TECHNICAL MANUAL

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0 0 0 0 C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
4 4 4 4 4
5 5 5 5
6 6 6
7 7
8
```

ᛁᛁ-400 L
CARD READER

FEBRUARY 1973

IMPORTANT NOTICE

THIS TECHNICAL MANUAL IS SUPPLIED
WITH DOCUMATION CARD READER SERIAL
NUMBER

THIS MANUAL SHOULD REMAIN WITH THAT
CARD READER.

Technical Manual Change Record

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

Customer: GENERAL AUTOMATION

Model: __M400L__ Voltage __115__ Frequency __60__

Options: 01,02,03,09,23 CS No.: __171__

Addendums: __n-a__

Text Changes: __1-1,4-10,4-11,4-13,4-15__

Schematic Changes:

Title	Drawing No. or Modification
Wiring Diagram, AC Power Distribution, 115 VAC, 60 Hz	
Wiring Diagram, AC Power Distribution, 230 VAC, 50 Hz	
Card Cage, P.C. Card Location	
Wiring Diagram, Card Cage	1241999
Wiring Diagram, Control Panel	
5V Power Supply, 115 VAC, 60 Hz	
5V Power Supply, 230 VAC, 50 Hz	
Solenoid Driver, 115 VAC, 60 Hz	
Solenoid Driver, 230 VAC, 50 Hz	
Clock Card Assembly	
Schematic, (sheet 1 of 3)	
Schematic, (sheet 2 of 3)	
Schematic, (sheet 3 of 3)	MODIFIED PER OPT. 02
Error Card Assembly..........................	
Schematic, (sheet 1 of 2)	1241716
Schematic, (sheet 2 of 2) .... MODIFIED PER OPT. 01	1241716
Sync Card Assembly..........................	
Schematic, (sheet 1 of 3)	
Schematic, (sheet 2 of 3)	
Schematic, (sheet 3 of 3)	
Control Card Assembly.......................	
Schematic, (sheet 1 of 2)	1241715
Schematic, (sheet 2 of 2)	1241715

Special Cards:

_____	_____
_____	_____
_____	_____
_____	_____

Doc. No. ___M3001 JJ___   Verified _Andrea Newshaw_

[Diagonal stamp:] THIS READER HAS BEEN MODIFIED FOR AN AUTOMATIC MOTOR SHUTDOWN OF 30 SECONDS. TIMING FOR SHUTDOWN IS OCCURS IF UNIT IS IN REMOTE AND NO PICK COMMAND IS RECEIVED.

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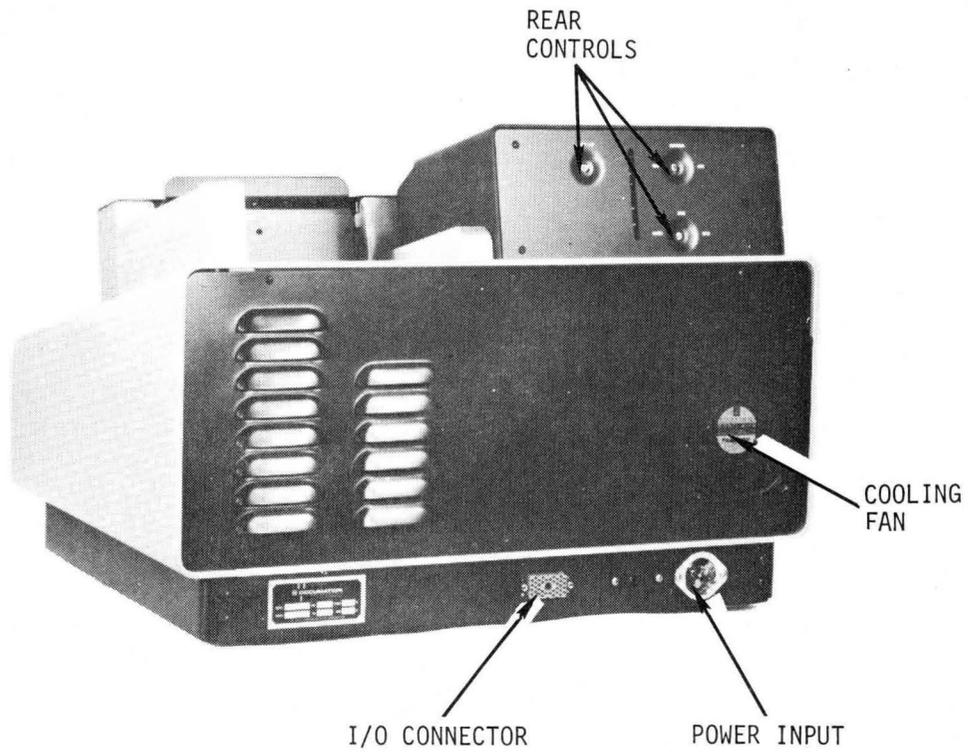
Figure 1-2. Card Reader, Three-Quarter Rear View (Typical)

SECTION 1
INTRODUCTION

1.1 GENERAL

This technical manual contains operation, maintenance, interface, and repair information to properly set up, operate, and maintain the Documation Model M400L Card Reader. An Illustrated Parts Breakdown is included in Section 12 to aid in locating and identifying parts if replacement becomes necessary.

The M400L 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 1000 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 400 cards per minute.

1.2 DESCRIPTION

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

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

1.3 SPECIFICATIONS

READING SPEED:	400 cards per minute maximum in continuous run. Single Card Cycle: 167 milliseconds.
CARD TYPE:	Standard 80 column cards.
CONTROL:	Demand feed, one card-at-a-time under external program control. Reader will continuous run as long as the Pick Command remains TRUE.
HOPPER SIZE:	7.25 inches (approximately 1000 cards of 7 mil thickness).
STACKER SIZE:	7.25 inches (approximately 1000 cards of 7 mil thickness).

POWER REQUIREMENTS:

Voltage: 115 VAC ± 10%, single phase, 60 Hz (standard model).
230 VAC ± 10%, single phase, 50 Hz (export model).

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

SIZE:

Height:	16-1/4 inches	41.2 cm
Width:	23-1/16 inches	58.6 cm
Depth:	18 inches	45.7 cm
WEIGHT:	77 pounds	34.4 Kg

OPERATING ENVIRONMENT:

Dry Bulb Temperature	50 to 100°F.
Relative Humidity	30 to 90% non-condensing
Wet Bulb Temperature	80°F. maximum
Thermal Shock	15°F. per hour
Altitude	1000 feet below to 6000 feet above sea level

STORAGE ENVIRONMENT:

Dry Bulb Temperature	-25 to +135°F.
Relative Humidity	5 to 95% non-condensing
Altitude	1000 feet below to 12,000 feet above sea level

CARD STOCK

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

PUNCH DATA

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

SECTION 2
UNPACKING AND INITIAL CHECKOUT

2.1 UNPACKING

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

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

2.2 INITIAL CHECKOUT

Use the following instructions to test reader readiness.

a. Make sure input voltage and frequency are correct. Plug in the AC power cord.

b. Place the CIRCUIT BREAKER (rear connector panel) to ON.

c. Set the MODE switch (rear panel) to LOCAL.

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 3-second delay, the STOP and HOPPER CHECK indicator illuminates.

f. Depress and hold momentarily the LAMP TEST switch (rear panel) and observe that all front panel indicators illuminate. Release switch.

g. Pull the hopper follower back with one hand and load approximately 3 inches of unpunched cards into the hopper area.

h. Depress the RESET switch. The RESET indicator will illuminate and the STOP indicator will extinguish. The drive motor and vacuum/blower should come on and, after approximately a 3-second delay, the cards should be picked and stacked. The drive motor and vacuum/blower will then shut off and the STOP and HOPPER CHECK indicators illuminate.

i. Depress the POWER switch to turn off the reader. All indicators are extinguished.

j. Pull the stacker plate toward the front of the reader with one hand and remove the cards.

k. This completes the initial off-line test.
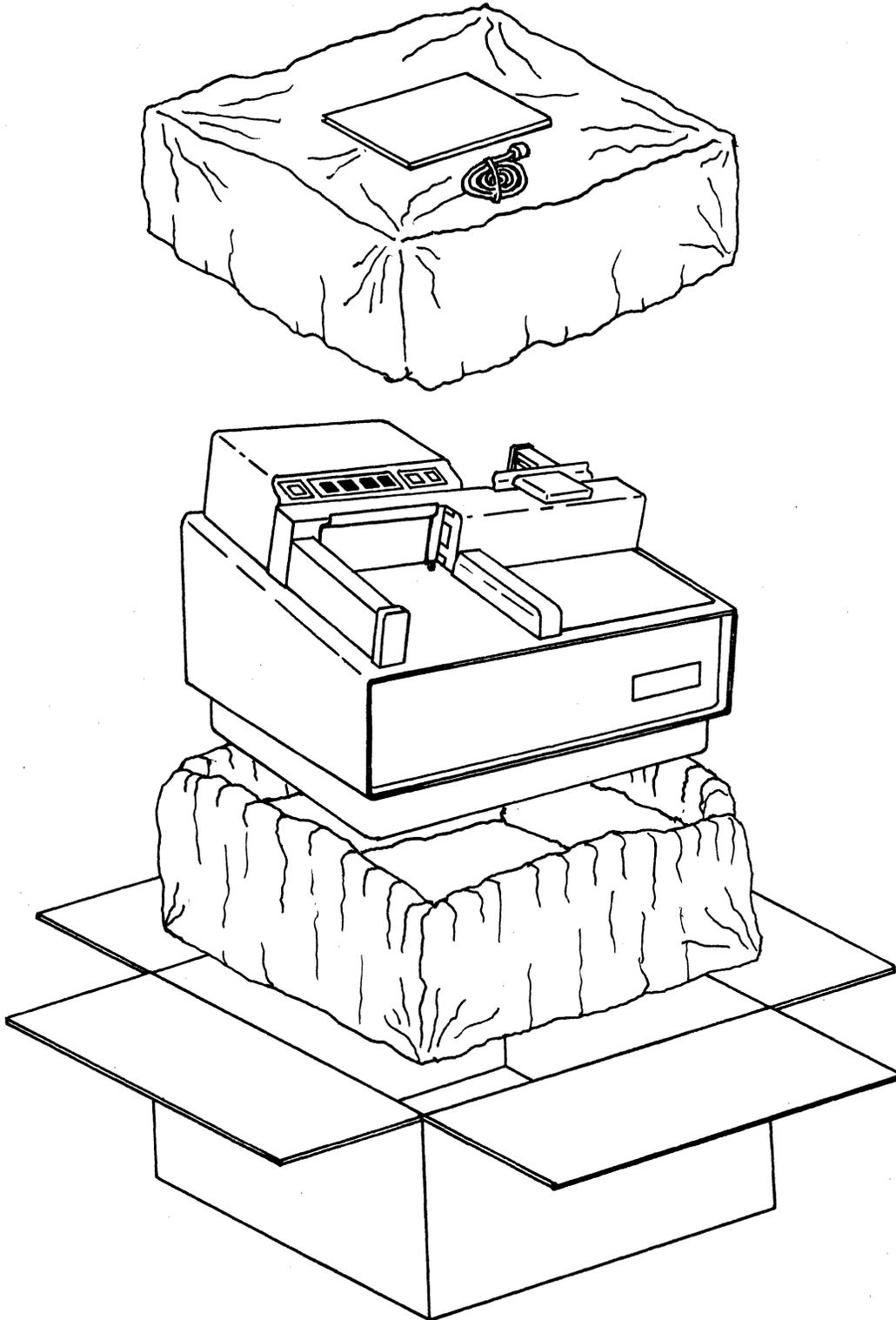
Figure 2-1. Unpacking

SECTION 3
OPERATION

3.1 LOADING THE INPUT HOPPER

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

a. 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 1000 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

| POWER | | READ CHECK | PICK CHECK | STACK CHECK | HOPPER CHECK | | STOP | RESET |

REAR PANEL

LAMP TEST

SHUTDOWN
MAN — AUTO
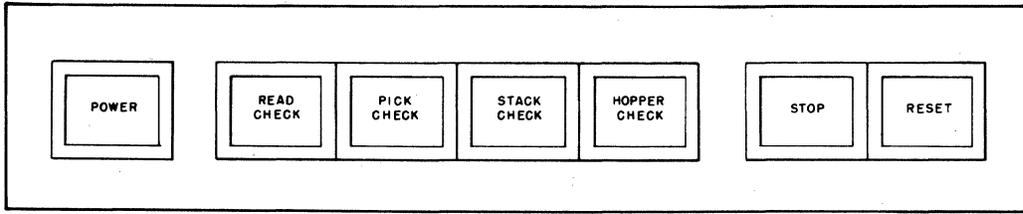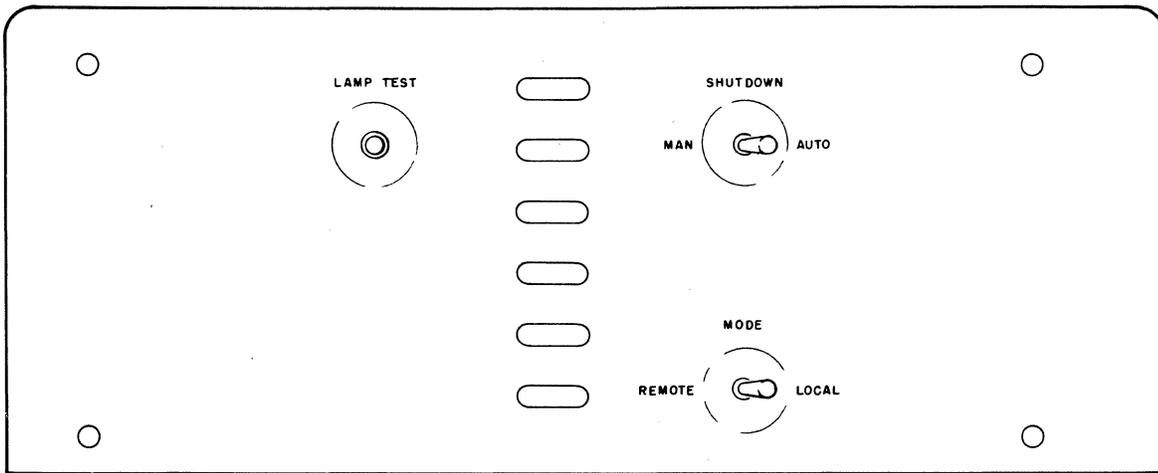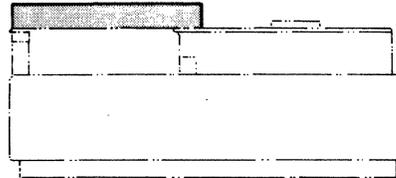
MODE
REMOTE — LOCAL
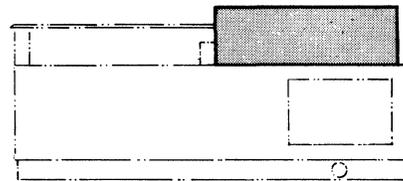
Figure 3-1. Switch and Indicator Location

3.3.1 FRONT PANEL CONTROLS AND INDICATORS

Located on the front panel are three pushbutton type switches.

POWER
STOP
RESET

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

Four other "error" indicators are located on the front panel.

> READ CHECK
> PICK CHECK
> STACK CHECK
> HOPPER CHECK

3.3.2   REAR READER CONTROLS

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

> SHUTDOWN - MAN/AUTO
> MODE - REMOTE/LOCAL

3.4 OPERATIONAL PROCEDURES

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

a.   Place the AC power circuit breaker 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 and vacuum/blower will run continuously when AC power is applied. When the AUTO mode of operation is selected, all motors will turn off after the last card is read.

c.   The second mode switch is used to select either REMOTE or LOCAL operation. When LOCAL operation is selected, card reader operations are controlled from the operator's control panel. In normal operation the card reader is connected to the appropriate interface logic and the switches should be in AUTO and REMOTE positions.

d.   With the LOCAL mode of operation established, depress the POWER switch on the front panel to apply primary power to the reader. The drive motor and vacuum/blower will not come on at this time due to the input hopper being empty and AUTO shutdown selection.

e.   Depress the LAMP TEST switch and check that all front panel indicators are lighted.

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 STACK CHECK will light if the previous card read has not reached the output stacker. Check the card track to make sure it is clear and check the output stacker for incorrectly stacked cards.

j.   The HOPPER CHECK indicator will light when the input hopper is empty or when the output stacker is full. This is normal operation.

k.   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 check list before calling for maintenance.

NOTE:
POWER CORD CONNECTED TO PROPER
VOLTAGE & FREQUENCY AVAILABLE
BEFORE POWER SWITCH IS DEPRESSED

POWER ON

CHECK THAT
CIRCUIT BREAKER IS ON

NO

YES

SET SWITCHES TO
DESIRED MODE

NO

REAR PANEL
SWITCHES IN
DESIRED
MODE

REMOTE/LOCAL
MANUAL/AUTO

YES

ALARM
INDICATORS
OFF

YES

DEPRESS LAMP TEST
SWITCH TO ASSURE PROPER
OPERATION ON INDICATORS

NO

REPEAT
CYCLE

DEPRESS
RESET
SWITCH,ALARM
INDICATORS
OFF

NO

HOPPER CHECK ALARM
REMAINS ON WITH HOPPER
PROPERLY LOADED

CALL
MAINTENANCE
TECHNICIAN

YES

PICK CHECK ALARM
IS RAISED

NO

BEGIN
OPERATION

YES

CHECK FIRST CARD IN
HOPPER FOR STAPLES
OR SEVERE MUTILATION

READ
CHECK
ALARM

YES

INSPECT LAST CARD
IN STACKER FOR
TORN LEADING OR
TRAILING EDGE

YES

DUPLICATE
CARD AND
REREAD

NO

CHECK PICK SHOE
FOR INK BUILD UP
SCRUB WITH ALCOHOL

STACK
CHECK
ALARM

YES

INSPECT LAST CARD
FOR SEVERE DAMAGE
OR STACKER BLOCKAGE

NO

CALL
MAINTENANCE
TECHNICIAN

NO

CHECK FOR PROPER
VACUUM ACTION
AND RIFFLE AIR

HOPPER
CHECK
ALARM

YES

HOPPER IS EMPTY
OR STACKER IS FULL

NO

CALL
MAINTENANCE
TECHNICIAN

CALL
MAINTENANCE
TECHNICIAN

NOTE:
STOP SWITCH WILL COME ON AND
BLOWER WILL SHUTDOWN WHEN IN
REMOTE /AUTO MODE.

OPERATION
COMPLETE;
DEPRESS
STOP OR
PWR SWITCH

UNLOAD STACKER
RELOAD HOPPER
DEPRESS RESET SWITCH

REPEAT
CYCLE

Figure 3-2 – Operational Flow Chart

3-5

SECTION 4
THEORY OF OPERATION

4.1 CARD FEEDING MECHANISM

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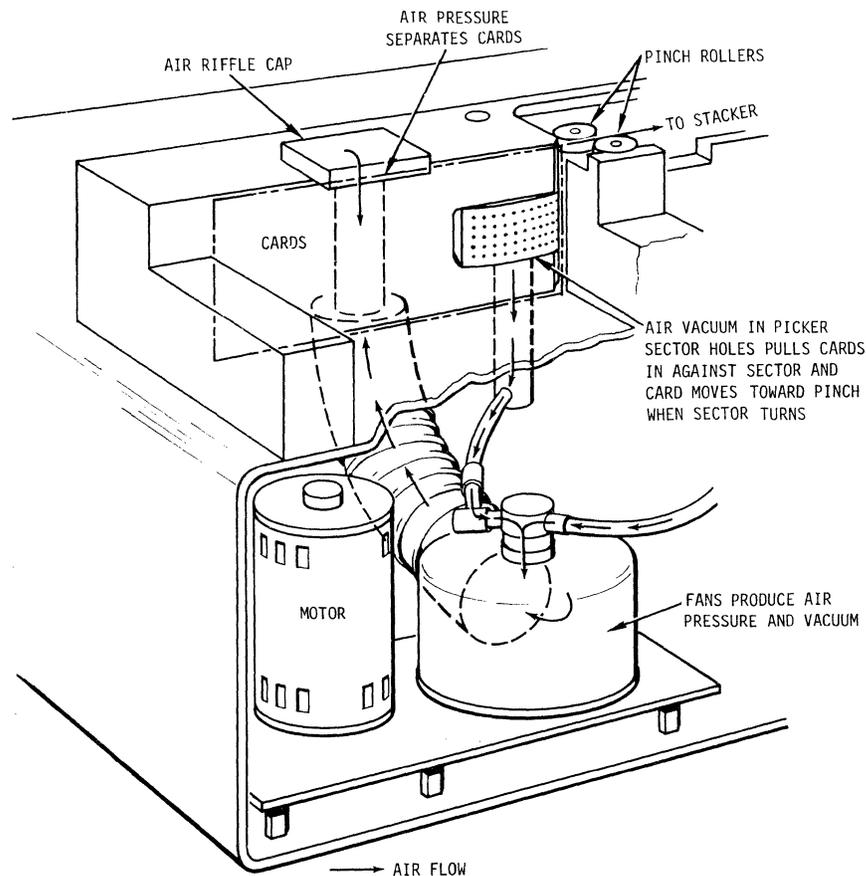
Figure 4-1. Card Feeding Air Flow

4.2 DATA RECOVERY

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

Data recovery is accomplished by the functions of <u>Reader Control</u>, <u>Data Detection</u> and <u>Data Storage</u>. 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 $\overline{PCLK}$ 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

READER FUNCTIONAL AREAS

DATA DETECTION DATA STORAGE READER CONTROL

CONTROL SWITCHES

STACK STATION

HOPPER EMPTY /STACKER FULL

ERROR INDICATORS

ONE DARK

ONE LIGHT

ERROR LOGIC

4

HOPPER CHECK

MOTION CHECK

ERROR

LED LIGHT STATION

(PHOTOTRANS.) READ STATION

DATA AMPLIFIERS AND INVERTERS

12

INVERTER

12

12

DATA REGISTER

12

DATA DRIVERS

DATA

CHECK CONDITIONS

DATA

12

PSET

ONE LIGHT

CSDS

STØC

READY/STOP INDICATORS

2

CONTROL LOGIC

PCR + PCLK

READY

INDEX MARKS

INTERFACE SIGNALS TO & FROM CONTROLLING DEVICE

ĪMFF

OCR

81CR

84CR +CR

TST1

DATA CONTROL & SYNC LOGIC

GPR

81CR

1CR

TIMING STROBE LOGIC

STØC

STØD

COLUMN COUNTER

BLOWER CONTROL

GPR

PICK COMMAND

PICK LOGIC

BUSY

ØA ØB ØC ØD

C̄1

MAG PICK UP

BLOWER SOLID STATE RELAY

4.8MHZ OSCILLATOR AND FOUR PHASE GEN.

PICK

PICK SOLENOID DRIVER

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

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

4.2.3 DATA STORAGE

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

4.3 DETAIL OPERATIONAL DESCRIPTION

The following gives a detailed description of each block shown in Figure 4-2, Block Diagram - M Series Card Reader. The description is designed to give the reader an 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.
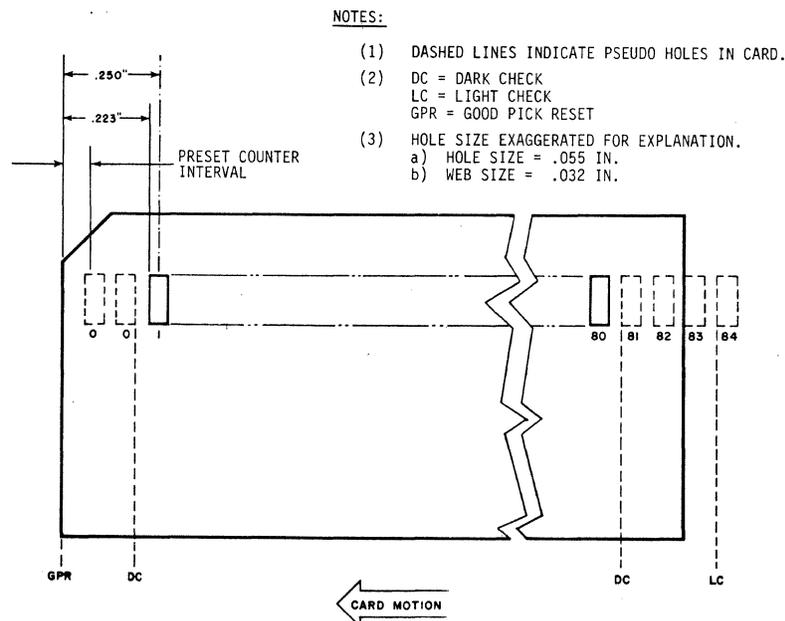
Figure 4-3 - Timing Relationship for Standard Punched Card

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 Series Card Reader.

4.3.1.1   4.8 MHz Oscillator and Four-Phase Generator

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

ØA, ØB, ØC, ØD and C1 are used throughout the reader as a timing source.

4.3.1.2   Control Logic

The Control Logic (Figure 4-5) contains the Ready/Stop Logic, Power On Reset, Blower Control, Reset Control and Good Pick Sync Control. At reader power turn on, a three-second Power On Reset (POR) is initiated. See timing of Figure 4-5. The long POR allows the blower to come up to speed before the controlling device or an operator can initiate a reader
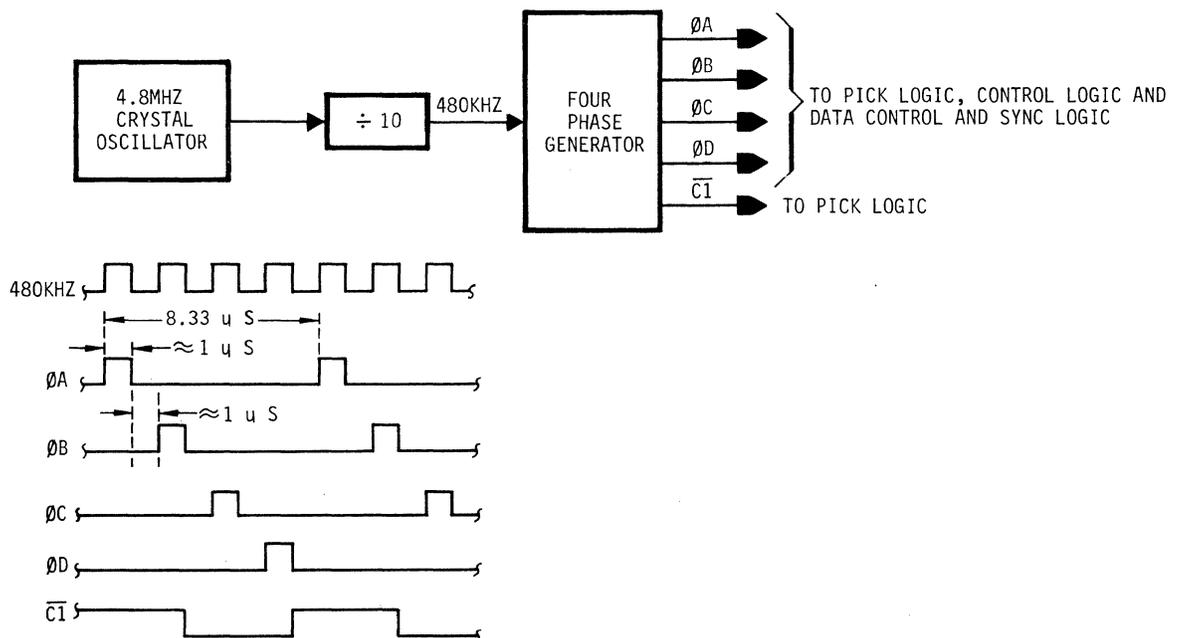
Figure 4-4 - Block and Timing Diagram, 4.8 MHz Oscillator
and Four-Phase Generator

4-5

FROM STOP
SWITCH

$\overline{STOP}$

$\overline{STOP}$
TO ERROR LOGIC

$\overline{LIGHT\ CHECK}$
$\overline{DARK\ CHECK}$
FROM
ERROR LOGIC
$\overline{PICK\ CHECK}$
$\overline{STACK\ CHECK}$
$\overline{HOPPER\ CHECK}$

READY/STOP
LOGIC

READY
TO CONTROLLING
DEVICE

READY/STOP INDICATORS
2
0 + 5VDC

READY
TO PICK LOGIC

FROM ONE DARK
ONE DARK

FROM OSCILLATOR
& FOUR PHASE
GENERATOR
ØC
ØD

GOOD PICK
SYNC
CONTROL

GPR
TO COLUMN COUNTER,
DATA CONTROL & SYNC
LOGIC, AND PICK LOGIC

FROM PICK LOGIC
PCR

POR
TO PICK LOGIC &
COLUMN COUNTER

POWER ON
RESET &
3 SEC DELAY

$\overline{POR}$

POR
+
RESET
GATE

$\overline{POR + RESET}$
TO ERROR LOGIC

FROM ERROR LOGIC
HECK

MANUAL
S1

AUTO

ACTIVATE
DELAY

BLOWER
CONTROL

BLOWER
RELAY
DRIVER

BLOWER CONTROL
TO BLOWER MOTOR SOLID
STATE RELAY

FROM PICK LOGIC
$\overline{PCLK}$
FROM COLUMN COUNTER
84 CR +CR
FROM RESET SWITCH
RESET

RESET
CONTROL

RESET

RESET
TO PICK LOGIC
& COLUMN COUNTER

$\overline{RESET\ INHIBIT}$
TO ERROR LOGIC

Vcc a
POWER
TURN ON

POR

3 SEC

READY

SWITCH DEPRESS
SWITCH RELEASE

RESET

$\overline{POR + RESET}$

ONE DARK

GPR

ANY CHECK
CONDITION
OR STOP

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

4-6

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

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

The Good Pick Sync Control is initialized by Pick Command Reset (PCR).
During a card read cycle, the Good Pick Sync Control detects a ONE
DARK and processes this signal with clock phase $\emptyset C$ and $\emptyset D$ to produce
Good Pick Reset (GPR). GPR is used to:
a. Initialize the Column Counter.
b. Begin the data synchronization process by the Data Control and Sync
    Logic.
c. Verify to the Pick Logic that a Pick Command has been successful.

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

4.3.1.3   Pick Logic

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

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

The Pick Logic will then:
1. Generate $\overline{PCLK}$
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 27 ms).
5. If the leading edge has not arrived in 50 ms, generate another pick pulse.
6. Repeat the pick attempt six times and if the leading edge has not appeared, generate a pick fail alarm $(\overline{PSET})$.

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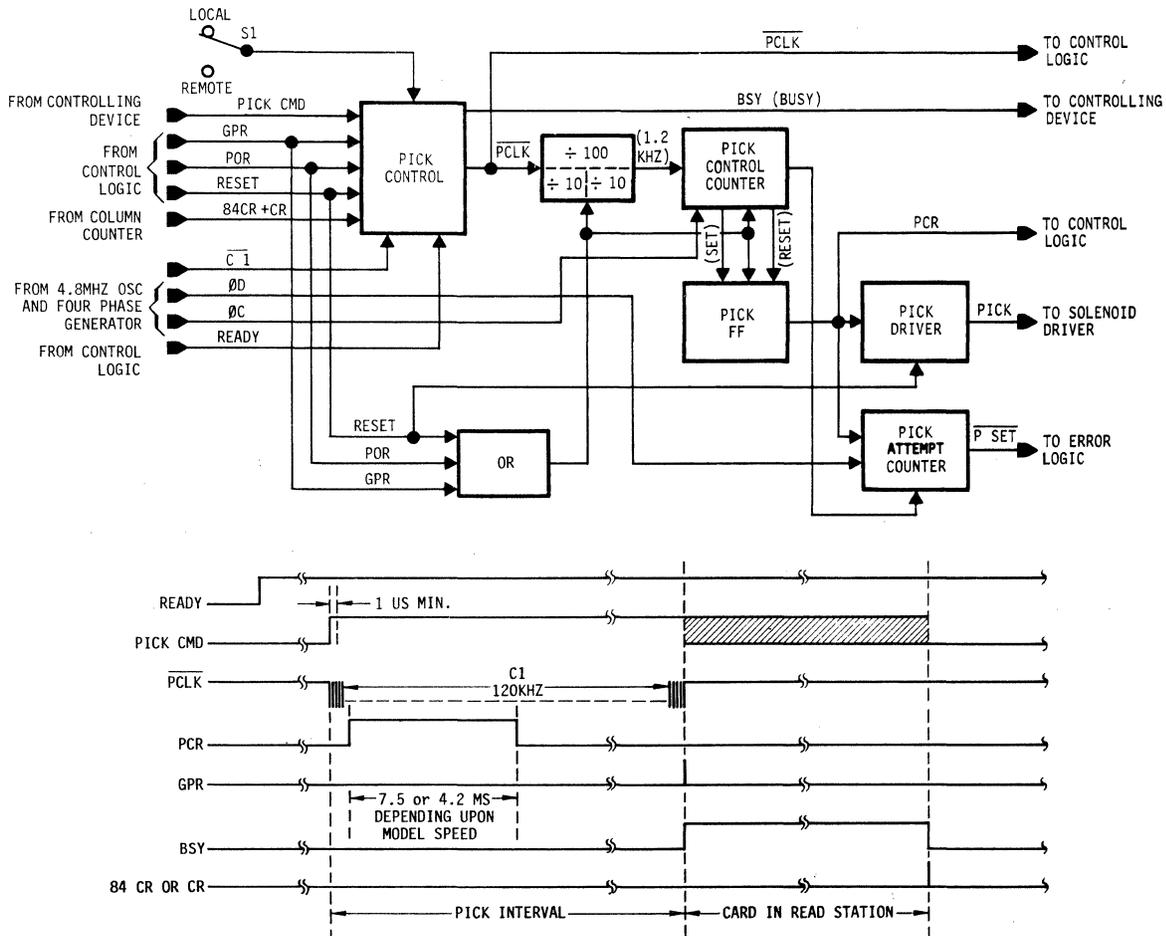
Figure 4-6 - Block and Timing Diagram, Pick Logic

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

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 or CR indicating the card has left the read station and another PICK CMD can be accepted.

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

4.3.1.4   Column Counter

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

COUNT	USED BY
OCR	1. Error Logic for a Dark Check
1CR	1. Data Control and Sync Logic to set the Index Mark Control Flip Flop (IMFF).
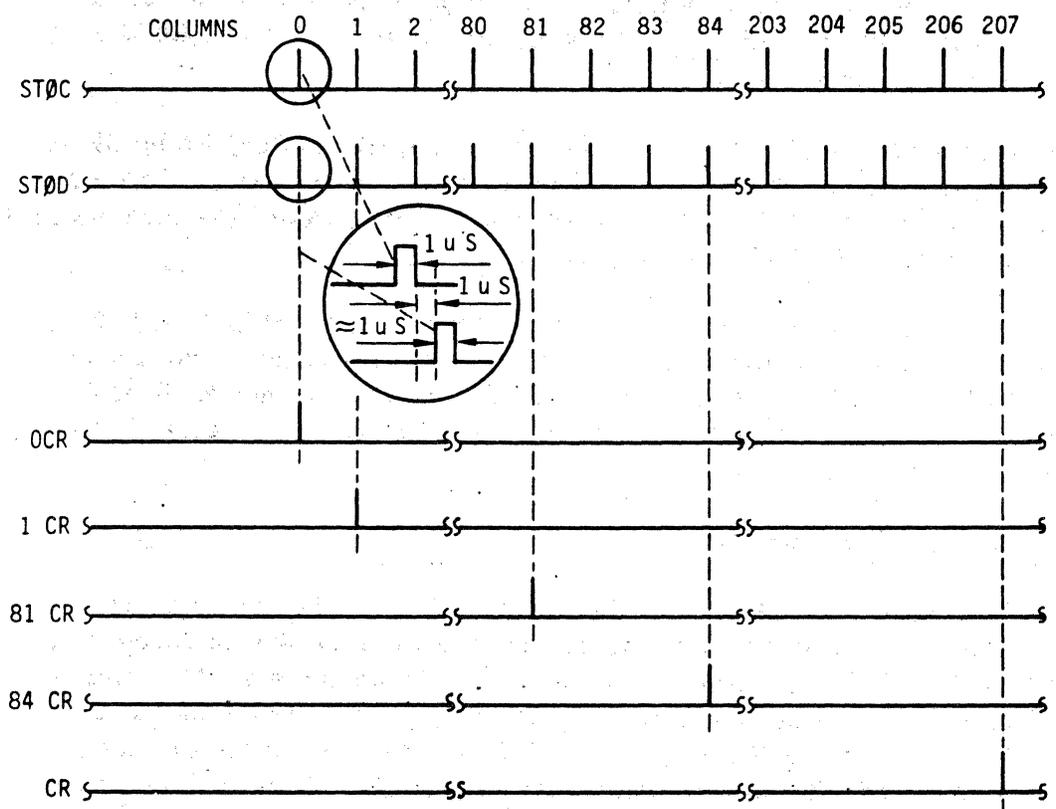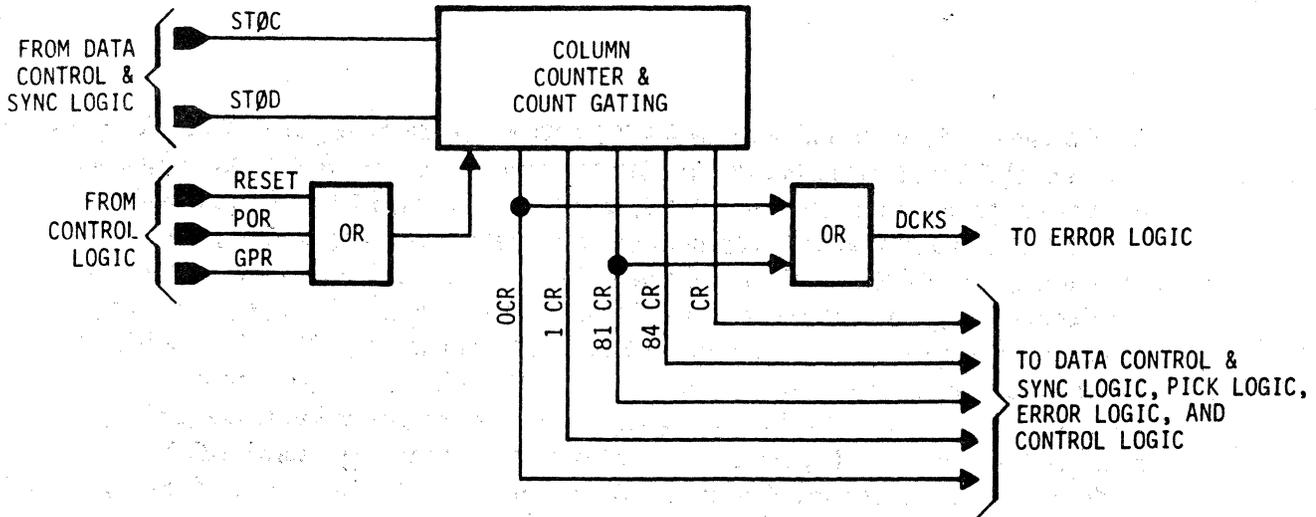
Figure 4-7 - Block and Timing Diagram, Column Counter

COUNT		USED BY
81CR	1.	Data Control and Sync Logic to Reset the IMFF.
	2.	Verify punch in IBM 129 Series keypunched cards.
	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.

CR (M300 Only) 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. Data Control and Sync Logic to reset the Sync Control Logic.
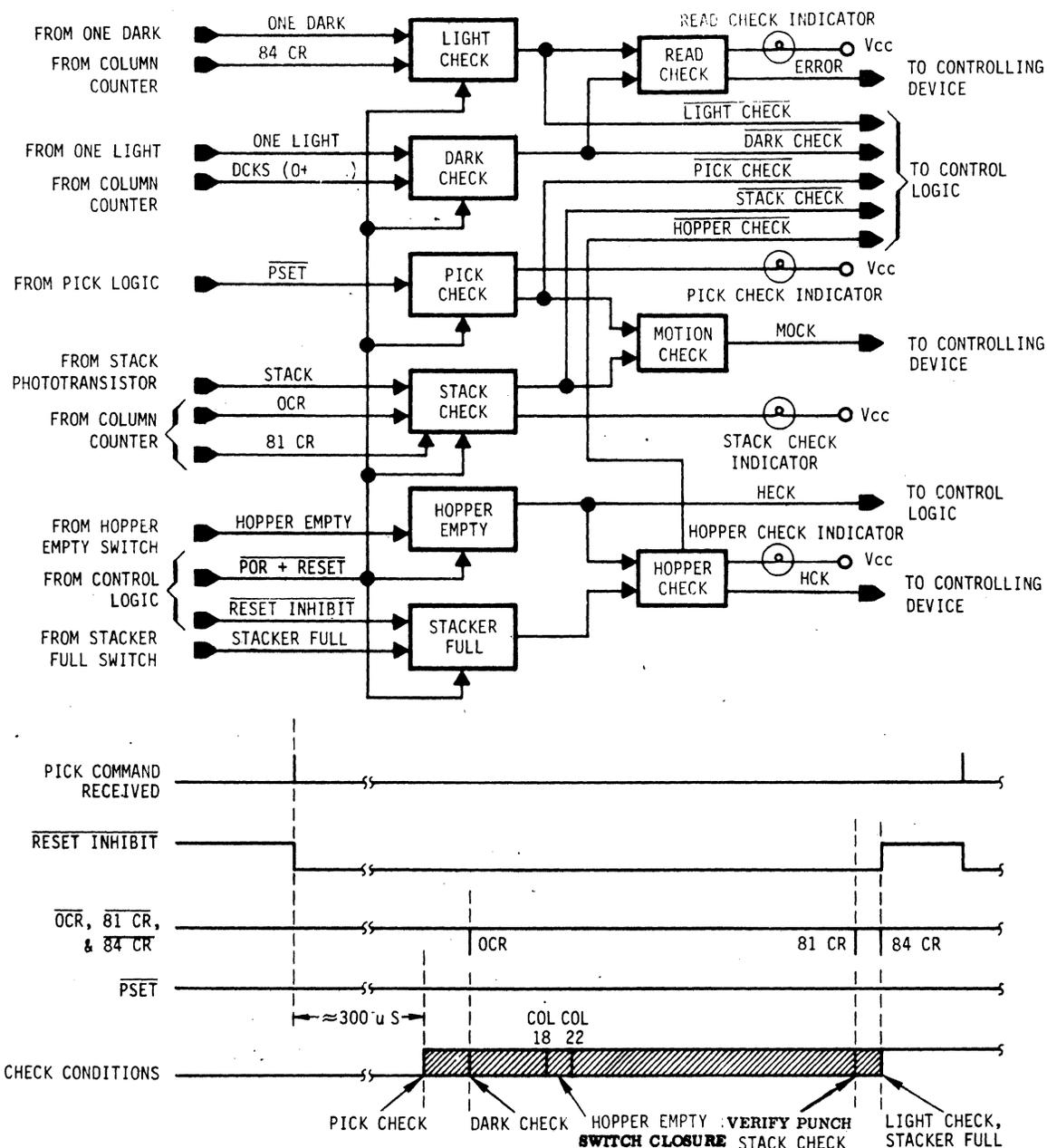
Figure 4-8. Block and Timing Diagram, Error Logic

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 4-8. Should a CHECK CONDITION occur the reader READY will be reset. The first test is Pick Check. If a PSET is signalled to Pick Check, a Motion Check (MOCK) will be sent to the controlling device. PSET will occur approximately 300 ms after PICK CMD was received and reader READY will be reset. Pick Check will be signalled to the operator by the PICK CHECK control panel indicator. If PICK CHECK does not occur, a read cycle will be in process and OCR will sample the Dark Check circuits. Should ONE LIGHT be present during the check, indicating a failed LED, phototransistor, or a torn card leading edge, an ERROR signal will be sent to the controlling device and READY dropped. The reader control panel will indicate READ CHECK.

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

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

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

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

Since 84CR or CR 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 HOPPER CHECK to the controlling device, Reset READY, and light the HOPPER CHECK Indicator.
All error conditions are cleared by the Reset Switch.

4.3.2 DATA DETECTION

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

4.3.2.1 Data Amplifiers and Inverters

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

4.3.2.2 One Dark and One Light

In order to provide the Dark Check at 0CR 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.

4-13

Opt. 02
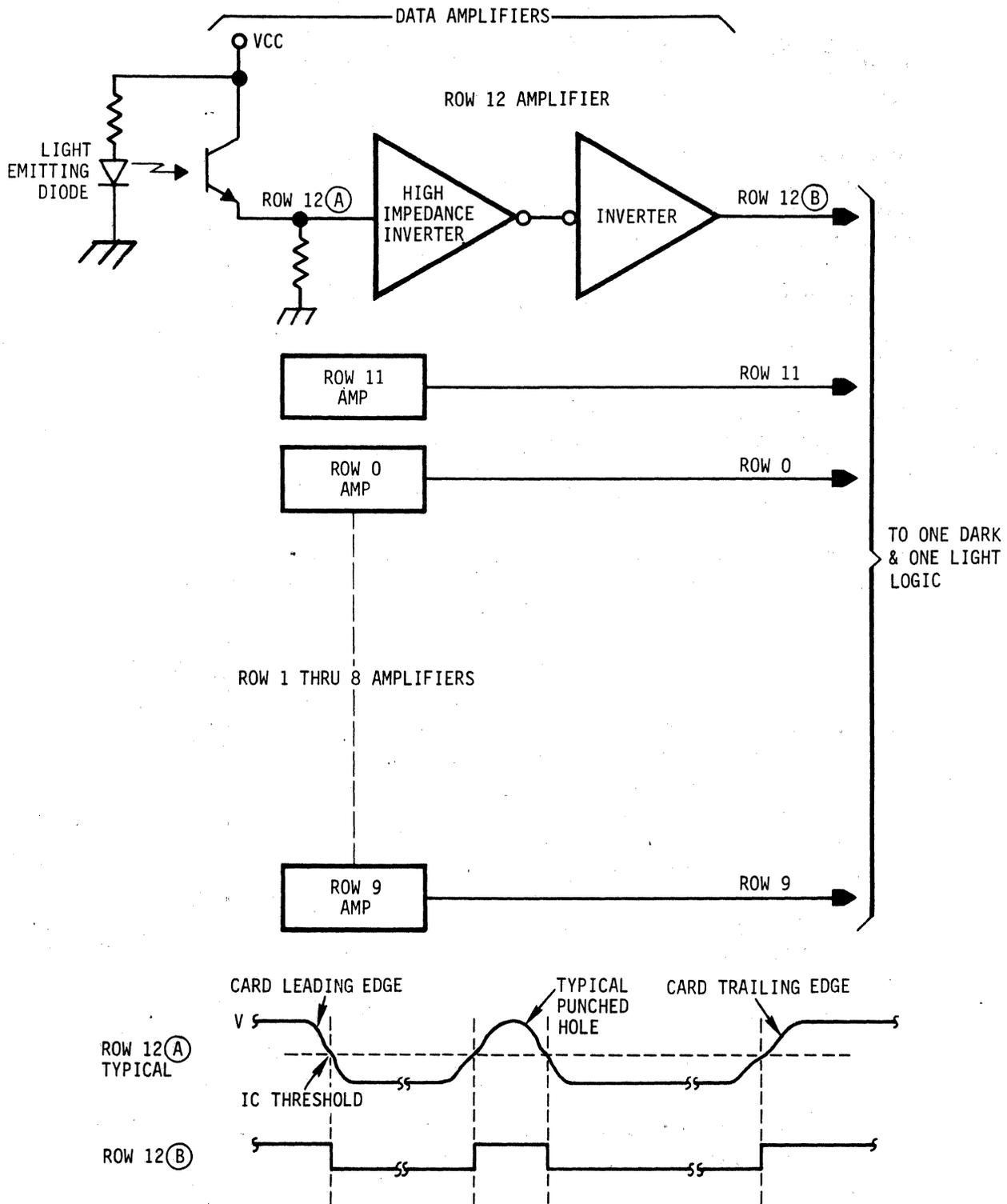
Figure 4-9. Block and Timing Diagram, Data Amplifiers and Inverters

The timing of Figure 4-10 shows the normal waveforms for ONE DARK and ONE LIGHT. When 0CR occurs, ONE LIGHT should be low indicating all PTs are dark. At 84CR, ONE DARK should be low indicating light is being received by all PTs. If the foregoing conditions are not met, a READ CHECK will result and the reader READY will be reset.

4.3.3   DATA STORAGE

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

4.3.3.1   Data Control and Sync Logic

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

Following a GPR, the Data Control and Sync Logic must measure by means of logic counters two distances to determine where the Column Storage Data Strobe should begin. As shown on the card illustration,
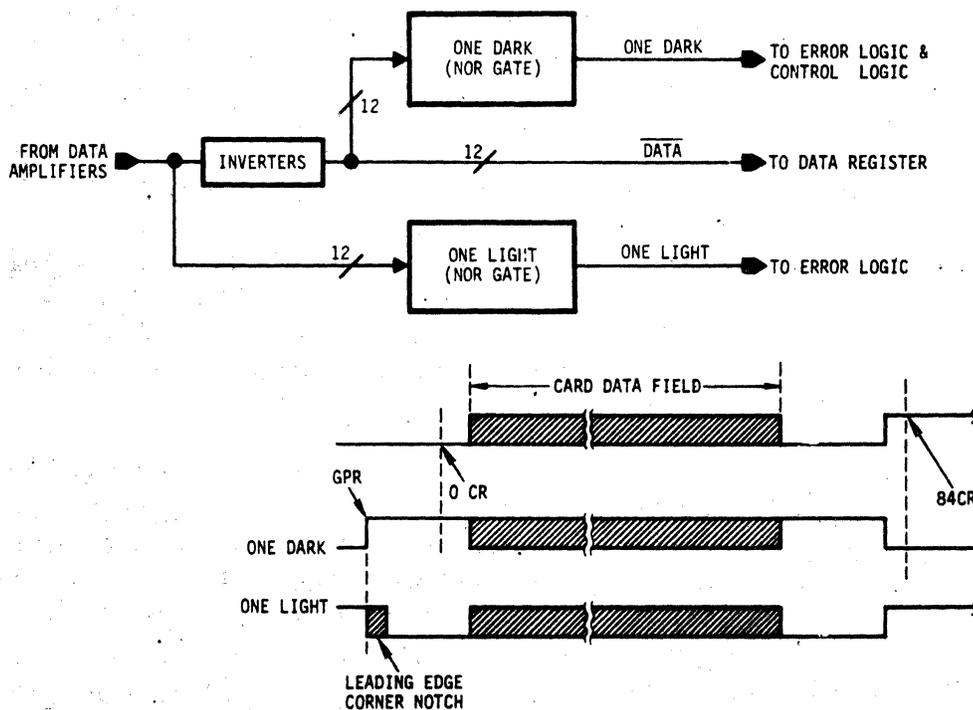
Figure 4-10.   Block and Timing Diagram, One Dark and One Light

4-15

the first measurement is the PRESET DISTANCE. PRESET is the distance from the card's leading edge (GPR) to the point in column 0^1 where the Column Storage Data Strobe (CSDS) should begin. This distance is equal to .063 inch. The PRESET DISTANCE is predetermined and a PRESET count calculated by knowing the PRESET distance, card velocity and the Preset Counter's input clock rate. The sole purpose of the PRESET DISTANCE is to establish an end point for measuring OFFSET.

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

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

The Synchronization process is initialized when a GPR is received by the Sync Control Logic and Preset Counter. GPR presets the predetermined count in the Preset Counter and causes the Sync Control Logic to generate $\overline{PRCLK}$ (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 $\overline{OSCLK}$ (Offset Clock). $\overline{OSCLK}$ at 120 KHz drives the eight stage Offset Storage Counter, counting it upwards, while and until the Preset Counter reaches all ones. $\overline{ZERO}$ is now generated by the Preset Counter terminating both $\overline{PRCLK}$ and $\overline{OSCLK}$. 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 ($\overline{OSUCLK}$). $\overline{OSUCLK}$ is used to count the Offset Counter up until the Comparator detects an equal value between the Offset Storage Counter and Offset Counter. CSDS for Column 0 is now generated by the Strobe Logic. The Strobe Logic's STØB resets the Sync Control Logic, STØC resets the Data Register and STØC and STØD are used to drive the Column Counter. The Sync Control Logic repeats this cycle for every other TST1 causing the Strobe Logic to generate CSDS, STØB, STØC and STØD each time.
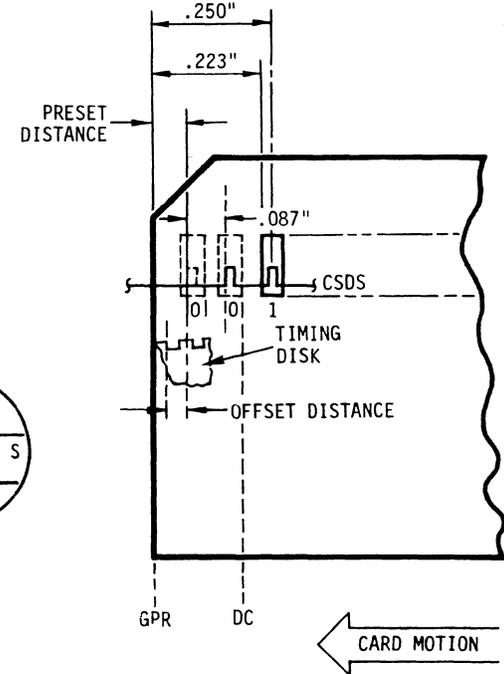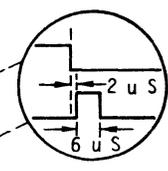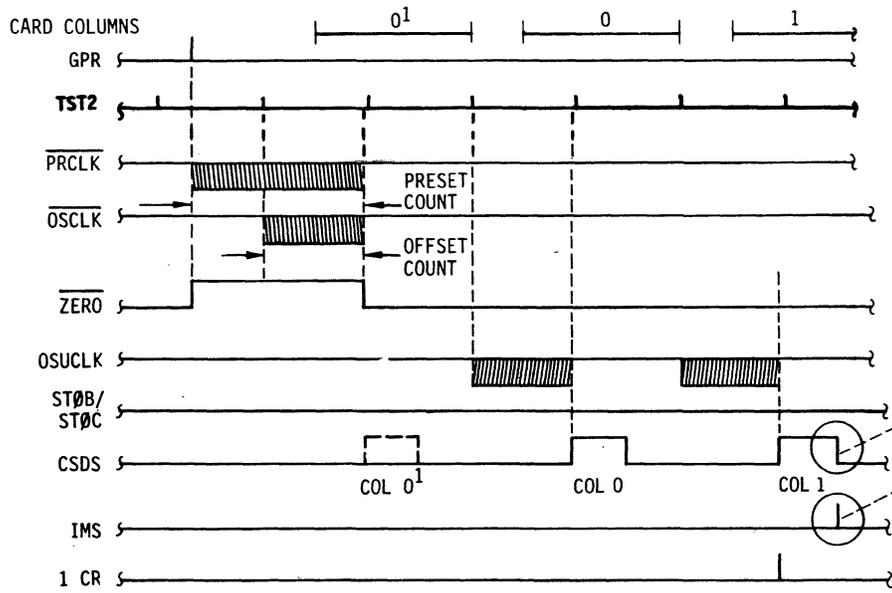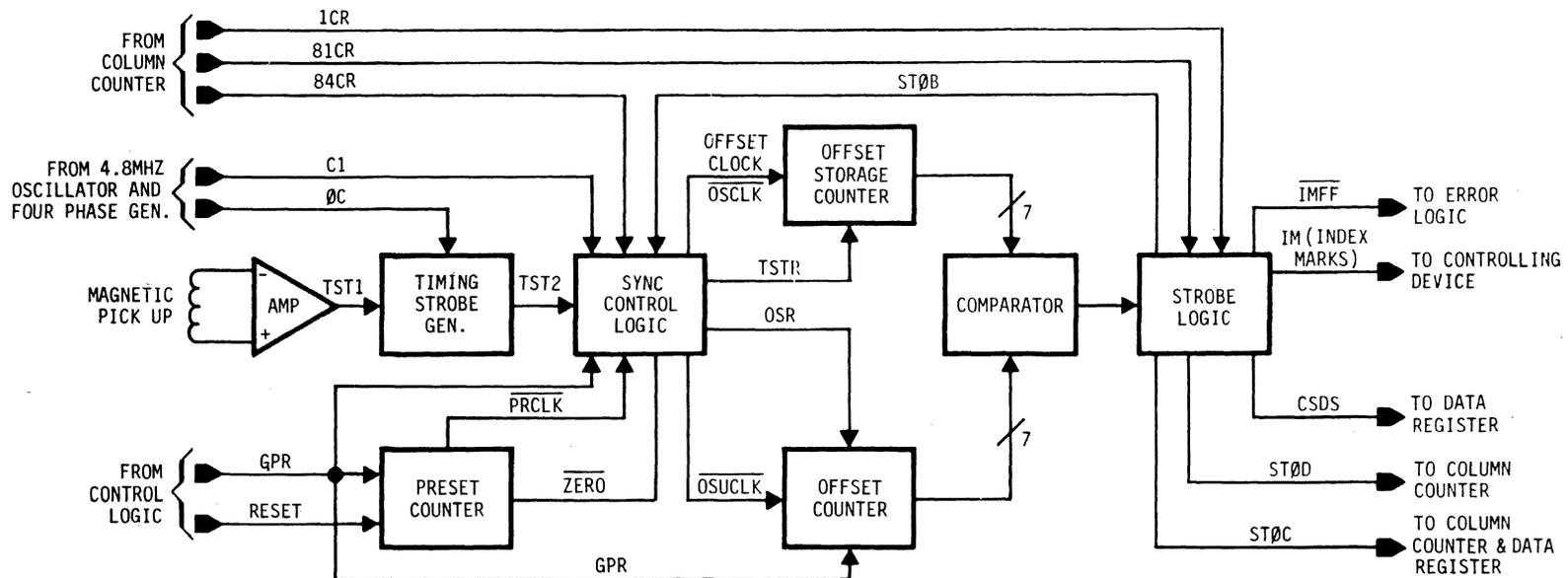
Figure 4-11. Block and Timing Diagram, Data Control and Sync Logic Drivers

4-17
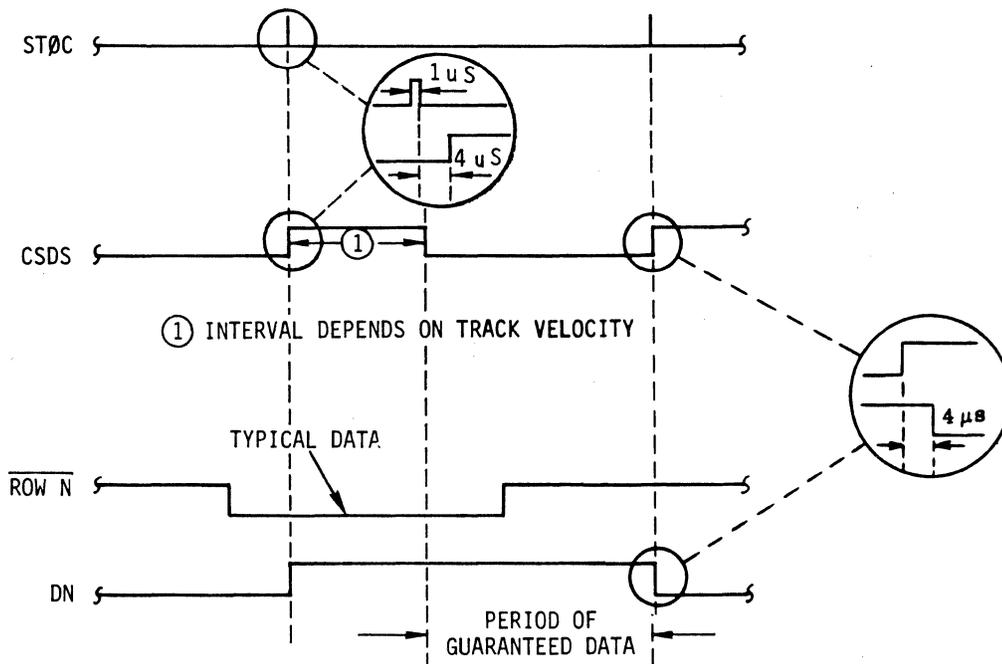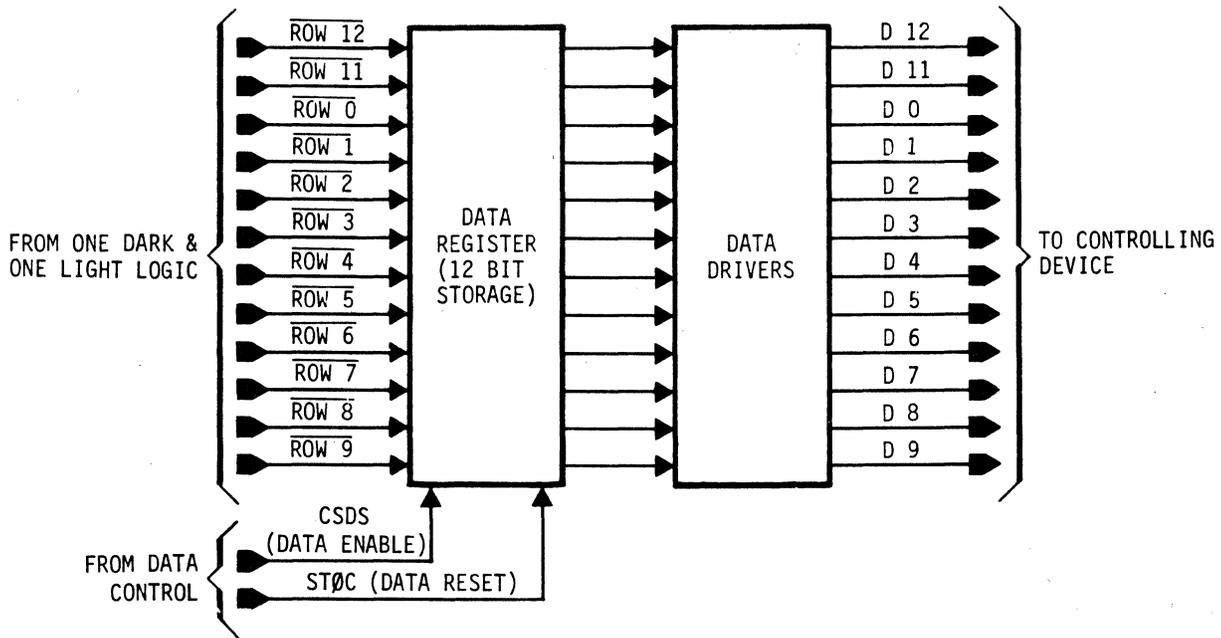
Figure 4-12. Block and Timing Diagram, Data Register and Data Drivers

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

4.3.3.2   Data Registers

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

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

The data drivers provide the necessary buffering between the Data Register and the Controlling Device.
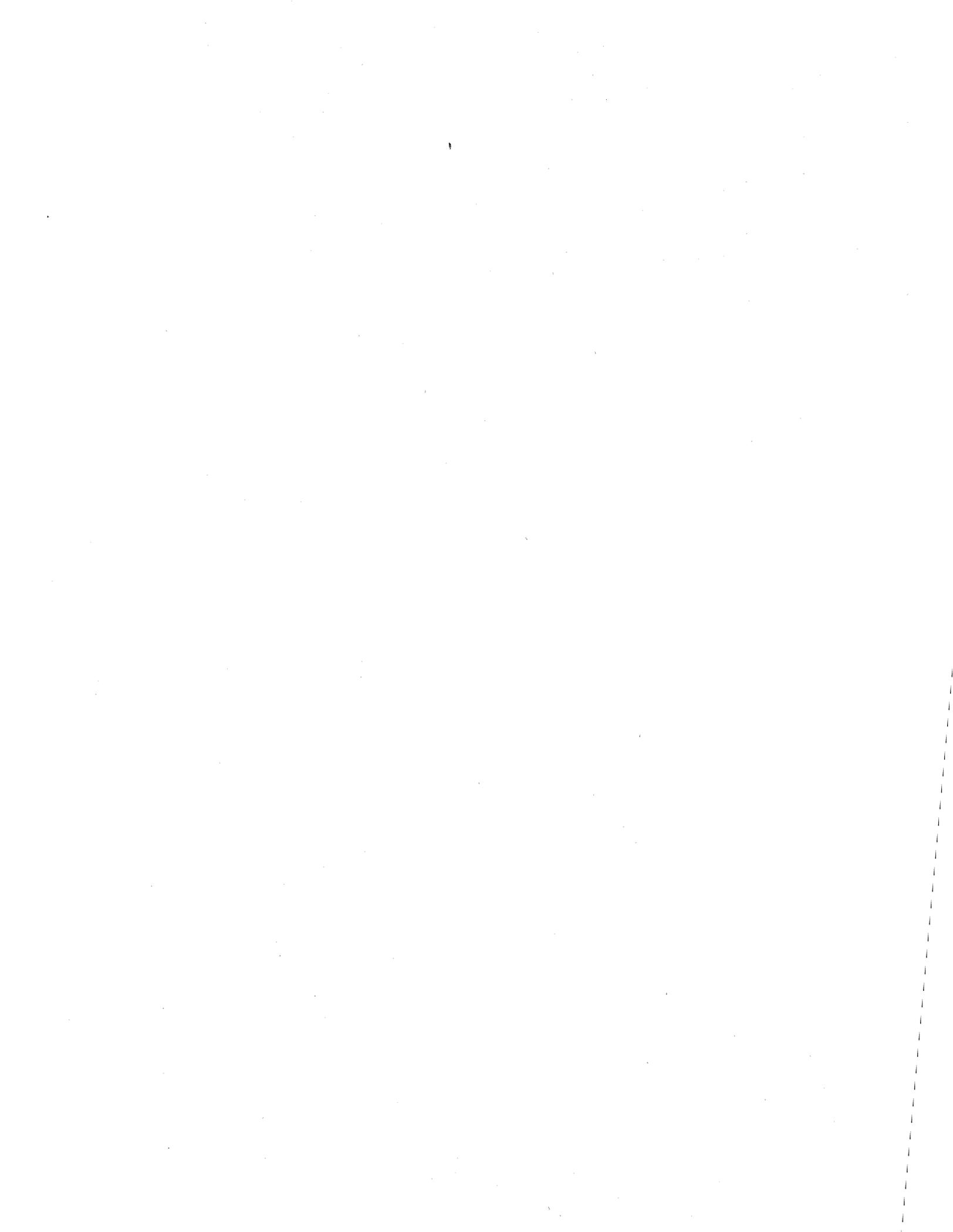
SECTION 5
INTERFACE

5.1 GENERAL

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

5.2 TIMING

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

5.2.1   PICK CONTROL

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

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

1.   Power applied and the 3-second run-up completed.
2.   The input hopper has been loaded.
3.   Depress and release of the RESET pushbutton.

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

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

MODEL	A (MIN)	B	C	D	E	CARD PICK CYCLE
M 200	24	6142	1421	2020	7384	211
M 300	24	2626	606	864	100,780	195
M 600	24	2626	606	864	3158	100
M 1000	15	1508	346	496	1813	60
M 1200	14	1232	280	405	1480	50
	M SEC	μ SEC	μ SEC	μ SEC	μ SEC	M SEC
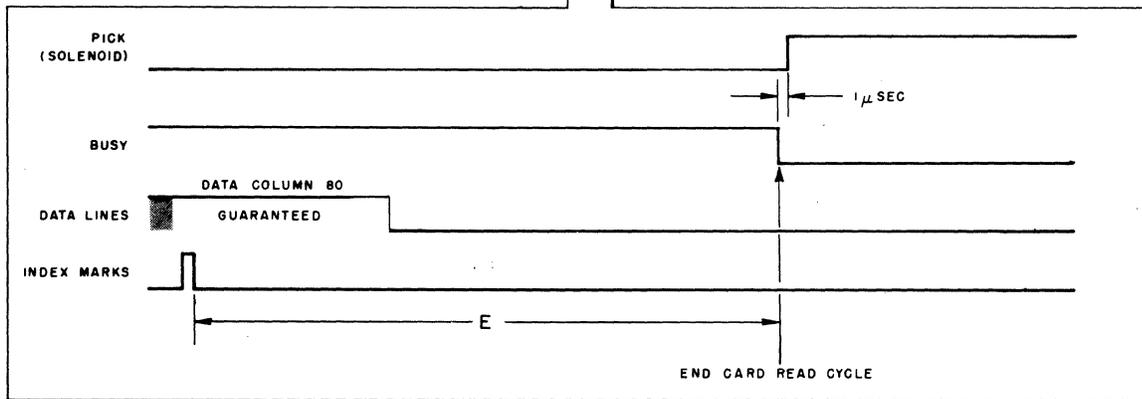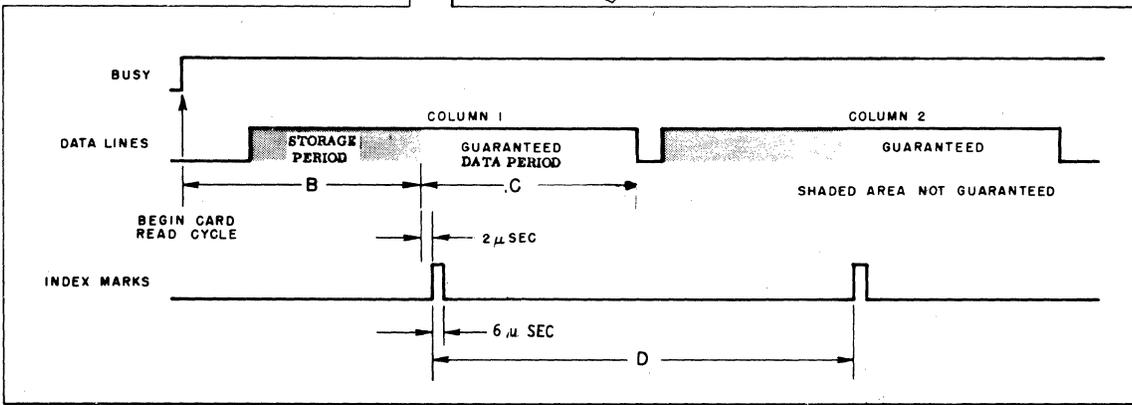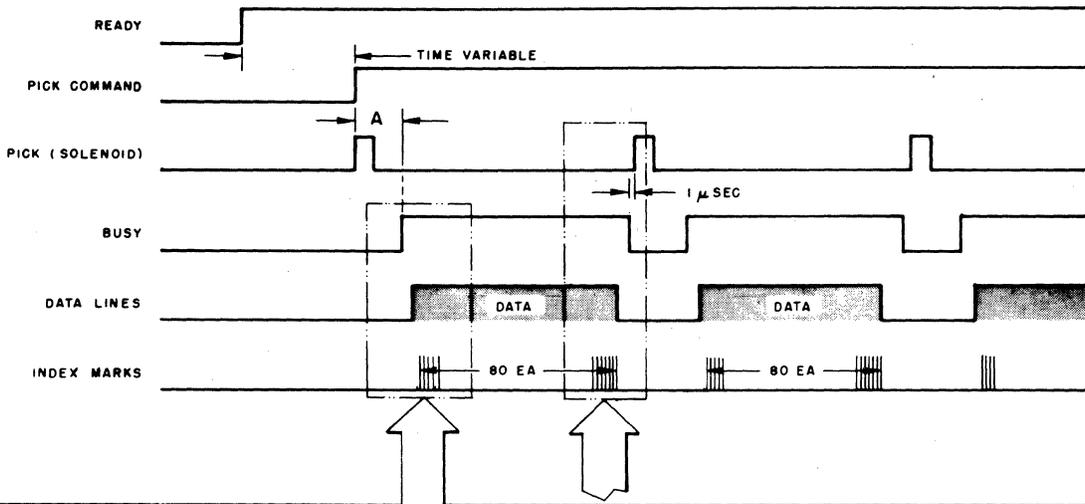
NOTE:

WAVEFORMS NOT
SHOWN TO SCALE.

Figure 5-1. Interface Timing Diagram

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

5.2.2   DATA READOUT

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

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

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

5.2.3   ALARMS

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

5.2.3.1   Hopper Check

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

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

5.2.3.2   Error

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

5.2.3.3   Motion Check

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

5.3 CONNECTORS

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

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

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

J2 I/O SIGNAL CONNECTOR PIN LIST

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

POWER CONNECTOR PIN LIST

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

* For Non-Standard Units, see Wiring Diagram, figure 10-3.

5.4 SIGNAL CHARACTERISTICS

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

5.5 GROUNDING

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

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

Vcc

Output Drive
TTL type 7404 (or equivalent)

I_{load}

Logical TRUE
$I_{load} = -400$ ua @ 2.4V min

I_{sink}

Logical FALSE
$I_{sink} = 16$ ma @ 0.4V max

Vcc

330 ohms

Input Impedance
(PICK COMMAND)

1 DTL
Load

.01 ufd
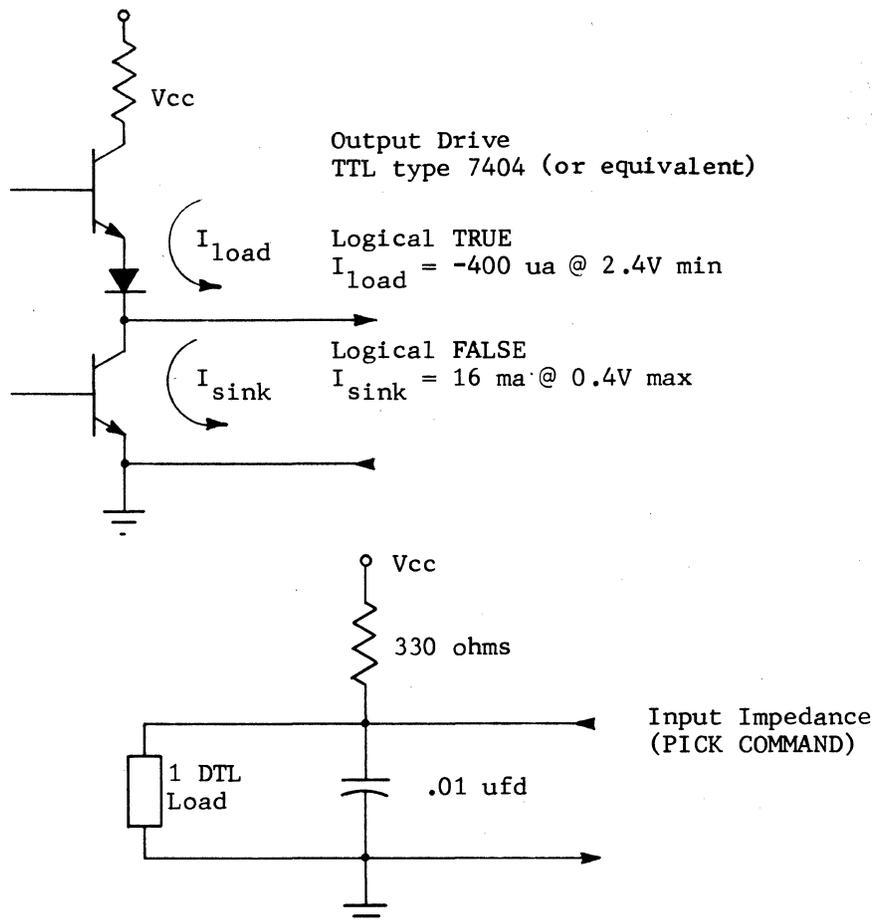
Figure 5-2. Circuit Characteristics

5-6

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 the front, top and rear panels. Remove all three panels using a 5/64 Allen wrench.

a. Remove six screws ① which hold front panel and remove panel, figure 6-1.

b. Remove four screws ③ which hold top cover and remove cover

c. Remove six screws ② which hold rear panel, figure 6-2.

d. Move rear panel out slightly and disconnect fan, then remove panel.
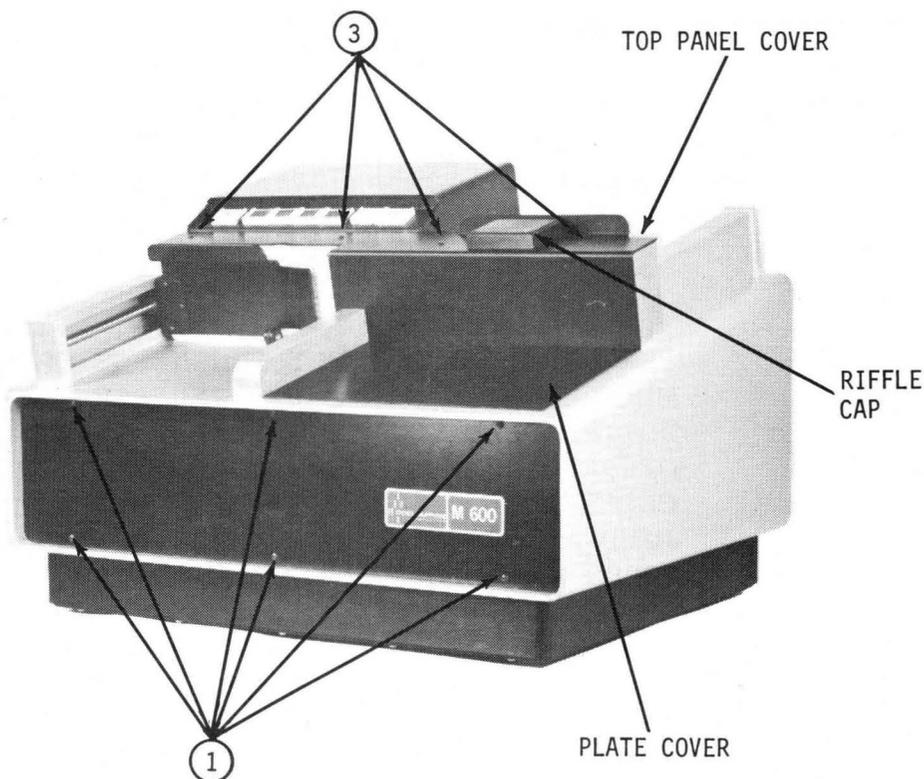
Figure 6-1, Front Panel and Top Cover Removal
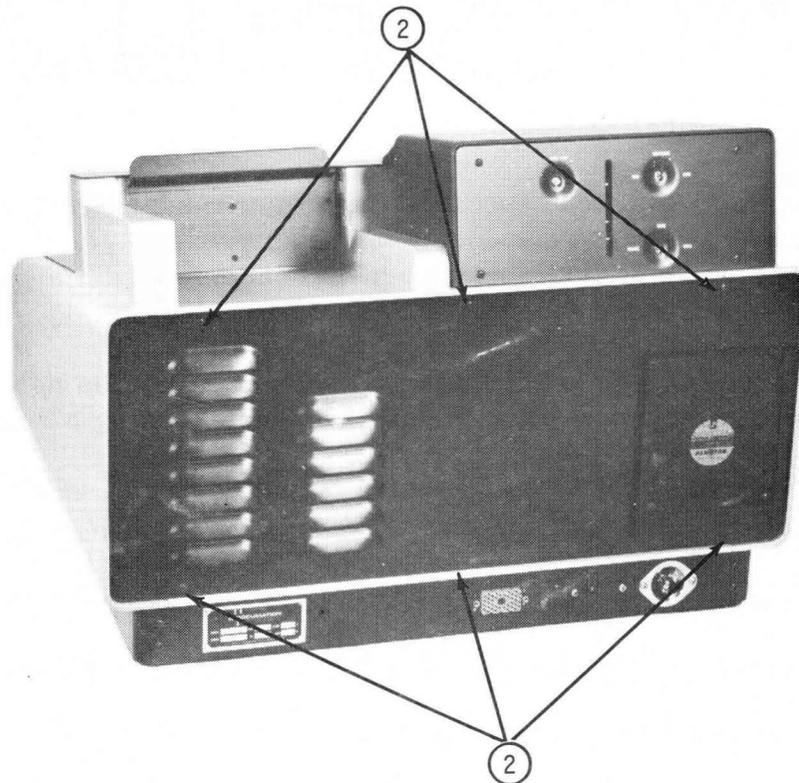
Figure 6-2. Rear Panel Removal

6.2 TENSION ON THE MAIN DRIVE MOTOR BELT

The drive motor belt tension is adjusted to ensure constant card speed and timing.

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

CAUTION

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

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

DEFLECT BELT   MOTOR MOUNTING SCREWS

DRIVE ROLLER
SHAFT PULLEY

TIMING DISC
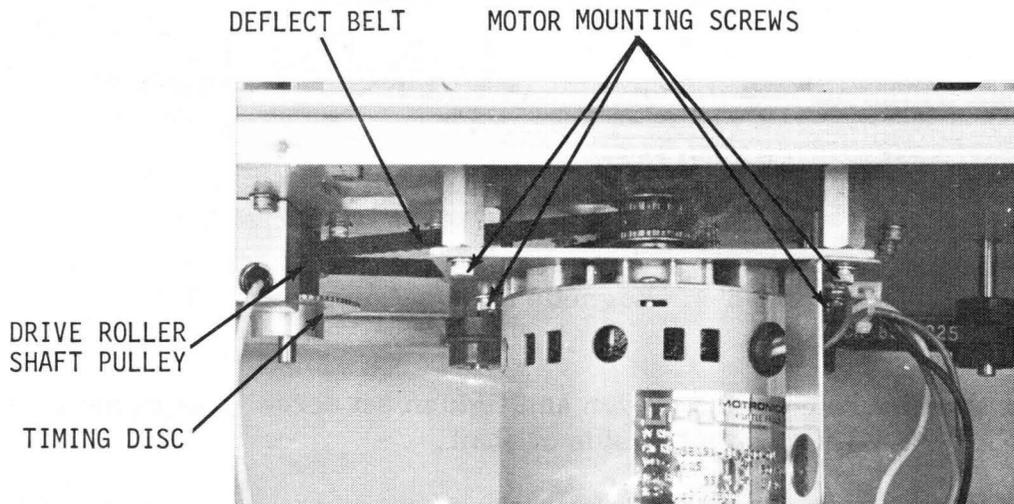
Figure 6-3. Drive Motor Belt Tension Adjustment

6.3 MAGNETIC PICKUP ADJUSTMENT

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

a. Using a 1/16 Allen wrench, LOOSEN set screw that is holding timing disc on drive roller shaft and position timing disc on drive roller shaft so that it is in a horizontal plane with center of magnetic pickup tip.

CAUTION

IF THE TIMING DISC MUST BE REMOVED,
EXERCISE EXTREME CAUTION. DAMAGE
TO DISC WILL RESULT IN ERRONEOUS
MACHINE OPERATION.
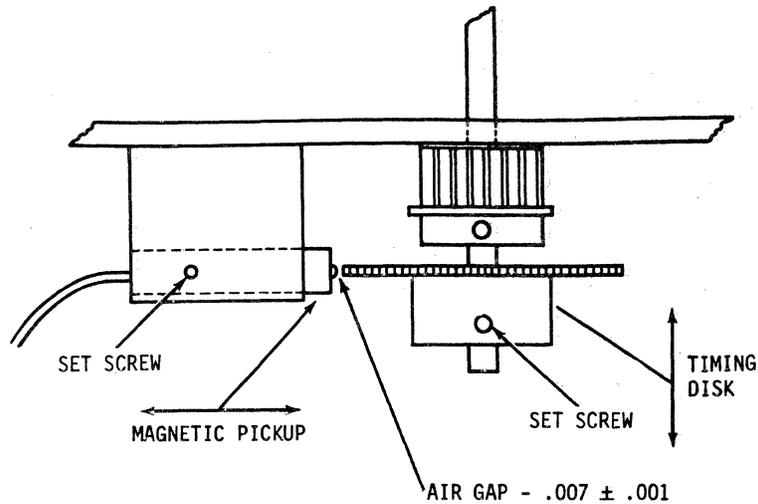
Figure 6-4. Magnetic Pickup Adjustment

b. Align disc in correct position and tighten set screw making sure that set screw is tightened on flat side of shaft.

c. To adjust air gap between magnetic pickup and timing disc, LOOSEN set screw holding magnetic pickup in its mounting block and reposition pickup. The air gap should be set to .007" + .001".

d. Rotate timing disc and check two other positions to make sure that air gap is maintained.

If either of these two adjustments of the magnetic pickup are not correct, card synchronization may be erratic resulting in read checks or incorrect data being read.
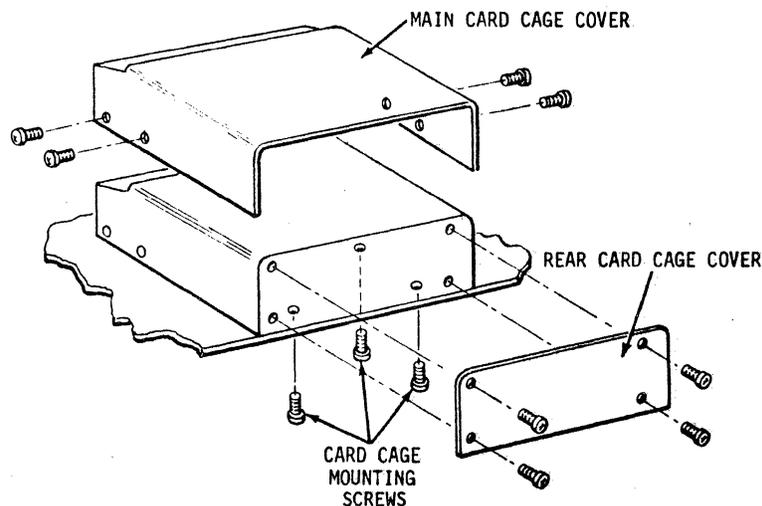
Figure 6-5. Card Cage Repositioning

6.4 ADJUSTMENT OF STACK PHOTOCELL

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

The card cage must be repositioned in this adjustment to allow easy access to the rear of the stacker photocell.

a. Using a 5/64 Allen screwdriver, remove the 4 button head screws retaining the rear card cage cover, figure 6-5.

b. Using the same tool, remove the 4 screws retaining the main card cage cover.

c. Use a 9/64 Allen screwdriver to remove the 3 socket head screws from the underside of the mainframe which is holding the card cage in place, figure 6-5.

d. Move the card cage to the rear of the reader, approximately 3 inches and replace one of the two rear mounting screws.

e. To gain access to the stack photocell set screw, the drive roller must be removed. Using a 1/16 Allen screwdriver loosen the set screw in the drive roller and remove the roller, figure 6-6.

f. Using the same tool, loosen the set screw in the stacker casting which retains the stack photocell, figure 6-6.
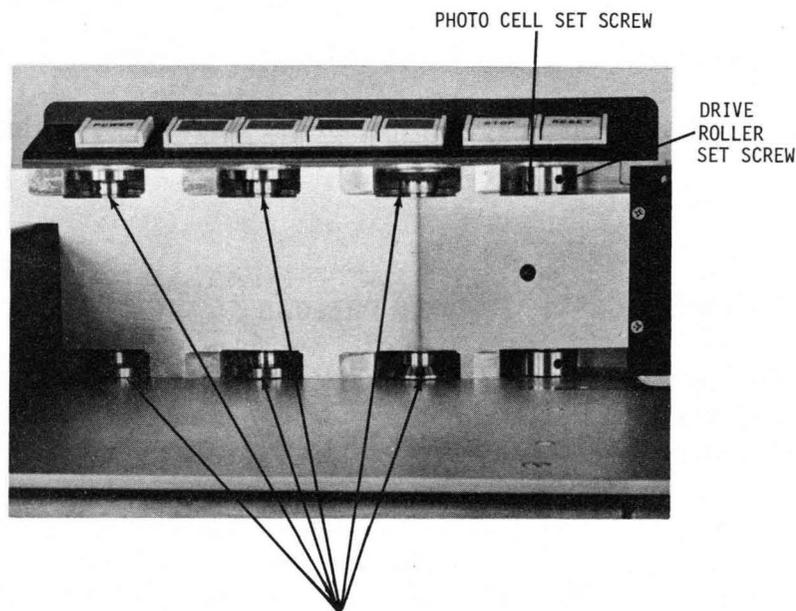
Figure 6-6.   Location of Photo Cell Set Screw
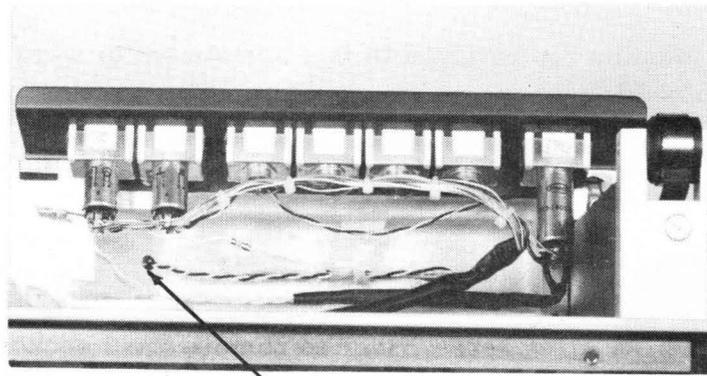
STACKER PHOTO CELL

Figure 6-7. Stacker Photo Cell

g. Remove photocell from rear of stacker casting and inspect photocell lens for any damage, figure 6-7.

h. Replace stack photocell and align photocell lens flush with surface of stacker casting.

i. Tighten photocell set screw.

j. Replace drive roller and adjust for proper preload per paragraph 6-5.

k. Reinstall card cage in its normal mounting position.

6.5 STACKER ROLLER SHAFT BEARING PRELOAD

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

a. Preloading bearings can be accomplished by rotating roller of shaft to be adjusted to conveniently expose the set screw. Using a 1/16" Allen screwdrive, LOOSEN set screw in top roller, figure 6-8.

b. From bottom side of mainframe push shaft upwards as far as possible.
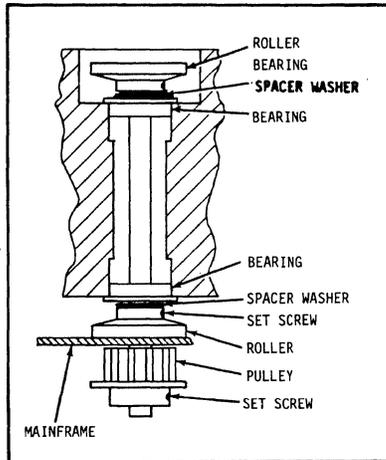
Figure 6-8. Roller Shaft Bearing Preload Adjustment

c. Using a feeler gauge set, select gauge that will shim shaft in this position. Place selected gauge between bottom roller and main frame.

NOTE

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

d. Ensure that set screw is on flat side of shaft.

e. With feeler gauge in place, exert downward pressure on top roller and tighten set screw.

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

6.6 HOPPER EMPTY SWITCH ADJUSTMENT

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

a. Using a 3/32 Allen wrench, remove two screws holding riffle air cap, figure 6-1.

b. Check that operating arm of switch is parallel to top of picker casting, and that arm is not bent.
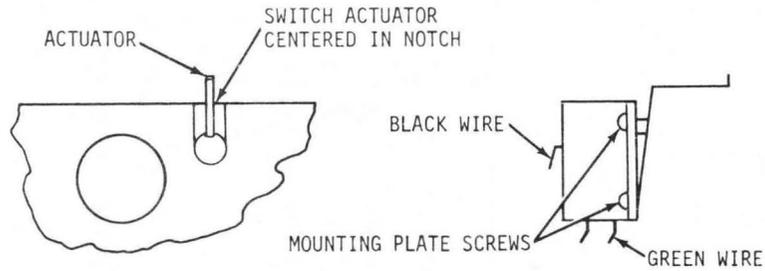
Figure 6-9. Hopper Empty Switch Adjustment

c. Using a 1/16 Allen screwdriver, LOOSEN two screws holding switch mounting plate, figure 6-9.

d. Center switch arm in picker casting counterbore. Exert slight pressure on switch arm, pressing arm into casting. Tighten switch mounting plate set screws.

e. Replace riffle air cap.

If hopper empty switch is faulty or misadjusted, an eroneous status condition will be developed. Refer to paragraph 9.21, Hopper Empty Switch.

6.7 STACKER FULL SWITCH ADJUSTMENT

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

a. Place approximately one inch of cards in hopper. Depress POWER switch placing the machine in operation.
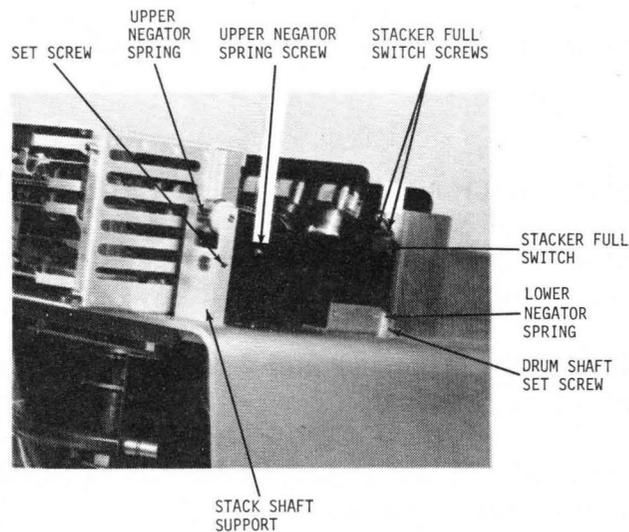
Figure 6-10. Stacker Full Switch Adjustment

b. After a few moments, the STOP indicator should illuminate. Pull stacker follower toward front of reader. Approximately 1/8" before end of travel, HOPPER CHECK light should illuminate. If this condition is not met, stacker full switch must be repositioned.

c. Using a small Phillips screwdriver, LOOSEN two screws retaining stacker full switch bracket, figure 6-10.

d. Adjust switch bracket horizontally until HOPPER CHECK indicator illuminates when stacker follow is approximately 1/8" before end of travel. Secure bracket mounting screws.

6.8 PICKER SECTOR ADJUSTMENT

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

CAUTION

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

a. Check picker sector height adjustment. Using a 6" steel rule, measure distance from top of mainframe to center of middle row of holes in picker sector. This should be exactly 1-5/8", figure 6-11.
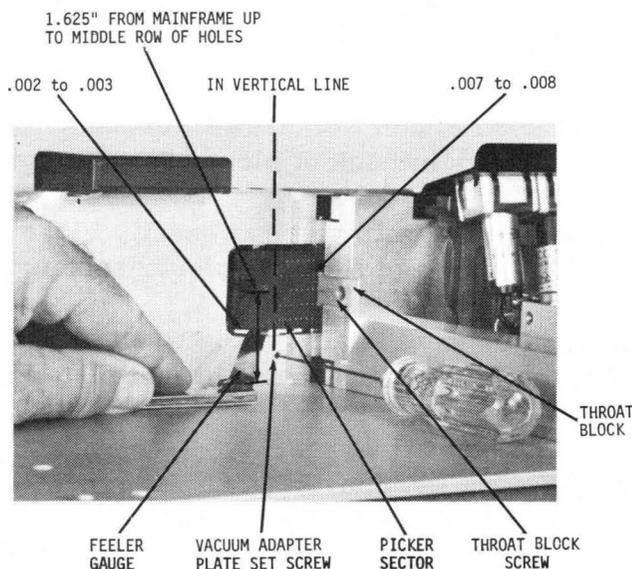
Figure 6-11. Picker Sector Adjustment, Rear View

PICKER SECTOR   RETAINING RING   HOPPER EMPTY   SWITCH
SET SCREWS   AND SPACERS   SWITCH   SCREWS

PICKER   PICKER   PICKER STOP   HOPPER EMPTY
BUMPER   SECTOR   SCREWS   SWITCH TIE-DOWN
SCREWS
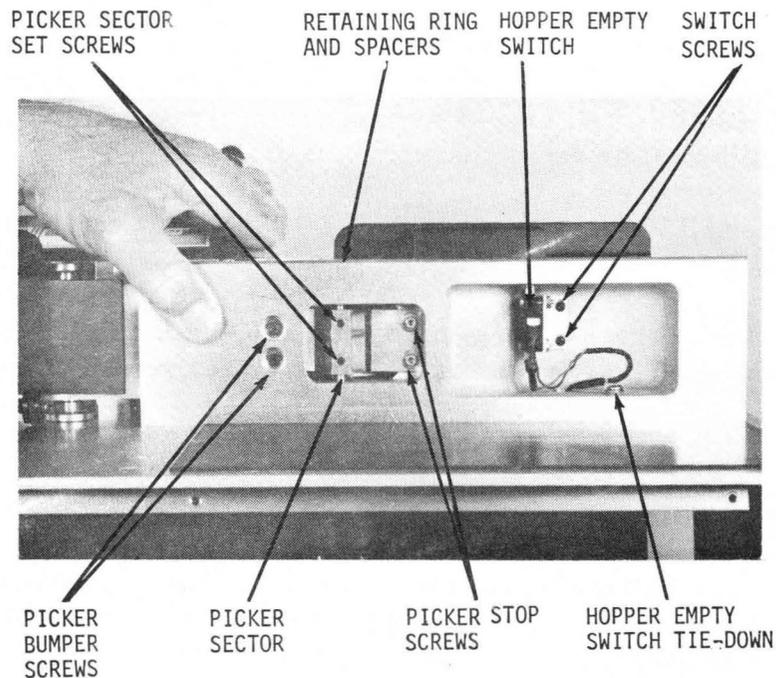
Figure 6-12. Picker Sector Adjustment, Front View

VACUUM TUBE ELBOW
SET SCREW   VACUUM ADAPTER
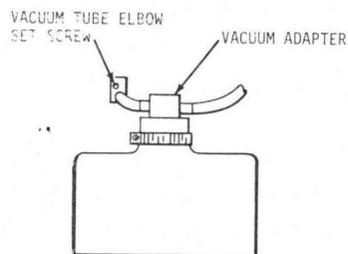
Figure 6-13. Removal of Vacuum Tube Adapter

b. If height of picker sector requires adjustment, use a 5/64 Allen wrench and LOOSEN set screws in back of picker sector, figure 6-12.

c. Adjust picker sector until there is exactly 1-5/8" between mainframe and center of middle rows of holes on picker sector.

d. The second adjustment is air gap between picker sector and vacuum adapter plate. The tolerance between sector and plate is .002" to allow for maximum vacuum with free sector travel.

e. Using a .050 Allen wrench, LOOSEN set screw in vacuum tube adapter elbow located on underside of mainframe, figure 6-13. Remove elbow from sleeve. Prop open hopper using about one inch of cards inserted at a right angle.

f. Using a .050 Allen wrench, LOOSEN vacuum adapter plate set screw, figure 6-11.

g. Insert a .002 feeler gauge between picker sector and vacuum adapter plate. From bottom side of mainframe push vacuum adapter plate upward. Exert upward pressure and tighten vacuum adapter plate set screw.

h. Replace vacuum tube adapter elbow.

i. Check picker sector rest position. The back edge of last row of holes on the picker sector should line up with middle of vacuum adapter plate set screw hole. The position is established by placement of the rest stop.

j. Using a 5/64 Allen wrench, LOOSEN two picker stop screws, figure 6-12.

k. Using a 6" steel rule to gauge picker sector rest position, and while holding picker sector firmly in alignment push rest stop against picker sector and tighten the screws.

l. Check gap between throat block and picker sector. The gap should be .008 inches to ensure that only one card is picked at a time.

m. Using a small Phillips screwdriver LOOSEN screw holding throat block, figure 6-11.

n. Place an .008 feeler gauge between throat block and picker sector face.

o. Exert slight pressure on rear of throat block and tighten the mounting screw.

p. Check solenoid coupling adjustment. The solenoid coupling is used to transfer rotational solenoid motion to picker sector.

q. Using a 1/16 Allen screwdriver, LOOSEN two set screws in the top of the solenoid coupling, figure 6-14.

r. Depress coupling slightly with fingers and while maintaining pressure, tighten two coupling set screws, ensuring one set screw is on flat portion of shaft. Remove return spring on load shaft and check that solenoid return tension is just sufficient to return load on its stop position. Too much tension could cause solenoid to not provide enough drive action to load shaft.

s. Replace return spring and check solenoid action, by operating picker sector manually while power is applied, vacuum is applied, and cards are in the input hopper.

t. Check adjustment of picker sector bumper. This bumper is used to limit picker sector over-travel to .020 inches beyond point where card is delivered to pinch rollers.

u. Place about 2" of cards in the input hopper. Depress POWER switch. With reader in LOCAL, depress RESET switch and run a few cards into stacker. Depress STOP switch.

v. Manually operate picker sector. Note point at which card reaches pinch rollers. After card is picked, there should be approximately .020" of over-travel of sector before it reaches bumper.

w. Using a 9/64 Allen wrench, LOOSEN two picker bumper socket head screws, figure 6-12.

x. Adjust picker bumper to proper position and tighten screws.
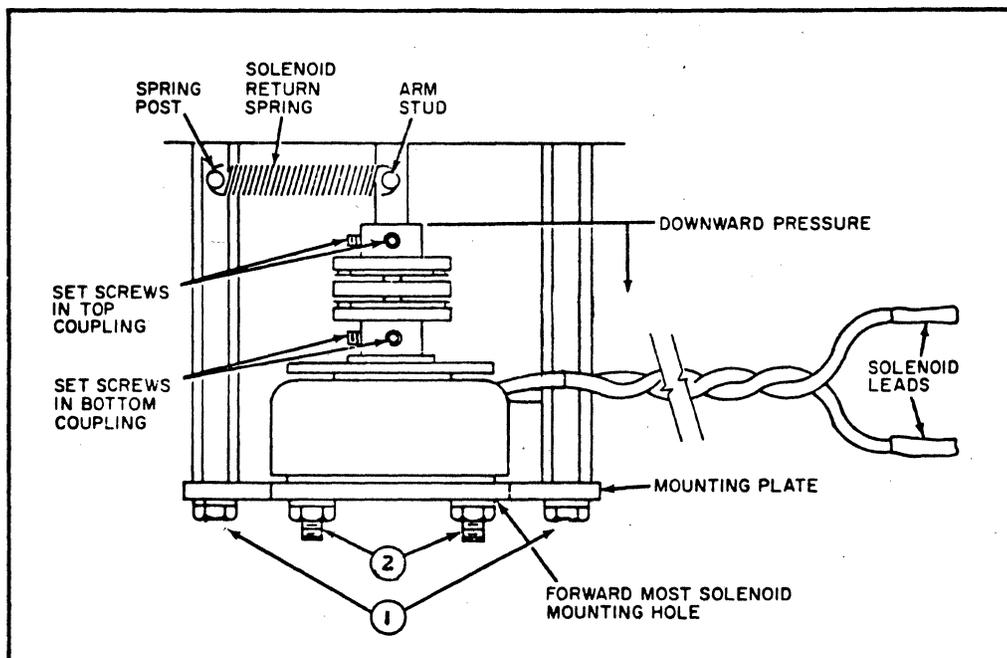
Figure 6-14. Solenoid Preload Adjustment

6.9 VACUUM PUMP BELT TENSION ADJUSTMENT

The vacuum/blower motor belt tension is a critical adjustment. A reduction in amount of vacuum or riffle air can cause erratic picking. The vacuum/blower assembly must be removed from base plate to accomplish adjustment procedure.

    a. Using a Phillips screwdriver, remove four screws from rear subframe panel, ① , figure 6-15.

    b. Remove five screws ② from bottom of baseplate retaining rear subframe panel.

    c. Cut the cable tie holding main connector cable to baseplate. Move subframe panel backward and bend outward.

CARD CAGE COVER   REAR PANEL
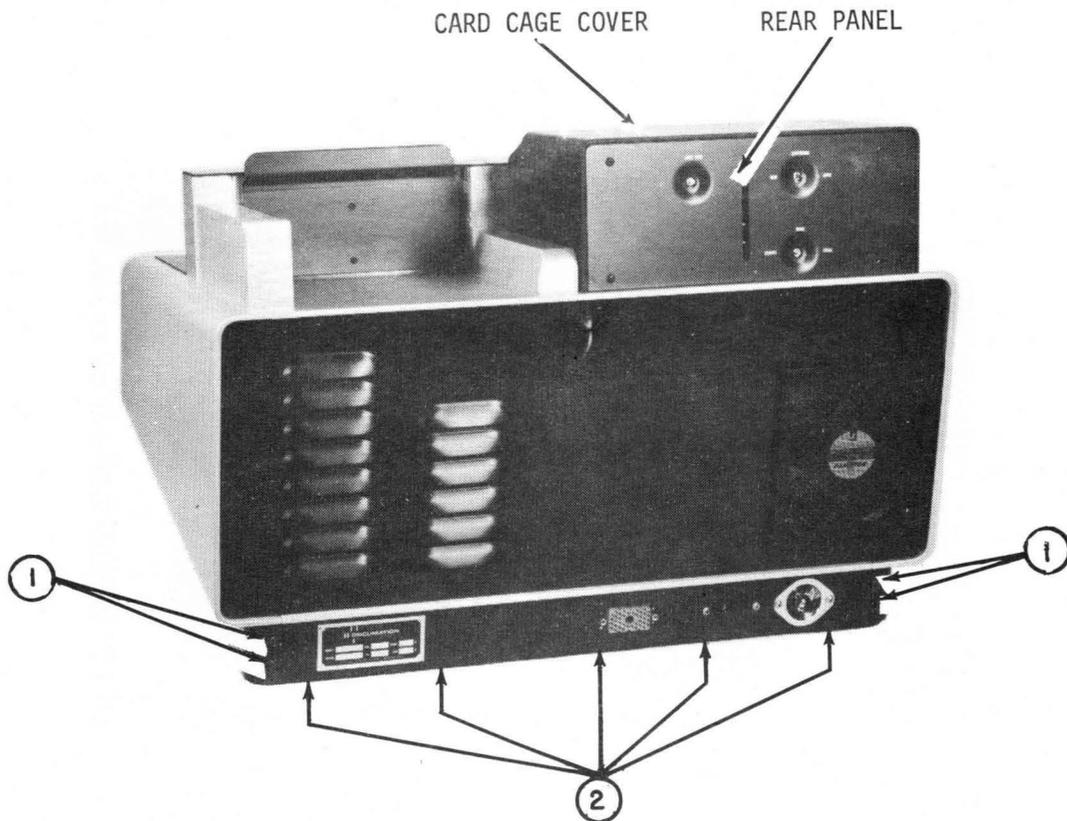
Figure 6-15. Removal of Rear Subframe Panel

NOTE

Be sure to tag the wires to be
removed in the following step
to ensure they are replaced on
the proper terminals.

d. Remove rubber hood from motor run capacitor and disconnect red
    and blue clip leads, figure 6-16.

e. Remove yellow clip lead from solid state relay.

f. LOOSEN blower hose clamp on side of pump and remove hose from pump.
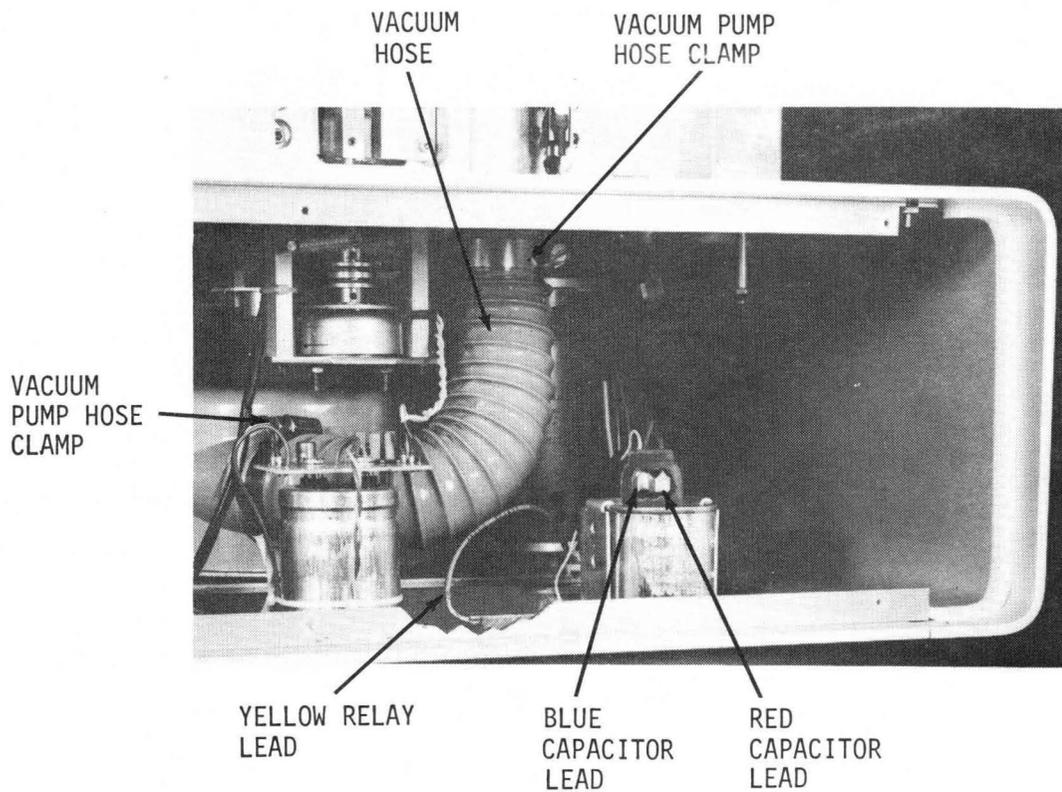
Figure 6-16. Disconnecting Vacuum Blower Motor Assembly

g. LOOSEN vacuum adapter clamp on top of pump and remove from pump, figure 6-17.

h. Using a Phillips screwdriver, remove ground strap from pump mounting plate.

CAUTION

USE A $\frac{1}{2}$ INCH OPEN-END WRENCH
TO HOLD MOUNTING POSTS TO
AVOID TWISTING OFF THE PUMP
PLATE RUBBER SHOCK MOUNTS.

i. Remove four Phillips head mounting screws ①holding the vacuum pump motor assembly.

j. The pump assembly can now be removed from reader and belt tension adjusted.
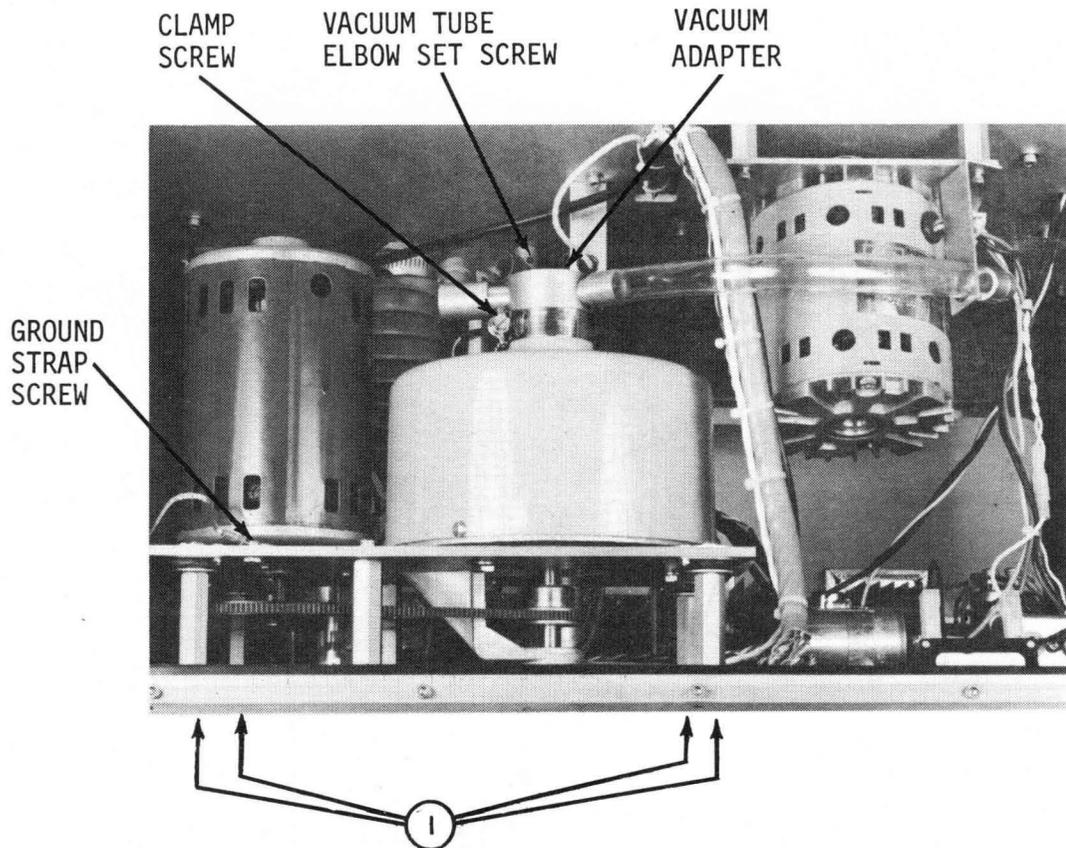
Figure 6-17. Removal of Vacuum Blower Motor Assembly

k. Using a 7/16 open-end wrench, LOOSEN three hex bolts ①holding pump assembly in place, figure 6-18.

l. Using a spring scale, adjust for approximately 4 to 6 ounces of belt tension. This should cause belt to deflect 3/64 inch when properly adjusted.

m. Check pulleys to make sure they are in the same plane. Also check motor pulley set screw to make sure it is secure.

n. Install pump in reverse order of disassembly and check reader for proper operation.

o. Refasten main connector cable to baseplate and replace rear subframe panel.
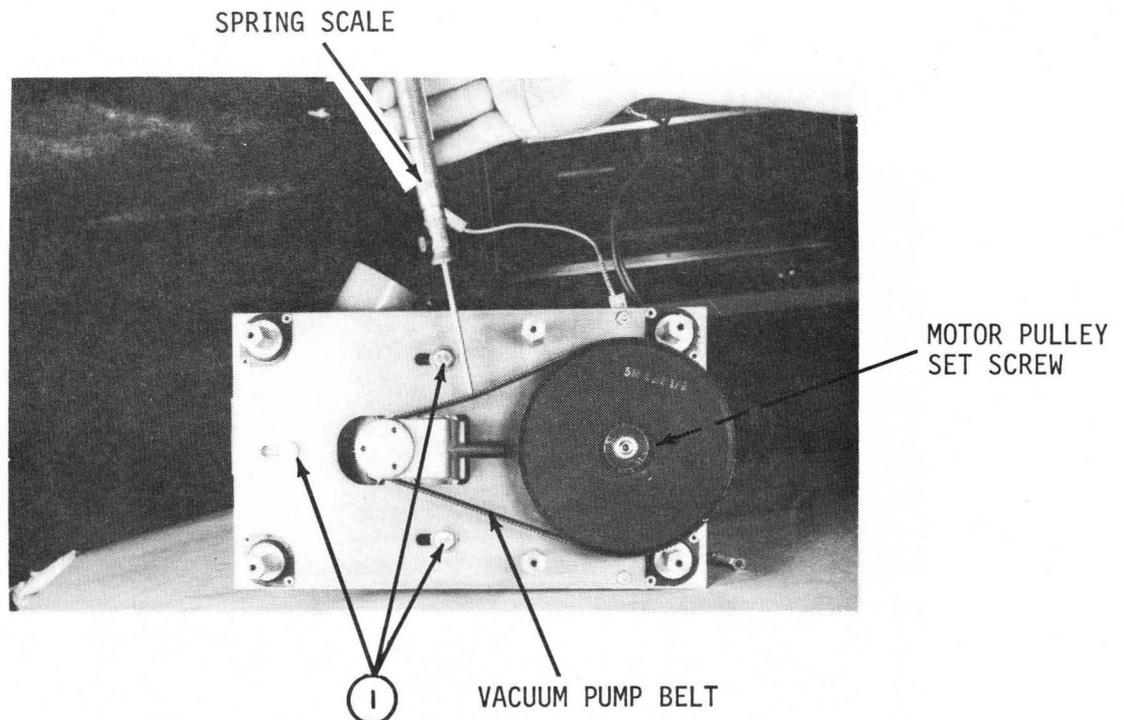
Figure 6-18. Adjustment of Vacuum Blower Motor Belt Tension

6.10 PICKER CASTING ADJUSTMENT

a. Position picker casting in place, insert mounting screws but do not fully tighten.

b. Make a gauge using 8 new unpunched cards cut to 2 x 5 inches and staple together.

c. Insert gauge between picker casting and stacker casting but avoid covering read station window. Apply even pressure to picker casting toward stacker casting and tighten picker casting mounting screws.

d. Using extender board on control card, connect voltmeter between R17 and card ground. Verify voltage is $>$ 2.3 vdc and $<$ 4.3 vdc. (Nominal 3 to 4 vdc)

e. Repeat step d. at R18 through R28.

f. If any reading is outside limits, LOOSEN picker casting mounting screws and reposition for optimum reading. Tighten screws and re-check per paragraph d. and e.

g. If a dial caliper is available, measure distance from outside face of stacker casting to outside face of picker casting. This measurement should be 2.98 inches $\pm$ 1 mil.

SECTION 7
PREVENTIVE MAINTENANCE

7.1 GENERAL

The following paragraphs provide information for preventive maintenance and general care of the M-Series 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 <u>routine</u> 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 ③ , Figure 9-1, holding top panel cover. Remove this cover and use a vacuum cleaner to remove any card debris buildup around the picker and stacker castings. Use a small brush to clean around the picker and stacker rollers and picker sector.

7.2.3 COOLING FAN

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

7.2.4 EXTERIOR CLEANING

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

7.3 LUBRICATION

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

RETURN SPRING   COUPLING

GREASE POINT (3)   SOLENOID
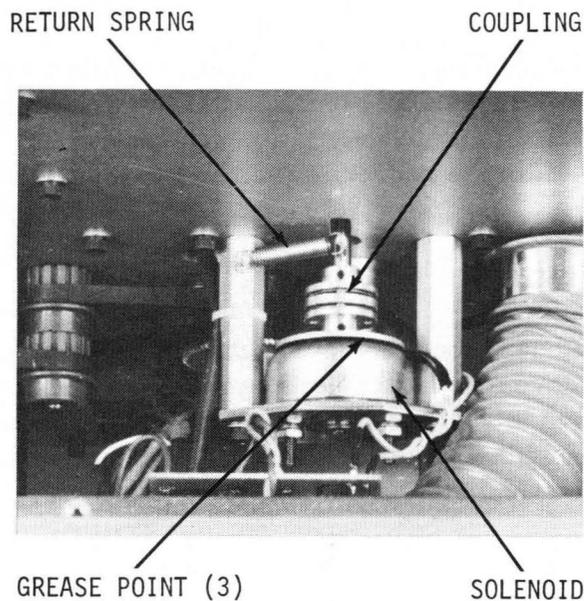
Figure 7-1. Solenoid Lubrication

SECTION 8
TROUBLESHOOTING

8.1 GENERAL

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

FAULT ISOLATION CHART

SYMPTOM	PROBABLE CAUSE	REMEDY
POWER indicator fails to light.	1. Power cord is not 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.	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 indicator excluded).	1. Lamp is burned out. 2. Defective Error Card.	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 indicator excluded).	1. Defective lamp test switch. 2. Defective Error Card	1. Replace lamp test switch. 2. Replace Error Card.
HOPPER CHECK indicator does not light when hopper goes empty or stacker goes full. No other error indications.	1. Lamp is burned out. 2. Defective Error Card.	1. Replace lamp. 2. Replace Error Card.
HOPPER CHECK indicator does not light when hopper goes empty and PICK CHECK indicator is lit.	1. Hopper empty switch not adjusted properly. 2. Defective hopper empty switch.	1. Adjust hopper empty switch per paragraph 6.6. 2. Replace hopper empty switch.

SYMPTOM	PROBABLE CAUSE	REMEDY
HOPPER CHECK indicator does not light when stacker goes full.	1. Stacker full switch is not adjusted properly. 2. Defective stacker full switch.	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.	1. Lamp is burned out. 2. Defective Error Card.	1. Replace lamp. 2. Replace Error Card.
STACK CHECK indicator fails to light when there is a stack check condition.	1. Lamp is burned out. 2. Defective Error Card.	1. Replace lamp. 2. Replace Error Card.
PICK CHECK indicator lights regularly after making six pick attempts.	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.	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.	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 Control Card. 4. Defective Error Card.	1. Replace lamp. 2. Replace Clock Card. 3. Replace Control Card. 4. Replace Error Card.
Reader picks three cards, and then stops with a PICK CHECK.	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.	1. Replace Clock Card. 2. Replace Sync Card. 3. Replace Sync Card.

SYMPTOM	PROBABLE CAUSE	REMEDY
Reader picks two to six cards and then stops with a PICK CHECK.	Pick attempt counter is not being reset at good pick 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.	1. Column "84CR or CR" 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.	1. Replace Clock Card 2. Replace Sync Card. 3. Replace Clock Card. 4. Replace Clock Card.
Reader reads erroneous data.	1. Defective Clock Card. 2. Defective Sync Card. 3. Defective Control Card.	1. Replace Clock Card. 2. Replace Sync Card. 3. Replace Control Card.
Sharp, metallic noise from picker sector while reading cards.	1. Picker sector maladjusted. 2. Rubber roller worn. 3. Bearing bad. 4. Belt too tight.	1. Adjust picker sector per procedure in paragraph 6.8. 2. Replace roller. 3. Replace bearing. 4. Readjust belt.

NOTE

When using test equipment for trouble-shooting, connect test equipment ground to card logic ground to obtain accurate values.

SECTION 9
REPAIR PROCEDURES

9.1 GENERAL

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

9.2 REQUIRED TOOLS

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

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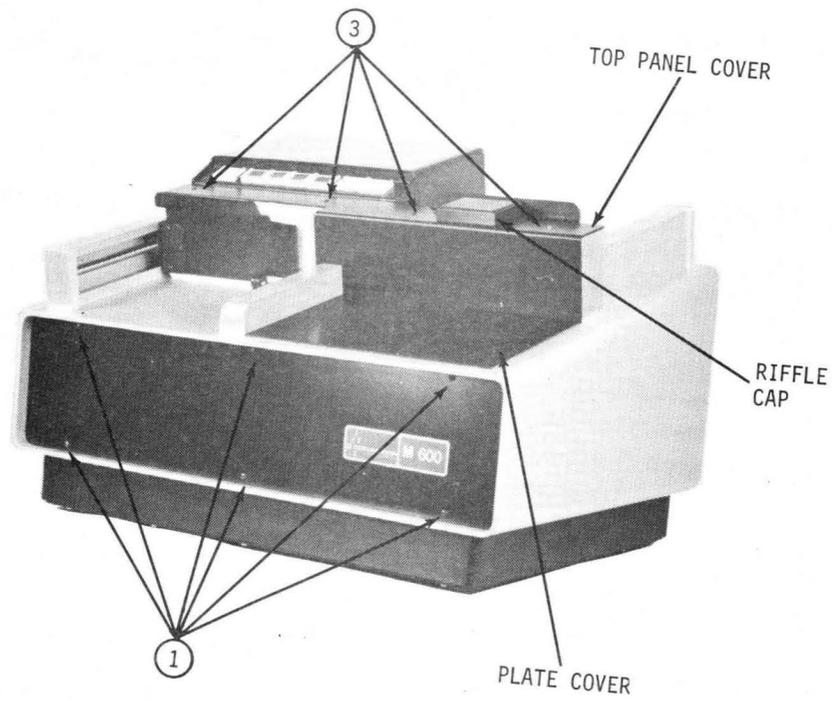
Figure 9-1. Front Panel and Top Cover Removal
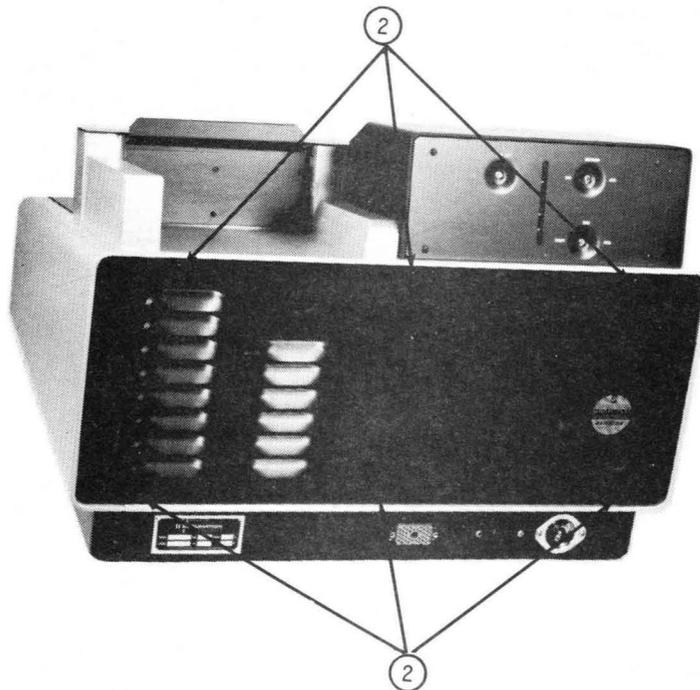
Figure 9-2. Rear Panel Removal

9.3 MAIN DRIVE MOTOR BELT

a. Using a 5/64 Allen wrench, remove six 6 x 32 button head screws ① holding front panel and remove front panel, figure 9-1.

b. Using a 5/64 Allen wrench, remove six 6 x 32 button head screws ② holding rear panel, move rear panel out slightly, disconnect fan motor connector, and remove rear panel, figures 9-2 and 9-14.

c. Using a 9/64 Allen wrench, LOOSEN three 8 x 32 socket head motor mounting plate screws (bottom of mainframe). Remove fourth motor mounting plate screw, figure 9-3.

d. Using a 1/16 Allen wrench, LOOSEN 8 x 32 set screw in timing disc, figure 9-4.

CAUTION

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

e. Using a 1/16 Allen wrench, LOOSEN set screw in fifth stacker roller pulley, figure 9-5.

f. Remove fifth stacker roller pulley from stacker-roller shaft.

g. Using a 3/32 Allen wrench, LOOSEN set screw in bottom fourth stacker roller pulley.

h. Remove bottom fourth stacker roller pulley.

i. Remove main drive motor belt, figure 9-4.

j. To replace main drive motor belt:

CAUTION

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

MOTOR MOUNTING SCREWS

REMOVE THIS SCREW
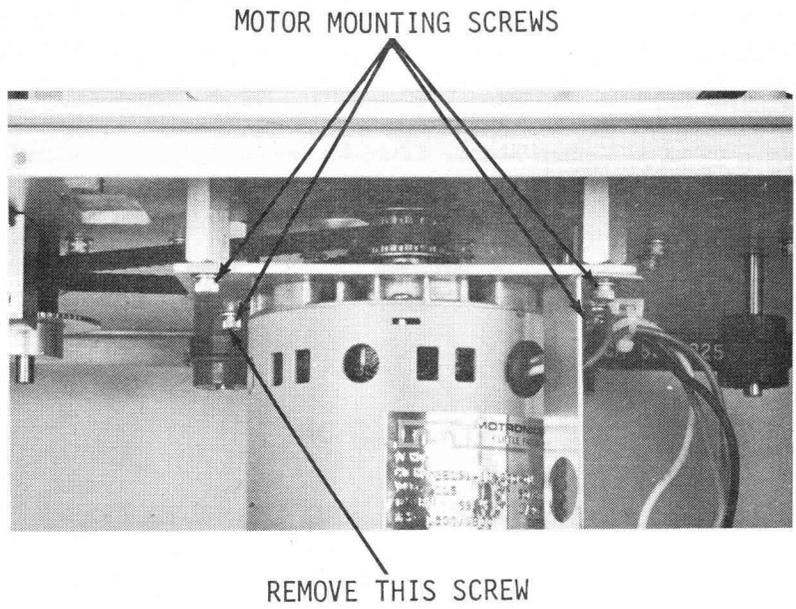
Figure 9-3. Main Drive Motor Mounting

FIRST STACKER
DRIVE BELT

SECOND STACKER
DRIVE BELT

MAIN DRIVE
MOTOR BELT

TIMING DISC

MAIN DRIVE
MOTOR PULLEY

TIMING DISC
SET SCREW

THIRD STACKER
DRIVE BELT

MAGNETIC PICKUP
MOUNTING BLOCK
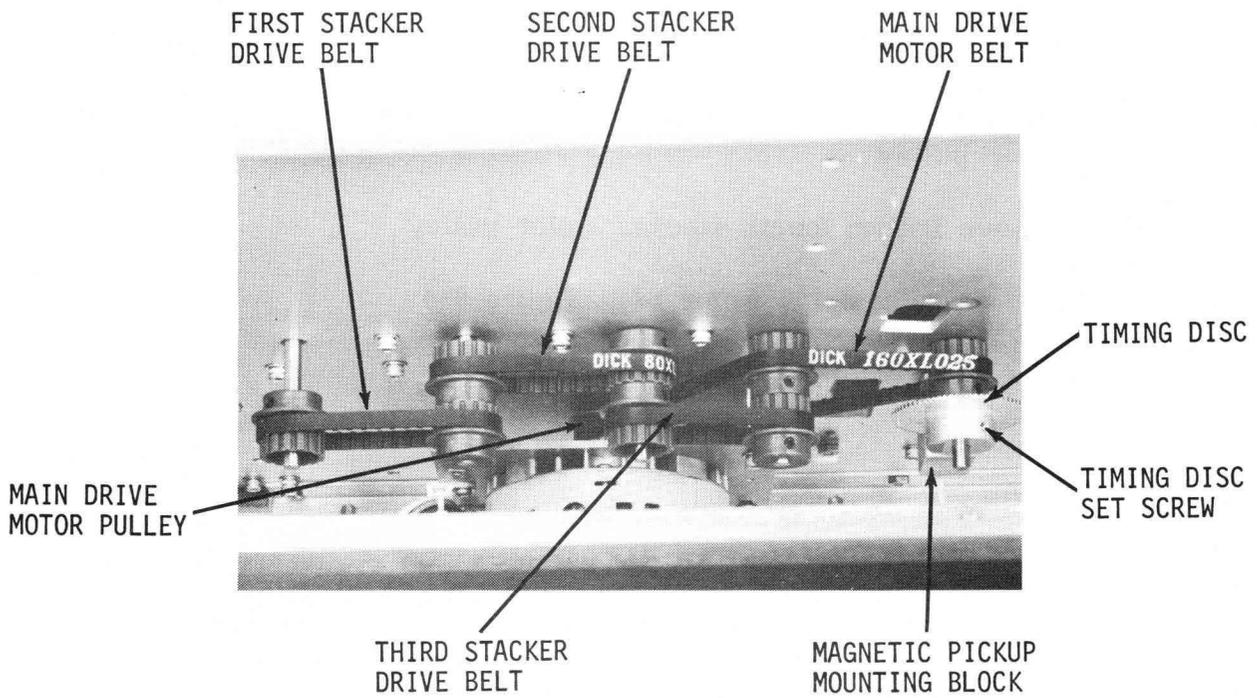
Figure 9-4. Stacker Drive Train Belt Arrangement

1. Place belt over main drive motor pulley.

2. Slip belt over upper fourth stacker roller pulley, figure 9-5.

3. Place belt over fifth stacker roller pulley and replace this pulley on fifth stacker roller shaft.

4. Replace bottom fourth stacker roller pulley

5. Locate fourth stacker roller pulley so that set screw is on flat side of shaft and carefully tighten set screw.

CAUTION

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

6. Push fifth stacker roller pulley up against mainframe, then pull VERY SLIGHTLY downward making sure pulley is free from mainframe.

7. Locate fifth stacker roller pulley so that set screw is on flat side of shaft and carefully tighten set screw.

k. Replace timing disc on fifth stacker roller shaft and tighten set screw lightly.

l. The main drive motor belt tension must be adjusted first. Refer to paragraph 6.2.

m. Second, the magnetic pickup and timing disc must be adjusted. Refer to paragraph 6.3.

9.4 THIRD STACKER ROLLER DRIVE BELT

a. Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1 and 9-2.

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.
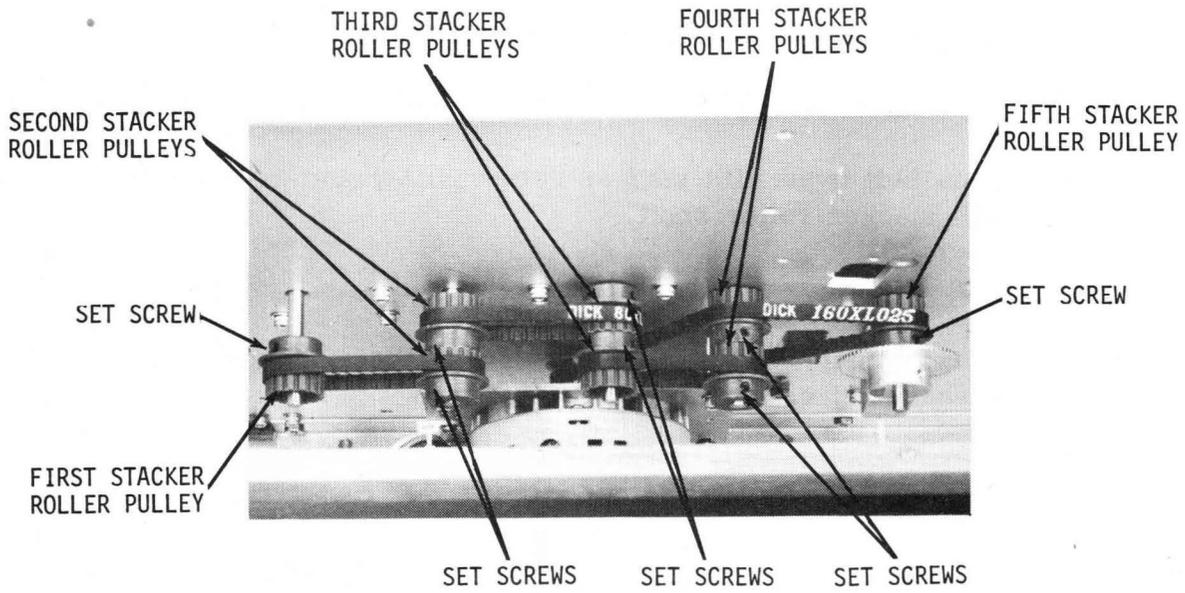
Figure 9-5. Stacker Drive Train Pulley Arrangement
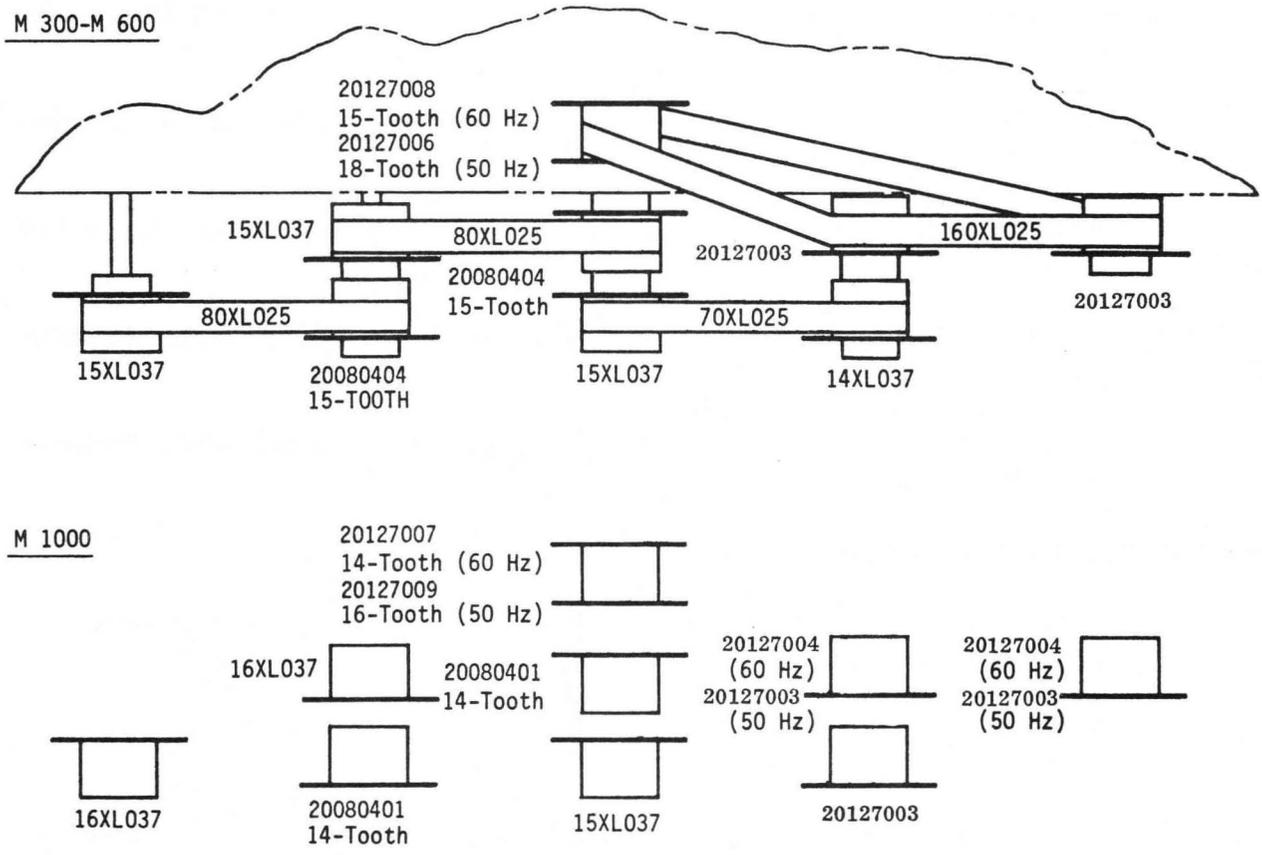
Figure 9-6. Pulley and Belt Configuration

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 flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.

g. Replace front and rear panels.

9.5 FIRST STACKER ROLLER DRIVE BELT

CAUTION

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

a. Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1 and 9-2.

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 flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.

g. Replace front and rear panels.

9.6 SECOND STACKER ROLLER DRIVE BELT

CAUTION

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

a. Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1 and 9-2.

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 position of upper pulleys with
respect to mainframe, figure 9-5. Note
that pulleys three, four and five are
installed close to mainframe with a slight
clearance. Pulley number two should
be lowered sufficiently to allow 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 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 front and rear panels.

9.7 FIRST, SECOND, AND THIRD STACKER ROLLER BEARING ASSEMBLIES

NOTE

Replace both bearings and shaft
with new matched assembly to
assure proper operation.

a. Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1 and 9-2. Also remove four screws ③ , figure 9-1, holding top panel cover.

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 bearing assembly 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, 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 replace bearing assembly.

   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 spacer washer between the top roller and the bear-
      ing seat, figure 9-7. Remove top roller from shaft.

   c. To remove top bearing, 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. **Install new bearings.** Place spacer washer on top bearing. Slide
      bottom roller and spacer washer under shaft hole.

   f. Replace top roller on new shaft, flush with (or slightly below)
      shaft end. Replace shaft in shaft hole. Select feeler gauge
      (5 to 25 mils) to force roller against bearing.

   g. Insert feeler gauge between main frame 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.
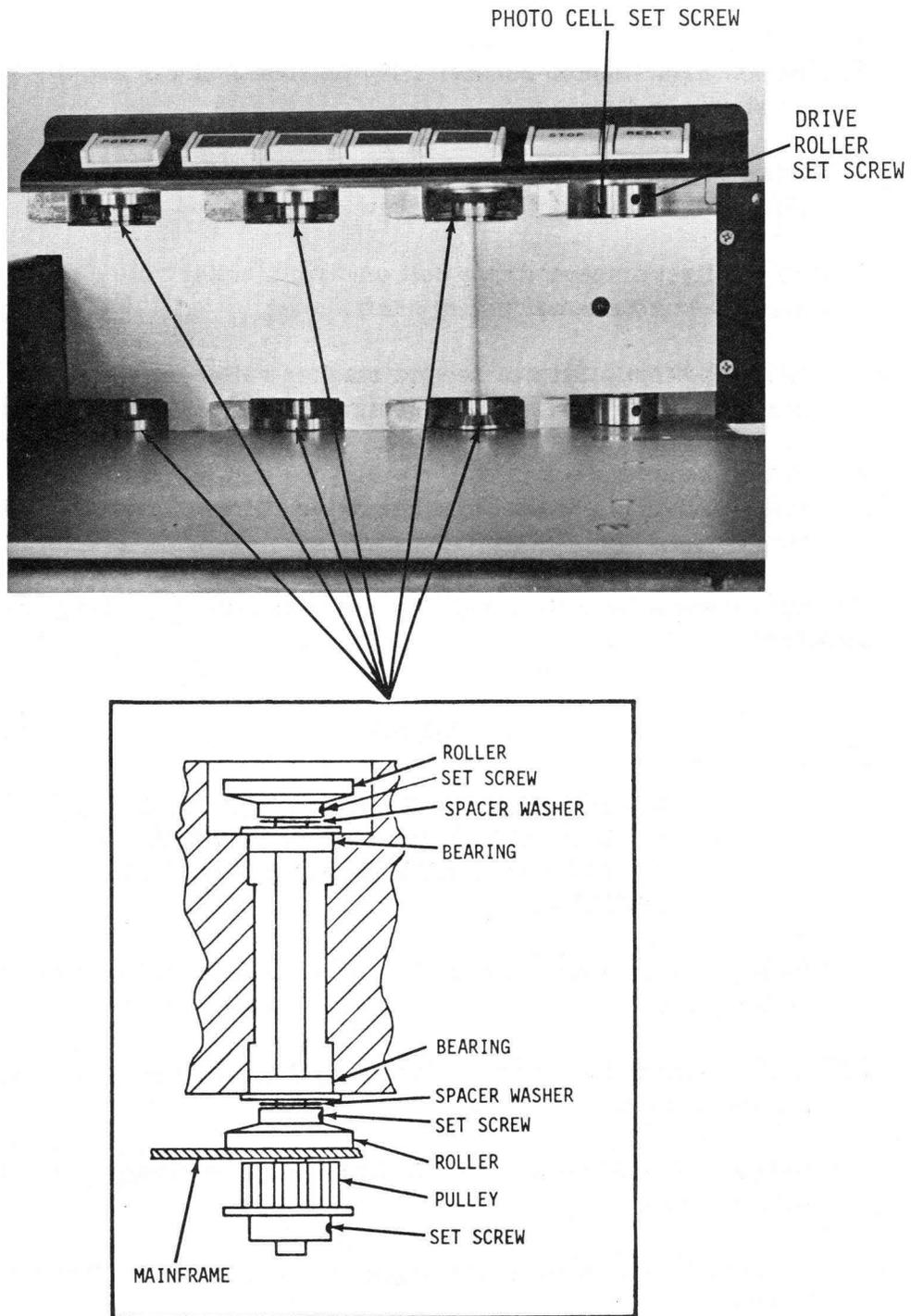
Figure 9-7. Pictorial, Stacker Roller Bearing Assembly

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 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 flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.

e. To replace second stacker roller bearing assembly 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 replace bearing assembly.

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 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 flat side of shaft and belt is parallel to other drive belts. Carefully tighten set screw.

f. To replace third stacker roller bearing assembly 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 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 replace bearing assembly.

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 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 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 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 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 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 front and rear panels and top panel cover.

9.8 SOLENOID

a. Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1, and 9-2.

NOTE

Hold lugs on board with long nose
pliers while unsoldering or solder-
ing 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 two white leads from solenoid drive 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 top solenoid coupling.

e. Using a 9/64 Allen wrench, remove two screws ① holding solenoid mounting plate. 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 extend-
ing from the right side (viewed from the
front of the reader) and that the forward-
most solenoid mounting hole is on the right
side.
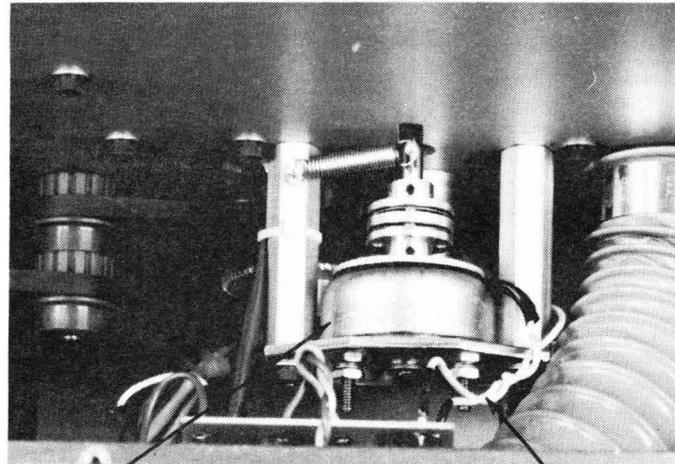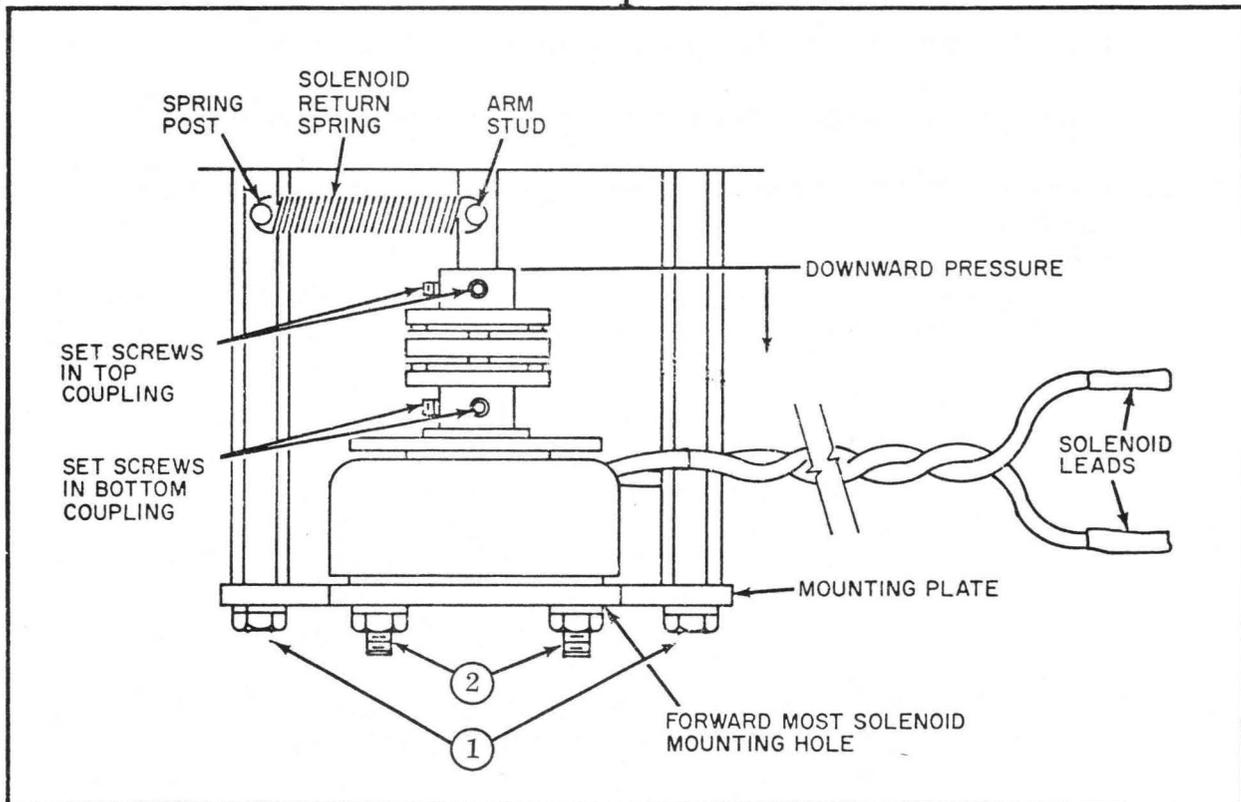
Figure 9-8. Pictorial, Solenoid Assembly

f. Using an 11/32 wrench, remove two mounting nuts ② .

g. Using a 1/16 Allen wrench, LOOSEN two set screws retaining coupling on solenoid shaft. Remove coupling.

NOTE

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

h. Place coupling on new solenoid shaft locating bottom coupling set screws on two flat sides of the shaft.

i. Tighten bottom coupling set screws and replace solenoid on mounting plate making sure holes are in proper position, with wires extending from right side.

j. Replace solenoid on mounting post, sliding top coupling onto picker shaft.

k. Replace solenoid return spring between spring post and arm stud.

l. Solder two white leads to solenoid drive circuit board, terminals 3 and 4.

m. Preload solenoid coupling per paragraph 6.8, steps q., r., and s.

NOTE

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

n. Replace front and rear panels.

9.9 VACUUM PUMP MOTOR ASSEMBLY BELT

a. Remove front and rear panels. Refer to steps a. and b. of paragraph 9.3, figures 9-1 and 9-2.

b. Remove four Phillips head screws ① at rear of subframe panel, figure 9-9.

CARD CAGE COVER   REAR PANEL
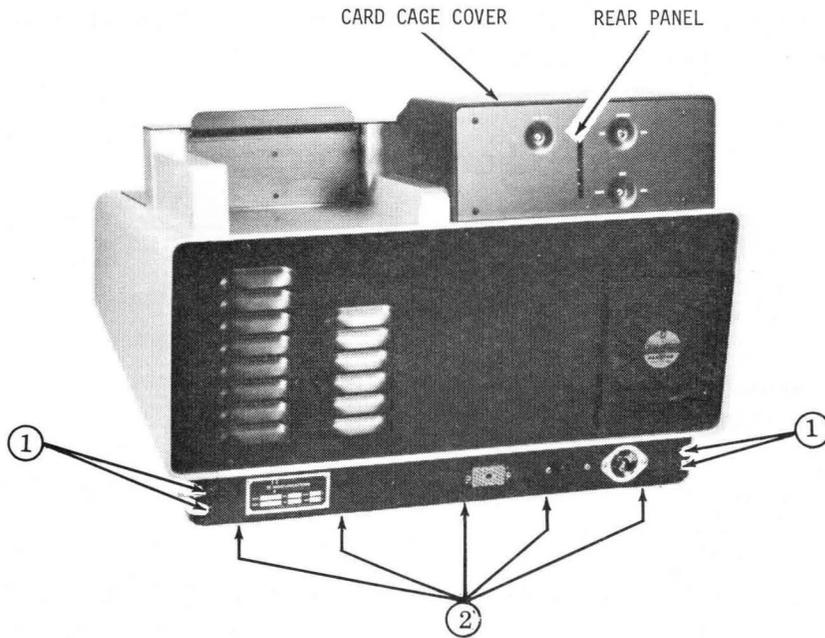
Figure 9-9.   Removal of Rear Subframe Panel,
Main Card Cage Cover and Panel

VACUUM   VACUUM PUMP
HOSE   HOSE CLAMP

VACUUM
PUMP HOSE
CLAMP

YELLOW RELAY   BLUE   RED
LEAD   CAPACITOR   CAPACITOR
                    LEAD   LEAD
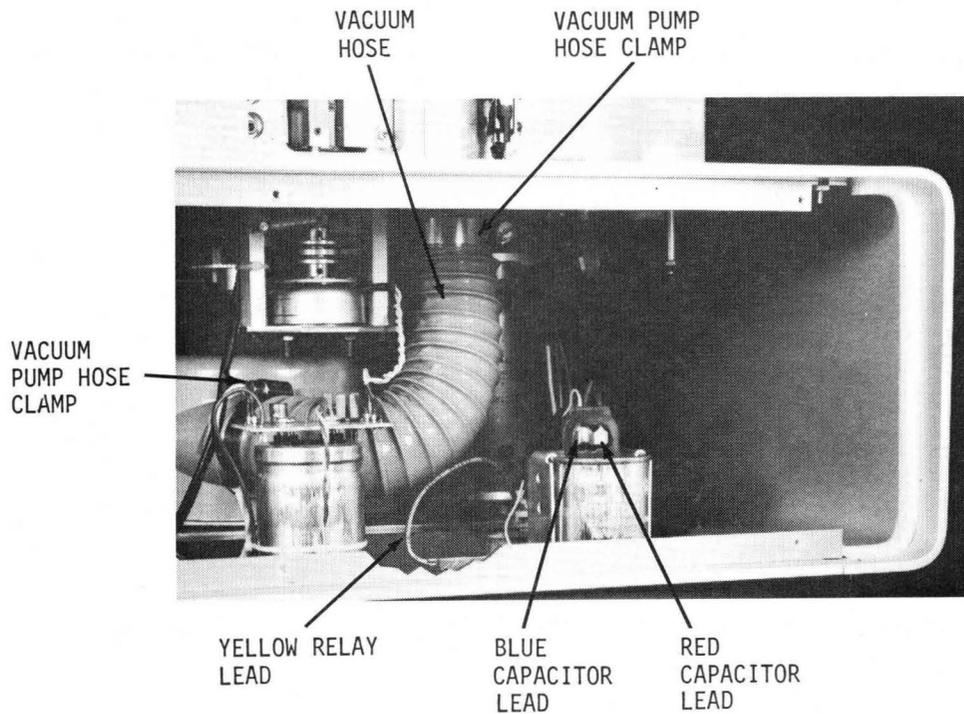
Figure 9-10.   Vacuum Pump Motor Assembly Connections

c. Remove five Phillips head screws ② on bottom, rear edge of card reader, holding subframe panel.

NOTE

Tag the wires to be removed in the following step. They must be replaced on the proper terminals.

d. Remove two connectors from capacitor and one connector from relay to disconnect vacuum pump motor, figure 9-10.

e. Loosen vacuum hose clamp on vacuum pump and remove hose from pump.

f. Using a .050 Allen wrench, LOOSEN set screw in vacuum tube elbow and pull elbow downward, figure 9-11.

g. LOOSEN vacuum adapter clamp screw at top of vacuum pump assembly and remove adapter from card reader with a slight upward pressure.

h. Remove screw holding ground strap to subframe.

CAUTION

USE A $\frac{1}{2}$ INCH OPEN-END WRENCH TO HOLD MOUNTING POSTS TO AVOID TWISTING OFF THE PUMP PLATE RUBBER SHOCK MOUNTS.

i. Remove four Phillips head mounting screws holding vacuum pump motor assembly, figure 9-11.

j. The vacuum pump assembly may now be removed from card reader.

k. LOOSEN three hex vacuum pump mounting bolts ① figure 9-12.

l. Replace vacuum pump belt.

m. Using a spring scale, adjust vacuum pump for a belt tension of 4-6 ounces. This is about 3/64" belt deflection.

n. With appropriate belt tension applied, tighten three hex vacuum pump mounting bolts.

o. Check pulleys to make sure they are in the same plane. Also check each pulley set screw to make sure it is secure.

CLAMP
SCREW

VACUUM TUBE
ELBOW SET SCREW

VACUUM
ADAPTER

GROUND
STRAP
SCREW

①
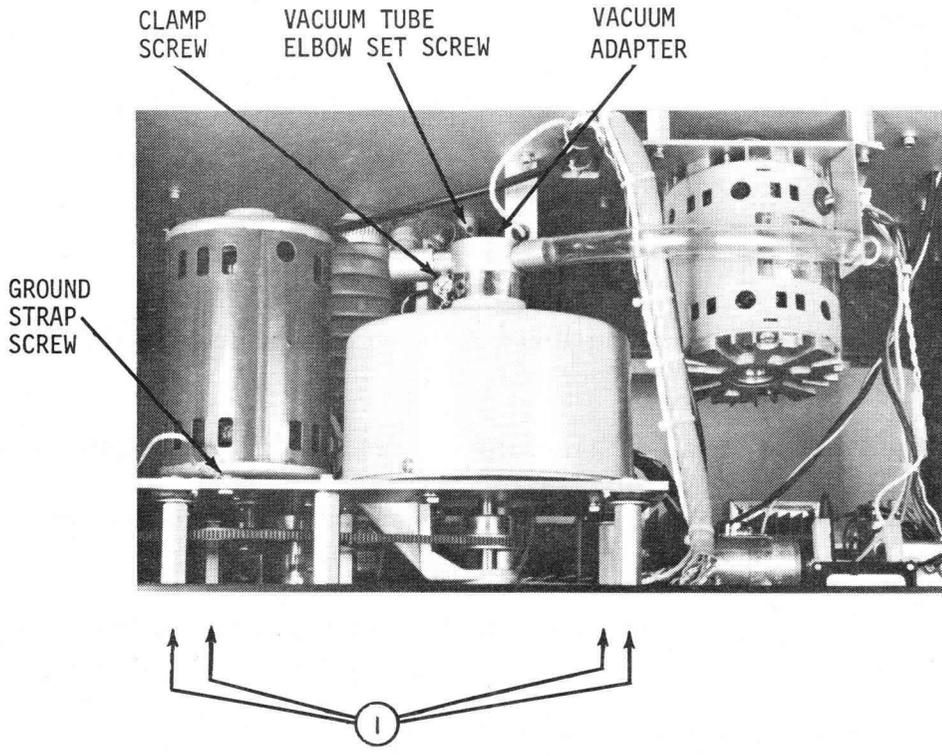
Figure 9-11. Removal of Vacuum Pump Motor Assembly

SPRING SCALE

MOTOR PULLEY
SET SCREW
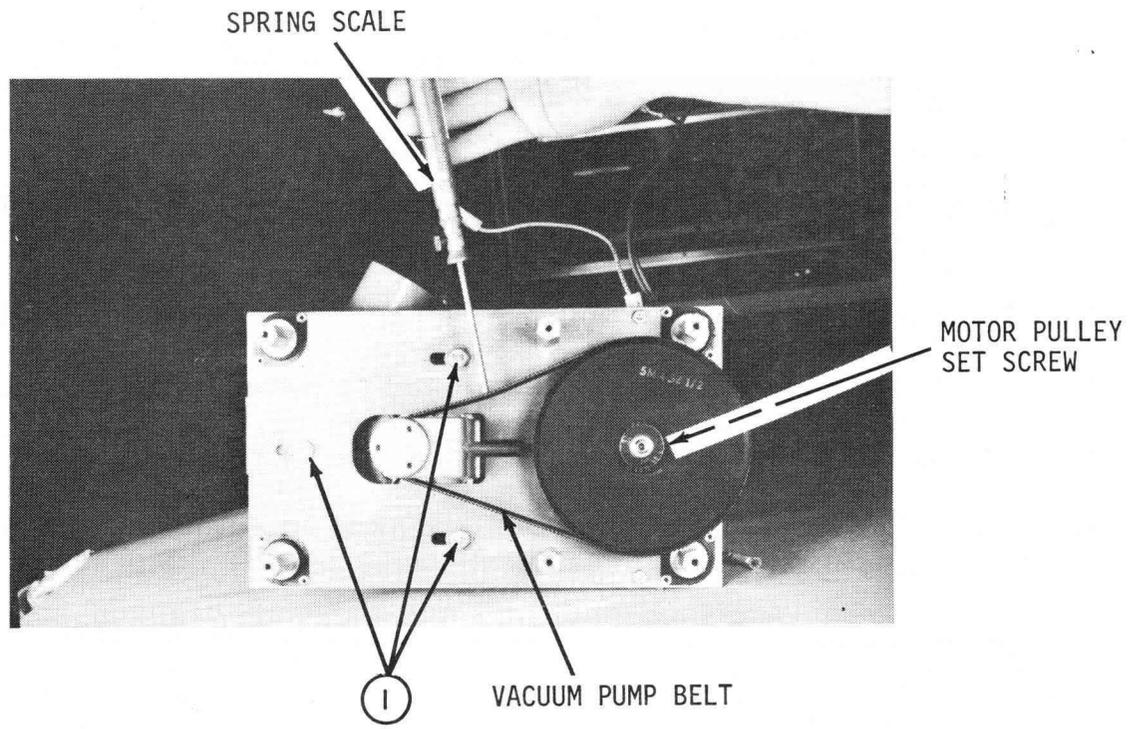
①   VACUUM PUMP BELT

Figure 9-12. Vacuum Pump Belt Replacement

p. Reinstall vacuum pump assembly into card reader in reverse order of disassembly.

q. Replace panels removed.

9.10 MAGNETIC PICKUP

a. Using step b. of paragraph 9.3, remove rear panel, figures 9-2 and 9-14.

b. Using a 1/16 Allen wrench, LOOSEN set screw in magnetic pickup mounting block, figure 9-13.

c. Remove magnetic pickup from mounting block.

d. Remove two button head screws on each side of card cage cover, slide backward, and lift off, figure 9-9.

e. Remove four button head screws holding rear panel of card cage and remove rear panel.

f. Using a 9/64 Allen wrench, remove three socket head screws ① holding card cage in place. Move card cage to rear and remount using two rear screws, figures 9-14 and 9-15.

g. Remove all cards from card cage using card extractor levers, figures 9-15.

NOTE

Tag magnetic pickup wires so that they
can be identified with their proper posi-
tion in the card cage connector, figure
9-15.

h. Using AMP tool 465195-2, remove two magnetic pickup wires and shield from card cage connectors.

i. Replace wires from new magnetic pickup unit into their proper positions in card cage connector, figure 10-3.

j. Insert the pickup unit into mounting block, figure 9-13.

k. Refer to paragraph 6.3 for adjustment of magnetic pickup.

l. Reassemble reader in reverse order of disassembly.

TIMING DISK MAGNETIC PICKUP TIP MAGNETIC PICKUP

MAINFRAME SET SCREW MAGNETIC PICKUP MOUNTING BLOCK
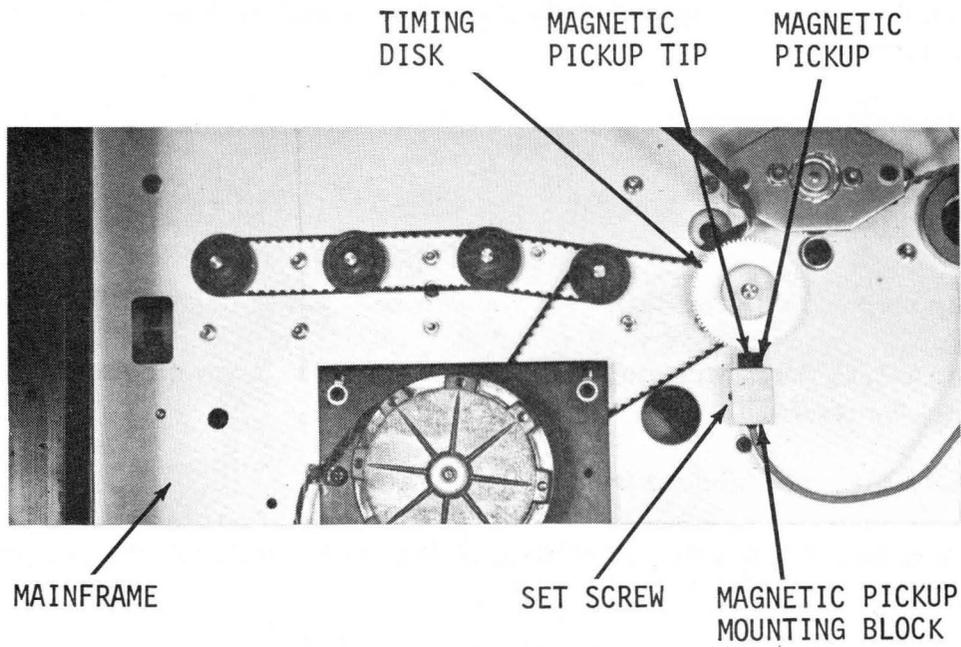
Figure 9-13. Magnetic Pickup Replacement

SUPPORT FOLLOWER CASTING FOLLOWER SHAFT HOPPER FOLLOWER

FAN MOTOR CONNECTOR
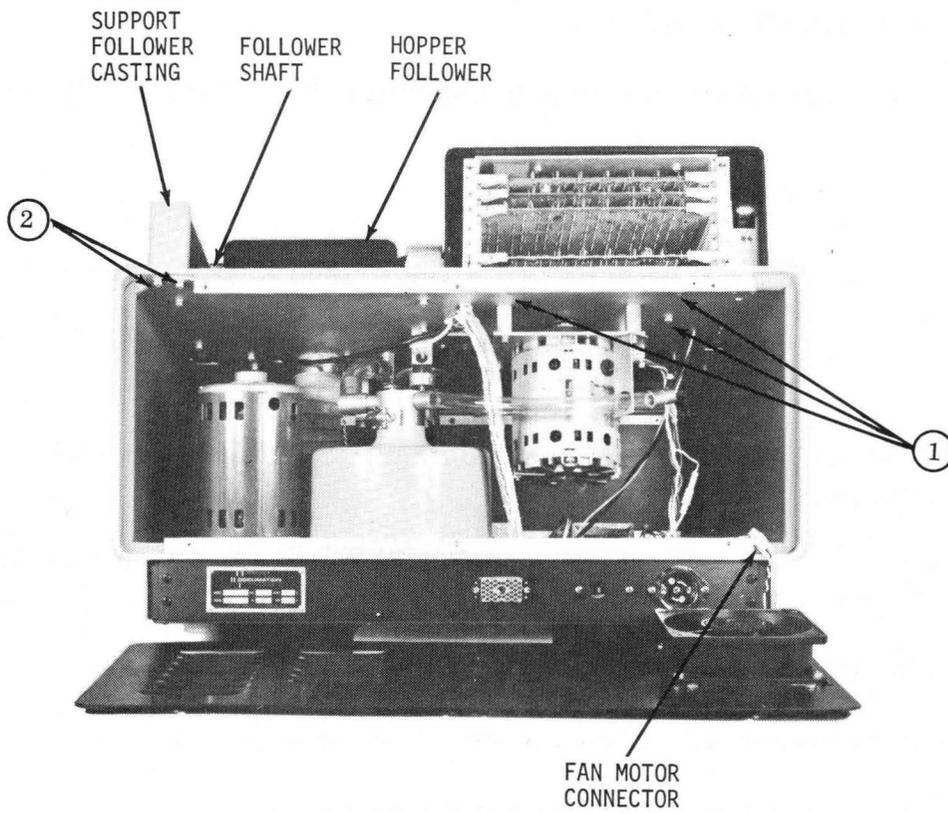
Figure 9-14. Card Cage Repositioning
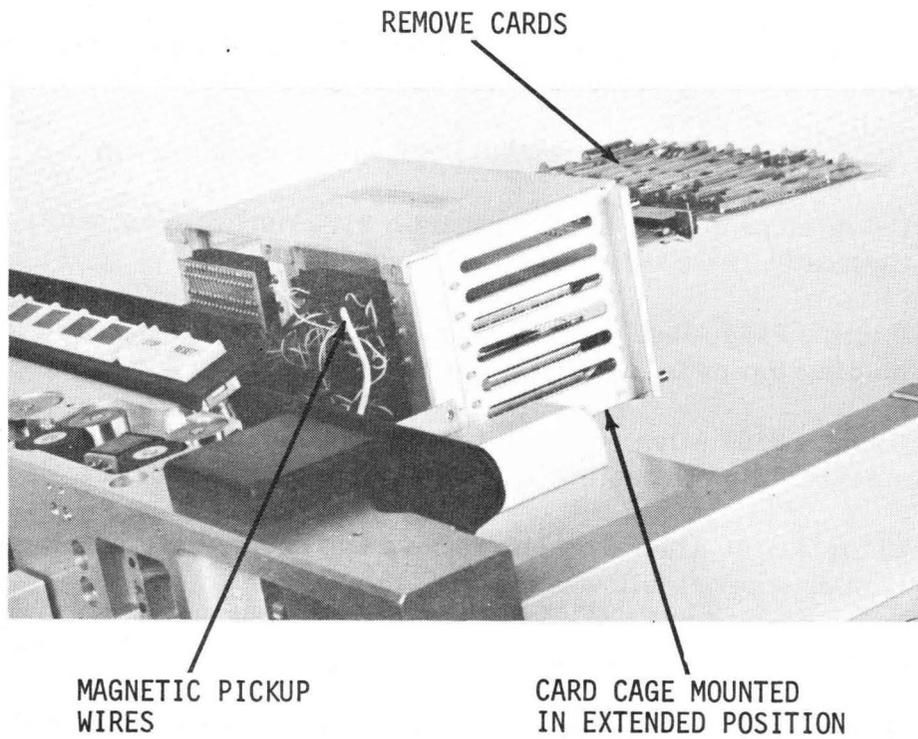
Figure 9-15. Card Cage in Extended Position
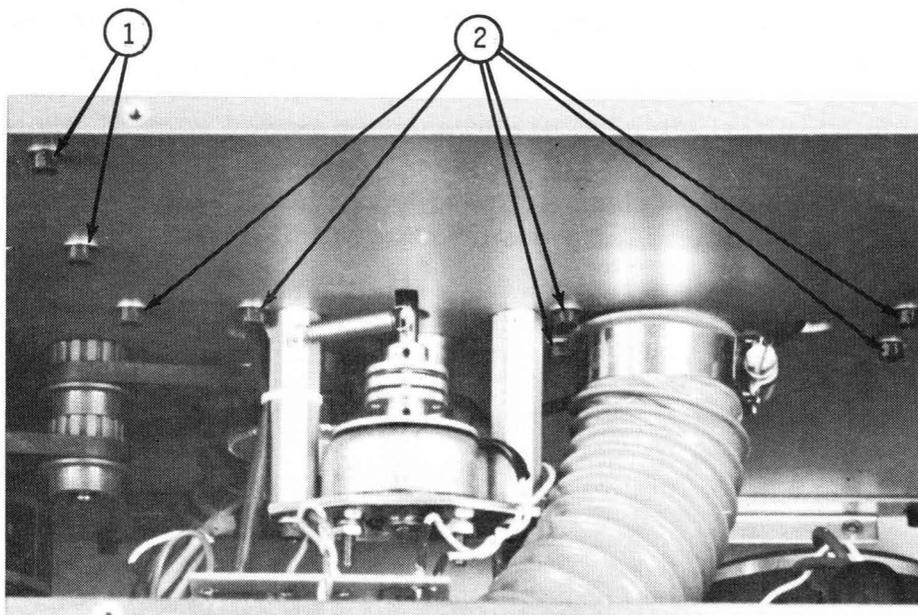
Figure 9-16. Picker Casting Removal

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 Bearing Assemblies
Light Station   First and Second Picker Roller Bearing Assemblies

    a.   To remove the Picker Support Assembly proceed as follows:

       1.   Using steps a. and b. of paragraph 9.3, remove front and rear panels, figures 9-1 and 9-2.

       2.   Using a 5/64 Allen wrench, remove four button head screws ③ , holding top panel cover, figure 9-1.

       3.   Using a 9/64 Allen wrench, remove two socket head screws ① holding stacker follower casting, figure 9-16, front of reader.

       4.   Using a 9/64 Allen wrench, remove two socket head screws holding hopper support follower casting, figure 9-17.

       5.   Remove hopper follower shaft.

       6.   Pull hopper support follower beyond rear of mainframe sufficiently to expose negator spring screw.

       7.   Using a Phillips screwdriver, remove negator spring screw and allow spring to slowly return to its roller. Remove hopper follower.

       8.   Using a .050 Allen wrench, LOOSEN vacuum tube elbow set screw. figure 9-11. Slide elbow off vacuum tube and move to left.

       9.   LOOSEN adapter clamp screw at top of vacuum pump assembly and with a slight upward pressure remove this adapter from card reader.

    10.   LOOSEN screw on two large hose clamps; remove blower hose, figure 9-10.

    11.   Remove solenoid return spring, figure 9-8.

    12.   Using a 1/16 Allen wrench, LOOSEN two top solenoid coupling set screws.

    13.   Using a 9/64 Allen wrench, remove two socket head screws ① holding solenoid assembly. Lay solenoid assembly on baseplate.
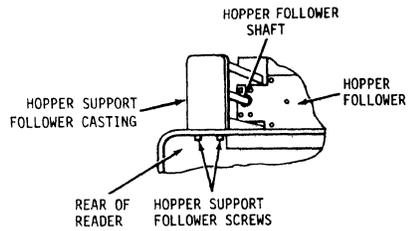
Figure 9-17. Hopper Follower Assembly Removal

14. Using a 9/64 Allen wrench, remove six socket head screws ② holding picker casting.

15. Remove plastic tie-down holding light station cable on solenoid mounting post.

16. Remove plastic tie-down holding hopper empty switch cable, figure 9-19.

17. Lift picker casting straight up and lay on chassis, figure 9-18.

b. To replace the Picker Support Assembly proceed as follows:

1. Set picker casting in place, figure 9-19.

2. Using LOCTITE GRADE C, set all six socket head screws ② , figure 9-16, BUT DO NOT TIGHTEN.

3. Adjust position of picker casting per paragraph 6.10.

4. The remainder of the reader may now be assembled in reverse order of disassembly.

5. Readjust the picker sector per paragraph 6.8.

FOURTH STACKER
ROLLER BEARINGS

①

FIFTH STACKER
ROLLER BEARINGS

SECOND PICKER
ROLLER BEARINGS

FIRST PICKER
ROLLER BEARINGS

②
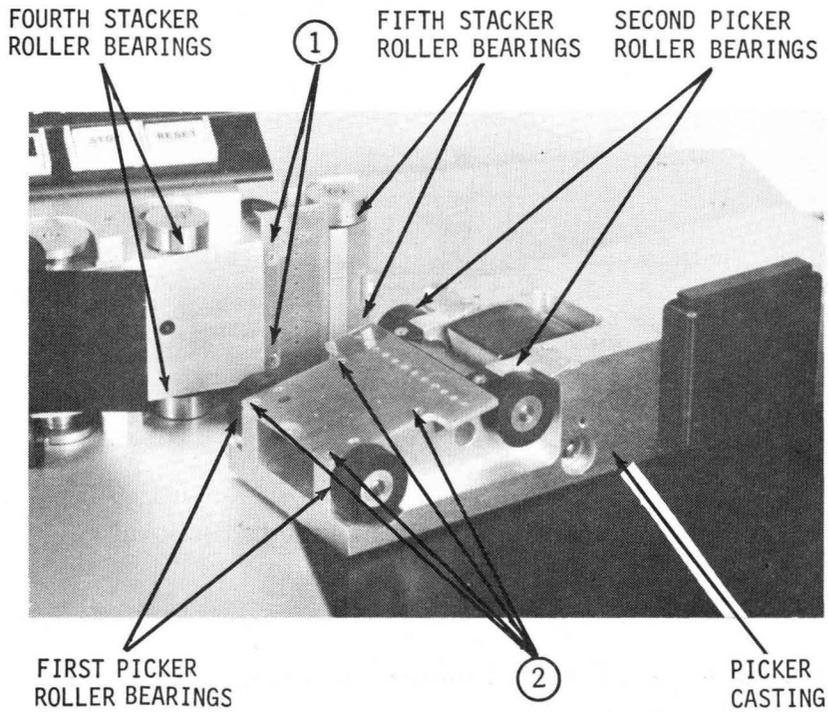
PICKER
CASTING

Figure 9-18. Picker Casting Removed From Reader

PICKER SECTOR
SET SCREWS

RETAINING RING
AND SPACERS

HOPPER EMPTY
SWITCH

SWITCH
SCREWS

PICKER
BUMPER
SCREWS

PICKER
SECTOR

PICKER STOP
SCREWS

HOPPER EMPTY
SWITCH TIE-DOWN
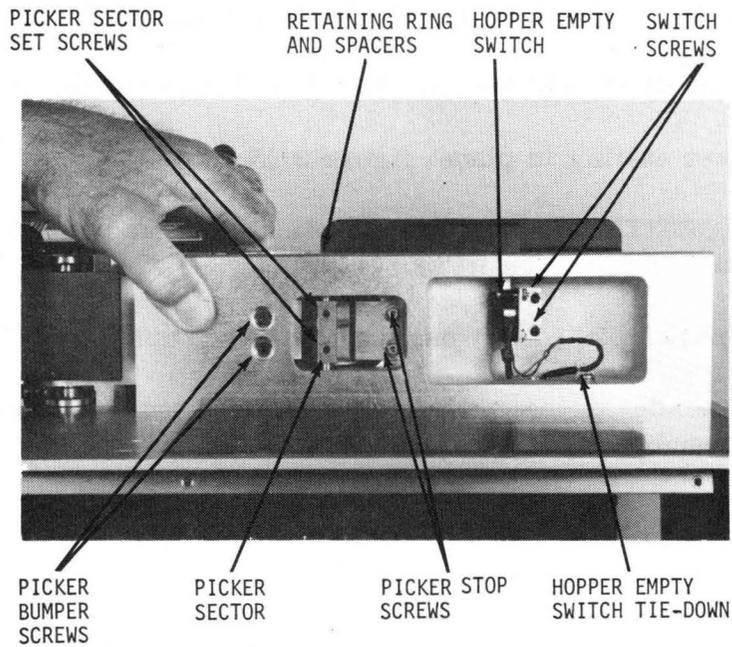
Figure 9-19. Replacement of Picker Casting And
Picker Sector, Front View

9.12 READ HEAD

a. Remove picker support assembly per paragraph 9.11 a.

b. Remove two button head screws each side of card cage cover and remove main card cage cover sliding back slightly and lifting upward, figure 9-9.

c. Remove four button head screws and remove rear card cage panel.

d. Using a 9/64 Allen wrench, remove three socket head screws ① holding card cage in place. Move card cage to rear and remount using two rear screws. figures 9-14 and 9-15.

e. Remove all cards from card cage using extractor levers, figure 9-15.

f. Using AMP tool 465195-2, remove read head wires from connector per the following diagram.

```
BLUE ―――――――――
GREEN ―――――――
YELLOW ――――――
ORANGE ―――――
RED ―――――
BROWN ――――
BLACK ―
        ┌──┬──┬──┬──┬──┬──┬──┐      VIEWED FROM
        │12│13│14│15│16│17│18│  ⊗   FRONT OF
        ├──┼──┼──┼──┼──┼──┼──┤      READER
        │P │R │S │T │U │V │  │
                              ⊗
                     └ BLUE/W
                       GREEN/W
                       YELLOW/W
                       ORANGE/W
                       RED/W
                       BROWN/W
```
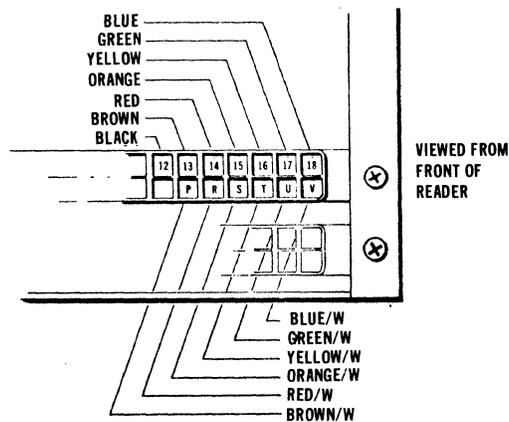
g. Remove two flat head Phillips screws ① to remove read head, figure 9-18.

h. Replace read head and connectors in card cage making sure wires are installed in proper color coded positions.

i. Replace picker support assembly per paragraph 9.11 b.

9.13 LIGHT STATION

a. Remove picker support assembly per paragraph 9.11. a.

b. Remove four flat head Phillips screws ② to remove light station, figure 9-18.

c. Slide off plastic tie-down holding light station cable connector on power supply.

d. Remove light station connector from power supply.

e. Replace light station, plug connector into power supply, and replace tie down.

f. Replace picker support assembly per paragraph 9.11. b.

9.14 FOURTH AND FIFTH STACKER ROLLER BEARING ASSEMBLIES

NOTE

Replace both bearings and shaft
with new matched assembly to
assure proper operation.

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 bearing assembly, 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 1/16 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 spacer washer between the top roller and the bearing seat. Remove top roller from shaft.

7. To remove top bearing, use L-shaped tool to lift bearing from casting.

8. 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.

9. Replace bearing, place spacer washer on top bearing and slide bottom spacer and roller under shaft hole.

10. Replace top roller on new shaft, flush with (or SLIGHTLY below) shaft end.

11. Place main drive motor belt around hole for fourth stacker roller shaft. Replace roller shaft in hole. Select feeler gauge (5 to 25 mils) to force roller against bearing.

12. Insert feeler gauge between top plate and bottom roller. Apply firm finger pressure on top roller and tighten set screw in bottom roller.

13. Check for vertical play in fourth stacker shaft. If there is vertical play, LOOSEN set screw in bottom roller and repeat substep 12 to eliminate play.

14. 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.

15. Replace top pulley of fourth stacker roller on shaft and push pulley upward until it is engages with main drive motor belt, figures 9-5 and 9-6.

16. 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.

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

18. Replace third stacker drive belt on third stacker roller and around
fourth stacker shaft. Hold drive belt in this position.

19. 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.

20. 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.

21. Rotate bottom pulley so that set screw is on flat side of shaft.
Tighten set screw.

22. Replace picker support assembly per paragraph 9.16.

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 1/16 Allen wrench, LOOSEN set screw in timing disc,
figure 9-4. Carefully remove disc and wrap it in soft tissue.

2. Use a 1/16 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 spacer washer between top roller and bearing seat. Remove top roller from shaft.

6. To remove top bearing, use L-shaped tool to lift bearing from casting.

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 bearings. Place spacer washer on top bearing and slide bottom spacer and roller under shaft hole.

9. Replace top roller on new shaft, flush with (or SLIGHTLY below) shaft end.

10. Place main drive motor belt around hole for fifth stacker roller shaft. Replace roller shaft in hole. Select feeler gauge (5 to 25 mils) to force roller against bearing.

11. Insert 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 first 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 fourth stacker roller pulley, and around fifth stacker roller shaft. Hold drive belt in this position.

14. 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.

15. 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.

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

17. Replace timing disc on fifth stacker roller shaft, figure 9-4. Rotate timing disc so that set screw is on flat side of shaft and line up timing disc teeth with magnetic pickup tip. Tighten timing disc set screw.

18. The main drive motor belt tension must be adjusted first. Refer to paragraph 6.2.

19. Second, the magnetic pickup and timing disc must be adjusted. Refer to paragraph 6.3.

20. Replace 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 shaft from picker assembly. Remove bottom roller and spacer, and top spacer.

3. To remove top or bottom bearing, use L-shaped tool to pull bearing from casting.

4. Replace bearing, place spacer 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 retained ring and roller, and tighten set screw in roller.

e. Install picker support assembly per paragraph 9.11.b.

9.16 PICKER SECTOR

a. Using a 5/64 Allen wrench, remove four button head screws ③ holding top panel cover, figure 9-1.

b. Perform steps a. and c. through f. of paragraph 9.8. Prop open input hopper follower by taping together 3/4 inch of cards and placing in hopper at right angles.

c. Using a #2 retaining ring remover tool, remove the retaining ring from the top of the picker shaft, figure 9-19.

d. Remove spacers located under the retaining ring, figure 9-19.

CAUTION

ALL OF THE SPACERS MUST BE
REPLACED IN REASSEMBLY.

e. Using a 5/64 Allen wrench, LOOSEN two set screws holding picker sector.

f. Remove picker shaft from bottom of chassis.

g. Using a Phillips screwdriver, remove throat block, figure 9-20.

h. Remove picker sector from rear side of picker casting.

i. Replace picker sector, shaft, all spacers, and retaining ring.

j. Adjust shaft to place sector set screws on flat side of shaft.

k. Using a 6" metal ruler, measure 1.625" from the mainframe up to the center of the row of holes on the picker sector.

l. Retaining this measurement, tighten two picker sector set screws, figure 9-19.

m. Reassemble reader in reverse order of disassembly.

n. Refer to paragraph 6.8 for adjustment of picker sector.
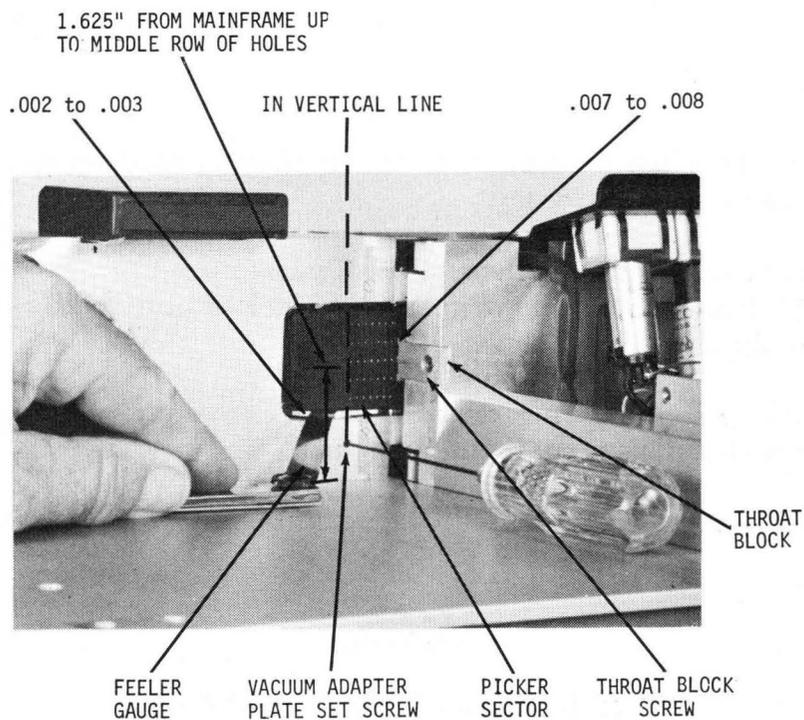
Figure 9-20. Picker Sector, Rear View

9.17 STACKER PHOTOCELL

a. Using a 5/64 Allen wrench, remove four button head screws ③ holding top panel cover, figure 9-1.

b. Remove two button head screws each side of card cage cover, slide backward about 2" and lift off, figure 9-9.

c. Remove four button head screws from rear card cage panel and remove panel.

d. Using a 5/64 Allen wrench, remove six 6 x 32 button head screws holding rear panel, move rear panel out slightly, disconnect fan motor connector, and remove rear panel, figures 9-2 and 9-14.

e. Using a 9/64 Allen wrench, remove three socket head screws 8 holding card cage in place. Move card cage to rear and remount using two rear screws, figures 9-14 and 9-15.

f. Remove all cards from card cage using extractor levers, figure 9-15.

g. Using a 1/16 Allen wrench, LOOSEN set screw in top fourth stacker roller figure 9-7. Remove stacker roller and preload washer.

h. Using a 1/16 Allen screwdriver, LOOSEN set screw in stacker casting holding stacker photocell.

i. Tag black and white wires from photocell. Using AMP tool 465195-2, remove connectors from card cage.

j. Remove photocell from rear of stacker casting, figure 9-21.

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

CAUTION

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

l. Replace connectors in card cage.

m. Replace stacker roller making sure there is no vertical play in stacker roller shaft. Refer to paragraph 6.5 for preloading bearings.

n. Reassemble in reverse order of disassembly.
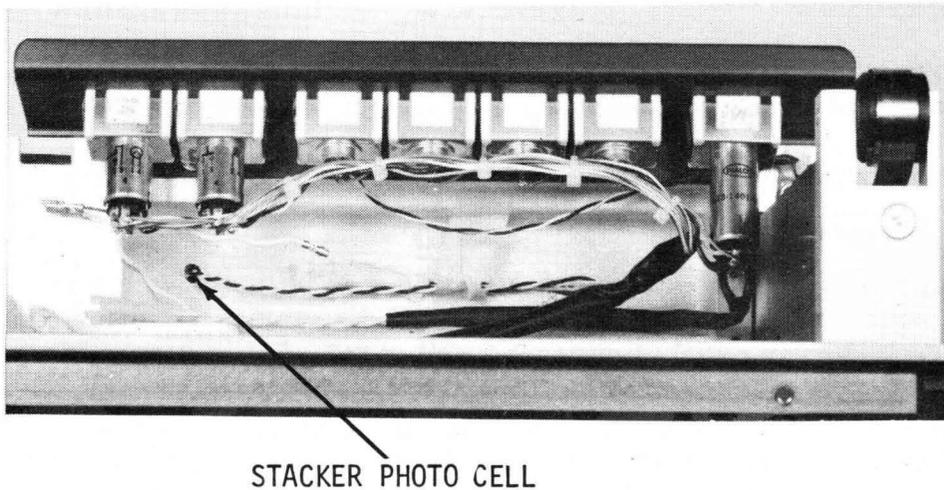
STACKER PHOTO CELL

Figure 9-21.   Location of Stacker Photocell

9.18 HOPPER NEGATOR SPRING

a.   Use steps b., c., and e., of paragraph 9.17 to gain access to negator
spring retaining screw.

b.   Hold spring and remove spring screw.

c.   Pull spring from roller and roll new spring onto roller.

d.   Replace spring screw and reassemble input hopper follower assembly,
figure 9-17.

9.19 LOWER STACKER NEGATOR SPRING

a.   Using a 5/64 Allen wrench, remove six button head screws retaining front
panel and remove front panel, figure 9-1.

b.   Remove two button head screws each side of card cage cover, slide cover
back slightly and lift off, figure 9-9.

c. Using a 9/64 Allen wrench, remove two socket head screws ① holding front stacker shaft support, figure 9-22.

d. LOOSEN set screw in rear stacker shaft support, figure 9-23.

e. Remove stacker shaft, figure 9-22.

f. Move stacker follower sufficiently beyond front edge of chassis to reveal negator spring screw.

g. Hold spring, remove screw, and pull spring from roller.

h. Reroll new spring onto roller and replace spring screw.

i. Reassemble in reverse order of disassembly.
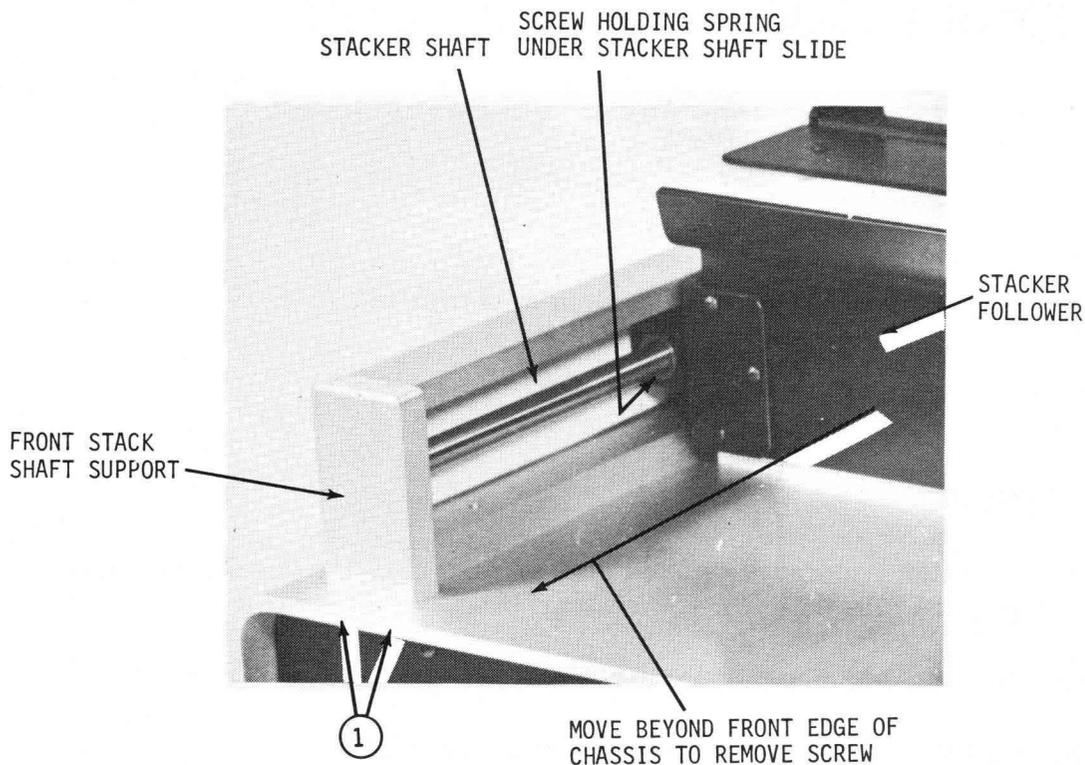
Figure 9-22.   Stacker Negator Spring Replacement
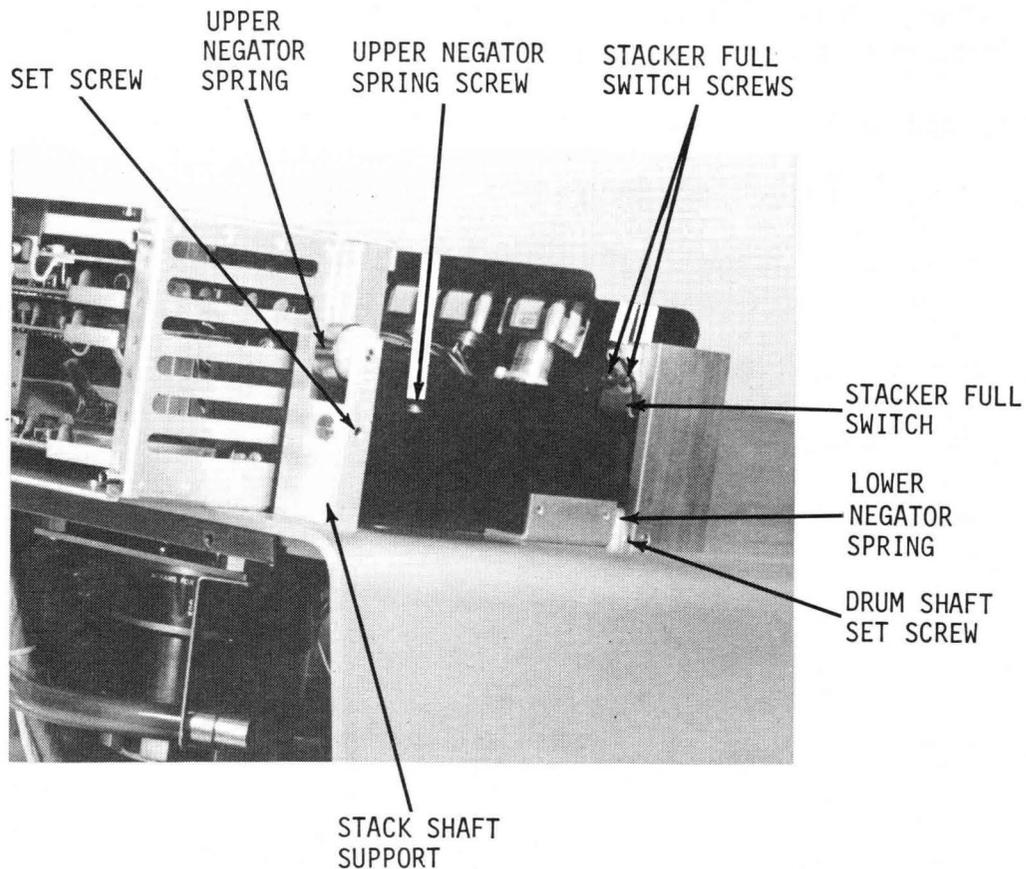
Figure 9-23. Stacker Full Switch Replacement

9.20 UPPER STACKER NEGATOR SPRING

a. Remove two button head screws each side of card cage cover, slide cover back slightly and lift off.

b. Remove upper stacker negator spring screw, figure 9-23.

c. Pull spring from roller and roll new spring onto roller.

d. Replace spring screw.

e. Replace card cage cover.

9.21 HOPPER EMPTY SWITCH

    a.   Using a 5/64 Allen wrench, remove four button head screws ③ , figure 9-1, holding top panel cover.

    b.   Using a 3/32 Allen wrench, remove two socket head screws holding riffle cap.

    c.   Remove two connectors from hopper empty switch, figure 9-19.

    d.   Using a 1/16 Allen wrench, remove two button head screws holding switch.

    e.   Replace switch and adjust per paragraph 6.6.

    f.   Reassemble in reverse order of disassembly.

9.22 STACKER FULL SWITCH

    a.   Remove two button head screws on each side of card cage cover, slide cover back slightly and lift off.

    b.   Remove two Phillips head screws holding stacker full switch, figure 9-23.

    c.   Unsolder leads from switch, and solder to new switch.

    d.   Mount switch and adjust per paragraph 6.7.

    e.   Replace card cage cover.

9.23 INDICATOR LAMPS

    a.   Grasp indicator lens with thumb and forefinger and pull upward with a rocking motion to remove lens.

    b.   Pull lamp from lens.

    c.   Insert new lamp into lens.

    d.   Press lens firmly into switch.

SECTION 10
DRAWINGS
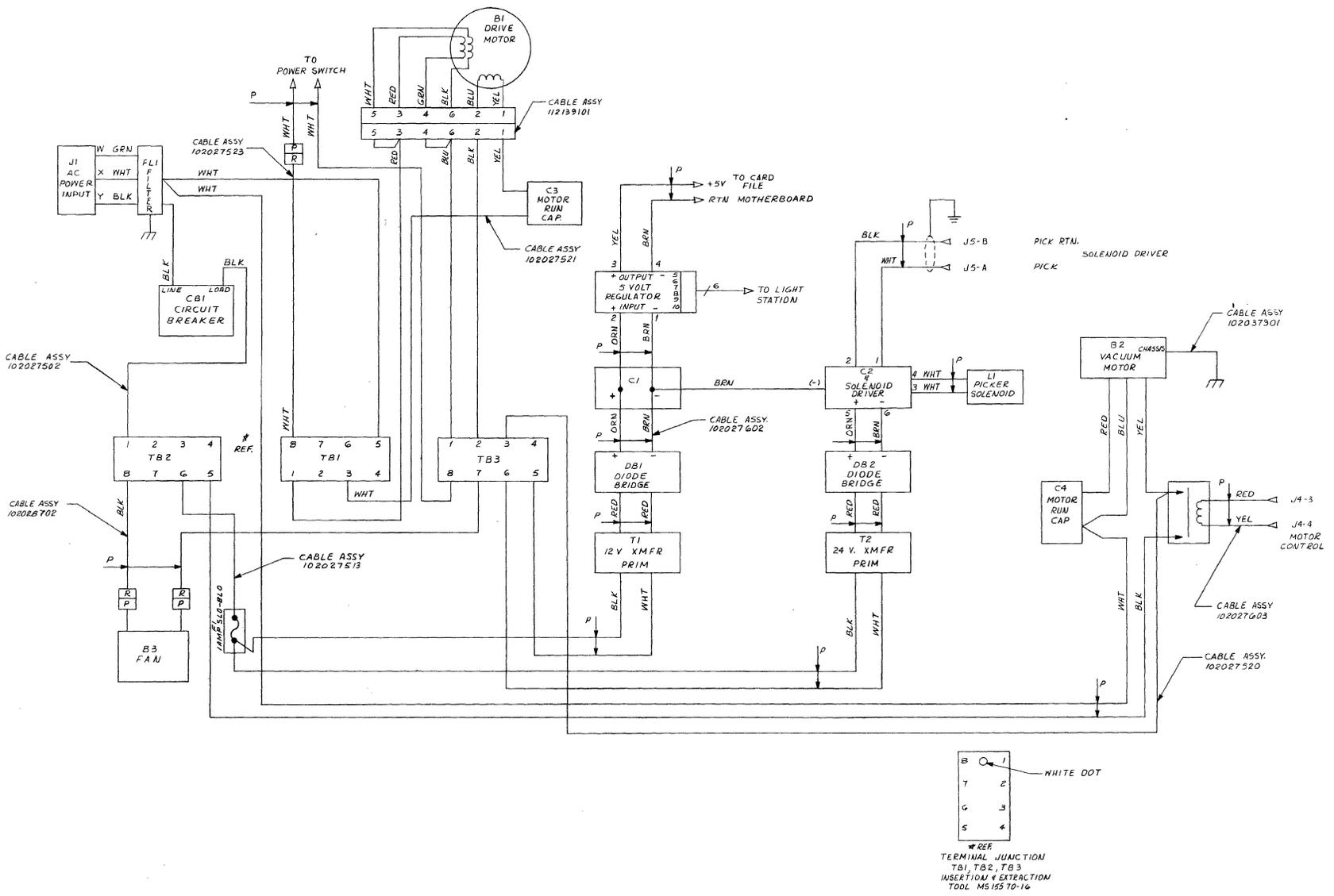
Figure 10-1.   Wiring Diagram, AC Power Distribution, 115 VAC, 60 Hz
(Dwg. No. 1041562)
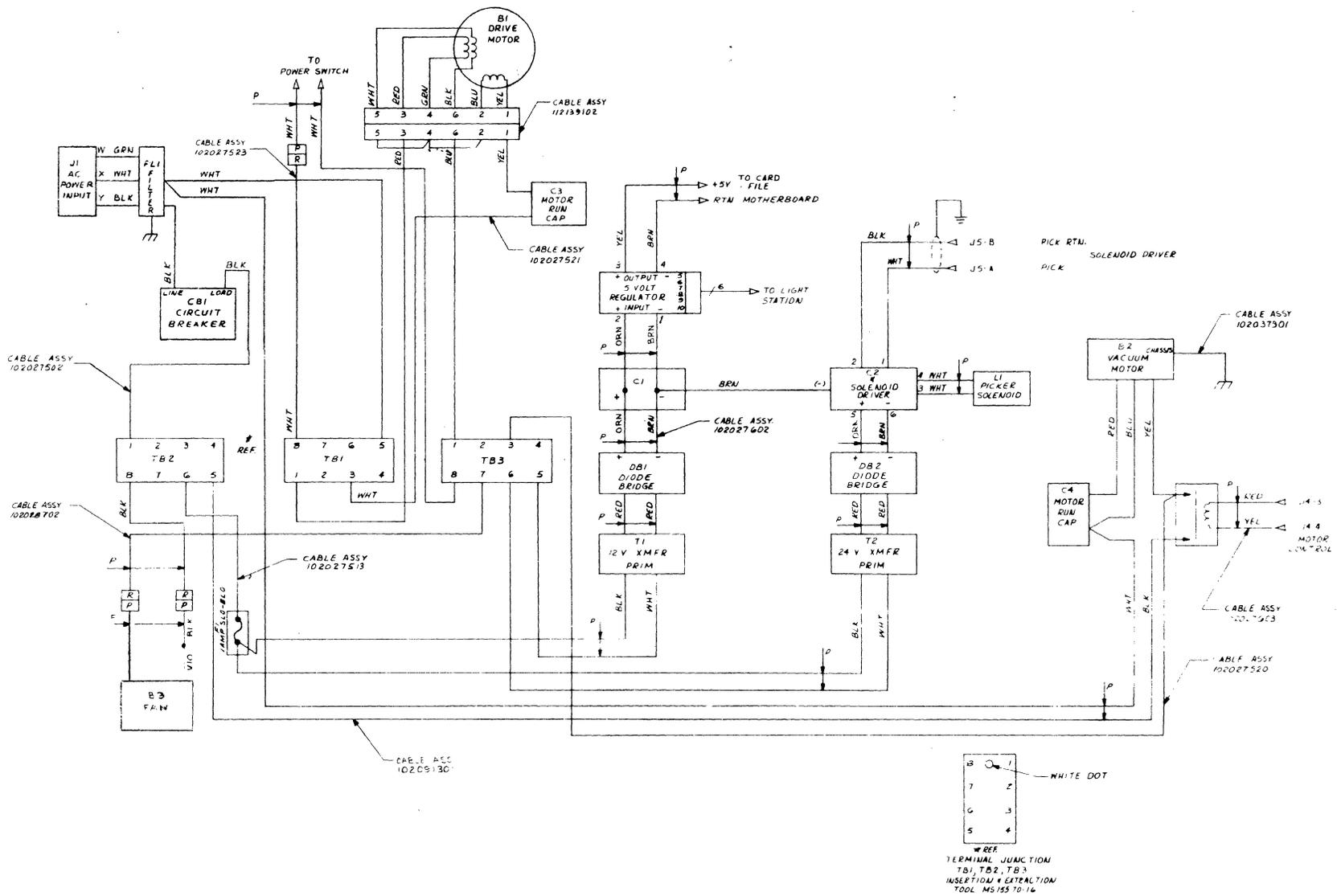
Figure 10-1A. Wiring Diagram, AC Power Distribution, 230 VAC, 50 Hz
(Dwg. No. 1041603)

CLOCK - J3
CARD

ERROR - J4
CARD

SYNC - J5
CARD
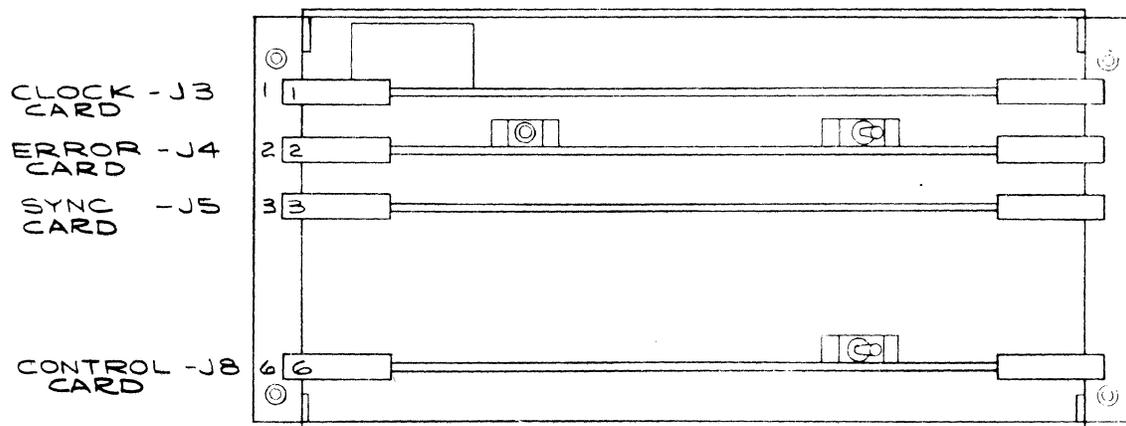
CONTROL - J8
CARD

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

NOTES:
[2] SWITCH SHOWN IN "OUTPUT STACKER FULL" CONDITION.
[3] SWITCH SHOWN IN "INPUT HOPPER EMPTY" CONDITION.

Figure 10-3. Wiring Diagram, Card Cage
(Dwg. No. 1241999)

See AC Wiring Diagram
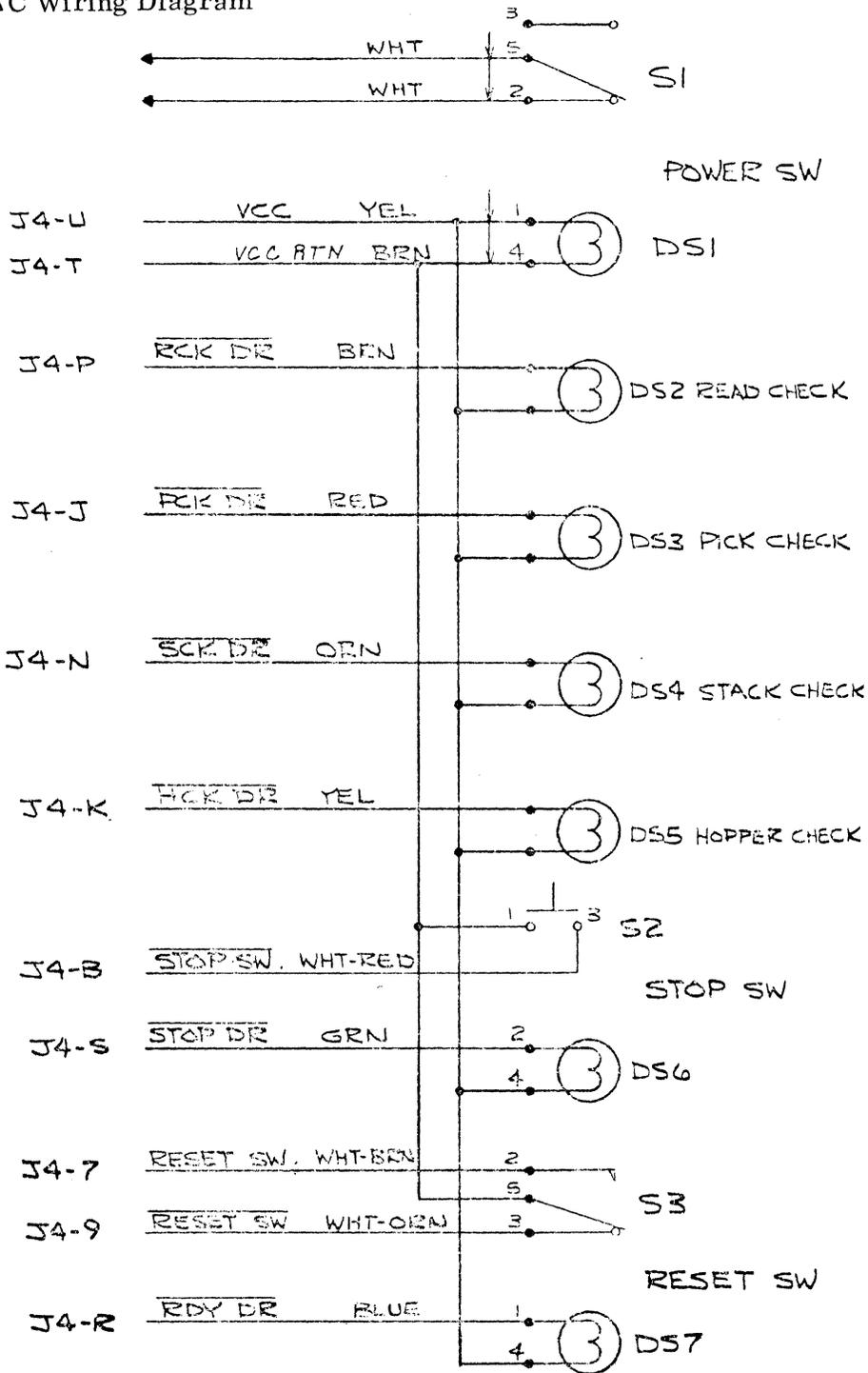
Figure 10-4. Wiring Diagram, Control Panel
(Dwg. No. 1020147)

10-4
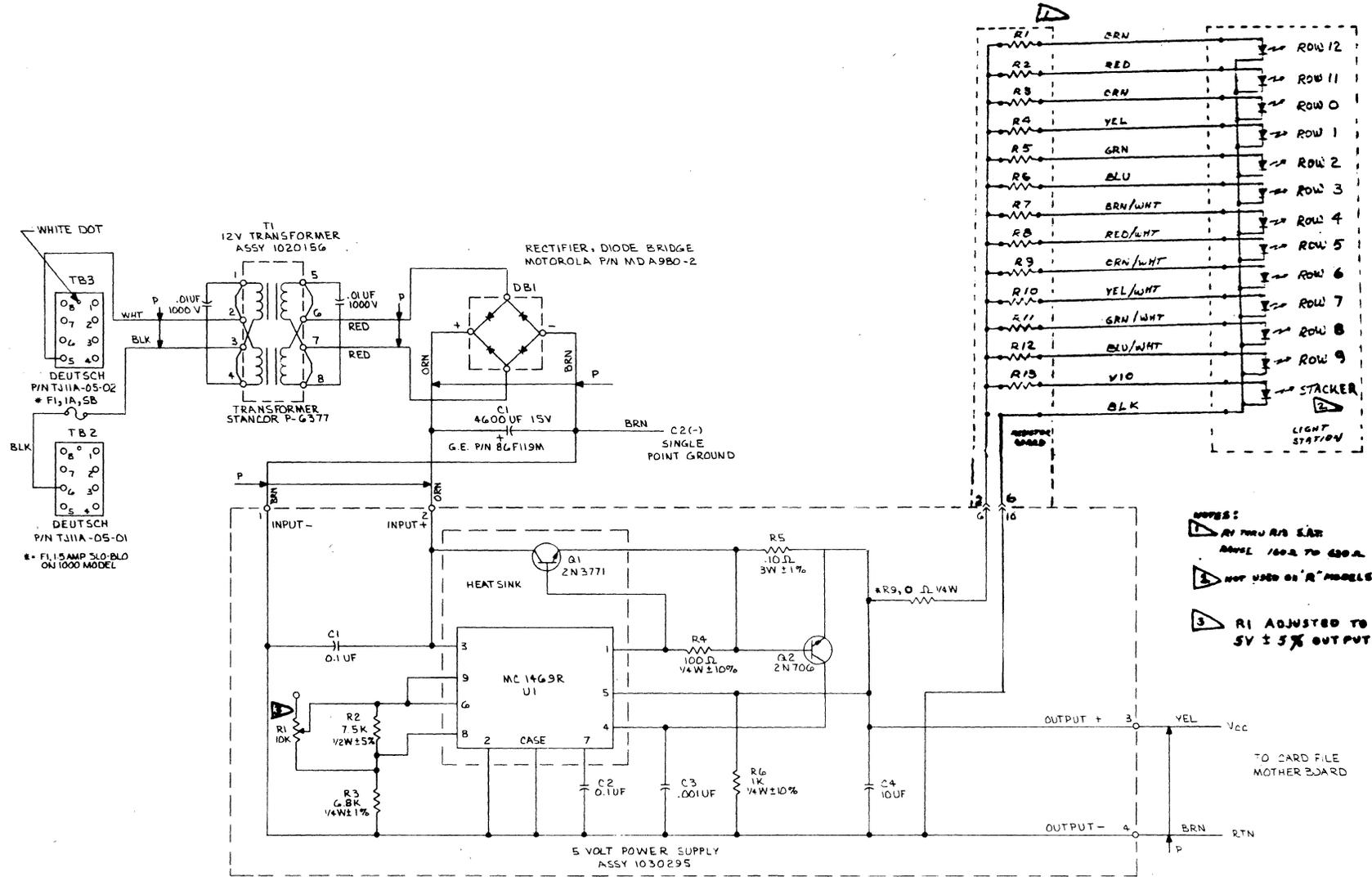
Figure 10-5. Schematic Diagram, 5V Power Supply, 115 VAC, 60 Hz
(Dwg. No. 1040506)
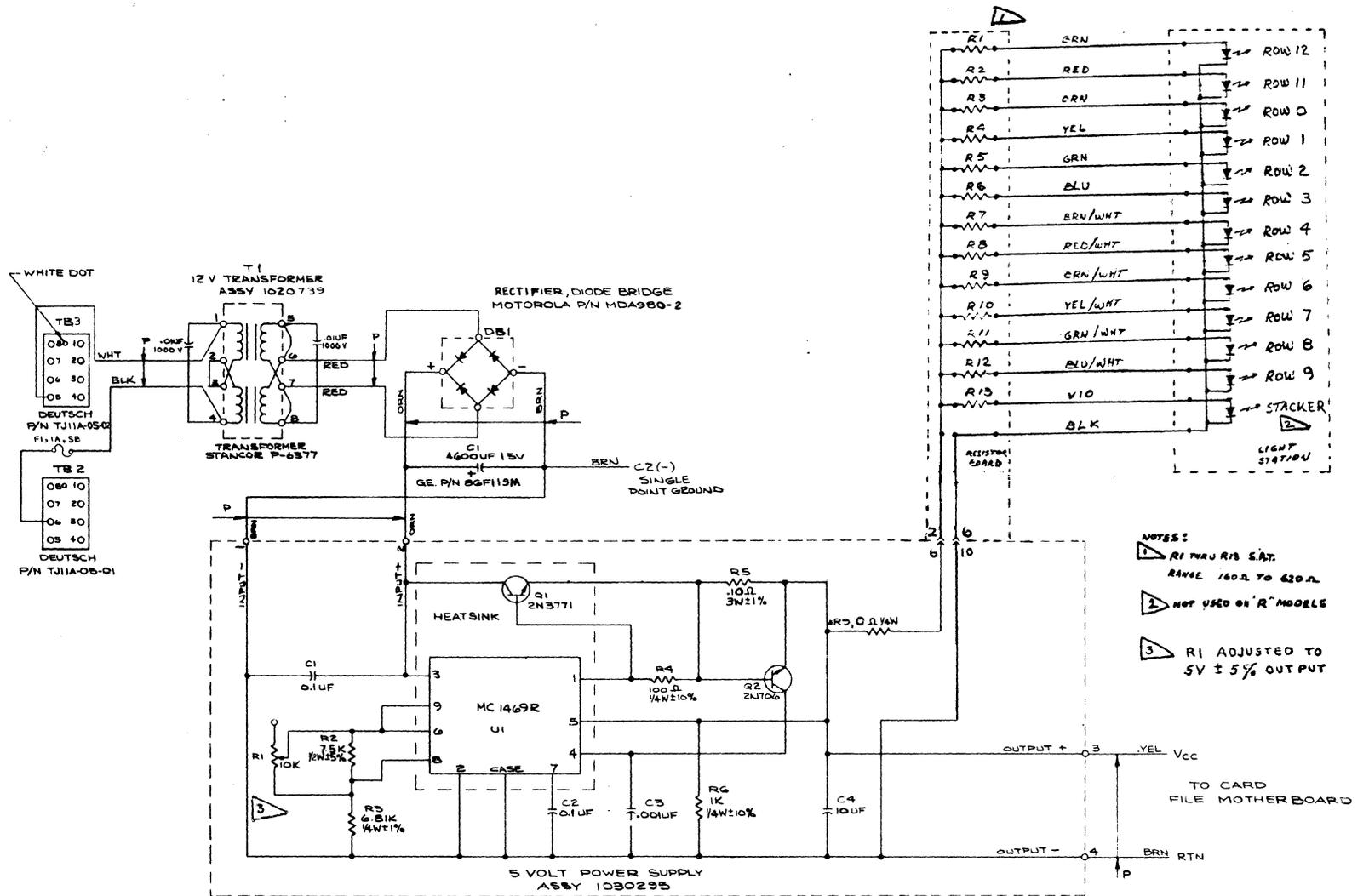
Figure 10-5A. Schematic Diagram, 5V Power Supply, 230 VAC, 50 Hz
(Dwg. No. 1041269)
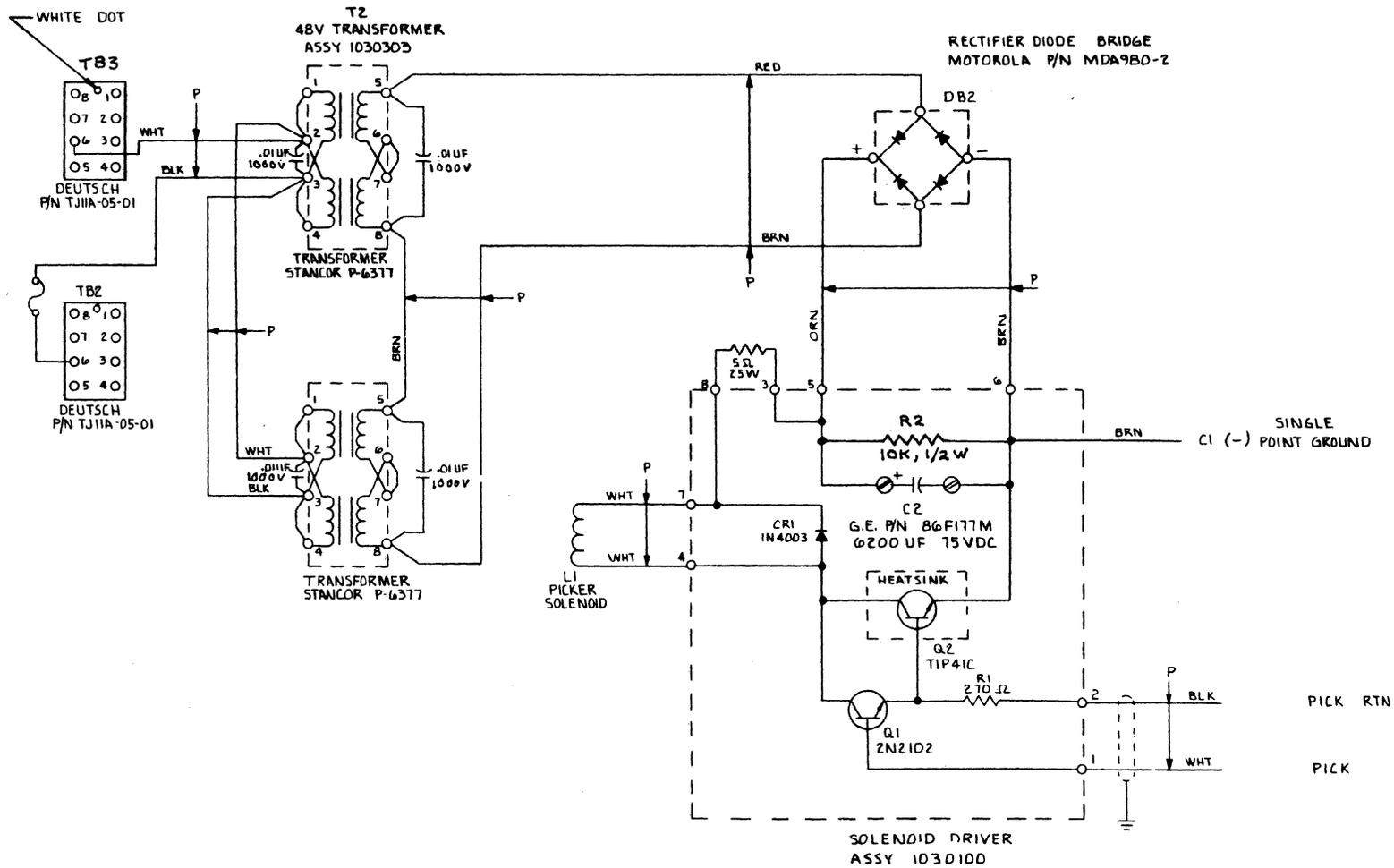
Figure 10-6. Schematic Diagram, Solenoid Driver, 115 VAC, 60 Hz

(Dwg. No. 1341226)

WHITE DOT

TB3

08 10
07 20
06 30
05 40

DEUTSCH
P/N TJ11A-05-02

WHT

BLK

.01 UF
1000V

P

F1, 1A, SB

TB2

08 10
07 20
06 30
05 40

DEUTSCH
P/N TJ11A-05-01

T2
24 V TRANSFORMER
ASSY 1020740

RED

RED

TRANSFORMER
STANCOR P-6377

P

RECTIFIER, DIODE BRIDGE
MOTOROLA P/N MDA980-2

DB2

+

−

P

ORG

BRN

5

6

R2
10K 1/2 W

BRN

SINGLE
C1 (−) POINT GROUND

+

C2
G.E. P/N 86F177M
6200UF 75VDC

P

L1
PICKER
SOLENOID

WHT

WHT

3

4

CR1
1N4003

HEATSINK

Q2
TIP41C

R1
270Ω
1/4 W

2

BLK J5-B   PICK RTN

SOLENOID DRIVER

Q1
2N2102

1

WHT J5-A   PICK

P

SOLENOID DRIVER
ASSY 1030100

Figure 10-6A.   Schematic Diagram, Solenoid Driver, 230 VAC, 50 Hz
(Dwg. No. 1041268)

Figure 10-7.   Assembly Diagram, Clock Card
(Dwg. No. 1040765)
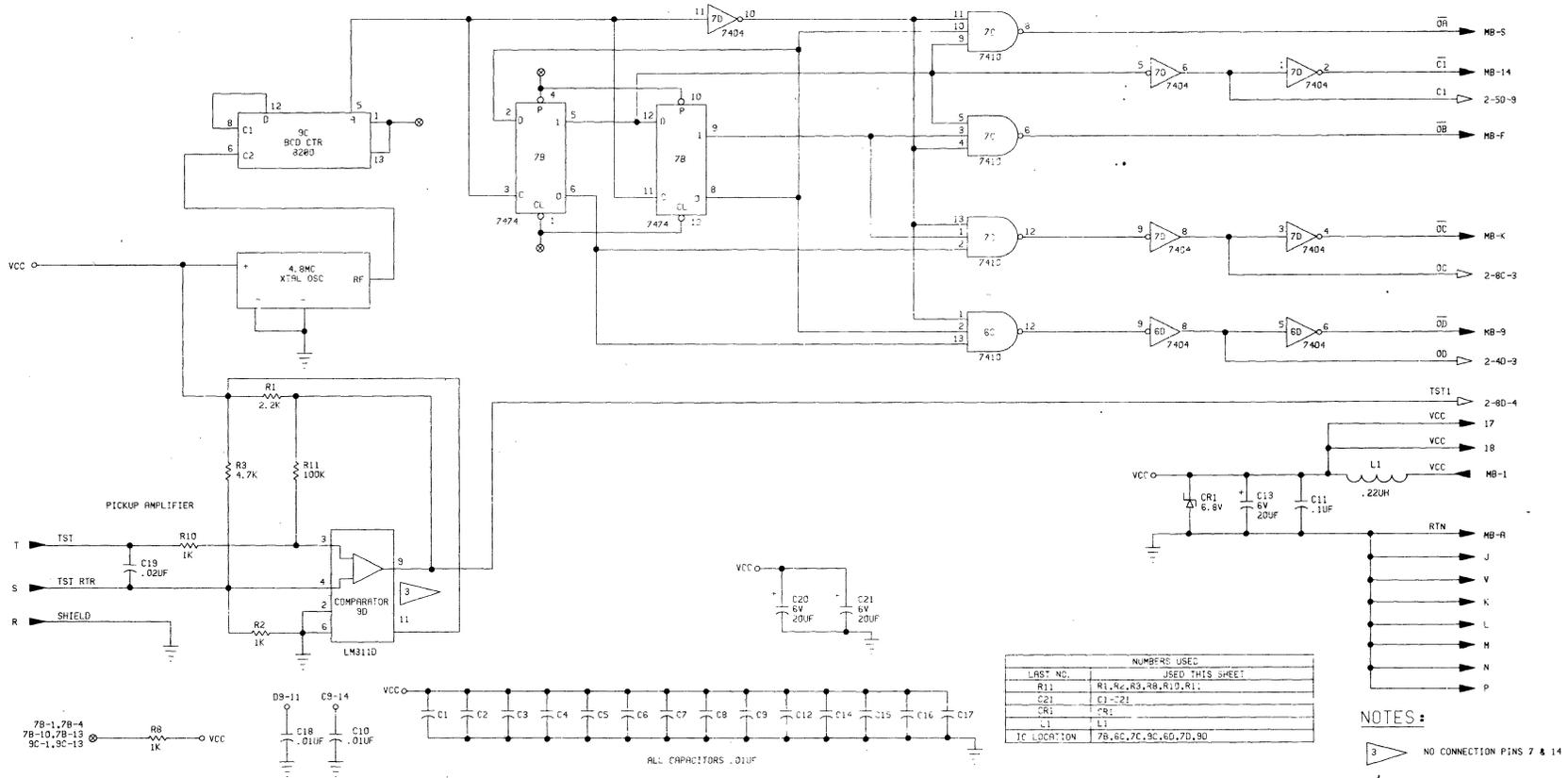
Figure 10-8. Schematic Diagram, Clock Card (Sh. 1 of 3)

(Dwg. No. 1040800)
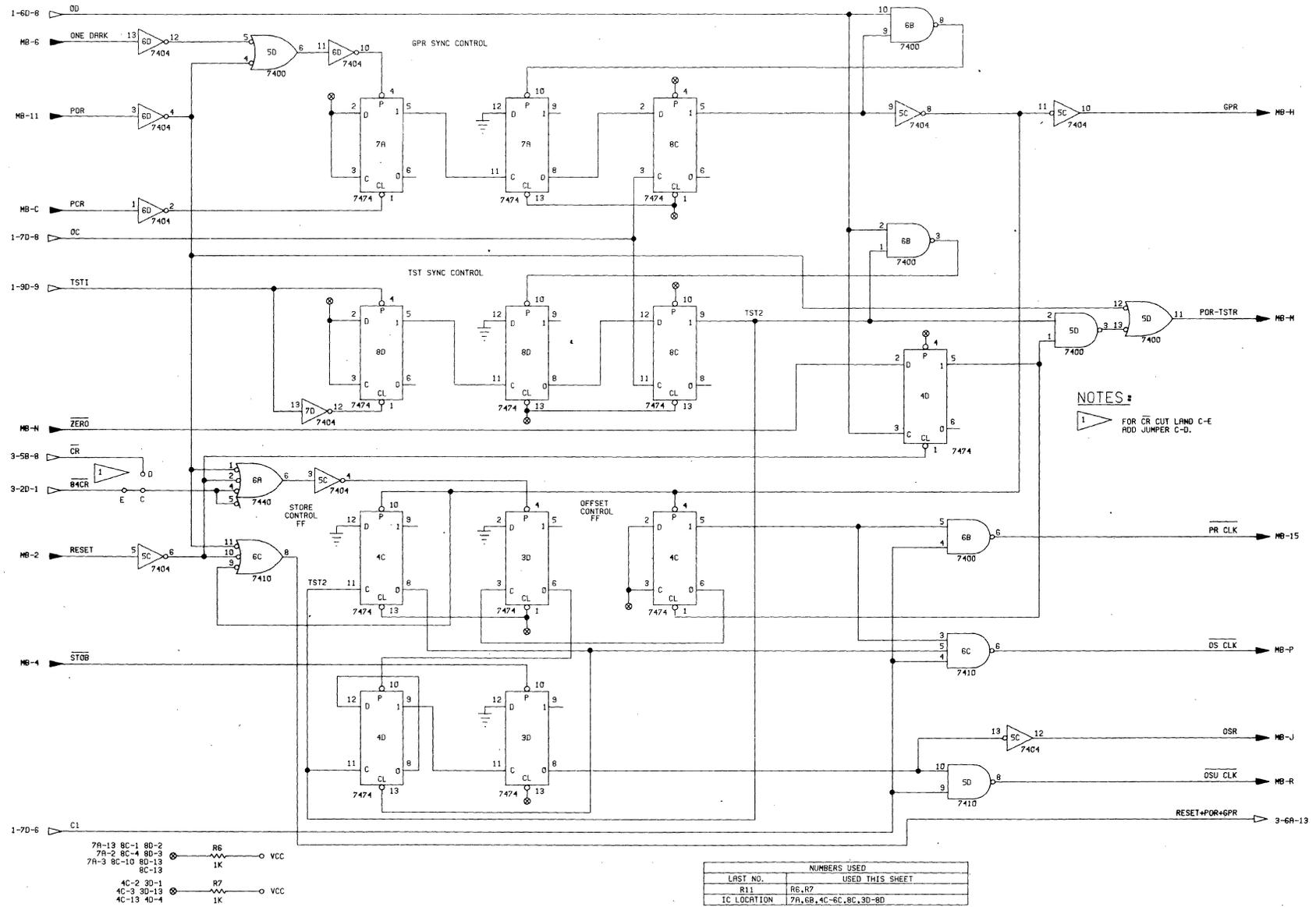
Figure 10-9. Schematic Diagram, Clock Card (Sh. 2 of 3)
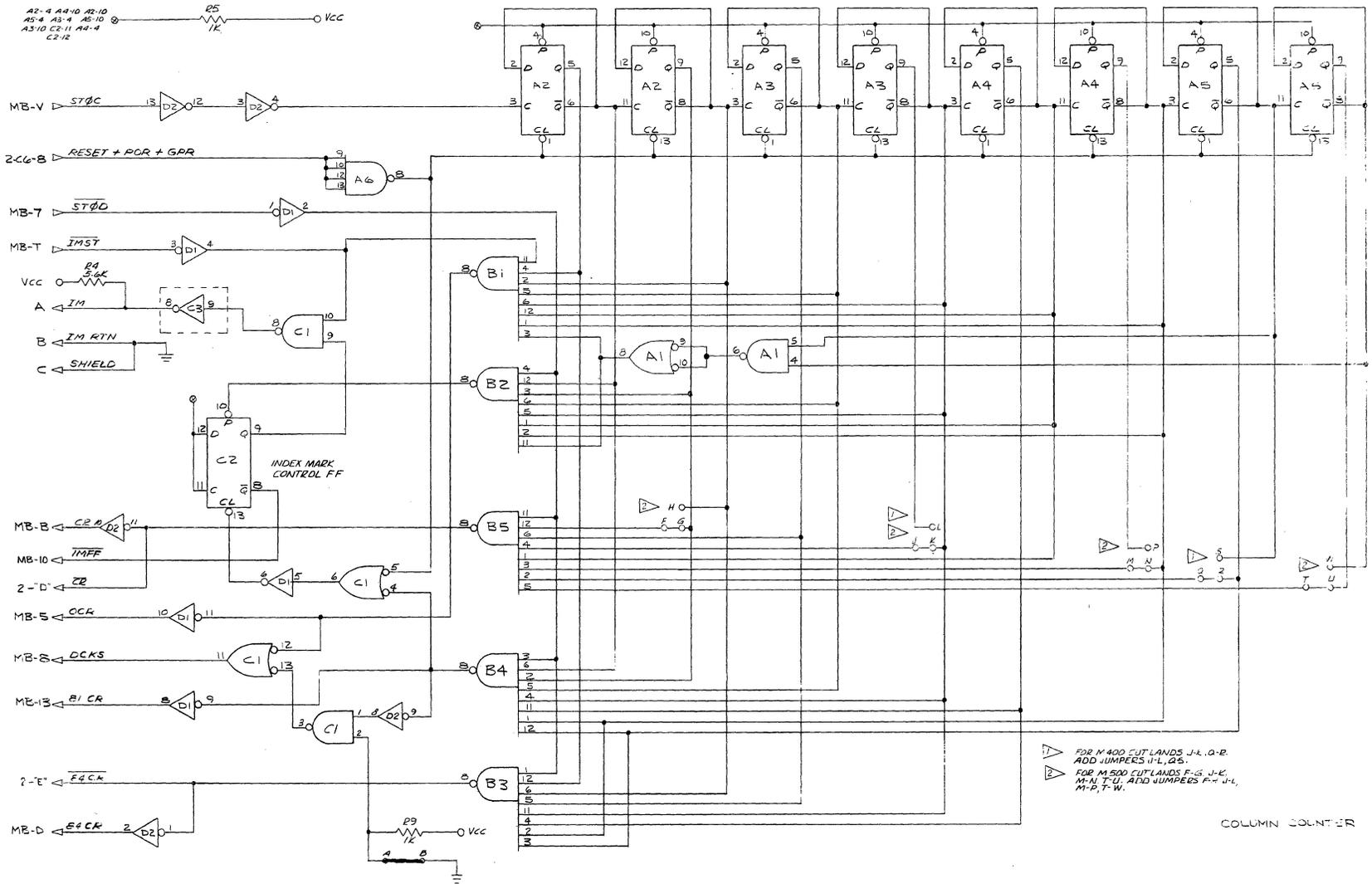
Figure 10-10. Schematic Diagram, Clock Card, (Sh. 3 of 3)

Figure 10-11. Assembly Diagram, Error Card

(Dwg. No. 1040610)
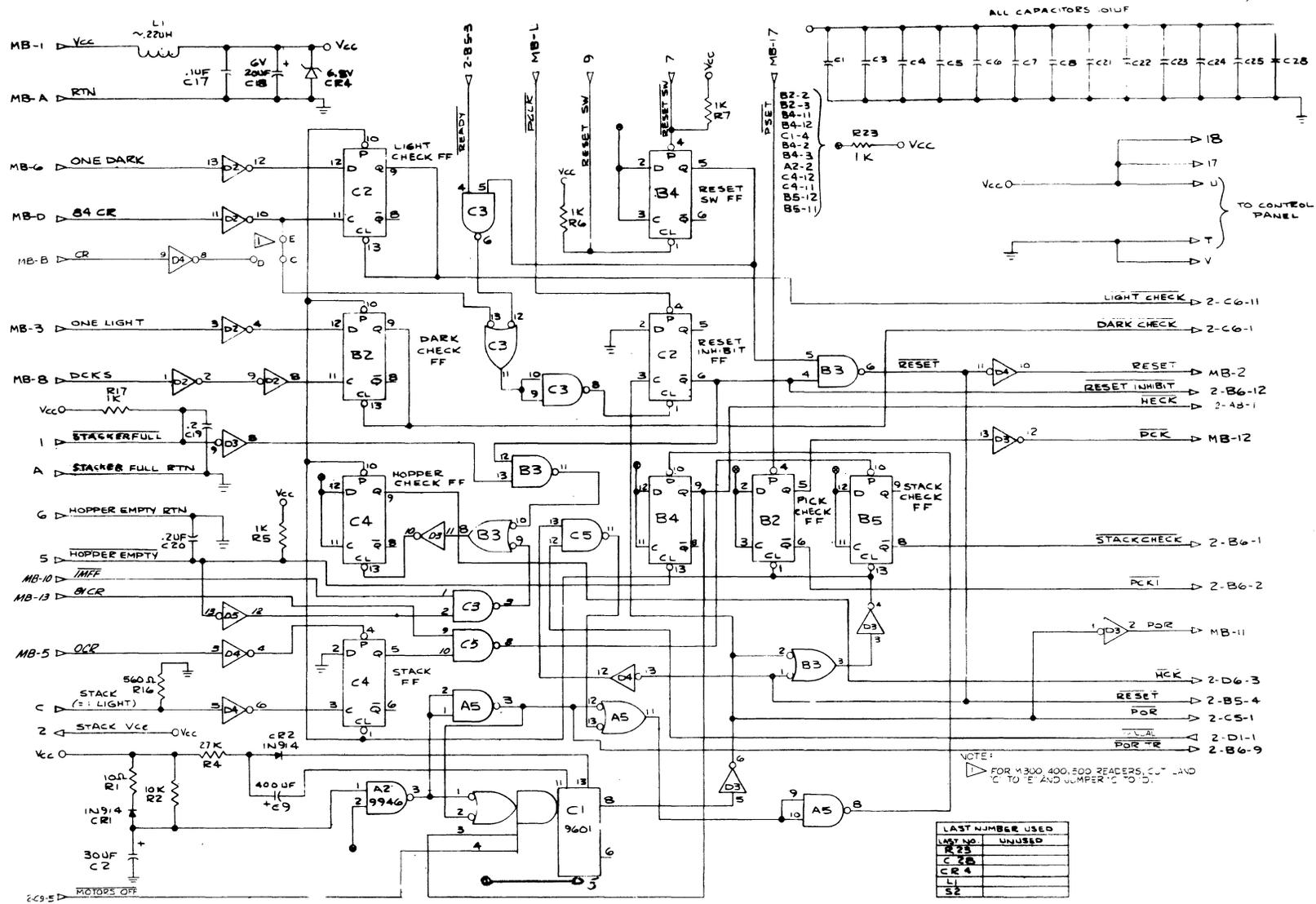
Figure 10-12.   Schematic Diagram, Error Card (Sh. 1 of 2)
(Dwg. No. 1241716)
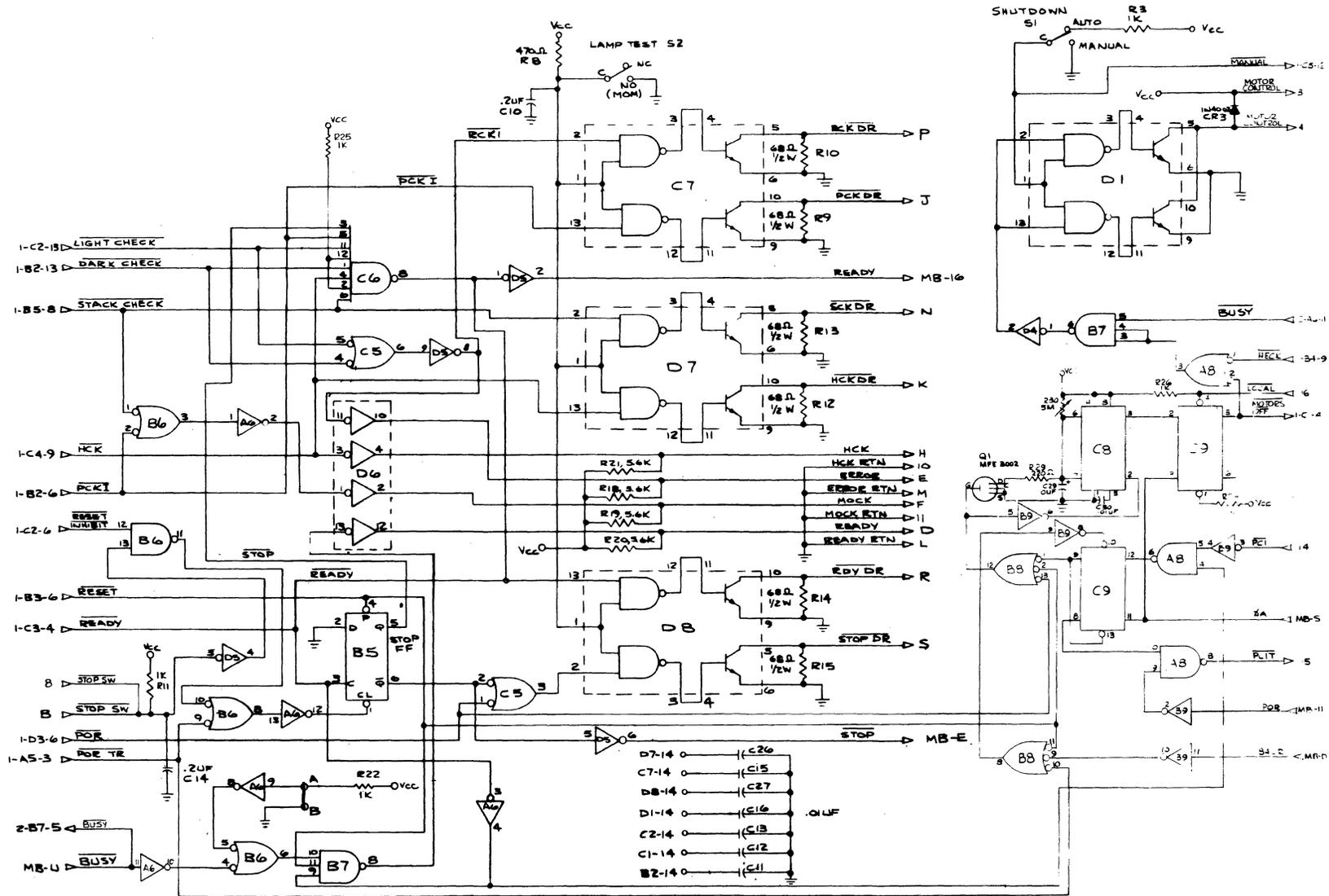
Figure 10-13. Schematic Diagram, Error Card (Sh. 2 of 2)

Figure 10-14.   Assembly Diagram, Sync Card
(Dwg. No. 1040353)
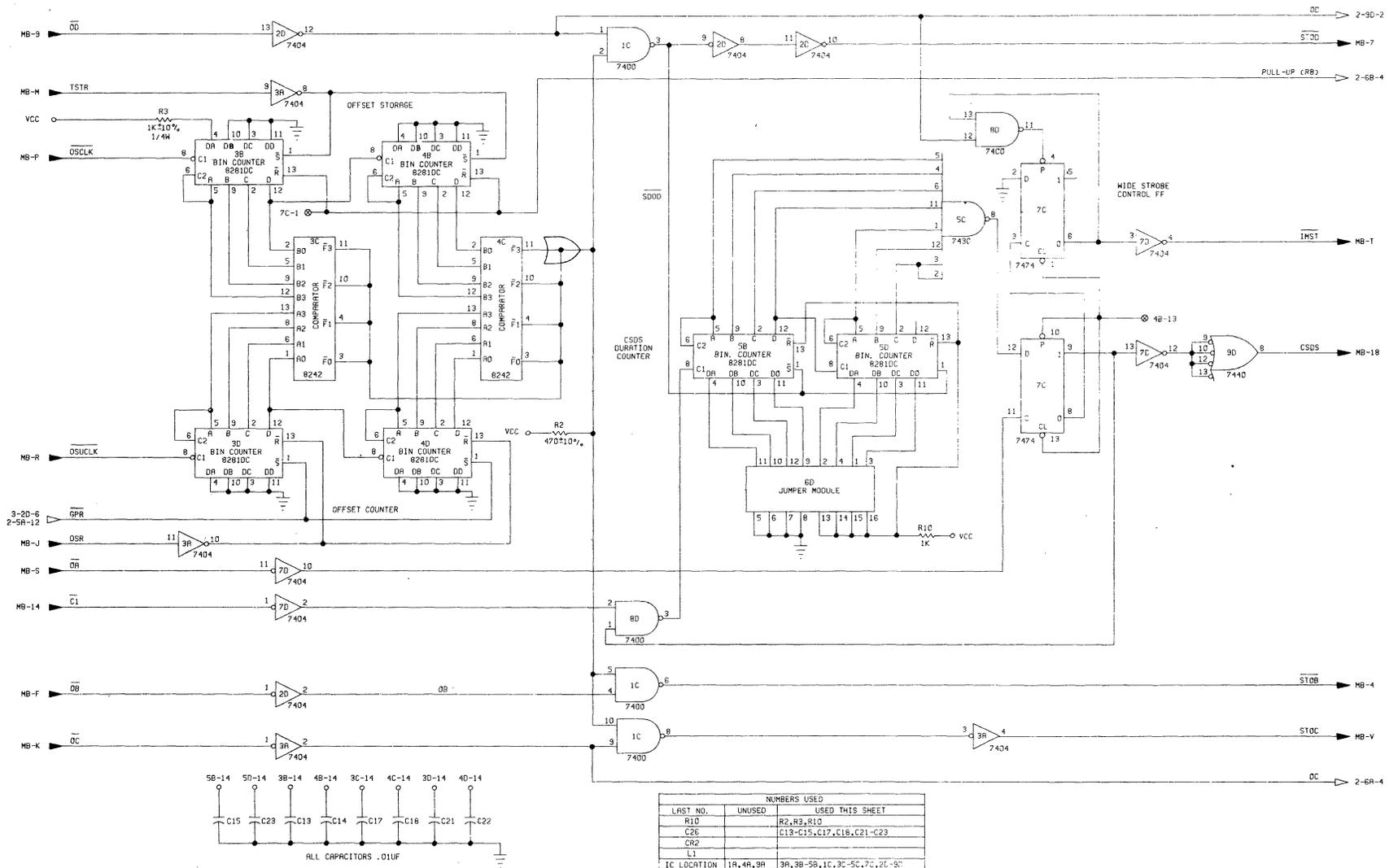
Figure 10-15. Schematic Diagram, Sync Card (Sh. 1 of 3)
(Dwg. No. 1640943)
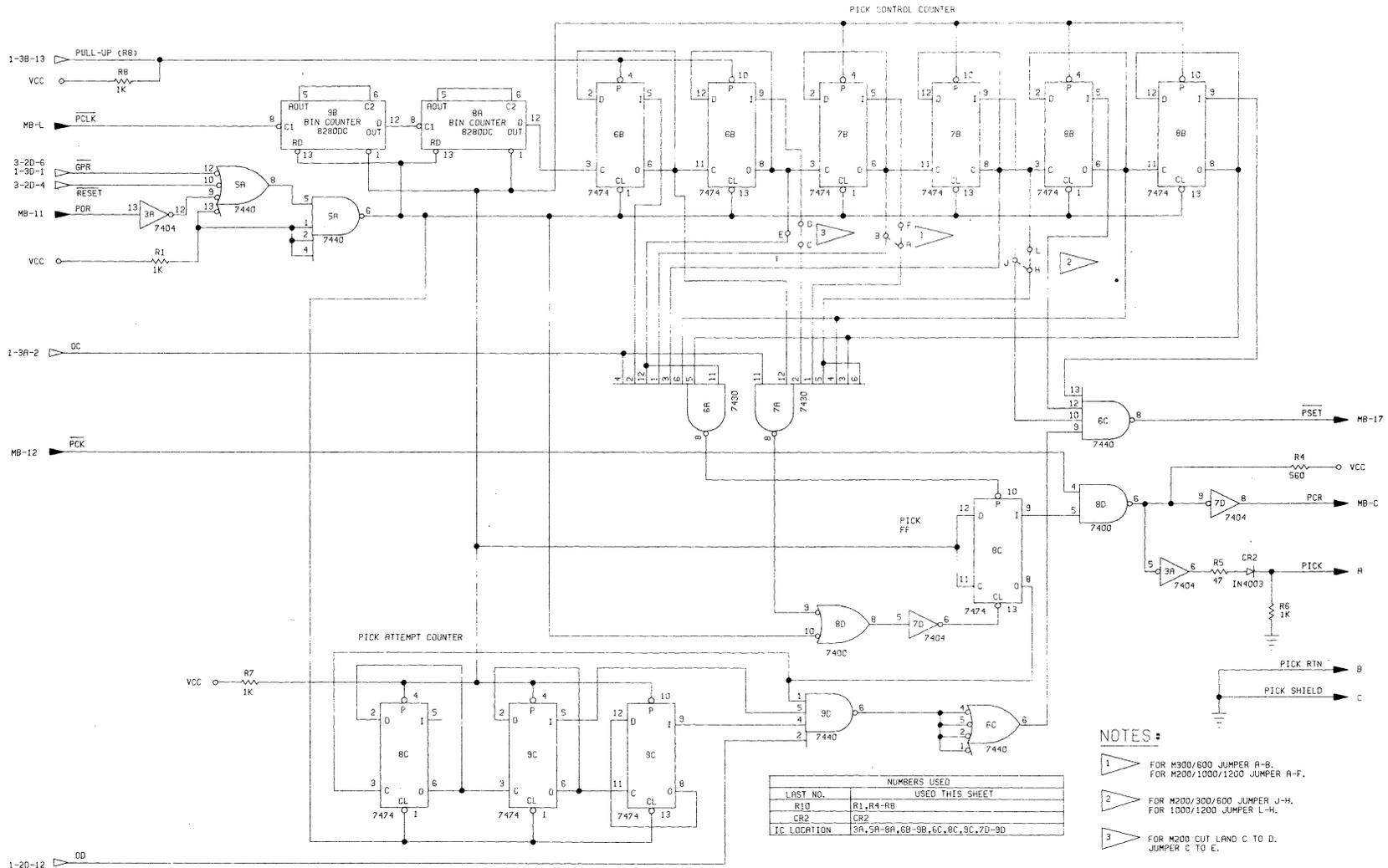
Figure 10-16. Schematic Diagram, Sync Card (Sh. 2 of 3)
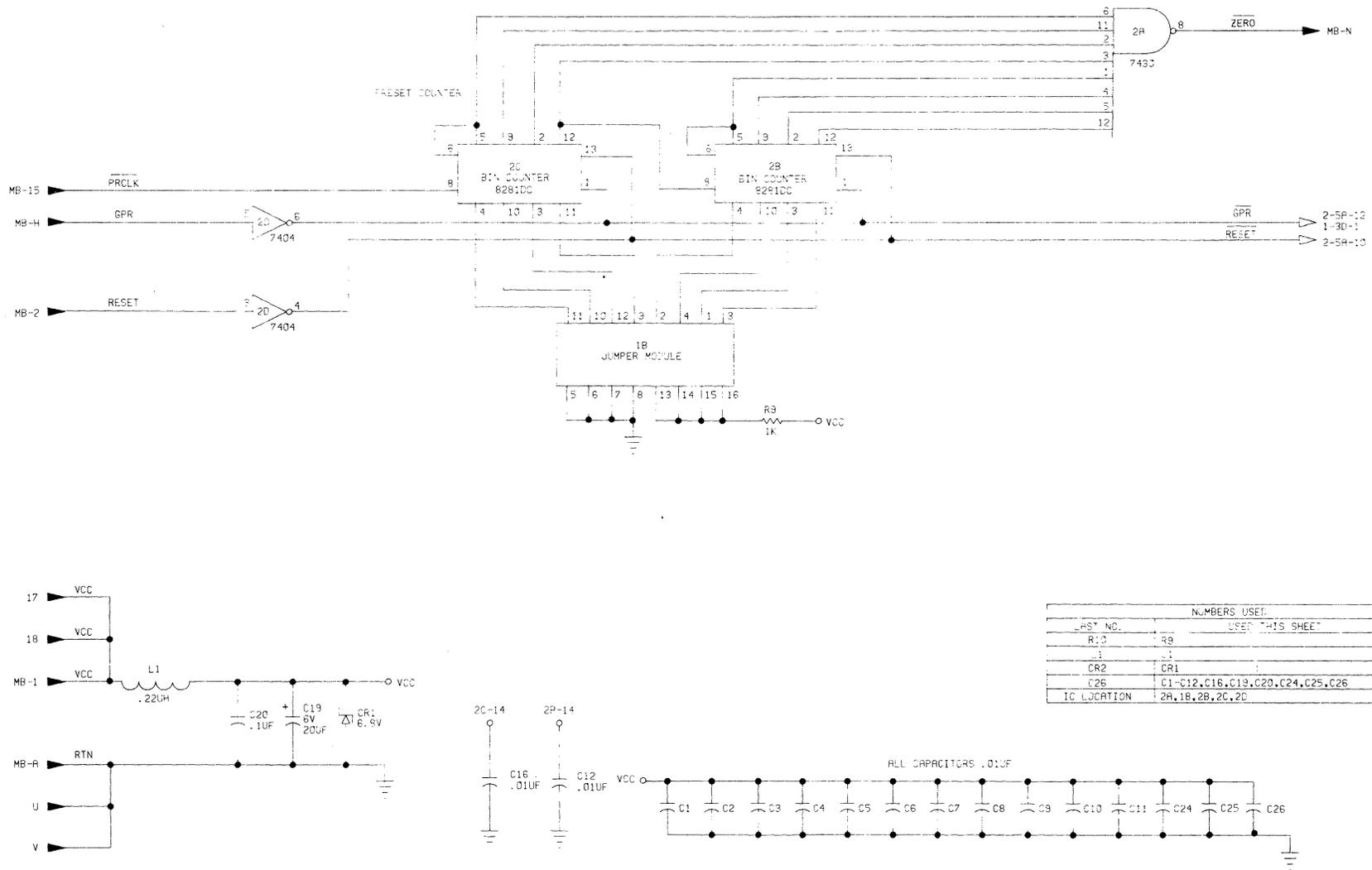
Figure 10-17. Schematic Diagram, Sync Card (Sh. 3 of 3)

TO
PRESET COUNTER

LSB   MSB

1	2	4	8	16	32	64	128
11	10	12	9	2	4	1	3

B1

| 5 | 6 | 7 | 8 | 13 | 14 | 15 | 16 |

Vcc
1K

TO CSDS
DURATION COUNTER

LSB   MSB

1	2	4	8	16	32	64	Not Used
11	10	12	9	2	4	1	3

D6

| 5 | 6 | 7 | 8 | 13 | 14 | 15 | 16 |

Vcc
1K
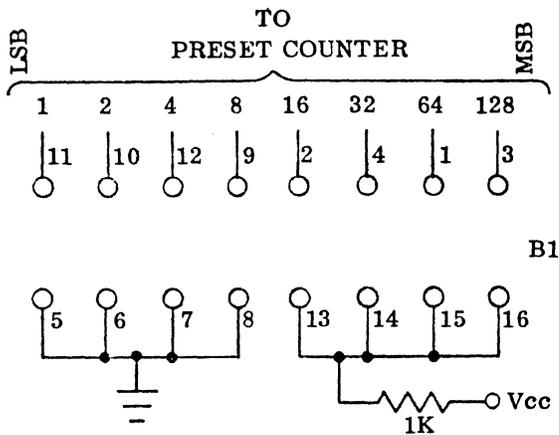
M-SERIES
PRESET TIMING REQUIREMENTS

Model	Count	Time in μsec
M 200	176	1466.0
M 200 (310 CPM)	164	1366.6
M 300/600	75	625.0
M 1000	43	358.3
M 1200	35	291.7
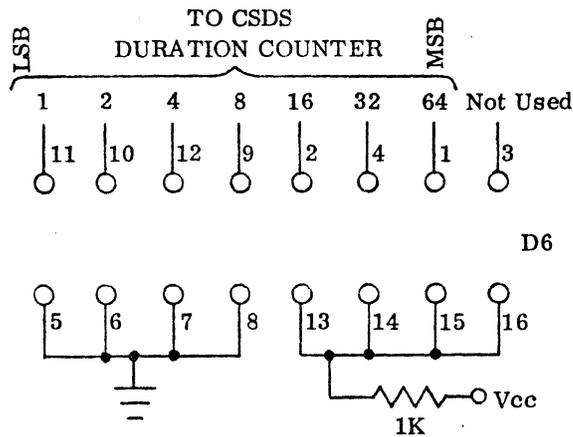
CSDS TIMING REQUIREMENTS

Model	Count	Time in μsec
M 200	72	600.0
M 200 (310 CPM)	72	600.0
M 300/600	31	258.3
M 1000	18	150.0
M 1200	15	125.0

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

    a.   Let ground represent logic "1", and strap pins 5, 6, 7 and/or 8 to create the required count.

    b.   Strap all other pins to Vcc, at pins 13, 14, 15 and/or 16.

Figure 10-17A. Preset and CSDS Counter Strapping
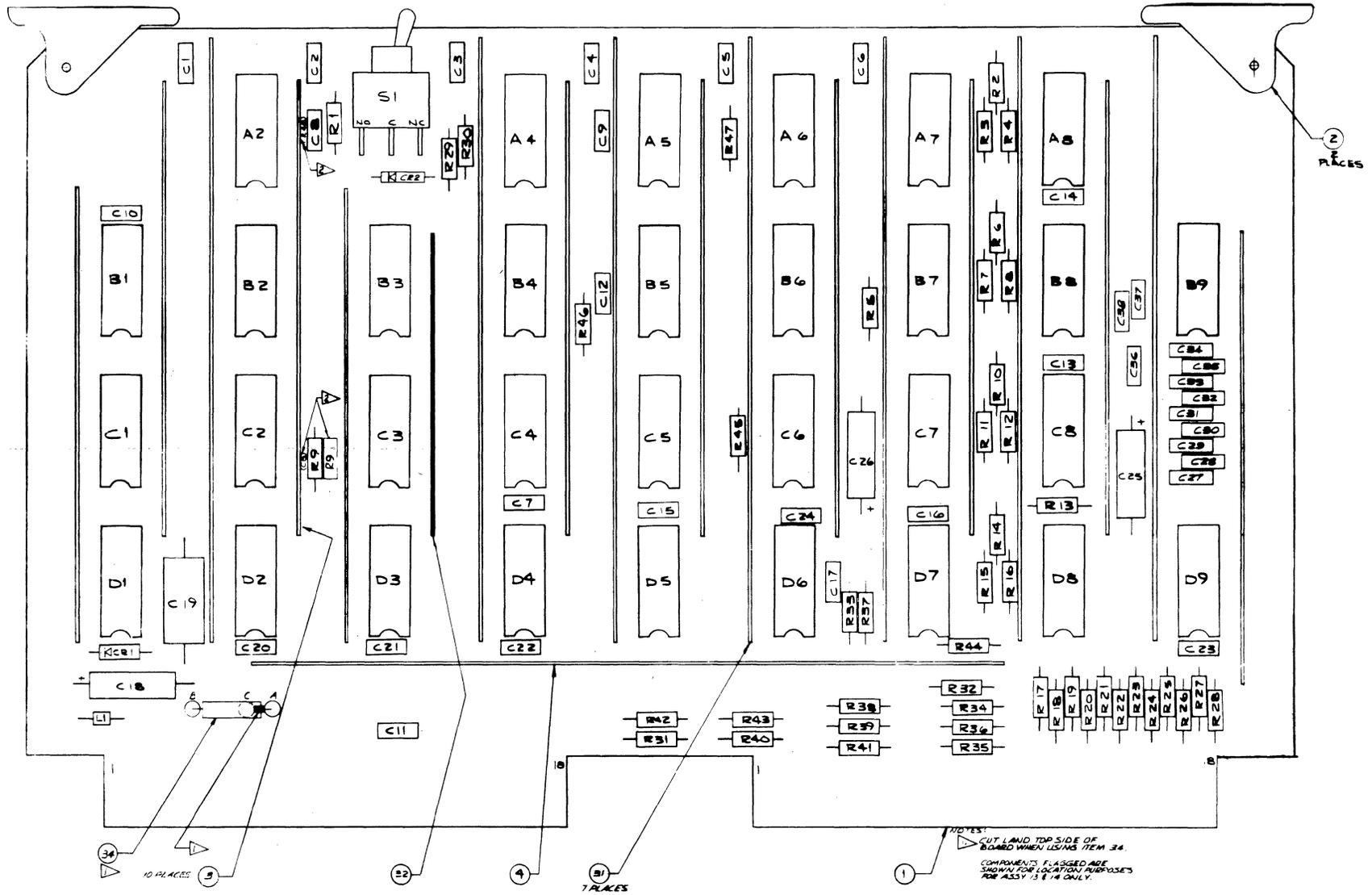
Figure 10-18. Assembly Diagram, Control Card
(Dwg. No. 1040619)
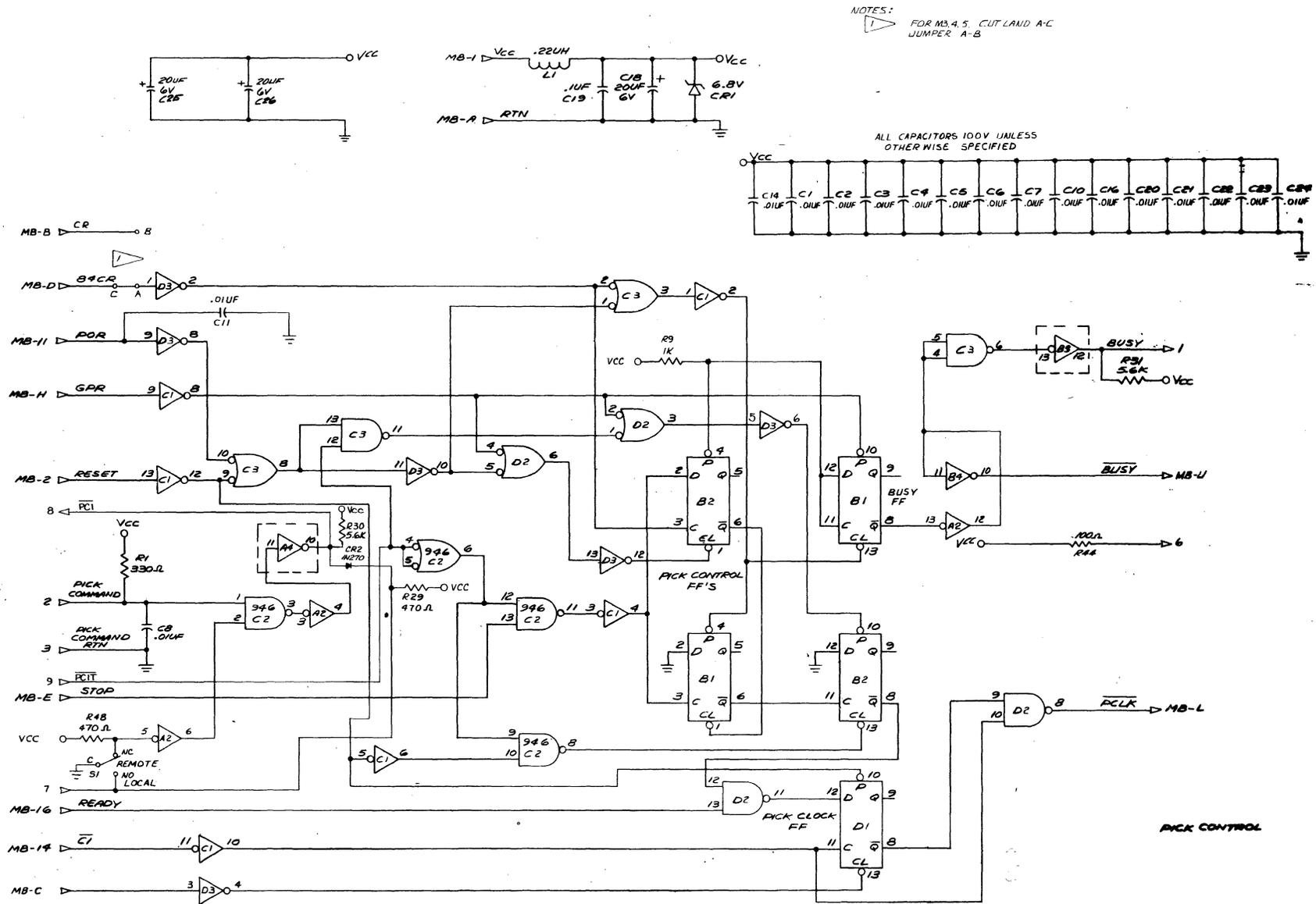
Figure 10-19.   Schematic Diagram, Control Card (Sh. 1 of 2)
(Dwg. No. 1241715)
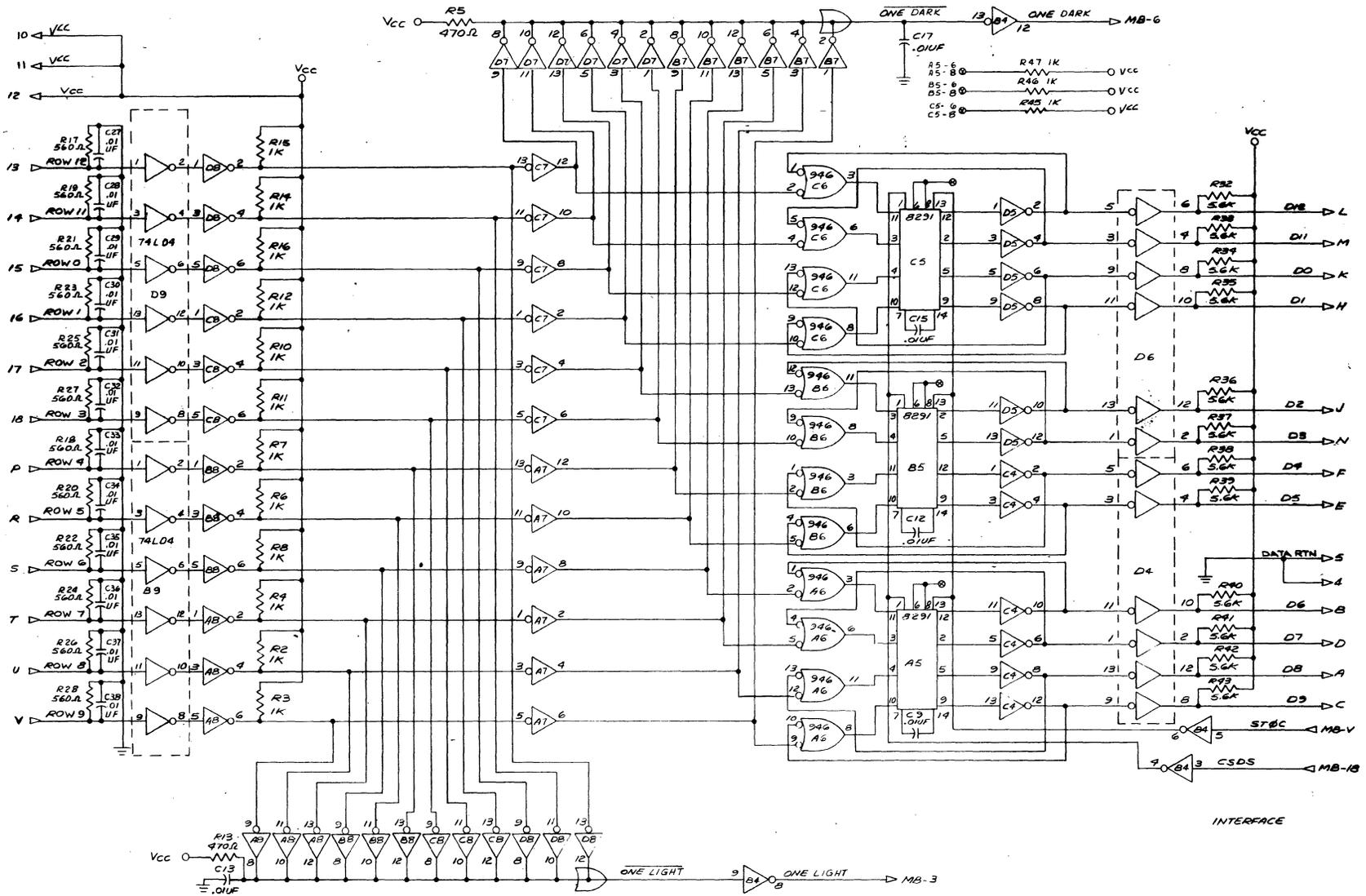
Figure 10-20.   Schematic Diagram, Control Card (Sh. 2 of 2)

10-20

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)
∅A	Clock Phase A	MB-S	Clock Card
∅B	Clock Phase B	MB-F	Clock Card
∅C	Clock Phase C	MB-K	Clock Card
∅D	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
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	Stacker Full Switch	J4-1	Error Card
STACKER FULL RTN	Stacker 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-J	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
STØB	Column Strobe Phase B	MB-4	Sync Card
STØC	Column Strobe Phase C	MB-V	Sync Card
STØD	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 + POR	Timing Strobe Reset	MB-M	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 BASE PLATE ASSEMBLY breakdown, for example,
(Figure 12-9), under index #19, two capacitors are listed for the same index
number.

19   00000202 . . CAPACITOR 17 µf, 370 VAC (60 Hz Models)
        00000206 . . CAPACITOR 10 µf, 365 VAC (50 Hz Models)

The Quick Reference List (Table 12-1) list the major assemblies and subassem-
blies and associated components of the card reader with the figure number in
which they are listed and illustrated. In the parts list, Documation parts or
assemblies are identified by an eight-digit number. Parts or assemblies that
Documation purchases from suppliers and used "as is" are identified by manu-
facturer part number. The manufacturers' are identified by manufactureres
codes in the description column of the parts list. Table 12-2 list the names and
address 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.

INDEX NO.	ASSEMBLY	FIGURE NO.
1	TRIM GROUP ASSEMBLY	12-3
2	MAIN FRAME 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
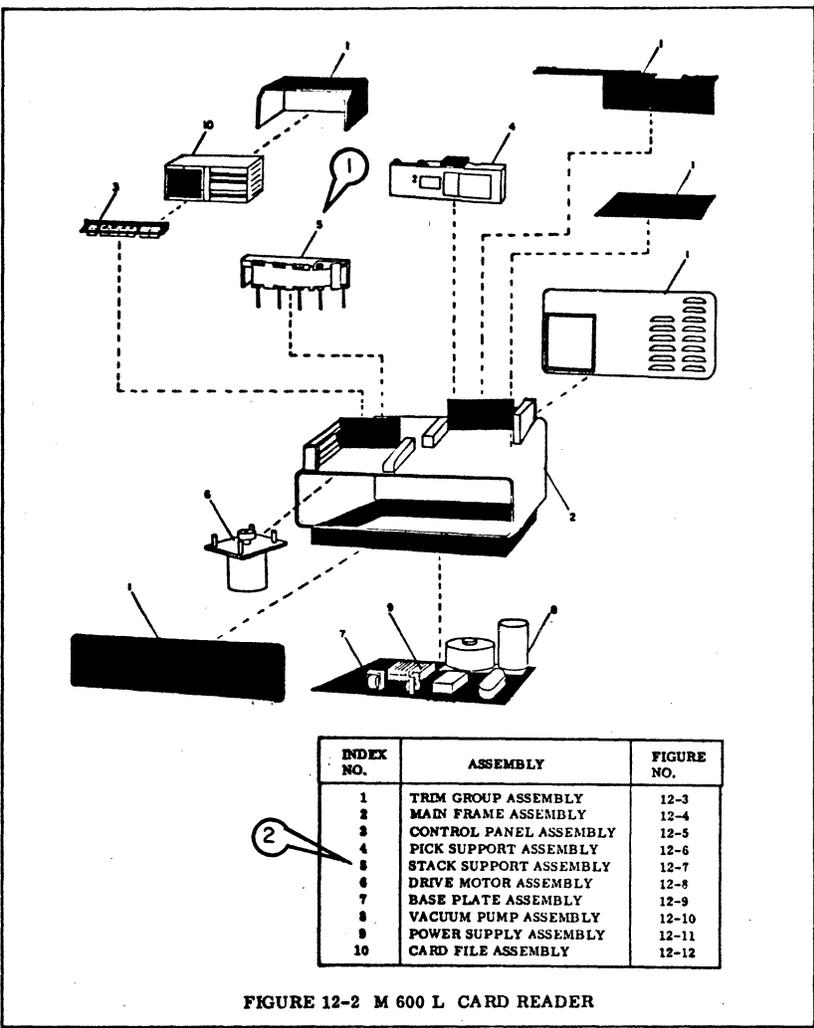
FIGURE 12-2 M 600 L CARD READER

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 accompanying parts list, use index number of part to find part number, description, and quantity per unit.

FIGURE 12-7 STACK SUPPORT ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	4002120S	STACK SUPPORT ASSEMBLY	1	
-1	40048801	. SUPPORT, Stack	1	
-2	20056301	. READ ARRAY ASSEMBLY (Attaching Parts)	1	
-3	60000353	. . SCREW, Flat Head 4 - 40 x 1/4	2	
-4	10003002	FIRST STACK DRIVE ASSEMBLY . SHAFT, Stack Drive	1	
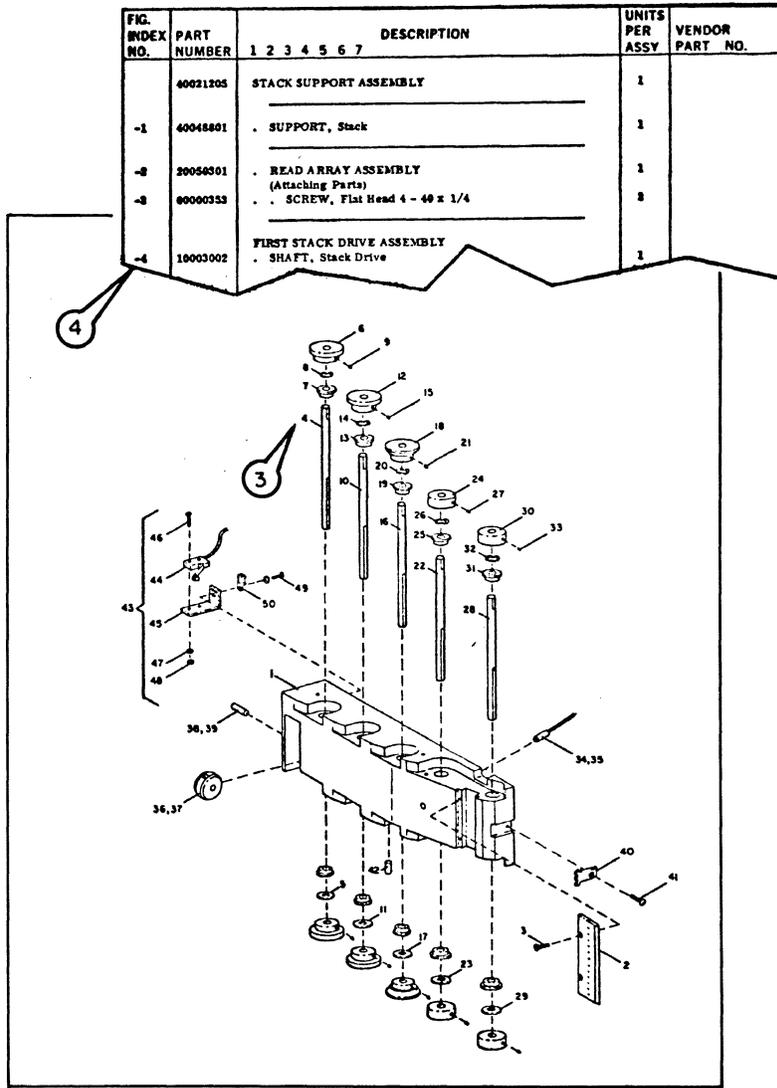
FIGURE 12-7 STACK SUPPORT ASSEMBLY

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

TABLE 12-1 QUICK REFERENCE LIST

FIGURE	ASSEMBLY	PAGE
12-3	TRIM GROUP ASSEMBLY	12-11
	Fan	12-11 a
	Capacitor	12-11 b
	Cord, Power	12-11 b
12-4	MAIN FRAME ASSEMBLY	12-13
	Yoke, Stack Shaft	12-13 d
	Spring, Negator	12-13 d
	Drum, Spring	12-13 d
	Shaft, Spring Drum	12-13 d
	Shaft, Pick Follower	12-13 d
	Solenoid Assembly	12-13 d
	Timing Disc Assembly	12-13 d
	Pulleys, Stack Drive Assemblies	12-13 e
	Belts, Stack Drive Assemblies	12-13 e
	Magnetic Pickup Assembly	12-13 e
	Pick Follower Assembly	12-13 e
	Stack Bumper Plate Assembly	12-13 f
	Circuit Breakers	12-13 f
	Filter	12-13 g
	Light Station Assembly	12-13 g
	Read Array Assembly	12-13 g
12-5	CONTROL PANEL ASSEMBLY	12-15 a
	Bulbs	12-15 a
12-6	PICK SUPPORT ASSEMBLY	12-17 b
	Switch Assembly, Hopper Empty	12-17 b
	Sector Assembly	12-17 b
	Cap, Riffle Air	12-17 b
	Drive Roller, 2nd Pick Drive Assembly	12-17 b
	Stack Drive, 1st Pick Drive Assembly	12-17 c
	Drum, Spring	12-17 c
	Spring, Negator	12-17 c
	Shaft, Spring Drum	12-17 c
	Tube, Pick Vacuum	12-17 c

M6,M3,M10

M6,M3,M10

QUICK REFERENCE LIST (CONT'D)

M6, M3, M10

TABLE 12-2 LIST OF MANUFACTURERS

CODE	MANUFACTURER	CODE	MANUFACTURER
00779	Amp, Incorporated P.O. Box 3608 Harrisburg, Pennsylvania 17105	05063	Hamilton - Avnet Electronics 70 State Street Westbury, N.Y. 11590
01121	Allen Bradley Company 1201 2nd Street Milwaukee, Wisconsin 53212	05245	Components Corporation 2857 N. Halsted Street Chicago, Illinois 60657
01295	Texas Instruments, Incorporated Semi-Conductor Components Division 13500 North Central Expressway Dallas, Texas 75231	05411	DuPage Manufacturing Company 2250 Curtiss Avenue Downers Grove, Illinois 60515
01634	Aluminum Co. of America 1501 Alcoa Building Pittsburg, Pennsylvania 15219	05972	Loctite Corporation 705 N. Mountain Road Newington, Connecticut 06111
01963	Cherry Electrical Products Corp. 3600 Sunset Avenue Waukegan, Illinois 60085	06229	Electrovert, Incorporated 86 Hartford Avenue Mt. Vernon, N.Y. 10553
02697	Parker Seal Company 2360 Palumbo Drive Lexington, Kentucky 40509	06383	Panduit Corporation 17301 Ridgeland Tinley Park, Illinois 60477
02735	RCA Corporation Solid State Division Route 202 Somerville, N.J. 08876	06540	Amaton Electronic Hardware Division of Mite Corporation 446 Blake Street New Haven, Connecticut
03597	General Electric Company Turbine Division of Apparatus Group Schenectady, N.Y.	07108	R. & J. Dick Co., Inc. 912 E. 5th Street Muscatine, Iowa 52763
03786	Industrial Enterprises, Incorporated 5900 N. Telegraph Road Dearbon, Michigan 48127	07137	Tec, Incorporated 6700 Washington Avenue South Eden Prairie, Minn. 55343
04963	Minnesota Mining and Mfg. Company Center Street St. Paul, Minnesota 55101	07263	Fairchild Semi-Conductor 464 Ellis Street Mountain View, California 94040
04713	Motorola Semi-Conductor Products, Inc. 5005 East McDowell Road Phoenix, Arixona 85008	07355	AirPax Electronic, Inc. Central Engineering Division 6601 N. W. 19th Street Ft. Lauderdale, Florida 33310
04866	Nylok - Detroit 1893 Barrett Road Troy, Michigan 48084	07446	Engler Instrument Company 250 Culver Avenue Jersey City, N.J. 07305

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

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

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

CODE	MANUFACTURER	CODE	MANUFACTURER
18714	RCA Corporation Solid State Division Fostoria Road Findley, Ohio 45840	27264	Molex Products Company 5224 Katrine Avenue Downers Grove, Illinois 60515
18788	General Illumination, Incorported 2233 University Avenue St. Paul, Minnesota 55114	28523	Gulf Electronics Corporation 1740 N.W. 69th Avenue Miami, Florida 33148
19070	Eastern Air Devices, Incorporated 385 Central Avenue Dover, New Hampshire 03820	28818	Soundcoat Co., Incorporated 515 Madison Avenue New York, N.Y. 10010
19401	Gladwin Industries, Incorporated Gladwin Educational Division P.O. Box 80545/1940 Will Ross Ct. Chamblee, Georgia 30341	29227	Herco Hecht Rubber Corporation 482 - 484 Riverside Avenue Jacksonville, Florida 32202
19701	Electra/Midland Corporation P.O. Box 760 Mineral Wells, Texas 76067	29440	Winfred - Berg 499 Ocean Avenue East Rockaway, L.I., N.Y. 11518
20772	Spectronics, Incorporated 24 Kinkle Street Westbury, N.Y. 11590	33062	Ferronics, Incorporated 66 N. Main Street Fairport, New York 14450
22589	Electro - Space Fabricators, Inc. 101 - 125 Centre Avenue Topton, Pennsylvania 19562	33498	Automation Components One Short Avenue Peckville, Pannsylvania 18452
23880	Stanford Applied Engineering 340 Martin Avenue Santa Clara, California 95050	34936	Nashua Corporation 44 Franklin Street Naushua, New Hampshire 03060
23936	William J. Purdy Company Pamotor Division 770 Airport Boulevard Burlingame, California 94010	46384	Penn Eng. and Mfg. Corporation Old Easton Highway Doylestown, Pennsylvania 18901
24161	Gates Rubber Company 999 South Broadway Denver, Colorado 80217	50521	HEI, Incorporated Johnathan Industrial Center Chaska, Minnesota 55318
24211	Grisby - Barton, Incorporated 3800 Industrial Drive Rolling Meadows, Illinois 60008	50522	Monsanto Electronic Special Products 10131 Bubb Road Cupertino, California 95014
27014	National Semi-Conductor Corporation 2950 San Ysidro Way Santa Clara, California 95051	55719	Snap - On Tools Corporation 8026 28th Avenue Kenosha, Wisconsin 53140

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

CODE	MANUFACTURING	CODE	MANUFACTURING
56289	Sprague Electric Company North Adams, Massachusetts 01247	71838	Standard Pressed Steel Company Industrial Fastener Division 4444 Lee Road Cleveland, Ohio 44128
60361	Toro Manufacturing Company 8111 Lyndale Avenue South Minneapolis, Minnesota 55420	71984	Dow Corning Corporation South Saginaw Road Midland, Michigan 48641
64475	Welch Allyn, Incorporated Jordan Road Skaneateles Falls, New York 13153	72136	Elmenco South Park and John Streets Willimantic, Connecticut 06226
65083	Westinghouse Electric Corporation Lamp Division MacArthur Avenue Bloomfield, New Jersey 07003	72619	Dialight Corporation 60 Stewart Avenue Brooklyn, New York 11237
70276	Allen Manufacturing Company P.O. Box 570 Hartford, Connecticut 06101	72653	G.C. Electronics Company 400 S. Wyman Street Rockford, Illinois 61101
70854	Barden/NMB 200 Park Avenue Danbury, Connecticut 06810	73138	Beckman Instrument, Incorporated Heliport Division 2500 Harbor Boulevard Fullerton, California 92634
70903	Belden Corporation 415 S. Kilpatrick Avenue Chicago, Illinois	74364	Eastman Chemical Product, Inc. Eastman Road Kingsport, Tennessee 37662
71034	Bliley Electric Company 2545 W. Grandview Blvd. Erie, Pennsylvania 16512	74545	Hubbell Harvey, Incorporated State Street and Bostwick Avenue Bridgeport, Connecticut 06602
71279	Cambion 445 Concord Avenue Cambridge, Massachusetts 02138	75511	Lamb Electric/Ametek 627 Lake Street Kent, Ohio 44240
71590	Centralab Electric 5757 N. Greenbay Avenue Milwaukee, Wisconsin 53201	75915	Littlefuse, Incorporated 800 E. Northwest Highway Des Plaines, Illinois 60016
71744	Chicago Miniature Lamp Works 4433 Ravenswood Avenue Chicago, Illinois 60640	76005	Lord Manufacturing Company 1635 West 12th Street Erie, Pennsylvania 16512
71785	Cinch Manufacturing Company Division of T.R.W., Inc. Elk Grove Village, Illinois	76599	The Murray Corporation Industrial Park Cockeysville, Maryland 21030

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

CODE	MANUFACTURER	CODE	MANUFACTURER
79023	United Elastic Company Division of Stevens, J. P. & Co., Inc. P. O. Box 391 50 Payson Avenue East Hampton, Massachusetts 01027	81840	Ledex, Incorporation Ledex Division 123 Webster Street Dayton, Ohio 45402
79136	Waldes Kohinoor, Inc. 47 - 16 Austel Place Long Island, N. Y. 11101	83014	The Hartwell Corporation 9035 Venice Blvd. Los Angeles, California 90034
79405	Wood Electric Corporation Danvers Industrial Park Danvers, Massachusetts 01923	83259	Parker Seal Company 10567 Jefferson Blvd. Culver City, California 90231
80089	Essex International Controls Division 131 Godfrey Street Logansport, Indiana	83330	H. H. Smith, Incorporated 812 Snedicker Avenue Brooklyn, New York 11207
80103	Lambda Electronics Corporation 515 Broad Hollow Road Huntington, New York 11749	83584	Drive-Lok, Incorporated 1140 Park Avenue Sycamore, Illinois 60178
80183	Sprague Products Company Beaver Street North Adams, Massachusetts	84830	Lee Spring Company 30 Main Street Brooklyn, New York 11201
80223	T. R. W. Electronic Components United Transformer Division 150 Varick Street New York, N. Y. 10013	85446	Bokers, Incorporated 3104 Snelling Avenue Minneapolis, Minnesota 55406
80294	Bournes, Incorporated 1200 Columbia Avenue Riverside, California 92507	86577	Precision Metal Prod. of Malden, Inc. 41 Elm Street Stoneham, Massachusetts 02180
80382	Air Reduction Co., Incorporated 150 E. 42nd Street New York, N. Y. 10017	87034	Marco - Oak Industries, Incorporated P. O. Box 4011 207 S. Helena Anaheim, California 92803
80545	Ametek Hunter Spring 1 Spring Avenue Hatfield, Pennsylvania 19440	87730	United Mineral and Chemical Corp. 129 Hudson Street New York, N. Y. 10013
81312	Winchester Electronics Main Street and Hillside Avenue Oakville, Connecticut 06779	88132	Goodyear Rubber Company 25 Hamlin Middletown, Connecticut 06457
81541	Airpax Electronics, Incorporation Woods Road Cambridge, Maryland 21613	91506	Augat, Incorporated 33 Perry Avenue Attleboro, Massachusetts 02703
		91637	Dale Electronics, Incorporated P. O. Box 609 Columbus, Nebraska 68601

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

CODE	MANUFACTURER	CODE	MANUFACTURER
91662	Elco Corporation Maryland Road and Computer Avenue Willow Grove, Pennsylvania 19090		Dearborn Wire and Cable Company 9299 Evenhouse Rosemont, Illinois
92194	Alpha Wire 711 Lidgerwood Avenue Elizabeth, New Jersey		Extron Corporation P.O. Box 10725 Knoksville, Tennessee 37919
94144	Raytheon Company Components Division Industrial Components Operation 465 Centre Street Quincy, Massachusetts 02169		Merit Fastners 127 Atlantic Boulevard Maitland, Florida 32951
94222	Southco, Incorporated Lester, Pennsylvania 19113		Millitary Packing Company P.O. Box 460 Orlando, Florida 32802
94452	Berkley and Company Highway 9 and 71 Spirit Lake, Iowa 51360		Motronics Corporation Riverside Industrial Park Little Falls, N.Y. 13365
95275	Vitramon, Incorporated P.O. Box 544 Bridgeport, Connecticut 06601		National Gard. Product, Incorporated P.O. Box 7353 Memphis, Tennessee 38107
95987	Weckesser Co., Incorporated 4444 West Irving Park Road Chicago, Illinois 60641		Pipeline Service Company 3240 N. Manheim Road Franklin Park, Illinois 60131
96182	Master Specialties Company 1640 Monrovia Costa Mesa, California 92627		Potter – Brumfield 1200 E. Broadway Princeton, Indiana 47470
96881	Thomson Industries, Incorporated 1029 Plandome Road Manhasset, New York 11030		Reynolds Aluminum Supply Company 2920 Eunice Avenue Orlando, Florida 32802
99743	IMC Magnetics Corporation 6058 Walker Avenue Maywood, California 90270		Sunset Wire and Cable, Incorporated P.O. Box 224 Cape Canaveral, Florida 32930
	– Active and Passive Components 121 – 18 Du Pont Street Plainview, N.Y. 11803		The Torrington Company Clinton Bearing Plant Clinton, South Carolina
	Consolidated Wire and Cable 1637 South Clinton Chicago, Illinois 60616		Thorgren Tool and Moulding Company 110 Evans Avenue Valparaiso, Indiana 46383
			Tri – Power, Incorporated Akron, Ohio

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

CODE	MANUFACTURER	CODE	MANUFACTURER
	Voyce - Legler 523 N.W. 28th Street Miami, Florida 33127		
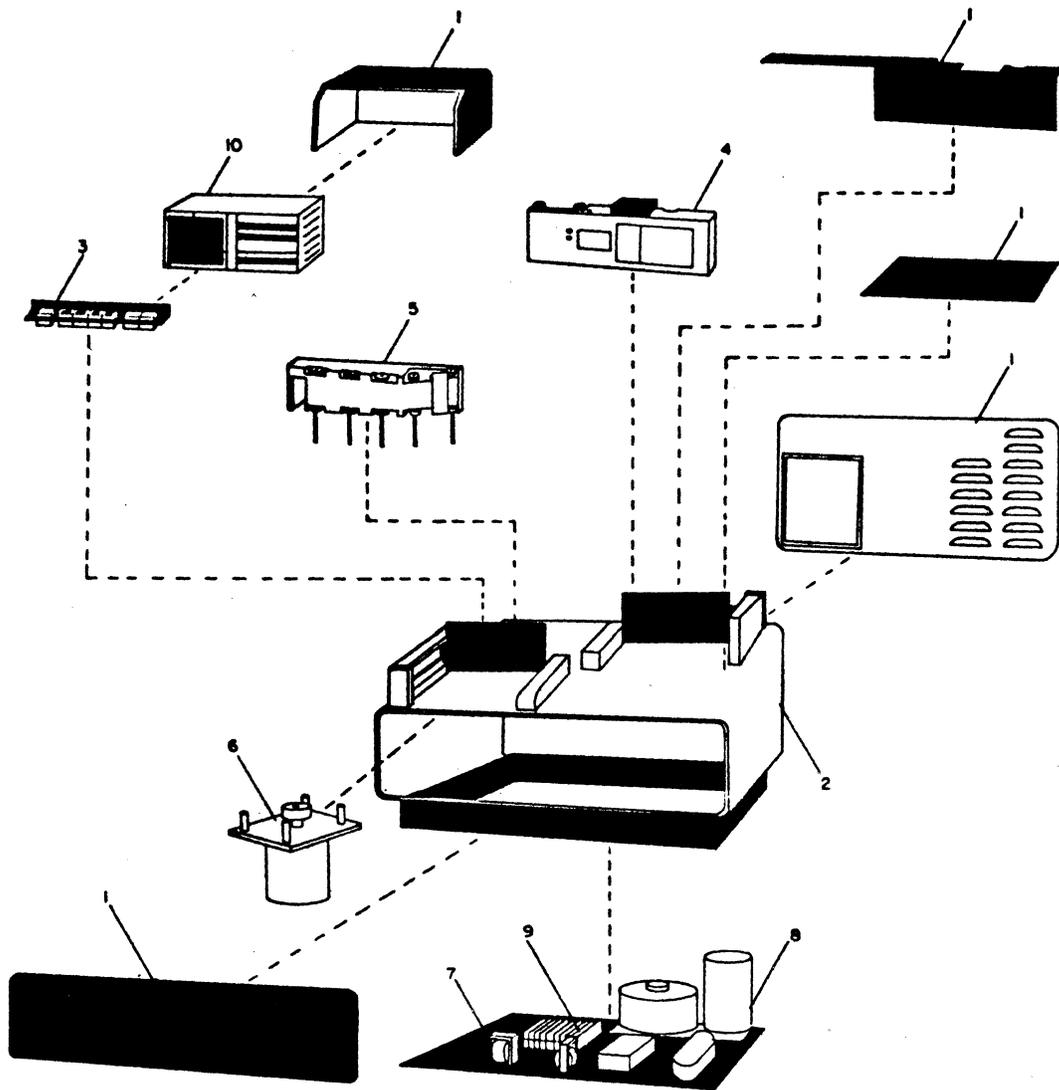
INDEX NO.	ASSEMBLY	FIGURE NO.
1	TRIM GROUP ASSEMBLY	12-3
2	MAIN FRAME ASSEMBLY	12-4
3	CONTROL PANEL ASSEMBLY	12-5
4	PICK SUPPORT ASSEMBLY	12-6
5	STACK SUPPORT ASSEMBLY	12-7
6	DRIVE MOTOR ASSEMBLY	12-8
7	BASE PLATE ASSEMBLY	12-9
8	VACUUM PUMP ASSEMBLY	12-10
9	POWER SUPPLY ASSEMBLY	12-11
10	CARD FILE ASSEMBLY	12-12

M6

FIGURE 12-2 M-SERIES (SLOPE) CARD READERS
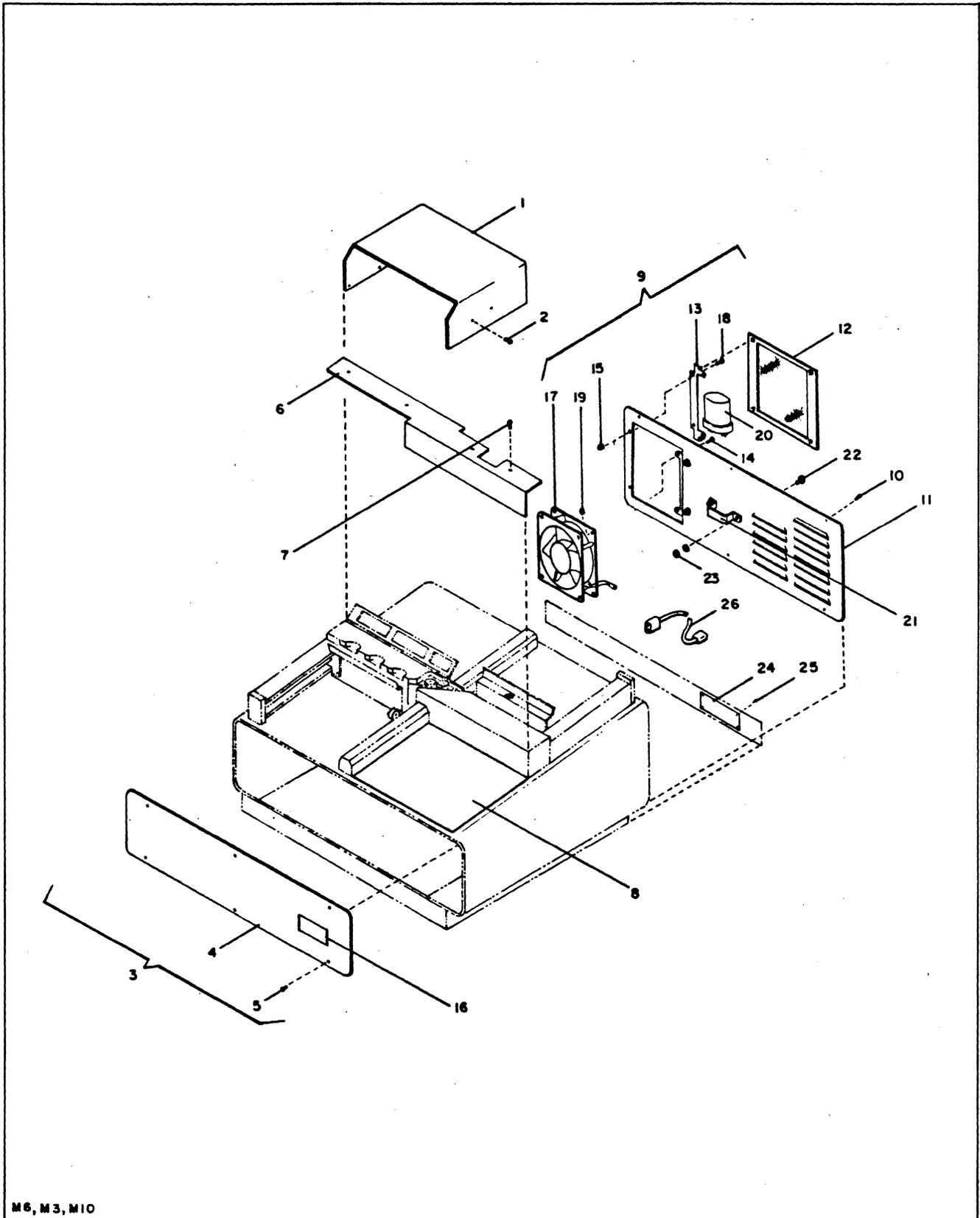
M6, M3, M10

FIGURE 12-3 TRIM GROUP ASSEMBLY

FIGURE 12-3 TRIM GROUP ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40049401	TRIM GROUP ASSEMBLY - 115 VAC, 60 Hertz Model		
	40049404	TRIM GROUP ASSEMBLY - 230 VAC, 50 Hertz Model		
-1	30031602	. HOOD, Control Panel	1	
		(Attaching Parts)		
-2	00000343	. . SCREW, Machine, Button Head 6 - 32 x 3/8	4	
-3	40045501	. COVER ASSEMBLY, Front (Modified)	1	
-4	40045591	. . COVER, Front	1	
		(Attaching Parts)		
-5	00000343	. . . SCREW, Machine, Button Head 6 - 32 x 3/8	6	
-6	40031501	. COVER, Track	1	
		(Attaching Parts)		
-7	00000343	. . SCREW, Machine, Button Head 6 - 32 x 3/8	4	
-8	30005801	. PLATE, Cover, Top	1	
-9	40048601	. COVER ASSEMBLY, Rear - 115 VAC, 60 Hertz Model	1	
	40048602	. COVER ASSEMBLY, Rear - 230 VAC, 50 Hertz Model		
		. (Attaching Parts)		
-10	00000343	. . SCREW, Machine, Button Head 6 - 32 x 3/8	6	
-11	40045701	. . PANEL, Rear - 115 VAC, 50/60 Hertz	1	
	40045702	. . PANEL, Rear - 230 VAC, 60 Hertz	1	
-12	00000323	. . SCREEN, Fan (23936)	1	5503
-13	00000324	. . MOUNTING BRACKETS, Fan (Pair) (23936)	1	5501
		(Attaching Parts)		
-14	00000375	. . . SCREW, Pan Head 6 - 32 x 1/4	4	
-15	00000301	. . . NUT, Hex 6 - 32	4	
-16	200280XX	. TAG, Series (Specify Model)	1	
-17	00000325	. . FAN - 115 VAC, 50/60 Hertz (23936)	1	4600
		W/INTEGRAL COMPONENTS		
	00000035	CONTACT, Pin (00779)	2	60618-1
	00000449	HOUSING, Pin (00779)	1	1-480319-0
	00000127	TUBING, Heatshrink 1/8 DIA. x 1/2 (92194)	2	FIT-105
	00000164	WIRE, Elec. AWG 20 TWPR BLK-WHT 3"	1	1854/19
	00000059	MOUNT, Cable Tie (06383)	1	TAIS8
	00000058	TIE, Cable (06383)	1	SSTIM
	20098301	. . FAN ASSEMBLY - 230 VAC, 50 Hertz	1	
		W/INTEGRAL COMPONENTS		
	00000035	CONTACT, Pin (00779)	2	60618-1
	00000449	HOUSING, Pin (00779)	1	1-480319-0
	00000087	TUBING, Heatshrink 3/32 x 1" (92194)	1	FIT-105
	00000530	RECEPTACLE, Faston (250) (00779)	3	61370-1
	00000452	HOUSING, Receptacle (00779)	3	480416-0
	00000114	SCREW, Button Head 6 - 32 x 1/4	6	
	00000301	NUT, Hex 6 - 32	8	
	00000302	SCREW, Pan Head 6 - 32 x 1/2	4	

FIGURE 12-3   TRIM GROUP ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	00000295	WASHER, Flat #6	4	
	00000059	MOUNT, Cable Tie (06383)	1	TAIS8
	00000058	TIE, Cable (06383)	1	SSTIM
	00000156	WIRE, Elec. – AWG 16 WHT 7" – BLK 6 1/2	1	1858/19
	00000155	(Attaching Parts)		
-18	00000302	. . . SCREW, Pan Head 6 - 32 x 1/2	4	
-19	00000301	. . . NUT, Hex 6 - 32	4	
-20	00000511	. . CAPACITOR, 2.0 μf 270 VAC Nom. (230 VAC, 50 Hz) (03597)	1	4SF270
-21	00000289	. . BRACKET, Cap. Mtg. (03597)	1	K9827065P21
		(Attaching Parts)		
-22	00000375	. . . SCREW, Pan Head 6 - 32 x 1/4	2	
-23	00000301	. . . NUT, Hex 6 - 32	2	
-24	20028101	. TAG, Information – 115 VAC, 60 Hertz	1	
	20028102	. TAG, Information – 230 VAC, 50 Hertz	1	
		(Attaching Parts)		
-25	00000488	. . PIN, Drive	4	MS-21318-9
-26	20014801	. CORD, Power (115 VAC, 60 Hertz)	1	
	00000456	. CORD, Power (230 VAC, 50 Hertz)	1	17250
-27	00000555	. ADHESIVE, Pliobond	A/R	

M3, M6, M10

12-11 b

13 (FIG. 12-5)

10, 11, 12
10 (FIG. 12-12)

14

15

7, 8, 9
(FIG. 12-7)
129,130

4, 5, 6
(FIG. 12-6)
127,128

1

122

119, 120

118,120

2 (FIG. 12-9)

121

3

M3,M6,M10

FIGURE 12-4 MAIN FRAME ASSEMBLY (Sht. 1 of 3)
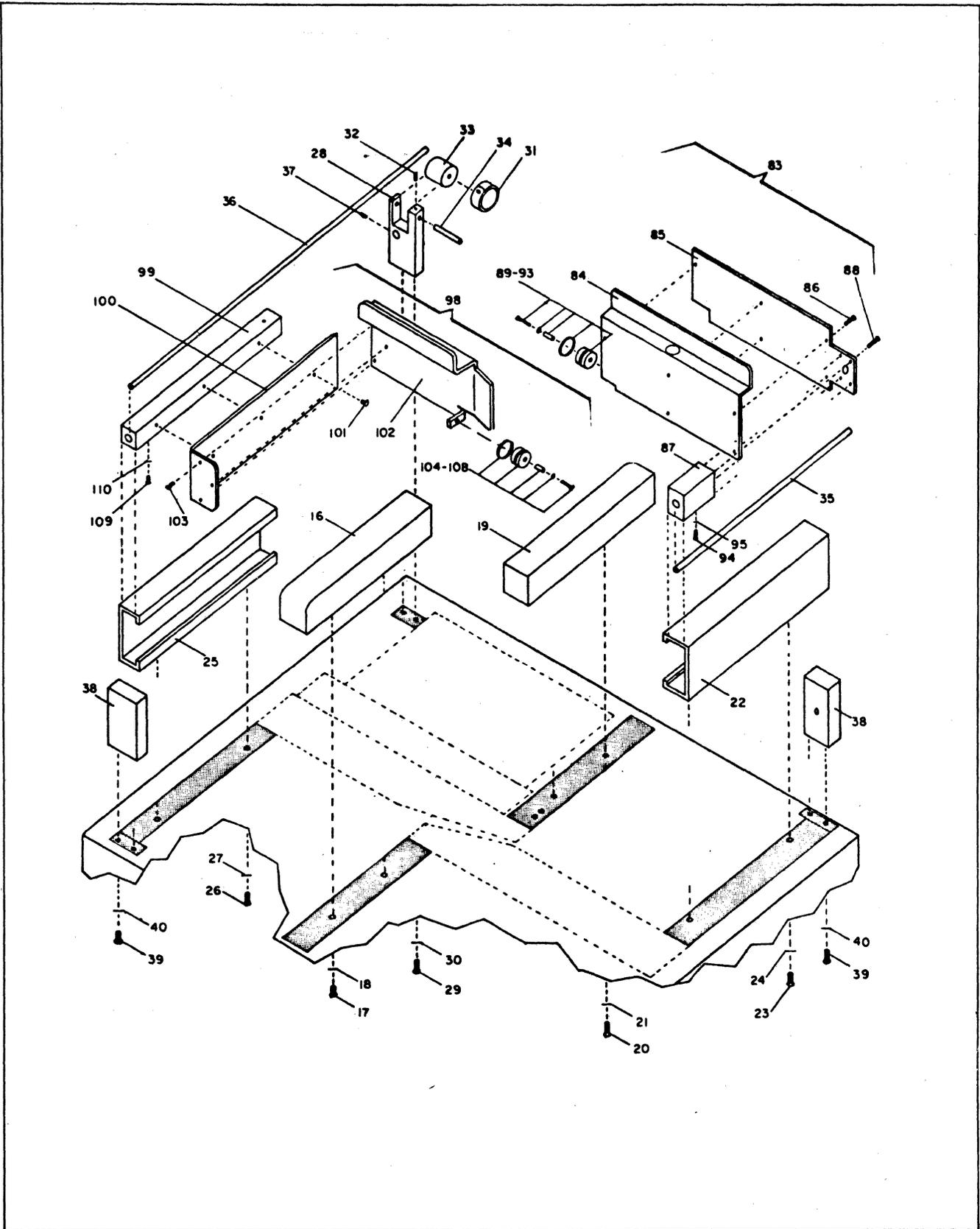
FIGURE 12-4 MAIN FRAME ASSEMBLY (sheet 2 of 3)

12-13 a
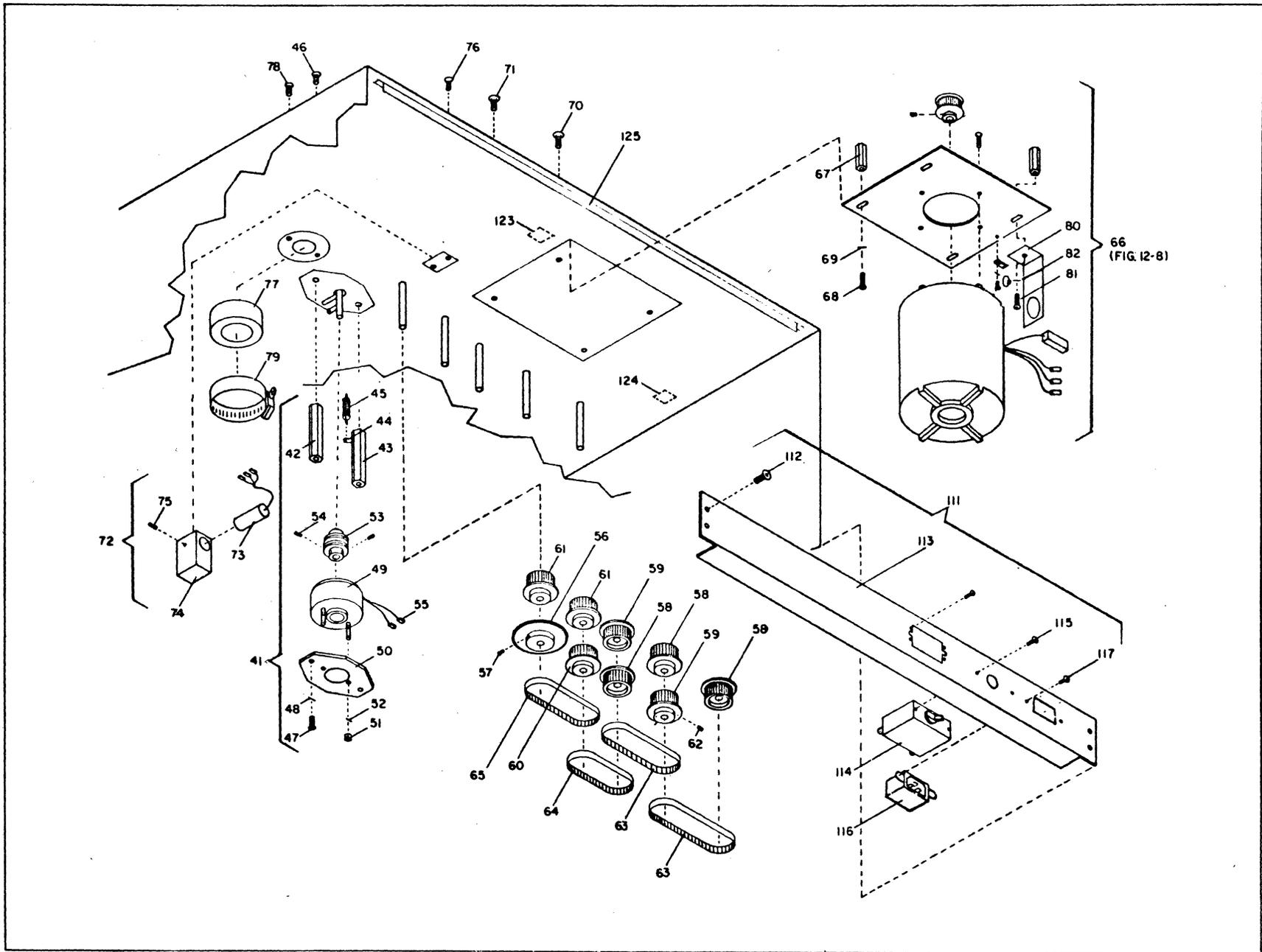
FIGURE 12-4 MAIN FRAME ASSEMBLY (sheet 3 of 3)

FIGURE 12-4 MAIN FRAME ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40048903	MAIN FRAME ASSEMBLY - 60 Hertz Models, 115 VAC		
	40048905	MAIN FRAME ASSEMBLY - 50 Hertz Models, 230 VAC		
-1	40045001	. MAIN FRAME	1	
-2	40075101	. BASE PLATE ASSEMBLY - 60 Hertz Models (Fig. 12-9)	1	
	40075113	. BASE PLATE ASSEMBLY - 50 Hertz Models, 115 VAC (Figure 12-9)	1	
	40075103	. BASE PLATE ASSEMBLY - 50 Hertz Models, 230 VAC (Figure 12-9) (Attaching Parts)		
-3	00000382	. . SCREW, Machine, Pan Head 8 - 32 x 3/8	18	
-4	40048201	. PICK SUPPORT ASSEMBLY (Fig. 12-6) (Attaching Parts)	1	
-5	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	6	
-6	00000294	. . WASHER, Flat No. 8	6	
-7	40021205	. STACK SUPPORT ASSEMBLY (Fig. 12-7) (Attaching Parts)	1	
-8	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	8	
-9	00000294	. . WASHER, Flat No. 8	8	
-10	40061216	. CARD FILE ASSEMBLY (Fig. 12-12) (Attaching Parts)	1	
-11	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 3/8	3	
-12	00000294	. . WASHER, Flat No. 8	3	
-13	30038301	. CONTROL PANEL ASSEMBLY (Fig. 12-5) (Attaching Parts)	1	
-14	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 3/8	3	
-15	00000294	. . WASHER, Flat No. 8	3	
-16	20000101	. GUIDE, Card Edge, Stack (Attaching Parts)	1	
-17	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	2	
-18	00000294	. . WASHER, Flat No. 8	2	
-19	20000102	. GUIDE, Card Edge, Pick (Attaching Parts)	1	
-20	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	2	
-21	00000294	. . WASHER, Flat No. 8	2	
-22	30046502	. COVER, Pick Slide (Attaching Parts)	1	
-23	00000395	. . SCREW, Machine, Socket Head 8 - 32 x 3/8	2	
-24	00000294	. . WASHER, Flat No. 8	2	
-25	30049201	. COVER, Stack Slide (Attaching Parts)	1	
-26	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	2	

M6.M3

MAIN FRAME ASSEMBLY (CONT'D)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-27	00000294	. . WASHER, Flat No. 8	2	
-28	20122801	. YOKE, Stack Shaft (Attaching Parts)	1	
-29	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	2	
-30	00000294	. . WASHER, Flat No. 8	2	
-31	00000306	. SPRING, Negator (80545)	1	SL6F24
-32	00000297	. . SETSCREW, 8 - 32 x 3/16	1	
-33	20012703	. DRUM, Spring	1	
-34	20047601	. SHAFT, Spring Drum	1	
-35	20000503	. SHAFT, Pick Follower	1	
-36	20000502	. SHAFT, Stack Follower (Attaching Parts)	1	
-37	00000297	. . SETSCREW, 8 - 32 x 3/16	1	
-38	20000201	. SUPPORT, Follower Shaft (Attaching Parts)	2	
-39	00000396	. . SCREW, Machine, Socket Head 8 - 32 x 5/8	2	
-40	00000294	. . WASHER, Flat No. 8	2	
-41	20022501	. SOLENOID ASSEMBLY (Attaching Parts)	1	
-42	10002002	. . STANDOFF, Plain	1	
-43	10002003	. . STANDOFF, With Arm Stud Hole	1	
-44	00000439	. . PIN GROOVED TYPE	1	
-45	00000285	. . SPRING, Solenoid (84830) (Attaching Parts)	1	LE026C2MW
-46	00000358	. . . SCREW, Machine, Flat Head 8 - 32 x 3/8	2	
-47	00000396	. . . SCREW, Machine, Flat Head 8 - 32 x 5/8	2	
-48	00000294	. . . WASHER, Flat No. 8	2	
-49	20010601	. . SOLENOID	1	
-50	20001201	. . MOUNTING PLATE (Attaching Parts)	1	
-51	00000299	. . . NUT, Plain, Hex 8 - 32	2	
-52	00000269	. . . WASHER, Lock, int. tooth No. 8	2	
-53	10010501	. . COUPLING (Attaching Parts)	1	
-54	00000566	. . . SETSCREW, Knurled Cup Point 4 - 40 x 3/16	4	
-55	00000270	. . CONNECTOR, Pin (00779)	2	60598-5
-56	20022301	. TIMING DISC ASSEMBLY (Attaching Parts)	1	
-57	00000297	. . SETSCREW, 8/32 x 3/16	1	

M6,M3,M10

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-58	00000274	. PULLEY, First, Second (Top), and Third (Bottom) Stack Drive Assemblies (07108)	3	15XL037
-59	20080404	. PULLEY, Second (Bottom), and Third (Top) Stack Drive Assemblies (07108)	2	
-60	00000273	. PULLEY, Fourth (Bottom) Stack Drive Assemblies (07108)	1	14XL037
-61	20127003	. PULLEY, Timing (Fourth (Top) and Fifth Stack Drive Assemblies (07108) (Attaching Parts)	2	
-62		. . SETSCREW, 10 - 24 x 1/4	8	
-63	00000281	. BELT, First and Second Stack Drive (07108)	2	80XL025
-64	00000280	. BELT, Third Stack Drive (07108)	1	70XL025
-65	00000283	. BELT, Fourth Stack Drive (07108)	1	160XL025
-66	30016201	. DRIVE MOTOR ASSEMBLY - 60 Hertz Models - 115 VAC	1	
	30016203	. DRIVE MOTOR ASSEMBLY - 50 Hertz Models - 230 VAC	1	
	30016204	. DRIVE MOTOR ASSEMBLY - 50 Hertz Models - 115 VAC (Attaching Parts)	1	
-67	10002001	. . STANDOFF	4	
-68	00000293	. . SCREW, Machine, Socket Head 8 - 32 x 1/2	4	
-69	00000294	. . WASHER, Flat No. 8	4	
-70	00000298	. . SCREW, Machine, Flat Head 8 - 32 x 1/2	2	
-71	00000379	. . SCREW, Machine, Pan Head 8 - 32 x 1/2	2	
-72	20016101	. MAGNETIC PICKUP ASSEMBLY	1	
-73	00000447	. . PICKUP, Magnetic (07355)	1	1-0194/086-2110019
-74	20010401	. . HOLDER, Pickup (Attaching Parts)	1	
-75	00000292	. . . SETSCREW, Flat 6 - 32 x 3/16	1	
-76	00000304	. . . SCREW, Machine, Flat Head 6 - 32 x 1/2	2	
-77	20031901	. FITTING, Air Outlet (Attaching Parts)	1	
-78	00000358	. . SCREW, Machine, Flat Head 8 - 32 x 3/8	2	
-79	00000407	. CLAMP, Hose (76599)	1	H - 24
-80	20059901	. BRACKET, Vacuum Pump Hose Support (Attaching Parts)	1	
-81	00000293	. . SCREW, Machine, Socket Head 8 - 32 x 1/2	1	
-82	00000294	. . WASHER, Flat No. 8	1	
-83	30104401	. PICK FOLLOWER ASSEMBLY		
-84	30101002	. . FOLLOWER, Card	1	
-85	30047701	. . BRACKET, Card Follower (Attaching Parts)	1	
-86	00000271	. . . SCREW, Machine, Button Head, 4 - 40 x 3/16	5	

M6,M3

MAIN FRAME ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-87	20000301	. . BEARING, Follower Support	1	
		(Attaching Parts)		
-88	00000096	. . . SCREW, Machine, Button Head, 4 - 40 x 1/4	4	
-89	10011801	. . ROLLER, Card Follower	1	
-90	10011901	. . SHAFT	1	
-91	00000518	. . "O" RING	1	5 - 23D
		(Attaching Parts)		
-92	00000272	. . . SCREW, Cap, Socket Head, 4 - 40 x 5/8	1	
-93	00000065	. . . WASHER, Flat No. 4	1	
REF	20000301	. . BEARING, Follower Support	1	
		(Attaching Parts)		
-94	00000397	. . . SCREW, Cap Socket Head, 4 - 40 x 1/4	1	
-95	00000065	. . . WASHER, Flat No. 4	1	
-96	00000409	. . BUSHING, Ball	2	A 61014
-97	00000495	. . RUBBER, Neoprene, 1/8 x 1/4 x 5/8	2	
	00000573	. . EASTMAN 910	A/R	
	00000557	. . LOCKTITE RETAINING COMPOUND 75	A/R	
-98	40104301	. STACK BUMPER PLATE ASSEMBLY		
-99	20012501	. . CARRIER, Card Follower	1	
-100	30012401	. . BUMPER, Card	1	
		(Attaching Parts)		
-101	00000346	. . . SCREW, Machine, Flat Head 4 - 40 x 1/4	3	
-102	30078801	. . FOLLOWER, Card	1	
		(Attaching Parts)		
-103	00000271	. . . SCREW, Machine, Button Head 4 - 40 x 3/16	3	
-104	10011801	. . ROLLER CARD FOLLOWER	1	
-105	10011901	. . SHAFT	1	
-106	00000518	. . "O" RING (83259)	1	5 - 23D
		(Attaching Parts)		
-107	00000272	. . . SCREW, Cap, Socket Head 4 - 40 x 5/8	1	
-108	00000065	. . . WASHER, Flat No. 4	1	
REF	40104301	. STACK BUMPER PLATE		
		(Attaching Parts)		
-109	00000397	. . SCREW, Cap, Socket Head 4 - 40 x 1/4	2	
-110	00000065	. . WASHER, Flat #4	2	
REF	00000409	. . BUSHING, Ball	2	B 61014
REF	00000495	. . SPONGE, Neoprene Closed Cell	1	
REF	00000495	. . RUBBER, Neoprene	1	
-111	30023702	. PANEL ASSEMBLY, Subframe - 115 VAC, 60 Hertz	1	
	30076301	. PANEL ASSEMBLY, Subframe - 230 VAC, 50 Hertz	1	
		(Attaching Parts)		
-112	00000382	. . SCREW, Pan Head, 8 - 32 x 3/8	4	
-113	30006601	. . PANEL, Subframe - 115 VAC, 60 Hertz	1	
	30076201	. . PANEL, Subframe - 230 VAC, 50 Hertz	1	
-114	00000188	. . CIRCUIT BREAKER, 8A - 115 VAC, 60 Hertz	1	UPG1162802
	00000186	. . CIRCUIT BREAKER, 5A - 230 VAC, 50 Hertz	1	UPG1162502
		(Attaching Parts)		
-115	00000375	. . . SCREW, Machine, Pan Head, 6 - 32 x 1/4	2	

M6, M3, M10

MAIN FRAME ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-116	00000476	. . CONNECTOR, AC Recessed (115 VAC, 60 Hz) (74545)	1	7486
	00000470	. . FILTER RFI, Connector 50 – 400 Hz 6A (05245)	1	6EF1
		(Attaching Parts)		
-117	00000375	. . . SCREW, Machine, Pan Head 6 - 32 x 1/4	2	
-118	30006301	. PLATE, Front Edge Frame	1	
-119	30008301	. PLATE, Rear Edge Trim	1	
-120	30006901	. ANGLE ASSEMBLY, Panel Mount Bottom	2	
-121	40006401	. SUBFRAME	1	
-122	30046001	. ANGLE ASSEMBLY, Panel Mount Top	1	
-123	20065501	. MOUNTING BRACKET, Hood	1	
-124	20057101	. MOUNTING BRACKET, Hood	1	
-125	30046201	. ANGLE ASSEMBLY, Panel Mount	1	
-126	00000302	. SCREW, Machine Pan Head, 6 - 32 x 1/2 Output Connector Mounting	4	
	10158905	. READ/LIGHT STATION ASSEMBLIES (Matched)	1	
-127*	30014401	. . LIGHT STATION ASSEMBLY	1	
		(Attaching Parts)		
-128	00000344	. . . SCREW, Machine, Flat Head 2 - 56 x 1/4	4	
-129*	20050301	. . READ ARRAY ASSEMBLY	1	
		(Attaching Parts)		
-130	00000353	. . . SCREW, Flat Head, 4 - 40 x 1/4	2	
-131	20038601	. CABLE ASSEMBLY, Hopper Empty Switch		
-132	20027502	. CABLE ASSEMBLY, Circuit Breaker		
-133	20027603	. CABLE ASSEMBLY, Relay		
-134	40076401	. WIRING DIAGRAM, 230 VAC, 50 Hertz		
-135	40075401	. WIRING DIAGRAM, 115 VAC, 60 Hertz		
-136	00000059	. MOUNT, Cable Tie (06383)	1	TA158C
-137	00000058	. TIE, Cable (06383)	1	SSTIM
-138	30036901	. CABLE ASSEMBLY, Output		
-139	20017101	. CABLE ASSEMBLY, Solenoid DR		
-140	00000657	. RUBBER, Foam	A/R	

* Light Station Assembly and Read Array Assembly must be ordered as a matched Set...   Part No. 10158905

M3, M6, M10
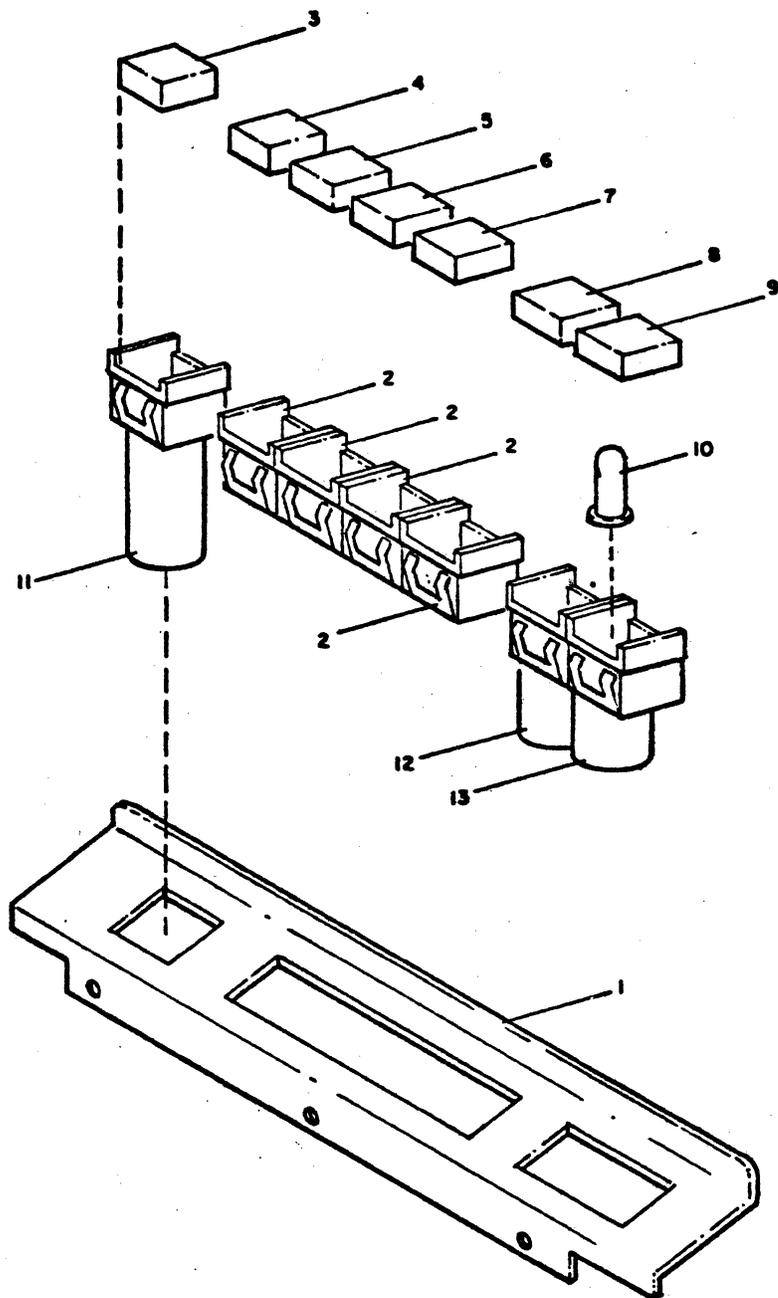
M6,M3,M10,M12

FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIGURE 12-5 CONTROL PANEL ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	30039002	CONTROL PANEL ASSEMBLY		
-1	30031001	. PANEL, Control	1	
-2	00000106	. INDICATOR, White Barrier (72619)	4	533-1004
-3	00000101	. CAP "Power" (72619)	1	303-6375
-4	00000097	. CAP "Read Check", White Barrier (72619)	1	534-0404-339
-5	00000094	. CAP "Pick Check", White Barrier (72619)	1	534-0404-339
-6	00000098	. CAP "Stack Check", White Barrier (72619)	1	534-0404-399
-7	00000099	. CAP "Hopper Check", White Barrier (72619)	1	534-0404-339
-8	00000102	. CAP "Stop" (72619)	1	303-6361
-9	00000103	. CAP "Reset" (72619)	1	303-6362
-10	00000318	. BULB, Incandescent 6V @ .2A (08806)	7	381
-11	00000319	. SWITCH, Alt Action, White Barrier (72619)	1	513-0410-004
-12	00000321	. SWITCH, N.O., SPST, White Barrier (72619)	1	513-0110-004
-13	00000320	. SWITCH, N.O., Snap Action, White Barrier (72619)	1	513-1610-004
-14	00000036	. CONTACT, Connector Amp Leaf (00779)	9	42702-4LP
-15	00000034	. CONTACT, Amp Leaf (00779)	2	42717-4LP
-16	00000510	. CONTACT, Junction (08524)	1	1841-1-5616
-17	00000035	. CONTACT, Pin (00779)	1	60618-1
-18	00000451	. HOUSING, Pin (00779)	1	1480350-0
-19	00000058	. TIE, Cable (06383)	5	STIM-M
-20	00000086	. TUBING, Heatshrink, BLK 3/16 Dia. x 6" (92194)	1	FTT-105
-21	00000127	. TUBING, Heatshrink, BLK 1/8 Dia. X 3/4" (92194)	2	FTT-105
-22	00000085	. TUBING, Heatshrink, 1/4 Dia. x 8" (92194)	1	FTT-105
-23	00000824	. SLEEVING (92194)	1	PVC-105119
-24	N/R	. WIRE, Elec. #18 AWG	A/R	1857/19
-25	00000150	. WIRE, Bus #22 AWG, Solid	A/R	3818
-26	N/R	. WIRE, Elec. #24 AWG	A/R	1854/19

M8, M3, M10
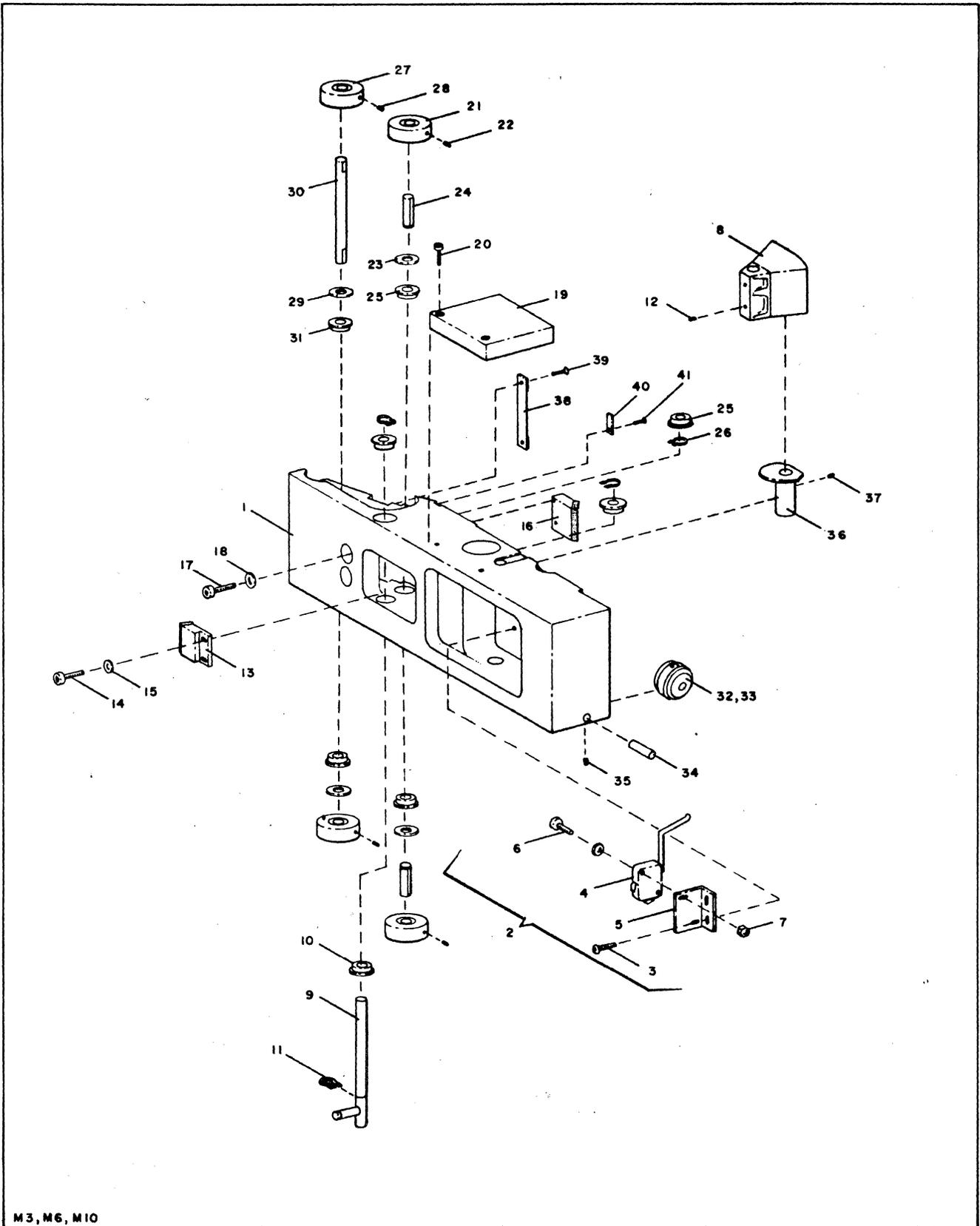
M3, M6, M10

FIGURE 12-6 PICK SUPPORT ASSEMBLY

FIGURE 12-6 PICK SUPPORT ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40048201	PICK SUPPORT ASSEMBLY		
-1	40001601	. PICK SUPPORT	1	
-2	20027701	. SWITCH ASSEMBLY, Hopper Empty (Attaching Parts)	1	
-3	00000096	. . . SCREW, Machine, Button Head, 4 - 40 x 1/4	2	
-4	10023501	. . SWITCH (01963)	1	E21-85HX
-5	20023401	. . BRACKET, Switch (Attaching Parts)	1	
-6	00000272	. . . SCREW, Machine, Pan Head, 4 - 40 x 5/8	2	
-7	00000062	. . . NUT, Plain, Hex, 4 - 40	2	
-8	30003701	. SECTOR ASSEMBLY (Attaching Parts)	1	
-9	20101401	. . SHAFT, Pick Assembly	1	
-10	00000429	. . BEARING (14927)	2	SFR188TTK25LG1
-11	00000467	. . RING, Snap (79136)	2	5100-25
-12	00000297	. . SET SCREW, 8 - 32 x 3/16	2	
-13	10004101	. STOP, Pick (Attaching Parts)	1	
-14	00000398	. . SCREW, Socket Head, 6 - 32 x 5/8	2	
-15	00000295	. . WASHER, Flat #6	2	
-16	10004701	. BUMPER, Pick (Attaching Parts)	1	
-17	00000293	. . SCREW, Socket Head, 8 - 32 x 1/2	2	
-18	00000294	. . WASHER, Flat #8	2	
-19	30023303	. CAP, Riffle Air (Attaching Parts)	1	
-20	00000391	. . SCREW, Socket Head, 4 - 40 x 3/4	2	
		DRIVE ROLLER, 2nd Pick Drive Assembly		
-21	20005901	. CAPSTAN (Attaching Parts)	2	
-22	00000292	. . SETSCREW, Knurled Cup, 6 - 32 x 3/16	2	
-23	00000432	. SPACER, Bearing	2	SS2-28
-24	10002201	. SHAFT	2	
-25	00000429	. BEARING (14927)	4	SFR188TTK25LG1
-26	00000467	. RING SNAP (79136)	2	5100-25

M3, M6, M10

FIGURE 12-6 PICK SUPPORT ASSEMBLY (CONT'D)

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

M3, M6, M10

FIGURE 12-7 STACK SUPPORT ASSEMBLY

M3, M6, M10

FIGURE 12-7 STACK SUPPORT ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40021205	STACK SUPPORT ASSEMBLY	1	
-1	40048801	. SUPPORT, Stack	1	
		FIRST STACK DRIVE ASSEMBLY		
-2	10003002	. SHAFT, Stack Drive	1	
-3	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-4	20001505	. ROLLER, Stack Drive	2	
-5	00000429	. BEARING, (14927)	2	SFR188TT (3)
-6		. SAME AS ITEM -3		
		(Attaching Parts)		
-7	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		SECOND STACK DRIVE ASSEMBLY		
-8	10003002	. SHAFT, Stack Drive	1	
-9	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-10	20001504	. ROLLER, Stack Drive	2	
-11	00000429	. BEARING (14927)	2	SFR188TT (3)
-12		. SAME AS ITEM -9		
		(Attaching Parts)		
-13	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		THIRD STACK DRIVE ASSEMBLY		
-14	10003002	. SHAFT, Stack Drive	1	
-15	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-16	20001506	. ROLLER, Stack Drive	2	
-17	00000429	. BEARING (14927)	2	SFR188TT (3)
-18		. SAME AS ITEM -15		
		(Attaching Parts)		
-19	00000292	. . SCREW, Set Knurled Cup PT, 6 - 32 x 3/16	2	
		FOURTH STACK DRIVE ASSEMBLY		
-20	10003002	. SHAFT, Stack Drive	1	
-21	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-22	20002101	. ROLLER, Stack Drive	2	

M3,M6

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-23	00000430	. BEARING, (14927)	2	SFR4TT (3)
-24		. SAME AS ITEM -21		
		(Attaching Parts)		
-25	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	2	
		FIFTH STACK DRIVE ASSEMBLY		
-26	10003002	. SHAFT, Stack Drive	1	
-27	00000431	. SPACER, Bearing (29440)	A/R	SS2-27
	00000432	. SPACER, Bearing (29440)	A/R	SS2-28
	00000433	. SPACER, Bearing (29440)	A/R	SS2-30
-28	20002101	. ROLLER, Stack Drive	2	
-29	00000430	. BEARING (14927)	2	SFR4TT (3)
-30		. SAME AS ITEM -27		
		(Attaching Parts)		
-31	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	2	
-32	20038202	. STACK PHOTOCELL ASSEMBLY	1	
		(Attaching Parts)		
-33	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	1	
-34	20012702	. DRUM, Spring	1	
-35	00000499	. SPRING, Negator (80545)	1	SL5E17
-36	10000701	. SHAFT, Spring Drum	1	
		(Attaching Parts)		
-37	00000292	. . SCREW, Set - Knurled Cup PT, 6 - 32 x 3/16	1	
-38	10075801	. THROAT, Pick	1	
		(Attaching Parts)		
-39	00000305	. . SCREW, Pan Head 4 - 40 x 1/4	1	
-40	00000492	. PIN, Dowel, .25 Dia. x 1/2 Hardened Steel (70276)	1	PINDOW1-4X1-2
-41	20021101	. SWITCH ASSEMBLY, Stacker Full	1	
		(Attaching Parts)		
-42	00000314	. . SWITCH, Snap Action (01963)	1	E63030K
-43	20012201	. . BRACKET SWITCH	1	
		(Attaching Parts)		
-44	00000369	. . . SCREW, Machine, Pan Head 2 - 56 x 1/2	2	
-45	00000725	. . . WASHER, Split Lock #2	2	
-46	00000425	. . . NUT, Hex #2 - 56	2	
-47	00000305	. . . SCREW, Machine, Pan Head 4 - 40 x 1/4	2	
-48	00000059	. . CABLE TIE, Mount	1	
		(Attaching Parts)		
-49	00000064	. . . SCREW, Machine, Pan Head 4 - 40 x 3/8	1	
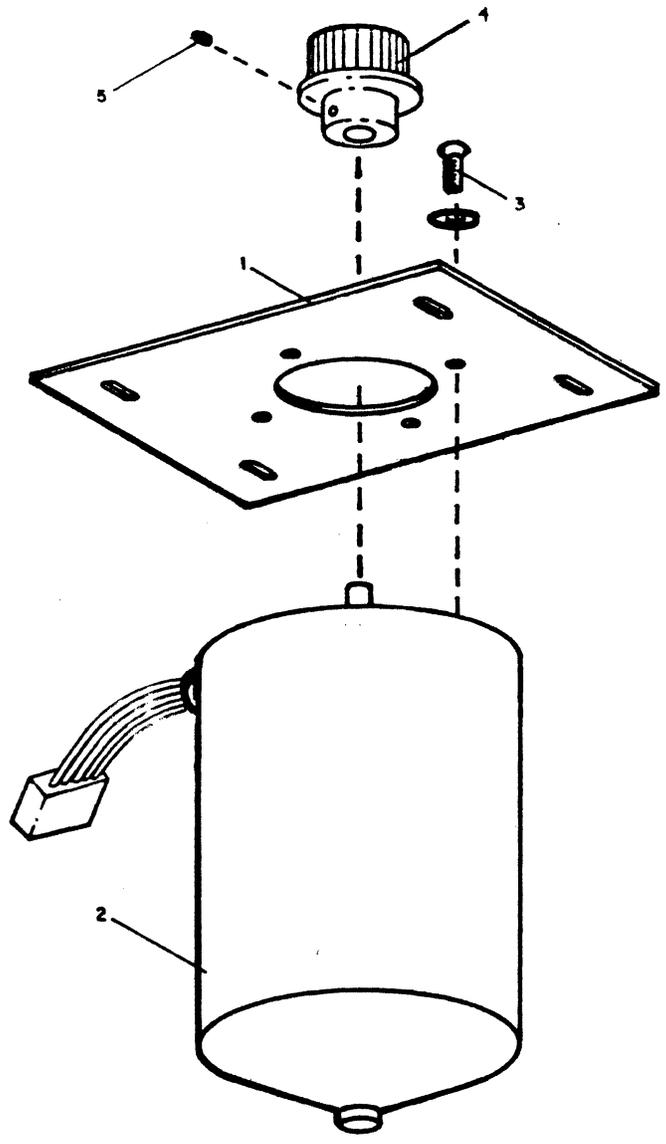
M3, M6

FIGURE 12-8 DRIVE MOTOR ASSEMBLY

FIGURE 12-8 DRIVE MOTOR ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	30016205	DRIVE MOTOR ASSEMBLY, 115 VAC, 60 Hertz		
	30016206	DRIVE MOTOR ASSEMBLY, 230 VAC, 50 Hertz		
-1	20001901	. PLATE, Motor Mounting - 115 VAC, 60 Hertz	1	
	20001902	. PLATE, Motor Mounting - 230 VAC, 50 Hertz	1	
-2	00000774	. MOTOR, (19070)	1	H34BBP-8
		(Attaching Parts)		
-3	00000368	. . SCREW, Machine Pan Head, 10 - 32 x 3/8	4	
-4	20127008	. SPROCKET, Timing Belt (15) - (115 VAC, 60 Hertz)	1	
	20127006	. SPROCKET, Timing Belt (18) - (230 VAC, 50 Hertz)	1	
		(Attaching Parts)		
-5	00000292	. . SCREW, Set (Supplied with item 4)	1	
-6	00000295	. CONNECTOR, Housing 6 Pos SKT (00779)	1	
-7	00000610	. CONTACT, Connector SKT Crimp (00779)	6	
-8	00000526	. TIE, Cable (06383)	2	SSTIM
-9	00000058	. MOUNT, Cable Tie (06383)	1	TAI58C
		(Attaching Parts)		
-10	00000059	. . SCREW, Machine Pan Head 6 - 32 x 1/4	1	
-11	00000375	. . WASHER, Flat No. 6	1	

M6,M3
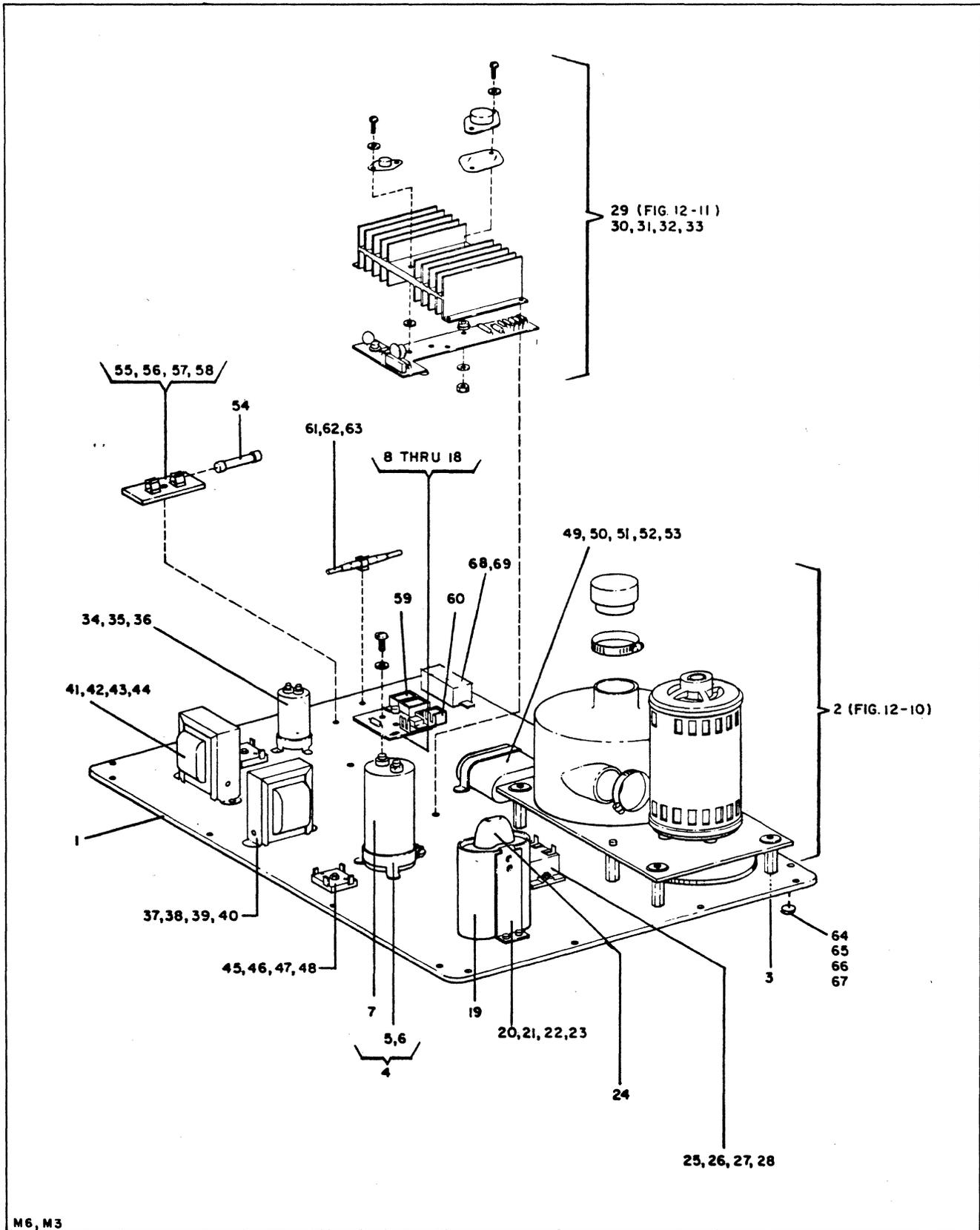
FIGURE 12-9 BASE PLATE ASSEMBLY

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.
	40075115	BASE PLATE ASSEMBLY - 115 VAC, 60 Hertz		
	40075116	BASE PLATE ASSEMBLY - 230 VAC, 50 Hertz		
-1	40008001	. PLATE, Bottom - 115 VAC, 60 Hertz	1	
	40077401	. PLATE, Bottom - 230 VAC, 50 Hertz	1	
-2	40033304	. VACUUM PUMP ASSEMBLY - 115 VAC, 60 Hz (Fig. 12-10)	1	
	40033307	. VACUUM PUMP ASSEMBLY - 230 VAC, 50 Hz (Fig. 12-10)	1	
		(Attaching Parts)		
-3	00000379	. . SCREW, Machine, Pan Head #8 - 32 x 1/2	4	
-4	30010001	. DRIVER ASSEMBLY, Solenoid	1	
-5	00000199	. . CAPACITOR, 6200 mf, 75 VDC (08806)	1	86F177M
-6	00000498	. . . RIVET, (Pop)	3	SD44BS
-7	00000548	. . BRACKET, Capacitor, Mounting (08806)	1	94A734AB3
-8	20010201	. . P. C. BOARD	1	
-9	00000040	. . . DIODE (01295)	1	1N403
-10	00000139	. . . TRANSISTOR, NPN (94144)	1	2N2102
-11	00000247	. . . RESISTOR, 270 ohms, ± 10%, 1/4W	1	RCO7GF271K
-12	00000141	. . . TRANSISTOR, NPN, Power (01295)	1	T1P41C
-13	00000108	. . . COMPOUND, Heatsink (13103)	1	6107B-14
		(Attaching Parts)		
-14	00000064	. . . . SCREW, Machine, Pan Head 4 - 40 x 3/8	1	
-15	00000062	. . . . NUT, Hex 4 - 40	1	
-16	00000065	. . . . WASHER, Flat No. 4	1	
		(Attaching Parts)		
-17	00000368	. . . SCREW, Pan Head, 10 - 32 x 3/8	2	
-18	00000444	. . . WASHER, Lock, Internal tooth No. 10	4	
-18A	00000236	. . . RESISTOR, 10K, 1/2W	1	RC20GF103K
-19	00000202	. CAPACITOR, Vacuum Pump Motor Run, 17.5 µf 370 VAC (115 VAC, 60 Hertz) (08806)	1	45F279
	00000206	. CAPACITOR, Vacuum Pump Motor Run, 10 µf 200-365 VAC (230 VAC, 50 Hertz) (08806)	1	45F170
-20	00000290	. CLAMP, Capacitor (Pair) (08806)	1	302C920126
		(Attaching Parts)		
-21	00000302	. . SCREW, Machine, Pan Head #6 - 32 x 1/2	4	
-22	00000301	. . NUT, Hex, #6 - 32	4	
-23	00000295	. . WASHER, Flat #6	4	
-24	00000472	. BOOT	1	614A625P21
-25	00000109	. RELAY, Vacuum Pump and Drive Motor 20A (115 VAC, 60 Hertz) (12617)	1	724-11-159
	00000474	. RELAY, Vacuum Pump and Drive Motor 6A (230 VAC, 50 Hertz) (12617)	1	733-12-150
		(Attaching Parts)		
-26	00000379	. . SCREW, Machine, Pan Head, 8 - 32 x 1/2	2	
-27	00000299	. . NUT, Hex #8 - 32	2	
-28	00000556	. . COMPOUND, Heatsink	A/R	

M6, M3

FIGURE 12-9 BASE PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-29	30029505	. POWER SUPPLY ASSEMBLY (Fig. 12-11)		
		(Attaching Parts)		
-30	10015401	. . STANDOFF	4	
-31	00000392	. . SCREW, Socket Head, #6 - 32 x 1/2	4	
-32	00000295	. . WASHER, Flat #6	4	
-33	00000302	. . SCREW, Machine, Pan Head, #6 - 32 x 1/2		
-34	00000200	. CAPACITOR. Logic Power Supply, 4600 mf 25 VDC		
		(08806)	1	86F119M
-35	00000479	. CLAMP, Capacitor (08806)	1	942A734AA1
		(Attaching Parts)		
-36	00000498	. . RIVET, (Pop)	3	SD44B5
-37	20015501	. TRANSFORMER ASSEMBLY, Solenoid Driver, 24V		
		(115 VAC, 50/60 Hertz)	1	
	20074001	. TRANSFORMER ASSEMBLY, Solenoid Driver, 24V		
		(230 VAC, 50 Hertz)	1	
	00000134	. . TRANSFORMER (Stancor)	1	P6377
	00000194	. . CAPACITOR, .01 mf, 1000 VDC	2	5HK510
		(Attaching Parts)		
-38	00000296	. . SCREW, Machine, Pan Head, 6 - 32 x 3/8	2	
-39	00000295	. . WASHER, Flat #6	2	
-40	00000301	. . NUT, Hex #6 - 32	2	
-41	20015601	. TRANSFORMER ASSEMBLY, Logic Power Supply 12V		
		(115 VAC, 50/60 Hertz)	1	
	20073901	. TRANSFORMER ASSEMBLY, Logic Power Supply 12V		
		(230 VAC, 50 Hertz)	1	
	00000134	. . TRANSFORMER (Stancor)	1	P6377
	00000194	. . CAPACITOR, .01 mf, 1000 VDC	2	5HK510
		(Attaching Parts)		
-42	00000296	. . SCREW, Machine, Pan Head, 6 - 32 x 3/8	2	
-43	00000295	. . WASHER, Flat #6	2	
-44	00000301	. . NUT, Hex #6 - 32	2	
-45	00000143	. RECTIFIER, Diode Bridge, 100 VDC (04713)	2	MDA980-2
		(Attaching Parts)		
-46	00000272	. . SCREW, Machine, Pan Head, 4 - 40 x 5/8	2	
-47	00000065	. . WASHER, Flat #4	2	
-48	00000062	. . NUT, Hex #4 - 40	2	
-49	00000205	. CAPACITOR, Drive Motor Run, 3 μf, 370V (115 VAC, 60 Hz)	1	45F271
		(08806)		
	00000204	. CAPACITOR, Drive Motor Run, 4 μf, 370V (230 VAC, 50 Hz)	1	45F272
		(08806)		
-50	00000289	. BRACKET, Capacitor (08806)	1	K987065P21
		(Attaching Parts)		
-51	00000296	. . SCREW, Machine, Pan Head, 6 - 32 x 3/8	2	

M3, M6

BASE PLATE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-52	00000295	. . WASHER, Flat #6	2	
-53	00000301	. . NUT, Hex, 6 - 32	2	
-54	00000147	. FUSE, 1 amp Slo-Blo (75915)	1	313001
-55	00000133	. MOUNT, Fuse (75915)	1	356001
		(Attaching Parts)		
-56	00000302	. . SCREW, Machine, Pan Head, 6 - 32 x 1/2	1	
-57	00000295	. . WASHER, Flat #6	1	
-58	00000301	. . NUT, Hex 6 - 32	1	
-59	00000503	. JUNCTION, Terminal (08524)	2	TJ11A-0501
-60	00000504	. JUNCTION, Terminal (08524)	1	TJ11A-0502
-61	00000487	. TOOL, Insertion/Extraction (08524)	1	M15570-16
-62	00000132	. CLIP (79515)	1	101002
		(Attaching Parts)		
-63	00000498	. . RIVET, (Pop)	1	SD44BS
-64	00000428	. BUMPER, Rubber (83330)	4	SC405
		(Attaching Parts)		
-65	00000296	. . SCREW, Pan Head, #6 - 32 x 3/8	4	
-66	00000295	. . WASHER, Flat #6	4	
-67	00000301	. . NUT, Hex #6 - 32	4	
-68	30075601	. FILTER ASSEMBLY	1	
		(Attaching Parts)		
-69	00000498	. . RIVET Pop	2	SD44BS
-70	00000498	. RIVET, Blind, Aluminum, 1/8 inch	2	SD44BS
-71	00000059	. MOUNT, Cable Tie (06383)	5	TA158C
-72	00000058	. TIE, Cable (06383)	11	SSTIM
-73	00000531	. LOCTITE, Grade C	A/R	60414-1
-74	00000555	. ADHESIVE, Pliobond	A/R	
-75	00000556	. COMPOUND, Heatsink (13103)	A/R	
-76	20027513	. CABLE ASSEMBLY, Fuse	1	
-77	20027505	. CABLE ASSEMBLY	1	
-78	20091301	. CABLE ASSEMBLY, Relay (230 VAC, 50 Hertz)	1	
-79	20027502	. CABLE ASSEMBLY	1	
-80	40075401	. WIRING DIAGRAM (115 VAC, 60 Hertz)		
	40076401	. WIRING DIAGRAM (230 VAC, 50 Hertz)		

M6,M3
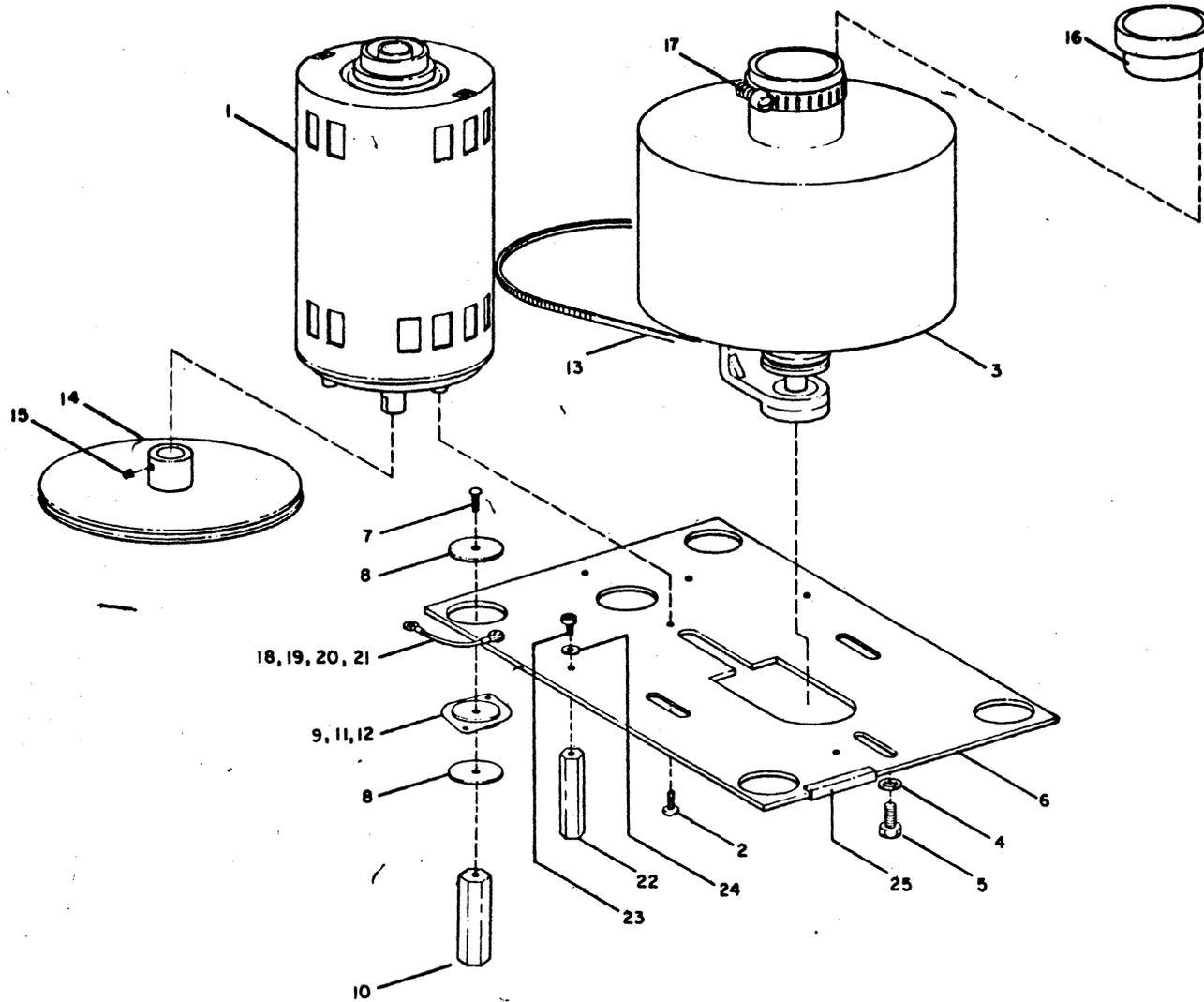
FIGURE 12-10 VACUUM PUMP ASSEMBLY

FIGURE 12-10 VACUUM PUMP ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40033304	VACUUM PUMP ASSEMBLY, 115 VAC, 60 Hertz	1	
	40033307	VACUUM PUMP ASSEMBLY, 230 VAC, 50 Hertz	1	
-1	00000539	. MOTOR, 60 Hz, 3350 rpm, 115 VAC, 60 Hertz (03597)	1	KCPMPG-19OA
	00000540	. MOTOR, 50 Hz, 230 VAC, (03597)	1	5KCP19PG0222
		(Attaching Parts)		
-2	00000379	. . SCREW, Machine, Pan Head, 8 - 32 x 1/2	4	
-3	00000541	. BLOWER (75511)	1	60-115626
		(Attaching Parts)		
-4	00000441	. . WASHER, Flat #1/4	3	
-5	00000855	. . SCREW, Cap, Hex Head, 1/4 - 20 x 5/8	3	
-6	30031801	. PLATE, Blower - 115 VAC, 60 Hertz	1	
	30076701	. PLATE, Blower - 230 VAC, 50 Hertz	1	
		(Attaching Parts)		
-7	00000381	. . SCREW, Machine, Pan Head, 8 - 32 x 3/4	4	
-8	00000294	. . WASHER, Flat, No. 8 7/8 OD	8	
-9	00000505	. . MOUNT, Rubber (76005)	2	100PD2
	00000291	. . MOUNT, Rubber (76005)	2	100PD4
-10	10002004	. . STANDOFF	4	
-11	00000064	. . SCREW, Machine, Pan Head 4 - 40 x 3/8	8	
-12	00000062	. . NUT, Plain, Hex, No. 4 - 40	8	
-13	00000519	. BELT - 115 VAC, 60 Hertz (24161)	1	5 M 545
	00000520	. BELT - 230 VAC, 50 Hertz (24161)	1	5 M 580
-14	20076101	. PULLEY - 115 VAC, 60 Hertz	1	
	20076102	. PULLEY - 230 VAC, 50 Hertz	1	
		(Attaching Parts)		
-15	00000591	. . SCREW, Set, Nyloc Cup Point STLN BLK, 1/4 - 20 x 3/8 (83014)	1	
-16	20064701	. ADAPTER ASSEMBLY, Vacuum, 115 VAC, 60 Hertz	1	
	20064702	. ADAPTER ASSEMBLY, Vacuum, 230 VAC, 60 Hertz	1	
		(Attaching Parts)		
-17	00000407	. . CLAMP (76599)	1	H - 24
-18	20037901	. GROUND STRAP ASSEMBLY	1	
		(Attaching Parts)		
-19	00000296	. . SCREW, Pan Head, 6 - 32 x 3/8	1	
-20	00000445	. . WASHER, Lock, int. tooth, #6	1	
-21	00000301	. . NUT, Hex, 6 - 32	1	
-22	10002005	. STANDOFF	2	
		(Attaching Parts)		
-23	00000293	. . SCREW, Cap, Socket Head, 8 - 32 x 1/2	2	
-24	00000294	. . WASHER, Flat #8	2	

M6,M3,M10

12-25 a

VACUUM PUMP ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-25	00000482	. STRIP, Grommet (06229)	1	G55
-26	00000058	. TIE, Cable (06383)	2	SSTIM
-27	00000059	. CABLE TIE, Mount (06383)	1	TAIS8
-28	00000525	. RECEPTACLE, Faston (2.50) (00779)	3	60414-1
-29	00000531	. LOCTITE, Grade C	A/R	
-30	00000085	. TUBING HEAT SHRINK, 1/4 x 1 1/4 (92194)	3	FIT - 105
-31	00000555	. ADHESIVE, Pliobond	A/R	

M6,M3,M10
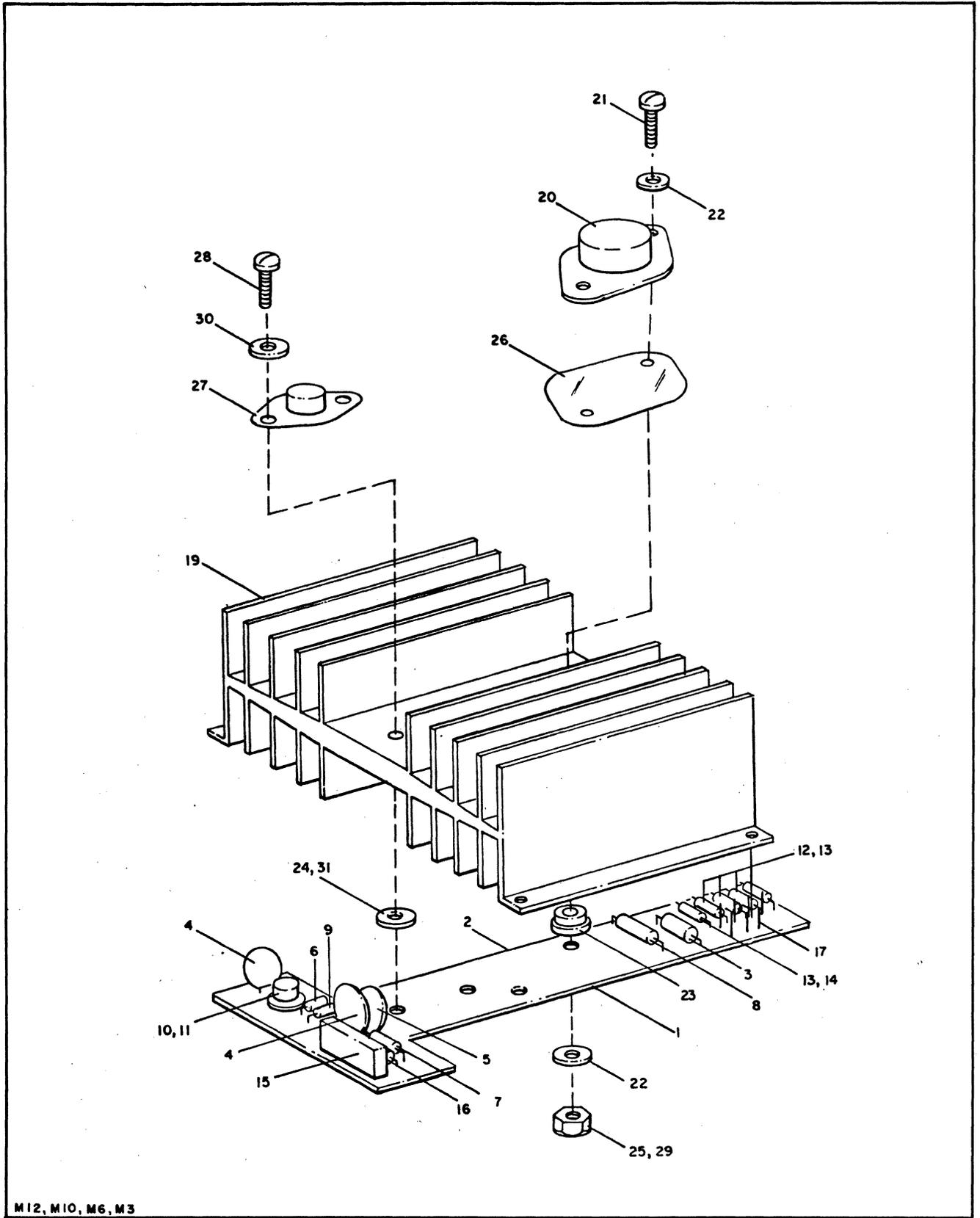
FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIGURE 12-11 POWER SUPPLY ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	30029505	POWER SUPPLY ASSEMBLY		
-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% 1/4W	1	RC07GF101K
-8	00000207	. . RESISTOR, .10 ohm $\pm$1% 3W	1	RW79UR100F
-9	00000070	. . RESISTOR, 1K ohm $\pm$ 10% 1/4W	1	RC07GF102K
-10	00000140	. . TRANSISTOR, NPN (04713)	1	2N706
-11	00000107	. . PAD, Transistor mount (red) (13103)	1	7717-14S
-12	00000570	. . RESISTOR, (SAT) $\pm$ 10% 1/4W range 33 to 100 ohm	4	RC07GF
-13	00000460	. . SOCKET, Miniature Spring (00779)	10	3-331677-6
-14	00000570	. . RESISTOR, (SAT) $\pm$ 10% 1/4W range 82 to 120 ohm	1	RC07GF
-15	00000232	. . RESISTOR, Variable, 10K $\pm$ 10% 1W	1	3009P-1-103
-16	00000238	. . RESISTOR, 7.5K, $\pm$ 5% 1/2W	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-6-312NA
-25	00000569	. . . NUT, Plain, Hex 6 - 32, Nickel Brass Plate	2	
-26	00000567	. . . WASHER, Insulating (13103)	1	43-03-04
-27	00000115	. . INTEGRATED CIRCUIT, Regulator (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	00000108	. COMPOUND, Heatsink, (13103)	A/R	

M6,M3,M10,M12
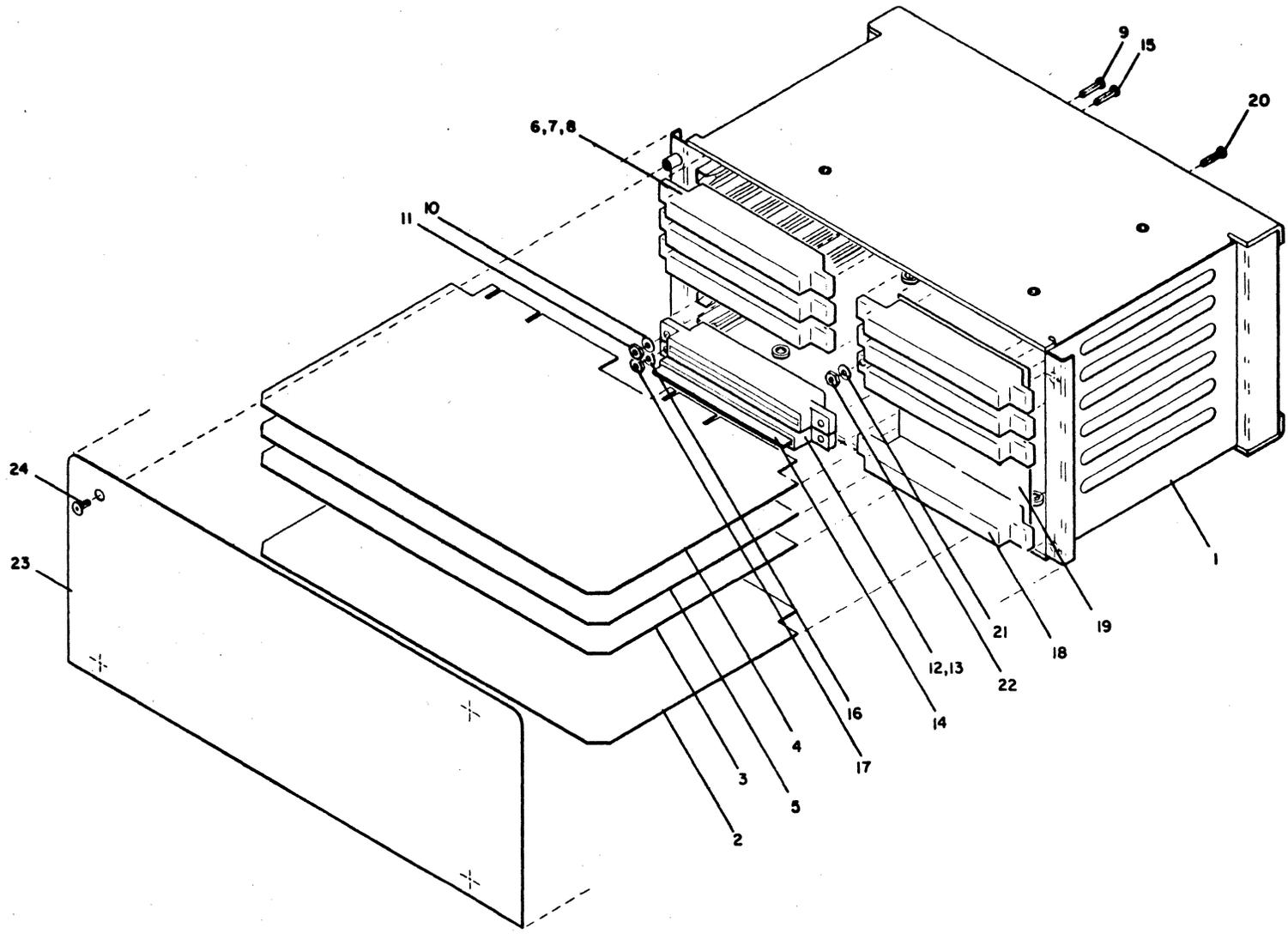
FIGURE 12-12 CARD FILE ASSEMBLY

FIGURE 12-12 CARD FILE ASSEMBLY

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	400612XX	CARD FILE ASSEMBLY		
-1	30029401	. CARD CAGE WITH GUIDES	1	
-2	40061903	. P.C. ASSEMBLY, Control Card (PT)	1	
	40061906	. P.C. ASSEMBLY, Control Card (PTRP)	1	
	40061908	. P.C. ASSEMBLY, Control Card (GTRP)	1	
	40061909	. P.C. ASSEMBLY, Control Card (PTOC)	1	
	40061904	. P.C. ASSEMBLY, Control Card (GTOC)	1	
-3	40035301	. P.C. ASSEMBLY, Sync Card	1	
-4	40076507	. P.C. ASSEMBLY, Clock Card (PT)	1	
	40076509	. P.C. ASSEMBLY, Clock Card (PTRP)	1	
	40076504	. P.C. ASSEMBLY, Clock Card (GTRP)	1	
	40076510	. P.C. ASSEMBLY, Clock Card (PTOC)	1	
	40076508	. P.C. ASSEMBLY, Clock Card (GTOC)	1	
-5	40061004	. P.C. ASSEMBLY, Error Card (PT)	1	
	40061006	. P.C. ASSEMBLY, Error Card (PTRP)	1	
	40061008	. P.C. ASSEMBLY, Error Card (GTRP)	1	
	40061010	. P.C. ASSEMBLY, Error Card (PTOC)	1	
	40061005	. P.C. ASSEMBLY, Error Card (GTOC)	1	
-6	00000029	. CONN HOUSING, Crimp, Snap-In (00779)	4	1-582191-5
-7	00000030	. PLUG, Keyed (00779)	16	582501-5
-8	00000061	. SPRING, Retaining (00779)	11	42973-2
		(Attaching Parts)		
-9	00000064	. . SCREW, Machine, Pan Head, SSL 4 - 40 x 3/8	8	
-10	00000066	. . WASHER, Lock, Internal Tooth #4	8	
-11	00000062	. . NUT, Plain, Hex Head #4 - 40	8	
-12	00000032	. CONNECTOR, Single Row (00779)	1	583302-1
-13	00000702	. CONTACT, Connector (00779)	1	583259-2
-14	20036201	. BUS BAR, Connector	1	
		(Attaching Parts)		
-15	00000063	. . SCREW, Machine, Pan Head, SSL 4 - 40 x 1/2	2	
-16	00000066	. . WASHER, Lock, Internal Tooth #4	2	
-17	00000062	. . NUT, Plain, Hex # 4 - 40	2	
-18	00000032	. CONNECTOR, Tab, Solder Loaded (00779)	4	583334-1
-19	40032401	. P.C. CARD, Motherboard	1	
		(Attaching Parts)		
-20	00000063	. . SCREW, Machine, Pan Head, SSL 4 - 40 x 1/2	8	
-21	00000066	. . WASHER, Lock, Internal Tooth #4	8	
-22	00000062	. . NUT, Plain, Hex #4 - 40	8	

M3

FIGURE 12-12 CARD FILE ASSEMBLY (CONT'D)

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
-23	30033501	. PLATE, Cover	1	
		(Attaching Parts)		
-24	00000114	. . SCREW, Machine Button Head BLK 6 - 32 x 1/4	4	
		————————————————		
-25	20056609	. JUMPER WIRE ASSEMBLY	1	
-26	N/R	. WIRE, Elec. #20 AWG, BRN	A/R	1854/19
-27	20063601	. CABLE ASSEMBLY, D.C. Power	1	
-28	40099401	. WIRING DIAGRAM		

M3, M6,
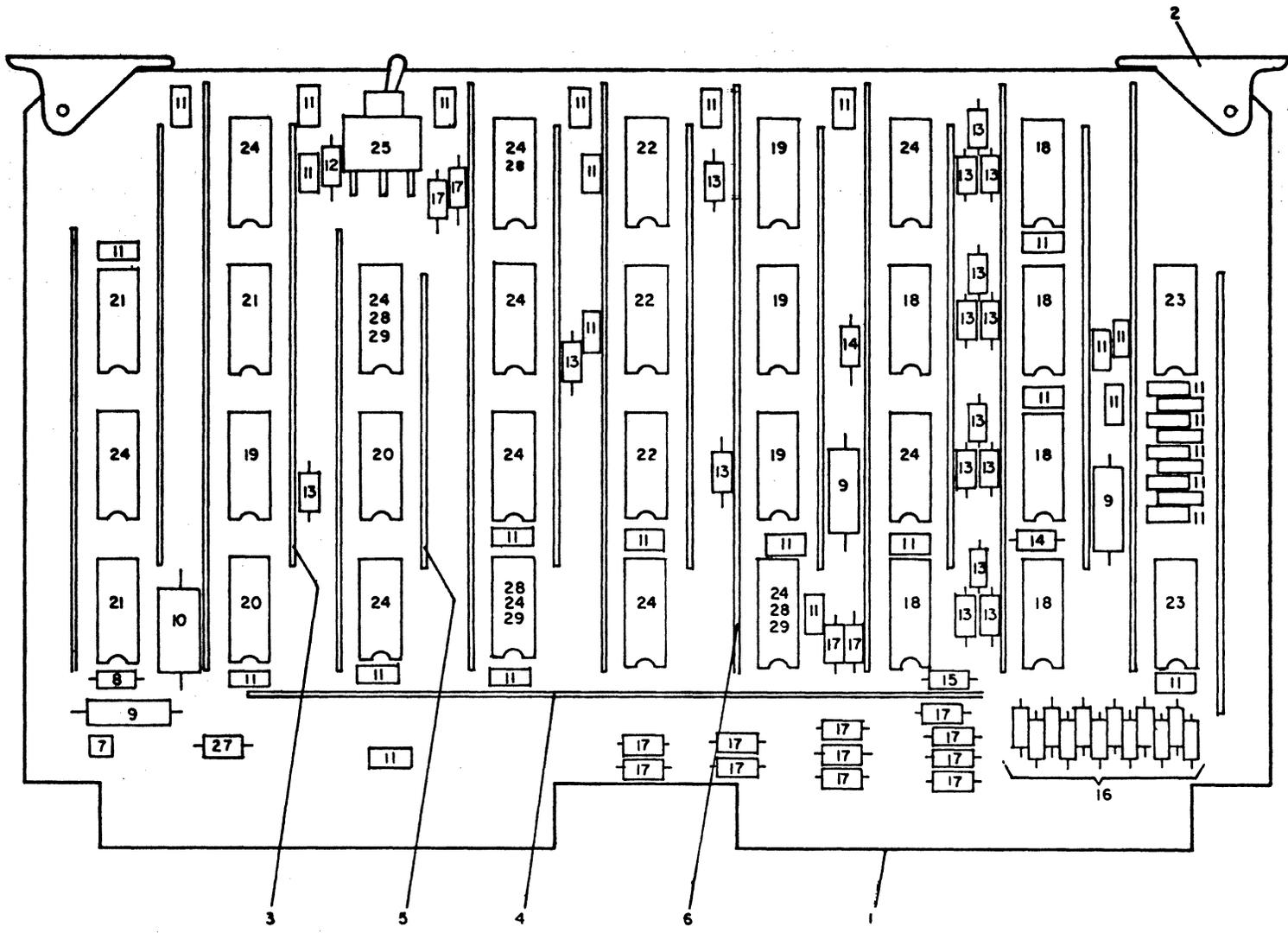
FIGURE 12-13 P.C. ASSEMBLY - Control Card

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

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS/ASSY						VENDOR PART NO.
			PT	GT	PTRP	GTRP	PTOC	GTOC	
	REF	P.C. ASSEMBLY, Control Card							
-1	40064901	. PRINTED CIRCUIT BOARD	1		1	1	1	1	
-2	00000060	. HANDLE, Extractor with roll pin (18617)	2		2	2	2	1	S-203
-3	20031104	. BUS BAR, 4 Pin	10		10	10	10	10	
-4	20031106	. BUS BAR, 6 Pin	1		1	1	1	1	
-5	20031103	. BUS BAR, 3 Pin	1		1	1	1	1	
-6	20031105	. BUS BAR, 5 Pin	7		7	7	7	7	
-7	00000088	. BEAD, Ferrite (33062)	1		1	1	1	1	21-030-F
-8	00000039	. DIODE, Zener 6.8V (04713)	1		1	1	1	1	IN5235
-9	00000025	. CAPACITOR, Elec., 20 μf, 6V (03597)	3		3	3	3	3	76F02CC200
-10	00000024	. CAPACITOR, Mylar, 0.1 μf, 100V (03597)	1		1	1	1	1	BA12A104B
-11	00000023	. CAPACITOR, 0.01 μf, 100V (80813)	34		34	34	34	34	T6-S10
-12	00000075	. RESISTOR, 300 ohm, $\pm$10%, 1/4W	1		1	1	1	1	RC07GF331K
-13	00000070	. RESISTOR, 1K ohm, $\pm$10%, 1/4W	16		16	16	16	16	RC07GF102K
-14	00000076	. RESISTOR, 470 ohm, $\pm$10%, 1/4W	2		2	2	2	2	RC07GF471K
-15	00000069	. RESISTOR, 100 ohm, $\pm$10%, 1/4W	1		1	1	1	1	RC07GF101K
-16	00000258	. RESISTOR, 560 ohm, $\pm$5%, 1/4W	12		12	12	12	12	RC07GF561J
-17	00000080	. RESISTOR, 5.6K, $\pm$10%, 1/4W	2		15	15	2	2	RC07GF562K
-18	00000049	. INTEGRATED CIRCUIT, Hex Inverter (18324)	6		6	6	6	6	N7405A
-19	00000043	. INTEGRATED CIRCUIT, Quad 2 input DTL gate (07236)	4		4	4	4	4	U6A994659X
-20	00000046	. INTEGRATED CIRCUIT, 2 input (18324)	2		2	2	2	2	N7400A
-21	00000044	. INTEGRATED CIRCUIT, Dual D Flip-Flop (18324)	3		3	3	3	3	N7474A
-22	00000054	. INTEGRATED CIRCUIT, 4 Bit Counter (18324)	3		3	3	3	3	N8281ADC
-23	00000057	. INTEGRATED CIRCUIT, Low Pwr. Hex Inv. (Fairchild)	2		2	2	2	2	U6AL0459X
-24	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	12		9	8	9	8	N7404A
-25	00000083	. SWITCH, SPDT PC Mount (09353)	1		1	1	1	1	7101A
-26	00000020	. WIRE, Bus 18 AWG 11/16"	1		1	1	1	1	
-27	00000198	. JUMPER, 0 ohm Resistor (Speer)	1		1	1	1	1	Res. Jumper 0" ohm
-28	00000124	. INTEGRATED CIRCUIT, Hex Buffer Non Inv. (18324)	–		–	4	–	4	N7417A
-29	00000123	. INTEGRATED CIRCUIT, Hex Inverter (18324)	–		3	–	3	–	N7416A
-30	40065001	. SCHEMATIC	1		1	1	1	1	

M2,M3,M5,M10,M12

12-31a

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

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

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	VENDOR PART NO.
	40035303	P.C. ASSEMBLY – Sync Card		
-1	40060001	. PRINTED CIRCUIT BOARD	1	
-2	00000060	. HANDLE, Extractor with Roll Pin (18617)	2	S-203
-3	20031104	. BUS BAR, 4 Pin	9	
-4	20031105	. BUS BAR, 5 Pin	8	
-5	20031107	. BUS BAR, 7 Pin	1	
-6	00000088	. BEAD, Ferrite (33062)	1	21-030-F
-7	00000039	. DIODE, Zener 6.8V (04713)	1	1N5235
-8	00000025	. CAPACITOR, Electrolytic, 20 μf, 6V (03597)	1	76F02CC200
-9	00000023	. CAPACITOR, .01 μf, 50V (56289)	25	TG-S10
-10	00000024	. CAPACITOR, Mylar, .1 μf (03597)	2	BA12A104B
-11	00000070	. RESISTOR, 1K ohm, $\pm$ 10% 1/4W	6	RC07GF102K
-12	00000076	. RESISTOR, 470 ohm, $\pm$ 10%, 1/4W	3	RC07GF471K
-13	00000072	. RESISTOR, 220 ohm, $\pm$ 10%, 1/4W	1	RC07GF221K
-14	00000042	. INTEGRATED CIRCUIT, Hybrid Driver (07886)	1	H6F22009XX
-15	00000054	. INTEGRATED CIRCUIT, Counter Register (18324)	8	N8281ADC
-16	00000055	. INTEGRATEE CIRCUIT, 4 Bit Comparator O.C. (18324)	2	N8242A
-17	00000047	. INTEGRATED CIRCUIT, Single 8 Input Gate (18324)	4	N7430A
-18	00000044	. INTEGRATED CIRCUIT, Dual D Flip-Flop (18324)	6	N7474A
-19	00000045	. INTEGRATED CIRCUIT, Dual 4 Input Buff (18324)	3	N7440A
-20	00000046	. INTEGRATED CIRCUIT, Quad 2 Input Gate (18324)	2	N7400A
-21	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	3	N7404A
-22	00000053	. INTEGRATED CIRCUIT, Counter Register (18324)	2	N8280ADC
-23	00000020	. WIRE, Bus #AWG 18, 11/16	1	
-24	40094301	. SCHEMATIC		

M2,M3,M9,M10,M12
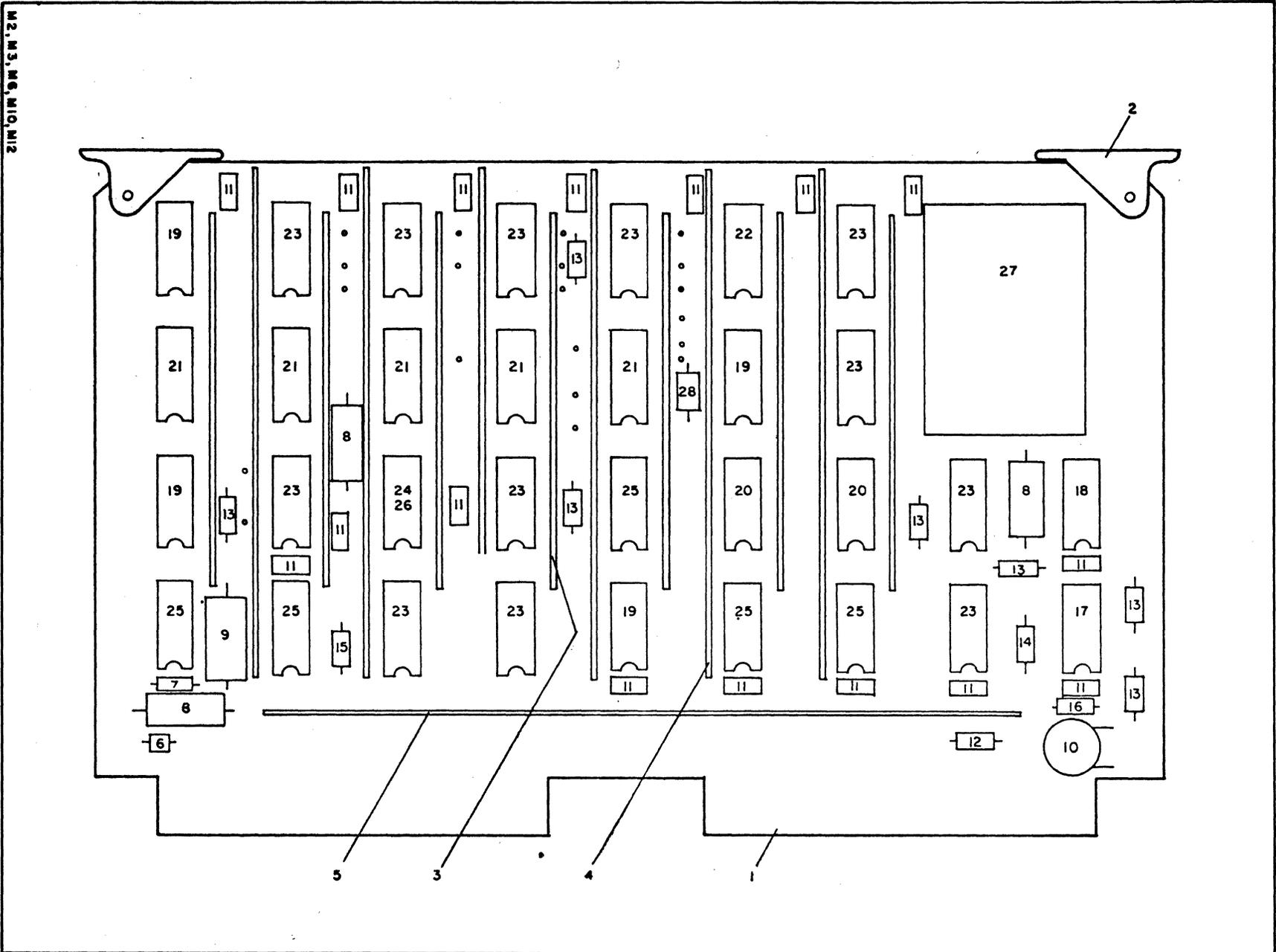
FIGURE 12-15 P.C. ASSEMBLY - Clock Card

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

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	PT	GT	PTRP	GTRP	PTOC	GTOC	VENDOR PART NO.
	REF	P.C. ASSEMBLY, Clock Card							
-1	40079901	. PRINTED CIRCUIT BOARD	-		1	1	-	1	
	40032201	. PRINTED CIRCUIT BOARD	1		-	-	-	-	
	40062601	. PRINTED CIRCUIT BOARD	-		-	-	-	1	
-2	00000060	. HANDLE, Extractor with Roll Pins (18617)	2		2	2	2	2	S-203
-3	20031104	. BUS BAR, 4 Pin	8		8	8	8	8	
-4	20031105	. BUS BAR, 5 Pin	5		5	5	5	5	
-5	20031107	. BUS BAR, 7 Pin	1		1	1	1	1	
-6	00000088	. BEAD, Ferrite	1		1	1	1	1	21-030-F
-7	00000039	. DIODE, Zener 6.8V (04713)	1		1	1	1	1	IN5235
-8	00000025	. CAPACITOR, Electrolytic, 20 μf, 6V (03597)	1		3	3	-	3	76F02CC200
-9	00000024	. CAPACITOR, Mylar, .1 μf, 100V (03597)	1		1	1	1	1	BA12A104B
-10	00000022	. CAPACITOR, .02 μf, 100V (56289)	1		1	1	1	1	TG-S20
-11	00000023	. CAPACITOR, .01 μf, 100V (56289)	16		16	16	16	16	TG-S10
-12	00000077	. RESISTOR, 4.7K $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF472K
-13	00000070	. RESISTOR, 1K $\pm$ 10%, 1/4W	1		7	7	6	7	RC07GF102K
-14	00000073	. RESISTOR, 2.2K $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF222K
-15	00000080	. RESISTOR, 5.6K $\pm$ 10%, 1/4W	-		1	1	-	-	RC07GF562K
-16	00000225	. RESISTOR, 100K $\pm$ 10%, 1/4W	-		1	1	-	1	RC07GF104K
-17	00000056	. INTEGRATED CIRCUIT, Comparator (07886)	1		1	1	1	1	LM311D
-18	00000053	. INTEGRATED CIRCUIT, Counter Register (18324)	1		1	1	1	1	N8280ADC
-19	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (18324)	4		4	4	4	4	N7400A
-20	00000048	. INTEGRATED CIRCUIT, Single 3 input gate (18324)	2		2	2	2	2	N7410A
-21	00000047	. INTEGRATED CIRCUIT, Single 8 input gate (18324)	5		5	5	5	5	N7430A
-22	00000045	. INTEGRATED CIRCUIT, Dual 4 input gate (18324)	1		1	1	1	1	N7440A
-23	00000044	. INTEGRATED CIRCUIT, Dual D Flip Flop (18324)	12		12	12	12	12	N7474A
-24	00000123	. INTEGRATED CIRCUIT, Hex Buff, Inv. O.C. (18324)	-		1	-	-	-	N7416A
-25	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	5		5	5	5	5	N7404A
-26	00000124	. INTEGRATED CIRCUIT, Hex Buff, Non Inv. O.C.	-		-	1	1	1	N7417A
-27	00000067	. OSCILLATOR, Crystal 4.8 MHz (04713)	1		1	1	1	1	K1035A00710
-28	00000198	. RESISTOR, 0 ohm Jumper (Speer)	-		1	1	-	1	
-29	00000020	. WIRE, Bus AWG #18 11/16	1		1	1	1	1	
-30	40080001	. SCHEMATIC	-		1	1	-	1	
	40030801	. SCHEMATIC	1		-	-	-	-	
	40062701	. SCHEMATIC	-		-	-	1	-	

M2, M3, M6, M10, M12

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

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

FIG. INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	PT	GT	PTRP	GTRP	PTOC	GTQC	VENDOR PART NO.
	REF	P.C. ASSEMBLY - Error Card							
-1	40081001	. PRINTED CIRCUIT BOARD	1		1	1	1	1	
-2	00000060	. HANDLE, Extractor with Roll Pin (18617)	2		2	2	2	2	S-203
-3	20031105	. BUS BAR, 5 Pin	6		6	6	6	6	
-4	20031104	. BUS BAR, 4 Pin	8		8	8	8	8	
-5	20031107	. BUS BAR, 7 Pin	1		1	1	1	1	
-6	00000088	. BEAD, Ferrite (33062)	1		1	1	1	1	21-030-F
-7	00000039	. DIODE, Zener 6.8V (04713)	1		1	1	1	1	IN5235
-8	00000041	. DIODE, Signal	2		2	2	2	2	IN914
-9	00000040	. DIODE	1		1	1	1	1	IN4003
-10	00000025	. CAPACITOR, Electrolytic, 20 μf, 6V (03597)	1		1	1	1	1	76F02CC200
-11	00000024	. CAPACITOR, 0.1 μf, 100V (03597)	1		1	1	1	1	BA12A104B
-12	00000026	. CAPACITOR, 400 μf, 6V (03597)	1		1	1	1	1	76F02CM401
-13	00000027	. CAPACITOR, 30 μf, 12V (03597)	1		1	1	1	1	76F02ED300
-14	00000021	. CAPACITOR, .22 μf, 25V (56289)	4		4	4	4	4	2C023224X0250A3
-15	00000023	. CAPACITOR, .01 μf, 100V (56289)	19		19	19	19	19	TG-S10
-16	00000081	. RESISTOR, 68 ohm, $\pm$ 10%, 1/2W	6		6	6	6	6	RC20GF680K
-17	00000071	. RESISTOR, 10K ohm, $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF103K
-18	00000068	. RESISTOR, 10 ohm, $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF100K
-19	00000076	. RESISTOR, 470 ohm, $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF471K
-20	00000078	. RESISTOR, 1K ohm, $\pm$ 5%, 1/4W	1		1	1	1	1	RC07GF561J
-21	00000070	. RESISTOR, 1K ohm, $\pm$ 10%, 1/4W	8		8	8	8	8	RC07GF102K
-22	00000074	. RESISTOR, 27K ohm, $\pm$ 10%, 1/4W	1		1	1	1	1	RC07GF273K
-23	00000080	. RESISTOR, 5.6K ohm, $\pm$ 10%, 1/4W	–		4	4	–	–	RC07GF562K
-24	20031103	. BUS BAR, 3 Pin	2		2	2	2	2	
-25	00000051	. INTEGRATED CIRCUIT, Dual Driver (01295)	4		4	4	4	4	SN7545ON
-26	00000044	. INTEGRATED CIRCUIT, Dual D Flip Flop (18324)	5		5	5	5	5	N7474A
-27	00000046	. INTEGRATED CIRCUIT, Quad 2 input gate (18324)	5		5	5	5	5	N7400A
-28	00000047	. INTEGRATED CIRCUIT, Single 8 input gate (18324)	1		1	1	1	1	N7430A
-29	00000050	. INTEGRATED CIRCUIT, Hex Inverter (18324)	6		5	5	5	5	N7404A
-30	00000048	. INTEGRATED CIRCUIT, Triple 3 input gate (18324)	1		1	1	1	1	N7410A
-31	00000052	. INTEGRATED CIRCUIT, Delay Element (07263)	1		1	1	1	1	U6A960159X
-32	0000042	. INTEGRATED CIRCUIT, Quad 2 input DTL gate (07263)	1		1	1	1	1	U6A994659X
-33	00000123	. INTEGRATED CIRCUIT, Hex Buff Inv. O.C. (18324)	–		1	–	1	–	N7416A
-34	00000124	. INTEGRATED CIRCUIT, Hex Buff, Non. Inv. O.C (18324)	–		–	1	1	1	N7417A
-35	00000083	. SWITCH, SPDT, P.C. Mount (09353)	1		1	1	1	1	7101A
-36	00000082	. SWITCH, SPDT, Push, P.C. Mount (09353)	1		1	1	1	1	P8121R
-37	00000198	. JUMPER, 0 ohm, Resistor (Speer)	1		1	1	1	1	Res-Jumper 0 ohm
-38	00000020	. WIRE, Bus #AWG 18, 11/16	1		1	1	1	1	
-39	40081401	. SCHEMATIC							

M2.M3.M8.M10.M12