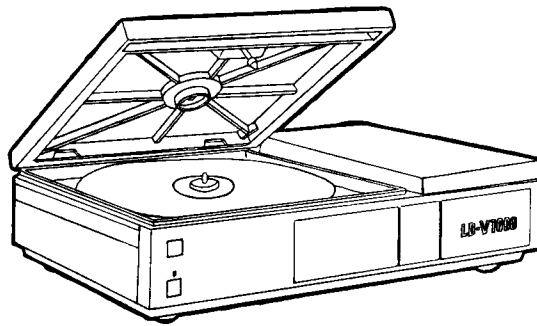


Service Manual



ORDER NO.
VRT-018-0

VIDEO DISC PLAYER

LD-V1000

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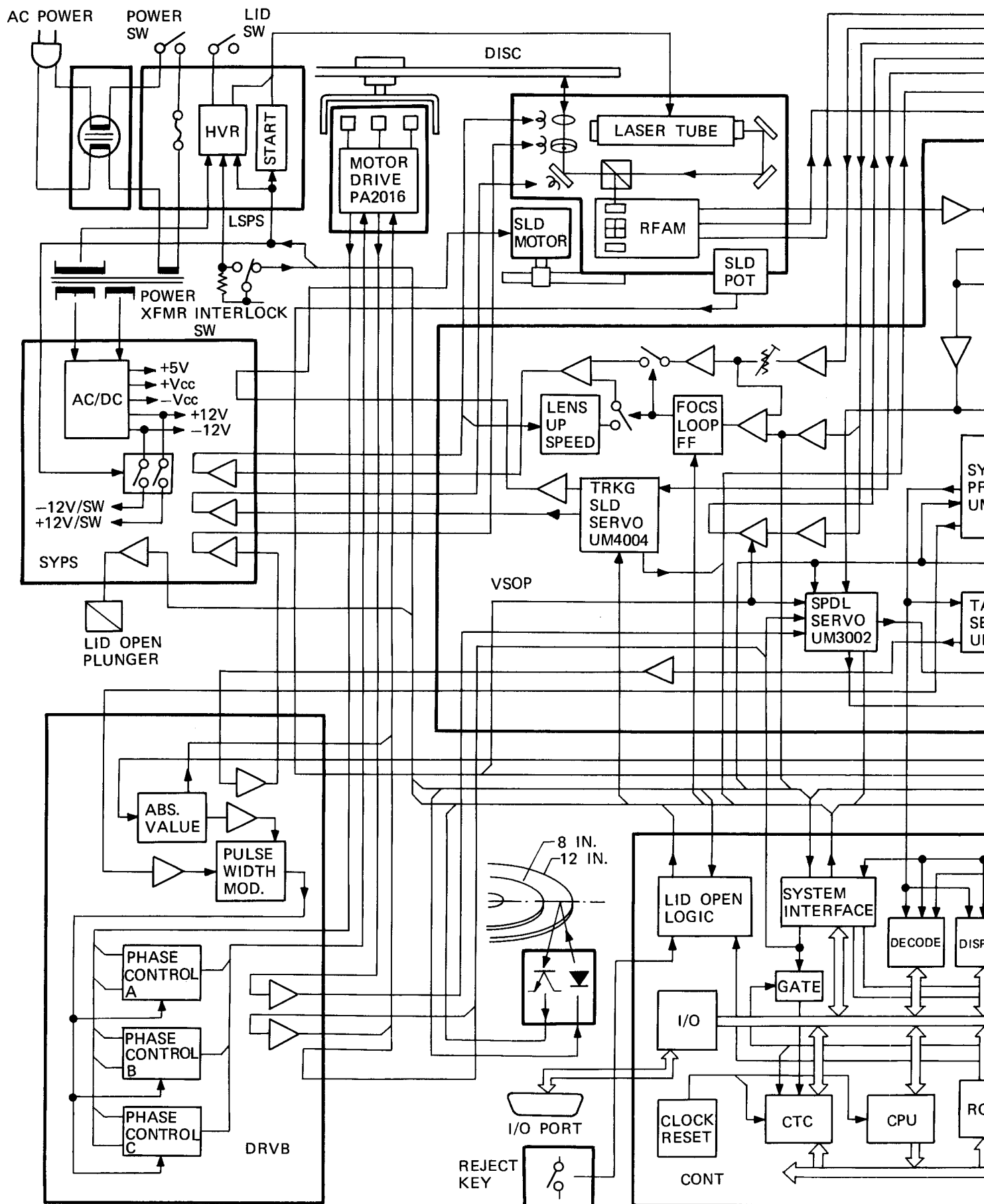
1. BLOCK DIAGRAM

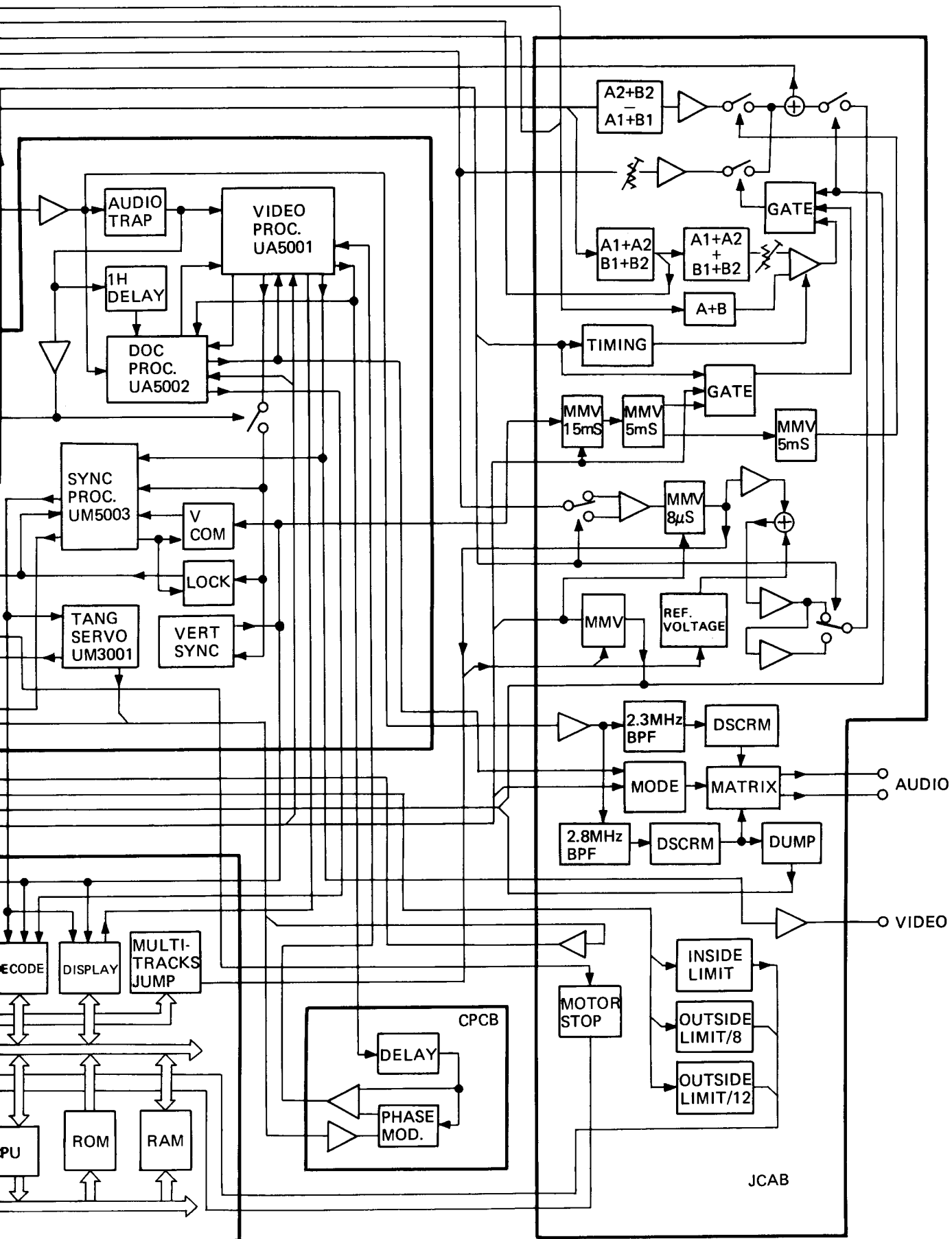
A

B

C

D





B

C

D

2. CIRCUIT DESCRIPTIONS

1. CONT GENERAL

The CONT circuit block diagram is shown in Fig. 1-4.

Z1 is a CPU, and uses Z80 or Z80A series IC, operating with a 2.5 MHz clock signal. Z3 is the memory of the program, and uses an IC2764 (8KBYTE EPROM) to allocate from ADDR 00H to 1FFFH. Z4, as the CPU's working RAM and user's memory, uses 6116 (2KBYTEC-MOSSTATIC RAM) to allocate from ADDR 8000H to 83FFFH.

The unit is equipped with two types of I/O, isolated I/O and mapped I/O. Isolated I/O include Z1, Z2, Z7, Z8, Z9, and Z10, while mapped I/O include Z5 and Z6. Each chip is selected by the decoding of the ADDR BUS signal by Z14 (memory select IC). By means of the INSIDE, OUTSIDE, and the REJECT signals, the Z2 (CTC) monitors the player status and the timer function which places an interrupt on the CPU every 1 msec; as the interrupt controller, it generates the INTERRUPT signal, and informs the CPU of the player's status. Z7 and Z8 are parallel ports with specifications identical to PR7820 and PR8020, and their timing chart is shown in Fig. 1-2. Z9 and Z10 are DECODER IC and DISPLAY IC. The DECODER IC has the function of reading the phillips code (24 bit \times 3 = 72 bit) contained in 16, 17, and 18H among the NTSC VIDEO signals, and accord with demands from the CPU, outputs these to the CPU. Two lines exist in Z10, and by writing a blank signal, these can be shown so as not to be displayed. Also, the position of the POSITION COUNTER within the DISPLAY can be read.

Z5 and Z6 (IC8255) are used as player control input/output ports. The OSC section which produces the clock for the CPU is made up of Z15, Z18, Z16, and Q1, and produces a 5 MHz fundamental oscillation by means of X1 (X'tal) and Z15. After that output is waveform shaped by Z15, it is frequency divided by Z18 (LS74), and made it 50% duty factor. By using Z16 and Q1, the 2.5 MHz 50% duty factor signal obtained from the output of Z18 is made into an $f = 2.5$ MHz, $V_1 = 0V$, $V_h = V_{cc}$, duty cycle = 50% signal, and in a status fulfilling the Z80 CPU's clock conditions, is output to the CPU and CTC.

The RESET circuit, which uses Z11 (7705), is a reset IC, and is designed so that if the mains voltage falls below rated voltage, the RESET terminal automatically becomes LOW.

The DECODER and DISPLAY IC's (Z9, Z10) are status controlled by the ATN, STB, and TX/RX signals, and the DATA BUS. These signal lines are constructed by the Z21, Z23, Z24, and Z26 gate IC's.

The various signal lines and IC status are shown in the chart below.

CONTROL OF DECODER, DISPLAY IC

	ATN	STB	TX/RX	BUS
DEVICE RESET	0	0	1	
DEVICE SELECT	0	1	1	DEVICE NO.
READ DATA	1	0	0	DATA TO CPU
WRITE DATA	1	0	1	DATA FROM CPU

If the CPU attempts to perform read or write operations with respect to the various devices, but the devices are in a BUSY status, the devices inform the CPU that they are busy, without the ACK switching to LOW.

The circuitry is designed so that in the event that the devices are in the BUSY status, a WAIT is imposed on the CPU by Z18 and Z23. As a result, the CPU is made to wait until the BUSY status is cancelled.

A timing chart for ATN, STB, TX/RX, and ACK is shown in the separate Fig. 1-2.

A general outline of the program flow is shown in Fig. 1-3.

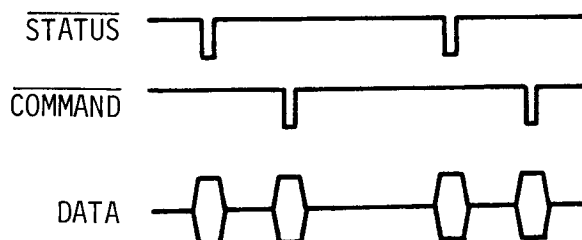


Fig. 1-1 TIMING CHART OF PARALLEL PORT

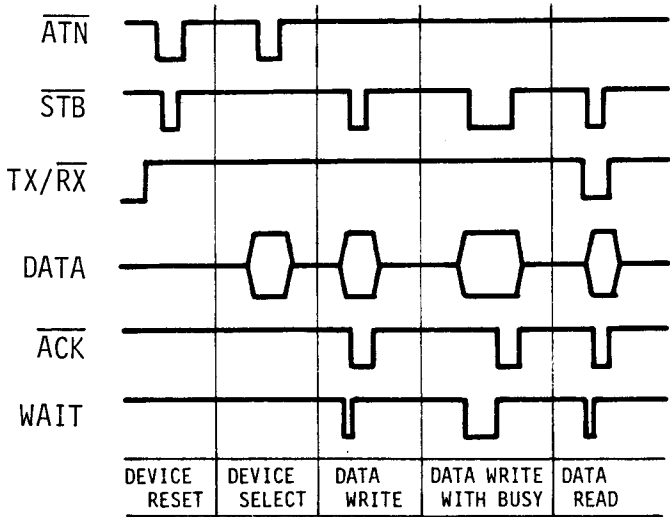


Fig. 1-2 TIMING CHART OF DECODER, DISPLAY IC

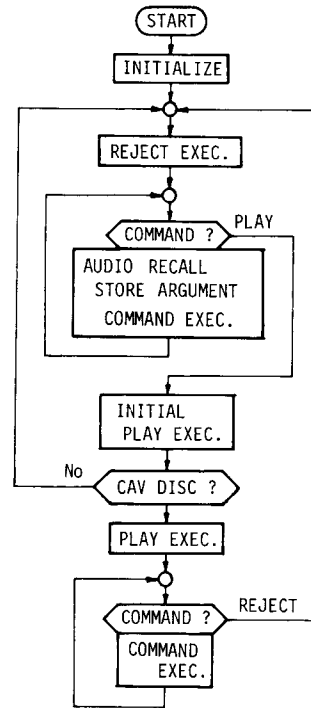


Fig. 1-3 GENERAL FLOW CHART

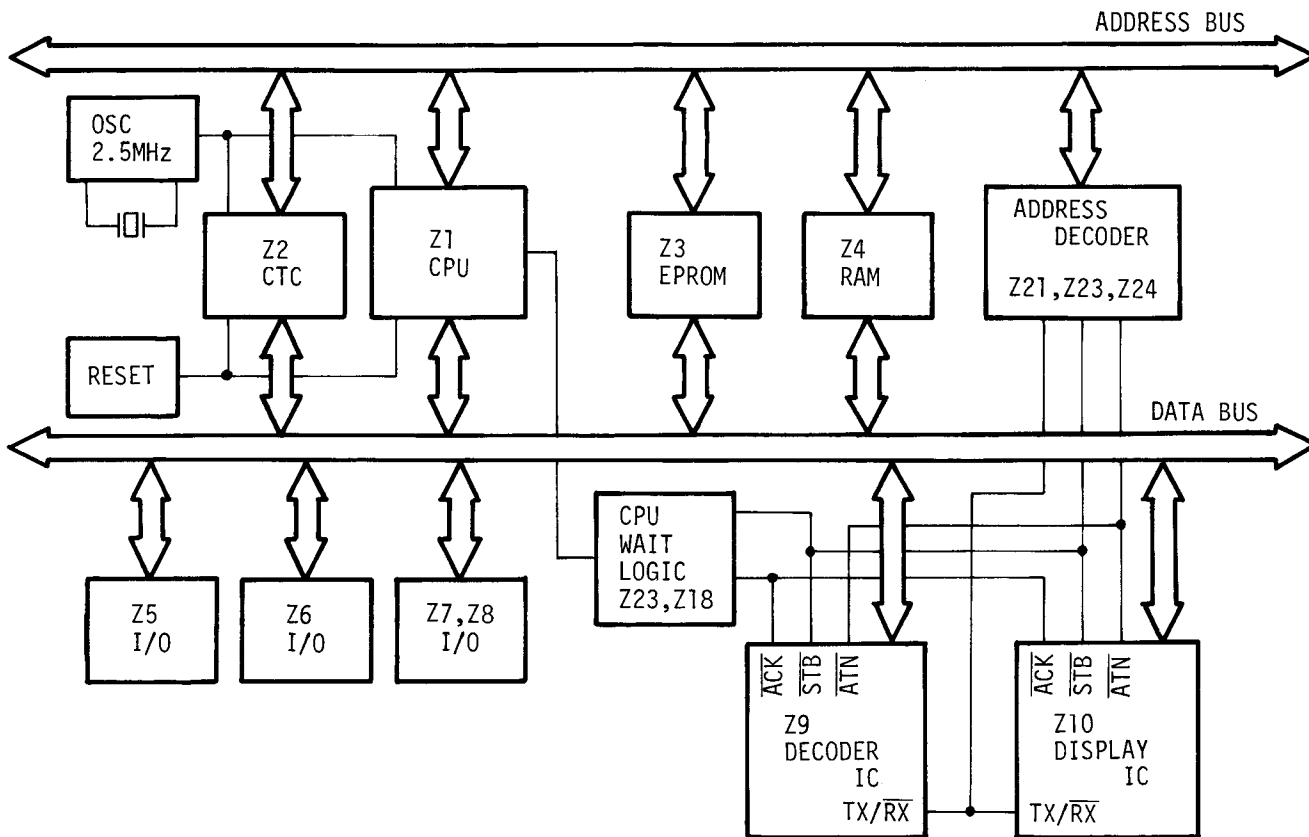


Fig. 1-4 CONT BLOCK DIAGRAM

2. JCAB GENERAL

(1) HIGH-SPEED SEARCH

1-1 Improvement of LOCK IN Ability of TRKG Servo

In order to perform search at high speed, the slider must be made to travel at high speed. TRKG Servo loop condition during the search period was OPEN on the previous 7820 unit, but on the LD-1100, codes were read by a repetitive CLOSE, OPEN operation. However, as the speed of the slider becomes faster, the time the reading beam is focusing on a single track becomes shorter, with the result that the chances of reading the RF signals between data spaces without dropout become smaller.

This fact was an obstacle to attempts to shorten or stabilize the time needed for fast search. In order to solve this problem, search on LD-V1000 with tracking open, sending the slider at high speed, while at the same time, TRKG servo loop (including that of code spacing) is closed at each V-SYNC (1/2 revolution), with the result that the reliability of the data read is increased, making high-speed search possible.

In order to achieve this, it is necessary to stabilize the tracking CLOSE LOCK IN operation, but this is performed by the ON TRACK DETECTOR, which is not present in former players.

1-2 Detection of ON TRACK Signals

The relation between tracks and the 3 beams is shown in Fig. 2-1. As shown in Fig. 2-1, the light reflected from the disc which enters the FOCUS detector (4 divisions), is least when the beam is at the mirror surface between tracks.

On the other hand, the change in the amount of beam spot incident to the 2 tracking detectors, as shown in Fig. 2-1, indicates a mutual inverted phase change. That is because, as shown in Fig. 2-1, the reading beams for the two tracks are arranged so that they are separated by 1/2 cycle of tracking pitch. Accordingly, if the sum of the two is considered, a fixed, direct-current signal corresponding to the average amount of light reflected from the disc can be obtained, regardless of the reading position.

With respect to changes in the power of the beam light and reflectance ratio from the disc, the amount of beam spot incident to the three detectors changes at the same ratio; as a result, for example, by performing an appropriate gain adjustment on the output of the FOCUS detector, a condition like that shown in Fig. 2-1 can be achieved.

When signals have their levels aligned in this way, and are compared by the comparator, a square wave like that shown in the figure is obtained. At LOW level, the fact that the center of the FOCUS beam is above the track can be ascertained from Fig. 2-1.

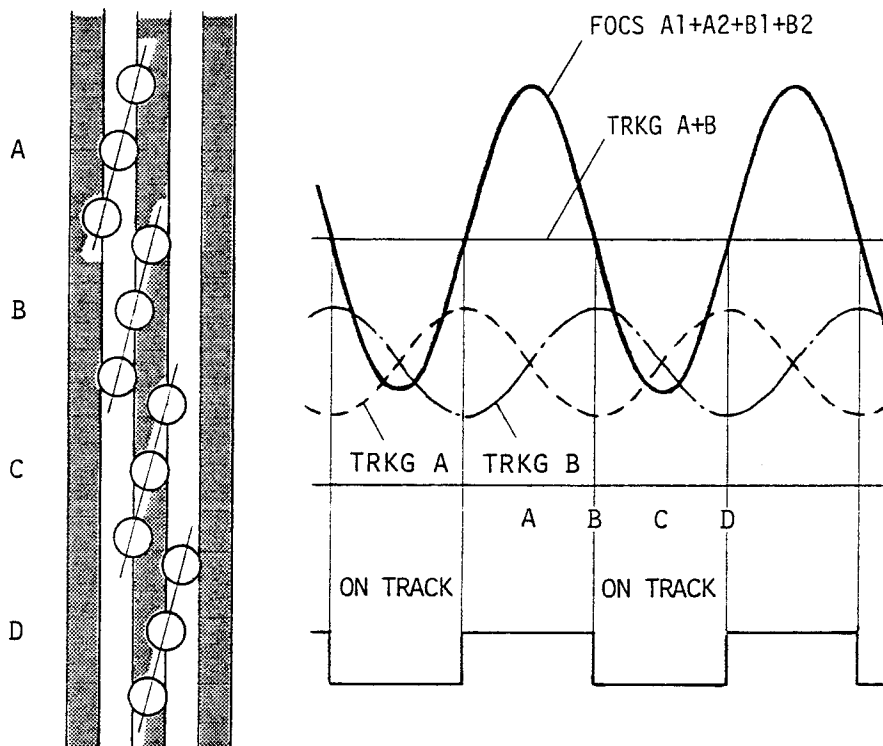


Fig. 2-1 ON TRACK DETECTION

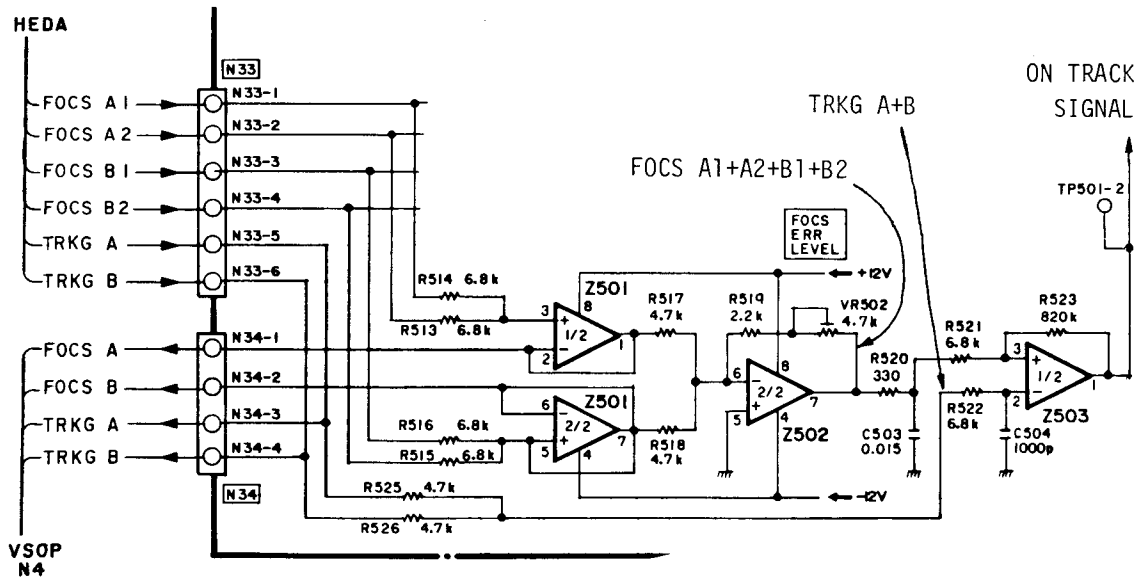


Fig. 2-2 ON TRACK DETECTION CIRCUIT

Fig. 2-2 shows the circuits used in the LD-V1000. This circuitry can be explained as follows: The 4-part FOCUS signals input from the RFAM to JCAB are of negative polarity, and TRKG A and B are positive polarity. TRKG A and B are mixed by R525 and R526, pulsive noise is removed by R522 and C504, and the signals are input into the (-) terminal of comparator Z503. On the other hand, of the 4-part FOCUS signals, A1, A2 are mixed by R513, R514, converted to low impedance by Z501-1/2, and sent to the VSOP FOCUS SERVO circuit. Then, passing through R519, they are mixed by Z502-1/2 with the identically constructed signals FOCUS B1, B2. The output of Z502-1/2 is the total sum of the 4-part signal, and its polarity has also been inverted to positive. Pulsive noise is removed by R520, C503, and the signal is input to the (+) terminal of Z503, where level comparison is performed, and the ON TRACK signal is detected. R521 and R523 add positive feedback to the comparator, generate hysteresis, and give the signal noise-resistance.

1-3 TRKG Servo Equalizer and LOOP SW

Fig. 2-3 shows the TRKG LOOP SW which controls the tracking servo EQ and TRKG MIRROR operation. The TRKG error sent from VSOP is GAIN adjusted by VR503, then, after

being phase-advance compensated by Z502-1/2, is input to TRKG LOOP SW Q503, the operation of Q503 is decided by the 3 control inputs which are input after passing through resistors R537, 538, 540. The LOOP OPEN signal, which is sent at TTL level, is made wired OR by the aforementioned 3 resistors; level shift is performed by Q506, and a switching pulse is generated by Q505. Accordingly, when any one of the 3 LOOP OPEN signals becomes H-LEVEL, the TRKG LOOP becomes OPEN. For example, when TRKG OPEN occurs, and Q502 turns ON, centering servo error (to be explained later) is input to the mirror, and the mirror is controlled so as to be fixed near the center of the field of view. In addition, for the purpose of jump, a mirror acceleration pulse passes through the R600, and is input from the MULTI JUMP circuit. In order to close the TRKG LOOP, as previously explained, the LOCK IN operation is quickly performed by the ON TRACK signal. Since the ON TRACK signal is constantly input to R538, if the other 2 LOOP OPEN signals are LOW, the LOCK IN operation occurs.

In this way, this block is the place where the signals controlling mirror movement are selected.

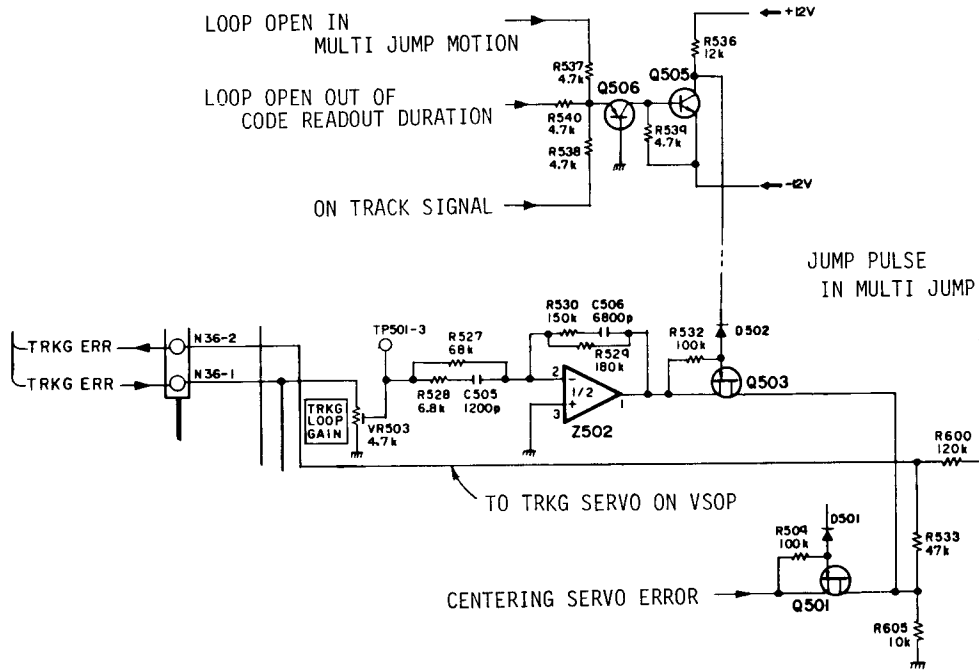


Fig. 2-3 TRKG SERVO EQUALIZER AND LOOP CONTROL CIRCUIT

1-4 Centering Servo

This block is designed so as to prevent the reading beam from deviating toward the outside of the objective lens's field during search, thus causing a loss of good reading operation. As shown in Fig. 2-4, when the reading beam is in the center of the lens field, the laser beam returning to the FOCUS detector is also at the center of the detector. Using this characteristic, by taking the sum and error in a different combination from that at the time of FOCUS error detection, the direction and size of the deviation from the center of the returning beam above the detector is detected. This is performed by Z509-1/2, while phase compensation is performed by Z509-2/2. By feedback to the mirror, when Q502 is ON at the time of TRKG LOOP OPEN, the mirror is quickly returned to the vicinity of the center of the field. VR501 is an adjustment VR for the purpose of harmonizing the return point and the center of field.

The arrow shows the direction of movement of returning beam spot at time of tracking mirror oscillation.

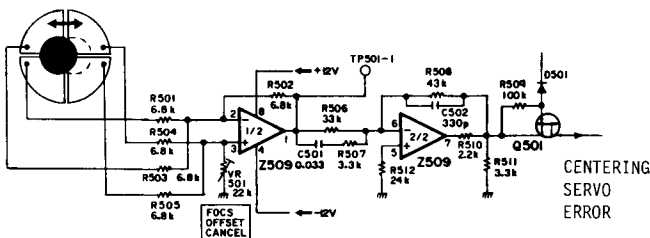


Fig. 2-4 CENTERING SERVO CIRCUIT

1-5 SEARCH CONTROL

This block is the section which generates gate signals for the purpose of CLOSING the TRKG in code readout duration of the vicinity of V-SYNC, and making it OPEN in other duration. However, it also has the function of turning the LOOP SW ON/OFF by the LOOP OPEN signal sent from the VSOP at the time of still, slow, and 3 × speed play mode, and also at the time of the mirror stopper operation.

In addition, it generates the pulse which causes the centering servo to operate, quickly returning the mirror to center following the completion of code reading at time of SEARCH.

The V-SYNC signal is constantly sent from the VSOP, but other than in SEARCH MODE, Z511 is on, with the result that Z504-1/2 is not triggered, and Q511 remains at LOW. However, if a LOOP OPE signal is sent from VSOP at this time, the D505 cathode is grounded, with the result that the current flowing through D506 to the base of Q511 flows to D505, and Q511 becomes HIGH.

This is sent to Q506 in Fig. 2-3, and the TRKG LOOP becomes OPEN.

Since the SCAN MODE becomes LOW level at times of SEARCH, D508 is grounded, and in the same way as the LOOP OPEN from VSOP, Q511 becomes HIGH, and TRKG LOOP becomes OPEN. At the same time, since Z51 becomes OFF (CLEAR), Z504 is triggered at the trailing edge of the V-SYNC, triggering the next Z504-2/2. This Z504-2/2 pulse generates the gate pulse which becomes HIGH at the playback video signal's

V-SYNC and code duration, with the result that Q511 comes LOW level during this period.

During the period of TRKG OPEN, when Q511 becomes LOW, the fN TRACK signal is constantly input to 538, and R537, R540 are grounded and thus LOCK IN is performed quickly, as explained earlier. Accordingly, in V-SYNC (code duration), TRKG servo is closed, dropout from OFF TRACK is eliminated, and highly reliable code reading is made possible. When Z504-2/2 returns to LOW, Q511 becomes HIGH, and thus for a second time, TRKG LOOP becomes OPEN. However, since the TRKG servo was closed while being moved at high

speed, the mirror vibrates toward the outside of the field. As a result, it is necessary to return the mirror to field center again immediately after the transition from CLOSE to OPEN. To this end, Z512 and Q513 generate a gate pulse which turns the centering servo circuit ON. Z512 inverts the output of Z504-2/2, driving the differentiating circuit made up of R555, and C512. In accord differentiating circuit's time constants, Q513 becomes OFF, with the result that Q509 also is OFF.

Accordingly, Q501 becomes ON, and the centering servo operates.

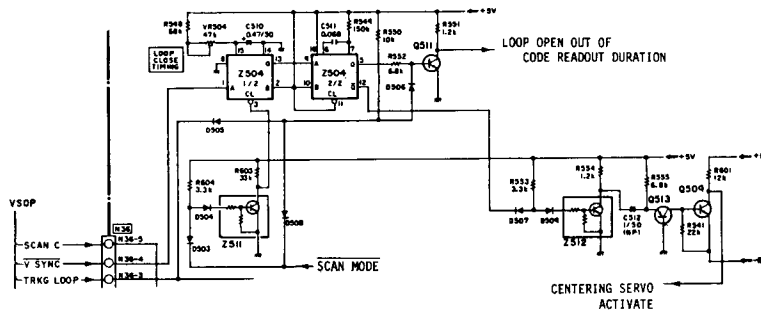


Fig. 2-5 SEARCH CONTROL CIRCUIT

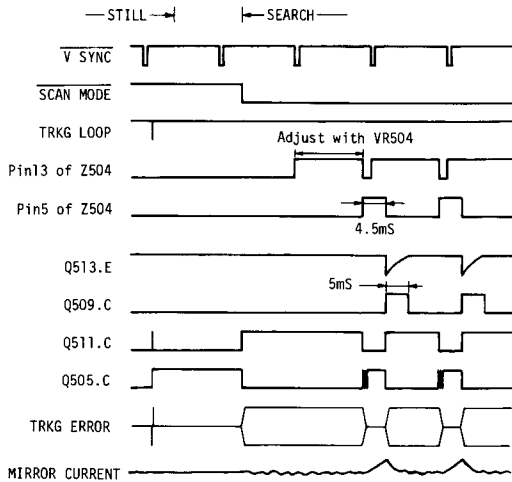


Fig. 2-6 DATA READOUT TIMING CHART

1-6 Timing Circuit

As shown in Fig. 2-8, when the ON TRKG signal is live, during jump control to the adjacent track the LOOP OPEN time of t alone is increased, and the jump becomes unstable.

When TRK LOOP becomes OPEN, at the time of operations of track jump such as still, slow, and X3 jump operation may be disturbed due to the ON TRKG signal. The timing circuit is thus provided so that when TRKG servo is opened at such operations, the ON TRACK signal is kept for a short time at LOW, namely maintained at the level of ON TRACK status (Q508 ON).

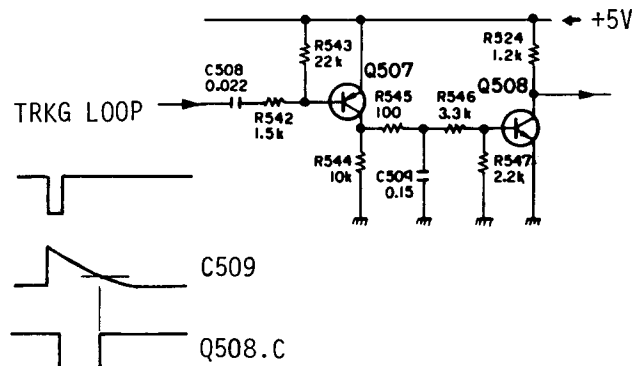


Fig. 2-7 TIMING CIRCUIT

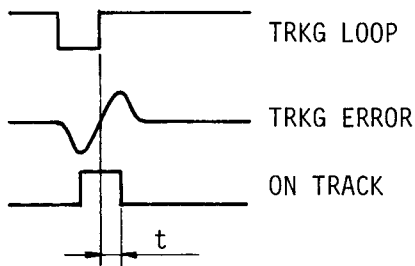


Fig. 2-8 ON TRACK DELAY

(2) MULTI JUMP CIRCUIT

2-1 General

When the MULTI JUMP TRIG is input, the MMV, Z505-1/2 is triggered at its trailing edge, Q514 turns ON, and the input of R537 becomes HIGH, namely, TRKG LOOP OPEN. Also, Q526 turns ON, and acceleration voltage is impressed on the mirror. For example, when jumping to the FWD side, Q517 turns ON, and Q518 turns OFF, so that the voltage input from R616 to Z507-2/2 is impressed on the mirror, and the mirror begins accelerating toward the FWD side. (In the case of REV, the voltage inverted by Z507-1/2 is impressed). The zero crosspoint of the TRKG error signal is detected by Z503, and at its trailing edge, Z505-2/2 triggered, generating a pulse with width of about $8\mu\text{s}$. This $8\mu\text{s}$ pulse becomes the CLOCK PULSE which subtracts the present counter on the CONT board, and is also input to the low pass filter composed of R614 and C513, becoming a negative direct current voltage in accordance with the pulse density. When this is mixed with the reference voltage of the previous R616, the respective polarities are opposed, so they are subtracted, and detection is made of how much the relative speed of the reading beam and the track differs from the reference. If faster than the reference, it is decelerated, and if slower, it is accelerated, so that stable tracking is performed, unaffected by amount of eccentricity, etc.

As the counter is subtracted, when it reaches a remaining 8 tracks, a HIGH level is output as BREAK from the CONT board, and Z513 becomes ON. As a result, the reference voltage supplied by R616 is lowered, the jump speed is correspondingly decreased, making for easy LOCK IN. When the counter becomes zero, JUMP CLR is input, and Z505-1/2 is cleared, Q514 becomes OFF, and TRKG becomes CLOSED.

2-2 Control Circuit for Jump Direction

The FWD/REV signal (TTL level) sent from CONT is converted to $\pm 12\text{V}$, and a 2-phase control signal is obtained.

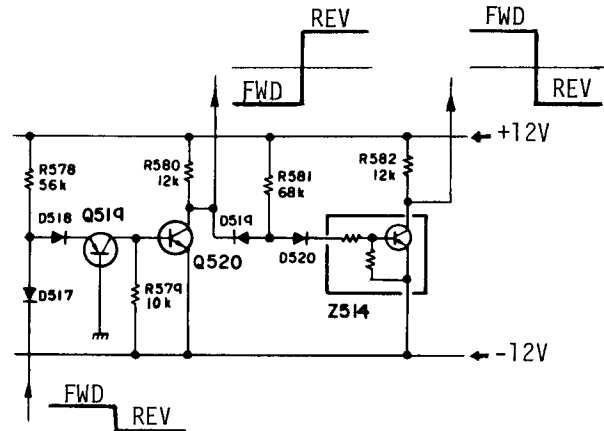


Fig. 2-9 JUMP DIRECTION CONTROL CIRCUIT

2-3 Track Count Pulse Generating Circuit

R602 and C520 are low pass filters for removing TRKG error pulsive noise. Since comparator Z503 operates at $+5\text{V}$, D516 is to cut out TRKG error negative polarity portions, -0.6V and below.

The comparator input is inverted depending on which of Q522 and Q523 is ON. Accordingly, the TRKG error waveform and the Z503-2/2 output pulse polarity are inverted, but by this, the comparator input is inverted in accord with FWD/REV input signal so that the comparator's output edge polarity is not inverted depending on the direction of the jump, namely depending on whether the reading beam vibrates toward the circumference or toward the outside, and thus the Z505-2/2 is always triggered during off TRKG, regardless of the JUMP direction.

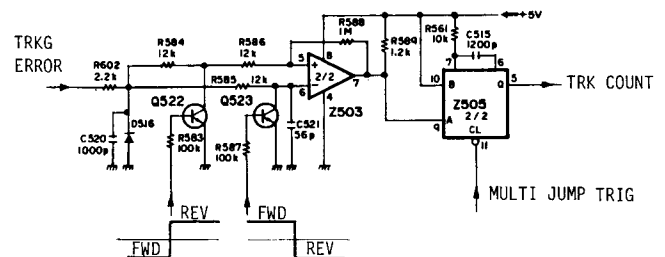


Fig. 2-10 TRACK COUNT PULSE GENERATOR

2-4 JUMP CONTROL Circuit

The operation of this section can be understood from the timing chart in Fig. 2-12, and the contents of 2-1.

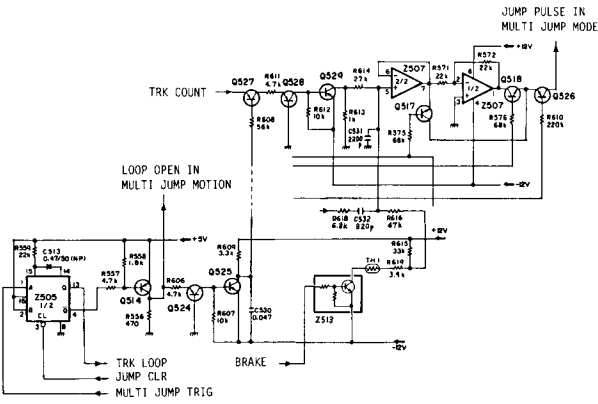


Fig. 2-11 JUMP CONTROL CIRCUIT

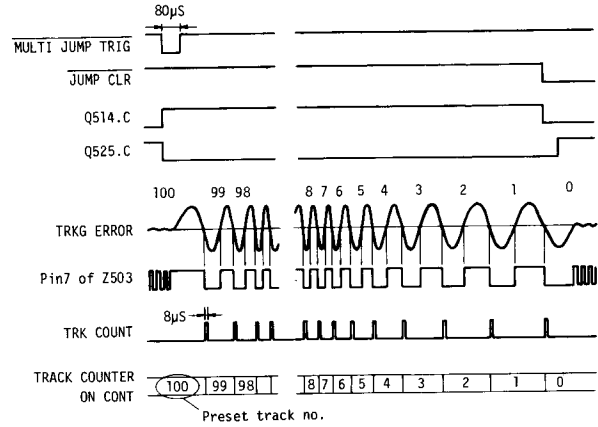


Fig. 2-12 MULTI JUMP TIMING CHART

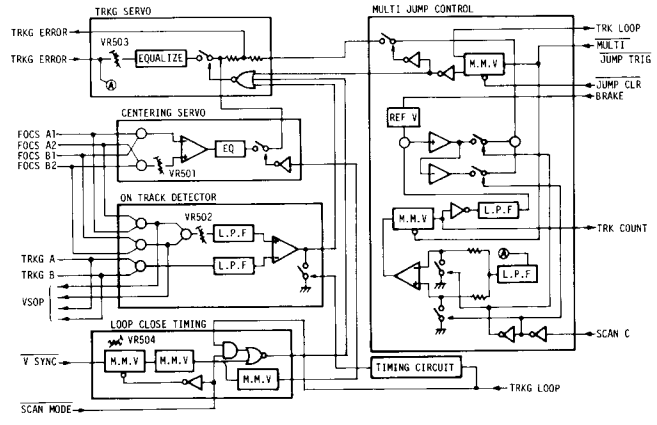


Fig. 2-13 JCAB BLOCK DIAGRAM

3. ELECTRICAL ADJUSTMENTS

PRIOR TO ADJUSTMENT

1. Remove the bottom cover and the screw which fixes the front panel.
2. Remove the five green screws which fix VSOP board to the chassis.
3. Raise the front of the set and hold the set by VSOP board.
4. Open the hood and remove the two screws which fixes the front panel.
5. Disconnect the connector on KEYC board and then remove the front panel.

TP SIGNALS

- | | |
|-------|---------------------|
| TP1-1 | FOCS error |
| -2 | Test signal input |
| -3 | FOCS bridge balance |
| -4 | GND |
| -10 | FOCS motor drive |
| | |
| TP2-5 | TRKG error |
| -6 | Test signal input |
| -7 | TRKG mirror current |
| -8 | TRKG loop switch |
| -9 | GND |
| -11 | RF |
| -12 | TANG mirror current |
| | |
| TP3-1 | TANG loop switch |
| -2 | PB H |
| -3 | REF H |
| -4 | TANG error |
| -5 | not used |
| -6 | not used (FG) |

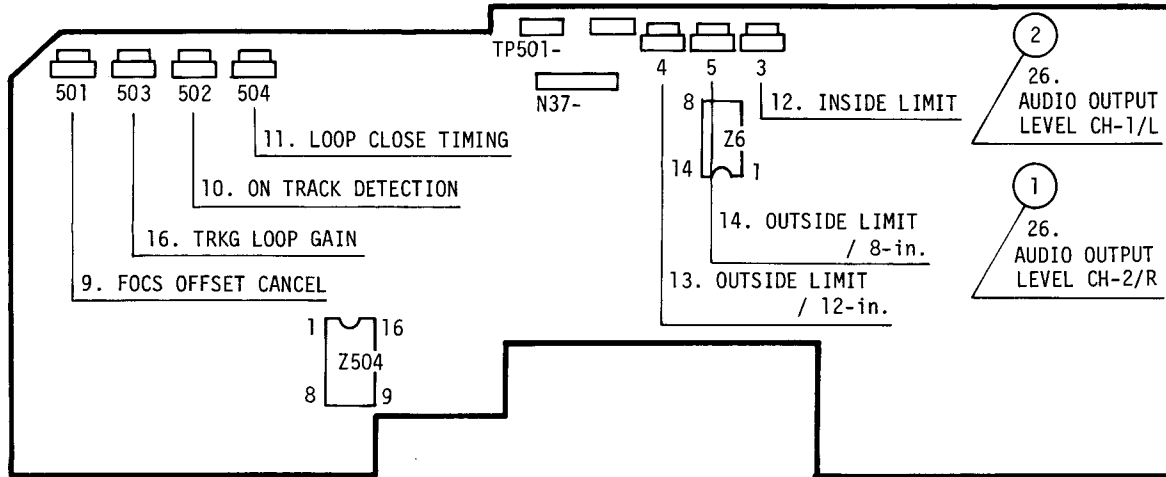
EQUIPMENTS AND TOOLS

Oscilloscope
 Colour TV monitor
 Oscillator
 Test disc B1
 Grating adjustment driver
 NTSC video signal generator etc.

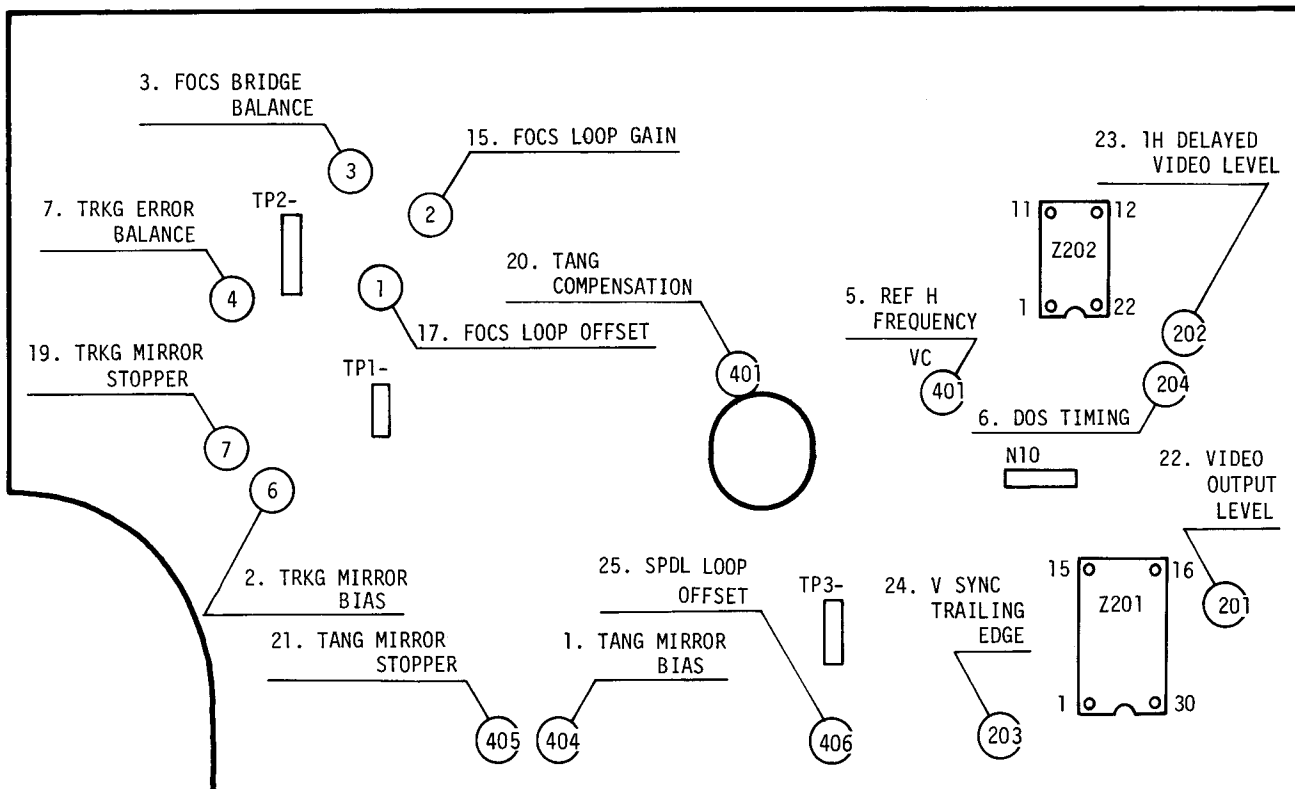
WARNING:

EXTREME CARE MUST BE EXERCISED TO LSPS BOARD WHILE WORKING WITH THE PLAYER TO PREVENT POSSIBILITY OF EXPOSING YOURSELF TO DANGEROUS VOLTAGES.

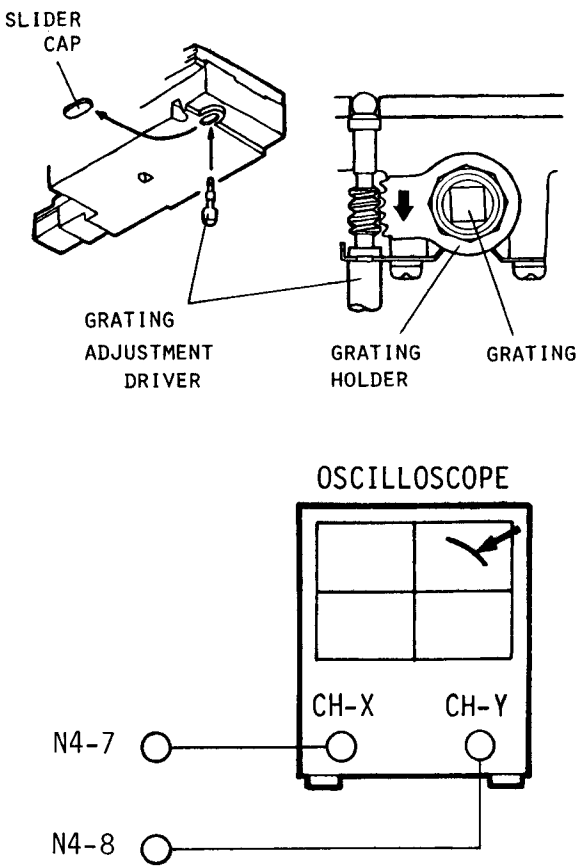
JCAB ADJUSTMENT POINT

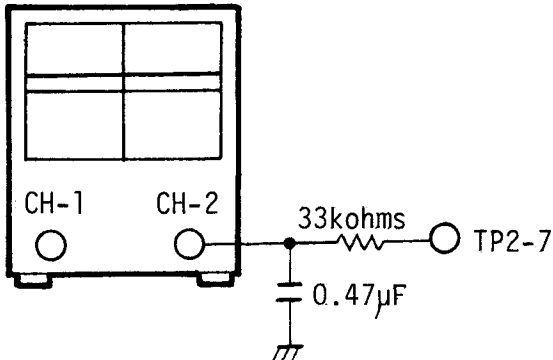


VSOP ADJUSTMENT POINT

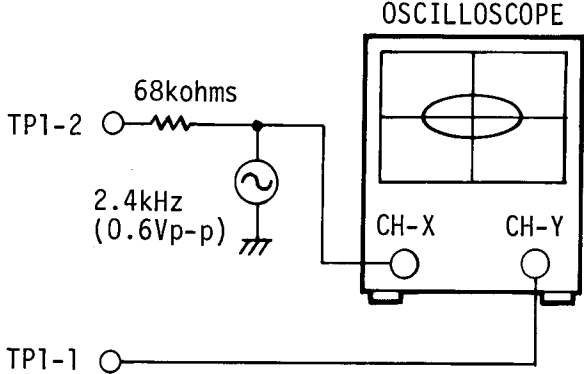


STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
1	Set up	—	TP2-12	VR404	<p>TANG MIRROR BIAS/VSOP</p> <p>Make sure that a voltage at TP2-12 is 0 ± 20 mV. If not, adjust VR404 to satisfy the before-mentioned standard.</p>
2	Set up	—	TP1-3	VR3	<p>FOCS BRIDGE BALANCE/VSOP</p> <p>Connect TP1-10 to GND. Measure a voltage at TP1-3 (an offset voltage of Z2), then disconnect TP1-10 from GND. Adjust VR3 so that a voltage at TP1-3 is 20 mV lower than that measured voltage. This step must be finished within one minute after the power is turned on.</p>
3	Set up	—	TP1-1	VR1	<p>FOCS OFFSET INITIAL SET/VSOP</p> <p>Make sure that a voltage at TP1-1 is 0 ± 20 mV. If not, adjust VR1 to satisfy the before-mentioned standard.</p>
4	Set up	—	TP3-3	VC401	<p>REF H FREQUENCY/VSOP</p> <p>Connect CH1 input of the scope to an H-SYNC OUT terminal of an NTSC video generator, and connect CH2 input to TP3-3. With triggering by CH1, adjust VC401 to stop a current of the square waves in CH2. In other way, connect a frequency counter to TP3-3, and adjust VC401 so that the frequency comes 15734 Hz.</p>
5	Set up	—	pin 14 of Z201	VR204	<p>DOS TIMING/VSOP</p> <p>Connect a 12th post of SYPS (LASER ON) to GND. Connect an oscillator output to TP2-11, and input a signal of 5.5 MHz (200 mVp-p). Rotate VR204 fully CW, then back to CCW until a voltage at pin 14 of Z201 turns H to L. Disconnect a 12th post of SYPS from GND.</p>

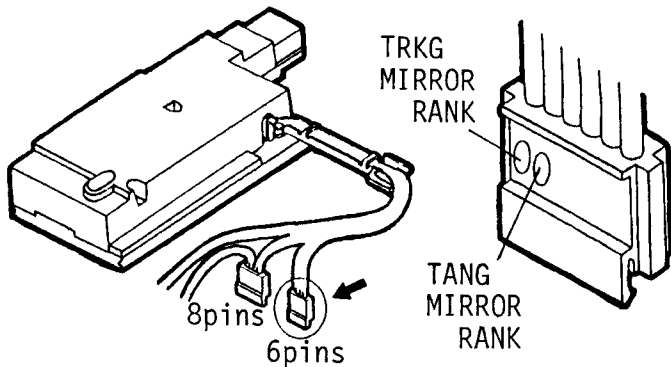
STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
6	Still	TRKG: O/L TANG: O/L	TP2-5	Grating	<p>TRKG ERROR CHECK/VSOP</p> <p>Connect TP2-8 and TP3-1 to GND. (TRKG and TANG servo loops are opened.)</p> <p>Make sure that TRKG error level is more than 2Vp-p. If not, a mounted angle of a diffraction grating should be adjusted.</p> <p>Scan to the point where displayed Frame no. comes 14,000 nearby, and then push STOP key on the control jig.</p> <p>Remove a slider cap, and insert a grating driver into the opening.</p> <p>Engage the cogs of the grating holder and the driver.</p> <p>While observing TRKG error, adjust the grating angle to find the smooth null point of the waveform.</p> <p>Then rotate the grating holder in the direction of the arrow to find the first point where maximum TRKG error with smooth envelope is obtained.</p> <p>Set the scope into X-Y mode.</p> <p>Connect CH-X input to N4-7 and CH-Y to N4-8.</p> <p>Adjust the angle finely so that the waveform comes as illustrated.</p> 

STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
7	Play	TRKG: O/L TANG: O/L	TP2-7	VR6	<p>TRKG MIRROR BIAS/VSOP</p> <p>Make sure that a voltage at TP2-7 is 0 ± 5 mV. If not, adjust VR6 to satisfy the before-mentioned standard.</p> <p>In this step, use a 1:1 probe and an oscilloscope which is calibrated accurately.</p> <p>OSCILLOSCOPE</p> 
8	Play	TRKG: O/L TANG: O/L	TP2-5	VR4	<p>TRKG ERROR BALANCE/VSOP</p> <p>Push PLAY key on the control jig and scan to the middle of the disc.</p> <p>Adjust VR4 to where TRKG error waveform is centered on DC 0V.</p>
9	Play	TRKG: O/L TANG: O/L	TP501-1	VR501	<p>FOCS OFFSET CANCEL/JCAB</p> <p>Adjust VR501 so that the waveform at TP501-1 is centered on DC 0V.</p>
10	Play	TRKG: O/L TANG: O/L	TP501-2	VR502	<p>ON TRACK DETECTION/JCAB</p> <p>Adjust the V position of the scope so that GND level is equal to the center line of the horizontal scale on CRT, and set the input mode of the scope to AC.</p> <p>Adjust VR502 so that the waveform at TP501-2 is centered on the center line on CRT. (The duty cycle of the waveform comes 50%.)</p>

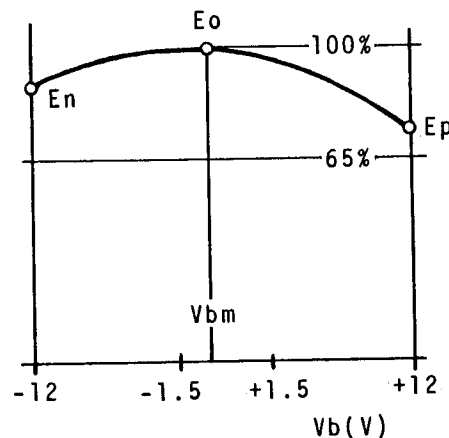
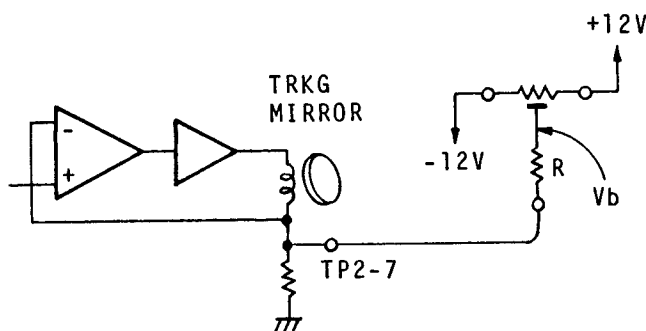
STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
11	Play	TRKG: O/L TANG: O/L	pin 5 of Z504	VR504	<p>LOOP CLOSE TIMING IN SEARCH MODE/JCAB</p> <p>Remove the N37 connector housing from the pin-post, and connect N37-7 (SCAN MODE) to GND. While observing the waveform at pin 5 of Z504 and the video signal at Video out terminal, adjust VR504 so that the center of DATA read-out duration is aligned with suppressed MCA code in the video signal.</p> <p>Disconnect N37-7 from GND, and connect the N37 connector housing to the pin-post again.</p>
<div style="text-align: center;"> </div>					
12	Scan rev.	TRKG: O/L TANG: O/L	—	VR3	<p>INSIDE LIMIT/JCAB</p> <p>Connect a 220Ω resistor between pin 13 and pin 15 of Z202 on VSOP. While pressing SCAN REV key and observing the TV screen, adjust VR3 so that scan action ends in LEAD-IN no. 9—no. 11.</p>
13	Scan rev.	TRKG: O/L TANG: O/L	—	VR4	<p>12/IN. DISC OUTSIDE LIMIT/JCAB</p> <p>Connect a 220Ω resistor to the same position as step 12. While pressing SCAN FWD key and observing the TV screen, adjust VR4 so that scan action ends in LEAD-OUT no. 14—no. 16. Disconnect a resistor.</p>

STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
14	Still	TRKG: C/L TANG: O/L	pin 14 of Z6	VR5	<p>8/IN. DISC OUTSIDE LIMIT/JCAB</p> <p>Scan fwd to the point where displayed Frame no. comes 24,000, and press STOP key. Adjust VR5 so that a voltage at pin 14 of Z6 on JCAB turns H to L. While playing in the vicinity of Frame no. 24,000, make sure that the voltage turns H to L in Frame no. 24,000—no. 24,300. Repeat this in several times.</p>
15	Play	TRKG: C/L TANG: O/L	TP1-1, TP1-2	VR2	<p>FOCS LOOP GAIN/VSOP</p> <p>Disconnect TP2-8 from GND. Set the scope into X-Y mode and an oscillator output to 2.4 kHz (0.6 Vp-p). Connect the oscillator output to CH-X input and also to TP1-2 through a 68 kΩ, and connect CH-Y input to TP1-1. Adjust VR2 to make Lissajous figure into a horizontal ellipse.</p> 
16	Play	TRKG: C/L TANG: O/L	TP2-5 (VSOP), TP501-3	VR503	<p>TRKG LOOP GAIN/JCAB</p> <p>Set the oscillator output to 4.8 kHz (10 Vp-p). Connect the output to CH-X input and also to TP501-3 through a 68 kΩ, and connect CH-Y input to TP2-5 (VSOP). Adjust VR503 to make lissajous figure into a horizontal ellipse.</p>
17	Play	TRKG: C/L TANG: O/L	TP1-1	VR1	<p>FOCS LOOP OFFSET/VSOP</p> <p>Play in the vicinity of Frame no. 100 nearby. While observing RF signal at TP2-11, adjust VR1 to obtain maximum RF signal. The measure an offset voltage of FOCS error at TP1-1 (DC voltage of the waveform center). Push REJECT key on the player, make sure that the voltage at TP1-1 is equal to that offset voltage. If not, adjust VR1.</p>

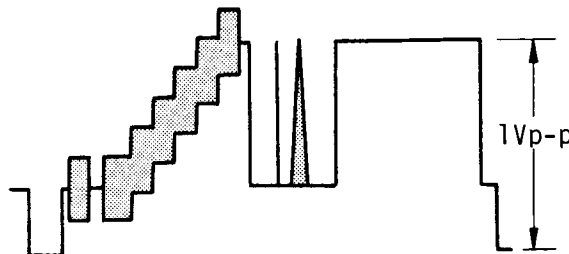
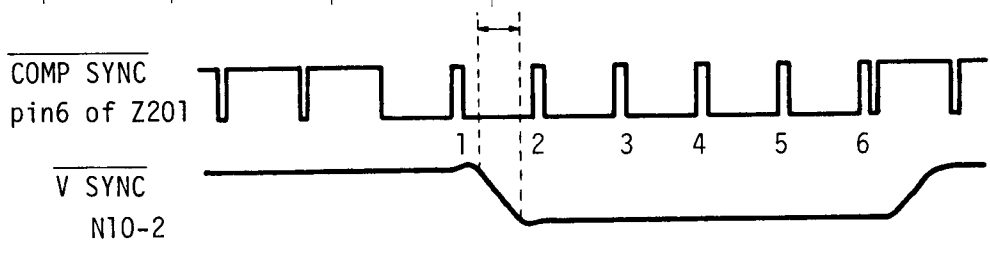
STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
18	Play	TRKG: O/L TANG: O/L	-	-	<p>OPTICAL PATH CHECK/VSOP</p> <p>This step has to be performed when the slider is replaced or the problem seems to relate with the optical path.</p> <p>Connect TP2-8 and TP3-1 to GND.</p> <p>TRKG and TANG mirrors are classified into five ranks by their sensitivities as shown below and their ranks are designated on the connector housing.</p> <p>Connect each end of jig VR to +12V and -12V line on VSOP, and also the center tap to TP2-7 through the resistor corresponding to the mirror rank.</p> <p>Adjust the jig VR to obtain maximum TRKG error at TP2-5, and read the peak-to-peak amplitude; E_o.</p> <p>Rotate the jig VR so that maximum positive bias is put to the mirror, and read the peak-to-peak amplitude; E_p.</p> <p>Rotate the jig VR so that maximum negative bias is put to the mirror, and read E_n.</p> <p>Make sure the followings.</p> <p>$E_p > 0.65 \times E_o$, $E_n > 0.65 \times E_o$ and $-1.5V < V_{bm} < +1.5V$</p> <p>If $E_p > 0.80 \times E_o$ and $E_n > 0.80 \times E_o$, the V_{bm} is not confined to the above.</p> <p>Likewise, put bias to TANG mirror at TP2-12, and measure TRKG error peak-to-peak amplitudes E_o, E_p and E_n at TP2-5. Make sure that the before-mentioned standards are satisfied.</p>



Mirror Rank			R(Ohm)
Code	Color	No	
C1	Black	1	316
C2	Red	2	300
C3	Yellow	3	273
D	Blue	4	240
E	Green	5	218



STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL																																			
19	Scan fwd.	TRKG: C/L TANG: O/L	TP2-7	VR7	<p>TRKG MIRROR STOPPER/VSOP</p> <p>Disconnect TP2-8 from GND. Set the scope into X-Y mode, and insert a low pass filter (33 kΩ/0.1 μF) between the probe and the scope input (CH-Y). While pressing SCAN FWD key, observe TP2-7 and adjust VR7 to obtain a positive voltage depending on the mirror rank. Mirror ranks and set points are shown below.</p> <table border="1"> <thead> <tr> <th colspan="3">Mirror Rank</th> <th rowspan="2">Set point (mV)</th> </tr> <tr> <th>Code</th> <th>Color</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>C1</td> <td>Black</td> <td>1</td> <td>200 ± 20</td> </tr> <tr> <td>C2</td> <td>Red</td> <td>2</td> <td>210 ± 20</td> </tr> <tr> <td>C3</td> <td>Yellow</td> <td>3</td> <td>230 ± 20</td> </tr> <tr> <td>D</td> <td>Blue</td> <td>4</td> <td>250 ± 20</td> </tr> </tbody> </table>	Mirror Rank			Set point (mV)	Code	Color	No	C1	Black	1	200 ± 20	C2	Red	2	210 ± 20	C3	Yellow	3	230 ± 20	D	Blue	4	250 ± 20												
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<p>OSCILLOSCOPE</p>																																								
20	Play	TRKG: C/L TANG: C/L	TP3-4	VR401	<p>TANG COMPENSATION IN V-BLANKING INTERVAL/VSOP</p> <p>Disconnect TP2-8 and TP3-1 from GND. While observing TANG error at TP3-4 and the video signal, adjust VR401 to minimize the TANG error waveform in the vertical blanking interval of the video signal.</p>																																			
21	Play	TRKG: C/L TANG: C/L, O/L	TP2-12	VR405	<p>TANG MIRROR STOPPER/VSOP</p> <p>Insert a low pass filter (33 kΩ/0.47 μF) between the probe and the scope input. Rotate VR405 fully CW direction, and adjust VR404 so that a voltage at TP2-12 comes the set point X. (shown below) Rotate VR405 slowly to CCW direction and adjust to the set point Y. Connect TP3-1 to GND, and adjust so that a voltage at TP2-12 comes 0±20 mV.</p> <table border="1"> <thead> <tr> <th colspan="3">Mirror Rank</th> <th colspan="2">Set point</th> </tr> <tr> <th>Code</th> <th>Color</th> <th>No</th> <th>X(V)</th> <th>Y(V)</th> </tr> </thead> <tbody> <tr> <td>C1</td> <td>Black</td> <td>1</td> <td>-0.55</td> <td>-0.40</td> </tr> <tr> <td>C2</td> <td>Red</td> <td>2</td> <td>-0.60</td> <td>-0.45</td> </tr> <tr> <td>C3</td> <td>Yellow</td> <td>3</td> <td>-0.65</td> <td>-0.50</td> </tr> <tr> <td>D</td> <td>Blue</td> <td>4</td> <td>-0.70</td> <td>-0.55</td> </tr> <tr> <td>E</td> <td>Green</td> <td>5</td> <td>-0.80</td> <td>-0.65</td> </tr> </tbody> </table>	Mirror Rank			Set point		Code	Color	No	X(V)	Y(V)	C1	Black	1	-0.55	-0.40	C2	Red	2	-0.60	-0.45	C3	Yellow	3	-0.65	-0.50	D	Blue	4	-0.70	-0.55	E	Green	5	-0.80	-0.65
Mirror Rank			Set point																																					
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<p>OSCILLOSCOPE</p>																																								

STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
22	Still	TRKG: C/L TANG: C/L	Video out	VR201	<p>VIDEO OUTPUT LEVEL/VSOP</p> <p>Disconnect TP2-9 and TP3-1 from GND. Play in the vicinity of Frame no. 1,000 nearby, and push STOP key where the composite test signal is reproduced.</p> <p>With Video output terminated into 75Ω, make sure that the video level is $1\pm 0.1V$ from the sync tip to the white peak. If not, adjust VR201 to satisfy the above.</p>  <p>COMPOSITE TEST SIGNAL</p>
23	Still	TRKG: C/L TANG: C/L	pin 16, 18 of Z201	VR202	<p>1H DELAYED VIDEO LEVEL/VSOP</p> <p>Make sure that the video level at pin 16 of Z201 is equal to the level at pin 18. If not, adjust VR202.</p>
24	Play	TRKG: C/L TANG: C/L	pin 6 of Z201, N10-2	VR203	<p>V SYNC TRAILING EDGE TIMING/VSOP</p> <p>Make sure that V SYNC trailing edge is aligned with the position between the first and second equalizing pulses in COMP SYNC (pin 6 of Z201) after that trailing edge. If not, adjust VR203.</p> 

STEP NO.	MODE	SERVO LOOP	CHECK POINT	ADJUST. POINT	DETAIL
25	Play	TRKG: C/L TANG: O/L	TP3-2, TP3-3	VR406	<p>SPDL LOOP OFFSET/VSOP</p> <p>Connect TP3-1 to GND. Adjust VR406 so that the center of the leading edge of PB H including jitter (at TP3-2) is aligned with the leading edge of REF H (at TP3-3). After about 30 seconds, make sure that a phase difference between PB H and REF H is less than $\pm 2\mu$seconds. If it is greater, then adjust VR406 again. Disconnect TP3-1 from GND, and make sure that there is no red streak or other color distortion in the picture.</p>
26	Play	TRKG: C/L TANG: C/L	Audio out	VR1, VR2	<p>AUDIO OUTPUT LEVEL/JCAB</p> <p>While playing from Frame no. 25,201 to no. 26,100, adjust VR1 so that the CH1/L audio signal level at Audio out put terminal with terminated into $51\text{ k}\Omega$ comes $490\pm 60\text{ Vrms}$. While playing from Frame no. 26,101 to no. 27,000, adjust VR2 so that the CH2/R level comes $490\pm 60\text{ Vrms}$.</p>

4. SCHEMATIC DIAGRAMS, PCB PATTERNS AND PARTS LISTS

ELECTRICAL PARTS LIST

	<u>Mk.</u>	<u>Parts No.</u>	<u>Description</u>	
CIRCUIT BOARDS		VWR-044	SYPS	
		VWR-045	LSPS	
		▼ VWR-035	LSFB	
		▼ VWM-002	MCNB	
		VWR-038	DRVB	
		VWV-042	RFAM	
		VWV-043	JCAB	
		VWS-040	VSOP	
		VWV-028	CPCB	
		VWG-097	CONT	
		▼ VWG-098	KEYC	
		▼ VWG-099	SIZD	
		▼ VWG-100	DIOB	
	OTHERS		VTT-034	Power transformer
			VXM-029	Spindle motor
			VXM-030	Slider motor
		VXP-005	Plunger	
		VGX-043	Slider assembly	
		VSA-006	SW1 Power switch	
		VSF-006	SW2 Interlock switch	
		VSF-007	SW3 Lid switch	
		SM1A-02	D1	
		RD1/4PM271J	R1	
		VCS-005	Potentiometer	
		VCG-011	C1	
		VCG-013	C2	
		VCG-005	C3	
		VDG-016	Power cord	

Note: ▼ marked parts are not supplied
as service parts.

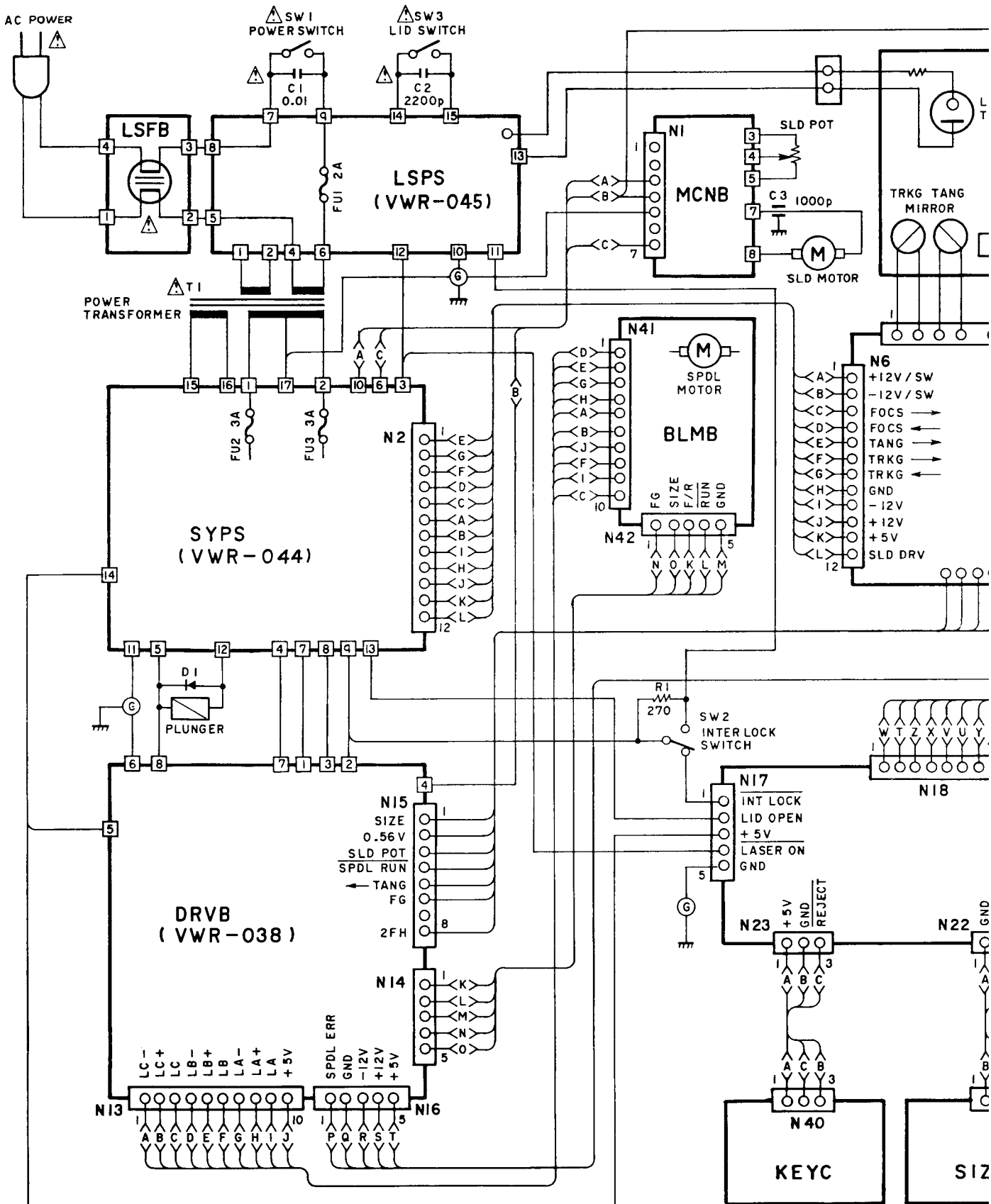
4-1. OVERALL

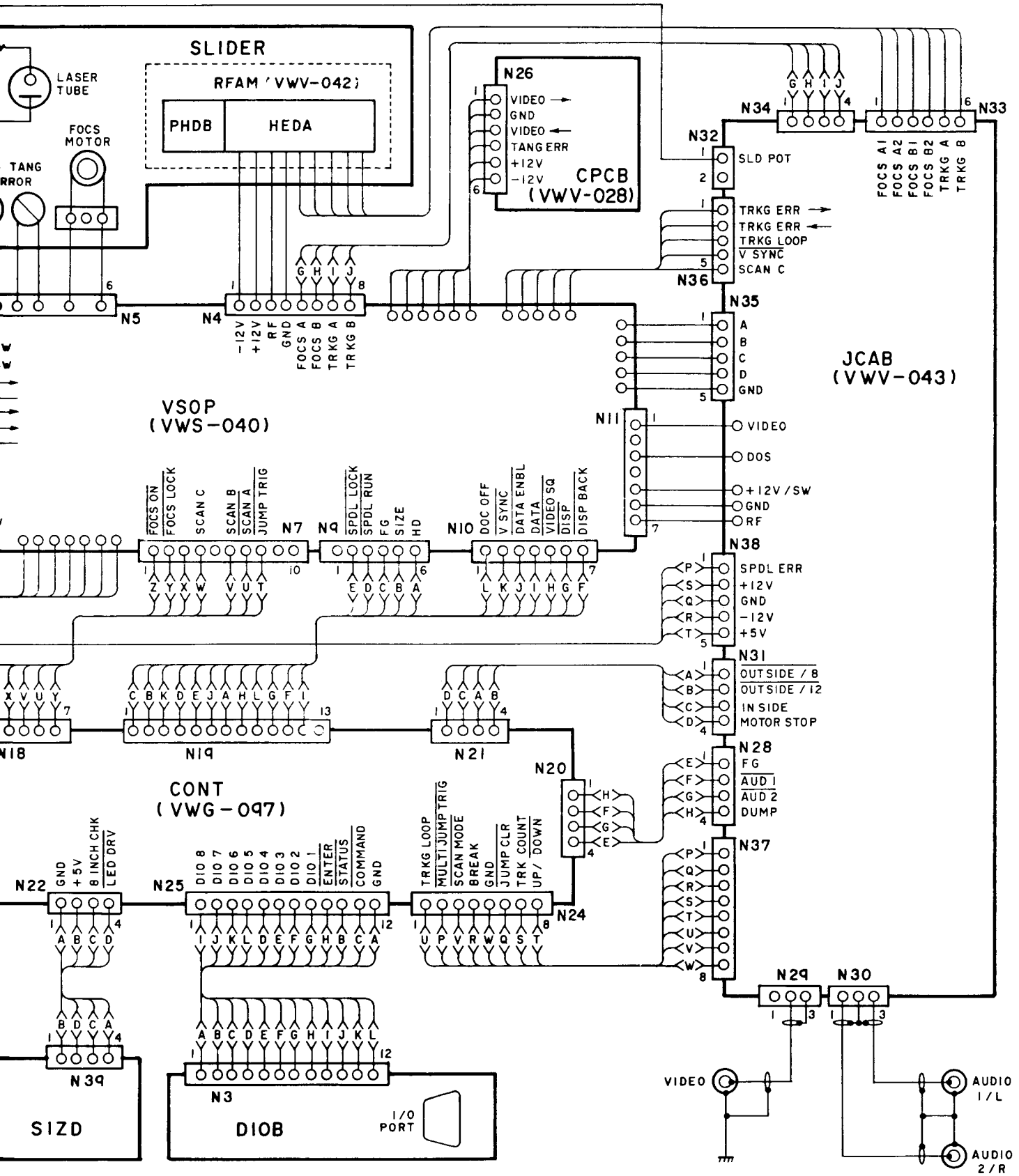
A

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A

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D

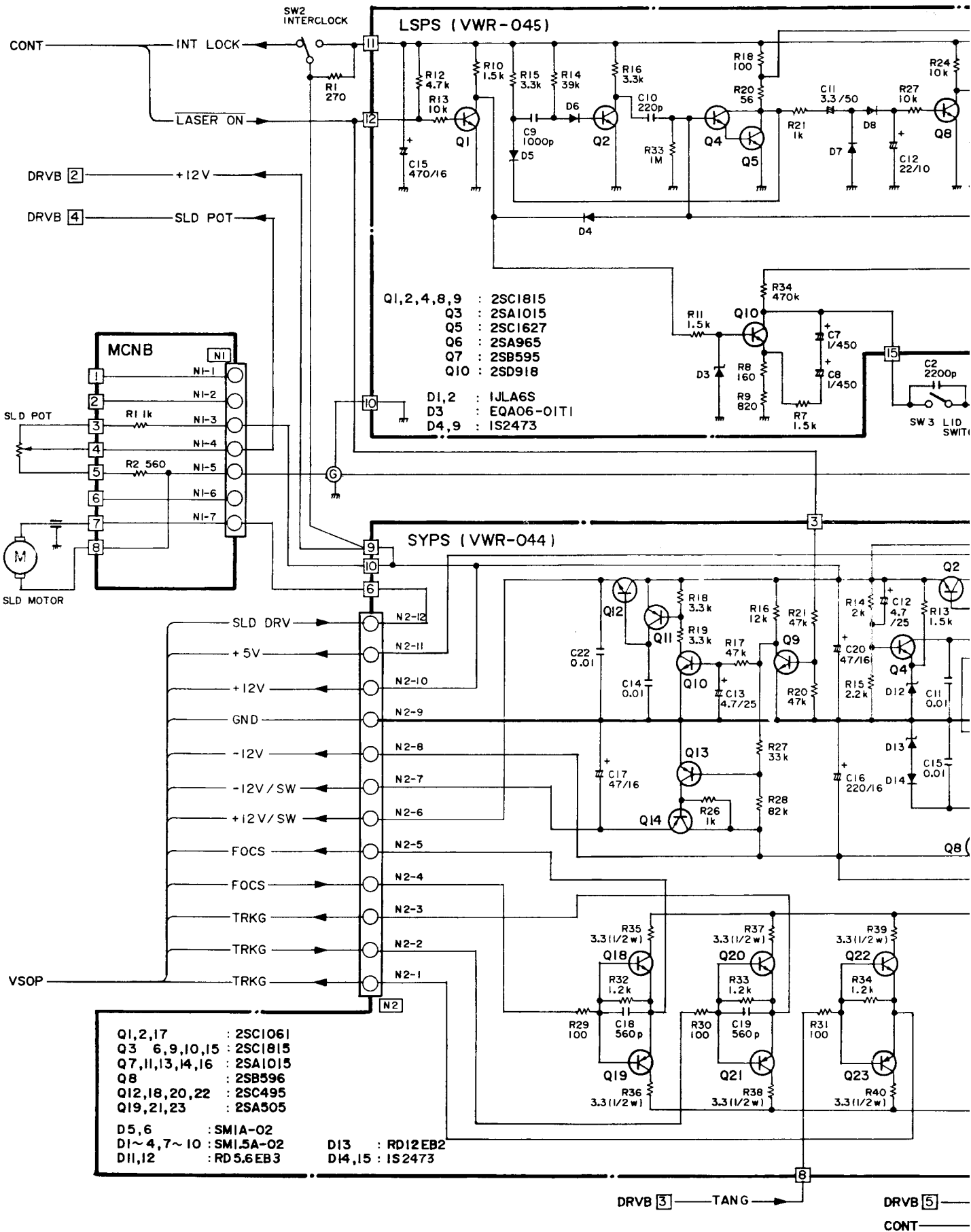
4.2. SYPS, LSPS, LSFB AND MCNB

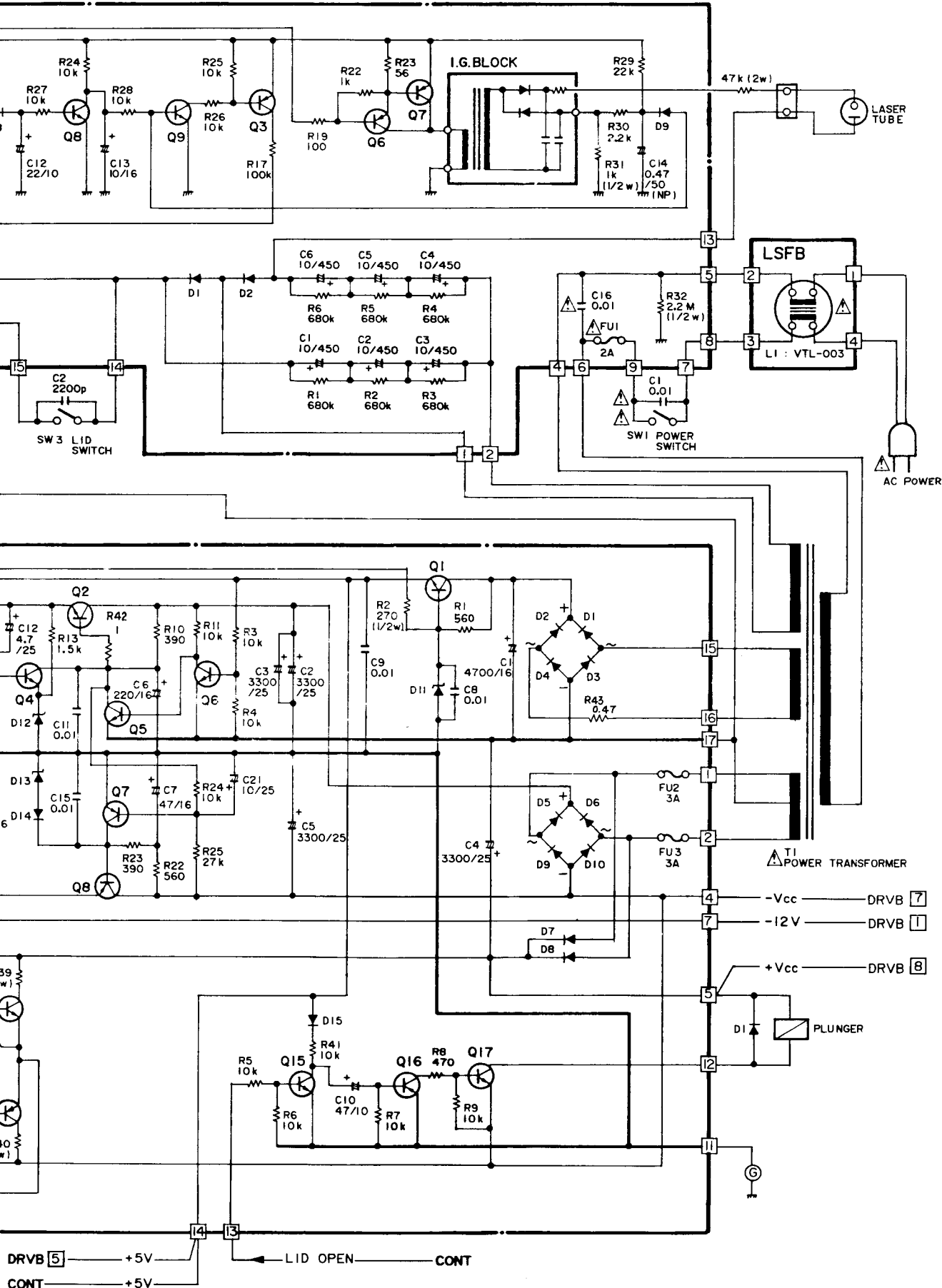
A

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D





A

B

C

D

SYPS(VWR-044) Parts list 1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
2SC1061-B/C	Q 1, 2, 17
2SC1815-Y	Q 4
2SC1815-0/Y/GR	Q 5, 6, 9, 10, 15
(2SC2320-E/F)	
(2SC2603-E/F)	
2SA1015-0/Y	Q 7, 11, 13, 14, 16
2SB596-0/Y	Q 8
2SC495-0/Y	Q 12, 18, 20, 22
2SA505-0/Y	Q 19, 21, 23
SM1.5A-02	D 1- 4, 7- 10
SM1A-02	D 5, 6
RD5.6EB3	D 11, 12
(XZ-057)	
RD12EB2	D 13
1S2473	D 14, 15
RD1/4PM000J	R 1, 3- 11, 13, 16- 34, 41- 43
RD1/2VS271J	R 2
RN1/4PR0000F	R 14, 15
RD1/2VS3R3J	R 35- 40
VCN-116	R 43
CEA472M16	C 1
VCH-009	C 2- 5
	3300/25
CEA221M16	C 6, 16
CEA470M16	C 7, 17, 20
CKDYF103Z50	C 8, 9, 11, 14, 15, 22
CEA470M10	C 10
CEA4R7M25	C 12, 13
CKDYB561K50	C 18, 19
CEA100M25	C 21
VEK-006	FU 2, 3 Fuse 3A
VEC-028	Spacer
VEC-072	Insulator/mica
VEC-101	Insulator/silicon
VBA-003	Screw
VKR-001	Fuse holder

LSFB(VWR-035) Parts list 1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
VTL-003	L 1 Line filter
(VTL-004)	

LSPS(VWR-045) Parts list 1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
2SC1815-0/Y/GR	Q 1, 2, 8, 9
(2SC2320-E/F)	
(2SC2603-E/F)	
2SA1015-0/Y/GR	Q 3
2SC1815-0/Y	Q 4
2SC1627-0/Y	Q 5
2SA965-0/Y	Q 6
2SB595-0/Y	Q 7
2SD818	Q 10
GHV-03Z	D 1, 2
(GHV-03SSN)	
(1JLA6S)	
EQA01-06TI	D 3
1S2473	D 4- 9
RD1/4PM000J	R 1- 8, 10- 30, 33, 34
RN1/4PR8200F	R 9
RD1/2VS102J	R 31
VCH-003	C 1- 6
	10/450
VCH-010	C 7, 8
	1/450
CKDYB102K50	C 9
CCDSL221J50	C 10
CEA3R3M50	C 11
CEA220M10	C 12
CEA100M16	C 13
CEAR47M50NP	C 14
CEA471M16	C 15
VCG-011	C 16
	0.01uF
VEK-004	FU 1 Fuse 2A
VKR-001	Fuse holder
VDA-022	H.V. cord
VKN-049	H.V. cap
VCA-004	I.G. block

MCNB(VWM-002) Parts list 1

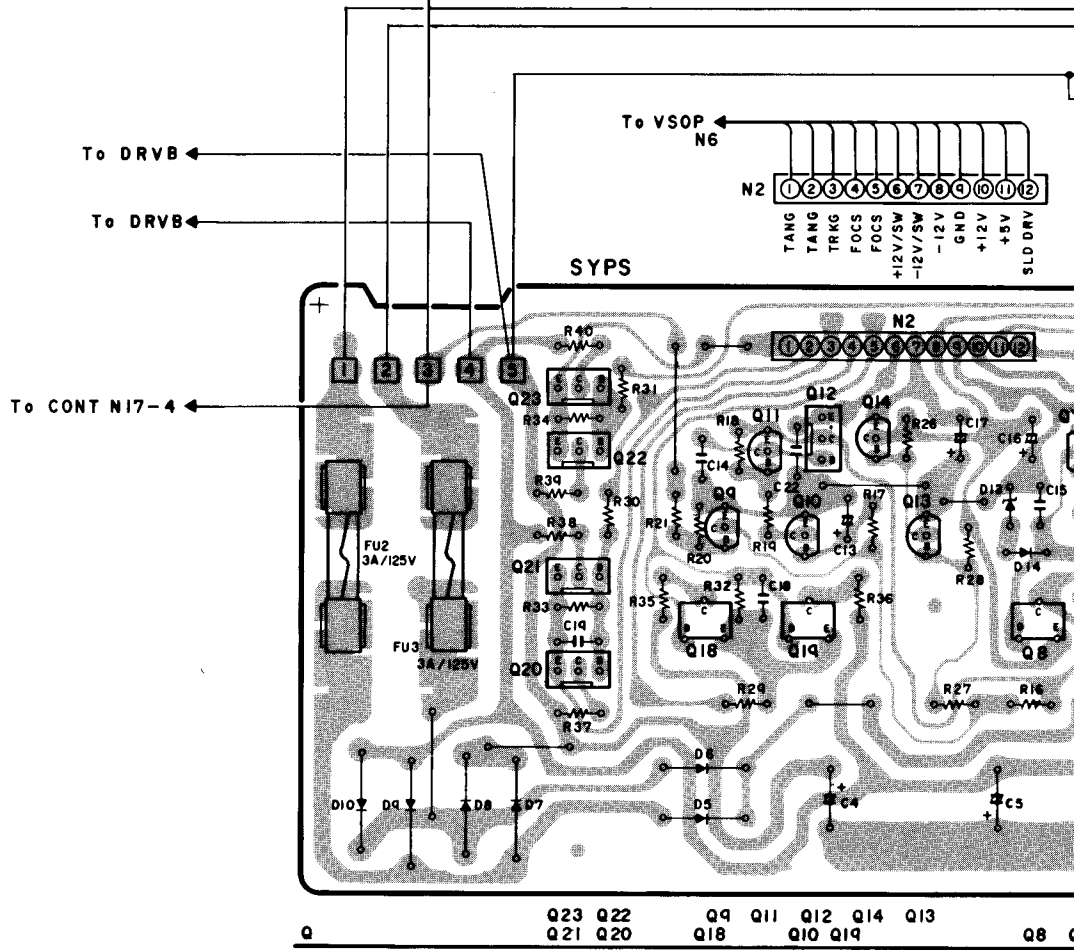
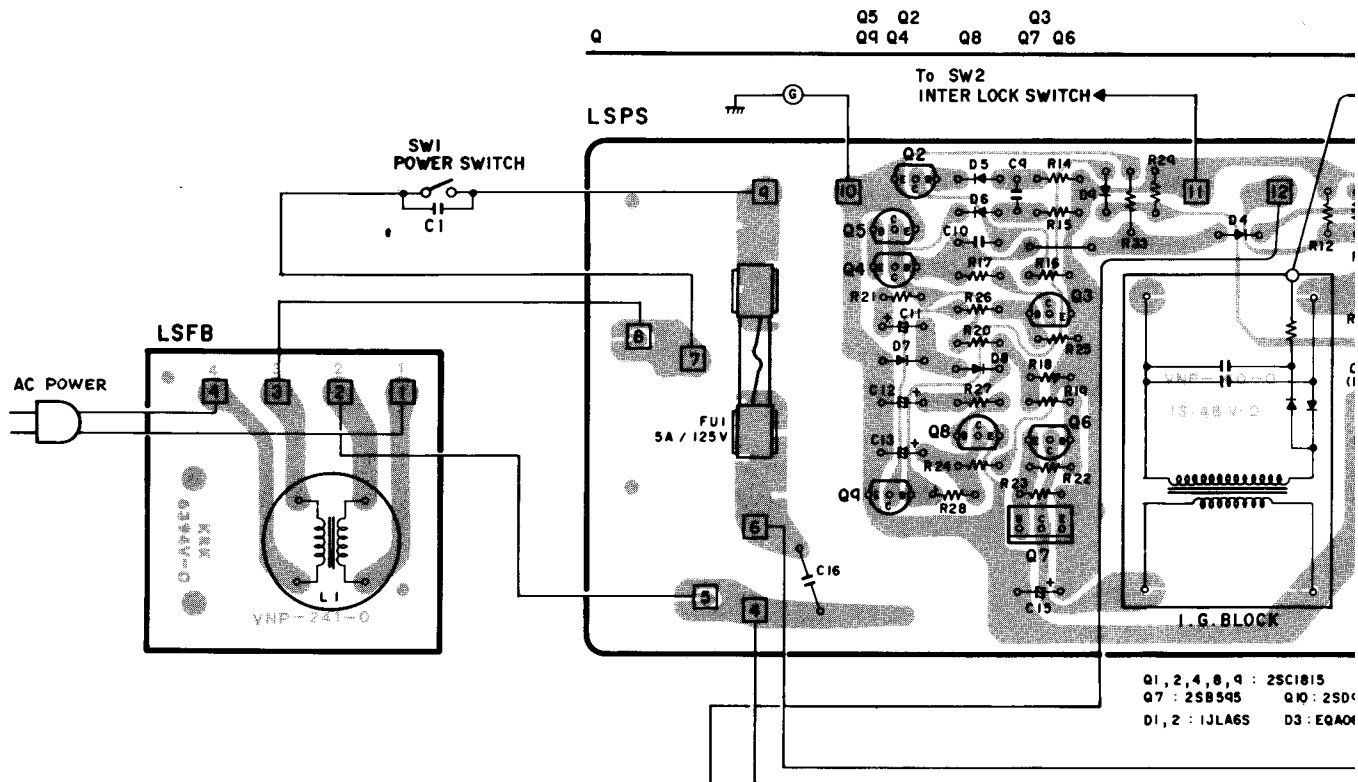
(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
RD1/4PM000J	R 1, 2

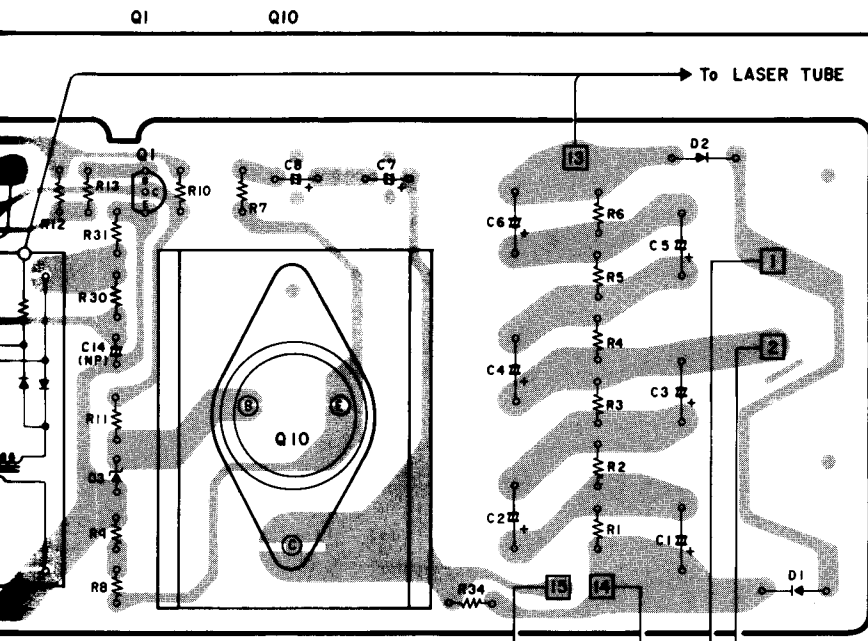
A

B

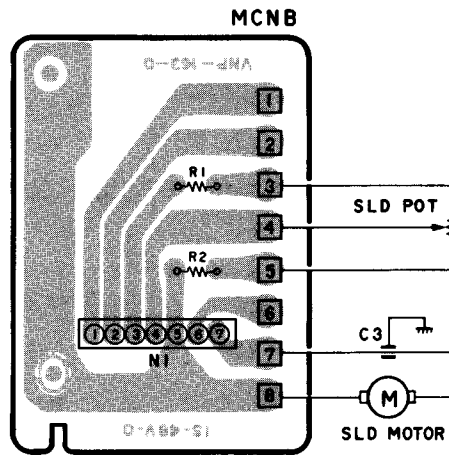
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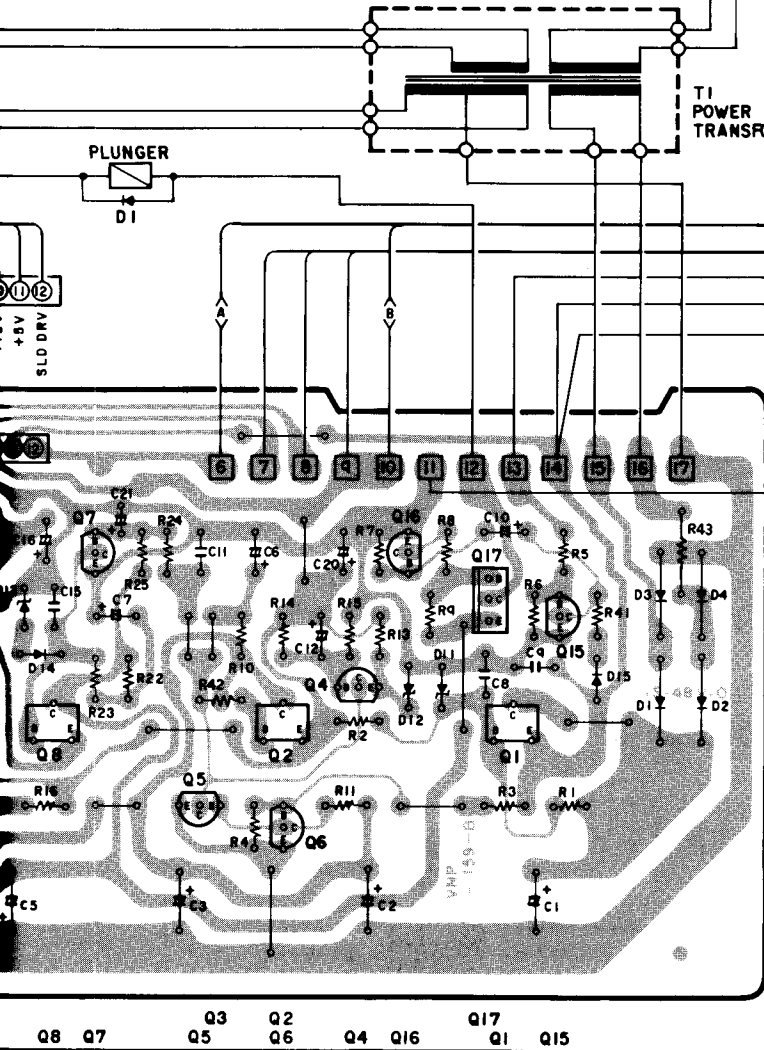
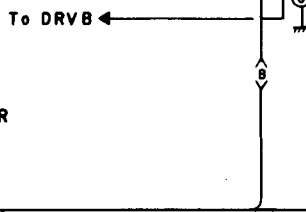


Q3 : 2SA1015 Q5 : 2SC1627 Q6 : 2SA465
 Q10 : 2SD418
 D3 : EGA06-01T1 D4,4 : IS2473



SW3 LID SWITCH

T1 POWER TRANSFORMER



Q1, 2, 17 : 2SC1061
 Q3~6, 9, 10, 15 : 2SC1815
 Q7, 11, 13, 14, 16 : 2SA1015
 Q8 : 2SB546
 Q12, 18, 20, 22 : 2SC445
 Q19, 21, 23 : 2SA505

D1~4, 7~10 : SM1.5A-02
 D5, 6 : SM1A-02
 D11, 12 : RD5.6E83
 D13 : RD12E82
 D14, 15 : IS2473

Q8 Q7 Q3 Q2 Q4 Q16 Q17 Q1 Q15

A

B

C

D

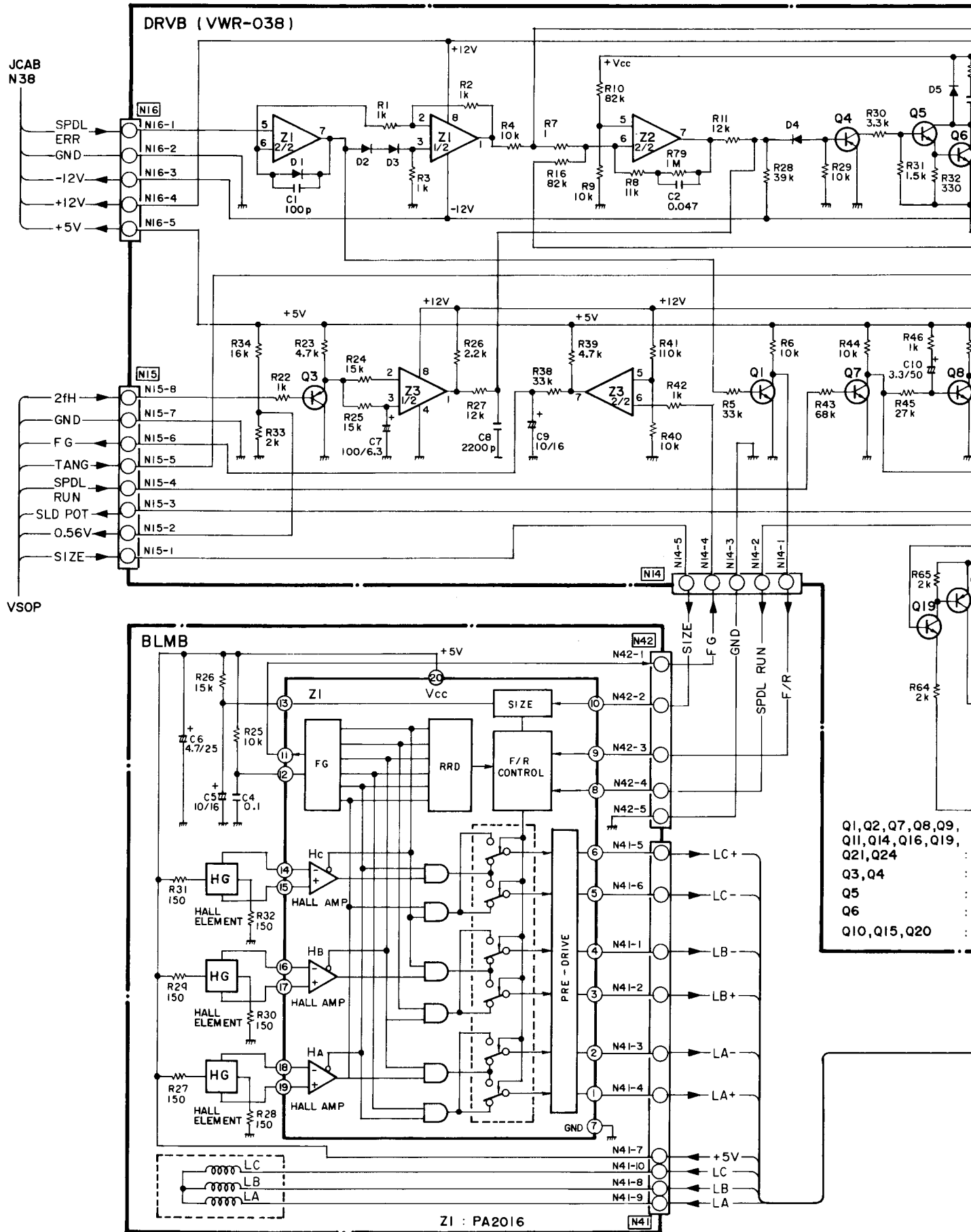
4.3. DRV B

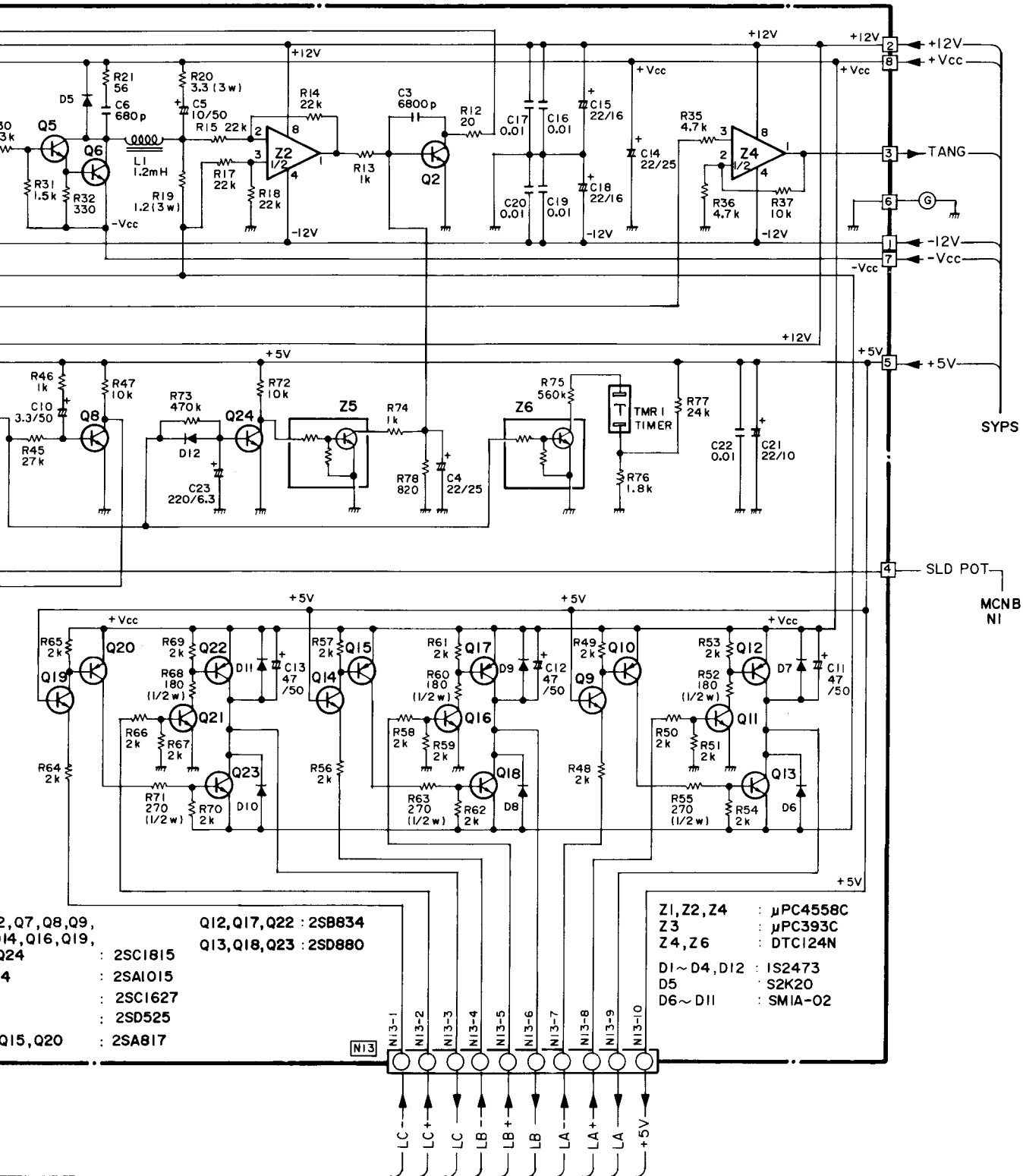
A

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A

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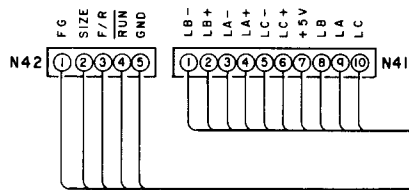
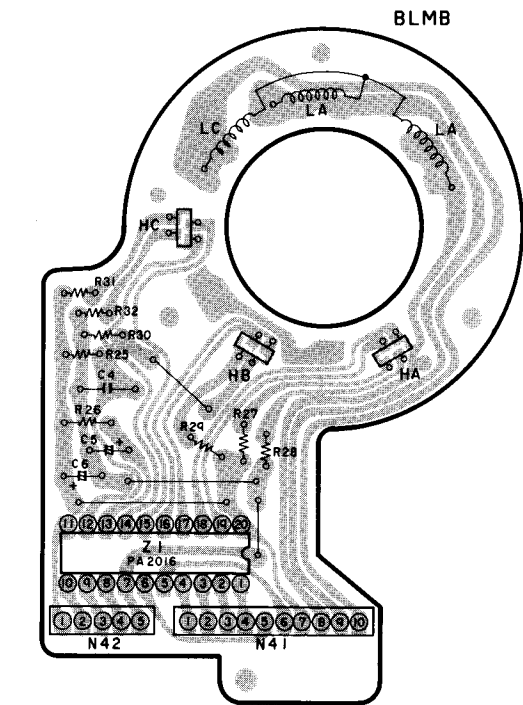
D

A

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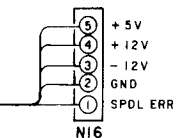
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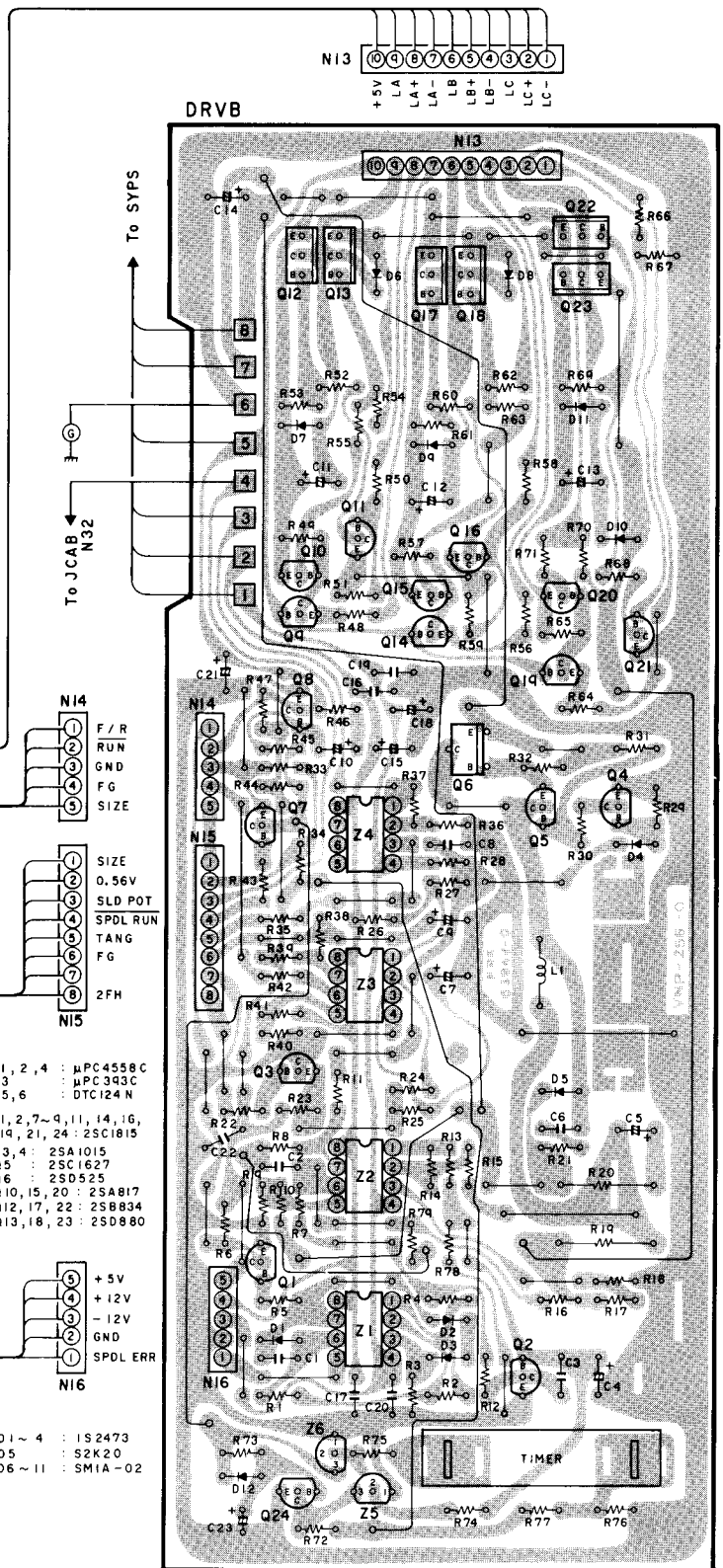
To VSOP ←

- Z1, 2, 4 : MPC4558C
- Z3 : MPC343C
- Z5, 6 : DTC124N
- Q1, 2, 7~9, 11, 14, 16, 19, 21, 24 : 2SC1815
- Q3, 4 : 2SA1015
- Q5 : 2SC1627
- Q6 : 2SD0525
- Q10, 15, 20 : 2SA817
- Q12, 17, 22 : 2SB834
- Q13, 18, 23 : 2SD880

To JCAB N38 ←



- D1 ~ 4 : 1S2473
- D5 : S2K20
- D6 ~ 11 : SM1A-02



- Z, Q
- Q22
- Q12 Q13
- Q23
- Q17 Q18
- Q11
- Q16
- Q10
- Q15 Q20
- Q9
- Q14 Q21
- Q19
- Q8
- Q6
- Q5 Q4
- Q7
- Z4
- Z3
- Q3
- Z2
- Q1
- Z1
- Q2
- Z6
- Q24 Z5

DRVB(VWR-038) Parts list

1

(MK)(Part No.) (IT)(REF Nos. & DESCRIPTIONS)

UPC4558C (NJM4558D)	Z	1, 2, 4	
UPC393C (LM393P)	Z	3	
DTC124N	Z	5, 6	
2SC1815-Y/GR	Q	1, 2, 7- 9, 11, 14, 16, 19, 21	
2SA1015-Y/GR	Q	3, 4	
2SC1627-O/Y	Q	5	
2SD525-O/Y	Q	6	
2SA817-O/Y	Q	10, 15, 20	
2SB834-Y/GR	Q	12, 17, 22	
2SD880-Y/GR	Q	13, 18, 23	
2SC1815-GR	Q	24	
1S2473	D	1- 4, 12	
S2K20	D	5	
SM1A-02	D	6- 11	
RD1/4PM000J	R	1- 13, 16, 21- 32, 35- 51, 53, 54, 56- 59, 61, 62, 64- 67, 69, 70, 72- 77, 79	
RN1/4PR2202F	R	14, 15, 17, 18	
VCN-092	R	19 1.2/3W	
VCN-098	R	20 3.3/3W	
RD1/2VS000J	R	52, 55, 60, 63, 68, 71	
CCDSL101J50	C	1	
CQMA473J50	C	2	
CKDYB682K50	C	3	
CEA220M25	C	4, 14	
CEA100M50	C	5	
CKDYB681K50	C	6	
CEA101M6R3	C	7	
CQMA222J50	C	8	
CEA100M16	C	9	
CEA3R3M50	C	10	
CEA470M50	C	11- 13	
CEA220M16	C	15, 18	
CKDYF103Z50	C	16, 17, 19, 20, 22	
CEA220M10	C	21	
CEA221M6R3	C	23	
VTT-021	L	1 1.2mH	
VKR-001		Fuse holder	
VEC-028		Spacer	
VEC-101		Isolater	
VBA-003		Screw	

A

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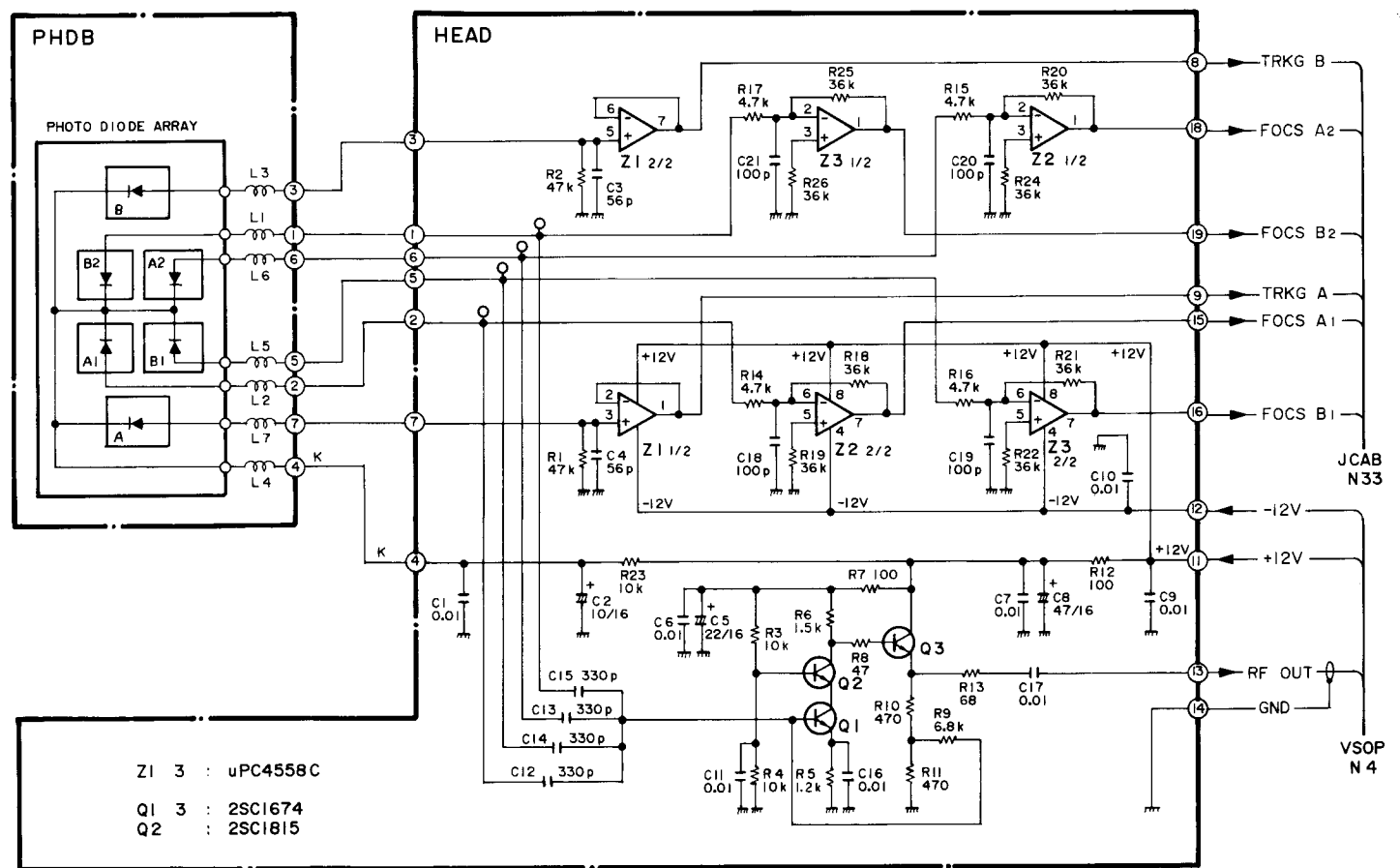
4.4. RFAM

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RFAM(VWV-042) Parts list

1

PHI

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
UPC4558C	Z 1- 3
2SC1674-L/K (2SC2786-L/K)	Q 1, 3
2SC1815-Y	Q 2
RD1/4PM000J	R 1- 17, 19, 22- 24, 26
RN1/4PR3602F	R 18, 20, 21, 25
CKDYF103Z50	C 1, 6, 7, 9- 11, 16, 17
CEA100M16	C 2
CCDSL560J50	C 3, 4
CEA220M16	C 5
CEA470M16	C 8
CCDSL331K50	C 12- 15
CCDSL101J50	C 18- 21
VTF-011	L 1- 7
VKP-315	Conn.cords
VKP-314	Conn.cords

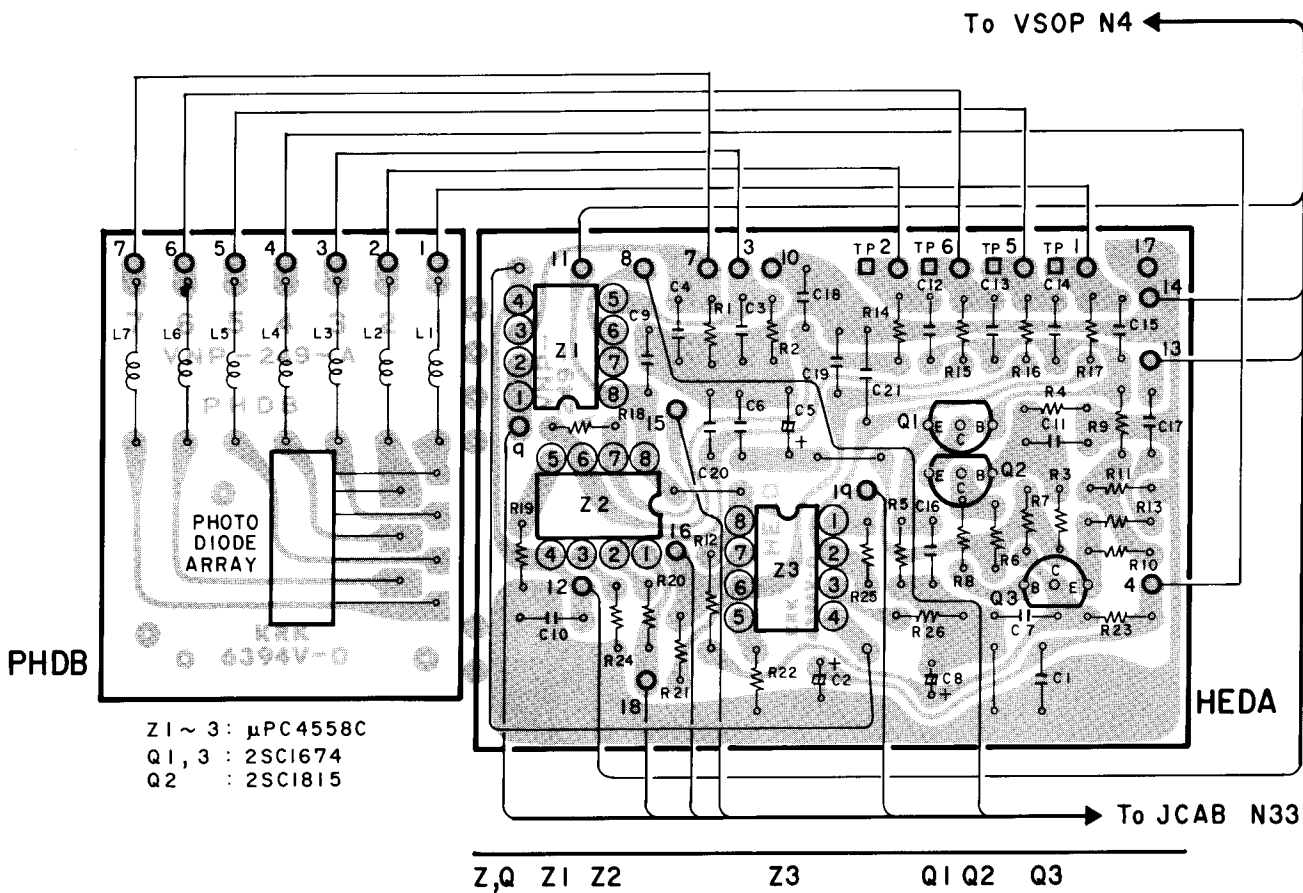
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A1
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JCAB
N33
VSOP
N4

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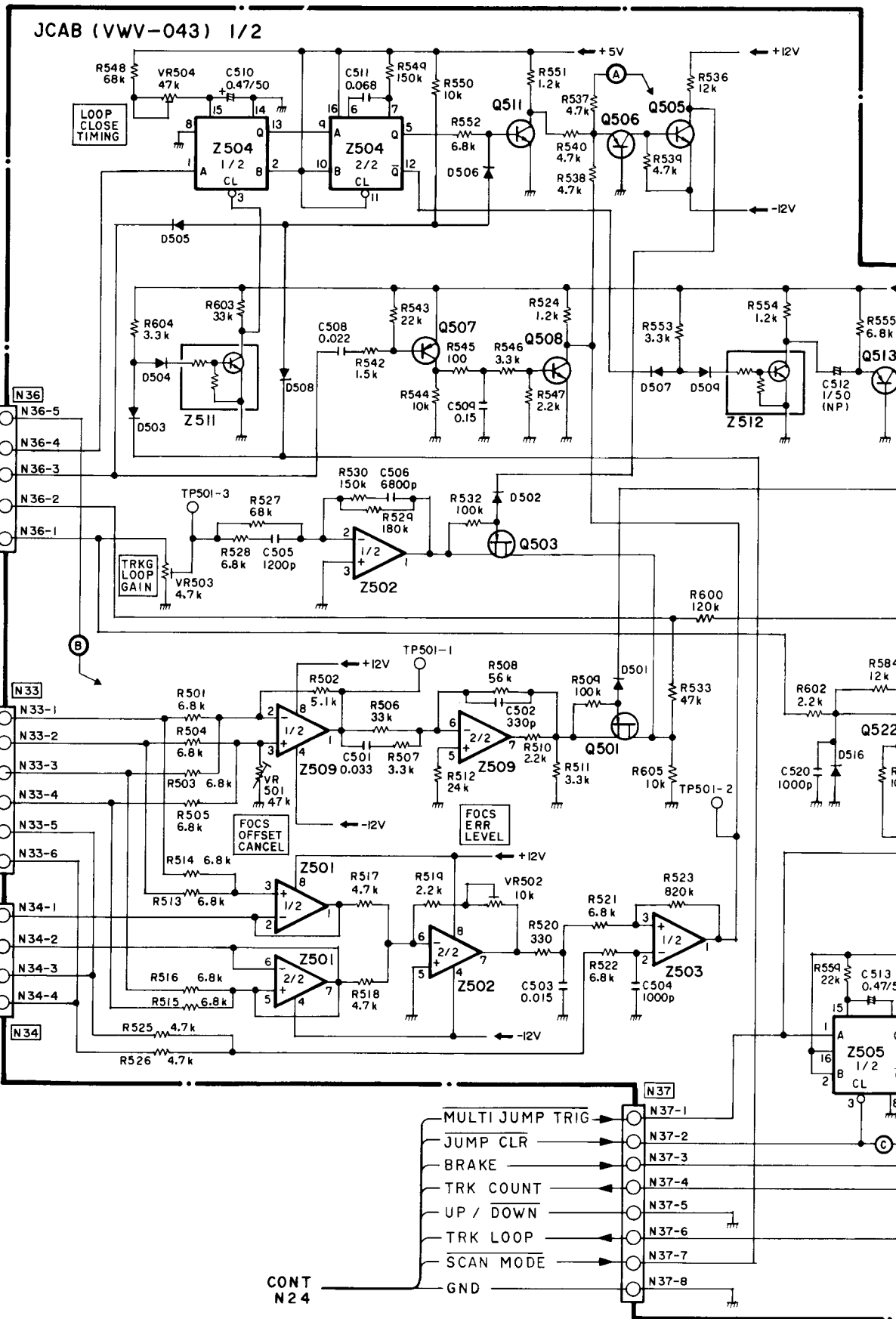


4-5. JCAB

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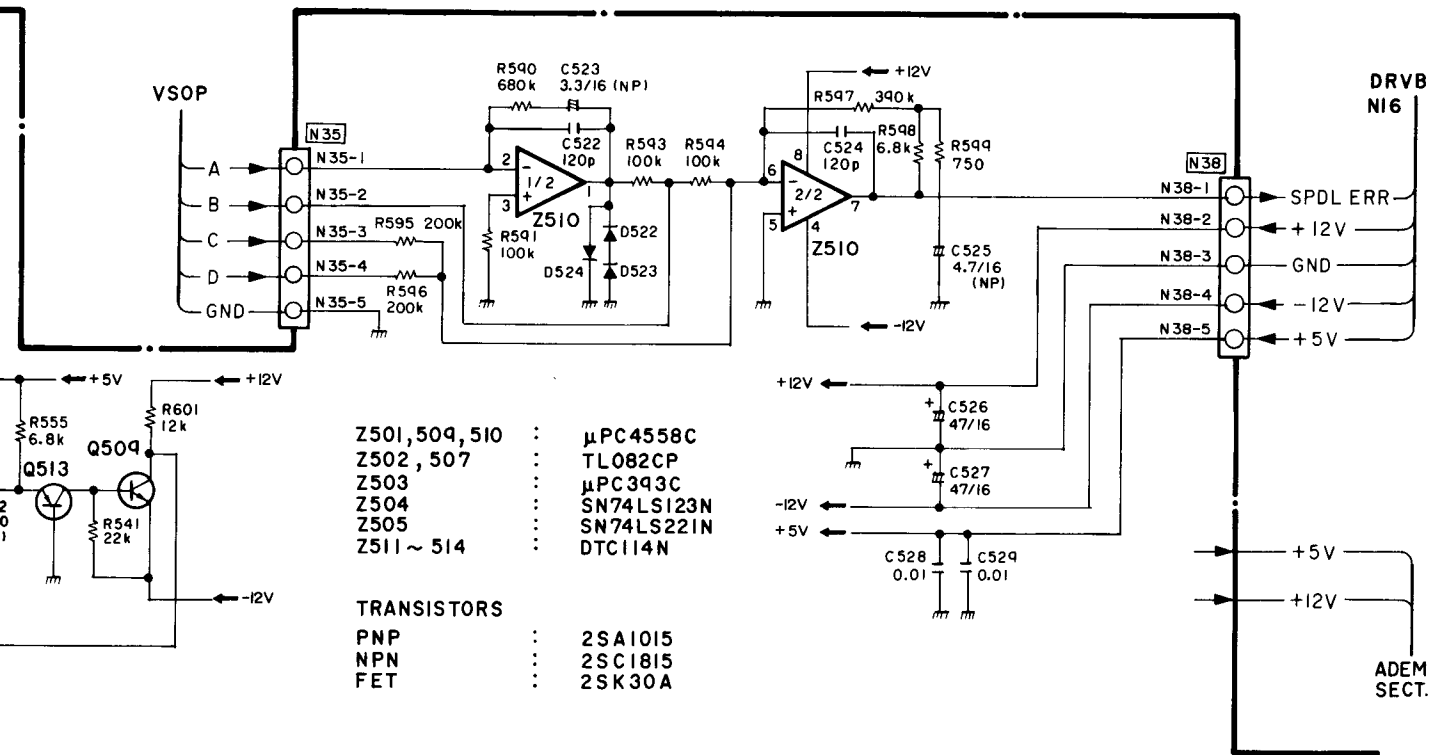
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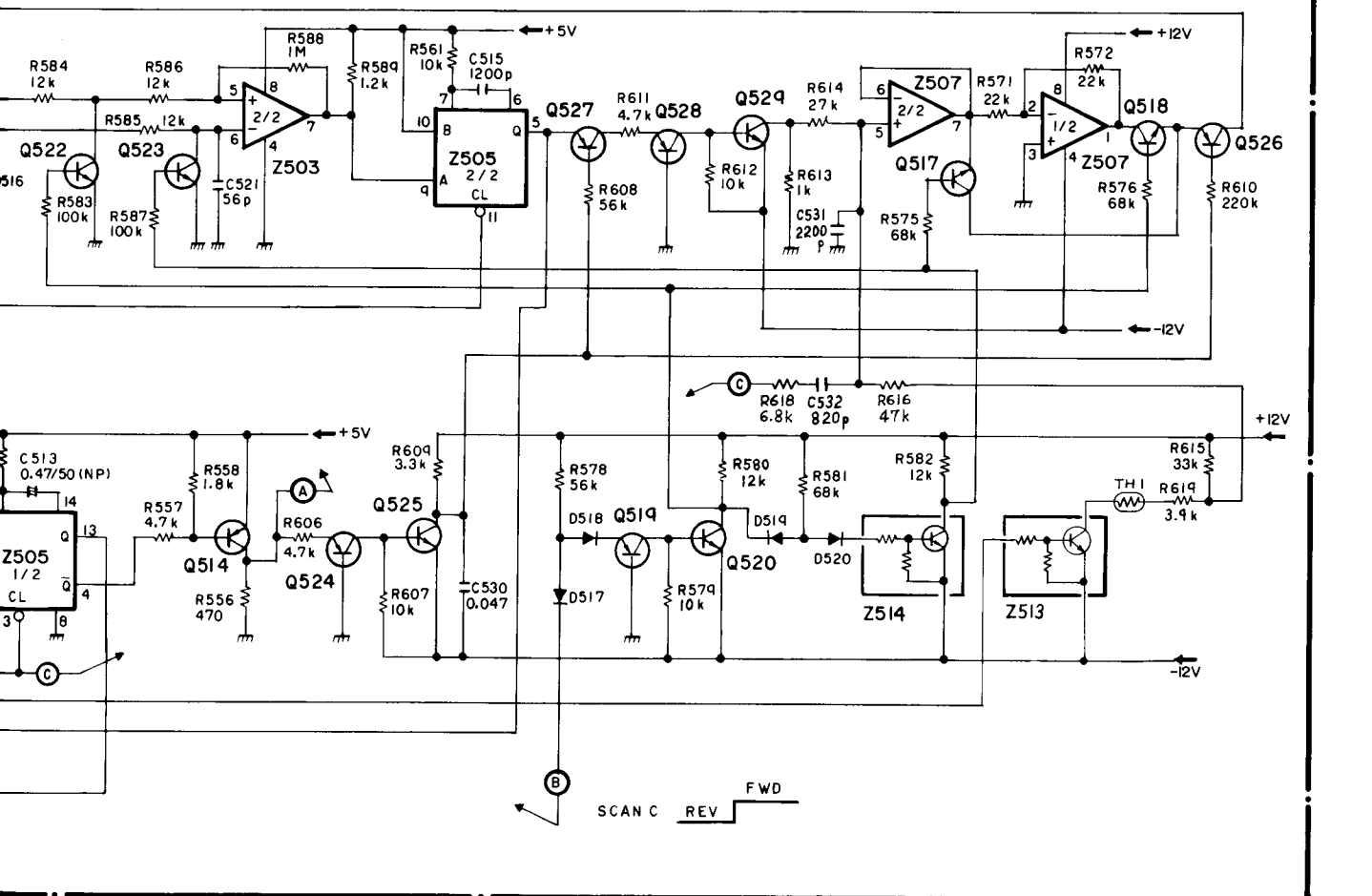
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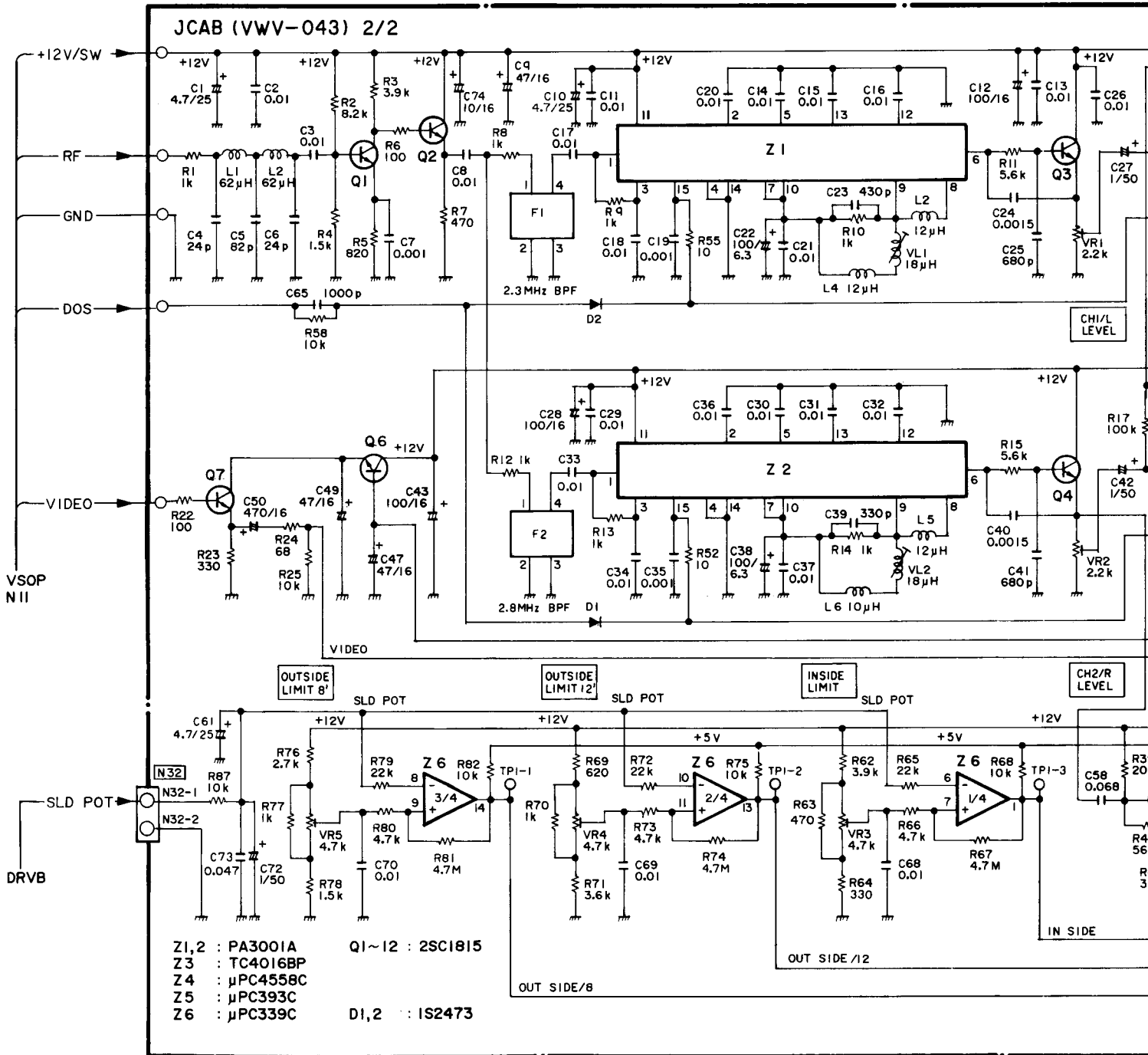
D

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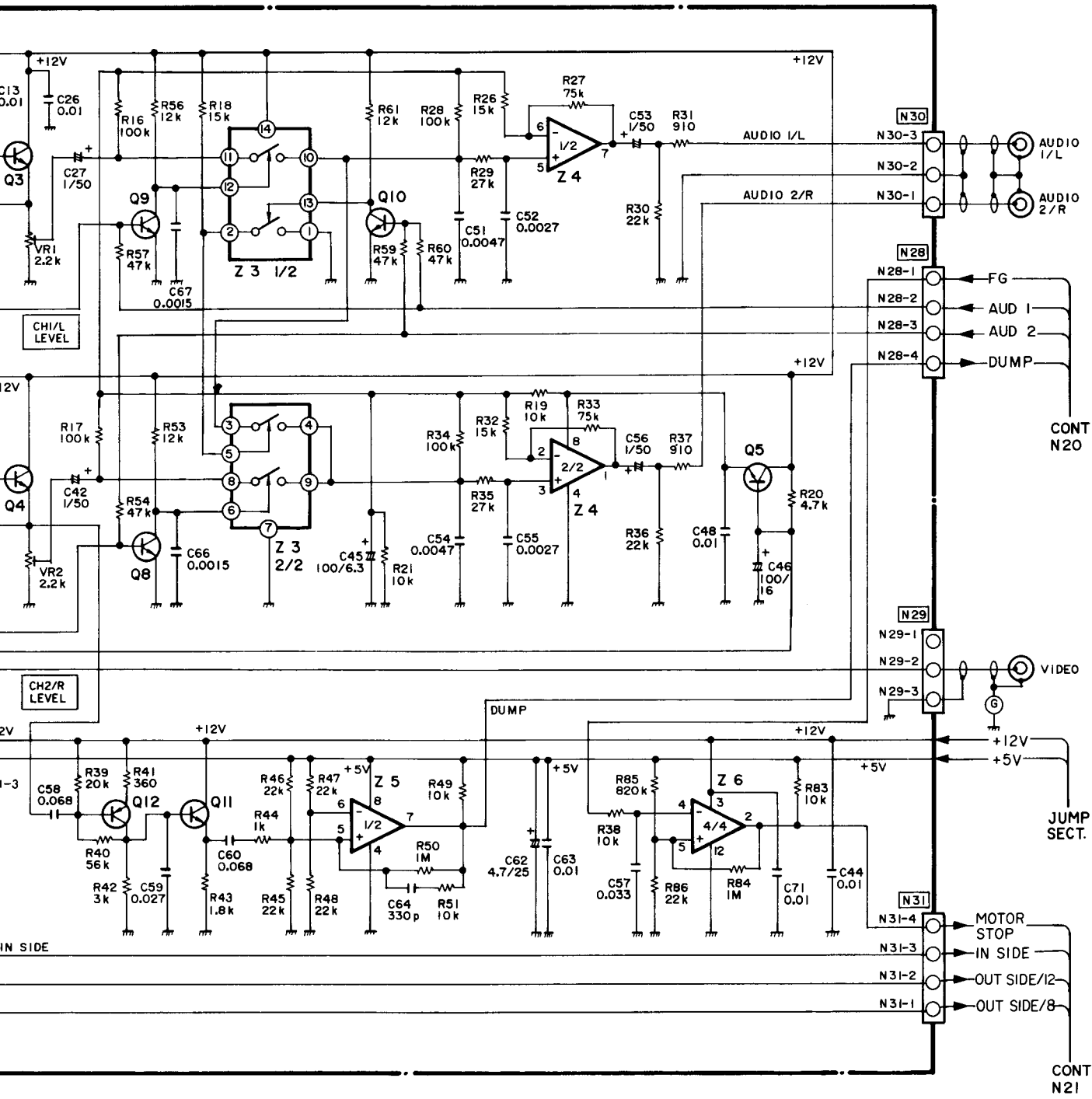


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JCAB(VWV-043) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
PA3001A	Z 1, 2
TC4016BP	Z 3
UPC4558C (NJM4558D)	Z 4, 501, 509, 510
UPC393C	Z 5, 503
UPC339C	Z 6
TL082CP	Z 502, 507
SN74LS123N (HD74LS123P) (HD74LS221P)	Z 504
SN74LS221N DTC114F	Z 505 Z 511-514
2SC1815-Y/GR	Q 1- 3, 7, 525, 529
2SC1815-O/Y/GR	Q 4- 6, 8- 11, 505, 508, 509, 511, 517, 518, 520, 522, 523
2SA1015-O/Y/GR	Q 12, 506, 507, 513, 514, 519, 524, 526-528
2SK30A-Y	Q 501, 503
1S2473	D 1, 2, 501-509, 516-520, 522- 524
RD1/4PM000J	R 1- 26, 28- 30, 32, 34- 36, 38- 40, 44- 49, 51, 54, 57- 68, 70, 72- 75, 77- 83, 86, 87, 509, 517, 518, 520, 525, 526, 532, 533, 537-545, 550, 556, 557, 559, 561, 571, 572, 579, 583, 587, 591, 593, 594, 605-607, 611-616, 619
RD1/4PM000J	R 27, 31, 33, 37, 41- 43, 50, 52, 53, 55, 56, 69, 71, 76, 84, 85, 501-508, 510-512, 519, 521-524, 527-530, 536, 546-549, 551-555, 558, 575, 576, 578, 580- 582, 584-586, 588-591, 595-604, 608-610, 618
RN1/4PR6001F	R 513-516
VCP-025	VR 1, 2 2.2k
VCP-006	VR 3- 5, 503
VCP-009	VR 501, 504 4.7k 47k
CEA4R7M25	C 1, 10, 61, 62
CKDYF103Z50	C 2, 3, 8, 11, 13- 18, 20, 21, 26, 29- 34, 36, 37, 44, 48, 63, 68- 71, 528, 529
CCDCH240J50	C 4, 6
CCDCH820J50	C 5
CKDYB102K50	C 7, 19, 35, 65, 504, 520
CEA470M16	C 9, 47, 49, 526, 527
CEA101M16	C 12, 28, 43, 46
CEA101M6R3	C 22, 38, 45
CCDSL431J50	C 23
CQMA152J50	C 24, 40
CKDYB681K50	C 25, 41
CEA010M50	C 27, 42, 53, 56, 72
CCDSL331J50	C 39, 502, 518
CEA471M16	C 50
CQMA472J50	C 51, 54
CQMA272J50	C 52, 55
CKDYF333Z50	C 57
CQMA683J50	C 58, 60, 511

JCAB(VWV-043) Parts list

2

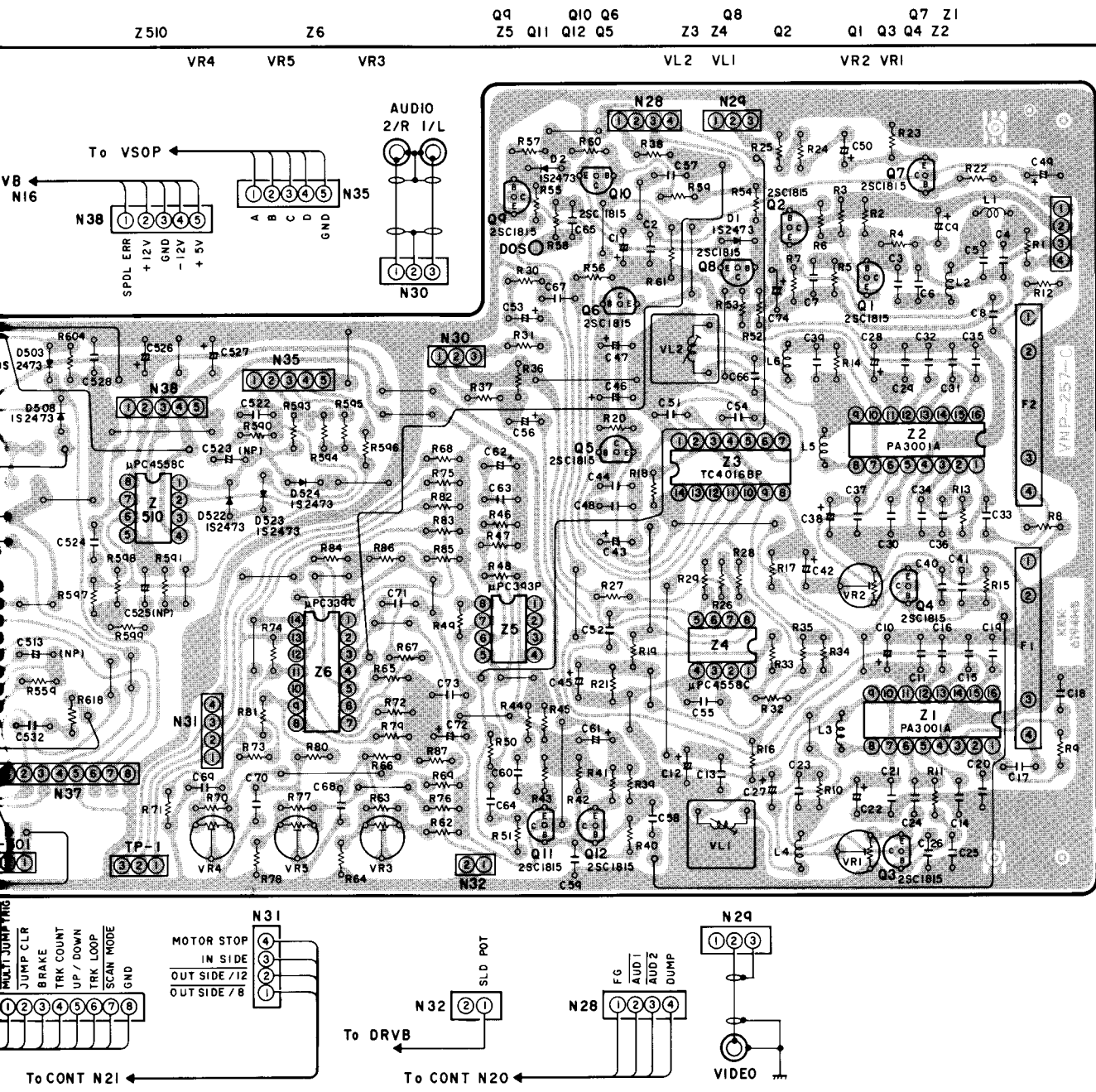
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CQMA273J50	C 59
CKDYB331K50	C 64
CKDYB152K50	C 66, 67
CKDYF473Z50	C 73
CEA100M16	C 74, 533
CQMA333J50	C 501
CQMA153J50	C 503
CQMA122J50	C 505, 515
CQMA682J50	C 506
CQMA223J50	C 508
CQMA154J50	C 509
CEAR47M50	C 510
CEA010M50NP	C 512
CEAR47M50NP	C 513
CCDSL560J50	C 521
CCDSL121J50	C 522, 524
CEA3R3M16NP	C 523
CEA4R7M16NP	C 525
CQMA473J50	C 530
CQMA222J50	C 531
CKDYB821K50	C 532
VTL-048 (VTL-068)	L 1, 2 62uH
VTL-093	L 3, 5 12uH
VTL-024 (VTL-062)	L 4 12uH
VTL-092	L 6 10uH
VTF-006 (VTF-021)	VL 1, 2 18uH
VTF-051	F 1 2.3MHz B.P.F
VTF-052	F 2 2.8MHz B.P.F
D33A	TH 1

A

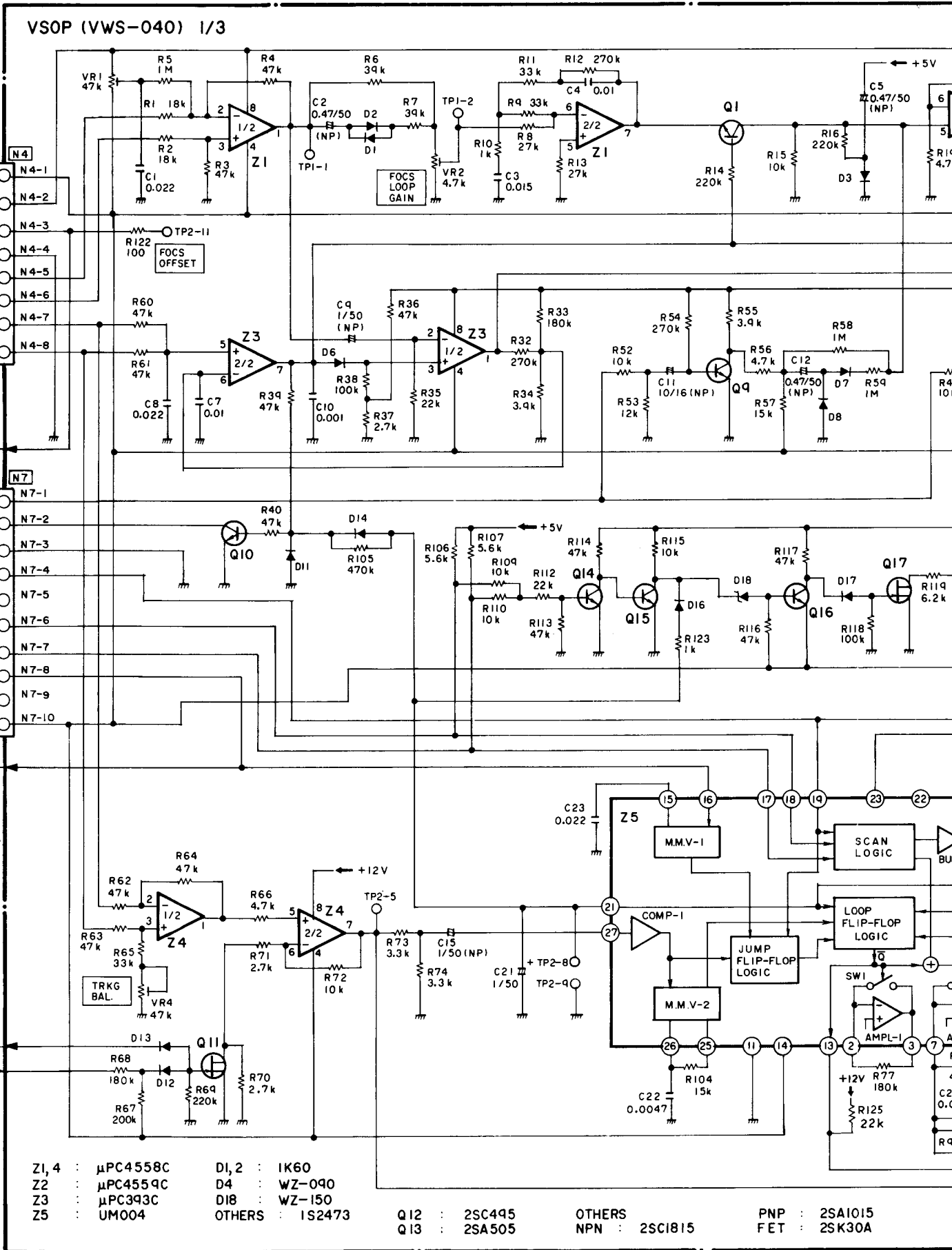
B

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4-6. VSOP AND CPCB



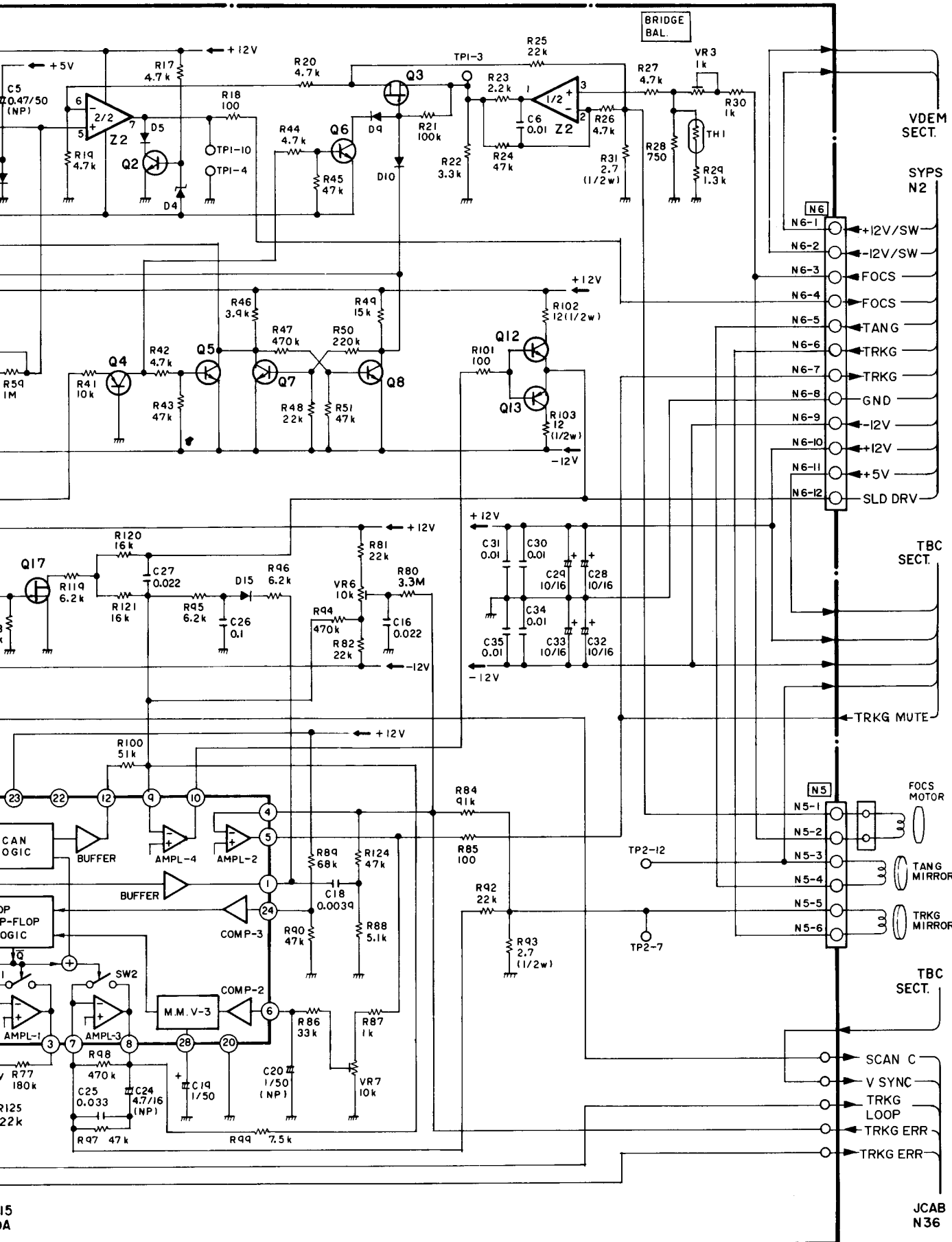
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- | | | | | |
|------------------|-----------------|--------------|------------------|---------------|
| Z1, 4 : μPC4558C | D1, 2 : 1K60 | Q12 : 2SC495 | OTHERS : 2SC1815 | PNP : 2SA1015 |
| Z2 : μPC4559C | D4 : WZ-090 | Q13 : 2SA505 | | FET : 2SK30A |
| Z3 : μPC393C | D18 : WZ-150 | | | |
| Z5 : UM004 | OTHERS : 1S2473 | | | |



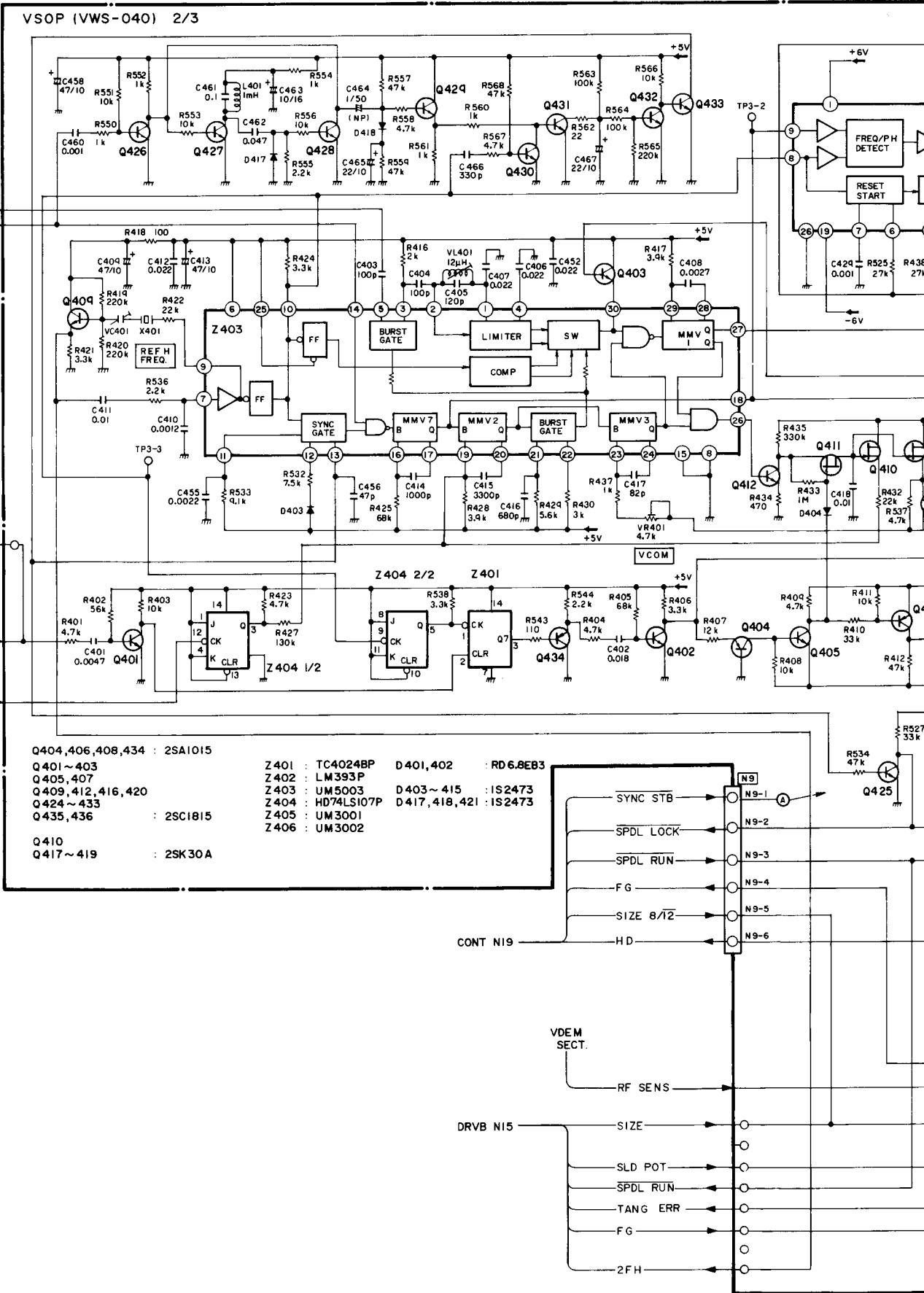
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JCAB N36

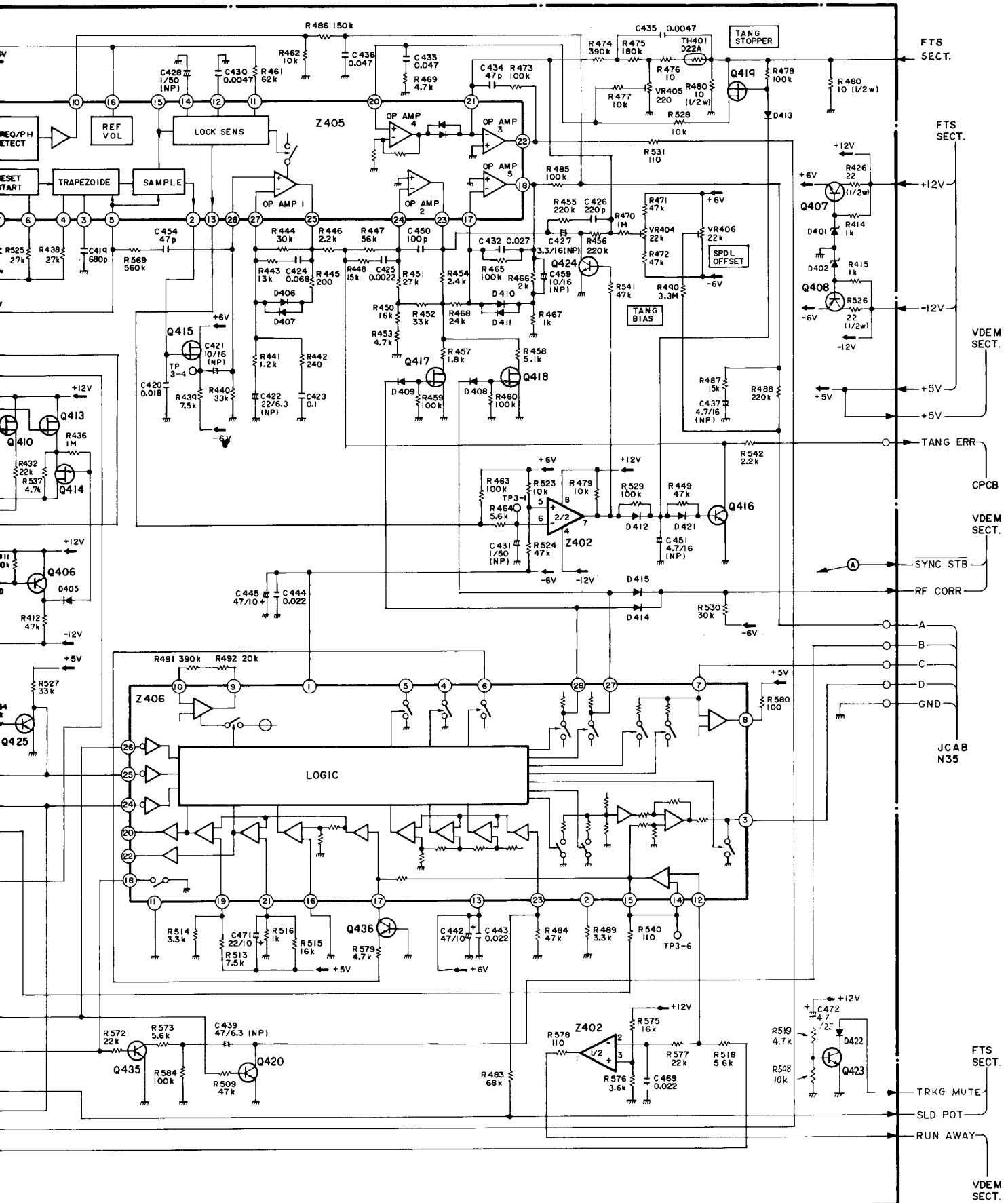


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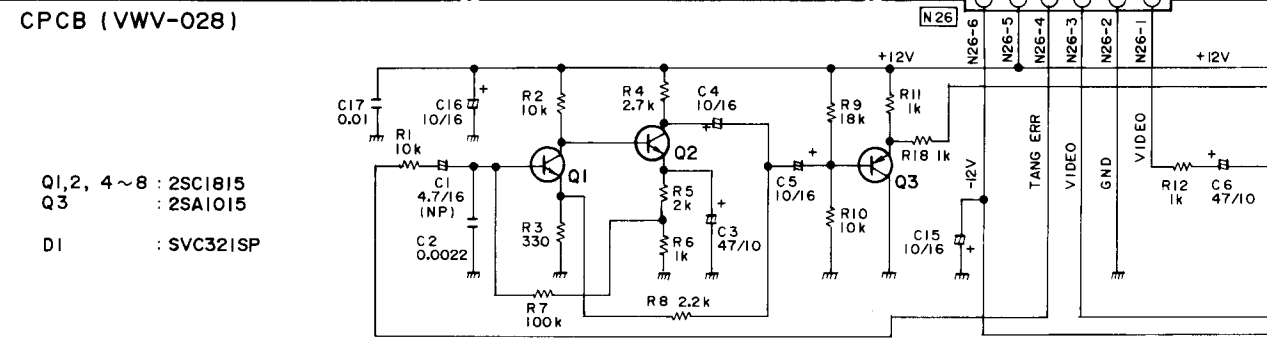
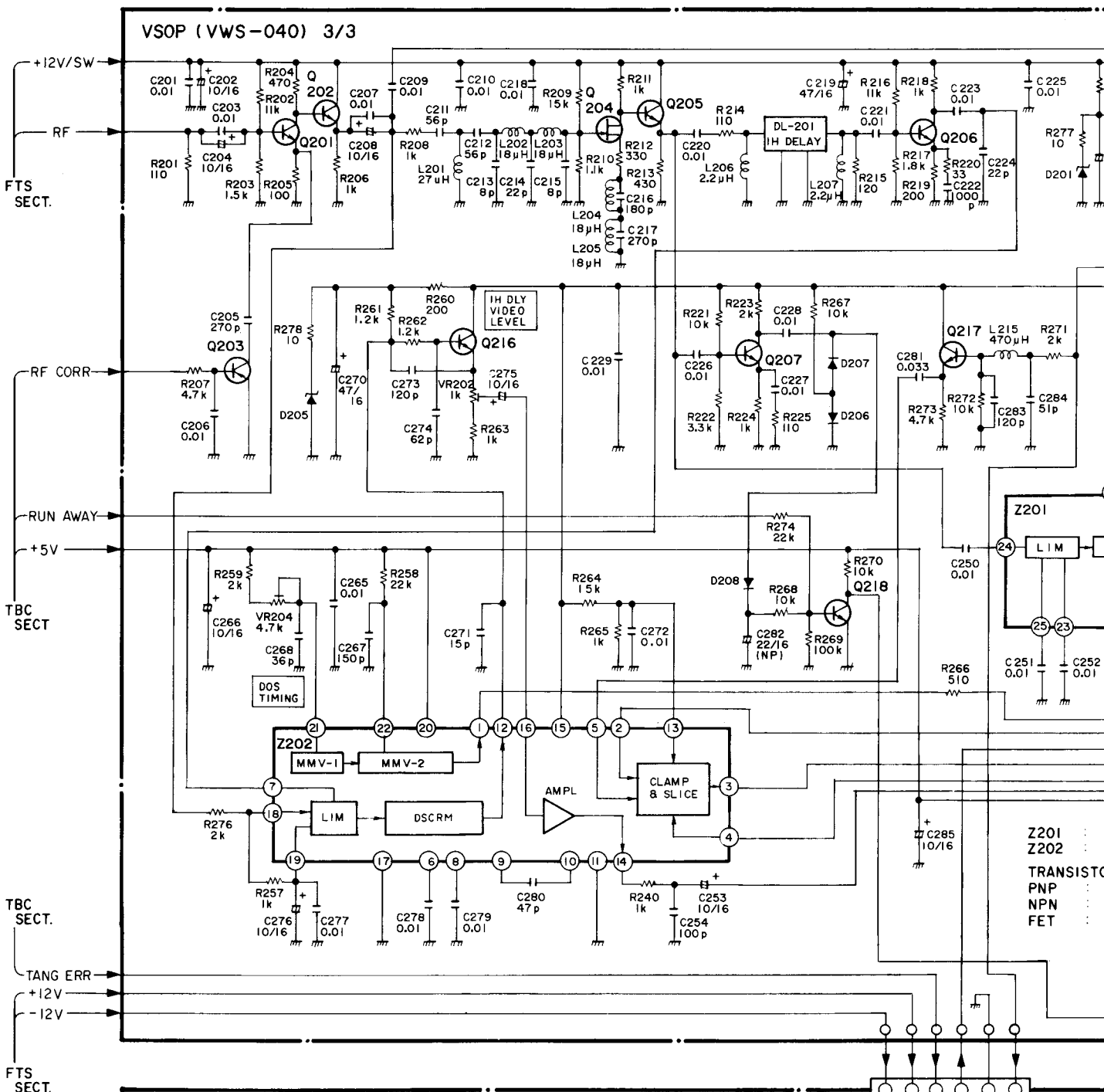
D

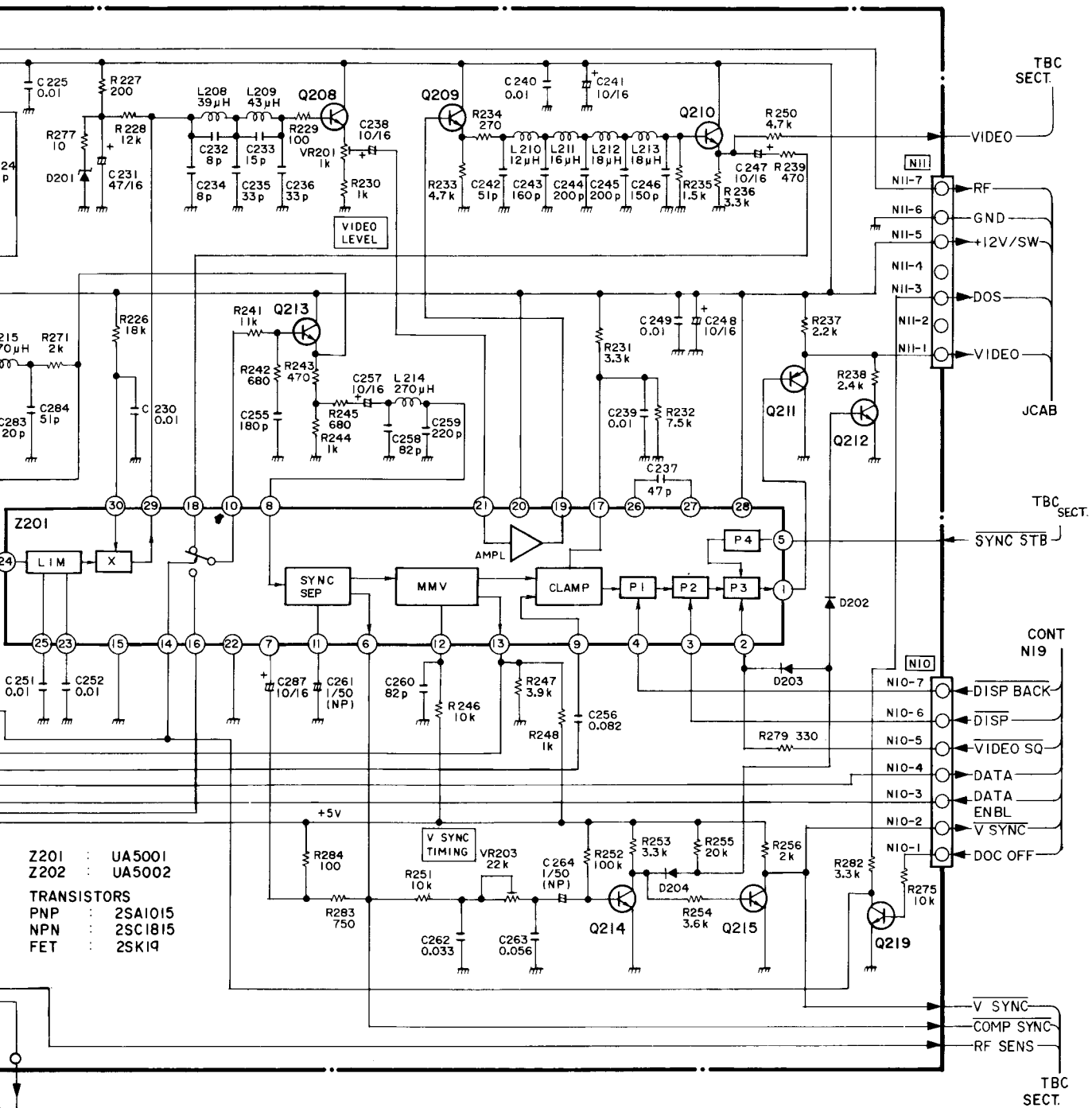
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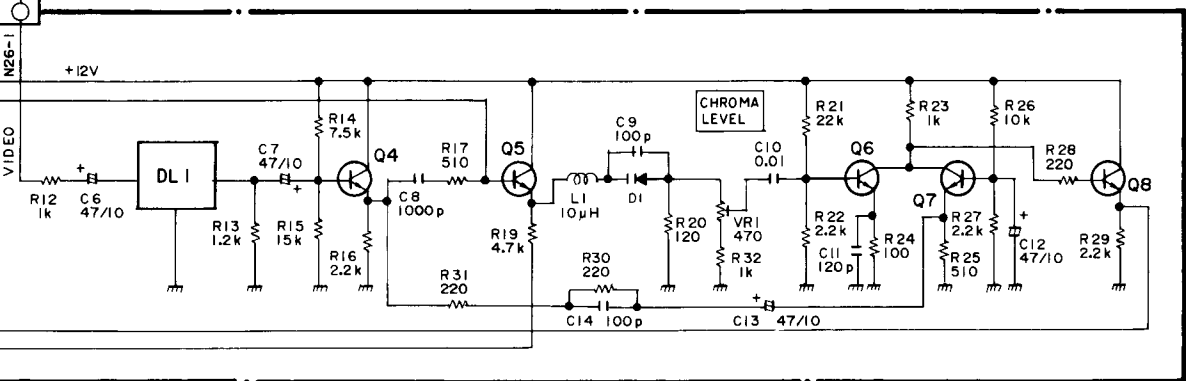
A

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D

- Z201 : UA5001
- Z202 : UA5002
- TRANSISTORS
- PNP : 2SA1015
- NPN : 2SC1815
- FET : 2SK119



VSOP(VWS-040) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
UPC4558C (NJM4558D)	Z 1, 4
UPC4560C (UPC4559C)	Z 2
LM393P (UPC393C)	Z 3,402
UM4004	Z 5
UA5001	Z 201
UA5002	Z 202
TC4024BP (MB84024BM)	Z 401
UM5003	Z 403
HD74LS107P (SN74LS107AN)	Z 404
UM3001	Z 405
UM3002 (UM3002A)	Z 406
2SC1815-0/Y/GR	Q 1, 2, 5- 8, 10, 14- 16, 201,202,205-210,212-219,401- 403,405,409,412,416,420,424- 433,436
(2SC1740-Q/R)	
2SK30A-Y/GR	Q 3, 17,410,411,413-415,417- 419
2SA1015-0/Y/GR	Q 4,203,211,404,406,434
2SC1815-Y/GR	Q 9,423,435
2SK30A-Y	Q 11
2SC495-0/Y	Q 12,407
2SA505-0/Y	Q 13,408
2SK192A-Y (2SK19TM-Y)	Q 204
OA90-R	D 1, 2,203
1S2473	D 3, 5- 17,202,204,206-208, 403-415,417,418,421,422
RD9.1EB3	D 4
RD15EB3	D 18
RD10EB2	D 201,205
RD6.8EB3 (EQA01-07R2)	D 401,402
RD1/4PM000J	R 1- 30, 32- 74, 77, 80- 82, 84- 90, 92, 94-101,104-107, 109,110,112-122
RD1/2VS000J	R 31, 93,102,103,426,480,526
RD1/4PM000J	R 124,201-210,210-219,221-248, 250-279,282-284,401-412,414- 423,425,427-430,432
RD1/4PM000J	R 125
RD1/4PM000J	R 433-479,483-492,508,509,518, 519,523-525,527-534,536-544, 550-569,572,573,575-581
RN1/4PR0000F	R 513-516
VCP-029	VR 1, 4 47k
VCP-026	VR 2,204,401 4.7k
VCP-024	VR 3,201,202 1k
VCP-027	VR 6, 7 10k
VCP-028	VR203,404,406 22k

VSOP(VWS-040) Parts list

2

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
VCP-022	VR405 220
CKDYF223Z50	C 1, 8, 16, 27,406,407,412, 443,444,452,469
CEAR47M50NP	C 2, 5, 12
CQMA153J50	C 3
CQMA103J50	C 4,418
CKDYF103Z50	C 6, 7, 30, 31, 34, 35,201, 203,206,207,209,210,218,220, 221,223,225-230,239,240,249- 252,265,269,272,277-279,411
CEA010M50NP	C 9, 15, 20,261,264,428,431, 464
CKDYB102K50	C 10,222,453,460
CEA100M16NP	C 11,421,459
CQMA392J50	C 18
CEA010M50	C 19, 21
CQMA472J50	C 22,401,430,435
CQMA223J50	C 23
CEA4R7M16NP	C 24,437,451
CQMA333J50	C 25,262,281
CQMA104J50	C 26,423
CEA100M16	C 28, 29, 32, 33,202,204,208, 238,241,247,248,253,257,266, 275,276,285,287,463
CCDSL271J50	C 205,217
CCDCH560J50	C 211,212
CCDCH080D50	C 213,215,232,234
CCDCH220J50	C 214
CCDSL181J50	C 216,255
CEA470M16	C 219,231,270
CCDCH220J50	C 224
CCDCH150J50	C 233
CCDCH330J50	C 235,236
CCDUJ470J50	C 237
CCDSL510J50	C 242,284
CCDSL161J50	C 243
CCDSL201J50	C 244,245
CCDSL151J50	C 246,267
CCDSL101J50	C 254,403,404,450
CQMA823J50	C 256
CCDSL820J50	C 258,260,417
CCDSL221J50	C 259,426
CQMA563J50	C 263
CCDCH360J50	C 268
CCDSL150J50	C 271
CCDSL121J50	C 273,283,405
CCDSL620J50	C 274
CCDCH470J50	C 280
CEA220M16NP	C 282
CQMA183J50	C 402,420
CQMA272J50	C 408
CEA470M10	C 409,413,442,445,458
CQMA122J50	C 410
CQSH102J50	C 414
CQMA332J50	C 415

VSOP(VWS-040) Parts list

3

(MK)(Part No.) (IT)(REF Nos. & DESCRIPTIONS)

CQSH681J50	C 416,419	
CEA220M6R3NP	C 422	
CQMA683J50	C 424	
CQMA222J50	C 425,455	
CEA3R3M16NP	C 427	
CQMA102J50	C 429	
CQMA273J50	C 432	
CQMA473J50	C 433,436,462	
CCDSL470J50	C 434,454,456	
CEA470M6R3NP	C 439	
VCE-007	C 461	0.1uF
CEA220M10	C 465,467,471	
CCDSL331J50	C 466	
CEA4R7M25	C 472	
VCM-004	VC401	
(VCM-005)		
(VTL-065)		
VTL-095	L 202-205,212,213	
(VTL-026)		
VTL-015	L 206,207	2.2uH
(VTL-060)		
VTL-030	L 208	39uH
(VTL-066)		
VTL-051	L 209	43uH
(VTL-067)		
VTL-024	L 210	12uH
(VTL-062)		
VTL-056	L 211	16uH
(VTL-063)		
VTL-040	L 214	270uH
(VTL-073)		
VTL-043	L 215	470uH
(VTL-069)		
VTL-076	L 401	1mH
VTF-019	VL401	12uH
(VTF-022)		
VSS-005	X 401	31.5kHz
(VSS-010)		
D33A	TH 1	
D22A	TH401	
VTF-012	DL201 1H D1y	
(VTF-030)		
(VTF-013)		

CPCB(VWV-028) Parts list

1

(MK)(Part No.) (IT)(REF Nos. & DESCRIPTIONS)

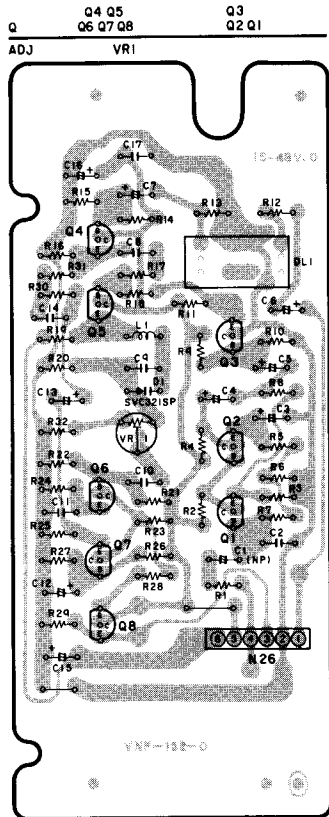
2SC1815-O/Y/GR	Q 1, 2, 4- 8	
(2SC2021-Q/R/S)		
(2SC1740-Q/R/S)		
2SA1015-O/Y/GR	Q 3	
SVC321SP-B1/D1	D 1	
RD1/4PM000J	R 1- 32	
VCP-023	VR 1	470
CEA4R7M16NP	C 1	
CKDYB222K50	C 2	
CEA470M10	C 3, 6, 7, 12, 13	
CEA100M16	C 4, 5, 15, 16	
CEA470M10	C 6	
CKDYB102K50	C 8	
CCDSL101J50	C 9, 14	
CKDYF103Z50	C 10, 17	
CCDSL121J50	C 11	
VTL-023	L 1	10uH
(VTL-061)		
VTF-032		0.5uS D1y

1

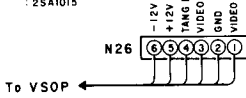
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3

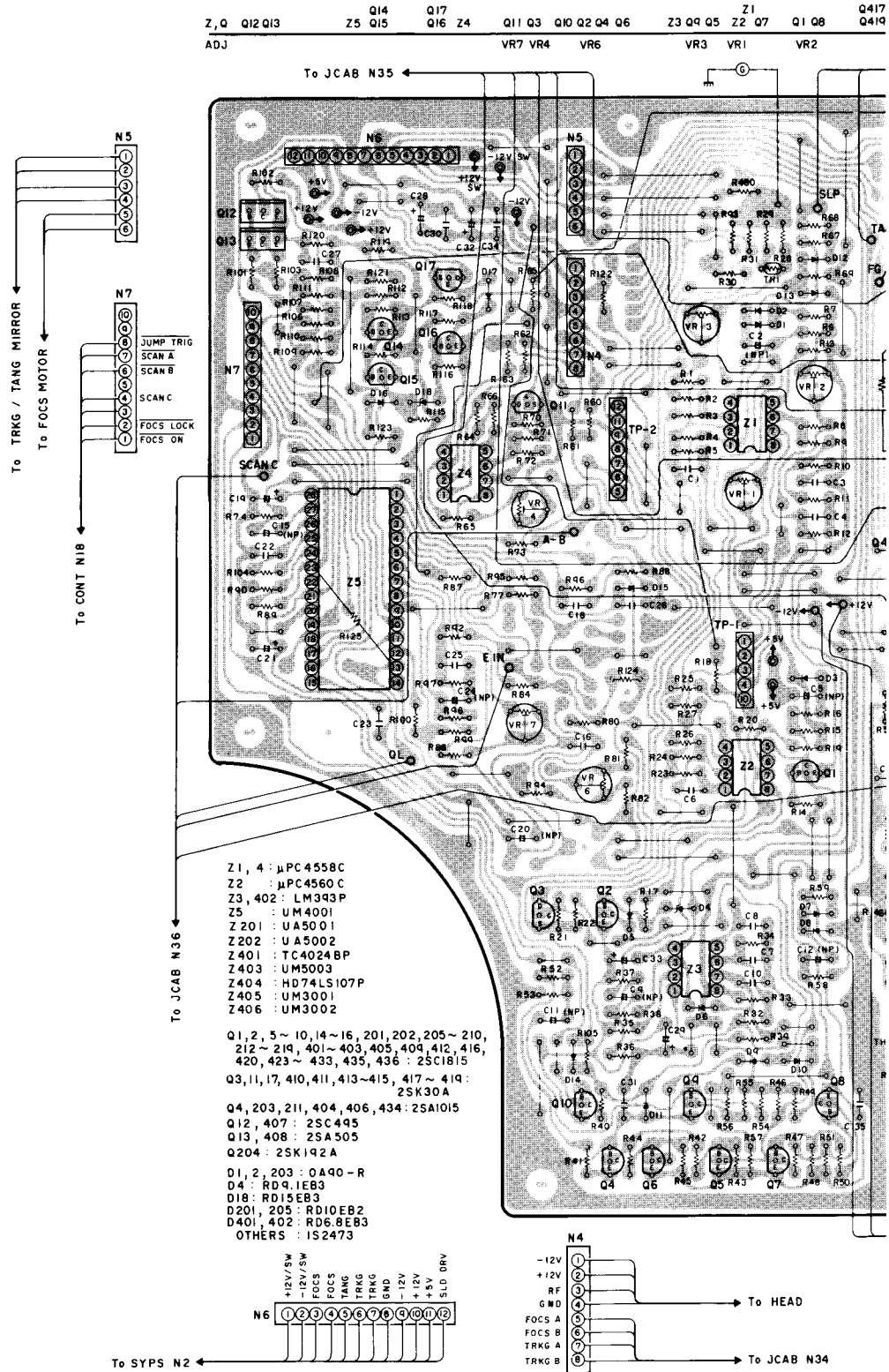
A



Q1, 2, 4-8 : 25C1815
Q3 : 25A1015



B



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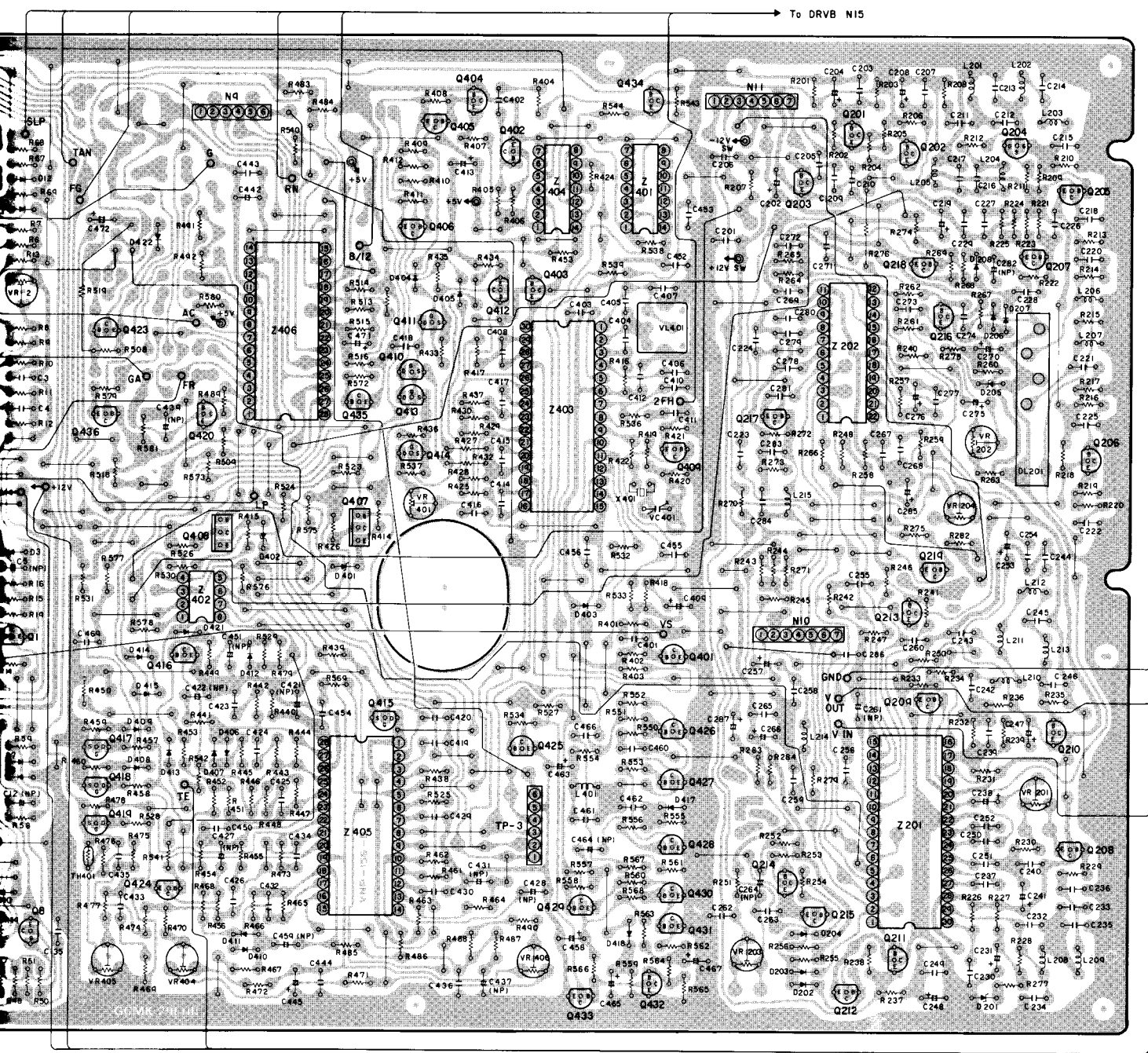
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Q1 Q8 Q423 Q417 Q436 Q419 Q418 Q424 Q416 Q408 Z402 Q420 Z406 Q435 Z405 Q415 Q410 Q413 Q407 Q414 Q411 Q404 Q412 Q425 Z403 Q433 Q403 Q402 Z404 Q429 Q434 Q401 Q426 Q409 Z401 Q427 Q428 Q432 Q431 Q430 Q201 Q202 Q218 Q203 Z202 Q213 Q209 Q216 Q217 Q214 Q215 Q212 Q211 Z201 Q219 Q205 Q208 Q204 Q207 Q210 Q206

VR2 VR405 VR404 Z406 VR406 VC401 VL401 VR203 VR204 VR202 VR201

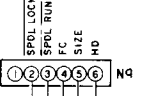


A

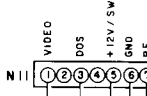
B

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To CONT N19



JCAB



To CONT N19

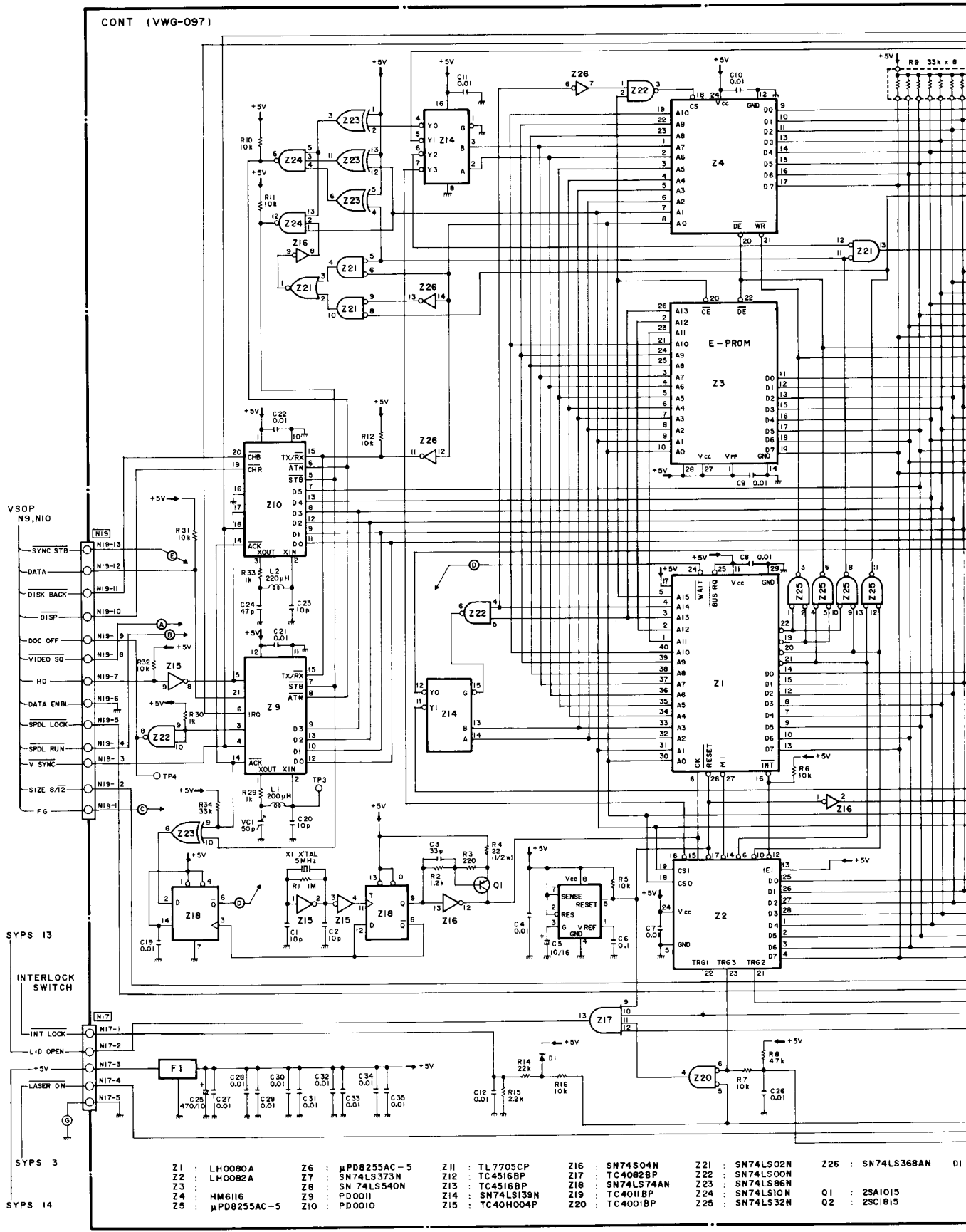
4-7. CONT, KEYC, SIZD AND DI0B

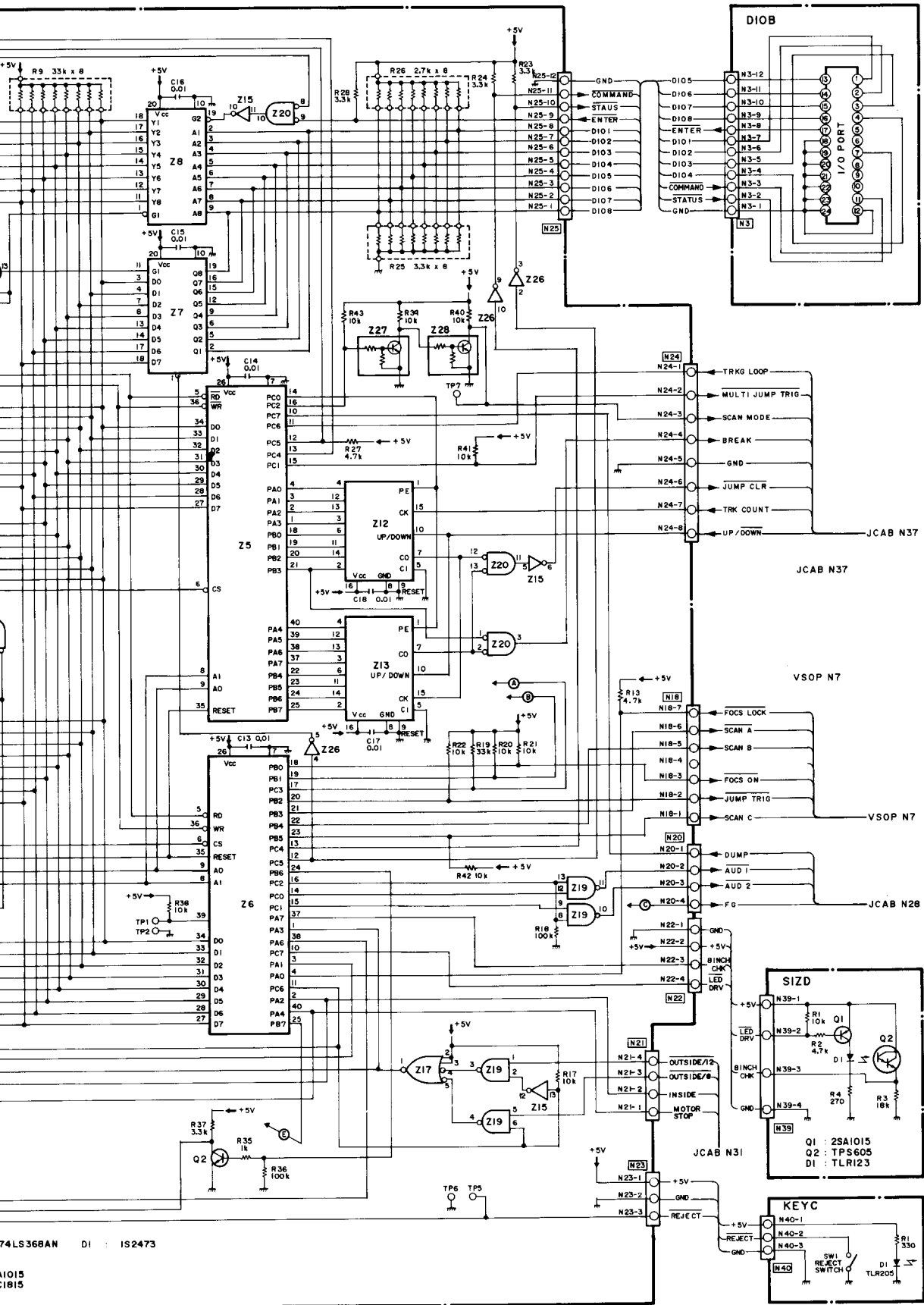
A

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D





A

B

C

D

74LS368AN DI IS2473
 1015
 1815

CONT(VWG-097) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
LH-0080A (LH-0080)	Z 1
LH-0082A (LH-0082)	Z 2
HM6116P-4	Z 4
UPD8255AC-5	Z 5, 6
SN74LS373N	Z 7
SN74LS540N	Z 8
PD0011	Z 9
PD0010	Z 10
TL7705CP	Z 11
TC4516BP	Z 12, 13
SN74LS139N (HD74LS139P)	Z 14
TC40H004P	Z 15
SN74S04N (HD74S04P)	Z 16
TC4082BP	Z 17
SN74LS74AN (HD74LS74AP)	Z 18
TC4011BP	Z 19
TC4001BP	Z 20
SN74LS02N (HD74LS02P)	Z 21
SN74LS00N (HD74LS00P)	Z 22
SN74LS86N (HD74LS86P)	Z 23
SN74LS10N (HD74LS10P)	Z 24
SN74LS32N	Z 25
SN74LS368AN (HD74LS368AP)	Z 26
DTC124N	Z 27, 28
2SA1015-0/Y/GR	Q 1
2SC1815-0/Y/GR (2SC1740-Q/R) (2SC1740LN-Q/R)	Q 2
1S2473	D 1
RD1/4PM000J	R 1- 3, 5- 8, 10- 24, 27- 43
RD1/2VS220J	R 4
VCN-091	R 9 33k
VCN-097	R 25 3.3k
VCN-035	R 26 2.7k
CCDSL100D50	C 1, 2, 20, 23
CCDSL330J50	C 3
CKDYF103Z50	C 4, 7- 19, 21, 22, 26- 35
CEA100M16	C 5
CQMA104J50	C 6
CCDSL470J50	C 24
CEA471M10	C 25
VCM-003	VC 1 50pF
VTL-155	L 1 200uH
VTL-039	L 2 220uH
VTH-005	F 1
VSS-023	X 1 5MHz

CONT(VWG-097) Parts list

2

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
VKH-018	40P socket
VKH-019	28P socket

KEYC(VWG-098) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
TLR205	D 1
RD1/4PM331J	R 1
VSC-004	SW 1

SIZD(VWG-099) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
2SA1015-0/Y/GR	Q 1
TPS605	Q 2
TLR123	D 1
RD1/4PM000J	R 1- 4
VNL-179	Sensor cover

DIOB(VWG-100) Parts list

1

(MK)(Part No.)	(IT)(REF Nos. & DESCRIPTIONS)
VKN-133	24P connector

1

2

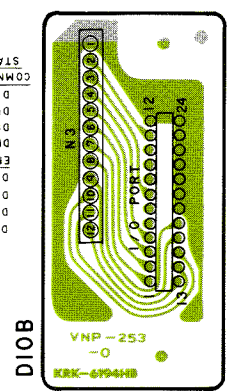
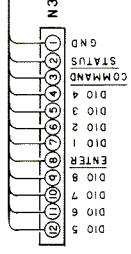
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A

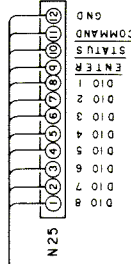
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C

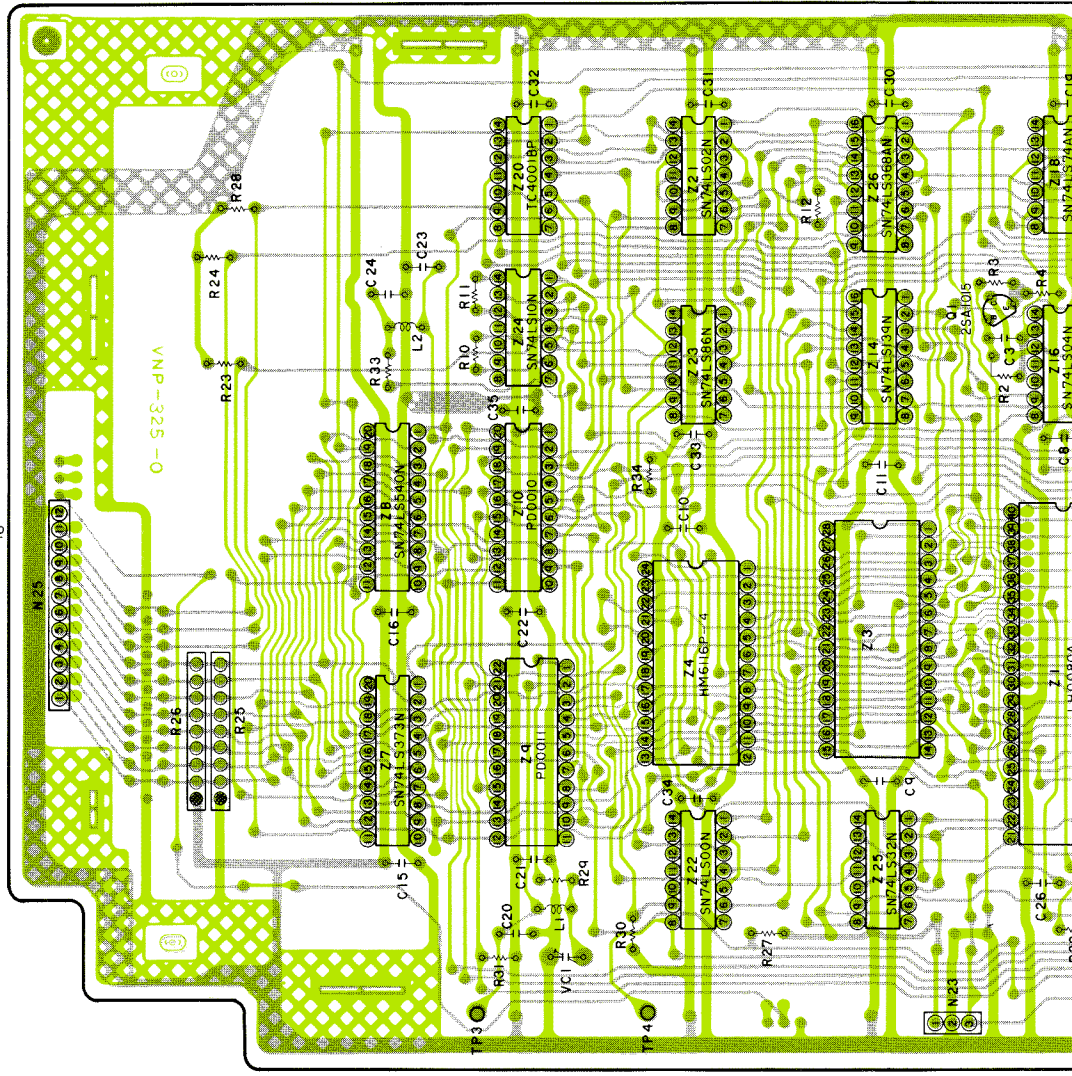
D



DIOB



CONT



Z, Q

Z7 Z8

Z9 Z10
Z24 Z20

Z22 Z4
Z23 Z21

Z25 Z3
Z14 Z26

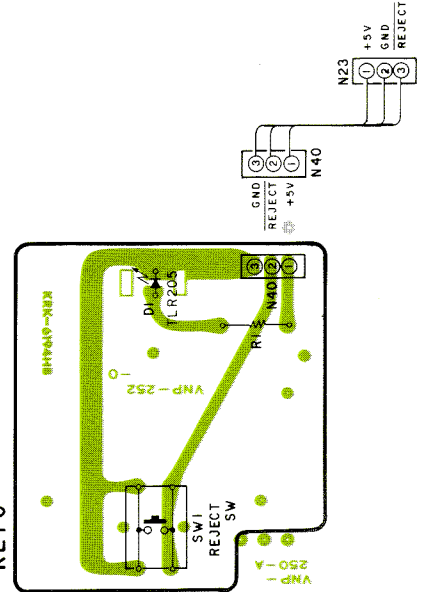
Q1
Z1
Z16 Z18

1

2

3

B1



KEYC

4

5

Q1
Z1
Z16 Z18

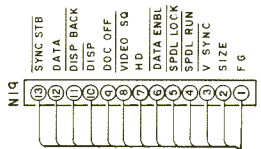
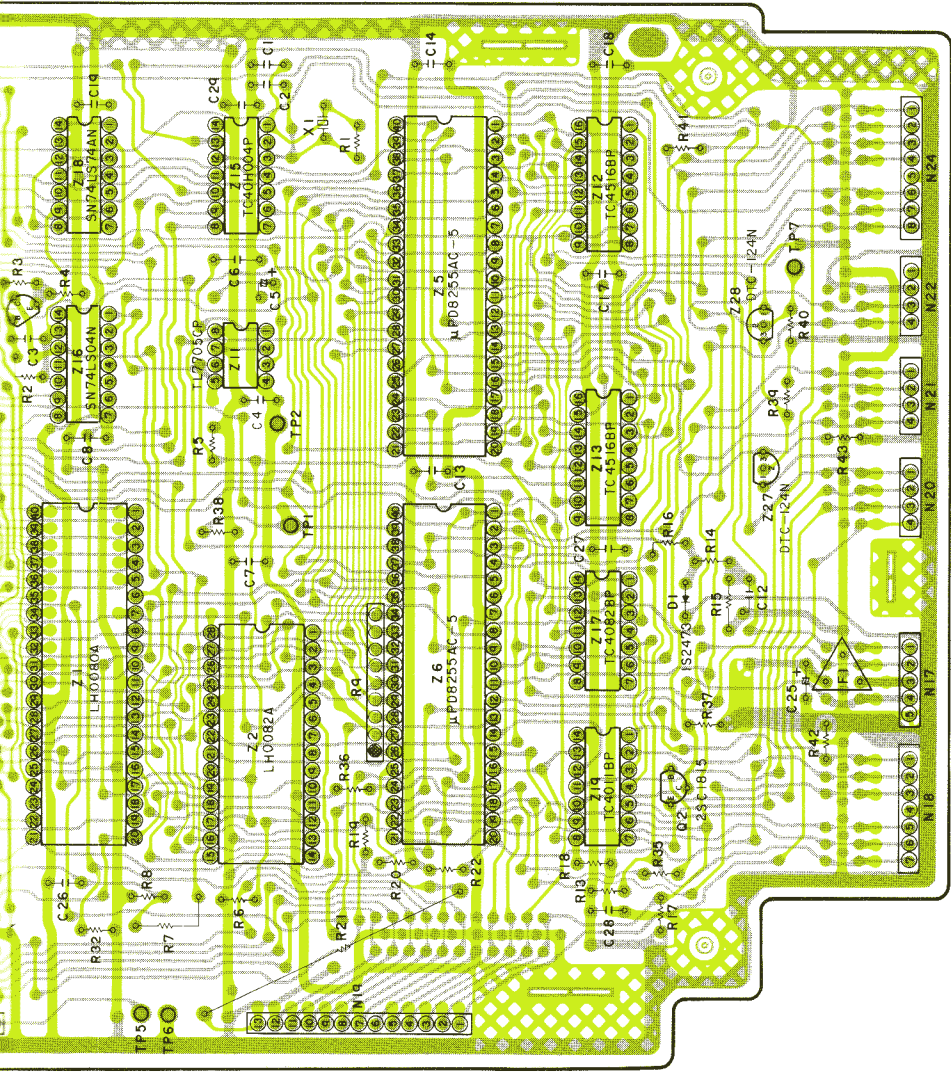
Z11 Z15
Z2

Z6 Z5

Z19 Z17
Z13 Z12

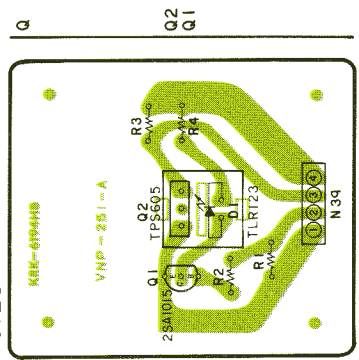
Q2

Z27 Z28



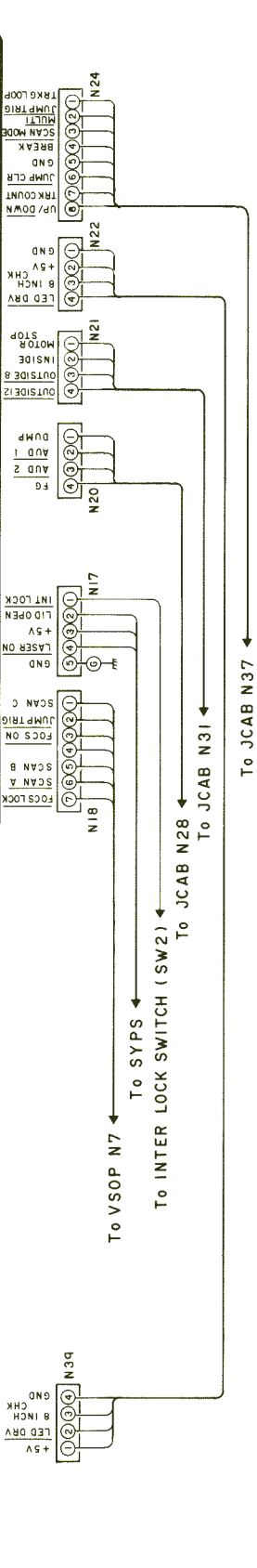
To VSOP Nq, 10

S1ZD



Q

Q2
Q1



To VSOP N7
To SYPS
To INTER LOCK SWITCH (SW2)
To JCAB N28
To JCAB N31
To JCAB N37

A

B

C

D

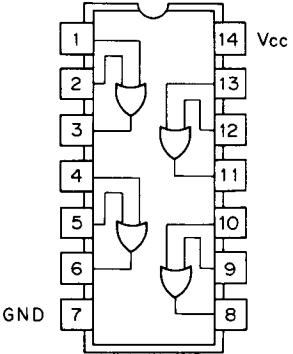
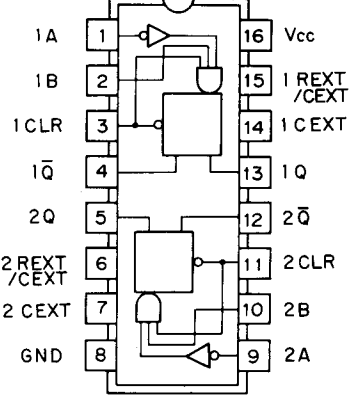
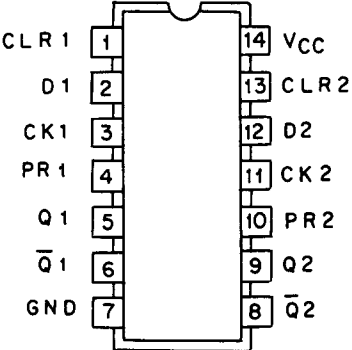
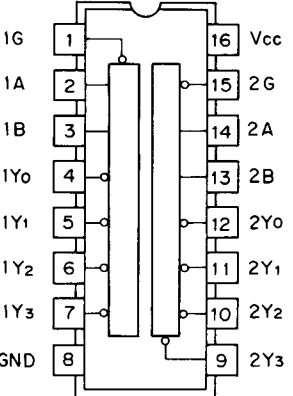
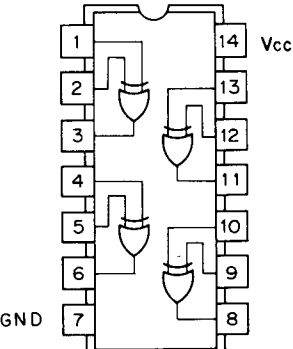
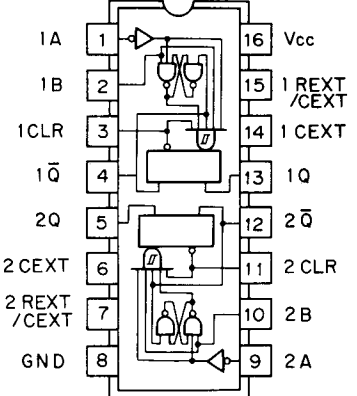
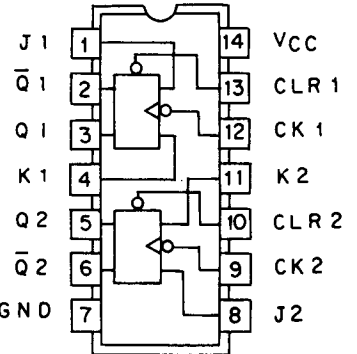
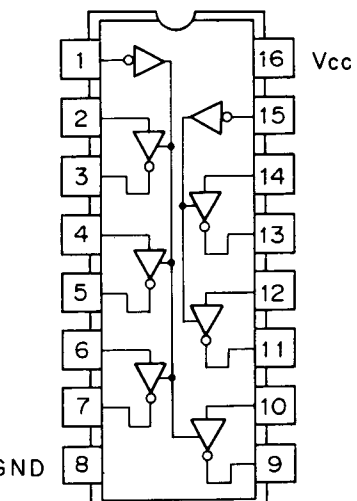
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5

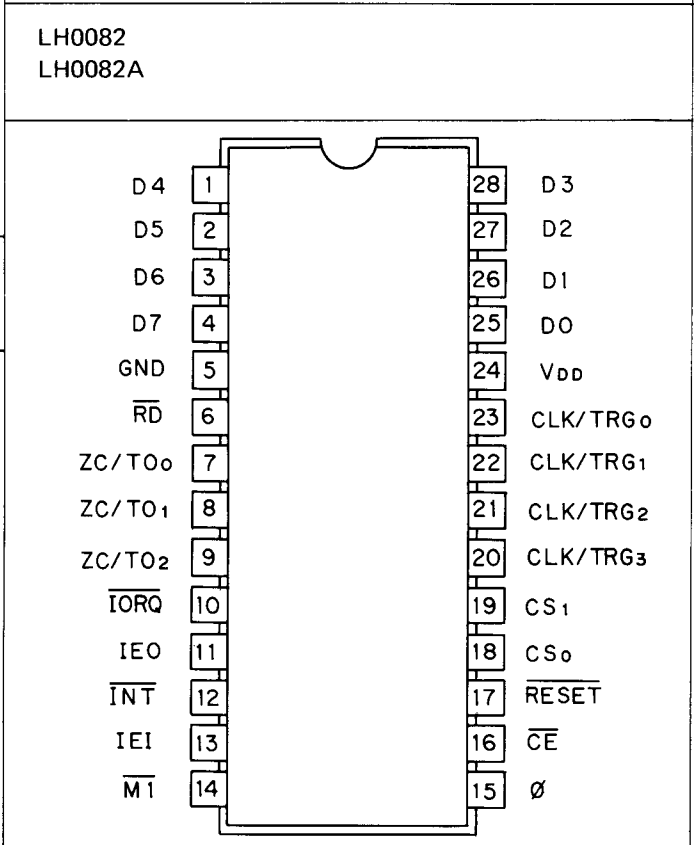
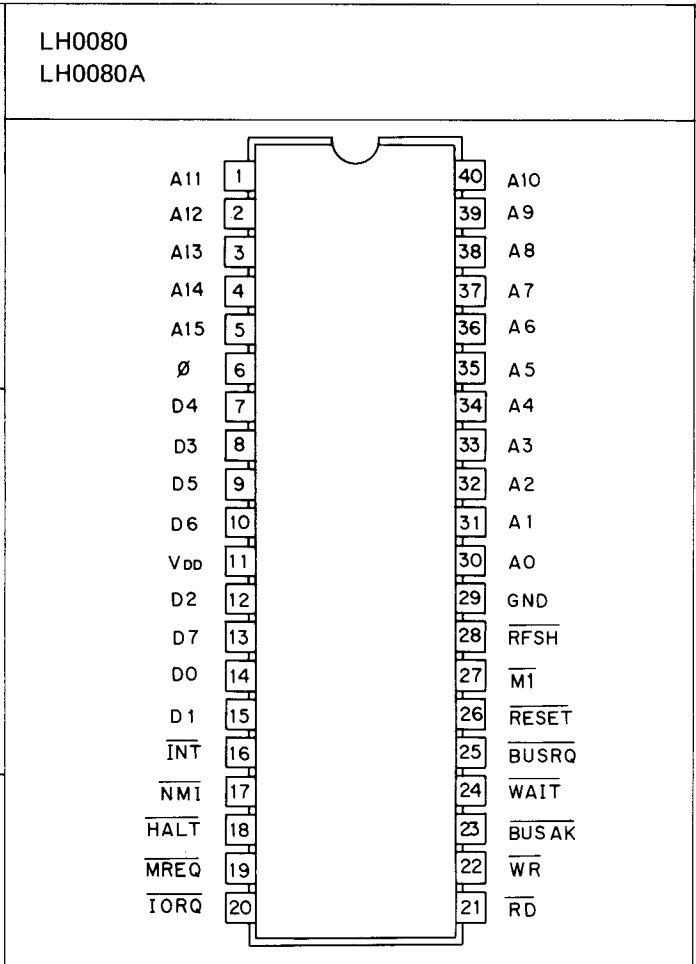
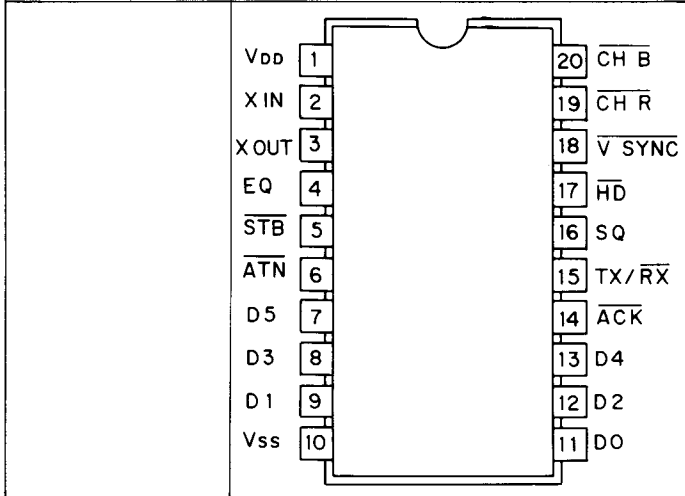
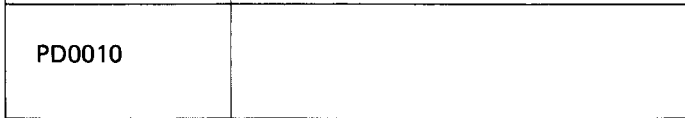
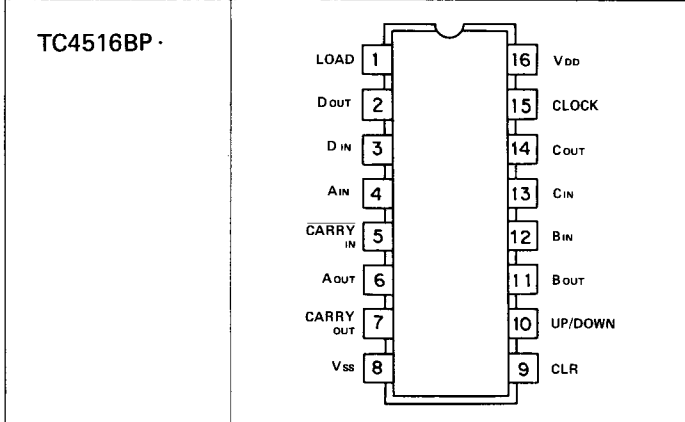
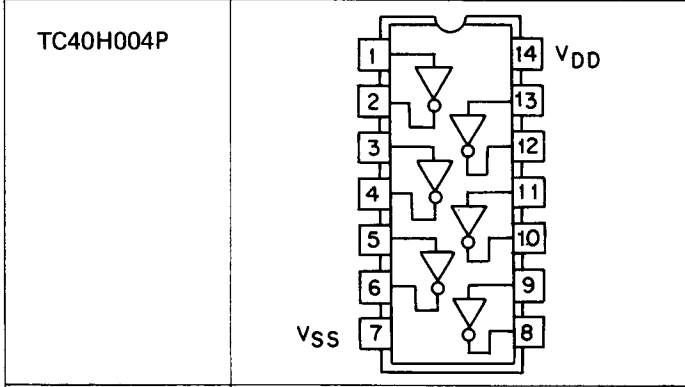
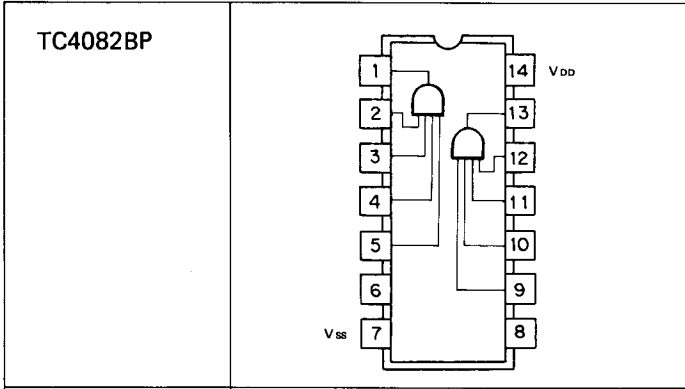
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5. PIN ASSIGNMENTS

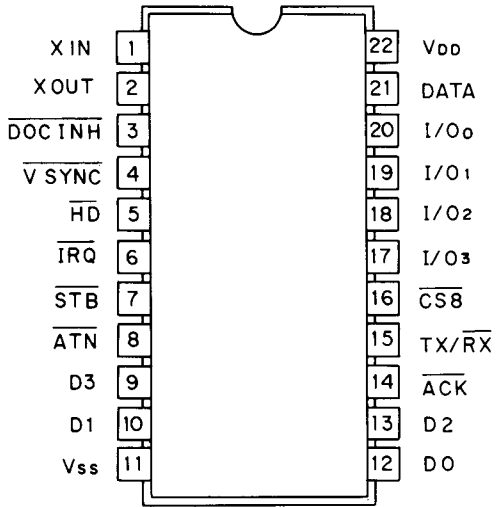
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<p>UPC393C LM393P</p>		<p>SN74LS00N HD74LS00P</p>	
<p>PA3001A</p>		<p>SN74LS02N HD74LS02P</p>	
<p>UPC339C</p>		<p>SN74S04N HD74S04P</p>	
<p>DTC124N</p>		<p>SN74LS10N HD74LS10P</p>	
<p>DTC114F</p>			

<p>SN74LS32N</p>		<p>SN74LS123N HD74LS123P</p>	
<p>SN74LS74AN HD74LS74AP</p>		<p>SN74LS139N HD74LS139P</p>	
<p>SN74LS86N HD74LS86P</p>		<p>SN74LS221N HD74LS221P</p>	
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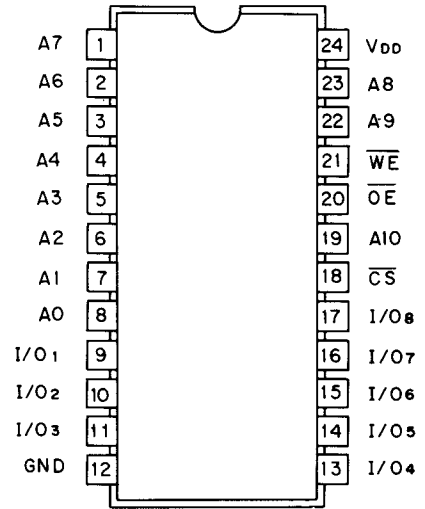
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<p>SN74LS540N</p>		<p>TC4011BP</p>	
		<p>TC4016BP</p>	
		<p>TC4024BP MB84024BM</p>	



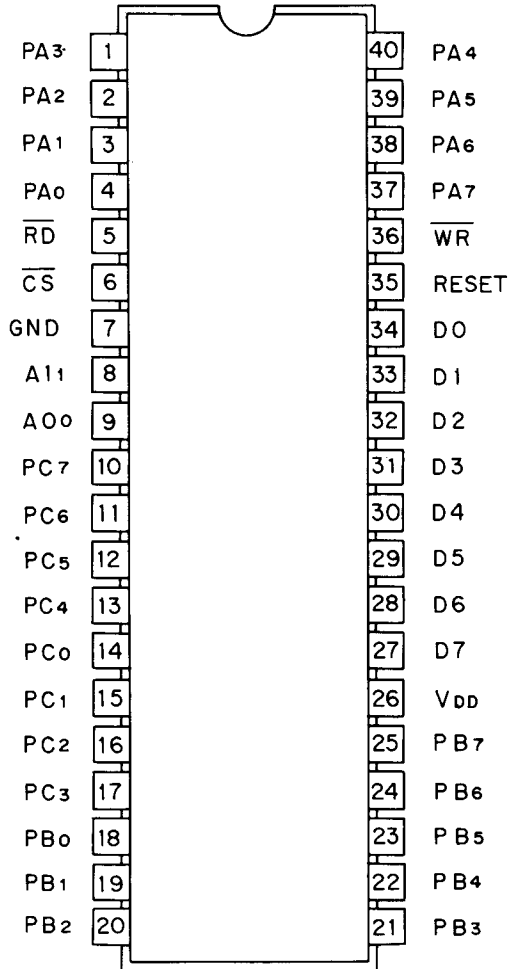
PD0011

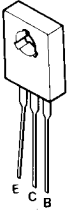
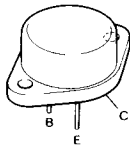
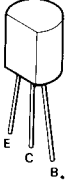
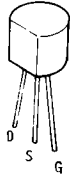
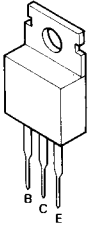
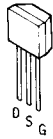

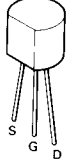
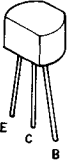

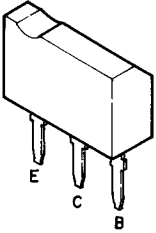


HM6116P-4



UPD8255AC-5



<p>2SA505 2SC495</p>		<p>2SD818</p>	
<p>2SA817 2SA1015 2SC1627 2SC1674 2SC1740 2SC1815 2SC2320</p>		<p>2SK30A</p>	
<p>2SB595 2SB596 2SB834 2SD525 2SD880 2SC1061</p>		<p>2SK192A</p>	
<p>2SA965</p>		<p>2SK19TM</p>	
<p>2SC2603</p>		This area is empty in the original image	
<p>2SC2786</p>			
<p>2SC2021</p>			

6. EXPLODED VIEWS AND PARTS LIST

TOP VIEW PARTS LIST

A			A		
No.	Parts No.	Description	No.	Parts No.	
1.	VXX-149	Hood assembly	61.	ACZ 30P060	FMC
2.	VNE-244	Plate	62.	AMZ 30P080	FMC
3.	VNE-286	Hood lever	63.	BBZ 30P080	FZK
4.	VXA-053	Hood hinge	64.	BCZ 30P050	FMC
5.	VXX-096	Turntable assembly	65.	BMZ 26P050	FMC
6.	VXX-185	Top housing assembly	66.	BMZ 30P040	FZK
7.	VXX-214	Disc clamper	67.	BMZ 30P060	FZK
8.	VEB-038	Washer	68.	BMZ 30P080	FZK
9.	VNE-305	Interlock base	69.	CMZ 26P060	FMC
10.	VNL-141	Protector	70.	CMZ 26P080	FZK
11.	VBH-059	Spring	71.	IPZ 30P080	FMC
12.	VNL-022	Collar	72.	PMA 26P060	FMC
13.	VLA-060	Interlock pin	73.	PMA 30P060	FMC
14.	VLL-089	Shipping screw	74.	PMA 30P080	FMC
15.	VNE-276	Shipping plate	75.	PMA 40P120	FZK
16.	VRW-091	Caution tag	76.	PMB 26P060	FMC
17.	VXX-196	Bottom cover assembly	77.	PMB 30P080	FMC
18.	VED-008	Cushion	78.	PMB 30P100	FZK
19.	VWG-097	CONT	79.	PMZ 20P030	FMC
20.	VHA-012	Lens cap	80.	SMK 26H080	FZK
21.	VNH-027	Focus motor cover	81.	VPZ 30P060	FMC
22.	VEC-153	Yoke seal	82.	WA 30F080	N100
23.	VMX-001	Clamper magnet	83.	WB 50	FMC
24.	VXA-166	Yoke assembly	84.	WW 50	FBT
25.	VNV-018	Centering hab	85.	ZMD 30H040	FBT
26.	VBH-034	Spring	86.	ZMD 30H250	FBT
27.	VDM-007	Spacer			
28.	VXM-029	Spindle motor			
29.	VLL-246	Holding bolt			
30.	VLA-061	Nut			
31.	VLL-222	Adjustment bolt			
32.	VNM-001	Fin			
33.	VCG-011	Capacitor			
34.	VEC-063	Capacitor cover			
35.	VSA-006	Power switch			
36.	VEC-151	Flexible ring			
37.	VAC-225	Power switch button			
38.	—	KEYC			
39.	VXX-186	Front panel assembly			
40.	VBH-051	Spring			
41.	VAC-224	Reject key top			
42.	VNK-184	Window(L)			
43.	VKN-198	Window(R)			

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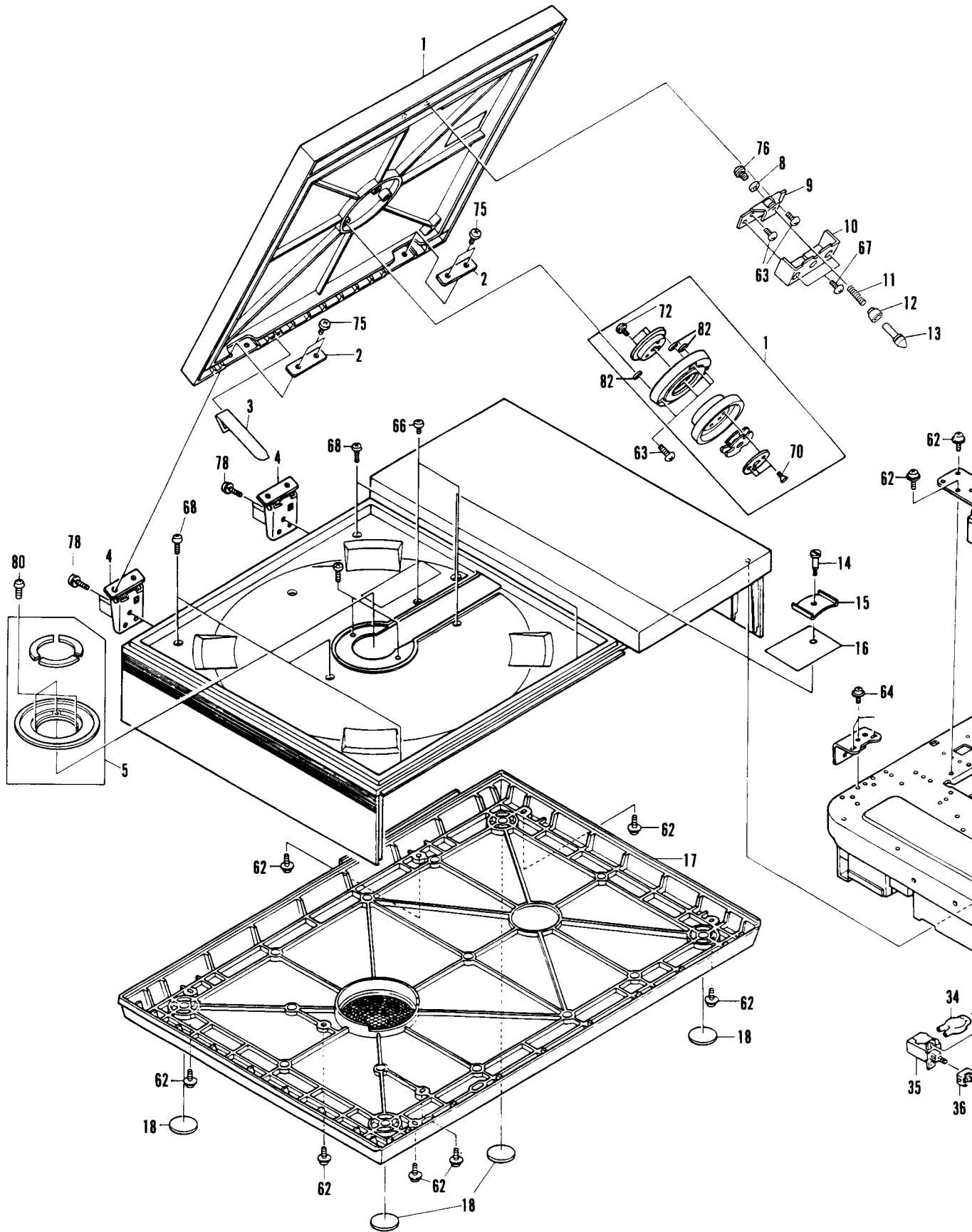
6-1. TOP AND EXTERNAL VIEW

A

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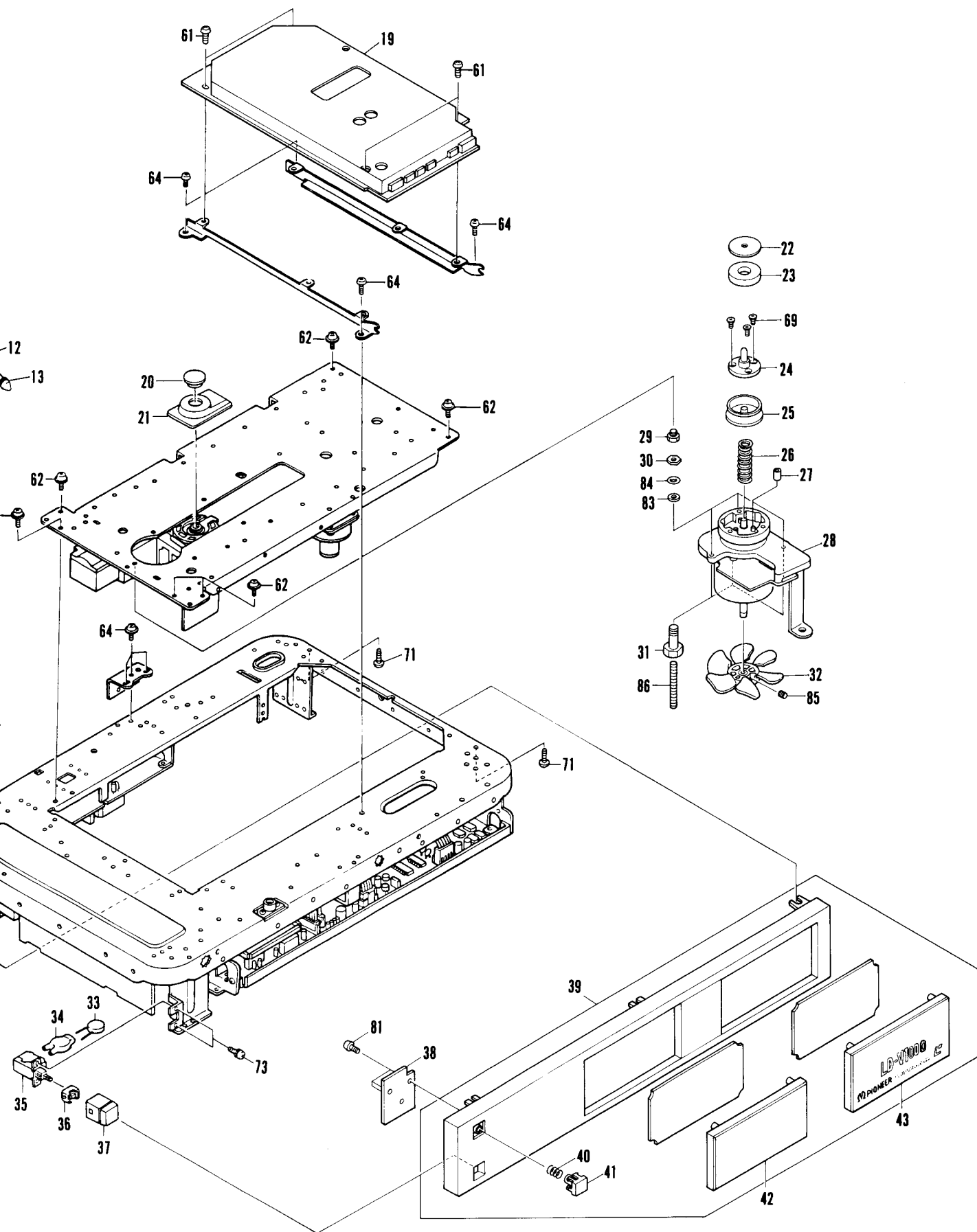
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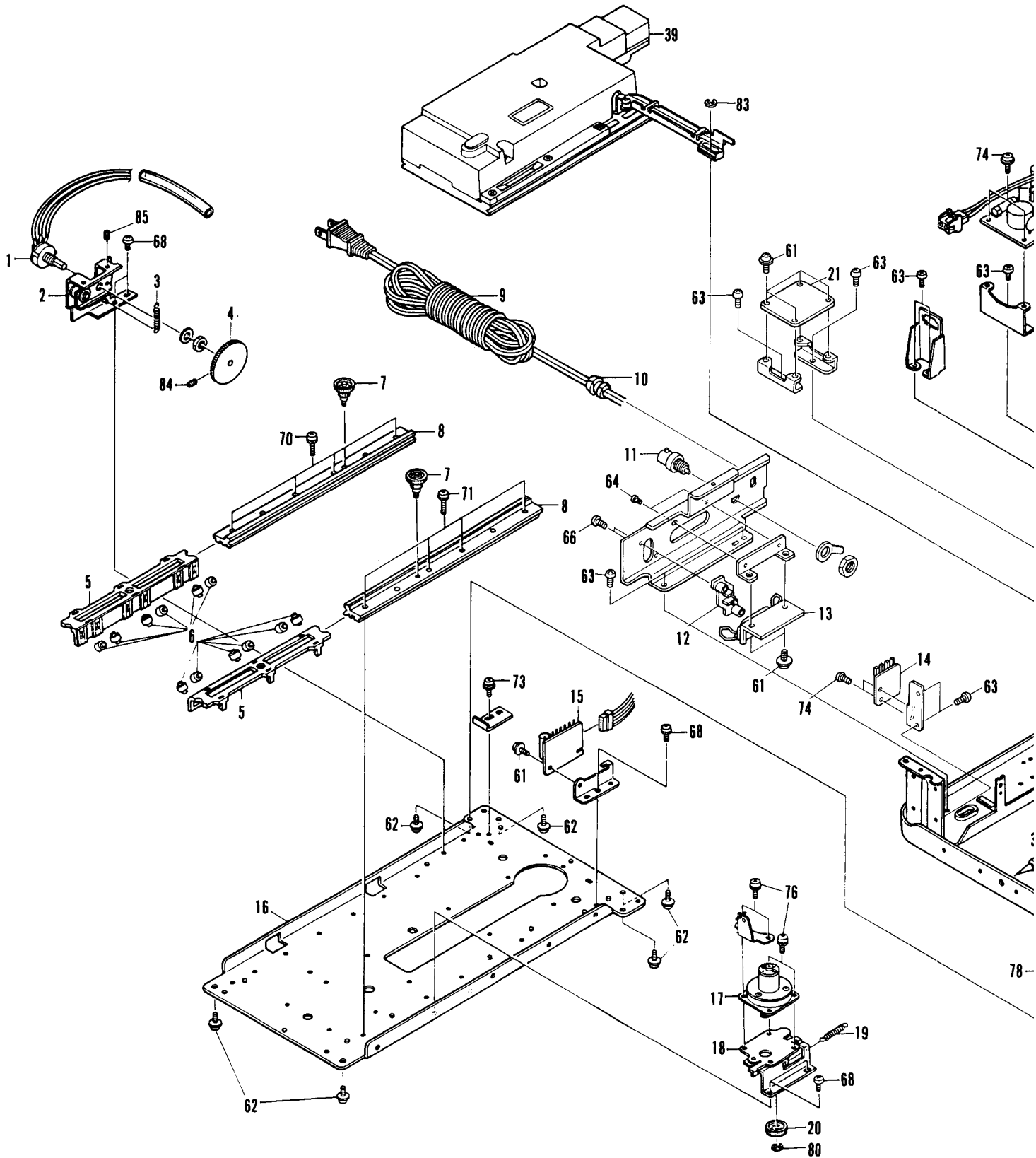
6-2. BOTTOM VIEW

A

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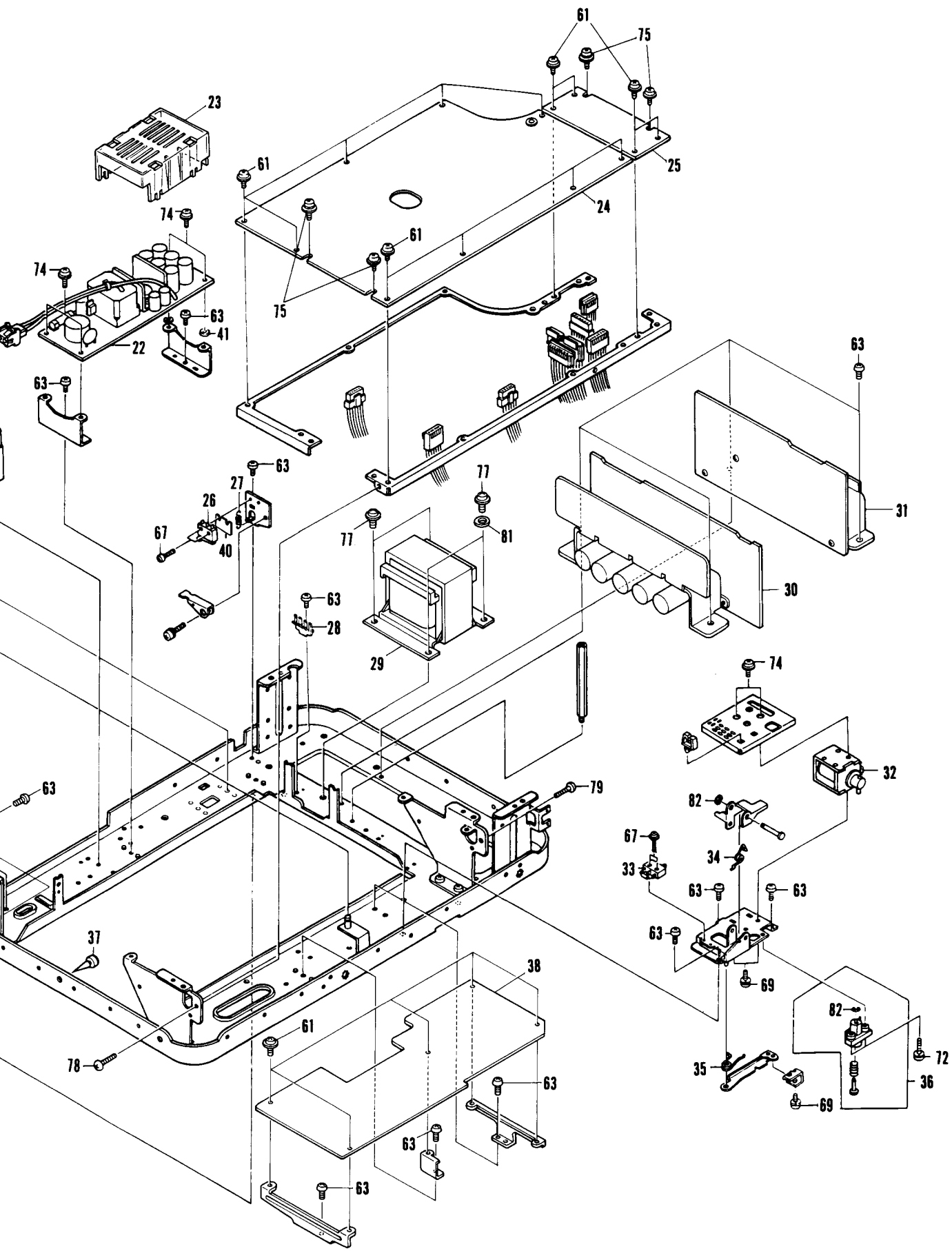
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BOTTOM VIEW PARTS LIST

No.	Parts No.	Description	No.	Parts No.	
1.	VCS-005	Potentiometer	61.	ACZ 30P060	FMC
2.	VXA-059	Gear assembly	62.	AMZ 30P080	FMC
3.	VBH-042	Spring	63.	BCZ 30P050	FMC
4.	VNL-045	Pinion	64.	BCZ 30P050	FZK
5.	VNL-031	Retainer	65.	BMZ 30P060	FZK
6.	VLL-121	Roller	66.	BPZ 30P080	FZK
7.	VXX-006	Retainer pinion assembly	67.	IMZ 20P100	FMC
8.	VNG-002	Rail	68.	PMA 30P050	FMC
9.	VDG-016	Power cord	69.	PMA 30P060	FMC
10.	VEC-027	Cord stopper	70.	PMA 30P120	FMC
11.	VKN-007	BNC jack	71.	PMA 30P120	FRD
12.	VKB-003	2P pin jack	72.	PMA 30P120	FZK
13.	—	DIOB	73.	PMA 40P060	FMC
14.	—	LSFB	74.	PMB 30P060	FMC
15.	—	MCNB	75.	PMB 30P080	FGN
16.	—	Mech. chassis	76.	PMB 30P080	FMC
17.	VXM-030	Slider motor	77.	PMB 40P080	FMC
18.	VXA-054	Motor holder	78.	VCZ 30P080	FMC
19.	VBH-041	Spring	79.	VCZ 30P100	FMC
20.	VNL-028	Pinion	80.	WA 17D035	D025
21.	—	SIZD	81.	WC 50	FMC
22.	VWR-045	LSPS	82.	YE 20	FUC
23.	VNH-023	H.V. cover	83.	YE 30	FUC
24.	VWS-040	VSOP	84.	ZMD 30H060	FBT
25.	VWV-028	CPCB	85.	ZMK 40H080	FBT
26.	VSF-007	Switch			
27.	VBH-040	Spring			
28.	VKC-005	4P terminal			
29.	VTT-034	Power transformer			
30.	VWR-044	SYPS			
31.	VWR-038	DRVB			
32.	VXP-005	Plunger			
33.	VSF-006	Switch			
34.	VBH-045	Spring			
35.	VBH-043	Spring			
36.	VXX-039	Pin guide assembly			
37.	VEB-031	Slider cushion			
38.	VWV-043	JCAB			
39.	VGX-043	Slider assembly			
40.	VEC-099	Insulator			
41.	VBF-002	Washer			

SLIDER PARTS LIST

No.	Parts No.	Description	No.	Parts No.	
1.	—	Dust cover	41.	BMZ 30P060	FMC
2.	VDA-013	H.V. cord assembly	42.	CMZ 30P080	FBT
3.	VEB-032	Bushing	43.	PMA 26P100	FMC
4.	VNE-212	Tube holder	44.	PMA 30P060	FMC
5.	VED-014	Tube cushion	45.	PMA 30P080	FMC
6.	VGN-004 (VGN-005)	Laser tube	46.	PMA 30P100	FMC
7.	VXX-021	Vinyl tube	47.	PMB 30P060	FMC
8.	VDM-001	Insulator pipe	48.	PMB 30P080	FMC
9.	VCN-014	Resistor (47kohms/2W)	49.	PMB 30P100	FMC
10.	—	Radiation shield	50.	PMZ 20P040	FMC
11.	VNL-044	Rack(G)	51.	SMK 30H080	FBT
12.	VNE-261	Grating holder	52.	SMK 30H120	FBT
13.	VGX-022	Grating assembly	53.	VCZ 30P060	FMC
14.	VGX-018	DG lens assembly	54.	WA 26N050	W050
15.	—	Prism	55.	YE 30	FUC
16.	VNE-148	Wave plate holder	56.	ZMR 30H080	FBT
17.	VGX-016	Wave plate assembly			
18.	VGX-024	Servo mirror assembly			
19.	VGX-015	Fixed mirror assembly			
20.	—	Slider base			
21.	VEC-051	Mask plate			
22.	VGX-020	Photo-detector assembly			
23.	VLP-003	Photo-detector spacer			
24.	VWV-042	RFAM			
25.	VGX-026	Objective assembly			
26.	VNH-027	Focus motor cover			
27.	VHA-012	Lens cap			
28.	VNL-029	Rack(N)			

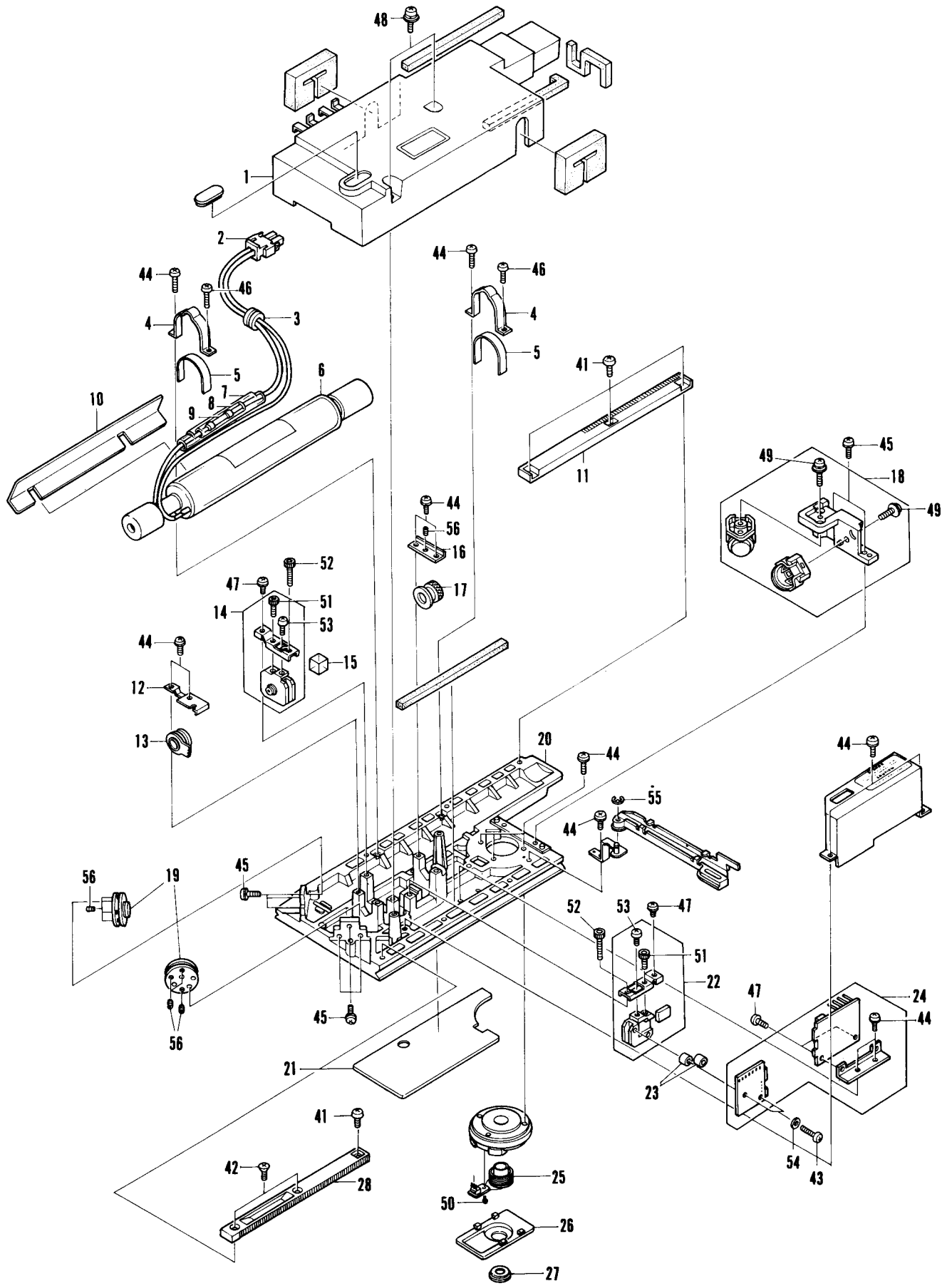
6-3. SLIDER

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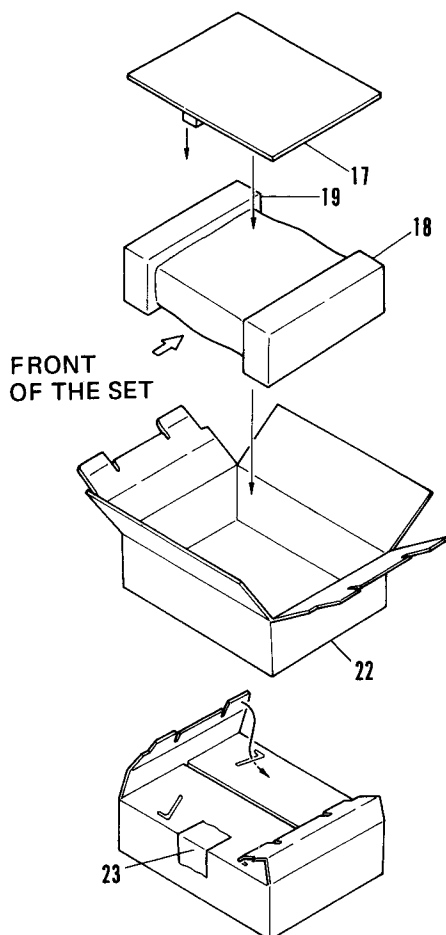
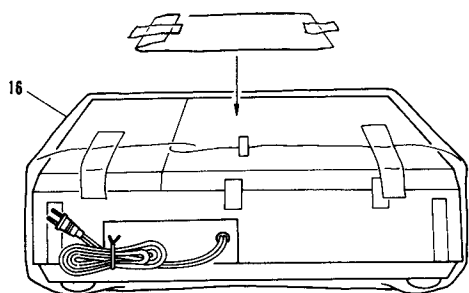
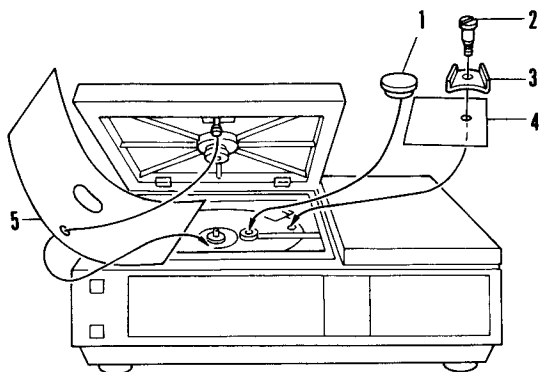
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7. PACKING PROCESS





PACKING PROCESS

1. Set the lens cap, loose the shipping screw together with the caution tag and the shipping plate, and then close the hood securely. Power switch must be turned off.
2. Bind the power cord, place the set in the bag and seal it with adhesive tapes as illustrated. Take care that the power plug doesn't injure the set.
3. Stick the bag containing "Operating Instructions" on the packed set.
4. Fit the pad L and R correctly into position at the both ends of the set, place the set in the packing box, and the cushion board on the set with the cushion against the front of the hood.
5. As illustrated turn the top of the box in.

PACKING MATERIALS

Mark	No.	Part No.	Description
	1.	VHA-012	Lens cap
	2.	VLL-089	Shipping screw
	3.	VNE-276	Shipping plate
	4.	VRW-091	Caution tag
	5.	VHA-017	Sheet
	6.	VRB-024	Operating instructions
	7.	VHL-014	Bag
	8.	VHA-029	Bag
	9.	VXA-069	Cushion board
	10.	VHA-033	Pad (R)
	11.	VHA-032	Pad (L)
	12.	VHG-064	Packing box
	13.	VRW-049	Label

8. SAFETY CHECK

 **CAUTION**
RISK OF ELECTRIC SHOCK
DO NOT OPEN 

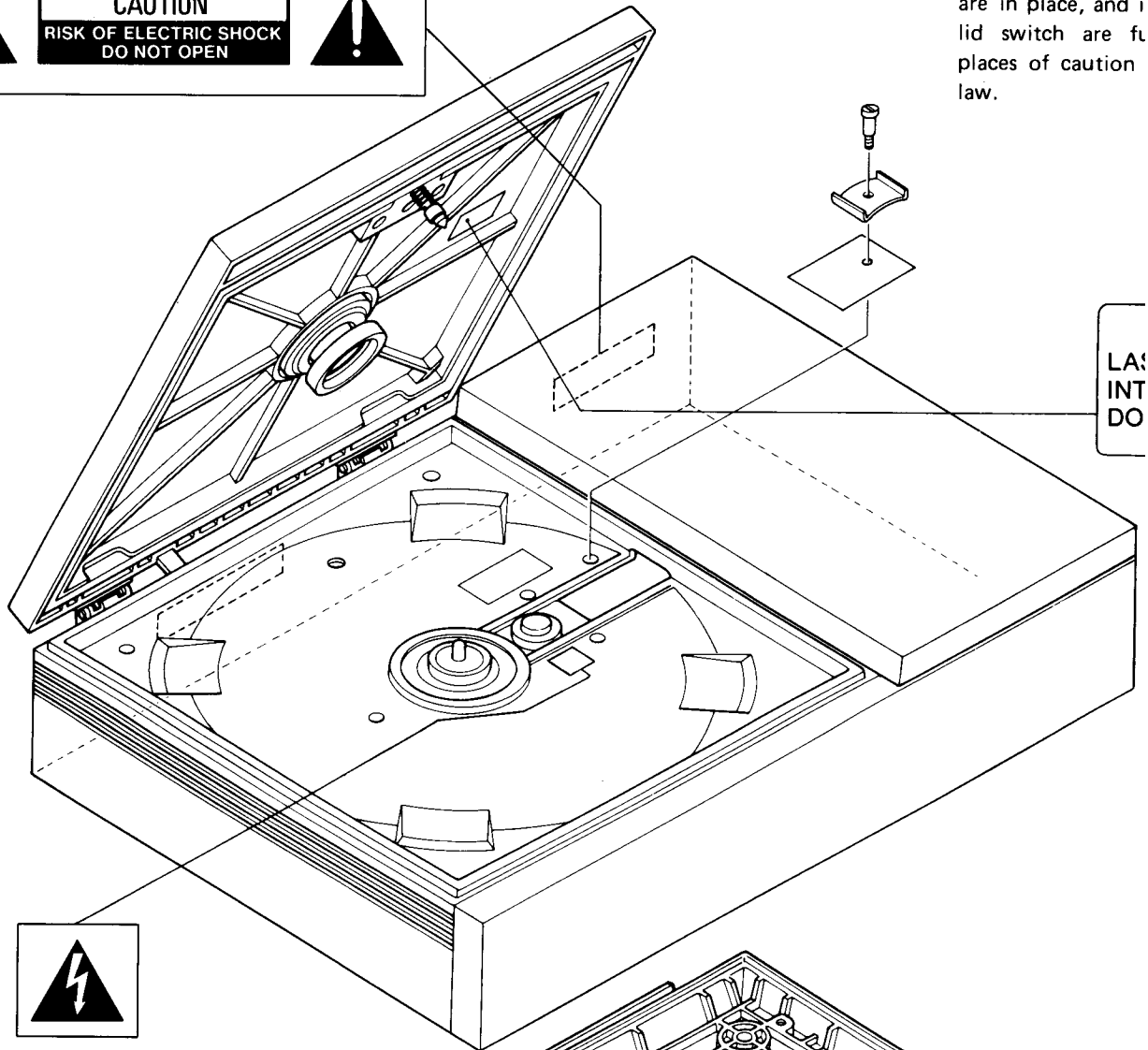
Before returning
make sure all shields
are in place, and i
lid switch are fu
places of caution
law.

A

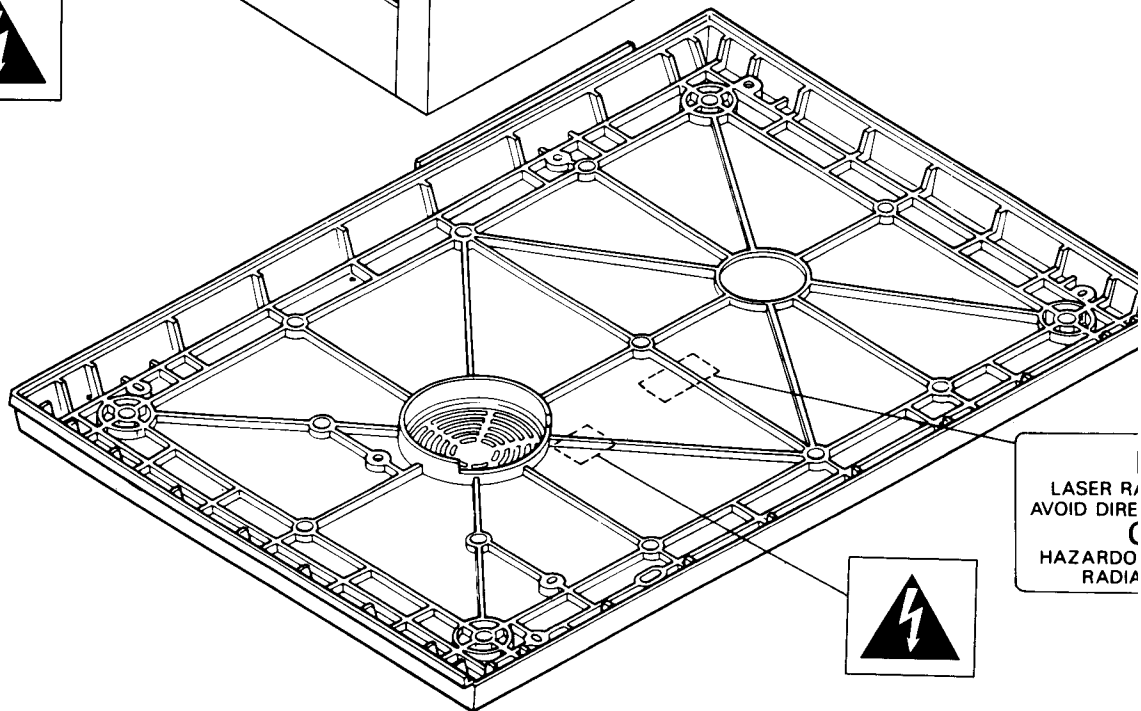
B

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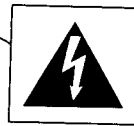
D



LASER
INT
DO

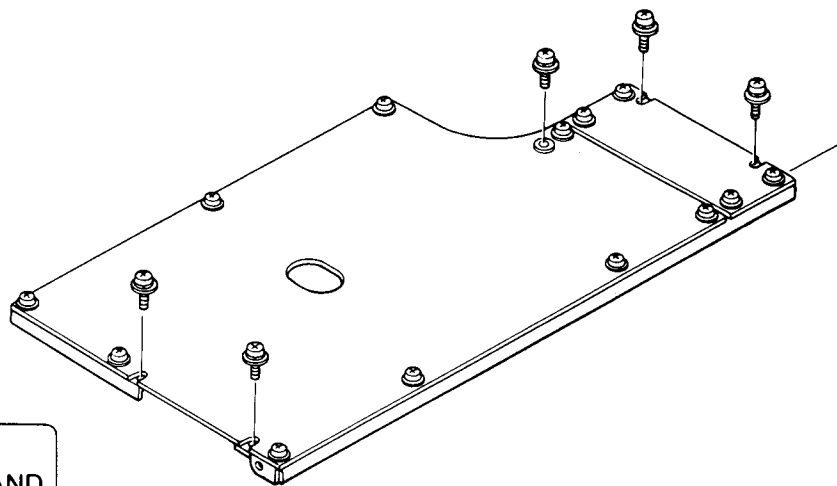


LASER R
AVOID DIRE
HAZARDO
RADIAT



NOTE:

Returning this player to the customer, reassemble all shields, barriers, covers, and labels in the correct sequence, and inter-lock system of the lid, and ensure all components are functioning properly. Attaching the caution labels are based on the federal

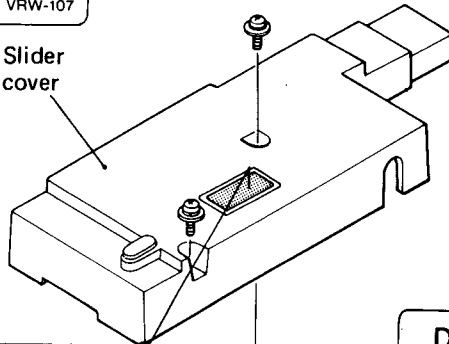


A

CAUTION
LASER LIGHT WHEN OPEN AND INTERLOCK FAILED.
DO NOT STARE INTO BEAM.

VRW-107

Slider cover



CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACEMENT FUSES SHOULD BE OF SAME TYPE AND RATINGS ONLY.

VRW-021

B

DANGER VRW-095
LASER RADIATION WHEN OPEN
AVOID DIRECT EXPOSURE TO BEAM
CAUTION
HAZARDOUS ELECTROMAGNETIC RADIATION WHEN OPEN

High voltage cover

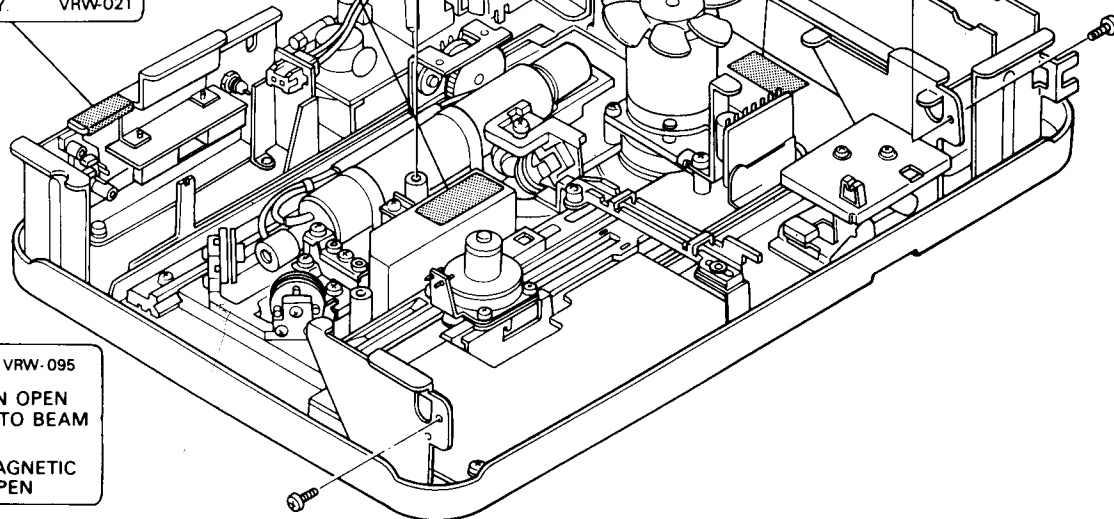
DANGER
HIGH VOLTAGE
VRW-085

CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACEMENT FUSES SHOULD BE OF SAME TYPE AND RATINGS ONLY.

VRW-021

C

DANGER VRW-095
LASER RADIATION WHEN OPEN
AVOID DIRECT EXPOSURE TO BEAM
CAUTION
HAZARDOUS ELECTROMAGNETIC RADIATION WHEN OPEN



D

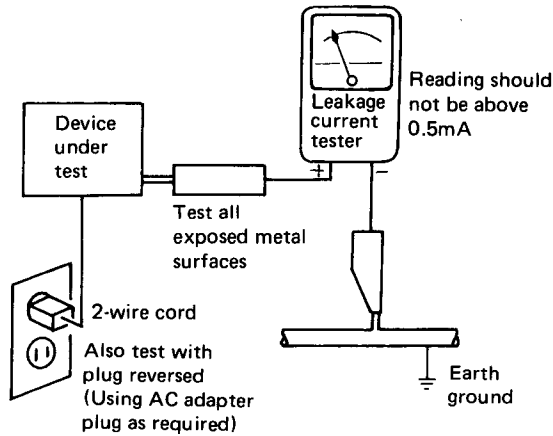
9. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a \square on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.