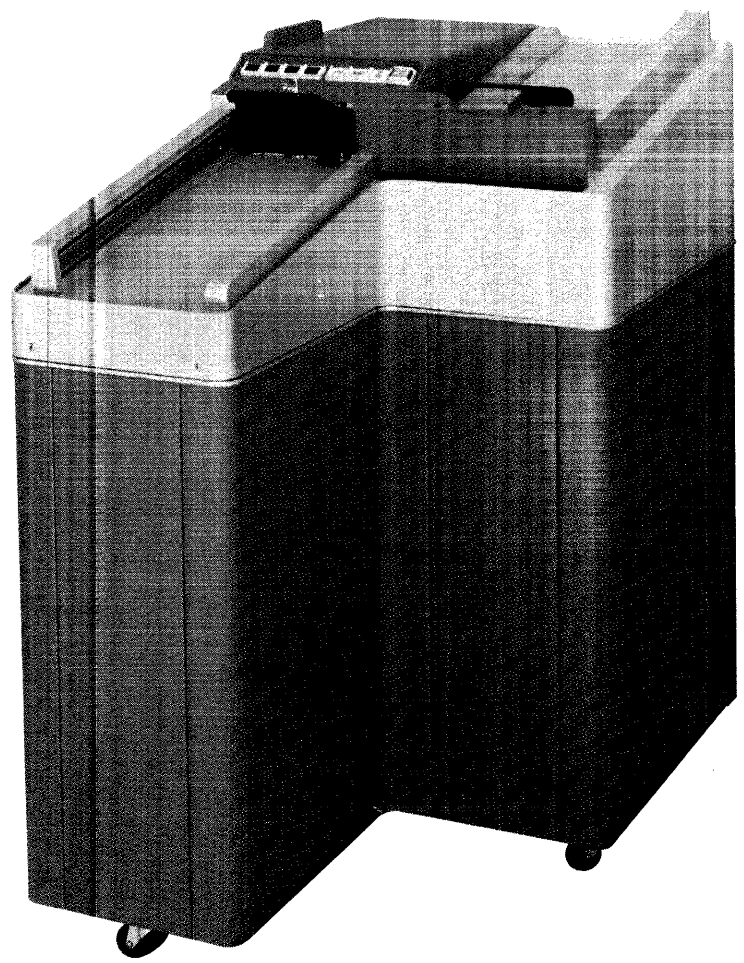


O P E R A T I N G A N D S E R V I C E M A N U A L

2950A
CARD READER



HEWLETT  PACKARD

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.



OPERATING AND SERVICE MANUAL

2950A

CARD READER

Serial Numbers Prefixed: 1237

FOREWORD

This manual contains operating and service information for the Hewlett-Packard model HP 2950A Card Reader. Model number HP 2950A is the Hewlett-Packard designation for the model M1200 Card Reader manufactured by Documation Incorporated.

This manual also applies to HP option 015, which is the 230-volt, 50-hertz version of the card reader.

The content of this manual was prepared by Documation Incorporated.

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SECTION 1

INTRODUCTION

1.1 GENERAL

This technical manual contains operation, maintenance and repair information for Hewlett-Packard field specialists to support the HP-2950A Card Reader. The Card Reader is interfaced to the HP-3000 series computers using an HP-30206A interface kit and is referred to as the HP-30107A Card Reader subsystem. The HP-2950A uses differential interface circuits.

The HP-2950A is a modified Documation Incorporated M1200 Card Reader. This manual will reference M1200 as the model number.

The M1200 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 2250 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 1200 cards per minute.

The M1200 Card Reader is specifically designed for continuous duty operation in adverse operational environments. The chassis is of heavy duty construction and all components have been chosen to provide for rugged, reliable performance. The vacuum-type picker has a remarkable tolerance to mutilated, warped, and edge-damaged cards. The short card track and gentle acceleration forces of the card handling mechanism yield insignificant wear so that card decks routinely last in excess of 1000 passes.

1.2 SPECIFICATIONS

READING SPEED:	1200 cards per minute maximum in continuous run. Single Card Cycle: 50 milliseconds.
CARD TYPE:	Standard 80 column card.
CONTROL:	Demand feed, one card-at-a-time under external program control. Reader will continuously run as long as the Pick Command remains TRUE.
HOPPER SIZE:	18 inches (approximately 2250 cards of 7 mil thickness).
STACKER SIZE:	18 inches (approximately 2250 cards of 7 mil thickness).

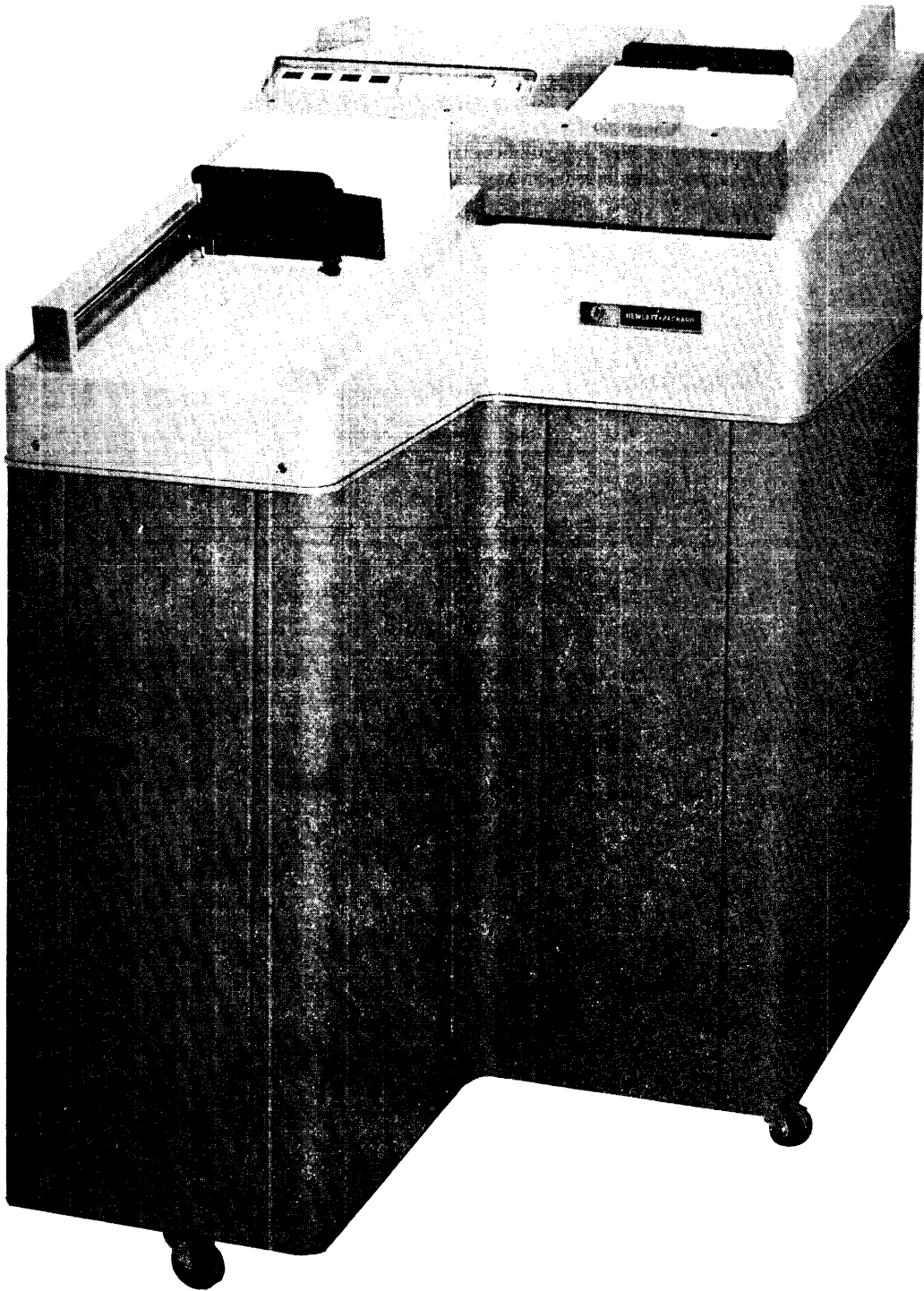


Figure 1-1 Model HP-2950 Card Reader, Front View

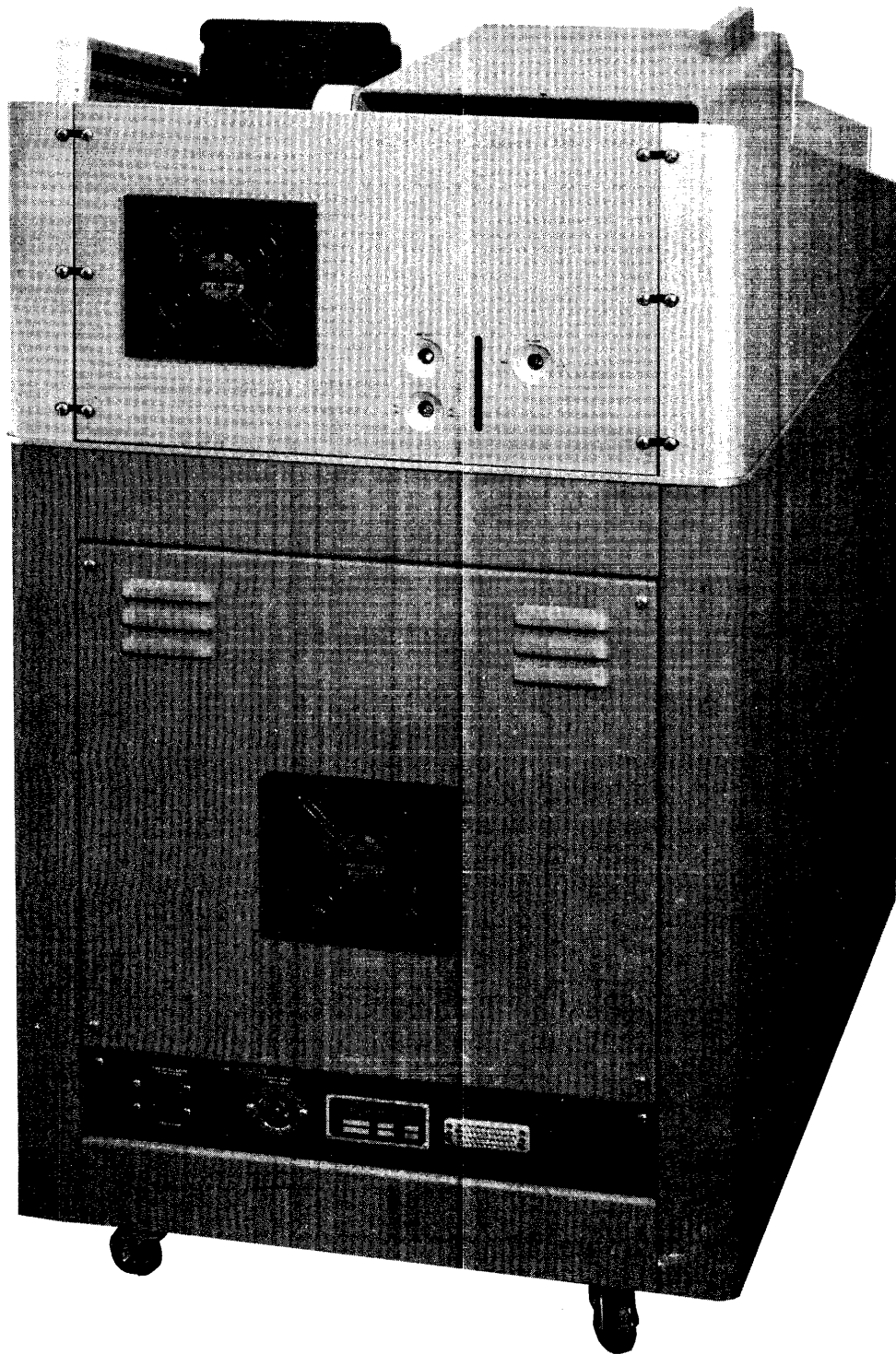


Figure 1-2 Model HP-2950 Card Reader, Rear View

POWER REQUIREMENTS:

Voltage: 103.5 to 126.5 VAC, single phase, @ 60 Hz (standard model).
207 to 253 VAC, single phase, @ 50 Hz (export model).

Power: 2500 VA starting load for 6 sec
1150 VA running load

SIZE:

Height: 37-7/8 inches 96.2 cm
Width: 23-1/2 inches 59.7 cm
Depth: 37-1/4 inches 94.7 cm

WEIGHT: 200 pounds 90.7 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 M1200 Card Reader is packed in a sturdy box container 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.

Cut the bands holding the container package together. Remove the top, unwrap the sides, and remove all interior packing and padding. Included in the container are the power cord and the technical manual. After removing these items, inspect the card reader for any physical damage and report any damage to Documentation Incorporated. Carefully move the card reader off from the wooden base.

Two shipping screws must be removed before the card reader is put into operation. For access to these screws, remove four screws which hold the bottom rear cover to the cabinet. Move cover out slightly and disconnect fan wires. Remove cover. From the underside of the bottom shelf, use a short Phillips screwdriver to remove two red screws. These screws hold 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. Place the CIRCUIT BREAKERS (rear connector panel) to ON.
- c. Set the Mode switch (rear panel) to OFF LINE.
- d. Set the SHUTDOWN switch (rear panel) to AUTO.
- e. Depress the POWER switch to energize the reader. The POWER indicator illuminates and, after approximately a 6-second delay, the STOP and HOPPER/STACKER indicators illuminate.
- f. Depress and hold momentarily the LAMP TEST switch (rear panel) and observe that all front panel indicators illuminate (except END OF FILE indicator). Release switch.
- g. Depress the END OF FILE switch and observe that the indicator illuminates.
- h. Pull the hopper follower back with one hand and load approximately 3 inches of unpunched cards into the hopper area.

- i. Depress the RESET switch. The RESET indicator will illuminate and the END OF FILE and STOP indicators will extinguish. The drive motor, fans, and vacuum/blowers should come on and, after approximately a 6-second delay, the cards should be picked and stacked. The drive motor, fans, and vacuum/blowers will then shut off and the STOP and HOPPER/STACKER indicators illuminate.
- j. Depress the POWER switch to turn off the reader. All indicators are extinguished.
- k. Pull the stacker plate toward the front of the reader with one hand and remove the cards.
- l. This completes the initial off-line test.

SECTION 3 OPERATION

3.1 LOADING THE INPUT HOPPER

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

- a. Pull the hopper follower back with one hand 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 2250 cards).

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, pull the follower back 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.

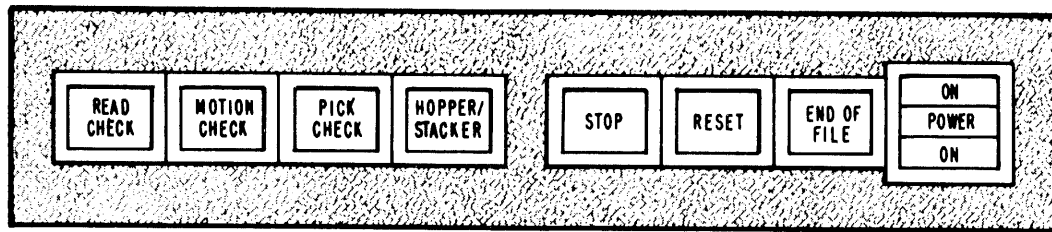
3.2 UNLOADING STACKER

To unload the stacker, perform the following steps:

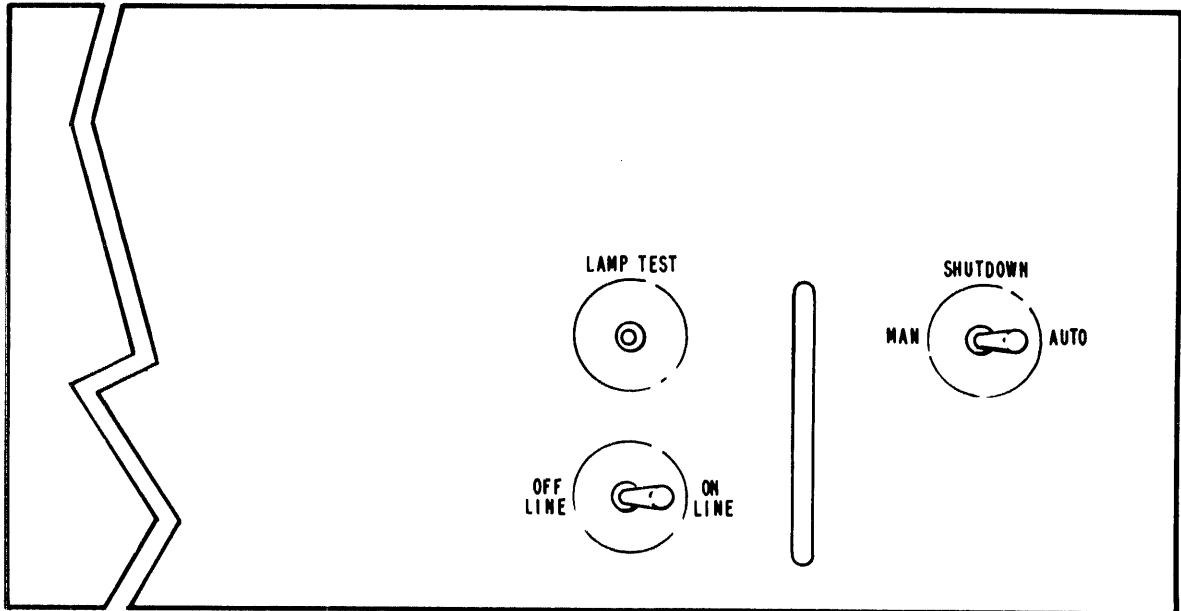
- a. Pull stacker follower back with one hand and remove the front or rear portion of the card deck from the stacker area, being careful that deck order is maintained.
- b. To unload stacker during operation, pull stacker back and remove portion of deck taking care to allow stacker plate to return to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

3.3 CONTROL AND INDICATOR DESCRIPTION

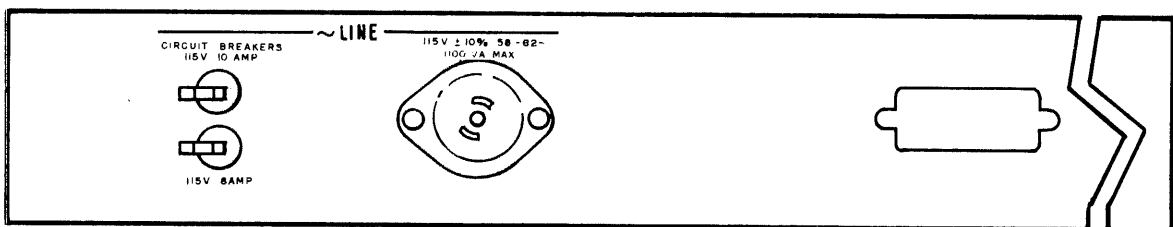
Reader controls and indicators, figure 3-1, are located on the front control panel, the rear of the card cage, and the rear subframe. Control and indicator descriptions are as follows:



FRONT CONTROL PANEL



REAR PANEL



CONNECTOR PANEL

Figure 3-1. Control and Indicator Location

3.3.1 FRONT PANEL CONTROLS AND INDICATORS

Located on the front panel are four pushbutton type switches

- | | |
|-------------|-------|
| POWER | RESET |
| END OF FILE | STOP |

Located within these switches are lighted indicators showing reader status; they are POWER ON (green), OFF (white), END OF FILE (green), RESET (green), and STOP (red).

Three other "error" indicators and a status indicator are located on the front panel.

READ CHECK
MOTION CHECK

PICK CHECK
HOPPER/STACKER

3.3.2 REAR READER CONTROLS

Located on the rear panel are two mode switches and a LAMP TEST switch. The two mode switches are:

SHUTDOWN - MAN/AUTO
Mode - OFF LINE/ON LINE

Located on the connector panel are two CIRCUIT BREAKERS.

115V 10 AMP
115V 8 AMP

3.4 OPERATIONAL PROCEDURES

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

- a. Place the AC power circuit breakers in the ON position to allow power ON/OFF control from the front panel.
- b. Select the mode of operation, MANUAL or AUTO. When the MANUAL mode is selected, the drive motor, fans, and vacuum/blowers 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.
- c. The second mode switch is used to select either ON-LINE or OFF-LINE operation. When OFF-LINE 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 ON-LINE positions.
- d. With the OFF-LINE mode of operation established, depress the POWER switch on the front panel to apply primary power to the reader. The drive motor, fans, and vacuum/blowers will not come on at this time due to the input hopper being empty and AUTO shutdown selection.

- e. Depress the LAMP TEST switch and check that all front panel indicators are lighted (except the END OF FILE indicator).
- f. Load the input hopper and depress the RESET switch. The RESET switch is a momentary action pushbutton indicator 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.
- g. 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.
- h. 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.
- i. The MOTION 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.
- j. The END OF FILE switch is used to develop a status signal to the external control logic. This status indicates that the cards remaining in the input hopper are the last cards in the input file. The END OF FILE switch indicator will light green when the END OF FILE switch is pressed. The END OF FILE switch indicator can be turned off by again pressing the END OF FILE switch or pressing the RESET switch.
- k. The HOPPER/STACKER indicator will light when the input hopper is empty or when the output stacker is full. This is normal operation.
- l. The STOP switch is a momentary action pushbutton switch indicator 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 checklist before calling for maintenance.

NOTE:

POWER CORD CONNECTED TO PROPER VOLTAGE AND FREQUENCY AVAILABLE BEFORE POWER SWITCH IS DEPRESSED.

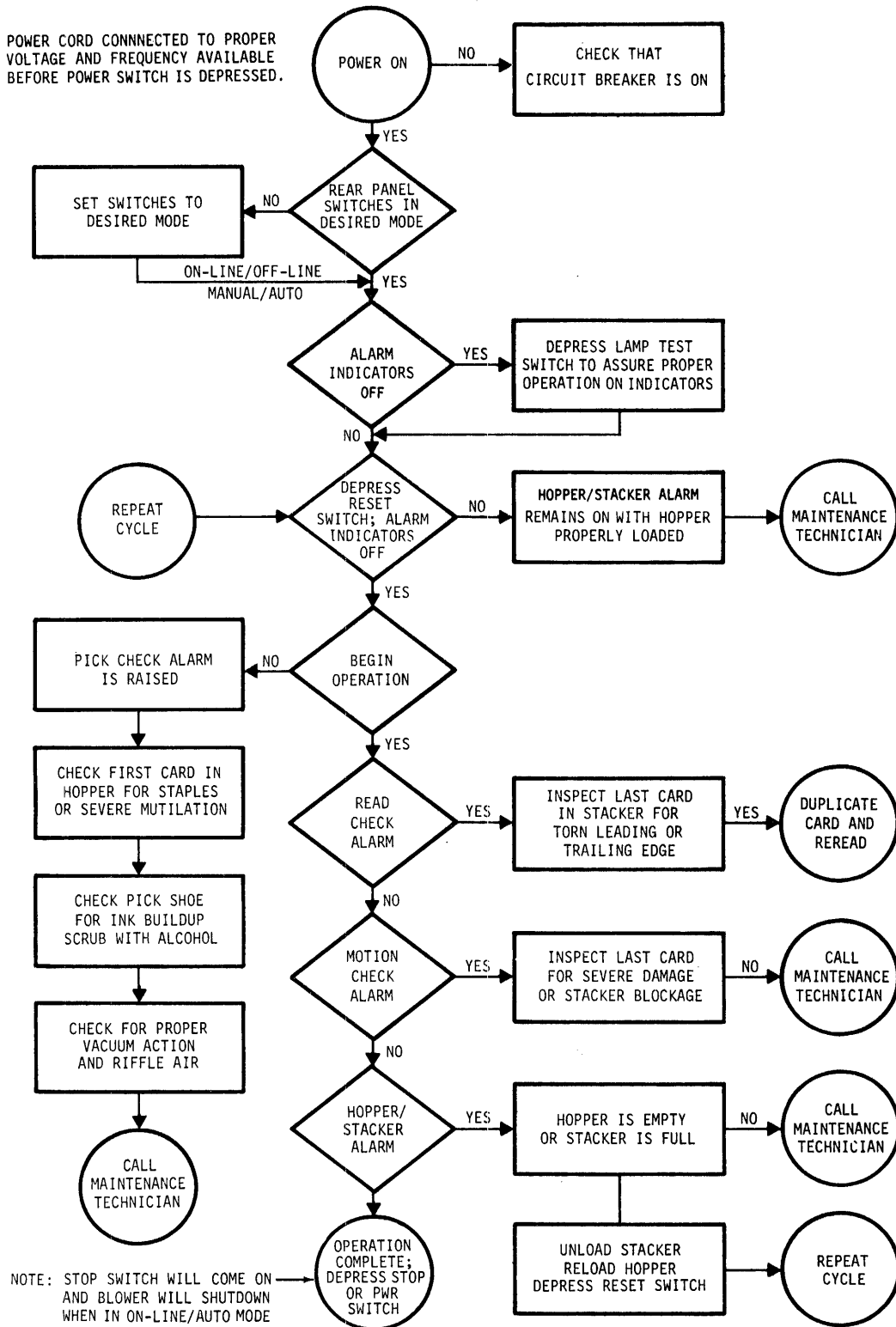


Figure 3-2 - Operational Flow Chart

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 ruffles 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 will be sucked in ready for the next pick command.

Once in the card track, the drive rollers on either side of the read station drive the card through the read station and into the stacker at a velocity equal to 214 inches per second. (.002 inches equals 10 usec.)

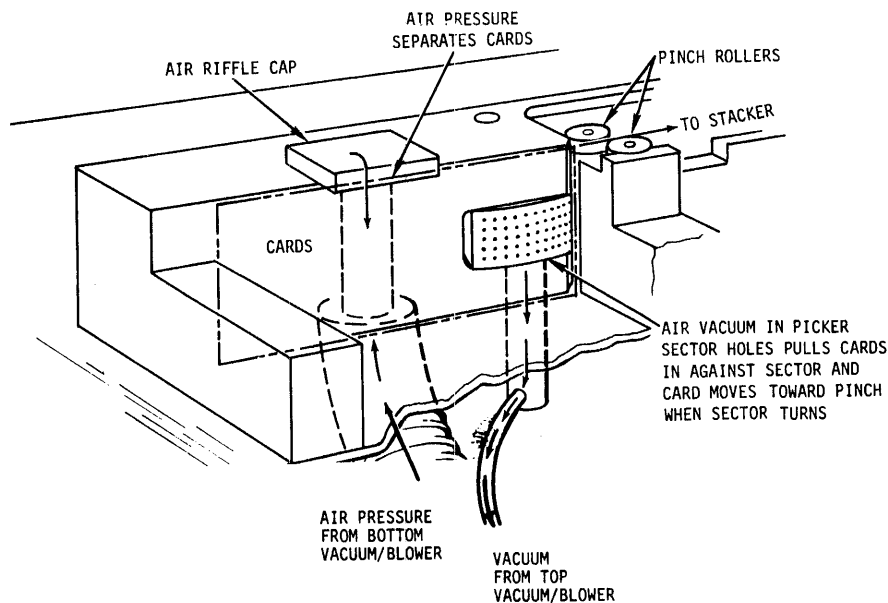


Figure 4-1. Card Feeding Air Flow

4.2 DATA RECOVERY

The logic block diagram for the M 1200 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 $\overline{\text{PCLK}}$ 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

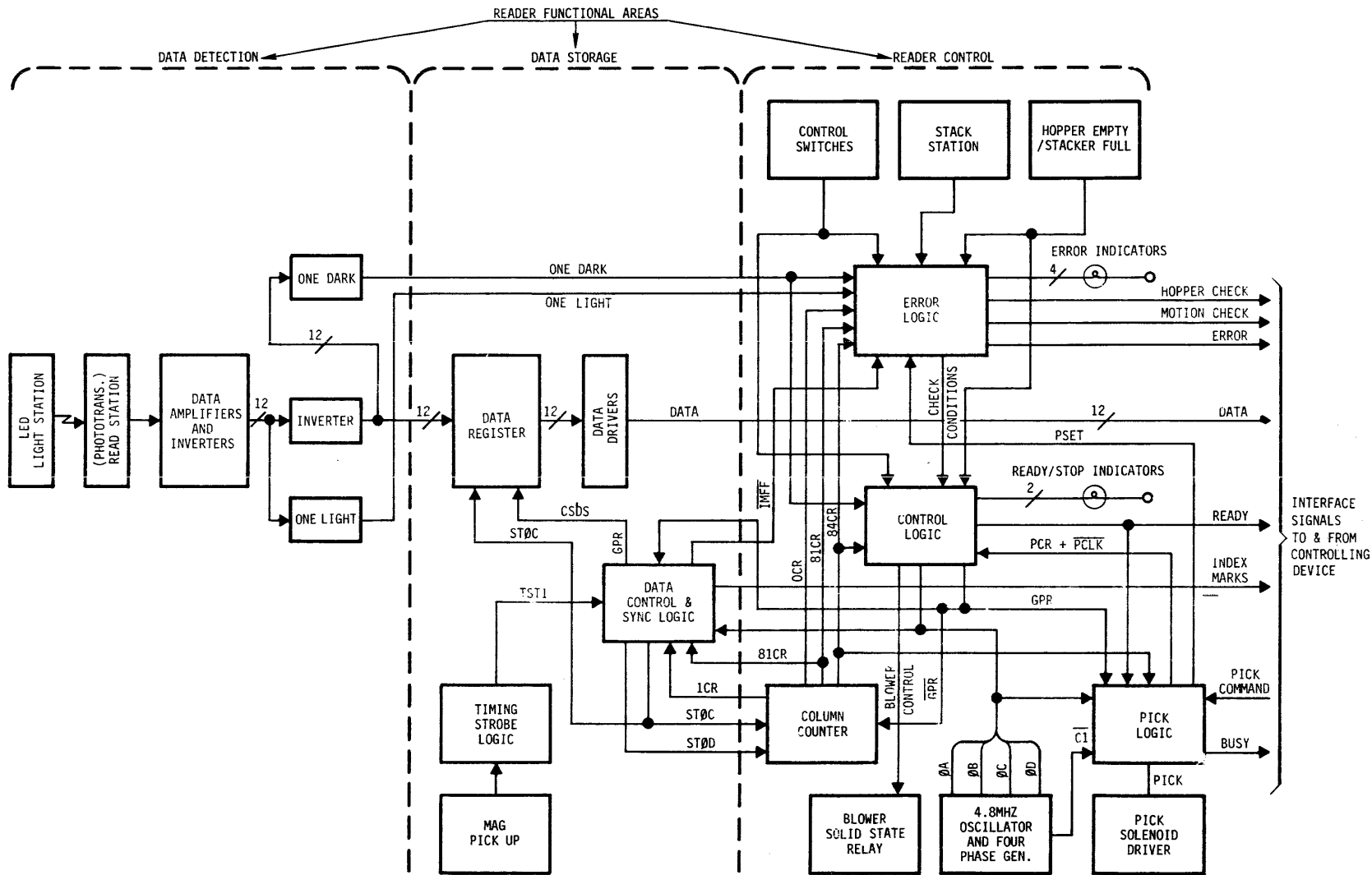


Figure 4-2. Block Diagram, M 1200 Card Reader

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 1200 Card Reader. The description is designed to give the reader an in-depth 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.

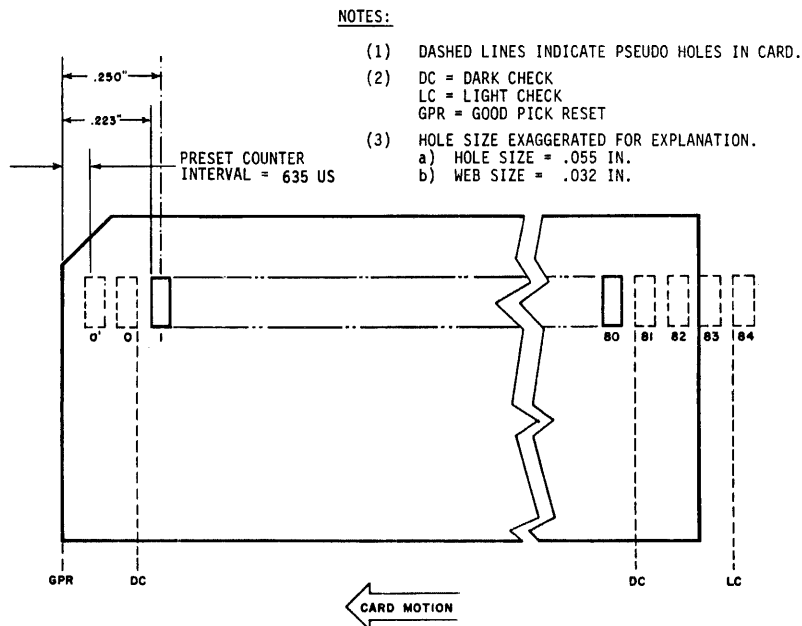


Figure 4-3 - Timing Relationship for Standard Punched Card

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 1200 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 $\emptyset A$, $\emptyset B$, $\emptyset C$, $\emptyset D$ and $\overline{C1}$ 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 6-second (nominal) 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 operation. POR is also used to initialize the Pick Logic and

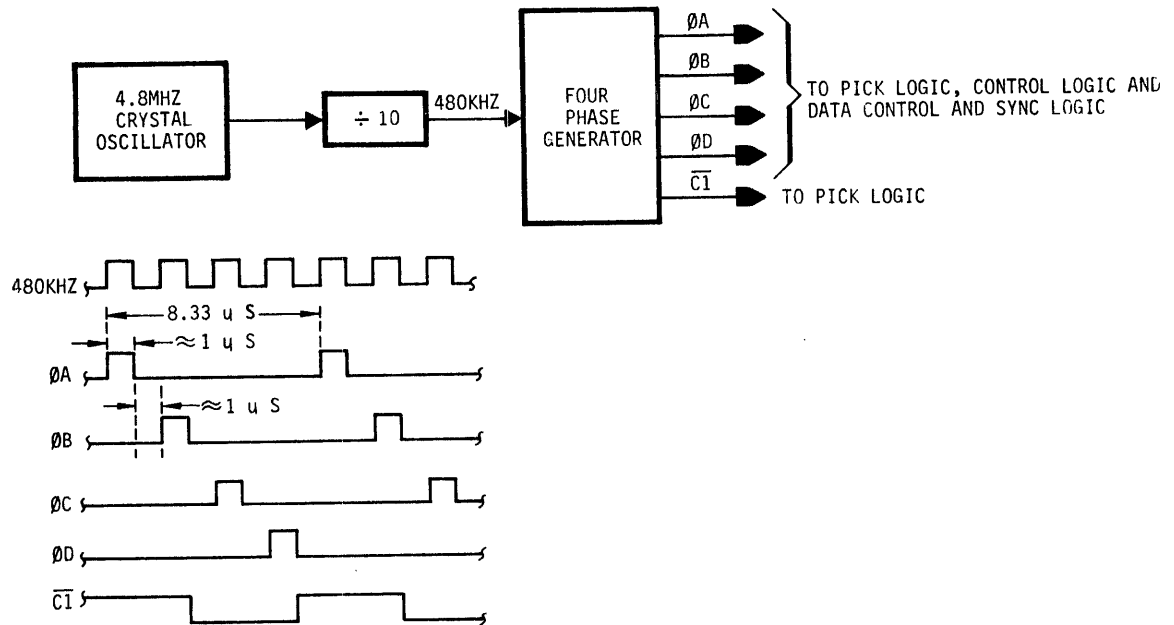


Figure 4-4 - Block and Timing Diagram, 4.8 MHz Oscillator and Four-Phase Generator

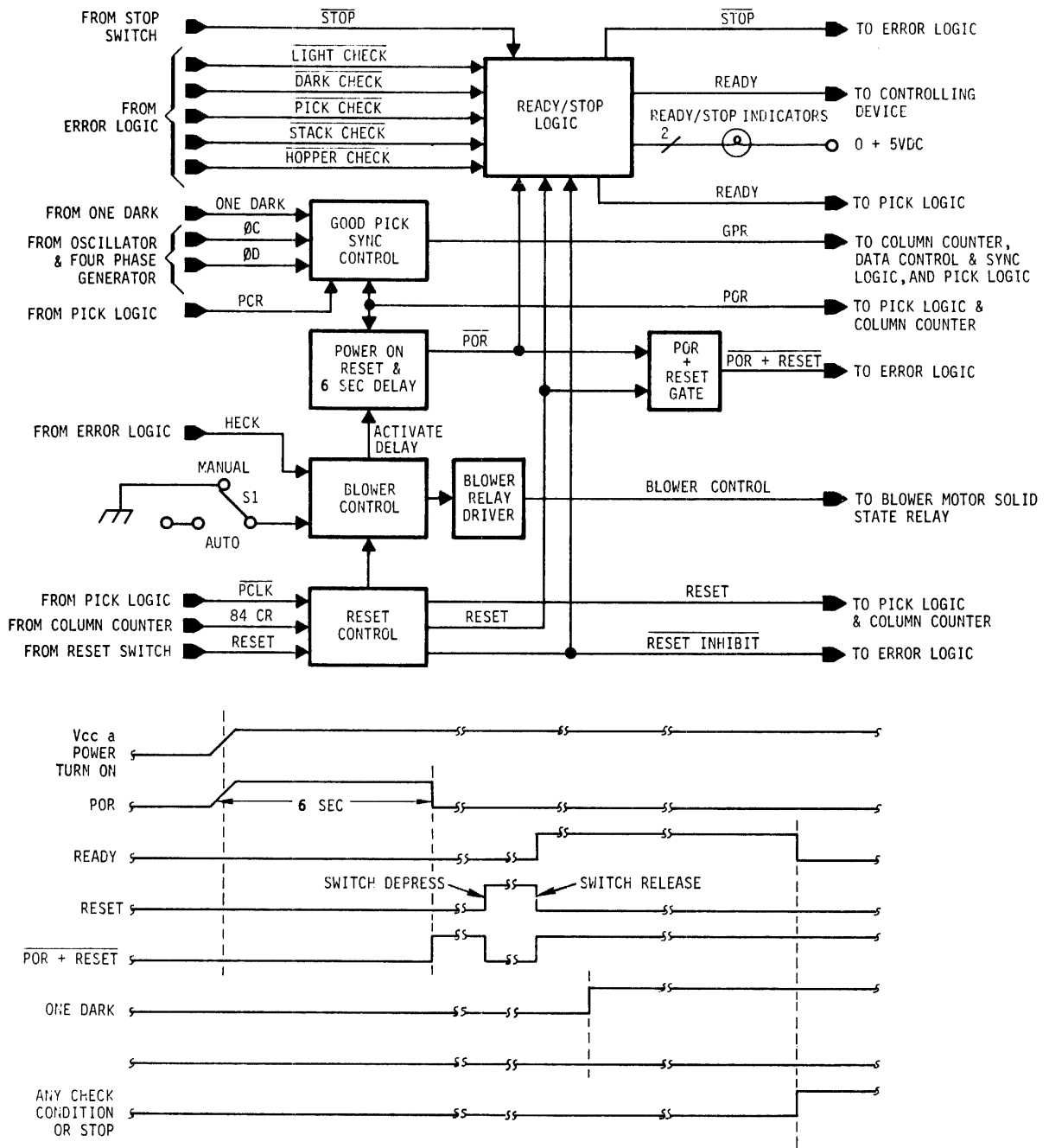


Figure 4-5 - Block and Timing Diagram, Control Logic

Column Counter. $\overline{\text{POR}}$ OR'ed with $\overline{\text{RESET}}$ to form $\overline{\text{POR} + \text{RESET}}$ 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, $\overline{\text{RESET}}$ is routed to initialize the Pick Logic and Column Counter and $\overline{\text{RESET}}$ activates the $\overline{\text{POR} + \text{RESET}}$ signal to the Error Logic. The Reset Control is designed to ignore all RESET switch signals while a read cycle is in progress. Signals $\overline{\text{PCLK}}$ and $\overline{\text{84CR}}$ 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 $\overline{\text{HOPPER CHECK}}$ is not being presented by the Error Logic. (All other Error Logic Check signals will be reset by $\overline{\text{POR}}$ or $\overline{\text{RESET}}$.) 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 $\overline{\text{CHECK}}$ signal from the Error Logic or if the STOP Switch is depressed by the operator and $\overline{\text{RESET INHIBIT}}$ is not present. The Ready/Stop Logic gates the STOP signal with $\overline{\text{RESET INHIBIT}}$, preventing READY from being reset due to $\overline{\text{STOP}}$ during a card read cycle. $\overline{\text{RESET INHIBIT}}$, generated by the Reset Control, is set by $\overline{\text{PCLK}}$ and reset by $\overline{\text{84CR}}$. 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 $\emptyset\text{C}$ and $\emptyset\text{D}$ to produce Good Pick Reset (GPR). GPR is used to:

1. Initialize the Column Counter.
2. Begin the data synchronization process by the Data Control and Sync Logic.
3. 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 motors, fans, 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 6-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 \overline{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 15 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 (\overline{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 (\overline{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

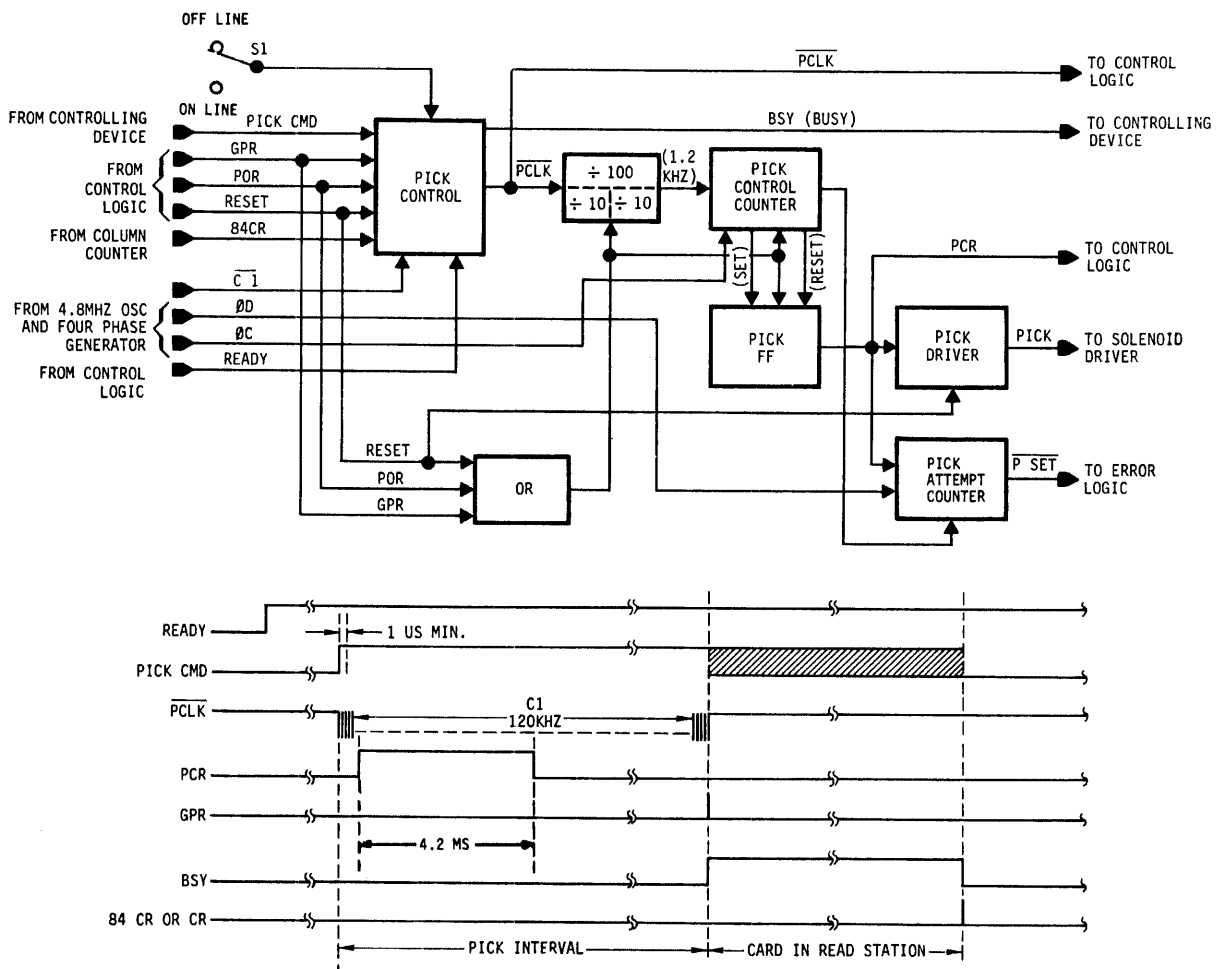


Figure 4-6 - Block and Timing Diagram, Pick Logic

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 6 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 PCR's and the Pick Control Counter reaches Count 56. When six PCR's have been counted and count 56 is reached $\overline{\text{PSET}}$ is generated. $\overline{\text{PSET}}$ will cause READY to go false terminating $\overline{\text{PCLK}}$.

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 OFF LINE, 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 ON LINE, 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 and 84CR. These signals are used by the Control Logic, Data Control and Sync Logic, Pick Logic and Error Logic as follows:

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

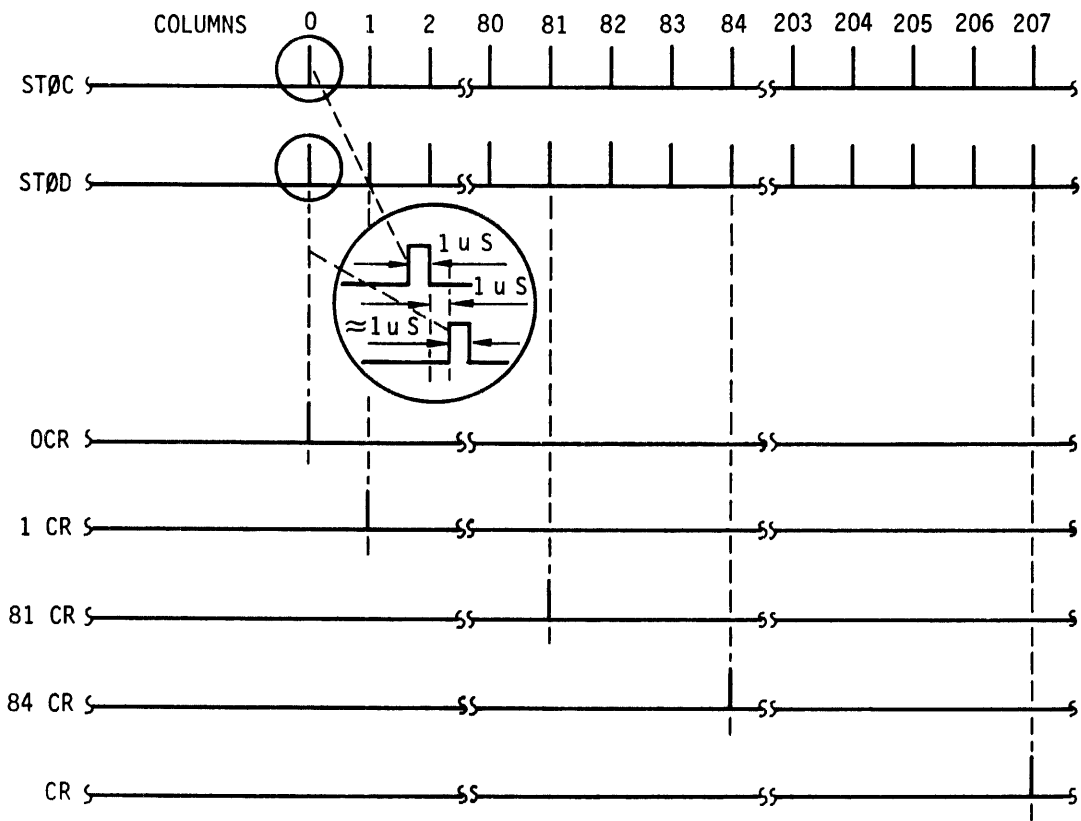
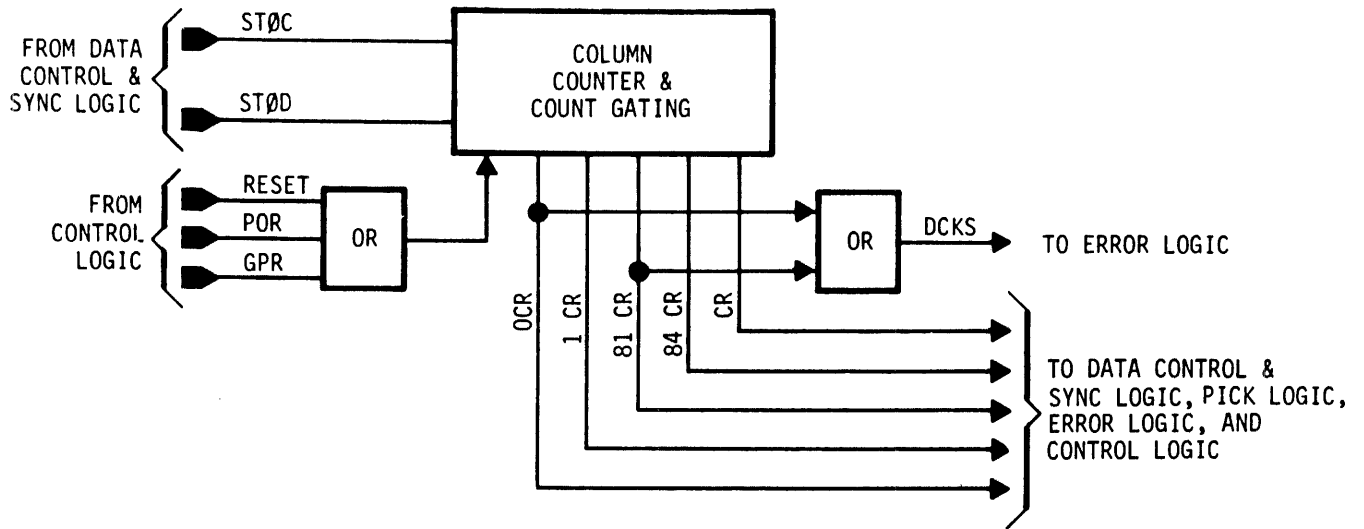


Figure 4-7 - Block and Timing Diagram, Column Counter

COUNT

USED BY

81CR

1. Data Control and Sync Logic to Reset the IMFF.
2. Error Logic for a Dark Check.
3. 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.

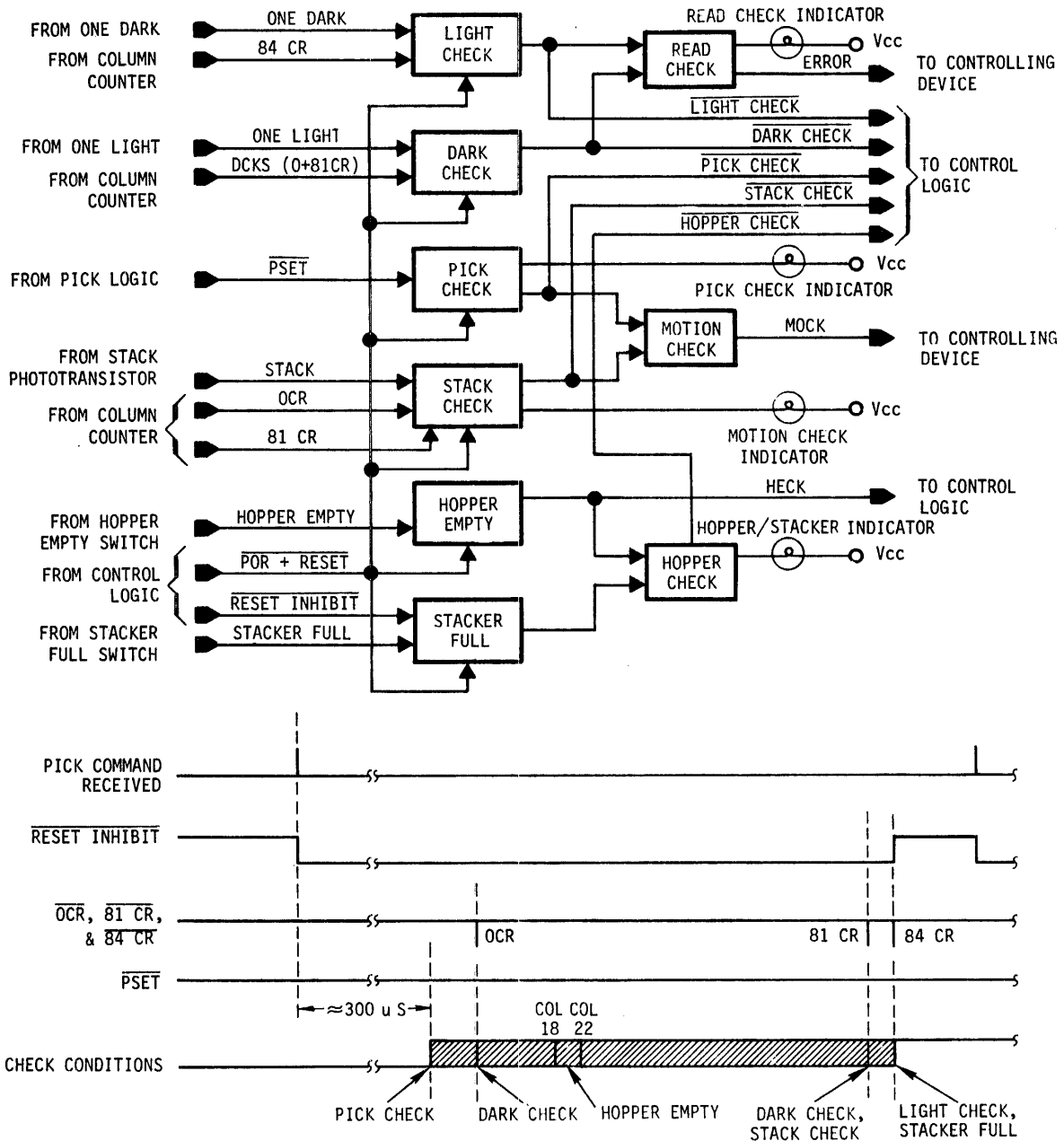


Figure 4-8. Block and Timing Diagram, Error Logic

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 MOCK Motion Check 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 micro-switch. 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/STACKER 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 MOTION 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 indications 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 1200 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.

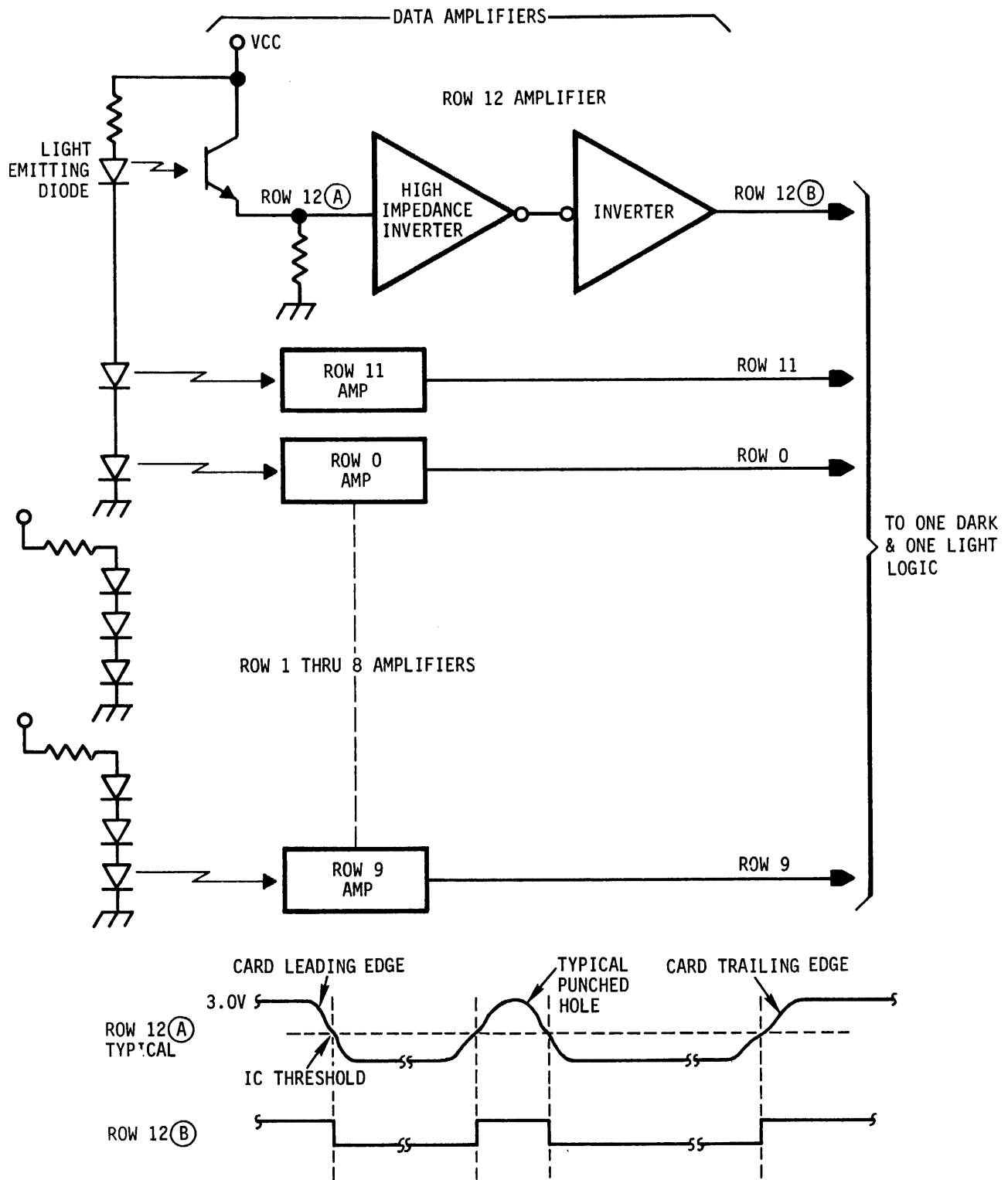


Figure 4-9. Block and Timing Diagram, Data Amplifiers and Inverters

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 1200 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,

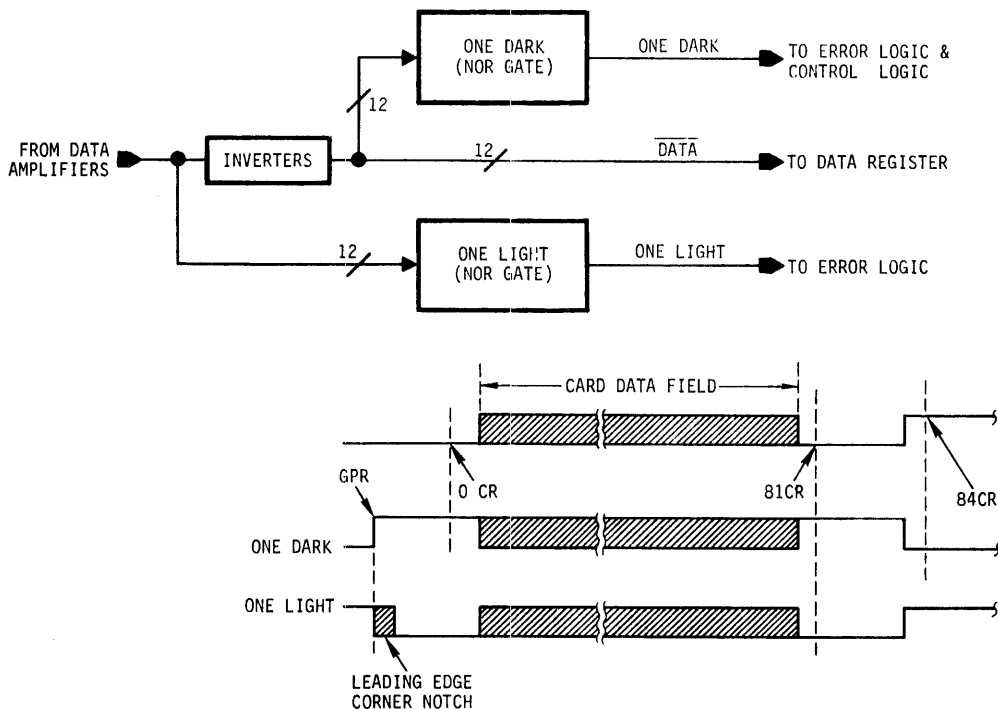


Figure 4-10. Block and Timing Diagram, One Dark and One Light

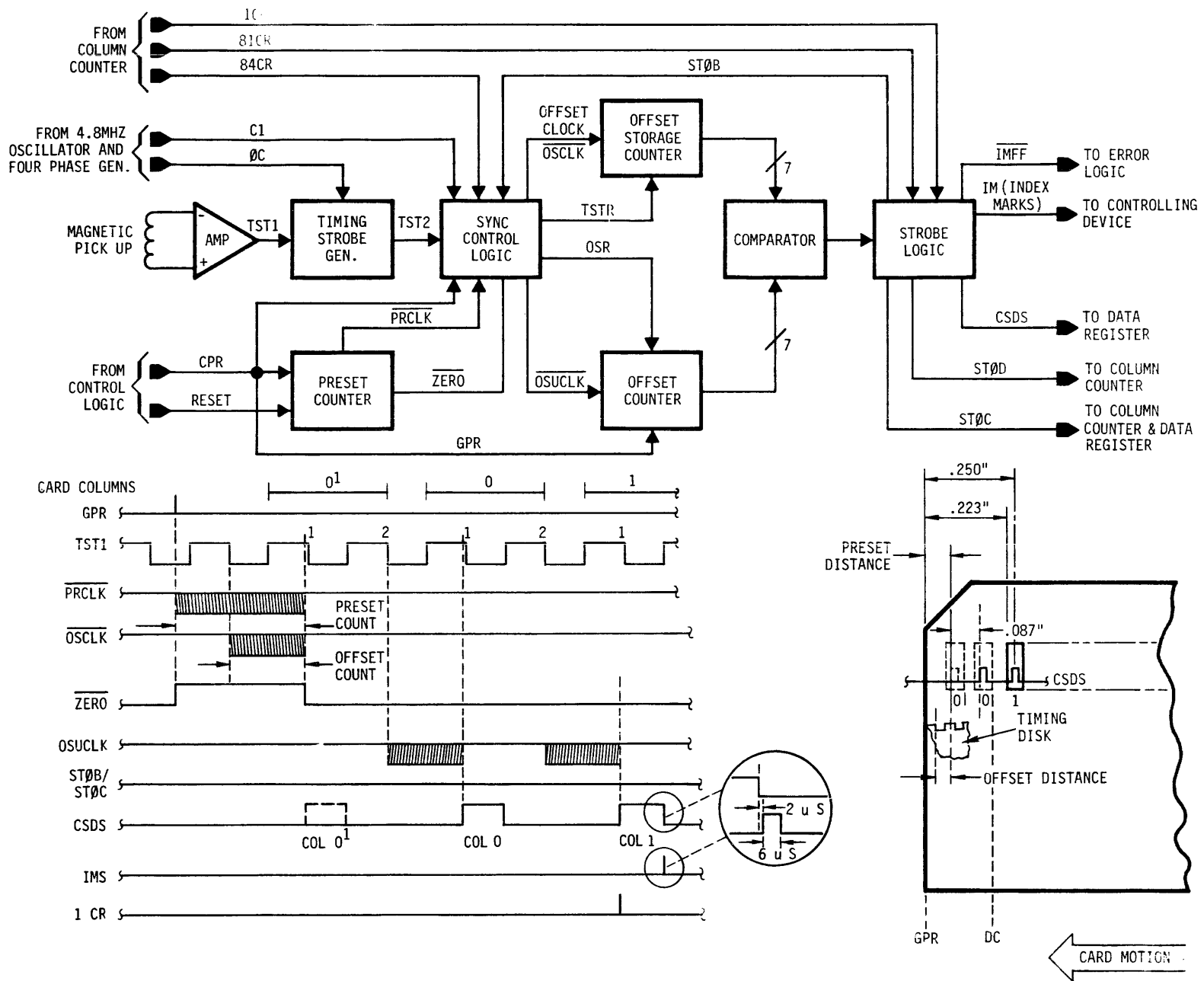
the first measurement is the PRESET DISTANCE. PRESET is the distance from the card's leading edge (GPR) to the point in column 0¹ where the Column Storage Data Strobe (CSDS) should begin. This distance is equal to .0635 inch. The PRESET DISTANCE is predetermined and a PRESET count calculated by knowing 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 $\overline{\text{PRCLK}}$ (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 $\overline{\text{OSCLK}}$ (Offset Clock). $\overline{\text{OSCLK}}$ at 120 KHz drives the eight stage Offset Storage Counter, counting it upwards, while and until the Preset Counter reaches all ones. $\overline{\text{ZERO}}$ is now generated by the Preset Counter terminating both $\overline{\text{PRCLK}}$ and $\overline{\text{OSCLK}}$. 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 ($\overline{\text{OSUCLK}}$). $\overline{\text{OSUCLK}}$ 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 $\text{ST}\overline{\text{O}}\text{B}$ resets the Sync Control Logic, $\text{ST}\overline{\text{O}}\text{C}$ resets the Data Register and $\text{ST}\overline{\text{O}}\text{C}$ and $\text{ST}\overline{\text{O}}\text{D}$ 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, $\text{ST}\overline{\text{O}}\text{B}$, $\text{ST}\overline{\text{O}}\text{C}$ and $\text{ST}\overline{\text{O}}\text{D}$ each time.



4-17

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

1CR from the Column Counter sets the Index Mark Control Flip Flop (IMFF) in the Strobe Logic. The Strobe Logic generates $6\mu\text{s}$ Index Marks (IM) for each Column. The IM's indicate 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

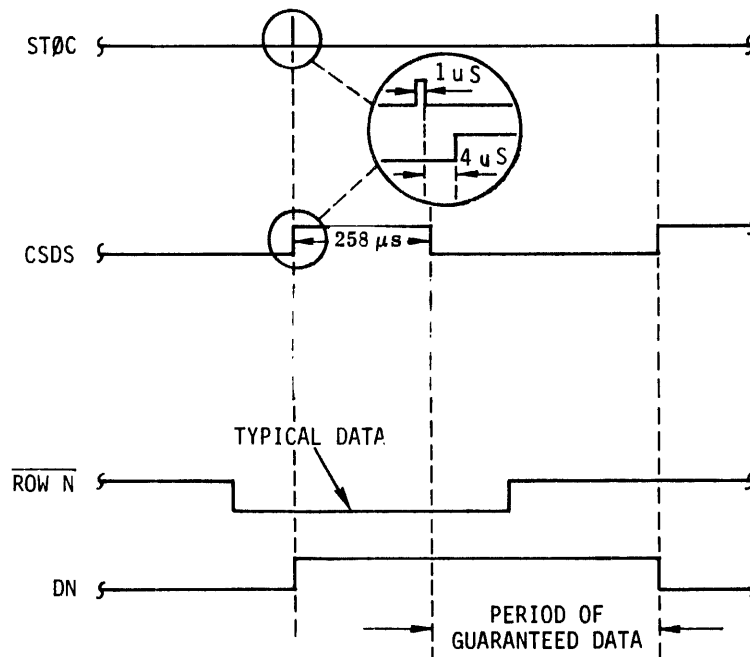
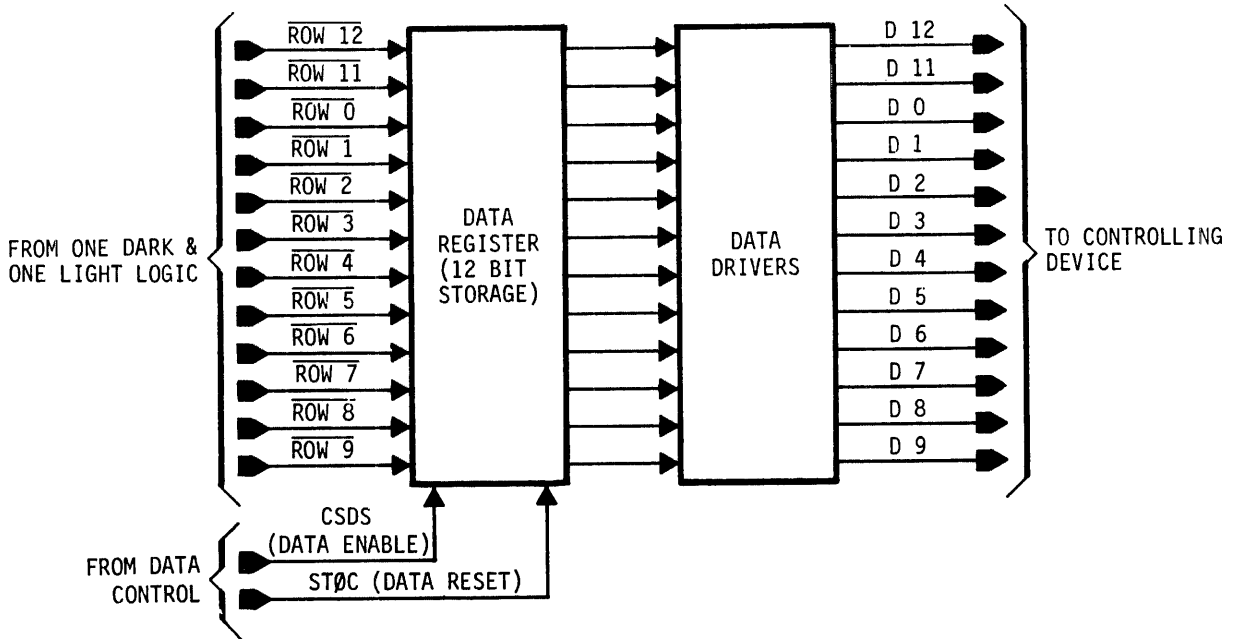


Figure 4-12. Block and Timing Diagram, Data Register and Data Drivers

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 Amplifiers and Inverters

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 close to 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 M1200 punched card reader and the equipment into which it transfers data.

5.2 INTERFACE CARDS

All interface signals are processed by and/or routed through the Interface Cards as shown in Figure 5-1. The Driver Card and Receiver Card contain Differential Line Drivers and Receivers. The Differential Line Drivers and Receivers transmit differential outputs and receive differential inputs providing rejection of large common mode signals while responding to small differential signals.

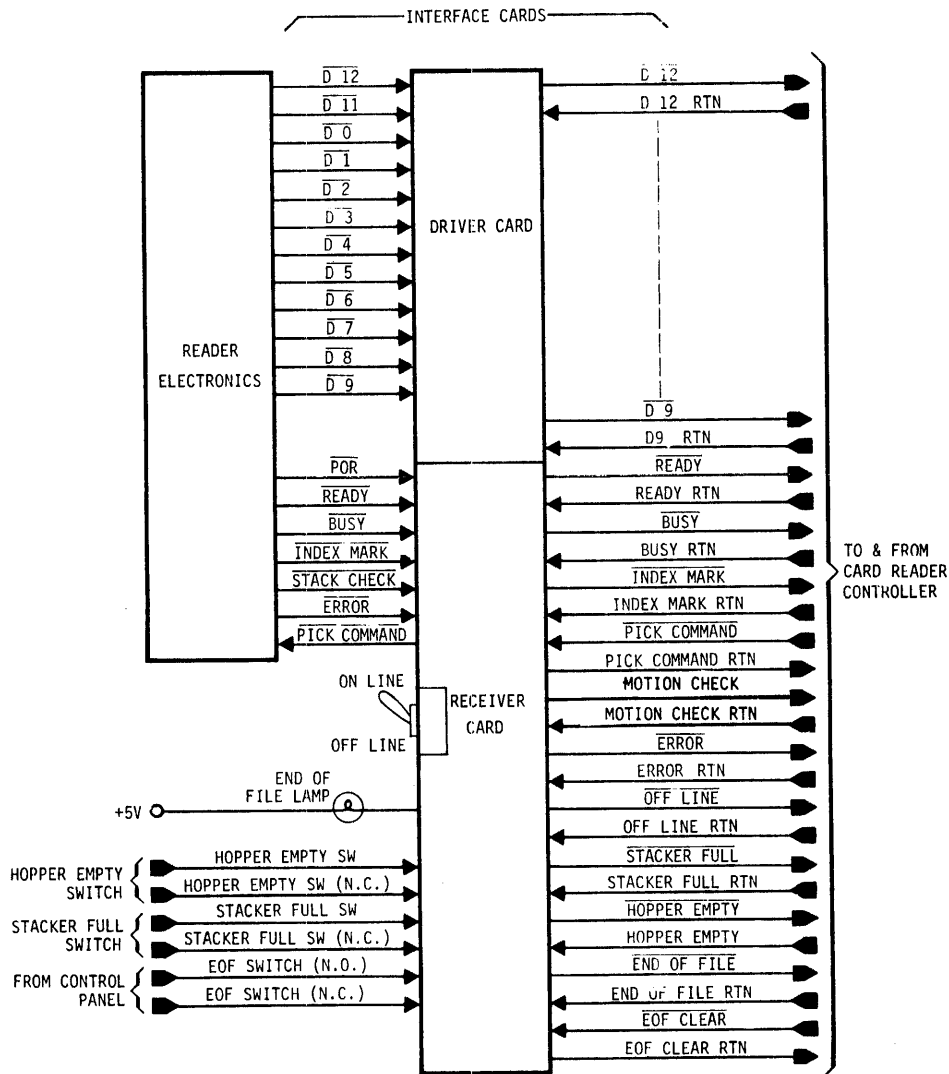


Figure 5-1. Block Diagram, Interface Cards

Figure 5-1 is a block diagram showing the interconnections between the Interface Cards, Reader Electronics, Reader Control Panel and Card Reader Controller. The following is a description of each of those interconnections and their functions.

Signal	Description
D12 through D9	D12 through D9 are converted to differential outputs by the Driver Card.
POR	Power On Reset (POR) is used by the Receiver to initialize the End of File logic.
READY BUSY INDEX MARK STACK CHECK ERROR PICK COMMAND	These signals are converted to differential outputs by the Receiver Card. The Receiver Card accepts a differential input signal and generates PICK COMMAND to the Reader Electronics. Logic is provided on the Receiver Card to generate a continuous PICK COMMAND to the Reader Electronics when in the OFF LINE mode of operation.
HOPPER EMPTY SW. HOPPER EMPTY SW. (N.C.) STACKER FULL SW. STACKER FULL SW. (N.C.)	The Receiver Card contains debounce Flip Flops for the Hopper Empty and Stacker Full switches. The Flip Flops drive differential line drivers on the Receiver Card.
EOF SWITCH (N.O.) EOF SWITCH (N.C.)	Depressing the END OF FILE Control Panel Switch will cause the Receiver Card to generate a differential End of File signal to the Card Reader Controller. The EOF SWITCH (N.O.) and (N.C.) inputs are used to set and reset a debounce Flip Flop on the Receiver Card. The output of this Flip Flop drives the clock input of the End of File Flip Flop. Each time the switch is depressed and released a clock edge is generated causing the End of File Flip Flop to toggle.

END OF FILE LAMP

The End of File Lamp is located in the EOF switch housing. Each time the End of File Flip Flop is set the lamp will light.

EOF CLEAR

The Receiver Card receives a differential EOF CLEAR signal and clears the End of File Flip Flop.

5.3 TIMING

In interfacing the M1200 card reader 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.

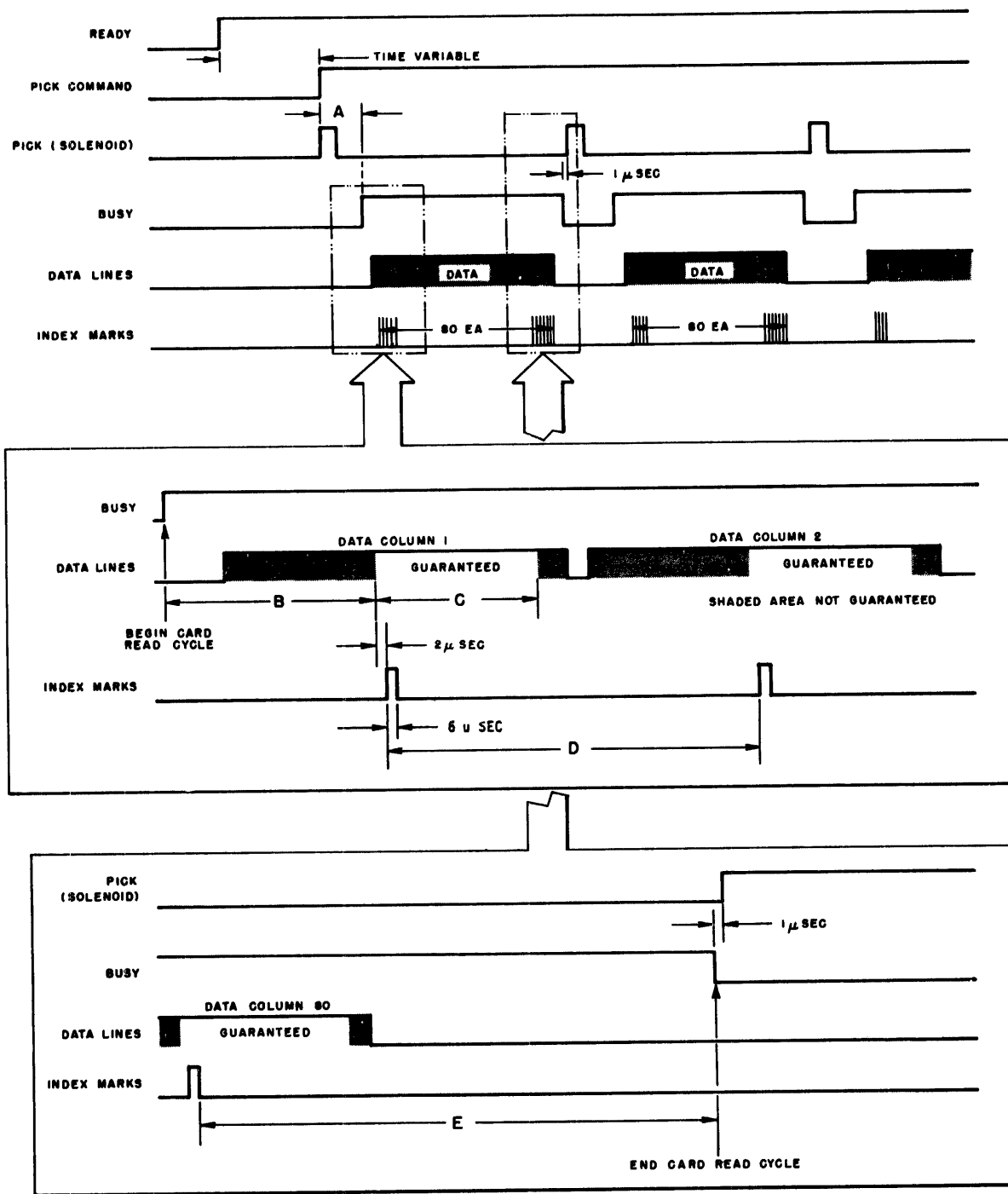
5.3.1 PICK CONTROL

The PICK COMMAND initiates the card read cycle, and depending upon its duration, the card reader will either continuously 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 RESET indicator on the front control panel illuminated green.

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

1. Power applied and the 6-second run-up completed.
2. The input hopper has been loaded.
3. ON LINE is selected by the ON LINE/OFF LINE 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, 5-2), 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.



NOTE:
WAVEFORMS NOT SHOWN TO SCALE.

MODEL	A (min)	B	C	D	E	CARD PICK CYCLE
M1200	14	1120	240	405	1529	50
	M SEC	u SEC	u SEC	u SEC	u SEC	M SEC

Figure 5-2. Interface Timing Diagram

To initiate the card pick cycle, the PICK COMMAND must be present for at least 1 microsecond (μ s) 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 1μ s of the BUSY signal going FALSE.

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.

5.3.2 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 6μ s 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 5-2.

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 Documentation 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 2μ s prior to the Index Mark.

By the time the Index Mark is generated, the data will have been read, stored, and the data lines should have settled. Data levels are guaranteed to remain on the output lines available for transfer to the external equipment for interval C. The data lines may actually remain TRUE longer than the guaranteed period; however, the absolute duration of the data signal is not controlled as it will vary slightly due to variations in the track speed of the card reader.

5.3.3 ALARMS

A description of the standard alarm signals provided in the M 1200 reader follows:

5.3.3.1 Hopper Empty

The HOPPER EMPTY signal goes TRUE when the last card has been fed from the input hopper. When the hopper goes empty and the AUTO/MANUAL switch is on the AUTO position, the blower is automatically switched off. When the input hopper is reloaded and RESET depressed, the blower will turn on.

5.3.3.2 Stacker Full

The STACKER FULL signal goes TRUE when the stacker reaches its card capacity. The STACKER FULL condition can only be reset after sufficient cards are removed to eliminate the full-to-capacity condition.

5.3.3.3 End of File

The END OF FILE (EOF) signal is TRUE when the EOF switch indicator illuminates green. The EOF condition can be reset by depressing the EOF switch or the RESET switch.

5.3.3.4 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.

5.3.3.5 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 MOTION 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.

5.4 CONNECTOR

A 50 pin Winchester connector P/N MRAL-50-S-J-602, provides access for all control, data and alarm lines.

The connector pin assignment configuration is listed as follows:

J2 I/O SIGNAL CONNECTOR PIN LIST

<u>PIN</u>	<u>SIGNAL</u>	<u>DESCRIPTION</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>DESCRIPTION</u>
A	D12	Row 12 Data	<u>e</u>	HOPPER EMPTY	Hopper Empty
E	D12 RTN	Row 12 Data Return	<u>k</u>	HOPPER EMPTY RTN	Hopper Empty Rtn
B	D11	Row 11 Data	<u>p</u>	MOTION CHECK	Motion Check
F	D11 RTN	Row 11 Data Return	<u>u</u>	MOTION CHECK RTN	Motion Check Rtn
C	DO	Row 0 Data	<u>f</u>	PC	Pick Command
H	DO RTN	Row 0 Data Return	<u>m</u>	PC RTN	Pick Command Rtn
D	D1	Row 1 Data	<u>n</u>	BUSY	Busy
J	D1 RTN	Row 1 Data Return	<u>t</u>	BUSY RTN	Busy Return
K	D2	Row 2 Data	<u>r</u>	IM	Index Mark
P	D2 RTN	Row 2 Data Return	<u>v</u>	IM RTN	Signal Ground
L	D3	Row 3 Data	<u>y</u>	STACKER FULL	Stacker Full
R	D3 RTN	Row 3 Data Return	<u>cc</u>	STACKER FULL RTN	Stacker Full Rtn
M	D4	Row 4 Data	<u>w</u>	EOF CLEAR	End of File Clear
S	D4 RTN	Row 4 Data Return	AA	EOF CLEAR RTN	End of File Clear
N	D5	Row 5 Data			
T	D5 RTN	Row 5 Data Return			
U	D6	Row 6 Data	<u>x</u>	EOF	End of File
Y	D6 RTN	Row 6 Data Return	BB	EOF RTN	End of File Rtn
V	D7	Row 7 Data	<u>z</u>	OFF LINE	Off Line
Z	D7 RTN	Row 7 Data Return	DD	OFF LINE RTN	Off Line Return
W	D8	Row 8 Data	HH	+5V	+5 Volts
<u>a</u>	D8 RTN	Row 8 Data Return	<u>s</u>	SPARE	
<u>d</u>	D9	Row 9 Data	FF	SPARE	
<u>i</u>	D9 RTN	Row 9 Data Return	EE	SPARE	
X	RDY	Ready			
<u>b</u>	RDY RTN	Ready Return			
<u>c</u>	ERROR	Error			
<u>h</u>	ERROR RTN	Error Return			

5.5 SIGNAL CHARACTERISTICS

The interface signal sense of Receiver and Driver Cards is a differential signal consisting of the signal line going to ground and the signal line's return going to Vcc. Circuit characteristics are shown in figure 5-3.

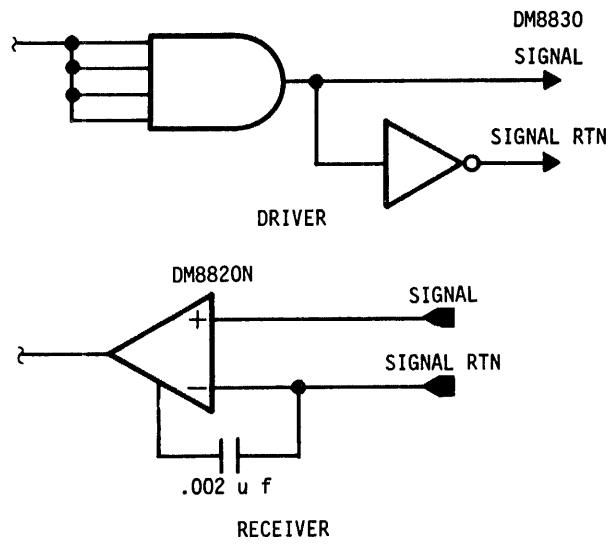


Figure 5-3. Receiver and Driver Card Interface, Circuit Characteristics

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 adjustments in this section, it will be necessary to remove one or more of the following: the top rear panel, the shroud, the bottom rear panel, the track cover, or the control panel hood. These procedures are:

6.1.1 TOP REAR PANEL

Using a #2 Phillips screwdriver, remove the three screws and flat washers ① and LOOSEN the three screws ② which hold the top rear panel to the main frame, figure 6-1. Slide top rear panel to left and move it out slightly. Disconnect fan motor connector and remove top rear panel.

6.1.2 SHROUD

Using a #2 Phillips screwdriver, remove the two screws ② from the front of the shroud, figure 6-2. Using the same tool, LOOSEN the six screws ③ which hold the shroud to the main frame, figure 6-1. With both hands grasp the shroud at the points indicated ④. Spread shroud and carefully lift it over top of card reader.

6.1.3 BOTTOM REAR PANEL

Using a #2 Phillips screwdriver, remove the four screws and flat washers ⑤ which hold the bottom rear cover to the cabinet frame, figure 6-1. Move panel out slightly, disconnect fan motor connector and remove bottom rear panel.

6.1.4 TRACK COVER

Using a 5/64 Allen wrench, remove the four screws ① which secure the track cover to the main frame and remove the track cover, figure 6-2.

6.1.5 CONTROL PANEL HOOD

Using a 5/64 Allen wrench, remove the three screws on right side of the control panel hood (as viewed from back of cabinet), figure 6-1. Using a 5/64 Allen wrench, remove the two screws left side of the control panel hood.

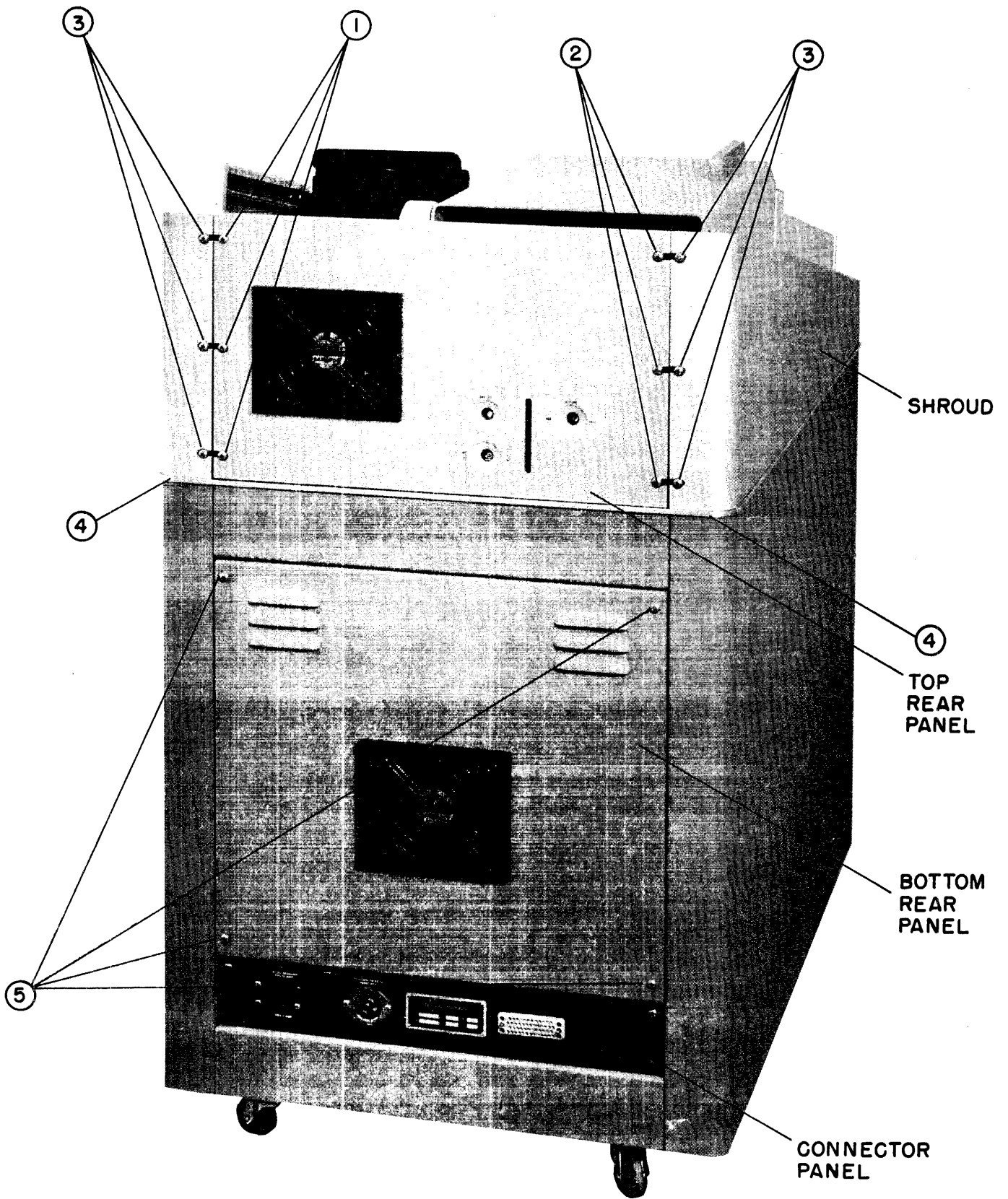


Figure 6-1. Card Reader Console, Rear View

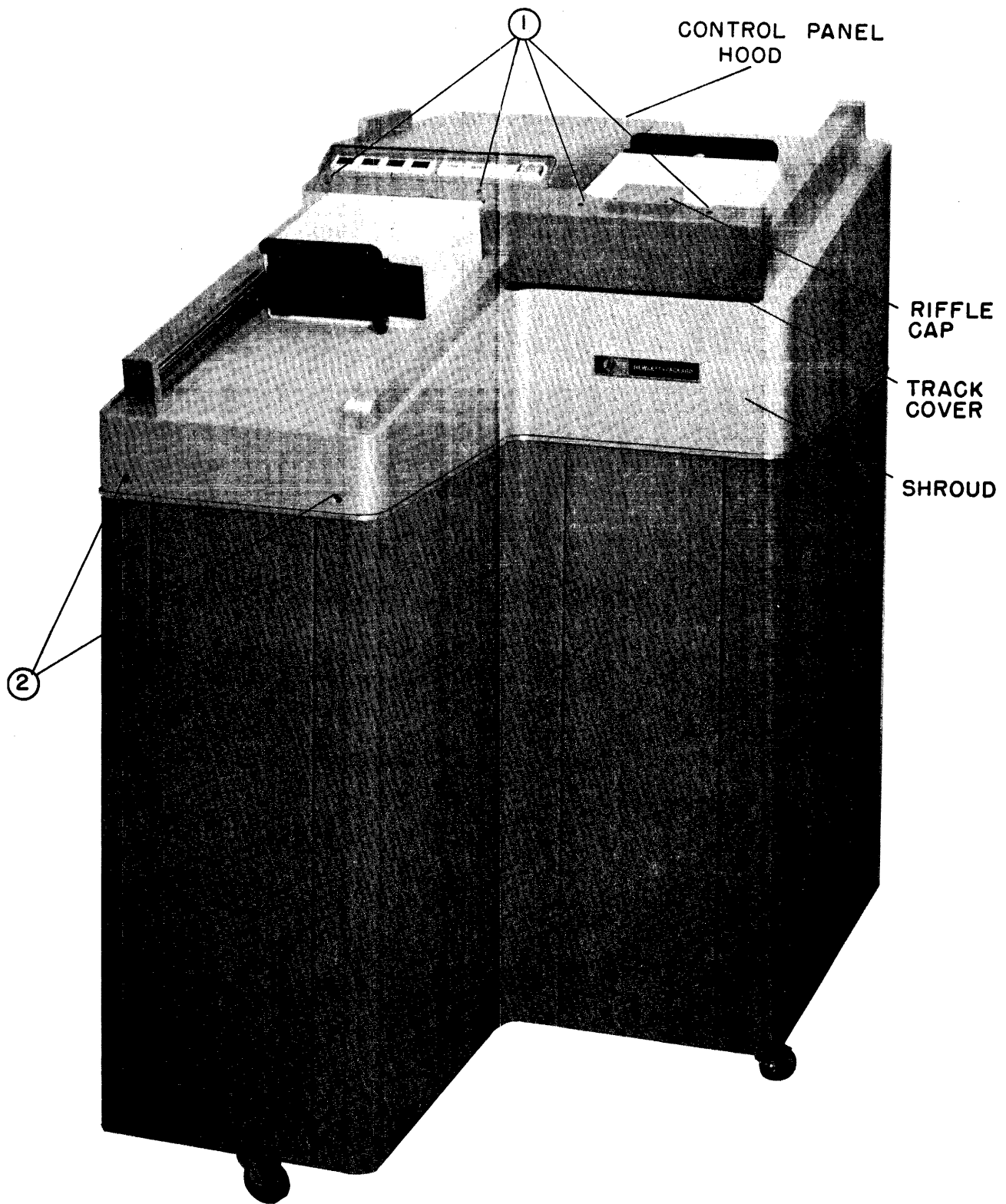


Figure 6-2. Card Reader Console, Front View

6.2 TENSION ON THE MAIN DRIVE MOTOR BELT

For access to the main drive motor, remove the shroud per paragraph 6.1.2 and the top rear panel per paragraph 6.1.1. The drive motor belt tension is adjusted to ensure constant card speed and timing.

- a. Using a 9/64 Allen wrench, LOOSEN the four motor mounting plate screws, figure 6-3.

CAUTION

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

- b. Move the motor mounting plate back and forth to be sure it slides freely. Attach spring scale to motor so that pulling on spring scale from the rear of card reader and in line with the motor mounting slots will apply tension to the main drive motor belt. Pull on spring scale until it reads 24 ounces. Hold tension at that level and tighten the four motor mounting plate screws.
- c. Replace shroud and top rear panel.

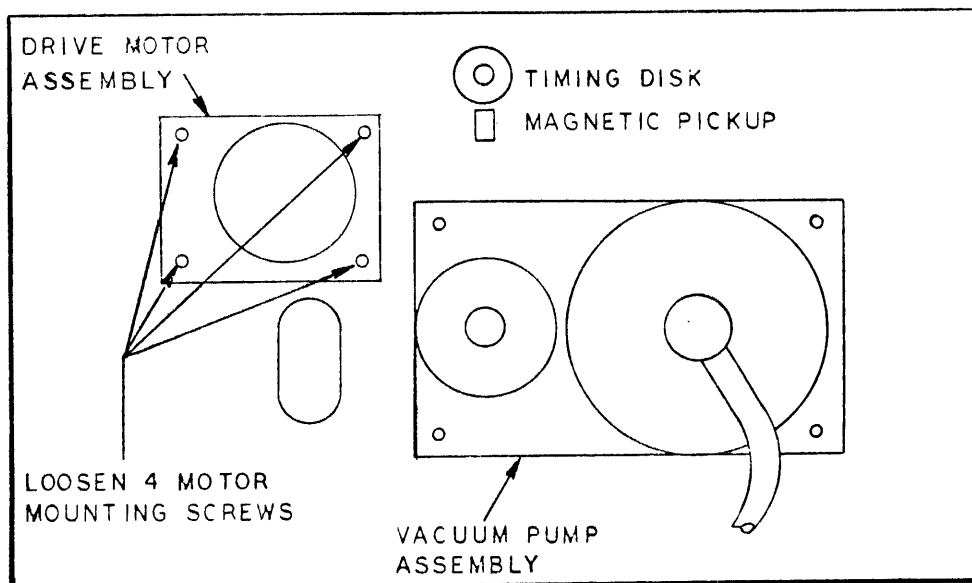


Figure 6-3. Drive Motor, Magnetic Pickup, and Vacuum Pump, Top Plate Assembly

6.3 MAGNETIC PICKUP ADJUSTMENT

The magnetic pickup is adjusted to ensure that the timing pulses are developed correctly. There are two adjustments to the magnetic pickup. They are horizontal alignment and air gap. Refer to figures 6-3 and 6-4. Remove the shroud per paragraph 6.1.2.

- a. Position the timing disc on the drive roller shaft so that it is in a horizontal plane with the center of the magnetic pickup tip. This is accomplished by using a 5/64 Allen wrench and LOOSENING the set screw that is holding the timing disc on the drive roller shaft.

CAUTION

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

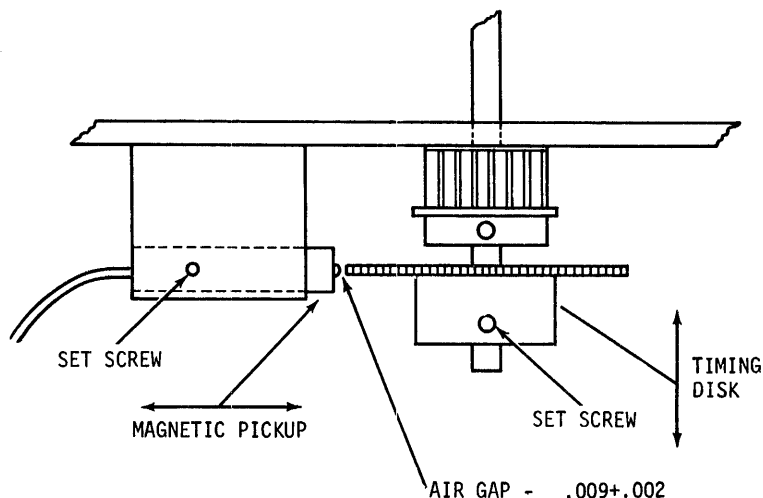


Figure 6-4. Magnetic Pickup Adjustment

- b. Align the disc in the correct position and tighten the set screw, making sure that the set screw is tightened on the flat side of the shaft.
- c. To adjust the air gap between the magnetic pickup and the timing disc, LOOSEN the set screw holding the magnetic pickup in its mounting block and reposition the pickup. The air gap should be set to $.009 \pm .002$ inches.
- d. Rotate the timing disc and check two other positions to make sure that the air gap is maintained.
- e. Replace shroud.

6.4 ADJUSTMENT OF STACK PHOTOCELL

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

Remove the track cover per paragraph 6.1.4 and the control panel hood per paragraph 6.1.5. For access to the photocell set screw, it is necessary to remove the top drive roller of the fourth stacker roller.

- a. Using a 1/16 Allen screwdriver, LOOSEN the set screw in the drive roller and remove the roller, figure 6-5.
- b. Using the same tool, LOOSEN the set screw in the stacker casting which holds the stack photocell.
- c. Align the lens of the photocell flush with the surface of the stacker casting by means of the wiring attached to the photocell. Tighten the photocell set screw.
- d. Replace the drive roller and adjust for proper preload per paragraph 6.5.
- e. Replace track cover and control panel hood.

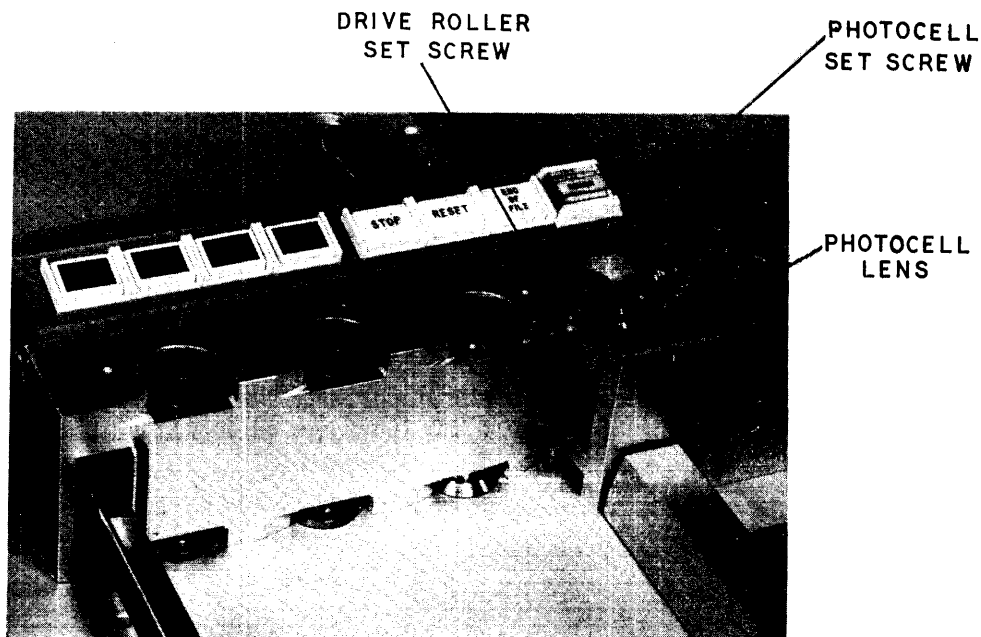


Figure 6-5. Location of Photocell and Photocell Set Screw

6.5 STACKER ROLLER SHAFT BEARING PRELOAD

The preload of the bearings on the drive and stacker roller shafts is very important. This ensures that there is no detectable end play in the shafts. If there is any detectable end play, excessive wear of the support bearings will result. Remove the shroud per paragraph 6.1.2 and the track cover per paragraph 6.1.5.

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

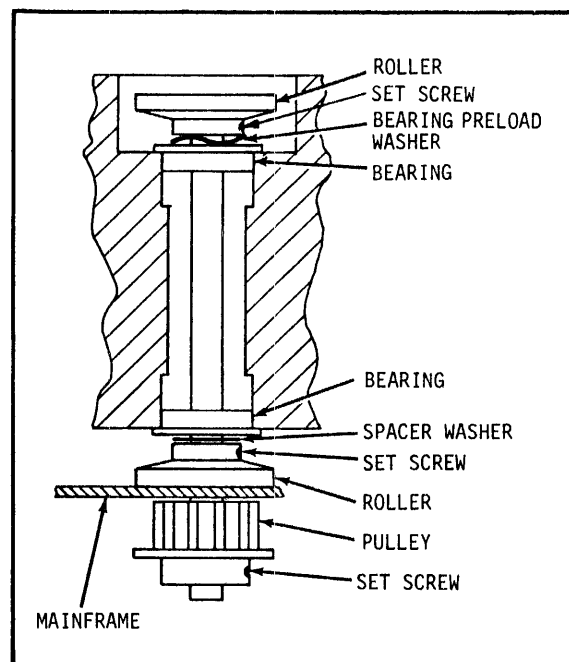


Figure 6-6. Roller Shaft Bearing Preload Adjustment

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

NOTE

The size of the gauge required may be different for each shaft.

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

- f. Replace shroud and track cover.

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

6.6 HOPPER EMPTY SWITCH ADJUSTMENT

The adjustment of the hopper empty switch, located under the riffle air cap, ensures the input hopper empty condition is detected. Remove the track cover per paragraph 6.1.4.

- a. Using a 3/32 Allen wrench, remove the two screws holding the riffle air cap, figure 6-2.
- b. Check that the operating arm of the switch is parallel to the top of the picker casting, and that the arm is not bent.

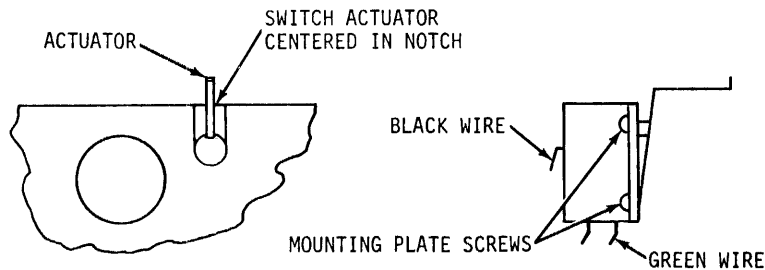


Figure 6-7. Hopper Empty Switch Adjustment

- c. Using a 1/16 Allen screwdriver, LOOSEN the two screws holding the switch mounting plate, figure 6-7.
- d. Center the switch arm in the picker casting counterbore. Exert slight pressure on the switch arm, pressing arm into casting. Tighten switch mounting plate set screws.
- e. Replace riffle air cap.
- f. Replace track cover.

6.7 STACKER FULL SWITCH ADJUSTMENT

The stacker full switch is adjusted to ensure that when the output stacker becomes full, the condition is detected. Remove the shroud per paragraph 6.1.2.

- a. Place approximately one inch of cards in the hopper. Depress the POWER switch placing the machine in operation.

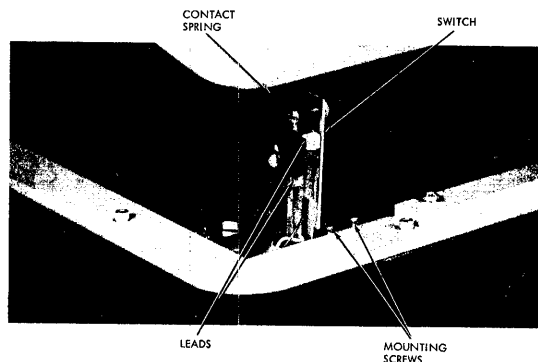


Figure 6-8. Stacker Full Switch Adjustment

- b. After a few moments, the STOP indicator should illuminate. Pull the stacker follower toward the front of the reader. Approximately 1/8" before the end of travel, the HOPPER/STACKER indicator should illuminate. If this condition is not met, the stacker full switch must be repositioned.
- c. Using a small Phillips screwdriver, LOOSEN the two screws retaining the stacker full switch bracket, figure 6-8.
- d. Adjust the switch bracket horizontally until the HOPPER/STACKER indicator illuminates when the stacker follower is approximately 1/8" before the end of travel. Secure the bracket mounting screws.
- e. Replace shroud.

6.8 PICKER SECTOR ADJUSTMENT

The picker sector is adjusted to ensure that cards are picked properly. There are six adjustments to the picker sector assembly; the height, the vacuum adapter air gap, the rest stop, the throat block, the solenoid coupling, and the forward bumper stop. Remove the shroud per paragraph 6.1.2 and the track cover per paragraph 6.1.4.

CAUTION

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

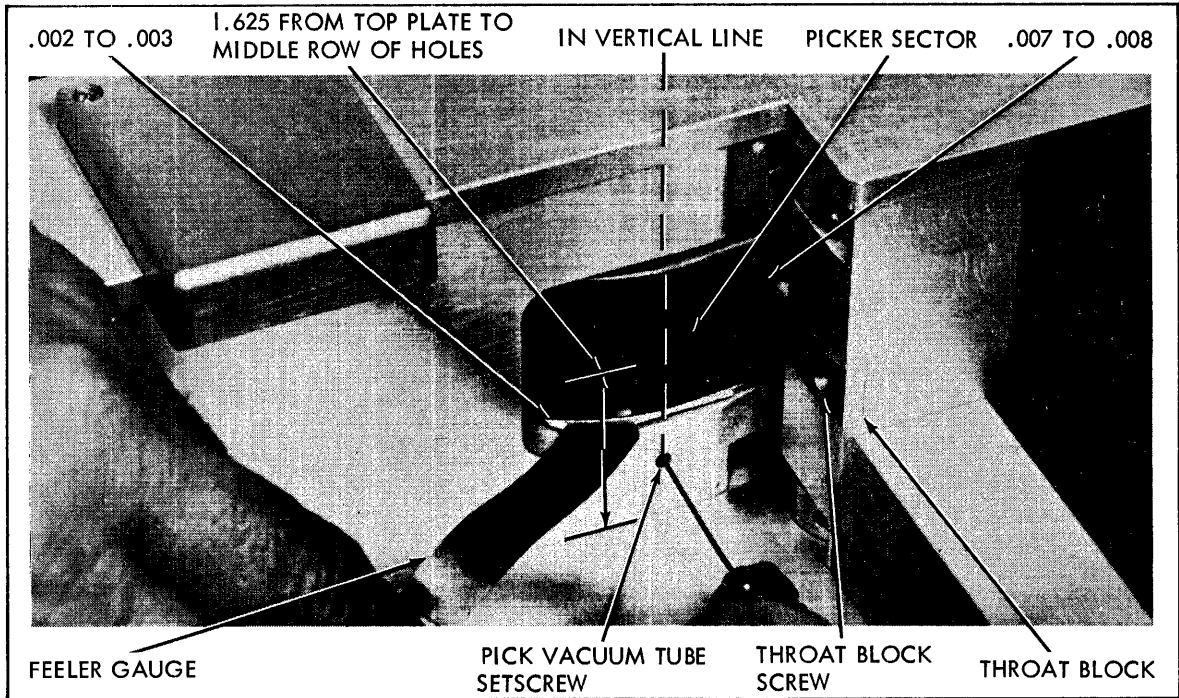
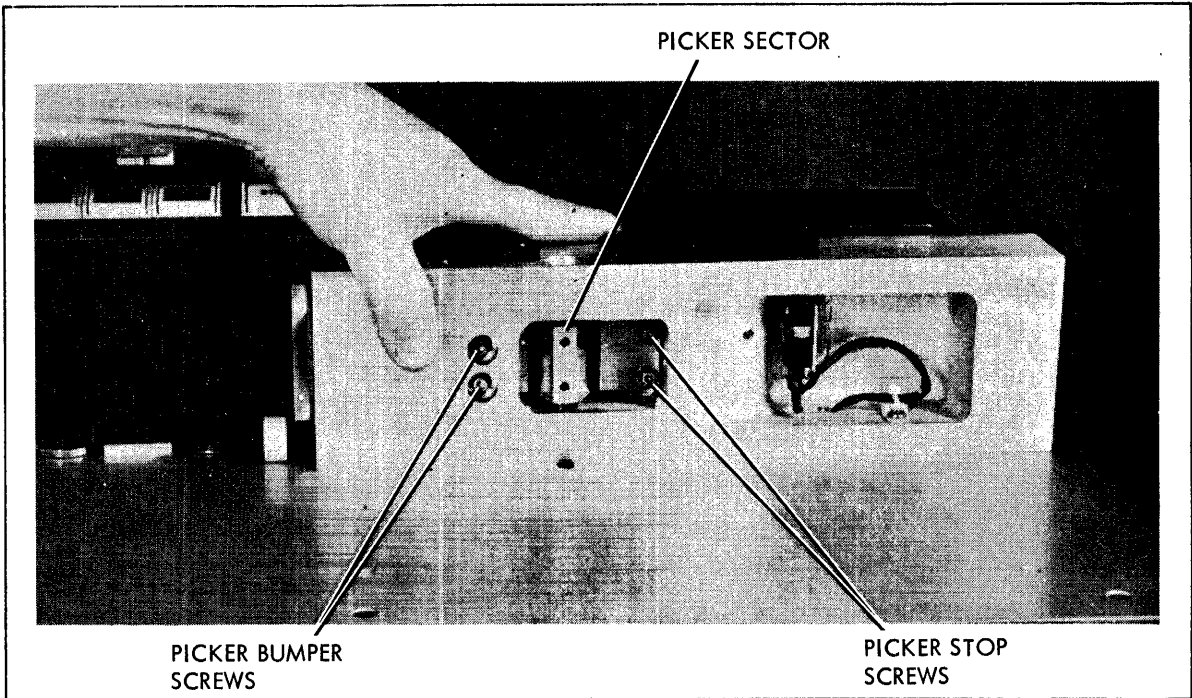


Figure 6-9. Picker Sector Adjustment

- a. Check the picker sector height adjustment. Using a 6" steel rule, measure the distance from the top of the mainframe to the center of the middle row of holes in the picker sector. This should be exactly 1-5/8", figure 6-9.
- b. If the height of the picker sector requires adjustment, use a 5/64 Allen wrench and LOOSEN the set screws in the back of the picker sector, figure 6-9.
- c. Adjust the picker sector until there is exactly 1-5/8" between the mainframe and the center of the middle rows of holes on the picker sector.
- d. Check the air gap adjustment between the picker sector and the vacuum adapter plate. The clearance between the sector and the plate is .002 to allow for maximum vacuum with free sector travel.

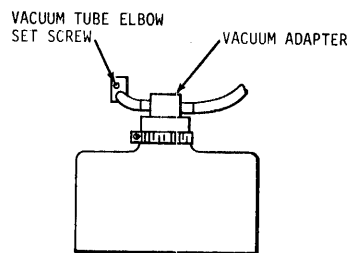


Figure 6-10. Removal of Vacuum Tube Adapter

- e. Using a .050 Allen wrench, LOOSEN the set screw in the vacuum tube adapter elbow located on the underside of the mainframe, figure 6-10. Remove the elbow from the sleeve. Prop open the hopper using about 1" of cards inserted at a right angle.
- f. Using a .050 Allen wrench, LOOSEN the vacuum adapter plate set screw, figure 6-9.
- g. Insert a .002 feeler gauge between the picker sector and the vacuum adapter plate. From the bottom side of the mainframe push the vacuum adapter plate upward. Exert upward pressure and tighten the vacuum adapter plate set screw.
- h. Replace the vacuum tube adapter elbow.

- i. Check the picker sector rest position. The back edge of the last row of holes on the picker sector should line up with the middle of the vacuum adapter plate set screw hole. The position is established by placement of the rest stop.
- j. Using a 5/64 Allen wrench, LOOSEN the two rest stop socket head screws.
- k. Using a 6" steel rule to gauge the picker sector rest position, and while holding the picker sector firmly in alignment push the rest stop against the picker sector and tighten the screws.
- l. Check the gap between the throat block and the 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 the screw holding the throat block.
- n. Place an .008 feeler gauge between the throat block and the picker sector face.
- o. Exert slight pressure on the rear of the throat block and tighten the mounting screw.
- p. Check the solenoid coupling adjustment. The solenoid coupling is used to transfer the rotational solenoid motion to the picker sector.
- q. Using a 1/16 Allen screwdriver, LOOSEN the two set screws in the top of the solenoid coupling, figure 6-11.
- r. Preload the solenoid coupling by depressing the top of the solenoid coupling. Sufficient pressure should be exerted to result in .010 clearance between the wafers of the coupling. This may be checked using a feeler gauge.
- s. While maintaining the proper pressure on the coupling, tighten the two set screws ensuring the set screws are on the flats of the shaft. 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 the rest position. If the picker sector does not return to the rest position, the coupling has been compressed too far. Test for this latter condition by operating the picker sector manually while power is applied, vacuum is applied, and cards are in the input hopper.
- t. Check the adjustment of the picker sector bumper. This bumper is used to limit the picker sector over-travel to .020 inches beyond the point where the card is delivered to the pinch rollers.

- u. The adjustment must be made with the machine operating. Place about 2" of cards in the input hopper. Depress the POWER switch. With the reader in "off-line", depress the RESET switch and run a few cards into the stacker. Depress the STOP switch.
- v. Manually operate the picker sector. Note the point at which the card reaches the pinch rollers. After the card is picked, there should be approximately .020" of over-travel of the sector before it reaches the bumper.
- w. Using a 9/64 Allen wrench, LOOSEN the two picker bumper socket head screws, figure 6-9.
- x. Adjust the picker bumper to the proper position and tighten the screws.
- y. Replace shroud and track cover.

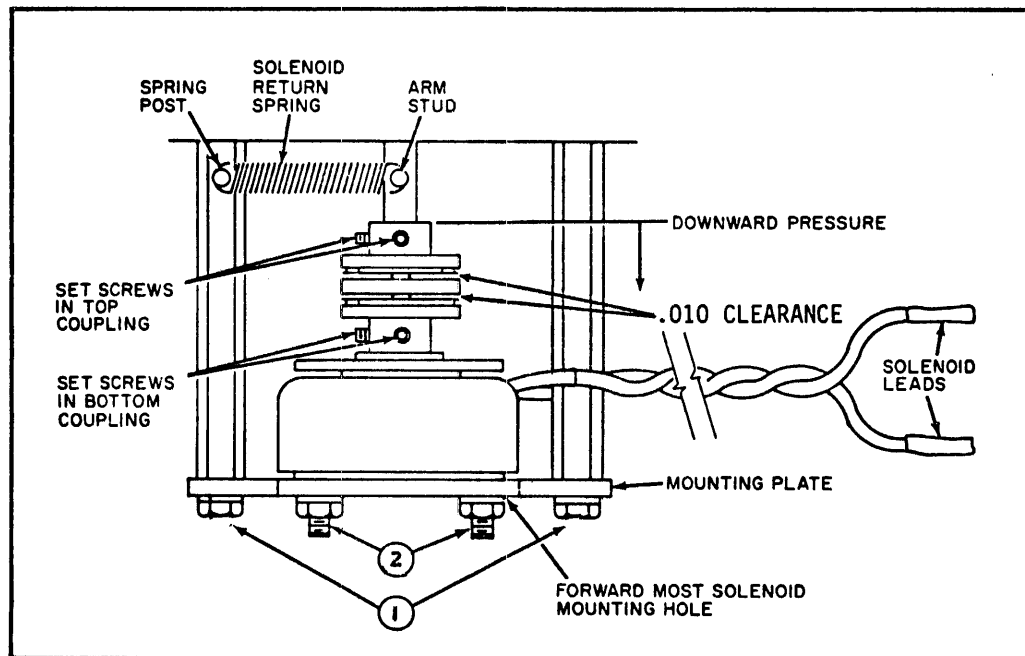


Figure 6-11. Solenoid Preload Adjustment

6.9 VACUUM PUMP BELT TENSION ADJUSTMENT

The top vacuum/blower provides the picker vacuum. The vacuum pump belt tension can be adjusted without removing the vacuum/blower. Remove the shroud paragraph 6.1.2 and the top rear panel per paragraph 6.1.1, then perform steps g. through i. Replace shroud and top rear panel.

The bottom vacuum/blower provides the riffle air and must be removed in order to adjust the vacuum pump belt tension. Remove the bottom rear panel per paragraph 6.1.3, then perform the following:

- a. Remove the rubber hood from the motor run capacitor and disconnect the red and blue clip leads, figure 6-12.
- b. Remove the yellow clip lead from the solid state relay.
- c. Loosen the vacuum adapter clamp on the top of the pump and remove from the pump.
- d. Using a Phillips screwdriver, remove the ground straps from the pump mounting plate.

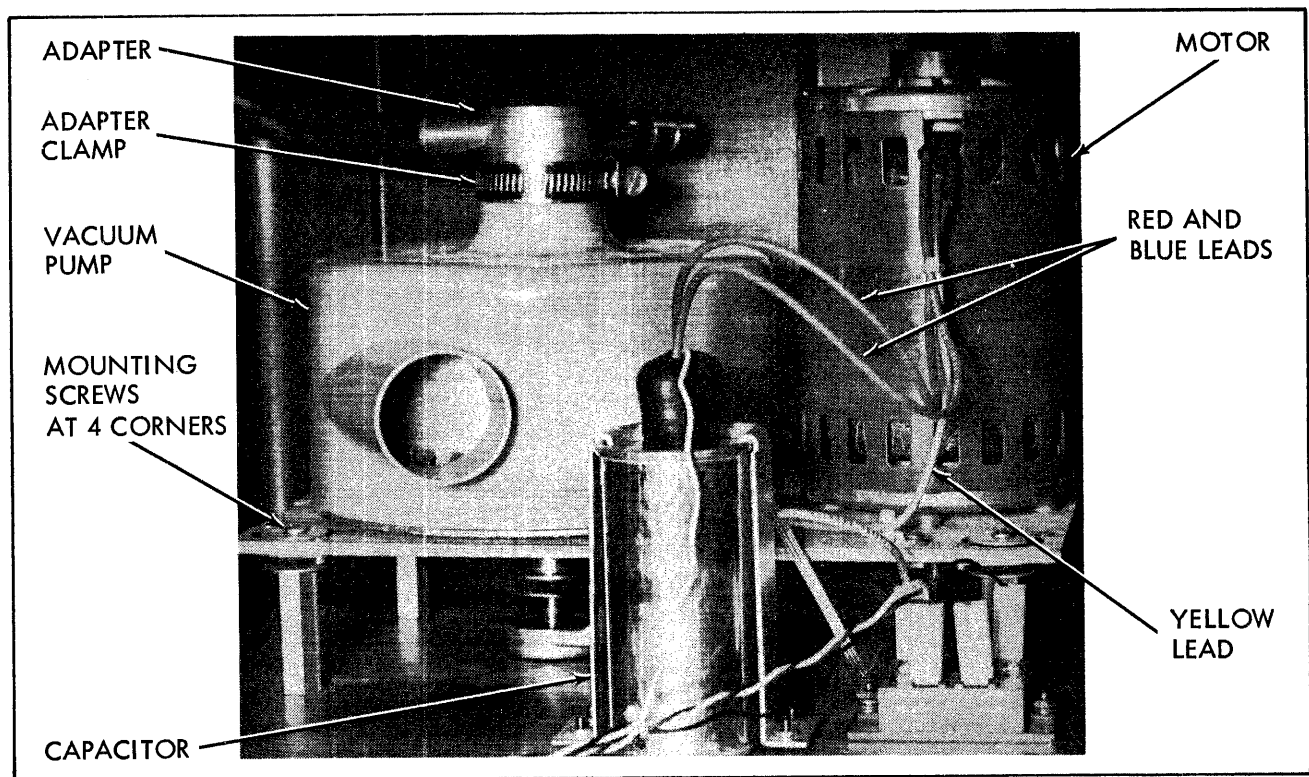


Figure 6-12. Bottom Vacuum Pump Assembly Removal

CAUTION

BE SURE TO USE THE OPEN-END WRENCH TO AVOID TWISTING OFF THE PUMP PLATE RUBBER SHOCK MOUNTS.

- e. Using a 1/2" open-end wrench to hold the mounting post, remove the four Phillips head screws located on the pump assembly.
- f. Remove the pump assembly from the baseplate.
- g. Using a 7/16" open-end wrench, LOOSEN the three bolts holding the pump assembly in place, figure 6-13.
- h. Using a spring scale, adjust for approximately 4 to 6 ounces of tension to the belt. This should cause the belt to deflect 3/64 inch when properly adjusted.
- i. Check the pulleys to make sure they are in the same plane. Also check the motor pulley set screw to make sure it is secure.
- j. Install the pump in the reverse order of disassembly and check the reader for proper operation.
- k. Replace bottom rear panel.

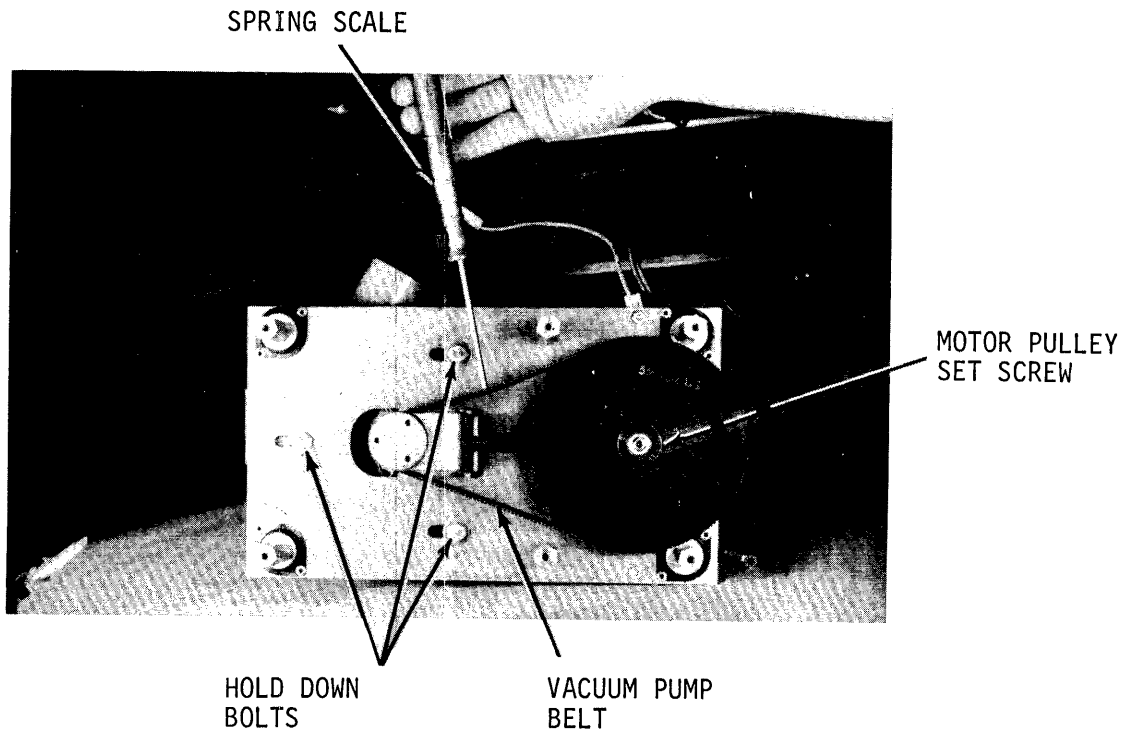


Figure 6-13. Vacuum/Blower Motor Belt Tension Adjustment

SECTION 7

PREVENTIVE MAINTENANCE

7.1 GENERAL

The following paragraphs provide information for preventive maintenance and general care of the M1200 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 four button head 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 grease, HP #6040-0222, to each of the three roller grease points (Figure 7-1).

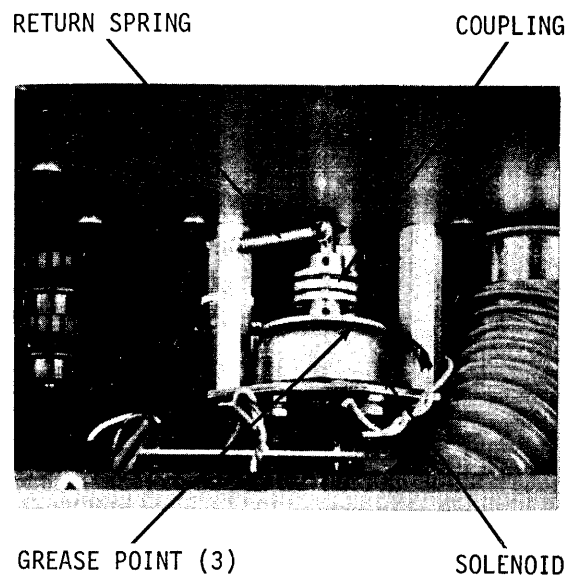


Figure 7-1. Solenoid Lubrication

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 ON indicator fails to light.	<ol style="list-style-type: none"> 1. Power cord is not connected to reader or power source. 2. Circuit breaker CB1 is not on 3. Fuse F1 is defective. 4. Lamp is burned out. 5. +5 volt power regulator defective. 	<ol style="list-style-type: none"> 1. Connect power cord to reader and power source. 2. Place circuit breaker CB1 to ON position. 3. Replace F1. 4. Replace lamp. 5. Replace +5 volt power regulator.
A given lamp fails to light when LAMP TEST switch is activated (POWER ON and END OF FILE indicator excluded).	<ol style="list-style-type: none"> 1. Lamp is burned out. 2. Defective Error Card. 	<ol style="list-style-type: none"> 1. Replace defective lamp. 2. Replace Error Card.
When LAMP TEST switch is activated, none of the lamps on the control panel will light. (POWER ON and END OF FILE indicator excluded).	<ol style="list-style-type: none"> 1. Defective lamp test switch. 2. Defective Error Card 	<ol style="list-style-type: none"> 1. Replace lamp test switch. 2. Replace Error Card.
HOPPER/STACKER indicator does not light when hopper goes empty or stacker goes full. No other error indications.	<ol style="list-style-type: none"> 1. Lamp is burned out. 2. Defective Error Card. 	<ol style="list-style-type: none"> 1. Replace lamp. 2. Replace Error Card.
HOPPER/STACKER indicator does not light when hopper goes empty and MOTION CHECK indicator is lit.	<ol style="list-style-type: none"> 1. Hopper empty switch not adjusted properly. 2. Defective hopper empty switch. 	<ol style="list-style-type: none"> 1. Adjust hopper empty switch per paragraph 6. 6. 2. Replace hopper empty switch.

SYMPTOM	PROBABLE CAUSE	REMEDY
HOPPER/STACKER indicator does not light when stacker goes full.	<ol style="list-style-type: none"> 1. Stacker full switch is not adjusted properly. 2. Defective stacker full switch. 	<ol style="list-style-type: none"> 1. Adjust stacker full switch per paragraph 6.7. 2. Replace stacker full switch.
PICK CHECK indicator fails to light when reader makes six attempts and fails to pick a card.	<ol style="list-style-type: none"> 1. Lamp is burned out. 2. Defective Error Card. 	<ol style="list-style-type: none"> 1. Replace lamp. 2. Replace Error Card.
MOTION CHECK indicator fails to light when there is a stack check condition.	<ol style="list-style-type: none"> 1. Lamp is burned out. 2. Defective Error Card. 	<ol style="list-style-type: none"> 1. Replace lamp. 2. Replace Error Card.
PICK CHECK indicator lights regularly after making six pick attempts.	<ol style="list-style-type: none"> 1. Dirty picker sector. 2. Maladjustment of picker stops, vacuum plate, throat clearance, or solenoid coupling. 3. Defective Sync Card. 4. Defective Error Card. 5. Defective Clock Card. 	<ol style="list-style-type: none"> 1. Clean picker sector with denatured alcohol. 2. Readjust picker sector per paragraph 6.8. 3. Replace Sync Card. 4. Replace Error Card. 5. Replace Clock Card.
READ CHECK indicator fails to light when a dark check or light check condition occurs.	<ol style="list-style-type: none"> 1. Lamp is burned out. 2. Column "0" output or Column "81" output is missing from the Clock Card. 3. One light or one dark output missing from the Data Card. 4. Defective Error Card. 	<ol style="list-style-type: none"> 1. Replace lamp. 2. Replace Clock Card. 3. Replace Control Card. 4. Replace Error Card.
Reader picks three cards, and then stops with a MOTION CHECK.	<ol style="list-style-type: none"> 1. Good pick reset output is missing from the Clock Card. 2. Clear pick control is missing on the Sync Card. 3. Pick attempt counter is not being cleared out properly. 	<ol style="list-style-type: none"> 1. Replace Clock Card. 2. Replace Sync Card. 3. Replace Sync Card.

SYMPTOM	PROBABLE CAUSE	REMEDY
Reader picks six cards, and then stops with a PICK CHECK.	Pick attempt counter is not being reset at good pick reset 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 pressing the STOP switch.	<ol style="list-style-type: none"> 1. Column "84" output is missing from the Clock Card. 2. Column strobe phase "B" or phase "D" is missing from Sync Card. 3. Clock phase "C" or phase "D" is missing from Clock Card. 4. Clock phase "B" is missing from Clock Card. 	<ol style="list-style-type: none"> 1. Replace Clock Card 2. Replace Sync Card. 3. Replace Clock Card. 4. Replace Clock Card.
Reader reads erroneous data.	<ol style="list-style-type: none"> 1. Defective Clock Card. 2. Defective Sync Card. 3. Defective Control Card. 	<ol style="list-style-type: none"> 1. Replace Clock Card. 2. Replace Sync Card. 3. Replace Sync Card.
Sharp, metallic noise from picker sector while reading cards.	Picker sector maladjusted.	Adjust picker sector per procedure in paragraph 6. 8.

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 an experienced technician.

To perform any of the repair procedures in this section, it will be necessary to remove one or more of the following: the top rear panel, the shroud, the bottom rear panel, the track cover, or the control panel hood. These procedures are:

9.1.1 TOP REAR PANEL

Use a #2 Phillips screwdriver to remove the three screws and flat washers ① and LOOSEN the three screws ② which hold the top rear panel to the mainframe, figure 9-1. Slide top rear panel to left and move it out slightly. Disconnect fan motor connector and remove top rear panel.

9.1.2 SHROUD

Use a #2 Phillips screwdriver to remove the two screws ② from the front of the shroud, figure 9-2. Using the same tool, LOOSEN the six screws ③ which hold the shroud to the mainframe, figure 9-1. With both hands grasp the shroud at the points indicated ④. Spread shroud and carefully lift it over top of card reader.

9.1.3 BOTTOM REAR PANEL

Use a #2 Phillips screwdriver to remove the four screws and flat washers ⑤ which hold the bottom rear cover to the cabinet frame. Move panel out slightly, disconnect fan motor connector and remove bottom rear panel.

9.1.4 TRACK COVER

Use a 5/64 Allen wrench to remove the four screws ① which secure the track cover to the mainframe and remove the track cover, figure 9-2.

9.1.5 CONTROL PANEL HOOD

Use a 5/64 Allen wrench to remove the three screws on right side of the control panel hood (as viewed from back of cabinet), figure 9-1. Use a 5/64 Allen wrench to remove the two screws left side of the control panel hood.

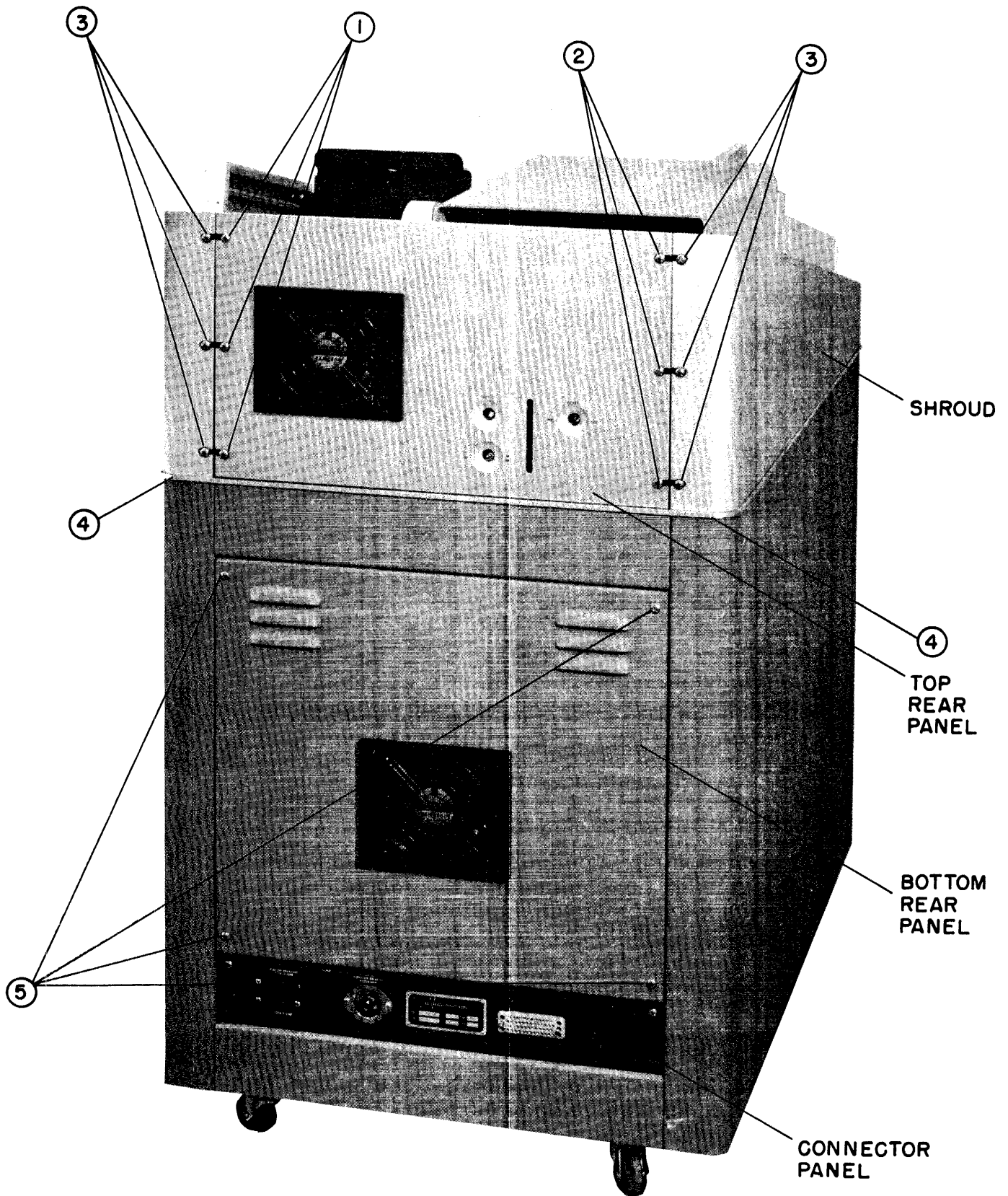


Figure 9-1. Card Reader Console, Rear View

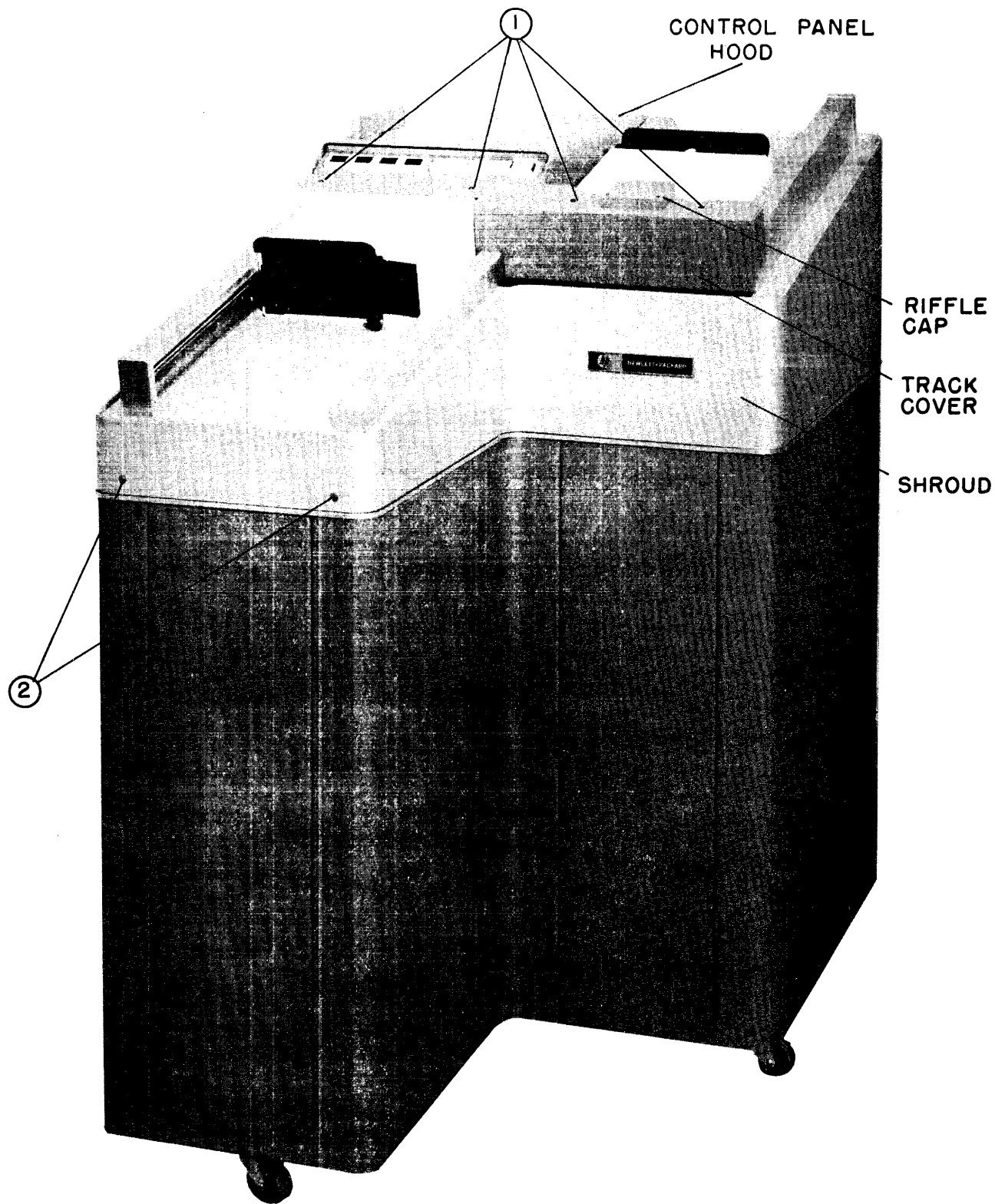


Figure 9-2. Card Reader Console, Front View

9.3 MAIN DRIVE MOTOR BELT

CAUTION

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

- a. Remove the shroud per paragraph 9.1.2 and the top rear panel per paragraph 9.1.1.
- b. Using a 9/64 Allen wrench, LOOSEN three motor mounting plate screws (bottom of mainframe). Remove the fourth motor mounting plate screw, figure 9-3.

CAUTION

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

- c. Using a 5/64 Allen wrench, LOOSEN set screw in timing disc, figure 9-4. Remove timing disc.
- d. Using 3/32 Allen wrench, LOOSEN set screw in fifth stacker roller pulley, figure 9-5.
- e. Remove fifth stacker roller pulley from stacker roller shaft.
- f. Using a 3/32 Allen wrench, LOOSEN set screw in bottom fourth stacker roller pulley.
- g. Remove bottom fourth stacker roller pulley.
- h. Remove main drive motor belt, figure 9-4.

CAUTION

PULLEY CONFIGURATION MUST BE MAINTAINED. ALWAYS REPLACE THE PROPER PULLEY IN ITS CORRECT POSITION ON THE SHAFT (UPPER OR LOWER) AND ON ITS RESPECTIVE SHAFT. FIGURE 9-6 SHOWS THE CORRECT CONFIGURATION.

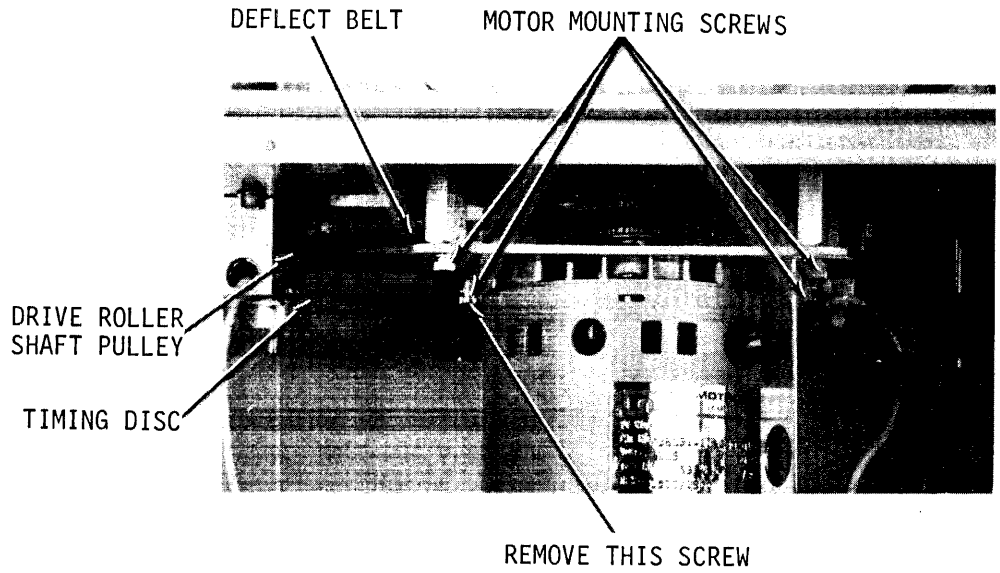


Figure 9-3. Main Drive Motor Mounting

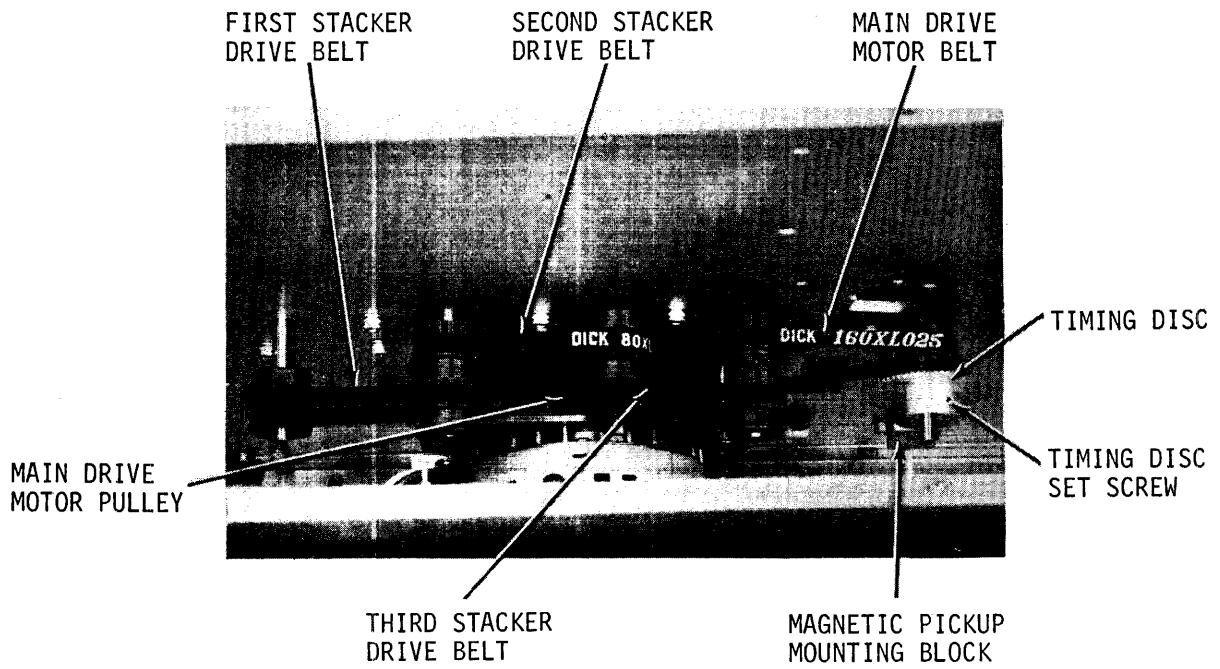


Figure 9-4. Stacker Drive Train Belt Arrangement

- i. Place belt over main drive motor pulley.
- j. Slip belt over upper fourth stacker roller pulley, figure 9-5.
- k. Place belt over fifth stacker roller pulley.
- l. Replace this pulley on fifth stacker roller shaft.
- m. Replace bottom fourth stacker roller pulley.
- n. Locate fourth stacker roller pulley on flat side of shaft and carefully tighten set screw.
- o. Push fifth stacker roller pulley up against mainframe, then pull VERY SLIGHTLY downward making sure pulley is free from mainframe.
- p. Locate fifth stacker roller pulley so that set screw is on flat side of shaft and carefully tighten set screw.
- q. Replace timing disc on fifth stacker roller shaft and tighten set screw lightly.
- r. The main drive motor belt tension must be adjusted first. Refer to paragraph 6.2.
- s. Second, the magnetic pickup and timing disc must be adjusted. Refer to paragraph 6.3.
- t. Replace shroud.

9.4 THIRD STACKER ROLLER DRIVE BELT

CAUTION

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

- a. Remove the shroud per paragraph 9.1.2.
- b. Using a 3/32 Allen wrench, LOOSEN set screw in bottom fourth stacker roller pulley, figure 9-5.
- c. Pull bottom pulley down to disengage third stacker drive belt. Remove pulley and belt.

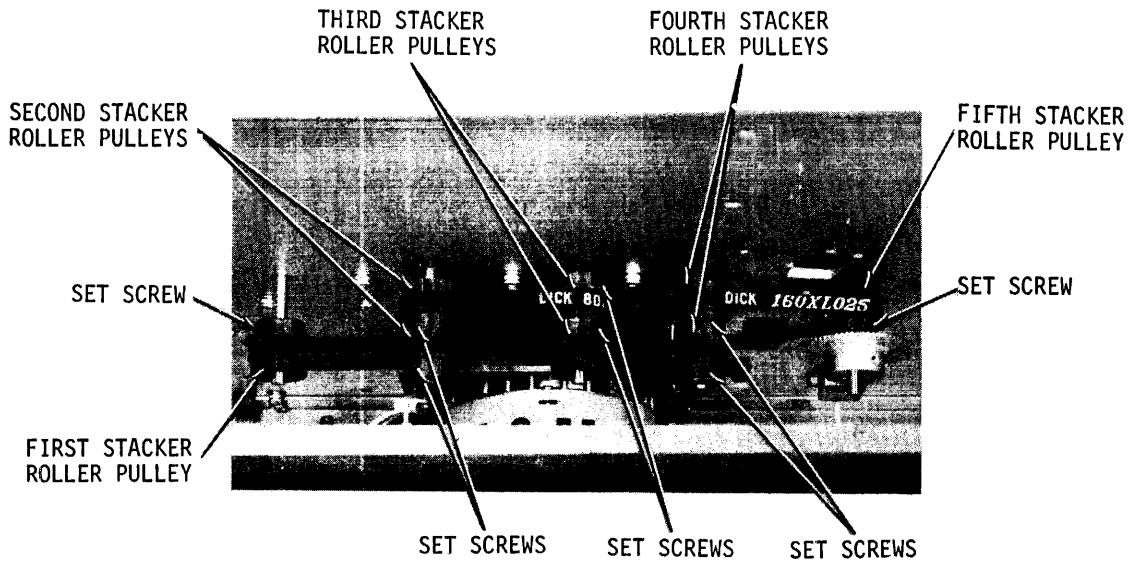


Figure 9-5. Stacker Drive Train Pulley Arrangement

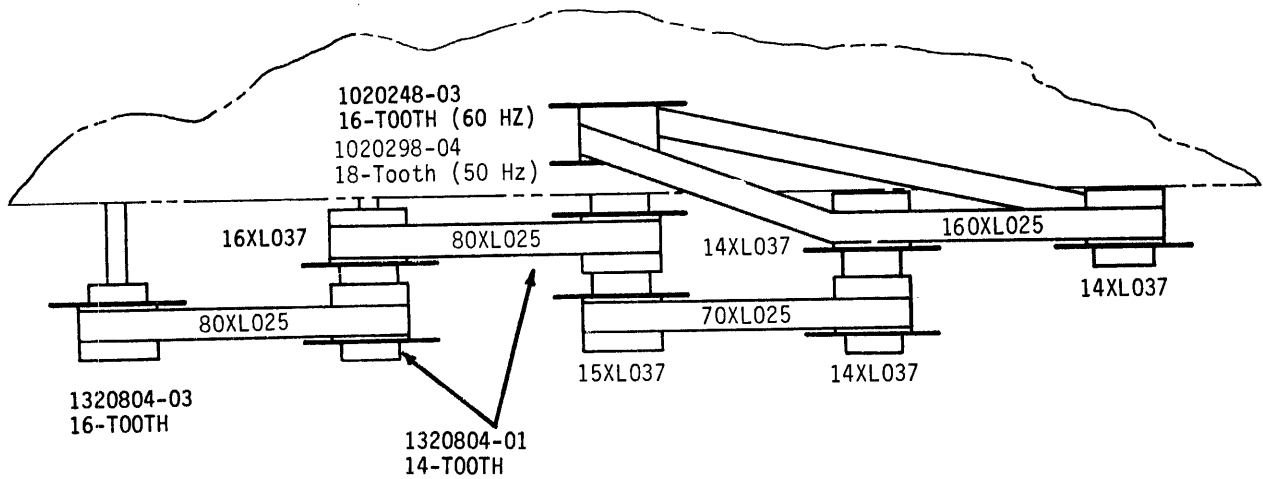


Figure 9-6. Pulley and Belt Configuration

- d. Replace third stacker drive belt on bottom third stacker roller pulley and around fourth stacker roller shaft.
- e. Replace bottom pulley of fourth stacker roller on shaft and push up until it engages with belt and is against top pulley.
- f. Position fourth stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- g. Replace shroud.

9.5 FIRST STACKER ROLLER DRIVE BELT

CAUTION

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

- a. Remove the shroud per paragraph 9.1.2.
- b. Using a 3/32 Allen wrench, LOOSEN set screw in bottom second stacker roller pulley, figure 9-5.
- c. Pull bottom pulley down to disengage first stacker drive belt. Remove pulley and belt.
- d. Replace first stacker drive belt on bottom first stacker roller pulley and around second stacker roller shaft.
- e. Replace bottom pulley of second stacker roller on shaft and push up until it engages with belt and is against top pulley.
- f. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- g. Replace shroud.

9.6 SECOND STACKER ROLLER DRIVE BELT

CAUTION

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

- a. Remove the shroud per paragraph 9.1.2.
- b. Using a 3/32 Allen wrench, LOOSEN set screw in bottom second stacker roller pulley.
- c. Pull bottom pulley down to disengage first stacker drive belt. Remove pulley and belt.
- d. Using a 3/32 Allen wrench, LOOSEN set screw in bottom fourth stacker roller pulley.
- e. Pull bottom pulley down to disengage third stacker drive belt. Remove pulley and belt.
- f. Using a 3/32 Allen wrench, LOOSEN set screw in top second stacker roller pulley.
- g. Pull top pulley down to disengage second stacker drive belt. Remove pulley and belt.
- h. Replace second stacker drive belt on top third stacker roller pulley and around second stacker roller shaft.
- i. Replace top pulley of second stacker roller on shaft and push up until it engages with belt.

NOTE

Observe the position of the upper pulleys with respect to the mainframe, figure 9-5. Note that pulleys three, four and five are installed close to the mainframe with a slight clearance. Pulley number two should be lowered sufficiently to allow the belt to line up with pulley number three.

- j. Position top second stacker roller pulley so that set screw is on flat side of shaft and belt lines up with top pulley of third stacker roller. Carefully tighten set screw.
- k. Replace first stacker drive belt on bottom first stacker roller pulley and around second stacker roller shaft.
- l. Replace bottom pulley of second stacker roller on shaft and push up until it engages with belt and is against top pulley.
- m. Position second stacker roller on shaft so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- n. Replace third stacker drive belt on bottom third stacker roller pulley and around fourth stacker roller shaft.
- o. Replace bottom pulley of fourth stacker roller on shaft and push up until it engages with belt and is against top pulley.
- p. Position fourth stacker roller pulley so that set screw is on flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- q. Replace shroud.

9.7 FIRST, SECOND, AND THIRD STACKER ROLLER BEARINGS

- a. Remove the shroud per paragraph 9.1.2 and the track cover per paragraph 9.1.4.
- b. Use a 1/2 inch thick group of cards to prop stacker follower in extended position.
- c. To replace first stacker roller bearings, perform step d; to replace second stacker roller bearings, perform step e.; to replace third stacker roller bearings, perform step f.
- d. To replace first stacker roller bearings perform the following substeps.

CAUTION

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

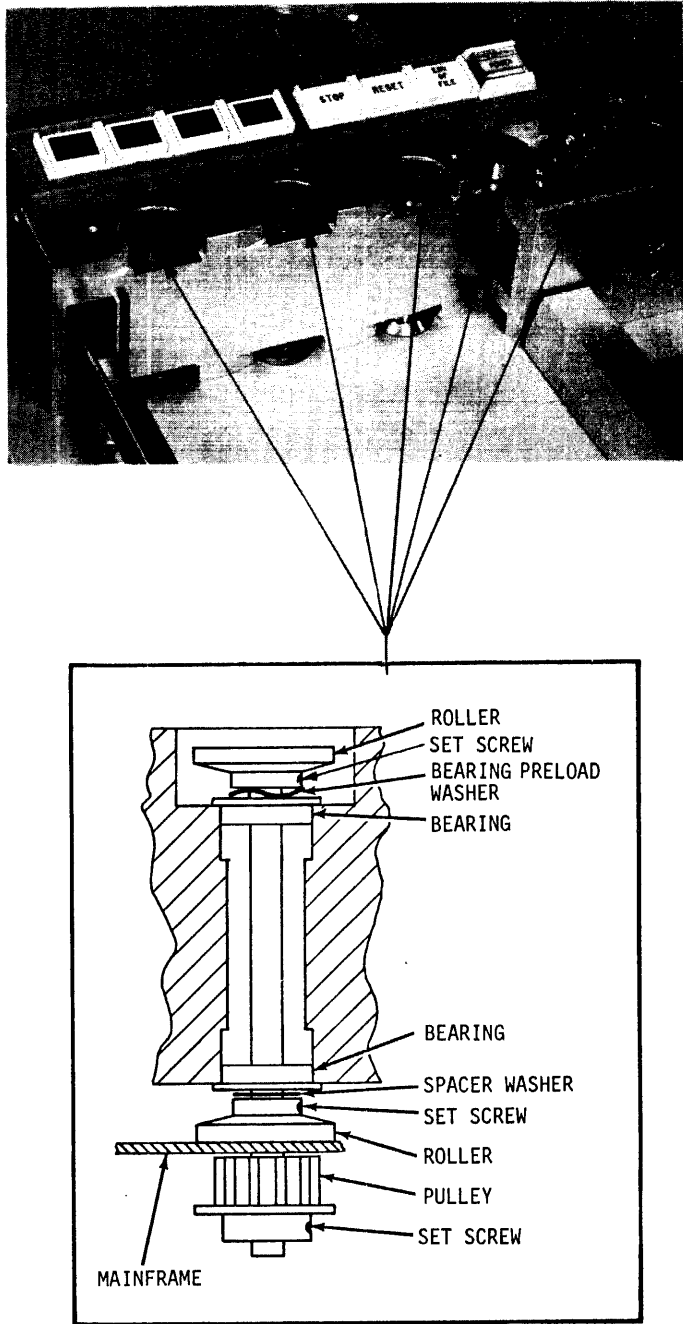


Figure 9-7. Stacker Roller Bearing Assembly

1. Using a 3/32 Allen wrench, LOOSEN set screw in bottom second stacker roller pulley, figure 9-5.
2. Pull bottom pulley down to disengage first stacker drive belt. Remove pulley and belt.
3. Using a 3/32 Allen wrench, LOOSEN set screw in first stacker roller pulley. Remove pulley.
4. Perform the following substeps to remove bearings.
 - a) Using a 1/16 Allen wrench, LOOSEN set screw in bottom roller of stacker roller assembly.
 - b) Lift stacker shaft straight up and out of stacker casting. Observe that there is a preload washer between the top roller and the bearing seat, figure 9-7.
 - c) To remove top bearings, use L-shaped tool to lift bearing from assembly.
 - d) To remove bottom bearing, slide out bottom roller and spacer washer. Use a straight tool to tap edge of bearing from inside of shaft hole to drop bearing from casting.
 - e) Replace bearing(s). Place preload washer on top bearing. Slide bottom roller and spacer washer under shaft hole.
 - f) Replace roller shaft in shaft hole.
 - g) Insert .010 feeler gauge between mainframe and bottom roller. Apply firm finger pressure on top roller and tighten set screw in bottom roller.
 - h) Check for vertical play in stacker shaft. If there is vertical play, LOOSEN set screw in bottom roller and repeat step g.
5. Replace first stacker roller pulley on first stacker roller shaft in position shown in figure 9.5.
6. Position first stacker roller pulley so that set screw is on the flat side of shaft. Carefully tighten set screw.
7. Replace first stacker drive belt on first stacker roller pulley and around second stacker roller shaft.

8. Replace bottom pulley of second stacker roller on shaft and push up until it engages with belt and is against top pulley.
 9. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- e. To replace second stacker roller bearings, perform the following substeps.

CAUTION

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

1. Using a 3/32 Allen wrench, LOOSEN set screw in bottom second stacker roller pulley.
2. Pull bottom pulley down to disengage first stacker drive belt. Remove pulley and belt.
3. Using a 3/32 Allen wrench, LOOSEN set screw in top second stacker roller pulley.
4. Pull top pulley down to disengage second stacker drive belt. Remove pulley.
5. Perform step d. 4. to remove bearings.
6. Place second stacker drive belt on third stacker roller pulley and around second stacker roller shaft.
7. Replace top pulley of second stacker roller on shaft and push up until it engages with belt.
8. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
9. Place first stacker drive belt on first stacker roller pulley and around second stacker roller shaft.
10. Replace bottom pulley of second stacker roller on shaft and push up until it engages with belt.

11. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- f. To replace third stacker roller bearings, perform the following substeps.

CAUTION

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

1. Using a 3/32 Allen wrench, LOOSET set screw in bottom second stacker roller pulley.
2. Pull bottom pulley down to disengage first stacker drive belt. Remove pulley and belt.
3. Using a 3/32 Allen wrench, LOOSEN set screw in bottom fourth stacker roller pulley.
4. Pull bottom pulley down to disengage third stacker drive belt. Remove pulley and belt.
5. Using a 3/32 Allen wrench, LOOSEN set screw in bottom third stacker roller pulley. Remove pulley.
6. Using a 3/32 Allen wrench, LOOSEN set screw in top second stacker roller pulley.
7. Pull top pulley down to disengage second stacker drive belt. Remove pulley and belt.
8. Using a 3/32 Allen wrench, LOOSEN set screw in top third stacker roller pulley. Remove pulley.
9. Perform step d. 4 to remove bearings.
10. Replace top third stacker roller pulley on third stacker roller shaft in position shown in figure 9.5.
11. Position third stacker roller pulley so that set screw is on the flat side of shaft. Carefully tighten set screw.

12. Place second stacker drive belt on third stacker roller pulley and around second stacker shaft.
 13. Replace top pulley of second stacker roller on shaft and push up until it engages with belt.
 14. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
 15. Replace bottom pulley on third stacker roller shaft.
 16. Position third stacker roller pulley so that set screw is on the flat side of shaft. Carefully tighten set screw.
 17. Place third stacker drive belt on third stacker roller pulley and around fourth stacker roller shaft.
 18. Replace bottom pulley of fourth stacker roller on shaft and push up until it engages with belt.
 19. Position fourth stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
 20. Place first stacker drive belt on first stacker roller pulley and around second stacker shaft.
 21. Replace bottom pulley of second stacker roller on shaft and push up until it engages with belt.
 22. Position second stacker roller pulley so that set screw is on the flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.
- g. Remove cards used to prop stacker in extended position.
- h. Replace shroud and track cover.

9.8 SOLENOID

- a. Remove the shroud per paragraph 9.1.2.

NOTE

Hold the lugs on the board with long nose pliers while unsoldering or soldering the leads in the following procedure. This will prevent the lugs from being disconnected from the land on the bottom side of the board.

- b. Unsolder the two white leads from the solenoid driver circuit board.
- c. Remove solenoid return spring from spring post and arm stud, figure 9-8.
- d. Using a 1/16 Allen wrench, LOOSEN two set screws in the top solenoid coupling.
- e. Using a 9/64 Allen wrench, remove two screws ① holding solenoid mounting plate.
- f. Remove solenoid downward.

NOTE

Viewing the bottom of the solenoid plate, note that the solenoid mounting holes are not in line with the mounting plate holes. To ensure that the solenoid is reinstalled correctly, make sure the wires are extending from the right side (viewed from the front of the reader) and that the forward-most solenoid mounting hole is on the right side.

- g. Using an 11/32 wrench, remove two mounting nuts ②
- h. Using a 1/16 Allen wrench, LOOSEN two set screws retaining the coupling on the solenoid shaft. Remove coupling.

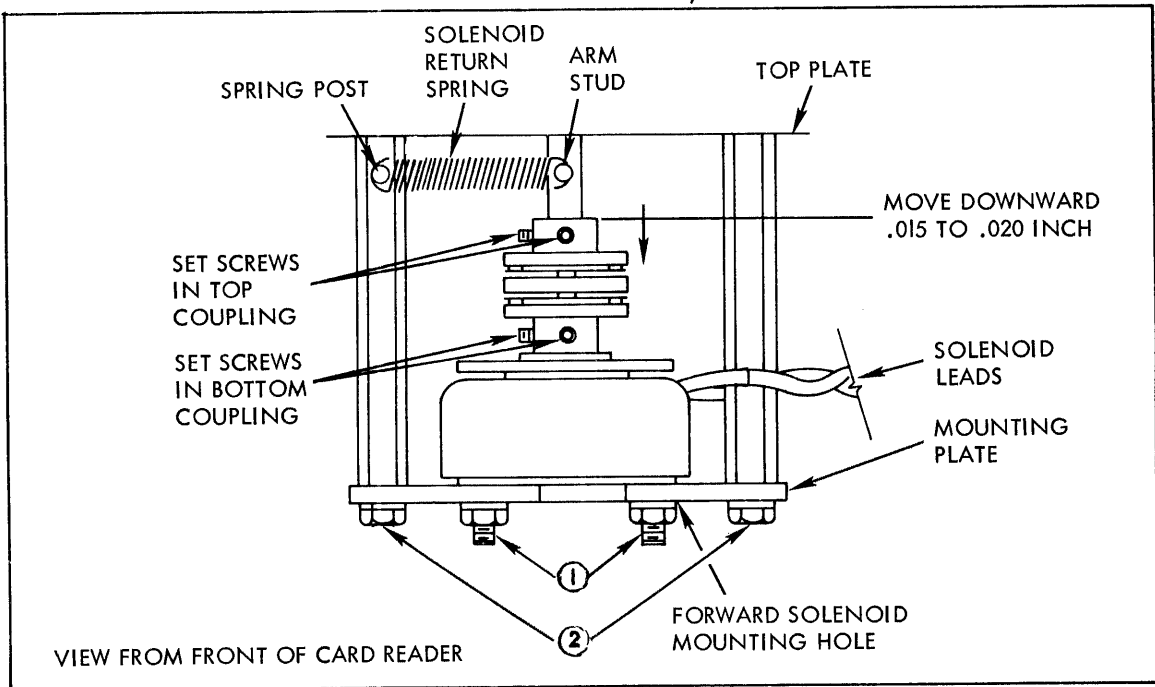
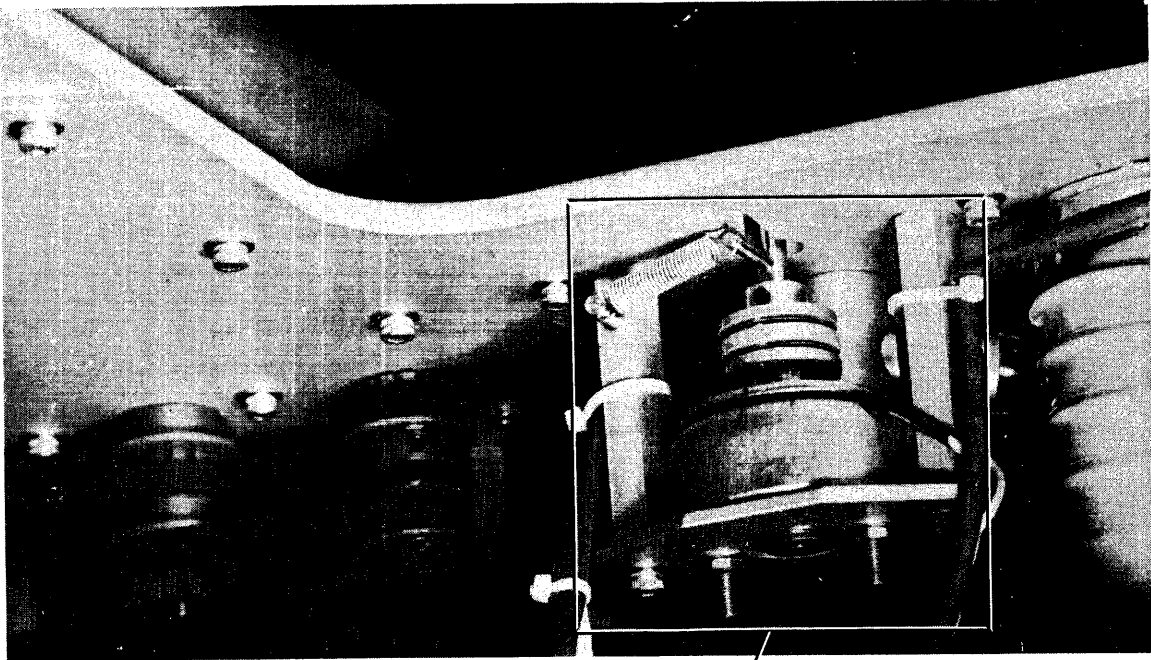


Figure 9-8. Solenoid Assembly

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.

- i. Place the coupling on the new solenoid shaft locating the bottom coupling set screws on the two flat sides of the shaft.
- j. Tighten the bottom coupling set screws and replace the solenoid on the mounting plate making sure holes are in the proper position, with wires extending from the right side.
- k. Replace the solenoid on mounting post, sliding top coupling onto the picker shaft.
- l. Replace the solenoid return spring between the spring post and the arm stud.
- m. Solder the two white leads to the solenoid driver circuit board, terminals 3 and 4.
- n. Preload the solenoid coupling per paragraph 6.8, steps r. and s.

NOTE

If proper pick action does not result after preloading the solenoid, perform the Picker Sector Adjustment, paragraph 6.8.

- o. Replace shroud.

9.9 VACUUM PUMP MOTOR ASSEMBLY BELT

The top vacuum/blower provides the picker vacuum. The vacuum pump belt can be replaced without removing the vacuum/blower. Remove the shroud per paragraph 9.1.2 and the top rear panel per paragraph 9.1.1, then perform steps g. through k. Replace shroud and top rear panel.

The bottom vacuum/blower provides the riffle air and must be removed to replace the vacuum pump belt. Remove the bottom rear panel per paragraph 9.1.3, then perform the following:

- a. Remove the rubber hood from the motor run capacitor and disconnect the red and blue clip leads, figure 9.9.
- b. Remove the yellow clip lead from the solid state relay.
- c. Loosen the vacuum adapter clamp on the top of the pump and remove from the pump.
- d. Using a Phillips screwdriver, remove the ground straps from the pump mounting plate.

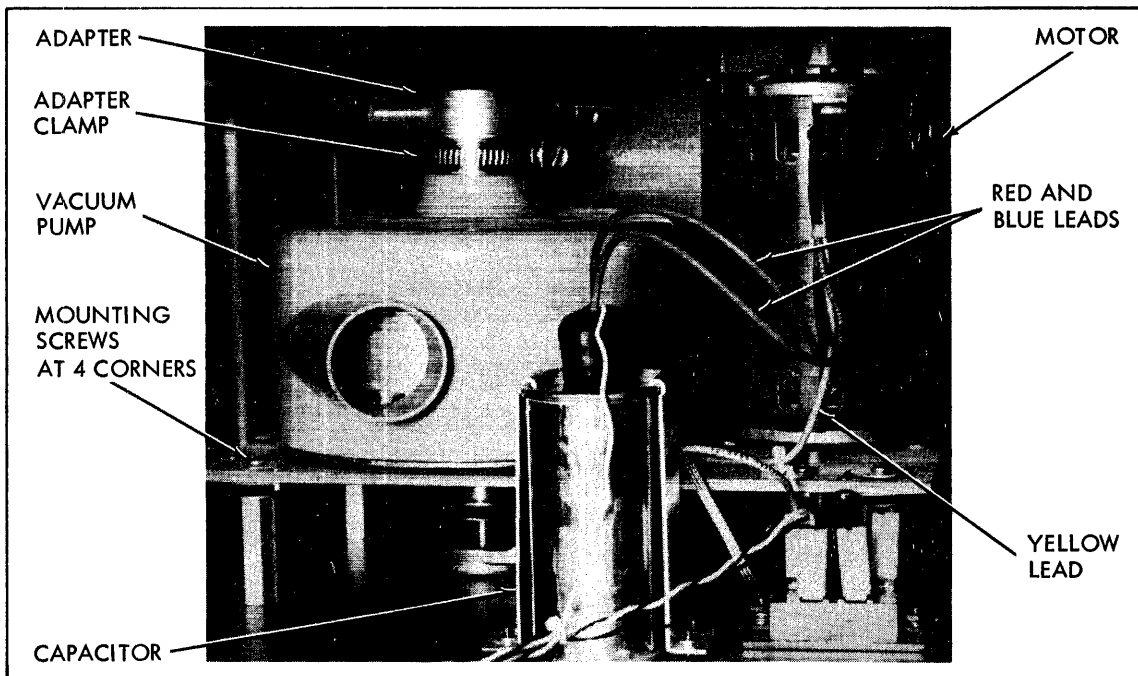


Figure 9-9. Bottom Vacuum Pump Assembly Removal

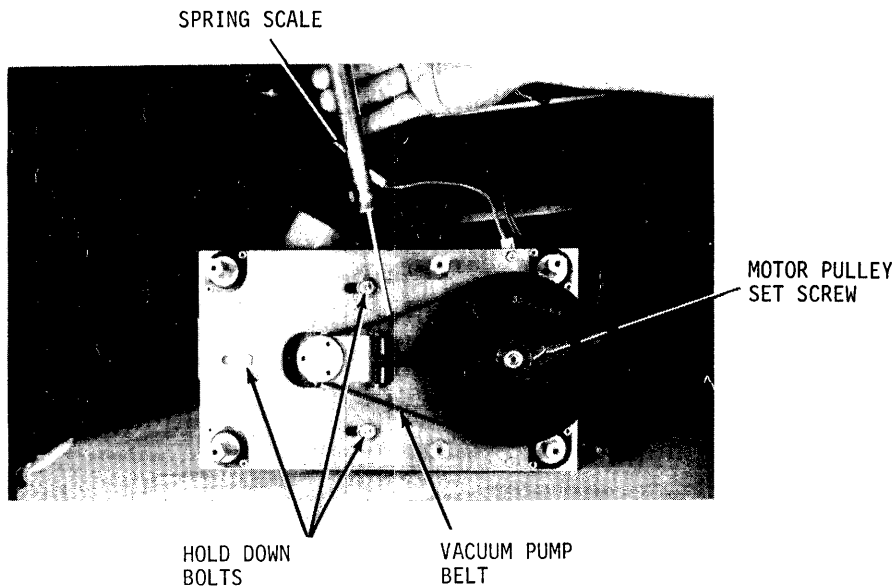


Figure 9-10. Vacuum Pump Belt Replacement

CAUTION

BE SURE TO USE THE OPEN-END WRENCH TO AVOID TWISTING OFF THE PUMP PLATE RUBBER SHOCK MOUNTS.

- e. Using a 1/2" open-end wrench to hold the mounting post, remove the four Phillips head screws located on the pump assembly.
- f. Remove the pump assembly from the baseplate.
- g. LOOSEN the three bolts holding the vacuum pump in place, figure 9-10. Slide pump to loosen belt.
- h. Replace vacuum pump belt.
- i. Using a spring scale, adjust vacuum pump for a belt tension of 4-6 ounces. This is about 3/64" belt deflection.
- j. With the appropriate belt tension applied, tighten the three vacuum pump mounting bolts.

- k. Check the pulleys to make sure they are in the same plane. Also check the pulley set screw to make sure it is secure.
- l. Reinstall the vacuum pump assembly into the card reader in reverse order of disassembly.
- m. Replace bottom rear panel.

9.10 MAGNETIC PICKUP

- a. Remove the shroud per paragraph 9.1.2 and the top rear panel per paragraph 9.1.1.
- b. Remove applicable plastic cable ties to free magnetic pickup cable. Note location of ties.
- c. Remove all cards from card cage using extractor levers.

NOTE

Tag the magnetic pickup connections on the card cage so that they can be identified for connecting the new magnetic pickup leads.

- d. Using Amp tool 465195-2, remove pickup leads from pins R, S and T on card cage connector J3.

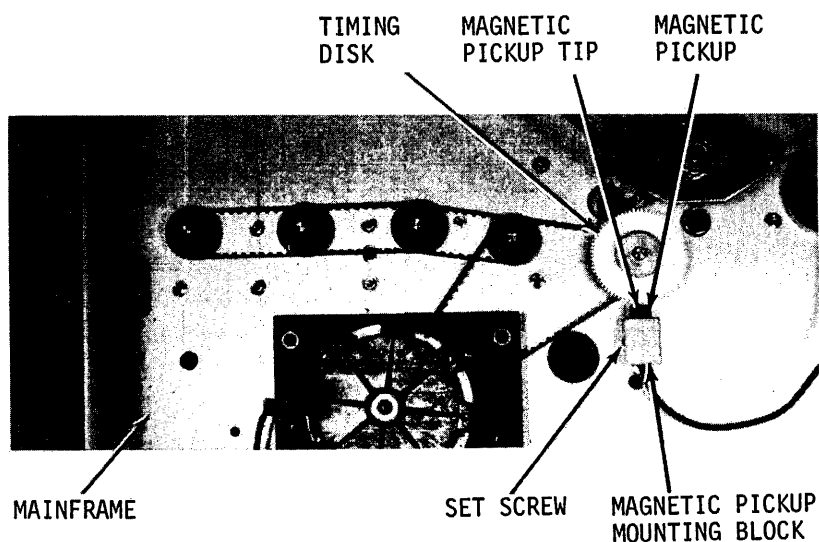


Figure 9-11. Magnetic Pickup Replacement

- e. Using a 1/16 Allen wrench, LOOSEN set screw in magnetic pickup mounting block, figure 9-11. Remove magnetic pickup from mounting block. Remove pickup and its cable from cabinet.
- f. Insert new magnetic pickup in mounting block.
- g. Adjust magnetic pickup per applicable steps of paragraph 6.3.
- h. Connect leads of new magnetic pickup to pins R, S and T of card cage connector J3.
- i. Secure magnetic pickup cable with plastic cable ties in same locations as removed in step b.
- j. Replace all cards in card cage.
- k. Replace shroud and top rear panel.

9.11 PICKER SUPPORT ASSEMBLY

The Picker Support Assembly must be removed to replace any of the following assemblies and installed after the replacement of the assembly. These assemblies are:

Read Array	Fourth and Fifth Stacker Roller Bearings
Light Station	First and Second Picker Roller Bearings

- a. Removal of Picker Support Assembly
 - 1. Remove the shroud per paragraph 9.1.2, the top rear panel per paragraph 9.1.1, and the track cover per paragraph 9.1.4.
 - 2. Using a 9/64 Allen wrench, remove two screws holding picker follower shaft support, figure 9-12. Remove support.
 - 3. Remove picker follower shaft.
 - 4. Move picker hopper follower to rear of card reader.
 - 5. Remove screw and carefully release negator spring from picker hopper follower. Remove follower.
 - 6. Using a 9/64 Allen wrench, remove four screws holding stacker edge guide, Remove edge guide.
 - 7. Using a .050 Allen wrench, LOOSEN setscrew in vacuum tube elbow. Remove elbow.

8. Remove solenoid per paragraph 9.8, steps a. through h.
 9. Remove hopper empty switch cable tie-down in picker support assembly, figure 9-15.
 10. Using a 9/64 Allen wrench, remove six screws holding picker support assembly to top plate, figure 9-12.
 11. Carefully lift picker support assembly straight up and lay it on cloth on top plate of card reader, figure 9-14.
- b. Installation of Picker Support Assembly
1. Carefully set picker support assembly in place over top plate mounting holes, figure 9-15.
 2. Apply LOCTITE GRADE C on six picker support assembly mounting screws, figure 9-12.
 3. Replace but do not tighten shorter of six screws in front right hole (beneath hole for hopper empty switch tie-down screw). Replace but do not tighten five other screws.
 4. Apply hand pressure between picker and stacker support assemblies as shown in figure 9-15. Hold that pressure and tighten six screws.
 5. Replace hopper empty switch cable tie-down.
 6. Replace solenoid assembly per paragraph 9.8, steps i. through n.
 7. Replace vacuum tube elbow, figure 9-12, on picker support assembly. Tighten elbow set screw.
 8. Place stacker edge guide in mounting position. Replace four screws and secure stacker edge guide to top plate.
 9. Replace screw to attach negator spring to picker hopper follower.
 10. Place picker hopper follower in its normal forward position.
 11. Replace picker follower shaft.
 12. Replace picker follower shaft support and secure with two socket head screws.
 13. Replace shroud, top rear panel, and track cover.

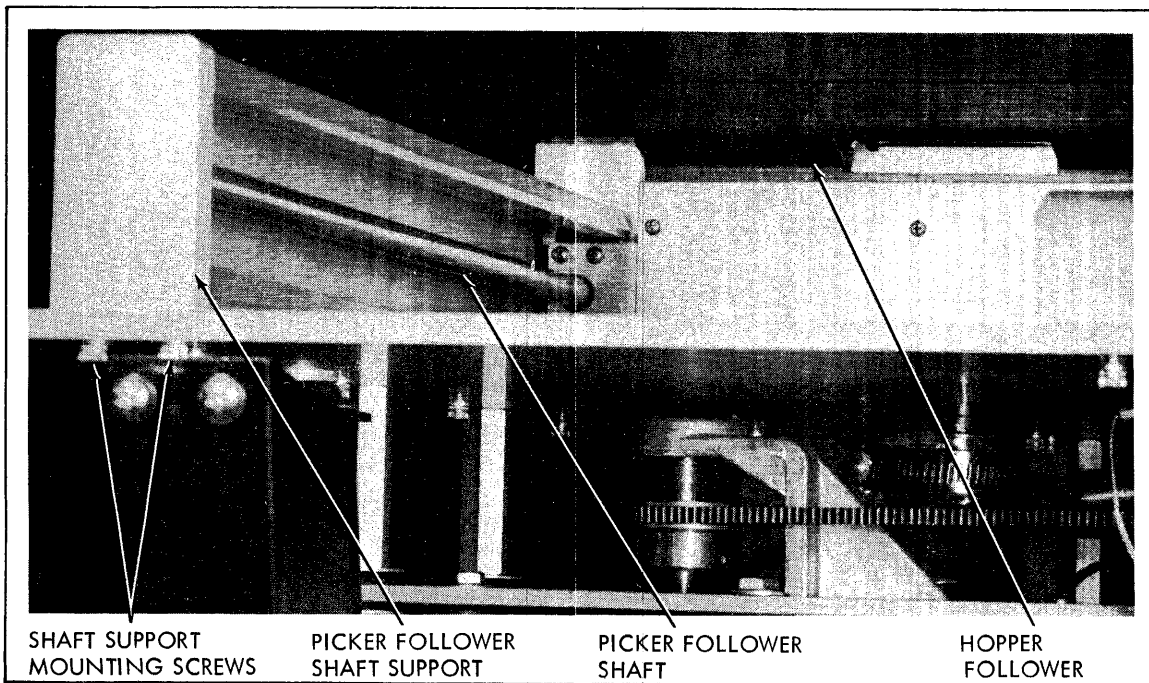
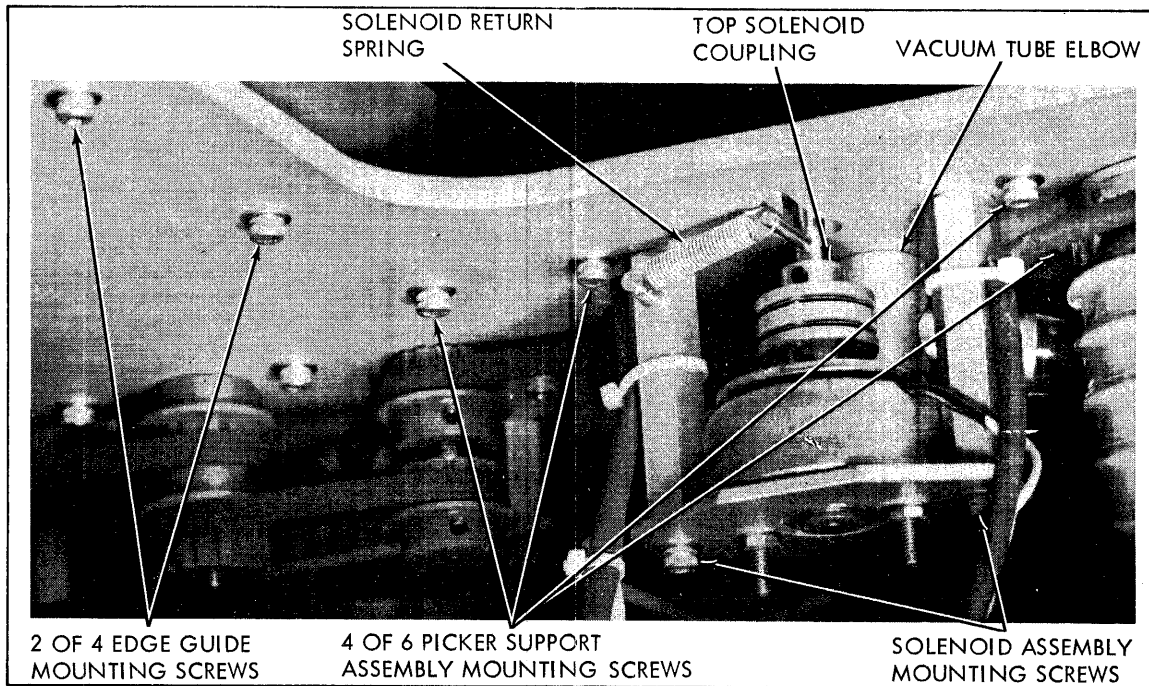


Figure 9-12. Component Locations for Picker Support Assembly Removal

9.12 READ HEAD

- a. Remove picker support assembly per paragraph 9.11. a.
- b. Remove cards from card file assembly, figure 9-13.
- c. Using AMP tool 465195-2, remove the leads shown in the following diagram from connector J8 of card file.

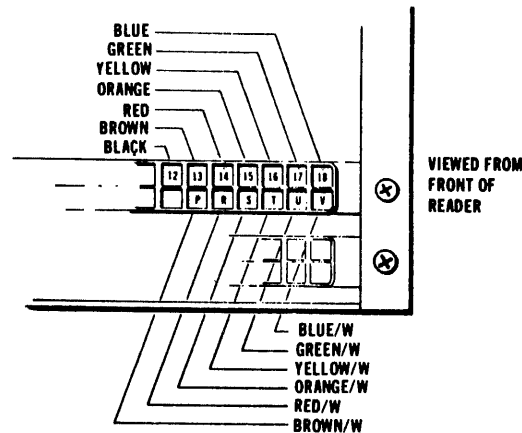


Figure 9-13. Read Head Wires Connection Diagram

- d. Using a #1 Phillips screwdriver, remove two screws (1) holding read array, figure 9-14. Remove read array.
- e. Replace read array and two screws. Tighten screws to secure read array to stacker support assembly.
- f. Connect leads shown in figure 9-13 to connector J8 of card file.
- g. Replace cards in card file.
- h. Install picker support assembly per paragraph 9.11. b.

9.13 LIGHT STATION

- a. Remove picker support assembly per paragraph 9.11. a.
- b. Using a #1 Phillips screwdriver, remove four screws (2), figure 9-14. Remove light station from picker support assembly.

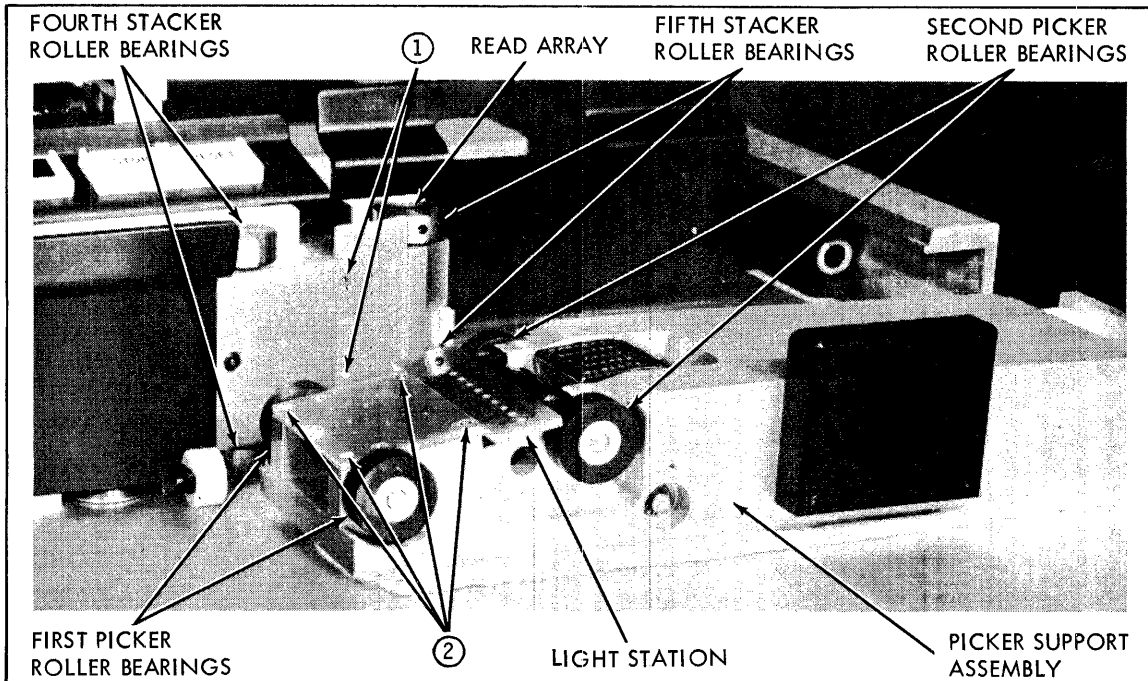


Figure 9-14. Picker Casting Removed From Reader

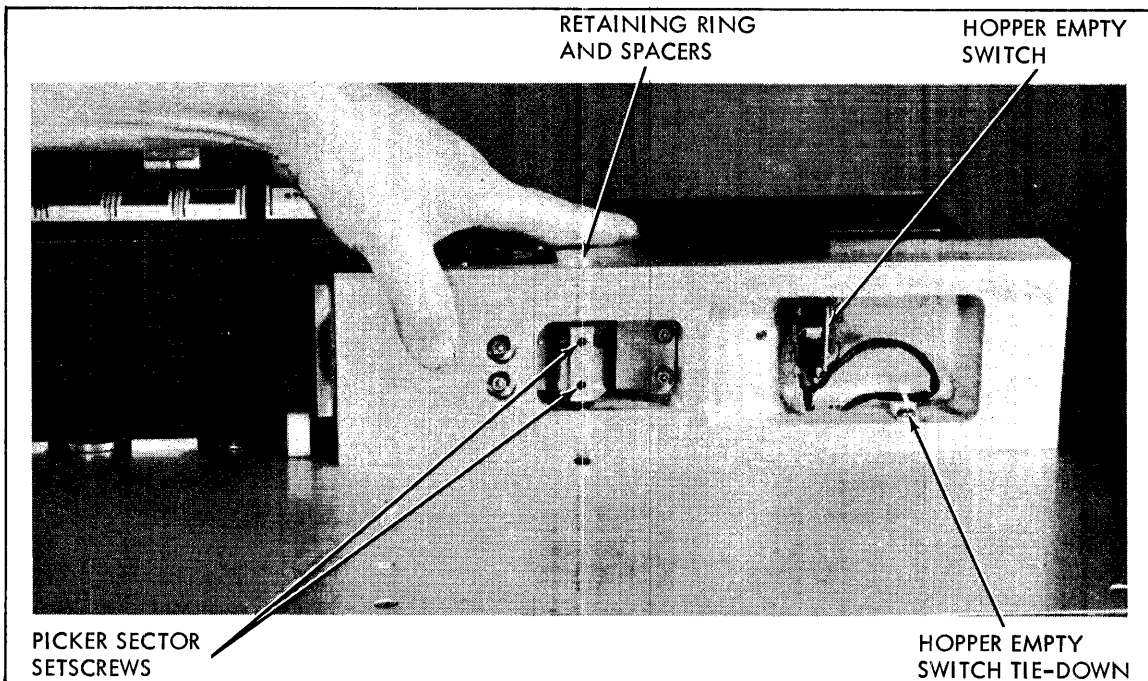


Figure 9-15. Picker Sector Retaining Ring, Spacers, and Set Screws and Hopper Empty Switch

- c. Remove light station cable from tie-down on solenoid assembly standoff and from all other tie-downs.
- d. Disconnect light station connector from power supply on baseplate assembly.
- e. Replace light station and four screws. Tighten screws to secure light station to picker support assembly.
- f. Connect light station connector to power supply on baseplate assembly.
- g. Replace light station cable in tie-down on solenoid assembly standoff and in all tie-downs from which it was removed in step c.
- h. Install picker support assembly per paragraph 9.11.b.

9.14 FOURTH AND FIFTH STACKER ROLLER BEARINGS

- a. Remove picker support assembly per paragraph 9.11.a.
- b. To replace fourth stacker roller bearings, perform step c. To replace fifth stacker roller bearings, perform step d.
- c. To replace fourth stacker roller bearings, figure 9-14, perform the following substeps.
 - 1. Using a 3/32 Allen wrench, LOOSEN set screw in bottom pulley of fourth stacker roller, figures 9-5 and 9-6.
 - 2. Pull bottom pulley down to disengage third stacker drive belt. Remove belt and pulley.
 - 3. Using a 3/32 Allen wrench, LOOSEN set screw in top pulley of fourth stacker roller.
 - 4. Pull pulley downward to disengage it from main drive motor belt. Remove pulley.
 - 5. Using a 1/16 Allen wrench to LOOSEN set screw in bottom roller of fourth stacker roller assembly, figure 9-7.
 - 6. Lift fourth stacker shaft from stacker casting. Observe that there is a preload washer between the top roller and the bearing seat.
 - 7. To remove top bearing, use L-shaped tool to lift bearing from casting.

8. To remove bottom bearings, slide out bottom roller and spacer. Use a straight tool to tap edge of bearing from inside shaft hole to drop bearing from casting.
9. Replace bearing, place preload washer on top bearing and slide bottom spacer and roller under shaft hole.
10. Place main drive motor belt around hole for fourth stacker roller shaft. Replace roller shaft in hole.
11. Place .010 feeler gauge between top plate and bottom roller. Apply firm finger pressure on top roller and tighten set screw in bottom roller.
12. Check for vertical play in fourth stacker shaft. If there is vertical play, LOOSEN set screw in bottom roller and repeat substep 11 to eliminate play.
13. Place main drive motor belt on motor pulley, on fifth stacker roller pulley, and around fourth stacker roller shaft. Hold drive belt in this position.
14. Replace top pulley of fourth stacker roller on shaft and push pulley upward until it is engaged with main drive motor belt, figures 9-5 and 9-6.
15. Adjust drive motor belt and top pulley, if necessary, so that drive belt is completely engaged with motor pulley, and fourth and fifth stacker roller pulleys.

CAUTION

**USE MODERATE TORQUE TO TIGHTEN
PULLEY SET SCREW. OVERTORQUE
WILL DAMAGE PULLEY.**

16. Position top pulley so that set screw is on the flat side of shaft. Make sure pulley is slightly away from top plate and tighten set screw.

17. Replace third stacker drive belt on third stacker roller and around fourth stacker shaft. Hold drive belt in this position.
 18. Replace bottom pulley of fourth stacker roller on shaft and push pulley upward until it is engaged with drive belt and is against top pulley.
 19. Adjust third stacker drive belt and bottom pulley, if necessary, so that drive belt is completely engaged with pulleys and is parallel to other belts.
 20. Rotate bottom pulley so that set screw is on flat of shaft. Tighten set screw.
- d. To replace fifth stacker roller bearings, figure 9-14, perform the following substeps.

CAUTION

USE EXTREME CARE NOT TO DAMAGE
TIMING DISC. KEEP DISC IN SOFT
TISSUE WHEN NOT IN CARD READER.

1. Using a 5/64 Allen wrench, LOOSEN set screw in timing disc, figure 9-4. Carefully remove disc and wrap it in soft tissue.
2. Use a 3/32 Allen wrench to LOOSEN set screw in fifth stacker roller pulley.
3. Pull pulley downward to disengage it from main drive motor belt. Remove pulley.
4. Use a 1/16 Allen wrench to LOOSEN set screw in bottom roller of fifth stacker roller assembly, figure 9-7.
5. Lift fifth stacker shaft from stacker casting. Observe that there is a preload washer between the top roller and the bearing seat.
6. To remove top bearing, use L-shaped tool to lift bearing from assembly.
7. To remove bottom bearing, slide out bottom roller and spacer. Use a straight tool to tap edge of bearing from inside shaft hole to drop bearing from casting.

8. Replace bearing. Place preload washer on top bearing and slide bottom spacer and roller under shaft hole, as required.
9. Place main drive motor belt around hole for fifth stacker roller shaft. Replace roller shaft in hole.
10. Place .010 feeler gauge between top plate and bottom roller. Apply firm finger pressure on top roller and tighten set screw in bottom roller.
11. Check for vertical play in first stacker shaft. If there is vertical play, LOOSEN set screw in bottom roller and repeat substep 10 to eliminate play.
12. Place main drive motor belt on motor pulley, on fourth stacker roller pulley, and around fifth stacker roller shaft. Hold drive belt in this position.
13. Replace fifth stacker roller pulley on shaft and push pulley upward until it is engaged with main drive motor belt, figures 9-5 and 9-6.
14. Adjust drive motor belt and pulley, if necessary, so that drive belt is completely engaged with motor pulley, and fourth and fifth stacker roller pulleys.

CAUTION

USE MODERATE TORQUE TO TIGHTEN
PULLEY SET SCREW. OVERTORQUE
WILL DAMAGE PULLEY.

15. Position pulley so that set screw is on the flat side of shaft. Make sure pulley is slightly away from top plate and tighten set screw.
 16. Replace timing disc on fifth stacker roller shaft, figure 9-4. Rotate timing disc so that set screw is on the flat side of shaft and line up timing disc teeth with magnetic pickup tip. Tighten timing disc set screw.
 17. The main drive motor belt tension must be adjusted first. Refer to paragraph 6.2.
 18. Second, the magnetic pickup and timing disc must be adjusted. Refer to paragraph 6.3.
- e. Install picker support assembly per paragraph 9.11.b.

9.15 FIRST AND SECOND PICKER ROLLER BEARINGS

- a. Remove picker support assembly per paragraph 9.11. a.
- b. To replace first picker roller bearings, perform step c. To replace second picker roller bearings, perform step d.
- c. To replace first picker roller bearings, perform the following substeps.
 1. Using a 1/16 Allen wrench, LOOSEN set screw in bottom roller of first picker roller, figure 9-14.
 2. Pull first picker roller from picker assembly. Remove bottom roller and spacer, and top preload washer.
 3. To remove top or bottom bearing, use L-shaped tool to pull bearing from casting.
 4. Replace bearing, place preload washer on top bearing, and replace roller shaft in shaft hole.
 5. Replace bottom spacer and roller on shaft.
 6. Apply firm finger pressure on top and bottom rollers and tighten set screw in bottom roller.
 7. Check for vertical play in first picker shaft. If there is play, LOOSEN set screw in bottom roller and repeat substep 6 to eliminate play.
- d. To replace either of the second picker roller bearings, perform the following substeps.
 1. Using a 1/16 Allen wrench, LOOSEN set screw in roller. Remove shaft and retaining ring, roller, and spacer.
 2. To remove bearing, use a slender straight or L-shaped tool to either push or pull bearing from picker assembly.
 3. Replace bearing, shaft and retaining ring, spacer, and roller.
 4. Apply firm finger pressure to retainer ring and roller, and tighten set screw in roller.
- e. Install picker support assembly per paragraph 9.11. b.

9.16 PICKER SECTOR

- a. Remove the track cover per paragraph 9.1.4 and the shroud per paragraph 9.1.2.
- b. Remove solenoid assembly per paragraph 9.8.
- c. Using a 9/64 Allen wrench, remove two screws holding picker follower shaft support, figure 9-12. Remove support.
- d. Remove picker follower shaft.
- e. Move picker follower to rear of card reader.
- f. Remove screw and carefully release negator spring from picker follower.
Remove follower.
- g. Using #2 retaining ring remover, remove retaining ring from top of picker shaft, figure 9-15.

CAUTION

ALL SPACERS MUST BE REINSTALLED
IN ASSEMBLY OF RETAINING RING AND
PICKER SHAFT.

- h. Remove spacers from under retaining ring.
- i. Using a 5/64 Allen wrench, LOOSEN two set screws holding picker sector.
- j. Remove picker shaft from bottom of top plate.
- k. Using a Phillips screwdriver, remove throat block screw, figure 9-16. Remove throat block.
- l. Remove picker sector from picker hopper side (rear) of picker support assembly.
- m. Replace picker sector, picker shaft, all spacers, and retaining ring.
- n. Adjust picker shaft to place sector set screws on flats of shaft.
- o. Using a six inch metal ruler, measure from top plate to middle row of holes on picker sector. Move picker sector until ruler measures 1.625 inches. Retain picker sector position and tighten two picker sector set screws, figure 9-15.

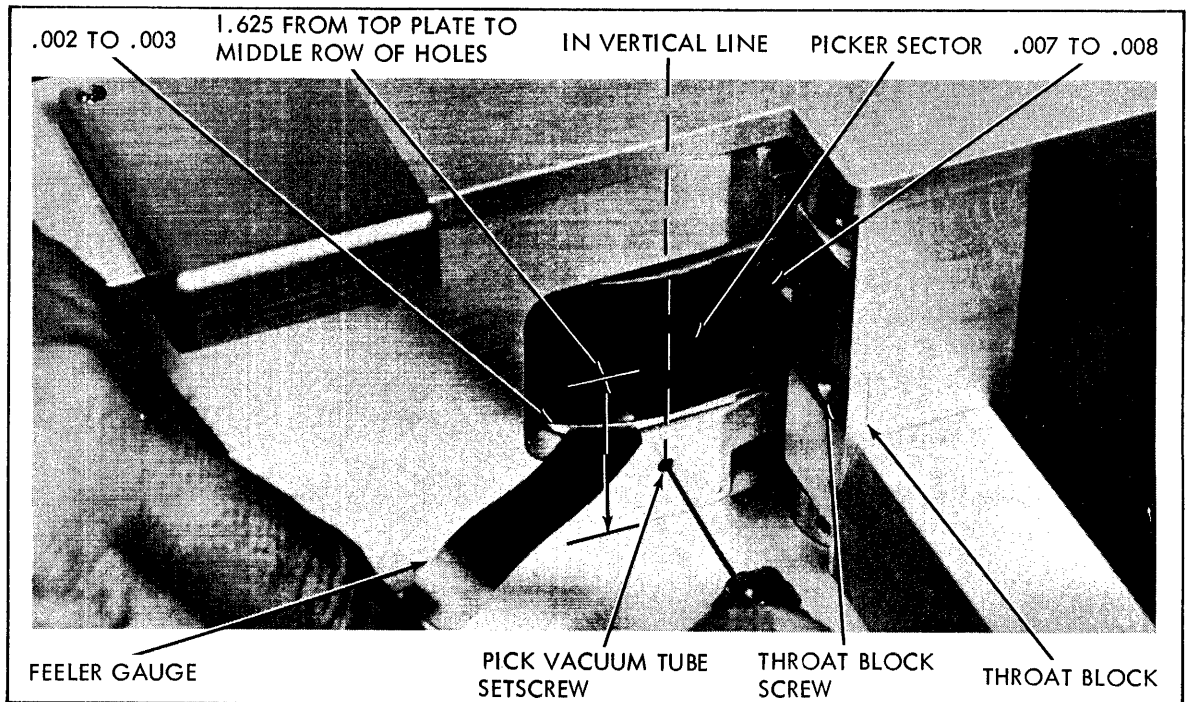
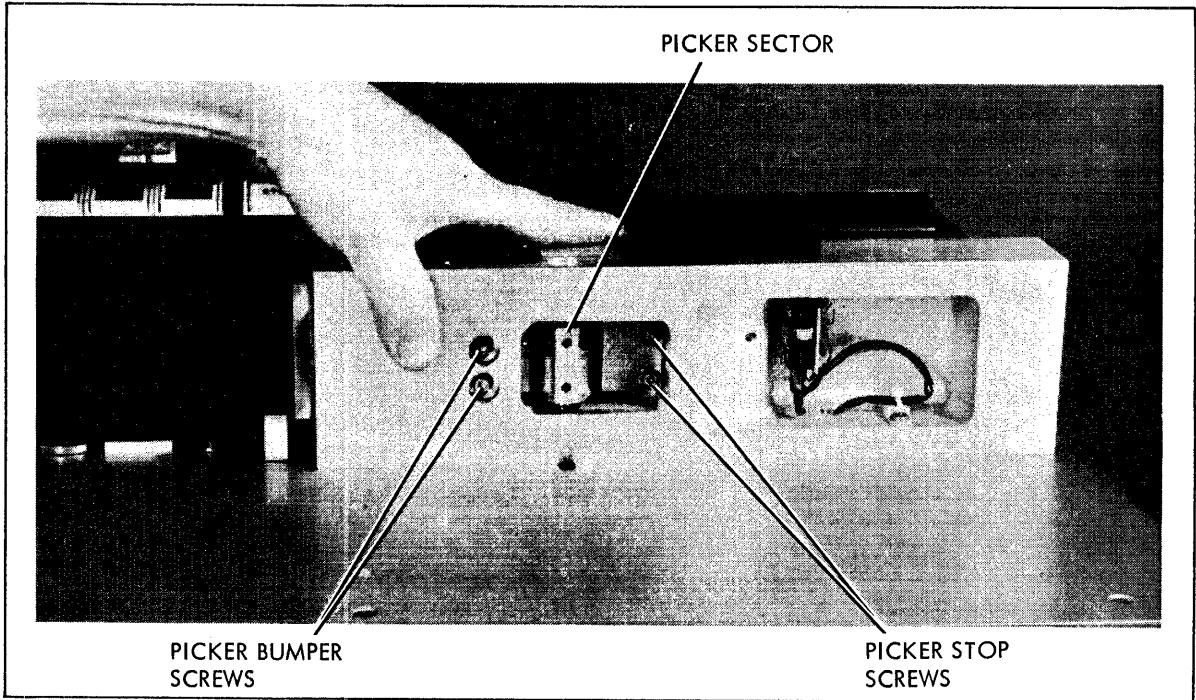


Figure 9-16. Picker Sector Replacement

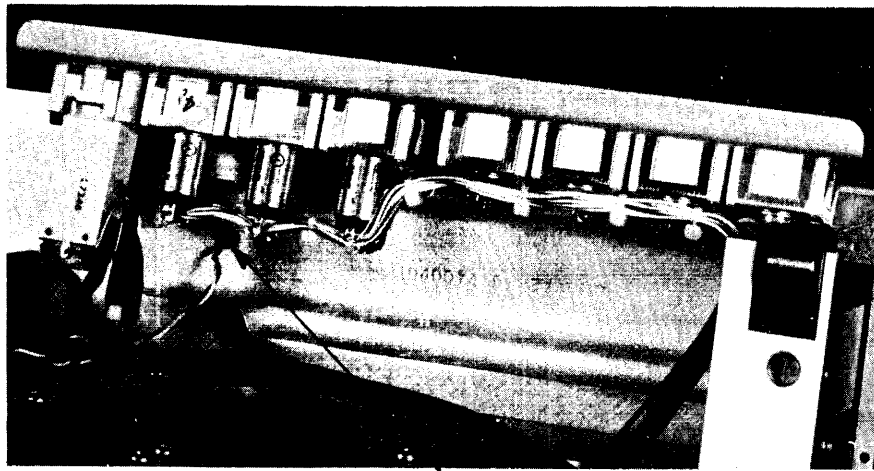
- p. Using a .050 Allen wrench, LOOSEN pick vacuum tube set screw, figure 9-16.
- q. Using a feeler gauge, measure clearance between pick vacuum tube and picker sector. Adjust pick vacuum tube for clearance of .002 to .003 and tighten pick vacuum tube set screw.
- r. Replace solenoid assembly per paragraph 9.8.
- s. Replace throat block and throat block screw. Do not tighten screw.
- t. Use a feeler gauge to measure clearance between throat block and picker sector. Adjust throat block for clearance of .007 to .008 and tighten throat block screw.
- u. Replace screw to attach end of negator spring to picker follower, figure 9-12. Tighten screw and move follower to its normal forward position.
- v. Replace picker follower shaft.
- w. Replace two screws and picker follower shaft support. Tighten screws to secure support to top plate.
- x. For further adjustment refer to Picker Sector Adjustment, paragraph 6.8.
- y. Replace track cover and shroud.

9.17 STACKER PHOTOCCELL

- a. Remove the shroud per paragraph 9.1.2, the track cover per paragraph 9.1.4, the control panel hood per paragraph 9.1.5, and the top rear panel per paragraph 9.1.1.
- b. Remove all cards from card file, using extractor levers.
- c. Remove plastic cable ties from applicable cable to free photocell leads. Note location of ties.
- d. Using AMP tool 465195-2, disconnect photocell leads from connector J4 on card file.

NOTE

Tag the photocell lead connections on the card cage so that they can be identified for connecting the new photocell leads.



STACKER PHOTOCELL

Figure 9-17. Location of Stacker Photocell

- e. Using a 1/16 Allen wrench, LOOSEN set screw in top roller of fourth stacker roller assembly, figure 9-14. Remove roller and preload washer to gain access to photocell set screw.
- f. Using a 1/16 Allen screwdriver, LOOSEN photocell set screw. Remove photocell from rear of stacker castings, figure 9-17.
- g. Remove photocell and leads through hole in top plate.
- h. Insert new photocell through hole in rear of stacker casting. Push photocell until it is flush with the front of stacker casting. Tighten photocell set screw.
- i. Route photocell leads through top plate to the card file.
- j. Connect black lead to J4, pin C and white lead to J4, pin 2.
- k. Replace all cards in card file, figure 10-2.
- l. Replace preload washer and top roller on fourth stacker roller shaft.
- m. Apply firm finger pressure on top roller and tighten set screw in top roller.

- n. Check for vertical play in fourth stacker shaft. If there is vertical play, LOOSEN set screw and repeat step m. to eliminate play.
- o. Secure stacker photocell leads with plastic cable ties in same location as removed in step d.
- p. Replace shroud, track cover, control panel hood, and top rear panel.

9.18 HOPPER NEGATOR SPRING

- a. Remove the shroud per paragraph 9.1.2 and the control panel hood per paragraph 9.1.5.
- b. To replace stacker follower top negator spring, perform step c. To replace stacker follower bottom negator spring, perform step d.
- c. To replace stacker follower top negator spring, perform the following substeps.
 - 1. Remove spring mounting screw and remove end of spring from stacker follower assembly, figure 9-18.
 - 2. LOOSEN drum shaft set screw in stacker shaft yoke. Remove drum shaft, spring drum, and negator spring.
 - 3. Remove negator spring from drum.
 - 4. Replace new negator spring on drum.
 - 5. Replace drum shaft and drum on stacker shaft yoke so that spring can be extended from bottom of drum.
 - 6. Adjust drum shaft to position and tighten drum shaft set screw.
 - 7. Secure negator spring to stacker follower assembly by replacing and tightening spring mounting screw.
- d. To replace stacker follower bottom negator spring or picker negator spring, perform the following substeps.
 - 1. When replacing stacker follower bottom negator spring, remove spring mounting screw and top negator spring from stacker follower assembly.
 - 2. Use a 9/64 Allen wrench to remove two screws holding follower shaft support, figure 9-12. (Picker and stacker follower shaft supports are identical.)

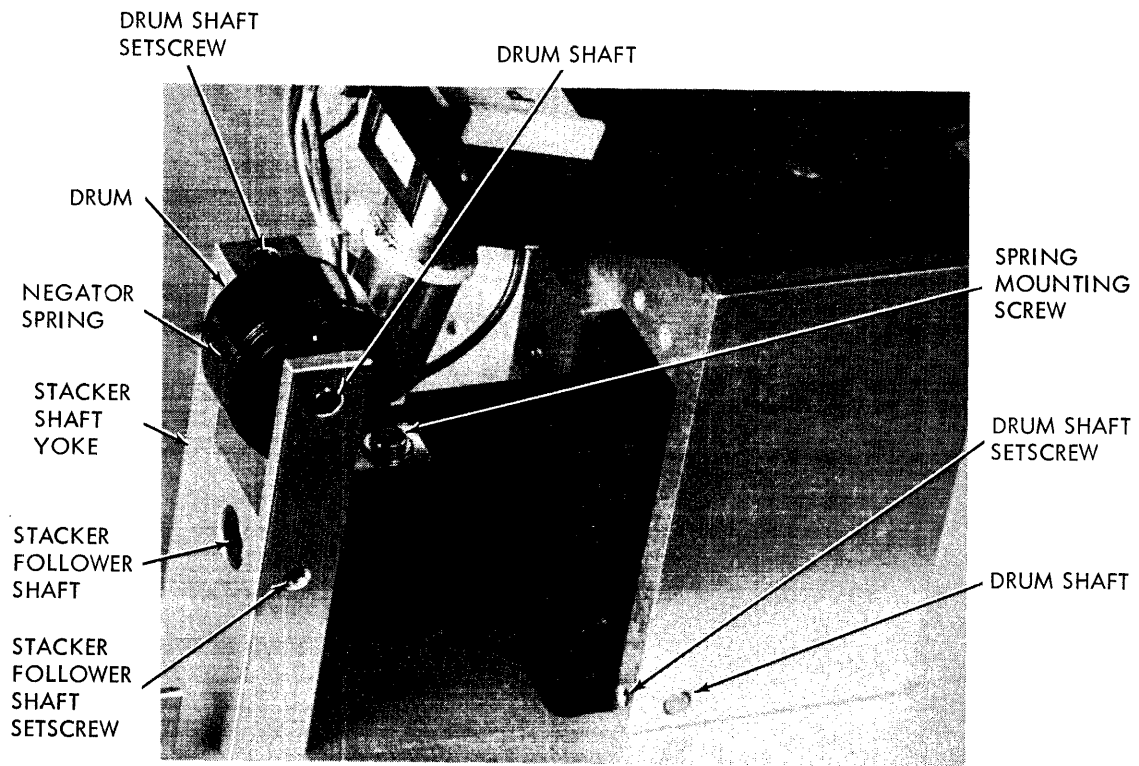


Figure 9-18. Negator Spring Replacement

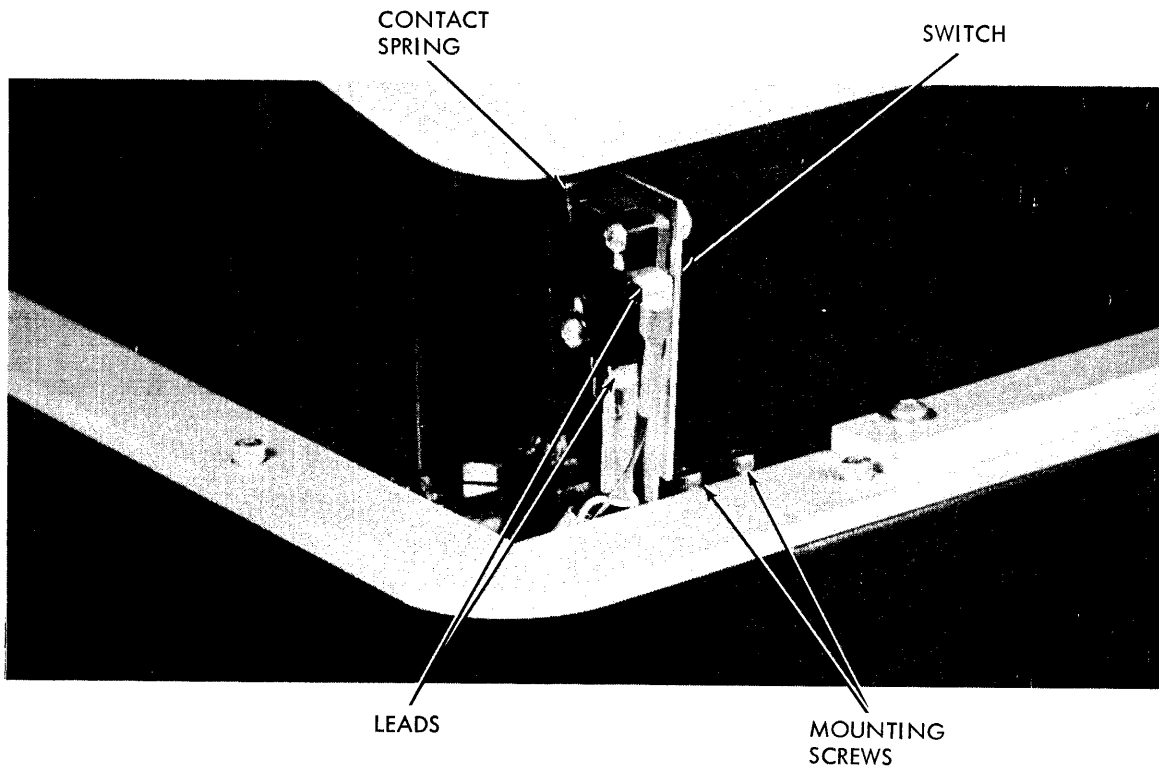


Figure 9-19. Stacker Full Switch

3. LOOSEN follower shaft set screw, figure 9-18, (stacker follower shaft only), and remove follower shaft.
 4. Move follower past edge of card reader. Hold negator spring and remove spring mounting screw. Remove negator spring from follower assembly and let it wind onto spring drum. Remove follower assembly.
 5. LOOSEN drum shaft set screw. From inside support casting, work drum shaft out of casting. Remove drum shaft and drum.
 6. Remove negator spring from drum.
 7. Replace new negator spring on drum.
 8. Replace drum shaft and drum into casting so that spring can be extended from top of drum.
 9. Adjust drum shaft so that one end of shaft is flush with face of casting and tighten drum shaft set screw.
 10. Attach end of negator spring to follower assembly by replacing and tightening spring mounting screw. Move follower to its normal forward position.
 11. Replace follower shaft.
 12. Replace two screws and follower shaft support, figure 9-12. Tighten screws to secure support to top plate.
 13. When replacing stacker follower shaft, adjust shaft so that ends of shaft are completely engaged with follower shaft support and stacker shaft yoke. Tighten stacker follower shaft set screw.
 14. On stacker follower only, attach end of top negator spring to follower assembly by replacing and tightening spring mounting screw.
- e. Replace shroud and control panel hood.

9.19 HOPPER EMPTY SWITCH

- a. Remove track cover per paragraph 9.1.4.
- b. Using a 3/32 Allen wrench, remove two screws holding raffle cap. Remove raffle cap to gain access to switch mounting screws.
- c. Disconnect two leads from hopper empty switch, figure 9-15.
- d. Using a 1/16 Allen wrench, remove two screws holding switch. Remove switch.
- e. Replace switch and two screws. Do not tighten screws.
- f. Adjust switch position so that microswitch is activated with card in hopper and not activated with hopper empty. Tighten screws to secure switch to picker casting.
- g. Connect two leads to switch.
- h. Replace two screws and raffle cap. Tighten screws to secure raffle cap to picker casting.
- i. Replace track cover.

9.20 STACKER FULL SWITCH

- a. Remove the shroud per paragraph 9.1.2.
- b. Disconnect two leads from stacker full switch, figure 9-19.
- c. Using a 1/16 Allen wrench, remove two screws holding switch. Remove switch contact spring out of slot in top plate and remove switch.
- d. Move contact spring of new switch through slot in top plate and place new switch in mounting position. Replace two screws. Tighten screws to secure switch to cabinet.
- e. Connect two leads to switch.
- f. Adjust contact spring so that switch is activated when the stacker is almost full.
- g. Replace shroud.

9.21 INDICATOR LAMPS

- a. Grasp the indicator lens with the thumb and forefinger and pull upward with a rocking motion to remove the lens.
- b. Pull the lamp from the lens.
- c. Insert the new lamp into the lens.
- d. Press the lens firmly into the switch.

SECTION 10
DIAGRAMS

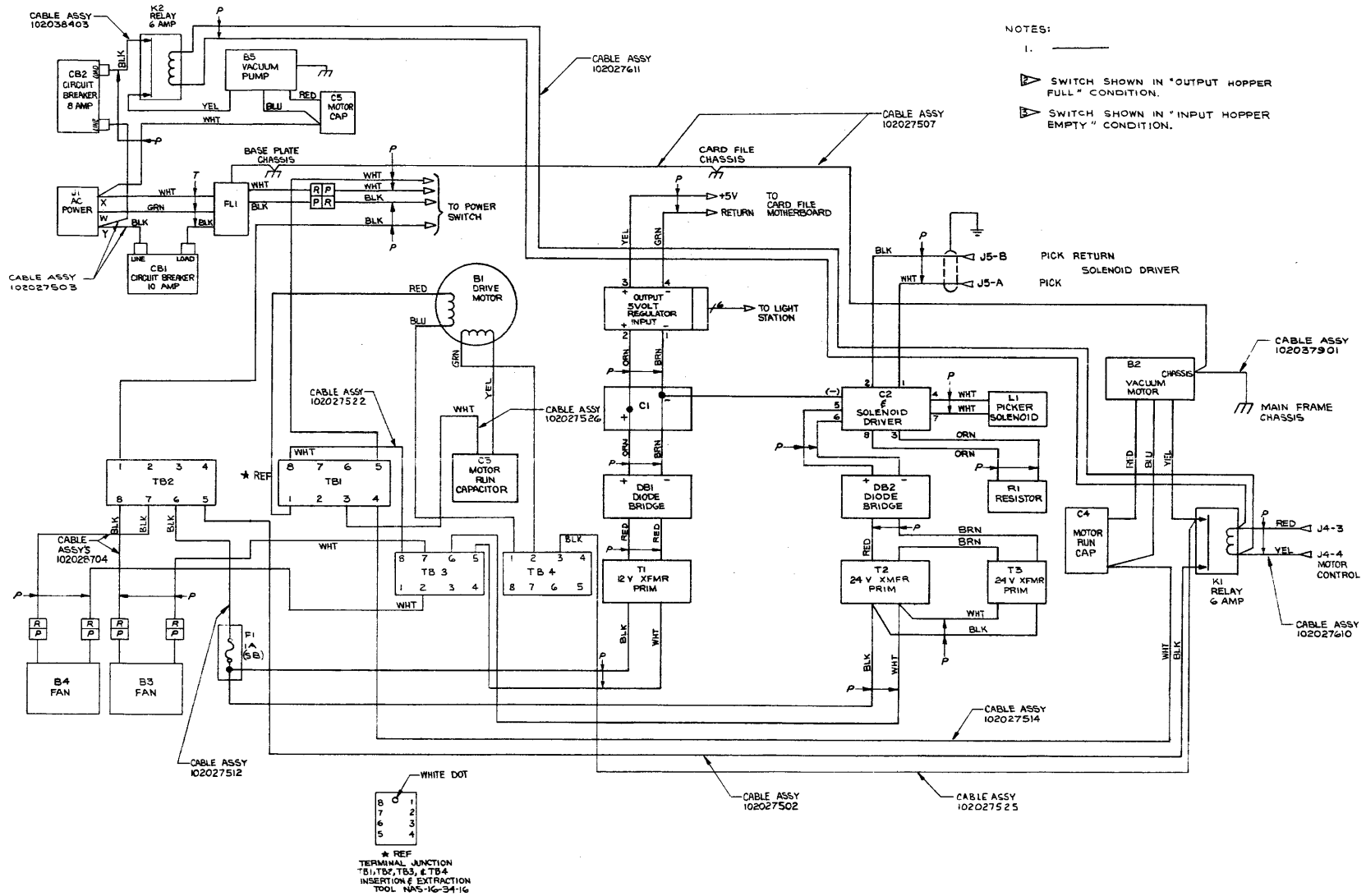


Figure 10-1. Wiring Diagram, AC Power Distribution, 115 VAC, 60 Hz

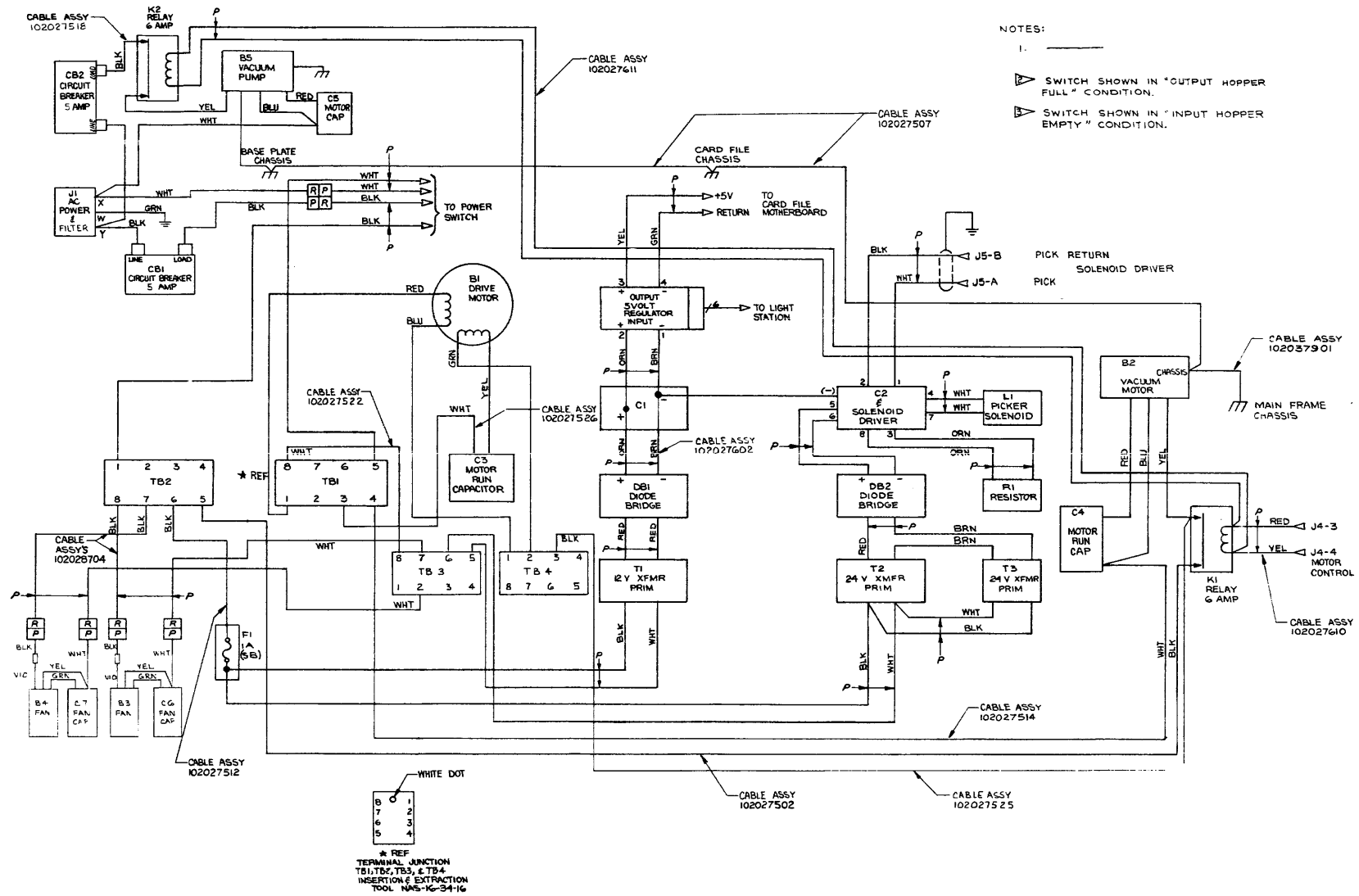


Figure 10-1A. Wiring Diagram, AC Power Distribution, 230 VAC, 50 Hz

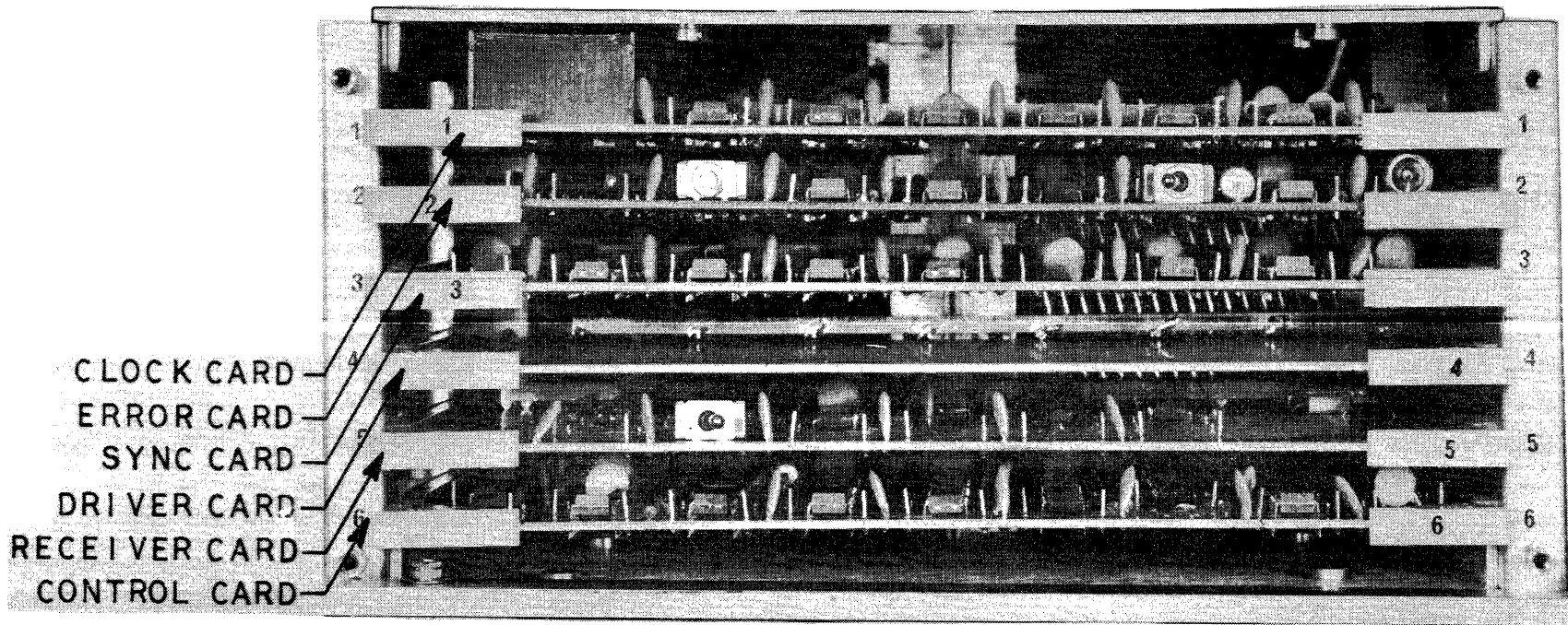
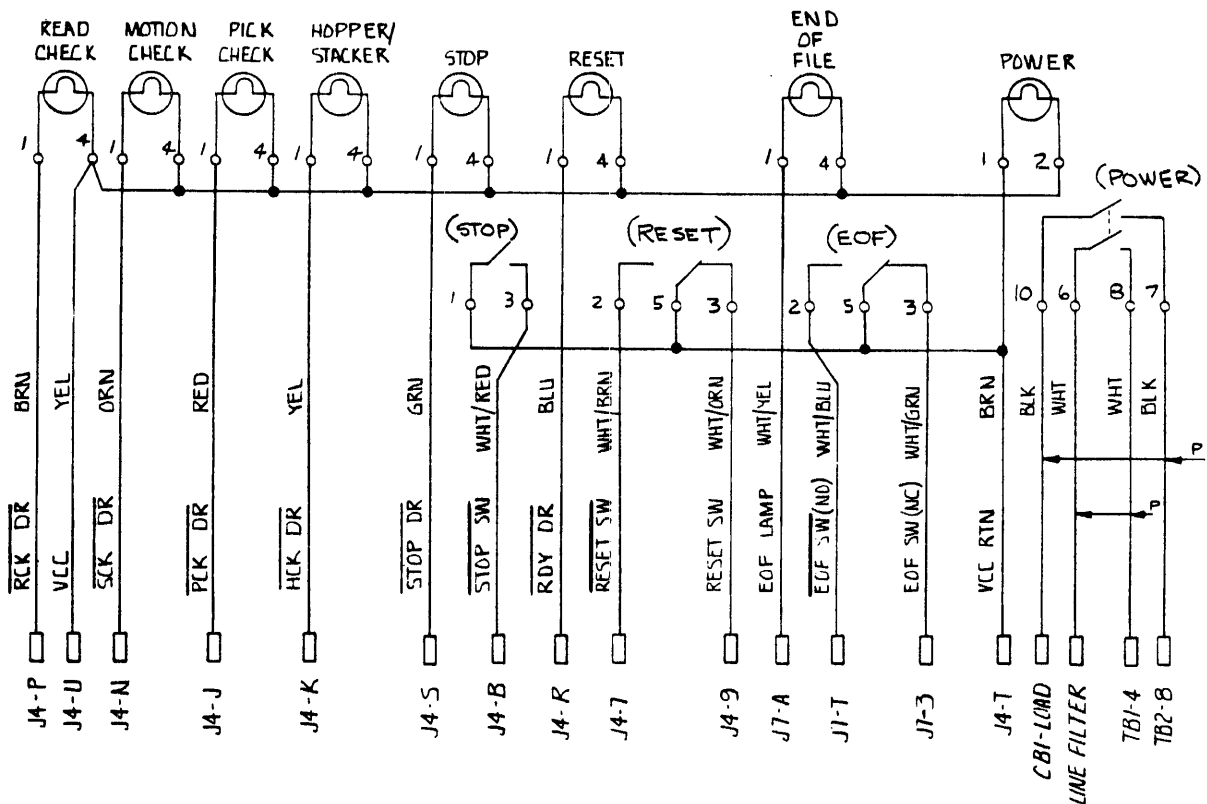


Figure 10-2. Card Cage, P.C. Card Location



NOTE:
 THIS SCHEMATIC USED WITH H.P. CONTROL
 PANEL. (DWG NO. 103083 B)

Figure 10-4. Wiring Diagram, Control Panel

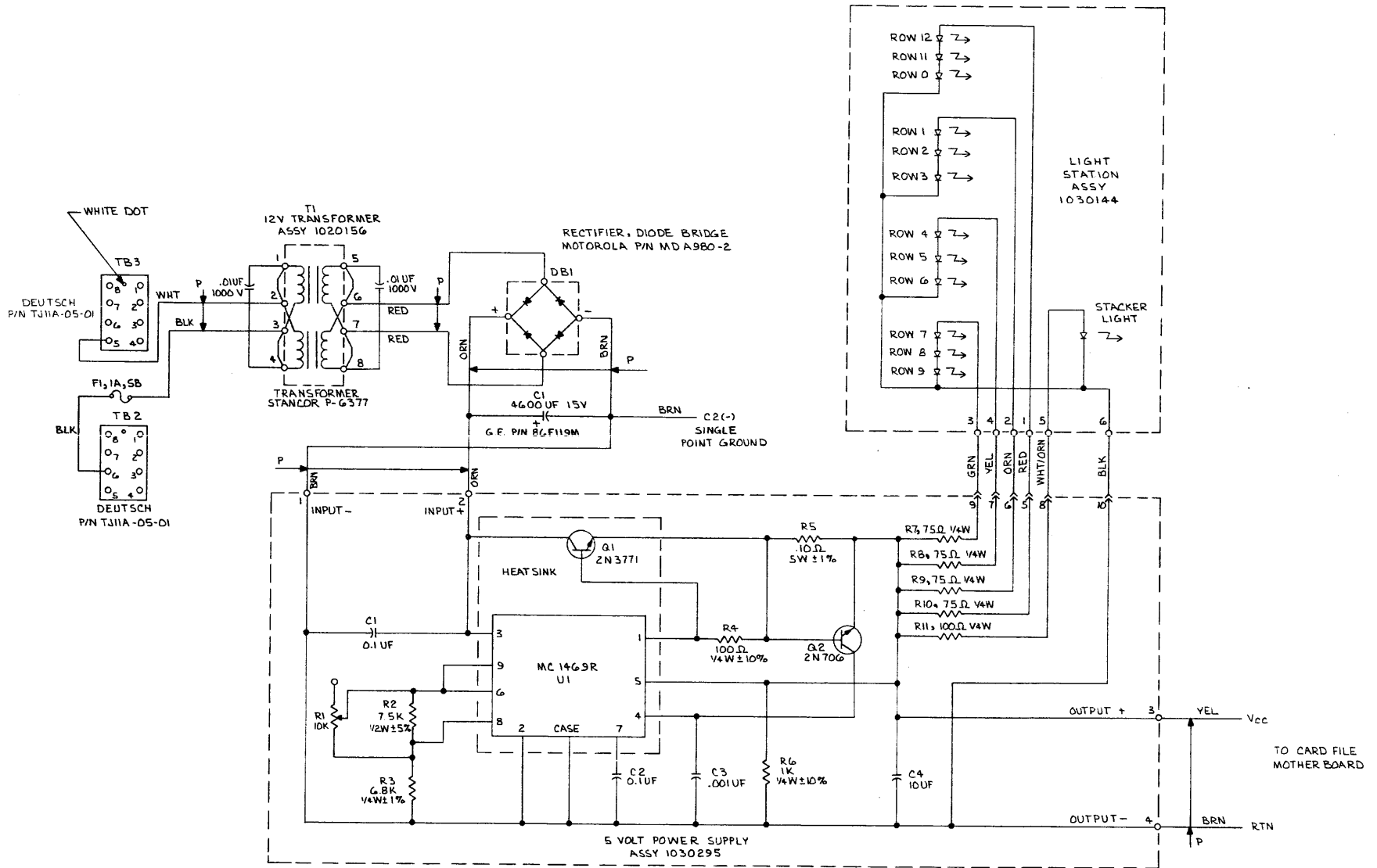


Figure 10-5. Schematic Diagram, 5V Power Supply, 115 VAC, 60 Hz

10-5A

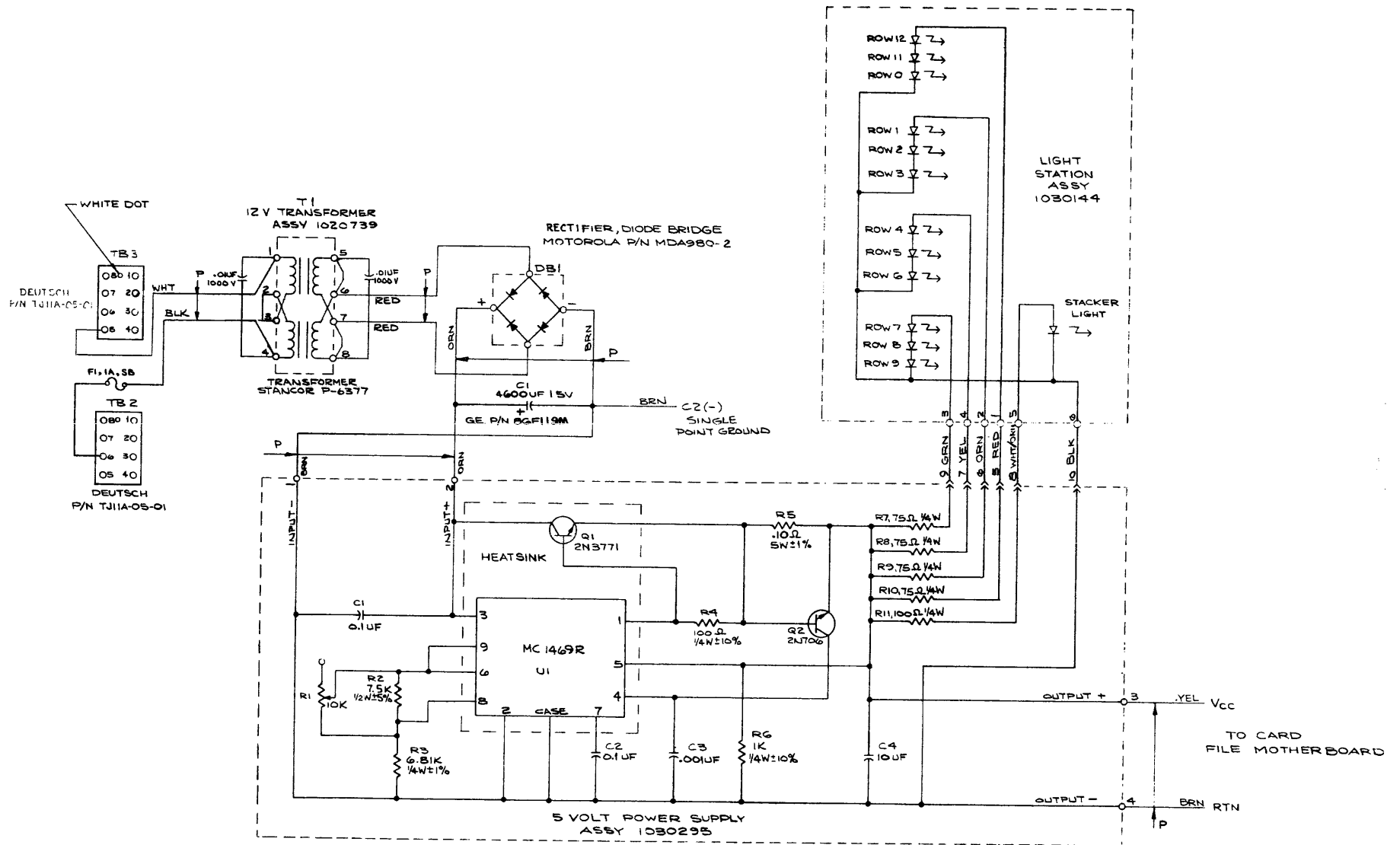


Figure 10-5A. Schematic Diagram, 5V Power Supply, 230 VAC, 50 Hz

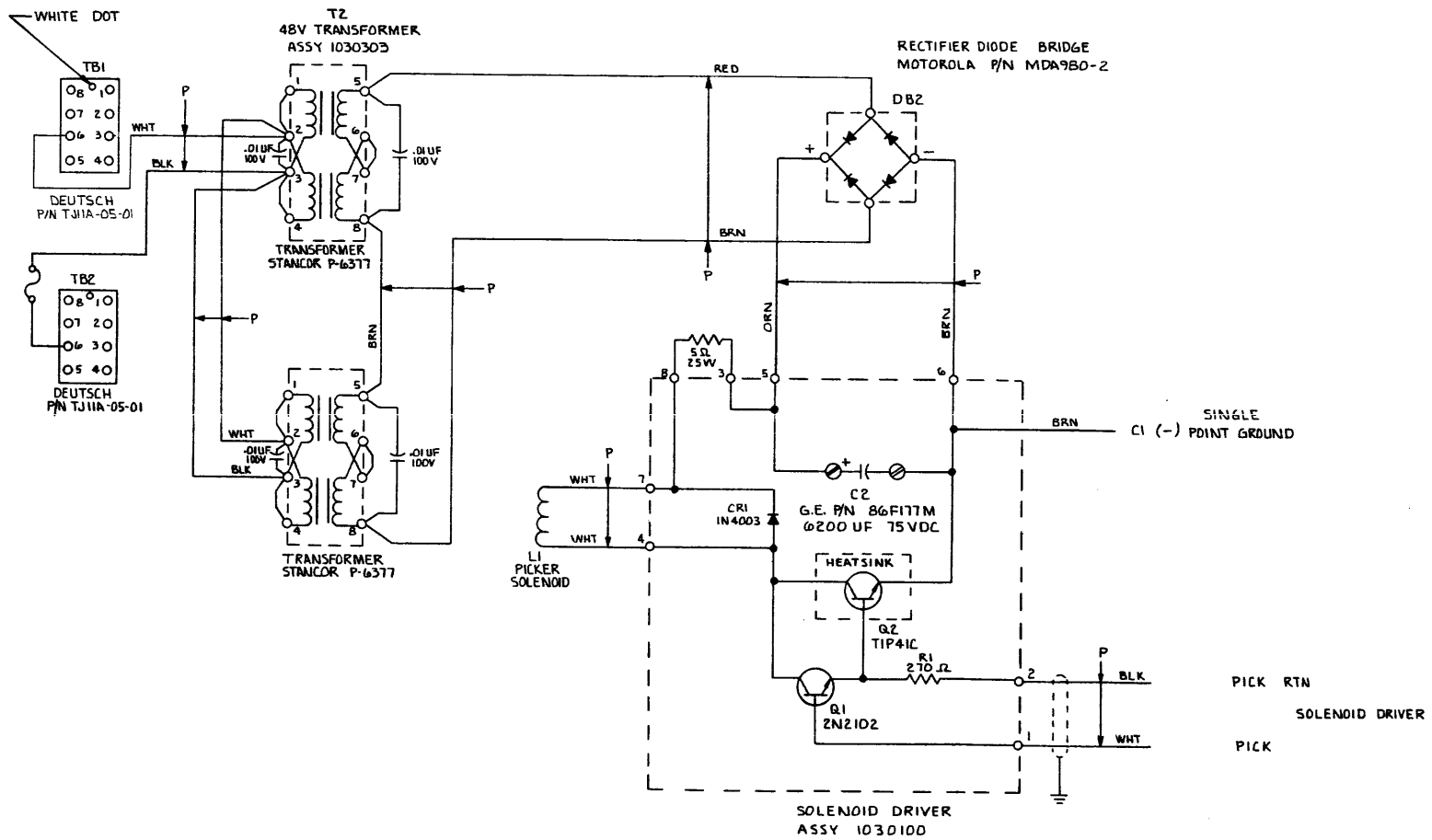


Figure 10-6. Schematic Diagram, Solenoid Driver, 115 VAC, 50 Hz

10-6A

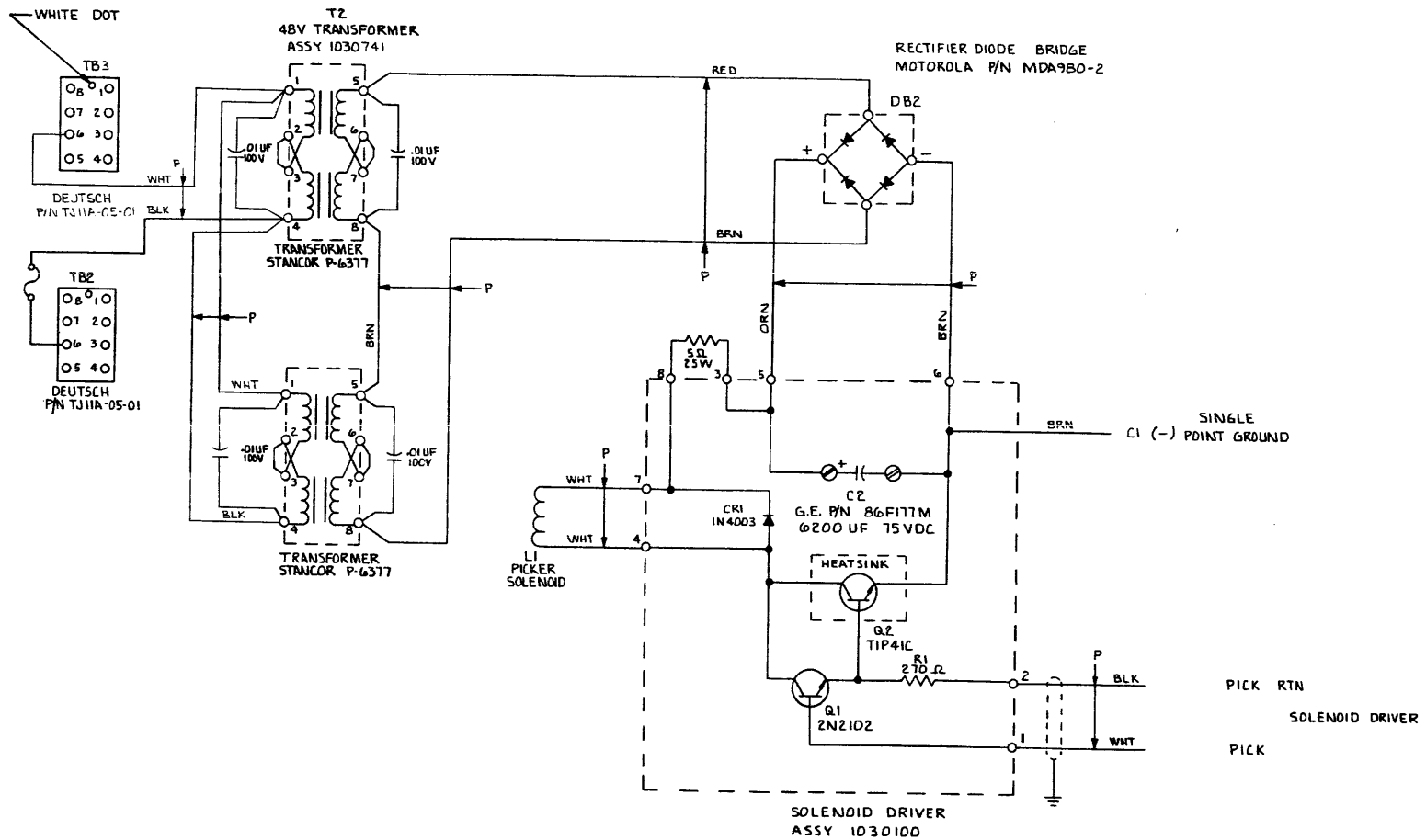


Figure 10-6A. Schematic Diagram, Solenoid Driver, 230 VAC, 50 Hz

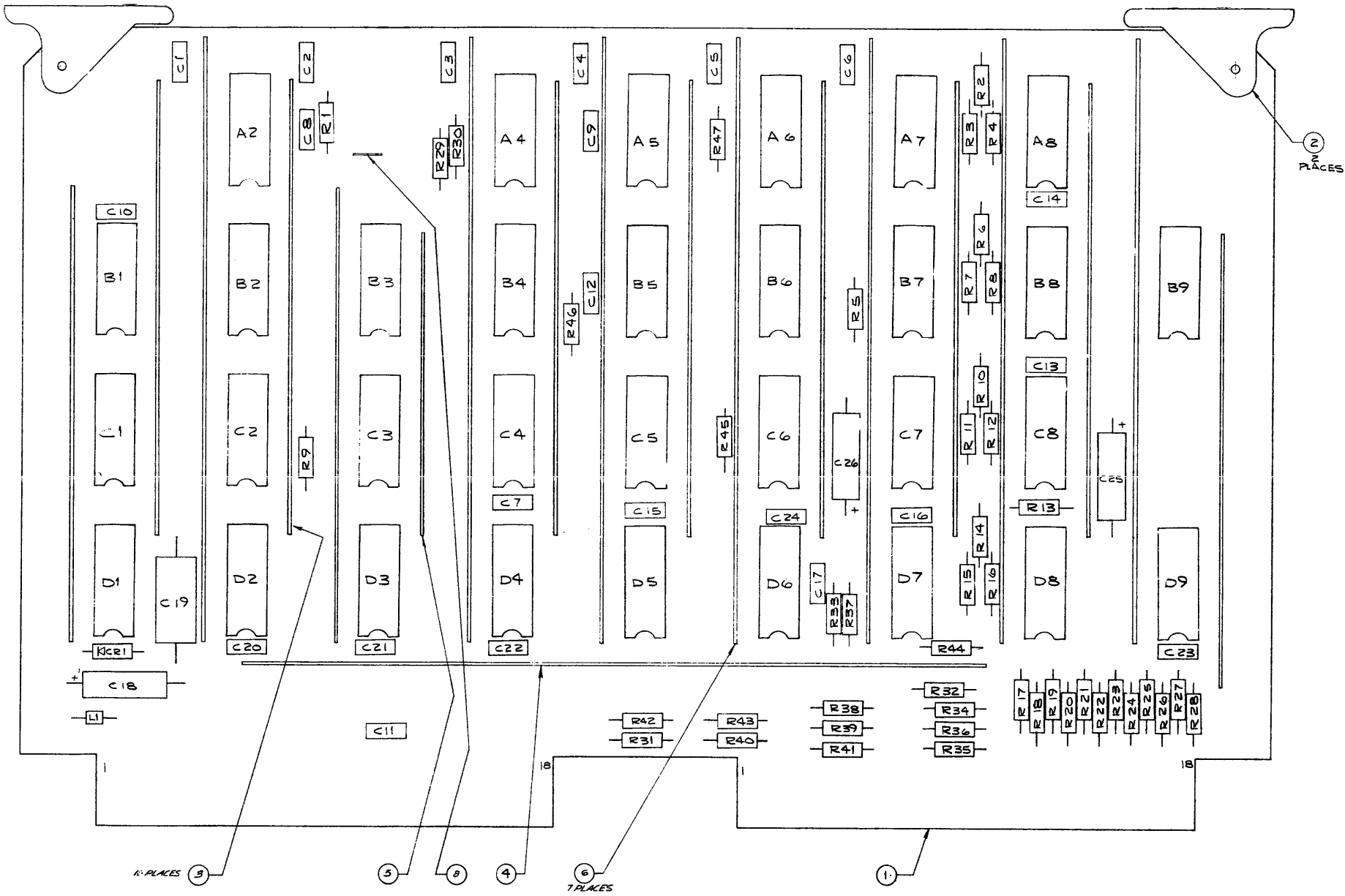


Figure 10-7. Assembly Diagram, Control Card

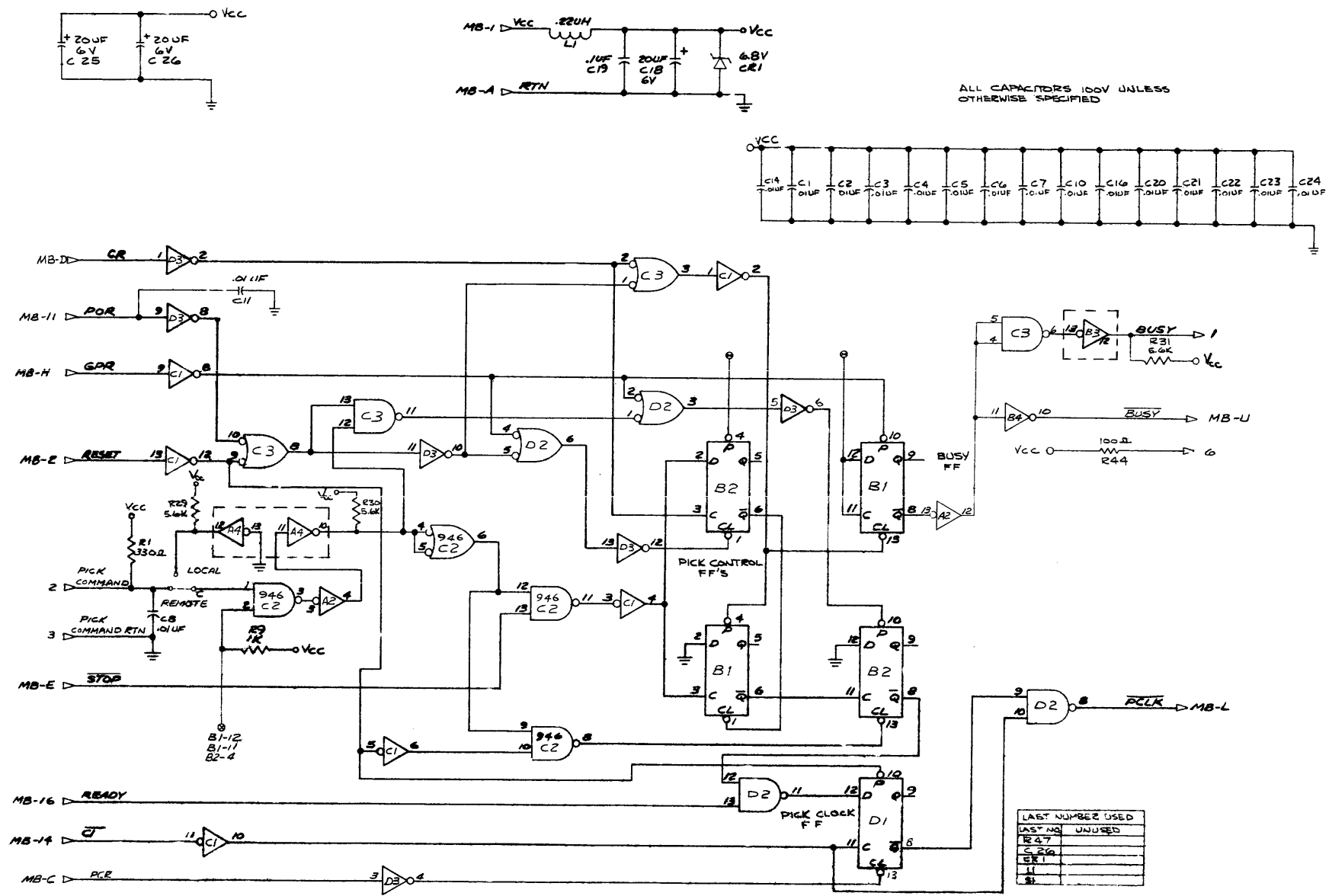


Figure 10-8. Schematic Diagram, Control Card (sheet 1 of 2)

6-01

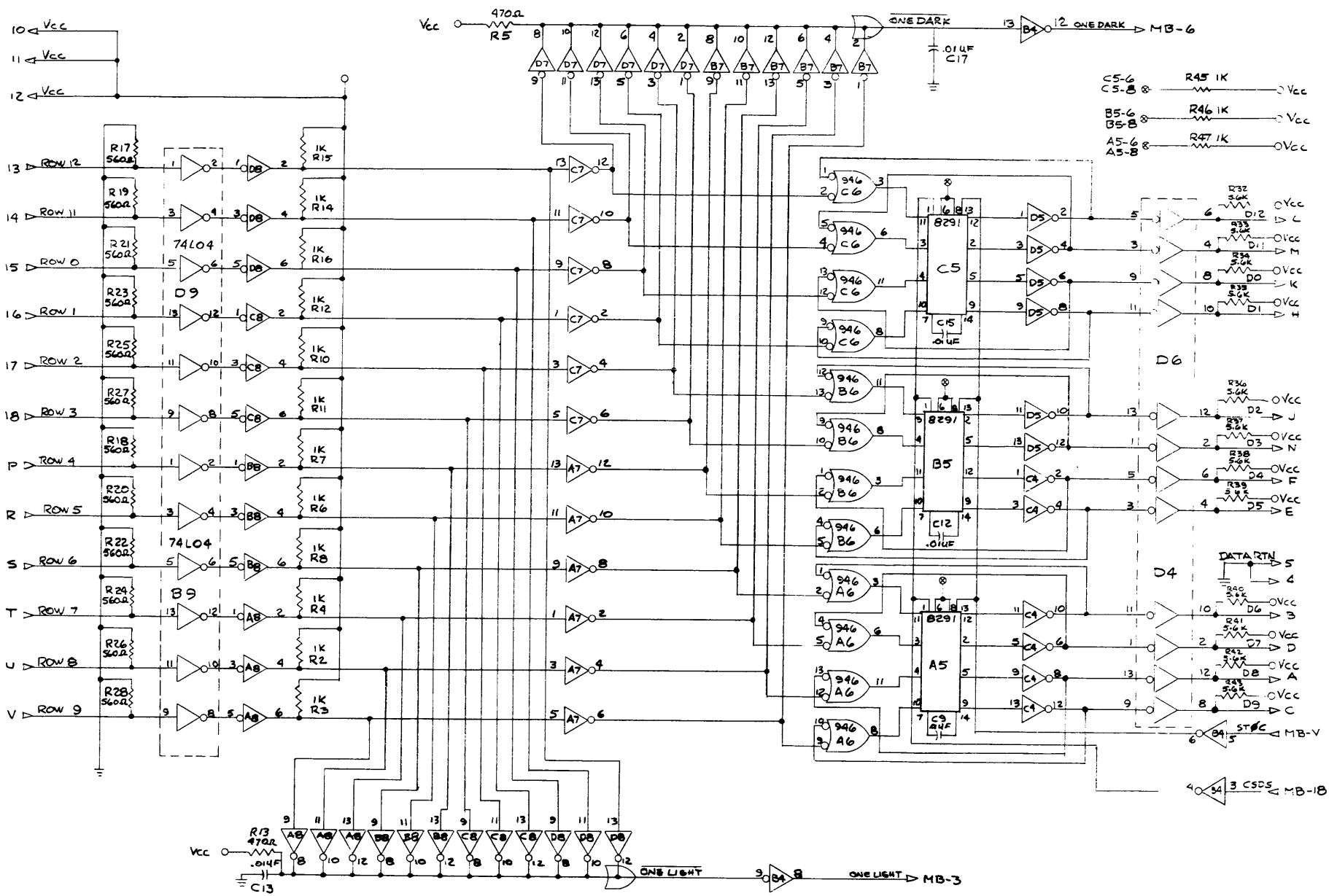


Figure 10-9. Schematic Diagram, Control Card (sheet 2 of 2)

10-10

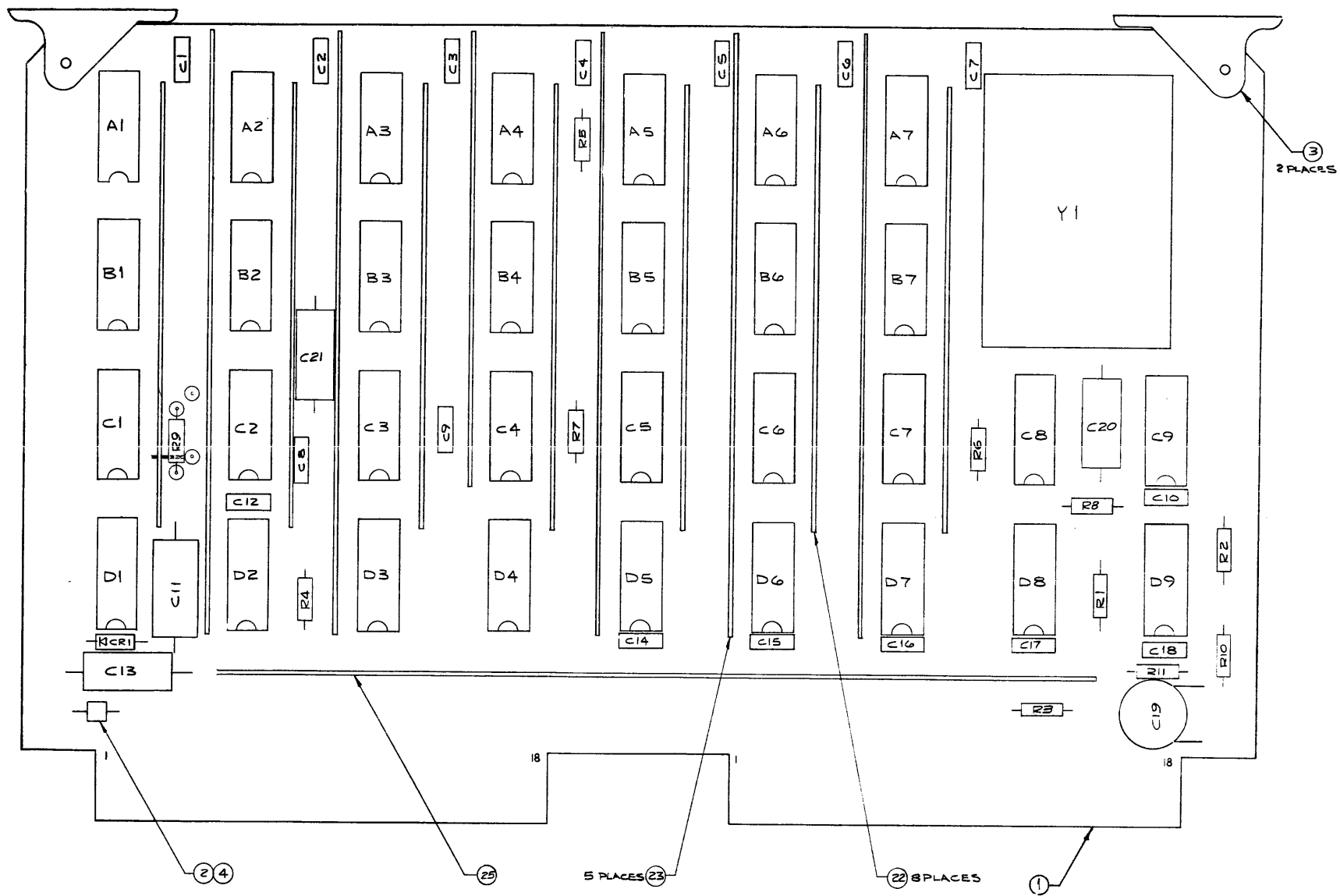


Figure 10-10. Assembly Diagram, Clock Card

10-11

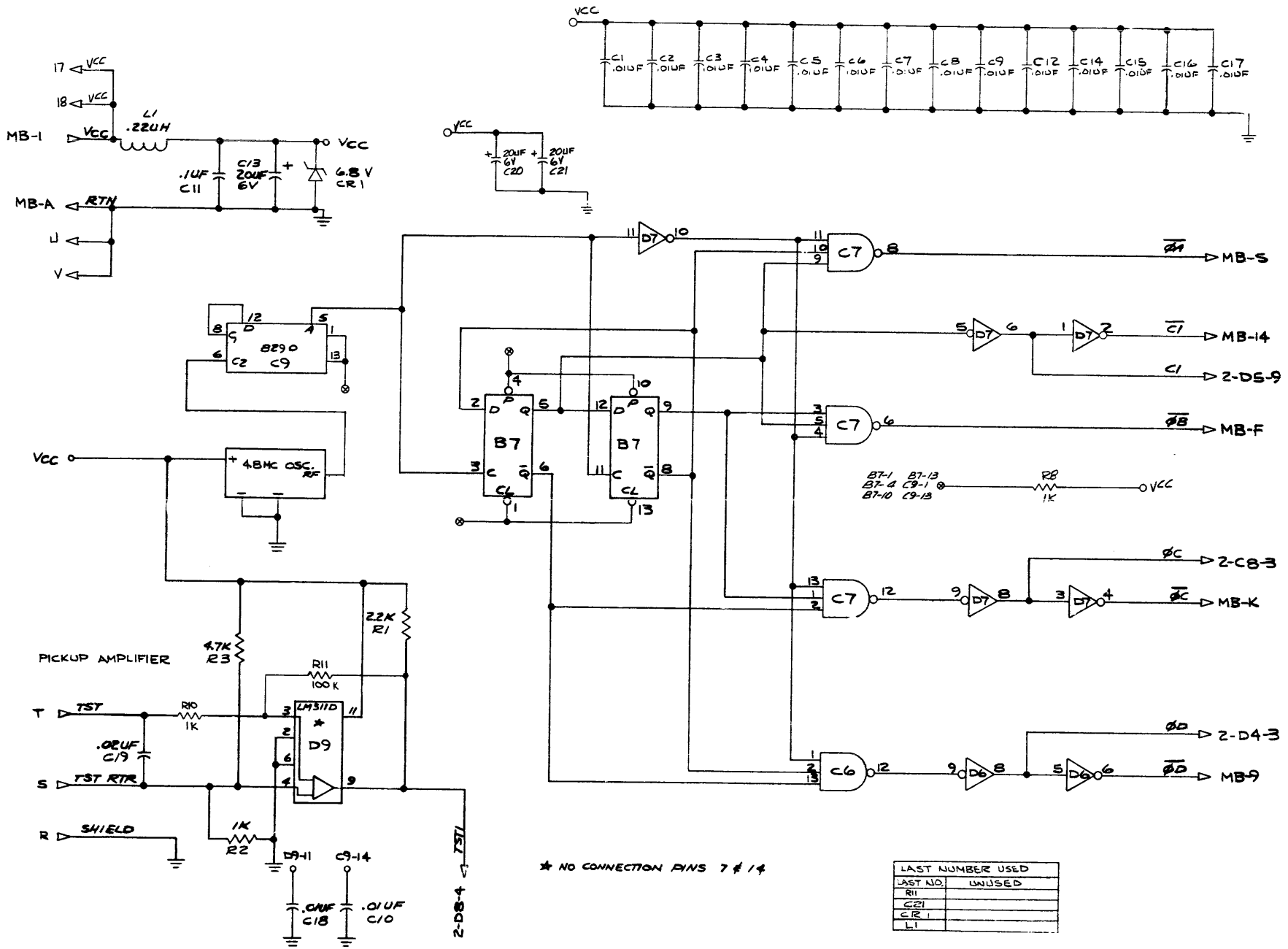


Figure 10-11. Schematic Diagram, Clock Card, (sheet 1 of 3)

LAST NUMBER USED	
LAST NO.	UNUSED
R11	
C21	
CR1	
L1	

10-13

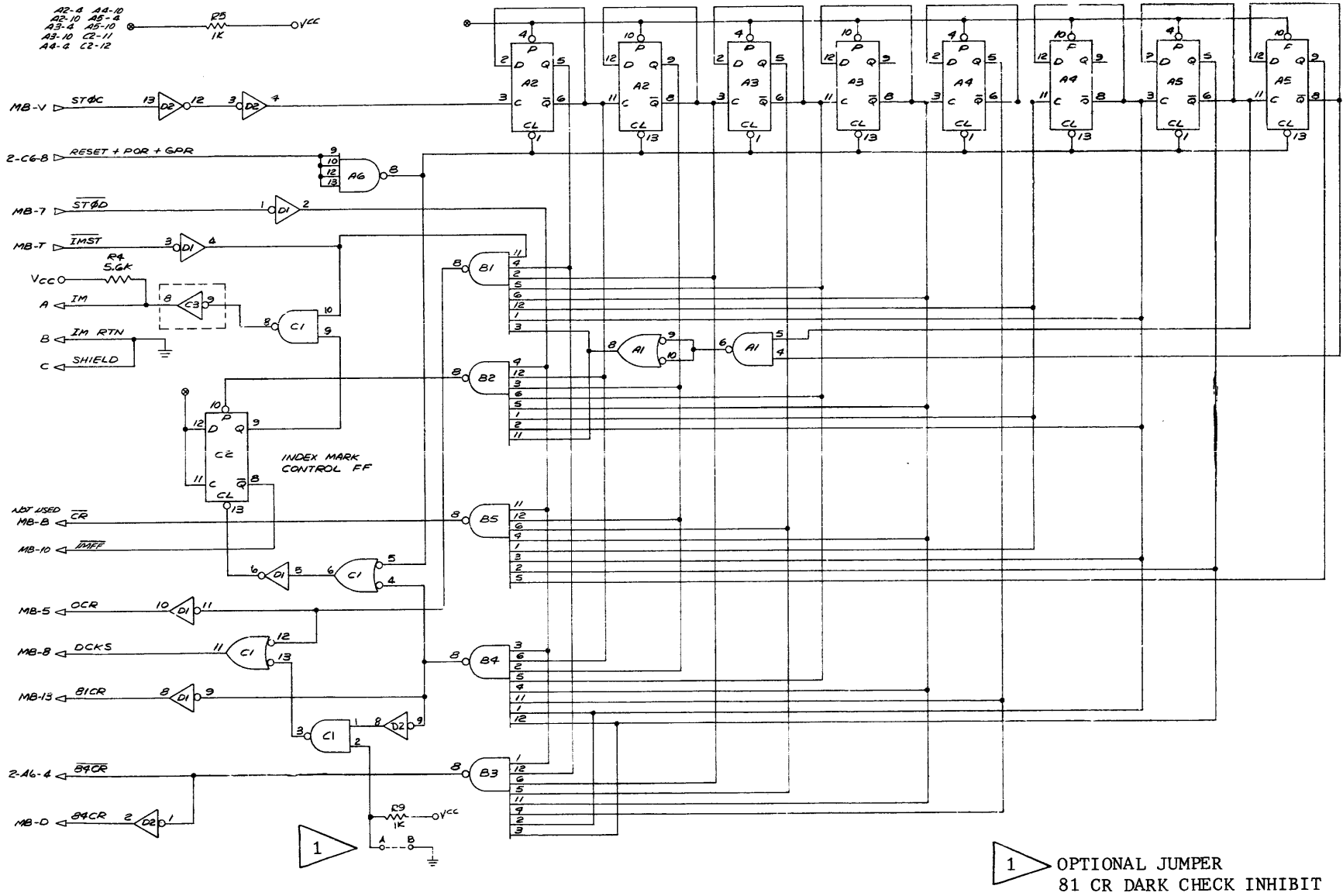


Figure 10-13. Schematic Diagram, Clock Card, (sheet 3 of 3)

10-15

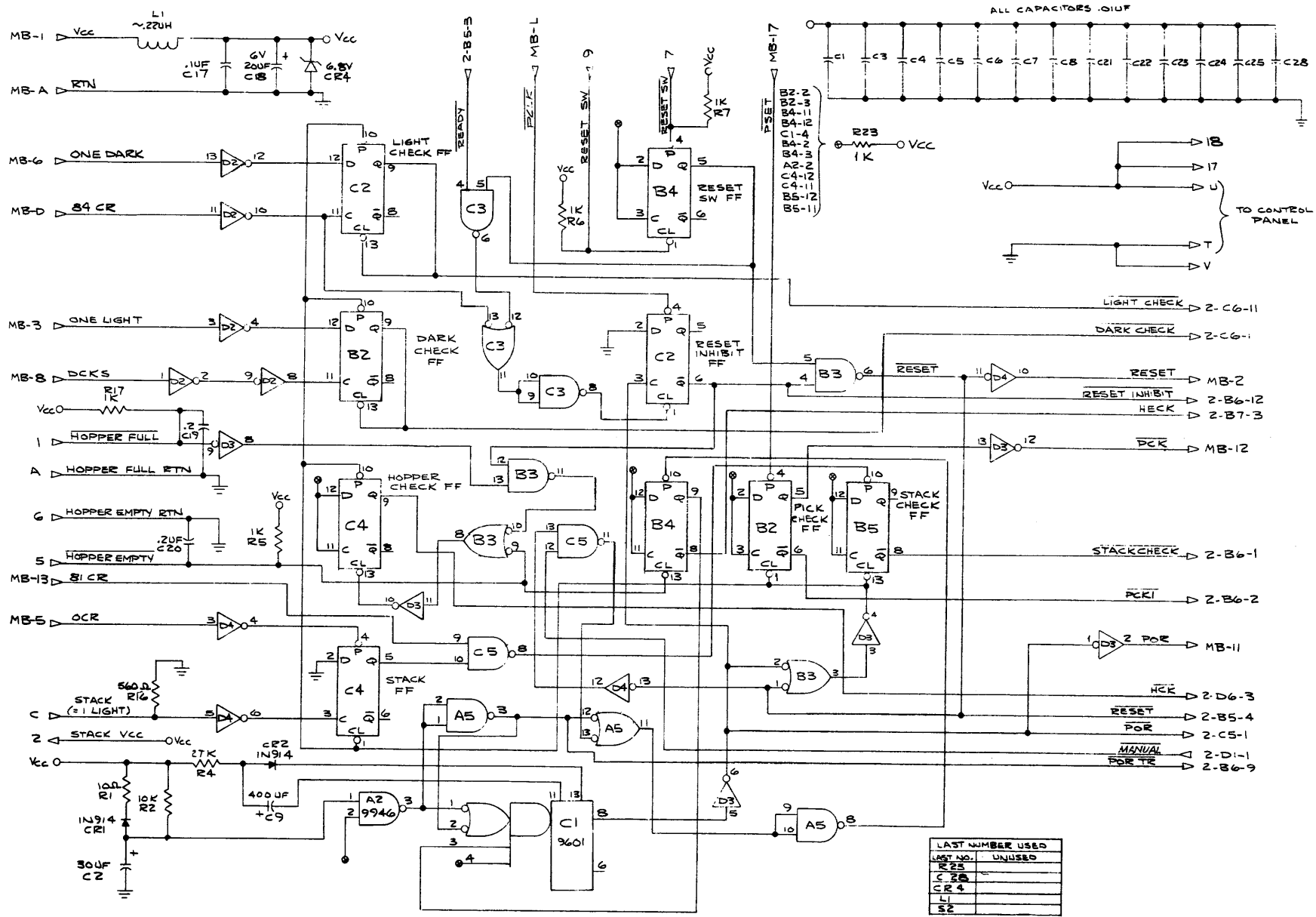
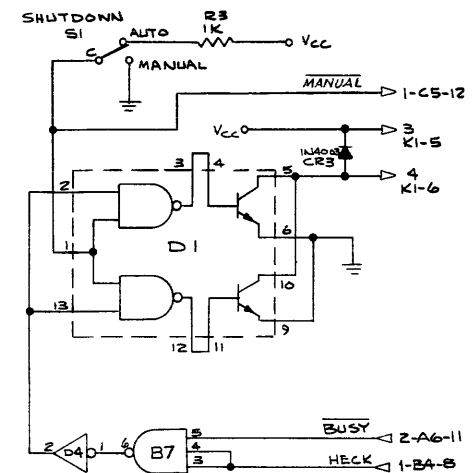
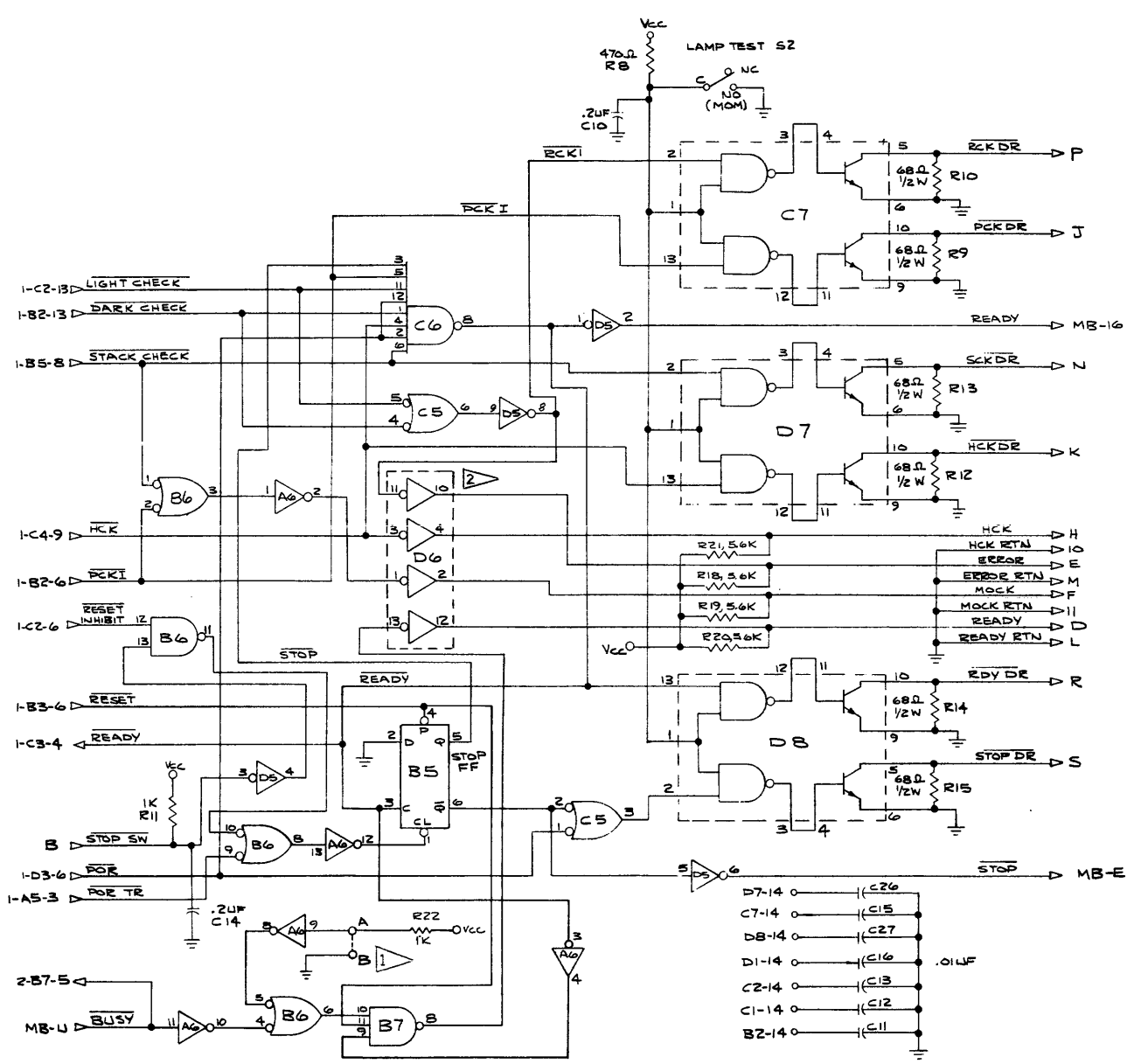


Figure 10-15. Schematic Diagram, Error Card (Sheet 1 of 2)



- 1 OPTIONAL JUMPER
BUSY INHIBITS READY
- 2 OPTIONAL DRIVERS
TO MATCH GROUND TRUE
LOGIC INTERFACE

Figure 10-16. Schematic Diagram, Error Card (Sheet 2 of 2)

10-21

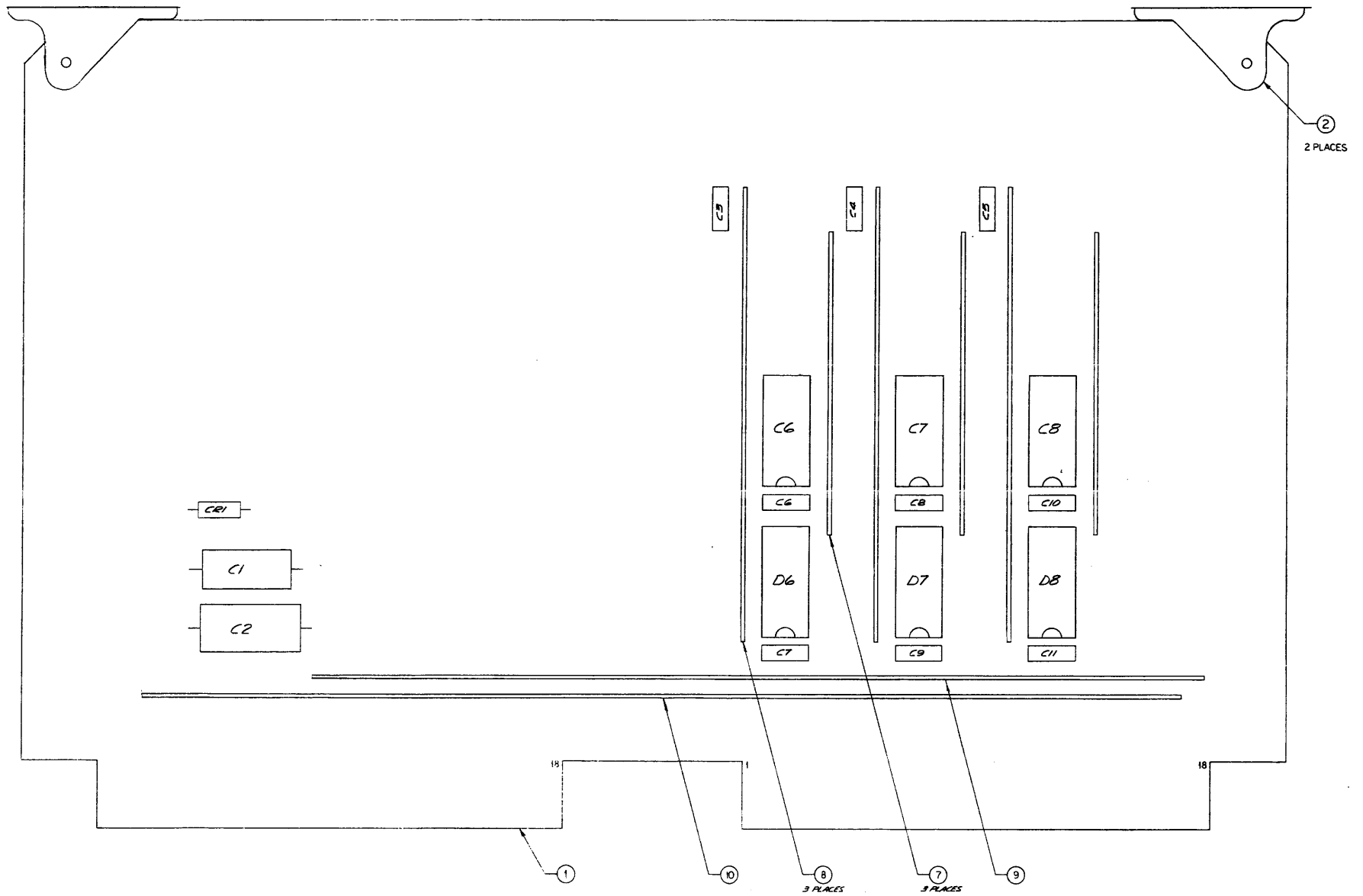


Figure 10-21. Assembly Diagram, Driver Card

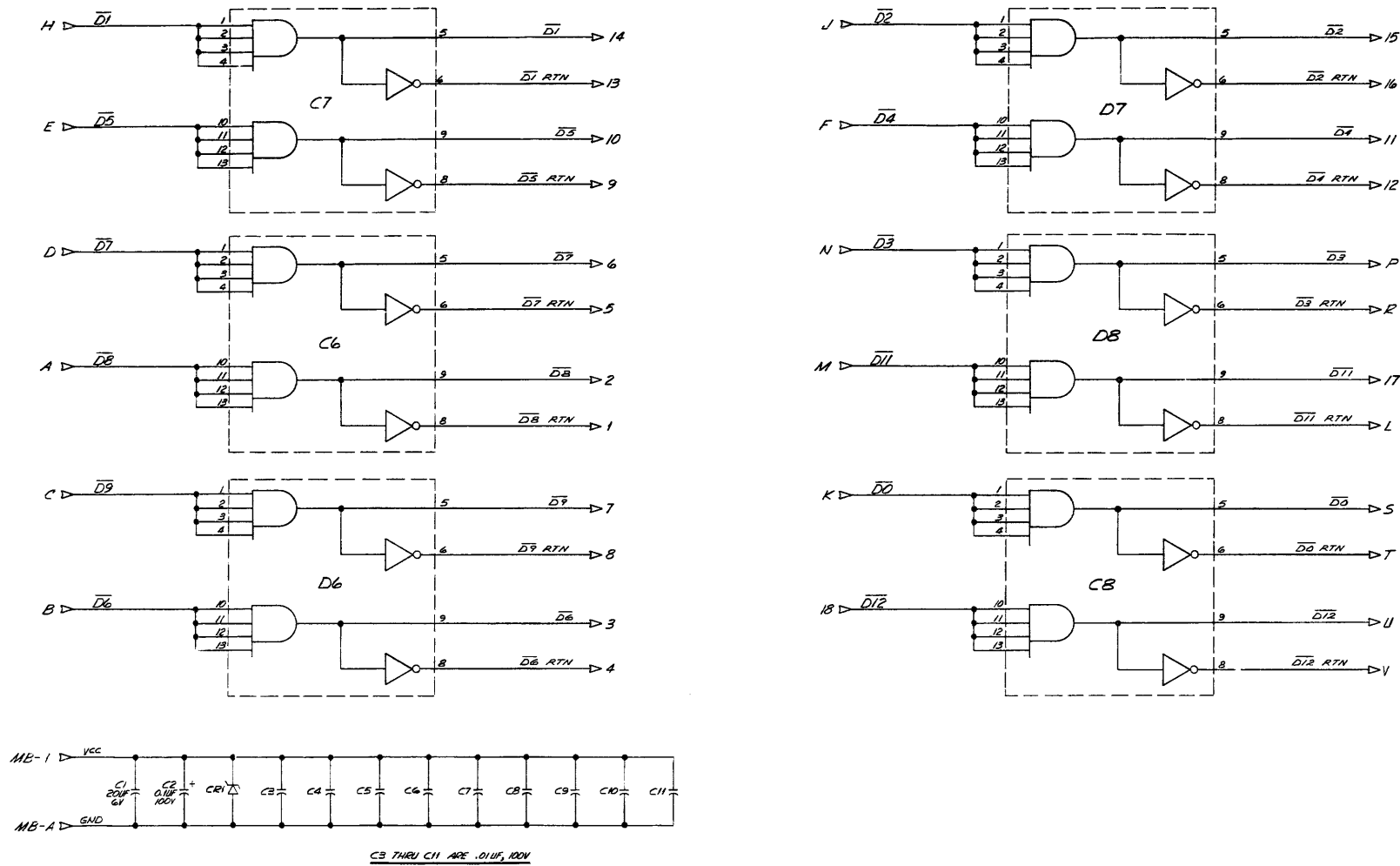


Figure 10-22. Schematic Diagram, Driver Card

10-23

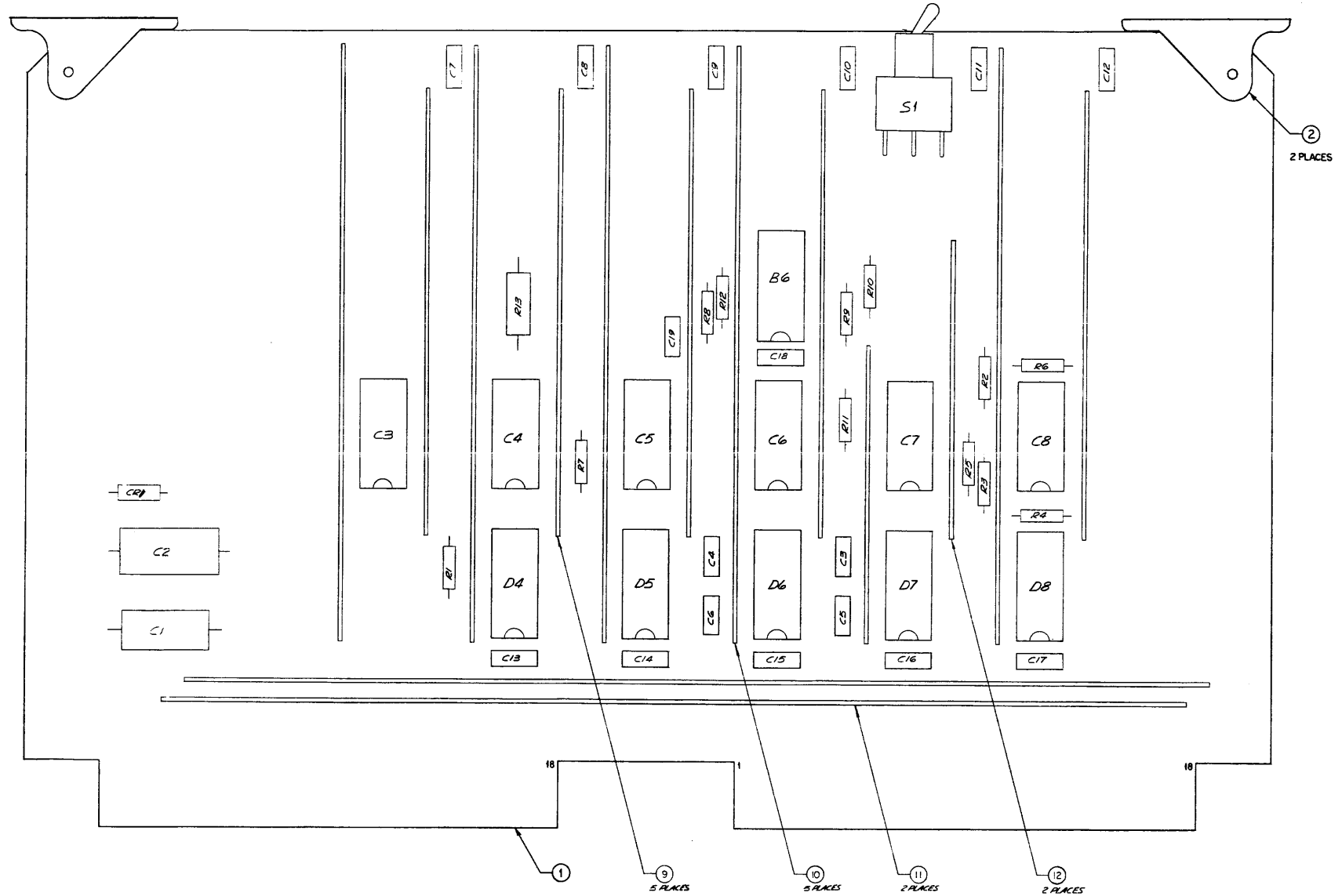


Figure 10-23. Assembly Diagram, Receiver Card

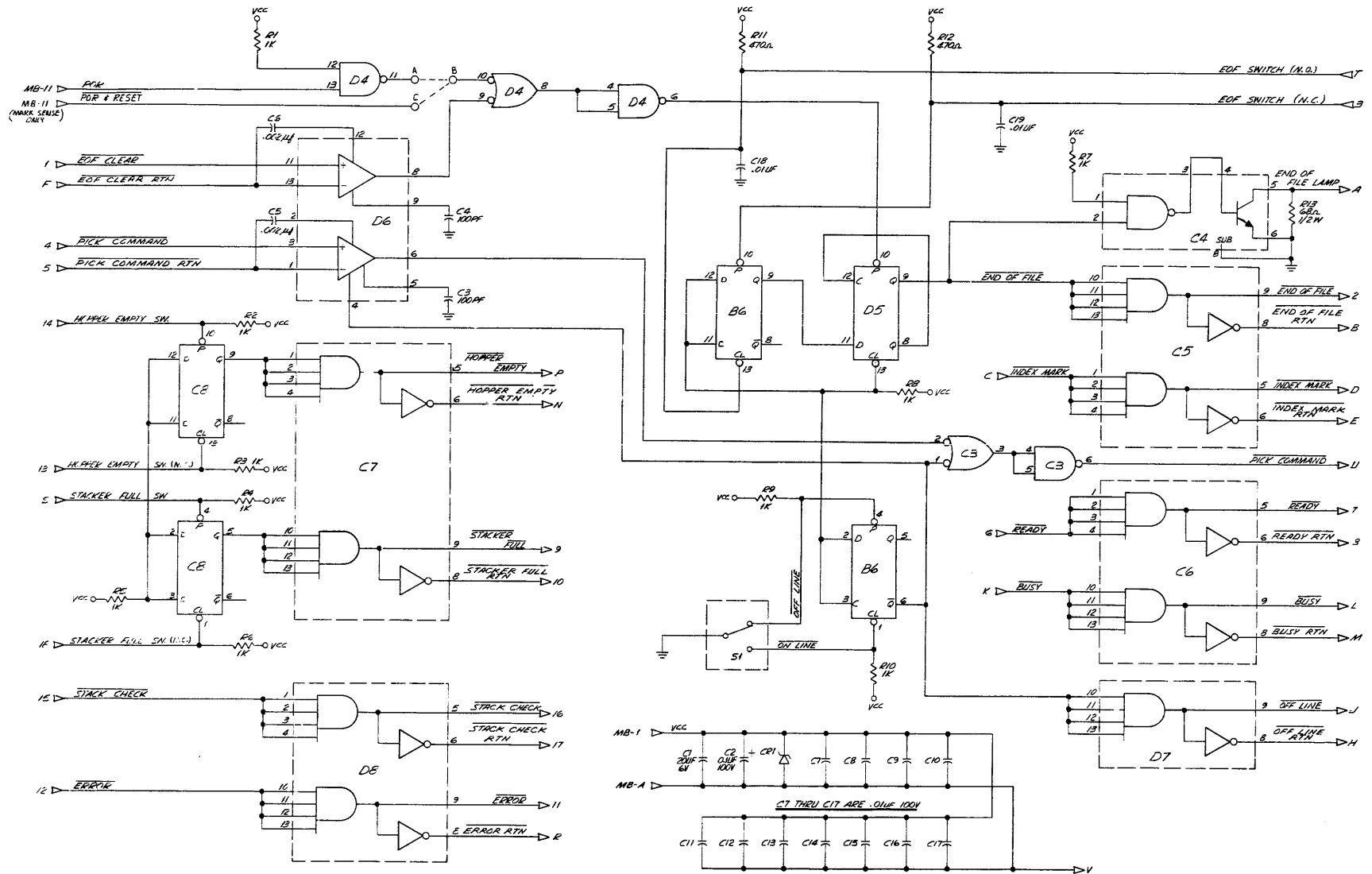


Figure 10-24. Schematic Diagram, Receiver Card

SECTION 11

SIGNAL MNEMONICS AND ABBREVIATIONS

MNEMONIC	DESCRIPTION	LOCATION	ORIGINATING SOURCE
Vcc	+5 volts	MB-1	5 volt power supply (Mother Board)
RTN	+5 volt return	MB-A	5 volt power supply (Mother Board)
ØA	Clock Phase A	MB-S	Clock Card
ØB	Clock Phase B	MB-F	Clock Card
ØC	Clock Phase C	MB-K	Clock Card
ØD	Clock Phase D	MB-9	Clock Card
81CR	81st Column Reset	MB-13	Clock Card
84CR	84th Column Reset	MB-D	Clock Card
BUSY	Busy Output	J8-1	Control Card
BUSY	Busy Signal	MB-U	Control Card
C1	Basic Clock	MB-14	Clock Card
CR	Column Reset	MB-B	Clock Card
CSDS	Column Storage Data Strobe	MB-18	Sync 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
D5	Data Row 5 Output	J8-E	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
D11	Data Row 11 Output	J8-M	Control Card
D12	Data Row 12 Output	J8-L	Control Card
DCKS	Dark Check Strobes	MB-8	Clock Card
DARK CHECK	Dark Check	B2-9	Error Card
EOF CLEAR	End of File Clear	J7-1	Receiver Card
EOF SWITCH (N. O.)	End of File Switch (Normally Open)	J7-T	Receiver Card
ERROR	Error Output	J4-E	Error Card
ERROR RTN	Error Output Return	J4-M	Error Card
GPR	Good Pick Reset	MB-H	Clock Card
HCK	Hopper Check Output	J4-H	Error Card
HCK	Input or Output Hopper Check	C4-9	Error Card
HCK DR	Hopper Check Lamp Driver	J4-K	Error Card
HCK RTN	Hopper Check Output Return	J4-10	Error Card
HECK	Hopper Empty Check	B4-8	Error Card

MNEMONIC	DESCRIPTION	LOCATION	ORIGINATING SOURCE
HOPPER EMPTY	Hopper Empty Switch	J4-5	Error Card
HOPPER EMPTY RTN	Hopper Empty Switch Return	J4-6	Error Card
STACKER FULL	Hopper Full Switch	J4-1	Error Card
STACKER FULL RTN	Hopper Full Switch Return	J4-A	Error Card
IM	Index Marks	J3-A	Clock Card
IM RTN	Return for Index Marks	J3-B	Clock Card
IMST	Index Mark Strobes	MB-T	Sync Card
LIGHT CHECK	Light Check	C2-9	Error Card
MOCK	Motion Check Output	J4-F	Error Card
MOCK RTN	Motion Check Output Return	J4-11	Error Card
OCR	Zero Column Reset	MB-5	Clock Card
ONE DARK	Read Station Any Dark	MB-6	Control Card
ONE LIGHT	Read Station Any Light	MB-3	Control Card
OSCLK	Offset Clock	MB-P	Clock Card
OSR	Offset Reset	MB-J	Clock Card
OSUCLK	Offset Up-Clock	MB-R	Clock Card
PCK	Pick Check	B2-5	Error Card
PCK DR	Pick Check Lamp Driver	J4-P	Error Card
PCKI	Pick Check Indicator	B2-2	Error Card
PCLK	Pick Clock	MB-L	Control Card
PCR	Pick Control Reset	MB-C	Sync Card
PICK	Pick Driver Output	J5-A	Sync Card
PICK RTN	Pick Driver Output Return	J5-B	Sync Card
PICK COMMAND	Pick Command Input	J8-2	Control Card
PICK COMMAND RTN	Pick Command Input Return	J8-3	Control Card
POR	Power On Reset	MB-11	Error Card
POR TR	Power On Reset Trigger	A5-12	Error Card
PRCLK	Preset Clock	MB-15	Clock Card
PSET	Pick Check Set	MB-17	Sync Card
RCK DR	Read Check Lamp Driver	J4-P	Error Card
RDY DR	Ready Lamp Driver	J4-R	Error Card
READY	Ready	MB-16	Error Card
READY	Ready Output	J4-D	Error Card
READY RTN	Ready Output Return	J4-L	Error Card
RESET	Gated Reset Switch	MB-2	Sync Card
RESET SW	Reset Switch Normally Open	J4-9	Error Card
RESET SW	Reset Switch Normally Closed	J4-7	Error 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	J8-17	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

MNEMONIC	DESCRIPTION	LOCATION	ORIGINATING SOURCE
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
Row 11	Read Sensor Input Row 11	J8-14	Control Card
Row 12	Read Sensor Input Row 12	J8-13	Control Card
RTN	Data Drivers Return	J8-5	Control Card
SCK DR	Stack Check Lamp Driver	J4-N	Error Card
SHIELD	Shield for Index Marks	J3-C	Clock Card
SHIELD	Shield for PICK	J5-C	Sync Card
SHIELD	Shield for Timing Strobe	J3-R	Reluctance Pickup
SHUTDOWN STATUS	Mode Switch Input	S1-C	Error Card
STACK	Stack Sensor Input	J4-C	Error Card
STACK CHECK	Output Stacker Check	B5-8	Error Card
STACK Vcc	Stack Sensor +5 volts	J4-2	Error Card
ST ϕ B	Column Strobe Phase B	MB-4	Sync Card
ST ϕ C	Column Strobe Phase C	MB-V	Sync Card
ST ϕ D	Column Strobe Phase D	MB-7	Sync Card
STOP	Stop	MB-E	Error Card
STOP DR	Stop Lamp Driver	J4-S	Error Card
STOP SW	Stop Switch Input	J4-B	Error Card
TST	Timing Strobe	J3-T	Reluctance Pickup
TST RTN	Timing Strobe Return	J3-S	Reluctance Pickup
TST1	Timing Strobe One	D9-9	Clock Card
TST2	Timing Strobe Two	C8-9	Clock Card
TSTR	Timing Strobe Reset	MB-N	Clock Card
Vcc	+5V to Read Sensor Array	J8-12	Control Card
ZERO	Preset Decode	MB-N	Sync 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 TRIM GROUP assembly breakdown, for example, (Figure 12-3), under index #111, two capacitors are listed for the same index number.

111	00000 202 . .	CAPACITOR 17 μ f, 370 VAC (60 Hz Models)
	00000 206 . .	CAPACITOR 10 μ f, 365 VAC (50 Hz Models)

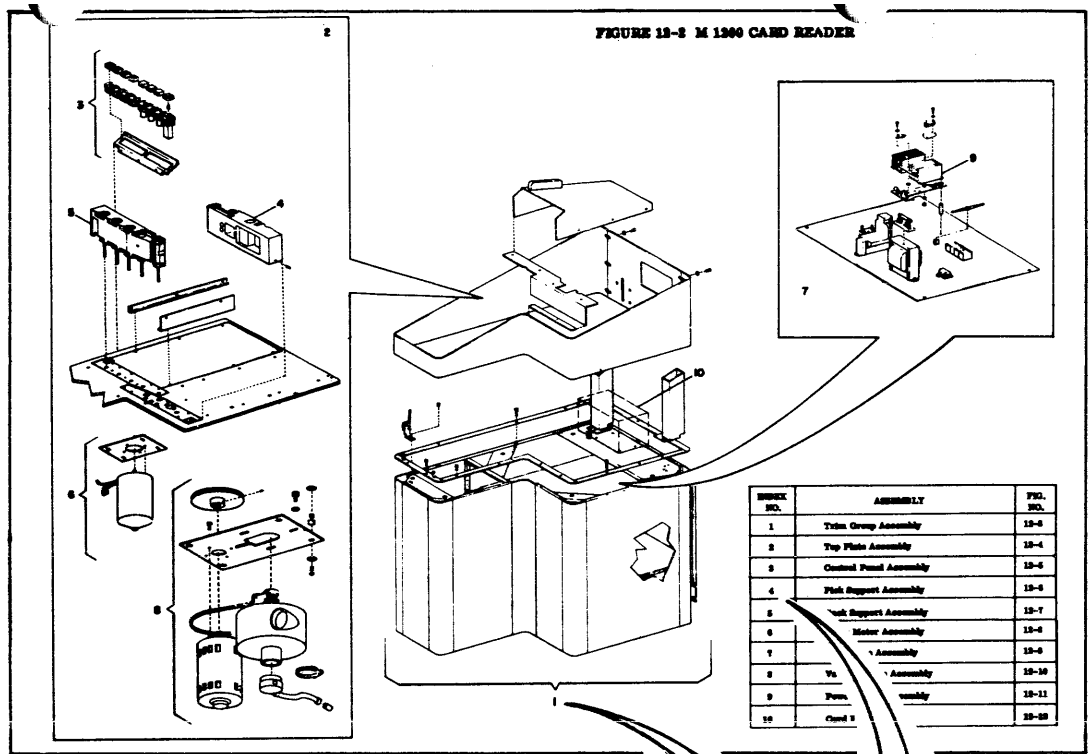
Table 12-1 list the major assemblies and subassemblies and associated components of the card reader with the figure number in which they are listed and illustrated. In the parts list, Documentation parts or assemblies are identified by an eight-digit number. Parts or assemblies that Documentation purchases 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 lists the individual components or parts.
- c. To simplify the updating of Section 12 of this manual, only ODD numbered pages are used.



- ① In Figure 12-2 locate index number of major assembly from which part was removed.
- ② In Figure 12-2, use index number of major assembly to find figure number of major assembly parts breakdown illustration.
- ③ In major assembly parts breakdown illustration, locate index number of part.
- ④ In the illustration parts list, use index number of part to find part number, description, and quantity per unit.

FIGURE 12-3 TRIM GROUP ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
	40071601	TRIM GROUP ASSEMBLY, 115 VAC, 60 HERTZ		
	40071602	TRIM GROUP ASSEMBLY, 230 VAC, 50 HERTZ		
-1	60071501	. CABINET, Console	1	
-8	40067201	. TOP PLATE ASSEMBLY, 115 VAC, 60 Hertz	1	
		. TOP PLATE ASSEMBLY, 230 VAC, 50 Hertz	1	
-8	40067601	. BASE PLATE ASSEMBLY, 115 VAC, 60 Hertz (Fig. 12-9)	1	
	40067602	. BASE PLATE ASSEMBLY, 230 VAC, 50 Hertz (Fig. 12-9)	1	
-4	40071802	. SHROUD, Console (Attaching Parts)	1	
-5	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	6	
-6	00000442	. . WASHER, Flat #10	6	
	STRIP		1	

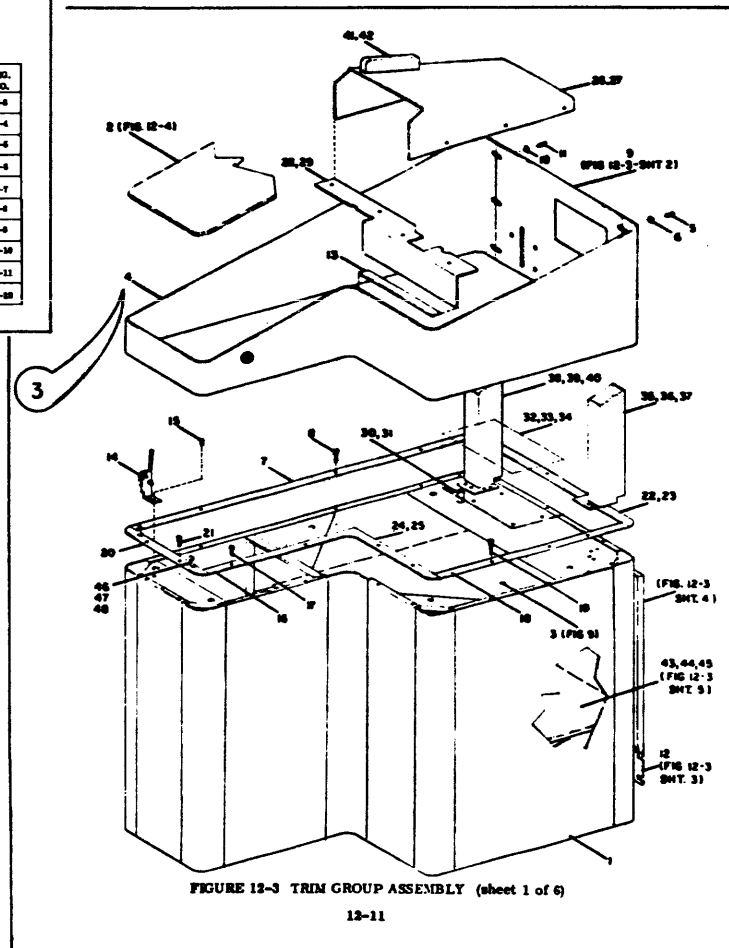


FIGURE 12-1 HOW TO USE ILLUSTRATED PARTS BREAKDOWN WHEN PART NUMBER IS NOT KNOWN

TABLE 12-1 LIST OF MAJOR ASSEMBLIES

FIGURE	TITLE	PAGE
12-3	TRIM GROUP ASSEMBLY Cabinet, Console Shroud, Console Rear Panel Assembly Connector Panel Assembly Hopper Full Switch Assembly Hood, Control Panel Card File Assembly Attaching Parts Base Plate Assembly Cover, Track Panel, Cabinet Access Vacuum Pump Assembly	12-11 12-11 f 12-11 f 12-11 f 12-11 f 12-11 f 12-11 g 12-11 g 12-11 g 12-11 g 12-11 i 12-11 i
12-4	TOP PLATE ASSEMBLY Top Plate Guide, Pick Card Edge Guide, Stack Card Edge Control Panel Assembly Attaching Parts Cover, Pick Slide Cover, Stack Slide Pick Support Assembly Attaching Parts Stack Support Assembly Attaching Parts Yoke, Stack Shaft Spring Negator Shaft, Pick Follower Shaft, Stack Follower Support, Follower Shaft Solenoid Assembly Spring, Solenoid Timing Disc Assembly Vacuum Pump Assembly Attaching Parts Belts, Drive Pulleys Motor Run Capacitor Drive Motor Assembly Attaching Parts Magnetic Pickup Assembly Pick-up Holder Hose Pick Follower Assembly Stack Follower Assembly	12-13 12-13 d 12-13 d 12-13 d 12-13 d 12-13 d 12-13 d 12-13 d 12-13 d 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 e 12-13 f 12-13 f 12-13 f 12-13 g 12-13 g 12-13 g 12-13 g 12-13 g 12-13 h

TABLE 12-1 LIST OF MAJOR ASSEMBLIES (CONT'D)

FIGURE	TITLE	PAGE
12-5	CONTROL PANEL ASSEMBLY	12-15 a
12-6	PICK SUPPORT ASSEMBLY Light Station Assembly Hopper Empty Switch Assembly Sector Assembly Stop, Pick Bumper, Pick Rifle Air Cap 2nd Pick Drive Assembly Capstan Spacer Bearing Shaft Bearing Ring Snap 1st Pick Drive Assembly Capstan Spacer Bearing Shaft Bearing Drum, Spring Spring Negator Shaft, Spring Drum Tube, Pick Vacuum Guide, Card Insert, Pick Support	12-17 a 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 b 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c 12-17 c
12-7	STACK SUPPORT ASSEMBLY Read Array Assembly 1st Stack Drive Assembly Shaft, Spacers, Roller, Bearing and Bearing Springs 2nd Stack Drive Assembly Shaft, Spacers, Roller, Bearings and Bearing Springs 3rd Stack Drive Assembly Shaft, Spacers, Roller, Bearings and Bearing Springs 4th Stack Drive Assembly Shaft, Spacers, Roller, Bearings and Bearing Springs 5th Stack Drive Assembly Shaft, Spacers, Roller, Bearings and Bearing Springs Stack Photocell Assembly Spring Drum Negator Spring Spring Drum Shaft Pick Throat	12-19 12-19 b 12-19 b 12-19 b 12-19 b 12-19 b 12-19 b 12-19 b 12-19 b 12-19 b 12-19 c 12-19 c 12-19 c 12-19 c 12-19 c 12-19 c 12-19 c 12-19 c

TABLE 12-1 LIST OF MAJOR ASSEMBLIES (CONT'D)

FIGURE	TITLE	PAGE
12-8	DRIVE MOTOR ASSEMBLY	12-21 a
12-9	BASE PLATE ASSEMBLY Solenoid Driver Assembly Power Supply Assembly Solid State Relay Resistor Assembly Transformer Assemblies Rectifier Terminal Junction Tool Capacitor Filter Assembly Fuse	12-23 12-23 b 12-23 b 12-23 b 12-23 c 12-23 c 12-23 c 12-23 c 12-23 c 12-23 c 12-23 c 12-23 d 12-23 d
12-10	VACUUM PUMP ASSEMBLY Vacuum Pump Motor Vacuum Pump Blower Vacuum Pump Pulley Assembly Vacuum Pump Belt Vacuum Adapter Assembly	12-25 a 12-25 a 12-25 a 12-25 a 12-25 a 12-25 a
12-11	POWER SUPPLY ASSEMBLY	12-17 a
12-12	CARD FILE ASSEMBLY	12-29 a
12-13	PC ASSEMBLY - Control Card	12-31 a
12-14	PC ASSEMBLY - Sync Card	12-33 a
12-15	PC ASSEMBLY - Clock Card	12-35 a
12-16	PC ASSEMBLY - Error Card	12-37 a
12-17	PC ASSEMBLY - Driver Card	12-39 a
12-18	PC ASSEMBLY - Receiver Card	12-41 a

TABLE 12-2 LIST OF MANUFACTURERS

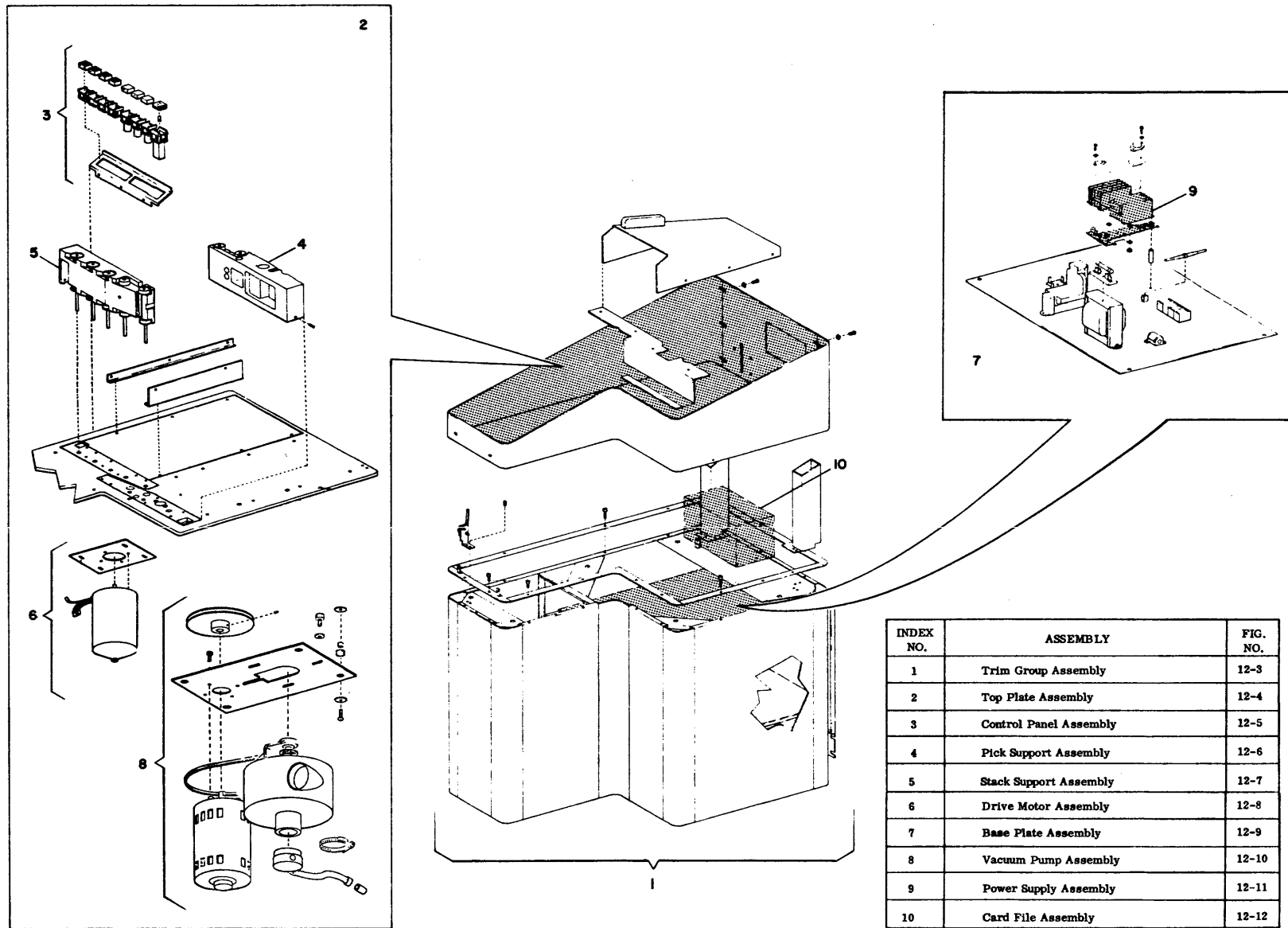
CODE	MANUFACTURER	CODE	MANUFACTURER
00779	Amp Inc. P. O. Box 3608 Harrisburg, Pa. 17105	07355	Airpax Electronics, Inc. Central Engineering Division 6601 N. W. 19th Street Ft. Lauderdale, Florida 33310
01121	Allen Bradley Company 1201 S. 2nd Street Milwaukee, Wisconsin 53204	07886	National Radio Co., Inc. Commercial Products Division 37 Washington Street Melrose, Mass. 02176
01295	Texas Instruments, Inc. Semiconductor Components Div. 13500 North Central Expressway Dallas, Texas 75231	08524	Deutch Fastener Corp. Municipal Airport Banning, Calif. 92220
01963	Cherry Electrical Products Corp. 3600 Sunset Avenue P. O. Box 718 Waukegan, Illinois 60085	08806	General Electric Company Miniature Lamp Department Nela Park Cleveland, Ohio 44112
02735	RCA Corporation Solid State Division Fostoria Road Findlay, Ohio 45840	09023	Cornell - Dubilier, Div. Fed. Pac. Elec. Co. 2562 Dalrymple Sanford, N. C. 27330
03597	General Electric Company Turbine Division of Apparatus Group Schenectady, N. Y.	09353	C & K Components, Inc. 103 Morse Street Watertown, Mass. 02172
04713	Motorola Semiconductor Products, Inc. 5005 East McDowell Road Phoenix, Arizona 85008	09922	Burndy Corporation Richards Avenue Norwalk, Conn. 06852
05245	Components Corporation 2855-57 North Halsted Street Chicago, Illinois 60657	10108	Hurst Manufacturing Corp. P. O. Box 326 Princeton, Indiana 47570
06229	Electrovert Inc. 86 Hartford Avenue Mt. Vernon, N. J.	12617	Hamlin Inc. Lake and Grove Streets Lake Mills, Wisconsin 53551
06383	Panduit Corporation 17301 Ridgeland Tinley Part, Illinois 60477	13103	Thermalloy Company 8717 Diplomacy Row Dallas, Texas 75247
07108	R. & J. Dick Co., Inc. 912 E. 5th Street Muscatine, Iowa 52761	14927	Kubar, Inc. 21 Erie Cambridge, Mass 02139
07263	Fairchild Semiconductor A division of Fairchild Camera and Instrument Corporation 464 Ellis Street Mountain View, Calif. 94040	18324	Signetics Corp. 811 East Arques Avenue Sunnyvale, Calif. 94086

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

CODE	MANUFACTURER	CODE	MANUFACTURER
18677	Scanbe Manufacturing Corp. 1161 Monterey Pass Road Monterey Park, Calif. 91754	71590	Centralab Elect. 5757 N. Greenbay Avenue Milwaukee, Wisc. 53201
19070	Eastern Air Devices 385 Central Avenue Dover, New Hampshire 03820	71984	Dow Corning Corp. South Saginaw Road Midland, Mich. 48641
19701	Electra/Midland Corp. P. O. Box 760 Mineral Wells, Texas 76067	72619	Dialight Corp. 60 Stewart Avenue Brooklyn, N. Y. 11237
20772	Spectronics Inc. 541 Sterling Drive Richardson, Texas 75080	74364	Eastman Chem. Prod, Inc. Eastman Road Kingsport, Tenn. 37662
23936	Pamotor Inc. 770 Airport Boulevard Burlingame, Calif. 94010	74545	Hubbell Harvey, Inc. State Street and Bostwick Avenue Bridgeport, Conn. 06602
24161	Gates Rubber 2301 N. Dale Mabry P. O. Box 15454 Tampa, Florida 33614	75511	Lamb Electric/Ametek Kent, Ohio 44240
24202	Computer Products 1400 N.W. 70th Street P. O. Box 23849 Ft. Lauderdale, Florida 33307	75915	Littlefuse, Inc. 800 E. Northwest Highway Des Plaines, Illinois 60016
29440	Winfred Berg 499 Ocean Avenue East Rockaway, L. I., N. Y. 11518	76005	Lord Manufacturing Company Eric, Pennsylvania 16512
33062	Ferronics Inc. 66 North Main Street Fairport, N. Y. 14450	76599	The Murray Corporation Industrial Park Cockeysville, Maryland 21030
46384	PEM (Penn Eng. Mfg. Co.) P. O. Box 311 Doylestown, Pa. 18901	79136	Waldes Kohinoor, Inc. 47 - 16 Austel Place Long Island City, N. Y. 11101
56289	Sprague Electric Company North Adams, Mass. 01247	80103	Lambda Electronics Corp. 515 Broad Hollow Road Huntington, N. Y. 11749
70276	Allen Mfg. Co. P. O. Box 570 Hartford, Conn. 06101	80183	Sprague Products Company North Adams, Mass.
70854	Barden/NMB P. O. Box 231 Danbury, Conn. 06810	80294	Bourns, Inc. 1200 Columbia Avenue Riverside, Calif. 92507
		80382	Airco, Inc. 150 E. 42nd Street New York, N. Y. 10017

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

CODE	MANUFACTURER	CODE	MANUFACTURER
80545	Ametek Hunter Spring 1 Spring Avenue Hatfield, Pa. 19440		Motronics Corp. Riverside Industrial Park Little Falls, N. Y. 13365
81541	Airpax Electronics, Inc. Woods Road Cambridge, Md. 21613		Electro Space Fabricators, Inc. 101 - 125 Centre Avenue Topton, Penn. 19562
83014	The Hartwell Corporation 9035 Venice Blvd. Los Angeles, Calif. 90034		IMC Magnetics Corp. 6058 Walker Avenue Maywood, Calif. 90270
83259	Parker - Seal Co. 10567 Jefferson Blvd. Culver City, Calif. 90231		Motronics Corp. Riverside Industrial Park Little Falls, N. Y. 13365
83330	Smith Herman H., Inc. 812 Snediker Avenue Brooklyn, N. Y. 11207		
87034	Marco - Oak Industries 2231 N. State Road 7 Lauderhill, Fla. 33311		
88132	Goodyear Rubber Company 25 Hamlin Middletown, Conn. 06457		
91637	Dale Electronics, Inc. P. O. Box 609 Columbus, Neb. 68601		
91662	Elco Corporation Maryland Road and Computer Avenue Willow Grove, Pa. 19090		
92194	Alpha Wire Corporation 711 Lidgerwood Avenue Elizabeth, N. J. 07207		
94144	Raytheon Company Components Div. Industrial Components Operation Quincy, Mass.		
95987	Weckesser 4444 West Irving Park Road Chicago, Illinois 60641		
	Electro - Space Fabricators, Inc. Centre Avenue Topton, Pa. 19562		



INDEX NO.	ASSEMBLY	FIG. NO.
1	Trim Group Assembly	12-3
2	Top Plate Assembly	12-4
3	Control Panel Assembly	12-5
4	Pick Support Assembly	12-6
5	Stack Support Assembly	12-7
6	Drive Motor Assembly	12-8
7	Base Plate Assembly	12-9
8	Vacuum Pump Assembly	12-10
9	Power Supply Assembly	12-11
10	Card File Assembly	12-12

FIGURE 12-2 M 1200 CARD READER

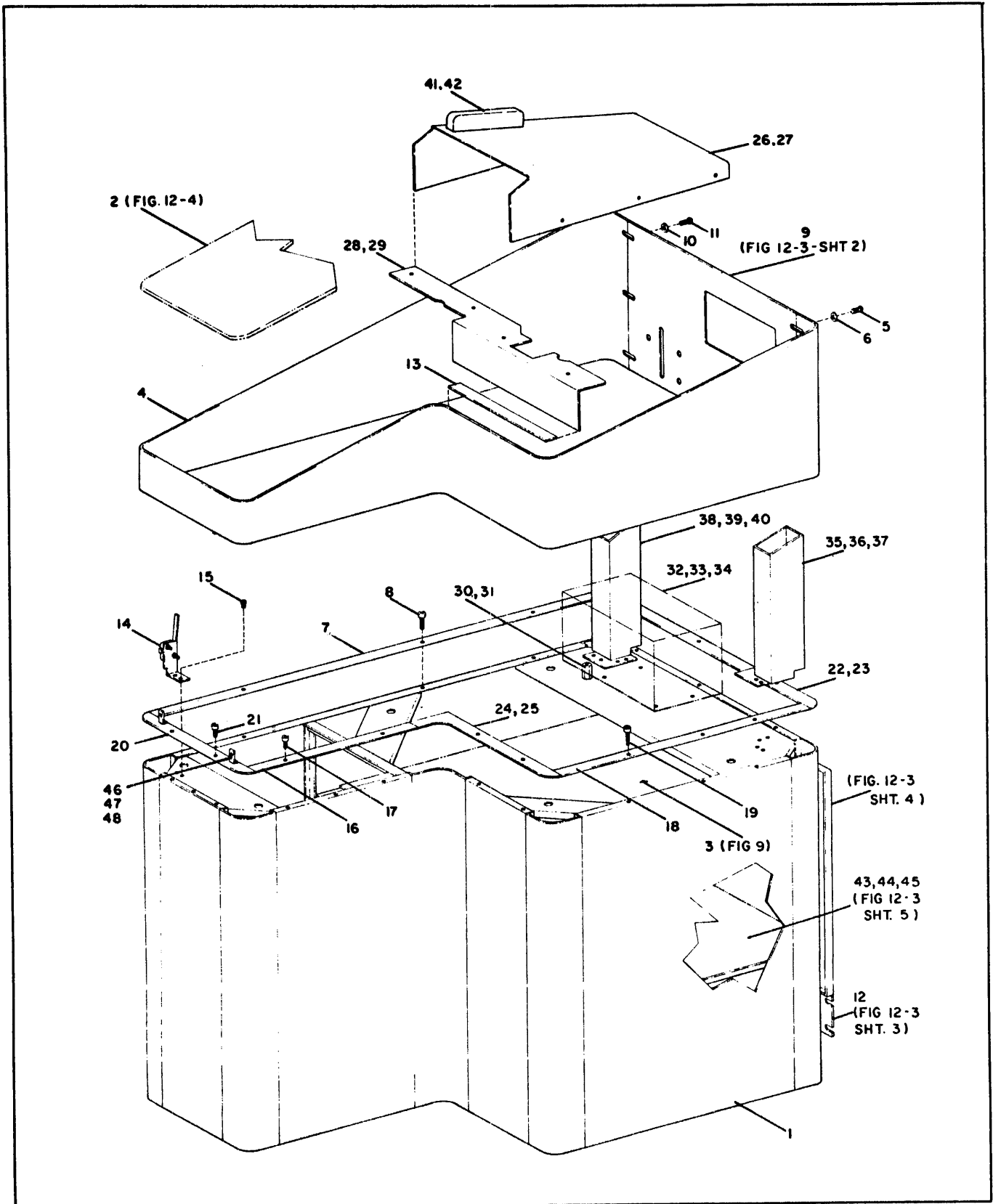


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 1 of 6)

12-11 a

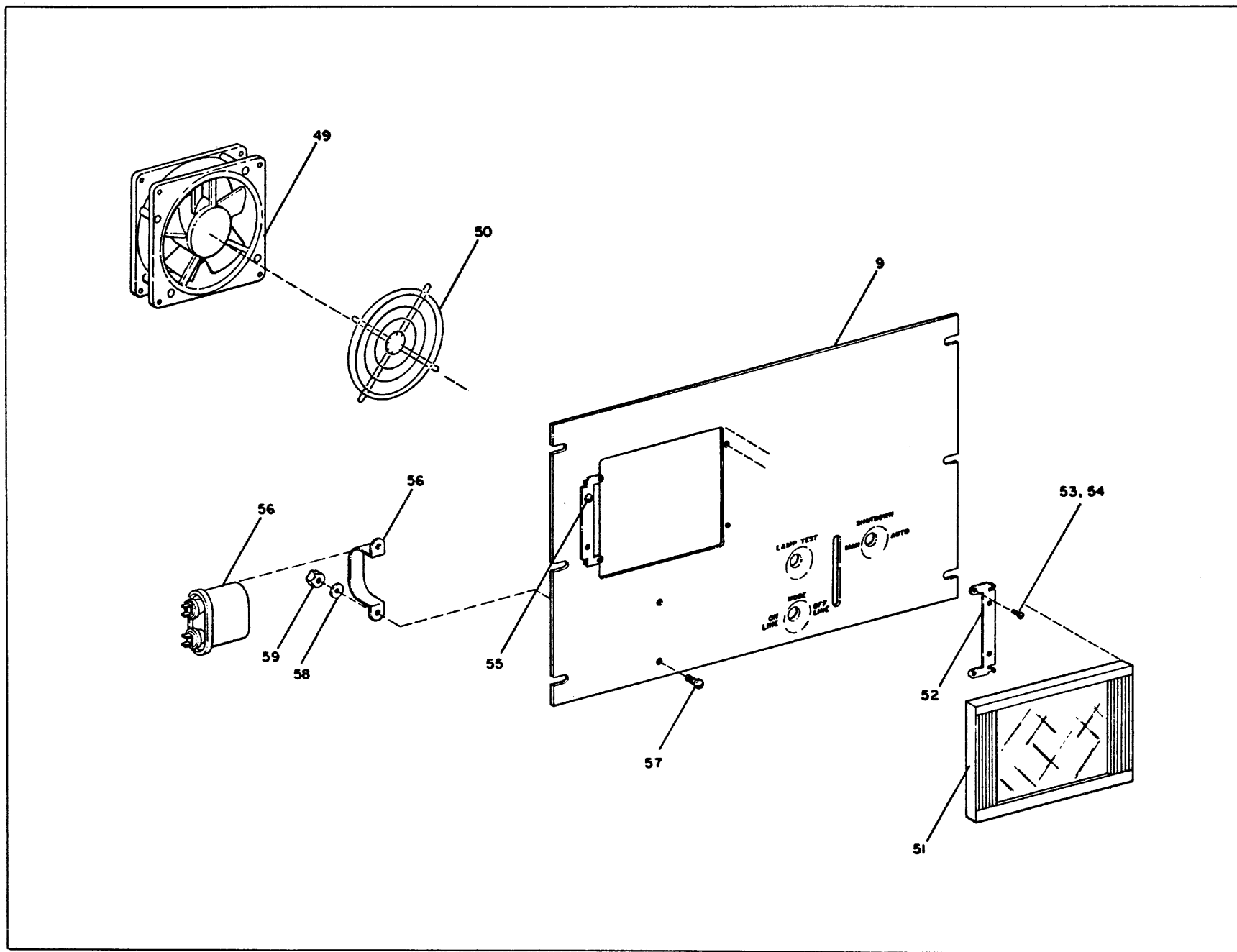


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 2 of 6)

12-11 b

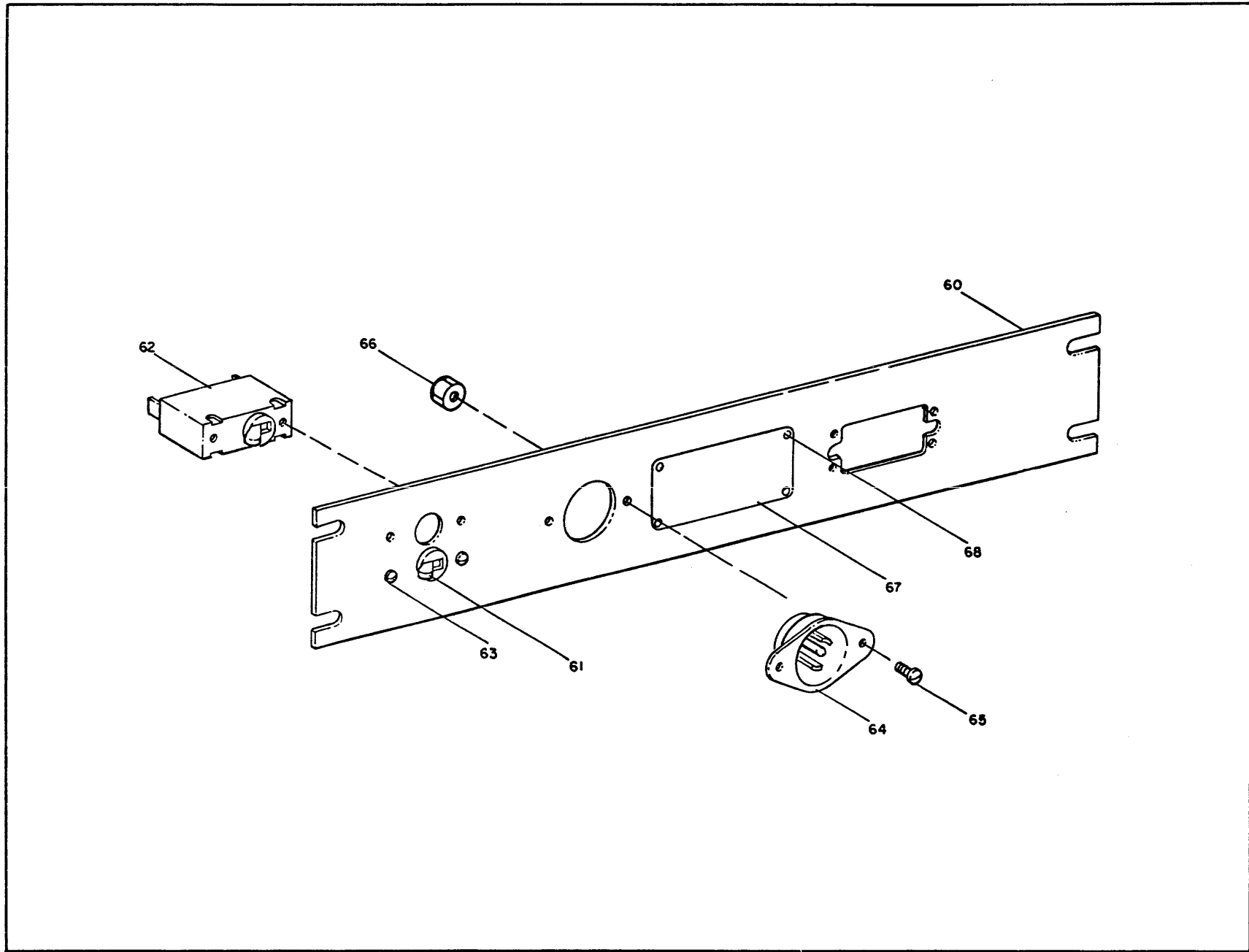


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 3 of 6)

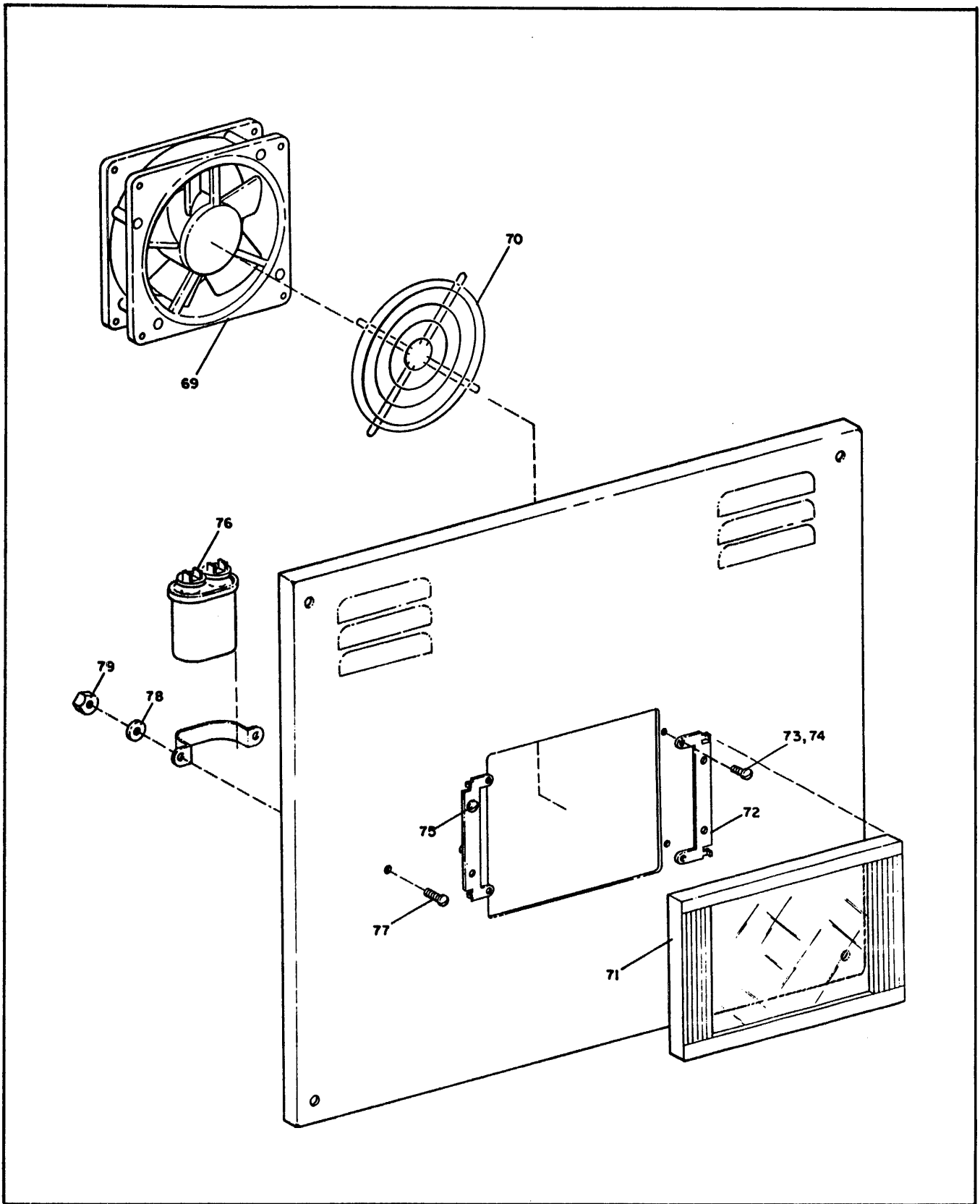


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 4 of 6)

12-11 P

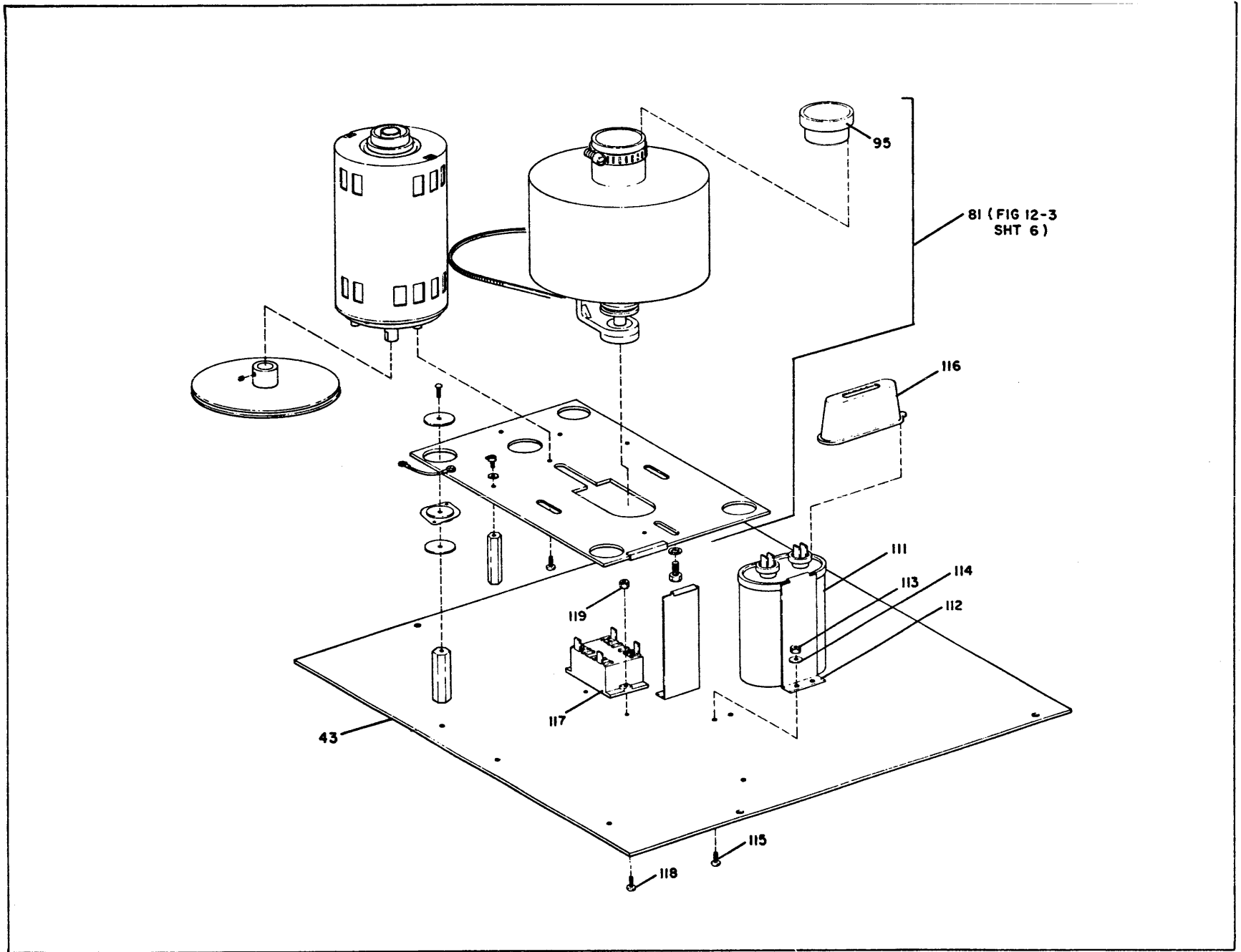


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 5 of 6)

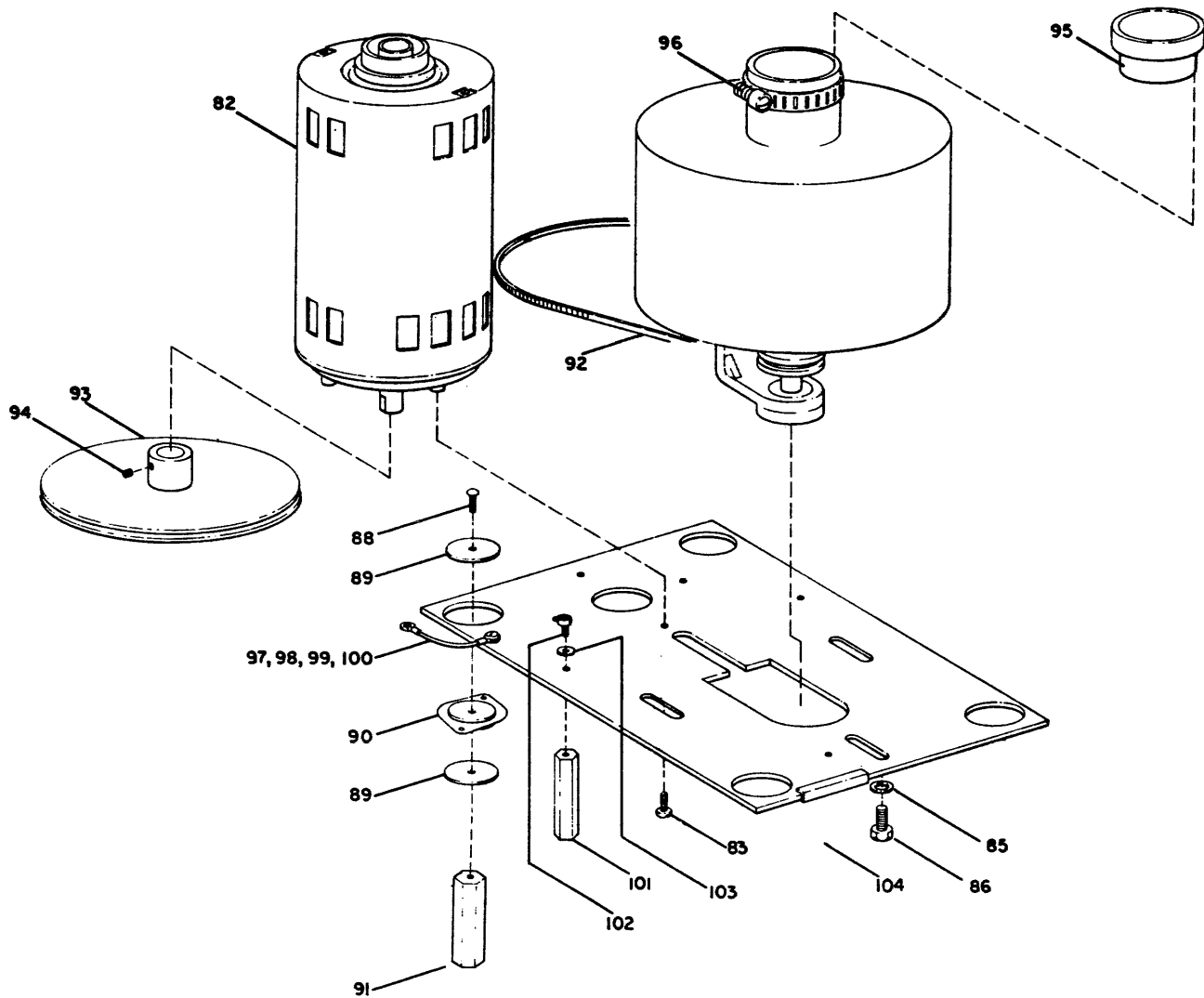


FIGURE 12-3 TRIM GROUP ASSEMBLY (sheet 6 of 6)

FIGURE 12-3 TRIM GROUP ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
	40071601 40071602	TRIM GROUP ASSEMBLY, 115 VAC, 60 HERTZ TRIM GROUP ASSEMBLY, 230 VAC, 50 HERTZ				
-1	50071501	. CABINET, Console	1			
-2	40067201	. TOP PLATE ASSEMBLY, 115 VAC, 60 Hertz (Fig. 12-4) . TOP PLATE ASSEMBLY, 230 VAC, 50 Hertz (Fig. 12-4)	1 1			
-3	40067601 40067602	. BASE PLATE ASSEMBLY, 115 VAC, 60 Hertz (Fig. 12-9) . BASE PLATE ASSEMBLY, 230 VAC, 50 Hertz (Fig. 12-9)	1 1			
-4	40071802	. SHROUD, Console (Attaching Parts)	1			
-5	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	6			
-6	00000442	. . WASHER, Flat #10	6			
-7	20072201	. STRIP, Trim (Attaching Parts)	1			
-8	00000849	. . Screw, Socket Head, 6 - 32 x 3/4	3			
-9	40089501	. PANEL, Rear (Fig. 12-3, sheet 2) (Attaching Parts)	1			
-10	00000442	. . WASHER, Flat #10	6			
-11	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	6			
-12	30088401 30147701	. PANEL ASSY, Connector, 115 VAC, 60 Hz (Fig. 12-3, sht. 3) . PANEL ASSY, Connector, 230 VAC, 50 Hz (Fig. 12-3, sht. 3)	1 1			
-13	20065301	. PLATE, Trim	1			
-14	20070201	. HOPPER FULL SWITCH ASSEMBLY (Attaching Parts)	1			
-15	00000848	. . SCREW, Pan Head, 6 - 32 x 3/16	2			
-16	20072202	. STRIP, Trim (Attaching Parts)	1			
-17	00000393	. . SCREW, Socket Head, 6 - 32 x 3/8	2			
-18	20072203	. STRIP, Trim (Attaching Parts)				
-19	00000849	. . SCREW, Socket Head, 6 - 32 x 3/4	3			

TRIM GROUP ASSEMBLY(CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
-20	20072303	. STRIP, Trim (Attaching Parts)	1	
-21	00000393	. . SCREW, Socket Head, 6 - 32 x 3/8	2	
-22	20072302	. STRIP, Trim (Attaching Parts)	1	
-23	00000849	. . SCREW, Socket Head, 6 - 32 x 3/4	3	
-24	20072101	. STRIP, Trim	1	
-25	00000849	. . SCREW, Socket Head, 6 - 32 x 3/4	2	
-26	40052801	. HOOD, Control Panel (Attaching Parts)	1	
-27	00000114	. . SCREW, Button Head, 6 - 32 x 1/4	5	
-28	40031501	. COVER, Track (Attaching Parts)	1	
-29	00000114	. . SCREW, Button Head, 6 - 32 x 1/4	4	
-30	20069201	. STANDOFF (Attaching Parts)	4	
-31	00000376	. . SCREW, Pan Head, 6 - 32 x 3/4	3	
-32	40083601	. CARD FILE ASSEMBLY (Figure 12-12) (Attaching Parts)	1	
-33	00000383	. . SCREW, Pan Head, 8 - 32 x 7/8	4	
-34	00000294	. . WASHER, Flat, #8	4	
-35	30071001	. BRACKET, Rear Panel Mounting (Attaching Parts)	1	
-36	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	4	
-37	00000426	. . NUT, Hex, 10 - 32	4	
-38	30071002	. BRACKET, Rear Panel Mounting	1	
-39	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	4	
-40	00000426	. . NUT, Hex, 10 - 32	4	
-41	20043801	. BAR, Tamp	1	
-42	00000382	. . SCREW, Pan Head, 8 - 32 x 3/8	2	
-43	40079601	. BASE PLATE ASSY, 115 VAC, 60 Hz (Fig. 12-3, sht. 5)	1	
	40079602	. BASE PLATE ASSY, 230 VAC, 50 Hz (Fig. 12-3, sht. 5) (Attaching Parts)	1	

TRIM GROUP ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
-44	00000368	. . SCREW, Pan Head, 10 - 32 x 3/8	4	
-45	00000442	. . WASHER, Flat #10	4	
-46	20090901	. BRACKET (Attaching Parts)	2	
-47	00000847	. . SCREW, Oval Head, 8 - 32 x 3/8	2	
-48	00000395	. . SCREW, Socket Head, 8 - 32 x 3/8	2	
	40089501	. PANEL, Rear (Ref. item 9) (115 VAC, 60 Hz Model)		
	40089502	. PANEL, Rear (Ref. item 9) (230 VAC, 50 Hz Model)		
-49	00000325	. FAN, (115 VAC, 60 Hertz Model) (23936)	1	4600
	00000326	. FAN, (230 VAC, 50 Hertz Model) (23936)	1	2050
-50	00000473	. GUARD, Finger (IMC)	1	65-175
-51	00000323	. SCREEN, Fan (23936)	1	5503
-52	00000324	. MOUNTING BRACKETS, Fan (23936) (Attaching Parts)	2	5501
-53	00000302	. . SCREW, Pan Head, 6 - 32 x 1/2	4	
-54	00000301	. . NUT, Hex, 6 - 32	8	
-55	00000375	. . SCREW, Pan Head, 6 - 32 x 1/4	4	
-56	00000842	. CAPACITOR, 2.0 UF, 370 VAC, Clamp (80183) 230 VAC, 50 Hertz Model only (Attaching Parts)	1	200P1901TP
-57	00000114	. . SCREW, Button Head, 6 - 32 x 1/4	2	
-58	00000295	. . WASHER, Flat, #6	2	
-59	00000301	. . NUT, Hex, 6 - 32	2	
	30088401	. PANEL ASSEMBLY, Connector, 115 VAC, 60 Hertz (Ref. item 12)		
	30147701	. PANEL ASSEMBLY, Connector, 230 VAC, 50 Hertz (Ref. item 12)		
-60	40087701	. . PANEL, Connector, 115 VAC, 60 Hertz	1	
	40147801	. . PANEL, Connector, 230 VAC, 50 Hertz	1	
-61	00000188	. . . CIRCUIT BREAKER (8 amp), 115 VAC, 60 Hertz (07355)	1	UPG-1-1-6-2802
	00000186	. . . CIRCUIT BREAKER (5 amp), 230 VAC, 50 Hertz (07355)	2	UPG-1-1-6-2506
-62	00000187	. . . CIRCUIT BREAKER (10 amp), 115 VAC, 60 Hertz (07355) (Attaching Parts)	1	UPG-1-1-6-2103
-63	00000375	. . . . SCREW, Maching, Pan Head, 6 - 32 x 1/4	4	
-64	00000476	. . . . CONNECTOR, AC Recessed, 115 VAC, 60 Hertz (74545)	1	7486
	20102602	. . . . FILTER, Cable Assembly, 230 VAC, 50 Hertz Model	1	
-64a	00000470	. . . . FILTER, Power Line (05245) (Attaching Parts)	1	GEF1
-65	00000375	. . . . . SCREW, Machine Pan Head, 6 - 32 x 1/4 (115 VAC, 60 Hertz)	2	
	00000305	. . . . . SCREW, Machine Pan Head, 4 - 43 x 1/4 (230 VAC, 50 Hertz)	2	
-66	00000301	. . . . . NUT, Hex, 6 - 32, 115 VAC, 60 Hertz	2	
	00000062	. . . . . NUT, Hex, 4 - 40, 230 VAC, 50 Hertz	2	
-67	20028101	. . . . TAG, Model Information (Attaching Parts)	1	

TRIM GROUP ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
-68	00000488	.	.	.	.	PIN, Drive			4	MS-21318-9
		<hr/>								
		.	.	.	.	CABINET ACCESS PANEL (Refer to Item 1)				
-69	00000325	.	.	FAN, (115 VAC, 60 Hertz Model)					1	4600
	00000326	.	.	FAN, (230 VAC, 50 Hertz Model)					1	2050
-70	00000473	.	.	GUARD, Finger (IMC)					1	65-175
-71	00000323	.	.	SCREEN, Fan (23936)					1	5503
-72	00000324	.	.	BRACKETS, Mounting, Fan (23936)					2	5501
		.	.	(Attaching Parts)						
-73	00000302	.	.	SCREW, Pan Head, 6 - 32 x 1/2					4	
-74	00000301	.	.	NUT, Hex, 6 - 32					8	
-75	00000375	.	.	SCREW, Pan Head, 6 - 32 x 1/4					4	
-76	00000842	.	.	CAPACITOR, 2.0 UF, 370 VAC, Clamp (80183)					1	200P1901TP
		.	.	230 VAC, 50 Hertz Model only						
		.	.	(Attaching Parts)						
-77	00000114	.	.	SCREW, Button Head, 6 - 32 x 1/4					2	
-78	00000295	.	.	WASHER, Flat, #6					2	
-79	00000301	.	.	NUT, Hex, 6 - 32					2	
		<hr/>								
	40079601	.	.	BASE PLATE ASSEMBLY, 115 VAC, 60 Hertz (Ref. item 43)					1	
	40079602	.	.	BASE PLATE ASSEMBLY, 230 VAC, 50 Hertz (Ref. item 43)					1	
-80	40079501	.	.	PLATE, Bottom					1	
-81	40033308	.	.	VACUUM PUMP ASSEMBLY, 115 VAC, 60 Hertz					1	
		.	.	(Fig. 12-3, sheet 6)						
	40033312	.	.	VACUUM PUMP ASSEMBLY, 230 VAC, 50 Hertz					1	
		.	.	(Fig. 12-3, sheet 6)						
-82	00000539	.	.	MOTOR, 60 Hz, 3350 rpm, 115 VAC, 60 Hertz					1	KCPMPG-190A
		.	.	(03597)						
	00000540	.	.	MOTOR, 50 HZ, 230 VAC, (03597)					1	5KCP19PG0222
		.	.	(Attaching Parts)						
-83	00000379	.	.	SCREW, Machine, Pan Head, 8 - 32 x 1/2					4	
-84	00000541	.	.	BLOWER (75511)					1	60-115626
		.	.	(Attaching Parts)						
-85	00000441	.	.	WASHER, Flat #1/4					3	
-86	00000855	.	.	SCREW, Cap, Hex Head, 1/4 - 20 x 5/8					3	
-87	30031801	.	.	PLATE, Blower					1	
		.	.	(Attaching Parts)						
-88	00000381	.	.	SCREW, Machine, Pan Head, 8 - 32 x 3/4					4	
-89	00000294	.	.	WASHER, Flat, No. 8 7/8 OD					8	
-90	00000505	.	.	MOUNT, Rubber (76005)					2	100PD2
	00000291	.	.	MOUNT, Rubber (76005)					2	100PD4
-91	10002004	.	.	STANDOFF					4	
		<hr/>								
-92	00000519	.	.	BELT, (24161)					1	5 M 545
-93	20076101	.	.	PULLEY					1	
		.	.	(Attaching Parts)						
-94	00000591	.	.	SCREW, Set, Nyloc Cup Point STLN BLK,					1	
		.	.	1/4 - 20 x 3/8 (83014)						
		<hr/>								

TRIM GROUP ASSEMBLY (COND'T)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
-95	20079701	. . . ADAPTER ASSEMBLY, Vacuum, 115 VAC, 60 Hertz	1			
	20069501	. . . ADAPTER ASSEMBLY, Vacuum, 230 VAC, 50 Hertz (Attaching Parts)	1			
-96	00000407	. . . . CLAMP (76599)	1	H-24	
<hr/>						
-97	20037901	. . . GROUND STRAP ASSEMBLY (Attaching Parts)	1			
-98	00000296	. . . . SCREW, Pan Head, 6 - 32 x 3/8	1		
-99	00000445	. . . . WASHER, Lock, int. tooth, #6	1		
-100	00000301	. . . . NUT, Hex, 6 - 32	1		
<hr/>						
-101	10002005	. . . STANDOFF (Attaching Parts)	2			
-102	00000293	. . . . SCREW, Cap, Socket Head, 8 - 32 x 1/2	2		
-103	00000294	. . . . WASHER, Flat #8	2		
<hr/>						
-104	00000482	. . . STRIP, Grommet (06229)	1	GS5		
-105	00000058	. . . TIE, Cable (06383)	2	SSTIM		
-106	00000059	. . . CABLE TIE, Mount (06383)	1	TAIS8		
-107	00000525	. . . RECEPTACLE, Faston (2.50) (00779)	3	60414-1		
-108	00000531	. . . LOCTITE, Grade C	A/R			
-109	00000085	. . . TUBING HEAT SHRINK, 1/4 x 1 1/4 (92194)	3	FIT-105		
-110	00000555	. . . ADHESIVE, Pliobond	A/R			
-111	00000202	. . CAPACITOR, 17.5 UF, 370 VAC (115 VAC, 60 Hertz Model) (03597)	1	45F279		
	00000206	. . CAPACITOR, Motor, 10 UF 200 - 365 VAC (230 VAC 50 Hertz Model) (03597) (Attaching Parts)	1	45F170AA6		
-112	00000290	. . . BRACKET, Capacitor (03597)	2	302CP20P126		
-113	00000301	. . . NUT, Hex, 6 - 32	4			
-114	00000295	. . . . WASHER, Flat #6	4		
-115	00000375	. . . . SCREW, Machine, Pan Head, 6 - 32 x 1/4	4		
-116	00000472	. . . BOOT (03597)	1	614A625P21		
-117	00000109	. . RELAY, Solid State, 115 VAC, 60 Hertz (12617)	1	724-11-159		
	00000112	. . RELAY, Solid State, 230 VAC, 50 Hertz (12617) (Attaching Parts)	1	733-12-150		
-118	00000379	. . . . SCREW, Machine, Pan Head, 8 - 32 x 1/2	2		
-119	00000299	. . . . NUT, Hex #8 - 32	2		
<hr/>						
-120	00000573	. ADHESIVE, Eastman 910	A/R			
-121	00000555	. ADHESIVE, Pliobond	A/R			
-122	00000058	. TIE, Cable (06383)	20	SSTIM		
-123	00000090	. TIE, Cable (06383)	8	SST 4-C		
-124	00000035	. CONTACT, Pin - 115 VAC, 60 Hertz only (00779)	4	60618-1		
-125	00000449	. HOUSING, Pin - 115 VAC, 60 Hertz only (00779)	2	1-480319-0		
-126	00000127	. TUBING, Heat Shrink, 1/8 DIA x 1/2" - 115 VAC, 60 Hertz only (92194)	4	FIT-105		
-127	00000164	. WIRE, 20 AWG TWPR, BLK - WHT 5" - 115 VAC, 60 Hertz Model (92194)	2	1854/19		

TRIM GROUP ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
-128	00000557	.							A/R	
-129	20027610	.							1	
-130	20027506	.							1	
-131	30084302	.							1	
-132	20027609	.							1	
-133	20085403	.							1	
-134	20017101	.							1	
-135	20027507	.							3	
-136	20027611	.							1	
-137	20038403	.							1	
-138	20027518	.							1	
-139	20085402	.							1	
-140	20027514	.							1	
-141	20027503	.							2	
-142	20027519	.							1	
-143	40070601	.							1	
	40098701	.							1	

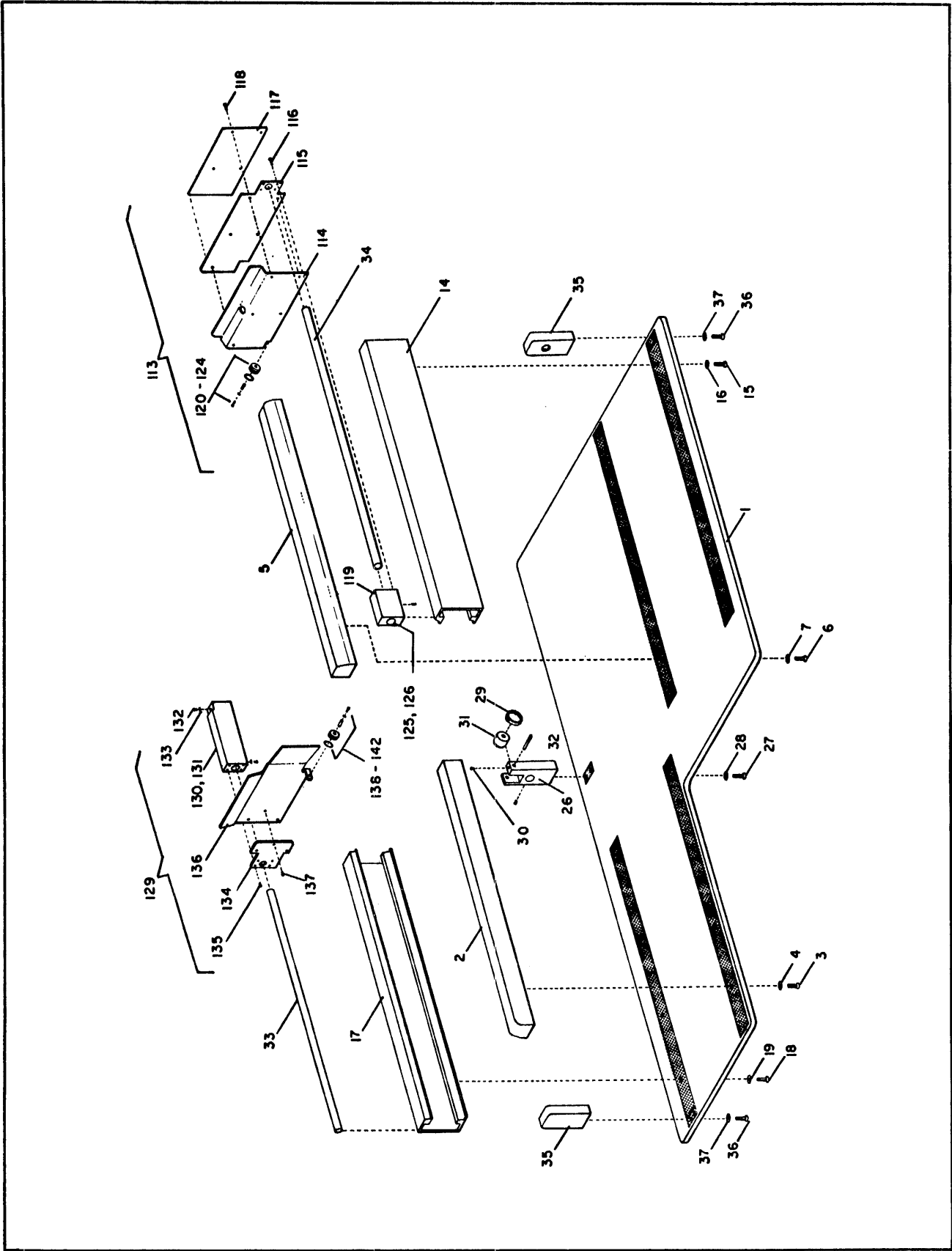


FIGURE 12-4 TOP PLATE ASSEMBLY (sheet 1 of 4)

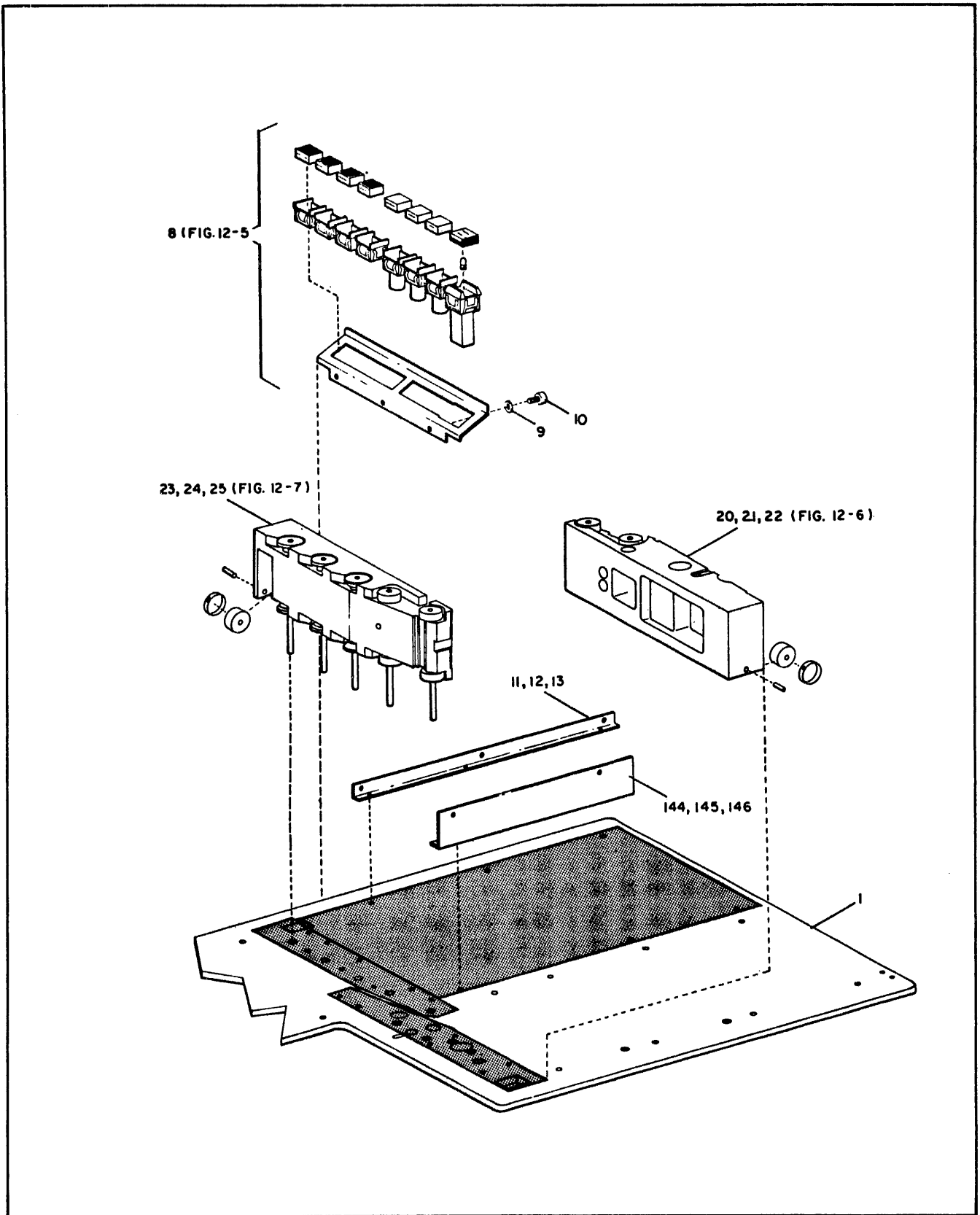


FIGURE 12-4 TOP PLATE ASSEMBLY (sheet 2 of 4)

12-13 b

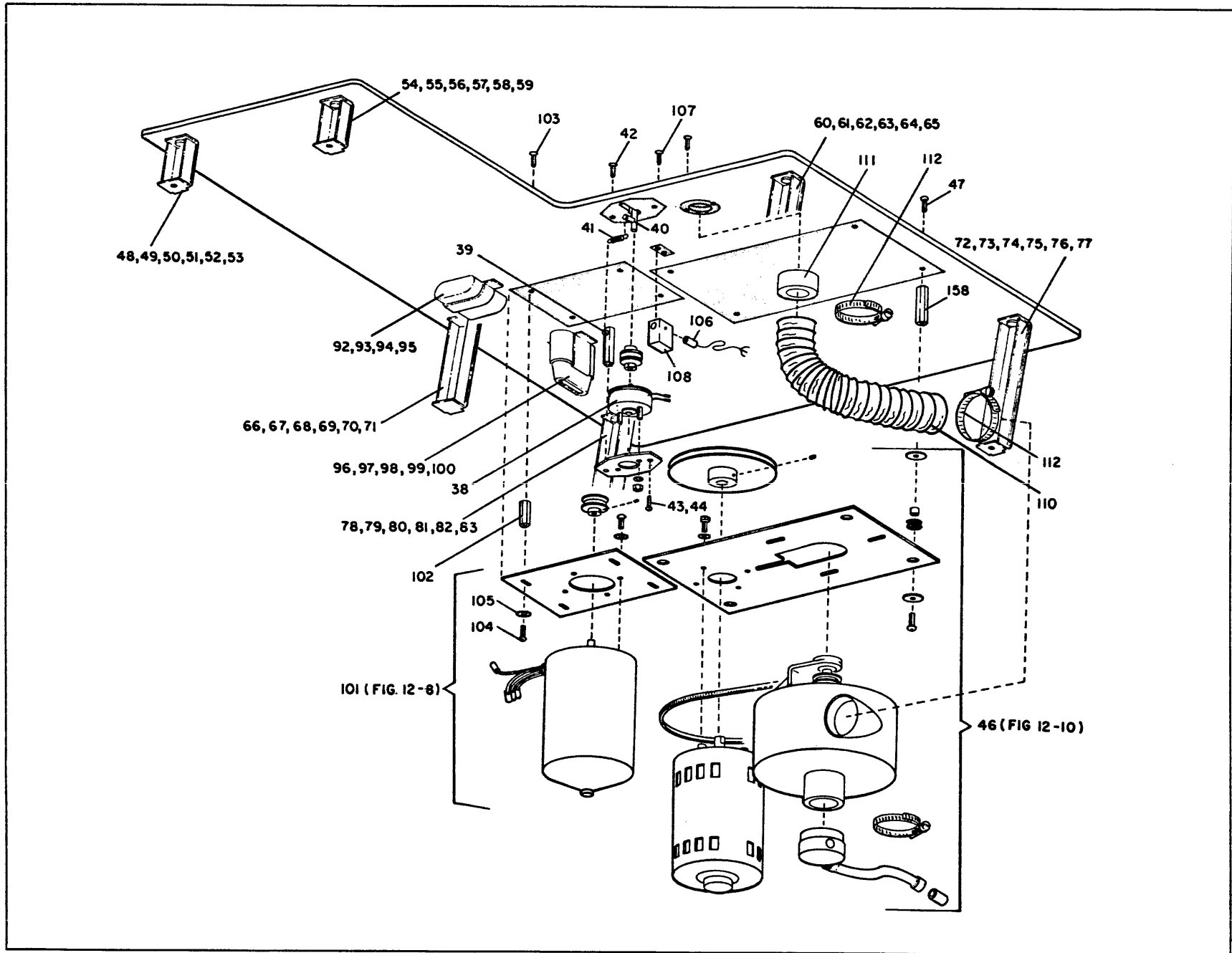


FIGURE 12-4 TOP PLATE ASSEMBLY (sheet 3 of 4)

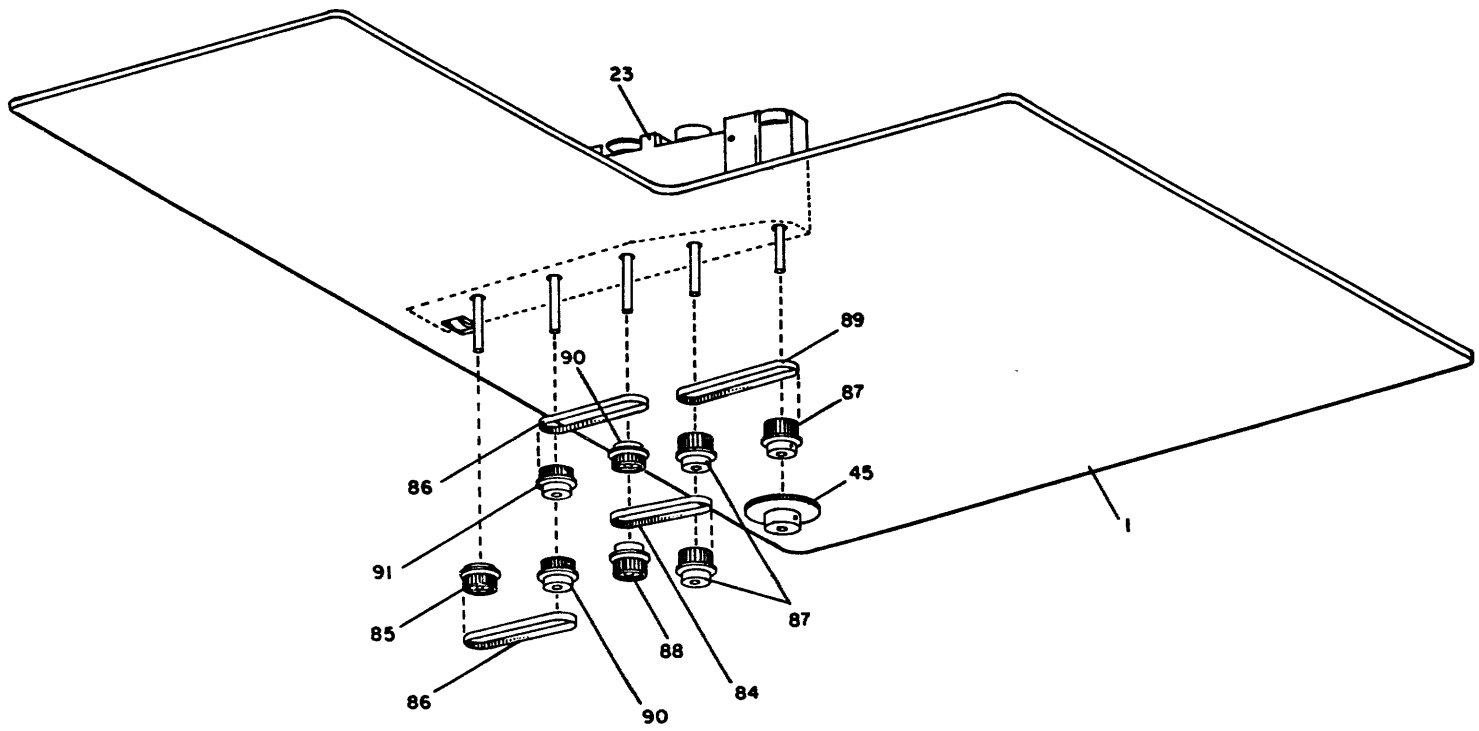


FIGURE 12-4 TOP PLATE ASSEMBLY (sheet 4 of 4)

FIGURE 12-4 TOP PLATE ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	VENDOR PART NO.
			PER ASSY	
	40067201	TOP PLATE ASSEMBLY, 115 VAC, 60 HERTZ		
	40067203	TOP PLATE ASSEMBLY, 320 VAC, 50 HERTZ		
-1	50051801	. PLATE, Top	1	
-2	30052401	. GUIDE, Edge (Attaching Parts)	1	
-3	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4	
-4	00000294	. . WASHER, Flat, #8	4	
-5	30052402	. GUIDE, Edge (Attaching Parts)	1	
-6	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4	
-7	00000294	. . WASHER, Flat #8	4	
-8	30083802	. CONTROL PANEL ASSEMBLY (Figure 12-5) (Attaching Parts)	1	
-9	00000294	. . WASHER, Flat #8	3	
-10	00000395	. . SCREW, Socket Head 8 - 32 x 3/8	3	
-11	30052701	. ANGLE, Hood Support (Attaching Parts)		
-12	00000296	. . SCREW, Pan Head, 6 - 32 x 3/8	3	
-13	00000294	. . WASHER, Flat #6	3	
-14	30052201	. COVER, Pick Slide (Attaching Parts)	1	
-15	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4	
-16	00000294	. . WASHER, Flat #8	4	
-17	30052101	. COVER, Stack Slide (Attaching Parts)	1	
-18	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4	
-19	00000294	. . WASHER, Flat #8	4	
-20	40048202	. PICK SUPPORT ASSEMBLY (Figure 12-6) (Attaching Parts)	1	
-21	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	6	
-22	00000294	. . WASHER, Flat #8	6	
-23	40067401	. STACK SUPPORT ASSEMBLY (Figure 12-7) (Attaching Parts)	1	
-24	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	8	
-25	00000294	. . WASHER, Flat, #8	8	

TOP PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
-26	20067101	. YOKE, Stack Shaft (Attaching Parts)	1			
-27	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	2			
-28	00000294	. . WASHER, Flat #8	2			
<hr/>						
-29	00000306	. SPRING NEGATOR (Attaching Parts)	1	SL6F24		
-30	00000868	. . SCREW, Set, 8 - 32 x 1/8	2			
-31	20012703	. DRUM, Spring	1			
-32	20047601	. SHAFT, Spring Drum	1			
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-33	20000504	. SHAFT, Follower	1			
-34	20000505	. SHAFT, Follower	1			
-35	20000201	. SUPPORT, Follower Shaft (Attaching Parts)	2			
-36	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4			
-37	00000294	. . WASHER, Flat #8	4			
<hr/>						
-38	20022502	. SOLENOID ASSEMBLY	1			
-39	10002002	. STANDOFF (Solenoid)	1			
-40	20101601	. STANDOFF ASSEMBLY	1			
-41	00000285	. SPRING, Solenoid (Attaching Parts)	1	LE-026-C2-J		
-42	00000298	. . SCREW, Flat 8 - 32 x 1/2	2			
-43	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	2			
-44	00000294	. . WASHER, Flat #8	2			
<hr/>						
-45	20022301	. TIMING DISC ASSEMBLY	1			
-46	40068301	. VACUUM PUMP ASSY (115 VAC, 60 Hz) (Fig. 12-10)	1			
	40068302	. VACUUM PUMP ASSY (230 VAC, 50 Hz) (Fig. 12-10) (Attaching Parts)	1			
-47	00000866	. . SCREW, Flat Head, 8 - 32 x 5/8	4			
<hr/>						
-48	20071401	. SUPPORT, Shock Mount	1			
-49	00000291	. SHOCK MOUNT (76005) (Attaching Parts)	1	PDP-4		
-50	00000286	. . STUD, Flush Head, Self Clinching (46384)	1	FHS-832-20		
-51	00000300	. . WASHER, Flat, #8, 7/8 O.D.	1			
-52	00000305	. . SCREW, Pan Head, 4 - 40 x 1/4	2			
-53	00000299	. . NUT, Hex 8 - 32	1			
<hr/>						
-54	20071402	. SUPPORT, Shock Mount	1			
-55	00000291	. SHOCK MOUNT (76005) (Attaching Parts)	1	PDP-4		
-56	00000286	. . STUD, Flush Head, Self Clinching (46384)	1	FHS-832-20		
-57	00000300	. . WASHER, Flat #8, 7/8 O.D.	1			
-58	00000305	. . SCREW, Pan Head, 4 - 40 - 1/4	2			

TOP PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.	
		1	2	3	4	5	6	7			
-59	00000299	.	.	NUT, Hex, 8 - 32					1		
-60	20017403	.	SUPPORT, Shock Mount							1	
-61	00000284	.	SHOCK MOUNT (76005) (Attaching Parts)							1	PD-12
-62	00000286	.	.	STUD, Flush Head, Self - Clinching (46384)					1	FHS-832-20	
-63	00000300	.	.	WASHER, Flat, #8 7/8 O.D.					1		
-64	00000305	.	.	SCREW, Pan Head, 4 - 40 x 1/4					2		
-65	00000299	.	.	NUT, Hex, 8 - 32					1		
-66	20071404	.	SUPPORT, Shock Mount							1	
-67	00000284	.	SHOCK MOUNT (76005) (Attaching Parts)							1	PD-12
-68	00000286	.	.	STUD, Flush Head, Self - Clinching (46384)					1	FHS-832-20	
-69	00000300	.	.	WASHER, Flat #8, 7/8 O.D.					1		
-70	00000305	.	.	SCREW, Pan Head, 4 - 40 x 1/4					2		
-71	00000299	.	.	NUT, Hex, 8 - 32					1		
-72	20071405	.	SUPPORT, Shock Mount							1	
-73	00000287	.	SHOCK MOUNT (76005) (Attaching Parts)							1	PD-10
-74	00000286	.	.	STUD, Flush Head, Self - Clinching (46384)					1	FHS-832-20	
-75	00000300	.	.	WASHER, Flat, #8, 7/8 O.D.					1		
-76	00000305	.	.	SCREW, Pan Head, 4 - 40 x 1/4					2		
-77	00000299	.	.	NUT, Hex, 8 - 32					1		
-78	20071406	.	SUPPORT, Shock Mount							1	
-79	00000287	.	SHOCK MOUNT (76005) (Attaching Parts)							1	PD-10
-80	00000286	.	.	STUD, Flush Head, Self - Clinching (46384)					1	FHS-832-20	
-81	00000300	.	.	WASHER, Flat, #8, 7/8 O.D.					1		
-82	00000305	.	.	SCREW, Pan Head, 4 - 40 x 1/4					2		
-83	00000299	.	.	NUT, Hex, 8 - 32					1		
-84	00000280	.	BELT, Drive (07108)							1	70XL-025
-85	20080403	.	PULLEY, Mod 16							1	
-86	00000281	.	BELT DRIVE (07108)							2	80XL-025
-87	00000455	.	PULLEY, Drive Nylon (07108)							3	14XL-037
-88	00000277	.	PULLEY, Drive Nylon (07108)							1	15XL-037
-89	00000283	.	BELT, Drive (07108)							1	160XL-025
-90	20080401	.	PULLEY, Mod 14							2	
-91	00000278	.	PULLEY, Nylon 16 (07108)							1	16XL-037
-92	00000288	.	CAPACITOR, Motor Run 6 μ f 330V (03597)							1	23F1215
-93	00000289	.	BRACKET CAPACITOR (03597) (Attaching Parts)							1	K9827068P1
-94	00000296	.	.	SCREW, Pan Head, 6 - 32 x 3/8					2		
-95	00000295	.	.	WASHER, Flat #6					2		

TOP PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
-96	00000202	. CAPACITOR, 17.5 μ f, 370 VAC (03597) (230 VAC, 50 Hz Model)	1	45F279		
-97	00000290	. CLAMP, Capacitor (Pair) (03597) (Attaching Parts)	1	302C920P126		
-98	00000377	. . SCREW, Pan Head, #6 - 32 x 5/8	4			
-99	00000421	. . NUT, #6 - 32 (PEM)	4			
-100	00000472	. BOOT (G. E.)	1	614A625P21		
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-101	30068101	. DRIVE MOTOR ASSEMBLY (115 VAC, 60 Hz) (Fig. 12-8)	1			
	30068103	. DRIVE MOTOR ASSEMBLY (230 VAC, 50 Hz) (Fig. 12-8)	1			
-102	10002001	. STANDOFF, Motor (Attaching Parts)	4			
-103	00000303	. . SCREW, Pan Head, 8 - 32 x 5/8	4			
-104	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	4			
-105	00000294	. . WASHER, Flat #8	4			
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REF	20010401	. MAGNETIC PICKUP ASSEMBLY	1			
-106	00000447	. PICK-UP, Magnetic (07355) (Attaching Parts)	1	1-0194/086-2110019		
-107	00000304	. . SCREW, Flat Head, 6 - 32 x 1/2	2			
-108	20010401	. PICK-UP HOLDER (Attaching Parts)				
-109	00000867	. . SET SCREW, 6 - 32 x 1/8 Flat	1			
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-110	00000471	. HOSE, Flexible 1 3/4 DIA. x 11" (80382) (Attaching Parts)	1	A15		
-111	20031901	. FITTING, Air Outlet	1			
-112	00000407	. . CLAMP, Hose 2" adj. (76599)	2	H-24		
<hr/>						
-113	30104601	. FOLLOWER ASSEMBLY, Pick	1			
-114	30101002	. . CARD, Follower	1			
-115	30047701	. . BRACKET, Card Follower (Attaching Parts)	1			
-116	00000305	. . . SCREW, Pan Head 4 - 40 x 1/4	4			
-117	20066401	. . WEIGHT, Follower (Attaching Parts)	1			
-118	00000064	. . . SCREW, Pan Head 4 - 40 x 3/8	4			
-119	20000301	. . SUPPORT, Follower Bearing	1			
-120	10011801	. . ROLLER, Card Follower	1			
-121	10011901	. . SHAFT, Roller Card Follower	1			
-122	00000518	. . "O" RING, 1/8 DIA. Compound C - 557 - 7 1/2 ID (83259) (Attaching Parts)	1	5-230		
-123	00000063	. . . SCREW, Pan Head, 4 - 40 x 1/2	1			
-124	00000065	. . . WASHER, Flat #4	1			
-125	00000409	. . BUSHING BALL (Thompson)	2	B61014		
-126	00000495	. . NEOPREME RUBBER 1/8 x 1/4 x 5/8	2			
-127	00000573	. . ADHESIVE, Eastman 910	A/R			
-128	00000557	. . LOCKTITE RETAINING COMPOUND, Grade C	A/R			

TOP PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
-129	30071901	.	FOLLOWER ASSEMBLY, Stack						1	B61014
-130	20064601	.	.	SUPPORT, Follower Bearing (Attaching Parts)					1	
-131	00000305	.	.	.	SCREW, 4 - 40 x 1/4			2		
-132	00000065	.	.	.	WASHER, #4			2		
-133	00000409	.	.	BUSHING, Ball (Thompson)					2	
-134	20013801	.	.	BRACKET, Follower (Attaching Parts)					1	
-135	00000096	.	.	SCREW, Button Head (BLK) 4 - 40 x 1/4					4	
-136	30078801	.	.	FOLLOWER, Card (Attaching Parts)					1	
-137	00000271	.	.	.	SCREW, Button Head (BLK) 4 - 40 x 3/16			3		
-138	10011801	.	.	ROLLER, Card Follower					1	
-139	10011901	.	.	SHAFT, Roller					1	
-140	00000518	.	.	"O" RING, 1/8 DIA. Compound C-557-7 1/2 ID (83259) (Attaching Parts)					1	
-141	00000063	.	.	.	SCREW, Pan Head, 4 - 40 x 1/2			1		
-142	00000065	.	.	.	WASHER, Flat #4			1		
-143	00000557	.	.	LOCKTITE RETAINING COMPOUND, Grade C					A/R	
-144	30052601	.	ANGLE, Hood Support (Attaching Parts)						1	
-145	00000296	.	.	SCREW, Pan Head, 6 - 32 x 3/8					2	
-146	00000295	.	.	WASHER, #6					2	
-147	00000573	.	ADHESIVE, Eastman						A/R	
-148	40088301	.	WIRING DIAGRAM (115 VAC, 60 Hertz) (See Fig. 10-1)						A/R	
	40147601	.	WIRING DIAGRAM (230 VAC, 50 Hertz) (See Fig. 10-1A)							

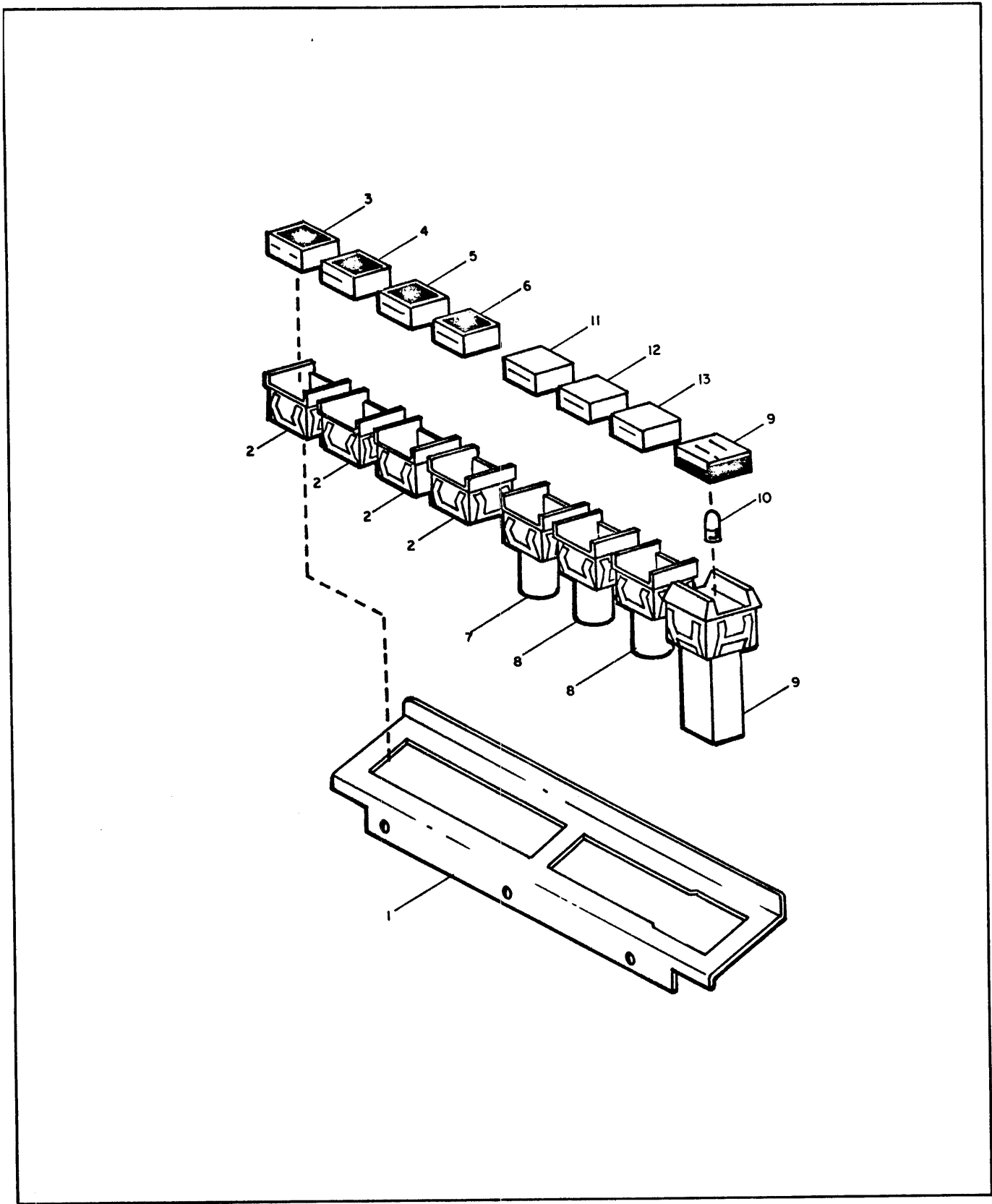


FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	30083802	CONTROL PANEL ASSEMBLY								
-1	30083401	. PANEL, Control							1	
-2	00000106	. INDICATOR, White Barrier (72619)							4	533-1004
-3	00000097	. CAP "READ CHECK", White Barrier (72619)							1	534-0404-339
-4	00000093	. CAP "MOTION CHECK", White Barrier (72619)							1	534-0404-339
-5	00000094	. CAP "PICK CHECK", White Barrier (72619)							1	534-0404-339
-6	00000092	. CAP "STACKER/HOPPER", White Barrier (72619)							1	534-0704-339
-7	00000321	. SWITCH N.O. SPST, White Barrier (72619)							1	513-0110-004
-8	00000320	. SWITCH N.O. SNAP ACTION, White Barrier (72619)							2	513-1610-004
-9	00000316	. SWITCH, Presslight, w/green "on" insert (87034)							1	53-77200-121
-10	00000318	. BULB, Incandescent 6V @ .2A (08806)							7	381
-11	00000102	. CAP, "STOP" (72619)							1	303-6361
-12	00000103	. CAP, "RESET" (72619)							1	303-6362
-13	00000104	. CAP, "END OF FILE" (72619)							1	303-6362
-14	00000510	. CONTACT, Junction (08524)							2	1841-1-5616
-15	00000036	. CONTACT, Conn Amp Leaf (00779)							12	42702-4LP
-16	00000034	. CONTACT, Amp Leaf (00779)							2	42717-4LP
-17	00000035	. CONTACT, Pin (00779)							2	60618-1
-18	00000451	. HOUSING, Pin (00779)							2	1480350-0
-19	00000058	. TIE, Cable (06383)							3	STIM-M
-20	00000085	. TUBING, Heatshrink, 1/4 x 31" (92194)							1	FIT-105
-21	00000018	. WIRE, Elec. #18 AWG TWPR BLK/BLK 66" (92194)							1	1857/19-2
-22	00000085	. TUBING, Heatshrink, 1/4 x 12" (92194)							1	FIT-105
-23	00000160	. WIRE, Elec., #18 AWG TWPR WHT/WHT 66"							1	1857/19-1
-24	00000157	. WIRE, Elec., #18 AWG BRN 44"							1	1857/19-7
-25	00000161	. WIRE, Elec., #18 AWG YEL 44"							1	1857/19-5
-26	00000002	. WIRE, Elec., #24 AWG RED/WHT 44"							1	1854/19-12
-27	00000006	. WIRE, Elec., #24 AWG BRN/WHT 44"							1	1854/19-16
-28	00000010	. WIRE, Elec., #24 AWG GRN - 44"							1	1854/19-4
-29	00000013	. WIRE, Elec., #24 AWG BRN - 44"							1	1854/19-7
-30	00000011	. WIRE, Elec., #24 AWG YEL - 44"							1	1854/19-5
-31	00000012	. WIRE, Elec., #24 AWG BLUE - 44"							1	1854/19-6
-32	00000009	. WIRE, Elec., #24 AWG RED - 44"							1	1854/19-3
-33	00000014	. WIRE, Elec., #24 AWG ORG - 44"							1	1854/19-8
-34	00000004	. WIRE, Elec., #24 AWG YEL/WHT - 44"							1	1854/19-14
-35	00000005	. WIRE, Elec., #24 AWG BLU/WHT - 44"							1	1854/19-15
-36	00000003	. WIRE, Elec., #24 AWG GRN/WHT - 44"							1	1854/19-13
-37	00000007	. WIRE, Elec., #24 AWG ORG/WHT - 44"							1	1854/19-17

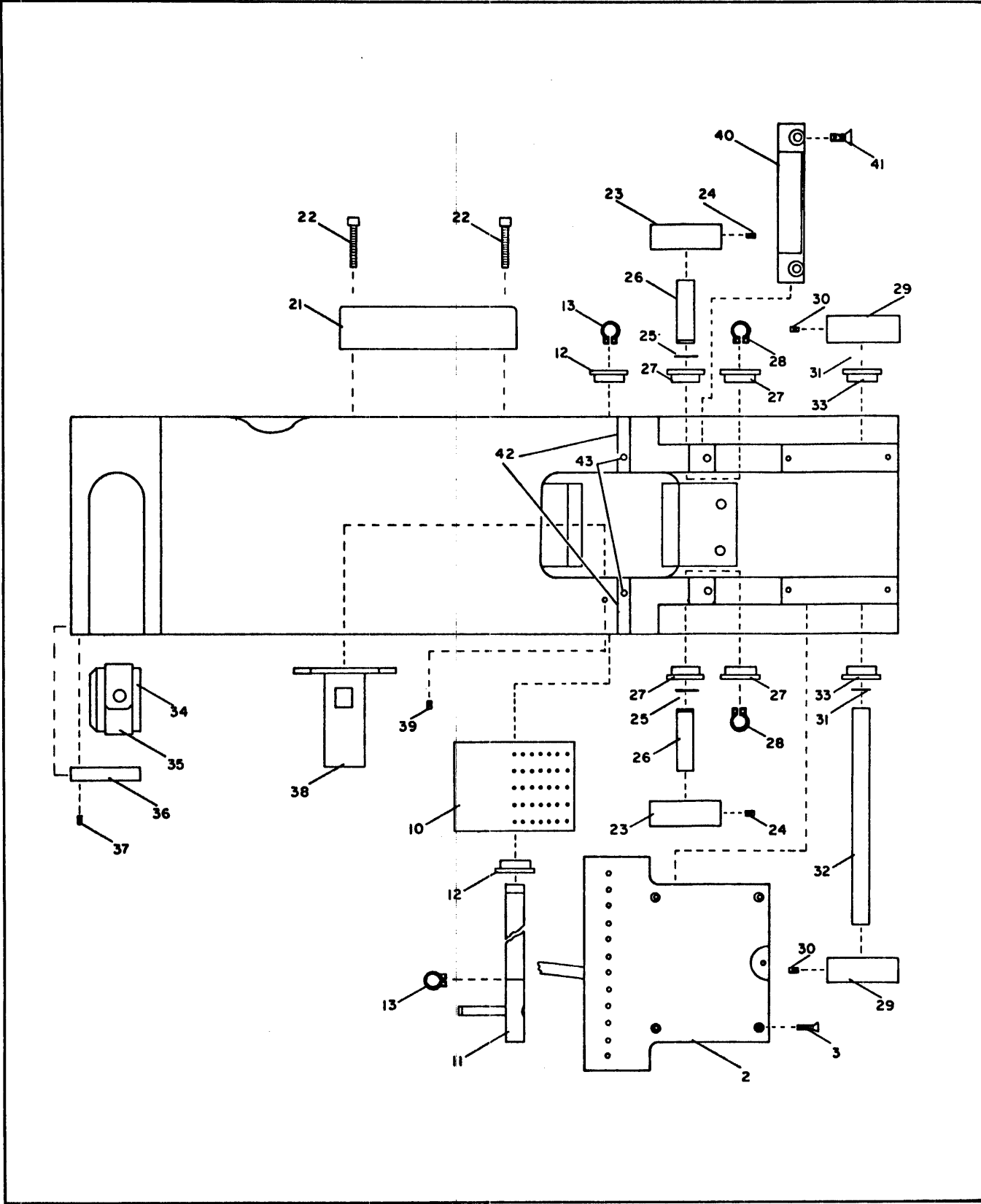


FIGURE 12-6 PICK SUPPORT ASSEMBLY (sheet 1 of 2)

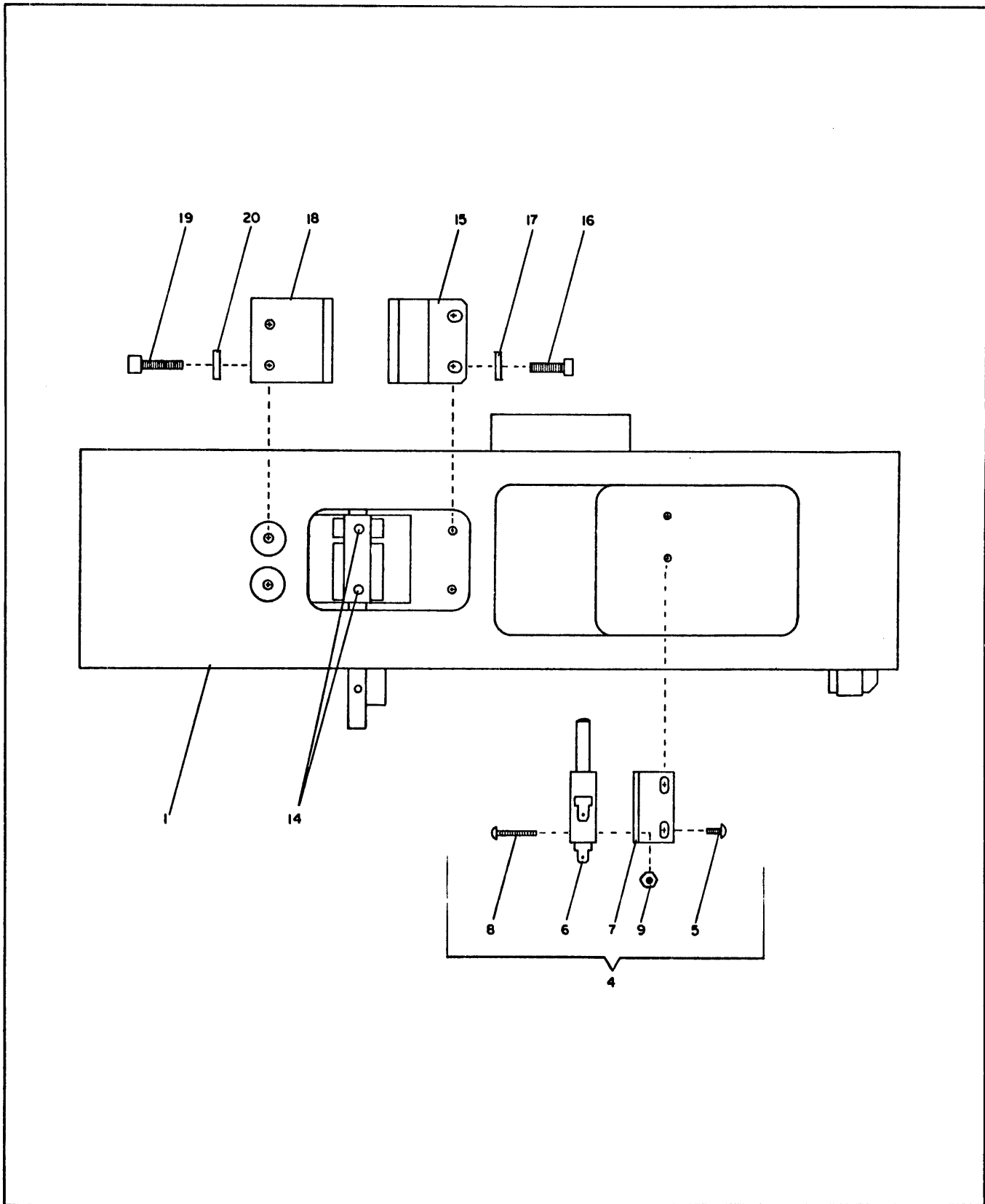


FIGURE 12-6 PICK SUPPORT ASSEMBLY (sheet 2 of 2)

FIGURE 12-6 PICK SUPPORT ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	40048202	PICK SUPPORT ASSEMBLY								
-1	40001601	.	PICK SUPPORT						1	
-2	30014402	.	LIGHT STATION ASSEMBLY (Attaching Parts)						1	
-3	00000344	.	.	SCREW, Machine, Flat Head, 2 - 56 x 1/4					4	
-4	20027701	.	SWITCH ASSEMBLY, Hopper Empty (Attaching Parts)						1	
-5	00000096	.	.	SCREW, Machine, button head, 4 - 40 x 1/4					2	
-6	10023501	.	.	SWITCH (01963)					1	E21-85HX
-7	20023401	.	.	BRACKET, Switch (Attaching Parts)					1	
-8	00000272	.	.	SCREW, Machine, Pan Head 4 - 40 x 5/8					2	
-9	00000062	.	.	NUT, Plain, Hex 4 - 40					2	
-10	30003701	.	SECTOR ASSEMBLY (Attaching Parts)						1	
-11	20101402	.	.	SHAFT, Pick Assembly					1	
-12	00000429	.	.	BEARING (14927)					2	SFR188TTK25LG1
-13	00000467	.	.	RING, Snap (79136)					2	5100-25
-14	00000297	.	.	SET SCREW, 8 - 32 x 3/16					2	
-15	10004101	.	STOP, Pick (Attaching Parts)						1	
-16	00000398	.	.	SCREW, Socket Head, 6 - 32 x 5/8					2	
-17	00000295	.	.	WASHER Flat, #6					2	
-18	10004701	.	BUMPER, Pick (Attaching Parts)						1	
-19	00000293	.	.	SCREW, Socket Head, 8 - 32 x 1/2					2	
-20	00000294	.	.	WASHER, Flat #8					2	
-21	30023303	.	CAP, Riffle Air (Attaching Parts)						1	
-22	00000391	.	.	SCREW, Socket Head, 4 - 40 x 3/4					2	
-23	20005901	.	DRIVE ROLLER, 2nd PICK DRIVE ASSEMBLY CAPSTAN (Attaching Parts)						2	
-24	00000292	.	.	SETSCREW, Knurled Cup, 6 - 32 x 3/16					2	
-25	00000432	.	SPACER, Bearing						2	SS2-28
-26	10002201	.	SHAFT						2	

PICK SUPPORT ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
-27	00000429	.	BEARING (14927)						4	SFR118TTK25LG1 5100-25
-28	00000467	.	RING SNAP (79136)						2	
<hr/>										
STACK DRIVE, 1st PICK DRIVE ASSEMBLY										
-29	20005901	.	CAPSTAN (Attaching Parts)						2	
-30	00000292	.	SETSCREW, Knurled Cup, 6 - 32 x 3/16						2	
-31	00000432	.	SPACER, Bearing						2	SS2-28
-32	10003003	.	SHAFT						1	
-33	00000429	.	BEARING (14927)						2	SFR188TTK25LG1
<hr/>										
-34	20012703	.	DRUM, Spring						1	
-35	00000306	.	SPRING, Negator (80545)						1	SLGF24
-36	10000701	.	SHAFT, Spring Drum (Attaching Parts)						1	
-37	00000564	.	SET SCREW, 4 - 40 x 3/32						1	
<hr/>										
-38	20004801	.	TUBE, Pick Vacuum (Attaching Parts)						1	
-39	00000564	.	SET SCREW, 4 - 40 x 3/32						1	
<hr/>										
-40	20008101	.	GUIDE, Card (Attaching Parts)						1	
-41	00000346	.	SCREW, Machine, Flat Head, 4 - 40 x 1/4						2	
<hr/>										
-42	20072801	.	INSERT, Pick Support (Attaching Parts)						2	
-43	00000565	.	SCREW, Machine, under cut Flat Head, 2 - 56 x 3/16						2	

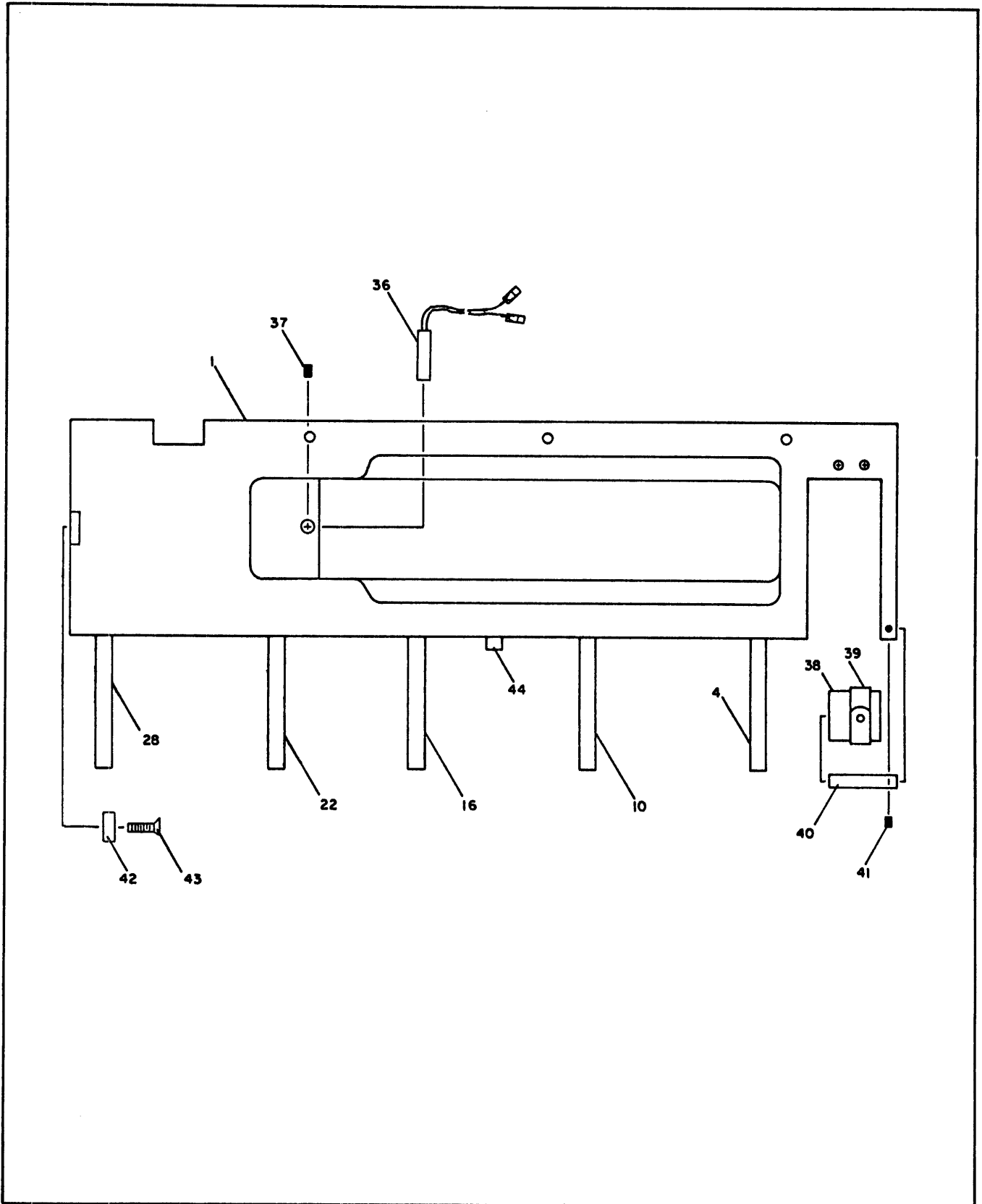


FIGURE 12-7 STACK SUPPORT ASSEMBLY (sheet 2 of 2)

FIGURE 12-7 STACK SUPPORT ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
	40067401	STACK SUPPORT ASSEMBLY	1	
-1	40048802	. SUPPORT, Stack	1	
-2	20050302	. READ ARRAY ASSEMBLY (Attaching Parts)	1	
-3	00000353	. . SCREW, Flat Head 4 - 40 x 1/4	2	
		FIRST STACK DRIVE ASSEMBLY		
-4	10003002	. SHAFT, Stack Drive	1	
-5	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-6	20001508	. ROLLER, Stack Drive	2	
-7	00000429	. BEARING (14927)	2	SFR188TT (3)
-8	00000435	. SPRING, Bearing Pre-load (29440) (Attaching Parts)	1	SV-1
-9	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		SECOND STACK DRIVE ASSEMBLY		
-10	10003002	. SHAFT, Stack Drive	1	
-11	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-12	20001508	. ROLLER, Stack Drive	2	
-13	00000429	. BEARING (14927)	2	SFR118TT (3)
-14	00000435	. SPRING, Bearing Pre-load (29440) (Attaching Parts)	1	SV-1
-15	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		THIRD STACK DRIVE ASSEMBLY		
-16	10003002	. SHAFT, Stack Drive	1	
-17	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-18	20001507	. ROLLER, Stack Drive	2	
-19	00000429	. BEARING (14927)	2	SFR118TT (3)
-20	00000435	. SPRING, Bearing Pre-load (29440) (Attaching Parts)	1	SV-1
-21	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		FOURTH STACK DRIVE ASSEMBLY		
-22	10003002	. SHAFT, Stack Drive	1	
-23	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30

STACK SUPPORT ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
-24	20002101	. ROLLER, Stack Drive	2			
-25	00000430	. BEARING (14927)	2	SFR4TT (3)		
-26	00000435	. SPRING, Bearing Pre-load (29440) (Attaching Parts)	1	SV-1		
-27	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	2			

FIFTH STACK DRIVE ASSEMBLY						
-28	10003002	. SHAFT, Stack Drive	1			
-29	00000431	. SPACER, Bearing (29440)	A/R	SS2-27		
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28		
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30		
-30	20002101	. ROLLER, Stack Drive	2			
-31	00000430	. BEARING (14927)	2	SFR4TT (3)		
-32	00000435	. SPRING, Bearing Pre-load (29440) (Attaching Parts)	1	SV-1		
-33	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	2			
-34	20065101	. PLATE, Bumper (Attaching Parts)	1			
-35	00000379	. . SCREW, Pan Head, .8 - 32 x 1/2	2			

-36	20038202	. STACK PHOTOCELL ASSEMBLY (Attaching Parts)	1			
-37	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	1			

-38	20012703	. DRUM, Spring	1			
-39	00000306	. SPRING, Negator (80545)	1	SL6F24		
-40	10000701	. SHAFT, Spring Drum (Attaching Parts)	1			
-41	00000566	. . SCREW, Set - Knurled Cup PT 4 - 40 x 3/16				

-42	10075801	. THROAT, Pick (Attaching Parts)	1			
-43	00000305	. . SCREW, Pan Head 4 - 40 x 1/4	1			

-44	00000492	. PIN, Dowel, .25 DIA. x 1/2 Hardened Steel (70276)	1	PINDOW1-4X1-2		

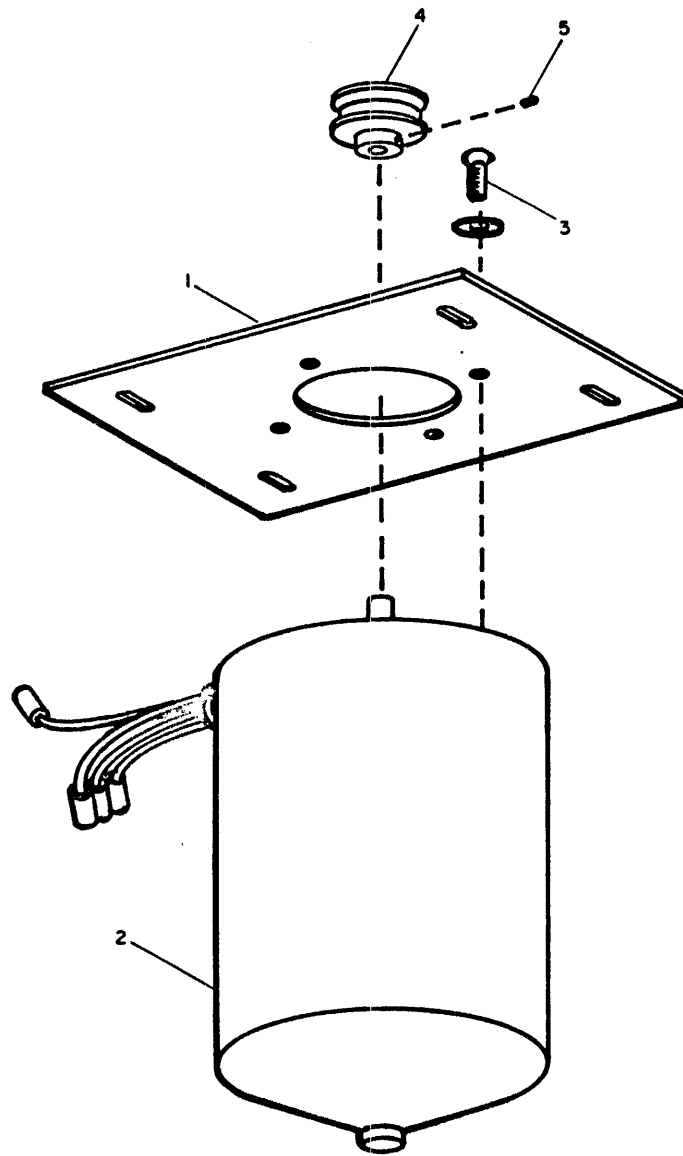


FIGURE 12-8 DRIVE MOTOR ASSEMBLY

FIGURE 12-8 DRIVE MOTOR ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	30068101	DRIVE MOTOR ASSEMBLY, 115 VAC, 60 HERTZ								
	30068103	DRIVE MOTOR ASSEMBLY, 230 VAC, 60 HERTZ								
-1	20028801	. PLATE, Motor Mounting							1	
-2	00000418	. MOTOR, 3600 rpm @ 60 Hz (115 VAC, 60 Hz Model) (19070)							1	H44ABJ-8
	00000419	. MOTOR, 3000 rpm @ 50 Hz (230 VAC, 50 Hz Model) (19070)							1	H44ABL-9
		(Attaching Parts)								
-3	00000368	. . SCREW, Pan Head 10							4	
<hr/>										
-4	20127009	. SPROCKET, Timing Belt, (16 x L) (115 VAC, 60 Hertz Model)							1	
	20127006	. SPROCKET, Timing Belt, (18 x L) (230 VAC, 50 Hertz Model)							1	
		(Attaching Parts)								
-5	20127009	. . SCREW, Set (Supplied with item 4)								
<hr/>										
-6	00000530	. RECEPTACLE, Faston (.250) (00779)							1	61370-1
-7	00000510	. CONTACT, Junction (115 VAC, 60 Hertz) (08524)							3	1841-1-5616
	00000510	. CONTACT, Junction (230 VAC, 50 Hertz) (08524)							2	1841-1-5616
-8	00000452	. HOUSING, Receptacle (00779)							1	480416-0

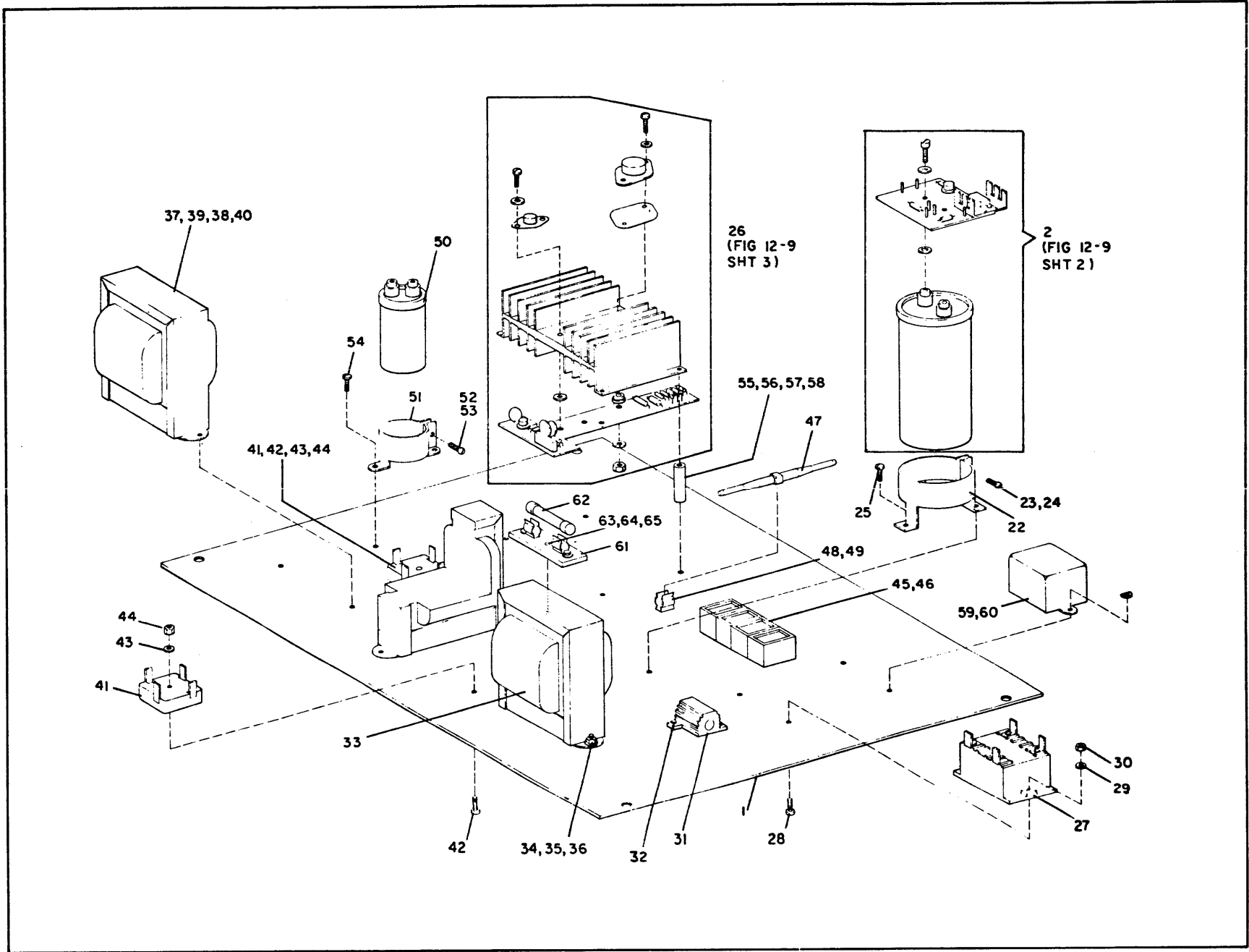


FIGURE 12-9 BASE PLATE ASSEMBLY (sheet 1 of 2)

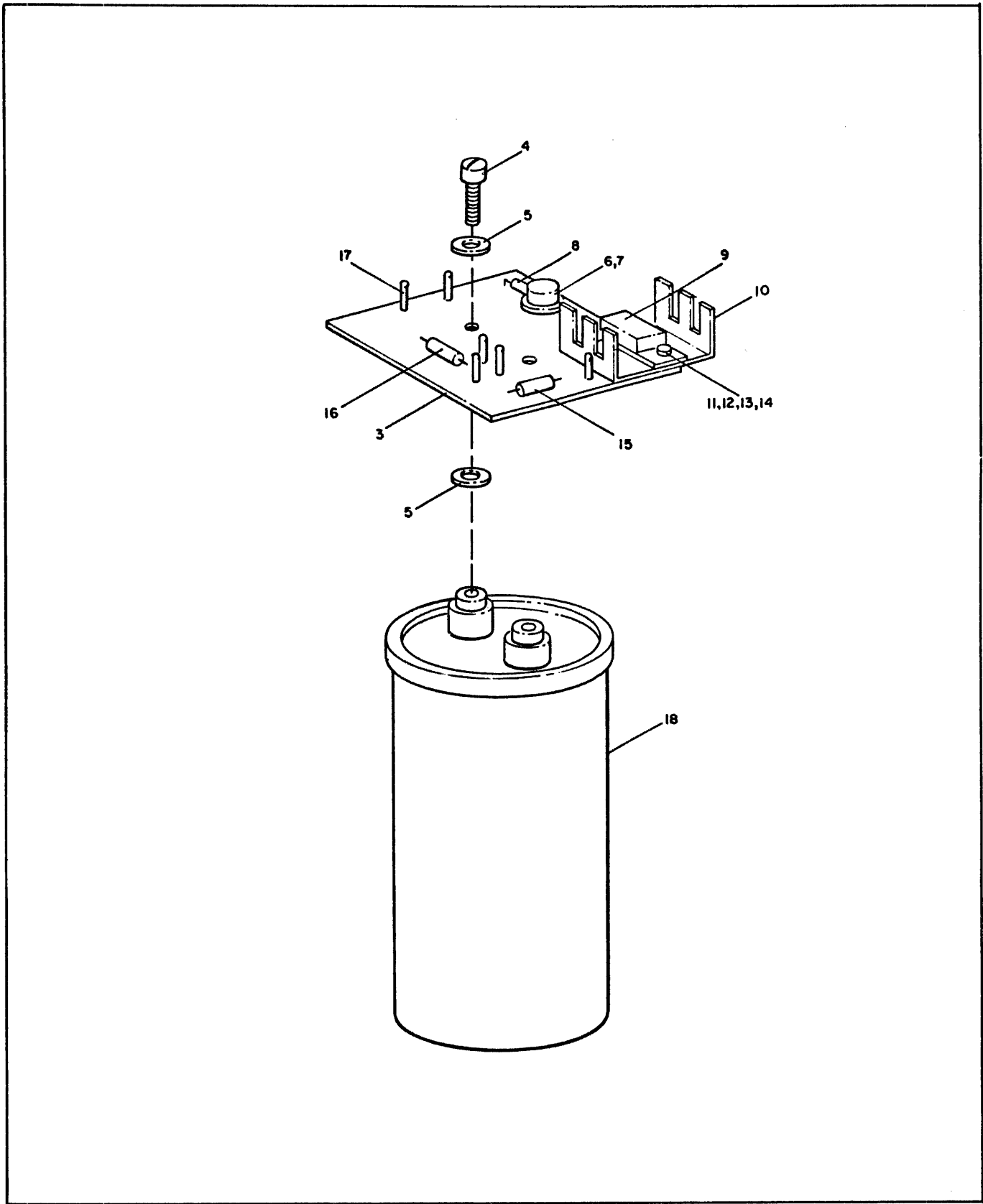


FIGURE 12-9 BASE PLATE ASSEMBLY (sheet 2 of 2)

FIGURE 12-9 BASE PLATE ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR
				PART NO.
	40067601 40067602	BASE PLATE ASSEMBLY - 115 VAC, 60 Hertz BASE PLATE ASSEMBLY - 230 VAC, 50 Hertz		
-1	40066301 40066303	. PLATE, Base - 115 VAC - 60 Hertz . PLATE, Base - 230 VAC - 50 Hertz	1 1	
-2	30010002	. SOLENOID DRIVER ASSEMBLY	1	
-3	20010201	. . BOARD, P. C. (Attaching Parts)	1	
-4	00000199	. . . SCREW, Machine Pan Head 10 - 32 (Supplied with item 18)	2	
-5	00000444	. . . WASHER, Lock internal tooth, No. 10	4	
-6	00000139	. . . TRANSISTOR NPN (01295)	1	2N2102
-7	00000107	. . . PAD, Transistor (13103)	1	7717-145N
-8	00000247	. . . RESISTOR, 270 ohm \pm 10% 1/4 W	1	RCO7GF271K
-9	00000141	. . . TRANSISTOR, Power NPN (01295)	1	TIP41C
-10	00000108	. . . HEAT SINK (13103) (Attaching Parts)	1	6107B-14
-11	00000556	. . . COMPOUND, Head Sink (13103)	A/R	
-12	00000361	. . . SCREW, Machine, Pan Head 4 - 40 x 3/8	1	
-13	00000141	. . . WASHER, Torque (Supplied with item 9)	1	
-14	00000062	. . . NUT, Hex 4 - 40	1	
-15	00000040	. . . DIODE (01295)	1	IN4003
-16	00000236	. . . RESISTOR, 10K \pm 10% 1/2 W	1	RC20GF103K
-17	00000330	. . . PIN, .058 Diameter (00779)	6	61038-1
-18	00000199	. . . CAPACITOR, 6200 UF, 75 VDC (03597)	1	86F177M
-19	00000452	. . . HOUSING, Receptacle (00779)	2	1-480416-0
-20	00000530	. . . RECEPTACLE, Faston (.250) (00779)	2	61370-1
-21	00000463 10020101	. . . TERMINAL Ring, Tongue (00779) . . . SCHEMATIC	1	32494
-22	00000548	. CLAMP, Capacitor (03597)	1	942A734AB3
-23	00000548	. SCREW (Supplied with item 22)	1	
-24	00000548	. NUT (Supplied with item 22) (Attaching Parts)	1	
-25	00000498	. . POP - RIVET	3	SD44BS
-26	30029505	. POWER SUPPLY ASSEMBLY (Fig. 12-11)	1	
-27	00000109 00000112	. RELAY, Solid State - 115 VAC - 60 Hertz (12617) . RELAY, Solid State - 230 VAC - 50 Hertz (12617) (Attaching Parts)	1 1	724-11-159 733-12-150
-28	00000379	. . SCREW, Pan Head, 8 - 32 x 1/2	2	
-29	00000294	. . WASHER, Flat #8	2	
-30	00000299	. . NUT, Hex #8 - 32	2	

BASE PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION						UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6			7
-31	20022802	.	RESISTOR ASSEMBLY (Attaching Parts)					1	
-32	00000498	.	.	POP - Rivet				2	SD44BS
-33	30030302	.	TRANSFORMER ASSEMBLY, 48V, 115 VAC - 60 Hertz					2	
	30074102	.	TRANSFORMER ASSEMBLY, 48V, 230 VAC - 50 Hertz (Attaching Parts)					2	
-34	00000296	.	.	SCREW, Pan Head 6 - 32 x 3/8				4	
-35	00000295	.	.	WASHER, Flat #6				4	
-36	00000301	.	.	NUT, Hex 6 - 32				4	
-37	20015603	.	TRANSFORMER ASSEMBLY, 12V, 115 VAC - 60 Hertz					1	
	20073903	.	TRANSFORMER ASSEMBLY, 12V, 230 VAC - 50 Hertz (Attaching Parts)					1	
-38	00000296	.	.	SCREW, Pan Head 6 - 32 x 3/8				2	
-39	00000295	.	.	WASHER, Flat #6				2	
-40	00000301	.	.	NUT, Hex 6 - 32				2	
-41	00000143	.	RECTIFIER, Diode Bridge 100V (04713) (Attaching Parts)					2	MDA980-2
-42	00000377	.	.	SCREW, Pan Head 6 - 32 x 5/8				2	
-43	00000295	.	.	WASHER, Flat #6				2	
-44	00000301	.	.	NUT, Hex 6 - 32				2	
-45	00000503	.	JUNCTION, Terminal (08524)					4	TJ11A-05-01
-46	00000555	.	.	ADHESIVE, Pliobond				A/R	
-47	00000487	.	TOOL (08524) (Attaching Parts)					1	M15570-16
-48	00000132	.	.	CLIP (75915)				1	101002
-49	00000498	.	.	RIVET, Pop				1	SD44BS
-50	00000200	.	CAPACITOR, 4600 μ f, 15 VDC (03597)					1	86F119M
-51	00000479	.	CLAMP, Capacitor (03597)					1	942A73AA T
-52	00000479	.	SCREW, (Supplied with item 51)					1	
-53	00000479	.	NUT, (Supplied with item 51) (Attaching Parts)					1	
-54	00000498	.	.	RIVET, Pop				2	SD44BS
-55	10015401	.	SPACER					4	
-56	00000382	.	SCREW, Socket Head 6 - 32 x 1/2					4	
-57	00000295	.	WASHER, Flat #6					4	
-58	00000302	.	SCREW, Pan Head, 6 - 32 x 1/2					4	

BASE PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS	VENDOR PART NO.
			PER ASSY	
-59	30080502	. FILTER ASSEMBLY (115 VAC - 60 Hertz only) (Attaching Parts)	1	
-60	00000498	. . RIVET, Pop	2	SD44BS
-61	00000133	. FUSEHOLDER, Scr. Term. Clip (75915)	1	356001
-62	00000147	. FUSE, 1 amp Slo-Blo (75915) (Attaching Parts)	1	313001
-63	00000296	. . SCREW, Pan Head 6 - 32 x 3/8	1	
-64	00000295	. . WASHER, Flat #6	1	
-65	00000301	. . NUT, Hex 6 - 32	1	
-66	00000059	. MOUNT, Cable Tie (06383)	3	TA1S8
-67	00000058	. TIE, Cable (06383)	7	SSTIM
-68	00000557	. LOCKTITE, Grade C	A/R	
-69	00000556	. COMPOUND, Heat Sink (13103)	A/R	252
-70	20027602	. CABLE ASSEMBLY, Cap to Bridge	1	
-71	20028704	. CABLE ASSEMBLY, Fan	2	
-72	20027512	. CABLE ASSEMBLY, Fuse	1	
-73	20027505	. CABLE ASSEMBLY, Relay to Junction Block (115 VAC - 60 Hertz only)	1	
-74	20027523	. CABLE ASSEMBLY	1	
-75	20027525	. CABLE ASSEMBLY	1	
-76	20027526	. CABLE ASSEMBLY	1	
-77	40088301	. WIRING DIAGRAM, 115 VAC - 60 Hertz (See Fig. 10-1)		
-78	40146701	. WIRING DIAGRAM, 230 VAC - 50 Hertz (See Fig. 10-1A)		

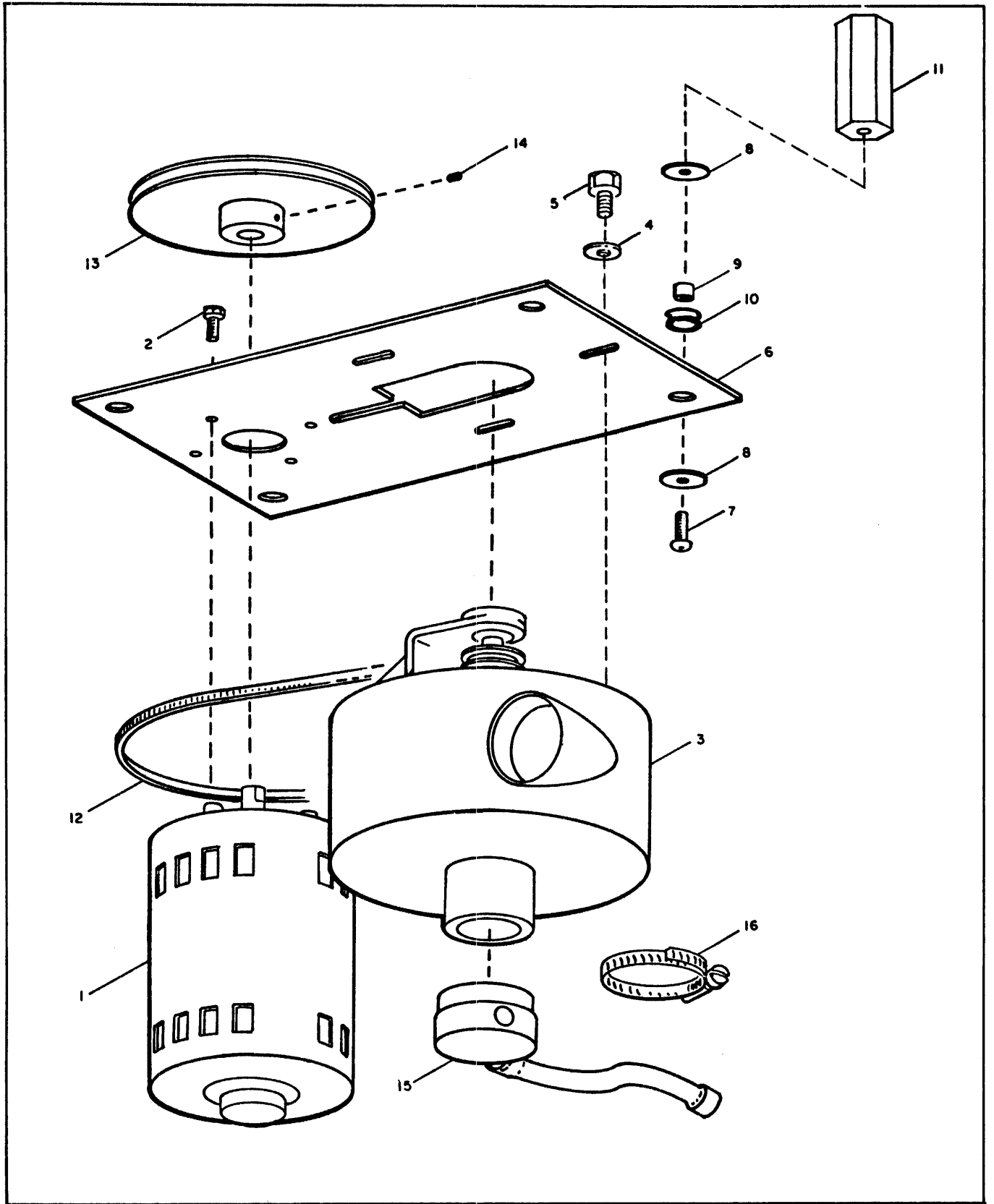


FIGURE 12-10 VACUUM PUMP ASSEMBLY

FIGURE 12-10 VACUUM PUMP ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	VENDOR PART NO.
			PER ASSY	
	40068301 40068302	VACUUM PUMP ASSEMBLY, 115 VAC, 60 Hertz VACUUM PUMP ASSEMBLY, 230 VAC, 50 Hertz		
-1	00000539	. MOTOR, 60 cycle, 3350 rpm, 115 VAC 60 Hertz (03597)	1	KCP19PG190A
	00000540	. MOTOR, 230 VAC, 50 Hertz (03597) (Attaching Parts)	1	ECO 5KCP19GF222
-2	00000846	. . SCREW, Pan Head, 8 - 32 x 7/16	4	553-1
-3	00000541	. BLOWER, (75511) (Attaching Parts)	1	553-1
-4	00000441	. . WASHER, Flat #1/4	3	
-5	00000360	. . SCREW, Cap, Hex HD, 1/4 - 20 x 1/2	3	
-6	30070701	. PLATE, Blower (Attaching Parts)	1	
-7	00000381	. . SCREW, Pan Head, 8 - 32 x 3/4	4	
-8	00000294	. . WASHER, Flat #8, 7/8 O.D.	8	
-9	20069101	. . SPACER	4	
-10	00000478	. . GROMET (83330)	4	91106
-11	10002005	. . STANDOFF	4	
-12	00000519	. BELT (24161)	1	5 M 545
-13	20076101	. PULLEY ASSEMBLY (Attaching Parts)	1	
-14	00000845	. . SCREW, Set Cup PT 1/4 - 20 x 3/16	2	
-15	20069501	. VACUUM ADAPTER ASSEMBLY (Attaching Parts)	1	
-16	00000407	. . CLAMP, Hose 2" Adj. (76599)	1	H-24
-17	20037901	. GROUND STRAP ASSEMBLY (Attaching Parts)		
-18	00000296	. . SCREW, Pan Head, 6 - 32 x 3/8	1	
-19	00000445	. . WASHER, Lock, int. tooth #6	1	
-20	00000301	. . NUT, Hex, #6 - 32	1	
-21	00000530	. RECEPTACLE, Faston (.250) (00779)	3	61370-1
-22	00000452	. HOUSING, Receptacle (00779)		
-23	00000557	. LOCTITE, Grade C	A/R	

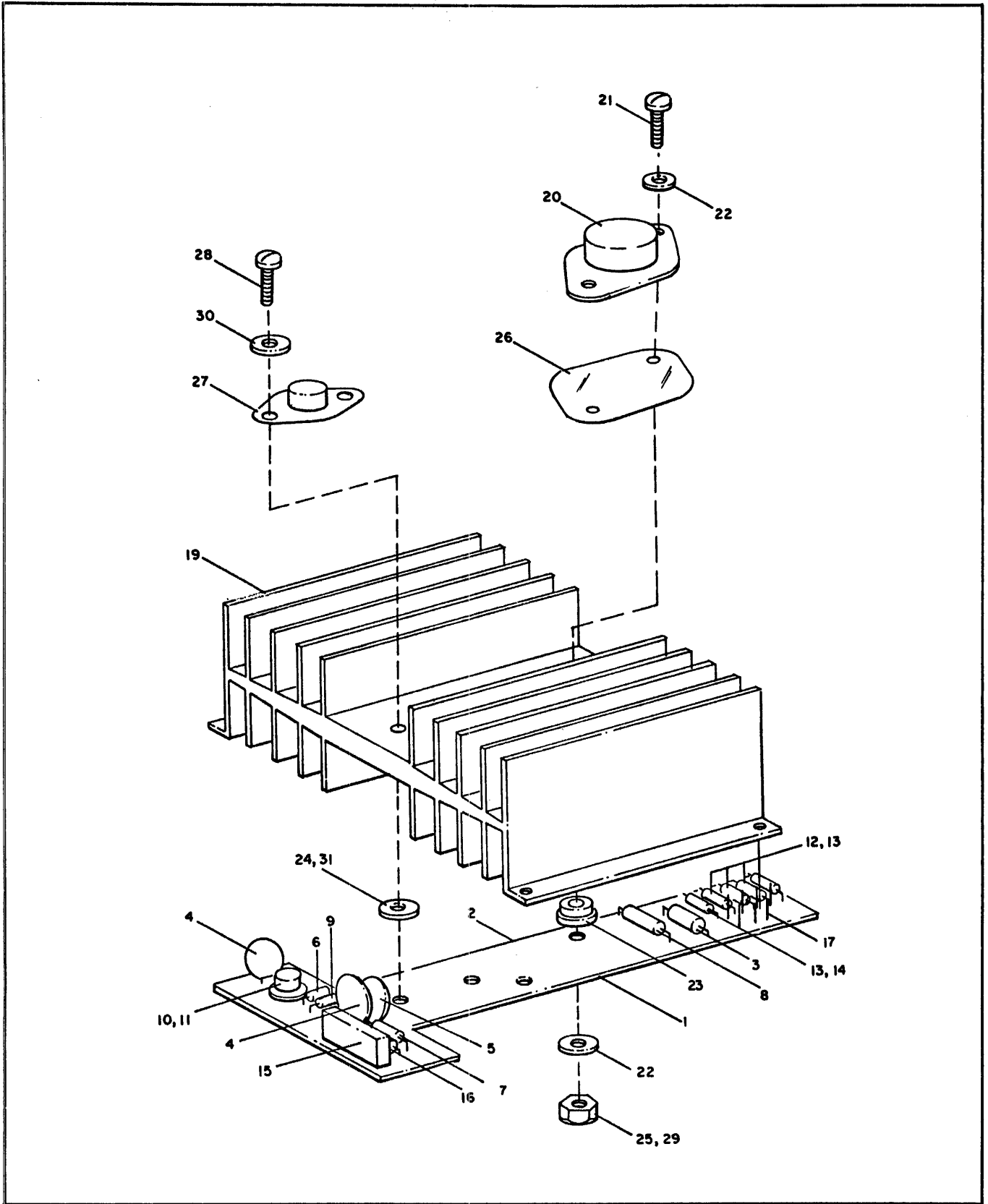


FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY							VENDOR PART NO.
			1	2	3	4	5	6	7	
	30029505	POWER SUPPLY ASSEMBLY								
-1	20032803	. PC BOARD ASSEMBLY							1	
-2	30032703	. . PC BOARD							1	
-3	00000844	. . CAPACITOR, 10.0 UF, 12 VDC \pm 10% (80183)							1	TE 1128
-4	00000190	. . CAPACITOR, .1 UF, 100 VDC, \pm 10% (80183)							2	TG-P10
-5	00000195	. . CAPACITOR, .001 UF, 200 VDC (80183)							1	5HK-D10
-6	00000209	. . RESISTOR, Prec., 6.81K \pm 1% 1W							1	RN60D6811F
-7	00000069	. . RESISTOR, 100 ohm \pm 10% 1/4 W							1	RCO7GF101K
-8	00000207	. . RESISTOR, 10 ohm, \pm 1% 2W							1	RW79UR100F
-9	00000070	. . RESISTOR, 1K ohm, \pm 10% 1/4 W							1	RCO7GF102K
-10	00000140	. . TRANSISTOR, NPN (04713)							1	2N706
-11	00000107	. . PAD, Transistor mount (red) (13103)							1	7717-14S
-12	00000570	. . RESISTOR, (Sat) \pm 10% 1/4 W range 33 to 100 ohm							4	RCO7GF
-13	00000460	. . SOCKET, Miniature Spring (00779)							10	3-331877-6
-14	00000570	. . RESISTOR, (Sat) \pm 10% 1/4 W range 82 to 120 ohm							1	RCO7GF
-15	00000232	. . RESISTOR, Variable, 10K \pm 10% 1W							1	3009P-1-103
-16	00000238	. . RESISTOR, 7.5K, \pm 5%, 1/2 W							1	RC20GF752J
-17	00000671	. . CONTACT, Electrical (.025 sq. MODU) (00779)							7	86094-2
-18	00000463	. . TERMINAL, Ring Tongue (00779)							2	32949
-19	20029101	. . HEAT SINK							1	
-20	00000137	. . TRANSISTOR, NPN, Power (04713) (Attaching Parts)							1	2N3771
-21	00000568	. . . SCREW, Machine, Phillips Head 6 - 32 x 5/8 Nickle Brass Plate							2	
-22	00000445	. . . WASHER, Lock internal tooth #6							3	
-23	00000502	. . . WASHER, Shoulder, nylon (95987)							2	SW-6-NA
-24	00000491	. . . WASHER, nylon (95987)							1	NW-6-3124NA
-25	00000569	. . . NUT, Plain, Hex 6 - 32, Nickel Brass Plate							2	
-26	00000567	. . . WASHER, insulating (13103)							1	43-03-04
-27	00000115	. . INTEGRATED CIRCUIT (04713) (Attaching Parts)							1	MC 1469R
-28	00000568	. . . SCREW, Machine, Phillips Head, 6 - 32 x 5/8 Nickle Brass Plate							2	
-29	00000569	. . . NUT, Plain, Hex 6 - 32, Nickle Brass Plate							2	
-30	00000445	. . . WASHER, Lock internal tooth #6							4	
-31	00000491	. . . WASHER, Nylon (95987)							2	NW-6-3124NA
-32		. COMPOUND, Heatsink, Silicon (13103)							A/R	

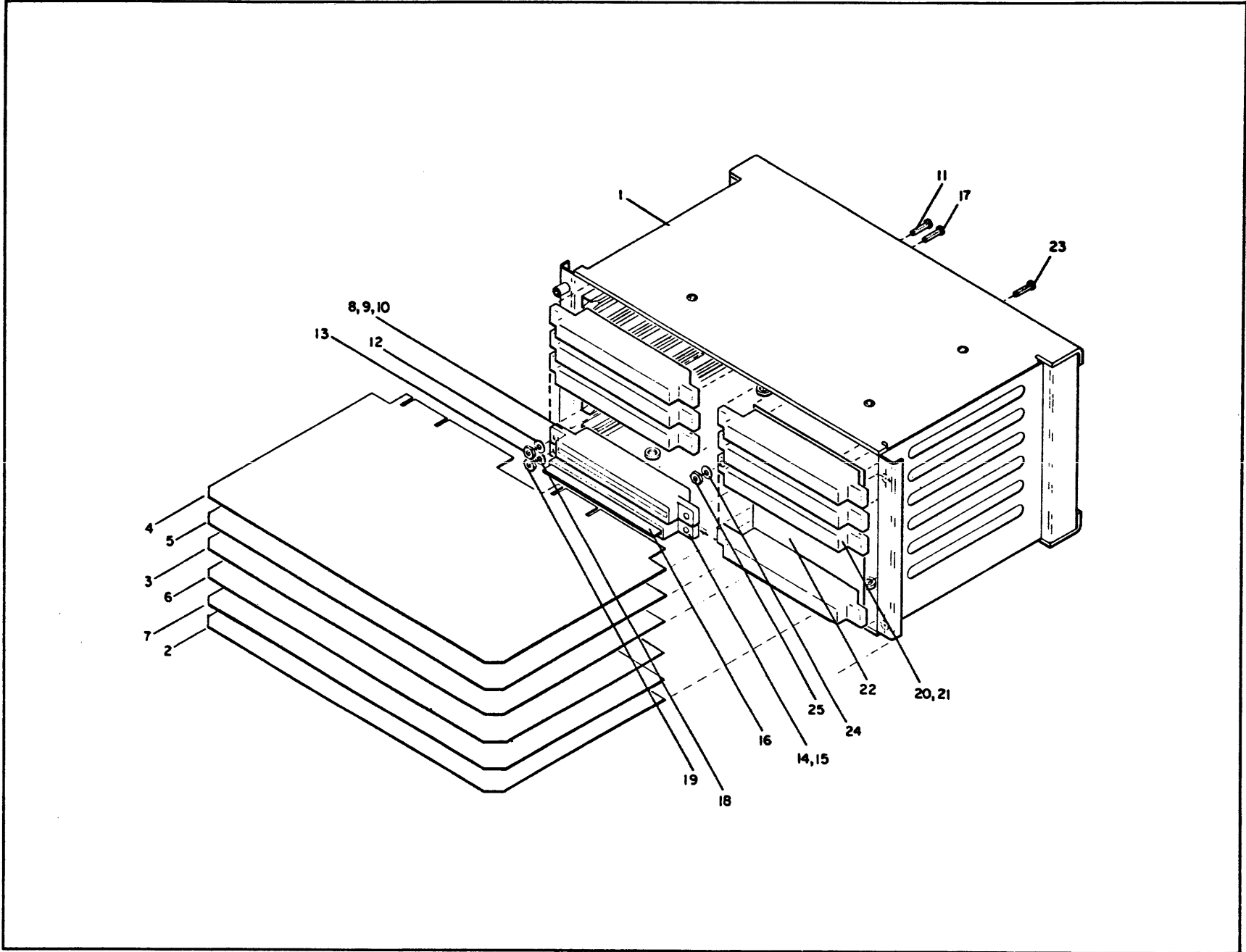


FIGURE 12-12 CARD FILE ASSEMBLY

FIGURE 12-12 CARD FILE ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
	40083601	CARD FILE ASSEMBLY				
-1	30029401	. CARD GAGE W/GUIDES	1			
-2	40083301	. P. C. CARD ASSEMBLY, Control	1			
-3	40035302	. P. C. CARD ASSEMBLY, Sync	1			
-4	40076503	. P. C. CARD ASSEMBLY, Clock	1			
-5	40061007	. P. C. CARD ASSEMBLY, Error	1			
-6	40078601	. P. C. CARD ASSEMBLY, Driver	1			
-7	40079101	. P. C. CARD ASSEMBLY, Receiver	1			
-8	00000029	. CONN HOUSING, Crimp, Snap-In (00779)	6	1-582191-5		
-9	00000030	. PLUG, Keying (00779)	24	582501-1		
-10	00000061	. SPRING, Retaining (00779) (Attaching Parts)	11	42973-2		
-11	00000064	. . SCREW, Machine, Pan Head, SSL, 4 - 40 - 3/8	12			
-12	00000066	. . WASHER, Lock, internal tooth, #4	12			
-13	00000062	. . NUT, Plain, Hex, 4 - 40	12			
<hr/>						
-14	00000032	. CONNECTOR, Single Row (00779)	1	583302-1		
-15	00000702	. CONTACT, Connector (00779)	37	583259-2		
-16	20036201	. BUS BAR, Connector (Attaching Parts)	1			
-17	00000064	. . SCREW, Machine, Pan Head, SSL 4 - 40 - 3/8	2			
-18	00000066	. . WASHER, Lock, internal tooth #4	2			
-19	00000062	. . NUT, Plain, Hex 4 - 40	2			
<hr/>						
-20	00000032	. CONNECTOR, Solder, TAB, Loaded (00779)	6	583334-1		
-21	00000030	. PLUG, Keying (00779)	36	582501-1		
-22	40032401	. P. C. CARD, Mother Board (Attaching Parts)	1			
-23	00000063	. . SCREW, Machine, Pan Head SSL 4 - 40 x 1/2	12			
-24	00000066	. . WASHER, Lock, internal tooth #4	12			
-25	00000062	. . NUT, Plain, Hex, 4 - 40	12			
<hr/>						
-26	20063601	. CABLE ASSEMBLY, D. C. Power	1			
-27	00000017	. WIRE, Elec., #20 AWG, BRN, 8"	1			
-28	00000166	. WIRE, Elec., #24 AWG, WHT, 2.25" (92194)	2	1854/19-1		
-29	00000014	. WIRE, Elec., #24 AWG, ORN, 2.25" (92194)	2	1854/19-8		
-30	00000013	. WIRE, Elec., #24 AWG, BRN, 3.00" (92194)	1	1854/19-7		
-31	00000011	. WIRE, Elec., #24 AWG, YEL, 2.25" (92194)	2	1854/19-5		
-32	00000012	. WIRE, Elec., #24 AWG, BLU, 2.25" (92194)	3	1843/19-6		
-33	00000010	. WIRE, Elec., #24 AWG, GRN, 2.25" (92194)	2	1854/19-4		
-34	00000013	. WIRE, Elec., #24 AWG, BRN, 2.25" (92194)	1	1854/19-7		
-35	00000009	. WIRE, Elec., #24 AWG, RED, 4.00" (92194)	1	1854/19-3		
-36	00000166	. WIRE, Elec., #24 AWG, WHT, 3.00" (92194)	1	1854/19-1		
-37	00000011	. WIRE, Elec., #24 AWG, YEL, 2.75" (92194)	1	1854/19-5		
-38	00000014	. WIRE, Elec., #24 AWG, ORN, 2.75" (92194)	1	1854/19-8		
-39	00000166	. WIRE, Elec., #24 AWG, WHT, 3.25" (92194)	1	1854/19-1		

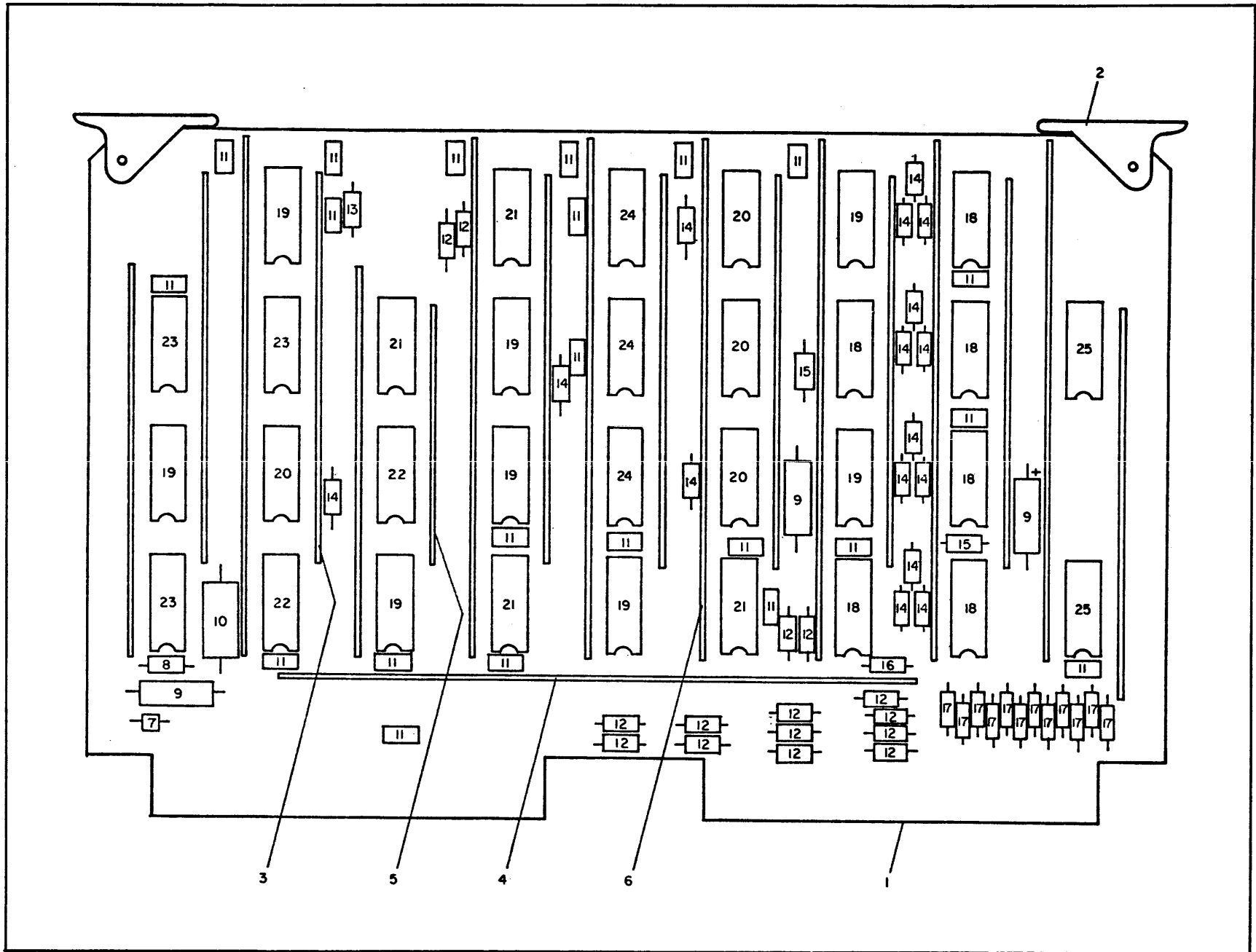


FIGURE 12-13 PC ASSEMBLY - CONTROL CARD

FIGURE 12-13 PC ASSEMBLY - CONTROL CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	40083301	PC ASSEMBLY, Control Card								
-1	40064901	. PRINTED CIRCUIT BOARD							1	
-2	00000060	. HANDLE, Extractor with roll pin (18617)							2	S-203
-3	20031104	. BUS BAR, 4 pin							10	
-4	20031106	. BUS BAR, 6 pin							1	
-5	20031103	. BUS BAR, 3 pin							1	
-6	20031105	. BUS BAR, 5 pin							7	
-7	00000088	. BEAD, Ferrite (33062)							1	21-030-F
-8	00000039	. DIODE, Zener 6.8V (04713)							1	IN5235
-9	00000025	. CAPACITOR, Elec., 20 UF, 6V (03597)							3	76F02CC200
-10	00000024	. CAPACITOR, Mylar, 0.1 UF, 100V (03597)							1	BA12A1043
-11	00000023	. CAPACITOR, 0.01 UF, 100V (80813)							22	T6-S10
-12	00000080	. RESISTOR, 5.6K, $\pm 10\%$, 1/4 W							15	RCO7GF562K
-13	00000075	. RESISTOR, 330 ohm, $\pm 10\%$, 1/4 W							1	RCO7GF331K
-14	00000070	. RESISTOR, 1K, $\pm 10\%$, 1/4 W							16	RCO7GF102K
-15	00000076	. RESISTOR, 470 ohm, $\pm 10\%$, 1/4 W							2	RCO7GF471K
-16	00000069	. RESISTOR, 100 ohm, $\pm 10\%$, 1/4 W							1	RCO7GF101K
-17	00000079	. RESISTOR, 560 ohm, $\pm 10\%$, 1/4 W							12	RCO7GF561K
-18	00000049	. INTEGRATED CIRCUIT, Hex Inverter (18324)							6	N7405A
-19	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)							8	N7404A
-20	00000043	. INTEGRATED CIRCUIT, 2 input DTL gate (07263)							4	UGA994659X
-21	00000124	. INTEGRATED CIRCUIT, Hex - Buffer, non, inv. (18324)							4	SN7417N
-22	00000046	. INTEGRATED CIRCUIT, Quad 2 input (18324)							2	N7400A
-23	00000044	. INTEGRATED CIRCUIT, Dual D flip flop (18324)							3	N7474A
-24	00000053	. INTEGRATED CIRCUIT, 4 bit counter (07263)							3	UGA937659
-25	00000057	. INTEGRATED CIRCUIT, Low power Hex inverter (07263)							2	UGA9L0459X
-26	00000020	. WIRE, Bus 18 AWG 7/16"							1	
-27	00000020	. WIRE, Bus 18 AWG 11/16"							1	
-28	40083501	. SCHEMATIC (See Figure 10-8)								

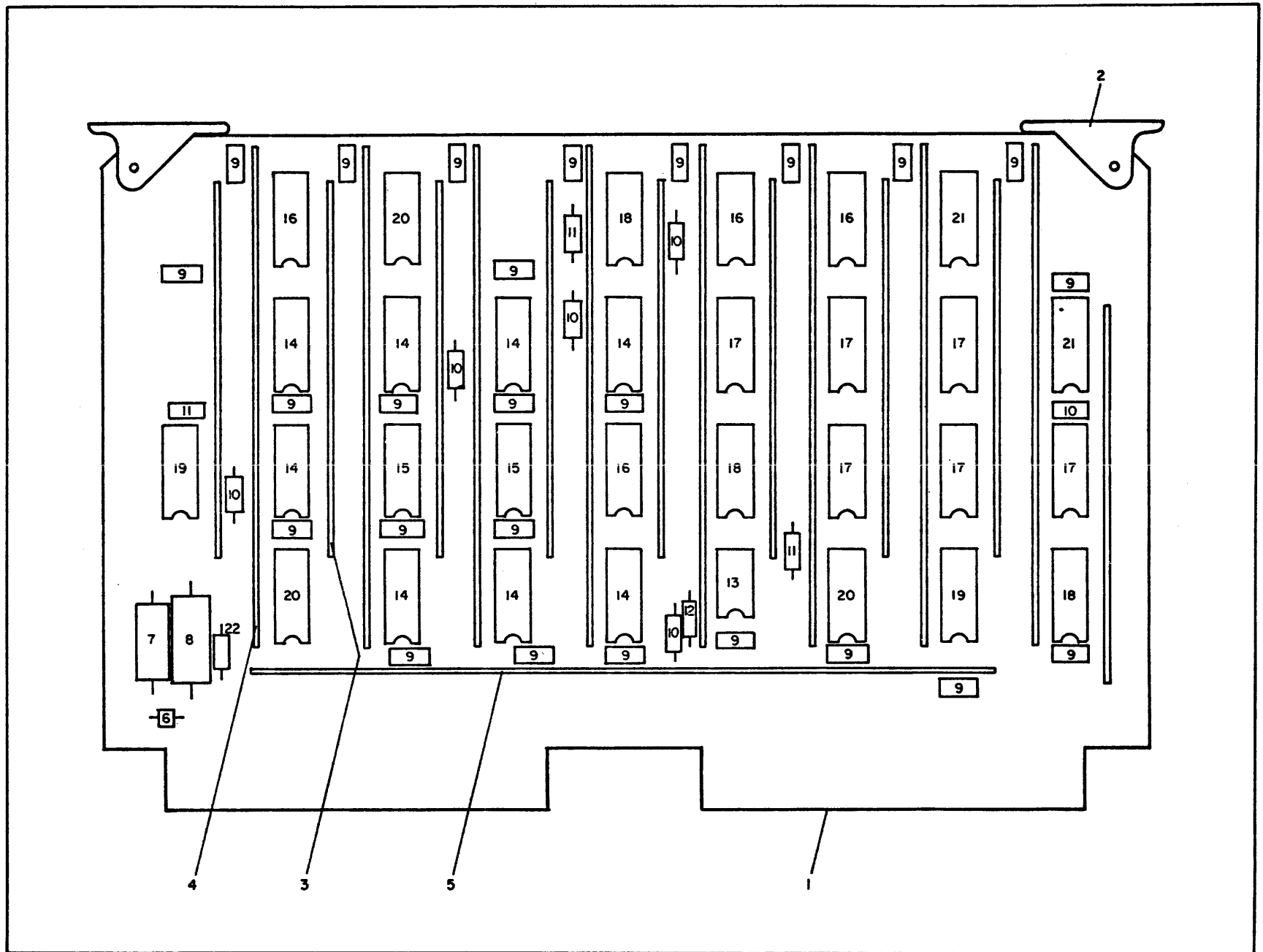


FIGURE 12-14 PC ASSEMBLY - SYNC CARD

FIGURE 12-14 PC ASSEMBLY - SYNC CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	40035302	PC ASSEMBLY, Sync Card								
-1	40060101	. BOARD, Printed circuit							1	
-2	00000060	. HANDLE, Extractor with roll pin (18677)							2	S-20-3
-3	20031105	. BUS BAR, 5 pin							8	
-4	20031104	. BUS BAR, 4 pin							9	
-5	20031107	. BUS BAR, 7 pin							1	
-6	00000088	. BEAD, Ferrite (33062)							1	21-030F
-7	00000025	. CAPACITOR, Electrolytic, 20 UF, 6V (03597)							1	76F02CC200
-8	00000024	. CAPACITOR, Mylar, .1 UF, 100V (03597)							1	BA12A104B
-9	00000023	. CAPACITOR, .01 UF, 50V (80183)							25	TG-S10
-10	00000070	. RESISTOR, 1K OHM, $\pm 10\%$, 1/4 W							6	RCO7GF102K
-11	00000076	. RESISTOR, 470 ohm, $\pm 10\%$, 1/4 W							3	RCO7GF471K
-12	00000072	. RESISTOR, 220 ohm, $\pm 10\%$, 1/4 W							1	RCO7GF221K
-13	00000042	. INTEGRATED CIRCUIT, Hybrid driver (07883)							1	NH0017CN
-14	00000054	. INTEGRATED CIRCUIT, Counter register							8	N8281ADC
-15	00000055	. INTEGRATED CIRCUIT, 4 bit comparator, O. C. (18324)							2	N8242A
-16	00000047	. INTEGRATED CIRCUIT, Single 8 input gate (18324)							4	N7430A
-17	00000044	. INTEGRATED CIRCUIT, Dual D flip flop (18324)							6	N7474A
-18	00000045	. INTEGRATED CIRCUIT, Dual 4 input buff (18324)							3	N7440A
-19	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (18324)							2	N7400A
-20	00000050	. INTEGRATED CIRCUIT, Hex inverter (18324)							3	N7404A
-21	00000053	. INTEGRATED CIRCUIT, Counter register (18324)							2	N8280ADC
-22	00000039	. DIODE 6.8V, Zener (04713)							1	IN5235
-23	00000020	. WIRE, Bus, #18 GA, 11/16							1	
-24	40060401	. SCHEMATIC (See Figure 10-18)								

FIGURE 12-15 PC ASSEMBLY - CLOCK CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR	
				PART NO.	
	40076503	PC ASSEMBLY, Clock Card			
-1	40079901	. BOARD, Printed circuit	1		
-2	00000060	. HANDLE, Extractor with roll pins (18677)	2	S-203	
-3	20031104	. BUS BAR, 4 pin	8		
-4	20031105	. BUS BAR, 5 pin	5		
-5	20031107	. BUS BAR, 7 pin	1		
-6	00000088	. BEAD, Ferrite (33062)	1	21-030-F	
-7	00000025	. CAPACITOR, Electrolytic, 20 UF, 6V (03597)	3	76F02CC200	
-8	00000024	. CAPACITOR, Mylar, .1 UF, 100V (03597)	1	BA12A104A	
-9	00000022	. CAPACITOR, .02 UF, 100V (80183)	1	TG-S20	
-10	00000023	. CAPACITOR, .01 UF, 100V (80183)	16	TG-S10	
-11	00000077	. RESISTOR, 4.7K, $\pm 10\%$, 1/4 W	1	RCO7GF472K	
-12	00000070	. RESISTOR, 1K, $\pm 10\%$, 1/4 W	7	RCO7GF102K	
-13	00000073	. RESISTOR, 2.2K, $\pm 10\%$, 1/4 W	1	RCO7GF222K	
-14	00000067	. OSCILLATOR, Crystal, 4.8 MHz (04713)	1	K1035A00710	
-15	00000056	. INTEGRATED CIRCUIT, Comparator (07886)	1	LM311D	
-16	00000053	. INTEGRATED CIRCUIT, Counter Register (18324)	1	N3280ADC	
-17	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (18324)	4	N7400A	
-18	00000048	. INTEGRATED CIRCUIT, 3 input gate (18324)	2	N7410A	
-19	00000047	. INTEGRATED CIRCUIT, 8 input gate (18324)	5	N7430A	
-20	00000045	. INTEGRATED CIRCUIT DUAL, 4 input gate (18324)	1	N7440A	
-21	00000044	. INTEGRATED CIRCUIT, Dual D flip flop (18324)	12	N7474A	
-22	00000050	. INTEGRATED CIRCUIT, Hex inverter (18324)	5	N7404A	
-23	00000124	. INTEGRATED CIRCUIT, Hex buff, Non inv. O. C. (18324)	1	N7417A	
-24	00000039	. DIODE, Zener, 6.8V (04713)	1	IN5235	
-25	00000080	. RESISTOR, 5.6K, $\pm 10\%$, 1/4 W	1	RCO7GF562K	
-26	00000225	. RESISTOR, 100K, $\pm 10\%$, 1/4 W	1	RCO7GF104K	
-27	00000020	. WIRE, Bus, #18 AWG, 11/16	1		
-28	40080003	. SCHEMATIC (See Figure 10-11)			

FIGURE 12-16 PC ASSEMBLY - ERROR CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION							UNITS PER ASSY	VENDOR PART NO.
		1	2	3	4	5	6	7		
	40061007	PC ASSEMBLY, Error Card								
-1	40060901	. BOARD, Printed circuit							1	
-2	00000060	. HANDLE, Extractor with roll pins (18677)							2	S-203
-3	20031105	. BUS BAR, 5 pin							6	
-4	20031104	. BUS BAR, 4 pin							8	
-5	20031103	. BUS BAR, 3 pin							2	
-6	20031107	. BUS BAR, 7 pin							1	
-7	00000088	. BEAD, Ferrite (33062)							1	21-030-F
-8	00000025	. CAPACITOR, 20 UF, 6V (03597)							1	76F02CC200
-9	00000024	. CAPACITOR, 0.1 UF, 100V (03597)							1	BA12A104B
-10	00000026	. CAPACITOR, 400 UF, 6V (03597)							1	76F02CM401
-11	00000027	. CAPACITOR, 30 UF, 12V (03597)							1	76F02ED300
-12	00000021	. CAPACITOR, .22 UD, 25V (80183)							4	2C023224X0250A3
-13	00000023	. CAPACITOR, 0.01 UF, 100V (80183)							19	TG-S10
-14	00000081	. RESISTOR, 68 ohm, $\pm 10\%$, 1/2 W							6	RC20GF68OK
-15	00000071	. RESISTOR, 10K OHM, $\pm 10\%$, 1/4 W							1	RCO7GF103K
-16	00000068	. RESISTOR, 10 ohm, $\pm 10\%$, 1/4 W							1	RCO7GF100K
-17	00000076	. RESISTOR, 470 ohm, $\pm 10\%$, 1/4 W							1	RCO7GF471K
-18	00000079	. RESISTOR, 560 ohm, $\pm 5\%$, 1/4 W							1	RCO7GF561K
-19	00000070	. RESISTOR, 1K OHM							8	RCO7GF102K
-20	00000841	. RESISTOR, 33K OHM, $\pm 10\%$, 1/4 W							1	RCO7
-21	00000080	. RESISTOR, 5.6K OHM, $\pm 10\%$, 1/4 W							4	RCO7GF562K
-22	00000083	. SWITCH, SPDT, PC mount (09353)							1	7101A
-23	00000082	. SWITCH, SPDT, Push, P. C. mount (09353)							1	P8121R
-24	00000051	. INTEGRATED CIRCUIT, Driver (01295)							4	SN75450N
-25	00000044	. INTEGRATED CIRCUIT, Dual D type F. F. (18324)							5	N7474A
-26	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (18324)							5	N7400A
-27	00000047	. INTEGRATED CIRCUIT, Single 8 input gate (18324)							1	N7430A
-28	00000048	. INTEGRATED CIRCUIT, Triple 3 input gate (18324)							1	N7410A
-29	00000052	. INTEGRATED CIRCUIT, Delay Element (07263)							1	UGA960159X
-30	00000043	. INTEGRATED CIRCUIT, Quad 2 input DTL gate (07263)							1	UGA994659X
-31	00000050	. INTEGRATED CIRCUIT, Hex inv. (18324)							5	N7404A
-32	00000124	. INTEGRATED CIRCUIT, Hex Buff, Non inv., D. C. (18324)							1	N7417A
-33	00000041	. DIODE, Signal							2	IN914
-34	00000040	. DIODE							1	IN4003
-35	00000039	. DIODE, Zener, 6.8V (04713)							1	IN5235
-36	00000020	. WIRE, Bus, AWG 18, solid 11/16							1	
-37	40060801	. SCHEMATIC (See Figure 10-15)								

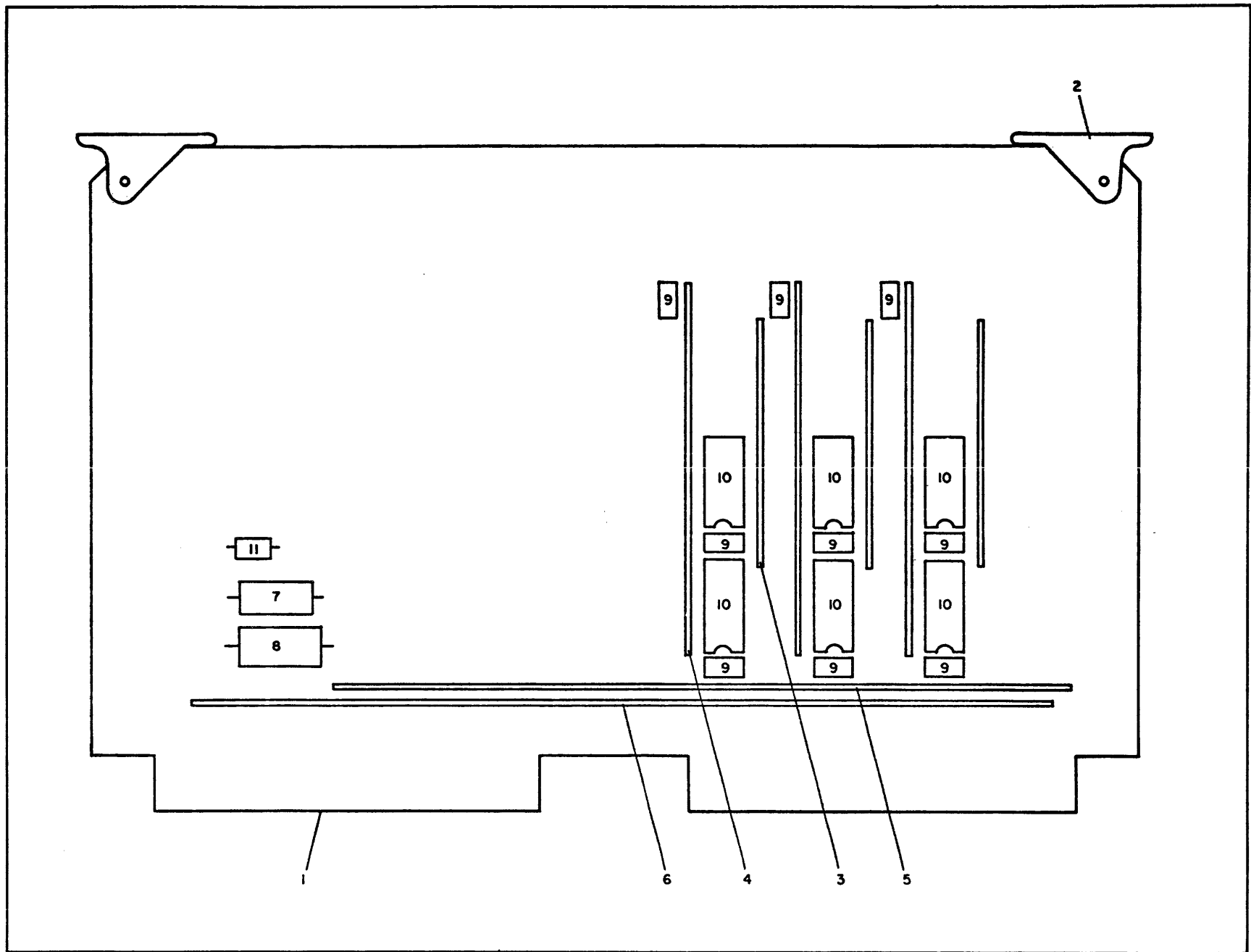


FIGURE 12-17 PC ASSEMBLY - DRIVER CARD

FIGURE 12-17 PC ASSEMBLY - DRIVER CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.		
					1	2	3	4	5	6	7
	40078601	PC ASSEMBLY, Driver				
-1	40078501	. BOARD, Printed circuit	1			
-2	00000060	. HANDLE, Extractor with roll pins (18677)	2	S-203		
-3	20031103	. BUS BAR, 3 pin	3			
-4	20031104	. BUS BAR, 4 pin	3			
-5	20031107	. BUS BAR, 7 pin	1			
-6	20031103	. BUS BAR, 8 pin	1			
-7	00000025	. CAPACITOR, 20 UF, 6V (03597)	1	76F02CC200		
-8	00000024	. CAPACITOR, .10 UF, 100V (03597)	1	BA12A104B		
-9	00000023	. CAPACITOR, .01 UF, 100V (80183)	9	TG-S10		
-10	00000116	. INTEGRATED CIRCUIT, Dual Diff, Line Driver (07886)	6	DM6830AN		
-11	00000039	. DIODE, Zener, 6.8V	1	IN5235		
-12	40078701	. SCHEMATIC (See Figure 10-22)				

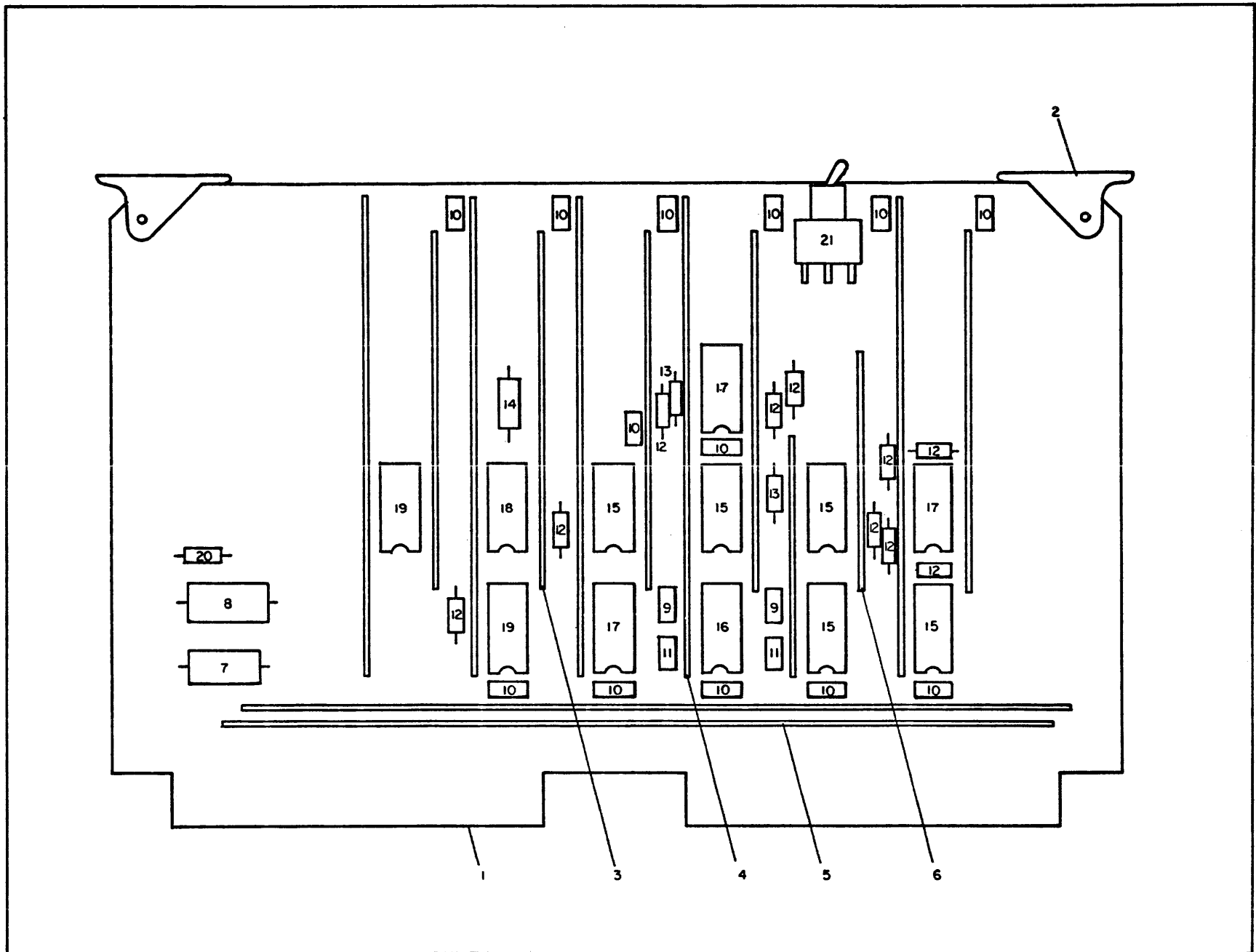


FIGURE 12-18 PC ASSEMBLY - RECEIVER CARD

FIGURE 12-18 PC ASSEMBLY - RECEIVER CARD

FIG. INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	VENDOR PART NO.
			PER ASSY	
	40079101	PC ASSEMBLY, Receiver		
-1	40079001	. BOARD, Printed circuit	1	
-2	00000060	. HANDLE, Extractor with roll pins (18677)	2	S-203
-3	20031104	. BUS BAR, 4 pin	5	
-4	20031105	. BUS BAR, 5 pin	5	
-5	20031108	. BUS BAR, 8 pin	2	
-6	20031103	. BUS BAR, 3 pin	2	
-7	00000025	. CAPACITOR, 20 UF, 6V (03597)	1	76F02CC200
-8	00000024	. CAPACITOR, 0.1 UF, 100V (03597)	1	BA12A104B
-9	00000193	. CAPACITOR, 100 PF (Centralab)	2	DD101
-10	00000023	. CAPACITOR, .01 UF, 100V (80183)	13	TG-S10
-11	00000192	. CAPACITOR, .002 UF (Centralab)	2	DD202
-12	00000070	. RESISTOR, 1K, $\pm 10\%$ 1/4 W	10	RCO7GF102K
-13	00000076	. RESISTOR, 470 ohm, $\pm 10\%$, 1/4 W	2	RCO7GF471K
-14	00000081	. RESISTOR, 68 ohm, $\pm 10\%$, 1/2 W	1	RN20GF680K
-15	00000116	. INTEGRATED CIRCUIT, Dual Diff Line Driver (07886)	5	DM8830AN
-16	00000117	. INTEGRATED CIRCUIT, Dual Line Receiver (07886)	1	DM8820AN
-17	00000044	. INTEGRATED CIRCUIT, Dual D Type FF (18324)	3	N4747A
-18	00000051	. INTEGRATED CIRCUIT, Driver (01295)	1	SN75450N
-19	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (19324)	2	N7400A
-20	00000039	. DIODE, Zener, 6.8V	1	IN5235
-21	00000083	. SWITCH, SPST, P.C. mount (C & K)	1	7101A
-22	00000198	. JUMPER, (Speer)	1	
-23	40079201	. SCHEMATIC (See Figure 10-24)		



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