

**ONKYO SERVICE MANUAL****STEREO CASSETTE  
TAPE DECK  
MODEL TA-2000**

UD, UD(N)	120V AC, 60Hz
UG	220V AC, 50Hz
UW	120/220V AC 50/60Hz
UQ	240V AC, 50Hz

**SAFETY-RELATED COMPONENT WARNING!!**

COMPONENTS IDENTIFIED BY MARK  $\Delta$  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

**SPECIFICATIONS**

Track Format: 4-tracks, 2-channels  
Erasing System: AC erase  
Tape Speed: 4.8 cm/sec. (1-7/8 i.p.s.)

Wow and Flutter: 0.07% (WRMS)  
Frequency Response: 20-15,000Hz (Normal)  
(30-14,000Hz  $\pm$ 3dB)  
20-16,000Hz (High)  
(30-15,000Hz  $\pm$ 3dB)  
20-17,000Hz (Metal)  
(30-16,000Hz  $\pm$ 3dB)  
S/N Ratio: 58dB (metal tape, Dolby NR off)  
A noise reduction of 10dB above 5kHz and 5dB at 1kHz is possible with Dolby B NR. A noise reduction of 20dB at 5kHz is possible with Dolby C NR.  
Input Jacks: Line IN: 2  
Input sensitivity: 60mV  
Input impedance: 50 kohms  
Outputs: Line OUT: 2  
Standard output level: 500mV (0dB)  
Optimum load impedance: over 50 kohms  
Headphone jack: 1  
optimum load impedance: 8 to 200 ohms  
Motors: DC servo motor: 1  
Heads: REC/PB: Special Hard Permalloy  $\times$  1;  
Erase head: Ferrite  $\times$  1  
Power Supply Rating: U.K. and Australian models:  
AC 240V, 50Hz  
U.S.A. and Canadian models:  
AC 120V, 60Hz.  
Worldwide models:  
AC 120V and 220V switchable, 50/60Hz  
Power Consumption: 11 watts  
Dimensions: 435(W) $\times$ 122(H) $\times$ 264(D)mm  
(17-1/8" $\times$ 4-13/16" $\times$ 10-3/8")  
Weight: 3.9 kg. (8.6 lbs.)

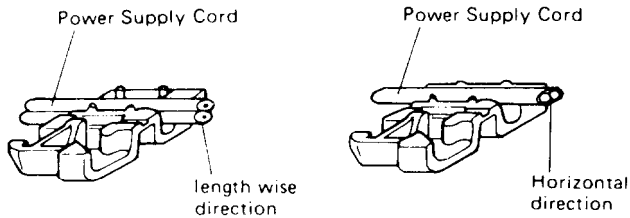


Specifications and external appearance are subject to change without notice because of product improvements.

## SERVICE PROCEDURES

### 1. Replacement of power supply cord

There are two power supply cord outlets on the strainrelief. Insert them in prescribed direction to ensure safety. AS-UC-3 (UD<120V> model) should be inserted lengthwise and other types of cords should be inserted horizontally.



### 2. Insulating resistance measurement

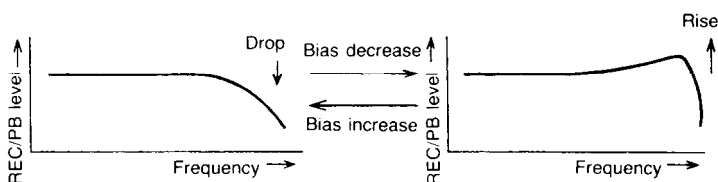
Connect the insulating-resistance tester between the plug of power supply cord and chassis.

Specifications: 500V more than 10MΩ

## HX PRO CIRCUIT OPERATION EXPLANATION

### 1. Regarding recording frequency characteristic and bias

Ordinarily, if the recording bias current is increased, REC/PB frequency response level in the high frequency region (about 10KHz and above) drops, and if the bias is decreased, the response rises.



### 2. Regarding the basic operation of HX PRO (Refer to Fig. 1)

The HX PRO uses the  $\mu$  PC1297CA IC. The operation is in accordance with the following.

- 1) At (a), the recording bias is added onto the audio signal, and the recording signal is detected. This is the same as the recording head recording the signal on the tape.
- 2) The signal of 1) preserves the frequency response with the integrated circuit of (b).

$$\text{Frequency} = \frac{R435 + R433}{2\pi \times C435 \times R435 \times R433} \quad (2.1)$$

By means of the frequency of Fig. 1, the frequency which is effective from the beginning is determined. In the ordinary situation, this is half the audio band (10KHz), (10KHz ~ 7.5KHz).

- 3) At (c), in order to use the affected waveform after-ward, absolute detection is carried out.

- 4) At (d), the waveform peak value is detected. The output becomes the peak DC voltage.
- 5) At (e), the standard voltage and the voltage of (4) are compared.
- 6) With the output of (e), the frequency generation level is controlled (voltage controlled amplifier). That is, the bias size is varied.
- 7) Summing up 1) ~ 6):

At (a), the time constant (frequency) that is detected in the recording signal is preserved, and above a certain frequency and above a certain level, the VCA controls the bias current by causing its reduction. When this is done, in the manner shown in the explanation of Item 1 above, the frequency high region is raised. With this control, the audio signal is instantaneously dealt with.

### 3. Regarding the operating conditions of the HX PRO

- 1) With equation (2. 1) noted above, the effect begins at the frequency thus determined.
- 2) Above a certain level the effect begins.  
(Substantially 0 dB: In the vicinity of 500mV line out)  
The audio signal component level is dependent upon the waveform after point (c).

# HX PRO BLOCK DIAGRAM

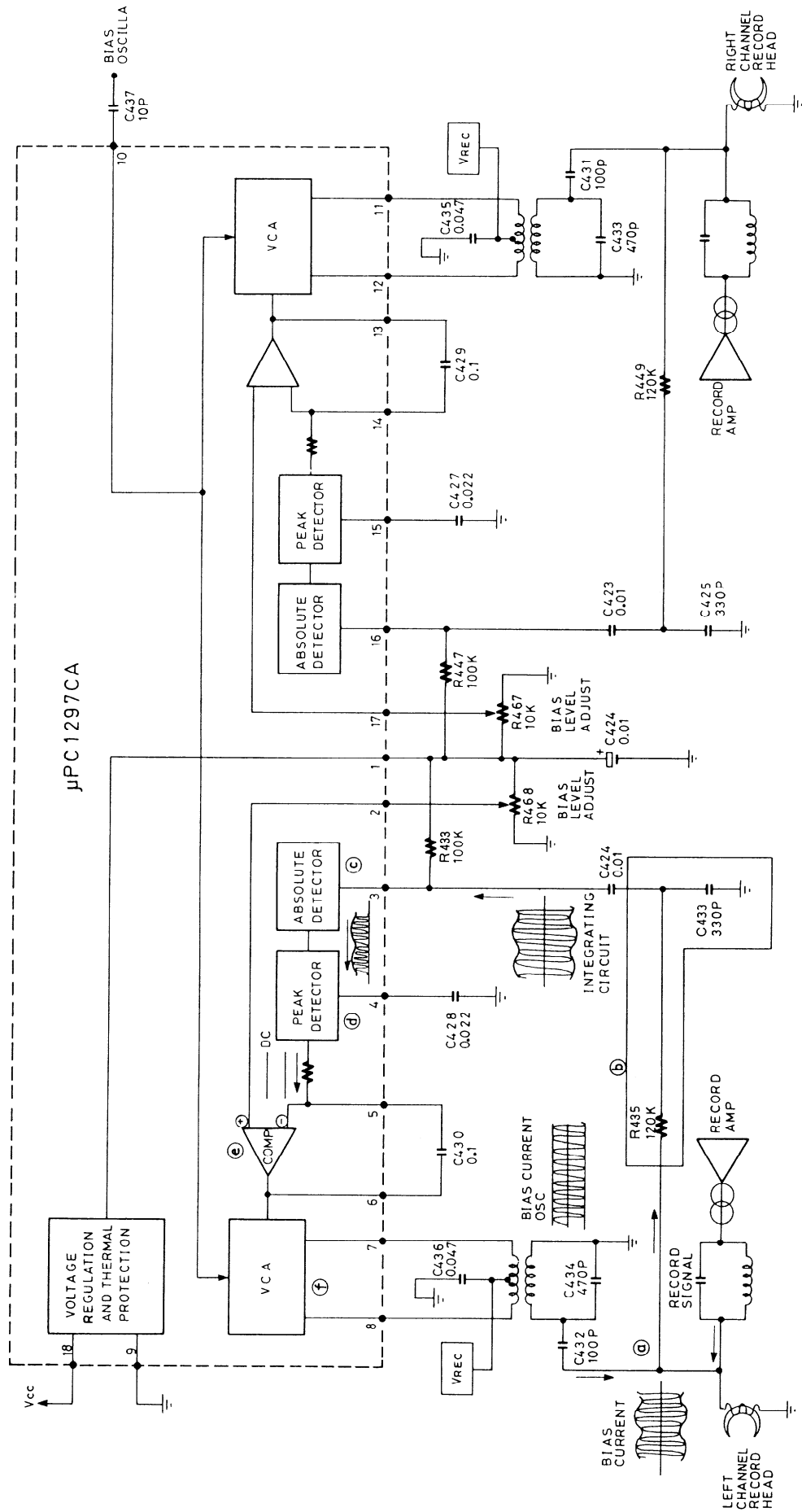
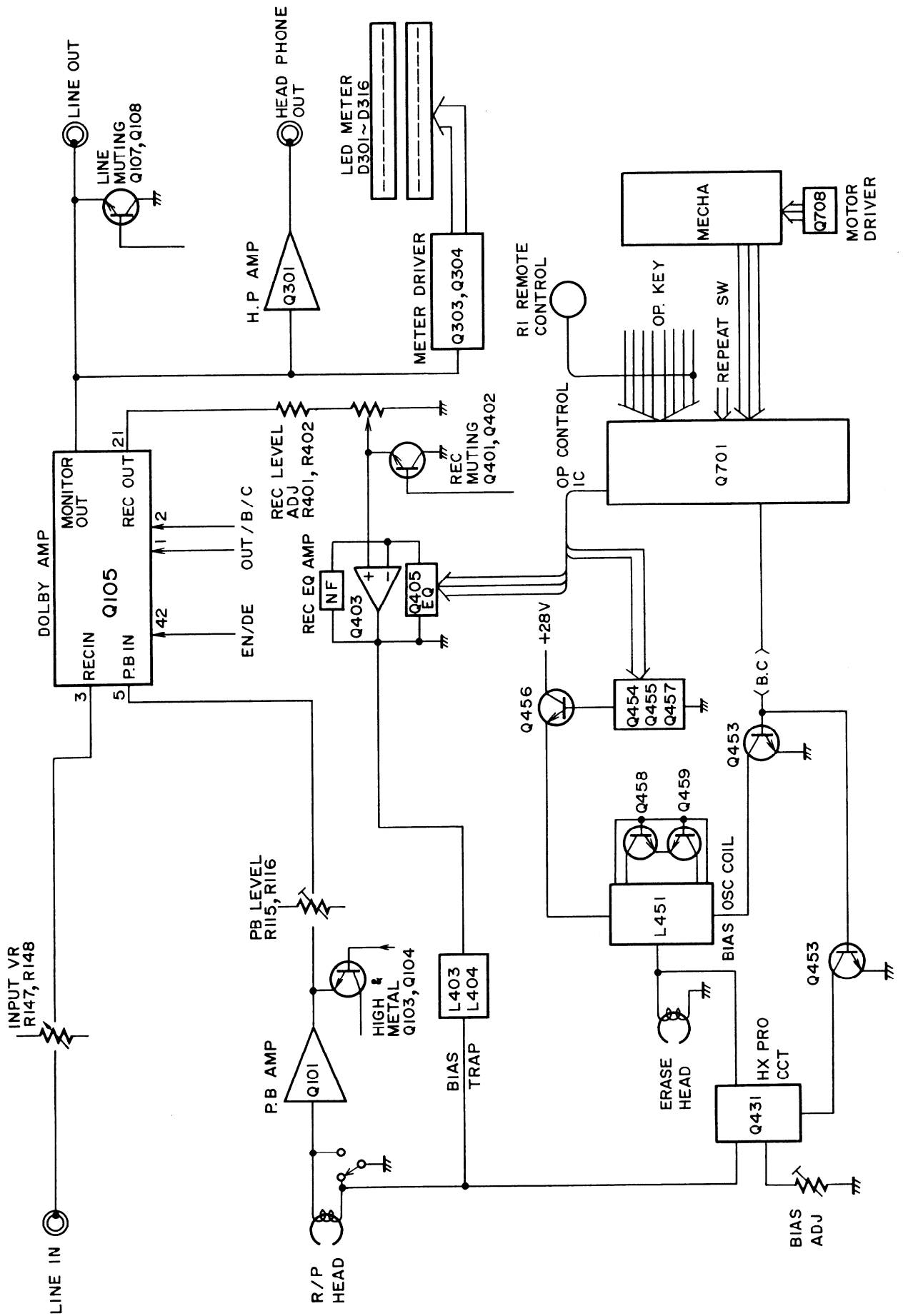
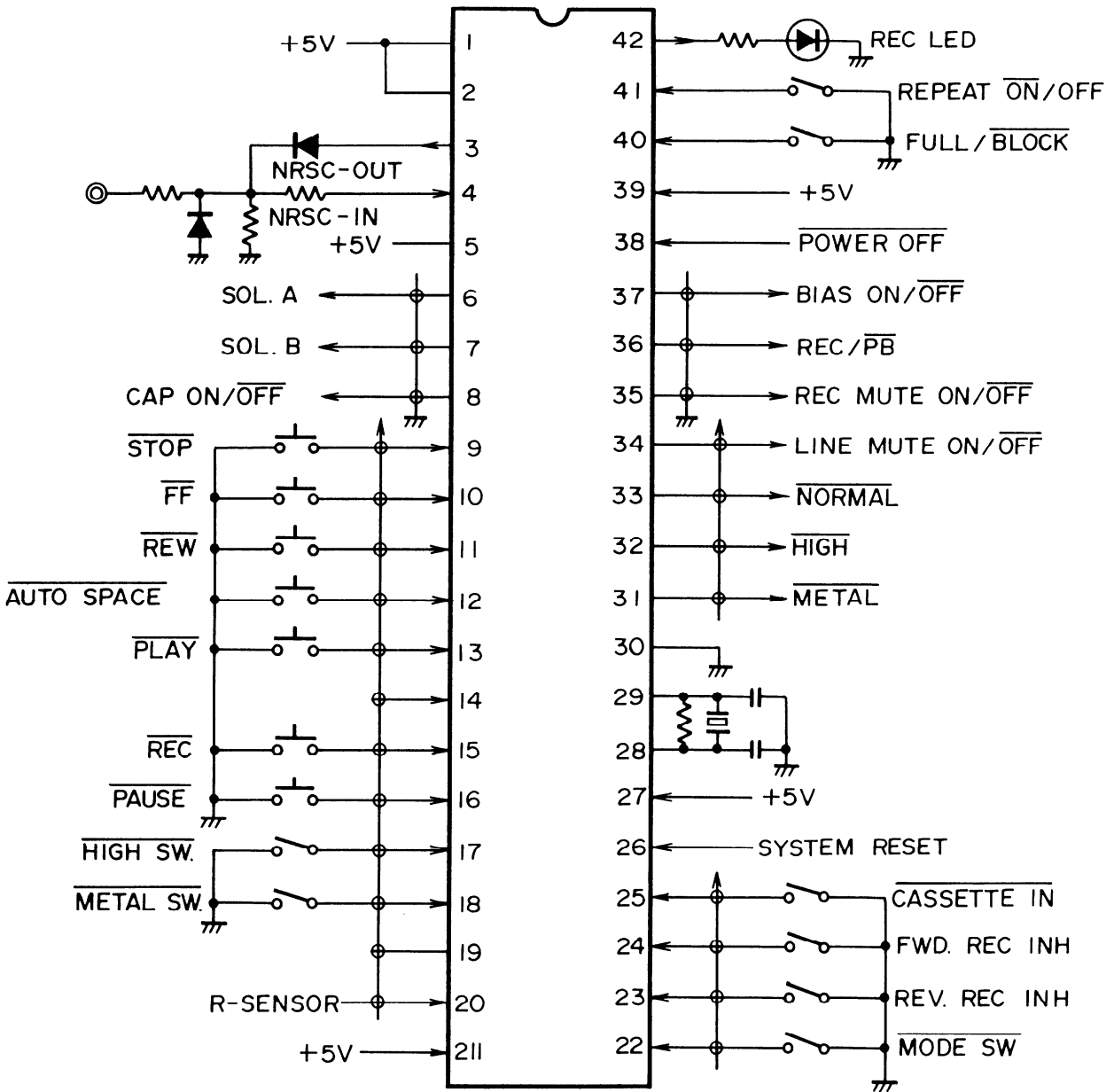


Fig. 1

# BLOCK DIAGRAM



# MICROCOMPUTER (HD614148SA47)



# PRINTED CIRCUIT BOARD PARTS LIST

## NAAF-3638-2

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Ics</b>			<b>Coils</b>	
Q101	222905	$\mu$ PC1228HA	L121, L122	233313	NMC-6048
Q105	222999	CX-20187	L123, L124	233382	NMC-2069
Q301	22240247 or 222652	BA15218N or M5218L	L401, L402	231085 or 24606072	NCH-2133 or NCH-1010
Q403	22240111 or 222808	BA15218 or M5218P	L403, L404 L431, L432	233314 231127	NCH-2097 NCH-4183
Q405	222918	BA6251	L451	231144A	NLO-2048
Q431	222959	$\mu$ PC1297CA	X701	3010150	CST4.00MGW
Q432	222921 or 222465	BA4558 or NJM-4558D		<b>Capacitors</b>	
Q601	22240147	$\mu$ PC1330HA	C103, C104	354780109	1 $\mu$ F50V, ELECT.
Q701	22240260	HD614148SA47	C107, C108	354721019	100 $\mu$ F6.3V, ELECT.
Q902	222780055	78M05HF	C113, C114	354780109	1 $\mu$ F50V, ELECT.
	<b>Transistoers</b>		C121	354780109	1 $\mu$ F50V, ELECT.
Q103, Q104	2211183 or 2212485	2SC1740R or JC501Q	C123-C126	354780229	2.2 $\mu$ F50V, ELECT.
Q107, Q108	2212794 or 2212795	2SD1468-R or 2SD1468-S	C127-C130	354780479	4.7 $\mu$ F50V, ELECT.
Q401, Q402	2211183 or 2212485	2SC1740R or JC501Q	C131, C132	354722219	220 $\mu$ F6.3V, ELECT.
Q433, Q434	221281	DTC114YS	C135, C136	354780479	4.7 $\mu$ F50V, ELECT.
Q451	2213074 or 2212494	2SA933R or JA101P	C139, C140	354784799	0.47 $\mu$ F50V, ELECT.
Q452	221281	DTC114YS	C141, C142	354781599	0.15 $\mu$ F50V, ELECT.
Q453	2211183 or 2212485	2SC1740R or JC501Q	C145, C146	354782299	0.22 $\mu$ F50V, ELECT.
Q454, Q455	221281	DTC114YS	C155, C156	354780479	4.7 $\mu$ F50V, ELECT.
Q456	2201540	2SD947	C301-C304	354780479	4.7 $\mu$ F50V, ELECT.
Q457	2211183 or 2212485	2SC1740R or JC501Q	C401, C402	354780479	4.7 $\mu$ F50V, ELECT.
Q458, Q459	2201883	2SC1213-C	C403, C404	354741009	10 $\mu$ F16V, ELECT.
Q602	221281	DTC114YS	C413, C414	354783399	0.33 $\mu$ F50V, ELECT.
Q603, Q604	2213074 or 2212494	2SA933R or JA101P	C415, C416	354780479	4.7 $\mu$ F50V, ELECT.
Q605	221281	DTC114YS	C431, C432	354741009	10 $\mu$ F16V, ELECT.
Q606-Q608	2213090	DTA114YS	C441-C444	370131514	150PF 100V, APS
Q702	2213074 or 2212494	2SA933R or JA101P	C447	354742209	22 $\mu$ F16V, ELECT.
Q704, Q705	221281	DTC114YS	C451	354724719	470 $\mu$ F6.3V, ELECT.
Q706, Q707	2212853 or 2212855	2SB1068-K or 2SB1068-U	C452	354744709	47 $\mu$ F16V, ELECT.
Q708	2211706	2SD655-F	C453	354741019	100 $\mu$ F16V, ELECT.
Q901	2201924 or 2201925	2SD1761-E or 2SD1761-F	C457	370131234	0.012 $\mu$ F100V, APS
Q903	2211945 or 2212304	2SK246-GR or 2SK381-D	C601, C602	354780109	1 $\mu$ F50V, ELECT.
	<b>Diodes</b>		C603	354780229	2.2 $\mu$ F50V, ELECT.
D401, D402	223163	1SS133	C604	354780479	4.7 $\mu$ F50V, ELECT.
D403	223150, 223124 or 223145	US1040, 1S2473 or 1S2076TD	C701	354741009	10 $\mu$ F16V, ELECT.
D404-D410	223163	1SS133	C703, C704	354780229	2.2 $\mu$ F50V, ELECT.
D601, D602	223163	1SS133	C706	354780109	1 $\mu$ F50V, ELECT.
D701, D703	223163	1SS133	C904	354761029	1000 $\mu$ F 35V, ELECT.
D704	224150562 or 224650562	05AZ5.6Y or HZ-5.6E-B2	C905, C906	354744709	47 $\mu$ F16V, ELECT.
D705	223163	1SS133	C907	354746829	6800 $\mu$ F 16V, ELECT.
D706, D707	223150, 223124 or 223145	US1040, 1S2473 or 1S2076TD	C909	354781599	0.15 $\mu$ F50V, ELECT.
D901-D905	22380032	1SR139-100	C910	354744709	47 $\mu$ F16V, ELECT.
D906, D907	223163	1SS133	C912	354742219	220 $\mu$ F16V, ELECT.
D908	224151303 or 224651303	05AZ13Z or HZ13EB3	C914	354741009	10 $\mu$ F16V, ELECT.
			<b>Resistors</b>		
			R115, R116	5210066 or 5210218	N06HR 22KBD or N06HR 20KBD
			R147, R148	5104226	N11RL50KA17, VR
			R401, R402	5210068 or 5210220	N06HR 47KBD or N06HR 50KBD
			R431, R432	5210064	N06HR 10kBD
			R440	5104254	N11RLC5KB17Z
			R702	49163392404	3.9K $\Omega$ $\times$ 4, 1/10W
			R736	49163392411	3.9K $\Omega$ $\times$ 11, 1/10W
			R901, R902	441520104F	RS1/2WBJ 1 $\Omega$

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Plugs, Socket</b>	
P101A	2009990009	NSAS-17P0015
P102	25045165	NPJ-4PDBL59
P701	25045172	HSJ-1003-01-020
P702A	2002393030	NSAS-30P0012
P703A	2006392030	NSAS-20P0013
P901A	2009990011A	NSAS-10P0020
	<b>Switch</b>	
S709-S712	25035587	NPS-422-S549
	<b>Miscellaneous</b>	
	27141059	BRACKET
	27300243	CLAMP

**NADIS-3639-2**

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>lc</b>	
Q303, Q304	222623	IR2E02
	<b>LED</b>	
D301-D310	225137CG or 225137DG	SEL2413E-CG or SEL2413E-DG
D311-D316 D711	225141 225141	SEL2213C SEL2213C
	<b>Capacitors</b>	
C305, C306	354780479	4.7 $\mu$ F 50V, ELECT.
C307, C308	354780109	1 $\mu$ F 50V, ELECT.
	<b>Switch</b>	
S701-S708	25035548	NPS-111S510, PUSH
	<b>Holder</b>	
	27190722	LED-19

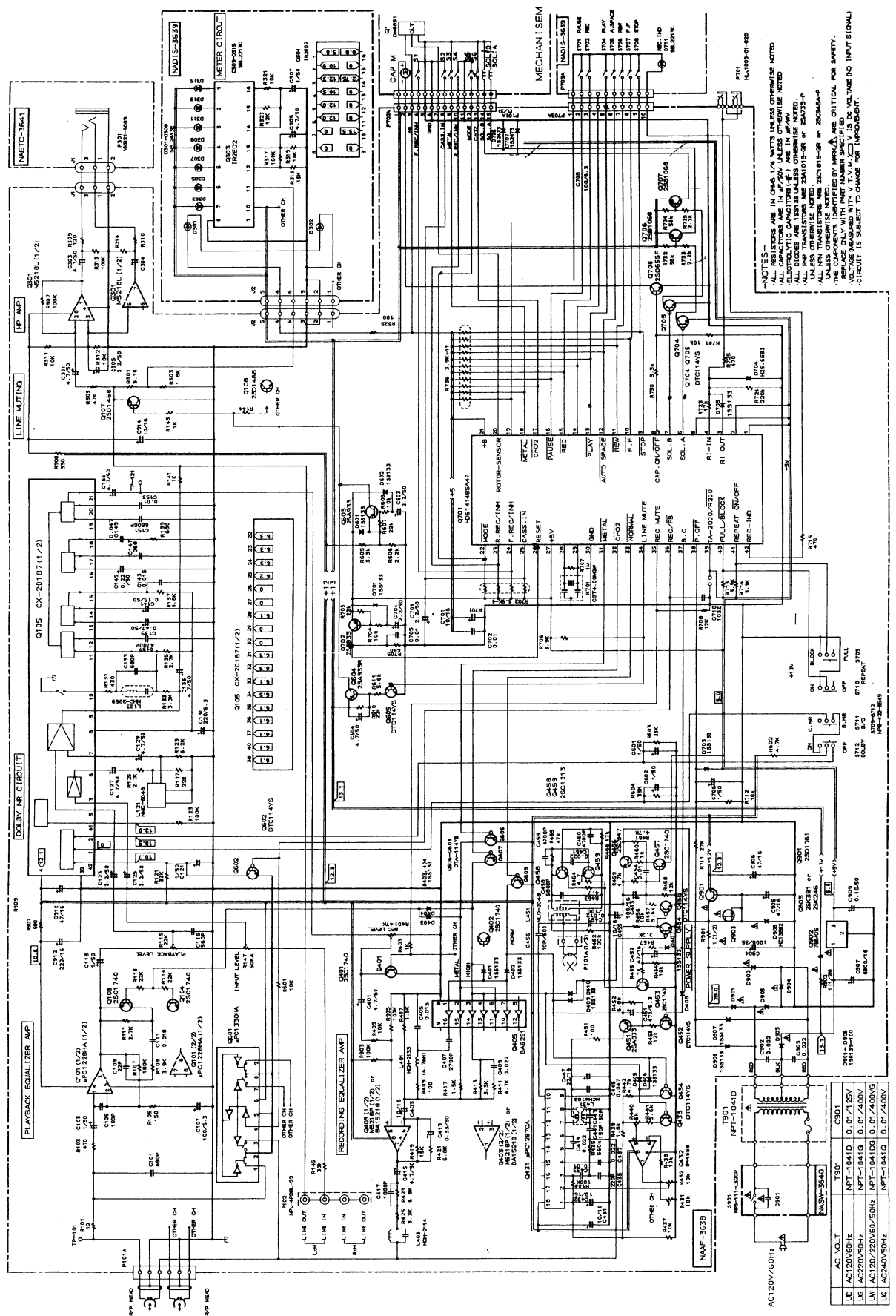
**NASW-3640-2**

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Capacitor</b>	
C901	3500065A	0.01 $\mu$ F AC400V, IS.
	<b>Switch</b>	
S901	25035558	NPS-111-L520P
	<b>Terminal</b>	
	25060092	NJM-1S33

**NAETC-3641-2**

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Terminal</b>	
P301	25045255	YKB21-5009, ST JACK

A B C D E F G



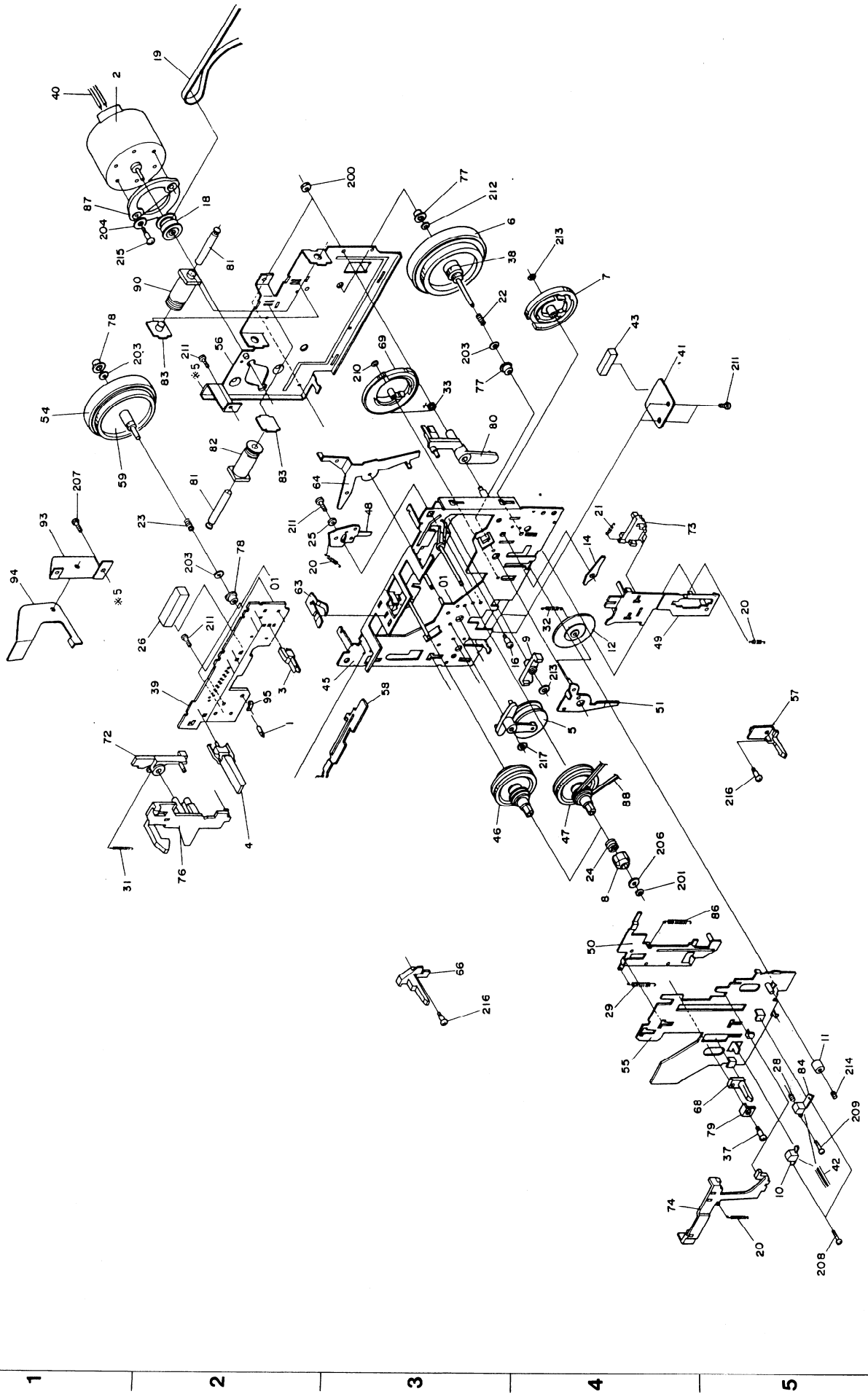
NOTES -  
 ALL CAPACITORS ARE IN OHMS UNLESS OTHERWISE NOTED  
 ALL ELECTROLYTIC CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE NOTED  
 ALL TRANSISTORS ARE 2N4010-OR OF 2N4010-P UNLESS OTHERWISE NOTED  
 ALL PNP TRANSISTORS ARE 2N4010-OR OF 2N4010-P UNLESS OTHERWISE NOTED  
 THE COMPONENTS WITH PART NUMBER SPECIFIED IN THIS SCHEMATIC ARE SUBJECT TO CHANGE FOR IMPROVEMENT.  
 VOLTAGE IS SUBJECT TO CHANGE FOR IMPROVEMENT.

AC VOLT	T901	C901
LD AC120V/60HZ	NFT-1041D	0.01/1.25V
LG AC220V/50HZ	NFT-1041G	0.01/400V
LH AC120V/220V/50HZ	NFT-1041D9	0.01/400V
LC AC240V/50HZ	NFT-1041G	0.01/400V



TAPE MECHANISM-EXPLODED VIEW

A B C D E F G



# ADJUSTMENT PROCEDURES

## PRECAUTIONS

- Before adjustment, clean the following parts with an alcohol moistened swab.
  - \* record/playback head
  - \* erase head
  - \* pinch roller
  - \* capstan
- Do not use magnetized screwdriver for adjustments.
- Demagnetize record/playback head with a head demagnetizer.

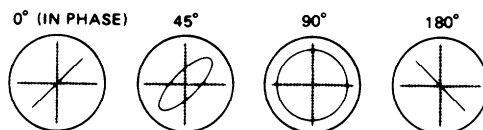
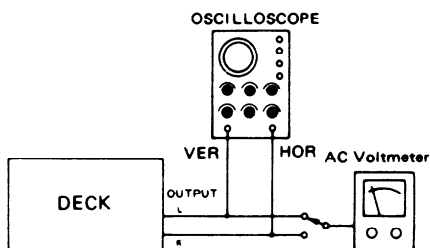
## TEST EQUIPMENT/TOOLS REQUIRED:

- Audio oscillator
- Digital frequency counter
- Oscilloscope
- Attenuator
- AC voltmeter
- Non-magnetic screw driver
- Test tapes
  - VTT-658 : 10 KHz, -15dB
  - MTT-111 : 3 kHz, -10dB
  - MTT-150 : Dolby level calibration  
400Hz, tone 200nWb/m

Item	Connection of instrument	Line input	Test tape	Mode	Output indicator	Adjustment point	Adjust	Remarks	
1	Tape speed	Frequency counter to LINE output terminal	MTT-111	PB	Frequency counter	Semi-fixed on the motor	3020±20Hz		
2	Head azimuth	AC voltmeter and oscilloscope to Line output terminal	VTT-703L	PB	AC voltmeter	Head azimuth screw	Maximum and same phase at channels L and R	fig-1	
3	Playback level	AC voltmeter to terminals TP-121 and TP-122	MTT-150	PB	AC voltmeter	R115(Ch.L) R116(Ch.R)	25mV		
5	OSC Block	Frequency counter to P101a read loose coupling	METAL TAPE MX-C90	REC	Frequency counter	L-451	85kHz±2kHz		
6	HX-PRO	AC voltmeter to terminals Tp-101 and TP-102	METAL TAPE	REC	AC voltmeter	L-431(ch.L) L-432(ch.R)	Maximum	R-431 R-432 clock wise	
7	Bias current	fig. 2	1kHz, -20dB and 12kHz, -20dB	XL-II C-90	REC-PB	AC voltmeter	R431(ch.L) R432(ch.R)	Same level at REC-PB	Input VR maximum.
8	Record level	fig. 2	1kHz	XL-II	REC	AC voltmeter	Attenuator or AF OSC output	350mV	
					REC/Pb	AC voltmeter	R401(ch.L) R402(ch.R)	Same level at REC/PB	

Blank tape

- NORMAL ..... UD-1 C-90      PLAY torque ..... 30~70g/cm
- HIGH ..... XL-II C-90      FF.REW torque ..... 80~180g/cm
- METAL ..... MX C-90      Back tention ..... 2~7g/cm



Confirming phase relationship fig-1

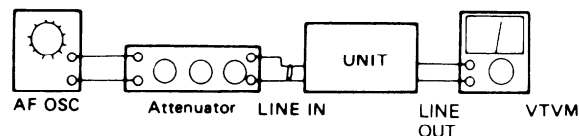
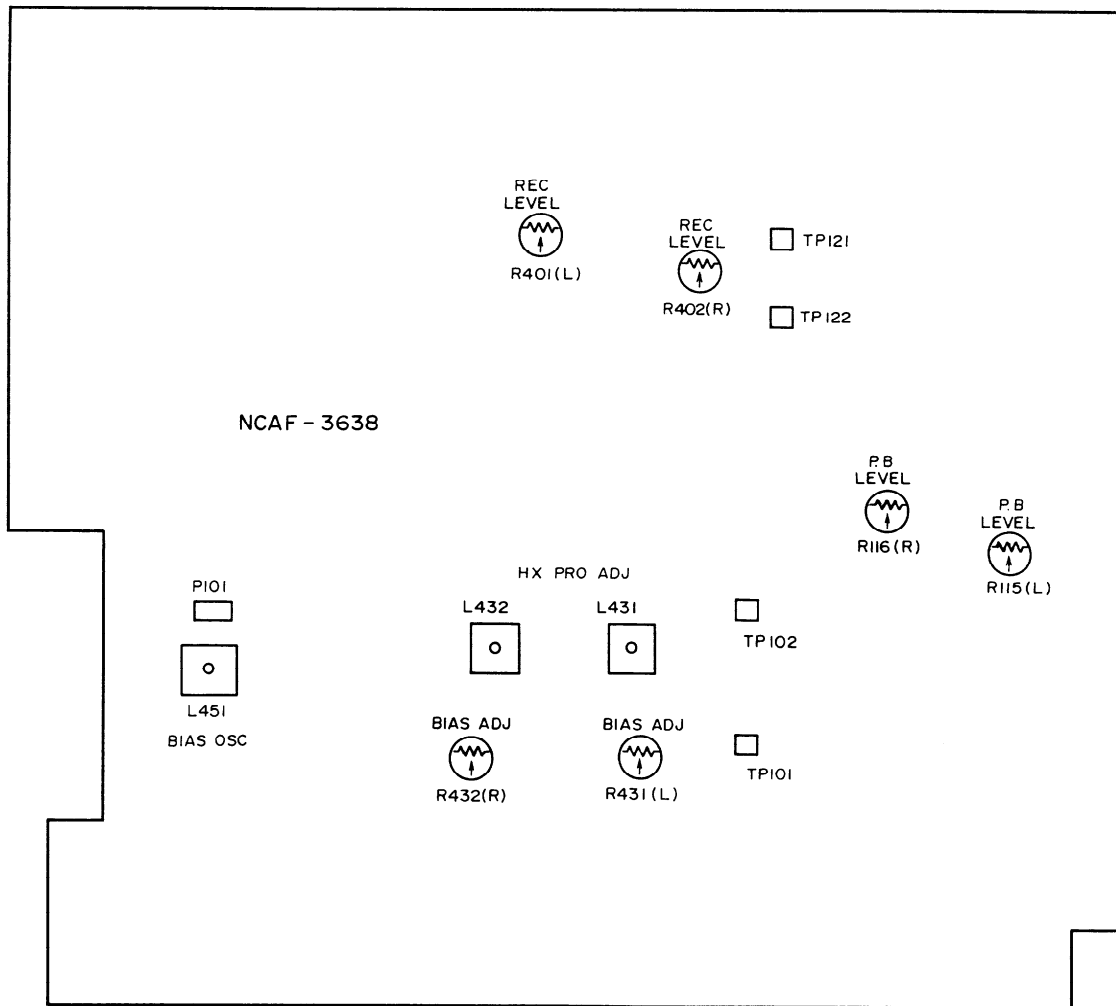
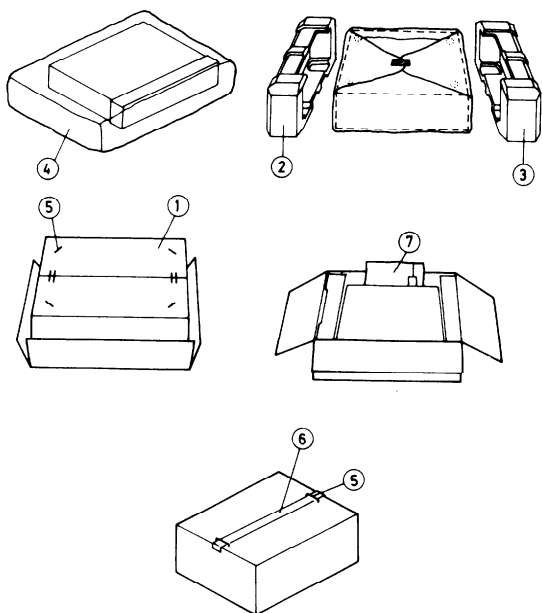


fig-2



### PACKING VIEW



### PACKING PART LIST

REF NO.	PART NO.	DESCRIPTION
1	29051962	Master carton box
2	29091235A	Pad (L)
3	29091236A	pad (R)
4	29100037A	650×500 Poly bag
5	282301	Sealing hook
6	260012	Damplon tape
7	Accessory bag ass'y	
	29341442	Instruction manual (D/QA/QB)
	29341443	Instruction manual (G/W)
	2010098A	Connection cable
	29365019	Waranty card (N)
	29365022	Waranty card (QB)
	29358002G	Service station list (N)
	29100006A	350×250 Poly bag
	25055018	CV-K-1 (W)

NOTE: (N): Only U.S.A. model  
 (W): Only worldwide model  
 (D): Only 120 V model  
 (G): Only 220 V model  
 (QA/QB): 240V model

# CHASSIS-EXPLODED NEW PART LIST

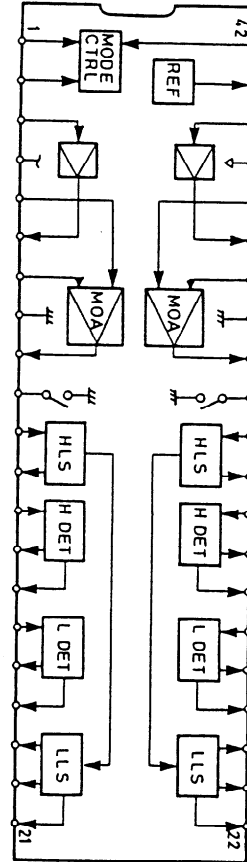
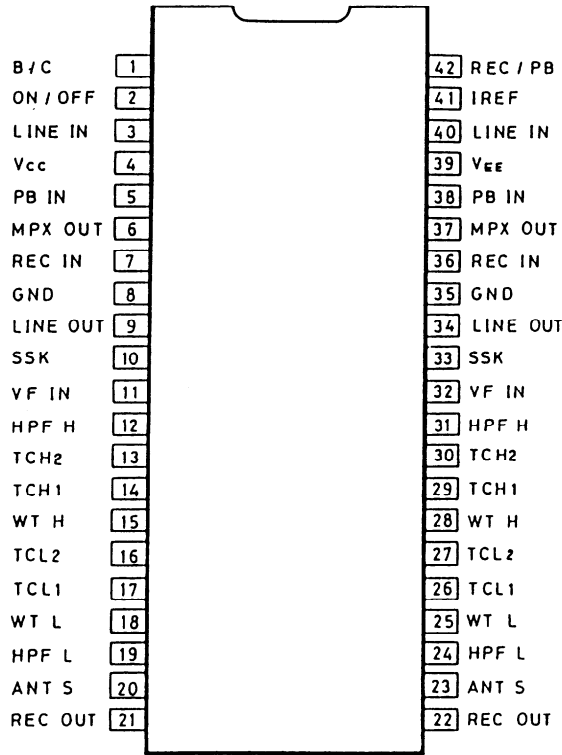
REF.NO.	PART NO.	DESCRIPTION
A1	27110512A	FRONT BRACKET AS
A5	28323758A	KNOB (EJ)
A6	27273056-1A	JOINT
A8	27180333-1	SPRING (T2)
A9	28400282	DAMPER
A11	28400508	CASSETTE LID AS
A11a	28400505	FRAME (CASSETTE)
A11b	28400509	CASSETTE LID
A11c	27180272	SPRING (CA)
A11d	28400503	WINDOW
A14	27100184C	CHASSIS
A15	27190266	HOLDER
A16	27121286	BACK PANEL (D)
	27121286-1	BACK PANEL (G)
	27121286-3	BACK PANEL (W)
	27121286-4	BACK PANEL (Q)
A17	27300750	BUSHING (CORD)
A18	27141351	BRACKET (ZE)
A19	86414010	FLANGE NUT FWN4×10FN
A21	27273122	JOINT (POW)
A22	24601234	TAPE COUNTER
A26	834430088	TAP-TIGHT SCREW 3TTS+8B(BC)
A27	833430080	TAP-TIGHT SCREW 3TTP+8P(BC)
A28	831130088	TAP-TIGHT SCREW 3TTW+8B
A29	830440089	TAP-TIGHT SCREW 4TTC+8C(BC)
A30	831430100	TAP-TIGHT SCREW 3TTW+10P(BC)
A31	838440089	TAP-TIGHT SCREW 4TTB+8C(BC)
A52	838130108	TAP-TIGHT SCREW 3TTB+10B
A301	28184388	TOP COVER
A306	28133228	BACK PLATE
A307	28191521A	CLEAR PLATE
A501	1N073121	FRONT PANEL
A631	27175219A	LEG
A810	28323759	KNOB (PUSH)
A811	28323241-1A	KNOB (POW)
A815	28323297	KNOB (VOL)
P901	253099C	AC CORD, AS-UC3 (D)
	253148	AC CORD, AS-CEE (G/W)
	253118	AC CORD, AS-SAA (Q)
	253104	AC CORD, C2.5BS2 (QB)
T901	△ 2300474	NPT-1041D (D)
	△ 2300475	NPT-1041G (G)
	△ 2300476	NPT-1041DG (W)
	△ 2300477	NPT-1041Q (Q)
S902	△ 25065123	NSS-1258P (W)
U1	1N072538-2	NAAF-3638-2
U2	1N072539-2	NADIS-3639-2
U3	1N072540-2	NASW-3640-2
U4	1N072541-2	NAETC-3641-2
U5	1N072542-2	NAETC-3642-2
U6	1N072542-2A	NAETC-3642-2A (W)
Z1	244130A	CASSETTE DECK MECAHNISM, NDM-122

NOTE: [D]: Only 120V models  
 [G]: Only 220V models  
 [W]: Only 120V/220V models  
 [Q]: Only 240 V models

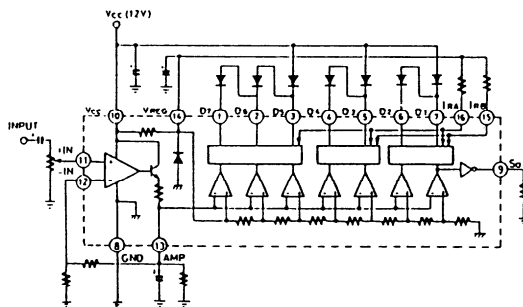
NOTE: THE COMPONENTS IDENTIFIED BY MARK △  
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 PART NUMBER SPECIFIED.

# IC BLOCK DIAGRAM

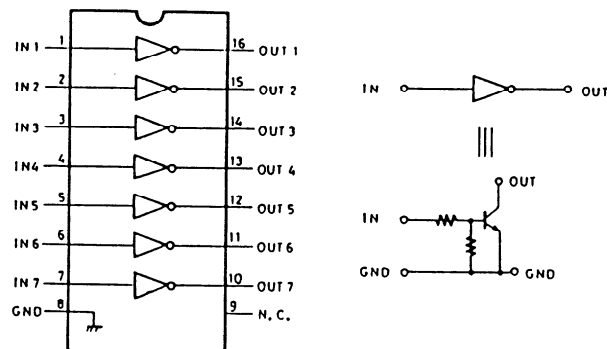
## CX-20817 (DOLBY N.R)



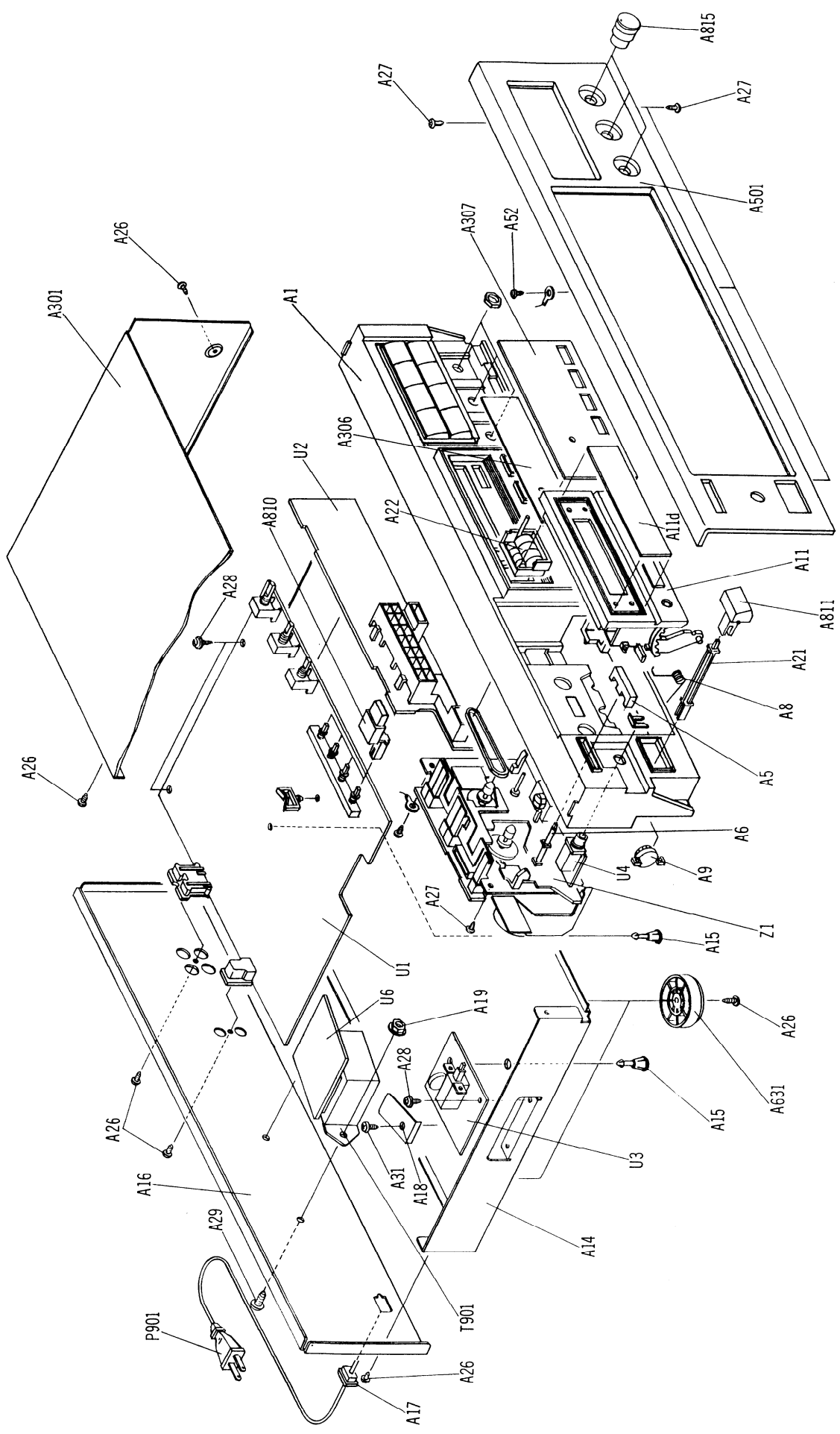
## IR2E02 (LEVEL METER DRIVE)



## BA6251 (REC AMP EQ)



CHASSIS-EXPLODED VIEW



# TAPE MECHANISM PART LIST

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
1	24606374	HALL IC DN6851A	88	24602491	COUNTER BELT
2	24601251	CAPSTAN MOTOR AS (2+18)	90	24606382	BOBBIN
3	24606375	LEAF SWITCH	93	24607109	BRACKET (EJECT)
4	24606376	LEAF SWITCH	94	24607110	ARM (EJECT)
5	24602492	TENSION AS	200	863126	NUT N-2.6F
6	24602512	FLYWHEEL	201	893020	E WASHER 2
7	24602493	CAM (GEAR)	203	24611413	WASHER
8	24602494	CAP (REEL)	204	24611414	WASHER
9	24607104	ARM (FR)	206	24611415	WASHER
10	24600094	E HEAD	207	83112652	SCREW
11	24602514	PINCH ROLLER	208	24609030	SCREW
12	24602497	GEAR	209	24609031	SCREW (AZIMUTH)
14	24607105	ARM (QUE)	210	24611417	WASHER
16	24609022	SCREW	211	833120047	SCREW 2TTP+4S
18	24602499	PULLEY	212	24611418	WASHER
19	24602500	BELT	213	24611419	WASHER
20	24605719	SPRING	214	24611424	WASHER
21	24605720	SPRING	215	24609028	SCREW
22	24605721	SPRING	216	24609029	SCREW
24	24605723	SPRING	217	24611421	WASHER
25	24604096	COLLAR			
26	24611400	HOUSING			
28	24605738	SPRING			
29	24605726	SPRING			
31	24605728	SPRING			
32	24605729	SPRING			
33	24605730	SPRING			
37	24609023	SCREW			
38	24602501	GEAR (FLYWHEEL)			
38	24606389	PRINTED CIRCUIT BOARD			
40	24606390	LEAD WIRE			
41	24606377	PRINTED CIRCUIT BOARD			
42	24606391	LEAD WIRE			
43	24611399	HOUSING			
45	24611422	CHASSIS			
46	24602502	REEL AS (R)			
47	24602503	REEL AS (L)			
48	24607106	ARM AS (REVERSE)			
49	24603372	LEVER AS (FR)			
50	24603373	LEVER AS (PLAY)			
51	24607107	ARM AS (GEAR) R			
54	24602515	FLYWHEEL			
56	24611403	PLATE (FW)			
57	24611423	PLATE (AZIMUTH)			
58	24607111	ARM (SW)			
59	24602504	FLYWHEEL GEAR			
63	24605735	SPRING (CASSETTE)			
64	24607113	ARM (TRIGGER)			
66	24611406	GUIDE (CASSETTE) L			
67	24611407	GUIDE (CASSETTE) R			
68	24611408	GUIDE (CASSETTE)			
69	24602508	GEAR (CAM)			
72	24607114	ARM (EJECT) 2			
73	24603375	LEVER (SELECT)			
74	24611410	BRAKE			
75	24604097	TUBE			
76	24603376	LEVER (LATCH) L			
77	24602510	METAL			
78	24602511	METAL			
79	24611411	CUSHION			
80	24607115	ARM (TRIGGER)			
81	24606379	PLUNGER			
82	24606380	BOBBIN			
83	24606381	PLATE AS			
84	24600093	R/P HEAD			
86	24605736	SPRING			
87	24604098	COLLAR			