XR-7150/7151/7152

SERVICE MANUAL

US Model
Canadian Model
XR-7150

AEP Model
XR-7150/7151/7152

Photo: XR-7150

Model Name Using Similar Mechanism	XR-7200
Tape Transport Mechanism Type	MG-55A-31

SPECIFICATIONS

Audio Power Specifications

POWER OUTPUT AND TOTAL HARMONIC DISTORTION
13 watts per channel minimum continuous average power into 4 ohms, both channels driven, from 20 to 20,000 Hz with no more than 1% total harmonic distortion.

Other Specifications

Power amplifier section

Outputs — Speaker outputs (sure seal connectors)
Speaker impedance — 4 – 8 ohms
Maximum power output — 25W + 25W (at 4 ohms)*
*Measured at 14.4V

Cassette player section

Tape track — 4-track 2-channel stereo
Frequency response — 30 – 18,000 Hz

Signal-to-noise ratio (A-weighted)

Cassette type	Dolby B	Dolby C	Dolby off
TYPE II, IV	66 dB	76 dB	58 dB
TYPE I	63 dB	73 dB	55 dB

Wow and flutter — 0.1% (WRMS)

Tuner section

FM

Tuning range — US, Canadian model: 87.9–107.9 MHz
AEP model: 87.5–108.0 MHz
Antenna terminal — External antenna connector
Intermediate frequency — 10.7 MHz
Usable sensitivity — 12 dBf (75 ohms)
Sensitivity at 50 dB quieting — 18 dBf (75 ohms)
Selectivity — 75 dB at 400 kHz
Signal-to-noise ratio — 65 dB (stereo), 70 dB (mono)
Harmonic distortion at 1 kHz — 0.5% (stereo), 0.3% (mono)
Separation — 30 dB at 1 kHz
Frequency response — 30 – 15,000 Hz
Capture ratio — 2.5 dB

AM (MW/LW)

Tuning range — **XR-7150**
US, Canadian model:
530–1,620 kHz
XR-7150/7152
AEP model:
531–1,602 kHz
XR-7151
LW: 153–281 kHz
MW: 531–1,602 kHz
Antenna terminal — External antenna connector
Intermediate frequency — 450 kHz

– Continued on page 2 –

FM/AM CASSETTE CAR STEREO
XR-7150/7152

FM/MW/LW CASSETTE CAR STEREO
XR-7151

SONY®

SECTION 4
DIAGRAMS

【IC301 (μPD75108G-642)】

The μPD75108G-642 functions are described below.

- Description

Pin No.	Name	I/O	Description
1	CLOCK	O	Clock output for data transfer related to display (LCD), PLL, and electronic volume control. CMOS output, active high.
2	DATA	O	Data on the display (LCD), PLL, and electronic volume control are output from this terminal. CMOS output, active high.
3	PLL	O	Output terminal for PLL data selection. When this terminal is high, the data is used for PLL setting. The data is set to PLL at the trailing edge (⌐↓_). CMOS output, active high.
4	VOL	O	Output terminal for electronic volume control data selection. When this terminal is high, the data is used for electronic volume control setting. The data is set to the electronic volume control at the trailing edge (⌐↓_). CMOS output, active high.
5	RADIO	O	Output terminal for controlling the power source of the tuner block. The RADIO output goes high during tuner mode and when SDK is on. CMOS output, active high.
6	LW	O	Output terminal for LW/MW switching. The LW output goes high when the LW band is selected, and remains low when any other bands are selected. CMOS output, active high.
7	$\overline{\text{RESET}}$	—	The microcomputer hardware is reset by this terminal. It should be pulled up (by VCC) at all times including backup (using lithium battery). The microcomputer hardware is reset when this terminal is set from low to high. It reset is executed during backup operation, operation is not normal. Reset should be executed with the backup line connected. (The reset button on the panel will not work unless the backup line is connected.)
8	×2	—	×2 and ×1 are connected to the osillator to provide the clock for this microcomputer. The oscillation is realized by cellalock of 4.19 MHz which is operated whis an instruction cycle of 0.97 usec. Oscillation is maintained during battery backup.
9	×1	—	
10	MONO/ST	I/O	Forced monaural output terminal and stereo input terminal. The terminal functions as the STEREO input terminal when MONO is off (AUTO stereo mode). When the terminal is made low, the stereo pilot lamp goes on. The terminal functions as the MONO output terminal when MONO is on (forced monaural) and the output is made low. Note : The STK3400 is set to forced monaural if no current is fed to the stereo indicator terminal. Current is fed by the microcomputer to set MONO. CMOS output or CMOS input, low active.
11	ACC IN	I	Input terminal for ACC voltage detection. The terminal is used to determine whether the ACC is on or off. When this input is made low, the ACC off processing is executed (tape stop mute output).
12	EQ IN	I	A connected graphic equalizer is detected by the EQ IN terminal. When this terminal is made high, the fader control is centered and fader control selection by the select key is disabled.

<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Description</th></tr>
<tr><td>13</td><td>METAL</td><td>O</td><td>Metal output and AUTO metal input terminal.
After reset is complete, Metal display is turned on if this input is high in input mode. Metal is not displayed if this input is low.
When the Metal button is pressed, metal output is set in, high signal is output from this terminal, and Metal is displayed.
The mode is reset to Input mode when the Metal button is pressed again.</td></tr>
<tr><td>14
15
16
17</td><td>MS3
MS2
MS1
MS0</td><td>—</td><td>Pins ⑭ to ⑰ are input terminals for directional mode setting.
<table>
<tr><th></th><th>MSO</th><th>MS1</th><th>MS2</th><th>MS3</th><th>FM</th><th>AM (MW)</th><th>LW</th><th>Others</th></tr>
<tr><td>XR-7150 (US) (Canadian)</td><td>0</td><td>0</td><td>0</td><td>1</td><td>87.9 to 107.9MHz (200kHz)</td><td>530 to 1620kHz (10kHz)</td><td></td><td></td></tr>
<tr><td>XR-7150 (AEP)</td><td>0</td><td>1</td><td>0</td><td>1</td><td rowspan="3">87.5 to 108MHz (50kHz)</td><td rowspan="3">531 to 1602kHz (9kHz)</td><td></td><td></td></tr>
<tr><td rowspan="2">XR-7151</td><td>0</td><td>1</td><td>1</td><td>1</td><td>155 to 281 kHz</td><td>9n, 9n+2 (n=10 (max))</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>155 to 279 kHz</td><td></td></tr>
<tr><td>XR-7152</td><td>0</td><td>0</td><td>1</td><td>1</td><td></td><td></td><td></td><td>SDK mode *1</td></tr>
<tr><td>TEST</td><td>0</td><td>0</td><td>0</td><td>0</td><td>76.0 TO 90.0MHz (100kHz)</td><td>522 to 1629kHz (9kHz)</td><td></td><td>Test mode *2</td></tr>
</table>
Notes :
*1 When the SDK mode is selected, the button functions are modified as follows :
XR-7150 XR-7152
AM SDK
FM FM/AM
MONO MONO/LOCAL
LOCAL DSPL
*2 During the test mode, the power switch is held off and tape end is not detected.
Power function : Voltage is applied if the power source is on.</td></tr>
<tr><td>18
19</td><td>LM1
LM0</td><td>O</td><td>Loading motor control output port.
<table>
<tr><th>Motor rotation</th><th>LM0</th><th>LM1</th></tr>
<tr><td>Loading direction</td><td>High</td><td>Low</td></tr>
<tr><td>Eject direction</td><td>Low</td><td>High</td></tr>
<tr><td>FF and REW (including AMS) mode</td><td>High (Brake)</td><td>High (Brake)</td></tr>
</table></td></tr>
<tr><td>20</td><td>CPM</td><td>O</td><td>Output terminal for capstan motor control.
The signal is kept high during PLAY, FF, and REW (including AMS) modes.</td></tr>
<tr><td>21</td><td>DPL</td><td>O</td><td>Output terminal for plunger control.
The signal is kept high during PLAY, FF, and REW (including AMS) modes.
The signal output is kept off for about 60 msec during direction mode.</td></tr>
</table>

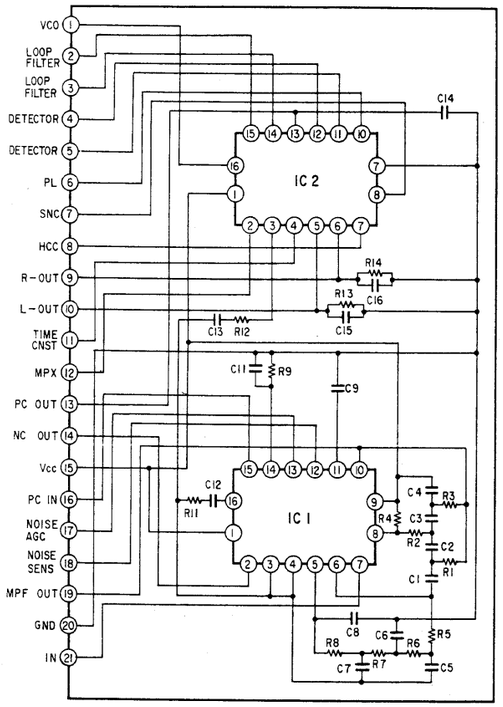
<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Description</th></tr>
<tr><td>22
23
24
25</td><td>PS1
PS2
PS3
PS4</td><td>I</td><td>Input terminals for detection of the MD (CMX-55) position.
<table>
<tr><td></td><td colspan="8">MD position</td></tr>
<tr><td>Switch port</td><td>EJECT</td><td>STOP</td><td></td><td>FF∗</td><td></td><td>REW∗</td><td></td><td>PLAY</td></tr>
<tr><td>PS1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>PS2</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>PS3</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>PS4</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
</table>
Note : The FF position and REW position are interchanged when the direction is reversed (FF to REW and REW to FF). The STOP mode indicates the status immediately after "0011" is changed to "0111", because switch mode during EJECT (set from STOP) is identical to the STOP status.</td></tr>
<tr><td>26</td><td>VSS</td><td>—</td><td>Microcomputer power source (GND) terminal.</td></tr>
<tr><td>27</td><td>BACK UP</td><td>I</td><td>Input terminal for back up current detection.
When this terminal is made low, the microcomputer clock is terminated (stop mode) and memory is backed up at low voltage.
When the terminal is set from low to high at the leading edge, the clock is started (operation is enabled).</td></tr>
<tr><td>28</td><td>OFF IN</td><td>I</td><td>Terminal for Handle Up detection.
When this input is high, operation identical to power off is executed.
When this input is made low, the previous status is reset.</td></tr>
<tr><td>29</td><td>AMS</td><td>I</td><td>This input is used to detect tuning during tape playback and AMS.
No curve is contained if this terminal is high, and the terminal is made low if curve is detected.</td></tr>
<tr><td>30</td><td>N/R</td><td>I</td><td>Input terminal to detect tape running direction.
High : Normal direction
Low : Reversed direction
During tape playback, the MD is controlled to match this input with the microcomputer internal status.</td></tr>
<tr><td>31
32</td><td>END1
END2</td><td>I</td><td>END1 and END2 are used to detect reel table rotation for tape end detection and tuning detect timing during AMS mode. Both leading and trailing edges (_┌ and ┐_) are counted (16 counts for one reel table rotation).
END1 (REEL1) ··· Normal direction take up reel table
END2 (REEL2) ··· Reverse direction take up reel table</td></tr>
<tr><td>33</td><td>SK
(Signal identifying the traffic information broadcasting station)</td><td>I</td><td>SK input terminal in SDK directional mode.
High : SK present (SK is indicated.)
Low : SK absent (No indication.)
If this terminal is held low for more than 8 seconds while the SDK switch is on, SEEK is executed automatically from local mode.(This applies to FM band.)
When SDK is on, only the stations with this terminal in high mode are terminated (automatic station selecting).</td></tr>
<tr><td>34</td><td>SDL</td><td>I</td><td>This input is used to detect the level of Seek, Memory scan, and AUTO memory during tuner automatic station selection.
When this terminal is made high, "station preset" is assumed and the SDS is output to start the IF counter of the PLL IC.
This terminal is also checked during SDC check (PLL IC IF counter matched output). If it is high, the station selection operation is terminated.
(AUTO memory is switched to Memory and Memory scan is held temporarily.)</td></tr>
</table>

<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Description</th></tr>
<tr><td>35</td><td>DK
(Traffic information broadcasting signal)</td><td>I</td><td>If this input is made high while SDK is on, "traffic information start is assumed. Tape mode (AUX) is switched to tuner (FM) mode and the volume level is raised to the level specified in memory. The SDK indication continues blinking during this operation. The system is reset to the previous mode when this input is made low or SDK is turned off.</td></tr>
<tr><td>36</td><td>BK
(Area identification signal)</td><td>I</td><td>Signals between 23 Hz and 54 Hz are counted and the area code is indicated (while SDK is on) as follows :
A 23.75 Hz
B 28.27 Hz
C 34.93 Hz
D 39.58 Hz
E 45.67 Hz
F 53.98 Hz</td></tr>
<tr><td>37</td><td>DK OUT</td><td>O</td><td>This output is usually kept high but is made low when the traffic information receive mode is set by the DK input.
CMOS output.</td></tr>
<tr><td>38</td><td>ILM2</td><td>O</td><td>Illumination mode output 2 is used for switching the dimmer on and off in this system.
Press button No. 4 while pressing the SELECT button to change the switching status.
ILM2 is made low during reset.</td></tr>
<tr><td>39</td><td>ILM1</td><td>O</td><td>Illumination mode output 1 is reserved in this system.
<table>
<tr><th>Button operation</th><th>ILM1</th></tr>
<tr><td>If Select and No. 1 are pressed :</td><td>Low</td></tr>
<tr><td>If Select and No. 2 are pressed :</td><td>High</td></tr>
<tr><td>If Select and No. 3 are pressed :</td><td>Low in Tuner mode
High in Tape or AUX mode</td></tr>
</table></td></tr>
<tr><td>40</td><td>BEEP</td><td>O</td><td>Output terminal to control the button operation confimation sound.
The multivibrator is controlled by this output to generate key tone pulse of about 60 mesc.
This output is disabled by pressing button No. 6 while pressing the SELECT button.</td></tr>
<tr><td>41</td><td>K3</td><td>I</td><td rowspan="4">Key input terminal.
Usually pulled up at 5 V. Key input is assumed when the signals are made low by the KS port.</td></tr>
<tr><td>42</td><td>K2</td><td>I</td></tr>
<tr><td>43</td><td>K1</td><td>I</td></tr>
<tr><td>44</td><td>K0</td><td>I</td></tr>
<tr><td>45</td><td>KS5</td><td>O</td><td rowspan="6">Key scan output terminals of N channel open drain type (active low).</td></tr>
<tr><td>46</td><td>KS4</td><td>O</td></tr>
<tr><td>47</td><td>KS3</td><td>O</td></tr>
<tr><td>48</td><td>KS2</td><td>O</td></tr>
<tr><td>49</td><td>KS1</td><td>O</td></tr>
<tr><td>50</td><td>KS0</td><td>O</td></tr>
<tr><td>51</td><td>B/$\overline{C}$</td><td>O</td><td>Dolby B/C selector output terminal.
High when Dolby B is selected or Dolby is off.
Low when Dolby C is selected.
The output can be pulled up at 5 V or above (up to 10 V) because it is on N channel open drain type (active low).</td></tr>
<tr><td>52</td><td>$\overline{DOLBY}$</td><td>O</td><td>Dolby on/off selector output terminal.
Low when Dolby is on (B & C).
High when Dolby is off.
The output can be pulled up at 5 V or above (up to 10 V) because it on N channel open drain type (active low).</td></tr>
</table>

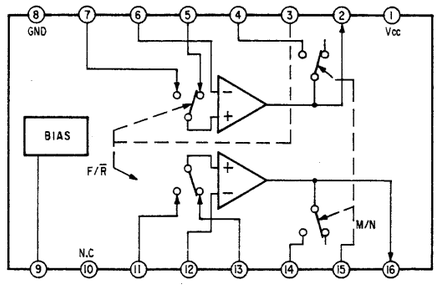
<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Description</th></tr>
<tr><td>53</td><td>S2</td><td>O</td><td rowspan="2">Signal selector output terminal.
Signals are selected as follows :
<table><tr><td colspan="2"></td><td>S1</td><td>S2</td></tr><tr><td rowspan="2">Tape</td><td>NOR</td><td>Low</td><td>Low</td></tr><tr><td>REV</td><td>High</td><td>Low</td></tr><tr><td colspan="2">Tuner</td><td>Low</td><td>High</td></tr><tr><td colspan="2">AUX</td><td>High</td><td>High</td></tr></table>The output can be pulled up at 5 V or above (up to 10 V) because it is on N channel open drain type (active low).</td></tr>
<tr><td>54</td><td>S1</td><td>O</td></tr>
<tr><td>55</td><td>FM/AM</td><td>O</td><td>Output terminal for FM/AM power sourece selection during Tuner mode.
Low ; FM
High ; AM
The current for the N channel open drain output is fed from the base of the transistor for power swicthing.</td></tr>
<tr><td>56</td><td>MUTE</td><td>O</td><td>Mute output terminal. The output is made high to apply muting during mode selection and AMS.
The signal is usually kept low and made high (high impedance) during nonoperating modes (N channel open drain type).</td></tr>
<tr><td>57</td><td>NC
(VPP)</td><td>—</td><td>Functions as VPP during one-time microcomputer mode and not connected (reserved) during mask mode.
For safety, NC is connected to the power source (VDD).</td></tr>
<tr><td>58</td><td>VDD</td><td>—</td><td>The microcomputer power source terminal, operating at 5 V ±0.5 V.</td></tr>
<tr><td>59</td><td>POWER</td><td>O</td><td>Power source control output terminal.
High level signal is output when power is turned on.
CMOS output.</td></tr>
<tr><td>60</td><td>OUT RUN</td><td>O</td><td>This output is used to stop the unit connected to the output terminal AUX for OUT RUN.
AUX High
Otherwise Low
CMOS output.</td></tr>
<tr><td>61</td><td>AUX IN</td><td>I</td><td>AUX mode input terminal.
When this input is made high, AUX input present is assumed and the system is set to AUX mode.</td></tr>
<tr><td>62</td><td>SDC</td><td>I</td><td>IF count matching output (PLL) input terminal.
If the IF frequency is matched, low is output from the PLL IC.
Low is always applied during AM mode in this system.
(Stop is executed only the by level difference.)</td></tr>
<tr><td>63</td><td>SDS</td><td>O</td><td>IF count start output terminal. When this terminal is made high, the IF count starts (PLL) and the SDC is made low if the IF frequency is matched.
If the SDL is made high during automatic station selection, this terminal is made high to start the IF counter. Ohterwise, the output is kept low.
CMOS output.</td></tr>
<tr><td>64</td><td>LCD</td><td>O</td><td>Output terminal for LCD data selection. When this terminal is high, the deta is used for LCD display. This output is connected to the LCD driver (Sanyo LC7582) CE terminal and used as the data latch signal.
CMOS output.</td></tr>
</table>

• IC BLOCK DIAGRAMS

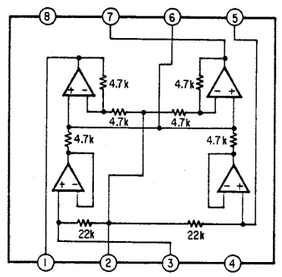
IC1 STK-3400



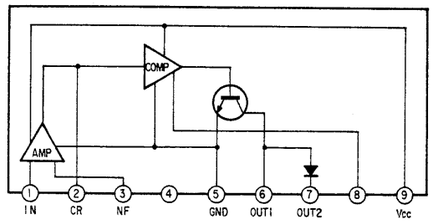
IC101 TA7705F



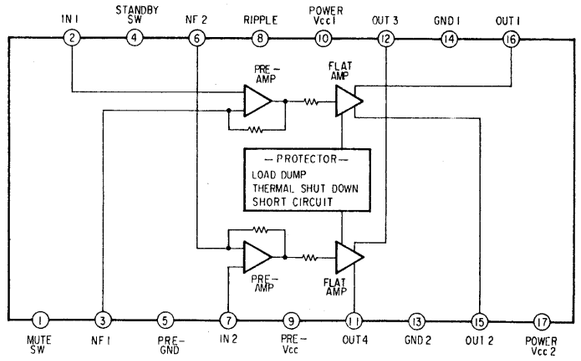
IC110, 112 M5280FP



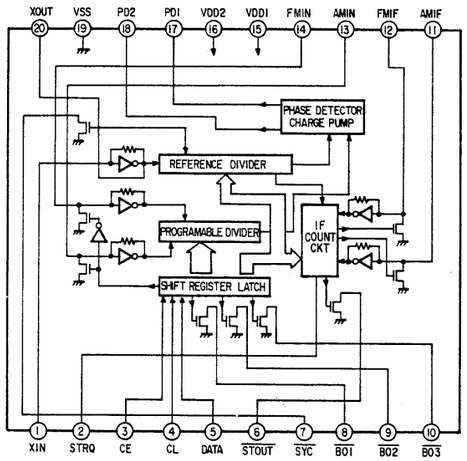
IC304 LA2000



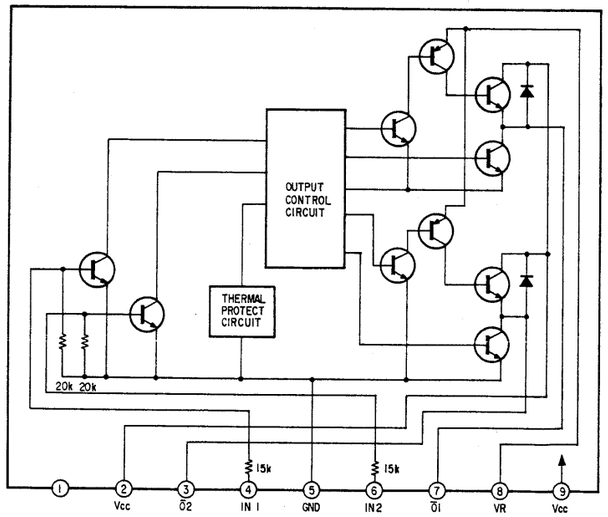
IC501 TA8210H



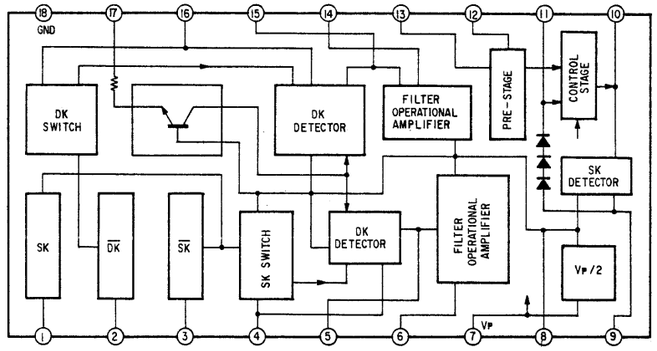
IC2 LM7000



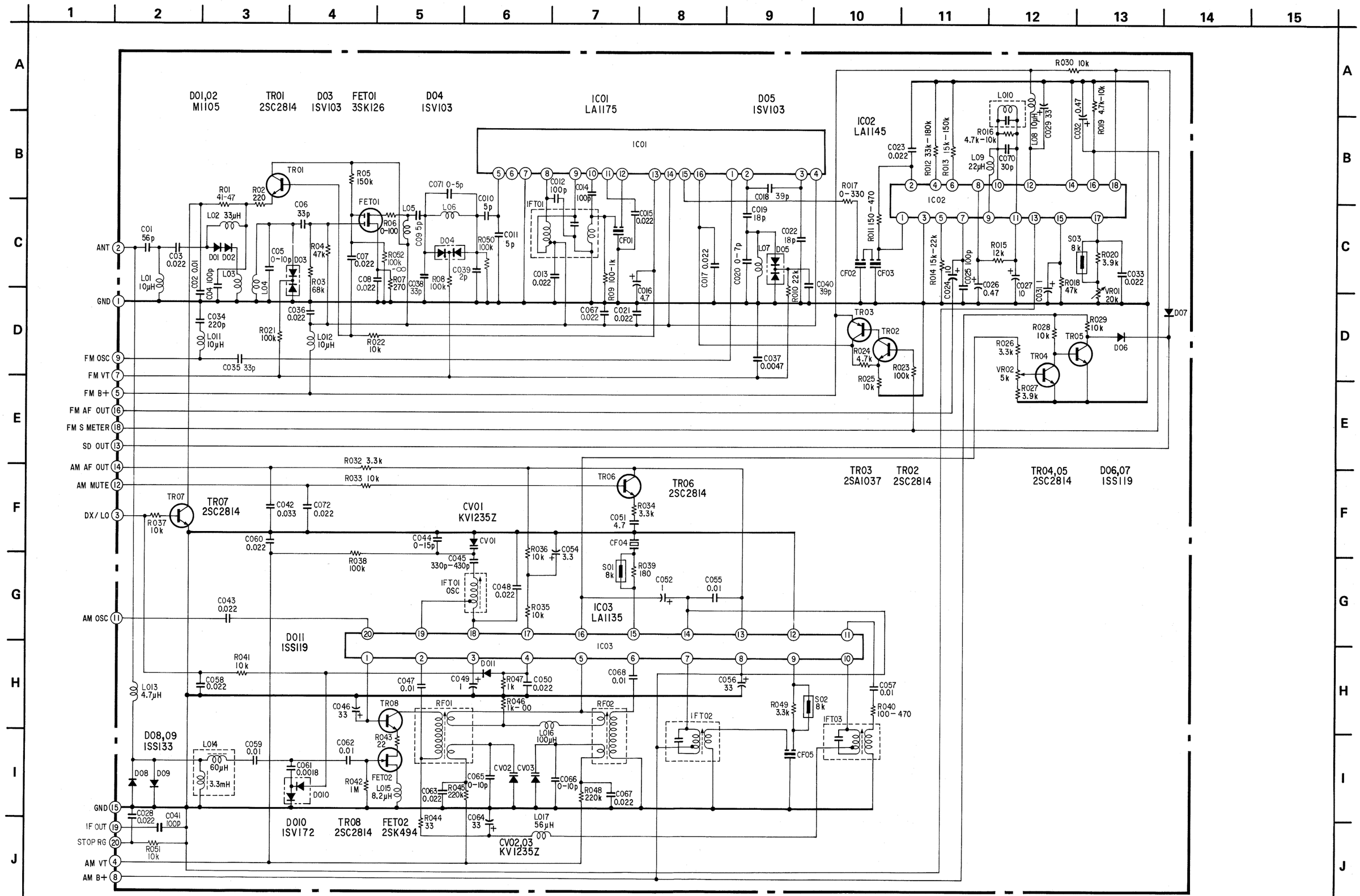
IC302 M54644BL



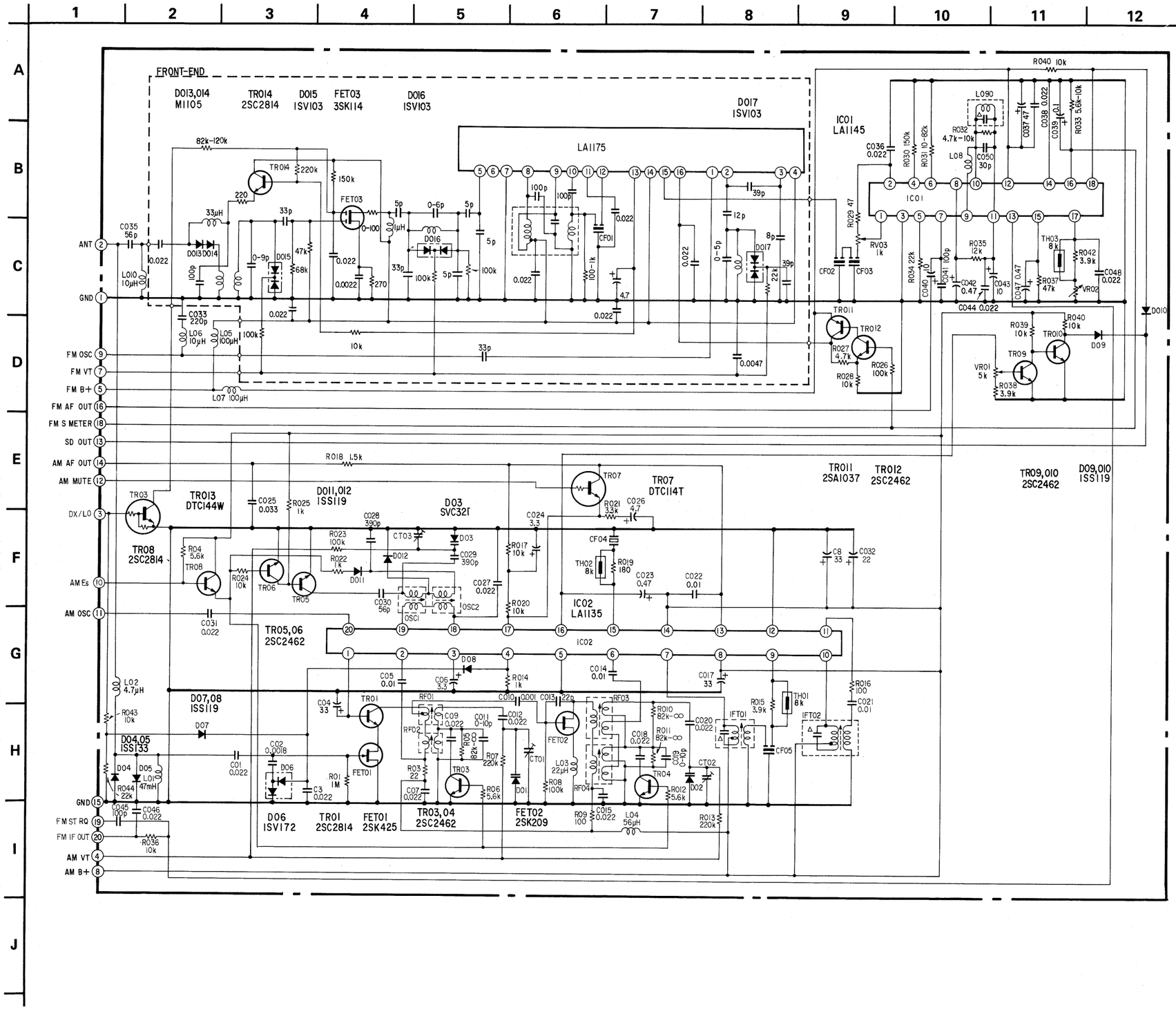
IC801 TDA1579



4-1. XR-7150/7152 TUNER SECTION SCHEMATIC DIAGRAM

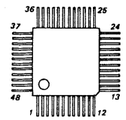


4-2. XR-7151 TUNER SECTION SCHEMATIC DIAGRAM



● Semiconductor Lead Layouts

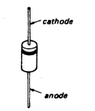
CXA1097Q



STK3400

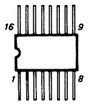
DTC314TK

RD6.2E-L2
RD9.1E-B2
10E2

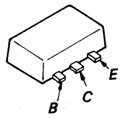


LA2000

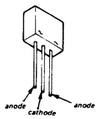
TA7705F
μPD4052BG



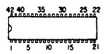
2SB1122-T
2SD1615



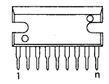
1S2838



LC7537AN

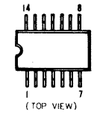


TA8210H



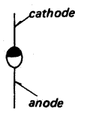
2SD1802

M5228FP
TC4081BF
μPD4066BG

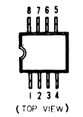


μPC4558C

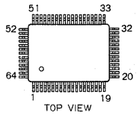
DSA3A4



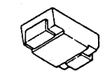
M5280FP
μPC4560G2



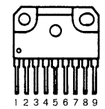
μPD75108G-642-1B



LN1451C

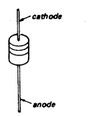


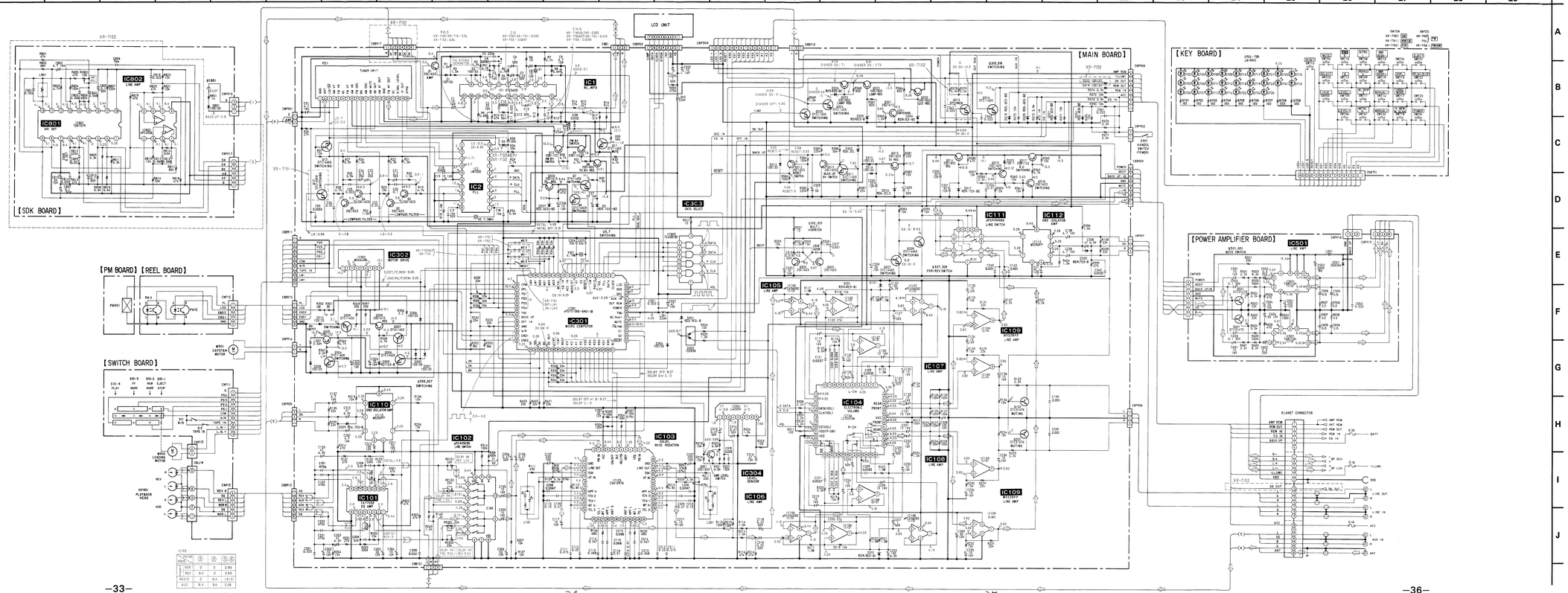
M54644BL



DTA114EK
DTC114EK
DTC144EK
2SC1623

RD10ES-B
RD11ES-B
RD3.9ES-B
RD4.3ES-B1
RD4.7ES-B
RD5.6ES-B2
1SS133





- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- % : indicates tolerance.
- △ : internal component
- ▬ : B+ Line
- ▭ : adjustment for repair.
- Voltage and waveforms are dc with respect to ground under no-signal (detuned) conditions.
  no mark : FM or PLAY
  ( ) : AM
- Voltages are taken with a VOM (50 kΩ/V). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Signal path.
  ⇨ : FM ⇨ : PB
- Switch

Ref. No.	Switch	Position
S10-1	EJECT STOP	OFF
S10-2	REW (NOR)	OFF
S10-3	FF (NOR)	OFF
S10-4	PLAY	OFF
S11	N/R	OFF
S12	TAPE IN	OFF
SW301	LW1/LW2	LW1
SW701	POWER	OFF
SW702	LOUD	OFF
SW703	SELECT	OFF
SW704	MUTE	OFF
SW705	LEVEL –	OFF
SW706	LEVEL +	OFF
SW707	4/METAL	OFF
SW708	1/INTRO	OFF
SW709	2/REPEAT	OFF
SW710	5/DOLBY	OFF
SW711	3/BL. SKIP	OFF
SW712	6	OFF
SW713	AMS/SEEK –	OFF
SW714	MANUAL –	OFF
SW715	DSPL	OFF
SW716	RESET	OFF
SW717	LOCAL/MONO	OFF
SW718	A. MEM/M. SCAN	OFF
SW719	AMS/SEEK +	OFF
SW720	MANUAL +	OFF
SW721	EJECT	OFF
SW722	PLAY/DIR	OFF
SW723	XR-7150/7151: FM	OFF
	XR-7152: FM/AM	OFF
	XR-7150: AM	OFF
SW724	XR-7151: MW/LW	OFF
	XR-7152: SDK	OFF

- CND: Canadian