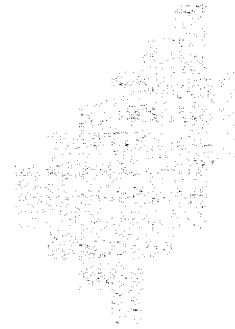
# SERVICE MANUAL

# 9125B CALCULATOR PLOTTER

SERIAL PREFIX: 1041

This service manual applies to HP Model 9125B
Calculator Plotters having Serial Prefix 1041.




16399 W. BERNARDO DRIVE, SAN DIEGO, CALIFORNIA 92127

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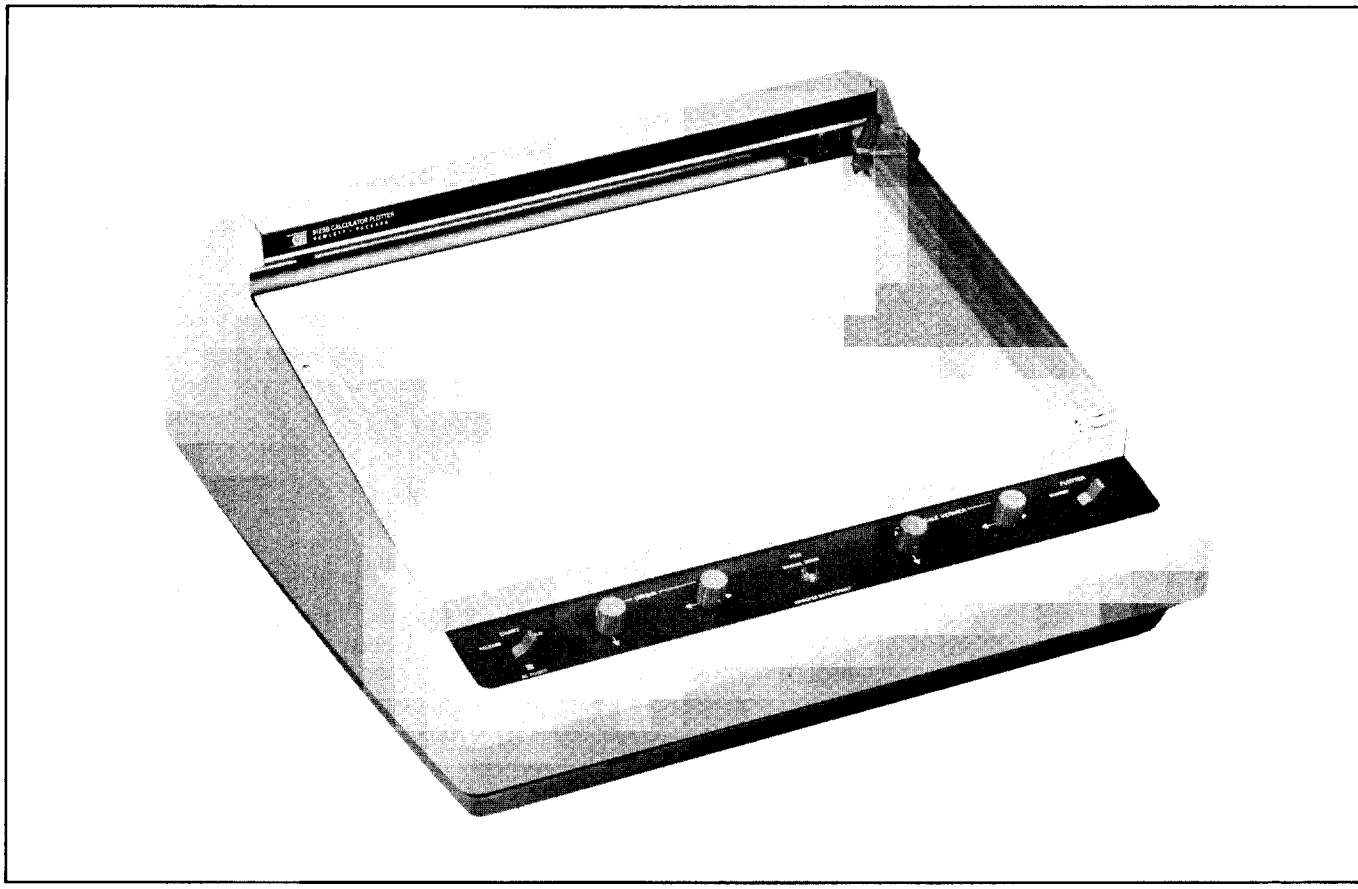


FIGURE 1-1. MODEL 9125B CALCULATOR PLOTTER

# SECTION I

# INTRODUCTION

## 1-1. INTRODUCTION

1-2. The Model 9125B Calculator Plotter (see Figure 1-1) is an X-Y plotter intended for use only with the HP Model 9100A or 9100B Calculator. All plotter operation in this manual refers to the combination of the calculator and plotter.

1-3. MODEL - MANUAL INFORMATION.

1-4. This manual is applicable to the Model 9125B with a serial prefix of 1041. For 9125A service information, refer to the 9125A Service Manual, part number 09125-90008. The serial prefix is the first four digits of a two-part nine digit serial number (0000A00000) used to identify each HP instrument (see Figure 1-2). The letter separating the prefix from the suffix identifies the country of origin.

1-5. MANUAL CHANGE.

1-6. Should any change in this manual be necessary, a new serial prefix will be assigned to the changed model and a change sheet will be supplied defining the difference between the changed model and the one described within this manual. Other corrections, due to any errors that existed when this manual was printed, will be provided. These changes are called Errata and will appear only on the change sheet (Manual Change). For additional information pertaining to this manual, or other HP instruments, contact the nearest Hewlett-Packard Sales/Service Office listed in the back of this manual.

1-7. MANUAL CONTENT.

1-8. This manual contains sections covering theory of operation, maintenance, and troubleshooting. Sufficient information is provided so that all required mechanical maintenance and troubleshooting can be performed. Electrical maintenance and troubleshooting, however, is covered only on a circuit board or module level.

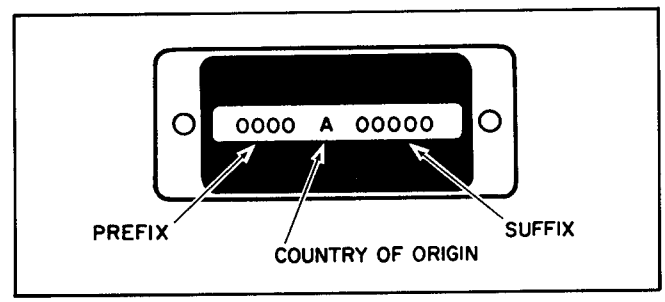



FIGURE 1-2. INSTRUMENT IDENTIFICATION

# SECTION II

# THEORY OF OPERATION

## 2-1. INTRODUCTION

2-2. This section deals primarily with Calculator-Plotter interface logic flow. It covers basic operation of the plotter on the functional block level. A theory of operation at the component level is not included.

## 2-3. THEORY

2-4. GENERAL. The 9125B Calculator Plotter operates by interpreting the coordinate values stored in the X and Y registers of the 9100A/B Calculator. Information is transferred from the X and Y display registers only while the calculator is in the display routine. Refer to Figure 2-1, Logic Flow Diagram and to Figure 2-2, Block Diagram.

2-5. INFORMATION TRANSFER. Information transfer from the calculator to the plotter is divided into four primary logical phases. The initial phase consists of detecting and decoding the proper operation code. This code is the ↑ or ↓ operation. The FMT initiates the display routine. The FMT code and the ↑ or ↓ code defines the plotting mode. The second phase determines the plotter and pen status. A determination is made in this phase as to whether the plotter is through plotting the last point and whether the pen is on or off the paper. The third phase consists of simply collecting the coordinate data and transferring the data to the appropriate digits in the digital to analog converter (DAC). The fourth and final phase initiates the actual plot of the new coordinate, sets the appropriate timers to allow sufficient time to actuate the pen if necessary, and issues a continue code to the calculator. The continue code starts the calculation of the next point while the previous point is being plotted. The four-phase cycle is then repeated.

2-6. FIRST PHASE. The first phase of the information transfer is initiated by an IOPF output from the calculator (see Figure 2-1). This indicates an operation code will follow (from keyboard if F41 is false, from program if F41 is true). FF 25 remembers whether the operation is from the keyboard or the program. The operation was a FMT if HFMT is issued coincident with IOPF. HFMT sets FF 20 which enables the FMT gate to decode the code lines, F20-F25, coincident with the next ITBB from the calculator. FF 20 is cleared and the sequence starts over if the code is not an ↑ or ↓. If the code is an ↑ or ↓, FF 21 is set which forces the calculator into a fixed point display, and triggers FFPDL when the plotter is ready for the next data point. FFPDL is a 40 ms pen delay. Additionally, a ↓ code sets FF 70, a ↑ code clears FF 70, determining whether the plot will be made with the pen up or down. When the clock (data strobe, a stretched version of ITBB) goes false, FF 20 is cleared to disable the FMT gate until the next FMT operation occurs.

2-7. SECOND PHASE. When ETS (400 ms timer) and ETL (650 ms timer) are true, indicating the plotter is ready to transfer data, along with FF 21, FFPDL (40 ms pen delay) is triggered. FFPDL allows the pen drop mechanism to actuate before any data is transferred. It is actuated for every data transfer, whether the pen is up or down, but adds negligibly to the total plot time. FF 90 indicates, when true, the pen was up when a previous FMT↓ was encountered. When ETL goes true, FF 80 (direct pen status control) is set and the pen drops. If FF 90 is false and a FMT↓ is encountered (FF 70 is set) it means the pen is down and the plotter is ready to transfer data as soon as the hold-off timers are all true. A FMT↑ (FF 70 cleared) clears FF 80 and lifts the pen when the hold-off timers are all true.

2-8. THIRD PHASE. The start of the third or coordinate data collection phase is signaled by the 60 Hz sync state of the calculator display routine. F40 and F41 indicate the state of the display when the calculator is in display mode, as shown by the chart on the flow diagram (Figure 2-1). FF 22 is set when sync is reached and the hold-off timers are cleared. FF 22 activates the DAC hold circuits and the old coordinate is retained. The decimal digits are transferred into the DAC least significant bit first, starting with the X register into the X axis and ending with the Y register into the Y axis of the plotter. FF 22 also activates the various digit decoding gates to determine which character is currently being transferred (present on code lines). When the state of F41 changes, it indicates the start of a new display register. The digit counter, a counter which counts ITBB's when F22 is set, is reset so that it can keep track of the number of decimal digits being transferred and fix

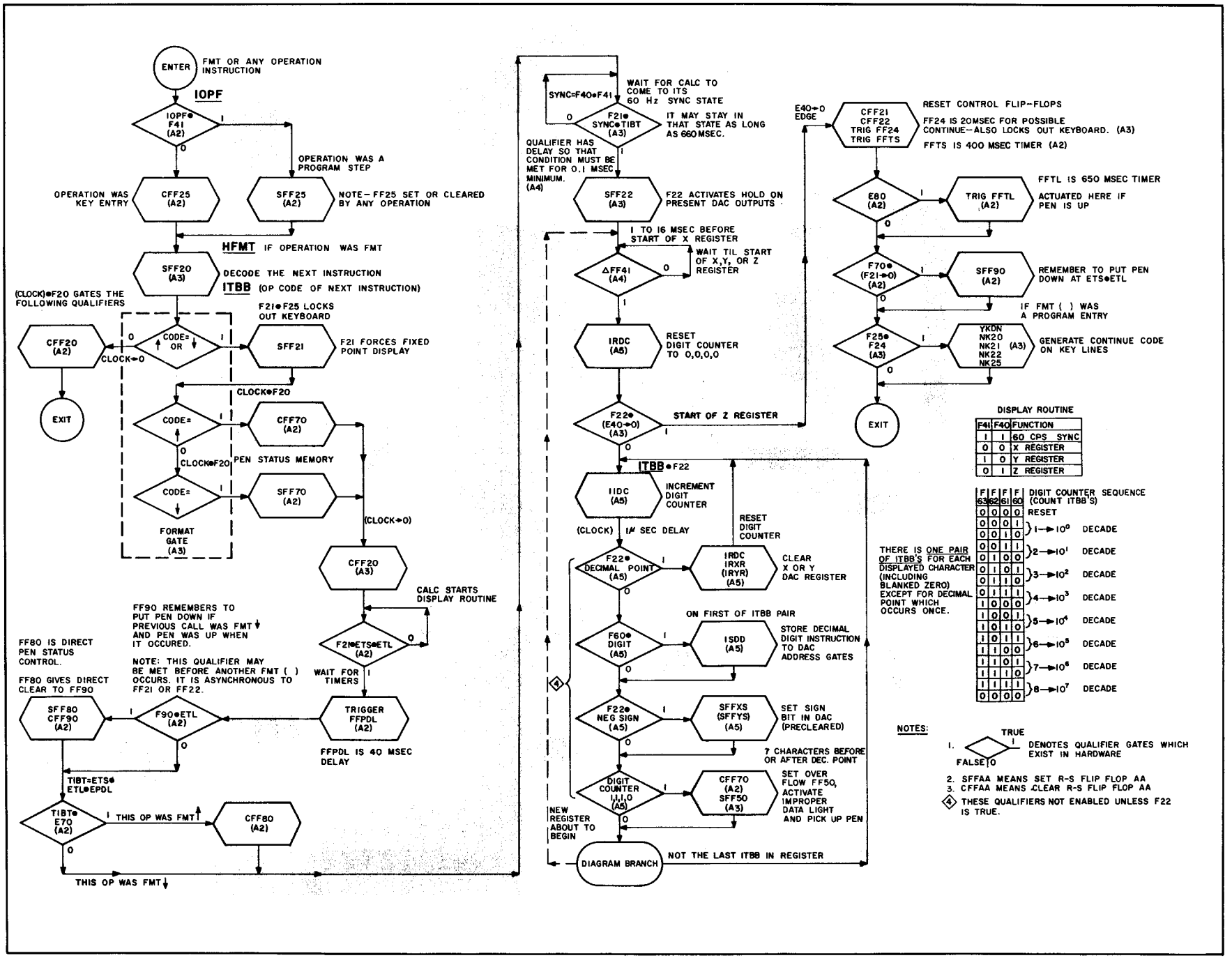



FIGURE 2-1. LOGIC FLOW DIAGRAM

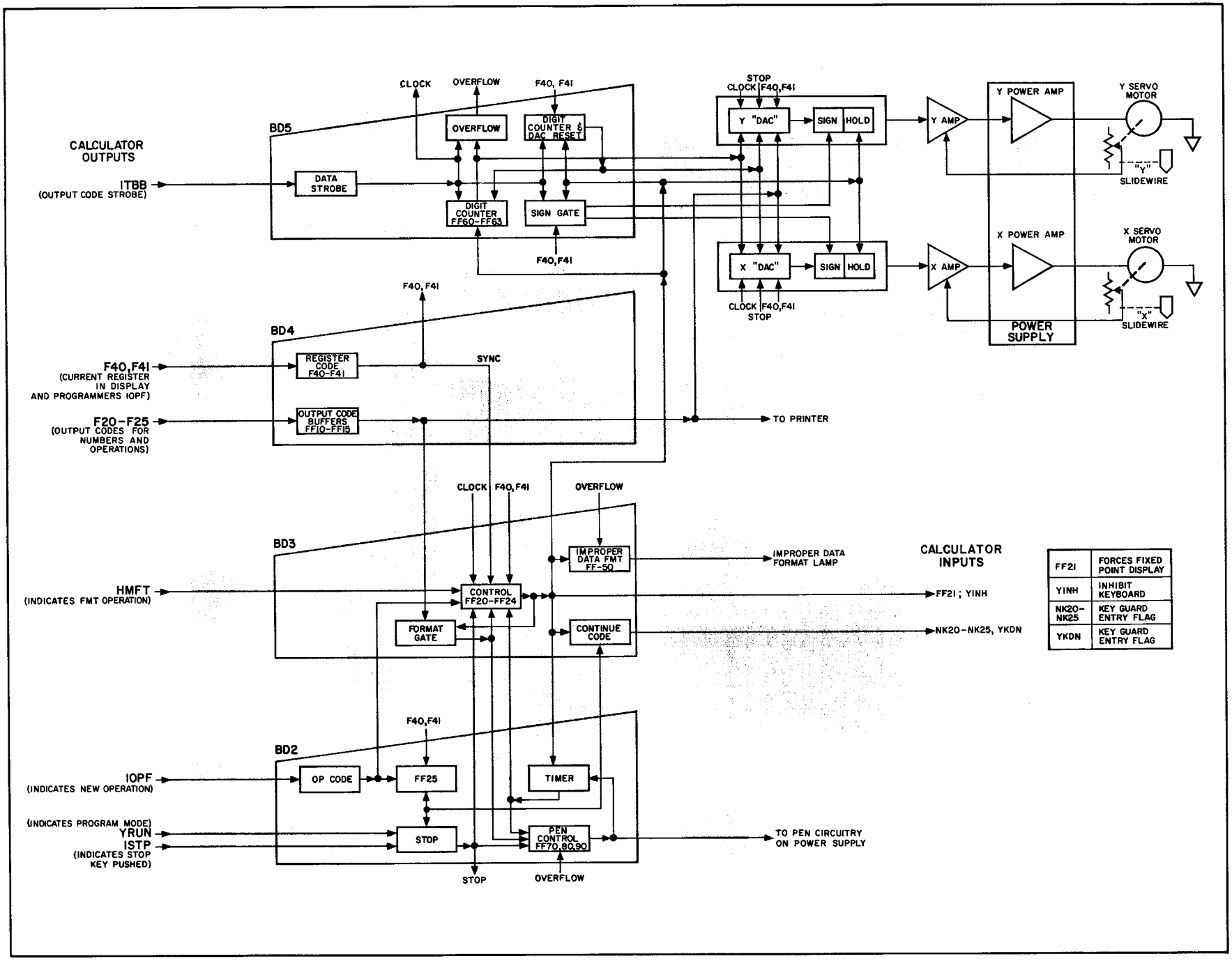



FIGURE 2-2. BLOCK DIAGRAM

the relative position of the serial digits in the appropriate decade of the DAC.

2-9. There are a pair of ITBB's for each character (including blanked zeros) except the decimal point for which the ITBB occurs only once. The first ITBB after F22 is set, increments the digit counter and places the first decimal digit in the 10° decade of the X DAC. The second ITBB merely increments the digit counter. Subsequent decimal digits are similarly stored and the digit counter is incremented for each ITBB. If a decimal point is encountered, the digit counter is reset along with the DAC currently being loaded. Only the digits to the left of the decimal point are of any interest and will remain loaded in the DAC. When a negative sign is encountered, it means the last digit was stored and the appropriate sign flip-flop is set (FFXS when F41 is false, and FFYS, when F41 is true). This reverses the analog input to the servo channel. If the digit counter reaches the state 1110, seven characters were encountered before or after the decimal point. This indicates an illegal data format. FF 50 is set and lights the Improper Data indicator; FF 70 is cleared so the pen will lift to keep the improper data from appearing on the graph. The beginning of a new register is indicated by the change of state of F41 at which time the digit counter is reset and the whole process starts again. When E40 goes false (F40 goes true) it indicates the start of the Z register. This means the X and Y coordinates are stored and the final, or plot, phase can begin.

2-10. FOURTH PHASE. As E40 goes false, it clears FF 21 and FF 22. The calculator is released from the mandatory fixed point display and the DAC's with the new coordinate are reconnected by the hold switches to the servo channel. FF 22 sets FF 24 which allows for a possible continue command to the calculator. FFTS is triggered and will hold off a new data point for at least 440 ms while the most recent coordinate is being plotted.

2-11. If E80 is true (F80 is false or cleared), the pen is up and the 650 ms timer (ETL) is enabled. When F21 clears and if F70 is true, FF 90 is set, which causes the pen to drop when the timers go true. If the FMT command was issued from the program when FF 24 is true, a continue command is issued. The FMT command is indicated by FF 25. The calculator now calculates the next point while the plotter moves to the coordinate just transferred. The four-phase cycle is then repeated.

# SECTION III

# MAINTENANCE, PERFORMANCE CHECKS, AND ADJUSTMENTS

## 3-1. INTRODUCTION

3-2. This section provides information for maintenance, performance testing, functional checks, and adjustment of the 9125B Calculator Plotter. Maintenance procedures, tests and adjustments will ensure that the instrument conforms to specifications. Functional checks maintain the instrument in an operational condition. If the instrument fails to meet specifications, or is inoperable, refer to Section V, Troubleshooting.

## 3-3. PREVENTIVE MAINTENANCE

3-4. GENERAL. The Model 9125B Calculator Plotter must be maintained properly to obtain accurate, trouble-free operation. This requires periodic lubrication, performance checks, and visual and electrical checks. In accordance with good maintenance procedures for all precision measuring instruments, Hewlett-Packard recorders should be protected from dust. Use furnished dust cover P/N 4040-0477, when not in use.

3-5. ENVIRONMENTAL OPERATION. This instrument is designed to operate over an ambient temperature range of 5°C to 55°C. Operation under other conditions will produce inaccurate results and may cause damage to the plotter. In areas with high humidity, graph paper may become distorted, affecting the accuracy of the grid lines. The area of operation should also be as free as possible of air contamination (soot, smoke, fumes, etc.). Excessive air contamination will require more frequent cleaning.

3-6. CLEANING. Thorough cleaning should be performed periodically. Intervals are determined by type of operation, local air contamination, and climatic conditions. Generally, under normal use and conditions, cleaning intervals should be nine to twelve months. Cleaning routine should include the following:

a. Remove platen and raise hinged top casting (see paragraph 3-15.

b. In inaccessible areas and where there is only dust accumulation, cleaning can be accomplished with an air gun. In more accessible areas and where air gun will not remove dirt, dust, or ink, accumulations should be removed with a sponge or cloth moistened in plain soap and warm water, then wiped dry.

c. Every eighteen to twenty-four months, gears should be cleaned thoroughly with a solvent and relubricated (recommended lubricant HP part number 6040-0272). Do not use soap or water on these components.

d. Platen should be cleaned as follows:

1. Carefully select a soap for cleaning. A mild liquid soap is preferable. Do not use any product with abrasives or corrosive chemicals; do not use solvents or silicone-based cleaners of any type.

2. Also be careful in selecting a cleaning cloth. Use a soft cloth that will not scratch the surface but will readily absorb water.

3. Saturate the cloth in warm, soapy water. Wring the cloth until the majority of the water has been removed.

4. Wipe the table surface with this damp cloth until the Autogrip table is clean.

**CAUTION**

Never let water stand on Autogrip surface. It may permanently damage the table.

5. Wipe any moisture from surface.

6. Allow a few minutes to dry before using.

e. Clean slidewires. See paragraph 3-7.

3-7 POTENTIOMETER CLEANING. Irregular or "jumpy" plots produced on a properly adjusted recorder may indicate worn or dirty balance potentiometers or wipers. To clean the potentiometers, spray the potentiometer and limit switch along their entire length with Slidewire Cleaner (Part No. 5080-3605). Rapidly move the carriage arm or pen carriage several full scale excursions. Spray the wipers directly with Slidewire Cleaner. Thoroughly saturate a Kimwipe

(Kimberly-Clark Type 900-S) or a cotton swab with Slidewire Cleaner. Rub the potentiometer (mandrel and return strip) and limit switch along their entire length, using the moistened tissue or swab (see Figure 3-1). Note any discoloration of the tissue or swab after rubbing. Repeat the cleaning procedure until there is no stain, then clean once more to ensure that all contaminants have been removed. After cleaning, the potentiometer (mandrel and return strip) and limit switch must be lubricated with the furnished Slidewire Lubricant (Part No. 5080-3635). This lubrication will reduce wear and chemical contamination of the assembly (see Figure 3-2). For access to the slidewire, see paragraph 3-15 b and c.

3-8. LUBRICATION. The Model 9125B is a precision instrument. Gears and other moving parts have very close tolerances. Lubricate gears sparingly; overlubrication may produce more friction than no lubrication. Intervals between periodic lubrication are determined by the type of operation, local air contamination, and climatic conditions. Generally, under normal use and conditions, the plotter should be lubricated every nine to twelve months. Relubricate completely every two years. All ball bearings are prelubricated by the manufacturer and require no further lubrication.

a. Apply a thin film of lubricant on X and Y drive gears (including idler gear). Recommended grease: HP 6040-0222.

**CAUTION**

Lubricant must not spill onto X-axis drive belt or cable, or Y-axis drive cable.

3-9. VISUAL INSPECTION. During periodic cleaning and lubrication, a planned visual inspection should be performed. The following general list can be used as a guide:

a. Check both X and Y drive gears for proper adjustment (minimal backlash), and any worn or damaged teeth.

b. Inspect X-axis drive cable pulleys for any binding.

c. Ensure that both servo motors are mounted securely.

d. Move pen carriage, listening for scrapes, grinding noises, etc., while feeling for any binding in movement. Repeat this procedure for carriage arm.

e. Check cables of both axes for evidence of fraying or rubbing.

f. A check of components should include inspection for evidence of overheating, loose connections, cracked circuit boards, etc.

## 3-10. PERFORMANCE TESTS

3-11. The following procedures test the plotter's performance for periodic evaluation, calibration, and troubleshooting.

3-12. TEST EQUIPMENT. Instruments and accessories required for adjusting and testing are listed in Table 3-1.

FIGURE 3-1. SLIDEWIRE CLEANING

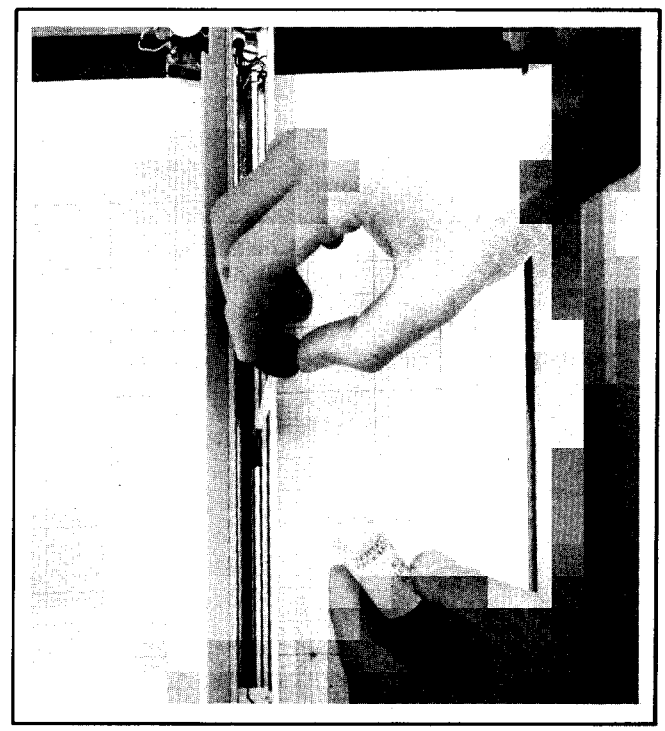


FIGURE 3-2. SLIDEWIRE LUBRICATION

TABLE 3-1. RECOMMENDED TEST EQUIPMENT

| |
|---|
| Model 140B Oscilloscope |
| Model 3460B Digital Voltmeter |
| Model 9100A or 9100B Calculator |
| Magnetic card with diagnostic program (Part No. 09125-90014) |

3-13. SYSTEM CHECK. The following procedure confirms the plotter is operating properly and is correctly installed:

a. Confirm 9100A/B Calculator is operating by executing calculator diagnostic routine (see page 5 of 9100 Operation and Programming Manual).

b. Place sheet of graph paper supplied with 9125B firmly against bottom paper guide and left edge paper stop. Set CHART RELEASE-HOLD switch to HOLD. Smooth paper to platen.

c. Calibrate plotter. See pull-out instruction card in plotter base.

d. Insert PLOTTER DIAGNOSTIC CARD into calculator's card reader.

NOTE

Same program is on both sides of diagnostic card.

e. On calculator:

1. Set OFF-POWER ON to POWER ON.
2. Set decimal wheel to 3.
3. Set PROGRAM-RUN to RUN.
4. Set RADIAN-DEGREES to DEGREES.
5. Set FLOATING-FIXED point to FIXED POINT.
6. Press END.
7. Press ENTER.
8. Press STOP.

f. On the Plotter, set the pen in the exact center of the paper using the ORIGIN controls.

g. On the Calculator:

1. Press END.
2. Press CONTINUE. The plot will be executed.

Proper execution of the program is indicated by plot as shown in Figure 3-3. The plot should be well formed, with the retraces having no more than 0.04 in. (1,0 mm) openings. The lines may exhibit some waviness or a slight oscillatory appearance, particularly at the ends. This waviness must not make the distance between outside edges of the line exceed one pen width plus 0.040 in. (1,0 mm). Should the plotter fail the diagnostic, refer to Section V of this manual.

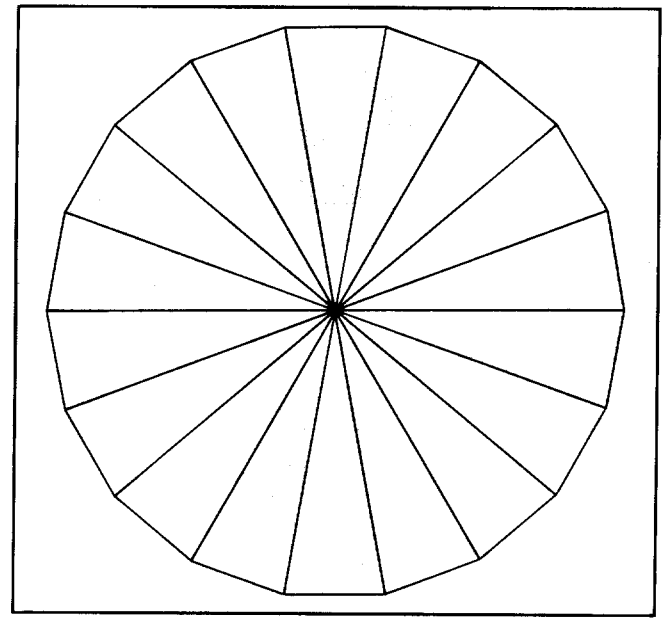


FIGURE 3-3. DIAGNOSTIC PLOT

## 3-14. MECHANICAL MAINTENANCE

3-15. GENERAL DISASSEMBLY. Access to the various components of the 9125B can be accomplished as follows:

a. Remove ac power cord.

b. Access to X axis slidewire and limit switch assembly is obtained by removing rear hood, which is held in place by two screws. To remove, turn each screw one full turn counterclockwise.

c. For access to Y-axis slidewire and limit switch assembly: 1) remove rear hood, 2) turn the black tab at upper end of scale 90° counterclockwise, 3) lift pen holder back to detent position and open slidewire cover.

d. Slidewire cover on the Y arm may be removed by pushing back on upper cover support with thin-bladed screwdriver (see Figure 3-4). This disengages cover and fully exposes Y axis slidewire limit switch and drive components.

e. Access to electronic components may be obtained by raising hinged top casting. Top and bottom castings are secured together by two screws located under bottom front lip of plotter.

f. X-axis drive system may be reached by removing recording platen as follows: 1) raise hinged top casting as outlined in step e; 2) remove Autogrip leads shown in Figure 3-5; 3) remove four No. 8-32 and two No. 6-32 mounting screws holding platen; 4) place carriage arm at far right of travel; 5) pull up on upper left hand corner of platen and slide platen out to left. Be sure to replace Autogrip leads when replacing platen.

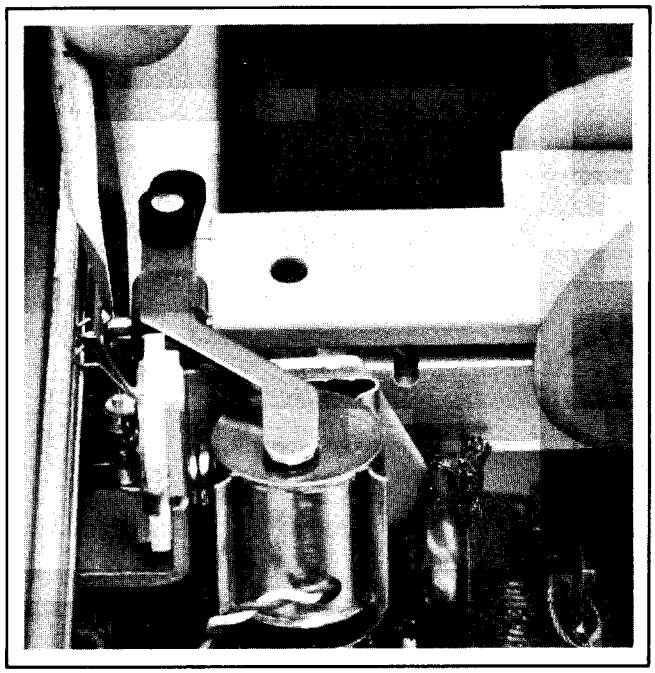


FIGURE 3-4. Y SLIDEWIRE COVER REMOVAL

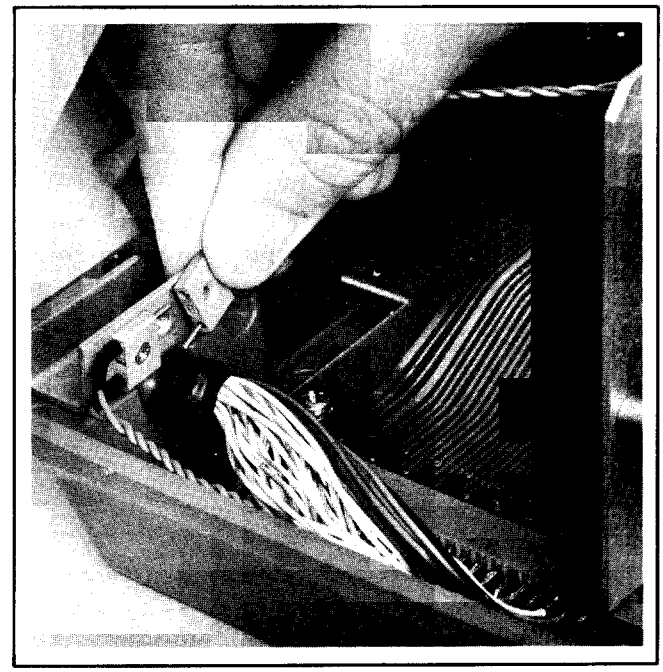


FIGURE 3-5. AUTOGRIP LEAD REMOVAL

g. To gain access to Y arm's lower slider block, remove paper alignment bar as follows: 1) raise hinged top casting as outlined in step e; 2) near front edge of top casting locate three No. 6-32 and three No. 8-32 screws - remove only the three No. 8-32 screws; 3) close top and carefully lift alignment bar up and out.

3-16. REMOVAL OF CARRIAGE ARM. The carriage arm may be removed for replacement or service as follows:

a. Remove pen from holder.

b. Remove rear hood.

c. Remove X-axis potentiometer to prevent its being damaged (see paragraph 3-22).

d. Release Y slidewire cover and remove from arm (see Figure 3-4).

e. The arm is held by two shouldered screws at upper end (see Figure 3-6a) and one screw at its lower end (see Figure 3-6b).

1. Remove screws (1), (2), and (3) and lift arm off of its motor block.

2. Lift arm up, separating it from lower carriage mount. Be careful not to damage wires connecting slidewire/limit switch assembly to motor block.

f. Reassemble carriage arm. Align Y axis. See paragraph 3-42.

3-17. REMOVAL OF PEN CARRIAGE. The pen carriage may be removed for replacement or service as follows:

a. Remove carriage arm from recorder as described in paragraph 3-16.

b. Remove nylon drive cord from around drive and return pulleys.

c. Remove retaining block and return pulley at lower end of carriage arm.

d. Slide carriage out of the arm.

e. Reassemble and adjust pen carriage as described in paragraph 3-38.

3-18. WIPER REPLACEMENT (Y-AXIS). The wiper is located on and is part of the pen carriage (Part No. 5080-8135). New carriage assemblies should be obtained from the local Sales/Service Office and installed as described in paragraph 3-17. When replacing the wiper/pen carriage assembly, care must be taken to avoid bending the wiper.

3-19. LIMIT SWITCH WIPER REPLACEMENT (Y-AXIS). The wiper for the limit switch is located on the pen carriage. New wiper assemblies should be obtained from the local Sales/Service Office and installed as described in the following paragraphs.

**CAUTION**

Damage to the limit switch may result if other than the factory-supplied wiper is used.

a. Remove carriage arm and pen carriage (see paragraphs 3-16 and 3-17).

b. Remove wiper assembly from pen block by removing No. 0-80 screw and nut.

c. Install new wiper (Part No. 09125-60110) using same screw and nut.

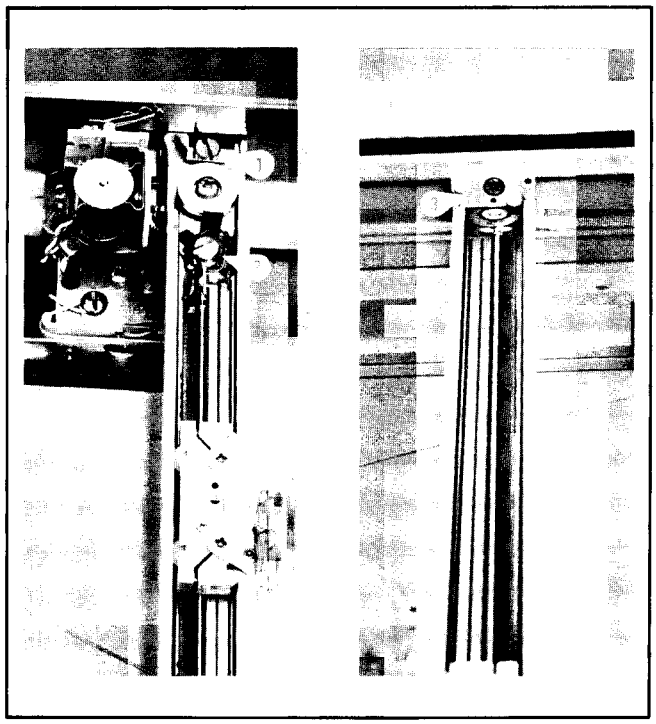


FIGURE 3-6. CARRIAGE ARM REMOVAL

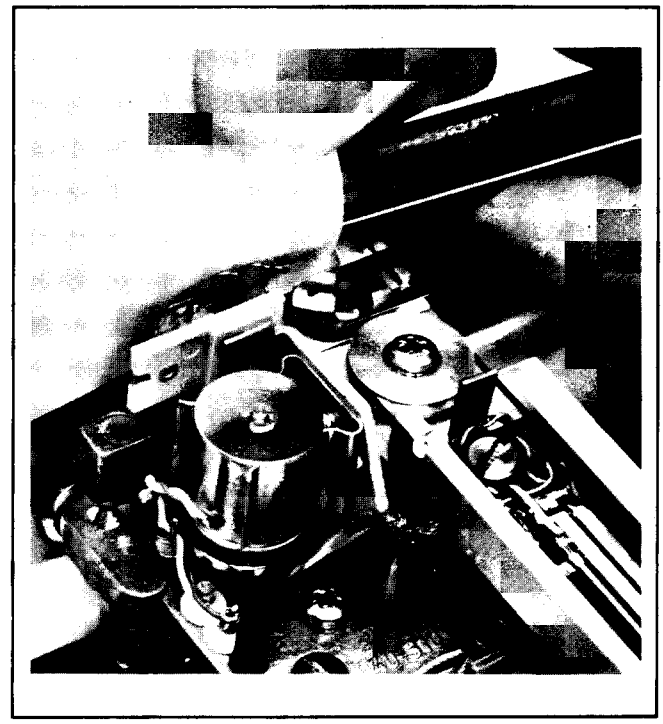


FIGURE 3-7. WIPER PROTECTION

d. Reassemble and adjust pen carriage per paragraph 3-38.

3-20. WIPER REPLACEMENT (X-AXIS). The wiper is located on the pen motor block at the upper end of the carriage arm. New wiper assemblies should be obtained from the local Sales/Service Office and installed as described below. When replacing the wiper, care must be taken to avoid bending the wiper.

**CAUTION**

Damage to the slidewire may result if other than the factory-supplied wiper is used.

a. Remove rear hood.

b. Snap pen lift solenoid out of its spring holder and remove holder by removing one mounting screw.

c. Remove wiper assembly mounting screw and install new wiper (Part No. 5080-8127). Protect slidewire using technique shown in Figure 3-7.

d. Reassemble holder and solenoid.

3-21. POTENTIOMETER REPLACEMENT (Y-AXIS). This unit is located in the carriage arm and is part of the carriage channel. The channel and potentiometer are replaced as one unit. Proceed as follows:

a. Remove carriage arm (see paragraph 3-16).

b. Remove all components, i. e., pen carriage, upper idler pulley, etc., from assembly (see paragraph 3-17).

c. Unsolder six wires, noting order in which leads connect to slidewire (see Figure 3-8).

d. To install new slidewire/limit switch and arm assembly (Part No. 5060-6536), pass bundle of leads through the small hole at top of arm and put arm assembly in place.

e. Install pen carriage.

f. Reinstall two fillister head screws at top taking care to also reinstall slidewire cover hinge and carriage stop.

g. Replace screw at bottom, securing it to lower slider block.

h. Resolder wires to the limit switch and slidewire.

i. Reinstall X-axis slidewire.

j. Reinstall X-axis wiper.

k. Reinstall Y-axis slidewire cover.

l. Check Y-axis alignment. Realign as necessary (see paragraph 3-42).

3-22. X-AXIS SLIDEWIRE/LIMIT SWITCH REPLACEMENT. The slidewire/limit switch assembly and their mounting channel are an integral unit and available only as a single item. Replace as follows:

a. Remove rear hood.

b. Remove wiper per paragraph 3-20.

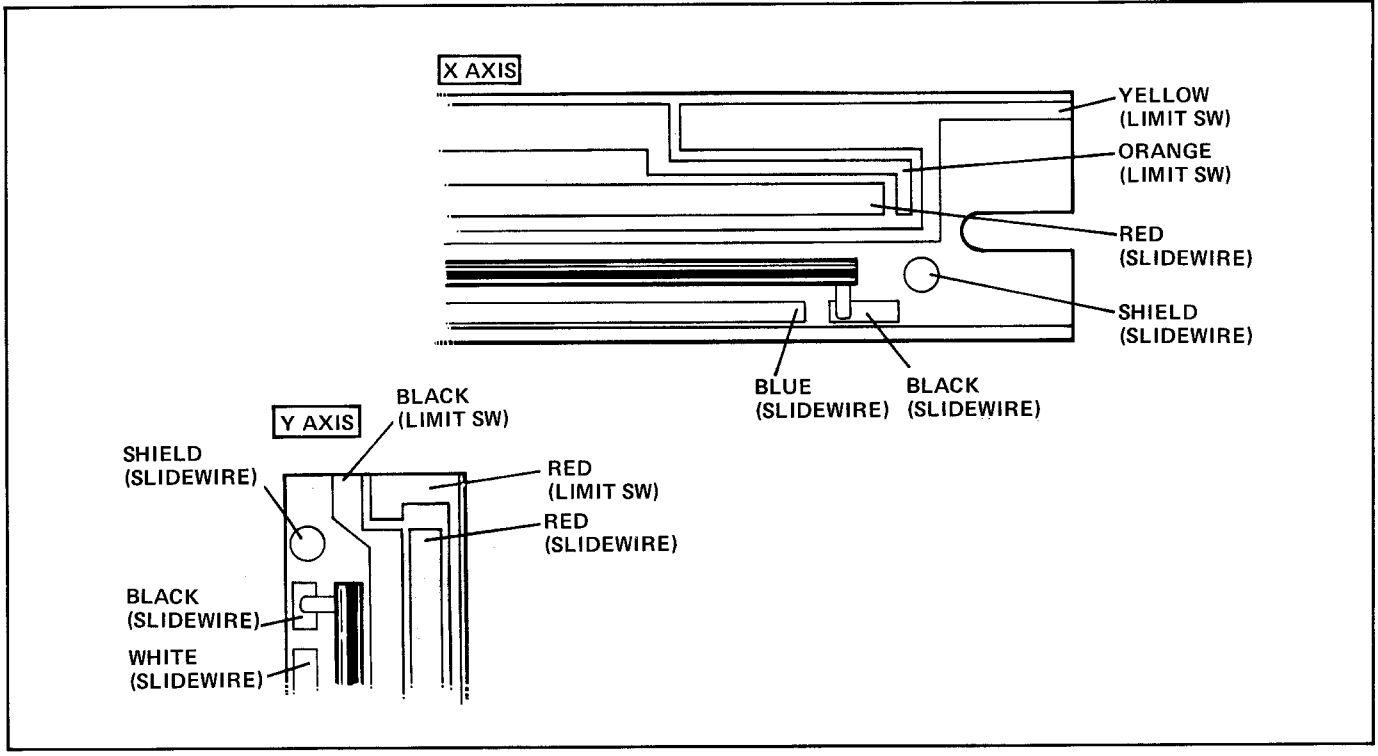



FIGURE 3-8. SLIDEWIRE LEAD CONNECTIONS

c. Unsolder six wires, noting the order in which leads connect to assembly (see Figure 3-8). Top two wires are for the limit switch, bottom four wires are for the slidewire.

d. Remove two screws mounting assembly to frame.

e. Lift assembly up and out.

f. Install new slidewire/limit switch assembly (Part No. 5060-6537). Secure it with two screws.

g. Resolder wires. When soldering, observe color codes and take extreme care not to bridge any gaps with solder.

3-23. Y-AXIS RESTRINGING.

3-24. MATERIAL REQUIRED: Y-axis cable assembly, Part No. 07005-60600.

3-25. Y-AXIS DRIVE STRING TENSION CHECK. The Y cable tension may be verified by measuring the force required to move the pen carriage downscale while the motor is locked. This required force shall be between the limits of 14 ounces and 20 ounces (see Figure 3-9).

3-26. Y-AXIS DRIVE STRING TENSION ADJUSTMENT. If the string tension is not correct, the string must be lengthened or shortened to attain the desired tension. This can be accomplished by removing the pen block from the pen arm and retying the knot on the end of the string (see paragraph 3-27).

3-27. RESTRINGING PROCEDURE. (Refer to Figure 3-10.)

a. Separate carriage arm from plotter and pen carriage from carriage arm. See paragraphs 3-16 and 3-17.

b. Install a new nylon drive cord assembly, consisting of a cable spring and nylon cord.

1. Attach free end of tension spring to hook on the pen carriage. Insert knotted end of cord in groove of pen block.

2. Slide pen carriage into carriage arm, making sure cable is between pen carriage and slidewire. Care should be taken not to damage wiper.

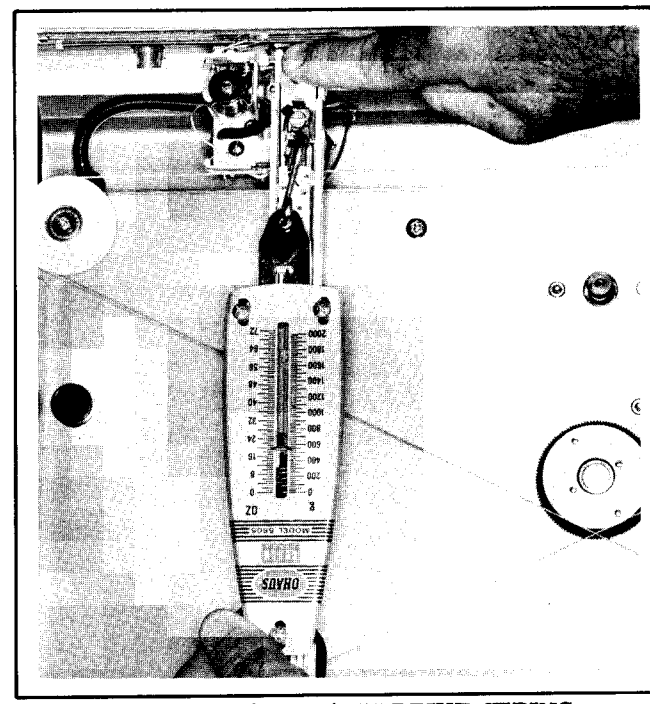



FIGURE 3-9. Y-AXIS DRIVE STRING TENSION CHECK

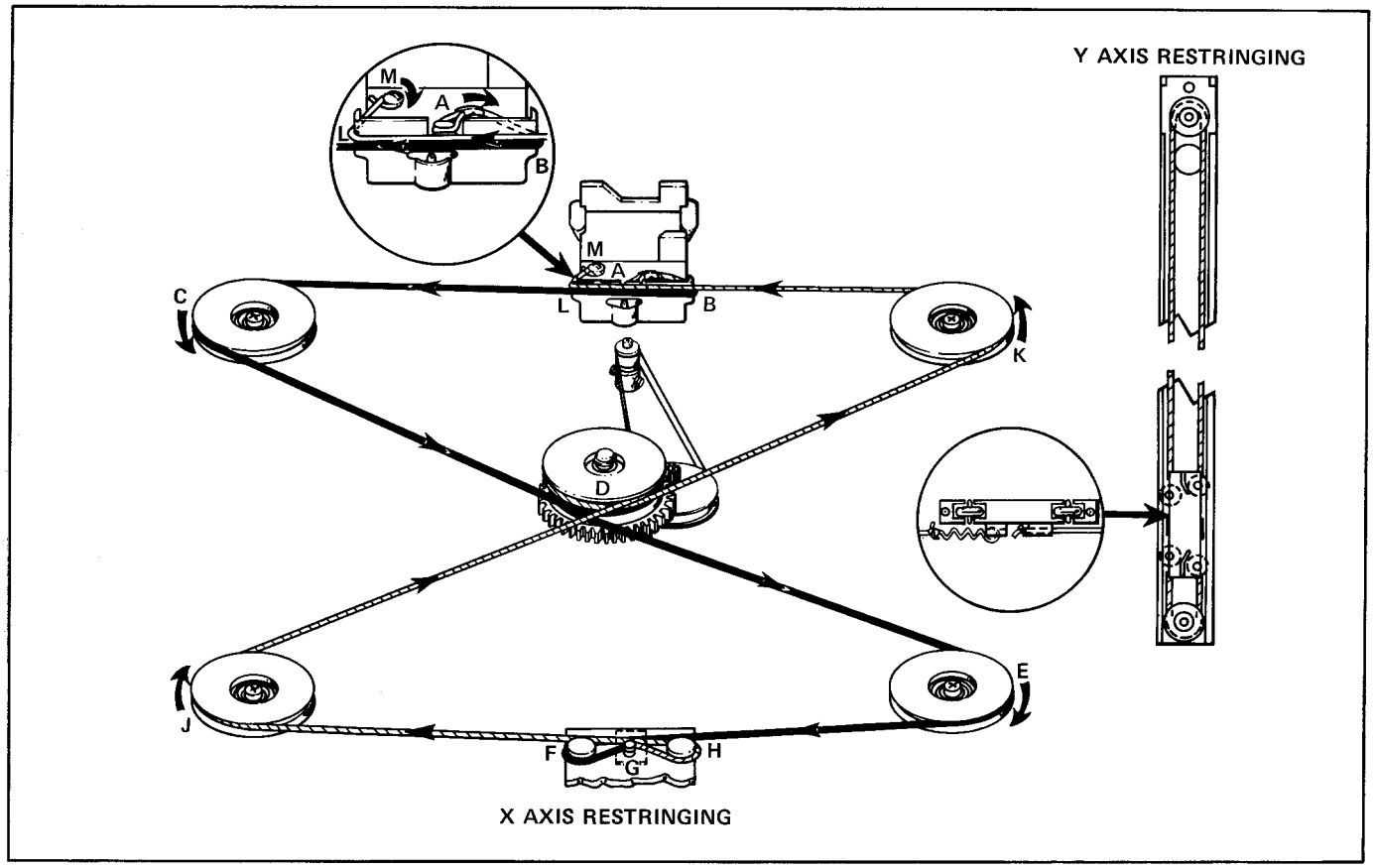



FIGURE 3-10. X AND Y AXES RESTRINGING

3. Loop cord around upper and lower pulleys.

4. Test for proper tension (see paragraph 3-25).

5. Reassemble remaining parts.

3-28. X-AXIS RESTRINGING.

3-29. DISASSEMBLY. When restringing the X-axis, the recording platen and paper alignment bar must be removed (see paragraph 3-15).

3-30. MATERIALS REQUIRED: X-axis stringing kit, Part No. 5080-7717.

3-31. RESTRINGING PROCEDURE. (Refer to Figure 3-10.)

a. Loosen screw securing stringing plate on lower slider bracket. Access to screw is accomplished by raising upper casting and positioning arm over the access hole in bottom plate.

b. Remove old cable and adjust bottom two pulleys (J and E, Figure 3-10) to their innermost position.

c. Secure the carriage arm in a convenient position to prevent movement.

d. Form a small loop of the new cable by inserting it through the cable crimp and doubling the end back.

e. Crimp cable crimp securely. This operation can be performed with a pair of dikes.

f. Place loop over stud in center of stringing bracket (Point A).

g. Pass cable around end of bracket (Point B) from back to front.

h. Pass cable across front of bracket to Pulley C and around Pulley C (1/2 turn) in a counterclockwise direction to Drive Sheave D.

i. Place one turn around Drive Sheave in a counterclockwise direction, passing cable under itself and continue to Pulley E.

j. Place 1/2 turn around Pulley E in a clockwise direction and continue to lower slider bracket.

k. Pass wire around stringing guide Point F (1/2 turn) in a counterclockwise direction, passing in front of Screw G while keeping it under plate and then around stringing Guide H (1/2 turn) in a counterclockwise direction.

l. Pass cable back across lower slider bracket passing over itself to Pulley J. Make 1/2 turn around Pulley J in a clockwise direction and continue to Drive Sheave D.

m. Make one turn around Drive Sheave in a counterclockwise direction, above previous turn, and passing cable under itself to Pulley K.

n. Make 1/2 turn around Pulley K in a counterclockwise direction, continuing to front of stringing bracket above cable already there, and around end of bracket (Point L) to screw M.

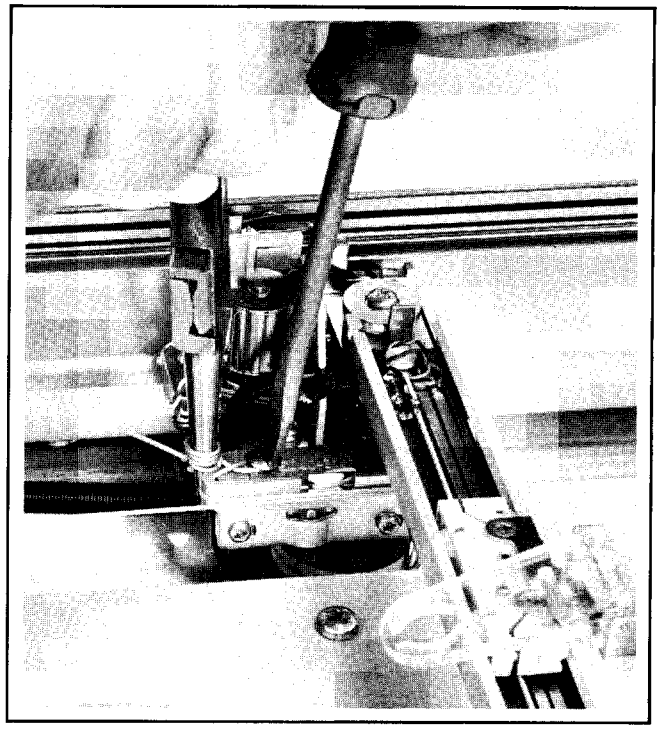


FIGURE 3-11. X-AXIS CABLE TIGHTENING

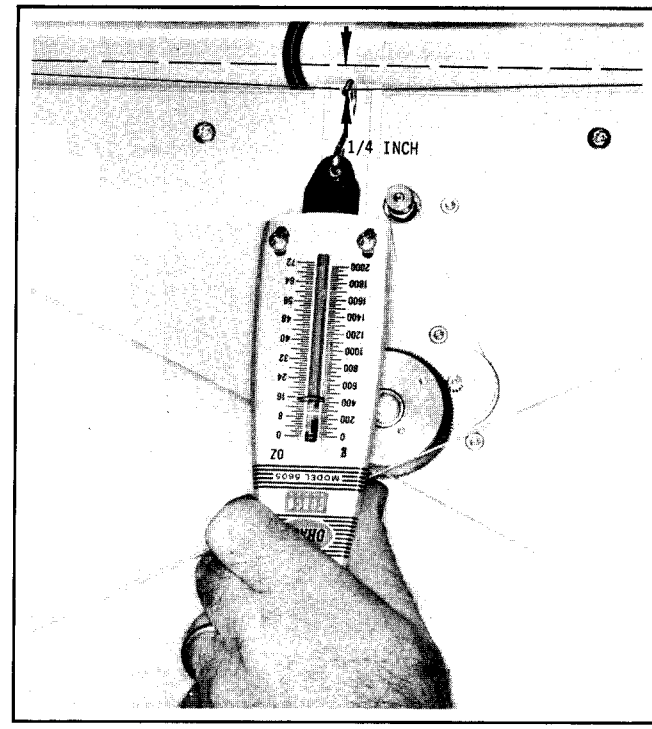



FIGURE 3-12. X-AXIS CABLE TENSION CHECK

o. Place one turn around screw M in a clockwise direction passing cable under itself.

p. Tighten screw lightly.

q. Make stringing taut. To make taut, grasp end of cable with a pair of long nose pliers placing several turns around end. Using motor block for support, continue wrapping cable around pliers until cable is taut (see Figure 3-11).

r. Tighten screw M securely and check tension per paragraph 3-32. Cut off remaining portion of cable leaving approximately 1/2 inch.

s. Replace paper alignment bar and platen.

t. Tighten screw G.

u. Align X-axis (para 3-43); align Y-axis (para 3-42).

3-32. X-AXIS CABLE TENSION CHECK. X cable tension should be verified by measuring the force required to displace it at a given distance. With the arm at the extreme right, measure the force required to displace the center of the longest span of the cable 1/4 inch past the vertical wall of the motor assembly trough. The measured force must be between the limits of 14 ounces and 18 ounces (see Figure 3-12).

3-33. X-AXIS CABLE TENSION ADJUSTMENT. X-axis cable tension can be adjusted by moving the two pulleys nearest the paper alignment bar in their elongated mounting holes. If enough adjustment is not present, restring the X-axis per paragraph 3-31.

3-34. X-AXIS MYLAR DRIVE BELT TENSION CHECK. The force required to move the carriage arm with the motor pulley held stationary should be between 6 and 7 pounds (see Figure 3-13). To adjust see paragraph 3-35, steps b, g, h, and i.

3-35. X-AXIS MYLAR BELT REPLACEMENT. The X-axis mylar belt may be replaced as follows:

a. Remove platen.

b. Raise hinged top casting and loosen screws holding motor and eccentric adjustment.

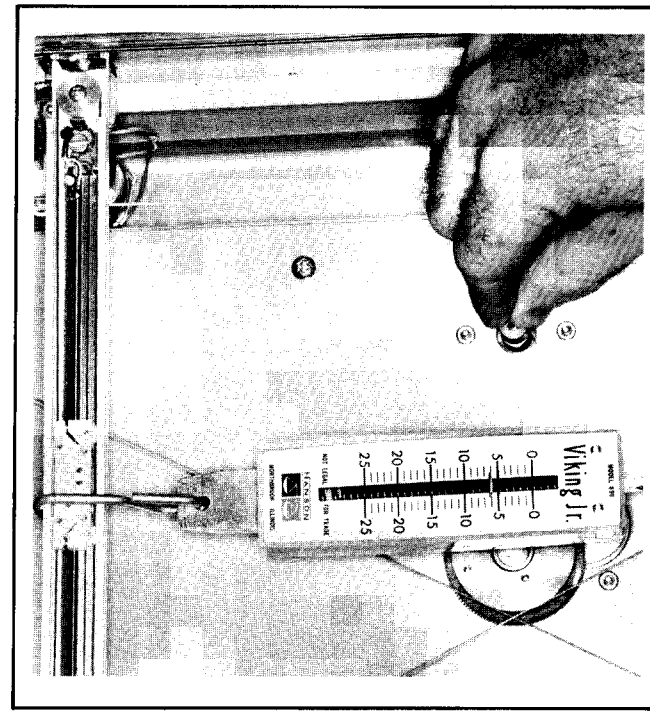



FIGURE 3-13. X-AXIS BELT TENSION CHECK

c. Loosen motor clamp screw and rotate motor until belt is as loose as possible.

d. Close top and lift belt off servo pulley.

e. Remove eccentric assembly and old belt.

f. Install new belt (Part No. 1500-0216) and replace eccentric assembly.

g. Readjust backlash (paragraph 3-41).

h. Tighten screw holding eccentric adjustment.

i. Turn plotter ON and pull X off null until the motor spins freely.

j. Adjust the motor position to achieve the proper belt tension (see paragraph 3-34).

k. Tighten motor screws.

l. Replace platen and rear hood.

3-36. X-AXIS DRIVE TRAIN BEARING REPLACEMENT (see Figure 3-14). To replace any of the X-axis drive bearings, the X-axis drive cable must be partially or completely removed, depending on which bearing is affected.

a. To replace a pulley bearing, proceed as follows:

1. Remove rear hood and platen.

2. Move pen carriage to its extreme position away from the affected pulley.

3. Apply masking tape to remaining pulleys and drive sheave so as to prevent cable from slipping off when tension is removed.

4. Raise hinged top casting.

5. While holding pulley nut on bottom side, remove No. 6-32 screw mounting pulley and remove pulley and its mounting stud.

6. Press out defective bearing and replace with a new bearing (Part No. 1410-0215).

7. Reassemble plotter, making sure that pulley is reinstalled with same side up.

8. Check cable tension per paragraph 3-32.

b. To replace drive sheave bearings, proceed as follows:

1. Remove rear hood and platen.

2. Remove X-axis drive cable.

3. Remove retaining ring and slip sheave/gear assembly upwards and off of stud.

4. Separate gear from sheave by removing four No. 2-56 pan head mounting screws.

5. Push one bearing out bottom of sheave and other out top of sheave and replace defective bearing(s) with new bearing(s) (Part No. 1410-0277).

6. Reassemble and restring X-axis (see paragraph 3-31).

7. Readjust backlash (paragraph 3-41).

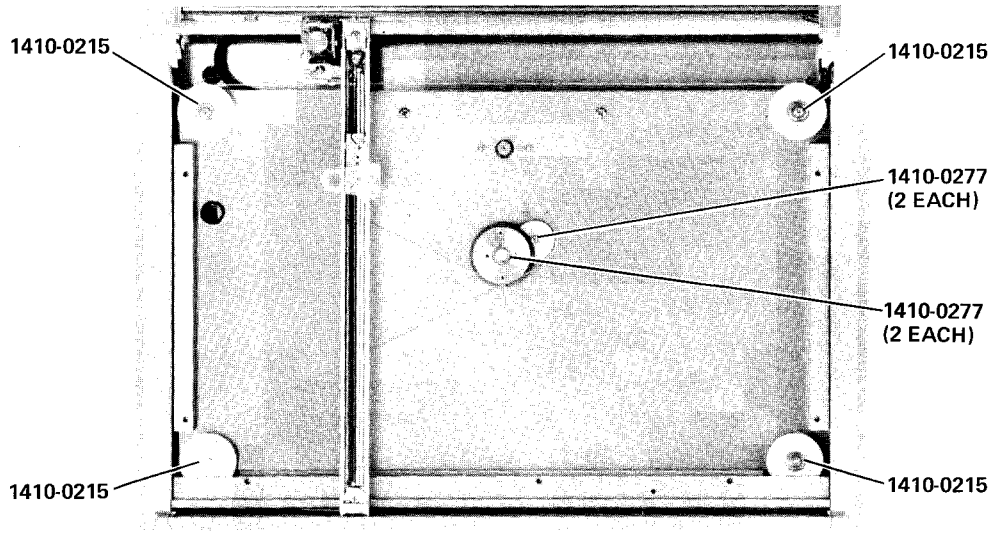



FIGURE 3-14. X-AXIS DRIVE TRAIN BEARING LOCATIONS

c. Replace belt pulley bearings as follows:

1. Remove rear hood and platen.

2. Raise top hinged casting.

3. Loosen motor clamping screws and rotate motor until the belt is as loose as possible.

4. Remove two clamps holding eccentric pulley housing, slip drive belt off of pulley and pull assembly out of its hole from bottom.

5. Remove retaining ring from belt pulley shaft and slide shaft out of housing.

6. Remove defective bearing(s) and replace with a new bearing (Part No. 1410-0277).

7. Reassemble and reinstall pulley and adjust belt tension.

8. Reassemble plotter.

## 3-37. MECHANICAL ADJUSTMENTS

3-38. Y-AXIS PEN CARRIAGE ADJUSTMENT.

a. Pen carriage rolls in carriage arm on four plastic rollers. To adjust rollers, remove rear hood, rotate black tab at upper end of scale 90° counterclockwise, pull pen holder back, and open scale. Move pen carriage to bottom of arm so that 2-56 setscrew in carriage is aligned with notch in side of arm (see Figure 3-16). Adjust setscrew to minimize side-play of carriage within arm.

b. Move pen block to the upper end of arm so as to align upper setscrew with notch at upper end of arm, and repeat operation.

NOTE

Care should be taken not to adjust out all side-play. This will cause mechanical drag and result in a poor trace.

3-39. Y-AXIS BACKLASH ADJUSTMENT. There are two gear meshes involved in the Y axis drive system. They must be adjusted in the proper sequence for best results. The backlash of the gear drive system may be adjusted as follows:

a. Remove rear hood.

b. Snap pen lift solenoid out of its holder.

c. Move arm to left until the rear adjusting setscrew at rear of motor block is in line with large access hole in rear wall.

d. Loosen gear locking screw in upper left corner of pen motor block.

e. Lightly pushing idler gear toward pen drive, turn adjusting screw in or out to attain minimum backlash between the two gears (see Figure 3-17).

f. Tighten gear locking screw.

g. Slightly loosen motor clamping screw located in center of motor block (Figure 3-15). Rotate motor slightly, first in one direction and then the other, while moving pen gear back and forth, until motor pinion rotates freely with minimum backlash. This procedure varies mesh between motor pinion and pen drive gear due to an eccentric mounting shoulder. A slight amount of backlash is desirable for optimum operation.

h. Tighten motor clamping screw and recheck for optimum backlash.

i. Reassemble plotter.

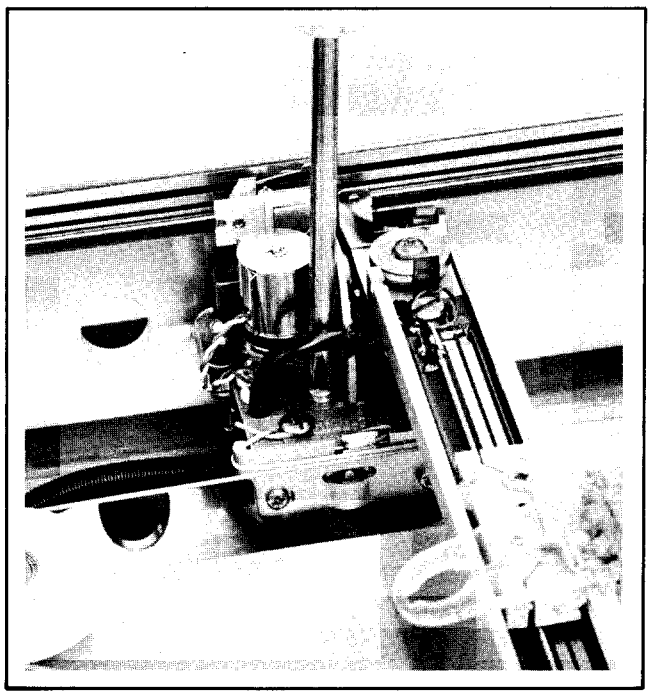


FIGURE 3-15. Y-AXIS MOTOR CLAMP SCREW

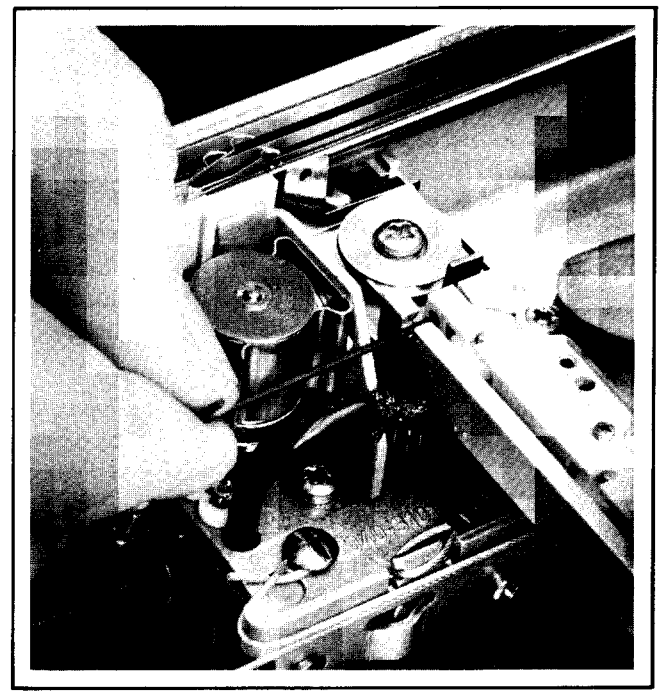


FIGURE 3-16. PEN CARRIAGE ADJUSTMENT

3-40. X-AXIS TRACK BEARING ADJUSTMENT. Adjustment of the X-axis track bearing is accomplished as follows:

a. Remove rear hood, and raise top casting.

**CAUTION**

Care must be taken not to damage power connectors or fuse holder when top is tilted too far back.

b. Move pen arm until it is opposite access slot in rear left corner of mechanical assembly (Figure 3-18).

c. Using a Phillips screwdriver, turn bearing adjusting screw until slight amount of clearance is detectable between 5 ball bearing rolls and track rod.

d. Reassemble recorder.

**CAUTION**

Do not overtighten this adjustment. This could result in bearing damage or failure.

3-41. X GEAR TRAIN BACKLASH ADJUSTMENT. Backlash is the amount of distance one gear tooth may move before encountering another gear face. The adjustment should accomplish minimal backlash with no binding. Backlash of the gear drive system may be adjusted as follows:

a. Remove platen.

b. Raise hinged top casting.

c. Loosen two screws securing the eccentric adjustment (Knurled Knob, Figure 3-19).

d. Move arm back and forth in short strokes and adjust eccentric by turning Knurled Knob until there is no discernible backlash. If backlash is too tight, a grinding sound will be evident when moving the arm a distance. If backlash is too loose a knocking or clicking sound will be apparent.

e. Recheck X belt tension (see paragraph 3-34).

f. Tighten screws and replace platen.

3-42. Y-AXIS ALIGNMENT. The Y axis may be aligned as follows:

a. Remove rear hood.

b. Raise hinged top casting and loosen screw securing stringing on lower slider bracket (Figure 3-10).

c. Loosen the two screws securing Y arm to motor block.

d. Install sheet of graph paper.

e. Place pen at 10 in. on Y and 7.5 in. on X.

f. Enter 0 in both registers of the 9100.

g. Press FMT ↓.

h. Enter 0 into X register and -5000 into Y register of 9100.

i. Press FMT ↓. Line drawn should not deviate from the Y axis grid lines (0.01 in. max). Move lower end of arm to right or left to effect alignment (see Figure 3-20).

j. Tighten screws on motor block and tighten screw securing stringing on lower slider bracket.

FIGURE 3-17. Y-AXIS GEAR TRAIN BACKLASH ADJUSTMENT

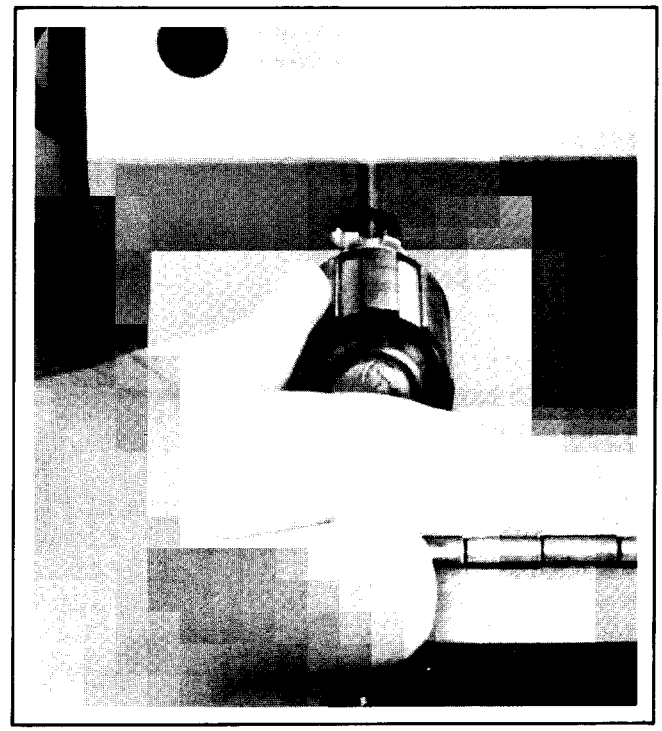


FIGURE 3-18. X-AXIS TRACK BEARING ADJUSTMENT

3-43. X-AXIS ALIGNMENT. The X-axis may be aligned as follows:

a. Loosen two end screws on paper alignment bar. Remove two No. 6-32 screws at bottom edge of platen and loosen the other four platen screws.

b. Place a sheet of graph paper on recorder.

c. Put pen at 0 in. on X axis and 5 in. on Y axis.

d. Enter 0 into both registers of 9100 and press FMT ↓.

e. Enter 7500 into X register of calculator, 0 into Y register and press FMT ↓. If line drawn is not parallel to X axis, move one end of paper alignment bar up or down to effect alignment (0.01 in. max). (See Figure 3-20.)

NOTE

If X alignment is changed, Y axis must be realigned.

## 3-44. PERFORMANCE CHECKS

3-45. INTRODUCTION. The following performance checks and adjustments are made with the 9125B coupled to a properly working 9100A or 9100B Calculator.

3-46. INSTRUMENT ON.

3-47. CONTROL SETTINGS.

a. Set the 9125B controls as follows:

| | |
|---|---|
| SERVO | STANDBY |
| ORIGIN (X & Y) | Mid-range (5 turns from clockwise stop) |
| SCALE VERNIER (X & Y) | Mid-range |
| CHART | RELEASE |

b. Set the 9100A/B controls as follows:

| | |
|---|---|
| POWER | OFF |
| RADIANS/DEGREES | DEGREES |
| FIXED/FLOATING | FLOATING |
| PROGRAM/RUN | RUN |
| DECIMAL DIGITS | 6 |

3-48. POWER APPLICATION. Turn the 9100A/B Calculator on. Check visually for indications of overheating and component failure.

3-49. FUNCTIONAL CHECK.

3-50. INSTALL PAPER. Place an 11 in. x 17 in. chart with a 10 in. x 15 in. (25 x 38 cm) grid chart on the plotting surface and set CHART to HOLD. Set SERVO to ON.

3-51. INITIAL POSITIONING. Press STOP. Pen should be near the center of the plotting surface. Horizontal and vertical servos should have a "tight notch."

3-52. ORIGIN SHIFT. Rotate ORIGIN controls over entire range. Pen should position anywhere on the plotting surface. Return pen to the center of the grid and depress PEN MANUAL DOWN switch several times to mark the origin of the plot. Observe that no movement occurs in either the X or Y axis as this switch is actuated.

3-53. CARRIAGE ADJUSTMENT CHECK. Adjust the ORIGIN controls over their entire range. Listen for unusually loud servo response, i.e., scraping, squeaking, or humming sounds. Pen should respond smoothly to a smooth adjustment of the ORIGIN controls.

3-54. INTERFACE AND CONTROL CIRCUITS.

a. Enter the Preliminary Functional Check Program A (Figure 3-21) into the 9100 Calculator.

b. Press END. Press CONTINUE.

c. Compare the plot obtained with Figure 3-22. The perimeter of the rectangle plotted should be located within each quadrant as indicated. Program should end with the pen up, positioned in the center as was set in paragraph 3-52. IMPROPER DATA light should be on.

3-55. POWER SUPPLY ADJUSTMENTS. Measure the power supply voltages with an HP 3460 Digital Voltmeter, monitoring the points indicated in Table 3-2.

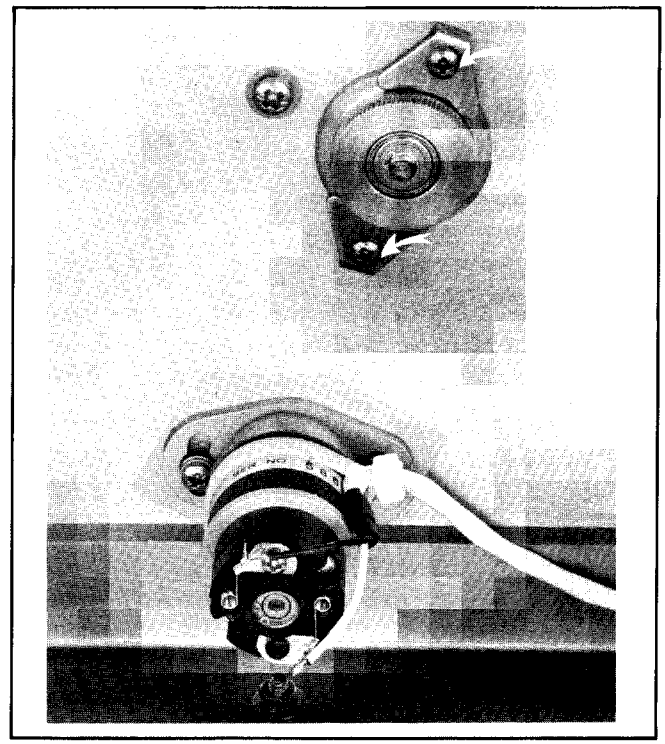


FIGURE 3-19. X-AXIS GEAR TRAIN BACKLASH ADJUSTMENT

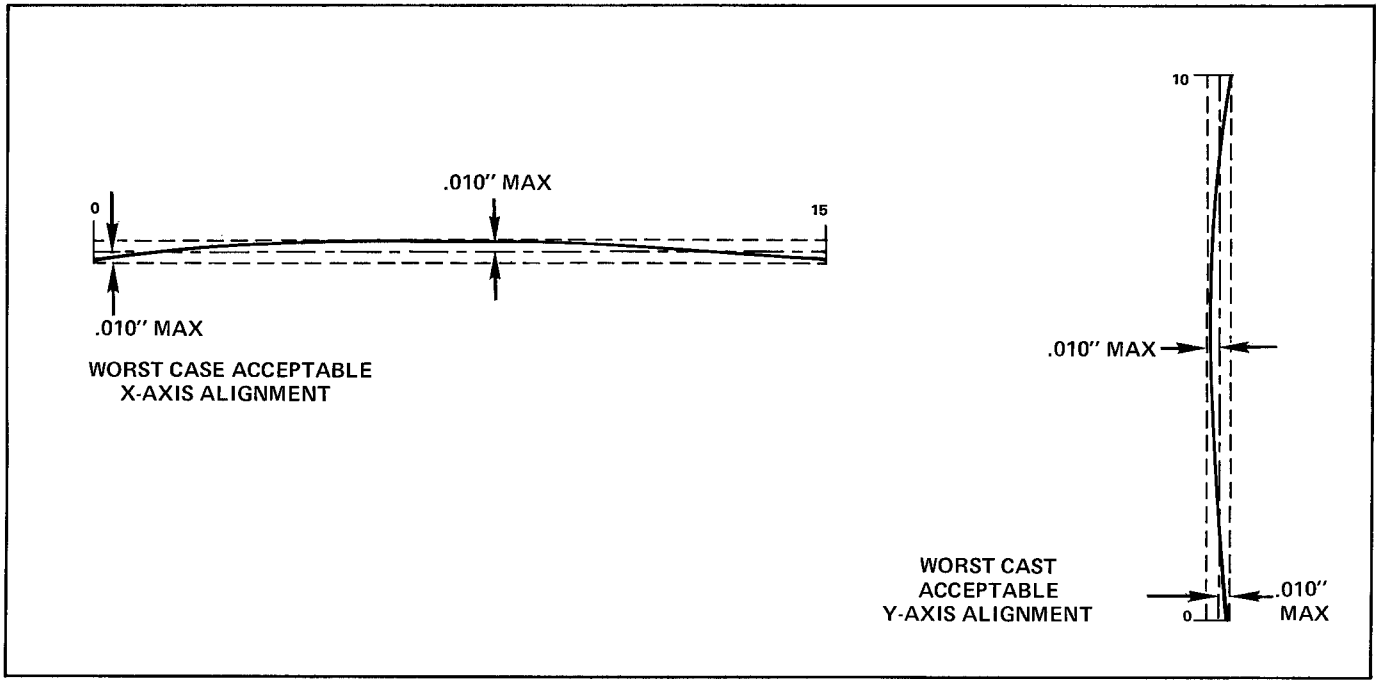



FIGURE 3-20. WORST CASE ACCEPTABLE ALIGNMENT (X-AXIS AND Y-AXIS)

3-56. SLIDEWIRE REFERENCE SUPPLY ADJUSTMENTS. Perform the following tests with the HP 3460B DVM monitoring the points indicated in Table 3-3. Set the SERVO switch to STANDBY. See Figures 3-23 and 3-24 for locations of test points and adjustments.

**CAUTION**

Use a floating ground on the DVM; polarity is not important.

3-57. TIMER ADJUSTMENTS. Measure the timer intervals with HP 140B Scope. Trigger the scope on the negative edge of the indicated timer output and measure the interval to the next positive edge.

3-58. SHORT TIMER.

a. Enter the Timer Program (Figure 3-25) into the calculator.

b. Press END.

c. Press CONTINUE.

d. Monitor the short timer output at test point FTS relating to ground on same circuit board, and adjust the interval to 410 ms ±10 ms, using A2R15 (see Figure 3-23).

3-59. LONG TIMER. Monitor the long timer output at test point FTL and adjust the interval to 665 ms ±15 ms, using A2R5 (see Figure 3-23).

3-60. DAC ALIGNMENT.

a. The DAC alignment will be accomplished by entering the DAC alignment program (Figure 3-26) into the calculator. Press END.

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | FMT | 42 |
| 0-2 | ↓ | 25 |
| 0-3 | FMT | 42 |
| 0-4 | ↑ | 27 |
| 0-5 | 1 | 02 |
| 0-6 | 5 | 00 |
| 0-7 | 0 | 00 |
| 0-8 | 0 | 00 |
| 0-9 | CH SIGN | 32 |
| 0-a | ↑ | 27 |
| 0-b | CH SIGN | 32 |
| 0-c | FMT | 42 |
| 0-d | ↓ | 25 |
| 1-0 | ↑ | 27 |
| 1-1 | FMT | 42 |
| 1-2 | ↓ | 25 |
| 1-3 | CH SIGN | 32 |
| 1-4 | FMT | 42 |
| 1-5 | ↓ | 25 |
| 1-6 | ↑ | 27 |
| 1-7 | FMT | 42 |
| 1-8 | ↓ | 25 |
| 1-9 | CH SIGN | 32 |
| 1-a | FMT | 42 |
| 1-b | ↓ | 25 |
| 1-c | ENT EXP | 26 |
| 1-d | 6 | 06 |
| 2-0 | ↑ | 27 |
| 2-1 | FMT | 42 |
| 2-2 | ↓ | 25 |
| 2-3 | END | 46 |

FIGURE 3-21. PRELIMINARY FUNCTIONAL CHECK PROGRAM A

TABLE 3-2. POWER SUPPLY ADJUSTMENTS

| SUPPLY | MONITOR | ADJUSTMENT | OUTPUT LIMITS |
|---|---|---|---|
| -15 V<br>+6.2 V<br>-2.5 V | A1 (-15 V)<br>A1 (6.2 V) | A10R11<br>-<br>- | -15 Vdc ±0.1 Vdc<br>+6.2 Vdc ±0.62 Vdc<br>-2.5 Vdc ±0.25 Vdc |
| Above referenced to digital ground, A1 (ground). See Figure 3-23. | | | |
| -9 V (X DAC)<br>-9 V (Y DAC) | A6 (-9 V)<br>A7 (-9 V) | A6R197<br>A7R197 | -9 Vdc ±0.01 Vdc<br>-9 Vdc ±0.01 Vdc |
| Above referenced to the respective DAC ground buss. See Figure 3-23. | | | |
| -30 V (X Amp)<br>+30 V (X Amp)<br>-30 V (Y Amp)<br>+30 V (Y Amp) | A8 (-30V)<br>A8 (+30V)<br>A8 (-30V)<br>A8 (+30V) | -<br>-<br>-<br>- | -29.4 Vdc ±3.0 Vdc<br>+29.4 Vdc ±3.0 Vdc<br>-29.4 Vdc ±3.0 Vdc<br>+29.4 Vdc ±3.0 Vdc |
| Above referenced to the respective axis amplifier common (see Figures 3-23 and 3-24). | | | |

TABLE 3-3. SLIDEWIRE REFERENCE SUPPLY ADJUSTMENT

| ORIGIN CONTROL AND SETTING | MONITOR | ADJUSTMENT | OUTPUT LIMITS |
|---|---|---|---|
| Extreme CCW | A9 (S.W.) | A9R42 | 2.26 Vdc ± 0.003 Vdc |
| Extreme CW | A9 (S.W.) | A9R43 | 2.26 Vdc ± 0.003 Vdc |
| Extreme CCW | A8 (S.W.) | A8R55 | 3.24 Vdc ± 0.003 Vdc |
| Extreme CW | A8 (S.W.) | A8R56 | 3.24 Vdc ± 0.003 Vdc |

TABLE 3-4. X DAC ALIGNMENT

| STEP | CONTENTS OF X AND Y DISPLAY REGISTER | ALIGNMENT INSTRUCTION (SEE FIGURE 3-22) |
|---|---|---|
| 1 | 0 | Adjust A6R6 for 0 Vdc ±60 μV DAC output. |
| 2 | 999 | Record DAC output. |
| 3 | 1000 | Adjust A6R198, 1000 F/F, for DAC output of previous step +400 μV ±100 μV. |
| 4 | Repeat step 2 | Repeat step 2. |
| 5 | Repeat step 3 | Repeat step 3. |
| 6 | 1999 | Record DAC output. |
| 7 | 2000 | Adjust A6R10, 2000 F/F, for DAC output of previous step +400 μV ±100 μV. |
| 8 | Repeat step 6 | Repeat step 6. |
| 9 | Repeat step 7 | Repeat step 7. |
| 10 | 3999 | Record DAC output. |
| 11 | 4000 | Adjust A6R8, 4000 F/F, for DAC output of previous step +400 μV ±100 μV. |
| 12 | | Repeat steps 1, 2, 3, 6, 7, 10, and 11 to verify alignment. |

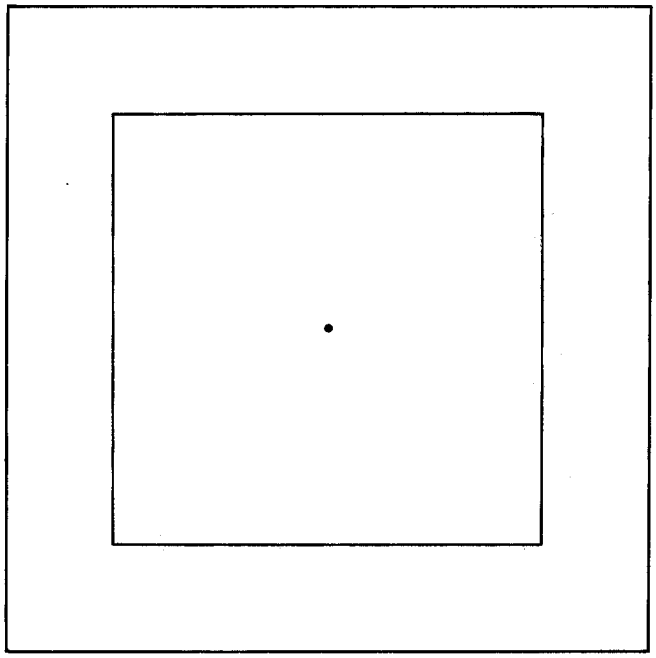


FIGURE 3-22. FUNCTIONAL CHECK GRAPH PROGRAM A

b. Use the 3460 DVM to make all DAC output voltage measurements. Connect the negative lead to CW terminal (see Figure 3-23) and positive lead to the ground buss on the appropriate DAC.

c. The sequence of steps 1 through 12 indicated in Table 3-4 will be provided by the program. Advancement to the indicated transfer may be accomplished by pressing SET FLAG and then CONTINUE until the desired transfer point is reached. The transfer may be repeated as required by pressing CONTINUE. After step 12, the program returns to step 1 and may be repeated as required.

3-61. X DAC ALIGNMENT. Table 3-4 shows the steps necessary for X DAC alignment.

3-62. Y DAC ALIGNMENT. Repeat procedures as in Table 3-4 for the Y DAC. Change adjustment prefix from A6R--- to A7R---.

3-63. VECTOR GENERATION ALIGNMENT.

NOTE

Filter adjustments (T1, T2, T3) are factory-adjusted only. If seal is broken on T1, T2, or T3, replace entire board (A9).

3-64. DEADBAND VERIFICATION.

a. Set the 9125B and 9100A/B controls as indicated in paragraph 3-47.

b. Check the X-axis deadband by carefully moving the carriage away from its null position approximately 1/8 inch and then allowing the servo amplifier to again seek its null. Place some pressure on the carriage to provide a slow return to null rather than a sudden step-function return.

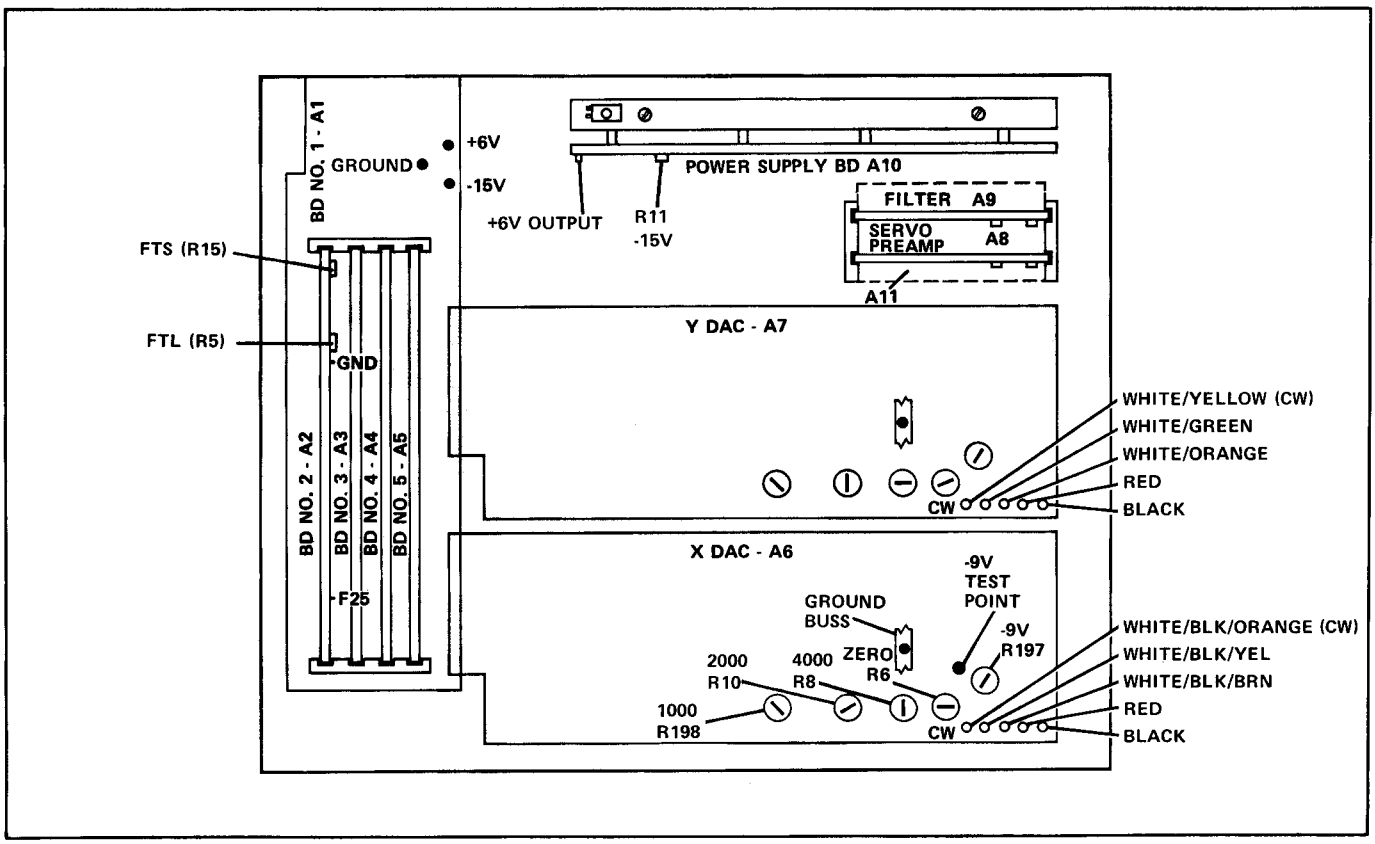



FIGURE 3-23. CARD LOCATION GUIDE

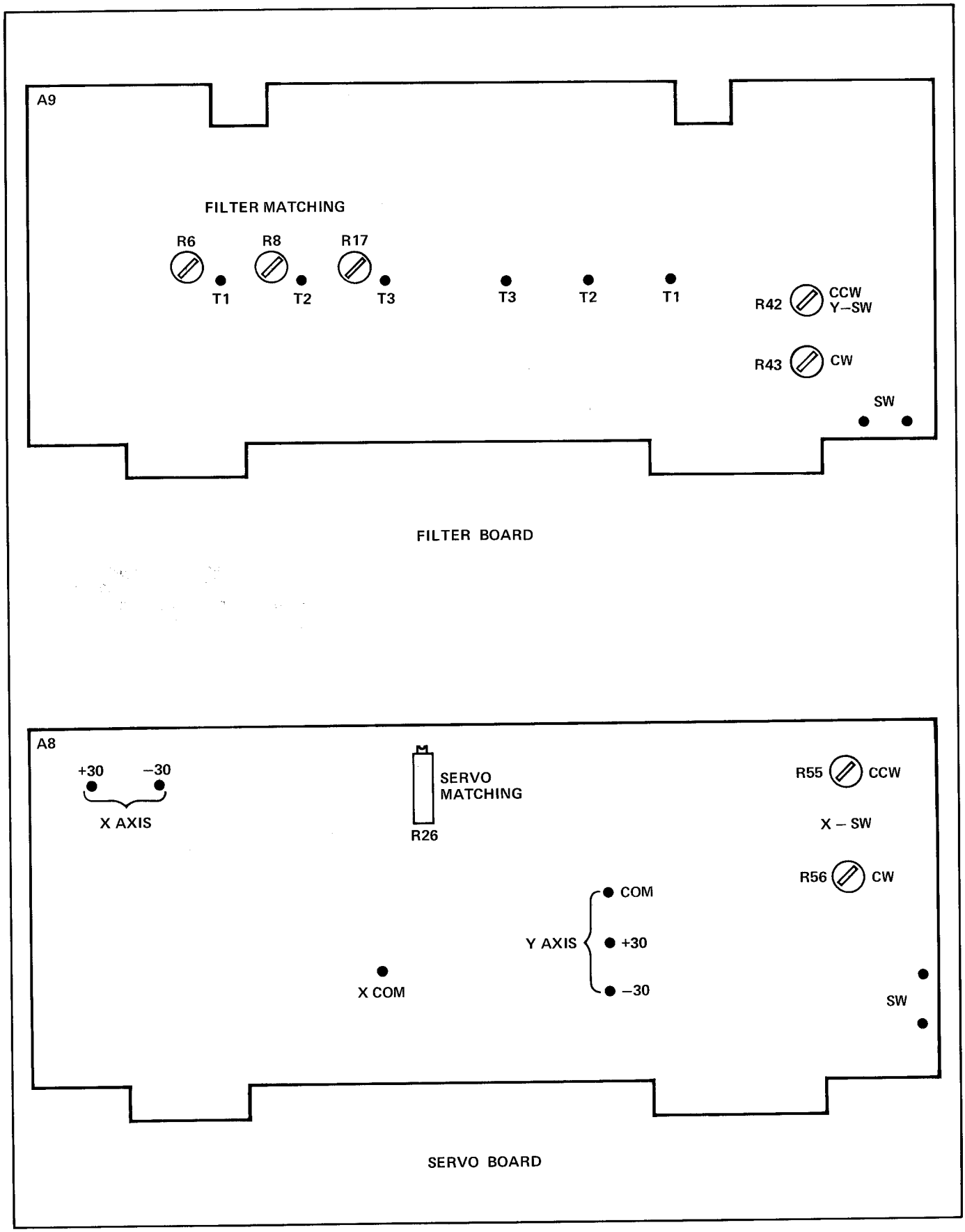



FIGURE 3-24. FILTER AND SERVO PREAMP BOARDS

c. Draw a reference line of this X position by using the Y axis ORIGIN control.

d. Repeat steps b and c while displacing the carriage in the opposite direction.

e. Repeat the above steps several times in each direction and then observe the total displacement between adjoining segments. This displacement must be within ±0.005 inch.

f. Repeat the above procedure for the Y axis, using the X ORIGIN control to provide the reference lines.

3-65. VECTOR ALIGNMENT PRELIMINARY. Set the control settings as follows:

a. Press STOP.

b. Press END.

c. Enter Vector Alignment Program (Figure 3-27) into the calculator.

d. Set the ORIGIN controls for Y = 1 inch, X = 1 inch.

3-66. SERVO MATCHING.

a. Press CONTINUE.

b. Adjust A8R26 on Servo Preamp board to close retrace plot. One retrace plot will be drawn each time CONTINUE is pressed.

c. As the retrace closes, additional resolution will be required to accomplish specified accuracy. This may be obtained from the program by pressing SET FLAG and then CONTINUE.

d. CONTINUE may now be pressed to provide adjacent parallel lines which may be compared as final adjustment is accomplished.

e. Final adjustment is complete when maximum spread of retrace lines is within ±0.020 inch plus one pen width.

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | FMT | 42 |
| 0-2 | ↓ | 25 |
| 0-3 | FMT | 42 |
| 0-4 | ↑ | 27 |
| 0-5 | GO TO | 44 |
| 0-6 | 0 | 00 |
| 0-7 | 0 | 00 |
| 0-8 | END | |

FIGURE 3-25. TIMER PROGRAM

3-67. ACCURACY.

a. Enter the Accuracy Test Program (Figure 3-28) into the calculator.

b. Press CONTINUE; the pen will go to the origin and drop. Set the ORIGIN controls so the pen is exactly at 0, 0 (lower left corner).

c. Press CONTINUE; the pen will go to full scale. Set the SCALE VERNIER controls so that the pen is exactly at the grid marks at the upper left corner.

d. Press CONTINUE; the pen will drop and mark a point at each major grid division. The point should be at the major division ±0.030 inch.

3-68. FUNCTIONAL TEST.

3-69. CONTROL SETTINGS. Set the control settings as follows:

a. Set ORIGIN to lower left corner of plot.

b. Enter 5000 into the 9100A/B X and Y registers.

c. Press FMT↑.

d. Adjust SCALE VERNIER to align pen with the Y = 10 in. and X = 10 in. coordinate.

3-70. FINAL TEST.

a. Press STOP.

b. Press END.

c. Enter Functional Test Program B (Figure 3-29) into the calculator.

d. Set ORIGIN to X = 7.5 in., Y = 5 in.

e. Press CONTINUE.

f. Enter 2000 into the calculator X register.

g. Press CONTINUE.

h. The resulting plot should have a radius of 4 inches. All spokes should extend to the adjacent chord intercepts. The spoke retrace patterns should overlay one another with a maximum spread of ±0.040 inches plus one pen width.

i. Enter 1500 into X register.

j. Set the X ORIGIN to 7.0 in.

k. Press CONTINUE.

l. The resulting plot should resemble that of Figure 3-30. Observe that the maximum spread of the retrace pattern forming the sides of the diamond does not exceed 0.040 in. and that end points are within 0.010 in. (see Figure 3-30).

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | FMT | 42 |
| 0-2 | ↑ | 27 |
| 0-3 | STOP | 41 |
| 0-4 | 9 | 11 |
| 0-5 | 9 | 11 |
| 0-6 | 9 | 11 |
| 0-7 | ↑ | 27 |
| 0-8 | FMT | 42 |
| 0-9 | ↑ | 27 |
| 0-a | STOP | 41 |
| 0-b | 1 | 01 |
| 0-c | ENT EXP | 26 |
| 0-d | 3 | 03 |
| 1-0 | ↑ | 27 |
| 1-1 | FMT | 42 |
| 1-2 | ↑ | 27 |
| 1-3 | STOP | 41 |
| 1-4 | IF FLAG | 43 |
| 1-5 | 1 | 01 |
| 1-6 | a | 13 |
| 1-7 | GO TO | 44 |
| 1-8 | 0 | 00 |
| 1-9 | 4 | 04 |
| 1-a | 1 | 01 |
| 1-b | 9 | 11 |
| 1-c | 9 | 11 |
| 1-d | 9 | 11 |
| 2-0 | ↑ | 27 |
| 2-1 | FMT | 42 |
| 2-2 | ↑ | 27 |
| 2-3 | STOP | 41 |
| 2-4 | 2 | 02 |
| 2-5 | ENT EXP | 26 |
| 2-6 | 3 | 03 |
| 2-7 | ↑ | 27 |
| 2-8 | FMT | 42 |
| 2-9 | ↑ | 27 |
| 2-a | STOP | 41 |
| 2-b | IF FLAG | 43 |
| 2-c | 3 | 03 |
| 2-d | 3 | 03 |
| 3-0 | GO TO | 44 |
| 3-1 | 1 | 01 |
| 3-2 | a | 13 |
| 3-3 | 3 | 03 |
| 3-4 | 9 | 11 |
| 3-5 | 9 | 11 |
| 3-6 | 9 | 11 |
| 3-7 | ↑ | 27 |
| 3-8 | FMT | 42 |
| 3-9 | ↑ | 27 |
| 3-a | STOP | 41 |
| 3-b | 4 | 04 |
| 3-c | ENT EXP | 26 |
| 3-d | 3 | 03 |
| 4-0 | ↑ | 27 |
| 4-1 | FMT | 42 |
| 4-2 | ↑ | 27 |
| 4-3 | STOP | 41 |
| 4-4 | IF FLAG | 43 |
| 4-5 | 0 | 00 |
| 4-6 | 0 | 00 |
| 4-7 | GO TO | 44 |
| 4-8 | 3 | 03 |
| 4-9 | 3 | 03 |
| 4-a | END | |

FIGURE 3-26. DAC ALIGNMENT PROGRAM

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | FMT | 42 |
| 0-2 | ↓ | 25 |
| 0-3 | 2 | 02 |
| 0-4 | 0 | 05 |
| 0-5 | 0 | 00 |
| 0-6 | 0 | 00 |
| 0-7 | ↑ | 27 |
| 0-8 | FMT | 42 |
| 0-9 | ↓ | 25 |
| 0-a | CLR | 20 |
| 0-b | FMT | 42 |
| 0-c | ↓ | 25 |
| 0-d | STOP | 41 |
| 1-0 | IF FLAG | 43 |
| 1-1 | 1 | 01 |
| 1-2 | 6 | 06 |
| 1-3 | GO TO | 44 |
| 1-4 | 0 | 00 |
| 1-5 | 0 | 00 |
| 1-6 | CLR | 20 |
| 1-7 | ACC + | 60 |
| 1-8 | RCL | 61 |
| 1-9 | X⇄Y | 30 |
| 1-a | 0 | 00 |
| 1-b | X⇄Y | 30 |
| 1-c | FMT | 42 |
| 1-d | ↓ | 25 |
| 2-0 | STOP | 41 |
| 2-1 | ↑ | 27 |
| 2-2 | 2 | 02 |
| 2-3 | 0 | 05 |
| 2-4 | 0 | 00 |
| 2-5 | 0 | 00 |
| 2-6 | + | 33 |
| 2-7 | X⇄Y | 30 |
| 2-8 | FMT | 42 |
| 2-9 | ↓ | 25 |
| 2-a | RCL | 61 |
| 2-b | X⇄Y | 30 |
| 2-c | 0 | 00 |
| 2-d | X⇄Y | 30 |
| 3-0 | FMT | 42 |
| 3-1 | ↓ | 25 |
| 3-2 | 2 | 02 |
| 3-3 | 5 | 05 |
| 3-4 | 0 | 00 |
| 3-5 | ↑ | 27 |
| 3-6 | PAUSE | 57 |
| 3-7 | PAUSE | 57 |
| 3-8 | GO TO | 44 |
| 3-9 | 1 | 01 |
| 3-a | 7 | 07 |
| 3-b | END | |

FIGURE 3-27. VECTOR ALIGNMENT PROGRAM

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | FMT | 42 |
| 0-2 | ↓ | 25 |
| 0-3 | STOP | 41 |
| 0-4 | 5 | 05 |
| 0-5 | 0 | 00 |
| 0-6 | 0 | 00 |
| 0-7 | 0 | 00 |
| 0-8 | ↑ | 27 |
| 0-9 | 7 | 07 |
| 0-a | 5 | 05 |
| 0-b | 0 | 00 |
| 0-c | 0 | 00 |
| 0-d | FMT | 42 |
| 1-0 | ↑ | 27 |
| 1-1 | FMT | 42 |
| 1-2 | ↓ | 25 |
| 1-3 | STOP | 41 |
| 1-4 | CLR | 20 |
| 1-5 | FMT | 42 |
| 1-6 | ↑ | 27 |
| 1-7 | 5 | 05 |
| 1-8 | 0 | 00 |
| 1-9 | 0 | 00 |
| 1-a | X TO ( ) | 23 |
| 1-b | a | 13 |
| 1-c | + | 33 |
| 1-d | ↓ | 25 |
| 2-0 | ↑ | 27 |
| 2-1 | FMT | 42 |
| 2-2 | ↓ | 25 |
| 2-3 | FMT | 42 |
| 2-4 | ↑ | 27 |

| STEP | COMMAND | CODE |
|---|---|---|
| 2-5 | 5 | 05 |
| 2-6 | 0 | 00 |
| 2-7 | 0 | 00 |
| 2-8 | 0 | 00 |
| 2-9 | X = Y | 50 |
| 2-a | 3 | 03 |
| 2-b | 2 | 02 |
| 2-c | a | 13 |
| 2-d | GO TO | 44 |
| 3-0 | 1 | 01 |
| 3-1 | c | 16 |
| 3-2 | R↑ | 22 |
| 3-3 | a | 13 |
| 3-4 | + | 33 |
| 3-5 | R↓ | 31 |
| 3-6 | FMT | 42 |
| 3-7 | ↓ | 25 |
| 3-8 | FMT | 42 |
| 3-9 | ↑ | 27 |
| 3-a | R↑ | 22 |
| 3-b | 7 | 07 |
| 3-c | 5 | 05 |
| 3-d | 0 | 00 |
| 4-0 | 0 | 00 |
| 4-1 | X = Y | 50 |
| 4-2 | 4 | 04 |
| 4-3 | 8 | 10 |
| 4-4 | a | 13 |
| 4-5 | GO TO | 44 |
| 4-6 | 3 | 03 |
| 4-7 | 4 | 04 |
| 4-8 | END | |

FIGURE 3-28. ACCURACY TEST PROGRAM

| STEP | COMMAND | CODE |
|---|---|---|
| 0-0 | CLR | 20 |
| 0-1 | STOP | 41 |
| 0-2 | X→ | 23 |
| 0-3 | a | 13 |
| 0-4 | CLR X | 37 |
| 0-5 | ↑ | 27 |
| 0-6 | FMT | 42 |
| 0-7 | ↓ | 25 |
| 0-8 | e | 12 |
| 0-9 | ↑ | 27 |
| 0-a | a | 13 |
| 0-b | TO RECT | 66 |
| 0-c | FMT | 42 |
| 0-d | ↓ | 25 |
| 1-0 | e | 12 |
| 1-1 | ↑ | 27 |
| 1-2 | 2 | 02 |
| 1-3 | 0 | 00 |
| 1-4 | + | 33 |
| 1-5 | Y→ | 40 |
| 1-6 | e | 12 |
| 1-7 | 3 | 03 |
| 1-8 | 5 | 05 |
| 1-9 | 1 | 01 |
| 1-a | X > Y | 53 |
| 1-b | 0 | 00 |
| 1-c | 4 | 04 |
| 1-d | CLR | 20 |
| 2-0 | FMT | 42 |
| 2-1 | ↓ | 25 |
| 2-2 | FMT | 42 |
| 2-3 | ↑ | 27 |
| 2-4 | a | 13 |
| 2-5 | TO RECT | 66 |
| 2-6 | FMT | 42 |
| 2-7 | ↓ | 25 |
| 2-8 | TO POLAR | 62 |
| 2-9 | 2 | 02 |
| 2-a | 0 | 00 |
| 2-b | ↑ | 27 |
| 2-c | ACC + | 60 |
| 2-d | RCL | 61 |
| 3-0 | 3 | 03 |
| 3-1 | 6 | 06 |
| 3-2 | 0 | 00 |
| 3-3 | X < Y | 52 |
| 3-4 | 3 | 03 |
| 3-5 | 9 | 11 |
| 3-6 | GO TO | 44 |
| 3-7 | 2 | 02 |
| 3-8 | 4 | 04 |
| 3-9 | CLR | 20 |
| 3-a | a | 13 |
| 3-b | TO RECT | 66 |
| 3-c | FMT | 42 |
| 3-d | ↓ | 25 |
| 4-0 | TO POLAR | 62 |
| 4-1 | 2 | 02 |
| 4-2 | 0 | 00 |
| 4-3 | ↑ | 27 |
| 4-4 | ACC - | 63 |
| 4-5 | RCL | 61 |
| 4-6 | 3 | 03 |
| 4-7 | 6 | 06 |
| 4-8 | 0 | 00 |
| 4-9 | CH SIGN | 32 |
| 4-a | X = Y | 50 |
| 4-b | 5 | 05 |
| 4-c | 2 | 02 |
| 4-d | GO TO | 44 |
| 5-0 | 3 | 03 |
| 5-1 | a | 13 |
| 5-2 | CLR | 20 |
| 5-3 | FMT | 42 |
| 5-4 | ↓ | 25 |
| 5-5 | FMT | 42 |
| 5-6 | ↑ | 27 |
| 5-7 | STOP | 41 |
| 5-8 | X>Y | 53 |
| 5-9 | X→ | 23 |
| 5-a | a | 13 |
| 5-b | CLR X | 37 |
| 5-c | FMT | 42 |
| 5-d | ↓ | 25 |
| 6-0 | a | 13 |
| 6-1 | CH SIGN | 32 |
| 6-2 | ↑ | 27 |
| 6-3 | CLR X | 37 |
| 6-4 | FMT | 42 |
| 6-5 | ↓ | 25 |
| 6-6 | CLR | 20 |
| 6-7 | a | 13 |
| 6-8 | FMT | 42 |
| 6-9 | ↓ | 25 |
| 6-a | X↔Y | 30 |
| 6-b | FMT | 42 |
| 6-c | ↓ | 25 |
| 6-d | X↔Y | 30 |
| 7-0 | CH SIGN | 32 |
| 7-1 | FMT | 42 |
| 7-2 | ↓ | 25 |
| 7-3 | X↔Y | 30 |
| 7-4 | FMT | 42 |
| 7-5 | ↓ | 25 |
| 7-6 | X↔Y | 30 |
| 7-7 | FMT | 42 |
| 7-8 | ↓ | 25 |
| 7-9 | CH SIGN | 32 |
| 7-a | X↔Y | 30 |
| 7-b | FMT | 42 |
| 7-c | ↓ | 25 |
| 7-d | X↔Y | 30 |
| 8-0 | FMT | 42 |
| 8-1 | ↓ | 25 |
| 8-2 | CH SIGN | 32 |
| 8-3 | ↑ | 27 |
| 8-4 | CLR X | 37 |
| 8-5 | FMT | 42 |
| 8-6 | ↓ | 25 |
| 8-7 | ↑ | 27 |
| 8-8 | FMT | 42 |
| 8-9 | ↓ | 25 |
| 8-a | FMT | 42 |
| 8-b | ↑ | 27 |
| 8-c | END | |

FIGURE 3-29. FUNCTIONAL TEST PROGRAM B

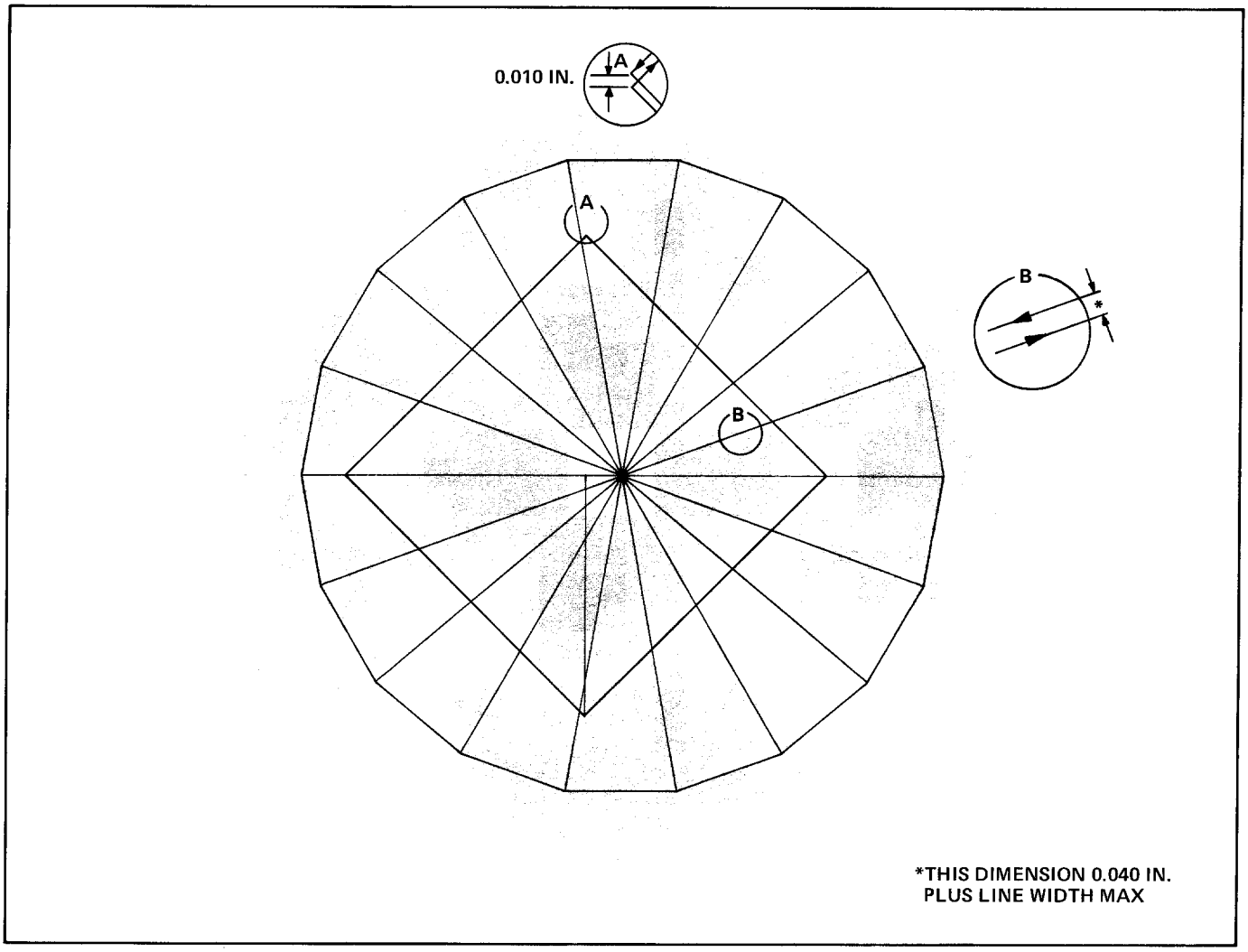



FIGURE 3-30. FUNCTIONAL TEST GRAPH PROGRAM B

# SECTION IV

# PARTS LIST

## 4-1. INTRODUCTION

4-2. This section contains mechanical and electrical parts lists. The mechanical parts list is supplemented by exploded views to aid in parts identification. Consistent with the maintenance and troubleshooting procedures presented in this manual, the electrical parts list indicates assemblies rather than individual components.

## 4-3. ORDERING INFORMATION

4-4. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard Sales/Service Office (see rear of manual for address of nearest HP office). Order should include part number and description used in this section. If required part is not listed in this section, provide model and serial numbers, description of part, and function and location of part.

TABLE 4-1. PARTS LIST

Accessory Kit (HP Part No. 09125-80131)

| HP Part No. | Description | Qty. |
|---|---|---|
| 5080-7979 | Disposable Pen, red | Pkg of 3 |
| 5080-7980 | Disposable Pen, blue | Pkg of 3 |
| 5080-3605 | Cleaner, Slidewire | 1 bottle |
| 5080-3635 | Lubricant, Slidewire | 1 bottle |
| 09125-90014 | Diagnostic Card | 1 |
| 2110-0201 | Fuse, 0.25 A, SB (230 V only) | 1 |

Pens and Paper Supplies Available

| HP Part No. | Description |
|---|---|
| 9270-1004 | Chart Paper - English, Heavy |
| 9270-1005 | Chart Paper - English, Light |
| 9270-1024 | Chart Paper - Metric, Heavy |
| 9270-1042 | Chart Paper - Metric, Light |
| 9280-0159 | Chart Paper - Semilog Linear x 2 Cycle |
| 9280-0160 | Chart Paper - Semilog Linear x 3 Cycle |
| 9280-0165 | Chart Paper - Log Log 3 x 2 Cycle |
| 9280-0167 | Chart Paper - Log Log 2 x 3 Cycle |
| 9280-0168 | Chart Paper - 3 Cycle x Semilog Linear |
| 9280-0169 | Chart Paper - 2 Cycle x Semilog Linear |
| 9280-0171 | Chart Paper - Log Log 3 x 4 Cycle |
| 5080-7981 | Disposable Pen - Green (Package of 3) |
| 5080-7994 | Disposable Pen - Black (Package of 3) |

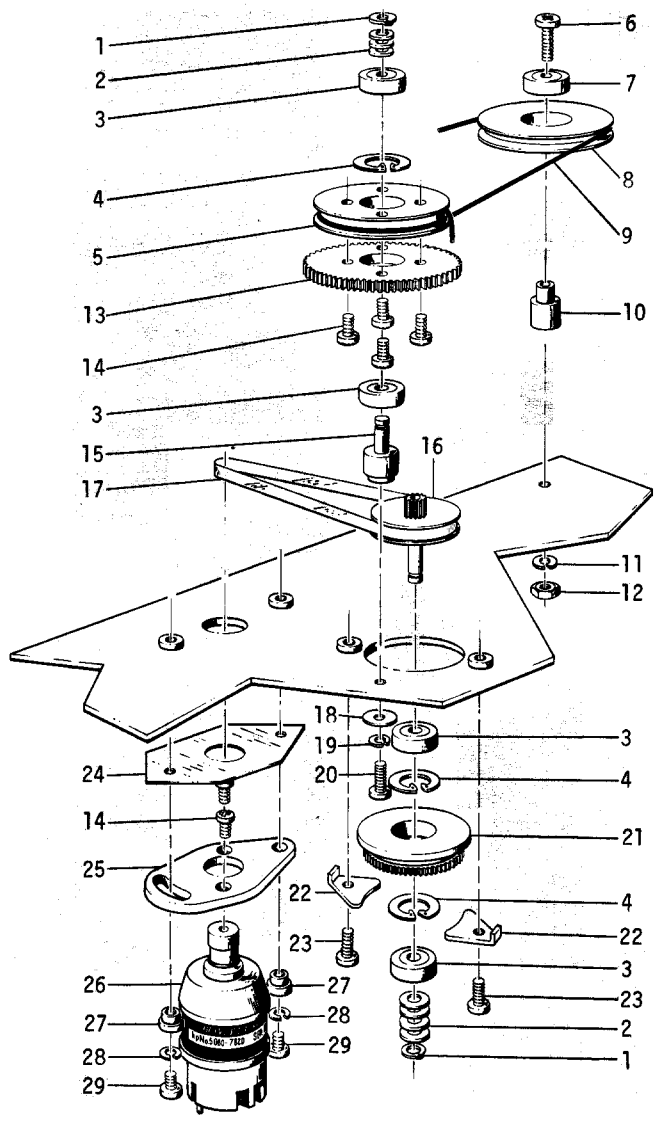
TABLE 4-1. PARTS LIST (Continued)

Board Assemblies

| Circuit Symbol | HP Part No. | Description |
|---|---|---|
| A6, A7 | 09125-80490 | D to A Board - Rebuilt |
| A6, A7 | 09125-80020 | D to A Board - New |
| A8 | 09125-66060 | Servo Preamp Board - Rebuilt |
| A8 | 09125-66030 | Servo Preamp Board - New |
| A9 | 09125-66070 | Filter Board - Rebuilt |
| A9 | 09125-66040 | Filter Board - New |
| A10 | 09125-80520 | Power Supply Assembly - Rebuilt |
| A10 | 09125-80220 | Power Supply Assembly - New |
| A12 | 07200-60002 | Mechanical Assembly - Rebuilt |
| A12 | 07200-60120 | Mechanical Assembly - New |
| A1 | 09125-80060 | Mother Board, Main |
| A2 | 09125-66010 | Interface Board No. 2 - New |
| A2 | 09125-66050 | Interface Board No. 2 - Rebuilt |
| A3 | 09125-80080 | Interface Board No. 3 - New |
| A3 | 09125-80560 | Interface Board No. 3 - Rebuilt |
| A4 | 09125-80090 | Interface Board No. 4 - New |
| A4 | 09125-80570 | Interface Board No. 4 - Rebuilt |
| A5 | 09125-80100 | Interface Board No. 5 - New |
| A5 | 09125-80580 | Interface Board No. 5 - Rebuilt |
| A11 | 09125-66020 | Mother Board, Amplifier |

Miscellaneous Parts

| Circuit Symbol | HP Part No. | Description |
|---|---|---|
| A14K1 | 0490-0705 | Relay, DPDT, 12 V, 800 ohms |
| A14CR1 | 1901-0040 | Diode (relay) |
| A14R3, A14R4 | 2100-2019 | Resistor, Variable, 1 k, 20%, 2 W, 1 T (Scale Vernier) |
| A14R1, A14R2 | 2100-2560 | Resistor, Variable, 1 k, 5%, 2 W, 10 T (Origin) |
| | 2100-0059 | Fuse, 1.5 A, Slo Blow (Power Supply) |
| A14DS1 | 2140-0018 | Lamp - Neon, 115 V ac/dc (ac power) |
| A14DS2 | 2140-0100 | Lamp - Incandescent, 14 V, .08 A (Improper Data Format) |
| A14S1 | 3101-1179 | Switch - Toggle, 2 PDT (Chart - Release and Hold) |
| A14PS1 | 07004-80290 | Autogrip Power Supply |
| | 09125-80250 | Autogrip Table |
| | 09125-80110 | Calculator Connecting Cable Assembly |
| | 09125-80261 | Rear Hood Assembly |
| | 09125-60330 | Case Assembly - Top Casting |
| | 09125-00320 | Control Panel |
| | 4040-0477 | Dust Cover |
| A14S3 | 3101-0896 | Switch - Toggle, 2 PDT (Plotter - Standby and On) |
| | 8120-1348 | Power Cord |
| | 8120-1370 | Instrument Cord |
| | 09125-80210 | Shipping Carton Assembly (Consisting of following four parts) |
| | 9220-1685 | Shipping Carton - Insert, Top Half |
| | 9220-1686 | Shipping Carton - Insert, Bottom Half |
| | 9211-0972 | Shipping Carton - Outer Box |
| | 9222-0322 | 30 in. x 30 in. Plastic Bag |
| T1 | 09125-80420 | Power Transformer Assembly |
| A13L1, A13L2 | 9100-1344 | Inductor, RF |
| A13S1 | 3101-0333 | Switch, Slide 115/230 |
| A10K1 | 0490-0794 | Relay, Power |




| Item | HP Part No. | Description |
|---|---|---|
| 1 | 0510-0238 | Ring-Retaining |
| 2 | 2190-0181 | Washer-Shim, .191 ID x .311 OD |
| 3 | 1410-0277 | Bearing-Ball |
| 4 | 0510-0742 | Ring-Retaining |
| 5 | 09125-20010 | Sheave X-Axis |
| 6 | 2460-0017 | Screw-Mach, 6-32 x 3/4, PH, PD |
| 7 | 1410-0215 | Bearing-Ball |
| 8 | 17999-06494 | Pulley-Cable |
| 9 | 5080-7717 | X-Axis Restringing Kit |
| 10 | 09125-20090 | Stud-Pulley |
| 11 | 2190-0007 | Washer, No. 6, LK WASH |
| 12 | 2420-0002 | Nut-Hex, 6-32, SST |
| 13 | 07035-20940 | Gear-Clutch, 123T, X-Axis |
| 14 | 0520-0065 | Screw-Mach, 2-56 x 3/16, PH, SST, PD |
| 15 | 09125-20130 | Stud-Gear Mount |
| 16 | 07035-62160 | Clutch Assembly, X-Axis |
| 17 | 1500-0216 | Belt-Drive |
| 18 | 3050-0399 | Washer-Flat, .138 ID x 3/8 OD |
| 19 | 2190-0105 | Washer-Lock, No. 6 |
| 20 | 2460-0033 | Screw-Mach, 6-32 x 5/16, PH, SST, PD |
| 21 | 07035-22120 | Housing-Bearing |
| 22 | 07035-02090 | Clamp-Housing |
| 23 | 2360-0062 | Screw-Mach, 4-40 x 3/8, PH, SST, PD |
| 24 | 07035-22440 | Insulator-Motor Plate |
| 25 | 07035-22450 | Motor-Plate |
| 26 | 5080-7820 | Motor Assembly |
| 27 | 07035-22430 | Washer-Motor Plate |
| 28 | 2190-0108 | Washer-Lock, No. 4 |
| 29 | 2200-0048 | Screw-Mach, 4-40 x 3/8, PH, SST, PD |

FIGURE 4-1. X-AXIS DRIVE ASSEMBLY

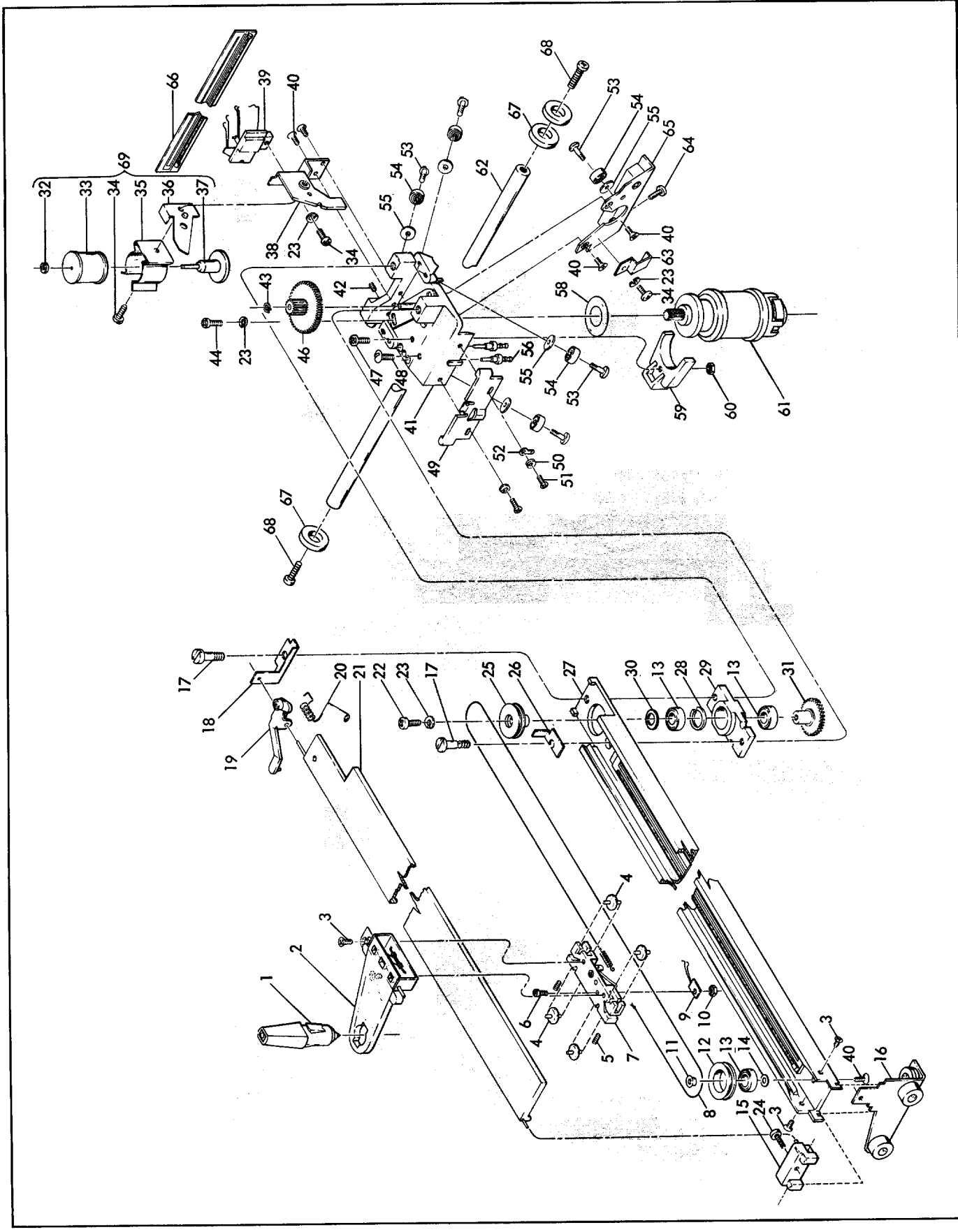


FIGURE 4-1. PEN ARM ASSEMBLY (Sheet 1 of 2)

| Ref. Designation | Part No. | Description | Quantity |
|---|---|---|---|
| 1 | 5080-7979 | Pen - Disposable, red (pkg. of 3) | As Req'd |
| | 5080-7980 | Pen - Disposable, blue (pkg. of 3) | As Req'd |
| | 5080-7981 | Pen - Disposable, green (pkg. of 3) | As Req'd |
| | 5080-7994 | Pen - Disposable, black (pkg. of 3) | As Req'd |
| 2 | 5060-6427 | Holder, Pen | 1 |
| 3 | 0525-0059 | Screw - Mach, ss, 2-56 x .188 FH POZI D | 4 |
| 4 | 07035-60860 | Wheel Assembly, Pen Carriage | 4 |
| 5 | 3030-0142 | Screw - Set, 2-56 x .125, Allen | 2 |
| 6 | 0570-0190 | Screw - Mach. ss, 0-80 x .125 Fill H PD | 1 |
| 7 | 5080-8135 | Carriage Block and Wiper Assembly | 1 |
| 8 | 07200-60280 | Cable Assembly, Pen Carriage | 1 |
| 9 | 09125-60110 | Wiper Assembly (Y axis Limit Switch) | 1 |
| 10 | 0590-0149 | Nut - Hex, 0-80 | 1 |
| 11 | 07035-20240 | Stud, Return Pulley | 1 |
| 12 | 07035-20200 | Pulley, Return | 1 |
| 13 | 1410-0269 | Ball Bearing | 3 |
| 14 | 3050-0394 | Washer - No. 4, Flat | 2 |
| 15 | 09125-40060 | Block Assembly, Pen Arm | 1 |
| 16 | 07005-60260 | Bracket Assembly - Slider | 1 |
| 17 | 07035-20350 | Screw, Shouldered | 2 |
| 18 | 07035-00230 | Mount - Rear, Scale | 1 |
| 19 | 5060-6538 | Pen Lift Assembly | 1 |
| 20 | 1460-1201 | Spring, Pen Lift | 1 |
| 21 | 09125-60140 | Slidewire Cover | As Req'd |
| 22 | 2200-0145 | Screw - Mach. ss, 4-40 x 7/16, PH POZI D | 1 |
| 23 | 2190-0108 | Washer - Lock, No. 4 | 4 |
| 24 | 2220-0726 | Screw, Mach, 4-40 x 5/16, Fill, SSTL | 1 |
| 25 | 07035-22180 | Pulley, Drive | 1 |
| 26 | 07005-20410 | Stop, Pen Carriage | 1 |
| 27 | 5060-6536 | Pen Arm Assembly | 1 |
| 28 | 0510-0940 | Retaining Ring | 1 |
| 29 | 07035-20330 | Block, Arm Mounting | 1 |
| 30 | 2190-0125 | Shim - ss, 0.093 ID, 0.156 OD, 0.012 THK | As Req'd |
| 31 | 07004-60070 | Pen Drive Assembly | 1 |
| 32 | 0510-0810 | Retaining Ring | 1 |
| 33 | 09125-60030 | Solenoid Assembly | 1 |
| 34 | 2270-0022 | Screw - Mach. ss, 4-40 x .188, PH PD | 1 |
| 35 | 1400-0340 | Holder, Solenoid Assembly | 1 |
| 36 | 07005-00730 | Pointer, Index | 1 |
| 37 | 09125-20350 | Plunger Assembly, Solenoid | 1 |
| 38 | 5060-4569 | Bracket Assembly - Coil and Wiper | 1 |
| 39 | 5080-8127 | Wiper Assembly, X axis | 1 |
| 40 | 2200-0164 | Screw - Mach. ss, 4-40 x 3/16 FH PD | 5 |
| 41 | 09125-60270 | Motor Block Assembly | 1 |
| 42 | 3030-0208 | Screw - Set, 4-40 x .125, Allen | 3 |
| 43 | 0510-0724 | Retaining Ring | 1 |
| 44 | 2200-0139 | Screw - Mach. ss, 4-40 x .25 PH POZI D | 1 |
| 45 | 3050-0394 | Washer - Flat, .130 ID, .25 OD, .02 THK | 1 |
| 46 | 07004-60060 | Gear Assembly, Pen Drive | 1 |
| 47 | 2200-0145 | Screw - Mach. ss, 4-40 x .438, PH POZI D | 1 |
| 48 | 2200-0710 | Screw - Mach. ss, 4-40 x .375, TH SD | 1 |
| 49 | 5020-4225 | Yoke, Cable | 1 |
| 50 | 2190-0094 | Washer - Lock, No. 2 | 2 |
| 51 | 0520-0066 | Screw - Mach. ss, 2-56 x .188 PH PD | 2 |
| 52 | 0360-0243 | Terminal Lug | 1 |
| 53 | 0570-1103 | Screw, Shoulder | 5 |
| 54 | 1410-0941 | Ball Bearing | 5 |
| 55 | 3050-0367 | Washer - Flat, .105 ID, 1/4 OD, 1/64 THK | 5 |
| 56 | 0360-1626 | Stud, Terminal | 2 |
| 57 | Not Used | | 2 |
| 58 | 07035-22440 | Insulator, Mylar | 1 |
| 59 | 09125-40030 | Cleat, Motor | 1 |
| 60 | 2260-0007 | Nut, 4-40 | 1 |
| 61 | 5080-7966 | Servo Motor | 1 |
| 62 | 09125-20210 | Rod, Track | 2 in. |
| 63 | 07004-00350 | Clamp, Trailing Cable | 1 |
| 64 | 2200-0048 | Screw - Mach. ss, 4-40 x .375 PH PD | 1 |
| 65 | 09125-60280 | Bearing Adjustment Assembly | 1 |
| 66 | 5060-6537 | X axis Slidewire and Limit Switch Assembly | 1 |
| 67 | 09125-20070 | Bumper | 3 |
| 68 | 2360-0209 | Screw - Mach. 6-32 x 1.00, SST, Pan, POZI | 2 |
| 69 | 09125-60040 | Pen, Solenoid, Complete | 1 |

FIGURE 4-2. PEN ARM ASSEMBLY (Sheet 2 of 2)

# SECTION V

# TROUBLESHOOTING

## 5-1. INTRODUCTION

5-2. CONTENT. This section contains instructions for troubleshooting the Model 9125B. A Printed Circuit Board Location drawing (Figure 5-1), a Troubleshooting Chart (Figure 5-2) and a Wiring Diagram (Figure 5-3) are supplied to aid in troubleshooting.

## 5-3. TROUBLESHOOTING

5-4. REQUIREMENTS. Troubleshooting of the 9125B should be performed in a logical manner. The concept of bracketing should be established, such as establishing which section is not operational or operating abnormally. This is generally the fastest method to locate trouble in a unit. The block diagram and logic flow diagram (Figures 2-1 and 2-2) in Section II may be utilized to assist troubleshooting. However, the Troubleshooting Chart should serve as the prime troubleshooting guide.

5-5. TROUBLESHOOTING CHART. Malfunctions not caused by improper adjustments may be detected by referring to the Troubleshooting Chart, Figure 5-2.

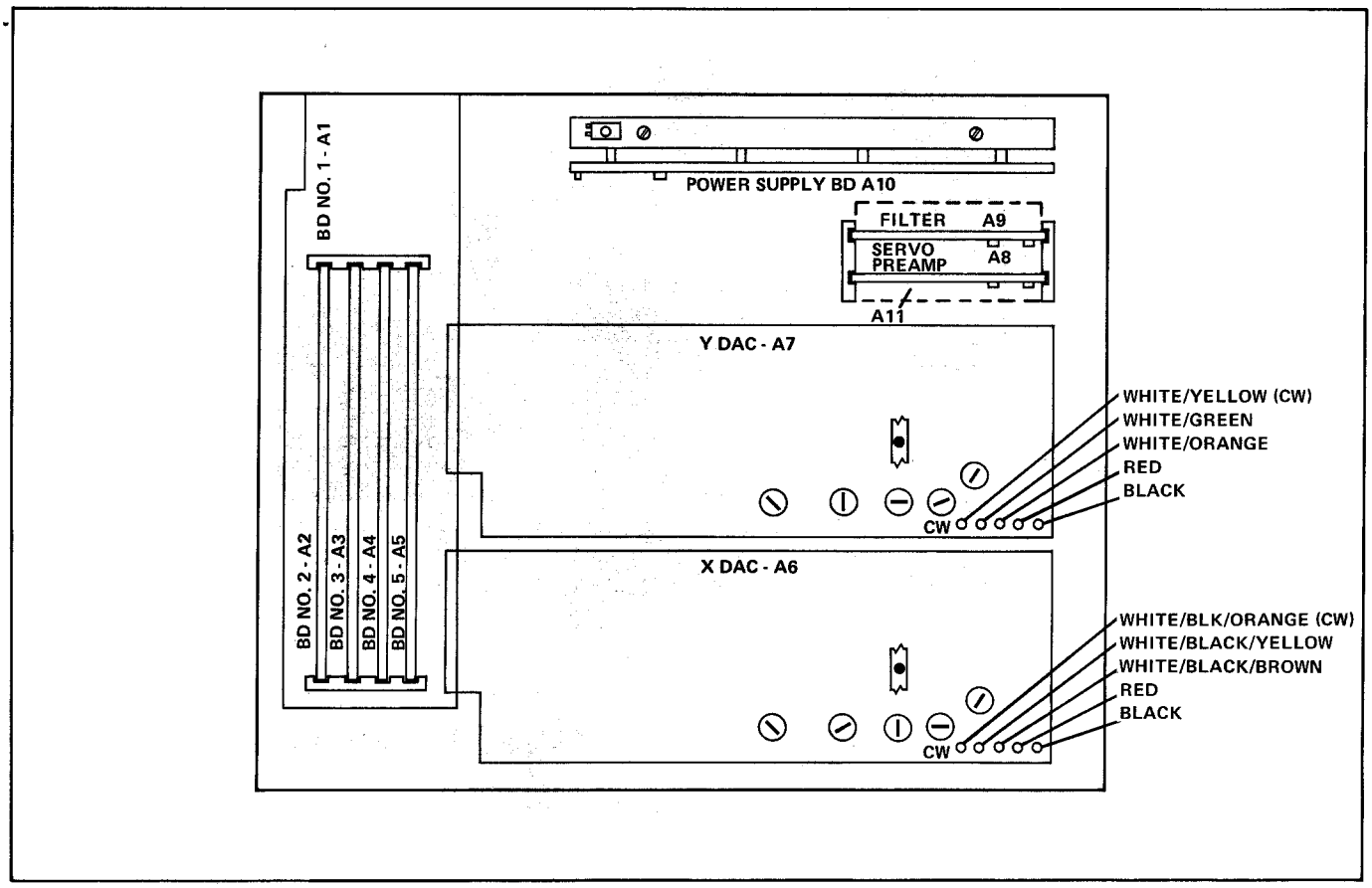



FIGURE 5-1. PRINTED CIRCUIT BOARD LOCATIONS

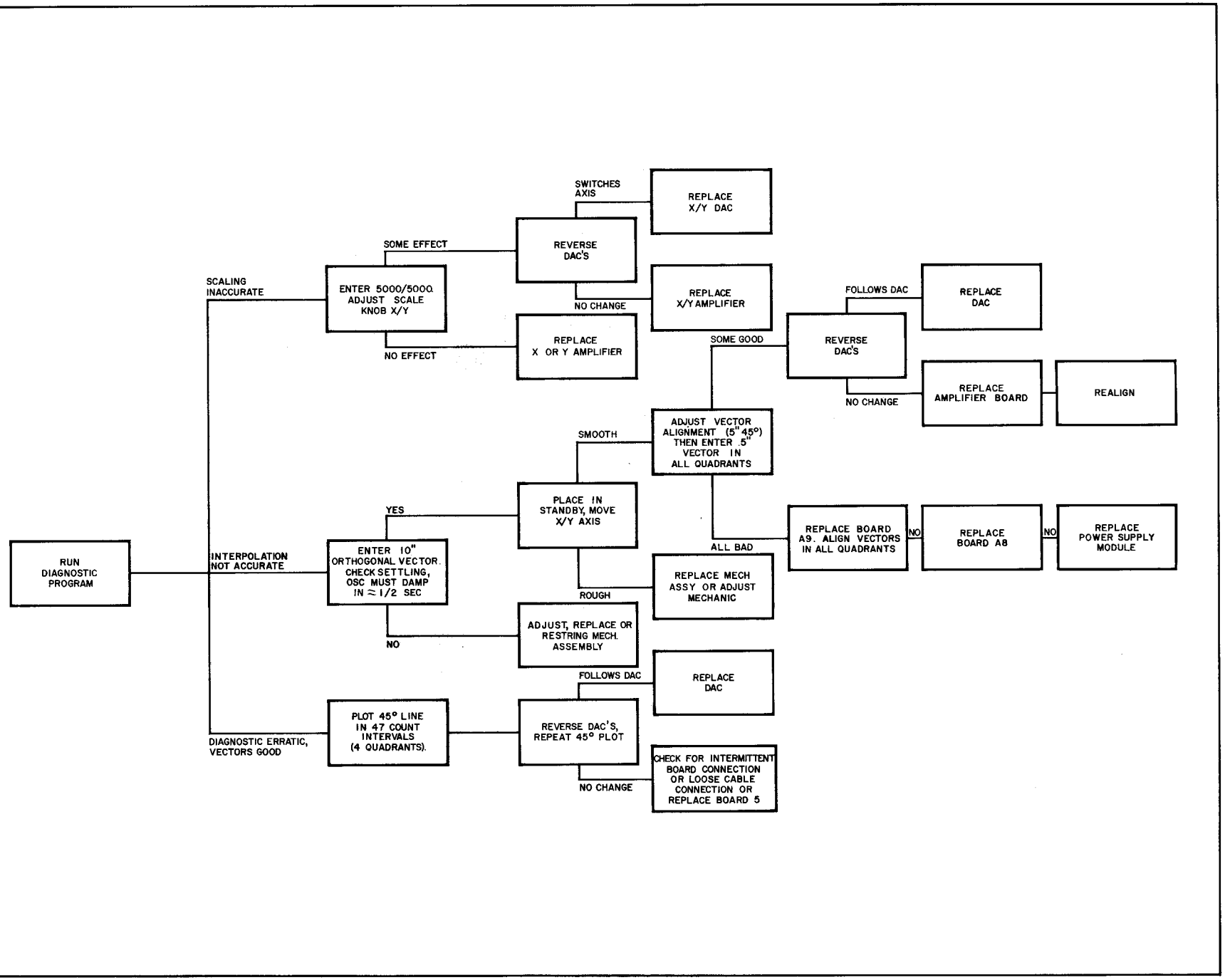



FIGURE 5-2. TROUBLESHOOTING CHART (Sheet 1 of 4)

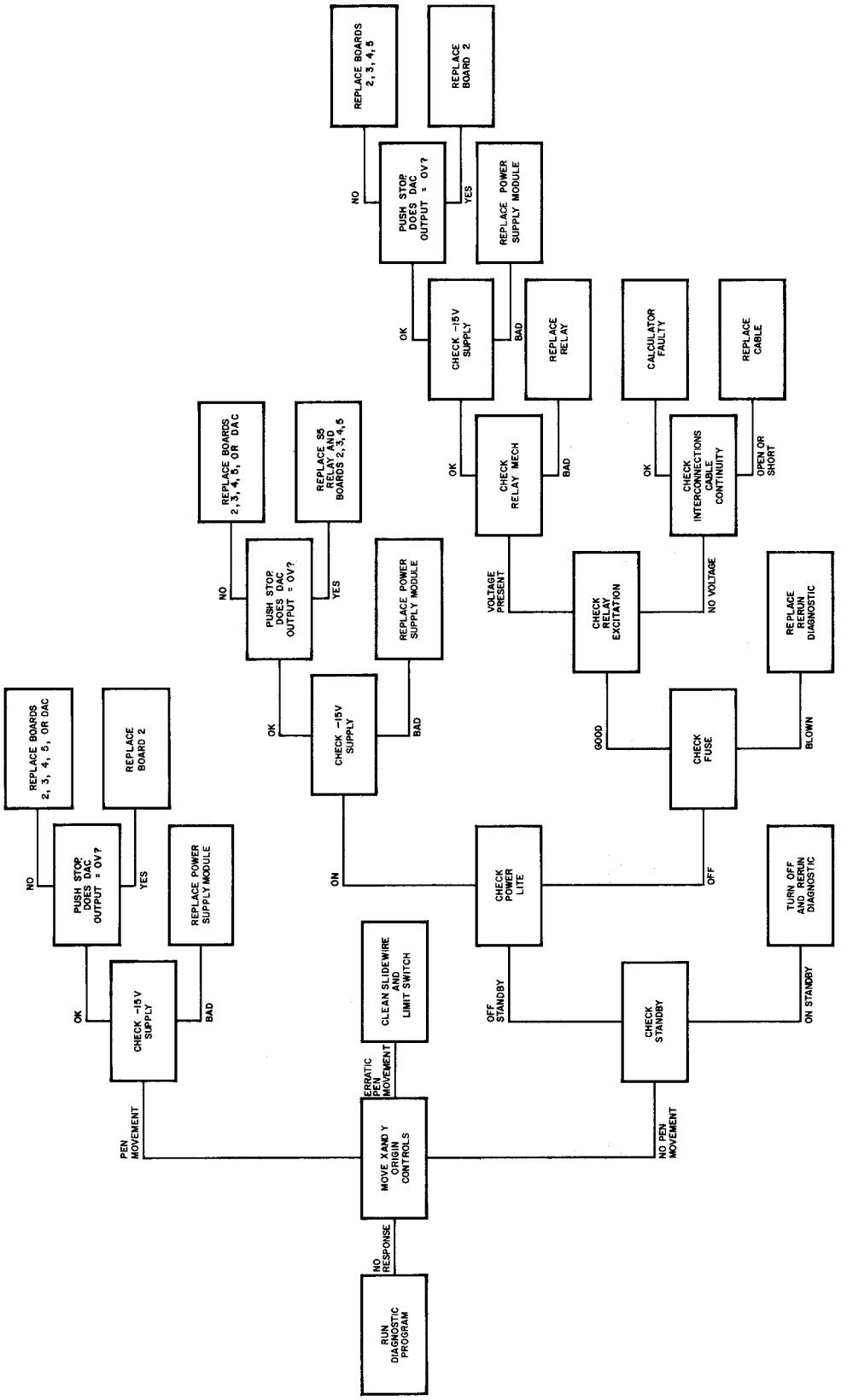



FIGURE 5-2. TROUBLESHOOTING CHART (Sheet 2 of 4)

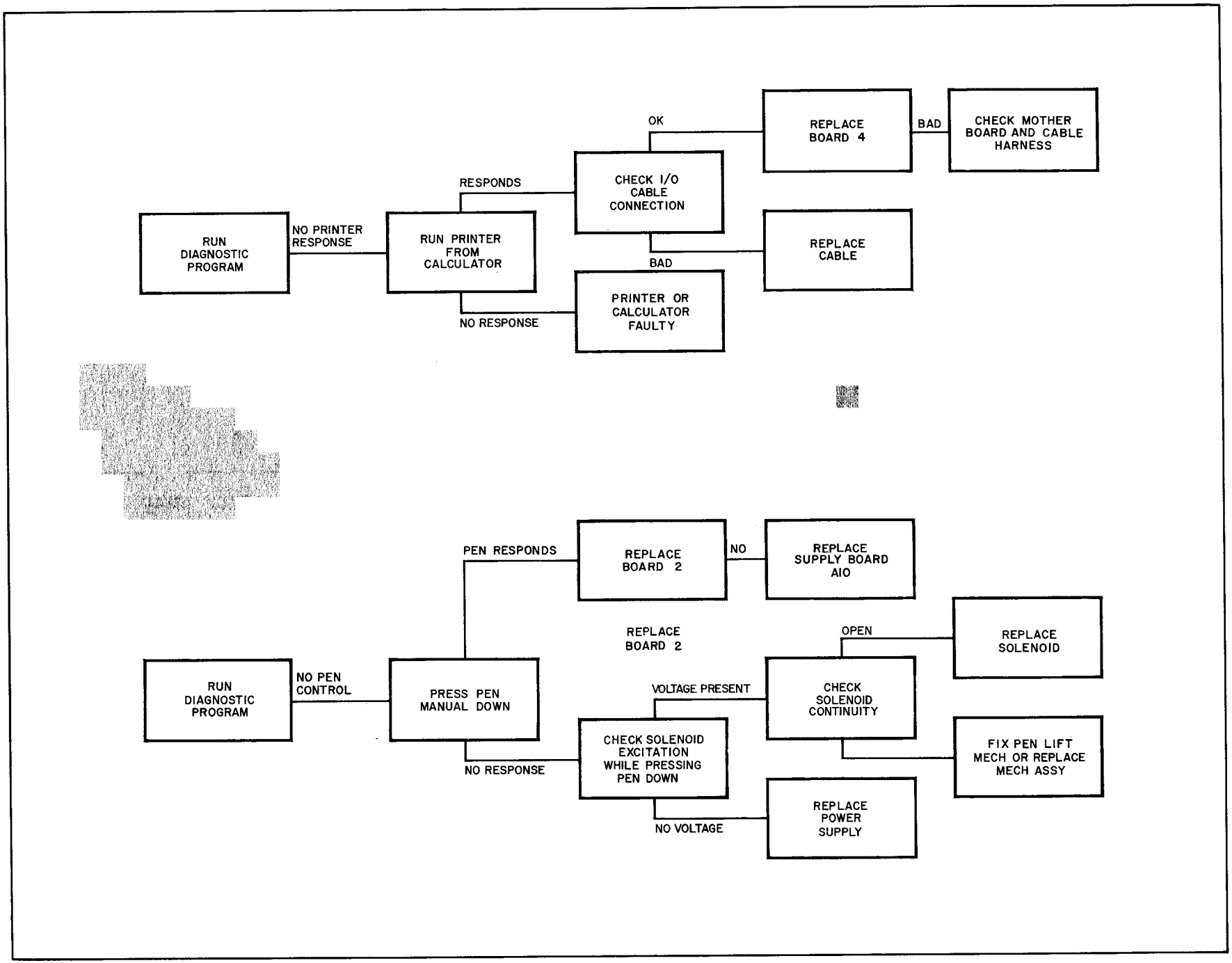



FIGURE 5-2. TROUBLESHOOTING CHART (Sheet 3 of 4)

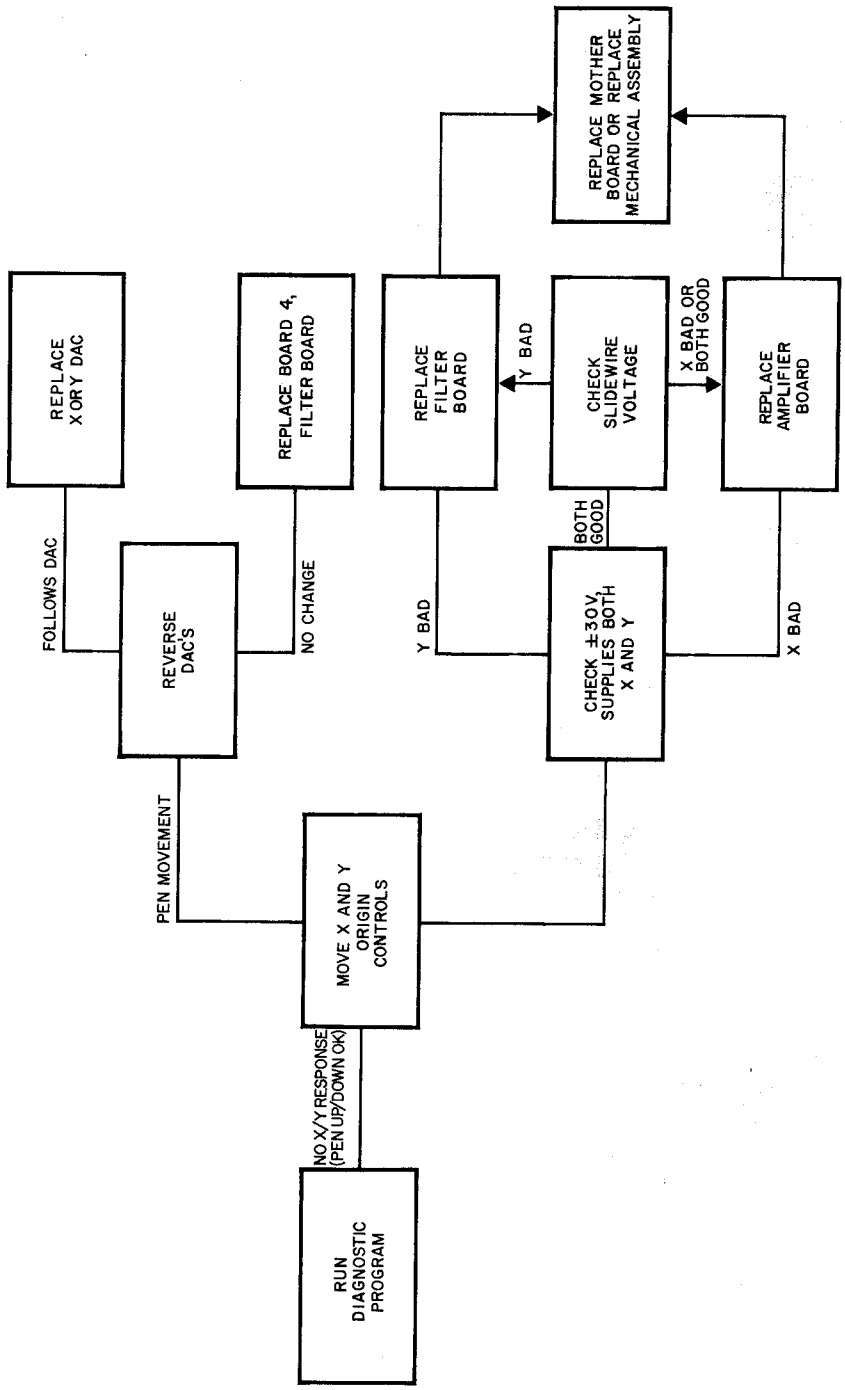



FIGURE 5-2. TROUBLESHOOTING CHART (Sheet 4 of 4)

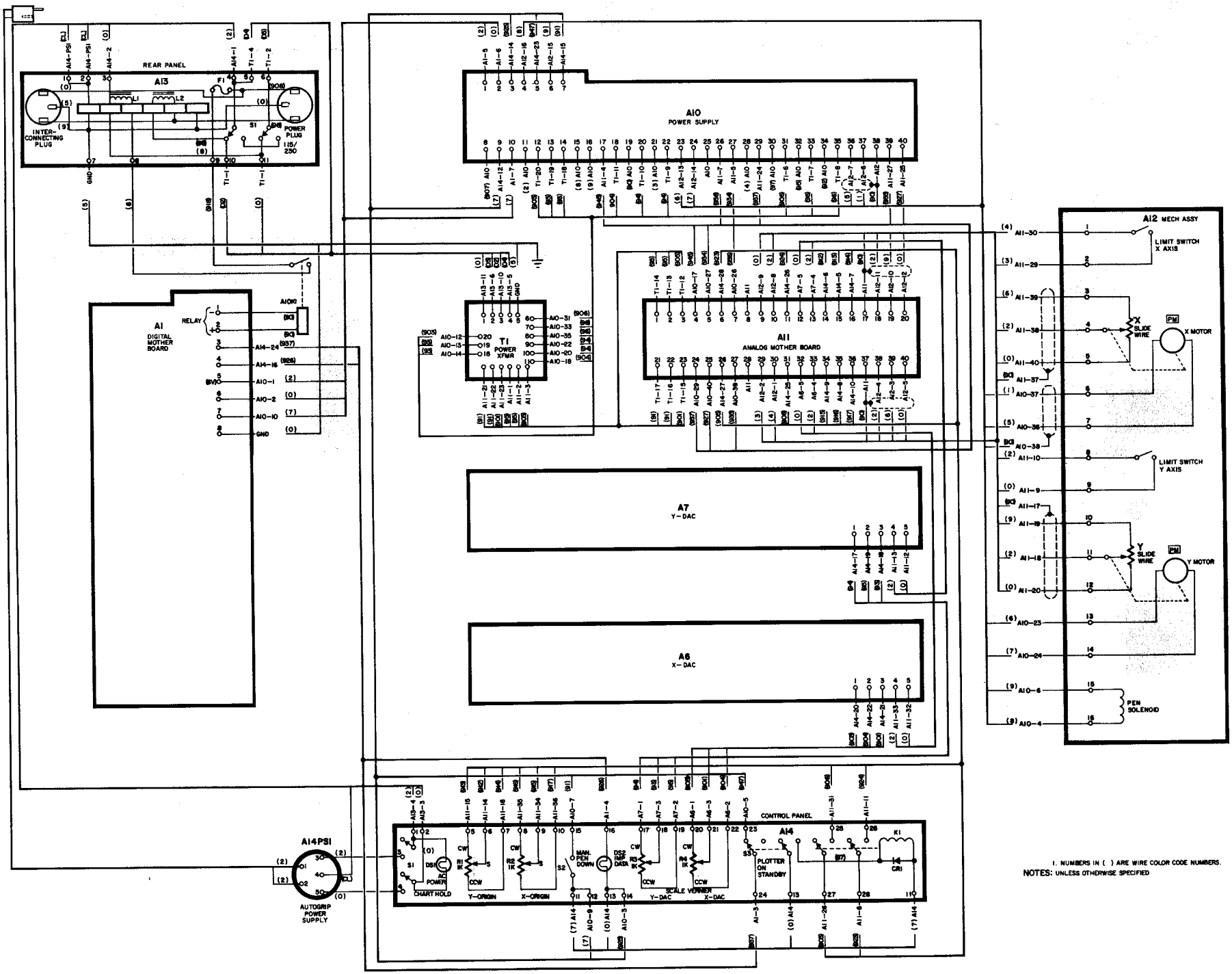



FIGURE 5-3. WIRING DIAGRAM