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SERVICE MANUAL

MODELS : DK577XB/DK578XB/DK589XB(DK9753CEM/DK9853CEM/DK9966CEM)

LG Electronics Inc.

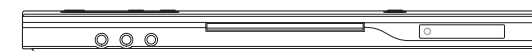


DVD VIDEO PLAYER SERVICE MANUAL

**MODELS : DK577XB/DK578XB/DK589XB
(DK9753CEM/DK9853CEM/DK9966CEM)**

CAUTION

BEFORE SERVICING THE UNIT, READ THE "SAFETY PRECAUTIONS"
IN THIS MANUAL.



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SUMMARY

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PRODUCT SAFETY SERVICING GUIDELINES FOR VIDEO PRODUCTS

CAUTION : DO NOT ATTEMPT TO MODIFY THIS PRODUCT IN ANY WAY. NEVER PERFORM CUSTOMIZED INSTALLATIONS WITHOUT MANUFACTURER'S APPROVAL. UNAUTHORIZED MODIFICATIONS WILL NOT ONLY VOID THE WARRANTY, BUT MAY LEAD TO YOUR BEING LIABLE FOR ANY RESULTING PROPERTY DAMAGE OR USER INJURY.

SERVICE WORK SHOULD BE PERFORMED ONLY AFTER YOU ARE THOROUGHLY FAMILIAR WITH ALL OF THE FOLLOWING SAFETY CHECKS AND SERVICING GUIDELINES. TO DO OTHERWISE, INCREASES THE RISK OF POTENTIAL HAZARDS AND INJURY TO THE USER.

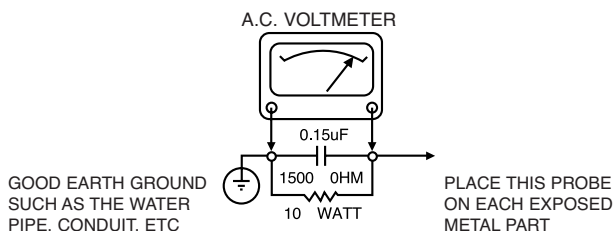
WHILE SERVICING, USE AN ISOLATION TRANSFORMER FOR PROTECTION FROM A.C. LINE SHOCK.

SAFETY CHECKS

AFTER THE ORIGINAL SERVICE PROBLEM HAS BEEN CORRECTED, A CHECK SHOULD BE MADE OF THE FOLLOWING.

SUBJECT : FIRE & SHOCK HAZARD

1. BE SURE THAT ALL COMPONENTS ARE POSITIONED IN SUCH A WAY AS TO AVOID POSSIBILITY OF ADJACENT COMPONENT SHORTS. THIS IS ESPECIALLY IMPORTANT ON THOSE MODULES WHICH ARE TRANSPORTED TO AND FROM THE REPAIR SHOP.
2. NEVER RELEASE A REPAIR UNLESS ALL PROTECTIVE DEVICES SUCH AS INSULATORS, BARRIERS, COVERS, SHIELDS, STRAIN RELIEFS, POWER SUPPLY CORDS, AND OTHER HARDWARE HAVE BEEN REINSTALLED PER ORIGINAL DESIGN. BE SURE THAT THE SAFETY PURPOSE OF THE POLARIZED LINE PLUG HAS NOT BEEN DEFEATED.
3. SOLDERING MUST BE INSPECTED TO DISCOVER POSSIBLE COLD SOLDER JOINTS, SOLDER SPLASHES OR SHARP SOLDER POINTS. BE CERTAIN TO REMOVE ALL LOOSE FOREIGN PARTICLES.
4. CHECK FOR PHYSICAL EVIDENCE OF DAMAGE OR DETERIORATION TO PARTS AND COMPONENTS. FOR FRAYED LEADS, DAMAGED INSULATION (INCLUDING A.C. CORD), AND REPLACE IF NECESSARY FOLLOW ORIGINAL LAYOUT, LEAD LENGTH AND DRESS.
5. NO LEAD OR COMPONENT SHOULD TOUCH A RECEIVING TUBE OR A RESISTOR RATED AT 1 WATT OR MORE. LEAD TENSION AROUND PROTRUDING METAL SURFACES MUST BE AVOIDED.
6. ALL CRITICAL COMPONENTS SUCH AS FUSES, FLAMEPROOF RESISTORS, CAPACITORS, ETC. MUST BE REPLACED WITH EXACT FACTORY TYPES, DO NOT USE REPLACEMENT COMPONENTS OTHER THAN THOSE SPECIFIED OR MAKE UNRECOMMENDED CIRCUIT MODIFICATIONS.
7. AFTER RE-ASSEMBLY OF THE SET ALWAYS PERFORM AN A.C. LEAKAGE TEST ON ALL EXPOSED METALLIC PARTS OF THE CABINET, (THE CHANNEL SELECTOR KNOB, ANTENNA TERMINALS, HANDLE AND SCREWS) TO BE SURE THE SET IS SAFE TO OPERATE WITHOUT DANGER OF ELECTRICAL SHOCK. DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST USE AN A.C. VOLT-METER, HAVING 5000 OHMS PER VOLT OR MORE SENSITIVITY, IN THE FOLLOWING MANNER; CONNECT A 1500 OHM 10 WATT RESISTOR, PARALLELED BY A .15 MFD. 150.V A.C TYPE CAPACITOR BETWEEN A KNOWN GOOD EARTH GROUND (WATER PIPE, CONDUIT, ETC.) AND THE EXPOSED METALLIC PARTS, ONE AT A TIME. MEASURE THE A.C. VOLTAGE ACROSS THE COMBINATION OF 1500 OHM RESISTOR AND .15 MFD CAPACITOR. REVERSE THE A.C. PLUG AND REPEAT A.C. VOLTAGE MEASUREMENTS FOR EACH EXPOSED METALLIC PART. VOLTAGE MEASURED MUST NOT EXCEED 75 VOLTS R.M.S. THIS CORRESPONDS TO 0.5 MILLIAMPS A.C. ANY VALUE EXCEEDING THIS LIMIT CONSTITUTES A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED IMMEDIATELY.



SUBJECT: GRAPHIC SYMBOLS



THE LIGHTNING FLASH WITH APROWHEAD SYMBOL, WITHIN AN EQUILATERAL TRIANGLE, IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF UNINSULATED "DANGEROUS VOLTAGE" THAT MAY BE OF SUFFICIENT MAGNITUDE TO CONSTITUTE A RISK OF ELECTRIC SHOCK.



THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

SUBJECT : X-RADIATION

1. BE SURE PROCEDURES AND INSTRUCTIONS TO ALL SERVICE PERSONNEL COVER THE SUBJECT OF X-RADIATION. THE ONLY POTENTIAL SOURCE OF X-RAYS IN CURRENT T.V. RECEIVERS IS THE PICTURE TUBE. HOWEVER, THIS TUBE DOES NOT EMIT X-RAYS WHEN THE HIGH VOLTAGE IS AT THE FACTORY SPECIFIED LEVEL. THE PROPER VALUE IS GIVEN IN THE APPLICABLE SCHEMATIC. OPERATION AT HIGHER VOLTAGES MAY CAUSE A FAILURE OF THE PICTURE TUBE OR HIGH VOLTAGE SUPPLY AND, UNDER CERTAIN CIRCUMSTANCES, MAY PRODUCE RADIATION IN EXCESS OF DESIRABLE LEVELS.
2. ONLY FACTORY SPECIFIED C.R.T. ANODE CONNECTORS MUST BE USED. DEGAUSSING SHIELDS ALSO SERVE AS X-RAY SHIELD IN COLOR SETS, ALWAYS RE-INSTALL THEM.
3. IT IS ESSENTIAL THAT SERVICE PERSONNEL HAVE AVAILABLE AN ACCURATE AND RELIABLE HIGH VOLTAGE METER. THE CALIBRATION OF THE METER SHOULD BE CHECKED PERIODICALLY AGAINST A REFERENCE STANDARD, SUCH AS THE ONE AVAILABLE AT YOUR DISTRIBUTOR.
4. WHEN THE HIGH VOLTAGE CIRCUITRY IS OPERATING PROPERLY THERE IS NO POSSIBILITY OF AN X-RADIATION PROBLEM. EVERY TIME A COLOR CHASSIS IS SERVICED, THE BRIGHTNESS SHOULD BE RUN UP AND DOWN WHILE MONITORING THE HIGH VOLTAGE WITH A METER TO BE CERTAIN THAT THE HIGH VOLTAGE DOES NOT EXCEED THE SPECIFIED VALUE AND THAT IT IS REGULATING CORRECTLY. WE SUGGEST THAT YOU AND YOUR SERVICE ORGANIZATION REVIEW TEST PROCEDURES SO THAT VOLTAGE REGULATION IS ALWAYS CHECKED AS A STANDARD SERVICING PROCEDURE. AND THAT THE HIGH VOLTAGE READING BE RECORDED ON EACH CUSTOMER'S INVOICE.
5. WHEN TROUBLESHOOTING AND MAKING TEST MEASUREMENTS IN A PRODUCT WITH A PROBLEM OF EXCESSIVE HIGH VOLTAGE, AVOID BEING UNNECESSARILY CLOSE TO THE PICTURE TUBE AND THE HIGH VOLTAGE SUPPLY. DO NOT OPERATE THE PRODUCT LONGER THAN IS NECESSARY TO LOCATE THE CAUSE OF EXCESSIVE VOLTAGE.
6. REFER TO HV. B+ AND SHUTDOWN ADJUSTMENT PROCEDURES DESCRIBED IN THE APPROPRIATE SCHEMATIC AND DIAGRAMS (WHERE USED).

SUBJECT: IMPLOSION

1. ALL DIRECT VIEWED PICTURE TUBES ARE EQUIPPED WITH AN INTEGRAL IMPLOSION PROTECTION SYSTEM, BUT CARE SHOULD BE TAKEN TO AVOID DAMAGE DURING INSTALLATION, AVOID SCRATCHING THE TUBE. IF SCRATCHED REPLACE IT.
2. USE ONLY RECOMMENDED FACTORY REPLACEMENT TUBES.

SUBJECT : TIPS ON PROPER INSTALLATION

1. NEVER INSTALL ANY PRODUCT IN A CLOSED-IN RECESS, CUBBY-HOLE OR CLOSELY FITTING SHELF SPACE. OVER OR CLOSE TO HEAT DUCT, OR IN THE PATH OF HEATED AIR FLOW.
2. AVOID CONDITIONS OF HIGH HUMIDITY SUCH AS: OUTDOOR PATIO INSTALLATIONS WHERE DEW IS A FACTOR, NEAR STEAM RADIATORS WHERE STEAM LEAKAGE IS A FACTOR, ETC.
3. AVOID PLACEMENT WHERE DRAPERIES MAY OBSTRUCT REAR VENTING. THE CUSTOMER SHOULD ALSO AVOID THE USE OF DECORATIVE SCARVES OR OTHER COVERINGS WHICH MIGHT OBSTRUCT VENTILATION.
4. WALL AND SHELF MOUNTED INSTALLATIONS USING A COMMERCIAL MOUNTING KIT. MUST FOLLOW THE FACTORY APPROVED MOUNTING INSTRUCTIONS A PRODUCT MOUNTED TO A SHELF OR PLATFORM MUST RETAIN ITS ORIGINAL FEET (OR THE EQUIVALENT THICKNESS IN SPACERS) TO PROVIDE ADEQUATE AIR FLOW ACROSS THE BOTTOM, BOLTS OR SCREWS USED FOR FASTENERS MUST NOT TOUCH ANY PARTS OR WIRING. PERFORM LEAKAGE TEST ON CUSTOMIZED INSTALLATIONS.
5. CAUTION CUSTOMERS AGAINST THE MOUNTING OF A PRODUCT ON SLOPING SHELF OR A TILTED POSITION, UNLESS THE PRODUCT IS PROPERLY SECURED.
6. A PRODUCT ON A ROLL-ABOUT CART SHOULD BE STABLE ON ITS MOUNTING TO THE CART. CAUTION THE CUSTOMER ON THE HAZARDS OF TRYING TO ROLL A CART WITH SMALL CASTERS ACROSS THRESHOLDS OR DEEP PILE CARPETS.
7. CAUTION CUSTOMERS AGAINST THE USE OF A CART OR STAND WHICH HAS NOT BEEN LISTED BY UNDERWRITERS LABORATORIES, INC. FOR USE WITH THEIR SPECIFIC MODEL OF TELEVISION RECEIVER OR GENERALLY APPROVED FOR USE WITH T.V.'S OF THE SAME OR LARGER SCREEN SIZE.
8. CAUTION CUSTOMERS AGAINST THE USE OF EXTENSION CORDS, EXPLAIN THAT A FOREST OF EXTENSIONS SPROUTING FROM A SINGLE OUTLET CAN LEAD TO DISASTROUS CONSEQUENCES TO HOME AND FAMILY.

SERVICING PRECAUTIONS

CAUTION : Before servicing the DVD covered by this service data and its supplements and addends, read and follow the **SAFETY PRECAUTIONS**. **NOTE :** if unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions in this publication, always follow the safety precautions.

Remembers Safety First:

General Servicing Precautions

1. Always unplug the DVD AC power cord from the AC power source before:
 - (1) Removing or reinstalling any component, circuit board, module, or any other assembly.
 - (2) Disconnection or reconnecting any internal electrical plug or other electrical connection.
 - (3) Connecting a test substitute in parallel with an electrolytic capacitor.
Caution : A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Do not spray chemicals on or near this DVD or any of its assemblies.
3. Unless specified otherwise in this service data, clean electrical contacts by applying an appropriate contact cleaning solution to the contacts with a pipe cleaner, cotton-tipped swab, or comparable soft applicator.
Unless specified otherwise in this service data, lubrication of contacts is not required.
4. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.
5. Do not apply AC power to this DVD and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
6. Always connect test instrument ground lead to the appropriate ground before connection the test instrument positive lead. Always remove the test instrument ground lead last.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect an insulation resistance meter(500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts (Note 1) should be more than 1M-ohm.

Note 1 : Accessible Conductive Parts including Metal panels, Input terminals, Earphone jacks, etc.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor chip components.

The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified a "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charge sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil, or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

Caution : Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Normally harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

SPECIFICATIONS

• GENERAL

Power requirements:	AC 110-240 V , 50/60 Hz
Power consumption:	8W
Dimensions (Approx.):	430 x 35 x 242 mm (W x H x D) without foot
Weight (Approx.):	1.9 kg
Operating temperature:	5 °C to 35 °C (41 °F to 95 °F)
Operating humidity:	5 % to 90 %

• OUTPUTS

VIDEO OUT:	1 Vp-p 75 Ω , sync negative, RCA jack x 1 / SCART (TO TV)
COMPONENT VIDEO OUT:	(Y) 1.0 V (p-p), 75 Ω , negative sync, RCA jack x 1 (Pb)/(Pr) 0.7 V (p-p), 75 Ω , RCA jack x 2
AUDIO OUT:	2.0 Vrms (1 KHz, 0 dB), 600 Ω , RCA jack (L, R) x 1 / SCART (TO TV)
DIGITAL OUT (COAXIAL):	0.5 V (p-p), 75 Ω , RCA jack x 1

• SYSTEM

Laser:	Semiconductor laser, wavelength 650 nm
Signal system:	PAL / NTSC
Frequency response:	DVD (PCM 96 kHz): 8 Hz to 44 kHz DVD (PCM 48 kHz): 8 Hz to 22 kHz CD: 8 Hz to 20 kHz
Signal-to-noise ratio:	More than 100 dB (ANALOG OUT connectors only)
Harmonic distortion:	Less than 0.008%
Dynamic range:	More than 95 dB (DVD/CD)

• ACCESSORIES

Remote control (1), Batteries (2)

SECTION 2

CABINET & MAIN CHASSIS

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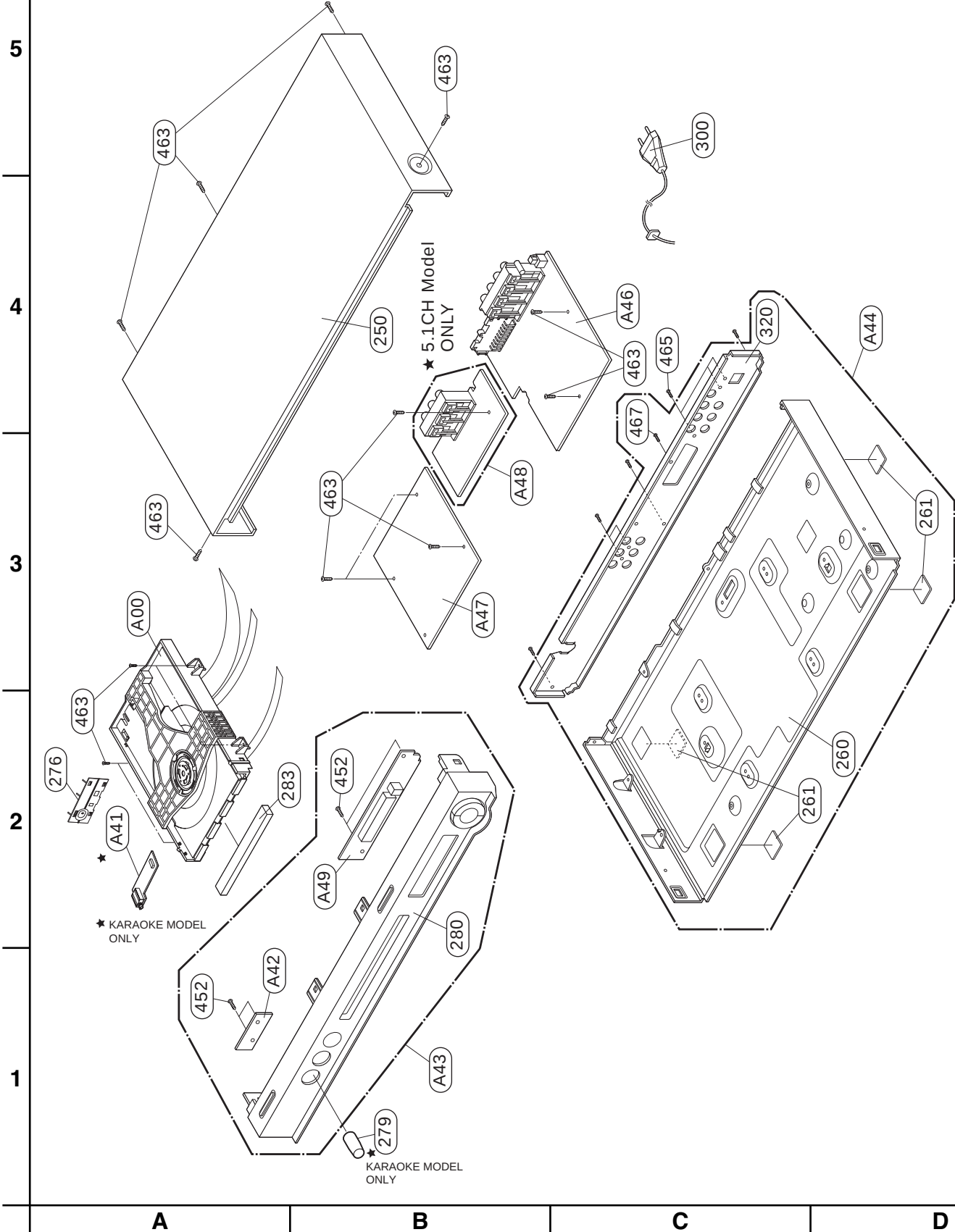
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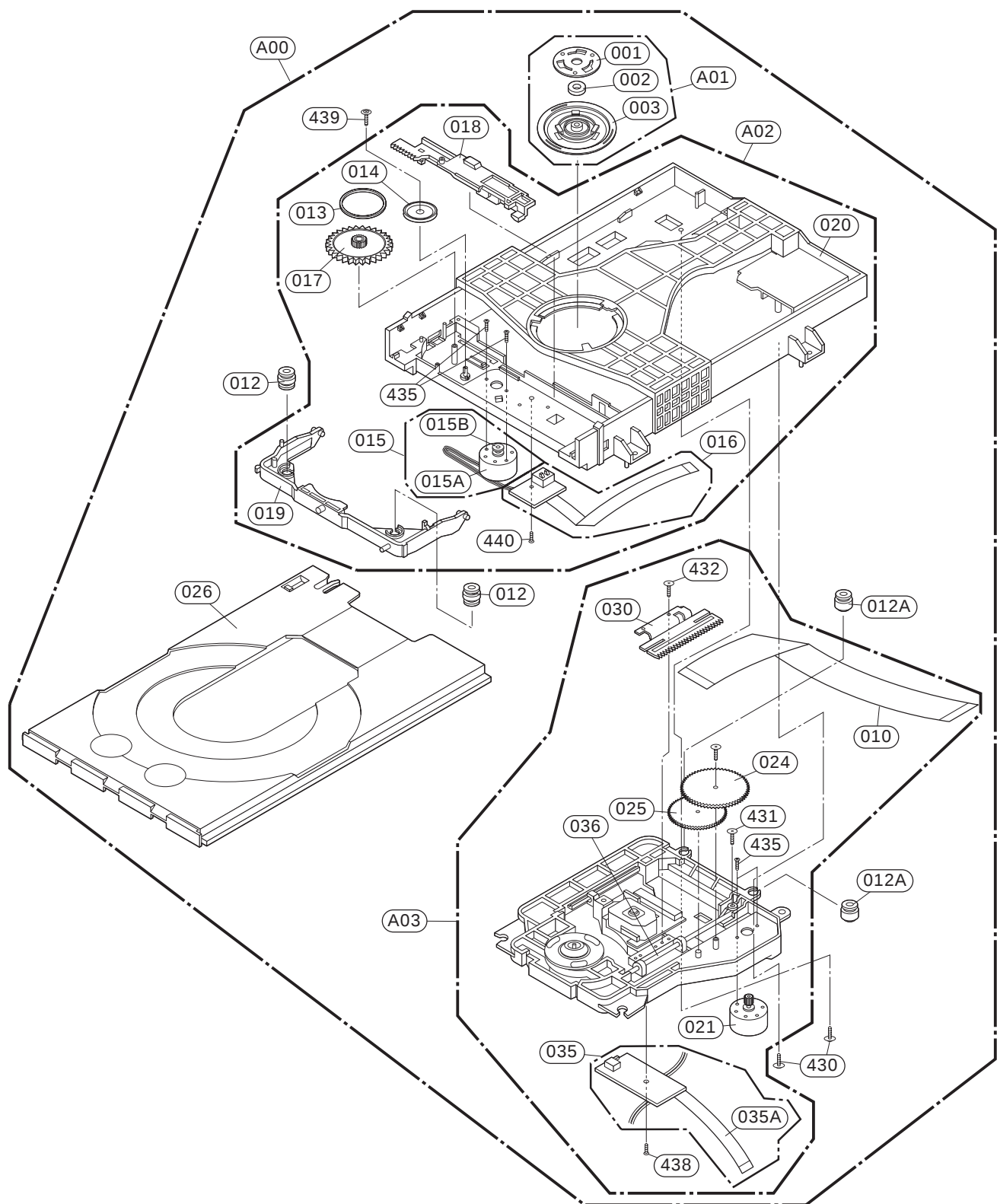
3. Packing Accessory Section2-4

EXPLODED VIEWS

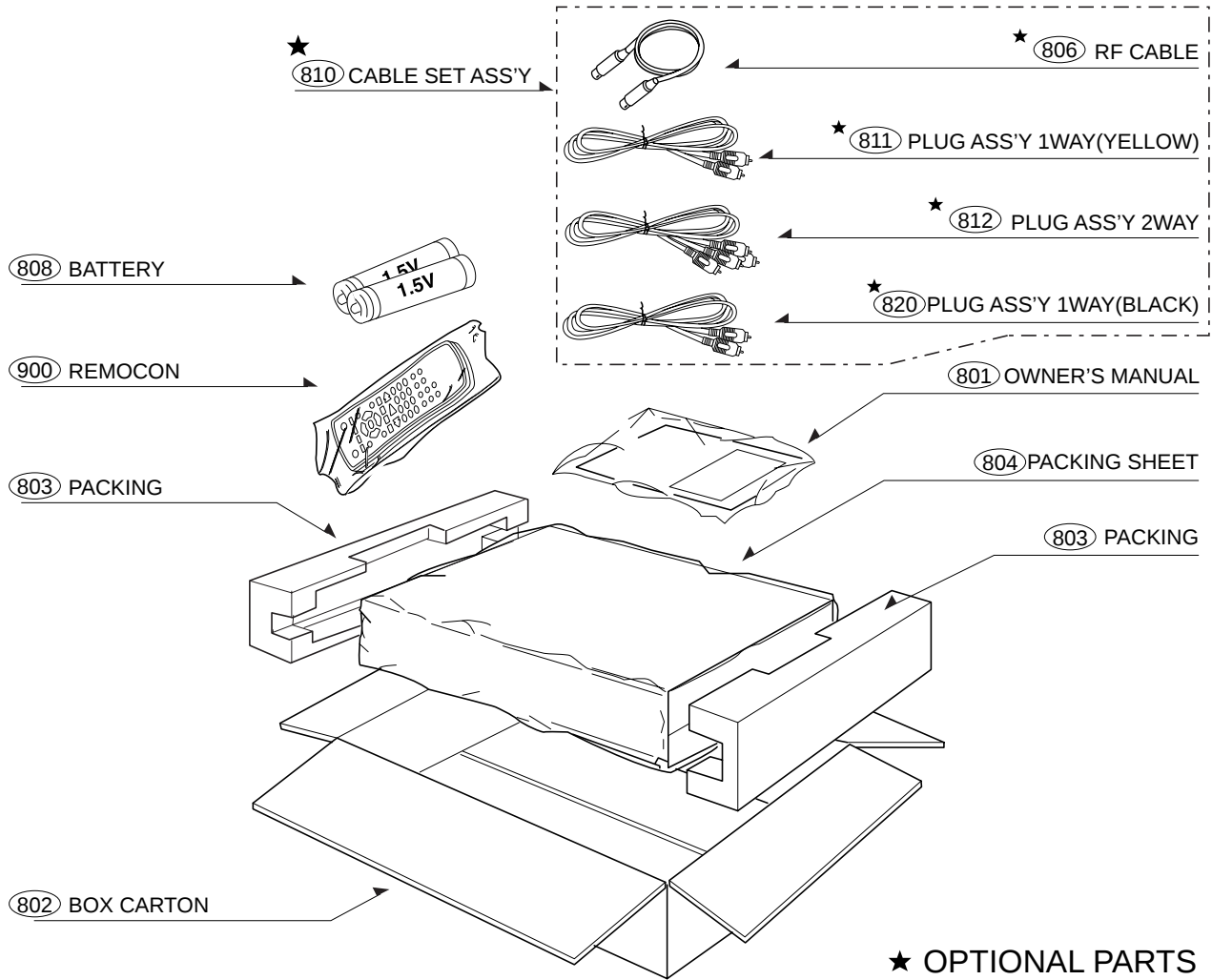
1. Cabinet and Main Frame Section



2. Deck Mechanism Section(DP-9)



3. Packing Accessory Section



SECTION 3

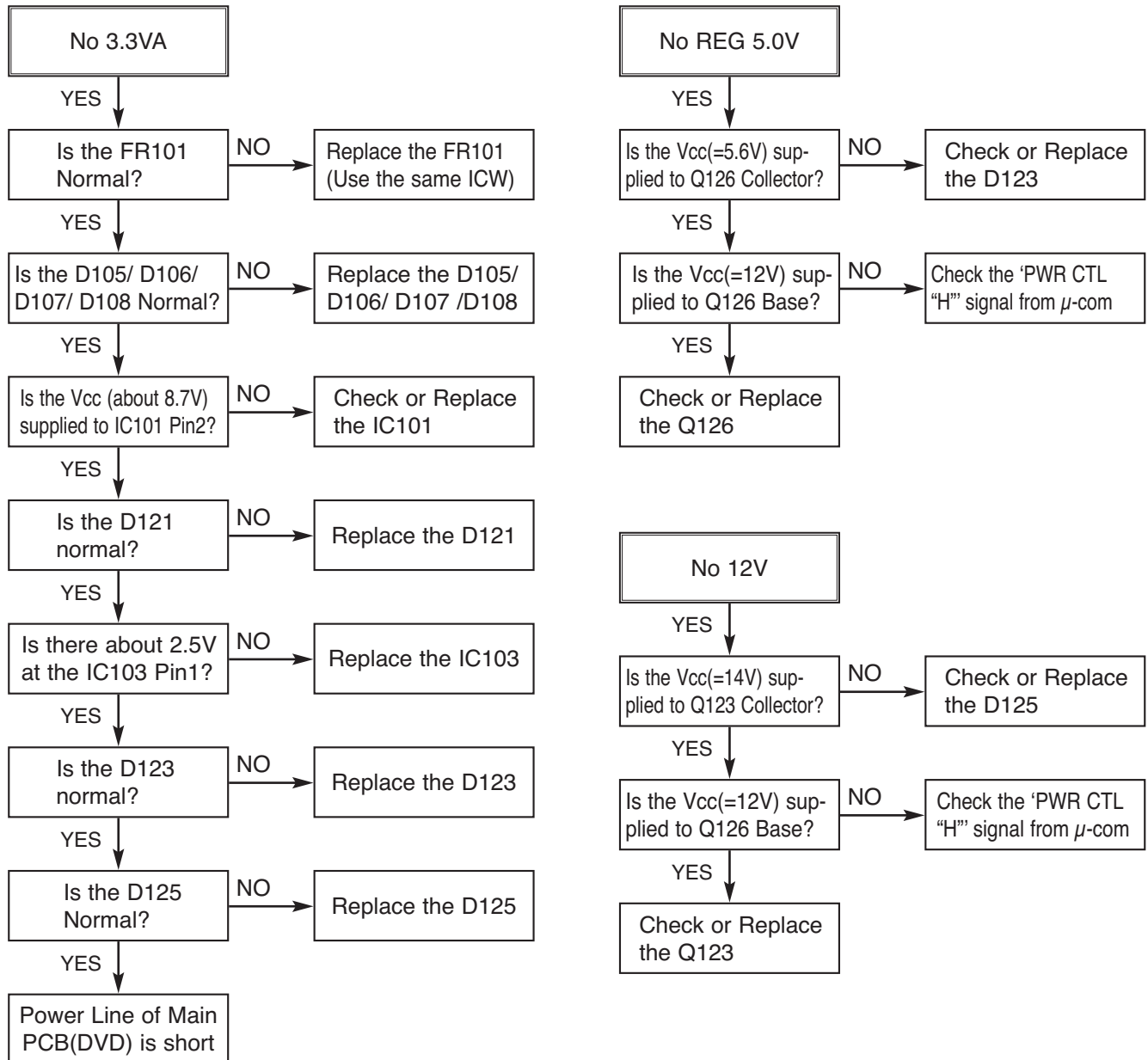
ELECTRICAL

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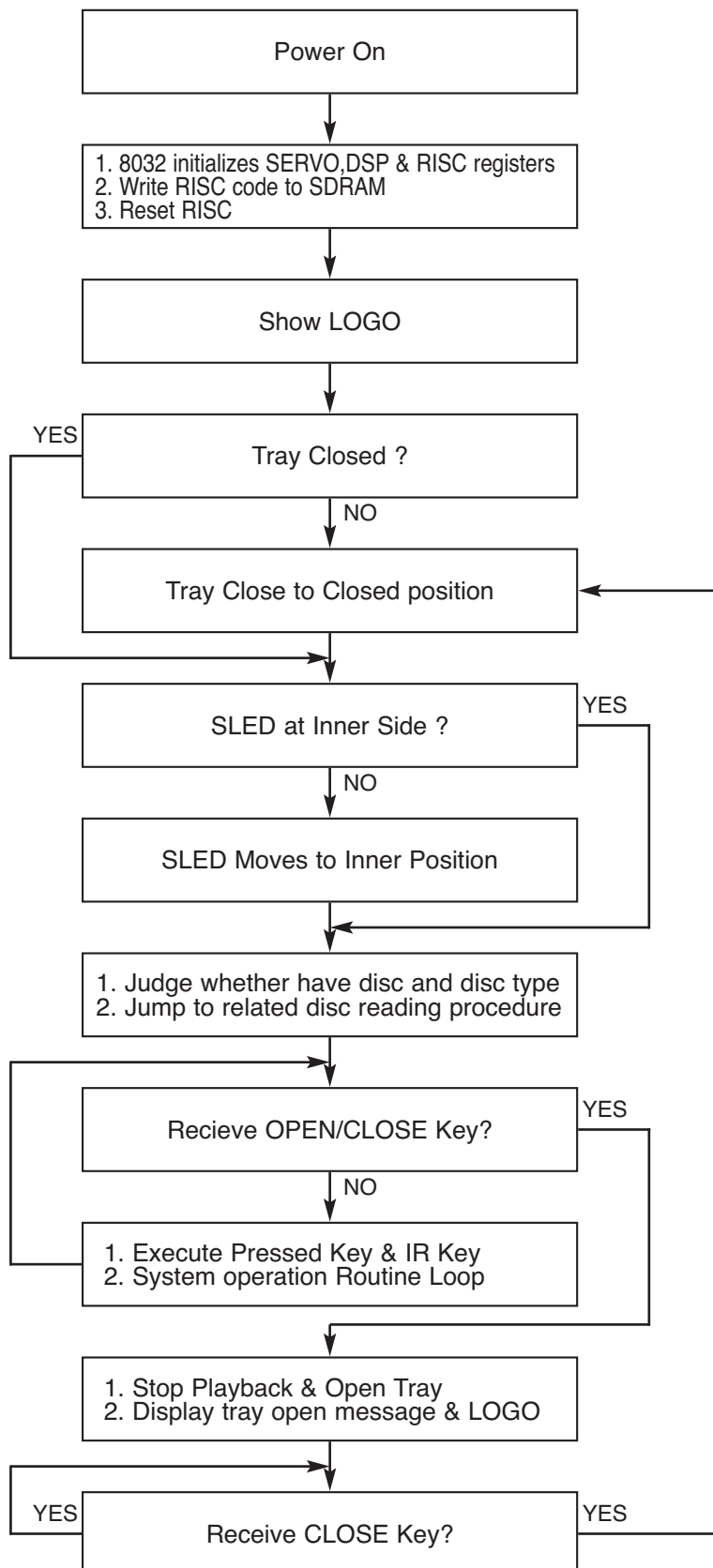
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ELECTRICAL TROUBLESHOOTING GUIDE

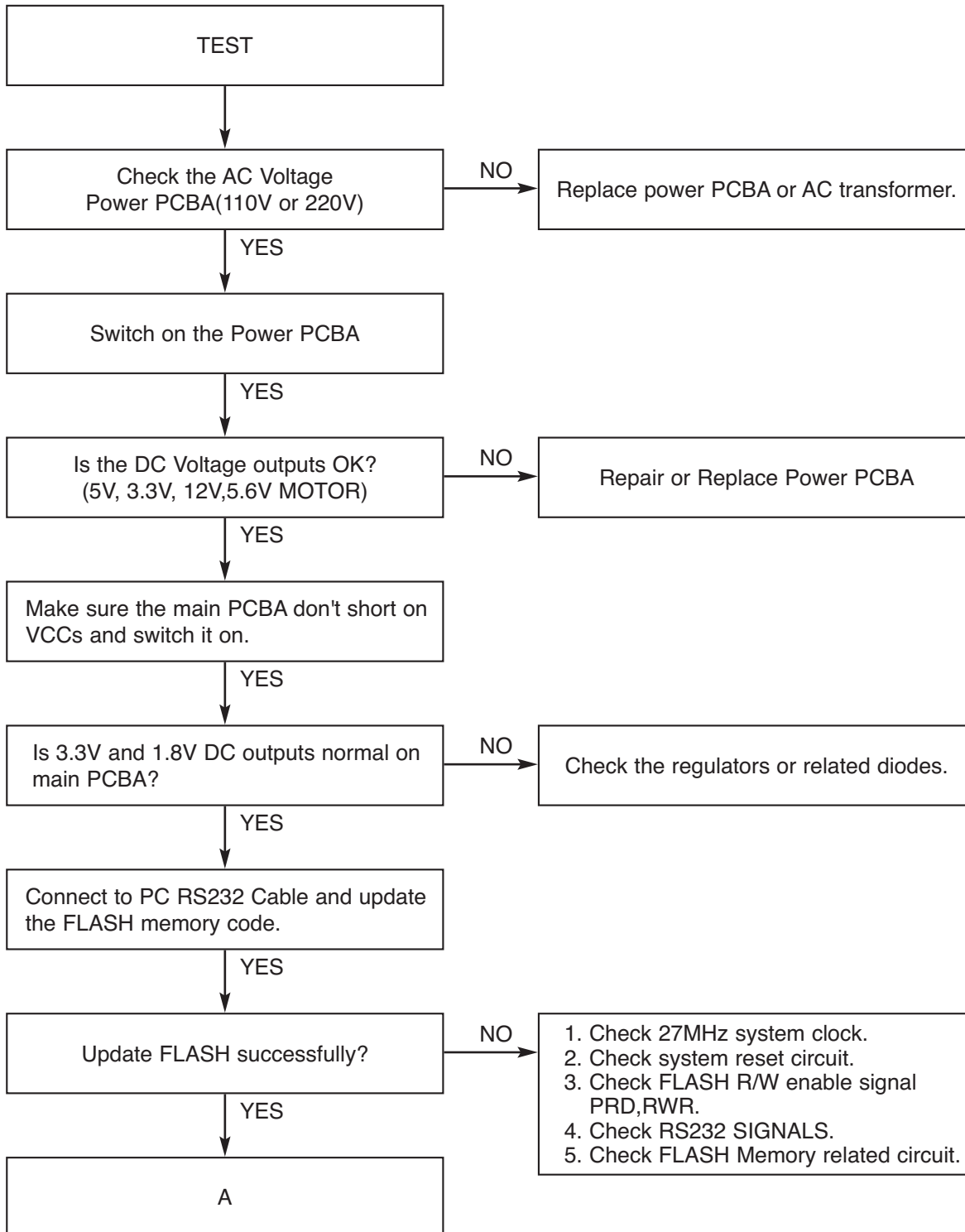
1. Power check flow

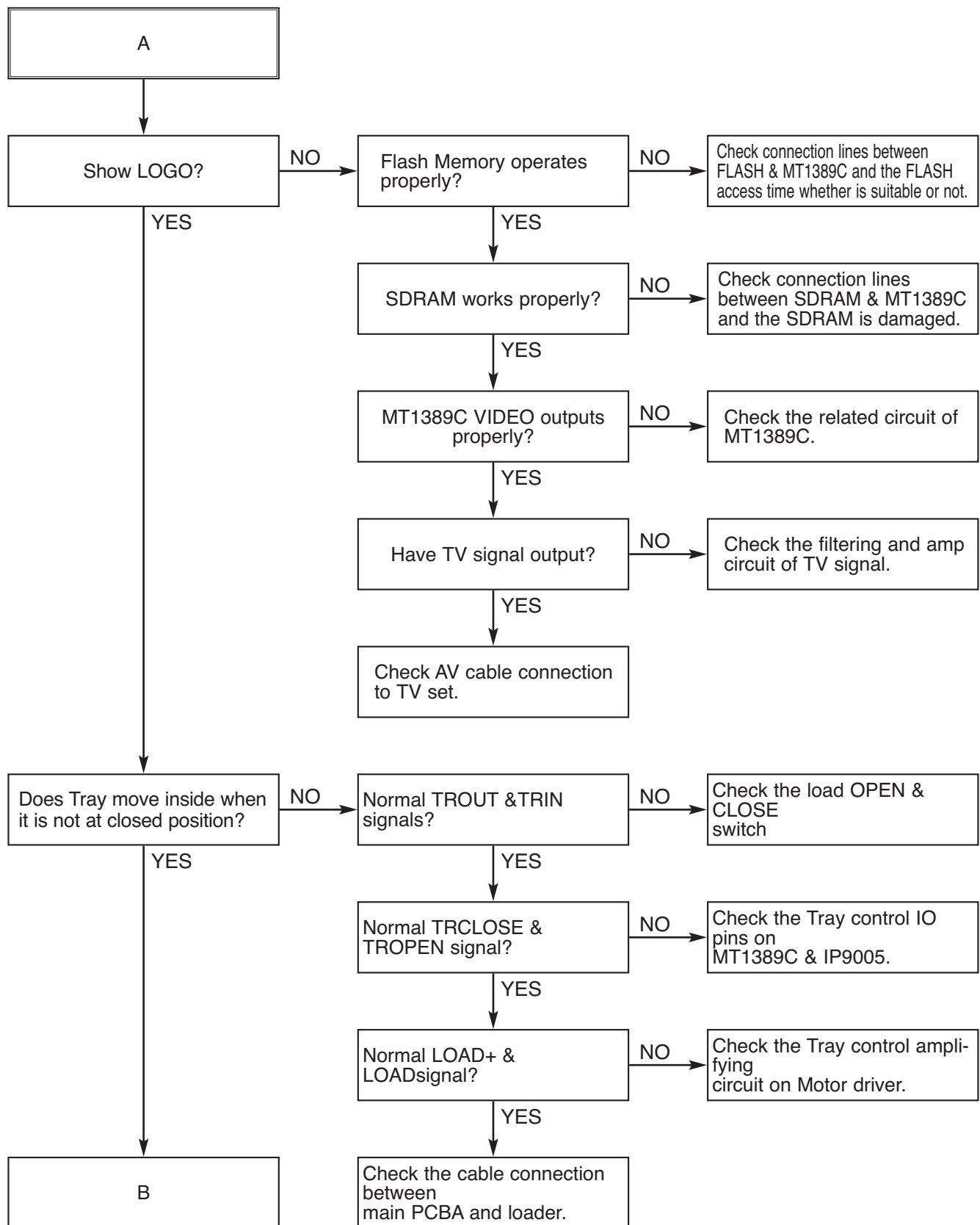


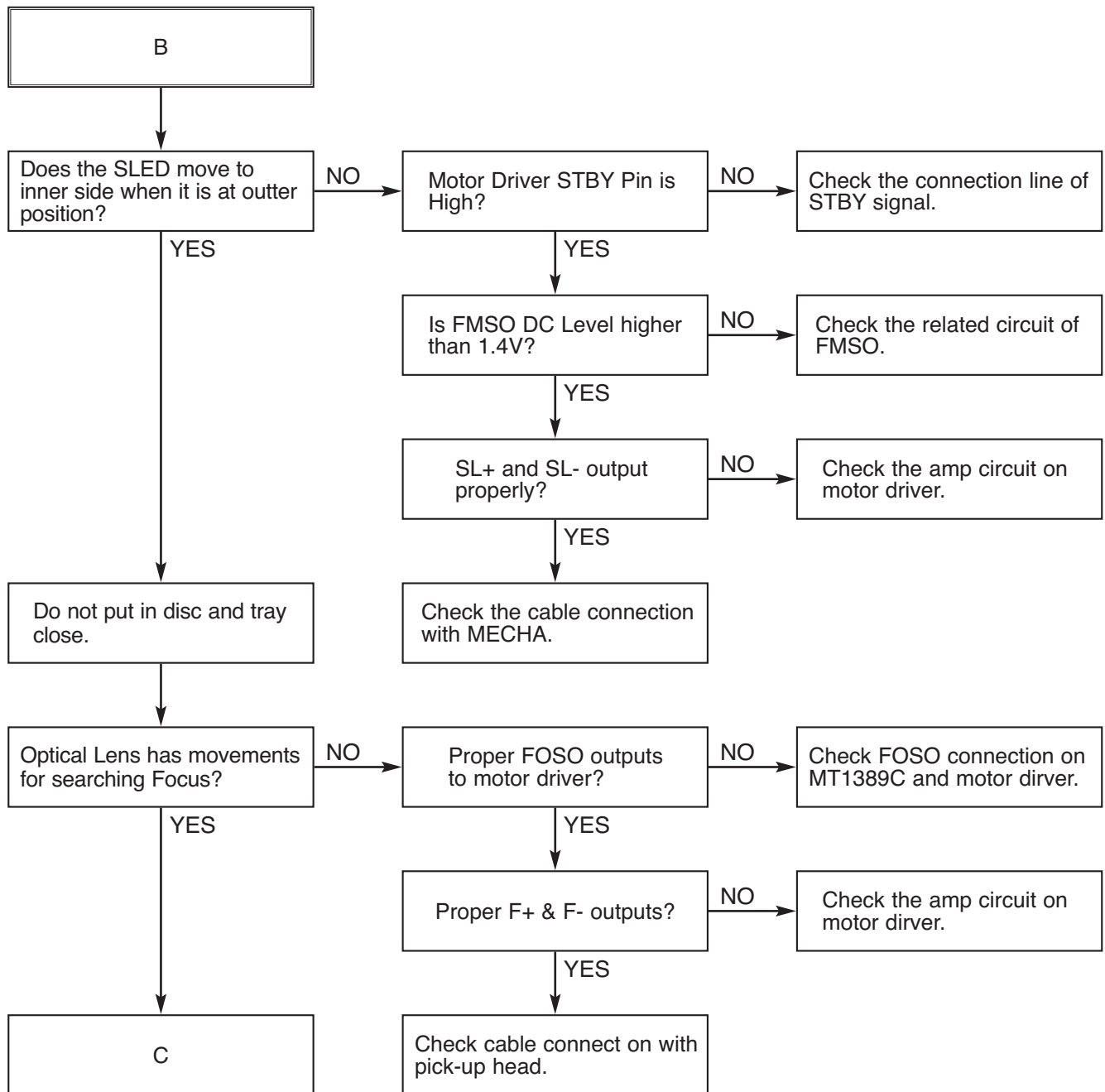
2. System operation flow

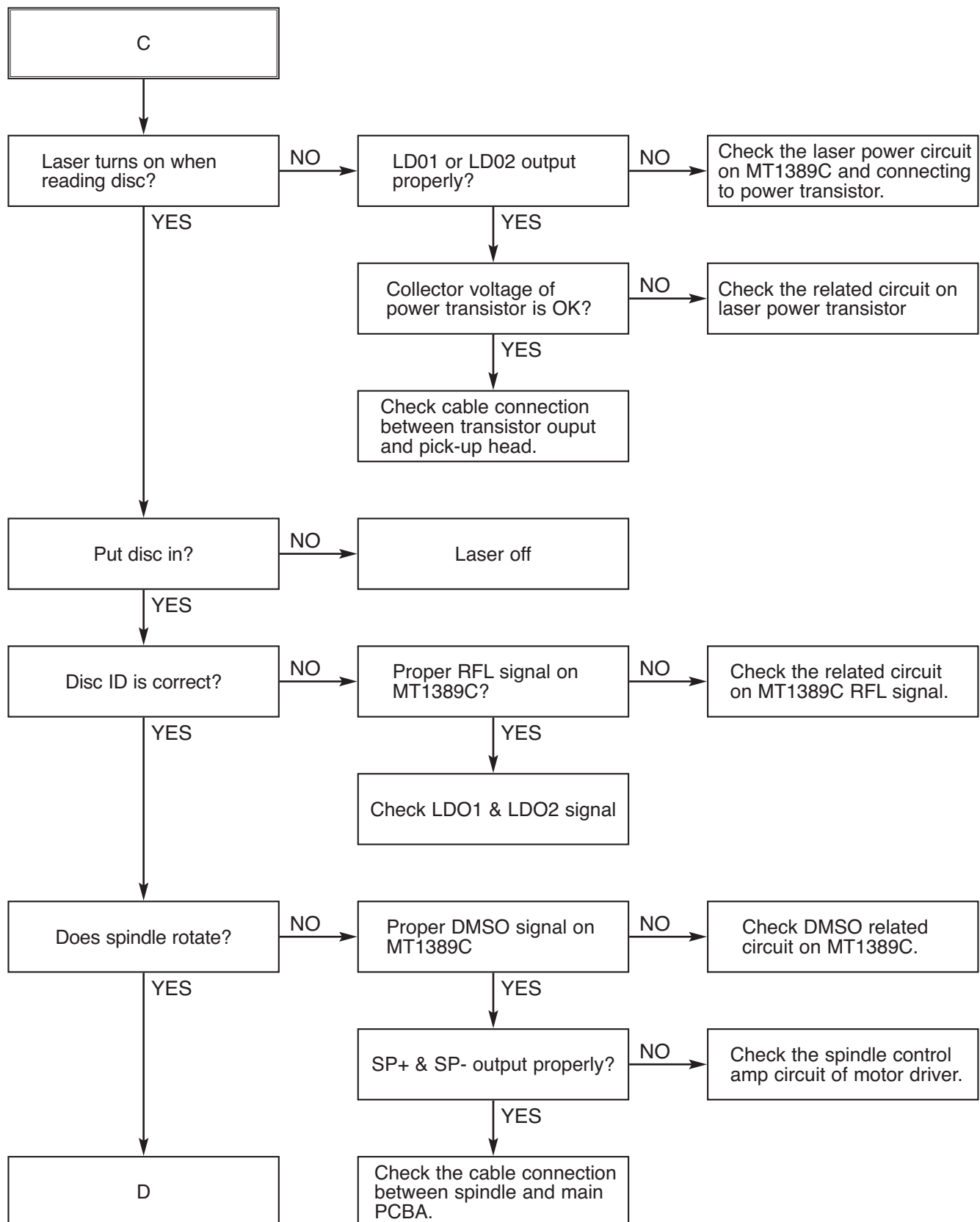


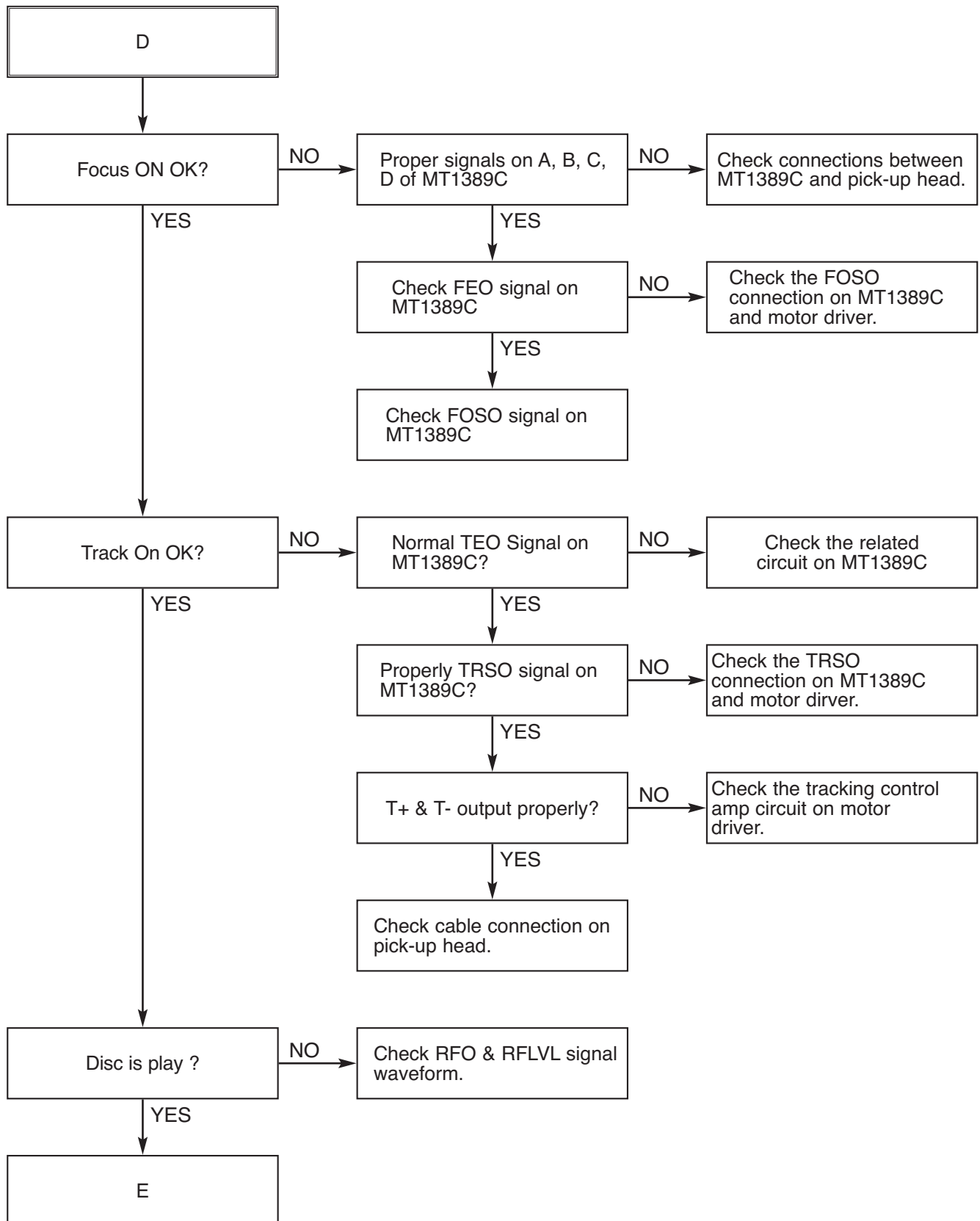
3. Test & debug flow

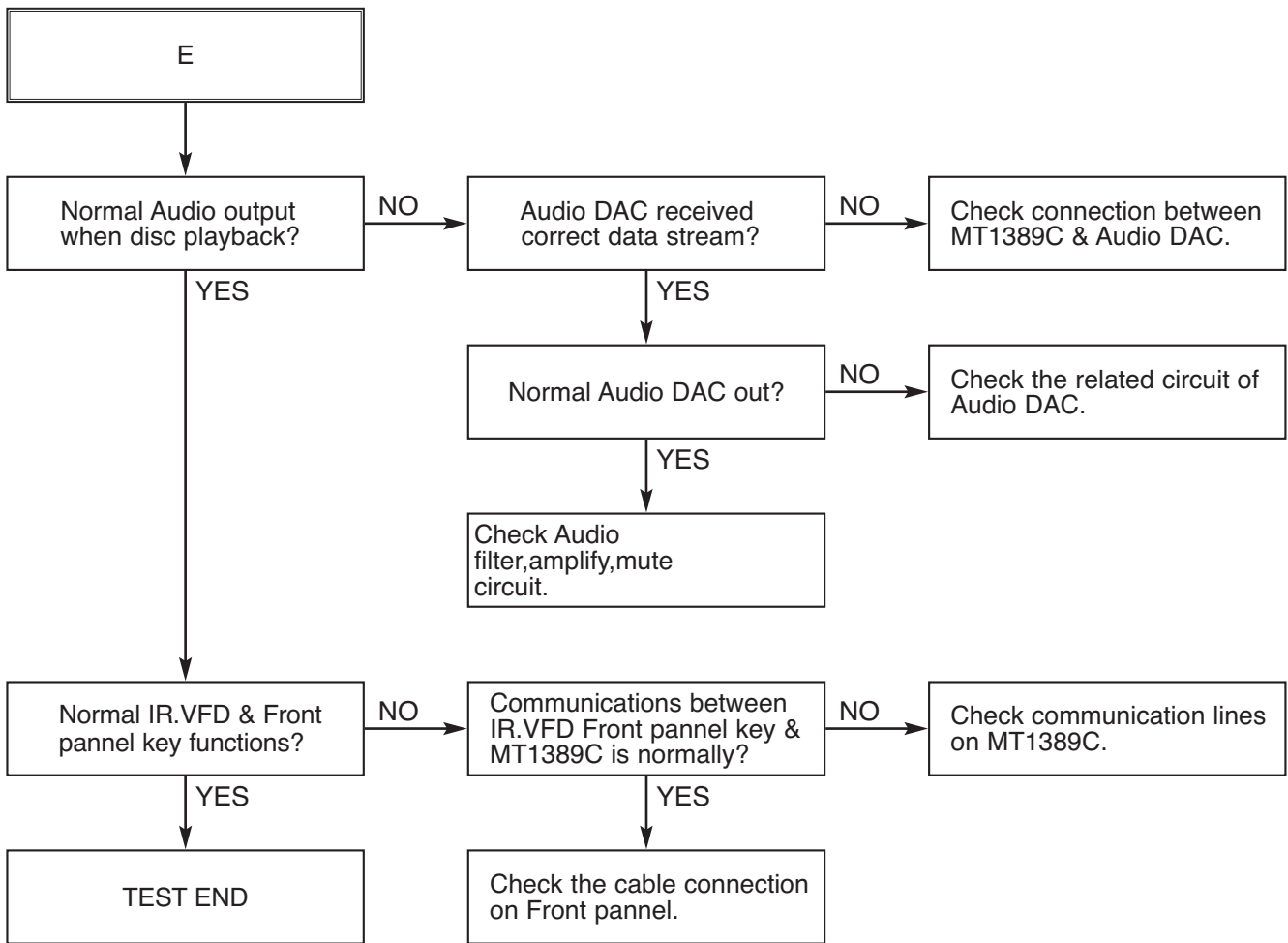




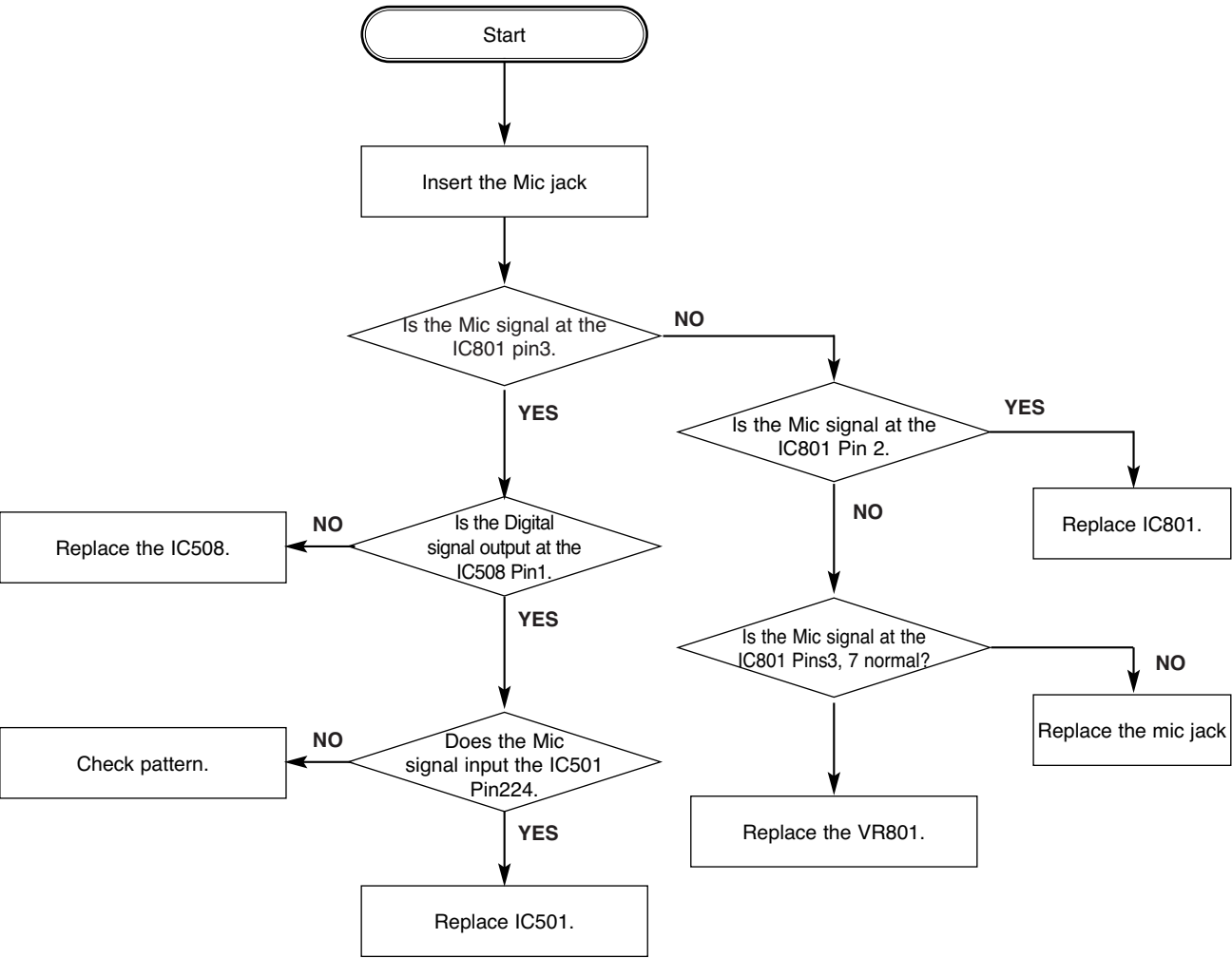








4. KARAOKE Flow (KARAOKE MODEL ONLY)



DETAILS AND WAVEFORMS ON SYSTEM TEST AND DEBUGGING

1. SYSTEM 27MHz CLOCK,RESET,FLASH R/W SIGNAL.

1) MT1389C main clock is at 27MHz(X501)

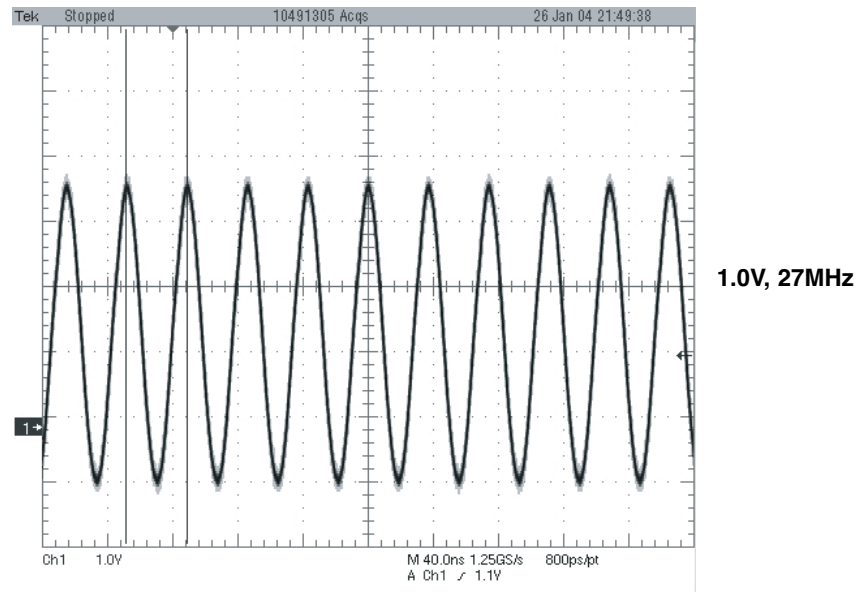


FIG 1-1

2) MT1389 reset is low active.

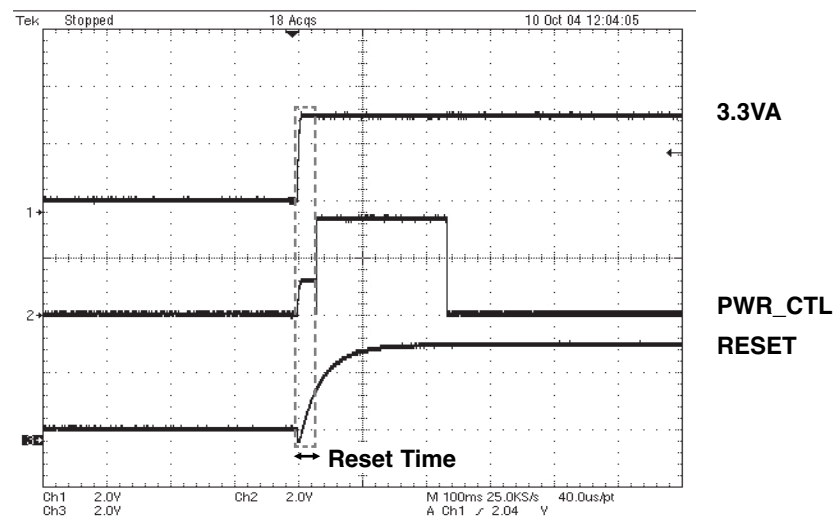


FIG 1-2

3) RS232 waveform during procedure(Downloading)

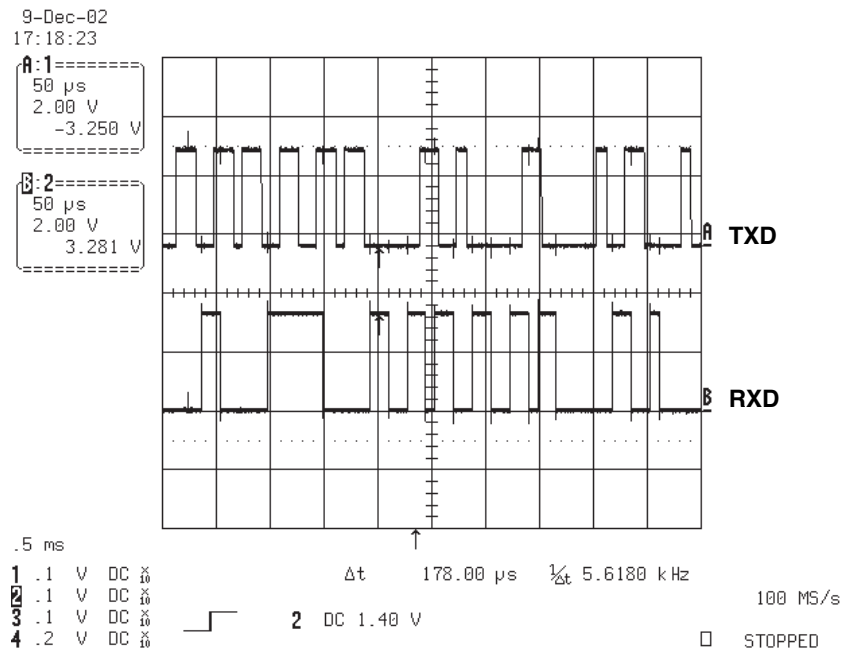


FIG 1-3

4) Flash R/W enable signal during download(Downloading)

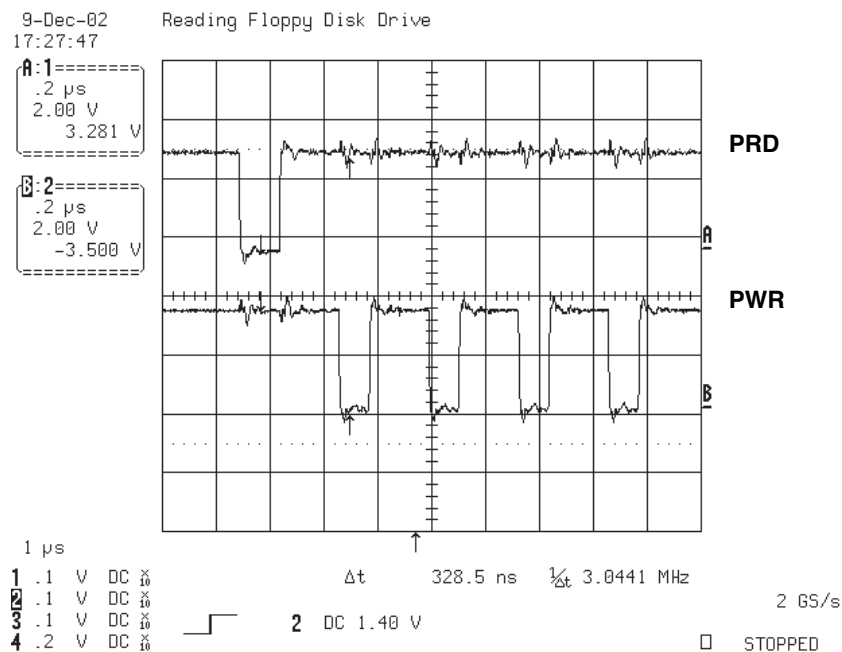


FIG 1-4

2. SDRAM CLOCK

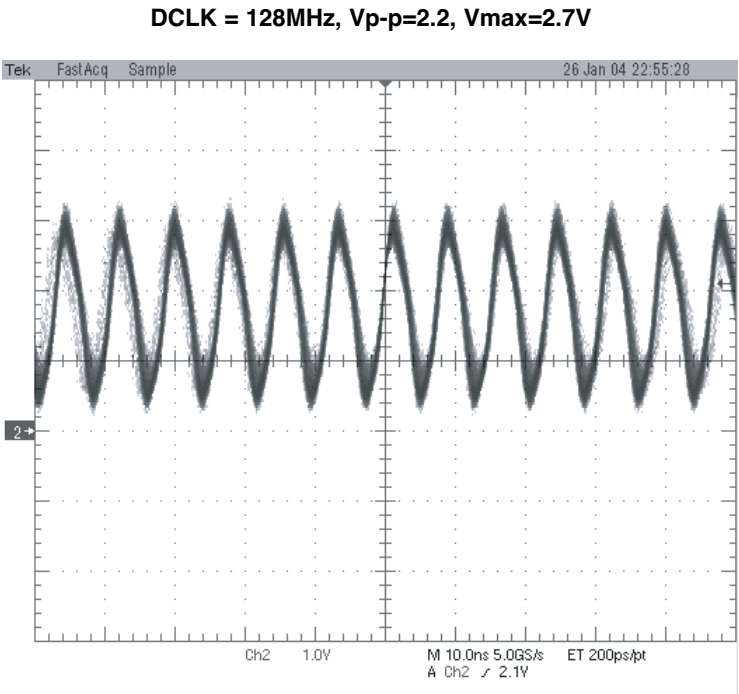


FIG 2-1

3. TRAY OPEN/CLOSE SIGNAL

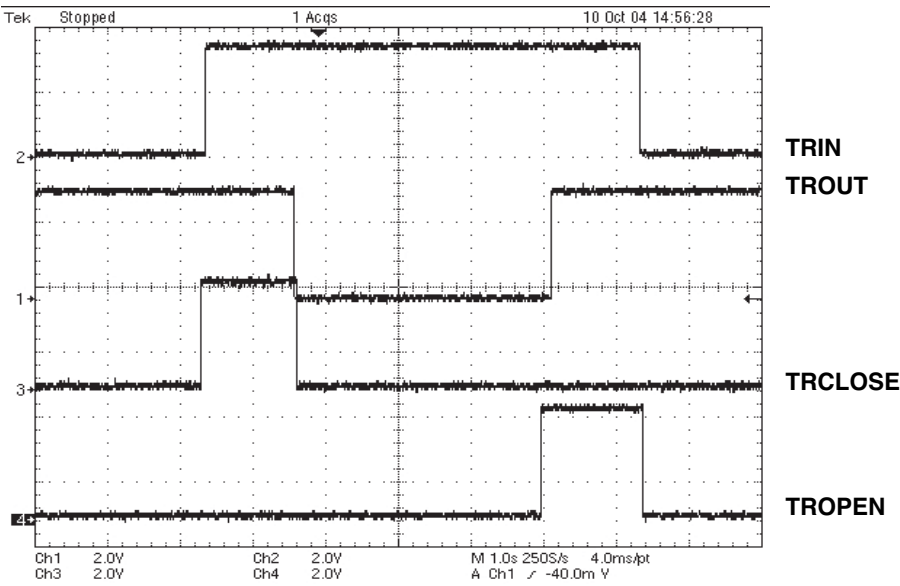


FIG 3-1

4. SLED CONTROL RELATED SIGNAL (NO DISC CONDITION)

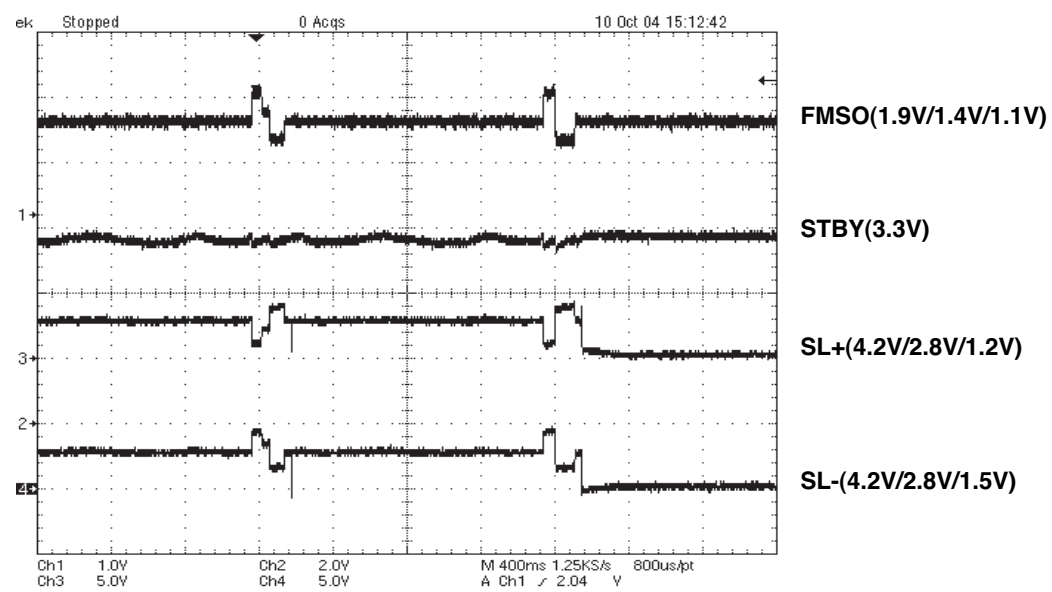


FIG 4-1

5. LENS CONTROL RELATED SIGNAL(NO DISC CONDITION)

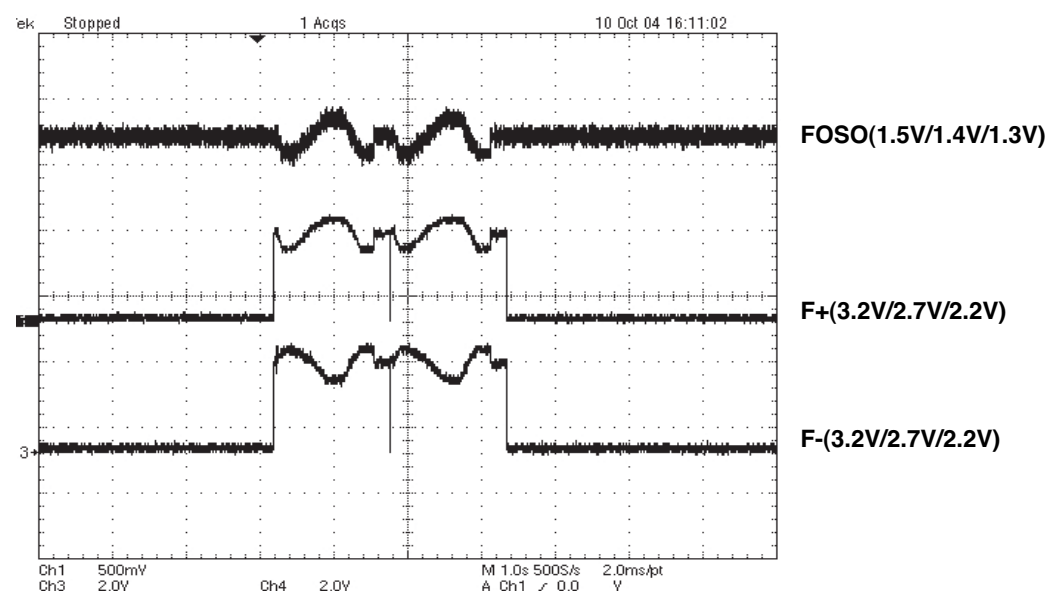


FIG 5-1

6. LASER POWER CONTROL RELATED SIGNAL(NO DISC CONDITION)

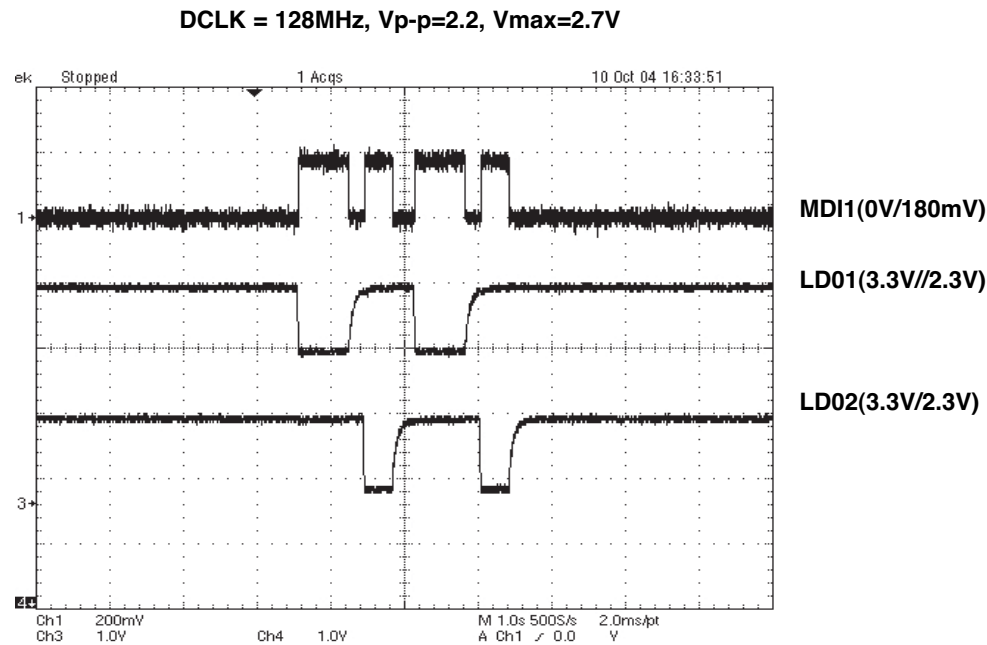


FIG 7-2 (DVD)

7. DISC TYPE JUDGEMENT WAVEFORM

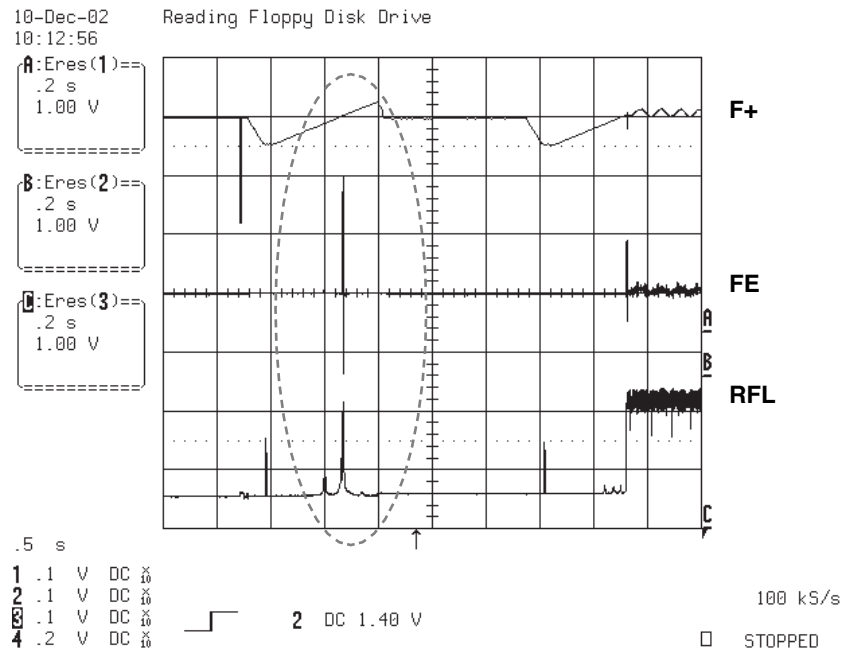


FIG 7-1

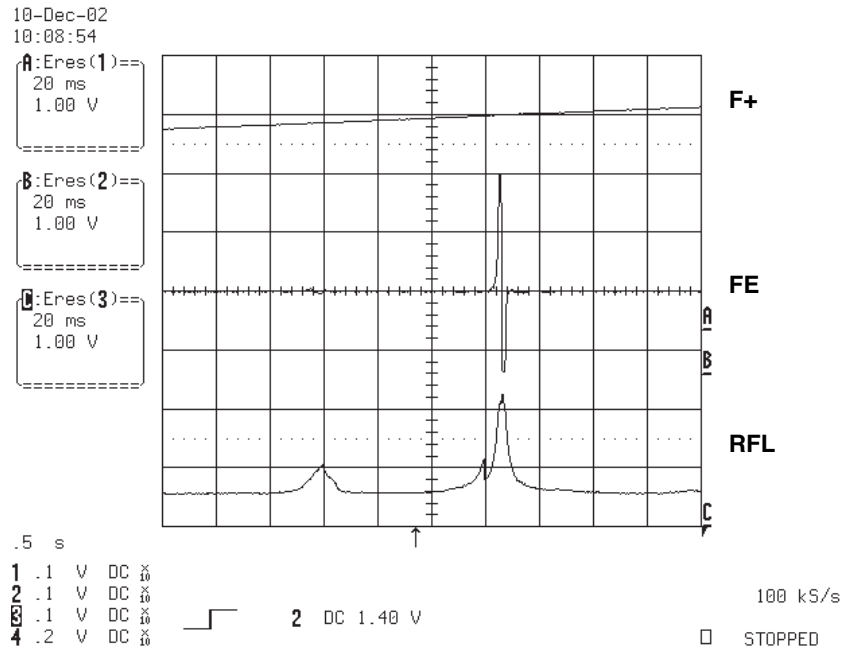


FIG 7-2 (DVD)

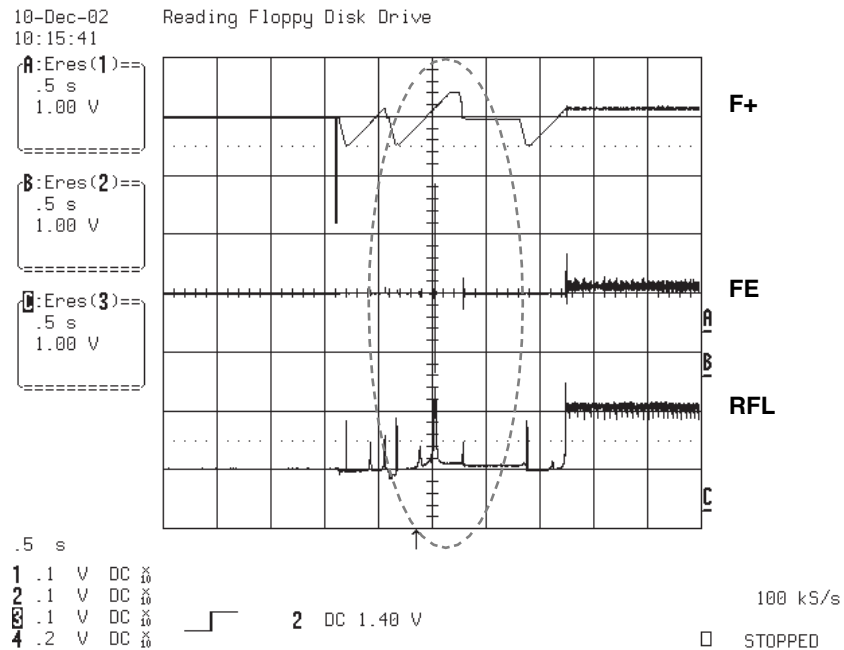


FIG 7-3 (CD)

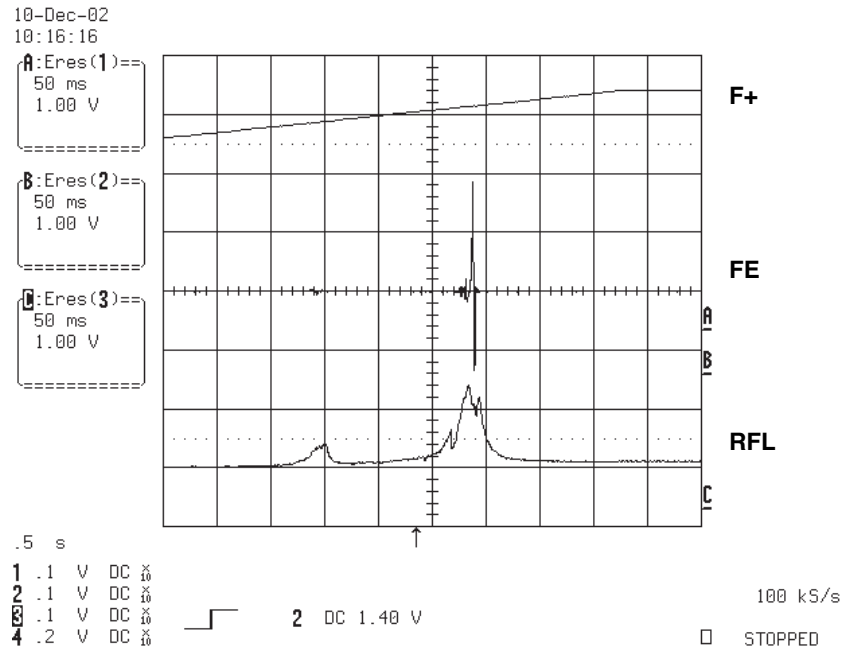


FIG 7-4 (CD)

8. FOCUS ON WAVEFORM

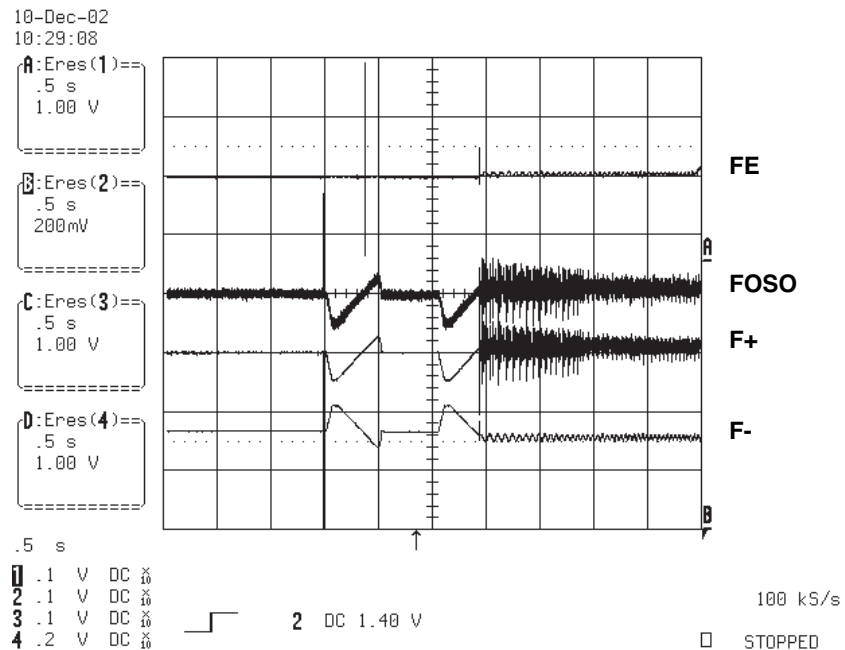


FIG 8-1 (DVD)

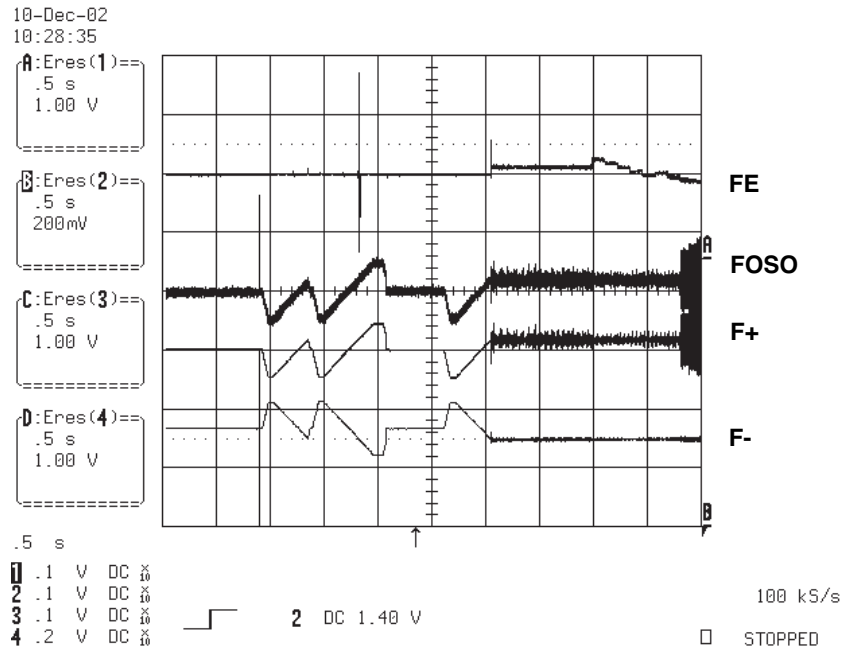


FIG 8-2 (CD)

9) SPINDLE CONTROL WAVEFORM (NO DISC CONDITION)

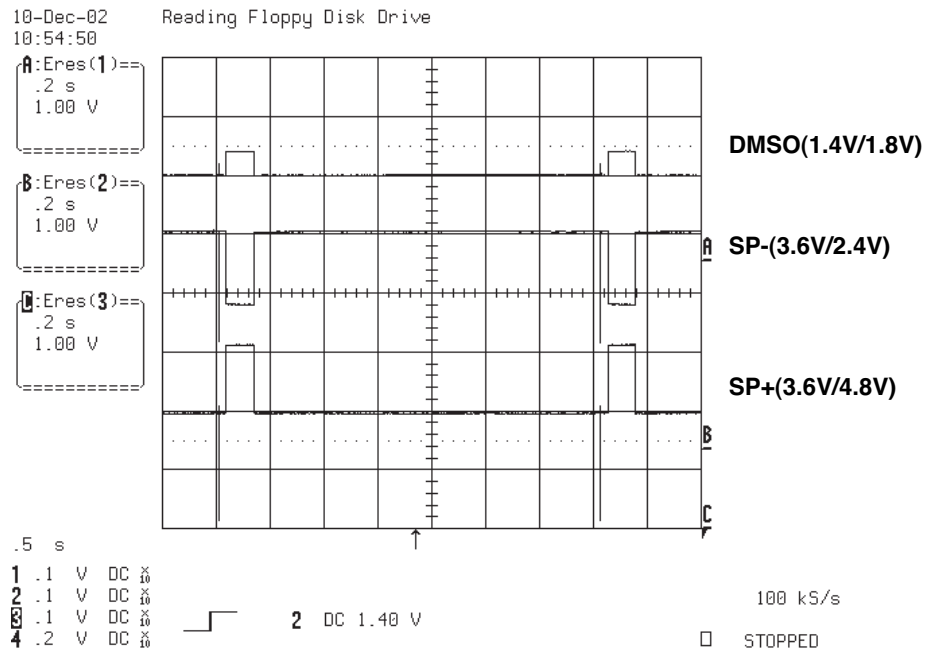


FIG 9-1

10. TRACKING CONTROL RELATED SIGNAL(System checking)

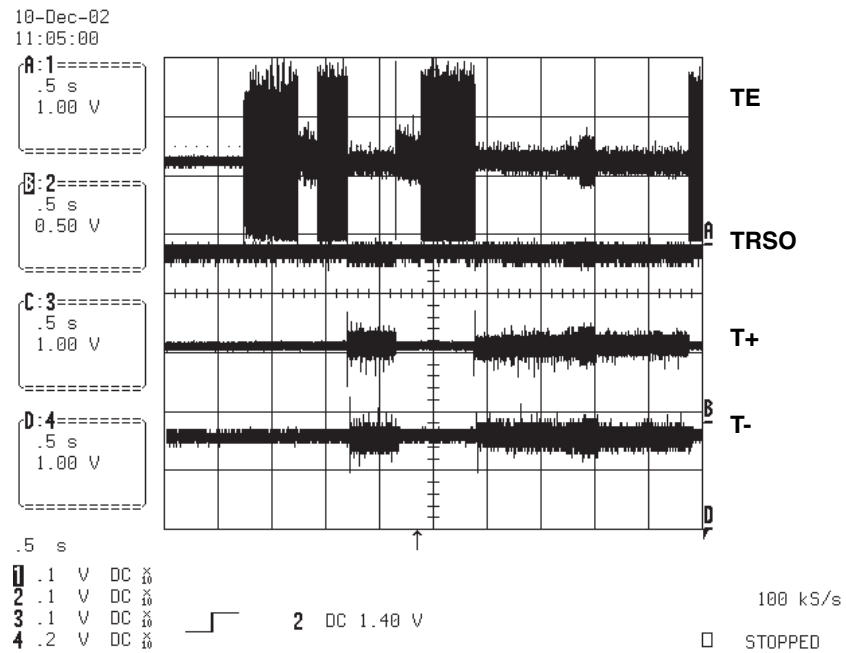


FIG 10-1 (DVD)

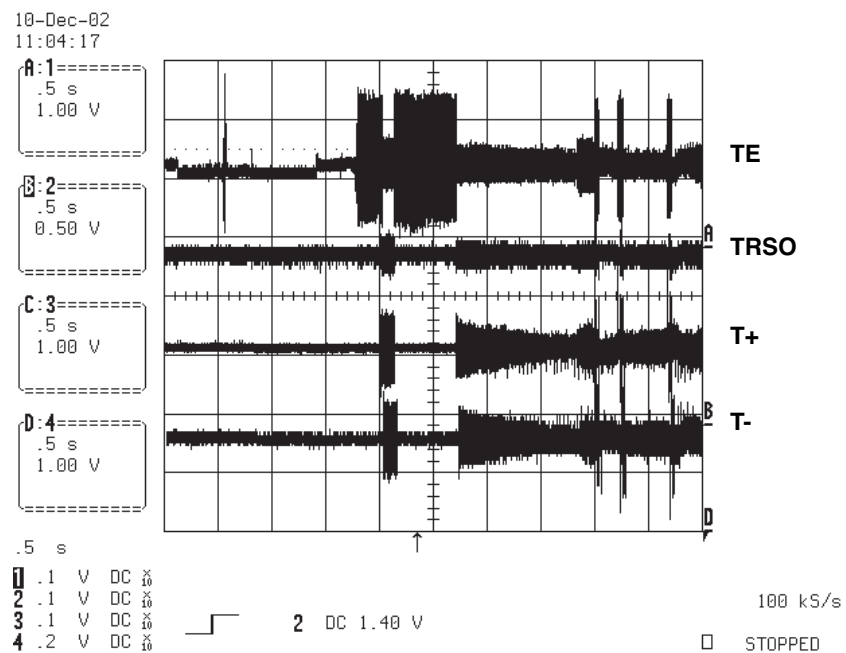


FIG 10-2 (CD)

11. MT1389C AUDIO OPTICAL AND COAXIAL OUTPUT (SPDIF)

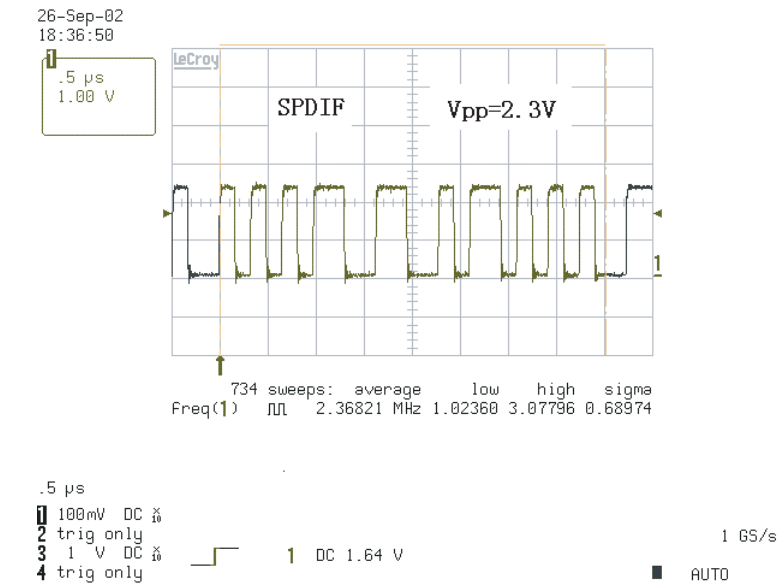


FIG 12-1

13. MT1389C VIDEO OUTPUT WAVEFORM

1) 100%

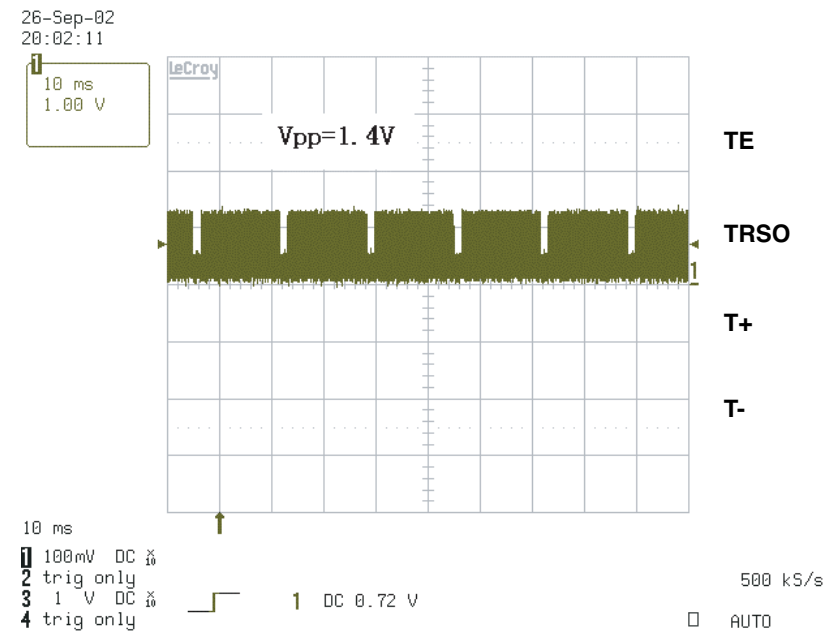


FIG 13-1

2) COMPOSITE VIDEO SIGNAL

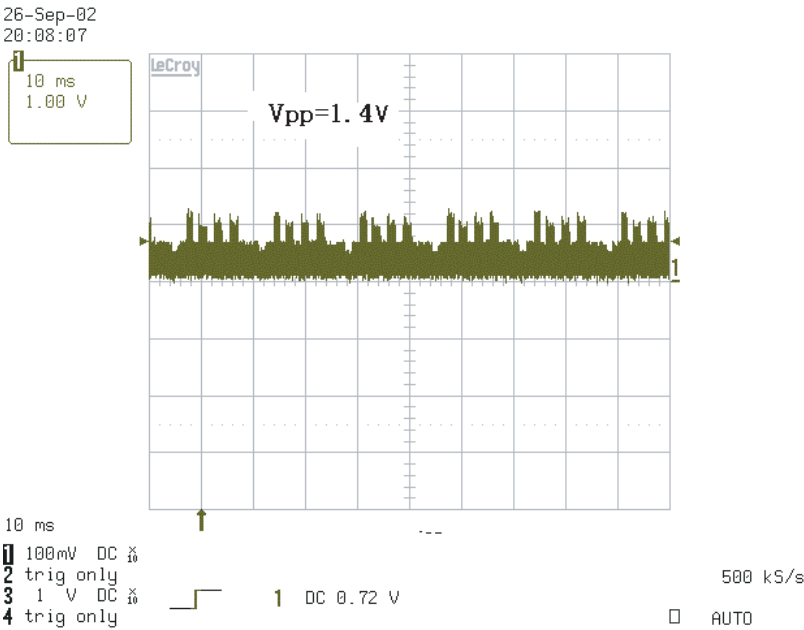


FIG 13-2

14. MT1389C AUDIO OUTPUT TO AUDIO DAC

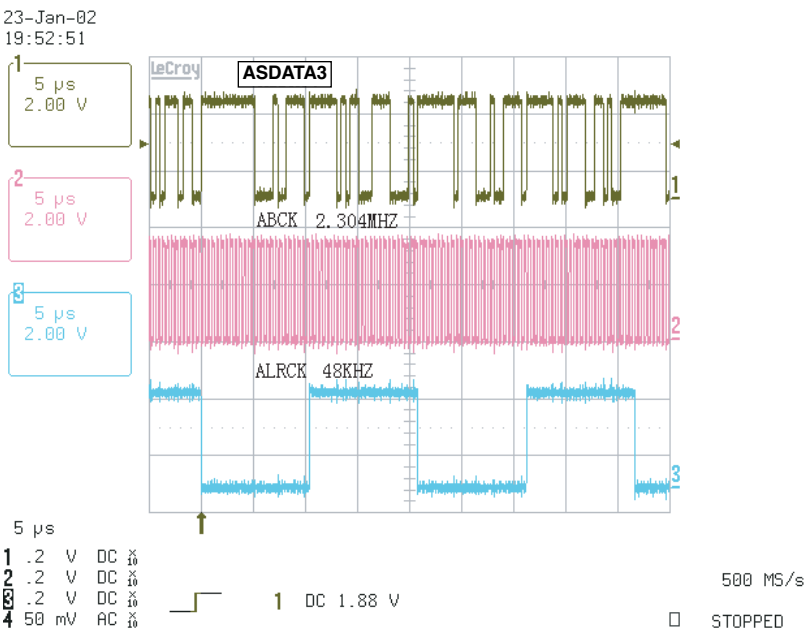


FIG 14-1

15. AUDIO OUTPUT FROM AUDIO DAC

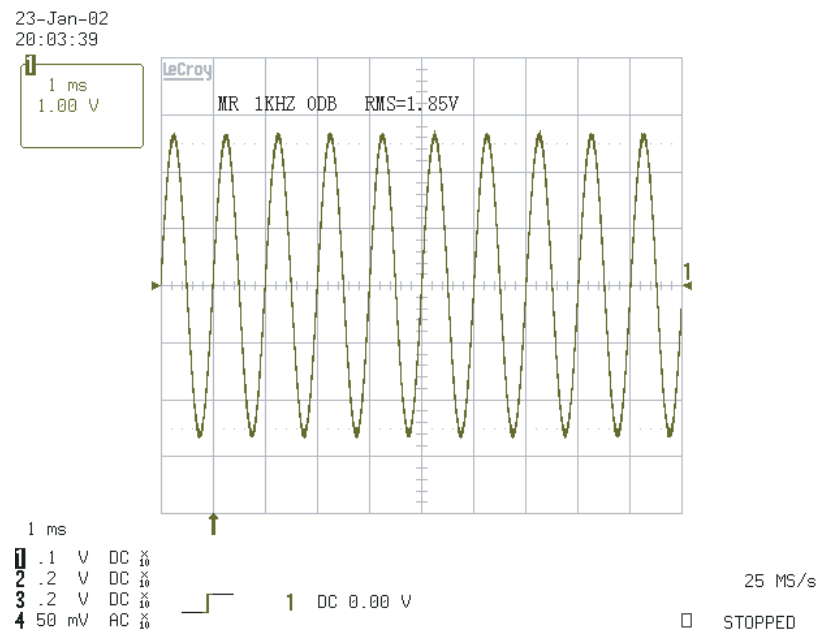
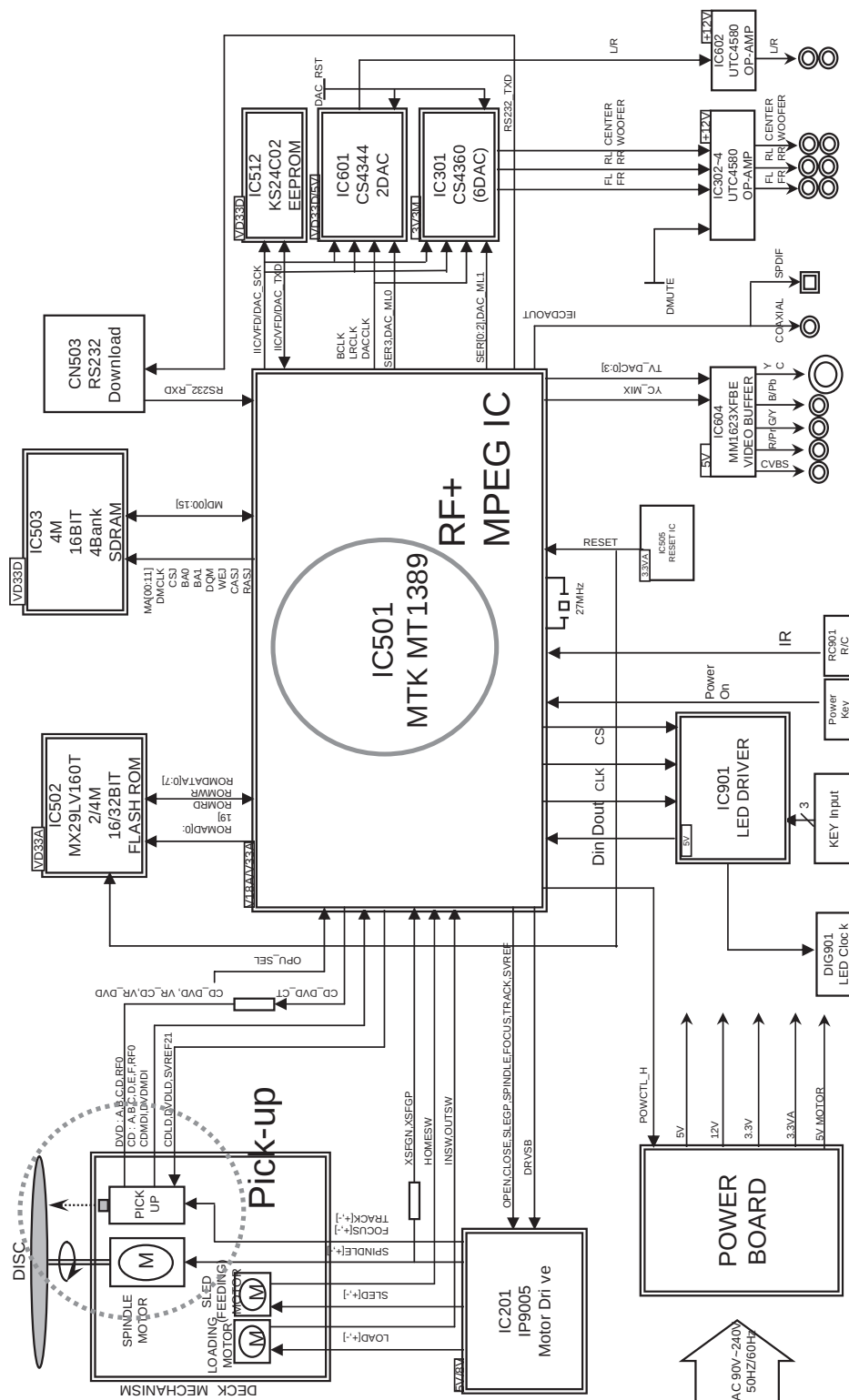


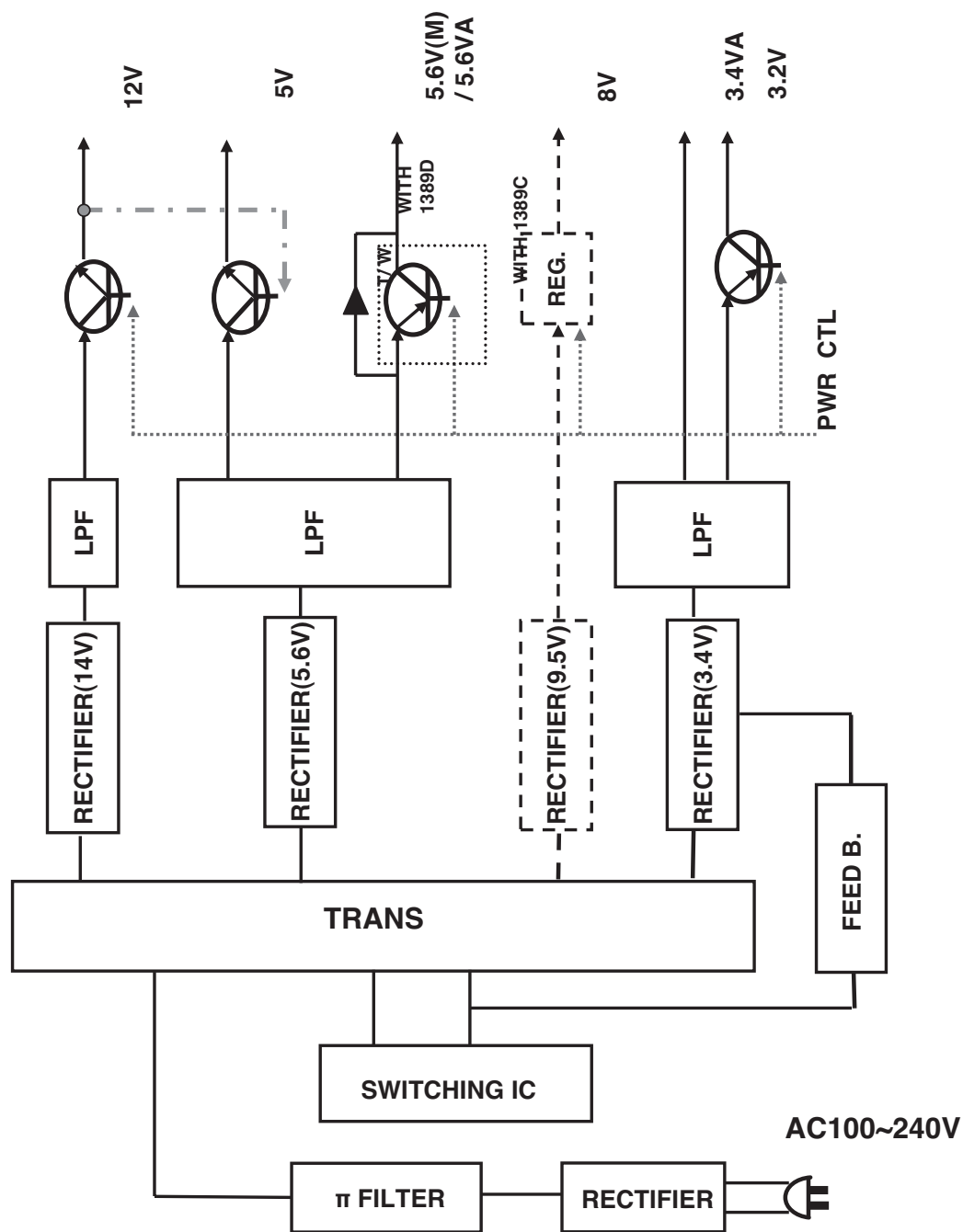
FIG 15-1

BLOCK DIAGRAMS

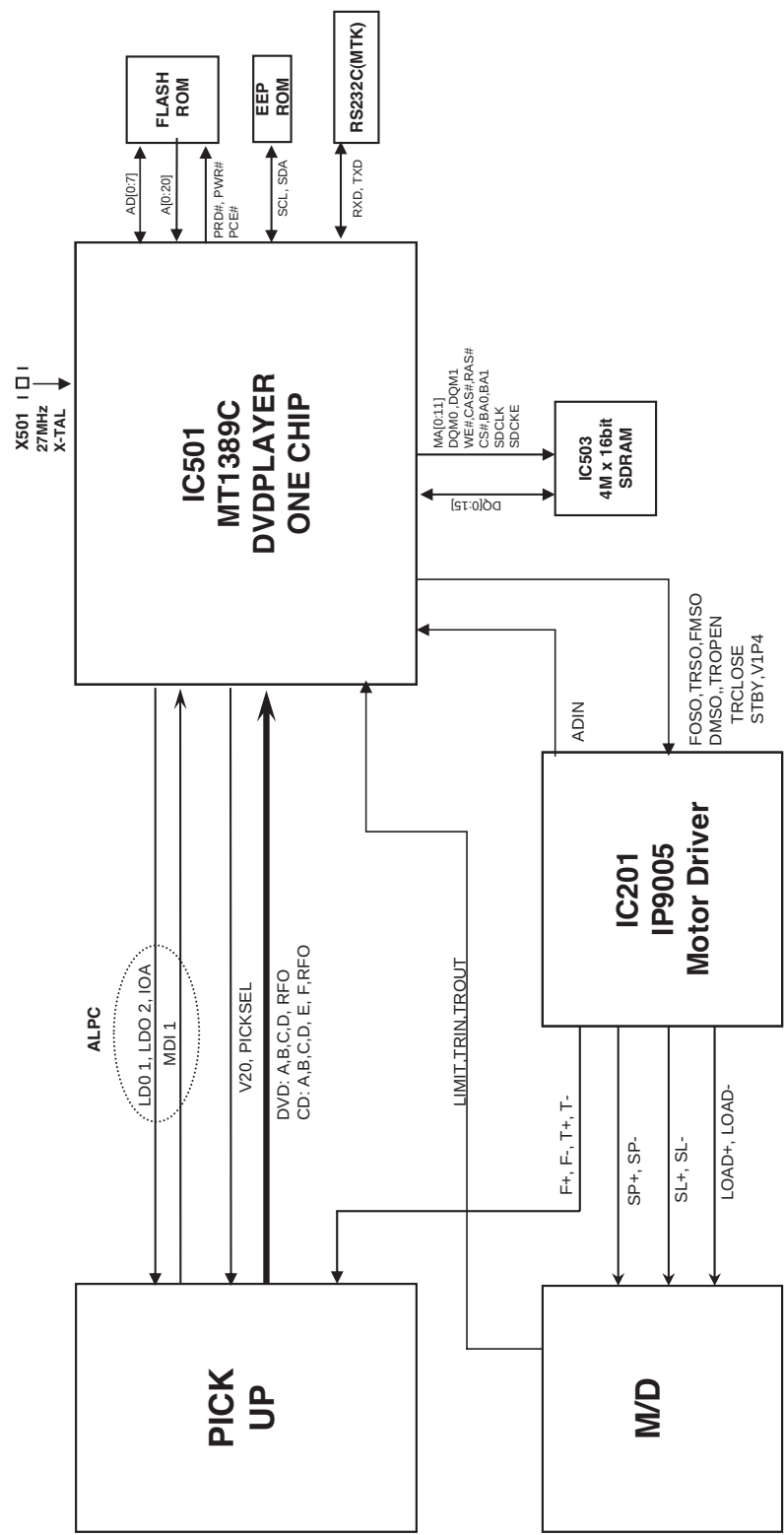
1. Overall Block Diagram



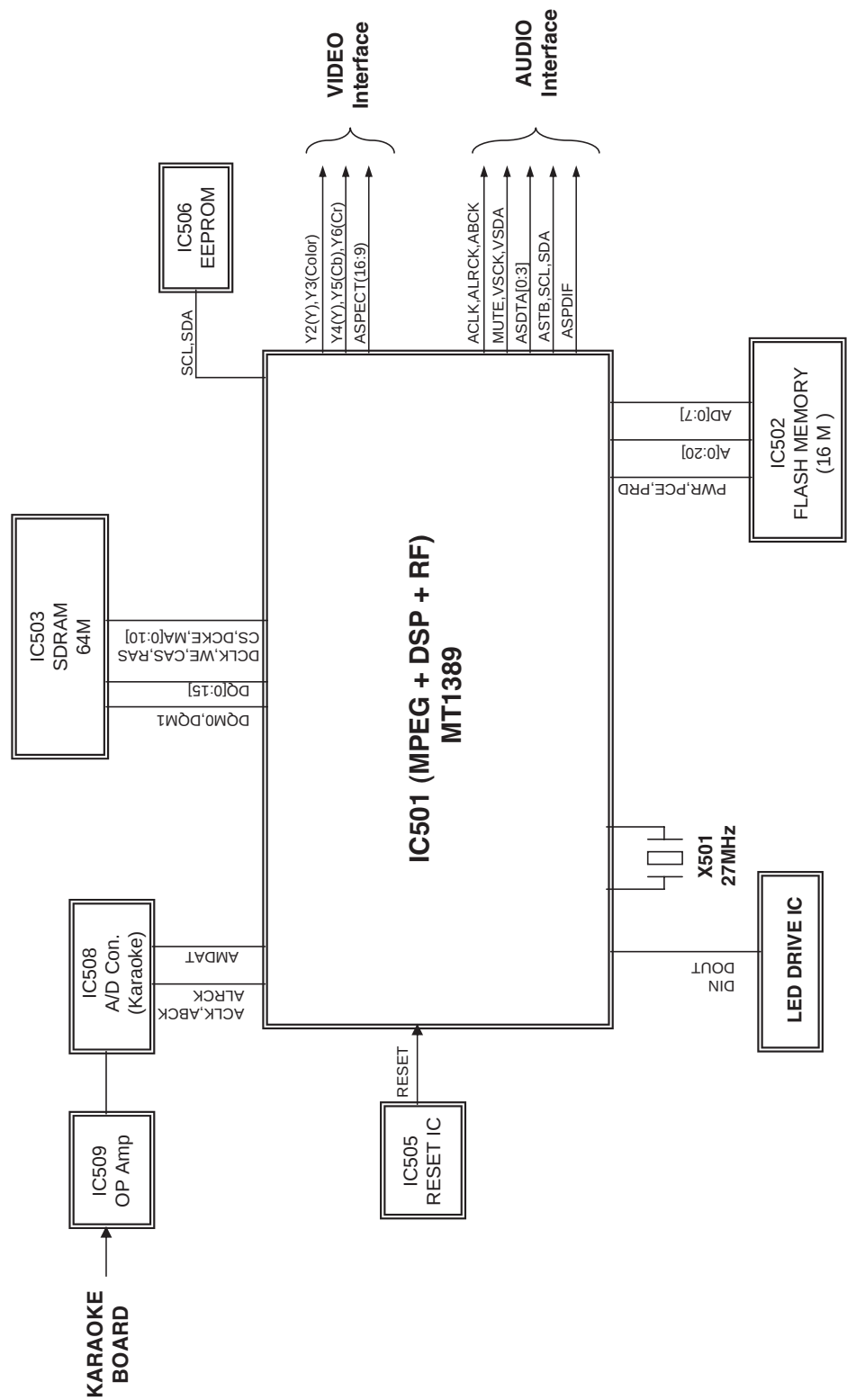
2. Power(SMPS) Block Diagram



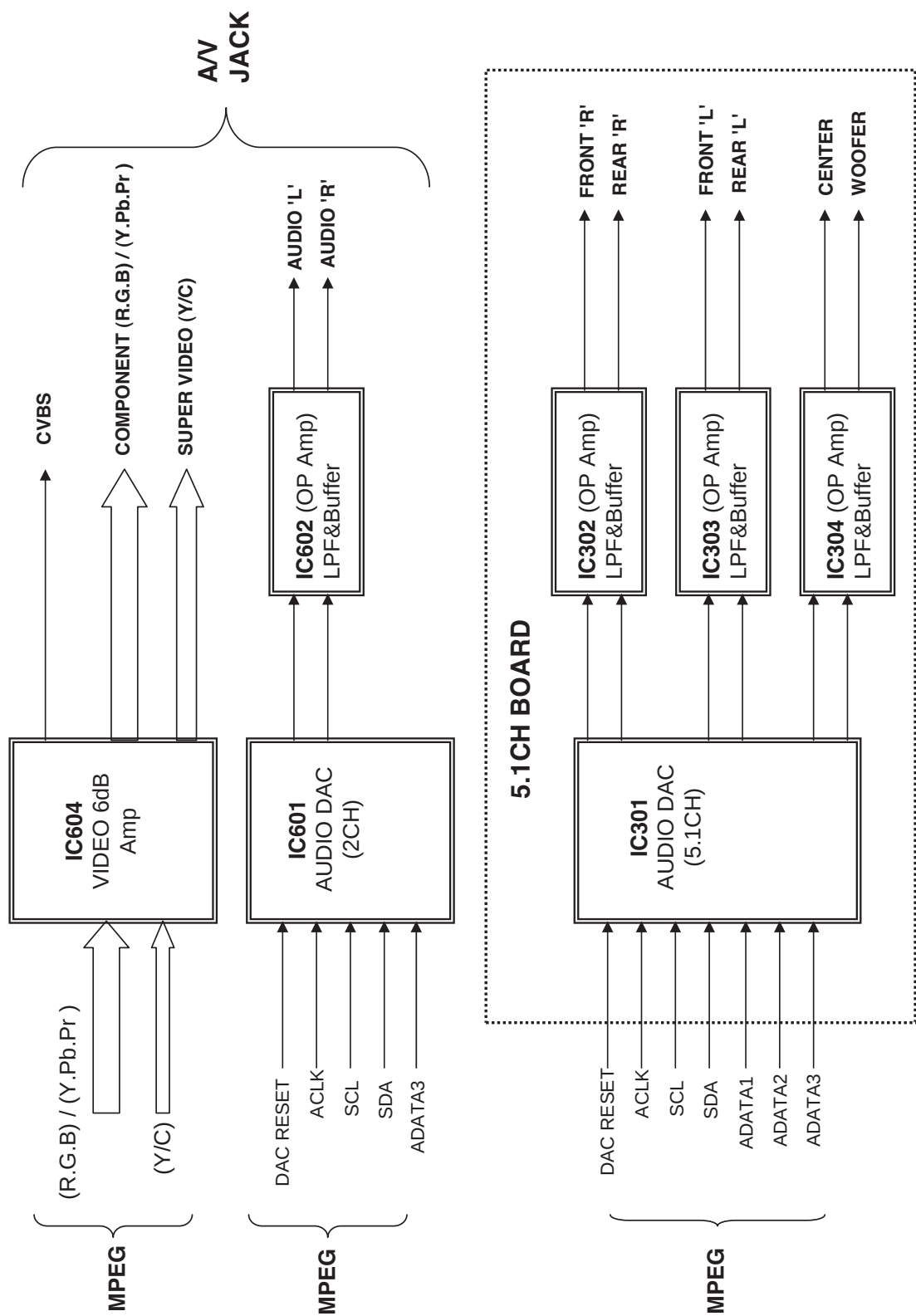
3. SERVO Block Diagram



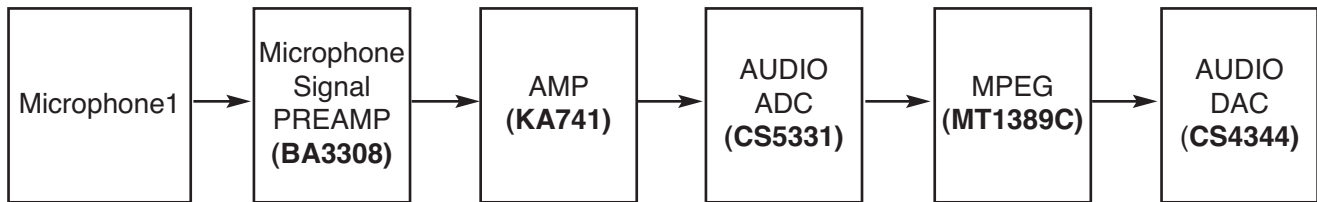
4. MPEG & MEMORY Block Diagram



5. VIDEO & AUDIO Block Diagram



6. KARAOKE Block Diagram(KARAOKE MODEL ONLY)

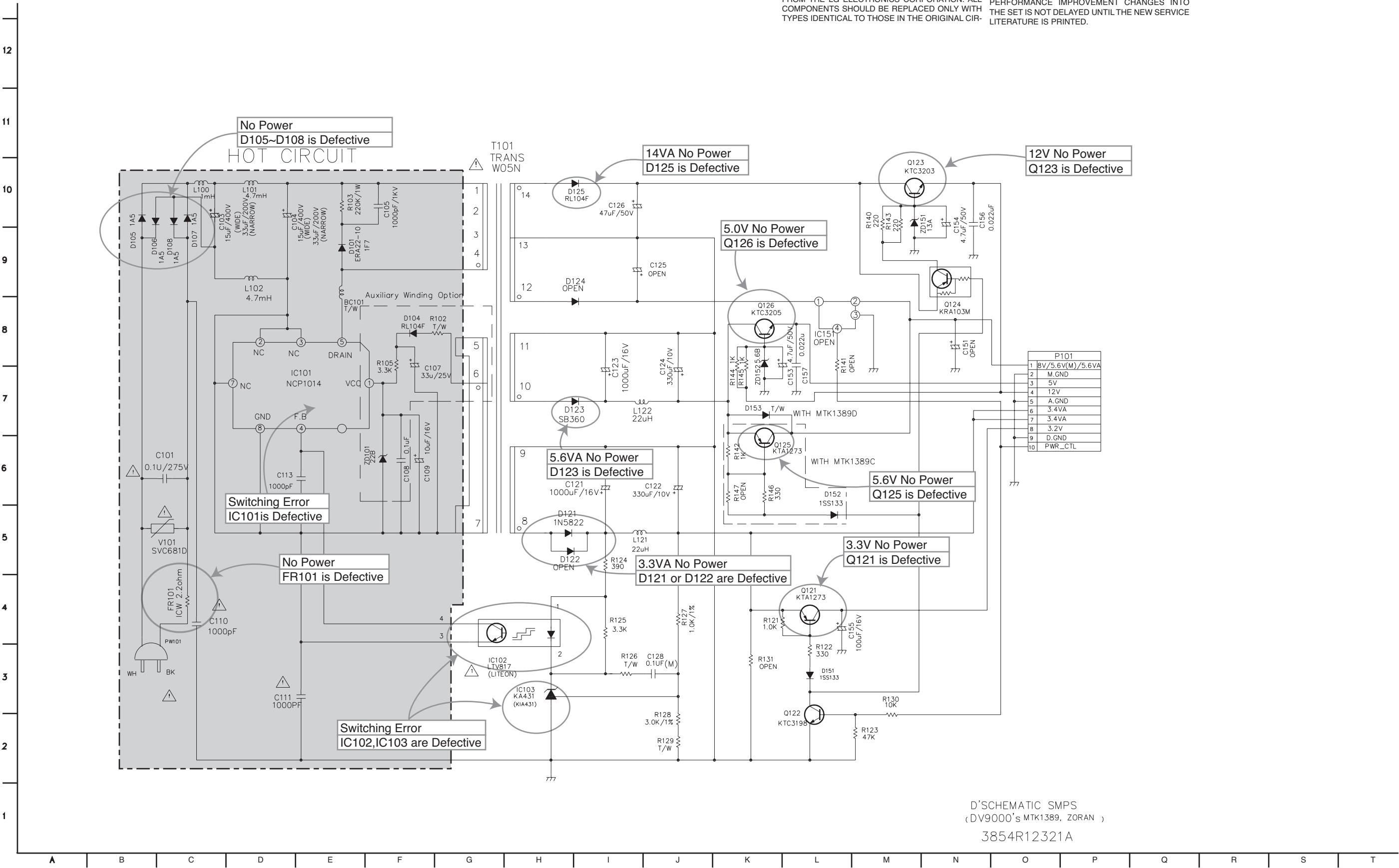


(Block Diagram)

- 1 The unit turns to KARAOKE MODE with on-screen lyrics display and melody sound when it plays back VCD or DVD KARAOKE DISC.
2. If a microphone is connected at this time, MICON recognizes the connection and prepares the composition of external voice and internal melody.
3. The weak signal of the microphone is converted to the digital signal after voice output that has passed through PREAMP(BA3308) and AMP(KA741) passes through(CS5331) that is Audio ADC(Analog to Digital converter).
4. This digital signal enters MT1389C that is MPEG IC
5. This mixed signal is output to AV JACK after passing through AUDIO DAC(CS4344).

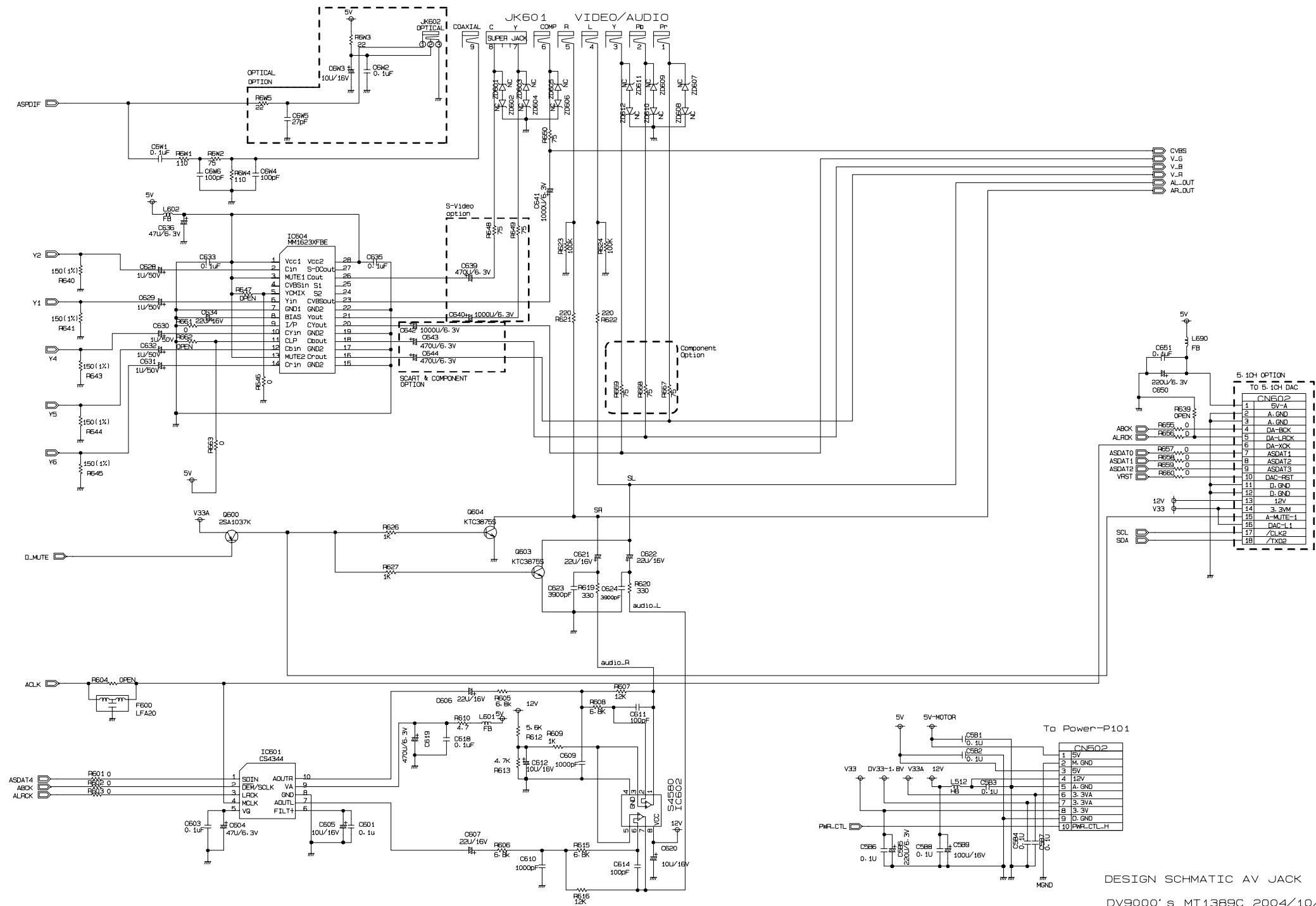
CIRCUIT DIAGRAMS

1. POWER(SMPS) CIRCUIT DIAGRAM



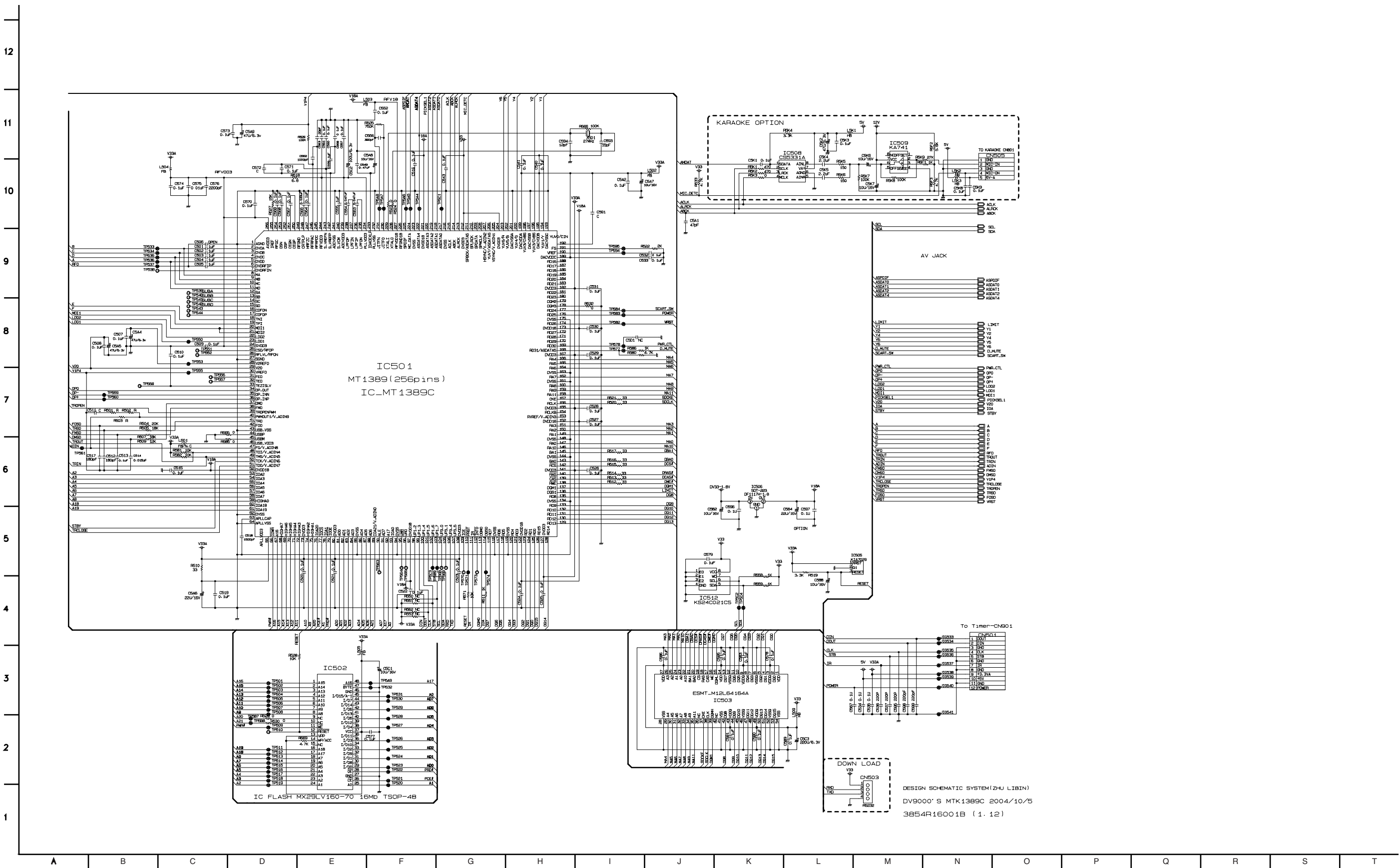
D'SCHEMATIC SMPS
(DV9000's MTK1389, ZORAN)
3854R12321A

2. AV/JACK CIRCUIT DIAGRAM

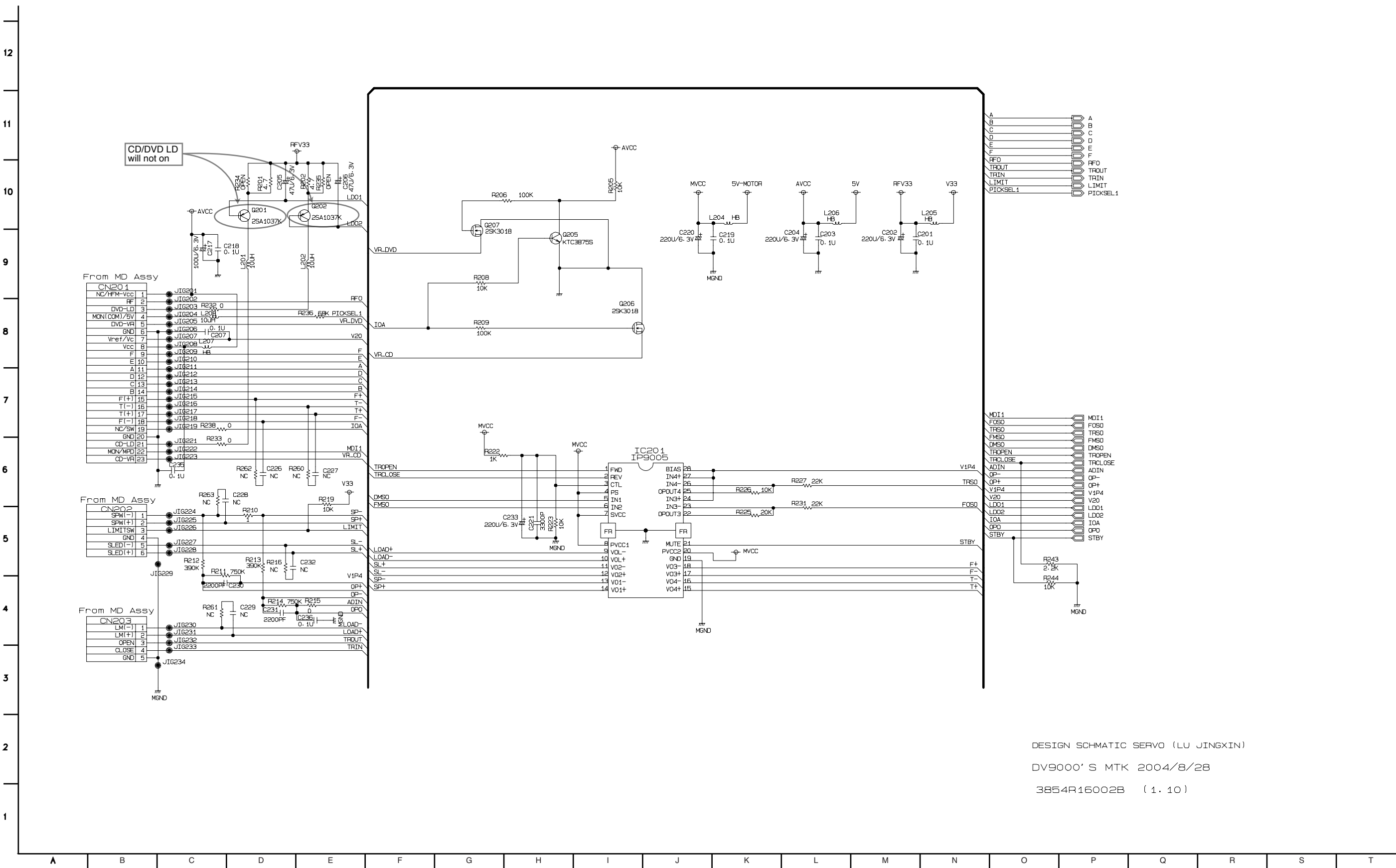


DESIGN SCHMATIC AV JACK
DV9000' s MT1389C 2004/10/5
3854R16003B (1.12)

3. SYSTEM CIRCUIT DIAGRAM



4. DRIVER CIRCUIT DIAGRAM



12
11
10
9
8
7
6
5
4
3
2
1



10

8

7

6

5

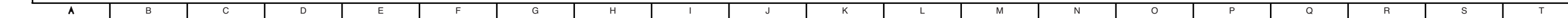
4

3

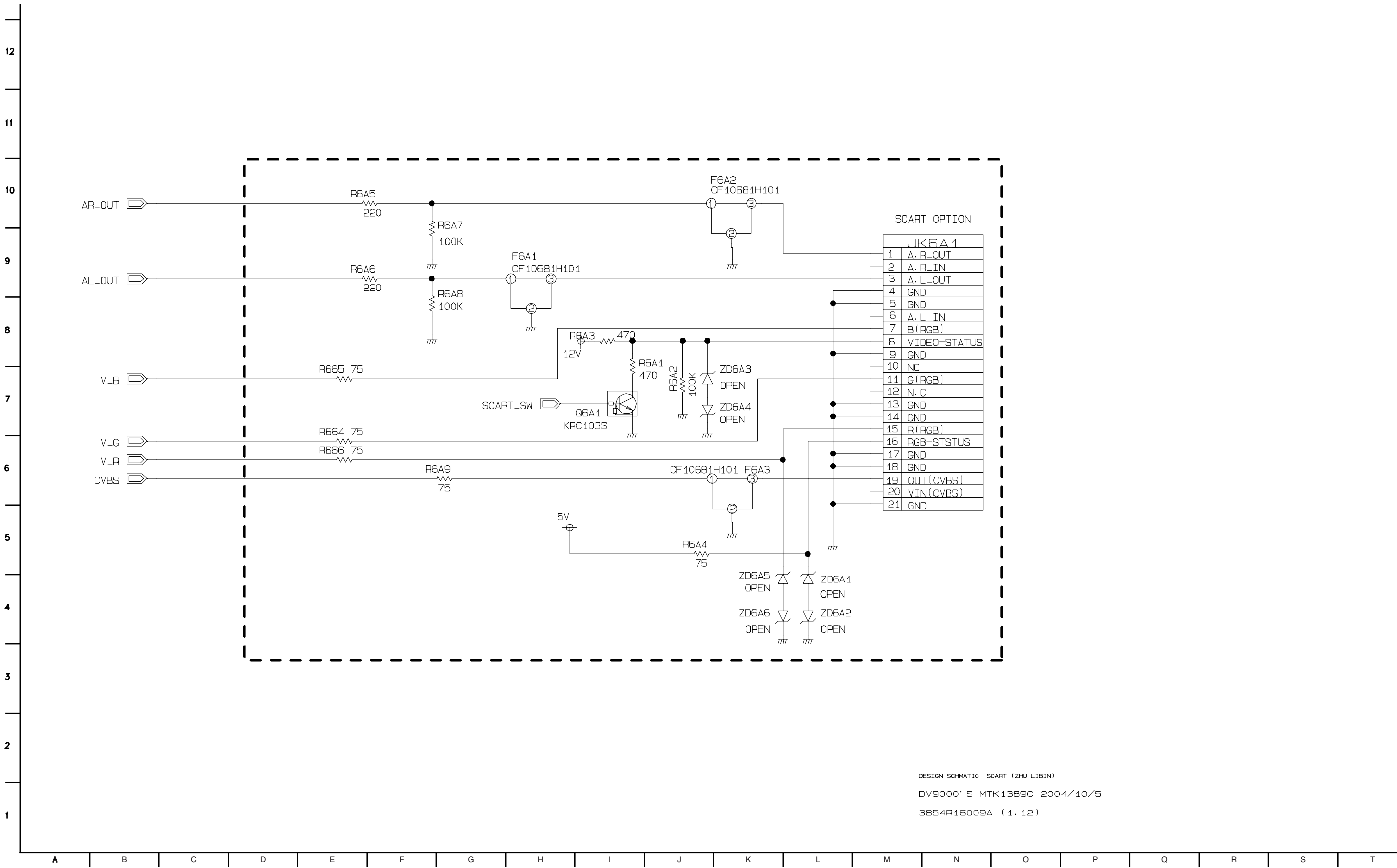
2

1

A vertical number line with tick marks labeled 1 through 12. The numbers are arranged vertically from bottom to top, with 1 at the bottom and 12 at the top. Each number is centered next to its corresponding tick mark.



7. SCART CIRCUI



DESIGN SCHEMATIC SCART (ZHU LIBIN)

DV9000' S MTK1389C 2004/10/5

3854R16009A (1.12)

• CIRCUIT VOLTAGE CHART

MODE PIN NO.	STOP	PLAY
IC201(9005)		
1	0	0
2	0	0
3	5.01	5.04
4	5.52	5.55
5	1.8	1.76
6	1.42	1.42
7	5.52	5.55
8	5.52	5.54
9	0	0
10	0	0
11	2.65	2.69
12	2.61	2.63
13	1.2	1.46
14	4.08	3.85
15	2.66	2.69
16	2.66	2.68
17	2.68	2.71
18	2.63	2.66
19	0	0
20	5.53	5.56
21	3.29	3.29
22	1.43	1.43
23	1.43	1.43
24	1.43	1.43
25	1.42	1.43
26	1.43	1.43
27	1.43	1.43
28	1.43	1.43
IC501		
1	0	0
2	1.73	0
3	1.73	1.73
4	1.73	1.73
5	1.73	1.73
6	1.75	1.73
7	2.15	1.74
8	2.2	2.21
9	2.18	2.18
10	2.16	0
11	2.14	2.14
12	1.74	1
13	1.04	1
14	1.03	1
15	0.12	1
16	0.13	0
17	0.12	1
18	0.13	2.05
19	2.05	0
20	2.05	0
21	2.05	0
22	2.38	0
23	3.29	0
24	3.3	3.3
25	0.21	1

MODE PIN NO.	STOP	PLAY
26	2.34	0
27	0	0
28	2.8	2.8
29	2	0
30	1.4	0
31	1.52	0
32	1.38	0
33	1.38	0
34	2.62	0
35	2.62	2.73
36	2.25	0
37	2.2	2.11
38	1.37	1.36
38	0	0
40	1.4	0
41	1.43	0
42	1.4	141
43	0	0
44	0	0
45	0	0
46	3.3	3.3
47	2.64	0
48	3.32	0
49	0.01	0
50	3.3	0
51	0	0
52	1.76	1.8
53	2.13	0
54	2.14	2.12
55	2.13	1.74
56	1.81	1.34
57	2.12	0
58	1.83	1.52
59	0	1.63
60	0	2.99
61	0	0
62	0	0
63	0	2.05
64	0	0
65	3.3	3.3
66	3.3	3.32
67	1.29	0
68	2.36	0.32
69	0	0.37
70	0.56	0.46
71	0	3.2
72	1.27	1.42
73	3.3	3.3
74	2.23	1.93
75	1.39	0
76	0	0
77	0	0
78	2.06	0
79	0	0
80	3.3	3.3

MODE PIN NO.	STOP	PLAY
81	1.2	1.07
82	0	0.82
83	1.17	0.77
84	0.64	0.54
85	0	0
86	1.44	0.53
87	1.65	1.77
88	1.4	1.53
89	0	0
90	1.21	1.2
91	1.02	1.03
92	0	0
93	2.06	1.93
94	0	0
95	3	2.74
96	3.28	3.25
97	1.8	1.8
98	3	2.7
99	3	2.7
100	2.97	2.67
101	0	2.68
102	3.33	3.32
103	3.33	3.32
104	3	2.7
105	5.18	5.18
106	3.32	3.31
107	2.76	2.75
108	3.3	3.3
109	0	0
110	5.2	5.2
111	2.67	2.92
112	3.14	3.18
113	2.28	1.6
114	0	0
115	1.06	0.85
116	0	0
117	1.04	1.09
118	1.28	0.94
119	0	0
120	1.18	1.65
121	1.36	1.7
122	1.8	1.75
123	1.26	1.51
124	1.23	1.4
125	1.28	1.16
126	0	0.86
127	3.3	3.3
128	2.35	1.28
129	1.8	1.05
130	0	1.1
131	1.39	1.25
132	1.37	1.27
133	1.31	1.3
134	0	0
135	1.33	1.37

MODE PIN NO.	STOP	PLAY
136	3.3	3.3
137	2.63	1.65
138	3.27	3.1
139	3	2.63
140	3.2	3.1
141	3.3	3.3
142	2.9	2.38
143	1.59	1.7
144	0	0
145	1.38	1.55
146	0.07	0
147	0.31	0.78
148	0	0
149	1.51	1.95
150	1.49	1.93
151	1.49	1.62
152	1.8	1.75
153	0	0
154	0	0
155	3.3	3.3
156	1.72	1.72
157	0.92	2.29
158	0	0
159	0	0
160	0	0
161	0	0
162	1.56	1.4
163	0	0
164	2.36	1.54
165	2.32	1.61
166	1.49	1.61
167	3.3	3.3
168	3.25	3.24
169	3.3	3.27
170	0	0
171	0	0
172	0	0
173	1.8	1.8
174	3.33	3.3
175	0	0
176	2.73	2.73
177	0	0
178	3.32	3.32
179	2.75	0
180	0	0
181	0	0
182	3.3	3.3
183	0	0
184	0	0
185	0	0
186	0	0
187	0	0
188	0	0
189	3.3	3.3
190	1.24	1.24

MODE PIN NO.	STOP	PLAY
191	1.25	1.24
192	2.26	2.25
193	0	0
194	0.46	0.47
195	3.3	3.3
196	0.7	0.7
197	0	0
198	3.28	3.29
199	3.3	3.3
200	0.42	0.43
201	0	0
202	0.57	0.38
203	0	0.42
204	3.3	3.3
205	0.25	2.62
206	2.72	2.64
207	2.71	2.63
208	0	0
209	0	0
210	0	0
211	0.1	3.3
212	3.3	3.3
213	1.31	1.66
214	1.67	1.64
215	1.58	1.57
216	0	0
217	0	1.24
218	0	1.1
219	0	0
220	0	0
221	1.76	1.76
222	0	1.24
223	0	0
224	0	0
225	1.66	1.65
226	0	0
227	1.8	1.76
228	3.3	3.3
229	3.3	3.3
230	0.85	0.86
231	0.81	0.82
232	0	0
233	0.83	0.89
234	3.19	3.18
235	1.74	1.72
236	1.71	1.71
237	1.71	1.71
238	1.72	1.75
239	3.19	3.18
240	0	0
241	0	0
242	0	0
243	0	0
244	3.19	3.19
245	1.55	1.55

MODE PIN NO.	STOP	PLAY
246	1.39	1.39
247	1.45	1.44
248	1.93	1.94
249	0	0
250	0	0
251	0	0
252	1.75	1.75
253	1.71	1.71
254	1.37	1.37
255	0.94	0.94
256	3.3	3.3
IC502 (MX29LV160-70)		
1	3.2	3.17
2	0	3.17
3	3.2	3.17
4	3.2	0.97
5	3.2	3.16
6	3.2	3.16
7	0	3.16
8	0	3.16
9	0	3.16
10	0	1.02
11	3.2	3.16
12	5.25	5.25
13	0	2.73
14	1.54	3.19
15	1.33	1.71
16	3.2	2.43
17	3.2	3.17
18	3.2	3.16
19	1.7	3.17
20	2.2	3.17
21	0	3.17
22	0	3.17
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	3.2	3.17
29	3.2	3.17
30	0	0
32	0	0
33	0	0
34	0	0
35	3.2	0
36	0	0
37	3.2	3.23
38	3.26	0
39	3.2	3.17
40	0	0
41	3.2	3.17
42	0	0
43	0	3.17
44	0	0

MODE PIN NO.	STOP	PLAY
45	0	0
46	0	0
47	0	0
48	3.2	3.17
IC503 (M12L64164A)		
1	3.25	3.23
2	2.85	2.86
3	3.25	3.22
4	2.87	2.87
5	2.85	2.5
6	0	0
7	2.81	2.1
8	2.9	2.04
9	3.25	3.22
10	2.85	2.1
11	2.87	2.91
12	1.9	0
13	2.8	
14	3.25	3.22
15	0	0
16	3.18	3.1
17	3.07	2.58
18	3.14	0.61
19	2.95	2.97
20	2.9	2.96
21	2.6	0.32
22	2.81	2.83
23	0.05	0.06
24	0.16	0.18
25	0.16	0.18
26	0.16	0.17
27	3.26	3.24
28	0	0.59
29	0.16	0.17
30	0.15	0.53
31	0.16	0.53
32	0.12	0.5
33	0.05	0.16
34	0.05	0.17
35	0.04	0.5
36	2.85	0.08
37	3.26	3.236
38	1.79	1.78
39	0	0
40	2.7	0.1
41	2.7	0
42	2.9	2
43	3.26	3.23
44	2.92	1.95
45	2.92	2.01
46	0	0
47	2.92	2.03
48	2.94	2.17
49	3.26	3.23
50	2.91	2

MODE PIN NO.	STOP	PLAY
51	2.94	2
52	0	0
53	2.9	1.85
54	0	0
IC601		
1	0	1.23
2	1.65	1.64
3	1.65	1.65
4	1.64	1.63
5	2.37	2.382
6	4.7	4.69
7	2.4	2.39
8	0	0
9	4.79	1.91
10	2.38	1.72
IC604(MM1623)		
1	5.17	5.16
2	2.52	2.47
3	5.17	5.16
4	1.36	1.27
5	0	0
6	1.68	1.55
7	0	0
8	2.52	2.51
9	0	0
10	1.68	1.53
11	0	0
12	2.49	2.47
13	5.17	5.16
14	2.5	2.47
15	0	0
16	2.53	2.52
17	0	0
18	2.51	2.51
19	0	0
20	2.18	2
21	2.16	2.05
22	0	0
23	2.16	1.96
24	0.25	0.42
25	0.23	0.42
26	2.51	2.51
27	0.53	0.8
28	5.17	5.16
IC901		
1	2.16	2.15
2	4.83	4.8
3	4.83	4.8
4	4.83	4.81
5	3.84	4.2
6	0	0.01
7	0	0.01
8	0	0.01
9	4.84	4.8
10	2.3	4.75

MODE PIN NO.	STOP	PLAY
11	1.81	2.7
12	1.96	2.39

1. MAIN P.C.BOARD

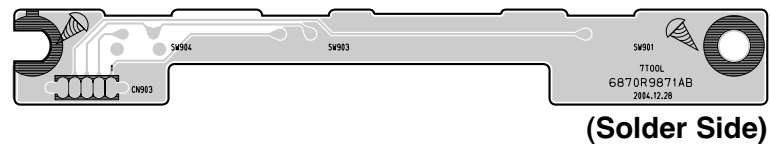


LOCATION GUIDE

J16201 B6	J16065 B2	C201 K4	C529 I5	C591 J4	G618 I3	I0512 H6	I2222 L7	R553 I7	R643 I4	TP551 K5
J16202 B6	J16066 B2	C202 L4	C530 I5	C593 J4	G619 I3	I0513 H6	R223 L7	R558 I6	R644 I4	TP552 K5
J16203 B6	J16067 B2	C203 L6	C532 I4	C594 J4	G620 J2	I0602 J3	R227 L7	R559 I6	R645 I4	TP553 J5
J16204 B6	J16068 B2	C204 L6	C533 I4	C595 J4	G621 J2	I0603 J3	R228 L7	R560 I6	R646 I4	TP554 J5
J16205 B6	TP501 B6	C205 K5	C534 I4	C596 J4	G622 J2	I0604 J3	R229 L7	R561 K5	R647 H3	TP555 J7
J16206 B6	TP502 B6	C206 K5	C534 I7	C597 J4	G623 J3	I0602 J3	R231 L7	R566 J4	R648 H2	TP557 K5
J16207 B6	TP503 B6	C207 K5	C535 I7	C598 J4	G624 J3	I0601 J3	R232 K6	R569 J7	R649 H2	TP558 K5
J16208 B6	TP504 B6	C208 L6	C536 I7	C599 J4	G625 J3	I0602 J3	R233 K6	R570 J6	R650 H2	TP559 K6
J16209 B5	TP505 B6	C218 L6	C537 I7	C5A1 I3	G629 H3	L202 K4	R5 K5	R580 I5	R655 K2	TP560 K7
J16210 B5	TP506 B6	C219 L7	C540 I4	C5A2 H5	G630 H3	L204 K5	R234 K5	R581 K7	R656 K2	TP563 J6
J16211 B5	TP507 B6	C220 K7	C541 I4	C5A4 K5	G631 G4	L205 K4	R236 K3	R582 K7	R657 K3	TP564 J6
J16212 B5	TP508 B6	C221 K7	C542 I4	C5A5 K5	G632 G4	L206 K4	R237 K3	R583 K7	R658 K3	TP565 J6
J16213 B5	TP509 B6	C226 L6	C549 J4	C5A6 J6	G633 H3	L207 L6	R243 L7	R586 J4	R659 K3	TP568 J6
J16214 B5	TP510 B6	C227 L6	C552 J4	C5A7 H5	G634 H3	L208 K4	R244 L7	R5F1 H6	R660 K3	TP569 J6
J16215 B6	TP511 B6	C228 K7	C553 J4	C5A8 J3	G635 H3	L209 K4	R246 L7	R5F2 H6	R661 H3	TP570 I6
J16216 B6	TP512 B6	C229 K7	C554 J4	C5B7 H5	G636 H3	L210 K4	R247 L7	R5F3 H6	R662 H3	TP571 I6
J16217 B6	TP513 B6	C230 K7	C555 J4	C580 K3	G639 H2	L503 L4	R262 L6	R5K1 H4	R663 K3	TP573 I6
J16218 B6	TP514 B6	C231 K6	C556 J4	C581 L4	G640 H2	L504 K4	R263 K7	R5K2 H4	R664 K2	TP577 I5
J16219 B5	TP515 B7	C232 L6	C557 J4	C582 L4	G641 K2	L505 I3	R501 K6	R5K3 H4	R665 K2	TP594 L4
J16220 B5	TP516 B7	C233 L6	C558 J4	C583 L4	G642 H2	L506 I3	R502 K6	R5K4 H4	R666 K2	TP595 L4
J16222 B5	TP517 B7	C235 L6	C559 J4	C584 L3	G643 I2	L512 I3	R503 K6	R5K5 G4	R667 J2	TP5A4 L4
J16223 B5	TP518 B7	C236 K6	C560 J4	C585 L3	G644 J2	L5K1 H4	R504 K7	R5K6 G5	R668 J2	TP5A6 G2
J16224 K7	TP519 B7	C501 K4	C561 J4	C586 K3	G650 I3	L5K2 H7	R505 K7	R5K7 G5	R669 J2	TP5A7 J4
J16225 B6	TP520 B7	C502 K4	C562 J4	C587 K3	G651 H2	L5K3 H7	R507 K7	R5K8 H7	R670 K2	TP5A8 J4
J16226 B6	TP521 B7	C503 K4	C563 J4	C588 K3	G6M2 G2	L601 I3	R509 J7	R5K9 H7	R6A2 M2	TP5C1 K3
J16227 B6	TP522 B7	C504 K4	C564 J4	C589 K3	G6M2 G2	L602 G3	R510 J6	R601 I3	R6A3 M2	X501 J3
J16228 B6	TP523 B6	C505 K4	C565 J4	C5C1 J7	G6M3 G2	L690 L4	R511 I5	R602 I3	R6A4 L2	Z0601 I2
J16229 B6	TP524 B6	C506 K4	C566 J4	C5C2 K3	G6M4 G2	Z001 I3	R512 I6	R603 I3	R6A5 M2	Z0602 H2
J16230 B6	TP525 B6	C507 K4	C567 J4	C5C3 K3	G6M5 G2	Z002 K3	R513 I5	R604 I3	R6A6 M2	Z0603 H2
J16231 C7	TP526 E7	C508 K5	C569 J4	C501 I5	ON01 G5	Z026 I5	R514 H5	R605 J3	R6A7 M2	Z0604 H2
J16232 C7	TP527 B6	C509 K5	C570 K4	C501 H4	ON02 G5	Z025 I5	R515 H5	R606 J3	R6A8 M2	Z0605 K2
J16233 C7	TP528 B6	C510 K5	C571 J4	C5K2 G4	ON02 G6	Z027 L6	R516 H5	R607 J3	R6A9 K2	Z0606 K2
J16234 C7	TP529 B6	C511 K5	C572 J4	C5K3 G4	ON03 H3	Z028 I3	R517 H5	R608 J3	R6B0 K2	Z0607 K2
J16235 E7	TP530 B6	C512 L7	C573 J3	C5K4 G4	ON06 J7	G603 J2	R518 K4	R609 J3	R6W2 G2	Z0608 J2
J16236 E7	TP531 B6	C513 L7	C574 K4	C5K5 G4	ON03 H4	G604 J2	R519 H7	R610 I3	R6W3 G2	Z0609 I2
J16237 E7	TP532 B6	C514 L7	C575 K4	C5K6 G7	ON06 K4	G6A1 M3	R520 H7	R612 J3	R6W4 G2	Z0610 I2
J16238 E7	TP533 B6	C515 L7	C576 K4	C5K7 J6	ON06 H3	G605 J2	R521 H5	R613 J3	R6W5 K2	Z0611 I2
J16239 E7	TP534 B6	C516 J4	C577 L6	C5K8 H7	ON02 L2	R205 I5	R522 J4	R615 J3	TP533 K4	Z0612 I2
J16240 E7	TP535 B6	C517 L7	C578 H6	C5K9 H7	F600 L2	L202 K5	R523 L4	R616 J3	TP534 K4	Z06A1 L2
J16241 E7	TP536 B6	C518 J6	C579 I6	C5K1 J6	F6A1 K2	R209 I5	R524 J4	R619 J3	TP535 K4	Z06A2 L2
J16242 E7	TP537 B6	C519 J6	C580 H6	C601 J3	F6A2 M2	R208 I6	R525 J4	R620 J6	TP536 K4	Z06A3 L2
J16243 E7	TP538 B6	C520 J6	C581 H5	C604 I3	F6A3 K2	R209 I5	R526 J4	R621 J2	TP537 K4	Z06A4 L2
J16244 B2	TP545 A4	C521 J6	C582 L3	C605 I3	I0501 I5	R210 K7	R527 K4	R622 J2	TP538 K4	Z06A5 L2
J16245 B2	TP549 B6	C522 J6	C583 G5	C606 J3	I0521 J5	R211 K7	R528 J7	R623 J2	TP539 K4	Z06A6 L2
J16246 B2	TP550 B6	C523 J6	C584 G5	C607 J3	I0502 H6	R212 K7	R529 J7	R624 J2	TP540 K4	
J16247 B2	TP548 B6	C524 L6	C585 G5	C609 J3	I0503 H6	R213 K6	R530 J6	R626 J2	TP541 K5	
J16248 B2	TP589 B6	C525 L6	C586 G5	C610 I3	I0505 H6	R214 K6	R532 I5	R627 J2	TP542 J5	
J16249 B2	TP5C2 E7	C526 I5	C587 H7	G611 J3	I0506 J3	R215 K6	R533 I4	R629 M2	TP543 J5	
J16250 B2	TP5C3 E7	C527 I5	C588 H6	G612 J3	I0507 H6	R216 K6	R534 I4	R630 M2	TP544 J5	
J16251 B2	TP5C4 E7	C528 J6	C589 G6	G613 J3	I0508 H7	R217 K6	R535 I4	R631 M2	TP545 K4	

2. KEY P.C.BOARD

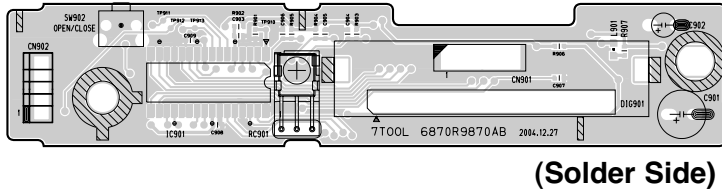
(7 TOOL ONLY)



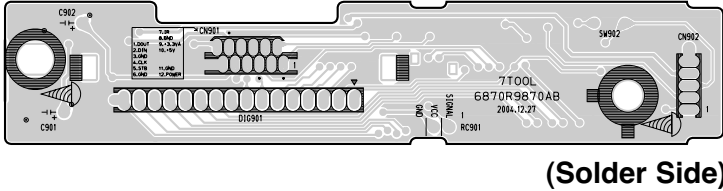
3. TIMER P.C.BOARD

(7 TOOL ONLY)

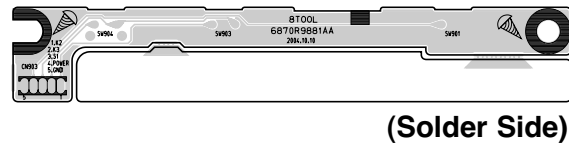
(TOP VIEW)



(BOTTOM VIEW)

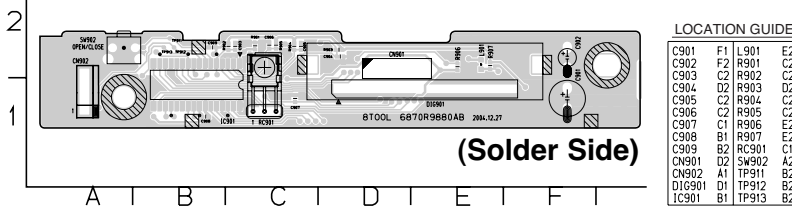


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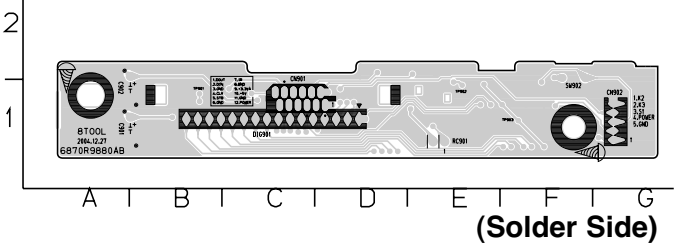


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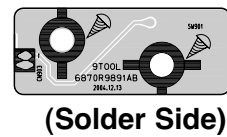
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(BOTTOM VIEW)

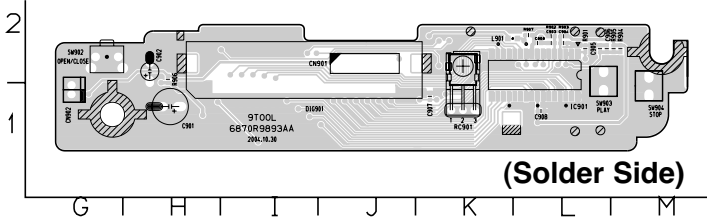


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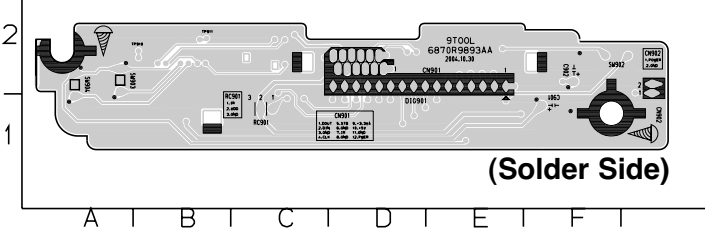


(9 TOOL ONLY)

(TOP VIEW)



(BOTTOM VIEW)



MEMO

Handwriting practice area with 25 horizontal dotted lines.

MEMO

Handwriting practice area with 25 horizontal dotted lines.