented by the Error Logic. (All other Error Logic Check signals will be reset by POR or RESET.) Reader READY is indicated to the operator by the RESET Switch lighting green. The controlling device can now begin a read cycle by transmitting a PICK COMMAND to the reader. READY will be reset upon receipt of any CHECK signal from the Error Logic or if the STOP Switch is depressed by the operator and RESET INHIBIT is not present. The Ready/Stop Logic gates the STOP signal with RESET INHIBIT, preventing READY from being reset due to STOP during a card read cycle. RESET INHIBIT, generated by the Reset Control, is set by PCLK and reset by 84CR or CR. The Stop Condition is indicated by the STOP switch lighting red.

The Good Pick Sync Control is initialized by Pick Command Reset (PCR). During a card read cycle, the Good Pick Sync Control detects a ONE DARK and processes this signal with clock phase \emptyset C and \emptyset D to produce Good Pick Reset (GPR). GPR is used to:

- a. Initialize the Column Counter.
- b. Begin the data synchronization process by the Data Control and Sync Logic.
- c. Verify to the Pick Logic that a Pick Command has been successful.

The Blower Control provides signals to control AC power to the reader blower motor and drive motor. These motors automatically shut down when a HECK (Hopper Empty Check) condition exists and switch S1 is in the AUTO position. After the HECK condition is corrected by reloading the input hopper, depressing of the RESET switch will cause the Blower Control Logic to activate the 3-second (nominal) POR. When the SHUTDOWN switch is in the MAN position, all motors remain on as long as reader power is applied.

4.3.1.3 Pick Logic

Once the reader is brought to ready condition, a PICK CMD from the

controlling device can be accepted by the Pick Control. (Figure 4-6, see diagram and timing.)

The Pick Logic will then:

- 1. Generate PCLK
- 2. Initiate a PICK pulse that drives the picker solenoid.
- 3. Control the PICK pulse length.
- 4. Wait out the interval while the card leading edge is accelerated to the read station (14 to 27 ms).
- 5. If the leading edge has not arrived in 50 ms, generate another pick pulse.
- 6. Repeat the pick attempt six times and if the leading edge has not appeared, generate a pick fail alarm (PSET).

The Pick Control generates \overline{PCLK} (Figure 4-6 timing) until a GPR is received or READY goes false due to the pick fail signal (PSET). \overline{PCLK} gated from Pick Control is divided by two decade MSI counters to a frequency of 1.2 KHz. The 1.2 KHz is then counted by the Pick Control

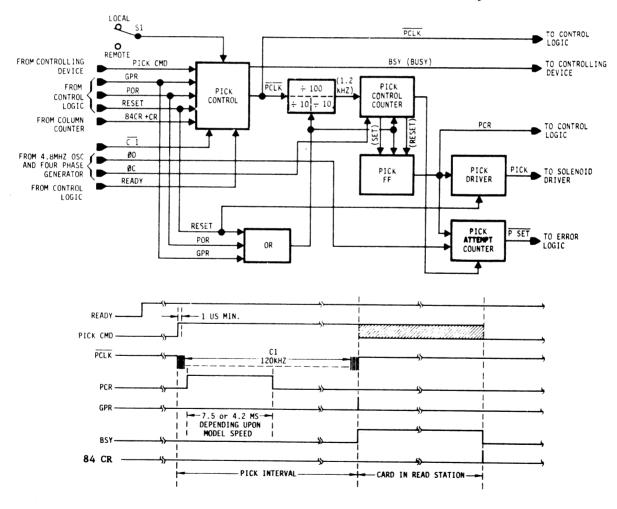


Figure 4-6 Block and Timing Diagram, Pick Logic

Counter. At the count of one the Pick Control Counter sets the Pick Flip-Flop (FF). This begins the PICK pulse interval. The Pick Control Counter continues to count the 1.2 KHz until count 10 (for M200, 300 and 600) or 6 (for M1000, M1200) is decoded generating a reset to the Pick FF ending the PICK pulse. PCR, generated by the Pick FF, is used by the Control Logic to initialize the Good Pick Sync Control. The Pick Control Counter continues to count the 1.2 KHz while awaiting a GPR. If no GPR is received by the count of 63, the Pick Control Counter resets to all zeros and begins its count cycle again generating another PICK and PCR pulse. PICK and PCR pulses will continue to be generated until a GPR is received or the PICK Attempt Counter counts six PCRs and the Pick Control Counter reaches Count 56. When six PCRs have been counted and count 56 is reached PSET is generated. PSET will cause READY to go false terminating PCLK.

Upon receipt of a GPR, the Pick Control signals Busy (BSY) to the controlling device to indicate a card has entered the read station. BSY remains true until 84CR indicating the card has left the read station and another PICK CMD can be accepted.

The position of Switch S1 determines the source of the PICK CMD. In LOCAL, the PICK CMD signal is held true so that whenever the reader is READY, PICK CMDs are generated internally each time 84CR is reached. When in REMOTE, only a PICK CMD from the controlling device can initiate a read cycle.

4.3.1.4 Column Counter

The Column Counter (Figure 4-7) provides a record keeping control function by counting and decoding columns as the card passes through the Read Station. Following GPR, a STØC followed by a STØD (Refer to timing diagram of Figure 4-7) will be generated for each column by the Data Control and Sync Logic. STØC is used to drive the Column Counter and STØD to sample the Count Gating. The Column Counter generates OCR (0 column reset), 1CR, 81CR, 84CR. These signals are used by the Control Logic, Data Control and Sync Logic, Pick Logic and Error Logic as follows:

COUNT		USED BY
OCR	1.	Error Logic for a Dark Check and set Stack FF.
1CR	1.	Data Control and Sync Logic to set the Index Mark Control Flip Flop (IMFF).

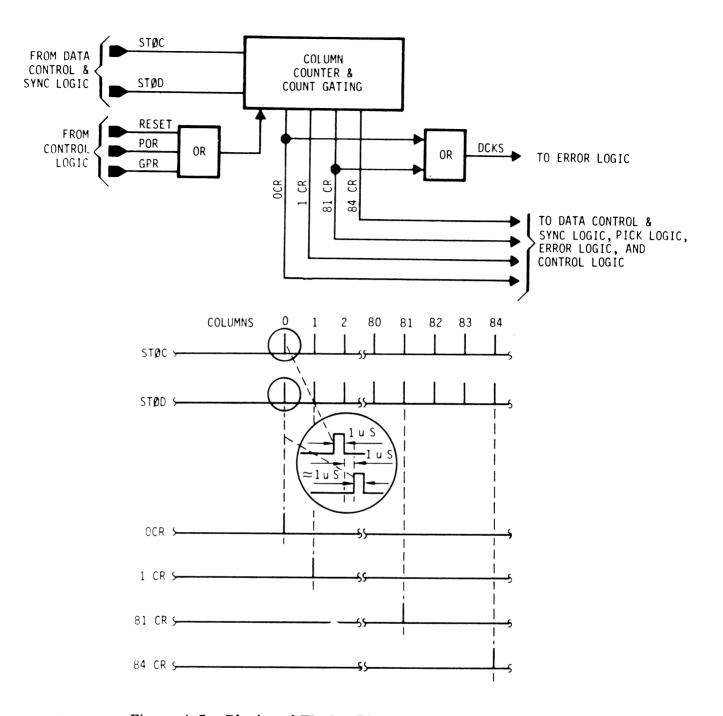


Figure 4-7 - Block and Timing Diagram, Column Counter

COUNT		USED BY
81CR	2.	Data Control and Sync Logic to Reset the IMFF. Error Logic for a Dark Check. Error Logic for a Stack Check.

84CR

- 1. Control Logic to reset the RESET INHIBIT Flip Flop.
- 2. Pick Logic to enable the Pick Control for the next PICK CMD and reset BUSY.
- 3. Error Logic for a Light Check.
- 4. Data Control and Sync Logic to reset the Sync Control Logic.

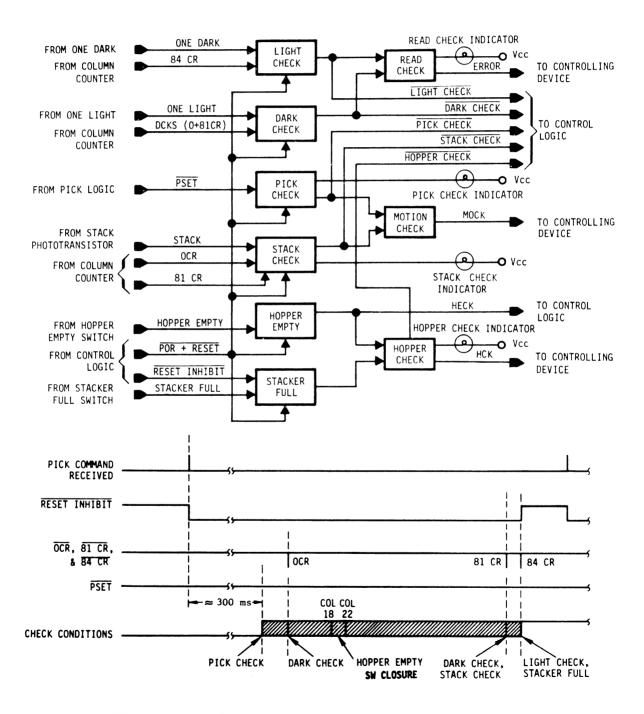


Figure 4-8. Block and Timing Diagram, Error Logic

The Column Counter counts until 84CR is generated. The Column Counter is reset to zero by each GPR and RESET or POR.

4.3.1.5 Error Logic

The Error Logic of Figure 4-8 contains the error/alarm detection circuits.

Once a PICK CMD is accepted by the reader, the Error Logic is sampled at intervals of card processing for error and reader conditions. These error/reader conditions are referred to as CHECK CONDITIONS and shown in the timing diagram of Figure 4-7. Should a CHECK CONDITION occur the reader READY will be reset. The first test is Pick Check. If a PSET is signalled to Pick Check, a Motion Check (MOCK) will be sent to the controlling device. PSET will occur approximately 300 ms after PICK CMD was received and reader READY will be reset. Pick Check will be signalled to the operator by the PICK CHECK control panel indicator. If PICK CHECK does not occur, a read cycle will be in process and OCR will sample the Dark Check circuits. Should ONE LIGHT be present during the check, indicating a failed LED, phototransistor, or a torn card leading edge, an ERROR signal will be sent to the controlling device and READY dropped. The reader control panel will indicate READ CHECK.

The Hopper Empty circuit senses closure of the Hopper Empty microswitch. This switch is located under the riffle cap and senses when the last card has left the Hopper. As shown in the timing for CHECK CONDITIONS the hopper empty switch will close between columns 18 and 22 of the last card. Hopper Empty is signaled to the controlling device and READY is reset. Hopper Empty is signalled to the operator by the HOPPER CHECK indicator.

OCR will be followed by 81CR which samples the Stack Check circuits and again samples the Dark Check circuits. The stack check sensor is located at the exit of the card track and detects that the tail of a card is clear of the card track (fully seated in the output stacker). The Stack Check logic is designed to test the stack sensor light-to-dark transition (i.e., track clear) between the time an OCR signal occurs (card entering the read station) and the 81CR signal occurs. Should this transition not have taken place, a STACK CHECK alarm is generated. This signal generates a MOTION CHECK to the controlling device, resets the READY line and lights the STACK CHECK indicator on the control panel.

84CR occurs next in the read cycle and samples the Light Check circuitry. A ONE DARK present at 84CR indicates a failed LED phototransistor or

excessive card slip in the read track. This error is signalled to the controlling device as an ERROR and the READY line is reset. The reader control panel will indicate READ CHECK.

Since 84CR is also used to reset RESET INHIBIT, the Stacker Full circuit will be checked for a closure of the Stacker Full Switch. If the switch is closed, the Stacker Full circuitry will send STACKER FULL to the controlling device, Reset READY, and light the HOPPER/STACKER Indicator.

All error conditions are cleared by the Reset Switch.

4.3.2 DATA DETECTION

The following is a detailed description of each block shown under Data Detection in Figure 4-2 Block Diagram, M Series Card Reader.

4.3.2.1 Data Amplifiers and Inverters

The Light Station contains one infrared Light Emitting Diode (LED) and the Read Station one Phototransistor for each of the 12 punched card rows. Light emitted by the LEDs is allowed to pass to the Phototransistors by the presence of punched holes in the tab card. Figure 4-9 presents a block diagram and typical waveform for the Data Amplifiers and Inverters. Light reaching the Phototransistor (PT) is amplified by the PT and converted into an electrical signal at its' emitter. A typical PT's emitter waveform is ROW 12 (A). As the leading edge of the card passes over the PT lens, the received light is reduced causing a reduction in the PT's output voltage. The emitter of the PT is coupled to pull down resistor R and the input of a high impedance TTL inverter. When the PT's emitter voltage drops through the switching threshold of the inverter (nominally) 1.4 volts) the inverter changes states. The High Impedance Inverters output is amplified by the Inverter and then used to drive the One Light and One Dark Logic. As can be seen from the waveforms each time the High Impedance Inverters threshold is crossed the device switches states driving the inverter to produce waveform ROW 12(B).

4.3.2.2 One Dark and One Light

In order to provide the Dark Check at OCR and 81CR and the Light Check at 84CR, the outputs of the Data Amplifiers and Inverters are OR'ed in a One Light nor gate and inverted and OR'ed in a One Dark nor gate. These nor gates consist of 12 each open collector, TTL inverters in a wired OR configuration. Figure 4-10 is a block and timing diagram for the One Dark and One Light logic.

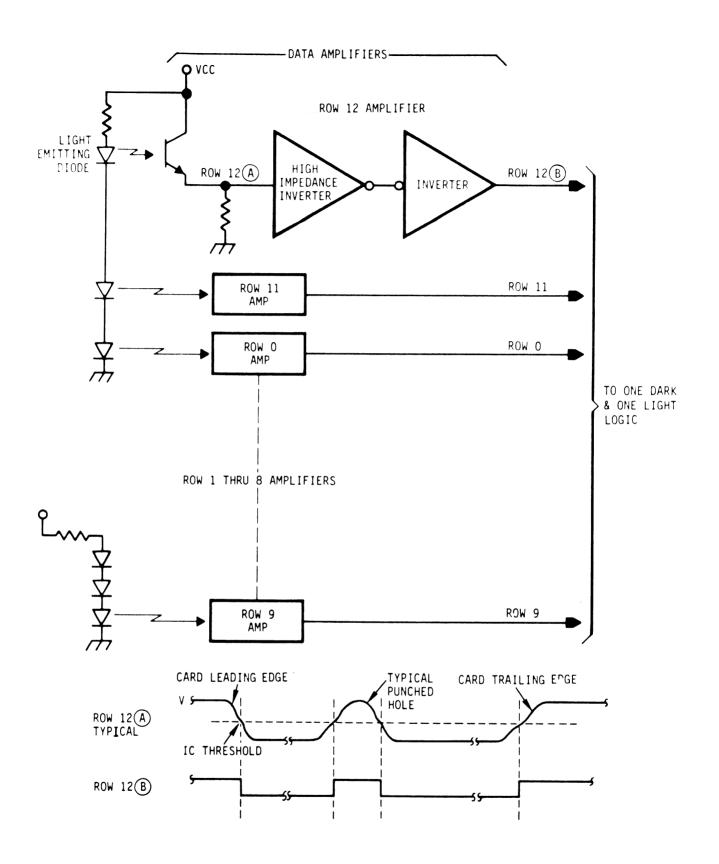


Figure 4-9. Block and Timing Diagram, Data Amplifiers and Inverters

The timing of Figure 4-10 shows the normal waveforms for ONE DARK and ONE LIGHT. When OCR occurs, ONE LIGHT should be low indicating all PTs are dark. The same is true for 81CR. At 84CR, ONE DARK should be low indicating light is being received by all PTs. If the foregoing conditions are not met, a READ CHECK will result and the reader READY will be reset.

4.3.3 DATA STORAGE

The following describes the blocks shown under Data Storage in Figure 4-2 Block Diagram, M Series Card Reader.

4.3.3.1 Data Control and Sync Logic

The Data Control and Sync Logic provides the synchronization and control necessary for data storage. Figure 4-11 is the block diagram, timing and illustration that should be referenced to fully understand the following description.

Following a GPR, the Data Control and Sync Logic must measure by means of logic counters two distances to determine where the Column Storage Data Strobe should begin. As shown on the card illustration,

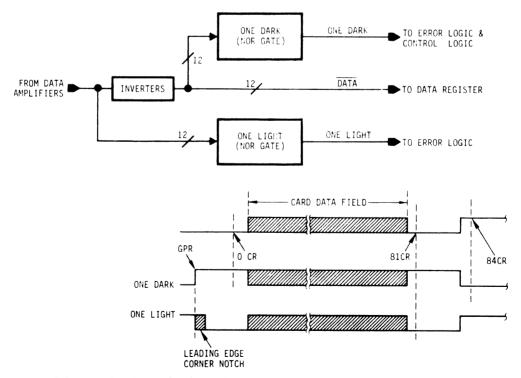


Figure 4-10. Block and Timing Diagram, One Dark and One Light

the first measurement is the PRESET DISTANCE. PRESET is the distance from the card's leading edge (GPR) to the point in column 0¹ where the Column Storage Data Strobe (CSDS) should begin. This distance is equal to .063 inch. The PRESET DISTANCE is predetermined and a PRESET count calculated by knowing the PRESET distance, card velocity and the Preset Counter's input clock rate. The sole purpose of the PRESET DISTANCE is to establish an end point for measuring OFFSET.

As the PRESET DISTANCE is being counted, the OFFSET DISTANCE is measured. The OFFSET is the distance from the trailing edge of the last Timing Disc tooth to pass the magnetic pickup to where the CSDS should begin. Since there are precisely two timing disc teeth for each Column on the card, the reader logic can now count the next two teeth's trailing edges, add the Offset Count and again be positioned to provide CSDS.

Because the Timing Disc's teeth rotate past the magnetic pickup asynchronously with respect to the arrival of the card's leading edge in the Read Station, the OFFSET DISTANCE is a variable and subsequently measured and stored for each card read.

The Synchronization process is initialized when a GPR is received by the Sync Control Logic and Preset Counter. GPR presets the predetermined count in the Preset Counter and causes the Sync Control Logic to generate PRCLK (see timing of Figure 4-11). A zero crossing amplifier (AMP) converts the sine wave produced by the Magnetic Pickup to a TTL compatible squarewave TST1. Following GPR, the first negative transition of TST1 (corresponds to tooth trailing edge) generates TST2 that causes the Sync Control Logic to generate OSCLK (Offset Clock). OSCLK at 120 KHz drives the eight stage Offset Storage Counter, counting it upwards, while and until the Preset Counter reaches all ones. ZERO is now generated by the Preset Counter terminating both PRCLK and OSCLK. The OFFSET has now been measured electronically and stored in the Offset Storage Counter.

The Sync Control counts two negative transitions of TST1 and generates Offset Up-Clock (OSUCLK). OSUCLK is used to count the Offset Counter up until the Comparator detects an equal value between the Offset Storage Counter and Offset Counter. CSDS for Column 0 is now generated by the Strobe Logic. The Strobe Logic's STØB resets the Sync Control Logic, STØC resets the Data Register and STØC and STØD are used to drive the Column Counter. The Sync Control Logic repeats this cycle for every other TST1 causing the Strobe Logic to generate CSDS, STØB, STØC and STØD each time.

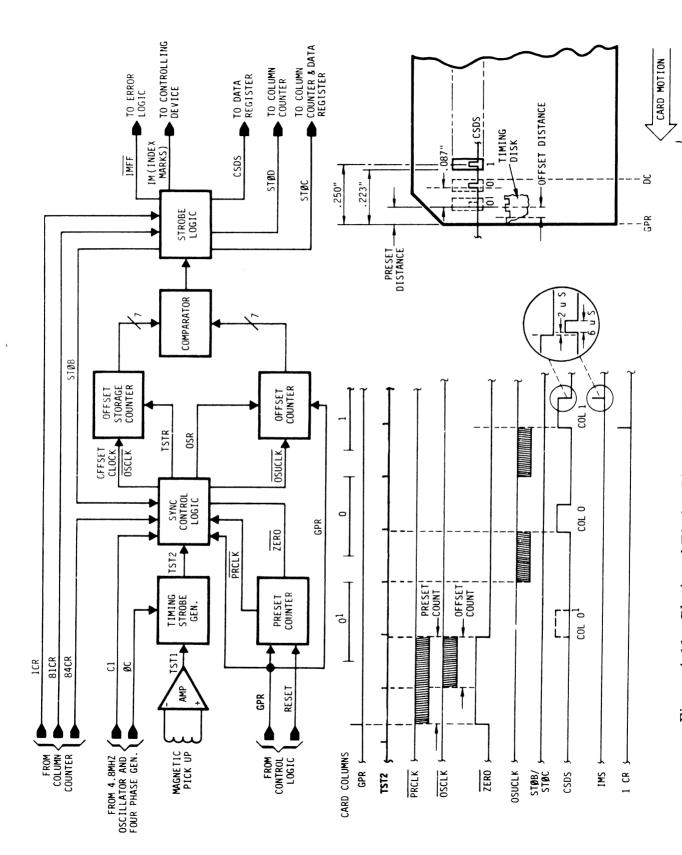


Figure 4-11. Block and Timing Diagram, Data Control and Sync Logic Drivers

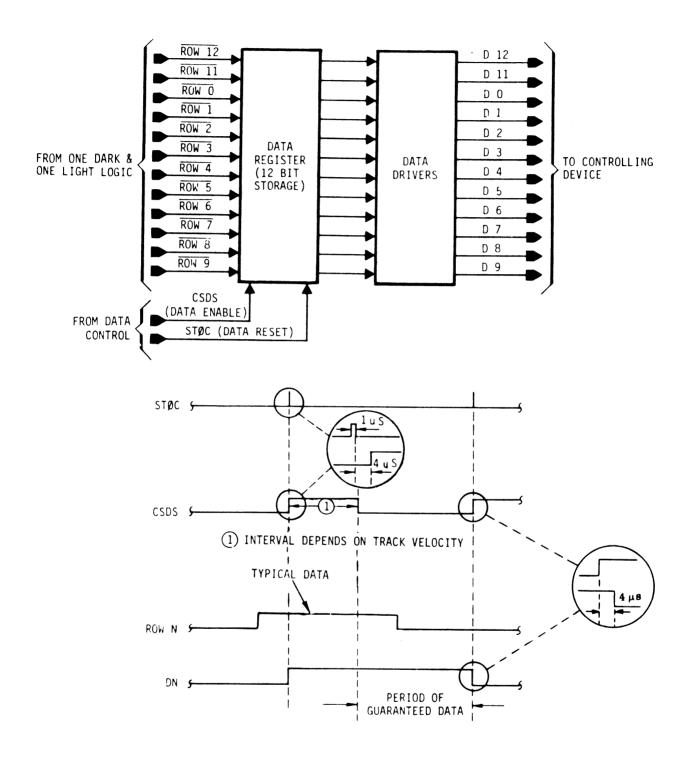


Figure 4-12. Block and Timing Diagram, Data Register and Data Drivers

1CR from the Column Counter sets the Index Mark Control Flip Flop (IMFF) in the Strobe Logic. The Strobe Logic generates 6µs Index Marks (IM) for each Column. The IM indicates to the controlling device the beginning of the guaranteed data period. When the 81CR is received by the Strobe Logic, the IMFF resets preventing any further IM's from being sent to the Controlling Device. The Data Control and Sync Logic will continue to generate CSDS signals until 84CR resets the Sync Control Logic.

4.3.3.2 Data Registers

Data detected by the Data Amplifiers and Inverters is routed through the One Dark and One Light circuitry to the Data Register for transfer to the Controlling Device. Figure 4-12, Data Registers and Data Drivers diagram and timing details this sequence.

The 12 bit Data Register is reset each time STØC is generated by the Data Control and Sync Logic. The 1 us STØC is followed in approximately 4 us by the Column Storage Data Strobe, CSDS. CSDS is synchronized with the card movement by the Data Control and Sync Logic so that they occur in the center of the card's data columns. Any ROW's input to the Data Register that is low during CSDS will cause a "1" to be stored for the row. When CSDS goes low, a period of guaranteed data occurs. This period lasts until CSDS again goes true.

The data drivers provide the necessary buffering between the Data Register and the Controlling Device.

SECTION 5 INTERFACE

5.1 GENERAL

This section covers the interface between the M Series punched card readers and the equipment into which it transfers data.

5.2 TIMING

In interfacing the M Series card readers to an external system or card reader controller, three separate categories of interface signals must be considered. The first are the signals which control and report the status of card processing, the second are the data signals themselves with their associated index marks, and the third are the various alarm signals provided. In the description following, refer to the timing diagram shown in figure 5-1.

5.2.1 PICK CONTROL

The PICK COMMAND initiates the card read cycle, and depending upon its duration, the card reader will either continuous run or operate in a card-at-a-time mode. This signal can be presented to the reader at any time, but the reader will only accept it when the READY line is TRUE. The READY signal indicates that the card reader is cleared of errors and is ready to receive a PICK COMMAND from the external program control. A visual indication of the READY line is the green RESET indicator on the front control panel.

The conditions which must be present for the READY line to be TRUE are:

- 1. Power applied and the 3-second run-up completed.
- 2. The input hopper has been loaded.
- 3. REMOTE is selected on the LOCAL/REMOTE MODE switch.
- 4. Depress and release of the RESET pushbutton.

Should all of the above conditions be satisfied, the presence of a PICK COMMAND signal will generate the PICK pulse to the picker solenoid. The first card is introduced into the card track, and after a delay (see A, figure 5-1), the leading edge will arrive at the read station. The BUSY signal will go TRUE as soon as the leading edge of the card enters the read station.

To initiate the card pick cycle, the PICK COMMAND must be present for at least 1 microsecond (us) concurrently with the READY signal. Once the pick cycle is initiated, the PICK COMMAND line is ignored until the BUSY signal goes FALSE, indicating the end of the card read cycle. In card-at-a-time operation, it is suggested that the PICK COMMAND be retained TRUE until receipt of the column 1 index mark. In the continuous run mode, the PICK COMMAND may be left in the TRUE condition and a new PICK signal will be automatically generated within 1 us of the BUSY signal going FALSE.

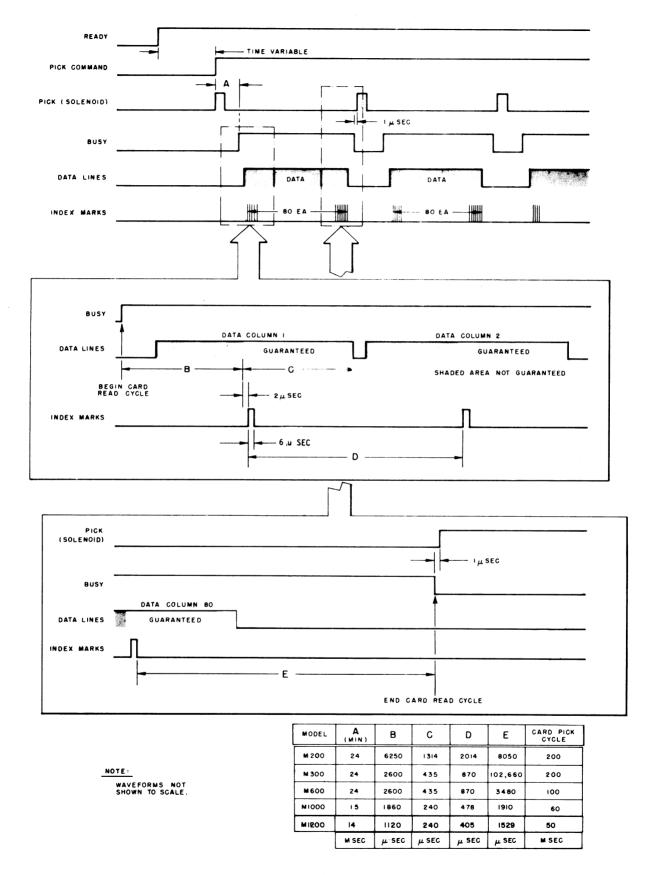


Figure 5-1. Interface Timing Diagram

Should the picker fail to engage the card, the Pick Control logic will wait 50 milliseconds (ms) and automatically try again. It will continue to generate a PICK pulse every 50 ms until 6 attempts have been made. After 6 attempts have been unsuccessful (300 ms), a PICK CHECK alarm will be generated, disabling the READY line.

5.2.2 DATA READOUT

The card read cycle starts with the recognition that the card leading edge has entered the read station. At this time the BUSY line goes TRUE. Eighty equally spaced Index Marks of 6 us duration are generated while the BUSY signal is present. The time spacing of the Index Marks and the BUSY signal are shown by intervals, B, D, and E on figure 5-1.

It can be seen from the timing diagram that data signals may appear on the data output lines before the occurrence of the associated Index Mark. Since torn webs are sometimes encountered which could partially obscure the hole, all Documation card readers feature a wide data acceptance interval to provide greater tolerance to this damage. During this interval, any signal from the read station sensors indicates a hole, and therefore is recognized as a valid data bit and is stored into the Character Buffer. Since the contents of the Character Buffer are subject to change throughout this interval, the data is not guaranteed until the end of the acceptance interval. This period is terminated 2 us prior to the Index Mark.

By the time the Index Mark is generated, the data will have been read, stored, and the data lines settled. Data levels are guaranteed to remain on the output lines available for transfer to the external equipment for interval C.

5.2.3 ALARMS

A description of the standard alarm signals provided in the M Series reader follows:

5.2.3.1 Hopper Check

The HOPPER CHECK signal remains FALSE during normal card reader operation, but goes TRUE if either the input hopper is empty or the output stacker is full. If the input hopper is empty and the SHUTDOWN switch is in AUTO position, the motors are also automatically switched off; when the input is reloaded and RESET depressed, the motors will automatically turn on.

When the last card leaves the input hopper, the switch which senses the empty condition immediately signals a HOPPER CHECK and disables the READY signal. This occurs at the 81st data column. The reader continues the read cycle; however, when the BUSY line next goes FALSE the reader is stopped. In the case of a full output stacker, the HOPPER CHECK signal only appears at the end of the read cycle during which it occurred.

5.2.3.2 Error

The ERROR signal is produced by failure of the LIGHT or DARK check. This usually indicates that a card has a tear at the leading or trailing edge (DARK CHECK). If the read station should experience an emitter/sensor failure while reading a card, the LIGHT CHECK will pick it up. Either type of failure will be signalled by the ERROR line going TRUE and a READ CHECK indication on the front panel.

5.2.3.3 Motion Check

The MOTION CHECK signal is a composite of the PICK CHECK and STACK CHECK alarm. Both alarms are conditions requiring operator intervention and are furnished to the interface as a single alarm line. The condition is displayed on the front panel indicator lights as either a PICK CHECK or a STACK CHECK. The MOTION CHECK signal will occur within 300 ms of the initiation of an unsuccessful pick attempt or in time to inhibit the picking of the second card after the stacker sensor detects that a card is not completely clear of the card track.

5.3 CONNECTORS

The 38-pin output connector provides access for all control, data and alarm lines. The output connector is Elco part no. 00-8016-038-000-707 and the mating connector is Elco part no. 00-8016-038-217-704 with solder-type pins (#60-8017-0513). This mating connector assembly is available from Documation and is shipped unassembled as a kit (P/N 10139401).

The power connector is Hubbell part no. 7486. The mating connector is Hubbell part no. 7484. The mating AC power connector is supplied on the standard accessory power cord; however, it is identified if it is desired to fabricate a special power interface.

The standard M Series pin assignment configuration is listed as follows: *

J2 I/O SIGNAL CONNECTOR PIN LIST

PIN	SIGNAL	DESCRIPTION	PIN	SIGNAL	DESCRIPTION
A	D12	Row 12 Data	X	D7 (RET)	
В	D11	Row 11 Data	Y	D8	Row 8 Data
C	D0	Row 0 Data	\mathbf{Z}	D9	Row 9 Data
D	D1	Row 1 Data	AA	IM	Index Mark
E	D12 (RET)		BB	RDY	Ready
\mathbf{F}	D11 (RET)		CC	D8 (RET)	Ü
H	D0 (RET)		DD	D9 (RET)	
J	D1 (RET)		$\mathbf{E}\mathbf{E}$	IM (RET)/GRD	Signal Ground
. K	D2	Row 2 Data	FF	RDY (RET)	
L	D3	Row 3 Data	HH	ERROR	Error
\mathbf{M}	D4	Row 4 Data	JJ	HCK	Hopper Check
N	D5	Row 5 Data	KK	MOCK	Motion Check
P	D2 (RET)		$_{ m LL}$	PC	Pick Command
R	D3 (RET)		MM	BSY	Busy
\mathbf{S}	D4 (RET)		NN	Error (RET)	v
T	D5 (RET)		PP	HCK (RET)	
U	D6	Row 6 Data	RR	MOCK (RET)	
V	D7	Row 7 Data	SS	PC (RET)	
W	D6 (RET)		TT	BSY (RET)	

POWER CONNECTOR PIN LIST

PIN	SIGNAL	
W	Safety Ground	(green)
X	Neutral	(white)
Y	115 Volts	(black)

^{*} For Non-Standard Units, see Wiring Diagram, Figure 10-3.

5.4 SIGNAL CHARACTERISTICS

The standard interface is supplied as the output of TTL type 7404. Signal sense is specified as a Logical TRUE and is a positive level; logical FALSE is a ground level. Circuit characteristics are shown in figure 5-2. Other output drive configurations are available.

5.5 GROUNDING

Grounding within the M Series card readers maintains AC power and signal ground separate. Signal ground is the logic power return (Vcc return) and is transformer isolated from the AC power distribution system. The chassis is protected by connection to the safety wire (green) in the AC power cord.

It is recommended that twisted pair cable be used to connect the M Series card readers to external equipment. The signal returns should be terminated as close as possible to the signal receivers. It should be noted that pin EE (Index Mark return) is designated as SIGNAL GROUND on the pin assignment chart. If twisted pair interconnection is not used, it is recommended that pin EE be connected to the external equipment signal return.

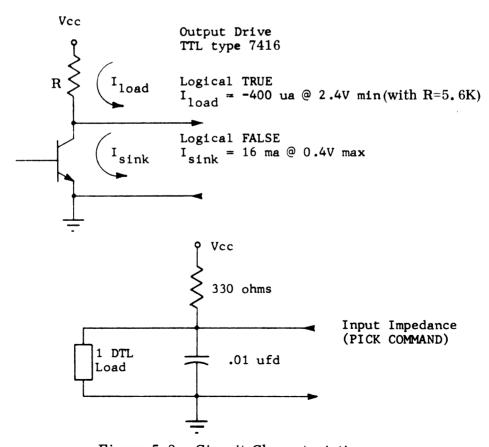


Figure 5-2. Circuit Characteristics

SECTION 6 ADJUSTMENT PROCEDURES

6.1 GENERAL

The adjustment procedures necessary for proper reader operation are listed separately in this section for ease in reference. These adjustments should be checked when minor malfunctions occur and before major repair is attempted. They will also be used after major repair and replacement.

To perform any of the adjustment procedures in this section, it is necessary to remove the top cover and/or the rear panel as follows:

- a. Using a 5/64 Allen wrench, remove five screws 1 , figure 6-1, which hold the top cover.
- b. Lift cover sufficiently to disconnect the control panel connector, figure 6-3, and remove cover.
- c. Using a 5/64 Allen wrench, remove six screws (2), figure 6-2, which hold the rear panel.
- d. Move panel out slightly, disconnect fan connector and remove panel.
- e. After adjustments have been completed, replace top cover and/or rear panel removed.

6.2 TENSION ON THE MAIN DRIVE MOTOR BELT

a. Using a Phillips screwdriver, LOOSEN three motor mounting screws 1, figure 6-3.

CAUTION

THE DRIVE MOTOR BELT TENSION IS CRITICAL. TOO MUCH TENSION CAN CAUSE EXCESSIVE WEAR OF DRIVE ROLLER BEARING. IT MAY ALSO CAUSE DEFLECTION OF DRIVE ROLLER BEARING SHAFT RESULTING IN READ CHECKS. TOO LITTLE TENSION MAY CAUSE BELT TO JUMP A COG OR CREATE A NON-CONSTANT TRACK SPEED RESULTING IN LOSS OF TIMING, INCORRECT DATA, OR READ CHECKS.

b. Move motor back and forth to be sure it slides freely. Attach spring scale to motor stand off so that pulling on spring scale from front of card reader and in line with motor mounting slots will apply tension to main drive motor belt. Pull on spring scale until it reads 24 ounces. Hold tension at that level and tighten three motor mounting screws.

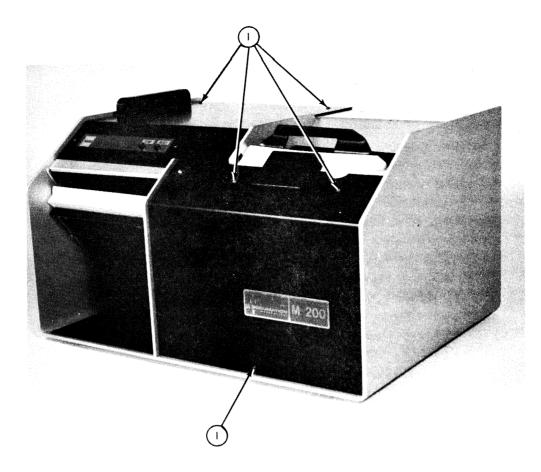


Figure 6-1. Top Cover Removal

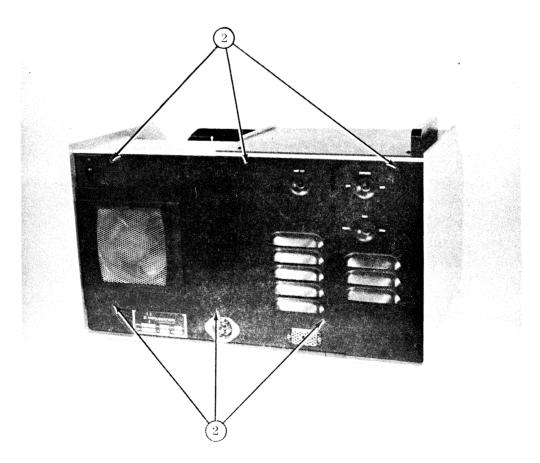


Figure 6-2. Rear Panel Removal

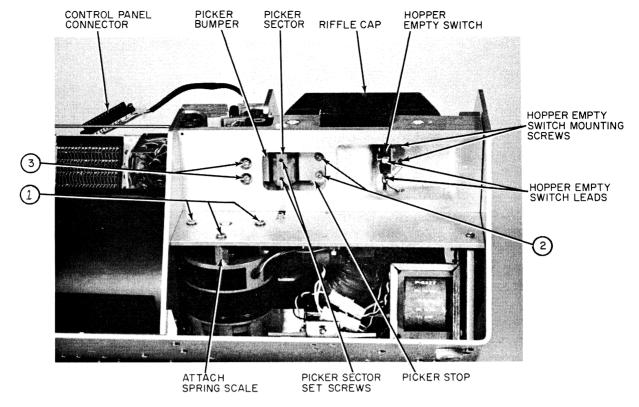


Figure 6-3. Drive Motor Belt Tension Adjustment

6.3 MAGNETIC PICKUP ADJUSTMENT

The magnetic pickup is adjusted to ensure that timing pulses are developed correctly. There are two adjustments: horizontal alignment and air gap. Refer to figure 6-4.

a. Using a 5/64 Allen wrench, LOOSEN set screw that is holding timing disc on drive roller shaft and position timing disc on drive roller shaft so that it is in a horizontal plane with center of magnetic pickup tip.

CAUTION

IF THE TIMING DISC MUST BE REMOVED, EXERCISE EXTREME CAUTION. DAMAGE TO DISC WILL RESULT IN ERRONEOUS MACHINE OPERATION.

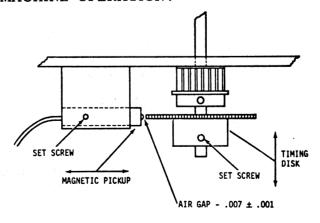


Figure 6-4. Magnetic Pickup Adjustment

- b. Align disc in correct position and tighten set screw, making sure that set screw is tightened on flat side of shaft.
- c. To adjust air gap between magnetic pickup and timing disc, LOOSEN set screw holding magnetic pickup in its mounting block and reposition pickup. The air gap should be set to .007" ± .001". (One punch card may be used as gauge.)
- d. Rotate timing disc and check two other positions to make sure that air gap is maintained.

6.4 ADJUSTMENT OF STACK PHOTOCELL

The stack photocell is adjusted to ensure that it correctly monitors stacking of cards and so that it is not in the way of cards entering output stacker.

- a. Using a 1/16 Allen screwdriver, LOOSEN the set screw in the stacker casting which retains the stack photocell (1), figure 6-5.
- b. Remove photocell from stacker casting and inspect photocell lens for any damage.
- c. Replace stack photocell and align photocell lens flush with surface of stacker casting.
- d. Tighten photocell set screw.

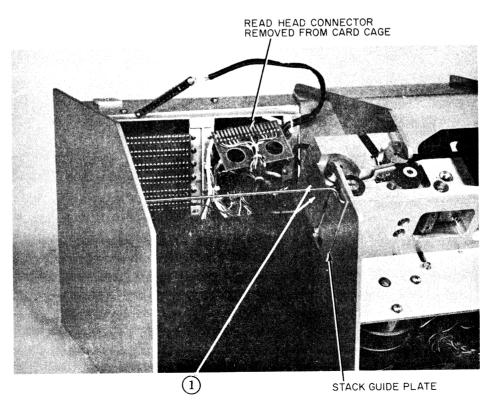


Figure 6-5. Location of Stack Photocell and Photocell Set Screw

6.5 ROLLER SHAFT BEARING PRELOAD

The preload of bearings on drive and stacker roller shafts is very important. This ensures that there is not detectable end play in shafts. If there is any detectable end play, excessive wear of the support bearings will result.

- a. Preloading bearings can be accomplished by rotating roller of shaft to be adjusted to conveniently expose the set screw. Using a 1/16" Allen screwdriver, LOOSEN set screw in top roller, figure 6-6.
- b. From bottom side of mainframe push shaft upwards as far as possible.

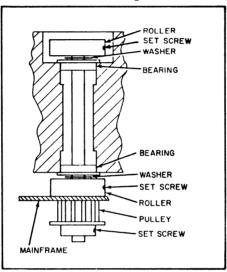


Figure 6-6. Roller Shaft Bearing Preload Adjustment

c. Using a feeler gauge set, select gauge that will shim shaft in this position. Place selected gauge under roller.

NOTE

The size of the gauge required may be different for each shaft (5 to 25 mils).

- d. Ensure that set screw is on flat side of shaft.
- e. With feeler gauge in place, exert downward pressure on top roller and tighten set screw.

If the end play is excessive, a chattering noise will be detected when drive motor is on.

6.6 HOPPER EMPTY SWITCH ADJUSTMENT

The adjustment of hopper empty switch, located under riffle air cap, ensures that input hopper empty condition is detected.

- a. Using a 3/32 Allen wrench, remove two screws holding riffle air cap.
- b. Check that operating arm of switch is parallel to top of picker casting, and that arm is not bent, figure 6-7.

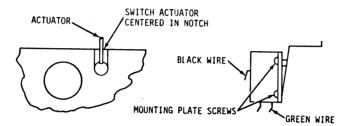


Figure 6-7. Hopper Empty Switch Adjustment

- c. Using a 1/16 Allen screwdriver, LOOSEN two screws holding switch mounting plate.
- d. Center switch arm in picker casting counterbore. Exert slight pressure on switch arm, pressing arm into casting. Tighten switch mounting plate set screws.
- e. Replace riffle air cap.

6.7 STACKER FULL SWITCH ADJUSTMENT

The stacker full switch is adjusted to ensure that output stacker full condition is detected.

- a. Remove two screws from bottom of mainframe holding stacker front panel (1), figure 6-8.
- b. Place approximately one inch of cards in hopper. Place AC power circuit breaker to ON.
- c. After a few moments, the STOP indicator should illuminate. Pull stacker follower toward front of reader. Approximately 1/8" before end of travel, HOPPER CHECK indicator should illuminate. If this condition is not met, stacker full switch must be repositioned.

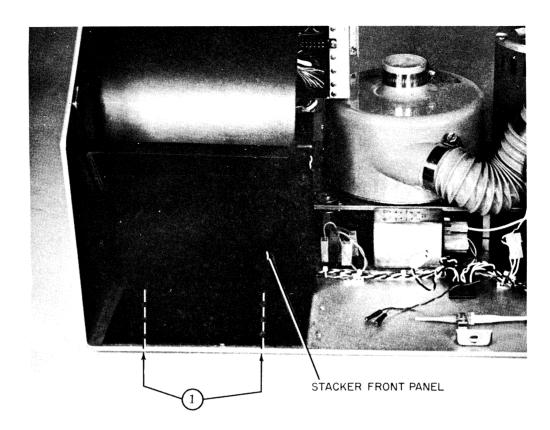


Figure 6-8. Stacker Panel Removal

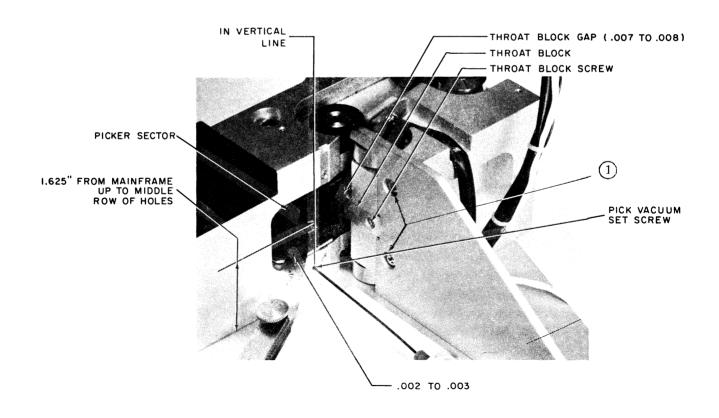


Figure 6-9. Picker Sector Adjustment, Rear View

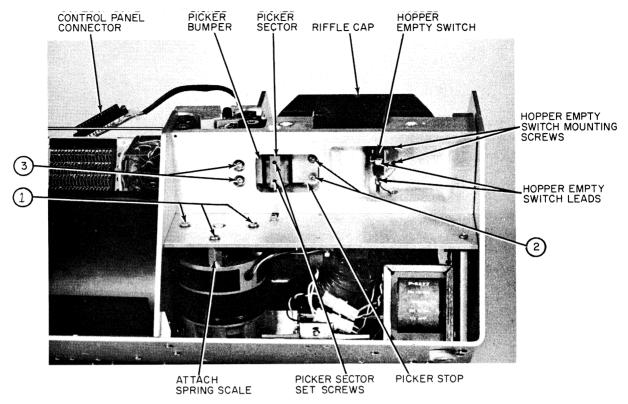


Figure 6-10. Picker Sector Adjustment, Front View

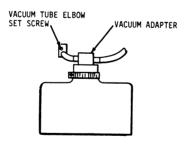


Figure 6-11. Removal of Vacuum Tube Adapter

- d. Using a small Phillips screwdriver, LOOSEN two screws retaining stacker full switch bracket.
- e. Adjust switch bracket until HOPPER CHECK indicator illuminates when stacker follow is approximately 1/8" before end of travel. Secure bracket mounting screws.
- f. Replace stacker front panel.

6.8 PICKER SECTOR ADJUSTMENT

The picker sector is adjusted to ensure that cards are picked properly. There are six adjustments to picker sector assembly; height, vacuum adaptor air gap, rest stop, throat block, forward bumper stop, and solenoid coupling. For solenoid coupling adjustments, see paragraph 9.5.

CAUTION

IT IS VERY IMPORTANT THAT THE ADJUSTMENTS BE FOLLOWED IN THE SEQUENCE STATED.

- a. Check picker sector height adjustment. Using a 6" steel rule, measure distance from top of mainframe to center of middle row of holes in picker sector. This should be exactly 1-5/8", figure 6-9.
- b. If height of picker sector requires adjustment, use a 5/64 Allen wrench and LOOSEN set screws in back of picker sector, figure 6-10.
- c. Adjust picker sector until there is exactly 1-5/8" between mainframe and center of middle rows of holes on picker sector.
- d. The second adjustment is air gap between picker sector and vacuum adapter plate. From bottom side of mainframe push vacuum adapter plate upward. Exert slight upward pressure and tighten vacuum adapter plate set screw. Recheck air gap and ensure that pick sector does not touch vacuum adaptor.
- e. Using a .50 Allen wrench, LOOSEN set screw in vacuum tube adapter elbow located on underside of mainframe, figure 6-11. Remove elbow from sleeve Prop open hopper using about one inch of cards inserted at a right angle.
- f. Using a .050 Allen wrench, LOOSEN vacuum adapter plate set screw, figure 6-9.

- g. Insert a .002 feeler gauge between picker sector and vacuum adapter plate. From bottom side of mainframe push vacuum adapter plate upward. Exert slight upward pressure and tighten vacuum adapter plate set screw. Recheck air gap and ensure that picker sector does not touch vacuum adapter.
- h. Replace vacuum tube adapter elbow.
- i. Check picker sector rest position. The back edge of last row of holes on the picker sector should line up with middle of vacuum adapter plate set screw hole. The position is established by placement of the rest stop.
- j. Using a 5/64 Allen wrench, LOOSEN two picker stop screws (2), figure 6-10.
- k. Using a 6" steel rule to gauge picker sector rest position, and while holding picker sector firmly in alignment, push rest stop against picker sector and tighten the screws.
- 1. Check gap between throat block and picker sector. The gap should be .008 inches to ensure that only one card is picked at a time.
- m. Using a small Phillips screwdriver, LOOSEN screw holding throat block, figure 6-9.
- n. Place an .008 feeler gauge between throat block and picker sector face.
- o. Exert slight pressure on rear of throat block and tighten the mounting screw. Be sure that sector does not rotate.
- p. Check adjustment of picker sector bumper. This bumper is used to limit picker sector over-travel to .020 inches beyond point where card is delivered to pinch rollers.
- q. Place about 2" of cards in the input hopper. Place AC power circuit breaker to ON. With reader in LOCAL, depress RESET switch and run a few cards into stacker. Depress STOP switch.
- r. Manually operate picker sector. Note point at which card readers pinch rollers. After card is picked, there should be approximately .020" of over-travel of sector before it reaches bumper.
- s. Using a 9/64 Allen wrench, LOOSEN two picker bumper socket head screws, 3 , figure 6-10
- t. Adjust picker bumper to proper position and tighten screws.

6.9 STACKER ADJUSTMENT

- a. Remove top cover per paragraph 9.1, steps a. and b.
- b. Locate stacker spring behind left side of stacker tray, figure 6-12.

NOTE

The spring is adjusted at the factory for cards with approximately 3 punches per column (or 25% density).

- c. Adjust for cards with many punches by placing end of spring in one of the holes of spring plate toward front of plate.
- d. Adjust for cards with few punches by placing end of the spring in one of the holes of spring plate toward rear of plate.
- e. Place top end of spring in the hole which will allow sufficient clearance for card to drop into stacker tray, and cards then continue to load evenly and smoothly.

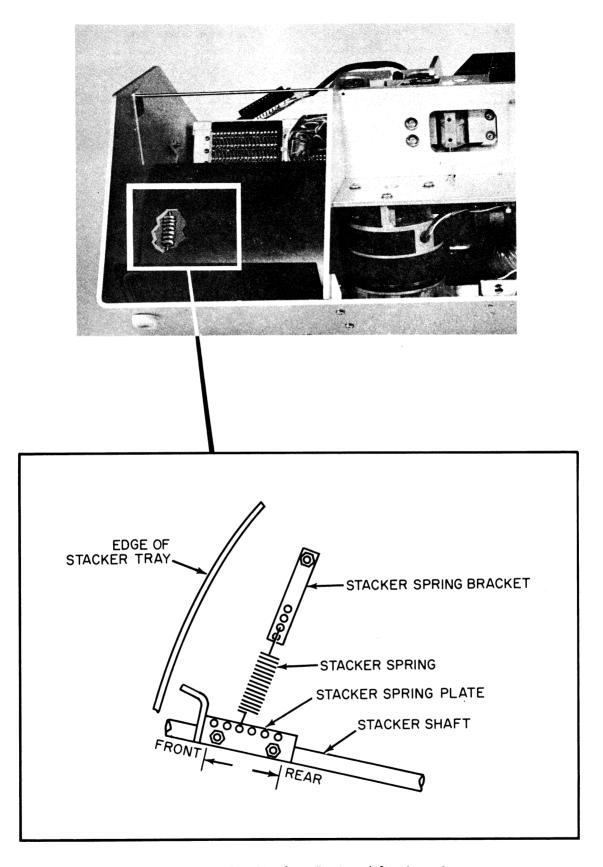


Figure 6-12. Stacker Spring Adjustment

SECTION 7 PREVENTIVE MAINTENANCE

7.1 GENERAL

The following paragraphs provide information for preventive maintenance and general care of the M200 card readers. The card readers are of rugged construction and are designed to provide many hours of failsafe, reliable operation; as such, preventive maintenance consists primarily of routine cleaning.

7.2 CLEANING

Keeping the card reader clean is very important and can prevent problems which appear to be major malfunctions.

7. 2. 1 PICKER SECTOR

The picker sector is the heart of the card reader; it is the mechanism that must operate properly to remain on-line.

After each 40 hours of operation, the neoprene surface of the picker sector should be wiped with a cloth or paper wiper saturated with a solvent such as Freon TF. This will remove the glaze buildup from the ink which rubs off of the cards. This is especially prevalent where new cards are used exclusively. If this glaze is allowed to remain, it reduces the coefficient of friction of the picker sector to the point that erratic pick operation may result.

After each 160 hours of operation, the picker sector should be examined to see if any of the vacuum holes have become plugged with lint, trash, or card meal which the solvent scrub has failed to dislodge. If so, gently push this debris through the holes with a paper clip while the reader is on. The vacuum system will remove the debris.

7.2.2 CASTING ASSEMBLIES

After each 160 hours of operation, the card track should be cleaned. Using a 5/64 Allen wrench, remove five screws (1), Figure 9-1 holding top panel cover. Remove this cover and use a vacuum cleaner to remove any card debris buildup around the picker and stacker castings. Use a small brush to clean around the picker and stacker rollers and picker sector.

7, 2, 3 COOLING FAN

The cooling fan air-intake screen performs the function of preventing dirt and dust from entering the card reader interior. Depending upon the operational atmosphere, the screen should be cleaned as necessary. Use a flat-blade screwdriver and remove the screen, then clean in a solvent or use a vacuum cleaner as necessary.

7. 2. 4 EXTERIOR CLEANING

The exterior should be cleaned as often as practical. Wipe the exterior with a clean, lint-free cloth saturated with a mild solvent such as denatured alcohol or household ammonia after each 40-hour operational period. If persistent dirt buildup is present, the exterior should be rubbed down with a heavier solvent. Attention to this routine will keep the anodized finish of the reader with a like-new appearance indefinitely.

7.3 LUBRICATION

The rollers of the rotary solenoid should be checked and one drop of lubricant applied to each roller every four months of operation. The amount of lubricant required will be determined by the humidity, use, and speed of the machine, but the four month application will maintain a safe level. Sparingly apply light lubricant, (Part No. 124048-001), to each of the three roller grease points (Figure 7-1). This is available from Documation or Ledex, Inc., Dayton, Ohio.

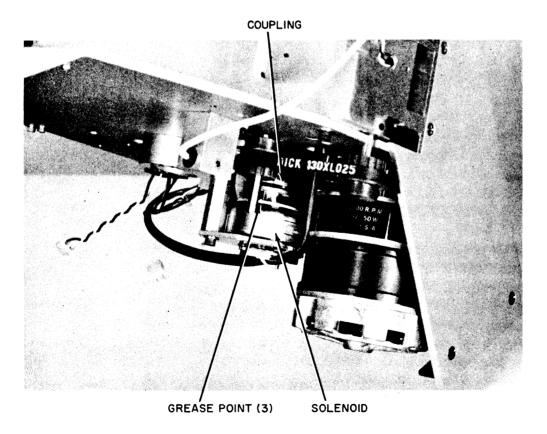


Figure 7-1. Solenoid Lubrication

SECTION 8 TROUBLESHOOTING

8.1 GENERAL

If trouble persists after checking the adjustment procedures in Section 6, use the following fault isolation chart to analyze the problem. If it is determined that a part is defective and needs replacement, use the repair and replacement procedure in Section 9, and the illustrated parts breakdown.

FAULT ISOLATION CHART

SYMPTOM	PROBABLE CAUSE	REMEDY
POWER indicator fails to light.	1. Power cord is not con- nected to reader or power source.	1. Connect power cord to reader and power source.
	2. Circuit breaker CB1 is not on	2. Place circuit breaker CB1 to ON position.
	3. Fuse F1 is defective.	3. Replace F1.
	4. Lamp is burned out.	4. Replace lamp.
	5. +5 volt power regulator defective.	5. Replace +5 volt power regulator.
A given lamp fails to light when lamp test switch is activated (POWER indicator excluded).	 Lamp is burned out. Defective Error Card. 	 Replace defective lamp. Replace Error Card.
When LAMP TEST switch is activated, none of the lamps on the control panel will light. (POWER indicator excluded).	 Defective lamp test switch. Defective Error Card 	 Replace lamp test switch. Replace Error Card.
HOPPER CHECK indicator does not light when hopper goes empty or stacker goes full. No other error indications.	 Lamp is burned out. Defective Error Card. 	1. Replace lamp. 2. Replace Error Card.
HOPPER CHECK indicator does not light when hopper goes empty and PICK CHECK indicator is lit.	 Hopper empty switch not adjusted properly. Defective hopper empty switch. 	 Adjust hopper empty switch per paragraph 6. 6. Replace hopper empty switch.

SYMPTOM	PROBABLE CAUSE	REMEDY
HOPPER CHECK indicator does not light when stacker goes full.	 Stacker full switch is not adjusted properly. Defective stacker full switch. 	 Adjust stacker full switch per paragraph 6.7. Replace stacker full switch.
PICK CHECK indicator fails to light when reader makes six attempts and fails to pick a card.	1. Lamp is burned out. 2. Defective Error Card.	 Replace lamp. Replace Error Card.
STACK CHECK indicator fails to light when there is a stack check condition.	 Lamp is burned out. Defective Error Card. 	 Replace lamp. Replace Error Card.
PICK CHECK indicator lights regularly after making six pick attempts.	 Dirty picker sector. Maladjustment of picker stops, vacuum plate, throat clearance, or solenoid coupling. Defective Sync Card. Defective Error Card. Defective Clock Card. 	 Clean picker sector with denatured alcohol. Readjust picker sector per paragraph 6.8. Replace Sync Card. Replace Error Card. Replace Clock Card.
READ CHECK indicator fails to light when a dark check or light check condition occurs.	 Lamp is burned out. Column "0" output or Column "81" output is missing from the Clock Card. One light or one dark output missing from the Control Card. Defective Error Card. 	 Replace lamp. Replace Clock Card. Replace Control Card. Replace Error Card.
Reader picks three cards, and then stops with a PICK CHECK.	 Good pick reset output is missing from the Clock Card. Clear pick control is missing on the Sync Card. Pick attempt counter is not being cleared out properly. 	 Replace Clock Card. Replace Sync Card. Replace Sync Card.

SYMPTOM	PROBABLE CAUSE	REMEDY
Reader picks two to six cards and then stops with a PICK CHECK.	Pick attempt counter is not being reset at good pick re- set time. Defective Sync Card.	Replace Sync Card
Reader picks one card but the reader will not pick additional cards. Unable to stop the reader by press- ing the STOP switch.	 Column "84CR" output is missing from the Clock Card. Column strobe phase "B" or phase "D" is missing from Sync Card. Clock phase "C" or phase "D" is missing 	 Replace Clock Card Replace Sync Card. Replace Clock Card.
	from Clock Card. 4. Clock phase "B" is missing from Clock Card.	4. Replace Clock Card.
Reader reads erroneous data.	 Defective Clock Card. Defective Sync Card. Defective Control Card. 	 Replace Clock Card. Replace Sync Card. Replace Control Card.
Sharp, metallic noise from picker sector while reading cards.	 Picker sector maladjusted. Rubber roller worn. Bearing bad. Belt too tight. 	 Adjust picker sector per procedure in paragraph 6.8. Replace roller. Replace bearing. Readjust belt.

NOTE

When using test equipment for troubleshooting, connect test equipment ground to card logic ground to obtain accurate values.

SECTION 9 REPAIR PROCEDURES

9.1 GENERAL

The following repair procedures detail step by step methods for those parts for which replacement may be required during the life of the reader. It is recommended that these procedures be followed closely and performed by a technician familiar with tools, their use and disassembly/assembly techniques.

The procedural steps necessary to remove and replace one or more assemblies, prior to performing any repair/adjustment, are provided below and the applicable steps are referenced in the repair/adjustment procedure.

(Top Cover Removal)

- a. Using a 5/64 Allen wrench, remove five screws 1, figure 9-1, which hold top cover.
- b. Lift cover sufficiently to disconnect control panel connector, figure 9-7, and remove cover.

(Rear Panel Removal)

- c. Using a 5/64 Allen wrench, remove six screws 2, figure 9-2, which hold rear panel.
- d. Move panel out slightly, disconnect fan connector and remove panel.

(Rear Connector Panel Removal)

e. Using a Phillips screwdriver, remove three screws 1, figure 9-3, which hold rear connector panel to bottom plate.

(Main Mounting Plate Removal)

- f. Disconnect light station connector, figure 9-10.
- g. Disconnect motor AC connector, figure 9-12.
- h. Disconnect solenoid driver connector.
- i. Disconnect relay connector, yellow lead.
- j. Lift rubber protective cover from capacitor and disconnect red and blue leads.
- k. Disconnect hopper empty switch leads, figure 9-5.

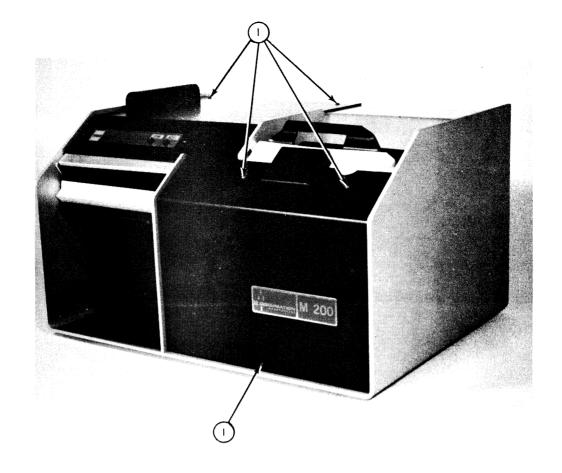


Figure 9-1. Top Cover Removal

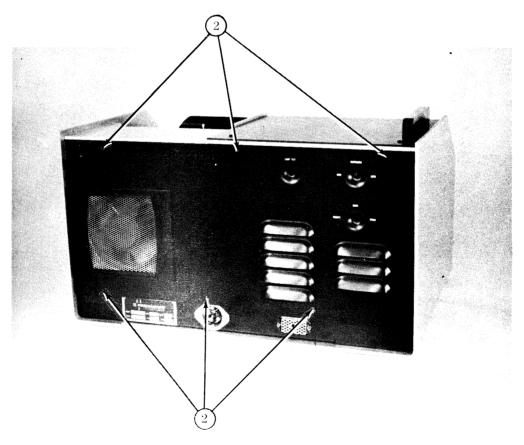


Figure 9-2. Rear Panel Removal

- 1. LOOSEN vacuum hose clamp screw and remove hose from main mounting plate, figure 9-12.
- m. LOOSEN vacuum adapter clamp screw and lift adapter off from pump, figure 9-3.
- n. Disconnect read head connector from card cage, figure 9-7.
- o. Using a Phillips screwdriver, remove three screws (8); one from main mounting plate, and two from under mainframe, figure 9-4.
- p. Using a flat blade screwdriver, remove two screws 9 from top of main mounting plate.
- q. Remove main mounting plate and set to one side.

(Assembly/Assemblies Replacement)

r. Replace in reverse order of disassembly.

9.2 REQUIRED TOOLS

The following tools are required to perform removal and replacement procedures in this section and adjustment procedures in Section 6.

Description	Manufacturer and Part Number of Special Tools
1/16" Allen Screwdriver	
3/32" Allen Wrench (long arm)	
5/64" Allen Wrench (long arm)	
7/64" Allen Wrench (long arm)	
1/8" Allen Wrench (long arm)	
9/64" Allen Wrench (long arm)	
. =	
.050" Allen Wrench (short arm)	
1/16" Allen Wrench (short arm)	A 3/CD 01000 1
AMP Extraction Tool	AMP 91022-1
"AMP Leaf Contact" Extraction Tool	AMP 465195-2 or 465275-1
"AMP Modified Fork" Contact Extraction Tool	AMP 91037-2
"AMP Mod IV" Contact Extraction Tool	AMP 91029-1A
Deutsch Insertion/Extraction Tool (on base plate)	M15570-16
IC Removal Tool	AMP 91049-1
Elco Extraction Tool	Elco 061877-04
Elco Insertion Tool	Elco 061742-04
Feeler Gauge Set 0.0015" thru 0.025"	
Long Nose Pliers	
IC Test Clip	AP Inc. 923700
Medium Flat Blade Screwdriver 3" long	
Medium Flat Blade Screwdriver 6" long	
6" Metal Scale, decimal/fraction per inch	
1/4" - Open End or Socket Wrench	·
1/2" - Open End Wrench	
11/32" - Open End or Socket Wrench	
7/16" - Open End or Socket Wrench	
#1 Phillips Screwdriver 6" long	
#2 Phillips Screwdriver 6" long	
Printed Circuit Card Extender	Documation P/N 103099501
#2 Retaining Ring Remover	
Side Cutter	
Solder Removal Tool	
60-Watt Soldering Iron	
32-oz. Spring Scale	

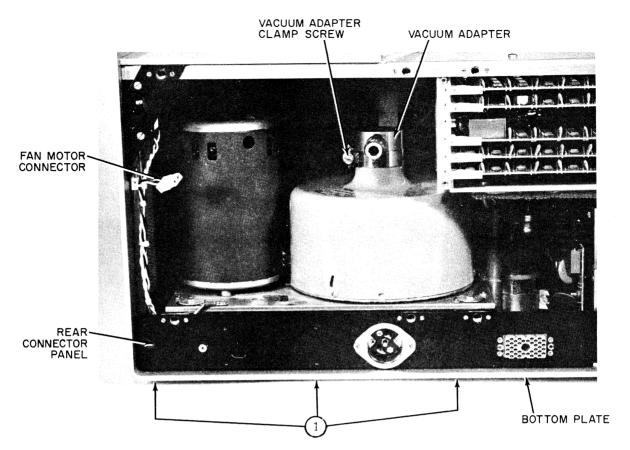


Figure 9-3. Rear View, Cover Removed

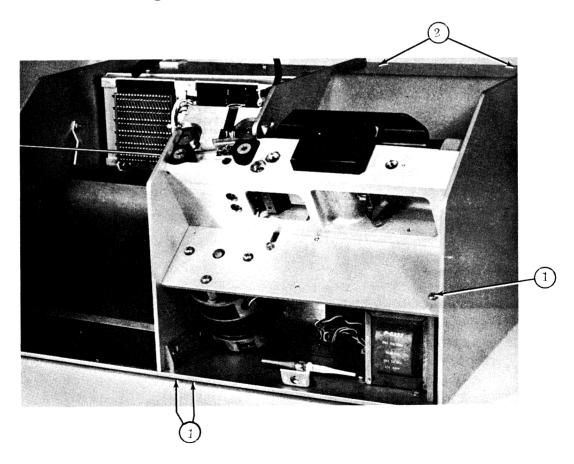


Figure 9-4. Front View, Main Mounting Plate Removal

9.3 MAIN DRIVE MOTOR BELT

- a. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
- b. Using a Phillips screwdriver, remove three main drive motor mounting screws 1, figure 9-5, and remove belt from motor pulley. Set motor aside.
- c. Using a 5/64 Allen wrench. LOOSEN set screw in timing disc, figure 9-6.

CAUTION

REMOVE TIMING DISC USING EXTREME CARE NOT TO DAMAGE TEETH ON DISC. WRAP DISC IN SOFT TISSUE WHILE NOT IN READER.

- d. Remove main drive motor belt.
- e. Replace belt over timing disc pulley and roller pulley.
- f. Reposition motor to replace belt over motor pulley, and replace motor mounting screws but do not tighten.
- g. Adjust tension on the main drive motor belt per paragraph 6.2.
- h. Replace timing disc on shaft, align with tip on magnetic pickup, figure 6-4, and tighten set screw. Check for .007 <u>+</u> .001 inch clearance between magnetic pickup tip and timing disc. Adjust if necessary per paragraph 6.3, steps c. and d.
- i. Replace main mounting plate, rear connector panel, rear panel, and top cover in reverse order of paragraph 9.1 (steps q. through a.).

9.4 MAGNETIC PICKUP

- a. Remove top cover and rear panel per paragraph 9.1, steps a. through d.
- b. Using a 1/16 Allen wrench, LOOSEN set screw in magnetic pickup mounting block, figure 9-6.
- c. Disconnect read head connector from card cage, figure 9-7.
- d. Free magnetic pickup cable from read head connector cable and unsolder wires (note colors) from pins J, K, and L on read head connector, figure 10-3.

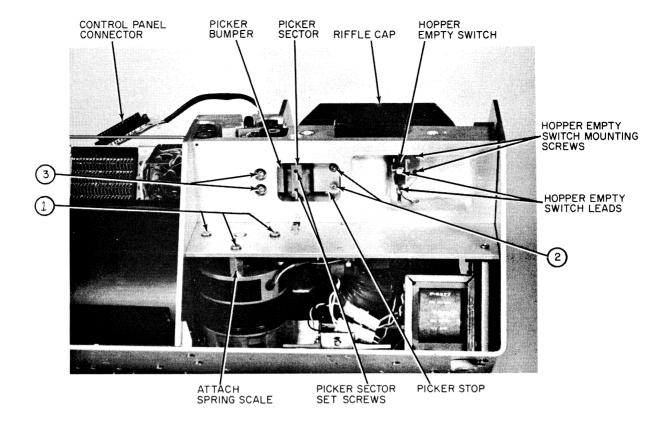


Figure 9-5. Partial Front View, Cover Removed

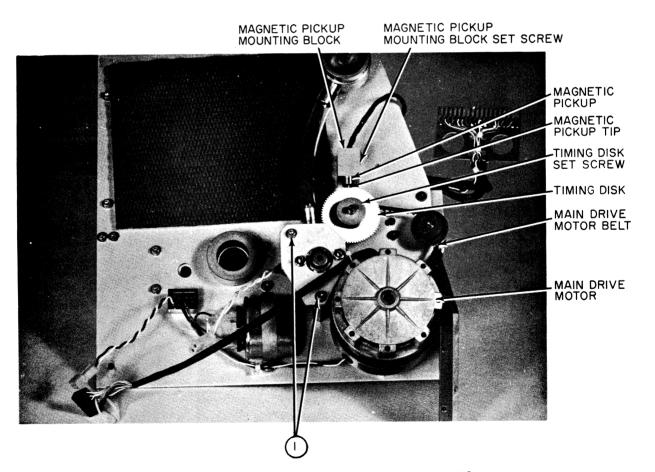


Figure 9-6. Bottom View, Main Mounting Plate

- e. Solder wires of new magnetic pickup to read head connector pins J, K, and L. Ensure wires replaced as noted in step c.
- f. Rewrap magnetic pickup cable and read head connector cable and insert new pickup unit into mounting block.
- g. Adjust spacing between timing disc teeth and tip of magnetic pickup for .007 ± .001 inch, figure 6-4. Tighten set screw.
- h. Replace rear panel and top cover in reverse order of paragraph 9.1 (steps d. through a.).

9.5 SOLENOID

- a. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
- b. To adjust solenoid, perform steps 1. through n. only. To replace solenoid perform steps c. through n. Refer to figure 9-8.
- c. Remove solenoid spring from spring post and arm stud.
- d. Using a 1/16 Allen wrench, LOOSEN two set screws in top solenoid coupling.
- e. Using a 9/64 Allen wrench, remove two screws (1) holding solenoid mounting plate. Remove solenoid.
- f. Using a 11/32 wrench, remove two mounting nuts 2 to remove solenoid from mounting plate.
- g. Using a 1/16 Allen wrench, LOOSEN two set screws holding coupling on solenoid shaft. Remove coupling.

NOTE

Remove the set screws from the coupling. Apply LOCTITE GRADE C to the screws and replace. LOCTITE GRADE C should be applied to all operational and mounting type hardware, with the exception of panel screws.

- h. Place coupling on new solenoid shaft locating bottom coupling set screws on two flat sides of shaft.
- i. Tighten bottom coupling set screws and replace solenoid on mounting plate making sure holes are in proper position, with wires extending from left side, as viewed from bottom of main mounting plate.

- j. Replace solenoid on mounting posts, sliding top coupling onto picker shaft.
- k. Replace solenoid return spring between spring post and arm stud.
- 1. With two screws in top solenoid coupling LOOSE, depress coupling slightly with fingers and while maintaining pressure, tighten two coupling set screws, ensuring one set screw is on flat portion of shaft. Remove return spring on load shaft and check that solenoid return tension is just sufficient to return load on its stop position. Too much tension could cause solenoid to not provide enough drive action to load shaft.
- m. Replace return spring and check solenoid action, by operating picker sector manually while power is applied, vacuum is applied, and cards are in the input hopper.

NOTE

When this adjustment is made properly, the picker sector will have sufficient driving force to reliably pick cards and be capable of fully returning to rest position. If picker sector does not return to rest position, coupling has been compressed too far.

n. Replace main mounting plate, rear connector panel, rear panel, and top cover in reverse order of paragraph 9.1 (steps q. through a.).

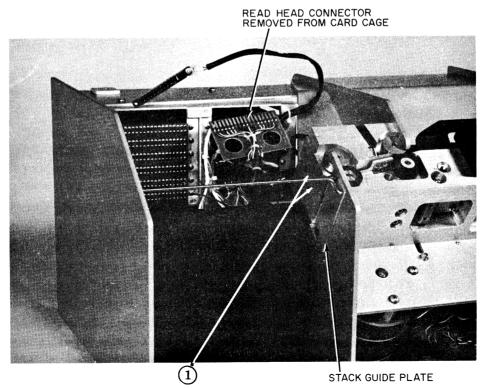


Figure 9-7. Partial Top Left View, Cover Removed

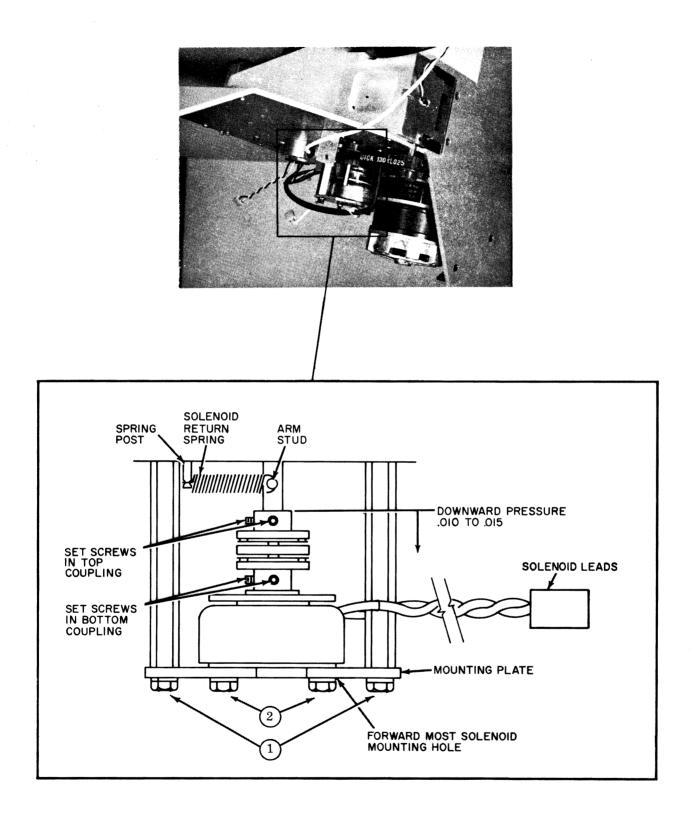


Figure 9-8. Solenoid Replacement and Adjustment

9.6 STACKER CASTING

The stacker casting must be removed to replace any of the following assemblies and installed after the replacement of the assembly. These assemblies are: Roller Bearings, Read Head, or Light Station.

- a. To remove stacker casting, proceed as follows:
 - 1. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
 - 2. Using a flat blade knife, remove stack guide plate, figure 9-7.

NOTE

The stack guide plate is fastened on with Pliobond cement. The old cement must be cleaned off and new cement applied when replacing stack guide plate.

- 3. Using a Phillips screwdriver, remove two screws 1 holding side support plate, figure 9-9.
- 4. Remove two screws 1 from input hopper wall, figure 6-9.
- 5. Using a 5/64 Allen wrench, LOOSEN set screw in timing disc. Remove timing disc, figure 9-6.

CAUTION

REMOVE TIMING DISC USING EXTREME CARE NOT TO DAMAGE TEETH ON DISC. WRAP DISC IN SOFT TISSUE WHILE NOT IN READER.

- 6. LOOSEN three screws 1 holding main drive motor, figure 9-5.
- 7. Remove main drive motor belt.
- 8. Using a 3/32 Allen wrench, LOOSEN set screws in two stacker pulleys, figure 9-9. Remove pulleys.
- 9. Remove tie-wrap on solenoid mounting plate holding light station cable.
- 10. Using a 9/64 Allen wrench, remove three screws holding stacker casting. Set stacker casting to one side.

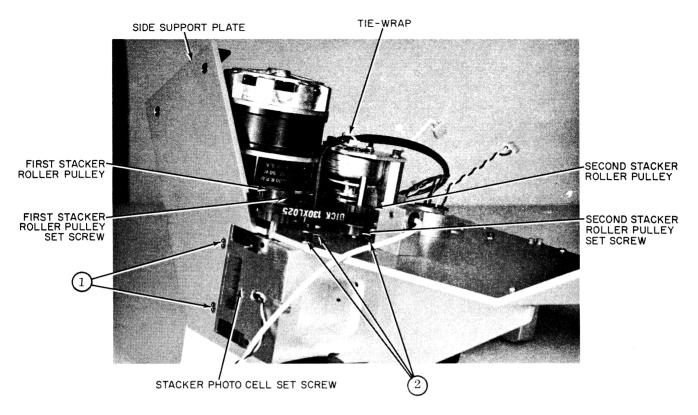


Figure 9-9. Side View, Main Mounting Plate

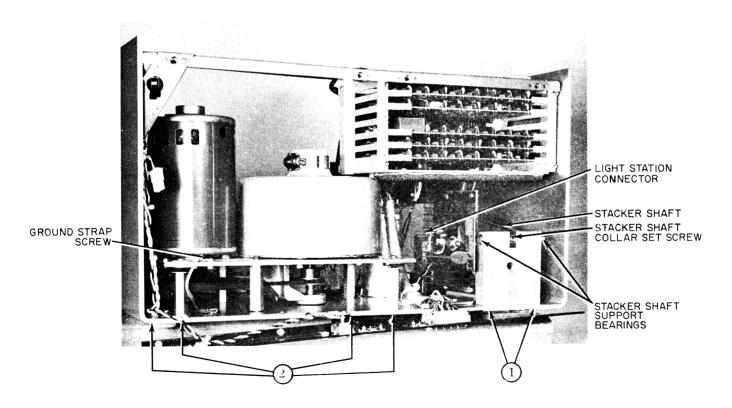


Figure 9-10. Rear View, Cover and Rear Connector Panel Removed

- b. To replace stacker casting proceed as follows:
 - 1. Reposition stacker casting and insert three mounting screws but do not fully tighten.
 - 2. Make a gauge using eight new unpunched cards cut to 2 x 5 inches.
 - 3. Insert gauge between picker casting and stacker casting but avoid covering read station window. Apply even pressure to stacker casting toward picker casting and tighten stacker casting mounting screws. Remove gauge. Observe that steel rollers cause a slight depression on rubber rollers.
 - 4. Position main mounting plate on reader in order to test read head output voltage.
 - 5. Connect read head connector to card cage, figure 9-7.
 - 6. Connect light station connector, figure 9-10.
 - 7. Using extender board on control card and, with power applied, connect voltmeter between R17 and card ground. Verify voltage is 2.3 vdc and 4.3 vdc. (Nominal 3 to 4 vdc)
 - 8. Repeat step 7. at R18 through R28.
 - 9. If any reading is outside limits, LOOSEN stacker casting mounting screws and reposition for optimum value. Tighten screws and re-check per steps 7. and 8.
 - 10. Remove extender board and replace control card in card file.
 - 11. Remove main mounting plate from reader.
 - 12. Replace cable wrap holding light station cable.
 - 13. Replace two stacker pulleys.

CAUTION

USE MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. DO NOT OVER-TORQUE OR DAMAGE WILL RESULT TO PULLEY.

- 14. Replace timing disc and adjust per paragraph 6.3.
- 15. Complete stacker casting replacement in reverse order of paragraph 9.6, a (steps 4. through 1.).

9.7 STACKER ROLLER BEARING ASSEMBLIES

- a. Remove stacker casting per paragraph 9.6. a.
- b. Using a 1/16 Allen wrench, LOOSEN set screw in bottom roller of assembly to be removed. Remove roller and spacer washer, figure 9-11.
- c. Lift shaft straight up out of casting. Observe spacer washer between top roller and bearing seat.
- d. To remove top bearing, use L-shaped tool to lift bearing from assembly.
- e. To remove bottom bearing, use a straight tool to tap edge of bearing from inside of shaft hole to drop bearing from casting.
- f. Install new bearings. Place spacer washer on top bearing and replace shaft in shaft hole.
- g. Replace bottom roller with spacer washer between roller and bearing seat.
- h. Apply firm finger pressure between top and bottom roller's and tighten set screw in bottom roller.
- i. Check for vertical play in stacker shaft. If there is vertical play, repeat step h.
- j. Replace stacker casting per paragraph 9.6, b.

9.8 READ HEAD ASSEMBLY

- a. Remove stacker casting per paragraph 9.6, a.
- b. Using a Phillips screwdriver, remove two screws ①, figure 9-11, to remove read head, and disconnect read head connector. Unwrap read head cable.
- c. Using a 1/16 Allen wrench, LOOSEN set screw in magnetic pickup mounting block and remove magnetic pickup, figure 9-6.
- d. Using a 1/16 Allen wrench, LOOSEN set screw in stacker casting holding stacker photocell and remove photocell, figure 9-9. Read head assembly is now free.
- e. Replace read head assembly, insert two mounting screws and tighten.
- f. Insert magnetic pickup in mounting block and adjust per paragraph 6.3, c.

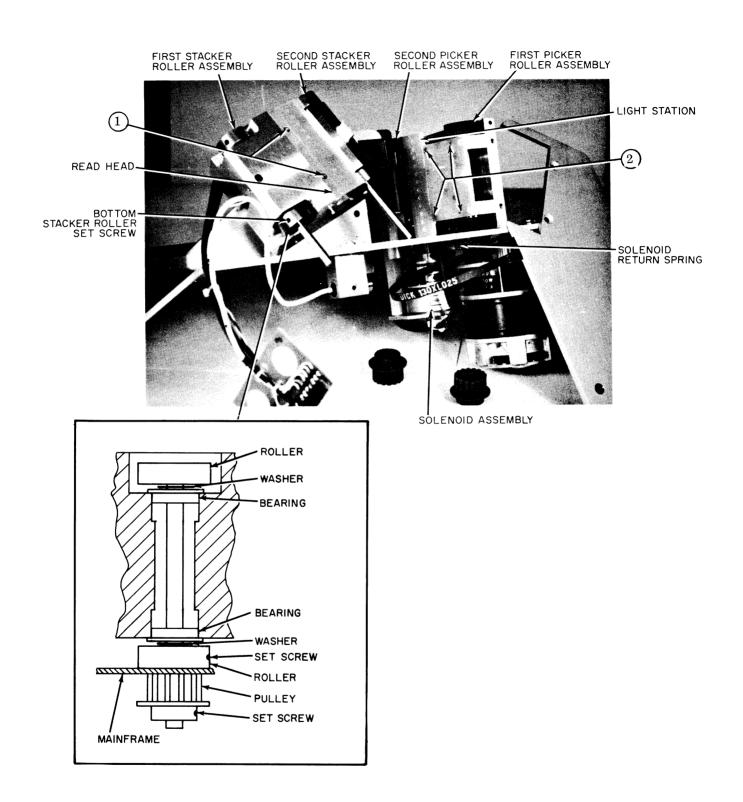


Figure 9-11. Stacker Casting Removal and Bearing Replacement

g. Replace photocell in stacker casting, align flush with stacker casting faceplate, and tighten photocell set screw.

CAUTION

MAKE SURE PHOTOCELL DOES NOT EXTEND BEYOND SURFACE OF CASTING OR DAMAGE MAY RESULT TO PHOTOCELL OR CARDS.

NOTE

If light station is to be replaced at this time, see paragraph 9.9, step b. through d.

h. Replace stacker casting per paragraph 9.6, b.

9.9 LIGHT STATION ASSEMBLY

- a. Remove stacker casting per paragraph 9.6, a.
- b. Using a Phillips screwdriver, remove four screws 2 , figure 9-11, to remove light station assembly.
- c. Remove cable wrap and disconnect light station connector, figure 9-10. Light station assembly is now free.
- d. Replace light station assembly and tighten four mounting screws. Replace cable wrap and connect light station connector.

NOTE

If read head is to be replaced at this time, see paragraph 9.8, steps b. through g.

e. Replace stacker casting per paragraph 9.6, b.

9.10 STACKER SHAFT SUPPORT BEARINGS

- a. Remove top cover, rear panel, and rear connector panel per paragraph 9.1, steps a. through e.
- b. Using a 5/16 Allen wrench, LOOSEN stacker shaft collar set screw.

- c. Using a Phillips screwdriver, remove two screws 1 from underneath main-frame holding stacker shaft support casting, figure 9-10.
- d. Move stacker shaft support casting to rear and slide off shaft to left.
- e. Using an arbor press, remove and replace two bearings in stacker shaft support casting.
- f. Reassemble in reverse order of disassembly.
- g. Replace rear connector panel, rear panel, and top cover in reverse order of paragraph 9.1 (steps e. through a.).

9.11 VACUUM PUMP MOTOR ASSEMBLY BELT

- a. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
- b. Remove screw holding ground strap to subframe.

CAUTION

USE A 1/2 INCH OPEN-END WRENCH TO HOLD MOUNTING POST TO AVOID TWISTING OFF THE PUMP PLATE RUBBER SHOCK MOUNTS.

- c. Remove four Phillips head mounting screws 2 holding vacuum pump motor assembly, figure 9-10.
- d. The vacuum pump assembly may now be removed from card reader.
- e. LOOSEN three hex vacuum pump mounting bolts 1, figure 9-13.
- f. Replace vacuum pump belt.
- g. Using a spring scale, adjust vacuum pump for a belt tension of 4-6 ounces. This is about 3/64" belt deflection.
- h. With appropriate belt tension applied, tighten three hex vacuum pump mounting bolts.
- i. Check pulleys to make sure they are in the same plane. Also check each pulley set screw to make sure it is secure.
- j. Replace vacuum pump motor assembly in reverse order of disassembly.
- k. Replace main mounting plate, rear connector panel, rear panel, and top cover in reverse order of paragraph 9.1 (steps q. through a.).

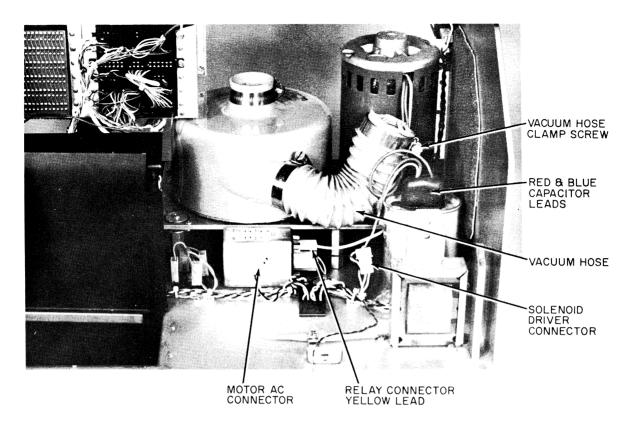


Figure 9-12. Front View, Main Wiring Connections

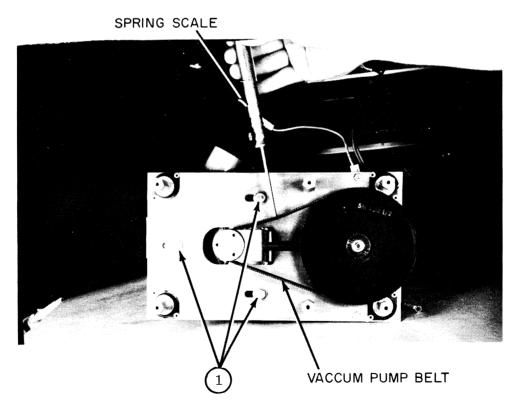


Figure 9-13. Vacuum Pump Belt Adjustment

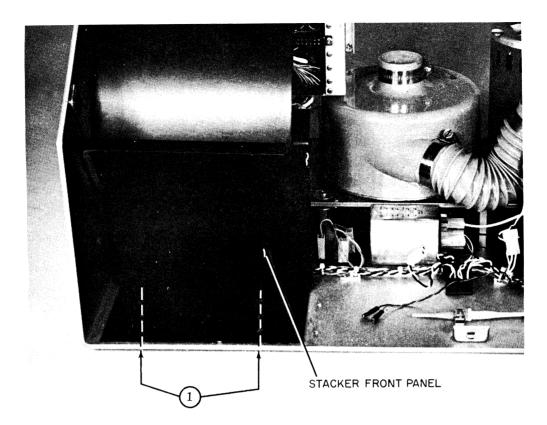


Figure 9-14. Stacker Panel Removal

9.12 STACKER FULL SWITCH

- a. Remove top cover per paragraph 9.1, steps a. and b.
- b. Using a Phillips screwdriver, remove two screws 1 from underside of main-frame holding stacker front panel, figure 9-14.
- c. Remove two leads from stacker full switch, figure 9-15.
- d. Using a Phillips screwdriver, remove two screws holding switch.
- e. Replace switch, connect leads, and adjust per paragraph 6.7.
- f. Replace top cover in reverse order of paragraph 9.1 (steps b. and a.).

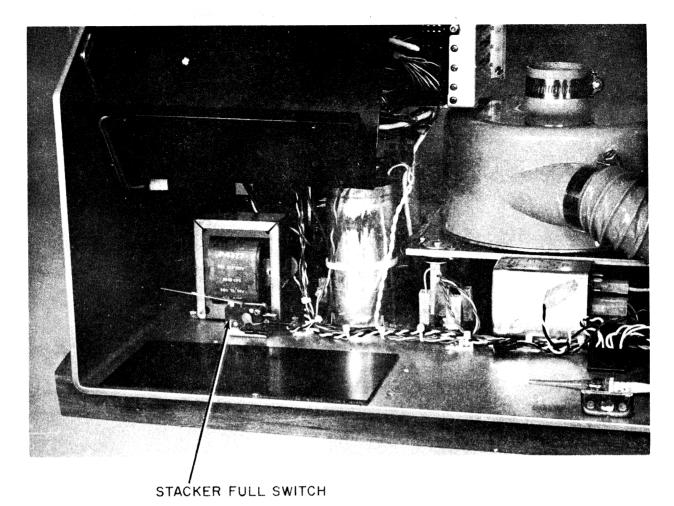


Figure 9-15. Stacker Full Switch Replacement

9.13 HOPPER EMPTY SWITCH

- a. Remove top cover per paragraph 9.1, steps a. and b.
- b. Using a 3/32 Allen wrench, remove two screws holding riffle cap, figure 9-5.
- c. Remove two leads from hopper empty switch.
- d. Using a 1/16 Allen wrench, remove two screws holding switch.
- e. Replace switch, connect leads, and adjust so that switch is activated with card in hopper and disengaged with hopper empty. See paragraph 6.6 for adjustment.
- f. Replace top cover in reverse order of paragraph 9.1 (steps b. and a.).

9.14 PICKER

- a. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
- b. Remove solenoid per paragraph 9.5, steps c. through e.
- c. Using a #2 retaining ring remover tool, remove retaining ring from top of picker shaft, figure 9-16.
- d. Remove spacers from picker shaft.

CAUTION

ALL SPACERS MUST BE REPLACED IN REASSEMBLY.

- e. Using a 5/64 Allen wrench, LOOSEN two set screws holding picker sector, figure 9-5.
- f. Remove picker shaft from underside of main mounting plate.
- g. Using a Phillips screwdriver, remove throat block, figure 6-9.
- h. Remove picker sector from rear side of picker casting.
- i. Replace picker sector, shaft, all spacers and retaining ring.
- i. Rotate shaft to place flat side of shaft under picker sector set screws.
- k. Adjust per paragraph 6.8, steps a. through k.
- 1. Replace solenoid per paragraph 9.5, steps i. through m.
- m. Replace throat block, insert screw, but do not fully tighten.
- n. Using a feeler gauge, adjust pick throat for a clearance of .008 between throat block and picker sector. Tighten throat block.
- o. Replace main mounting plate, rear connector panel, rear panel, and top cover in reverse order of paragraph 9.1 (steps q. through a.).

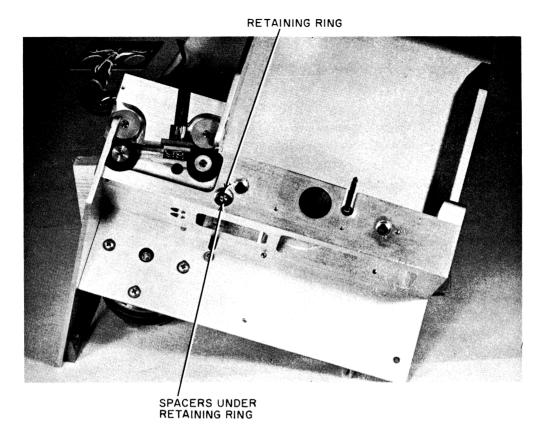


Figure 9-16. Top View Casting Assembly

9.15 INDICATOR LAMPS

- a. Remove top cover per paragraph 9.1, steps a. and b.
- b. To replace any indicator lamp, push center terminal, at base of lamp socket, to one side.
- c. Remove old lamp, replace with new lamp, and push center terminal back to center of lamp socket.
- d. Replace top cover in reverse order of paragraph 9.1 (steps b. and a.).

9.16 PICKER ROLLER BEARINGS

- a. Remove picker casting as follows:
 - 1. Remove top cover, rear panel, rear connector panel, and main mounting plate per paragraph 9.1, steps a. through q.
 - 2. Using a flat blade knife, remove stacker guide plate figure 9-7.

NOTE

The stack guide plate is fastened on with Pliobond cement. The old cement must be cleaned off and new cement applied when replacing stack guide plate.

- 3. Using a Phillips screwdriver, remove two screws 1 holding side support plate, figure 9-9.
- 4. Using a Phillips screwdriver, remove three main drive motor mounting screws ①, figure 9-5, and remove belt from motor pulley. Set motor aside.
- 5. Remove solenoid spring from spring post and arm stud, figure 9-8.
- 6. Using a 1/16 Allen wrench, LOOSEN two set screws in top solenoid coupling.
- 7. Using a 9/64 Allen wrench, remove two screws holding solenoid mounting plate. Move solenoid down and set aside.
- 8. Using a Phillips screwdriver, remove screw holding throat block to stacker casting and remove throat block, figure 6-9.
- 9. Using a 9/64 Allen wrench, remove six screws holding picker casting to main mounting plate and remove picker casting.
- b. Replace first picker roller bearings per paragraph 9.7, steps b. through i.

c. Replace second picker roller bearings as follows:

NOTE

The second picker rollers are each mounted on its own shaft.

- 1. Using a 1/16 Allen wrench, LOOSEN set screw in roller and remove roller and washer.
- 2. Remove shaft from center of casting.
- 3. Using a straight tool, tap edge of bearing from inside shaft hold to drop bearing from casting.
- 4. Install new bearing. Place shaft into shaft hole from center of casting.
- 5. Replace washer and roller on shaft. Apply firm finger pressure between roller and shaft end and tighten set screw in roller.
- 6. Check for vertical play in shaft. If there is vertical play, repeat step 5.
- d. To replace picker casting proceed as follows:
 - 1. Reposition picker casting and insert six mounting screws but do not fully tighten.
 - 2. Make a gauge using eight new unpunched cards cut to 2 x 5 inches.
 - 3. Insert gauge between picker casting and stacker casting but avoid covering read station window. Apply even pressure to picker casting toward stacker casting and tighten picker casting mounting screws. Remove gauge. Observe that steel rollers cause a slight depression on rubber rollers.
 - 4. Position main mounting plate on reader in order to test read head output voltage.
 - 5. Connect read head connector to card cage, figure 9-7.
 - 6. Connect light station connector, figure 9-10.
 - 7. Using extender board on control card and, with power applied, connect voltmeter between R17 and card ground. Verify voltage is > 2.3 vdc and < 4.3 vdc. (Nominal 3 to 4 vdc.)
 - 8. Repeat step 7. at R18 through R28.

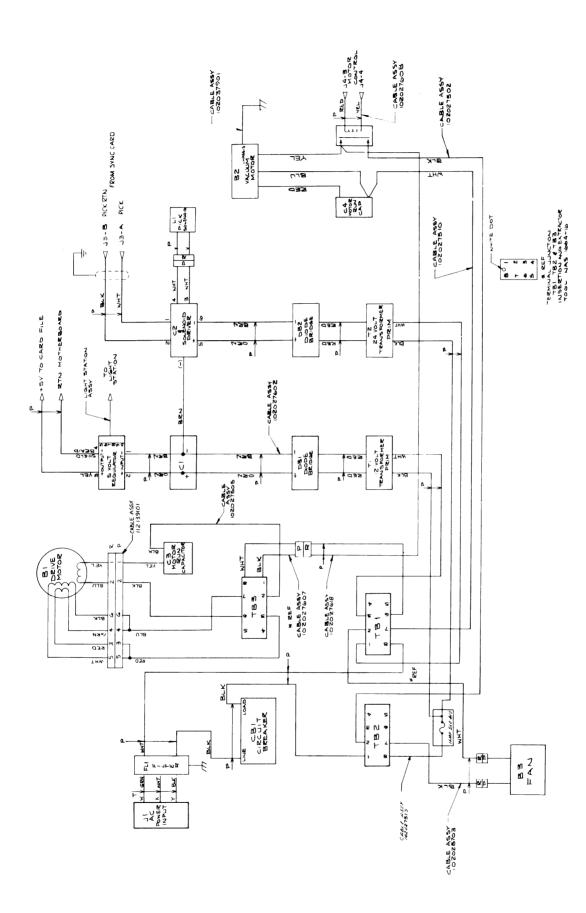
- 9. If any reading is outside limits, LOOSEN picker casting mounting screws and reposition for optimum value. Tighten screws and recheck per steps 7. and 8.
- 10. Remove extender board and replace control card in card file.
- 11. Remove main mounting plate from reader.
- 12. Tighten solenoid on mounting posts, sliding top coupling onto picker shaft. Tighten screws holding solenoid.
- 13. Replace solenoid return spring between spring post and arm stud.
- 14. With two screws in top solenoid coupling LOOSE, depress coupling slightly with fingers and while maintaining pressure, tighten two coupling set screws, ensuring one set screw is on flat portion of shaft. Remove return spring on load shaft and check that solenoid return tension is just sufficient to return load on its stop position. Too much tension could cause solenoid to not provide enough drive action to load shaft.
- 15. Replace return spring and check solenoid action, by operating picker sector manually while power is applied, vacuum is applied, and cards are in the input hopper.

NOTE

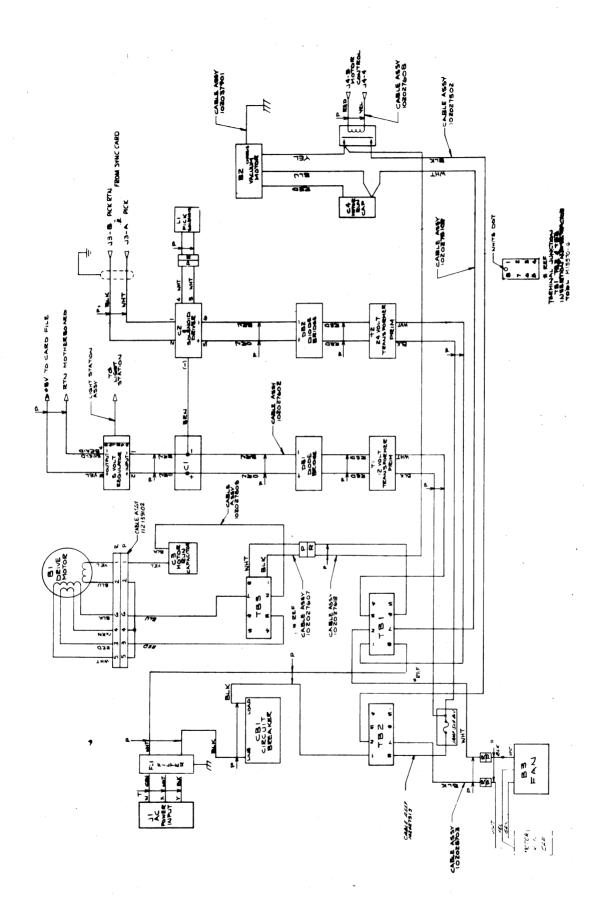
When this adjustment is made properly, the picker sector will have sufficient driving force to reliably pick cards and be capable of fully returning to rest position. If picker sector does not return to rest position, coupling has been compressed too far.

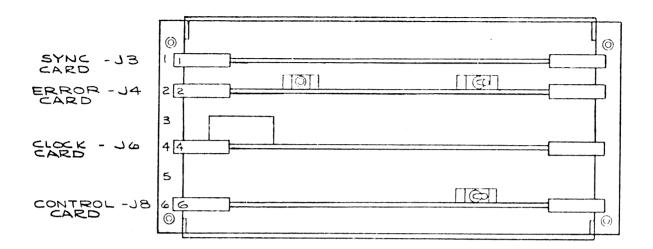
- 16. Replace throat block, insert mounting screw, but do not tighten. Adjust gap between throat block and picker sector to .008 inch.
- 17. Complete picker casting replacement in reverse order of paragraph 9.16, (steps 3. through 1.).

SECTION 10 DRAWINGS



Wiring Diagram, AC Power Distribution, 115 VAC, 60 Hz (Dwg. No. 1040755) Figure 10-1.





CARD FILE, REAR VIEW COVER REMOVED

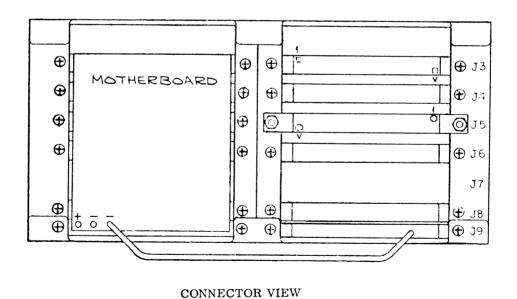
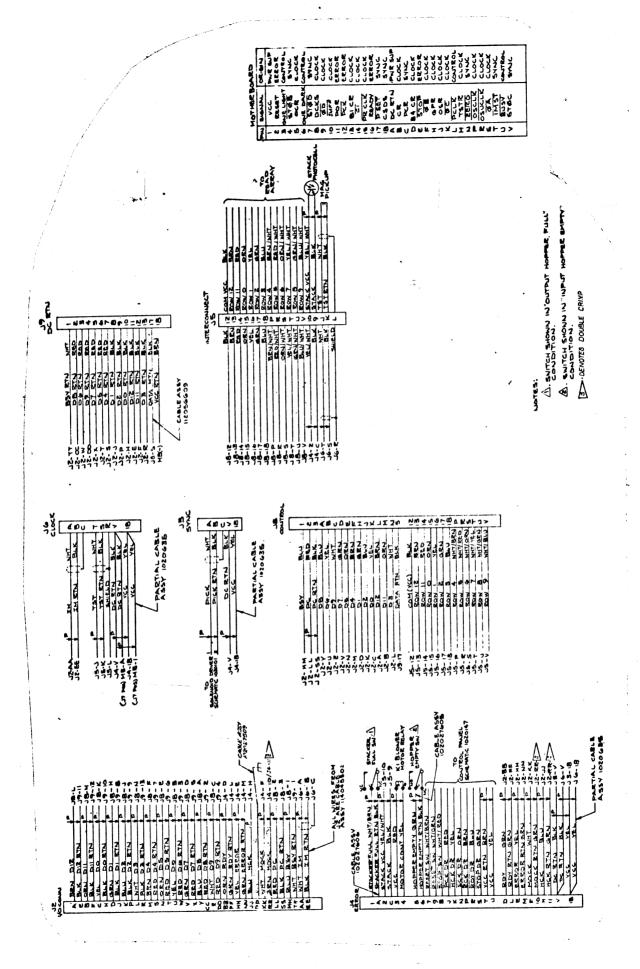


Figure 10-2. Card Cage, P.C. Card Location



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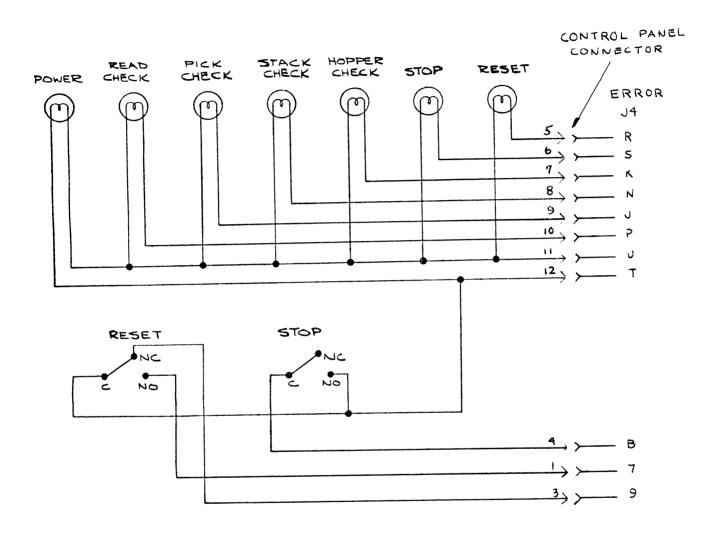
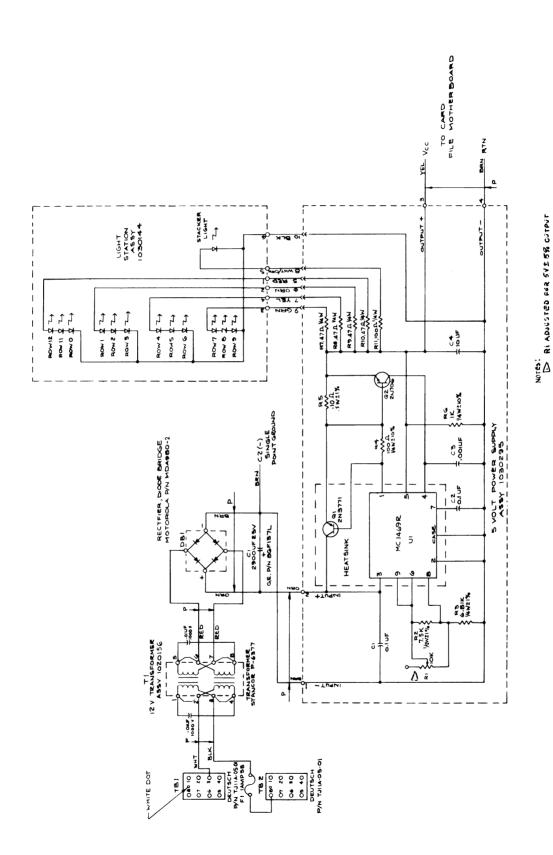


Figure 10-4. Wiring Diagram, Control Panel (Dwg. No. 1130366)

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Schematic Diagram, 5V Power Supply, 115 VAC, 60 Hz (Dwg. No. 1140637) Figure 10-5.

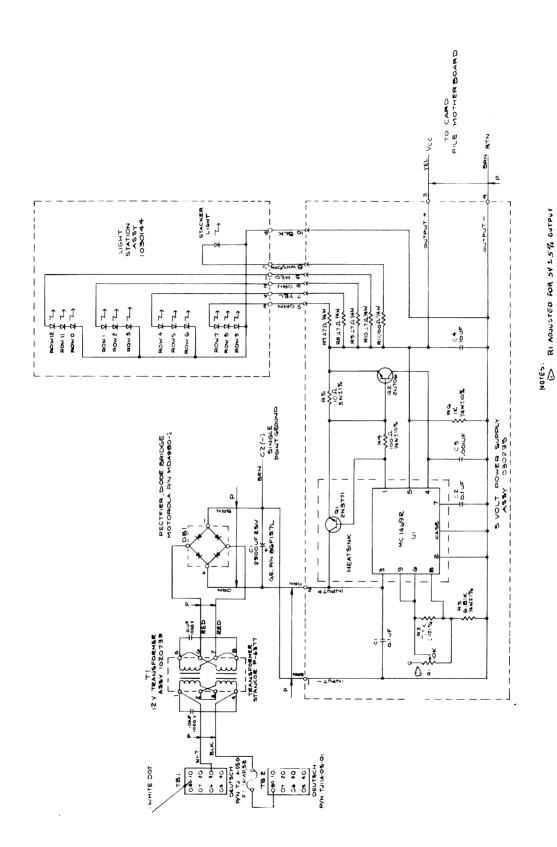


Figure 10-5A. Schematic Diagram, 5V Power Supply, 230 VAC, 50 Hz (Dwg. No. 1140924)

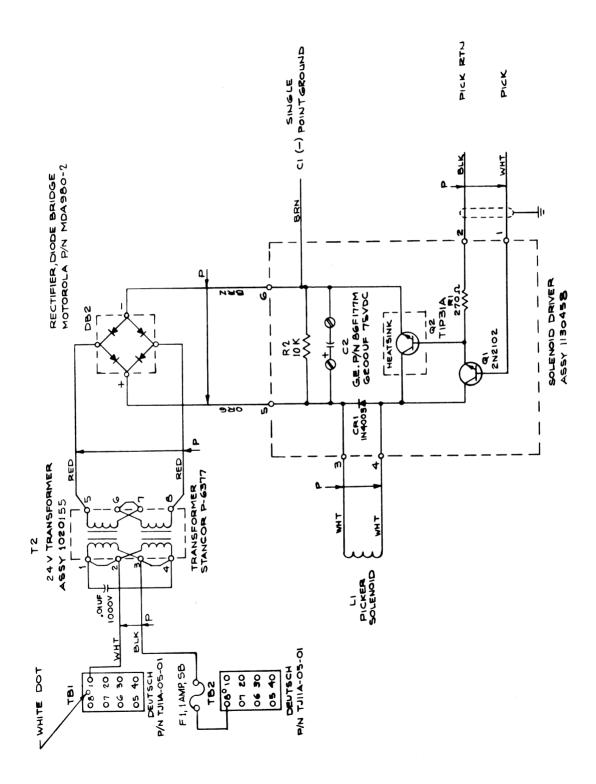


Figure 10-6. Schematic Diagram, Solenoid Driver, 115 VAC, 60 Hz (Dwg. No. 1140632)

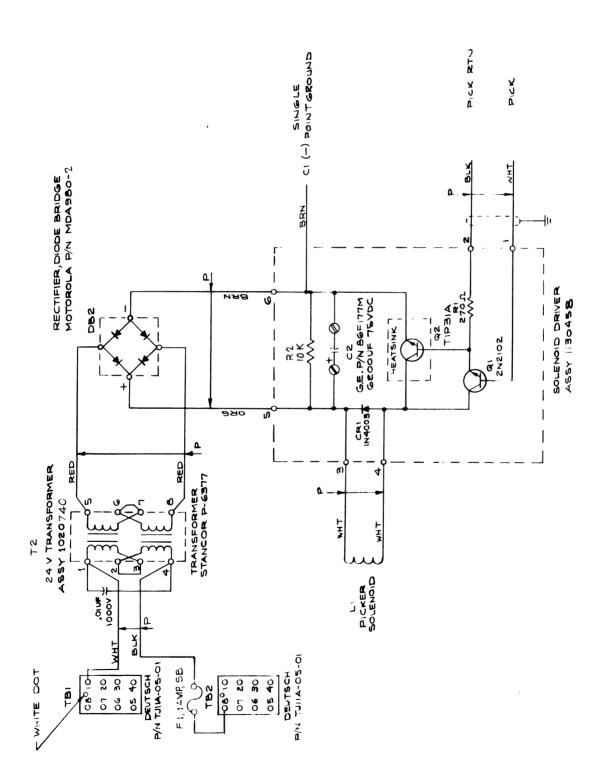


Figure 10-6A. Schematic Diagram, Solenoid Driver, 230 VAC, 50 Hz (Dwg. No. 1140925)

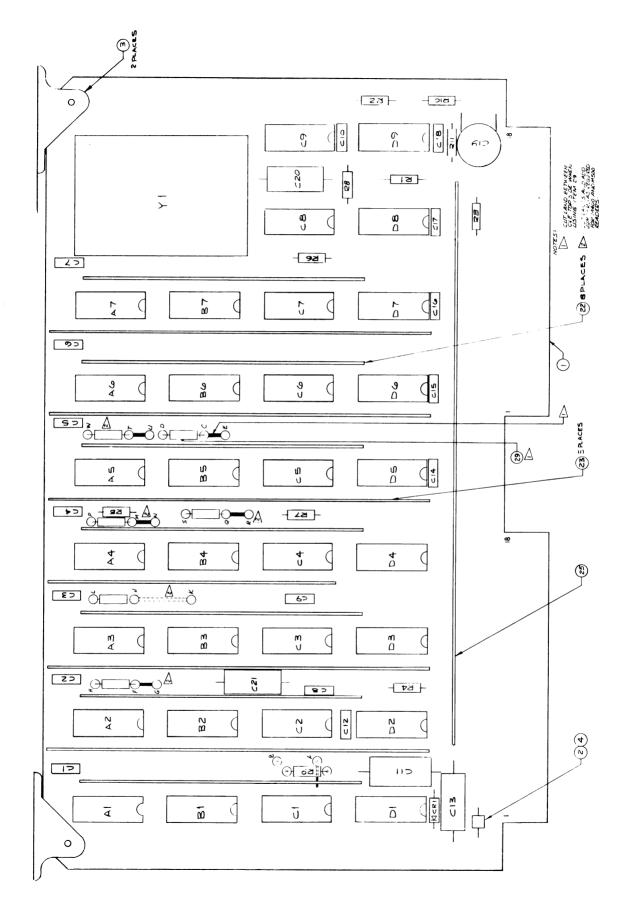
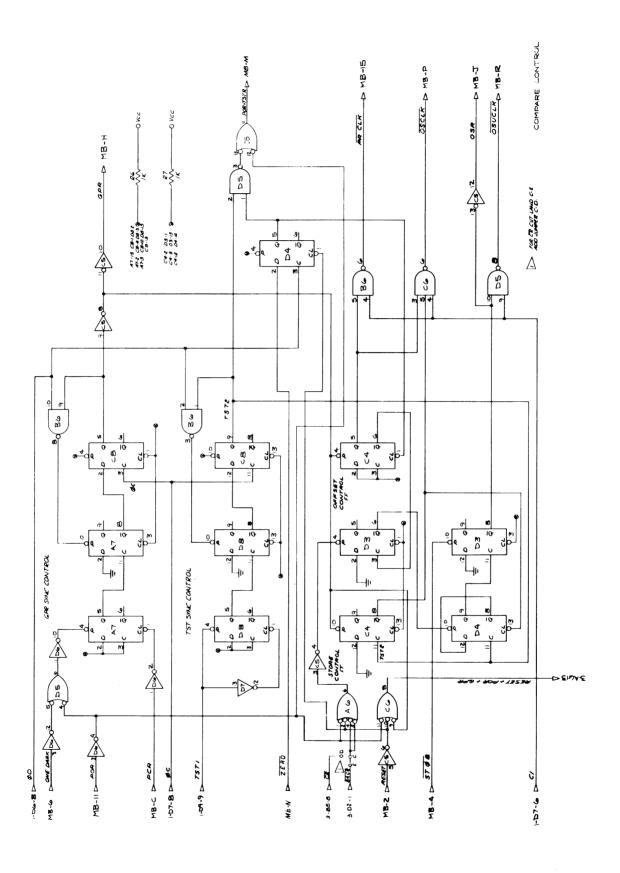


Figure 10-7. Assembly Diagram, Clock Card (Dwg. No. 1040765)

Figure 10-8. Schematic Diagram, Clock Card (Sh. 1 of 3) (Dwg. No. 1040800)



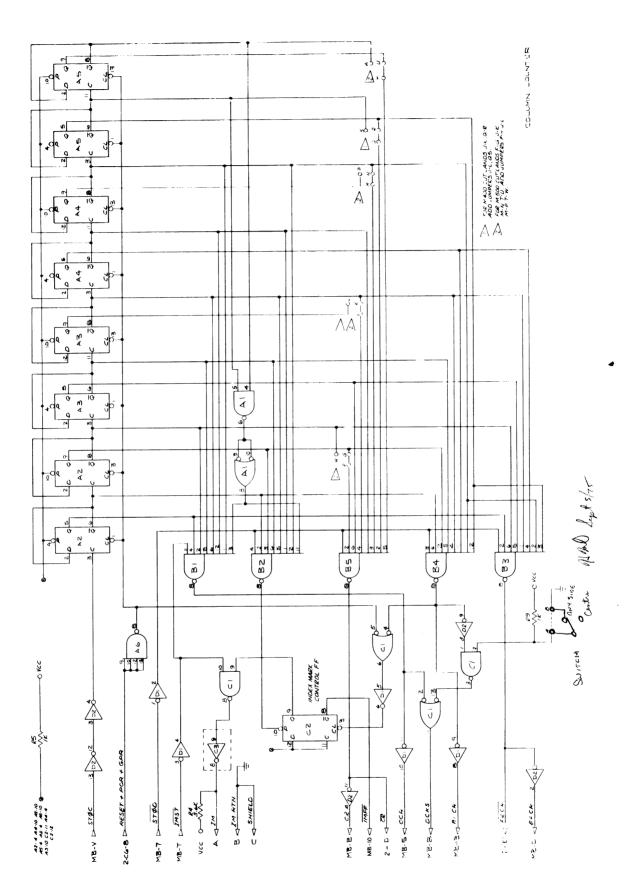


Figure 10-10. Schematic Diagram, Clock Card (Sh. 3 of 3)



Figure 10-11. Assembly Diagram, Error Card (Dwg. No. 1040610)

Figure 10-12. Schematic Diagram, Error Card (Sh. 1 of 2) (Dwg. No. 1040814)

Figure 10-13. Schematic Diagram, Error Card (Sh. 2 of 2)

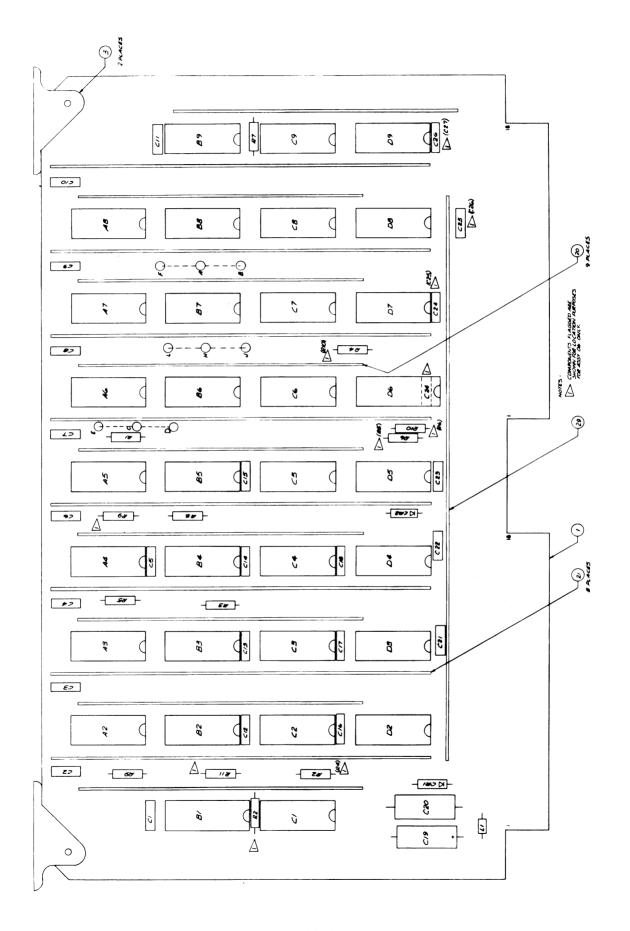
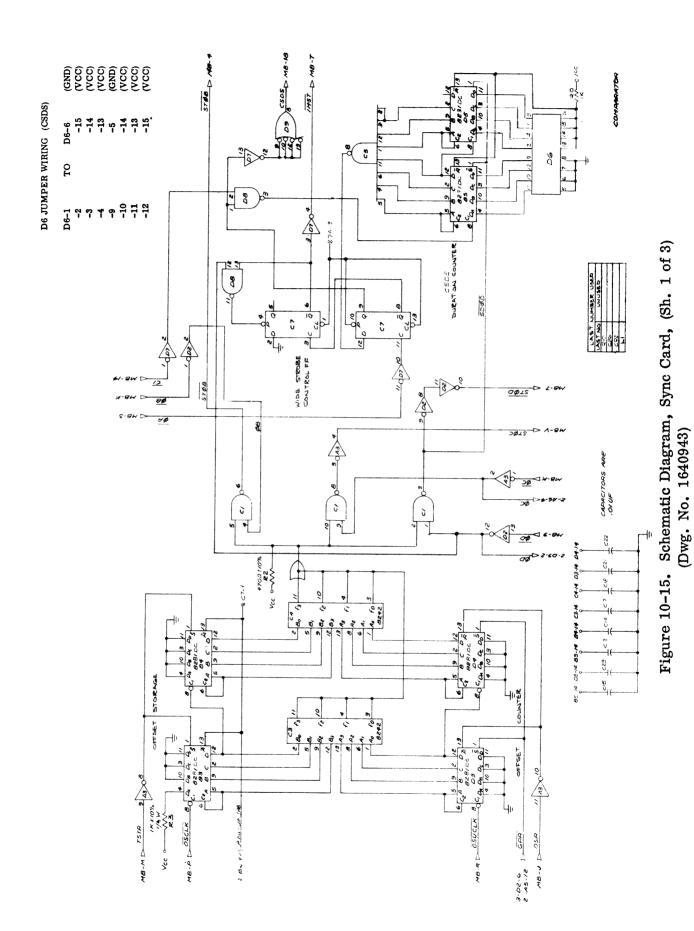


Figure 10-14. Assembly Diagram, Sync Card (Dwg. No. 1040353)

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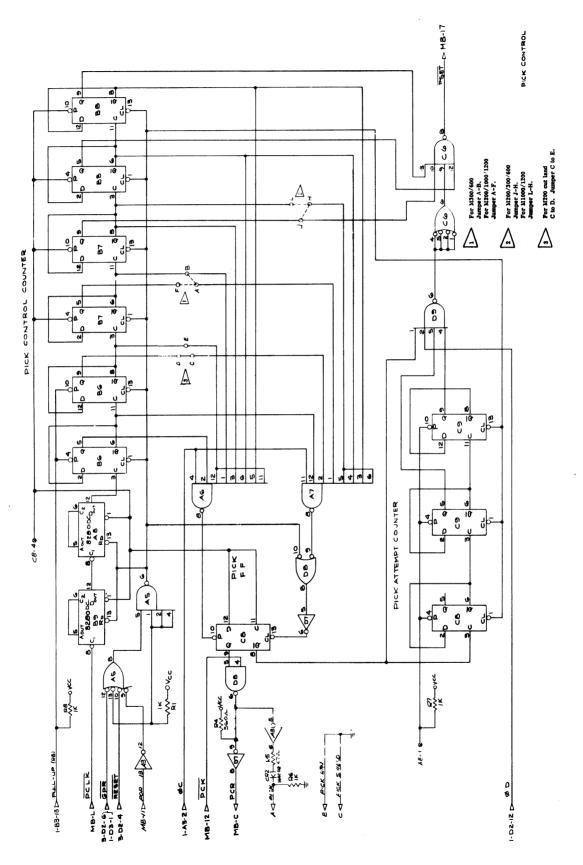


Figure 10-16. Schematic Diagram, Sync Card, (Sh. 2 of 3)

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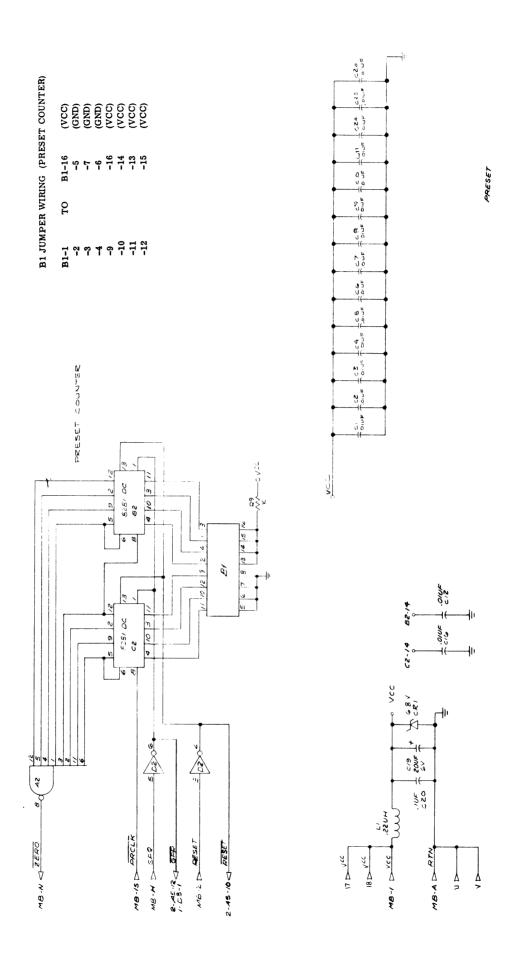
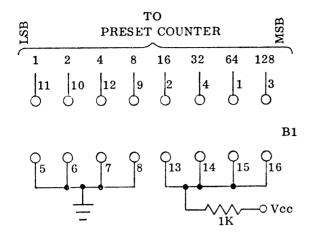
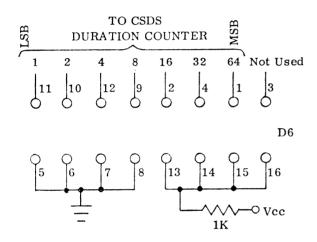


Figure 10-17. Schematic Diagram, Sync Card, (Sh. 3 of 3)



PRESET TIMING REQUIREMENTS

Model	Count	Time In µsec
M 200	176	1466.0
M 300/600	75	625.0
M 1000	44	366.5
M 1200	39	325.0



CSDS TIMING REQUIREMENTS

Model	Count	Time In µsec
M 200 M 300/600 M 1000 M 1200	72 39 11 9	599.7 324.9 91.6 75.0

To program the counters, so that they are loaded with the complement of the required count, proceed as follows:

- a. Let ground represent logic "1", and strap pins 5, 6, 7 and/or 8 to create the required count.
- b. Strap all other pins to Vcc, at pins 13, 14, 15 and/or 16.

Figure 10-17A. Preset and CSDS Counter Strapping

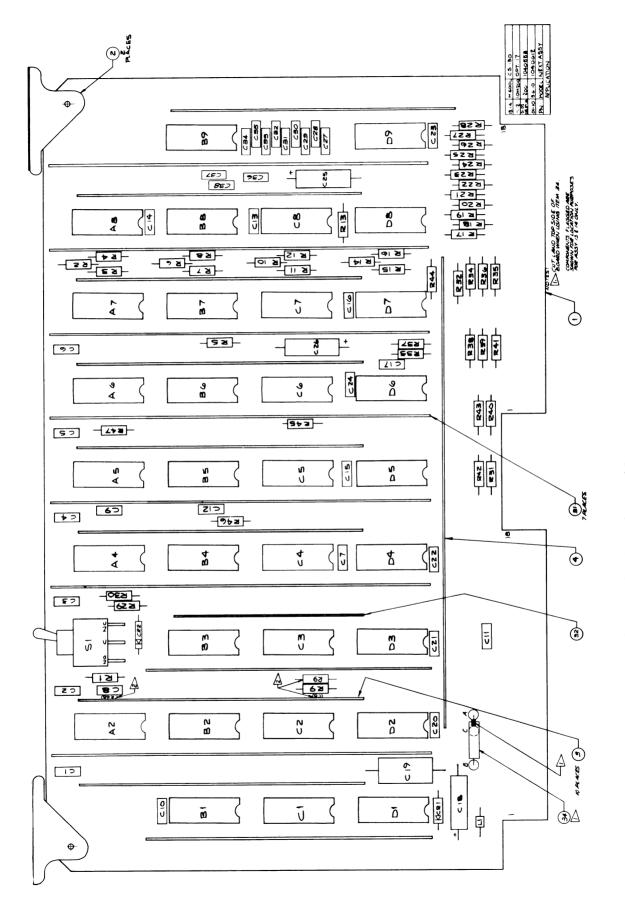


Figure 10-18. Assembly Diagram, Control Card (Dwg. No. 1040619)

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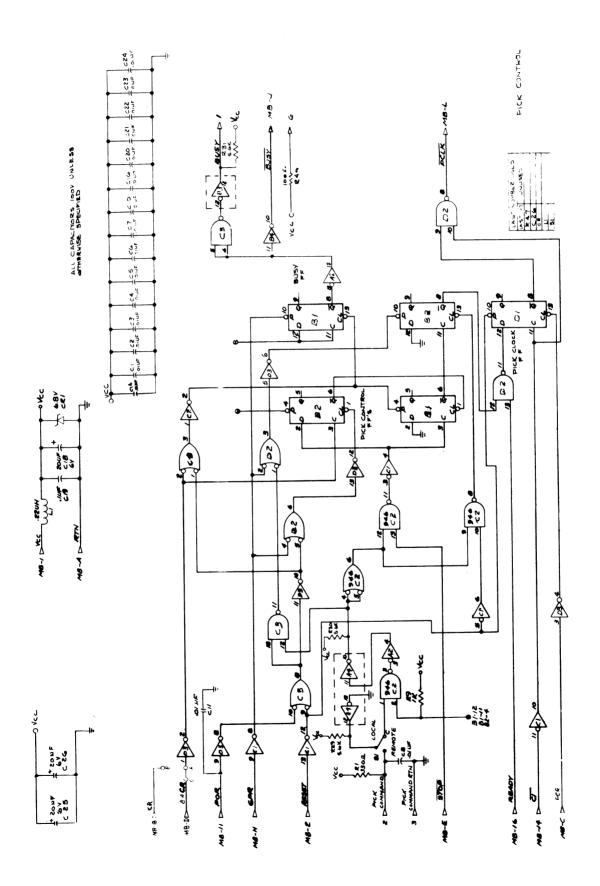


Figure 10-19. Schematic Diagram, Control Card, (Sh. 1 of 2) (Dwg. No. 1040650)

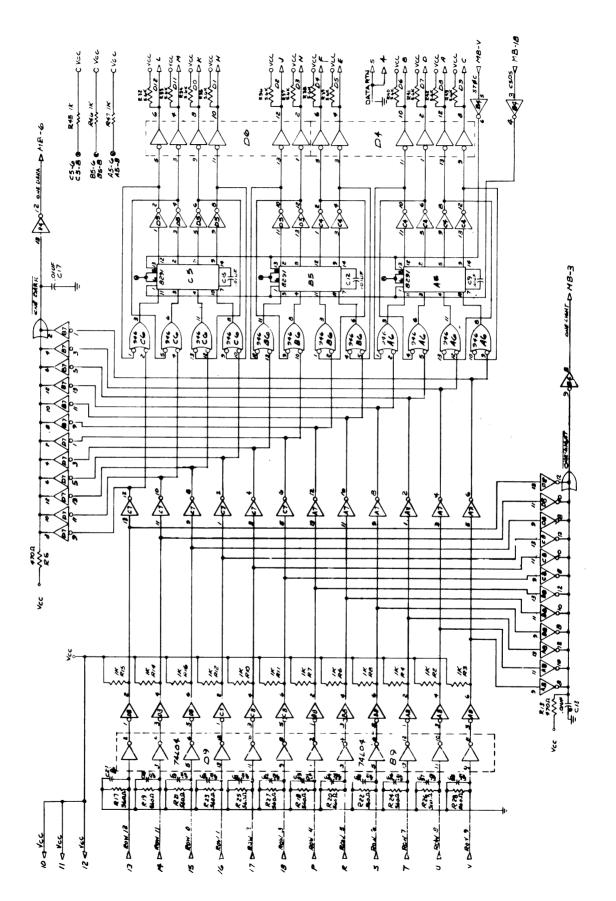


Figure 10-20. Schematic Diagram, Control Card, (Sh. 2 of 2)

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SECTION 11 SIGNAL MNEMONICS AND ABBREVIATIONS

MNEMONIC	DESCRIPTION	LOCATION	SOURCE
Vec	+5 volts	MB-1	5 volt power supply (Mother Board)
RTN	+5 volts return	MB-A	5 volt power supply (Mother Board)
TST	Timing Strobe	J3-T	Reluctance Pickup
TST RTN	Timing Strobe Return	J3-S	Reluctance Pickup
SHIEŁD	Shield for Timing Strobe	J3-R	Reluctance Pickup
TST1	Timing Strobe One	D9-9	Clock Card
φA	Clock Phase A	MB-S	Clock Card
C1	Basic Clock	MB-14	Clock Card
øВ	Clock Phase B	MB-F	Clock Card
øС	Clock Phase C	MB-K	Clock Card
øD	Clock Phase D	MB-9	Clock Card
ONE DARK	Read Station Any Dark	MB-6	Control Card
POR	Power On Reset	MB-11	Error Card
PCR	Pick Control Reset	MB-C	Sync Card
ZERO	Preset Decode	MB-N	Sync Card
RESET	Gated Reset Switch	MB-2	Sync Card
STøB	Column Strobe Phase B	MB-4	Sync Card
GPR	Good Pick Reset	МВ-Н	Clock Card
TST2	Timing Strobe Two	C8-9	Clock Card
TSTR + POR	Timing Strobe Reset	MB-M	Clock Card
PRCLK	Preset Clock	MB-15	Clock Card
OSCLK	Offset Clock	MB-P	Clock Card
OSR	Offset Reset	MB-J	Clock Card
OSUCLK	Offset Up-Clock	MB-R	Clock Card
STØC	Column Strobe Phase C	MB-V	Sync Card
STØD	Column Strobe Phase D	MB-7	Sync Card
IMST	Index Mark Strobes	MB-T	Sync Card
IM	Index Marks	J3-A	Clock Card
IM RTN	Return for Index Marks	J3 - B	Clock Card
SHIELD	Shield for Index Marks	J3-C	Clock Card
CR	Column Reset	мв-в	Clock Card
OCR	Zero Column Reset	MB-5	Clock Card
DCKS	Dark Check Strobes	MB-8	Clock Card
81CR	81st Column Reset	MB-13	Clock Card
84CR	84th Column Reset	MB-D	Clock Card
PICK COMMAND	Pick Command Input	J8 - 2	Control Card
PICK COMMAND RTN	Pick Command Input Return	J8 - 3	Control Card
STOP	Stop	мв-е	Error Card
READY	Ready	MB-16	Error Card

MNEMONIC	DESCRIPTION	LOCATION	SOURCE
BUSY	Busy Output	J8-1	Control Card
PCLK	Pick Clock	MB-L	Control Card
Vec	+5V to Read Sensor Array	J8 -1 2	Control Card
Row 12	Read Sensor Input Row 12	J8-13	Control Card
Row 11	Read Sensor Input Row 11	J8 -1 4	Control Card
Row 0	Read Sensor Input Row 0	J8 - 15	Control Card
Row 1	Read Sensor Input Row 1	J8-16	Control Card
Row 2	Read Sensor Input Row 2	J8 -1 7	Control Card
Row 3	Read Sensor Input Row 3	J8-18	Control Card
Row 4	Read Sensor Input Row 4	J8-P	Control Card
Row 5	Read Sensor Input Row 5	J8-R	Control Card
Row 6	Read Sensor Input Row 6	J8 -S	Control Card
Row 7	Read Sensor Input Row 7	J8-T	Control Card
Row 8	Read Sensor Input Row 8	J8-U	Control Card
Row 9	Read Sensor Input Row 9	J8-V	Control Card
ONE LIGHT	Read Station Any Light	MB-3	Control Card
D12 .	Data Row 12 Output	J8-L	Control Card
D11	Data Row 11 Output	J8-M	Control Card
D0	Data Row 0 Output	J8 - K	Control Card
D1	Data Row 1 Output	J8 - H	Control Card
D2	Data Row 2 Output	J8 - J	Control Card
D3	Data Row 3 Output	J8-N	Control Card
D4	Data Row 4 Output	J8-F	Control Card
$D\bar{5}$	Data Row 5 Output	J8-E	Control Card
RTN	Data Drivers Return	J8-5	Control Card
D6	Data Row 6 Output	J8 - B	Control Card
D7	Data Row 7 Output	J8 - D	Control Card
D8	Data Row 8 Output	J8-A	Control Card
D9	Data Row 9 Output	J8-C	Control Card
CSDS	Column Storage Data Strobe		Sync Card
STACKER FULL	Stacker Full Switch	J4-1	Error Card
STACKER FULL RTN	Stacker Full Switch Return	J4-A	Error Card
HOPPER EMPTY RTN	Hopper Empty Switch Return	J4-6	Error Card
HOPPER EMPTY	Hopper Empty Switch	J4-5	Error Card
STACK	Stack Sensor Input	J4-C	Error Card
STACK Vcc	Stack Sensor +5 volts	J4-2	Error Card
RESET SW	Reset Switch Normally Open	J4-9	Error Card
RESET SW	Reset Switch Normally Closed		Error Card
PSET	Pick Check Set		Sync Card
LIGHT CHECK	Light Check		Error Card
DARK CHECK	Dark Check		Error Card
HECK	Hopper Empty Check		Error Card
PCK	Pick Check		Error Card
STACK CHECK	Output Stacker Check	B5-8	Error Card
		200	

MNEMONIC	NIC DESCRIPTION		SOURCE
PCKI	Pick Check Indicator	B2-2	Error Card
нск	Input or Output Hopper Check	C4-9	Error Card
SHUTDOWN STATUS	Mode Switch Input	S1-C	Error Card
POR TR	Power on Reset Trigger	A5-12	Error Card
STOP SW	Stop Switch Input	J4 - B	Error Card
RCK DR	Read Check Lamp Driver	J4 - P	Error Card
PCK DR	Pick Check Lamp Driver	J4 - J	Error Card
SCK DR	Stack Check Lamp Driver	J4-N	Error Card
HCK DR	Hopper Check Lamp Driver	J4 - K	Error Card
нск	Hopper Check Output	J4 - H	Error Card
HCK RTN	Hopper Check Output Return	J4-10	Error Card
ERROR	Error Output	J4-E	Error Card
ERROR RTN	Error Output Return	J4-M	Error Card
MOCK	Motion Check Output	J4-F	Error Card
MOCK RTN	Motion Check Output Return	J4-11	Error Card
READY	Ready Output	J4 - D	Error Card
READY RTN	Ready Output Return	J4 - L	Error Card
RDY DR	Ready Lamp Driver	J4 - R	Error Card
STOP DR	Stop Lamp Driver	J4 - S	Error Card
PICK	Pick Driver Output	J5 - A	Sync Card
PICK RTN	Pick Driver Output Return	J5-B	Sync Card
SHIELD	Shield for PICK	J5-C	Sync Card
BUSY	Busy Signal	MB-U	Control Card

SECTION 12 ILLUSTRATED PARTS BREAKDOWN

12-1 INTRODUCTION

This section contains, in breakdown order, the complete card reader's assemblies, subassemblies, sub-subassemblies, detail parts of each, and associated attaching parts.

The unit is divided into ten significant assemblies (refer to figure 12-2), each illustrated, and provided with a parts listing keyed to the illustrations. The assembly parts breakdown illustrations and associated parts lists identify and describe all parts of the 115 VAC 60 Hz and the 230 VAC 50 Hz models of the Card Reader. Most parts are common to both models, when a part is common only to the 50 Hz models, it is listed immediately after the equivalent part for the 60 Hz model. In the MAIN FRAME assembly breakdown, for example, (Figure 12-4), under index #16, two circuit breakers are listed for the same index number.

16 00000188 . . CIRCUIT BREAKER, 8 amp (115 VAC, 60 Hz models) 00000185 . . CIRCUIT BREAKER, 6 amp (230 VAC, 50 Hz models)

Table 12-1 list the major assemblies and subassemblies and associated components of the card reader with the figure number in which they are listed and illustrated. In the parts list, Documation parts or assemblies are identified by an eight-digit number. Parts or assemblies that Documation purchases from suppliers and used "as is" are identified by manufacturer part number. The manufacturers' are identified by manufacturers codes in the description column of the parts list. Table 12-2 list the names and addresses of all manufacturers' codes used in the parts list.

12-2 HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

- a. When the Part Number is not known (Figure 12-1):
 - 1) Refer to Figure 12-2 and locate the index number of the major assembly from which the part was removed.
 - 2) In the major assembly listing of Figure 12-2 use the index number to locate the figure number of the parts breakdown illustration for that assembly.
 - 3) In the major assembly parts breakdown illustration, locate the index number of the part.

- 4) In the illustration part listing, use the index number to find the part number, description and quantity per unit.
- b. When the assembly and/or the major component of which an item is part of is known, refer to Table 12-1 to locate the figure number which illustrates and list the individual components or parts.
- c. To simplify the updating of Section 12 of this manual, only <u>ODD</u> numbered pages are used.

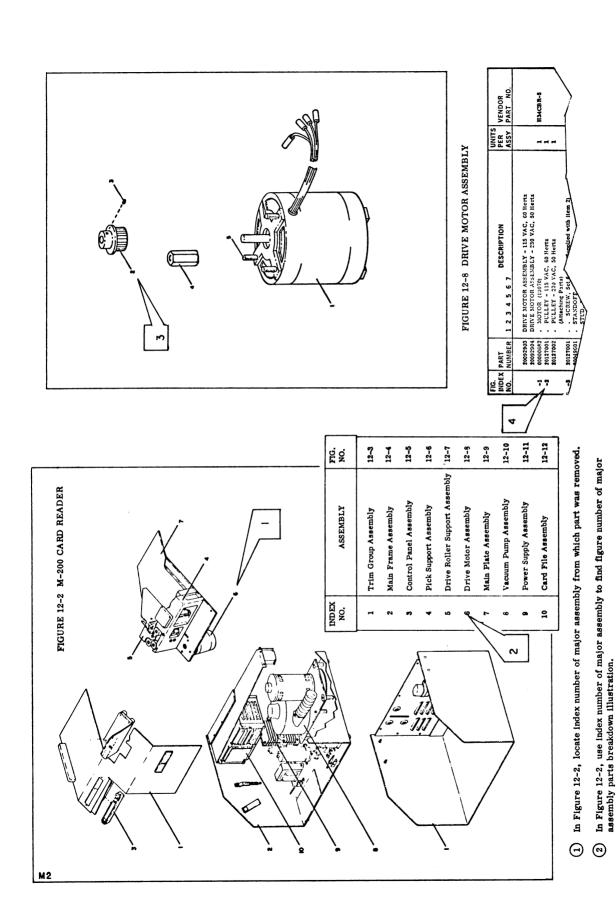


FIGURE 12-1 HOW TO USE ILLUSTRATED PARTS BREAKDOWN WHEN PART NUMBER IS NOT KNOWN

In the illustration parts list, use index number of part to find part number, description

and quantity per unit.

In major assembly parts breakdown illustration, locate index number of part,

<u></u> \odot



TABLE 12-1 QUICK REFERENCE LIST

Figure	Assembly	Page
12-3	TRIM GROUP ASSEMBLY	12-11a
	Fan	12–11 b
	Capacitor	12-11b
12-4	MAIN FRAME ASSEMBLY	12-13c
	Switch, Hopper Full	12-13c
	Circuit Breaker	12-13c
	Transformer, 12 Volt	12-13c
	Transformer, 24 Volt	12-13c
	Power Supply Assembly	12-13d
	Solenoid Driver Assembly	12-13e
	Vacuum Pump Assembly	12-13e
	Relay	12-13e
	Filter Assembly	12-13e
	Connector Panel Assembly	12-13e
	Rectifier, Diode Bridge	12-13e
	Capacitor, 17.5 μf	12-13f
	Capacitor, 10 μf	12-13f
	Capacitor, 4600 μf	12-13f
	Spring	12-13f
	Fuse	12-13f
	Solenoid Driver Assembly	12-13f
12-5	CONTROL PANEL ASSEMBLY	12-15a
	Lamp	12-15a
12-6	PICK SUPPORT ASSEMBLY	12-17a
	Switch Assembly, Hopper Empty	12-17a
	Sector Assembly	12-17a
	Drive Roller, 2nd Pick Drive Assembly	12-17a
	Stack Drive, 1st Pick Drive Assembly	12-17b
12-7	DRIVE ROLLER SUPPORT ASSEMBLY	12-19a
	First Stack Drive Assembly	12-19a
	Second Stack Drive Assembly	12-19a
12-8	DRIVE MOTOR ASSEMBLY	12-21a
"	Motor	12-21a
	Pulley	12-21a

TABLE 12-1 QUICK REFERENCE LIST (CONT'D)

Figure	Assembly	Page
12-9	MAIN PLATE ASSEMBLY	12-23b
	Drive Motor Assembly	12-23b
	Solenoid Assembly	12-23c
	Pick-up	12-23c
	Timing Disc Assembly	12-23c
	Pulley	12-23c
	Belt	12-23c
	Capacitor, 2 μf	12-23c
	Capacitor, 3 μf	12-23c
	Read/Light Station Assembly	12-23 d
12-10	VACUUM PUMP ASSEMBLY	12-25a
	Motor	12-25a
	Blower	12-25a
	Belt	12-25a
	Pulley	12-25a
12-11	POWER SUPPLY ASSEMBLY	12-27a
	P.C. Board Assembly	12-27a
12-12	CARD FILE ASSEMBLY	12-29a
	Connector, Single Row	12-29a
	Connector, Tab	12-29a
12-13	P. C. ASSEMBLY - Control Card	12-31a
12-14	P.C. ASSEMBLY - Sync Card	12-33a
12-15	P.C. ASSEMBLY - Clock Card	12-35a
12-16	P.C. ASSEMBLY - Error Card	12-37a

TABLE 12-2 LIST OF MANUFACTURERS

00779			
00779		05063	Hamilton - Avnet Electronics
	Amp, Incorporated	03003	70 State Street
	P.O. Box 3608		
	Harrisburg, Pennsylvania 17105		Westbury, N.Y. 11590
01121	Allen Bradley Company	05245	Components Corporation
01121	1201 2nd Street		2857 N. Halsted Street
	Milwaukee, Wisconsin 53212		Chicago, Illinois 60657
01005	Texas Instruments, Incorporated	05411	DuPage Manufacturing Company
01295	Semi-Conductor Components Division	*	2250 Curtiss Avenue
	13500 North Central Expressway		Downers Grove, Illinois 60515
			20
	Dallas, Texas 75231	05972	Loctite Corporation
	A CAMPANIA	00312	705 N. Mountain Road
01634	Aluminum Co. of America		Newington, Connecticut 06111
	1501 Alcoa Building		Newington, Connecticut voili
	Pittsburg, Pennsylvania 15219	00000	Electrovert, Incorporated
		06229	
01963	Cherry Electrical Products Corp.		86 Hartford Avenue
	3600 Sunset Avenue		Mt. Vernon, N.Y. 10553
	Waukegan, Illinois 60085		- 1 W G
		06383	Panduit Corporation
02697	Parker Seal Company		17301 Ridgeland
	2360 Palumbo Drive		Tinley Park, Illinois 60477
	Lexington, Kentucky 40509		
		06540	Amaton Electronic Hardware
02735	RCA Corporation		Division of Mite Corporation
	Solid State Division		446 Blake Street
	Route 202		New Haven, Connecticut
	Somerville, N.J. 08876		
	,	07108	R. & J. Dick Co., Inc.
03597	General Electric Company		912 E. 5th Street
03331	Turbine Division of Apparatus Group		Muscatine, Iowa 52763
	Schenectady, N.Y.		
	Beneficetady, 11.1.	07137	Tec, Incorporated
00700	Industrial Enterprises, Incorporated	****	6700 Washington Avenue
037 86			South Eden Prairie, Minn. 55343
	5900 N. Telegraph Road		
	Dearbon, Michigan 48127	07263	Fairchild Semi-Conductor
	No. 1 Attainment Man Commons	01200	464 Ellis Street
04963	Minnesota Mining and Mfg. Company		Mountain View, California 94040
	Center Street		Wountain view, Camorina 51010
	St. Paul, Minnesota 55101	05055	AirPax Electronic, Inc.
		07355	
04713	Motorola		Central Engineering Division 6601 N.W. 19th Street
	Semi-Conductor Products, Inc.		
	5005 East McDowell Road		Ft. Lauderdale, Florida 33310
	Phoenix, Arixona 85008		T 1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
		07446	Engler Instrument Company
04866	Nylok - Detroit		250 Culver Avenue
	1893 Barrett Road		Jersey City, N.J. 07305
	Troy, Michigan 48084		
	İ		

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURER	CODE	MANUFACTURER
07679	Hardware Specialty Co., Inc. 48 - 75 36th Street Long Island City, N.Y. 11101	12505	Air Product/Chemical Incorporated P.O. Box 1231 R Hanover Avenue Morristown, N.J. 07960
07707	USM "Pop" Rivet Division 510 River Road Shelton, Connecticut 06484	12617	Hamlin, Incorporated Grove and Lake Streets Lake Mills, Wisconsin 53551
07886	National Radio Co., Incorporated Commercial Products Division 78 Stone Place Melrose, Massachusetts 02176	13103	Thermalloy Company 8717 Diplomacy Row Dallas, Texas 75247
08524	Deutsch Fastener Corporation 70001 West Inperial Highway Los Angeles, California 90045	14519	Designatronics, Incorporated Stock Drive Products 55 South Denton Avenue New Hyde Park, N.Y. 11040
08806	General Electric Company Miniature Lamp Department Nela Park Cleveland, Ohio 44112	14563	Neuman & Company 8136 N. Lawndale Skokie, Illinois 60076
09021	Speer Carbon Company Speer Resistor Division A Division of Air Reduction Co., Inc.	14927	Kubar, Incorporated 21 Erie Cambridge, Massachusetts 02139
09023	Foster Brook Road Bradford, Pennsylvania 16701 Cornell - Dubilier	14936	General Instrument Corporation P.O. Box 600 600 W. John Street Hicksville, New York 11802
03025	Division of Fed. Pac. Electric Co. 2526 Dalrymple Sanford, North Carolina 27330	16059	Devcon Corporation 59 Endicott Street Danvers, Massachusetts 01923
09353	C. & K. Components, Incorporated 103 Morse Street Watertown, Massachusetts 02172	18324	Signetics Corporation 811 E. Arques Sunnyvale, California 94086
09922	Burndy Corporation Richards Avenue Norwalk, Connecticut 06852	18583	Curtis Instruments, Incorporated 200 Kisco Avenue Mount Kisco, N.Y. 10549
10108	Hurst Manufacturing Corporation 64 East Princeton Road Princeton, Indiana 47570	18655	Computer Products 1400 N.W. 70th Street Ft. Lauderdale, Florida 33307
11214	Hardigg Industries, Incorporated N. Main Street South Deerfield, Mass. 01373	18677	Scanbe Manufacturing Corporation 3445 Fletcher Avenue
11253	Elrad Manufacturing Company 4300 N. California Avenue Chicago, Illinois 60618		El Monte, California 91731

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURER	CODE	MANUFACTURER
	PGA Garage Market	27 264	Molex Products Company
18714	RCA Corporation	21204	5224 Katrine Avenue
	Solid State Division		Downers Grove, Illinois 60515
	Fostoria Road		Downers Grove, mimors occio
	Findley, Ohio 45840	00500	Gulf Electronics Corporation
		28523	1740 N.W. 69th Avenue
18788	General Illumination, Incorported		
	2233 University Avenue		Miami, Florida 33148
	St. Paul, Minnesota 55114		a lost as Turnmanatad
		28818	Soundcoat Co., Incorporated
19070	Eastern Air Devices, Incorporated		515 Madison Avenue
	385 Central Avenue		New York, N.Y. 10010
	Dover, New Hampshire 03820		
		29227	Herco
19401	Gladwin Industries, Incorporated		Hecht Rubber Corporation
	Gladwin Educational Division		482 - 484 Riverside Avenue
	P.O. Box 80545/1940 Will Ross Ct.		Jacksonville, Florida 32202
	Chamblee, Georgia 30341		
	,	29440	Winfred - Berg
19701	Electra/Midland Corporation		499 Ocean Avenue
	P.O. Box 760		East Rockaway, L.I., N.Y. 1151
	Mineral Wells, Texas 76067		
	,	33062	Ferronics, Incorporated
20772	Spectronics, Incorporated		66 N. Main Street
20112	24 Kinkle Street		Fairport, New York 14450
	Westbury, N.Y. 11590		•
	,, 05,000, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	334 98	Automation Components
22589	Electro - Space Fabricators, Inc.		One Short Avenue
22000	101 - 125 Centre Avenue		Peckville, Pannsylvania 18452
	Topton, Pennsylvania 19562		
	Topion, Temojivana 1999	34936	Nashua Corporation
23880	Stanford Applied Engineering		44 Franklin Street
23000	340 Martin Avenue		Naushua, New Hampshire 03060
	Santa Clara, California 95050		
	Santa Clara, Camorina 30000	46384	Penn Eng. and Mfg. Corporation
00000	William J. Purdy Company	10001	Old Easton Highway
23936	Pamotor Division		Doylestown, Pennsylvania 18901
			Doylestown, Tennsylvania 10001
	770 Airport Boulevard	50521	HEI, Incorporated
	Burlingame, California 94010	30321	Johnathan Industrial Center
0.41.01	Cotos Dubban Comuser		Chaska, Minnesota 55318
24161	Gates Rubber Company		Onaska, Minnesota 30010
	999 South Broadway	50500	Monsanto
	Denver, Colorado 80217	50522	
			Electronic Special Products 10131 Bubb Road
2 4211	Grisby - Barton, Incorporated		
	3800 Industrial Drive		Cupertino, California 95014
	Rolling Meadows, Illinois 60008		
	1	55719	Snap - On Tools Corporation
27014	National Semi-Conductor Corporation		8026 28th Avenue
	2950 San Ysidro Way		Kenosha, Wisconsin 53140
	Santa Clara, California 95051		
	i		

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURING	CODE	MANUFACTURING
56289	Sprague Electric Company	71838	Standard Pressed Steel Company
30289	North Adams, Massachusetts 01247	11000	Industrial Fastener Division
	North Adams, Massachusetts 01247		4444 Lee Road
60361	Toro Manufacturing Company		Cleveland, Ohio 44128
00301	8111 Lyndale Avenue South		Cleverand, Onto 44128
	Minneapolis, Minnesota 55420	71984	Dow Corning Corporation
	Willineaports, Willinesota 33420	11304	South Saginaw Road
64475	Welch Allyn, Incorporated		Midland, Michigan 48641
04473	Jordan Road		· · ·
	Skaneateles Falls, New York 13153	72136	Elmenco South Park and John Streets
65 083	Westinghouse Electric Corporation		Willimantic, Connecticut 06226
	Lamp Division		•
	MacArthur Avenue	72619	Dialight Corporation
	Bloomfield, New Jersey 07003		60 Stewart Avenue
	•		Brooklyn, New York 11237
70276	Allen Manufacturing Company		
	P.O. Box 570	72653	G.C. Electronics Company
	Hartford, Connecticut 06101		400 S. Wyman Street
			Rockford, Illinois 61101
70854	Barden/NMB		
	200 Park Avenue	7313 8	Beckman Instrument, Incorporated
	Danbury, Connecticut 06810		Heliport Division
			2500 Harbor Boulevard
70903	Belden Corporation		Fullerton, California 92634
	415 S. Kilpatrick Avenue		
	Chicago, Illinois	74364	Eastman Chemical Product, Inc.
			Eastman Road
71034	Bliley Electric Company		Kingsport, Tennessee 37662
	2545 W. Grandview Blvd.		
	Erie, Pennsylvania 16512	74545	Hubbell Harvey, Incorporated
7 1279	Cambion		State Street and Bostwick Avenue
71279	445 Concord Avenue		Bridgeport, Connecticut 06602
		75511	Lamb Electric/Ametek
	Cambridge, Massachusetts 02138	75511	627 Lake Street
71590	Centralab Electric		Kent, Ohio 44240
11030	5757 N. Greenbay Avenue		isone, Onto 11210
	Milwaukee, Wisconsin 53201	75915	Littlefuse, Incorporated
	Militauree, Wisconsin 00201	10310	800 E. Northwest Highway
71744	Chicago Miniature Lamp Works		Des Plaines, Illinois 60016
	4433 Ravenswood Avenue		
	Chicago, Illinois 60640	76005	Lord Manufacturing Company
			1635 West 12th Street
71785	Cinch Manufacturing Company		Erie. Pennsylvania 16512
. =	Division of T. R. W., Inc.		
	Elk Grove Village, Illinois	76599	The Murray Corporation
			Industrial Park
			Cockeysville, Maryland 21030
			• • • • • • • • • • • • • • • • • • • •

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURER	CODE	MANUFACTURER
79023	United Elastic Company Division of Stevens, J.P. & Co., Inc. P.O. Box 391 50 Payson Avenue East Hampton, Massachusetts 01027	81840	Ledex, Incorporation Ledex Division 123 Webster Street Dayton, Ohio 45402
79136	Waldes Kohinoor, Inc. 47 - 16 Austel Place Long Island, N.Y. 11101	83014	The Hartwell Corporation 9035 Venice Blvd. Los Angeles, California 90034
79405	Wood Electric Corporation Danvers Industrial Park Danvers, Massachusetts 01923	83259	Parker Seal Company 10567 Jefferson Blvd. Culver City, California 90231
80089	Essex International Controls Division 131 Godfrey Street Logansport, Indiana	83330	H.H. Smith, Incorporated 812 Snedicker Avenue Brooklyn, New York 11207
80103	Lambda Electronics Corporation 515 Broad Hollow Road Huntington, New York 11749	83584	Drive-Lok, Incorporated 1140 Park Avenue Sycamore, Illinois 60178
80183	Sprague Products Company Beaver Street North Adams, Massachusetts	84830	Lee Spring Company 30 Main Street Brooklyn, New York 11201
80223	T.R.W. Electronic Components United Transformer Division 150 Varick Street	85446	Bokers, Incorporated 3104 Snelling Ayenue Minneapolis, Minnesota 55406
80294	New York, N.Y. 10013 Bournes, Incorporated	86577	Precision Metal Prod. of Malden, Inc 41 Elm Street Stoneham, Massachusetts 02180
	1200 Columbia Avenue Riverside, California 92507	87034	Marco - Oak Industries, Incorporated P.O. Box 4011 207 S. Helena
803 82	Air Reduction Co., Incorporated 150 E. 42nd Street New York, N.Y. 10017	87730	Anaheim, California 92803 United Mineral and Chemical Corp.
80545	Ametek Hunter Spring 1 Spring Avenue		129 Hudson Street New York, N.Y. 10013
01010	Hatfield, Pennsylvania 19440	88132	Goodyear Rubber Company 25 Hamlin Middletown, Connecticut 06457
81312	Winchester Electronics Main Street and Hillside Avenue Oakville, Connecticut 06779	91506	Augat, Incorporated 33 Perry Avenue
81541	Airpax Electronics, Incorporation Woods Road		Attleboro, Massachusetts 02703
	Cambridge, Maryland 21613	91637	Dale Electronics, Incorporated P.O. Box 609 Columbus, Nebraska 68601

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURER	CODE	MANUFACTURER
91662	Elco Corporation		Dearborn Wire and Cable Company
31002	Maryland Road and Computer Avenue		9299 Evenhouse
	Willow Grove, Pennsylvania 19090		Rosemont, Illinois
	Willow drove, Tempy wanta 1999		
92194	Alpha Wire		Extron Corporation
32131	711 Lidgerwood Avenue		P.O. Box 10725
	Elizabeth, New Jersey		Knoksville, Tennessee 37919
94144	Raytheon Company		Merit Fastners
	Components Division		127 Atlantic Boulevard
	Industrial Components Operation		Maitland, Florida 32951
	465 Centre Street		Millitory Dealing Company
	Quincy, Massachusetts 02169		Millitary Packing Company P.O. Box 460
	7 11 7 W WALL		Orlando, Florida 32802
94222	Southco, Incorporated		Oriando, Fiorida 52002
	Lester, Pennsylvania 19113		Metropies Comparation
0.4450	Devilation and Comments		Motronics Corporation Riverside Industrial Park
94452	Berkley and Company		Little Falls, N.Y. 13365
	Highway 9 and 71 Spirit Lake, Iowa 51360		intile Palls, N. I. 10000
	Spirit Lake, lowa 51000		National Gard. Product, Incorporate
95275	Vitramon, Incorporated		P.O. Box 7353
30210	P.O. Box 544		Memphis, Tennessee 38107
	Bridgeport, Connecticut 06601		
	Diagopoli, Commence		Pipeline Service Company
95987	Weckesser Co., Incorporated		3240 N. Manheim Road
	4444 West Irving Park Road		Franklin Park, Illinois 60131
	Chicago, Illinois 60641		
			Potter - Brumfield
96182	Master Specialties Company		1200 E. Broadway
	1640 Monrovia		Princeton, Indiana 47470
	Costa Mesa, California 92627		
			Reynolds Aluminum Supply Company
96881	Thomson Industries, Incorporated		2920 Eunice Avenue
	1029 Plandome Road		Orlando, Florida 32802
	Manhasset, New York 11030		Garage William and Galda Transmission
			Sunset Wire and Cable, Incorporated
99743	IMC Magnetics Corporation		P.O. Box 224 Cape Canaveral, Florida 32930
	6058 Walker Avenue		Cape Canaverar, Florida 32930
	Maywood, California 90270		The Torrington Company
			Clinton Bearing Plant
	Active and Passive Components		Clinton, South Carolina
	121 - 18 Du Pont Street		Campon, Court Caronna
	Plainview, N.Y. 11803		Thorgren Tool and Moulding Compan
	1 min 10 mg 11, 2 , 11000		110 Evans Avenue
	Consolidated Wire and Cable		Valparaiso, Indiana 46383
	1637 South Clinton		-
	Chicago, Illinois 60616		Tri - Power, Incorporated
			Akron, Ohio
	1		

TABLE 12-2 LIST OF MANUFACTURERS (CONT'D)

CODE	MANUFACTURER	CODE	MANUFACTURER
	Voyce - Legier 523 N.W. 28th Street Miami, Florida 33127		

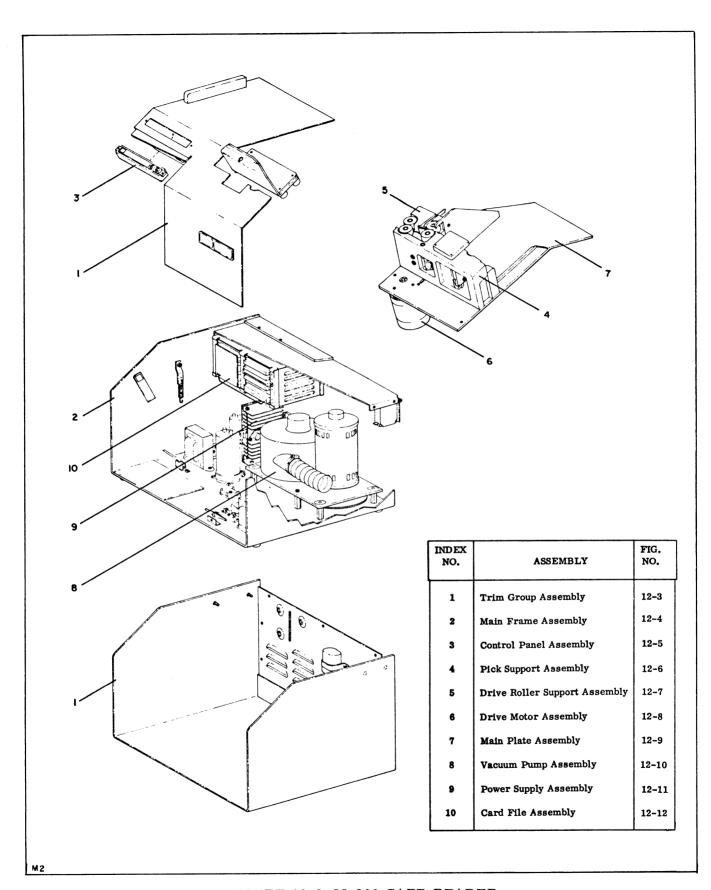


FIGURE 12-2 M-200 CARD READER

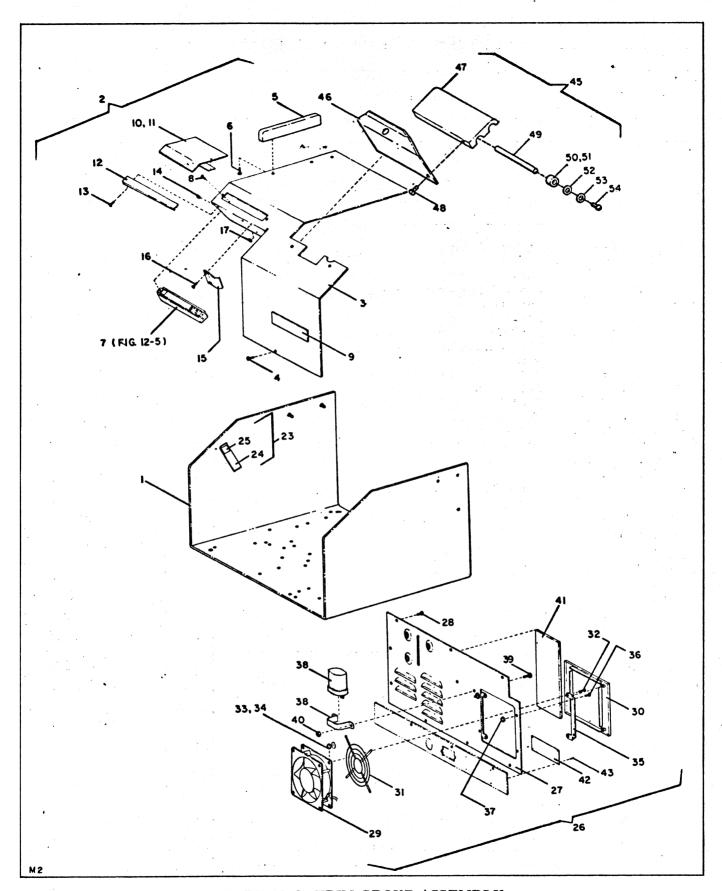


FIGURE 12-3 TRIM GROUP ASSEMBLY

FIGURE 12-3 TRIM GROUP ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
		<u> </u>		
	20059001	TRIM GROUP ASSEMBLY - 115 VAC, 60 Hertz TRIM GROUP ASSEMBLY - 230 VAC, 50 Hertz		
	20059002	TRIM GROUP ASSEMBLE - 230 VAC, 50 Hertz		
-1	40076801	. MAIN FRAME ASSEMBLY	1	en e
	40053503	. COVER ASSEMBLY	1	
-2 -3	40053503	. COVER ASSEMBLI	li	
-3	40032301	(Attaching Parts)	1 .	
-4	00000114	SCREW, Button Head BLK 6 - 32 x 1/4	4	
-5	20043801	. BAR, Tamp	li	
		(Attaching Parts)		
-6	00000382	SCREW, Machine, Pan Head 8 - 32 x 3/8	2	· · · · · · · · · · · · · · · · · · ·
-7	00000413	CONTROL PANEL ASSEMBLY (Fig. D-5)	1	DPA-7164B
		(Attaching Parts)		
8	00000296		2	
-9	20028004		1	
-10	00000558		1	GP-2
-11	REF	RUBBER 1//6 x 1" x 7 1/2"	1	
-12	20062301	GUIDE, Stacker	1	
	0000000	(Attaching Parts)		•
-13	00000096	SCREW, Button Head, #4 - 40 x 1/4	2 2	
-14 -15	00000062 20102301	NUT, Hex #4 - 40 CARD DEFLECTOR		
-19	20102301	(Attaching Parts)	1 *	
-16	00000114	SCREW, Machine, Button Head #6 - 32 x 1/4	2	
-17	00000301	NUT, Hex #6 - 32		
		Not Head	1	
-18		Not Used Not Used		
-19 -20		Not Used	1	
-20 -21		Not Used		
-21		NOT OBELL		
-22		Not Used		
-23	20061601	• STACK BUMPER PLATE ASSEMBLY	1	
-24	20042701	PLATE, Stack Bumper	.1	
-25	20042801	RUBBER BUMPER	1	
-26	40055701	. REAR PANEL ASSEMBLY - 115 VAC, 60 Hertz	1	
	40082801	. REAR PANEL ASSEMBLY - 230 VAC, 50 Hertz	1	
-27	40050101	PANEL, Rear - 115 VAC, 60 Hertz	1	
	40082901	PANEL, Rear - 230 VAC, 50 Hertz	1	
	00000114	(Attaching Parts)	6	
-28	00000114	SCREW, Button Head BLK #6 - 32 x 1/4	1 0	

M/L 1120590 (M)

FIGURE 12-3 TRIM GROUP ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
		DAN ACCEMBLY 115 WAG COU-	1	
-28	20237301	FAN ASSEMBLY, 115 VAC, 60 Hz	1	4600
	00000325	FAN (23936)	1 -	1000
		W/Integral Components CONTACT, Pin (00779)	2	60618-1
	00000035	HOUSING, Pin (00779)	1	1-408319-0
	00000499	TUBING, Heatshrink, $1/8$ Dia. x $1/2$ " (92194)	2	FIT-105-1-8
	00000127 00000164	WIRE, Elec., #20 AWG, Tw. Pr., Blk-Wht, 3" (92194)	1	1854/19
	20098302	(52154) FAN ASSEMBLY, 230 VAC, 50 Hz	1	
	00001786	FAN (82877)	1	CTA-3A52
	00001780	W/Integral Components	_	
	00000035	CONTACT, Pin (00779)	2	60618-1
	00000033	HOUSING, Pin (00779)	1	1-408319-0
	00000443	TUBING, Heatshrink, $1/8$ Dia. x $1/2$ " (92194)	2	FIT-105-1-8
	00000127	WIRE, Elec., #18 AWG, Tw. Pr., Blk-6 1/2,	1	1854/19
	30000130	Wht-7'' (92194)		
-29	30269001	GUARD ASSEMBLY, Fan	1	
-30	20214102	SCREEN, Fan	1	
-30	20214102	(Attaching Parts)		
-31	00000302	SCREW, Pan Head, #6-32 x 1/2	4	
-32	00000295	WASHER, Flat #6	4	
-33	00000301	NUT, Hex, #6-32	4	
-34	20266501	RETAINER BRACKET, Fan	2	
-34A	00001000	PACKING, "O" Ring (83259)	8	2-005
		(Attaching Parts)		
-35	00000356	SCREW, Machine, Flat Head, #6-32 x 1/4	4	
-36	00000301	NUT, Hex, #6-32	4	
-37	00000558	FOAM DAMPING, 7 3/8" x 3 3/8 (Voyce-Legier)	1	GP-2
		(Attaching Parts)		
-38	00000555	COMPOUND, Adhesive (88132)	A/R	Pliobond 20
-38A	20263701	PLUG, Dimple	3	
-39	20028104	. TAG, Model Information - 115 VAC, 60 Hertz	1	
	20028102	. TAG, Model Information - 230 VAC, 50 Hertz	1	
		(Attaching Parts)		
-40	00000488	PIN, Drive	4	MS-21318-9
-41	30158601	. FOLLOWER ASSEMBLY	1	
-42	30158401	. PLATE, Card Follower	1	
-43	30158301	SUPPORT, Follower	1	
"		(Attaching Parts)		
-44	00000346	SCREW, Flat Head, Phillips, #4-40 x 1/4	2	
-45	10011901	SHAFT, Roller-Card Follower	4	
-46	20158501	ROLLER, Card Follower	4	
-47	00000518	"O" RING, Compound C-557-7, 1/2 I.D. (83259)	4	5-230
-48	00000431	SPACER, Shaft, .004 (29440)	4	SS2-27
1		(Attaching Parts)		
-49	00000065	WASHER, Flat #4	4	
-50	00000272	SCREW, Pan Head, Phillips, #4-40 x 5/8	4	
				<u></u>

12-11b

FIGURE 12-3 TRIM GROUP ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-51 -52	10069901 10069902 20014801	. SHIPPING KIT - 115 VAC, 60 Hz . SHIPPING KIT - 230 VAC, 50 Hz CORD, Power - 115 VAC, 60 Hz	1 1 1	
-53	00000456 00000683	CORD, Power - 230 VAC, 50 Hz (70903) TECHNICAL MANUAL	1 1	17250 TM-M 200
·				
				i

12**-**11c

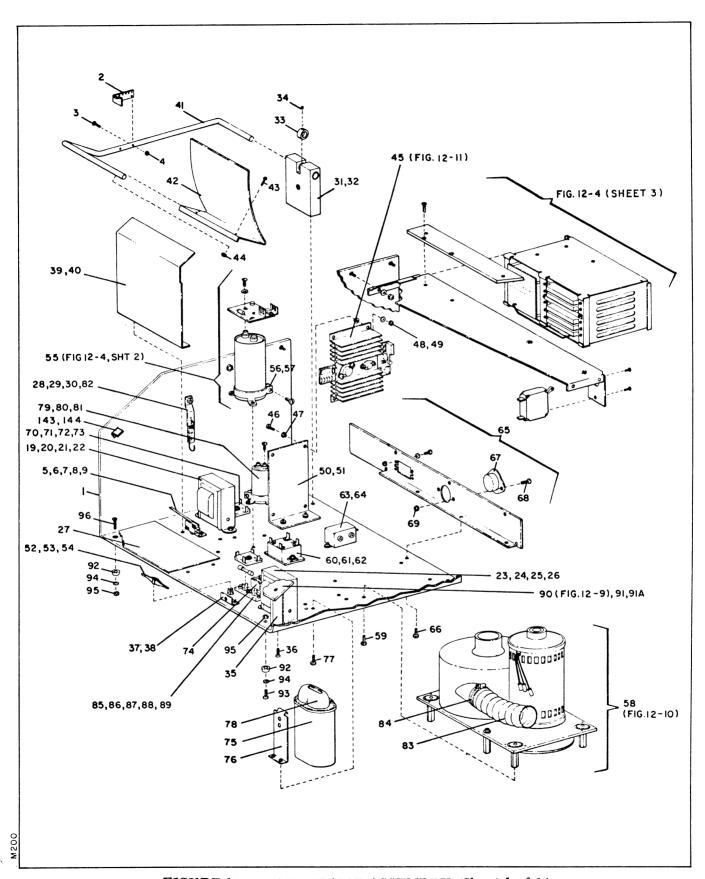


FIGURE 12-4 MAIN FRAME ASSEMBLY (Sheet 1 of 3)

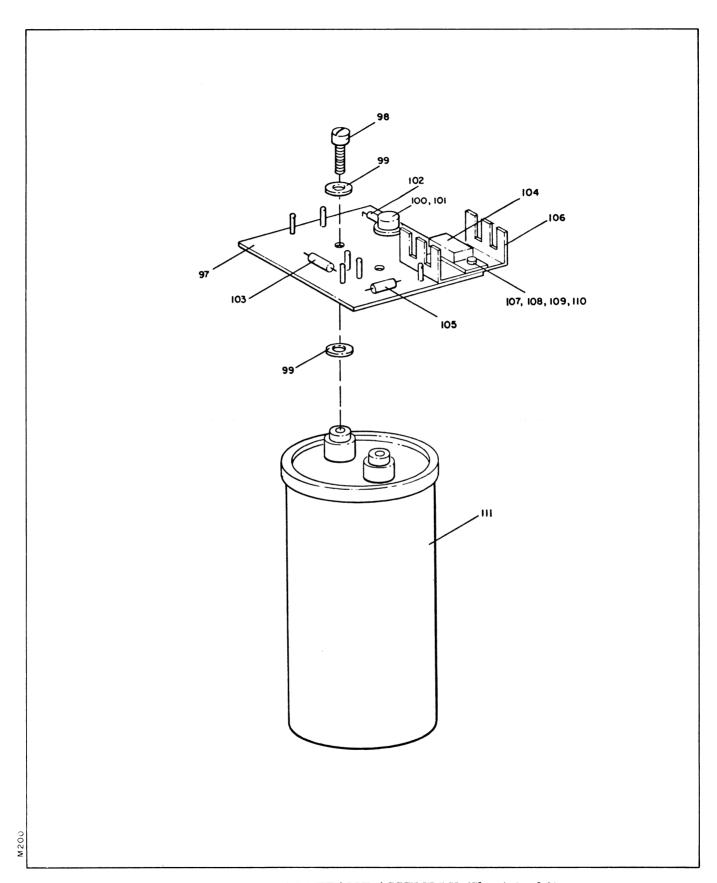


FIGURE 12-4 MAIN FRAME ASSEMBLY (Sheet 2 of 3)

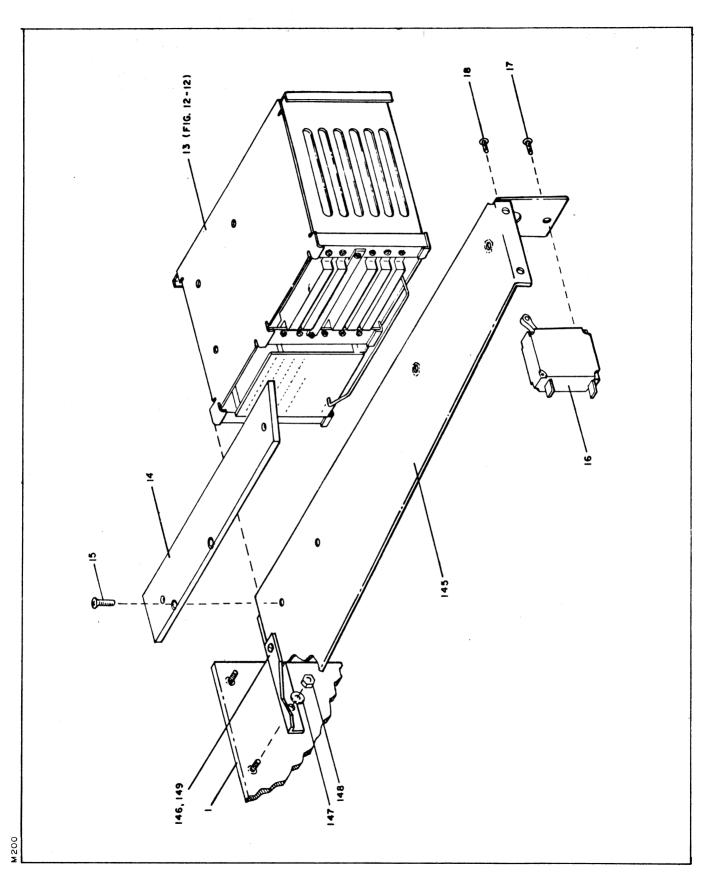


FIGURE 12-4 MAIN FRAME ASSEMBLY (Sheet 3 of 3)

FIGURE 12-4 MAIN FRAME ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40075205 40076901	MAIN FRAME ASSEMBLY - 115 VAC, 60 Hertz MAIN FRAME ASSEMBLY - 230 VAC, 50 Hertz		
	40070301	AMINITATION AND AND AND AND AND AND AND AND AND AN		
-1	40076801	. MAIN FRAME	1	
-2	20043001	. PLATE, Spring (Attaching Parts)	1	
-3 -4	00000345	SCREW, Machine, Flat Head, #4-40 x 1/2	2	
-4	00000062	NUT, Hex, #4-40	2	
-5	20042901	. BRACKET, Switch Mounting	1	
-6	00000313	. SWITCH, Hopper Full (01963) (Attaching Parts)	1 1	E21-85HX
-7 -8	00000296 00000272	SCREW, Pan Head, #6-32 x 3/8 SCREW, Machine, Pan Head, #4-40 x 5/8	2 2	
-9	00000062	NUT, Hex, #4-40	2	
-10		(NOT USED)		
-11		(NOT USED)		
-12		(NOT USED)		
-13	400553XX	. CARD FILE ASSEMBLY (Figure 12-12)	1	
-14	30052001	. BAR SPACER (Attaching Parts)	1	
-15	00000382	SCREW, Pan Head, #8-32 x 3/8	2	
-16	00000188	. CIRCUIT BREAKER, 8 Amp - 115 VAC, 60 Hz (07355)	1	UPG1-1-6-2-802
	00000185	CIRCUIT BREAKER, 6 Amp - 230 VAC, 50 Hz (07355) (Attaching Parts)	1	UPG1-1-6-2-602
-17 -18	00000356	SCREW, Machine, Flat Head, #6-32 x 1/4 SCREW, Button Head, #6-32 x 1/4	1	
-10	00000114	SCREW, Button nead, #0-32 x 1/4	1 1	
-19	20015602	. TRANSFORMER, 12 Volt - 115 VAC, 60 Hz	1	
	20073902	. TRANSFORMER, 12 Volt - 230 VAC, 50 Hz (Attaching Parts)	1	
-20	00000299	NUT, Hex, #8-32	2	
-21 -22	00000294	WASHER, Flat #8 SCREW, Machine, Pan Head, #8-32 x 3/8	2 2	
-23	20015502	. TRANSFORMER, 24 Volt - 115 VAC, 60 Hz	1	
	20074002	. TRANSFORMER, 24 Volt - 230 VAC, 50 Hz (Attaching Parts)	1	
-24	00000299	NUT, Hex, #8-32	2	
-25 -26	00000294	WASHER, Flat #8 SCREW, Machine, Pan Head, #8-32 x 3/8	2 2	
-20	00000382	SCREW, Machine, Pan Head, #8-32 x 3/8	2	

12-13c

FIGURE 12-4 MAIN FRAME ASSEMBLY (CONT'D)

FIG. INDEX NO.		DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-25	00000294	WASHER, Flat #8	2	
-26	00000234	SCREW, Machine, Pan Head #8 - 32 x 3/8	2 2	
-27	20042201	. PLATE, Trim	1	, .
-28	20041701		1	
90	00000294	(Attaching Parts) WASHER, Flat #8	1	
-29 -30	00000294		li	
-31	30041603	. SUPPORT ASSEMBLY, Stacker Bearing (Attaching Parts)	1	
-32	00000379	SCREW, Machine Pan Head #8 - 32 x 1/2	2	
-33	20053801	. BUSHING, Retaining	1	
		(Attaching Parts)		
-34	00000297	SCREW, Set #8 - 32 x 3/16	1.1	
-35	20039801		1	
-36	00000382	(Attaching Parts) SCREW, Machine Pan Head #8 - 32 x 3/8	1	
-37	20039301	. FASTENER, Bracket	1	
		(Attaching Parts)		
-3 8	00000498	. RIVET, Pop	2	SD44BS
-39	30046401	. COVER, Rear, Stacker	1	
-40	00000382	(Attaching Parts) . SCREW, Machine Pan Head, #8 - 32 x 3/8	2	-
-41	30054001	. ROD, Stack Follower	1	
-42	30040201	. TRAY, Stacker (Attaching Parts)	1	
-43	00000345	SCREW, Machine, Flat Head #4 - 40 x 1/2	3	
-44	00000062	NUT, Hex #4 - 40	3	
-45	30029505	. POWER SUPPLY ASSEMBLY (Figure 12-11)	1	
-46	00000296	(Attaching Parts) SCREW, Machine Pan Head #8-32 x 1/2	4	
-47	00000567	WASHER, Nylon (95987)	8	SW-6-NA
-48	00000295	WASHER, #6	4	-
-49	00000301	NUT #6 - 32	4	

FIGURE D-4 MAIN FRAME ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-50	20040701	. BRACKET, Power Supply (Attaching Parts)	1	
-51	00000379	SCREW, Machine, Pan Head #8 - 32 x 1/2	2	
				M15570-16
-52 -53	00000487 00000132	. TOOL (08524) . CLIP COMPONENT (75915)	1 1	101002
-33	00000132	(Attaching Parts)		
-54	00000498	. RIVET, Pop	1	SD44BS
-55	30045801	. SOLENOID DRIVER ASSEMBLY	1	
-56	00000479	. CLAMP, Capacitor (03597)	1	942A734AA1
-57	00000498	(Attaching Parts) . RIVET, Pop	3	SD44BS
-58	40033302 40033306	. VACUUM PUMP ASSEMBLY - 230 VAC, 50 Hertz (Fig. D-(Attaching Parts)		
-59	00000379	SCREW, Machine, Pan Head #8 - 32 x 1/2	4	
-60	00000109		1	724-1 1-159
	00000112	. RELAY, Solid State - 230 VAC, 50 Hertz (12617) (Attaching Parts)	1	733-12- 150
-61 -62	00000303 00000294	SCREW, Machine, Pan Head #8 - 32 x 5/8 WASHER, Flat #8	2 2	
-63	20072001	. FILTER ASSEMBLY	1	
-64 -64a	00000296 00000301	(Attaching Parts) SCREW, Machine, Pan Head, 6 - 32 x 3/8 NUT, Hex 6 - 32	2 2	
-65	30058201	. CONNECTOR PANEL ASSEMBLY	1	
-66	00000296	SCREW, Machine Pan Head #6 - 32 x 3/8	3	
-67	00000476 2011 44 01	CONNECTOR, AC - 115 VAC, 60 Hertz (74545) FILTER ASSEMBLY - 230 VAC, 50 Hertz	1	7486
-68	00000296	(Attaching Parts) SCREW, Machine, Pan Head 6 - 32 x 3/8	2	
-69	00000290	NUT, Plain Hex 6 - 32	2	
-70	00000143	. RECTIFIER, Diode Bridge, 100V - 230 VAC, 50 Hz (04713) (Attaching Parts)	2	MDA980-2
-71	00000376	SCREW, Machine, Pan Head #6 - 32 x 3/4	2	
-72 -73	00000295 00000301	WASHER, Flat #6 NUT, Hex #6 - 32	2 2	
				36
M2				

FIGURE 12-4 MAIN FRAME ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-74	00000503	. TERMINAL, Junction (08524)	2	TJ11A-0501
-75	00000202	. CAPACITOR, 17.5 μf, 370V (115 VAC, 60 Hertz) (03597)	1	45F279
	00000880	. CAPACITOR, 10 μf, 370V (230 VAC, 50 Hertz) (03597)	1	45F276
-76	20214301	BRACKET ASSEMBLY, Capacitor Mounting		
	20214601	(115 VAC, 60 Hertz) (03597) BRACKET ASSEMBLY, Capacitor Mounting	2	
	20211001	(230 VAC, 50 Hertz) (03597)	2	
-77	00000302	SCREW, Machine Pan Head, $\#6-32 \times 1/2$	4	
-7 8	00000472	. BOOT, (03597)	1	614A527P21
-79	00000200	. CAPACITOR, 4600 μf 15VDC - (03597)	1	86F119M
-80	00000479	. CLAMP, Capacitor - 230 VAC, 50 Hertz (03597)	1	942A734AB2
.,	00000409	(Attaching Parts)	2	SD44DS
-81	00000498	RIVET, Pop	2	SD44BS
-82	00000485	. SPRING (84830)	1	LE-041E-6(MW)
-83	00000471	. HOSE, Flexible, 1 3/4 Dia. x 7 1/2" (80382)	1	606080
-84	00000407	. CLAMP, Hose 2" Adjustable (76599)	1	H-24
-85 -86	00000147 00000133	. FUSE, 1 amp Slo-Blo (75915) . FUSE HOLDER (75915)	1 1	313001 356001
-00	00000133	(Attaching Parts)	1	20001
-87	00000377	SCREW, Machine Pan Head, #6-32 x 5/8	1	
-88	00000295	WASHER, Flat #6	1	
-89	00000301	NUT, Hex #6-32	1	
-90	40051611	. MAIN PLATE ASSEMBLY - 115 VAC, 60 Hertz (Fig. 12-9)	1	
l	40051608	. MAIN PLATE ASSEMBLY - 230 VAC, 50 Hertz (Fig. 12-9)	1	
-91	00000298	(Attaching Parts) . SCREW, Machine Flat Head, #8-32	2	
-91A	00000238	SCREW, Machine Plat Head, #8-32	1	
-92	00000499	DIMDED Dukken White (90997)		GG 0407
-92	00000428	. BUMPER, Rubber, White (29227) (Attaching Parts)	4	SC-340X
-93	00000379	SCREW, Machine Pan Head, #8-32 x 1/2	3	
-94	00000294	WASHER, Flat #8	4	
-95 -96	00000299	NUT, Hex #8-32 SCREW Machine Flat Head #8-32 x 1/2	4	
-96	00000379	SCREW, Machine Flat Head, #8-32 x 1/2	1	
REF	30045801	. SOLENOID DRIVER ASSEMBLY	1 1	
-97	20010201	P.C. BOARD, Solenoid Driver	1	
-98	00000199	(Attaching Parts) SCREW, Machine Pan Head, #10-32 (supplied with		
į		item 111)	2	
-99	00000444	WASHER, Lock Internal Tooth #10	4	

FIGURE D-4 MAIN FRAME ASSEMBLY (CONT'D)

FIG.	PART	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
NO.	NUMBER	1 2 3 4 5 6 7	A331	PART NO.
	00000045	RESISTOR, 270 ohm ⁺ 10% 1/4W	1	RCO7GF271K
-102	00000247 00000236	RESISTOR, 270 offin - 10% 1/4W RESISTOR, 10K [±] 10% 1/2W	1 1	RC20GF103K
-103		RESISTOR, 10K - 10% 1/2W TRANSISTOR, Power NPN (10295)	1	TP41C
-104	00000141		1	1N4003
-105	00000040	• •	1 1	6107A-14
-106	00000108	HEATSINK (13103) (Attaching Parts)	1	0101V-14
107	00000361		1	
-107	00000361	· · · · · · · · · · · · · · · · · · ·	1	
-108 -109	00000141		1	
-109 -110	000000556	•	A/R	
-110 -111	00000338		1	86F177M
-111 -112	00000155	·	l i	1857/19-7
-112 -113	00000157		l ī	1858/A
-113 -114	00000132		i	1857/19-1
-114 -115	00000180	· · · · · · · · · · · · · · · · · · ·	li	3221-1-2
-115 -116	00000019		2	61370-1
-117	00000463		1	32949
-118	00000435		2	60818-1
-119	00000449		2	1-480319-0
-120	00000036	· · · · · · · · · · · · · · · · · · ·	2	42839-4
-121	00000034		1	428 40 -3
-122	00000086		2	FIT-105
-123	00000087		1	FIT-105
-124	00000452	•	2	480416-0
-125	20028703	. CABLE ASSEMBLY, Fan	1	
-126	20028702	. CABLE ASSEMBLY, Drive Motor - 115 VAC, 60 Hertz	1	1
	20027607	. CABLE ASSEMBLY, Drive Motor - 230 VAC, 50 Hertz	1	
-127	20027602	. CABLE ASSEMBLY, Bridge to Cap	1	
-128	20027502	. CABLE ASSEMBLY, Vacuum Pump Relay	1	
-129	20027510	. CABLE ASSEMBLY, Vacuum Pump Cap.	1	
-130	20027608	. CABLE ASSEMBLY, Relay	1	·
-131	20027606	. CABLE ASSEMBLY, Hopper Full	1	
-132	20027605	. CABLE ASSEMBLY, Hopper Empty	1	
-133	20027513	. CABLE ASSEMBLY, Fuse	1	
-134	40075501	. WIRING DIAGRAM - 115 VAC, 60 Hertz		
	40087401	. WIRING DIAGRAM - 230 VAC, 50 Hertz		
-135	00000555	. ADHESIVE, Pliobond (88132)	A/R	
-136	00000556	. COMPOUND, Heatsink (13103)	A/R	
-137	00000531	. LOCTITE, Grade C	A/R	
-138	00000058	. TIE, Cable (06383)	16	SSTIM
-139	00000059	. MOUNT, Cable (06383)	8	TAIS8
-140	00000390	. SCREW, Cap Socket Head #4 - 40 x 5/8	4	
-141	00000065	. WASHER, Flat #4	4	
-142	00000062	. NUT, Hex #4 - 40	4	
-143	20027509	. CABLE ASSEMBLY, Ground		
				36
M2				

FIGURE 12-4 MAIN FRAME ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
			A /D	84-21
-137	00000663	. COMPOUND, Grade C (05972)	A/R 16	SSTIM
-138	00000058	. TIE, Cable (06383)	8	TA1S8
-139	00000059	 MOUNT, Cable (06383) SCREW, Cap, Socket Head, #4-40 x 5/8 	4	INIDO
-140	00000390		4	
-141	00000065	. WASHER, Flat #4 . NUT, Hex #4-40	4	
-142	00000062	. No 1, Hex # 4-40		
-143	20164301	. BRACKET, Cover Support	1	
		(Attaching Parts)		
-144	00000299	NUT, Hex, #8-32	1	
-145	40050001	. BRACKET, Support	1	
-146	20200401	. BRACE, Support	1	
		(Attaching Parts)		
-147	00000294	WASHER, Flat #8	4 4	
-148 -149	00000299 00000296	NUT, Hex #8-32 SCREW, Machine, Pan Head, #8-32 x 3/8	2	
	}			

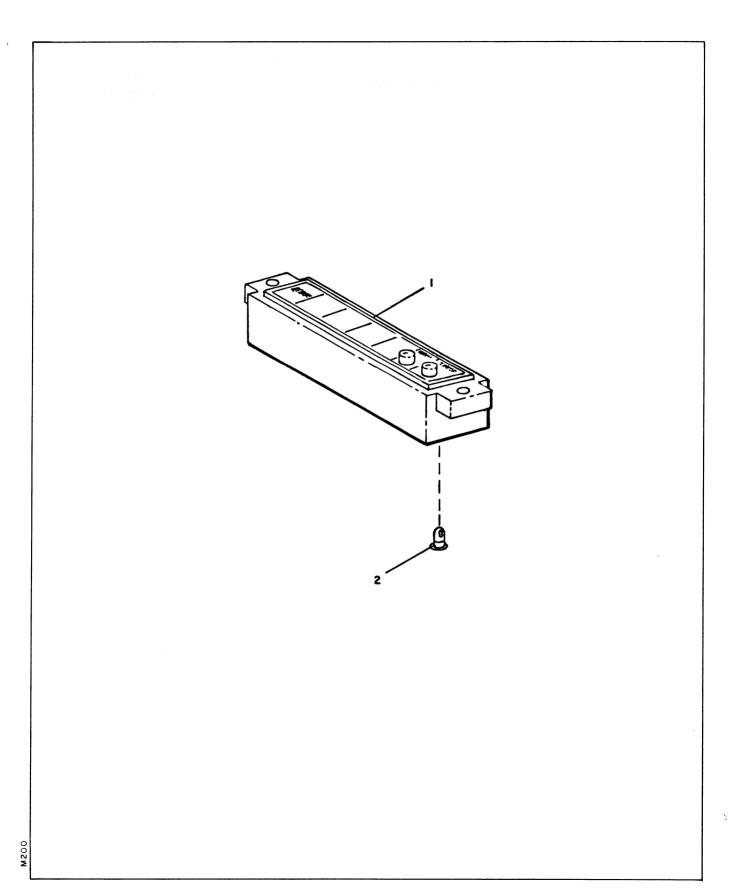


FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-1 -2	00000413 00000318	CONTROL PANEL ASSEMBLY (07137) . CONTROL PANEL (07137) . LAMP, Incandescent, 6V @ .2A T-1 3/4 Mid Flg. Base (18788)	1 7	DPA 7164B 381

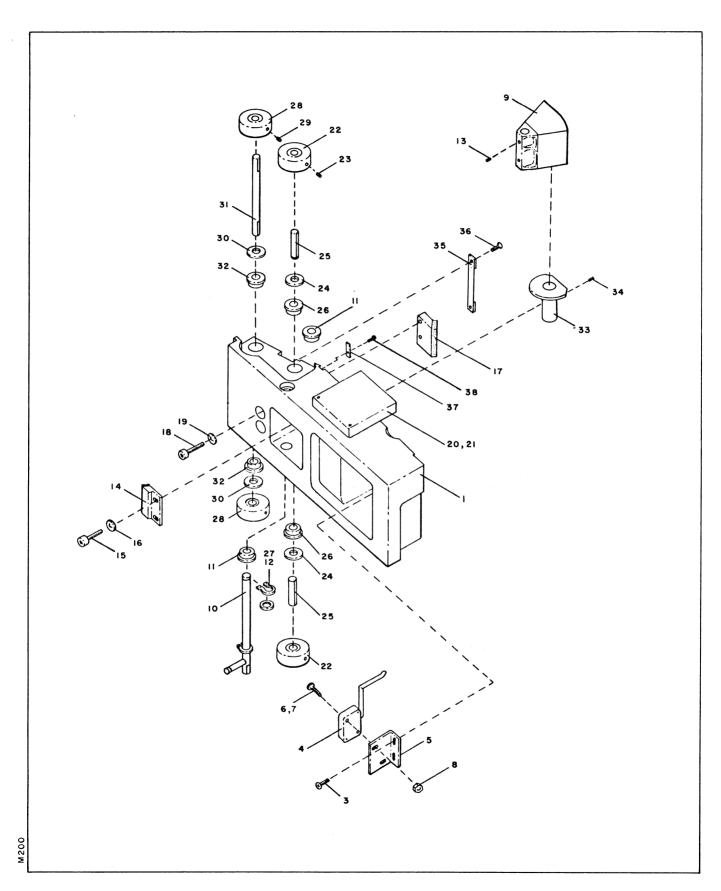


FIGURE 12-6 PICK SUPPORT ASSEMBLY

FIGURE 12-6 PICK SUPPORT ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40047109	PICK SUPPORT ASSEMBLY		
	40047102	PICK SUPPORT ASSEMBLE		
-1	40070902	. SUPPORT, Pick	1	
-2	20027701	. SWITCH ASSEMBLY, Hopper Empty	1	
-3	00000096	(Attaching Parts) SCREW, Machine, Pan Head, 4-40 x 1/4	2	
-4	10023501	SWITCH, Hopper Empty	1	
-5	20023401	BRACKET, Switch	1	
		(Attaching Parts)		
-6	00000272	SCREW, Machine, Pan Head, 4-40 x 5/8	2	04.01
-7	00000663	COMPOUND, Grade C (05972)	A/R	84-21
-8	00000062	NUT, Plain, Hex, #4-40	2	
-9	30003701	. SECTOR ASSEMBLY	1	
-10	20101401	. SHAFT, Pick Assembly	1	
-11	00000429	. BEARING (14927)	2	SFR188TT(3)
-12	00000467	. RING, Snap (79136)	1	5100-25
		(Attaching Parts)		
-13	00000297	SCREW, Set, Cup PT,8-32 x 3/16	2	N.
-14	10004101	. STOP, Pick (Attaching Parts)	1	
-15	00000398	SCREW, Cap, Socket Head, 6-32 x 5/8	2	•
-16	00000295	WASHER, Flat #6	2	
-17	10004701	. BUMPER, Pick	1	
-11	10004101	(Attaching Parts)		
-18	00000293	SCREW, Cap, Socket Head, 8-32 x 1/2	2	
-19	00000294	WASHER, Flat #8	2	·
90	20022202	. CAP ASSEMBLY, Riffle Air	1	·
-20	30023303	(Attaching Parts)		
-21	00000391	SCREW, Cap, Socket Head, 4-40 x 3/4	2	
		DRIVE ROLLER, 2nd Pick Drive Assembly		
-22	20005901	. CAPSTAN (Attaching Parts)	2	
-23	00000292	. SCREW, Set, Knurled Cup, 6-32 x 3/16	2	
-24	00000432	. SPACER, Bearing (29440)	2	SS-2-27, 28 or 30
-25	10002201	. SHAFT, Drive Roller	2	
-26	00000429	. BEARING (14927)	4	SFR188TT(3)
-27	00000467	RING, Snap (79136)	2	5100-25
1				L

FIGURE 12-6 PICK SUPPORT ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-28	2 0 005901	STACK DRIVE, 1st Pick Drive Assembly . CAPSTAN	2	
00	00000001	(Attaching Parts) SCREW, Set, Knurled Cup, 3-32 x 3/16	2	
-29 -30	00000391 00000432	. SPACER, Bearing (29440)	2	SS-2-27,28 or 30
-31	10003003	. SHAFT, Stack Drive	1	
-32	00000429	BEARING (14927)	2	SFR188TT(3)
-33	20004801	. TUBE, Pick Vacuum	1	
-34	00000564	(Attaching Parts) . SCREW, Set, 4-40 x 3/32	1	
0.5	00000101	CHIDE Cond	1	
-35	20008101	. GUIDE, Card (Attaching Parts)	1	
-36	00000346	SCREW, Machine, Flat Head, 4-40 x 1/4	2	
-37	20072801	. INSERT, Pick Support	2	
-3 8	00000565	(Attaching Parts) SCREW, Machine, Undercut, Phillips Hd, 2-56 x 3/16	2	

12-17**b**



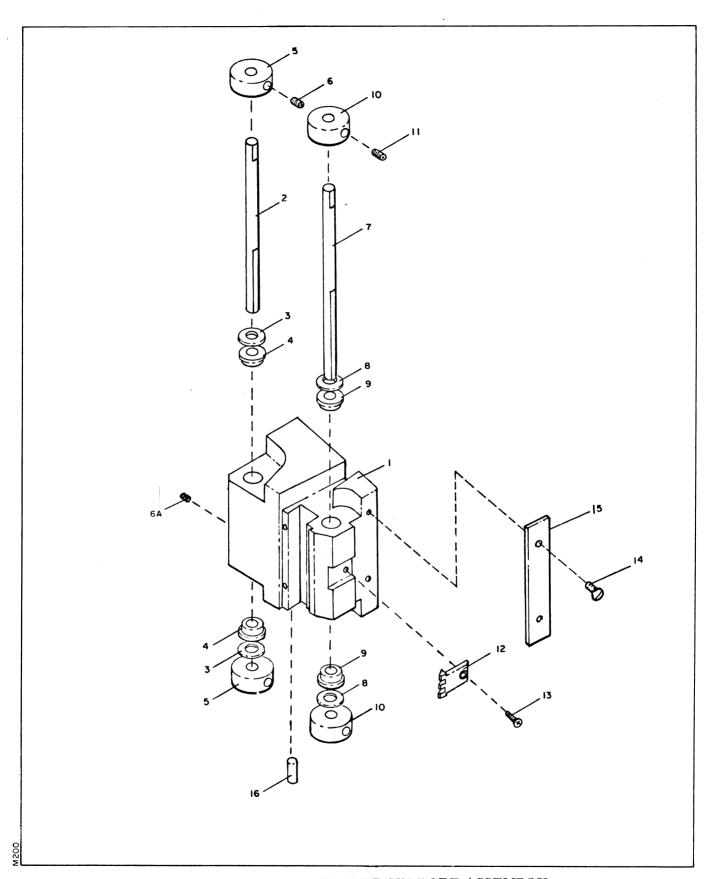


FIGURE 12-7 DRIVE ROLLER SUPPORT ASSEMBLY

FIGURE 12-7 DRIVE ROLLER SUPPORT ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-1	30051202 30050801	DRIVE ROLLER SUPPORT ASSEMBLY . SUPPORT, Drive Roller	1	
-2 -3	10003001 00000431 00000432 00000433	FIRST STACK DRIVE ASSEMBLY SHAFT, Stack Drive SPACER, Bearing (29440) SPACER, Bearing (29440) SPACER, Bearing (29440)	1 A/R A/R A/R	SS-27 SS-28 SS-30
-4 -5 -6	00000429 20002101 00000292	. BEARING (14927) . ROLLER, Drive (Attaching Parts) . SCREW, Set, Knurled Cup, PT 6-32 x 3/16	2 2	SFR188TT(3)
-6A	00000566	SECOND STACK DRIVE ASSEMBLY	1	
-7 -8	10003002 00000431 00000432 00000433	SHAFT, Stack Drive SPACER, Bearing (29440) SPACER, Bearing (29440) SPACER, Bearing (29440)	1 A/R A/R A/R	SS-27 SS-28 SS-30
-9 -10 -11	00000429 20002101 00000292	 BEARING (14927) ROLLER, Drive (Attaching Parts) SCREW, Set, Knurled Cup PT, 6-32 x 3/16 	2 2 2	SFR188TT(3)
-12	10075801	THROAT, Pick (Attaching Parts)	1	
-13 -14	00000305 20176501	SCREW, Machine, Pan Head, #4-40 x 1/4 GUIDE, Throat	1	
-15	00000382	(Attaching Parts) . SCREW, Phillips Head, #8-32 x 3/8	2	
-16	00000492	PIN, Dowel, .250 Dia. x 1/2 Hard Steel (70276)	1	

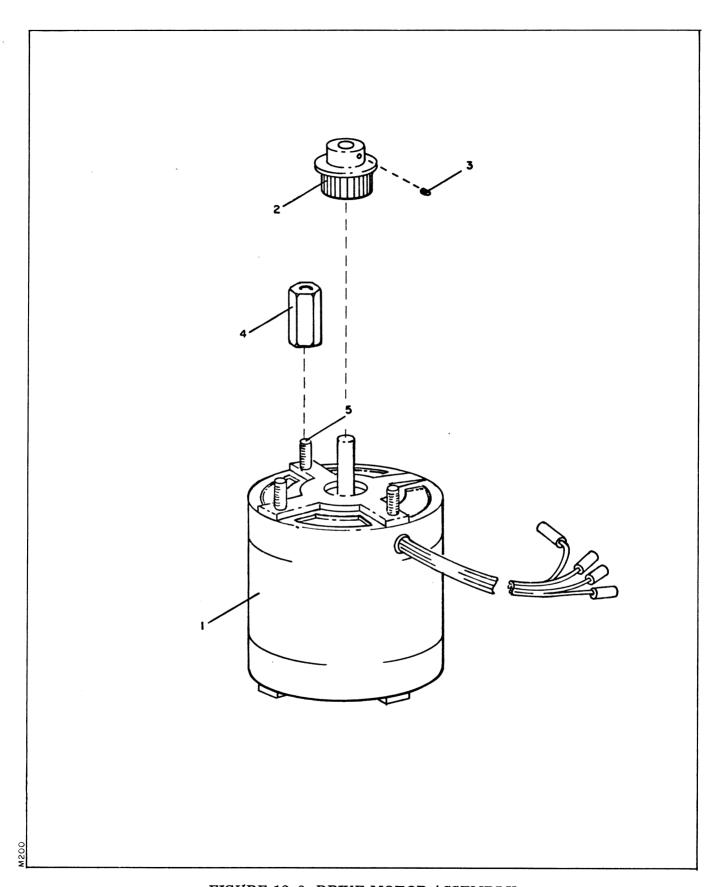


FIGURE 12-8 DRIVE MOTOR ASSEMBLY

FIGURE 12-8 DRIVE MOTOR ASSEMBLY

PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
20092903 20092904 00000682 20127001 20127002	DRIVE MOTOR ASSEMBLY - 115 VAC, 60 Hertz DRIVE MOTOR ASSEMBLY - 230 VAC, 50 Hertz . MOTOR (19070) . PULLEY - 115 VAC, 60 Hertz . PULLEY - 230 VAC, 50 Hertz (Attaching Parts)	1 1 1	H34CBR-5
20049601	SCREW, Set, #6-32 (Supplied with Item 2) . STANDOFF	2 3 3 6 1	60617-1 1-480270-0
	20092903 20092904 00000682 20127001 20127002 20127001 20049601 00000434 00000295	NUMBER 1 2 3 4 5 6 7	PART NUMBER 1 2 3 4 5 6 7 ASSY

12-21a

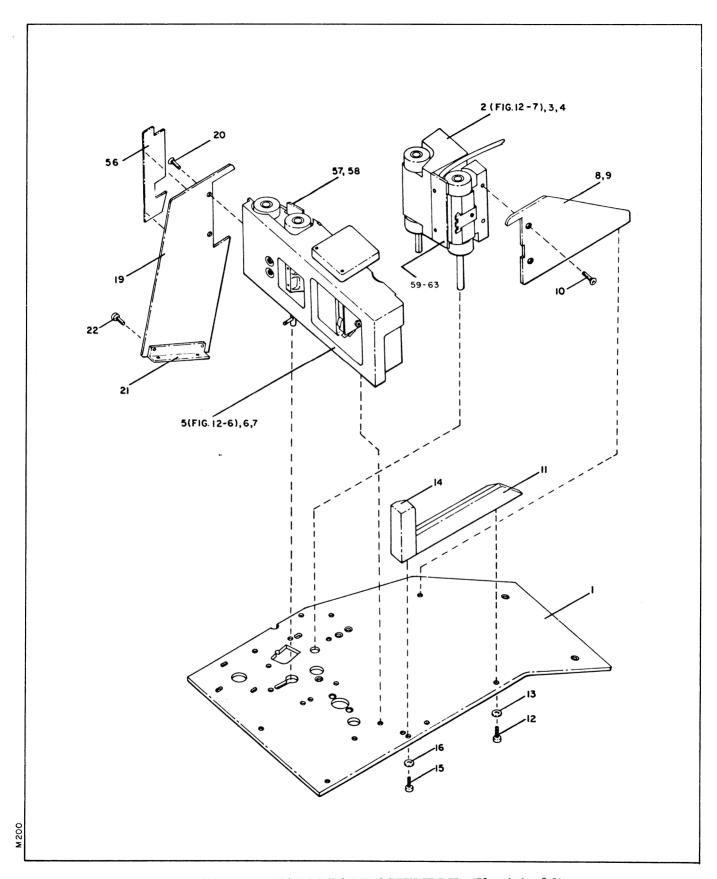


FIGURE 12-9 MAIN PLATE ASSEMBLY (Sheet 1 of 2)

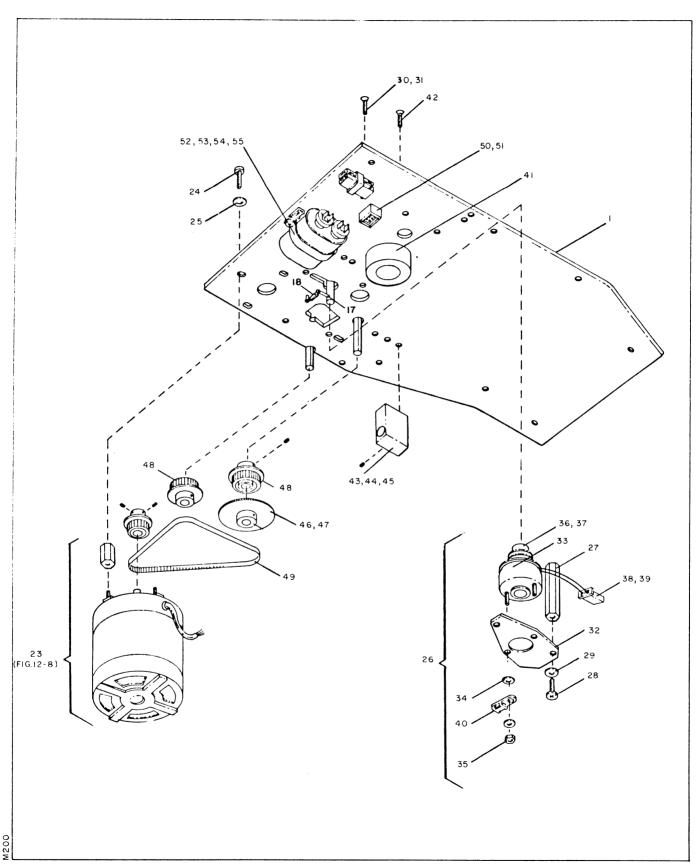


FIGURE 12–9 MAIN PLATE ASSEMBLY (Sheet 2 of 2)

FIGURE 12-9 MAIN PLATE ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.	
		MAIN PLATE ASSEMBLY - 115 VAC, 60 Hertz	1		
	40051611 40051608	MAIN PLATE ASSEMBLY - 230 VAC, 50 Hertz	1		
-1	40040402	. PLATE, Picker Mounting	1		
-2	30051202	. DRIVE ROLLER SUPPORT ASSEMBLY (Figure 12-7)	1		
		(Attaching Parts)			
-3	00000396	SCREW, Cap, Socket Head, 8-32 x 5/8	3		
-4	00000294	WASHER, Flat #8	3		
-5	40047102	. PICK SUPPORT ASSEMBLY (Figure 12-6)	1		
		(Attaching Parts)	· _		
-6	00000396	SCREW, Cap, Socket Head, 8-32 x 5/8	6		
-7	00000294	WASHER, Flat #8	0		
-8	30051101	. WALL, Input Hopper	1		
		(Attaching Parts)			
-9	00000063	SCREW, Machine, Pan Head, 4-40 x 1/2 SCREW, Machine, Pan Head, 8-32 x 1/2	$\begin{array}{ c c } & 1 \\ & 2 \end{array}$		
-10	00000379	SCREW, Machine, Pan Head, 6-32 x 1/2			
-11	20043201	. RAIL, Guide	1		
		(Attaching Parts)			
-12	00000396	SCREW, Cap, Socket Head, 8-32 x 5/8	2 2		
-13	00000294	WASHER, Flat #8		,	
-14	20043102	. BLOCK, Guide	1		
		(Attaching Parts)			
-15 -16	00000392 00000295	SCREW, Cap, Socket Head, 6-32 x 1/2 WASHER, Flat #6	2 2		
-10	00000293	WASHER, Flat #0			
-17	00000438	. PIN, Spring (83584)	1	G3/16 x 1/2	
-18	00000285	. SPRING, Solenoid (84830)	1	LE-026-C2MW	
-19	30039501	. SUPPORT, Side Plate	1		
		(Attaching Parts)			
-20	00000382	SCREW, Machine, Pan Head, 8-32 x 3/8	2		
-21	20040301	. BRACKET, Side Plate Mtg.	1		
		(Attaching Parts)			
-22	00000358	SCREW, Machine, Flat Head, 8-32 x 3/8	2		

FIGURE 12-9 MAIN PLATE ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
NO.	NUMBER	1234307	1001	17411
-23	20092903 20092904	DRIVE MOTOR ASSEMBLY - 115 VAC, 60 Hz (Fig. 12-8) DRIVE MOTOR ASSEMBLY - 230 VAC, 50 Hz (Fig. 12-8) (Attaching Parts)		
-24	00000561	SCREW, Cap, Socket Head, 10-32 x 1/2	3	
-25	00000361	WASHER, Flat #10	3	
-26	20049801	. SOLENOID ASSEMBLY	1	
-27	10022002	. STANDOFF (Solenoid) (Attaching Parts)	2	
-28	00000396	SCREW, Cap, Socket Head, 8-32 x 5/8	2	
-29	00000294	WASHER, Flat #8	2	
-30	00000358	SCREW, Machine, Flat Head, 8-32 x 3/8	1	
-31	00000379	SCREW, Machine, Pan Head, 8-32 x 1/2	1	
-32	20143801	PLATE, Solenoid Mounting	1	
-33	20010601	SOLENOID, Pick	1	
		(Attaching Parts)		
-34	00000294	WASHER, Flat #8	2	
-35	00000299	NUT, Hex, #8-32	2	
-36	10010501	COUPLING, Solenoid	1	
		(Attaching Parts)		
-37	00000292	SCREW, Set, Knurled Cup Pt., 6-32 x 3/16	2	60617 1
-38	00000526	CONTACT, Socket (00779)	1	60617-1 1-480318-0
-39	00000448	HOUSING, Socket (00779)	1	TA158-C
-40	00000059	MOUNT, Cable Tie (06383)	1	18130-0
-41	20254701	. FITTING, Air Outlet	1	
-42	00002089	(Attaching Parts) SCREW, Flat Head, Phillips, Self-Tapping, 8-32 x 5/8	2	
40	00010401	MOVDED. Mornetic Dicleus	1	
-43	20010401	. HOLDER, Magnetic Pickup (Attaching Parts)		
-44	00000304	SCREW, Machine, Flat Head, #6-32 x 1/2	2	
-45	00000292	SCREW, Set, #6-32 x 3/16	1	
-46	20125801	. GEAR, Timing	1	
45	00000000	(Attaching Parts)	1	
-47	00000292	SCREW, Set, Knurled Cup Pt., #6-32 x 3/16		
-48	20127005	. PULLEY	2	
-49	00000282	BELT (07108)	1	130XL025
-50	00000504	. JUNCTION, Terminal (08524)	1	TJ11A-05-02
		(Attaching Parts)		
-51	00000555	COMPOUND, Adhesive (88132)	A/R	

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FIGURE 12-9 MAIN PLATE ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-52	00000511 00000205	. CAPACITOR, 2μf, 270 VAC (115 VAC, 60 Hz)(03597) . CAPACITOR, 3μf, 370 VAC (230 VAC, 50 Hz)(03597)	1	26F1023 26F1113
-53 -54	00000289	. CLAMP, Capacitor (03597) (Attaching Parts) SCREW Machine, Pan Head, #8-32 x 3/8	1 2	K9827065P21
-55	00000612	BOOT, Cap, Insulating (03597)	1	614A527P21
-56	20042601	. PLATE, Stack Guide (Attaching Parts)	1 A/R	
-56A	10158904	COMPOUND, Adhesive (88132) READ/LIGHT STATION ASSEMBLY (Matched)	1	
-57 * -58 -59 *	30014401 00000344 30057201	LIGHT STATION ASSEMBLY (Attaching Parts) SCREW, Machine, Flat Head, 2-56 x 1/4 READ STATION ASSEMBLY	1 4 1	
-60 -61 -62 -63	20228301 30046801 00000447 00000544	(Attaching Parts) SCREW, Shoulder P.C. BOARD, Cable Plug PICKUP, Magnetic (07355 PHOTOTRANSISTOR (20772)	2 1 1 1	086-211-0019 SS1443
-64 -65 -66 -67 -68 -69	00000058 00000059 00000498 20027505 20027607 20279101 20139102 00000555	. TIE, Cable (06383) . MOUNT, Cable Tie (06383) . RIVET, Pop . CABLE ASSEMBLY, One Wire (230 VAC, 50 Hz) . CABLE ASSEMBLY, Two Wire (230 VAC, 50 Hz) . CABLE ASSEMBLY, Drive Motor (115 VAC, 60 Hz) . CABLE ASSEMBLY, Drive Motor (230 VAC, 50 Hz) . COMPOUND, Adhesive (88132)	5 2 1 1 1 1 1 A/R	SSTIM TA158-C SD44BS
		* Light Station and Read Station Assemblies must be ordered as a matched set 10158904.	,	

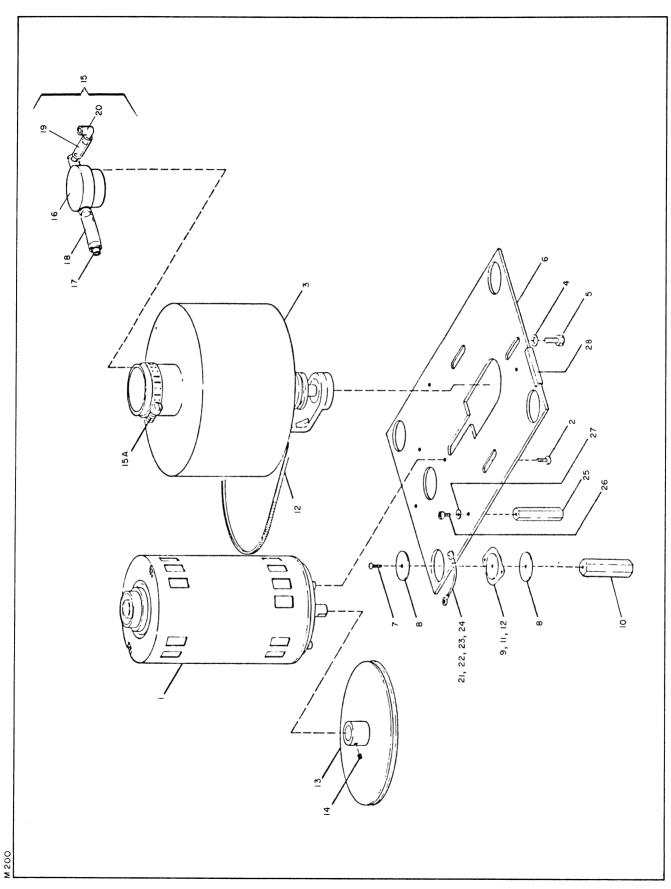


FIGURE 12-10 VACUUM PUMP ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40033319	VACUUM PUMP ASSEMBLY - 115 VAC, 60 Hertz	1	
	40033306	VACUUM PUMP ASSEMBLY - 230 VAC, 50 Hertz	1	
-1	10095401	. MOTOR, 60 Hz, 3350 rpm, 115 VAC, 60 Hertz	1	K
	10095402	. MOTOR, 50 Hz, 230 VAC	1	
		(Attaching Parts)		
-2	00000379	SCREW, Machine, Pan Head, 8-32 x 1/2	4	
	20055001	. BLOWER, 115 VAC, 60 Hertz	1	
-3	30055901	. BLOWER, 113 VAC, 60 Hertz (75511)	li	60-115626
	30055902	(Attaching Parts)	1	00 110020
	00000441	WASHER, Flat, #1/4	3	
-4 -5	00000441	SCREW, Cap, Hex Head, 1/4-20 x 5/8	3	
-5	00000855	SCREW, Cap, Hex Head, 1/4-20 x 0/0		
-6	30076701	. PLATE, Blower	1	
		(Attaching Parts)		
-7	00000381	SCREW, Machine, Pan Head, 8-32 x 3/4	4	
-8	00000294	WASHER, Flat, #8 7/8 OD (76005)	8	J2049-1
-9	00000505	MOUNT, Rubber (76005)	2	100PD2
	00000291	MOUNT, Rubber (76005)	2	100PD4
-10	10002004	STANDOFF	4	
-11	00000926	RIVET, Pop, 1/8 x 1/2 (Merit)	8	AD46ABS
10	00000510	BELT, 115 VAC, 60 Hertz (24161)	1	5M545
-12	00000519 00000520	BELT, 230 VAC, 50 Hertz (24161)	1 1	5M580
10		. PULLEY, 115 VAC, 60 Hertz	1	JIII OO
-13	20076101	. PULLEY, 230 VAC, 50 Hertz	1 1	
1	20076102	(Attaching Parts)	1	
-14	00000591	SCREW, Set, Nyloc Cup Point, STLN BLK,	1	
		1/4-20 x 3/8 (83014)		
-15	20058602	. ADAPTER ASSEMBLY, Vacuum	1	
		(Attaching Parts)		
-15A	00000407	CLAMP (76599)	1	H-24
-16	20252301	VACUUM ADAPTER	1	
-17	20026808	ORIFICE	1	
-18	00000899	TUBING, Clear, 1/2" I.D. x 3/4" O.D., 1 1/4" (Pipeline)	1	Transtube 1/2x3/4
-19	00000899	TUBING, Clear, 1/2" I.D. x 3/4" O.D., 5 1/4" (Pipeline)	1	Transtube 1/2x3/4
-20	20252401	VACUUM TUBE ELBOW	1	
-21	20037901	. GROUND STRAP ASSEMBLY (Attaching Parts)	1	
-22	00000296	SCREW, Pan Head, 6-32 x 3/8	1	
-23	00000230	WASHER, Lock, Int. Tooth, #6	1	
-24	00000301	NUT, Hex, 6-32	1	

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FIGURE 12-10 VACUUM PUMP ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-25 -26 -27	10002005 00000293 00000294	 STANDOFF (Attaching Parts) SCREW, Cap, Socket Head, 8-32 x 1/2 WASHER, Flat #8 	2 2 2	
-28 -29 -30 -31 -32 -33 -34	20160701 00000058 00000059 00000525 00000452 00000531 00000555	. STRIP, Grommet . TIE, Cable (06383) . CABLE TIE, Mount (06383) . RECEPTACLE, Faston (.250) (00779) . CONNECTOR, Housing, Elec. (00779) . COMPOUND, Retaining . ADHESIVE, Pliobond	1 2 1 3 1 A/R A/R	SSTIM TA1S8 60414-1 1-480416-0 75-21

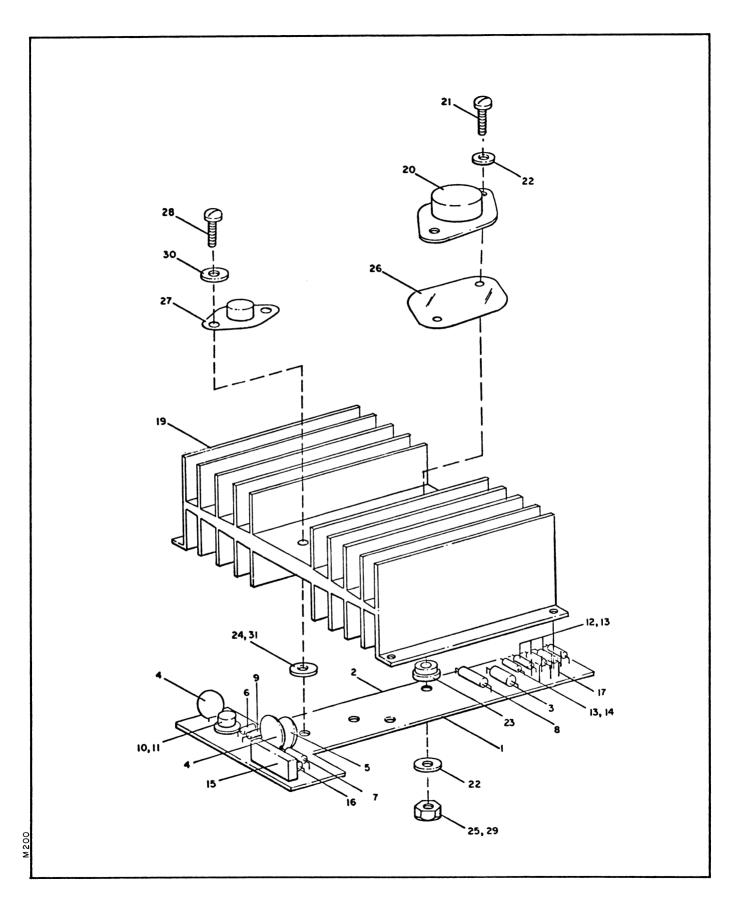


FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.	
	30029505	POWER SUPPLY ASSEMBLY			
_	20032803	. PC BOARD ASSEMBLY	1		
_	30032701	PC BOARD	1	mp 1100	
_	00000844	CAPACITOR, 10.0 μ f, 12 VDC, \pm 10% (80183)	1	TE 1128	
	00000886	CAPACITOR, .1μf, 50 VDC, ±10% (33498)	2	LT-AC5-104Z 5HK-D10	
- 5	00000195	CAPACITOR, .001μf, 200 VDC (80183)	1	RN60D6811F	
-6	00000209	RESISTOR, Prec., 6.81K, ±1%, 1W	1	RC07GF101K	
-7	00000069	RESISTOR, 100 Ohm, ±10%, 1/4W	1	RW79UR100F	
-8	00000207	RESISTOR, .10 Ohm, ±1%, 3W	1	RC07GF102K	
-9	00000070	RESISTOR, 1K Ohm, ±10%, 1/4W TRANSISTOR, NPN (04713)	1	2N706	
-10	00000140		1	7717-145N	
-11	00000107	PAD, Transistor Mount (Red)(13103) RESISTOR, (SAT), ±10%, 1/4W Range 33 to 100 Ohm	4	RC07GF	
	00000570		10	3-331677-6	
-13 -14	00000460 00000570	SOCKET, Miniature Spring (00779) RESISTOR, (SAT), +10%, 1/4W range 82 to 120 Ohm	1	RC07GF	
-14 -15	00000370	RESISTOR, (SA1), ±10%, 174w Tange 62 to 120 Chin RESISTOR, Variable, 10K, ±10%, 1W	1	3009P-1-103	
	00000232	RESISTOR, Variable, 10K, ±10%, 1W	1	RC20GF752J	
-16 -17	00000238		7	86094-2	
-17 -18	00000463	. TERMINAL, Ring Tongue (00779)	2	32949	
-10	20000 400				
-19	20029101	. HEAT SINK	1		
-20	00000137	. TRANSISTOR, NPN, Power (04713)	1	2N3771	
-21	0000056 8	(Attaching Parts) . SCREW, Machine, Phillips Head, 6-32 x 5/8,	2		
		Nickel Brass Plate	_		
-22	00000445	WASHER, Lock, Internal Tooth, #6	3		
-2 3	00000502	WASHER, Shoulder, Nylon (95987)	2	SW-6-NA	
-24	00000491	WASHER, Nylon (95987)	1	NW-6-3124	
	00000569	NUT, Plain, Hex, 6-32, Nickel Brass Plate	2	49 00 04	
-26	00000567	WASHER, Insulating (13103)	1	43-03-04	
-27-	00000115	. INTEGRATED CIRCUIT, Regulator	1	MC1469R	
-28	00000568	(Attaching Parts) SCREW, Machine, Phillips Head, 6-32 x 5/8, Nickel Brass Plate	2		
-29	00000569	NUT, Plain, Hex, 6-32, Nickel Brass Plate	2	,	
-29 -30	00000305	. WASHER, Lock, Internal Tooth, #6	4		
-30 -31	00000443	. WASHER, Nylon (95987)	2	NW-6-3124NA	
-01	0000401				
-32	00000108	. COMPOUND, Heat Sink (13103)	A/R		
-33	30033001	. SCHEMATIC			

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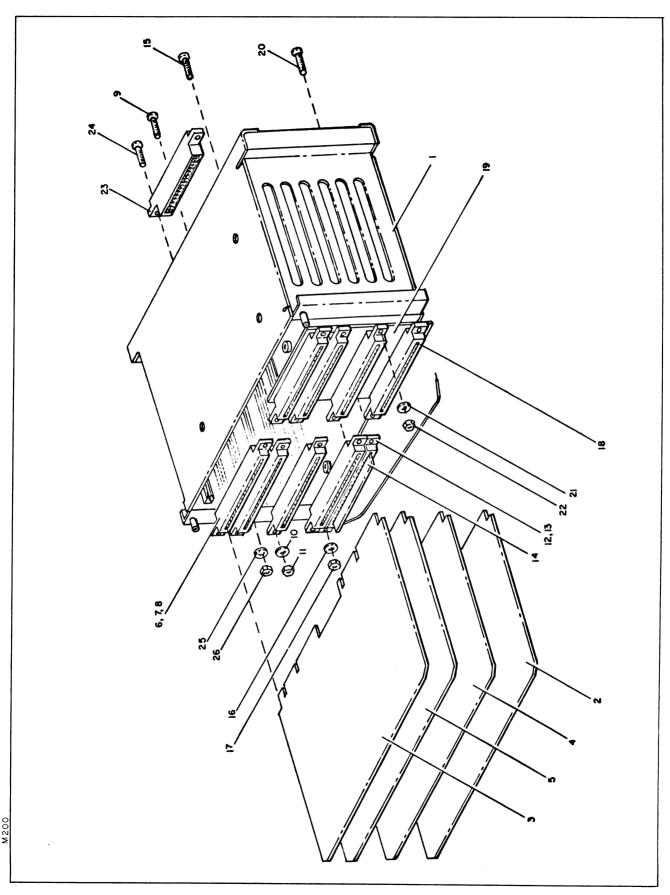


FIGURE 12-12 CARD FILE ASSEMBLY

FIG. & INDEX	1	DESCRIPTION	UNITS PER	VENDOR
NO.	NUMBER	1 2 3 4 5 6 7	ASSY	PART NO.
	400553XX	CARD FILE ASSEMBLY		
-1	300294XX	. CARD CAGE W/GUIDES	1	
-2	40061901	. P.C. CARD ASSEMBLY, Control (PT)	1	
_	40061905	. P.C. CARD ASSEMBLY, Control (PTRP)	1 1	
	40061907	. P.C. CARD ASSEMBLY, Control (GTRP)	1 1	
	40061910	. P.C. CARD ASSEMBLY, Control (PTOC)	i	
	40061902	. P.C. CARD ASSEMBLY, Control (GTOC)	ī	
-3	400353 03	. P.C. CARD ASSEMBLY, Sync (SINGLE)	1	
-4	40076501	. P.C. CARD ASSEMBLY, Clock (PT)	1	
-	40076505	. P.C. CARD ASSEMBLY, Clock (PTRP)	l i l	
	40076503	. P.C. CARD ASSEMBLY, Clock (GTRP)	1	
	40076511	. P.C. CARD ASSEMBLY, Clock (PTOC)	1	
	40076502	. P.C. CARD ASSEMBLY, Clock (GTOC)	1	
- 5	40061001	. P.C. CARD ASSEMBLY, Error (PT)	1	
	40061003	. P.C. CARD ASSEMBLY, Error (PTRP)	l i l	
	40061007	. P.C. CARD ASSEMBLY, Error (GTRP)	1 1	
	40061011	. P.C. CARD ASSEMBLY, Error (PTOC)	1	
	40061002	. P.C. CARD ASSEMBLY, Error (GTOC)	1	
-6	00000029	. CONN HOUSING, Crimp, Snap-In (00779)	4	1-582191-5
-7	00000030	. PLUG, Keying (00779)	16	582501-1
-8	00000061	. SPRING, Retaining (00779)	20	42973-2
	İ	(Attaching Parts)		
-9	00000064	SCREW, Machine, Pan Head, SSL 4-40-x 3/8	8	
-10	00000066	WASHER, Lock, Internal Tooth #4	8	
-11	00000062	. NUT, Plain, Hex, 4-40	8	
-12	00000032	. CONNECTOR, Single Row (00779)	1	583302-1
-13	00000702	. CONTACT, Connector (00779)	1	583259-2
-14	20036201	. BUS BAR, Connector	1	
		(Attaching Parts)		
-15	00000064	SCREW, Machine, Pan Head, SSL, 4-40 x 3/8	2	
-16	00000066	WASHER, Lock, Internal Tooth #4	2	
-17	00000062	. NUT, Plain, Hex, 4-40	2	
-18	00000032	. CONNECTOR, Tab, Solder-Loaded (00779)	4	583334-1
-19	40032401	. P.C. CARD, Motherboard	1	
		(Attaching Parts)		
-20	00000063	SCREW, Machine, Pan Head, SSL, 4-40 x $1/2$	8	
-21	00000066	WASHER, Lock, Internal Tooth #4	8	
-22	00000062	. NUT, Plain, Hex, 4-40	8	
1				

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FIGURE 12-12 CARD FILE ASSEMBLY (Cont'd)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-23	30056001	. CABLE ASSEMBLY, Interconnect	1	
		(Attaching Parts)		
-24	00000064	SCREW, Machine, Pan Head, SSL, 4-40 x 3/8	2	
-25	00000066	WASHER, Lock, Internal Tooth, #4	2 2	
-26	00000062	. NUT, Plain, Hex, 4-40	1	1854/19
-27	00000017 200566XX	. WIRE, Elec., #20 AWG, BRN, 8" (92194) . JUMPER WIRE ASSEMBLY	1 1	1004/10
-28 -29	20056577	. JUMPER WIRE ASSEMBLY . CABLE ASSEMBLY, DC Power	-	
-30	30056301	. CABLE ASSEMBLY, Control Panel		
-31	30045301	. CABLE ASSEMBLY, Data Output		
-32	40196701	. WIRING DIAGRAM		
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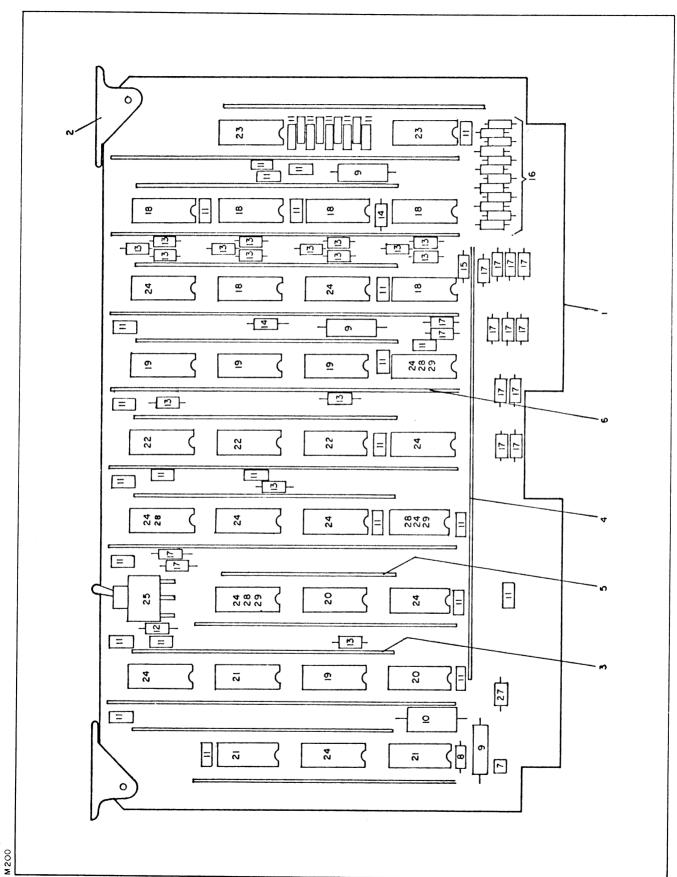


FIGURE 12-13 P.C. ASSEMBLY - Control Card

FIGURE 12-13 P.C. ASSEMBLY - Control Card

FIG. &	PART	UNITS/ASSY			VENDOR				
INDEX NO.	NUMBER	DESCRIPTION 1 2 3 4 5 6 7	ΡŢ	GT	PTRP	GTRP	PTOC	бтос	PART NO.
	REF	P. C. ASSEMBLY - Control Card							
-1	40064901	. PRINTED CIRCUIT BOARD	1		1	1	1	1	
-2	00000060	. HANDLE, Extractor with Roll Pin (18617)	2		2	2	2	2	S-203
-3	20031104	. BUS BAR, 4 Pin	10		10	10	10	10	
-4	20031106	. BUS BAR, 6 Pin	1		1	1	1	1	
-5	20031103	. BUS BAR, 3 Pin	1		1	1	1	1	
-6	20031105	. BUS BAR, 5 Pin	7		7	7	7	7	
-7	00000088	. BEAD, Ferrite (33062)	1		1	1	1	1	21-030-F
-8	00000039	. DIODE, Zener, 6.8V (04713)	1		1	1	1	1	1N5235
-9	00000025	. CAPACITOR, Elec., 20μf, 6V (03597)	3		3	3	3	3	76F02CC200
-10	00000024	. CAPACITOR, Mylar, 0.1μf, 100V (03597)	1		1	1	1	1	BA12A104B
-11	00000023	. CAPACITOR, $0.01\mu f$, $100V$ (80813)	34		34		34	34	TG-S10
-12	00000075	. RESISTOR, 330 Ohm, ±10%, 1/4W	1		1	1	1	1	RC07GF331K
-13	00000070	. RESISTOR, 1K Ohm, +10%, 1/4W	16		16	16	16	16	RC07GF102K
-14	00000076	. RESISTOR, 470 Ohm, ±10%, 1/4W	2		2	2	2	2	RC07GF471K
-15	00000069	. RESISTOR, 100 Ohm, +10%, 1/4W	1		1	1	1	1	RC07GF101K
-16	00000258	. RESISTOR, 560 Ohm, ±5%, 1/4W	12		12	12	12	12	RC07GF561J
-17	00000080	. RESISTOR, 5.6K, $+10\%$, $1/4$ W	2	1	15	15	2	2	RC07GF562K
-18	00000049	. INTEGRATED CIRCUIT, Hex Inverter (18324)	6		6	6	6	6	N7405A
-19	00000043	. INTEGRATED CIRCUIT, Quad 2-Input DTL Gate (07236)	4		4	4	4	4	U6A994659X
-20	00000046	. INTEGRATED CIRCUIT, 2-Input (18324)	2		2	2	2	2	N7400A
-21	00000044	. INTEGRATED CIRCUIT, Dual D Flip-Flop (18324)	3		3	3	3	3	N7474A
-22	00000054	. INTEGRATED CIRCUIT, 4 Bit Counter (18324)	3		3	3	3	3	N8281ADC
-23	00000057	. INTEGRATED CIRCUIT, Low Power Hex Inverter (07263)	2		2	2	2	2	U6AL0459X
-24	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	12		9	8	9	8	N7404A
-25	00000083	. SWITCH, SPDT, PC Mount (09353)	1		1	1	1	1	7101A
-26	00000020	. WIRE, Bus, 18 AWG, 11/16"	1	1	1	1	1	1	
-27	00000198	. JUMPER, 0 Ohm Resistor (09021)	1		1	1	1	1	i
-28	00000124	. INTEGRATED CIRCUIT, Hex Buffer Non Inverter (18324)	-		-	4	-	4	
-29	00000123	. INTEGRATED CIRCUIT, Hex Inverter (18324)	-		3	-	3	-	N7416A
-30	40065001	. SCHEMATIC	1		1	1	1	1	

FIGURE 12-14 P.C. ASSEMBLY - Sync Card

FIGURE 12-14 P.C. ASSEMBLY - Sync Card

FIG. & INDEX		DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
NO.	NUMBER	123430/	7331	17111110.
	40035303	P.C. ASSEMBLY - Sync Card		
-1	40094401	. PRINTED CIRCUIT BOARD	1	
-2	00000060	. HANDLE, Extractor with Roll Pin (18617)	2	S-203
-3	20031104	. BUS BAR, 4 Pin	9	
-4	20031105	. BUS BAR, 5 Pin	8	
-5	20031107	. BUS BAR, 7 Pin	1	
-6	00000088	. BEAD, Ferrite (33062)	1	21-030-F
-7	00000039	. DIODE, Zener, 6.8V (04713)	1	1N5235
-8	00000025	. CAPACITOR, Electrolytic, 20μf, 6V (03597)	1	76F02CC200
-9	00000023	. CAPACITOR, .01μf, 50V (56289)	24	TG-S10
-10	00000024	. CAPACITOR, Mylar, .1μf (03597)	2	BA12A104B
-11	00000070	. RESISTOR, 1K Ohm, $\pm 10\%$, $1/4$ W	7	RC07GF102K
-12	00000076	. RESISTOR, 470 Ohm, ±10%, 1/4W	1	RC07GF471K
-13	00000072	. RESISTOR, 220 Ohm, $\frac{1}{2}$ 10%, 1/4W	1	RC07GF221K
-14	30210006	. MODULE, Jumper (D-6)	1	
-15	00000054	. INTEGRATED CIRCUIT, Counter Register (18324)	8	N8281ADC
-16	00000055	. INTEGRATED CIRCUIT, 4 Bit Comparator O.C. (18324)	2	N8242A
-17	00000047	. INTEGRATED CIRCUIT, Single 8-Input Gate (18324)	4	N7430A
-18	00000044		6	N7474A
-19	00000045	. INTEGRATED CIRCUIT, Dual 4-Input Buff (18324)	3	N7440A
-20	00000046	. INTEGRATED CIRCUIT, Quad 2-Input Gate (18324)	2	N7400A
-21	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	3	N7404A
-22	00000053	. INTEGRATED CIRCUIT, Counter Register (18324)	2	N8280ADC
-23	00000020	. WIRE, Bus, #18 AWG, 11/16	1	3816
-24	40094301	. SCHEMATIC		
-25	REF	. WIRE LIST (See Schematic, Item 24)	ł	
-26	30210005	. MODULE, Jumper (B-1)	1	
-27	00000079	. RESISTOR, 560 Ohm, $\pm 10\%$, $1/4$ W	1	RC07GF561K
-2 8	00000265	. RESISTOR, 47 Ohm, <u>+</u> 10%, 1/4W	1	RC07GF470K
-29	00000040	. DIODE, 200V	1	1N4003
-30	00000198	. RESISTOR, 0 Ohm (09021)	A/R	01204
		A		
			1	

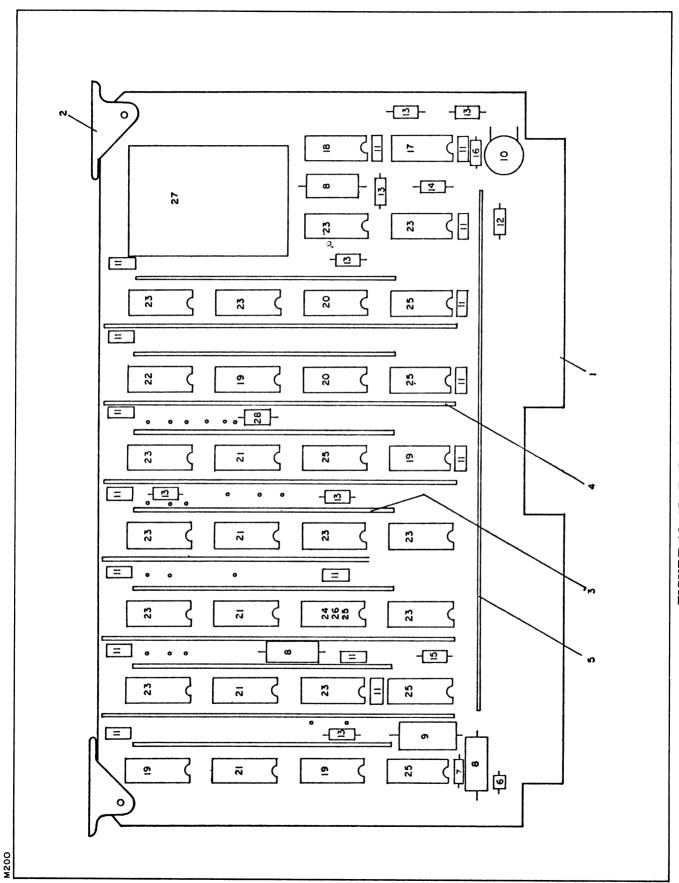


FIGURE 12-15 P.C. ASSEMBLY - Clock Card

FIGURE 12-15 P.C. ASSEMBLY - Clock Card

FIG. &	DADT		ı	JNI	TS,	<u>/</u> A	SS	1	VENDOR
INDEX NO.	NUMBER	DESCRIPTION 1 2 3 4 5 6 7	F	GT	PTRP	GTRP	PTOC	втос	PART NO.
INDEX	PART NUMBER REF 40079901 00000060 20031104 20031107 00000025 00000022 00000023 00000077 00000073 00000046 0000048 0000047 00000047 00000045 00000045 000000123 00000050 00000124 000000124 000000124 000000128 000000198 00000020 40080001		- 2 8 5 1 1 1 3 1 1 1 6 1 7 1 - 1 1 1 4 2 5 1		1 2 8 5 1 1 1 3 1 1 1 1 1 1 1 1 4 2 5 1	1 2 8 5 1 1 1 3 1 1 1 1 1 1 1 4 2 5 1	- 2 8 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		S-203 21-030-F 1N5235 76F02CC200 BA12A104B TG-S20 TG-S10 RC07GF472K RC07GF102K RC07GF102K RC07GF562K RC07GF562K RC07GF104K LM311D N8280ADC N7400A N7410A N7430A N7440A N7440A N7440A N7474A N7416A
M 200									

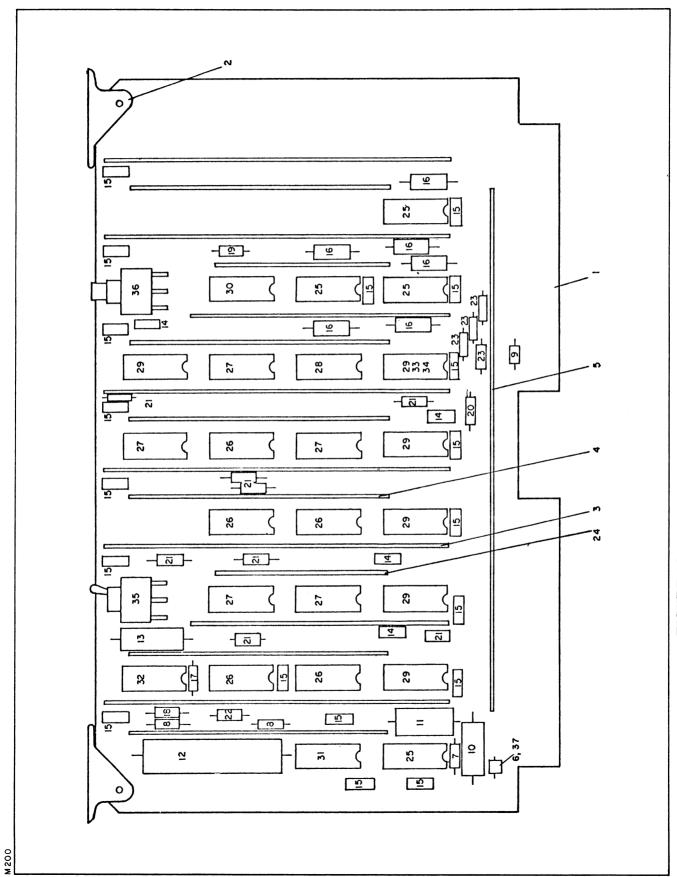


FIGURE 12-16 P.C. ASSEMBLY - Error Card

FIGURE 12-16 P.C. ASSEMBLY - Error Card

FIG. &	DART	UNITS/ASSY		VENDOR					
INDEX	PART NUMBER	DESCRIPTION	ΡŢ	GT	PTRP	GTRP	PTOC	G ТОС	PART NO.
NO.		1 2 3 4 5 6 7	٩	ဗ	۵.	9	۵.	.9	
	מממ	P.C. ASSEMBLY - Error Card							
-1	REF 40081001	PRINTED CIRCUIT BOARD	1		1	1	1	1	
-1 -2	00000060	. HANDLE, Extractor with Roll Pin (18617)	2		2	1 2	2	2	S-203
-2 -3	20031105	BUS BAR, 5 Pin	6		6	6	6	6	
-4	20031103	. BUS BAR, 4 Pin	8		8	8	8	8	
-5	20031107	BUS BAR, 7 Pin	1		1	1	1	1	
-6	00000088	. BEAD, Ferrite (33062)	1		1	1	1	1	21-030-F
-7	00000039	. DIODE, Zener, 6.8V (04713)	1		1	1	1	1	1N5235
-8	00000041	. DIODE, Signal	2		2	2	2	2	1N914
-9	00000040	. DIODE	1		1	1	1	1.	1
-10	00000025	. CAPACITOR, Electrolytic, 20 μf, 6V (03597)	1		1	1	1	1	76F02CC200
-11	00000024	. CAPACITOR, 0.1μf, 100V (03597)	1	İ	1	1	1	1	BA12A104B
-12	00000026	. CAPACITOR, 400 μf, 6V (03597)	1		1	1	1	1	
-13	00000027	. CAPACITOR, 30 μf, 12V (03597)	1		1	1	1	1	
-14	00000021	. CAPACITOR, .22μf, 25V (56289)	4	ŀ	4	4	4	_	2C023224X0250A3
-15	00000023	. CAPACITOR, .01μf, 100V (56289)	19			1		19	
-16	00000081	. RESISTOR, 68 Ohm, + 10%, 1/2W	6		6	6	6	6	
-17	00000071	. RESISTOR, 10K Ohm, ±10%, 1/4W	1		1	1 1	1	1	RC07GF103K RC07GF100K
-18	00000068	. RESISTOR, 10 Ohm, +10%, 1/4W	1		1	1	1	1 1	RC07GF100K RC07GF471K
-19	00000076	. RESISTOR, 470 Ohm, +10%, 1/4W	1		1	1	1	1	RC07GF561J
-20	00000078	. RESISTOR, 560 Ohm, +5%, 1/4W	8		8	8	8	8	RC07GF3013 RC07GF102K
-21	00000070	. RESISTOR, 1K Ohm, ±10%, 1/4W	1		1	1	1	1	RC07GF273K
-22	00000074	. RESISTOR, 27K Ohm, ±10%, 1/4W	_		4	4	_	_	RC07GF562K
-23	00000080	. RESISTOR, 5.6K Ohm, ±10%, 1/4W	2		2	2	2	2	1
-24	20031103	. BUS BAR, 3 Pin . INTEGRATED CIRCUIT, Dual Driver (01295)	4	1	4	4		4	1
-25	00000051	. INTEGRATED CIRCUIT, Dual D Flip-Flop (18324)			5	5	5	5	1
-26 -27	00000044	. INTEGRATED CIRCUIT, Dual 2-Input Gate (18324)			5	5	5	5	N7400A
-27 -28	00000047	, INTEGRATED CIRCUIT, Single 8-Input Gate	1	1	1	1	1	1	1.
-20	00000041	(18324)				-			
-29	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18824)	6		5	5	5	5	N7404A
-30	00000048	. INTEGRATED CIRCUIT, Triple 3-Input Gate	1		1	1	1	1	N7410A
"		(18324)				1			
-31	00000052	. INTEGRATED CIRCUIT, Delay Element (07263)	1		1	1	1	1	
-32	00000042	. INTEGRATED CIRCUIT, Quad 2-Input DTL Gate	1		1	1	1	1	U6A994659X
1		(07263)							
-33	00000123	. INTEGRATED CIRCUIT, Hex Buff Inv. O.C.	-		1	-	1	-	N7416A
	1	(18324)	1	1					
-34	00000124	. INTEGRATED CIRCUIT, Hex Buff, Non-Inv. O. C.	-		-	1		1	N7417A
1		(18324)				1		1.	
-35	00000083	. SWITCH, SPDT, P.C. Mount (09353)	1		1	1	1	1	7101A
-36	00000082	. SWITCH, SPDT, Push, P.C. Mount (09353)	1		1	1	1	1	P8121R
-37	00000020	. WIRE, Bus, #18 AWG, 11/16	1	1	1	1	1	1	3816
-3 8	40081401	. SCHEMATIC		1					
	1				1				
			1						
			1						
	1				1		1		
				1				1	
	1			1					
Z	1			1	1				
٦.	1		ــــــــــــــــــــــــــــــــــــــ						

RECOMMENDED FIELD SPARES FOR M200 CARD READER

PREPARED FOR DIGITAL EQUIPMENT CORPORATION

UNDER CS 23

CS 36

CS 51

CS 78



5	acquan		MANU-	
NUMBER	PART NUMBER	DESCRIPTION	FACTURER	QTY.
00000	CED 19077717.981 C.1	BEARING SEALED BALL (SEE SHAFT ASSY)	KUMBAR	œ
# 2 # 00000 00000			DICK	-
000000	SMSRO	BELT. TIMING. PEU-BLOWER, 50HZ	GATES	-
90000	5N545	BELT TIMING, PEU-BLOWER, 60HZ	GATES	-
30055901	113055901	BLOWER, MOD, 60HZ	DOCUMATION	
30055902	113055902	BLOWER, MOD, 50HZ	DOCUMATION	-
20139101	20139101	CABLE ASSY, DRIVE MOTOR 115V	DOCUMATION	-
20139102	20139102	CABLE ASSY, DRIVE MOTOR 230V	DOCUMATION	, 1 .
0000000	86F119M	CAPACITOR, ALUMINUM 4600UF 15VDCW	CE	~
0000000		CAPACITOR, PAPER/OIL 10UF 10% 370VAC	GE	-
0000000	45F279	CAPACITOR, PAPER/OIL 17.5UF 370VAC 60HZ	GE	
00000511	45F270	CAPACITOR, PAPER/OIL 2UF 370VAC 50HZ	GE	-
0000000	45F271	CAPACITOR, PAPER/OIL 3UF 370VAC 60HZ	GE	-
20005901	102005901	CAPSTAN, DRIVE	DOCUMATION	~
00000188	UPG1-1-6-2-802	CIRCUIT BREAKER, 8A 50/60HZ 250V	AIRPAX	-
00000032	583302-1	CONNECTOR, ELEC, 18 CONT, SINGLE ROW	AMP	-
00000033	583334-1	CONNECTOR ELEC, 18 DUAL POS	AMP	4
00000029	1-592191-5	CONNECTOR, HOUSING, ELEC 18DUAL POS	AMP	毋 .
00000031	583300-1	CONNECTOR, HOUSING, ELEC, 12 CONT	AMP	-
00000028	008016038000707	CONNECTOR, OUTPUT /J2/	ELC0	-
00000523	60-8017-0513	CONTACT, CONNECTOR, SOLDER	ELCO	100
00000210	1841-1-5616	CONTACT, JUNCTION, NO 16	DEUTSCH	100
00000516	42840-4	CONTACT, LEAF, 18-21AWG	AMP	100
00000036	42839-4	CONTACT, LEAF, 22-26AWG	AMP	100
00000037	583261-1	CONTACT, MODIFIED FORK	AMP	100
10010501	101010501	COUPLING, SOLENOID (INCL WITH SOL ASSY)	DOCUMATION	- (
00000143	MDA980-2	DIODE BRIDGE, 100V	MOTOROLA	7
20125801	20022301	DISC ASSY, TIMING	DOCUMATION	-
30045801	113045801	DRIVER ASSY, SOLENOID	DOCUMATION	-
20098301	132098301	FAN ASSY, 230V/50HZ	DOCUMATION	-
00000325	4600	FAN, COOLING, 117V 50/60HZ	PAMOTOR	-
00000311	10B1	FILTER, RFI, 50-400HZ 10A 115/230VAC	COMP CORP	 (
00000147	313001	FUSE, 1A, SLO/BLO 3AG	LITTLE FUSE	S.

PART NUMBER	VENDOR PART NUMBER	DESCRIPTION	MANU- FACTURER	QTY.
00000323	5503	GRILL, FAN, METAL SCREEN	PAMOTOR	1
00000318	381	LAMP, INCAND 6V .20A T-1 3/4	GEN ILLUM	2
00000208	124048-001	LUBRICANT NO 2	LEDEX	7
10139401	10139401	MATING CONNECTOR KIT	DOCUMATION	1
00001091	SP1	MOTOR ASSY, BLOWER, 2850RPM 230V/50HZ	DOCUMATION	
00001092	SP2	MOTOR ASSY, BLOWER, 2850RPM 115V/50HZ	DOCUMATION	-
00001093	SP3	MOTOR ASSY, BLOWER, 3350RPM 115V/60HZ	DOCUMATION	-
00001094	SP4	MOTOR ASSY, 115/230V 50/60HZ (1000/1200RPM) AFTER S/N 7200000	DOCUMATION	-
00001095	SPS	MOTOR SP ASSY DRIVE 1000RPM 230V/50H7	DOCUMATION	-
00001096	SP6	1000RPM	DOCUMATION	-
00001097	SP7	SP ASSY, DRIVE, 1200RPM	DOCUMATION	-
00000291	100PD4		LORD	-
00000202	100PD2	MOUNT, SHOCK, RBR	LORD	2
00000413	DPA7164B	PANEL ASSY, CONTROL	TEC	-
40076505	40076505	PC ASSY CLOCK CARD (PTRP)	DOCUMATION	1
40061905	40061905	PC ASSY CONTROL CARD (PTRP)	DOCUMATION	-
40061003	40061003	PC ASSY ERROR CARD (PTRP)	DOCUMATION	-
(CS23)				
40076503	40076503	PC ASSY CLOCK CARD (GTRP)	DOCUMATION	-
40084501	40084501	PC ASSY CONTROL CARD (GTRP)	DOCUMATION	1
40082201	40082201	PC ASSY ERROR CARD (GTRP)	DOCUMATION	1
40035303	40035303	PC ASSY SYNC CARD M-200	DOCUMATION	1
30099501	10309501	PC BOARD ASSY, EXTENDER CARD	DOCUMATION	1
00000244	SS1443	PHOTOTRANSISTOR, STACK SENSOR	SPECTRONICS	-
00000447	1-0194/086-2110019	PICKUP, MAGNETIC, UNTERMINATED	AIRPAX	-
20014801	102014801	POWER CORD ASSY, 9 FT	DOCUMATION	-
30029505	103029505	POWER SUPPLY ASSY, 5V	DOCUMATION	-
20076101	102076101	PULLEY ASSY, BLOWER DRIVE /60HZ/	DOCUMATION	-
20076102	102076102	PULLEY ASSY, BLOWER DRIVE /50HZ/	DOCUMATION	-
20127005	16XL037	PULLEY, DRIVE T BELT NYL 16GRV	DOCUMATION	-
20127001	112044801	PULLEY, DRIVE MOTOR, 11GRV, 60HZ	DOCUMATION	-
10158901	10158901	READ & LIGHT STATION ASSY MATCHED	DOCUMATION	7

PART NUMBER	VENDOR PART NUMBER	DESCRIPTION	MANU- FACTURER	QTY.
00000001	GB2400-2505-403	RELAY, AC 25A 120-240VAC 50/60HZ	G. BART	T 4
00000467	5100-25	KING, KEIAINING, EAIEANAL I-TIN	TOTILE	-
00000663	84-21	SEALANT, GRADE C 10CC BLO	DOCTIMATION	. ~
30003701	103003701 MFG-0030	SHAFT ASSY (SHAFT MATCHED WITH		-
		00000429 BEARING)		
00000872	MFG-0032	SHAFT ASSY (SHAFT MATCHED WITH		2
		00000429 BEARING)		
20101401	102101401	SHAFT ASSY, PICKER	DOCUMATION	-
10002201	101002201	SHAFT, DRIVE ROLLER	DOCUMATION	
20049801	112049801	SOLENOID ASSY	DOCUMATION	-
00000431	SS2-27	SPACER, SHAFT, .004	W. BERG	4
00000432	SS2-28	SPACER, SHAFT, .006	W. BERG	₹
00000433	SS2-30	SPACER, SHAFT, .016	W. BERG	ယ
00000435	SV1	SPRING, BEARING PRELOAD	W. BERG	₹ .
00000285	LEO26C2MW	SPRING, SOLENOID	LEE	~
00000485	LEO41E6MW	SPRING, STACKER	LEE	
20041603	112041603	SUPPORT ASSY, STACKER BEARING	DOCUMATION	-
20027701	102027701	SWITCH ASSY, HOPPER EMPTY	DOCUMATION	-
00000313	E21-85HX	SWITCH, STACKER FULL	CHERY	-
00000028	SST1M	TIE, CABLE	PANDUIT	40
06000000	SST4S	TIE, CABLE	PANDUIT	10
00000688	91022-1	TOOL AMP EXTRACTION	AMP	-
00000571	465195-2	TOOL, CONTACT EXTRACTION, LEAF	AMP	-
00000487	M15570-16	TOOL, CONTACT INSERT/EXTRACT	DEUTSCH	-
00000675	ELCO 061877-04	TOOL ELCO EXT.	ELCO	
00000674	ELCO 061742-04	TOOL ELCO INSERT	ELCO	-
00000469	91037-2	TOOL MOD FORK CONTACT EXT.	AMP	-
00000676	91029-1A	TOOL MOD IV CONTACT EXT.	AMP	-
20015602	102015602	TRANSFORMER ASSY, 12V-115V	DOCUMATION	-

QTY.	
MANU- FACTURER	DOCUMATION DOCUMATION STANCOR
DESCRIPTION	TRANSFORMER ASSY, 12V-230V TRANSFORMER ASSY, 24V-115V TRANSFORMER ASSY, 24V-230V TRANSFORMER, 50/60HZ 115/230V
VENDOR PART NUMBER	20073902 102015502 20074001 P6377
PART NUMBER	20073902 20015502 20074001 00000134

W. J. (JIM) GARDEN

OEM SALES MANAGER



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