

LBO – 507-508
5” OSCILLOSCOPE
SERVICE MANUAL

WARNING

These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the service manual unless you are qualified to do so.

TABLE OF CONTENTS

| | |
|--|----|
| PCB. REPLACEMENT LIST | 3 |
| TEST EQUIPMENT REQUIRED | 5 |
| CHECK AND ADJUSTMENT PROCEDURE | 6 |
| 1 POWER SUPPLY | 6 |
| 2 DISPLAY | 6 |
| 1) Intensity Offset | 6 |
| 2) Intensity | 7 |
| 3 VERTICAL | 7 |
| 1) Step Attenuator Balance | 7 |
| 2) DC Balance | 8 |
| 3) ADD. Balance | 8 |
| 4) VOLTS/CM | 9 |
| 5) Step Attenuator Phase Compensation ... | 10 |
| 6) Input Capacitance | 10 |
| 7) Vertical Amplifier High Frequency Compensation | 11 |
| 8) Frequency Response | 11 |
| 4 TIME BASE | 12 |
| 1) TIME/CM | 12 |
| 2) MAG. X5 | 12 |
| 3) MAG. X5 Centering | 13 |
| 4) Sweep Length | 13 |
| 5) MAG. X5 High Speed Linearity Compensation | 14 |
| 6) MAG. X5 Linearity | 15 |
| 5 TRIGGER | 15 |
| 1) Sweep Stability | 15 |
| 2) Internal Trigger | 16 |
| 3) External Trigger | 16 |
| 6 X-Y OPERATION | 16 |
| 1) X Gain | 16 |
| 2) X-Y Position Centering | 17 |
| 7 CALIBRATOR | 17 |

| | |
|---|----|
| TRUBLE SHOOTING CHART | 18 |
| LOCATION OF ADJUSTOR | 21 |
| PIN CONNECTION , TRANSISTOR and CRT | 27 |
| PRINTED CIRCUIT BOARD | 29 |
| BLOCK DIAGRAM | 34 |
| CIRCUIT DIAGRAM and WAVEFORM CHART | 35 |
| CHANGE INFORMATION ----- | 48 |

PCB. REPLACEMENT LIST

| PCE. No. | Item | Model | Ser. No. | Principal changes |
|----------|-------------|---------------|-----------------------|--|
| T-1312 | TRIG. SWEEP | 507 | No. 7070001 ~ 7100450 | |
| | | 508 | No. 7070001 ~ 7100800 | |
| T-1312A | | 507 | No. 7110451 ~ 7010650 | Additional parts: C340 ~ 342, R1301:508 R1302, Q326, GND-TP Replacement parts: connector (P-301, P-305, P-310: 508) Removement parts: D308 |
| | | 508 | No. 7110801 ~ 7012150 | |
| T-1312B | | 507 | No. 7020651 ~ | Additional parts: R1304, 1305, Q327 Replacement parts: C331, R386 Removement parts: C309 |
| | | 508 | No. 7022151 ~ | |
| T-1313 | V-FINAL | 507 | No. 7070001 ~ 7021050 | |
| | | 508 | No. 7070001 ~ 7022550 | |
| T-1313A | | 507 | No. 7031051 ~ | Replacement parts: C219 connector (P-213) |
| | 508 | No. 7032551 ~ | | |
| T-1314 | V-PREAMP | 507 | No. 7070001 7100450 | |
| T-1314A | | | | No. 7110451 ~ |
| T-1315 | V-PREAMP | 508 | No. 7070001 ~ 7100800 | |
| T-1315A | | | | No. 7110801 ~ 7012150 |

| PCB. No. | Item | Model | Ser. No. | Principal changes |
|----------|-----------------|-----------------------|-----------------------|--|
| T-1015B | V-PREAMP | | No. 7022151~ | Additional parts: C1233, R1263, 1264, R239 C1224 → VC1207, C214 |
| T-1322 | PWR. & H-AMP | 507 | No. 7070001 ~ 7100450 | * NOTE: HIGH VOLTAGE TP-5: -1500V |
| | | 508 | No. 7070001 ~ 7100800 | |
| T-1322A | | 507 | No. 7100451 ~ 7031250 | Additional parts: C124, 126, 406, VC401 R137, 138, 423 GND- TP Replacement parts: connector (P-101, 109, 110, 111, 112, 402) * NOTE: HIGH VOLTAGE TP-5: -1500V |
| | 508 | No. 7110801 ~ 7032750 | | |
| T-1322B | | 507 | No. 7041251~ | Additional parts: C406 R140, 141 D121, 122 F113 J122....Rear panel Replacement parts: C122, C405 → VC401 R136, 407, 413, 422 D116 ~ 118 * NOTE: HIGH VOLTAGE TP-5: -2000V |
| | | 508 | No. 7042751~ | |
| T-1467 | Beam rotator | 507A | No. 8060401~ | Additional Unit Beam rotator (Ref. O-995A 1/7) |
| | | 508A | No. 8060101~ | |

TEST EQUIPMENT REQUIRED

| | |
|---------------------------------|---|
| Voltmeter | DC 0 to 2000V AC 0 to 600V |
| Amplitude Calibrator | Square-wave 50mV to 50V Frequency: approximately 1KHz |
| Sine-wave Generator | 100Hz to 20MHz Constant Amplitude |
| Fast Rise Square-wave Generator | 1KHz to 100KHz |
| Capacitance Meter | 35pF |
| Time Marker Generator | 0.2S to 0.5 μ S |
| Oscilloscope | 10mV 20MHz |

CHECK AND ADJUSTMENT PROCEDURE

- * 507 and 508 are the same procedure.
Different parts are as follows.

LBO-507 507

LBO-508 508

1 POWER SUPPLY

Check the Power Supply for the DC Levels and Ripples.
Connect the DC Voltmeter between the Test Point and ground.
Voltage to be within the given limits.

Table-1

| Voltage | Test Point | % | Tolerance Reading | Ripple |
|---------|------------|------|----------------------|----------|
| +15V | TP-2 | ±5% | +15.75V to +14.25V | 0.5mVp-p |
| -15V | TP-1 | ±5% | -15.75V to -14.25V | 1mVp-p |
| +200V | TP-3 | ±10% | +180V to +220V | 0.7mVp-p |
| +310V | TP-4 | ±10% | +279V to +341V | 2Vp-p |
| -2000V | TP-5 | ±10% | -1800V to -2200V | 0.5Vp-p |

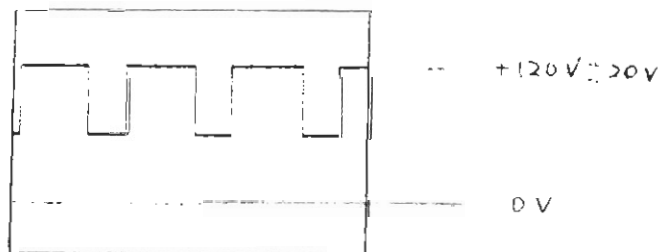
2 DISPLAY

1) Intensity Offset

SET: TIME/CM 0.5mS/cm
 TRIG. MODE AUTO

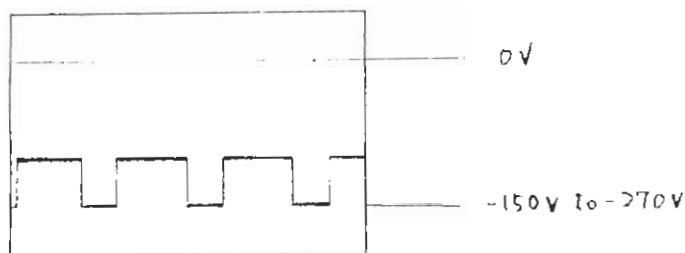
Connect the test Oscilloscope to the TP-6.

ADJUST: It is as follows by INTEN Offset Level ADJ. (VR102).



Connect the test Oscilloscope to the TP-14.

CHECK: Blanking Level to be between -150V and -270V as follows.

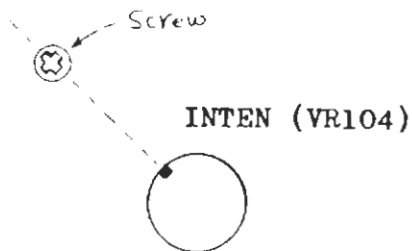


2) Intensity

SET: TIME/CM 1mS/cm
 INTEN. Control as shown below

CHECK: The trace to be barely obtained.

ADJUST: INTEN. ADJ. Control (VR105) until the trace slightly appears.



3 VERTICAL

1) Step Attenuator Balance

| | |
|-----------------|----------|
| SET: VERT. MODE | CH-1 |
| VOLTS/CM | 0.05V/cm |
| VARIABLE | CAL'D |
| AC-GND-DC | GND |

Position the trace to the scale center by VERTICAL position control.

CHECK: No trace shift when switching the CH-1 VOLTS/CM from 0.05V/cm to 0.01V/cm.

ADJUST: Set the VOLTS/CM to 0.05V/cm.
 Position the trace to the scale center.
 Set the VOLTS/CM to 0.01V/cm.
 Position the trace to the scale center by adjusting
 the CH-1 STEP BAL. ADJ. control 507 : VR3201
508 : VR1201
 Repeat the above procedures until the minimum
 trace shift can be obtained.

CH-2: Apply the same procedures as CH-1.
 CH-2 STEP BAL. ADJ.: VR2201

2) DC Balance

| | |
|-----------------|----------|
| SET: VERT. MODE | CH-1 |
| VOLTS/CM | 0.01V/cm |
| AC-GND-DC | GND |

Position the trace to the scale center.

CHECK: No trace shift when rotating the VARIABLE control—
 fully clockwise (CAL'D) to fully counterclockwise.

ADJUST: Set the VARIABLE fully counterclockwise.
 Position the trace to the scale center by VERTICAL
 position control.
 Turn the VARIABLE to CAL'D.
 Position the trace to the scale center by adjusting
 the CH-1 DC BAL. ADJ. 507 : VR3204
508 : VR1202
 Repeat the above procedures until the minimum trace
 shift can be obtained.

CH-2: Apply the same procedures as CH-1.
 CH-2 DC BAL. ADJ.: VR2202

3) ADD. Balance (only 508)

| | |
|-----------------|----------|
| SET: VERT. MODE | DUAL |
| VOLTS/CM | 0.01V/cm |
| AC-GND-DC | GND |

Position both CH-1 and CH-2 traces to the scale center.
 Push the ADD. button.

CHECK: No trace shift when changing the Dual to the ADD.

ADJUST: ADD BAL. ADJ. (VR201) for the minimum trace shift between the DUAL and the ADD.

Repeat the above adjustment for the minimum trace shift.

4) VOLTS/CM --- Gain of the Vertical Amplifier.

SET: VOLTS/CM 0.01V/cm
 VARIABLE CAL'D
 AC-GND-DC DC
 Amplitude Calibrator Connect to the CH-1.
 Freq.: 1KHz
 Output: 50mV

CHECK: Display of 5cm of deflection within $\pm 3\%$ tolerance.

ADJUST: CH-1 GAIN ADJ. 507 : VR3204 for 5cm.
 508 : VR1204

CHECK: Accuracy of the other CH-1 VOLTS/CM according to Table-2

CH-2: Apply the same procedures as CH-1.
 CH-2 GAIN ADJ. (VR2204)

Table-2

| VOLTS/CM | Calibrator Output (V) | Deflection (cm) | GAIN ADJ. |
|----------|-----------------------|-----------------|--|
| 0.01 | 0.05 | 5 | 507 VR3204 508 CH-1: VR1204 CH-2: VR2204 |
| 0.02 | 0.1 | 5 | |
| 0.05 | 0.2 | 4 | |
| 0.1 | 0.5 | 5 | |
| 0.2 | 1 | 5 | |
| 0.5 | 2 | 4 | |
| 1 | 5 | 5 | |
| 2 | 10 | 5 | |
| 5 | 20 | 4 | |
| 10 | 50 | 5 | |
| 20 | 100 | 5 | |

5) Step Attenuator Phase Compensation

SET: CH-1 VOLTS/CM 0.1V/cm
 Amplitude Calibrator Connect to CH-1.
 Freq.: 1KHz
 Output: 0.5V

CHECK: Display of a flat-top waveform without overshoot and ringing.

ADJUST: PHASE COMP. ADJ. (VC1201) for the best flat-top waveform.

CHECK: A flat-top waveform of 0.2V/cm and 0.5V/cm ranges.

CHECK and ADJUST the Phase Compensation of all the other VOLTS/CM ranges according to Table-3.

Table-3

| VOLTS/CM | PHASE COMP. ADJ. | |
|--------------|------------------|--------|
| | CH-1 | CH-2 |
| 0.1V to 0.5V | 507 : VC3201 | VC2201 |
| | 508 : VC1201 | |
| 1V to 5V | 507 : VC3203 | VC2203 |
| | 508 : VC1203 | |
| 10V to 20V | 507 : VC3205 | VC2205 |
| | 508 : VC1205 | |

6) Input Capacitance

SET: CH-1 VOLTS/CM 0.01V/cm
 AC-GND-DC DC
 Capacitance Meter Connect to CH-1.

CHECK: Input Capacitance is 35pF ±5pF.
 At the same time, Check the input capacitances of 0.02V/cm and 0.05V/cm ranges within the given limits.

The other ranges:
 Check the input capacitances of all the other VOLTS/CM ranges within 0.01V/cm C-in ±0.5pF.

ADJUST: INPUT CAPACITANCE ADJ. for the given limits according to Table-4.

CH-2: Apply the same procedures as the CH-1.

Table-4

| VOLTS/CM | INPUT CAPACITANCE ADJ. | |
|----------------|------------------------------|--------|
| | CH-1 | CH-2 |
| 0.01V to 0.05V | | |
| 0.1V to 0.5V | 507 : VC3202 508 : VC1202 | VC2202 |
| 1V to 5V | 507 : VC3204 508 : VC1204 | VC2204 |
| 10V to 20V | 507 : VC3206 508 : VC1206 | VC2206 |

7) Vertical Amplifier High Frequency Compensation

SET: CH-1 VOLTS/CM 0.01V/cm
 Square-wave Generator Connect to CH-1.
 Freq.: 100KHz
 Output: 4cm display

CHECK: Display of a flat-top waveform with 5% or less overshoot and ringing.

ADJUST: HIGH FREQ. COMP. ADJ. VR202, VC201 507 : VC3207
 508 : VC1207
 for a flat-top waveform within the given limits.

Check the display of a flat-top waveform within the limits at 0.02V/cm and 0.05V/cm.

CH-2: Apply the same procedures as CH-1.
 CH-2 HIGH FREQ. COMP. ADJ.: VC2207

8) Frequency Response

SET: CH-1 VOLTS/CM 0.01V/cm
 Sine-wave Generator Connect to CH-1.
 Freq.: 1KHz
 Output: 4cm display

Set the sine-wave generator to 20MHz without changing its generator amplitude adjustment.

CHECK: Display amplitude to be 2.8cm or greater.

Apply the above procedures for all CH-1 VOLTS/CM ranges and check the frequency response.

CH-2: Apply the same procedures as CH-1.

* NOTE: Repeat adjustments and checks through 7) and 8) as these have an adjustment interaction.

4 TIME BASE

1) TIME/CM (Horizontal Amplifier X1 Gain)

| | |
|-----------------------|---------------------------------|
| SET: TIME/CM | 0.5mS/cm |
| VARIABLE | CAL'D |
| VOLTS/CM | 0.5V/cm |
| LEVEL | NORM. |
| Time Marker Generator | Connect to CH-1. Time: 0.5mS |

Fill the scale with 11 Time Markers.

CHECK: 1 marker per centimeter is exactly within $\pm 3\%$ tolerance on the scale line.

ADJUST: TIME/CM ADJ. (WIDTH ADJ.: VR304) to exactly make 1 Time Marker per cm.

CHECK: Accuracy of all CH-1 TIME/CM ranges.

READJUST: TIME/CM ADJ. (VR304) to be within the given limits at all CH-1 TIME/CM ranges.

2) MAG. X5 (Horizontal Amplifier X5 Gain)

| | |
|-----------------------|----------|
| SET: TIME/CM | 0.5mS/cm |
| VARIABLE | CAL'D |
| Time Marker Generator | 0.5mS |
| MAG. | X5 |

CHECK: Two Time Markers are exactly at an interval of 5cm length.

ADJUST: MAG. GAIN ADJ. (VR403) to exactly make 1 mark per 5cm.

3) MAG. X5 Centering

| | |
|-----------------------|----------|
| SET: TIME/CM | 0.5mS/cm |
| VARIABLE | CAL'D |
| Time Marker Generator | 0.5mS |
| MAG. | x1 |

Position 2nd time marker from the sweep starting point exactly to the scale center.

Pull the MAG. knob.

CHECK: 3 Time Markers are obtained exactly at intervals of 5cm length.

ADJUST: MAG. CENTER ADJ. (VR402) to position the middle time marker on the scale center line.

*NOTE: Repeat the above adjustments until no horizontal shift of the Time Marker is observed between X1 MAG. and X5 MAG.

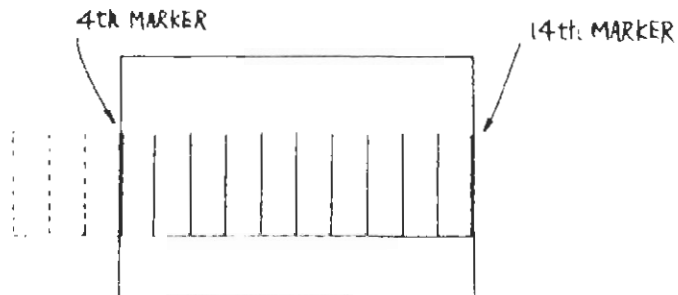
4) Sweep Length

| | |
|-----------------------|---------------------------------|
| SET: TIME/CM | 0.5mS/cm |
| VARIABLE | CAL'D |
| LEVEL | NORM. |
| MAG. | X1 |
| Time Marker Generator | Connect to CH-1. Time: 0.5mS |

Position the 4th Time Marker from the sweep starting point to the left end of the scale.

CHECK: 14th Time Marker is just observed in the right end of the scale.

ADJUST: LENGTH ADJ. (VR305) until the 14th Time Marker appears in the right end of the scale as follows.



5) MAG. X5 High Speed Linearity Compensation

SET: TIME/CM 0.5μS/cm
 VARIABLE CAL'D
 MAG. X1
 Time Marker Generator Connect to CH-1.
 Time: 0.5μS

Set the 3rd Time Marker from the sweep starting point at the scale center.

Pull the MAG. knob.

CHECK: Each Time Marker of the three to be respectively positioned at the left end, the center and the right end of the scale within ±5% tolerance.

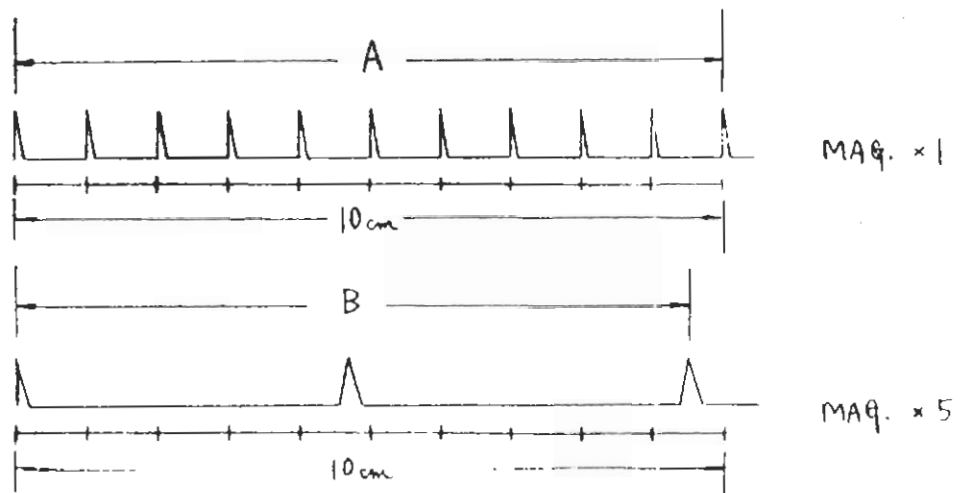
ADJUST: Exactly position the left Time Marker exactly to the scale left end.
 The other 2 Time Markers are positioned at the center and right end respectively by adjusting HIGH SPEED LINEARITY ADJ. (VC401).

CHECK: MAG. High Speed Linearity for a portion of the sweep center and sweep end in the same manner.

CHECK: Accuracy of 1μS/cm and 1mS/cm ranges as mentioned above.

*NOTE: Accuracy of the MAG. X5 High Speed Linearity can be defined by the following equation.

$$\epsilon = \frac{5 - (A/B)}{5} \times 100$$



5) MAG. X5 LINEARITY

| | |
|-----------------------|-------------------------------|
| SET: TIME/CM | 1mS/cm |
| VARIABLE | CAL'D |
| Time Marker Generator | Connect to CH-1. Time: 1mS |
| MAG. | X5 |

3 Time Markers are obtained on the scale.

Position the middle Time Marker exactly at the center.

CHECK: Linearity to be within $\pm 10\%$ tolerance.

ADJUST: Linearity Compensation Capacitance VC401 for the given limits.

CHECK: Accuracy of $1\mu\text{S/cm}$ and $0.5\mu\text{S/cm}$ ranges in the same manner as mentioned above.

5 TRIGGER

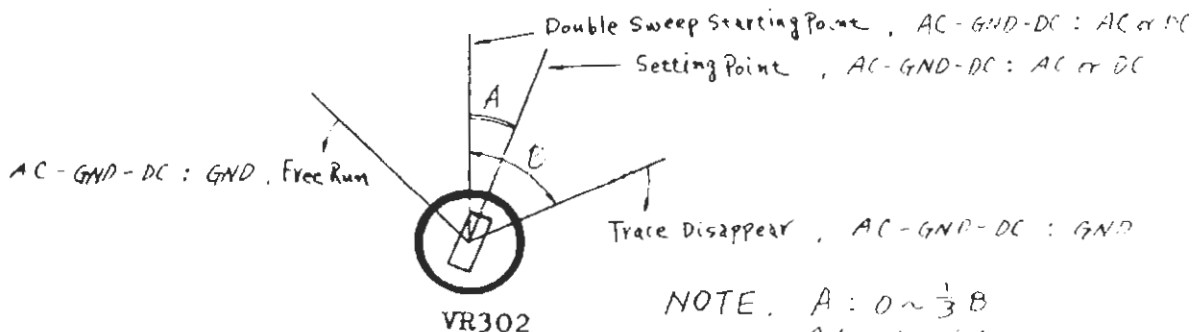
1) SWEEP STAB.

| | |
|---------------------|---|
| SET: TIME/CM | 1mS/cm |
| VARIABLE | CAL'D |
| LEVEL | NORM. |
| V. MODE | DUAL |
| Sine-wave Generator | Connect to CH-1. Freq.: 100Hz Output: 1cm display |

CHECK: Stable display to be obtained by rotating the LEVEL knob.

ADJUST: Position the STAB. ADJ. (VR302) to the starting point of free-runs and rotate the TIME/CM VARIABLE counterclockwise until the double sweep occurs.

Adjust the STAB. ADJ. (VR302) as follows.



2) Internal Trigger

| | |
|---------------------|---|
| SET: TIME/CM | 0.5 μ S/cm |
| LEVEL | NORM. |
| V. MODE | DUAL |
| Sine-wave Generator | Connect to CH-1. Freq.: 20MHz Output: 1cm display |

CHECK: Stable display to be obtained by rotating the LEVEL knob, and then by setting the TRIG. SLOPE to -

CH-2: Apply the same procedure as CH-1.

At the same time, check if the stable display can be obtained by setting LEVEL knob to AUTO.

3) External Trigger

| | |
|---------------------|--|
| SET: TIME/CM | 0.5 μ S/cm |
| V. MODE | DUAL |
| TRIG. | EXT. |
| LEVEL | NORM. |
| Sine-wave Generator | Connect to CH-1 in paralel with Ext. Trig. in. Freq.: 20MHz Output: 150mVp-p |

CHECK: Stable display to be obtained by rotating the LEVEL knob and at the same time, by setting TRIG. SLOPE to - .

*NOTE: When no stable display can be observed in checking 2) and 3), readjust the STAB. ADJ. (VR302).

6 X-Y OPERATION

1) X GAIN

| | |
|----------------------|---------------------------------|
| SET: TIME/CM | X-Y |
| VOLTS/CM | 0.01C/cm |
| V. VARIABLE | CAL'D |
| H. POSITION | Midrange |
| Amplitude Calibrator | Connect to CH-1 Output: 50mV |
| AC-GND-DC | DC |

CHECK: Two dots to be obtained at 5cm interval.

ADJUST: X Gain ADJ. (VR307) for 5cm.

2) X-Y Position Centering

SET: Switch DC to GND under the above setup.

CHECK: Dot to be positioned on the scale center line.

ADJUST: X-Y POSITION ADJ. (VR306)

7 CALIBRATOR

| | | |
|------------------------|---------------------------|---------------|
| SET: Test oscilloscope | VOLTS/DIV. | 0.1Volts/div. |
| | TIME/DIV. | 0.2mS/div. |
| | Connect to CAL. terminal. | |

CHECK: Amplitude to be 0.5Vp-p $\pm 1\%$.

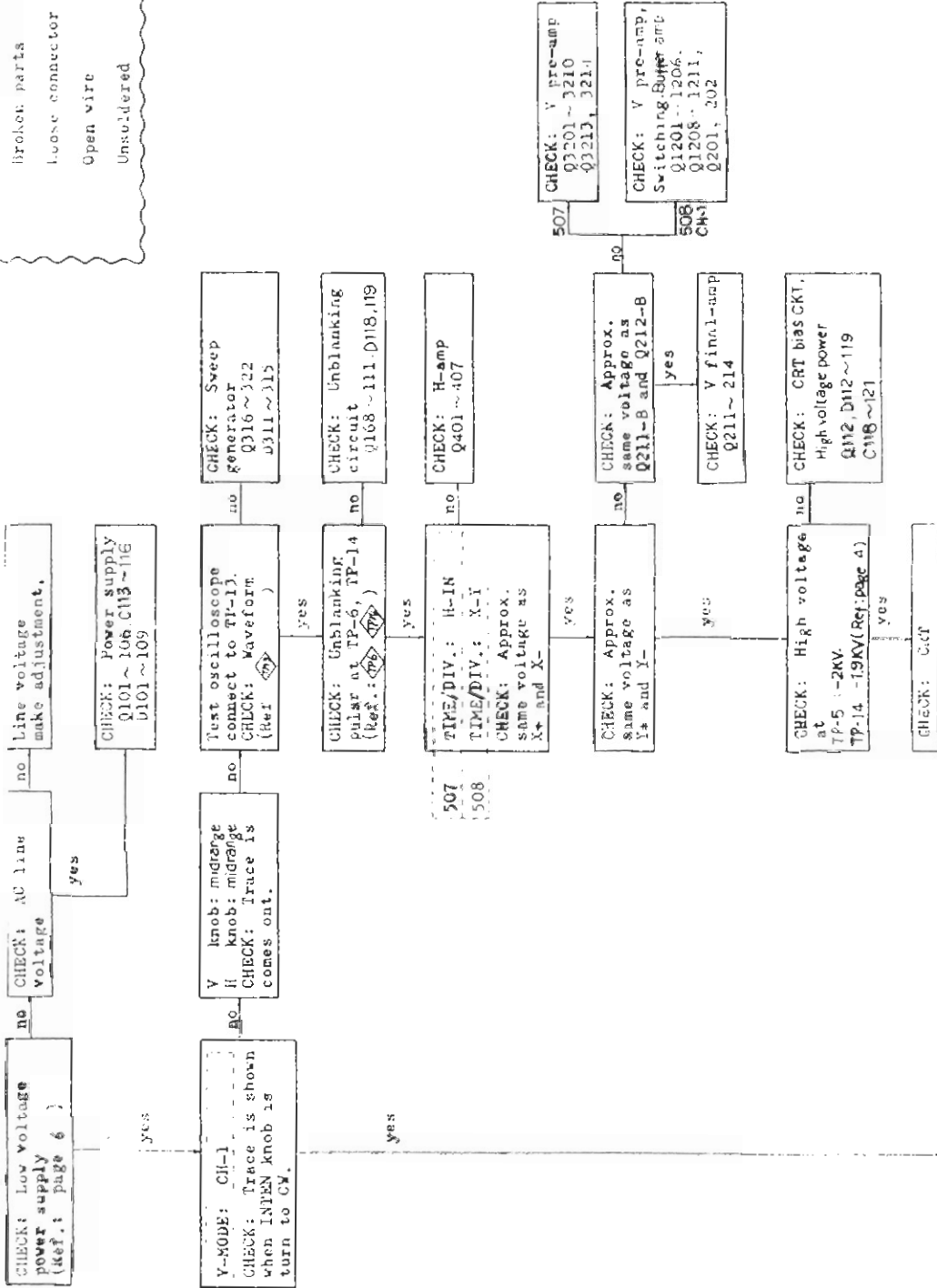
ADJUST: CAL. ADJ. (VR101) for 0.5Vp-p $\pm 1\%$.

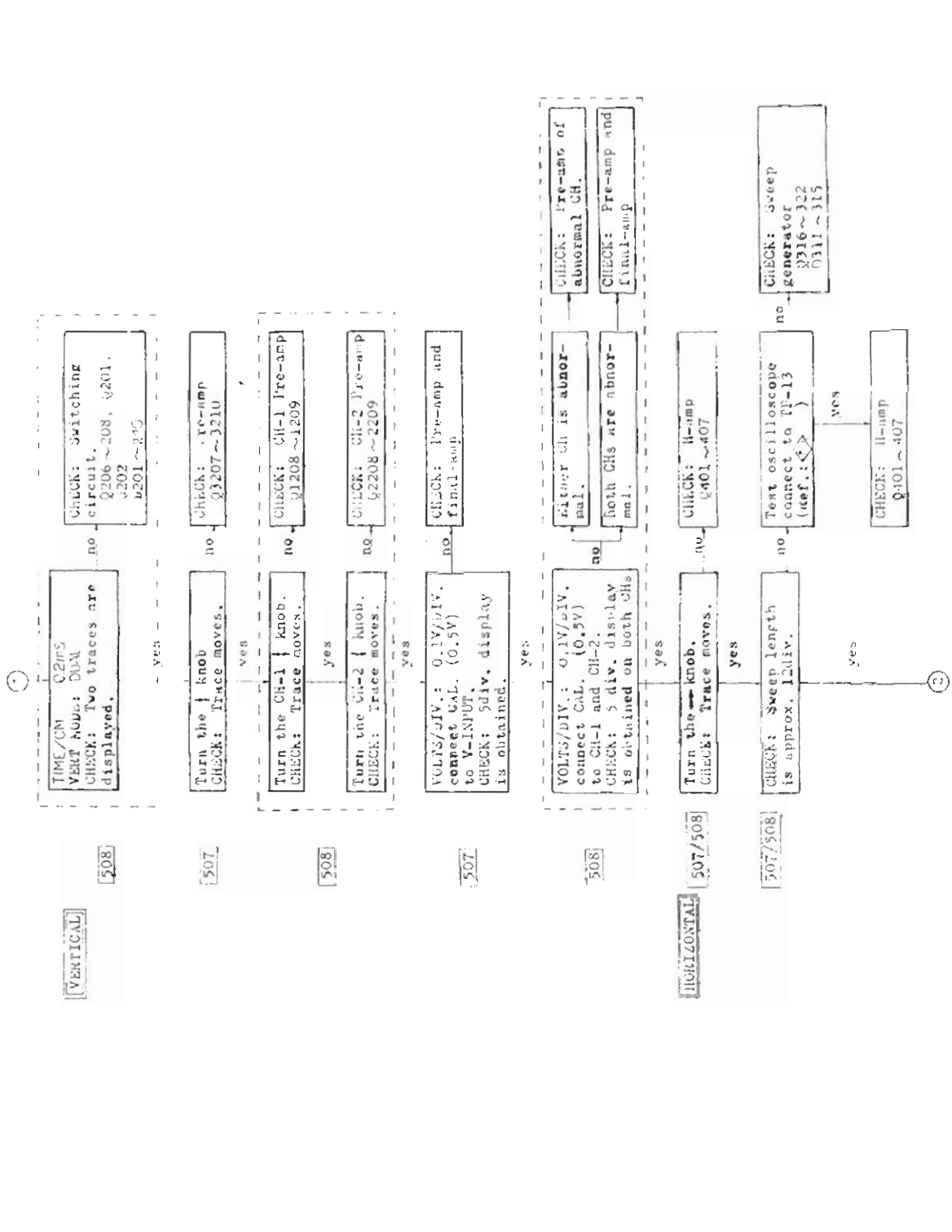
TROUBLE SHOOTING CHART

CHECK: Any associated circuit
 Broken parts
 Loose connector
 Open wire
 Unsoldered

507/508

507/508





TRIGGER

507

TIME/DIV.: 10mS
TRIG. MODE: Auto
CHECK: Stable display
can be obtained.

CHECK: Trigger circuit
Q3211~3212
Q309~315
CHECK: Sweep generator
Q316~322, D311~315

yes

508

TIME/DIV.: 10mS
TRIG. MODE: Auto
CHECK: Stable display
can be obtained on
both CHs.

CHECK: Trigger circuit
CH-1 Q1207, Q204
CH-2 Q2207, Q203
Q205, 325,
Q309~315
CHECK: Sweep generator
Q316~322, D311~315

yes

TIME BASE

507/508

Shows approx. 5 cycle
display.

CHECK: H-amp
Q401~407
CHECK: Sweep
timing circuit
R371~379
C327~330, 343

yes

MAG. X5

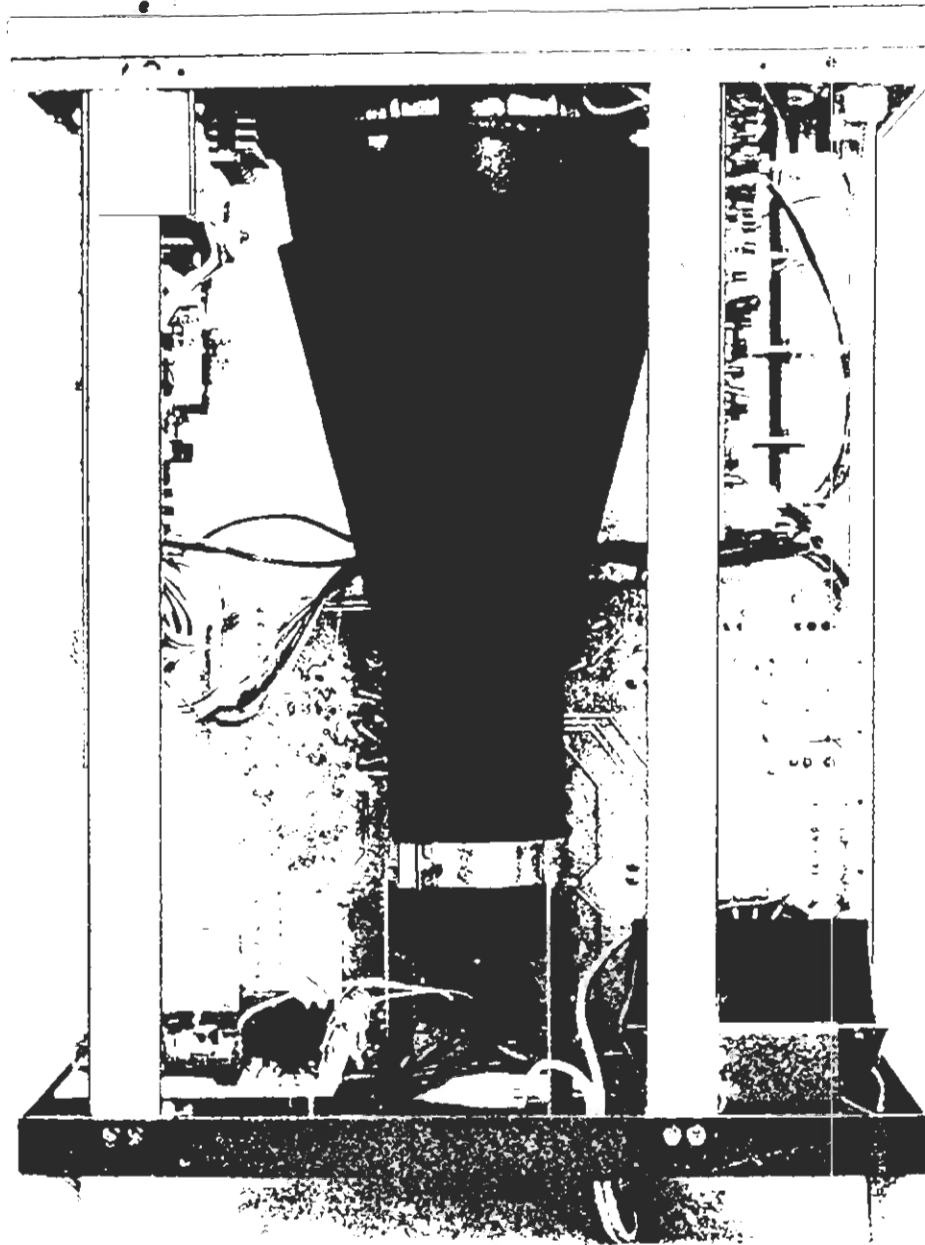
507/508

MAG. X5: Pull-out
CHECK: Shows approx.
1 cycle display.

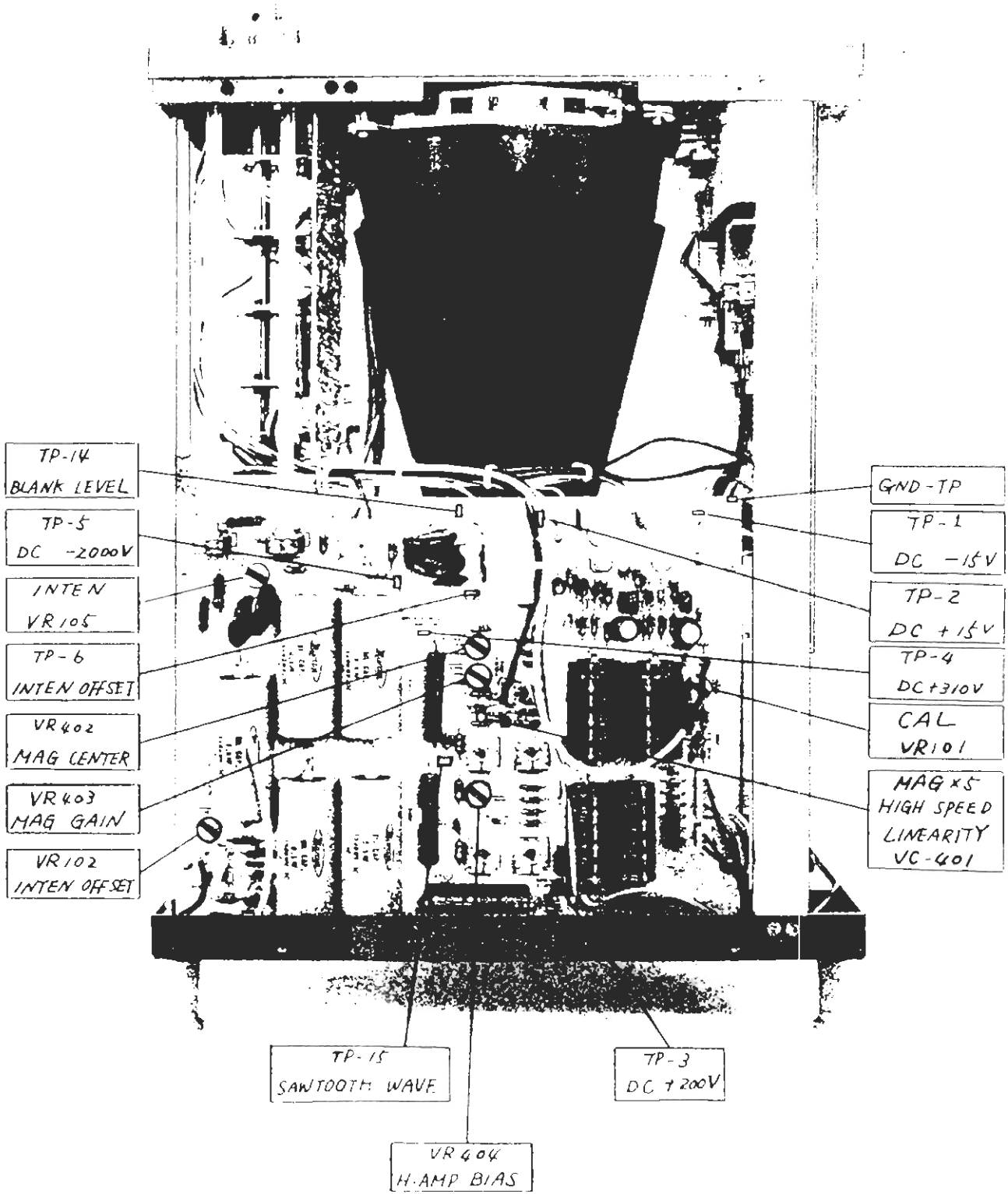
CHECK: H-amp
Q402

END

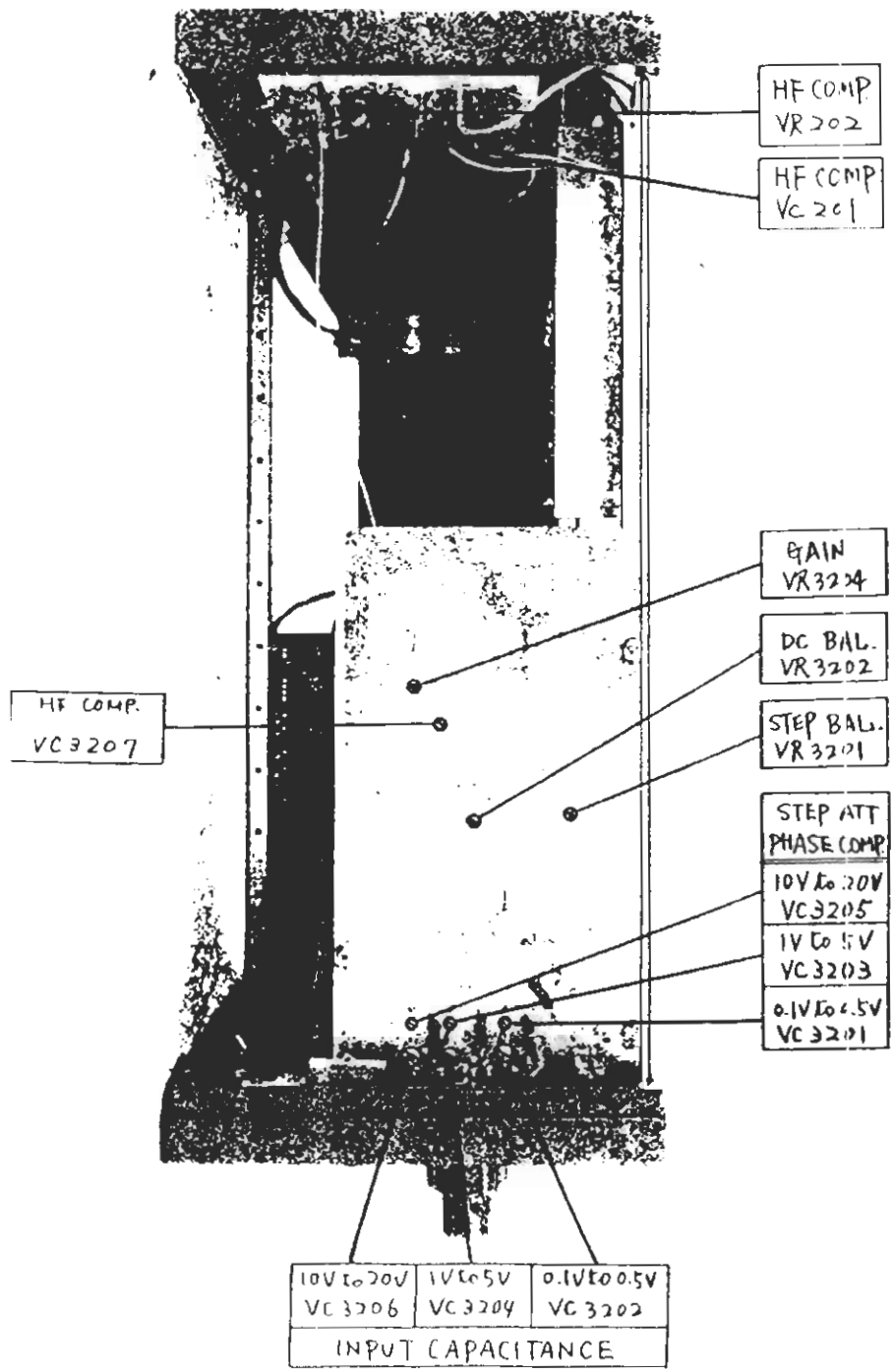
LOCATION OF ADJUSTOR



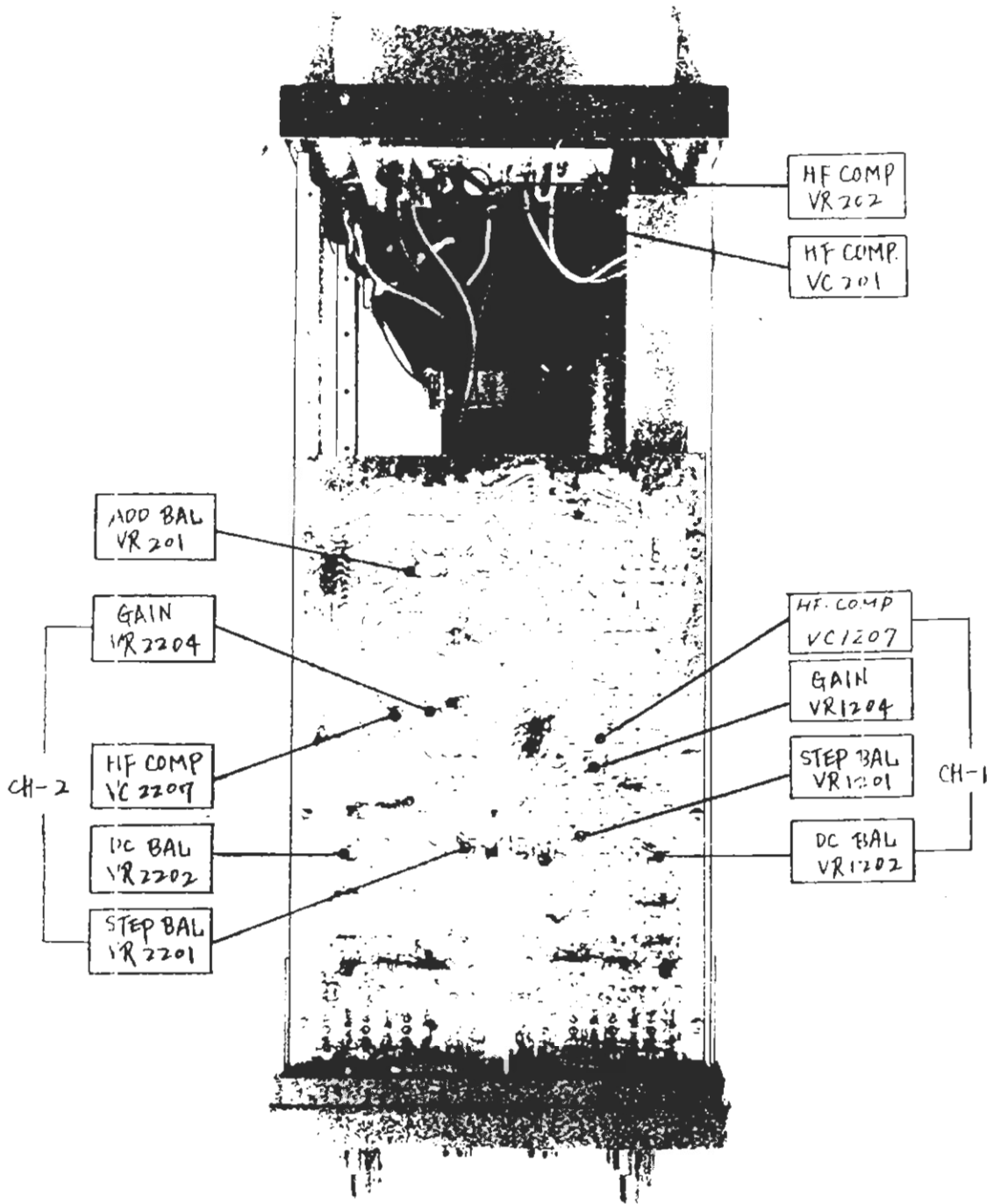
POWER , H-AMP, and V-FINAL AMP.



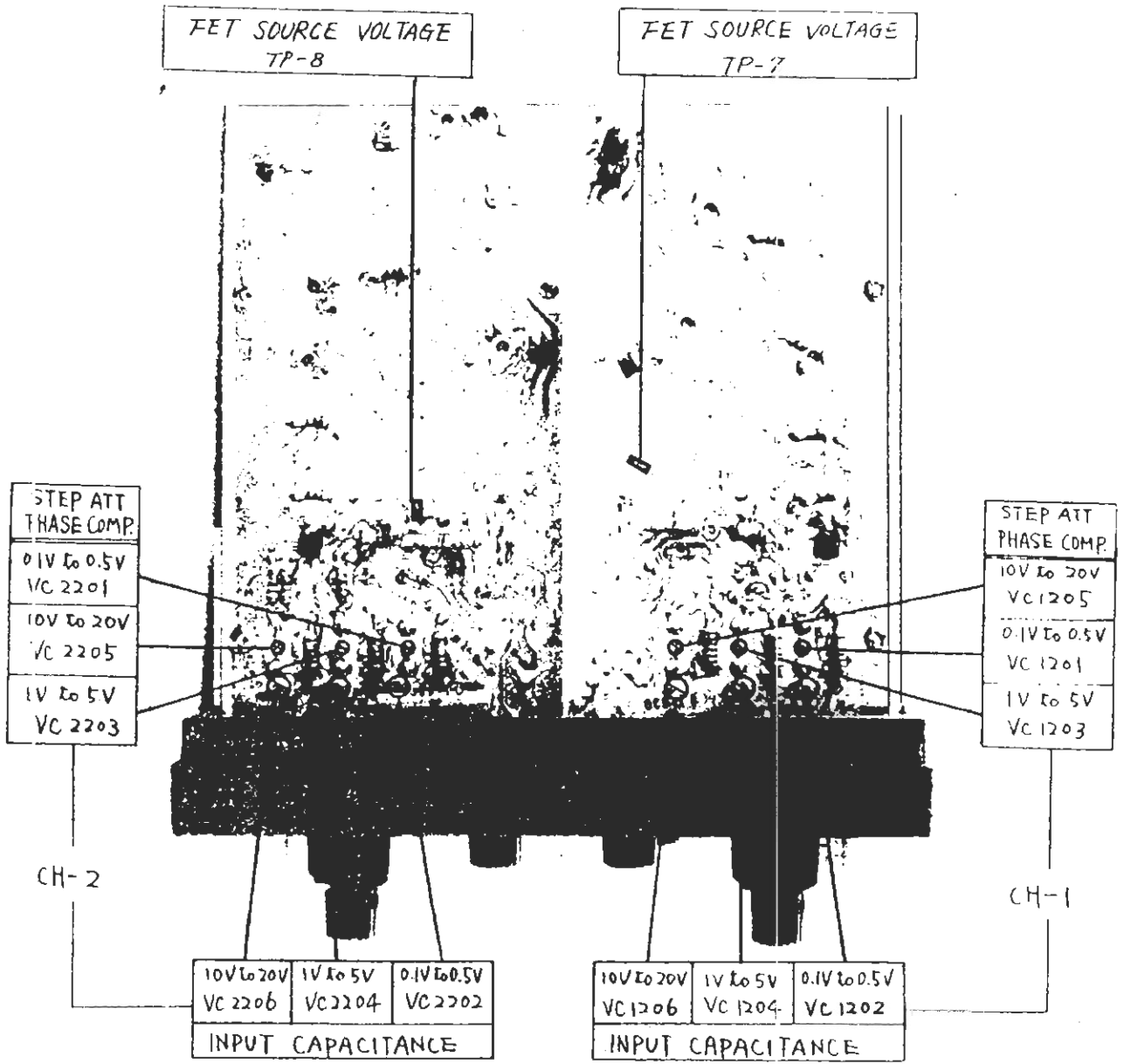
POWER and H-AMP



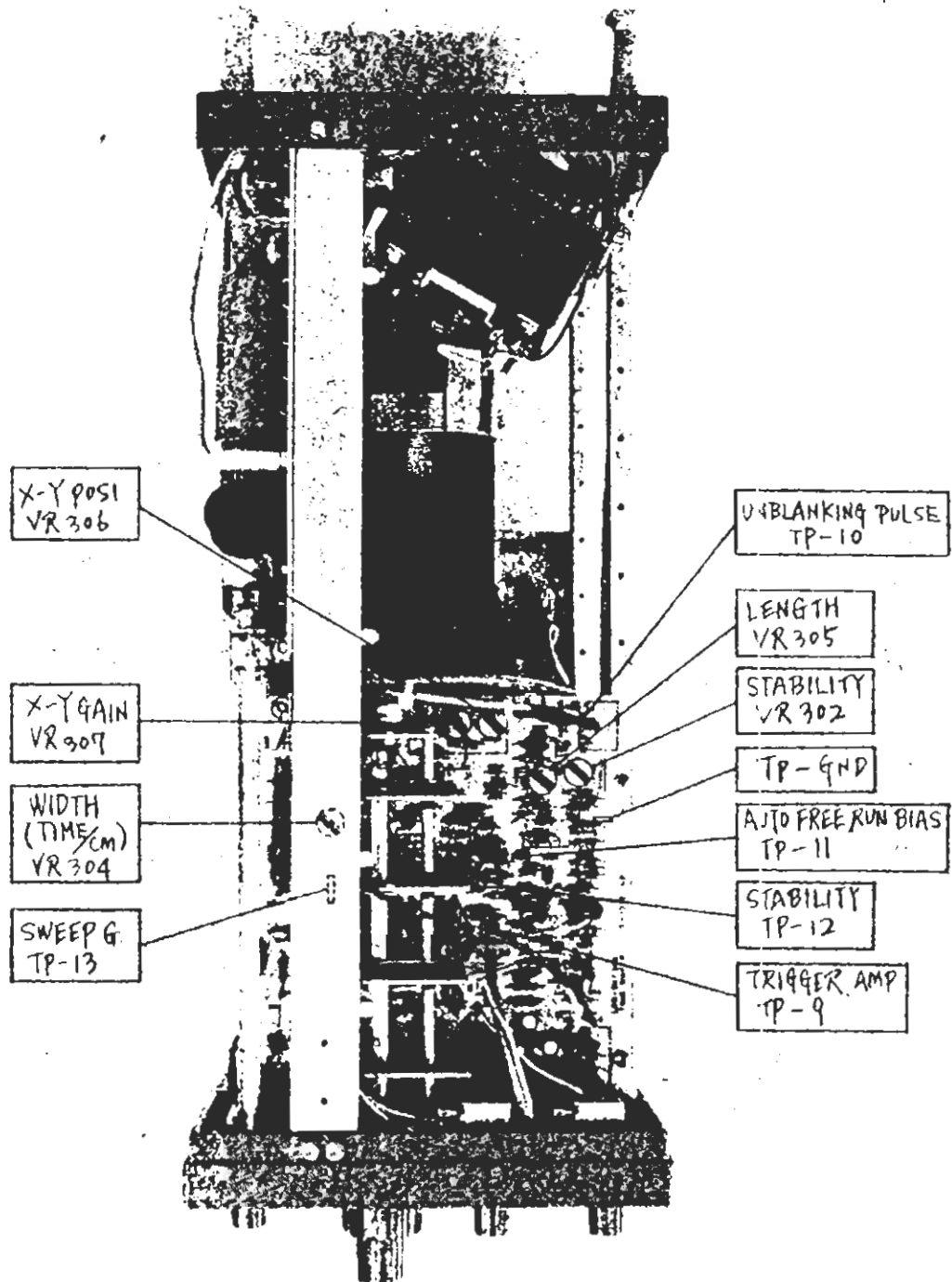
507 V-PREAMP and V-FINAL AMP



508 V-PREAMP and



508 V-PREAMP


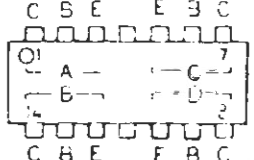
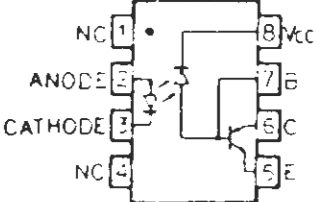
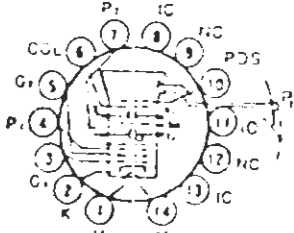
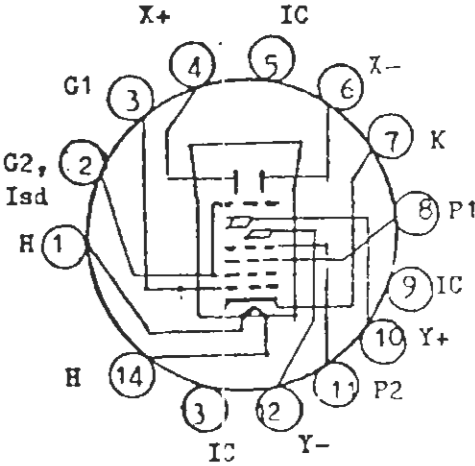



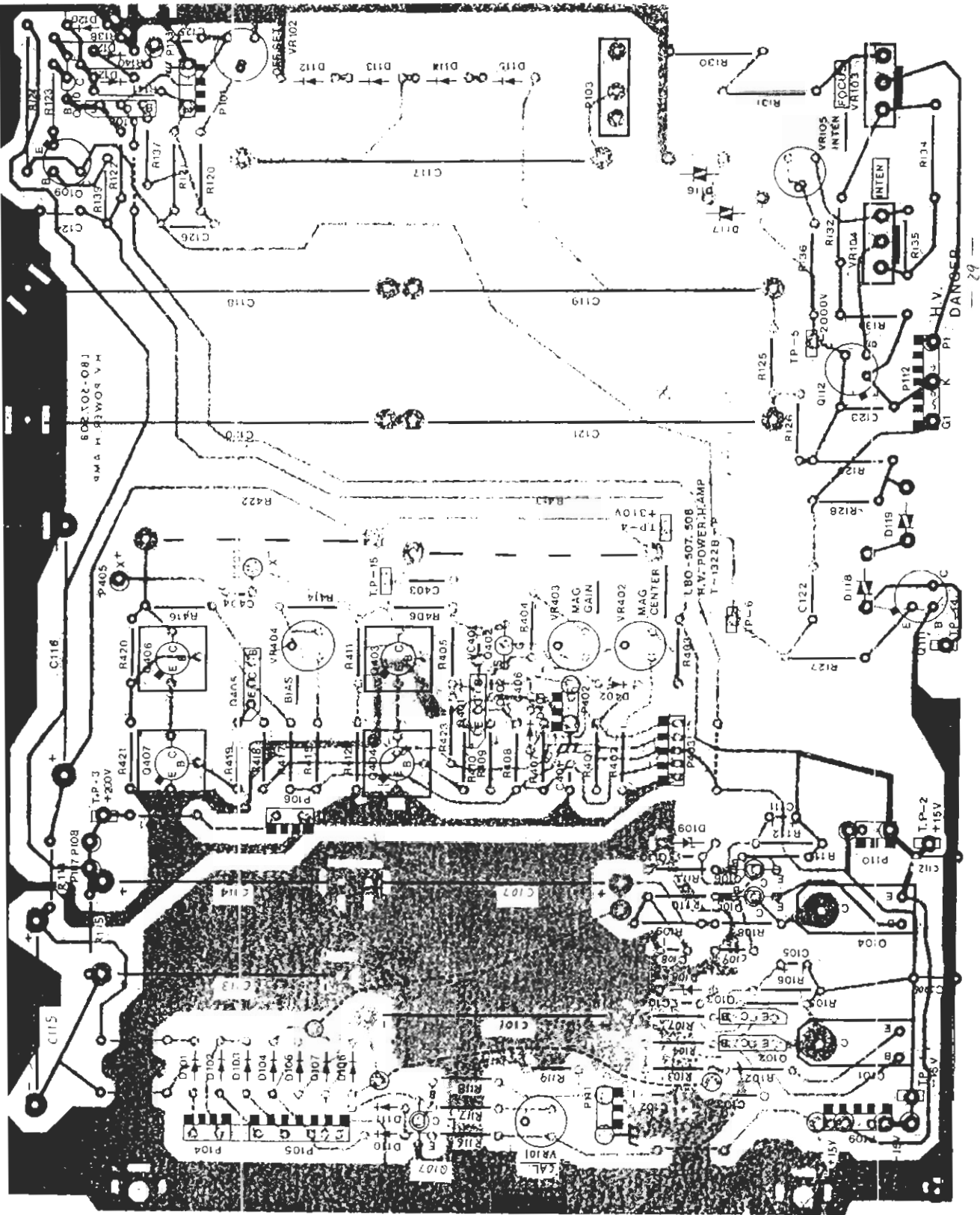
TRIG. AMP. and SWEEP GEN.

PIN CONNECTION, TRANSISTOR and CRT

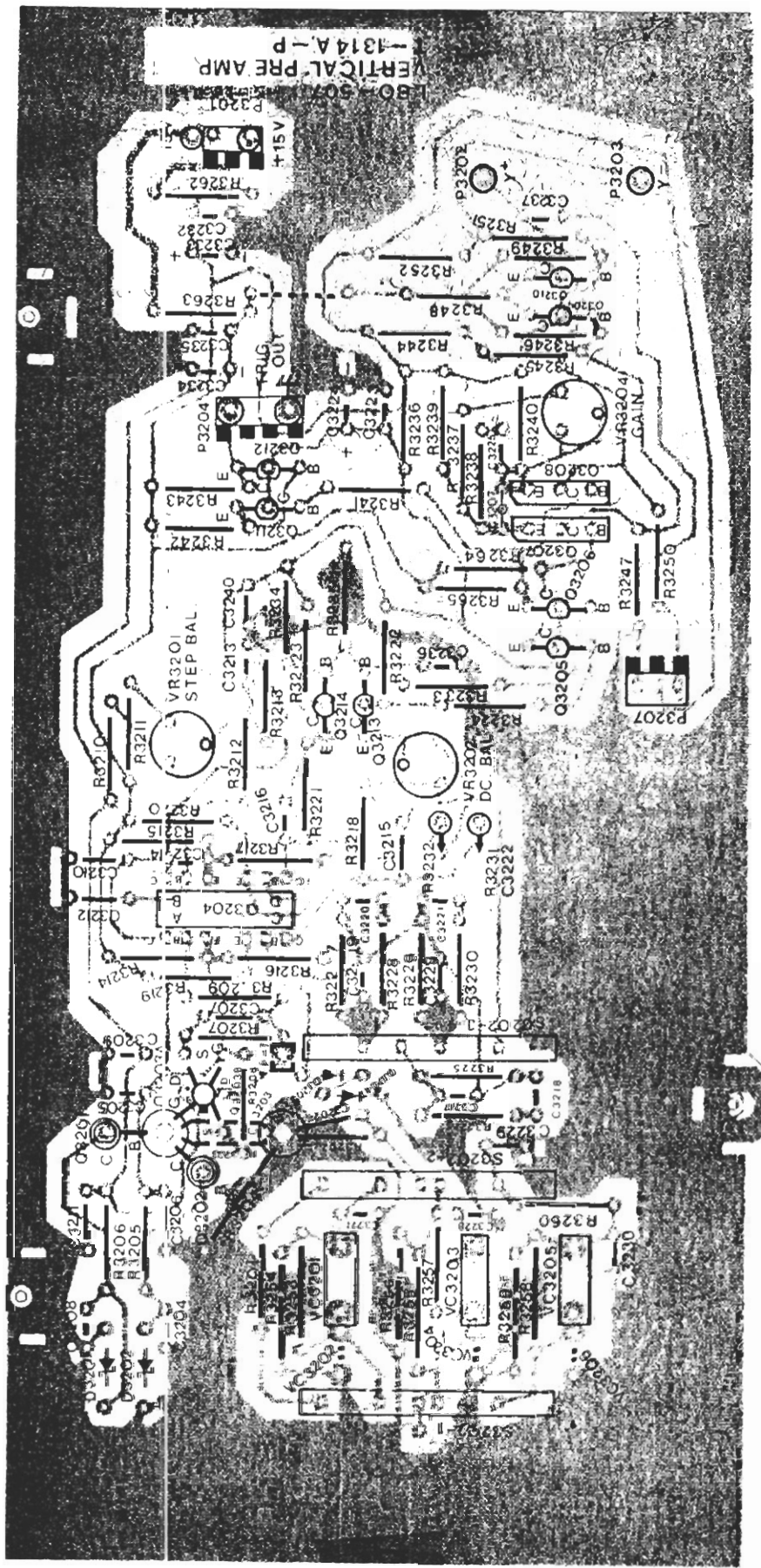
| name | type | connection |
|--|------|------------|
| 2SA-495 2SA-561 | PNP | |
| 2SC-372 2SC-780A 2SC-373 2SC-752 | NPN | |
| 2SA-628 | PNP | |
| 2SA-678 | PNP | |
| S-A92 | PNP | |
| 2SA-497 2SA-711 | PNP | |
| 2SC-507 2SC-1012A 2SC-1216 | NPN | |
| 2N-3866 | NPN | |
| 2SC-288A | NPN | |
| 2SC-1279 2SC-1215 2SC1815 | NPN | |
| 2SC-1569 2SC-1625 | NPN | |
| 2SD-315 | NPN | |
| 2SK-30A | FET | |
| 2SK-33 | FET | |

PIN CONNECTION, TRANSISTOR and CRT

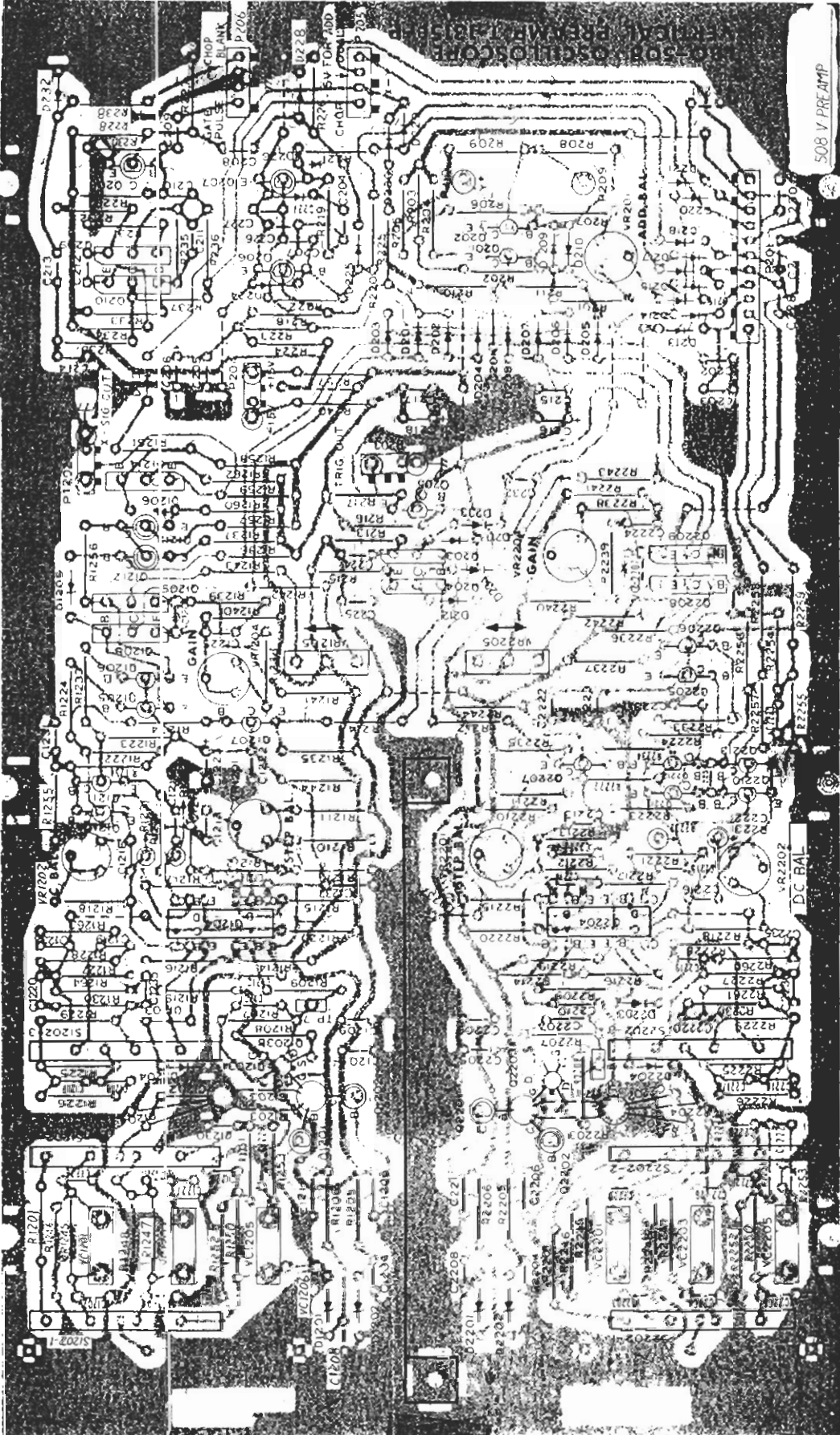
| name | type | connection |
|----------------------------|----------|---|
| IMF-3958 2N-3958 | Pair FET |  |
| ITS-30809 | Pair FET | |
| TR. guard array NFQ-918 | NPN |  |
| photocoupler 5082-4351 | NPN |  |
| E2663331 | CRT |  |
| 130BX331 C5S66P31B | CRT |  |
| 2SA1015 | TR |  |



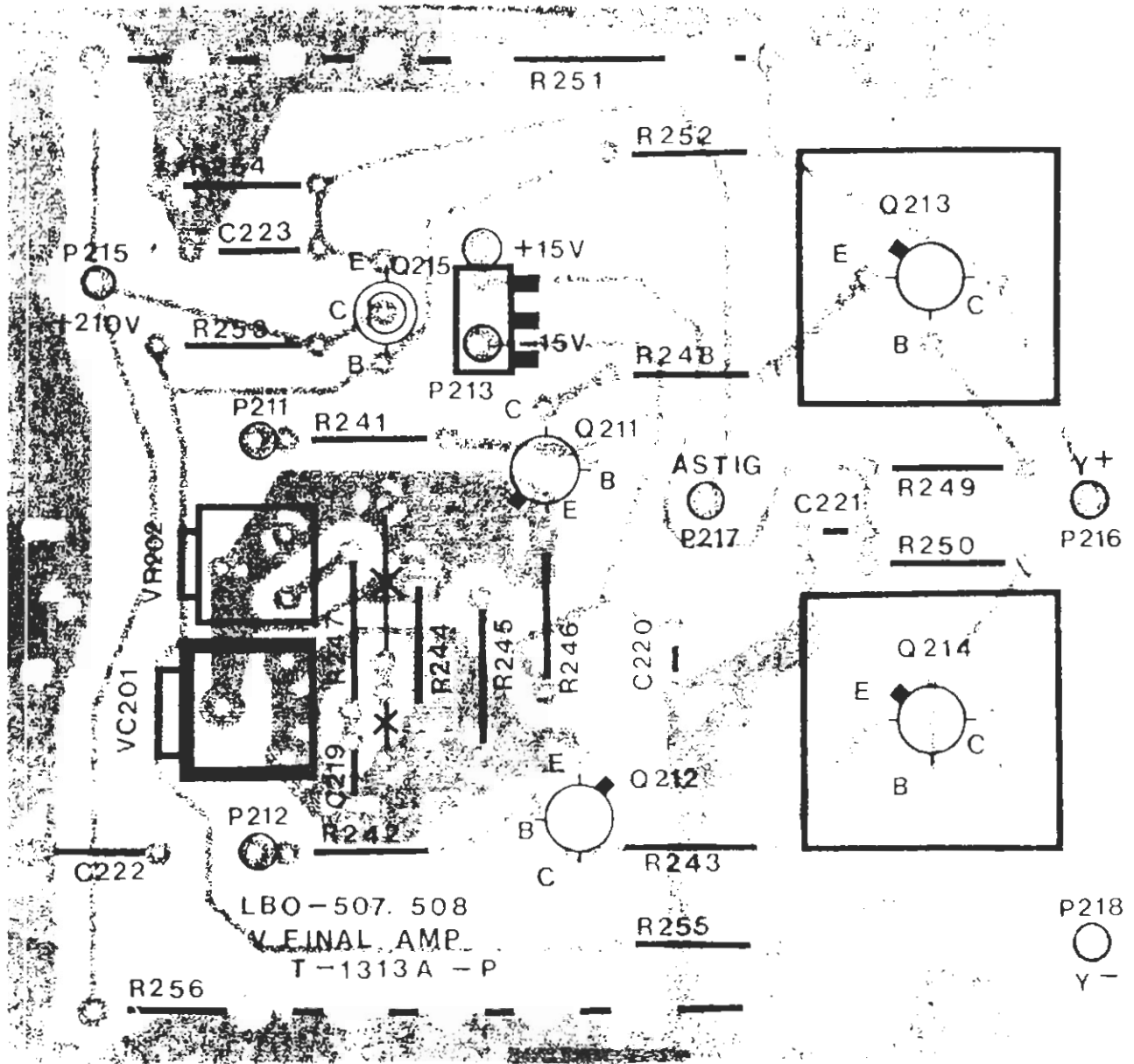
29



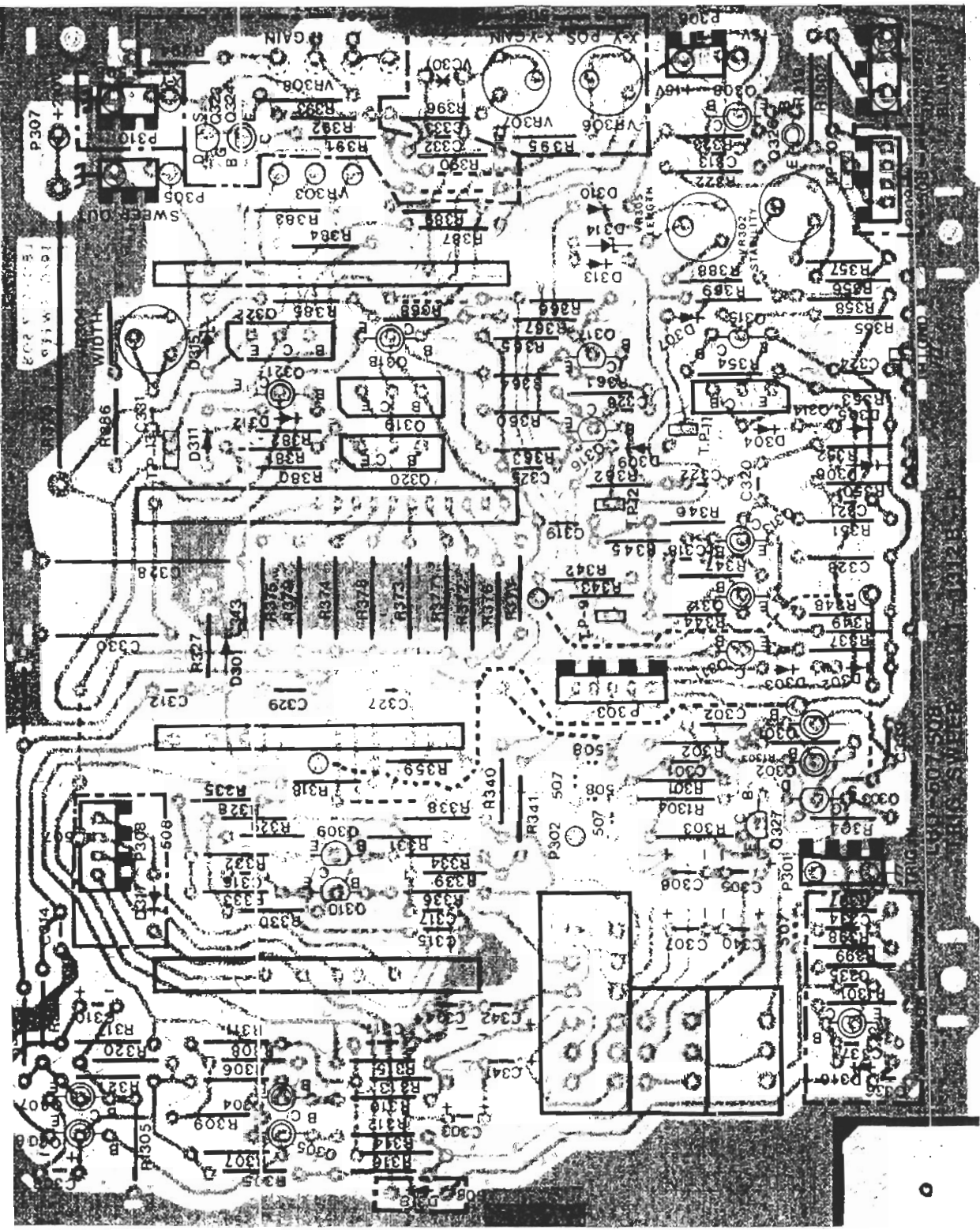
507 V-PREAMP



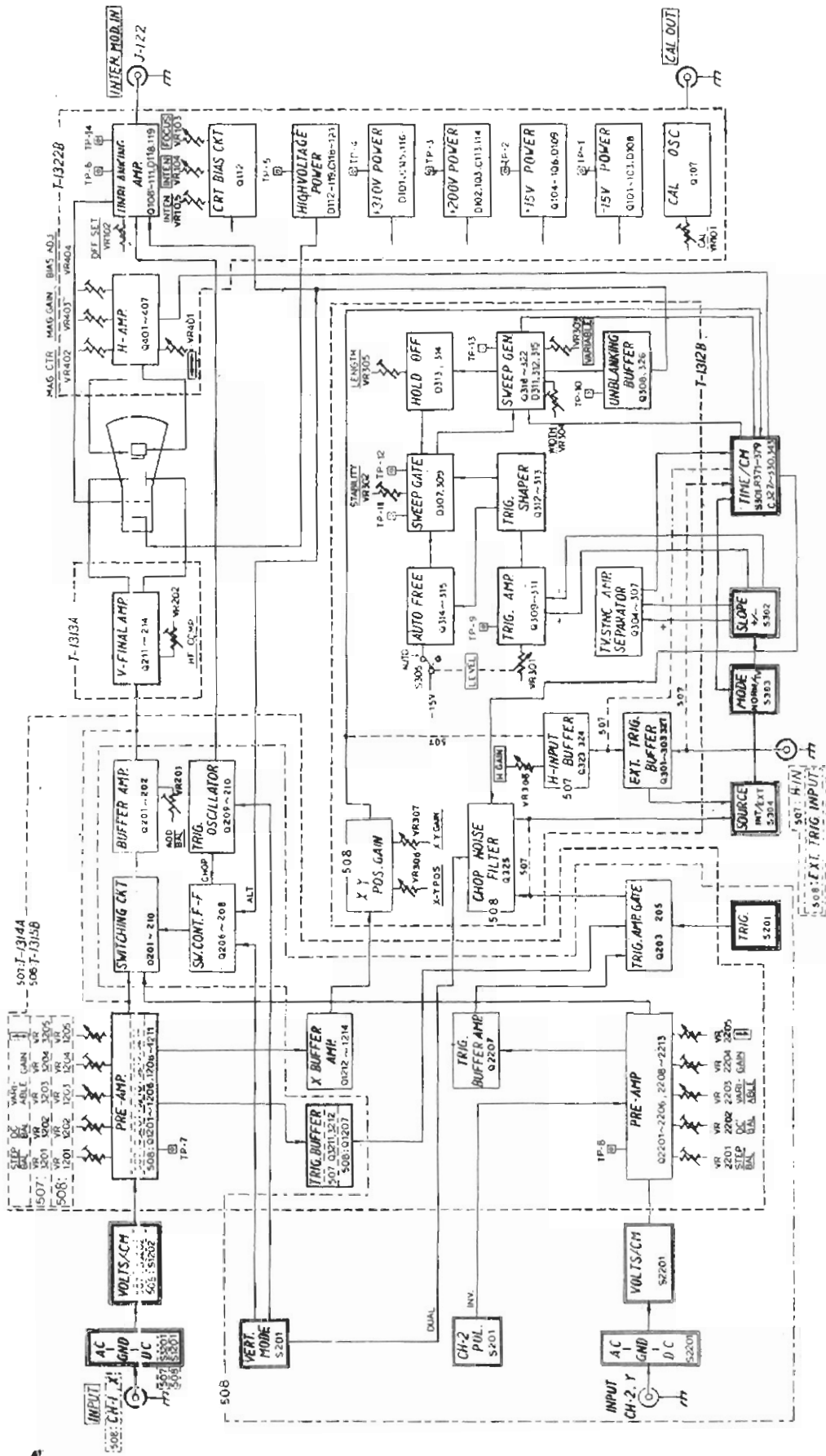
508 V. PRE AMP



V-FINAL



TRIG AMP and SWEEP GEN



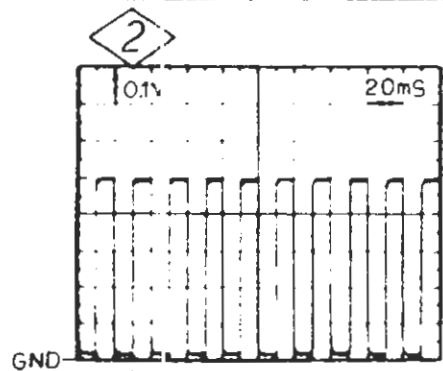
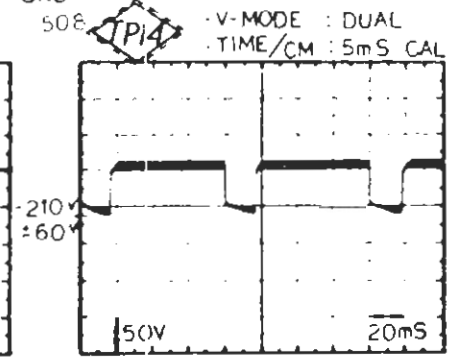
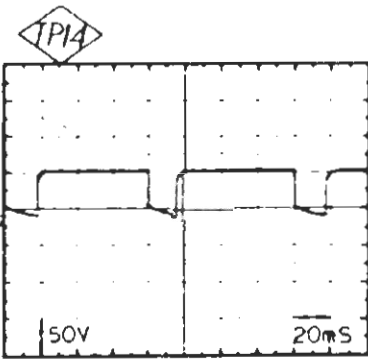
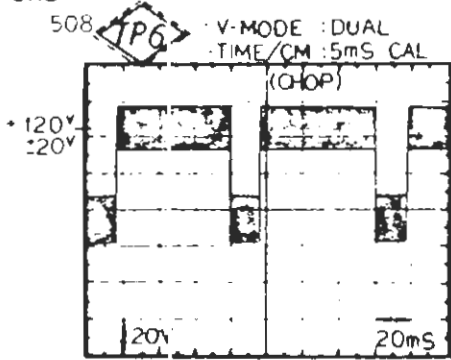
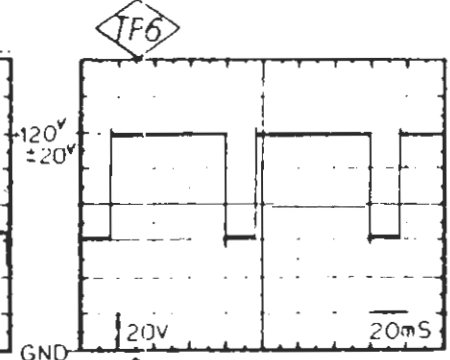
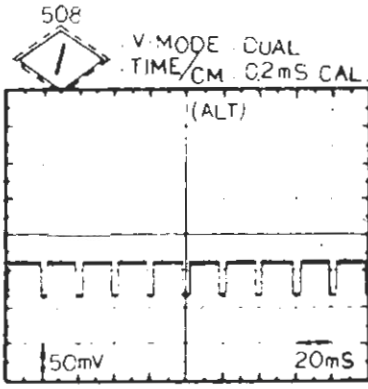
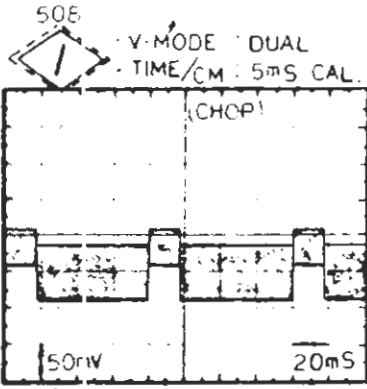
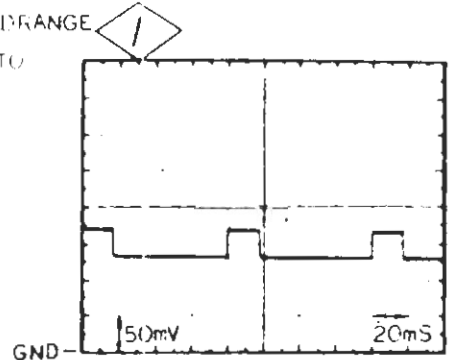
L80-507/508 BLOCK DIAGRAM

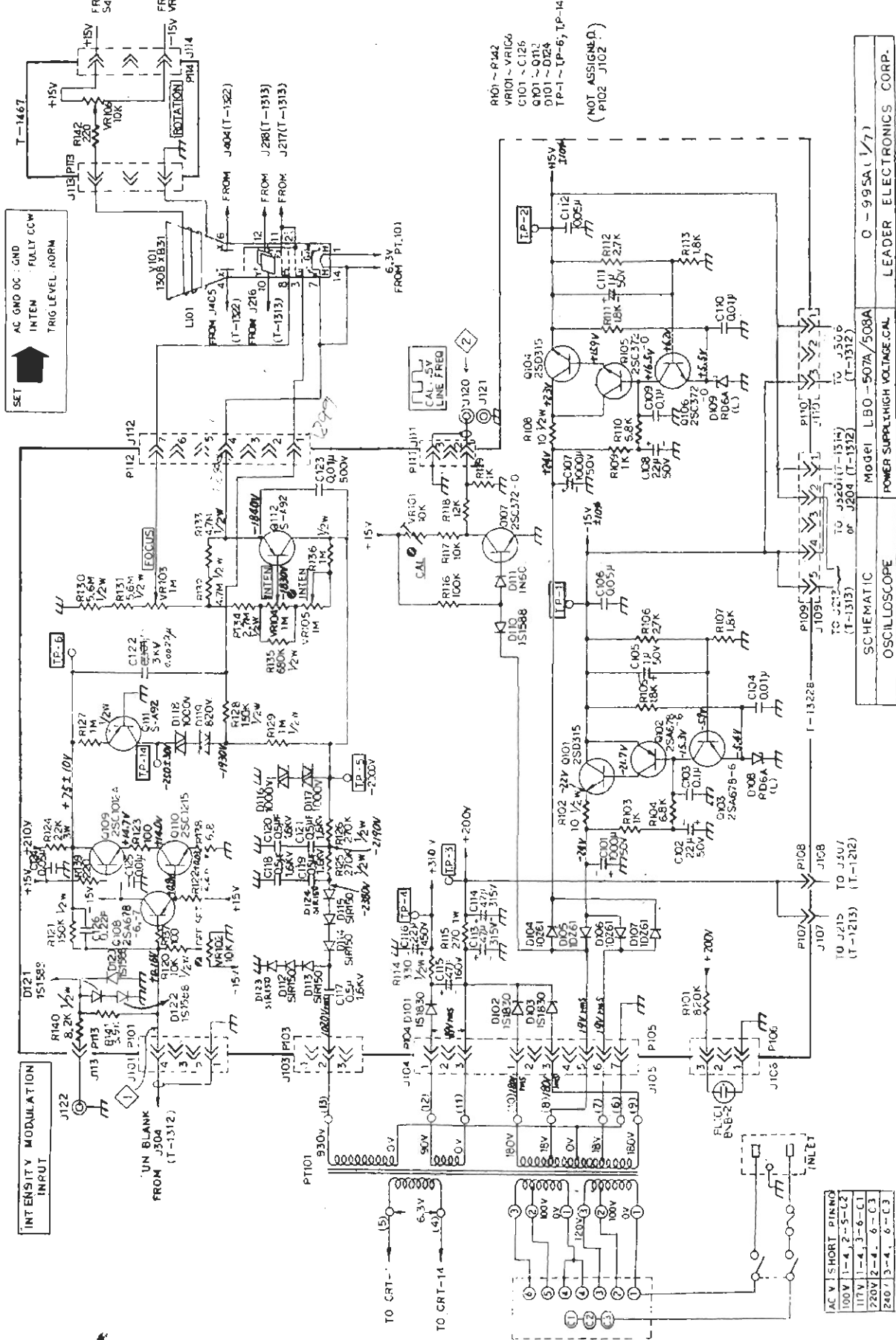
POWER

BASIC SET FUNCTION

508 | V-MODE : CH-1
 | TRIG : CH-1
 | AC-GND-DC : DC
 | VOLTS/CM : 0.1V/CM.CAL
 | CAL OUT : CONNECT TO V-IN
 | SLOPE : +
 | MODE(NORM/TV) : NORM
 | SOURCE : INT

LEVEL : AUTO.KNOB MIDRANGE
 V-POS : ALT.WAVEFORM TO CTN
 MAG. : NORM
 TIME/CM : 5mS CAL
 H-POS : MIDRANGE





SET
 AC GND OC : GND FULLY CCW
 INTEN TRIG LEVEL NORM

INTENSITY MODULATION INPUT

UN BLANK FROM J504 (T-1312)

TO CRT-14

TO CRT-

TO CRT-14

TO CRT-

TO CRT-

TO CRT-14

TO CRT-

| AC V | SHORT PINS |
|-------|-------------|
| 100 V | 1-4, 2-5-C2 |
| 117 V | 1-4, 3-6-C1 |
| 220 V | 2-4, 6-C3 |
| 240 V | 3-4, 6-C3 |

| Model | LBO | 507A/508A | POWER SUPPLY HIGH VOLTAGE CAL | OSCILLOSCOPE | SCHMATIC |
|-------|--------------|-----------|-------------------------------|--------------|----------|
| 0 | 9.9 SA (1/7) | | | | |

LEADER ELECTRONICS CORP.

ROTATION

FROM J404 (T-1322)

FROM J28 (T-1313)

FROM J217 (T-1313)

FROM J405 (T-1322)

FROM J216 (T-1322)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

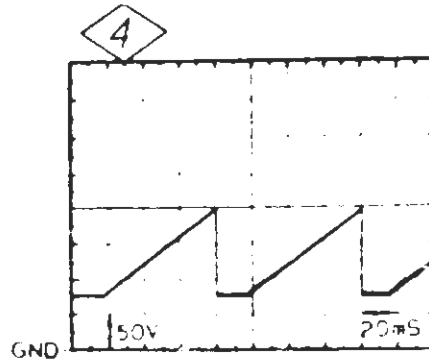
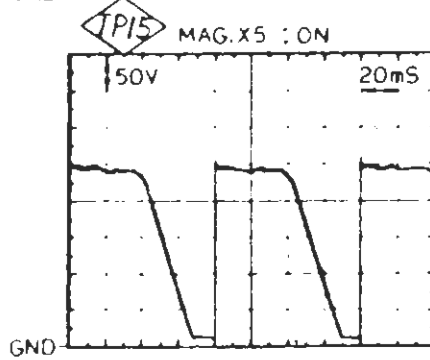
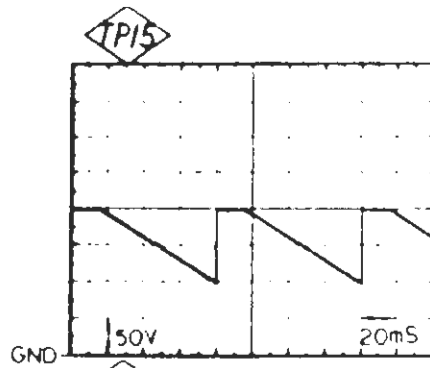
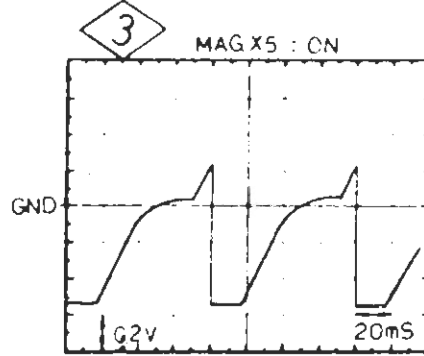
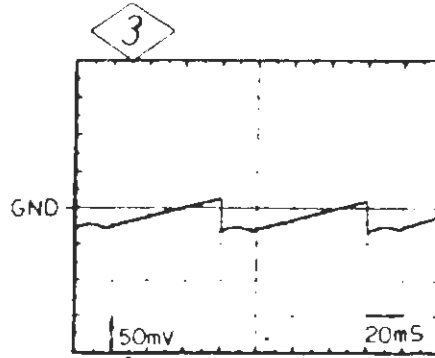
FROM J216 (T-1313)

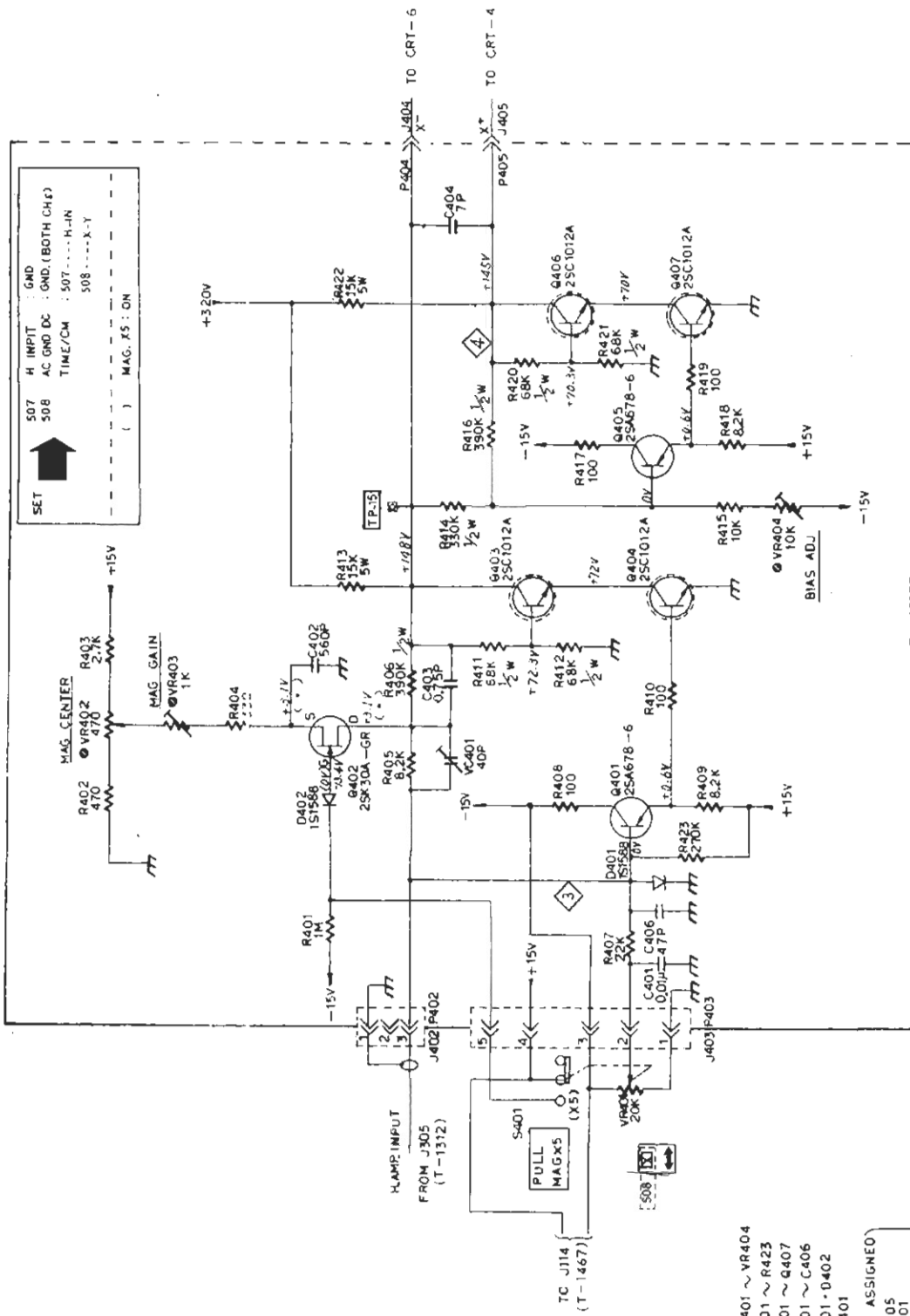
FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

FROM J216 (T-1313)

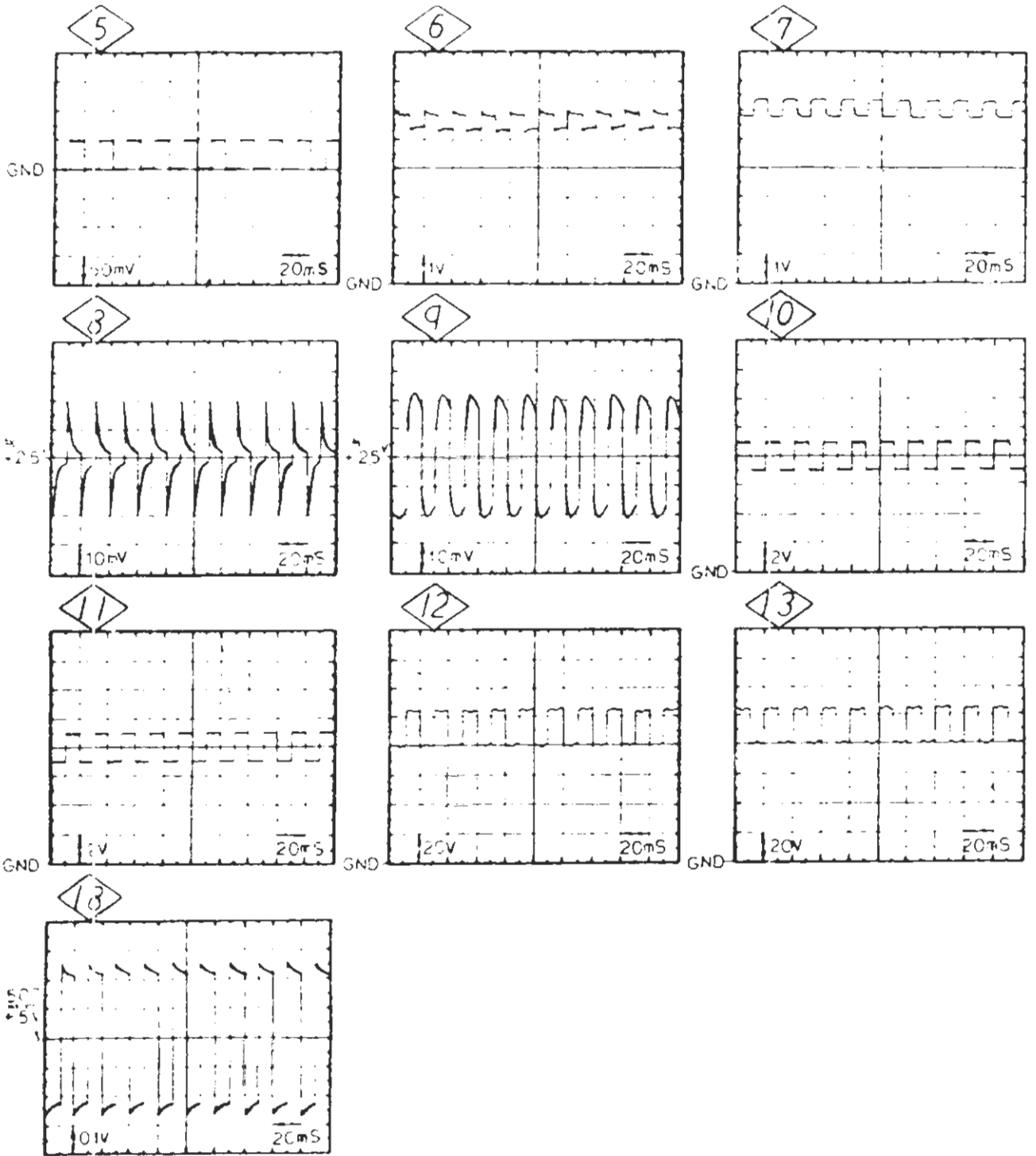


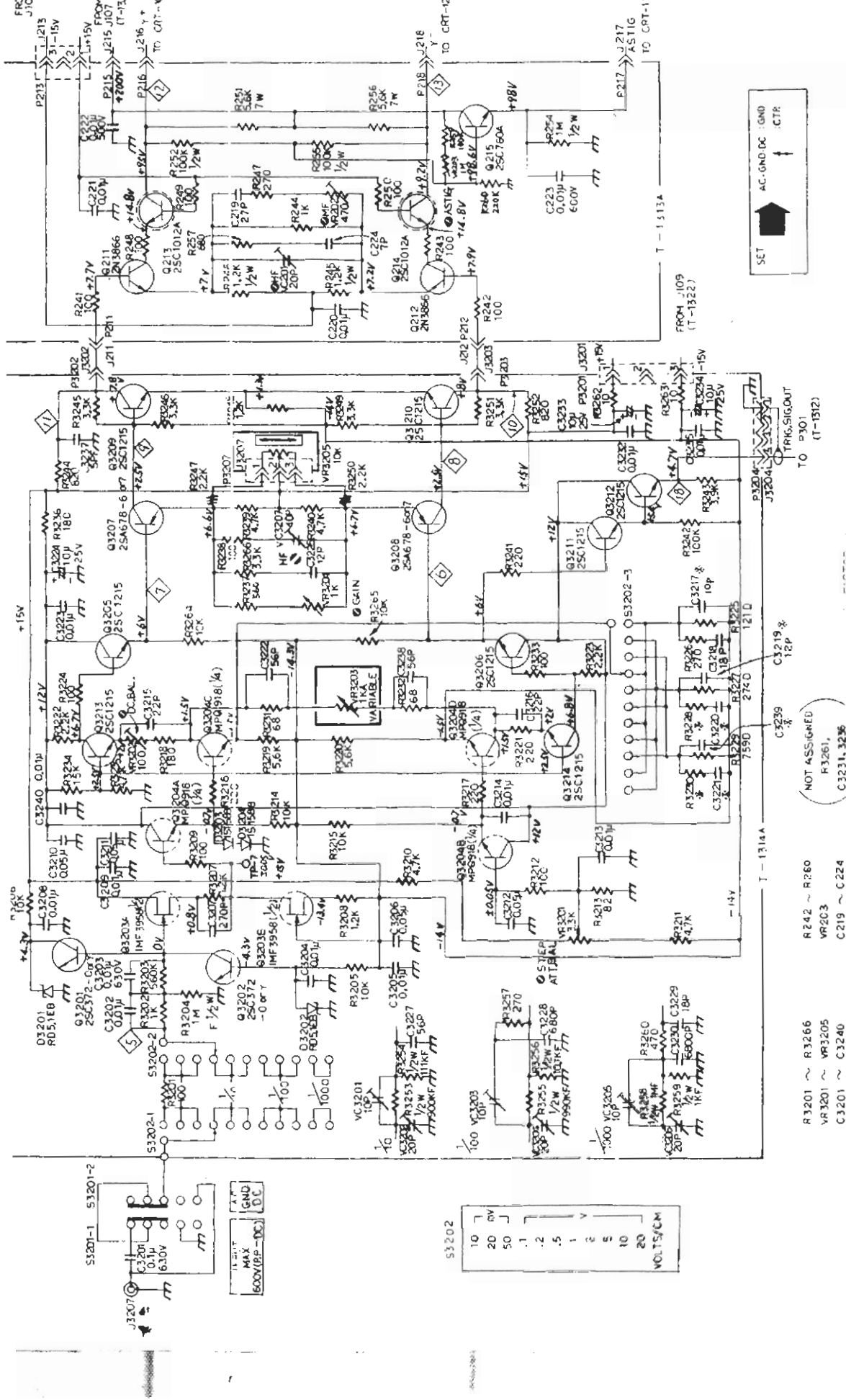


- VR401 ~ VR404
 R401 ~ R423
 Q401 ~ Q407
 C401 ~ C406
 D401 ~ D402
 VC401
 (NOT ASSIGNED)
 C405
 P401
 J401

| | | | |
|--------------|-------|-----------------|--------------------------|
| SCHEMATIC | Model | LBO-507A/508A | 0-995A (2/1) |
| OSCILLOSCOPE | | HORIZONTAL AMP. | LEADER ELECTRONICS CORP. |

V-PREAMP and FINAL AMP





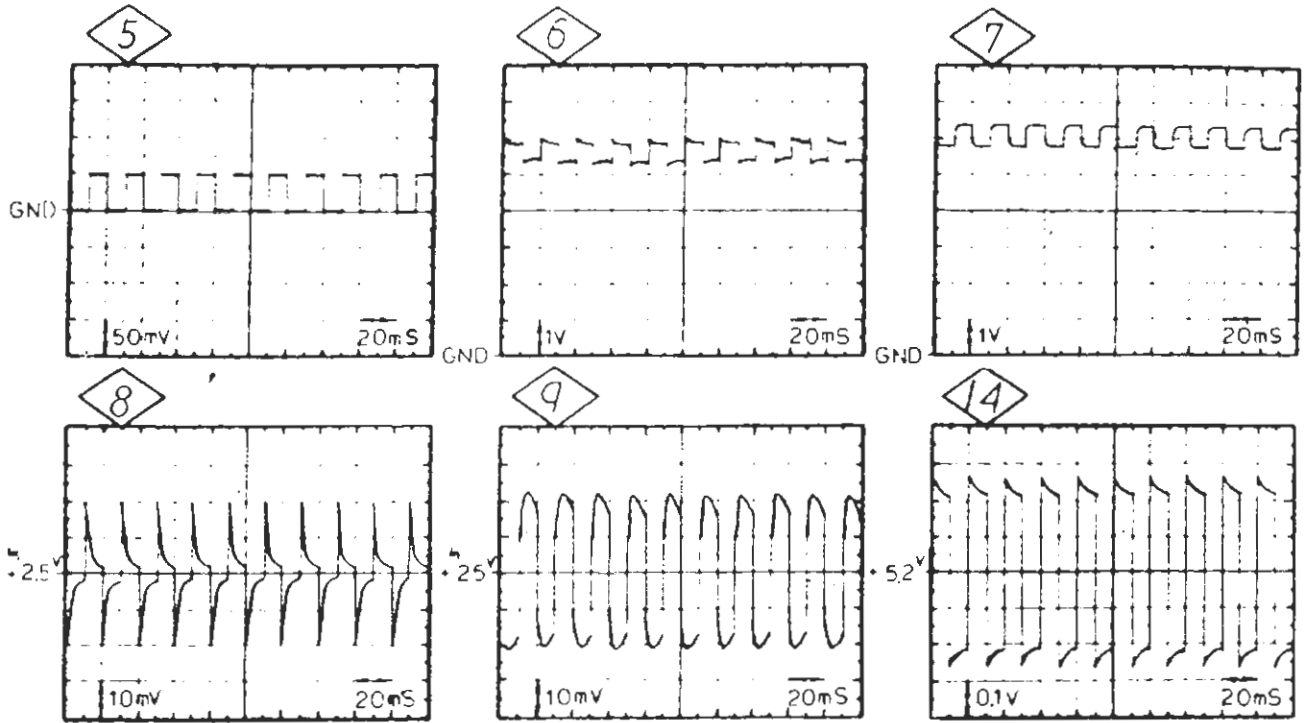
- R242 ~ R280
- VR203
- C3201 ~ C3240
- VC201
- Q211 ~ Q215
- R3201 ~ R3266
- VR3201
- C3201 ~ C3240
- VC3201
- Q3201 ~ Q3214
- D3201 ~ D3204

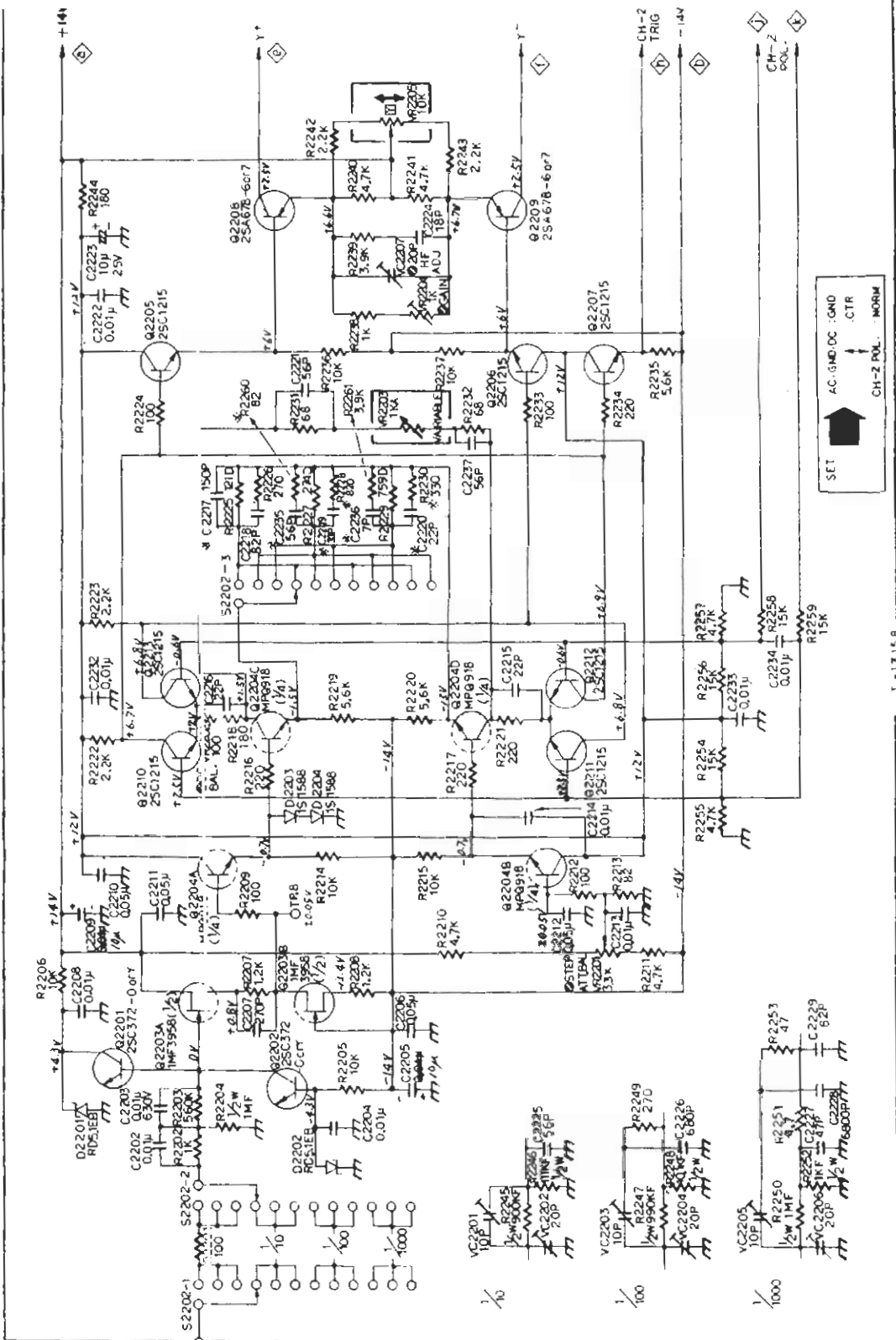
NOT ASSIGNED
R3261,
C3231, C3236
C3226

FACTORY ADJ

| | |
|--------------------------|---------------|
| MODEL LBO-507A | 0-995A (3/7) |
| OSCILLOSCOPE | VERTICAL AMP. |
| LEADER ELECTRONICS CORP. | |

V-PREAMP





SET AC-GND-DC :GND
 CTR
 CH-2 POL. : NORM

SCHEMATIC MODEL LBO-508A 0-995A 5/7
 OSCILLOSCOPE 2-VERTICAL PRE AMP, CH-2 LEADER ELECTRONICS CORP.

NOT ASSIGNED
 (C2230, R2231)

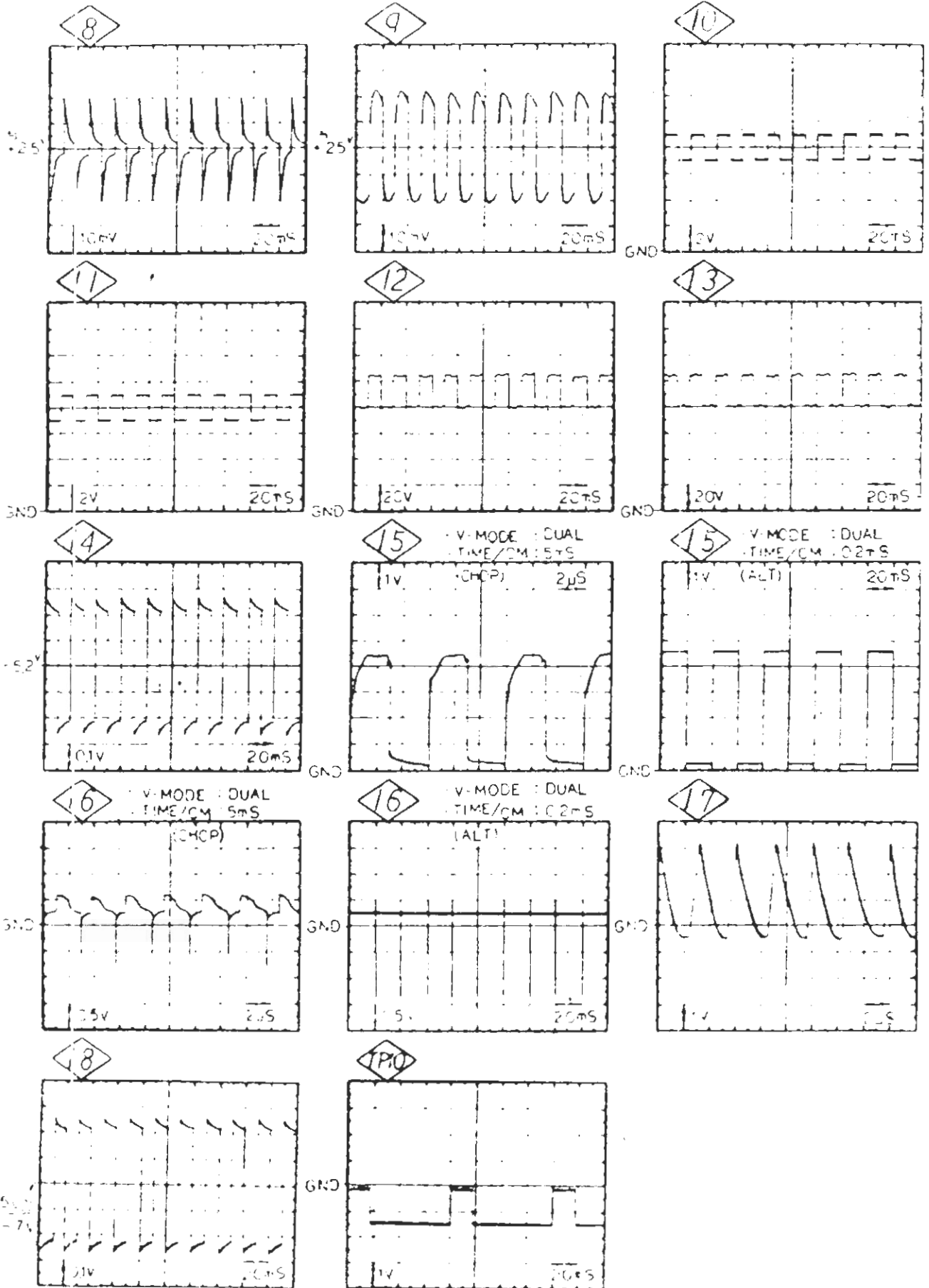
- R2201 ~ R2261
- VR2201 ~ VR2205
- C2201 ~ C2237
- VC2201 ~ VC2207
- Q2201 ~ Q2213
- D2201 ~ D2204

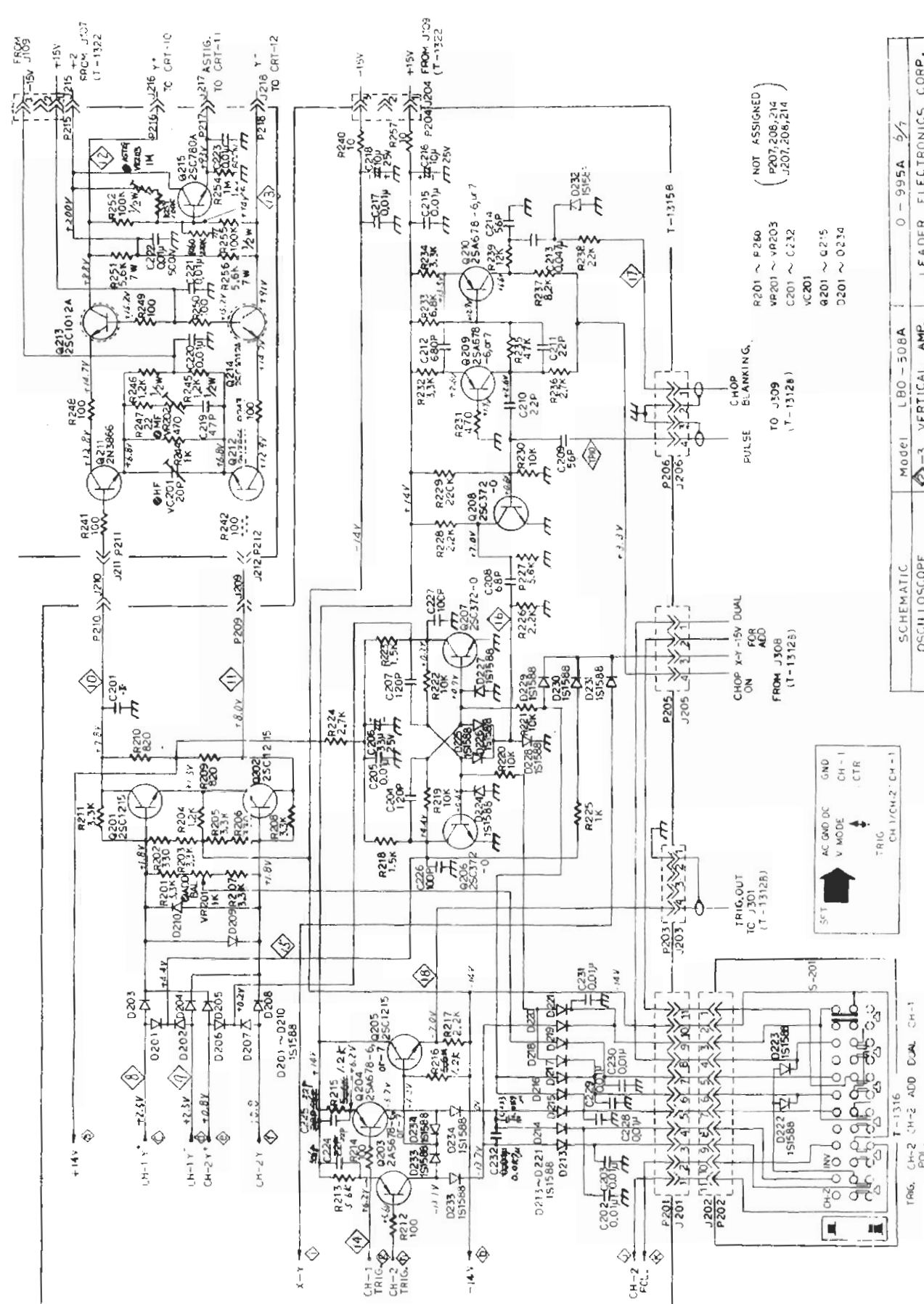
| S2202 | 0.1 | 0.2 | 0.5 | 1 | 2 | 5 | 10 | 20 |
|-------------|-----|-----|-----|---|---|---|----|----|
| INPUT | | | | | | | | |
| MAX | | | | | | | | |
| GND | | | | | | | | |
| D.C. | | | | | | | | |
| 500K(EP-DC) | | | | | | | | |

OUTLS/CH

1-1315 B

V-AMP AND SWITCHING CKT





(NOT ASSIGNED)
 P201 ~ P260
 VP201 ~ VP203
 C201 ~ C232
 VC201
 Q201 ~ Q215
 D201 ~ D234

CHOP BLANKING
 TO J309
 (T-1312B)

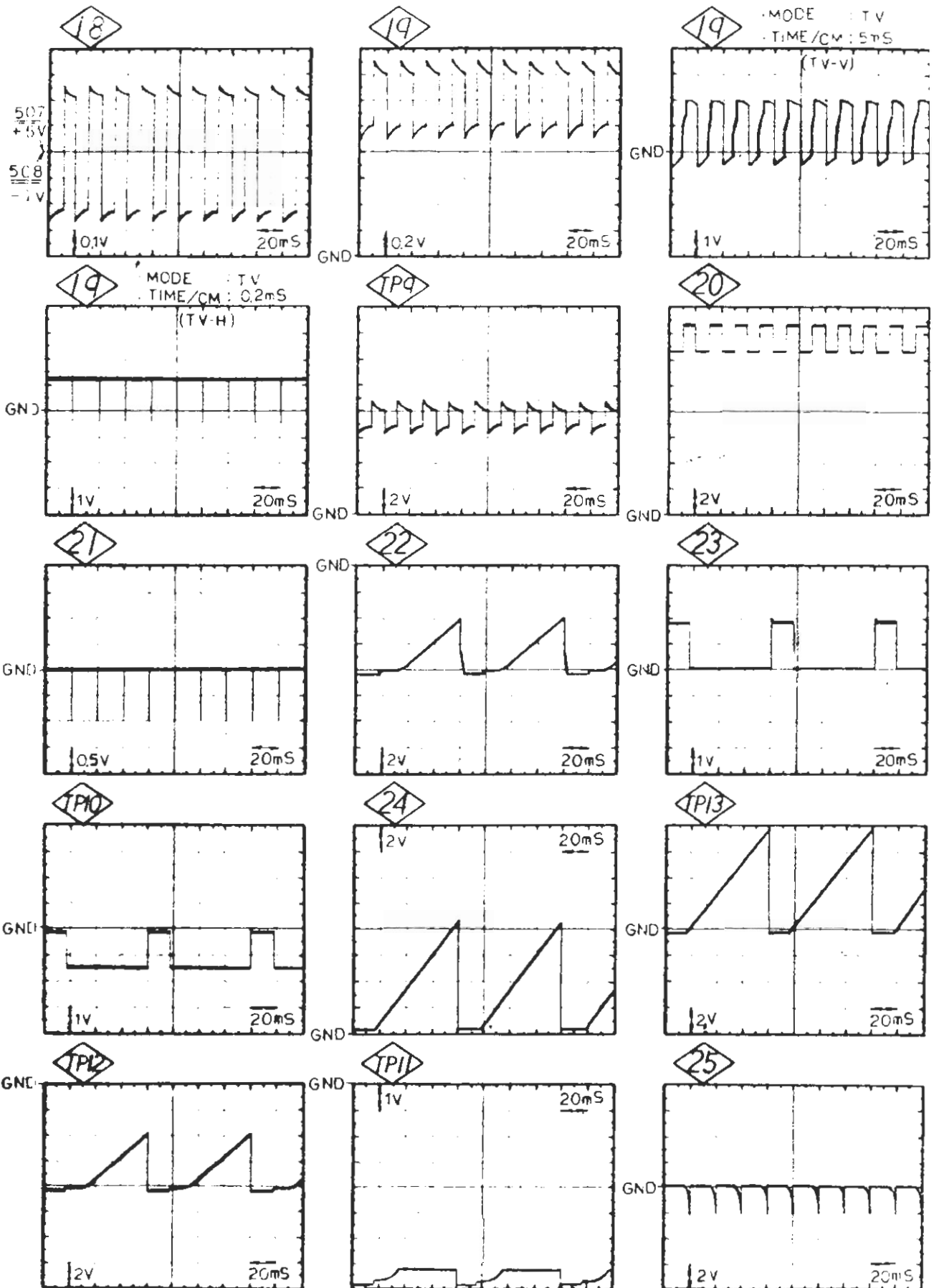
CHOP X-Y -15V DUAL
 ON FOR ADD
 FROM J308
 (T-1312B)

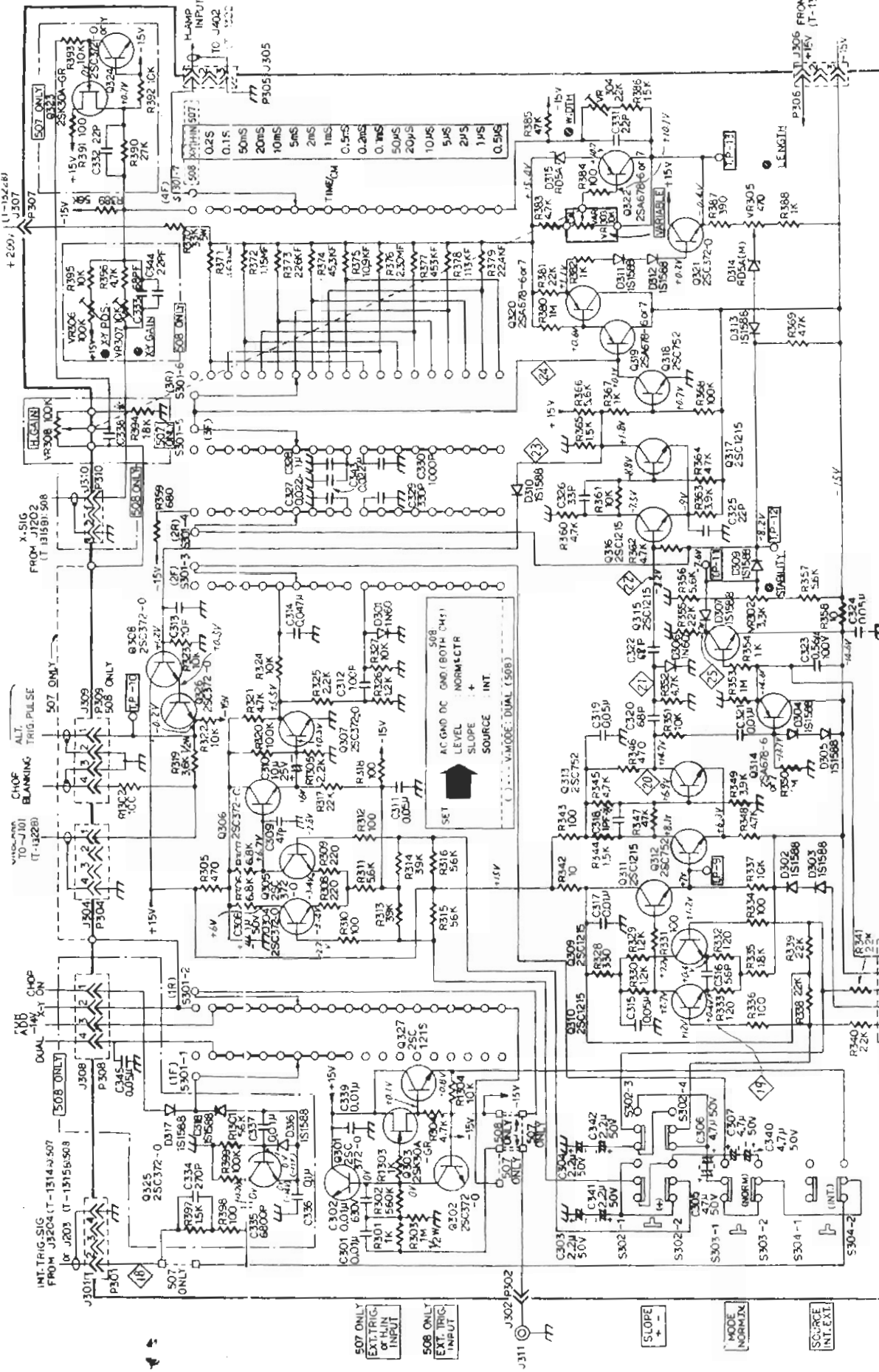


| | | | |
|--------------|-------|-----------------|--------------------------|
| SCHEMATIC | MODEL | LBO-308A | 0-995A |
| OSCILLOSCOPE | | 3 VERTICAL AMP. | LEADER ELECTRONICS CORP. |

T-1316
 TRIG. CH-2 CH-2 ADD DUAL CH-1
 POL.

TRIG. AMP. and SWEEP GEN.





Model LBO-507A/508A
 LEADER ELECTRONICS COMP.

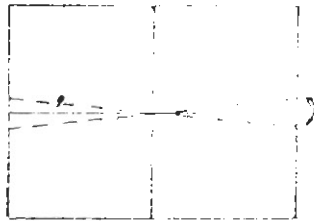
CHANGE INFORMATION

| PCB. No. | Item | Model | Ser. No. | Principal changes |
|----------|-----------------|-------|---------------|-----------------------------------|
| T-1467 | Beam rotator | 507A | No. 8060401 ~ | Additional Unit |
| | | 508A | No. 8060101 ~ | Beam rotator (Ref. O-995A 1/7) |

TRACE ROTATION

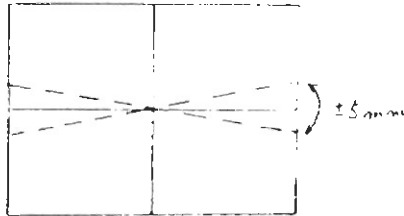
ROTATION

ROTATION to make the trace parallel with the horizontal center line on the seal.



ROTATION

Limit controlled by ROTATION



Remark: CRT must be remounted when ROTATION can't make the trace parallel with the horizontal center line.