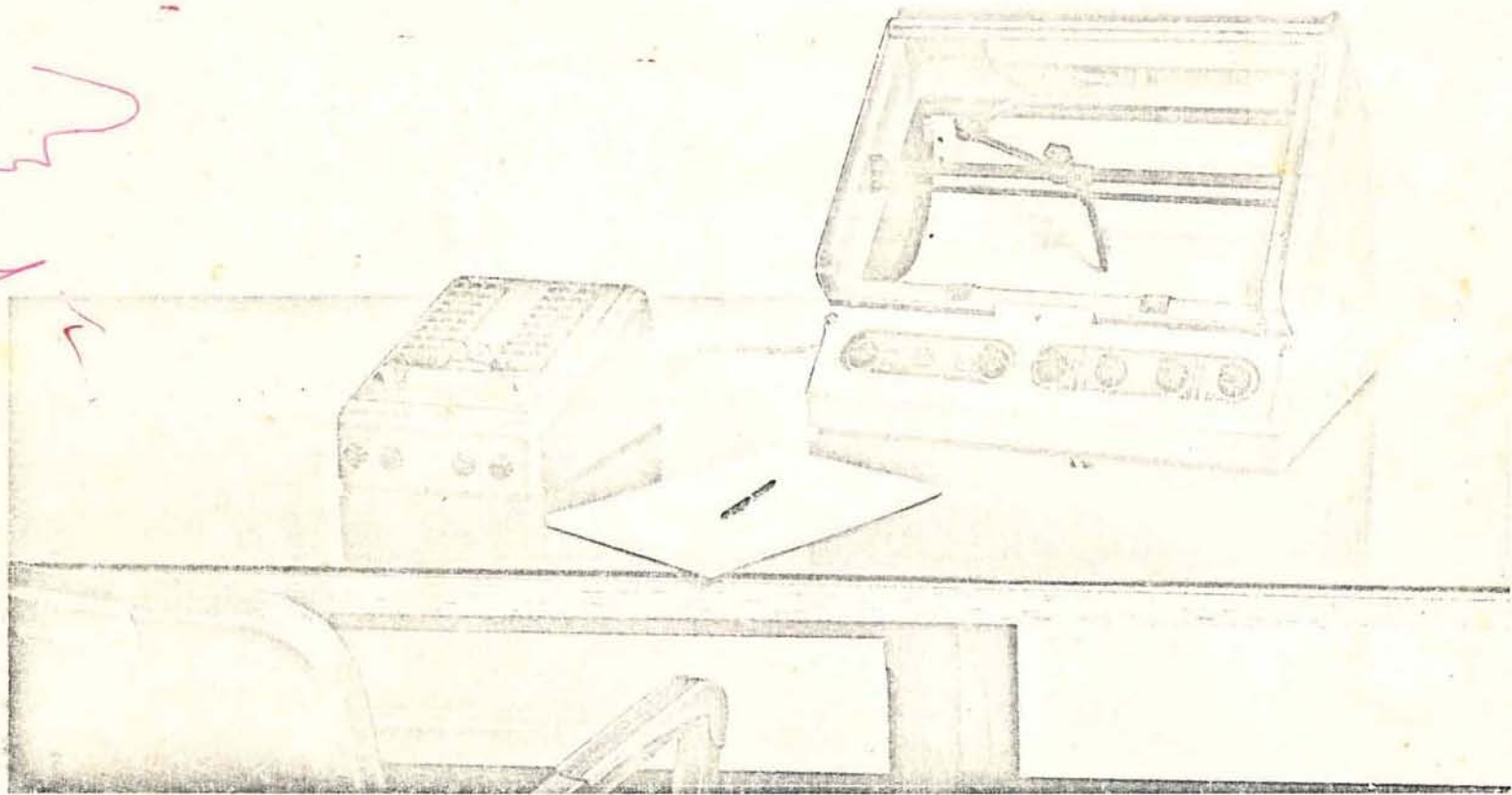


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ii

# New Versatility, Faster Performance, Greater Accuracy



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## WARRANTY

The Librascope X-Y Plotter is warranted to be free from defects in material and workmanship impairing the normal use and service for which it is intended.

The liability of Librascope under this warranty is limited to repairing or replacing any X-Y plotter or plotter component returned, with all transportation charges prepaid, to Librascope within ninety (90) days after delivery to the original purchaser and found to be defective. In no event shall Librascope be liable for collateral or consequential damages.

This warranty is in lieu of any other warranty, expressed, implied or statutory (except as to title) and no agreement extending it will be binding upon Librascope unless in writing and signed by an officer of the Company.

X - Y P L O T T E R   M O D E L   2 0 0 B



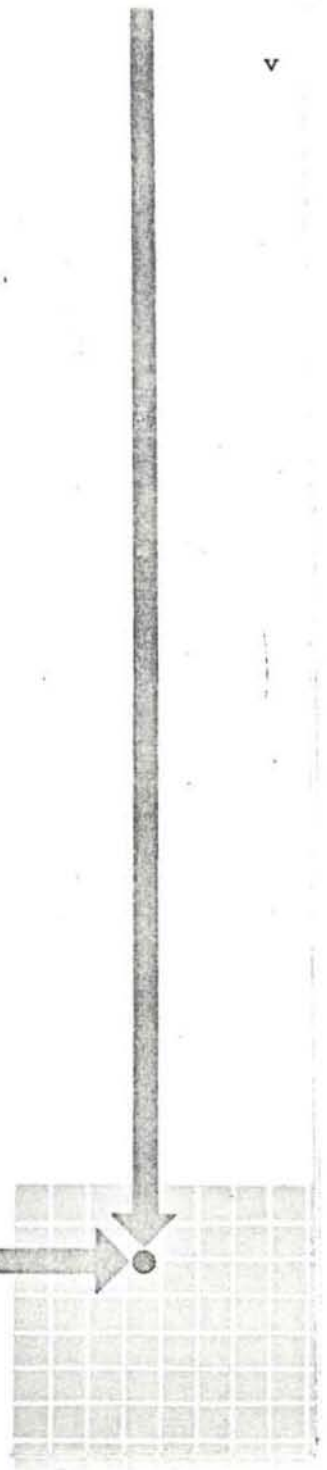
# TABLE OF CONTENTS

	Page		Page
GENERAL DATA . . . . .	vi	OPERATION . . . . .	6
INTRODUCTION . . . . .	1	MAINTENANCE . . . . .	7
Characteristics . . . . .	1	Refilling Ink Reservoir . . . . .	7
Input Requirements . . . . .	2	Cleaning Pen Point . . . . .	7
INSTALLATION . . . . .	3	Correcting Pen Actuation . . . . .	7
Mounting . . . . .	3	Adjusting Pen Stroke . . . . .	7
Connections . . . . .	3	Limit Stops . . . . .	8
Pen Installation . . . . .	3	Lubrication . . . . .	8
Chart Insertion . . . . .	4	Electrical Adjustments . . . . .	8
CHART CALIBRATION . . . . .	5	PLOTTER CONVERSION . . . . .	13
Preparation . . . . .	5	Chassis Interchange . . . . .	13
Single-Quadrant Plotting . . . . .	5	Resetting Stops . . . . .	16
Four-Quadrant Plotting . . . . .	5	PARTS LIST . . . . .	17
		PLOTTER ACCESSORIES . . . . .	30

# ILLUSTRATIONS

	Page
Figure 1. Librascope X-Y Plotter, Model 200B . . . . .	vii
Figure 2. Plotter Installations . . . . .	3
a. Desk Model. . . . .	3
b. Rack Mounting . . . . .	3
Figure 3. Pen Carriage and Pen . . . . .	4
Figure 4. Rear View, Mesh Screen Removed . . . . .	9
Figure 5. Bottom View, Case Removed . . . . .	12
Figure 6. Interchanging Preamplifier Chassis . . . . .	14

X - Y P L O T T E R   M O D E L   2 0 0 B





## GENERAL DATA

### Power Switch

Controls power to plotter circuits. Switch settings: OFF STBY ON

### Operational Switch

Controls operation for chart insertion (LOAD), calibration (CALIB), point plotting (PLOT), and continuous curve tracing (TRACE)

### Scale Knobs

Provide choice of these 11 voltage scale settings: 10, 0, 5.0, 2.5, 1.0, .50, .25, .10, .050, .025, .010, .005.

### Zero Knobs

Provide for continuous shifting of origin to any point on plotting area.

### Static Accuracy

Within 0.1% of full scale

### Dynamic Accuracy

Within 0.5% of full scale at maximum tracking rate of 5 in/sec

### Response

Approximately 1 sec full scale in either axis

### Power Required

115-volt, 150-watt, 60-cycle. Plotter accepts low level DC input from external source.

### Plotter Dimensions

15-7/8" wide × 19" high × 16-3/4" deep

### Plotter Weight

70 pounds

### Input Impedance

Greater than 10 megohms from .005 volt to .50 volt; 2 megohms from 1 to 10 volts

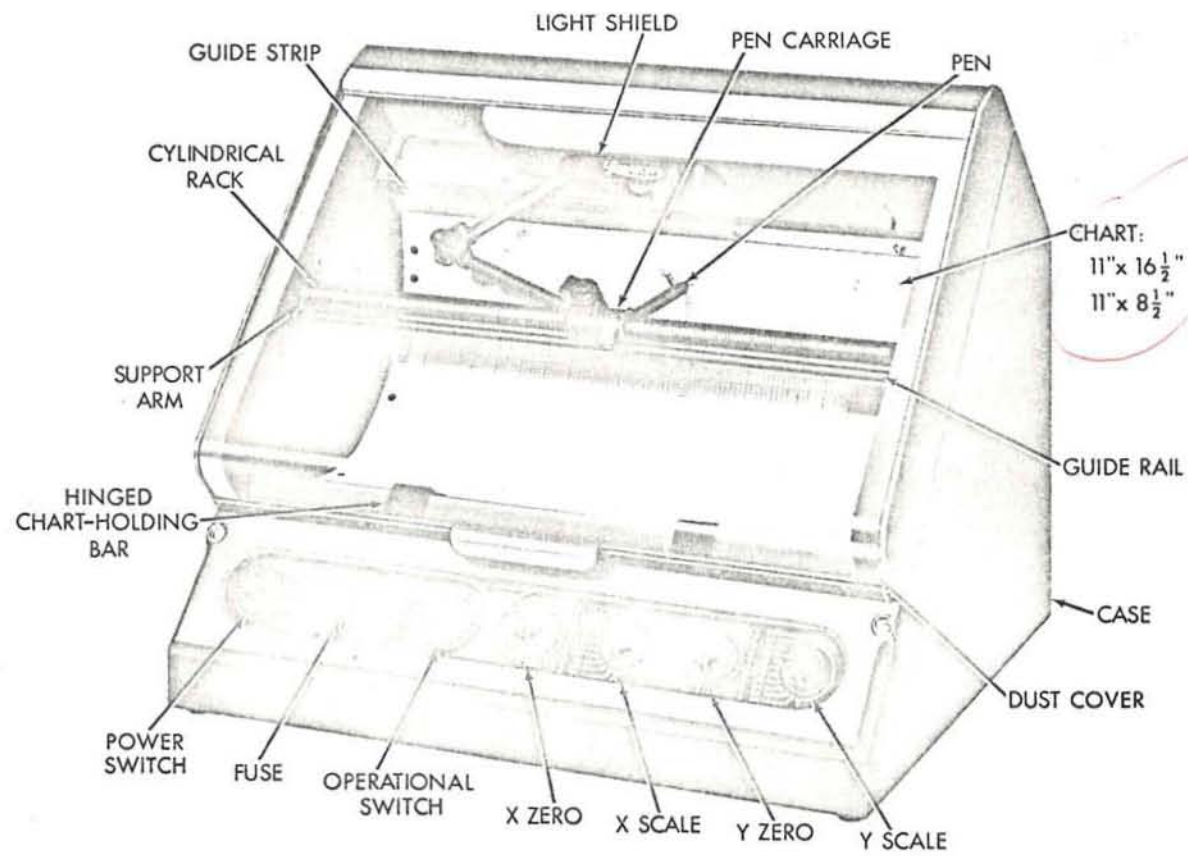


Figure 1. Librascope X-Y Plotter, Model 200B

X - Y P L O T T E R M O D E L 2 0 0 B

# INTRODUCTION

The X-Y plotter is a precision data recording instrument which automatically plots a two-coordinate graph of analog input data. The plotter is available in two models, the 200A, or type A, and the 200B, or type B. The basic difference between the plotters lies in their preamplifier circuitry.

The type B plotter accepts a low level DC input from an external source. The type A supplies power to its input transducers and operates with any device possessing the properties of a resistance potentiometer.

Both models have split chassis. This arrangement permits easy conversion and minimizes the need to modify circuits for special applications.

Librascope Decimal Keyboard, Model 226, shown on page 30, may be used to manually enter inputs into the type B plotter. After converting Model 200B to Model 200A, other Librascope accessories, shown on page 31, can be used with the X-Y plotter.

This manual applies specifically to Model 200B, shown in figure 1. Instructions for converting the type B plotter to type A are given under PLOTTER CONVERSION, page 13.

## characteristics

Independent gear trains drive the pen in the X and Y axes and assure positive indexing of all plotted points.

L I B R A S C O P E , I N C O R P O R A T E D

Precision manufacture results in a static accuracy of 0.1 percent of full scale. Dynamic accuracy exceeds 0.5 percent of full scale when the plotter is tracking a velocity input scaled to five inches per second.

The chart scale can be expanded independently in each axis by changing the sensitivity of the associated preamplifier circuit with a ganged attenuator switch. The origin can be shifted to any part of the chart for single- or four-quadrant plotting.

The plotter is energized from a 115-volt, 60-cycle source. No other external power is needed.

## input requirements

The plotter uses inputs in the form of low-level, single-ended DC voltages. X and Y Scale knob settings make available eleven input ranges between zero volt and these maximum values: .005, .010, .025, .050, .10, .25, 0.5, 1.0, 2.5, 5.0 and 10.0 volts.

Use of a standard cell reference assures drift-free operation and permits exceedingly accurate scaling of inputs.

Input impedance between the .005 volt and .50 volt scale settings exceeds 10 megohms and is 2 megohms between 1 and 10 volts.



X - Y P L O T T E R   M O D E L   2 0 0 B



# INSTALLATION

## mounting

The desk model plotter is shown in figure 1. The plotter can be adapted for operation in a standard RCA or RMA rack by removing the plotter from its case and attaching an adapter plate and a filler plate to the rear of the plotter assembly base plate, as shown in figure 2. These parts plus necessary hardware and installation drawings for rack mounting may be ordered from Librascope, Inc.

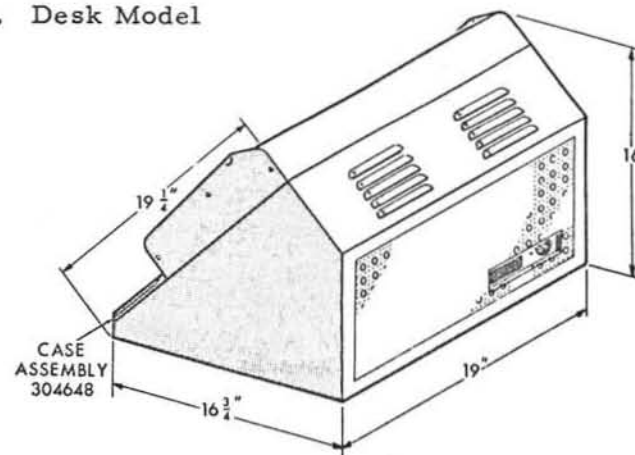
## connections

Plotter receptacle J201 is provided to accommodate the inputs from external equipment. DC inputs are received at J403 and J405. A line cord is provided to connect an external source of 115-volt, 60-cycle power to plotter receptacle J203.

## pen installation

Slip the stroke adjustment wire through the notch in the pivoted lever in the pen carriage,

### a. Desk Model



### b. Rack Mounting

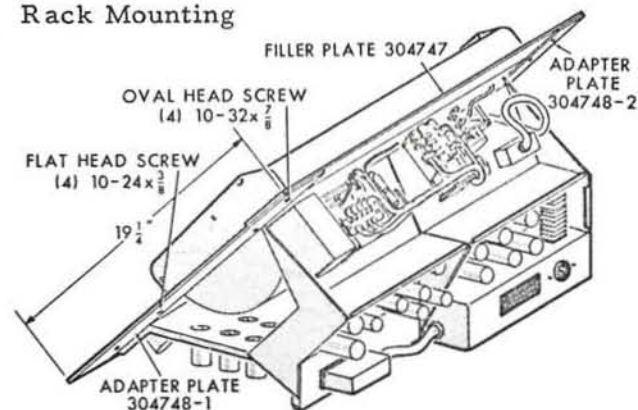


Figure 2. Plotter Installations

figure 3. Insert the pen point through the guide bushing at the lower end of the pen carriage. To seat the pen properly, the spring must be compressed until the retainer is held by the spring catch in the carriage.

### chart insertion

Move the pen to the upper left corner of the plotting area, either by guiding it manually, or, if the plotter is energized, by setting the Operational switch at LOAD.

To move the pen manually in the X-axis, move the pen carriage along the guide rail. To move the pen manually in the Y-axis, use the support arms at either end of the guide rail, figure 1. To avoid misalignment, do not push on pen carriage or guide rail.

Raise the hinged chart-holding bar at the bottom of the chart platen, advance the chart onto the platen until its upper edge is aligned under the guide strip at the top of the platen, and lower the holding bar to clamp the chart in place.

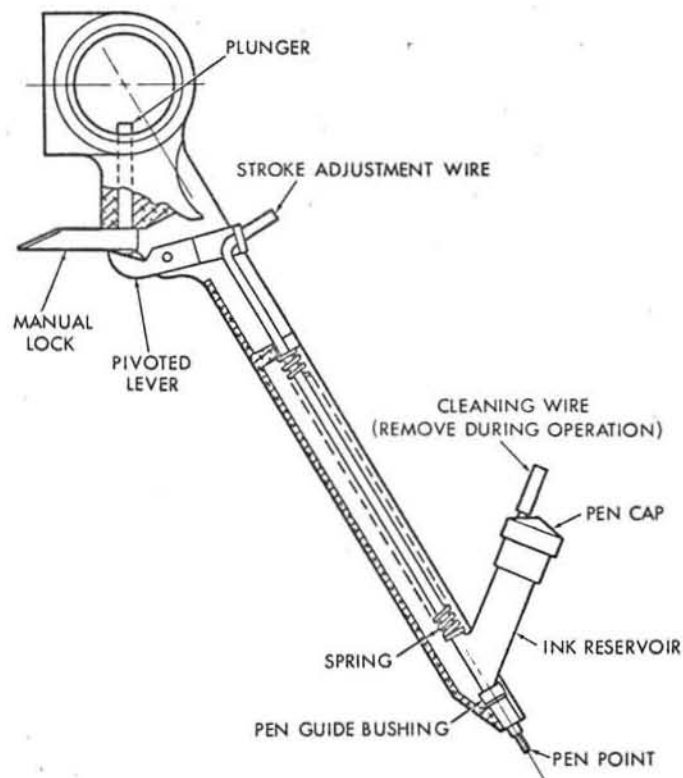
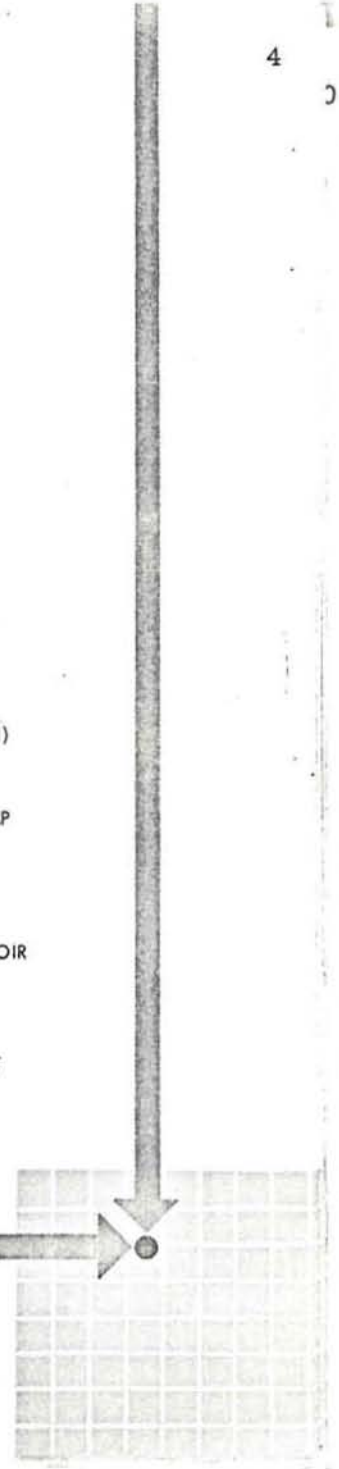


Figure 3. Pen Carriage and Pen



# CHART CALIBRATION

The type B plotter plots in any one of four quadrants or in all four, depending on the Zero and Scale knob settings.

With maximum input each of the X and Y Scale knob settings produces full scale pen deflection. Be sure to select scale settings which include the full input range to keep the pen carriage from driving into the limit stops.

When calibrating the chart follow the procedures detailed below.

## preparation

1. Set Power switch at STBY for a few minutes to warm plotter.
2. Turn Power switch to ON.
3. Set Operational switch at CALIB.

At this switch setting pen remains retracted in carriage.

## single-quadrant plotting

1. Set X and Y Scale knobs at desired voltage ranges.
2. Adjust X and Y Zero knobs to position pen at point corresponding to zero in the quadrant selected for plotting.

## four-quadrant plotting

1. Set X and Y Scale knobs at the desired voltage ranges.
2. Adjust X and Y Zero knobs to position pen at center of chart.



## OPERATION

Follow this four-step procedure to operate the X-Y plotter:

1. Set Power switch at STBY for a few minutes to warm plotter.
2. Set Power switch at ON.
3. Calibrate chart if necessary. Follow instructions detailed on page 5.
4. Set Operational switch at PLOT for discrete point plotting as commanded by the external input equipment or at TRACE for continuous curve tracing.

After the above settings have been made, the plotter operates automatically.

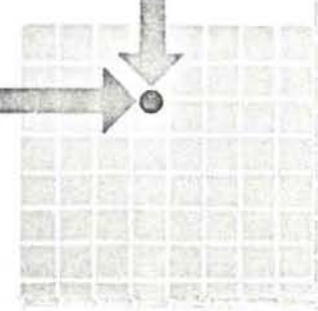
In the usual PLOT cycle, the pen carriage, with the pen retracted, moves to a signaled point and stops while the pen lowers and marks

the chart. After each point is plotted, the pen retracts and a new signal is received.

In typical installations providing the intermittent input required for PLOT operation, a thyatron controls the pen solenoid and the reference phases of the X and Y servomotors. The control phases of the servomotors supply the thyatron grid signal. When the grid signal approaches a value indicating servo null, the thyatron fires, opening the circuits to the pen solenoid and the servomotor reference phases. The pen carriage thus remains stationary while the pen drops to the chart. In dropping to the chart, the pen closes a set of contacts in the plotter. This action restores these circuits and clears the input source in readiness for the next plotting cycle.

In TRACE operation, the pen remains in contact with the chart at all times, and the carriage moves in response to changes in the input signal to produce a continuous curve.

X - Y P L O T T E R   M O D E L   2 0 0 B





## MAINTENANCE

Precision manufacture and use of top quality components in the X-Y plotter help to insure trouble-free service. With proper maintenance, major adjustments or repairs should rarely be required.

To protect internal parts from dust, keep the plastic cover closed when the plotter is not in use. Wipe the guide rail occasionally to prevent dust and lint from accumulating.

Follow the routine maintenance procedures described below to insure peak performance by the plotter at all times. Return the plotter (shipped postpaid) to Librascope, Incorporated, Customer Service Division, Glendale, California, for any other adjustments required.

### refilling ink reservoir

The reservoir contains enough ink for extended periods of plotting. To refill, remove the plastic cap, figure 3, and use an eye dropper to transfer ink to the reservoir. Esterline Angus red ink for graphic instruments is recommended.

### cleaning pen point

To clean the pen point, insert the cleaning wire into the tube projecting through a hole in the plastic reservoir cap, figure 3, until the wire extends beyond the pen point. Remove cleaning wire when plotter is in operation.

### correcting pen actuation

The pen should drop to the chart when the pen-actuating solenoid is de-energized and should retract when the solenoid is energized. If the pen fails to lower or to retract properly, check the manual lock and the pen, figure 3. Release the manual lock if it is engaged. Straighten or replace the pen if bent.

### adjusting pen stroke

Pen stroke adjustment is not ordinarily required except when installing a new pen. To adjust the pen stroke, modify the stroke adjustment wire curvature. This wire engages

the slot in the pivoted lever when the pen is installed in the pen carriage. Modifying its curvature affects the length of the pen stroke.

Pen stroke adjustments are critical. Make only slight changes in the wire's curvature, taking care not to twist or bend the pen shank. After each change use the manual lock to lower and retract the pen in the carriage. The pen point should rest on the chart just firmly enough to mark legibly.

### limit stops

The X and Y limit stops may require re-setting if pen travel beyond opposite margins in either axis is unequal, or if pen carriage strikes support arm.

Repeated, vigorous striking by the pen carriage can cause the limit stops to slip. Excessive slippage may result in damage to the support arms.

If it should become necessary to reset the

limit stops, follow the procedure described on page

### lubrication

DO NOT LUBRICATE PLOTTER PARTS. Choice of mating materials and dry-lube techniques make lubrication unnecessary and undesirable.

### electrical adjustments

Most plotter circuits can be adjusted in accordance with standard amplifier servicing techniques. Voltages should be within 20 percent of those shown on the two schematic diagrams supplied in the envelope on the inside back cover of the book: Power Section, Librascope Drawing 307058; and Type B Preamplifier Section, Librascope Drawing 307381. Procedures for adjustments specific to the type B plotter are described below.

Preamplifier Series-Regulator Circuit.  
Place a DC voltmeter across metering point J407 to ground, figure 4. Set the Power switch

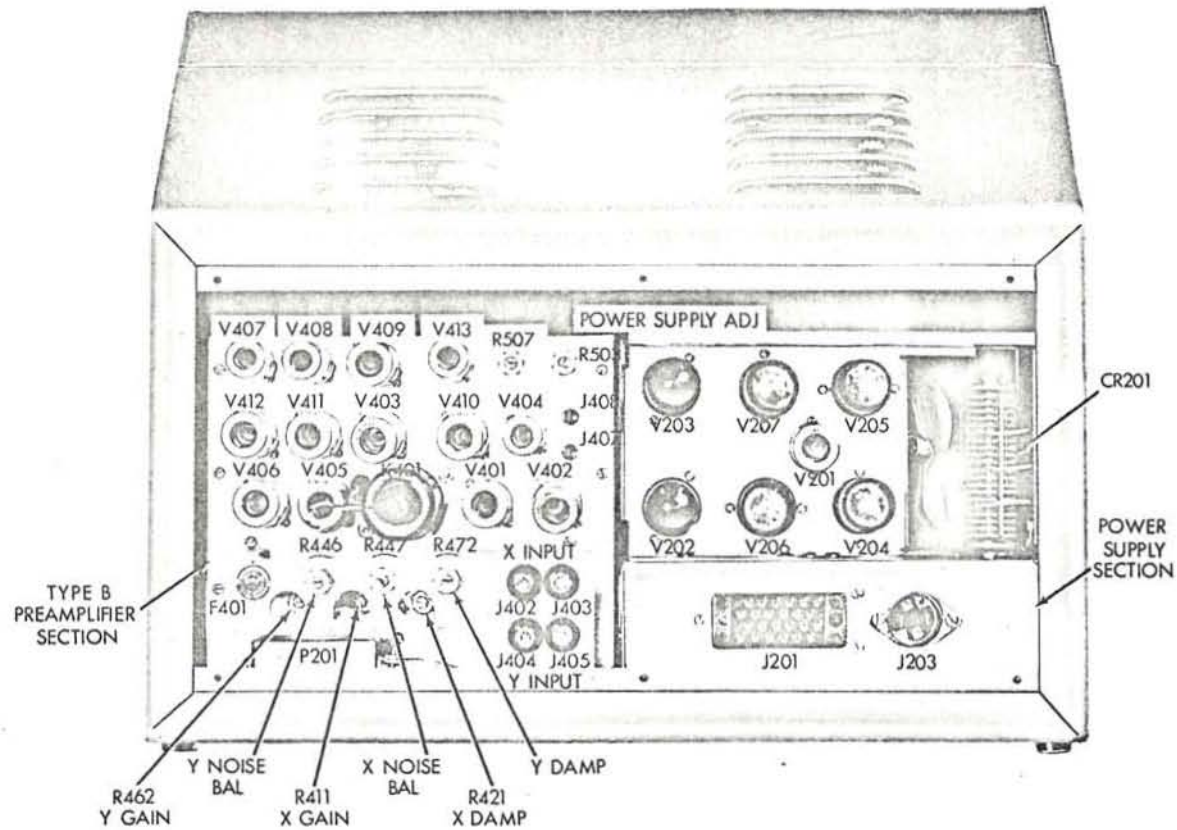


Figure 4. Rear View, Mesh Screen Removed

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at ON. Adjust the slider of potentiometer R503 to produce a 150-volt output at J407.

Place an oscilloscope across metering point J408 to ground. With the Power switch at ON, adjust R507 to produce zero difference voltage at chopper K402. The trace on the scope will approximate a straight line.

Gain. Two adjustment potentiometers, the X Gain and Y Gain controls at the rear of the preamplifier chassis, are used to adjust the gain. The potentiometers can be reached with a screwdriver through the mesh screen at the rear of the case. The adjustment consists of setting these controls so that statically the X amplifier generates 75 to 85 volts across the X servomotor and the Y amplifier generates 65 to 75 volts across the Y servomotor when the pen is 3/10-inch from the null point in each of the X and Y axes.

Make these adjustments with both the X and Y Scale knobs set at 0.50 volt:

1. Place jumper across terminals J402

and J403 to simulate X input, and across terminals J404 and J405 to simulate Y input. A piece of solid wire fitted into terminals will serve. Value of input has no bearing on adjustment.

2. Connect AC voltmeter across control phase of X servomotor (terminal N of J201 to ground) and another AC voltmeter across control phase of Y servomotor (terminal S of J201 to ground). Set range of both meters to indicate 100 volts without going off scale.
3. Energize plotter and set Operational switch to CALIB. Turn up gain in each axis until servo nulls with small static error about null point. Then set Operational switch at PLOT.
4. Move pen 3/10-inch to right by manually turning large spur gear under lamp housing.

X - Y P L O T T E R   M O D E L   2 0 0 B



5. Adjust X Gain potentiometer so voltmeter across X servomotor indicates between 75 and 85 volts.
6. Set Operational switch at CALIB.
7. Set Operational switch at PLOT.
8. Move pen 3/10-inch up in Y-axis, using support arms at either end of guide rail.
9. Adjust Y Gain potentiometer so voltmeter across Y servomotor indicates between 65 and 75 volts.
10. Turn Operational switch to CALIB.

Noise. Potentiometers R446 and R447, labelled X NOISE BAL and Y NOISE BAL, mounted at the rear of the preamplifier chassis, can be adjusted to minimize the null voltage across the control phases of the X and Y servomotors. This adjustment is most readily performed with the X and Y Scale knobs set at 0.005 volt.

Damping. Repeat gain adjustments, if necessary, and adjust the X and Y damping controls (X Damp and Y Damp, figure 4) at rear of the preamplifier chassis for critical damping. Critical damping is the fastest response obtainable with a minimum of overshoot.

Internal Scale Factor Adjustments. Ganged potentiometers R523-524 and R526-527 permit adjustment of the internal scale factor so a maximum input at any scale setting will produce exactly 15 inches of pen deflection in the X axis, and 10 inches in the Y axis. These potentiometers, X Calibrate and Y Calibrate in figure 5, can be reached for servicing through the mesh screen on the bottom of the plotter case.

To adjust, set the X and Y Scale knobs at 0.5 volt. Supply X and Y inputs of 0.5 volt. Adjust X Calibrate to produce 15 inches of pen travel from the origin. Adjust Y Calibrate to produce 10 inches of pen travel from the origin.

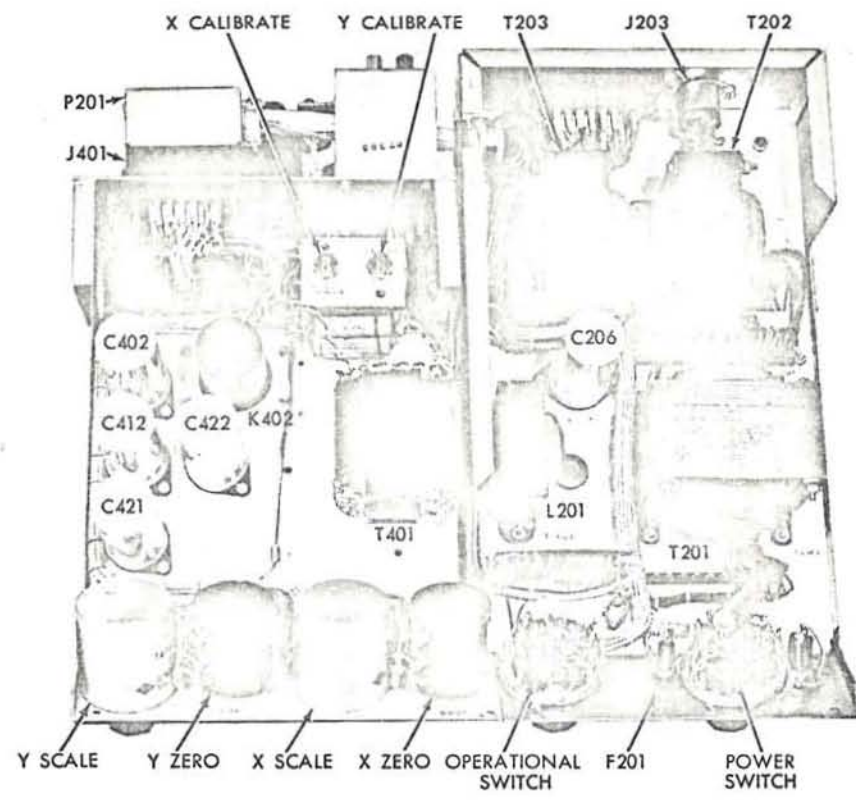


Figure 5. Bottom View, Case Removed

X - Y P L O T T E R   M O D E L   2 0 0 B



## PLOTTER CONVERSION

Converting the X-Y plotter from type B to type A requires changing the preamplifier chassis and the plug-in follow-up potentiometers, and resetting the mechanical stops which limit the pen carriage travel.

Procedures for these two conversion steps are detailed below.

### chassis interchange

Changing the chassis and plug-in follow-up potentiometers is accomplished as follows:

1. De-energize plotter.
2. Remove plastic dust cover.
3. Gently turn plotter face down on padded, level surface with base plate

extending over surface edge to permit access to case-mounting screws, figure 6.

4. Remove two 10-30 oval-head case-mounting screws (A in figure 6) on base plate. Slip case free of positioning dowels and remove from plotter assembly.
5. Remove four 8-32 screws (B in figure 6) that secure corners of preamplifier chassis control knob panel to main frame.
6. Remove two 8-32 screws (C in figure 6) that hold flange of preamplifier chassis to main frame of plotter assembly. Screws are accessible through access holes in chassis.

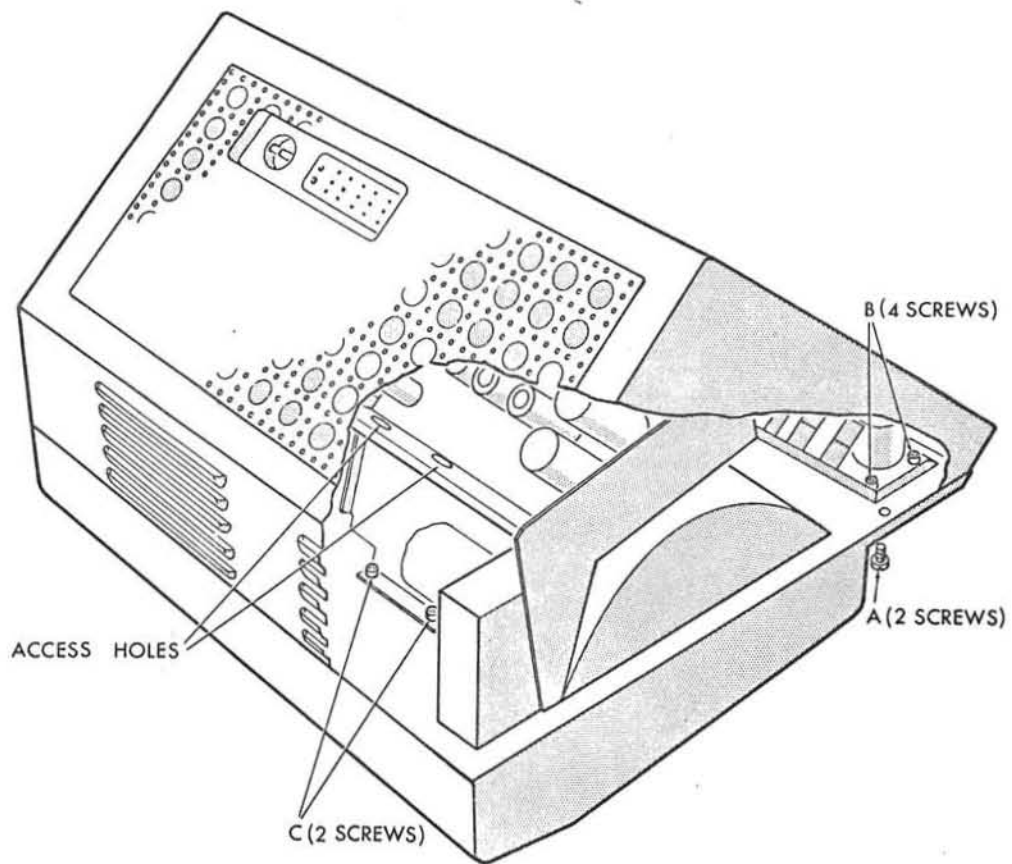


Figure 6. Interchanging Preamplifier Chassis

X - Y P L O T T E R M O D E L 2 0 0 B



7. Disconnect plug P201 from receptacle on preamplifier. P201 connects cable from power supply chassis to preamplifier chassis.
8. Gently slip out preamplifier chassis.
9. Install replacement chassis. Replace two screws at flange and four screws at control knob panel.
10. Reconnect P201 to preamplifier receptacle.
11. Set plotter assembly upright.
12. Replace X and Y follow-up potentiometers in mechanical section with potentiometers designed to operate with newly installed preamplifier. For a type A preamplifier use 10,000-ohm, three-turn, X and Y potentiometer assemblies. For a type B preamplifier use 500-ohm, three-turn, X and Y potentiometer assemblies.
13. Reset mechanical stops which limit pen travel in X and Y axes. For procedure, see Resetting Stops, page 16.  

NOTE: If newly installed preamplifier is type B, allow a few minutes for fluid in standard cell to settle before resetting stops.
14. Set plotter assembly face down on padded surface with base plate extending over surface edge. Slip case in place so as to engage the positioning dowels, and replace two mounting screws that hold case to base plate.
15. Set plotter upright and replace plastic dust cover.

## resetting stops

The follow-up potentiometer change is accomplished with the plotter out of the case at step 12, Chassis Interchange. At this point, to set the X-axis stops proceed as follows:

1. Unclamp X follow-up potentiometer and loosen stop clamp.
2. Move pen carriage to left end of rack until it rests against support arm, then move it 1/16-inch away from support arm.
3. Clamp stop with pen carriage in this position.
4. Allow approximately 0.01 inch end play in stop washers to prevent binding.
5. Move pen carriage to right end of

rack, making sure it stops about 1/16-inch from right support arm.

6. Move pen carriage back to left side of rack until it rests against stop.
7. Rotate follow-up potentiometer slider to its zero limit and reconnect potentiometer shaft to gear train shaft.
8. Move pen back and forth in X-axis, checking for oscillation of potentiometer due to misalignment of gear train shaft with potentiometer shaft. Align potentiometer coupling shaft if necessary.

To adjust stops in the Y-axis, follow a similar procedure. Set the Y-axis stops to limit pen travel at a point approximately 1/32-inch beyond the margins of the chart paper.

X - Y P L O T T E R   M O D E L   2 0 0 B



# PARTS LIST

## PREAMPLIFIER SECTION

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
	S401A Attenuator	R424	20K ohms, 1/2 watt, 5% tol. Cinema
<u>Capacitor</u>		R425	10K ohms, 1/2 watt, 5% tol. Cinema
C436	.02 mfd, 200 volts	R426	6.2K ohms, 1/2 watt, 5% tol. Cinema
<u>Resistors</u>		R427	2.2K ohms, 1/2 watt, 5% tol. Cinema
R429	1 meg, 1/4 watt, .1% tol. Cinema	R428	2.2K ohms, 1/2 watt, 5% tol. Cinema
R430	600K ohms, 1/4 watt, .1% tol. Cinema		S401C Attenuator
R431	200K ohms, 1/4 watt, .1% tol. Cinema	<u>Resistors</u>	
R432	100K ohms, 1/4 watt, .1% tol. Cinema	R433	1030 ohms, 1/4 watt, .1% tol. Cinema
	S401B Attenuator	R434	3222 ohms, 1/4 watt, .1% tol. Cinema
<u>Resistors</u>		R435	5848 ohms, 1/4 watt, .1% tol. Cinema
R422	100K ohms, 1/2 watt, 5% tol. Cinema		
R423	62K ohms, 1/2 watt, 5% tol. Cinema		





PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
R479	2.2K ohms, 1/4 watt, .1% tol. Cinema	R490	200K ohms, 1/4 watt, .1% tol. Cinema
	S402C Attenuator	R491	100K ohms, 1/4 watt, .1% tol. Cinema
<u>Resistors</u>		Turret Socket Assembly XV401 Librascope Drawing 307542	
R484	1030 ohms, 1/4 watt, .1% tol. Cinema	<u>Capacitors</u>	
R485	3222 ohms, 1/4 watt, .1% tol. Cinema	C401	.05 mfd, 200 volts DC, Westcap #26K2503 Type 26
R486	5848 ohms, 1/4 watt, .1% tol. Cinema	C403	.05 mfd, 200 volts DC, Aerovox Type P-85
R487	13890 ohms, 1/4 watt, .1% tol. Cinema	C404	.1 mfd, 200 volts DC, Aerovox Type P-85
R488	75K ohms, 1/4 watt, .1% tol. Cinema	C405	.01 mfd, 200 volts DC, Aerovox Type P-85
R489	600K ohms, 1/4 watt, .1% tol. Cinema		

PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
<u>Resistors</u>		C407	.05 mfd, 400 volts DC, Aerovox Type P-85
R401	4.7 meg, 1/2 watt, 5% tol. Ohmite	C408	.1 mfd, 400 volts DC, Aerovox Type P-85
R403	130K ohms, 1/2 watt, 5% tol. Ohmite	<u>Resistors</u>	
R404	1 meg, 1/2 watt, 5% tol. Ohmite	R408	1 meg, 1/2 watt, 5% tol. Ohmite
R405	100K ohms, 1/2 watt, 5% tol. Ohmite	R409	680 ohms, 1/2 watt, 5% tol. Ohmite
R406	68K ohms, 1/2 watt, 5% tol. Ohmite	R410	130K ohms, 1/2 watt, 5% tol. Ohmite
R407	330 ohms, 1/2 watt, 5% tol. Ohmite	R412	130K ohms, 1/2 watt, 5% tol. Ohmite
Turret Socket Assembly XV402 Librascope Drawing 307543		R413	680 ohms, 1/2 watt, 5% tol. Ohmite
<u>Capacitors</u>		R414	68K ohms, 1/2 watt, 5% tol. Ohmite
C406	.002 mfd, 200 volts DC, Aerovox Type P-85		

X - Y P L O T T E R M O D E L 2 0 0 B



PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
	Turret Socket Assembly XV403 Librascope Drawing 307544	R420	68K ohms, 1/2 watt, 5% tol. Ohmite
		R465	68K ohms, 1/2 watt, 5% tol. Ohmite
<u>Capacitors</u>		R468	820 ohms, 1/2 watt, 5% tol. Ohmite
C409	.05 mfd, 200 volts DC, Aerovox Type P-85	R469	120K ohms, 1/2 watt, 5% tol. Ohmite
C410	.05 mfd, 200 volts DC, Aerovox Type P-85	R471	68K ohms, 1/2 watt, 5% tol. Ohmite
C419	.05 mfd, 200 volts DC, Aerovox Type P-85		
C420	.05 mfd, 200 volts DC, Aerovox Type P-85		Turret Socket Assembly XV404 Librascope Drawing 307545
<u>Resistors</u>		<u>Resistors</u>	
R416	68K ohms, 1/2 watt, 5% tol. Ohmite	R419	15K ohms, 1 watt, 5% tol. Ohmite
R417	820 ohms, 1/2 watt, 5% tol. Ohmite	R448	47K ohms, 1/2 watt, 5% tol. Ohmite
R418	120K ohms, 1/2 watt, 5% tol. Ohmite	R449	47K ohms, 1/2 watt, 5% tol. Ohmite

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PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
R450	5K ohms, 2 watts, 5% tol. Ohmite	R453	130K ohms, 1/2 watt, 5% tol. Ohmite
R451	5K ohms, 2 watts, 5% tol. Ohmite	R455	1 meg, 1/2 watt, 5% tol. Ohmite
R470	15K ohms, 1 watt, 5% tol. Ohmite	R456	100K ohms, 1/2 watt, 5% tol. Ohmite
Turret Socket Assembly XV405 Librascope Drawing 307546		R457	330 ohms, 1/2 watt, 5% tol. Ohmite
<u>Capacitors</u>		R458	68K ohms, 1/2 watt, 5% tol. Ohmite
C411	.05 mfd, 200 volts DC, Westcap Type 26 #26K2503	Turret Socket Assembly XV406 Librascope Drawing 307547	
C413	.05 mfd, 200 volts DC, Aerovox Type P-85	<u>Capacitors</u>	
C414	.01 mfd, 200 volts DC, Aerovox Type P-85	C416	.002 mfd, 200 volts DC, Aerovox Type P-85
C415	.1 mfd, 200 volts DC, Aerovox Type P-85	C417	.05 mfd, 400 volts DC, Aerovox Type P-85
<u>Resistors</u>		C418	.1 mfd, 400 volts DC, Aerovox Type P-85
R452	4.7 meg, 1/2 watt, 5% tol. Ohmite		

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PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>
<u>Resistors</u>	
R459	1 meg, 1/2 watt, 5% tol. Ohmite
R460	130K ohms, 1/2 watt, 5% tol. Ohmite
R461	680 ohms, 1/2 watt, 5% tol. Ohmite
R463	680 ohms, 1/2 watt, 5% tol. Ohmite
R464	130K ohms, 1/2 watt, 5% tol. Ohmite
R466	68K ohms, 1/2 watt, 5% tol. Ohmite

Turret Socket Assembly XV409  
Librascope Drawing 307548

<u>Symbol</u>	<u>Description</u>
<u>Capacitors</u>	
C426	.25 mfd, 200 volts DC, Aerovox Type P-82

<u>Symbol</u>	<u>Description</u>
C427	2 mfd, 200 volts DC, Aerovox Type P-82
<u>Resistors</u>	
R500	180K ohms, 1/2 watt, 5% tol. Ohmite
R501	18K ohms, 1/2 watt, 5% tol. Ohmite
R502	330K ohms, 1/2 watt, 5% tol. Ohmite
R505	330K ohms, 1/2 watt, 5% tol. Ohmite

Turret Socket Assembly XV410  
Librascope Drawing 307549

<u>Symbol</u>	<u>Description</u>
<u>Capacitors</u>	
C425	.1 mfd, 200 volts DC, Aerovox Type P-85

L I B R A S C O P E , I N C O R P O R A T E D



PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>
C434	100 mfd, 3 volts DC, Aerovox S RE
C435	100 mfd, 3 volts DC, Aerovox S RE
<u>Resistor</u>	
R504	27K ohms, 1 watt, 5% tol. Ohmite

Turret Socket Assembly XV411  
Librascope Drawing 307550

<u>Capacitors</u>	
C428	.002 mfd, 200 volts DC, Aerovox Type P-85
C429	.1 mfd, 200 volts DC, Aerovox Type P-85

<u>Resistors</u>	
R509	47K ohms, 1/2 watt, 5% tol. Ohmite
R510	10K ohms, 1/2 watt, 5% tol. Ohmite

<u>Symbol</u>	<u>Description</u>
R511	510K ohms, 1/2 watt, 5% tol. Ohmite
R512	820 ohms, 1/2 watt, 5% tol. Ohmite
R513	68K ohms, 1/2 watt, 5% tol. Ohmite

Turret Socket Assembly XV412  
Librascope Drawing 307551

<u>Capacitors</u>	
C430	.03 mfd, 200 volts DC, Aerovox Type P-85
C431	.006 mfd, 200 volts DC, Aerovox Type P-85
C432	.03 mfd, 200 volts DC, Aerovox Type P-85
C433	.1 mfd, 200 volts DC, Aerovox Type P-85

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PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
<u>Resistors</u>		R498	10K ohms, 5 watts, 5% tol. Ohmite
R514	2.2 meg, 1/2 watt, 5% tol. Ohmite	R499	10K ohms, 5 watts, 5% tol. Ohmite
R515	1K ohm, 1/2 watt, 5% tol. Ohmite	R508	1 meg, 1/2 watt, 5% tol. Ohmite
R516	68K ohms, 1/2 watt, 5% tol. Ohmite	R521	875 ohms, 1/2 watt, 1% tol. Hycore Type 53
R517	2.2 meg, 1/2 watt, 5% tol. Ohmite	R522	125 ohms, 1/2 watt, 1% tol. Hycore Type 53
R518	68K ohms, 1/2 watt, 5% tol. Ohmite		
R519	1.5K ohms, 1/2 watt, 5% tol. Ohmite		Miscellaneous Components
R520	100K ohms, 1/2 watt, 5% tol. Ohmite		
	Turret Socket Assembly XV413		
	Librascope Drawing 307552		
<u>Resistors</u>		<u>Capacitors</u>	
R497	2.5K ohms, 5 watts, 5% tol. Ohmite	C402A	125 mfd, 25 volts, Sprague TVL 3743
		C402B	30 mfd, 450 volts, Sprague TVL 3743
		C402C	30 mfd, 450 volts, Sprague TVL 3743

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PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
C412A	125 mfd, 25 volts, Sprague TVL 3743	C423	2 mfd, 450 volts, Sprague TVA 1701
C412B	30 mfd, 450 volts, Sprague TVL 3743	C424	10 mfd, 450 volts, Sprague TVA 1705
C412C	30 mfd, 450 volts, Sprague TVL 3743	<u>Resistors</u>	
C421A	10 mfd, 450 volts, Sprague TVL 2776	R402	1K ohm, 1/2 watt, 5% tol. Ohmite
C421B	80 mfd, 450 volts, Sprague TVL 2776	R411	1 meg, Type AB, Ohmite CLU1052
C422A	40 mfd, 450 volts, Sprague TVL 3786	R415	27K ohms, 1/2 watt, 5% tol. Ohmite
C422B	40 mfd, 450 volts, Sprague TVL 3786	R421	50K ohms, Type AB, Ohmite CLU5031
C422C	20 mfd, 450 volts, Sprague TVL 3786	R441	1010 ohms, 1/4 watt, 1% tol. Cinema
		R442	100K ohms, 1/4 watt, .1% tol. Cinema
		R443	200K ohms, 1/4 watt, .1% tol. Cinema
		R444	200K ohms, 1/4 watt, .1% tol. Cinema

X - Y P L O T T E R   M O D E L   2 0 0 B



PREAMPLIFIER SECTION (Cont.)

<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
R445	500 ohms, 10 turns, 5% lin. Helipot 500AZ center tapped	R495	1010 ohms, 1/4 watt, .1% tol. Cinema
R446	250 ohms, Type AB, Ohmite CLU2511	R496	500 ohms, 10 turns, 5% lin. Helipot 500AZ center tapped
R447	250 ohms, Type AB, Ohmite CLU2511	R503	1 meg, Type AB, Ohmite CLU1052
R454	1K ohm, 1/2 watt, 5% tol. Ohmite	R506	4.7K, 1/2 watt, 5% tol. Ohmite
R462	1 meg, Type AB, Ohmite CLU1052	R523	50 ohms (ganged) Allen- Bradley
R467	27K ohms, 1/2 watt, 5% tol. Ohmite	R524	50 ohms (ganged) JJLU-5001- SD4040L
R472	50K ohms, Type AB, Ohmite CLU5031	R525	50 ohms (ganged) Allen- Bradley
R492	100K ohms, 1/4 watt, .1% tol. Cinema	R526	50 ohms (ganged) JJLU-5001- SD4040L
R493	200K ohms, 1/4 watt, .1% tol. Cinema		
R494	200K ohms, 1/4 watt, .1% tol. Cinema		

POWER SECTION

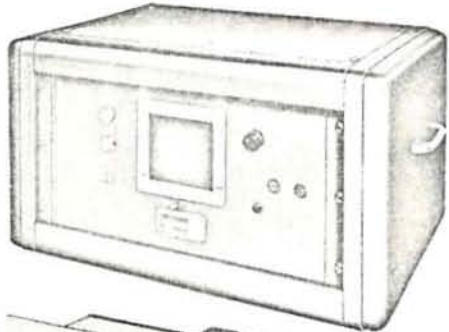
<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
<u>Potentiometers</u>		R209	1 meg, 1/2w, 5% tol. Ohmite
R101	10K, Helipot	R210	130K, 1/2w, 5% tol. Ohmite
R102	10K, Helipot	R211	130K, 1/2w, 5% tol. Ohmite
		R212	130K, 1/2w, 5% tol. Ohmite
		R213	130K, 1/2w, 5% tol. Ohmite
		R214	27K, 1/2w, 5% tol. Ohmite
<u>Resistors</u>		R215	470K, 1/2w, 5% tol. Ohmite
R201	200 ohm, 5w, Ohmite	R216	250 ohm, 5w, Ohmite
R202	1 meg, 1/2w, 5% tol. Ohmite	R217	470K, 1/2w, 5% tol. Ohmite
R203	100K, 1/2w, 5% tol. Ohmite	R218	470K, 1/2w, 5% tol. Ohmite
R204	1 meg, 1/2w, 5% tol. Ohmite	R219	250 ohm, 5w, Ohmite
R205	5.1 meg, 1/2w, 5% tol. Ohmite	R220	470K, 1/2w, 5% tol. Ohmite
R206	510K, 1/2w, 5% tol. Ohmite	R221	7500 ohm, 5w, Ohmite
R207	100K, 1/2w, 5% tol. Ohmite	R222	1K, 1/2w, 5% tol. Ohmite
R208	5.1 meg, 1/2w, 5% tol. Ohmite	R223	1K, 1/2w, 5% tol. Ohmite

X - Y P L O T T E R   M O D E L   2 0 0 B

POWER SECTION (cont.)

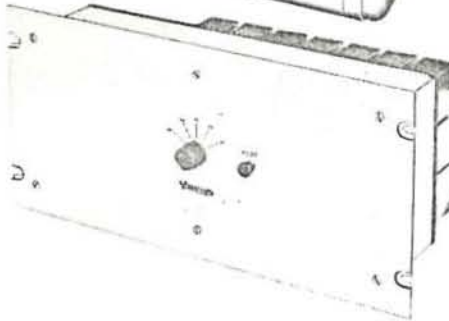
<u>Symbol</u>	<u>Description</u>	
<u>Capacitors</u>		<u>Miscellaneous</u>
C201	2 mfd, 200 v Aerovox P-82	
C202	.03 mfd, 400 v Aerovox P-82	Ink Esterline-Angus or Equal
C203	.02 mfd, 400 v Aerovox P-82	
C204	.03 mfd, 400 v Aerovox P-82	Graph Paper Librascope Drawing 306957
C205	.02 mfd, 400 v Aerovox P-82	
C206	30-30-20 mfd, 450 v Sprague TVL 3840	Pen Assembly Librascope Drawing 309004
C207	.05 mfd, 400 v Aerovox P-82	
C208	.05 mfd, 400 v Aerovox P-82	Pen Cleaning Wire Librascope Drawing 309109
C209	.05 mfd, 400 v Aerovox P-82	
C210	.05 mfd, 400 v Aerovox P-82	
C211	.25 mfd, 600 v Aerovox P-82	
C212	.25 mfd, 600 v Aerovox P-82	

## Accessories for Librascope X-Y Plotter, Model 200A



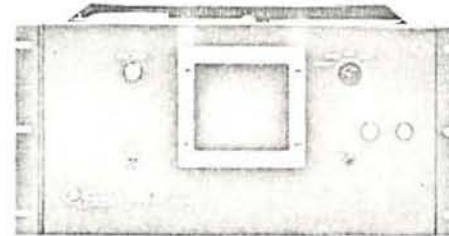
### PUNCHED TAPE CONVERTER

Relay-operated converter. Accepts then converts digital data from a punched paper tape to corresponding analog resistance for use in controlling plotter. Accepts three-decimal digits and sign for each axis. Can be programmed to reject any additional data. Operates by manual advance or automatic feeding of tape. Maximum speed: Up to 80 points per minute with accuracy of 0.1%.



### BINARY CONVERTER

Relay-operated converter. Accepts 9-bit and sign binary signal for each axis and converts to corresponding analog resistance for plotter. Total resistance: 10,000 ohms per bank. Normally, external thyratrons energize the relays and order the plot cycle, which is controlled by relays in the converter. External power requirement: 120 volts DC at 550 milliamps.



### PUNCHED CARD CONVERTER

Relay-operated converter. Accepts then converts three-decimal digit, and sign, two channel, IBM punched card data to an analog form for input to plotter. Cards can be fed manually through IBM reading brushes singly or read automatically at rates up to 50 cards per minute with an accuracy of 0.1%. Operates with IBM Reproducing Punch Type 519 and IBM Gang Summary Punch Type 523.

NOTE: Librascope Decimal Keyboard Model 225 is used with Librascope X-Y Plotter Model 200A.

L I B R A S C O P E , I N C O R P O R A T E D



## Librascope DECIMAL KEYBOARD MODEL 226

Librascope Decimal Keyboard Model 226, an accessory for Librascope X-Y Plotter Model 200B, converts manual inputs into the signal form required by the plotter.

A compact unit, the keyboard consists of a three-decimal bank for each axis with associated plus-minus keys. Depressing of plotting bar initiates plot and clears keyboard automatically. Manual clear button also provided. Features Librascope positive-action self-wiping contacts. It can be operated on any horizontal surface.

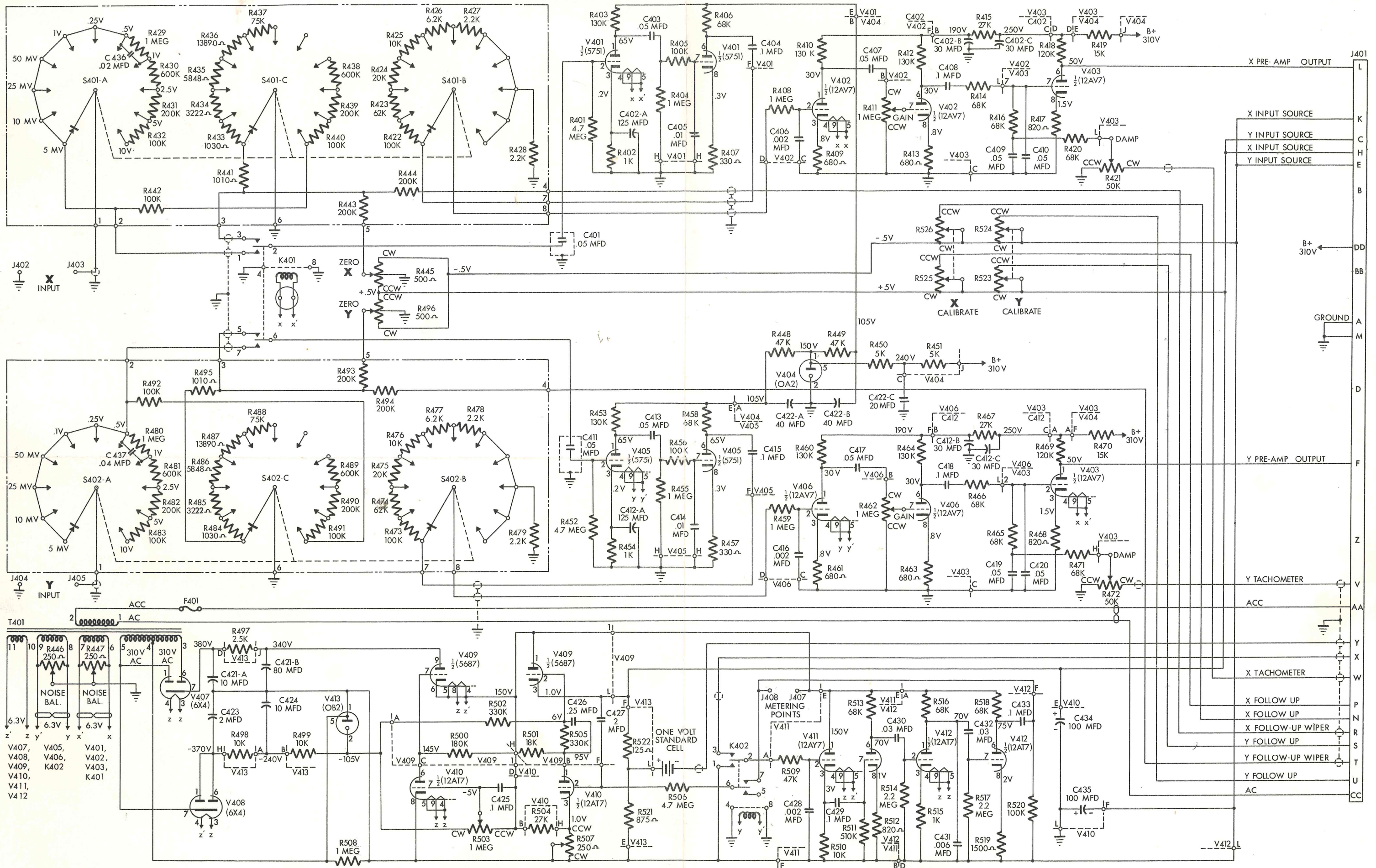
Some additional characteristics of the keyboard are these:

- Input Capacity . . . From 0 to  $\pm 999$  in each axis
- Power . . . . . Energized by X-Y Plotter. No other source necessary.
- Dimensions . . . . 8-1/2 in. wide  $\times$  11 in. deep  $\times$  6 in. high
- Weight . . . . . 12 pounds



X - Y P L O T T E R M O D E L 2 0 0 B





LIBRASCOPE DRAWING 307381. PREAMPLIFIER SECTION SCHEMATIC WIRING DIAGRAM, LIBRASCOPE X-Y PLOTTER, MODEL 200B