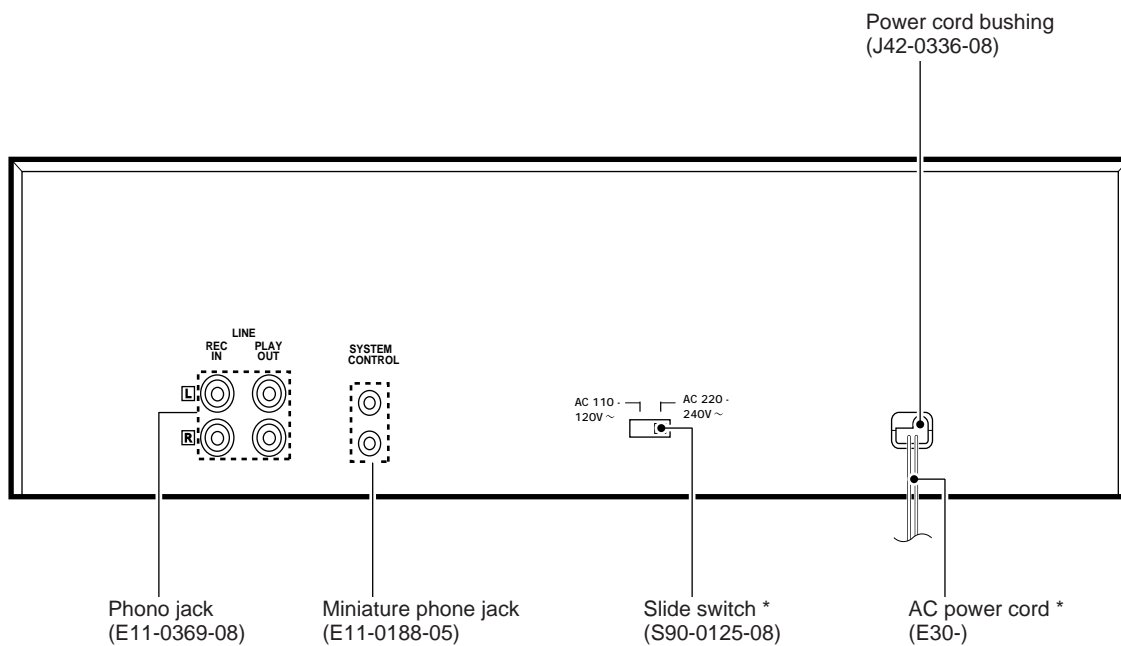
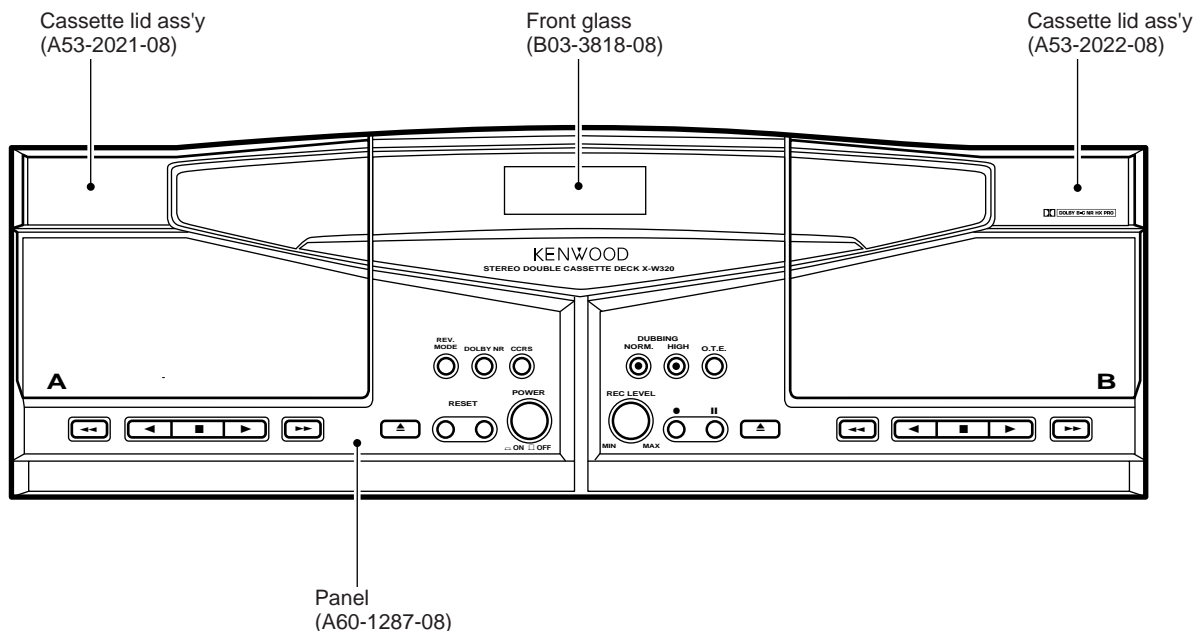


X-W320

SERVICE MANUAL



* Refer to parts list page on 16.



X-W320

CONTENTS / ACCESSORIES

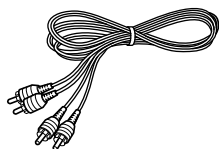
Contents

CONTENTS / ACCESSORIES	2	SCHEMATIC DIAGRAM	9
CIRCUIT DESCRIPTION	3	EXPLODED VIEW	14
ADJUSTMENT	6	PATS LIST	16
PC BOARD	7	SPECIFICATIONS	Back cover

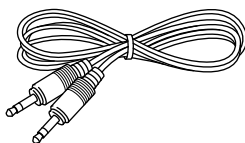
Accessories

Check that the following accessories are present.

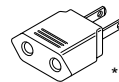
Audio cord(2)
(E30-0505-05)



System control cord(1)
(E30-2733-05)



* AC plug adapter(1)
(E03-0115-05)

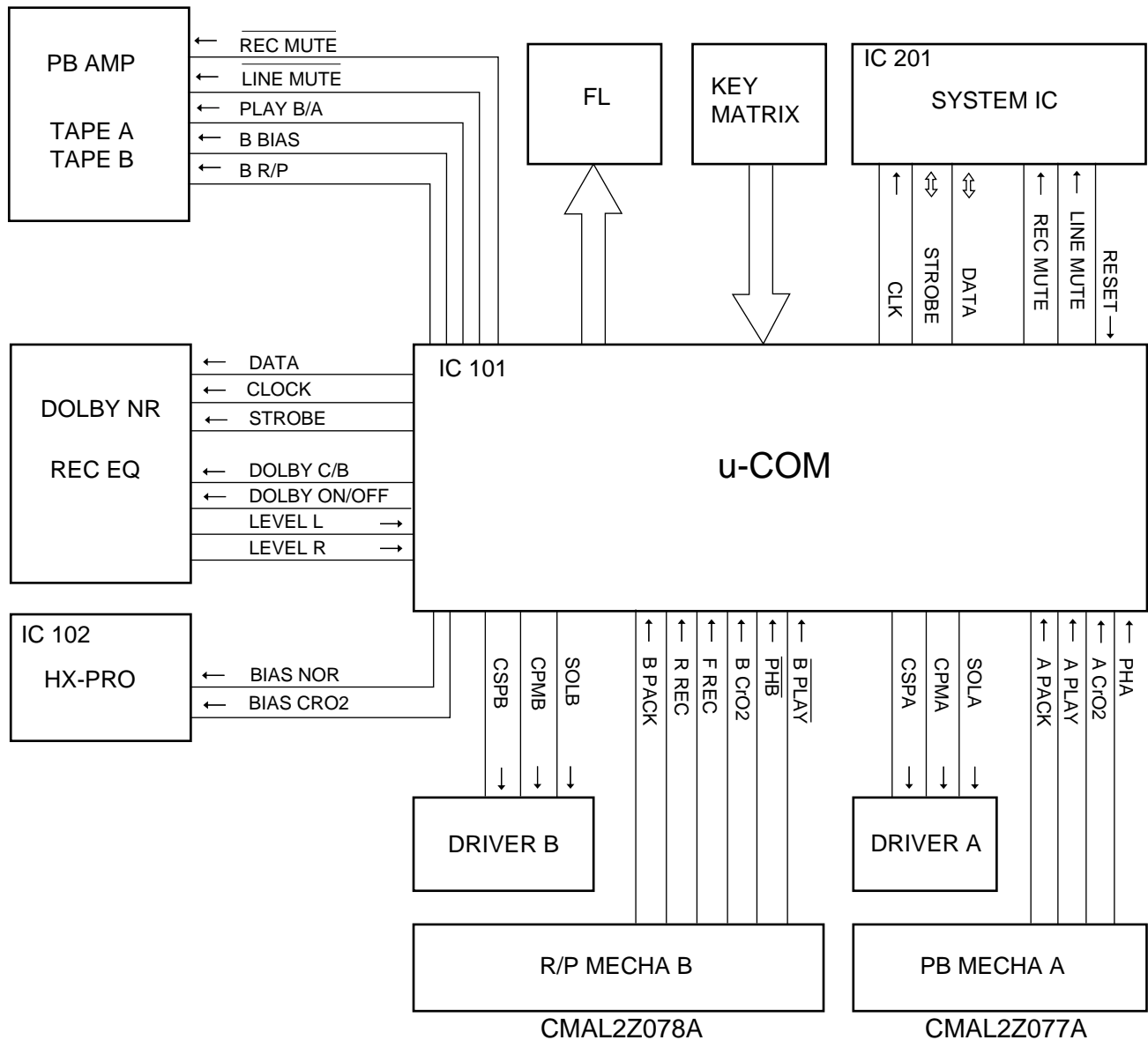


* Use to adapt the plug on the power cord to the shape of the wall outlet (Accessory only for regions where use is necessary.)

CIRCUIT DESCRIPTION

1. Microprocessor

1-1 Microprocessor periphery block diagram



KEY MATRIX

Pin No.	I/O	FUNCTION	KR0	KR1	KR2	KR3
63	FIP23	SB	—	CW	CCW	—
64	FIP22	SC	COUNTER B	F.F A	REV A	STOP A
65	FIP21	SD	REW A	REV MODE	DOLBY	FWD A
66	FIP20	SE	COUNTER A	DUBB HIGH	DUBB NOR	CCRS
67	FIP19	SF	O.T.E	PAUSE	RECORD	STOP B
68	FIP18	SG	REW B	F.F B	REV B	FWD B

CIRCUIT DESCRIPTION

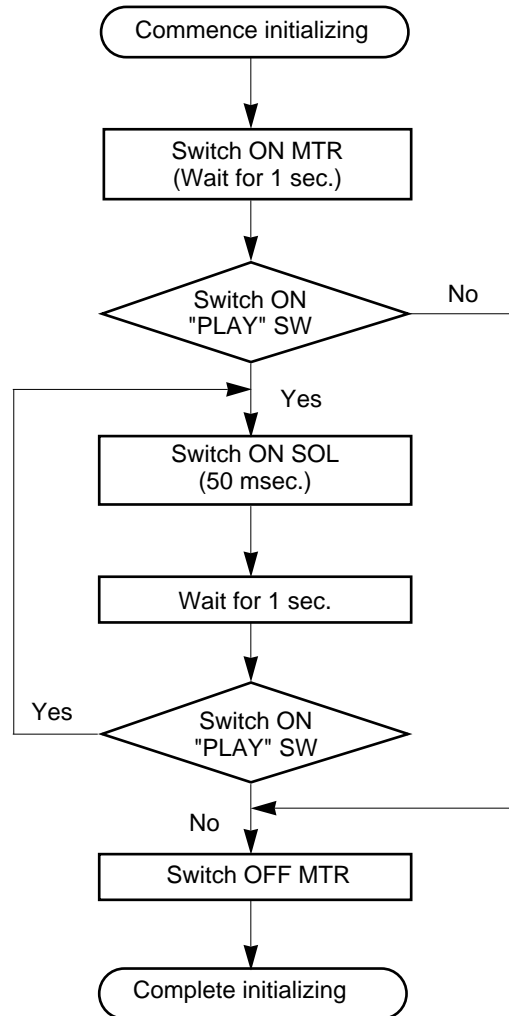
1-2 Pin description

Pin No.	Pin Name	I/O	Description	Action
1~7	G7~G1	O	FL tube grid signal output (G7~G1)	
8	VDD		SUPPLY (+5V)	
9	CLK	O	System IC clock output	
10	STB	O	System IC strobe signal input	H
11	DATA	O	System IC serial data output	H/L
12	HXPRO	O	HX-PRO bias switching	L : ON L
13	PLAY B/A	O	B/A Head switching	H : B H/L
14	DOLBY ON	O	DOLBY ON/OFF	H
15	DOLBY C/B	O	DOLBY C/B	H
16	MPX	O	MPX FILTER OFF/ON	L
17	RST	I	Reset signal input	L
18	CPMA	O	A capstan motor ON	H
19	CPMB	O	B capstan motor ON	H
20	AVss		GND	
21	PHA	I	A mecha rotation detection	L
22	PHB	I	B mecha rotation detection	L
23	A PACK	I	A tape detection input	H
24	B PACK	I	B tape detection input	H
25	A CrO2	I	A mecha CrO2 tape detection	H
26	B CrO2	I	B mecha CrO2 tape detection	H
27	LEVEL L	I	CCRS, DPSS Lch signal input	
28	LEVEL R	I	CCRS, DPSS Rch signal input	
29	AVDD		ANALOG SUPPLY (+5V)	
30	AVREF		FOR ADC	
31, 32	XT1, XT2		OPEN	
33	Vss		GND	
34	X1	I	Clock oscillator	
35	X2	I	Clock oscillator	
36	CSPB	O	B-Capstan motor speed High/Nor	H/L
37	B BIAS	O	B Bias ON/OFF	H : ON H
38	B Mecha R/P	O	B REC/PLAY switching	H : REC H
39	F REC	I	A-Fool Proof FWD	L : REC OK H
40	R REC	I	A-Fool Proof BWD	L : REC OK H
41	CSP A	O	A-capstan motor speed High/Nor	H/L
42	SOLB	O	B solenoid ON	H
43	SOLA	O	A solenoid ON	H
44	EQ SP	O		
45	S DATA	I/O	Serial data input output	H/L
46	S BUSY	I/O	Serial busy input output	H/L
47	CE	I	System Stop	L
48	IC		Connect to VSS	
49	LINE MUTE	O	Line mute control	H
50	REC MUTE	O	Rec mute control	H
51	BIAS NORMAL	O	HX-PRO Bias switching	H : NOR H
52	VDD		Supply (+5V)	
53	B PLAY SW	I	B-Mecha Mode SW	L : PLAY L
54	A PLAY SW	I	A-Mecha Mode SW	L : PLAY L
55	EQ 70/120	O	EQ switching	H : 70us H
56	OTE	O	OTE LED Indicator	L
57~60	KR3~0	I	Key return signal input(KR3~0)	
61	70HSP	O	EQ SP HIGH & BIAS 70us	
62~70	SA~SI	O	FL tube grid signal output(SA~SI)	
71	VLOAD		FL tube driving voltage(-30V)	
72~77	SJ~SO	O	FL tube segment signal output	
78	IC	O	Supply (+5V) to FL	
79,80	G9,G8	O	FL tube grid signal output	

CIRCUIT DESCRIPTION

2. Initialize

When the mechanism made an irregular action, follow the chart below for initializing.



3. Test mode

3-1 Setting method

While pressing the STOP key (A DECK), turn the power switch ON.

After turned the power ON, all lights are illuminated for 1.5 seconds and return to normal display with T indication.

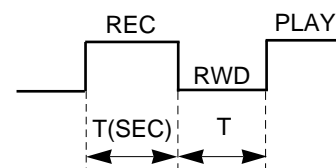
3-2 Cancellation

Turn the power switch OFF.

3-3 Contents of the test mode

1) (4 / 8 / 12) seconds recording.

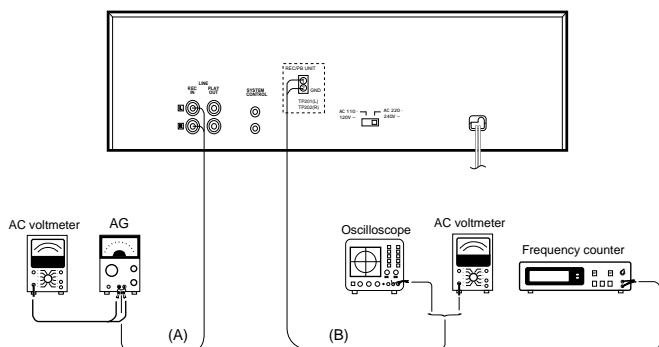
KEYS	T(SECONDS)
DECK B STOP ■ + DECK B REC ●	4
DECK B STOP ■ + DECK B PAUSE	8
DECK B STOP ■ + DOLBY NR	12



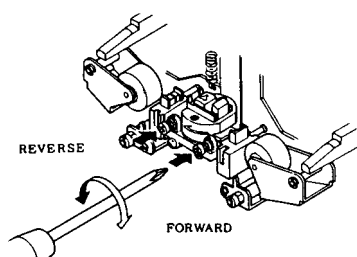
ADJUSTMENT

No.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	CASSETTE TAPE DECK SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
Unless otherwise specified : each ; switch should be set as follows : TAPE : NORMAL, DOLBY : OFF, INPUT : LINE 0dBs=0.775V							
I. Cassette mechanism section (REC/PB head adjustment)							
[1]	Demagnetization and cleaning	-	-	Power OFF, demagnetization, cleaning play	REC/PB head, erase head, capstan, pinch roller	Demagnetize the REC /PB head by head eraser. Clean the REC/PB head, erase head capstan and pinch roller with a cotton swab immersed in alcohol.	
[2]	REC/PB head azimuth	MTT-114, TCC-153, SCC-1727	(B)	PLAY	Azimuth adjustment screw.	Maximize the output and adjust so that the Lissajous figure nears a line slanted 45°.	(a)
II. Printed circuit board adjustment. Note : First perform the high-speed adjustment.							
<1>	Tape speed (A DECK)	HIGH	MTT-111, TCC-100, SCC-1727, 3kHz, -4dB	TP201 or TP202 (B)	1. Playback a TEST TAPE 2. Connect collector (Q404)/R404 to GND via 1kΩ.	HIGH VR401	Adjust so that the frequency is 6kHz(HIGH), 3kHz(NOR) at the tape center.
		NOR.			3. Disconnect a 1kΩ.	NOR. VR402	
	Tape speed (B DECK)	HIGH			1. Playback a TEST TAPE. 2. Connect collector (Q508)/R524 to GND via 1kΩ.	HIGH VR501	
		NOR.			3. Disconnect a 1kΩ.	NOR. VR502	
<2>	Playback level (A DECK)	TCC-130	PLAY	VR403(L), VR404(R)	775mV		
	Playback level (B DECK)					VR503(L), VR504(R)	
<3>	MPX filter	19kHz, -20dB	REC LEVEL 0dB, DOLBY B MODE	L 203(L), L 204(R)	775mV ±2dB		
<5>	Bias current	1kHz, 15mV, 10kHz, 15mV	TP201(L), TP202(R) (B)	<ul style="list-style-type: none"> Adjust the REC LEVEL volume so that the recording monitor output becomes 15mV at 1kHz. Record 1kHz and 10kHz alternately. Rewind and playback recorded signal. 	VR101(L), VR102(R)	15mV ±1dB	
<4>	Recording level	1kHz, 200mV	<ul style="list-style-type: none"> Adjust the REC LEVEL volume so that the recording monitor output becomes 200mV at 1kHz. Record 1kHz. Rewind and playback recorded signal. 	VR201(L), VR202(R)	Adjust the variable resistors so that a playback level of 200mV ±0.5dB is obtained.		

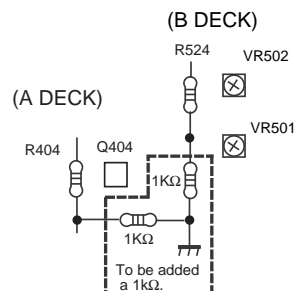
SYSTEM CONNECTIONS



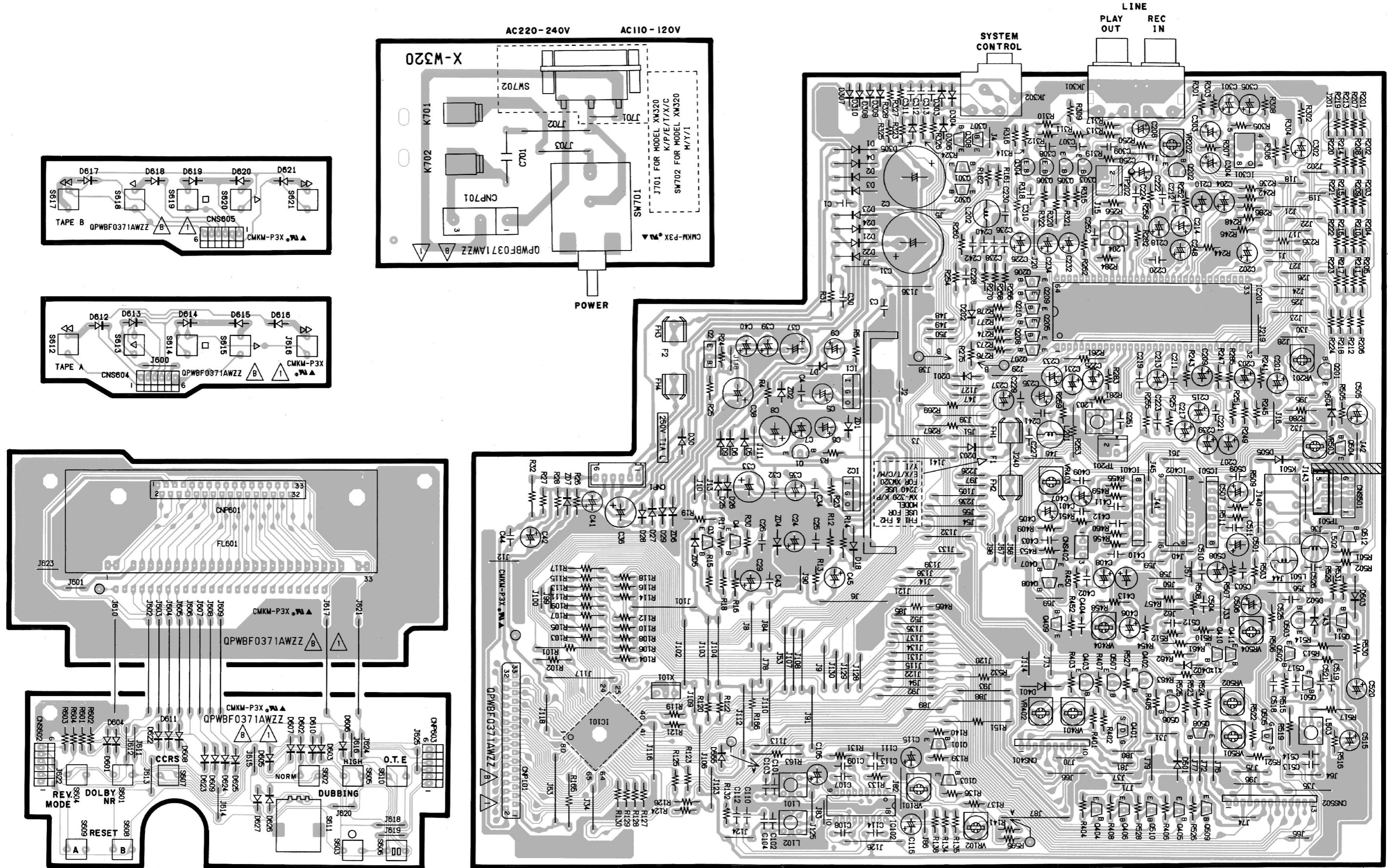
(a) AZIMUTH ADJUSTMENT SCREW



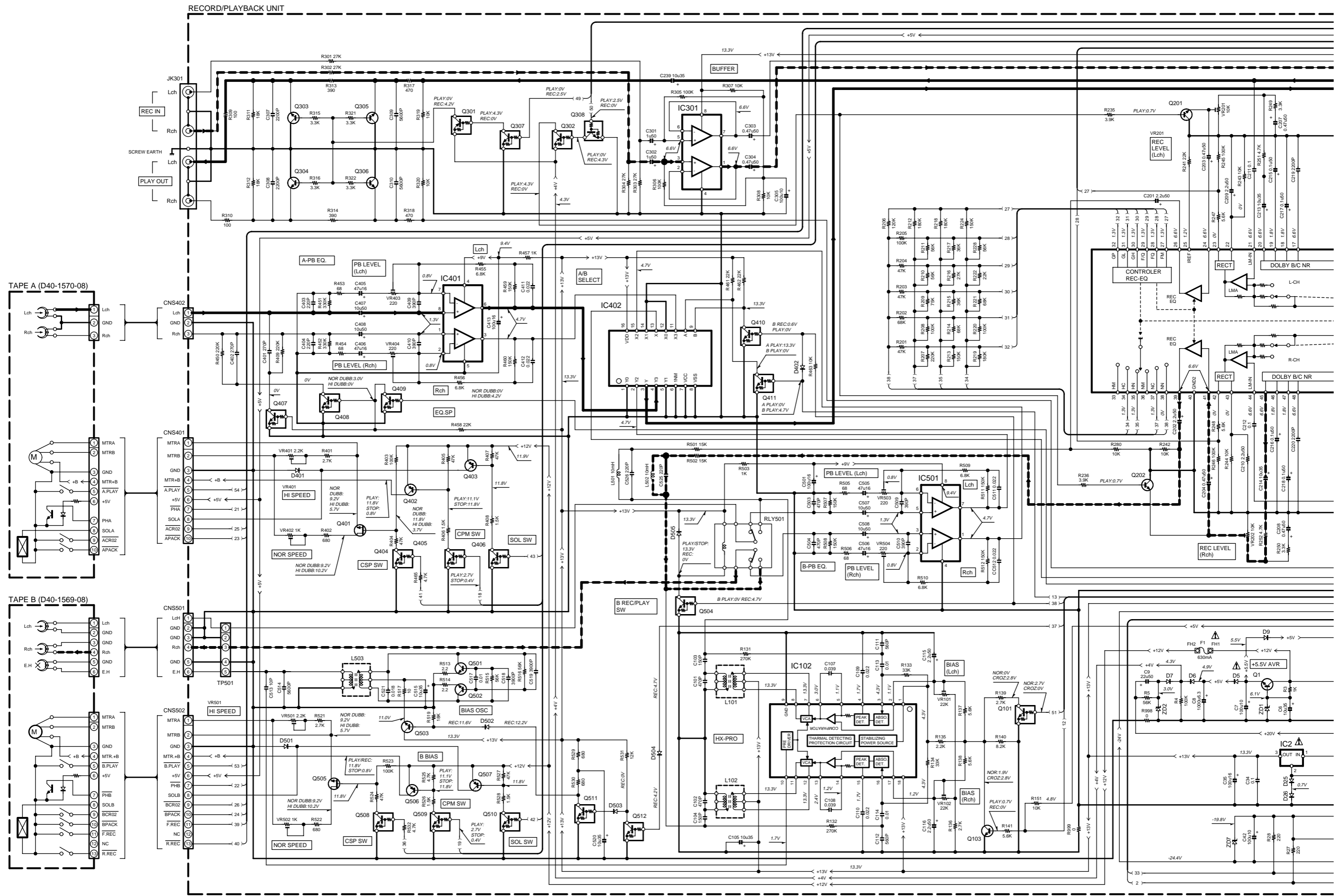
TAPE SPEED(HIGH) TEST POINT



PC BOARD(Component side view)



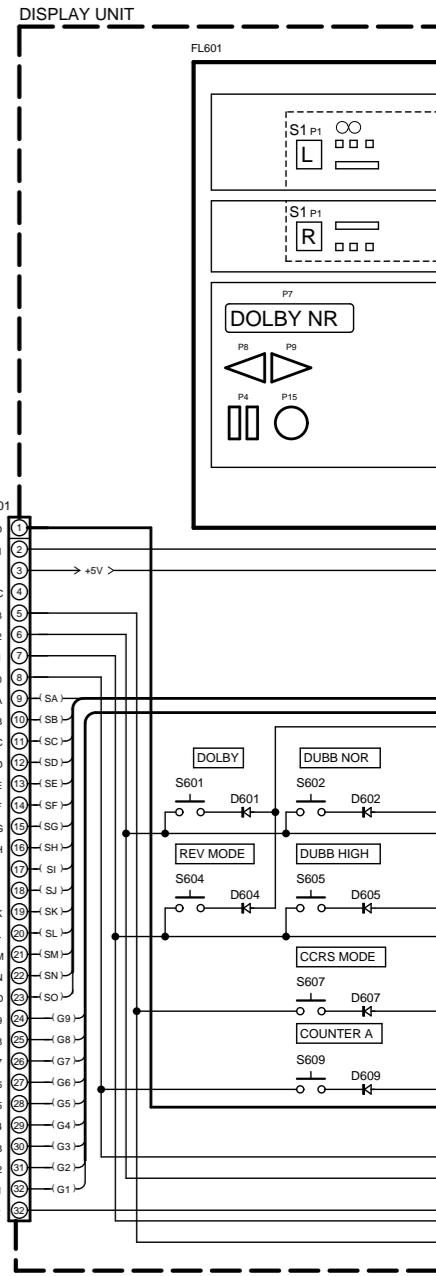
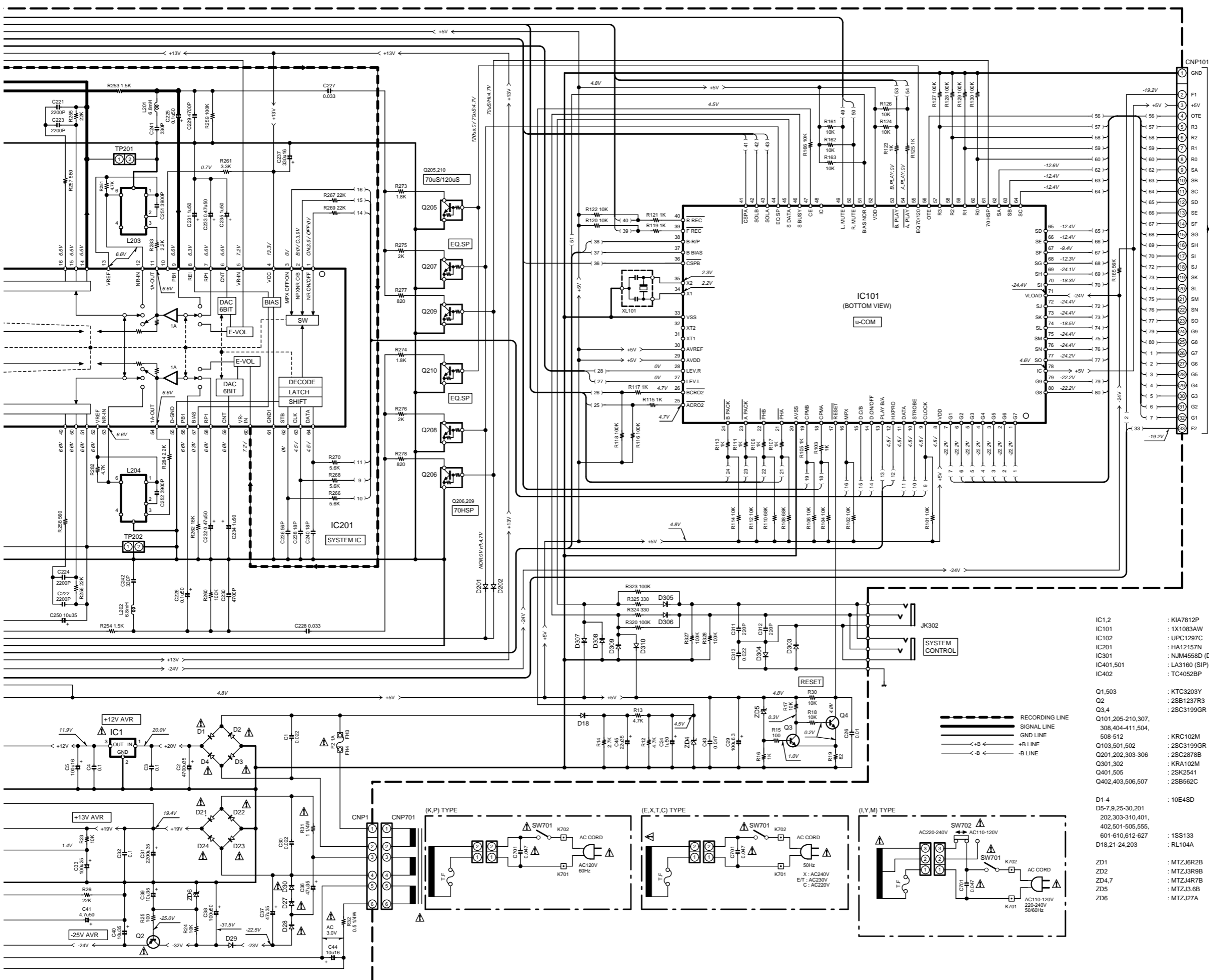
Refer to the schematic diagram for the value of resistors and capacitors.



RECORD/PLAYBACK UNIT

TAPE A (D40-1570-08)

TAPE B (D40-1569-08)

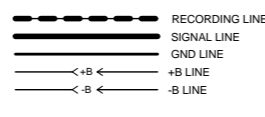


- IC1.2 : KIA7812P
- IC101 : 1X1083AW
- IC102 : UPC1297C
- IC201 : HA12157N
- IC301 : NJM4558D (DIP)
- IC401,501 : LA3160 (SIP)
- IC402 : TC4052BP

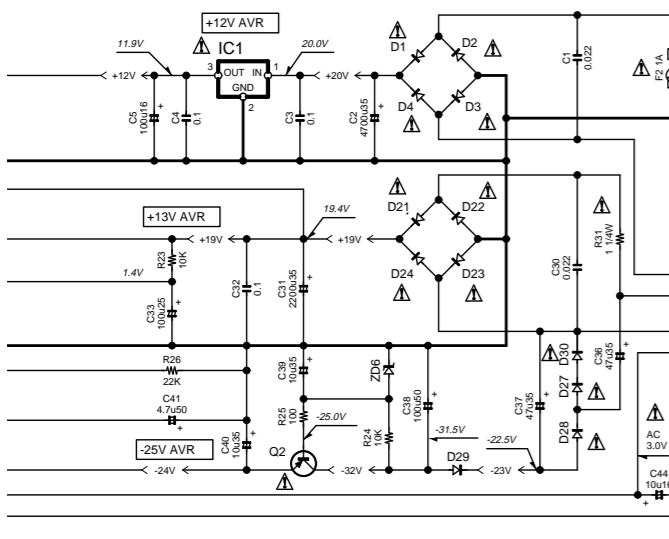
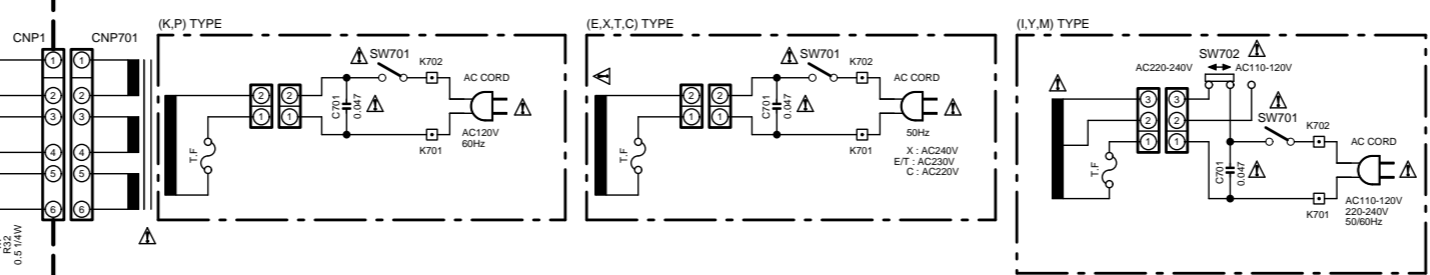
- Q1,503 : KTC3203Y
- Q2 : 2SB1237R3
- Q3,4 : 2SC3199GR
- Q101,205-210,307,308,404-411,504,508-512 : KRC102M
- Q103,501,502 : 2SC3199GR
- Q201,202,303-306 : 2SC2878B
- Q301,302 : KRA102M
- Q401,505 : 2SK2541
- Q402,403,506,507 : 2SB562C

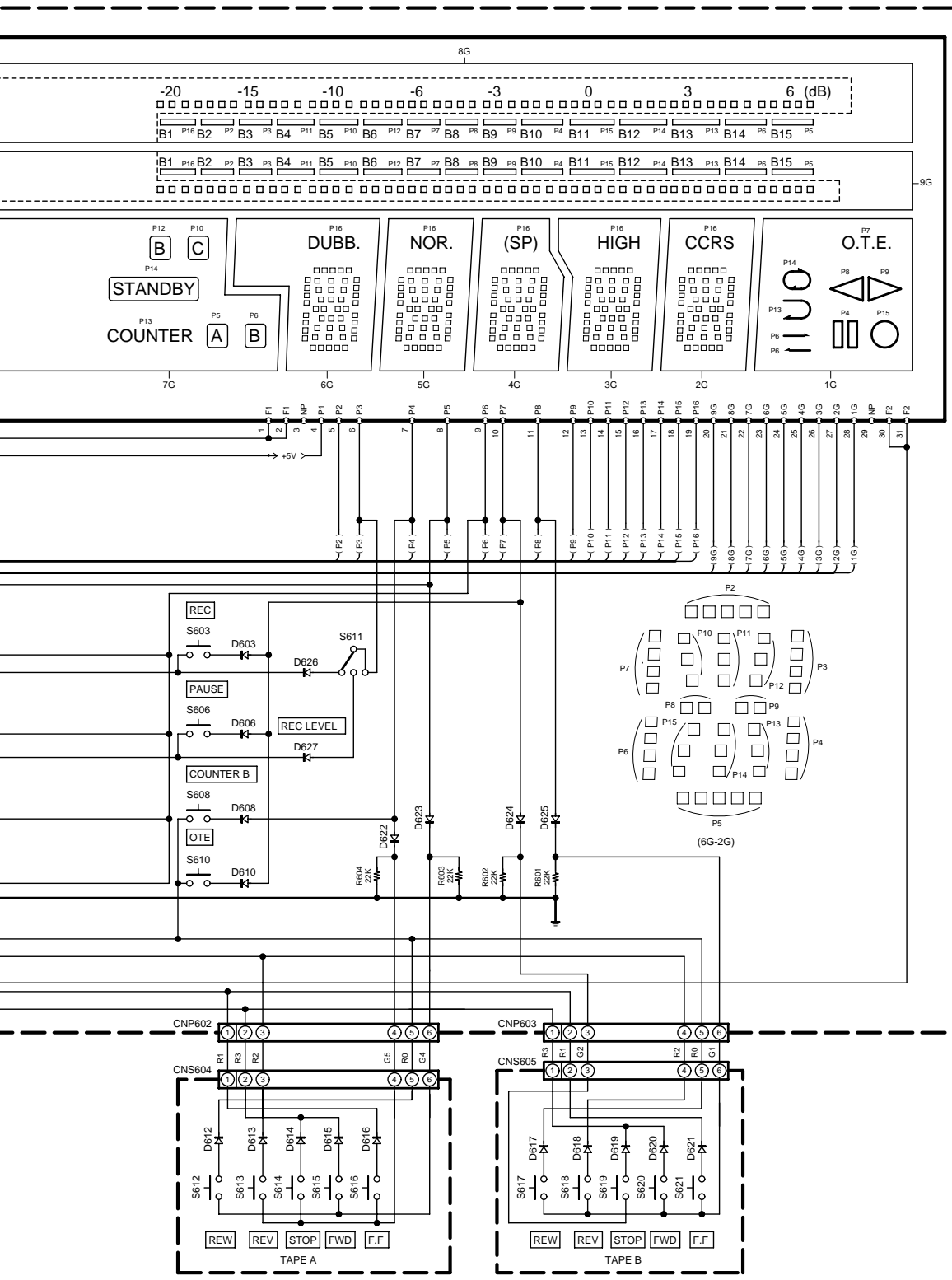
- D1-4 : 10E4SD
- D5-7,9,25-30,201,202,303-310,401,402,501-505,555,601-610,612-627 : 1SS133
- D18,21-24,203 : RL104A

- ZD1 : MTZJ6R2B
- ZD2 : MTZJ3R9B
- ZD4,7 : MTZJ4R7B
- ZD5 : MTZJ3.6B
- ZD6 : MTZJ27A

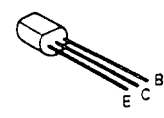


SB	NO	KR1	KR2	KR3
SC	COUN B	FF A	CCW	NO
SD	REW A	REVERSE MODE	DOLBY	FWD A
SE	COUN A	DUBB HIGH	DUBB NOR	CCRS
SF	OTE	PAUSE B	REC B	STOP B
SG	REW B	FF B	REV B	FWD B

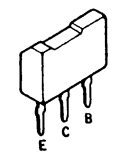




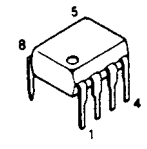
2SC2878B



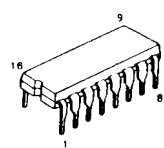
2SB1237R3



NJM4558D



TC4052BP



X-W320(K)

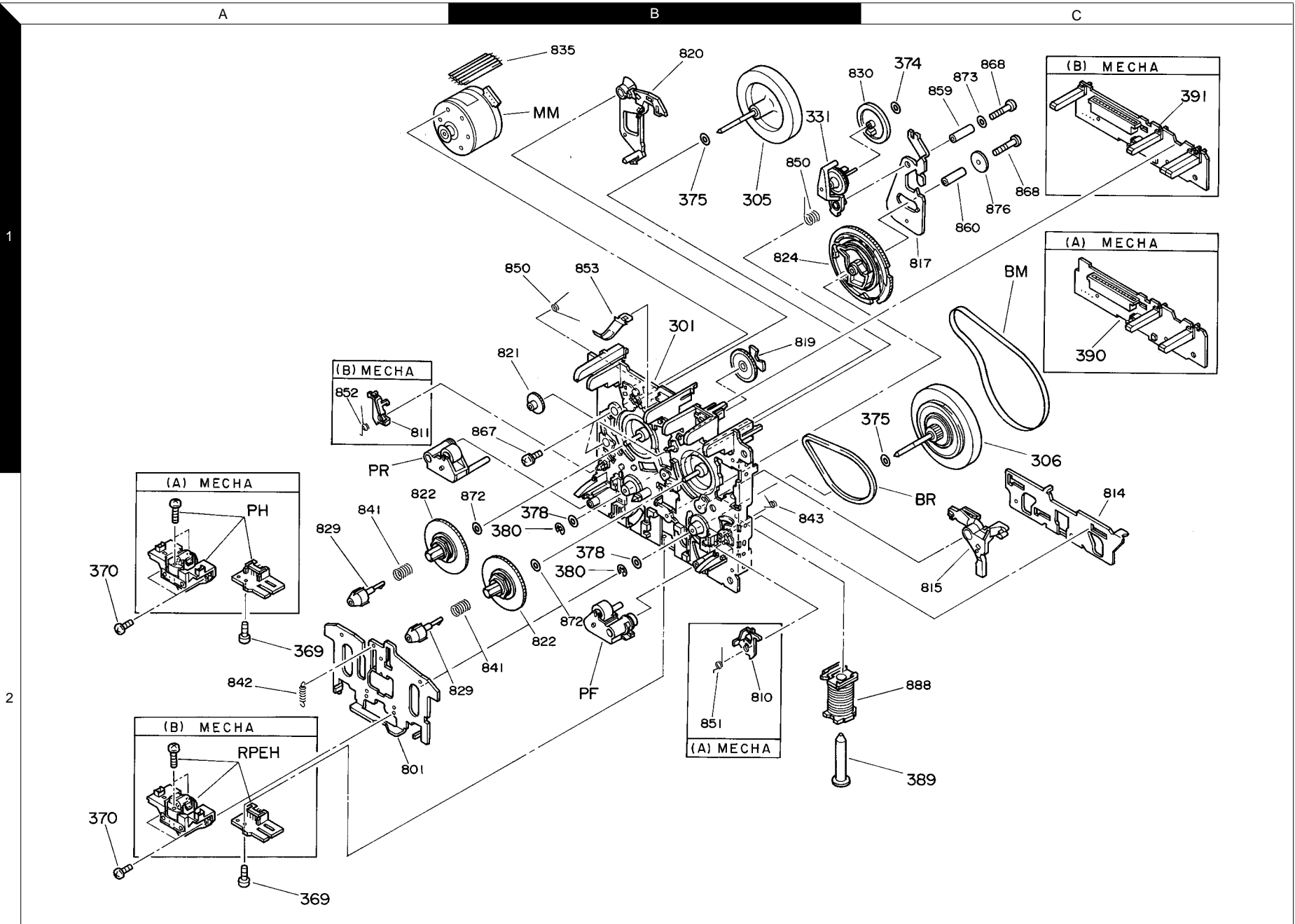
CAUTION: For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list). Δ indicates safety critical components. For continued protection against risk of fire, replace only with same type and rating fuse(s). To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.

DOLBY and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation. Noise reduction circuit made under license from Dolby Laboratories Licensing Corporation.

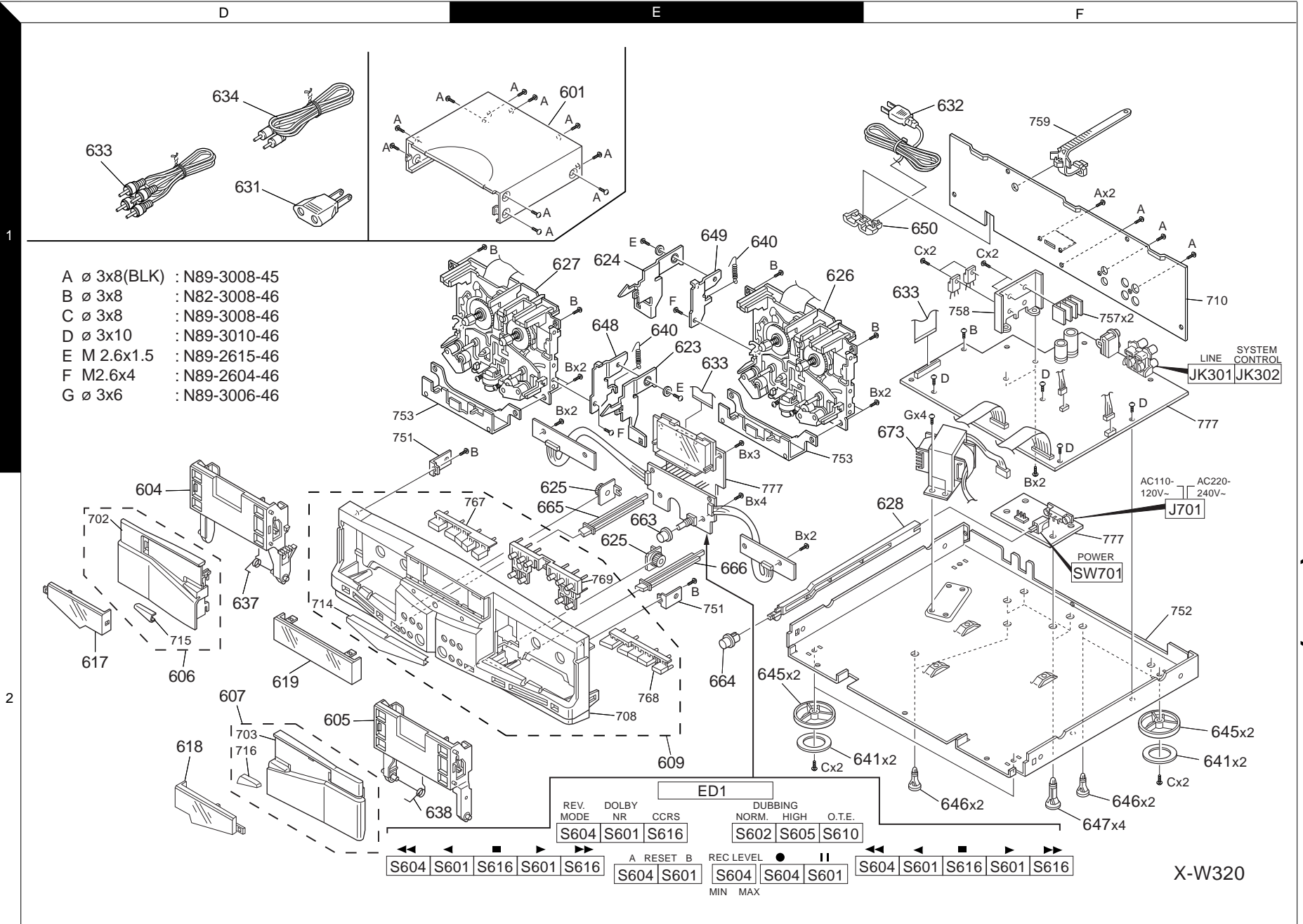
The DC voltage is an actual reading measured with a high impedance type voltmeter with a cassette loaded at playback mode. The measurement value may vary depending on the measuring instruments used or on the product. Bias circuit DC voltage is measured while in the record mode.

X-W320
KENWOOD

EXPLODED VIEW (MECHANISM)



Parts with exploded view numbers larger than 700 are not supplied.



EXPLODED VIEW (UNIT)

X-W320

* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

1

Table with columns: Ref. No, Add-res, New Parts, Parts No., Description, Desti-nation, Re-marks. Section: X-W320. Rows include parts like METALLIC CABINET, FRONT GLASS, WARRANTY CARD, INSTRUCTION MANUAL, EJECT LEVER, DAMPER, SWITCH LEVER, POWER CORD, AUDIO CORD, SPRING, CUSHION, and PROTECTION BAG.

L : Scandinavia Y : PX(Far East, Hawaii) Y : AAFES(Europe)
K : USA T : Europe X : Australia
P : Canada E : Europe M : Other Areas
R : Mexico G : Germany
C : China I : Malaysia

⚠ indicates safety critical components.

* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

2

Table with columns: Ref. No, Add-res, New Parts, Parts No., Description, Desti-nation, Re-marks. Section: RECORD PLAYBACK UNIT. Rows include parts like ITEM CARTON CASE, FOOT, UNIT HOLDER, LEVER BRAKE, POWER CORD BUSHING, KNOB (REC LEVEL), POWER TRANSFORM, MYLAR, ELECTRO, CERAMIC.

L : Scandinavia Y : PX(Far East, Hawaii) Y : AAFES(Europe)
K : USA T : Europe X : Australia
P : Canada E : Europe M : Other Areas
R : Mexico G : Germany
C : China I : Malaysia

⚠ indicates safety critical components.

* New Parts
 Parts without **Parts No.** are not supplied.
 Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.
 Teile ohne **Parts No.** werden nicht geliefert.

Ref. No	Add-ress	New Parts	Parts No.	Description	Desti-nation	Re-marks
IC401			LA3160	IC		
IC402			TC4052BP	IC(4CH MPX/DE-MPX)		
IC501			LA3160	IC		
Q1		*	KTC3203Y	TRANSISTOR		
Q2			2SB1237R3	TRANSISTOR		
Q3 ,4			KTC3199GR	TRANSISTOR		
Q101			KRC102M	TRANSISTOR		
Q103			KTC3199GR	TRANSISTOR		
Q201,202			2SC2878B	TRANSISTOR		
Q205-210			KRC102M	TRANSISTOR		
Q301,302			KRA102M	TRANSISTOR		
Q303-306			2SC2878B	TRANSISTOR		
Q307,308			KRC102M	TRANSISTOR		
Q401		*	2SK2541	TRANSISTOR		
Q402,403			2SB562C	TRANSISTOR		
Q404-411			KRC102M	TRANSISTOR		
Q501,502			KTC3199GR	TRANSISTOR		
Q503		*	KTC3203Y	TRANSISTOR		
Q504			KRC102M	TRANSISTOR		
Q505		*	2SK2541	TRANSISTOR		
Q506,507			2SB562C	TRANSISTOR		
Q508-512			KRC102M	TRANSISTOR		
ZD1			MTZJ6R2B	ZENER DIODE		
ZD2			MTZJ3R9BT	ZENER DIODE		
ZD4			MTZJ4R7B	ZENER DIODE		
ZD5			MTZJ3.6B	ZENER DIODE		
ZD6		*	MTZJ27A	ZENER DIODE		
ZD7			MTZJ4R7B	ZENER DIODE		
MECHANISM ASSY (A: D40-1570-08) (B: D40-1569-08)						
301	1B		A10-3157-08	CHASSIS BASE		
305	1B		D01-0119-08	FLYWHEEL ASSY LEFT		
306	1C	*	D01-0205-08	FLYWHEEL ASSY RIGHT		
331	2B	*	D19-0310-08	CLUTCH ASSY		
369	2A		N87-2004-46	HEAD PCB SCREW		
370	2A		N87-2006-46	SCREW		
374	1C		N19-0904-08	WASHER		
375	1B,1C		N19-0905-08	WASHER		
378	2B		N19-1214-08	WASHER		
380	2B		N29-0205-04	E RING		
389	2C		T94-0225-08	SOLENOID SHAFT		
390	1C	*	W02-2631-08	ELECTRIC UNIT A		
391	1C	*	W02-2632-08	ELECTRIC UNIT B		
BM	1C		D16-0371-08	MAIN BELT		
BR	2C		D16-0372-08	REEL BELT		
MM	1B		T42-0680-08	MAIN MOTOR ASSY		
PF	2B		D14-0364-08	PINCH ROLLER ASSY		
PH	2A	*	T39-0036-08	PLAYBACK HEAD		
PR	1A		D14-0365-08	PINCH ROLLER ASSY		
RPEH	2A	*	T39-0037-08	REC/PLAYBACK/ERASE HEAD		

L : Scandinavia K : USA P : Canada R : Mexico C : China
 Y : PX(Far East, Hawaii) T : Europe E : Europe G : Germany I : Malaysia
 Y : AAFES(Europe) X : Australia M : Other Areas

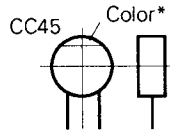
△ indicates safety critical components.

PARTS DESCRIPTIONS

CAPACITORS

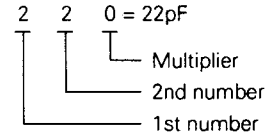
CC 45 TH 1H 220 J
 1 2 3 4 5 6

- 1 = Type ... ceramic, electrolytic, etc.
- 2 = Shape ... round, square, ect.
- 3 = Temp. coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance



• Capacitor value

- 010 = 1pF
- 100 = 10pF
- 101 = 100pF
- 102 = 1000pF = 0.001μF
- 103 = 0.01μF



• Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = -470 ± 60ppm/°C

• Tolerance (More than 10pF)

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40	+80	+100	More than 10μF -10 ~ +50
							-20	-20	-0	Less than 4.7μF -10 ~ +75

(Less than 10pF)

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

• Voltage rating

2nd word	A	B	C	D	E	F	G	H	J	K	V
1st word											
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

• Chip capacitors

(EX) C C 7 3 F S L 1 H 0 0 0 J
 1 2 3 4 5 6 7

(Chip) (CH, RH, UJ, SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
 1 2 3 4 5 6 7

(Chip) (B, F)

Refer to the table above.

- 1 = Type
- 2 = Shape
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance

Dimension (Chip capacitors)

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
A	4.5 ± 0.5	3.2 ± 0.4	Less than 2.0
B	4.5 ± 0.5	2.0 ± 0.3	Less than 2.0
C	4.5 ± 0.5	1.25 ± 0.2	Less than 1.25
D	3.2 ± 0.4	2.5 ± 0.3	Less than 1.5
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25
G	1.6 ± 0.2	0.8 ± 0.2	Less than 1.0

RESISTORS

• Chip resistor (Carbon)

(EX) R K 7 3 E B 2 B 0 0 0 J
 1 2 3 4 5 6 7

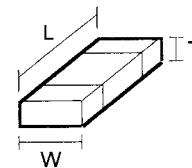
(Chip) (B, F)

• Carbon resistor (Normal type)

(EX) R D 1 4 B B 2 C 0 0 0 J
 1 2 3 4 5 6 7

- 1 = Type
- 2 = Shape
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Rating wattage
- 6 = Value
- 7 = Tolerance

Dimension



Dimension (Chip resistor)

Dimension code	L	W	T
E	3.2 ± 0.2	1.6 ± 0.2	1.0
F	2.0 ± 0.3	1.25 ± 0.2	1.0
G	1.6 ± 0.2	0.8 ± 0.2	0.5 ± 0.1

Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/8W	2H	1/2W		

X-W320

SPECIFICATIONS

Track System	4 track, 2 channel stereo	
Recording System	AC bias (Frequency: 105 kHz)	
Heads	A DECK	
	Playback head	1
	B DECK	
	Playback/recording heads	1
	Erasing head	1
Motors	A DECK	DC motor x1
	B DECK	DC motor x1
Wow and Flutter	±0.19 % (IEC)	
	±0.28 % (DIN)	
	0.1 % (W.R.M.S)	
Fast Winding Time	Approx. 100 seconds (C-60 tape)	
Frequency Response		
TYPE I tape	40 Hz to 18,000 Hz, ±3 dB	
TYPE II tape	40 Hz to 19,000 Hz, ±3 dB	
Signal to Noise Ratio		
Dolby NR OFF	56 dB	
(IEC, 250 nWb/m, TYPE II tape)		
Dolby NR OFF	59 dB	
Dolby B NR ON	68 dB	
Dolby C NR ON	75 dB	
(3rd, H.D., 3 %, TYPE II tape)		

Harmonic Distortion	Less than 1.9 %
(at 315 Hz, 3rd H.D., 250 nWb/m, TYPE II tape)	
Input sensitivity/Impedance	
LINE IN	123 mV/47 kΩ
Output Level/Impedance	
LINE OUT	775 mV/1.0 kΩ

[General]

Power Consumption	20 W
Dimensions	W:400 mm (15-3/4")
	H:141 mm (5-9/16")
	D:390 mm (15-3/8")
Weight (Net)	4.8 kg (10.6 lb)



1. KENWOOD follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.
2. The full performance may not be exhibited in an extremely cold location (under a water-freezing temperature).

Note:

Component and circuit are subject to modification to insure best operation under differing local conditions. This manual is based on Europe (E) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

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