TECHNICAL MANUAL

00006490

DOCUMATION
INCORPORATED
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MELBOURNE, FLORIDA 32901

IMPORTANT NOTICE

THIS TECHNICAL MANUAL IS SUPPLIED WITH DOCUMATION MACHINE SERIAL NUMBER

THIS MANUAL SHOULD REMAIN WITH THAT MACHINE.

MANUAL HISTORY AND CHANGE INSTRUCTIONS

EQUIPMENT: Card Reader PUB. PART NO. 00006490

MODEL: RM-1000L

MANUAL HISTORY

CHANGE NO.	CHANGE DATE	CHANGE DESCRIPTION
–	3/79	First Printing
–	7/79	Revised Edition – First Printing

CHANGE INSTRUCTIONS

REMOVE AND INSERT PAGES AS INDICATED IN THE FOLLOWING TABLE:

CHANGE NO.	REMOVE	INSERT

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages. Change No. 0 indicates an original page.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Total number of pages in this manual is 157 consisting of the following:

Page No.	Change No.	Page No.	Change No.	Page No.	Change No.	Page No.	Change No.
Outside Front Cover	0						
Inside Front Cover	0						
A, B	0						
i thru vi	0						
1-1 thru 1-8	0						
2-1 thru 2-10	0						
3-1 thru 3-14	0						
4-1 thru 4-54	0						
A-1 thru A-20	0						
B-0	0						
B-1 thru B-17	0						
C-1 thru C-8	0						
D-1, D-2	0						
E-0	0						
E-1 thru E-12	0						

Pub. No. 00006490

TECHNICAL MANUAL

RM SERIES
CARD READERS

WARNING

THIS EQUIPMENT GENERATES AND USES RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED PROPERLY, I.E., IN STRICT ACCORDANCE WITH THE INSTRUCTIONS MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A COMPUTING DEVICE PURSUANT TO SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE INTERFERENCE IN WHICH CASE THE USER, AT HIS OWN EXPENSE, WILL BE REQUIRED TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

DATE OF ORIGINAL: *MARCH* 79
CHANGED: July 79

TABLE OF CONTENTS

SECTION ONE
DESCRIPTION AND SPECIFICATION

SECTION TWO
OPERATION

TABLE OF CONTENTS (Cont'd)

TABLE OF CONTENTS (Cont d)

APPENDICES

LIST OF TABLES

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont'd)

SECTION FOUR
MAINTENANCE

4.1 GENERAL

Information in this section details step-by-step procedures for removal, reinstallation and adjustment of components for which repair or replacement may be required.

4.2 REQUIRED TOOLS AND EQUIPMENT

The following tables list tools and equipment required to perform removal, replacement and adjustment procedures described in this section.

Table 4-1. Special Tools and Equipment

DESCRIPTION	MFG.	MFG. PART NO.	DOCUMATION PART NO.
Extraction Tool, AMP	AMP	91022-1	00000688
Extraction Tool, Leaf Contact	AMP	465195-2	00000517
Extraction Tool, Modified Fork Contact	AMP	91037-2	00000469
Extraction Tool, Mod IV Contact	AMP	91029-1A	00000676
Removal Tool, IC	AMP	91049-1	
Insertion Tool	Elco	061742-04	00000674
Extraction Tool	Elco	061877-04	00000675
Insert/Extract Tool (on main frame)	Deutsch	M15570-16	00000487
Test Clip, IC	AP Inc.	923700	00000679
Extender, Printed Circuit Card	Documation	30099501	30099501
Tensiometer, Belt Tension	Gates	17599-F	00003944
Pliers, Retaining Ring External	AMP	PR229A	00000680

Table 4-2. Common Tools and Equipment

DESCRIPTION	
Drift Punch, 6 inch	Wrench, Allen, Short Arm, 0.050"
Pliers, Diagonal, Flush Cutting, 6 inch	Wrench, Open End, 1/2"
Pliers, Long Nose, 6 inch	Wrench, Open End, 7/16"
Pliers, Side Cutter, 6 inch	Wrench, Open End, 11/32"
Screwdriver, Allen, Long Arm, 1/16"	Wrench, Open End, 1/4"
Screwdriver, Phillips, No. 1 Tip, 6" long	C-Clamp, 4 inch
Screwdriver, Phillips, No. 2 Tip, 6" long	Dial Caliper
Screwdriver, Standard, 3/16" Flat Blade, 6" long	Feeler Gauge Set, .001" through .025"
Screwdriver, Standard, 1/4" Flat Blade, 3" long	Micrometer
Wrench, Allen, Long Arm, 1/4"	Scale, Machinist, 6 inch, fraction/decimal per inch
Wrench, Allen, Long Arm, 9/64"	Spring Scale, 32 ounce capacity
Wrench, Allen, Long Arm, 1/8"	Soldering Iron, 60 Watt
Wrench, Allen, Long Arm, 3/32"	Desoldering Tool
Wrench, Allen, Short Arm, 1/16"	

4.3 TROUBLESHOOTING

If a malfunction occurs in a Model RM card reader that cannot be corrected with operator maintenance procedures (paragraph 2.5) a maintenance technician should be called to isolate and correct the problem. The fault isolation flow charts (Figures 4-1 through 4-12) are provided to assist the technician in isolating problems that may occur in the reader.

4.4 COMPONENT MAINTENANCE PROCEDURES

4.4.1 ADJUSTMENTS

Adjustments should be checked when minor malfunctions occur and before major repair is attempted. They must also be effected after major repair and component replacement. Adjustment procedures are included where applicable.

4.4.2 ACCESS COVER REMOVAL AND INSTALLATION

To perform maintenance procedures detailed in this section, it may be necessary to remove the front panel, track cover and/or rear panel.

a. Remove six screws from front panel (Figure 4-13), then remove panel.

b. Remove four screws from track cover (Figure 4-13), then remove cover.

c. Remove six screws from rear panel (Figure 4-14).

d. Move rear panel out slightly, disconnect fan cable then remove rear panel.

e. To replace access covers, reverse the above procedure (steps d. through a.)

4.4.3 MAIN DRIVE MOTOR BELT

4.4.3.1 Removal and Installation

a. Remove front and rear panels (paragraph 4.4.2).

CAUTION

WHEN HANDLING TIMING DISC, BE EXTREMELY CAREFUL NOT TO DAMAGE THE TEETH. WRAP THE DISC IN TISSUE WHILE IT IS REMOVED FROM READER.

b. Loosen set screw in timing disc and remove disc (Figure 4-15).

c. Loosen three motor mounting plate screws on underside of main frame (Figure 4-16). Remove fourth screw.

d. Loosen set screw in bottom fourth stacker roller pulley (Figure 4-15).

e. Remove bottom fourth stacker roller pulley and third stacker roller drive belt (Figure 4-17).

f. Loosen set screw in fifth stacker roller pulley (Figure 4-15).

g. Remove fifth stacker roller pulley from shaft.

h. Remove main drive motor belt (Figure 4-17).

CAUTION

PULLEY CONFIGURATION MUST BE MAINTAINED. ALWAYS REPLACE PROPER PULLEY IN ITS CORRECT POSITION (UPPER OR LOWER) ON THE PROPER SHAFT. FIGURE 4-18 SHOWS THE CORRECT CONFIGURATION.

i. Install replacement belt around main drive motor pulley and top fourth stacker roller pulley.

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

k. Replace third stacker roller drive belt and bottom fourth stacker roller pulley.

l. Align bottom fourth stacker roller pulley set screw with flat side of shaft and carefully tighten set screw.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

m. Move fifth stacker roller pulley up on its shaft until it is just clear of main frame.

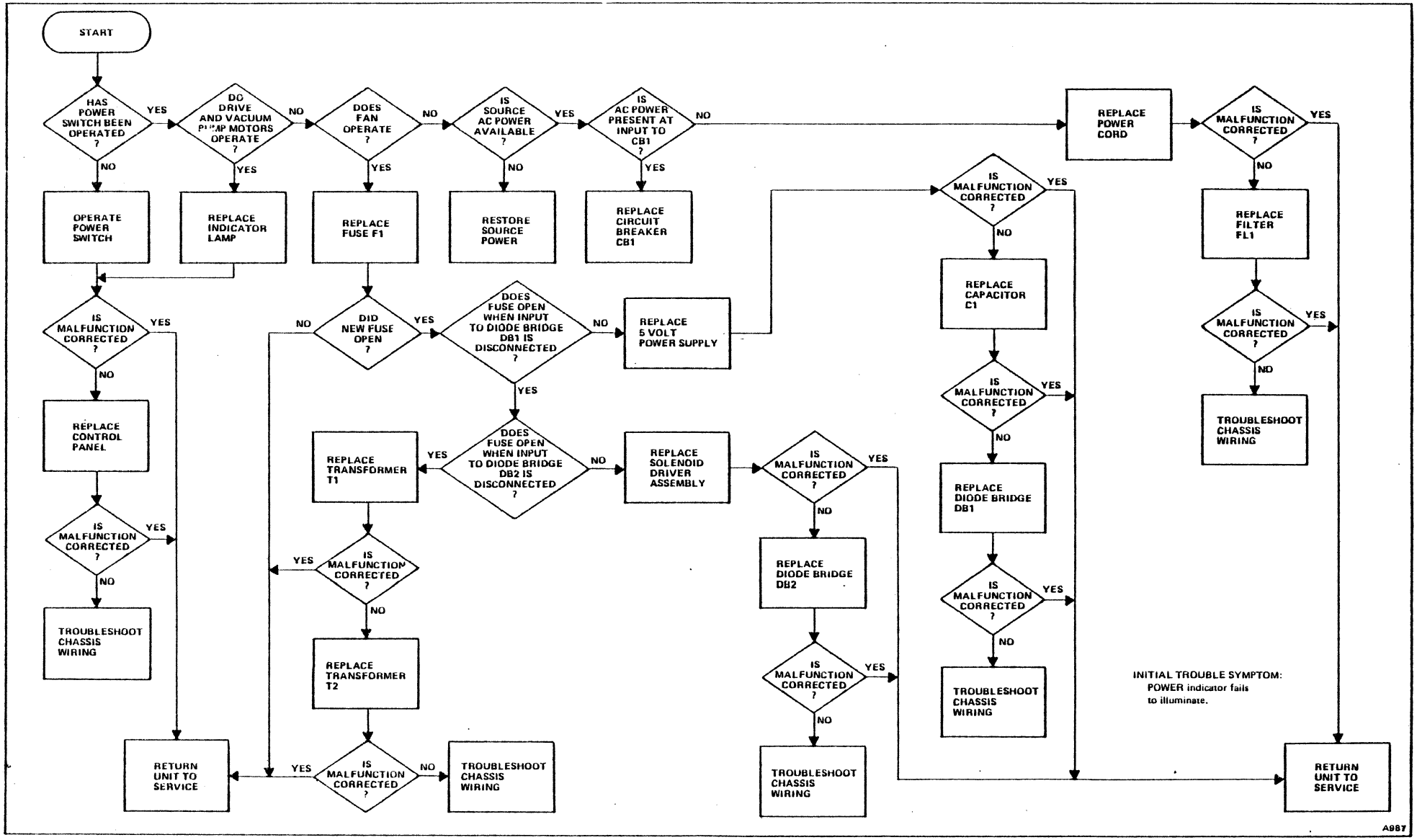
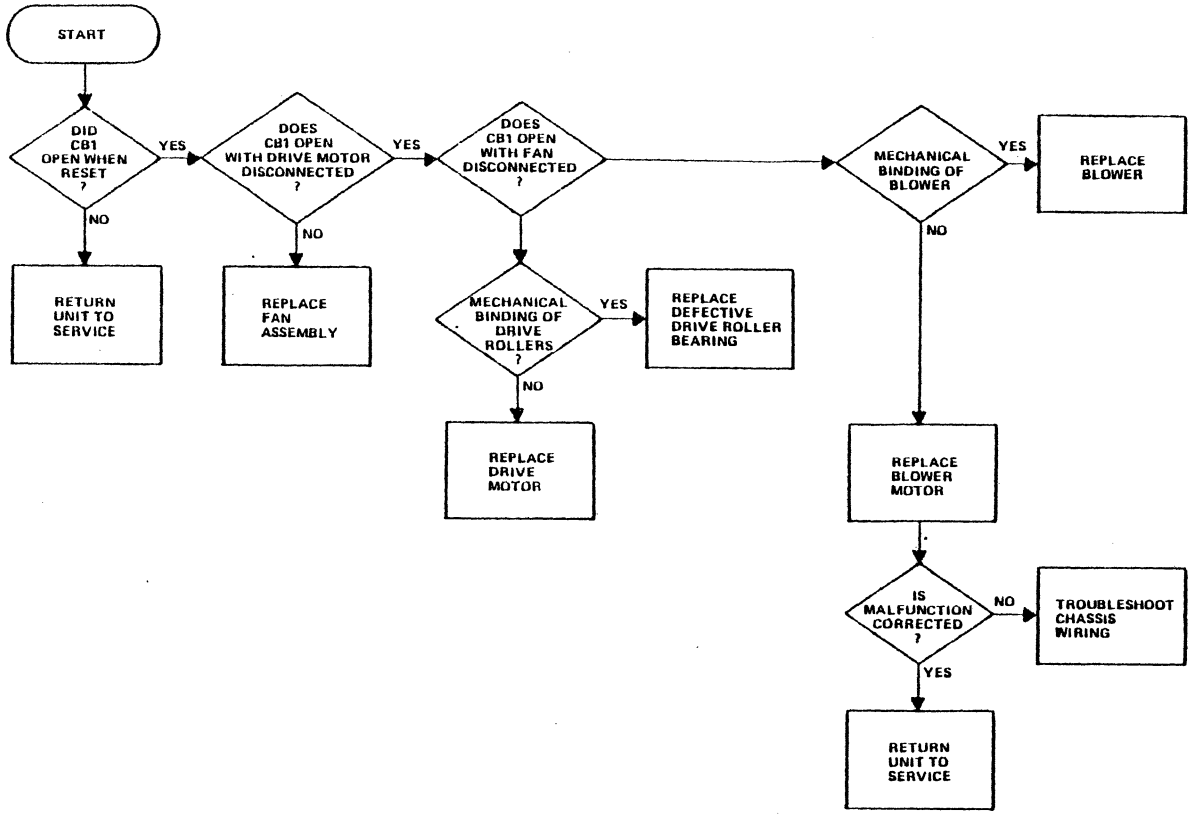


Figure 4-1
Fault Isolation Chart, AC Power



INITIAL TROUBLE SYMPTOM:
Circuit breaker CB1 is tripped.

A989

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Figure 4-2
Fault Isolation Chart, AC Circuit Breaker

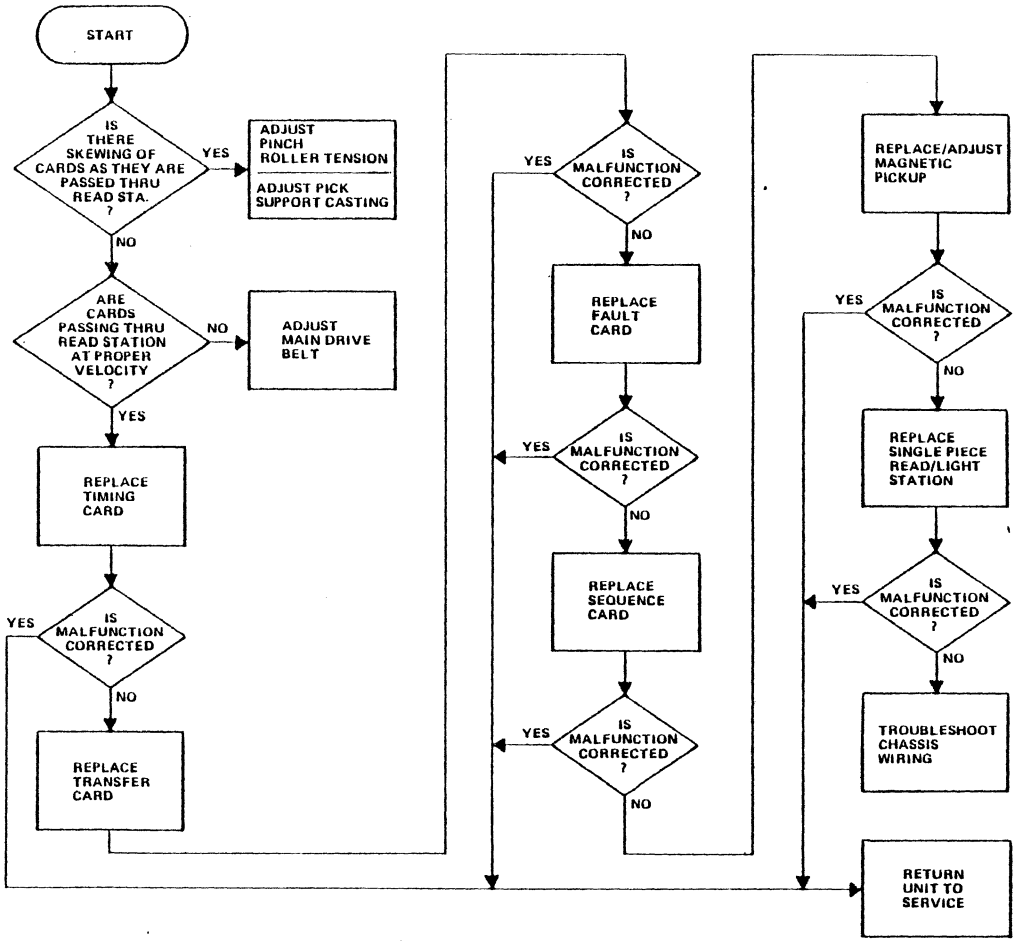

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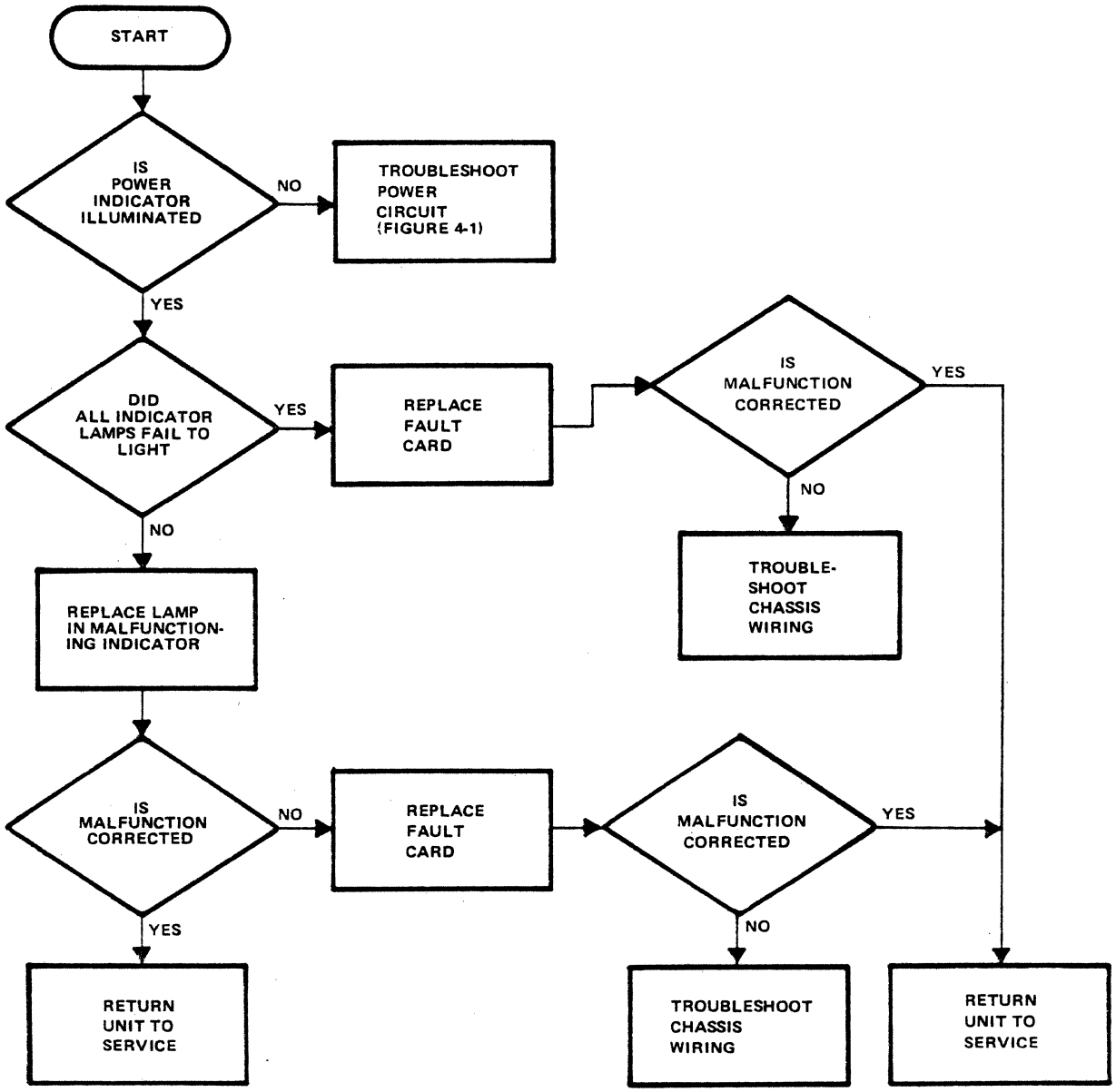
Figure 4-3
Fault Isolation Chart, Read Check



INITIAL TROUBLE SYMPTOM:
Indicator lamp(s) fails to illuminate when LAMP TEST pushbutton is depressed.

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Figure 4-4
Fault Isolation Chart, Lamp Test

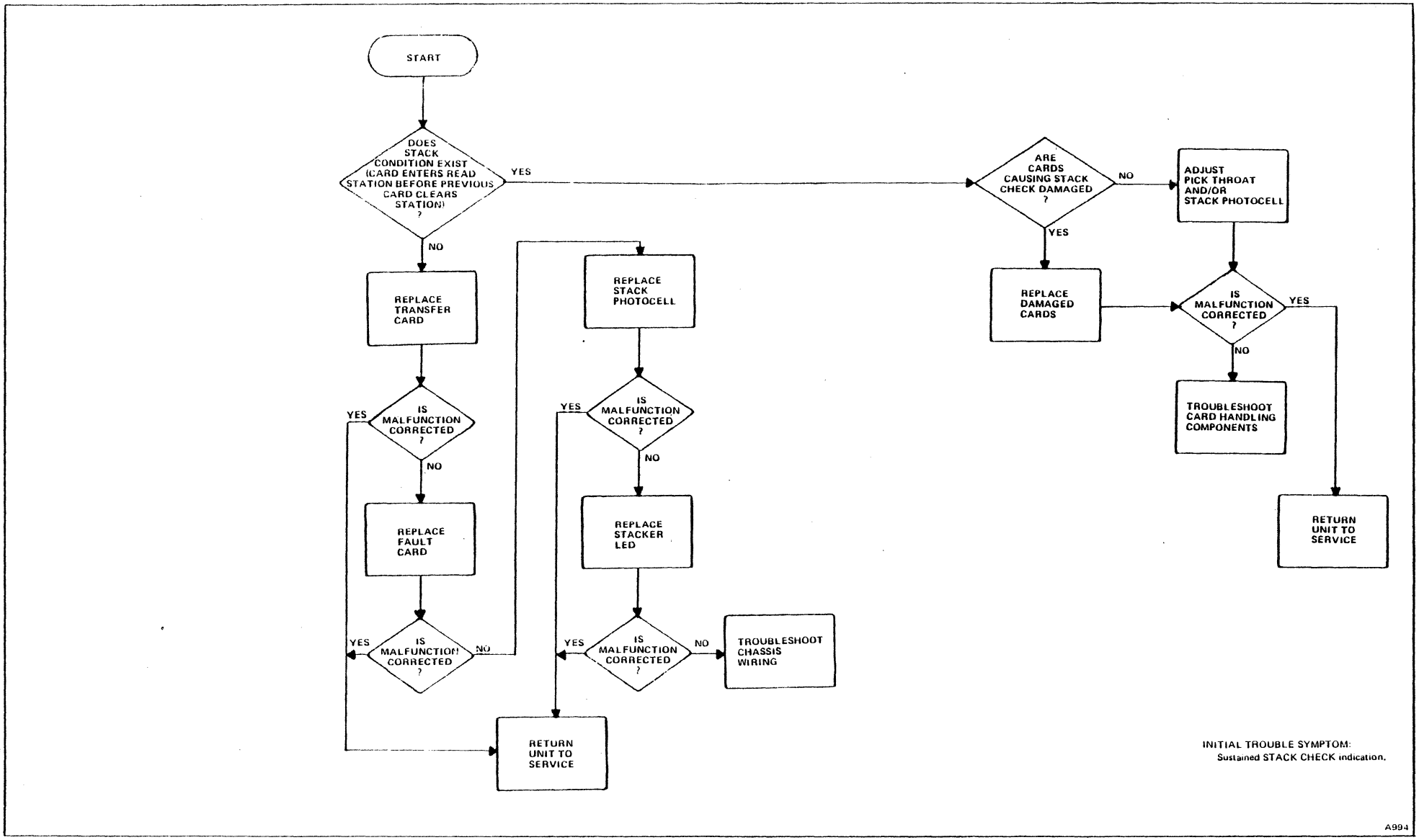

Figure 4-5
Fault Isolation Chart, Stack Check

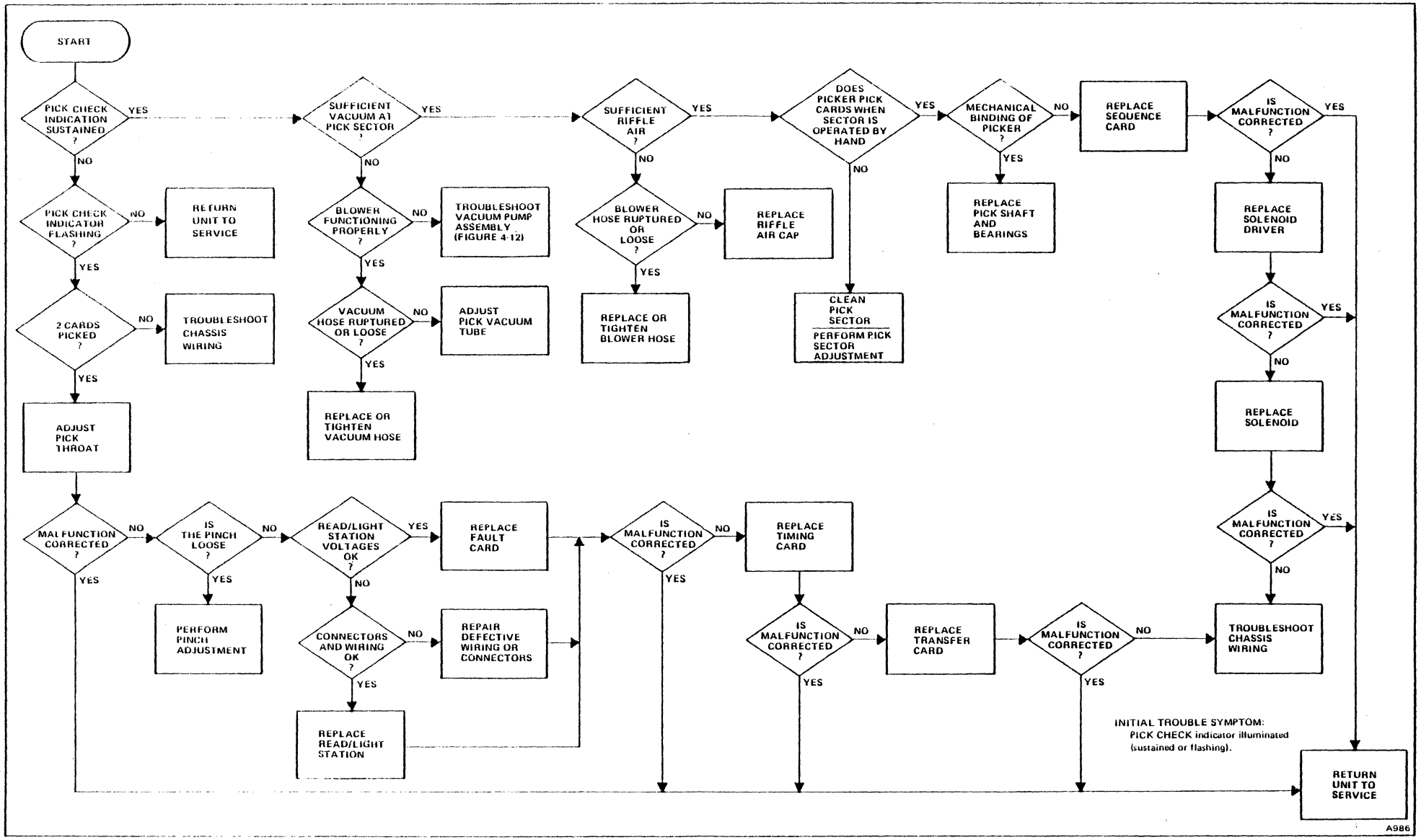

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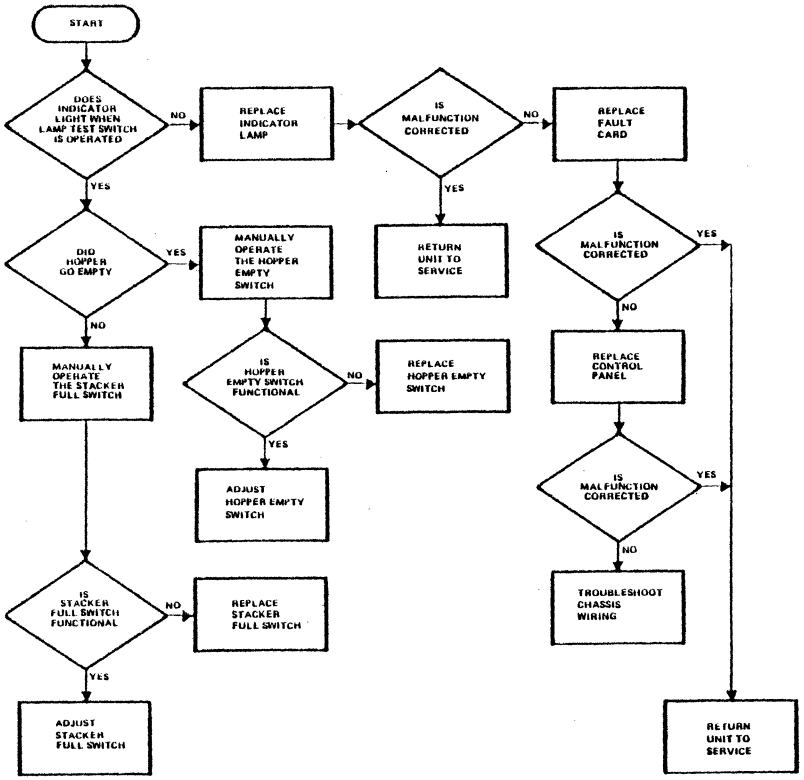
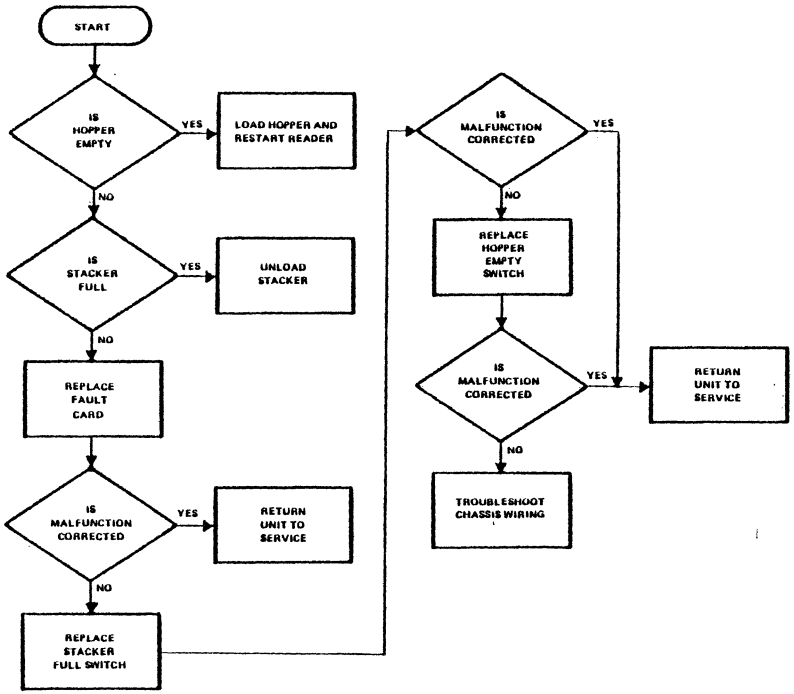
Figure 4-6
Fault Isolation Chart, Pick Check



INITIAL TROUBLE SYMPTOM:
HOPPER CHECK indicator fails to illuminate when check condition exists.

A421



INITIAL TROUBLE SYMPTOM:
Sustained HOPPER CHECK indication.

A420

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Figure 4-7
Fault Isolation Chart, Hopper Check

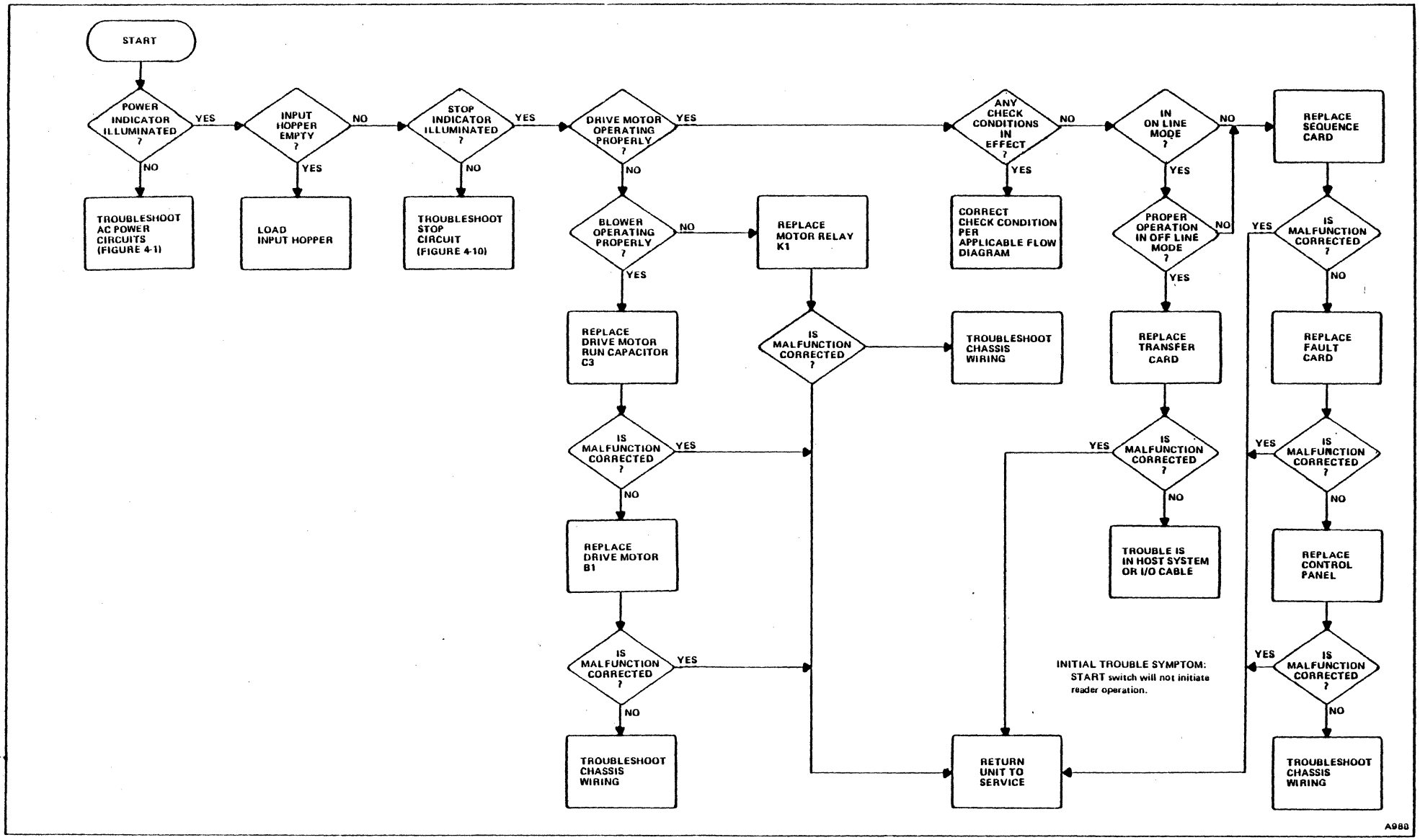

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Figure 4-8
Fault Isolation Chart, Start Function

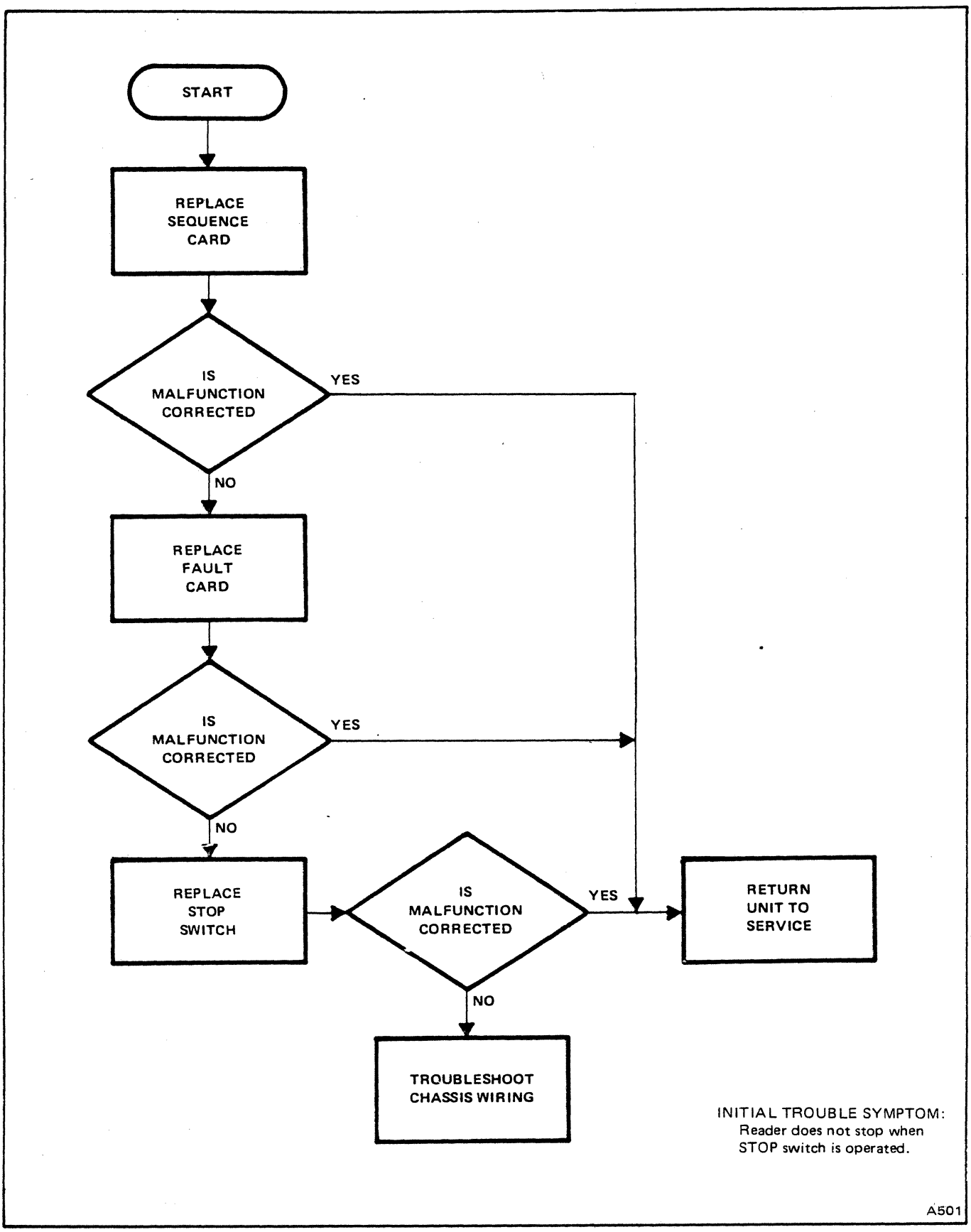

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Figure 4-9
Fault Isolation Chart, Stop Function

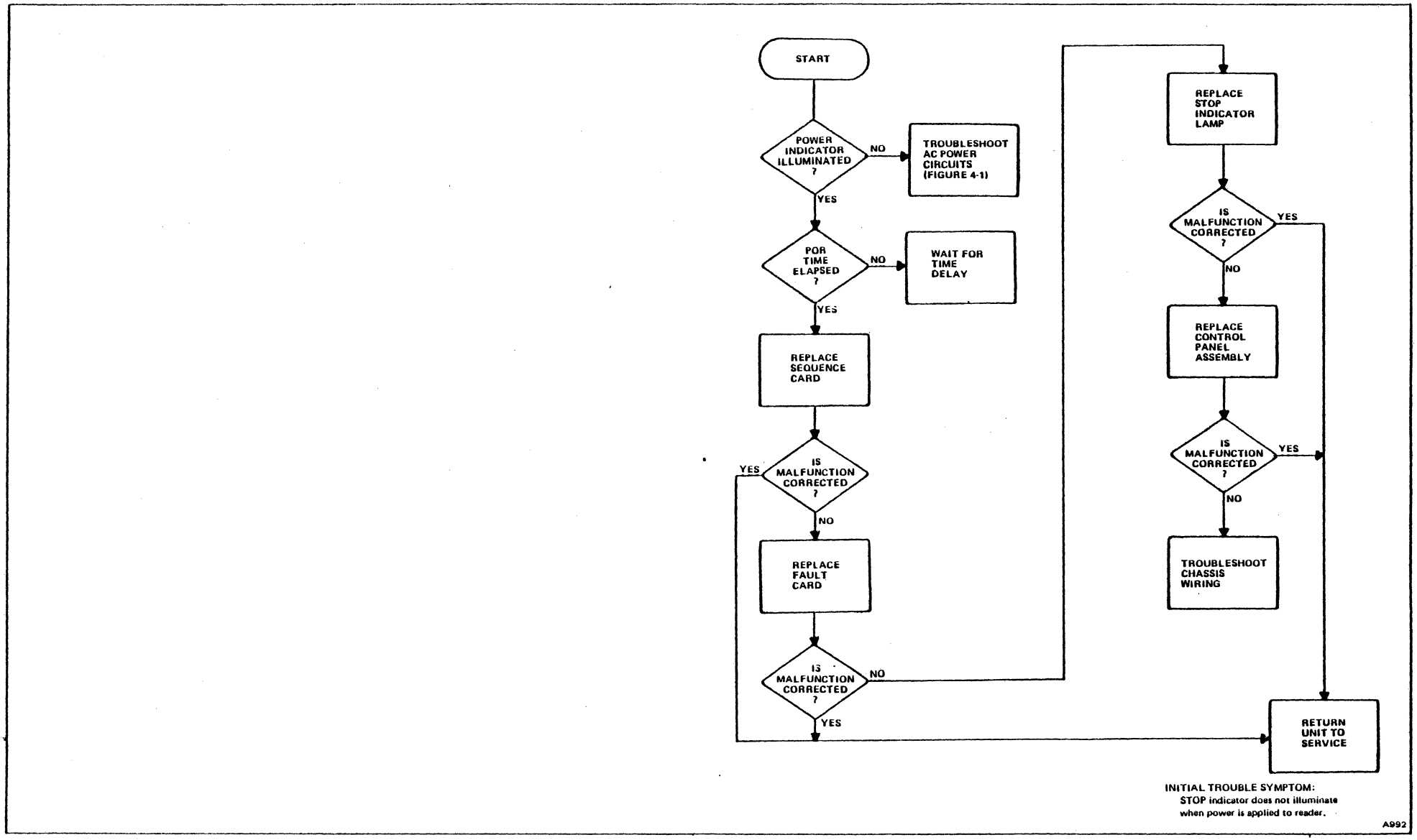

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Figure 4-10
Fault Isolation Chart, Stop Indication

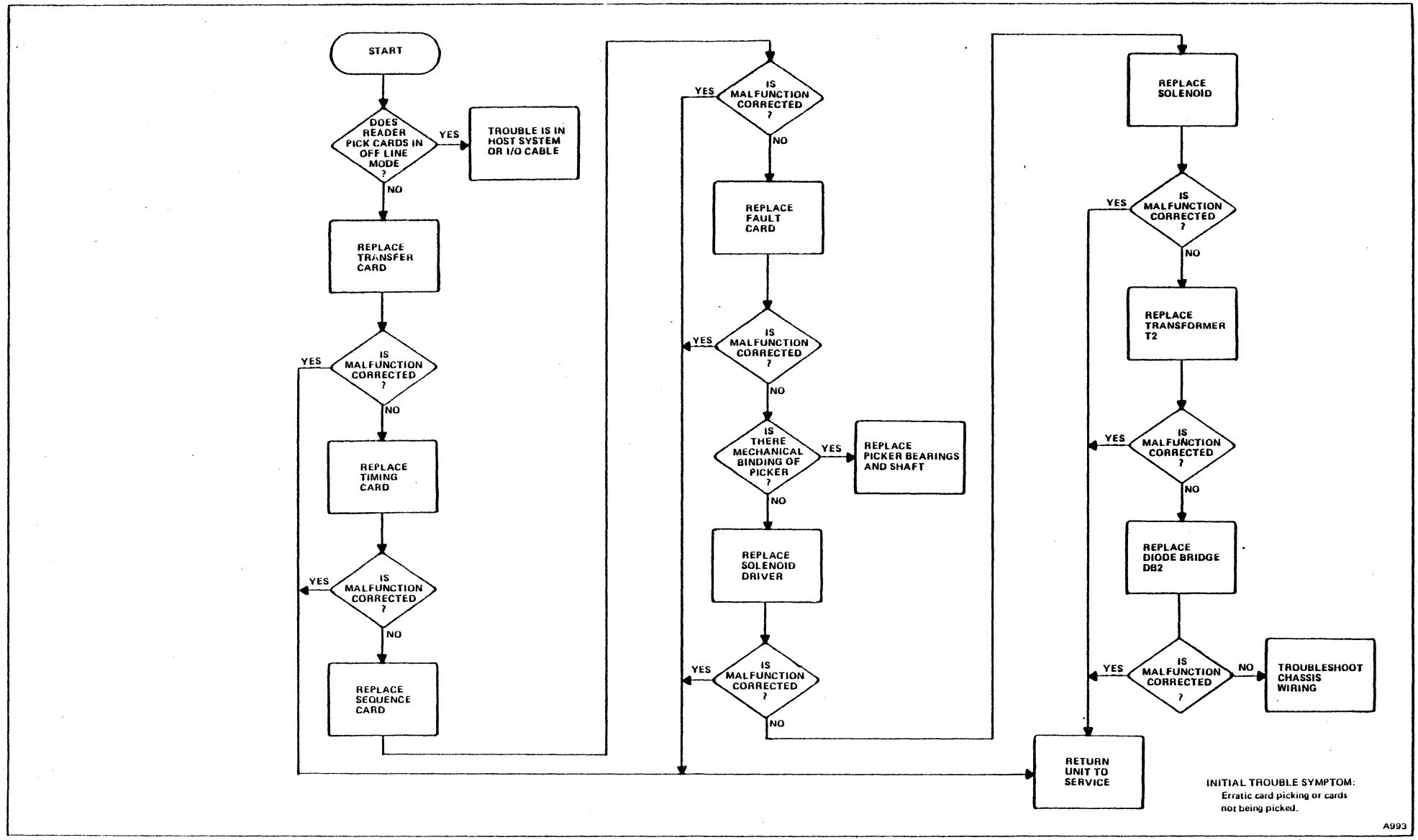

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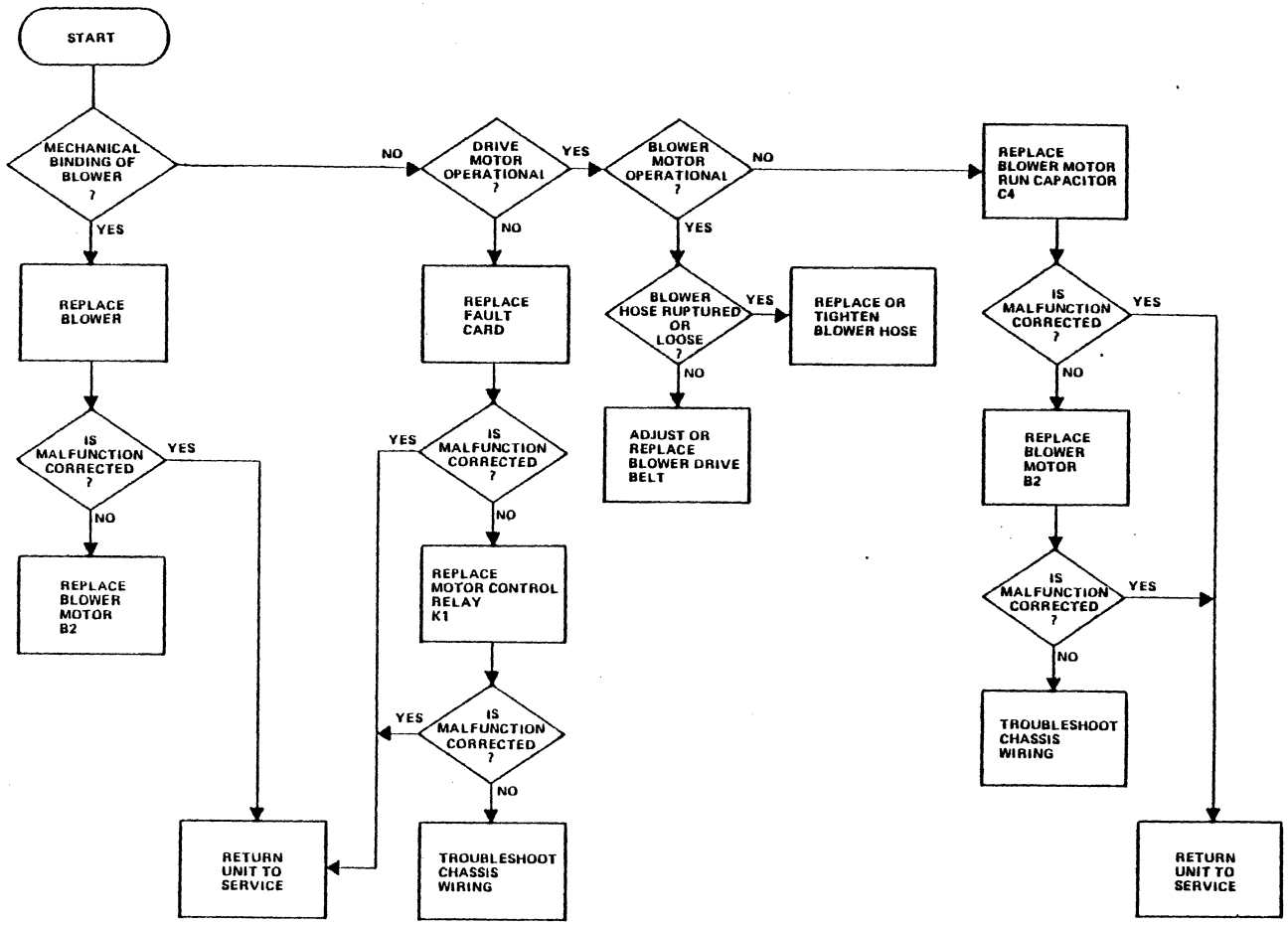
Figure 4-11
Fault Isolation Chart, Card Pick Function



79208/RM6L

Figure 4-12
Fault Isolation Chart, Blower System

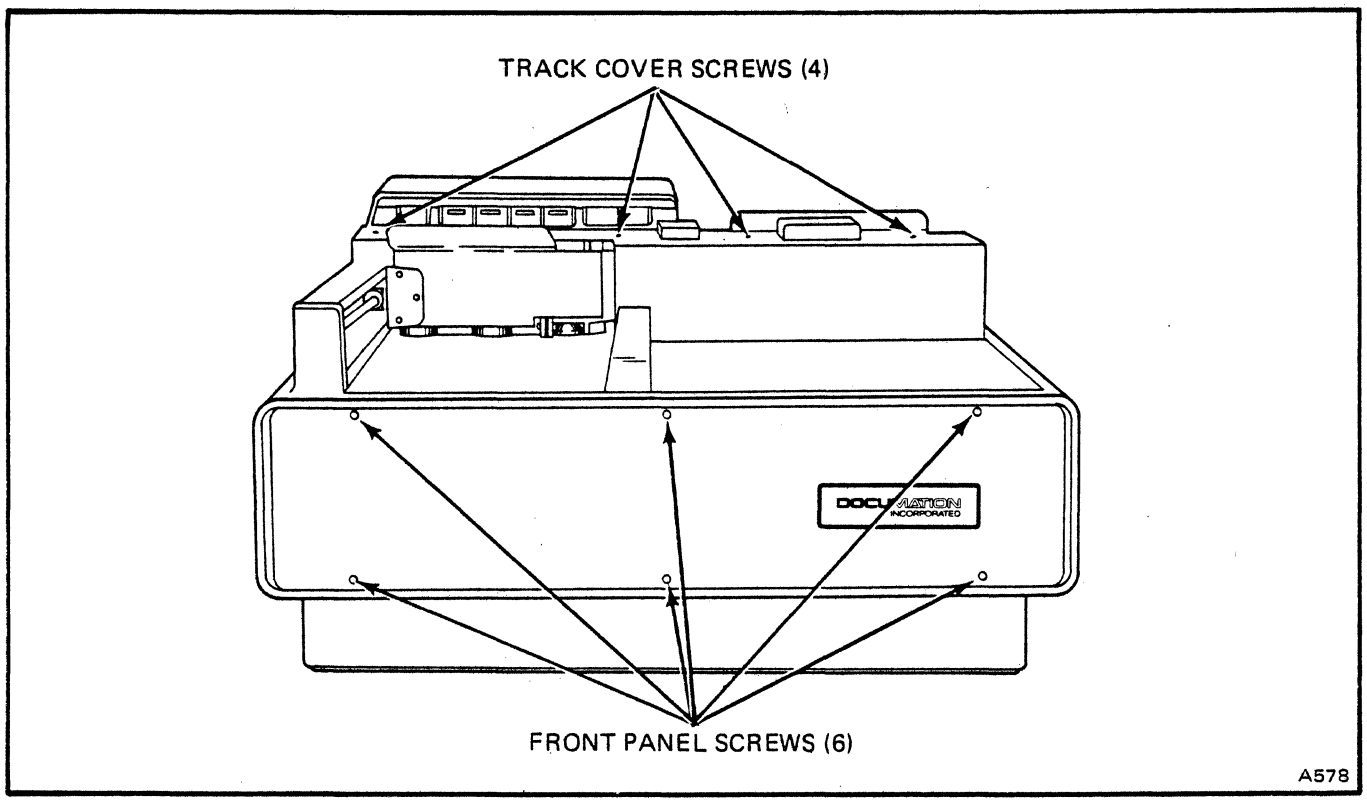


Figure 4-13. Removal of Front Panel and Track Cover

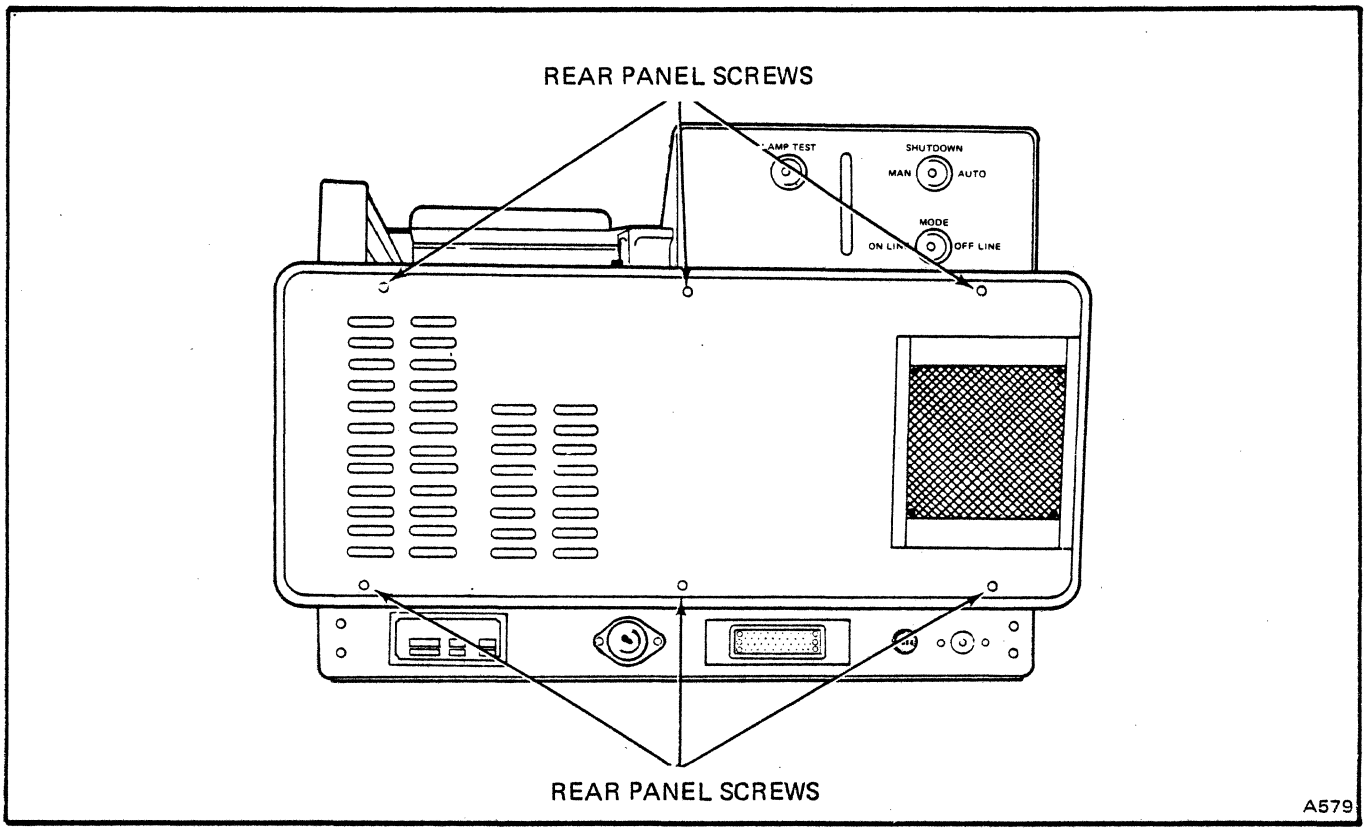


Figure 4-14. Removal of Rear Panel

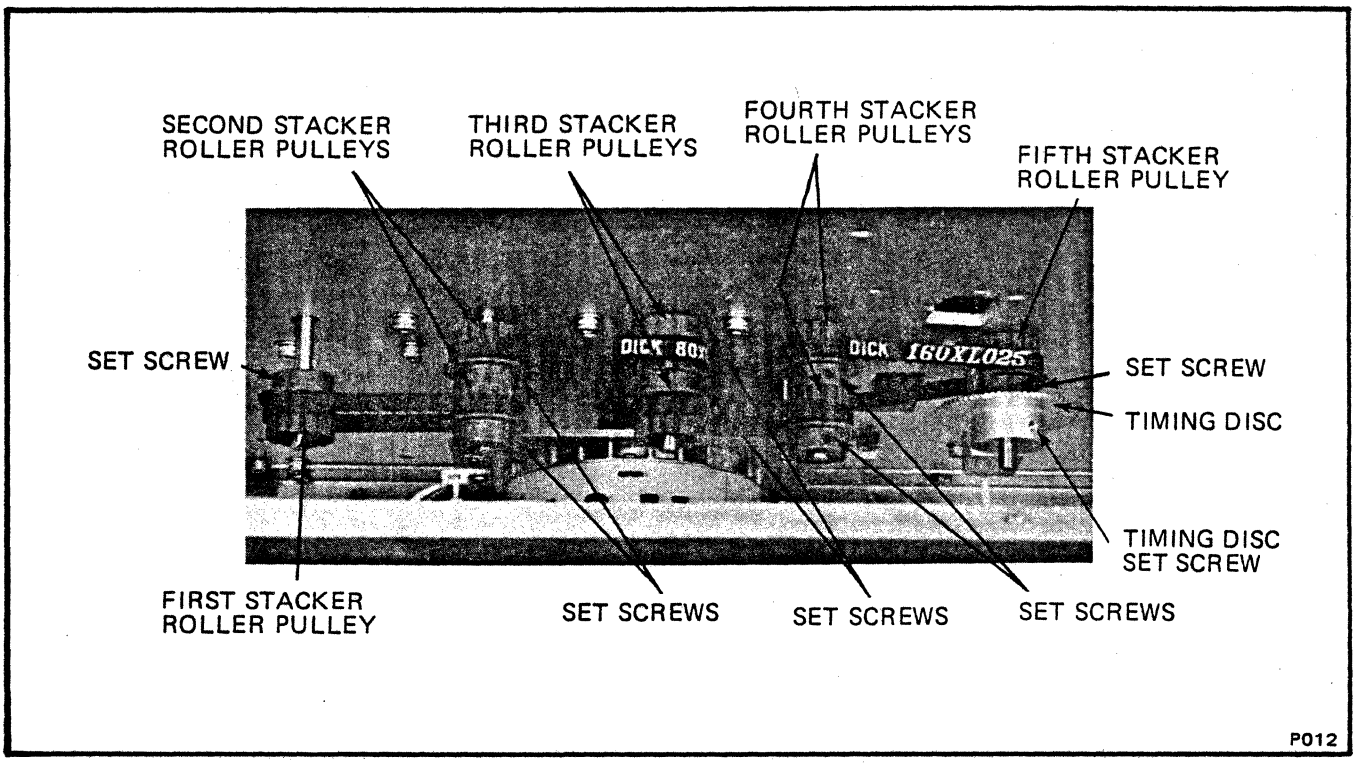


Figure 4-15. Stacker Drive Train Pulley Arrangement

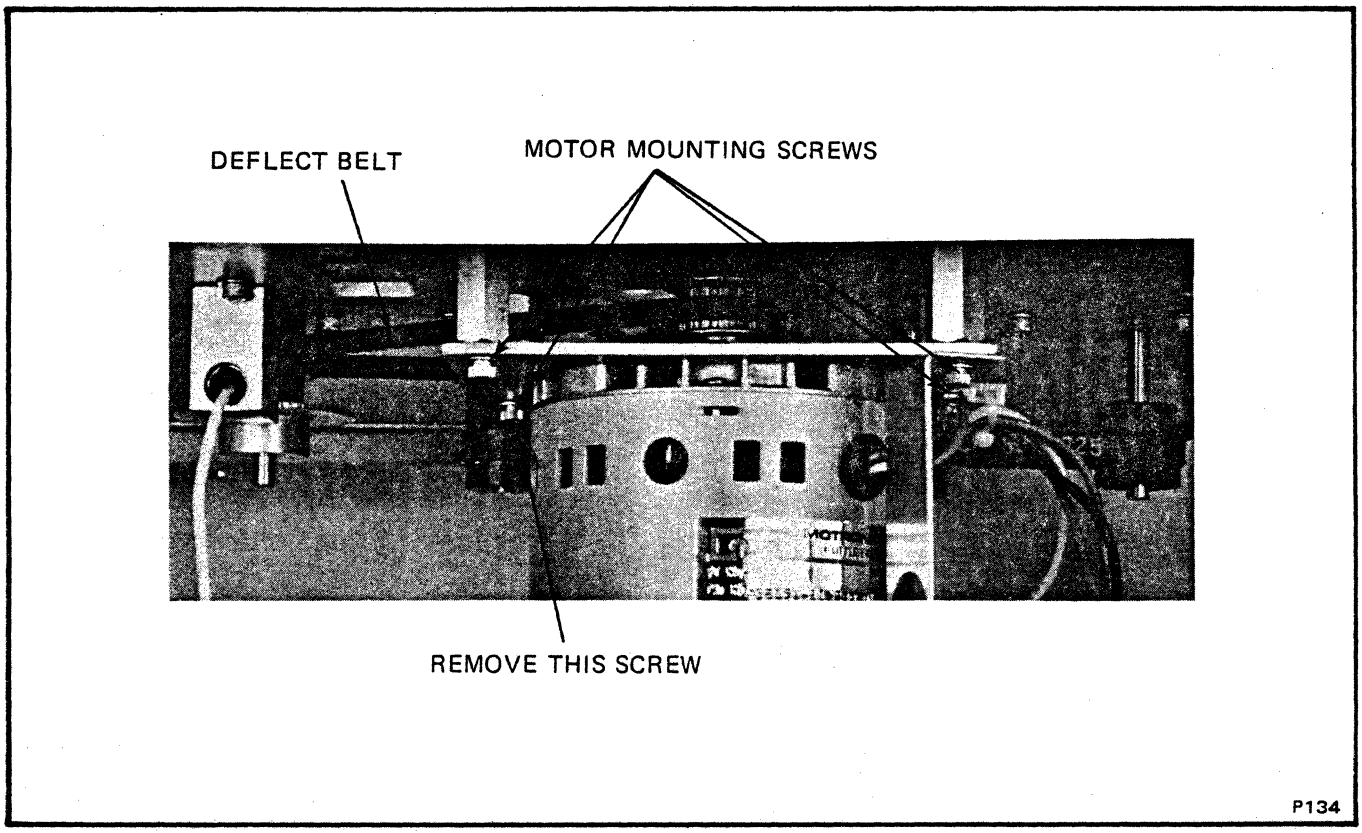


Figure 4-16. Main Drive Motor Mounting

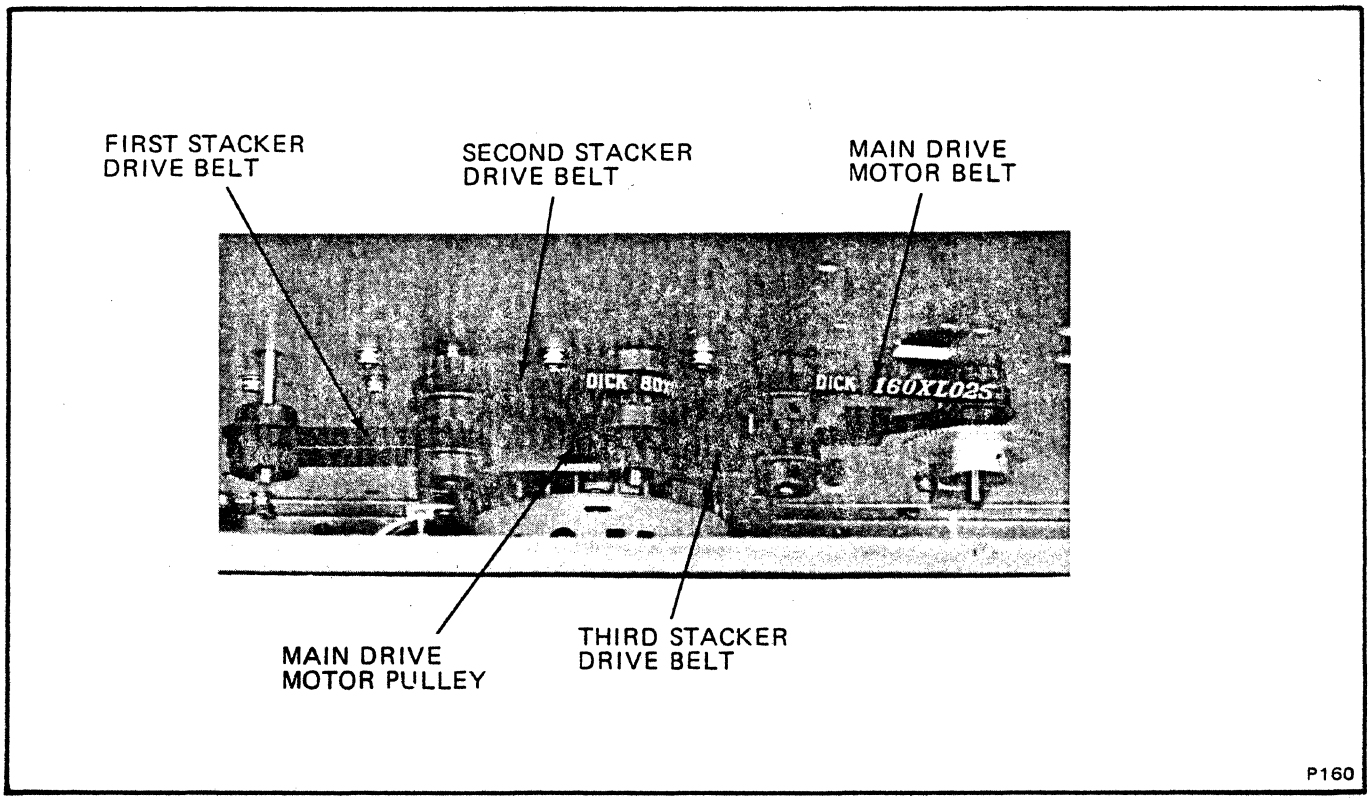


Figure 4-17. Stacker Drive Train Belt Arrangement

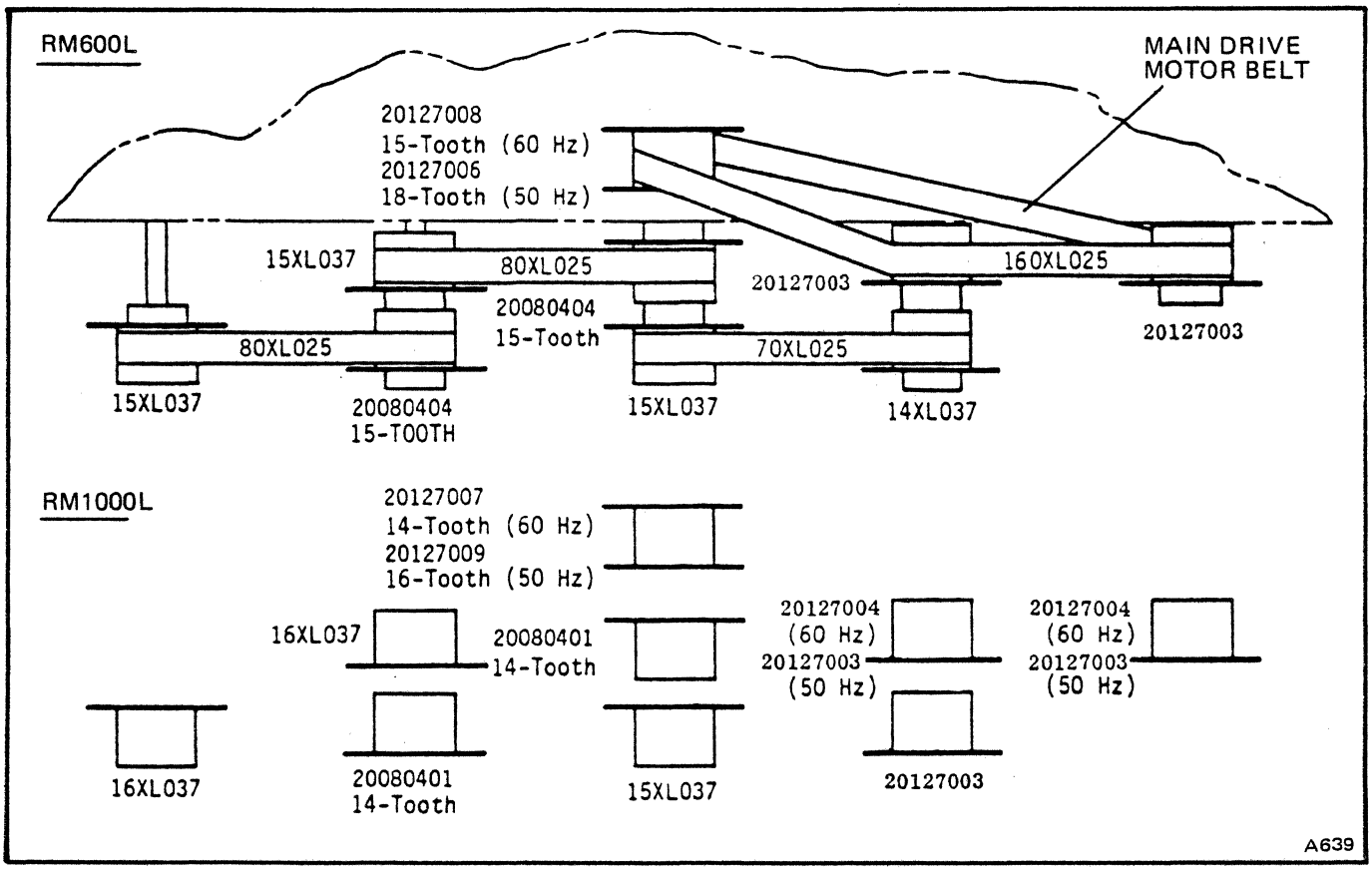


Figure 4-18. Pulley and Belt Configuration

n. Align fifth stacker roller pulley set screw with flat side of shaft and carefully tighten set screw.

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

p. Adjust main drive motor belt tension (paragraph 4.4.3.2).

q. Adjust timing disc (paragraph 4.4.4.2).

4.4.3.2 Tension Adjustment

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

a. Loosen four motor mounting plate screws (Figure 4.16).

CAUTION

THE DRIVE MOTOR BELT TENSION IS CRITICAL. TOO MUCH TENSION CAN CAUSE EXCESSIVE WEAR OF DRIVE ROLLER BEARINGS. IT MAY ALSO CAUSE DEFLECTION OF DRIVE ROLLER SHAFTS RESULTING IN READ CHECKS. TOO LITTLE TENSION MAY CAUSE BELT TO SLIP RESULTING IN ERRATIC TIMING, INCORRECT DATA AND/OR READ CHECKS.

b. The motor mounting plate should slide back and forth freely.

c. Pull motor and mounting plate back until tension is applied on drive motor belt. Tighten the four motor mounting plate screws just enough to hold motor in place.

d. Check drive motor belt tension by deflecting belt at point shown in Figure 4-16. Belt should deflect between 0.25 and 0.50 inch before side play of pulley shaft is discernible.

e. Repeat steps c. and d. until required deflection is obtained, then tighten motor mounting screws.

4.4.4 MAGNETIC PICKUP AND TIMING DISC

4.4.4.1 Replacement

a. Remove rear panel (paragraph 4.4.2).

b. Loosen set screw in magnetic pickup mounting block (Figure 4-19).

c. Remove magnetic pickup.

d. Disconnect magnetic pickup leads at connector.

e. Insert replacement pickup into mounting block (Figure 4-19).

f. Connect pickup leads at connector.

g. Adjust magnetic pickup (paragraph 4.4.4.2).

4.4.4.2 Adjustment

The magnetic pickup is adjusted to ensure that timing pulses of optimum level and modulation ratio (run-out) are developed. There are two adjustments: horizontal alignment and air gap (Figure 4-20). If either of these adjustments is incorrect, card synchronization may be erratic and cause read checks.

CAUTION

IF THE TIMING DISC MUST BE REMOVED, HANDLE IT WITH CARE. DAMAGE TO DISC MAY RESULT IN ERRONEOUS CARD PROCESSING.

a. Loosen timing disc set screw.

b. Position timing disc on shaft to align it in a horizontal plane with center of magnetic pickup tip.

c. Hold disc in position and tighten set screw on flat side of shaft.

d. Loosen magnetic pickup set screw.

e. Position magnetic pickup assembly to adjust air gap between pickup and timing disc. Initial air gap should be 0.006 ± 0.001 inch.

f. Remove card cage rear panel and place Timing Card (J3) on an extender board.

g. Connect an oscilloscope across magnetic pickup output (J3-S and J3-T).

h. Apply reader power.

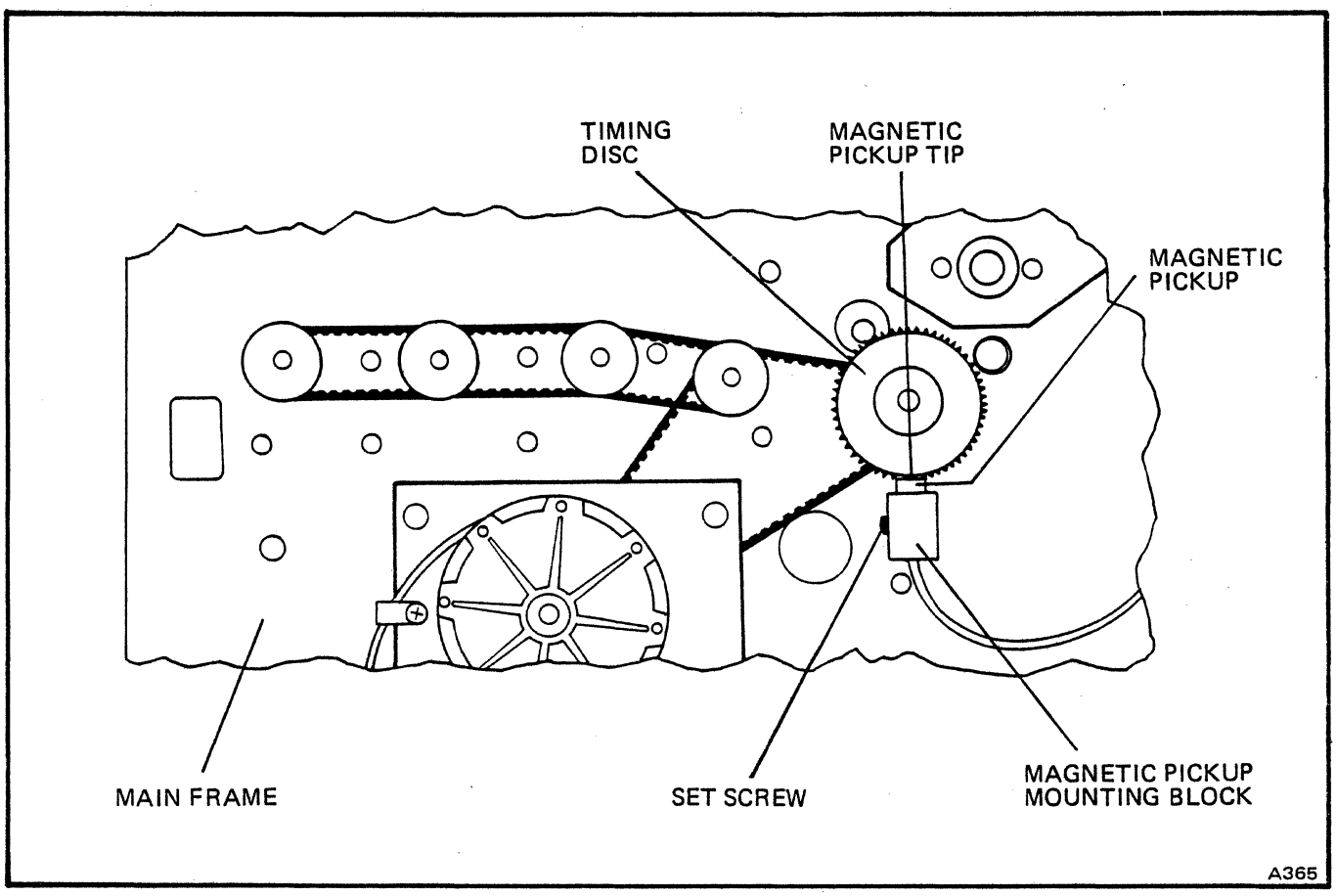


Figure 4-19. Magnetic Pickup Replacement

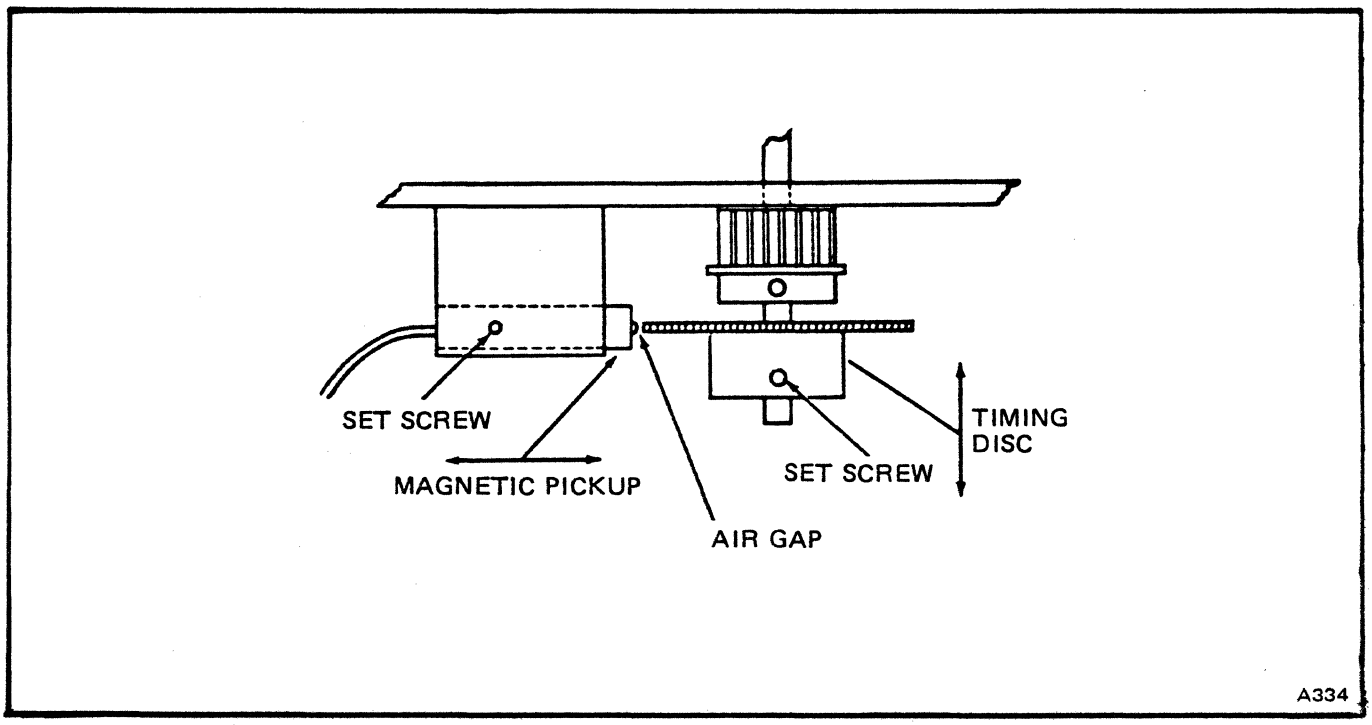


Figure 4-20. Magnetic Pickup Adjustments

CAUTION

MINIMUM PERMISSIBLE AIR GAP BETWEEN TIP OF MAGNETIC PICKUP AND TEETH OF TIMING DISC IS 0.003 INCH.

i. Carefully adjust magnetic pickup to obtain output waveform shown in Figure 4-21.

1. Output level should measure between 1.5 and 6.0 volts peak-to-peak.

2. Modulation ratio should not exceed 2:1.

j. Remove reader power; remove extender board and install timing card in its normal position.

k. Replace rear panel and card cage rear panel.

4.4.5 THIRD STACKER ROLLER DRIVE BELT

a. Remove front and rear panels (paragraph 4.4.2).

b. Loosen set screw in bottom fourth stacker roller pulley (Figure 4-15).

c. Move pulley downward to disengage third stacker roller drive belt. Remove pulley and belt.

d. Install replacement third stacker roller drive belt around bottom third stacker roller pulley and fourth stacker roller shaft.

e. Replace bottom fourth stacker roller pulley on shaft to engage third stacker roller drive belt. Position pulley against top fourth roller pulley.

f. Align bottom fourth stacker roller pulley set screw with flat side of shaft and carefully tighten set screw.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

g. Replace front and rear panels.

4.4.6 FIRST STACKER ROLLER DRIVE BELT

a. Remove front and rear panels (paragraph 4.4.2).

b. Loosen set screw in bottom second stacker roller pulley (Figure 4-15).

c. Move pulley downward to disengage first stacker roller drive belt. Remove pulley and belt.

d. Install replacement first stacker roller drive belt around first stacker roller pulley and second stacker roller shaft.

e. Replace bottom second stacker roller pulley on shaft to engage first stacker roller drive belt. Position pulley against top second stacker roller pulley.

f. Align bottom second stacker roller pulley set screw with flat side of shaft and carefully tighten set screw.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

g. Replace front and rear panels.

4.4.7 SECOND STACKER ROLLER DRIVE BELT

a. Remove front and rear panels (paragraph 4.4.2).

b. Remove bottom fourth stacker roller pulley and third stacker roller drive belt (paragraph 4.4.5).

c. Remove bottom second stacker roller pulley and first stacker roller drive belt (paragraph 4.4.6).

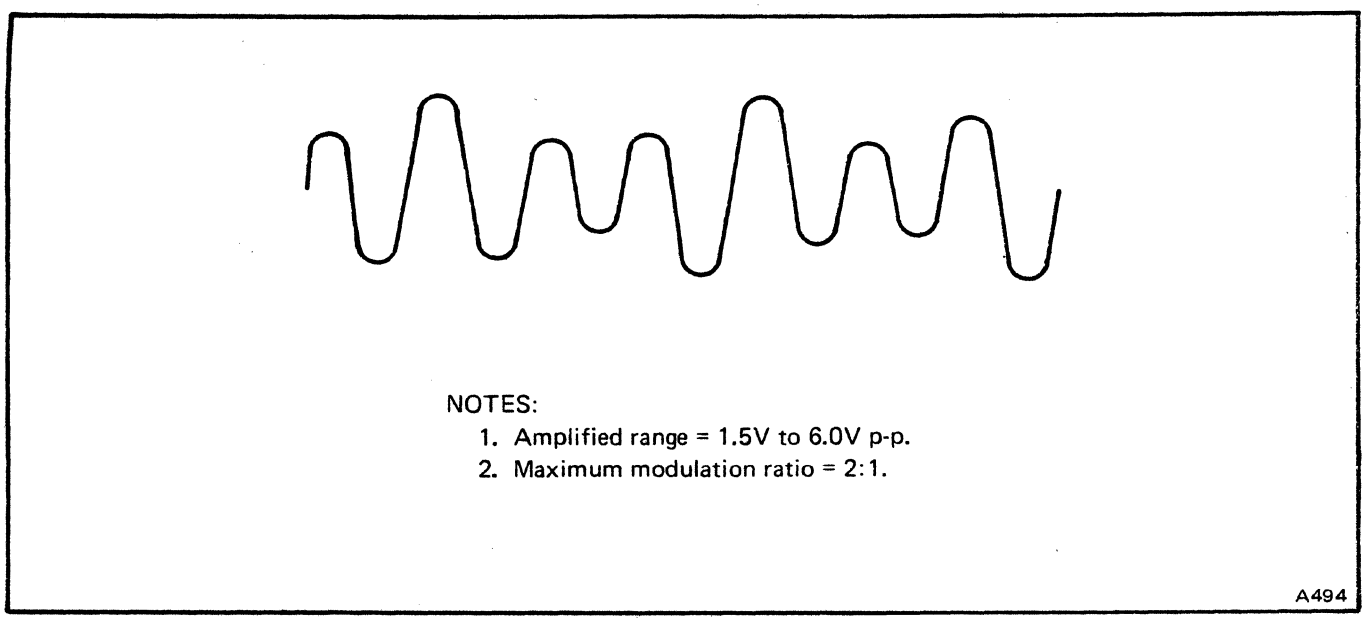
d. Loosen set screw in top second stacker roller pulley (Figure 4-15).

e. Move pulley downward to disengage second stacker roller drive belt. Remove pulley and belt.

f. Install replacement top second stacker roller drive belt around third stacker roller pulley and second stacker roller shaft.

g. Replace top second stacker roller pulley on shaft to engage second stacker roller drive belt.

h. Align top second stacker roller pulley set screw with flat side of shaft and position pulley on shaft to line up belt with upper third stacker roller pulley. Carefully tighten set screw.



NOTES:
1. Amplified range = 1.5V to 6.0V p-p.
2. Maximum modulation ratio = 2:1.

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Figure 4-21. Magnetic Pickup Output

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEYS.

i. Replace first stacker roller drive belt and bottom second stacker roller pulley (paragraph 4.4.6).

j. Replace third stacker roller drive belt and bottom fourth stacker roller pulley (paragraph 4.4.5).

k. Replace front and rear panels.

4.4.8 FIRST STACKER ROLLER BEARING ASSEMBLY

a. Remove front panel, rear panel and track cover (paragraph 4.4.2).

b. Prop stack follower open to its extended position.

c. Remove bottom second stacker roller pulley and first stacker roller drive belt (paragraph 4.4.6).

d. Loosen set screw in first stacker roller pulley and remove pulley.

e. To replace bearing assembly, perform the following:

NOTE

To assure proper operation, the roller shaft and both bearings should be replaced with a matched assembly.

1. Loosen set screw in bottom roller of stacker roller assembly (Figure 4-22).

2. Lift roller shaft straight up and out of casting. Note that there is a spacer washer between the top roller and the bearing seat. Remove top roller from shaft.

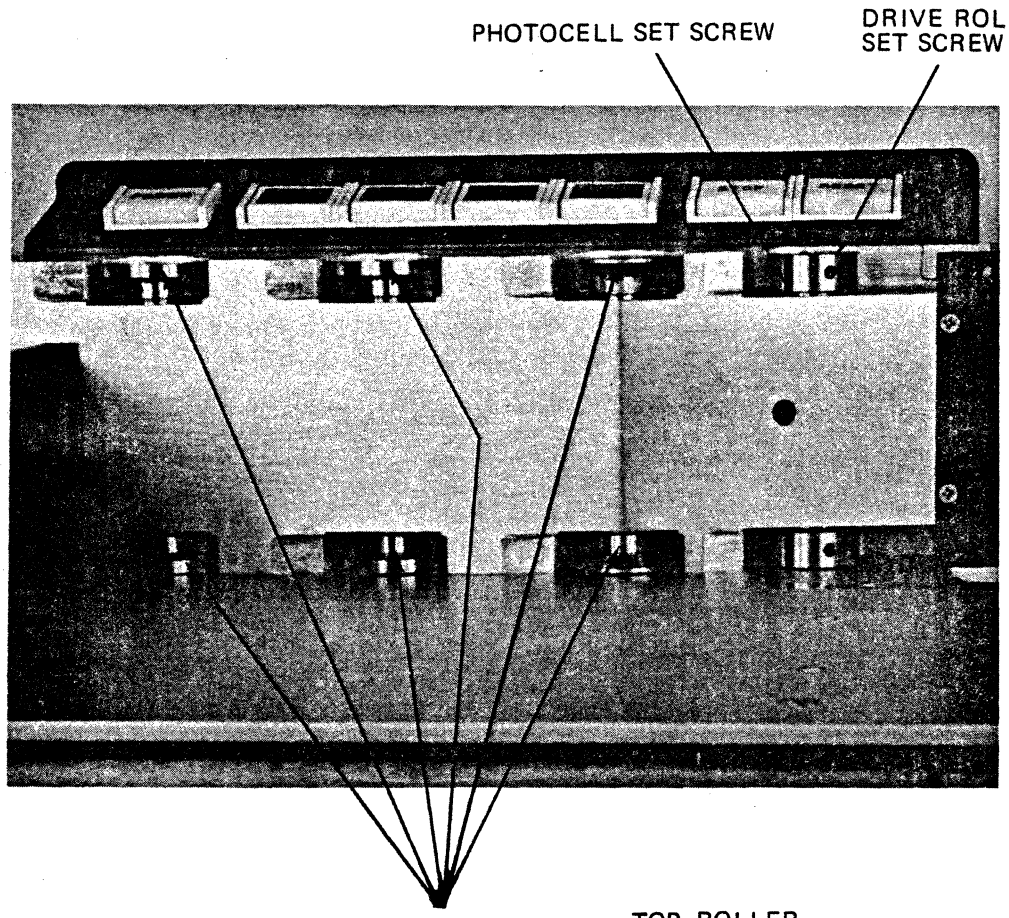
3. To remove top bearing, lift bearing from stacker casting with an L-shaped tool.

4. To remove bottom bearing, slide bottom roller and spacer washer clear of hole. Use a straight tool to tap edge of bearing from inside of shaft hole to drop bearing from casting.

5. Install new bearings. Place spacer washer on top bearing. Slide bottom roller and spacer washer under shaft hole.

6. Install top roller on new shaft, flush with (or slightly below) end of shaft.

7. Place shaft in shaft hole.



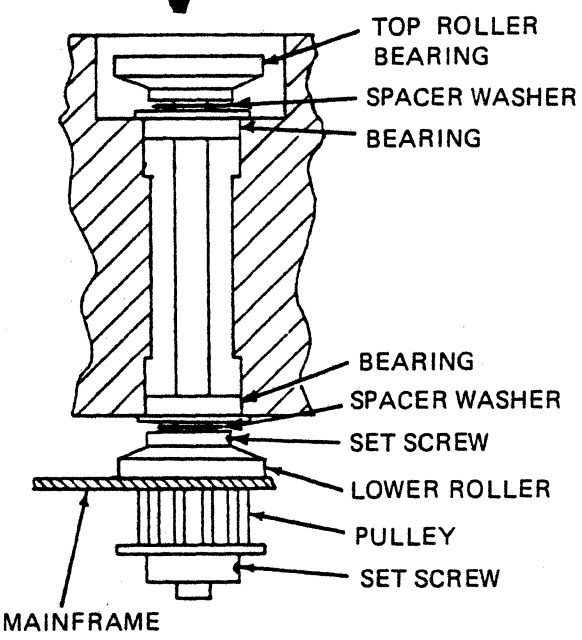


Figure 4-22. Stacker Roller Bearing Assembly

8. Select a feeler gauge (.005 to .025 inch) that will just force bottom roller against bearing when inserted between bottom roller and top surface of main frame.

9. Apply firm pressure on top roller and tighten set screw in bottom roller.

10. Check for vertical end play in stacker roller shaft assembly. If there is discernible vertical end play, loosen set screw in bottom roller and repeat steps 8 and 9.

f. Replace first stacker roller pulley on first stacker roller shaft in position shown in Figure 4-15.

g. Align first stacker roller pulley set screw with flat side of shaft. Carefully tighten set screw.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

h. Replace first stacker roller drive belt and bottom second stacker roller drive pulley (paragraph 4.4.6).

i. Return stack follower to its normal position.

j. Replace front panel, rear panel and track cover.

4.4.9 SECOND STACKER ROLLER BEARING ASSEMBLY

a. Remove front panel, rear panel and track cover (paragraph 4.4.2).

b. Prop stack follower open to its extended position.

c. Remove bottom second stacker roller pulley and first stacker roller drive belt (paragraph 4.4.6).

d. Remove top second stacker roller pulley and second stacker roller drive belt (paragraph 4.4.7).

e. Following procedure of paragraph 4.4.8, step e., replace bearing assembly.

f. Replace second stacker roller drive belt and top second stacker roller pulley (paragraph 4.4.7).

g. Replace first stacker roller drive belt and bottom second stacker roller pulley (paragraph 4.4.6).

h. Return stack follower to its normal position.

i. Replace front panel, rear panel and track cover.

4.4.10 THIRD STACKER ROLLER BEARING ASSEMBLY

a. Remove front panel, rear panel and track cover (paragraph 4.4.2).

b. Prop stack follower open to its extended position.

c. Remove bottom second stacker roller pulley and first stacker roller drive belt (paragraph 4.4.6).

d. Remove bottom fourth stacker roller pulley and third stacker roller drive belt (paragraph 4.4.5).

e. Loosen set screw in bottom third stacker roller pulley. Remove pulley.

f. Remove top second stacker roller pulley and second stacker roller drive belt (paragraph 4.4.7).

g. Loosen set screw in top third stacker roller pulley. Remove pulley.

h. Following procedures of paragraph 4.4.8, step e., replace bearing assembly.

i. Replace top third stacker roller pulley on third stacker roller shaft in position shown in Figure 4-15.

j. Align top third stacker roller pulley set screw with flat side of shaft. Carefully tighten set screw.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREWS. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEYS.

k. Replace second stacker roller drive belt and top second stacker roller pulley (paragraph 4.4.7).

l. Replace bottom third stacker roller pulley on third stacker roller shaft.

m. Align bottom third stacker roller pulley set screw with flat side of shaft. Carefully tighten set screw.

n. Replace third stacker roller drive belt and bottom fourth stacker roller pulley (paragraph 4.4.5).

o. Replace first stacker roller drive belt and bottom second stacker roller pulley (paragraph 4.4.6).

p. Return stack follower to its normal position.

q. Replace front panel, rear panel and track cover.

4.4.11 VACUUM PUMP ASSEMBLY

4.4.11.1 Removal

a. Remove front and rear panels (paragraph 4.4.2).

b. Remove four screws from rear of subframe panel assembly (Figure 4-23).

c. Remove five subframe panel screws from underside of base plate.

d. Cut cable tie holding output cable to base plate. Move subframe panel back and down.

e. Disconnect vacuum pump motor cable.

f. Loosen blower hose clamp under pick support casting and remove blower hose from adapter ring (Figure 4-24).

g. Loosen clamp holding vacuum adapter on top of blower and remove adapter (Figure 4-25).

h. Remove ground strap from vacuum pump mounting plate.

i. Tilt reader to gain access to four mounting plate screws from underside of reader.

CAUTION

IN STEP K, HOLD MOUNTING POSTS WITH A 1/2-INCH OPEN-END WRENCH TO AVOID TWISTING OFF THE PUMP PLATE RUBBER SHOCK MOUNTS.

k. Remove four screws holding pump assembly mounting posts to reader base plate.

l. Vacuum pump assembly may now be removed from reader.

4.4.11.2 Belt Adjustment

Vacuum pump belt tension is a critical adjustment. A reduction in vacuum or riffle air can cause erratic card picking. The vacuum pump assembly must be removed to perform this adjustment.

a. Remove vacuum pump assembly from the reader.

b. Loosen three vacuum pump mounting bolts, slide pump toward motor and remove belt (Figure 4-26).

c. Replace vacuum pump belt.

d. Using a spring scale, adjust vacuum pump for a belt tension of 4 to 6 ounces (about 3/64-inch belt deflection).

e. Tighten mounting bolts while maintaining tension.

f. Replace vacuum pump assembly (paragraph 4.4.11.3).

4.4.11.3 Installation

a. Place pump assembly in reader.

b. Tilt reader to gain access to underside of reader.

CAUTION

IN STEP C, HOLD MOUNTING POSTS WITH A 1/2-INCH OPEN-END WRENCH TO AVOID DAMAGE TO RUBBER SHOCK MOUNTS.

c. Install four screws to attach pump assembly mounting posts to reader base plate.

d. Connect ground strap to vacuum pump assembly mounting plate.

e. Install vacuum tube adapter on top of blower and tighten clamp.

f. Install blower hose on adapter ring under input hopper riffle cap and tighten hose clamp (Figure 4-24).

g. Connect motor cable.

h. Secure output cable to base plate with cable tie.

i. Replace subframe panel assembly.

j. Replace front and rear panels.

4.4.12 PICK SUPPORT ASSEMBLY

The pick support assembly must be removed to replace the fourth and fifth stacker roller bearing assemblies and the first and second picker roller bearing assemblies.

4.4.12.1 Removal

To remove the pick support assembly, proceed as follows:

a. Remove front and rear panels and track cover (paragraph 4.4.2).

b. Remove two screws holding hopper follower casting (Figure 4-27).

c. Remove two screws holding hopper follower shaft support casting (Figure 4-28).

d. Remove hopper follower shaft and shaft support casting.

e. Pull hopper follower beyond rear of main frame sufficiently to expose negator spring screw on underside.

f. Remove negator spring screw and guide spring back onto roller. Remove hopper follower.

g. Loosen vacuum tube elbow hose clamp (Figure 4-25). Slide elbow off vacuum tube and move to left.

h. Loosen adapter clamp screw at top of vacuum pump assembly and remove adapter.

i. Loosen screws on two large hose clamps and remove blower hose.

j. Remove solenoid return spring (Figure 4-29).

k. Loosen two upper set screws in solenoid coupling.

l. Disconnect solenoid leads at connector.

m. Remove two solenoid mounting plate screws, remove solenoid assembly and carefully set aside.

n. Remove six screws holding pick support casting (Figure 4-28).

o. Remove cable tie holding read station cable to solenoid mounting post.

p. Remove cable tie holding hopper empty switch cable.

q. Remove pick support casting (Figure 4-30).

4.4.12.2 Installation

a. Position pick support casting in place on main frame.

b. Apply LOCTITE Grade C and install six pick support casting mounting screws.

c. Reassembly remaining parts in reverse order of removal. Do not tighten solenoid coupling set screws.

d. Adjust pick sector (paragraph 4.4.18.2).

4.4.13 FOURTH STACKER ROLLER BEARING ASSEMBLY

a. Remove pick support assembly (paragraph 4.4.12).

b. Remove bottom fourth stacker roller pulley and third stacker roller drive belt (paragraph 4.4.5).

c. Loosen set screw in top fourth stacker roller pulley and remove pulley.

d. To replace shaft and bearing assembly, perform the following:

1. Loosen set screw in bottom roller of stacker roller assembly (Figure 4-22).

2. Lift roller shaft straight up and out of casting. Note that there is a spacer washer between the top roller and the bearing seat.

NOTE

To assure proper operation, the roller shaft and both bearings should be replaced with a matched assembly.

3. Loosen set screw in top drive roller and remove from shaft.

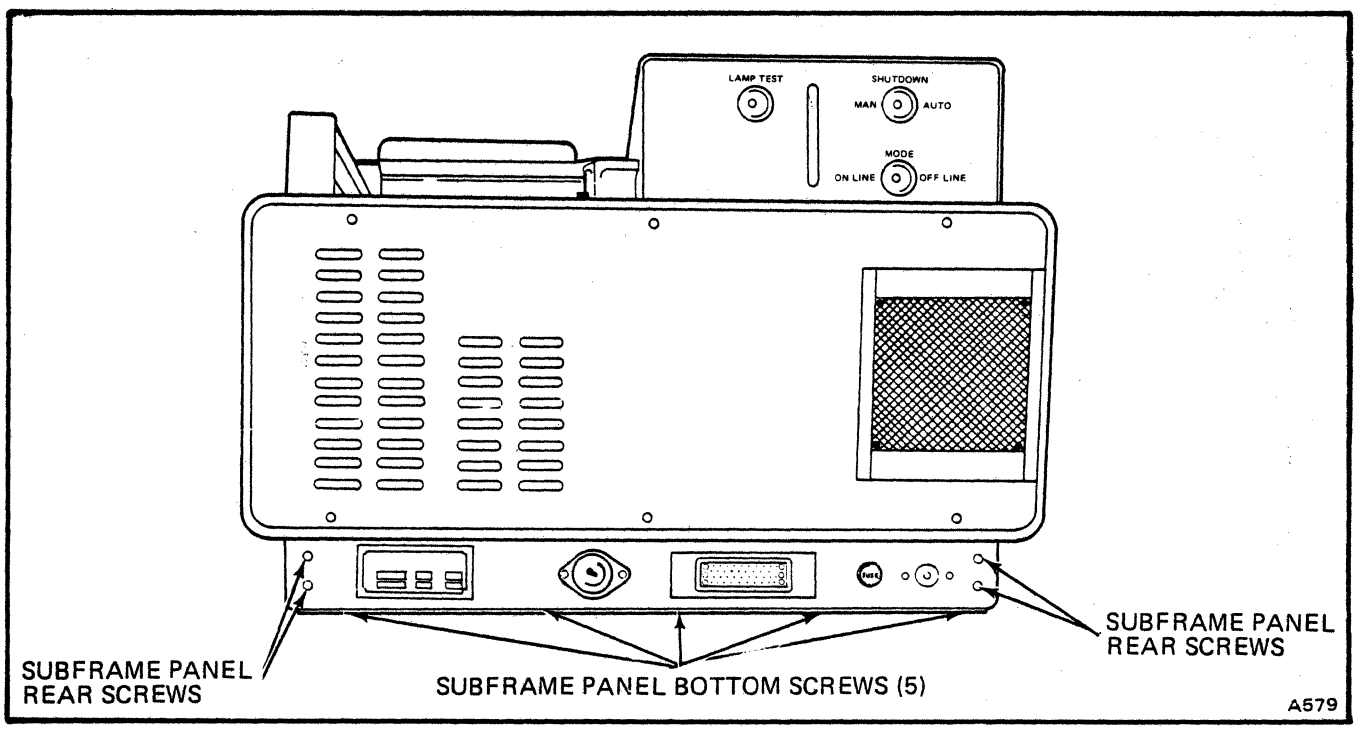


Figure 4-23. Removal of Rear Subframe Panel Assembly

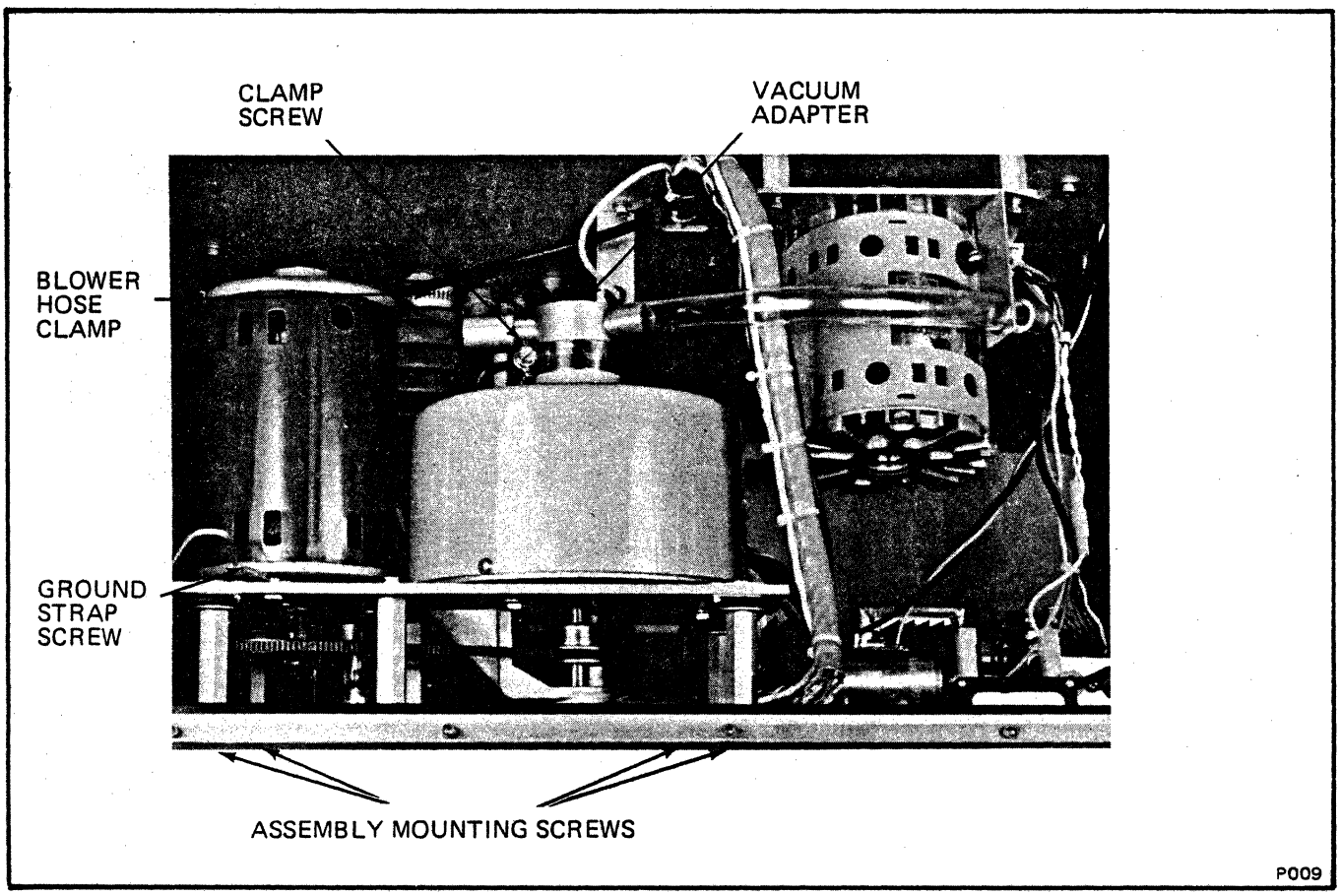


Figure 4-24. Removal of Vacuum Pump Assembly

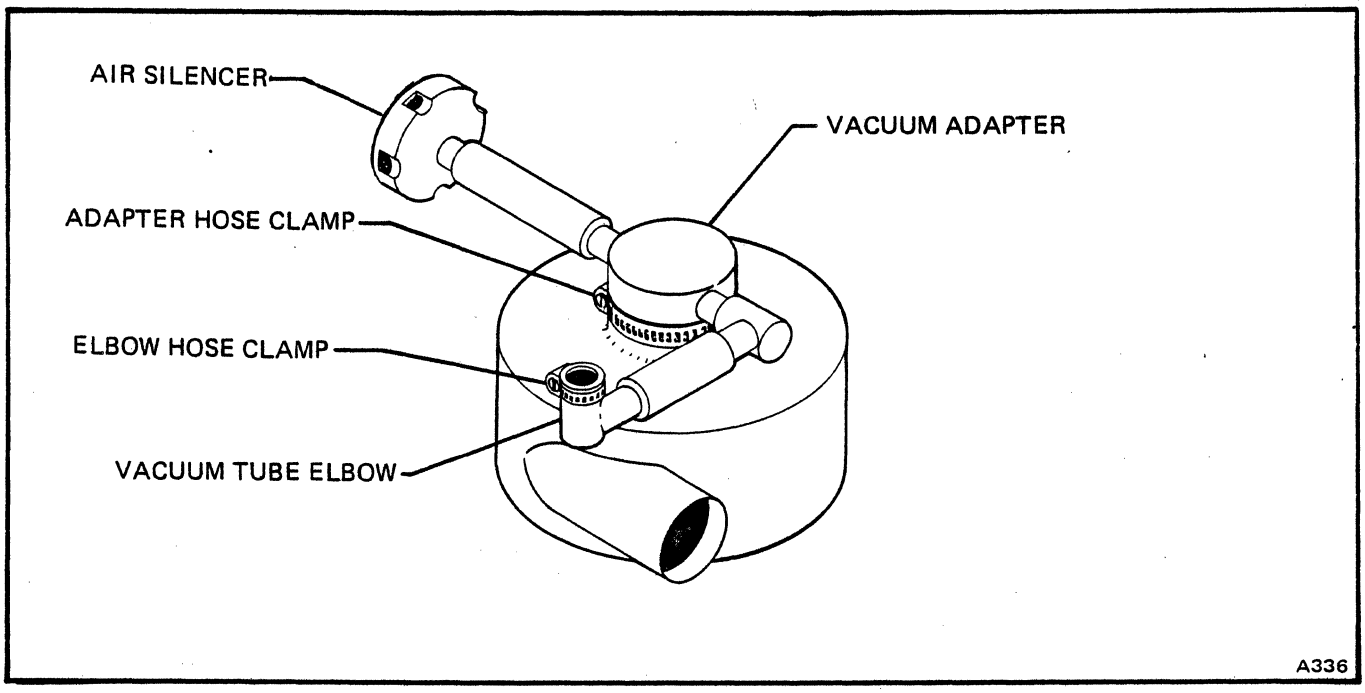


Figure 4-25. Removal of Vacuum Tube Adapter

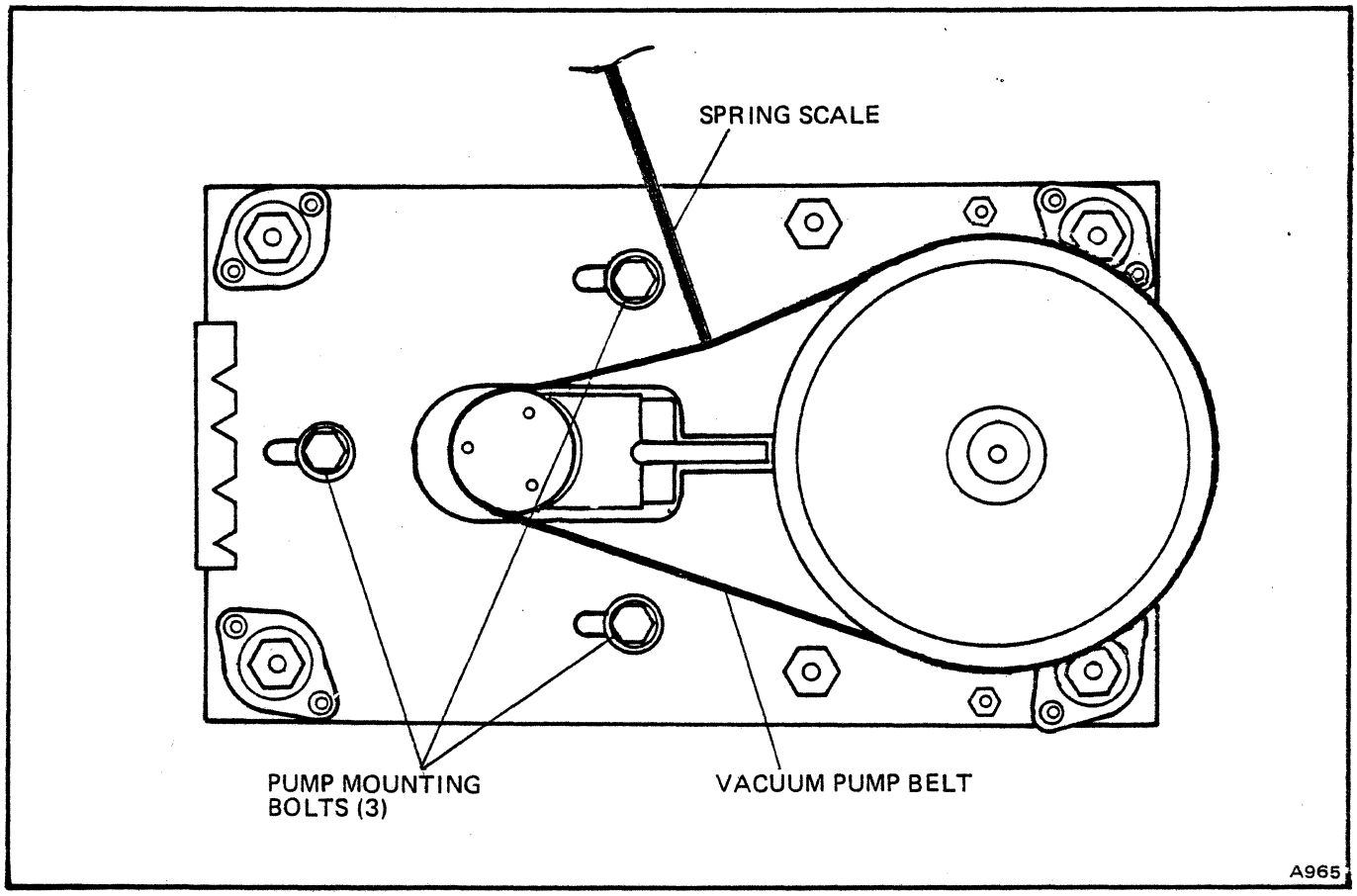


Figure 4-26. Vacuum Pump Belt Adjustment

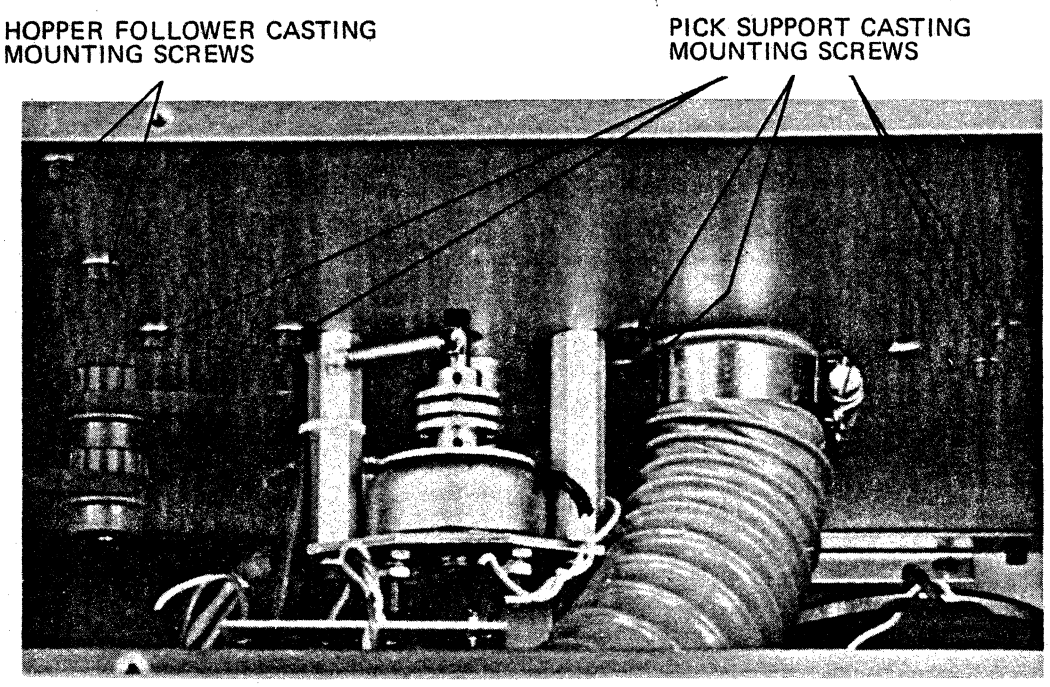


Figure 4-27. Removal of Pick Support Casting

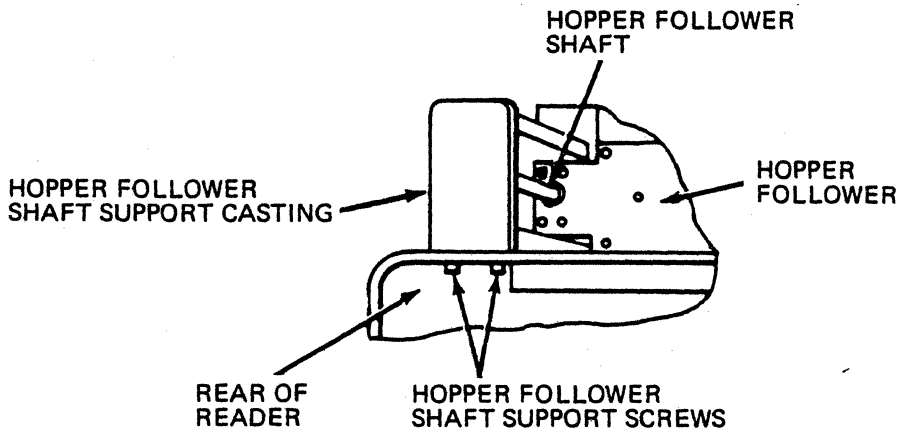


Figure 4-28. Removal of Hopper Follower Assembly

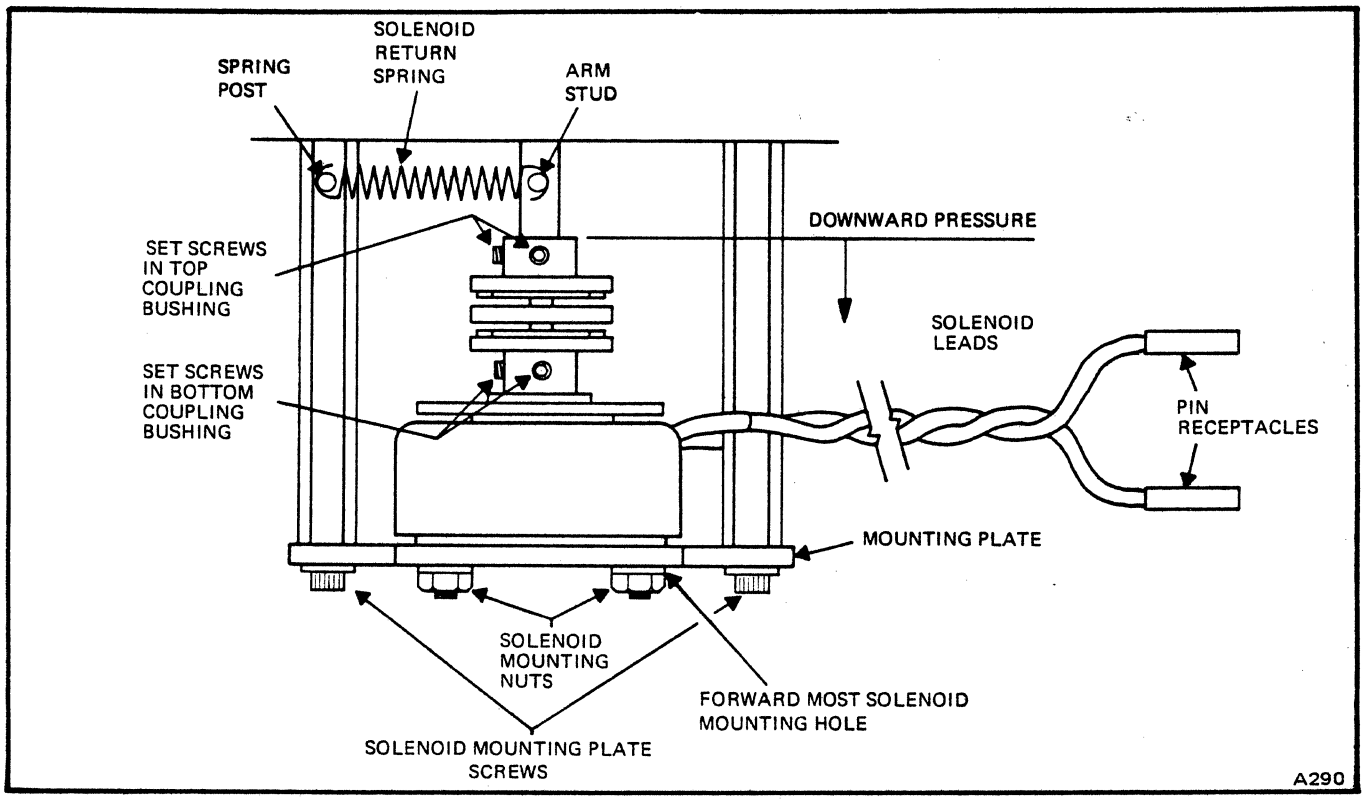


Figure 4-29. Solenoid Assembly

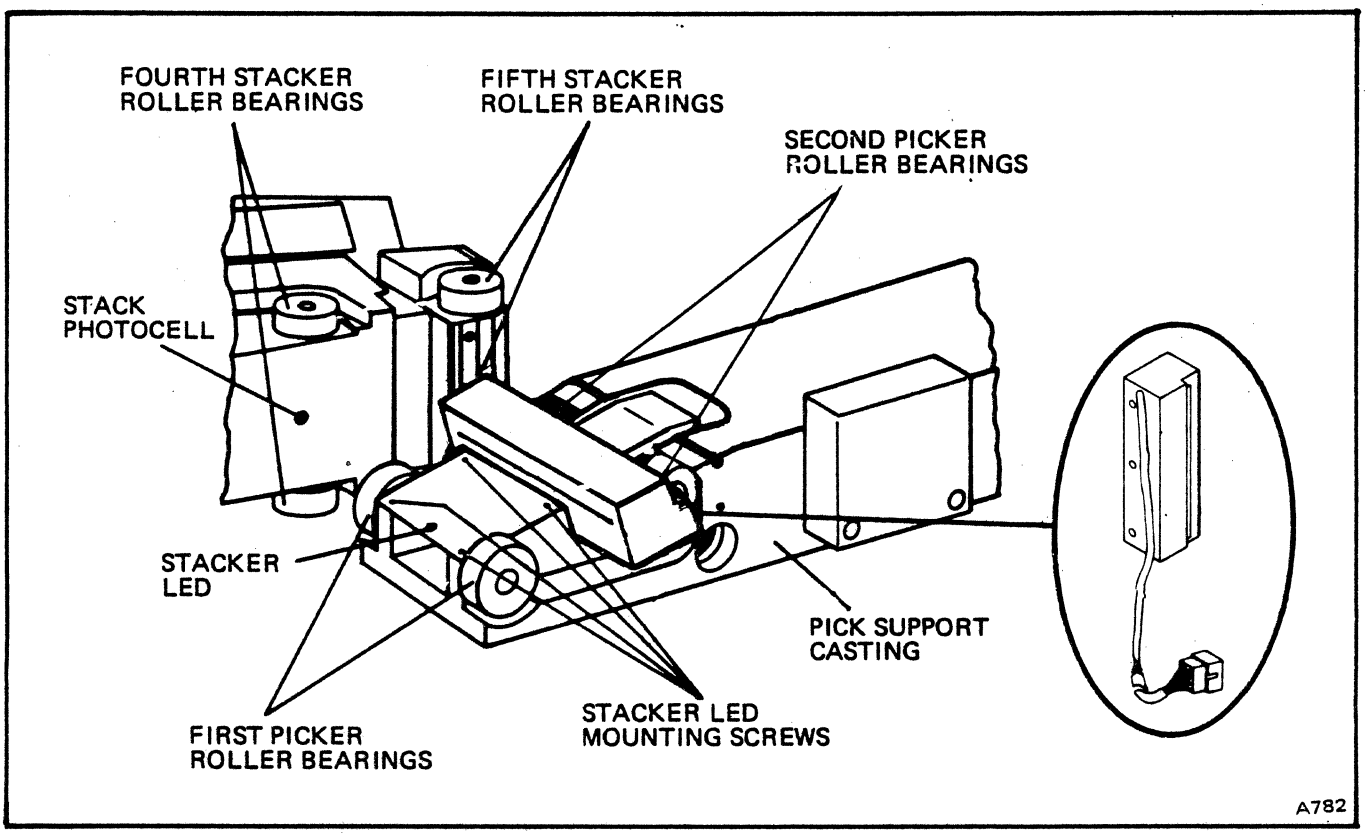


Figure 4-30. Pick Support Casting Removed from Reader

4. To remove top bearing, lift bearing from stack support casting with an L-shaped tool.

5. To remove bottom bearing, slide bottom roller and spacer washer clear of shaft hole. Use a straight tool to tap edge of bearing from inside of shaft hole to drop bearing from casting.

6. Install new bearings. Place spacer washer on top bearing. Slide bottom roller and spacer washer under shaft hole.

7. Install top roller on new shaft flush with (or slightly below) end of shaft.

8. Place new shaft with top roller installed, in shaft hole.

9. Select a feeler gauge (.005 to .025 inch) that will just force bottom roller against bearing when inserted between bottom roller and top surface of main frame.

10. Apply firm pressure on top roller and tighten set screw in bottom roller.

11. Check for vertical end play in stacker roller shaft assembly. If there is discernible vertical end play, loosen set screw in bottom roller and repeat steps 9 and 10.

e. Place main drive motor belt on motor pulley, on fifth stacker roller pulley, and around fourth stacker roller shaft. Hold belt in this position.

f. Place top fourth stacker roller pulley on its shaft. Move pulley up on the shaft until it engages main drive motor belt and is just clear of underside of main frame.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

g. Align top fourth stacker roller pulley with flat side of shaft. Adjust pulley, if necessary, to align main drive motor belt with motor pulley and fifth stacker roller pulley. Carefully tighten set screws.

h. Replace third stacker roller drive belt and bottom fourth stacker roller pulley (paragraph 4.4.5).

i. Replace pick support assembly (paragraph 4.4.12).

4.4.14 FIFTH STACKER ROLLER BEARING ASSEMBLY

a. Remove pick support assembly (paragraph 4.4.12).

CAUTION

WHEN HANDLING TIMING DISC, BE EXTREMELY CAREFUL NOT TO DAMAGE THE TEETH. WRAP THE DISC IN TISSUE WHILE IT IS REMOVED FROM READER.

b. Loosen set screw in timing disc and remove disc (Figure 4-15).

c. Loosen set screw in fifth stacker roller pulley and remove pulley.

d. Following procedure of paragraph 4.4.13, step d., replace bearing assembly.

e. Place main drive motor belt on motor pulley, on fourth stacker roller pulley, and around fifth stacker roller shaft. Hold belt in this position.

f. Place fifth stacker roller pulley on its shaft. Move pulley up on the shaft until it engages main drive motor belt and is just clear of underside of main frame.

CAUTION

APPLY ONLY MODERATE TORQUE TO TIGHTEN PULLEY SET SCREW. OVERTORQUE MAY RESULT IN DAMAGE TO PULLEY.

g. Align fifth stacker roller pulley with flat side of shaft. Adjust pulley, if necessary, to align main drive motor belt with motor pulley and fourth stacker roller pulley. Carefully tighten set screw.

h. Verify main drive motor belt tension adjustment (paragraph 4.4.3.2).

i. Replace timing disc on fifth stacker roller shaft.

j. Align timing disc set screw with flat side of shaft. Align timing disc teeth with magnetic pickup. Tighten timing disc set screw.

k. Adjust magnetic pickup and timing disc (paragraph 4.4.4.2).

l. Replace pick support assembly (paragraph 4.4.12).

4.4.15 PICKER CAPSTAN SHAFT BEARINGS

a. Remove pick support assembly (paragraph 4.4.12).

b. To replace first picker capstan shaft bearings:

1. Loosen set screw in bottom roller of first picker capstan assembly (Figure 4-22).

2. Pull first picker capstan shaft straight up and out of pick support casting. Remove bottom capstan and spacer and top spacer.

3. Loosen set screw in top capstan and remove from shaft. Install top capstan on new shaft and tighten set screw.

4. Remove top and bottom bearings, using an L-shaped tool to pull bearings from pick support casting.

5. Install new bearings in casting.

6. Place top spacer on shaft.

7. Install shaft, with spacer and top capstan installed in shaft hole.

8. Install bottom spacer and capstan on shaft.

9. Apply firm pressure on top and bottom capstans and tighten set screw in bottom capstan.

10. Check for vertical end play in first picker capstan shaft assembly. If there is discernible vertical end play, loosen set screw in bottom capstan and repeat substep 9.

c. To replace either of the second picker capstan shaft bearings:

1. Loosen set screw in capstan.

2. Remove shaft and retain ring, capstan and spacer.

3. Remove bearing, using an L-shaped tool to pull bearing from pick support casting.

4. Install new bearing in casting.

5. Install new shaft and retaining ring in shaft hole.

6. Install spacer and capstan on shaft.

7. Apply firm pressure to capstan and retaining ring end of shaft, and tighten set screw in capstan.

d. Install pick support assembly (paragraph 4.4.12).

4.4.16 PINCH ROLLER TENSION ADJUSTMENT

Normally all repairs to the stack support assembly can be accomplished without loosening the stack support casting. However, if loosening or removal of the casting becomes necessary, the following adjustment procedure must be performed.

CAUTION

ADJUSTMENT OF THE STACK SUPPORT CASTING IS A FACTORY ADJUSTMENT PROCEDURE. IT SHOULD NOT NORMALLY BE ATTEMPTED IN THE FIELD.

a. Remove front and rear panels and track cover (paragraph 4.4.2).

b. Remove main card cage cover (Figure 4-31).

c. Loosen control panel mounting screws.

d. Install a 4-inch C-clamp across the pick and stack support castings, centered between the first and second picker rollers and between the fourth and fifth stacker rollers.

e. Loosen stack support casting mounting screws.

f. Move the stack support casting to a position where the fourth and fifth stacker rollers just make contact with the first and second picker rollers, respectively.

g. Using a dial caliper, measure the distance from the rear of the stack support casting to the front of the pick support casting, across each set of rollers.

h. Carefully tighten the C-clamp until the measured distances are 0.010 inch less than measured in step g.

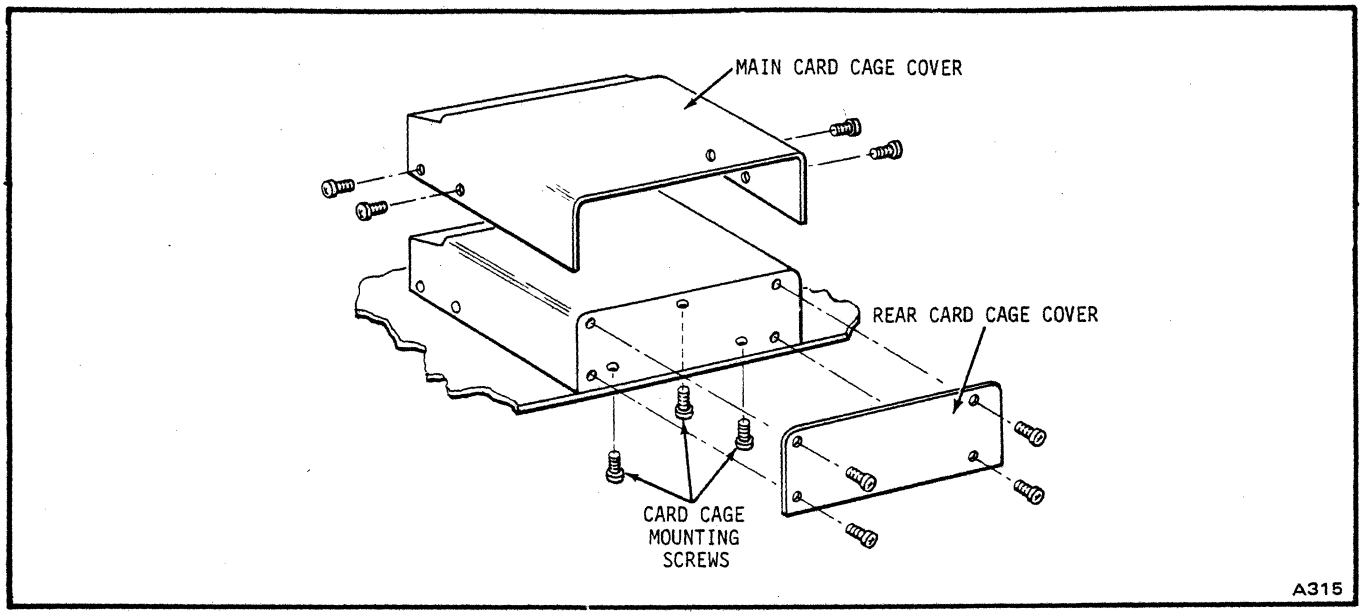


Figure 4-31. Card Cage Covers and Mounting

i. Tighten the stack support casting mounting screws; check measurements and repeat steps f., g. and h. if necessary.

j. Remove C-clamp and dial caliper.

k. Tighten control panel mounting screws.

l. Replace main card cage cover.

m. Replace front and rear panels and track cover.

4.4.17 SOLENOID ASSEMBLY

4.4.17.1 Removal

a. Remove front and rear panels (paragraph 4.4.2).

b. Disconnect solenoid leads at connector.

c. Remove solenoid return spring from sector shaft spring post and arm on solenoid mounting standoff (Figure 4-29).

d. Loosen two upper set screws in solenoid coupling.

e. Remove two solenoid mounting plate screws and remove solenoid assembly.

f. Remove two solenoid mounting nuts and remove solenoid from mounting plate.

g. Loosen two lower set screws in coupling and remove coupling from solenoid shaft.

4.4.17.2 Installation

Apply LOCTITE Grade C to the coupling set screws before replacing. LOCTITE Grade C should be applied to all mounting screws except panel screws.

a. Install solenoid coupling on shaft of new solenoid Tighten coupling set screws on flat sides of shaft.

NOTE

Note that solenoid mounting holes are not in line with the mounting plate holes. To ensure that solenoid is reinstalled correctly, solenoid leads must extend to the right (viewed from the front of the reader) and forwardmost solenoid mounting hole must be on the right.

b. Install solenoid on solenoid mounting plate.

c. Install solenoid assembly on mounting standoffs, sliding top coupling bushing onto pick shaft. Do not tighten upper set screws in coupling.

d. Connect solenoid leads at connector.

e. Preload solenoid coupling (paragraph 4.4.18.2 steps r. and s.).

f. Replace solenoid return spring.

NOTE

If proper pick action does not result from preloading the solenoid, perform the entire pick sector adjustment (paragraph 4.4.18.2).

g. Replace front and rear panels.

4.4.18 PICK SECTOR

4.4.18.1 Removal and Installation

a. Remove front panel, rear panel and track cover (paragraph 4.4.2).

b. Remove solenoid (paragraph 4.4.17). Prop open input hopper follower.

c. Remove retaining ring from top of pick shaft.

d. Remove spacers under retaining ring.

CAUTION

ALL SPACERS MUST BE INSTALLED WHEN UNIT IS REASSEMBLED.

e. Loosen two pick sector set screws.

f. Remove pick shaft from underside of main frame top plate.

g. Remove pick throat (Figure 4-32).

h. Remove pick sector from rear of pick support casting.

i. Install pick sector, shaft, all spacers and retaining ring.

j. Align flat side of shaft with set screws.

k. Adjust pick sector for 1-5/8 inches from top surface of main frame to middle row of holes on the pick sector.

l. Hold sector in place and tighten set screws (Figure 4-33).

m. Perform pick sector adjustment (paragraph 4.4.18.2).

4.4.18.2 Adjustment

The pick sector is adjusted to ensure that cards are picked properly. There are six adjustments: height, vacuum adapter air gap, pick stop, pick throat, solenoid coupling and pick bumper.

CAUTION

ADJUSTMENTS MUST BE PERFORMED IN THE SEQUENCE STATED.

a. Check pick sector height adjustment. Distance from top surface of main frame top plate to center of middle row of holes in pick sector should be 1.625 (1-5/8) inches (Figure 4-32).

b. If height of pick sector requires adjustment, loosen set screws in front of pick sector (Figure 4-33).

c. Adjust pick sector until middle row of holes in pick sector measures 1.625 inches above top surface of main frame top plate.

d. Check air gap between pick sector and vacuum adapter plate. The clearance should be 0.002 to 0.003 inch for maximum vacuum with free sector travel.

e. If adjustment is required, loosen hose clamp on vacuum tube adapter elbow located on the underside of main frame (Figure 4-25). Remove elbow from sleeve. Prop hopper follower open.

f. Loosen vacuum adapter plate set screw (Figure 4-32).

g. Insert a .002 inch feeler gauge between pick sector and vacuum adapter plate. From underside of main frame push vacuum adapter plate upward and tighten set screw.

h. Re-install vacuum tube adapter elbow.

i. Check pick sector rest position. Rear edge of last column of holes in pick sector should line up with center of vacuum adapter plate set screw. Alignment is determined by placement of pick stop. If adjustment of pick stop is necessary, perform steps j. and k.

j. Loosen two pick stop screws (Figure 4-33).

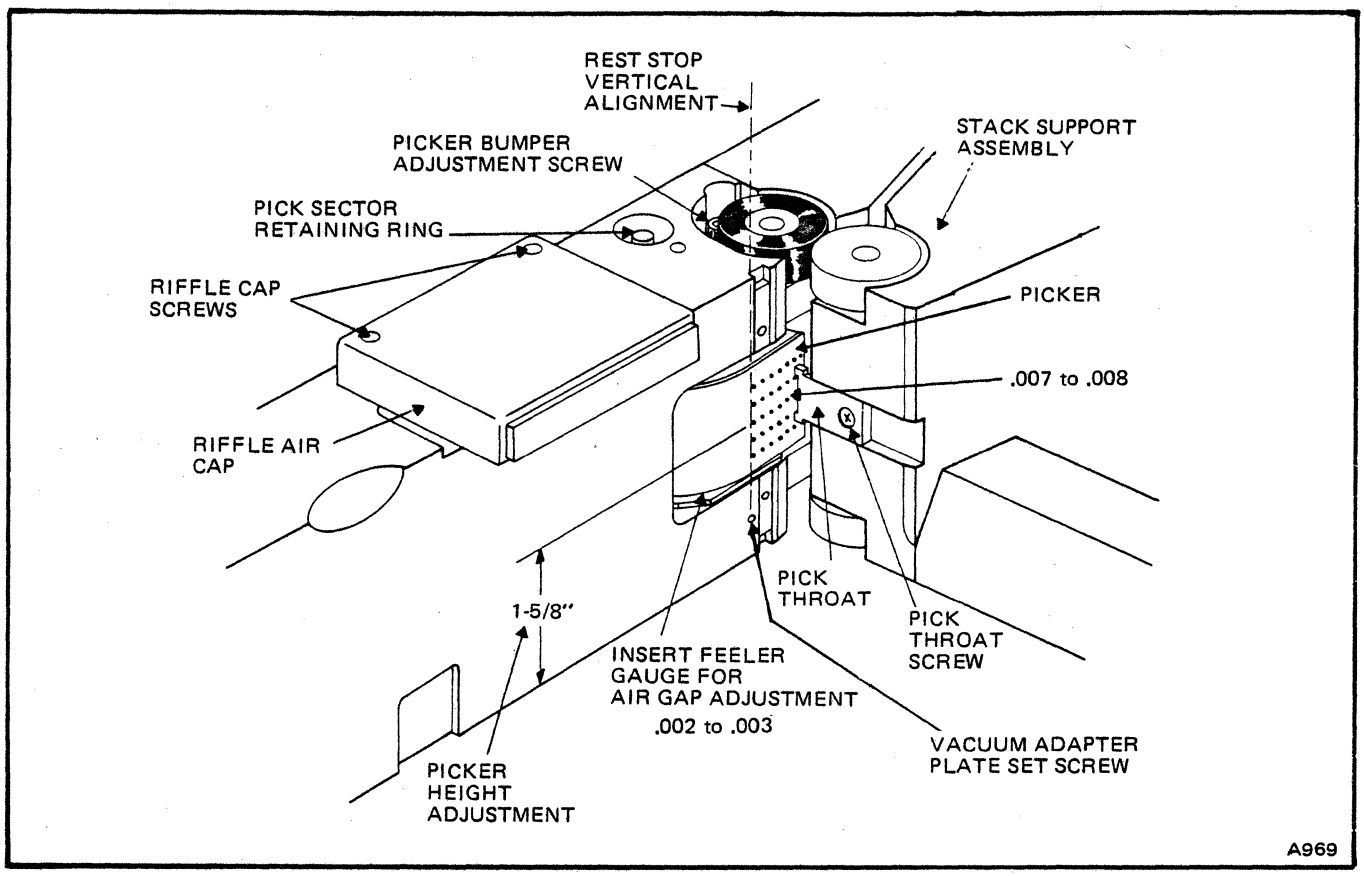


Figure 4-32. Pick Sector, Rear View

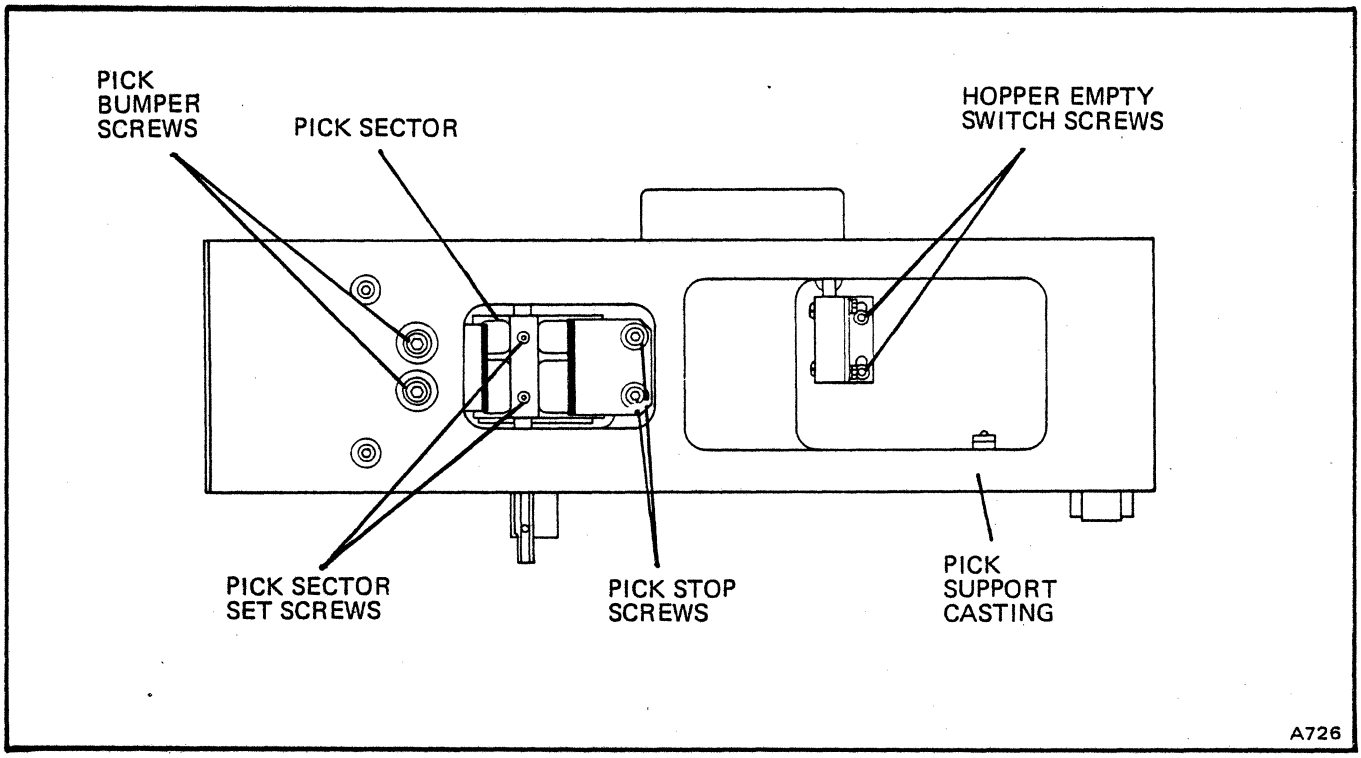


Figure 4-33. Pick Support Assembly, Front View

k. Using a straight edge to gauge pick sector rest position, hold sector in proper alignment, then push pick stop against pick sector and tighten pick stop screws.

l. Check gap between pick throat and pick sector. The gap should be 0.008 inch.

m. Loosen pick throat screw (Figure 4-32).

n. Insert a .008 inch feeler gauge between pick throat and pick sector.

o. Hold pick throat against feeler gauge and tighten screw.

p. Check solenoid coupling adjustment. The solenoid coupling transfers rotary solenoid motion to the pick sector.

q. Loosen two set screws in top bushing of solenoid coupling (Figure 4-29).

r. Depress coupling slightly with fingers and tighten set screws, ensuring one screw is on flat portion of shaft. Remove return spring from sector shaft and check that solenoid coupling return torque is just sufficient to return pick sector to within 0.020 to 0.040 inch of pick stop. Too much torque could result in insufficient drive to the pick shaft.

s. Install return spring and check solenoid action by picking cards manually while power is applied and drive and blower motors are on.

t. Check adjustment of pick bumper. This bumper limits pick sector overtravel beyond the point where card is delivered to pinch rollers.

u. Place about 2 inches of cards (250-300) in the input hopper. Operate POWER switch to energize reader. With reader in OFF LINE, operate START switch and run a few cards into stacker. Depress STOP switch.

v. Place a .007 inch feeler gauge against the pick sector side of the pick bumper. Manually operate pick sector. When card reaches pinch rollers the sector should be just touching the feeler gauge. If bumper must be repositioned, perform steps w. and x.

NOTE

A card should be picked normally within a 0.007-inch to 0.013-inch range of sector overtravel, but with 0.014-inch overtravel the card should not be picked by the pinch rollers.

w. Loosen two pick bumper screws (Figure 4-33).

x. Adjust pick bumper for proper overtravel and tighten screws.

4.4.19 STACK PHOTOCELL ASSEMBLY

4.4.19.1 Removal and Installation

a. Remove rear panel and track cover (paragraph 4.4.2).

b. Remove main card cage cover (Figure 4-31).

c. Remove rear card cage cover plate (Figure 4-31).

d. Remove logic cards from card file.

e. Remove three screws holding card cage in place. Move card cage to rear and remount temporarily, using two screws through rear holes in top plate and front holes in card cage (Figure 4-34).

f. Cut cable ties to free photocell leads.

g. Tag leads from photocell and, using AMP tool 465195-2, disconnect leads from card cage.

h. Loosen set screw in top fourth stacker roller (Figure 4-22). Remove stacker roller and spacer washer.

i. Loosen photocell set screw in stack support casting (Figure 4-22) and remove photocell (Figure 4-35).

j. Remove photocell assembly.

k. Insert new photocell. Align lens of photocell flush with face of stack support casting. Tighten set screw.

CAUTION

DAMAGE TO PHOTOCELL OR CARDS MAY RESULT IF PHOTOCELL EXTENDS BEYOND FACE OF STACK SUPPORT CASTING.

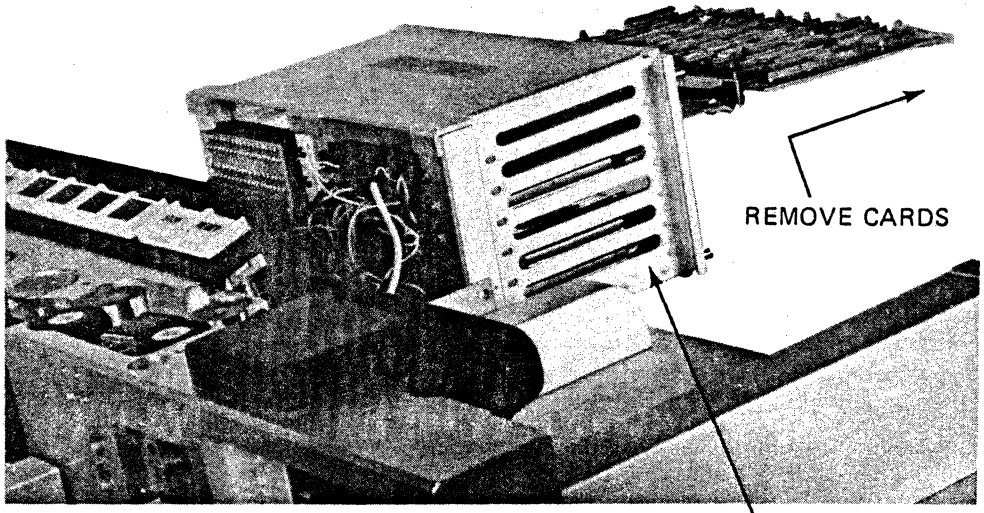


Figure 4-34. Card Cage in Extended Position

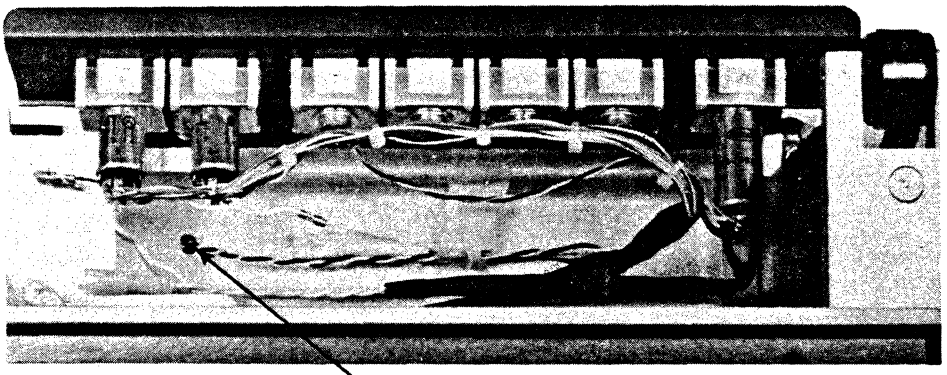


Figure 4-35. Location of Stack Photocell

l. Connect photocell leads to proper terminals on card cage.

m. Install new cable ties to replace those removed in step f.

n. Replace top fourth stacker roller: ensure there is no vertical end play in stacker roller shaft. If end play is descernible, refer to paragraph 4.4.13, step d., for adjustment procedures.

o. Return card cage to its normal position.

p. Install logic cards in card file (Figure 4-36).

r. Replace main card cage cover and rear card cage cover plate.

s. Replace track cover and rear panel.

4.4.20 STACKER LED ASSEMBLY

To replace stacker LED assembly:

a. Remove pick support assembly (paragraph 4.4.12.1).

b. Remove four stacker LED assembly mounting screws (Figure 4-30).

c. Remove cable ties from solenoid mounting plate and disconnect stacker LED at connector.

d. Remove stacker LED assembly.

e. Install new stacker LED assembly, connect at connector and replace cable ties on solenoid mounting plate.

f. Replace pick support assembly (paragraph 4.4.12.2).

4.4.21 HOPPER NEGATOR SPRING

To replace the hopper negator spring, perform the following:

a. Remove hopper follower shaft support and shaft (Figure 4-28).

b. Pull follower back past edge of top plate, turn it over, hold negator spring and remove spring screw.

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

d. Replace spring screw and reassemble hopper follower.

4.4.22 LOWER STACKER NEGATOR SPRING

To replace the lower stacker negator spring, perform the following:

a. Remove front panel and track cover (paragraph 4.4.2).

b. Remove main card cage cover (Figure 4-31).

c. Remove two screws holding front stack follower shaft support (Figure 4-37).

d. Loosen set screw in rear stack follower shaft support (Figure 4-38). Remove stack follower shaft.

e. Pull stack follower beyond front edge of chassis and turn it over.

f. Hold negator spring and remove screw, then pull spring from roller.

g. Roll new spring onto roller and install screw.

h. Reinstall stack follower shaft.

i. Perform stack follower adjustment (paragraph 4.4.24).

j. Replace front panel and track cover.

4.4.23 UPPER STACKER NEGATOR SPRING

To replace the upper stacker negator spring, perform the following:

a. Remove main card cage cover (Figure 4-31).

b. Remove upper negator spring retaining screw (Figure 4-38).

c. Remove spring, roll new spring onto roller, and replace retaining screw.

d. Replace card cage cover.

4.4.24 STACK FOLLOWER ADJUSTMENT

The stack follower is adjusted to ensure proper movement of cards into stacker.

a. Remove rear panel (paragraph 4.4.2).

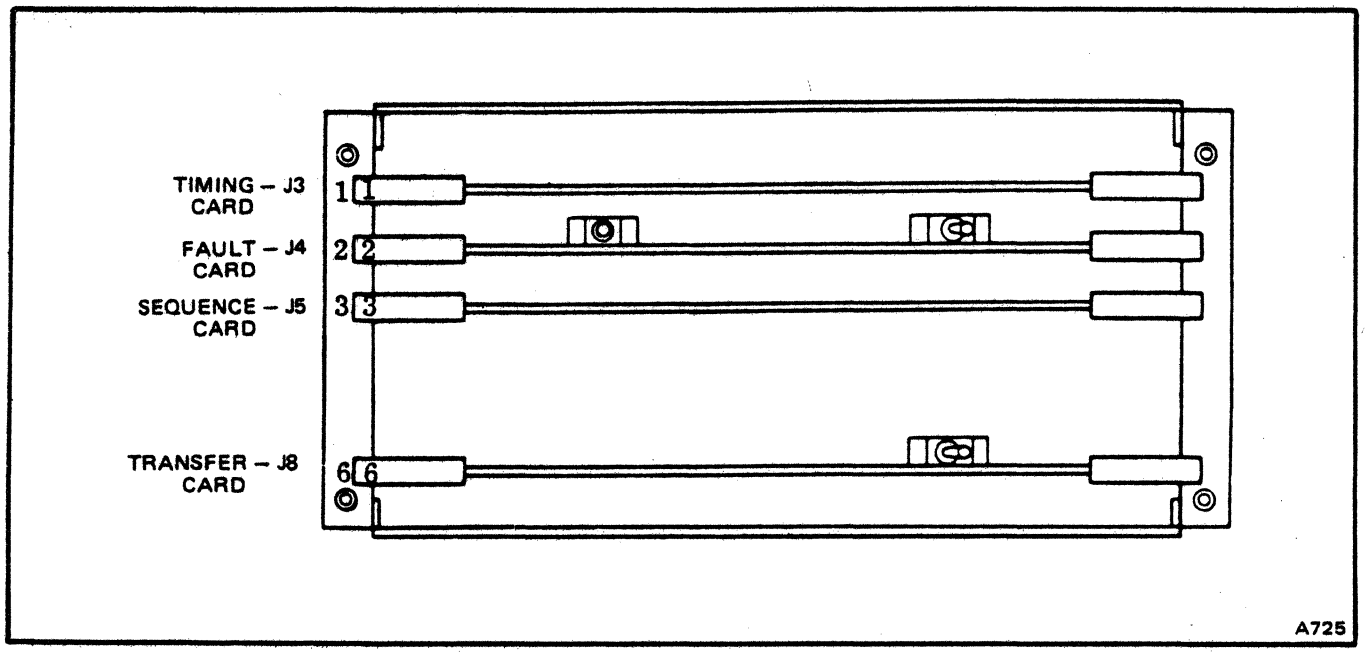


Figure 4-36. Card File Logic Card Locations

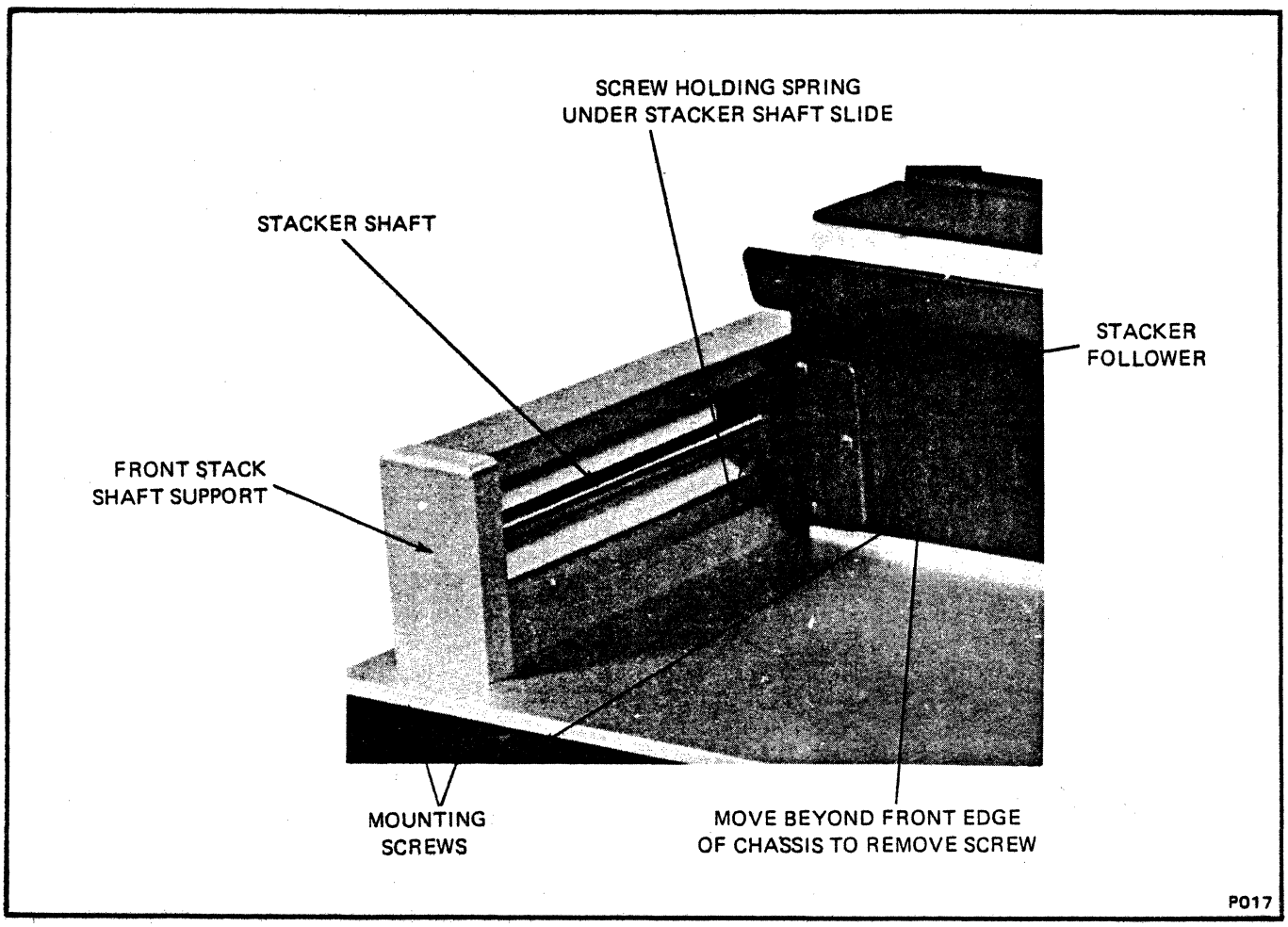


Figure 4-37. Stacker Negator Spring Replacement, Front View

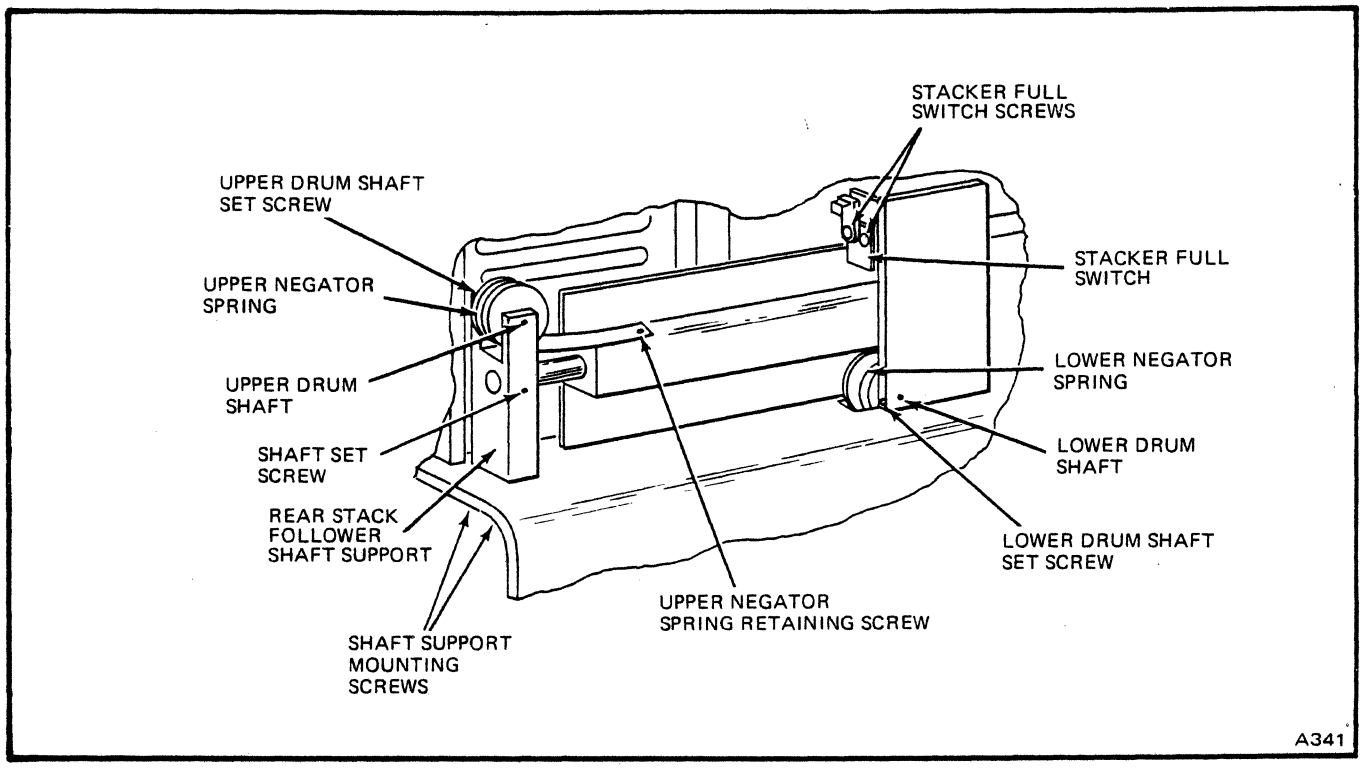


Figure 4-38. Stacker Negator Spring Replacement, Rear View

b. Remove card cage cover (Figure 4-31).

c. Loosen shaft set screw on rear stack follower shaft support (Figure 4-38).

d. Loosen two rear stack follower shaft support mounting screws. (Figure 4-38).

e. Adjust stack follower shaft support to achieve approximately 0.250 inch clearance between face of stack follower and front of stack support casting.

f. Tighten shaft support mounting screws and recheck clearance.

g. When proper clearance is verified, tighten shaft set screw.

h. Replace card cage cover.

i. Replace rear panel.

4.4.25 STACKER FULL SWITCH

4.4.25.1 Removal and Installation

a. Remove card cage cover (Figure 4-31).

b. Remove stacker full switch assembly (Figure 4-38).

c. Disconnect switch leads from card cage and install leads from new switch assembly.

d. Mount switch assembly and adjust.

4.4.25.2 Adjustment

The stacker full switch is adjusted to detect the output stacker full condition.

a. Place approximately 150 cards in hopper. Depress POWER switch to energize the reader.

b. After a few seconds, the STOP indicator will illuminate. Pull stack follower toward front of reader. Approximately 1/8 inch before end of travel, the HOPPER CHECK indicator should illuminate. If HOPPER CHECK does not illuminate as specified, the stacker full switch must be repositioned.

c. Loosen two screws retaining stacker full switch bracket (Figure 4-38).

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

e. Replace card cage cover.

4.4.26 HOPPER EMPTY SWITCH

The hopper empty switch is located under the riffle air cap assembly.

4.4.26.1 Removal and Installation

a. Remove track cover (paragraph 4.4.2).

b. Remove two screws holding riffle air cap (Figure 4-32) and remove cap.

d. Remove hopper empty switch assembly mounting screws (Figure 4-33), remove switch from pick support casting, and disconnect switch leads.

e. Connect leads to new switch and install switch in casting. Do not tighten mounting screws.

4.4.26.2 Adjustment

The hopper empty switch is adjusted to detect the hopper empty condition.

a. Check that arm of switch is parallel to top of pick support casting (Figure 4-39).

b. Center switch arm in recess in pick support casting. Press switch actuator arm lightly into casting.

c. Tighten switch mounting plate screws.

d. Install riffle air cap assembly.

e. Replace track cover.

4.4.27 READ STATION ASSEMBLY

4.4.27.1 Removal and Installation

a. Remove track cover (paragraph 4.4.2).

b. Remove two read station mounting screws in pick support casting (Figure 4-40).

c. Cut cable tie holding read station cable against top of main frame.

d. Disconnect read station cable at connector.

e. Lift read station straight up and out of pick support casting.

f. Install read station in reverse order of removal. Do not fully tighten read station mounting screws.

4.4.27.2 Adjustment

a. Remove card cage rear panel.

b. Remove transfer card from card cage (Figure 4-36). Install transfer card on card extender and install in card cage (J8).

c. Connect the input leads of a dual-trace oscilloscope to pins J8-13 and J8-V. Connect oscilloscope common to J8-4.

d. Set SHUTDOWN switch to AUTO.

e. Set MODE switch to OFF LINE.

f. Ensure input hopper is empty, then operate POWER pushbutton switch to apply ac line power (POWER indicator illuminated).

g. Voltages on pins J8-13 and J8-V should measure 2.4 Vdc (minimum).

h. Hand feed a square-cornered tab card into the card track. The bottom of the card must bear squarely against the top plate surface.

i. As the card enters the read station, voltages on pins J8-13 and J8-V should drop simultaneously from 2.4 Vdc (min) to between 0.9 and 1.9 Vdc (nominal 1.4 Vdc).

j. Adjust position of read station to obtain results of step h. Tighten read station mounting screws.

k. Operate POWER pushbutton switch to remove ac line power (POWER indicator extinguished).

l. Disconnect oscilloscope leads, remove card extender, and reinstall transfer card in card cage (J8).

m. Replace track cover and card cage rear panel.

4.4.29 INDICATOR LAMPS

To replace an indicator lamp:

a. Grasp indicator cap with thumb and forefinger and rock upward to remove cap.

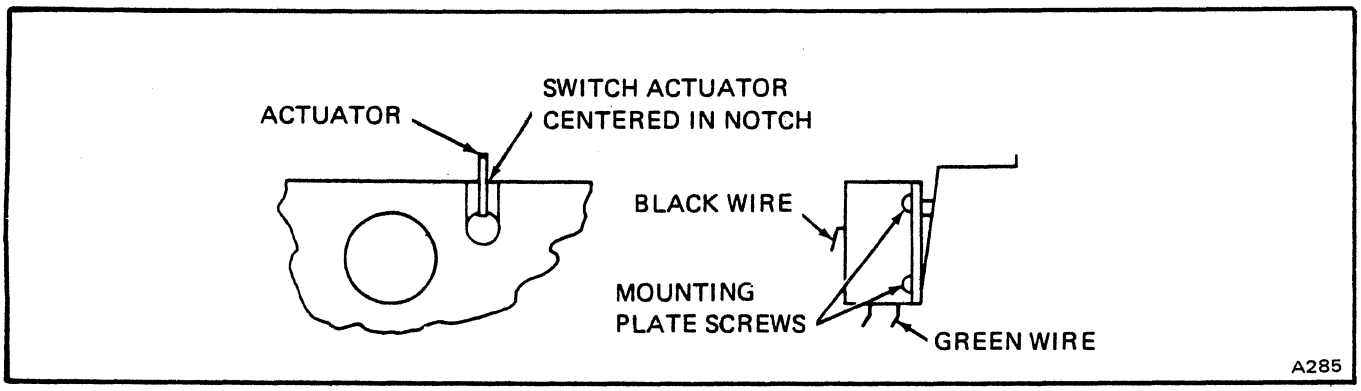


Figure 4-39. Hopper Empty Switch Adjustment

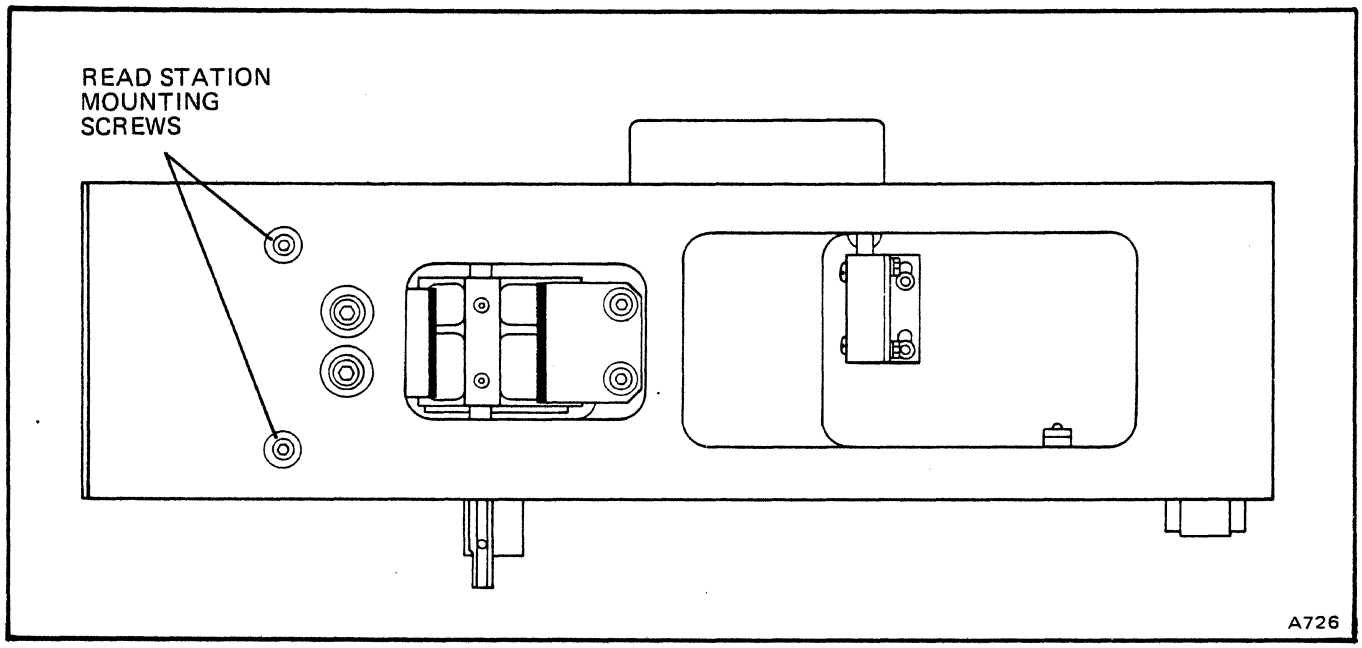


Figure 4-40. Removal of Read Station Assembly

b. Remove lamp from bottom of cap and insert replacement lamp. (6V incandescent, Type 381; Documation Part No. 00000318).

c. Press cap into switch or indicator base assembly.

The following pages illustrate major assemblies [illegible] assembly. (Some parts are available only as component parts. Accompanying tables [illegible] even though specific components may be view to facilitate location and [illegible] and provide Documation part numbers. Also include reader model and serial number and, if applicable, Customer Special number.

Table A-1 identifies major assemblies [illegible] RM1000L Card Reader. [illegible] parts numbers have been revised to [illegible] Customer Special requirements.

Those components which engineering [illegible] indicate may require replacement during [illegible] reader are identified with an asterisk (*) [illegible] spares. For additional information on replacement parts contact:

DOCUMATION INCORPORATED
P.O. Box 1240
Melbourne, Florida 32901
Telephone (305) 725-5500
TWX 510-959-6286

An 8-digit Documation part number [illegible] identified replacement part. When [illegible] this part number and description [illegible]

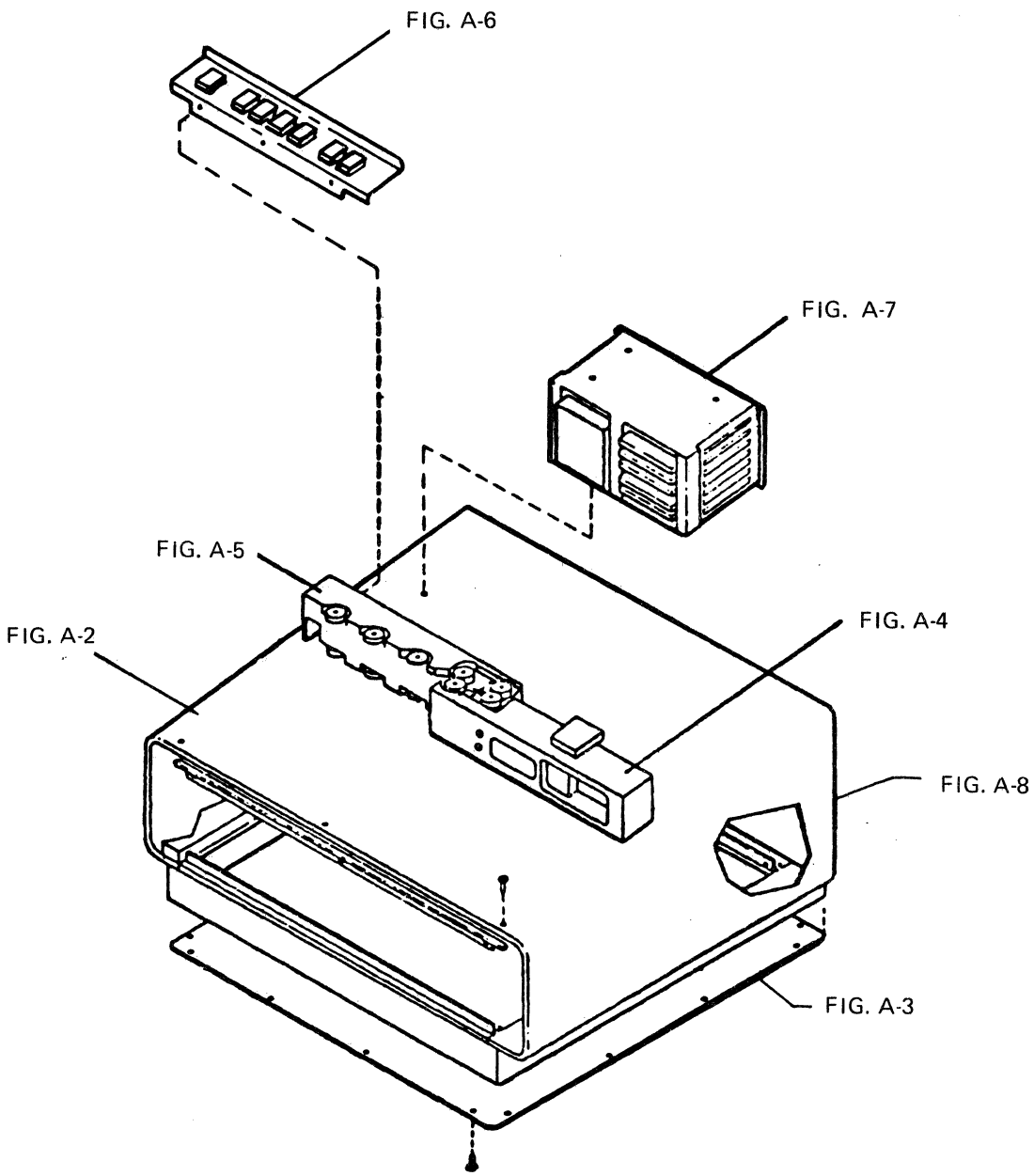


Figure A-1. Figure Reference

Table A-1. Major Assemblies, Reference Data

FIGURE	TABLE	DESCRIPTION	PART NUMBER
A-2	A-2	Main Frame Assembly (100V, 50 Hz)	41336706
		Drive Motor Assembly (100V, 50 Hz)	41386013
		Main Frame Assembly (100V, 60 Hz)	41336706
		Drive Motor Assembly (100V, 60 Hz)	41386014
		Main Frame Assembly (115V, 50 Hz)	41336706
		Drive Motor Assembly (115V, 50 Hz)	41386015
		Main Frame Assembly (115V, 60 Hz)	41336704
		Drive Motor Assembly (115V, 60 Hz)	41386016
		Main Frame Assembly (230V, 50 Hz)	41336705
		Drive Motor Assembly (230V, 50 Hz)	41386017
A-3	A-3	Base Plate Assembly (100V, 50 Hz)	41365510
		Vacuum Pump Assembly (100V, 50 Hz)	41335214
		Base Plate Assembly (100V, 60 Hz)	41365506
		Vacuum Pump Assembly (100V, 60 Hz)	41335209
		Base Plate Assembly (115V, 50 Hz)	41365509
		Vacuum Pump Assembly (115V, 50 Hz)	41335215
		Base Plate Assembly (115V, 60 Hz)	41365504
		Vacuum Pump Assembly (115V, 60 Hz)	41335207
		Base Plate Assembly (230V, 50 Hz)	41365505
		Vacuum Pump Assembly (230V, 50 Hz)	41335208
A-4	A-4	Pick Support Assembly	40418101
A-5	A-5	Stack Support Assembly (100/115V, 60 Hz; 230V, 50 Hz)	41028001
		Stack Support Assembly (100/115V, 50 Hz)	41028002
A-6	A-6	Control Panel Assembly	31395301
A-7	A-7	Card File Assembly (GTRP)	41375503
		Card File Assembly (PTRP)	41375504
A-8	A-8	Rear Panel Assembly (100V, 60 Hz) (p/o Trim Group Assembly)	41376803
		Rear Panel Assembly (100/115V, 50 Hz; 115V, 60 Hz) (p/o Trim Group Assembly)	41376801
		Rear Panel Assembly (230V, 50 Hz) (p/o Trim Group Assembly)	41376802
	A-9	Accessories, Miscellaneous Items (Not Illustrated)	

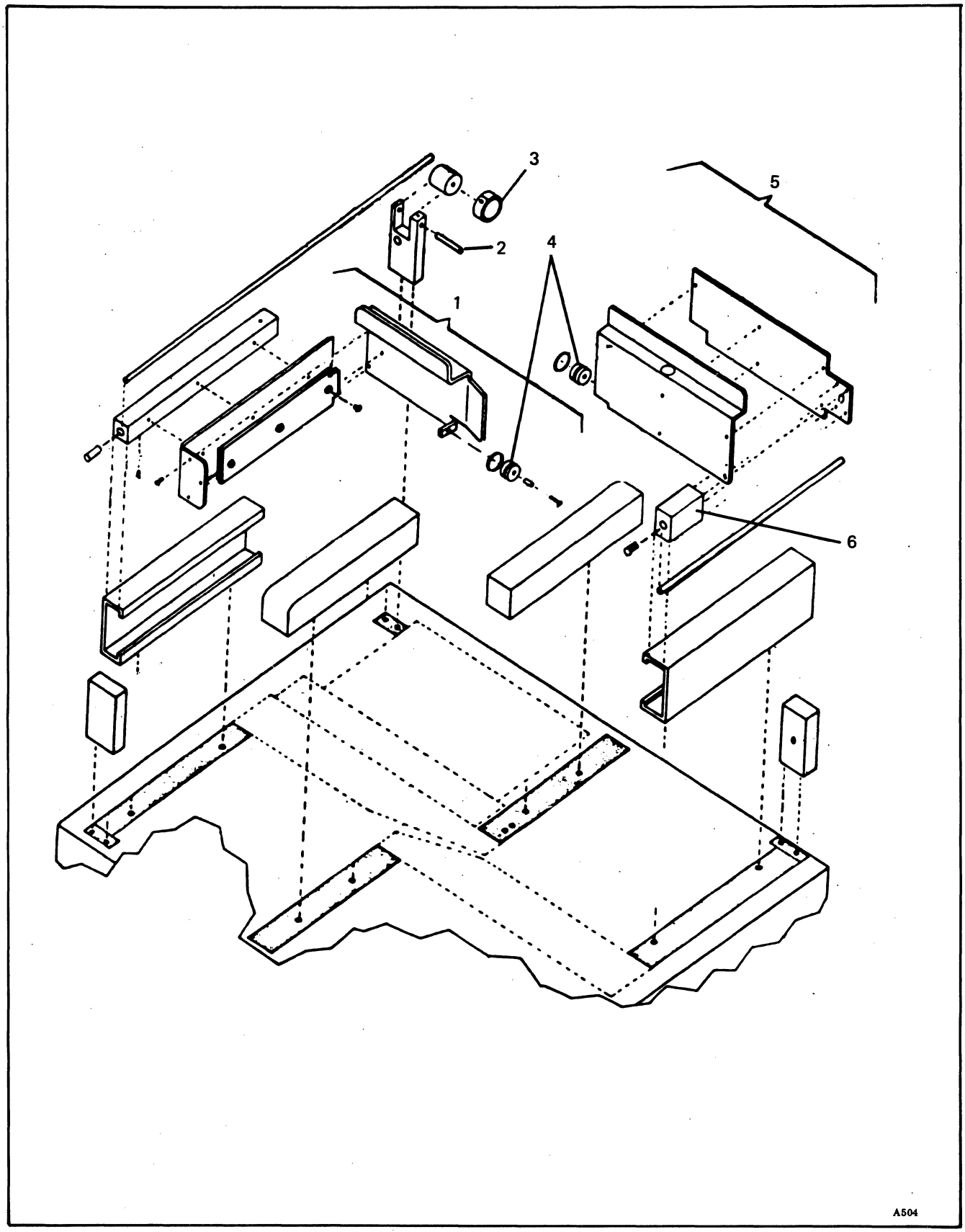


Figure A-2. Main Frame Assembly (Sheet 1 of 2) (Top View)

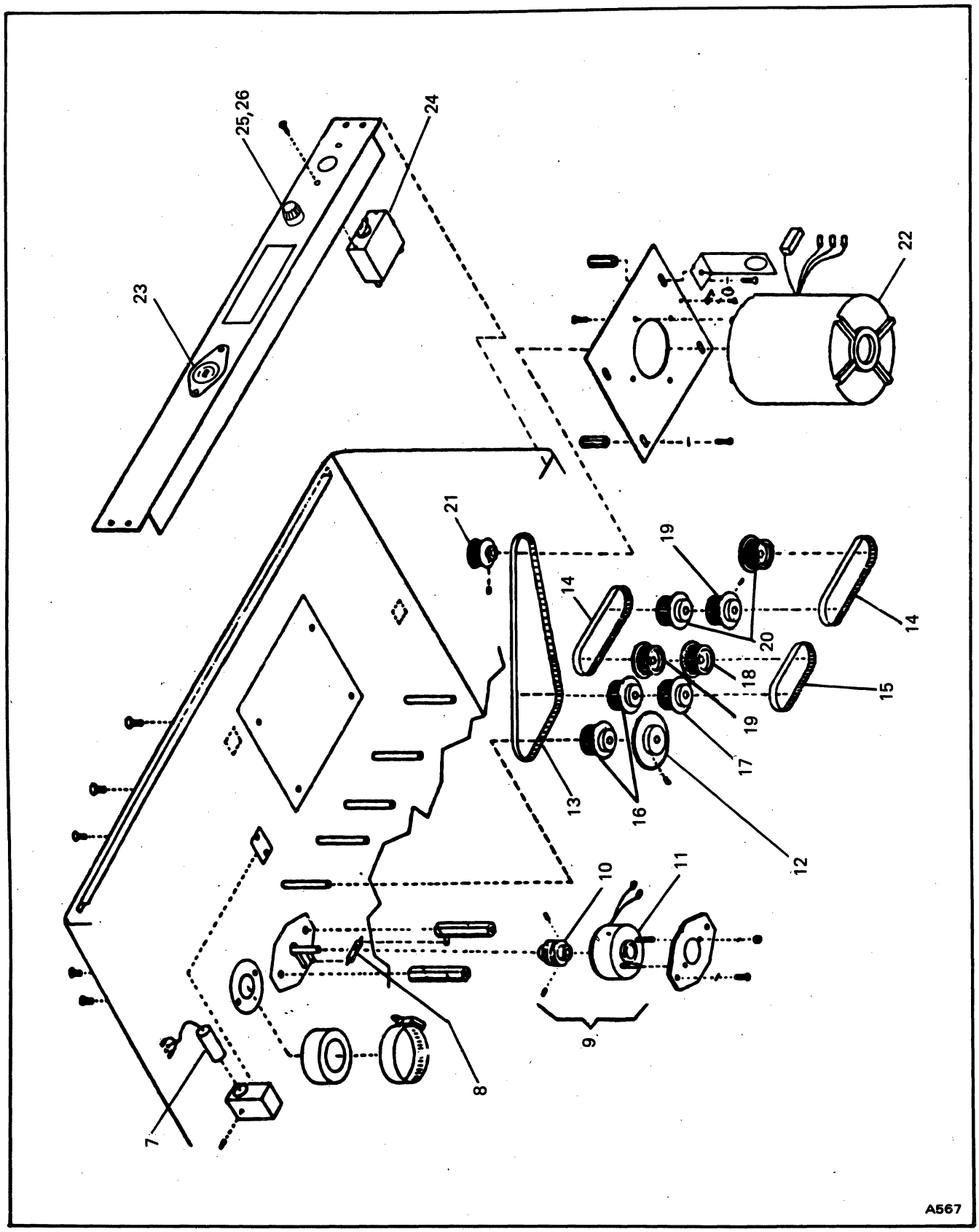


Figure A-2. Main Frame Assembly (Sheet 2 of 2) (Bottom View)

Table A-2. Replacement Parts List, Main Frame Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-2/1	PLATE ASSEMBLY, Stack Bumper	40104301
A-2/2	SHAFT, Spring Drum	20047601
*A-2/3	SPRING, Negator, SS, .006" thick x 3/8" wide x 24" long	00000306
A-2/4	ROLLER, Card Follower	10011801
A-2/5	FOLLOWER ASSEMBLY	30104401
A-2/6	BUSHING, Ball, .3750 Wkg BR, .6250 o.d., .875 long	00000406
*A-2/7	PICKUP ASSEMBLY, Magnetic, RM/TRM	31333901
*A-2/8	SPRING, Ext, MW, 1/4 x 1 1/8, Rate 2.3 lb./in.	00000285
*A-2/9	SOLENOID ASSEMBLY	20022502
A-2/10	COUPLING, Solenoid	10010501
A-2/11	SOLENOID, Pick	20010601
*A-2/12	GEAR ASSEMBLY, Timing	20125801
*A-2/13	BELT, Timing, Nprn, 1/5" p x 16" x 1/4" wide	00000283
*A-4/14	BELT, Timing, Nprn, 1/5" p x 8" pl x 1/4" wide	00000281
*A-2/15	BELT, Timing, Nprn, 1/5" p x 7" pl x 1/4" wide	00000280
A-2/16	PULLEY, Timing (100V/115V, 50/60 Hz)	20127004
	PULLEY, Timing (230V, 50 Hz)	20127003
A-2/17	PULLEY, T-Belt, Nylon, 14 grv, 1/4 br, 1/4 lg, ss, SF	00000273
A-2/18	PULLEY, T-Belt, Nylon, 15 grv, 1/4 br, 1/4 lg, ss, SF	00000274
A-2/19	PULLEY	20080401
A-2/20	PULLEY, T-Belt, Nylon, 16 grv, 1/4 br, 1/4 lg, ss, SF	00000275
(Note 1)	DRIVE MOTOR ASSEMBLY; consists of:	413860XX
A-2/21	PULLEY, Timing (60 Hz)	20127008
	PULLEY, Timing (50 Hz)	20127006
*A-2/22	MOTOR, 1500/1800 rpm, UL (115/230V, 50/60 Hz)	10270402
	DRIVE MOTOR, (100V, 50/60 Hz)	10939701
A-2/23	CONNECTOR, Electric, Male, 15A (110/115V, 50/60 Hz)	00001719
	FILTER ASSEMBLY, 230V (230V/50 Hz)	20102614
*A-2/24	CIRCUIT BREAKER, 12.5A, 250V, IP, Slo-Trip (100V, 50/60 Hz)	00002055
	CIRCUIT BREAKER, 8.0A, 250V, IP, Slo-Trip (115V, 50/60 Hz)	00000188
	CIRCUIT BREAKER, 6.0A, 250V, IP, Slo-Trip (230V, 50 Hz)	00000185
A-2/25	FUSEHOLDER, 3AG, Panel Mount, Shock Safe	00005859
*A-2/26	FUSE, 1.5A, Slo-Blo, 3 AG (100V, 50/60 Hz)	00000874
	FUSE, 1-0A, Slo-Blo, 3 AG (115/230V, 50/60 Hz)	00000147

Note:
1. See Table A-1 for assembly part numbers.

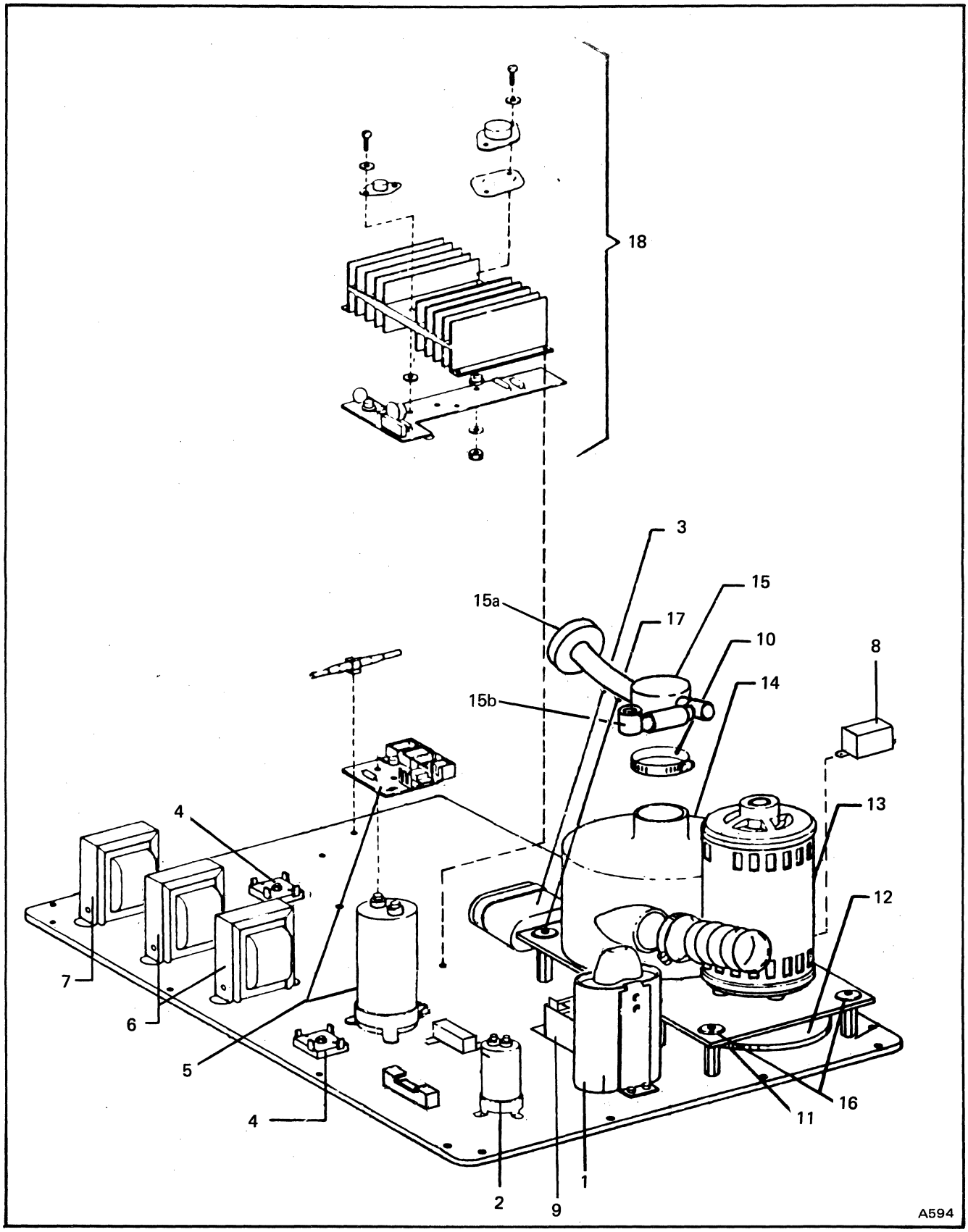


Figure A-3. Base Plate Assembly

Table A-3. Replacement Parts List, Base Plate Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-3/1	CAPACITOR, Paper/Oil, 17.5μF, 370 Vac (115V, 50/60 Hz)	00002049
	CAPACITOR, Paper/Oil, 10.0μF, 370 Vac (230V, 50 Hz)	00002051
	CAPACITOR, Paper/Oil, 25.0μF, 370 Vac (100V, 50/60 Hz)	00002052
A-3/2	CAPACITOR, Al, Elec., 4,600μF, −10+100%, 15 Vdcw	00000200
A-3/3	CAPACITOR, Paper/Oil, 6.0, 370 Vac (115V, 60 Hz)	00001743
	CAPACITOR, Paper/Oil, 8.0, 370 Vac (100V, 60 Hz)	00002510
	CAPACITOR, Paper/Oil, 10.0 370 Vac (All 50 Hz)	00002051
*A-3/4	DIODE BRIDGE, 70 Vrms, 12A	00000143
*A-3/5	P.C. ASSEMBLY, Solenoid Driver	30010002
A-3/6	TRANSFORMER ASSEMBLY, 48V (115V, 50/60 Hz	30030307
	TRANSFORMER ASSEMBLY, 48V (230V, 50 Hz)	30074106
	TRANSFORMER ASSEMBLY, 48V (100V, 50/60 Hz)	30030308
A-3/7	TRANSFORMER ASSEMBLY, 12V (115V, 50/60 Hz)	20015609
	TRANSFORMER ASSEMBLY, 12V (230V, 50 Hz)	20073908
	TRANSFORMER ASSEMBLY, 12V (100V, 50/60 Hz)	20015611
(Note 1)	TRANSFORMER, 12V-4A/24V-2A, 50/60 Hz	00000134
(Note 2)	TRANSFORMER, 100V, 50/60 Hz	00000956
A-3/8	FILTER ASSEMBLY (100/115V, 50/60 Hz)	30075605
*A-3/9	RELAY ASSEMBLY, Solid State, UL Apvd. (115V, 60 Hz)	20201001
	RELAY, Solid State, 10A (100V, 50/60 Hz; (115/230V, 50 Hz)	10255301
(Note 3)	VACUUM PUMP ASSEMBLY; consists of:	413352XX
A-3/10	CLAMP, Hose, Screw Adj, ss, 161/16"-2"	00000407
*A-3/11	BELT, Drive, 0.5" wide, outside length 21.46" (60 Hz)	10887405
	BELT, Drive, 0.5" wide, outside length 22.83" (50 Hz)	10887406
A-3/12	PULLEY (60 Hz)	21738101
	PULLEY (50 Hz)	21738102
*A-3/13	MOTOR, Blower, 115V/60 Hz, UL (115V/60 Hz)	10278101
	MOTOR, Blower, 208V/60 Hz, 220V/50 Hz, UL (230V/50 Hz)	10278105
	MOTOR, Blower, 115V-50/60 Hz, UL (100V, 50/60 Hz)	10278102
	MOTOR, 115 Vac, 50/60 Hz, 2850/3350 rpm (115V, 50 Hz)	10095404
*A-3/14	BLOWER, 3-Stage	30055913
A-3/15	ADAPTER ASSEMBLY, Vacuum	20064715
A-3/15a	AIR SILENCER ASSEMBLY	20258404
A-3/15b	ELBOW ASSEMBLY, Vacuum	20522401
A-3/16	MOUNT, Shock, Rbr Elem, 1 in dia w/stl plate	00000291
A-3/17	MOUNT, Shock, Rbr Elem, 1 in dia w/stl plate	00000505
*A-3/18	POWER SUPPLY ASSEMBLY, 5V	30029517

Notes:
1. Transformer only for Items 6 & 7 (115/230V, 50/60 Hz)
2. Transformer only for Items 6 & 7 (100V, 50/60 Hz)
3. See Table A-1 for assembly part numbers.

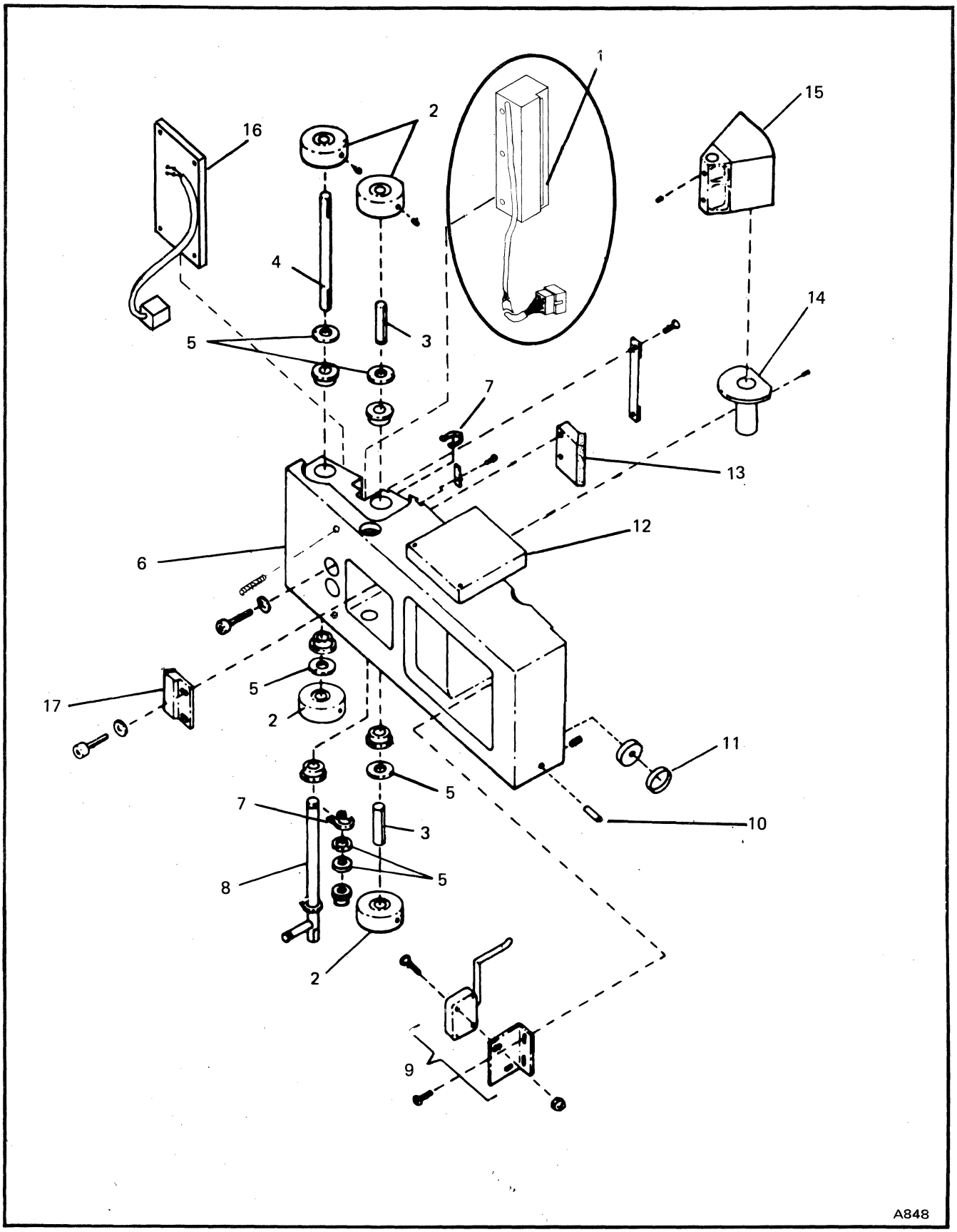


Figure A-4. Pick Support Assembly

Table A-4. Replacement Parts List, Pick Support Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-4/1	READ STATION ASSEMBLY, Single Piece	20422501
A-4/2	CAPSTAN, Drive	20005901
A-4/3	SHAFT ASSEMBLY, Drive Roller (Incl. Bearings)	00001514
A-4/4	SHAFT ASSEMBLY, Stack Drive (Incl. Bearings)	00001513
A-4/5	SPACER, Shaft, 0.004 in. thick	00000431
	SPACER, Shaft, 0.006 in. thick	00000432
	SPACER, Shaft, 0.016 in. thick	00000433
A-4/6	SUPPORT, Pick	40001602
A-4/7	RING, Retaining, External, 1/4 in.	00000467
A-4/8	SHAFT ASSEMBLY, Pick (Incl. Bearings)	00002513
A-4/9	SWITCH ASSEMBLY, Hopper Empty	20027701
A-4/10	SHAFT, Spring Drum	21102703
A-4/11	SPRING, Negator, SS, .006 in. thick, 3/8 in. wide, 24 in. long	00000306
A-4/12	CAP ASSEMBLY, Riffle Air	30023303
A-4/13	BUMPER ASSEMBLY, Pick	10004701
A-4/14	TUBE, Pick Vacuum	20004801
A-4/15	SECTOR ASSEMBLY	30003702
A-4/16	STACKER LED ASSEMBLY	20094701
A-4/17	STOP ASSEMBLY, Pick	10004101

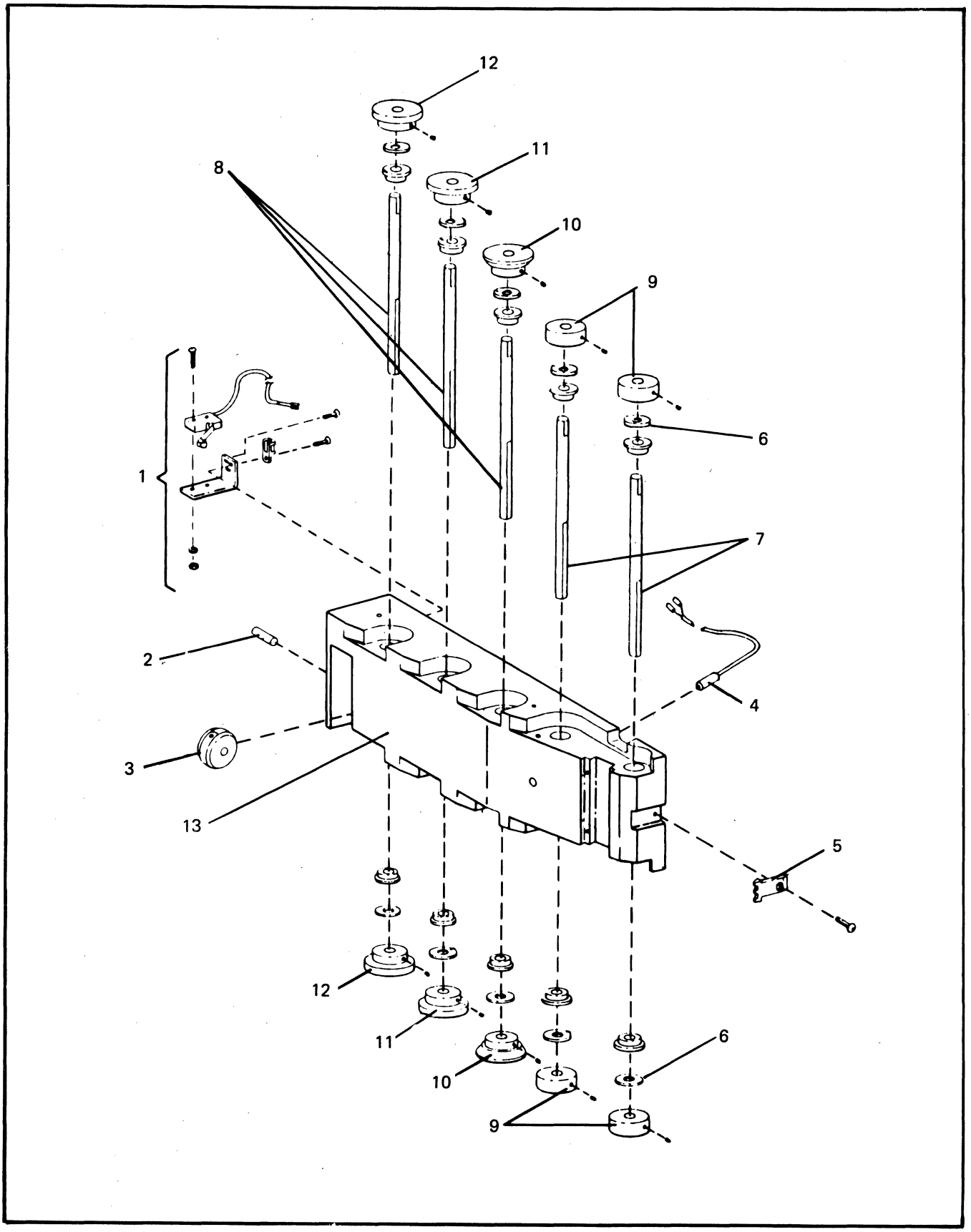


Figure A-5. Stack Support Assembly

Table A-5. Replacement Parts List, Stack Support Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-5/1	SWITCH ASSEMBLY, Stacker Full	20021101
A-5/2	SHAFT, Spring Drum	10000701
A-5/3	SPRING, Negator, SS, .005 in. thick, 3/8 in. wide, 17 in. long	00000409
A-5/4	PHOTOCELL ASSEMBLY, Stack	20038201
A-5/5	THROAT, Pick	10076401
A-5/6	SPACER, Shaft, 0.004 in. thick	00000431
	SPACER, Shaft, 0.006 in. thick	00000432
	SPACER, Shaft, 0.016 in. thick	00000433
A-5/7	SHAFT ASSEMBLY, Drive Roller (Incl. Bearings)	00000871
A-5/8	SHAFT ASSEMBLY, Stack Driver Roller (Incl. Bearings)	00000872
A-5/9	ROLLER, Drive	20002101
A-5/10	ROLLER, Stack Drive	20001506
A-5/11	ROLLER, Stack Drive	20001504
A-5/12	ROLLER, Stack Drive	20001504
A-5/13	SUPPORT, Stack	40483001

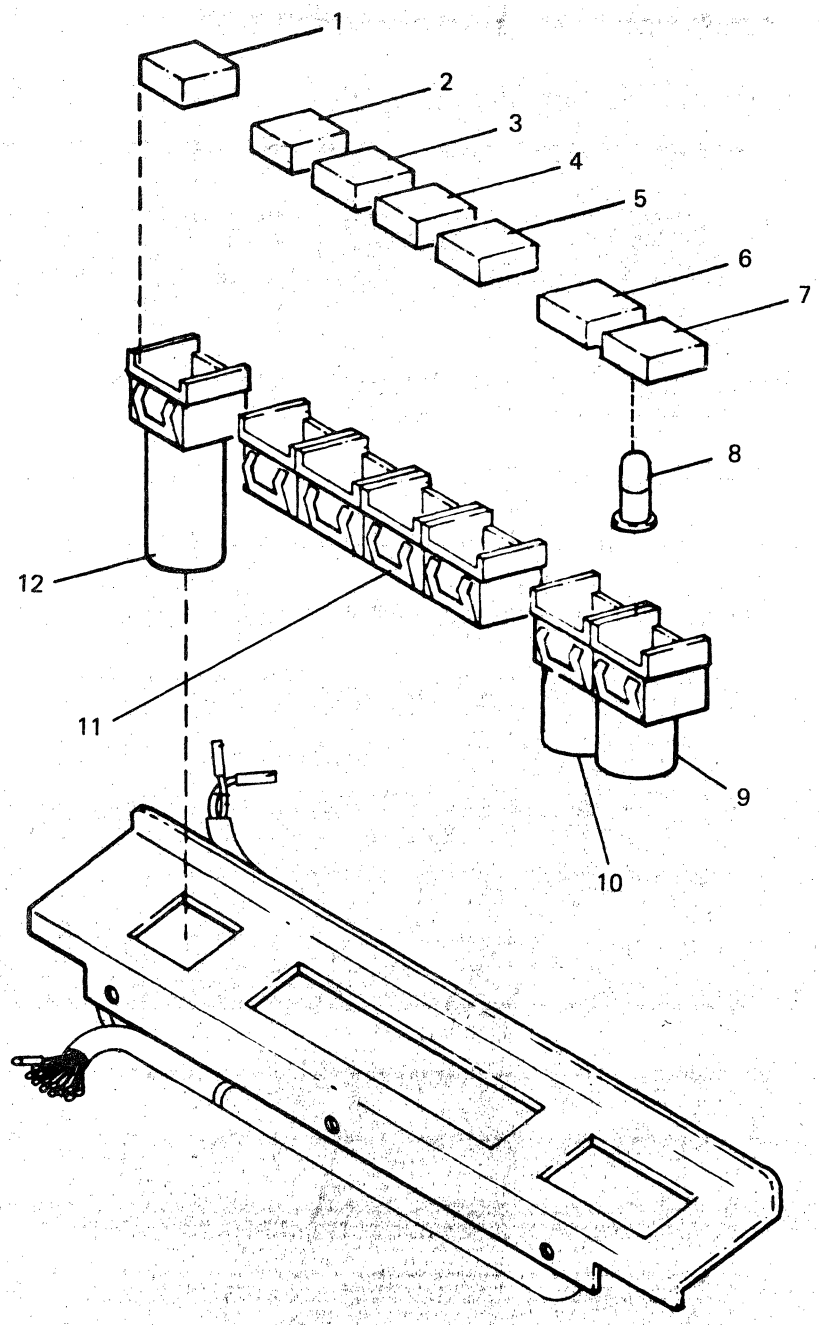


Figure A-6. Control Panel Assembly

Table A-6. Replacement Parts List, Control Panel Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-6/1	CAP, P.B., White, Engraved "POWER"	00000101
A-6/2	CAP, P.B., White, Amber Flt, Engrv "READ CHECK"	00000097
A-6/3	CAP, P.B., White, Amber Flt, Engrv "PICK CHECK"	00000094
A-6/4	CAP, P.B., White, Amber Flt, Engrv "STACK CHECK"	00000098
A-6/5	CAP, P.B., White, Amber Flt, Engrv "HOPPER CHECK"	00000099
A-6/6	CAP, P.B., White, Red Flt, Engrv "STOP"	00000102
A-6/7	CAP, P.B., White, Green Flt, Engrv "START"	00000105
A-6/8	LAMP, Incandescent, 6V., 0.2A, T-1 3/4, Type 381	00000318
A-6/9	SWITCH, SPDT, Momentary Snap Action	00000320
A-6/10	SWITCH, SPST, N.O. Momentary Non-snap Action	00000321
A-6/11	INDICATOR BASE ASSEMBLY	00000106
A-6/12	SWITCH, SPDT, Alternate Action	00000319

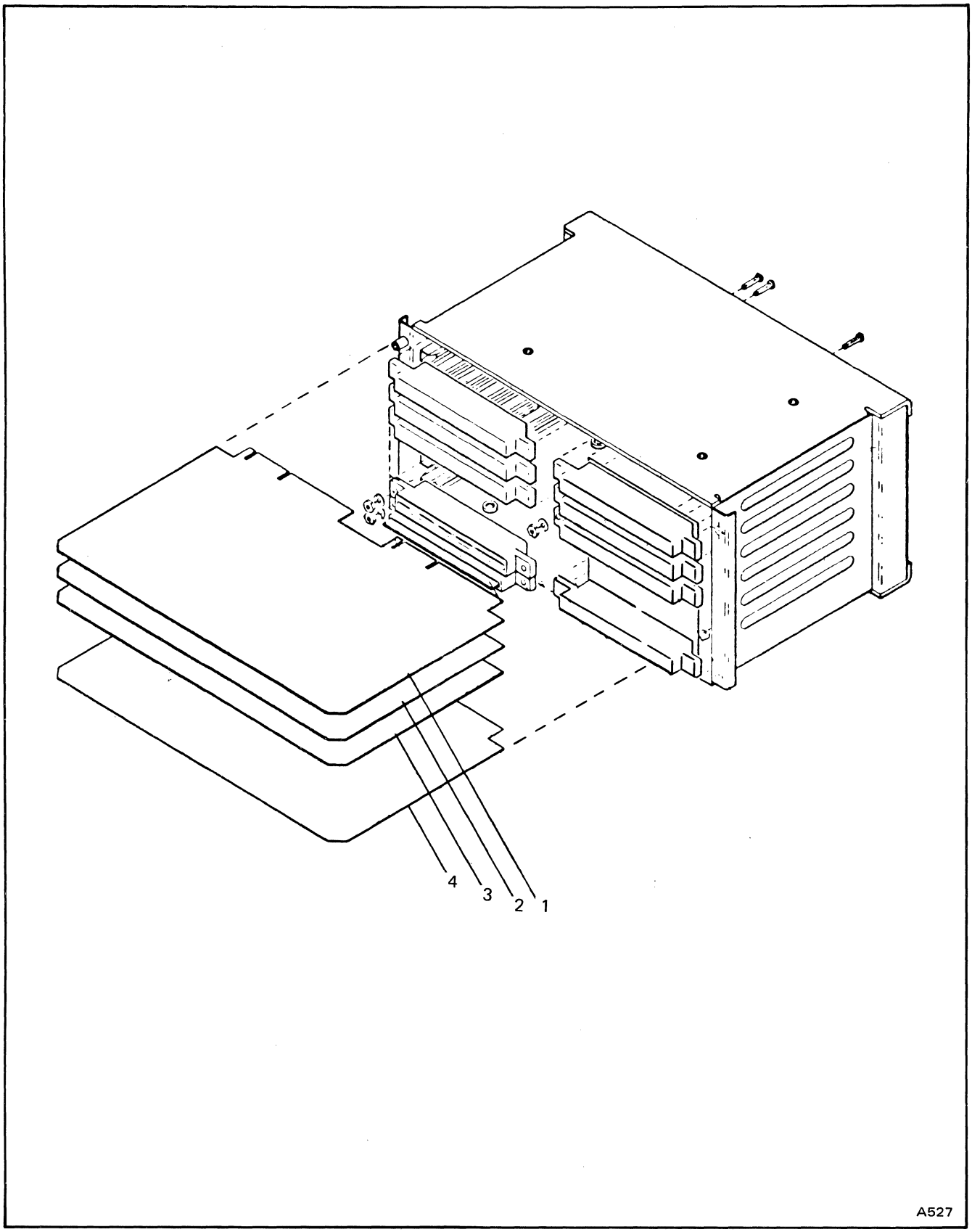


Figure A-7. Card File Assembly

Table A-7. Replacement Parts List, Card File Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-7/1	P.C. ASSEMBLY, Timing Card, GTRP	31322907
	P.C. ASSEMBLY, Timing Card, PTRP	31322908
A-7/2	P.C. ASSEMBLY, Fault Card, GTRP	31016908
	P.C. ASSEMBLY, Fault Card, PTRP	31016909
A-7/3	P.C. ASSEMBLY, Sequence Card, GTRP	31032209
	P.C. ASSEMBLY, Sequence Card, PTRP	31032210
A-7/4	P.C. ASSEMBLY, Transfer Card, GTRP	41331201
	P.C. ASSEMBLY, Transfer Card, PTRP	41331202

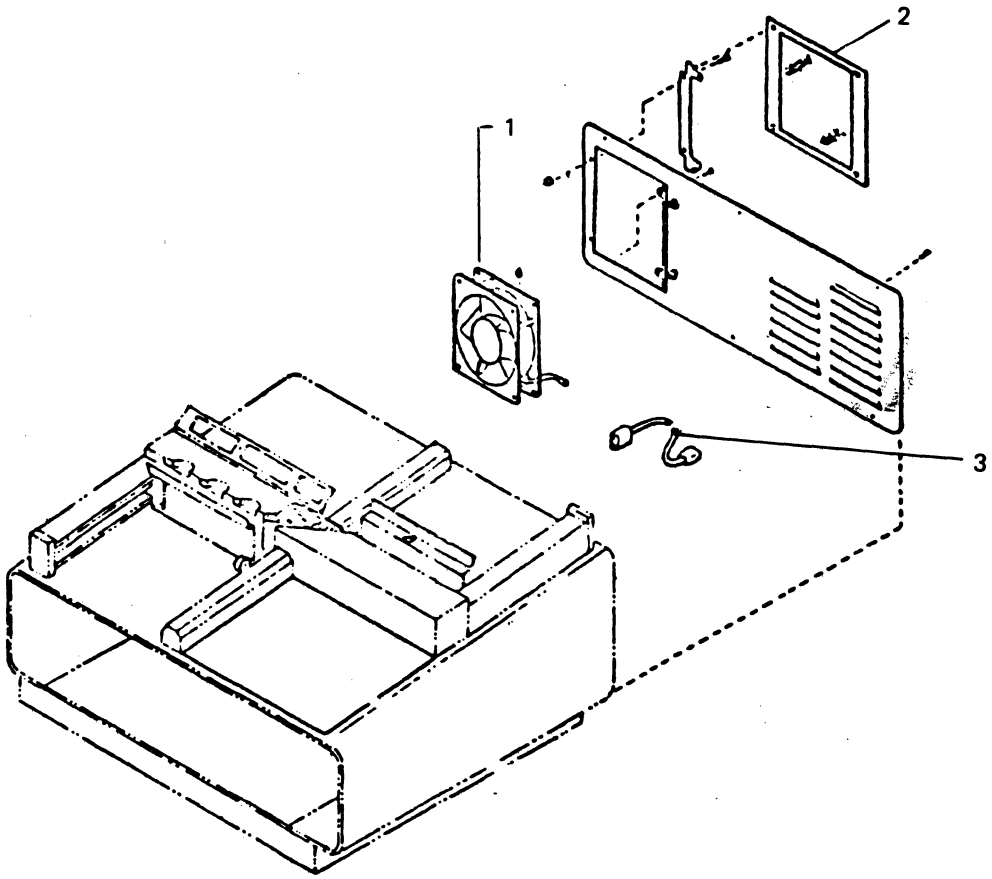


Figure A-8. Rear Panel Assembly

Table A-8. Replacement Parts List, Rear Panel Assembly

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
A-8/1	FAN ASSEMBLY, UL (100/115V, 50/60 Hz)	30212001
	FAN ASSEMBLY, UL (230V, 50 Hz)	30212002
A-8/2	CORD ASSEMBLY, Power (100/115V, 50/60 Hz)	20014801
	CORD ASSEMBLY, Power (230V, 50 Hz)	00000456
A-8/3	GUARD ASSEMBLY, Fan	30269001

Table A-9. Recommended Accessories, Miscellaneous Items (Not Illustrated)

FIG. & ITEM NO.	DESCRIPTION	PART NUMBER
	CLAMP, Hose, Screw Adj., 7/32 in. to 1 in.	00004764
	CLAMP, Hose, Screw Adj., 1-1/16 in. to 2 in.	00000407
	COMPOUND, Adhesive, 910	00000573
	COMPOUND, Loctite, Grade C	00000557
	CONNECTOR, 38 Contact, Receptacle, Output	00000028
	CONNECTOR HOUSING, Edge, 18 Position Single Row	00003524
	CONNECTOR HOUSING, Edge, 36 Position, Double Row	00003523
	CONNECTOR HOUSING, Skirt, 15 Position, 5 x 3	00003059
	CONTACT, Connector .062 in. Mina Skt	00003450
	CONTACT, Connector, Crimp	00000038
	CONTACT, Fork, 20-24 ga.	00000037
	CONTACT, Junction	00000510
	CONTACT, Leaf, 18-22 ga.	00000034
	CONTACT, Leaf, 22-26 ga.	00000036
	HARDWARE KIT	00001178
	HOSE, Plastic 1-3/4 in., 4 ft. long	00000471
	LUBRICANT No. 2	00000508
	MATING CONNECTOR KIT, 38 Pins	10139401
	P.C. BOARD ASSEMBLY, Extender Card	30099501
	TECHNICAL MANUAL, RM1000L	00006490
	TIE CABLE, Nylon, 4 in.	00000058
	TOOL KIT – Consists of:	00002301
	AMP Extractor	
	Contact Extractor, Leaf	
	Contact Insert/Extract Tool	
	Elco Extractor	
	Retaining Ring Remover	
	Mod. Fork Contact Extractor	
	Mod. IV Contact Extractor	
	Gauge, Card	
	Gauge, Punch	
	Hex Driver Set (English)	
	Hex Driver Set (Metric)	
	TUBING, Plastic, 3/4"OD x 1/2"ID, 2 ft. long	00000417

APPENDIX B
ASSEMBLY AND SCHEMATIC DIAGRAMS

NOTES:

1. REFER TO CARD CAGE WIRING DIAGRAM.
2. LOCATED ON CONTROL PANEL.
3. LOCATED ON SUBFRAME PANEL.
4. UNLESS OTHERWISE SPECIFIED ALL WIRE IS 18AWG.
5. ALTERNATE FILTER & RECEPTACLE WIRING FOR 230V/50HZ.

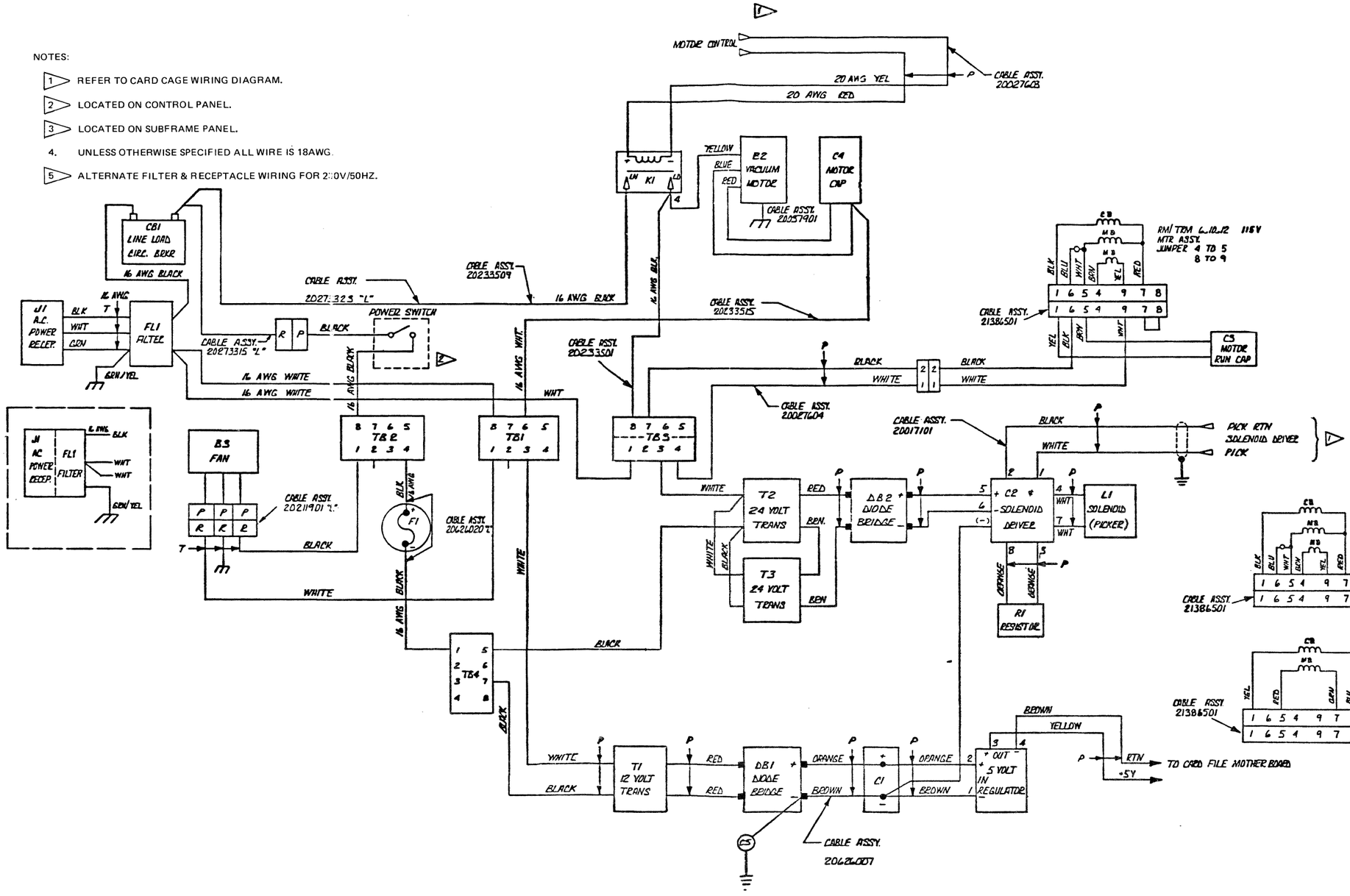


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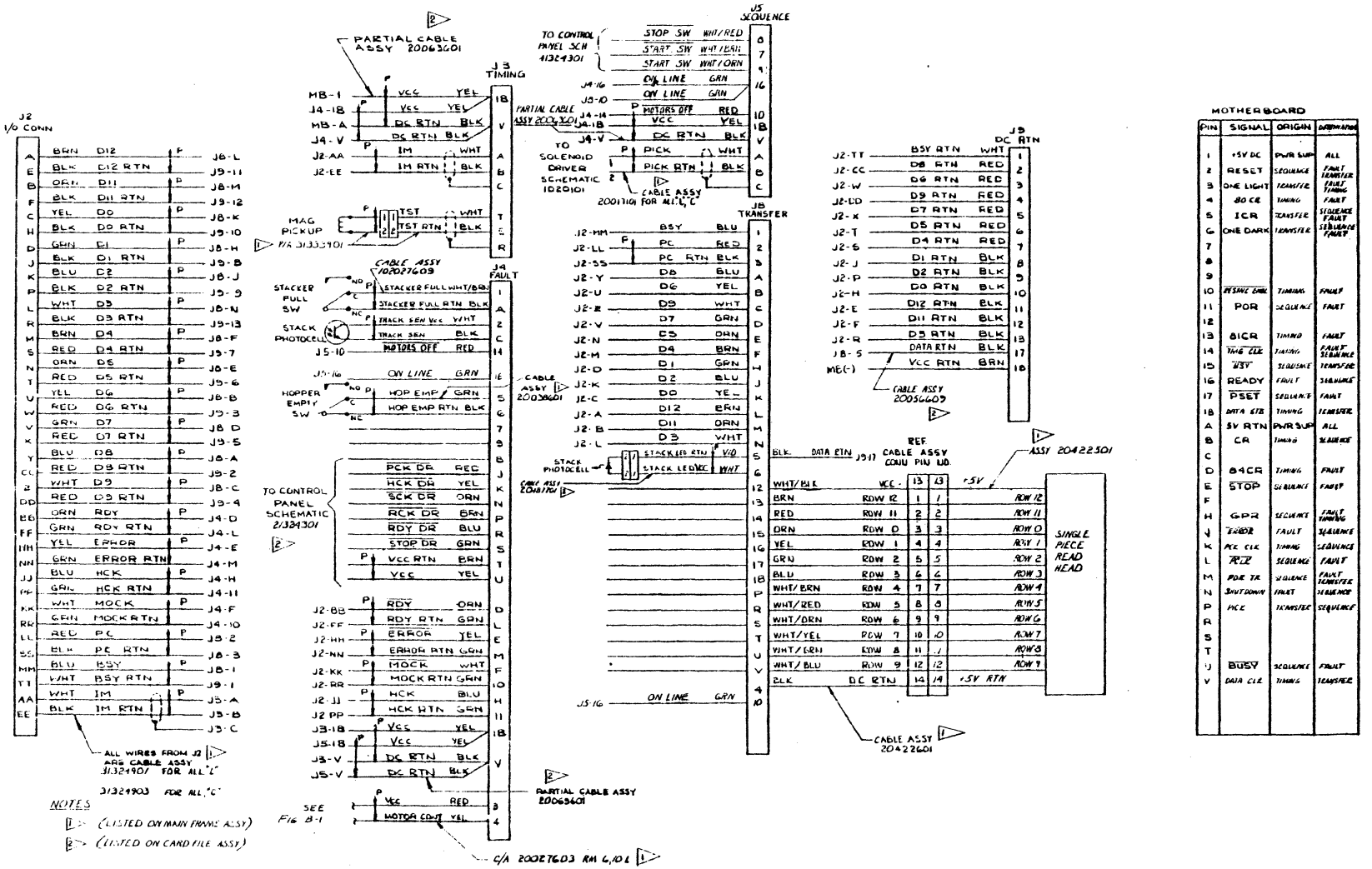
Figure B-1
Wiring Diagram, AC Power Distribution
(Dwg. No. 41336001)



79208(R1/6)

Figure B-2
Wiring Diagram, Card File
(Dwg. No. 41374301)

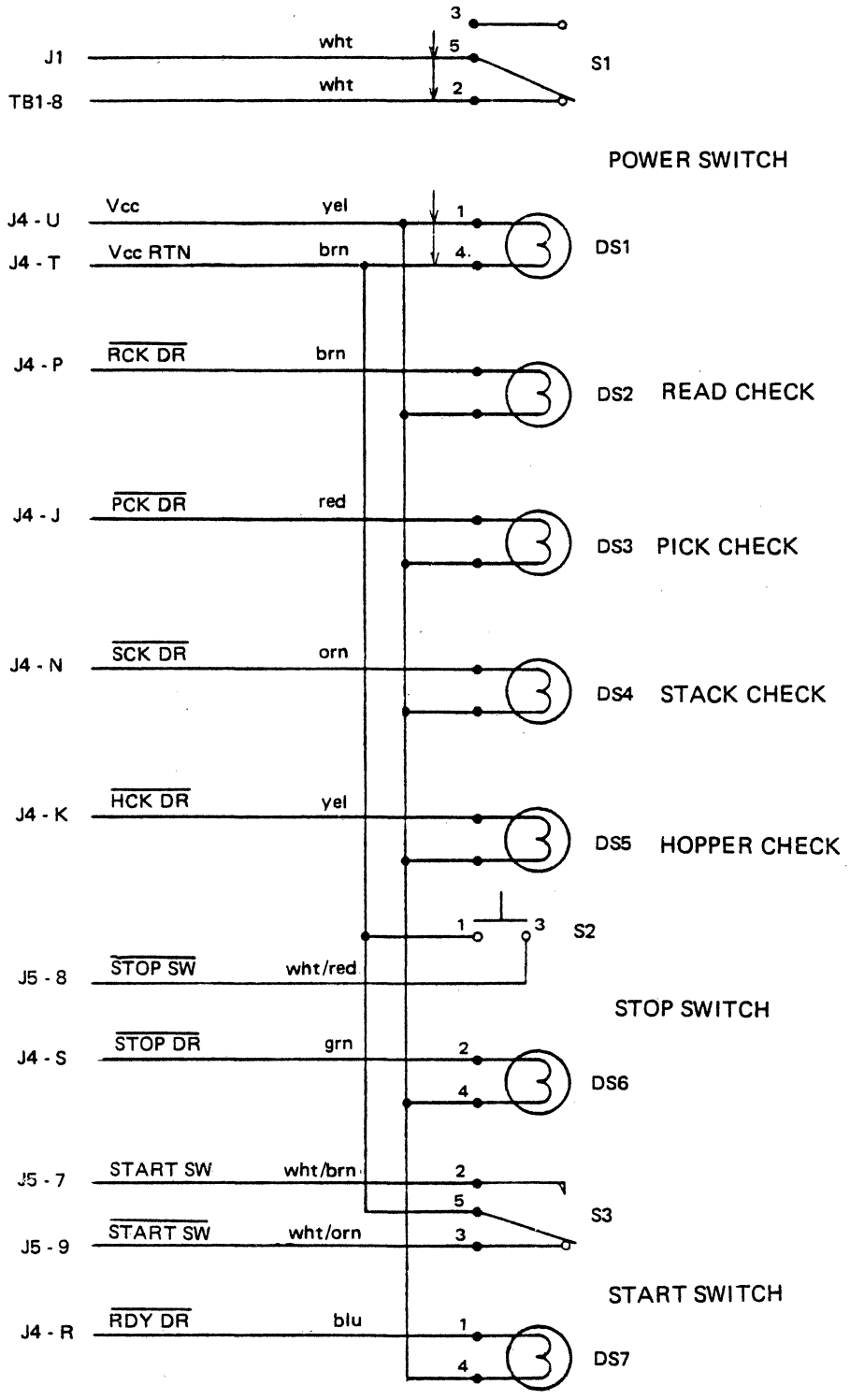


Figure B-3
Schematic Diagram, Control Panel
(Dwg. No. 21324301)

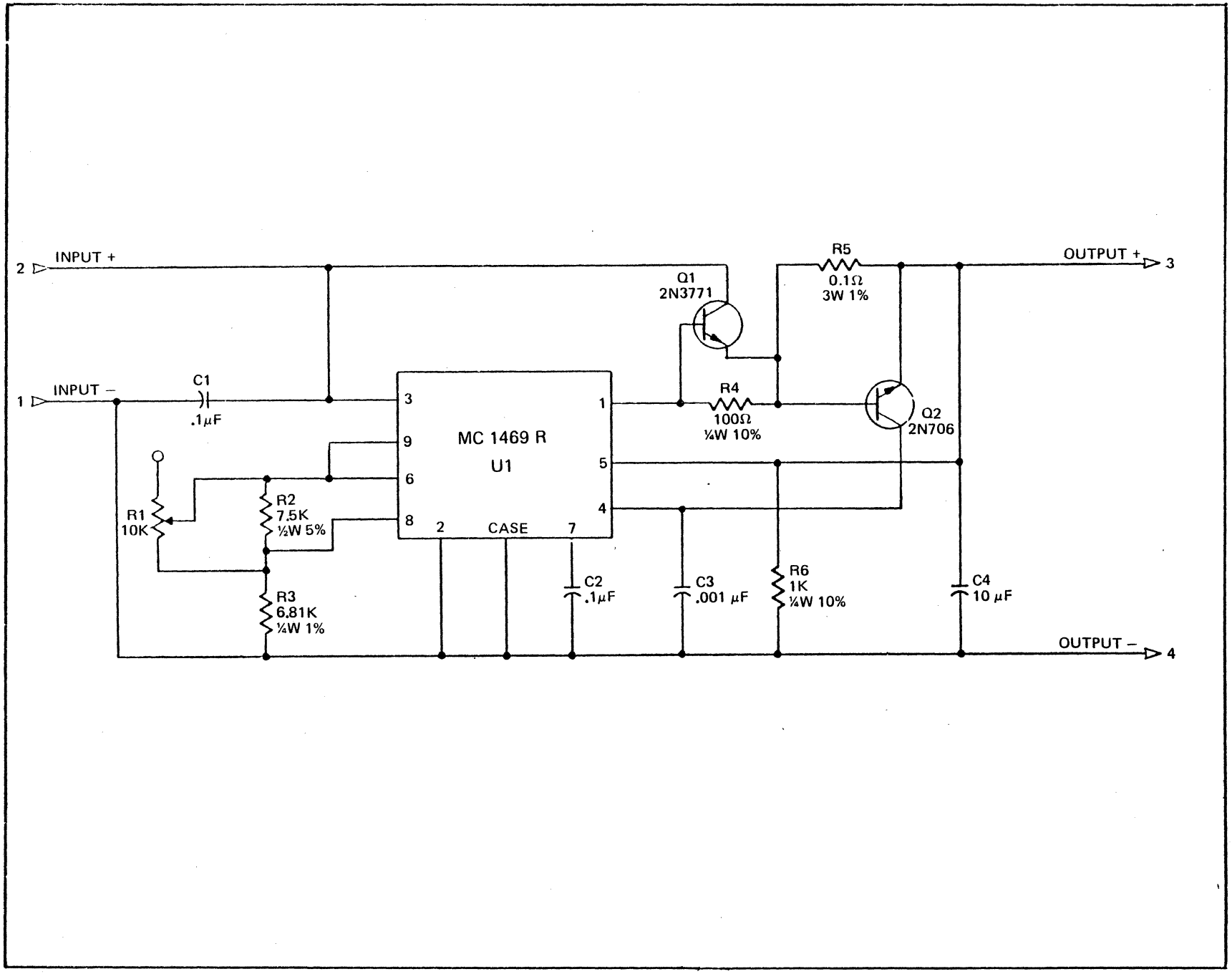


Figure B-4
Schematic Diagram, 5-Volt Regulator
(Dwg. No. 30107201)

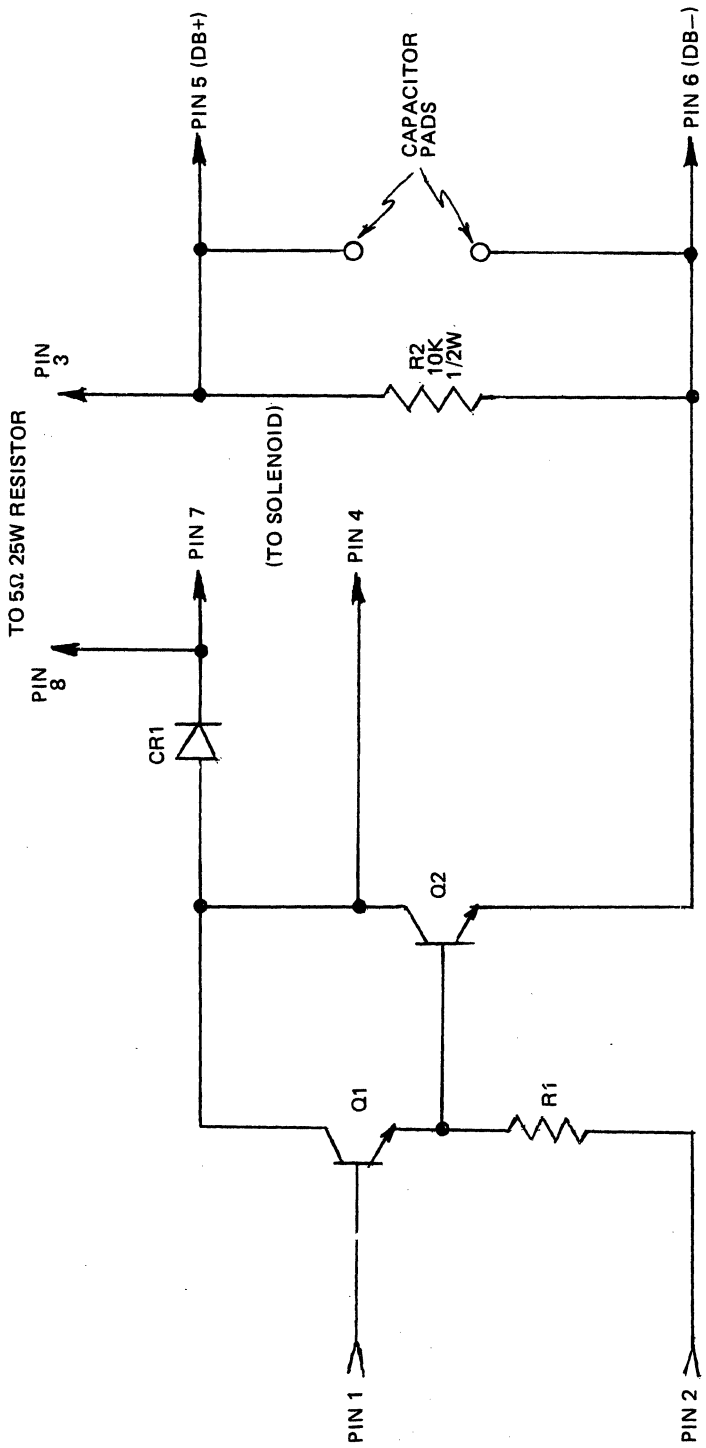


Figure B-5
Schematic Diagram, Solenoid Driver
(Dwg. No. 20010102)

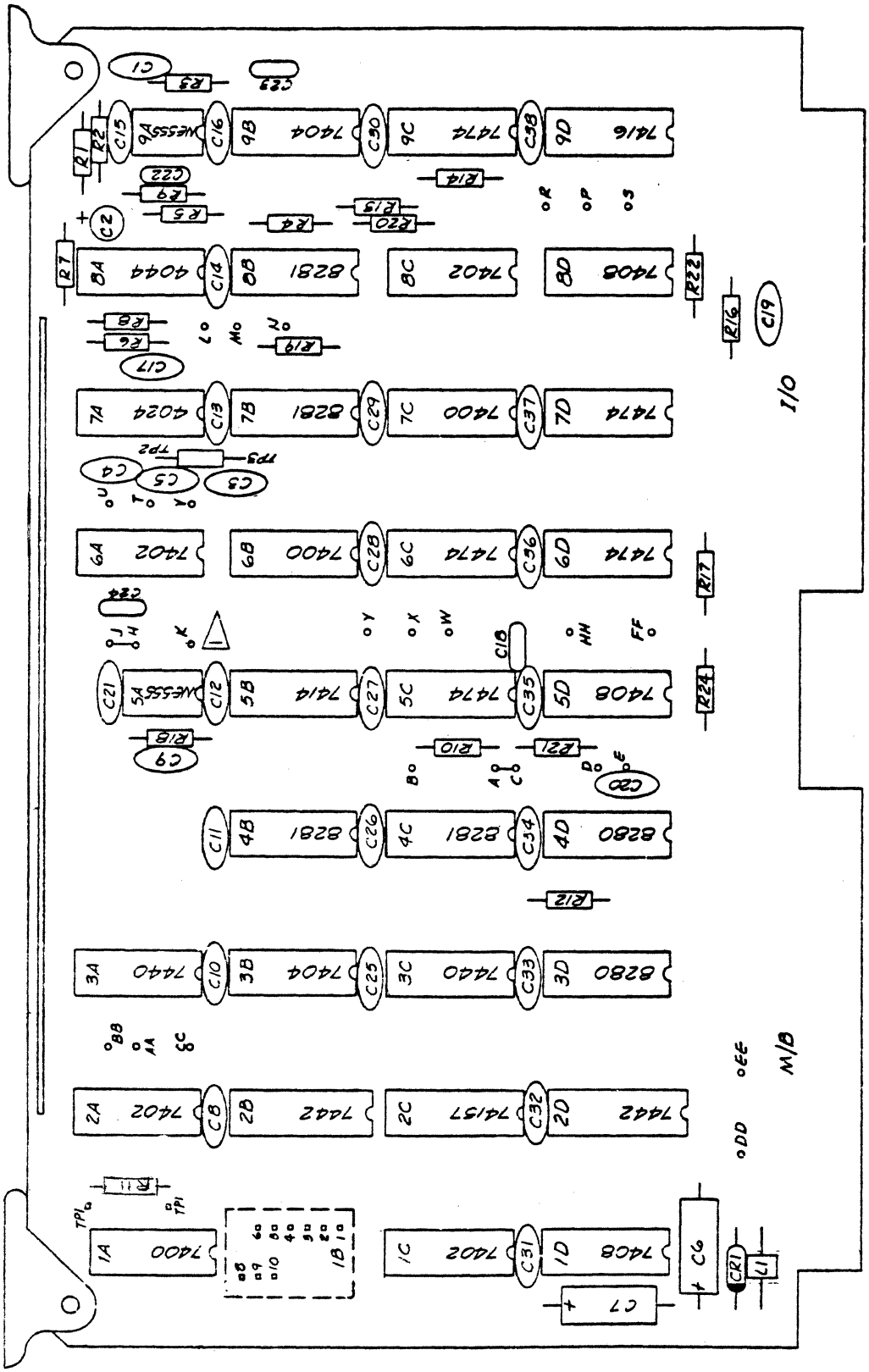
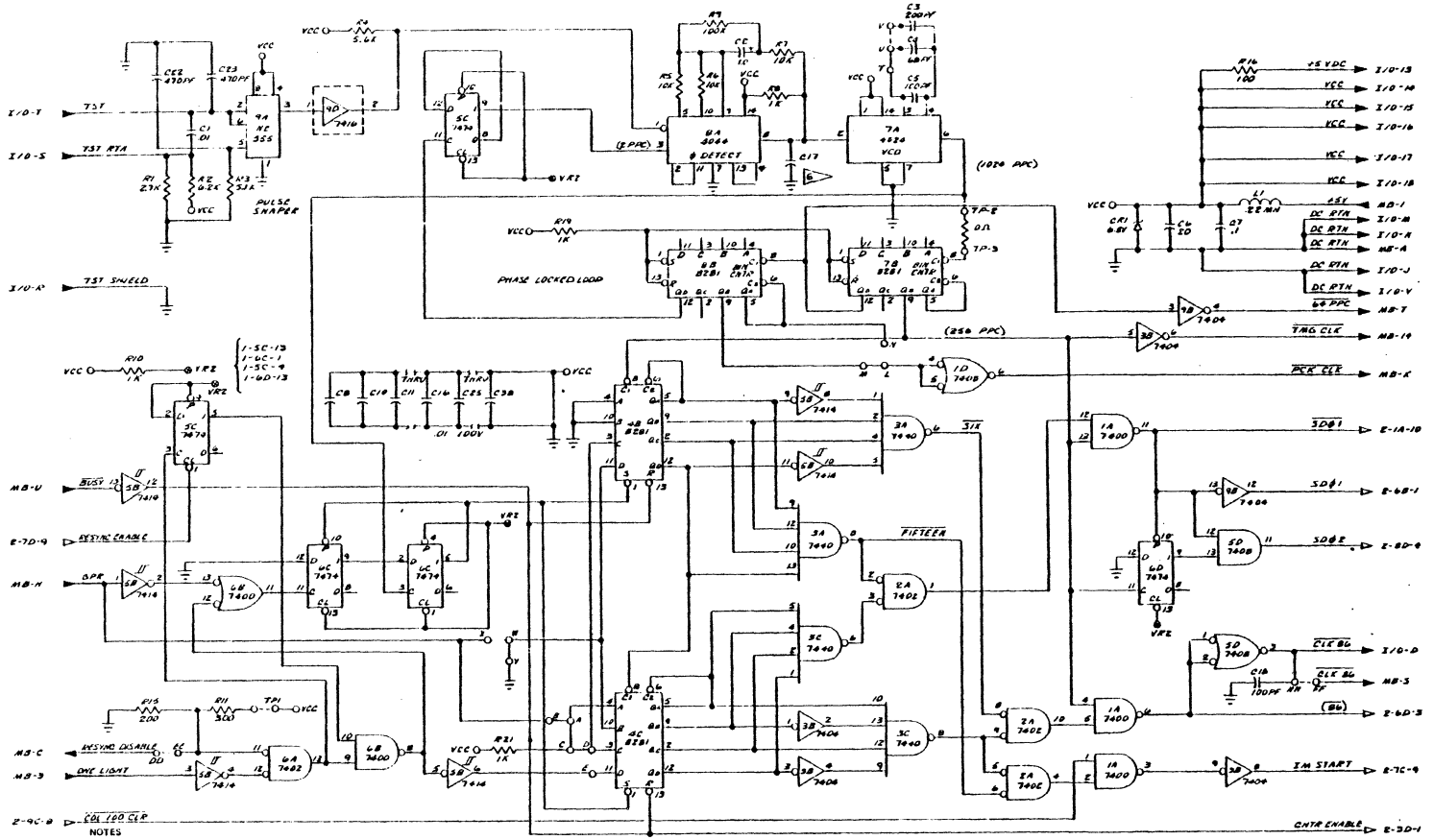


Figure B-6
Assembly Diagram, Timing Card
(Dwg. No. 313229XX)



NOTES

1. .01 µF DECOUPLING CAPS AT IC POSITIONS 2A, 3A, 1C, 4D, 4A, 6A, 9C, 9B
2. UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS, ±5%, 1/4W. CAPACITANCE VALUES ARE IN MICRO FARADS, 100V, ±20%.
3. IC 9C IMPLEMENTED ONLY FOR MOD VI
4. FOR POSITIVE TRUE INDEX MARKS USE N7417A AT POSITION 9D
5. INSTALL MOD VIII TO DISABLE RESYNC CIRCUITS
6. FOR RM 600, C17 = 3.3 µF; FOR RM 1000 AND RM 1200, C17 = 1.0 µF

Figure B-7
Schematic Diagram, Timing Card (Sheet 1 of 2)
(Dwg. No. 41331501)

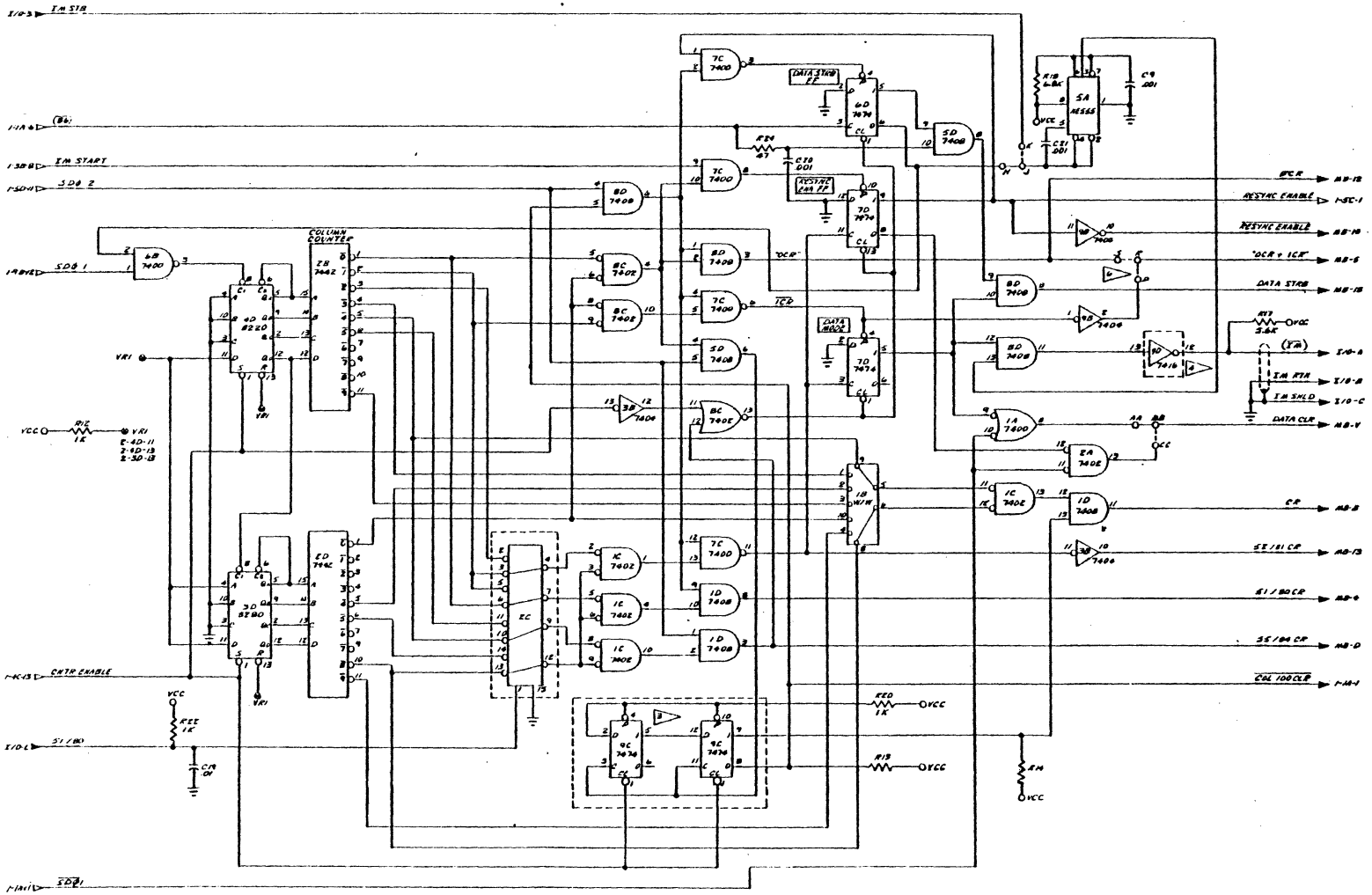


Figure B-7
Schematic Diagram, Timing Card (Sheet 2 of 2)
(Dwg. No. 41331501)

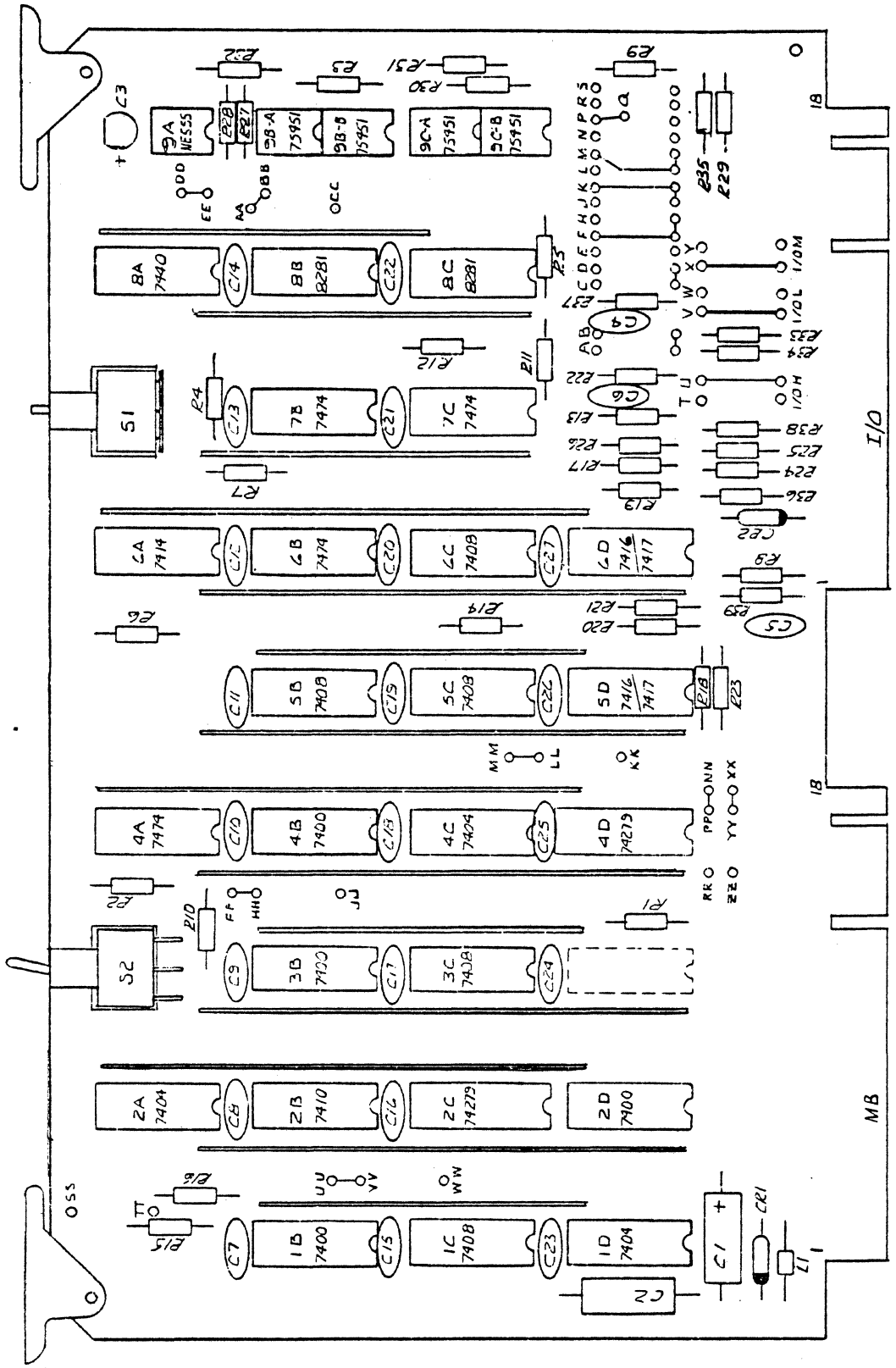


Figure B-8
Assembly Diagram, Fault Card
(Dwg. No. 310169XX)

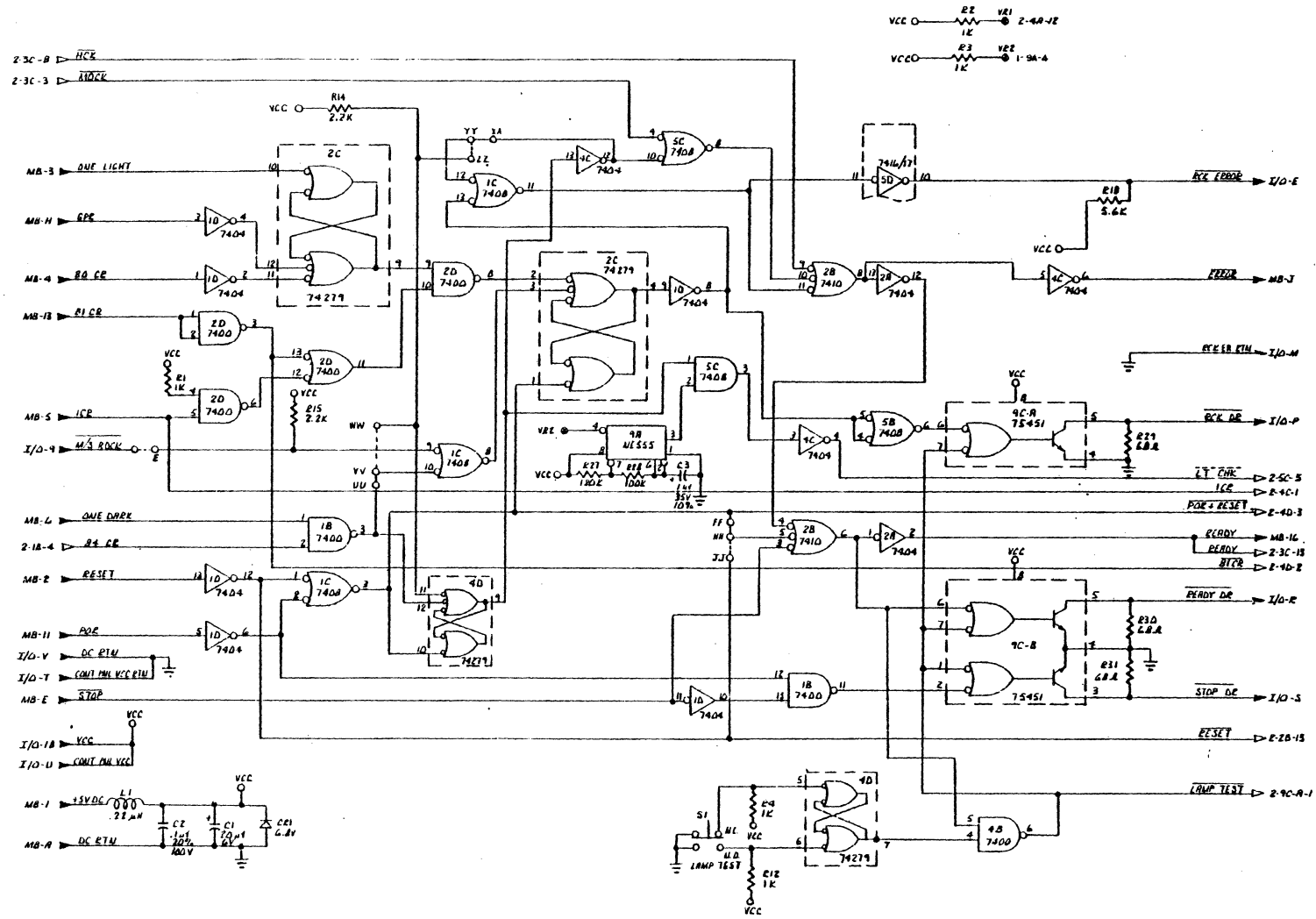
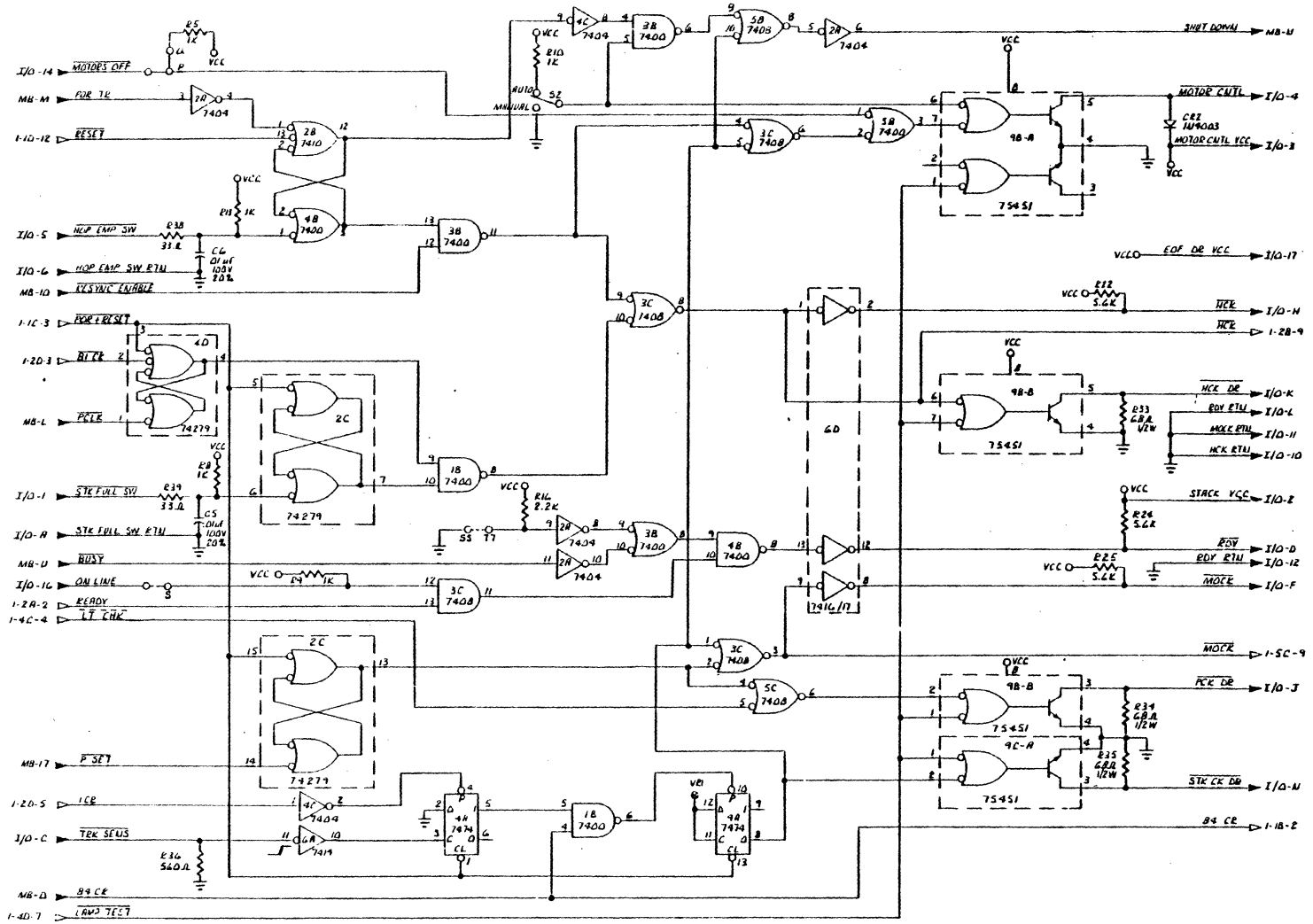


Figure B-9
Schematic Diagram, Fault Card (Sheet 1 of 2)
(Dwg. No. 41331701)



79208/RM6L

Figure E
Schematic Diagram, Fault Card (Sheet 2 of
(Dwg. No. 413317(

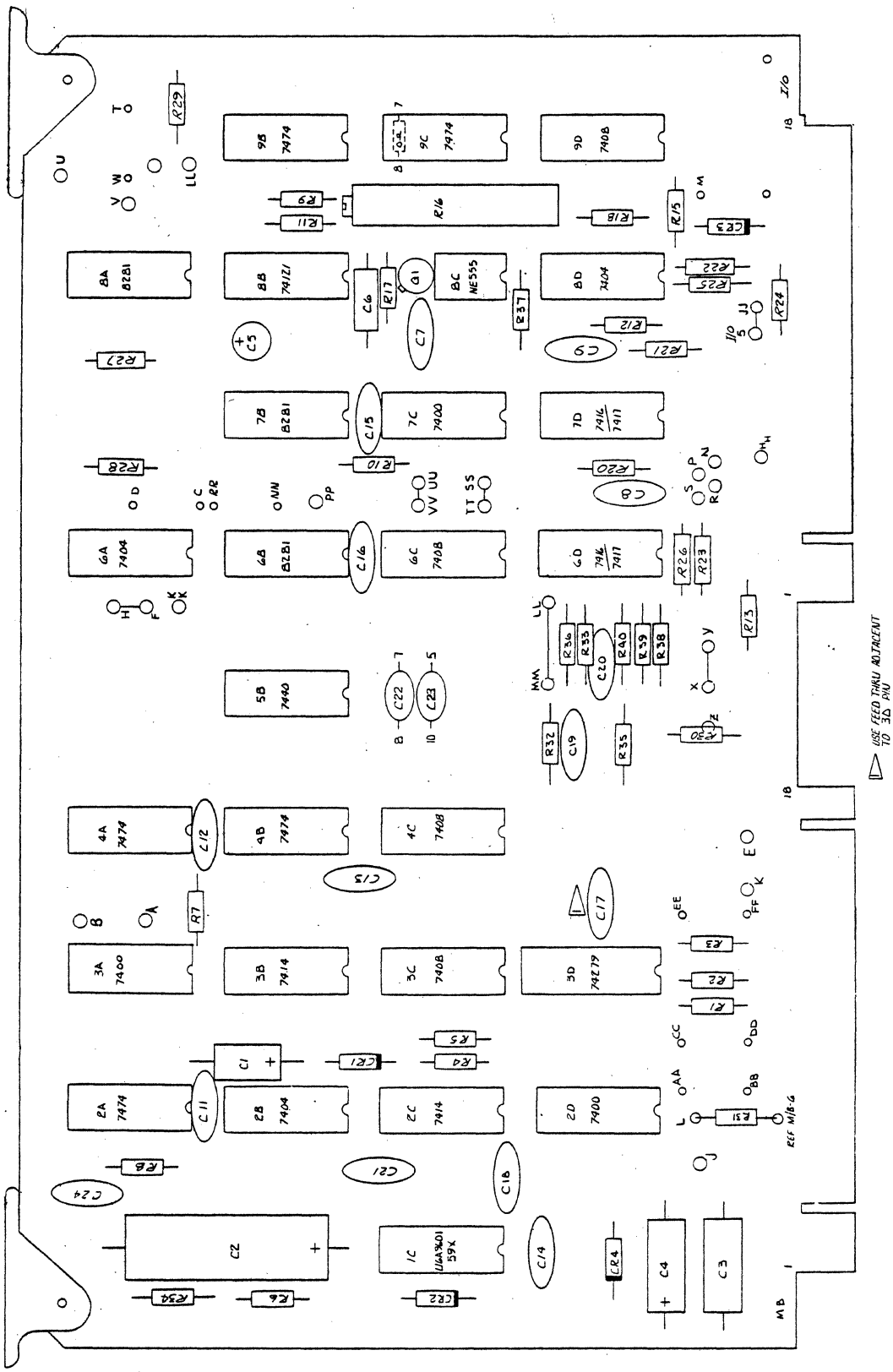


Figure B-10
Assembly Diagram, Sequence Card
(Dwg. No. 410322XX)

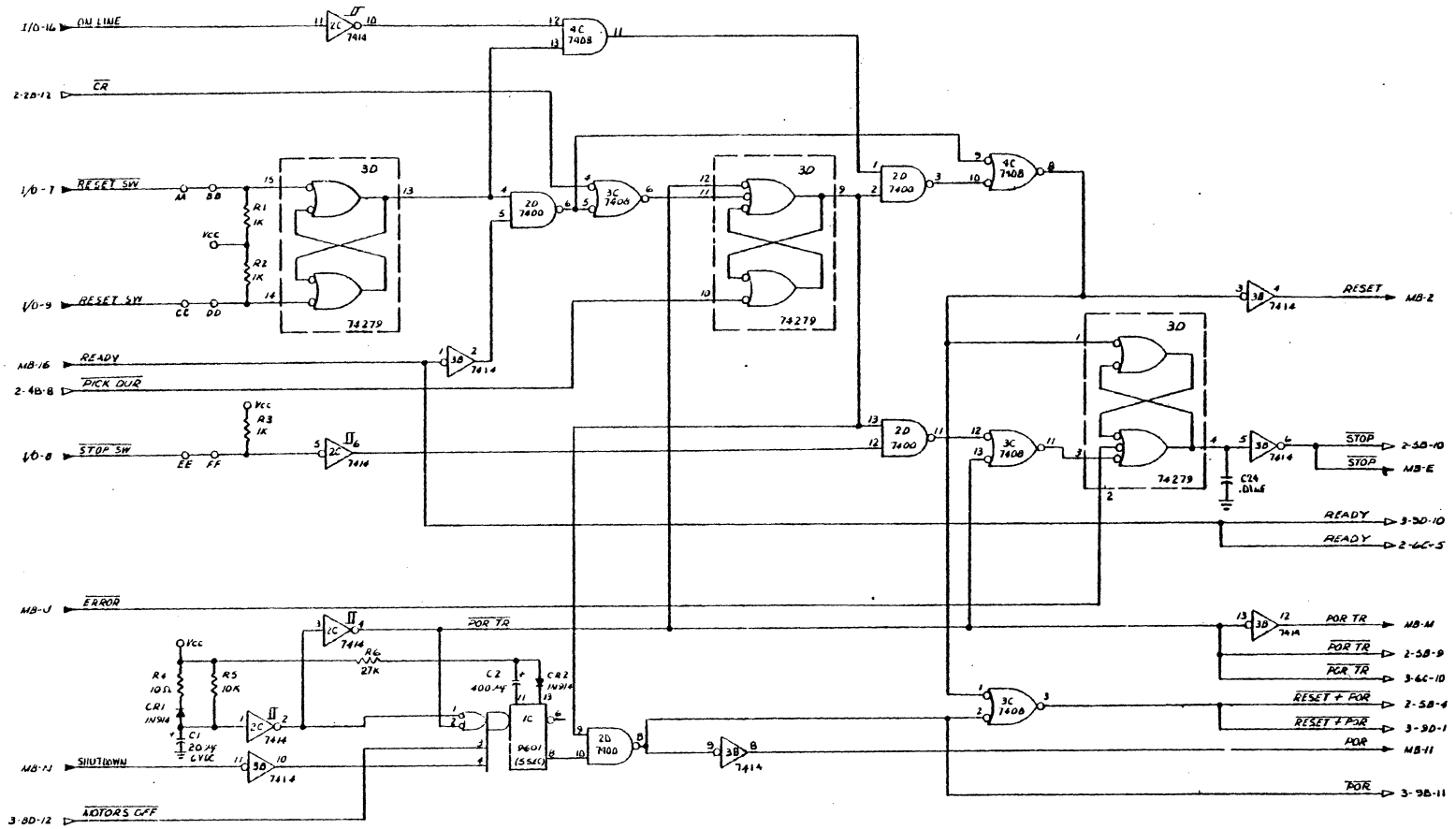


Figure B-11
Schematic Diagram, Sequence Card (Sheet 1 of 3)
(Dwg. No. 41331601)

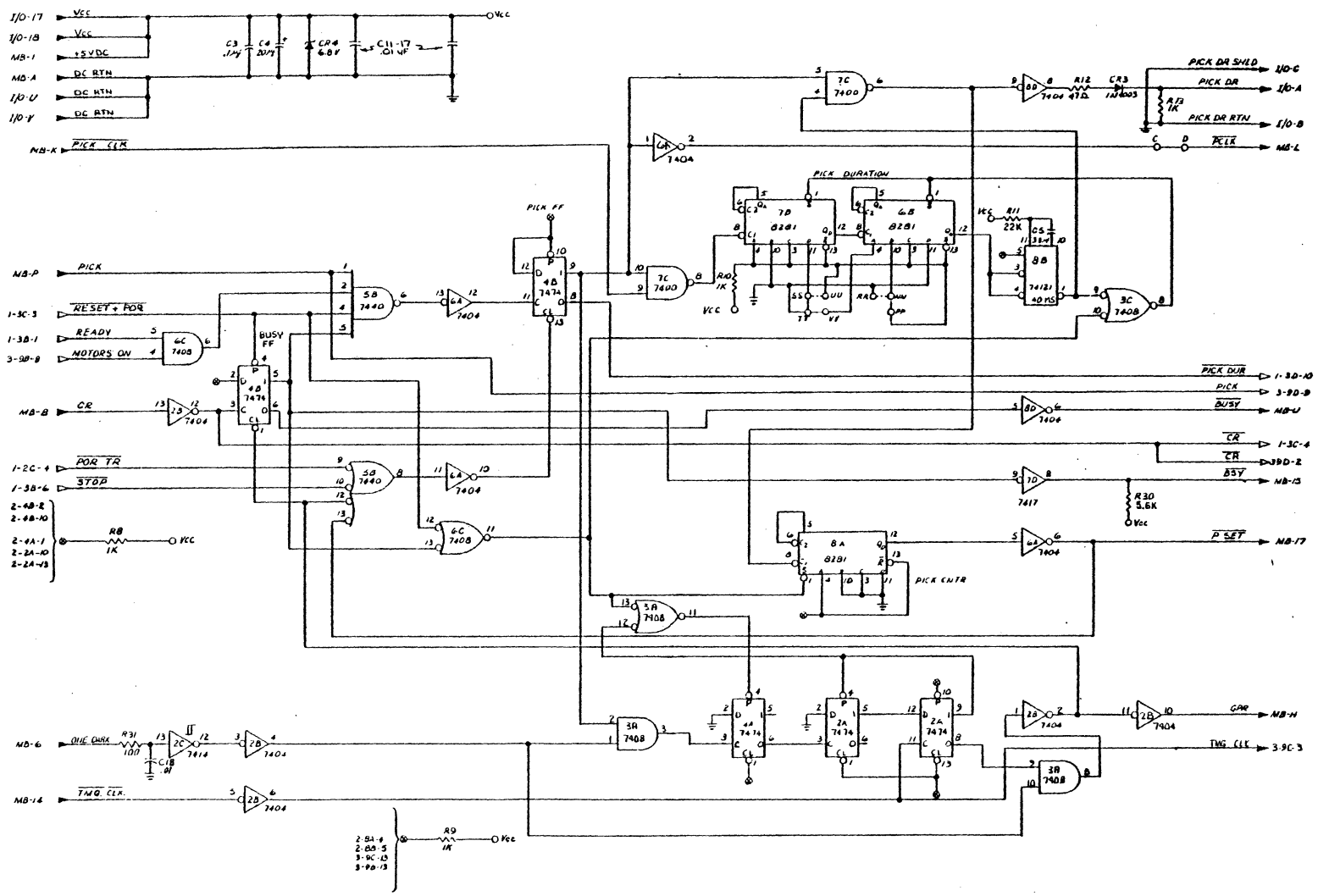


Figure B-11
Schematic Diagram, Sequence Card (Sheet 2 of 3)
(Dwg. No. 41331601)

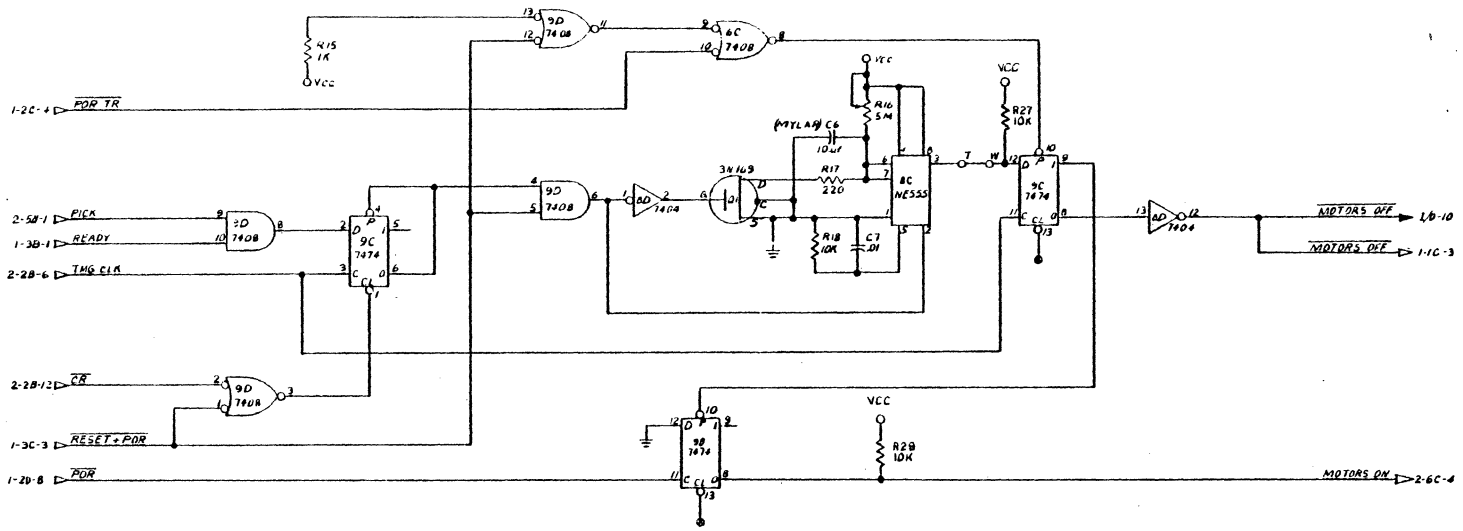


Figure B-11
Schematic Diagram, Sequence Card (Sheet 2 of 3)
(Dwg. No. 41331601)

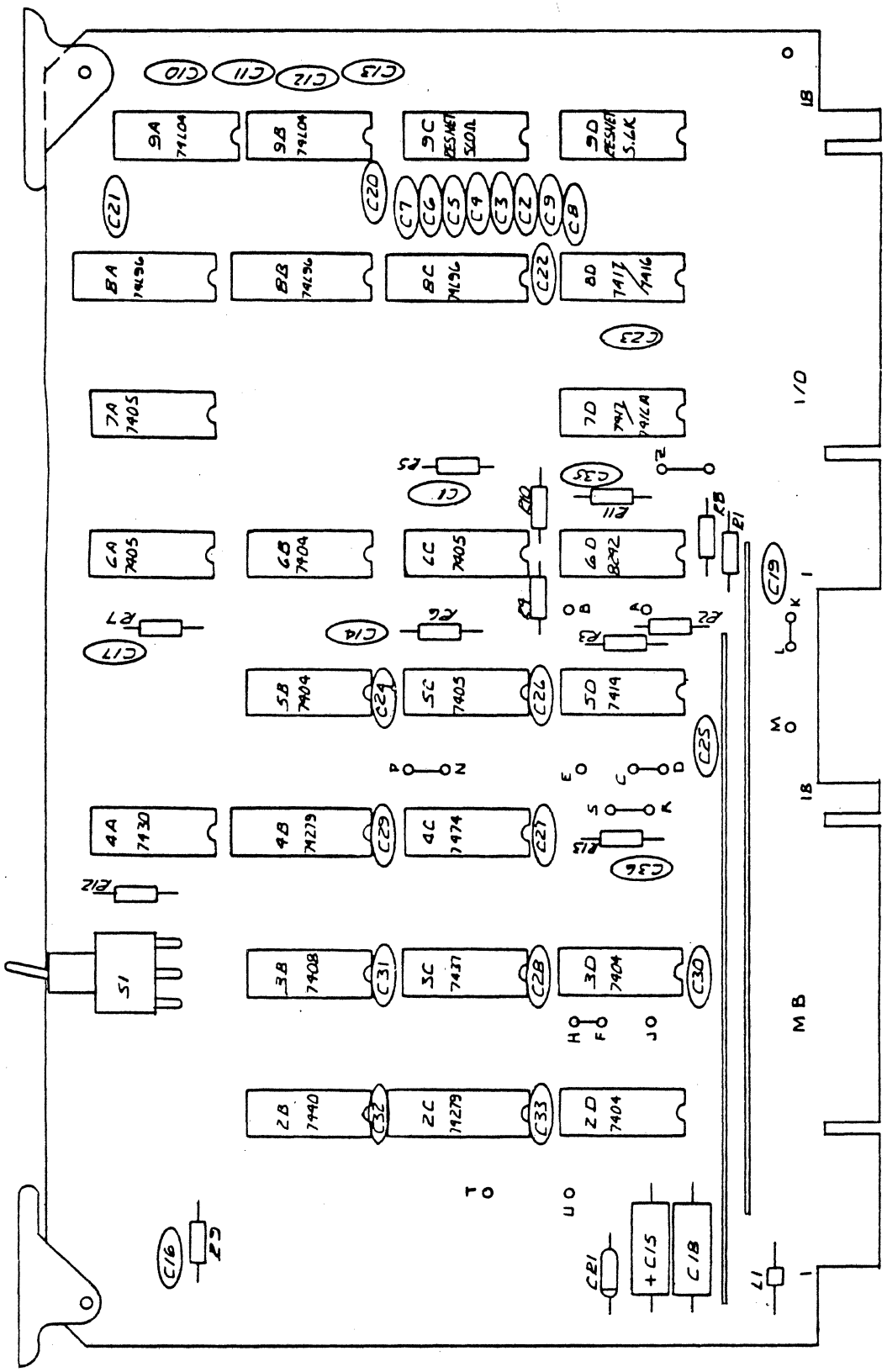


Figure B-12
Assembly Diagram, Transfer Card
(Dwg. No. 413312XX)

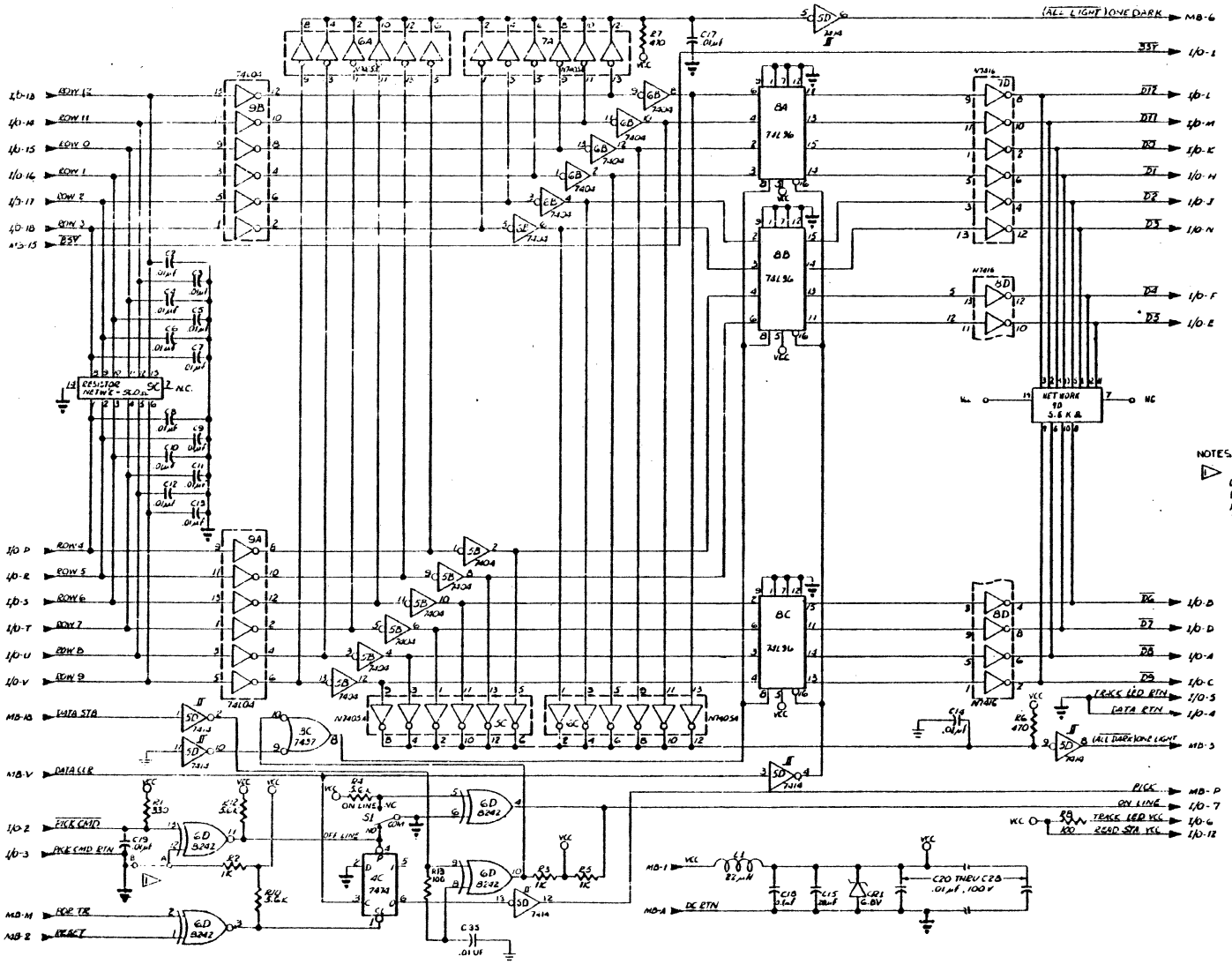


Figure B-13
Schematic Diagram, Transfer Card
(Dwg. No. 41332301)

APPENDIX C
INSTALLATION PROCEDURES

C.1 GENERAL

This section describes physical and electrical characteristics of the Model RM (L Series) card reader. It also prescribes installation requirements and procedures which should be followed to ensure optimum performance of the equipment.

C.2 SPECIFICATIONS AND OPERATING DATA

C.2.1 PHYSICAL CHARACTERISTICS

C.2.1.1 Size

Height	16.50 inches	42.0 cm
Width	24.00 inches	60.9 cm
Depth	19.00 inches	48.2 cm
Weight	77 pounds	35.0 kg

C.2.1.2 Capacity

Input Hopper	7.25 inches (1000 cards maximum)
Output Stacker	7.25 inches (1000 cards maximum)

C.2.1.3 Operating Environment

Dry Bulb Temperature	50° to 100°F (10° to 40°C)
Relative Humidity	30% to 90% noncondensing
Wet Bulb Temperature	80°F (27°C) maximum
Thermal Shock	15°F (8.3°C) per hour
Altitude	1000 ft. (300m) below to 6000 ft. (1832m) above sea level

C.2.1.4 Storage Environment

Dry Bulb Temperature	-25° to 135°F (-4° to 65°C)
Relative Humidity	5% to 90% noncondensing
Altitude	1000 ft. (300m) below to 12,000 ft. (3664m) above sea level.

C.2.2 OPERATING CHARACTERISTICS

Reading Speed	1000 cards per minute (max) in continuous run
Single Card Cycle	60 ms
Control	Demand feed, one card at a time under external control. Card processing is continuous as long as the Pick Command signal remains TRUE.

Input:

Pick Command (PC)	Logic TRUE for 1.0 μs (min) -15 mAdc at 0.8 Vdc (max)

Outputs:

Data Lines	TTL Type 7416 (GTRP) or 7417 (PTRP) I_{source} = 400μAdc at 2.4 Vdc (min) I_{sink} = 16mAdc at 0.4 Vdc (max)
Status/Alarm Lines	Hopper Check (HCK) Busy (BSY) Error (ERROR) Motion Check (MOCK) Ready (RDY)
Index Mark (IM)	10.0μs pulse, 80 Index Marks per card. Signals presence of data on output lines.

C.2.3 ELECTRICAL SPECIFICATIONS

Power Input:	Available for any of the following: 100 Vac ± 10%, 1 Phase, 50 Hz ± 2 Hz 100 Vac ± 10%, 1 Phase, 60 Hz ± 2 Hz 115 Vac ± 10%, 1 Phase, 50 Hz ± 2 Hz 115 Vac ± 10%, 1 Phase, 60 Hz ± 2 Hz 230 Vac ± 10%, 1 Phase, 50 Hz ± 2 Hz
Line Load:	2150 VA (max) starting load for 5 sec (max) 650 VA (max) run

C.3 SITE PLANNING

The Model RM (L Series) card reader may be installed in any convenient location within the following criteria:

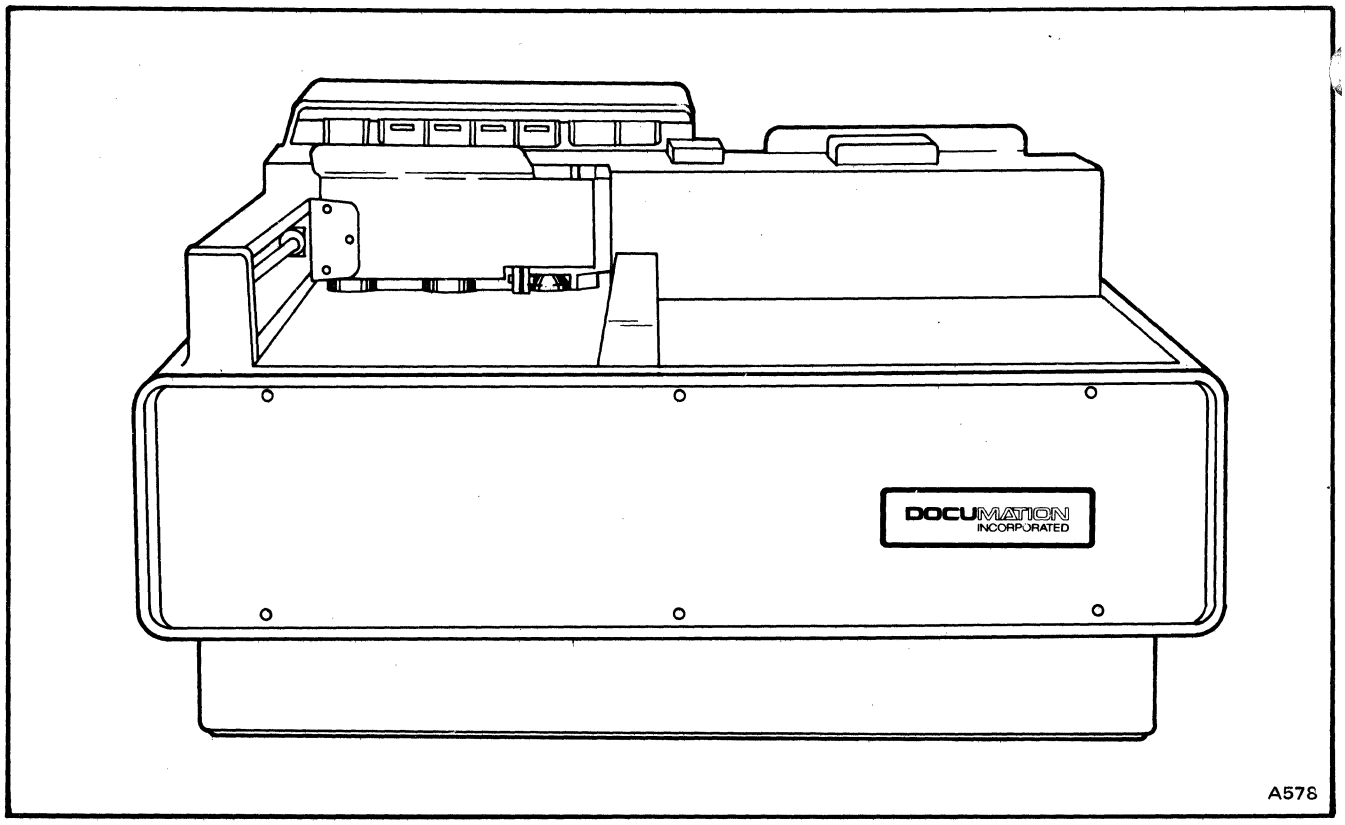
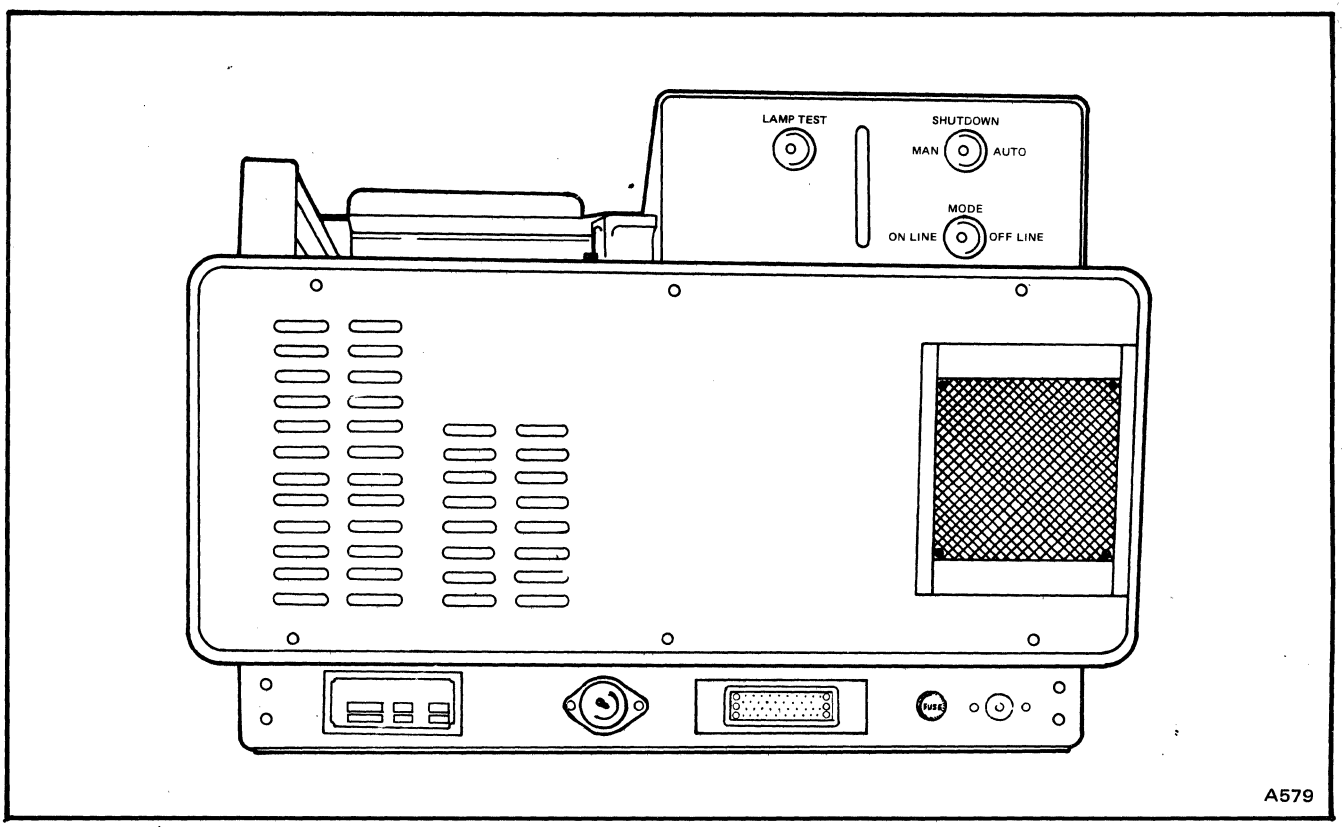


Figure C-1. Model RM (L Series) Card Reader, Front View



C-2. Model RM (L Series Card Reader, Rear View

C.3.1 ACCESS

Sufficient clearance should be maintained at the front and rear of the equipment to allow removal of cover plates and access for maintenance, and to permit adequate air flow to the cooling fan at rear of reader.

C.3.2 CABLE LENGTHS

Maximum distance from the controlling system is limited to 20 feet with positive true logic or 50 feet with ground true logic.

C.3.3 FOUNDATION

Special foundations or structural supports are not normally required for the Model RM (L Series) card reader. Where unusual conditions are encountered, Documation engineering staff should be contacted.

C.4 UNPACKING

Model RM (L Series) card readers are packed in cardboard containers (Figure C-3) with adequate packing material to protect the equipment from damage during shipment. Inspect the outside of the container and report any damage to the carrier.

Remove the power cord and technical manual, then lift the card reader out of the container. Inspect the reader and report any damage to Documation Incorporated. Tilt the reader to an upright position and remove the two red 8 x 32 screws in the bottom plate. These screws lock the vacuum pump assembly mounting plate in position to prevent damage to the vibration isolators during shipment.

C.5 INITIAL CHECKOUT

Perform the following steps to test reader readiness:

a. Connect the ac power cord to J1 on the reader connector panel and to a power source of the correct voltage and frequency.

b. Set the MODE switch (rear panel) to OFF LINE.

c. Set the SHUTDOWN switch (rear panel) to AUTO.

d. Set the ac power circuit breaker to ON. The POWER switch on the control panel can then be used to control power to the reader.

e. Operate the POWER pushbutton switch on the control panel. The POWER and HOPPER CHECK indicators will illuminate and, after a 3- to 5-second delay, the STOP indicator will illuminate.

f. Observe that the STOP indicator is illuminated, then depress and hold the LAMP TEST switch (rear panel) and verify that all control panel indicators illuminate. Release switch.

g. Pull the hopper follower back and load approximately 100 unpunched cards into the hopper, "9" edge down, column "0" to the left. Return hopper follower to rear of card deck.

h. Depress and release the START switch. The START indicator will illuminate and the STOP indicator will extinguish. The drive and vacuum pump motors will come on and, after a 5-second delay, card processing should begin. After the last card is processed the drive and vacuum pump motors will shut off and the STOP and HOPPER CHECK indicators will illuminate.

i. Operate the POWER switch to turn off the reader. All indicators will extinguish.

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

This completes the initial off-line test.

C.6 INPUT/OUTPUT INTERFACE

C.6.1 SIGNAL LEVEL

Required signal level for the Model RM card reader is 5 Volt PTL/TTL interface.

C.6.2 DRIVE CAPABILITY

Drive capability with standard positive true logic is 20 feet of twisted pair line per signal. With optional ground true logic this drive capability is increased to 50 feet.

C.6.3 OUTPUT

The following outputs are available to the external system:

a. READY — The reader is ready to accept a pick command.

b. BUSY — A card is in the process of being read.

c. ERROR — The card being read has failed the light/dark check.

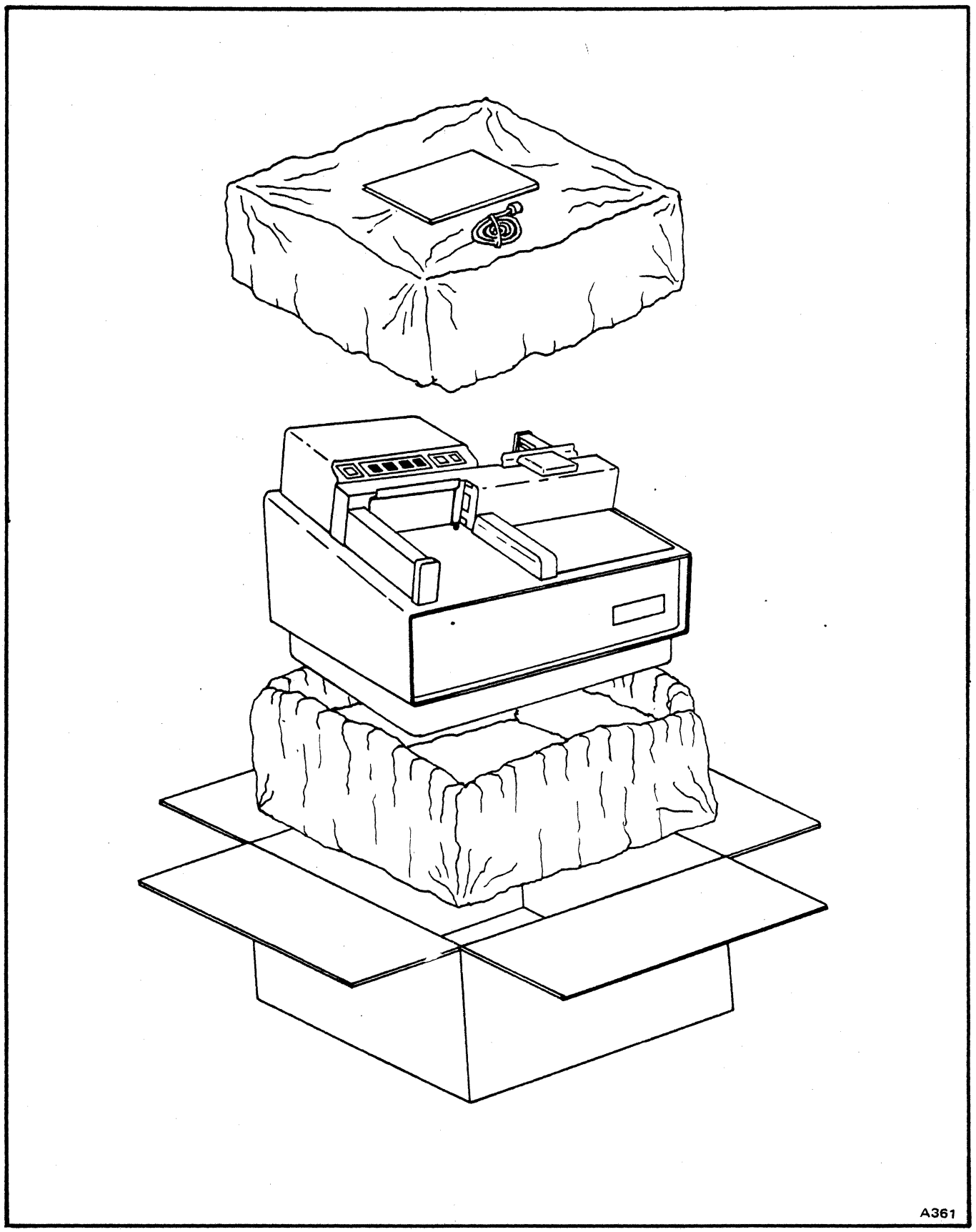


Figure C-3. Unpacking

d. MOTION CHECK – The card in process either did not reach the read station after six automatically generated pick attempts or did not clear the card track.

e. HOPPER CHECK – The input hopper is empty or the output stacker is full.

f. INDEX MARK – A pulse of 10.0-microseconds duration which signals the presence of data.

g. DATA LINES – Twelve parallel twisted pair lines corresponding to the twelve data rows on the card.

C.6.4 INPUT

An externally generated Pick Command signal initiates the card pick cycle. The reader will continue to pick as long as the pick command remains TRUE.

C.6.5 INPUT/OUTPUT CONNECTOR

The 38-pin input/output connector provides access to control, data and status/alarm lines. The standard connector is Elco Part No. 00-8016-038-000-707. Standard pin assignment is listed in Table C-1.

C.7 ITEMS SUPPLIED

The standard items supplied with a Model RM card reader are the power cord and technical manual. The 9-foot power cord is furnished with the appropriate connector to mate with the power connector on the reader. Table C-2 lists standard pin connections. Special power interface configurations are available.

C.8 ITEMS REQUIRED BUT NOT SUPPLIED

C.8.1 INPUT/OUTPUT CONNECTOR

Mating 38-pin input/output mating cable connector, Elco Part No. 00-8016-038-217-704, is required but not supplied with standard Model RM card readers. This connector is available from Documation and is shipped unassembled as a kit with connector base, cover and 38 solder pins (Documation Part No. 10139401).

C.8.2 TOOLS AND EQUIPMENT

Tools and equipment required for preventive and corrective maintenance of the Model RM card reader are listed in Tables C-3 and C-4.

C.9 REPACKING INSTRUCTIONS

If a reader is to be reshipped, it must be carefully packed in a suitable protective shipping container. Before packing, the two 8 x 32 screws in the bottom plate must be reinstalled (see paragraph C.4). These screws lock the vacuum pump assembly mounting plate in position to prevent damage to vibration isolators during shipment.

Table C-1. Input/Output Connector Pin Assignment

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

NOTE

For Non-Standard Units, see Wiring Diagram, Figure B-2.

Table C-2. Power Connector Wiring

CIRCUIT	WIRE COLOR
Safety Ground	Green
Neutral	White
Line	Black

Table C-3. Special Tools and Equipment

Description	Manufacturer	Manufacturer Part Number	Documation Part Number
Extraction Tool, AMP	AMP	91022-1	00000688
Extraction Tool, Leaf Contact	AMP	465195-2	00000517
Extraction Tool, Modified Fork Contact	AMP	91037-2	00000469
Extraction Tool, Mod IV Contact	AMP	91029-1A	00000676
Removal Tool, IC	AMP	91049-1	
Insertion Tool	Elco	061742-04	00000674
Extraction Tool	Elco	061877-04	00000675
Insert/Extract Tool (on main frame)	Deutsch	M15570-16	00000487
Test Clip, IC	AP Inc.	923700	00000679
Extender, Printed Circuit Card	Documation	30099501	30099501
Tensiometer, Belt Tension	Gates	17599-F	00003944
Pliers, Retaining Ring External	AMP	PR229A	00000680

Table C-4. Common Tools and Equipment

DESCRIPTION
Drift Punch, 6 inch
Pliers, Diagonal, Flush Cutting, 6 inch
Pliers, Long Nose, 6 inch
Pliers, Side Cutter, 6 inch
Screwdriver, Allen, Long Arm, 1/16"
Screwdriver, Phillips, No. 1 Tip, 6" long
Screwdriver, Phillips, No. 2 Tip, 6" long
Screwdriver, Standard, 3/16" Flat Blade, 6" long
Screwdriver, Standard, 1/4" Flat Blade, 3" long
Wrench, Allen, Long Arm, 1/4"
Wrench, Allen, Long Arm, 9/64"
Wrench, Allen, Long Arm, 1/8"
Wrench, Allen, Long Arm, 3/32"
Wrench, Allen, Short Arm, 1/16"
Wrench, Allen, Short Arm, 0.050"
Wrench, Open End, 1/2"
Wrench, Open End, 7/16"
Wrench, Open End, 11/32"
Wrench, Open End, 1/4"
C-Clamp, 4 inch
Dial Caliper
Feeler Gauge Set, .001" through .025"
Micrometer
Scale, Machinist, 6 inch, fraction/decimal per inch
Spring Scale, 32 ounce capacity
Soldering Iron, 60 Watt
Desoldering Tool

APPENDIX D
SIGNAL MNEMONICS AND ABBREVIATIONS

MNEMONIC	DESCRIPTION	LOCATION	ORIGINATING SOURCE
0CR	Zero Column Reset	MB-5	Timing Card
1CR	1st Column Reset	MB-5	Timing Card
80CR	80th Column Reset	MB-4	Timing Card
81CR	81st Column Reset	MB-13	Timing Card
84CR	84th Column Reset	MB-D	Timing Card
BSY	Busy Output	J8-1	Transfer Card
BUSY	Busy Signal	MB-U	Sequence Card
CLK 86	86th Column Clock	J3-D	Timing Card
CR	Column Reset	MB-B	Timing Card
DO	Data Row 0 Output	J8-K	Transfer Card
D1	Data Row 1 Output	J8-H	Transfer Card
D2	Data Row 2 Output	J8-J	Transfer Card
D3	Data Row 3 Output	J8-N	Transfer Card
D4	Data Row 4 Output	J8-F	Transfer Card
D5	Data Row 5 Output	J8-E	Transfer Card
D6	Data Row 6 Output	J8-B	Transfer Card
D7	Data Row 7 Output	J8-D	Transfer Card
D8	Data Row 8 Output	J8-A	Transfer Card
D9	Data Row 9 Output	J8-C	Transfer Card
D11	Data Row 11 Output	J8-M	Transfer Card
D12	Data Row 12 Output	J8-L	Transfer Card
DATA CLR	Data Clear	MB-V	Timing Card
DATA STB	Data Strobe	MB-18	Timing Card
ERROR	Error Output	J4-E	Fault Card
GPR	Good Pick Reset	MB-H	Sequence Card
HCK	Hopper Check Output	J4-H	Fault Card
HOP EMP	Hopper Empty Switch	J4-5	Fault Card
IM	Index Marks	J3-A	Timing
IM RTN	Index Marks Return/Signal Ground	J3-B	Timing Card
MOCK	Motion Check Output	J4-F	Fault Card
MOTOR CONT	Motor Control On	J4-4	Fault Card
MOTORS OFF	Motors Off	J4-14	Fault Card
ONE DARK	Read Station Any Dark	MB-6	Transfer Card
ONE LIGHT	Read Station Any Light	MB-3	Transfer Card
PC	Pick Command Input	J8-2	Transfer Card
PCK DR	Pick Check Lamp Driver	J4-J	Fault Card
PICK	Pick Pulse	MB-P	Transfer Card
PICK CLK	Pick Clock	MB-K	Timing Card
PICK CMD	Pick Command Signal	J8-2	Transfer Card
PICK DR	Pick Driver Output	J5-A	Sequence Card
POR	Power On Reset	MB-11	Sequence Card
POR TR	Power On Reset Trigger	MB-M	Sequence Card
PSET	Pick Check Set	MB-17	Sequence Card
RCK DR	Read Check Lamp Driver	J4-P	Fault Card
RDY	Ready Output	J4-D	Fault Card
RDY DR	Ready Lamp Driver	J4-R	Fault Card

Signal Mnemonics and Abbreviations Cont'd)

MNEMONIC	DESCRIPTION	LOCATION	ORIGINATING SOURCE
READY	Ready	MB-16	Fault Card
RESET	Gated Reset Signal	MB-2	Sequence Card
RESYNC ENABLE	Resync Enable	MB-10	Timing Card
Row 0	Punch Data Sensor Input Row 0	J8-15	Transfer Card
Row 1	Punch Data Sensor Input Row 1	J8-16	Transfer Card
Row 2	Punch Data Sensor Input Row 2	J8-17	Transfer Card
Row 3	Punch Data Sensor Input Row 3	J8-18	Transfer Card
Row 4	Punch Data Sensor Input Row 4	J8-P	Transfer Card
Row 5	Punch Data Sensor Input Row 5	J8-R	Transfer Card
Row 6	Punch Data Sensor Input Row 6	J8-S	Transfer Card
Row 7	Punch Data Sensor Input Row 7	J8-T	Transfer Card
Row 8	Punch Data Sensor Input Row 8	J8-U	Transfer Card
Row 9	Punch Data Sensor Input Row 9	J8-V	Transfer Card
Row 11	Punch Data Sensor Input Row 11	J8-14	Transfer Card
Row 12	Punch Data Sensor Input Row 12	J8-13	Transfer Card
SCK DR	Stack Check Lamp Driver	J4-N	Fault Card
SHUTDOWN	Mode Switch Input	MB-N	Fault Card
STACKER FULL	Stacker Full Switch	J4-1	Fault Card
STACK LED Vcc	Track Sensor +5 Volts	J8-6	Transfer Card
STOP	Stop	MB-E	Sequence Card
STOP DR	Stop Lamp Driver	J4-S	Fault Card
TMG CLK	Timing Clock	MB-14	Timing Card
TST	Timing Strobe	J3-T	Reluctance Pickup
Vcc	+5 Volts DC	MB-1	5-Volt Power Supply
VccRTN	+5 Volts Return	MB-A	5-Volt Power Supply

APPENDIX E
OPTIONAL FEATURES
FOR
MODEL RM1000L
CARD READER

APPENDIX E
OPTIONAL FEATURES

E.1 GENERAL

Performance capabilities of a standard RM1000L Card Reader may be modified to accommodate certain specific requirements of the user. The modifications are simple and utilize conventional electronic components. Installation may be accomplished by any competent electronics technician.

E.2 ACCESS COVER REMOVAL AND INSTALLATION

To install optional features described in this section, it will be necessary to remove the card cage rear panel and/or the reader rear panel assembly.

E.2.1 CARD CAGE REAR PANEL

a. Remove four screws from the rear panel of the card cage (Figure E-1), then remove panel.

b. Reinstall panel in reverse order of removal.

E.2.2 REAR PANEL ASSEMBLY

a. Remove six screws from rear panel (Figure E-2).

b. Move rear panel out slightly, disconnect fan cable, then remove rear panel.

c. Reinstall rear panel assembly in reverse order of removal.

E.3 MOD I. READY REFLECTS STATUS OF BUSY

This feature allows compatibility with systems designed for Mohawk Data Science (MDS) interface. It causes the Ready (RDY) output signal to remain false while the Busy (BSY) signal is true.

E.3.1 INSTALLATION

a. Remove card cage rear panel (paragraph E.2.1).

b. Remove Fault card (Figure E-3).

c. Install a zero-ohm resistor (Documation Part No. 00000198), or an insulated jumper wire on the Fault card between solder pads SS and TT (Figure E-4, item 1).

d. Using a grease pencil, mark "MOD I" on Fault card and on inside of card cage rear panel.

e. Install Fault card in card cage.

f. Replace card cage rear panel.

E.4 MOD II. WIDE INDEX MARK

This feature allows the pulse width of the index mark to be increased to any desired period, up to a maximum of 404μs.

E.4.1 INSTALLATION

a. Remove card cage rear panel (paragraph E.2.1).

b. Remove Timing card (Figure E-3).

NOTE

Resistor R18 and capacitor C9 in conjunction with IC 5A determine the index mark pulse width.

c. Using the formula t = 1.1RC, compute the values of R18 and C9 required to achieve the desired pulse width (t in μs, R in ohms, C in μF).

Example:

Desired pulse width is 280μs. From the above formula, the value of RC is found to be 254. Utilizing standard components, typical combinations of R18 and C9 that may be used are R18 = 51K, C9 = .005μF, or R18 = 5.1K, C9 = .05μF.

d. Remove R18 and C9 from the Timing card (Figure E-5, items 1 and 2).

e. Install new R18 and C9, determined in step c.

f. Using a grease pencil, mark "MOD II" on Timing card and on inside of card cage rear panel.

g. Install Timing card in card cage.

h. Replace card cage rear panel.

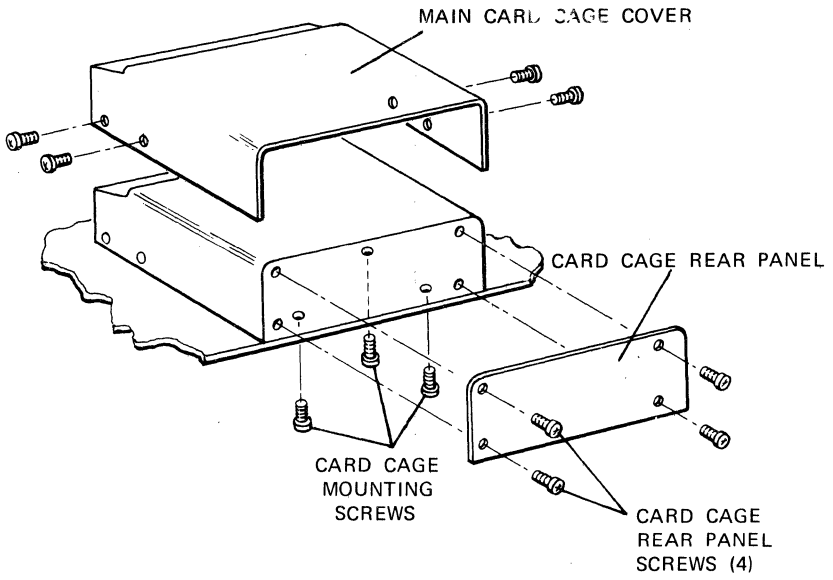


Figure E-1. Card Cage Covers and Mounting

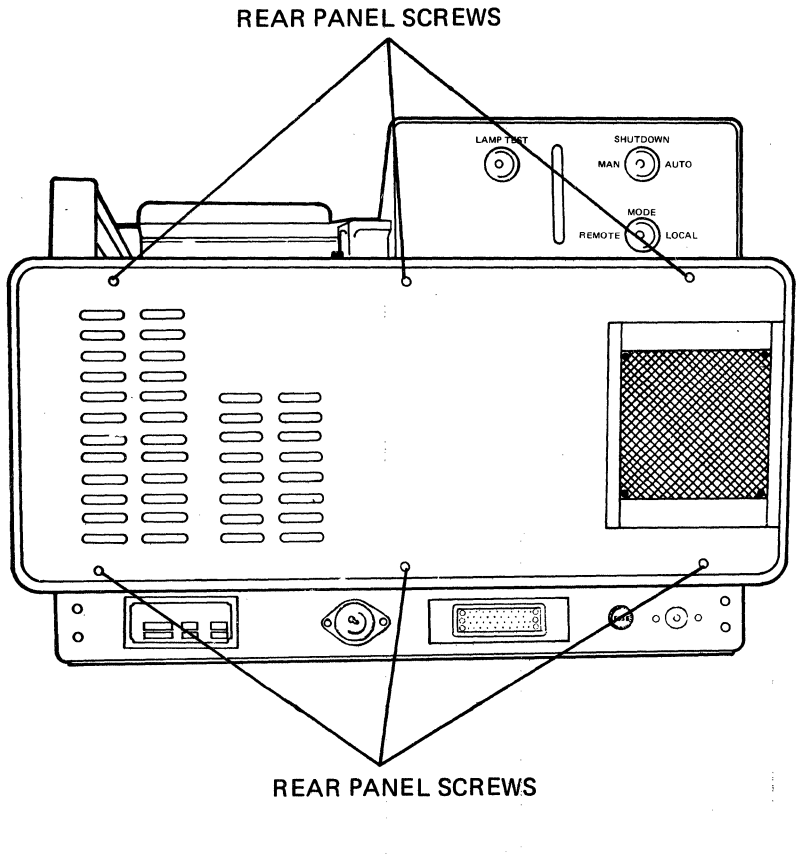


Figure E-2. Removal of Rear Panel

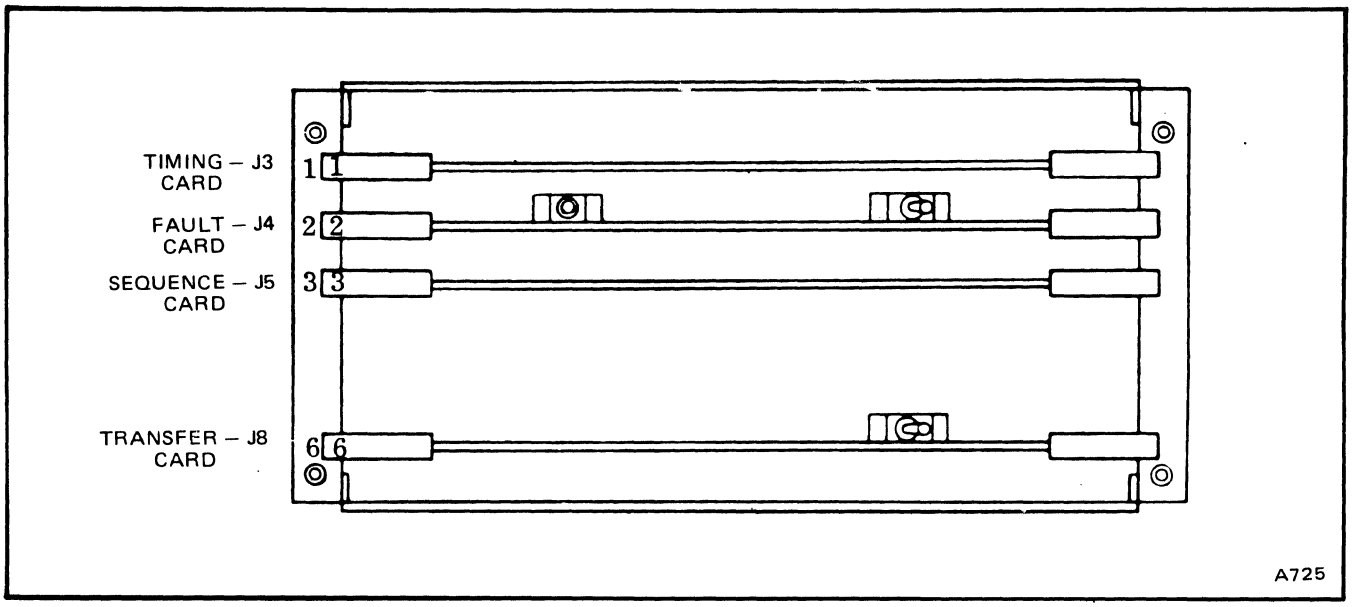


Figure E-3. Card Cage; Printed Circuit Card Locations

E.5 MOD III. +5 VOLTS TO OUTPUT CONNECTOR

This feature provides a 5-Volt interlock signal to the interface through a 100-ohm resistor on pin E of the input/output connector (J2).

E.5.1 INSTALLATION

a. Remove rear panel assembly and card cage rear panel (paragraph E.2).

b. Remove three screws holding card cage in place (Figure E-1). Move card cage to rear and remount temporarily, using two screws through rear holes in top of main frame and front holes in card cage (Figure E-6).

c. Locate and cut cable tie holding the input/output cable to the base plate.

d. Remove input/output connector (J2) from subframe panel assembly.

e. Using a pin extraction tool (ELCO Part No. 061877-04), remove black wires at pins J2-E and J2-F of the output connector (J2). Double crimp these wires in an ELCO contact (Documation Part No. 00000038) and reinstall at J2-F.

f. Terminate the green wire of the spare green-brown twisted pair with ELCO contact (Documation Part No. 00000038) and insert contact in pin location J2-E.

g. Terminate the card cage end of the green wire (step f.) with AMP contact (Documation Part No. 00000036) and insert at pin location J3-13 on connector J3 on card cage.

h. Reinstall input/output connector (J2) on subframe panel assembly.

i. Install new cable tie at original location to secure input/output cable.

j. Reinstall card cage in its normal location.

k. Using a grease pencil, mark "MOD III" on the inside of the card cage rear panel.

l. Replace rear panel assembly and card cage rear panel.

E.6 MOD IV. CHASSIS GROUND TO OUTPUT CONNECTOR

This feature provides a reader chassis ground to the interface at pin PP of the input/output connector (J2).

E.6.1 INSTALLATION

a. Remove rear panel assembly and card cage rear panel (paragraph E.2).

b. Locate and cut cable tie holding the input/output cable to the base plate.

c. Remove input/output connector (J2) from subframe panel assembly.

d. Using a pin extraction tool (ELCO Part No. 061877-04), remove green wires at pins J2-PP and J2-RR of the output connector (J2). Double crimp these wires in an ELCO contact (Documation Part No. 00000038) and reinstall at J2-RR.

e. Connect ends of cable assembly (Documation Part No. 20027509) as follows:

1. Terminate one end in an ELCO contact (Documation Part No. 00000038) and insert contact in pin location J2-PP.

2. Terminate other end in a ring tongue terminal (Documation Part No. 000000461) and install under screw on base plate that retains the Vacuum Pump Assembly ground strap.

f. Reinstall input/output connector (J2) on subframe panel assembly.

g. Install new cable tie at original location to secure input/output cable.

h. Using a grease pencil, mark "MOD IV" on the inside of the card cage rear panel.

i. Replace rear panel assembly and card cage rear panel.

E.7 MOD V. DECREASE INDEX MARK OUTPUT IMPEDANCE

This feature allows the output impedance of the Index Mark signal to be reduced to a desired lower value (510 ohms minimum).

E.7.1 INSTALLATION

a. Remove card cage rear panel (paragraph E.2.1).

b. Remove Timing card (Figure E-3).

c. Remove resistor R17 (Figure E-5, item 3) and replace with resistor of desired lower value (not less than 510 ohms).

d. Using a grease pencil, mark "MOD V" on Timing card and on inside of card cage rear panel.

e. Install Timing card in card cage.

f. Replace card cage rear panel.

E.8 MOD VI. (Not used on Model RM1000L)

E.9 MOD VII. (Not used on Model RM1000L)

E.10 MOD VIII. DISABLE RESYNCHRONIZATION CIRCUITS

If holes in punched cards being processed by the reader do not meet American National Standards Institute (ANSI) punched card specifications, it may be necessary to disable the resynchronization circuits. This feature disables the re-sync circuits and modifies reader timing to accommodate cards with punched holes that exceed specified dimensions.

E.10.1 INSTALLATION

a. Remove card cage rear panel (paragraph E.2.1).

b. Remove Timing card (Figure E-3).

c. Refer to Table E-1 and remove and add zero-ohm jumpers as indicated. Use insulated wire or zero-ohm resistors.

Table E-1. Cut and Jumper List (Mod. VIII)

Remove Jumpers	Add Jumpers
A to B	A to D
C to D	D to E
W to Y	W to X

d. Install a zero-ohm jumper between wire-wrap terminals at TP-1 (Figure E-5, item 4).

e. Using a grease pencil, mark "MOD VIII" on Timing card and on inside of card cage rear panel.

f. Install Timing card in card cage.

g. Replace card cage rear panel.

E.11 MOD IX. DISABLE DELAYED MOTOR SHUTDOWN

This feature allows the delayed motor shutdown function (standard in all Model RM and TRM readers) to be disabled.

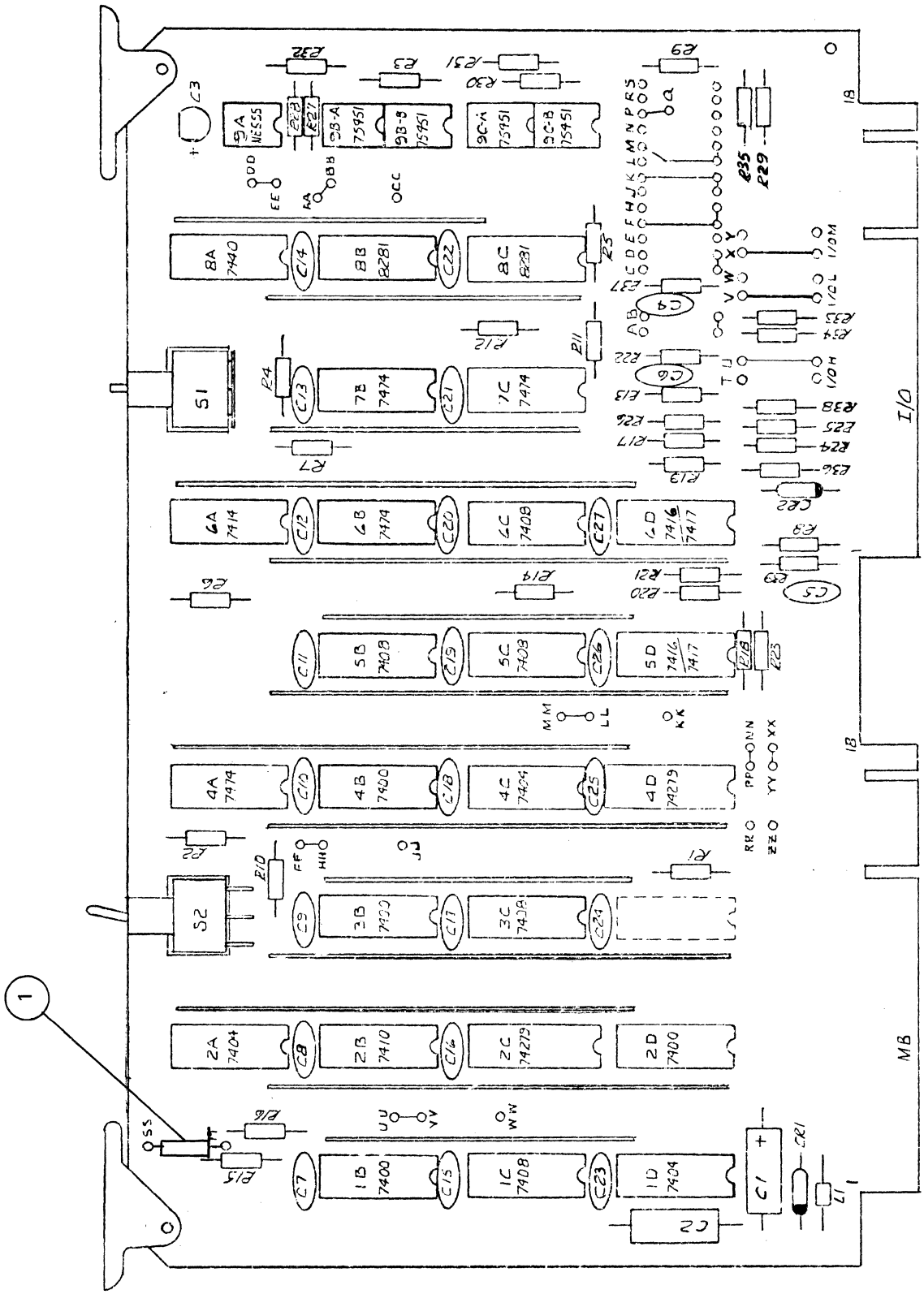


Figure E-4
Assembly Diagram, Fault Card
(Dwg. No. 310169XX)

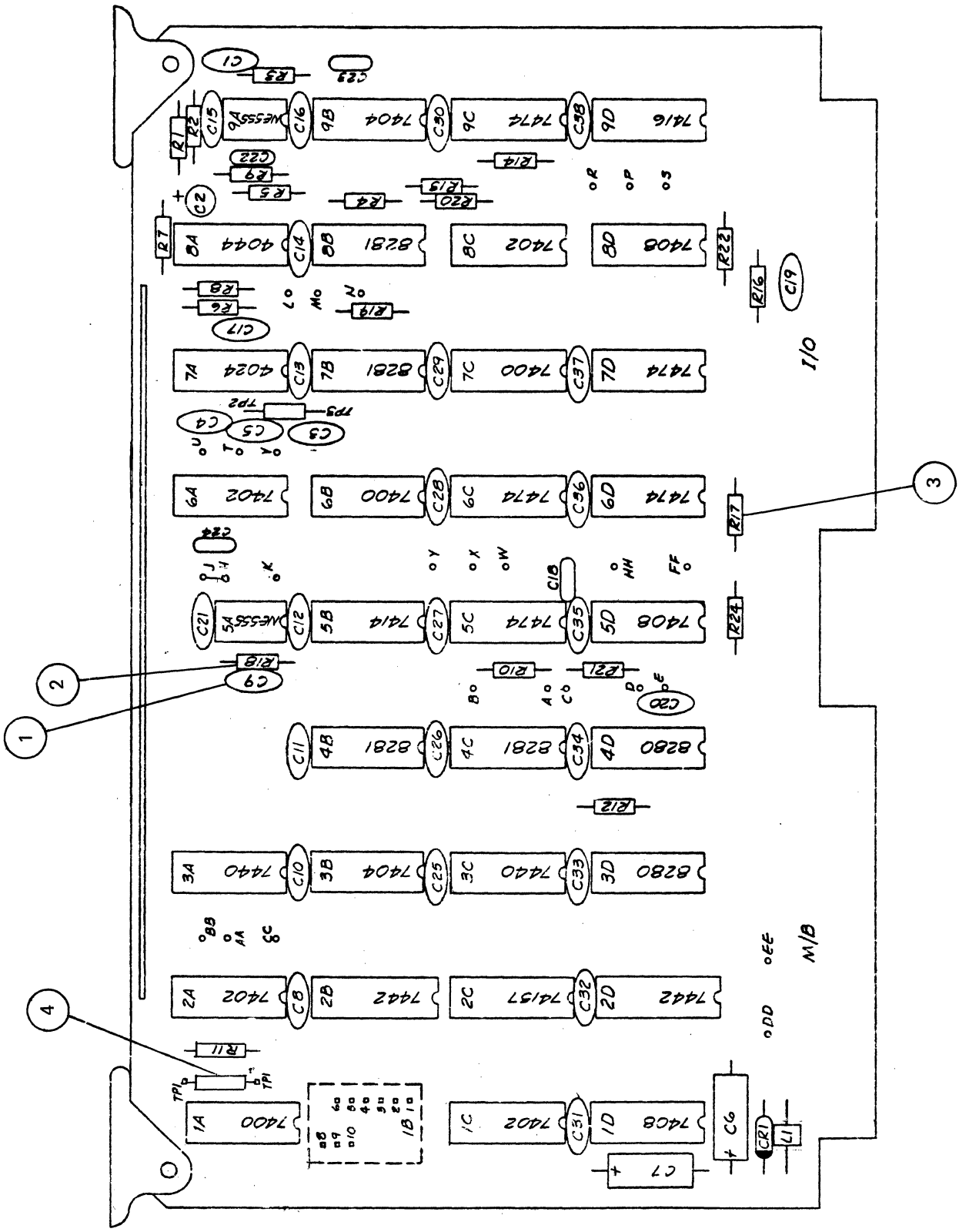


Figure E-5
Assembly Diagram, Timing Card
(Dwg. No. 313229XX)

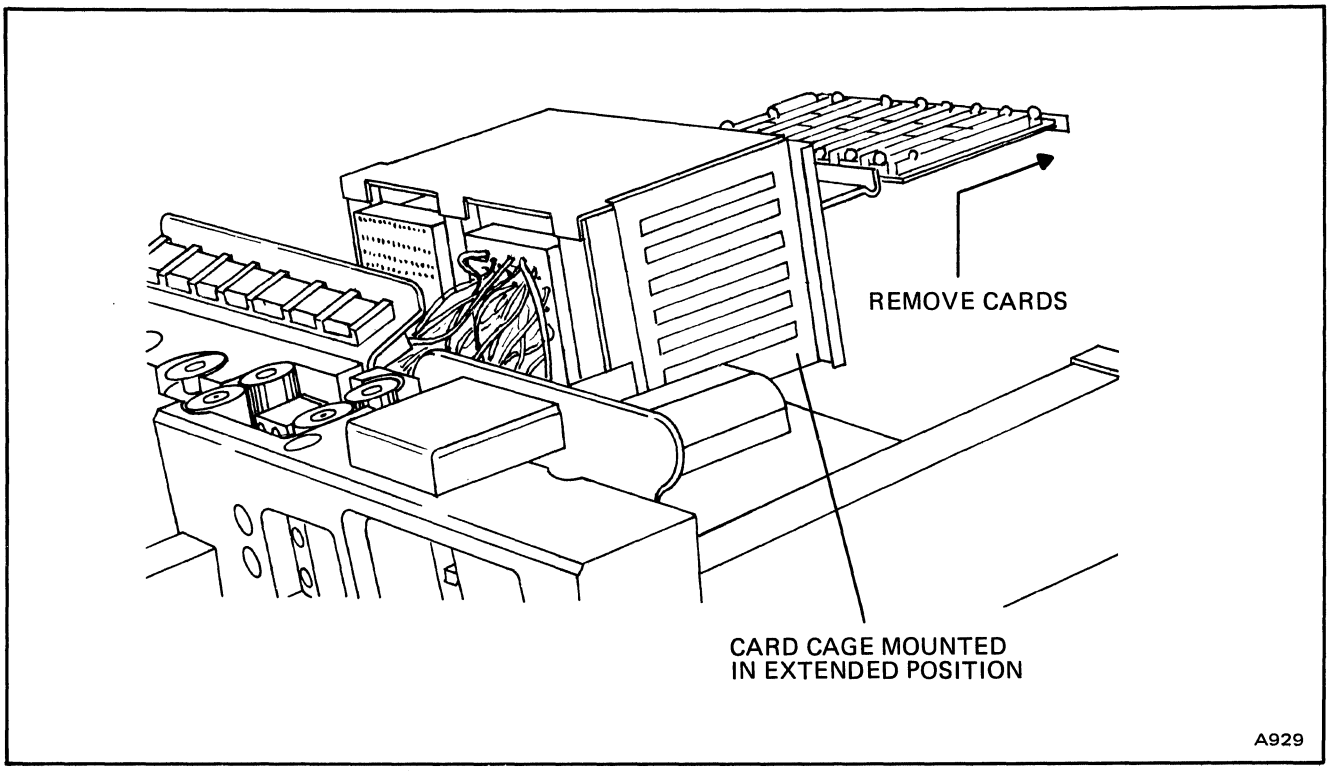


Figure E-6. Card Cage in Extended Position

E.11.1 INSTALLATION

a. Remove card cage rear panel (paragraph E.2.1).

b. Remove Sequence card (Figure E-3).

c. Cut jumper between T and W on Sequence card (Figure E-7, item 1).

d. Using a grease pencil, mark "MOD IX" on Sequence card and on inside of card cage rear panel.

e. Install Sequence card in card cage.

f. Replace card cage panel.

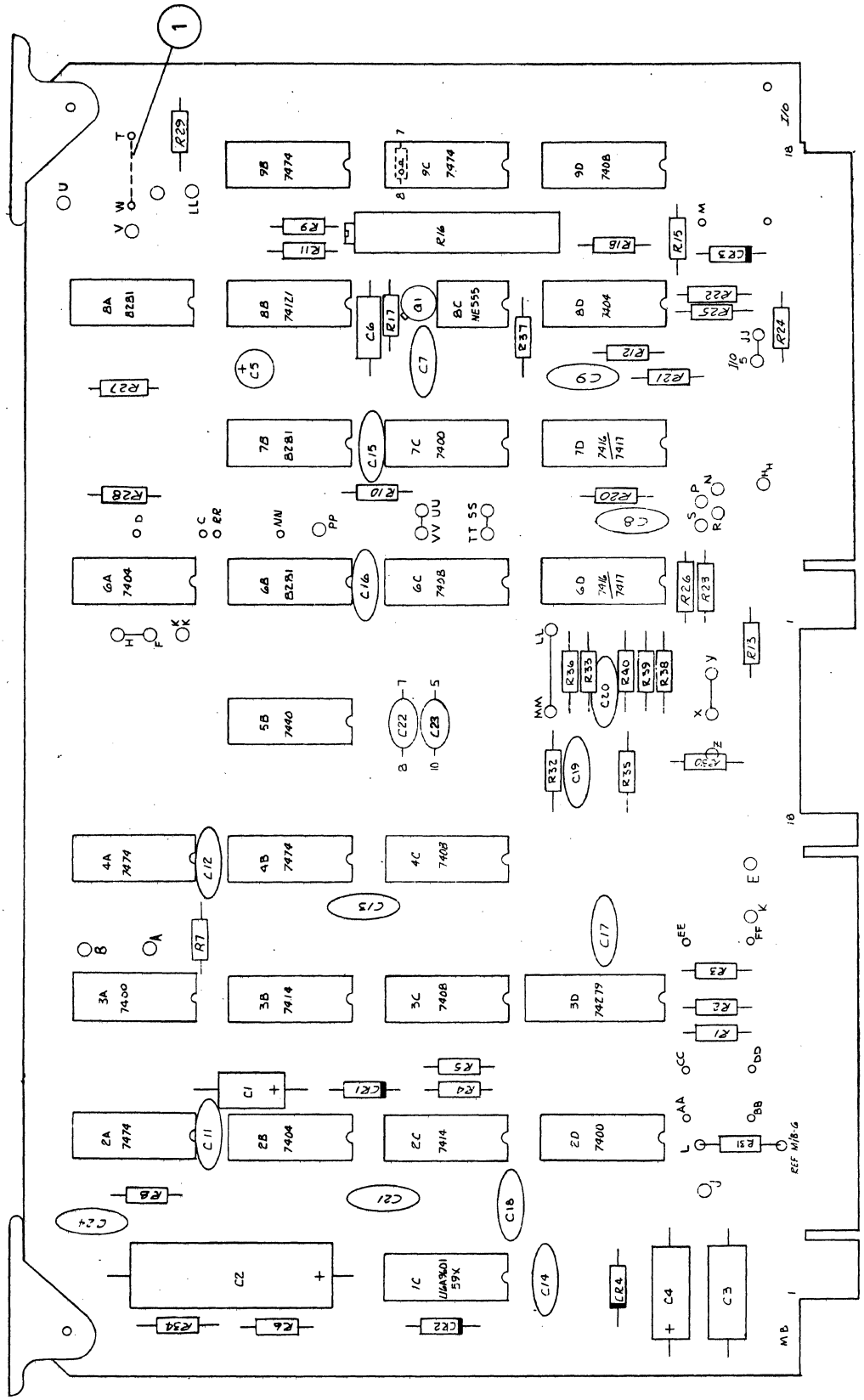


Figure E-7
Assembly Diagram, Sequence Card
(Dwg. No. 410322XX)