

ONKYO SERVICE MANUAL

STEREO CASSETTE TAPE DECK MODEL TA-RW99

Black and silver models

UDN, UDC, UD	120V AC, 60Hz
UG	220V AC, 50Hz
UW	120 or 220V AC, 50/60Hz
UQA, UQB	240V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ 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 System:	4-track, 2-channel stereo
Erasing System:	AC erase
Tape Speed:	4.8 cm/sec (1-7/8 i.p.s.)
Wow and Flutter:	0.05% (WRMS)
Frequency Response:	20 – 15,000Hz (Normal) (30 – 14,000Hz \pm 3dB) 20 – 16,000Hz (High) (30 – 15,000Hz \pm dB) 20 – 17,000Hz (Metal) (30 – 16,000Hz \pm 3dB)
S/N Ratio:	Dolby NR out: 58dB (metal position tape) A noise reduction of 10dB above 5 kHz and 5dB at 1kHz is possible with Dolby B. A noise reduction of 20dB at 5kHz is possible with Dolby C.
Input Jacks:	Line IN: 2 Input sensitivity: 60mV Input impedance: 50 kohms Microphone Jack: 1 Input Sensitivity: 1mV Input impedance: 5.6 kohms DIN Jack: 1 Input sensitivity: 0.1mV/ 1 kohms Input impedance: 2.2 kohms

ONKYO
AUDIO COMPONENTS

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 DIN Out Jack: 1 Standard output level: 500mV Optimum load impedance: over 50 kohms
Motors:	DC servo motor: 2 DC motor: 2
Heads:	Rec/PB: Special Hard Permalloy × 2 Erase head: Ferrite × 1
Power Supply:	AC220V/50Hz, 120/220V, 50/60Hz, 120V/60Hz or 240V/50Hz
Power Consumption:	30 watts
Dimensions:	435(W) × 112(H) × 334(D)mm (17-1/8" × 4-7/16" × 13-1/4")
Weight:	6.5 kg (14.3 lbs.)

- Specifications and external appearance are subject change without notice because of product improvements.
- Models for use with only an AC 120V power supply are not equipped with a DIN terminal.

SERVICE PROCEDURES

Instruction resistance measurement

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

Specifications; 500V more than 10MΩ

T-2 High Speed Adjustment

Operating the mechanism (PLAY/STOP) with TP-T2 grounded is liable to cause damage to the mechanism. Thus, follow the procedure outlined below for T-2 high speed adjustment.

1. Confirm that the mechanism is in the STOP mode.
2. Mount the test tape in T-2 and press the PLAY button.
3. Ground TP-T2 (high speed mode selected).
4. Adjust the speed (using the R793 potentiometer).
5. Disconnect TP-T2 from ground.
6. Press the STOP button.

Adjustment of light reversal sensor

Adjustment of quick reverse sensor is made using a TDK AD 120 tape. The voltage between Pin 2 (red lead) of socket P712 (for TAPE-1) or P713 (for TAPE-2) and ground.

Insert a TDK AD 120 tape into TAPE-1 and move the magnetic section of the tape in the FWD direction. Adjust the potentiometer R12 (20 kohm) on the relay PCB which follows the TAPE-1 mechanism, until the

voltage is between 2V and 2.5V.

Adjustments are made in the same manner for TAPE-2 using R22 (20 kohm).

FEATURES

Two Auto-Reverse Tape Compartments

Because this deck has two auto-reverse tape compartments, it is possible to make a non-stop copy of both sides of a cassette using this deck alone. A high speed dubbing mode is also provided to cut dubbing time in half.

Endless Auto-Reverse Relay Playback

When the reverse mode is set to repeat, both cassettes are played back alternately until the stop button of the compartment currently being used for playback is pressed.

Dolby B and C Noise Reduction

Along with standard Dolby B NR, this deck also has the even more effective Dolby C NR system. Dolby C NR reduces tape background noise by 20dB at 5kHz, about 3 times more than Dolby B NR. In addition to its wide band noise reduction, Dolby C NR uses a sliding band technique that varies the bandwidth of noise reduction according to the input level, thereby avoiding noise "pumping." Dolby C NR also has an anti-saturation effect to reduce the chance of tape saturation in the high range. All these features combine to eliminate the adverse effects on tape sound that other noise reduction systems can cause.

Auto Music Control System (AMCS)

Tape compartment 1 is equipped with the AMCS function which automatically plays the first 10 seconds of every song on a cassette in the current direction of playback. To stop AMCS and resume normal playback from the point, just press the play button. This is very useful when copying cassettes, too.

Direct Song Location

This deck is equipped with a direct access function that winds the tape in either compartment directly to the beginning of any song up to 15 songs away from the present location in either direction.

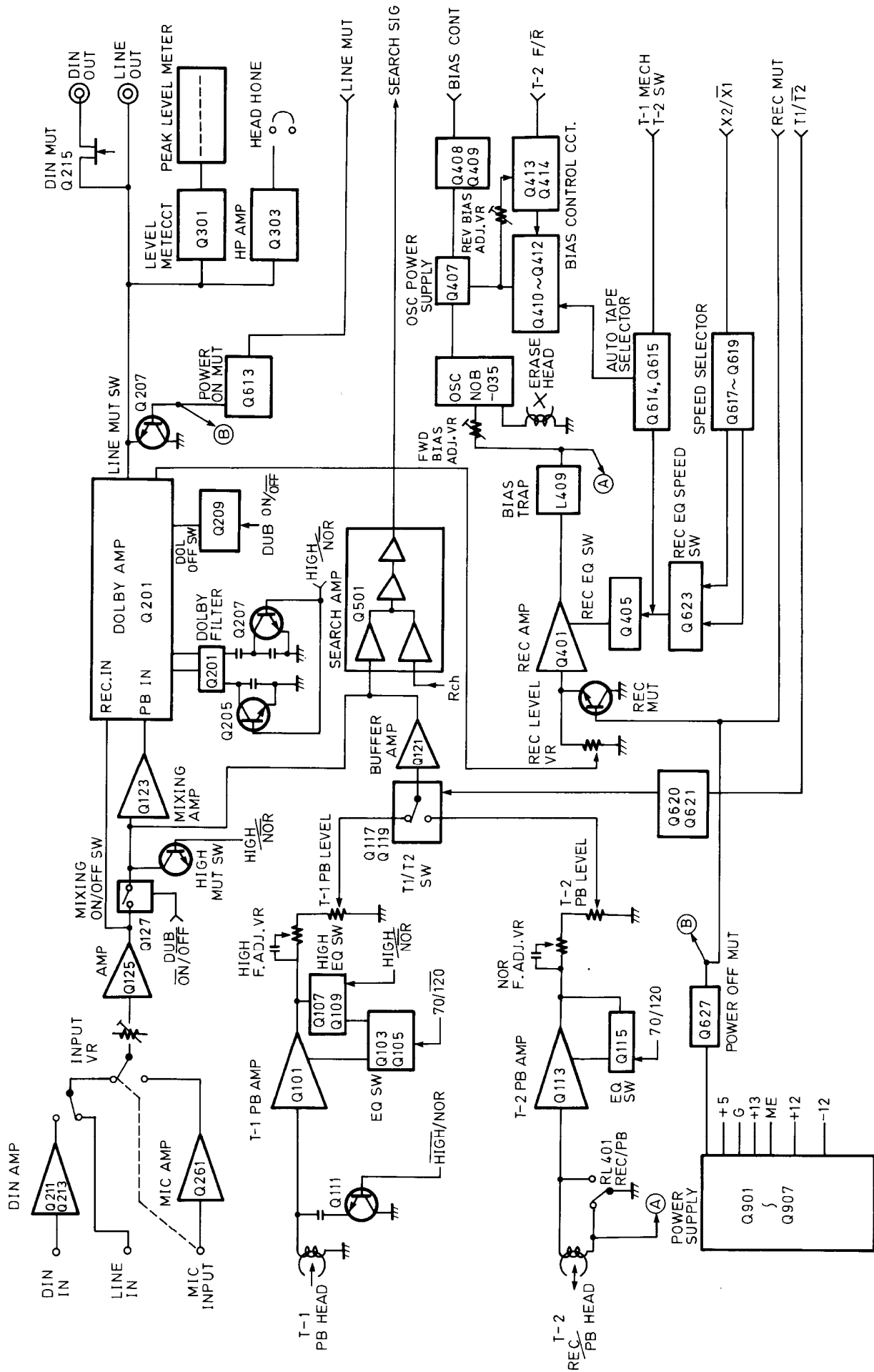
Search Dubbing Function

If the search dubbing button is pressed during a 10 second AMCS playback interval or the normal playback mode of the tape 1 holder while the tape 2 holder is in the dubbing pause mode, the cassette in the tape 1 holder is rewound to the beginning of the current song and dubbing is automatically started.

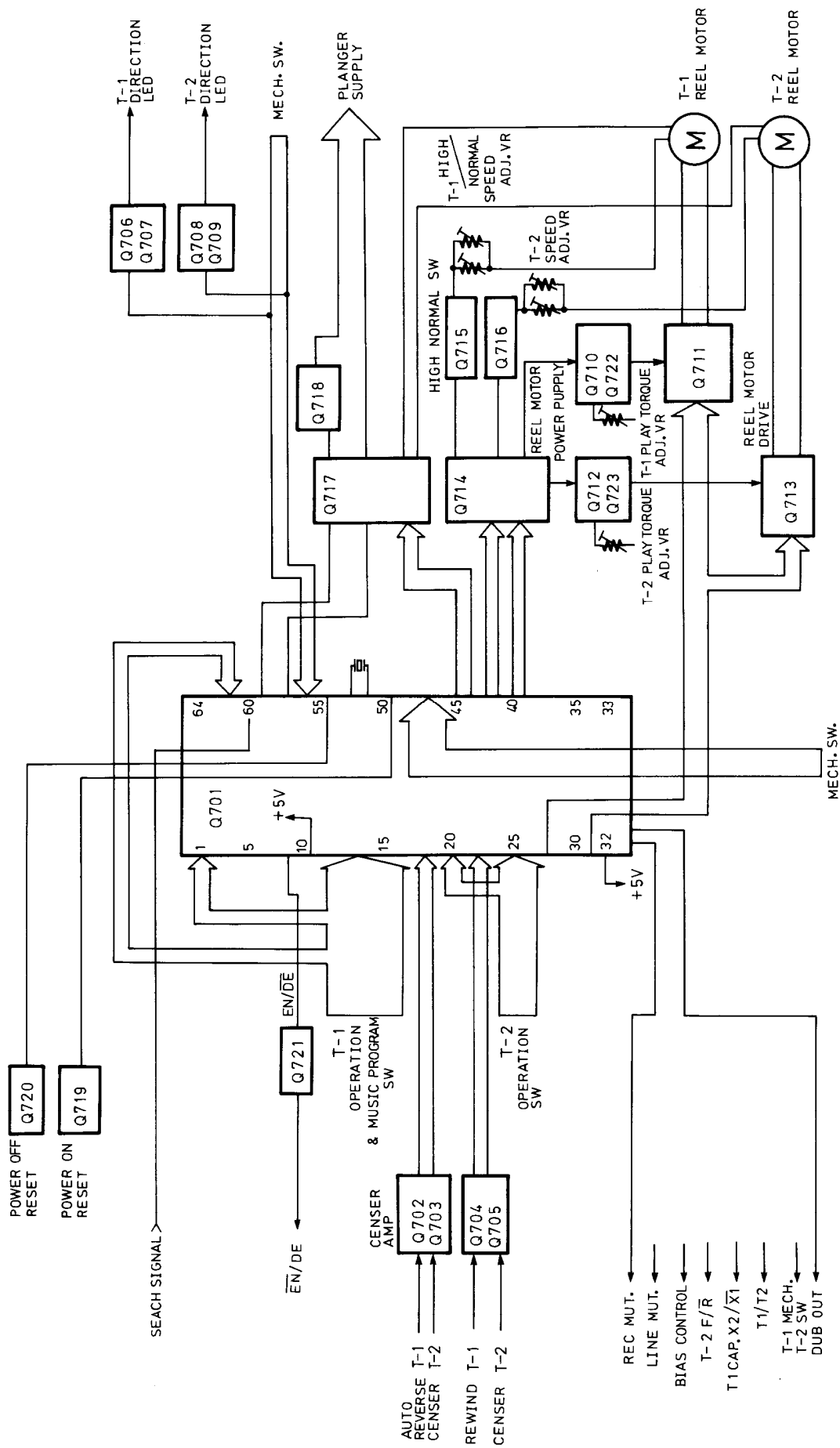
Many Other Useful Features

In addition to the above-mentioned features, this deck also has a mic mixing capability, an auto space rec mute button, fully automatic tape selection and easy-to-read peak level meters.

BLOCK DIAGRAM (AMPLIFIER SECTION)



BLOCK DIAGRAM (CONTROL SECTION)



1. Mechanism

This mechanism uses a power assist system provided by the capstan motor, and it consists of one capstan motor, reel motor, and solenoid. There are five operation modes: STOP, FWD PLAY, REV PLAY, FWD, and CUE/REV. These modes are selected in the cycle shown in Fig. 1, according to the solenoid trigger and the revolution of the intermittent gear obtained from the flywheel. The FWD PLAY mode is selected from the STOP mode by attracting the solenoid for 60ms, and the REV PLAY mode is selected by attracting it for 320ms. If the solenoid is attracted in the PLAY mode, the CUR/REV mode is selected during this interval, and if power to the solenoid is cut off, the STOP mode is selected. The direction of the head in the STOP mode is always towards FWD. There is a leaf switch for direction indication which retains the direction of the mechanism prior to selection of the STOP mode. This mechanism is equipped with another leaf switch called the play switch. This switch allows for confirmation of the head position. It is ON in the PLAY and CUE/REV positions, and OFF in the STOP position. This switch is used for initialization of the mechanism when the power is turned on, and for detection of mechanism trouble during operation.

The solenoid attraction time for selecting the PLAY mode from the STOP mode and the construction of the mechanism is such that the capstan motor rotates at a fixed speed. When high speed dubbing is selected, the high speed mode is switched to after operation of the mechanism is completed.

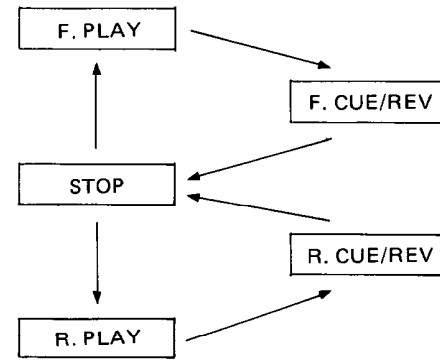


Fig. 1

2. Microprocessor

The LM6402 and LM6405 series devices used in conventional cassette recorders were NMOS microprocessors with the output port being the open drain of the N-channel MOS transistor. This unit uses a CMOS microprocessor with pins #1 to #19 and #58 to #64 being high voltage ports capable of handling voltage between +5V and -35V. The output port is the open drain of the PMOS transistor. The other output ports are the open drain of the conventional NMOS transistors. Fig. 2 and 3 show the equivalent circuits of the input and output ports for both types of transistors. As can be seen in the diagrams, the current flow for the PMOS output port is from the IC, and thus directly grounding the port is liable to damage the IC.

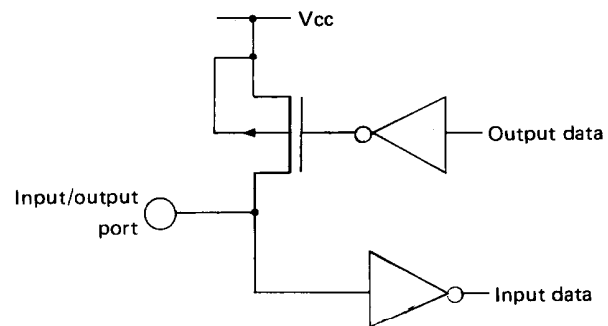


Fig. 2 PMOS open drain Input/output port

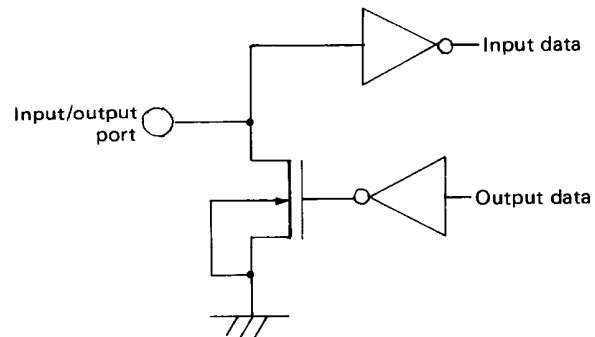




Fig. 3 NMOS open drain Input/output port

3. Port functions

Port number	Function
1 ~ 5	Output ports for LEDs. Directly drive the DUBBING, DUBBING x 2, REC, REC/PAUSE, and PRESET LEDs.
6	Output port tuning the bias oscillator ON/OFF
7	Output port for switching the REC/PB relay for T2
8	Output port for encode/decode switching of Dolby IC
9	Output port for selecting T1/T2 for playback
10	Both the input port for switching of Pin #61 ~ #64 functions and output port for selection of input signal for EQ dubbing
11 ~ 17 20, 21 24 ~ 27	Input ports for various function keys
18, 19	Input ports for light reversal signal used for T1 and T2 lead tape detection
22, 23	Input ports for revolution signal used for T1 and T2 tape end detection
28 ~ 31	Output ports used for T1 and T2 reel motor control
33	Output port used for TIMER REC/PB/OFF detection
34	Input port for MODE  /  detection
35, 36	Both input ports for T1 and T2 play switch and TIMER/REC/PB/OFF detection
37, 38	LINE MUTE and REC MUTE output ports
39, 40	Output ports for T1 and T2 O-PLAY
41, 42	Output ports for speed control of T1 and T2 capstan motor
43, 44	Output ports for turning T1 and T2 capstan motor ON/OFF
45, 46	Input ports for detection of T2 accidental recording prevention tab
47, 48	Input ports for T1 and T2 cassette loading
49	RESET input (positive logic)
50	TEST input for microprocessor IC (normally)
51, 52	Oscillator connection ports for clock
53	GND
54	Input port for POWER-OFF detection
55, 56	Input port for T1 and T2 direction detection
57	Power amplifier for increasing the attraction when the solenoids for T1 and T2 are driven
58, 59	Output ports driving T1 and T2 solenoids
60	Port for search signal input for selection of songs
61	Key input port for SEARCH DUBBING
62	Key input port for AMSC
63	Output port for T2 PLAY LED
64	Output port for T1 PLAY LED

PRINTED CIRCUIT BOARD PARTS LIST

Control pc board (NACOC2443)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q701	222920	HD614042S-C35
Q702,Q703	222465 or 222808	NJM4558D or M5218P
Q711,Q713	222862	LB1640N
Q714	222919	TD62554S
Q717	222689	LB1287
Transistors		
Q704-Q709	2212485 or 2210746	JC501(Q) or 2SC945(AP)
Q710,Q712	2201594 or 2201595	2SD1189(Q) or 2SD1189(P)
Q715,Q716	2212302, 2212303, 2212304 or 2211944	2SK381(B), 2SK381(C), 2SK381(D) or 2SK246(V)
Q718	2211554	2SA562TMY
Q719,Q720	2212494, 2212124 or 2211454	JA101(P), 2SA1048(Y) or 2SA1015(Y)
Q721-Q723	2212485 or 2210746	JC501(Q) or 2SC945(AP)
Diodes		
D701-D708	223155	1SS138
D709	223848	GP08B
Ceramic oscillator		
X701	3010099	CSA4, OOMG
Capacitors		
C701,C702	352742209	2.2 μ F, 16V, Elect.
C710-C712	352780109	1 μ F, 16V, Elect.
C713	352741009	10 μ F, 16V, Elect.
Resistors		
R708-R714	49163392407	3.9K Ω \times 7, 1/10W, Network
R723-R734	49163392412	3.9K Ω \times 12, 1/10W, Network
R742-R751	49163392410	3.9K Ω \times 10, 1/10W, Network

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R752-R755	49163392404	3.9K Ω \times 4, 1/10W, Network
R757-R761	49163392405	3.9K Ω \times 5, 1/10W, Network
R704,R779	441524794NF	0.47 Ω $\frac{1}{2}$ W, Metal oxide film
R798	441722204NF	22 Ω , 2W, Metal oxide film
R812,R813	441622704	27 Ω , 2W, Metal oxide film
R777,R782	5215020	NO8HR5KBC, Semi-fixed
R786,R789, R793,R796	5215021 or 5215045	NO8HR10KBC, Semi-fixed
R784,R791	4000103	1.2K Ω , 1/4W, LPTC-R

Plugs		
P701	25055134	NPLG-4P-118
P702	25055135	NPLG-5P-119
P703	25055136	NPLG-6P-120
P704,P705	25055138	NPLG-8P-122
P706,P709	25055132	NPLG-2P-115
P710	25055133	NPLG-3P-117
P711	25055138	NPLG-8P-122
P712-P715	25055133	NPLG-3P-117
P716	25055188	NPLG-7P-172
P717	25055190	NPLG-9P-174

Tape-1 display pc board (NSW-2447)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D717-D719	225192	GL-1NG1, LED
P716A	2000491A	NSAS-13P-447, socket

Tape-2 display pc board (NASW-2448)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D720,D722, D724	225192	GL-1NG1, LED
D721,D723	225190	GL-1PR, LED
P717A	2000492A	NSAS-17P-449, socket

Power switch pc board (NASW-2331)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C921	3500065A	0.01 μ F, 400V, capacitor IS
S901	25035375	NPS-111-L339P, power switch

ADJUSTMENT PROCEDURES

PRECAUTIONS

- Before adjustment, clean the following parts with an alcohol moistend swab.
 - * record/playback head
 - * pinch roller
 - * erase head
 - * 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

Blank tapes (completely erased)

NORMAL NEW UD90

HIGH NEW XL-II90

METAL NEW MX60

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	Playback torque		TW-2111	PB	TW-2111	T-1 R-777 T-2 R-782	40 g-cm	NACOC-2443	
2	T-1 H. speed	Frequency counter to LINE output terminal	MTT-111	Dubbing	Frequency counter	Semi-fixed R-786	6,040 to 6,050 Hz 3,030 to 3,040 Hz	Dolby OFF	
	N. speed			PB		R-789			
2	T-2 H. speed	Frequency counter to LINE output terminal	MTT-111	PB	Frequency counter	Semi-fixed R-793	6,000 to 6,010 Hz 3,000 to 3,010 Hz	NACOC-2443 GROUND TP-T2	
	N. speed			PB		R-796			
3	Head azimuth	AC voltmeter and oscilloscope to LINE output terminal	VTT-658	PB	AC voltmeter	Head azimuth screw	Maximum and same phase at channels L and R	See fig. 1	
4	Playback F. ADJ		TCC-173A	PB	AC voltmeter	T-1 R-131, R-132 T-2 R-157, R-158	Same level at 315Hz/10kHz	High speed Normal speed	
5	Playback level	AC voltmeter to terminals TP-1 and TP-2	MTT-150	PB	AC voltmeter	T-1 R-133, R-134 T-2 R-159, R-160	300mV		
6	Bias current	Fig. 2	1 kHz, -20dB and 12kHz, -20dB	NEW XL-II90	FWD REC/PB	AC voltmeter	R-449 (Ch. L) R-450 (Ch. R)	Same level at REC/PB	Input VR maximum
					REV REV/PB		R-459 (L. Rch)		
7	Record level	Fig. 2	1 kHz	REC PAUSE	AC voltmeter	Attenuator or AF OSC output	350mV	Input VR maximum	
				REC/PB	AC voltmeter	R-401 (Ch. L) R-402 (Ch. R)	Same level at REC/PB		

NCAF-2438



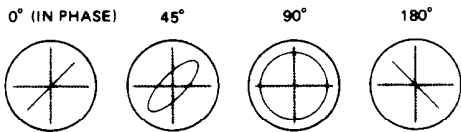
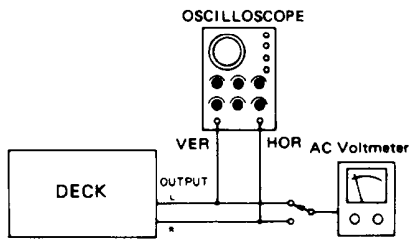
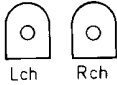
TP 2



TP 1



FWD. BIAS ADJ
R449 R450



Confirming phase relationship

fig-1

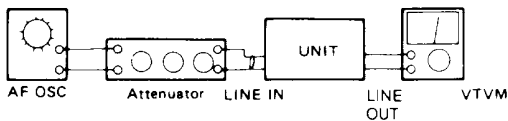


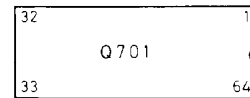
fig-2

T-2 T-1
R793 R786 H. SPEED



T-1
R789 N. SPEED

R796 TP-T 2



PLAY TORQUE



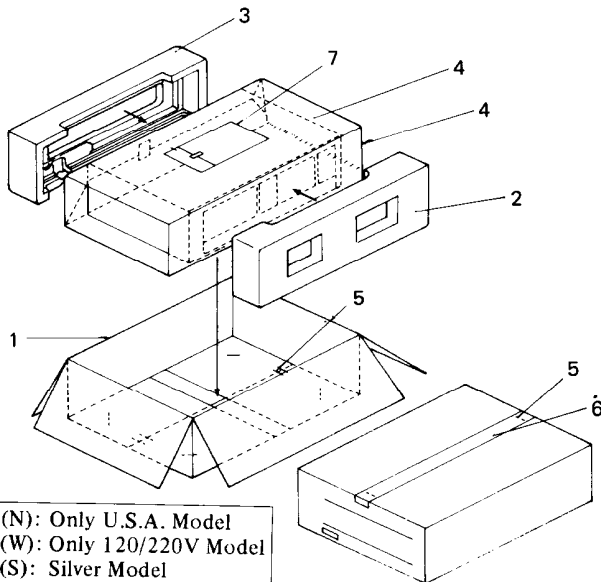
R777 R782
T-1 T-2

NCCOC-2443

CHASSIS-EXPLODED VIEW PARTS LIST

REF NO.	PARTS NO.	DESCRIPTION	REF NO.	PARTS NO.	DESCRIPTION
A2	27120760A	Back bracket (D)	A514	28400245	Windor (T1)
	27120767A	Back brackct (G)	A515	27262373A	Plate (S1)
A3	27300750	Strainrelief	A516	27262397	Plate (W1) (S)
A4	834430068	3TTS+6B (BC), Screw		27262399	Plate (W1) (B)
A6	27110257B	Front bracket	A518	28400246	Window (T2)
A7	27141027	Bracket (Counter)	A519	27262374A	Plate (S2)
A8	27141028	Bracket (MIC)	A520	27262398	Plate (W2) (S)
A9	82142003	2P+3F (BC), Screw		27262400	Plate (W2) (B)
A10	834430068	3TTS+6B (BC), Screw	A522	27170212	Bottom board
A12	27130405	Bracket (PT)	A523	27175028	Lag
A13	870065	Special washer	A527	28321928	Knob (POW) (S)
A14	830440089	4TTC+8C (BC), Screw		28321905B	Knob (POW) (B)
A15	834430108	3TTS+12B (BC), Screw	A528	28320797	Knob (SEL) (S)
A17	27115194	Side bracket		28321130	Knob (SEL) (B)
A19	24601147	Counter	A529	28322268	Knob (MODE) (S)
A20	834426068	2.6TTS+6B (BC), Screw		28322269	Knob (MODE) (B)
A22	27190351A	Holder (POW)	T901	△ 2300021	NPT-892D, Power transformer (D)
A23	27190556	Holder		2300022	NPT-892G, Power transformer (G)
A24	833430080	3TTP+8B (BC), Screw		2300023	NPT-892DG, Power Transformer (W)
A25	27273037A	Joint (L)	P1	△ 253112	AS-UC-4, Power supply cord (D)
A26	27190369	Holder		253128	AS-CEE, Power supply cord (G/W)
A27	27190331	Holder (KED)	S902	△ 25065123	NSS-1258P, Voltage selector (W)
A28	28140488	Cushion	A530	29055419	Sheet 44 x 35
A29	831430100	3TTW+10P (BC), Screw	Z1	244084	NDM-76, Tape mechanism ass'y for T-1
A32	831430088	3TTW+8B (BC), Screw	Z2	244085	NDM-77, Tape mechanism ass'y for T-2
A34	28322336A	Knob (EJ) (S) *	C721,C722	352942206	22μF, 16V, Nom-poler elect
	28322337A	Knob (EJ) (B) *	U1	15008538	NAAF-2438, Main pc board ass'y
A35	27260201A	Shaft (EJ)		15008538A	NAAF-2438A, Main pc board ass'y (G/W)
A37	28322279B	Knob (T1) ass'y (S)	U2	15008539	NAMIC-2439, Mic, pc board ass'y
	28322280B	Knob (T1) ass'y (B)	U3	15008540	NAVR-2440, Input volum pc board ass'y
A38	28322251	Knob (slide) (S)	U4	15008541	NASW-2441, Dolby switch pc board ass'y
	28322271	Knob (slide) (B)	U5	15008542	NAHP-2442, Headphone terminal pc board ass'y
A39	27190403A	Holder (LEV) (S)	U6	15008543	NACOC-2444, Control PC board ass'y
	27190411A	Holder (LEV) (B)	U7	15008544	NASW-2444, T-1 Operation switch pc board ass'y
A40	27260198	Shaft	U8	15008545	NASW-2445, T-2 Operation switch pc board ass'y
A43	28322254B	Knob (T2) ass'y (S)	U9	15008546	NASW-2446, Timer switch pc board ass'y
	28322281B	Knob (T2) ass'y (B)	U10	15008547	NADIS-2447, T-1 Display pc board ass'y
A301	28184296	Top cover (S)	U11	15008548	NADIS-2448, T-2 Display pc board ass'y
	28184298	Top cover (B)	U12	11488531	NASW-2331, Power switch pc board ass'y
A501	15008121	Front panel ass'y (S)			
	15018121	Front panel ass'y (B)			
A507	27262369	Plate(T1) (S)			
	27262370	Plate (T1) (B)			
A508	27262371	Plate (T2) (S)			
	27262372	Plate (T2) (B)			
A510	28133149	Back plat			
A512	28191327A	Clear plate			
A513	28400215A	Cassettelid			

PACKING VIEW PARTS LIST



NOTE: (N): Only U.S.A. Model
 (W): Only 120/220V Model
 (S): Silver Model
 (B): Black Model

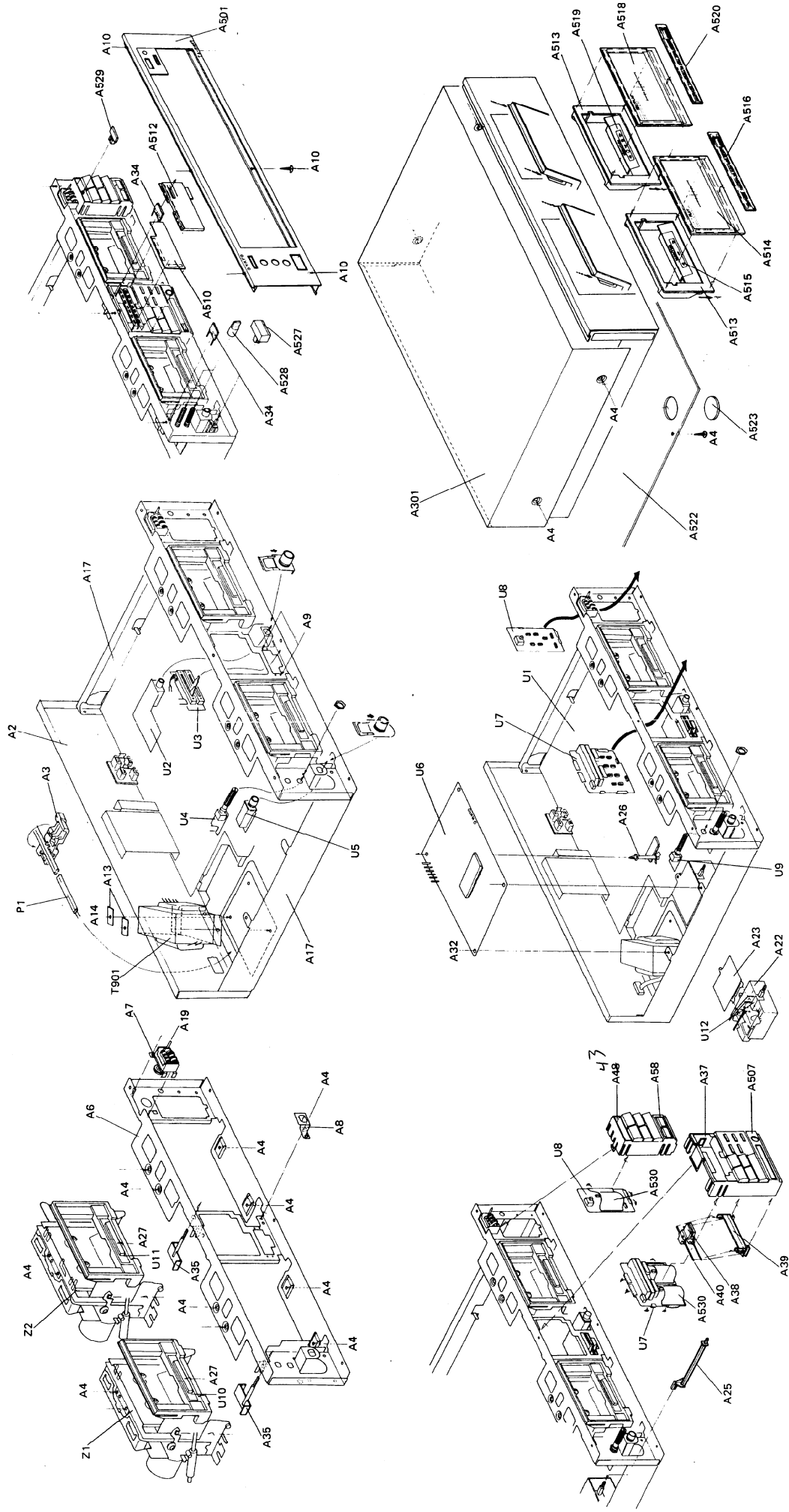
D Model

REF NO.	PART NO.	DESCRIPTION
1	29051207	Master carton box (S)
	29051209	Master carton box (B)
2	29091037	Pad (F)
3	29091038A	Pad (B)
4	29100034A	850 x 650 Poly bag
	29095019-1	800 x 600 Protection sheet
5	282301	Sealing hook
6	260012	Damplon tape
7		Accessory bag ass'y
	29340936	Instruction manual
	2010095	Connection cable
	29365006-7	Waranty card (N)
	29358002C	Service station list (N)
	29100006A	350 x 250 Poly bag

G/W Model

REF NO.	PART NO.	DESCRIPTION
1	29051207	Master carton box (S)
	29051209	Master carton box (B)
2	29091037	Pad (F)
3	29091038A	Pad (B)
4	29100034A	850 x 650 Poly bag
	29095019-1	800 x 600 Protection sheet
5	282301	Sealing hook
6	260012	Damplon tape
7		Accessory bag ass'y
	29340937	Instruction manual
	2010095	Connection cable
	25055040	Conversion plug (CV-K-2) (W)
	29100006A	350 x 250 Poly bag

CHASSIS-EXPLODED VIEW



CH PRINTED CIRCUIT BOARD PARTS LIST

MAIN CIRCUIT PC BOARD (NAAF-2438)

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	ICs				
Q101, Q102	222655	NJM4562DD	Q902	2212494,	JA101(P),
Q113, Q114	222655	NJM4562DD		2212124 or	2SA1048(Y) or
Q123-Q126	222736	NJM4558S		2211454	2SA1048(Y)
Q201	222910	HA-12088	Q903	2201604 or	2SB891(Q) or
Q301, Q302	222623	IR2E02		2201605	2SB891(R)
Q303, Q304	222652	M5218L	Q904	2212485 or	JC501(Q) or
Q401, Q402	222671 or	NJM4556DD or		2210746	2SC945(AP)
	222808	M5218P	Q905	2201074,	2SD880(Y),
Q405, Q406	222918	BA6251		2201385 or	2SD330(E) or
Q501	222681 or	IR3702 or		2201035	2SD325(E)
	222695	LA6324	Q907	2212304 or	2SK381(D) or
Q623	222918	BA6251		2211945	2SK246(GR)
Q901	222780122	78M12			
Q906	222780050	7805			
	Transistors				
Q102-Q112,	2212485 or	JC501(Q) or	D101-D104	Diodes	1S2076TD,
Q115, Q116	2210764	2SC945(AP)		223145,	1S2473 or
Q117, Q120,	2212302,	2SK381(B),	D105, D106	223124 or	US1040
Q127, Q128	2212303,	2SK381(C),	D401	223150	1SS138
	2212304,	2SK381(D),		223145,	1S2076TD,
	2211944 or	2SK381(D),		223124 or	1S2473 or
	2211945	2SK246(Y) or	D402-D403	223150	US1040
Q121, Q122	2212485 or	2SK246(GR)		2239673,	RD15EB3,
	2210746	JC501(Q) or		2239691,	RD16EB1,
Q129, Q130	2211705,	2SC945(AP)	D404	2243253 or	MTZ15C or
	2211706,	2SD655(E),		2243261	MTZ15A
	2212793,	2SD655(F),	D501	2239672 or	RD15EB2 or
	2212794 or	2SD1468(Q),		2243252	MTZ15B
	2212795	2SD1468(R) or	D601	223145,	1S2076TD,
Q202-Q206	2212485 or	2SD1468(S)	D602	223124 or	1S2473 or
	2210746	JC501(Q) or	D603-D607	223150	US1040
Q207, Q208	2211705,	2SC945(AP)		223145,	1S2076TD, (G/W)
	2211706,	2SD655(E),		223124 or	1S2473 or
	2212793,	2SD655(F),	D201, D202	223150	US1040
	2212794 or	2SD1468(Q),		223145,	1S2076TD, (G/W)
	2212793	2SD1468(R) or		223124 or	1S2473 or
Q209	2212458 or	2SD1468(S)	D609	223150	US1040
	2210746	JC501(Q) or		2239671,	RD15EB1,
Q211-Q214	2212485 or	2SC945(AP)		2239672,	RD15EB2,
	2210746	JC501(Q) or (G/W)	D610	2243251 or	MTZ15A or
Q215, Q216	2212302,	2SC945(AP)		2243252	MTZ15B
	2212303,	2SK381(B), (G/W)		223145,	1S2076TD,
	2212304,	2SK381(C),		223124 or	1S2473 or
	2211944 or	2SK381(D),	D611	223150	US1040
	2211945	2SK246(Y) or		2239471 or	RD5.6EB1 or (G/W)
Q403, Q404	2212458 or	2SK246(GR)	D612	2243151	MTZ5.6A
	2210746	JC501(Q) or	D613	223155	1SS138
Q407	2201540 or	2SC945(AP)		223145,	1S2076TD,
	2201060	2SD947 or		223124 or	1S2473 or
Q408, Q502	2212494,	2SD549	D901, D902	223150	US1040
	2212124 or	JA101(P),		223868 or	2W02 or
	2211454	2SA1048(Y) or		223889	RC202
Q409-Q414,	2212485 or	2SA1015(Y)	D903, D906,	223145,	1S2076TD,
Q611, Q617	2210746	JC501(Q) or	D907	223124 or	1S2473 or
Q612-Q616,	2212494,	2SC945(AP)		223150	US1040
Q618, Q619	2212124 or	JA101(P),	D904	2239672 or	RD15EB2 or
	2211454	2SA1048(Y) or		2243252	MTZ15B
Q620-Q622	2212485 or	2SA1015(Y)			
	2210746	JC501(Q) or	L201, L202	Coils	NMC-6046
Q624, Q627	2212494,	2SA945(AP)	L203, L204	233309	NMC-2029
	2212124 or	JA101(P),	L401, L402	233245	NCH-1037 or
	2211454	2SA1048(Y) or		23192 or	NCH-2082
Q625, Q626	2212485 or	2SA1015(Y)	L403, L404	231042	NCH-1007 or
	2210746	JC501(Q) or		24606069 or	NCH-2079
		2SC945(AP)		231039	

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
L405, L406	24606080 or 231038	NCH-1022 or NCH-2078	R906	441524794NF	0.47Ω, 1/2W, Metal oxide film
L407, L408	24606076 or 231037	NCH-1014 or NCH-2077	R908	441721804NF	18Ω, 1W, Metal oxide film
L409, L410	233283	NCH-4060	Plugs		
L411, L412	231025	NCH-1064	P101	25055101	NPLG-4P-85
Z401	OSC Block 231070	NOB-035	P102	25055103	NPLG-6P-87
C111, C112	Capacitors 352721019	100μF, 6.8V, Elect.	P301	25050248	NSCT-7P-76
C115, C116	352780339	3.3μF, 50V, Elect.	P302	25050249	NSCT-8P-77
C117, C118	352741009	10μF, 16V, Elect.	P401	25055100	NPLG-3P-84
C149, C150	352721019	100μF, 6.3V, Elect.	Sockets		
C153, C154	352780339	3.3μF, 50V, Elect.	P104A	2000498A	NSAS-6P-454
C155, C156	352741009	10μF, 16V, Elect.	P202	25050064	NSCT-5P18 DIN (G/W)
C157	352780109	1μF, 50V, Elect.	P701A	2000493	NSAS-4P-449
C165, C166	352780339	3.3μF, 50V, Elect.	P702A	2000494	NSAS-5P-450
C167-C170	352750479	4.7μF, 25V, Elect.	P703A	2000495	NSAS-6P-451
C201, C202	352783399	0.33μF, 50V, Elect.	P103	25045142	NPI-4P-DBL55
C203, C204	352780109	1μF, 50V, Elect.	MIC. TERMINAL PC BOARD (NAMIC-2439)		
C211-C216	352741009	10μF, 16V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C221, C222	352780109	1μF, 50V, Elect.	IC		
C223, C224	352786899	0.68μF, 50V, Elect.	Q261	222502,	NJM4558DX,
C225, C226	352780229	2.2μF, 50V, Elect.		222534 or	NJM4559DX or
C233, C234	352786899	0.68μF, 50V, Elect.		222811	NJM4558DD
C235, C236	352782009	2.2μF, 50V, Elect.	Capacitors		
C257	352734719	470μF, 10V, Elect.	C264, C265	352741009	10μF, 16V, Elect.
C258	352742209	22μF, 16V, Elect.	Terminal		
C239	352780109	1μF, 50V, Elect.	P201	25045135	HLJ4307-01-010
C251, C252	392880107	1μF, 50V, LL. (G/W)	INPUT VOLUME PC BOARD (NAVR-2440)		
C253, C254	352780109	1μF, 50V, Elect. (G/W)	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C255, C256	352741019	100μF, 16V, Elect. (G/W)	Resistors		
C301, C302	352741009	10μF, 16V, Elect.	R163, R164	6142030	N30LL50KA10Z
C303, C304	352780109	1μF, 50V, Elect.	Socket		
C305, C306	352750479	4.7μF, 25V, Elect.	P105A	2000499A	NSAS-6P-455
C401, C402	352741009	10μF, 50V, Elect.	DOLBY SWITCH PC BOARD (NASW-2441)		
C403, C404	352750479	4.7μF, 25V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C405, C406	352781599	0.15μF, 50V, Elect.	Switch		
C407, C408	352780339	3.3μF, 50V, Elect.	S601	25030231	NRS-123-25SBM
C433	352750479	4.7μF, 25V, Elect.	HEADPHONE TERMINAL PC BOARD (NAHP-2442)		
C434	352722219	220μF, 6.3V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C507	352741009	10μF, 16V, Elect.	Terminal		
C508, C509	352780109	1μF, 50V, Elect.	P303	25045184	HLJ-0520-01-010
C601	352780109	1μF, 50V, Elect.	TAPE-1 OPERATION SWITCH (NASW-2444)		
C602, C603	352741009	10μF, 16V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C604, C605	352780109	1μF, 50V, Elect.	LEDs		
C903, C904	357261029	1000μF, 35V, Elect.	D712, D715,	225177	GL3PR28
C905	352781099	0.1μF, 50V, Elect.	D716		
C906, C907	352741009	10μF, 16V, Elect.	D713, D714	225179	LG4NG28
C908	352752229	2200μF, 25V, Elect.	D701, D702	225159	SEL-9720MB01
C909	352742219	220μF, 16V, Elect.	Switch		
C910	352744709	47μF, 16V, Elect.	S701-S710	25035408	NPS-111-S372
C911	3504168	13000μF, 25V, Elect.	Holder		
C912	352782299	0.22μF, 50V, Elect.		27190409	Holder (LED-1)
C913	352781099	0.1μF, 50V, Elect.		27190410	Holder (LED-4)
C915	352744719	470μF, 16V, Elect.	TAPE-2 OPERATION SWITCH (NASW-2445)		
C916	352782299	0.22μF, 50V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C918	352780229	2.2μF, 50V, Elect.	Switch		
R131-R134,	5215003 or	N08HR20KBC,	S711-S717	25035408	NPS-111-S372
R157-R160	5215022	Semi-fixed	S718	25035399	NPS-122-L634
R401, R402	5215045 or	N08HR10KBC,	TIMER SWITCH PC BOARD (NASW-2446)		
N449, R450	5215021	Semi-fixed	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	5215047 or	N08HR100KBC,	Switch		
	5215024	Semi-fixed	S719	25030231	NRS-123-25SBM.
R459	5215003 or	N08HR20KBC,	Rotary switch		
R901, R902	5215022	Semi-fixed			
	441520224NF	2.2Ω, 1/2W, Metal oxide film			

TAPE MECHANISM—PARTS LIST (T-1)

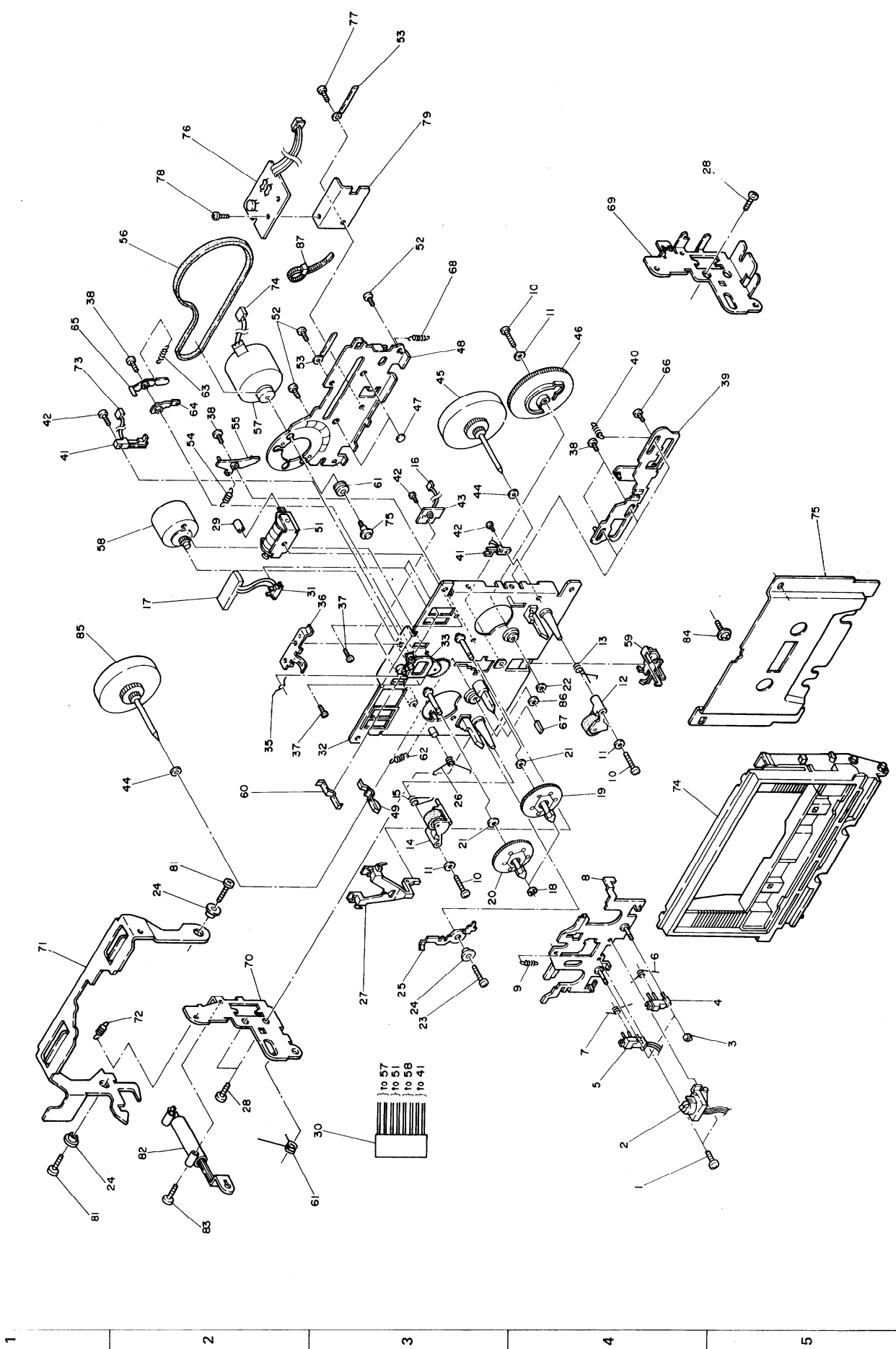
REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	801318	Screw w/washer M2 x 5	46	24602344	Cam gear (B)
2	24600058	Head ass'y	47	24604076	Spacer
3	24611038	Adjusting nut	48	24607039	Bracket (flywheel) B
4	24611021	Tape guide	49	24603325	Lever (reader)
5	24611020	Sensor ass'y	51	24606232	Solenoid coil PKA16122
6	24605484	Adjusting spring (R)	52	838126080	Screw 2.6 x 8
7	24605483	Adjusting spring (L)	53	24611033	Lug ass'y
8	24611176	Plate ass'y (head)	54	24605593	Spring (play arm)
9	24605584	Spring (head base)	55	24607042	Arm ass'y (play)
10	838120130	Wave screw 2 x 13	56	24602351	Main belt
11	87712206	Washer 2.2 x 6 x .4	57	24601191	Motor ass'y (main)
12	24602339	Pinch roller ass'y	58	24601190	Motor ass'y (reel)
13	24605585	Spring (pinch roller) R	59	24611181	Holder (lead)
14	24602349	Pinch roller ass'y	60	24603328	Lever (read)
15	24605598	Spring (pinch roller) L	61	24611137	Rubber cushion
16		Wire connector	62	24605590	Spring
17		Wire connector	63	24605594	Spring (A)
18	24611177	Plastic washer 1.7 x 3.2 x .25	64	24607043	Arm (A)
19	24602340	Reel ass'y	65	24607044	Arm (B)
20	24602345	Take up reel ass'y	66	24611182	Cap
21	24611175	Plastic washer 2.1 x 7 x .25	67	24611034	Reflector
22	24610926	Oil seal	68	24605591	Spring (ground)
23	838130080	Wave screw 3 x 8	69	24607030	Bracket (R)
24	24604048	Spacer	70	24607029	Bracket (L)
25	24607041	Arm (protect) L	71	24607047	Eject arm
26	24605586	Spring (L)	72	24605600	Spring eject arm
27	24603326	Lever (hold) C	73		Wire connector, 2P
28	833130047	Tap-tight screw 113 x 4	74	24611192	Cassette holder ass'y
29	24604075	Tube	75	24611174	Plate
30		Wire connector, 8P	76	24606234	P.C.B. ass'y
31	24606235	Push switch	77	82113057	Tap-tight screw M3 x 5
32	24611191	Chassis ass'y	78	82112047	Tap-tight screw M2 x 4
33	24602342	Idler ass'y	79	24607040	Bracket (P.C.B.)
35	24605587	Spring (hold)	81	82113006	Tap-tight screw M3 x 6
36	24605588	Spring (cassette)	82	24611193	Danper ass'y
37	801355	Screw/w M2.6 x 3.5	83	833120127	Tap tight screw M2 x 12
38	24611178	Cap	84	801293	Tap tight screw M2.6 x 12
39	24611179	Plate ass'y (slide)	85	24602352	Flywheel ass'y
40	24605589	Spring (slide)	86	24611188	Oil seal ϕ 2.2
41	24606231	Leaf switch	87	24611189	Bainder
42	838120070	Wave screw 2 x 7	88	24605599	Spring
43	24611180	Base ass'y (sensor)	89	801340	Screw (motor)
44	24611041	Plastic washer 2.6 x 0.25			
45	24602343	Flywheel ass'y			

TAPE MECHANISM—PARTS LIST (T-2)

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	801318	Screw w/washer M2 x 5	46	24602344	Cam gear (B)
2	24600057	Head ass'y	47	24604076	Spacer
3	24611038	Adjusting nut	48	24607039	Bracket (flywheel) B
4	24611021	Tape guide	49	24603330	Lever (reader)
5	24611020	Sensor ass'y	50	24603329	Lever (reader)
6	24605484	Adjusting spring (R)	51	24606232	Solenoid coil PKA16122
7	24605483	Adjusting spring (L)	52	838126080	Screw 2.6 x 8
8	24611176	Plate ass'y (head)	53	24611033	Lug ass'y
9	24605584	Spring (head base)	54	24605593	Spring (play arm)
10	838120130	Wave screw 2 x 13	55	24607042	Arm ass'y (play)
11	87712206	Washer 2.2 x 6 x .4	56	24602351	Main belt
12	24602339	Pinch roller ass'y	57	24601191	Motor ass'y (main)
13	24605585	Spring (pinch roller) R	58	24601190	Motor ass'y (reel)
14	24602349	Pinch roller ass'y	59	24611181	Holder (lead)
15	24605598	Spring (pinch roller) L	60	24603328	Lever (read)
16		Wire connector	61	24611137	Rubber cushion
17		Wire connector	62	24605590	Spring
18	24611177	Plastic washer 1.7 x 3.2 x .25	63	24605594	Spring (A)
19	24602353	Reel ass'y	64	24607043	Arm (A)
20	24602345	Take up reel ass'y	65	24607044	Arm (B)
21	24611175	Plastic washer 2.1 x 7 x .25	66	24611182	Cap
22	24610926	Oil seal	67	24611034	Reflector
23	838130080	Wave screw 3 x 8	68	24605591	Spring (ground)
24	24604048	Spacer	69	24607030	Bracket (R)
25	24607041	Arm (protect) L	70	24607029	Bracket (L)
26	24605586	Spring (L)	71	24607047	Eject arm
27	24603326	Lever (hold) C	72	24605600	Spring eject arm
28	833130047	Tap-tight screw 113 x 4	73		Wire connector
29	24604075	Tube	74	24611192	Cassette holder ass'y
30		Wire connector, 8P	75	24611174	Plate
31	24606235	Push switch	76	24606237	P.C.B. ass'y
32	24611191	Chassis ass'y	77	82113057	Tap-tight screw M3 x 5
33	24602342	Idler ass'y	78	82112047	Tap-tight screw M2 x 4
34	24606236	Push switch	79	24607040	Bracket (P.C.B.)
35	24605587	Spring (hold)	80	24602348	Belt (counter)
36	24605588	Spring (cassette)	81	82113006	Tap-tight screw M3 x 6
37	801355	Screw/w M2.6 x 3.5	82	24611193	Danper ass'y
38	24611178	Cap	83	833120127	Tap tight screw M2 x 12
39	24611179	Plate ass'y (slide)	84	801293	Tap tight screw M2.6 x 12
40	24605589	Spring (slide)	85	24602352	Flywheel ass'y
41	24606231	Leaf switch	86	24611188	Oil seal ϕ 2.2
42	838120070	Wave screw 2 x 7	87	24611189	Bainder
43	24611180	Base ass'y (sensor)	88	24605599	Spring
44	24611041	Plastic washer 2.6 x 0.25	89	801340	Screw (motor)
45	24602343	Flywheel ass'y			

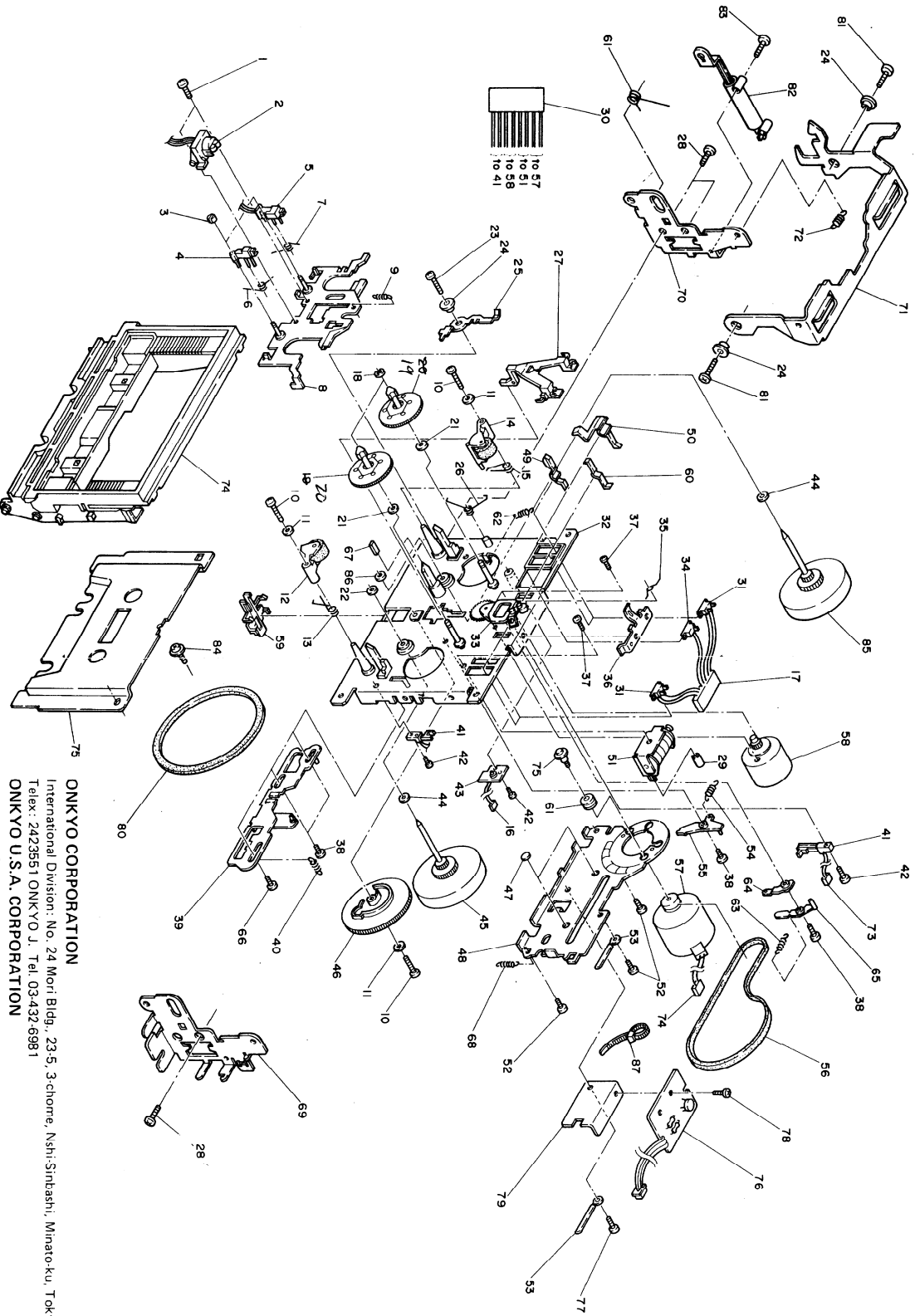
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TAPE MECHANISM—EXPLODED VIEW (T-1)



TAPE MECHANISM - EXPLODED VIEW (T-2)

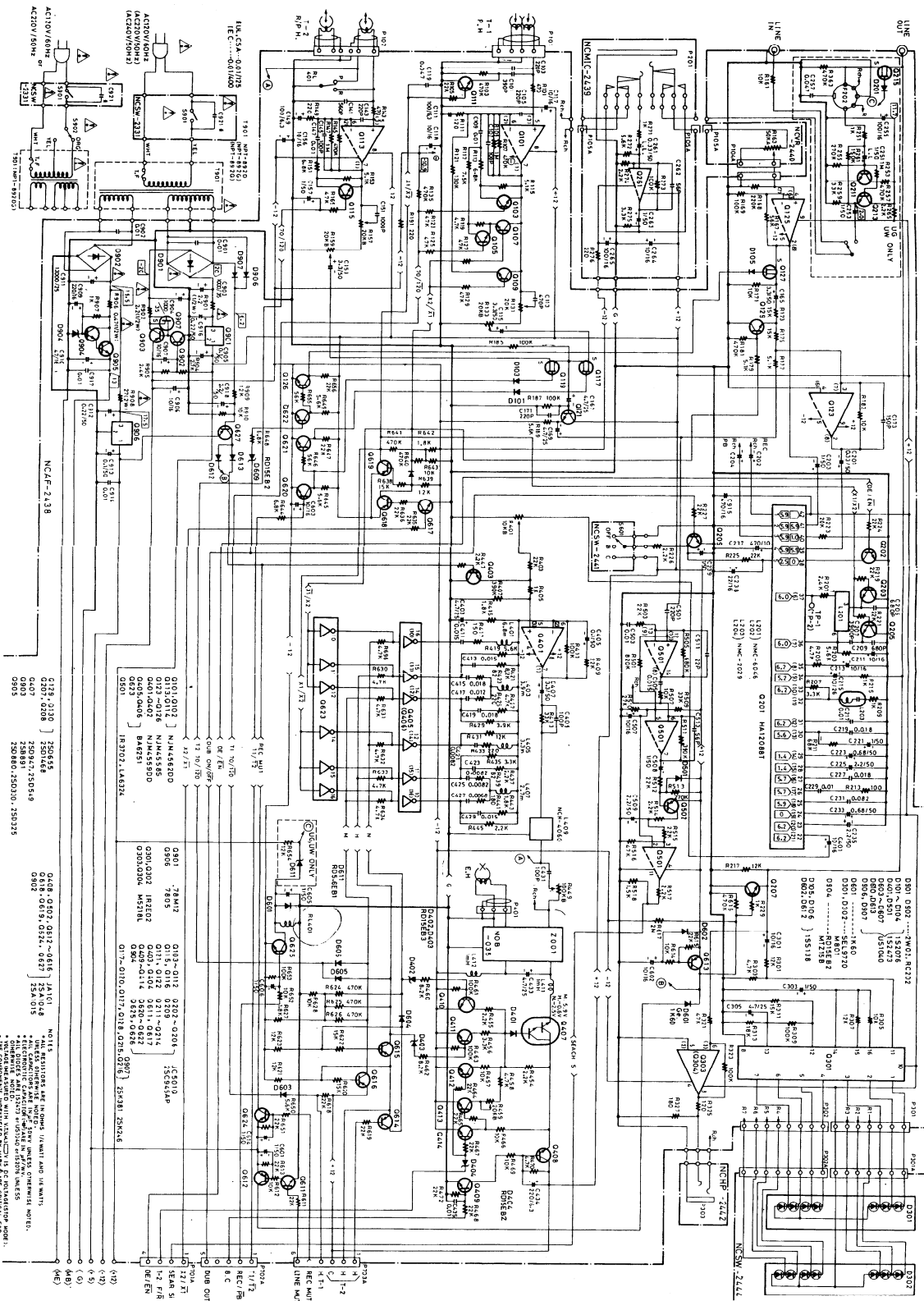
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SCHEMATIC DIAGRAM—AMPLIFIER SECTION

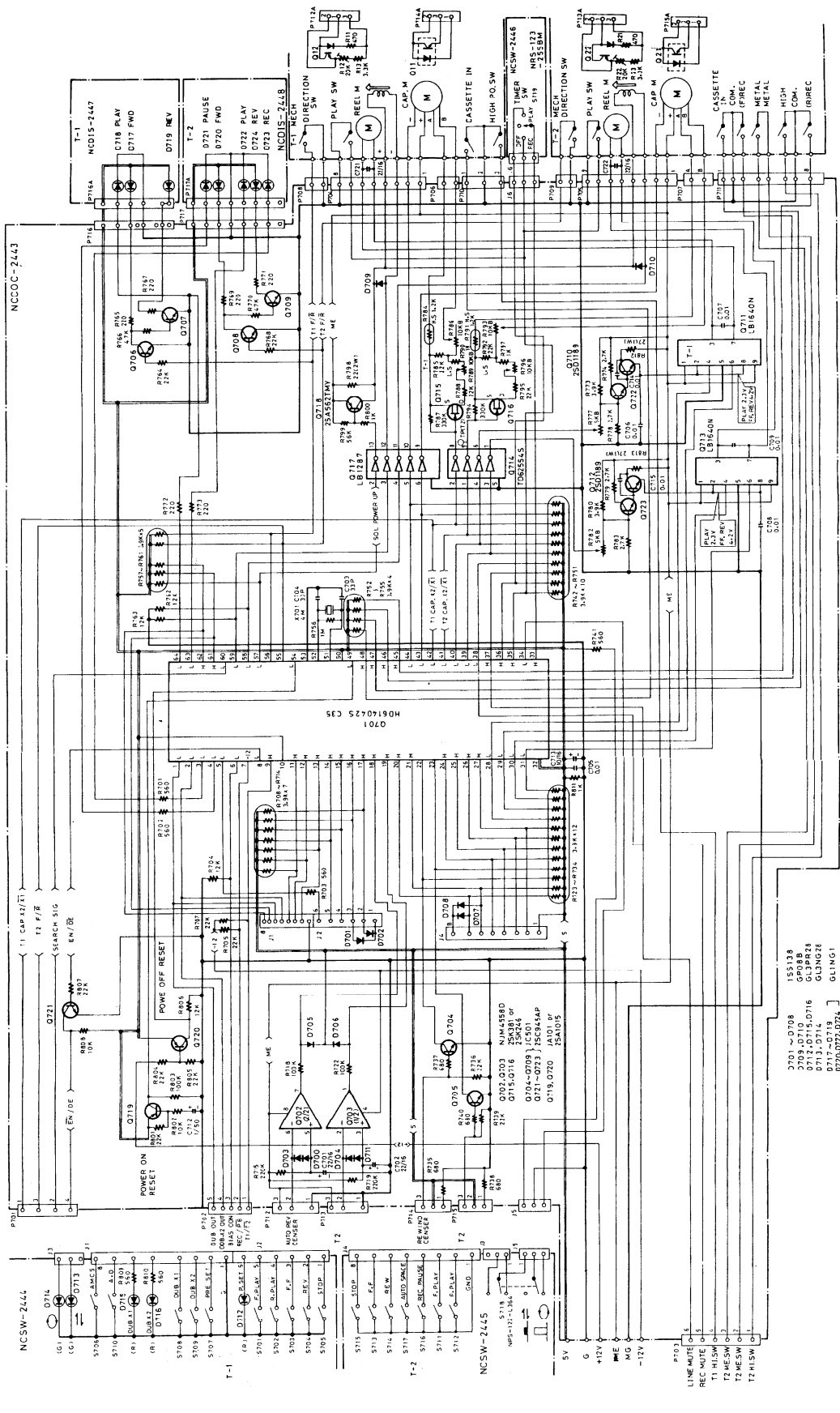
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A B C D E F G

SCHEMATIC DIAGRAM—CONTROL SECTION



- 3701 ~ 0708 155138
- 0709 0710 0711 0712 0713 0714 0715 0716 0717 0718 0719 0720 0721 0722 0723 0724 0725 0726 0727 0728 0729 0730 0731 0732 0733 0734 0735 0736 0737 0738 0739 0740 0741 0742 0743 0744 0745 0746 0747 0748 0749 0750 0751 0752 0753 0754 0755 0756 0757 0758 0759 0760 0761 0762 0763 0764 0765 0766 0767 0768 0769 0770 0771 0772 0773 0774 0775 0776 0777 0778 0779 0780 0781 0782 0783 0784 0785 0786 0787 0788 0789 0790 0791 0792 0793 0794 0795 0796 0797 0798 0799 0800

