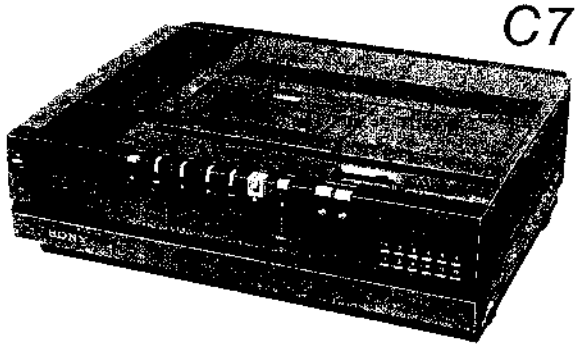
SL-C7E/C7UB

RMT-200

SERVICE MANUAL

C7E AEP Model
E Model
C7UB UK Model
HK Model



December, 1979

The circuits and mechanical structure of model SL-C7UB and SL-C7E are almost identical.

SPECIFICATIONS

General

Video recording system: Rotary two-head helical scanning

Video signal: CCIR standards, PAL colour (SL-C7E)
British colour TV standards (SL-C7UB)

Storage temperature: −20°C to +65°C (−4°F to +149°F)

Operating temperature: 5°C to 40°C (41°F to 104°F)

Aerial: 75-ohm, asymmetrical aerial socket

Channel coverage:
- VHF Western European Channels E2–12
- UHF Western European Channels E21–68
- (a total of up to 12 preselected channels) (SL-C7E)
- UHF channels 21-68 (a total of up to 12 preselected channels) (SL-C7UB)

RF output signal: UHF channels E30 to E39 (variable)
75 ohms, unbalanced (SL-C7E)
UHF channels 30 to 39 (variable)
75 ohms, unbalanced (SL-C7UB)

Power requirements: 110–127V, 220–240V AC ± 10% (adjustable), 50/60 Hz

Power consumption: 45 W

Dimensions: 485 x 163 x 379 mm (w/h/d)
(19 1/8 x 6 1/2 x 15 inches)

Weight: 15.5 kg (34 lb 3 oz)

Video

Input: VIDEO IN: BNC connector
1.0 V (p-p) $^{+1.0}_{-0.5}$ V (p-p), 75 ohms unbalanced, sync negative

Output: VIDEO OUT: BNC connector
1.0 V (p-p) ±0.1 V (p-p), 75 ohms unbalanced, sync negative

Horizontal resolution: Colour: 260 lines
B/W: 300 lines

Signal-to-noise ratio: Colour: Better than 40 dB
B/W: Better than 43 dB

Audio

Input: AUDIO IN: Phono connector
47 kohms, −10 dBs.
MIC: mini jack
−60 dBs, suitable for microphone with 600-ohm impedance

Output: AUDIO OUT:Phono connector
Less than 10 kohms, −5dBs
(47 k ohm load), unbalanced

Frequency response: 50 Hz to 10 kHz

Signal-to-noise ratio: Better than 40 dB

Audio distortion: Less than 4% at 400 Hz

Tape transport

Tape speed: 18.73 mm/sec.

Maximum recording time: 2 hours 10 min (with Sony L-500 cassette)
3 hours 15 min (with L-750)

Fast forward/rewind time: Within 3 1/2 min. (L-501)

Timer: Only for recording
Electronic digital timer
24-hour-clock cycle
2 weeks 4 events

– Continued on next page –

Beta

VIDEO CASSETTE RECORDER

SONY®

MICROFILM

Consumer VIDEO

Accessories supplied

Remote Commander RMT-200
Betamax Videocassette tape L-500
AC mains lead
75-ohm coaxial cable

Remote commander

Remote control system:	Infrared control
Power requirements:	6 V dc Battery size AA x 4 (IEC battery designation R6)
Dimensions:	68 x 34 x 144 mm (w/h/d) ($2\frac{3}{4}$ x $1\frac{3}{8}$ x $5\frac{3}{4}$ inches)
Weight:	220 g (8 oz) including batteries
Accessory supplied:	Battery size AA 4 pcs.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND ⚠ MARK ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

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TABLE OF CONTENTS

The circuits and mechanical stracture of models SL-C7UB (HK model) and SL-C7UB are almost identical. Therefore, the difference between SL-C7UB (HK model) and SL-C7UB are shown below.

Description \ Model	SL-C7UB (HK model)	SL-C7UB
⚠ CORD, power	1-551-646-00	1-534-819-00
LABEL, BEAB	———	3-701-940-00

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

1. DIFFERENT PARTS LIST

1-1. MECHANICAL PARTS LIST

Description \ Model	SL-C7E Part No.	SL-C7UB Part No.	Page (SL-C7E)
LABEL, F mark	3-656-407-00	————	
CASE, upper	3-662-292-00	3-662-292-21	
LABEL, model number	3-662-306-00	3-662-343-00	
LABEL, preset manual	3-662-321-00	3-662-348-00	
LABEL, made in JAPAN	————	3-701-690-00	4-1, 4-2
LABEL, beab	————	3-701-940-01	
LABEL, caution main	————	3-703-043-21	
LABEL, caution	————	3-703-082-21	
LABEL, DEMKO	4-310-380-00	————	
LID ASS'Y, cassette-up	X-3662-214-0	X-3662-221-0	
STICKER, C7E	3-662-263-00	————	4-3
STICKER, C7UB	————	3-662-342-00	
HOLDER (R-3), LED	3-662-227-00	————	4-5
COVER (L-3), lamp	3-662-230-00	————	
CAUTION (B), UK ground	————	3-701-961-01	4-14
INDIVIDUAL CARTON ASS'Y	X-3662-220-0	X-3662-226-0	
LABEL (GERMAN), explanation	3-662-334-01	————	
LABEL (FRENCH), explanation	3-662-335-01	————	
LABEL (DUTCH), explanation	3-662-336-01	————	
LABEL (SWEDISH), explanation	3-662-337-01	————	
MANUAL, instruction	3-783-007-11	3-783-172-41	4-15
INSTRUCTION	3-794-584-11	————	
MANUAL, instant information (E/G/F)	3-794-585-11	————	
MANUAL, instant information (D/S)	3-794-586-11	————	
MANUAL, instant information	————	3-794-812-41	
MANUAL, instant information; timer (D/S)	3-794-603-11	————	
MANUAL, instant information; timer (G/F)	3-794-604-11	————	

1-2. ELECTRICAL PARTS LIST

Description \ Model	SL-C7E Part No.	SL-C7UB Part No.	Page (SLC7E)
TU-11 Board, complete	A-6721-037-A	A-6721-043-A	
IF-10 Board, complete	A-6721-038-A	A-6721-044-A	
CH-3 Board, complete or CH-7 Board, complete	A-6725-154-A or A-6725-175-A	———— A-6725-170-A	4-5
PC-1 Board	1-601-835-00	1-601-835-14	
⚠ UHF tuner	1-463-242-00 (U322)	1-463-236-00 (U321)	
⚠ VHF tuner	1-463-243-00 (V314)	————	
⚠ RF modulator	1-464-105-00	1-464-116-00	
⚠ Switching regulator C106, C107	1-413-045-00 1-161-743-11 0.0022 AC400V	1-413-051-00 1-161-826-11 0.001 AC400V	3-4
⚠ CORD, power	————	1-534-819-00	—
PIN, cable	1-555-110-00	1-555-111-00	5-2

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

2. TUNER BLOCK (CH-7, IF-10, TU-11, CI-1, PC-1 BOARD) ELECTRICAL PARTS LIST

CH-7 BOARD

Ref. No.	Part No.	Description		Remark
♦	A-6725-170-A	CH-7 Board, Complete		
C1	1-131-347-00	1	35V	tantalum
C2	1-108-251-00	0.1		mylar
C3	1-161-323-00	0.001		
C4, 5	1-161-319-00	470p		
C6	1-108-365-00	0.001	100V	mylar
C8	1-161-021-00	0.047		
C9	1-161-271-00	100p		
C10	1-123-359-00	47	50V	elect
C11, 12	1-123-316-00	10	16V	elect
C14	1-161-323-00	0.001		
C15	1-123-352-00	1	50V	elect
C16	1-131-345-00	0.47	35V	tantalum
C17	1-161-021-00	0.047		
C18	1-123-352-00	1	50V	elect
C19	1-161-013-00	0.01		
C20	1-161-271-00	100p		
C21	1-161-263-00	22p		
C22	1-161-271-00	100p		
C23	1-108-820-00	0.22	mylar	
C24	1-161-265-00	33p		
C25	1-123-228-00	1	50V	elect
C26, 27	1-161-223-00	0.022		
C28	1-123-353-00	2.2	50V	elect
C29	1-161-013-00	0.01		
C30	1-131-349-00	2.2	35V	tantalum
C31	1-161-323-00	0.001		
C32	1-123-228-00	1	50V	elect
C33	1-131-345-00	0.47	35V	tantalum
♦CN2	1-508-735-21	5p Connector		
♦CN3	1-508-736-00	10p Connector		
♦CN4	1-508-847-00	4p Connector		
♦CN5	1-508-848-00	6p Connector		
♦CN6	1-508-735-00	5p Connector		
♦CN7	1-508-847-00	4p Connector		
♦CN8	1-508-742-00	3p Connector		
♦CN9	1-508-849-00	8p Connector		

Ref. No.	Part No.	Description		Remark
D2–5	8-719-815-55	1S1555		
D10	8-719-815-55	1S1555		
⇒D11–15	8-719-311-23	SEL1122P-N		
D19	8-719-812-31	TLR123		
⇒IC1	8-758-040-00	CX804		
IC2	8-759-040-46	MC14046BCP		
IC3	8-757-610-00	CX761		
IC4	8-757-600-00	CX760		
IC5	8-759-108-05	μPC78L05A		
IC6	8-759-240-12	TC4012BP		
IC7, 8	8-759-240-11	TC4011BP		
IC9	8-759-965-60	BA656		
IC10	8-759-240-11	TC4011BP		
IC11	8-759-240-12	TC4012BP		
IC12	8-759-157-40	μPC574J		
L1	1-407-184-xx	3.3μH		
Q1	8-729-902-11	2SC2021		
Q2	8-729-993-72	2SA937		
Q4	8-729-902-11	2SC2021		
Q5	8-729-139-04	2N3904		
⇒Q6	8-724-375-01	2SC403C		
Q7, 8	8-729-993-72	2SA937		
R6	1-202-463-00	2.2M	1/4W	composition
⚠R73, 74	1-213-155-00	10k	1W	metal oxide (nonflammable)
RV1	1-224-251-xx	4.7k, adjustable		
S1–5	1-552-174-00	Pushbutton		
S6, 7	1-516-226-00	Slide		

Ref. No.	Part No.	Description	Remark
		CI-1 BOARD	
★	1-601-831-00	CI-1 Board	
★CN10	1-508-849-00	8p Connector	
D20	8-719-803-26	TLR326	
IC13	8-759-997-64	SN29764N	
S10–21	1-552-412-00	Keyboard	
		IF-10 BOARD	
★	A-6721-044-A	IF-10 Board, Complete	
C501, 502	1-161-047-00	0.0047	
C503	1-161-272-00	120p	
C504–509	1-161-047-00	0.0047	
C510	1-123-355-00	4.7 50V elect	
C511	1-123-316-00	10 16V elect	
C512	1-161-047-00	0.0047	
C513	1-161-280-00	12p	
C514	1-102-529-00	100p	
C515	1-161-323-00	0.001	
C516	1-123-321-00	220 16V elect	
C517	1-101-006-00	0.047	
C518	1-103-725-00	0.001 styrol	
C519	1-161-051-00	0.01	
C520, 521	1-101-006-00	0.047	
C523	1-108-385-00	0.047 100V mylar	
C524–526	1-161-047-00	0.047	
C527	1-102-852-00	47p	
C528	1-102-525-00	68p	
C529	1-161-249-00	1.5p	
C530	1-161-259-00	10p	
C531–534	1-161-047-00	0.047	
C535	1-123-320-00	100 16V elect	
C536	1-161-267-00	47p	
C537	1-123-323-00	470 16V elect	
C538	1-161-047-00	0.047	
C539	1-123-353-00	2.2 50V elect	
CF501	1-409-333-00	Trap, ceramic	
CF502	1-527-262-00	Ceramic, filter	
★CN501	1-508-743-00	5p Connector	
★CN503	1-508-797-00	4p Connector	
⇒IC501	8-759-014-40	TBA1440G	
IC502	8-759-651-35	M5135p	
IC503	8-759-001-20	TBA120UB	
L501	1-404-221-00	Coil, IF	
L502	1-407-184-XX	3.3μH	
L503	1-407-159-XX	15μH	
L504	1-407-157-XX	10μH	
L505	1-407-184-XX	3.3μH	
Q501	8-765-300-00	2SC2009	
⇒Q502, 503	8-729-663-47	2SC1364	
⚠R517	1-247-005-00	100 1/4W carbon (nonflammadde)	
RV501	1-224-645-XX	10k, adjustable	
RV502	1-224-644-XX	4.7k, adjustable	
SF501	1-404-190-00	Filter, surface wave	
T501	1-404-206-00	1FT	
T502	1-404-207-00	VIF	
T503	1-404-203-00	VIF	
T504	1-403-810-00	AFT Discri (Pri)	
T505	1-403-811-00	AFT Discri (Sec)	
T506	1-404-135-00	SIF Discri	
T507	1-404-097-00	SIFT	
		PC-1 BOARD	
★	A-6723-132-A	PC-1 Board, complete	
C1	1-123-316-00	10 16V elect	
C2	1-102-074-00	0.001	
C3	1-123-316-00	10 16V elect	
★CN501	1-508-743-00	5p Connector	
★CN502	1-508-797-00	4p Connector	
⇒D1	8-719-162-07	RD6.2E	
Q1, 2	8-729-663-47	2SC1364	
Q10	8-729-663-47	2SC1364	
Q11	8-760-523-10	2SA772	
Q12, 13	8-729-663-47	2SC1364	
RV1	1-224-643-XX	2.2k, adjustable	
		TU-11 BOARD	
★	A-6721-043-A	TU-11 Board, complete	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C110	1-102-963-00	33p	
C111	1-102-125-00	0.0047	
C112	1-102-953-00	18p	
C113	1-102-676-00	68p	
C114	1-121-419-00	220 6.3V elect	
C115	1-121-806-00	10 16V elect (nonpolarized)	
C116	1-123-319-00	47 16V elect	
C117	1-123-352-00	1 50V elect	
C118	1-108-591-00	0.033 mylar	
C119	1-108-367-00	0.0015 100V mylar	
C120	1-123-320-00	100 16V elect	
C121	1-123-319-00	47 16V elect	
C122, 123	1-123-351-00	0.47 50V elect	
C124	1-102-973-00	100p	
C125	1-123-359-00	47 50V elect	
C126	1-123-383-00	4.7 100V elect	
C127	1-108-389-00	0.1 100V mylar	
C128	1-102-125-00	0.0047	
C130	1-108-820-00	0.22 mylar	
C131	1-123-317-00	22 16V elect	
C132	1-108-595-00	0.047 mylar	
C133	1-108-249-00	0.068 mylar	
C134	1-161-265-00	33p	
C136	1-123-319-00	47 16V elect	
C137	1-123-316-00	10 16V elect	
★CN101	1-508-797-00	4p Connector	
★CN102	1-508-743-00	5p Connector	
★CN103	1-508-910-00	12p Connector	
★CN104	1-508-743-00	5p Connector	
★CN105	1-508-845-00	6p Connector	
★CN107	1-508-742-00	3p Connector	
★CN108	1-508-845-00	6p Connector	
⇒D101, 102	8-719-815-85	1S1585	
⇒D103	8-719-127-25	RD27E-B2Z	
D104	8-719-815-55	1S1555	
L101			
L102, 103			
L104			
L105			
L106			
Q101			
⇒Q102			
⇒Q103			
Q104			
⇒Q106			
⇒Q107, 108			
⚠R126			
RV101			
T101			
T102			
⚠TU101			

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Ref. No.	Part No.	Description	Remark
T501	1-404-206-00	IFT	
T502	1-404-207-00	VIF	
T503	1-404-203-00	VIF	
T504	1-403-810-00	AFT Discri (Pri)	
T505	1-403-811-00	AFT Discri (Sec)	
T506	1-404-135-00	SIF Discri	
T507	1-404-097-00	SIFT	

PC-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6723-132-A	PC-1 Board, complete	
C1	1-123-316-00	10 16V elect	
C2	1-102-074-00	0.001	
C3	1-123-316-00	10 16V elect	
♦CN501	1-508-743-00	5p Connector	
♦CN502	1-508-797-00	4p Connector	
⇒D1	8-719-162-07	RD6.2E	
Q1, 2	8-729-663-47	2SC1364	
Q10	8-729-663-47	2SC1364	
Q11	8-760-523-10	2SA772	
Q12, 13	8-729-663-47	2SC1364	
RV1	1-224-643-XX	2.2k, adjustable	

TU-11 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6721-043-A	TU-11 Board, complete	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C110	1-102-963-00	33p	
C111	1-102-125-00	0.0047	
C112	1-102-953-00	18p	
C113	1-102-676-00	68p	
C114	1-121-419-00	220 6.3V elect	
C115	1-121-806-00	10 16V elect (nonpolarized)	
C116	1-123-319-00	47 16V elect	
C117	1-123-352-00	1 50V elect	
C118	1-108-591-00	0.033 mylar	
C119	1-108-367-00	0.0015 100V mylar	
C120	1-123-320-00	100 16V elect	
C121	1-123-319-00	47 16V elect	
C122, 123	1-123-351-00	0.47 50V elect	
C124	1-102-973-00	100p	
C125	1-123-359-00	47 50V elect	
C126	1-123-383-00	4.7 100V elect	
C127	1-108-389-00	0.1 100V mylar	
C128	1-102-125-00	0.0047	
C130	1-108-820-00	0.22 mylar	
C131	1-123-317-00	22 16V elect	
C132	1-108-595-00	0.047 mylar	
C133	1-108-249-00	0.068 mylar	
C134	1-161-265-00	33p	
C136	1-123-319-00	47 16V elect	
C137	1-123-316-00	10 16V elect	
♦CN101	1-508-797-00	4p Connector	
♦CN102	1-508-743-00	5p Connector	
♦CN103	1-508-910-00	12p Connector	
♦CN104	1-508-743-00	5p Connector	
♦CN105	1-508-845-00	6p Connector	
♦CN107	1-508-742-00	3p Connector	
♦CN108	1-508-845-00	6p Connector	
⇒D101, 102	8-719-815-85	1S1585	
⇒D103	8-719-127-25	RD27E-B2Z	
D104	8-719-815-55	1S1555	

Ref. No.	Part No.	Description	Remark
L101	1-407-186-XX	4.7μH	
L102, 103	1-407-178-XX	1μH	
L104	1-407-169-XX	100μH	
L105	1-407-696-00	18μH	
L106	1-407-169-XX	100μH	
Q101	8-765-300-00	2SC2009	
⇒Q102	8-724-375-01	2SC403C	
⇒Q103	8-729-612-77	2SA1027R	
Q104	8-729-663-47	2SC1364	
⇒Q106	8-760-413-10	2SC1475	
⇒Q107, 108	8-729-663-47	2SC1364	
⚠R126	1-246-979-00	1.2 1/8W carbon (nonflammable)	
RV101	1-224-645-XX	10k, adjustable	
T101	1-404-096-00	VHF	
T102	1-446-585-00	Convertor	
⚠TU101	1-463-236-00	UHF ET Tuner U321	

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- ⇒ : Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

3. PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

CH-7 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) PRINTED WIRING BOARDS – Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8

CH-7 BOARD

Q IC	IC10 IC11 IC6 IC7 Q4 IC8 IC2 IC12 Q2 Q1 Q6 Q5 IC4 Q9 Q8 Q10 IC3 IC9 IC5 Q7 IC1	Q IC
D	3 4 2 5 9 8 7 11 ~ 15 16 17 18 19 10	D
ADJ	RV1	ADJ

CI-1 BOARD

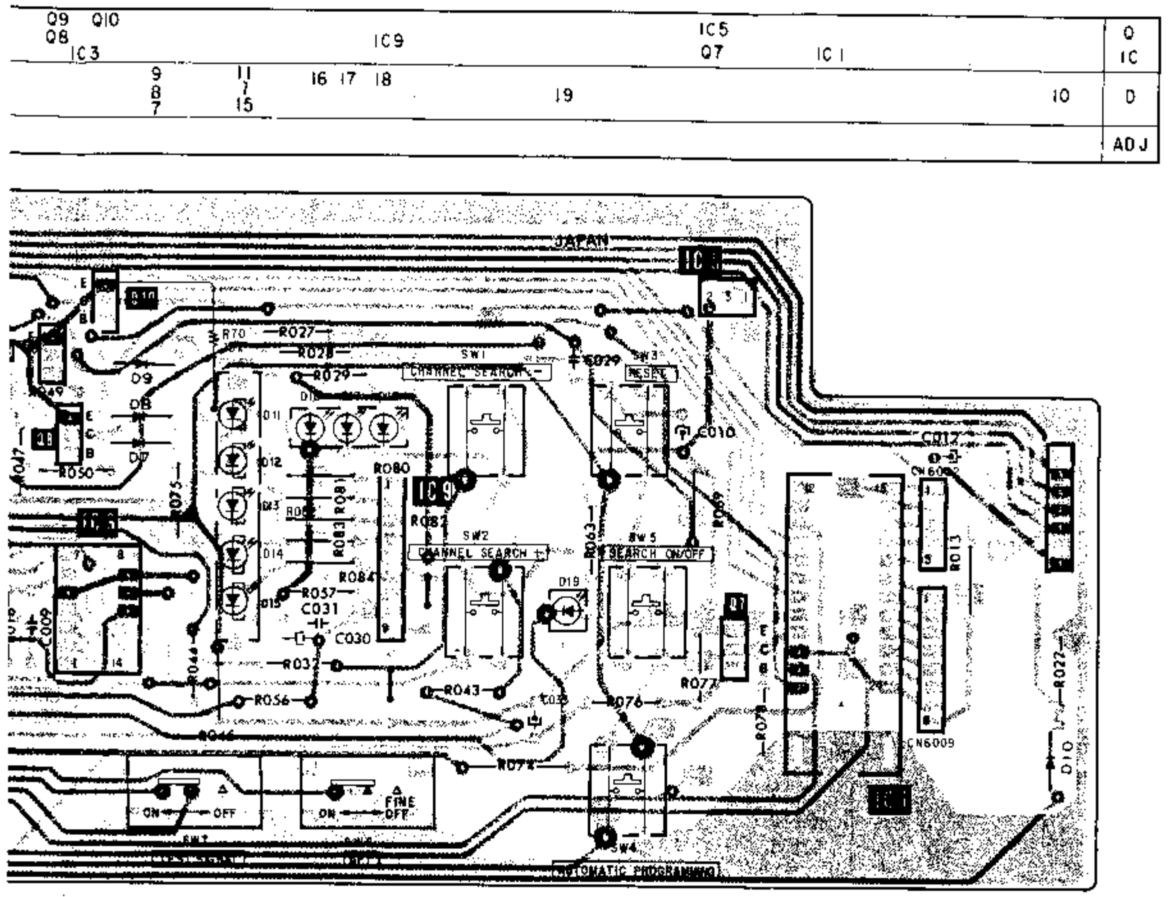
TU-11 BOARD

Q	106 101 102 108 107 103 104	Q
D	101 102 103 104	D
ADJ	RV101	ADJ

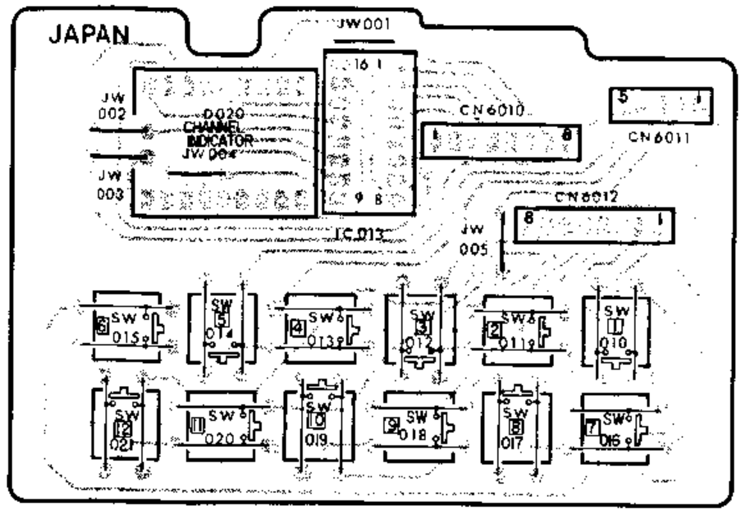
IF-10 BOARD

IC Q	503 IC503
ADJ	

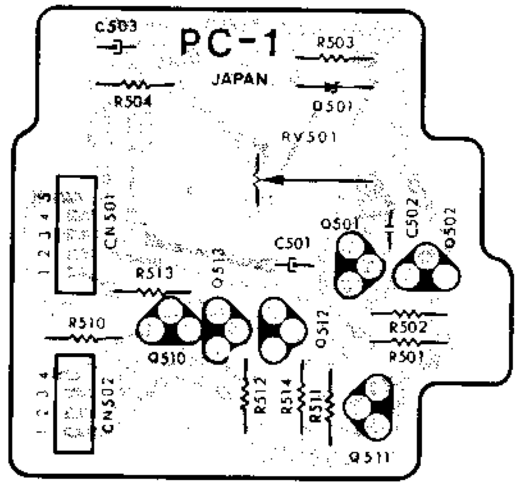
AND IF-10 (VIF, SIF, AFT) PRINTED WIRING BOARDS – Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –

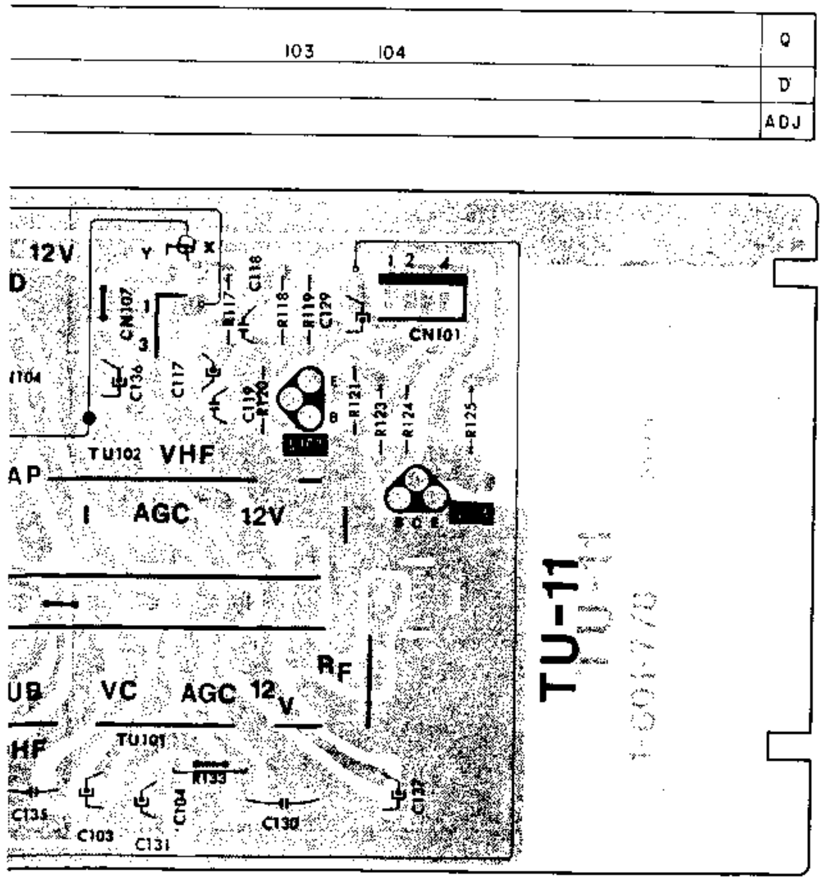


CI-1 BOARD

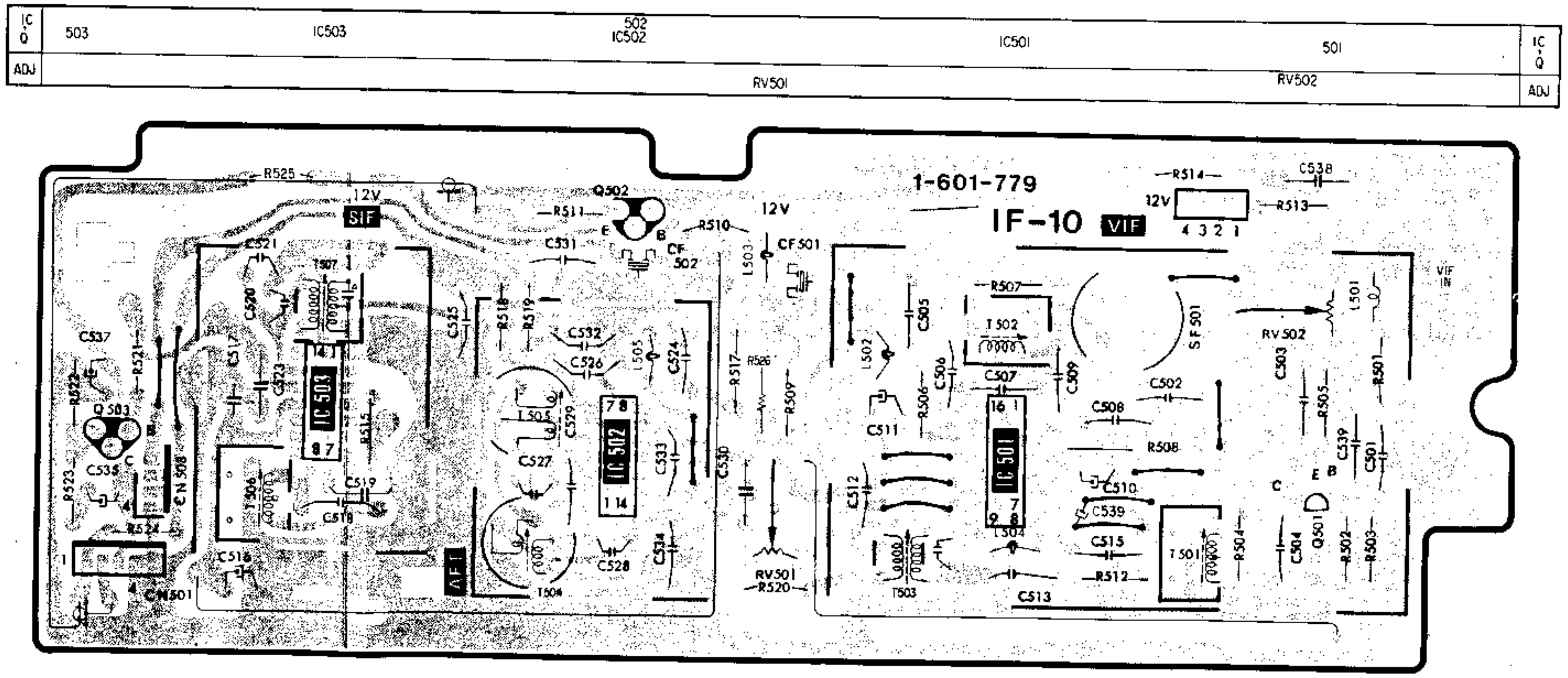


PC-1 BOARD



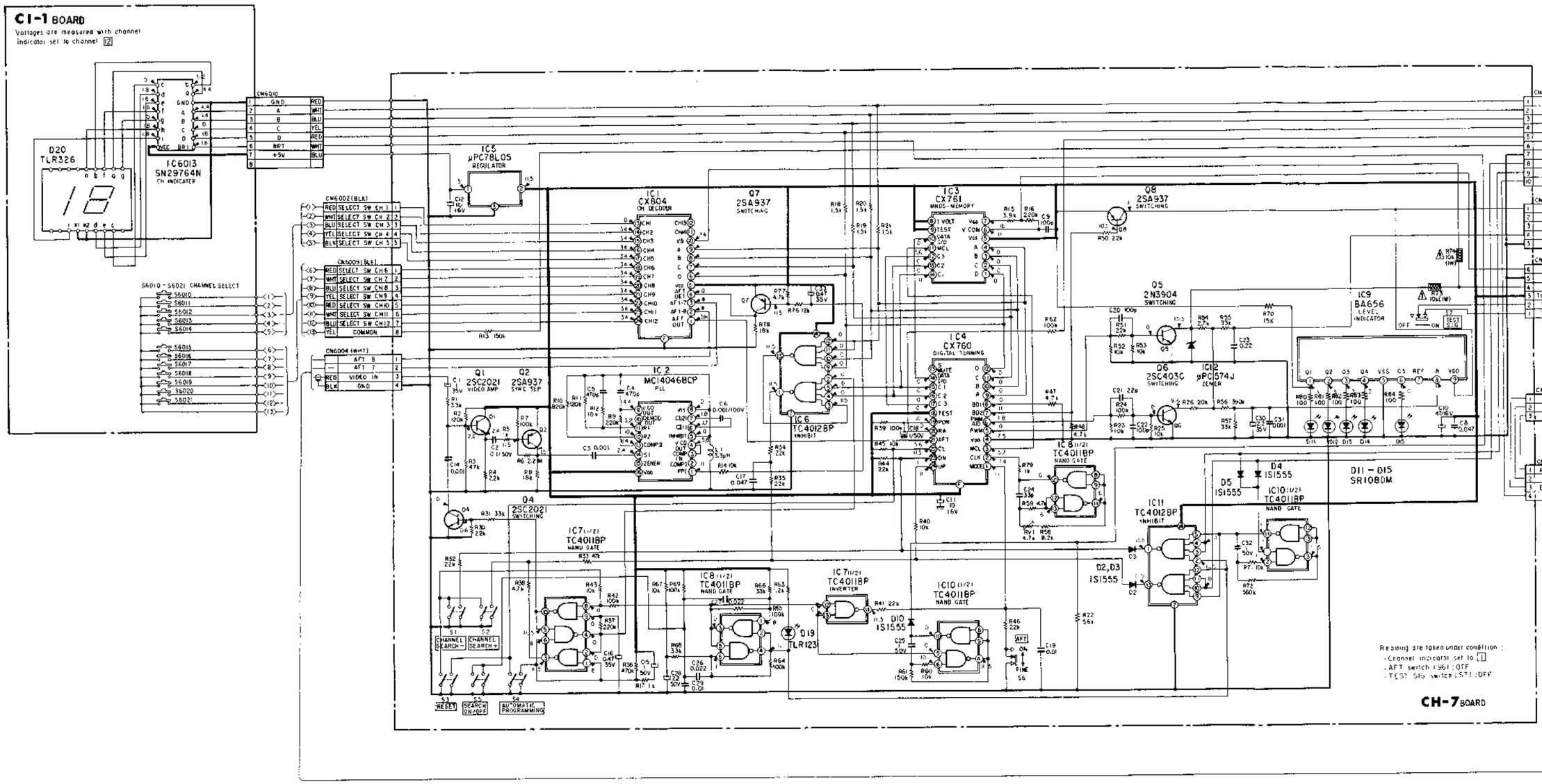


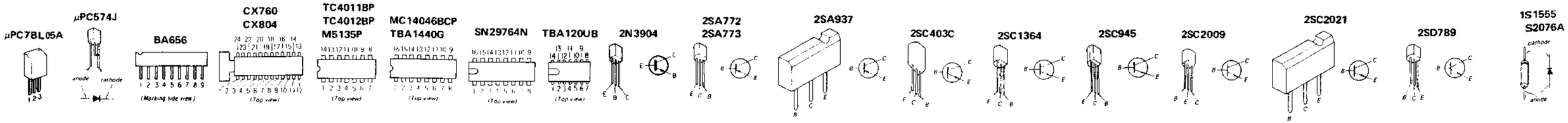
IF-10 BOARD

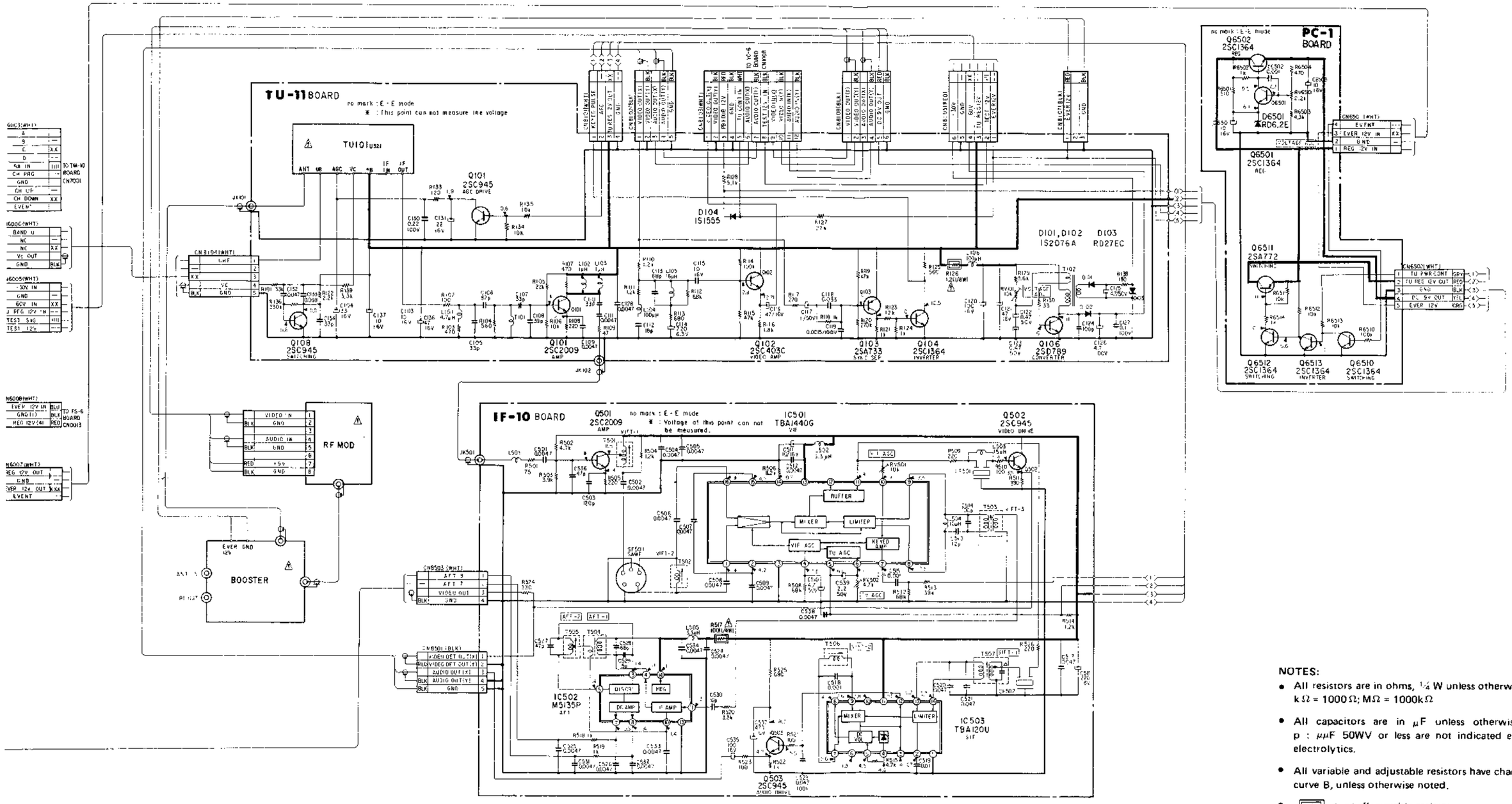


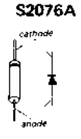
CH-7 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) BOARDS SCHEMATIC DIAGRAM

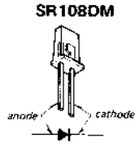
– Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –

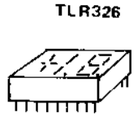












SD789

1S1555
S2076A

SR108DM

TLR326

NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ▭ : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

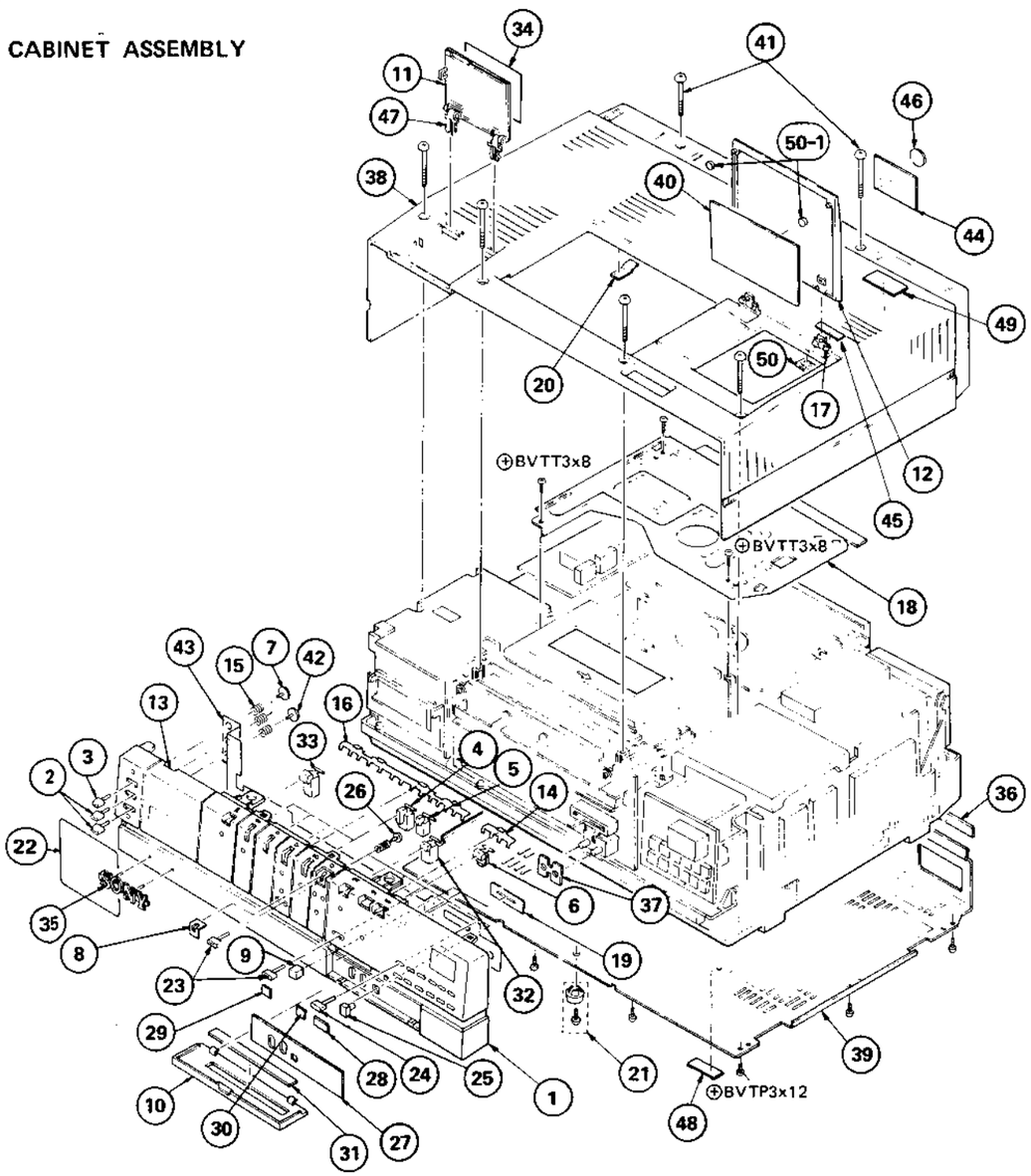
4. EXPLODED VIEWS

Note:

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- Items with no part number and no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- As to the part numbered with E-, refer to the electrical parts list.
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

CABINET ASSEMBLY

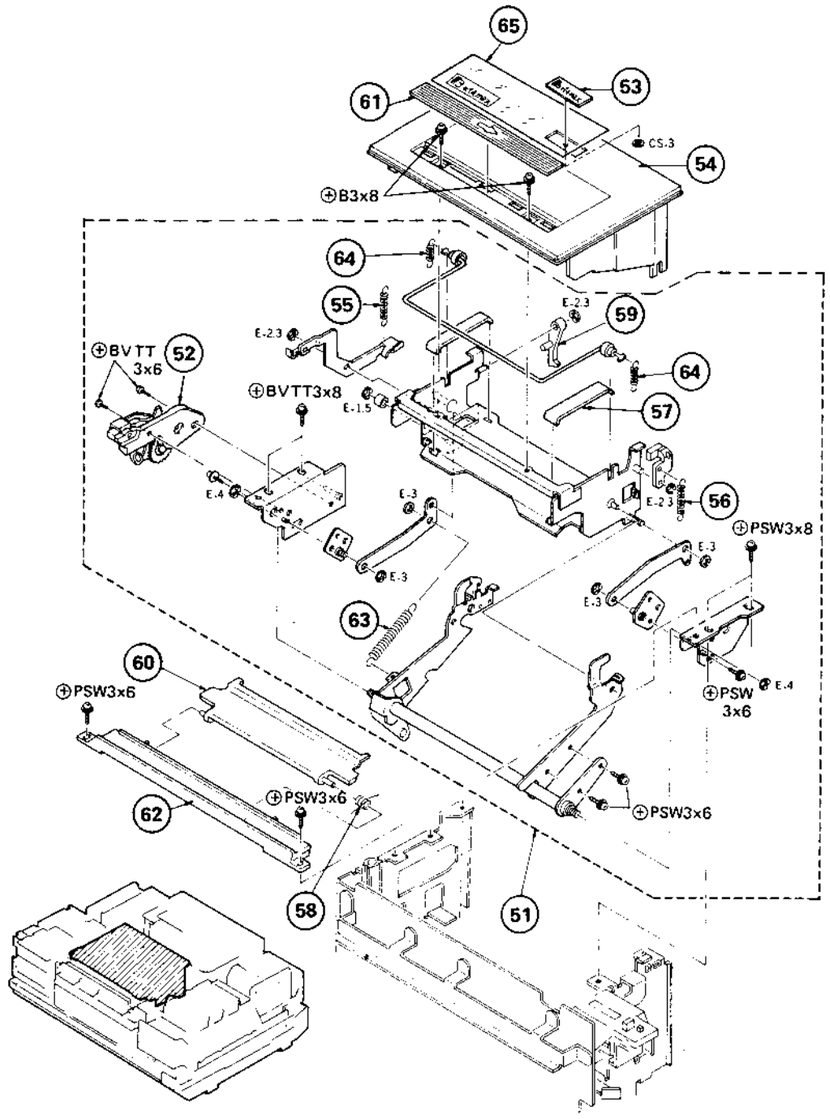


No.	Part No.	Description	Remark
1	A-6703-062-A	PANEL ASS'Y, front	2–8, 11, 13–16, 19, 22–33, 35, 42, 43
2	3-659-535-01	SWITCH, P	
3	3-659-535-11		
4	3-659-537-00	BUTTON (2), F	
5	3-659-538-00	BUTTON (3), F	
6	3-659-539-00	BUTTON (4), F	
7	3-659-542-00	RETAINER, spring	
8	3-659-543-00	PLATE, ornamental; REC button	
9	3-659-547-00	KNOB, control	
10	3-659-589-00	DOOR, front	
11	3-659-590-00	LID, timer	
12	3-659-599-21	DOOR, preset	
13	3-659-606-11	WINDOW, timer	
14	3-659-607-00	RETAINER (2), button	
15	3-659-609-00	SPRING, compression	
16	3-659-616-00	RETAINER (1), button	
17	3-659-618-00	HINGE, spring	
18	♦3-659-671-00	COVER, shield	
19	3-659-746-00	CLOTH, masking; VR	
20	3-659-748-00	CLOTH, masking; upper case	
21	3-659-768-00	FOOT	
22	3-660-901-00	COVER, front; timer	
23	3-662-211-00	BUTTON, SF	
24	3-662-212-00	BUTTON, tuning	
25	3-662-213-00	BUTTON, DUB	
26	3-662-214-00	RETAINER (2), spring	
27	3-662-217-00	INDICATOR	
28	3-662-218-00	PLATE, indication; DUB	
29	3-662-219-00	PLATE, indication; STILL	
30	3-662-220-00	PLATE, indication; SLOW	
31	3-662-236-00	LABEL (E), front door	
32	3-662-247-00	BUTTON (PAUSE), F	
33	3-662-248-00	BUTTON (EJECT), F	
34	3-662-252-00	STICKER (E), timer	
35	3-662-253-00	EMBLEM, SONY	
36	3-662-260-00	LABEL, input/output	
37	3-662-269-00	CLOTH, masking; switch	
38	3-662-292-21	CASE, upper	
39	3-662-293-00	PLATE, bottom	
40	3-662-321-00	LABEL, preset manual	
41	3-662-325-00	SCREW, tap	
42	3-662-339-00	RETAINER (3), spring	
43	3-662-340-00	PLATE (F), shield	
44	♦3-662-343-00	LABEL, model number	
45	3-701-690-00	LABEL, made in JAPAN	
46	3-701-940-01	LABEL, BEAB (UK model)	
47	3-703-035-11	SHAFT, LTD	
48	3-703-043-21	LABEL, caution main	
49	3-703-082-21	LABEL, caution	
50	3-831-441-XX	CLOTH (2), masking; upper case	
50-1	4-314-871-00	CUSHION	

CASSE

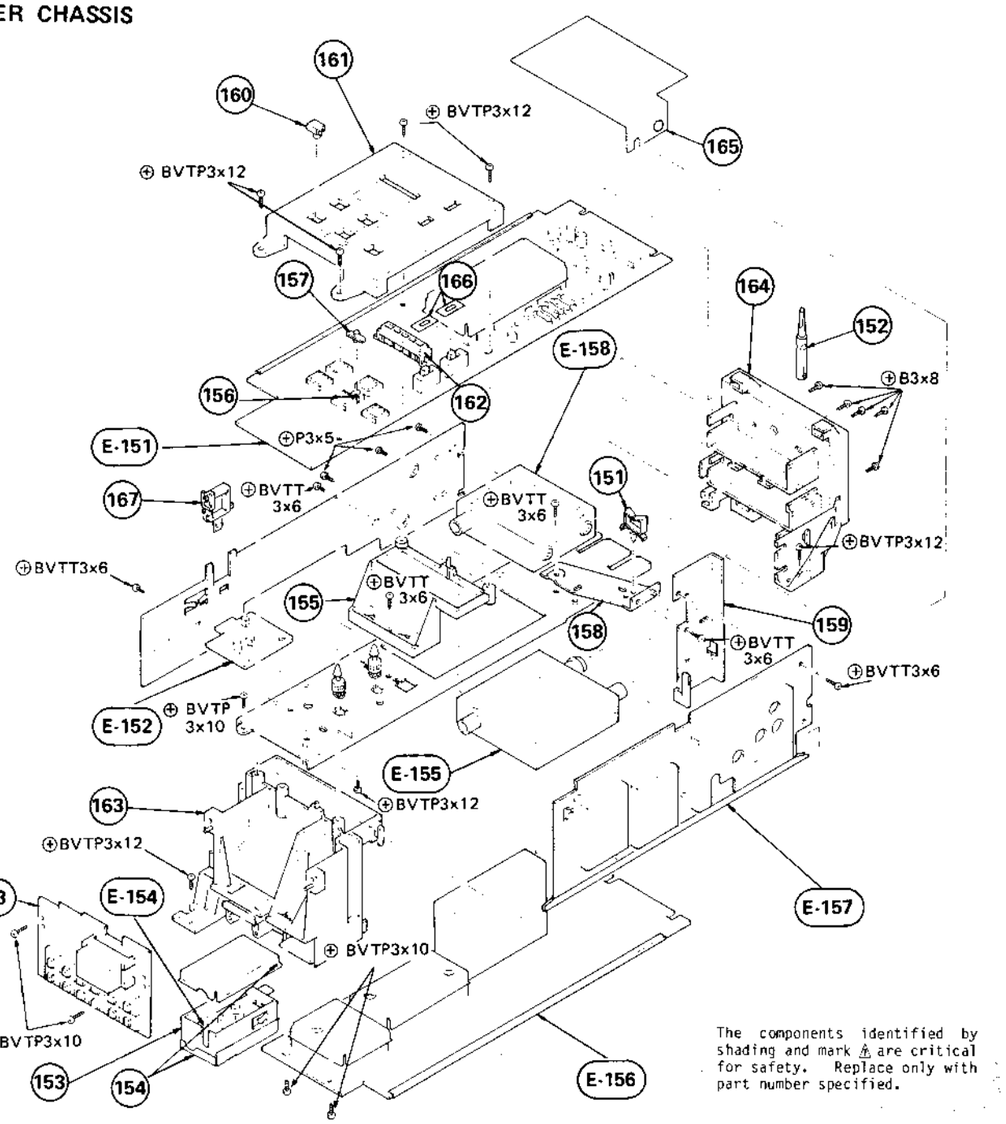
No.	Part
51	A-67
52	A-67
53	X-36
54	X-36
55	3-53
56	3-64
57	3-65

CASSETTE LIFT ASSEMBLY



No.	Part No.	Description	Remark
51	A-6751-061-A	CASSETTE-UP BLOCK ASS'Y	52, 55–57, 59, 63, 64
52	A-6751-079-A	DAMPER ASS'Y	
53	X-3658-101-0	EMBLEM ASS'Y (P)	
54	X-3662-221-0	LID ASS'Y, cassette-up	53, 65
55	3-534-274-XX	SPRING, tension	
56	3-642-490-00	SPRING, tension	
57	3-659-498-00	CUSHION, cassette holder	
58	3-659-531-00	SPRING	
59	3-659-579-00	LEVER, release lid lock	
60	3-659-583-00	PLATE, blind cassette	
61	3-659-585-00	STRIP, ornamental cassette	
62	3-659-598-21	GUIDE, cassette	
63	3-659-635-00	SPRING, tension	
64	3-659-636-00	SPRING, tension	
65	3-662-342-00	STICKER, C7UB	

TUNER CHASSIS

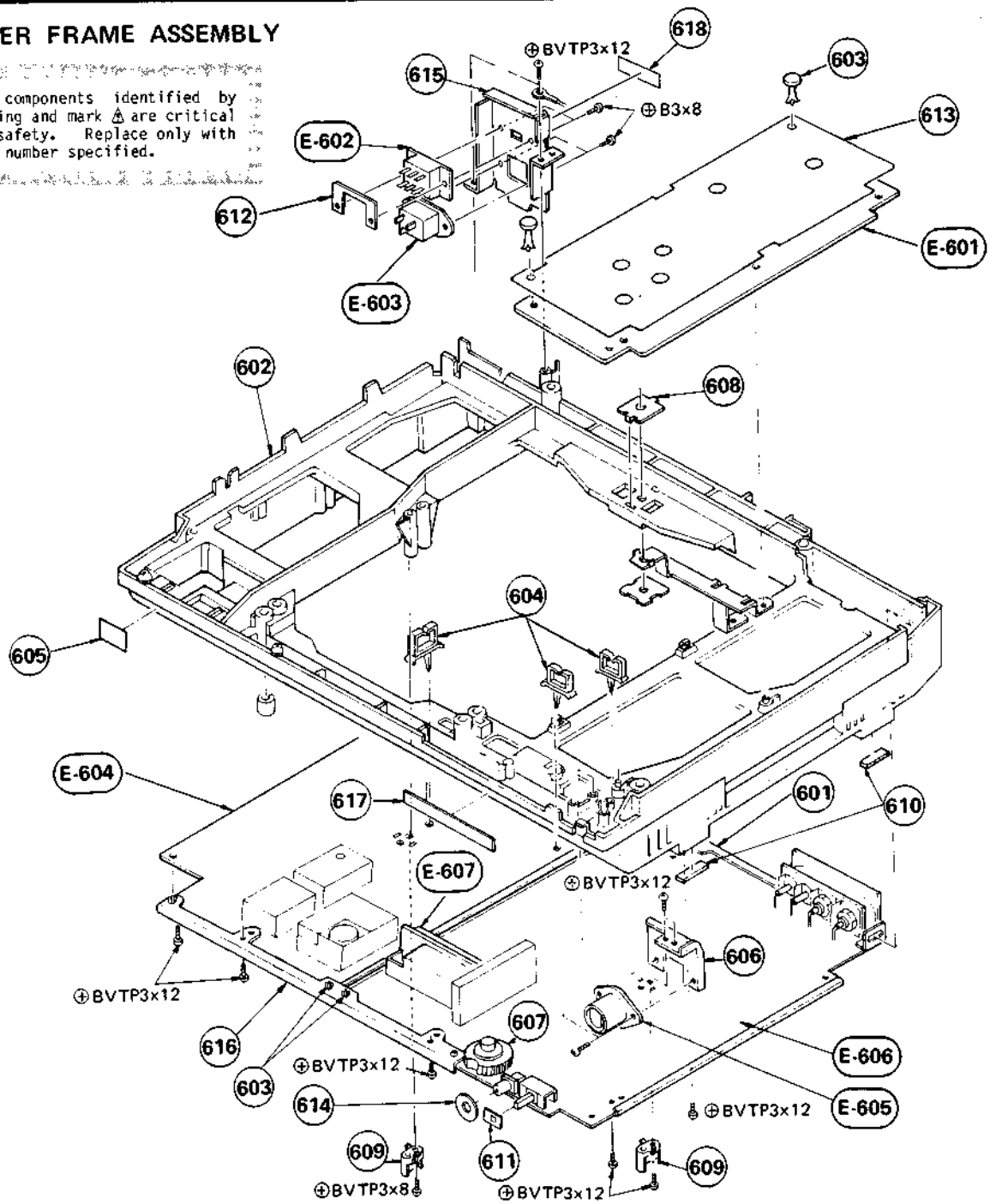


The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark
151	3-655-214-00	CLIP, cable	
152	3-656-301-00	SCREWDRIVER, control	
153	3-662-215-00	CASE, shield	
154	3-662-216-00	LID, shield case	
155	3-662-226-00	RETAINER, preset	
156	3-662-228-00	HOLDER (R-1), LED	
157	3-662-229-00	COVER, (L-1), lamp	
158	3-662-234-00	REINFORCEMENT, IF	
159	3-662-242-00	BRACKET, IF	
160	3-662-243-00	BUTTON, preset	
161	3-662-281-00	PLATE, ornamental; preset	
162	3-662-282-00	ESCUTCHEON, 5 gang LED	
163	3-662-288-00	CHASSIS (F), tuner	
164	3-662-289-00	CHASSIS (B), tuner	
165	3-662-324-00	PLATE, shield; TU	
166	3-831-441-XX	CLOTH, masking	
167	4-316-015-00	HOLDER, wire	
E-151	A-6725-154-A	CH-3 Board, complete	
E-152	1-601-835-00	PC-1 Board	
E-153	1-601-831-00	CI-1 Board	
E-154	1-601-834-00	IR-1 Board	
⚠ E-155	1-463-296-00	Antenna booster BT-971	
E-156	A-6721-037-A	TU-11 Board, complete	
E-157	A-6721-038-A	IF-10 Board, complete	
⚠ E-158	1-464-105-00	RF Modulator	

LOWER FRAME ASSEMBLY

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

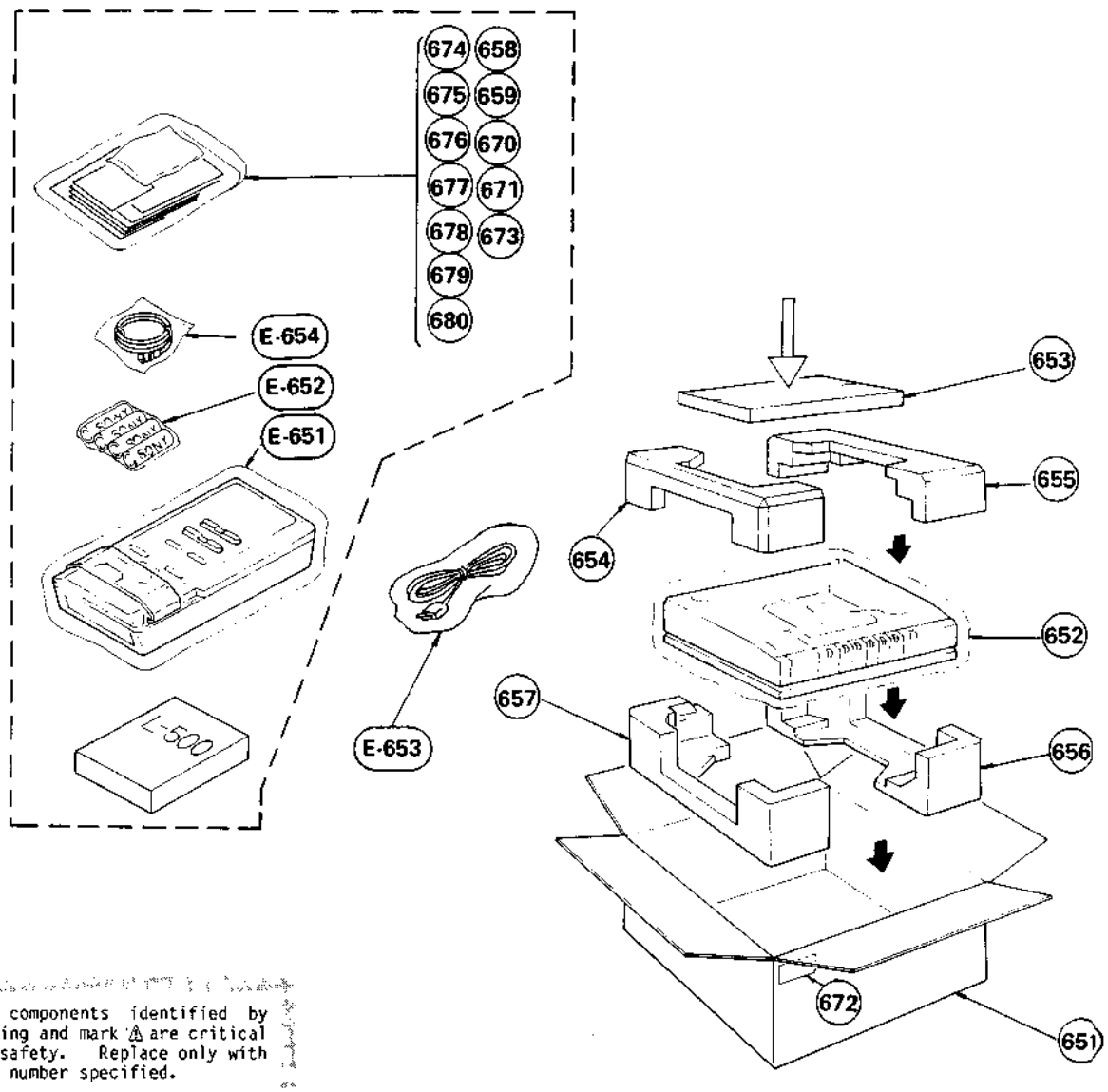


No.	Part No.	Description	Remark
601	X-3662-208-0	BRACKET (A) ASS'Y, chassis	
602	X-3662-211-0	FRAME ASS'Y, lower - - - - - - - 605, 617	
603	3-646-090-00	RIVET, nylon	
604	3-655-214-00	CLIP, cable	
605	3-656-344-00	LABEL, power switch	
606	3-659-522-00	BRACKET, camera connector	
607	3-659-528-00	KNOB, track control	
608	3-659-529-00	SPACER, plate	
609	3-659-530-00	BLOCK, support; bottom plate	
610	3-659-532-00	FELT, foot	
611	3-659-663-00	COVER, slide switch	
612	3-662-235-00	NUT, plate	
613	3-662-244-00	INSULATOR	
614	3-662-261-00	COVER, microphone jack	
615	3-662-273-00	PANEL (E), power	
616	3-662-279-00	BRACKET (B), chassis	
617	3-662-280-00	LABEL, input	
618	3-701-961-01	CAUTION (B), UK ground	
E-601	A-6711-217-A	CR-4 Board, complete	
⚠E-602	1-553-125-00	Slide, VOLTAGE SELECTOR	S9 505
⚠E-603	1-509-546-00	3P INLET	
E-604	A-6715-093-A	AS-3 Board, complete	
E-605	1-561-263-00	CONNECTOR, CAMERA	CN9501
E-606	A-6711-215-A	YC-6 Board, complete	
E-607	1-601-836-00	CB-1 Board	

A B C D

1 2 3

PACKING



The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark
651	X-3662-220-0	INDIVIDUAL CARTON ASS'Y	
652	3-656-390-00	BAG, protection	
653	3-662-327-00	CASE, accessory	
654	3-662-328-00	CUSHION, left upper	
655	3-662-329-00	CUSHION, right upper	
656	3-662-330-00	CUSHION, right lower	
657	3-662-331-00	CUSHION, left lower	

No.	Part No.	Description	Remark
658	3-701-630-00	BAG, polyethylene	
659	3-783-172-41	MANUAL, instruction	
670	3-794-605-11	MANUAL, instant information	
671	3-794-812-41	MANUAL, instant information	
E-651	A-6701-071-A	COMMANDER ASS'Y, remote	
E-652	1-528-027-11	BATTERY, long-life; SUM-3	
⚠ E-653	1-534-819-00	CORD, power (UK model)	
⚠ E-653	1-551-646-00	CORD, power (HK model)	
E-654	1-551-513-00	CABLE, coaxial ass'y	

SL-C7UB

SERVICE MANUAL

No. 2
July, 1981

SUPPLEMENT

SUBJECT: Addition of silver metallic color case

File this supplement with the service manual.

Part Name	Part No.	
	Dark Gray Color Case	Silver Metallic Color Case
PANEL ASS'Y, front	A-6703-062-A	A-6703-186-A
DOOR, front	3-659-589-21	3-659-589-63
CASE, upper	3-662-292-21	3-669-001-61
DOOR, preset	3-659-599-21	3-659-599-91
LID ASS'Y, cassette-up	X-3662-221-0	X-3662-255-0
EMBLEM ASS'Y (P) (X-3658-101-0)	3-703-471-00	3-703-471-00
COVER ASS'Y, counter	X-3662-205-0	X-3664-306-0
COMMANDER ASS'Y, remote	A-6701-071-A	A-6701-174-A
CASE (UPPER) ASS'Y	X-3662-213-0	X-3662-249-0
INDIVIDUAL CARTON ASS'Y (X-3662-226-0)	3-662-387-00	3-662-386-00

Note: Part Numbers of emblem ass'y (P) and individual carton ass'y of dark gray color case are changed as above.

VIDEOCASSETTE RECORDER

SONY®

SL-C7UB

Betamax
VIDEOCASSETTE RECORDER

No.1
October, 1980

SUPPLEMENT

Subject; CH-7 Board Change

This supplement includes production changes starting with Serial No. 235001 and later.

Note: HK model has been changed with Serial No. 202001 and later.

File this supplement with the service manual.

1. INTRODUCTION

The CH-7 board has been changed into the CH-16 board.

2. INTERCHANGEABILITY

The former and new circuit boards are interchangeable.

3. CHANGED PARTS LIST

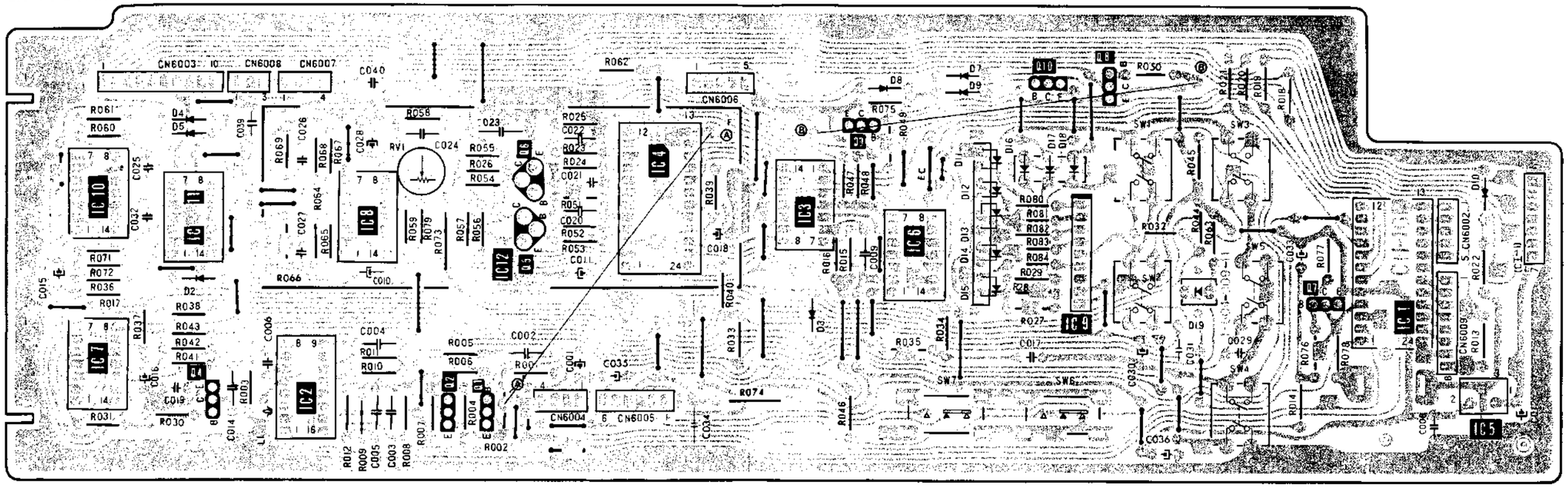
The CH-16 board parts list is shown on page 5.

SONY®
SERVICE MANUAL

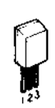
CH-16 (AUTO TUNING) PRINTED WIRING BOARD
– Ref. No. 6000 series –

Q, IC	IC10 IC7 IC11 4 IC2 IC8 2 IC12 6 5 1 IC4 IC3 9 IC6 10 IC9 8 7 IC1 IC5	Q, IC
D	4 5 2 3 8 7 9 11, 13, 12 14 15 16 17 18 19 10	D
ADJ	RV1	ADJ

CH-16 BOARD



µPC78L05A



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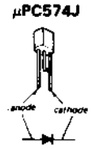

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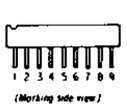
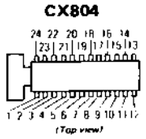


CX7915
CX804



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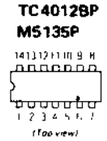
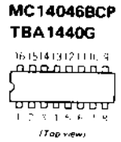
TC4011BP
TC4012BP
M5135P



MC14046BCP
TBA1440G



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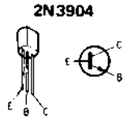

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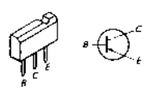
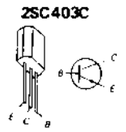
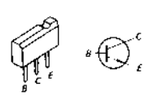


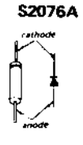
2SC403C



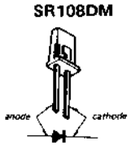
2SC2021



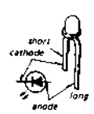
1S1555
S2076A



SR108DM

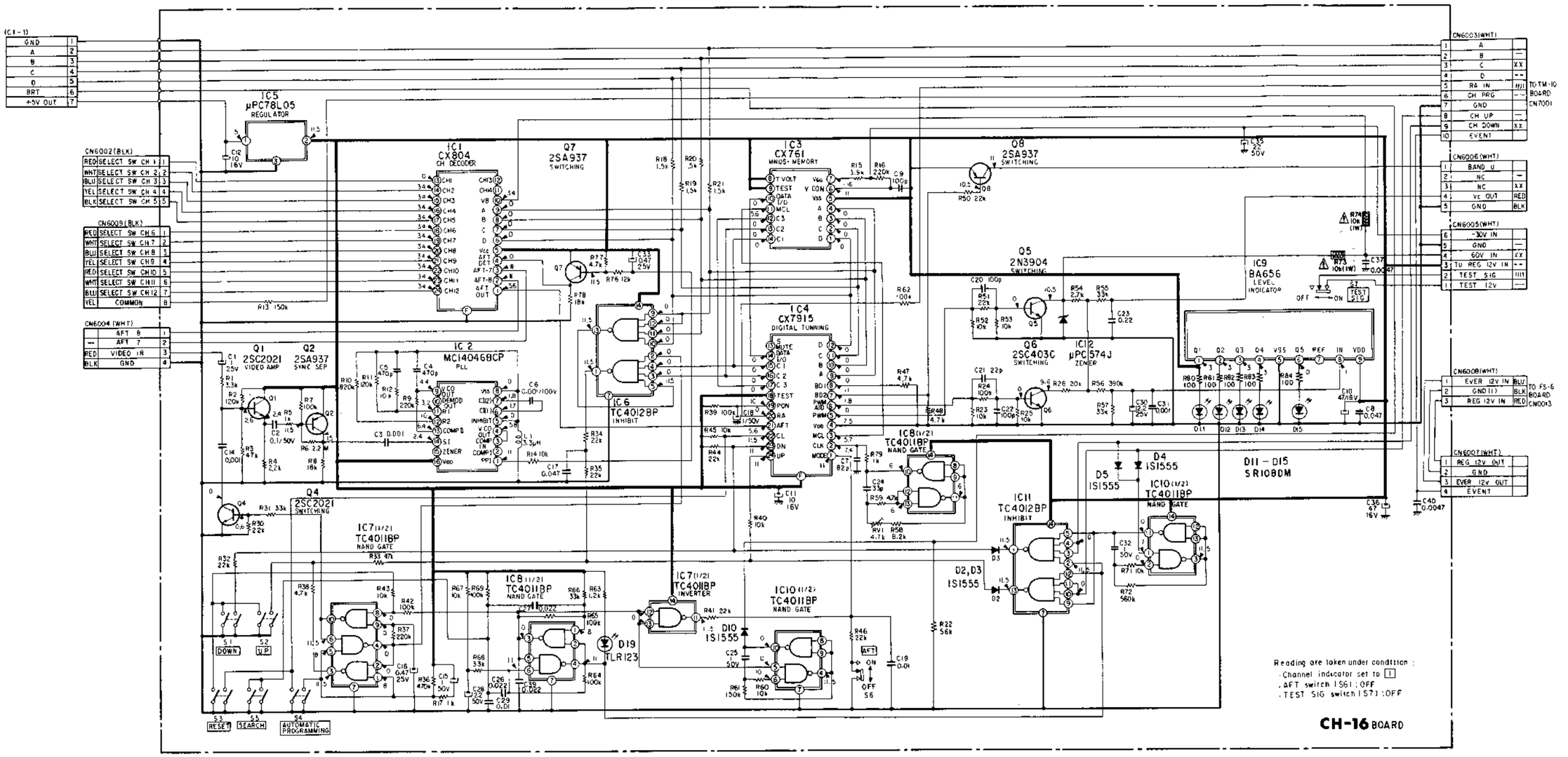


TLG123
TLR123
TLY123



CH-16 (AUTO TUNING) BOARD SCHEMATIC DIAGRAM

– Ref. No. 6000 series –



The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

CH-16 BOARD ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description		Remark
		CH-16 BOARD		
♦	A-6725-216-A	CH-16 Board, Complete		
C1	1-127-453-00	1	25V elect	
C2	1-108-251-00	0.1	mylar	
C3	1-161-323-00	0.001		
C4, 5	1-161-319-00	470p		
C6	1-108-365-00	0.001	100V mylar	
C7	1-102-974-00	82P		
C8	1-161-021-00	0.047		
C9	1-161-271-00	100p		
C10	1-123-319-00	47	16V elect	
C11, 12	1-123-316-00	10	16V elect	
C14	1-161-323-00	0.001		
C15	1-123-352-00	1	50V elect	
C16	1-127-451-00	0.47	25V elect	
C17	1-161-021-00	0.047		
C18	1-123-352-00	1	50V elect	
C19	1-161-013-00	0.01		
C20	1-161-271-00	100p		
C21	1-161-263-00	22p		
C22	1-161-271-00	100p		
C23	1-108-820-00	0.22	mylar	
C24	1-161-265-00	33p		
C25	1-123-228-00	1	50V elect	
C26, 27	1-161-223-00	0.022		
C28	1-123-353-00	2.2	50V elect	
C29	1-161-013-00	0.01		
C30	1-123-612-00	2.2	50V elect	
C31	1-161-323-00	0.001		
C32	1-123-228-00	1	50V elect	
C33	1-127-451-00	0.47	25V elect	
C34	1-108-653-00	0.0047	100V mylar	
C35	1-123-357-00	22	50V elect	
C36	1-123-319-00	47	16V elect	
C39	1-161-017-00	0.022		
C40	1-102-125-00	0.0047		
♦CN2	1-508-735-21	5p Connector		
♦CN3	1-508-736-00	10p Connector		
♦CN4	1-508-847-00	4p Connector		
♦CN5	1-508-848-00	6p Connector		
♦CN6	1-508-735-00	5p Connector		
♦CN7	1-508-847-00	4p Connector		
♦CN8	1-508-742-00	3p Connector		
♦CN9	1-508-849-00	8p Connector		
D2–5	8-719-815-55	1S1555		
D10	8-719-815-55	1S1555		
⇒D11–15	8-719-311-23	SEL1122P-N		
D19	8-719-812-31	TLR123		
IC1	8-758-040-00	CX804		
IC2	8-759-040-46	MC14046BCP		
IC3	8-757-610-00	CX761		
IC4	8-750-000-55	CX7915		
IC5	8-759-108-05	μPC78L05A		
IC6	8-759-240-12	TC4012BP		
IC7, 8	8-759-240-11	TC4011BP		
IC9	8-759-965-60	BA656		
IC10	8-759-240-11	TC4011BP		
IC11	8-759-240-12	TC4012BP		
IC12	8-759-157-40	μPC574J		
L1	1-407-184-xx	3.3μH		
Q1	8-729-902-11	2SC2021		
Q2	8-729-993-72	2SA937		
Q4	8-729-902-11	2SC2021		
Q5	8-729-139-04	2N3904		
Q6	8-724-375-01	2SC403C		
Q7, 8	8-729-993-72	2SA937		
R6	1-202-463-00	2.2M	1/4W composition	
⚠R73, 74	**1-213-155-00**	**10k**	**1W metal oxide (nonflammable)**	
RV1	1-224-251-XX	4.7k, adjustable		
S1–5	1-552-174-00	Pushbutton		
S6, 7	1-516-226-00	Slide		

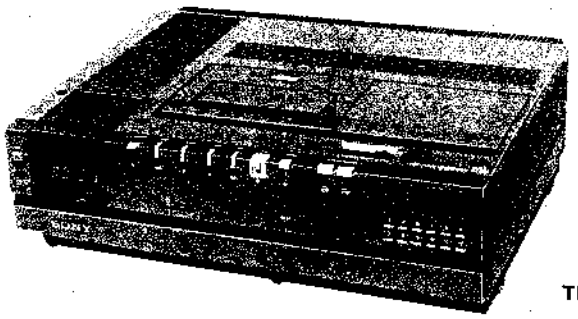
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- ⇒ : Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

SL-C7E

Betamax

VIDEOCASSETTE RECORDER



AEP Model
E Model

This Manual contains the Supplement No. 1 to No. 6.

SPECIFICATIONS

General

Video recording system:	Rotary two-head helical scanning
Video signal:	CCIR standards, PAL colour
Storage temperature:	−20°C to +65°C (−4°F to +149°F)
Operating temperature:	5°C to 40°C (41°F to 104°F)
Aerial:	75-ohm, asymmetrical aerial socket
Channel coverage:	VHF Western European Channels E2−12 UHF Western European Channels E21−68 (a total of up to 12 preselected channels)
RF output signal:	UHF channels E30 to E39 (variable) 75 ohms, unbalanced
Power requirements:	110−127V, 220−240V AC ± 10% (adjustable), 50/60 Hz
Power consumption:	45 W
Dimensions:	485 x 163 x 379 mm (w/h/d) (19 1/8 x 6 1/2 x 15 inches)
Weight:	15.5 kg (34 lb 3 oz)

Video

Input:	VIDEO IN: BNC connector 1.0 V (p-p) $^{+1.0}_{-0.5}$ V (p-p), 75 ohms unbalanced, sync negative
Output:	VIDEO OUT: BNC connector 1.0 V (p-p) ±0.1 V (p-p), 75 ohms unbalanced, sync negative
Horizontal resolution:	Colour: 260 lines B/W: 300 lines
Signal-to-noise ratio:	Colour: Better than 40 dB B/W: Better than 43 dB

Audio

Input:	AUDIO IN: Phono connector 47 kohms, −10 dBs. MIC: mini jack −60 dBs, suitable for microphone with 600-ohm impedance
Output:	AUDIO OUT:Phono connector Less than 10 kohms, −5 dBs (47 k ohm load), unbalanced
Frequency response:	50 Hz to 10 kHz
Signal-to-noise ratio:	Better than 40 dB
Audio distortion:	Less than 4% at 400 Hz

MICROFILM

Consumer VIDEO

Tape transport

Tape speed:	18.73 mm/sec.
Maximum recording time:	2 hours 10 min (with Sony L-500 cassette) 3 hours 15 min (with L-750)
Fast forward/rewind time:	Within 3 1/2 min. (L-500)
Timer:	Only for recording Electronic digital timer 24-hour-clock cycle 2 weeks 4 events

Accessories supplied

Remote Commander RMT-200
Betamax Videocassette tape L-500
AC mains lead
75-ohm coaxial cable

Remote commander

Remote control system:	Infrared control
Power requirements:	6 V dc Battery size AA x 4 (IEC battery designation R6)
Dimensions:	68 x 34 x 144 mm (w/h/d) (2 3/4 x 1 3/8 x 5 3/4 inches)
Weight:	220 g (8 oz) including batteries
Accessory supplied:	Battery size AA 4 pcs.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND ⚠ MARK ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

SONY®

SERVICE MANUAL

TABLE OF CONTENTS

SECTION 1
GENERAL

1-1. GENERAL

Video cassette recorder SL-C7E is the highest grade model with a logic control function for coping with the high speed picture search and the variable speed playback functions. The machine has many functions such as the 4 event/4 day timer, the remote commander, the automatic tuning system, and others. The features of the machine are as follows.

Main feature include:

Logic control system
The function buttons are feather light to touch. The operating mode may be changed without pressing the STOP button between modes. A tuned channel is not changed during record mode by misoperation.

Picture search operation
To locate a particular portion rapidly, the tape may be advanced or rewound at high speed while displaying the picture on the TV screen.

Variable playback speed
During playback, tape speed can be changed to any of these modes: still, frame-by-frame advance, slow-motion and triple-speed.

Timer recording
Recording may be started at any time on any of the next fourteen days and stopped after a predetermined interval. In addition, programming of up to 4 timer setting is possible.

Remote control
With the Sony Remote Commander RMT-200 (supplied), you can command the tape transport (still, frame-by-frame advance, slow-motion and triple-speed) and select previously preset channels up to 10 meters away from the recorder.

Auto programme search function
The APS switch facilitates locating the beginning of recorded programmes.

Camera recording
Camera recording can be made. The camera, equipped with the Sony K-type (14-pin) camera cable, can be connected directly to this recorder.
The power supply to the camera, and the video and audio inputs from the camera to the recorder are made through only one connecting cable.

Full auto rewind
At the end of the tape, the tape transport stops and the tape fully rewinds automatically.

Audio dubbing
Audio (commentary, music, etc.) may be added to a previously made video recording.

Automatic programming
Channel preset can be automatically set.

Timing phase pause
Elimination of picture disorder at the joint of the joint picture recording by the timing phase circuit.

1-2. BRIEF CIRCUIT DESCRIPTION

The major circuit boards of the SL-C7E and their functions are listed below.

YC-6 board	: Y & chroma signals record/playback processing circuit
NC-1 board	: Noise cancellar circuit of Y signal
CR-4 board	: Chroma process circuit during variable playback mode
RF-2 board	: Down-converted chroma signal and Y-FM signal record/playback processing circuit
SY-10, -11 boards	: Function key and logic control circuit
PL-2 board	: Solenoid drive circuit
IR-1 board	: Remote control receiver circuit
AS-3 board	: Audio signal record/playback circuit & servo circuit
SJ-1 board	: Servo control circuit during variable playback mode
TM-10, TM-12 board	: Programme timer circuit
TU-11 board	: Tuner & DC convertor circuit
IF-10 board	: VIF, SIF and AFT circuit
CH-3 board	: Auto tuning system circuit

Highly integrated circuits and modules are used in the machine. A microcomputer is employed in each of the system control receiver section and the timer section for centralizingand ensuring the complicated internal controls.

A switching mode regulator is employed in the power supply section for dealing with the fluctuation of the power supply voltage, increasing the conversion effect, and reducing the power consumption.

The ICs used and their functions in the various circuits are listed in the table below.

SY-11 board

μPD546C107	System control
μPD547C049	System control
BX342	Tape end detector

SY-10 board

μPD547C060	Remote control receiver decorder

AS-3 board

CX143A	Capstan servo
CX186	Drum servo
TA7120P	CTL signal & FG signal amplifier

YC-6 board

CX187	Y signal process
CX136A	Color signal process
CX150	Phase detect
CX145	Color sync
CX832	APC & AFC
M58478P	Servo reference counter
CX130	Video switch

RF-2 board

CX134A	RF playback amplifier, RF switcher & drop out compensator

NC-1 board

CX135	Video signal demodulator & limiter

CH-3 board

CX760	Digital tuning
CX761	Memory
μPC78L05A	5 V regulator
CX804	Channel decorder
MC14046BCP	PLL
BA656	Tuning voltage indicator

CT-1 board

SN29764N	Channel indicator

TM-10 board

MB8841-180	Timer control
μPA56C	Transistor array
M58478P	Reference counter

TM-11 board

μPC78L05A	5 V regulator

SR-08-2 board

TL494CN	Switching mode regulator

RM-1 board

M50112P	Remote control encoder

IF-10 board

TBA1440G	VIF, DET & AGC
TBA120U	SIF
M5135P	AFT

CR-4 board

TA7320BP	Chroma phase detect during variable playback mode
TC4528BP	MMV
TC4027BP	Flip-flop
CX150	Chroma phase arrange switch & burst gate
CX130	Chroma switch

[VIDEO CIRCUIT]

The video signal system circuitry is arranged with the circuits on the YC-6 board, RF-2 board, NC-1 board, and CR-4 board.

The circuit on the RF-2 board includes the record amplifier to supply the down-converted chroma signal and the luminance FM signal to the video head, the pre-amplifier to amplify the playback signal from the video head, the circuit to separate the playback signal into the playback Y signal and the chroma signal. The Y signal is fed to the limiter and the dropout compensation circuit and supplied to the YC-6 board. The chroma signal is fed to the low pass filter and supplied to the YC-6 board. (CX134A)

The YC-6 board, major board of the video system, has the input and output connectors and the input selector switch and includes the luminance signal circuit (CX187), the chroma system circuit (CX136A, CX832, CX150 & CX145), and the servo reference circuit (M58478P).

The input video signal is separated to the luminance signal and the chroma signal in the REC mode. The luminance signal is fed to AGC, the chroma signal is fed to ACC, and the two signals are mixed, becoming the E-E output. The luminance signal after the Y/C separation is emphasized in the non-linear emphasis circuit and fed to the FM modulator in the CX187.

The luminance FM signal is shifted by 1/2 fH for the crosstalk offset in order to remove the crosstalk in the comb filter circuit for the Y signal in playback. The chroma signal passed the ACC circuit after the Y/C separation is down-converted by the AFC idler signal (in the CX136A).

A false burst is inserted into the down-converted chroma signal for improving the S/N ratio of the APC in the record and the playback. The phase of the false burst locks to the one of the burst signal in the input signal and the point where the false burst is inserted is in the horizontal sync signal. The down-converted chroma signal and the FM-modulated luminance signal are fed to the RF-2 board where the signals are mixed and supplied to the video head.

In the PLAY mode, the signal from the video head is separated into the luminance signal and the chroma signal on the RF-2 board. The luminance signal is processed in the limiter and fed to the YC-6 board. The signal demodulated in the CX187 is fed to the 1 H delay line for the dropout compensation on the YC-6 board and supplied to the NC-1 board.

The signal from the YC-6 board is mixed with the demodulated signal in the CX135 on the NC-1 board and fed to the comb filter of the Y signal where the crosstalk in the Y signal is removed because of the 1/2 fH shift in the record mode. The signal passed the Y comb filter is corrected in the non-linear de-emphasis circuit and goes to the AGC circuit in the CX187. The chroma signal supplied to the YC-6 board from the RF-2 board is fed to the ACC circuit in the CX136A via the low pass filter. This down-converted PB chroma signal is converted to 4.43 MHz by the idler signal processed in the AFC and the APC circuits and mixed with the luminance signal passed the AGC circuit in the CX187 after the false burst inserted into the chroma signal is removed, becoming the output video signal.

The chroma signal in the VARIABLE PLAYBACK mode (TRIPLE SPEED, PAUSE, & PICTURE SEARCH) is processed on the CR-4 board. Sometimes the head goes across the recorded track and traces a different track in the VARIABLE PLAYBACK mode, making the color continuity, the character of the PAL system, discontinuous. The discontinuity is corrected on the CR-4 board. A noise is caused when the head goes across the track in the VARIABLE PLAYBACK mode and the vertical sync does not function on the TV receiver when the noise is superimposed on the vertical sync. Therefore a newly produced vertical sync is added. Since the S/N ratio of the color burst in the noise section is poor, a newly produced burst is also added.

System Control

The system control circuitry is on the SY-10, the SY-11 and the PL-2 boards.

The circuits on the SY-10 board is arranged with the input interface circuit of the function switch, the remote control decoder circuit and the end alarm circuit. The signal is converted to a key matrix signal when the function button is pressed, fed to the microcomputer on the SY-11 board, and converted to a continuous system control signal. A sample of the system control signal produced on the SY-11 board goes to the PL-2 board where it controls the solenoid. The other portion of the signal becomes the mode control signal supplied to the AS-3 board. The IR-1 board of the remote control receives the modulated infrared electromagnetic wave and the amplified signal goes to microcomputer μPD547C060 on the SY-10 board where it is decoded. The decoded signal goes to the SY-11 board and is converted to the system control signal in microcomputers μPD546C107 and μPD547C049.

Servo Circuit

1. **Drum servo circuit**
The drum servo circuit is located on the AS-3 board and the motor drive circuit on the LS-3 board. The drum is driven directly by the drum motor.
The rotation number of the drum is maintained to constant in the REC mode by the PG signal (25 Hz) obtained from the PG coil and the rotational phase is controlled to constant by comparing the phase of the PG signal with the one of the vertical sync signal (VD) separated from the video input signal.

2. **Capstan servo circuit**
The capstan servo circuit and the CTL record/playback amplifier, are on the AS-3 board and the motor drive circuit is on the LS-3 board.

The object of this circuit is;
1. To keep the tape speed stable.
2. To work as the tracking servo in the PLAY mode.
The speed servo is applied to the DC motor driving the capstan by the FG. At the same time the phase of the signal from the FG attached on the capstan flywheel is compared with the one of the vertical sync signal separated from the video input signal and the phase servo is applied to the motor for keeping the constant rotation speed of the capstan.
In the PLAY mode, the phase of the CTL signal reproduced from the tape is compared with the one of the 50 Hz reference signal obtained by counting down the 4.43 MHz (X'tal) on the YC-6 board for the tracking servo. The tracking servo makes the video heads trace the magnetic patterns on the tape correctly.

Various Playbacks

1. **Triple-speed playback circuit (x 3)**
The triple-speed playback circuit is on the AS-3 board. This circuit applies the speed servo to the capstan motor so that the motor rotates at a triple speed (about 3000rpm) of the one in the normal playback and compares the phase of the signal obtained by counting down the CTL signal (75 Hz in this case) to 1/3 with the one of the internal reference signal described previously for the phase servo. The phase servo makes the noise bands position at the top and bottom of the picture.

2. **Slow-motion, still, and frame-by-frame circuits**
These circuits are on the AS-3 and the SJ-1 boards. Since the tape speed is slow in these modes, the capstan motor is driven by the pulse drive method (to apply and cut off the voltage to the motor periodically) for stabilizing the tape speed.

- The time for applying voltage is varied by the slow VR for changing the tape speed in the SLOW-MOTION mode.

- The phase of the RF-SW pulse is compared with the one of the pulse which is obtained from the CR-4 board and indicates the positions of the noise bands in the STILL mode. When the pulses are out of phase, the tape is fed by the pulse drive method. When the pulses are in phase, the pulse drive is stopped so that the noise bands stay at the top and bottom of the picture.
The pulse to indicate the positions of the noise bands is generated on the CR-4 board whenever the color discontinuity is detected from the playback color singal by the video head when the video head goes across the recorded video track on the tape pattern. Consequently the position of the noise occupies at an optional point on the picture when the playback picture not having the color signal is made to be stationary.

- In the FRAME-BY-FRAME mode, the pulse drive is made forcibly for a certain time by pressing the automatic FRAME button so that the phases of the RF SW pulse and the pulse indicating the position of the noise band are varied, the same operation as the STILL is done until the phases lock, and the noise bands are stopped at the top and bottom of the picture.

3. **Picture search circuit**
The control of the rotation number of the drum in the PICTURE SEARCH mode is done on the AS-3 board. The number of the CTL pulses in the PICTURE SEARCH mode is larger than the one in the normal PB mode. The error voltage obtained by integrating the CTL pulse is added to the drum servo voltage so that the horizontal sync signal is controlled to be approx. 15.625 Hz even in the PICTURE SEARCH mode.

4. **Color signal process circuit in variable speed mode**
The color signal process circuit in the VARIABLE SPEED mode is on the CR-4 board. Sometimes the color condituity which is the characteristic of the PAL signal is lost when the video head goes across the video track recorded on the tape and plays back another video track. The discontinuity of the color signal is detected and immediately the correction is made for maintaining the color continuity.
The S/N ratio of the playback signal is poor around the noise bar and the burst signal which is the reference of the color signal is not in the playback signal.
If such a variable speed playback color signal is fed to the TV receiver, the color discrimination circuit malfunctions and no color appears on the picture. The playback burst signal is replaced by a new burst signal locked to the playback burst signal in order to produce the variable speed playback color signal on the CR-4 board. Thus the color picture can be viewed in the VARIABLE SPEED mode.

Audio Circuit

The audio circuit is on the AS-3 board. The erase oscillator and the bias circuits are also on the AS-3 board.

Tuner Block

The tuner block comprises the automatic tuning preset section, the channel select section, the IF section, the tuner AGC, the tuner section, the antenna booster, the mixer section, the RF modulator section, and the antenna terminal board.

1. **Tuner**
The VHF tuner and the UHF tuner are mounted on the TU-11 board.

2. **Automatic tuning preset section**
The control section of the automatic tuning, its memory and the decoder for introducing the channel signal fed from the channel select section are on the CH-3 board. The preset section is designed so that the channel set in the TIMER RECORD mode can be done by the channel data fed from the timer section.

3. **Channel select section**
   The channel select switch and the channel desplay section are on the CI-1 board. The channel desplay section comprises the display LEDs and the decoder IC to drive the LEDs.

4. **IF section**
   The IF section consisting of VIF, SIF and AFT is on the IF-10 board.

5. **Tuner AGC section**
   The tuner AGC control circuit is arranged on the IF-10 board. The VIF ciruit detects the level of the IF signal and converts it to a voltage, controlling the tuner gain.

6. **Antenna booster and mixer section**
   The BT-971 is constructed with the antenna booster and the mixer.
   The mixer section mixes the telecast signal entered the AERIAL IN terminal with the signal from the RF modulator out of the VTR and feeds the mixed signal to the receiver from the AERIAL OUT terminal. The booster section distributes the signal came in the AERIAL IN terminal to the signal fed to the tuner in the VTR and to the signal fed to the receiver directly through the mixer and involves the amplifier to correct the signal loss due to the signal distribution and the signal loss due to the mixer.

Timer Circuit

The timer ciruit is arranged by the circuits on the TM-10, -11 and -12 boards. 4 programs for 14 days can be placed into the memory of this timer and the memory once placed is maintained by the incorporated battery for the compensation of the power interruption unless the power interruption more than 10 minutes occurs. The timer as a normal clock employs the crystal lock system to use the 60 Hz signal obtained by counting down the signal oscillated in a crystal oscillator and the clock can work without regarding the frequency fluctuation of the input power supply.

Power Supply Block

The power supply block is constructed by power unit SR-08. The SR-08 comprises two blocks, one is the main power supply block employing the switching mode regulator system and the other is the ever power supply employing the series regulator system.

The main power supply supplies the power to all the sections except the timer and the booster and can follow the input voltage variation from 110V up to 240V.

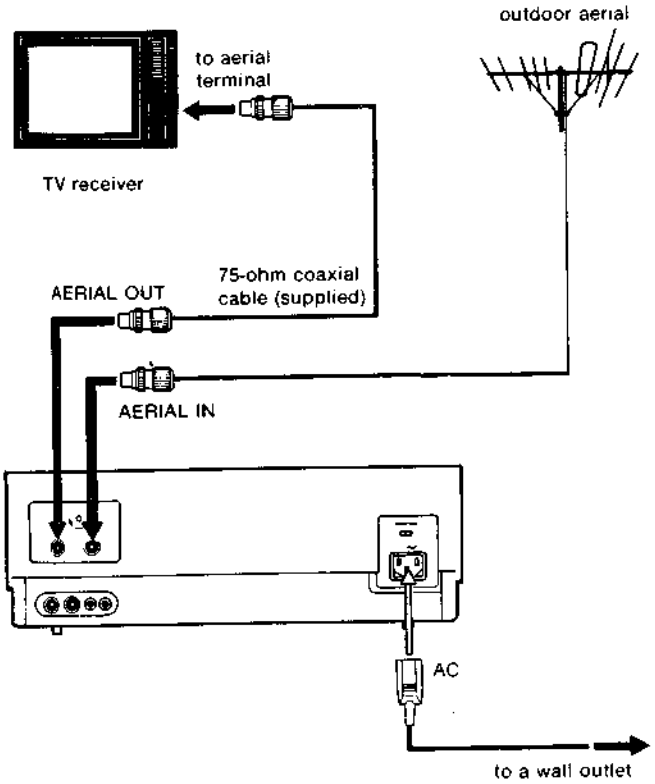
The ever power supply always works unless the main power switch is turned off and supplies the power to the timer and the antenna booster. The external voltage selector for 110–127V and 220V–240V switches only the ever power supply.

1-3. CONNECTIONS

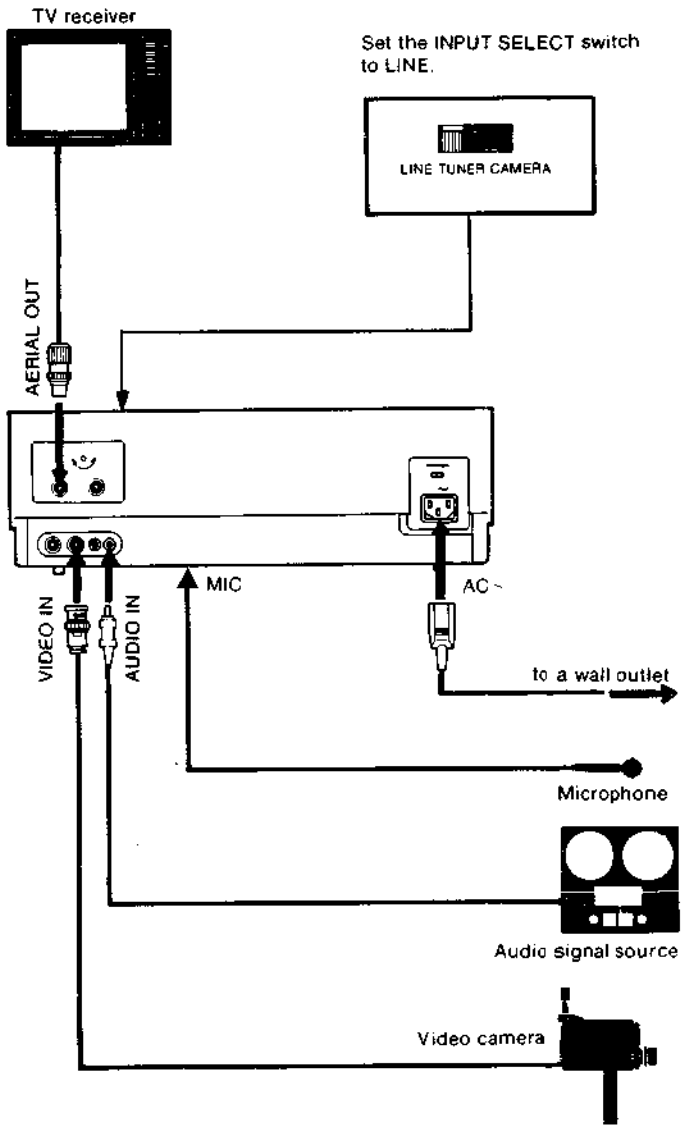
1-3-1. Aerial Connection

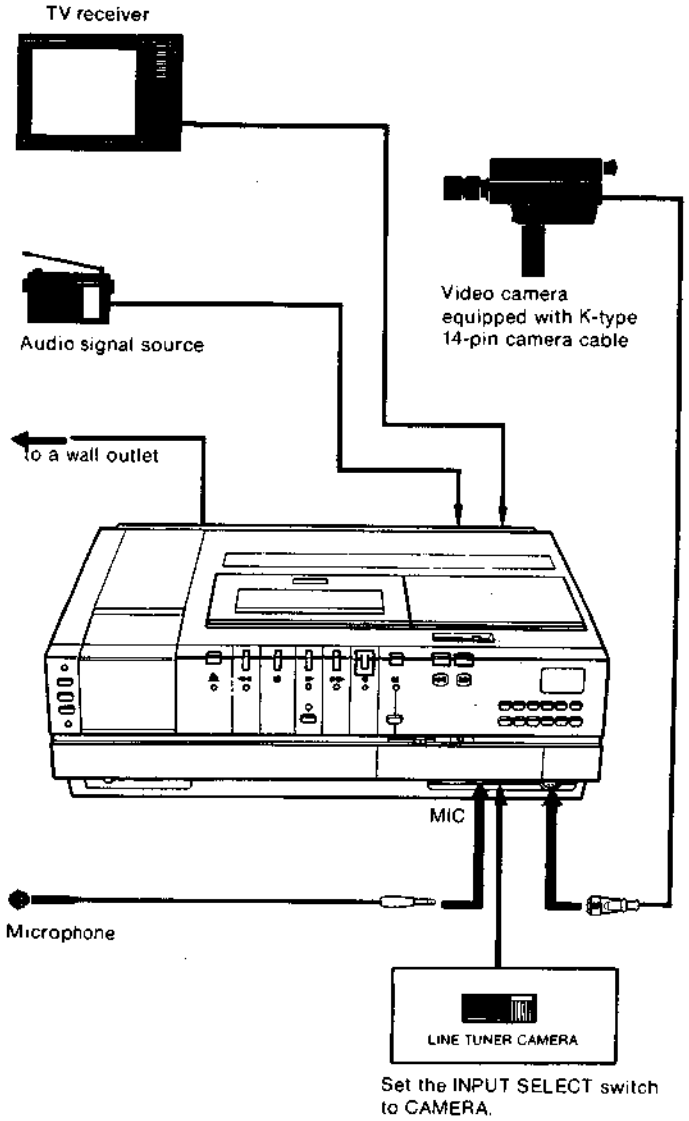
This recorder is equipped with a standard aerial connecting socket. Use a coaxial aerial connecting cable equipped with a single plug and insert the plug into the AERIAL IN connector on the recorder. Make the connection between AERIAL OUT connector on this recorder and the aerial socket on the TV receiver with the 75-ohm coaxial cable supplied.

- Either a telecast TV signal or an output signal from the built-in RF unit is obtained from the AERIAL OUT connector.

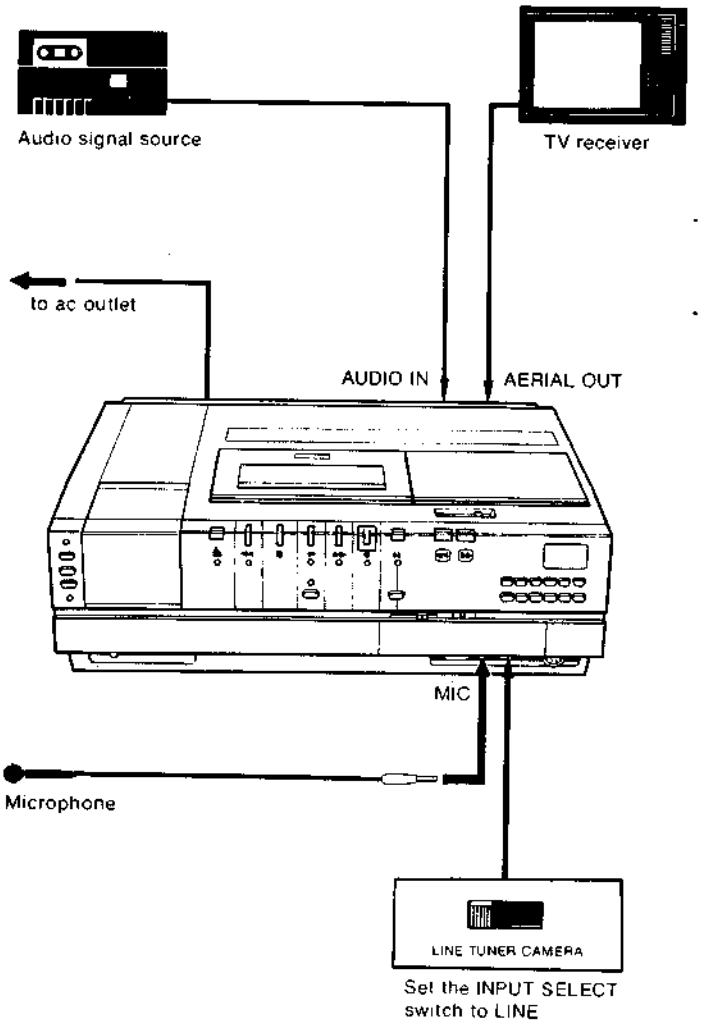


1-3-2. Camera Recording





1-3-3. Audio Dubbing



Notes

- Cameras must conform to CCIR TV standards.
- When a camera is equipped with Sony K-type (14-pin) camera cable (for example HVM-100CE), connect the camera to the CAMERA connector. In this case, set the INPUT SELECT switch to CAMERA.
  When a camera is connected to the VIDEO IN connector using a BNC-type connector, set the INPUT SELECT switch to LINE.
- In camera recording, connect a microphone to the MIC connector, or connect a tape recorder or a record player to the AUDIO IN connector.
- The MIC connector has priority over the AUDIO IN connector. Any input to the AUDIO IN connector is automatically disconnected whenever a microphone is plugged into the MIC connector.
- TV volume should be turned down to prevent acoustic feedback (whistle-like sounds).

1-4. OPERATION

1-4-1. Operating Voltage

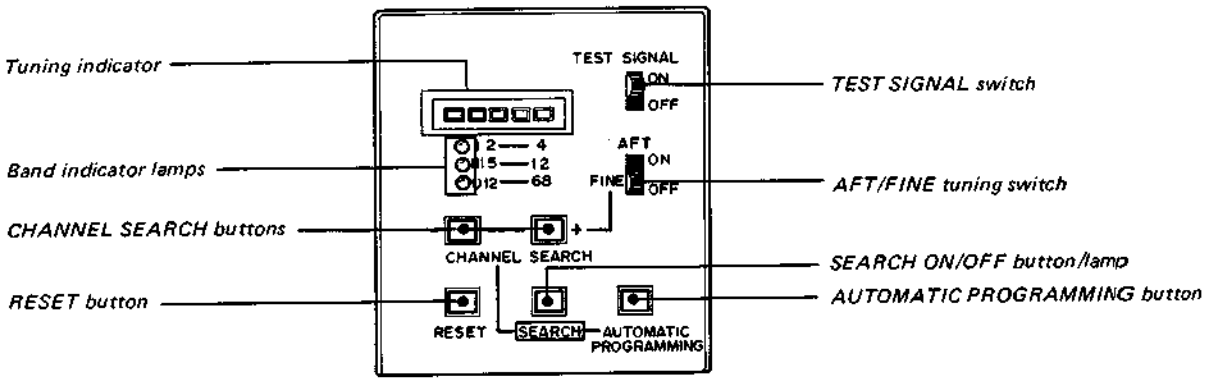
This machine operates on 110V – 127V or 220V – 240V. Before connecting the unit to the power source, check that the voltage selector setting is correct for your power supply. (The voltage selector is located on the rear panel.)

Reset the selector if your local mains supply is not same as that of the recorder.

1-4-2. Channel presetting

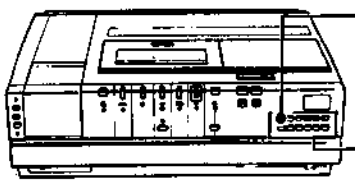
You can preset automatically all the channels in numerical sequence at one time or, if you wish, preset the channels one by one.

Location of control



1. To preset all the receivable VHF and UHF channels

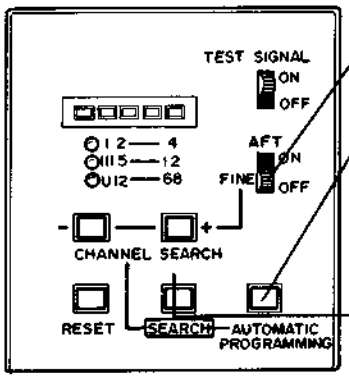
With the automatic programme search system, receivable channels in your area can be preset to the channel select buttons in numerical sequence; from the channel with the lowest frequency to the channel with the highest.



① Press channel select button "1". "1" will appear in the channel indicator.
• If the number "1" does not appear, check that the INPUT SELECT switch at the front panel is set to TUNER.

⑤ Check the picture quality of the preset channels by pressing the channel select buttons on the recorder.
If there are channels which do not provide satisfactory reception and you wish to erase the memories of these channels and rearrange the sequence of channels, proceed as indicated in "Ⓑ To preset the channels one by one".

Open the lid to expose the presetting controls.



⑥ Set the AFT switch to ON.

③ Press the AUTOMATIC PROGRAMMING button. Automatic programming will begin. The channel with the lowest frequency will be memorized on the channel select button "1". This tuning and memorizing procedure will be repeated in sequence until no more channels can be found.

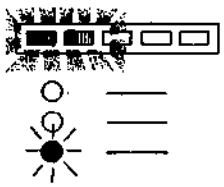
② Press the SEARCH ON/OFF button. The corresponding lamp will light. The channel number display in the channel indicator will blink indicating that the recorder is in search mode.

④ When the automatic channel presetting is completed, press the SEARCH ON/OFF switch to release the channel search mode (OFF). The lamp will go off.

2. To preset the channels one by one

To arrange the channels one by one in the sequence you want, proceed as follows:

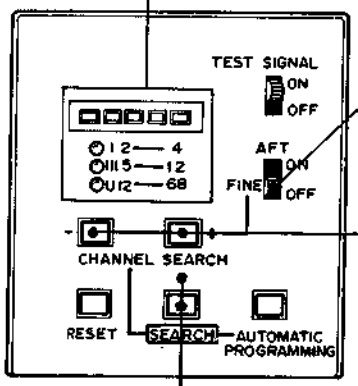
Ex. UHF channel 41



Tuning Indicator and Band Indicator Lamps

The red lamp when lit shows you are in the band including VHF channels 2 through 4, the yellow lamp when lit shows you are in the band including VHF channels 5 through 12, and the green lamp when lit shows you are in the band including UHF channels 21 through 68.

Within each of these bands, the multi-segment Tuning Indicator will show in what portion of the band you are tuned to at any given moment, with the left-most segment indicating the lowest frequency within each band, and the right-most segment indicating the highest frequency within each band.



① Press the channel select button to be preset.
The number corresponding to the selected button will light in the channel indicator.

⑦ Set the AFT switch to ON.

③ Press CHANNEL SEARCH [−] button for locating a lower frequency channel, or the CHANNEL SEARCH [+] button for locating a higher frequency channel (Do not hold the button in, just press it for a moment). The automatic channel search will begin and will stop when the first station is received.
• Allow one or two minutes for the picture to stabilize.

④ Referring to the picture displayed on the TV screen, repeat step ③ until the desired station is received.
Use the tuning indicator and band indicators as guides.
• If the automatic search will not activate when the CHANNEL SEARCH [−] or [+] button is pressed, press the opposite [+] or [−] button.

⑤ Repeat steps ①, ③ and ④ until every TV station you want has been preset on the recorder.

② Press the SEARCH ON/OFF button (ON). The lamp will light to indicate that the recorder is in the search mode. The channel number display in the channel indicator will blink.

⑥ Press the SEARCH ON/OFF button again. The lamp will go off.
• The channel display on the channel indicator will stop blinking.

RESET button

This button is used to erase the memory on a depressed channel select button.

During remote control operation, the buttons whose memories are erased will be skipped (see page 1-15).

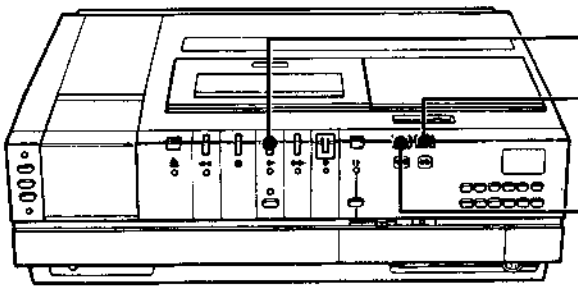
To erase the memory:

① Press the channel select button to be skipped.
② Press the SEARCH ON/OFF button (ON).
③ Press the RESET button.
④ Repeat steps ① and ③ until on all remaining channels the memories are erased.
⑤ Press the SEARCH ON/OFF button again (OFF).

1-4-3. Variable Speed Playback

During playback, it is possible to view a still, slow-motion, triple-speed or high-speed picture.

PICTURE SEARCH (high-speed picture)



① Press the PLAY button.

② Press the ▶▶ button.
While pressing this button, the high-speed playback picture in the forward direction can be seen.

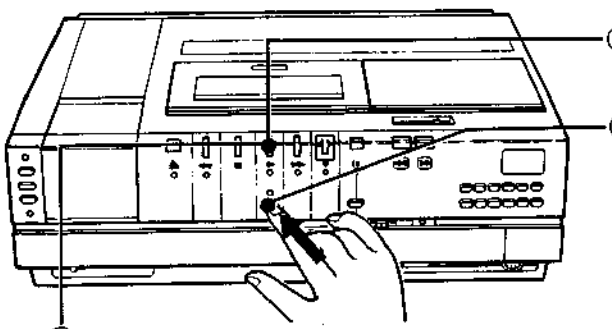
② Press ◀◀ button. While pressing this button, the high-speed playback picture in the reverse direction can be seen.

③ When the ▶▶ or the ◀◀ button is released, the tape returns to its normal playback speed.

Notes

- Streaks appear on the playback picture, but this is normal and not a problem.
- If the picture flows vertically, adjust the vertical hold control on the TV.
- During picture search, the sound is disconnected.
- The recorder may stop if the high-speed search function is used repeatedly over a period of short time.

TRIPLE SPEED PLAYBACK



① Press the PLAY button.

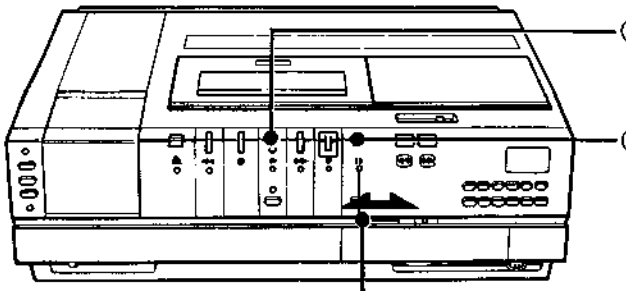
② Press the X3 button. The playback picture can be seen at three times the normal speed.

③ To return to normal speed, press the PLAY button again.

Notes

- If streks appear on the triple-speed playback picture, adjust the TRACKAING control. When triple-speed playback is finished, return the control to the centre detent position.
- During triple-speed playback, the sound is disconnected.

STILL PICTURE AND SLOW-MOTION PICTURE



① Press the PLAY button.

② Press ❚❚ button.
Picture motion will stop.
• Make sure that the STILL/SLOW lever is set to its far left (STILL) position.

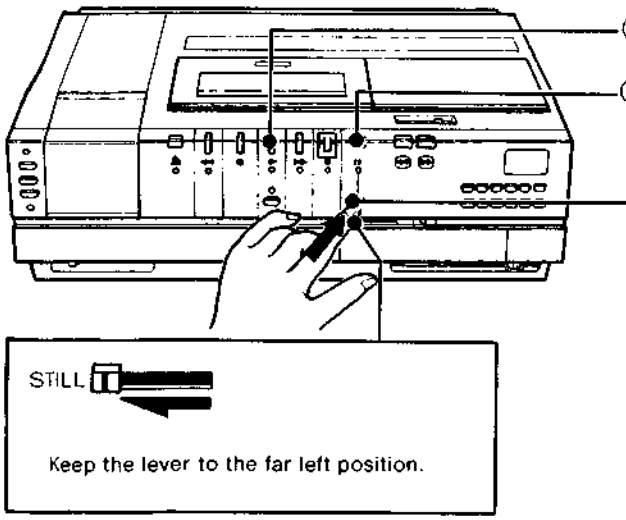
③ For a slow-motion picture, slide the lever to the right.
The far right position gives half normal speed.

Streaks and double images will appear during this operation, but this is normal and not a problem.

Notes

- After more than 8 minutes in the pause mode of operation, the pause mode will be automatically released and the previous playback mode will be resume.
- During slow-motion picture operation, the sound is disconnected.

FRAME-BY-FRAME PICTURE



Keep the lever to the far left position.

① Press the PLAY button.

② Press ❚❚ button. Picture motion will stop.

Press the FRAME button. A frame-by-frame advance of the tape is possible by pressing this button.
Pressing this button for a moment will advance the picture one frame.
Keeping this button pressed will continuously advance picture a frame every 2 seconds.

1-4-4. Full Auto Rewind

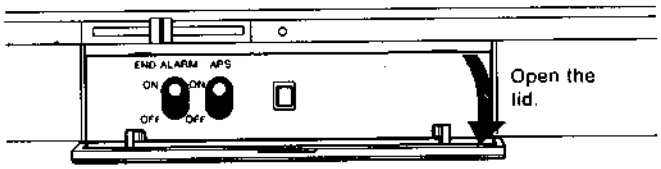
When the tape reaches its end, it will stop automatically and the REC, PLAY or FF lamp will go out. The END ALARM will sound for 10 seconds if the END ALARM switch is set to ON. Then, the REW lamp will light and the tape will automatically rewind to the beginning and stop.

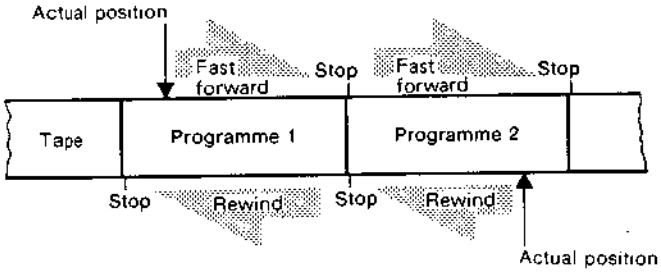
1-4-5. APS (Automatic Programme Search)

Use the APS switch to locate a beginning of the programmes on a recorded tape.

Each time the REC button is pressed, a cue signal is recorded on the tape. During the fast forward or rewind modes, if this switch is set to ON, the recorder will detect the nearest cue signal and will stop. Thus the starting point of a recorded programme may be easily found.

If another programme on the tape must be relocated beyond the position where the tape has stopped, press the FF or REW button again.





Notes

- This mechanism functions when a tape recorded on a machine with an APS function is used.
- In order for the APS function to operate, the tape must travel a certain distance.
- When this function is not required, set this switch to OFF.

1-4-6. Tape Counter And MEMORY Switch

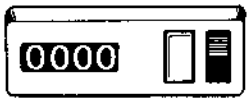
For later reference in playback, reset the Tape COUNTER to "0000" before starting a recording.

The MEMORY switch is used for precise programme relocation of a recorded tape.

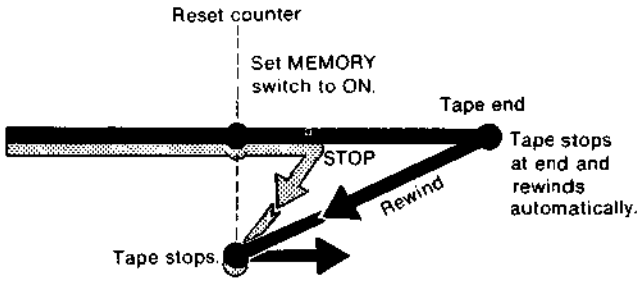
1 Locate any desired starting point on the tape and reset the Tape COUNTER to "0000" at this point.
2 Set the MEMORY switch to ON.
3 Play or record a tape.
4 Press the STOP button.
5 Press the REW button.

The tape will rewind and stop automatically at a point near the tape COUNTER reading "9999" (one count before "0000" in order to avoid missing the starting point).

- To rewind the tape further than "0000", press the REW button again.



COUNTER MEMORY

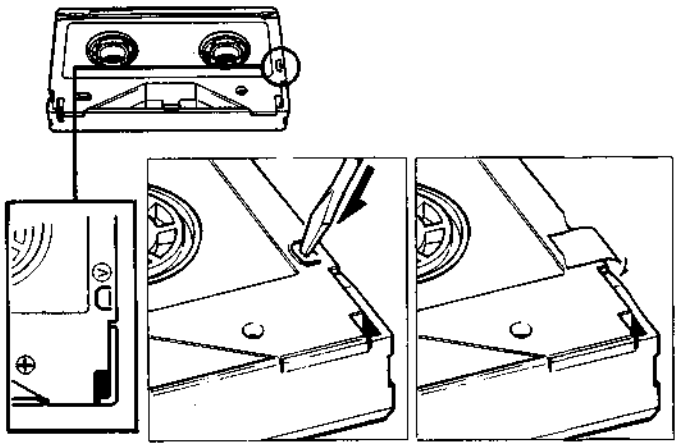


Notes

- When this function is not required, set this switch to OFF.
- If the machine stops before reaching the counter reading "0000", check that the APS switch is set to OFF.

1-4-7. Videocassette Safety Tab

To protect a recording from accidental erasure, break off the tab on the bottom of the videocassette using a screwdriver or similar. With the tab removed, the record mode does not function. If you wish to record on a cassette with the tab removed, simply cover the hole with a piece of cellophane or vinyl tape.

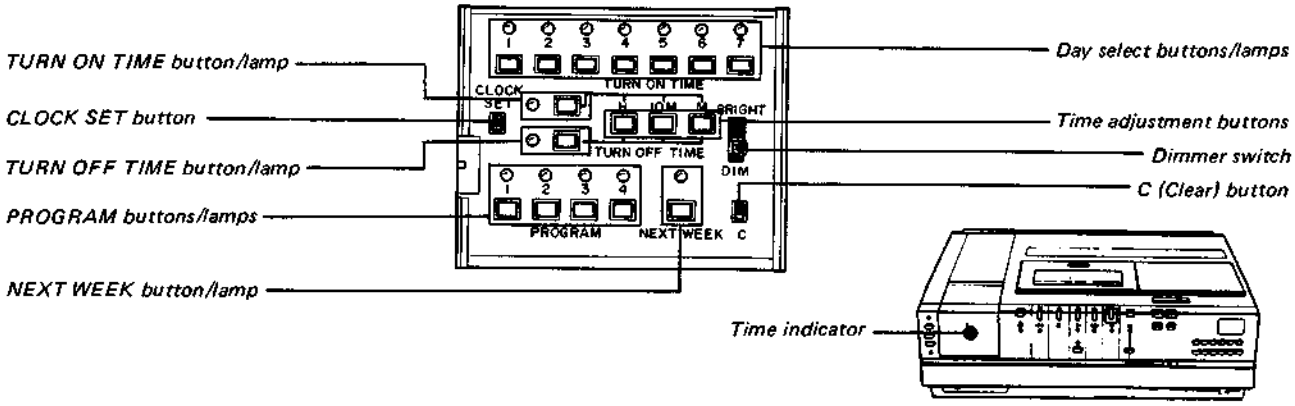


1-4-8. Tracking Adjustment

In the unlikely event that streaks or snow appear in the playback of tapes made on other recorders or in the triple speed playback picture, turn the TRACKING control in either direction until the best picture is obtained. Allow a second or two for the new settings to take effect. When playback of this particular tape is finished, return the TRACKING control to its center detent position.

1-4-9. Timer Operation

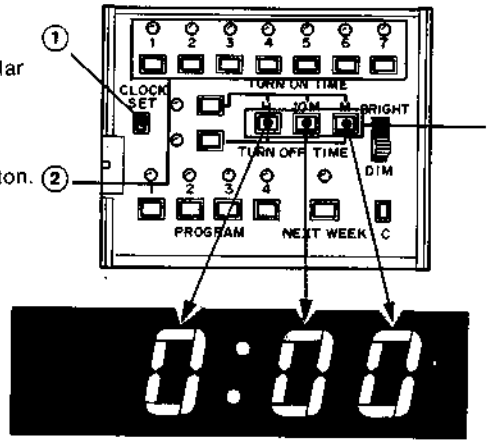
1. LOCATION OF CONTROLS



2. CLOCK TIME ADJUSTMENT

Hold the CLOCK SET button depressed with the tip of a pen or similar through step ③.

Press the appropriate day select button. ② The corresponding lamp will light. For details, refer to "DAY ADJUSTMENT".



Press the H button for hour digits. At first keep the button depressed to advance the digits rapidly and then press and release immediately to advance the digits one by one as the desired hour indication is approached. Press the 10 MIN and MIN buttons in the same manner.

④ Release the CLOCK SET button at a time signal from a broadcast or telephone. The clock is now set to maintain the correct time.

Notes

- Whenever the CLOCK SET button is depressed, the clock is set back to 0 second of the current minute and the clock begins to operate again only after the button is released. Therefore, do not press the button unnecessarily as the clock will lose time.
- When the CLOCK SET button is released, the upper dot blinks, and after 30 seconds, the upper dot stops blinking and the lower dot blinks .

Dimmer switch

This switch selects the brightness of the timer indicator. It may be set to BRIGHT during daylight hours and to DIM at night.

If the dots blink

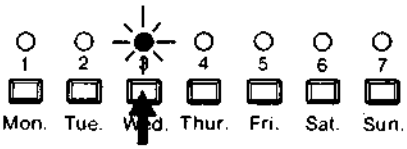
If the dots between the hour and minutes blink quickly, the time and the timer setting must be reset.

The dots will blink quickly in any of these three conditions:

- The recorder's POWER switch is first turned on.
- Before a power interruption, power has been supplied to the recorder for less than 24 hours. (If power is supplied to the recorder for more than 24 hours before a power interruption, an internal selfcharging battery will be charged and hold the clock and timer settings for about 10 minutes.)
- Power has been interrupted for more than 10 minutes.

DAY ADJUSTMENT

The day select buttons – numbered 1 to 7 – should be arranged from left to right in order. Determine by yourself which day corresponds button "1". Suppose today is Wednesday and that you decide that day select button "1" should represent Monday. When setting the clock time, press the button numbered "3" while keeping the CLOCK SET button depressed. The corresponding lamp will light.



When setting the day the timer is to trigger a recording, press the button which corresponds to the day the recording is to be made, while keeping the PROGRAM button depressed.

At first all the lamps light indicating that the setting is for everyday. When one of the day select buttons is pressed, the lamp corresponding to the button will remain lit and all the other will go out.

To change back the setting to everyday, press the same button again.

The setting must be either for one day or for everyday.

NEXT WEEK button

When the day the timer should trigger a recording is a week later than that day in the present week, press this button.

3. TURN-ON/OFF TIME AND DAY SETTINGS FOR TIMER RECORDING

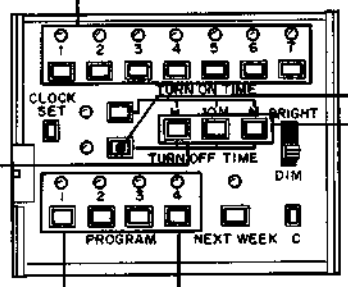
Before proceeding with this setting, set the clock time and day correctly.

Press the TIMER button. ①

Select the day(s) the timer is to trigger a recording. (See "DAY ADJUSTMENT".) Press the NEXT WEEK button, if necessary. ③

Set the time the recording is to be made with the H, 10 MIN and MIN buttons. (In the same manner as the clock time was set.) ④

Press the PROGRAM button to be set and hold it depressed through step ⑦. ②



⑤ Press the TURN OFF TIME button. The lamp will light.

⑥ Set the turn-off time with the H, 10 MIN and MIN buttons.
• If the turn-off time is not set (-:- -). the recording will continue until the tape runs out. The tape will be rewound to the beginning and then stop. The recorder will shut off after 30 seconds.

⑦ Press the appropriate channel select button. The selected channel will be displayed on the channel indicator.

⑧ Release the PROGRAM button when the timer setting is finished. The corresponding lamp lights.

Note: When the TIMER button is pressed, the EJECT button cannot operate. To insert a video-cassett, press the ON button and then the EJECT button.

C (Clear) button

If this button is pressed while a PROGRAM button is being held down, the memory of that button will be cleared or reset as follows.

Button	Result
Turn-on day	everyday
Turn-on time	–:–– (indicating there is no timer setting)
Turn-off time	–:––
Channel indicator	1
NEXT WEEK	no next week setting

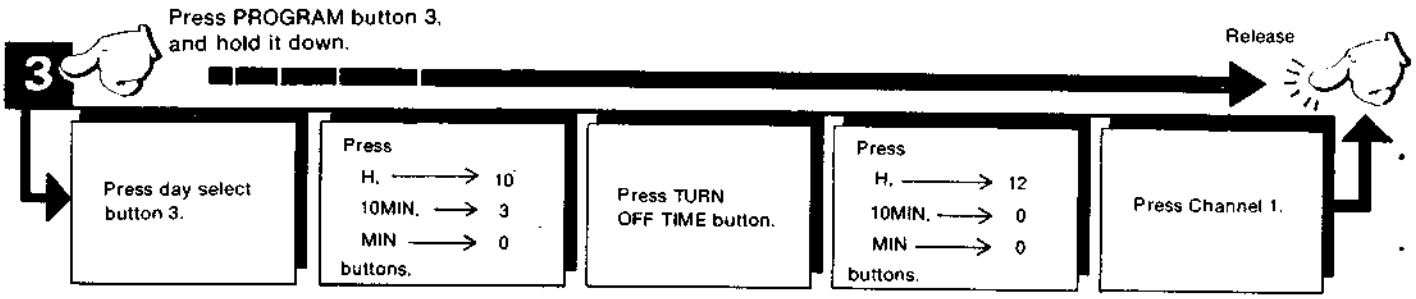
To check the timer setting

To check the timer setting, press the PROGRAM button to be checked. To confirm the turn-on time and day(s), press the PROGRAM button. To check the turn-off time, press the TURN OFF TIME button while keeping the PROGRAM button depressed. The channel number is displayed in the channel indicator.

4. PROGRAMMING EXAMPLES

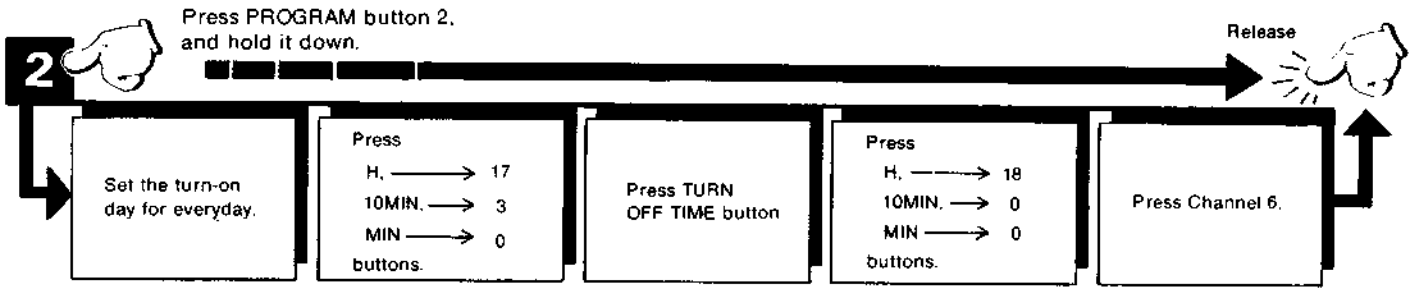
In the following examples, day select button "1" is Monday.

(1) To programme Wednesday at 10:30 to 12:00, channel 1, on PROGRAM button "3"



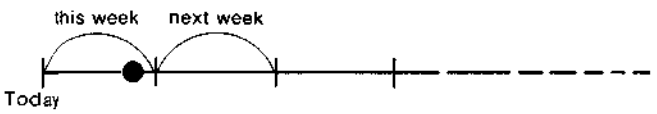
- The timer will trigger a recording every Wednesday at 10:30 to 12:00 if the programming is made on PROGRAM button "1". PROGRAM button "1" is the only button that can trigger a recording on **every subsequent** week.

(2) Programming everyday at 17:30 to 18:00, Channel 6, on the PROGRAM button "2"

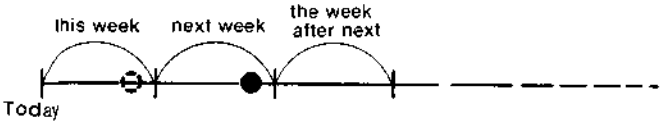


To sum up the programming procedure:

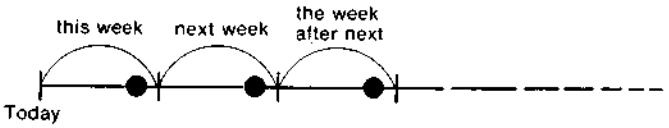
1) **Setting for everyday** can be made on any PROGRAM buttons, as in our previous example (2) .
   In this case, the NEXT WEEK button is ineffective.
2) **Setting for one day** can be made on PROGRAM button 2, 3 and 4. Any settings (day(s), time, channel) will be cleared from the memory after the recording is finished. As in our previous example (1) .



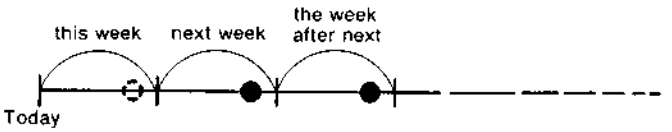
If the NEXT WEEK button is pressed, the turn-on day will be one week later than that day in the present week.



3) **Setting for one day, beginning with this week, and continually each week** should be made on PROGRAM button 1.



If the NEXT WEEK button is pressed, the recording will start and stop on the day set a week later than that day in the present week, turn on and off on that day at that time every week after that.



Once the setting is finished on each PROGRAM button, and the TIMER button is depressed, the lamp associated with the PROGRAM button will light. If the lamps blink, the time and day settings on two PROGRAM buttons overlap.

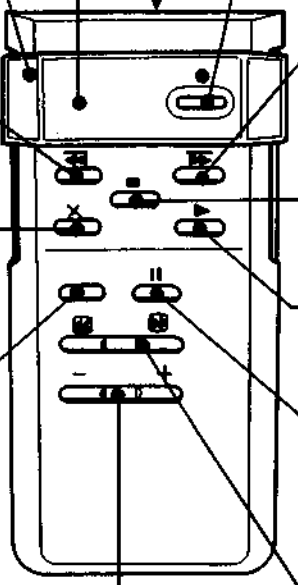
For example: PROGRAM button 1 on Wednesday 8:30 to 9:30
PROGRAM button 2 everyday 8:45 to 9:00

If this happens, reset the timer settings.

1-4-10. Remote Control Operation

FUNCTION OF BUTTONS ON THE REMOTE COMMANDER

The function of the controls on the remote commander is same as on the recorder.



Indicator
This lamp blinks when the remote commander is operating. If the lamp does not light when any of the function buttons are pressed, the batteries must be replaced.

Transmitter
Point towards the remote control detector on the recorder.

Sliding cover
During playback, slide this cover over the record button to prevent accidental recording. During recording, slide this cover down to prevent accidental interruption of recording.

Record button [●]
Press to start recording.

Fast-forward button [▶▶]
Press to advance the tape rapidly.

Rewind button [◀◀]
Press to rewind the tape.

Stop button [■]
Press to stop the tape transport.

X3 button
During playback, press to advance the tape three times faster than normal.

Playback button [▶]
Press to play back the tape.

FRAME button
For frame-by-frame advance of the tape.
During playback, press ❙❙ button and then the FRAME button.

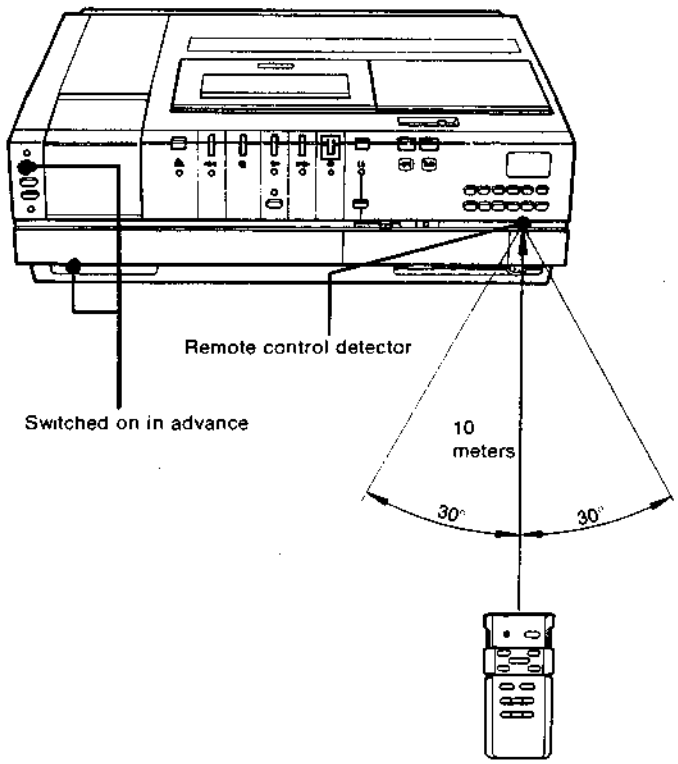
Pause button [❙❙]
Press to stop the tape for a moment. The pause mode will be released after about 8 minutes

Programme search button [PROGR.]
For selection of the channels. For lower numbered channels, press the [−] side. For higher numbered channels, press [+] side.
Pressing and immediately releasing this button will make a one channel advance.
Keeping this button pressed will advance the channels until the button is released.
Channels, on which the memories are erased in process of the manual channel presetting (see page 43), are skipped.
• During recording, the channel cannot be changed. To change the channel, press the Pause button [❙❙] and then search a desired channel.

Picture search button [◀◀ ▶▶]
For high-speed playback in forward direction, press ▶▶ side. For high-speed playback in reverse direction, press ◀◀ side.

OPERATION WITH THE REMOTE COMMANDER

Once the POWER button and ON button have been pressed, you can remotely control the recorder with this commander up to 10 meters away from the recorder and within the range illustrated below.

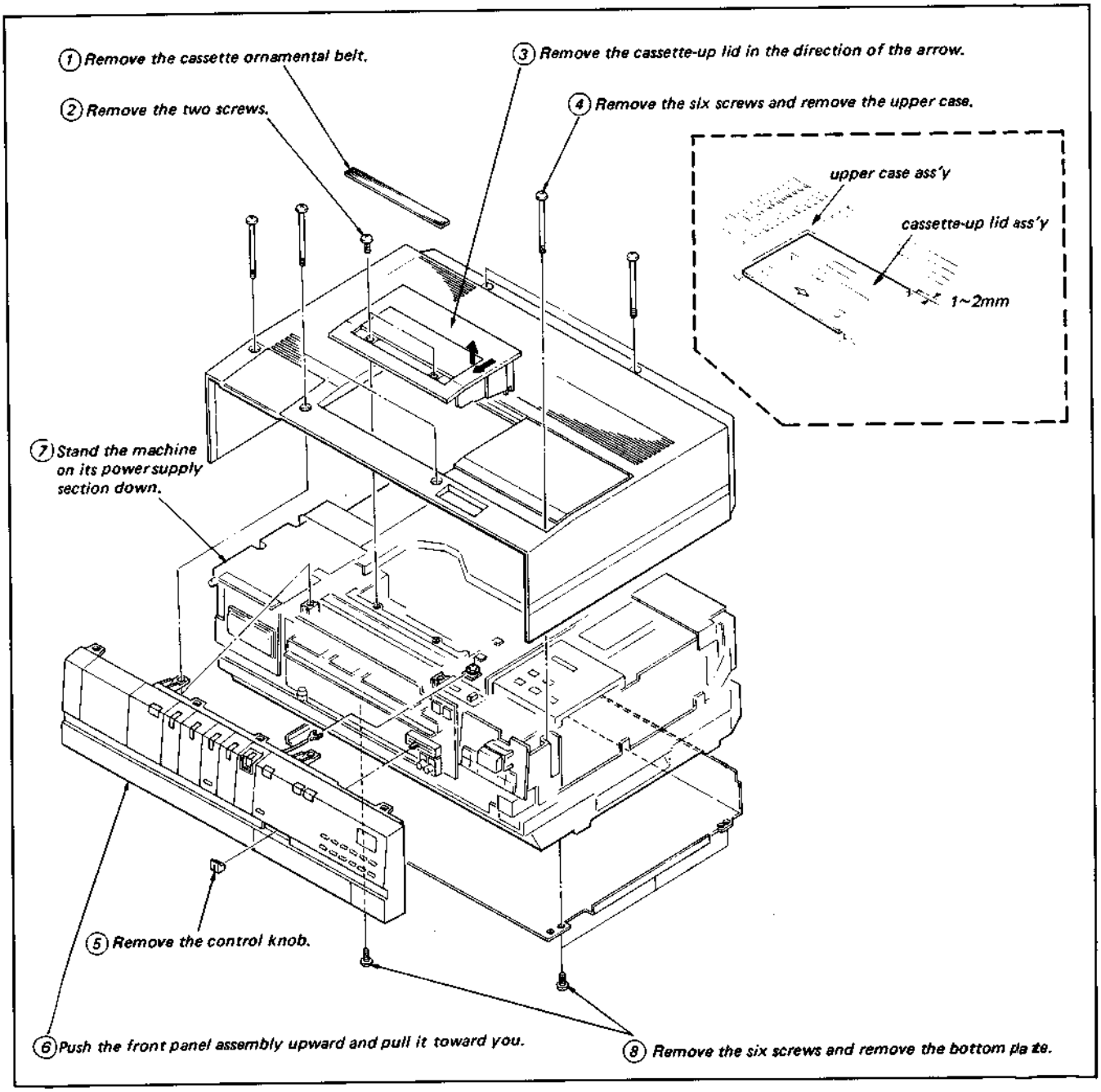


Notes on the remote commander

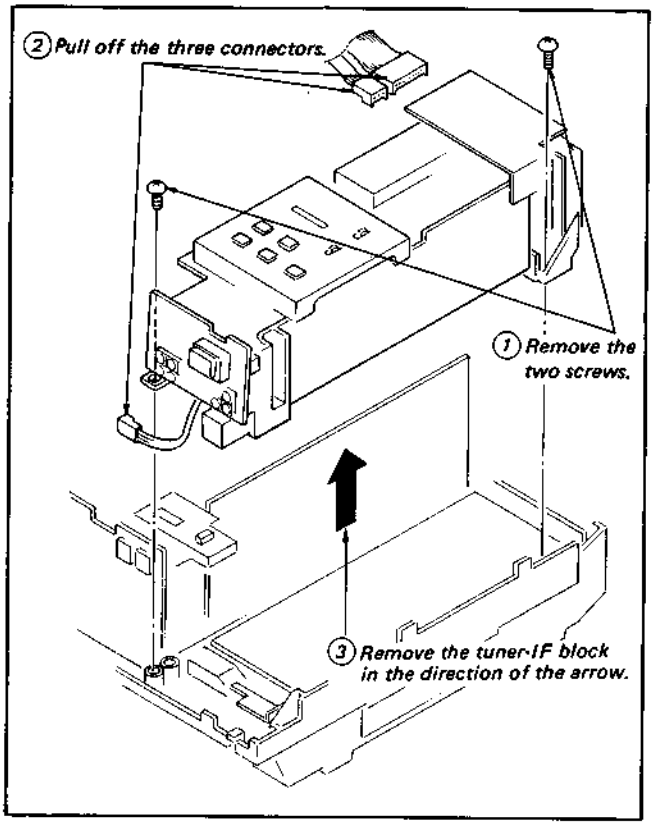
- Keep the commander away from extremely hot or humid places.
- Avoid dropping any foreign objects into the commander cabinet, particularly when replacing batteries.
- To avoid a malfunction, do not simultaneously depress two or more buttons.

1-5. DISASSEMBLY

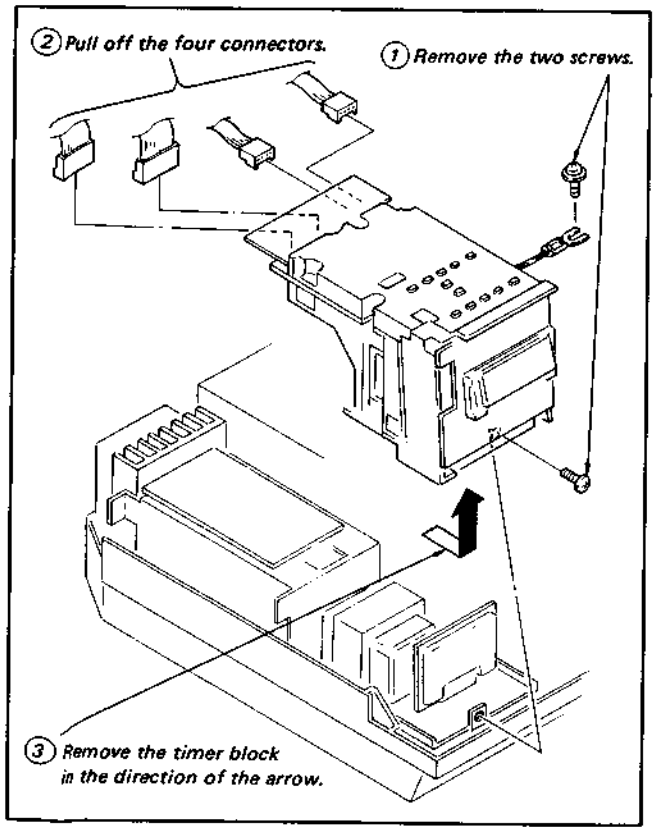
1-5-1. Cabinet Removal



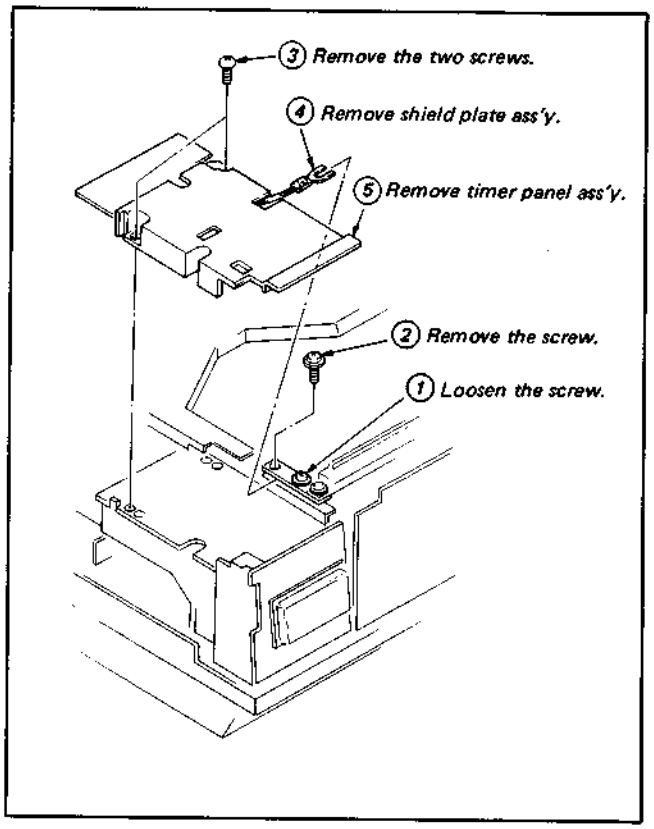
1-5-2. Tuner-I.F. Block Removal



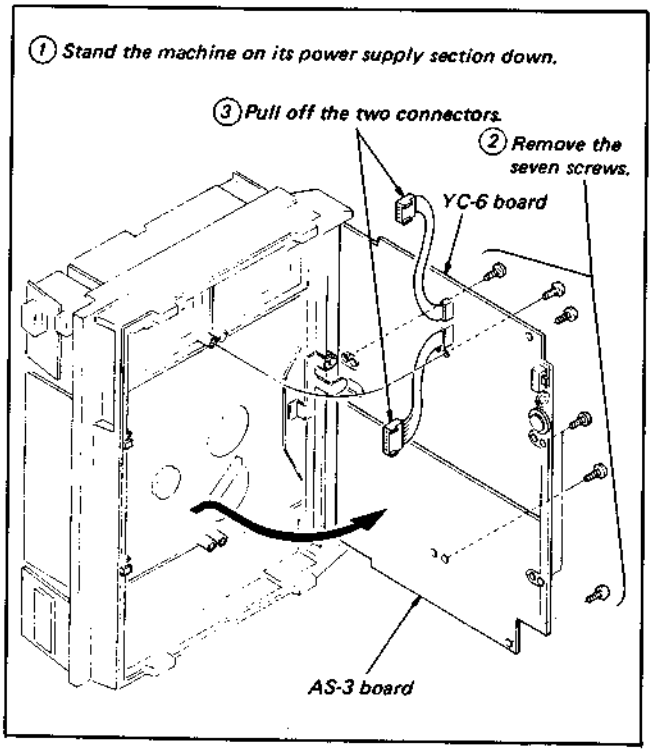
1-5-3. Timer Block Removal



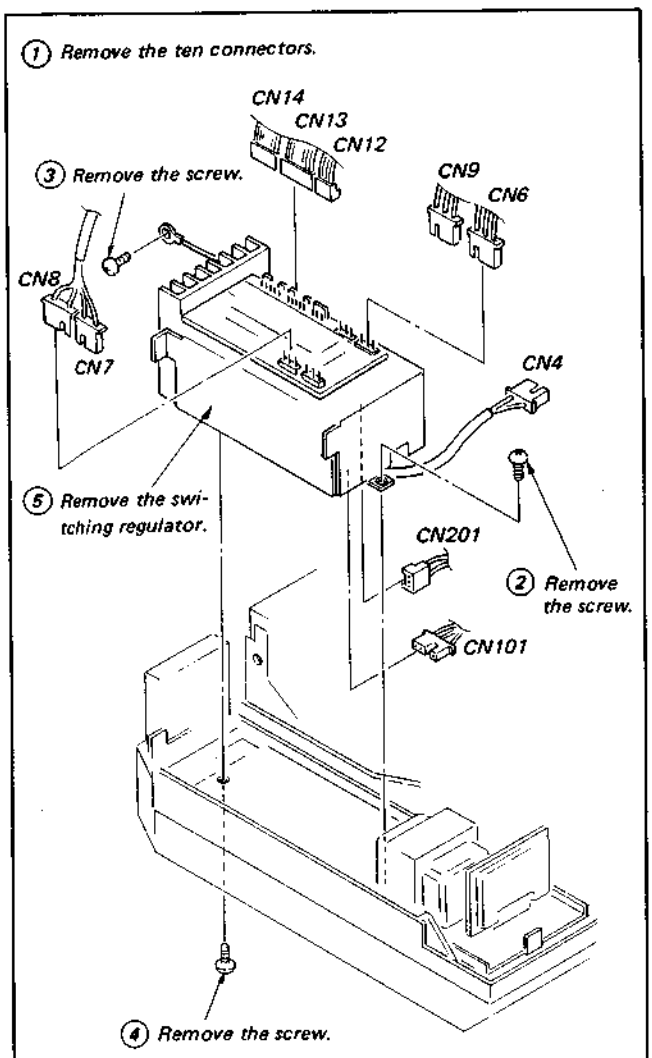
1-5-4. Timer Panel Removal



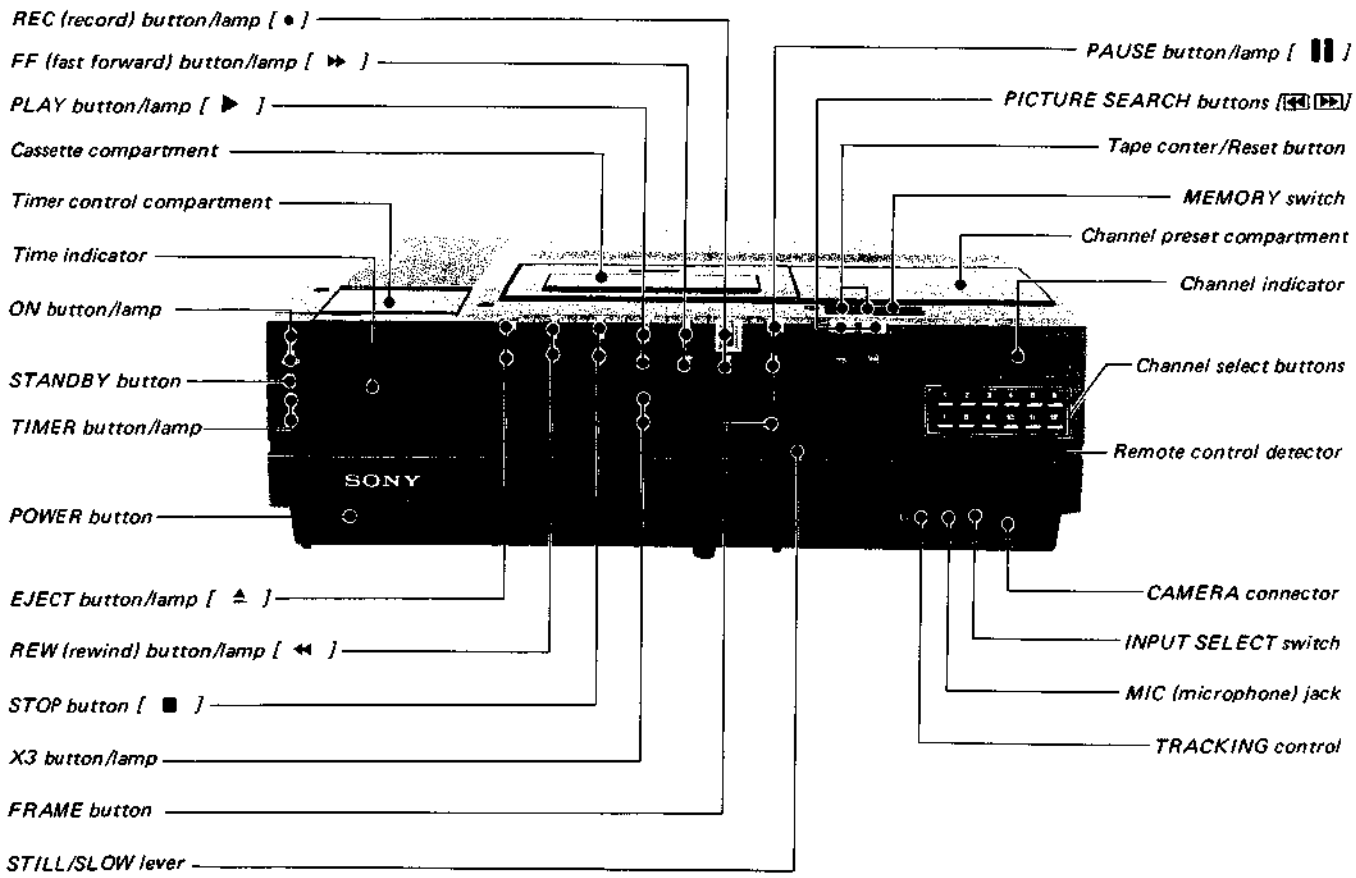
1-5-5. Checks of AS-3 and YC-6 Boards

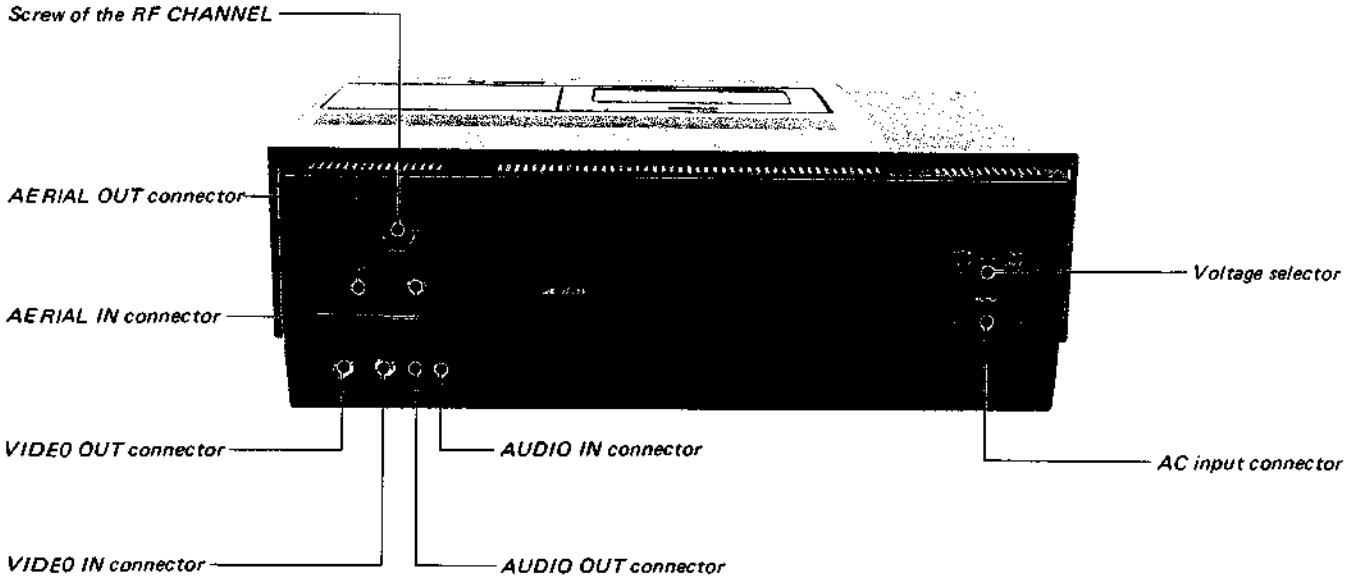


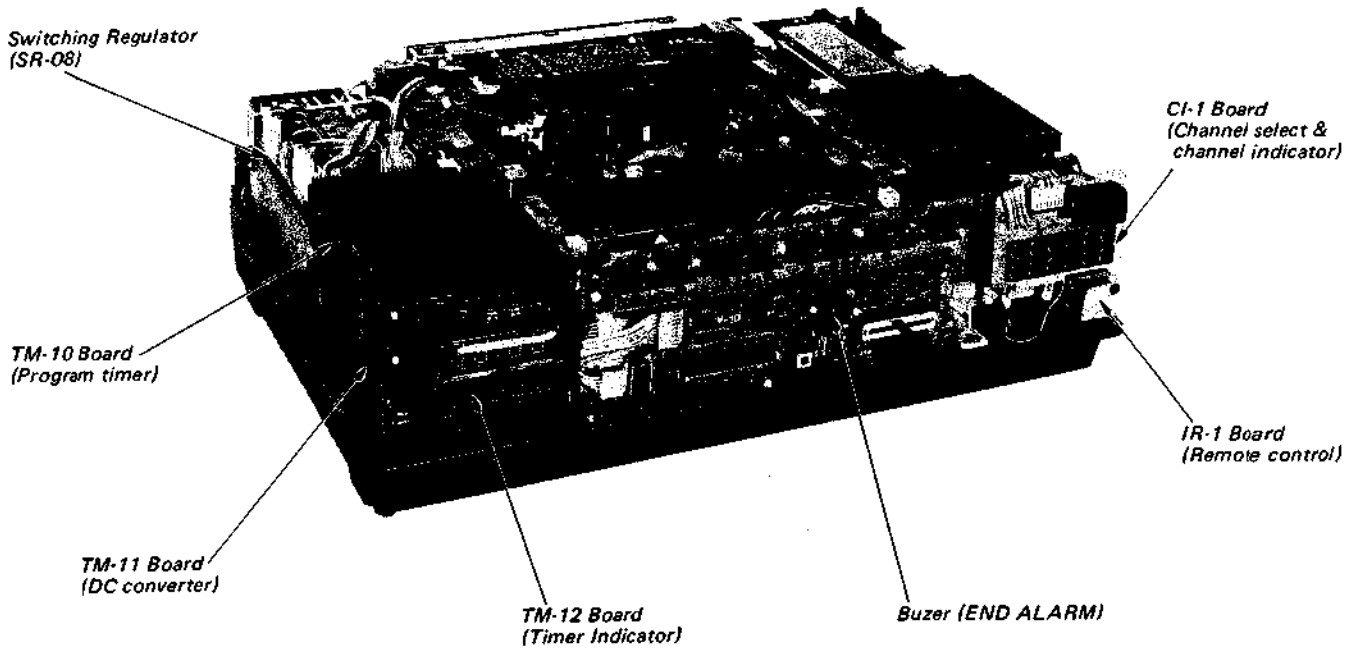
1-5-6. Switching Regulator Removal

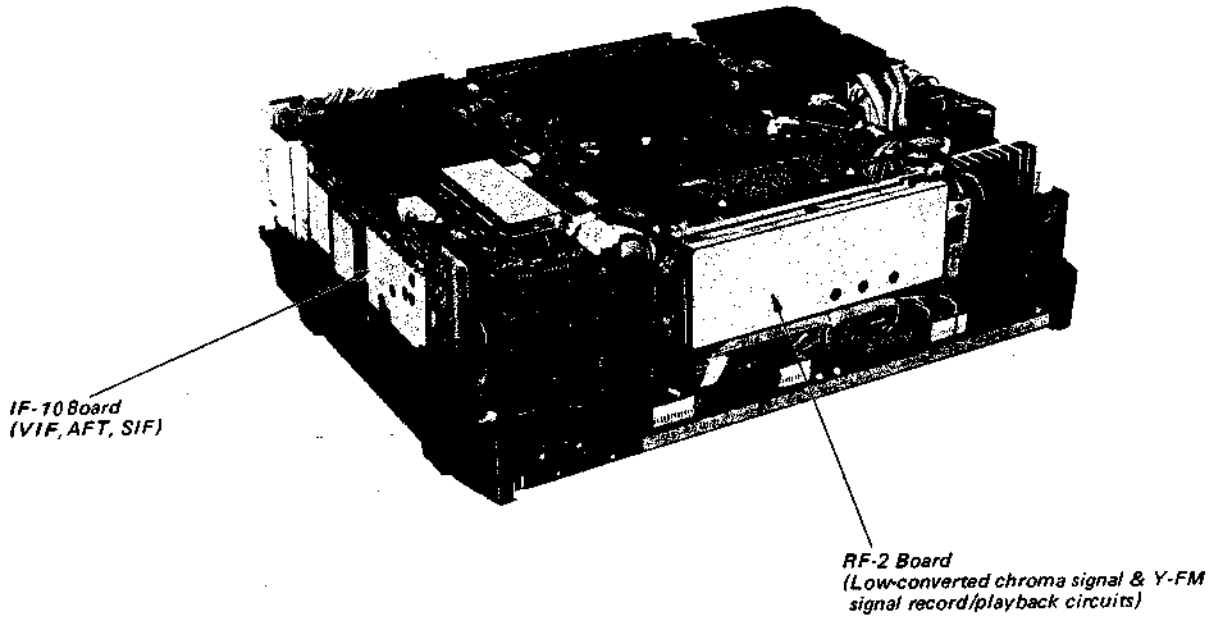


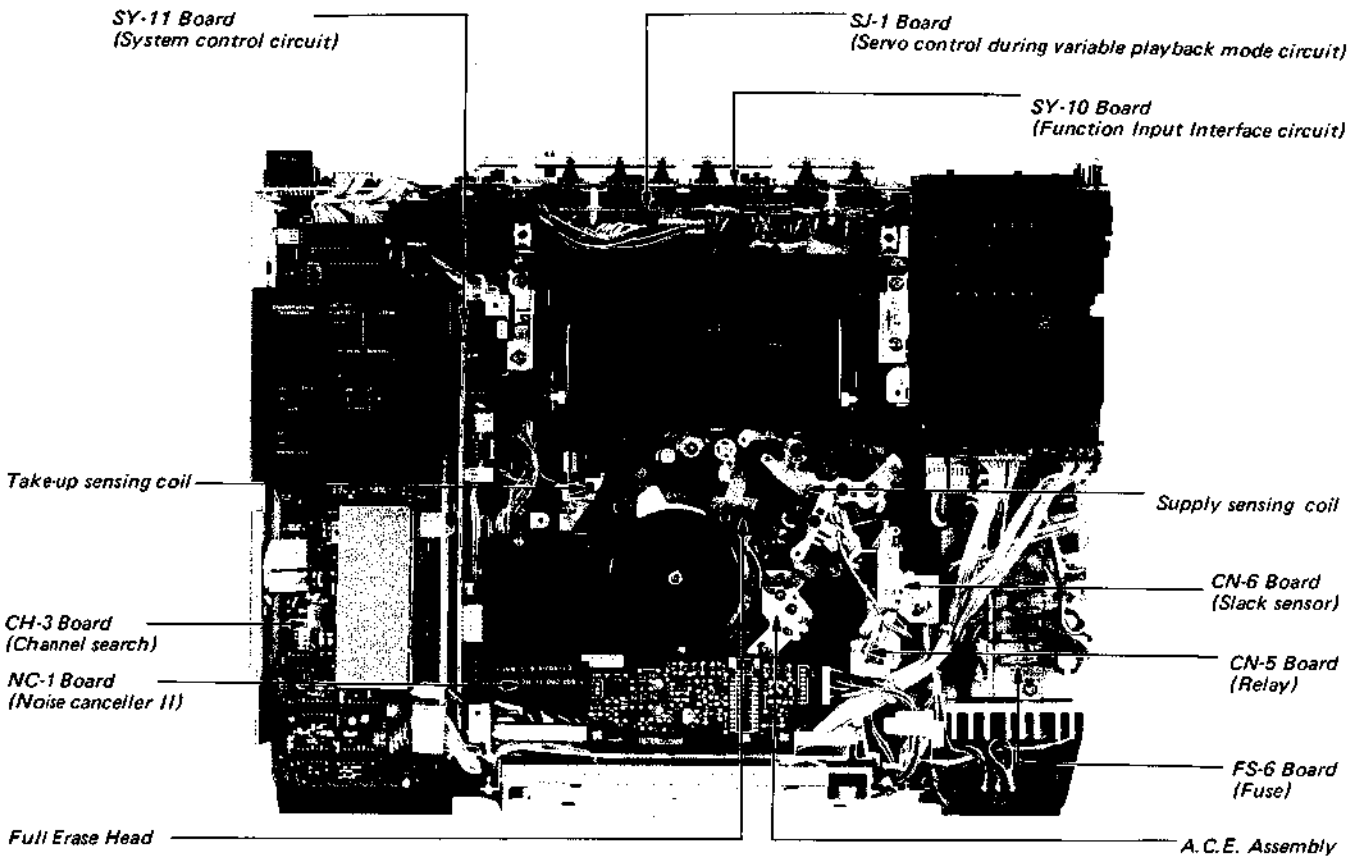
1-6. LOCATION OF PARTS AND CONTROLS

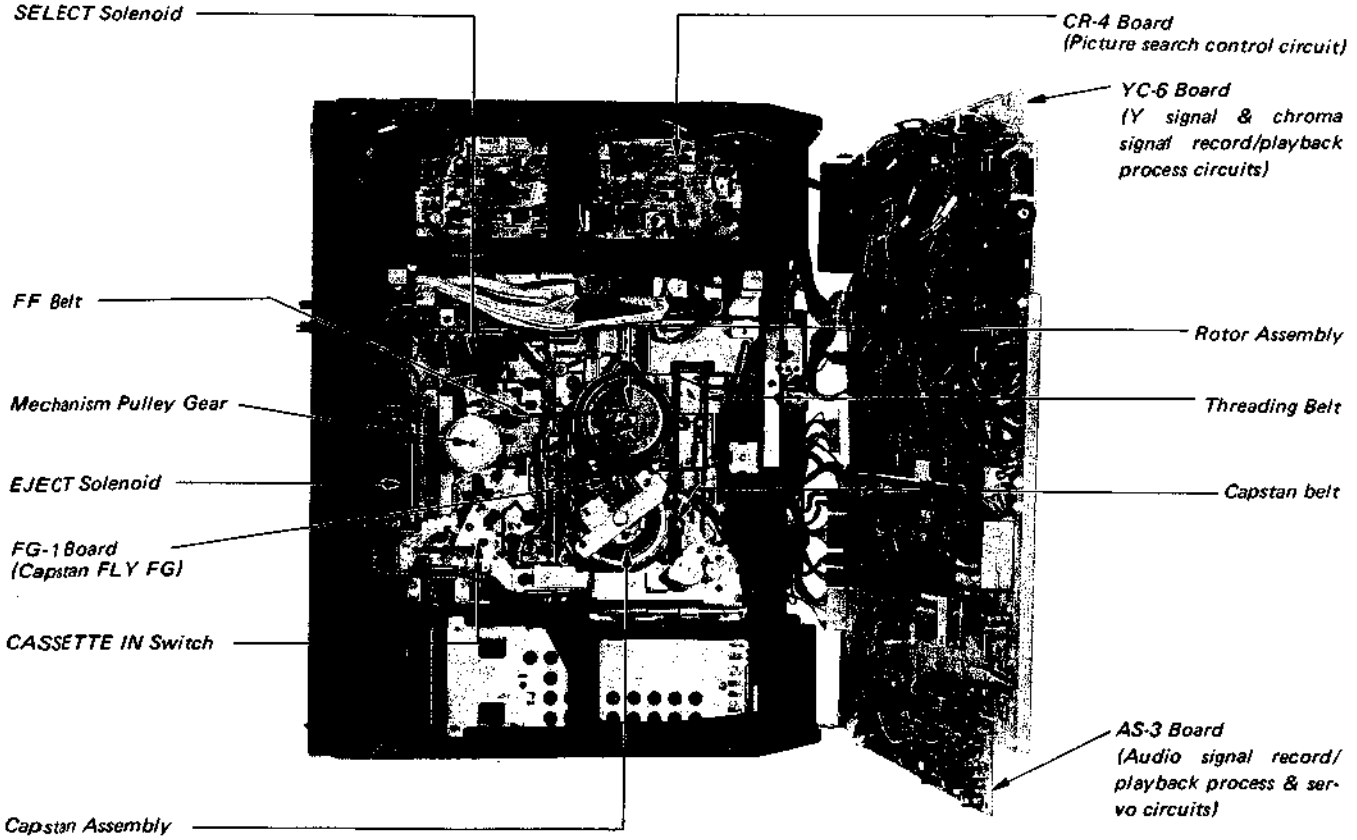




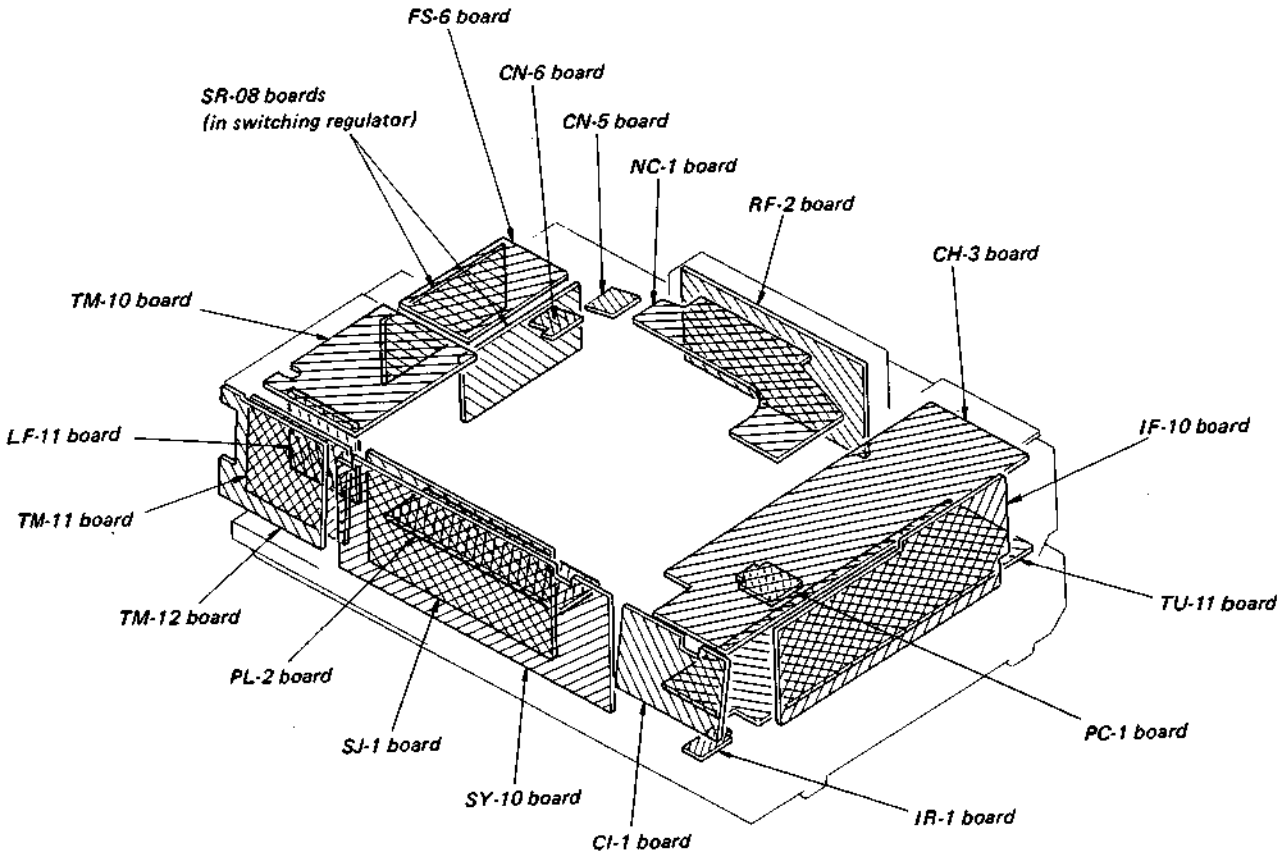

Switching Regulator
(SR-08)
CI-1 Board
(Channel select &
channel indicator)
TM-10 Board
(Program timer)
IR-1 Board
(Remote control)
TM-11 Board
(DC converter)
TM-12 Board
(Timer Indicator)
Buzer (END ALARM)

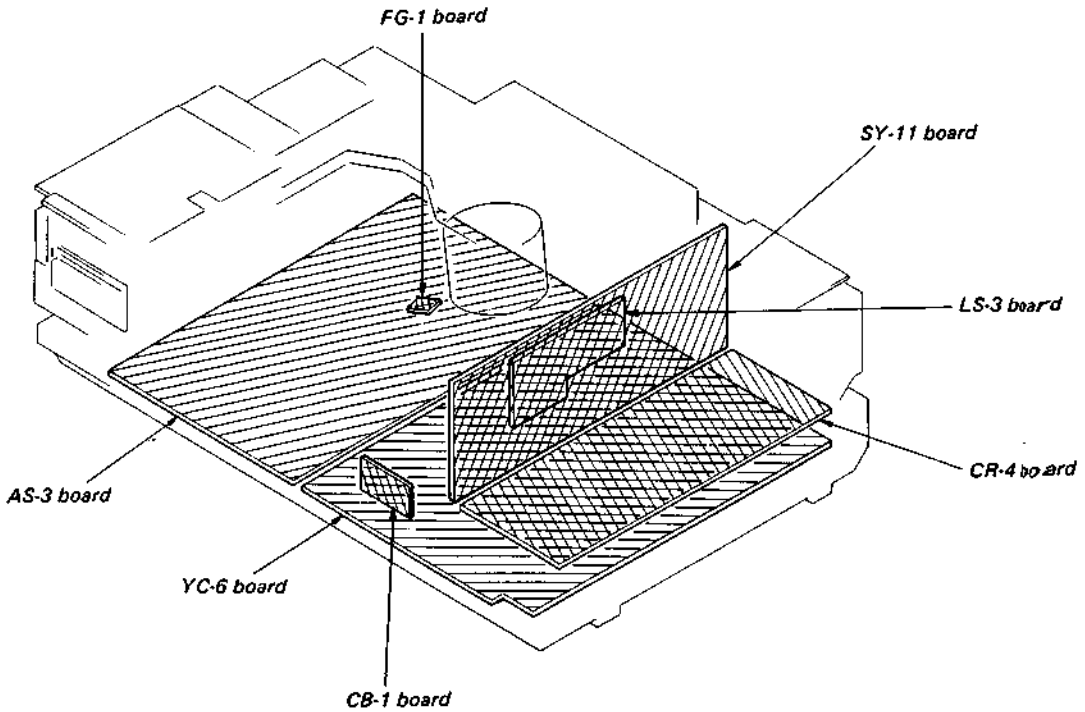

IF-10 Board
(VIF, AFT, SIF)
RF-2 Board
(Low-converted chroma signal & Y-FM
signal record/playback circuits)


SY-11 Board
(System control circuit)
SJ-1 Board
(Servo control during variable playback mode circuit)
SY-10 Board
(Function Input Interface circuit)
Take-up sensing coil
Supply sensing coil
CN-6 Board
(Slack sensor)
CH-3 Board
(Channel search)
CN-5 Board
(Relay)
NC-1 Board
(Noise canceller II)
FS-6 Board
(Fuse)
Full Erase Head
A.C.E. Assembly


SELECT Solenoid
CR-4 Board
(Picture search control circuit)
YC-6 Board
(Y signal & chroma signal record/playback process circuits)
FF Belt
Rotor Assembly
Mechanism Pulley Gear
Threading Belt
EJECT Solenoid
Capstan belt
FG-1 Board
(Capstan FLY FG)
CASSETTE IN Switch
AS-3 Board
(Audio signal record/playback process & servo circuits)
Capstan Assembly

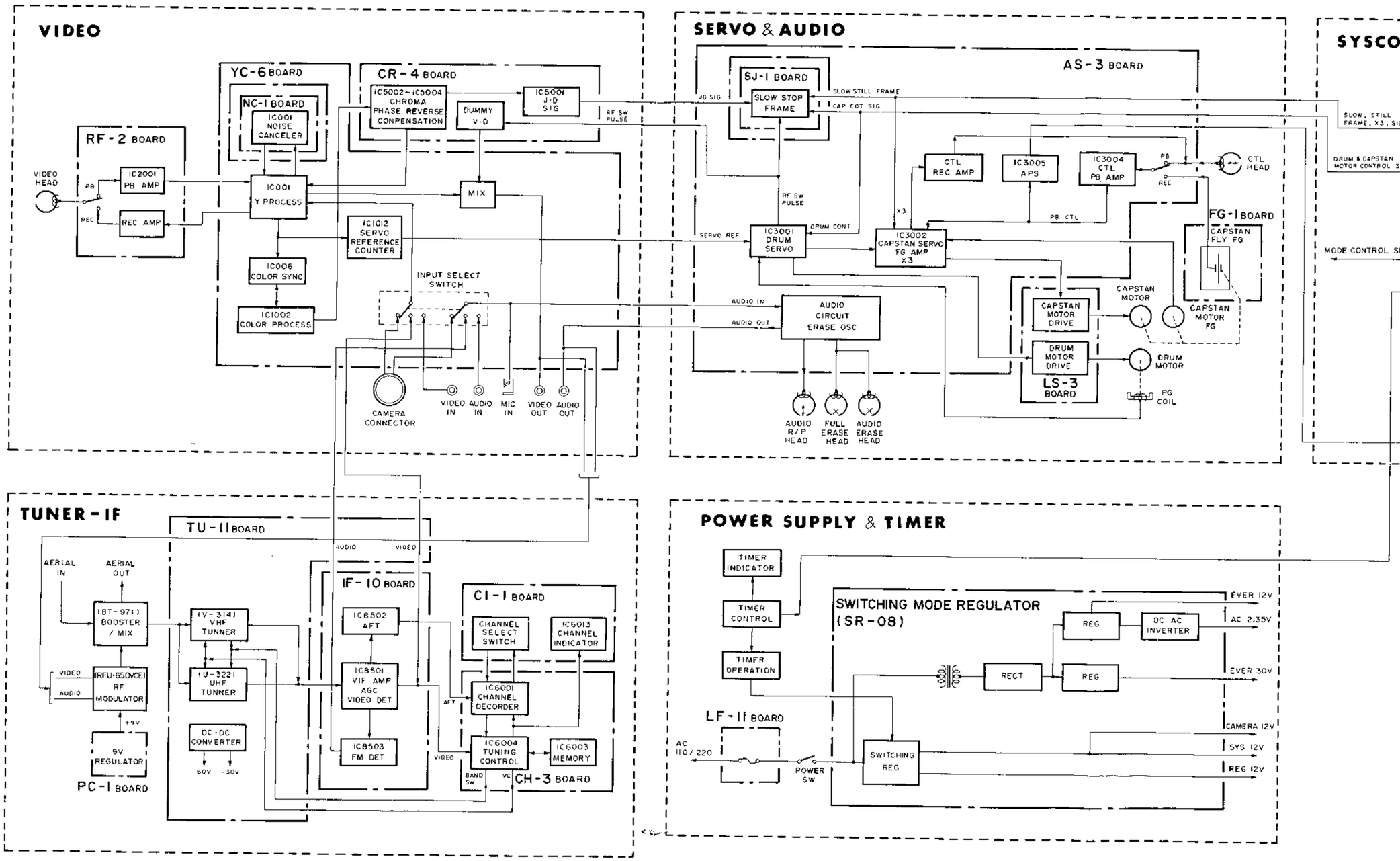
CIRCUIT BOARDS LOCATION

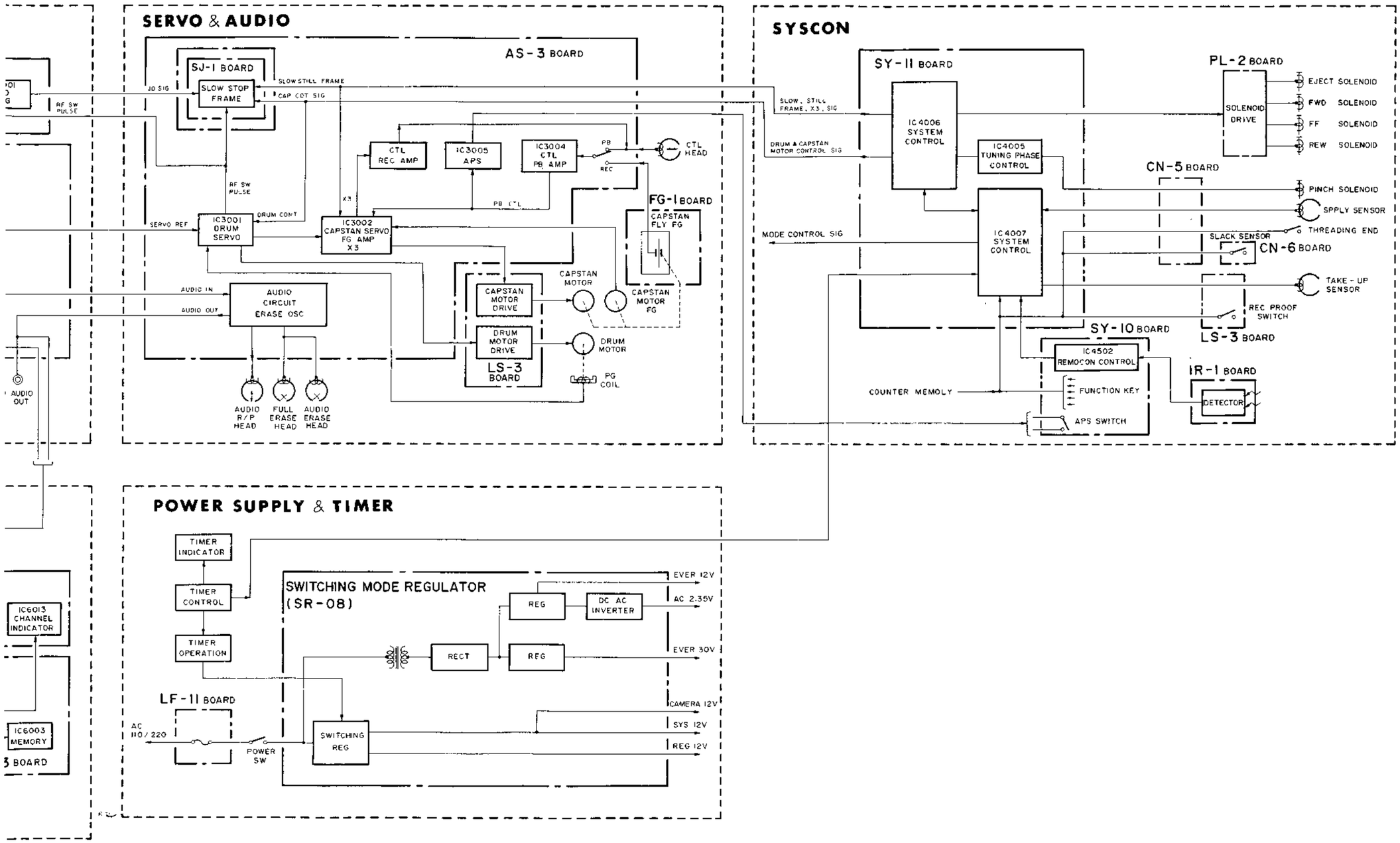




SECTION 2
BLOCK DIAGRAMS

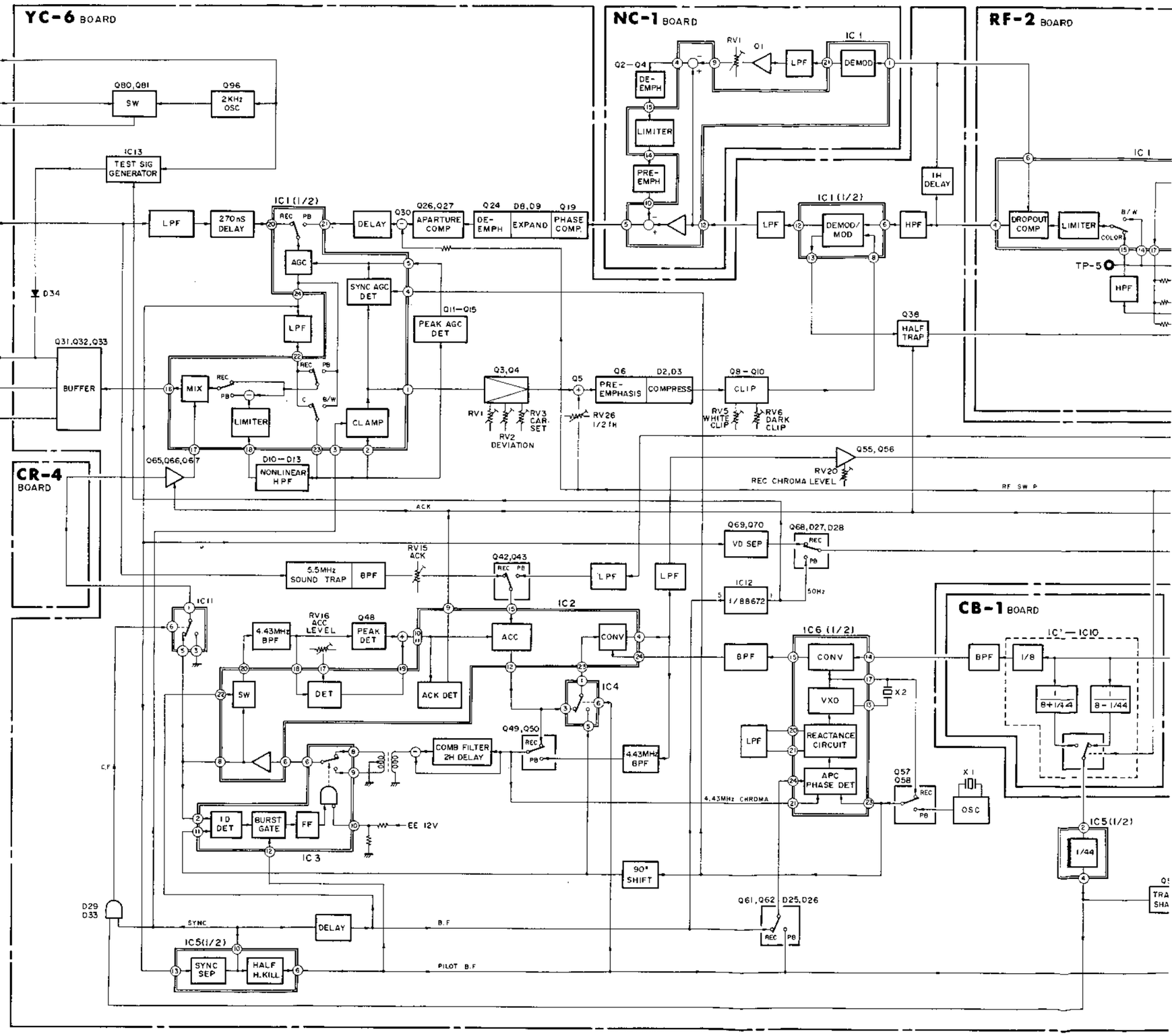
OVERALL BLOCK DIAGRAM

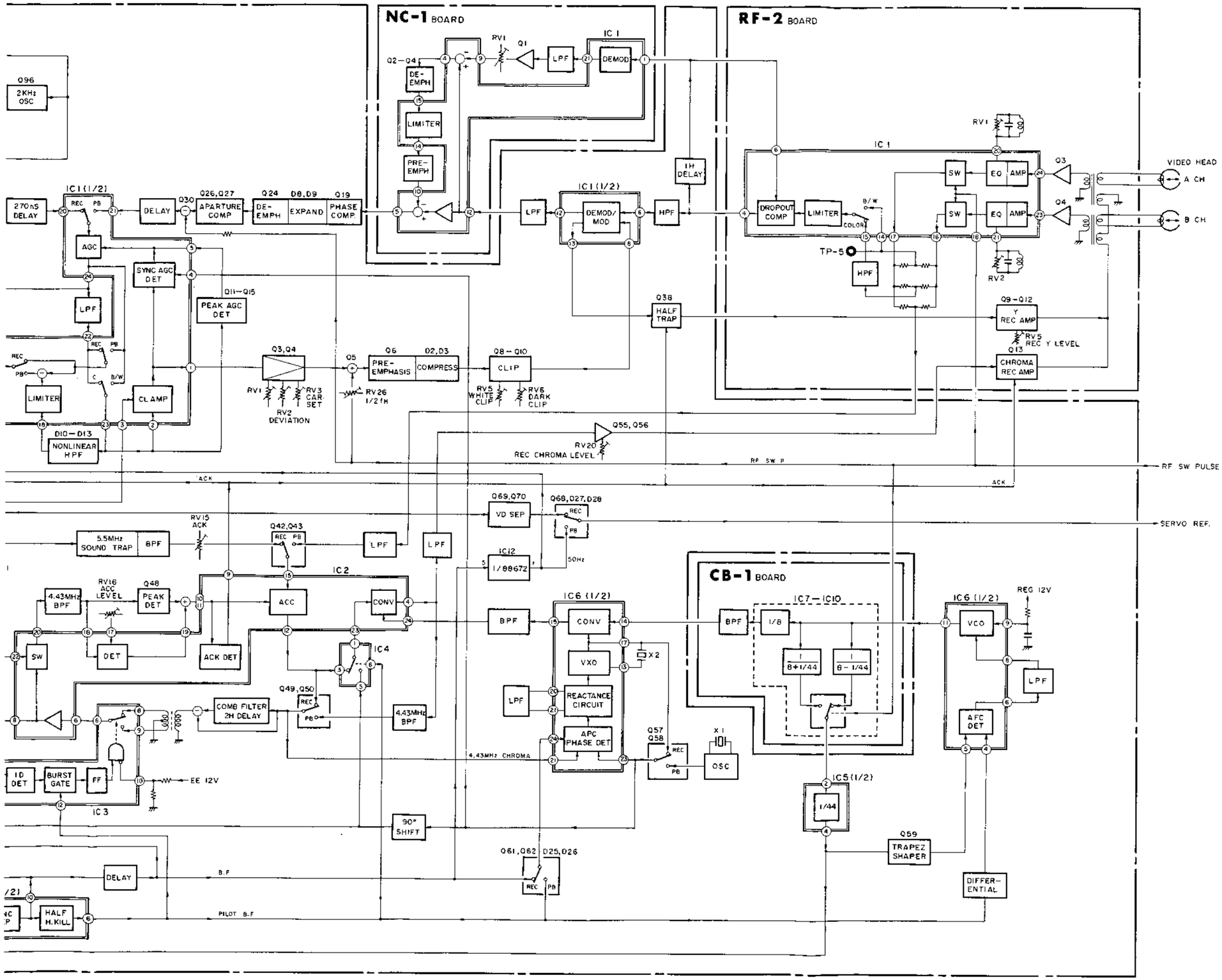



SERVO & AUDIO
AS-3 BOARD
SJ-1 BOARD
SLOW STOP FRAME
JD SIG
SLOW STILL FRAME
CAP CDT SIG
RF SW PULSE
CTL REC AMP
IC3005 APS
IC3004 CTL PB AMP
PB
REC
CTL HEAD
FG-1 BOARD
CAPSTAN FLY FG
X3
PB CTL
SERVO REF
IC3001 DRUM SERVO
DRUM CONT
IC3002 CAPSTAN SERVO FG AMP X3
AUDIO IN
AUDIO OUT
AUDIO CIRCUIT ERASE OSC
CAPSTAN MOTOR DRIVE
CAPSTAN MOTOR
CAPSTAN MOTOR FG
DRUM MOTOR DRIVE
DRUM MOTOR
LS-3 BOARD
PG COIL
AUDIO R/P HEAD
FULL ERASE HEAD
AUDIO ERASE HEAD
AUDIO OUT
SYSCON
SY-11 BOARD
SLOW, STILL FRAME, X3, SIG
DRUM & CAPSTAN MOTOR CONTROL SIG
IC4006 SYSTEM CONTROL
IC4005 TUNING PHASE CONTROL
IC4007 SYSTEM CONTROL
MODE CONTROL SIG
PL-2 BOARD
SOLENOID DRIVE
EJECT SOLENOID
FWD SOLENOID
FF SOLENOID
REW SOLENOID
CN-5 BOARD
PINCH SOLENOID
SPPLY SENSOR
THREADING END
SLACK SENSOR
CN-6 BOARD
TAKE-UP SENSOR
REC PROOF SWITCH
LS-3 BOARD
SY-10 BOARD
IC4502 REMOCON CONTROL
IR-1 BOARD
DETECTOR
FUNCTION KEY
APS SWITCH
COUNTER MEMOLY
IC6013 CHANNEL INDICATOR
IC6003 MEMORY
3 BOARD
POWER SUPPLY & TIMER
TIMER INDICATOR
TIMER CONTROL
TIMER OPERATION
SWITCHING MODE REGULATOR (SR-08)
REG
DC AC INVERTER
RECT
REG
EVER 12V
AC 2.35V
EVER 30V
CAMERA 12V
SYS 12V
REG 12V
LF-11 BOARD
AC 110 / 220
POWER SW
SWITCHING REG

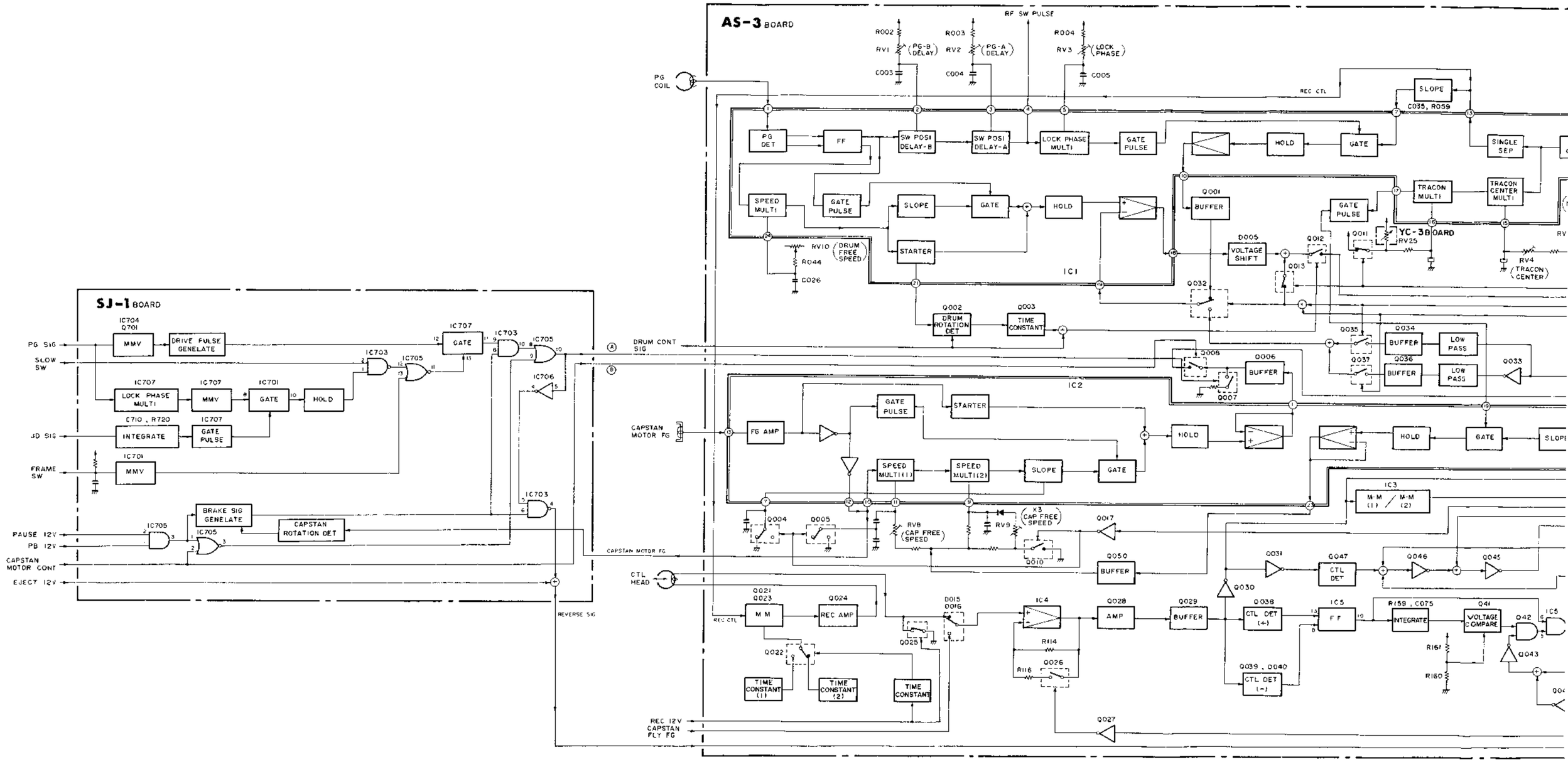
SL-C7E SL-C7E

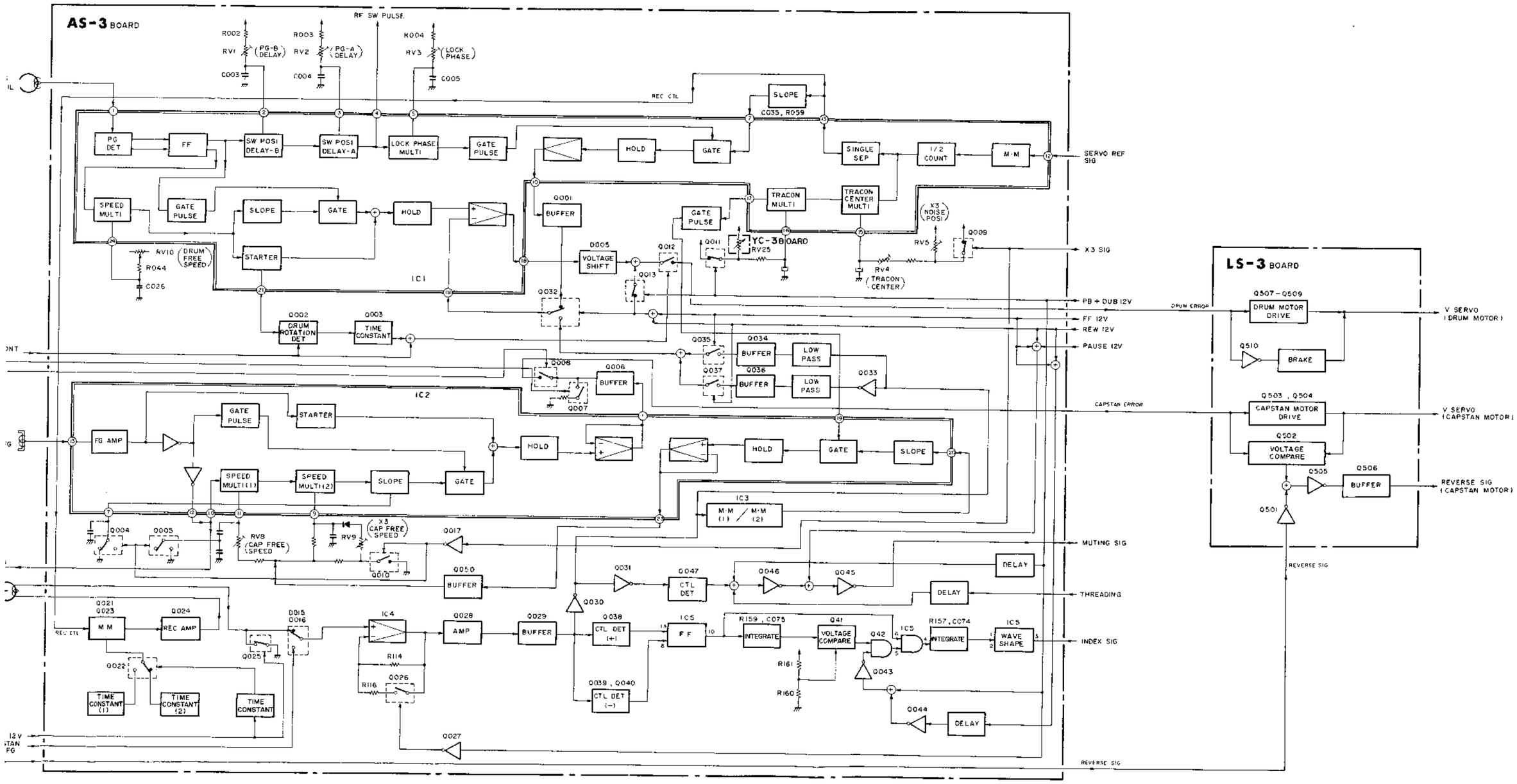
VIDEO SYSTEM BLOCK DIAGRAM



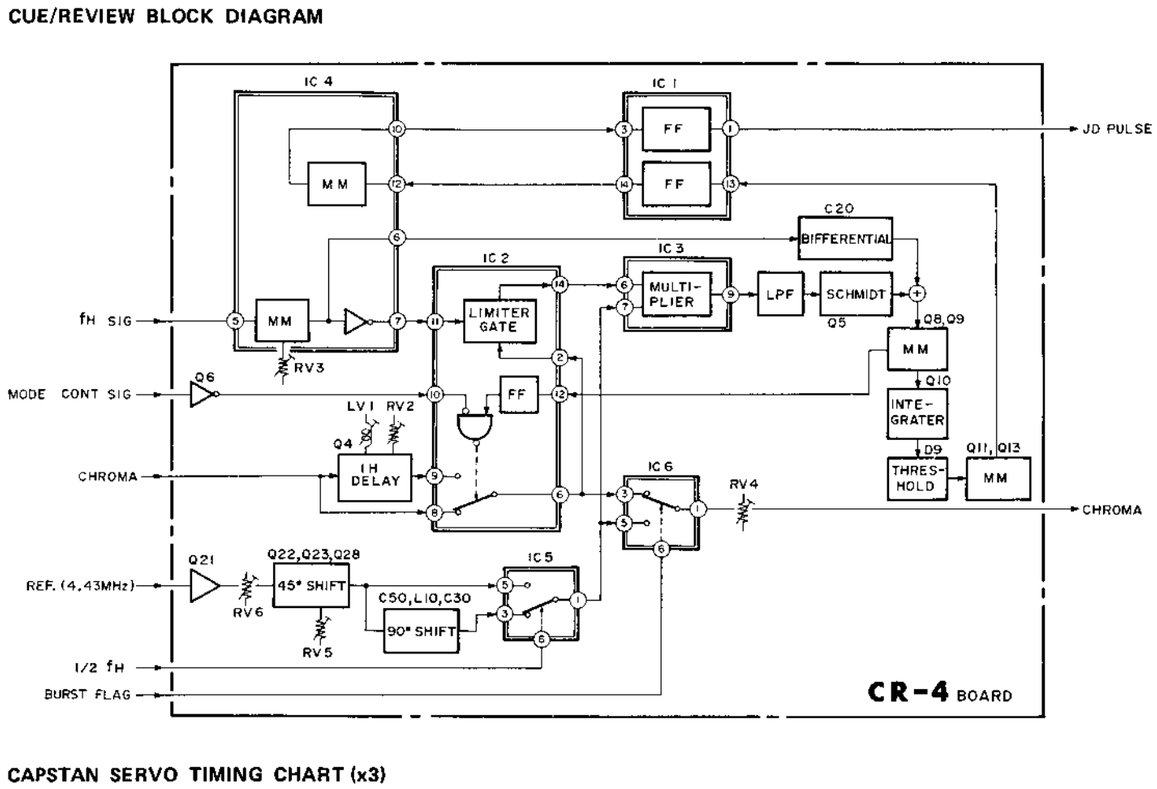

NC-1 BOARD
RF-2 BOARD
CB-1 BOARD
Q96
2KHz OSC
270nS DELAY
IC1 (1/2)
REC
PB
DELAY
Q30
Q26,Q27
APARTURE COMP
Q24
D8,D9
Q19
DE-EMPH
EXPAND
PHASE COMP.
AGC
SYNC AGC DET
LPF
Q11—Q15
PEAK AGC DET
B/W
C
LIMITER
CLAMP
D10—D13
NONLINEAR HPF
Q3,Q4
RV1
RV2 DEVIATION
RV3 CAR. SET
Q5
RV26 1/2fH
Q6
D2,D3
PRE-EMPHASIS
COMPRESS
Q8—Q10
CLIP
RV5 WHITE CLIP
RV6 DARK CLIP
Q2—Q4
DE-EMPH
LIMITER
PRE-EMPH
RV1
Q1
LPF
IC1
DEMOD
IC1 (1/2)
DEMOD/ MOD
HPF
1H DELAY
Q38
HALF TRAP
DROPOUT COMP
LIMITER
B/W
COLOR
TP-5
HPF
IC1
RV1
SW
EQ
AMP
Q3
Q4
VIDEO HEAD
A CH
B CH
RV2
Q9—Q12
Y REC AMP
RV5 REC Y LEVEL
Q13
CHROMA REC AMP
Q55, Q56
RV20 REC CHROMA LEVEL
RF SW P
RF SW PULSE
ACK
Q69,Q70
VD SEP
Q68,027,028
SERVO REF.
IC12
1/88672
50Hz
5.5MHz SOUND TRAP
BPF
RV15 ACK
Q42,043
LPF
IC2
4.43MHz BPF
RV16 ACC LEVEL
Q48
PEAK DET
ACC
CONV
SW
DET
ACK DET
IC4
Q49,Q50
COMB FILTER 2H DELAY
4.43MHz BPF
4.43MHz CHROMA
ID DET
BURST GATE
FF
EE 12V
IC3
90° SHIFT
DELAY
B.F
PILOT B.F
HALF H.KILL
Q61,062
D25,026
IC6 (1/2)
BPF
CONV
VXO
X2
REACTANCE CIRCUIT
APC PHASE DET
LPF
Q57
Q58
X1
OSC
IC7—IC10
1/8
1/8+1/44
1/8-1/44
IC5(1/2)
1/44
Q59
TRAPEZ SHAPER
IC6 (1/2)
VCO
REG 12V
LPF
AFC DET
DIFFER-ENTIAL

SERVO SYSTEM BLOCK DIAGRAM

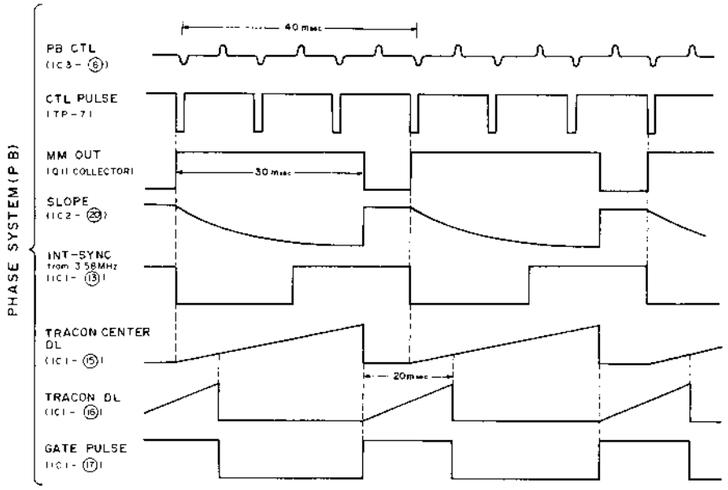



AS-3 BOARD
RF SW PULSE
R002
RV1
(PG-B DELAY)
C003
R003
RV2
(PG-A DELAY)
C004
R004
RV3
(LOCK PHASE)
C005
REC CTL
PG DET
FF
SW POSI DELAY-B
SW POSI DELAY-A
LOCK PHASE MULTI
GATE PULSE
HOLD
GATE
SLOPE
C035, R059
SINGLE SEP
1/2 COUNT
M·M
SERVO REF SIG
SPEED MULTI
GATE PULSE
SLOPE
GATE
HOLD
STARTER
RV10 (DRUM FREE SPEED)
R044
C026
IC1
Q001
BUFFER
TRACON MULTI
TRACON CENTER MULTI
X3 NOISE POSI
RV5
Q009
X3 SIG
YC-38 BOARD
RV25
RV4 (TRACON CENTER)
Q005
VOLTAGE SHIFT
Q012
Q011
Q013
Q032
PB + DUB 12V
FF 12V
REW 12V
PAUSE 12V
Q002
DRUM ROTATION DET
Q003
TIME CONSTANT
Q035
Q034
BUFFER
LOW PASS
Q037
Q036
BUFFER
LOW PASS
Q033
Q008
Q006
BUFFER
Q007
IC2
CAPSTAN ERROR
GATE PULSE
STARTER
FG AMP
HOLD
HOLD
GATE
SLOPE
SPEED MULTI(1)
SPEED MULTI(2)
SLOPE
GATE
IC3
M·M (1) / M·M (2)
Q004
Q005
RV8 (CAP FREE SPEED)
RV9
X3 (CAP FREE SPEED)
Q010
Q017
MUTING SIG
Q050
BUFFER
Q031
Q047
CTL DET
Q046
Q045
DELAY
DELAY
THREADING
Q030
Q021
Q023
M·M
Q024
REC AMP
REC CTL
Q025
Q022
Q015
Q016
IC4
Q028
AMP
Q029
BUFFER
Q038
CTL DET (+)
IC5
F F
R159, C075
INTEGRATE
Q41
VOLTAGE COMPARE
Q42
IC5
R157, C074
INTEGRATE
IC5
WAVE SHAPE
INDEX SIG
R161
R160
Q043
Q044
DELAY
R114
R116
Q026
TIME CONSTANT (1)
TIME CONSTANT (2)
TIME CONSTANT
Q039, Q040
CTL DET (−)
Q027
REVERSE SIG
LS-3 BOARD
DRUM ERROR
Q507 – Q509
DRUM MOTOR DRIVE
V SERVO (DRUM MOTOR)
Q510
BRAKE
Q503, Q504
CAPSTAN MOTOR DRIVE
V SERVO (CAPSTAN MOTOR)
Q502
VOLTAGE COMPARE
Q505
Q506
BUFFER
REVERSE SIG (CAPSTAN MOTOR)
Q501
REVERSE SIG

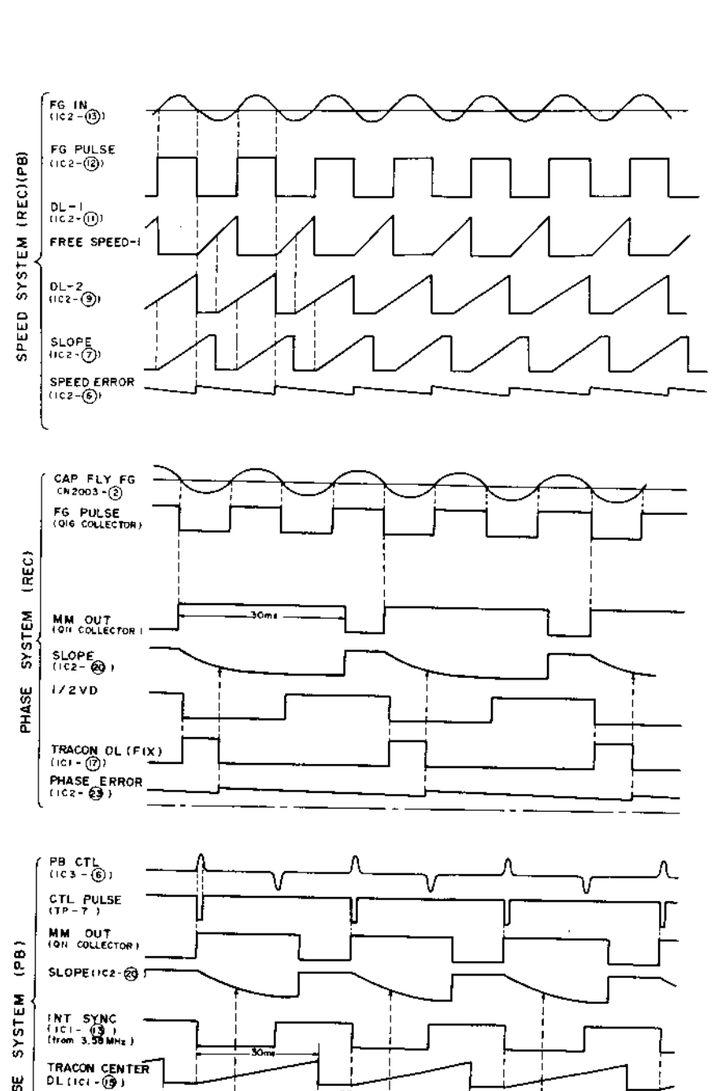
CUE/REVIEW BLOCK DIAGRAM



CAPSTAN SERVO TIMING CHART (x3)

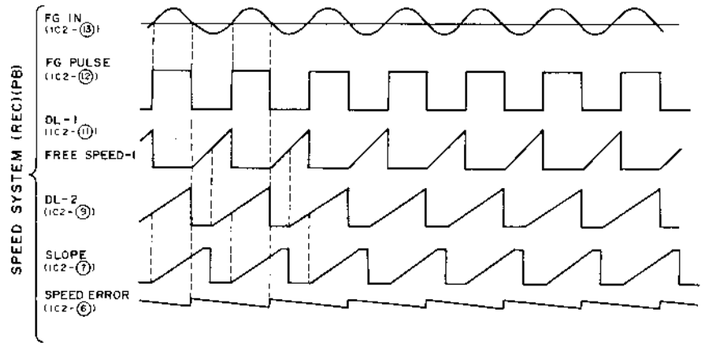


CAPSTAN SERVO TIMING CHART

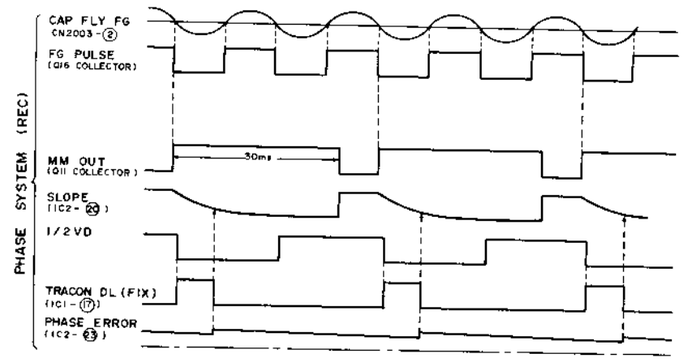


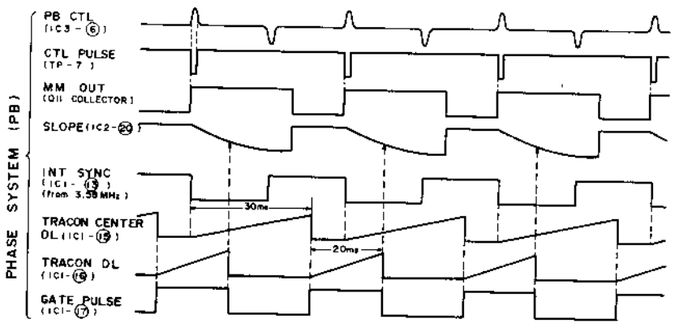
CAPSTAN SERVO TIMING CHART

JD PULSE

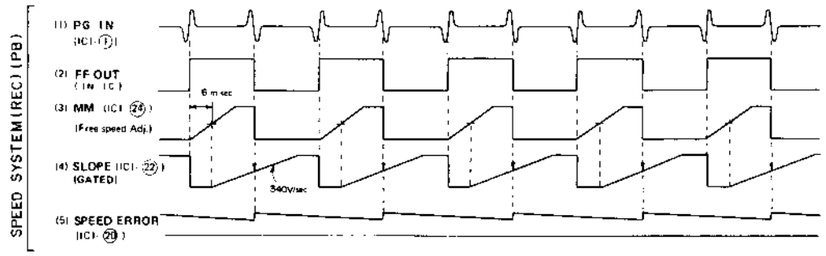


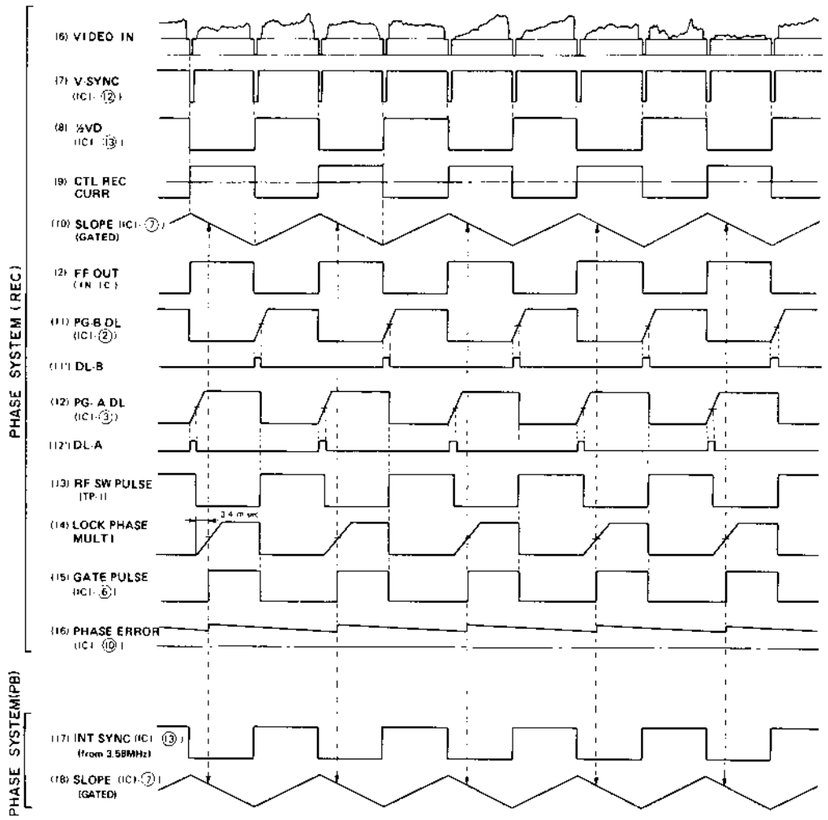
CHROMA



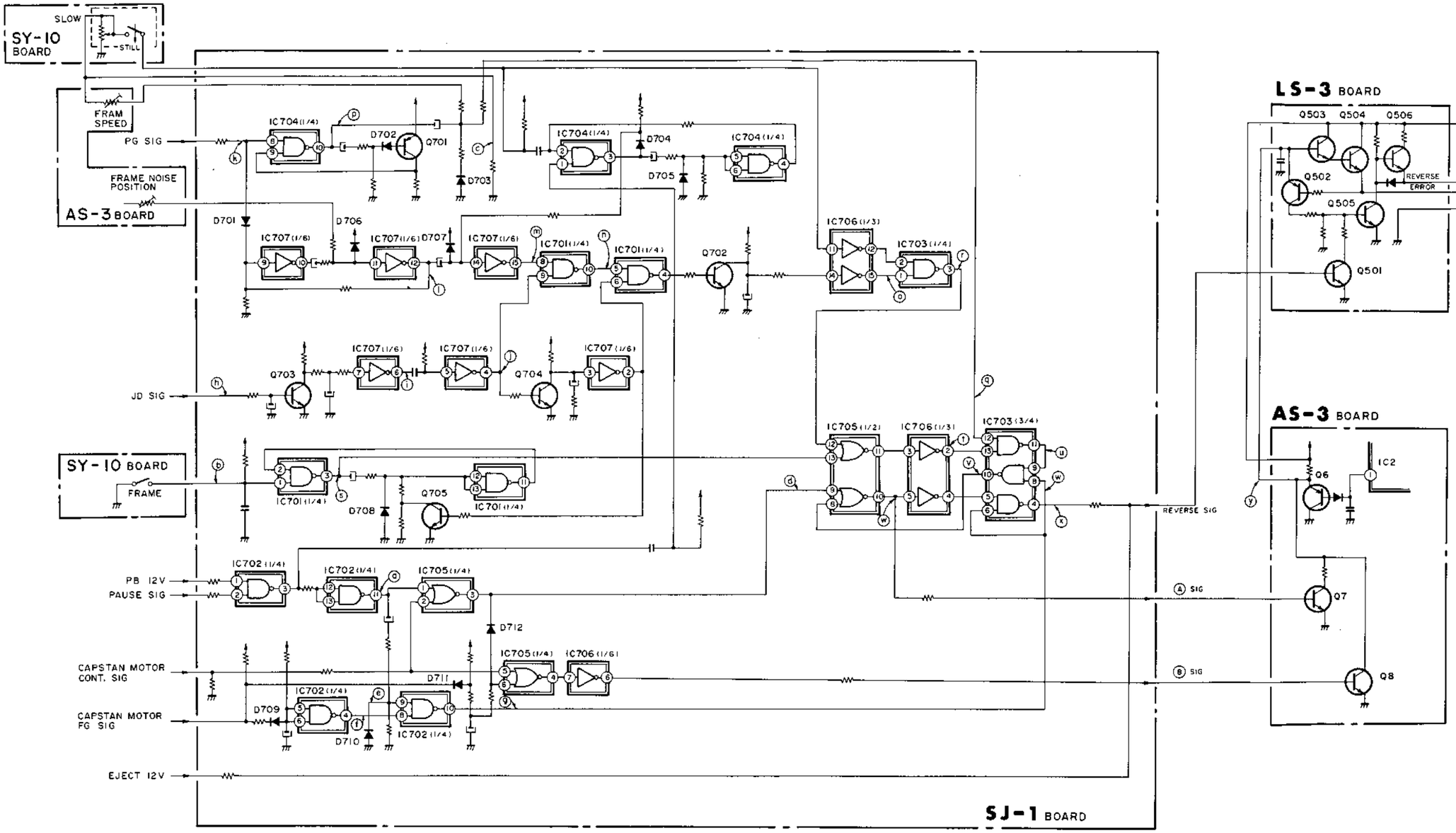


DRUM SERVO TIMING CHART

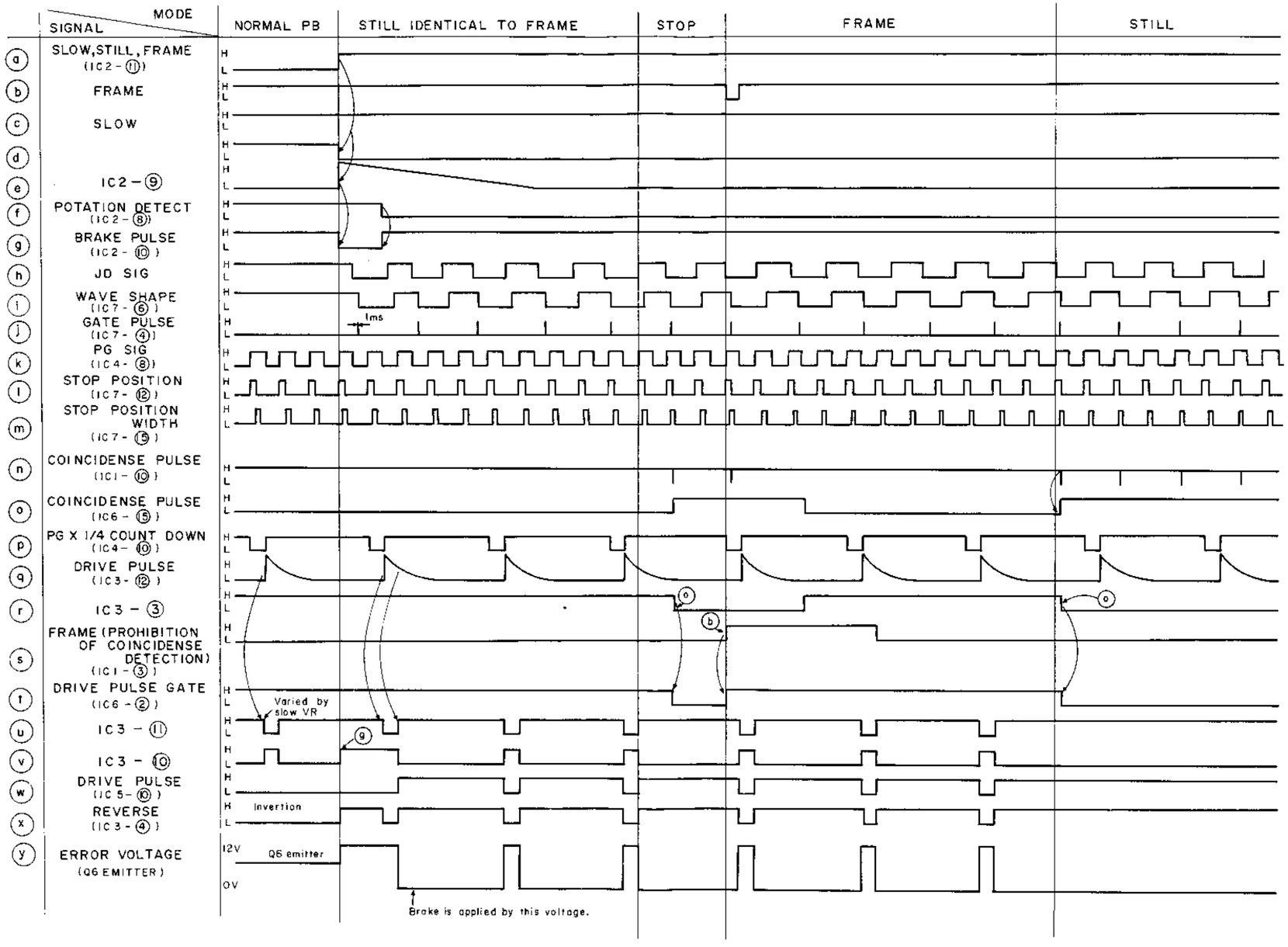




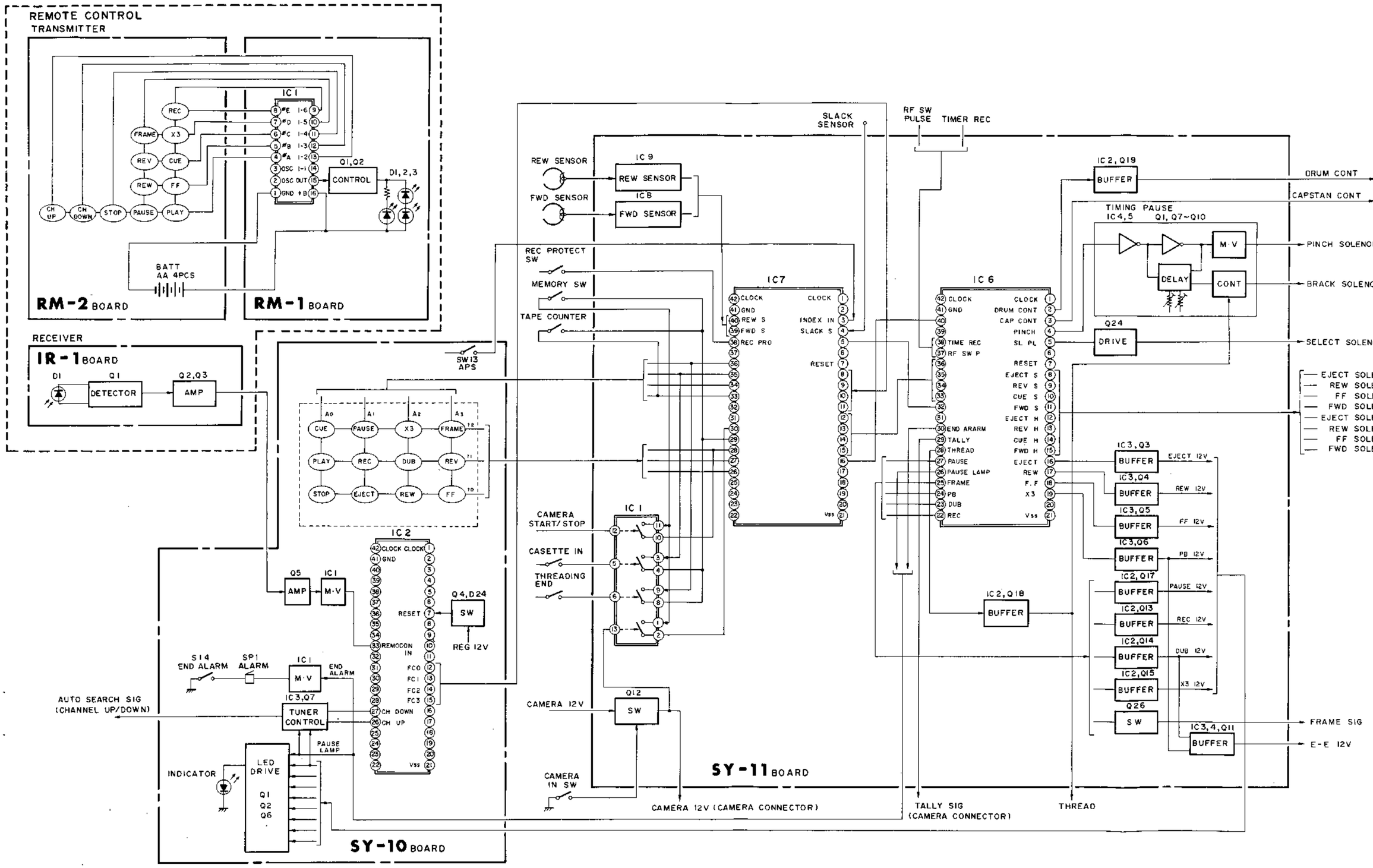
CAPSTAN DRIVE BLOCK DIAGRAM



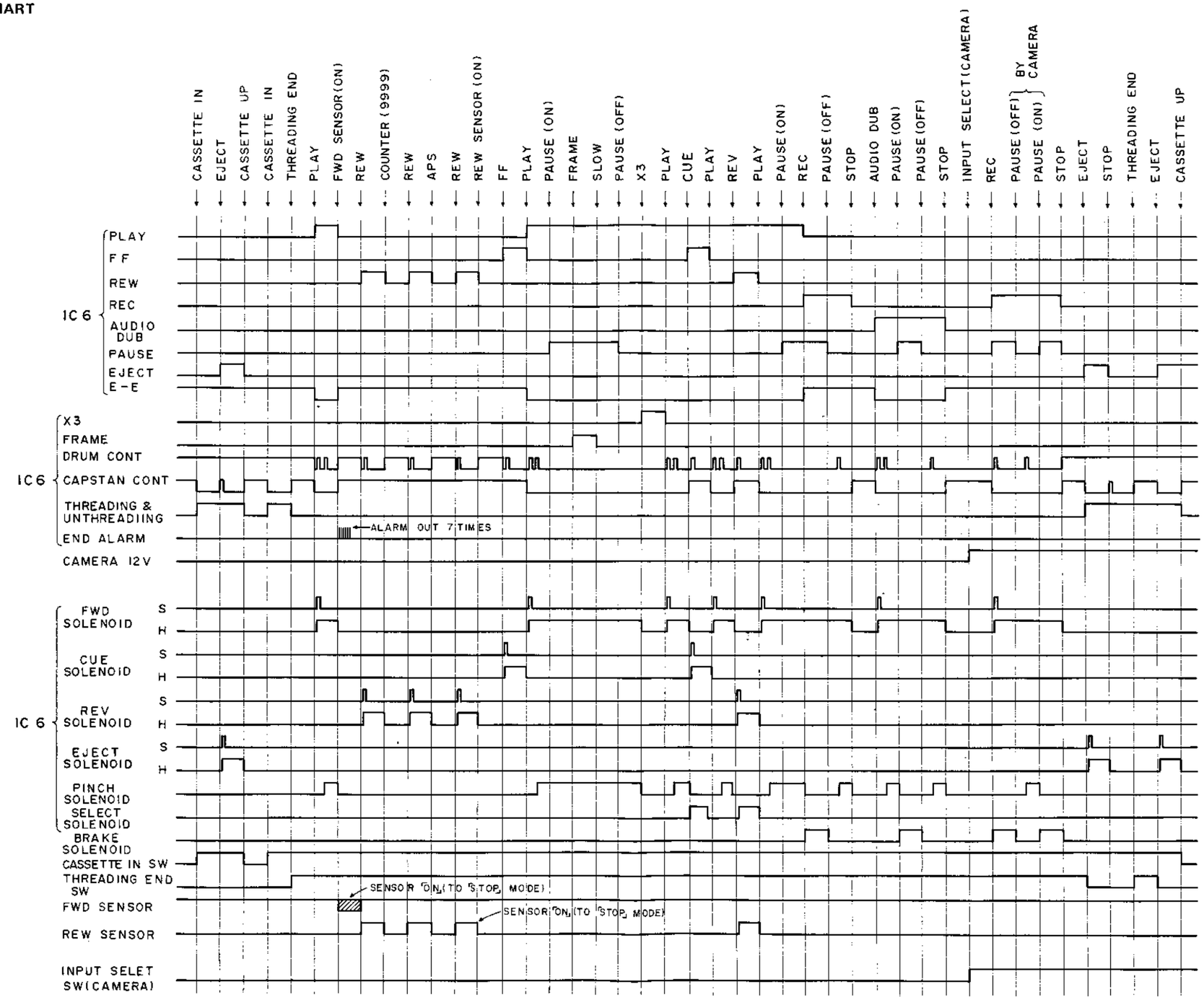
CAPSTAN DRIVE TIMING CHART



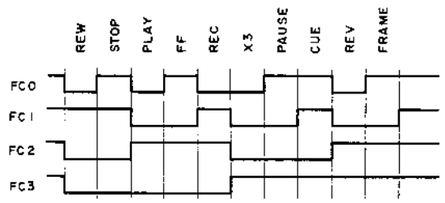
SYSTEM CONTROL BLOCK DIAGRAM

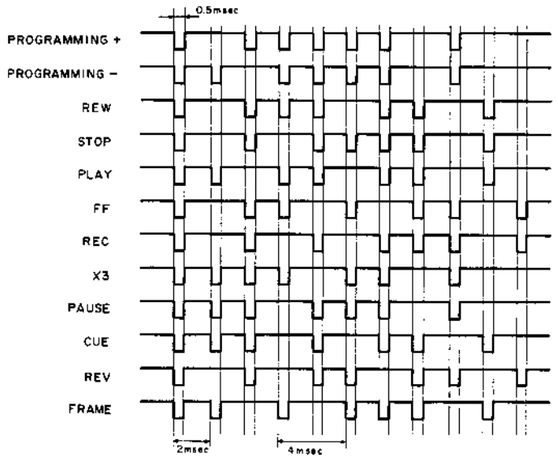


SYSTEM CONTROL TIMING CHART

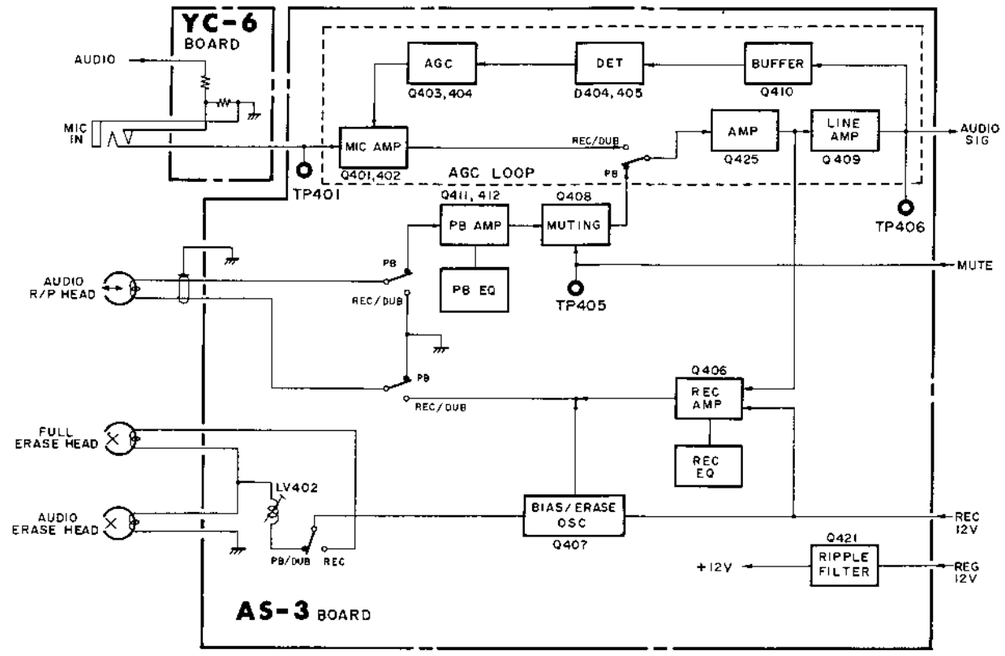


REMOTE CONTROL TIMING CHART



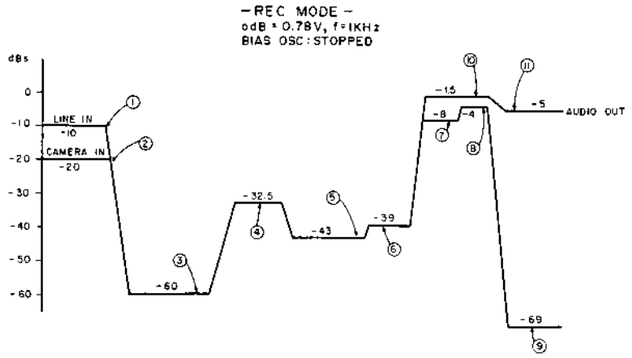


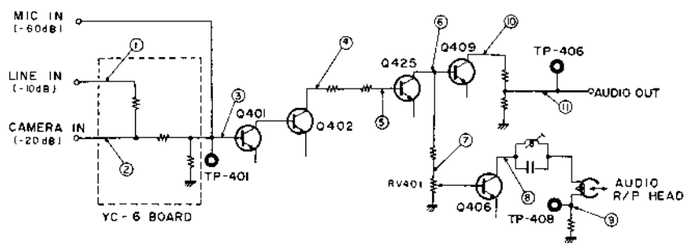
AUDIO BLOCK DIAGRAM



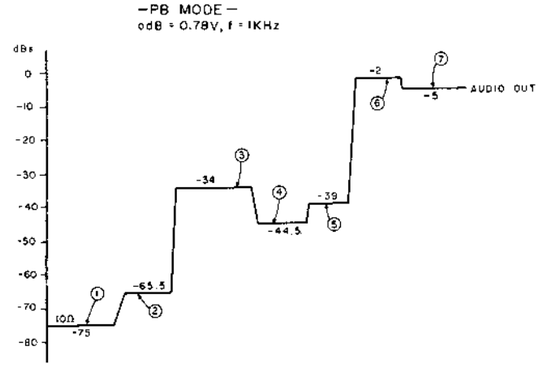
AUDIO LEVEL DIAGRAM

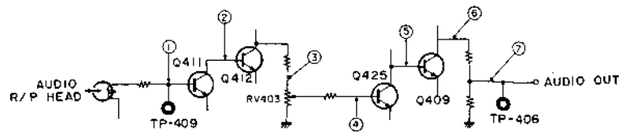
– REC MODE –



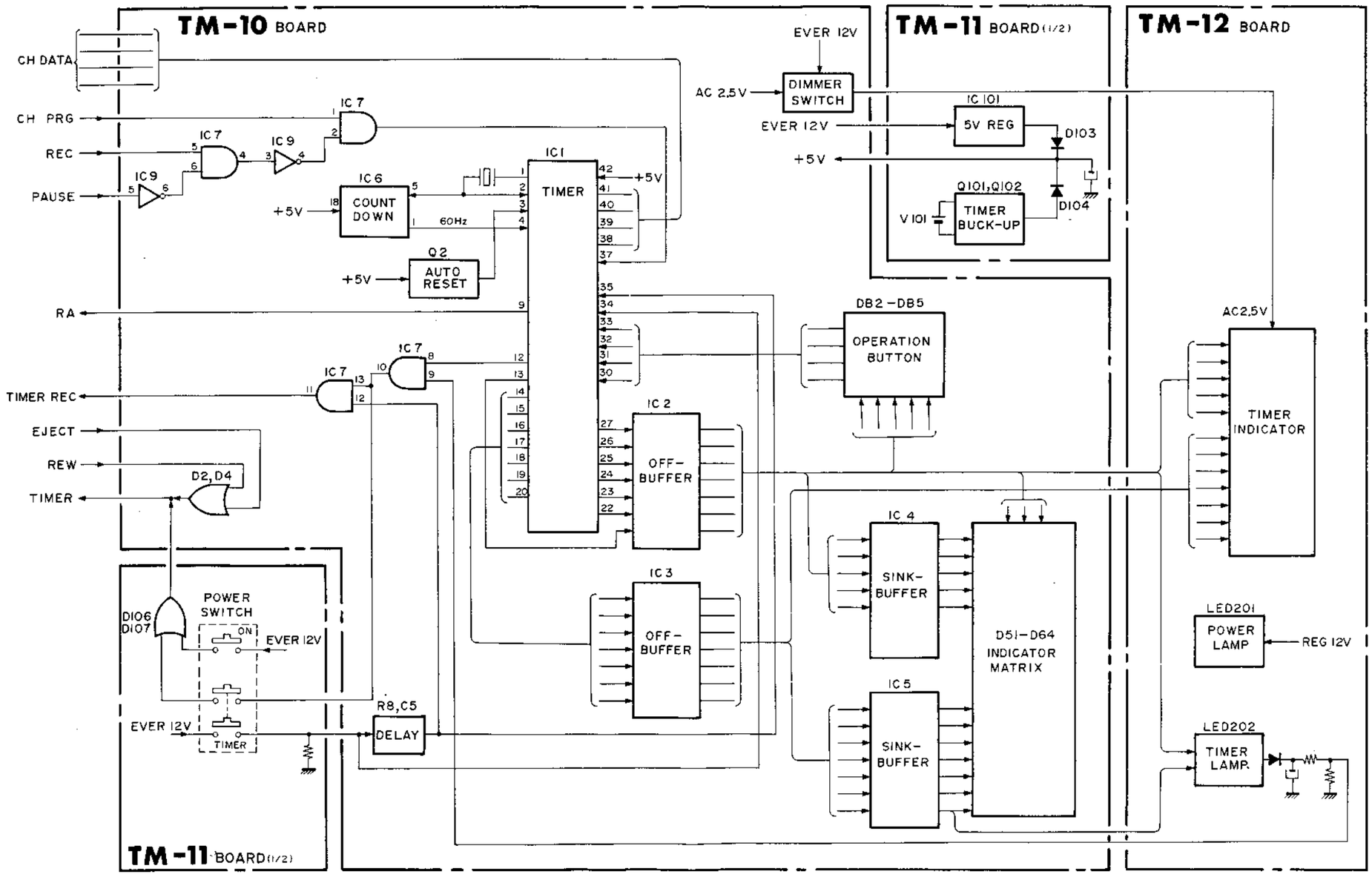


– PB MODE –

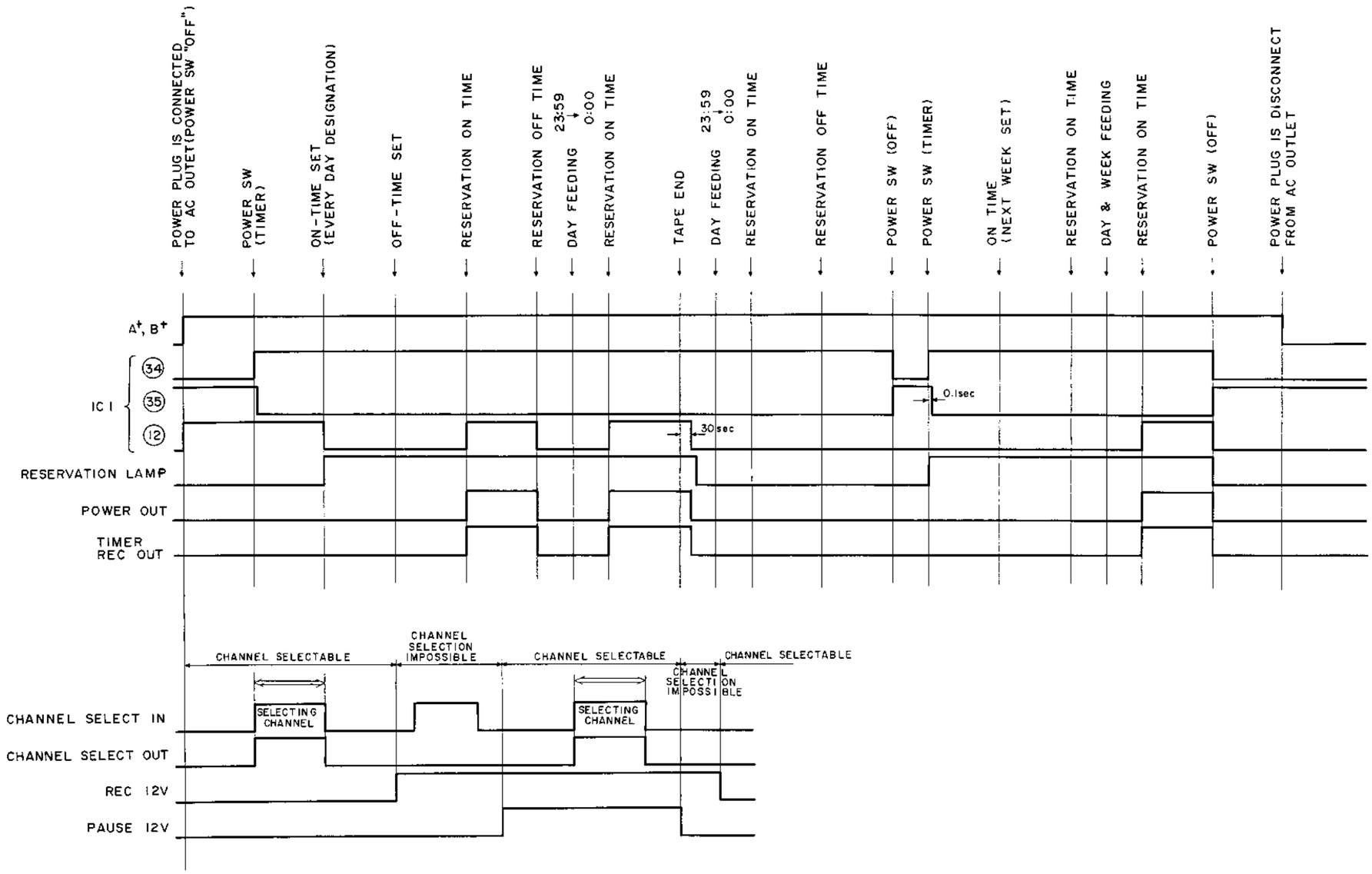




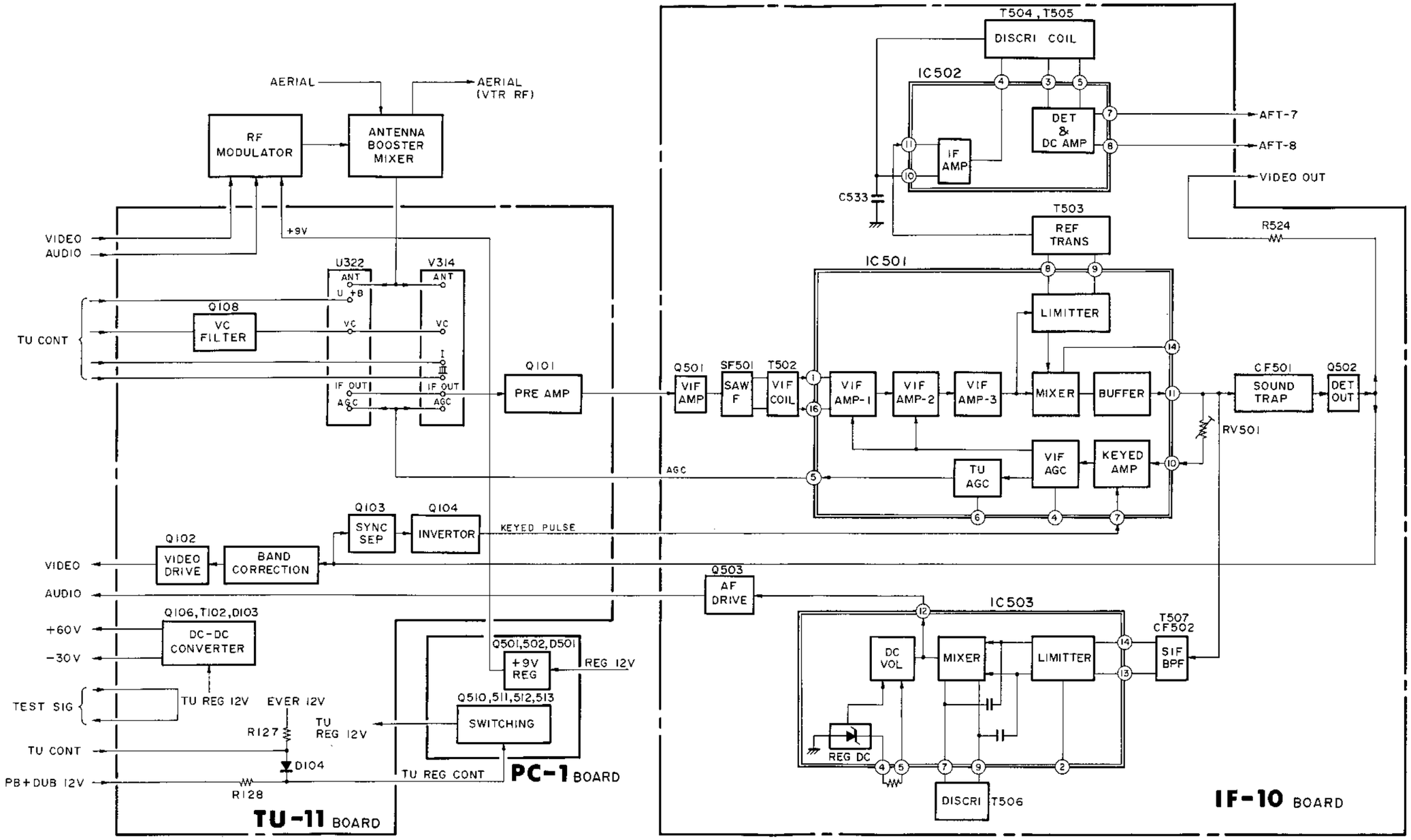
TIMER BLOCK DIAGRAM



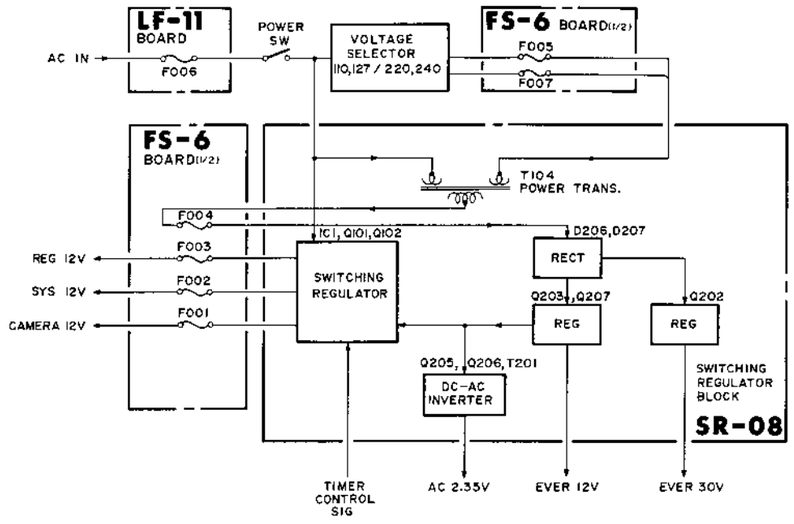
TIMER TIMING CHART



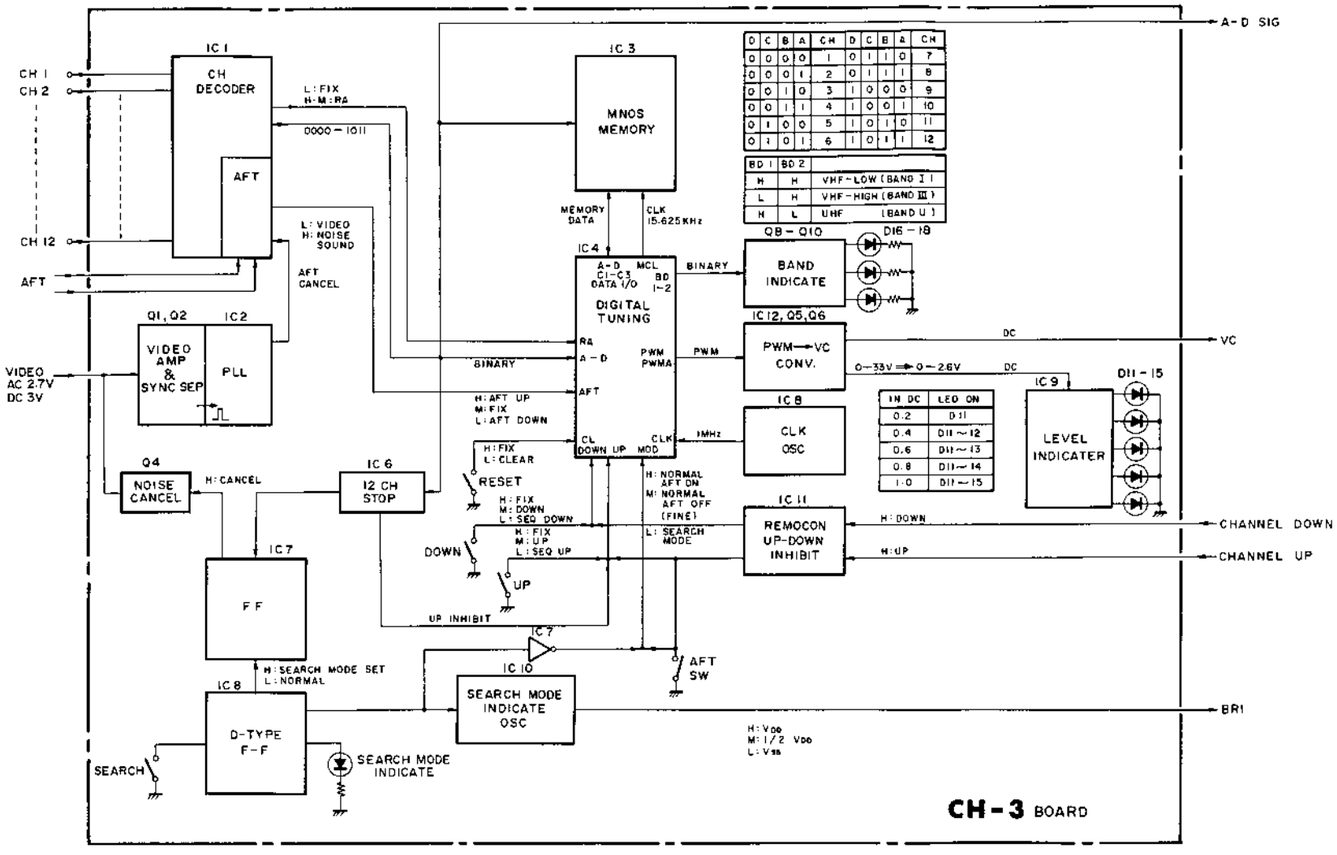
TUNER-IF BLOCK DIAGRAM



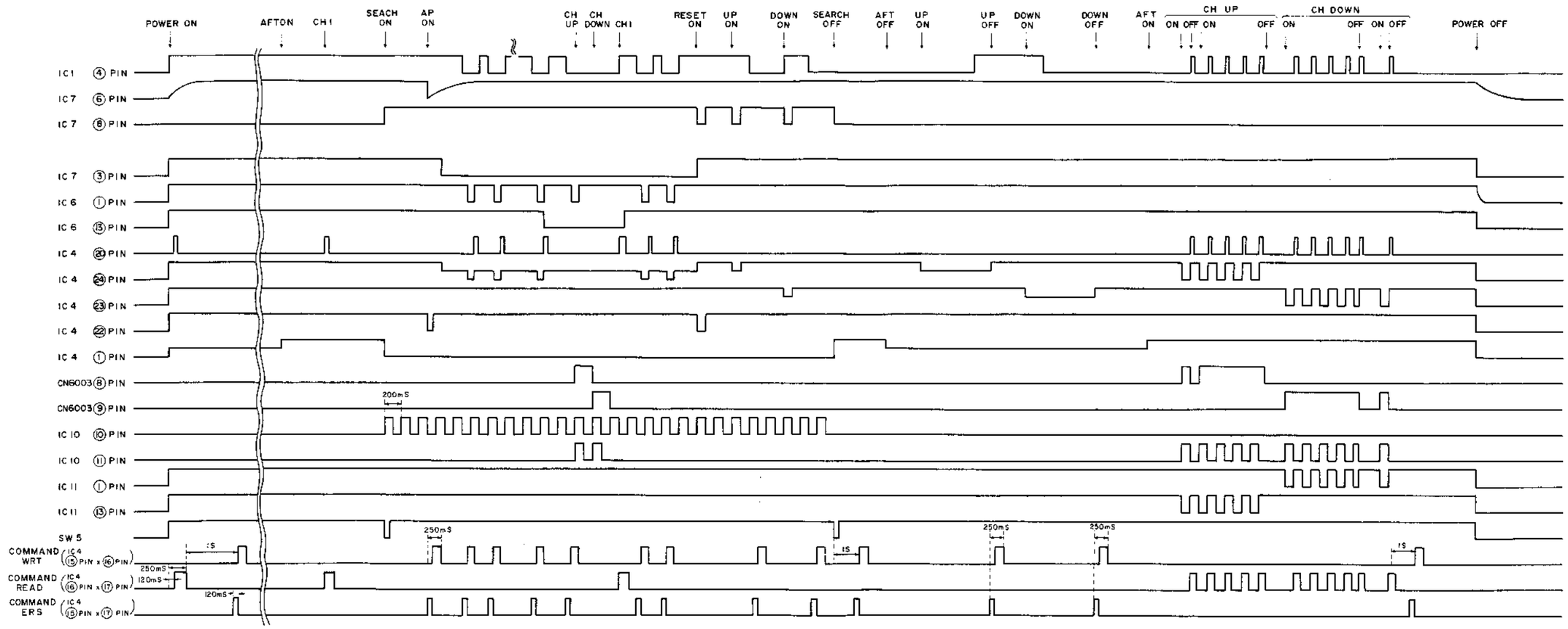
POWER SUPPLY BLOCK DIAGRAM



AUTO PROGRAME SEARCH BLOCK DIAGRAM

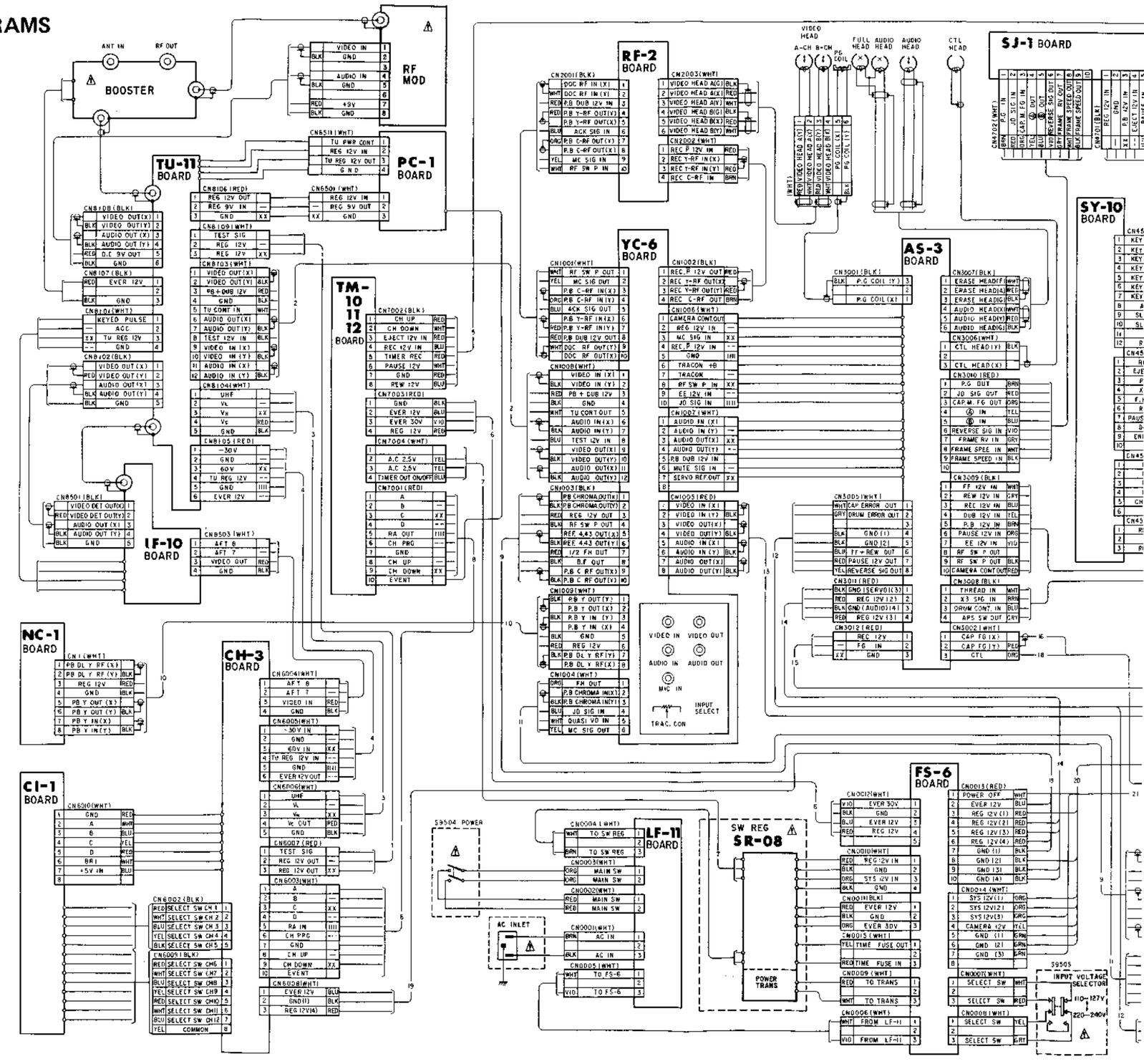


AUTO PROGRAME SEARCH TIMING CHART

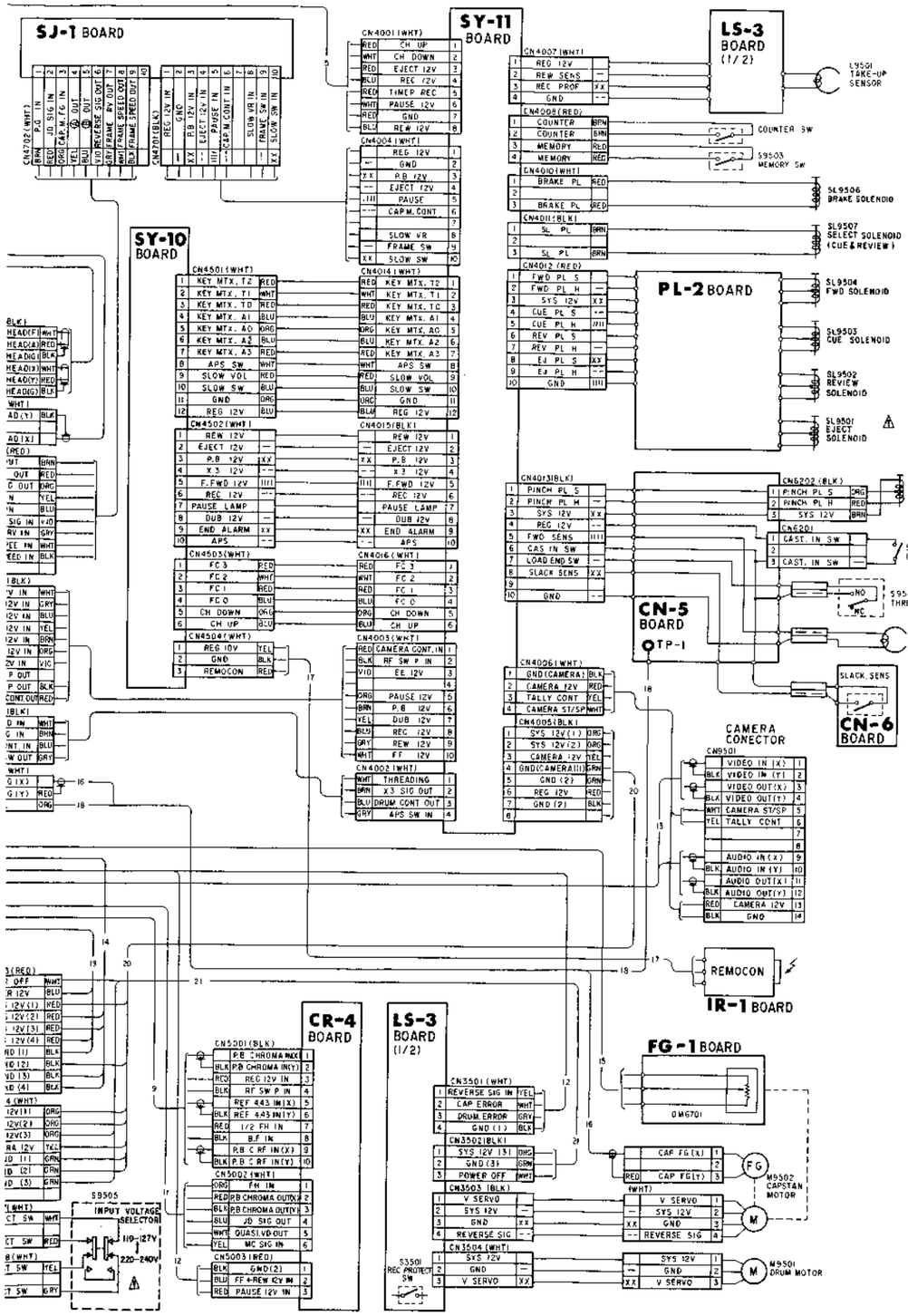


SECTION 3
PRINTED WIRING BOARD AND SCHEMATIC DIAGRAMS

FRAME SCHEMATIC DIAGRAM
– Ref. No. CHASSIS : 9500 Series –



The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

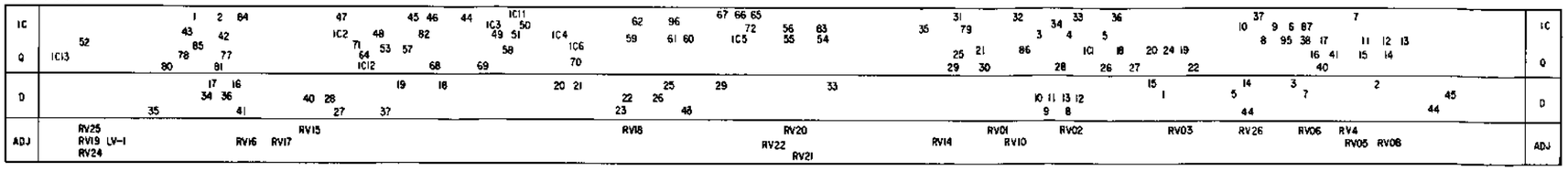

SJ-1 BOARD
SY-11 BOARD
SY-10 BOARD
LS-3 BOARD (1/2)
PL-2 BOARD
CN-5 BOARD
CN-6 BOARD
CR-4 BOARD
FG-1 BOARD
IR-1 BOARD
REMOCON
CAMERA CONECTOR
L9501 TAKE-UP SENSOR
COUNTER SW
S9503 MEMORY SW
SL9506 BRAKE SOLENOID
SL9507 SELECT SOLENOID (CUE&REVIEW)
SL9504 FWD SOLENOID
SL9503 CUE SOLENOID
SL9502 REVIEW SOLENOID
SL9501 EJECT SOLENOID
SL9505 PINCH SOLENOID
S9501 CASSETTE IN SW
S9502 THREADING END SW
L9502 SUPPLY SENSOR
SLACK SENS
M9502 CAPSTAN MOTOR
M9501 DRUM MOTOR
S9505 INPUT VOLTAGE SELECTOR
110-127V
220-240V
S3501 REC PROTECT SW

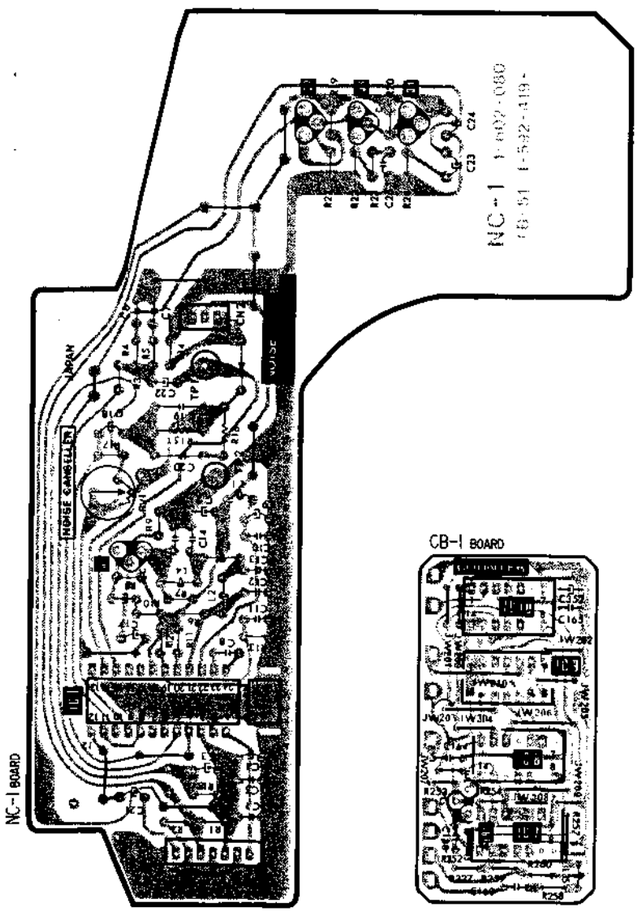
NC-1 (NOISE CANCELLER), YC-6 (Y & CHROMA SIGNALS RECORD/PLAYBACK PROCESS), CB-1, RF-2 (LOW-CONVERTED CHROMA & Y-FM SIGNAL RECORD/PLAYBACK PROCESS) AND CR-4 (CHROMA PROCESS DURING VARIABLE PLAYBACK MODE)

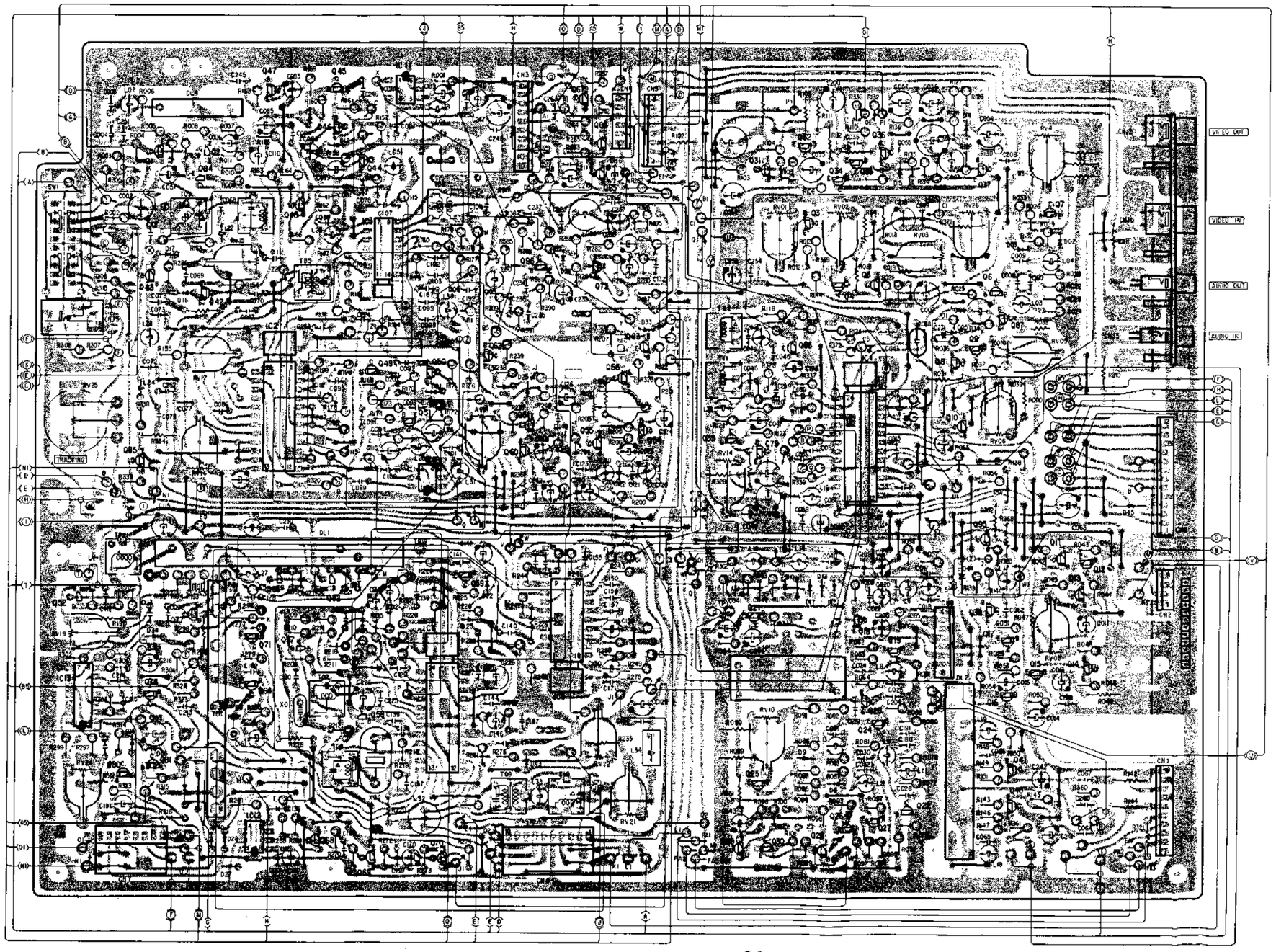
PRINTED WIRING BOARDS

– Ref. No. NC-1 BOARD: 001 Series YC-6, CB-1 BOARDS: 1000 Series
RF-2 BOARD: 2000 Series CR-4 BOARD: 5000 Series CHASSIS: 9500 Series –

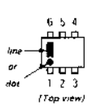
YC-6 BOARD



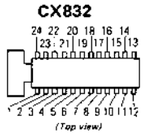




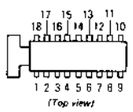
CX130



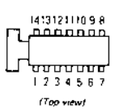
CX134A
CX135
CX136A
CX187
CX832



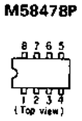
CX145



CX150
MSM4069



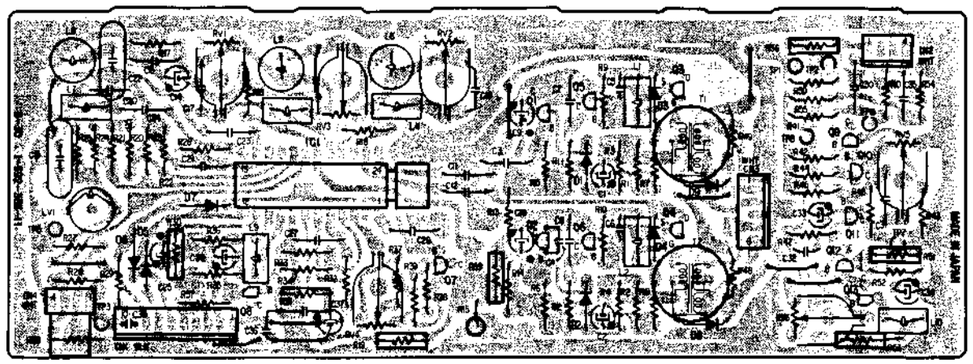
M58478P



		IC
1 12 13 14		Q
2 45 44		D
RV008		ADJ

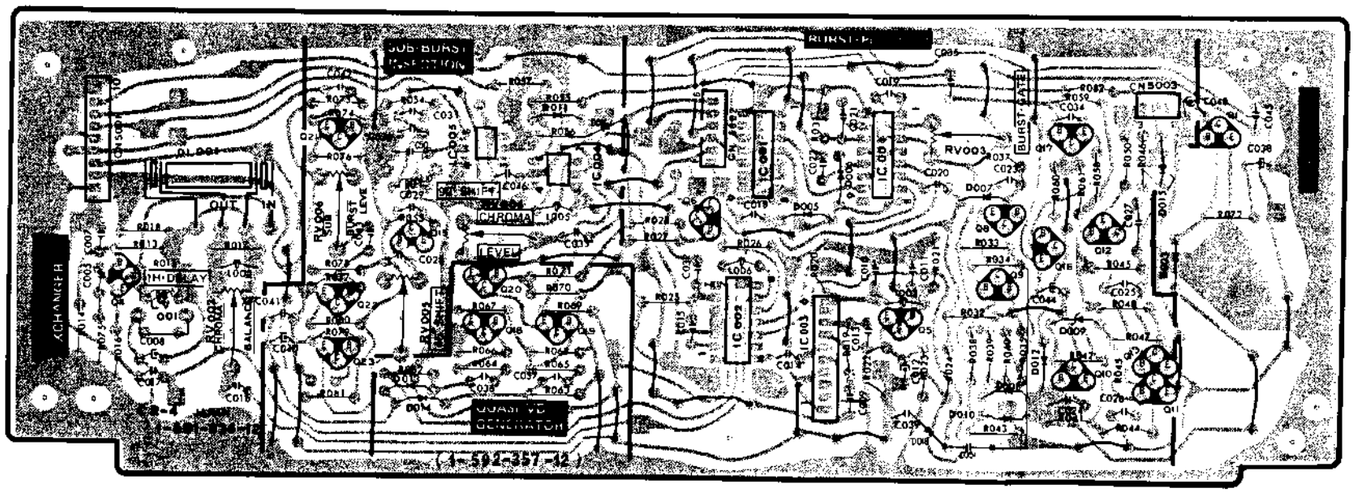
RF-2 BOARD

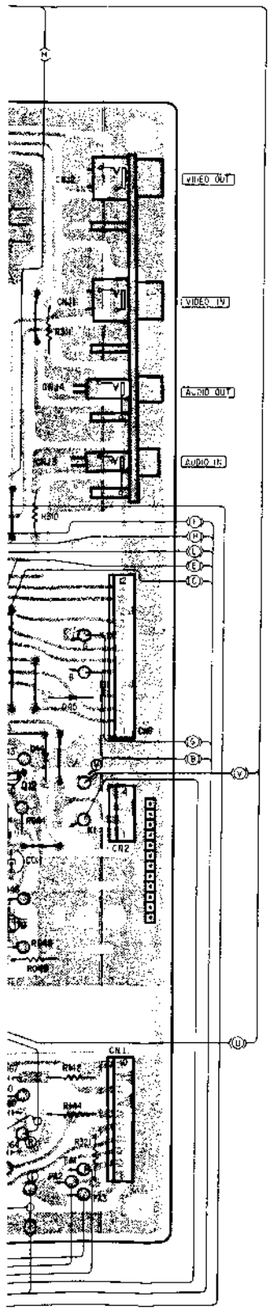
IC Q	IC1 8 7 1 2 5 6 3 4 9 10 11 12 13	IC Q
D	6,5 7 1 2 3 4 9 8	D
ADJ	RV1 RV3 RV2 RV4 RV5 RV5	ADJ



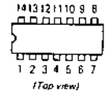
CR-4 BOARD

Q IC	4 21 22 23 15 IC005 20 18 IC006 19 6 IC001 IC002 IC003 IC004 5 8 9 16 17 10 12 11 13 1	Q IC
D	013 014 011 016 006 007 008 010 012 015 003	D
ADJ	LV001 RV002 RV006 RV005 RV004 RV003 018	ADJ

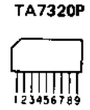




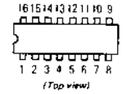
SN74LS10N
SN74LS74AN
SN74LS93N



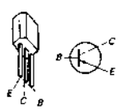
TA7320P



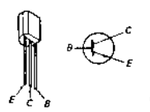
TC4027BP
TC4528BP



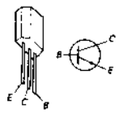
2SA1027R
2SA844



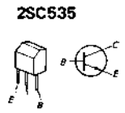
2SC1364



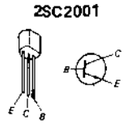
2SC403C



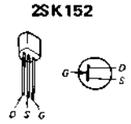
2SC535



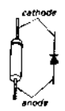
2SC2001



2SK152



1S1555
RD5.6E-B2Z
RD6.2E



YC-6 BOARD

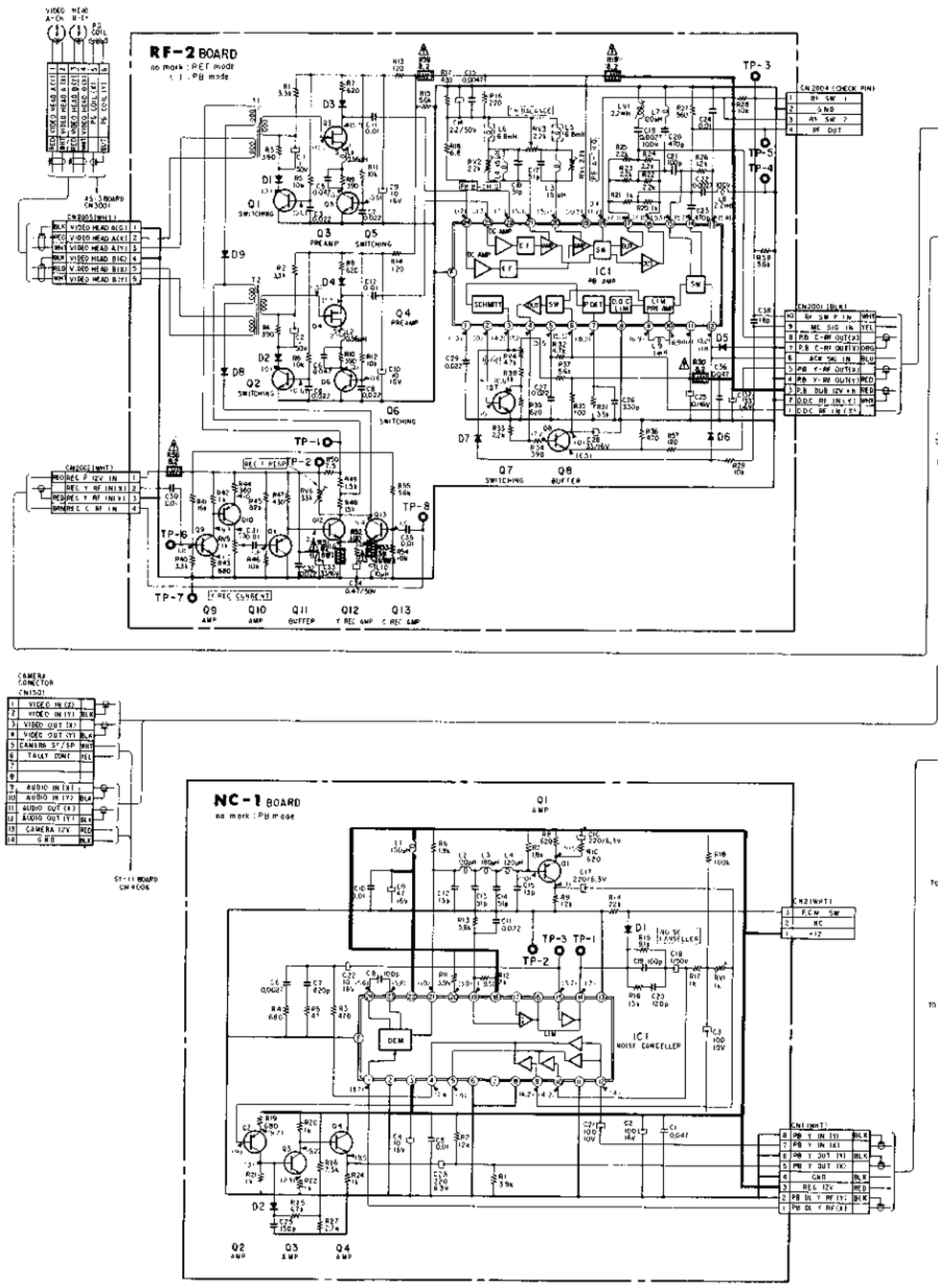
IC1 ① ② REC	IC1 ㉑ PB	TP-5 PB	TP-26 REC
IC1 ① ② PB	IC1 ㉒ REC	TP-5 REC	
IC1 ④ REC/PB	IC1 ㉔ REC	TP-9 REC	
IC1 ⑥ PB	IC2 ① REC	TP-11 PB	
IC1 ⑧ REC	IC2 ① PB	TP-19 REC/PB	
IC1 ⑫ PB	IC2 ⑫ PB	TP-22 REC/PB	
IC1 ⑮ REC	IC2 ㉒ REC/PB	TP-24 PB	
IC1 ⑯ PB	IC2 ㉔ REC/PB	TP-24 REC	

CR-4 BOARD

IC2 ⑥ PB	CN5001 ① PB	TP-1 REC
IC3 ⑦ PB	CN5001 ④ RF SW PULSE	TP-3 PB RF SW PULSE
IC4 ⑤ PB	CN5001 ⑤ PB	TP-5 PB
IC6 ① PB	CN 5002 ⑤ PB	TP-8 REC

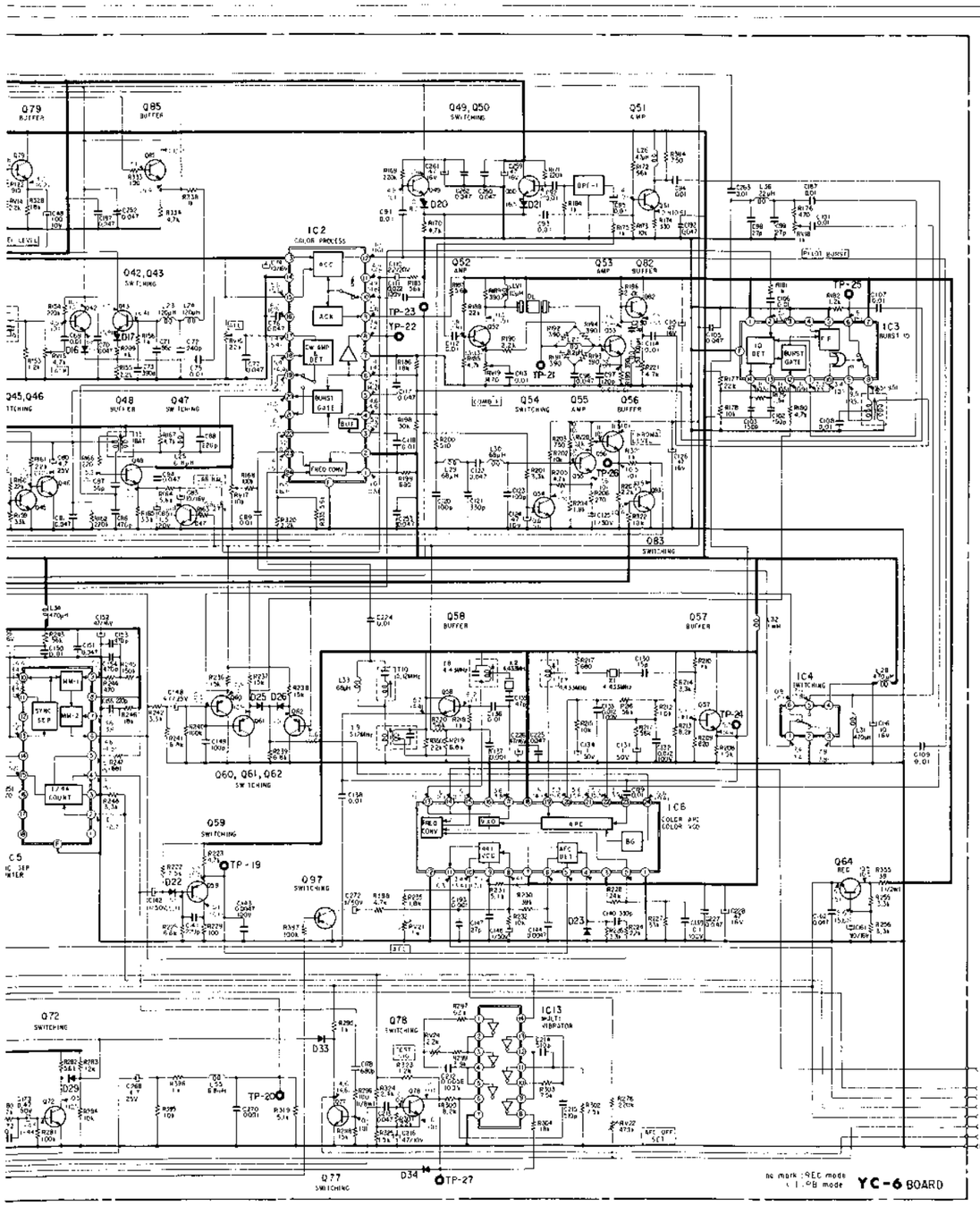
RF-2 BOARD

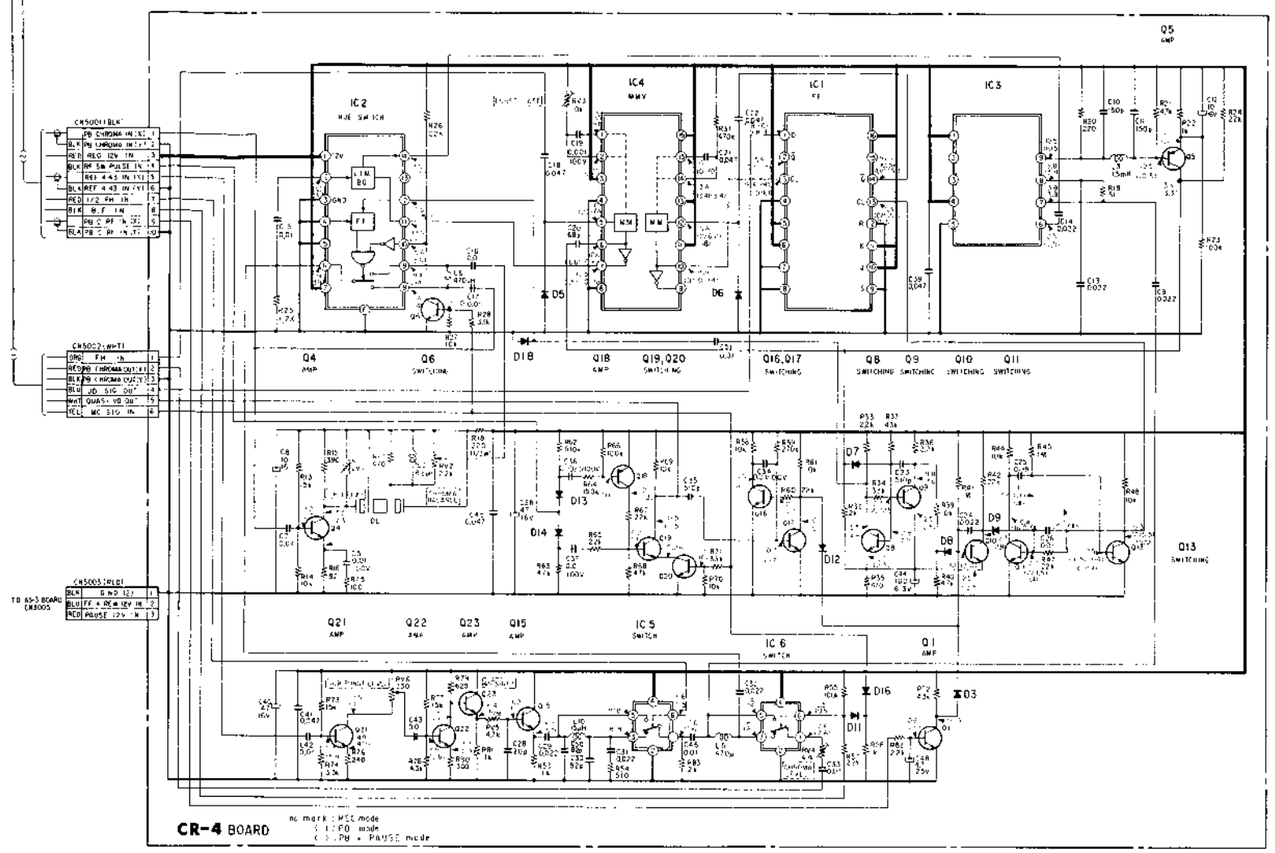
TP-1 REC	CN2001 ⑧ PB
TP-3 PB RF SW PULSE	CN5003 ⑤ PB

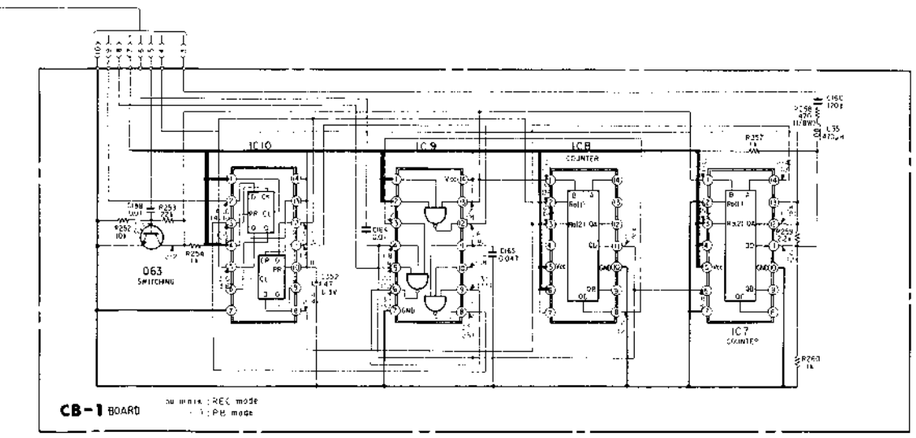


NC-1 (NOISE CANCELLER), YC-6 (Y & CHROMA SIGNALS RECORD/PLAYBACK PROCESS), CB-1, RF-2 (LOW-CONVERD CHROMA & Y-FM SIGNAL RECORD/PLAYBACK PROCESS) AND CR-4 (CHROMA PROCESS DURING VARIABLE PLAYBACK MODE) BOARDS SCHEMATIC DIAGRAM

– Ref. No. NC-1 BOARD: 001 Series YC-6, CB-1 BOARDS: 1000 Series RF-2 BOARD: 2000 Series CR-4 BOARD: 5000 Series CHASSIS: 9500 Series –







NOTES:

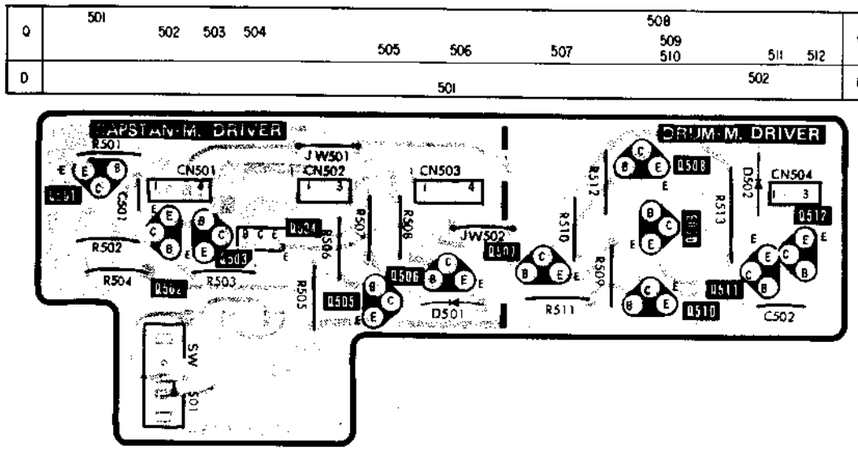
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

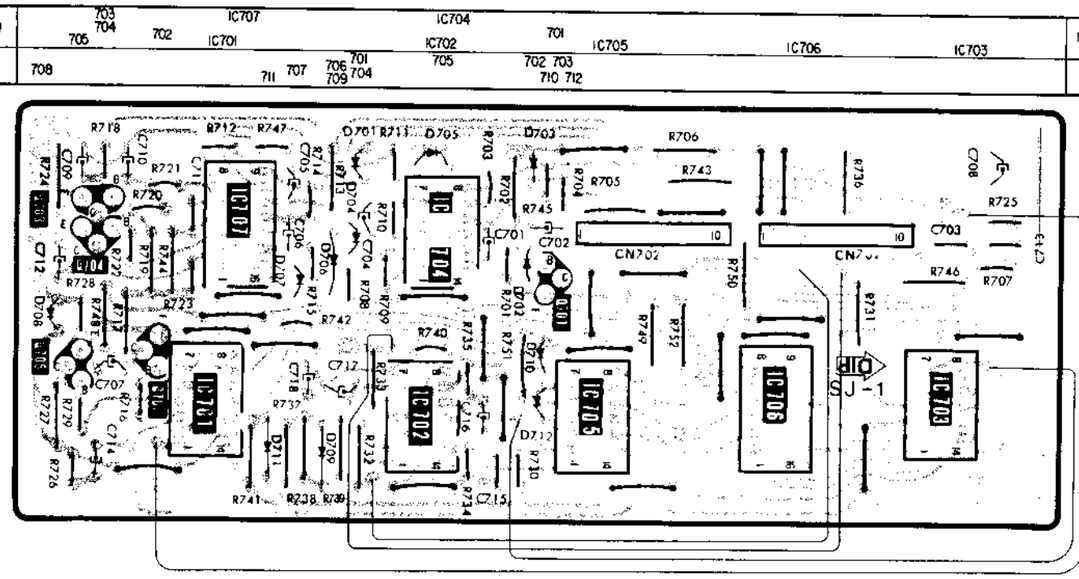
AS-3 (SERVO, AUDIO RECORD/PLAYBACK PROCESS), LS-3 (CAPSTAN & DRUM MOTOR DRIVE), SJ-1 (SERVO CONTROL DURING VARIABLE PLAYBACK MODE) AND FG-1 (CAPSTAN FLY FG) PRINTED WIRING BOARDS

– Ref. No. AS-3 BOARD : 3000 Series LS-3 BOARD : 3500 Series SJ-1 BOARD : 4700 Series FG-1 BOARD : 6700 Series CHASSIS : 9500 Series –

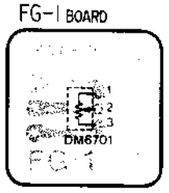
LS-3 BOARD



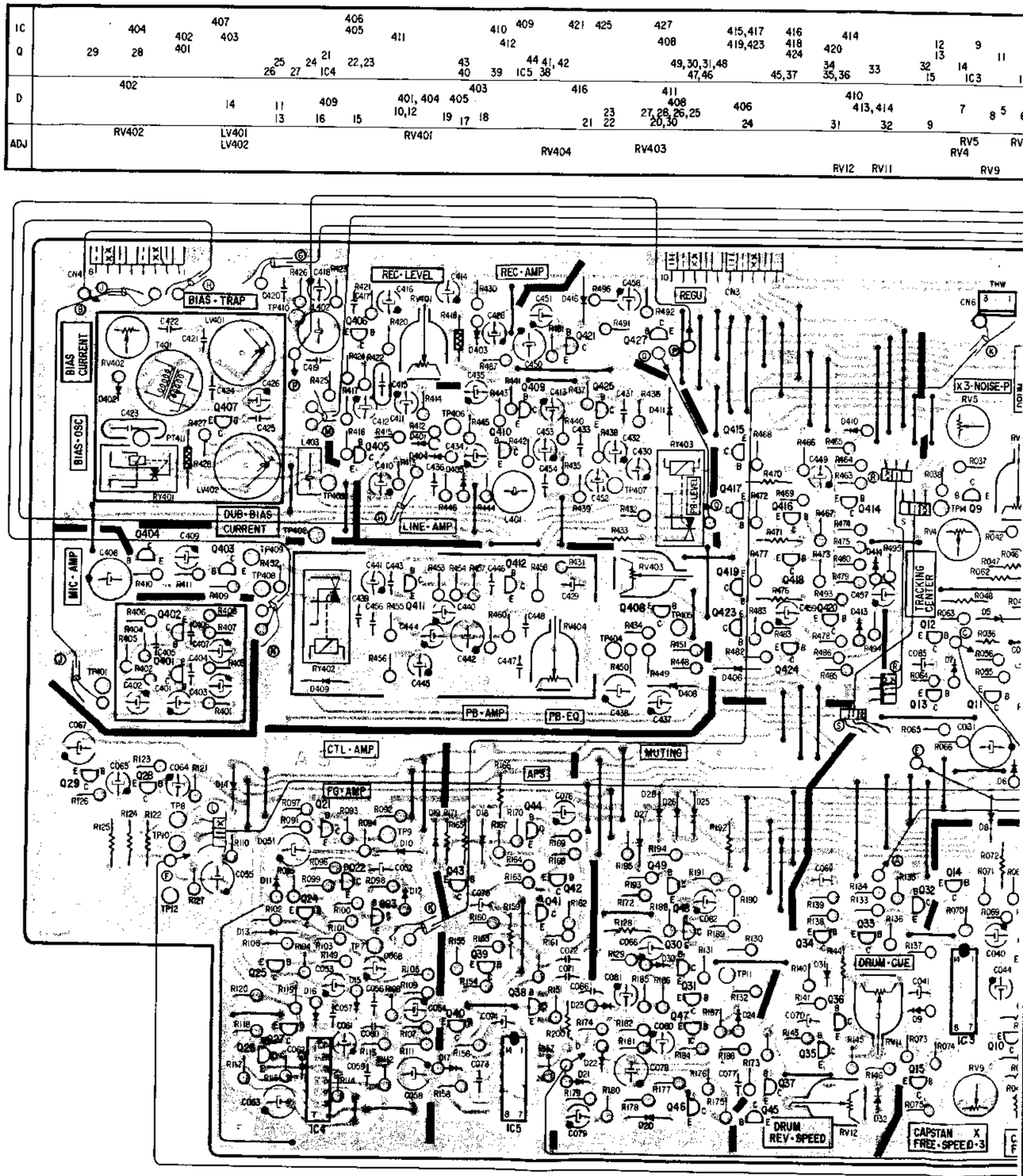
SJ-1 BOARD

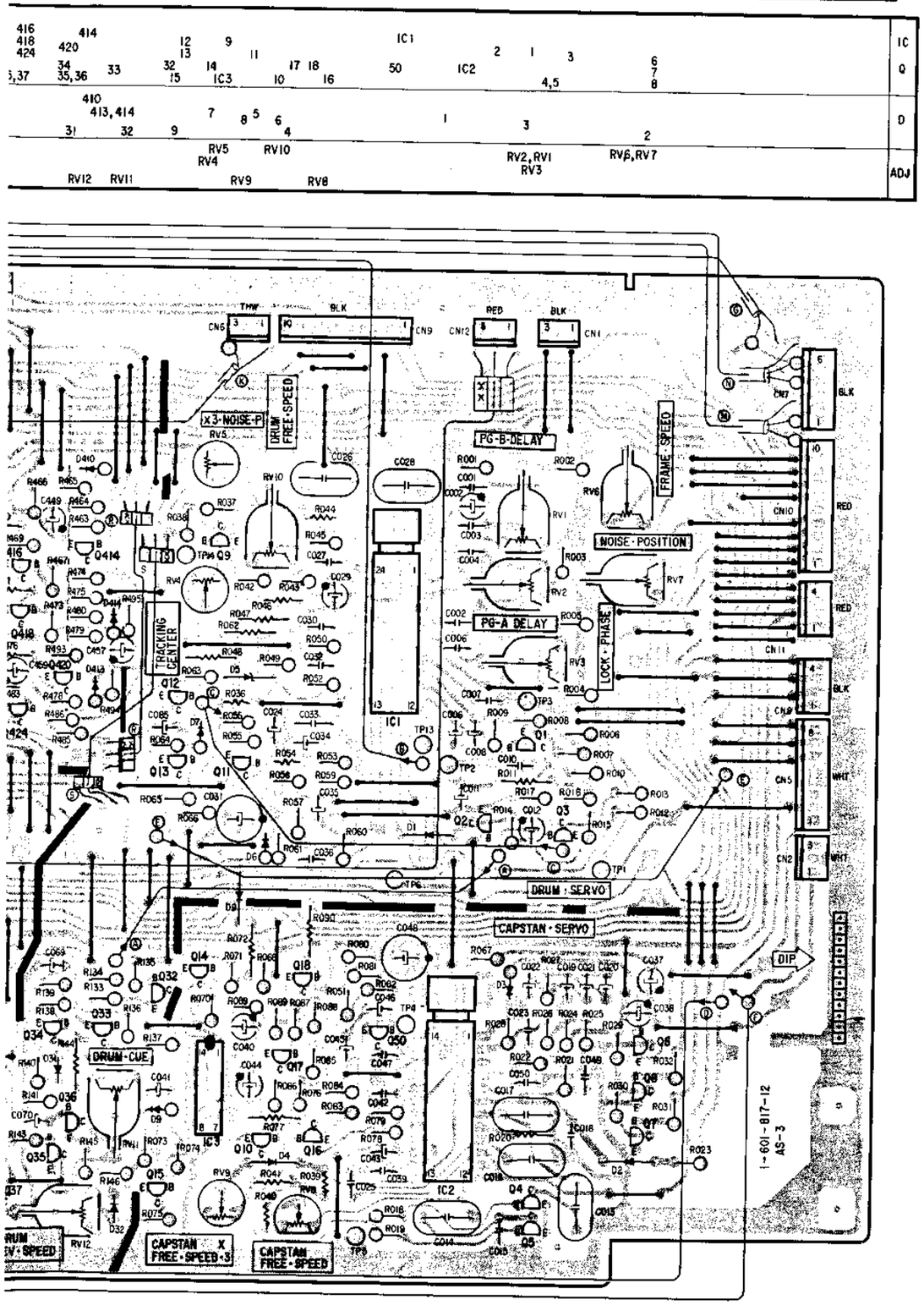


FG-1 BOARD

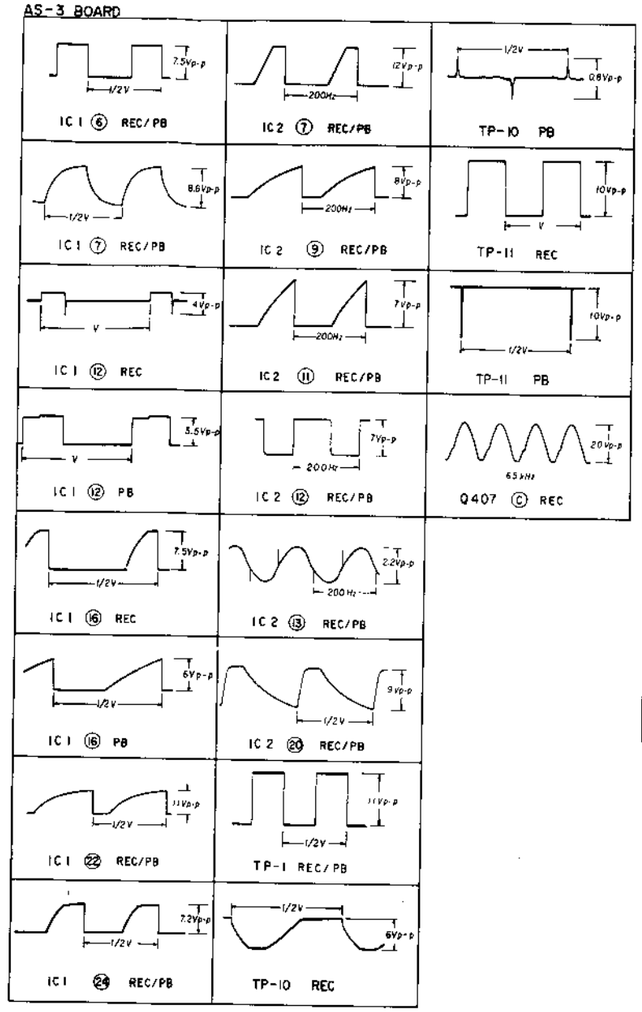


AS-3 BOARD





AS-3 BOARD



AS-3 BOARD

CUE/REV MODE

	Q1	Q12	Q13	Q16	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q35 (CUE MODE ONLY)	Q37 (REV MODE ONLY)
B	*	0	0	12.5	0.6	0.6	0.8	0	0.6	11	0.6	7.6	7.6
C	GND	1.2	0.6	11.5	0	0	0	5.7	0	11.5	0	7	7
E	*	GND	GND	11.5	GND	GND	GND	GND	GND	11.5	GND	7	7

IC 1

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
VOLTAGE	*	3.4	3.6	5.3	3	3	5.7	*	*	*	3	1.9	6	11.5	2.8	2.1	5.1	7.4	*	*	1.8	*	3.7	*

IC 2

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 (CUE/REV)	21	22	23	24
VOLTAGE	2.3	5.4	5.4	3.2	0.8	5.4	3.8	5.8	2.8	4.1	1.8	4.1	4.3	GND	GND	GND	–	–	11.5	3.8	4.8	0.9	*	*	11.5

X3 MODE

IC 2

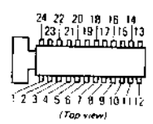
PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
VOLTAGE	7	5.4	5.8	3.4	0.3	5.8	0.4	5.8	3.5	3.9	3.4	3.9	4.3	GND	GND	GND	–	–	11.5	5.8	*	*	5	11.5

	Q4	Q5	Q6	Q10	Q17	Q18	Q48	Q49	Q50
B	0	0	4.6	0	0.6	11.5	11	0.6	5
C	0	2.5	GND	4.7	0	11.5	11.5	0	GND
E	GND	GND	6.1	GND	GND	11	11.5	GND	5.6

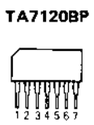
DUB MODE

	Q405	Q408	Q417	Q418	Q419	Q420	Q423	Q424	Q427
B	0	0.7	11	0	0	0.6	10.5	0.7	0
C	0	0	11.5	11.5	11.5	0	11.5	0	0
E	GND	GND	11.5	GND	11.5	GND	11.5	GND	GND

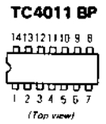
CX143A
CX186



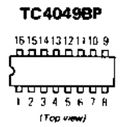
TA7120BP



TC4001BP
TC4011 BP



TC4049BP



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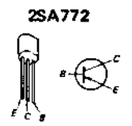
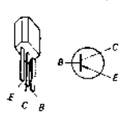


2SA1027R



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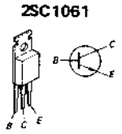

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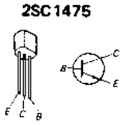
2SC1475



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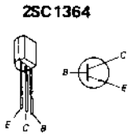
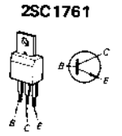
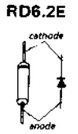


2SC1761

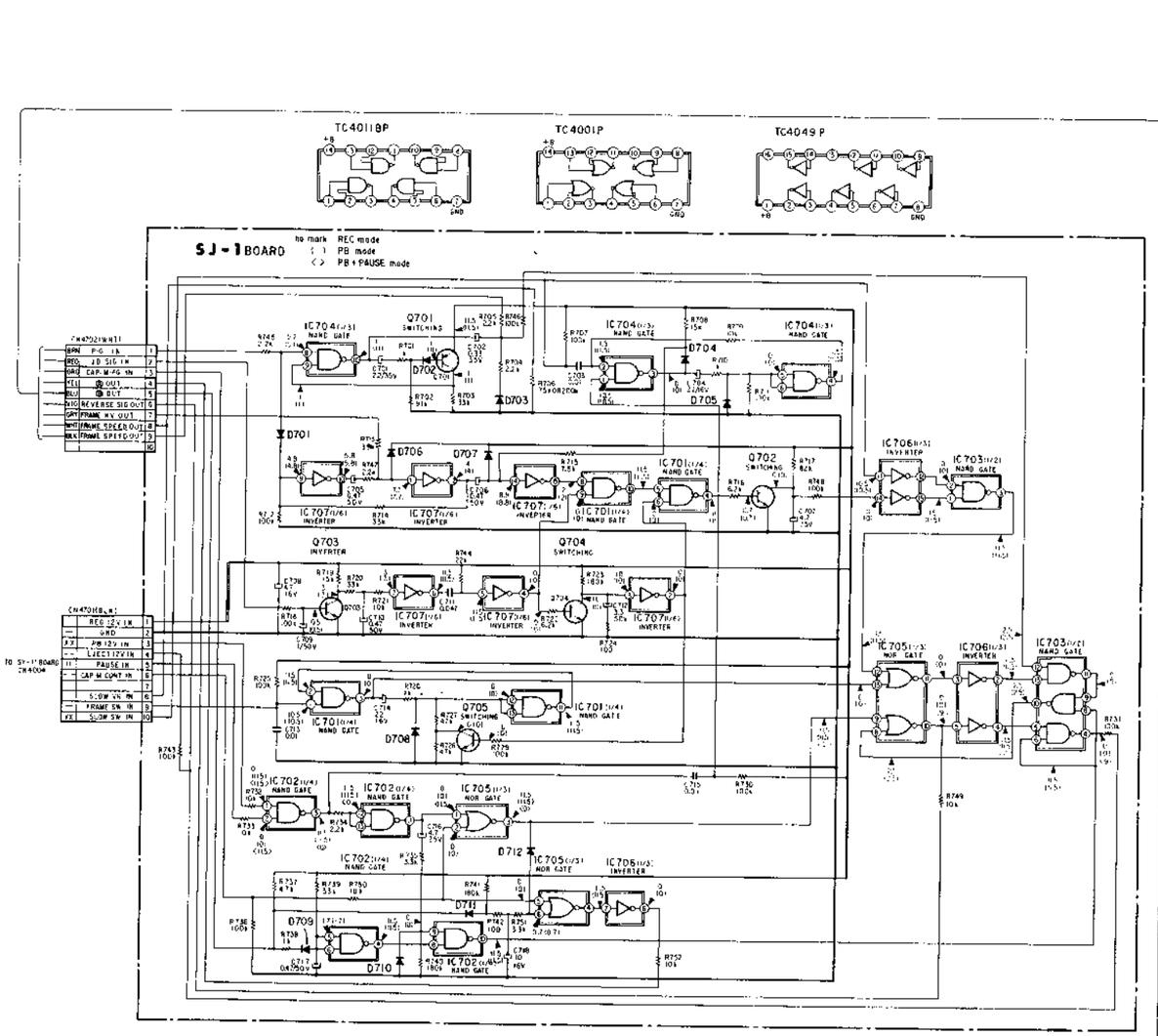


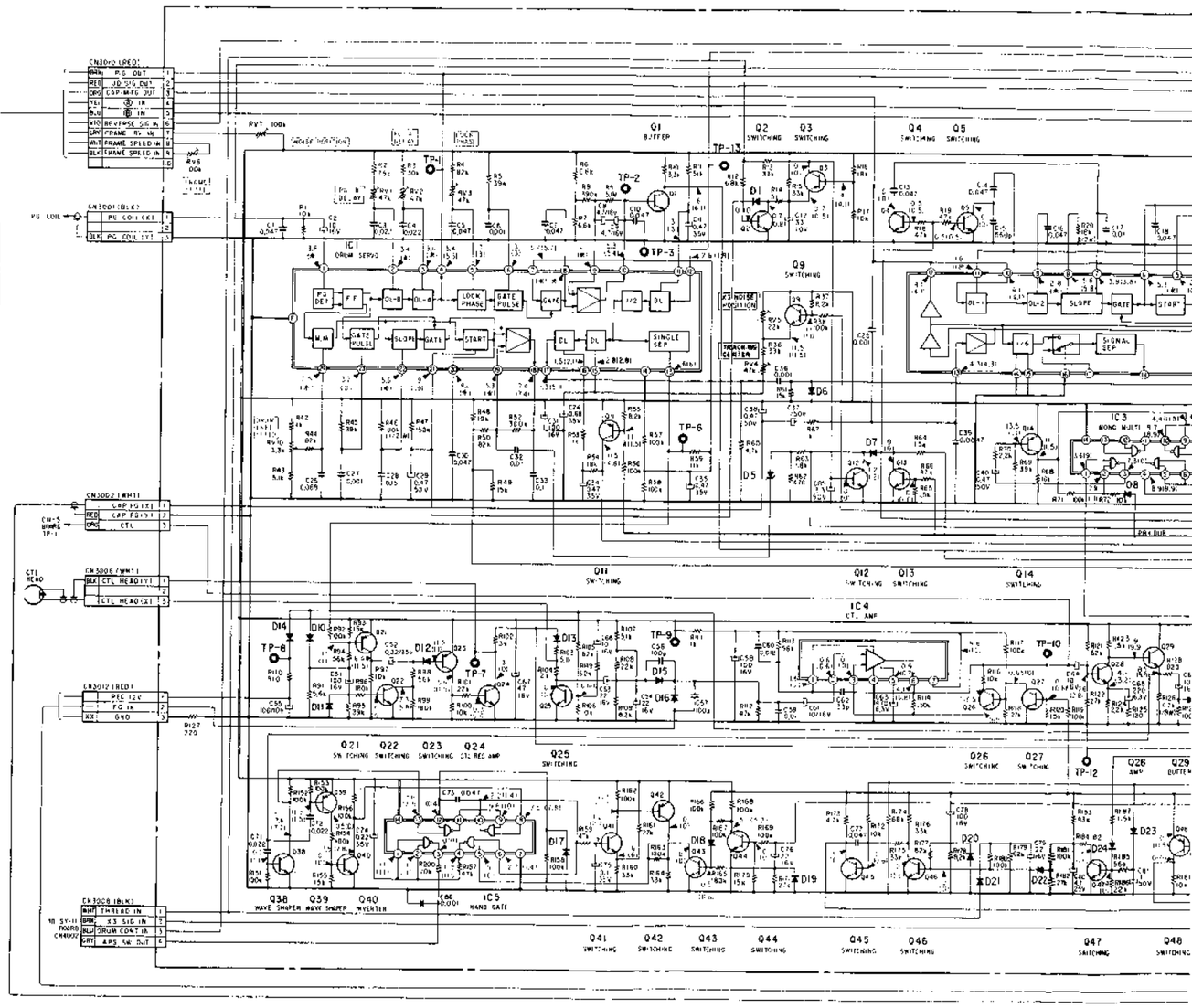
10E2
1S1555
1T22AM
RD6.2E



AS-3 (SERVO, AUDIO RECORD/PLAYBACK PROCESS), LS-3 (CAPSTAN & DRUM MOTOR DRIVE), SJ-1 (SERVO CONTROL DURING VARIABLE PLAYBACK MODE) AND FG-1 (CAPSTAN FLY FG) BOARDS SCHEMATIC DIAGRAM

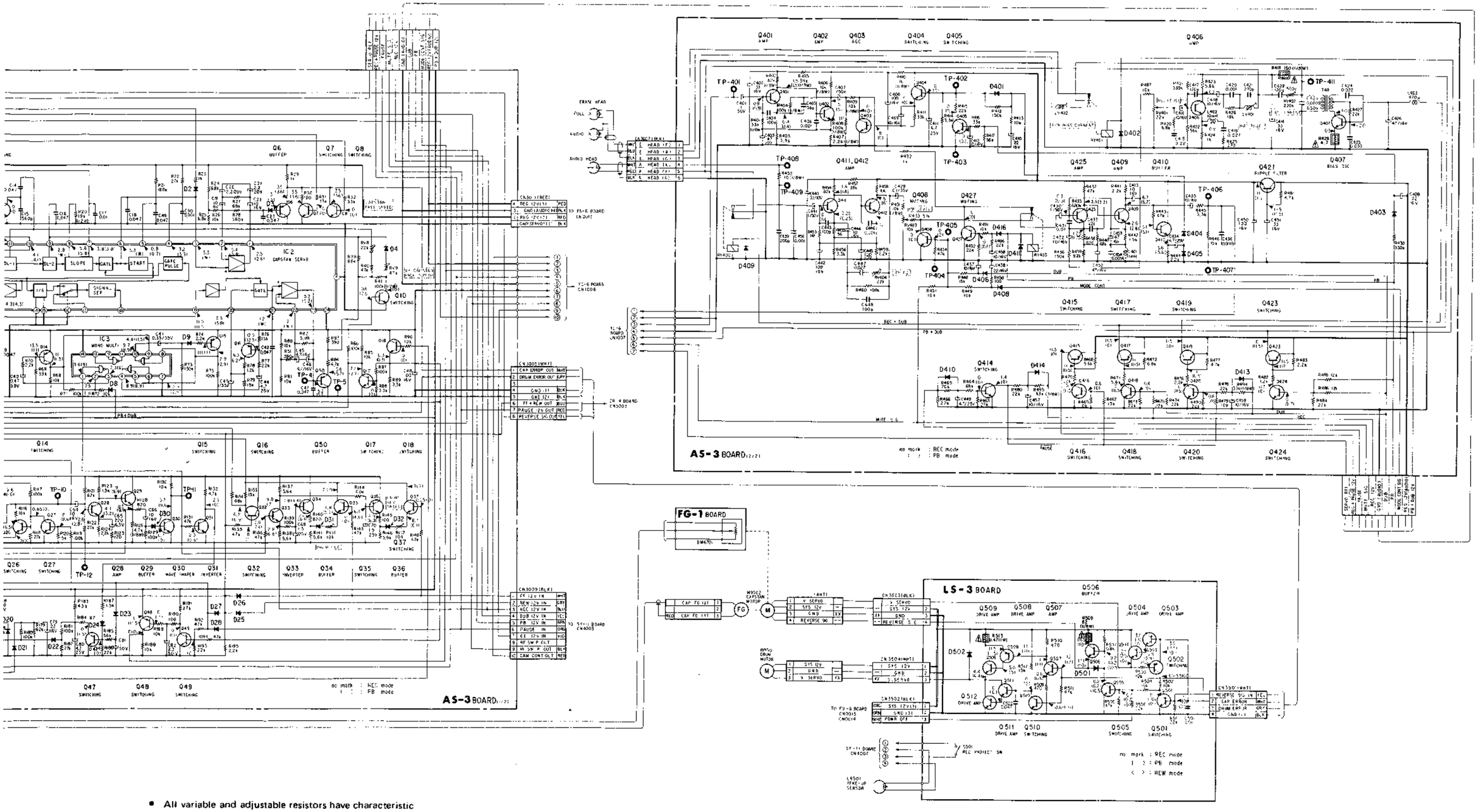
– Ref. No. AS-3 BOARD: 3000 Series LS-3 BOARD: 3500 Series SJ-1 BOARD: 4700 Series FG-1 BOARD: 6700 Series CHASSIS: 9500 Series –





NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.



- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

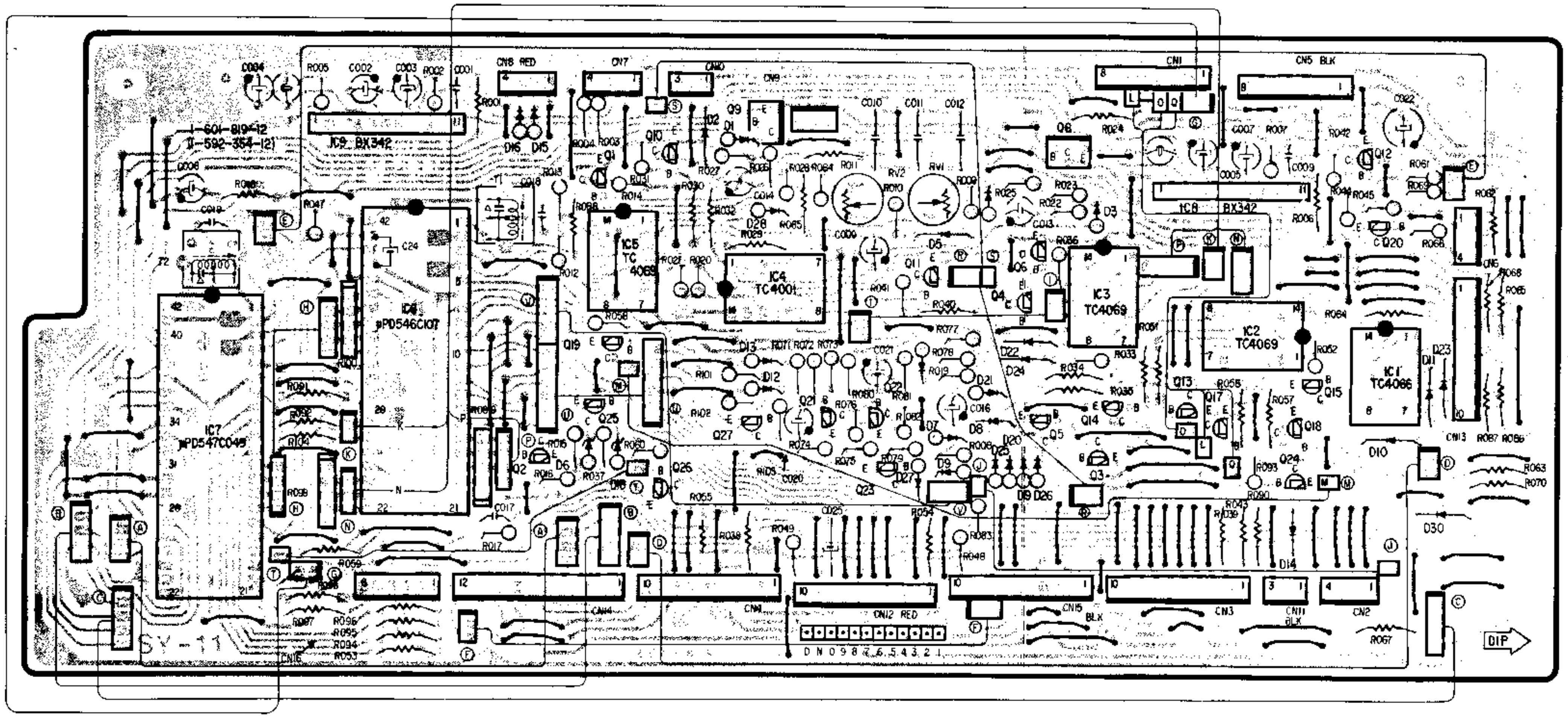
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

SY-11 (FUNCTION KEY), SY-10 (LOGIC CONTROL), PL-2 (SOLENOID DRIVE), RM-1/RM-2 (REMOTE CONTROL – transmit section –), IR-1 (REMOTE CONTROL – receive section –), CN-5 (RELAY) AND CN-6 (SLACK SENSOR) PRINTED WIRING BOARDS

– Ref. No. SY-11 BOARD: 4000 Series SY-10 BOARD: 4500 Series PL-2 BOARD: 4600 Series RM-1, RM-2 BOARDS: 4800 Series IR-1 BOARD: 4900 Series CN-5, CN-6 BOARDS: 6200 Series CHASSIS: 9500 Series –

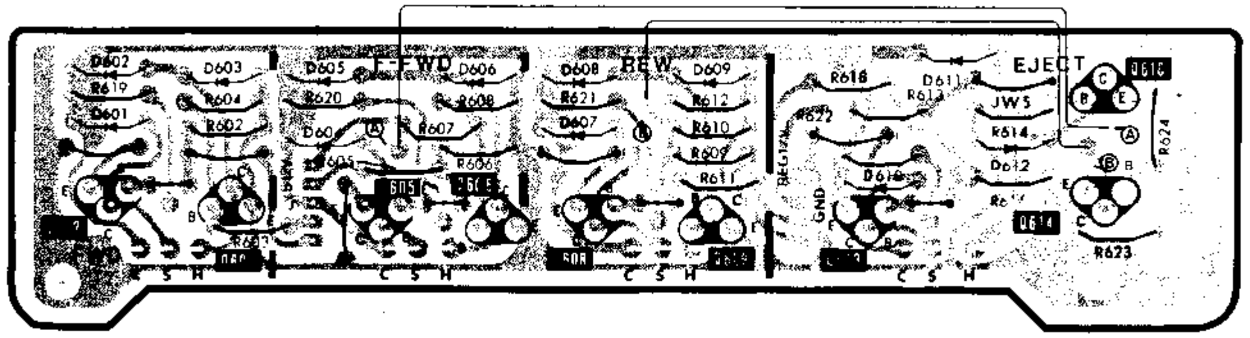
SY-11 BOARD

Q · IC	IC7 IC9 IC6 2 1 IC5 25 19 10 26 9 IC4 27 21 22 23 11 4 6 5 8 IC3 3 14 13 17 IC8 IC2 18 24 15 12 20 IC1
D	16, 15 6 18 2 12 28 13 27 29 5 7, 9 4 8 22, 24 21, 25, 20, 19, 26 3 14 10 11 30 23
ADJ	RV2 RV1

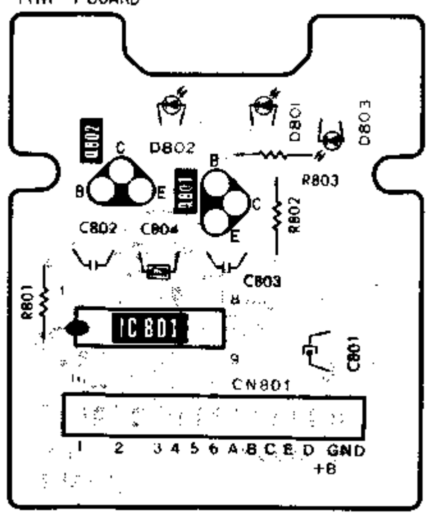


PL-2 BOARD

Q	602 603 605 606 608 609 613 610 614
D	602 601 603 605 604 606 608 607 609 610 611 612

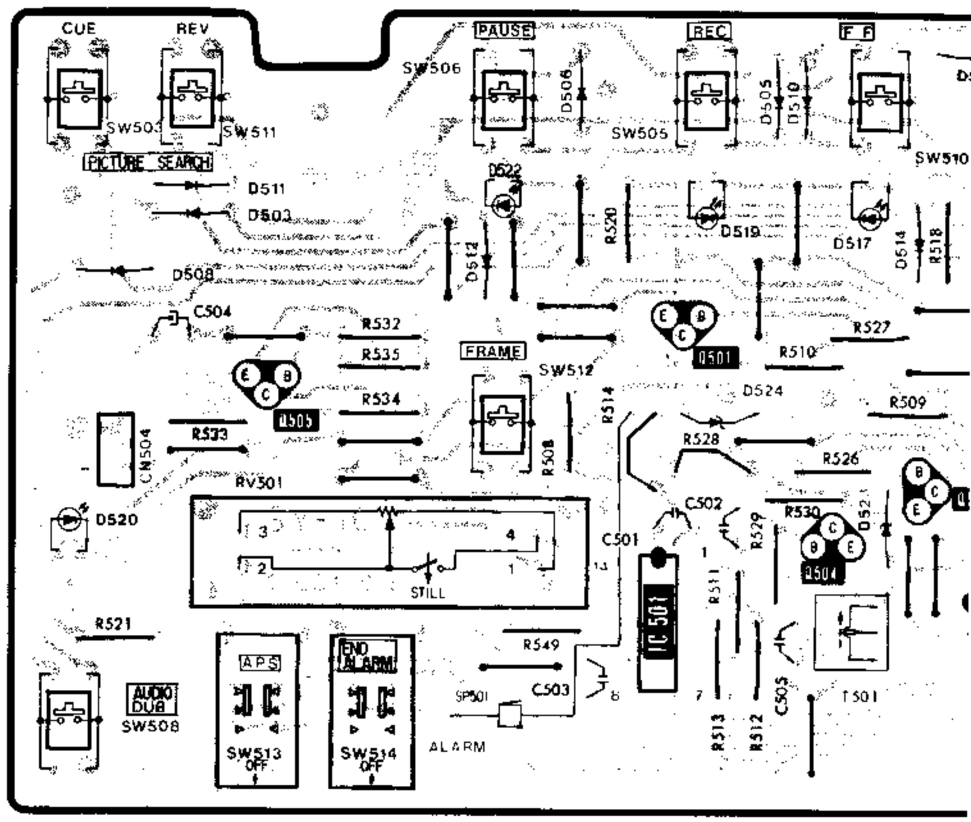


RM-1 BOARD

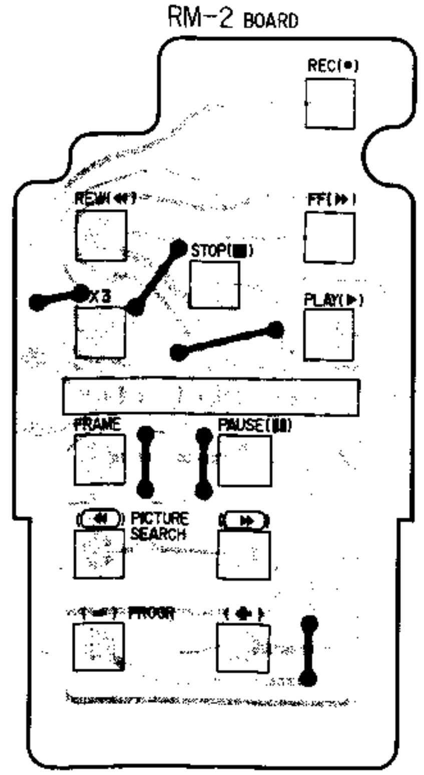


SY-10 BOARD

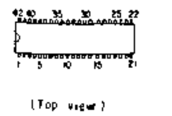
Q · IC	505 IC501 501 504 503
D	520 508 511 503 512 522 506 519 524 505, 510 517 523
ADJ	T501



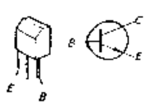
RM-2 BOARD



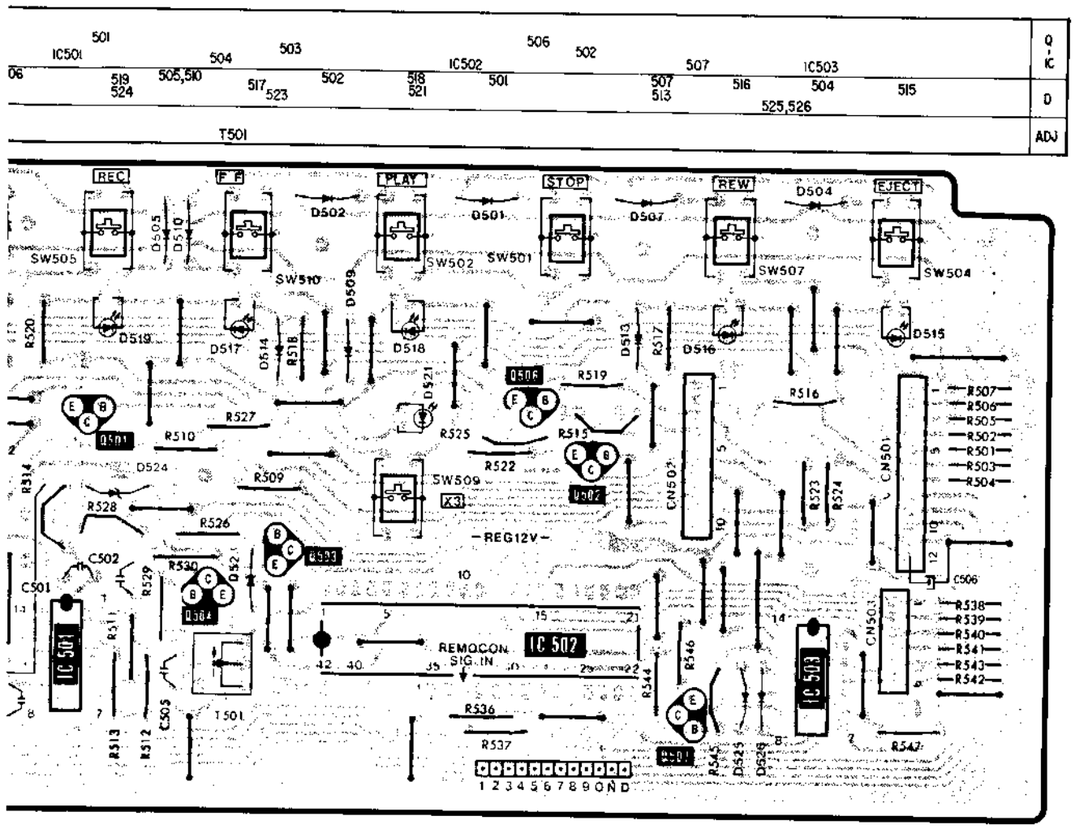
μPD546C107
μPD547C049
μPD547C060



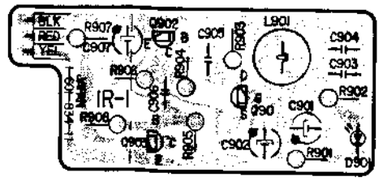
2SC2315



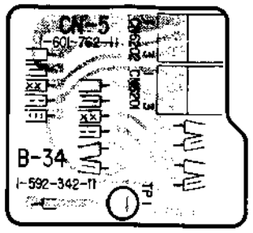
SYSTEM CONTROL



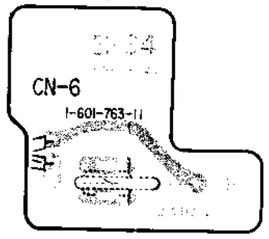
IR-1 BOARD



CN-5 BOARD



CN-6 BOARD



SY-11 BOARD

IC 6

PIN No. / MODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CUE	7.2	0	0	0	9.6	10	0	0	0	0	0	0	0.3	9.3	0	0	0	10	10	10	10	0	0	0	0	0	0	0
REV	7.2	0	0	0	9.6	10	0	0	0	0	0	0	9.3	0.3	0	0	10	0	10	10	10	0	0	0	0	0	0	0
PB+PAUSE	7.2	0	0	10	0	10	0	0	0	0	0	0	0	0	9.5	0	0	0	10	10	10	0	0	0	0	10	10	0

29	30	31	32	33	34	35	36	37	38	39	40	41	42
0	0	–	0.7	0.8	0	0.4	0.4	3.8	0	10	0.8	GND	7.1
0	0	–	0.7	0.4	0	0.4	0.8	3.8	0	10	0.8	GND	7.1
0	0	–	0.7	0.4	0	0.4	0.4	3.9	0	10	2.7	GND	7.1

IC 7

PIN No. / MODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
CUE	7.1	GND	0	0	0.7	10	0	9.5	9.5	9.5	9.5	0.8	0	0.4	0.4	3.2	–	–	–	10	10	–	–	–	–	0.5	0.5	0.5
REV	7.1	GND	0	0	0.7	10	0	9.5	9.5	9.5	9.5	0.4	0	0.4	0.8	3.3	–	–	–	10	10	–	–	–	–	0.5	0.5	0.5
PB+PAUSE	7.1	GND	0	0	0.7	10	0	9.5	9.5	9.5	9.5	0.4	0	0.4	0.4	2.8	–	–	–	10	10	–	–	–	–	0.5	0.5	0.5

29	30	31	32	33	34	35	36	37	38	39	40	41	42
0.5	8.2	–	–	0.5	0	0.4	0.4	10	0	0	0	GND	7.1
0.5	8.2	–	–	0	0	0.4	0.9	10	0	0	0	GND	7.1
0.5	8.2	–	–	0	0	0.4	0.4	10	0	0	0	GND	7.1

SY-10 BOARD

IC 2

MODE / PIN NO.	REW	F.F	STOP	x3	FWD	FRAME	PAUSE	REV	CUE	PROGR –	PROGR +
12	0	10	10	0	0	10	10	0	10	0	0
13	10	0	10	0	0	0	0	0	10	10	10
14	0	10	0	0	10	10	0	10	0	10	0
15	0	0	0	10	0	10	10	10	10	10	0
26	0	0	0	0	0	0	0	0	0	0	10
27	0	0	0	0	0	0	0	0	0	10	0

PAUSE mode

		PB	REC
Q1	B	0.6	0.6
	C	0	0
IC 3	13	10	10
	12	0	11.5
	11	0	11
	1		11
	2		0
	3		0
	4		11
	5		0
	6		11

X3 mode

Q6	B	0.6
	C	0

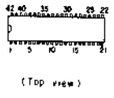
F.F WD mode

		REW mode
Q3	B	0
	C	7.8

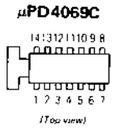
RM-I BOARD

		MODE											
		REC (●)	REW (◀◀)	FF (▶▶)	STOP (■)	X3	PLAY (▶)	FRAME	PAUSE (▮▮)	REV (◀◀)	CUE (▶▶)	PROGRAMMING(–)	PROGRAMMING(+)
IC 801 IPIN GND	2	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	3	3	3	3	3	3	3	3	3	3	3	3	3
	4	5.1	5.1	5.1	5.2	5.1	5.2	5.1	5.1	5.1	5.1	5.2	5.2
	5	5.1	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
	6	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.2	5.2	5.1	5.1
	7	5.1	5.1	5.1	5.1	5.2	5.1	5.2	5.2	5.1	5.1	5.1	5.1
	8	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
	9	5.2	5.7	5.2	5.6	5.2	5.2	5.7	5.7	5.6	5.2	5.6	5.6
	10	5.7	5.2	5.6	5.6	5.6	5.6	5.2	5.2	5.2	5.6	5.6	5.6
	11	5.7	5.6	5.6	5.2	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	12	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.2	5.6
	13	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	16	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Q 802	B	0	0	0	0	0	0	0	0	0	0	0	0
	C	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
	E	0	0	0	0	0	0	0	0	0	0	0	0

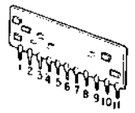
μPD546C107
μPD547C049
μPD547C060



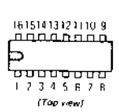
μPD4069C



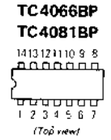
BX342



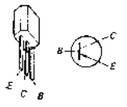
M50112P



TC4001BP
TC4011BP
TC4066BP
TC4081BP



2SA1027R



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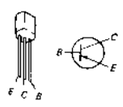

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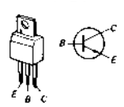

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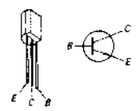
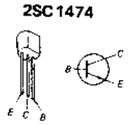


2SC1474



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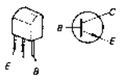
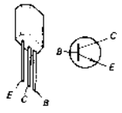
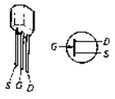


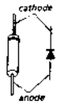
2SC403C



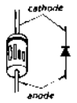
2SK23A



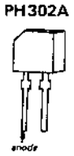
10E2
1S1555
RD11E-B



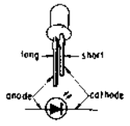
EQB01–08



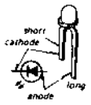
PH302A



SE303A

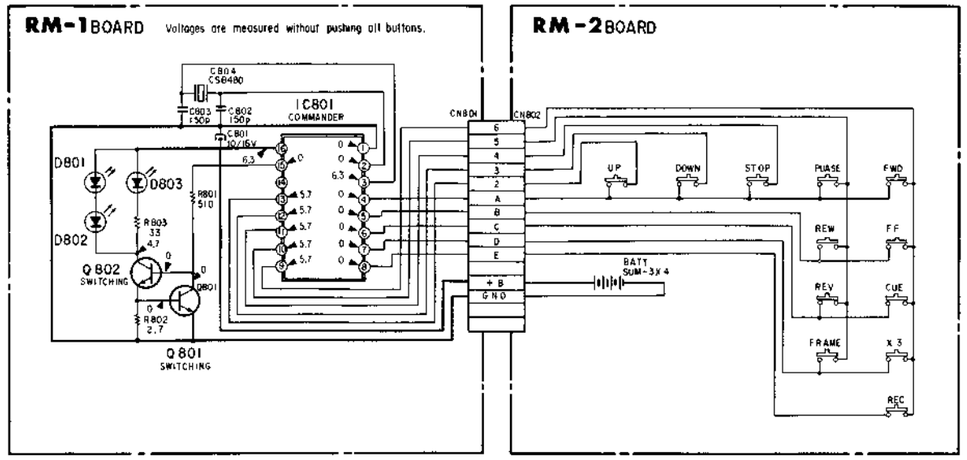


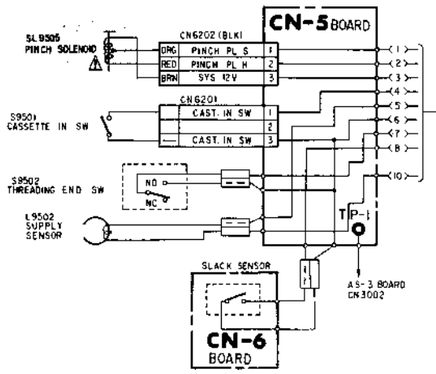
TLR123

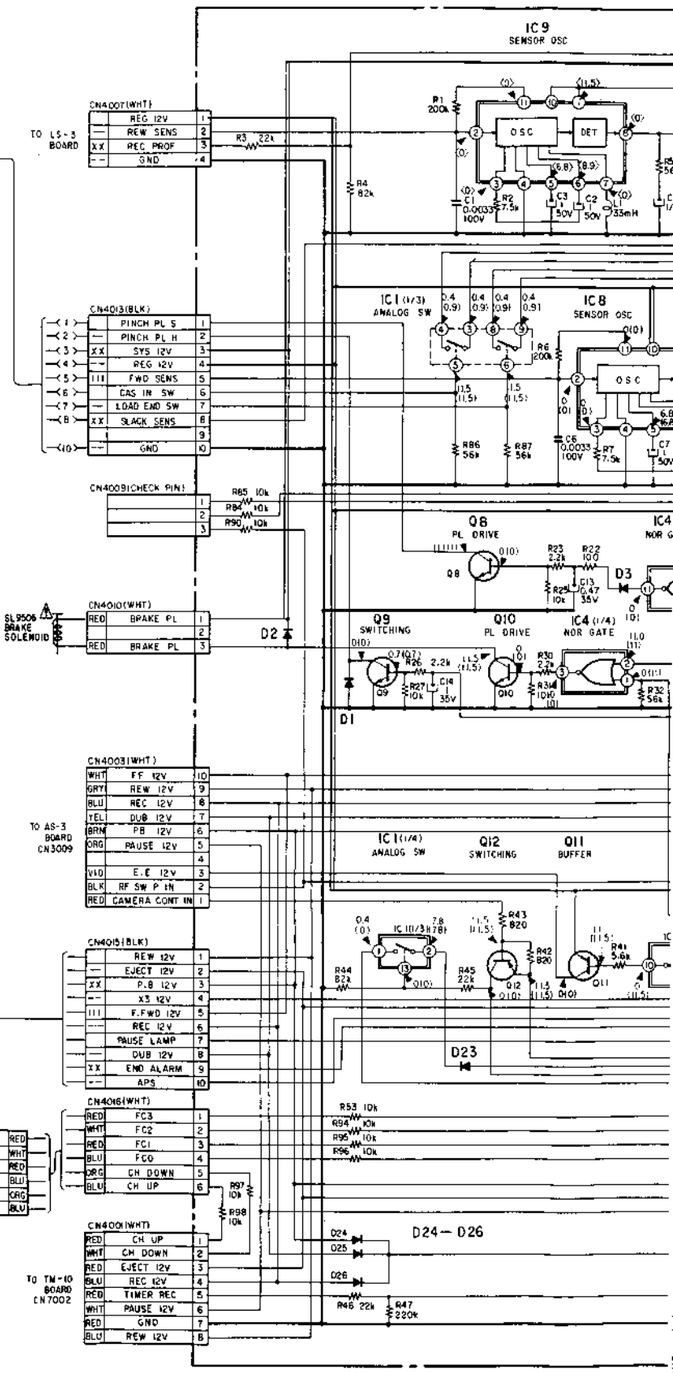


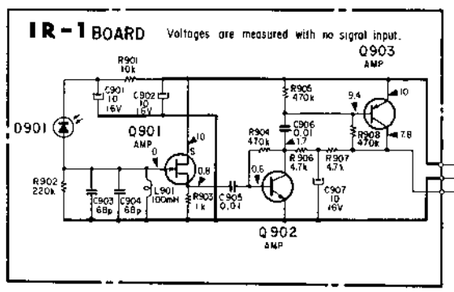
SY-11 (FUNCTION KEY), SY-10 (LOGIC CONTROL), PL-2 (SOLENOID DRIVE), RM-1/RM-2 (REMOTE CONTROL – transmit section –), IR-1 (REMOTE CONTROL – receive section–), CN-5 (RELAY) AND CN-6 (SLACK SENSOR) BOARDS SCHEMATIC DIAGRAM

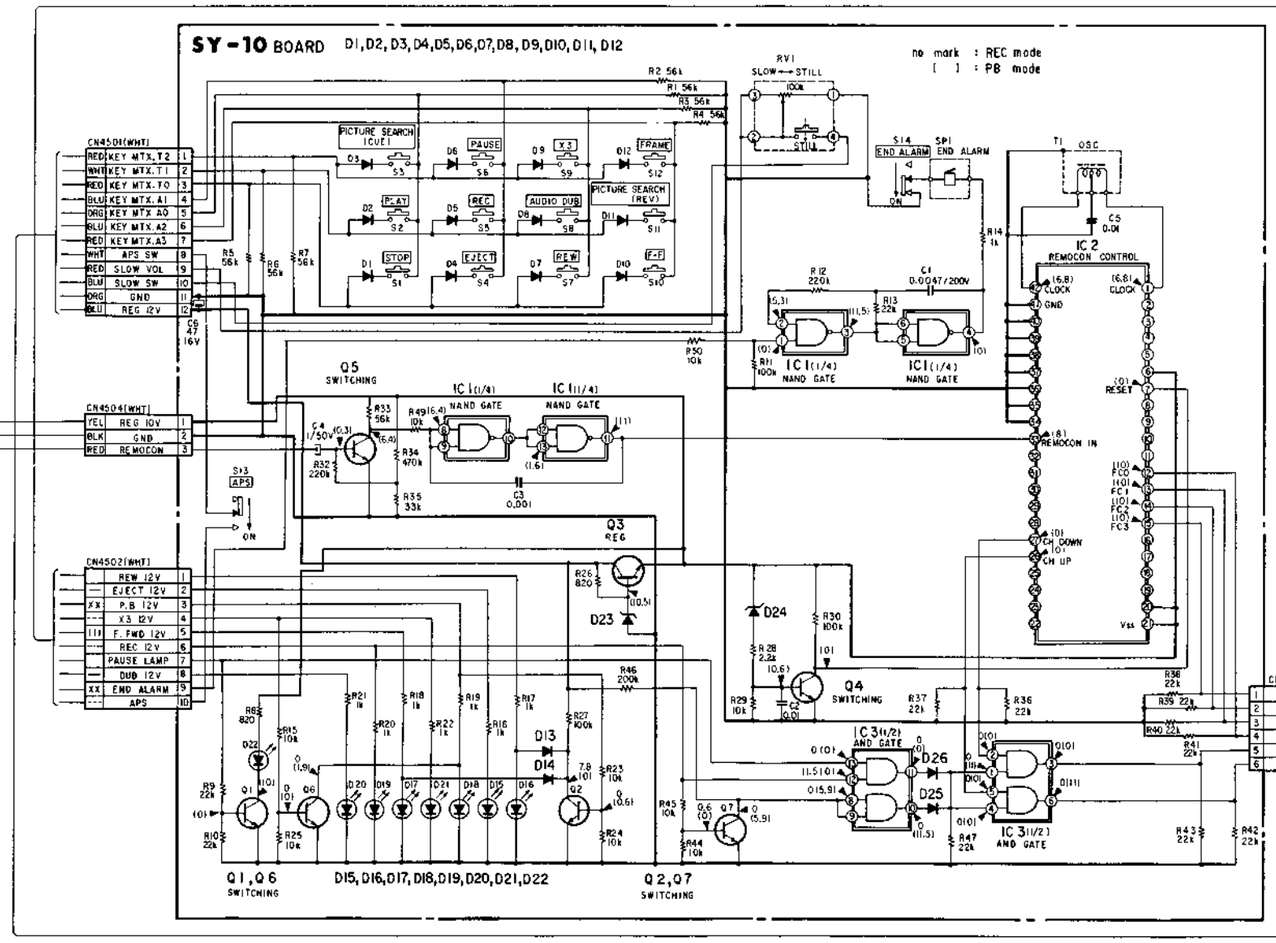
– Ref. No. SY-11 BOARD: 4000 Series SY-10 BOARD: 4500 Series PL-2 BOARD: 4600 Series RM-1, RM-2 BOARDS: 4800 Series IR-1 BOARD: 4900 Series CN-5, CN-6 BOARDS: 6200 Series CHASSIS: 9500 Series –







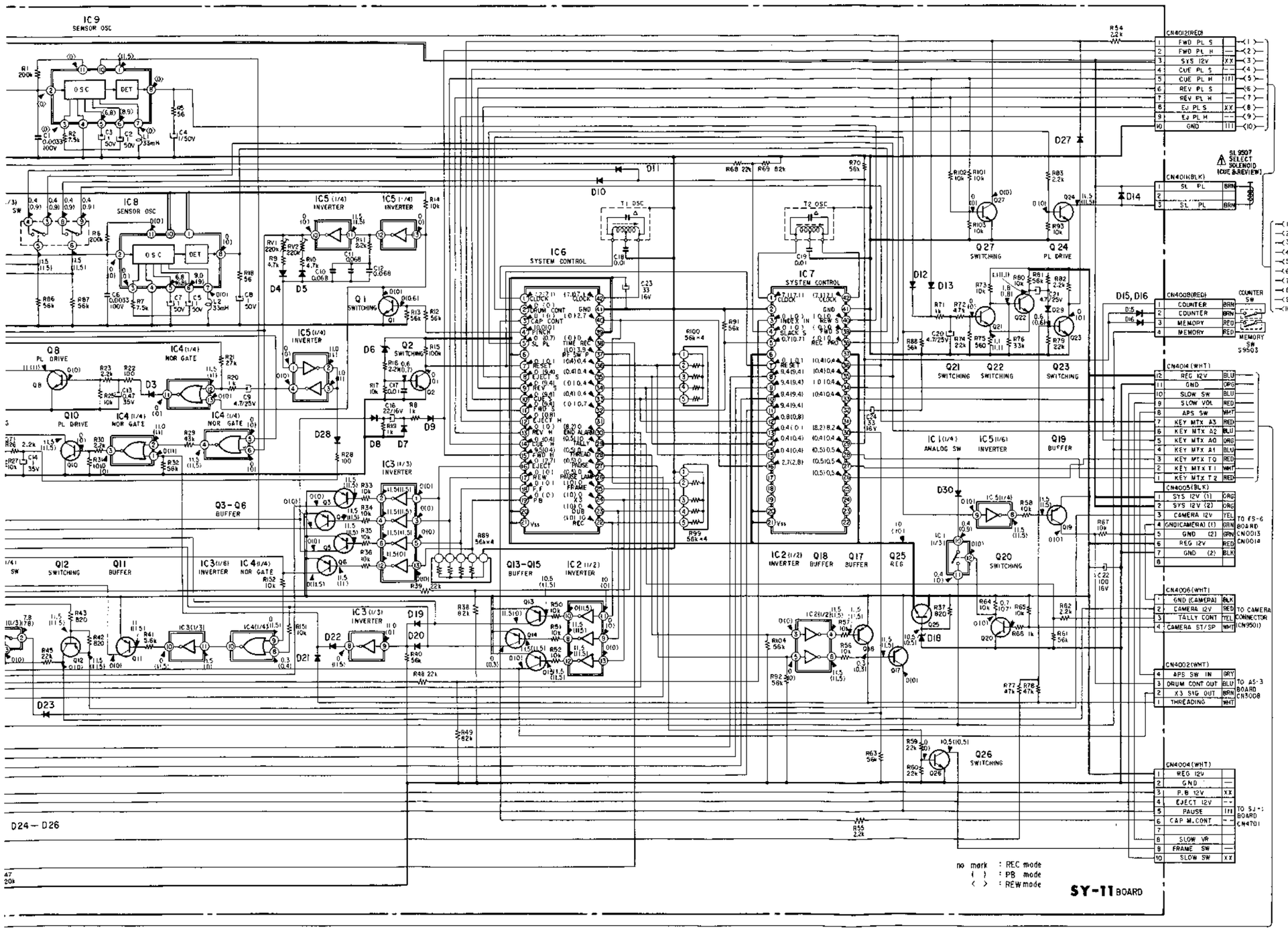


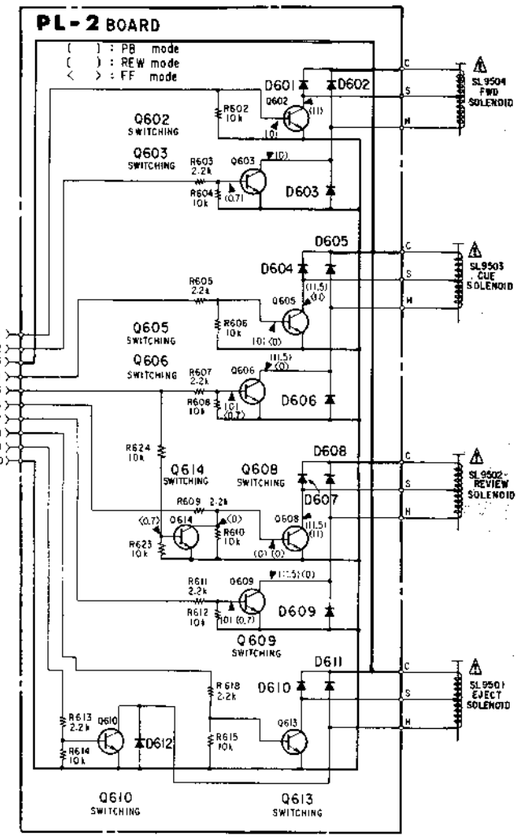


NOTES:

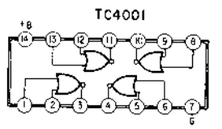
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

)S SCHEMATIC DIAGRAM

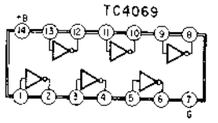




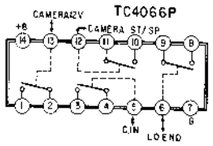
TC4001



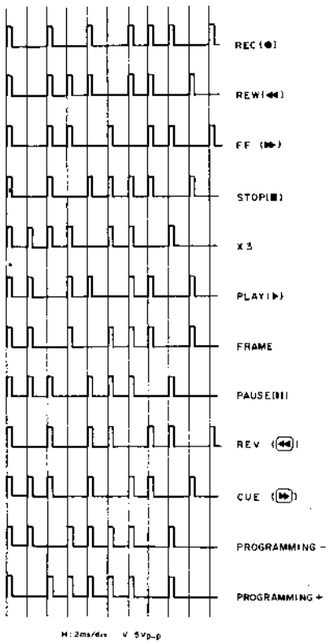
TC4069

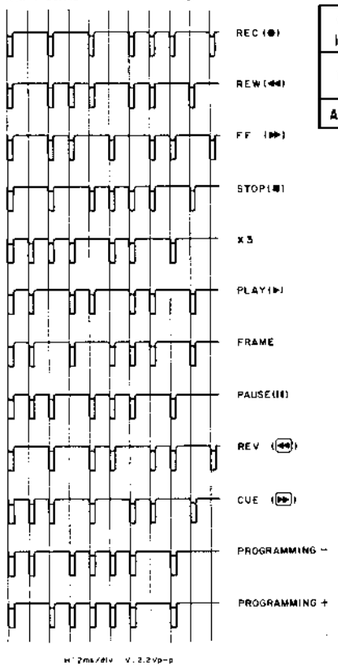


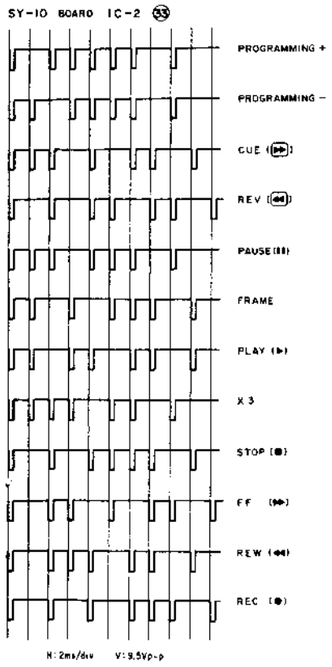
TC4066P

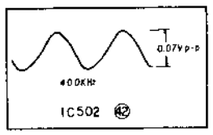


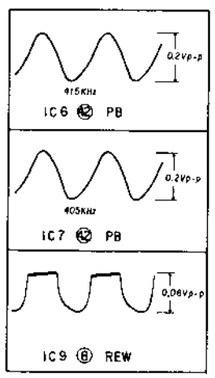
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.











RM-1 BOARD(2/2) IC801-⑮

RM-1 BOARD(1/2) Q802-©

SY-10 BOARD IC-2 ㉝

SY-10 BOARD

SY-11 BOARD

CH-3 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) PRINTED WIRING BOARDS

– Ref. No. CH-3, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –

CH-3 BOARD

Q IC	IC010 IC011 IC006 IC007 004 IC008 IC002 006 005 001 002 IC012 IC004 009 008 010 IC003 IC009 007 IC005 IC001
D	004 005 008 009 007 011 ~ 015 016 017 018 003 019
ADJ	RV001

CI-1 BOARD

PC-1 BOARD

007 IC005 IC001	Q IC
010	D
	ADJ

TU-11 BOARD

IC Q	106 101 102 108 103 104	IC Q
D	101 102 103 104	D
ADJ	RV101	ADJ

IF-10 BOARD

IC Q	503 IC503 502 IC502 IC501 501	IC Q
ADJ	RV501 RV502	ADJ

CX761
TC4011BP
TC4012BP
M5135P

MC14046BCP
TBA1440G

SN29764N

TBA120UB

2N3904

2SA772

2SC1475

2SC2009

1S1555
1S1585
RD6.2E
RD27E-B2Z

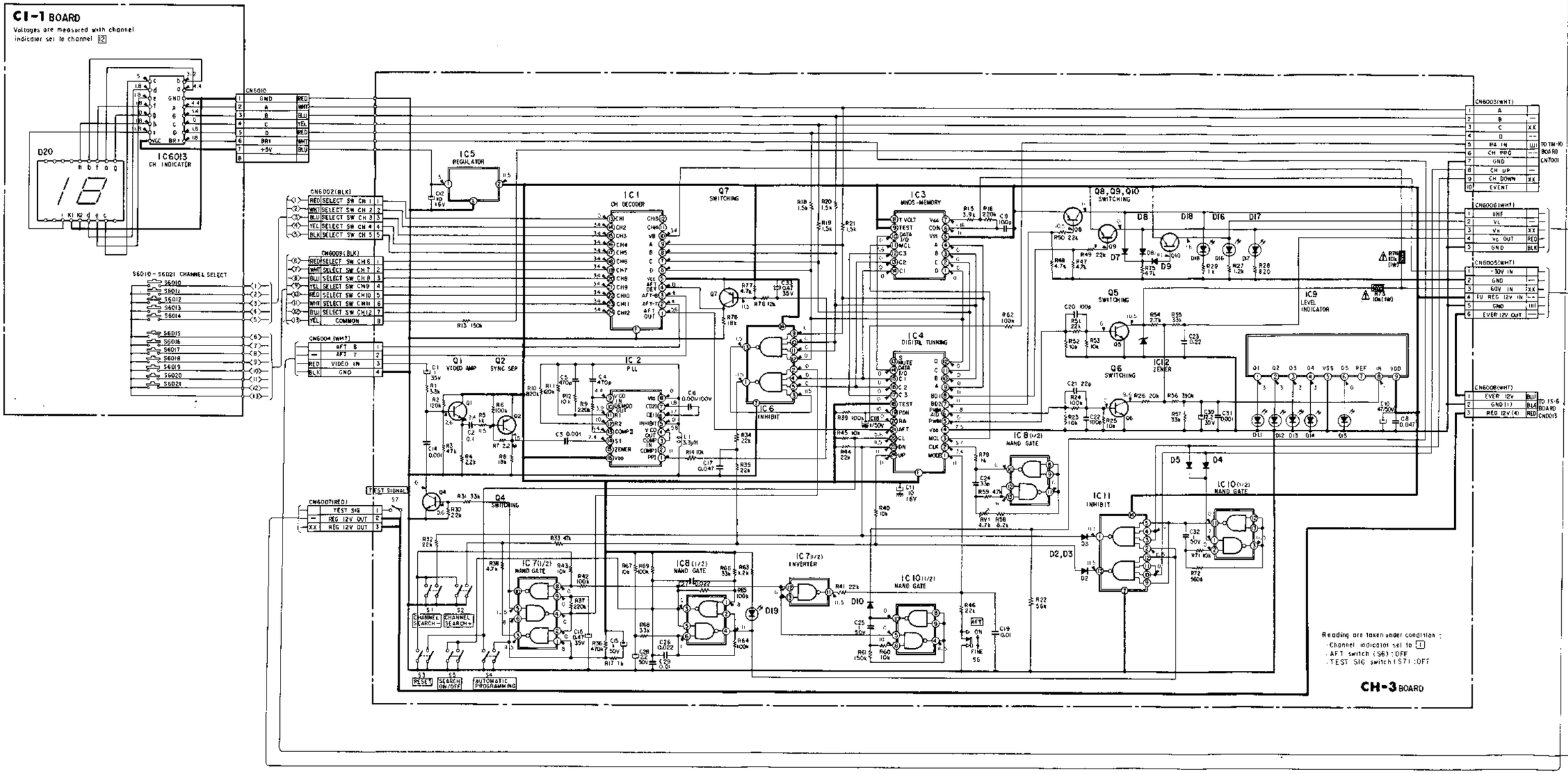
SEL1122P-N

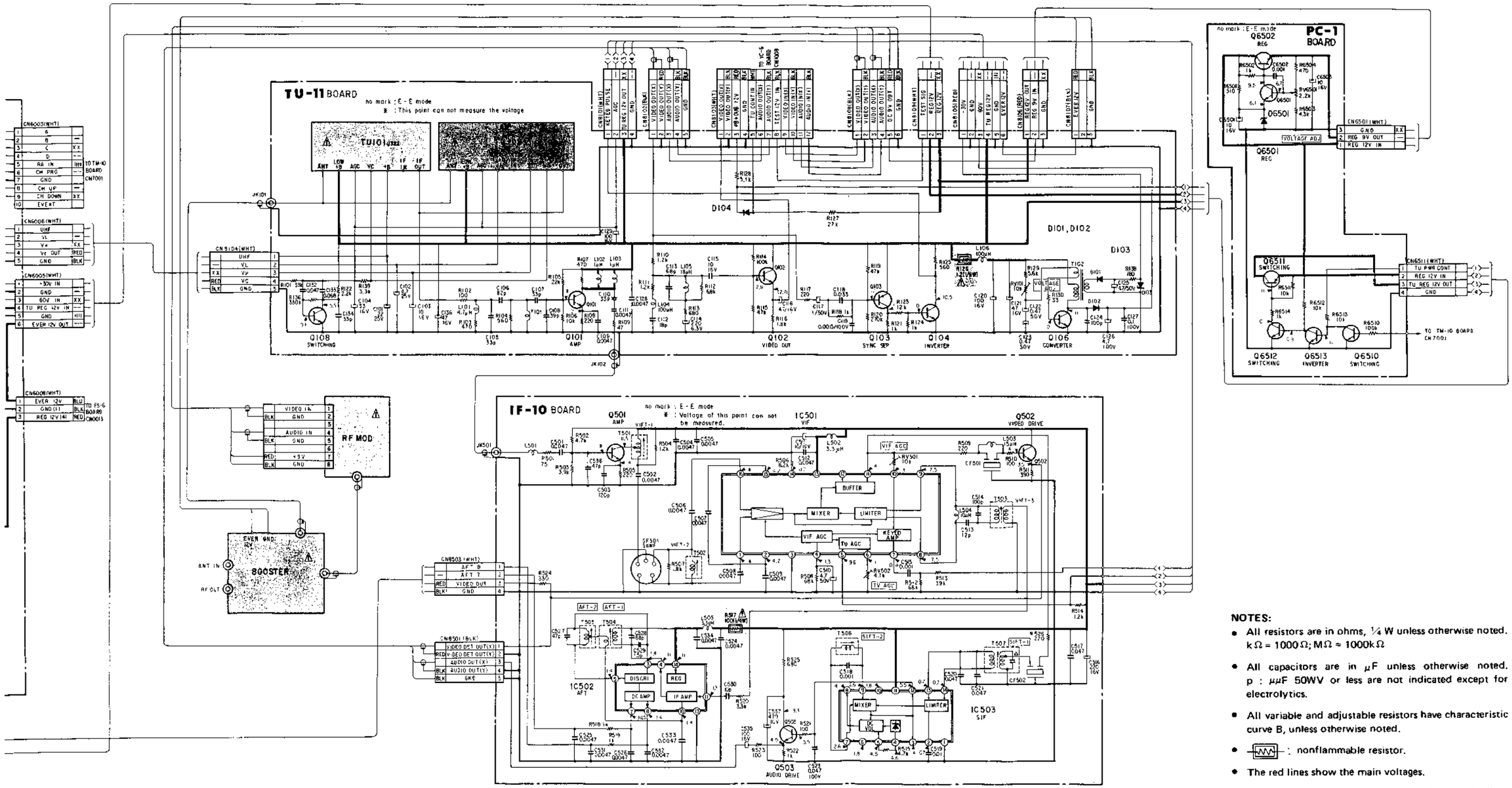
TLG123
TLR123
TLY123

TLR326

CH-3 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) BOARDS SCHEMATIC DIAGRAM

– Ref. No. CH-3, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –





NOTES:

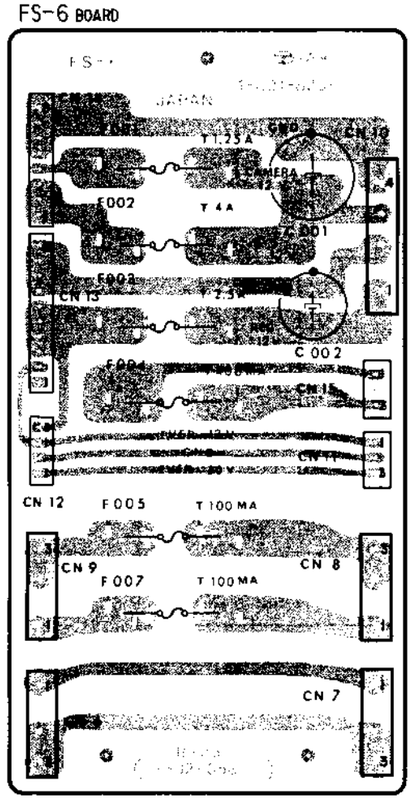
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ ≈ 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

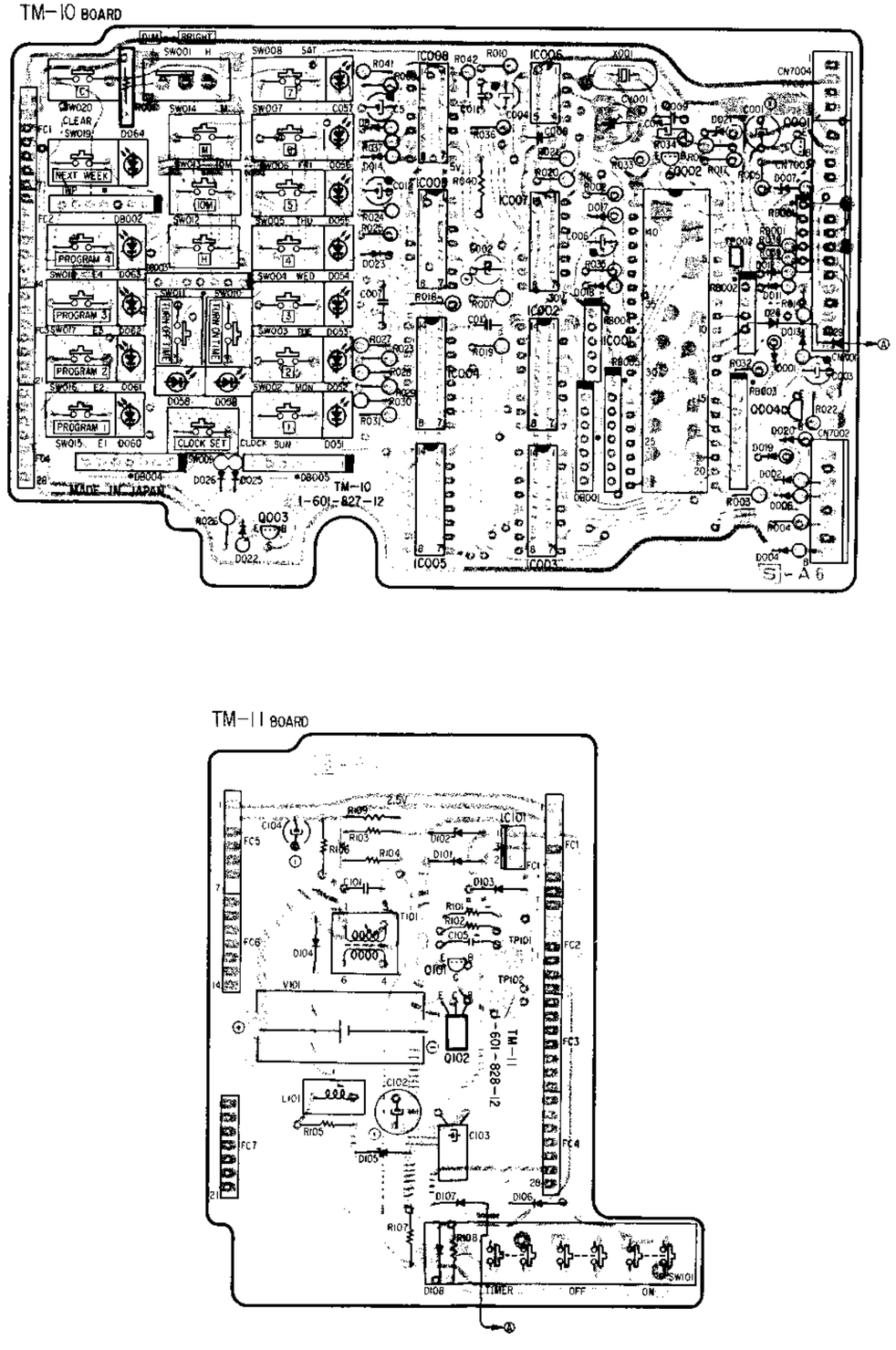
FS-6 (FUSE), LF-11 (LINE FILTER), TM-10/TM-11/TM-12 (PROGRAM TIMER) AND SR-08 (SWITCHING MODE REG) PRINTED WIRING BOARDS

– Ref. No. FS-6, LF-11 BOARDS: 0001 Series TM-10, TM-11, TM-12 BOARDS: 7000 Series SR-08 (SWITCHING REGULATOR): 9000 Series CHASSIS: 9500 Series –

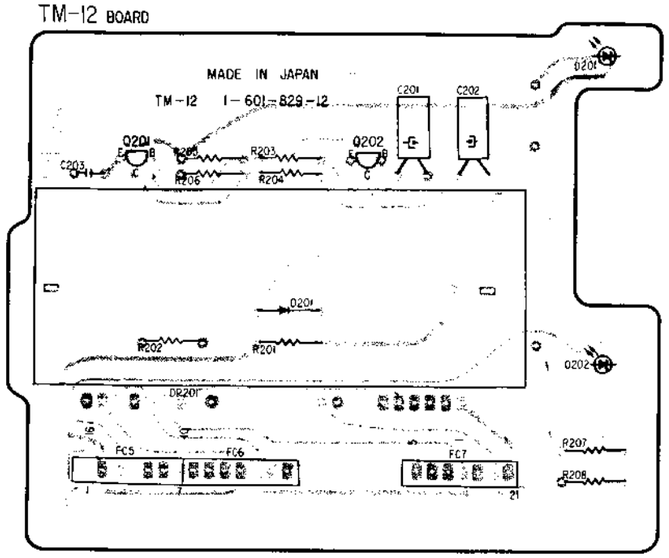
FS-6 BOARD



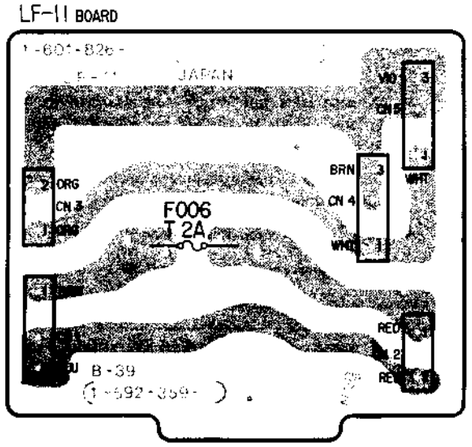
TM-10 BOARD



TM-12 BOARD

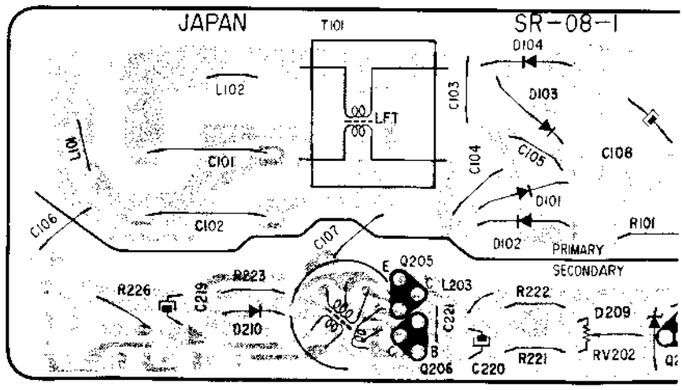


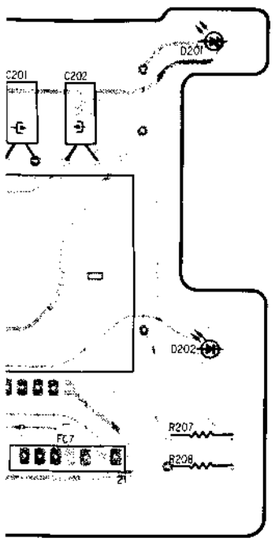
LF-11 BOARD



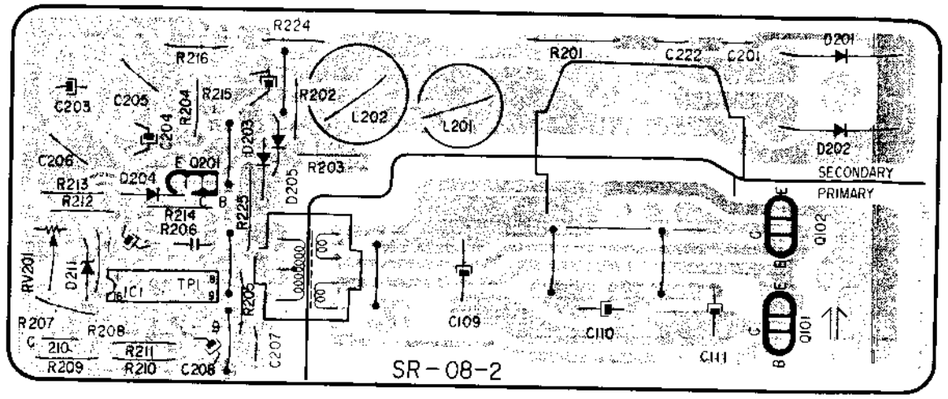
TM-11 BOARD

SR-08-1 BOARD

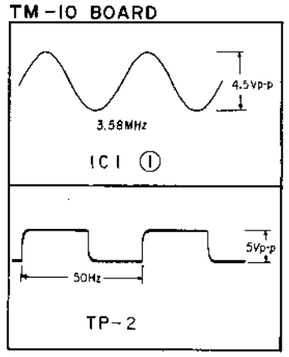


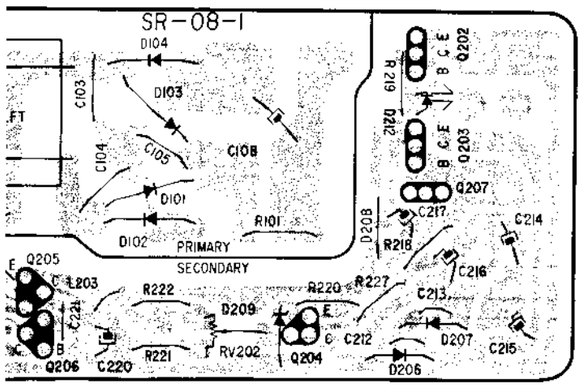


SR-08-2 BOARD

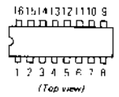


TM-10 BOARD



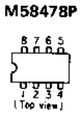


μPA56C
M54519P



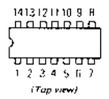
μPC78L05A

M58478P

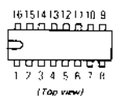


MB8841-180

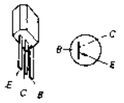
MSM4069
TC4071BP
TC4081BP



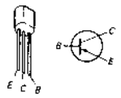
TL494CN



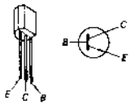
2SA1027R



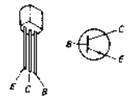
2SA684



2SC1364

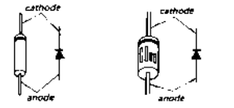


2SC1475

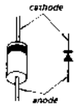


10E2
1S1555
1S1585
1SS83
RD24E-13
RD3.9E
RD5.1EB
RD5.6EB-B2Z
RD9.1E-B

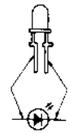
EQB01-15
EQB01-18



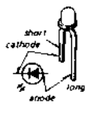
ERD33-02



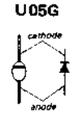
TLG114
TLR114



TLR124



U05G



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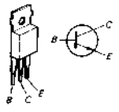
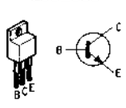
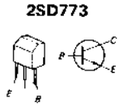


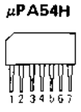
2SC2335



2SD773

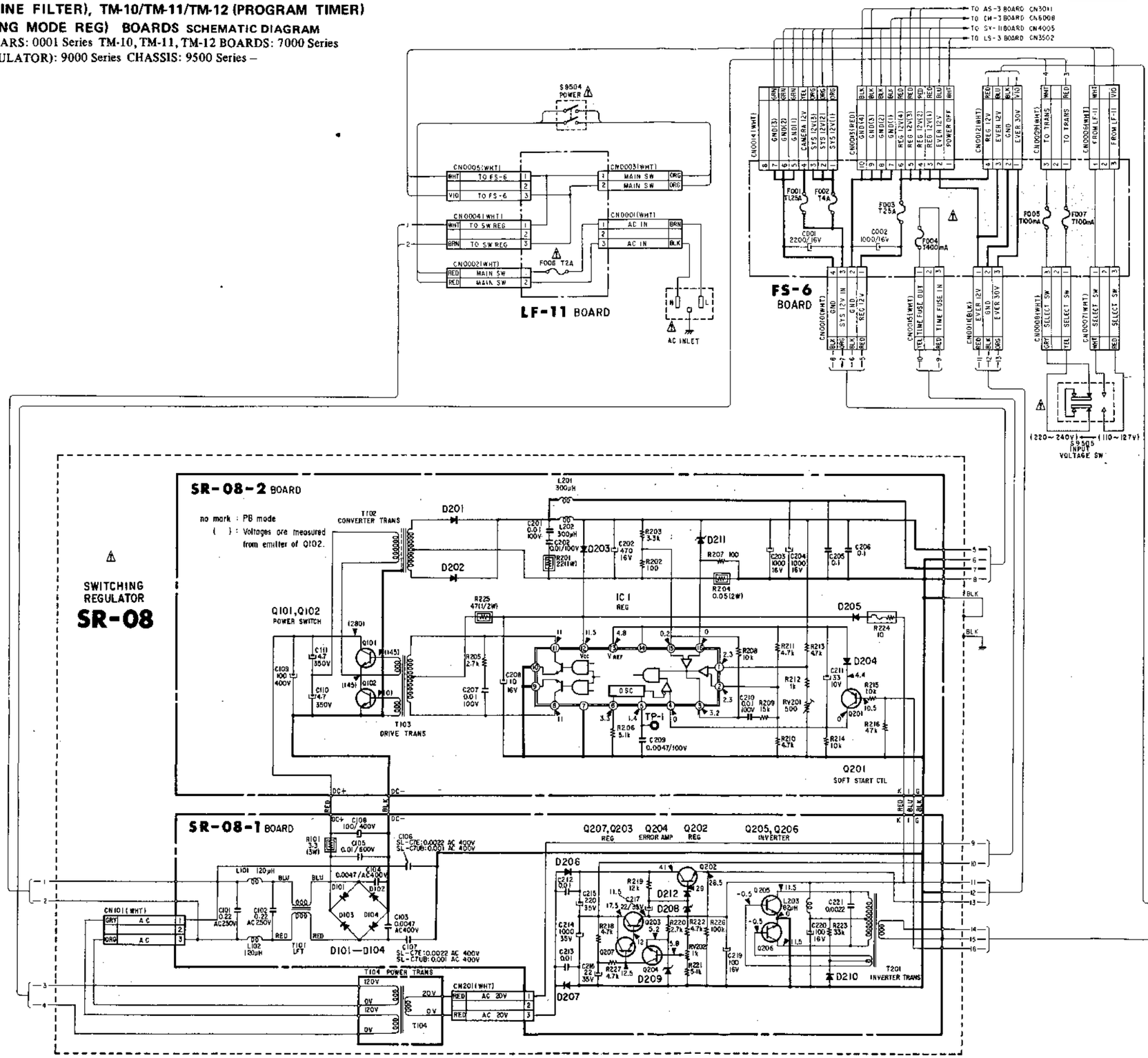


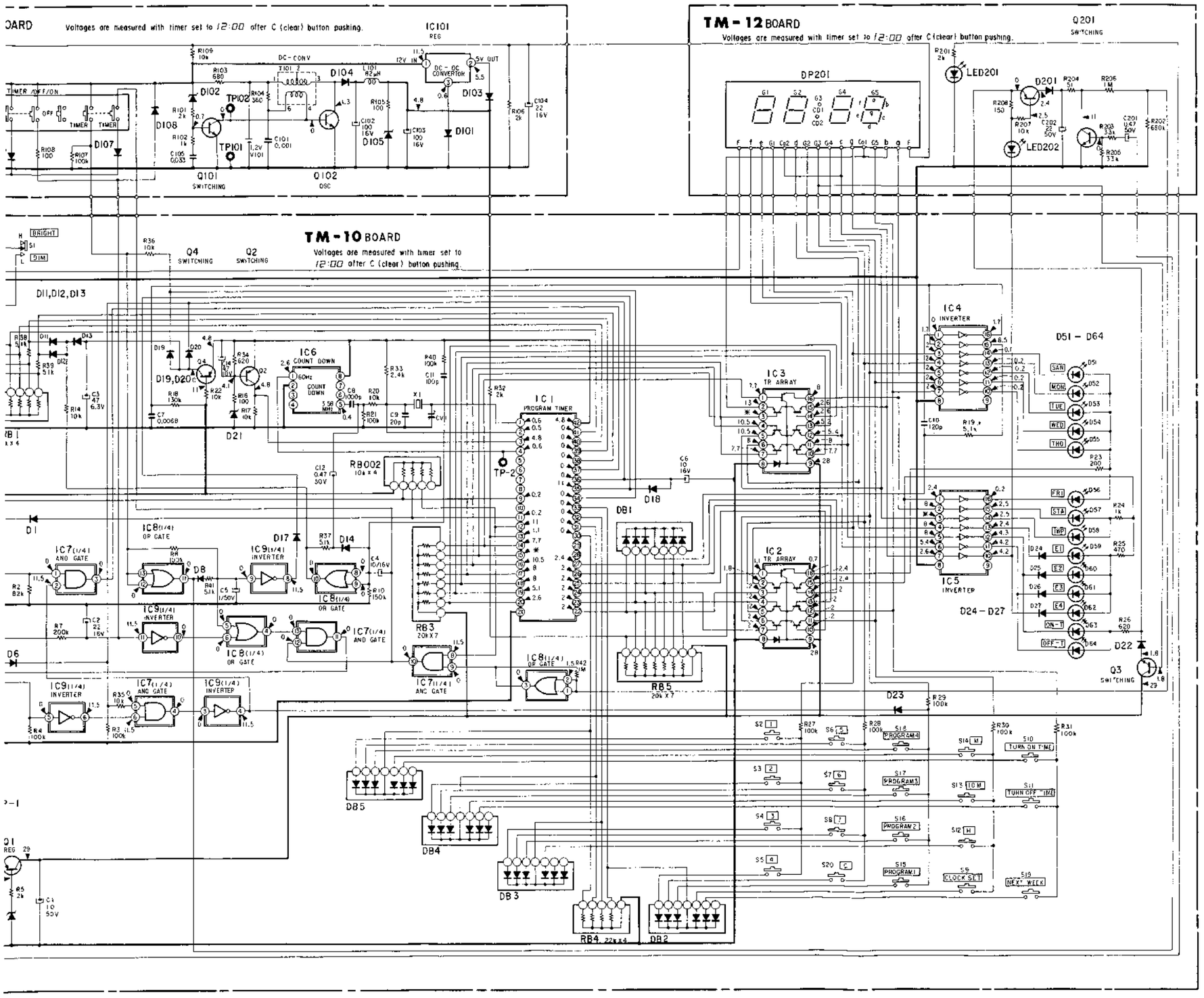
μPA54H



FS-6 (FUSE), LF-11 (LINE FILTER), TM-10/TM-11/TM-12 (PROGRAM TIMER) AND SR-08 (SWITCHING MODE REG) BOARDS SCHEMATIC DIAGRAM

– Ref. No. FS-6, LF-11 BOARS: 0001 Series TM-10, TM-11, TM-12 BOARDS: 7000 Series
SR-08 (SWITCHING REGULATOR): 9000 Series CHASSIS: 9500 Series –





NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⚡: nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

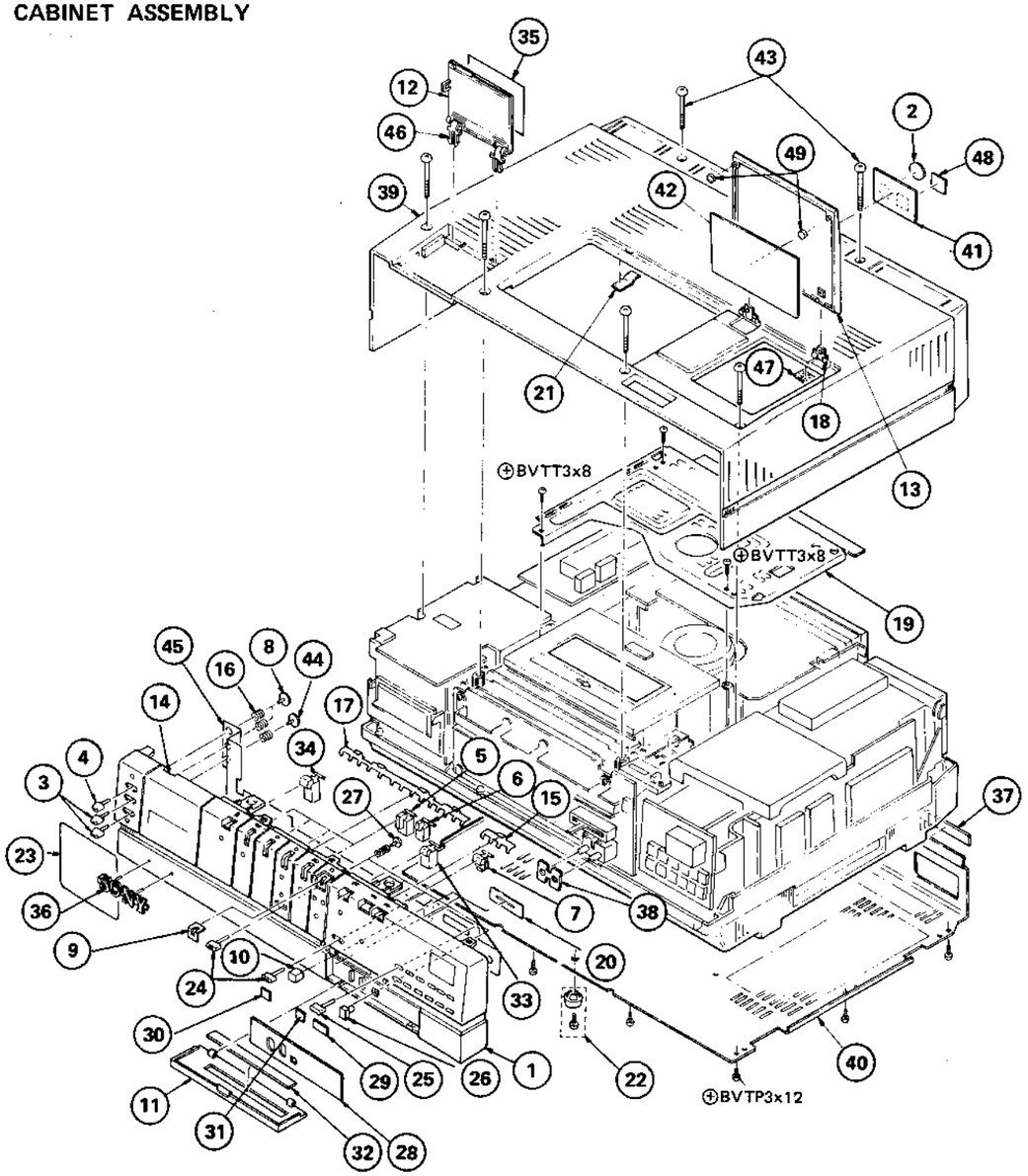
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

SECTION 4
EXPLODED VIEWS

Note:

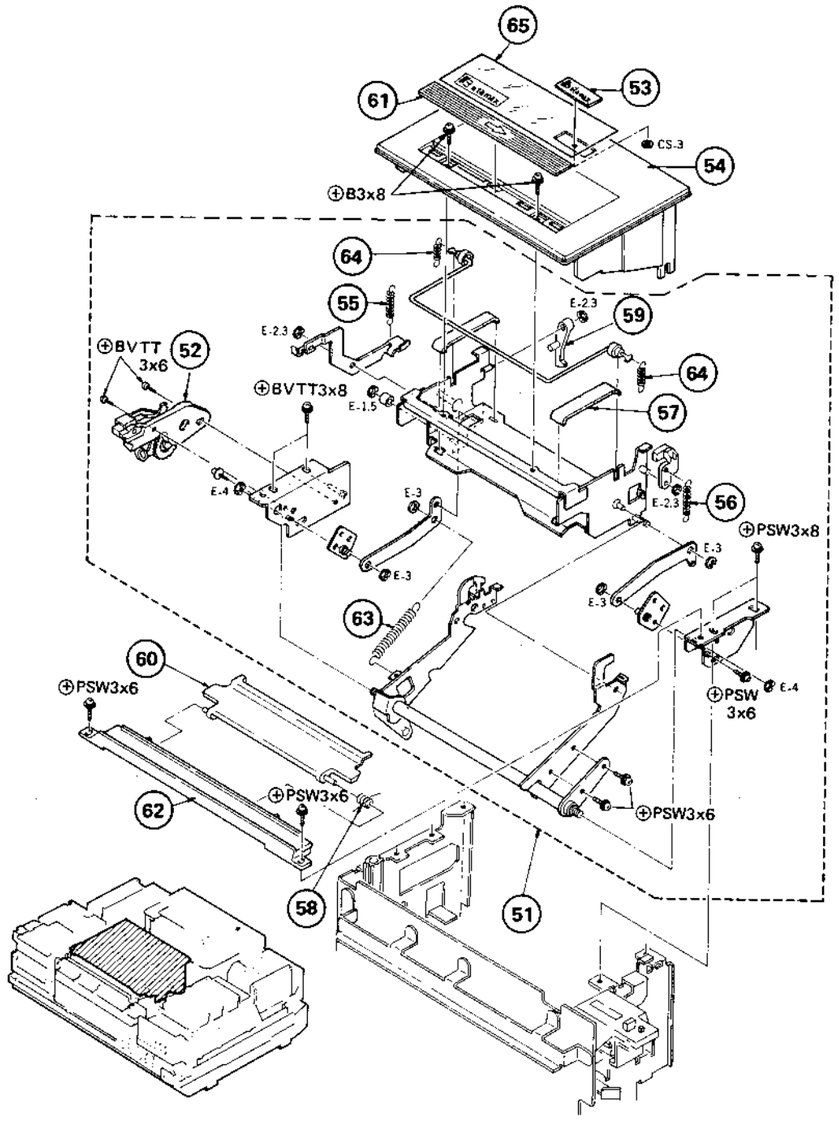
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- As to the part numbered with E-, refer to the electrical parts list.
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

CABINET ASSEMBLY



No.	Part No.	Description	Remark
1	A-6703-062-A	PANEL ASS'Y, front	3–9, 11, 14–17, 20, 23–34, 36, 44, 45
2	♦3-656-407-00	LABEL, F mark	
3	3-659-535-01	SWITCH, P	
4	3-659-535-11	SWITCH, P	
5	3-659-537-00	BUTTON(2), F	
6	3-659-538-00	BUTTON (3), F	
7	3-659-539-00	BUTTON(4), F	
8	3-659-542-00	RETAINER, spring	
9	3-659-543-00	PLATE, ornamental; REC button	
10	3-659-547-00	KNOB, control	
11	3-659-589-21	DOOR, front	
12	3-659-590-00	LID, timer	
13	3-659-599-21	DOOR, preset	
14	3-659-606-00	WINDOW, timer	
15	3-659-607-00	RETAINER(2), button	
16	3-659-609-00	SPRING, compression	
17	3-659-616-00	RETAINER(1), button	
18	3-659-618-00	HINGE, spring	
19	♦3-659-671-00	COVER, shield	
20	3-659-746-00	CLOTH, masking; VR	
21	3-659-748-00	CLOTH, masking; upper case	
22	3-659-768-00	FOOT	
23	3-660-901-00	COVER, front; timer	
24	3-662-211-00	BUTTON, SF	
25	3-662-212-00	BUTTON, tuning	
26	3-662-213-00	BUTTON, DUB	
27	3-662-214-00	RETAINER(2), spring	
28	3-662-217-00	INDICATOR	
29	3-662-218-00	PLATE, indication; DUB	
30	3-662-219-00	PLATE, indication; STILL	
31	3-662-220-00	PLATE, indication; SLOW	
32	3-662-236-00	LABEL(E), front door	
33	3-662-247-00	BUTTON(PAUSE), F	
34	3-662-248-00	BUTTON(EJECT), F	
35	3-662-252-00	STICKER(E), timer	
36	3-662-253-00	EMBLEM, SONY	
37	3-662-260-00	LABEL, input/output	
38	3-662-269-00	CLOTH, masking; switch	
39	3-662-292-00	CASE, upper	
40	3-662-293-00	PLATE, bottom	
41	♦3-662-306-00	LABEL, model number	
42	3-662-321-00	LABEL, preset manual	
43	3-662-325-00	SCREW, tap	
44	3-662-339-00	RETAINER(3), spring	
45	3-662-340-00	PLATE(F), shield	
46	3-703-035-11	SHAFT, LTD	
47	3-831-441-XX	CLOTH(2), masking; upper case	
48	4-310-380-00	LABEL, DEMKO	
49	4-314-871-00	CUSHION	

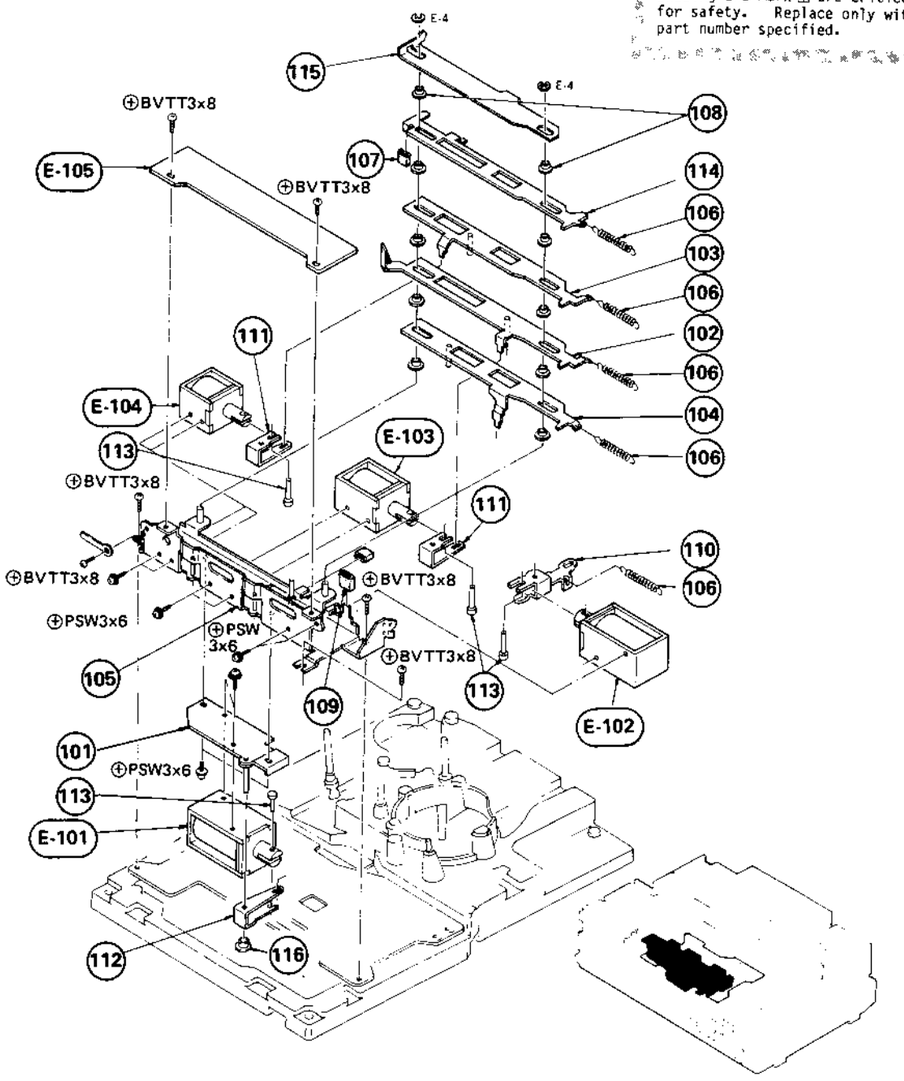
CASSETTE LIFT ASSEMBLY



No.	Part No.	Description	Remark
51	A-6751-061-A	CASSETTE-UP BLOCK ASS'Y	52, 55–57, 59, 63, 64
52	A-6751-079-A	DAMPER ASS'Y	
53	X-3658-101-0	EMBLEM ASS'Y (P)	
54	X-3662-214-0	LID ASS'Y, cassette-up	53, 65
55	3-536-006-XX	SPRING, tension	
56	3-642-490-00	SPRING, tension	
57	3-659-498-00	CUSHION, cassette holder	
58	3-659-531-00	SPRING	
59	3-659-579-00	LEVER, release lid lock	
60	3-659-583-00	PLATE, blind cassette	
61	3-659-585-00	STRIP, ornamental cassette	
62	3-659-598-21	GUIDE, cassette	
63	3-659-635-00	SPRING, tension	
64	3-659-636-00	SPRING, tension	
65	3-662-263-00	STICKER, C7E	

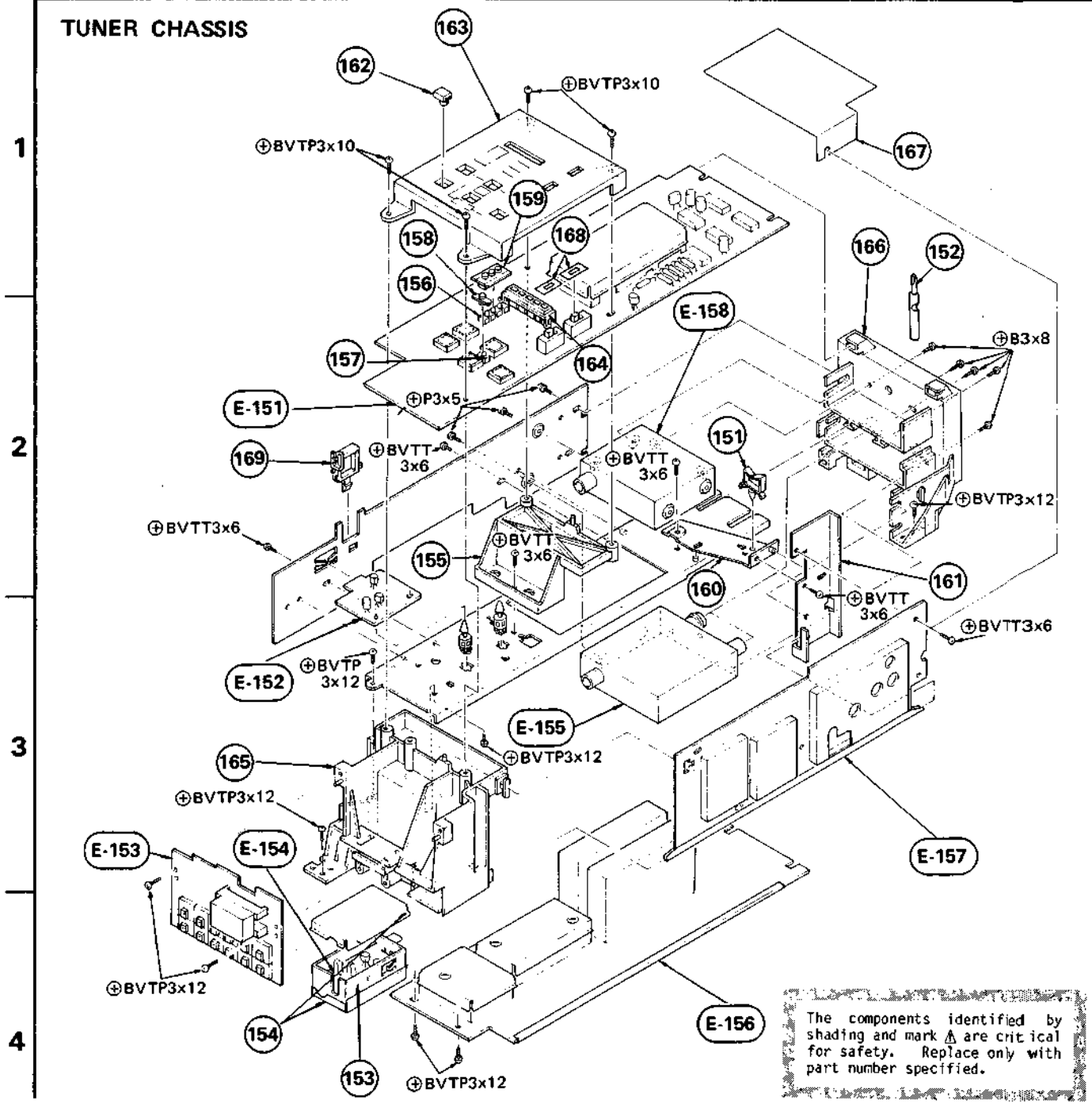
FUNCTION ASSEMBLY

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



No.	Part No.	Description	Remark
101	X-3659-329-0	BASE ASS'Y, E solenoid	
102	X-3659-341-0	PLATE ASS'Y, slide; F	
103	X-3659-342-0	PLATE ASS'Y, slide; R	
104	X-3659-343-0	PLATE ASS'Y, slide; E	
105	X-3659-353-0	FRAME ASS'Y, F solenoid	
106	3-536-006-XX	SPRING, tension	
107	3-537-790-21	SUPPORT, tension; arm	
108	3-646-271-00	BOSS	
109	3-655-856-11	RETAINER, tension regulator	
110	3-659-478-00	LEVER, F	
111	3-659-479-00	LEVER, FR	
112	3-659-480-00	LEVER, E	
113	3-659-481-00	PIN, solenoid	
114	3-659-569-00	PLATE, slide; B	
115	3-659-790-00	PLATE, slide; FB	
116	3-703-074-00	CAP 3, shaft	
⚠E-101	1-454-213-00	Solenoid, EJECT	SL9501
⚠E-102	1-454-214-00	Solenoid, FWD	SL9504
⚠E-103	1-454-215-00	Solenoid, CUE	SL9503
⚠E-104	1-454-216-00	Solenoid, REVIEW	SL9502
E-105	1-601-821-00	PL-2 Board	

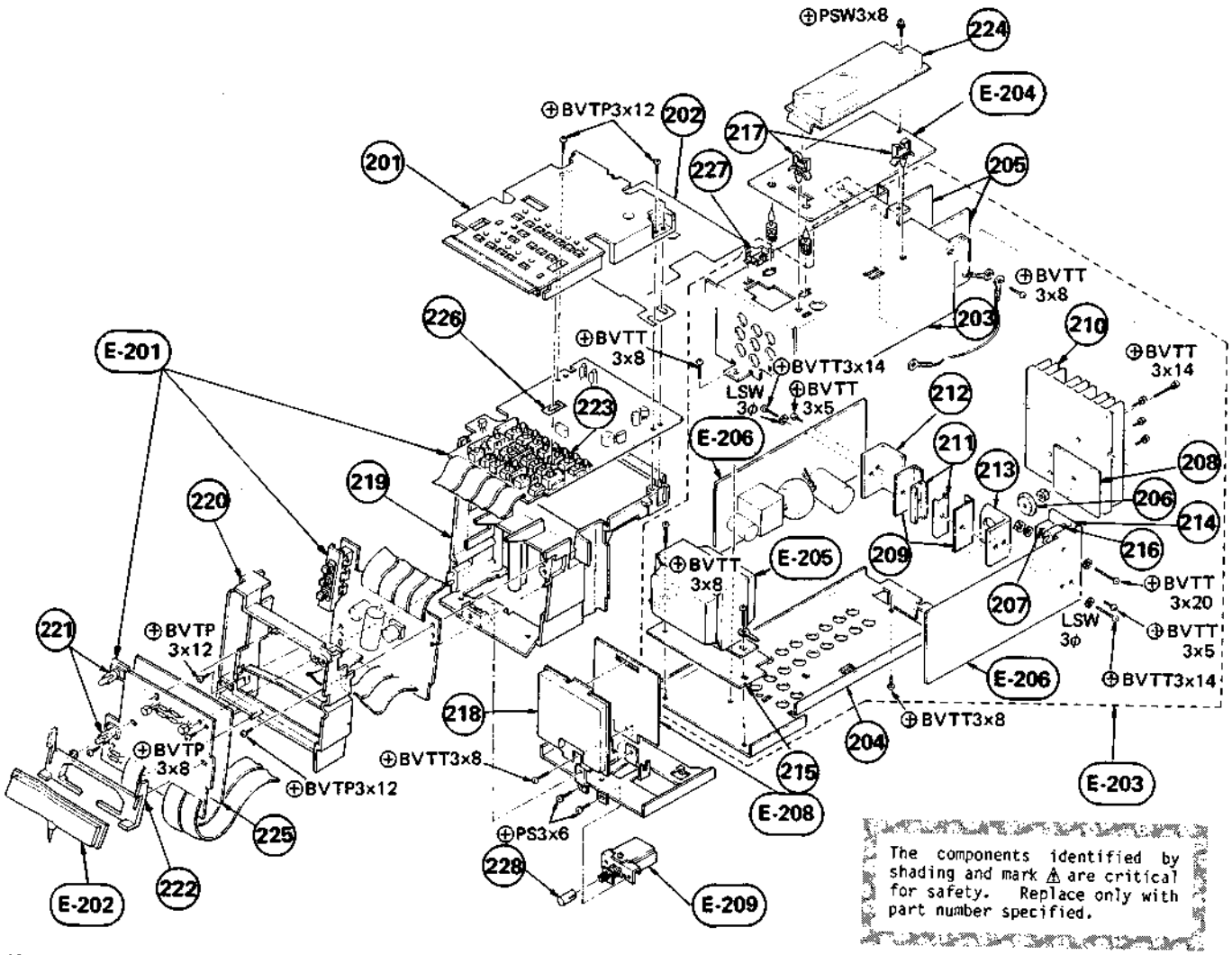
TUNER CHASSIS



The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark
151	3-655-214-00	CLIP, cable	
152	3-656-301-00	SCREWDRIVER, control	
153	3-662-215-00	CASE, shield	
154	3-662-216-00	LID, shield case	
155	3-662-226-00	RETAINER, preset	
156	3-662-227-00	HOLDER (R-3), LED	
157	3-662-228-00	HOLDER (R-1), LED	
158	3-662-229-00	COVER, (L-1), lamp	
159	3-662-230-00	COVER, (L-3), lamp	
160	3-662-234-00	REINFORCEMENT, IF	
161	3-662-242-00	BRACKET, IF	
162	3-662-243-00	BUTTON, preset	
163	3-662-281-00	PLATE, ornamental; preset	
164	3-662-282-00	ESCUTCHEON, 5 gang LED	
165	3-662-288-00	CHASSIS (F), tuner	
166	3-662-289-00	CHASSIS (B), tuner	
167	3-662-324-00	PLATE, shield; TU	
168	3-831-441-XX	CLOTH, masking	
169	4-316-015-00	HOLDER, wire	
E-151	A-6725-154-A	CH-3 Board, complete	
E-152	1-601-835-00	PC-1 Board	
E-153	1-601-831-00	CI-1 Board	
E-154	1-601-834-00	IR-1 Board	
⚠E-155	1-463-296-00	Antenna booster BT-971	
E-156	A-6721-037-A	TU-11 Board, complete	
E-157	A-6721-038-A	IF-10 Board, complete	
⚠E-158	1-464-105-00	RF Modulator	

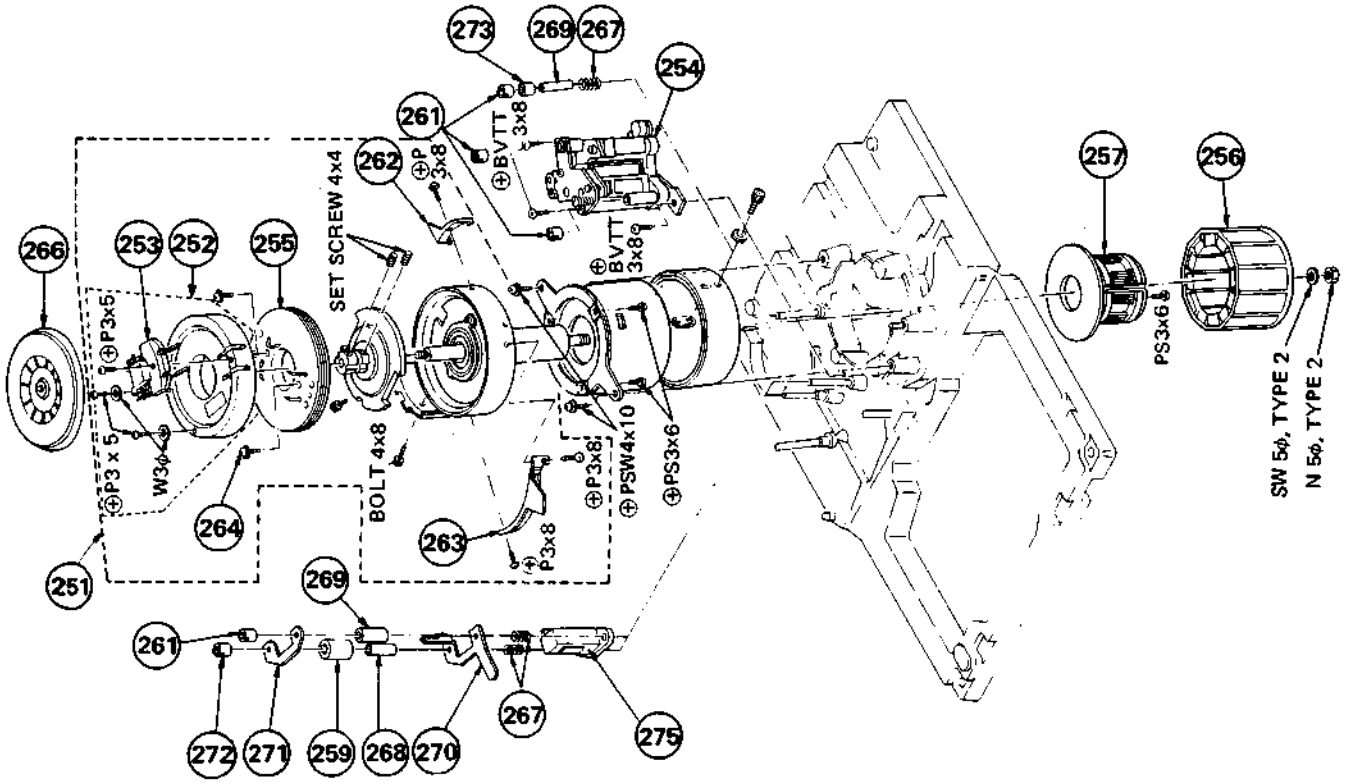
POWER UNIT CHASSIS



The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

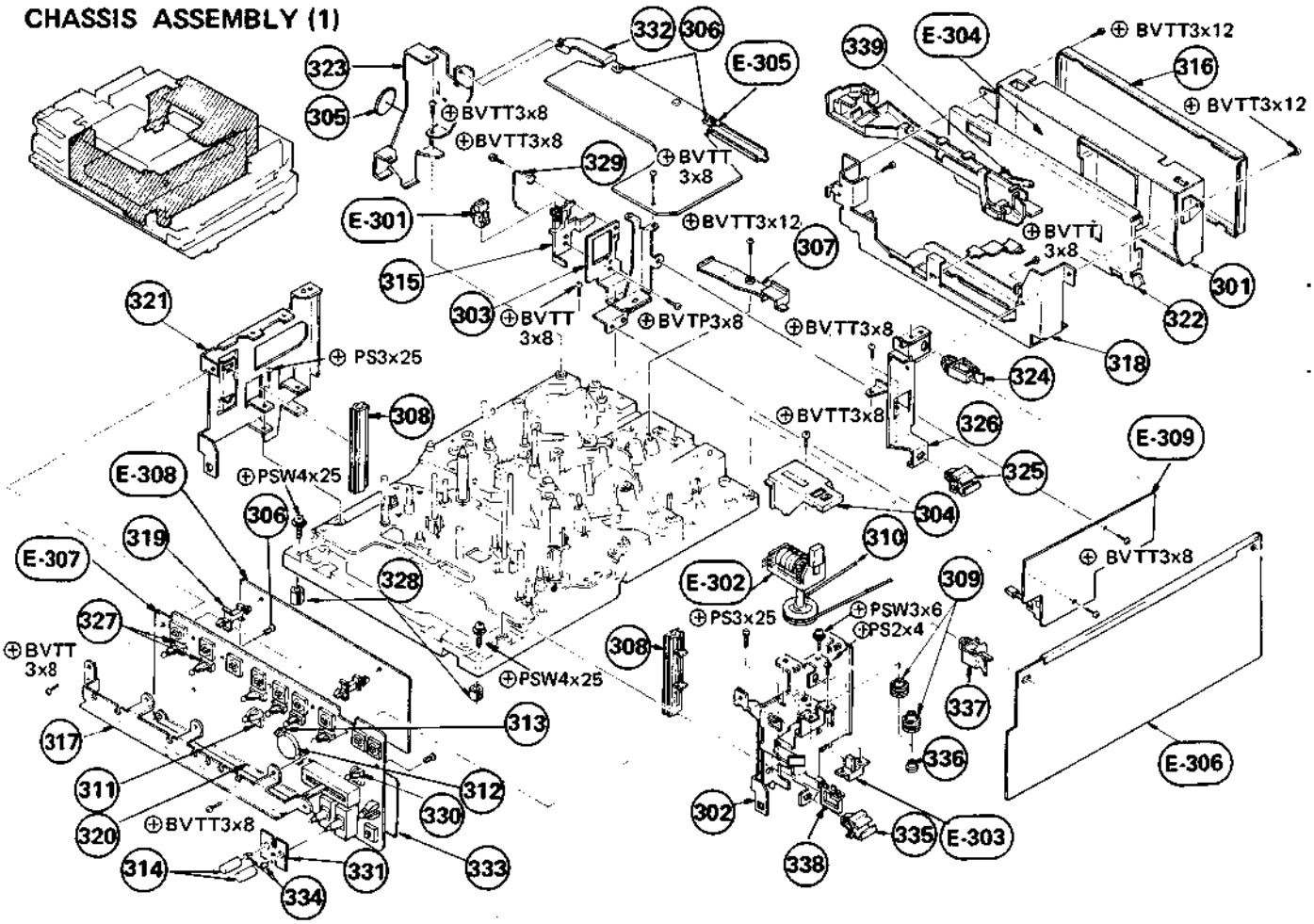
No.	Part No.	Description	Remark
201	X-3662-212-0	PANEL ASS'Y, timer	202
202	♦X-3662-223-0	PLATE (T) ASS'Y, shield	
203	♦2-403-428-00	CASE, upper	
204	♦2-403-429-00	CASE, lower	
205	♦2-430-138-00	PLATE, insulating	
206	2-430-117-00	WASHER, insulating	
207	♦2-430-131-00	RETAINER, transistor	
208	2-430-132-00	SHEET, rubber (large)	
209	2-430-133-00	SHEET, rubber (small)	
210	♦2-430-609-00	HEAT SINK	
211	♦2-430-610-00	RETAINER, transistor	
212	♦2-430-611-00	HEAT SINK, L type	
213	♦2-430-612-00	HEAT SINK, L type	
214	♦2-430-613-00	HEAT SINK, L type	
215	♦2-430-633-00	PLATE, shield	
216	2-832-004-02	WASHER, insulating	
217	♦3-655-214-00	CLIP, cable	
218	3-659-516-00	COVER, LF-9 PC board	
219	♦3-659-674-00	FRAME, rear timer	
220	♦3-659-677-00	FRAME, front timer	
221	3-659-684-00	HOLDER, power lamp	
222	♦3-661-537-00	HOLDER (Z), indication tube	
223	♦3-662-205-00	HOLDER (E), LED	
224	♦3-662-206-00	COVER, FS-6	
225	3-662-344-00	COVER, TM	
226	3-831-441-XX	CLOTH, masking	
227	4-310-385-00	HOLDER, wire	
228	4-334-115-00	KNOB, clock day	
E-201	♦A-6725-151-A	B-25 Board, complete (including TM-10, TM-11, TM-12 boards)	
E-202	1-519-174-00	Indicator, tube	DP201
⚠E-203	1-413-045-00	Switching regulator, SR-08	
E-204	♦1-601-825-00	FS-6 Board	
⚠E-205	1-446-589-12	POWER TRANS	T104
⚠E-206	♦2-402-645-00	SR-08-1 Board (including SR-08-2)	
E-208	♦1-601-826-00	LF-11 Board	
⚠E-209	1-516-277-00	Push, POWER	S9504

DRUM ASSEMBLY



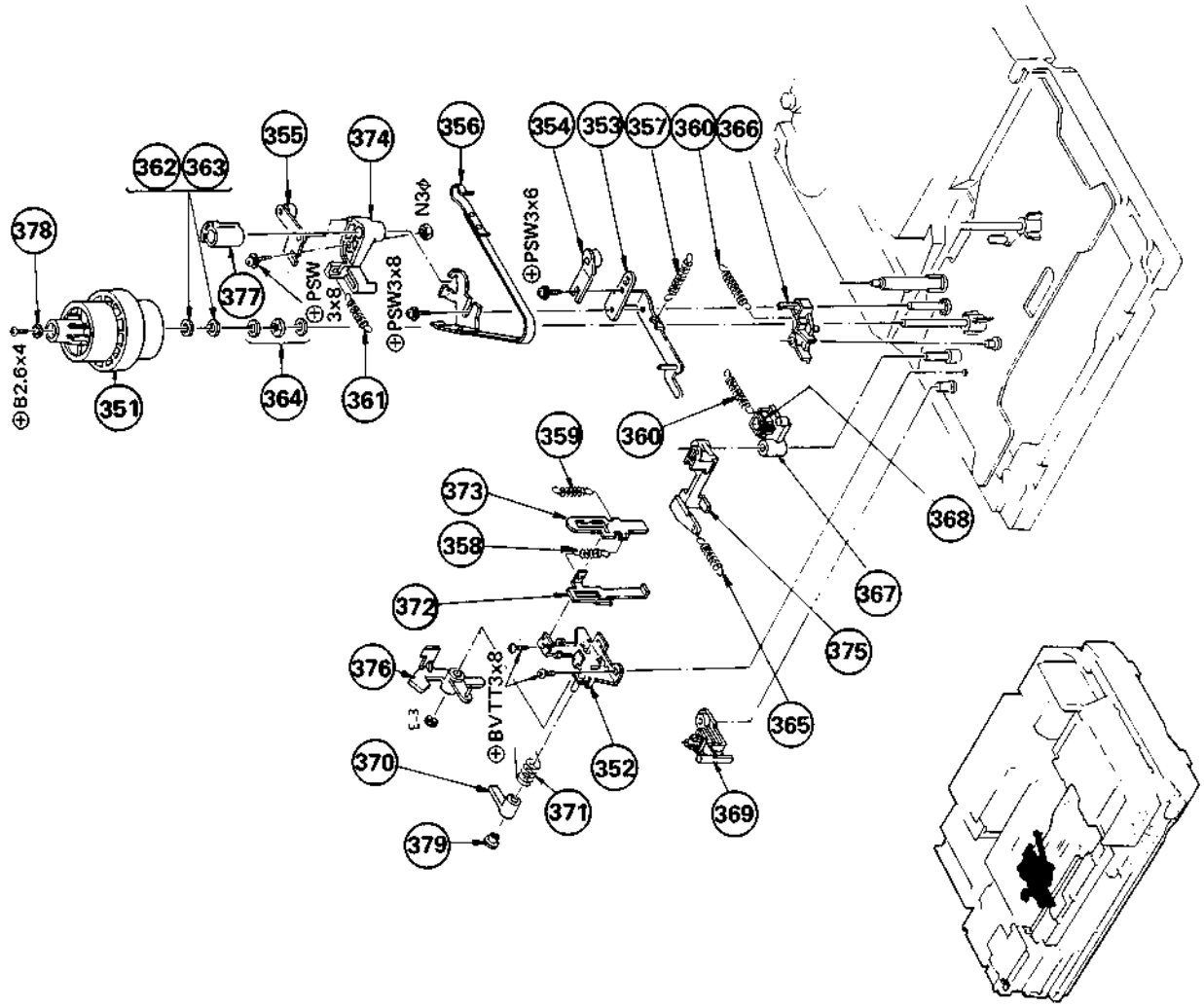
No.	Part No.	Description	Remark
251	A-6050-057-A	DRUM ASS'Y, DSH-08A-R.	252, 253, 255, 262, 263, 264,
252	A-6760-050-A	DRUM ASS'Y, upper	253
253	A-6761-013-B	SPRING ASS'Y, tape retainer	
254	A-6761-035-A	A.C.E. ASS'Y	261
255	A-6762-129-A	VIDEO HEAD DISK ASS'Y (DSR-36-R)	
256	♦X-2619-402-0	ROTOR ASS'Y	
257	X-2619-403-0	STATOR ASS'Y	
259	X-3659-304-0	ROLLER ASS'Y, guide; No. 1	
261	3-645-562-00	NUT	
262	3-652-728-00	BRACKET (B), tape	
263	3-652-741-00	BRACKET (A), tape	
264	3-652-751-00	SCREW (⊕ P EXT tooth WS 3 ×8)	
266	3-658-122-00	FAN	
267	3-659-324-00	SPRING, compression	
268	3-659-341-00	SLEEVE, guide; No. 1	
269	3-659-342-00	SLEEVE, guide; No. 2	
270	♦3-659-343-00	BRACKET, tape; entrance	
271	3-659-344-00	PLATE, guide; entrance	
272	3-659-345-00	NUT, guide; No. 1	
273	3-659-716-00	FLANGE, guide	
275	8-825-687-30	HEAD, full erase EF182-21	

CHASSIS ASSEMBLY (1)



No.	Part No.	Description	Remark
301	▲X-3659-339-0	CASE (A) MAIN ASS'Y, shield	
302	▲X-3659-352-0	BRACKET (RIGHT) ASS'Y, cassette	
303	▲X-3659-361-0	OPENER ASS'Y, lid	
304	X-3662-205-0	COVER ASS'Y, counter	
305	3-418-709-00	INDICATED, ground terminal	
306	3-646-090-00	RIVET, nylon	
307	▲3-659-303-00	RETAINER (SMALL), harness	
308	▲3-659-482-00	SUPPORT	
309	3-659-484-00	PULLEY, midway; counter	
310	3-659-485-00	BELT, counter	
311	▲3-659-486-00	HOLDER (C), LED	
312	3-659-487-00	HOLDER, buzzer	
313	▲3-659-488-00	PIN, buzzer holder	
314	3-659-521-00	KNOB, switch; lever slide	
315	▲3-659-548-00	HOLDER, T sensor	
316	▲3-659-549-00	LID BOTTOM, shield case (A)	
317	▲3-659-573-00	BRACKET (UPPER), FS PC board	
318	3-659-591-00	HOLDER, shield case	
319	3-659-619-01	HOLDER, PC board	
320	▲3-659-628-00	BRACKET (LOWER), FS PC board	
321	▲3-659-629-00	BRACKET, cassette-up (left)	
322	▲3-659-661-00	LID, upper, shield case (A)	
323	▲3-659-673-00	FOOT (LEFT), rear	
324	▲3-659-681-00	HOLDER, PC board	
325	▲3-659-682-00	HOLDER, PC board	
326	▲3-659-683-00	LEG, rear (right)	
327	3-659-685-00	HOLDER (B), LED	
328	3-659-719-00	STOPPER, punching M4 screw	
329	3-659-762-02	ARM, ejector static	
330	▲3-662-262-00	HOLDER (D), LED	
331	3-662-269-00	CLOTH, masking switch	
332	▲3-662-320-00	BRACKET, NC-1	
333	▲3-662-332-00	COVER, SY	
334	3-701-777-02	CAP	
335	▲3-703-072-00	HOLDER, plate; P	
336	3-703-075-00	CAP 2, shaft	
337	▲3-703-141-00	HOLDER, PCB	
338	▲4-316-015-01	HOLDER, wire	
339	▲4-857-472-00	CLAMP	
E-301	1-543-145-00	SUPPLY sensor	L9502
E-302	1-548-534-00	TAPE COUNTER	
E-303	1-552-822-00	Slide, MEMORY	S9503
E-304	▲A-6711-216-A	RF-2 Board, complete	
E-305	▲A-6711-221-A	NC-1 Board, complete	
E-306	▲A-6717-140-A	SY-11 Board, complete	
E-307	▲A-6717-142-A	SY-10 Board, complete	
E-308	▲A-6717-143-A	SJ-1 Board, complete	
E-309	▲A-6725-152-A	LS-3 Board, complete	

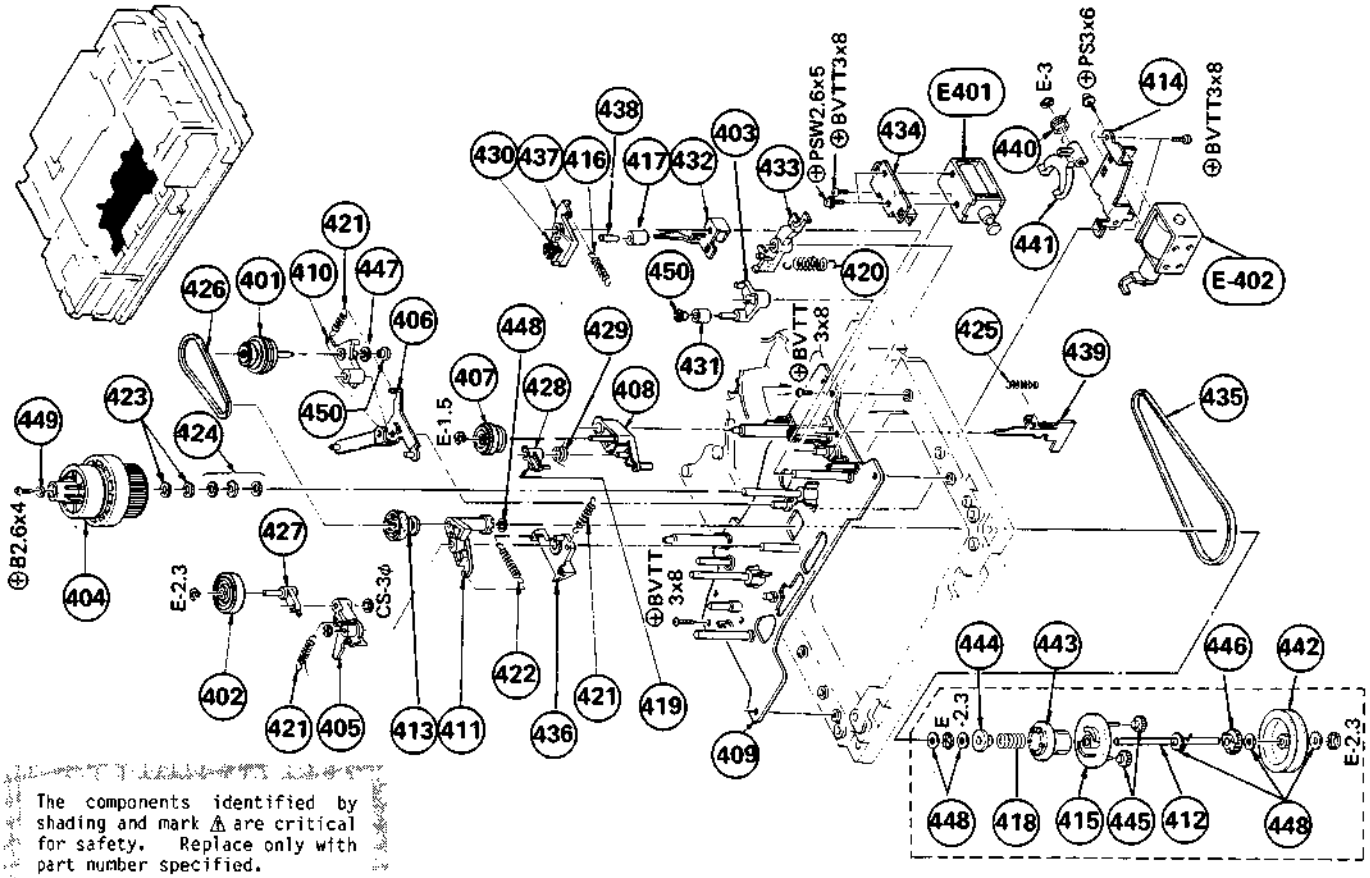
CHASSIS ASSEMBLY (2)



No.	Part No.	Description	Remark
351	X-3659-315-0	REEL ASS'Y, S	
352	♦X-3659-317-0	BRACKET ASS'Y, lock	
353	♦X-3659-322-0	ARM ASS'Y, ring	
354	X-3659-323-0	PLATE ASS'Y, adjustment; R	
355	X-3659-326-0	ARM ASS'Y, cassette compartment	
356	X-3659-328-2	BAND ASS'Y, tension regulator	
357	3-143-060-00	SPRING, tension	
358	3-492-150-00	SPRING, tension	
359	3-532-725-00	SPRING, tension	
360	3-534-217-00	SPRING, tension	
361	3-537-205-00	SPRING, tension	
362	3-646-184-00	SPACER (T:0.2), reel ADJ	
363	3-646-184-11	SPACER (T:0.1), reel ADJ	
364	3-646-185-00	BEARING, thrust	

No.	Part No.	Description	Remark
365	3-648-626-00	SPRING, tension	
366	♦3-659-415-00	LEVER, press; REW	
367	♦3-659-445-00	BRAKE, S	
368	3-659-446-00	LINING, brake	
369	3-659-452-00	ARM, brake release	
370	♦3-659-454-00	ARM, ring lock	
371	3-659-455-00	SPRING	
372	♦3-659-457-00	PLATE, slide; MS	
373	♦3-659-458-00	DETECTION, cassette	
374	♦3-659-562-00	ARM (1), cassette compartment	
375	♦3-659-567-00	BRAKE, soft	
376	3-659-624-00	LOCK, cassette compartment	
377	3-660-916-00	STOPPER, end	
378	3-701-441-21	WASHER	
379	3-703-074-00	CAP 3, shaft	

CHASSIS ASSEMBLY (3)

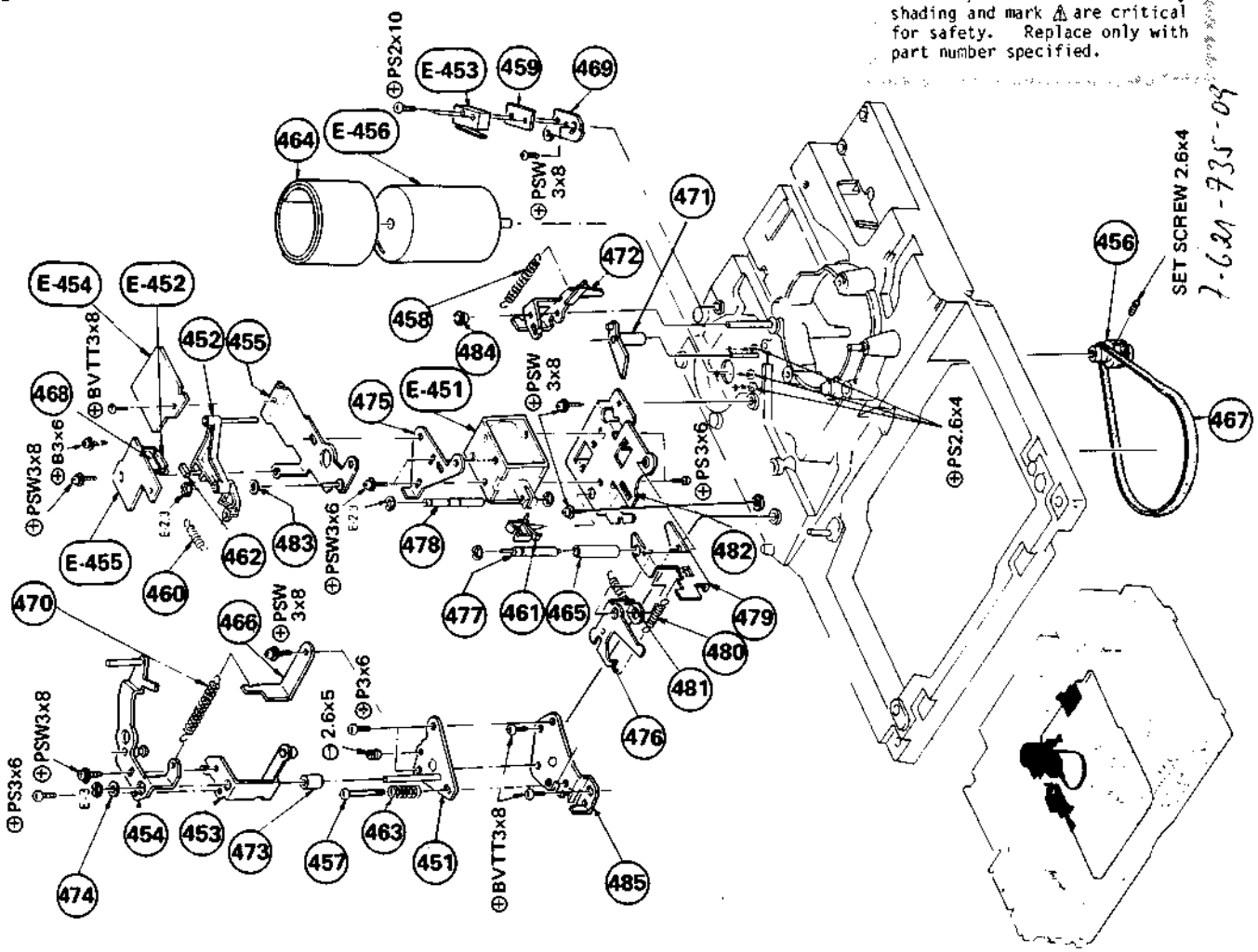


The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

No.	Part No.	Description	Remark
401	X-3653-310-0	LIMITER ASS'Y, FWD	
402	X-3653-315-0	IDLER ASS'Y	
403	X-3659-311-0	ARM ASS'Y, TB	
404	X-3659-316-3	TABLE ASS'Y, reel; T	
405	X-3659-318-0	BRACKET ASS'Y, adjustment	
406	X-3659-319-0	LEVER ASS'Y, FWD	
407	X-3659-324-0	IDLER ASS'Y, E	
408	X-3659-325-0	ARM ASS'Y, E idler	
409	X-3659-347-4	CHASSIS ASS'Y, mechanism	
410	X-3659-410-0	ARM ASS'Y, FWD	
411	X-3661-512-0	ARM ASS'Y, FF	
412	X-3661-518-0	SHAFT ASS'Y, midway pulley	
413	X-3661-520-0	PULLEY ASS'Y, midway	
414	X-3661-572-0	FRAME ASS'Y, SL	
415	X-3662-207-0	ARM ASS'Y, planet gear	
416	3-534-217-00	SPRING, tension	
417	3-538-051-11	RUBBER, brake	
418	3-543-966-00	SPRING, compression	
419	3-553-038-00	SPACER, EBF	
420	3-632-263-00	SPRING	
421	3-642-483-00	SPRING, tension	
422	3-645-168-00	SPRING, tension	
423	3-646-184-00	SPACER (T:0.2)	
424	3-646-185-00	BEARING, thrust	
425	3-646-312-00	SPRING	
426	3-653-324-00	BELT, FWD	
427	3-659-416-00	LEVER, REW	
428	3-659-431-00	CLAW, ratchet	
429	3-659-432-00	SPRING	
430	3-659-446-00	LINING, brake	
431	3-659-464-00	ROLLER, TB arm	
432	3-659-468-00	BRAKE, P	
433	3-659-469-00	ARM, press; PB	
434	3-659-470-00	BASE, PB solenoid	
435	3-659-471-00	BELT, FF	
436	3-659-564-00	LEVER ARM, FF press	
437	3-659-791-00	BRAKE, T	
438	3-660-941-00	RETAINER, brake rubber	
439	3-660-943-00	PLATE, erasing protection	
440	3-661-570-00	SPRING	
441	3-661-574-00	LEVER, clutch	
442	3-662-221-00	GEAR, mechanism pulley	
443	3-662-223-00	CLUTCH	
444	3-662-225-00	RETAINER, spring	
445	3-662-274-00	GEAR, planet	
446	3-662-275-00	GEAR, driving	
447	3-701-437-21	WASHER	
448	3-701-439-21	WASHER	
449	3-701-441-21	WASHER	
450	3-703-075-00	CAP 2, shaft	
⚠E-401	1-454-185-21	Solenoid, BRAKE	SL9506
⚠E-402	1-454-229-00	Solenoid, SELECT	SL9507

CHASSIS ASSEMBLY (4)

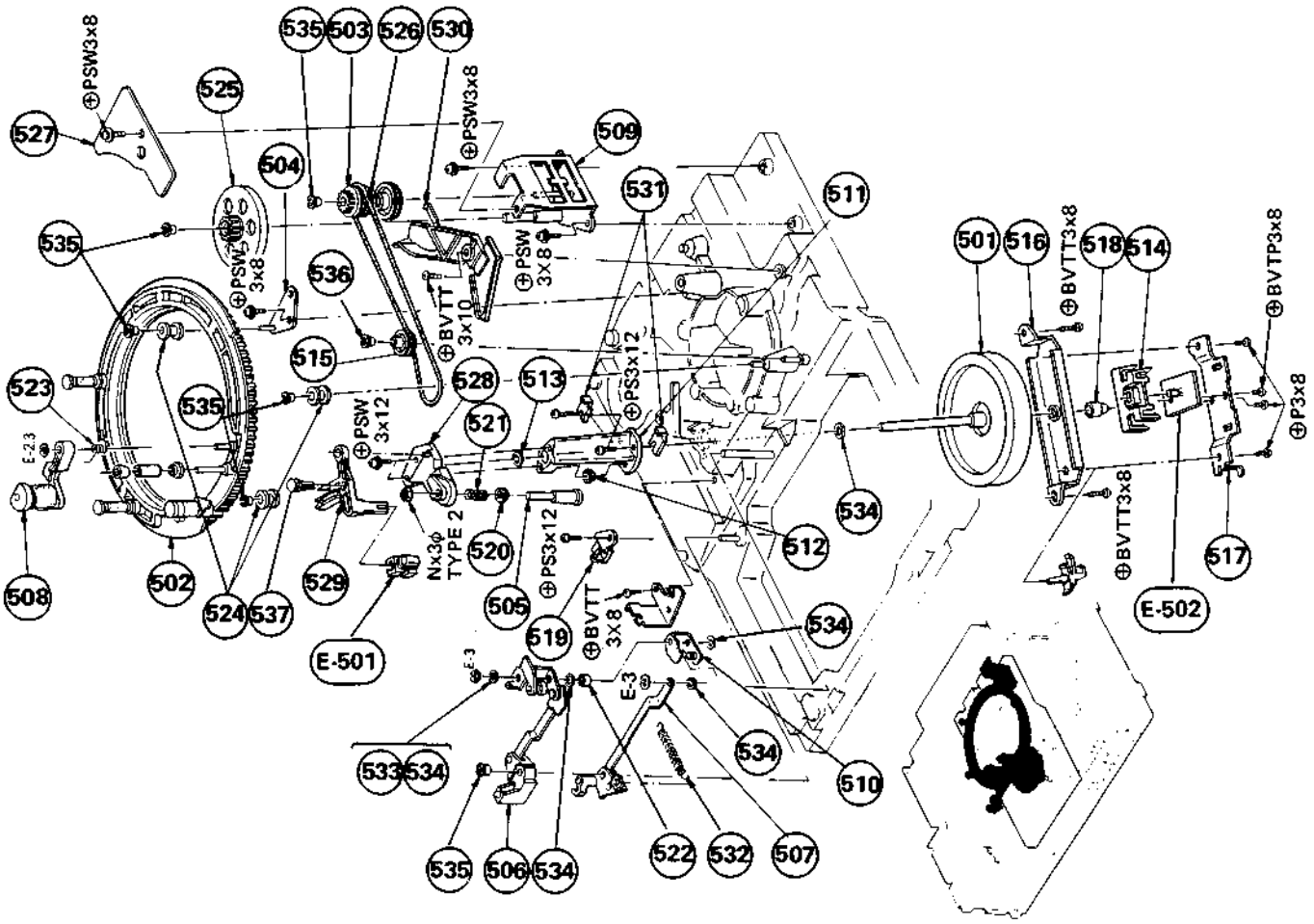
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



No.	Part No.	Description	Remark
451	♦X-3659-305-0	PLATE ASS'Y, adjustment	
452	X-3659-310-0	ARM ASS'Y, detection; slack	
453	♦X-3659-369-0	ARM ASS'Y, tension regulator	
454	♦X-3659-370-2	PLATE ASS'Y, arm	
455	♦X-3659-380-0	BASE ASS'Y	
456	X-3661-524-0	PULLEY ASS'Y, motor	
457	♦3-437-173-02	SCREW, head adjusting	
458	3-533-223-11	SPRING, tension	
459	3-534-263-00	INSULATOR	
460	3-542-476-00	SPRING, tension	
461	♦3-644-407-00	CLIP, AC wire; E	
462	3-646-571-00	MAGNET	
463	3-652-413-00	SPRING, compression	
464	♦3-658-173-00	SHIELD, capstan	
465	♦3-658-194-00	SPACER (4-25)	
466	♦3-659-319-00	PLATE, adjustment; BT	
467	3-659-351-00	BELT, capstan	
468	♦3-659-359-00	PLATE, boost; reed switch	
469	♦3-659-360-00	BRACKET, threading end; MS	
470	3-659-378-02	SPRING, tension	

No.	Part No.	Description	Remark
471	♦3-659-392-00	ARM, lock keep	
472	♦3-659-557-03	ARM, lock keep	
473	3-659-757-00	SPACER	
474	3-659-758-00	WASHER	
475	♦3-659-775-00	PLATE, adjustment; lever shaft	
476	♦3-659-777-00	LEVER (B), pinch press	
477	♦3-659-778-00	SHAFT, pinch press lever	
478	♦3-659-780-00	PIN, lever; pinch press	
479	♦3-659-781-00	LEVER (A), pinch press	
480	3-659-784-00	SPRING, tension	
481	3-659-785-00	SPRING, tension	
482	♦3-659-789-00	BASE, pinch plunger	
483	3-701-439-21	WASHER	
484	3-703-074-00	CAP3, shaft	
485	X-3659-312-0	CHASSIS ASS'Y TENSION REGULATOR	
⚠E-451	1-454-217-00	Solenoid, PINCH	S9505
E-452	1-552-180-00	REED, SLACK SENSOR	S6201
E-453	1-552-665-00	Miniature, THREADING END	S9502
E-454	♦1-601-762-00	CN-5 Board	
E-455	♦1-601-763-00	CN-6 Board	
E-456	8-838-008-00	CAPSTAN MOTOR, BHF-1100D	M9502

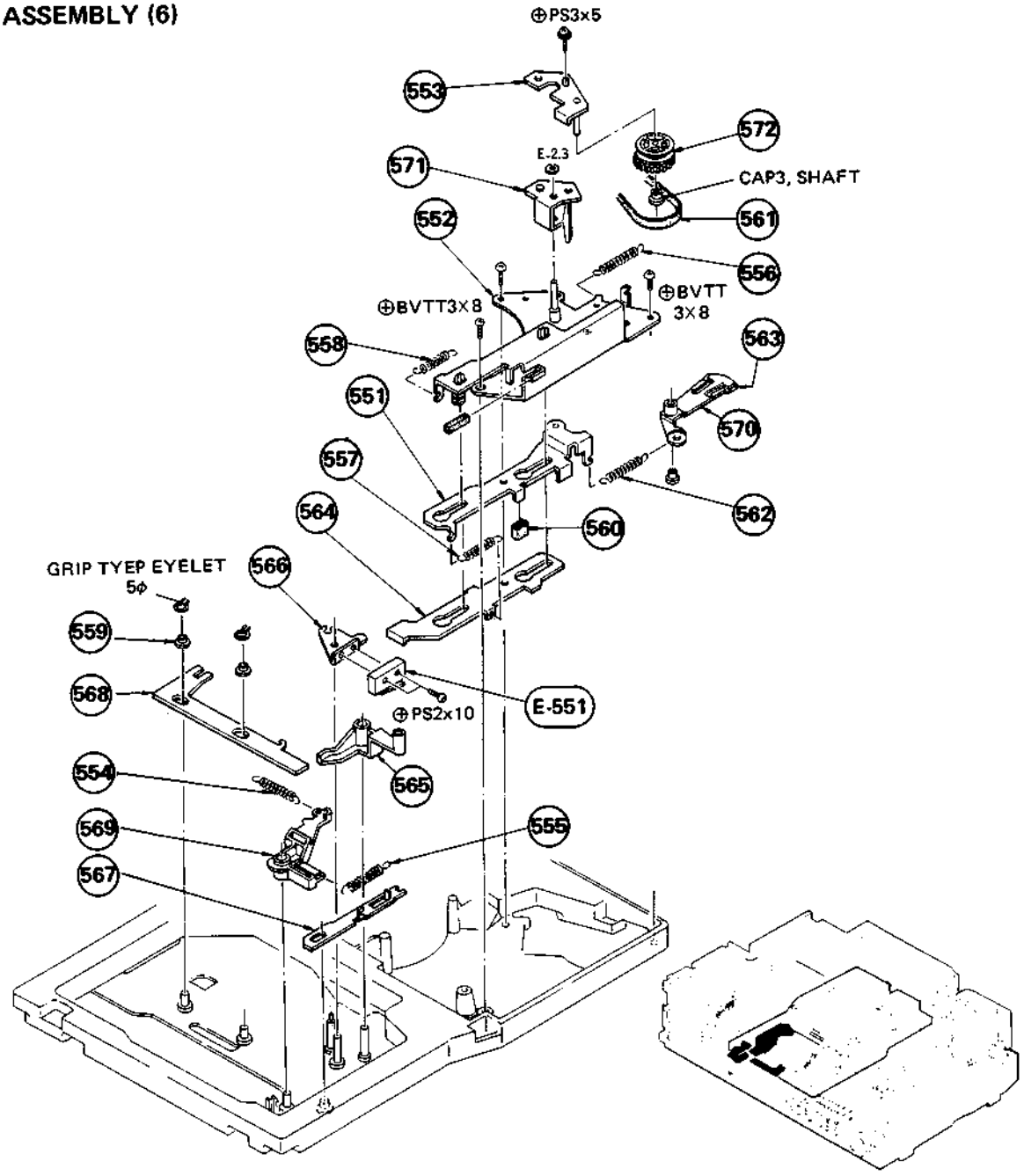
CHASSIS ASSEMBLY (5)



No.	Part No.	Description	Remark
501	A-6735-032-A	CAPSTAN BLOCK ASS'Y	
502	A-6750-087-A	RING BLOCK ASS'Y, threading	508, 523
503	X-3659-301-0	LIMITER ASS'Y, E	
504	♦X-3659-307-0	SUPPORT ASS'Y, ring roller	
505	X-3659-308-0	GUIDE ASS'Y, No. 0	
506	X-3659-333-0	STOPPER ASS'Y, tension regulator	
507	X-3659-335-5	LINK ASS'Y (1), release - - - - - - - -	532
508	X-3659-337-0	ARM ASS'Y, pinch roller	
509	♦X-3659-340-0	BRACKET ASS'Y, midway pulley	
510	X-3659-386-3	LINK ASS'Y (2), release	
511	X-3662-201-0	HOUSING ASS'Y, capstan	
512	3-646-182-00	CAP, oil	
513	3-646-183-00	ABSORBER, capstan oil	
514	3-658-161-00	HOLDER, DME	
515	3-659-302-00	PULLEY, idle	
516	3-659-312-00	RETAINER, capstan	
517	♦3-659-313-00	PLATE, adjustment; DME	
518	3-659-314-00	RETAINER, thrust	
519	♦3-659-320-00	HOOK, spring; release	

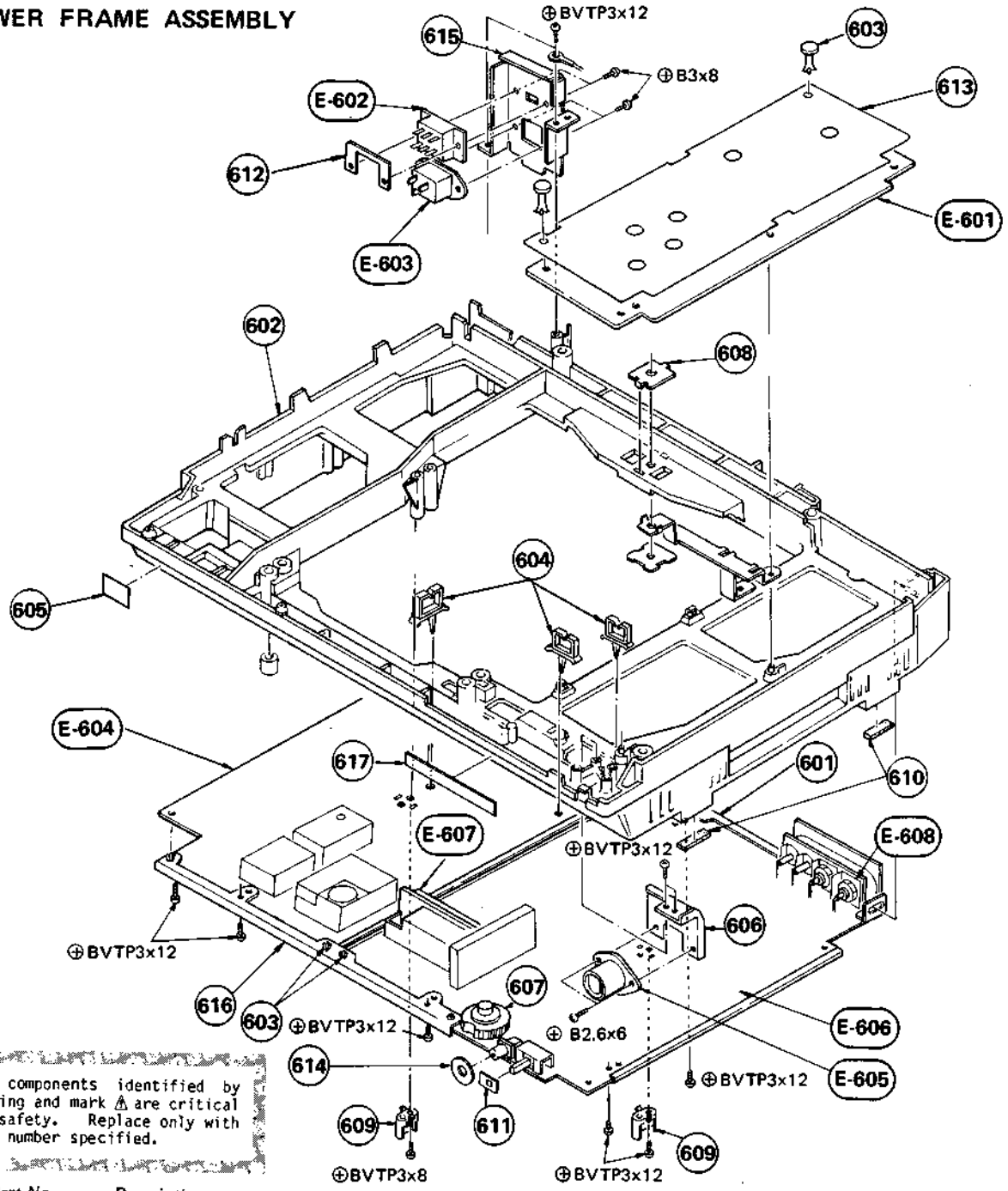
No.	Part No.	Description	Remark
520	3-659-337-00	FLANGE No. 0, guide upper	
521	3-659-338-00	SPRING, compression	
522	3-659-365-00	SPACER	
523	3-659-388-00	SPRING	
524	3-659-391-00	ROLLER, ring	
525	3-659-396-00	GEAR (B), midway	
526	3-659-397-00	BELT, eject	
527	♦3-659-414-00	PLATE, control	
528	3-659-551-00	FRAME, guide; No. 0	
529	♦3-659-632-00	HOLDER, S sensor	
530	♦3-659-691-00	RETAINER (LARGE), harness	
531	3-659-759-11	SPACER, capstan	
532	3-660-911-00	SPRING, tension	
533	3-701-441-11	WASHER	
534	3-701-441-21	WASHER	
535	3-703-074-00	CAP3, shaft	
536	3-703-075-00	CAP2, shaft	
537	4-829-039-00	RIVET, nylon	
E-501	1-543-145-00	TAKE-UP sensor	L9501
E-502	♦1-600-101-00	FG-1 Board	

CHASSIS ASSEMBLY (6)



No.	Part No.	Description	Remark
551	▲X-3659-303-0	LEVER (LOWER) ASS'Y, EJECT 560	
552	▲X-3659-359-0	BASE ASS'Y, threading unit	
553	▲X-3659-360-0	ARM (B) ASS'Y, gear pulley hold	
554	3-143-060-00	SPRING, tension	
555	3-532-125-00	SPRING, tension	
556	3-533-223-00	SPRING, tension	
557	3-642-510-00	SPRING, tension	
558	3-642-513-00	SPRING, tension	
559	3-646-271-00	BOSS	
560	3-655-856-11	RETAINER, tension regulator	
561	3-659-301-00	BELT, threading	
562	3-659-393-00	SPRING, tension	
563	3-659-394-00	SHOE, brake	
564	▲3-659-395-00	LEVER (UPPER), EJECT	
565	3-659-453-00	ARM, EL	
566	▲3-659-459-00	BRACKET, CSW	
567	▲3-659-460-00	PLATE, release; lock	
568	▲3-659-461-00	JOINT	
569	3-659-560-00	ARM, E	
570	▲3-659-679-00	ARM, motor brake	
571	▲3-659-705-00	ARM (A), gear pulley hold	
572	3-659-706-00	PULLEY, gear	
E-551	1-552-663-00	Miniature, CASSETTE IN	S9501

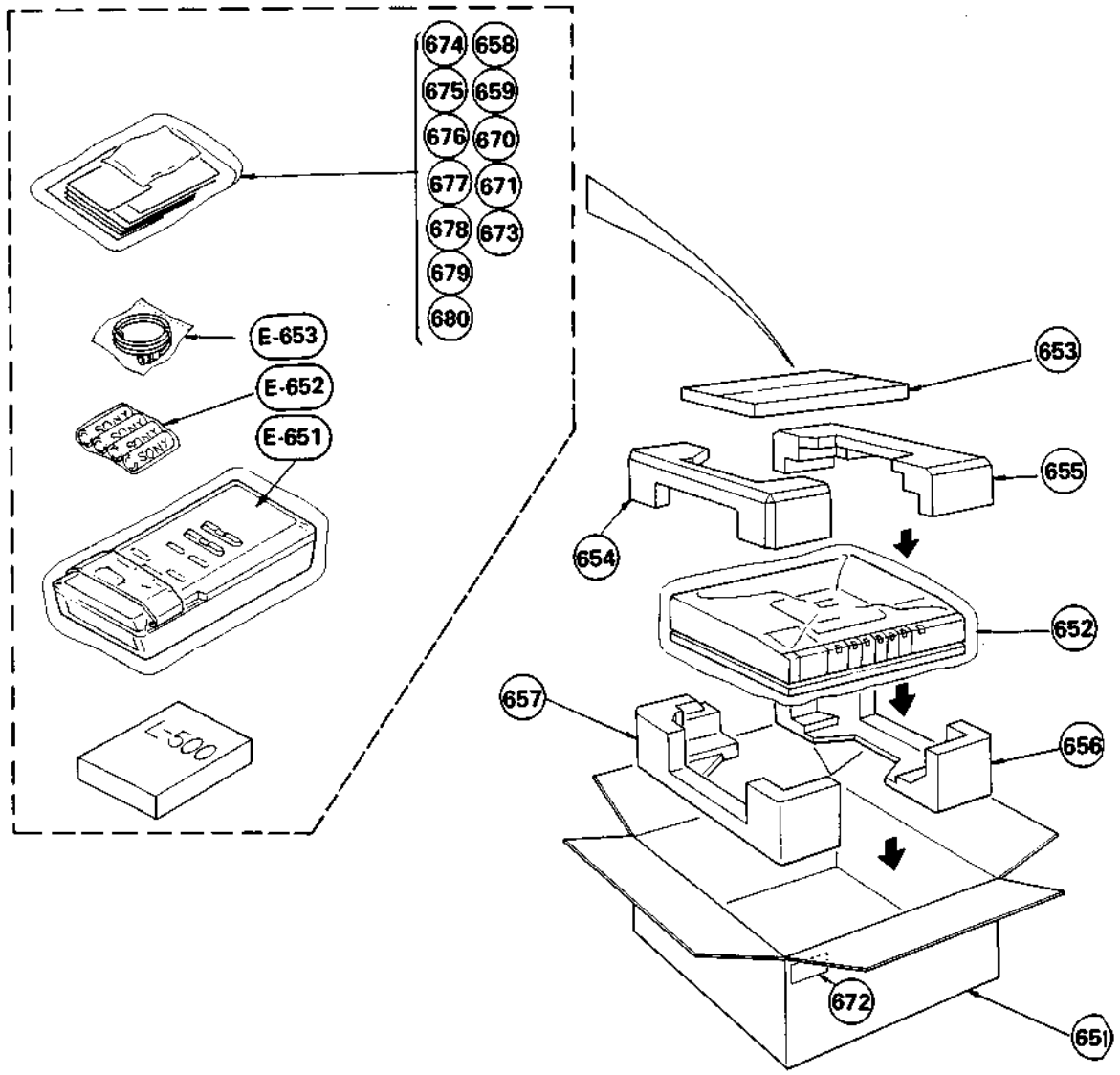
LOWER FRAME ASSEMBLY



The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

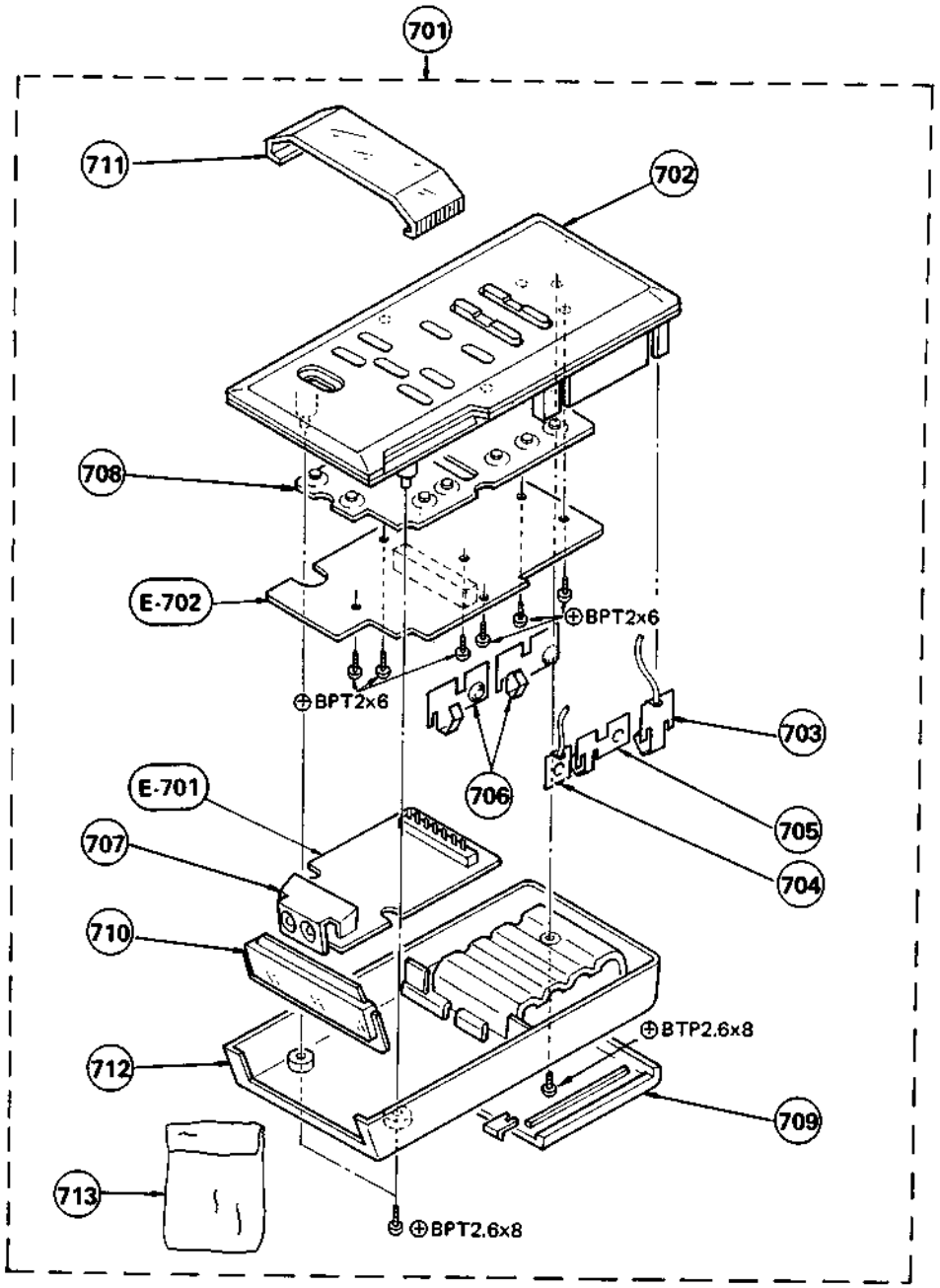
No.	Part No.	Description	Remark
601	X-3662-208-0	BRACKET (A) ASS'Y, chassis	
602	X-3662-211-0	FRAME ASS'Y, lower - - - - - - - 605, 617	
603	3-646-090-00	RIVET, nylon	
604	⧫3-655-214-00	CLIP, cable	
605	3-656-344-00	LABEL, power switch	
606	⧫3-659-522-00	BRACKET, camera connector	
607	3-659-528-00	KNOB, track control	
608	⧫3-659-529-00	SPACER, plate	
609	3-659-530-00	BLOCK, support; bottom plate	
610	3-659-532-00	FELT, foot	
611	3-659-663-00	COVER, slide switch	
612	⧫3-662-235-00	NUT, plate	
613	⧫3-662-244-00	INSULATOR	
614	3-662-261-00	COVER, microphone jack	
615	3-662-273-00	PANEL (E), power	
616	⧫3-662-279-00	BRACKET (B), chassis	
617	3-662-280-00	LABEL, input	
E-601	⧫A-6711-217-A	CR-4 Board, complete	
⚠E-602	1-553-125-00	Slide, VOLTAGE SELECTOR	S9505
⚠E-603	1-509-546-00	3P INLET	
E-604	⧫A-6715-093-A	AS-3 Board, complete	
E-605	⧫1-561-263-00	CONNECTOR, CAMERA	CN9501
E-606	⧫A-6711-215-A	YC-6 Board, complete	
E-607	⧫1-601-836-00	CB-1 Board	
E-608	1-536-614-00	BOARD, TERMINAL, control panel	CNJ1-4

PACKING



No.	Part No.	Description	Remark
651	X-3662-220-0	INDIVIDUAL CARTON ASS'Y	
652	3-656-390-00	BAG, protection	
653	3-662-327-00	CASE, accessory	
654	3-662-328-00	CUSHION, left upper	
655	3-662-329-00	CUSHION, right upper	
656	3-662-330-00	CUSHION, right lower	
657	3-662-331-00	CUSHION, left lower	
658	3-662-334-01	LABEL (GERMAN), explanation	
659	3-662-335-01	LABEL (FRENCH), explanation	
670	3-662-336-01	LABEL (DUTCH), explanation	
671	3-662-337-01	LABEL (SWEDISH), explanation	
672	3-701-360-00	LABEL, tack	
673	3-701-630-00	BAG, polyethylene	
674	3-783-007-11	MANUAL, instruction	
675	3-794-584-11	INSTRUCTION	
676	3-794-585-11	MANUAL, instant information	
677	3-794-586-11	MANUAL, instant information	
678	3-794-603-11	MANUAL, instant information	
679	3-794-604-11	MANUAL, instant information	
680	3-794-605-11	MANUAL, instant information	
E-651	A-6701-071-A	COMMANDER ASS'Y, remote; IMT-200	
E-652	1-528-027-11	BATTERY, long-life; SUM-3	
E-653	1-551-513-00	CABLE, coaxial ass'y	

COMMANDER BLOCK ASSEMBLY
RMT-200



No.	Part No.	Description	Remark
701	A-6701-071-A	COMMANDER ASS'Y, remote	702–713, E-701, 702
702	X-3662-213-0	CASE (UPPER) ASS'Y	
703	2-249-918-00	TERMINAL (A), battery	
704	2-249-919-00	TERMINAL (B), battery	
705	2-249-920-00	TERMINAL (C), battery	
706	2-249-921-00	TERMINAL (D), battery	
707	2-249-924-00	REFLECTOR	
708	3-662-299-00	CONTACT, rubber	
709	3-662-300-00	COVER, battery	
710	3-662-301-00	PLATE, frosted	
711	3-662-302-00	COVER, slide	
712	3-662-304-00	CASE (LOWER)	
713	3-701-620-00	BAG, polyethylene	
E-701	♦1-601-832-00	RM-1 Board	
E-702	♦1-601-833-00	RM-2 Board	

SECTION 5
ELECTRICAL PARTS LIST

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- ※ : selected to yield optimum performance.
- Items marked "♠" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

CAPACITORS

- All capacitors are in μF and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics. p : μμF, elect : electrolytic

RESISTORS

- All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on page 5-24 for their part numbers.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
  kΩ : 1000Ω, MΩ : 1000kΩ

COILS

- All coils are microinductors unless ohterwise noted.

SEMICONDUCTORS

This semiconductor list should be used when ordering the semiconductor (IC, Q, D) for repair parts.

Ref. No.	*For production*	*For repair*
AS-3 BOARD		
IC001	CX186	CX186 8-751-860-00
IC002	CX143A	CX143A 8-751-430-00
IC003	TC4011BP MC14011BCP MSM4011	TC4011BP 8-759-240-11
IC004	TA7120P	TA7120P 8-759-271-20
IC005	TC4011BP MC14011BCP MSM4011	TC4011BP 8-759-240-11
Q001	2SA733	2SA1027R 8-729-612-77
Q002	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q003	2SA733	2SA1027R 8-729-612-77
Q004, 005	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q006	2SA733	2SA1027R 8-729-612-77
Q007, 008	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q009	2SA733	2SA1027R 8-729-612-77
Q010	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q011	2SA733	2SA1027R 8-729-612-77
Q012, 013	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q014~016	2SA733	2SA1027R 8-729-612-77
Q017, 018	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q021	2SA733	2SA1027R 8-729-612-77
Q022	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q023	2SA733	2SA1027R 8-729-612-77

Ref. No.	For production	For repair
Q024~038	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q039	2SA733	2SA1027R 8-729-612-77
Q040, 041	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q042	2SA733	2SA1027R 8-729-612-77
Q043~047	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q048	2SA733	2SA1027R 8-729-612-77
Q049	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q050	2SA733	2SA1027R 8-729-612-77
Q401, 402	2SC1345 2SC1361 2SC1362	2SC1345 8-729-334-58
Q403~406	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q407	2SC1475 2SD774	2SC1475 8-760-413-10
Q408	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q409	2SC945	2SC1364 8-729-663-47
Q410	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q411, 412	2SC1345 2SC1361 2SC1362	2SC1345 8-729-334-58
Q414	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q415	2SA772 2SB733 2SB739	2SA772 8-760-514-10

Ref. No.	For production	For repair
Q416	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q417	2SA772 2SB733 2SB739	2SA772 8-760-514-10
Q418	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q419	2SA772 2SB733 2SB739	2SA772 8-760-514-10
Q420, 421	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q423	2SA772 2SB733 2SB739	2SA772 8-760-514-10
Q424	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q425	2SC1345 2SC1361 2SC1362	2SC1345 8-729-334-58
Q427	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
D001~004	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D005	RD6.2E	RD6.2E 8-719-162-07
D006~028 D030~032	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D401	1T22 1T22A	1T22AM 8-719-422-21
D402~406 D408~411 D413,414,416	1S1555 1S2076 1S2473	1S1555 8-719-815-55
CB-1 BOARD		
IC7, 8	SN74LS93N M53293P	SN74LS93N 8-759-900-93

Ref. No.	For production	For repair
IC9	SN74LS10N	SN74LS10N 8-759-900-10
IC10	SN74LS74AN	SN74LS74AN 8-759-900-74
Q63	2SC403C	2SC403C 8-724-375-01
CH-3 BOARD		
IC1	CX-804	CX804 8-758-040-00
IC2	MC14046BCP CO4046BE	MC14046BCP 8-759-040-46
IC3	CX761	CX761 8-757-610-00
IC4	CX760	CX760 8-757-600-00
IC5	μPC78L05A	μPC78L05A 8-759-108-05
IC6	TC4012BP μPD4012C MC140128CP	TC4012BP 8-759-240-12
IC7	TC4011BP μPD4011C MC14011BCP	TC4011BP 8-759-240-11
IC8	TC4011BP MC14011BCP	TC4011BP 8-759-240-11
IC9	BA656	BA656 8-759-965-60
IC10	TC4011BP μPD4011C MC14011BCP	TC4011BP 8-759-240-11
IC11	TC4012BP μPD4012C MC140128CP	TC4012BP 8-759-240-12
IC12	μPC574J	μPC574J 8-759-157-40
Q1	2SC945 2SC1364 2SC403C	2SC1364 8-729-663-47
Q2	2SA733 2SA844	2SA1027R 8-729-612-77
Q4	2SC945 2SC1364 2SC403C	2SC1364 8-729-663-47

Ref. No.	For production	For repair
Q5	2N3904	2N3904 8-729-139-04
Q6	2SC403C	2SC403C 8-724-375-01
Q7~10	2SA733 2SA844	2SA1027R 8-729-612-77
D2~5 D7~10	1S1555	1S1555 8-719-815-55
D11~15	SR108D SEL1122P	SEL1122P-N 8-719-311-23
D16	TLR123	TLR123 8-719-812-31
D17	TLY123	TLY123 8-719-812-32
D18	TLG123	TLG123 8-719-812-33
D19	TLR123	TLR123 8-719-812-31
CI-1 BOARD		
IC013	SN29764N	SN29764N 8-759-997-64
D020	TLR326	TLR326 8-719-803-26
CR-4 BOARD		
IC1	TC4027BP	TC4027BP 8-759-240-27
IC2	CX150	CX150 8-751-500-00
IC3	TA7320BP	TA7320P 8-759-213-20
IC4	TC4528BP	TC4528BP 8-759-245-28
IC5	CX130	CX130 8-751-300-00
Q1, 4	2SC403C	2SC403C 8-724-375-01
Q5	2SA733 2SA844 2SA925	2SA1027 8-729-612-77

Ref. No.	For production	For repair
Q6, 8~13	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q15	2SC535	2SC535 8-729-353-52
Q16, 17	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q18	2SA733 2SA844 2SA925	2SA1027R 8-729-612-77
Q19, 20	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q21~23	2SC535	2SC535 8-729-353-52
D3, 5~8	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D9	RD5.6E-B	RD5.6E-B2Z 8-719-156-25
D10~16	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D18	1S1555	1S1555 8-719-815-55
FG-1 BOARD		
DM701	DM101A	DM101A-1 8-749-011-01
IF-10 BOARD		
IC501	TBA1440G	TBA1440G 8-759-014-40
IC502	M5135P	M5135P 8-759-651-35
IC503	TBA120U	TBA120UB 8-759-001-20
Q501	2SC2009	2SC2009 8-765-300-00
Q502, 503	2SC945 2SC1364	2SC1364 8-729-663-47

Ref. No.	For production	For repair
IR-1 BOARD		
Q901	2SK23A	2SK23A 8-722-384-00
Q902	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
Q903	2SA678	2SA1027R 8-729-612-77
D901	PH302A	PH302A 8-719-100-33
LS-3 BOARD		
Q501	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q502	2SA733	2SA1027R 8-729-612-77
Q503	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q504	2SC1761	2SC1761 8-763-113-00
Q505~507	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q508	2SA733	2SA1027R 8-729-612-77
Q509	2SC1061	2SC1061 8-729-316-12
Q510, 511	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q512	2SC1761	2SC1761 8-763-113-00
D501	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D502	10E2 V06C	10E2 8-719-200-02

Ref. No.	For production	For repair
NC-1 BOARD		
IC1	CX135	CX135 8-751-350-00
Q1, 2	2SA844	2SA844 8-729-384-48
Q3, 4	2SC403C	2SC403C 8-724-375-01
D1, 2	1S1555 1S2076 1S2473	1S1555 8-719-815-55
PC-1 BOARD		
Q1, 2	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
Q11	2SA772 2SB733 2SB739	2SA772 8-760-514-10
Q12~14	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
D1	RD6.2E	RD6.2E 8-719-162-07
PL-2 BOARD		
Q602	2SC2315 2SC2315S	2SC2315 8-729-331-53
Q603	2SC1474 2SD773	2SC1474 8-760-335-10
Q605	2SC2315 2SC2315S	2SC2315 8-729-331-53
Q606	2SC1474 2SD773	2SC1474 8-760-335-10
Q608	2SC2315 2SC2315S	2SC2315 8-729-331-53
Q609, 610	2SC1474 2SD773	2SC1474 8-760-335-10
Q613	2SC2315 2SC2315S	2SC2315 8-729-331-53

Ref. No.	For production	For repair
Q614	2SC1364	2SC1364 8-729-663-47
D601~612	10E2 V06C	10E2 8-719-200-02
RF-2 BOARD		
IC1	CX134A	CX134A 8-751-340-00
Q1, 2	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q3, 4	2SK152	2SK152 8-765-422-00
Q5~7	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q8	2SC403C	2SC403C 8-724-375-01
Q9	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q10	2SA925 2SA844	2SA844 8-729-384-48
Q11	2SA733	2SA1021R 8-729-612-77
Q12	2SC1815	2SC1364 8-729-663-47
Q13	2SC403C	2SC403C 8-724-375-01
D1~9	1S1555 1S2076 1S2473	1S1555 8-719-815-55
RM-1 BOARD		
IC801	M50112P	M50112P 8-759-601-12
Q801, 802	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
D801, 802	SE303A	SE303A 8-719-103-03

Ref. No.	For production	For repair
D803	TLR124	TLR124 8-719-812-41
SJ-1 BOARD		
IC701~704	TC4011BP MC14011BCP	TC4011BP 8-759-240-11
IC705	TC4001BP MC14001BCP	TC4001BP 8-759-240-01
IC706, 707	TC4049BP	TC4049BP 8-759-240-49
Q701	2SA733	2SA1027R 8-729-612-77
Q702~705	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
D701~712	1S1555 1S2076 1S2473	1S1555 8-719-815-55
SR-08 BOARD		
⚠ IC1	TL494CN	TL494CN 8-759-904-94
⚠Q101, 102	2SC2335	Pair Transistor kit (2SC2335) A-6738-159-A
⚠Q201	2SA733	2SA1027R 8-729-612-77
⚠Q202, 203	2SC1816	2SC1816 8-764-803-00
⚠Q204	2SC945	2SC1364 8-729-663-47
⚠Q205, 206	2SC1475	2SC1475 8-760-413-10
⚠Q207	2SC945	2SC1364 8-729-663-47
⚠D101~104	ERC04-06S	U05G 8-719-911-55
⚠D201, 202	ERD33-02	ERD33-02 8-719-933-02
⚠D203~205	1S2076A	1S1585 8-719-815-85

Ref. No.	For production	For repair
⚠D206, 207	10E1	10E2 8-719-200-02
⚠D208	RD20E-B	EQB01-18 8-719-931-18
⚠D209	RD5.6E-B3Z	RD5.6E-B2Z 8-719-156-25
⚠D210	1S2076A	1S1585 8-719-815-85
⚠D211	RD15E-B	EQB01-15 8-719-931-15
⚠D212	1S2076A	1S1585 8-719-815-85
SY-10 BOARD		
IC1	TC4011BP MSM4011 MC14011BCP	TC4011BP 8-759-240-11
IC2	μPD547C060	μPD547C060 8-759-147-60
IC3	TC4081BP μPD4081C MSM4081	TC4081BP 8-759-240-81
Q1~4	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
Q5	2SC403C	2SC403C 8-724-375-01
Q6, 7	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
D1~14	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D15~22	TLR123	TLR123 8-719-812-31
D23	RD11E	RD11E-B 8-719-111-07
D24	RD7.5E	EQB01-08 8-719-931-08
D25, 26	1S1555 1S2076 1S2473	1S1555 8-719-815-55

Ref. No.	For production	For repair
SY-11 BOARD		
IC1	TC4066BP μPD4066C MSM4066	TC4066BP 8-759-240-66
IC2, 3	TC4069UBP CD4069UBE μPD4069C MC14069BCP	μPD4069C 8-759-140-69
IC4	TC4001BP MC14001BCP MSM4001	TC4001BP 8-759-240-01
IC5	TC4069UBP CD4069UBE μPD4069C MC14069BCP	μPD4069C 8-759-140-69
IC6	μPD546C107	μPD546C107 8-759-146-17
IC7	μPD547C049	μPD547C049 8-759-147-49
IC8, 9	BX342	BX342 8-743-420-00
Q1, 2	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
Q3~6	2SA677 2SA678	2SA1027R 8-729-612-77
Q8	2SC2315 2SC2315S	2SC2315 8-729-331-53
Q9	2SC1124	2SC1124 8-725-412-00
Q10	2SC1474	2SC1474 8-760-335-10
Q11, 12	2SA722 2SB733	2SA772 8-760-514-10
Q13~15, Q17~19	2SA677 2SA678	2SA1027R 8-729-612-77
Q20~23	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47
Q24	2SC1474	2SC1474 8-760-335-10
Q25~27	2SC1363 2SC1364 2SC945	2SC1364 8-729-663-47

Ref. No.	For production	For repair
D1, 2	10E2	10E2 8-719-200-02
D3~5	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D6	RD7.5E	EQB01-08 8-719-931-08
D7~13	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D14	10E2	10E2 8-719-200-02
D15, 16	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D18	RD11E	RD11E-B 8-719-111-07
D19~30	1S1555 1S2076 1S2473	1S1555 8-719-815-55
TM-10 BOARD		
IC001	MB8841-180	MB8841-180 8-759-981-80
IC002, 003	μPA56C	μPA56C 8-759-100-56
IC004, 005	M54519P	M54519P 8-759-645-19
IC006	M58478P	M58478P 8-759-684-78
IC007	TC4081BP MC14081BCP	TC4081BP 8-759-240-81
IC008	TC4071BP MC14071BCP	TC4071BP 8-759-240-71
IC009	TC4069UBP MC14069BCP	MSM4069 8-759-904-69
Q001	2SA773	2SA684 8-729-468-43
Q002	2SA733 2SA844	2SA1021R 8-729-612-77
Q003	2SC945 2SC1363	2SC1364 8-729-663-47

Ref. No.	For production	For repair
Q004	2SA733 2SA844	2SA1027R 8-729-612-77
D001, 002, 004, 006	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D007	RD24E	RD24E-B 8-719-124-07
D008, 011~014, 017~020	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D021	RD3.9E	RD3.9E 8-719-139-07
D022~027	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D051~064	TLR124	TLR124 8-719-812-41
DB001~005	μPA54H	μPA54H 8-759-100-54
TM-11 BOARD		
IC101	μPC78L05A	μPC78L05A 8-759-108-05
Q101	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q102	2SD773	2SD773 8-729-177-32
D101	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D102	RD9.1E	RD9.1E-B 8-719-191-07
D103	10E2 V06C	10E2 8-719-200-02
D104	1SS82	1SS83 8-719-901-83
D105	RD5.1E	RD5.1E-B 8-719-151-07
D106~108	1S1555 1S2076 1S2473	1S1555 8-719-815-55

Ref. No.	For production	For repair
TM-12 BOARD		
LED201	TLG114 TLG114A	TLG114 8-719-801-14
LED202	TLR114	TLR114 8-719-811-41
Q201	2SC945	2SC1364 8-729-663-47
Q202	2SA733	2SA1027R 8-729-612-77
D201	1S1555	1S1555 8-719-815-55
TU-11 BOARD		
Q101	2SC2009	2SC2009 8-765-300-00
Q102	2SC403C	2SC403C 8-724-375-01
Q103	2SA733	2SA1027R 8-729-612-77
Q104	2SC1364 2SC945	2SC1364 8-729-663-47
Q106	2SC1475 2SD789	2SC1475 8-760-413-10
Q108	2SC1364 2SC945	2SC1364 8-729-663-47
D101, 102	1S2076A	1S1585 8-719-815-85
D103	RD27E	RD27E-B2Z 8-719-127-25
D104	1S1555 1S2076 1S2473	1S1555 8-719-815-55
YC-6 BOARD		
IC1	CX187	CX187 8-751-870-00
IC2	CX136A	CX136A 8-751-360-00
IC3	CX150	CX150 8-751-500-00

Ref. No.	For production	For repair
IC4	CX130	CX130 8-751-300-00
IC5	CX145	CX145 8-751-450-00
IC6	CX832	CX832 8-758-320-00
IC11	CX130	CX130 8-751-300-00
IC12	M58478P	M58478P 8-759-684-78
IC13	TC4069UBP MSM4069	MSM4069 8-759-904-69
Q1, 2	2SC403C	2SC403C 8-724-375-01
Q3~5	2SA844	2SA844 8-729-384-48
Q6	2SC403C	2SC403C 8-724-375-01
Q7	2SC945	2SC1364 8-729-663-47
Q8	2SA844	2SA844 8-729-384-48
Q9~11	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q12, 13	2SA733 2SA844 2SA925	2SA1027R 8-729-612-77
Q14~17	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q18	2SC403C	2SC403C 8-724-375-01
Q19	2SA844	2SA844 8-729-384-48
Q20, 21	2SC403C	2SC403C 8-724-375-01
Q22	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q24	2SA844	2SA844 8-729-384-48

Ref. No.	For production	For repair
Q25	25C945	2SC1364 8-729-663-47
Q26, 27	2SC403C	2SC403C 8-724-375-01
Q28	2SA733 2SA844 2SA925	2SA1027R 8-729-612-77
Q29	2SA844	2SA844 8-729-384-48
Q30~32	2SC403C	2SC403C 8-724-375-01
Q33	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q34	2SC403C	2SC403C 8-724-375-01
Q35, 36	2SA733 2SA844 2SA925	2SA1027R 8-729-612-77
Q37	2SC403C	2SC403C 8-724-375-01
Q38	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q40~43	2SC403C	2SC403C 8-724-375-01
Q44~48	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q49~53	2SC403C	2SC403C 8-724-375-01
Q54	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q55~57	2SC403C	2SC403C 8-724-375-01
Q58	2SC945	2SC1364 8-729-663-47
Q59~62	2SA844 2SA733	2SA844 8-729-384-48
Q64	2SC1474 2SC2001	2SC2001 8-729-100-13
Q65	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47

Ref. No.	For production	For repair
Q66, 67	2SC403C	2SC403C 8-724-375-01
Q68, 69	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q70	2SA733 2SA844 2SA925	2SA1027R 8-729-612-77
Q71, 72, 77, 78	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q79	2SC403C	2SC403C 8-724-375-01
Q80, 81	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q82	2SC403C	2SC403C 8-724-375-01
Q83	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q84~86	2SC403C	2SC403C 8-724-375-01
Q87	2SA844	2SA844 8-729-384-48
Q95	2SC945 2SC1363 2SC1364	2SC1364 8-729-663-47
Q96	2SC403C	2SC403C 8-724-375-01
Q97	2SC945	2SC1364 8-729-663-47
D1~3	1S1555	1S1555 8-719-815-55
D5, 7	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D8~13	1S1555	1S1555 8-719-815-55
D14~23, 25~29, 33~36	1S1555 1S2076 1S2473	1S1555 8-719-815-55
D37	RD6.2E	RD6.2E 8-719-162-07
D40, 41, 44, 45	1S1555 1S2076 1S2473	1S1555 8-719-815-55

AS-3 BOARD

Ref.No.	Part No.	Description			Remark
★	A-6715-093-A	AS-3 Board, complete			E-604
C001	1-101-006-00	0.047			
C002	1-123-316-00	10	16V	elect	
C003, 004	1-108-587-00	0.022		mylar	
C005	1-108-595-00	0.047		mylar	
C006	1-101-001-00	0.001			
C007	1-101-006-00	0.047			
C008, 009	1-131-369-00	4.7	16V	tantalum	
C010	1-101-006-00	0.047			
C011	1-131-345-00	0.47	35V	tantalum	
C012	1-123-305-00	33	10V	elect	
C013, 014	1-130-200-00	0.047		film	
C015	1-102-115-00	560p			
C016	1-130-200-00	0.047		film	
C017	1-130-199-00	0.01		film	
C018	1-101-006-00	0.047			
C019	1-131-371-00	10	16V	tantalum	
C020, 021	1-131-361-00	2.2	20V	tantalum	
C022	1-131-371-00	10	16V	tantalum	
C023	1-101-006-00	0.047			
C024	1-131-346-00	0.68	35V	tantalum	
C025	1-101-001-00	0.001			
C026	1-130-201-00	0.068		polypropylen	
C027	1-101-001-00	0.001			
C028	1-130-535-00	0.15		polypropylene	
C029	1-123-351-00	0.47	50V	elect	
C030	1-101-006-00	0.047			
C031	1-123-320-00	100	16V	elect	
C032	1-101-004-00	0.01			
C033	1-161-025-00	0.1			
C034, 035	1-131-345-00	0.47	35V	tantalum	
C036	1-101-001-00	0.001			
C037	1-123-352-00	1	50V	elect	
C038	1-123-351-00	0.47	50V	elect	
C039	1-101-003-00	0.0047			
C040	1-123-351-00	0.47	50V	elect	
C041	1-131-344-00	0.33	35V	tantalum	
C042	1-101-006-00	0.047			
C043	1-131-347-00	1	35V	tantalum	
C044	1-123-328-00	4.7	25V	elect	
C045, 046	1-131-369-00	4.7	16V	tantalum	
C047	1-101-006-00	0.047			
C048	1-123-320-00	100	16V	elect	
C049	1-108-595-00	0.047		mylar	
C050	1-108-555-00	0.001		mylar	
C051	1-123-320-00	100	16V	elect	
C052	1-131-343-00	0.22	35V	tantalum	
C053, 054	1-123-317-00	22	16V	elect	
C055	1-123-307-00	100	10V	elect	
C056, 057	1-102-106-00	100p			
C058	1-123-320-00	100	16V	elect	
C059	1-101-004-00	0.01			
C060	1-161-016-00	0.018			
C061	1-123-316-00	10	16V	elect	
C062	1-102-963-00	33p			
C063	1-123-298-00	470	6.3V	elect	
C064	1-123-316-00	10	16V	elect	
C065	1-123-296-00	220	6.3V	elect	
C066	1-123-316-00	10	16V	elect	
C067	1-123-319-00	47	16V	elect	
C068	1-123-316-00	10	16V	elect	
C069, 070	1-131-354-00	1.5	25V	tantalum	
C071, 072	1-161-017-00	0.022			
C073	1-161-021-00	0.047			
C074	1-131-343-00	0.22	35V	elect	
C075	1-131-341-00	0.1	35V	tantalum	
C076	1-123-317-00	22	16V	elect	
C077	1-101-006-00	0.047			
C078	1-123-320-00	100	16V	elect	
C079	1-123-317-00	22	16V	elect	
C080	1-123-328-00	4.7	25V	elect	
C081	1-123-352-00	1	50V	elect	
C082	1-123-353-00	2.2	50V	elect	
C085	1-123-354-00	3.3	50V	elect	
C086	1-101-001-00	0.001			
C401	1-123-352-00	1	50V	elect	
C402	1-123-318-00	33	16V	elect	
C403	1-123-306-00	47	10V	elect	
C404	1-102-973-00	100p			
C405	1-101-884-00	56p			
C406	1-101-001-00	0.001			
C407	1-123-352-00	1	50V	elect	
C408	1-123-320-00	100	16V	elect	
C409	1-123-316-00	10	16V	elect	
C410	1-123-317-00	22	16V	elect	
C411	1-123-328-00	4.7	25V	elect	
C412, 413	1-123-316-00	10	16V	elect	
C414	1-123-318-00	33	16V	elect	
C415	1-108-611-00	0.22		mylar	
C416	1-123-316-00	10	16V	elect	
C417	1-102-816-00	120p			
C418	1-123-316-00	10	16V	elect	
C419	1-108-589-00	0.027		mylar	
C420	1-108-555-00	0.001		mylar	
C421	1-102-980-00	270p			
C422	1-107-171-00	120p	500V	mica	
C423	1-129-709-00	0.0039	630V	film	
C424	1-108-587-00	0.022		mylar	
C425	1-108-591-00	0.033		mylar	
C426	1-123-319-00	47	16V	elect	
C428	1-123-317-00	22	16V	elect	
C429	1-131-341-00	0.1	35V	tantalum	

Ref. No.	Part No.		Description		Remark
C430	1-123-352-00	1	50V	elect	
C431	1-108-579-00	0.01		mylar	
C432	1-123-316-00	10	16V	elect	
C433	1-102-959-00	22p			
C434	1-123-328-00	4.7	25V	elect	
C435	1-123-316-00	10	16V	elect	
C436	1-108-559-00	0.0015		mylar	
C437	1-123-316-00	10	16V	elect	
C438	1-123-317-00	22	16V	elect	
C439	1-102-977-00	200p			
C440	1-123-305-00	33	10V	elect	
C441	1-123-352-00	1	50V	elect	
C442	1-123-307-00	100	10V	elect	
C443	1-102-973-00	100p			
C444	1-123-316-00	10	16V	elect	
C445	1-123-307-00	100	10V	elect	
C446	1-101-001-00	0.001			
C447	1-108-589-00	0.027		mylar	
C448	1-102-973-00	100p			
C449	1-123-328-00	4.7	25V	elect	
C450	1-123-320-00	100	16V	elect	
C451	1-123-318-00	33	16V	elect	
C452, 453	1-123-319-00	47	16V	elect	
C454	1-108-573-00	0.0056		mylar	
C456	1-108-555-00	0.001		mylar	
C457–459	1-123-316-00	10	16V	elect	
♦CN001, 002	1-508-742-00	3P connector			
♦CN005	1-508-846-00	8P connector			
♦CN006	1-508-742-00	3P connector			
♦CN007	1-508-845-00	6P connector			
♦CN008	1-508-797-00	4P connector			
♦CN009, 010	1-508-744-00	10P connector			
♦CN011	1-508-797-00	4P connector			
♦CN012	1-508-742-00	3P connector			
L401	1-407-492-00	1mH			
L402	1-407-504-00	10mH			
L403	1-407-191-XX	470μH			
LV401	1-407-240-00	Inductor, variable 22mH			
LV402	1-407-286-00	Inductor, variable 2.2mH			
RO09	1-202-472-00	5.1M	1/4W	composition	
RO20	1-212-684-00	18k	1/2W	metal oxide	
RO36	1-214-168-00	33k	1/4W	metal oxide	
RO39	1-214-176-00	68k	1/4W	metal oxide	
RO40	1-214-172-00	47k	1/4W	metal oxide	

Ref. No.	Part No.		Description		Remark
R041	1-212-702-00	100k	1/2W	metal oxide	
R044	1-214-178-00	82k	1/4W	metal oxide	
R046	1-212-702-00	100k	1/2W	metal oxide	
R054	1-214-162-00	18k	1/4W	metal oxide	
R082	1-202-472-00	5.1M	1/4W	composition	
R126	1-246-791-00	4.7k	1/8W	carbon	
R401	1-246-801-00	33k	1/8W	carbon	
R402	1-246-806-00	82k	1/8W	carbon	
R404	1-246-807-00	100k	1/8W	carbon	
R405	1-246-802-00	39k	1/8W	carbon	
R406	1-246-795-00	10k	1/8W	carbon	
R407	1-246-787-00	2.2k	1/8W	carbon	
R408	1-246-807-00	100k	1/8W	carbon	
R409	1-246-795-00	10k	1/8W	carbon	
R410	1-246-783-00	1k	1/8W	carbon	
R414	1-210-825-00	3.3M	1/4W	composition	
⚠R418	1-246-991-00	150	1/8W	carbon (nonflammable)	
⚠R428	1-212-849-00	4.7	1/4W	fuse (nonflammable)	
R431	1-246-795-00	10k	1/8W	carbon	
R452	1-246-759-00	10	1/8W	carbon	
R494, 495	1-246-801-00	33k	1/8W	carbon	
RV001–003	1-224-647-XX	47k, adjustable			
RV004	1-224-254-XX	47k, adjustable			
RV005	1-224-253-XX	22k, adjustable			
RV006, 007	1-224-648-XX	100k, adjustable			
RV008	1-224-253-XX	22k, adjustable			
RV009	1-224-254-XX	47k, adjustable			
RV010	1-224-644-XX	3.3k, adjustable			
RV011, 012	1-224-645-XX	10k, adjustable			
RV401	1-224-646-XX	22k, adjustable			
RV402	1-224-256-XX	220k, adjustable			
RV403	1-224-645-XX	10k, adjustable			
RV404	1-224-646-XX	22k, adjustable			
RY401	1-515-335-00	Relay			
RY402, 403	1-515-323-00	Relay			
T401	1-405-670-00	Transformer, OSC			

CB-1 BOARD

♦	1-601-836-00	CB-1 Board			E-607
C160	1-102-816-00	120p			
C164	1-101-004-00	0.01			

Ref. No.	Part No.	Description	Remark
C165	1-101-006-00	0.047	
C188	1-101-004-00	0.01	
C352	1-123-294-00	47 6.3V elect	
L035	1-407-177-XX	470μH	

CH-3 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6725-154-A	CH-3 Board, complete	E-151
C001	1-131-347-00	1 35V tantalum	
C002	1-108-251-00	0.1 mylar	
C003	1-161-323-00	1000p	
C004, 005	1-161-319-00	470p	
C006	1-108-365-00	0.001 100V mylar	
C008	1-161-021-00	0.047	
C009	1-161-271-00	100p	
C010	1-123-359-00	47 50V elect	
C011, 012	1-123-316-00	10 16V elect	
C014	1-161-323-00	1000p	
C015	1-123-352-00	1 50V elect	
C016	1-131-345-00	0.47 35V tantalum	
C017	1-161-021-00	0.047	
C018	1-123-352-00	1 50V elect	
C019	1-161-013-00	0.01	
C020	1-161-271-00	100p	
C021	1-161-263-00	22p	
C022	1-161-271-00	100p	
C023	1-108-820-00	0.22 mylar	
C024	1-161-265-00	33p	
C025	1-123-228-00	1 50V elect	
C026, 027	1-161-223-00	0.022	
C028	1-123-353-00	2.2 50V elect	
C029	1-161-013-00	0.01	
C030	1-131-349-00	2.2 35V tantalum	
C031	1-161-323-00	1000p	
C032	1-123-228-00	1 50V elect	
C033	1-131-345-00	0.47 35V tantalum	
♦CN002	1-508-735-00	5P connector	
♦CN003	1-508-736-00	10P connector	
♦CN004	1-508-847-00	4P connector	
♦CN005	1-508-848-00	6P connector	
♦CN006	1-508-735-00	5P connector	
♦CN007, 008	1-508-734-00	3P connector	
♦CN009	1-508-849-00	8P connector	

Ref. No.	Part No.	Description	Remark
L001	1-407-184-XX	3.3μH	
R007	1-202-463-00	2.2M 1/4W composition	
⚠ R073, 074	1-213-155-00	10Ω 1W metal oxide (nonflammable)	
RV001	1-224-251-XX	4.7k, adjustable	
S001–005	1-552-174-00	push	
S006, 007	1-516-226-00	slide	

CI-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-601-831-00	CI-1 Board	E-153
♦CN010	1-508-849-00	8P connector	
S010–021	1-552-412-00	keyboard	
	1-526-638-00	socket, IC (9p)	

CN-5 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-601-762-00	CN-5 Board	E-454
♦CN1, 2	1-508-734-00	3P connector	

CN-6 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-601-763-00	CN-6 Board	E-455
S1	1-552-180-00	REED, SLACK SENSOR	E-452

CR-4 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6711-217-A	CR-4 Board, complete	E-601
C005	1-108-377-00	0.01 100V mylar	
C007	1-101-004-00	0.01	
C008	1-123-316-00	10 16V elect	
C009	1-101-005-00	0.022	
C010, 011	1-102-531-00	150p	
C012	1-123-316-00	10 16V elect	
C013, 014	1-101-005-00	0.022	
C015–017	1-101-004-00	0.01	
C018	1-101-006-00	0.047	
C019	1-106-172-00	0.001 100V mylar	
C020	1-102-525-00	68p	
C021	1-108-246-00	0.047 mylar	
C022	1-101-006-00	0.047	
C023	1-101-059-00	510p	
C024	1-108-242-00	0.022 mylar	
C025	1-108-364-00	0.18 mylar	
C026	1-101-004-00	0.01	
C028	1-101-974-00	20p	
C029	1-101-005-00	0.022	
C030	1-102-527-00	82p	
C031, 032	1-101-005-00	0.022	
C033	1-101-004-00	0.01	
C034	1-108-377-00	0.01 100V mylar	
C035	1-101-059-00	510p	
C036	1-108-369-00	0.0022 100V mylar	
C037	1-108-377-00	0.01 100V mylar	
C038	1-123-319-00	47 16V elect	
C039	1-101-006-00	0.047	
C040	1-123-319-00	47 16V elect	
C041	1-101-006-00	0.047	
C042, 043	1-101-004-00	0.01	
C044	1-123-295-00	100 6.3V elect	
C045	1-101-006-00	0.047	
C046	1-101-004-00	0.01	
C048	1-123-328-00	4.7 25V elect	
C050	1-102-527-00	82p	
C051	1-101-004-00	0.01	
♦CN001	1-508-744-00	10P connector	
♦CN002	1-508-845-00	6P connector	
♦CN003	1-508-742-00	3P connector	
L002	1-407-189-XX	8.2μH	
L003	1-407-213-XX	1.5mH	
L005, 006	1-407-191-XX	470μH	
L010	1-407-159-XX	15μH	
LV001	1-407-568-00	Coil, variable 6.8μH	
R018	1-244-857-00	220 1/2W carbon	
RV002	1-224-643-XX	2.2k, adjustable	
RV003	1-224-645-XX	10k, adjustable	
RV004, 005	1-224-644-XX	4.7k, adjustable	
RV006	1-224-640-XX	330k, adjustable	

FG-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-600-101-00	FG-1 Board	E-502

FS-6 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-601-825-00	FS-6 Board	E-204
C001	1-123-325-00	2200 16V elect	
C002	1-123-324-00	1000 16V elect	
♦CN006–009	1-560-033-00	3P connector	
♦CN010	1-560-136-00	4P connector	
♦CN011	1-508-742-00	3P connector	
♦CN012	1-508-797-00	4P connector	
♦CN013	1-508-744-00	10P connector	
♦CN014	1-508-849-00	8P connector	
♦CN015	1-508-742-00	3P connector	
⚠F001	1-532-285-00	Fuse T1.25A	
⚠F002	1-532-350-00	Fuse T4A	
⚠F003	1-532-286-00	Fuse T2.5A	
⚠F004	1-532-006-00	Fuse T0.4A	
⚠F005	1-532-469-00	Fuse T0.1A	
⚠F007	1-532-469-00	Fuse T0.1A	

Ref. No.	Part No.	Description	Remark
		IF-10 BOARD	
♦	A-6721-038-A	IF-10 Board, complete	E-157
C501, 502	1-161-047-00	4700p	
C503	1-161-272-00	120p	
C504–509	1-161-047-00	4700p	
C510	1-123-355-00	4.7 50V elect	
C511	1-123-316-00	10 16V elect	
C512	1-161-047-00	4700p	
C513	1-161-280-00	12p	
C514	1-102-529-00	100p	
C515	1-161-323-00	1000p	
C516	1-123-321-00	220 16V elect	
C517	1-101-006-00	0.047	
C518	1-103-725-00	0.001 styrol	
C519	1-161-051-00	0.01	
C520, 521	1-101-006-00	0.047	
C523	1-108-385-00	0.047 100V mylar	
C524–526	1-161-047-00	4700p	
C527	1-102-852-00	47p	
C528	1-102-525-00	68p	
C529	1-161-249-00	15p	
C530	1-161-259-00	10p	
C531–534	1-161-047-00	4700p	
C535	1-123-320-00	100 16V elect	
C536	1-161-267-00	47p	
C537	1-123-323-00	470 16V elect	
CF501	1-404-134-00	Trap, ceramic	
CF502	1-527-263-00	Ceramic Filter	
♦CN501	1-508-743-00	5P connector	
♦CN503	1-508-797-00	4P connector	
L501	1-404-221-00	Coil, IF	
L502	1-407-184-XX	3.3μH	
L503	1-407-159-XX	15μH	
L504	1-407-157-XX	10μH	
L505	1-407-184-XX	3.3μH	
⚠R517	1-247-005-00	100 carbon (nonflammable)	
RV502	1-224-645-XX	10k, adjustable	
RV502	1-224-644-XX	4.7k, adjustable	
SF501	1-404-208-00	Filter, surface wave	
T501	1-404-206-00	VIFT-1	
T502	1-404-207-00	VIFT-2	
T503	1-404-203-00	VIF-3	
T504	1-403-810-00	AFT-1	
T505	1-403-811-00	AFT-2	
T506	1-404-135-00	SIFT-2	
T507	1-404-097-00	SIFT-1	
		IR-1 BOARD	
♦	1-601-834-00	IR-1 Board	E-154
C901, 902	1-123-316-00	10 16V elect	
C903, 904	1-102-525-00	68p	
C905, 906	1-101-004-00	0.01	
C907	1-123-316-00	10 16V elect	
L901	1-409-315-00	100mH	
		LF-11 BOARD	
♦	1-601-826-00	LF-11 Board	E-208
♦CN001	1-560-033-00	3P PLUG	
♦CN002, 003	1-508-786-00	2P PLUG	
♦CN004, 005	1-560-033-00	3P PLUG	
⚠F006	1-532-203-00	Fuse T2A	
	1-533-087-00	HOLDER, fuse	
		LS-3 BOARD	
♦	A-6725-152-A	LS-3 Board, complete	E-309
C501	1-101-004-00	0.01	
C502	1-101-006-00	0.047	
♦CN501	1-508-847-00	4P connector	
♦CN502	1-508-734-00	3P connector	
♦CN503	1-508-847-00	4P connector	
♦CN504	1-508-734-00	3P connector	

Ref. No.	Part No.	Description	Remark
⚠R508	1-211-929-00	82 1/8W carbon (nonflammable)	
⚠R513	1-212-356-00	0.47 1W metal oxide (nonflammable)	
S501	1-553-035-00	Lever	

NC-1 BOARD

♦	A-6711-221-A	NC-1 Board, complete	E-305
C001	1-161-021-00	0.047	
C002	1-123-320-00	100 16V elect	
C003	1-123-307-00	100 10V elect	
C004	1-123-316-00	10 16V elect	
C005	1-161-013-00	0.01	
C006	1-161-006-00	0.0027	
C007	1-102-117-00	820p	
C008	1-102-529-00	100p	
C009	1-123-319-00	47 16V elect	
C010	1-161-013-00	0.01	
C011	1-161-017-00	0.022	
C012	1-102-950-00	13p	
C013, 014	1-101-882-00	51p	
C015	1-102-950-00	13p	
C016, 017	1-123-296-00	220 6.3V elect	
C018	1-123-352-00	1 50V elect	
C019	1-161-271-00	100p	
C020	1-161-272-00	120p	
C021	1-123-307-00	100 10V elect	
C022	1-123-316-00	10 16V elect	
C023	1-123-296-00	220 6.3V elect	
C025	1-101-361-00	150p	
L001	1-407-171-XX	150μH	
L002	1-407-170-XX	120μH	
L003	1-407-172-XX	180μH	
L004	1-407-170-XX	120μH	
RV001	1-224-249-XX	1k, adjustable	

PC-1 BOARD

♦	1-601-835-00	PC-1 Board	E-152
C001	1-123-316-00	10 16V elect	
C002	1-102-074-00	0.001	
C003	1-123-316-00	10 16V elect	
♦CN001	1-508-742-00	3P connector	
♦CN011	1-508-847-00	4P connector	
RV001	1-224-643-XX	2.2k adjustable	

PL-2 BOARD

♦	1-601-821-00	PL-2 Board	E-105

RF-2 BOARD

♦	A-6711-216-A	RF-2 Board, complete	E-304
C001, 002	1-123-352-00	1 50V elect	
C003, 004	1-161-494-00	2200p	
C005, 006	1-101-006-00	0.047	
C007, 008	1-161-494-00	2200p	
C009, 010	1-131-371-00	10 16V tantalum	
C011, 012	1-161-051-00	0.01	
C014	1-123-353-00	2.2 50V elect	
C015	1-161-047-00	4700p	
C017, 018	1-101-882-00	51p	
C019	1-108-619-00	0.0027 100V mylar	
C020	1-161-319-00	470p	
C021	1-161-271-00	100p	
C022	1-108-619-00	0.0027 100V mylar	
C023	1-161-319-00	470p	
C024	1-161-051-00	0.01	
C025	1-131-371-00	10 16V tantalum	
C026	1-161-317-00	330p	
C027	1-161-494-00	2200p	
C028	1-123-318-00	33 16V elect	
C029	1-161-494-00	2200p	
C030, 031	1-161-051-00	0.01	
C032	1-101-005-00	0.022	
C033	1-123-318-00	33 16V elect	
C034	1-123-351-00	0.47 50V elect	
C035	1-161-051-00	0.01	
C036	1-101-006-00	0.047	
C037	1-123-318-00	33 16V elect	
C038	1-102-953-00	18p	

Ref. No.	Part No.	Description	Remark
♦CN001	1-508-744-00	10P connector	
♦CN002	1-508-797-00	4P connector	
♦CN003	1-508-845-00	6P connector	
L001, 002	1-408-029-00	0.56μH	
L003, 004	1-407-159-XX	15μH	
L005, 006	1-408-158-00	6.8mH	
L007	1-407-706-00	120μH	
L008	1-407-496-00	2.2mH	
L009	1-407-195-XX	1mH	
L010	1-407-157-XX	10μH	
LV001	1-407-286-00	Inductor, variable	
⚠R049, 050	1-212-855-00	8.2 1/4W fuse (nonflammable)	
⚠R051	1-211-929-00	82 1/8W carbon (nonflammable)	
⚠R053	1-211-421-00	39 1/8W carbon (nonflammable)	
⚠R056	1-212-855-00	8.2 1/4W fuse (nonflammable)	
⚠R059	1-212-855-00	8.2 1/4W fuse (nonflammable)	
RV001–003	1-224-643-XX	2.2k, adjustable	
RV004	1-224-644-XX	4.7k, adjustable	
RV005	1-224-642-XX	1k, adjustable	
RV006	1-224-644-XX	3.3k, adjustable	
T001, 002	1-427-455-00	RFT	

RM-1 BOARD

♦	1-601-832-00	RM-1 Board	E-701
C801	1-131-371-00	10 16V tantalum	
C802, 803	1-102-531-00	150p	
C804	1-527-476-00	OSCILLATOR, ceramic	
♦CN801	1-560-211-00	15p PLUG	

RM-2 BOARD

♦	1-601-833-00	RM-2 Board	E-702
♦CN802	1-561-340-00	15P connector	

SJ-1 BOARD

♦	A-6717-143-A	SJ-1 Board, complete	E-308

C701	1-131-349-00	2.2	35V	tantalum
C702	1-131-344-00	0.33	35V	tantalum
C703	1-101-004-00	0.01		
C704	1-123-317-00	22	16V	elect
C705, 706	1-123-351-00	0.47	50V	elect
C707	1-123-328-00	4.7	25V	elect
C708	1-123-319-00	47	16V	elect
C709	1-123-352-00	1	50V	elect
C710	1-123-351-00	0.47	50V	elect
C711	1-101-006-00	0.047		
C712	1-123-354-00	3.3	50V	elect
C713	1-101-004-00	0.01		
C714	1-123-317-00	22	16V	elect
C715	1-101-004-00	0.01		
C716	1-123-328-00	4.7	25V	elect
C717	1-123-351-00	0.47	50V	elect
C718	1-123-316-00	10	16V	elect
♦CN701	1-508-736-21	10P connector		
♦CN702	1-508-736-00	10P connector		

SR-08 (SWITCHING REGULATOR)

SR-08-1 BOARD

⚠♦	2-402-643-00	SR-08-1 Board (including SR-08-2)	E-206
⚠C101, 102	1-130-160-11	0.22	AC250V
⚠C103, 104	1-161-738-11	0.0047	AC400V
⚠C105	1-130-436-11	0.01	600V
⚠C106, 107	1-161-734-11	0.0022	AC400V
⚠C108	1-123-581-11	100	400V elect
⚠C212, 213	1-108-657-11	0.01	100V film
⚠C214	1-123-349-61	1000	35V elect
⚠C215	1-123-346-61	220	16V elect
⚠C216, 217	1-123-347-61	22	35V elect

Ref. No.	Part No.	Description	Remark
⚠C219, 220	1-123-320-61	100 16V elect	
⚠C221	1-108-860-11	0.0022 film	
⚠♦CN101	1-560-033-11	3P connector	
⚠♦CN201	1-508-742-11	3P connector	
⚠L101, 102	1-459-215-11	120μH	
⚠L203	1-407-168-11	82μH	
⚠R101	1-217-255-11	3.3 3W wire wound (nonflammable)	
⚠R218	1-246-489-00	4.7k 1/4W carbon	
⚠R219	1-246-499-00	12k 1/4W carbon	
⚠R220	1-246-483-00	2.7k 1/4W carbon	
⚠R221	1-246-490-00	5.1k 1/4W carbon	
⚠R222	1-246-489-00	4.7k 1/4W carbon	
⚠R223	1-246-509-00	33k 1/4W carbon	
⚠R226	1-246-521-00	100k 1/4W carbon	
⚠R227	1-246-489-00	4.7k 1/4W carbon	
⚠RV202	1-226-233-11	1k, adjustable	
⚠T101	1-421-377-11	LFT	
⚠T201	1-446-559-11	INVERTER TRANS	

SR-08-2 BOARD

⚠♦	2-402-645-00	SR-08-2 Board (including SR-08-1)	E-206
⚠C109	1-123-381-11	100 400V elect	
⚠C110, 111	1-123-380-61	4.7 250V elect	
⚠C201	1-108-857-11	0.01 100V film	
⚠C202	1-123-333-61	470 16V elect	
⚠C203, 204	1-123-324-61	1000 16V elect	
⚠C205, 206	1-108-310-11	0.1 50V film	
⚠C207	1-108-857-11	0.01 100V film	
⚠C208	1-123-346-61	10 16V elect	
⚠C209	1-108-856-11	0.0047 100V film	
⚠C210	1-108-856-11	0.01 100V film	
⚠C211	1-123-305-61	33 50V elect	
⚠C222	1-108-857-11	0.01 100V film	
⚠L201	1-408-722-11	300μH (with magnet)	
⚠L202	1-408-521-11	300μH	

Ref. No.	Part No.	Description	Remark
⚠R201	1-212-376-11	22 1W metal oxide (nonflammable)	
⚠R202	1-246-449-00	100 1/4W carbon	
⚠R203	1-246-485-00	3.3k 1/4W carbon	
⚠R204	1-217-596-51	0.05 2W metal (nonflammable)	
⚠R205	1-217-483-00	2.7k 1/4W carbon	
⚠R206	1-217-490-00	5.1k 1/4W carbon	
⚠R207	1-217-449-00	100 1/4W carbon	
⚠R208	1-217-497-00	10k 1/4W carbon	
⚠R209	1-217-501-00	15k 1/4W carbon	
⚠R210, 211	1-217-489-00	4.7k 1/4W carbon	
⚠R212	1-217-473-00	1k 1/4W carbon	
⚠R213	1-217-489-00	4.7k 1/4W carbon	
⚠R214, 215	1-217-497-00	10k 1/4W carbon	
⚠R216	1-217-513-00	47k 1/4W carbon	
⚠R224	1-212-857-51	10 fuse resistor (nonflammable)	
⚠R225	1-247-208-11	47 1/2W carbon (nonflammable)	
⚠RV201	1-226-232-11	500 adjustable	
⚠T102	1-446-558-11	CONVERTER TRANS	
⚠T103	1-437-085-11	DRIVE TRANS	

MISCELLANEOUS (SR-08)

⚠T104	1-446-589-12	POWER TRANS	E-205
⚠	2-431-005-00	3P connector ass'y (with RED/ORG/BLK leads)	
⚠	2-431-006-00	4P connector ass'y (with BLU/YEL/YEL leads)	
⚠	2-431-007-00	4P connector ass'y (with RED/ORG/BLK/BLK leads)	
⚠	2-431-008-00	3P connector ass'y (with BRN/WHT leads)	
⚠	2-431-012-00	3P connector ass'y (with RED/YEL leads)	

SY-10 BOARD

♦	A-6717-142-A	SY-10 Board, complete	E-307
C501	1-108-417-00	0.0047 200V mylar	
C502	1-101-004-00	0.01 50V mylar	
C503	1-101-001-00	0.001	
C504	1-123-352-00	1 50V elect	

Ref. No.	Part No.	Description	Remark
C505	1-101-004-00	0.01 50V mylar	
C506	1-123-319-00	47 16V elect	
♦CN501	1-508-850-00	12P connector	
♦CN502	1-508-736-00	10P connector	
♦CN503	1-508-848-00	6P connector	
♦CN504	1-508-734-00	3P connector	
RV501	1-226-496-00	100k, variable	
S501–512	1-552-412-00	keyboard	
S513, 514	1-516-994-00	lever slide	
SP501	1-529-010-00	Buzzer	
T501	1-405-800-00	OSC	

SY-11 BOARD

♦	A-6717-140-A	SY-11 Board, complete	E-306
C001	1-129-794-00	0.0033 100V film	
C002–005	1-123-352-00	1 50V elect	
C006	1-129-794-00	0.0033 100V film	
C007, 008	1-123-352-00	1 50V elect	
C009	1-123-328-00	4.7 25V elect	
C010–012	1-130-201-00	0.068 polypropylene	
C013	1-131-345-00	0.47 35V tantalum	
C014	1-131-347-00	1 35V tantalum	
C016	1-123-317-00	22 16V elect	
C017–019	1-101-004-00	0.01 (nonpolarized)	
C020, 021	1-123-328-00	4.7 25V elect	
C022	1-123-320-00	100 16V elect	
C023, 024	1-123-318-00	33 16V elect	
♦CN001	1-508-846-00	8P connector	
♦CN002	1-508-797-00	4P connector	
♦CN003, 004	1-508-744-00	10P connector	
♦CN005	1-508-846-00	8P connector	
♦CN006	1-508-847-00	4P connector	
♦CN007, 008	1-508-797-00	4P connector	
♦CN009	1-508-734-00	3P connector	
♦CN010, 011	1-508-742-00	3P connector	
♦CN012	1-508-744-00	10P connector	
♦CN013	1-508-736-00	10P connector	
♦CN014	1-508-910-00	12P connector	
♦CN015	1-508-744-00	10P connector	
♦CN016	1-508-845-00	6P connector	
L001, 002	1-407-212-XX	33mH	
RV001, 002	1-224-256-XX	220k, adjustable	
T001, 002	1-405-800-00	Transformer, OSC	

TM-10 BOARD

♦	A-6725-151-A	B-25 Board, complete (including TM-10, TM-11, TM-12 boards)	E-201
C001	1-123-356-00	10 50V elect	
C002	1-123-317-00	22 16V elect	
C003	1-123-294-00	47 6.3V elect	
C004	1-123-316-00	10 16V elect	
C005	1-123-352-00	1 50V elect	
C006	1-123-316-00	10 16V elect	
C007	1-108-802-00	0.0068 mylar	
C008	1-102-074-00	0.001	
C009	1-101-974-00	20p	
C010	1-102-703-00	120p	
C011	1-161-271-00	100p	
C012	1-123-351-00	0.47 50V elect	
C014	1-123-306-00	47 10V elect	
♦CN001	1-508-744-00	10P connector	
♦CN002	1-508-846-00	8P connector	
♦CN003, 004	1-508-847-00	4P connector	
CV001	1-141-228-00	Trimmer	
RB001		COMPOSITION CIRCUIT	
RB002	1-231-599-00	COMPOSITION CIRCUIT	
RB003	1-231-659-00	COMPOSITION CIRCUIT	
RB004	1-231-569-00	COMPOSITION CIRCUIT	
RB005	1-231-659-00	COMPOSITION CIRCUIT	

Ref. No.	Part No.	Description	Remark
S001	1-516-226-00	Slide	
S002–020	1-552-438-00	Key	
X001	1-527-552-00	Radiator, crystal	

TM-11 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6725-151-A	B-25 Board, complete (including TM-10, TM-11, TM-12 boards)	E-201
C101	1-108-792-00	0.001	
C102, 103	1-123-320-00	100 16V elect	
C104	1-123-317-00	22 16V elect	
C105	1-161-019-00	0.033	
L101	1-407-168-XX	82μH	
S101	1-552-823-00	Power	
T101	1-446-571-00	Transformer, DC-convertor	
V101	1-528-074-00	BATTERY, nickel cadmium	

TM-12 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6725-151-A	B-25 Board, complete (including TM-10, TM-11, TM-12 boards)	E-201
C201	1-123-351-00	0.47 50V elect	
C202	1-123-357-00	22 50V elect	
DP201	1-519-174-00	Indicator, tube	E-202

TU-11 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6721-037-A	TU-11 Board, complete	E-156
C101	1-123-330-00	22 25V elect	
C102	1-123-328-00	4.7 25V elect	
C103	1-123-316-00	10 16V elect	
C104	1-123-318-00	33 16V elect	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C110	1-102-963-00	33p	
C111	1-102-125-00	0.0047	
C112	1-102-953-00	18p	
C113	1-102-676-00	68p	
C114	1-121-419-00	220 6.3V elect	
C115	1-121-806-00	10 16V elect	
C116	1-123-319-00	47 16V elect	
C117	1-123-352-00	1 50V elect	
C118	1-108-591-00	0.033 mylar	
C119	1-108-367-00	0.0015 100V mylar	
C120	1-123-320-00	100 16V elect	
C121	1-123-319-00	47 16V elect	
C122, 123	1-123-351-00	0.47 50V elect	
C124	1-102-973-00	100p	
C125	1-123-355-00	4.7 50V elect	
C126	1-123-383-00	4.7 100V elect	
C127	1-108-638-00	0.1 100V mylar	
C128	1-102-125-00	0.0047	
C129	1-123-320-00	100 16V elect	
C132	1-108-812-00	0.047 mylar	
C133	1-108-249-00	0.068 mylar	
C134	1-161-265-00	33p	
♦CN101	1-508-797-00	4P connector	
♦CN102	1-508-743-00	5P connector	
♦CN103	1-508-910-00	12P connector	
♦CN104	1-508-743-00	5P connector	
♦CN105	1-508-845-00	6P connector	
♦CN107	1-508-742-00	3P connector	
♦CN108	1-508-845-00	6P connector	
JK101, 102	1-526-575-00	1P socket	
L101	1-407-186-XX	4.7μH	
L102, 103	1-407-178-XX	1μH	
L104	1-407-169-XX	100μH	
L105	1-407-696-00	18μH	
L106	1-407-169-XX	100μH	
⚠R126	1-246-979-00	1.2 1/8W carbon (nonflammable)	

Ref. No.	Part No.	Description	Remark
RV101	1-224-645-XX	10k, adjustable	
T101	1-404-096-00	VHF	
T102	1-446-585-00	DC-Convertor	
⚠TU101	1-463-242-00	**UHF ET tuner U322**	
⚠TU102	1-463-243-00	**VHF ET tuner V314**	

YC-6 BOARD

★	A-6711-215-A	YC-6 Board, complete	E-606

C001	1-101-004-00	0.01		
C002	1-123-307-00	100	10V	elect
C003, 004	1-102-965-00	39p		
C006, 007	1-123-306-00	47	10V	elect
C008	1-102-823-00	430p		
C009	1-102-976-00	180p		
C010	1-161-021-00	0.047		
C011	1-123-351-00	0.47	50V	elect
C012	1-123-316-00	10	16V	elect
C013	1-123-307-00	100	10V	elect
C014	1-123-318-00	33	16V	elect
C015	1-102-961-00	27p		
C016	1-123-316-00	10	16V	elect
C017	1-102-950-00	13p		
C018	1-101-882-00	51p		
C019	1-101-004-00	0.01		
C020	1-101-882-00	51p		
C021	1-123-320-00	100	16V	elect
C022	1-102-950-00	13p		
C023	1-102-530-00	120p		
C025	1-102-816-00	120p		
C028	1-102-953-00	18p		
C031	1-102-976-00	180p		
C032	1-101-880-00	47p		
C033, 034	1-123-311-00	1000	10V	elect
C035	1-123-306-00	47	10V	elect
C036	1-161-013-00	0.01		
C037	1-101-059-00	510p		
C038	1-161-025-00	0.1		
C039	1-102-820-00	330p		
C040	1-161-013-00	0.01		
C041	1-123-316-00	10	16V	elect
C042	1-161-021-00	0.047		
C043	1-123-320-00	100	16V	elect
C044	1-101-890-00	75p		
C045	1-102-951-00	15p		
C046	1-102-978-00	220p		
C047	1-123-319-00	47	16V	elect
C048	1-123-307-00	100	10V	elect
C049	1-123-306-00	220	10V	elect
C050, 051	1-123-318-00	33	16V	elect
C052	1-161-021-00	0.047		
C053	1-161-013-00	0.01		
C054	1-123-316-00	10	16V	elect
C055	1-123-320-00	100	16V	elect
C056	1-123-319-00	47	16V	elect
C057	1-123-317-00	22	16V	elect
C058	1-161-013-00	0.01		
C059, 060	1-123-319-00	47	16V	elect
C061	1-161-013-00	0.01		
C062	1-102-116-00	680p		
C063–067	1-161-013-00	0.01		
C068	1-102-953-00	18p		
C069	1-101-004-00	0.01		
C070	1-101-006-00	0.047		
C071	1-101-884-00	56p		
C072	1-102-979-00	240p		
C073	1-102-822-00	390p		
C074	1-131-199-00	10	16V	tantalum
C075	1-101-004-00	0.01		
C076–078	1-101-006-00	0.047		
C079, 080	1-123-328-00	4.7	25V	elect
C081	1-101-006-00	0.047		
C083	1-123-316-00	10	16V	elect
C084	1-101-006-00	0.047		
C085	1-131-202-00	1.5	20V	tantalum
C086	1-102-824-00	470p		
C087	1-101-884-00	56p		
C088	1-102-978-00	220p		
C089	1-101-004-00	0.01		
C091–095	1-101-004-00	0.01		
C096	1-101-006-00	0.047		
C097	1-102-816-00	120p		
C098, 099	1-102-961-00	27p		
C101	1-101-004-00	0.01		
C102, 103	1-101-361-00	150p		
C105	1-101-006-00	0.047		
C106–109	1-101-004-00	0.01		
C110	1-131-196-00	2.2	20V	tantalum
C111	1-108-630-00	0.022	100V	mylar
C112–114	1-101-004-00	0.01		
C115	1-123-319-00	47	16V	elect
C116	1-123-316-00	10	16V	elect
C117	1-101-006-00	0.047		
C118	1-101-004-00	0.01		
C120	1-102-973-00	100p		
C121	1-102-820-00	330p		
C122	1-101-006-00	0.047		

Ref. No.	Part No.	Description	Remark
C123	1-102-973-00	100p	
C124	1-123-306-00	47 10V elect	
C125	1-123-352-00	1 50V elect	
C126	1-123-319-00	47 16V elect	
C129	1-101-004-00	0.01	
C130	1-102-851-00	15p	
C131	1-123-352-00	1 50V elect	
C132, 133	1-108-627-00	0.012 100V mylar	
C134	1-123-352-00	1 50V elect	
C135	1-102-852-00	47p	
C136	1-101-004-00	0.01	
C137	1-101-001-00	0.001	
C138	1-101-004-00	0.01	
C139	1-108-638-00	0.1 100V mylar	
C140	1-102-820-00	330p	
C141	1-102-978-00	220p	
C142	1-123-352-00	1 50V elect	
C143	1-108-622-00	0.0047 100V mylar	
C144	1-101-003-00	0.0047	
C146	1-123-352-00	1 50V elect	
C147	1-102-516-00	27p	
C148	1-123-328-00	4.7 25V elect	
C149	1-102-973-00	100p	
C150	1-101-004-00	0.01	
C151	1-101-006-00	0.047	
C152	1-123-319-00	47 16V elect	
C153, 154	1-102-824-00	470p	
C155	1-102-978-00	220p	
C156	1-123-316-00	10 16V elect	
C157	1-102-978-00	220p	
C158	1-102-116-00	680p	
C159	1-123-352-00	1 50V elect	
C161	1-123-316-00	10 16V elect	
C162	1-101-006-00	0.047	
C166	1-123-328-00	4.7 25V elect	
C167	1-123-316-00	10 16V elect	
C168	1-101-005-00	0.022	
C169	1-101-006-00	0.047	
C170	1-123-351-00	0.47 50V elect	
C171	1-102-820-00	330p	
C172	1-101-004-00	0.01	
C173	1-123-351-00	0.47 50V elect	
C178	1-102-116-00	680p	
C181	1-123-318-00	33 16V elect	
C183	1-123-319-00	47 16V elect	
C184	1-123-307-00	100 10V elect	
C186	1-102-981-00	300p	
C187	1-101-004-00	0.01	
C189	1-123-352-00	1 50V elect	
C190, 191	1-102-822-00	390p	
C192	1-101-006-00	0.047	
C193	1-101-001-00	0.001	
C194	1-101-006-00	0.047	
C195, 196	1-123-319-00	47 16V elect	
C197, 198	1-101-006-00	0.047	
C200	1-123-319-00	47 16V elect	
C204	1-101-006-00	0.047	
C205	1-123-319-00	47 16V elect	
C207	1-123-319-00	47 16V elect	
C208	1-101-006-00	0.047	
C210	1-123-319-00	47 16V elect	
C211	1-101-006-00	0.047	
C212	1-108-623-00	0.0056 100V mylar	
C213	1-101-006-00	0.047	
C214, 215	1-101-059-00	510p	
C216	1-123-306-00	47 10V elect	
C218	1-123-319-00	47 16V elect	
C224	1-101-004-00	0.01	
C225	1-101-006-00	0.047	
C226	1-123-319-00	47 16V elect	
C227	1-101-006-00	0.047	
C228	1-123-319-00	47 16V elect	
C230	1-102-942-00	5p	
C233	1-123-316-00	10 16V elect	
C234–236	1-101-004-00	0.01	
C237	1-101-006-00	0.047	
C240	1-101-004-00	0.01	
C241, 242	1-123-319-00	47 16V elect	
C243	1-123-320-00	100 16V elect	
C245	1-101-006-00	0.047	
C247	1-123-319-00	47 16V elect	
C250–254	1-101-006-00	0.047	
C255	1-123-320-00	100 16V elect	
C257	1-123-319-00	47 16V elect	
C258	1-101-006-00	0.047	
C259	1-123-319-00	47 16V elect	
C260	1-101-006-00	0.047	
C261	1-123-319-00	47 16V elect	
C262	1-101-006-00	0.047	
C263	1-101-004-00	0.01	
C264	1-123-319-00	47 16V elect	
C266	1-123-316-00	10 16V elect	
C268	1-123-328-00	4.7 25V elect	
C270	1-108-555-00	0.001 mylar	
C271	1-102-963-00	33p	
C272	1-123-352-00	1 50V elect	
CNJ1-4	1-536-614-00	Terminal Board, control panel	
♦CN1001	1-508-744-00	10P connector	
♦CN1002	1-508-797-00	4P connector	
♦CN1003	1-508-744-00	10P connector	
♦CN1004	1-508-845-00	6P connector	

Ref. No.	Part No.	Description	Remark
CN1005	1-508-846-00	8P connector	
CN1006	1-508-736-00	10P connector	
CN1007	1-508-849-00	8P connector	
CN1008	1-508-910-00	12P connector	
CN1009	1-508-846-00	8P connector	
CNJ1-4	1-536-614-00	Board, TERMINAL, control panel E-608	
DL001	1-415-192-00	Delay Line	127.886 μsec
DL002	1-415-203-00	Delay Line	
DL003	1-415-148-00	Delay Line	
DL004	1-415-204-00	Delay Line	
L001	1-407-177-XX	470μH	
L002	1-407-168-XX	82μH	
L003	1-407-160-XX	18μH	
L004	1-407-171-XX	150μH	
L005	1-407-170-XX	120μH	
L006	1-407-172-XX	180μH	
L007	1-407-170-XX	120μH	
L008	1-407-161-XX	22μH	
L009	1-407-167-XX	68μH	
L011	1-407-160-XX	18μH	
L012	1-407-167-XX	68μH	
L013	1-407-171-XX	150μH	
L014	1-407-165-XX	47μH	
L015	1-407-169-XX	100μH	
L016	1-407-171-XX	150μH	
L017	1-407-168-XX	82μH	
L018, 019	1-407-160-XX	18μH	
L020	1-407-166-XX	56μH	
L021	1-407-161-XX	22μH	
L022	1-407-168-XX	82μH	
L023, 024	1-407-170-XX	120μH	
L025	1-407-188-XX	6.8μH	
L026	1-407-165-XX	47μH	
L027	1-407-189-XX	8.2μH	
L028	1-407-177-XX	470μH	
L029, 030	1-407-167-XX	68μH	
L031	1-407-177-XX	470μH	
L032	1-407-195-XX	1μH	
L033	1-407-167-XX	68μH	
L034	1-407-191-XX	470μH	
L036	1-407-161-XX	22μH	
L050	1-407-177-XX	470μH	
L053	1-407-169-XX	100μH	
L055	1-407-204-XX	6.8μH	
LV001	1-407-569-XX	COMB FILTER	

Ref. No.	Part No.		Description	Remark
R013	1-246-791-00	4.7k	1/8W carbon	
R055	1-246-795-00	10k	1/8W carbon	
R105	1-244-860-00	300	1/2W carbon	
R111, 112	1-244-853-00	150	1/2W carbon	
⚠ R138	1-247-033-00	100	1/8W carbon	(nonflammable)
R272	1-210-829-00	4.7M	1/4W composition	
R277	1-246-795-00	10k	1/8W carbon	
R279	1-246-783-00	1k	1/8W carbon	
R296	1-246-771-00	100	1/8W carbon	
R308	1-246-775-00	220	1/8W carbon	
R355	1-244-839-00	39	1/2W carbon	
R365	1-246-771-00	100	1/8W carbon	
R369	1-246-771-00	100	1/8W carbon	
RV001	1-224-645-XX	10k, adjustable		
RV002	1-224-643-XX	2.2k, adjustable		
RV003	1-224-641-XX	470, adjustable		
RV004	1-224-642-XX	1k, adjustable		
RV005	1-224-647-XX	47k, adjustable		
RV006	1-224-644-XX	4.7k, adjustable		
RV008	1-224-643-XX	2.2k, adjustable		
RV010	1-224-642-XX	1k, adjustable		
RV014	1-224-643-XX	2.2k, adjustable		
RV015	1-224-644-XX	4.7k, adjustable		
RV016	1-224-646-XX	22k, adjustable		
RV017	1-224-645-XX	10k, adjustable		
RV018	1-224-642-XX	1k, adjustable		
RV019	1-224-641-XX	470, adjustable		
RV020, 021	1-224-642-XX	1k, adjustable		
RV022	1-224-552-00	470k, adjustable		
RV024	1-224-643-XX	2.2k, adjustable		
RV025	1-226-497-00	100k, variable		
RV026	1-224-648-XX	100k, adjustable		
S001	1-552-820-00	Slide		
T002	1-409-321-00	TRAP		
T003	1-409-320-00	5.5MHz TRAP		
T004	1-425-981-00	REC C BPT		
T005	1-425-785-21	BAT		
T006	1-405-669-00	PST		
T007	1-405-802-00	4.43MHz TUNING		
T008	1-405-803-00	4.43MHz TUNING		
T009	1-425-982-00	BPT		
T010	1-411-106-00	TUNING		
T011	1-426-027-00	EQT-2		
X001	1-527-345-00	Crystal, 4.43MHz		
X002	1-527-353-00	Crystal, 4.43MHz		

CHASSIS

Ref. No.	Part No.	Description	Remark
		CHASSIS	
♦ CN9501	1-561-263-00	CONNECTOR, CAMERA	E-605
L9501	1-543-145-00	TAKE-UP sensor	E-501
L9502	1-543-145-00	SUPPLY sensor	E-301
M9502	8-838-008-00	CAPSTAN MOTOR, BHF-1100D	E-456
S9501	1-552-663-00	Miniature, CASSETTE IN	E-551
S9502	1-552-665-00	Miniature, THREADING END	E-453
S9503	1-552-822-00	Slide, MEMORY	E-303
⚠S9504	1-516-277-00	Push, POWER	E-209
⚠S9505	1-553-125-00	Slide, VOLTAGE SELECTOR	E-602
⚠SL9501	1-454-213-00	Solenoid, EJECT	E-101
⚠SL9502	1-454-216-00	Solenoid, REVIEW	E-104
⚠SL9503	1-454-215-00	Solenoid, CUE	E-103
⚠SL9504	1-454-214-00	Solenoid, FWD	E-102
⚠SL9505	1-454-217-00	Solenoid, PINCH	E-451
⚠SL9506	1-454-185-21	Solenoid, BRAKE	E-401
⚠SL9507	1-454-229-00	Solenoid, SELECT	E-402

Ref. No.	Part No.	Description	Remark
⚠	1-413-045-00	Switching regulator, SR-08	E-203
⚠	1-463-296-00	Antenna booster BT-971	E-155
⚠	1-464-105-00	RF Modulator	E-158
⚠	1-509-546-00	3P INLET	E-603
	1-548-534-00	TAPE COUNTER	E-302
♦	1-555-110-00	PIN CABLE (TU-11 BOARD to Antenna booster)	
♦	1-555-147-00	2P CONNECTOR ASS'Y (S9504 to LF-11 BOARD CN2)	
♦	1-555-148-00	2P CONNECTOR ASS'Y (S9504 to LF-11 BOARD CN3)	
♦	1-555-149-00	3P CONNECTOR ASS'Y (3P INLET to LF-11 BOARD CN1)	
♦	1-555-150-00	3P CONNECTOR ASS'Y (FS-6 BOARD CN6 to LF-11 BOARD CN5)	
♦	1-555-151-00	3P CONNECTOR ASS'Y (FS-6 BOARD CN8 to VOLTAGE SELECTOR)	
♦	1-555-152-00	3P CONNECTOR ASS'Y (FS-6 BOARD CN7 to VOLTAGE SELECTOR)	

1/4 WATT CARBON RESISTORS

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

Betamax
VIDEOCASSETTE RECORDER

SL-C7E

No. 1
March, 1980

SUPPLEMENT

Subject; Addition of a Model for Asia, Africa and Australia.

The circuit and mechanical structure of the Model for Asia, Africa and Australia and the Model for AEP are almost identical.
Refer to the SL-C7E (AEP) service manual for operation and service procedure not contained in this publication.

1. Added and Changed Parts List

Description	Asia, Africa, Australia	AEP
Cord, power	1-551-646-00	————
Label, F mark	————	♦ 3-656-407-00
Label, explanation (DUTCH)	————	3-662-336-00
Label, explanation (SWEDISH)	————	3-662-337-00
Label, approval	3-703-274-00	————
Instruction	————	3-794-584-11
Manual, instant information	————	3-794-586-11
Manual, instant information	————	3-794-603-11
Label, DEMKO	————	4-310-380-00

- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

SONY®
SERVICE MANUAL

Betamax

VIDEOCASSETTE RECORDER

SL-C7E

No.2
April. 1980

SUPPLEMENT

Subject: Alignment

SPECIFICATIONS

General

Video recording system: Rotary two-head helical scanning

Video signal: CCIR standards, PAL colour

Storage temperature: −20°C to +65°C (−4°F to +149°F)

Operating temperature: 5°C to 40°C (41°F to 104°F)

Aerial: 75-ohm, asymmetrical aerial socket

Channel coverage: VHF Western European Channels E2–12
UHF Western European Channels E21–68
(a total of up to 12 preselected channels)

RF output signal: UHF channels E30 to E39 (variable)
75 ohms, unbalanced

Power requirements: 110–127V, 220–240V AC ± 10% (adjustable), 50/60 Hz

Power consumption: 45 W

Dimensions: 485 x 163 x 379 mm (w/h/d)
(19 1/8 x 6 1/2 x 15 inches)

Weight: 15.5 kg (34 lb 3 oz)

Video

Input: VIDEO IN: BNC connector
1.0 V (p-p) $^{+1.0}_{-0.5}$ V (p-p), 75 ohms unbalanced, sync negative

Output: VIDEO OUT: BNC connector
1.0 V (p-p) ±0.1 V (p-p), 75 ohms unbalanced, sync negative

Horizontal resolution: Colour: 260 lines
B/W: 300 lines

Signal-to-noise ratio: Colour: Better than 40 dB
B/W: Better than 43 dB

Audio

Input: AUDIO IN: Phono connector
47 kohms, −10 dBs.
MIC: mini jack
−60 dBs, suitable for microphone with 600-ohm impedance

Output: AUDIO OUT: Phono connector
Less than 10 kohms, −5 dBs
(47 k ohm load), unbalanced

Frequency response: 50 Hz to 10 kHz

Signal-to-noise ratio: Better than 40 dB

Audio distortion: Less than 4% at 400 Hz

Tape transport

Tape speed: 18.73 mm/sec.

Maximum recording time: 2 hours 10 min (with Sony L-500 cassette)
3 hours 15 min (with L-750)

Fast forward/rewind time: Within 3 1/2 min. (L-500)

Timer: Only for recording
Electronic digital timer
24-hour-clock cycle
2 weeks 4 events

Accessories supplied

Remote Commander RMT-200
Betamax Videocassette tape L-500
AC mains lead
75-ohm coaxial cable

Remote commander

Remote control system: Infrared control

Power requirements: 6 V dc
Battery size AA x 4
(IEC battery designation R6)

Dimensions: 68 x 34 x 144 mm (w/h/d)
(2 3/4 x 1 3/8 x 5 3/4 inches)

Weight: 220 g (8 oz)
including batteries

Accessory supplied: Battery size AA 4 pcs.

SONY®
SERVICE MANUAL

TABLE OF CONTENTS

SECTION 1
PREPARATION FOR MECHANICAL SECTION CHECK, ADJUSTMENT, AND REPLACEMENT

1-1. DISASSEMBLY

1. Removal and Re-assembly of Cabinet

1. Removal of outer cabinet perform procedures ① to ⑧
2. Note on assembling
   (i) When the upper case with the cassette-up lid is to be attached, attach the upper case while the cassette-up is raised.
   (ii) Attach the cassette-up lid so that the clearance between the cassette-up lid and the upper case is 1 to 2mm.

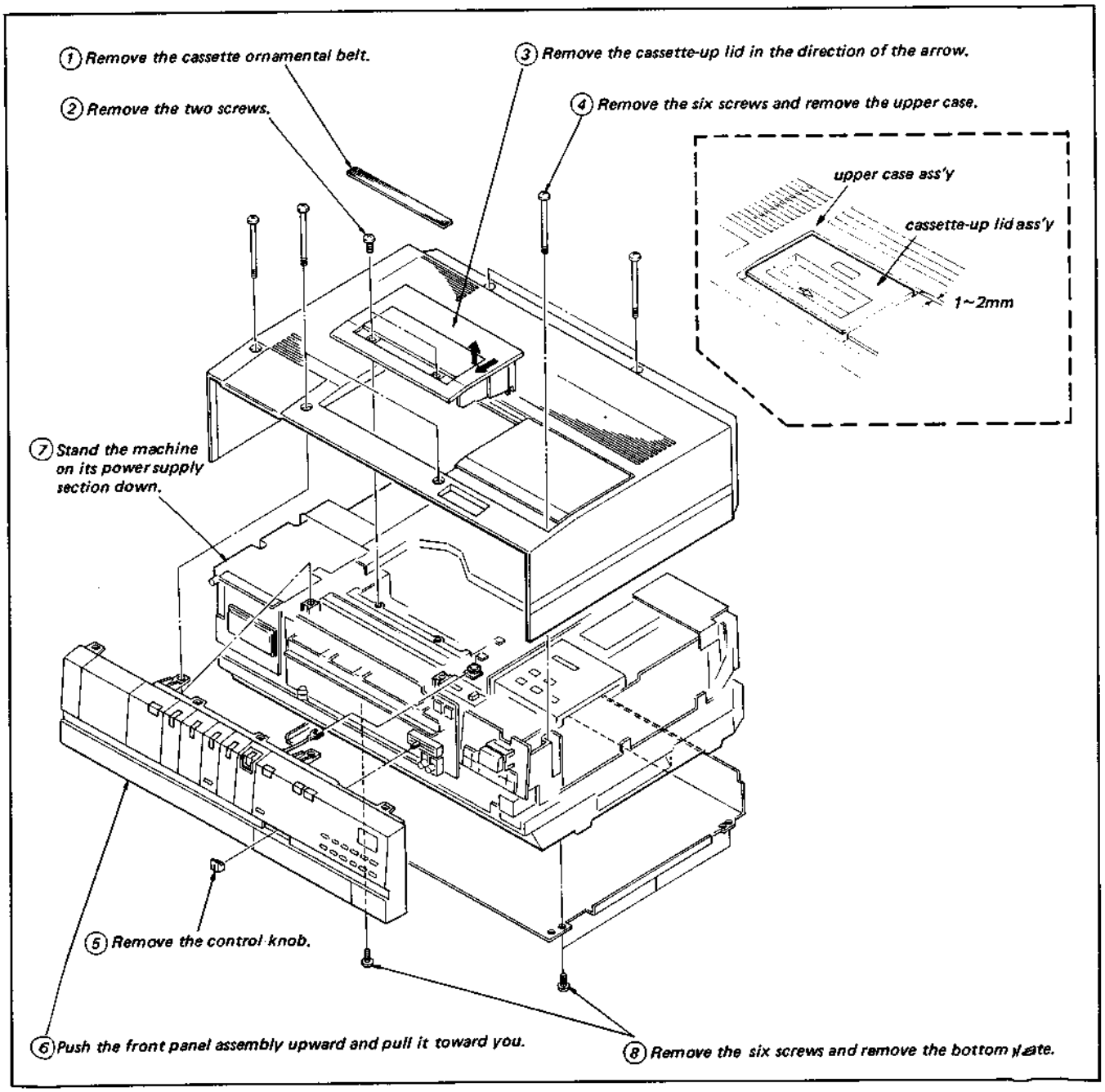


Fig. 1-1. Removal and re-assembly of cabinet

2. Tuner-IF Block Removal

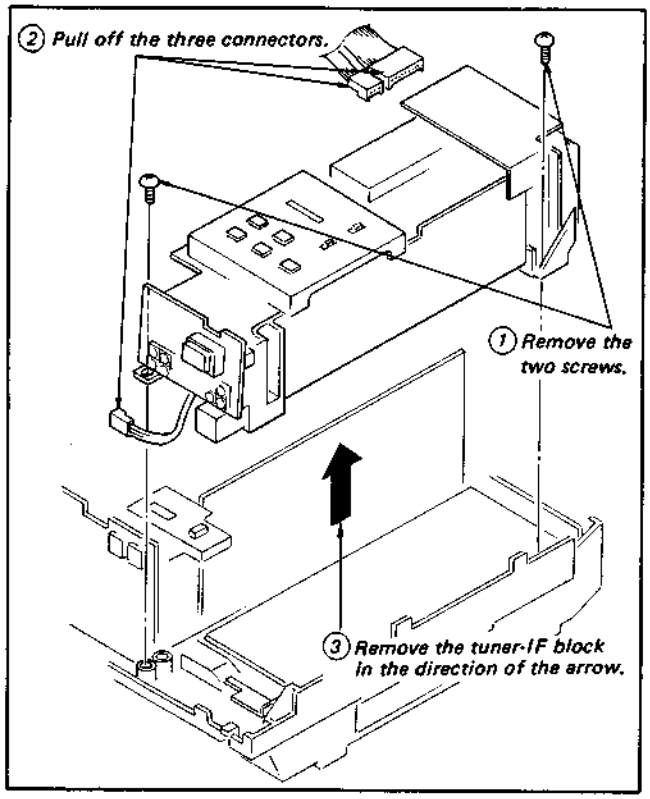


Fig. 1-2.

3. Timer Block Removal

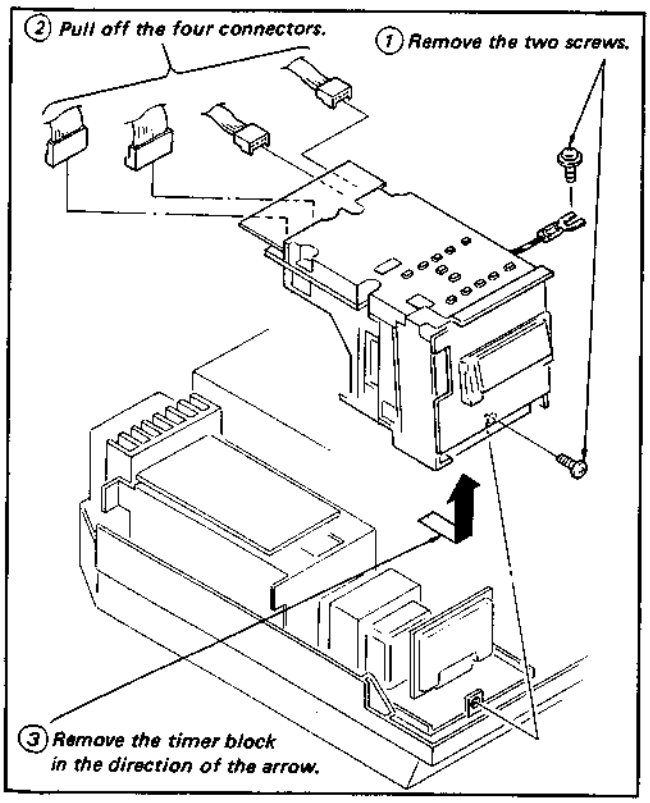


Fig. 1-3.

4. YC-6 and AS-3 Board Removal

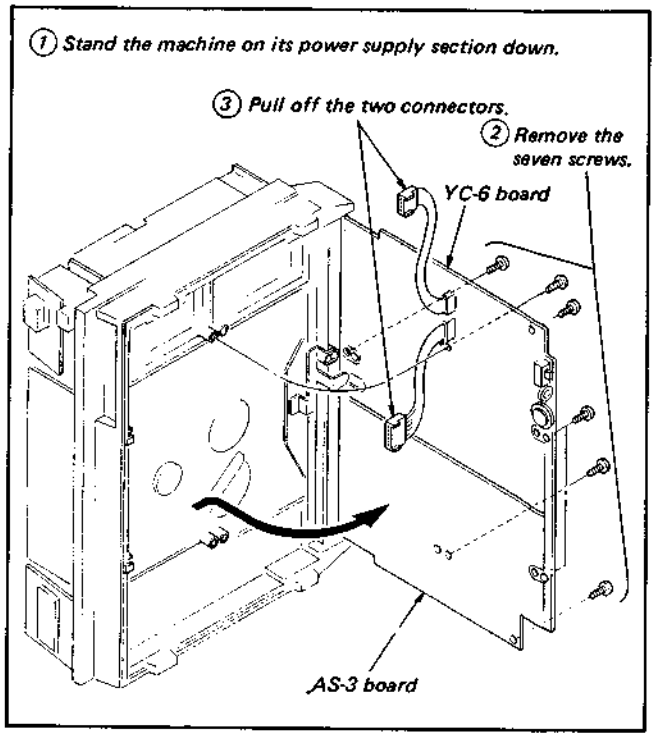


Fig. 1-4.

1-2. NOTES ON MAINTENANCE

1. Never place the machine upside down when the upper case lid has been removed from the machine, with the fan (black) attached on the drum assembly. (Since the fan projects from the chassis surface, an excessive force is applied on the drum if the machine is placed upside down, which could alter the tape movement and the tape interchangeability.)
2. Be sure to install the fan on the drum prior to the tape playback check or the electrical system alignment. If the check or the alignment is performed without the fan installed, the picture on the monitor may bend, as shown in Fig. 1-5.
3. The KR5-1H alignment tape is effective in making the tape path adjustment easy, as compared with the former alignment tapes.

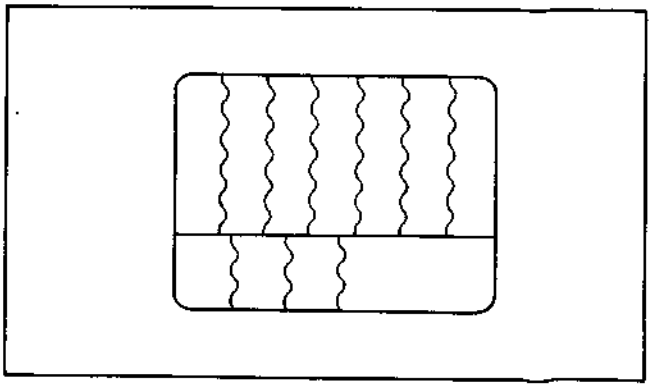


Fig. 1-5.

1-3. OPERATING RECORDER WITHOUT CASSETTE INSTALLED

1. To Set Up Threading Completion State Without Cassette and Cassette Lift Assembly.
   (This state is called "STOP mode" in this guide.)
   - Push down the cassette delection lever until the threading ring stops. (See Fig. 1-6.)

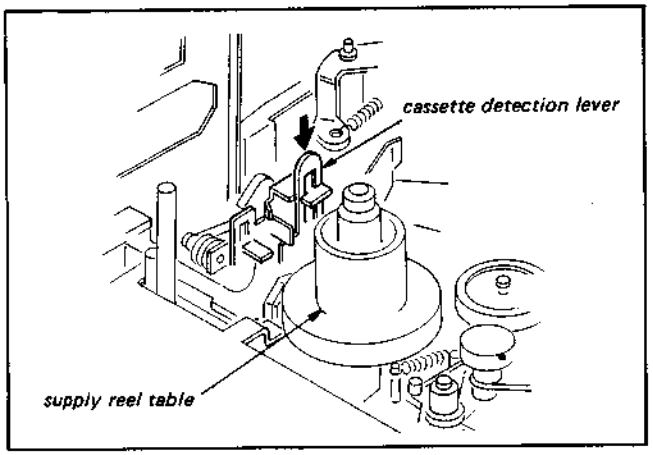


Fig. 1-6.

2. To Set Up PLAY, FAST FWD, And REWIND States Without Cassette Installed
   - Capture the cassette detection lever with an alligator clip, or an equivalent, as shown in Fig. 1-7, to place the cassette detection switch, mounted on the chassis, into the ON state. Then a desired state of operation can be set up by depressing the function button for the desired state. But note that the PLAY function button must be depressed after performing the procedures for stopping the slack sensor operation described in Section 1-4.

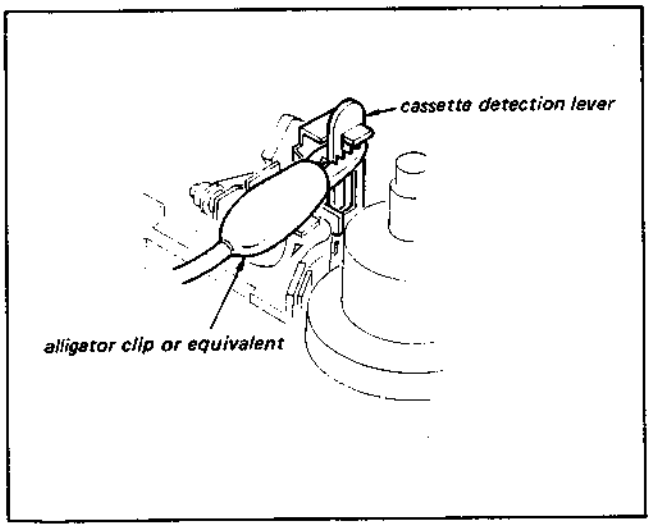


Fig. 1-7.

3. To Set Up EJECT Mode Without a Cassette:

   Note: Remove the alligator clip that captured cassette detection lever in Step 2.

   - Keep pressing the EJECT button until the unthreading is completed.

4. To Set Up RECORD Mode Without a Cassette:
   - Capture the cassette detection lever with an alligator clip as shown in Fig. 1-7, manually depress the erasing protection plate as shown in Fig. 1-8, and perform the procedure in Section 1-4, "Stopping Slack Sensor Operation". Then depress the RECORD button or the AUDIO DUB button.

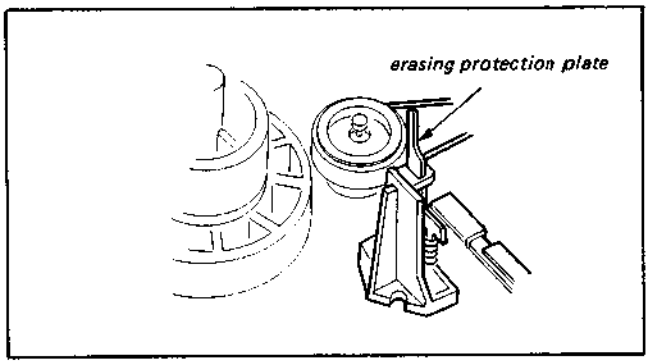


Fig. 1-8.

1-4. STOPPING SLACK SENSOR OPERATION

1. Insert a toothpick, or something like a matchstick whose point is sharpened, into the hole on the CN-6 board as shown in Fig. 1-9 to stop the movement of the slack sensor arm. A plastic pick would be preferred to the wooden one.

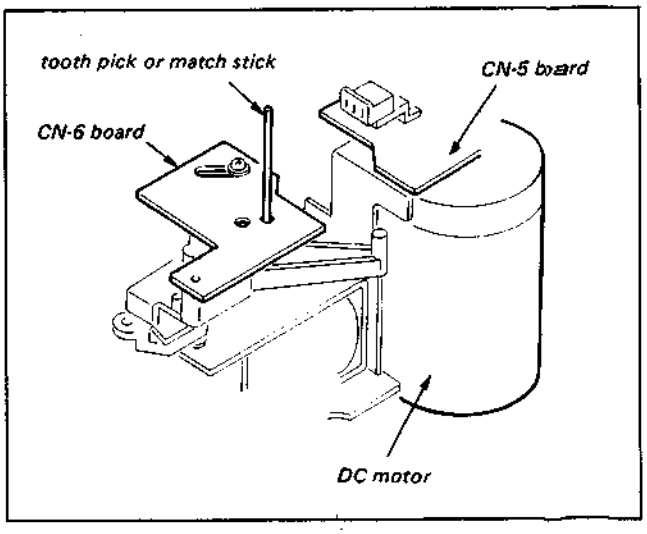
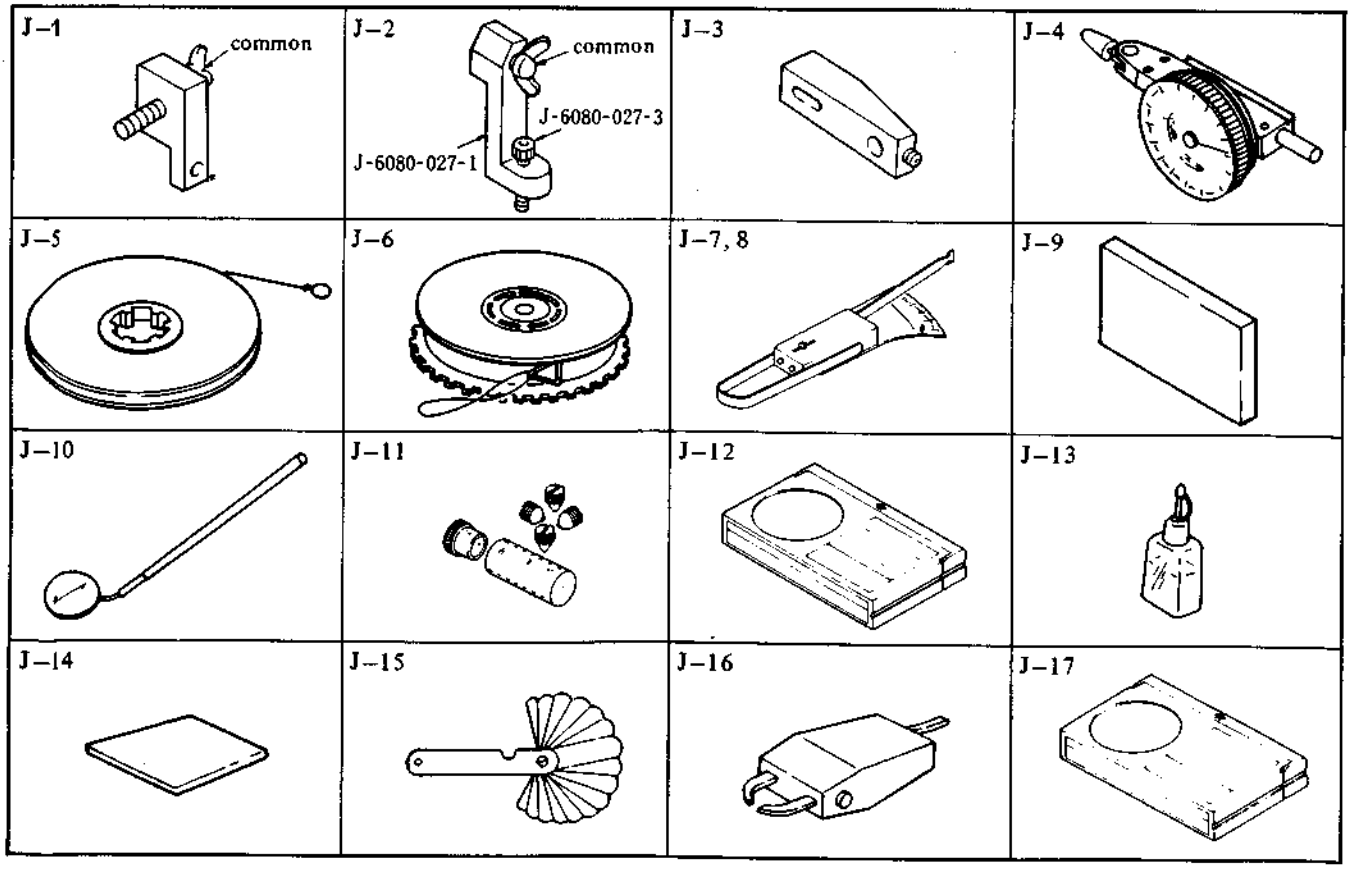


Fig. 1-9.

1-5. TOOLS AND FIXTURES REQUIRED

Ref. No.	Name	Part Code	Carved Jig No.	Use and Remarks
J-1	Upper drum eccentricity adjustment jig	J-6080-027-2	SL-0027	Components of the SL-0012 which has been used are utilized as eccentricity adjustment jigs (J-3 and J-4) of the video head disc.
J-2	Upper drum eccentricity adjustment jig	J-6080-027-1 J-6080-027-3		
J-3	Upper drum eccentricity adjustment jig	J-6080-012-A	SL-0012	
J-4	Upper drum eccentricity adjustment jig			
J-5	Reel table tension gauge	J-6080-011-A	SL-0011	For torque measurements
J-6	FWD back tension measurement jig	J-6080-002-A	SL-0002	For FWD back tension measurement
J-7	Sector type gauge (for 50 g)	7-732-050-20	———	For back tension and torque measurements
J-8	Sector type gauge (for 100 g)	7-732-050-30	———	
J-9	Parallel board	J-6086-570-A	SL-0657	For zenith adjustment of the audio/CTL head
J-10	Inspection mirror (handle)	7-723-902-01	———	For tape path adjustment and tape running check Be sure to place an order for the handle and the mirror as a set.
	Inspection mirror (mirror)	7-723-902-11	———	
J-11	Dihedral adjustment screw	J-6080-013-A	SL-0013	For video head dihedral adjustment
J-12	Alignment tape (KR5-1H)	8-969-995-91	———	For over all adjustments such as tracking and picture quality
J-13	Cleaning fluid	Y-2031-001-0	———	For cleaning
J-14	Chamois	2-034-697-00	———	For cleaning
J-15	Thickness gauge	9-911-053-00	———	For checking clearance
J-16	Head demagnetizer	Common	———	For video and audio head degaussing (Demagnetizer HE-2 or HE-3)
J-17	Lapping tape	8-888-004-00	———	For video head cleaning

Note: When the Jig Nos. J-1 and J-2 are ordered, be sure to place an order for these together as a set.



SECTION 2
PERIODIC CHECK AND MAINTENANCE

- It is recommended that the following periodic check and maintenance be performed for obtaining the full function and performance of the machine and extending the lives of the machine and tape.

2-1. MAINTENANCE AFTER REPAIR

The following maintenance items must be performed after repair of the machine without regard to the operating hours of the machine.

(1) Cleaning of the video head disk assembly
- Press chamois saturated with the cleaning fluid or isopropyl alcohol lightly on the video head disk assembly and turn the fan on the drum slowly by hand for cleaning. (Never try to clean the video head disk assembly with the motor running.)
- Never move the chamois vertically against the head tips for cleaning, or the head tips will be damaged.

(2) Cleaning of the tape movement system
- Clean the surfaces which the tape contacts during its movement (the tape guides, drum assembly, capstan, and pinch roller) with chamois saturated with the cleaning fluid or isopropyl alcohol.

(3) Cleaning of the driving system
- Clean the driving elements (such as belts, idlers, and reel table surfaces) with a piece of cloth saturated with the cleaning fluid or isopropyl alcohol.

2-2. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to user's operating hours.

○ Cleaning ◎ Lubrication ★ Replacement ☆ Confirmation

Maintenance & Check		Operating Hour (H) / Replacement Part No.	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Movement System	Cleaning of tape movement system	———	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning & degaussing of ACE ass'y	———	○	○	○	○	○	○	○	○	○	○	
	Cleaning & degaussing of video head disk ass'y	A-6762-038-A	○	○	○	○	○	○	○	○	○	○	The life of a head varies, depending on operational conditions and methods.
Driving System	Lubrication to thrust retainer	———	—	◎	—	◎	—	◎	—	◎	—	◎	Apply a drop of oil (such as sewing machine oil) on each of upper and lower bearings.
	Lubrication to thrust bearing (under reel table)	———	—	—	◎	—	—	◎	—	—	◎	—	Remove reel table and apply a drop of oil (such as sewing machine oil) on thrust bearing.
	Cleaning & replacement of capstan belt	3-659-351-00	○	○	★	○	○	★	○	○	★	○	•Cleaning must be done whenever repair is made.
	Cleaning & replacement of belts other than capstan belt	———	○	○	○	○	○	○	○	★	○	○	•Replacement must be done depending on operating hours on the table, or every two years.
	Replacement of FWD limiter	X-3653-310-0	—	—	★	—	—	★	—	—	★	—	
	Cleaning of iron core and opening of solenoid	———	—	—	—	○	—	—	—	○	—	—	Wipe iron core and opening of solenoids with a dry cloth.
Performance Confirmation	Abnormal sound	———	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which makes abnormal sound.
	Measurement of FWD back tension	———	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to Section 3-18. Specified value: 35 to 45g. (when measured with jig tape)
	Confirmation of brake system	———	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to Section 3-17.
	Confirmation of record & playback functions	———	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.

- Belts other than capstan belt

FWD belt	:	3-653-324-00
Threading belt	:	3-659-301-00
EJECT belt	:	3-659-397-00
FF belt	:	3-659-471-00
Counter belt	:	3-659-485-00

(Note on Overhaul)

A part replacement must be done in the overhal operation, referring to the listed items. The replacement periods of the motor and the head which are not included in the chart items are as follows.

Full erase head . . . . . about 4,000 operating hours
Capstan motor . . . . . about 2,000 operating hours

2-3. OTHERS

(1) Lubricating Oil

- Be careful in applying oil to any parts.
  Do not permit the oil to coat any surface that is touched by the tape, heads, or drive belts.

- Be sure to use SONY oil (or equivalent) for lubrication. (Various troubles will be caused, if a different viscosity oil is used.)
  SONY Oil: Part No. 7-661-018-01
  (Mitsubishi Diamond Oil #440)
  OR THE EQUIVALENT OF SEWING MACHINE TYPE OIL

- Use the oil without dust or other foreign material for the bearing lubrication. (If an oil including dust and others is used, friction and burning of the bearing are apt to occur)

- The quantity of "a drop of oil" is about the quantity that will attach to the tip of a 2 mm diameter stick, as shown in the figure.

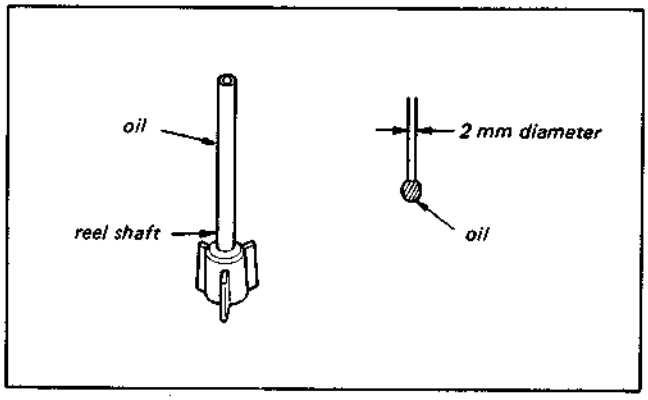


Fig. 2-1.

SECTION 3
CHECK, ADJUSTMENT, AND REPLACEMENT PROCEDURES

3-1. REPLACEMENT OF VIDEO HEAD DISK ASSEMBLY AND ECCENTRICITY ADJUSTMENT

1. Remove the video head disk assembly, following Steps (1) to (6) shown in Fig. 3-1.

Note:
- For removing fan (1), hold video head disk assembly (6) (without touching heads) and turn the fan in a counterclockwise direction.
- Never loosen the two setscrews that fasten the lower flange to the drum shaft.
- Never loosen the lower two screws of the drum support.
- Prior to installing the video head disk assembly (6), clean surfaces (A) and (B) with a piece of cloth saturated with methanol or isopropyl alcohol.

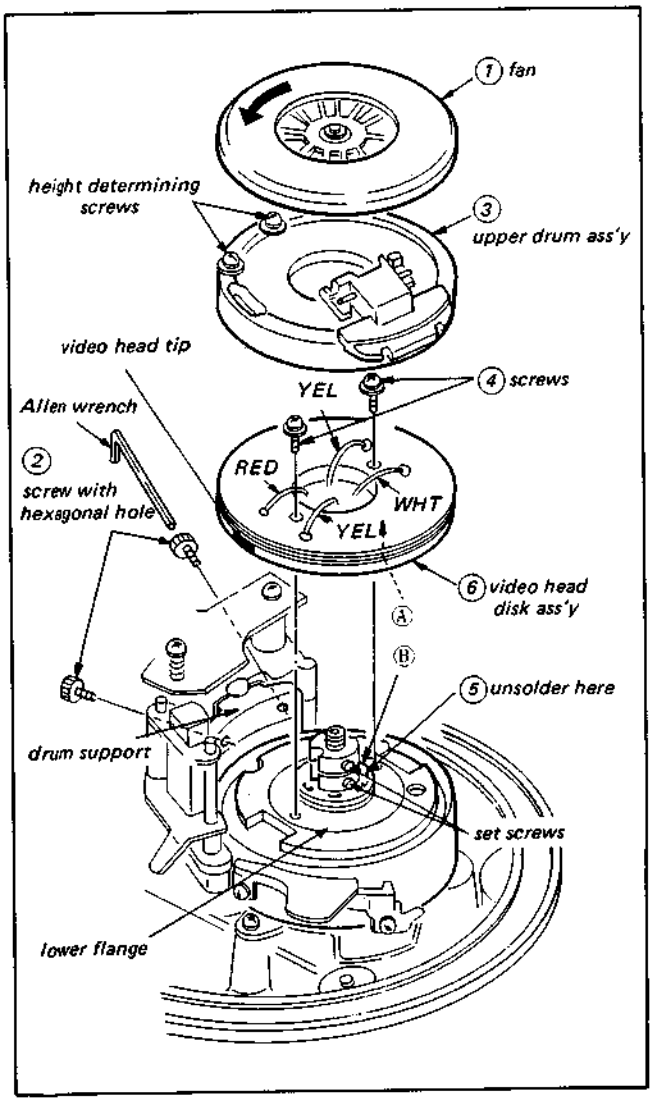


Fig. 3-1. Replacement of the video head disk assembly

2. Install the video head disk assembly tentatively (with two screws only finger-tight) and perform the eccentricity adjustment.

(i) Combine adjusting fixture parts (1), (2), (3), and (4) as shown in Fig. 3-2. Set the combined fixture on the machine by mounting the eccentricity gauge assembly in the capstan husing assembly. See Fig. 3-2.

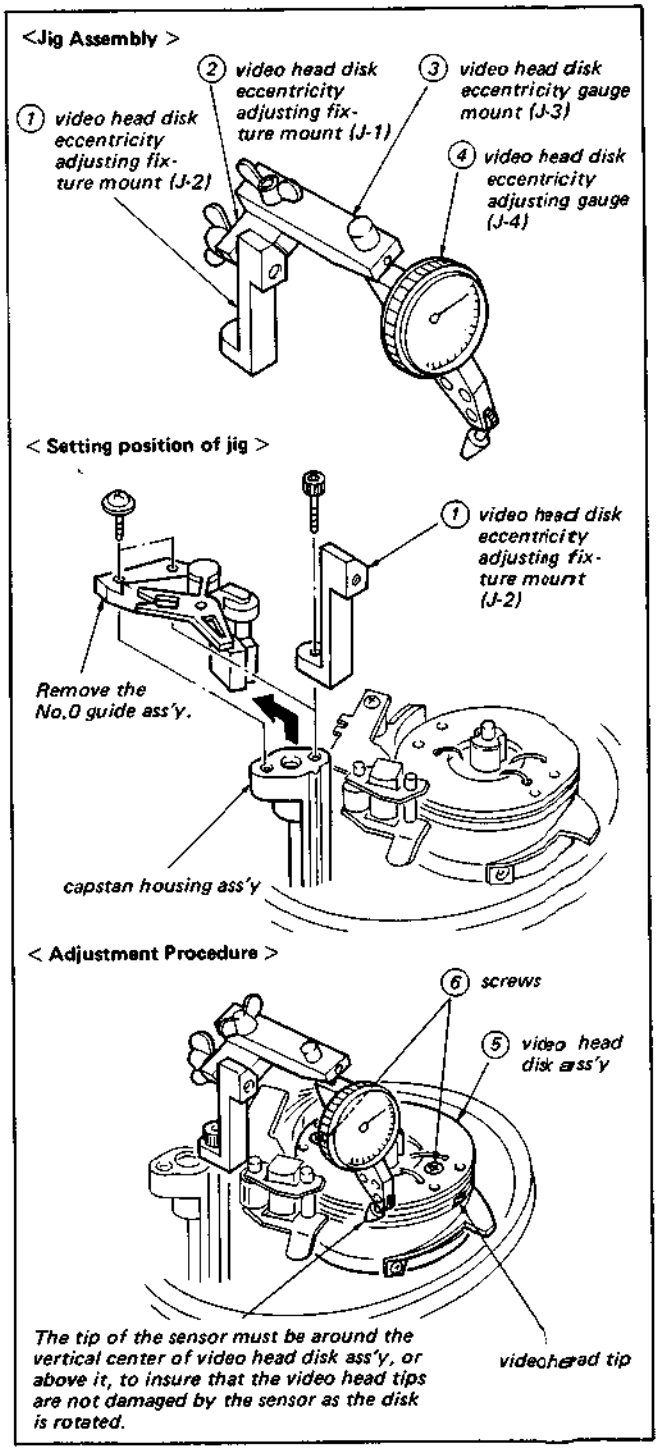


Fig. 3-2. Eccentricity adjustment of the video head disk assembly

(ii) Turn the shaft of the drum counterclockwise slowly with the fingers and adjust the video head disk position so that the variation in the reading of the drum eccentricity adjusting gauge is within 5 μm during each turn of the drum, by very gently tapping a screwdriver whose blade-tip is against the inner circumference of video head disk assembly (5).

(iii) Tighten the screws (6) that secure the video head disk assembly (5) alternately and gradually after the eccentricity adjustment is completed. (tightening torque: more than 10 kg.cm.)

(iv) After the screws are tightened, confirm again that the eccentricity deflection is within 5 μm.

(v) Solder the four leads of the head and remount the upper drum assembly while holding the upper drum height determining screws. (See Fig. 3-1.)

3. Perform the following adjustments after the replacement of the video head disk assembly.

3-11-6. No. 0 guide section assembly adjustment
3-19-1. Tape path adjustment
3-19-4. ACE assembly position adjustment
3-19-5. Video head dihedral adjustment
4-3-1.–2. RF switching position adjustment
4-3-1.–3. REC mode servo lock phase adjustment
4-4-2. Playback amplifier frequency characteristic adjustment (RF-2 board)
4-4-1. Y-FM record current adjustment (RF-2 board)
4-4-16. Chroma record current adjustment (YC-6 board)

3-2. REPLACEMENT OF DRUM ASSEMBLY

1. Stand the machine on its left side. Open the YC-6 and AS-3 boards. (Refer to Section 1-1-4.)
2. Remove FF belt (1) and drum shield (2) shown in Fig. 3-3.
3. Remove two screws (1) and connectors (2) and (3) shown in Fig. 3-4. The drum assembly can then be removed, by pulling it up.
4. Loosen the rotor assembly by inserting a long-nose pliers or a screwdriver into the two rotor holes shown in Fig. 3-5 and removing the N5φ nut and SW5φ washer. Pull off the rotor assembly.
5. Remove the screw mounting the stator assembly (shown in Fig. 3-5) and pull off the stator assembly.
6. Install the rotor assembly and the stator assembly (removed in Steps 4 and 5) onto the new drum assembly.

Note: Install the stator assembly so that the 3P connector on the stator assembly fits into the slot of the shield case assembly.

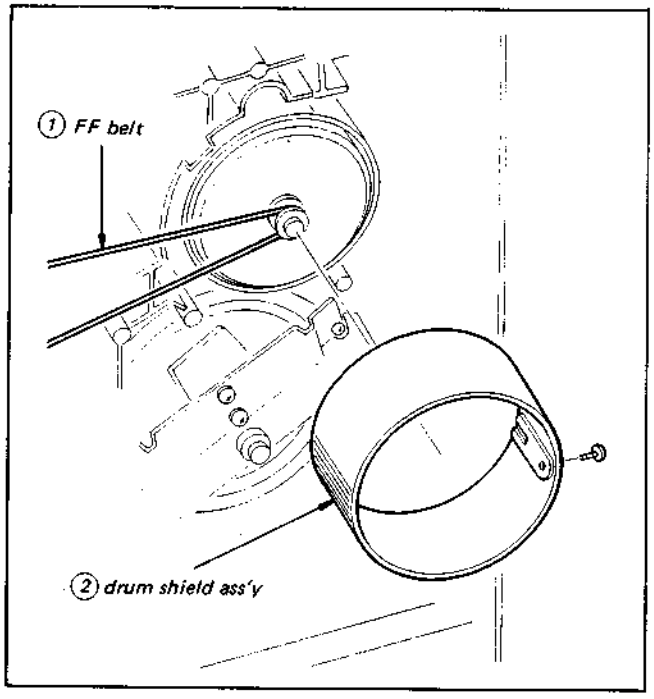


Fig. 3-3. Replacement of drum assembly (1)

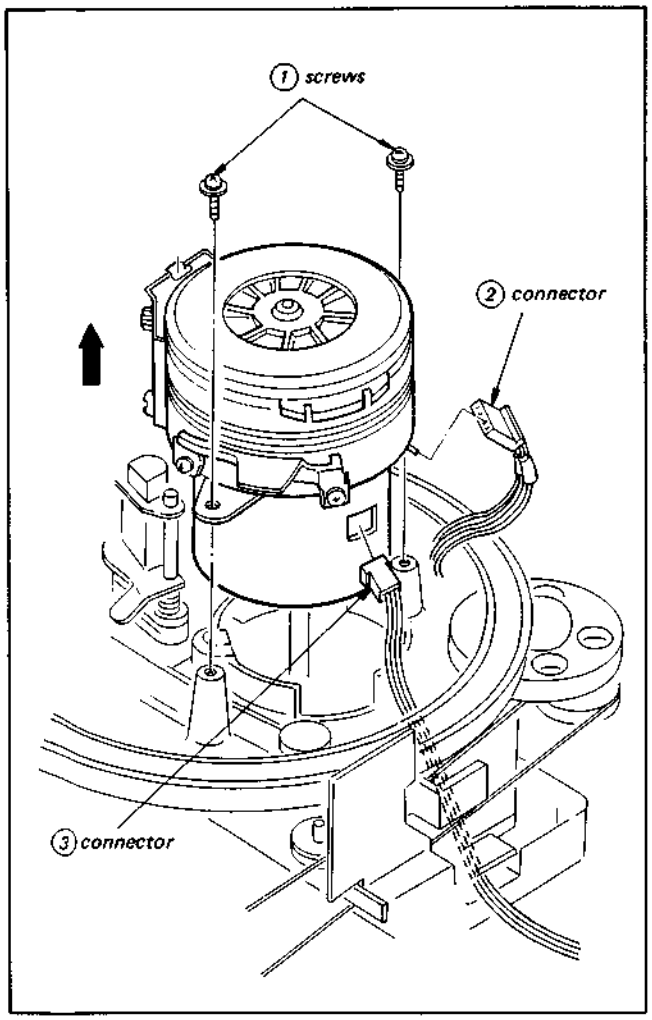


Fig. 3-4. Replacement of drum assembly (2)

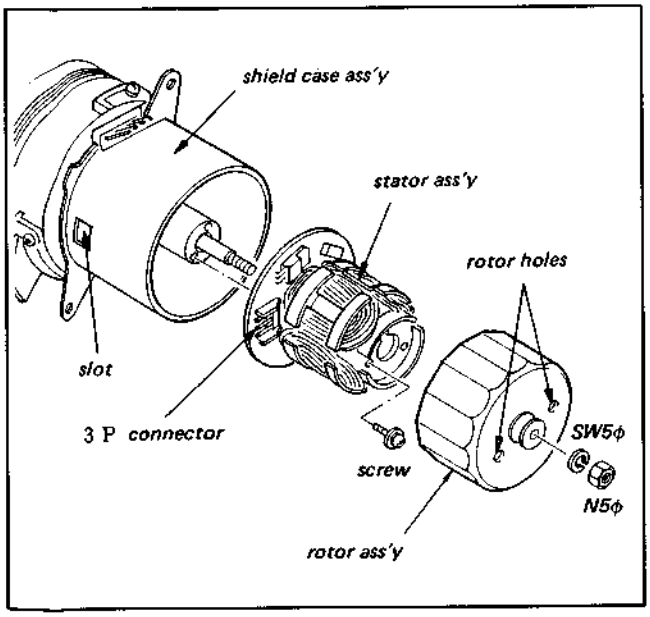


Fig. 3-5. Replacement of drum assembly (3)

7. Install two connectors, the drum shield assembly, and the FF belt on the drum assembly.

Note: 1. The bottom edge of the drum shield must be flush with the bottom edge of the shield base assembly.

2. Do not tighten the drum shield set screw too much or housing will distort.

Pull the leads of connector Ⓐ in the arrow direction and dress the leads so that the leads do not touch the EJECT belt. (See Fig. 3-6.)

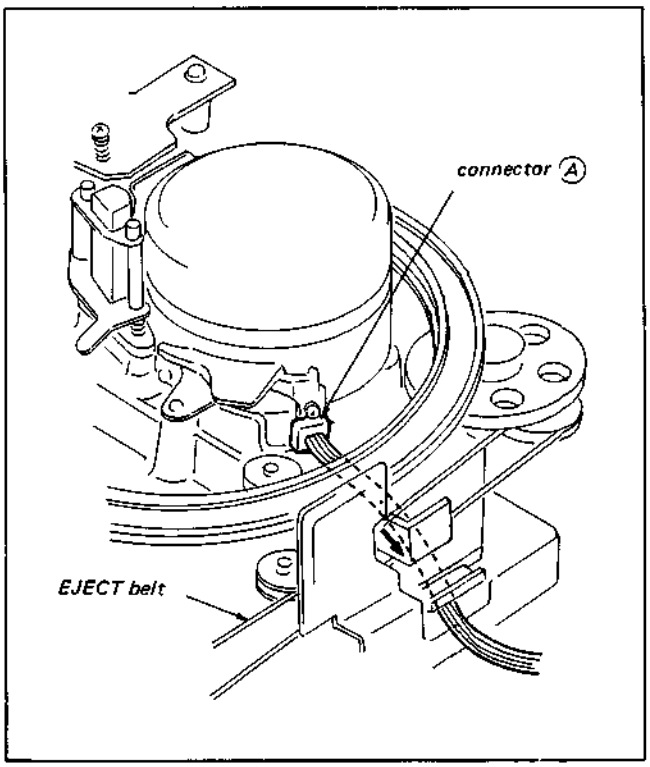


Fig. 3-6. Replacement of drum assembly (4)

8. Perform the following adjustments after the replacement.

3-19-1. Tape path adjustment
3-19-4. ACE assembly position adjustment
4-3-1. Drum servo system adjustment
4-4-2. Playback amplifier frequency characteristic adjustment (RF-2 board)
4-4-1. Y-FM record current adjustment (RF-2 board)
4-4-16. Chroma record current adjustment (YC-6 board)

3-3. REPLACEMENT OF CAPSTAN DC MOTOR

1. Stand the machine on its left side. Open the YC-6 and the AS-3 boards. (Refer to Section 1-1-4.)
2. Remove the DC motor from the drum base, following Steps ① to ④ shown in Fig. 3-7.
3. Take out the DC motor, following Steps ① to ⑨ shown in Fig. 3-8.

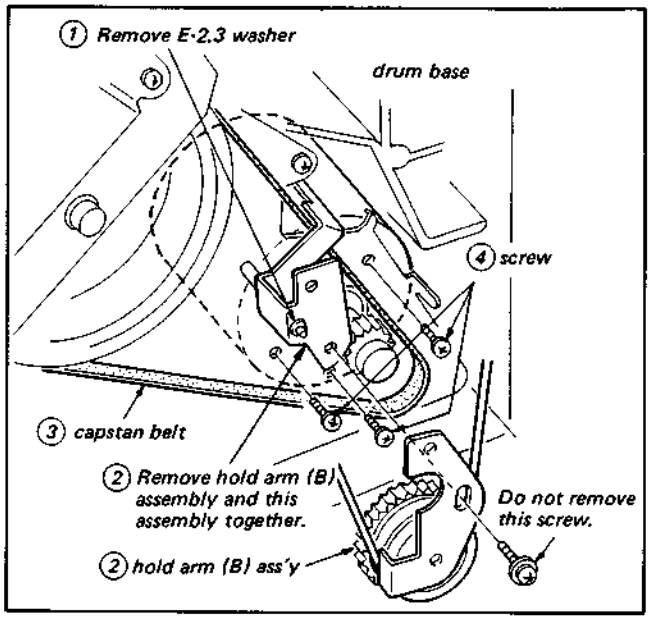


Fig. 3-7. Replacement of DC motor (1)

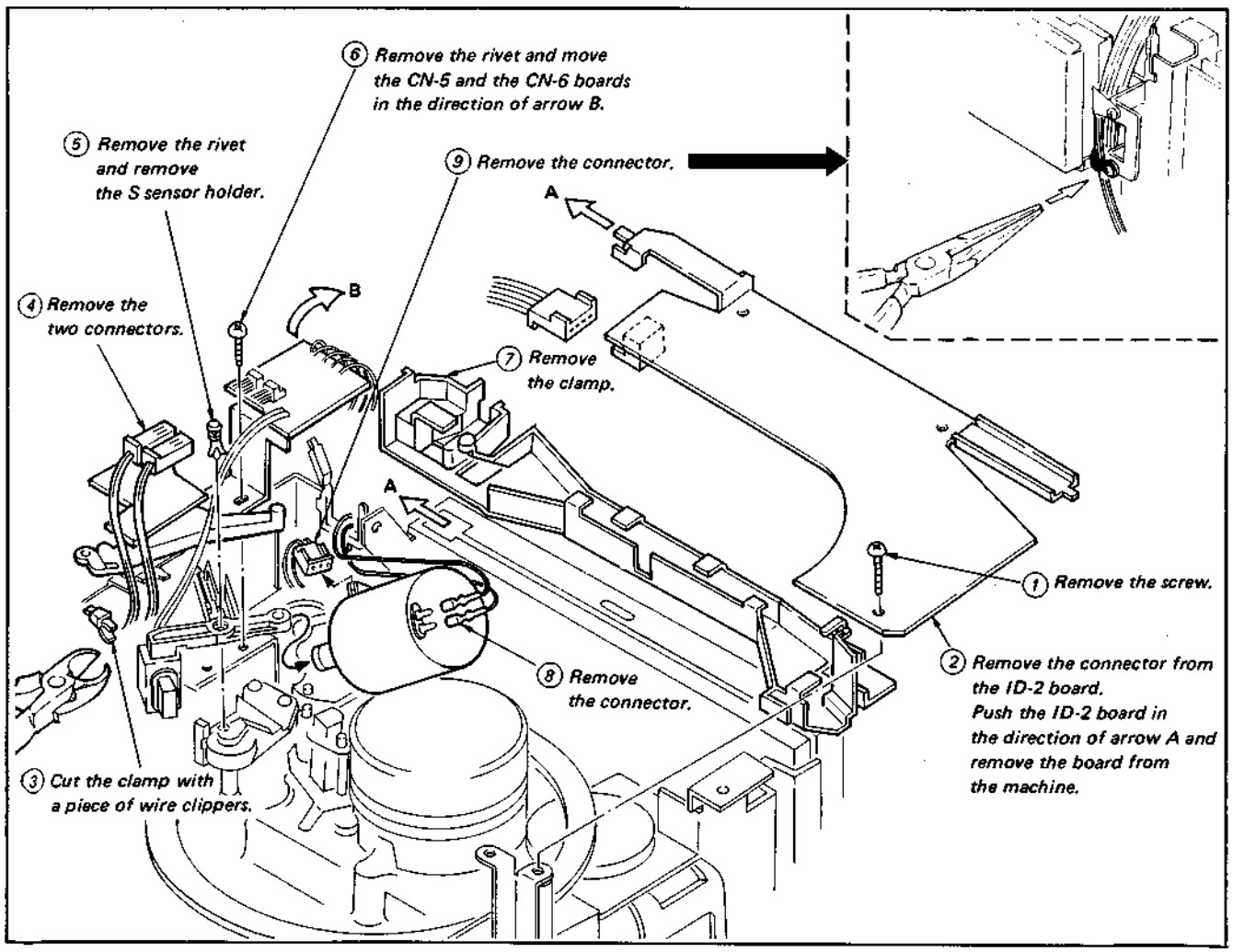


Fig. 3-8. Replacement of DC motor (2)

4. Remove capstan shield (1) and motor pulley assembly (2) from the defective motor and install them on the replacement motor. (See Fig. 3-9.)

Note: Install motor pulley assembly (2) so that there is a clearance of approx. 1.5 mm between the motor pulley assembly and capstan motor (3).

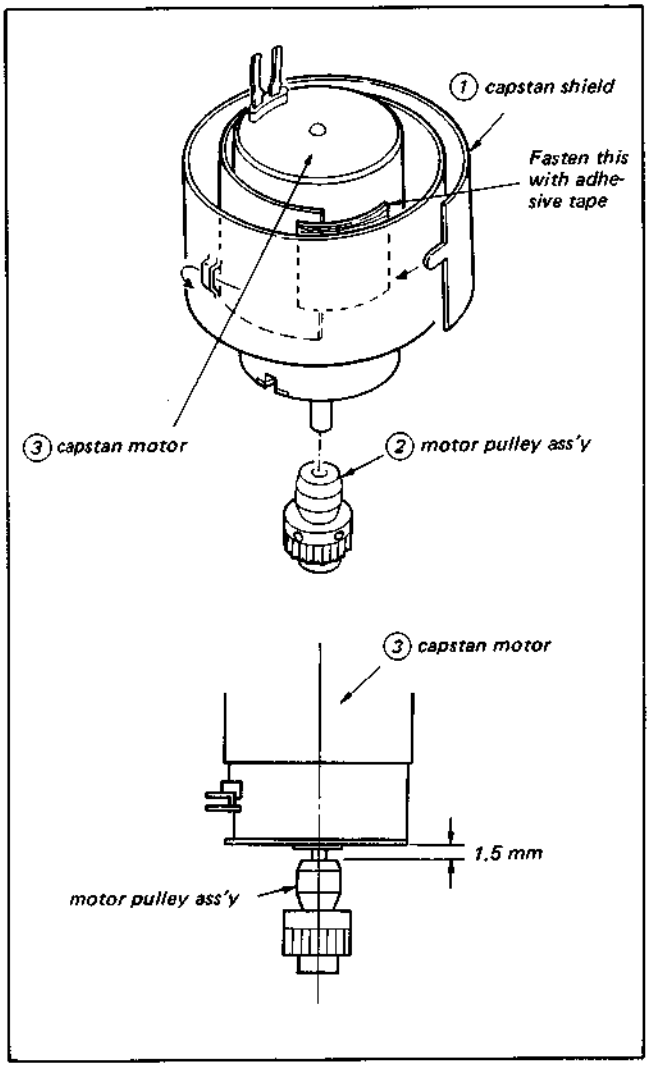


Fig. 3-9. Replacement of DC motor (3)

5. Perform the following adjustment after the replacement.

4-3-2.–1. Capstan free speed adjustment

3-4. REPLACEMENT AND ADJUSTMENT OF TENSION REGULATOR ARM PLATE ASSEMBLY AND TENSION REGULATOR BAND ASSEMBLY

The tension regulator arm replacement must be done carefully, following the procedure below, because the tape interchangeability is much affected by the tension regulator arm operation.

3-4-1. When Tension Regulator Band Assembly is Replaced;

1. The tension regulator band assembly can be removed after removing screw (1) and hook (2) shown in Fig. 3-10.
2. Perform the tension regulator FWD position adjustment described below after the replacement.
   - (i) Place the machine, without an inserted cassette, into the STOP mode. (Refer to Section 1-3.)
   - (ii) Set up the PLAY mode.
   - (iii) Move the tention regulator band assembly (3) in the arrow direction as shown in Fig. 3-10 so that the positional relationship of the brake band assembly is as shown (A) in Fig. 3-10. Then tighten screw (1).
   - (iv) Perform the FWD back tension adjustment, Section 3-18, after the replacement.

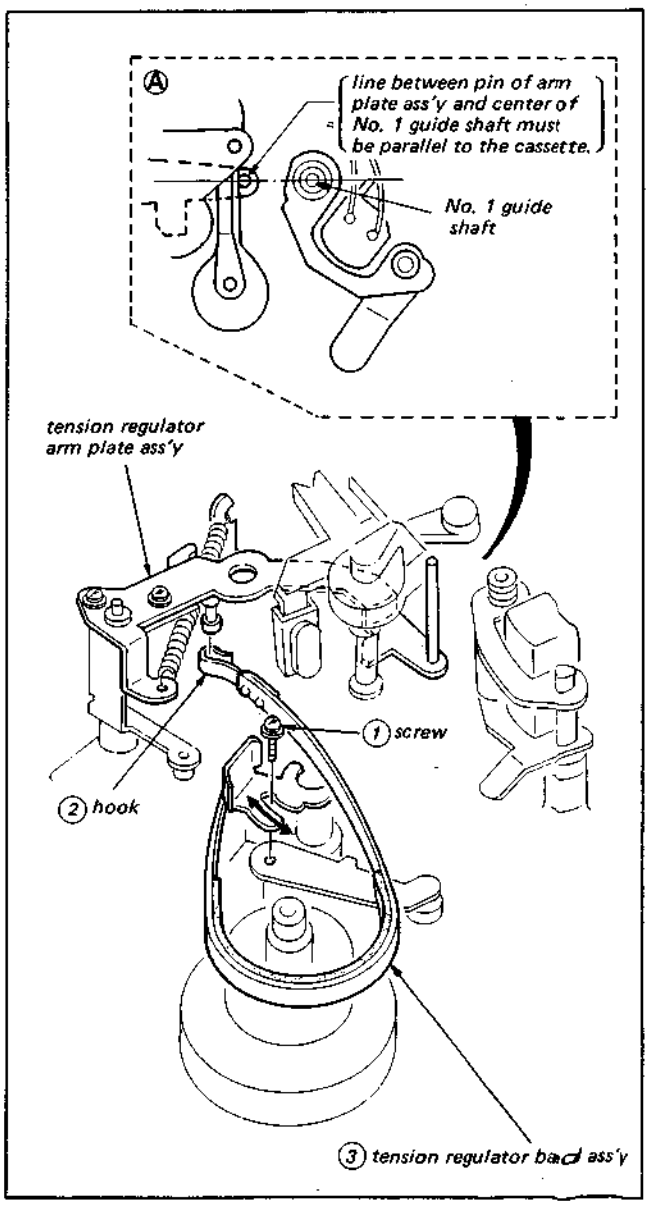


Fig. 3-10. Replacement and adjustment of the tension regulator band assembly

3-4-2. When Tension Regulator Arm Plate is Replaced:

1. The tension regulator arm plate can be removed after removing two screws (2) and spring (3) shown in Fig. 3-11.
2. After the replacement, perform the tension regulator FWD position adjustment as follows.
   - (i) Set up the STOP mode without an installed cassette. (Refer to Section 1-3.)
   - (ii) Set up the PLAY mode.
   - (iii) Loosen screw (5) that mounts tension regulator band assembly (4) as shown in Fig. 3-11. Move tension regulator band assembly (4) in the arrow direction, and tighten screw (5) tentatively when the condition shown in (A) is set up.
   - (iv) Insert a standard blade-tip screwdriver into section (B), adjust the clearance between release link (1) assembly (6) and tension regulator arm assembly (7), shown in Fig. 3-11, to be 2 to 2.5 mm, and tighten screw (2).
   - (v) Repeat Steps (iii) and (iv) again and tighten screws (2) and (5).
   - (vi) After the completion of the above steps, perform the FWD back tension adjustment, Section 3-18.

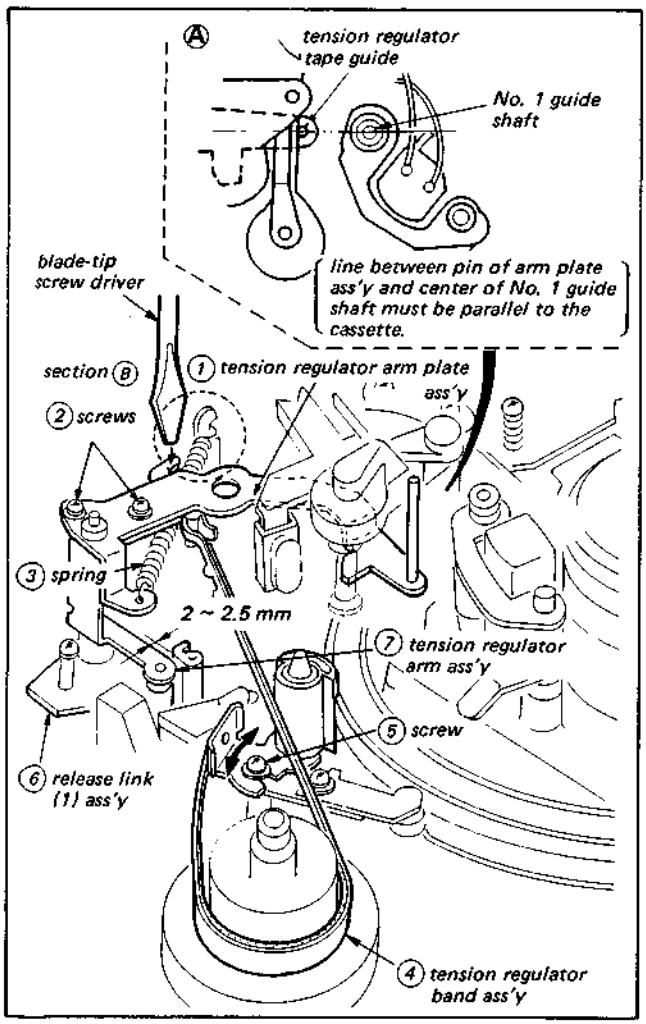


Fig. 3-11. Replacement and adjustment (1) of tension regulator arm plate assembly

3. Play back the 1 MHz segment of the alignment tape (KR5-1H). Loosen the lock screw and adjust screw "A" in Fig. 3-12 so that the RF waveform becomes that (see the waveform in the tape path adjustment, Section 3-19-1.) when the TRACKING knob is turned to the right and left from its center detent position and so that the tape is not apart from the flanges of guides (1), (2) and (3) shown in Fig. 3-12 and there is not a large tape curl at the guides.

   Note: Do not turn screw "A" to the right and left more than 90 degrees from its initial position.

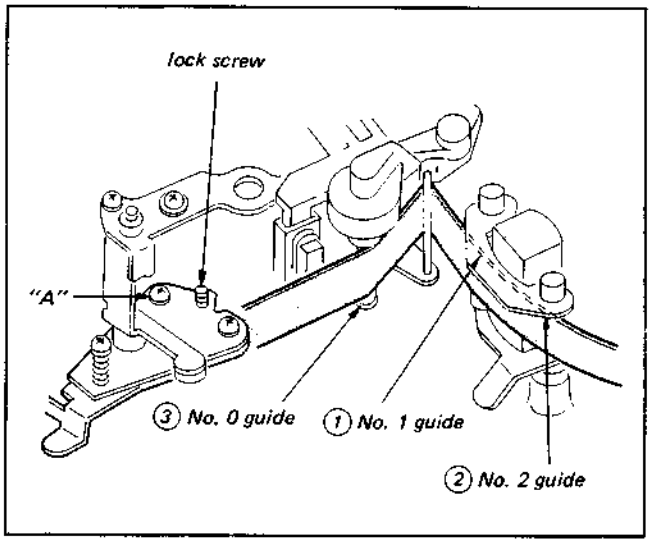


Fig. 3-12. Replacement and adjustment (2) of tension regulator arm plate assembly

4. Confirm that there is not a large bending of the tape at each of the tension regulator guide pin section and the No. 0 guide section shown in Fig. 3-13 after the completion of the adjustment. If the bending is found, repeat Step 3.

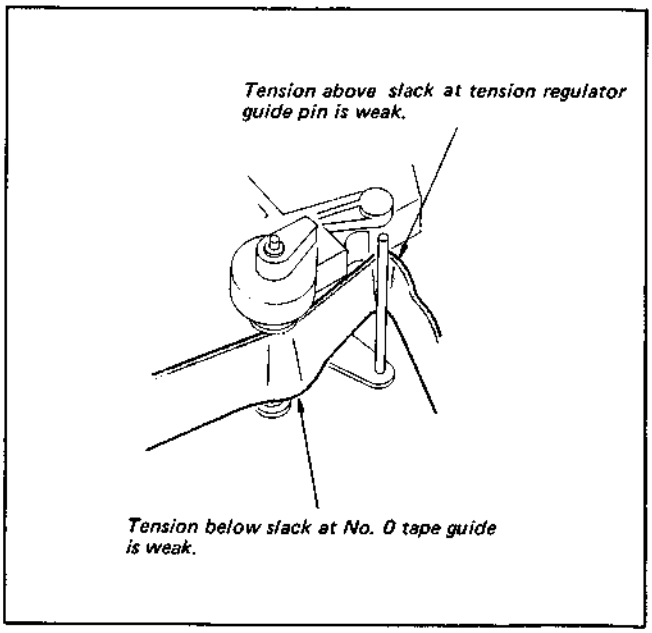


Fig. 3-13. Replacement and adjustment (3) of tension regulator arm plate assembly

3-5. REPLACEMENT OF CASSETTE-LIFT ASSEMBLY

1. Set up the unthreading state and remove the cassette-lift assembly by loosening four screws.
2. Install the cassette-lift assembly so that the reel tables and the reel holes on the cassette holder from concentric circles. (See Fig. 3-14.)
3. Insert the cassette into the cassette-lift compartment after the installation, set up the EJECT mode to perform unthreading after setting up the STOP mode, and confirm that the cassette-lift compartment assembly lifts. Make the confirmation after performing the lid opener position adjustment in Section 3-10.

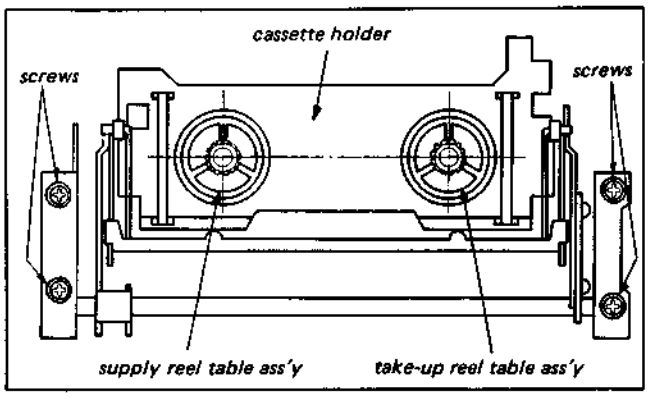


Fig. 3-14. Replacement of cassette-lift assembly

3-6. ADJUSTMENT OF REEL TABLE HEIGHT

- Since the reel table height serves as the reference of the tape movement system, the height must be adjusted caerfully after the reel table replacement.

1. Measure the height of the reel table with a slide caliper prior to the removal of the old reel table. (See Fig. 3-15.)
2. Place a new reel table, measure its height, and adjust height by adding or removing the adjusting spacer so that the difference in the heights of the former and new reel tables is within 0.1mm. (See Fig. 3-15.)

3-7. POSITION ADJUSTMENT, PAUSE SOLENOID

1. Set up the STOP mode without the cassette installed. (Refer to Section 1-3.)
2. Set up the REC PAUSE state so as to place the solenoid into the energized state.
3. Loosen the screws (1) that mount the solenoid and move the solenoid in the direction indicated by screw (A) as shown in Fig. 3-16 so that a clearance is made between the brake rubber and the take-up reel table.
4. Then move the solenoid in the direction shown by arrow (B) and tighten screws (1) after the solenoid is moved further 0.8 mm in the (B) arrow direction from the point where the brake rubber begins to touch the take-up reel table assembly.

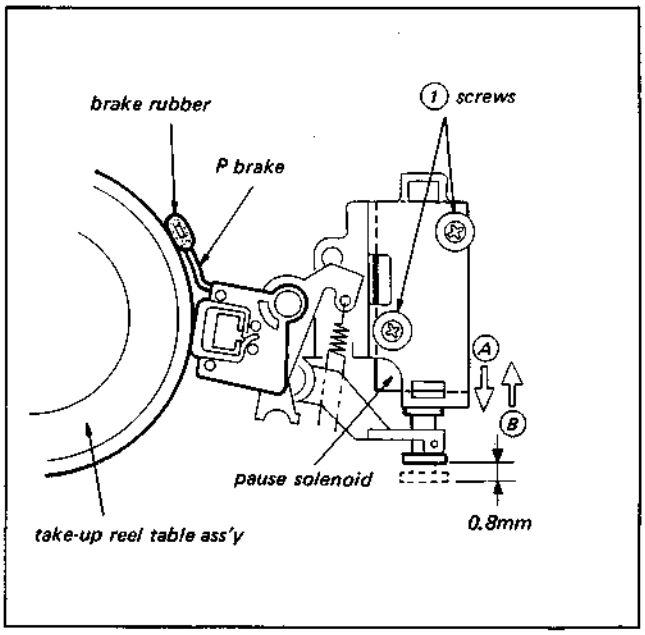


Fig. 3-16. Position adjustment of pause solenoid (Stroke adjustment)

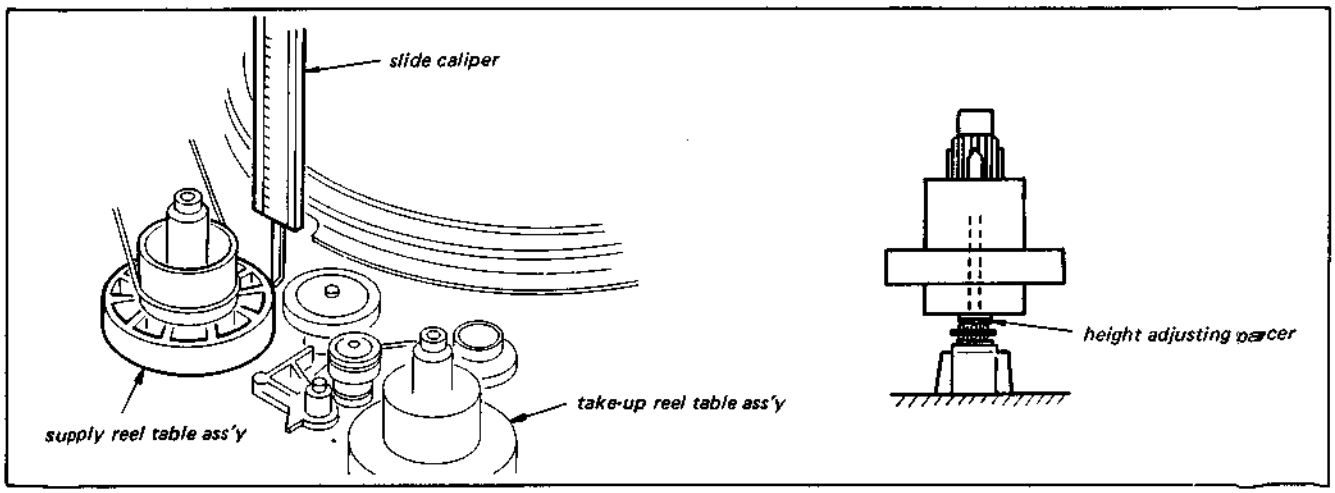


Fig. 3-15. Adjustment of reel table height

3-8. POSITION ADJUSTMENT OF FUNCTION SOLENOID

3-8-1. Position Adjustment of PLAY, F. FWD and REW Solenoids

The four solenoids shown in Fig. 3-17 require careful adjustments because these solenoids are the driving force for the PLAY, F. FWD, and other tape operations. (As to the position adjustment of the EJECT solenoid, refer to Section 3-8-2.)

1. Set up the STOP mode without the cassette. (See Section 1-3.)
2. Remove the two screws fixing the SY-10 board and open the board in the direction of the arrow.

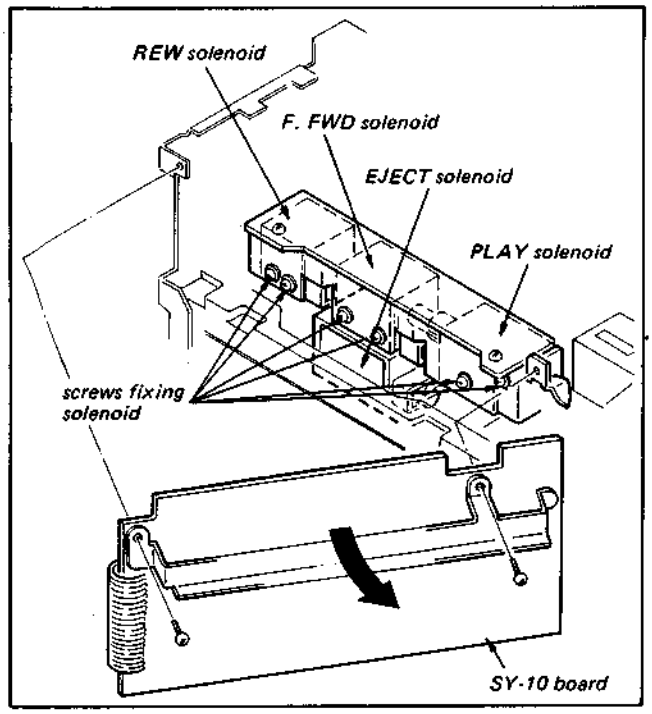
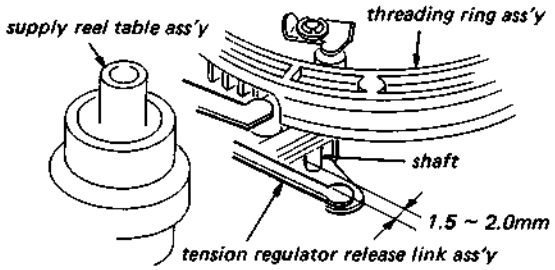


Fig. 3-17. Position adjustment of function solenoid

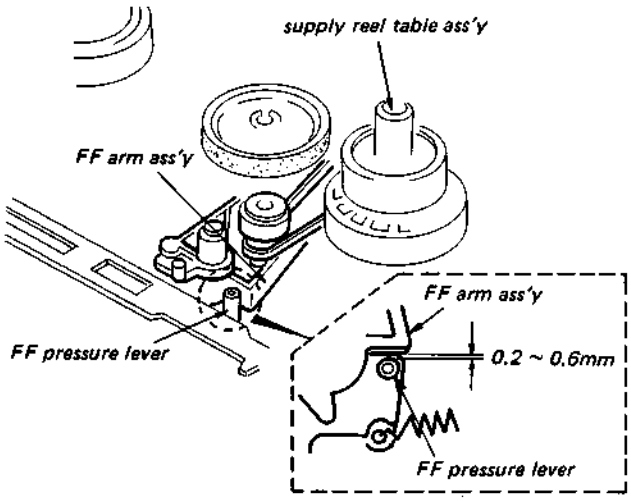
3. Check that the solenoids make the following operations when the relative mode to a solenoid is set up.
   - PLAY solenoid ..... Placing the tension regulator assembly into the operation.
     Making the FWD limiter assembly press the take-up reel table.
     Releasing the S and T brakes.
     Releasing the soft brakes.
   - F. FWD solenoid ..... Making the intermediate pulley assembly press the take-up reel table.
     Releasing the S and T brakes.
   - REW solenoid ..... Making the REW idler assembly press the supply reel table.
     Releasing the S and T brakes.
4. Check that the solenoids satisfy the specifications in Fig. 3-18. If the specifications are not satisfied, loosen the screws fixing the solenoid and adjust the position of the solenoid. See Fig. 3-17.
5. After tightening the screws, repeat Steps 3 and 4.

(1) stroke of PLAY solenoid



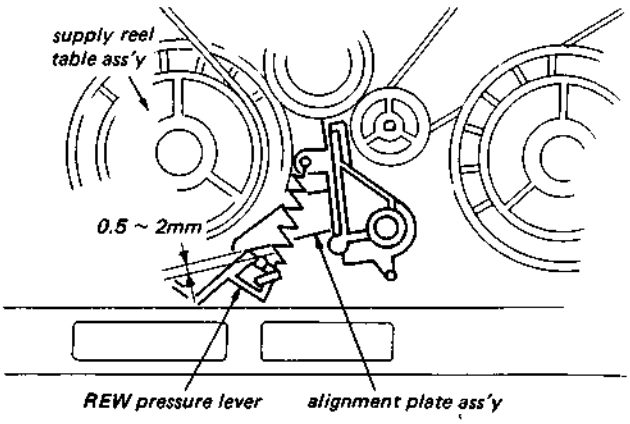
Specification: *A clearance of 1.5 to 2.0mm must be between the tension regulator release link ass'y and the shaft in the PLAY mode.*

(2) stroke of F. FWD solenoid



Specification: *A clearance of 0.2 to 0.6mm must be between the FF arm ass'y and the FF pressure lever in the F. FWD mode.*

(3) stroke of REW solenoid



Specification: *A clearance of 0.5 to 2mm must be between the REW pressure lever and the alignment plate ass'y in the REW mode.*

Fig. 3-18. Specifications of PLAY, F. FWD, and REW solenoid strokes

3-8-2. Position Adjustment of EJECT Solenoid

1. Set up the STOP mode without the cassette. (See Section 1-3.)
2. Check that following operations take place when the EJECT mode is set up.
   - EJECT solenoid . . . . The E idler assembly presses the take-up reel table.
     The ring arm assembly is released.
     The cassette compartment lock is released.
     The gear pulley engages with the motor pulley assembly.
3. Stand the machine on its left side down. Open the YC-6 and the AS-3 boards. (Refer to Section 1-1-4.)
4. Check that the specification shown in Fig. 3-19 is satisfied. If it is not, perform Steps 5, 6, and 7.
5. Push the cassette detect lever and release the lever at a midway of the threading.
6. Loosen the two screws shown in Fig. 3-19. Move the E solenoid base assembly to the position where the specification shown in Fig. 3-19 is satisfied, while turning the motor pulley assembly counterclockwise and setting the solenoid to the energized state.
7. After tightening the screws, repeat Steps 2 and 4.

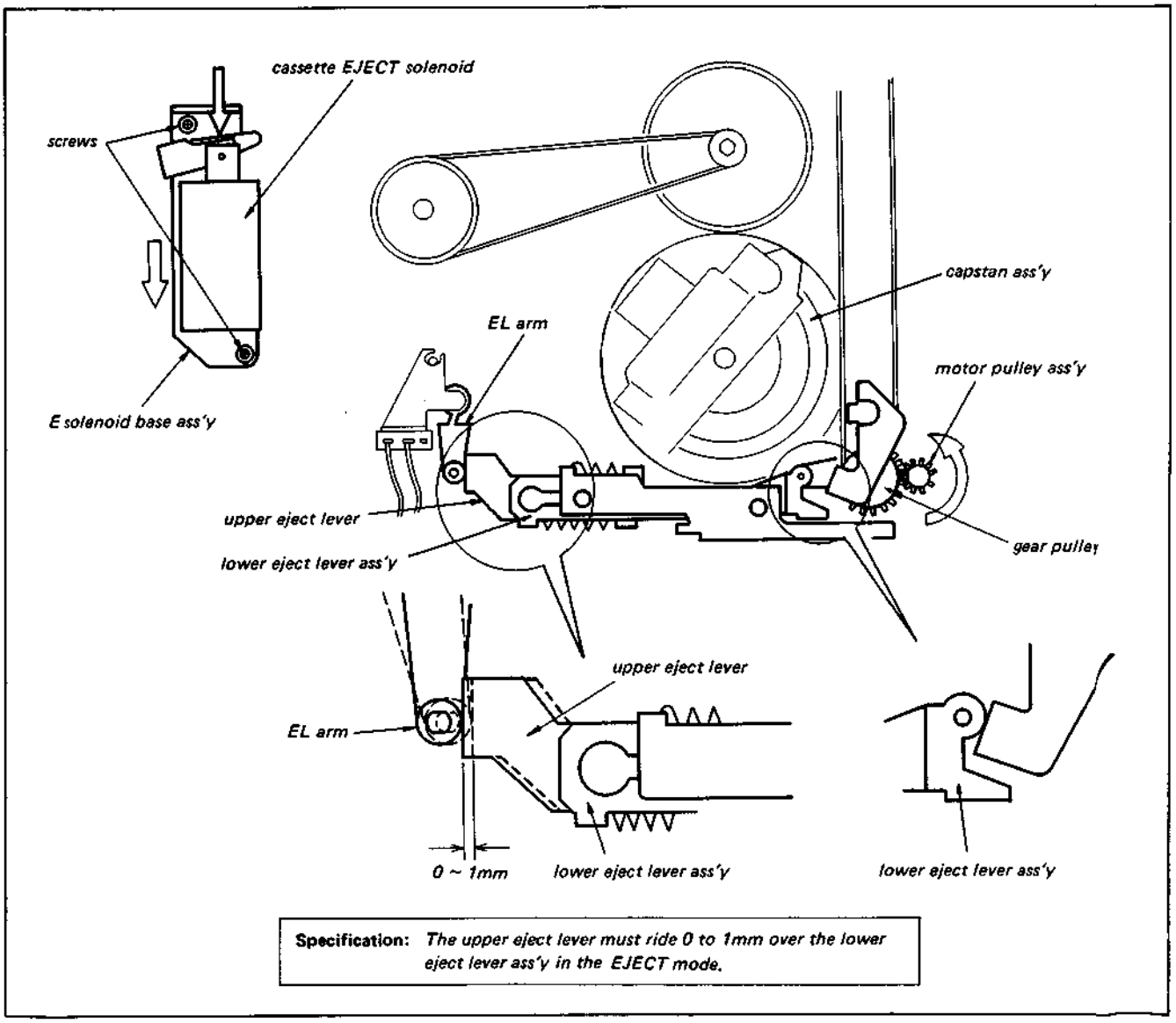


Fig. 3-19. Position adjustment of EJECT solenoid

3-9. ADJUSTMENT OF THREADING AND UNTHREADING

3-9-1. Operation Check of Cassette-in Switch

1. Set up the unthreading completion state without an inserted cassette and turn off the power.
2. Set section (A) as shown in Fig. 3-20.
3. Confirm that the microswitch mounted on the underside of the machine does not turn on when the cassette detection lever (1) is pushed in the arrow direction.
4. Set section (A) as shown in Fig. 3-21.
5. Confirm with a click that the microswitch mounted on the underside of the machine turns on when the cassette detection lever (1) is pushed in the arrow direction.
6. Adjust the mounting position of cassette detection (1) so that it moves more than 1.5mm further from the point where the click is heard.

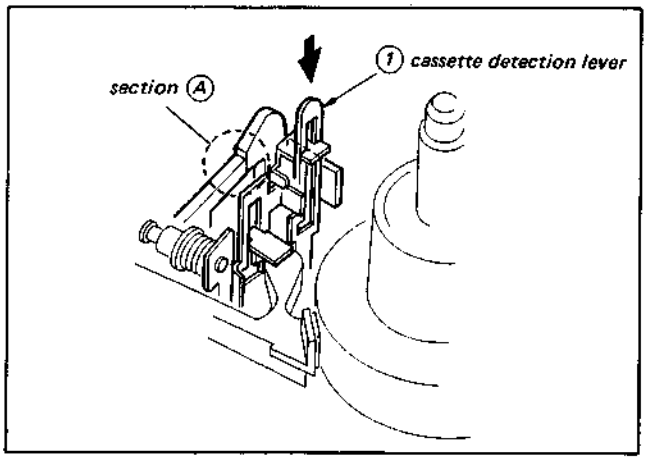


Fig. 3-20. Operation check of cassette-in switch

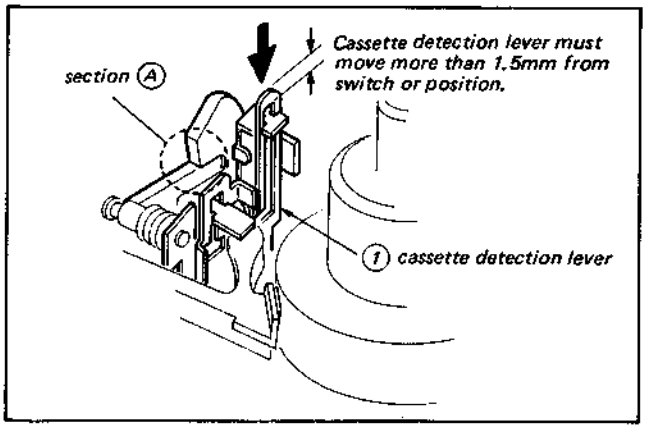


Fig. 3-21. Operation check of cassette-in switch

Note:
- The problem where the cassette-lift assembly does not lock occurs if the microswitch turns on in the condition shown in Fig. 3-20.
- The problem where the modes other than the EJECT mode cannot be set up occurs if the microswitch does not turn on in the state shown in Fig. 3-21.

3-9-2. Position Adjustment of Threading Unit B Assembly and Control Plate

1. Push down the cassette detection lever with fingers to perform the threading operation and release the lever when the threading ring assembly (5) shown in Fig. 3-22 has turned 90 degrees.
2. Loosen screws (1) shown in Fig. 3-22. Make the clearance (0.2mm) between midway gear (B) (4) and threading ring assembly (5) and tighten screws (1).
3. Make a clearance of 0.5mm between control plate (3) and threading ring assembly (5) and tighten screw (6).

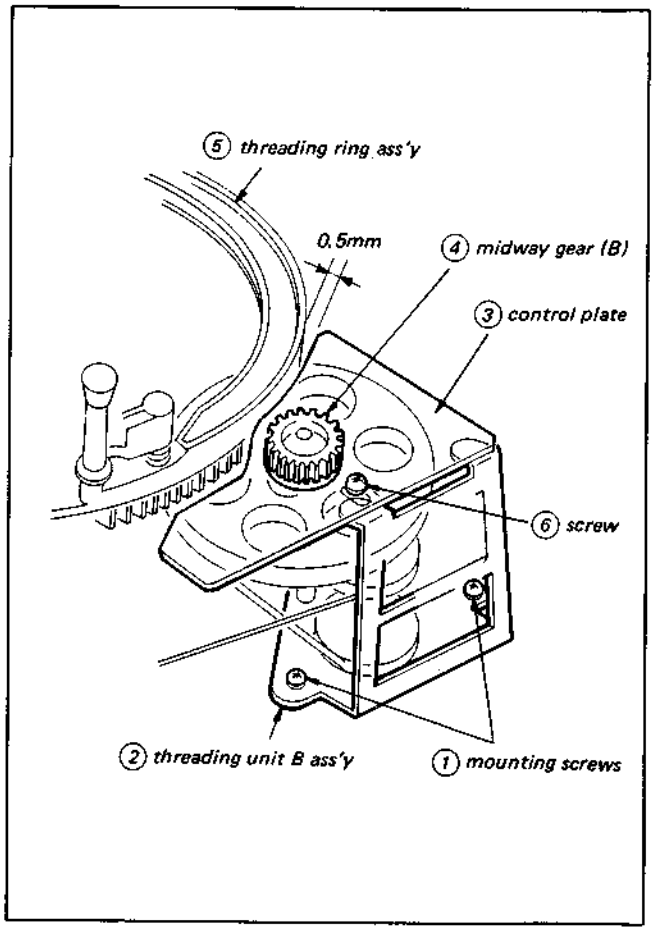


Fig. 3-22. Position adjustment of threading unit B assembly and control plate

3-9-3. Position Adjustment of Gear Pulley Hold Arm Assembly

1. Loosen screw (1) shown in Fig. 3-23, adjust the position of the gear pulley hold arm assembly so that the clearance between the motor pulley assembly (2) and the gear pulley (3) is 0.3 mm, and tighten screw (1).

3-9-4. Adhesion of Brake Shoe

1. Glue the brake shoe to the groove on the brake arm as shown in Fig. 3-23.

Note: If the brake shoe is not glued in the right position, it is possible for the brake shoe to touch the capstan belt. If the shoe is removed, there is a possibility of the occurrence of an abnormal sound at the initial stage of the unthreading.

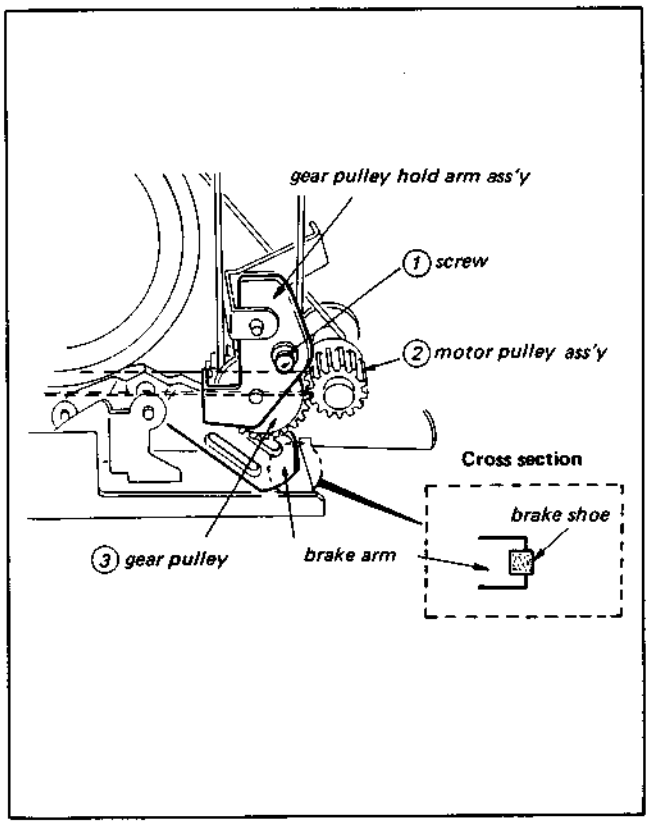


Fig. 3-23. Position adjustment of gear pulley hold arm assembly

3-9-5. Clearance Adjustment of Cassette Lift Assembly Arm

- Since a poor adjustment of the clearance causes the condition that the cassette lift assembly arm (2) is in strong contact with the threading ring assembly (3), the threading and unthreading cannot always be performed smoothly. When the clearance is larger than the specified value, the lock of the cassette lift assembly comes loose and the cassette lift assembly lifts during the unthreading, damaging the tape.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Loosen screw (1) and adjust the position of the cassette lift assembly arm (2) with the thickness gauge so that the clearance between the cassette lift assembly arm (2) and the threading ring (3) satisfies the specification (0.2 mm to 0.5 mm). (See Fig. 3-24.)
3. Check the value again after the screw is tightened.

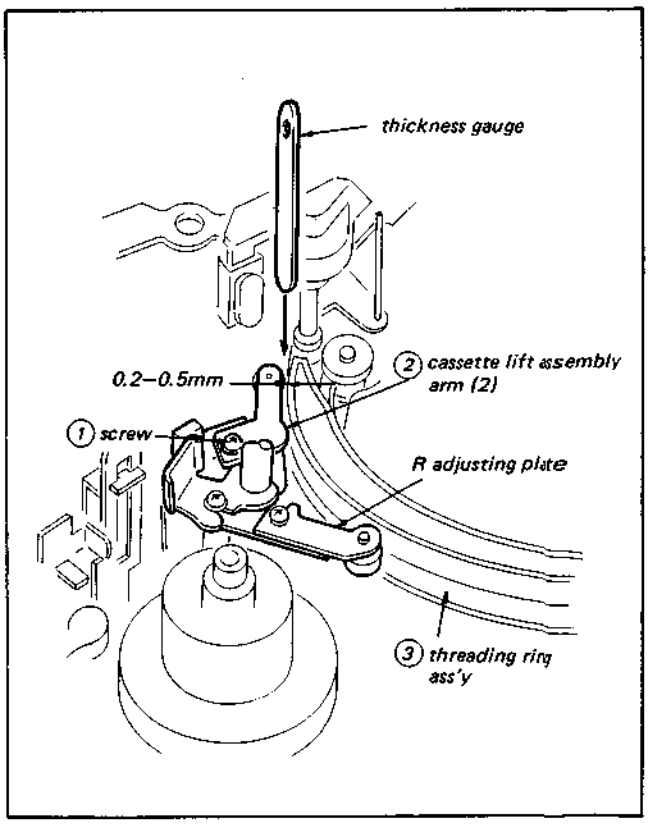


Fig. 3-24. Clearance adjustment of cassette lift assembly arm

3-9-6. Clearance Adjustment of Ring Arm

- The ring arm serves to stabilize the position of the threading ring at the completion of threading. If this adjustment is wrong, there is a possibility that the threading ring may move, from the position reached at the threading completion point, during the PLAY, FAST FWD and RECORD modes.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Set up the PLAY mode.
3. Loosen screw (1) shown in Fig. 3-25 and adjust R adjusting plate assembly (2) so that the clearance between the roller of R adjusting plate assembly (2) and threading ring assembly (3) satisfies the specification (0 to 0.2 mm). Repeat the threading and unthreading operations several times, confirm that the roller of R adjusting plate assembly (2) drops into the bottom of the cam of the threading ring, and tighten screw (1) after the confirmation.

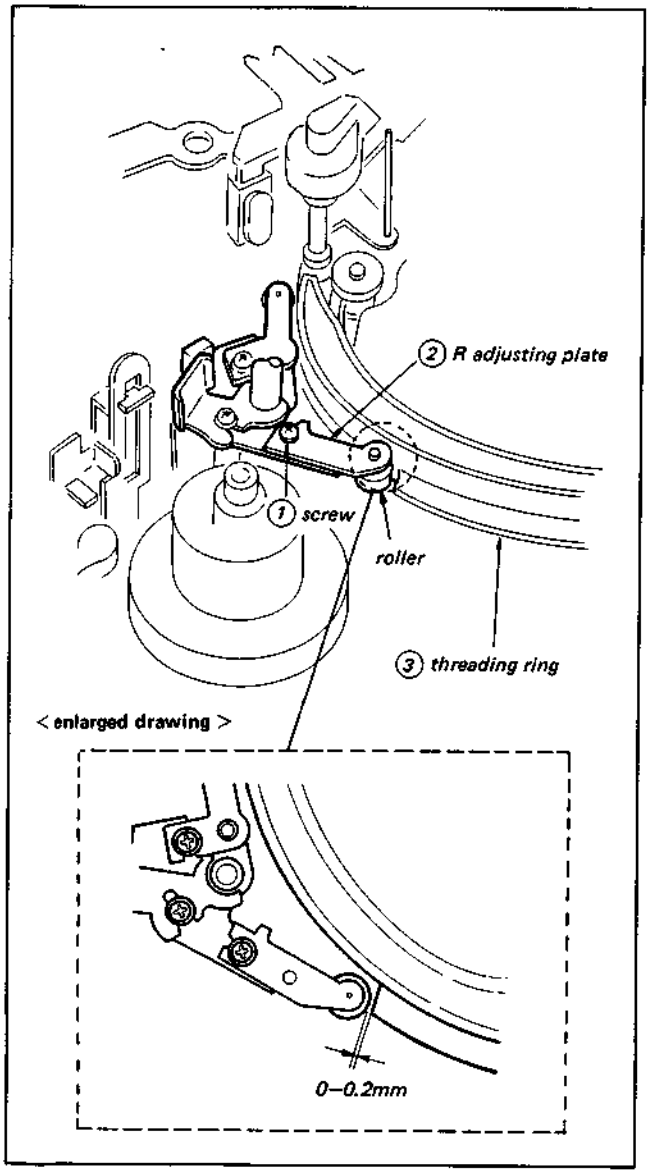


Fig. 3-25. Clearance adjustment of ring arm

3-9-7. Check of Unthreading Completion

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Set up the EJECT mode to complete the unthreading.
3. Confirm that the roller of cassette lift assembly arm (2) shown in Fig. 3-26 moves in the arrow direction when the cassette lift assembly arm (2) is pushed in the arrow direction.
4. Confirm that the tension regulator arm assembly is in contact with the boss of the cassette position-determining post. (See Fig. 3-26.)

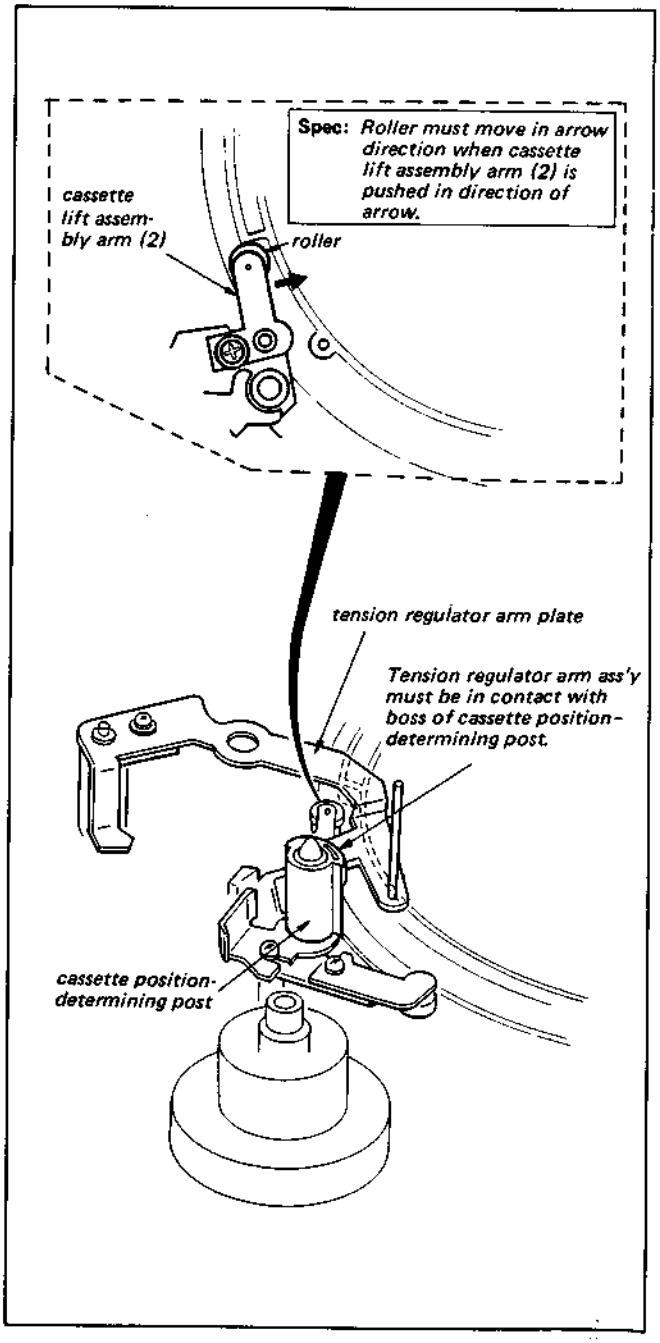


Fig. 3-26. Check of unthreading completion

3-10. POSITION ADJUSTMENT OF LID OPENER

- The mounting position of the cassette lid opener bracket is different when the cassette lift assembly is attached and is not attached to the SL-C7E.

1. When the cassette lift assembly is attached;

   (i) The plate of the cassette lid opener bracket must be near the center of the slot in the white plastic holder guide when the cassette lift assembly is lowered. If it is not in this position, bend the lower section of the cassette lid opener bracket, as shown in Fig. 3-27. for adjustment.

   (ii) Confirm that section (A) in Fig. 3-27 satisfies the specification (0.5mm to 3mm) when the cassette is inserted and the PLAY mode is set up. This is the spacing between the tape and the take-up sensor.

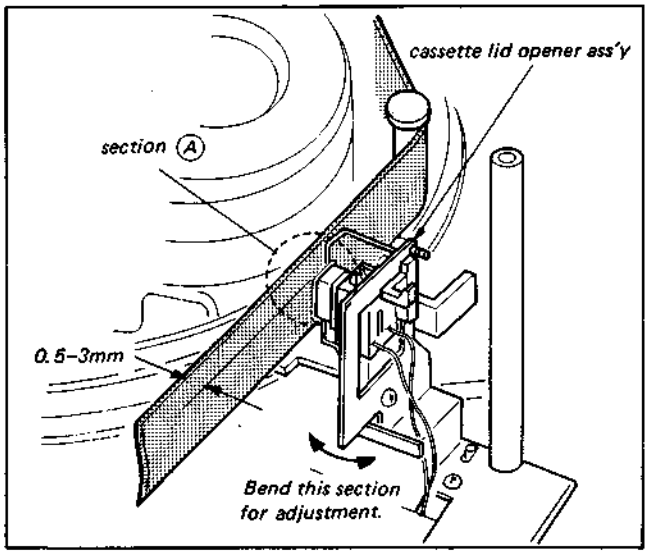


Fig. 3-27. Position adjustment of cassette lid opener metal (1)

2. When the cassette lift assembly is not attached;

   (i) Bend the lower section of the cassette lid opener bracket so that the cassette lid opener bracket positions itself almost at the center of the space marked by asterisk (*) shown in Fig. 3-28, when the cassette is placed on the four position determining posts.

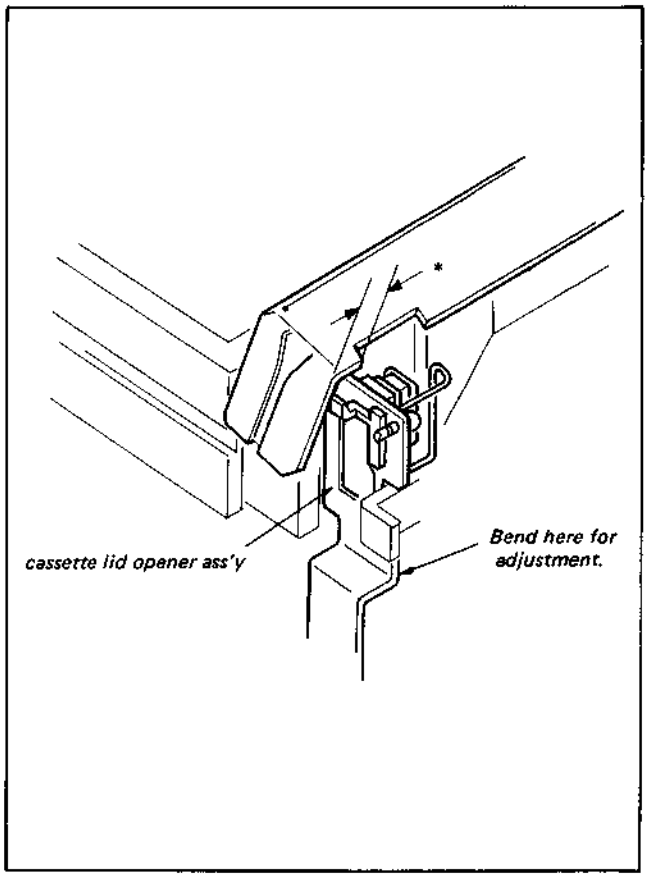


Fig. 3-28. Position adjustment of cassette lid opener metal (2)

3-11. REPLACEMENT AND ADJUSTMENT OF THREADING RING ASSEMBLY

1. Turn the threading ring to a point immediately before the threading completion position and stop it at the point where it does not touch the lock hold arm. (See Fig. 3-29.)
2. Perform procedures (1) to (5) shown in Fig. 3-29.
3. Remove the threading ring while moving the tension regulator arm assembly in the arrow direction by holding its lower section.

   Note: Do not hold the upper section of the tension regulator arm while moving the assembly.

4. Perform the adjustment of control plate (1), R adjusting plate (3), No. 0 guide section assembly (4), and ring roller unit assembly (5) after the replacement.
   (i) As to the adjustment of control plate (1), refer to "Position Adjustment of Threading Unit B assembly and Control Plate", Section 3-9-2.
   (ii) As to the adjustment of R adjusting plate (3), refer to "Clearance Adjustment of Ring Arm", Section 3-9-6.
   (iii) As to the adjustment of No. 0 guide section assembly (4), perform procedure 6 of this section.
   (iv) As to the adjustment of ring roller unit assembly (5), perform the adjustment, referring to detail drawing A in Fig. 3-29.
5. Perform the threading and unthreading several times and confirm the smooth movement of the threading ring.

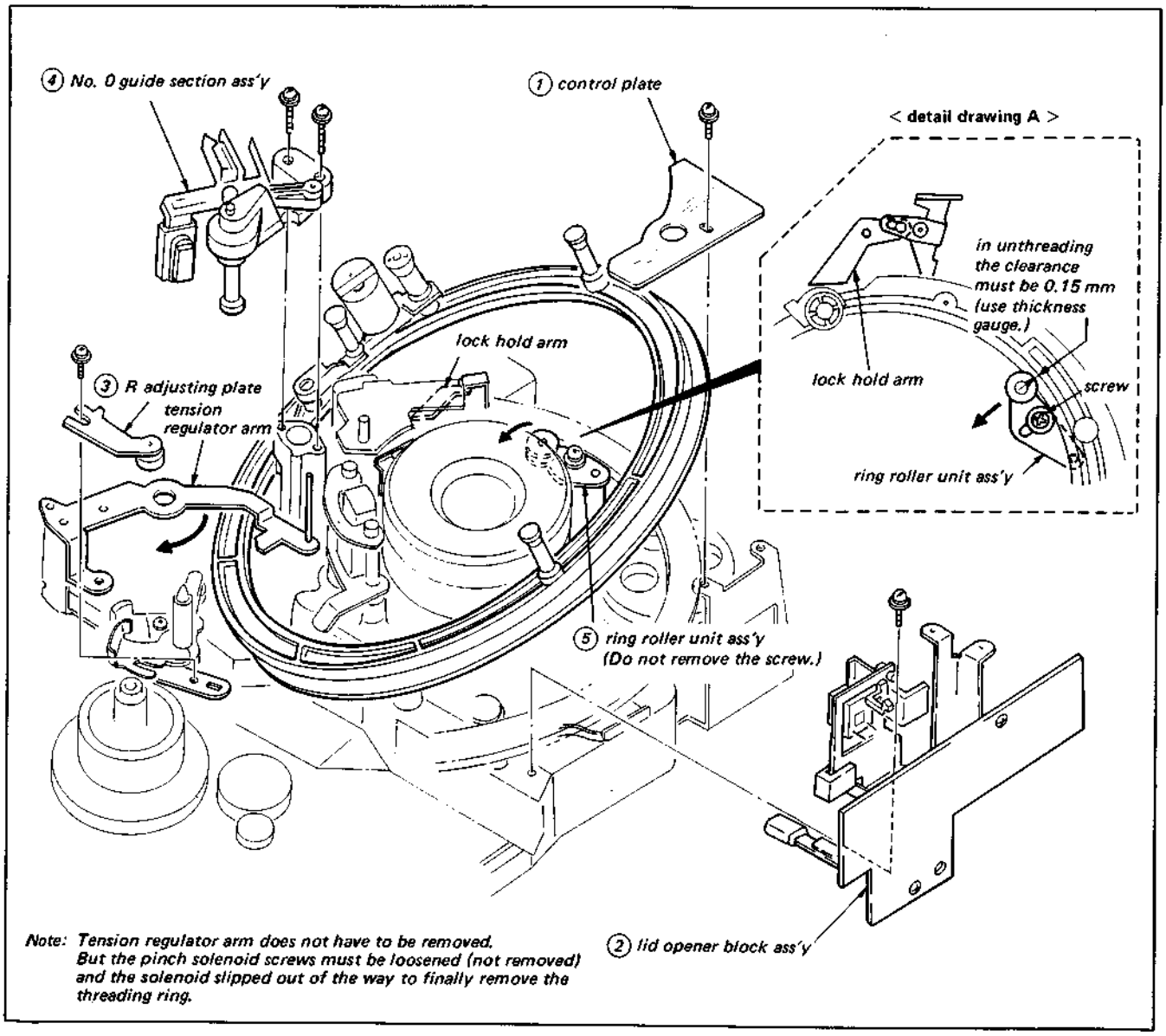


Fig. 3-29. Replacement of threading ring block assembly

6. Adjustment after the mounting of No.0 guide section assembly

   (i) Playback the 1MHz segment of the alignment tape (KR5-1H).

   (ii) Turn the TRACKING control knob so that the RF waveform at TP2005 on RF-2 board is 2/3 of its maximum level. (See Fig. 3-30.)

   (iii) Turn the No.0 guide shown in Fig. 3-30 fully counterclockwise (↶), then clockwise until the point where the RF waveform at the exit section becomes flat with small fluctuation, and tighten the mounting screws.

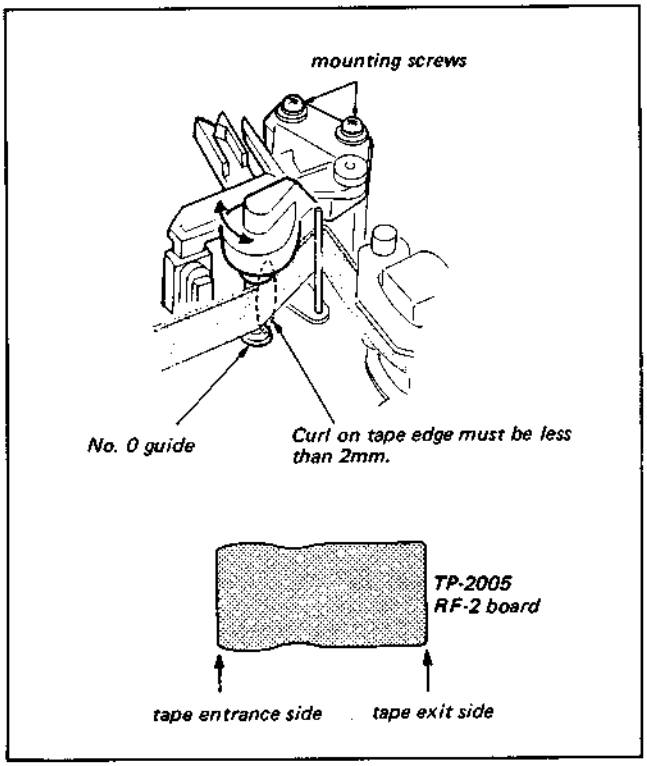


Fig. 3-30. Position adjustment of No.0 guide section assembly mounting

3-12. POSITION ADJUSTMENT OF PINCH ROLLER SOLENOID

3-12-1. Parallelism Adjustment of Pinch Press Lever

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Perform Steps (1) to (3) shown in Fig. 3-31 so as to set up the state in which the screw of pinch press lever shaft adjusting plate (4) can be loosened.
3. Loosen the two screws (1) fastening the pinch solenoid base (3) shown in Fig. 3-32 and tighten screws (1) when the pinch solenoid base (3) becomes parallel to the drum base.
4. Loosen two screws (2) shown in Fig. 3-32 by 1/3 to 1/2 turn and move pinch press lever shaft adjusting plate (4) in the direction shown by arrow B.
5. Insert a standard blade-tip screwdriver into hole F when the iron core is pulled slightly and pinch roller arm assembly (5) touches capstan shaft (6) equally along the complete length of the pinch roller. The pinch roller and the capstan should be parallel. Move the pinch press lever shaft adjusting plate (4) in the direction shown by arrow C and tighten the two screws (2) when clearance A becomes 0.

   Note: If the pinch roller arm assembly (5) does not touch the capstan with parallel and equally force when the iron core is pulled slightly, move pinch solenoid base (3) with a standard blade-tip screwdriver in the direction shown by arrow D.

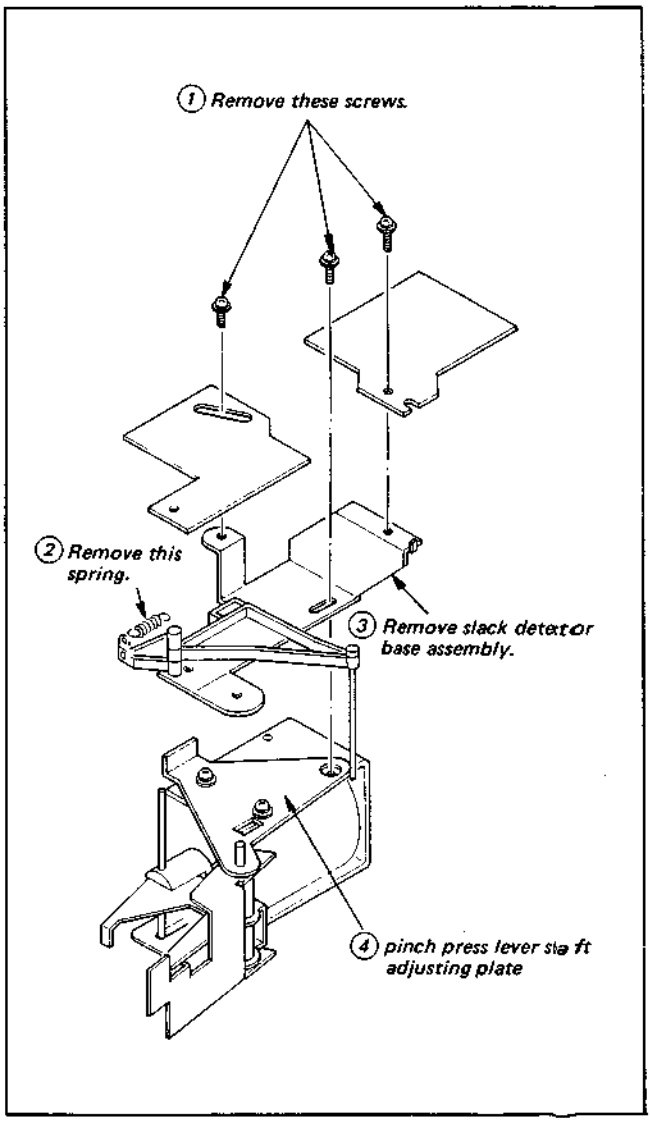


Fig. 3-31. Disassembly

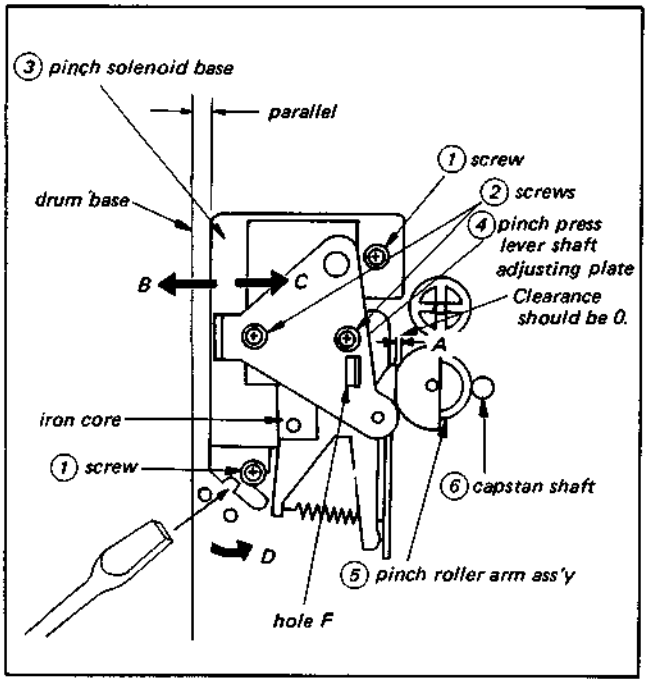


Fig. 3-32. Position adjustment of pinch roller solenoid

3-12-2. Position Adjustment of Pinch Solenoid

1. Check that "Parallelism Adjustment of Pinch Press Lever", Section 3-12-1, has been completed.
2. Loosen the two screws ① shown in Fig. 3-33 by 1/3 to 1/2 turns.
3. Insert the cassette (L-500) and set up the PLAY mode.
4. Insert the standard blade-tip screwdriver as shown in Fig. 3-33. Move pinch solenoid base ② in the arrow direction so that the specification at section B is satisfied, and tighten the two screws ①.

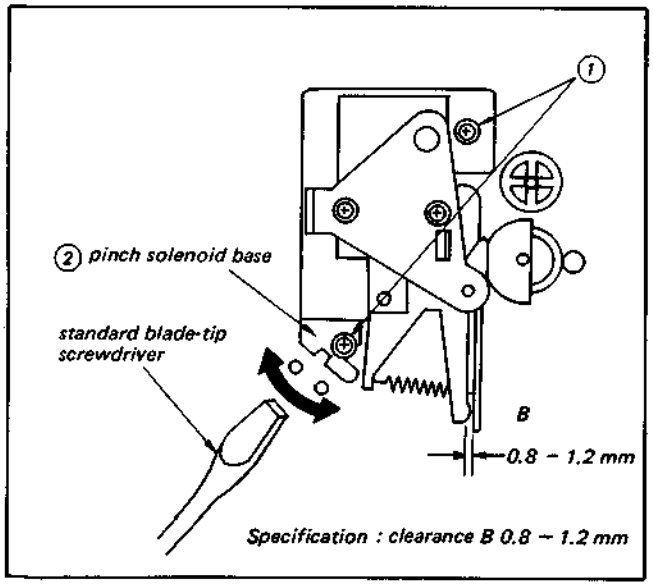


Fig. 3-33. Position adjustment of pinch solenoid

5. Tap the top and bottom of the tape around the capstan entrance and confirm that the specification shown in Fig. 3-34 is satisfied. If not, repeat Step 5 of Section 3-12-1, "Parallelism Adjustment of Pinch Press Lever".
6. Reverse Steps ① to ③ shown in Fig. 3-31.

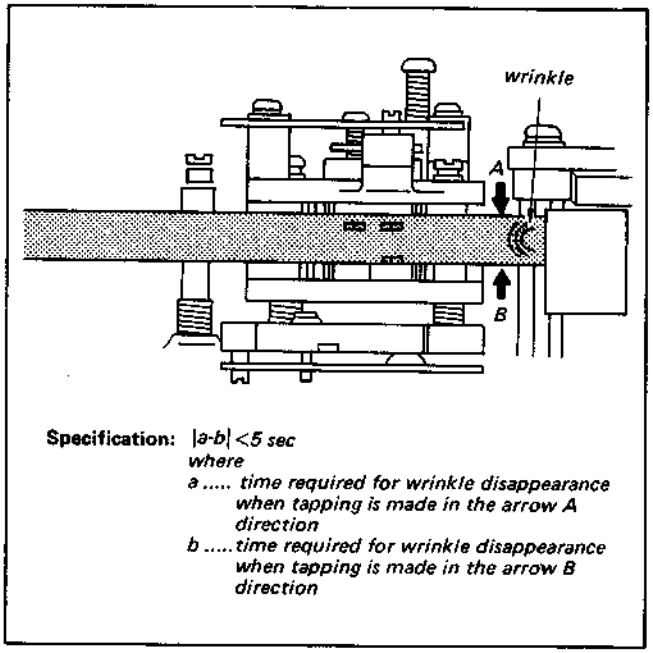


Fig. 3-34.

3-12-3. Position Adjustment of Slack Sensor Operation

1. Set up the STOP mode with the cassette. (Refer to Section 1-3.)
2. Loosen screw ① and adjust the CN-5 board position to satisfy the specification shown in Fig. 3-35.

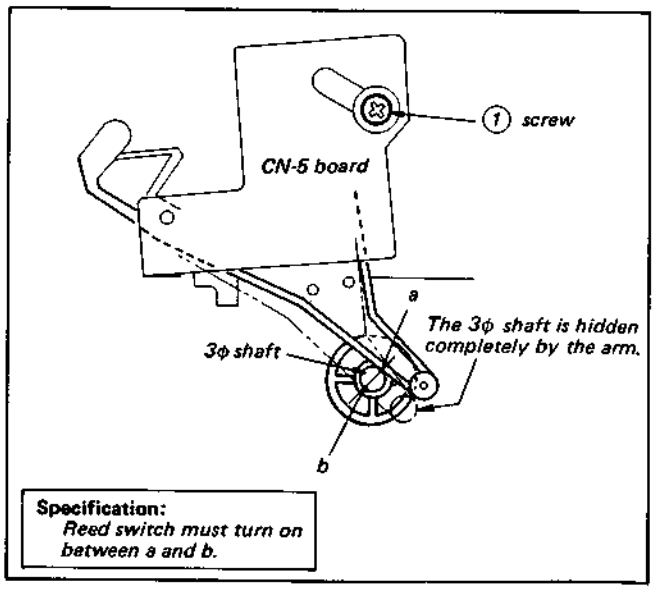


Fig. 3-35. Position adjustment of slack sensor operation

3-13. ADJUSTMENT OF BRAKE RELEASE STROKE

- The FB slide plate shown in Fig. 3-36 releases the take-up, the supply, and the soft brakes.

1. Place the machine without the cassette into the STOP mode. (Refer to Section 1-3.)
2. Bend section E of FB slide plate (2) so that the specification (0.5 to 1mm) of section C when brake release arm (1) is pushed in the direction of arrow D so that the clearances at sections A and B are eliminated.
3. Set up the PLAY mode and check that the take-up, the supply, and the soft brakes are released.

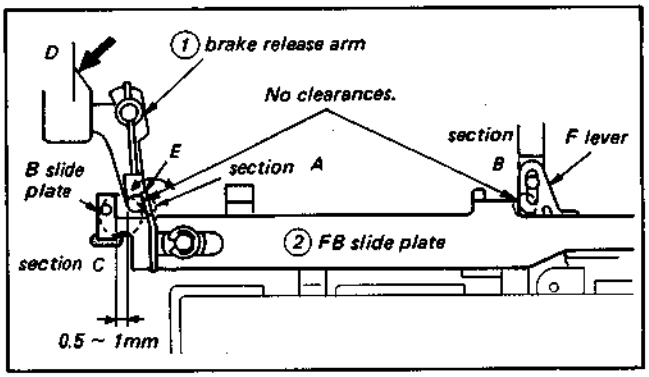


Fig. 3-36. Position adjustment of FB slide plate

3-14. POSITION ADJUSTMENT OF MICROSWITCH

3-14-1. Position Adjustment of Erasing Protection Microswitch

1. Remove the tuner block from the machine. (Refer to Section 1-1-2.)
2. Open the SY-11 board.
3. Check that the contact point of the erasing protection microswitch shown in Fig. 3-37 closes.
4. Loosen screws (2) and adjust the position of the switch while lowering the cassette with lid opened so that the cassette stops at the position more than 1mm from the contact point of the switch opens.

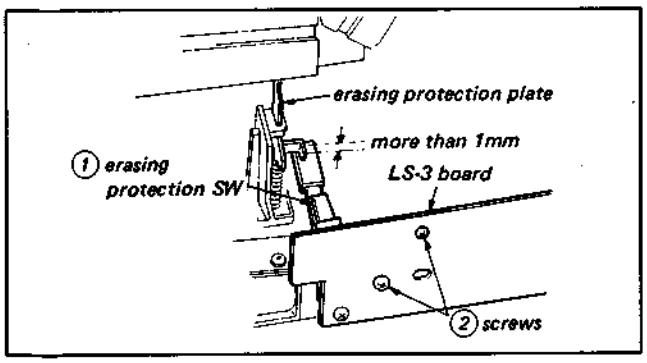


Fig. 3-37. Position adjustment of erasing protection microswitch

3-14-2. Position Adjustment of Threading End Switch

- Prior to this adjustment, the following adjustments must be completed.

  3-9-5. Clearance adjustment of cassette lift assembly arm
  3-9-6. Clearance adjustment of ring arm
  3-9-7. Check of unthreading completion

1. Turn the threading ring by hand and stop it at the point immediately before the threading completion position.
2. Loosen screw (4) and adjust the position of microswitch (3) so that microswitch (3) turns on before gear pulley hold arm (1) moves from the groove of lock arm (2), while turning the threading ring counterclockwise (↺) slowly by hand. Confirm the turning-on of the microswitch with a click.
3. Adjust the position further so that the clearance between the actuator of microswitch (3) shown in Fig. 3-38 and the microswitch satisfies the specification (0.7mm to 1.0mm) when the threading ring is turned counterclockwise (↺) beyond the threading completion point.
4. Repeat Steps 2 and 3 for confirmation.

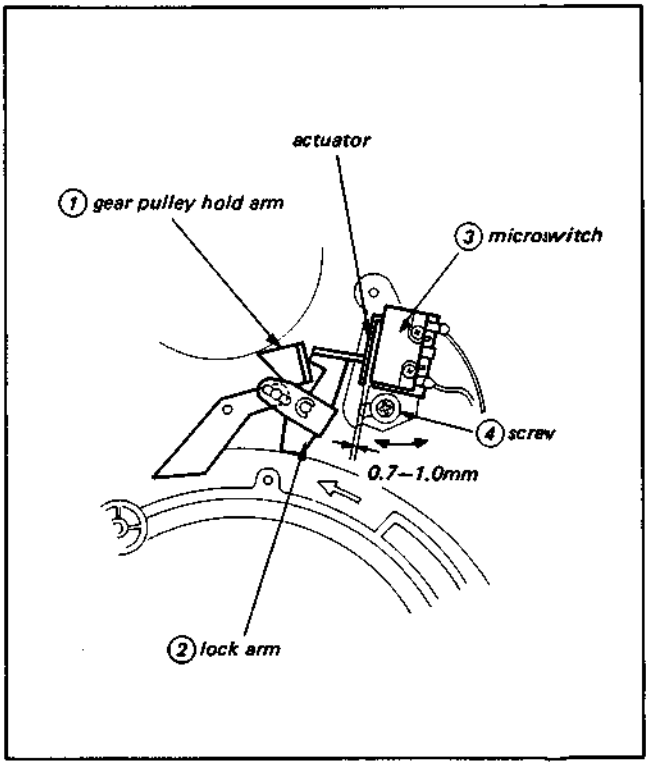


Fig. 3-38. Position adjustment of threading end switch

3-15. CHECK OF TAKE-UP TORQUE

- Since sufficient take-up torque cannot be obtained at the last section of the tape if the take-up torque is below the specified value, tape slackness is caused at the capstan shaft point and sometimes the slack sensor operates.
- The take-up torque tends to increase gradully due to aging.

1. Rewind the tape a little and set up the PLAY mode (for the playback of the very last section of the tape) after the auto-stop at the tape end in the FAST FWD mode. Confirm that the tape runs without any slackness at the capstan shaft area. If the tape slackens, perform the following adjustments.
2. Clean the take-up reel table assembly, the FWD idler assembly, and the FWD belt with a piece of cloth dampened with isopropyl alcohol.
3. Stop the operation of the slack sensor. (Refer to section 1-4.)
4. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) on the take-up reel table as shown in Fig. 3-39.
5. Pull out the string from the reel table tension gauge about 30 cm (12 inches) and hook the sector type tension gauge (50g full scale, Tool Kit Ref No. J-7) on the end of string.
6. Set up the PLAY mode.
7. Bring the sector type gauge toward the take-up reel table at a speed of approx. 2cm/sec. (8 inch/sec.) as shown in Fig. 3-39. Confirm that the gauge reading is within the specification. If not, replace the FWD limiter assembly and make the check again.

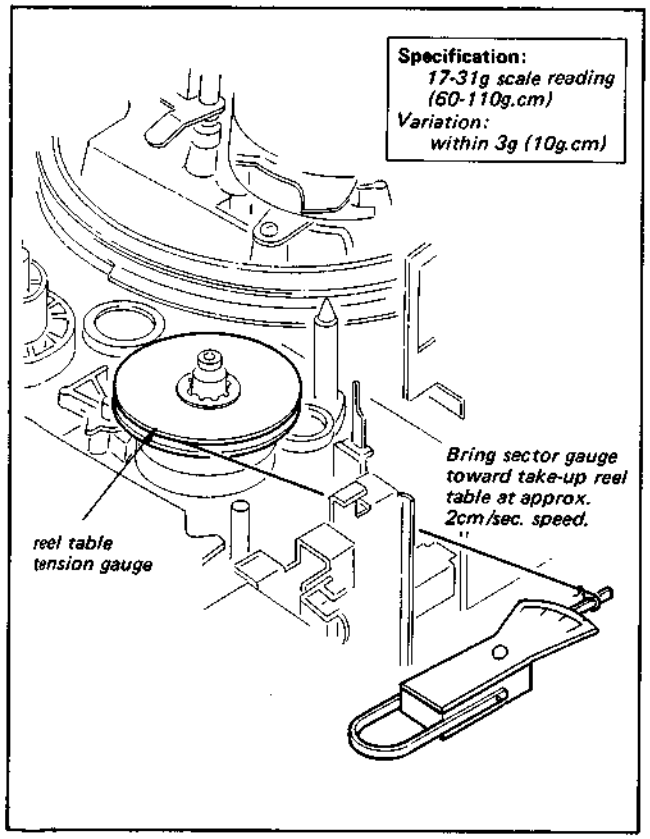


Fig. 3-39. Check of take-up torque

3-16. CHECK OF CASSETTE EJECT TORQUE

- The tape is taken up by the take-up reel table in the cassette EJECT mode. The take-up reel table is driven via the belt by the DC motor, while the threading ring unthreads.
- If the cassette eject torque is below the specification, only the threading ring performs the unthreading operation while the tape is not pulled back into the cassette, and the tape can be damaged.

1. Clean the take-up reel table, the E idler assembly, and the EJECT belt with a piece of cloth dampened with isopropyl alcohol.
2. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) as shown in Fig. 3-40.
3. Pull out the string of the gauge about 30 cm (12 inches) and hook the sector type gauge (50g full scale, Tool Kit Ref. No. J-7) on the end of the string.
4. Set up the EJECT mode.
5. Bring the sector type gauge toward the take-up reel table at a speed of approx. 2cm/sec. during the unthreading as shown in Fig. 3-40. Confirm that the gauge reading is within the specification. If not, replace the E limiter assembly (X-3659-301-0) of the threading unit section and make the confirmation again.

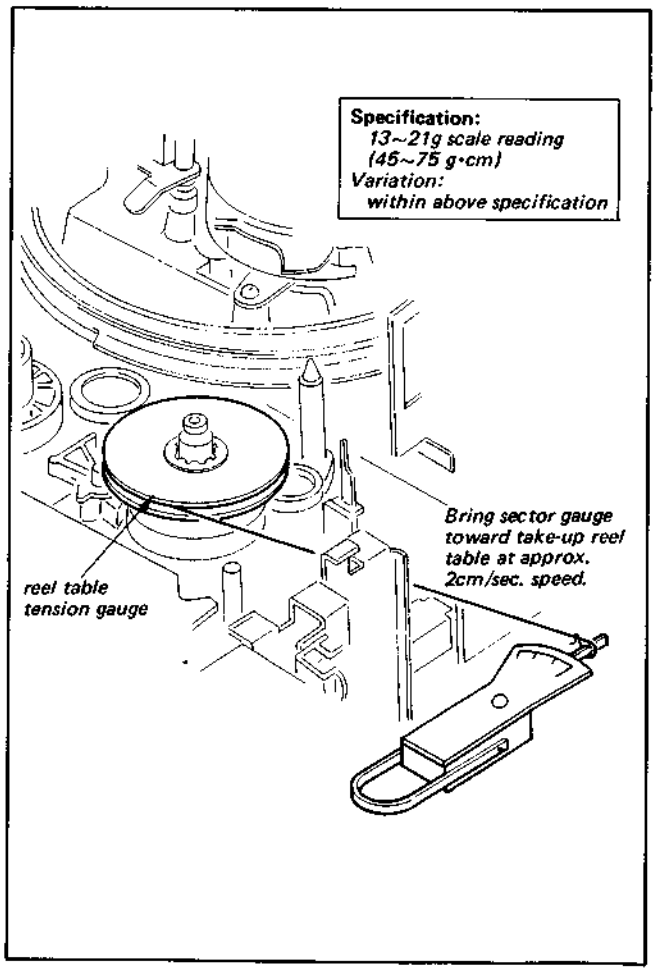


Fig. 3-40. Check of cassette eject torque

3-17. CHECK OF BRAKE TORQUE

- This machine has the supply brake, take-up brake, soft brake, and pause brake to stop the taking-up of the tape in the PAUSE mode. These brakes operate as follows.

Reel table ass'y / Mode	Supply side	Take-up side
Cassette EJECT mode	Supply and soft brakes are ON.	Only take-up brake is ON.
Threading mode	Only soft brake is ON. (It is normal that the supply reel rotates a little, supplying tape.) Soft brake torque; 15 to 30 g.cm. Reel table rotational direction is CW (↻).	Free (Tape is supplied from take-up side.)
STOP mode	Supply and soft brakes are ON. Reel table rotational direction CW (↻): 100 to 500g.cm Reel table rotational direction CCW (↺): 40 to 130g.cm	Only main brake is ON. Reel table rotational direction CW (↻): 20 to 60g.cm Reel table rotational direction CCW (↺): 60 to 500g.cm
FF mode	Only soft brake is ON.	Free (Tape is taken up to take-up side.)
REW mode	Free	Free
PLAY mode	Only FWD back tension brake band is ON.	Free (Tape is taken up to take-up side.)
REC PAUSE mode & PLAY PAUSE mode	FWD back tension brake is ON.	Take-up and pause brakes are ON.
Unthreading mode	Only soft brake is ON. (It is normal that supply reel rotates a little, supplying tape.)	Free (Tape is taken up to take-up side.)

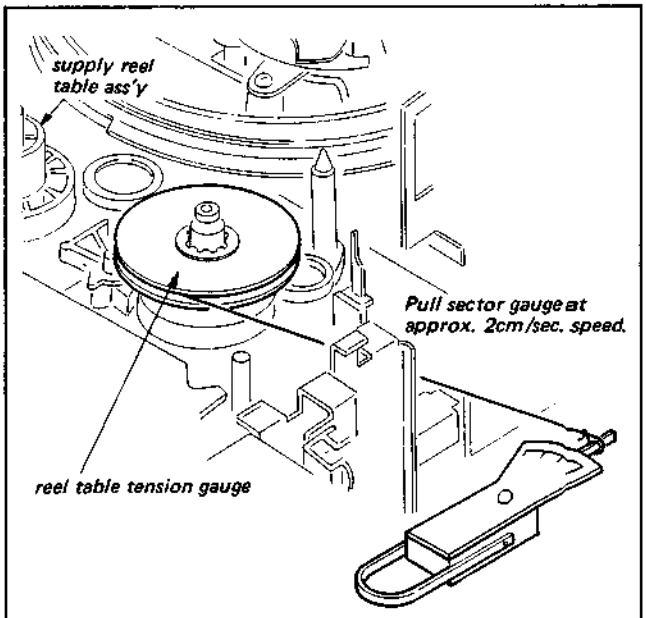
3-17-1. Check of Supply and Take-up Brake Operations

- When the tape slackens in when the mode is changed to STOP from PLAY and to STOP from REWIND, perform the check and adjustment, following the steps below.
- Since the slackness tends to occur when a wound diameter of the tape on a reel table is small, the check must be made in such a state.

1. Insert the cassette and set up the initial state of taking-up of the tape. (Rewind the tape and cue its beginning.)
2. Repeat the operation, changing the mode from PLAY to STOP two or three times and confirm that there is no tape slackness. If the tape slackens, perform steps 5 and 6 for adjustment.
3. Set-up the condition where the tape is about to be completely wound on the take-up reel. (Fast forward the tape and stop the tape movement at its end section.)
4. Repeat the operation, changing the mode from REWIND to STOP two or three times and confirm that no tape slackness occurs. If the tape slackens, perform Steps 5 and 6 for adjustment.
5. Remove the reel table assembly and clean the surface of the reel table assembly and the brake shoe with a piece of cloth dampened with isopropyl alcohol.
6. Clean the brake lining of the S and T brake with a piece of cloth dampened with isopropyl alcohol. If the tape still slacks even if the brake lining clean, replace them and perform the check again.

3-17-2. Check of Supply and Take-up Brake Torque

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) to the take-up reel table as shown in Fig. 3-41 and hook the sector type gauge (100g full scale, Tool Kit Ref. No. J-8) to the end of the string. Pull the sector type gauge at a speed of approx. 2 cm/sec. and read the gauge value.



Note: This figure shows the take-up torque check. For supply brake torque check, set reel table tension gauge on supply reel table.

Fig. 3-41. Check of supply and take-up brake torque

Specification

- When supply reel table ass'y rotates CW (↻): 100 to 500g.cm (Scale value is 29 to 143g.)
- When supply reel table ass'y rotates CCW (↺): 40 to 130g.cm (Scale value is 11 to 37g.)
- When take-up reel table ass'y rotates CW (↻): 20 to 60g.cm (Scale value is 6 to 17g.)
- When take-up reel table ass'y rotates CCW (↺): 60 to 500g.cm (Scale value is 17 to 143g.)

3-17-3. Check and Adjustment of Soft Brake Torque

1. Push the cassette detector lever by hand and release the lever during the threading. (In this condition, the supply and take-up brakes are released.)
2. Mount the reel table tension gauge (Tool Kit Ref. No. J-5) on the supply reel table as shown in Fig. 3-42 and hook the sector type guage (50g full scale, Tool Kit Ref. No. J-7) to the end of the string of the tension gauge.
3. Pull the sector type gauge at a speed of approx. 2cm/sec. and confirm that the gauge reading is within the specification. If the specification is not satisfied, change the position where the spring is hooked onto the soft brake and the F slide plate for adjustment and perform Steps 2 and 3.

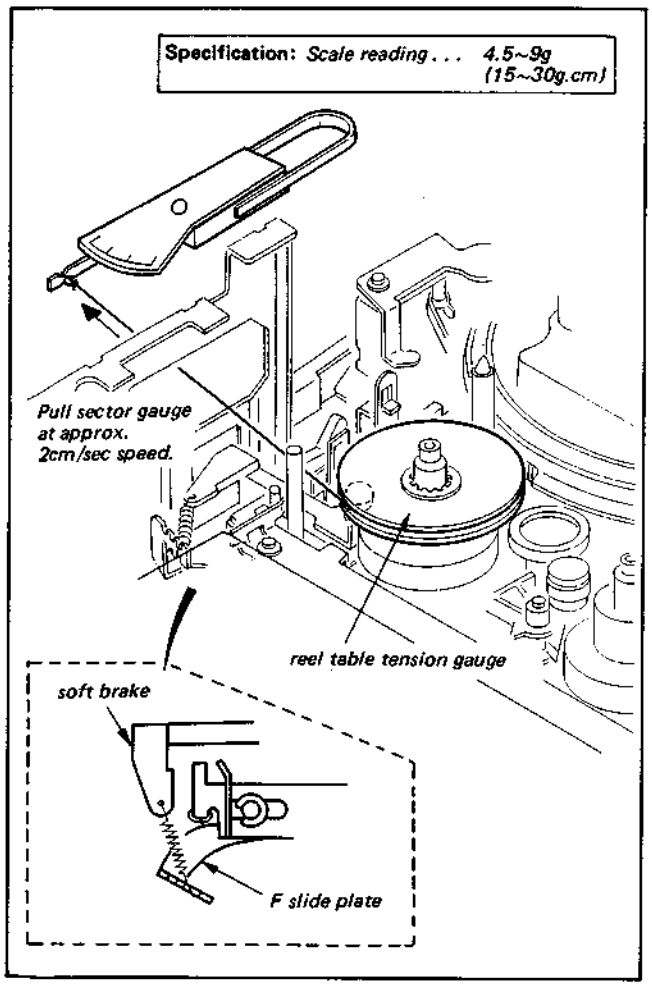


Fig. 3-42. Check of soft brake torque

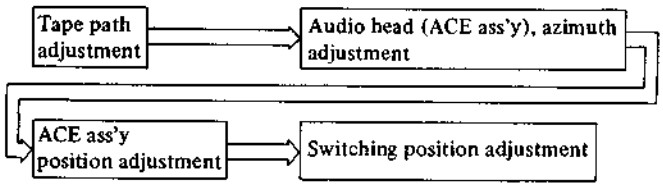
3-18. ADJUSTMENT OF FWD BACK TENSION

- The ideal measurement of the FWD back tension is to measure it under the same conditions as during the actual tape running state. The simple measurement procedure of the FWD back tension is described here. The measurement error due to the different measurement procedure is corrected in the specification.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Place the FWD back tension jig (Tool Kit Ref. No. J-6) on the supply reel table assembly and thread the tape as shown in Fig. 3-43. Hook the sector type gauge (100g full scale, Tool Kit Ref. No. J-8) to the end of the tape.
3. Set up the PLAY mode.
4. Pull the sector type gauge at a speed of approx. 2cm/sec. and confirm that the gauge reading is within the specification. If not, perform Steps 5 and 6.
5. Loosen the screw mounting the BT adjusting plate and move the BT adjusting plate in the direction shown by the arrow for the adjustment.
6. Repeat Steps 2 to 4 again.

3-19. ADJUSTMENT OF TRACKING

- Sequence of tracking adjustment



[Preparation]

1. Fixtures and Tools Required:
   Alignment tape (KR5-1H)
   Dual trace oscilloscope
   Inspection mirror
   Methanol or Isopropyl Alcohol
   Chamois
   3 mm flat tip screwdriver
2. Oscilloscope connection

RF envelope waveform:	TP2005	RF-2 board
External trigger:	TP2003	RF-2 board
AUDIO OUT:	TP3406	AS-3 board
VIDEO OUT:	TP1017	YC-6 board
Switching waveform:	TP2003	RF-2 board

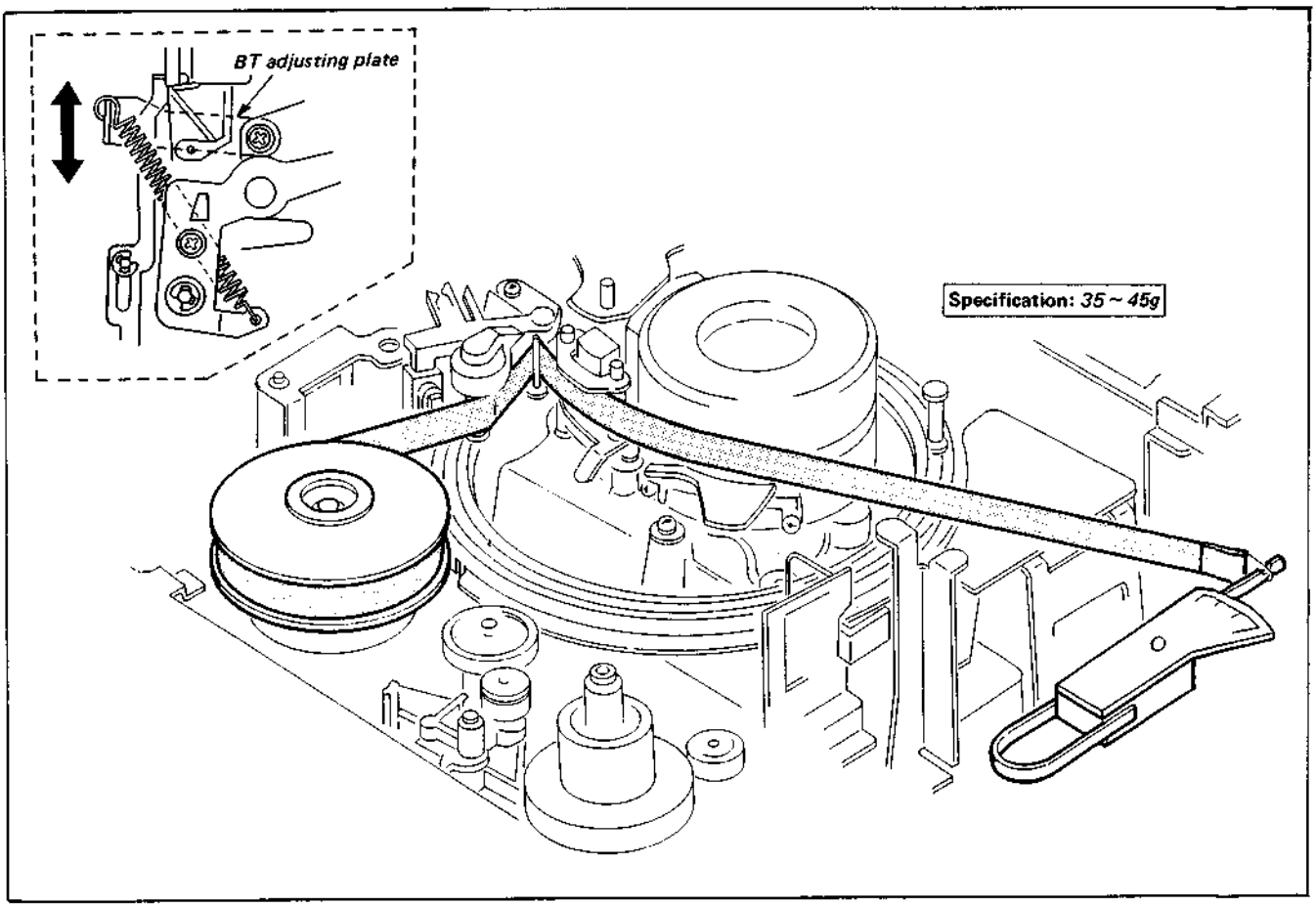


Fig. 3-43. Adjustment of FWD back tension

4. Location of circuit boards

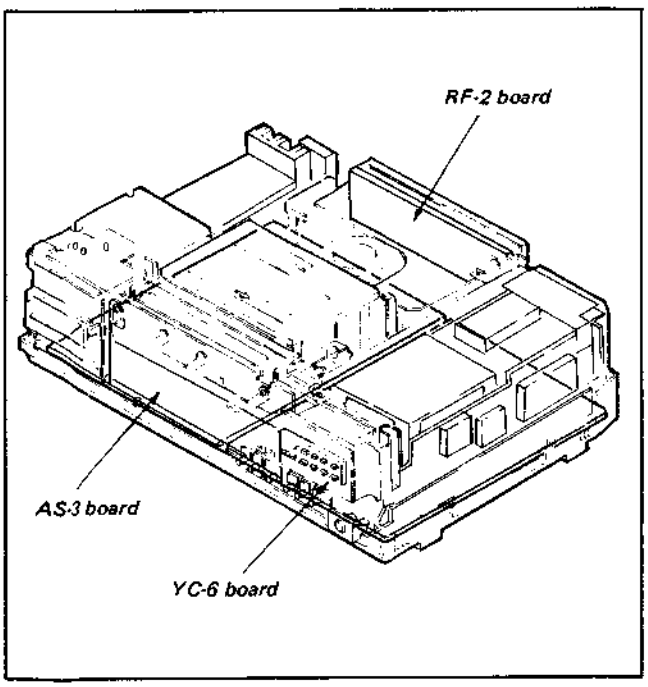


Fig. 3-44. Location of circuit boards

5. Location tape guides

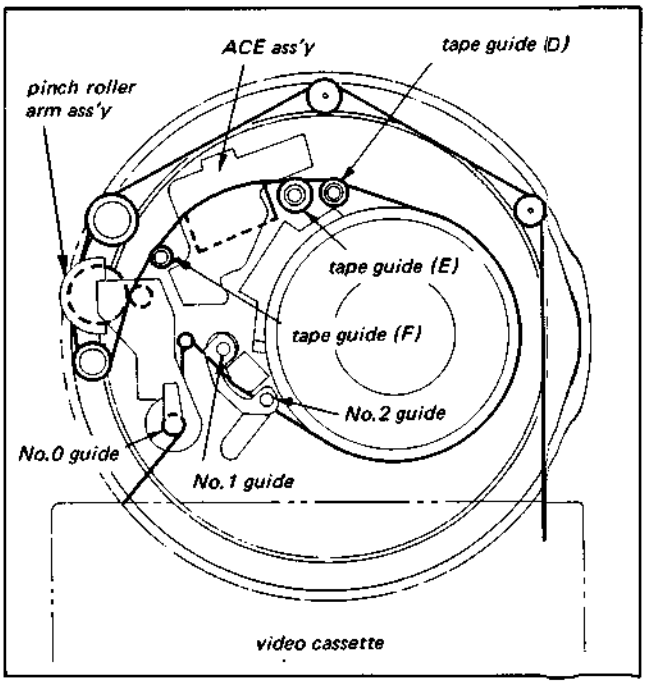


Fig. 3-45. Location of tape guides

3-19-1. Adjustment of Tape Path

- Perform this adjustment carefully because poor adjustment reduces tape interchangeability and picture quality.

1. Clean the tape movement faces (the tape guide, drum, capstan and pinch roller) with chamois dampened with methanol or isopropyl alcohol.
2. Connect the oscilloscope to TP-2005 on the RF-2 board and the external trigger to TP-2003.
3. Play back the 1 MHz segment of the alignment tape (KR5-1H).
4. Confirm that the RF output waveform envelope on the oscilloscope screen increases and decreases, while remaining flat, when the TRACKING control knob is turned to the left and the right from its center detent position. If the RF waveform does not increase and decrease while remaining flat, perform Step 6 for the adjustment.

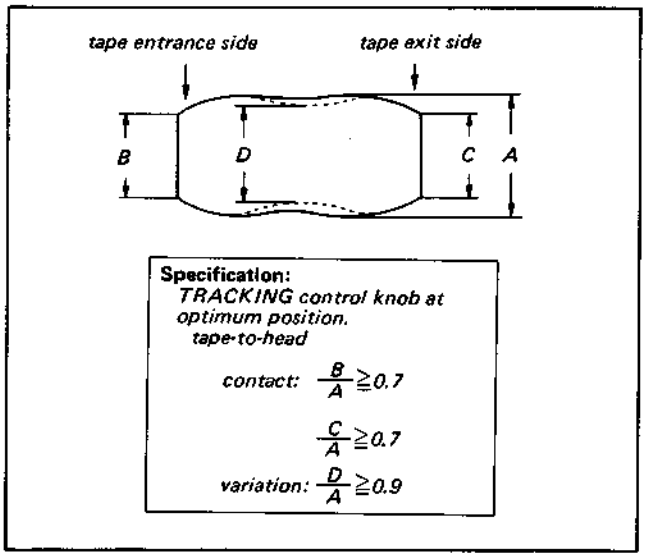


Fig. 3-46. Adjustment of tape path

5. Confirm that the fluctuation and the tape-to-head contact satisfy the specification shown in Fig. 3-46. If they do not, perform Step 6 for the adjustment.

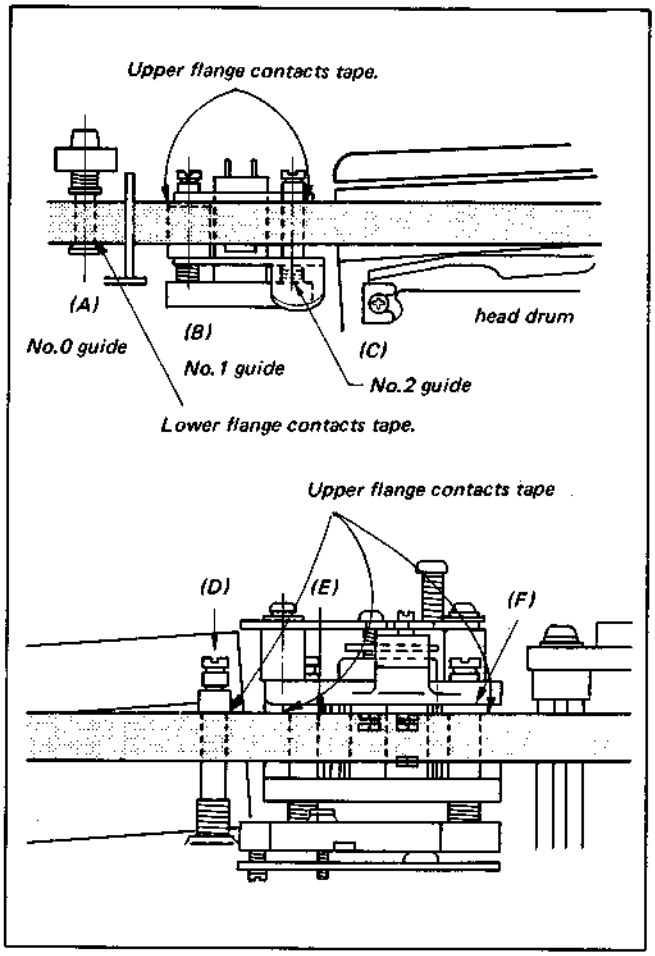


Fig. 3-48. Adjustment of tape path

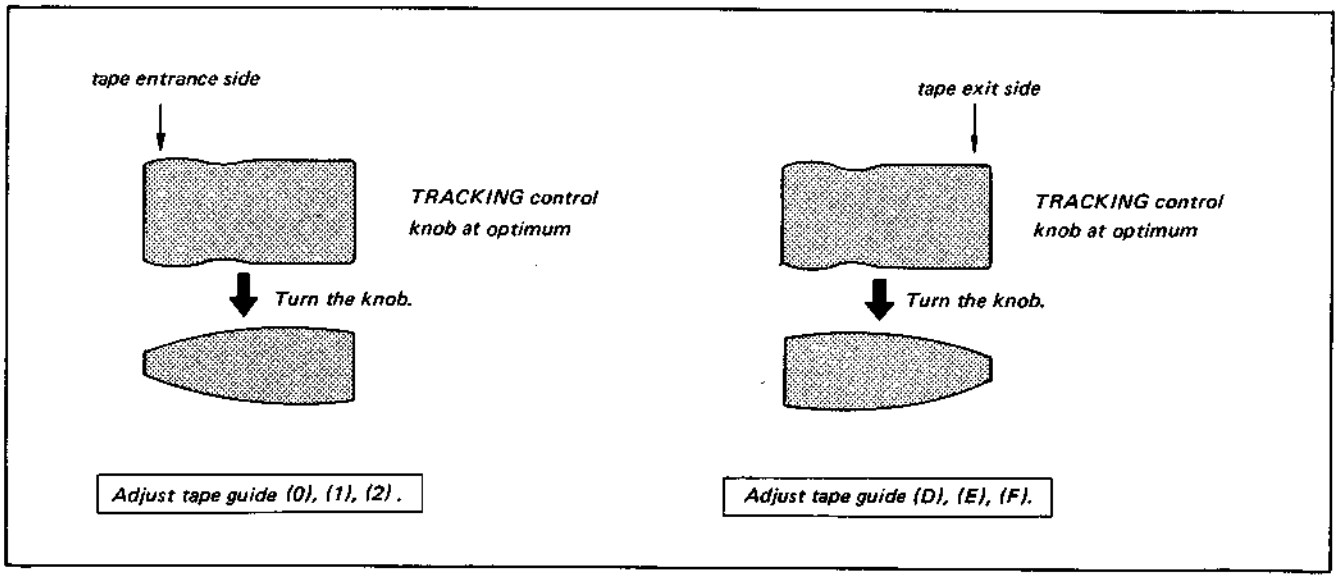


Fig. 3-47. Adjustment of tape path

6. When the waveform at the tape entrance side is not flat as shown in Fig. 3-47 for the clockwise and counterclockwise turning of the TRACKING control knob from center, detent position, adjust the heights of tape guides (0), (1), and (2). When the waveform at the tape exit side is not flat, adjust the heights of tape guides (D), (E), and (F). The height adjustment must be performed so that the tape contacts the drum heads, and there is a minimum curl (not more than 2 mm) at the flange of each tape guide, the upper or lower flanges contact the tape as shown in Fig. 3-48, and the RF waveform is flat.

Note: The construction of the ACE assembly enables the assembly to be adjusted so that its top plate is perpendicular to the face of the moving tape as a whole, but this "Zenith" adjustment is not necessary except after ACE assembly replacement.
Since tape guide (D) regulates the movement of the tape around the drum exit, raise tape guide (D) about 0.5 mm before the adjustment of the tape path on the exit side. Then lower tape guide (D) to the point immediately before the RF waveform varies, and with less than 2 mm curl after the tape path adjustment.

3-19-2. Adjustment of Exit Side Tracking after ACE Assembly Replacement

1. The ACE assembly can be removed if the three screws shown in Fig. 3-49 are removed.

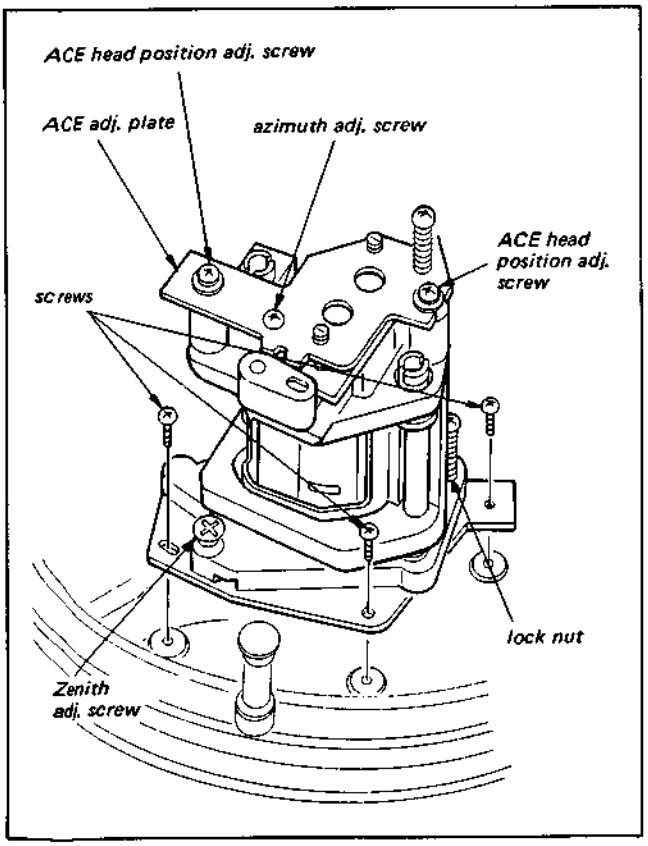


Fig. 3-49. Removal of ACE assembly

2. Perform the adjustment following Step 3 after the completion of the replacement.
3. Raise the tape guide (D) shown in Fig. 3-48 by 0.5 mm. (Turn the nut one turn.)
4. Play back the 1 MHz segment of the alignment tape (KR5-1H). Confirm that the RF wave output (see Fig. 3-46) satisfies the specification and there is a minimum curl (not more than 2 mm) on the tape edge contacting the tape guide. Confirm that the RF waveform varied from the flat state when the tape guides (E) and (F) are raised and adjust the heights of the tape guides so that the waveform output becomes flat.
5. When the waveform does not vary if the tape guides (E) and (F) are raised in Step 4 or when the waveform does not become flat if the tape guides are lowered, perform the adjustment, following the procedure below.
   (i) Loosen the lock nut shown in Fig. 3-49.
   (ii) Turn the zenith adjusting screw counterclockwise (↺) a little more than 30 degrees and turn it clockwise (↻) until the screw returns to the point 30 degrees counterclockwise from its original point.
   (iii) Perform Step 4 again. If the specification is not satisfied, perform Step 5 again. Since the ACE assembly was adjusted perpendicularly when assembled at the factory, do not turn the zenith adjusting screw more than 60 degrees to the right and left from the original position.
   (iv) After the adjustment, tighten the lock nut until a slight resistance for the tightening is felt and confirm that the specification in Step 4 is satisfied.
6. When there is an edge curl at the tape contacting the tape guide in Step 4, perform the adjustment, following the procedure below.
   (i) Loosen the lock nut shown in Fig. 3-49.
   (ii) Tighten the zenith adjusting screw clockwise only 15 degrees.
   (iii) Perform Step 4 again. If the specification is not satisfied, perform Steps 5 and 6 again, but do not turn the zenith adjusting screw to the right and left more than 60 degrees from its original position.
   (iv) Tighten the lock nut until a slight resistance is felt after the adjustment. Confirm that the specification in Step 4 is satisfied.

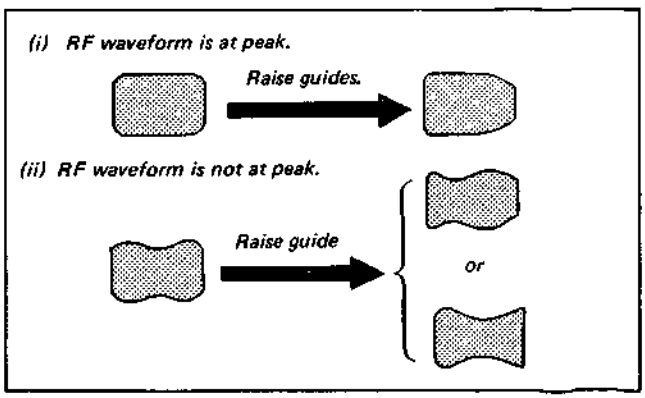


Fig. 3-50. Adjustment of exit side tracking after ACE assembly replacement

3-19-3. Audio Head Azimuth Adjustment

[Connection of Relative Equipment]

The connections of the equipments to the input/output terminals are shown in Fig. 3-51.

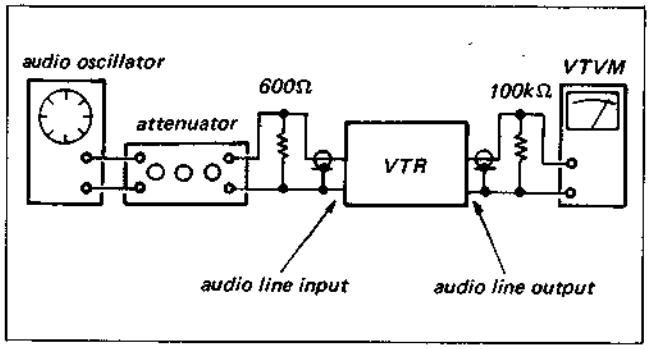


Fig. 3-51. Connections

1. Terminate the audio line output terminal with a 100 kΩ resistor and connect a VTVM.
2. Play back the 5 kHz signal segment of the alignment tape.
3. Adjust the azimuth adjustment screw on the audio head for a maximum VTVM reading. (See Fig. 3-51).

   Note: Loosen azimuth adjustment screw before the adjustment and tighten it after the completion.

3-19-4. Position Adjustment of ACE Assembly

- This adjustment includes the mechanical head mounting position adjustment and the electrical tracking control center adjustment.
- The adjustment sequence is to perform the tracking control center adjustment and then the mechanical adjustment of the head mounting position. If this sequence is reversed, poor tracking occurs.

1. Connect a dual-trace oscilloscope as follows.

   CH-1 . . . . . TP-2005 (RF-2 board)
   CH-2 . . . . . TP-3406 (AS-3 board)
   Ext trigger . . . . . TP-2003 (RF-2 board)

2. Play back the 1 MHz segment of alignment tape KR5-1H. (See Fig. 3-52).
3. Set the tracking control to the center, detent, position and confirm that the output waveform level is maximum and the 0 level point of the audio signal appears at the Bch waveform point as shown in Fig. 3-52. If the specification is not satisfied, perform the following Step 4.

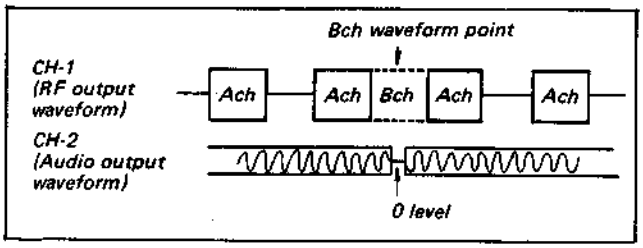


Fig. 3-52. Position adjustment of ACE assembly (1)

4. Perform the tracking control center adjustment. [Refer to section 4-3-2(2)].
5. Set the TRACKING control knob to its center detent point and play back the 1 MHz segment of the alignment tape (KR5-1H).
6. Loosen the two position adjusting screws of the ACE head and adjust the cut-out section of section A for maximum RF output waveform and a 0 level of audio signal at the Bch waveform point. (See Fig. 3-52.)

   Note: Perform the adjustment so that the center of the cut-out section of the A section will almost match the center of the round hole.

7. Play back the 1 MHz segment of the alignment tape and confirm the proper picture appearance.
8. Tighten the position adjusting screw of the ACE head.

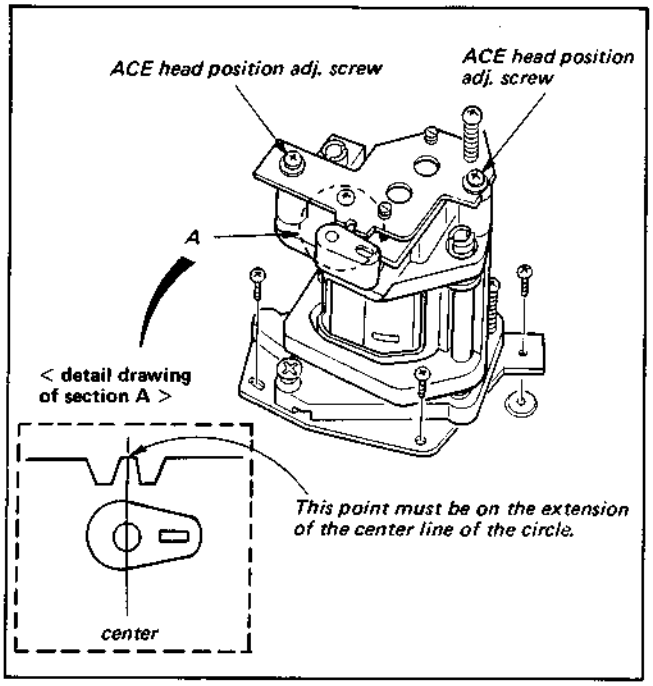


Fig. 3-53. Position adjustment of ACE assembly (2)

3-19-5. Video Head Dihedral Adjustment

- Generally this adjustment is not necessary except after the video head disk replacement.

  Note: The dihedron of a video head disk for replacement purposes was adjusted precisely with a microscope at the factory and the readjustment is usually not necessary.

- The ACE assembly position adjustment has been completed prior to this dihedral adjustment.
- The judgment of the video head dihedron must be performed in the condition that the monoscope signal segment of the alignment tape (KR5-1H) is played back and the TRACKING control knob is set to the center detent position. (See Fig. 3-54.)

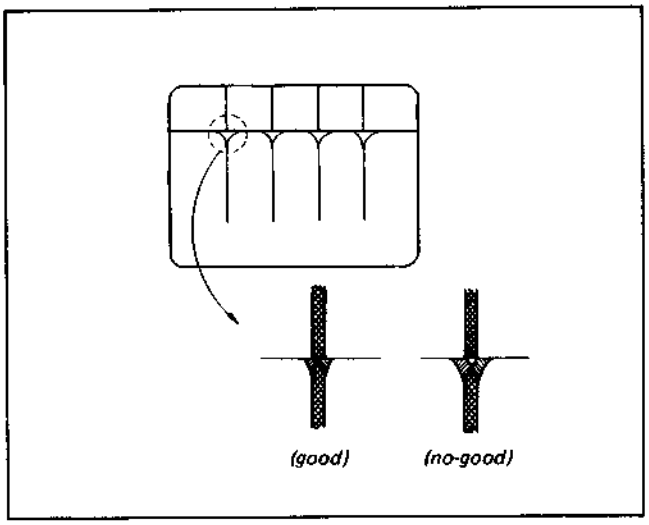


Fig. 3-54.

- When the dihedron is no-good, the preparation of the video head dihedral adjustment is to install two dihedral adjusting screws in the holes close to the small mark (•) shown in Fig. 3-55 and tighten them until the screw heads are level with the top surface of the video head disk. (If the screws are not tightened until their heads become level with the surface, the upper drum of the video head disk is caught by the adjusting screw heads and the video head disk cannot rotate. If the screws are tightened excessively, the head base is moved and the dihedral distortion becomes larger.)

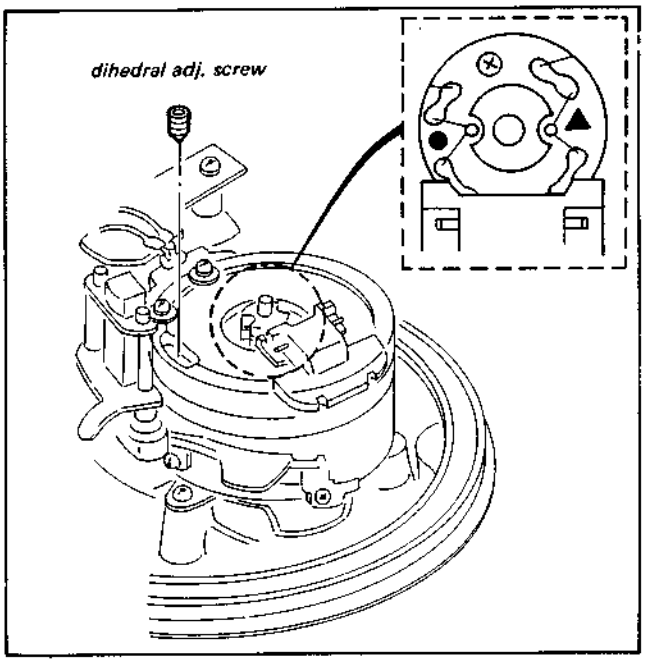


Fig. 3-55.

When the dihedron is no-good;

(1) When the split becomes small for the clockwise turn of the TRACKING control knob, the B head shifts by C in the arrow direction as shown in Fig. 3-56 and is tracing the magnetic pattern on the tape. The adjusting screw in adjustment hole **E** shown in the figure must be tightened further to shift the B head in the left direction until the good dihedron shown in Fig. 3-54 is obtained.
Set the TRACKING control knob to the center detent point.

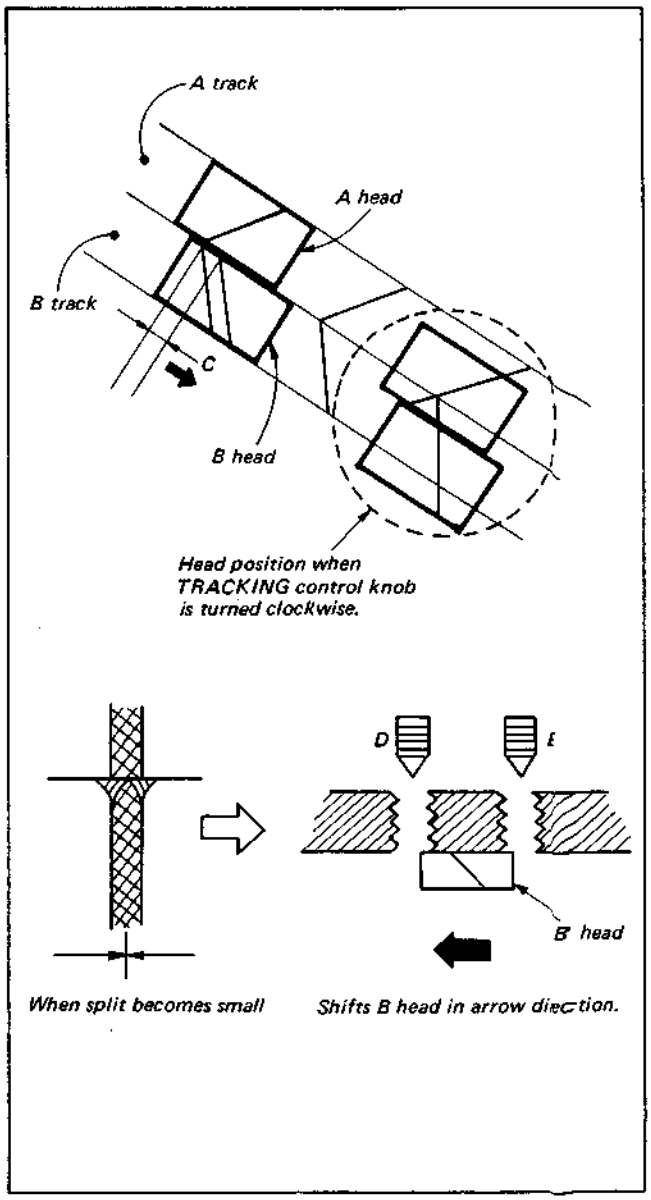


Fig. 3-56.

(2) When the split becomes large for the clockwise turn of the TRACKING control knob, the B head shifts by C in the arrow direction as shown in Fig. 3-57 and is tracing the magnetic pattern. The adjusting screw in adjustment hole D shown in the figure, must be tightened further to shift the B head in the right direction until the good dihedron shown in Fig. 3-54 is obtained.
Set the TRACKING control knob to the center detent point.

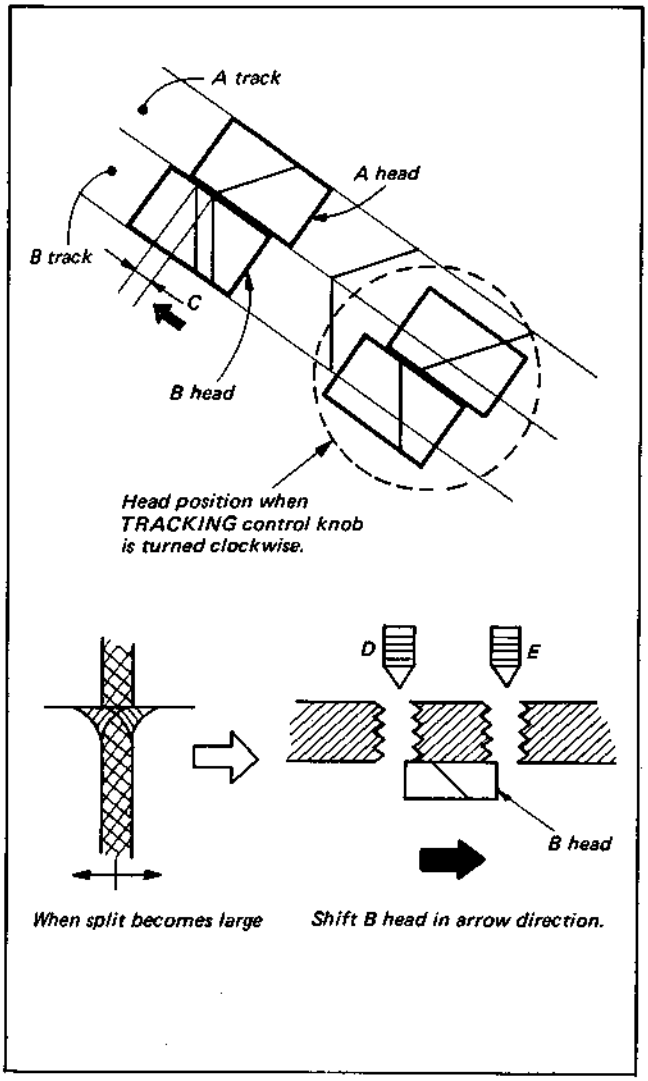


Fig. 3-57.

(3) Remove the adjusting screws after the completion of the adjustment and check the dihedron again.

SECTION 4
ELECTRICAL ALIGNMENT

All the electrical alignment can be performed by using the equipment mentioned below, the alignment tape, and the PAL colour bar signal (100%).

[Equipment Required]

(1) Colour Monitor TV

(2) Oscilloscope, Dual-trace, Bandwidth . . . more than 10 MHz with delay mode

(3) Frequency Counter

(4) PAL Colour-Bar Generator

(5) Digital voltmeter

(6) VOM (20 KΩ/V)

(7) Audio Signal Generator

(8) Vectorscope

(9) Attenuator

(10) Alignment Tape, type: KR5-1H, Code No. 8-969-995-91

(11) Alignment Tool (Adjusting screwdriver for semi-fixed resistors and coils)
Jig No. SL-0001, Code No. J-6080-001-A

[Setup for Alignment]

The antenna should be connected correctly to the antenna input terminal of the videocassette recorder.

It is important that the video output signal satisfies the specification because the telecast signal received by the incorporated tuner of the videocassette recorder is utilized as the adjustment signal of the machine. The incorporated tuner should be set to the channel with the best reception. The video signal should be checked with an oscilloscope connected to TP-15 on the YC-6 board. Verify that the sync signal amplitude is approx. 0.3 Vp-p and the video signal amplitude is approx. 0.7 Vp-p at peak. Adjust the fine tuning while observing the signal and the TV screen so that the burst signal amplitude becomes approx. 0.3 V ± 0.1 Vp-p. Also confirm that there is no spikes observed at the sync signal portion. (See Fig. 4-1.)

The video (colour bar) signal for the alignment is shown in Fig. 4-1.

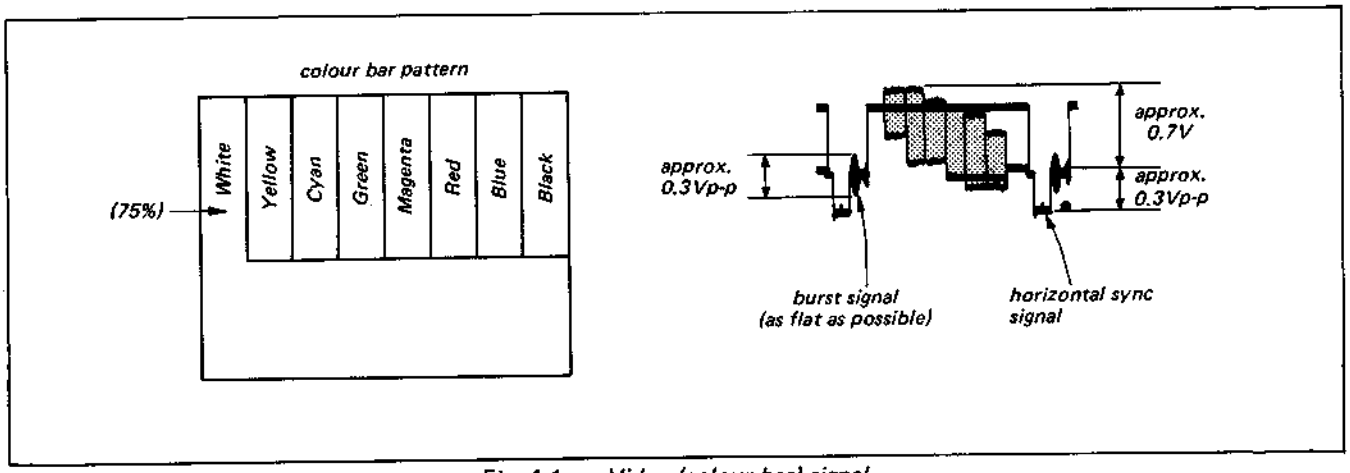


Fig. 4-1. Video (colour bar) signal

[Alignment Tape]

KR5-1H

	Video signal	Audio signal	Playing time	Use for
1.	Colour bars	3 kHz – 5 dB	5 min	General performance, tape speed checks, switching position adjustment.
2.	Monoscope	333 Hz – 25 dB	5 min	Video head dihedral, audio level adjustment.
3.	RF sweep	5 kHz – 25 dB	5 min	Video, audio frequency characteristics, audio azimuth adjustment marker: 1, 2, 3.58, 4.5, 5.2 MHz
4.	Tracking 1 MHz (CH-B) *1 (Channel B is inserted in every 3 frames.)	1 kHz – 5 dB *2 (Signal is dropped out in the positions where channel B is inserted.)	5 min	Tracking, Audio height adjustment, CTL Position check (Check if *1 and *2 are the same position.)

[Alignment Tool for Semi-fixed Variable Resistors and Coils]

Semi-fixed variable resistors and inductances should be adjusted with the alignment tool exclusively prepared for the adjustment of the components. A common screwdriver is too large for adjusting the components from the conductor side of a printed circuit board.

The metal blade of the alignment tool is used for variable resistors and trimmer capacitors and the plastic tip is used for variable inductances.

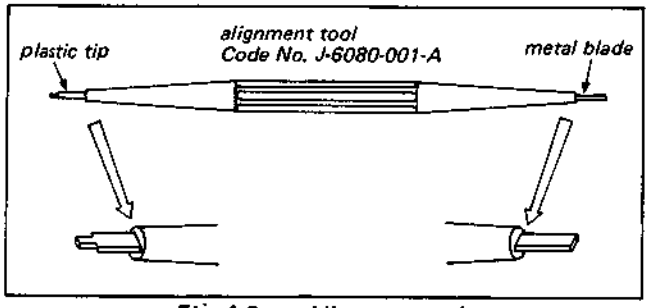


Fig. 4-2. Alignment tool

[Required Levels and Impedances of Input and Output]

VIDEO

Input ..... VIDEO IN: BNC connector
1.0 Vp-p, 75 ohms
unbalnced, sync negative

Output ..... VIDEO OUT: BNC connector
1.0 Vp-p, 75 ohms
unbalanced, sync negative

AUDIO

Input ..... AUDIO IN: Phono connector, 47 kohms, −10 dBs
MIC: mini jack, −60 dBs, suitable for microphone with 600-ohm impedance

Output ..... AUDIO OUT: Phono connector, Less than 10 kohms, −5 dBs (47 kohm load), unbalanced

[Colour Bar Signal]

The 100% colour bar signal recorded on the Alignment tape is shown in Fig. 4-3.

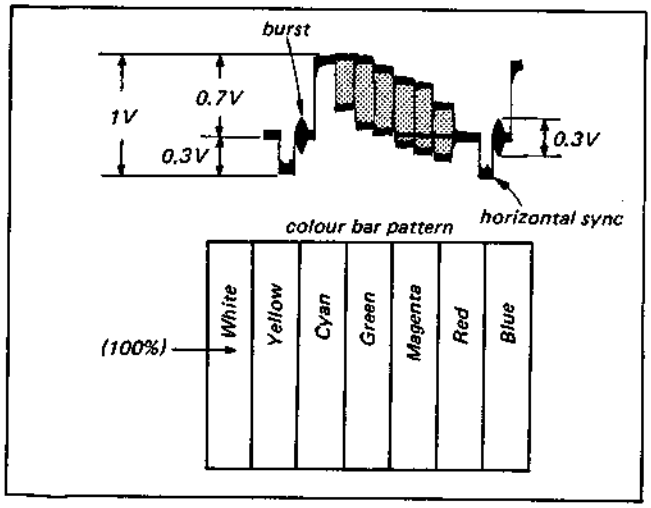
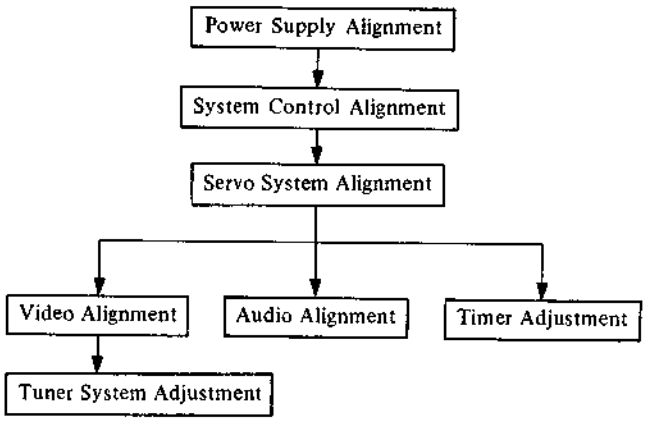


Fig. 4-3. Colour bar signal recorded on the alignment tape

[Alignment Sequence]

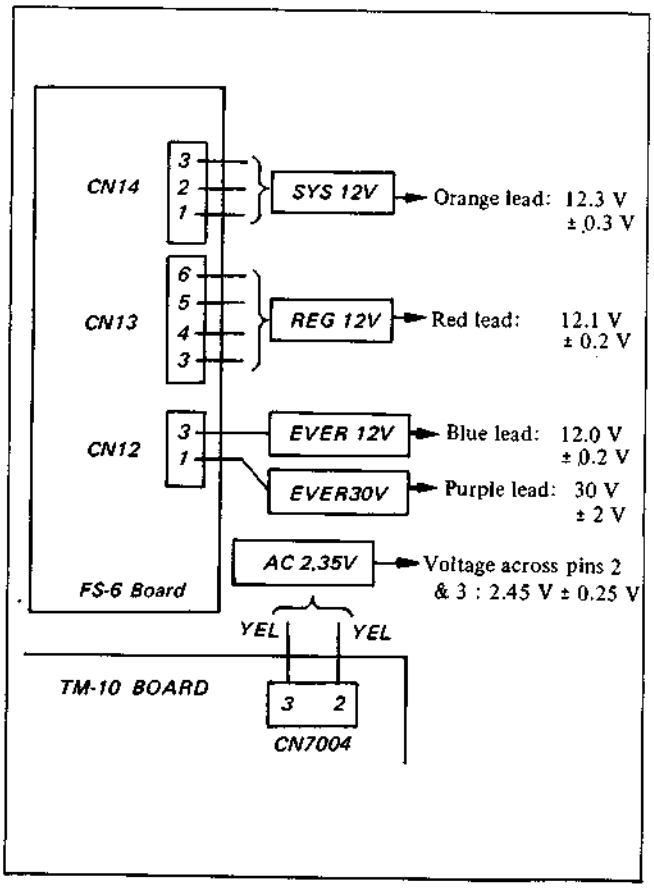
The alignment should be performed following the sequence below.



4-1. POWER SUPPLY ALIGNMENT AND CHECK

1. Output Voltage Check (FS-6 board)

Note: Set up the E-E mode.



2. REG 12 V Adjustment (Switching Regulator)

(1) Remove the upper case of the switching regulator.

Note: Connect the connector and the earth line (black) as they were.

(2) Set up the E-E mode.

(3) Connect the VOM to pin 2 (REG 12 V) of CN13 on the FS-6 board.

(4) Adjust RV201 for 12.1 V ± 0.2 Vdc.

3. SYS 12 V Adjustment (Switching Regulator)

(1) Remove the upper case of the switching regulator.

Note: Connect the connector and the earth line (black) as they were.

(2) Set up the E-E mode.

(3) Connect the VOM to pin 1 (Sys 12 V) of CN14 on the FS-6 board.

(4) Adjust RV202 for 12.3 V ±0.3 Vdc.

4-2. SYSTEM CONTROL ALIGNMENT AND CHECK (SY-10 & SY-11 board)

1. Clock Oscillating Frequency Adjustment (SY-10 board)

(1) Connect the frequency counter to pin 42 of IC502.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T501 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

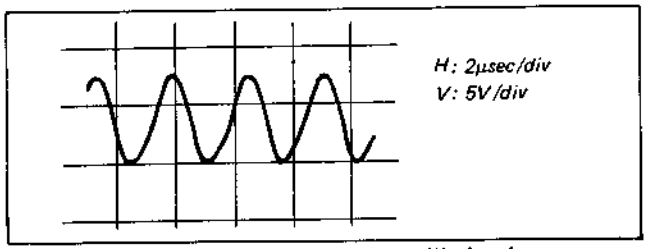


Fig. 4-2-1. Adjustment of clock oscillating frequency

2. Clock Oscillating Frequency Adjustment (SY-11 board)

(1) Connect the frequency counter to pin 43 of IC06.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T1 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

3. Clock Oscillating Frequency Adjustment (SY-11 board)

(1) Connect the frequency counter to pin 42 of IC07.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T2 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

4. Threading Check

(1) Load a cassette.

(2) Check that the threading is performed.
Threading time: about 3 seconds

5. Unthreading Check

(1) Press the EJECT button.

(2) Check that the unthreading is performed as soon as the EJECT lamp turns on, the lamp turns off after the completion of the unthreading, and the cassette lift assembly rises.
Unthreading time: about 4 seconds

6. Auto-Rewind Check

(1) Check that the auto-rewind is done automatically so that the tape is rewound at the tape end in the F.FWD, REC, PB, or CUE mode after the end alarm sounds 10 seconds if the END ALARM switch is in the on position.

4-3. SERVO SYSTEM ALIGNMENT

4-3-1. Drum Servo System Adjustment

1. Drum Free Speed Adjustment (AS-3 board)

(1) Set up the REC mode.
(2) Connect the oscilloscope as follows.

CH-1 . . . . . pin 1 of IC1
CH-2 . . . . . pin 7 of IC1

(3) Confirm that the waveform locks as shown in Fig. 4-3-1.

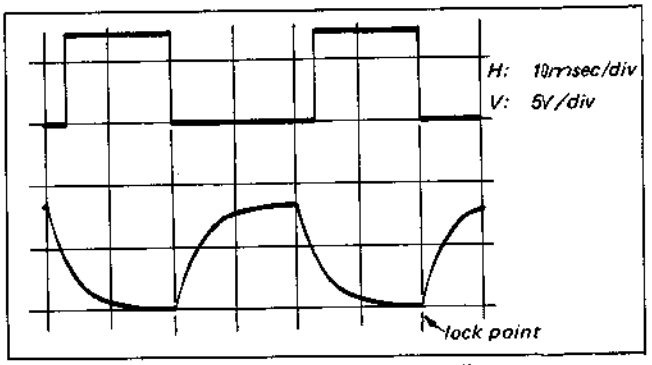


Fig. 4-3-1. Drum free speed adjustment

(4) Connect the CH-1 probe of the oscilloscope to TP2 (pin 10 of IC1).

Input range: DC

(5) Adjust RV10 for 5.2 V ± 0.3 V. (See Fig 4-3-2.)

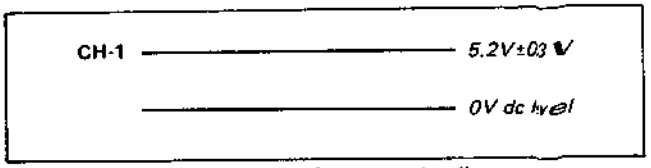


Fig. 4-3-2. Drum free speed adjustment

2. RF Switching Position Adjustment (YC-6, RF-2, & AS-3 boards)

(1) Play back the coulor bar segment of the alignment tape.

(2) Connect the oscilloscope to TP5 on the RF-2 board.

(3) Adjust the TRACKING knob for maximum output. (See Fig. 4-3-3.)

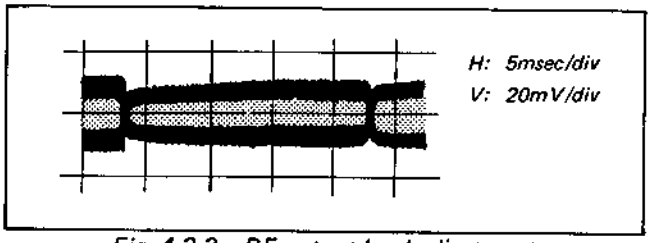


Fig. 4-3-3. RF output level adjustment

(4) Connect the oscilloscope as follows.
CH-1 . . . . . TP1/AS-3 board
CH-2 . . . . . Emitter of Q34/YC-6 board

(5) Adjust RV2 on the AS-3 board so that the phase difference between the falling section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-4.)

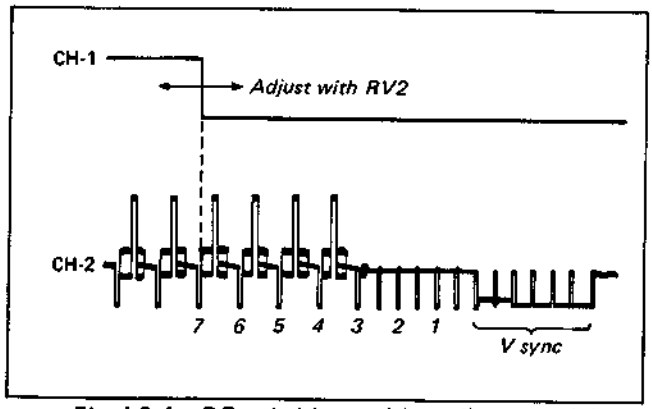


Fig. 4-3-4. RF switching position adjustment (1)

(6) Adjust RV1 on the AS-3 board so that the phase difference between the rising section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-5.)

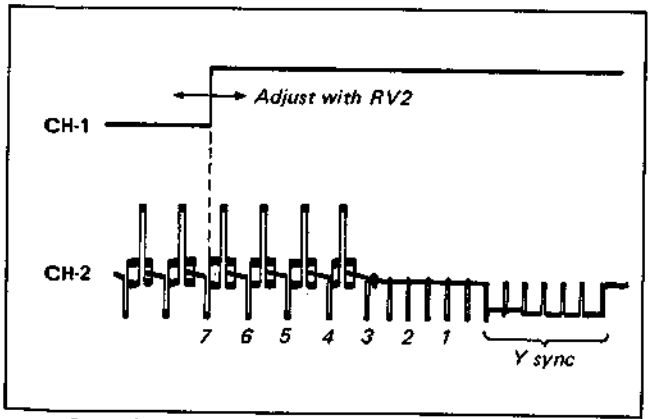


Fig. 4-3-5. RF switching position adjustment (2)

3. Record-Servo Lock Phase Adjustment (YC-6 & AS-3 boards)

(1) Record a video signal.

(2) Connect the oscilloscope as follows.
CH-1 . . . . . TP1/AS-3 board
CH-2 . . . . .,pin 20 of IC1/YC-6 board

(3) Adjust RV3 on the AS-3 board so that the phases of the falling section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-6.)

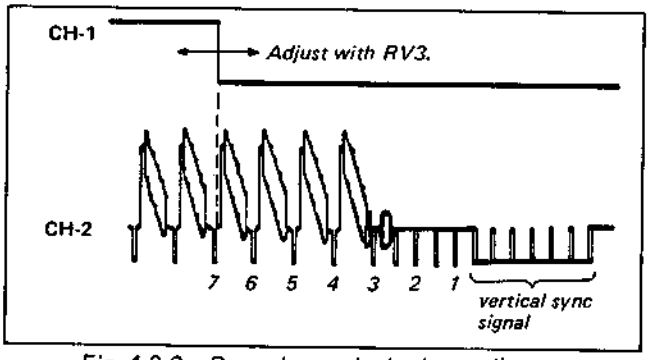


Fig. 4-3-6. Record-servo lock phase adjustment

4. Picture Search (High-Speed Picture) (AS-3 board)

(1) Record a video signal.

(2) Play back the recorded segment.

(3) Connect the oscilloscope to pin 10 of IC5 on the YC-6 board.

(4) Position the positive-going edge of the waveform at the exact center of the oscilloscope scale. (See Fig. 4-3-7.)

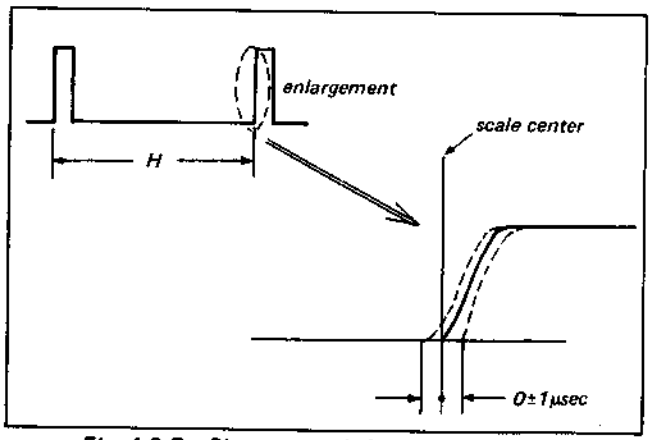


Fig. 4-3-7. Picture search free speed adjustment

(5) Set up the CUE mode.

(6) Adjust RV11 so that the fluctuation of the rising of the waveform is within 0 ± 1 μsec. for the scale center.

(7) Set up the REVIEW mode.

(8) Adjust RV12 so that the fluctuation of the rising of the waveform is within 0 ± 1 μsec. for the scale center.

4-3-2. Capstan Servo System Alignment

1. Capstan Free Speed Adjustment (AS-3 board)

   (1) Play back the colour bar segment of the alignment tape.

   (2) Connect the oscilloscope as follows.
   CH-1 . . . . . pin 19 of IC2
   CH-2 . . . . . pin 20 of IC2

   (3) Adjust RV8 for the phase lock shown in Fig. 4-3-8.)

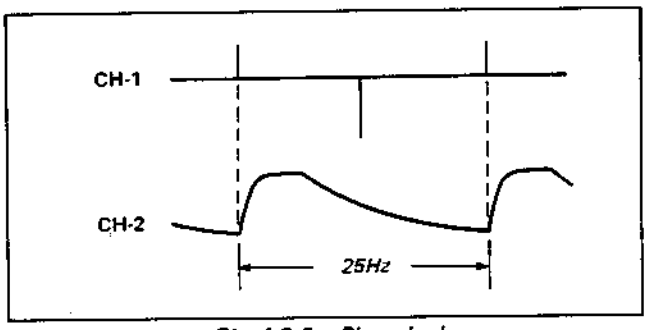


Fig. 4-3-8. Phase lock

   (4) Connect the oscilloscope to TP4.
   Input range: DC range

   (5) Adjust RV8 for 5.5 V ± 0.3 V.

   (6) Play back the coulor bar signal in the TRIPLE speed.

   (7) Adjust RV9 for 5.5 V ± 0.3 V.

2. Tracking Control Center Adjustment (AS-3 board)

   (1) Set the TRACKING knob to the center detent position.

   (2) Play back the colour bar signal segment of the alignment tape.

   (3) Connect the oscilloscope as follows.
   CH-1 . . . . . TP11
   CH-2 . . . . . TP6

   (4) Adjust RV4 so that the phases of the falling sections of the waveforms become the same. (See Fig. 4-3-9.)

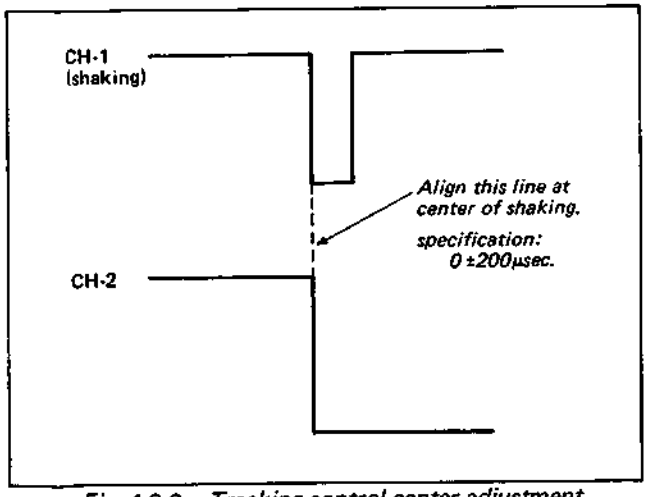


Fig. 4-3-9. Tracking control center adjustment

3. Triple Speed Noise Position Adjustment (AS-3 board)

   (1) Record an optional signal.

   (2) Set the TRACKING knob to the center detent position.

   (3) Play back the recorded segment in the TRIPLE speed.

   (4) Adjust RV5 so that the noise disappears from the monitor TV screen. (See Fig. 4-3-10.)

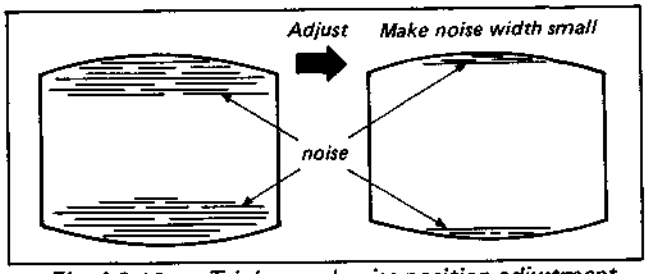


Fig. 4-3-10. Triple speed noise position adjustment

4-3-3. Automatic Frame-by-Frame Feed Circuit Adjustment

1. Frame-by-Frame Speed Adjustment (AS-3 board)

   (1) Set up the FRAME-by-FRAME mode. (Keep pressing the FRAME button.)

   (2) Connect the oscilloscope to the emitter of Q6.

   (3) Adjust RV6 for a pulse width of 18 msec ± 1 msec. (See Fig. 4-3-11.)

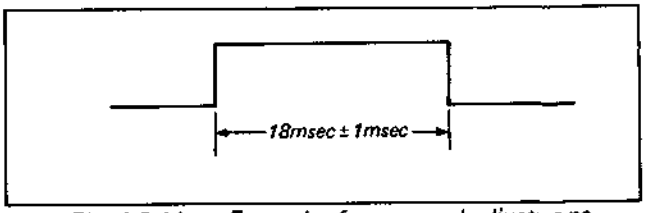


Fig. 4-3-11. Frame-by-frame speed adjustment

2. Frame-by-Frame Noise Position Adjustment (AS-3 board)

   (1) Set up the STILL mode.

   (2) Push the FRAME switch once and remember the position where the noise stops.

   (3) Turn RV7 clockwise or counterclockwie a little and push the FRAME switch again. Confirm the position where the noise stops varies.

   (4) Repeat Step (3) and adjust RV7 for minimum noise viewed on the picture. (See Fig. 4-312.)

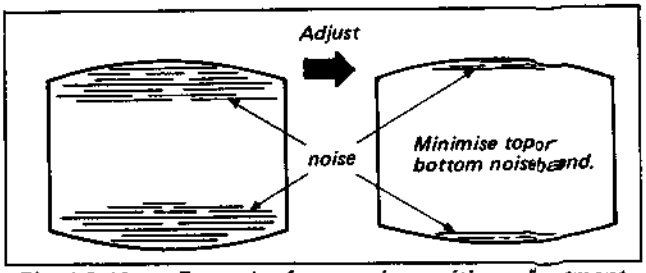


Fig. 4-3-12. Frame-by-frame noise position adjustment

4-4. VIDEO SYSTEM ALIGNMENT (CR-4, YC-6, and RF-2 boards)

The adjustment sequence for each circuit board is shown below. The colour video signal used for the video system alignment should satisfy the specification shown in the [Setup for Alignment].

[CR-4 Board]

1. 1 H Delay Adjustment

   (1) Supply the VTR with the colour bar signal and set up the E-E mode.

   (2) Connect the vectorscope to pin 8 of IC2.

   (3) Adjust the PHASE knob of the vectorscope for matching the burst signal phase. (See Fig. 4-4-1.)

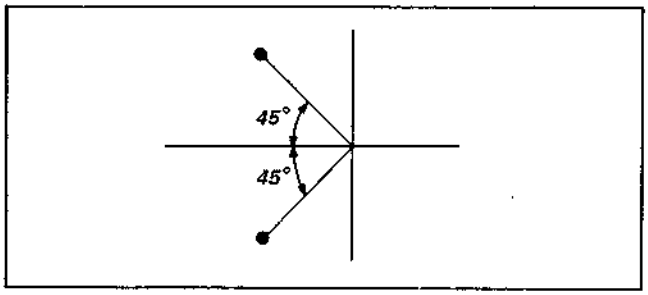


Fig. 4-4-1. Vectorscope adjustment

   (4) Connect the vectorscope pin 9 of IC2.

   (5) Adjust LV1 so that the burst signal phase matches the phase of pin 8 of IC2. (See Fig. 4-4-2.)

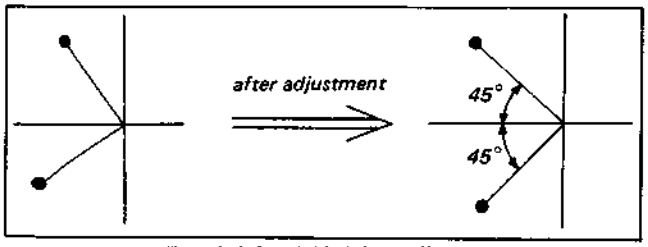


Fig. 4-4-2. 1 H delay adjustment

   (6) Connect the oscilloscope as follows.
   CH-1 . . . . . Pin 8 of IC2
   CH-2 . . . . . Pin 9 of IC2

   (7) Adjust RV2 so that the signal level of the CH-1 is equal to the one of the CH-2. (See Fig. 4-4-3.)

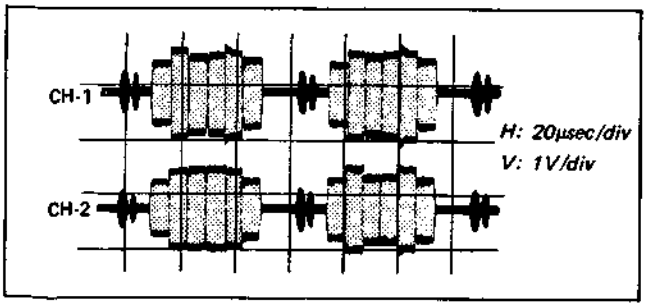


Fig. 4-4-3. Balance adjustment of chroma signal

2. Sub-Burst Adjustment

   (1) Supply the VTR with the colour bar signal and set up the E-E mode.

   (2) Connect the vectorscope to the base of Q21 and adjust the PHASE knob of the vectorscope so that the burst signal comes to the 270° point. (See Fig. 4-4-4.)

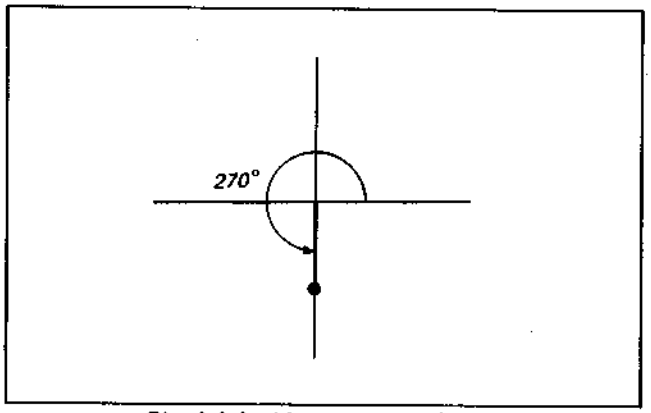


Fig. 4-4-4. Vectorscope adjustment

   (3) Connect the vectorscope to pin 1 of IC5.

   (4) Adjust RV5 so that the advanced phase of the burst signal becomes 225°. (See Fig. 4-4-5.)

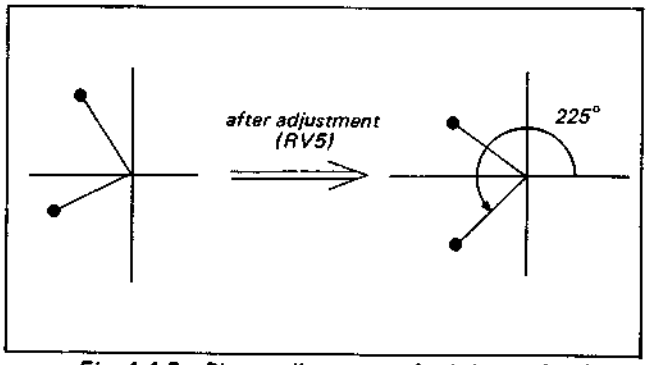


Fig. 4-4-5. Phase adjustment of sub-burst signal

   (5) Connect the oscilloscope to pin 1 of IC5.

   (6) Adjust RV6 so that the average output level is 0.56 V ± 0.02 Vp-p. (See Fig. 4-4-6.)

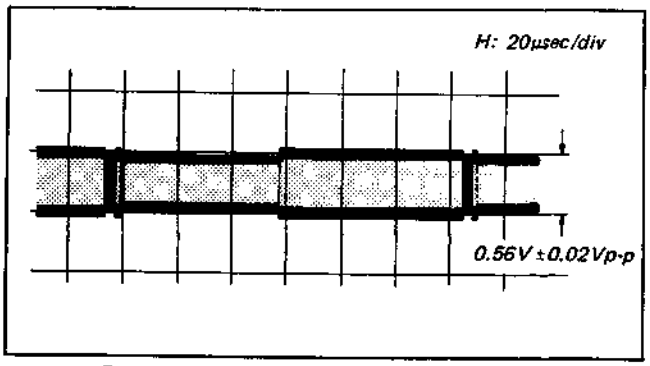


Fig. 4-4-6. Level adjustment of burst signal

3. Burst Gate Adjustment

(1) Connect the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope as follows.
CH-1 . . . . . Base of Q4
CH-2 . . . . . Pin 11 of IC2
Mode . . . . CHOP mode

(3) Adjust RV3 so that the pulse width of the burst gate signal is 4.4 μsec ± 0.2 μsec. (See Fig. 4-4-7.)

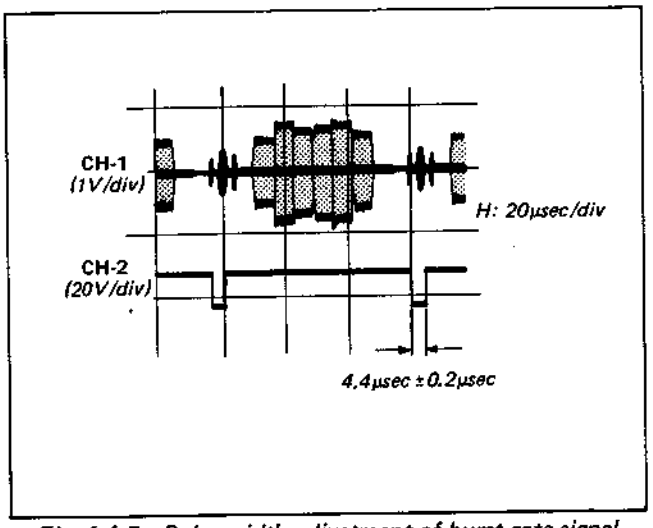


Fig. 4-4-7. Pulse width adjustment of burst gate signal

4. Chroma Level Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP17 (VIDEO OUT) on the YC-6 board.

(3) Adjust RV4 for the equal levels of the sync signal and the burst signal. (See Fig. 4-4-8.)

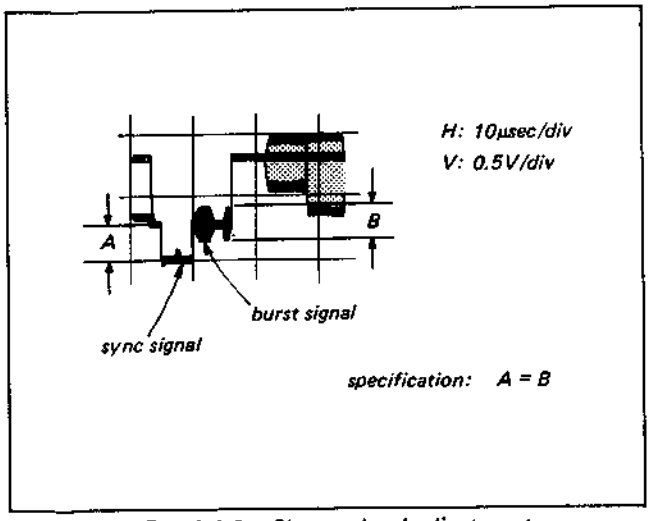


Fig. 4-4-8. Chroma level adjustment

5. Sub-Burst Adjustment

(1) Record the colour bar signal and play back the recorded segment.

(2) Connect the vectorscope to pin 2 of CN1004 on the YC-6 board.

(3) Write down the phase of the burst signal in the playback. (See Fig. 4-4-9.)

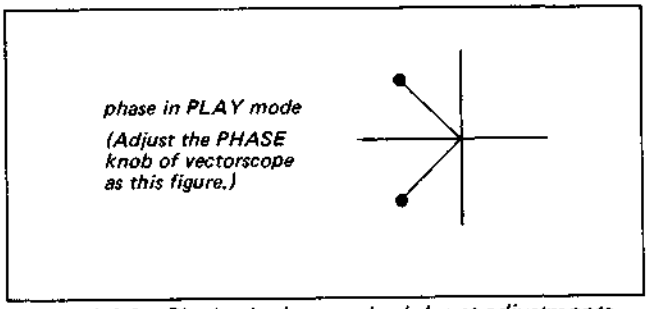


Fig. 4-4-9. Playback phase and sub-burst adjustments

(4) Set up the STILL mode and adjust RV5 so that the burst signal phase matches the phase in the playback written down in Step (3). (See Fig. 4-4-9.)

(5) Connect the oscilloscope to pin 2 of CN1004 on the YC-6 board.

(6) Adjust RV6 for the sub-burst signal level of 0.27 V ± 0.02 Vp-p. (See Fig. 4-4-10.)

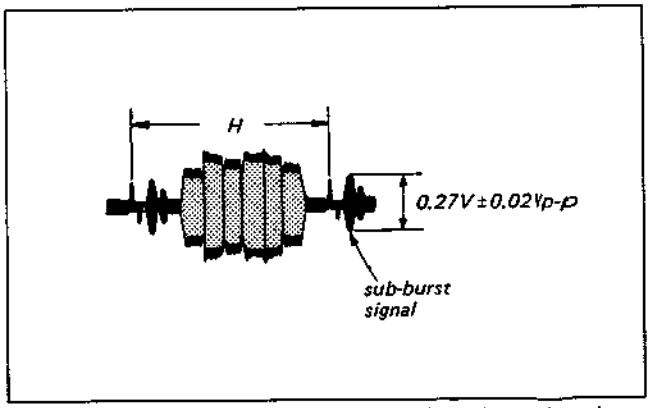


Fig. 4-4-10. Level adjustment of sub-burst signal

[YC-6 Board]

1. SYNC AGC Preset Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Check the following points with the oscilloscope.
IC1 Pin 3 . . . Sync . . . . . Approx. 6 Vp-p
Pin 4 . . . Burst flag . . . . . Approx. 5 Vp-p
Pulse width: Approx. 1 μsec
Pin 5 . . . AGC CONT . . . . . Approx. 1.4 Vdc
Pin 17 . . MONO/COLOUR . . . . Approx. 0 Vdc

(3) Connect the oscilloscope to pin 24 of IC1.

(4) Adjust RV1 for the sync signal level of 300mV ± 12mVp-p. (See Fig. 4-4-11.)

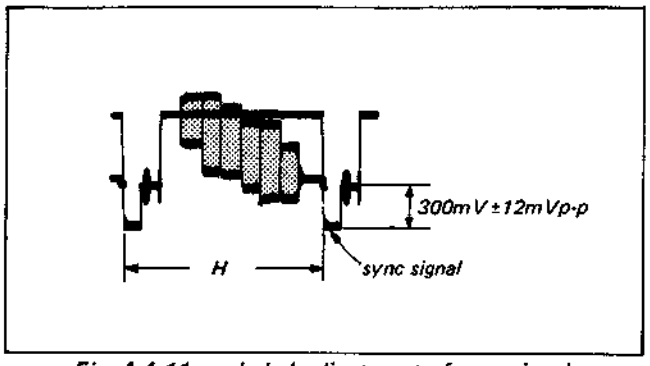


Fig. 4-4-11. Lebel adjustment of sync signal

2. Colour E-E Level Adjustment

(1) Supply the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 22 of IC1.

(3) Adjust RV14 for the sync signal level of 300 mV ± 15 mVp-p. (See Fig. 4-4-12.)

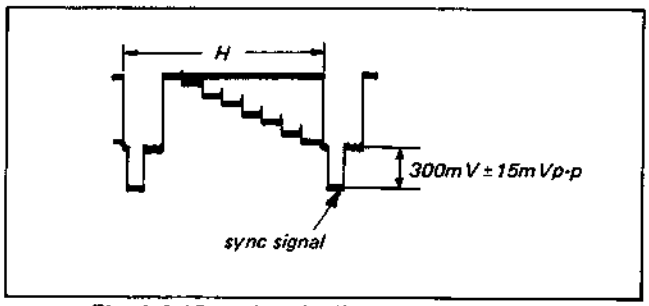


Fig. 4-4-12. Level adjustment of sync signal

3. Peak AGC (E-E Video Output Level) Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 24 of IC1.

(3) Adjust RV1 for maximum output level of the video signal and then adjust RV8 so that the output level of the video signal becomes 1.1 V ± 0.05 Vp-p. (See Fig. 4-4-13.)

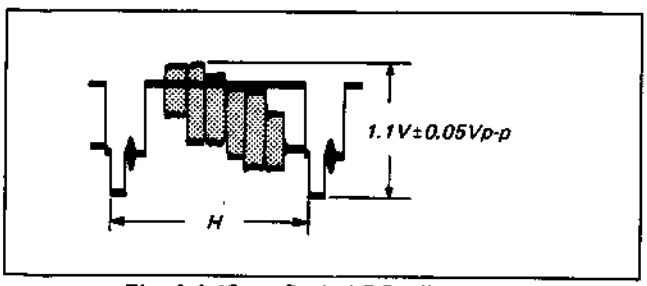


Fig. 4-4-13. Peak AGC adjustment

4. SYNC AGC Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 24 of IC1.

Note: The voltage at pin 17 of IC1 is approximately 0 Vdc

(3) Adjust RV1 so that the sync signal level is 300 mV ± 12 mVp-p. (See Fig. 4-4-14.)

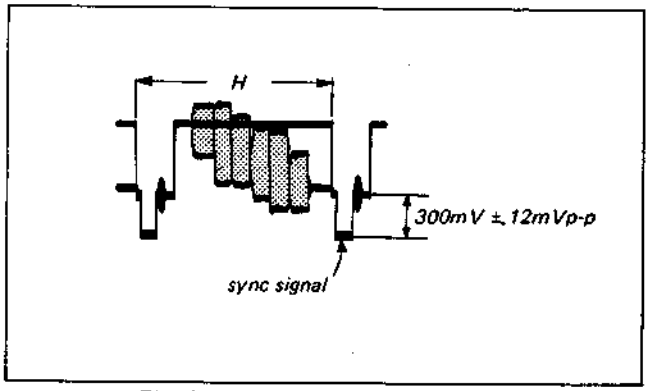


Fig. 4-4-14. Sync AGC adjustment

5. Compress Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the digital voltmeter to the points shown in Fig. 4-4-15.

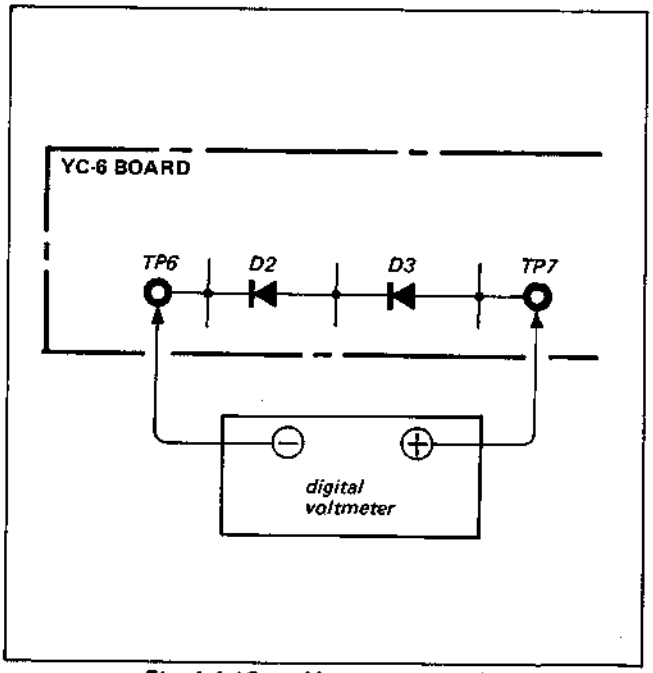


Fig. 4-4-15. Measurement points

(3) Adjust RV4 for 0.454 Vdc.

6. White Clip Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP4 (collector of Q8).

(3) Adjust RV5 so that the signal tip (white peak) is 220% ± 5%. (See Fig. 4-4-16.)

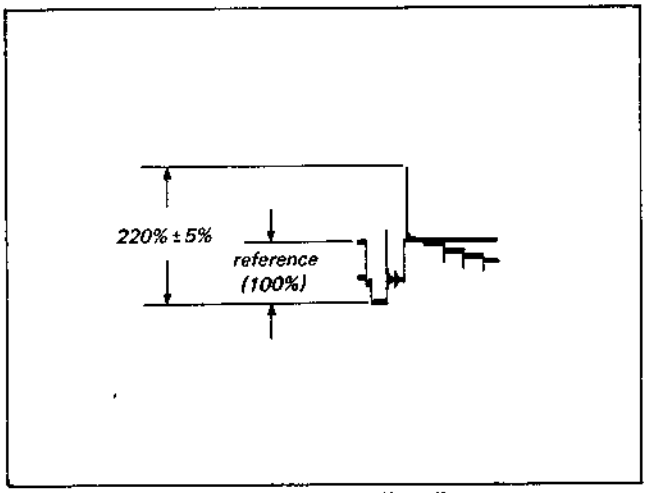


Fig. 4-4-16. White clip adjustment

7. Dark Clip Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP4 (collector of Q8).

(3) Adjust RV6 so that the signal tip (dark peak) is 170% ± 5%. (See Fig. 4-4-17.)

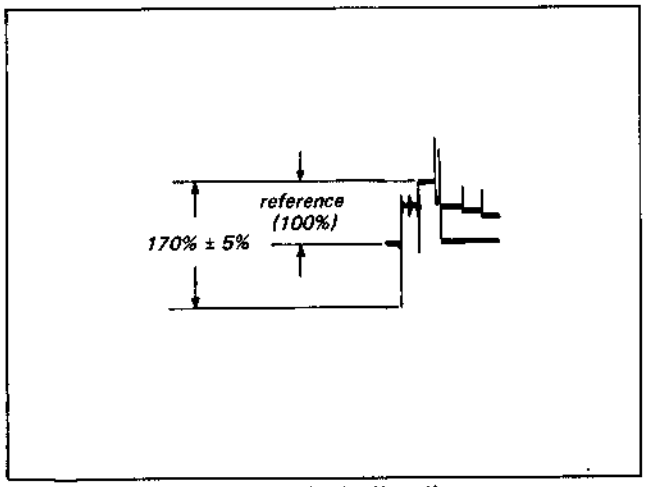


Fig. 4-4-17. Dark clip adjustment

8. Expand Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the digital voltmeter to the points shown in Fig. 4-4-18.

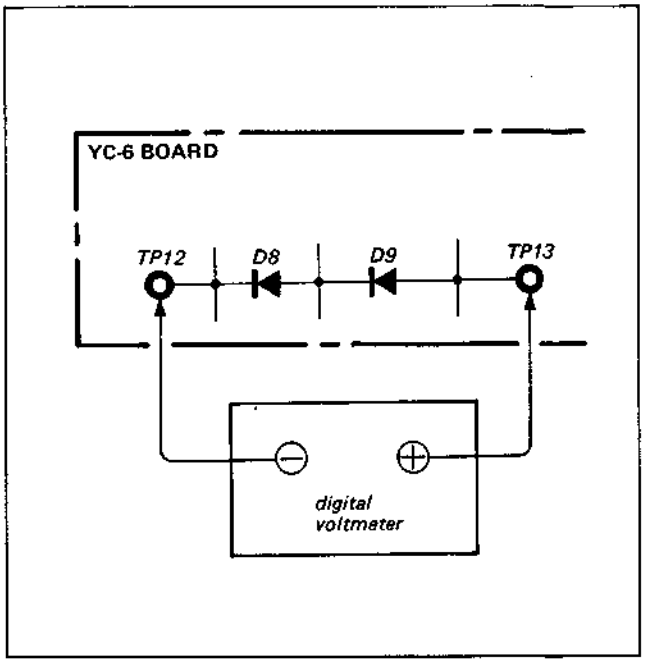


Fig. 4-4-18. Measurement points

(3) Adjust RV10 for 0.57 Vdc.

9. AFC Adjustment

(1) Supply the VTR with a video signal and set up the E-E mode.

(2) Connect the oscilloscope to TP19 (pin 4 of IC1, H.Sync).
TRIG: EXT (IC1-4 pin, H.Sync)

(3) Adjust RV21 so that the lock point is the center of the trapezoidal waveform. (See Fig. 4-4-19.)

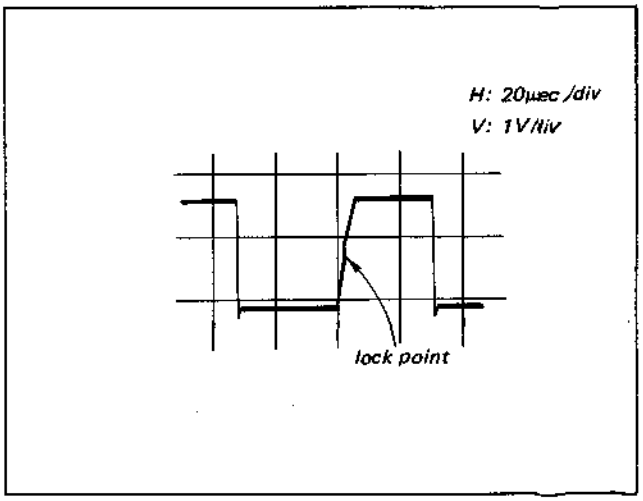


Fig. 4-4-19. AFC adjustment

10. AGC Offset Adjustment

(1) Supply the VTR with the video signal and set up the RECORD mode.

(2) Connect the oscilloscope to TP19 (pin 5 of IC6). TRIG: EXT (TP3, RF SW PULSE, on RF-2 board)

(3) Adjust RV22 so that the lock points of the A-CH and the B-CH are at the points shown in Fig. 4-4-20.

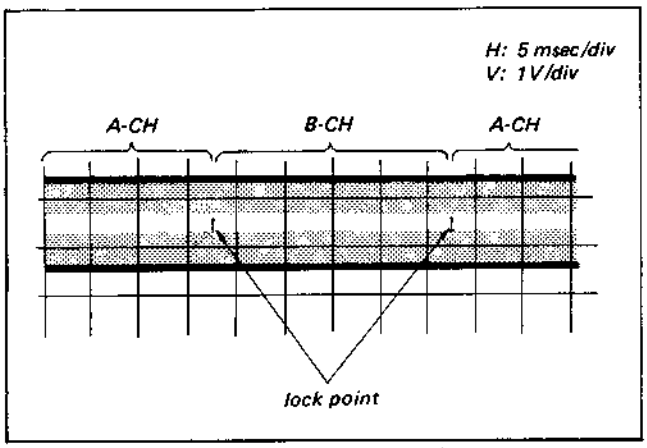


Fig. 4-4-20. AFC offset adjustment

11. Comb Filter Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Check that the chroma signal level at TP22 (pin 8 of IC2) is approximately 1.5 Vp-p. (See Fig. 4-4-21.)

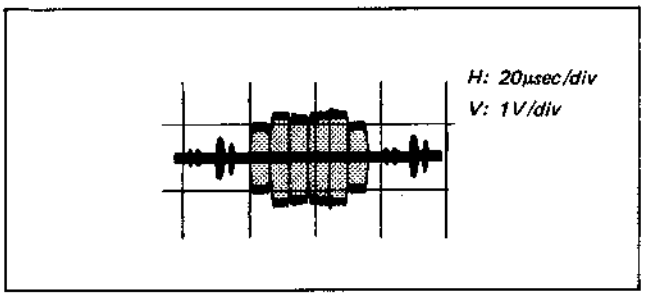


Fig. 4-4-21. Level check of chroma signal

(3) Connect the oscilloscope to TP21 (junction of R191 and R192).

(4) Adjust LV1 and RV19 alternately for minimum level of the chroma signal. (See Fig. 4-4-22.)

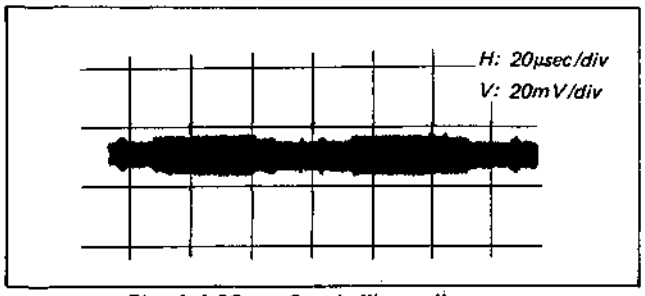


Fig. 4-4-22. Comb filter adjustment

(5) Check that the difference in the signal levels at TP21 and TP22 is more than 26 dB after the adjustment.

12. ACC Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP22 (pin 8 of IC2).

(3) Adjust T5 for minimum output level.

(4) Adjust RV16 for 1.5 V ± 0.1 Vp-p. (See Fig. 4-4-23.)

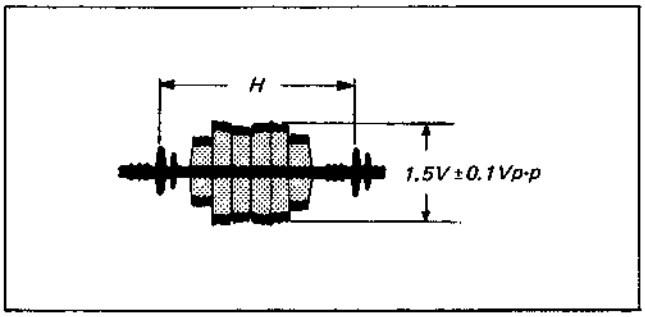


Fig. 4-4-23. ACC adjustment

13. X'tal Oscillation Adjustment

(1) Set up the PLAY mode.

(2) Connect the frequency counter to TP24 (emitter of Q57).

(3) Adjust T7 for an oscillating frequency of 4.433619 MHz.

(4) Check that the output level is 0.5 V ± 0.05 Vp-p. (See Fig. 4-4-24.)

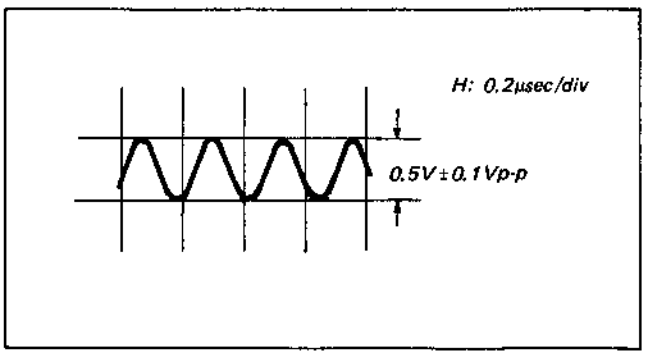


Fig. 4-4-24. Output level check

14. VXO Oscillating Frequency Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the frequency counter to TP24 (emitter of Q57).

(3) Adjust T8 so that the oscillating frequency is 4.433619 MHz ± 5 Hz.

(4) Check that the output level is 0.7 V ± 0.2 Vp-p. (See Fig. 4-4-25.)

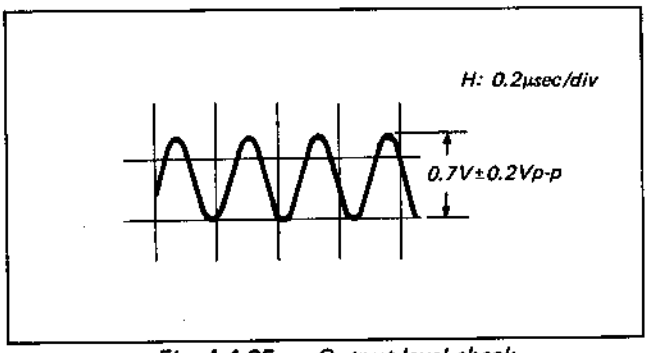


Fig. 4-4-25. Output level check

15. Pilot Burst Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP26 (emitter of Q56).

(3) Adjust RV18 so that the level of the chroma signal becomes equal to the one of the burst signal. (See Fig. 4-4-26.)

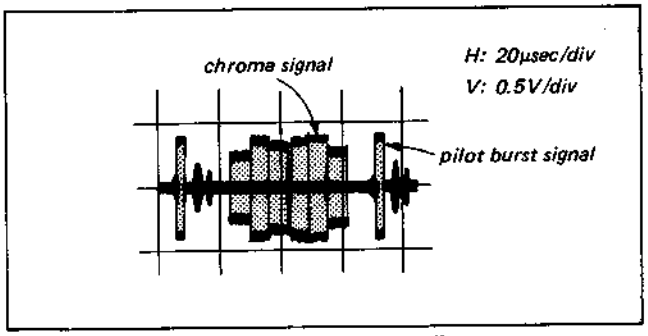


Fig. 4-4-26. Pilot burst adjustment

16. Chroma Record Current Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to TP26 (emitter of Q56).

(3) Adjust RV20 for a chroma signal level of 0.35 V ± 0.05 Vp-p. (See Fig. 4-4-27.)

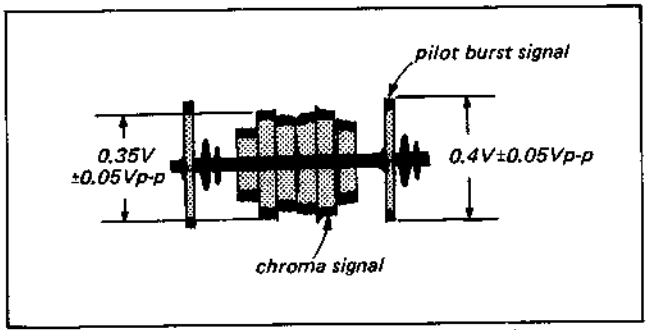


Fig. 4-4-27. Chroma record current adjustment

(4) Check that the level of the pilot burst signal is 0.4 V ± 0.05 Vp-p. If not, adjust RV18. (See Fig. 4-4-27.)

17. Test Signal Frequency Adjustment

[Adjustment with Frequency Counter]

(1) Turn on the TEST SIG switch.

(2) Connect the frequency counter to TP27 (emitter of Q78).

(3) Adjust RV24 for 15.625 kHz ± 100 Hz.

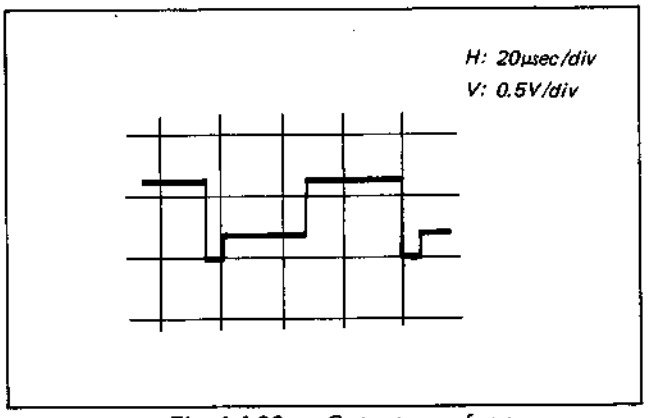


Fig. 4-4-28. Output waveform

[Adjustment by Observing Monitor TV]

(1) Turn on the TEST SIG switch.

(2) Adjust RV24 so that the monitor TV picture becomes as shown in Fig. 4-4-29.

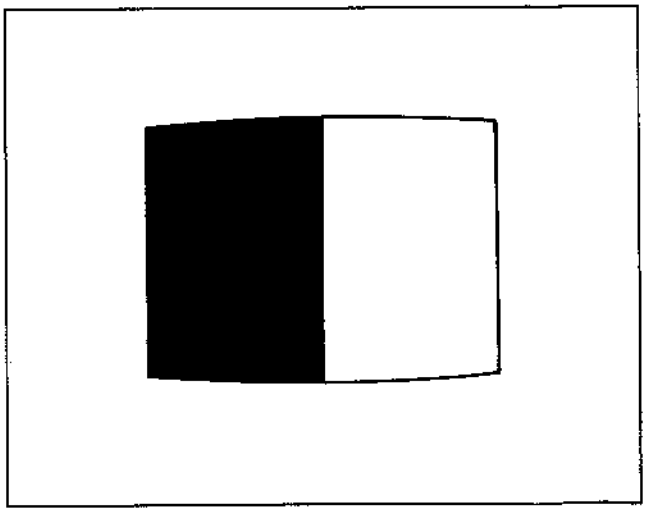


Fig. 4-4-29. Test signal adjustment

[RF-2 Board]

1. Record Current Frequency Characteristic Adjustment

(1) Set up the no-signal input state and set up the RECORD mode.

(2) Connect the oscilloscope to TP1 and the GND probe to TP2.

Note: Since TP2 is the REG 12 V line, do not connect the GND probe to the points other than TP2.

(3) Adjust RV6 for a signal level of 130 mVp-p. (See Fig. 4-4-30.)

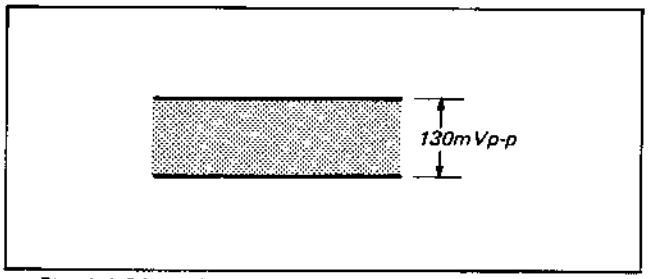


Fig. 4-4-30. Record current frequency characteristic adjustment

2. Playback Amplifier Frequency Characteristic Adjustment

(1) Play back the RF sweep signal segment of the alignment tape.

(2) Connect the oscilloscope to TP5.
TRIG: EXT (TP3, RF SW PULSE)
TRIG SLOPE { + ... CH-B / − ... CH-A

(3) Adjust the TRACKING knob for maximum signal level.

(4) Make the signal level from 1 MHz to 5.2 MHz flat.

A-CH RV1
B-CH RV2

(See Fig. 4-4-31.)

(5) Adjust RV3 so that the signal levels between 1 MHz and 2 MHz are all the same in the A-CH and B-CH.

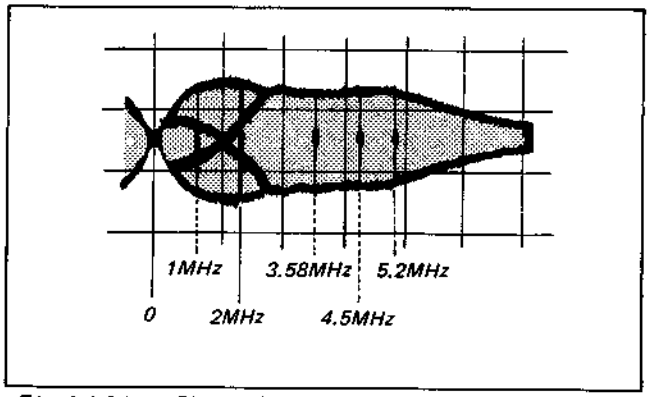


Fig. 4-4-31. Playback amplifier frequency characteristic adjustment

3. Dropout Compensation Adjustment

(1) Play back a blank tape.

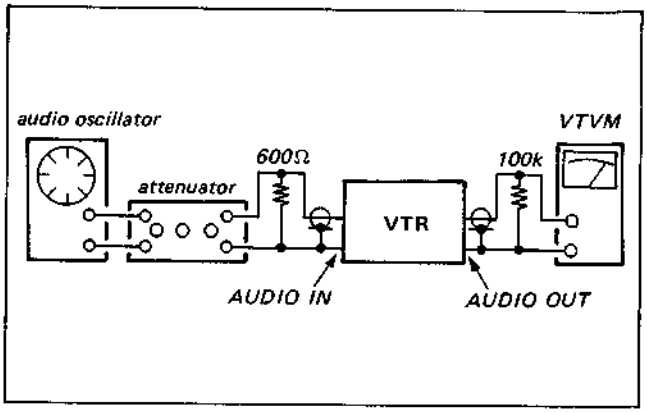
(2) Connect the oscilloscope to pin 2 of IC1.
INPUT: DC range

(3) Set RV4 to the point where the voltage at pin 2 of IC1 changes to 0.6 Vdc from 0 Vdc.

(4) Play back a recorded tape which has dropouts and check that the dropouts are compensated.

4-5. AUDIO SYSTEM ALIGNMENT (AS-3 Board)

[Connection of Relative Equipment]



[Adjustment Sequence]

1. Audio Head Adjustment
2. Playback Frequency Characteristic Adjustment
3. Playback Output Level Adjustment
4. Bias Oscillator Check
5. Bias Trap Adjustment
6. Record Bias Adjustment
7. Record Level Adjustment
8. Audio Dubbing Bias Adjustment
9. Overall Frequency Characteristic Check
10. Overall S/N Ratio Check
11. Overall Distortion Check

1. Audio Head Adjustment (Refer to the SECTION 3-19)
2. Playback Frequency Characteristic Adjustment

(1) Play back the 333 Hz and 5 kHz segments of the alignment tape.

(2) Adjust RV404 so that the output level difference between 333 Hz and 5 kHz is within +1.5 ± 1 dB.

3. Playback Output Level Adjustment

(1) Play back the 333 Hz segment of the alignment tape.

(2) Adjust RV403 so that the output level is within −25 ± 1 dB.

4. Bias Oscillator Check

(1) Insert the cassette and set up the RECORD mode.

(2) Connect a pickup coil (approx. 33mH) to the frequency counter and move the counter to T401 (in the shield case).

(3) Check that the oscillating frequency is 65 kHz ± 6.5 kHz.

5. Bias Trap Adjustment

(1) Set the input signal level to zero. (Set the audio oscillator output to zero and the attenuator to maximum.)

(2) Connect the oscilloscope to the collector of Q406.

(3) Adjust LV401 for minimum bias leak.
Value: minimum level below 1 Vp-p.

6. Record Bias Adjustment

Check that the playback frequency characteristic adjustment has been completed.

(1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.

(2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −25 dB.

(3) Record the signal.

(4) Change the audio signal to 7 kHz at −25 dB.

(5) Record the signal.

(6) Play back the recorded signals.

(7) Ensure that the output level of 7 kHz is within ±1 dB against the one of 333 Hz.

(8) If not, adjust RV402 and repeat Steps (2) through (7) until the specification is satisfied.

(9) Remove the jumper connected to TP402.

7. Record Level Adjustment

(1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.

(2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −5 dB.

(3) Record the signal.

(4) Play back the recorded signal.

(5) Ensure that the output level is within −5 ± 1 dB.

(6) If not, adjust RV401 and repeat Steps (2) through (5) until the specification is satisfied.

(7) Remove the jumper connected to TP402.

8. Audio Dubbing Bias Adjustment

(1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.

(2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −25 dB.

(3) Set up the AUDIO DUB mode.

(4) Change the oscillator signal to 7 kHz, −25 dB and set up the AUDIO DUB mode.

(5) Play back the signals.

(6) Ensure that the output level of 7 kHz is 0 ± 1 dB against the one of 333 Hz.

(7) If not, adjust LV402 and repeat Steps (2) through (6) until the specification is satisfied.

(8) Remove the jumper connected to TP402.

9. Overall Frequency Characteristic Check

(1) Set the oscillator frequency to 333 Hz and adjust the AUDIO terminal level with the attenuator for −25 dB.

(2) Record the signal.

(3) Change the oscillator signal to 50 Hz, 100 Hz, 3 kHz, 5 kHz, 7 kHz and 10 kHz.

(4) Record the signals.

(5) Play back the recorded signals.

(6) Ensure that the output levels are within the specified values. (See Fig. 4-5-1.)

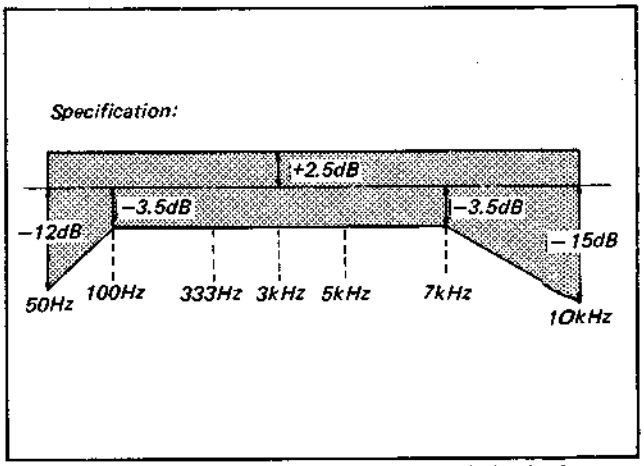


Fig. 4-5-1. Overall frequency caracteristic check

10. Overall S/N Ratio Check

(1) Terminate the AUDIO IN terminal.
(no signal input)

(2) Insert the cassette and set up the record mode.

(3) Open the AUDIO IN terminal and supply the 333 Hz at −10 dB signal to AUDIO IN terminal.

(4) Record the signal

(5) Play back the two segments.

(6) Ensure that the output level difference between two segments is more than 40 dB.

11. Overall Distortion Check

(1) Set the oscillator frequency to 400 Hz and adjust the AUDIO OUT terminal level with the attenuator for −10 dB.

(2) Record the signal.

(3) Connect the distortion meter to the AUDIO OUT terminal.

(4) Play back the recorded signal and ensure that the distorition is less than 4%.

4-6. TUNER BLOCK SYSTEM ALIGNMENT

1. +60 V Adjustment & −30 V Check (TU-11 board)

   (1) Receive the E-12CH telecast signal.

   (2) Connect the digital voltmeter to pin 3 of CN8105.

   (3) Adjust RV101 for 60 V ± 0.3 V.

   (4) Check that the voltage at pin 1 of CN8105 is within −25 V to −31 V.

4-7. TIMER SYSTEM ALIGNMENT (TM-10 Board)

1. Oscillating Frequency Adjustment

   (1) Connect the frequency counter to TP2 (pin 1 of IC6).

   (2) Adjust CV1 for 60 Hz.
   Specification: within 60 Hz ± 0.5 Hz/day

Betamax
VIDEOCASSETTE RECORDER

SL-C7E

No. 3
May, 1980

SUPPLEMENT

Subject; Tuner Block Modification

This supplement includes production changes starting with Serial No. 220001.
File this supplement with the service manual.

1. INTRODUCTION

The CH-3 board has been changed into the CH-7 board.

2. INTERCHANGEABILITY

The former and new circuit boards are not interchangeable.

3. CHANGED PARTS LIST

All tuner block electrical parts list is shown on next page and later.

SONY
SERVICE MANUAL

2. TUNER BLOCK (CH-7, CI-1, IF-10, PC-1, TU-11 BOARD) ELECTRICAL PARTS LIST

CH-7 BOARD

Ref. No.	Part No.	Description		Remark
♦	A-6725-175-A	CH-7 Board, complete		
C1	1-131-347-00	1	35V tantalum	
C2	1-108-251-00	0.1	mylar	
C3	1-161-323-00	0.001		
C4, 5	1-161-319-00	470p		
C6	1-108-365-00	0.001	100V mylar	
C8	1-161-021-00	0.047		
C9	1-161-271-00	100p		
C10	1-123-319-00	47	16V elect	
C11, 12	1-123-316-00	10	16V elect	
C14	1-161-323-00	0.001		
C15	1-123-352-00	1	50V elect	
C16	1-131-345-00	0.47	35V tantalum	
C17	1-161-021-00	0.047		
C18	1-123-352-00	1	50V elect	
C19	1-161-013-00	0.01		
C20	1-161-271-00	100p		
C21	1-161-263-00	22p		
C22	1-161-271-00	100p		
C23	1-108-820-00	0.22	mylar	
C24	1-161-265-00	33p		
C25	1-123-228-00	1	50V elect	
C26, 27	1-161-223-00	0.022		
C28	1-123-353-00	2.2	50V elect	
C29	1-161-013-00	0.01		
C30	1-131-349-00	2.2	35V tantalum	
C31	1-161-323-00	0.001		
C32	1-123-228-00	1	50V elect	
C33	1-131-345-00	0.47	35V tantalum	
C40	1-102-125-00	0.0047		
♦CN2	1-508-735-21	5P connector		
♦CN3	1-508-736-00	10P connector		
♦CN4	1-508-847-00	4P connector		
♦CN5	1-508-848-00	6P connector		
♦CN6	1-508-735-00	5P connector		
♦CN7	1-508-847-00	4P connector		
♦CN8	1-508-734-00	3P connector		
♦CN9	1-508-849-00	8P connector		

Ref. No.	Part No.	Description		Remark
D2–5	8-719-815-55	1S1555		
D7–10	8-719-815-55	1S1555		
⇒ D11–15	8-719-311-23	SEL1122P-N		
D16	8-719-812-31	TLR123		
D17	8-719-812-32	TLY123		
D18	8-719-812-33	TLG123		
D19	8-719-812-31	TLR123		
IC1	8-758-040-01	CX804		
IC2	8-759-040-46	MC14046BCP		
IC3	8-757-611-00	CX761A		
IC4	8-757-600-00	CX760		
IC5	8-759-108-05	μPC78L05A		
IC6	8-759-240-12	TC4012BP		
IC7, 8	8-759-240-11	TC4011BP		
IC9	8-759-965-60	BA656		
IC10	8-759-240-11	TC4011BP		
IC11	8-759-240-12	TC4012BP		
IC12	8-759-157-40	μPC574J		
L1	1-407-184-XX	3.3μH		
Q1	8-729-902-11	2SC2021		
Q2	8-729-993-72	2SA937		
Q4	8-729-902-11	2SC2021		
Q5	8-729-139-04	2N3904		
Q6	8-724-375-01	2SC403C		
Q7–10	8-729-993-72	2SA937		
R6	1-202-463-00	2.2M	1/4W conposition	
⚠R73, 74	1-213-155-00	10k	1W metal oxide (nonflammable)	
RV1	1-224-251-XX	4.7k, adjustable		
S1–5	1-552-174-00	Push button		
S6, 7	1-516-226-00	Slide		

CI-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	1-601-831-00	CI-1 Board	
♦CN10	1-508-849-00	8P connector	
D20	8-719-803-26	TLR326	
IC13	8-759-997-64	SN29764N	
S10–21	1-552-412-00	Keyboard	

IF-10 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6721-051-A	IF-10 Board, complete	
C501, 502	1-161-047-00	0.0047	
C503	1-161-272-00	120p	
C504–509	1-161-047-00	0.0047	
C510	1-123-355-00	4.7 50V elect	
C511	1-123-316-00	10 16V elect	
C512	1-161-047-00	0.0047	
C513	1-161-280-00	12p	
C514	1-102-529-00	100p	
C515	1-161-323-00	0.001	
C516	1-123-321-00	220 16V elect	
C517	1-101-006-00	0.047	
C518	1-103-725-00	0.001 styrol	
C519	1-161-051-00	0.01	
C520, 521	1-101-006-00	0.047	
C523	1-108-385-00	0.047 100V mylar	
C524–526	1-161-047-00	0.047	
C527	1-102-852-00	47p	
C528	1-102-525-00	68p	
C529	1-161-249-00	1.5p	
C530	1-161-259-00	10p	
C531–534	1-161-047-00	0.047	
C535	1-123-320-00	100 16V elect	
C536	1-161-267-00	47p	
C537	1-123-323-00	470 16V elect	
CF501	1-404-134-00	Trap, ceramic	
CF502	1-527-263-00	Ceramic, Filter	
♦CN501	1-508-743-00	5P connector	
♦CN503	1-508-797-00	4P connector	
IC501	8-759-014-40	TBA1440G	
IC502	8-759-651-35	M5135P	
IC503	8-759-001-20	TBA120UB	
L501	1-404-221-00	Coil, IF	
L502	1-407-184-XX	3.3μH	
L503	1-407-159-XX	15μH	
L504	1-407-157-XX	10μH	
L505	1-407-184-XX	3.3μH	
Q501	8-765-300-00	2SC2009	
⇒ Q502, 503	8-729-663-47	2SC1364	
⚠R517	1-247-005-00	100 1/4W carbon (nonflammable)	
RV501	1-224-645-XX	10k, adjustable	
RV502	1-224-644-XX	4.7k, adjustable	
SF501	1-404-208-00	Filter, surface wave	
T501	1-404-206-00	IFT	
T502	1-404-207-00	VIF	
T503	1-404-203-00	VIF	
T504	1-403-810-00	AFT Discri (Pri)	
T505	1-403-811-00	AFT Discri (Sec)	
T506	1-404-135-00	SIF Discri	
T507	1-404-097-00	SIFT	

PC-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6723-132-A	PC-1 Board, complete	
C1	1-123-316-00	10 16V elect	
C2	1-102-074-00	0.001	
C3	1-123-316-00	10 16V elect	
♦CN501	1-508-743-00	5P connector	
♦CN502	1-508-797-00	4P connector	
D1	8-719-162-26	RD6.2E-B3Z	
Q1, 2	8-729-663-47	2SC1364	
Q10	8-729-663-47	2SC1364	
Q11	8-760-523-10	2SA772	
Q12, 13	8-729-663-47	2SC1364	
RV1	1-224-643-XX	2.2k, adjustable	

TU-11 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6721-050-A	TU-11 Board, complete	
C101	1-123-330-00	22 25V elect	
C102	1-123-328-00	4.7 25V elect	
C103	1-123-316-00	10 16V elect	
C104	1-123-318-00	33 16V elect	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C110	1-102-963-00	33p	
C111	1-102-125-00	0.0047	
C112	1-102-953-00	18p	
C113	1-102-676-00	68p	
C114	1-121-419-00	220 6.3V elect	
C115	1-121-806-00	10 16V elect (nonpolarized)	
C116	1-123-319-00	47 16V elect	
C117	1-123-352-00	1 50V elect	
C118	1-108-591-00	0.033 mylar	
C119	1-108-367-00	0.0015 100V mylar	
C120	1-123-320-00	100 16V elect	
C121	1-123-319-00	47 16V elect	
C122, 123	1-123-351-00	0.47 50V elect	
C124	1-102-973-00	100p	
C125	1-123-359-00	47 50V elect	
C126	1-123-383-00	4.7 100V elect	
C127	1-108-638-00	0.1 100V mylar	
C128	1-102-125-00	0.0047	
C129	1-123-320-00	100 16V elect	
C132	1-108-812-00	0.047 mylar	
C133	1-108-249-00	0.068 mylar	
C134	1-161-265-00	33p	
C136	1-123-319-00	47 16V elect	
♦CN101	1-508-797-00	4P connector	
♦CN102	1-508-743-00	5P connector	
♦CN103	1-508-910-00	12P connector	
♦CN104	1-508-743-00	5P connector	
♦CN105	1-508-845-00	6P connector	
♦CN107	1-508-742-00	3P connector	
♦CN108	1-508-845-00	6P connector	

Ref. No.
⇒D101,
⇒D103
D104
L101
L102,
L104
L105
L106
Q101
Q102
⇒Q103
Q104
⇒Q106
⚠R126
RV101
T101
T102
⚠TU101
⚠TU102
⚠
⚠

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Ref. No.	Part No.	Description	Remark
T501	1-404-206-00	IFT	
T502	1-404-207-00	VIF	
T503	1-404-203-00	VIF	
T504	1-403-810-00	AFT Discri (Pri)	
T505	1-403-811-00	AFT Discri (Sec)	
T506	1-404-135-00	SIF Discri	
T507	1-404-097-00	SIFT	

PC-1 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6723-132-A	PC-1 Board, complete	
C1	1-123-316-00	10 16V elect	
C2	1-102-074-00	0.001	
C3	1-123-316-00	10 16V elect	
♦CN501	1-508-743-00	5P connector	
♦CN502	1-508-797-00	4P connector	
D1	8-719-162-26	RD6.2E-B3Z	
Q1, 2	8-729-663-47	2SC1364	
Q10	8-729-663-47	2SC1364	
Q11	8-760-523-10	2SA772	
Q12, 13	8-729-663-47	2SC1364	
RV1	1-224-643-XX	2.2k, adjustable	

TU-11 BOARD

Ref. No.	Part No.	Description	Remark
♦	A-6721-050-A	TU-11 Board, complete	
C101	1-123-330-00	22 25V elect	
C102	1-123-328-00	4.7 25V elect	
C103	1-123-316-00	10 16V elect	
C104	1-123-318-00	33 16V elect	
C105	1-102-884-00	33p	
C106	1-102-863-00	82p	
C107	1-102-884-00	33p	
C108	1-102-889-00	39p	
C109	1-102-125-00	0.0047	
C110	1-102-963-00	33p	
C111	1-102-125-00	0.0047	
C112	1-102-953-00	18p	
C113	1-102-676-00	68p	
C114	1-121-419-00	220 6.3V elect	
C115	1-121-806-00	10 16V elect (nonpolarized)	
C116	1-123-319-00	47 16V elect	
C117	1-123-352-00	1 50V elect	
C118	1-108-591-00	0.033 mylar	
C119	1-108-367-00	0.0015 100V mylar	
C120	1-123-320-00	100 16V elect	
C121	1-123-319-00	47 16V elect	
C122, 123	1-123-351-00	0.47 50V elect	
C124	1-102-973-00	100p	
C125	1-123-359-00	47 50V elect	
C126	1-123-383-00	4.7 100V elect	
C127	1-108-638-00	0.1 100V mylar	
C128	1-102-125-00	0.0047	
C129	1-123-320-00	100 16V elect	
C132	1-108-812-00	0.047 mylar	
C133	1-108-249-00	0.068 mylar	
C134	1-161-265-00	33p	
C136	1-123-319-00	47 16V elect	
♦CN101	1-508-797-00	4P connector	
♦CN102	1-508-743-00	5P connector	
♦CN103	1-508-910-00	12P connector	
♦CN104	1-508-743-00	5P connector	
♦CN105	1-508-845-00	6P connector	
♦CN107	1-508-742-00	3P connector	
♦CN108	1-508-845-00	6P connector	

Ref. No.	Part No.	Description	Remark
⇒D101, 102	8-719-815-85	1S1585	
⇒D103	8-719-127-25	RD27E-B2Z	
D104	8-719-815-55	1S1555	
L101	1-407-186-XX	4.7μH	
L102, 103	1-407-178-XX	1μH	
L104	1-407-169-XX	100μH	
L105	1-407-696-00	18μH	
L106	1-407-169-XX	100μH	
Q101	8-765-300-00	2SC2009	
Q102	8-724-375-01	2SC403C	
⇒Q103	8-729-612-77	2SA1027R	
Q104	8-729-663-47	2SC1364	
⇒Q106	8-760-413-10	2SC1475	
⚠R126	1-246-979-00	1.2 1/8W carbon (nonflammable)	
RV101	1-224-645-XX	10k, adjustable	
T101	1-404-096-00	VHF	
T102	1-446-585-00	Convertor	
⚠TU101	1-463-242-00	UHF ET Tuner U322	
⚠TU102	1-463-243-00	VHF ET Tuner V314	

TUNER CHASSIS

Ref. No.	Part No.	Description	Remark
⚠	1-463-296-00	Antenna booster (BT-971)	
⚠	1-464-105-00	RF modulator	

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- ⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

3. PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

CH-7 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) PRINTED WIRING BOARDS

– Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 85

CH-7 BOARD

Q IC	IC10 IC11 IC6 IC7 Q4 IC8 IC2 IC12 Q2 Q1 Q6 Q5 IC4 Q9 Q10 Q8 IC3 IC9 IC5 Q7 IC1	Q IC
D	3 4 2 5 9 8 7 11 ~ 15 16 17 18 19 10	D
ADJ	RV1	ADJ

CI-1 BOARD

TU-11 BOARD

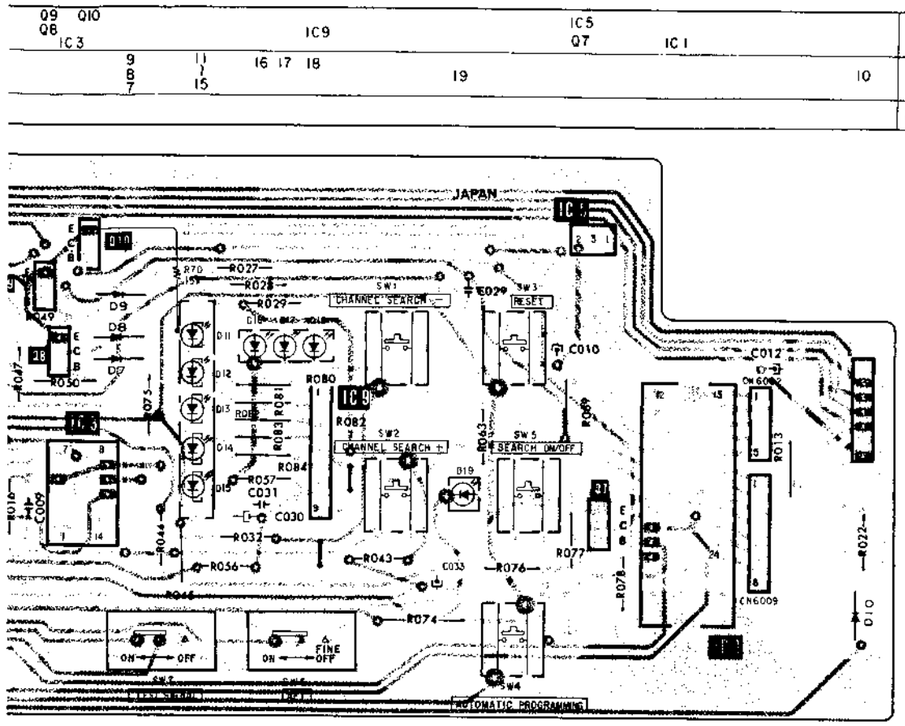
Q	106 101 102 108 107 103 104	Q
D	101 102 103 104	D
ADJ	RV101	ADJ

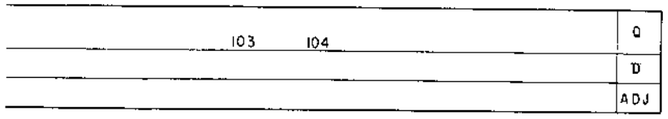
IF-10 BOARD

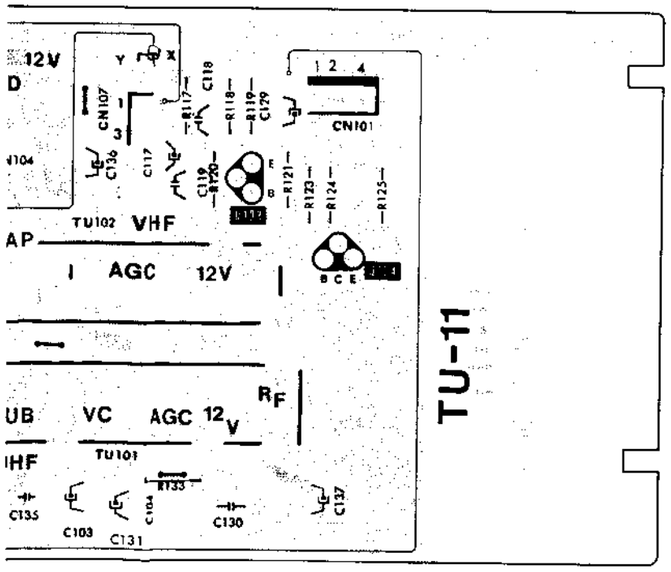
IC Q	503 IC503	
ADJ		

R) AND IF-10 (VIF, SIF, AFT) PRINTED WIRING BOARDS

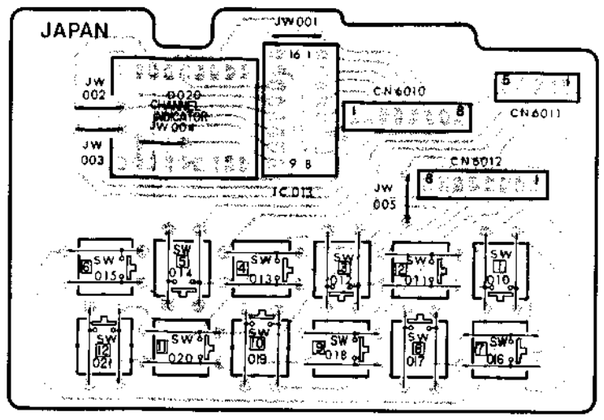
– Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –



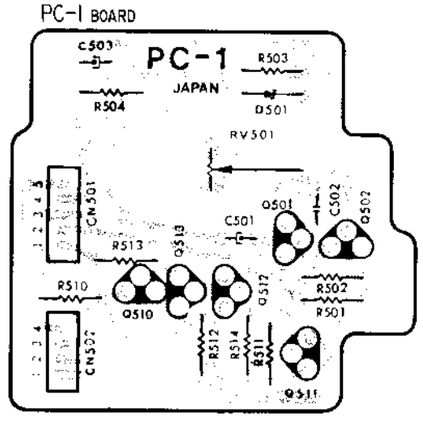




CI-1 BOARD

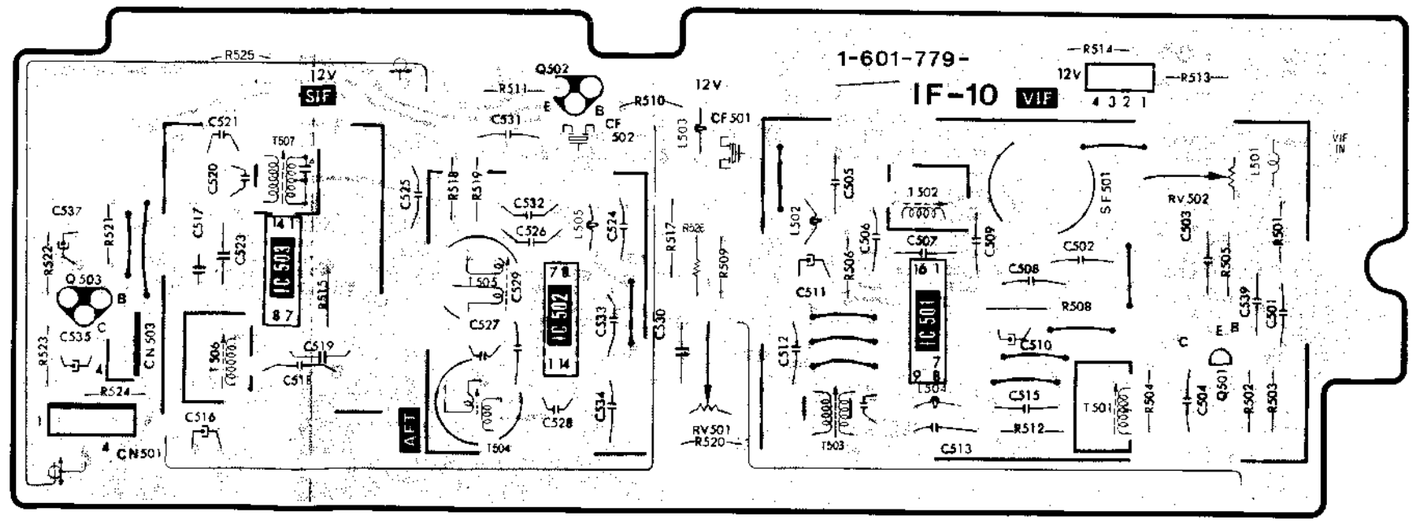


PC-1 BOARD



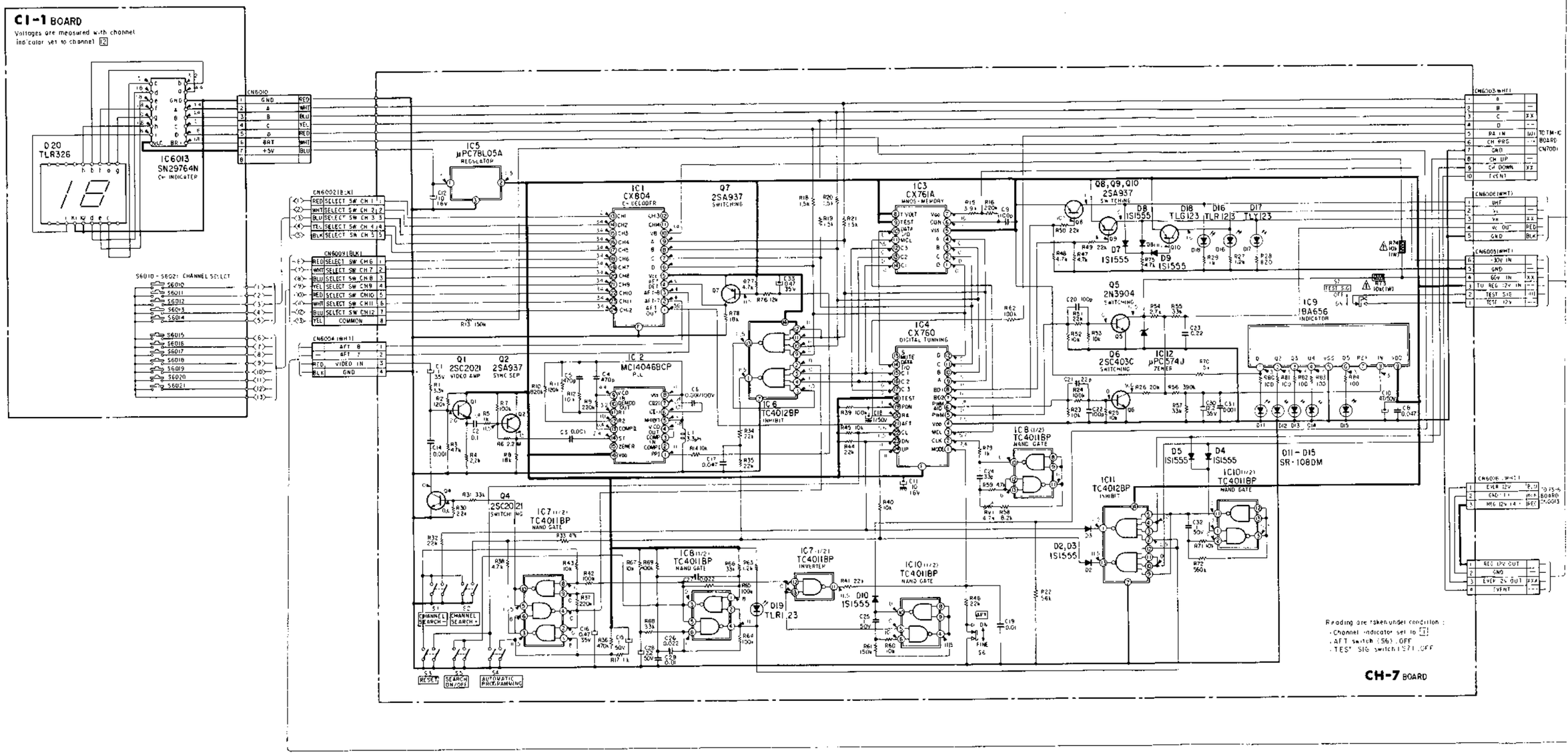
IF-10 BOARD

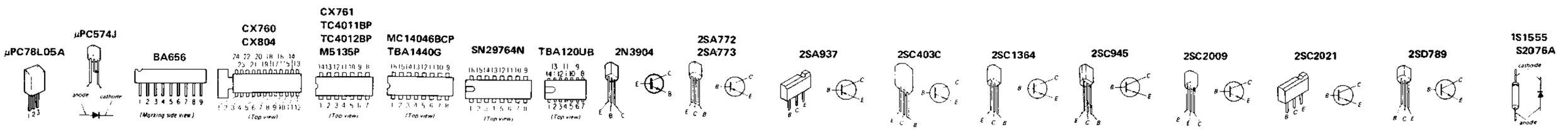
IC Q	503	IC503	502 IC502	IC501	501	IC Q
ADJ		RV501		RV502		ADJ

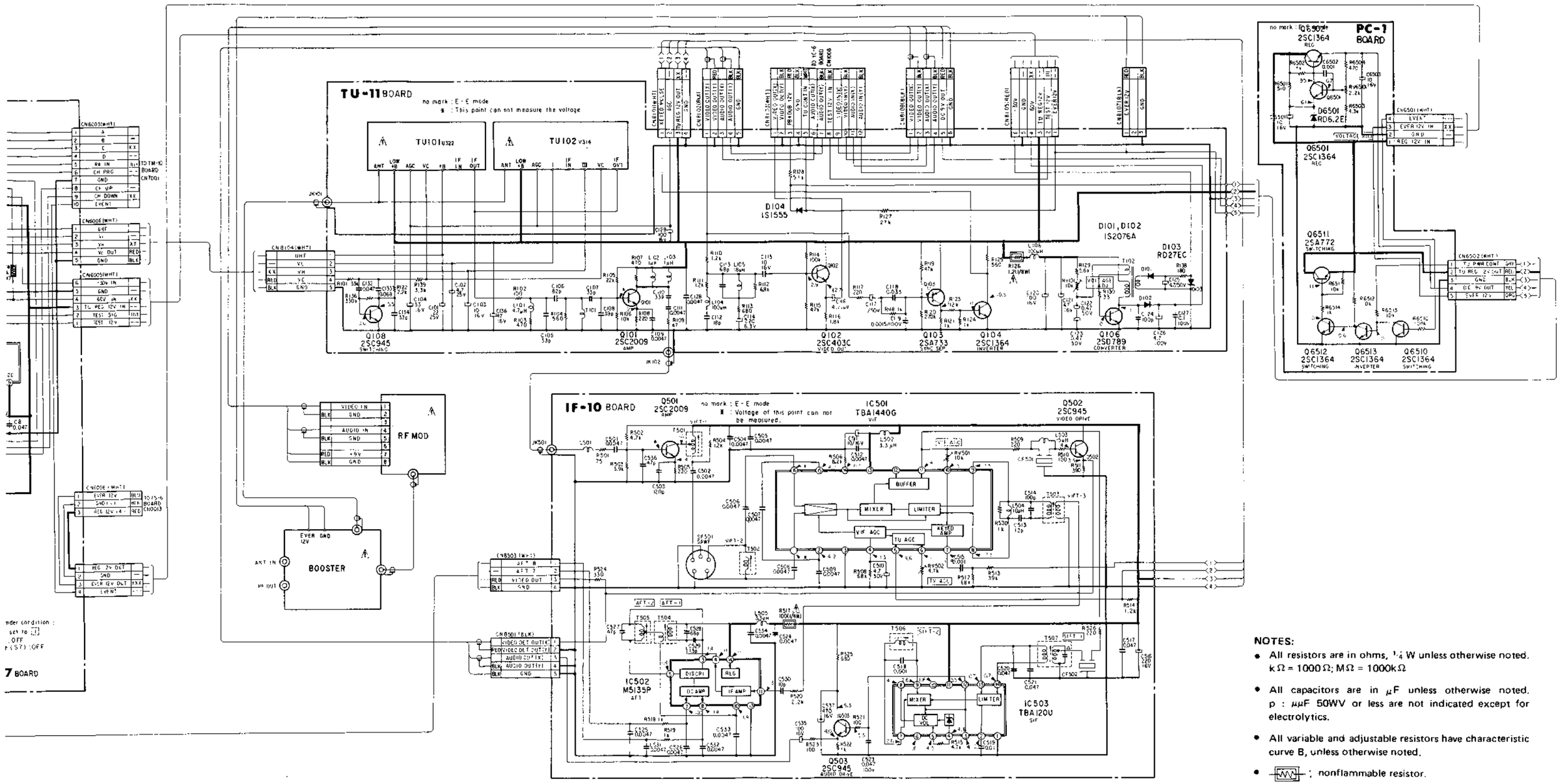


CH-7 (AUTO TUNING), CI-1 (CHANNEL INDICATOR), PC-1 (REG), TU-11 (TUNER) AND IF-10 (VIF, SIF, AFT) BOARDS SCHEMATIC DIAGRAM

– Ref. No. CH-7, CI-1 BOARDS: 6000 Series PC-1 BOARD: 6500 Series TU-11 BOARD: 8100 Series IF-10 BOARD: 8500 Series CHASSIS: 9500 Series –

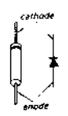




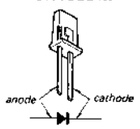


SD789

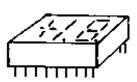
1S1555
S2076A



SR108DM



TLR326



NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⚠ : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

Betamax

VIDEOCASSETTE RECORDER

SL-C7E

No. 5
October, 1980

SUPPLEMENT

Subject; CH-7 Board Change

This supplement includes production changes starting with Serial No. 32501 / 239001 and later.
File this supplement with the service manual.

1. INTRODUCTION

The CH-7 board has been changed into the CH-16 board.

2. INTERCHANGEABILITY

The former and new circuit boards are interchangeable.

3. CHANGED PARTS LIST

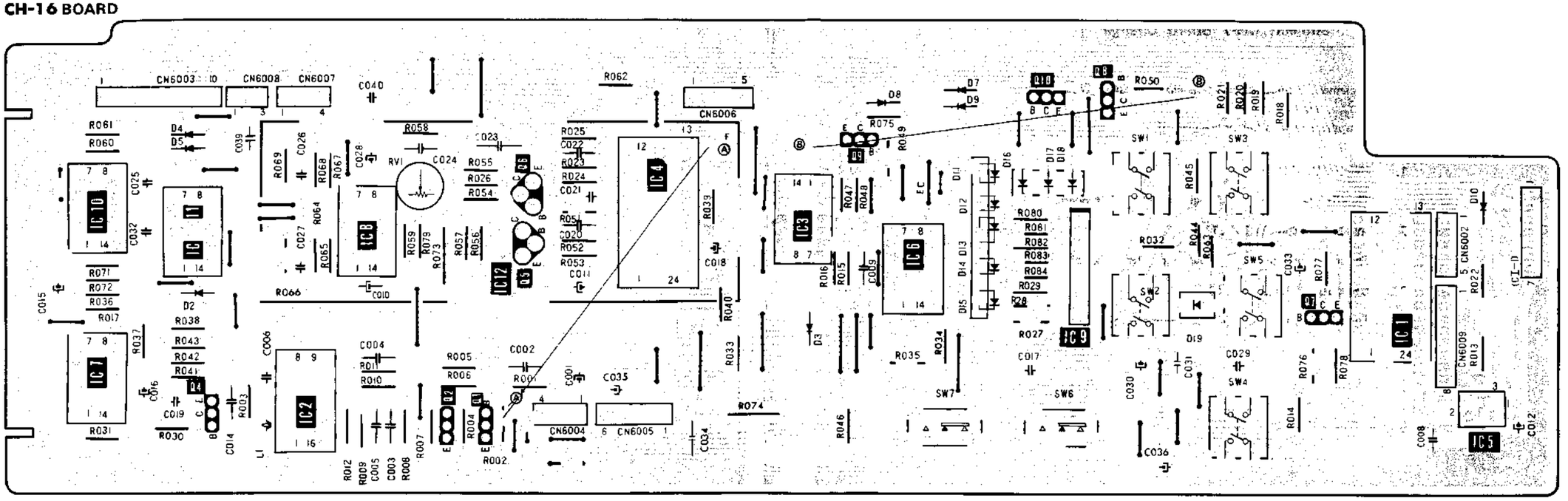
The CH-16 board parts list is shown on page 5.

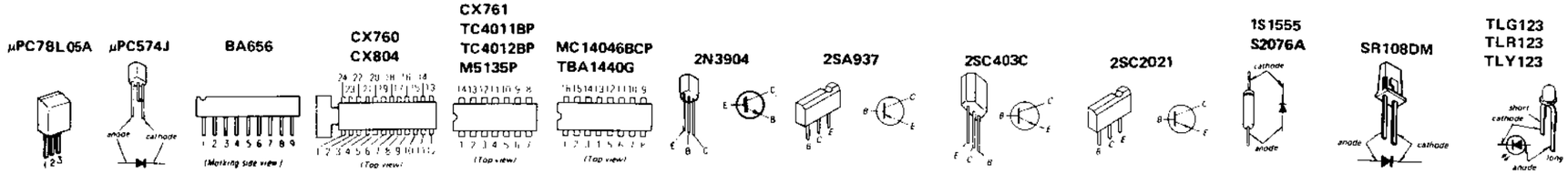
SONY
SERVICE MANUAL

CH-16 (AUTO TUNING) PRINTED WIRING BOARD
– Ref. No. 6000 series –

Q, IC	IC10 IC7	IC11 4	IC2	IC8 2	IC12 6 5	IC4	IC3 9	IC6	IC9 10 8	7	IC1	IC5	Q, IC
D		4 5 2					3	8	7 11, 9 13, 12 14 15	16 17 18	19	10	D
ADJ				RV1									ADJ

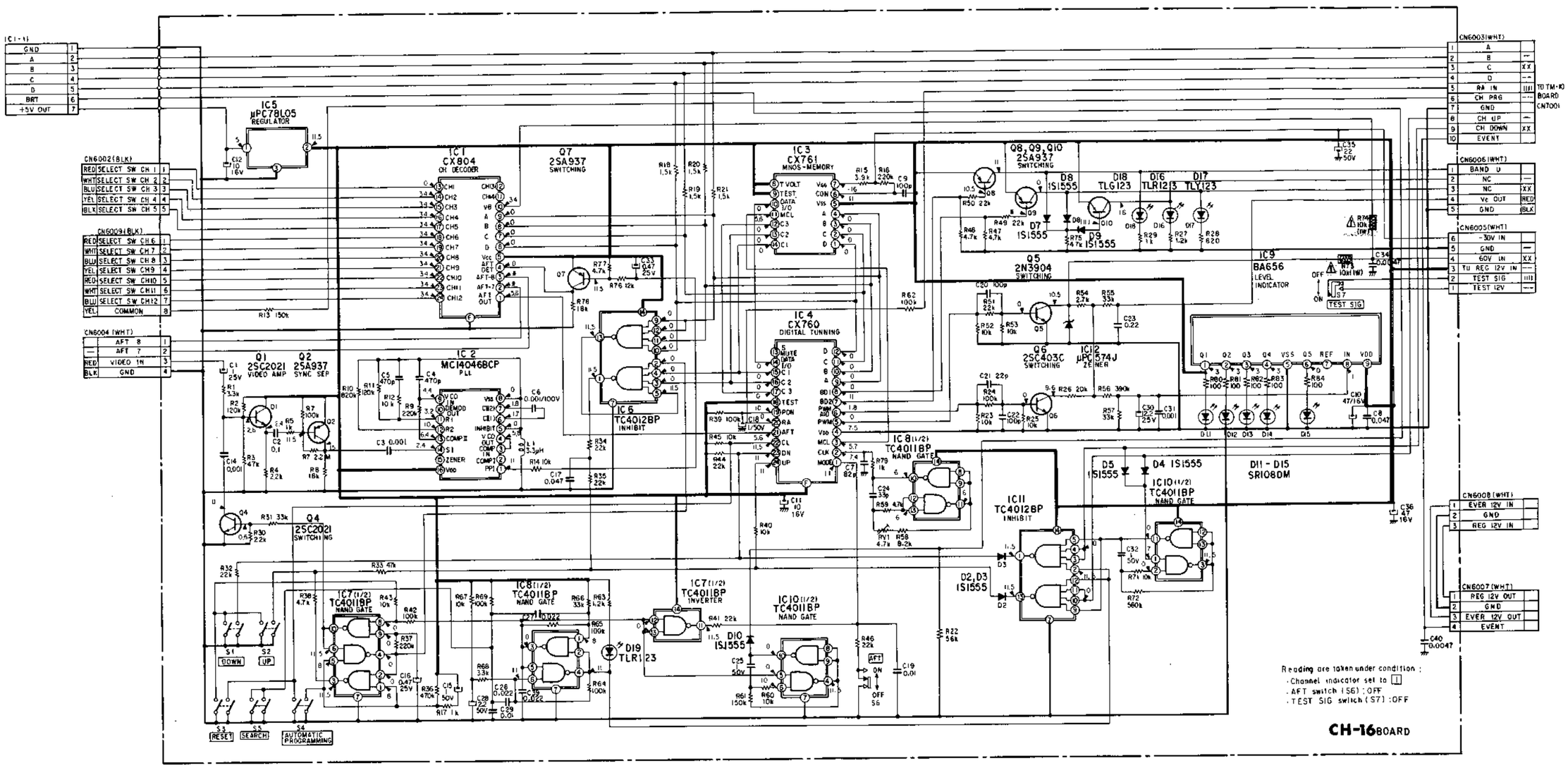
CH-16 BOARD





CH-16 (AUTO TUNING) BOARD SCHEMATIC DIAGRAM

– Ref. No. 6000 series –



The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

NOTES:

- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⚠ : nonflammable resistor.
- The red lines show the main voltages.
- All voltages are dc measured with a VOM (20kΩ/V).

CH-16 BOARD ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Remark
		CH-16 BOARD	
♦	A-6725-215-A	CH-16 Board, complete	
C1	1-127-453-00	1 25V elect	
C2	1-108-251-00	0.1 mylar	
C3	1-161-323-00	0.001	
C4, 5	1-161-319-00	470p	
C6	1-108-614-00	0.001 100V mylar	
C7	1-102-974-00	82P	
C8	1-161-021-00	0.047	
C9	1-161-271-00	100p	
C10	1-123-319-00	47 16V elect	
C11, 12	1-123-316-00	10 16V elect	
C14	1-161-323-00	0.001	
C15	1-123-352-00	1 50V elect	
C16	1-127-451-00	0.47 25V elect	
C17	1-161-021-00	0.047	
C18	1-123-352-00	1 50V elect	
C19	1-161-013-00	0.01	
C20	1-161-271-00	100p	
C21	1-161-263-00	22p	
C22	1-161-271-00	100p	
C23	1-108-820-00	0.22 mylar	
C24	1-161-265-00	33p	
C25	1-123-228-00	1 50V elect	
C26, 27	1-161-223-00	0.022	
C28	1-123-353-00	2.2 50V elect	
C29	1-161-013-00	0.01	
C30	1-123-612-00	2.2 50V elect	
C31	1-161-323-00	0.001	
C32	1-123-228-00	1 50V elect	
C33	1-127-451-00	0.47 25V elect	
C34	1-108-373-00	0.0047 100V mylar	
C35	1-123-357-00	22 50V elect	
C36	1-123-319-00	47 16V elect	
C39	1-161-017-00	0.022	
C40	1-102-125-00	0.0047	
♦CN2	1-508-735-21	5P connector	
♦CN3	1-508-736-00	10P connector	
♦CN4	1-508-847-00	4P connector	
♦CN5	1-508-848-00	6P connector	
♦CN6	1-508-735-00	5P connector	
♦CN7	1-508-847-00	4P connector	
♦CN8	1-508-734-00	3P connector	
♦CN9	1-508-849-00	8P connector	

Ref. No.	Part No.	Description	Remark
D2–5	8-719-815-55	1S1555	
D7–10	8-719-815-55	1S1555	
⇒ D11–15	8-719-311-23	SEL1122P-N	
D16	8-719-812-31	TLR123	
D17	8-719-812-32	TLY123	
D18	8-719-812-33	TLG123	
D19	8-719-812-31	TLR123	
IC1	8-758-040-01	CX804	
IC2	8-759-040-46	MC14046BCP	
IC3	8-757-611-00	CX761A	
IC4	8-757-600-00	CX760	
IC5	8-759-108-05	μPC78L05A	
IC6	8-759-240-12	TC4012BP	
IC7, 8	8-759-240-11	TC4011BP	
IC9	8-759-965-60	BA656	
IC10	8-759-240-11	TC4011BP	
IC11	8-759-240-12	TC4012BP	
IC12	8-759-157-40	μPC574J	
L1	1-407-184-XX	3.3μH	
Q1	8-729-902-11	2SC2021	
Q2	8-729-993-72	2SA937	
Q4	8-729-902-11	2SC2021	
Q5	8-729-139-04	2N3904	
Q6	8-724-375-01	2SC403C	
Q7–10	8-729-993-72	2SA937	
R6	1-202-463-00	2.2M 1/4W composition	
⚠R73, 74	1-213-155-00	10k 1W metal oxide (nonflammable)	
RV1	1-224-251-XX	4.7k, adjustable	
S1–5	1-552-174-00	Push button	
S6, 7	1-516-226-00	Slide	

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

- ⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.
- Items marked "♦" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Betamax
VIDEOCASSETTE RECORDER

SL-C7E

No. 4
July, 1980

SUPPLEMENT

Subject: Switching Mode Regulator Alignment

1. The adjustment procedure of the switching mode regulator (SR-08) has been changed as follows for increasing reliability.

2. Service kit

SONY
SERVICE MANUAL

1. REG 12V ADJUSTMENT

This adjustment should be executed after the replacement of IC1, R210, through R213, and RV201.

Caution: Discharge C108 with a resistor of 1kΩ (more than 2W). If it is not discharged, you will get a shock.

1) Remove CN0010 off the FS-6 board.

2) Connect the VOM at the point shown in Fig. 1.

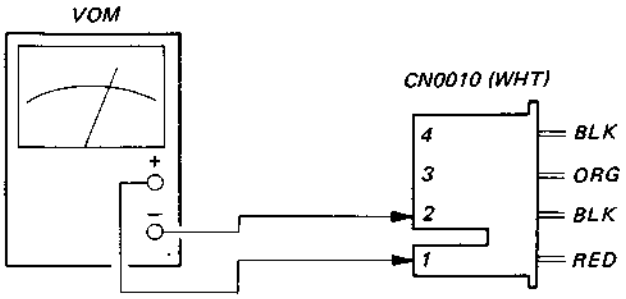


Fig. 1.

3) Adjust RV201 for 12.1 ± 0.1 V.

4) Connect CN0010 as it was.

5) Set up the PLAY mode.

6) Check that the VOM reading is within the value in Step 3). If it is not, readjust RV201.

2. EVER 12V ADJUSTMENT

This adjustment should be executed after the replacement of R220 through R222, RV202, and D209.

Caution: Discharge C108 with a resistor of 1kΩ (more than 2W). If it is not discharged, you will get a shock.

1) Remove CN0011 off the FS-6 board and CN7004 off the TM-11 board.

2) Connect the VOM at the point shown in Fig. 2.

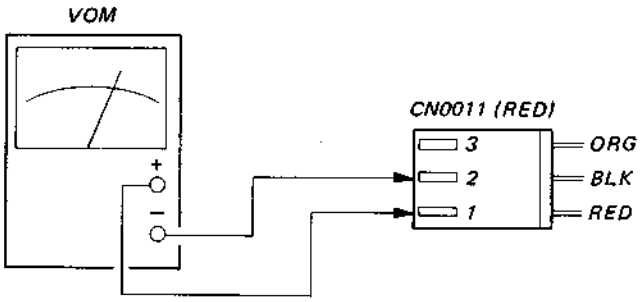


Fig. 2.

3) Adjust RV202 for 12 V ± 0.1 V.

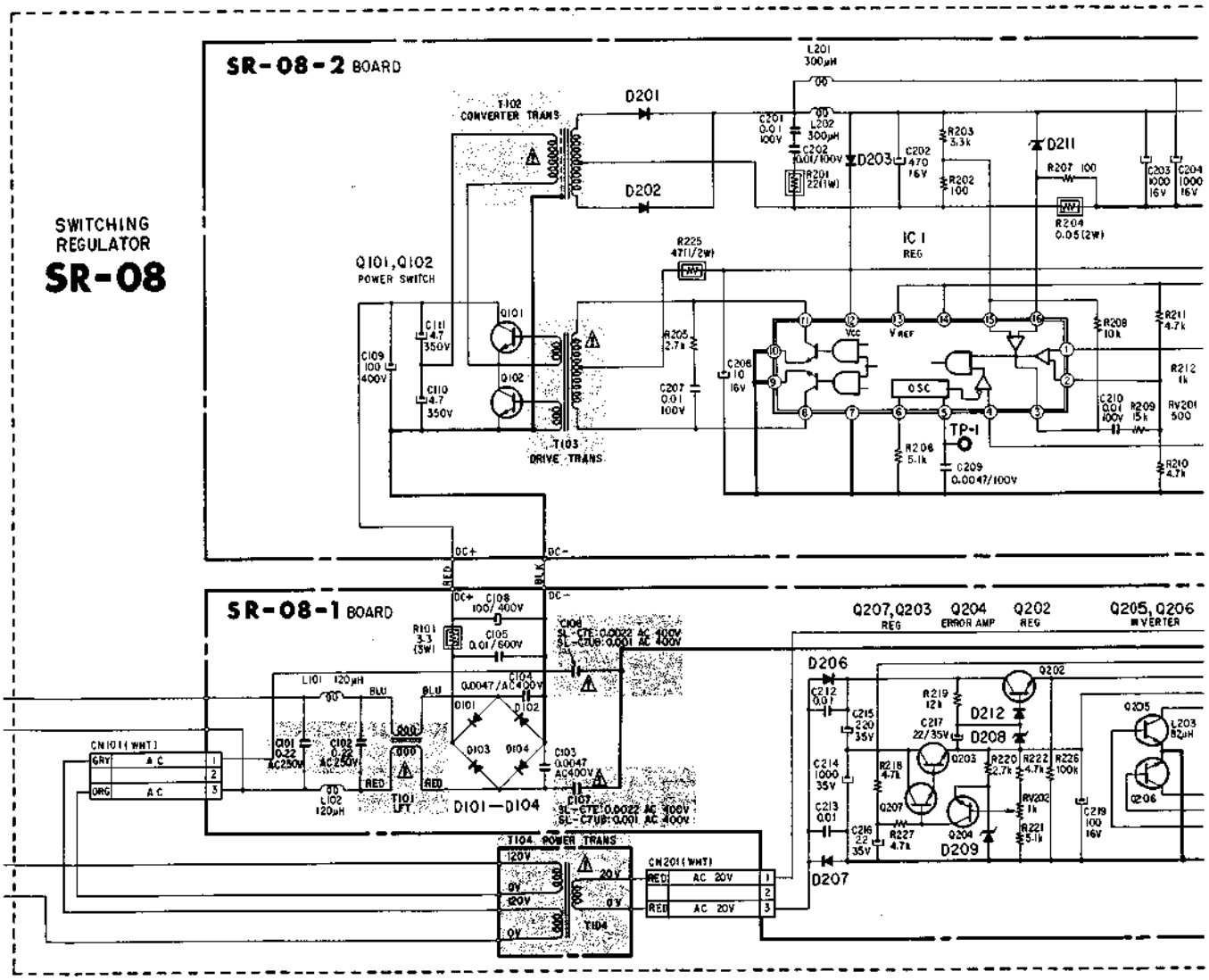
4) Connect CN0011 and CN7004 as they were.

5) Place the VTR into an optional mode.

6) Check the VOM reading is within the value in Step 3). If it is not, adjust RV202

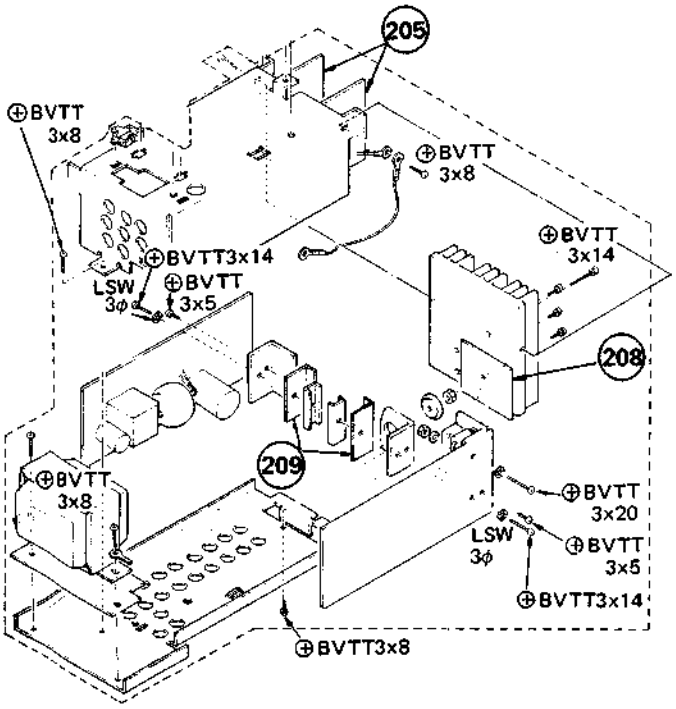
3. SAFETY SPECIFICATION PARTS

Safety specification parts have been changed as follow.



Ref. No.	Part No.	Description	Remark
⚠C101, 102	1-130-160-11	0.22, AC250V, film	
⚠C106, 107	1-161-734-11	0.0022, AC400V, film, SL-C7E	
⚠	1-161-826-11	0.001, AC400V, film, SL-C7UB	
⚠T101	1-421-377-11	LFT	
⚠T102	1-446-558-11	Converter	
⚠T103	1-437-085-11	Drive	
⚠T104	1-446-589-12	Power	

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.



No.	Part No.	Description	Remark
⚠205	2-430-138-00	PLATE, insulating	
⚠208	2-430-132-00	SHEET, rubber (large)	
⚠209	2-430-133-00	SHEET, rubber (small)	

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

4. NOTES ON PART REPLACEMENT

a. Replacement of Q101, Q102

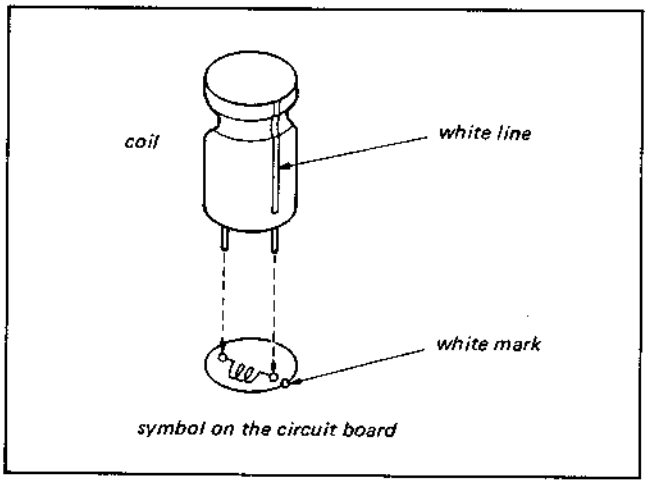
Replacement parts of Q101 and Q102 should be used the service kit.

All including parts in the service kit should be replaced when both or either of the transistors is defective.

Service Kit
Part No. A-6701-141-A
Assembly Parts transistor 2SC2335 . . . . . 2pcs.
rubber sheet . . . . . 2pcs.
resistor 3.3 (3W) . . . . . 1pc.
(for R101)

b. Replacement of L201 and L202

Attach the L201 and L202 as shown in Fig. 3 because the L201 and L202 have polarity.



5. KNOW-HOW OF REPAIR

Note: ① ⟶ ② ⟶ . . . shows the order of breakable parts.

The breakable parts in the excessive load of the SYS 12 V line of the REG 12 V.

① Q101, Q102 ⟶ ② R101 ⟶ ③ D201, D202 ⟶ ④ D101 to D104

The breakable parts in the excessive load of the EVER 30 V line of EVER 12 V.

① Q202, Q204 ⟶ ③ Q207

The breakable parts at the wrong switching of the INPUT switch (110 V – 127 V – – 220 V – 240 V).

① T104 ⟶ ② C214, C215

SL-C7E

SERVICE MANUAL

No. 6
July, 1981

SUPPLEMENT

SUBJECT: Addition of silver metallic color case

File this supplement with the service manual.

Part Name	Part No.	
	Dark Gray Color Case	Silver Metallic Color Case
PANEL ASS'Y, front	A-6703-062-A	A-6703-186-A
DOOR, front	3-659-589-21	3-659-589-63
CASE, upper	3-662-292-00	3-669-001-51
DOOR, preset	3-659-599-21	3-659-599-91
LID ASS'Y, cassette-up	X-3662-214-0	X-3662-248-0
EMBLEM ASS'Y (P) (X-3658-101-0)	3-703-471-00	3-703-471-00
COVER ASS'Y, counter	X-3662-205-0	X-3664-306-0
COMMANDER ASS'Y, remote	A-6701-071-A	A-6701-174-A
CASE (UPPER) ASS'Y	X-3662-213-0	X-3662-249-0
INDIVIDUAL CARTON ASS'Y (X-3662-220-0)	3-662-390-00	3-662-391-00

Note: Part Numbers of emblem ass'y (P) and individual carton ass'y of dark gray color case are changed as above.

VIDEOCASSETTE RECORDER

SONY®

Betamax
VIDEOCASSETTE RECORDER

SL-C7F

No. 1
September, 1980

SUPPLEMENT

Subject: Alignment

SONY
SERVICE MANUAL

TABLE OF CONTENTS

SECTION 1
PREPARATION FOR MECHANICAL SECTION CHECK, ADJUSTMENT, AND REPLACEMENT

1-1. DISASSEMBLY

1. Removal and Re-assembly of Cabinet

1. Removal of outer cabinet perform procedures ① to ⑧
2. Note on assembling
   (i) When the upper case with the cassette-up lid is to be attached, attach the upper case while the cassette-up is raised.
   (ii) Attach the cassette-up lid so that the clearance between the cassette-up lid and the upper case is 1 to 2mm.

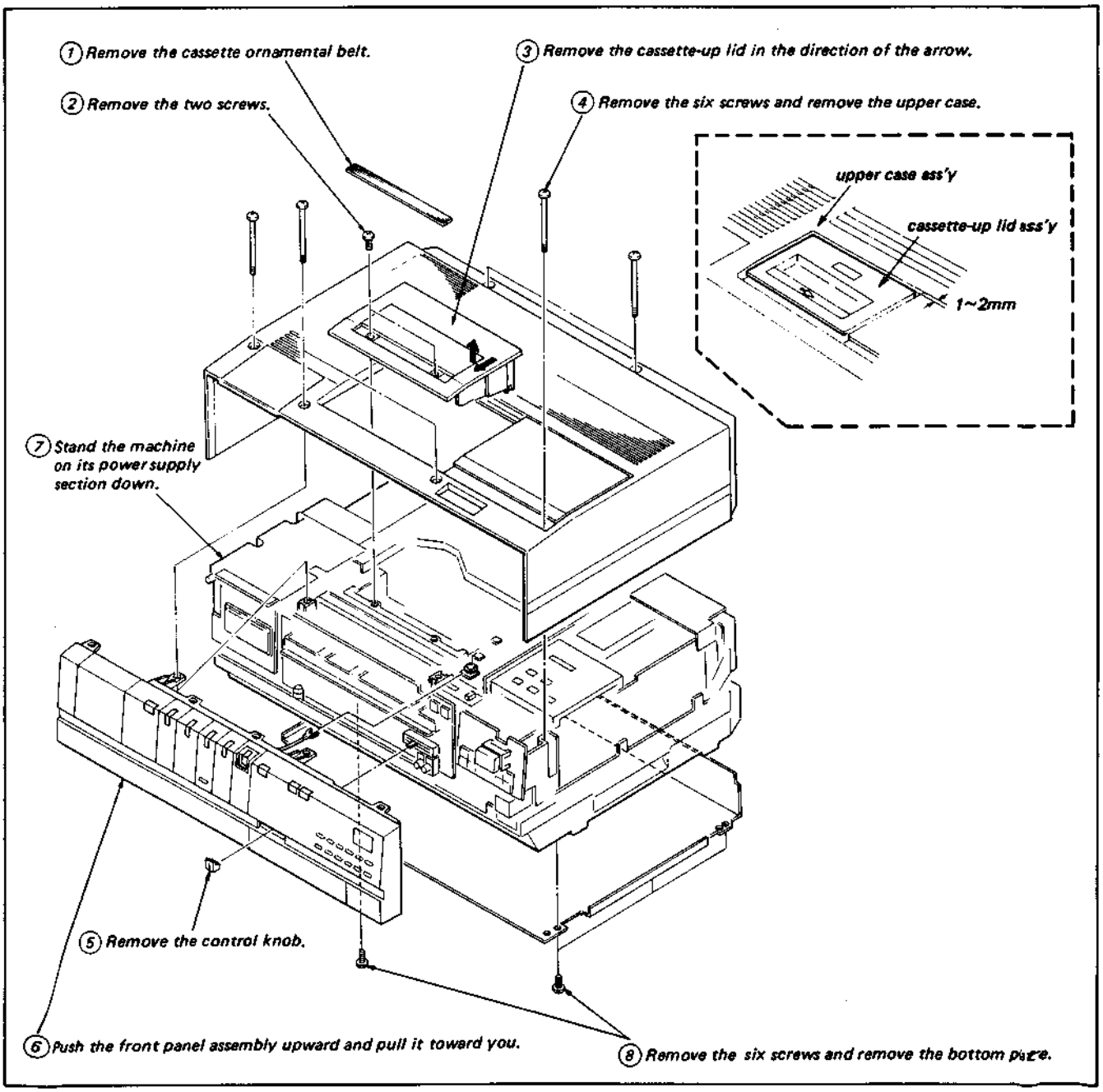


Fig. 1-1. Removal and re-assembly of cabinet

2. Tuner-IF Block Removal

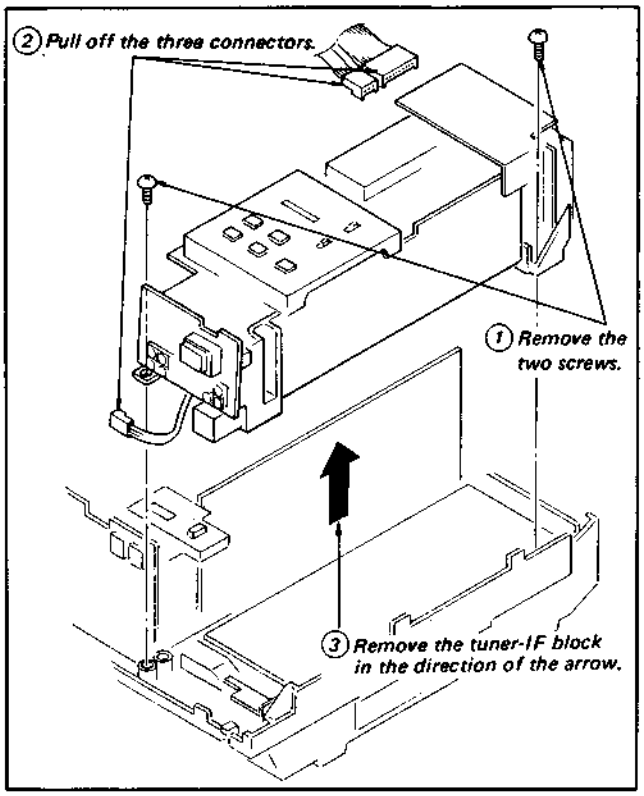


Fig. 1-2.

3. Timer Block Removal

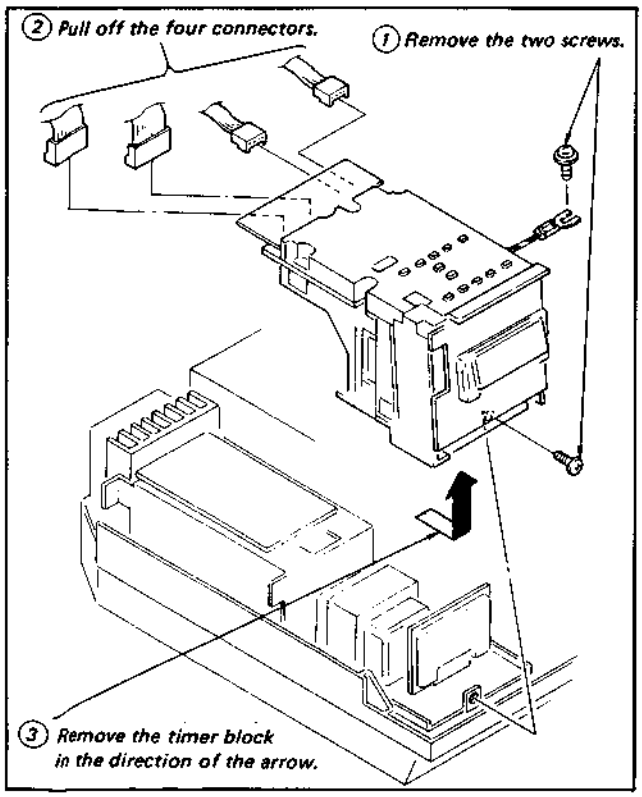


Fig. 1-3.

4. Timer Panel Removal

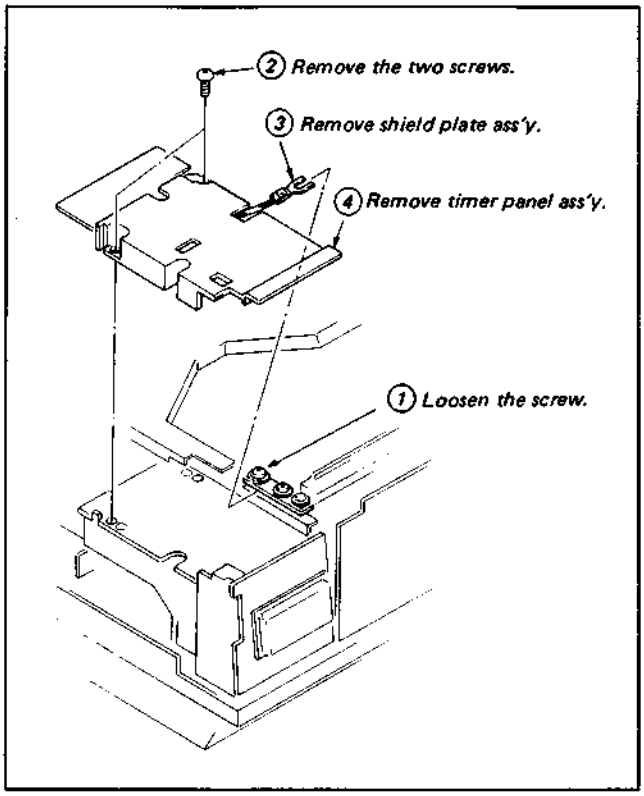


Fig. 1-4.

5. Checks of AS-3 and YC-12 Boards

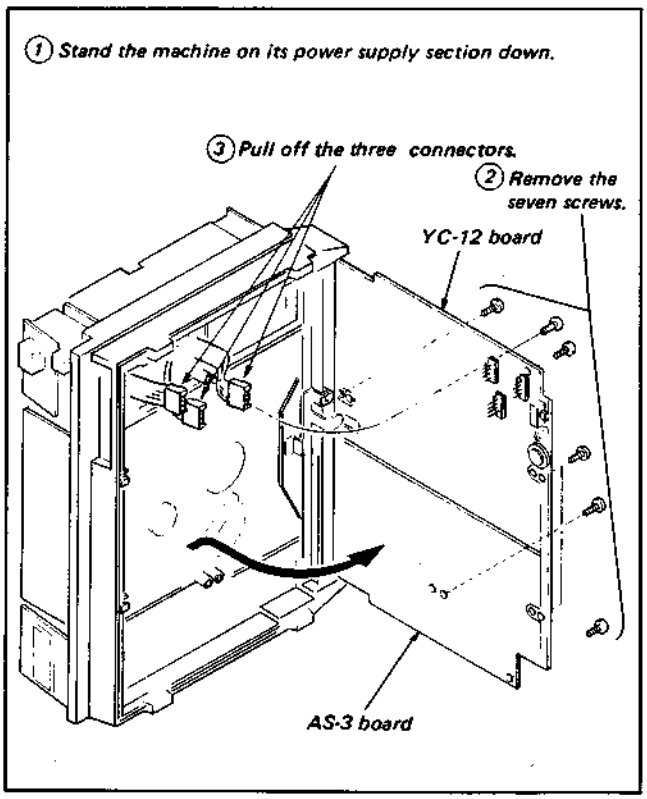


Fig. 1-5.

6. Switching Regulator Removal

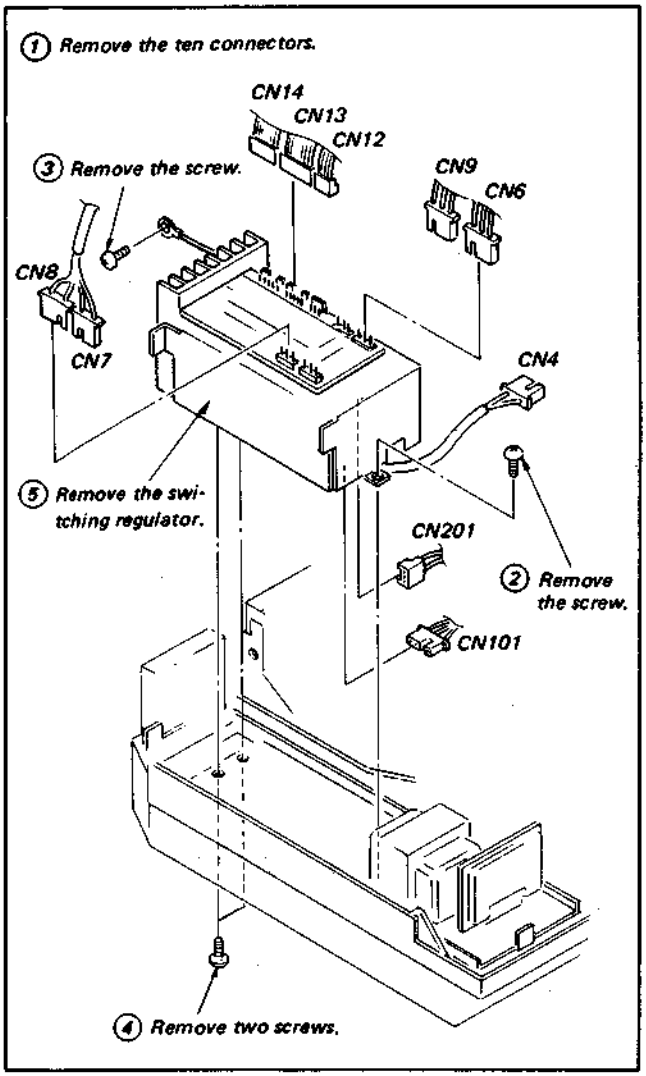


Fig. 1-6.

1-2. NOTES ON MAINTENANCE

1. Never place the machine upside down when the upper case lid has been removed from the machine, with the fan (black) attached on the drum assembly. (Since the fan projects from the chassis surface, an excessive force is applied on the drum if the machine is placed upside down, which could alter the tape movement and the tape interchangeability.)
2. Be sure to install the fan on the drum prior to the tape playback check or the electrical system alignment. If the check or the alignment is performed without the fan installed, the picture on the monitor may bend, as shown in Fig. 1-5.
3. The KR5-1J alignment tape is effective in making the tape path adjustment easy, as compared with the former alignment tapes.

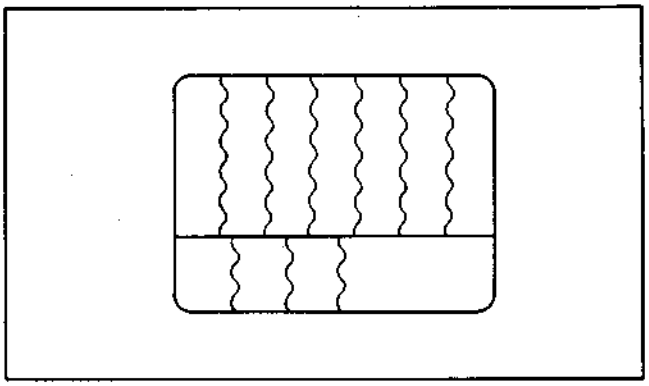


Fig. 1-7.

1-3. OPERATING RECORDER WITHOUT CASSETTE INSTALLED

1. To Set Up Threading Completion State Without Cassette and Cassette Lift Assembly.
   (This state is called "STOP mode" in this guide.)
   - Push down the cassette delection lever until the threading ring stops. (See Fig. 1-6.)

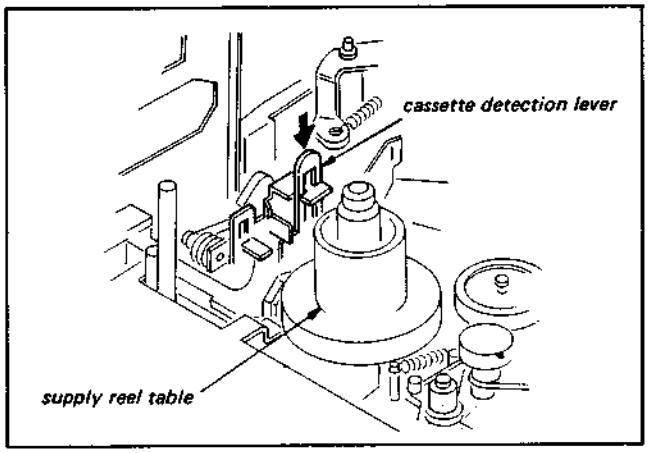


Fig. 1-8.

2. To Set Up PLAY, FAST FWD, And REWIND States Without Cassette Installed
   - Capture the cassette detection lever with an alligator clip, or an equivalent, as shown in Fig. 1-7, to place the cassette detection switch, mounted on the chassis, into the ON state. Then a desired state of operation can be set up by depressing the function button for the desired state. But note that the PLAY function button must be depressed after performing the procedures for stopping the slack sensor operation described in Section 1-4.

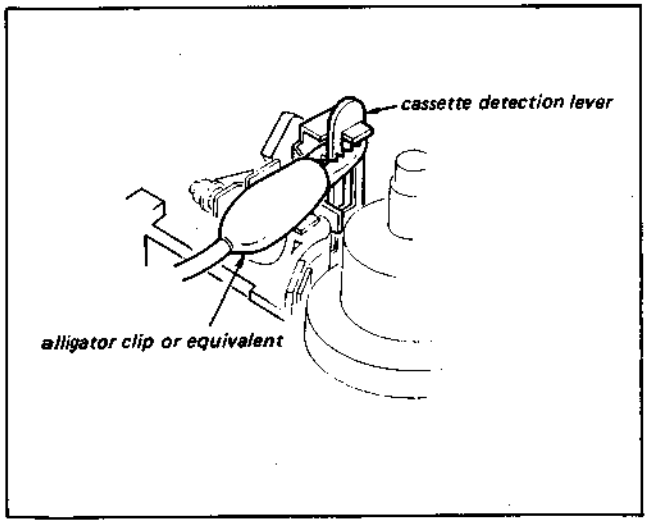


Fig. 1-9.

3. To Set Up EJECT Mode Without a Cassette:

   Note: Remove the alligator clip that captured cassette detection lever in Step 2.

   - Keep pressing the EJECT button until the unthreading is completed.

4. To Set Up RECORD Mode Without a Cassette:
   - Capture the cassette detection lever with an alligator clip as shown in Fig. 1-7, manually depress the erasing protection plate as shown in Fig. 1-8, and perform the procedure in Section 1-4, "Stopping Slack Sensor Operation". Then depress the RECORD button or the AUDIO DUB button.

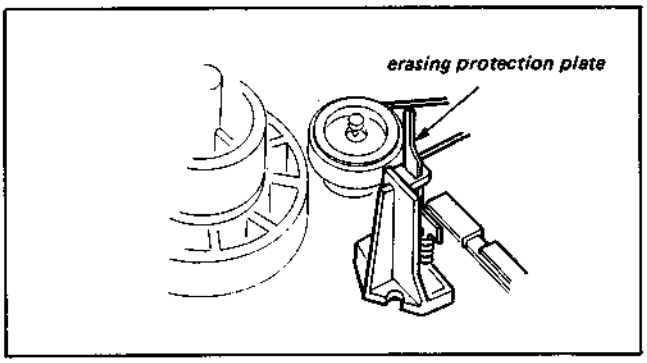


Fig. 1-10.

1-4. STOPPING SLACK SENSOR OPERATION

1. Insert a toothpick, or something like a matchstick whose point is sharpened, into the hole on the CN-6 board as shown in Fig. 1-9 to stop the movement of the slack sensor arm. A plastic pick would be preferred to the wooden one.

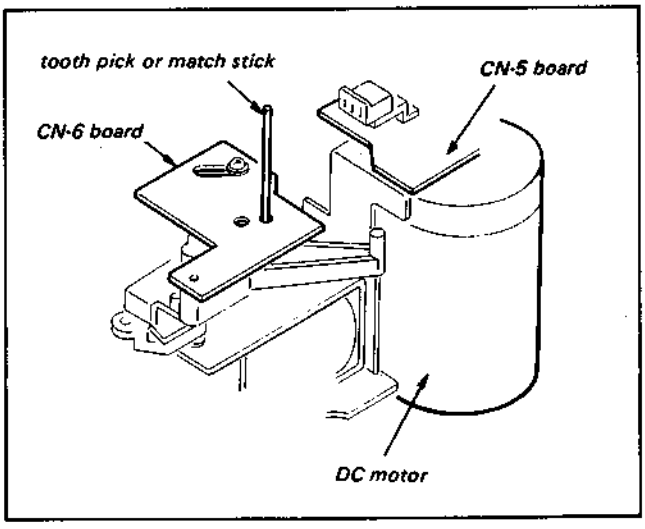
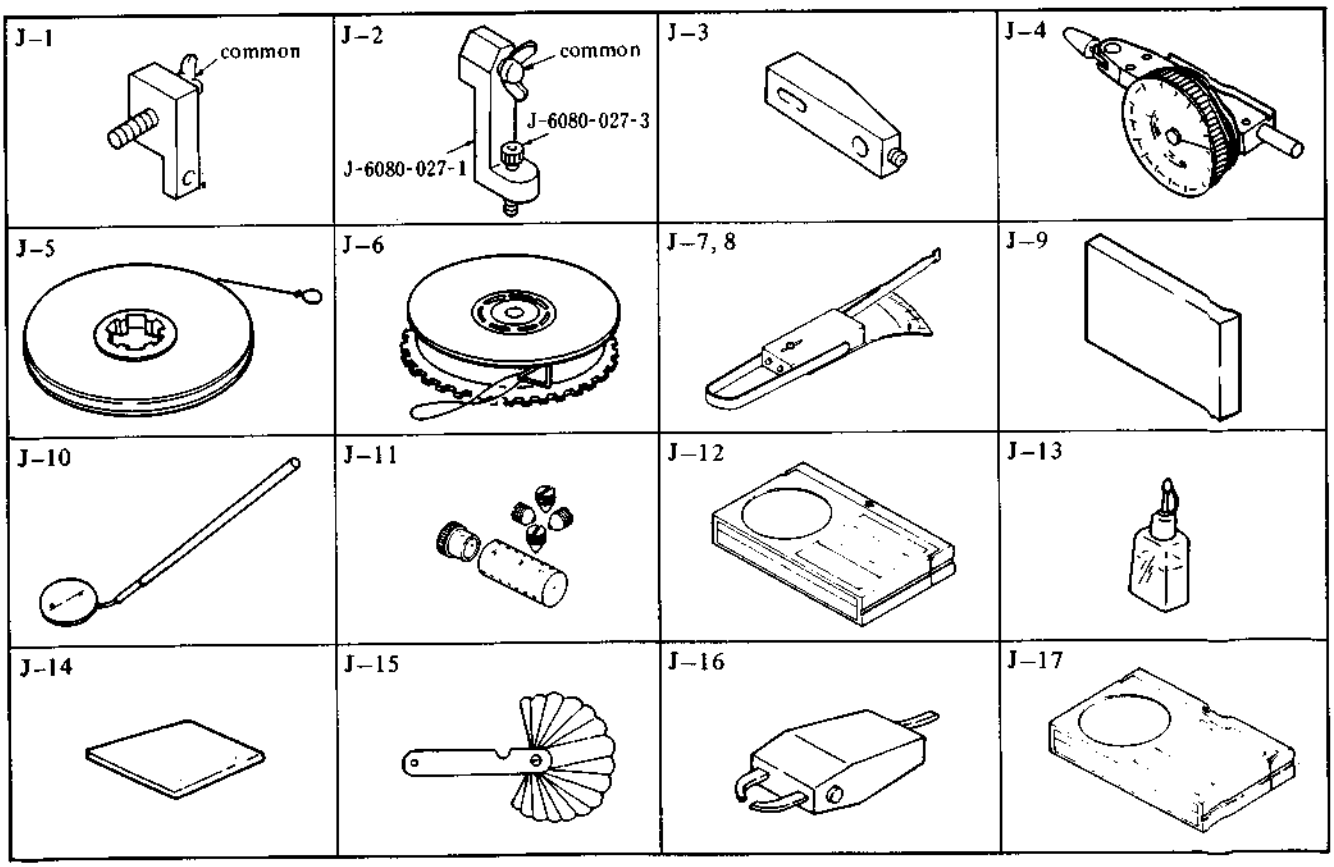


Fig. 1-11.

1-5. TOOLS AND FIXTURES REQUIRED

Ref. No.	Name	Part Code	Carved Jig No.	Use and Remarks
J-1	Upper drum eccentricity adjustment jig	J-6080-027-2	SL-0027	Components of the SL-0012 which has been used are utilized as eccentricity adjustment jigs (J-3 and J-4) of the video head disc.
J-2	Upper drum eccentricity adjustment jig	J-6080-027-1 J-6080-027-3		
J-3	Upper drum eccentricity adjustment jig	J-6080-012-A	SL-0012	
J-4	Upper drum eccentricity adjustment jig			
J-5	Reel table tension gauge	J-6080-011-A	SL-0011	For torque measurements
J-6	FWD back tension measurement jig	J-6080-002-A	SL-0002	For FWD back tension measurement
J-7	Sector type gauge (for 50 g)	7-732-050-20	———	For back tension and torque measurements
J-8	Sector type gauge (for 100 g)	7-732-050-30	———	
J-9	Parallel board	J-608-657-0A	SL-0657	For zenith adjustment of the audio/CTL head
J-10	Inspection mirror (handle)	7-723-902-01	———	For tape path adjustment and tape running check Be sure to place an order for the handle and the mirror as a set.
	Inspection mirror (mirror)	7-723-902-11	———	
J-11	Dihedral adjustment screw	J-6080-013-1	SL-0013	For video head dihedral adjustment
J-12	Alignment tape (KR5-1J)	8-969-996-03	———	For over all adjustments such as tracking and picture quality
J-13	Cleaning fluid	Y-2031-001-0	———	For cleaning
J-14	Chamois	2-034-697-00	———	For cleaning
J-15	Thickness gauge	9-911-053-00	———	For checking clearance
J-16	Head demagnetizer	Common	———	For video and audio head degaussing (Demagnetizer HE-2 or HE-3)
J-17	Lapping tape	8-888-004-00	———	For video head cleaning

Note: When the Jig Nos. J-1 and J-2 are ordered, be sure to place an order for these together as a set.



SECTION 2
PERIODIC CHECK AND MAINTENANCE

- It is recommended that the following periodic check and maintenance be performed for obtaining the full function and performance of the machine and extending the lives of the machine and tape.

2-1. MAINTENANCE AFTER REPAIR

The following maintenance items must be performed after repair of the machine without regard to the operating hours of the machine.

(1) Cleaning of the video head disk assembly
- Press chamois saturated with the cleaning fluid or isopropyl alcohol lightly on the video head disk assembly and turn the fan on the drum slowly by hand for cleaning. (Never try to clean the video head disk assembly with the motor running.)
- Never move the chamois vertically against the head tips for cleaning, or the head tips will be damaged.

(2) Cleaning of the tape movement system
- Clean the surfaces which the tape contacts during its movement (the tape guides, drum assembly, capstan, and pinch roller) with chamois saturated with the cleaning fluid or isopropyl alcohol.

(3) Cleaning of the driving system
- Clean the driving elements (such as belts, idlers, and reel table surfaces) with a piece of cloth saturated with the cleaning fluid or isopropyl alcohol.

2-2. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to user's operating hours.

○ Cleaning ◎ Lubrication ★ Replacement ☆ Confirmation

	Maintenance & Check	Replacement Part No.	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
	Operating Hour (H)												
Tape Movement System	Cleaning of tape movement system	———	○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning & degaussing of ACE ass'y	———	○	○	○	○	○	○	○	○	○	○	
	Cleaning, degaussing & replacement of video head disk ass'y	A-6762-038-A	○	★	○	★	○	★	○	★	○	★	The life of a head varies, depending on operational conditions and methods.
Driving System	Lubrication to thrust retainer	———	—	◎	—	◎	—	◎	—	◎	—	◎	Apply a drop of oil (such as sewing machine oil) on each of upper and lower bearings.
	Lubrication to thrust bearing (under reel table)	———	—	—	◎	—	—	◎	—	—	◎	—	Remove reel table and apply a drop of oil (such as sewing machine oil) on thrust bearing.
	Cleaning & replacement of capstan belt	3-659-351-00	○	○	★	○	○	★	○	○	★	○	•Cleaning must be done whenever repair is made.
	Cleaning & replacement of belts other than capstan belt	———	○	○	○	○	○	○	○	★	○	○	•Replacement must be done depending on operating hours on the table, or every two years.
	Replacement of FWD limiter	X-3653-310-0	—	—	★	—	—	★	—	—	★	—	
	Cleaning of iron core and opening of solenoid	———	—	—	—	○	—	—	—	○	—	—	Wipe iron core and opening of solenoids with a dry cloth.
Performance Confirmation	Abnormal sound	———	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which makes abnormal sound.
	Measurement of FWD back tension	———	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to Section 3-18. Specified value: 35 to 45g. (when measured with jig tape)
	Confirmation of brake system	———	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to Section 3-17.
	Confirmation of record & playback functions	———	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.

- Belts other than capstan belt

FWD belt	:	3-653-324-00
Threading belt	:	3-659-301-00
EJECT belt	:	3-659-397-00
FF belt	:	3-659-471-00
Counter belt	:	3-659-485-00

(Note on Overhaul)

A part replacement must be done in the overhal operation, referring to the listed items. The replacement periods of the motor and the head which are not included in the chart items are as follows.

Full erase head . . . . . about 4,000 operating hours
Capstan motor . . . . . about 2,000 operating hours

2-3. OTHERS

(1) Lubricating Oil

- Be careful in applying oil to any parts.
  Do not permit the oil to coat any surface that is touched by the tape, heads, or drive belts.

- Be sure to use SONY oil (or equivalent) for lubrication. (Various troubles will be caused, if a different viscosity oil is used.)
  SONY Oil: Part No. 7-661-018-01
  (Mitsubishi Diamond Oil #440)
  OR THE EQUIVALENT OF SEWING MACHINE TYPE OIL

- Use the oil without dust or other foreign material for the bearing lubrication. (If an oil including dust and others is used, friction and burning of the bearing are apt to occur)

- The quantity of "a drop of oil" is about the quantity that will attach to the tip of a 2 mm diameter stick, as shown in the figure.

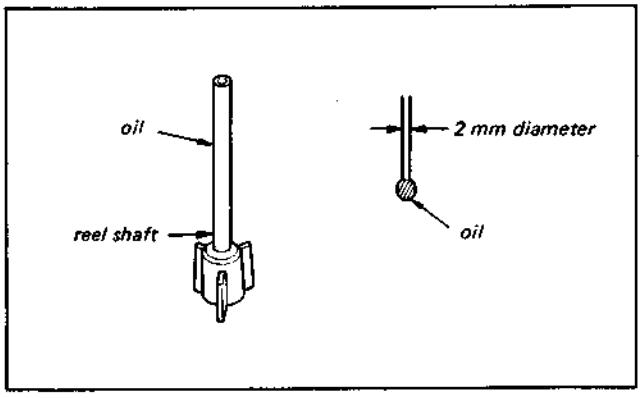


Fig. 2-1.

SECTION 3
CHECK, ADJUSTMENT, AND REPLACEMENT PROCEDURES

3-1. REPLACEMENT OF VIDEO HEAD DISK ASSEMBLY AND ECCENTRICITY ADJUSTMENT

1. Remove the video head disk assembly, following Steps ① to ⑥ shown in Fig. 3-1.

Note:
- For removing fan ①, hold video head disk assembly ⑥ (without touching heads) and turn the fan in a counterclockwise direction.
- Never loosen the two setscrews that fasten the lower flange to the drum shaft.
- Never loosen the lower two screws of the drum support.
- Prior to installing the video head disk assembly ⑥, clean surfaces Ⓐ and Ⓑ with a piece of cloth saturated with methanol or isopropyl alcohol.

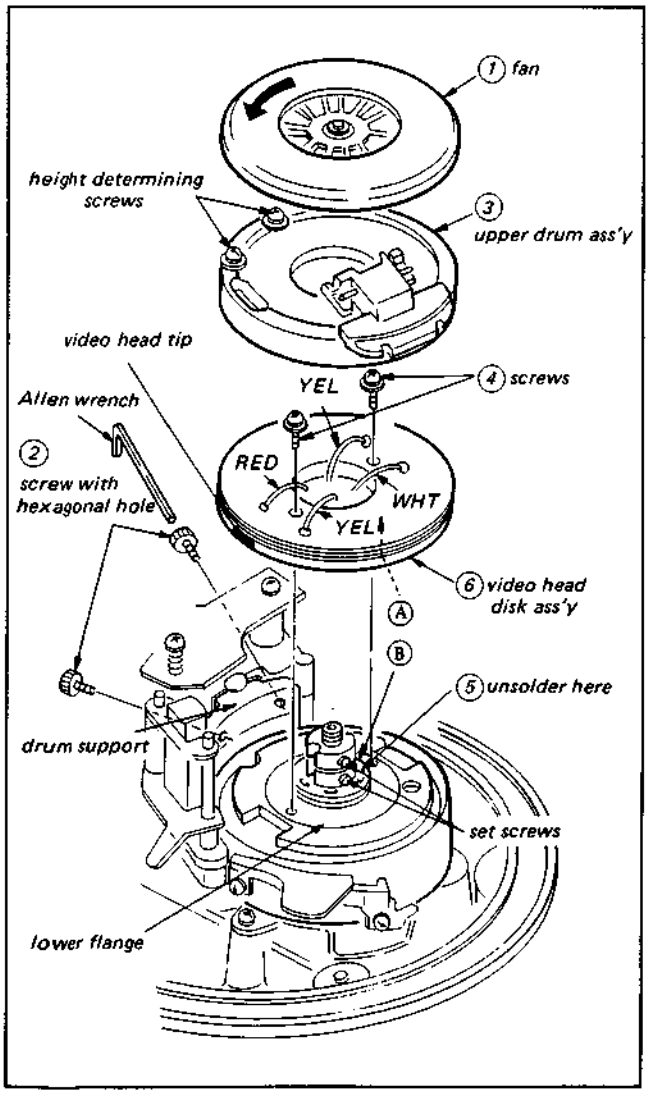


Fig. 3-1. Replacement of the video head disk assembly

2. Install the video head disk assembly tentatively (with two screws only finger-tight) and perform the eccentricity adjustment.

(i) Combine adjusting fixture parts ①, ②, ③, and ④ as shown in Fig. 3-2. Set the combined fixture on the machine by mounting the eccentricity gauge assembly in the capstan husing assembly. See Fig. 3-2.

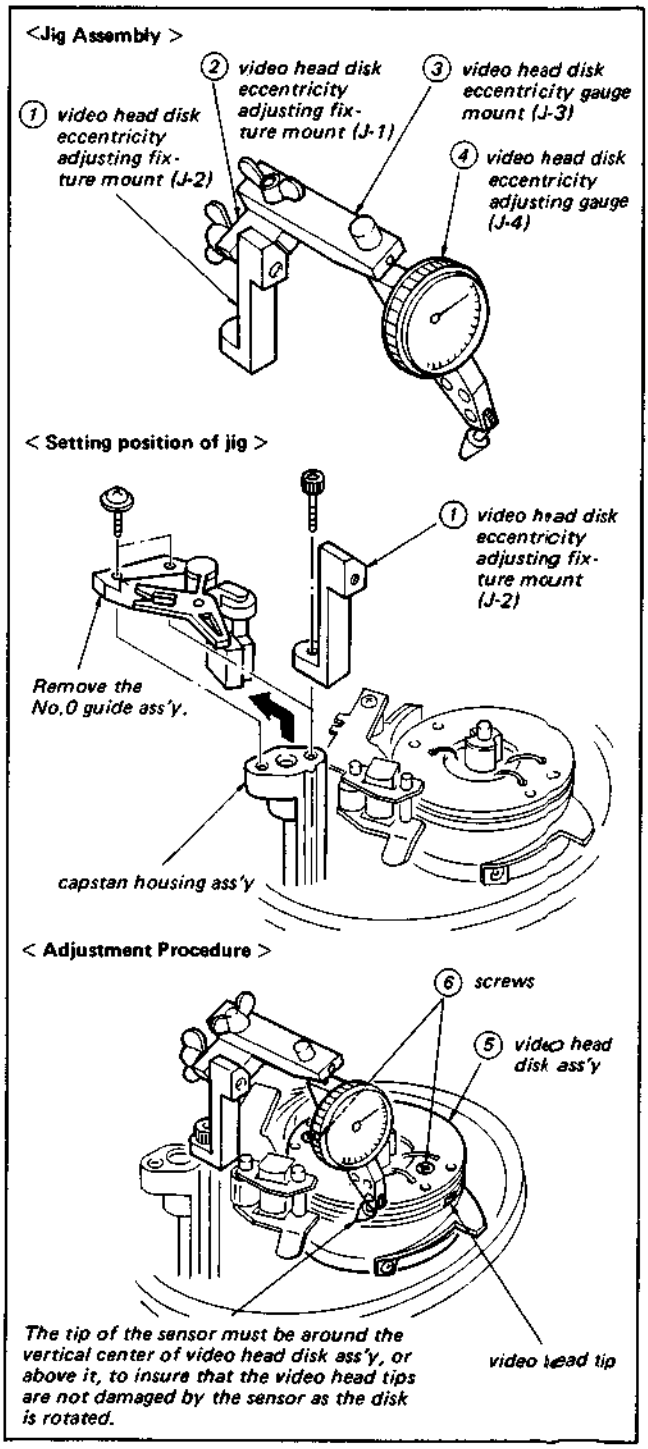


Fig. 3-2. Eccentricity adjustment of the video head disk assembly

(ii) Turn the shaft of the drum counterclockwise slowly with the fingers and adjust the video head disk position so that the variation in the reading of the drum eccentricity adjusting gauge is within 5 μm during each turn of the drum, by very gently tapping a screwdriver whose blade-tip is against the inner circumference of video head disk assembly (5).

(iii) Tighten the screws (6) that secure the video head disk assembly (5) alternately and gradually after the eccentricity adjustment is completed. (tightening torque: more than 10 kg.cm.)

(iv) After the screws are tightened, confirm again that the eccentricity deflection is within 5 μm.

(v) Solder the four leads of the head and remount the upper drum assembly while holding the upper drum height determining screws. (See Fig. 3-1.)

3. Perform the following adjustments after the replacement of the video head disk assembly.

3-11-6. No. 0 guide section assembly adjustment
3-19-1. Tape path adjustment
3-19-4. ACE assembly position adjustment
3-19-5. Video head dihedral adjustment
4-3-1.–2. RF switching position adjustment
4-3-1.–3. REC mode servo lock phase adjustment
4-4-2. Playback amplifier frequency characteristic adjustment (RF-2 board)
4-4-1. Y-FM record current adjustment (RF-2 board)
4-4-16. Chroma record current adjustment (YC-12 board)

3-2. REPLACEMENT OF DRUM ASSEMBLY

1. Stand the machine on its left side. Open the YC-12 and AS-3 boards. (Refer to Section 1-1-4.)
2. Remove FF belt (1) and drum shield (2) shown in Fig. 3-3.
3. Remove two screws (1) and connectors (2) and (3) shown in Fig. 3-4. The drum assembly can then be removed, by pulling it up.
4. Loosen the rotor assembly by inserting a long-nose pliers or a screwdriver into the two rotor holes shown in Fig. 3-5 and removing the N5φ nut and SW5φ washer. Pull off the rotor assembly.
5. Remove the screw mounting the stator assembly (shown in Fig. 3-5) and pull off the stator assembly.
6. Install the rotor assembly and the stator assembly (removed in Steps 4 and 5) onto the new drum assembly.

Note: Install the stator assembly so that the 3P connector on the stator assembly fits into the slot of the shield case assembly.

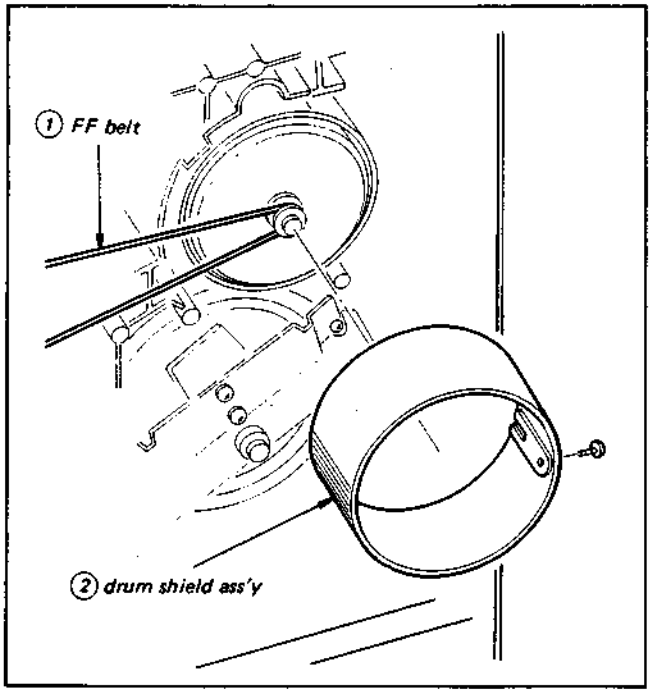


Fig. 3-3. Replacement of drum assembly (1)

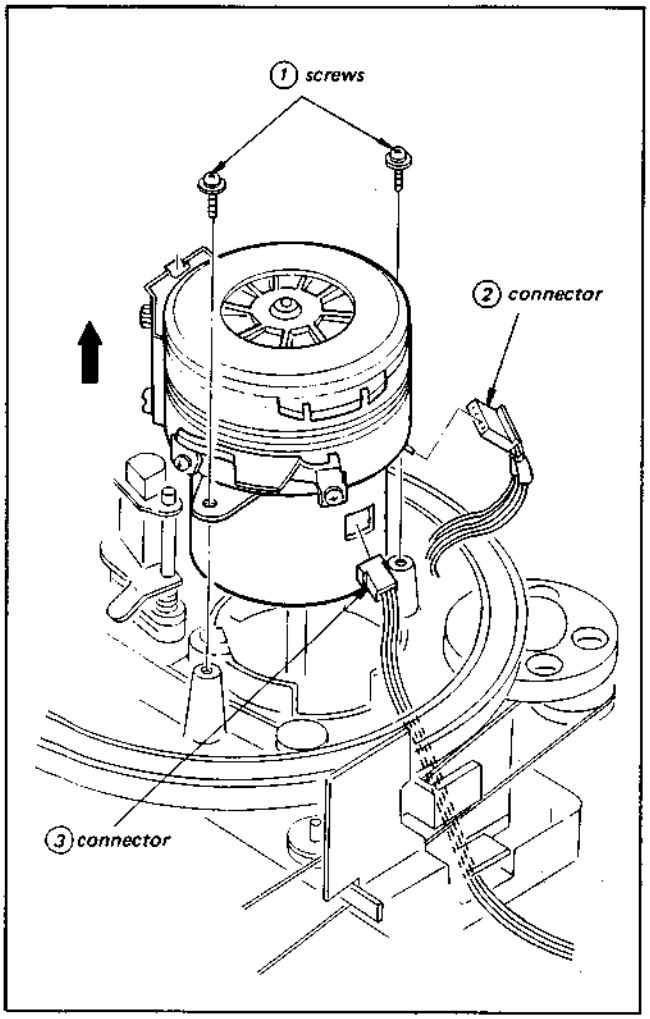


Fig. 3-4. Replacement of drum assembly (2)

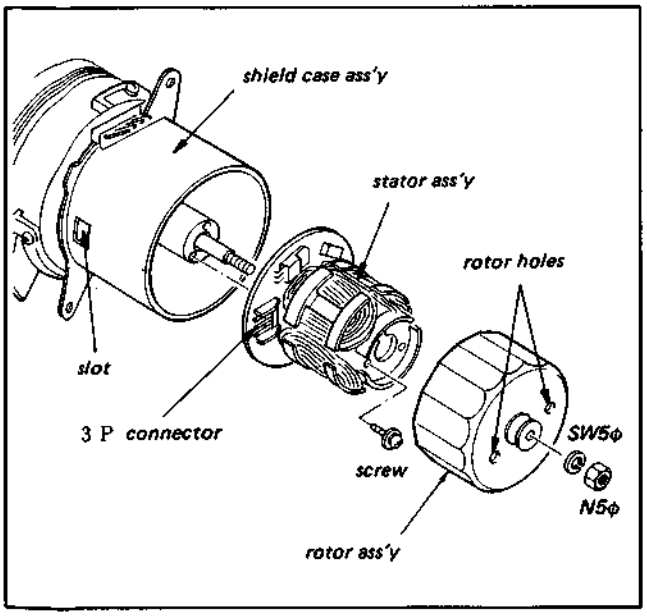


Fig. 3-5. Replacement of drum assembly (3)

7. Install two connectors, the drum shield assembly, and the FF belt on the drum assembly.

Note: 1. The bottom edge of the drum shield must be flush with the bottom edge of the shield base assembly.

2. Do not tighten the drum shield set screw too much or housing will distort.

Pull the leads of connector (A) in the arrow direction and dress the leads so that the leads do not touch the EJECT belt. (See Fig. 3-6.)

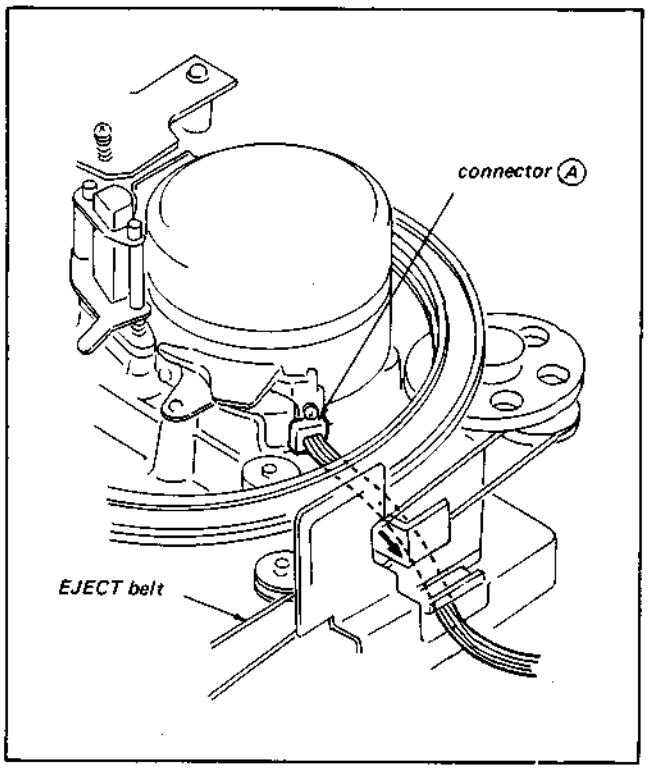


Fig. 3-6. Replacement of drum assembly (4)

8. Perform the following adjustments after the replacement.

3-19-1. Tape path adjustment
3-19-4. ACE assembly position adjustment
4-3-1. Drum servo system adjustment
4-4-2. Playback amplifier frequency characteristic adjustment (RF-2 board)
4-4-1. Y-FM record current adjustment (RF-2 board)
4-4-16. Chroma record current adjustment (YC-12 board)

3-3. REPLACEMENT OF CAPSTAN DC MOTOR

1. Stand the machine on its left side. Open the YC-12 and the AS-3 boards. (Refer to Section 1-1-4.)
2. Remove the DC motor from the drum base, following Steps ① to ④ shown in Fig. 3-7.
3. Take out the DC motor, following Steps ① to ⑦ shown in Fig. 3-8.

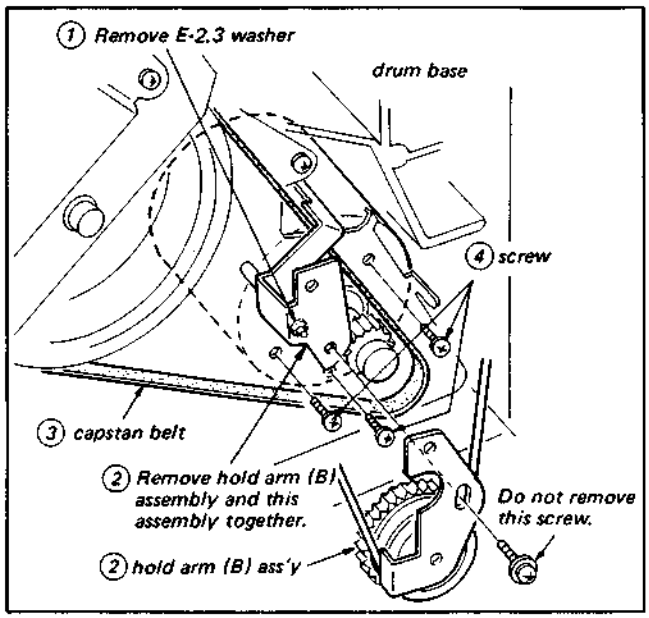


Fig. 3-7. Replacement of DC motor (1)

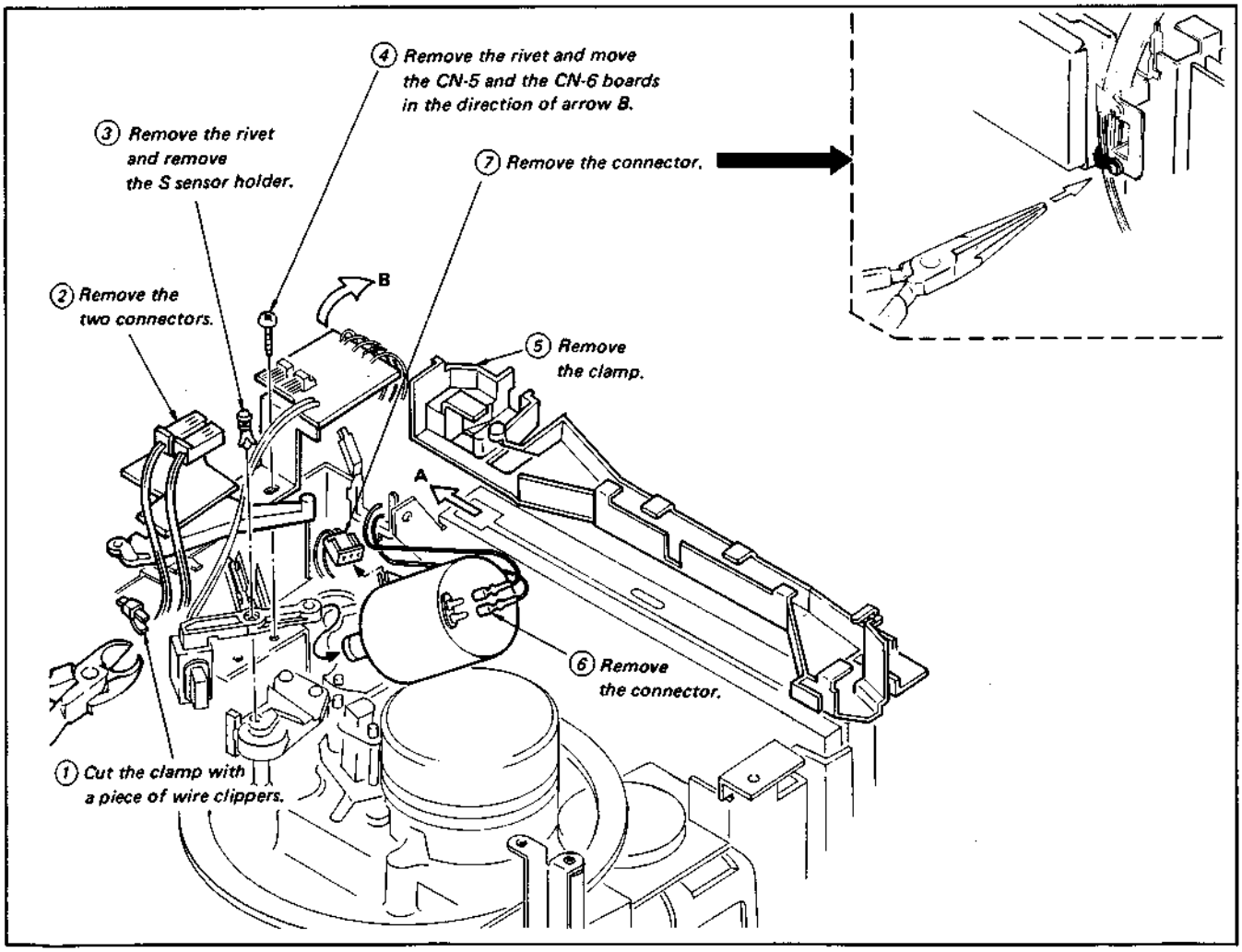


Fig. 3-8. Replacement of DC motor (2)

4. Remove capstan shield (1) and motor pulley assembly (2) from the defective motor and install them on the replacement motor. (See Fig. 3-9.)

Note: Install motor pulley assembly (2) so that there is a clearance of approx. 1.5 mm between the motor pulley assembly and capstan motor (3).

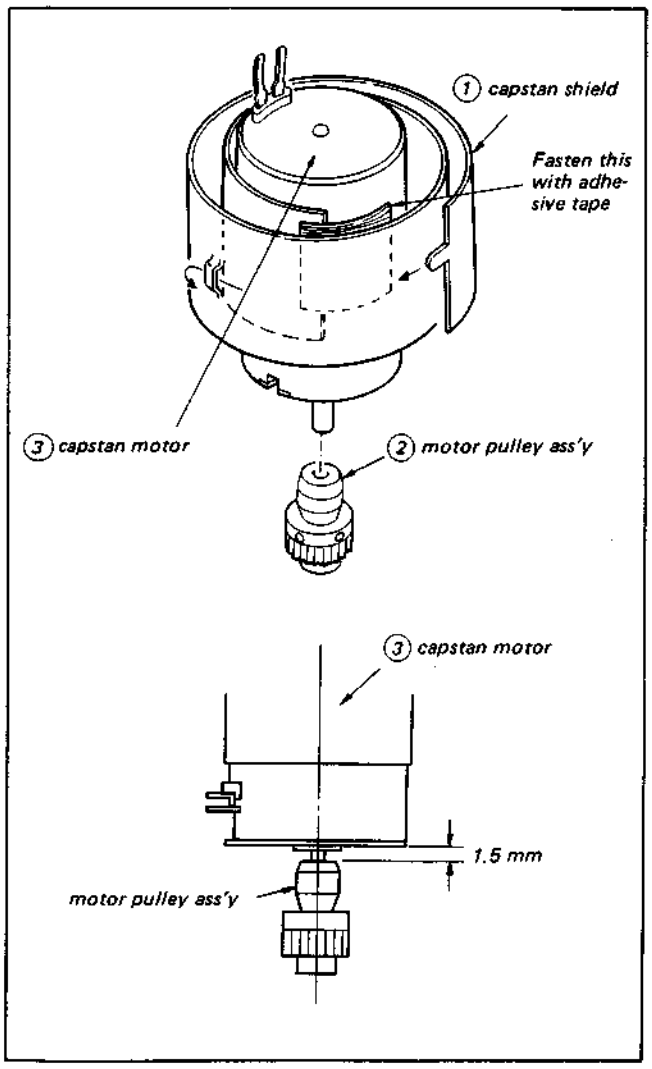


Fig. 3-9. Replacement of DC motor (3)

5. Perform the following adjustment after the replacement.

4-3-2.–1. Capstan free speed adjustment

3-4. REPLACEMENT AND ADJUSTMENT OF TENSION REGULATOR ARM PLATE ASSEMBLY AND TENSION REGULATOR BAND ASSEMBLY

The tension regulator arm replacement must be done carefully, following the procedure below, because the tape interchangeability is much affected by the tension regulator arm operation.

3-4-1. When Tension Regulator Band Assembly is Replaced;

1. The tension regulator band assembly can be removed after removing screw (1) and hook (2) shown in Fig. 3-10.
2. Perform the tension regulator FWD position adjustment described below after the replacement.
   - (i) Place the machine, without an inserted cassette, into the STOP mode. (Refer to Section 1-3.)
   - (ii) Set up the PLAY mode.
   - (iii) Move the tention regulator band assembly (3) in the arrow direction as shown in Fig. 3-10 so that the positional relationship of the brake band assembly is as shown (A) in Fig. 3-10. Then tighten screw (1).
   - (iv) Perform the FWD back tension adjustment, Section 3-18, after the replacement.

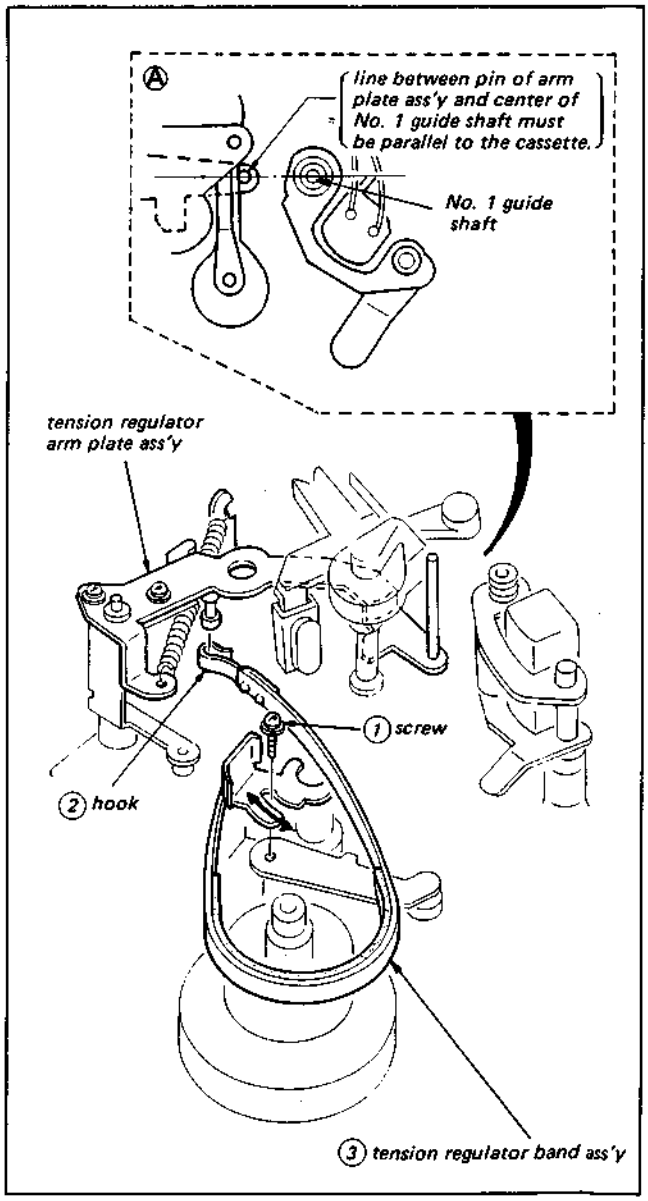


Fig. 3-10. Replacement and adjustment of the tension regulator band assembly

3-4-2. When Tension Regulator Arm Plate is Replaced:

1. The tension regulator arm plate can be removed after removing two screws (2) and spring (3) shown in Fig. 3-11.
2. After the replacement, perform the tension regulator FWD position adjustment as follows.
   (i) Set up the STOP mode without an installed cassette. (Refer to Section 1-3.)
   (ii) Set up the PLAY mode.
   (iii) Loosen screw (5) that mounts tension regulator band assembly (4) as shown in Fig. 3-11. Move tension regulator band assembly (4) in the arrow direction, and tighten screw (5) tentatively when the condition shown in (A) is set up.
   (iv) Insert a standard blade-tip screwdriver into section (B), adjust the clearance between release link (1) assembly (6) and tension regulator arm assembly (7), shown in Fig. 3-11, to be 2 to 2.5 mm, and tighten screw (2).
   (v) Repeat Steps (iii) and (iv) again and tighten screws (2) and (5).
   (vi) After the completion of the above steps, perform the FWD back tension adjustment, Section 3-18.

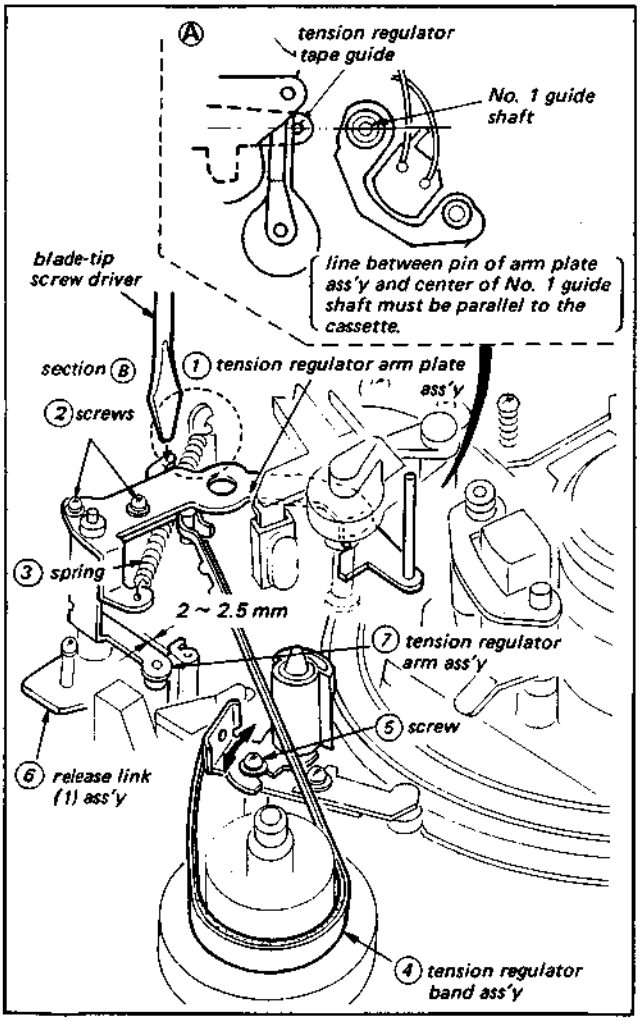


Fig. 3-11. Replacement and adjustment (1) of tension regulator arm plate assembly

3. Play back the 1 MHz segment of the alignment tape (KR5-1J). Loosen the lock screw and adjust screw "A" in Fig. 3-12 so that the RF waveform becomes that (see the waveform in the tape path adjustment, Section 3-19-1.) when the TRACKING knob is turned to the right and left from its center detent position and so that the tape is not apart from the flanges of guides (1), (2) and (3) shown in Fig. 3-12 and there is not a large tape curl at the guides.

Note: Do not turn screw "A" to the right and left more than 90 degrees from its initial position.

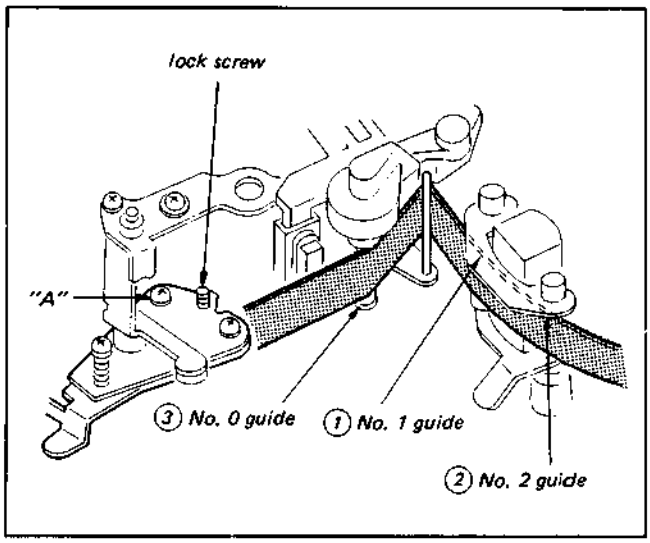


Fig. 3-12. Replacement and adjustment (2) of tension regulator arm plate assembly

4. Confirm that there is not a large bending of the tape at each of the tension regulator guide pin section and the No. 0 guide section shown in Fig. 3-13 after the completion of the adjustment. If the bending is found, repeat Step 3.

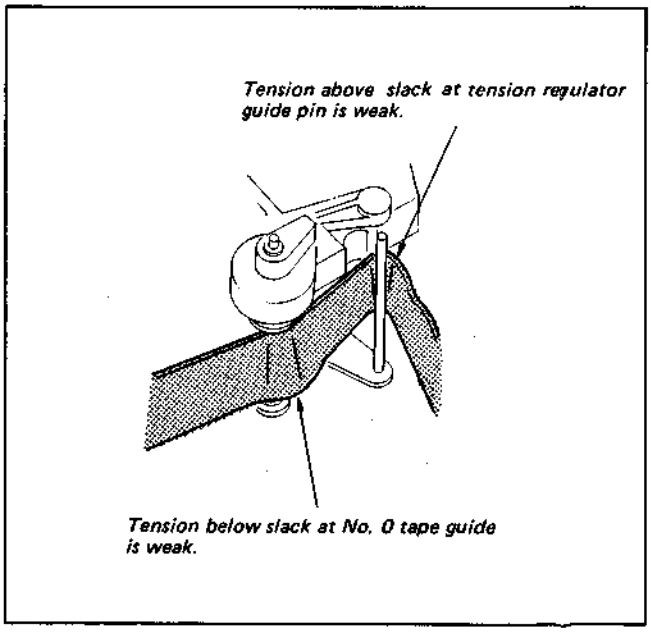


Fig. 3-13. Replacement and adjustment (3) of tension regulator arm plate assembly

3-5. REPLACEMENT OF CASSETTE-LIFT ASSEMBLY

1. Set up the unthreading state and remove the cassette-lift assembly by loosening four screws.
2. Install the cassette-lift assembly so that the reel tables and the reel holes on the cassette holder from concentric circles. (See Fig. 3-14.)
3. Insert the cassette into the cassette-lift compartment after the installation, set up the EJECT mode to perform unthreading after setting up the STOP mode, and confirm that the cassette-lift compartment assembly lifts. Make the confirmation after performing the lid opener position adjustment in Section 3-10.

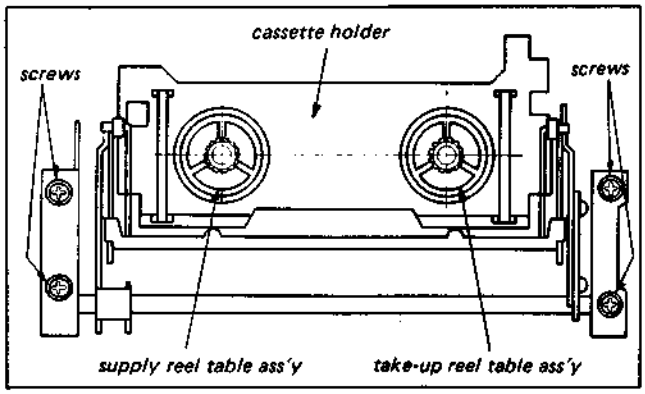


Fig. 3-14. Replacement of cassette-lift assembly

3-6. ADJUSTMENT OF REEL TABLE HEIGHT

- Since the reel table height serves as the reference of the tape movement system, the height must be adjusted caerfully after the reel table replacement.

1. Measure the height of the reel table with a slide caliper prior to the removal of the old reel table. (See Fig. 3-15.)
2. Place a new reel table, measure its height, and adjust height by adding or removing the adjusting spacer so that the difference in the heights of the former and new reel tables is within 0.1mm. (See Fig. 3-15.)

3-7. POSITION ADJUSTMENT, PAUSE SOLENOID

1. Set up the STOP mode without the cassette installed. (Refer to Section 1-3.)
2. Set up the REC PAUSE state so as to place the solenoid into the energized state.
3. Loosen the screws (1) that mount the solenoid and move the solenoid in the direction indicated by screw (A) as shown in Fig. 3-16 so that a clearance is made between the brake rubber and the take-up reel table.
4. Then move the solenoid in the direction shown by arrow (B) and tighten screws (1) after the solenoid is moved further 0.1–0.4 mm in the (B) arrow direction from the point where the brake rubber begins to touch the take-up reel table assembly.

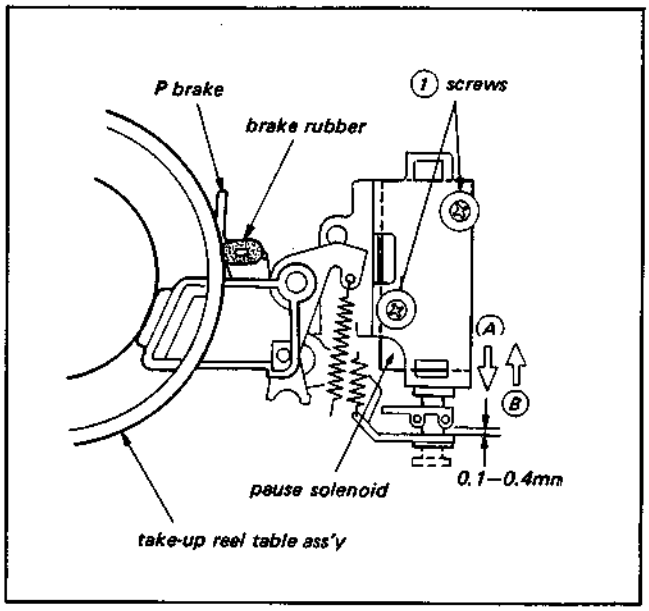


Fig. 3-16. Position adjustment of pause solenoid (Stroke adjustment)

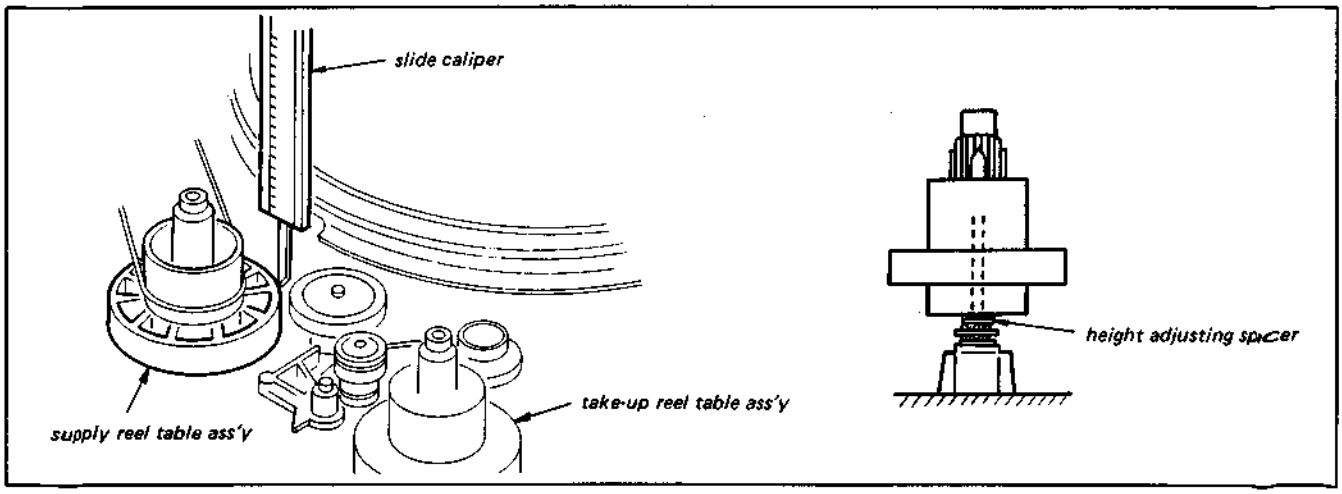


Fig. 3-15. Adjustment of reel table height

3-8. POSITION ADJUSTMENT OF FUNCTION SOLENOID

3-8-1. Position Adjustment of PLAY, F. FWD and REW Solenoids

The four solenoids shown in Fig. 3-17 require careful adjustments because these solenoids are the driving force for the PLAY, F. FWD, and other tape operations. (As to the position adjustment of the EJECT solenoid, refer to Section 3-8-2.)

1. Set up the STOP mode without the cassette. (See Section 1-3.)
2. Remove the two screws fixing the SY-10 board and open the board in the direction of the arrow.

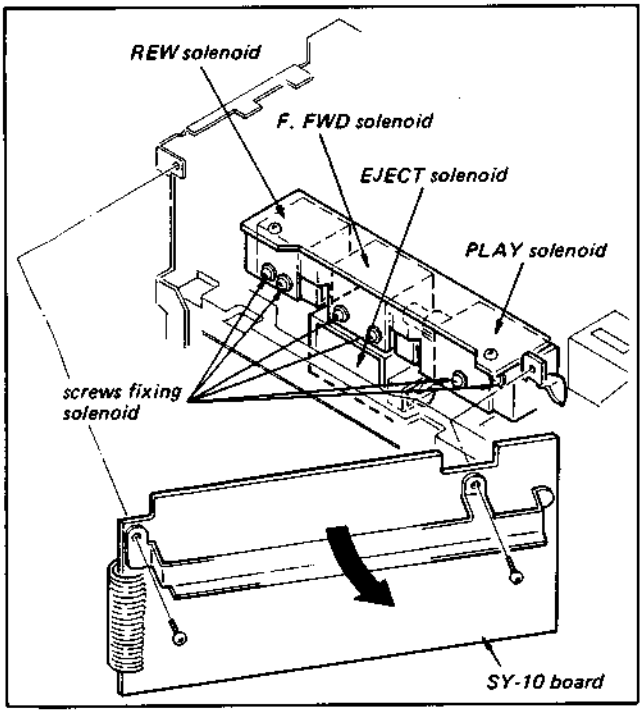


Fig. 3-17. Position adjustment of function solenoid

3. Check that the solenoids make the following operations when the relative mode to a solenoid is set up.
   - PLAY solenoid ..... Placing the tension regulator assembly into the operation. Making the FWD limiter assembly press the take-up reel table. Releasing the S and T brakes. Releasing the soft brakes.
   - F. FWD solenoid ..... Making the intermediate pulley assembly press the take-up reel table. Releasing the S and T brakes.
   - REW solenoid ..... Making the REW idler assembly press the supply reel table. Releasing the S and T brakes.
4. Check that the solenoids satisfy the specifications in Fig. 3-18. If the specifications are not satisfied, loosen the screws fixing the solenoid and adjust the position of the solenoid. See Fig. 3-17.
5. After tightening the screws, repeat Steps 3 and 4.

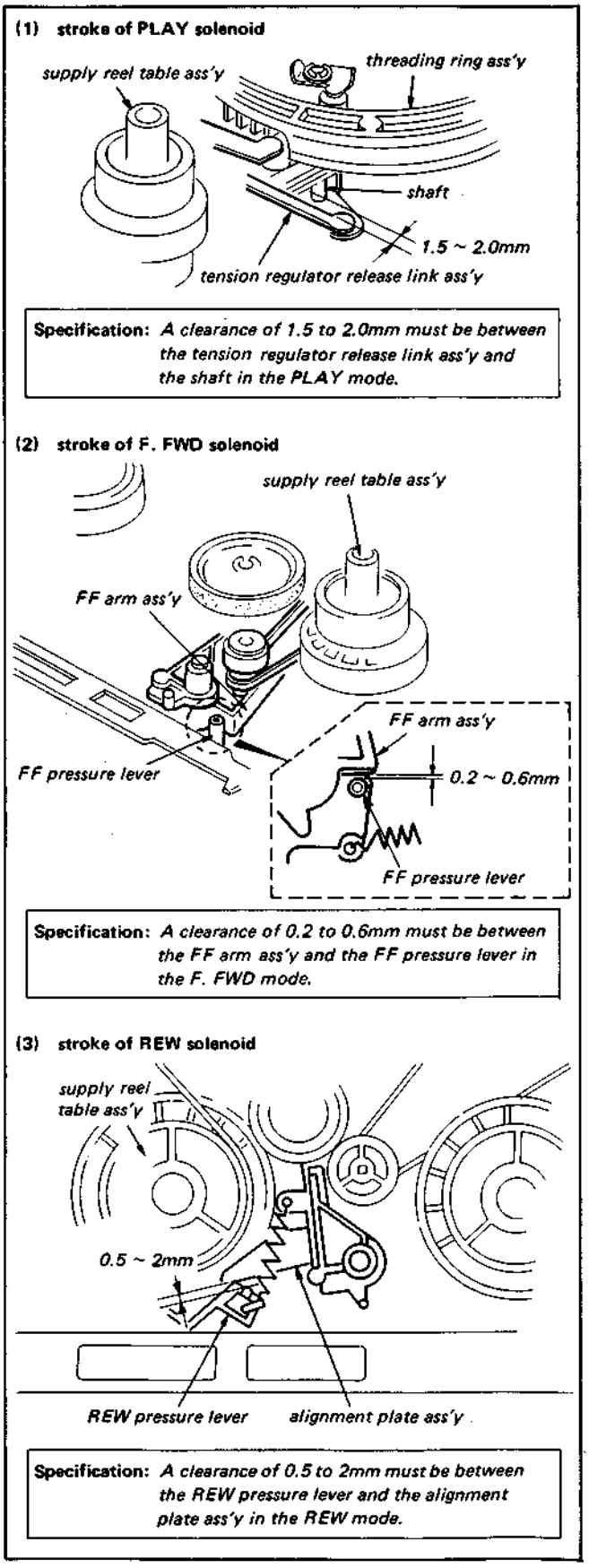


Fig. 3-18. Specifications of PLAY, F. FWD, and REW solenoid strokes

3-8-2. Position Adjustment of EJECT Solenoid

1. Set up the STOP mode without the cassette. (See Section 1-3.)
2. Check that following operations take place when the EJECT mode is set up.
   - EJECT solenoid . . . . The E idler assembly presses the take-up reel table.
     The ring arm assembly is released.
     The cassette compartment lock is released.
     The gear pulley engages with the motor pulley assembly.
3. Stand the machine on its left side down. Open the YC-12 and the AS-3 boards. (Refer to Section 1-1-4.)
4. Check that the specification shown in Fig. 3-19 is satisfied. If it is not, perform Steps 5, 6, and 7.
5. Push the cassette defect lever and release the lever at a midway of the threading.
6. Loosen the two screws shown in Fig. 3-19. Move the E solenoid base assembly to the position where the specification shown in Fig. 3-19 is satisfied, while turning the motor pulley assembly counterclockwise and setting the solenoid to the energized state.
7. After tightening the screws, repeat Steps 2 and 4.

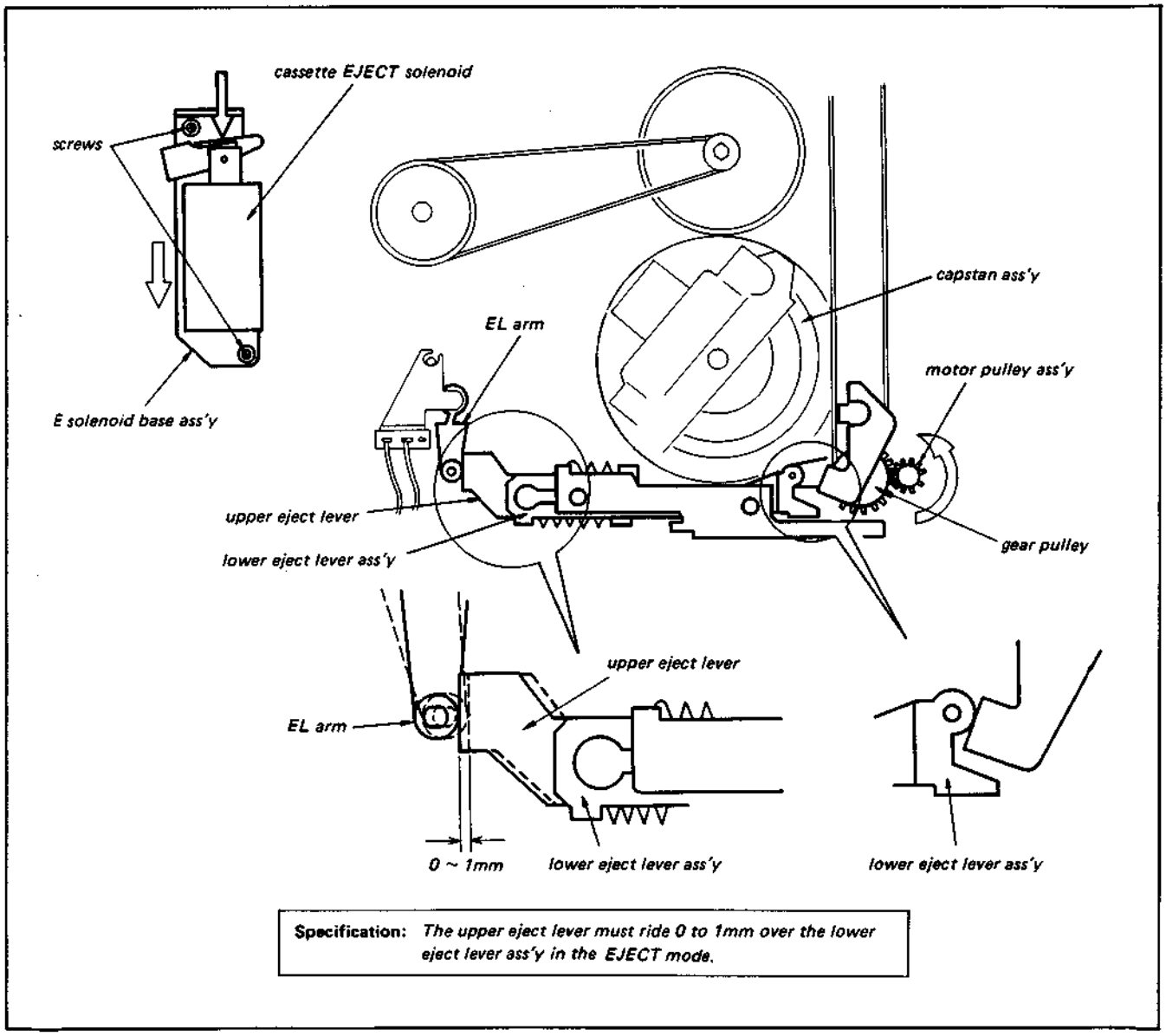


Fig. 3-19. Position adjustment of EJECT solenoid

3-9. ADJUSTMENT OF THREADING AND UNTHREADING

3-9-1. Operation Check of Cassette-in Switch

1. Set up the unthreading completion state without an inserted cassette and turn off the power.
2. Set section (A) as shown in Fig. 3-20.
3. Confirm that the microswitch mounted on the underside of the machine does not turn on when the cassette detection lever (1) is pushed in the arrow direction.
4. Set section (A) as shown in Fig. 3-21.
5. Confirm with a click that the microswitch mounted on the underside of the machine turns on when the cassette detection lever (1) is pushed in the arrow direction.
6. Adjust the mounting position of cassette detection (1) so that it moves more than 1.5mm further from the point where the click is heard.

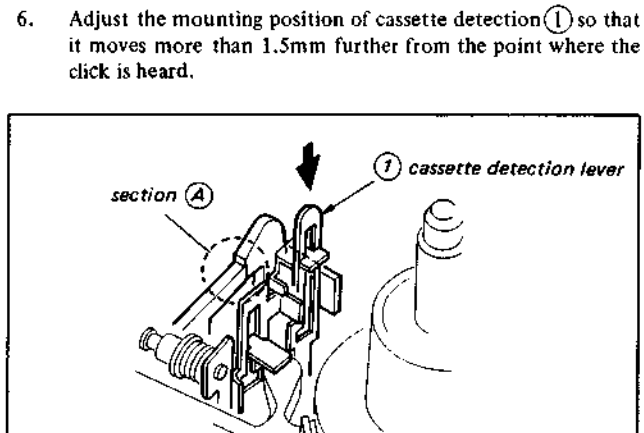


Fig. 3-20. Operation check of cassette-in switch

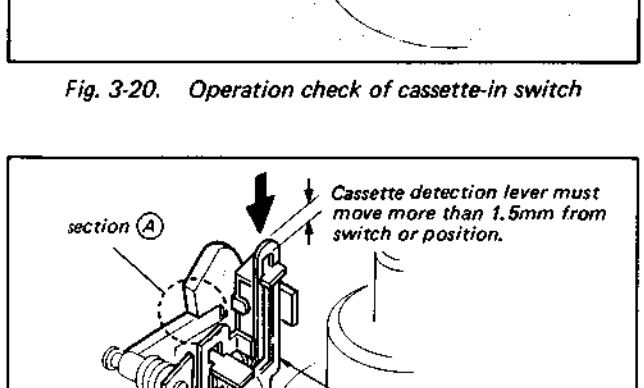


Fig. 3-21. Operation check of cassette-in switch

Note:
- The problem where the cassette-lift assembly does not lock occurs if the microswitch turns on in the condition shown in Fig. 3-20.
- The problem where the modes other than the EJECT mode cannot be set up occurs if the microswitch does not turn on in the state shown in Fig. 3-21.

3-9-2. Position Adjustment of Threading Unit B Assembly and Control Plate

1. Push down the cassette detection lever with fingers to perform the threading operation and release the lever when the threading ring assembly (5) shown in Fig. 3-22 has turned 90 degrees.
2. Loosen screws (1) shown in Fig. 3-22. Make the clearance (0.2mm) between midway gear (B) (4) and threading ring assembly (5) and tighten screws (1).
3. Make a clearance of 0.5mm between control plate (3) and threading ring assembly (5) and tighten screw (6).

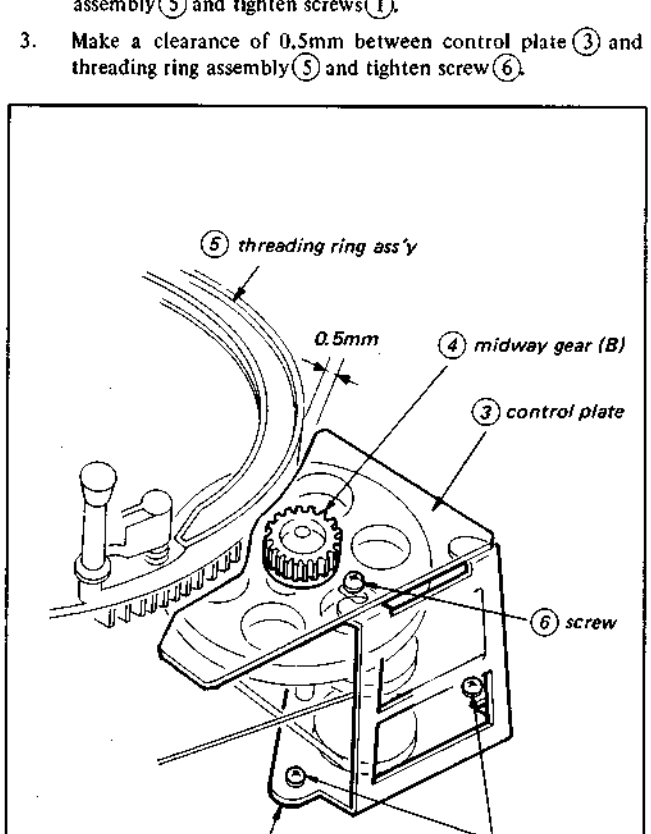


Fig. 3-22. Position adjustment of threading unit B assembly and control plate

3-9-3. Position Adjustment of Gear Pulley Hold Arm Assembly

1. Loosen screw (1) shown in Fig. 3-23, adjust the position of the gear pulley hold arm assembly so that the clearance between the motor pulley assembly (2) and the gear pulley (3) is 0.3 mm, and tighten screw (1).

3-9-4. Adhesion of Brake Shoe

1. Glue the brake shoe to the groove on the brake arm as shown in Fig. 3-23.

   Note: If the brake shoe is not glued in the right position, it is possible for the brake shoe to touch the capstan belt. If the shoe is removed, there is a possibility of the occurrence of an abnormal sound at the initial stage of the unthreading.

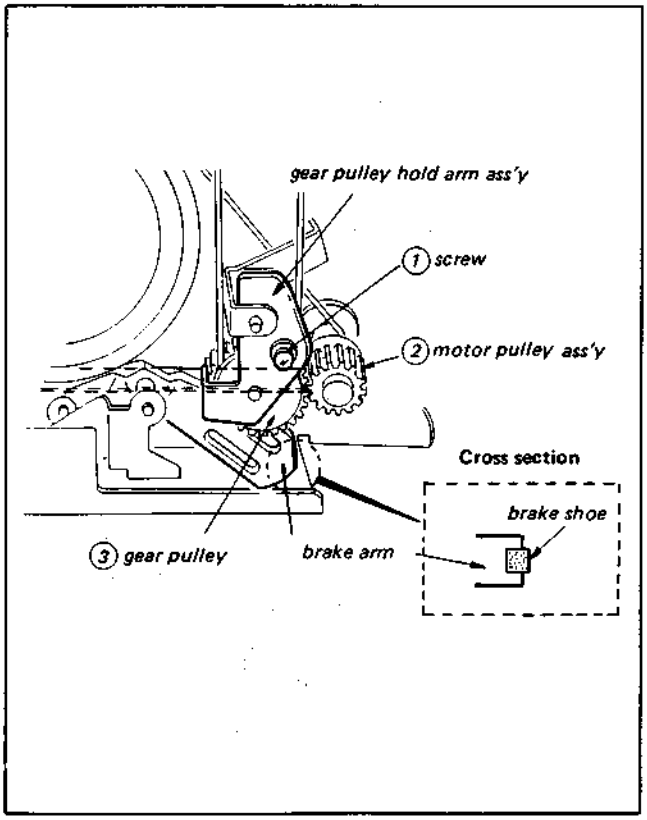


Fig. 3-23. Position adjustment of gear pulley hold arm assembly

3-9-5. Clearance Adjustment of Cassette Lift Assembly Arm

- Since a poor adjustment of the clearance causes the condition that the cassette lift assembly arm (2) is in strong contact with the threading ring assembly (3), the threading and unthreading cannot always be performed smoothly. When the clearance is larger than the specified value, the lock of the cassette lift assembly comes loose and the cassette lift assembly lifts during the unthreading, damaging the tape.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Loosen screw (1) and adjust the position of the cassette lift assembly arm (2) with the thickness gauge so that the clearance between the cassette lift assembly arm (2) and the threading ring (3) satisfies the specification (0.2 mm to 0.5 mm). (See Fig. 3-24.)
3. Check the value again after the screw is tightened.

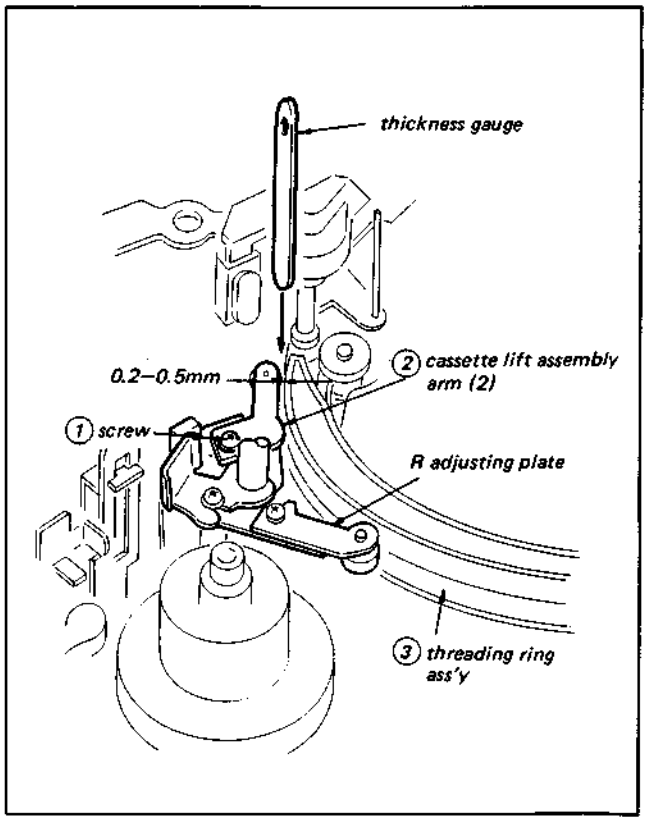


Fig. 3-24. Clearance adjustment of cassette lift assembly arm

3-9-6. Clearance Adjustment of Ring Arm

- The ring arm serves to stabilize the position of the threading ring at the completion of threading. If this adjustment is wrong, there is a possibility that the threading ring may move, from the position reached at the threading completion point, during the PLAY, FAST FWD and RECORD modes.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Set up the PLAY mode.
3. Loosen screw (1) shown in Fig. 3-25 and adjust R adjusting plate assembly (2) so that the clearance between the roller of R adjusting plate assembly (2) and threading ring assembly (3) satisfies the specification (0 to 0.2 mm). Repeat the threading and unthreading operations several times, confirm that the roller of R adjusting plate assembly (2) drops into the bottom of the cam of the threading ring, and tighten screw (1) after the confirmation.

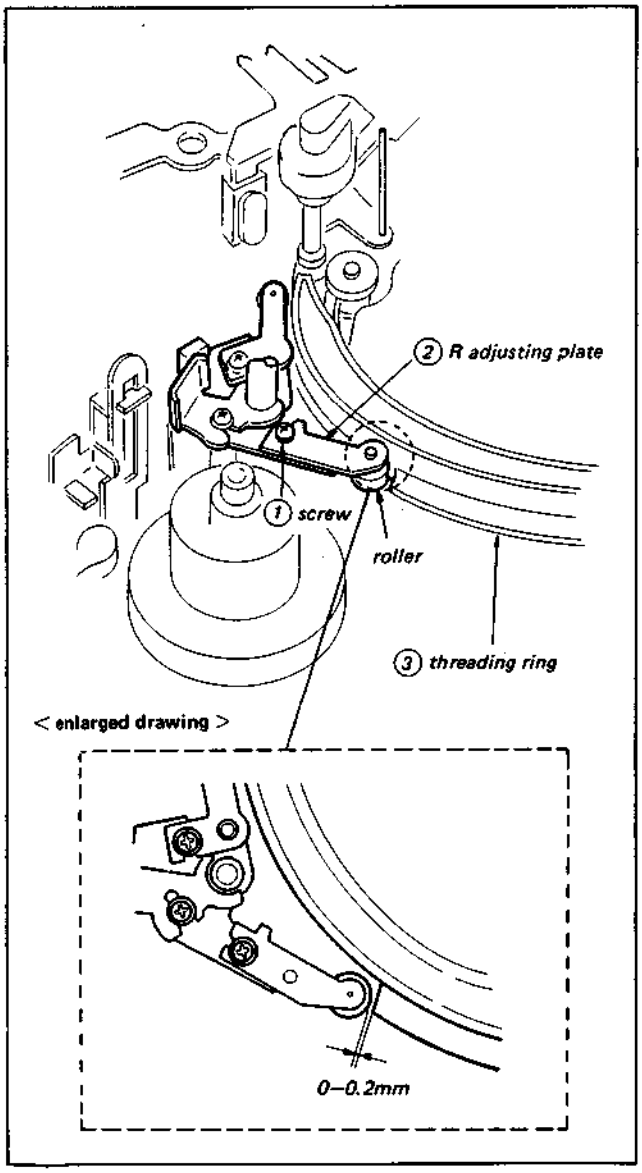


Fig. 3-25. Clearance adjustment of ring arm

3-9-7. Check of Unthreading Completion

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Set up the EJECT mode to complete the unthreading.
3. Confirm that the roller of cassette lift assembly arm (2) shown in Fig. 3-26 moves in the arrow direction when the cassette lift assembly arm (2) is pushed in the arrow direction.
4. Confirm that the tension regulator arm assembly is in contact with the boss of the cassette position-determining post. (See Fig. 3-26.)

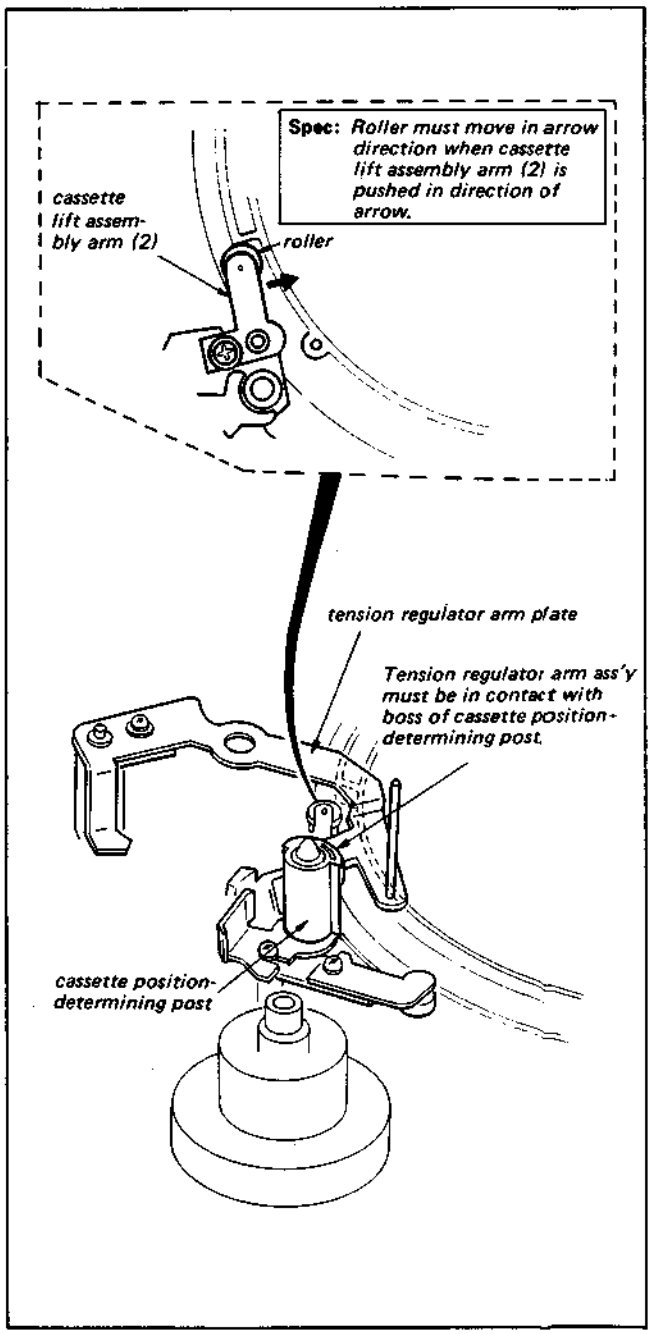


Fig. 3-26. Check of unthreading completion

3-10. POSITION ADJUSTMENT OF LID OPENER

- The mounting position of the cassette lid opener bracket is different when the cassette lift assembly is attached and is not attached to the SL-C7F.

1. When the cassette lift assembly is attached;

   (i) The plate of the cassette lid opener bracket must be near the center of the slot in the white plastic holder guide when the cassette lift assembly is lowered. If it is not in this position, bend the lower section of the cassette lid opener bracket, as shown in Fig. 3-27. for adjustment.

   (ii) Confirm that section (A) in Fig. 3-27 satisfies the specification (0.5mm to 3mm) when the cassette is inserted and the PLAY mode is set up. This is the spacing between the tape and the take-up sensor.

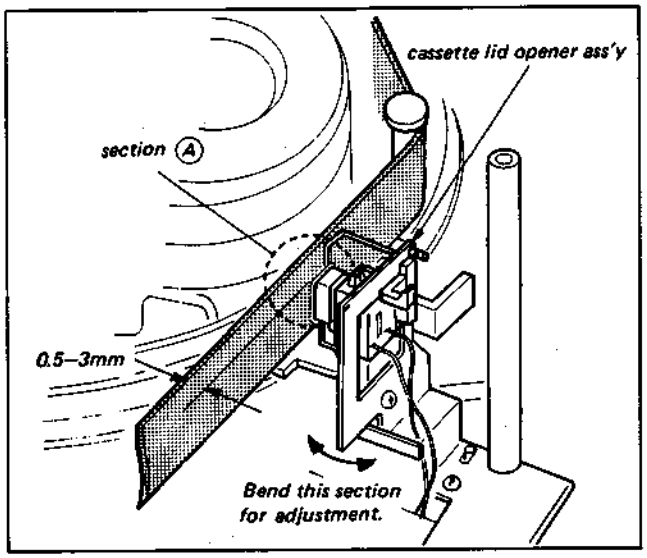


Fig. 3-27. Position adjustment of cassette lid opener metal (1)

2. When the cassette lift assembly is not attached;

   (i) Bend the lower section of the cassette lid opener bracket so that the cassette lid opener bracket positions itself almost at the center of the space marked by asterisk (*) shown in Fig. 3-28, when the cassette is placed on the four position determining posts.

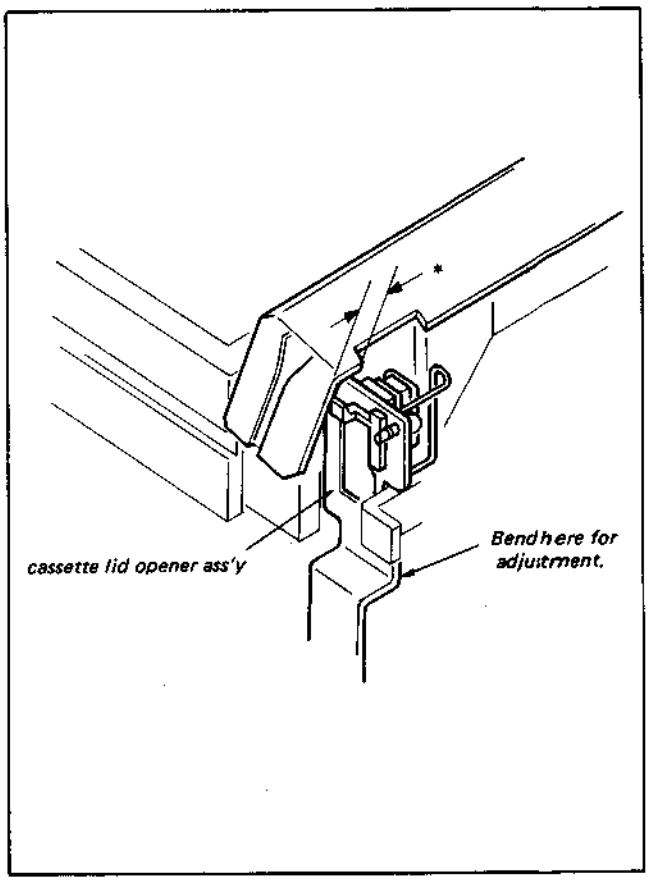


Fig. 3-28. Position adjustment of cassette lid opener metal (2)

3-11. REPLACEMENT AND ADJUSTMENT OF THREADING RING ASSEMBLY

1. Turn the threading ring to a point immediately before the threading completion position and stop it at the point where it does not touch the lock hold arm. (See Fig. 3-29.)
2. Perform procedures (1) to (5) shown in Fig. 3-29.
3. Remove the threading ring while moving the tension regulator arm assembly in the arrow direction by holding its lower section.

   Note: Do not hold the upper section of the tension regulator arm while moving the assembly.

4. Perform the adjustment of control plate (1), R adjusting plate (3), No. 0 guide section assembly (4), and ring roller unit assembly (5) after the replacement.
   (i) As to the adjustment of control plate (1), refer to "Position Adjustment of Threading Unit B assembly and Control Plate", Section 3-9-2.
   (ii) As to the adjustment of R adjusting plate (3), refer to "Clearance Adjustment of Ring Arm", Section 3-9-6.
   (iii) As to the adjustment of No. 0 guide section assembly (4), perform procedure 6 of this section.
   (iv) As to the adjustment of ring roller unit assembly (5), perform the adjustment, referring to detail drawing A in Fig. 3-29.
5. Perform the threading and unthreading several times and confirm the smooth movement of the threading ring.

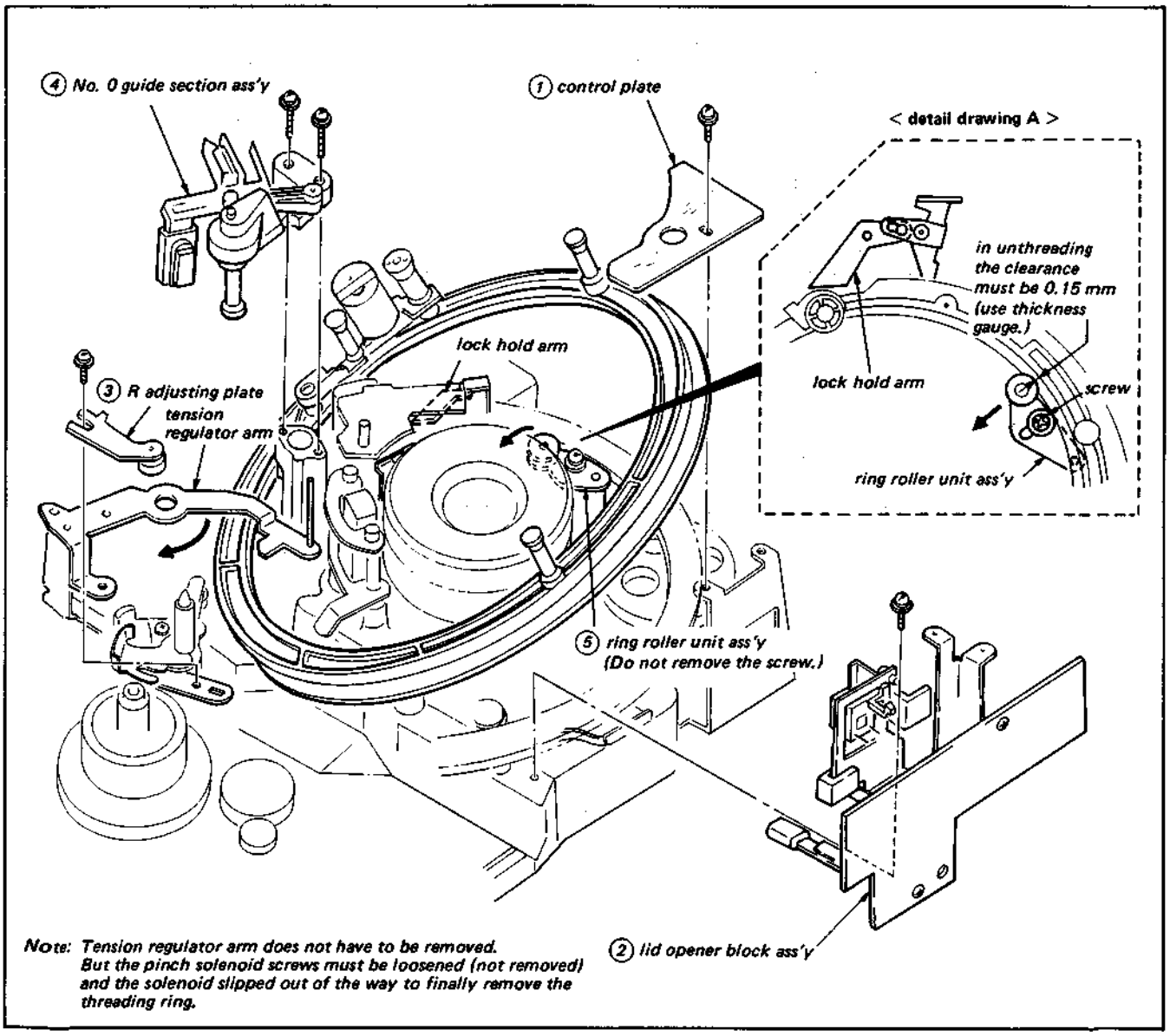


Fig. 3-29. Replacement of threading ring block assembly

6. Adjustment after the mounting of No.0 guide section assembly

   (i) Playback the 1MHz segment of the alignment tape (KR5-1J).

   (ii) Turn the TRACKING control knob so that the RF waveform at TP2005 on RF-2 board is 2/3 of its maximum level. (See Fig. 3-30.)

   (iii) Turn the No.0 guide shown in Fig. 3-30 fully counterclockwise (↺), then clockwise until the point where the RF waveform at the exit section becomes flat with small fluctuation, and tighten the mounting screws.

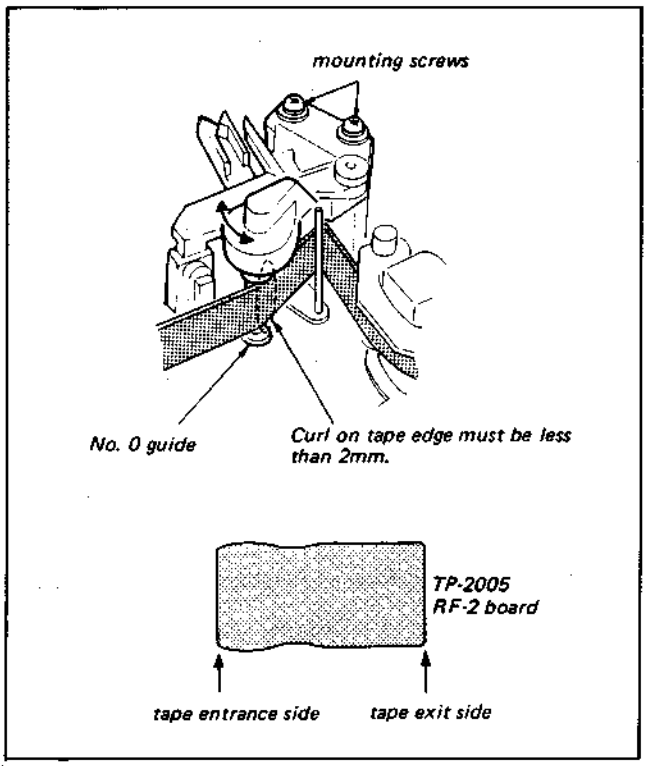


Fig. 3-30. Position adjustment of No.0 guide section assembly mounting

3-12. POSITION ADJUSTMENT OF PINCH ROLLER SOLENOID

3-12-1. Parallelism Adjustment of Pinch Press Lever

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Perform Steps (1) to (3) shown in Fig. 3-31 so as to set up the state in which the screw of pinch press lever shaft adjusting plate (4) can be loosened.
3. Loosen the two screws (1) fastening the pinch solenoid base (3) shown in Fig. 3-32 and tighten screws (1) when the pinch solenoid base (3) becomes parallel to the drum base.
4. Loosen two screws (2) shown in Fig. 3-32 by 1/3 to 1/2 turn and move pinch press lever shaft adjusting plate (4) in the direction shown by arrow B.
5. Insert a standard blade-tip screwdriver into hole F when the iron core is pulled slightly and pinch roller arm assembly (5) touches capstan shaft (6) equally along the complete length of the pinch roller. The pinch roller and the capstan should be parallel. Move the pinch press lever shaft adjusting plate (4) in the direction shown by arrow C and tighten the two screws (2) when clearance A becomes 0.

   Note: If the pinch roller arm assembly (5) does not touch the capstan with parallel and equally force when the iron core is pulled slightly, move pinch solenoid base (3) with a standard blade-tip screwdriver in the direction shown by arrow D.

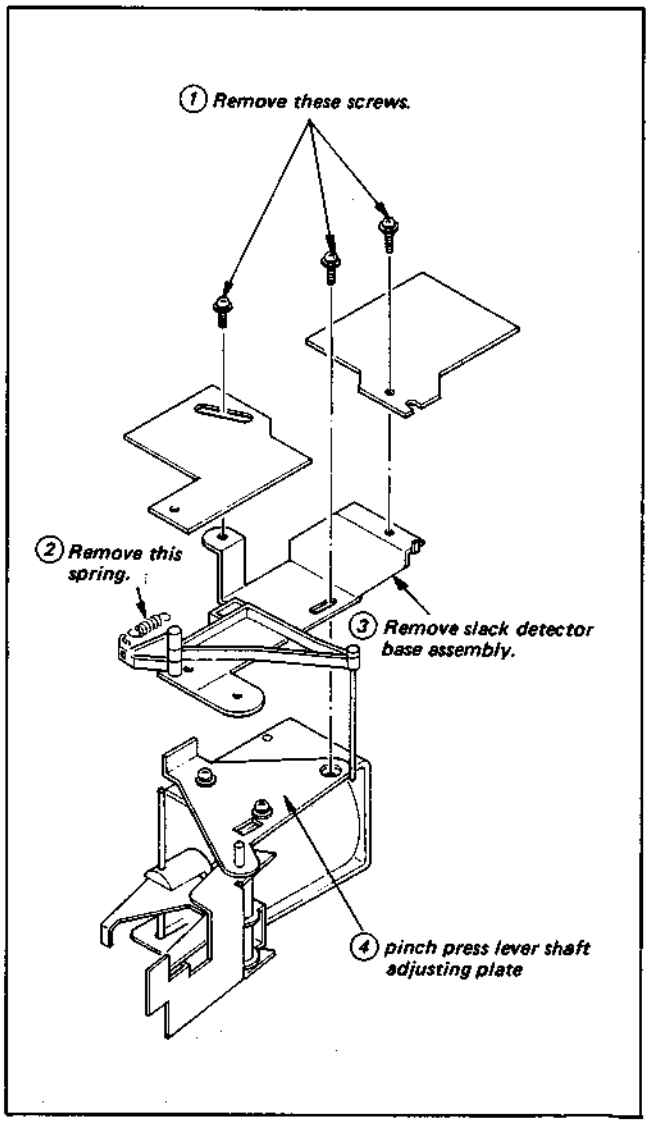


Fig. 3-31. Disassembly

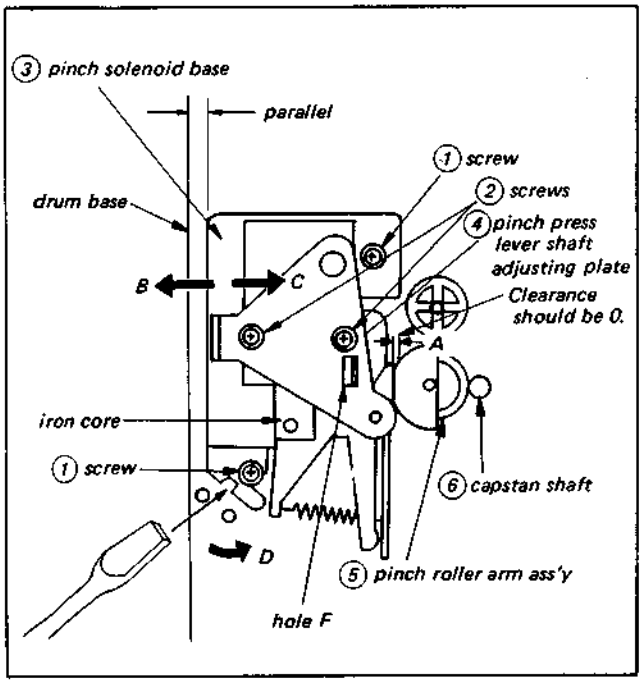


Fig. 3-32. Position adjustment of pinch roller solenoid

3-12-2. Position Adjustment of Pinch Solenoid

1. Check that "Parallelism Adjustment of Pinch Press Lever", Section 3-12-1, has been completed.
2. Loosen the two screws ① shown in Fig. 3-33 by 1/3 to 1/2 turns.
3. Insert the cassette (L-500) and set up the PLAY mode.
4. Insert the standard blade-tip screwdriver as shown in Fig. 3-33. Move pinch solenoid base ② in the arrow direction so that the specification at section B is satisfied, and tighten the two screws ①.

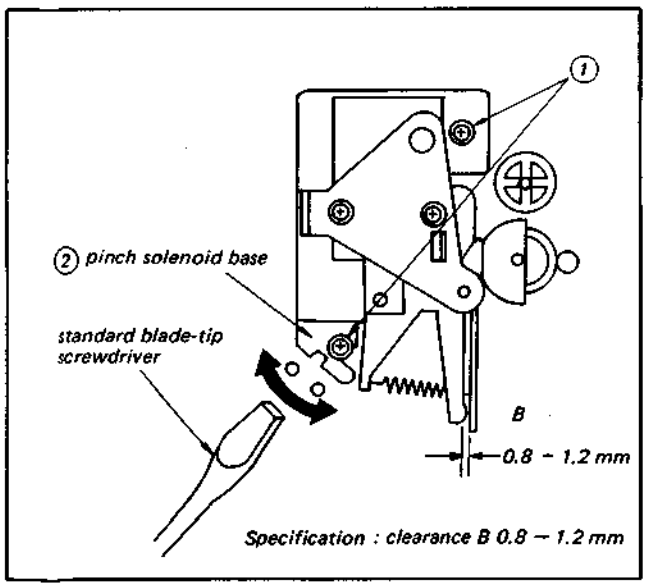


Fig. 3-33. Position adjustment of pinch solenoid

5. Tap the top and bottom of the tape around the capstan entrance and confirm that the specification shown in Fig. 3-34 is satisfied. If not, repeat Step 5 of Section 3-12-1, "Parallelism Adjustment of Pinch Press Lever".
6. Reverse Steps ① to ③ shown in Fig. 3-31.

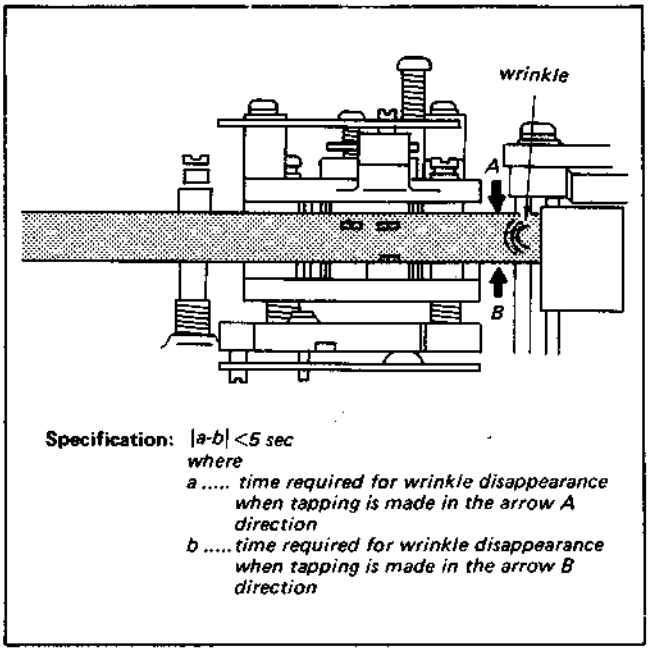


Fig. 3-34.

3-12-3. Position Adjustment of Slack Sensor Operation

1. Set up the STOP mode with the cassette. (Refer to Section 1-3.)
2. Loosen screw ① and adjust the CN-5 board position to satisfy the specification shown in Fig. 3-35.

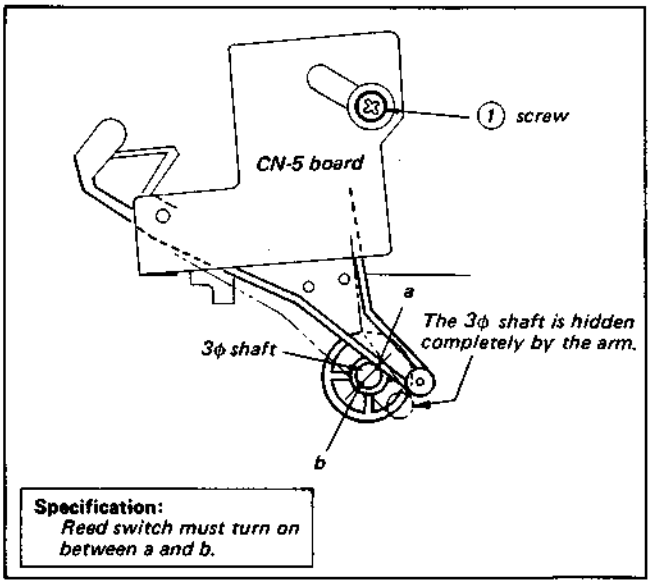


Fig. 3-35. Position adjustment of slack sensor operation

3-13. ADJUSTMENT OF BRAKE RELEASE STROKE

- The FB slide plate shown in Fig. 3-36 releases the take-up, the supply, and the soft brakes.

1. Place the machine without the cassette into the STOP mode. (Refer to Section 1-3.)
2. Bend section E of FB slide plate (2) so that the specification (0.5 to 1mm) of section C when brake release arm (1) is pushed in the direction of arrow D so that the clearances at sections A and B are eliminated.
3. Set up the PLAY mode and check that the take-up, the supply, and the soft brakes are released.

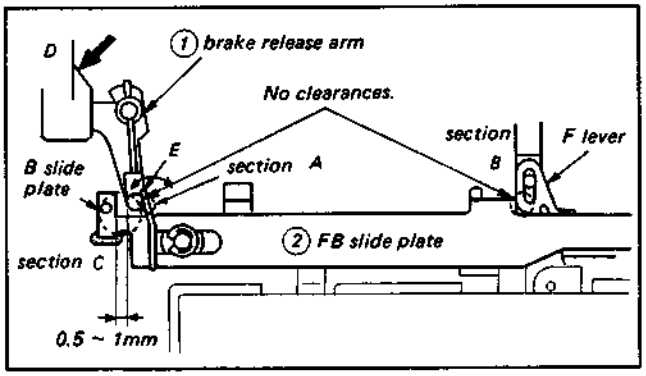


Fig. 3-36. Position adjustment of FB slide plate

3-14. POSITION ADJUSTMENT OF MICROSWITCH

3-14-1. Position Adjustment of Erasing Protection Microswitch

1. Remove the tuner block from the machine. (Refer to Section 1-1-2.)
2. Open the SY-11 board.
3. Check that the contact point of the erasing protection microswitch shown in Fig. 3-37 closes.
4. Loosen screws (2) and adjust the position of the switch while lowering the cassette with lid opened so that the cassette stops at the position more than 1mm from the contact point of the switch opens.

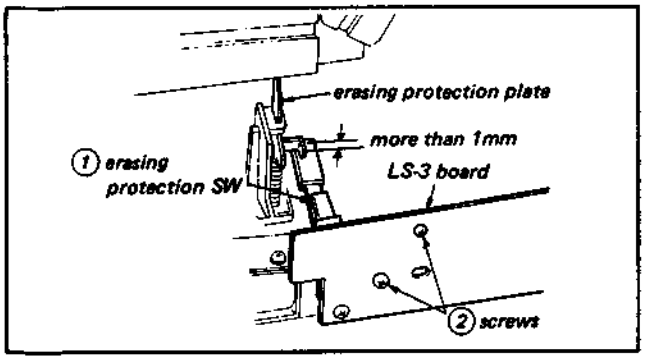


Fig. 3-37. Position adjustment of erasing protection microswitch

3-14-2. Position Adjustment of Threading End Switch

- Prior to this adjustment, the following adjustments must be completed.

  3-9-5. Clearance adjustment of cassette lift assembly arm
  3-9-6. Clearance adjustment of ring arm
  3-9-7. Check of unthreading completion

1. Turn the threading ring by hand and stop it at the point immediately before the threading completion position.
2. Loosen screw (4) and adjust the position of microswitch (3) so that microswitch (3) turns on before gear pulley hold arm (1) moves from the groove of lock arm (2), while turning the threading ring counterclockwise (↺) slowly by hand. Confirm the turning-on of the microswitch with a click.
3. Adjust the position further so that the clearance between the actuator of microswitch (3) shown in Fig. 3-38 and the microswitch satisfies the specification (0.7mm to 1.0mm) when the threading ring is turned counterclockwise (↺) beyond the threading completion point.
4. Repeat Steps 2 and 3 for confirmation.

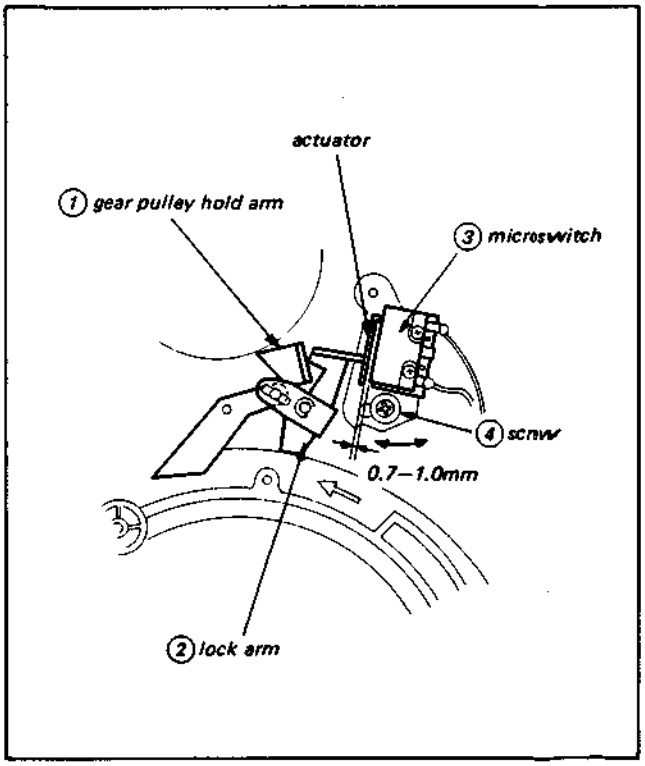


Fig. 3-38. Position adjustment of threading end switch

3-15. CHECK OF TAKE-UP TORQUE

- Since sufficient take-up torque cannot be obtained at the last section of the tape if the take-up torque is below the specified value, tape slackness is caused at the capstan shaft point and sometimes the slack sensor operates.
- The take-up torque tends to increase gradully due to aging.

1. Rewind the tape a little and set up the PLAY mode (for the playback of the very last section of the tape) after the auto-stop at the tape end in the FAST FWD mode. Confirm that the tape runs without any slackness at the capstan shaft area. If the tape slackens, perform the following adjustments.
2. Clean the take-up reel table assembly, the FWD idler assembly, and the FWD belt with a piece of cloth dampened with isopropyl alcohol.
3. Stop the operation of the slack sensor. (Refer to section 1-4.)
4. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) on the take-up reel table as shown in Fig. 3-39.
5. Pull out the string from the reel table tension gauge about 30 cm (12 inches) and hook the sector type tension gauge (50g full scale, Tool Kit Ref No. J-7) on the end of string.
6. Set up the PLAY mode.
7. Bring the sector type gauge toward the take-up reel table at a speed of approx. 2cm/sec. (8 inch/sec.) as shown in Fig. 3-39. Confirm that the gauge reading is within the specification. If not, replace the FWD limiter assembly and make the check again.

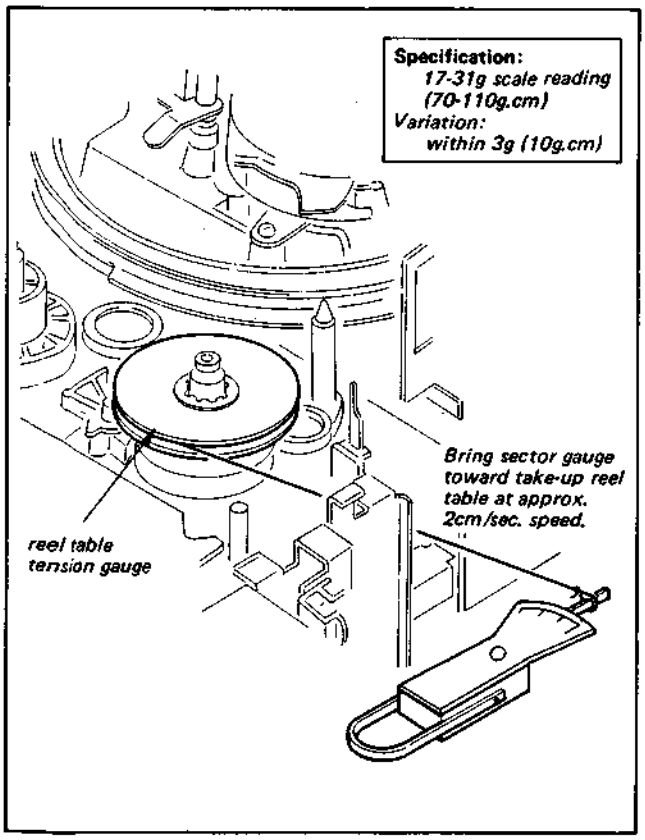


Fig. 3-39. Check of take-up torque

3-16. CHECK OF CASSETTE EJECT TORQUE

- The tape is taken up by the take-up reel table in the cassette EJECT mode. The take-up reel table is driven via the belt by the DC motor, while the threading ring unthreads.
- If the cassette eject torque is below the specification, only the threading ring performs the unthreading operation while the tape is not pulled back into the cassette, and the tape can be damaged.

1. Clean the take-up reel table, the E idler assembly, and the EJECT belt with a piece of cloth dampened with isopropyl alcohol.
2. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) as shown in Fig. 3-40.
3. Pull out the string of the gauge about 30 cm (12 inches) and hook the sector type gauge (50g full scale, Tool Kit Ref. No. J-7) on the end of the string.
4. Set up the EJECT mode.
5. Bring the sector type gauge toward the take-up reel table at a speed of approx. 2cm/sec. during the unthreading as shown in Fig. 3-40. Confirm that the gauge reading is within the specification. If not, replace the E limiter assembly (X-3659-301-0) of the threading unit section and make the confirmation again.

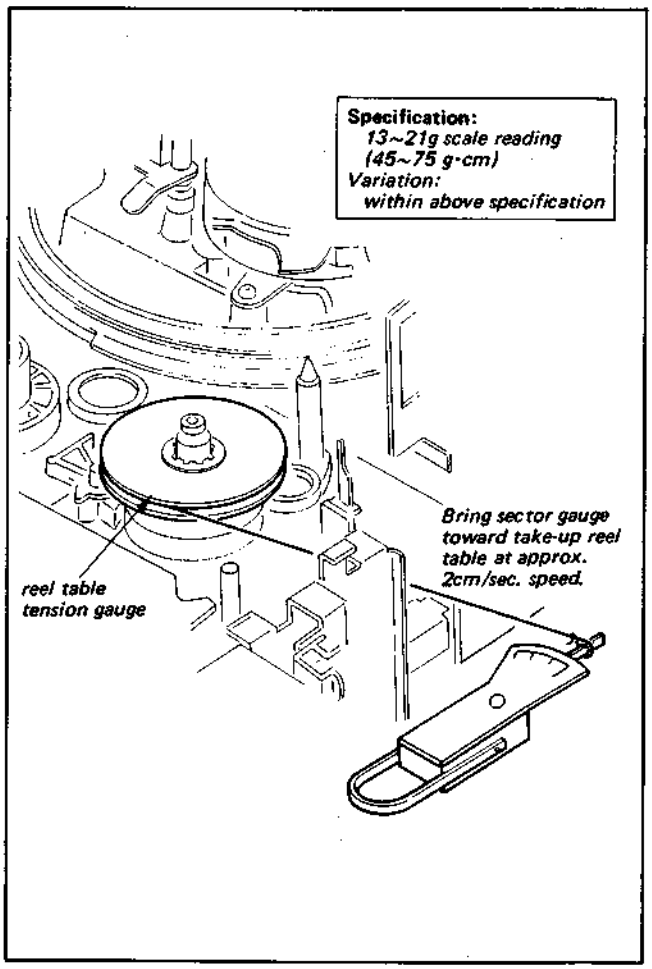


Fig. 3-40. Check of cassette eject torque

3-17. CHECK OF BRAKE TORQUE

- This machine has the supply brake, take-up brake, soft brake, and pause brake to stop the taking-up of the tape in the PAUSE mode. These brakes operate as follows.

Reel table ass'y / Mode	Supply side	Take-up side
Cassette EJECT mode	Supply and soft brakes are ON.	Only take-up brake is ON.
Threading mode	Only soft brake is ON. (It is normal that the supply reel rotates a little, supplying tape.) Soft brake torque; 15 to 30 g.cm. Reel table rotational direction is CW (↻).	Free (Tape is supplied from take-up side.)
STOP mode	Supply and soft brakes are ON. Reel table rotational direction CW (↻): 100 to 500g.cm Reel table rotational direction CCW (↺): 40 to 100g.cm	Only main brake is ON. Reel table rotational direction CW (↻): 30 to 100g.cm Reel table rotational direction CCW (↺): 60 to 500g.cm
FF mode	Only soft brake is ON.	Free (Tape is taken up to take-up side.)
REW mode	Free	Free
PLAY mode	Only FWD back tension brake band is ON.	Free (Tape is taken up to take-up side.)
REC PAUSE mode & PLAY PAUSE mode	FWD back tension brake is ON.	Take-up and pause brakes are ON.
Unthreading mode	Only soft brake is ON. (It is normal that supply reel rotates a little, supplying tape.)	Free (Tape is taken up to take-up side.)

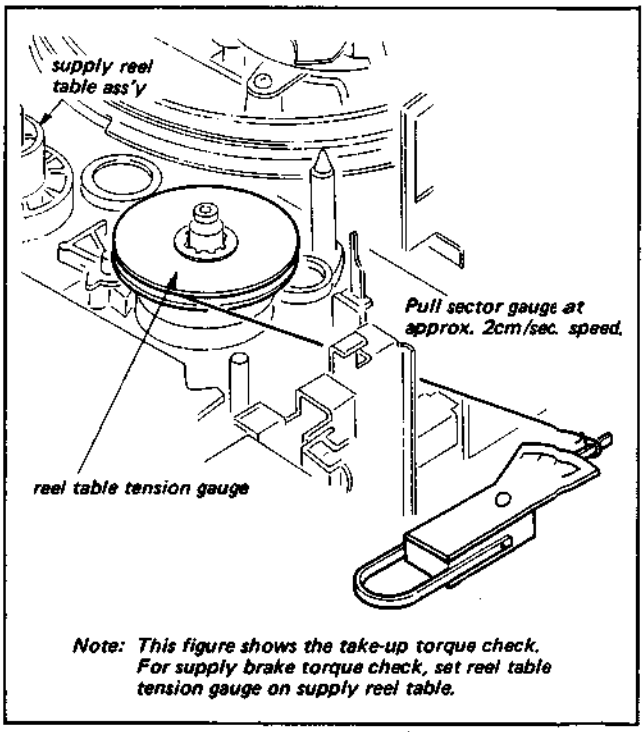
3-17-1. Check of Supply and Take-up Brake Operations

- When the tape slackens in when the mode is changed to STOP from PLAY and to STOP from REWIND, perform the check and adjustment, following the steps below.
- Since the slackness tends to occur when a wound diameter of the tape on a reel table is small, the check must be made in such a state.

1. Insert the cassette and set up the initial state of taking-up of the tape. (Rewind the tape and cue its beginning.)
2. Repeat the operation, changing the mode from PLAY to STOP two or three times and confirm that there is no tape slackness. If the tape slackens, perform steps 5 and 6 for adjustment.
3. Set-up the condition where the tape is about to be completely wound on the take-up reel. (Fast forward the tape and stop the tape movement at its end section.)
4. Repeat the operation, changing the mode from REWIND to STOP two or three times and confirm that no tape slackness occurs. If the tape slackens, perform Steps 5 and 6 for adjustment.
5. Remove the reel table assembly and clean the surface of the reel table assembly and the brake shoe with a piece of cloth dampened with isopropyl alcohol.
6. Clean the brake lining of the S and T brake with a piece of cloth dampened with isopropyl alcohol. If the tape still slacks even if the brake lining clean, replace them and perform the check again.

3-17-2. Check of Supply and Take-up Brake Torque

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Attach the reel table tension gauge (Tool Kit Ref. No. J-5) to the take-up reel table as shown in Fig. 3-41 and hook the sector type gauge (100g full scale, Tool Kit Ref. No. J-8) to the end of the string. Pull the sector type gauge at a speed of approx. 2 cm/sec. and read the gauge value.



Note: This figure shows the take-up torque check. For supply brake torque check, set reel table tension gauge on supply reel table.

Fig. 3-41. Check of supply and take-up brake torque

Specification

- When supply reel table ass'y rotates CW (↻): 100 to 500g.cm (Scale value is 29 to 143g.)
- When supply reel table ass'y rotates CCW (↺): 40 to 100g.cm (Scale value is 11 to 37g.)
- When take-up reel table ass'y rotates CW (↻): 30 to 100g.cm (Scale value is 6 to 17g.)
- When take-up reel table ass'y rotates CCW (↺): 60 to 500g.cm (Scale value is 17 to 143g.)

3-17-3. Check and Adjustment of Soft Brake Torque

1. Push the cassette detector lever by hand and release the lever during the threading. (In this condition, the supply and take-up brakes are released.)
2. Mount the reel table tension gauge (Tool Kit Ref. No. J-5) on the supply reel table as shown in Fig. 3-42 and hook the sector type guage (50g full scale, Tool Kit Ref. No. J-7) to the end of the string of the tension gauge.
3. Pull the sector type gauge at a speed of approx. 2cm/sec. and confirm that the gauge reading is within the specification. If the specification is not satisfied, change the position where the spring is hooked onto the soft brake and the F slide plate for adjustment and perform Steps 2 and 3.

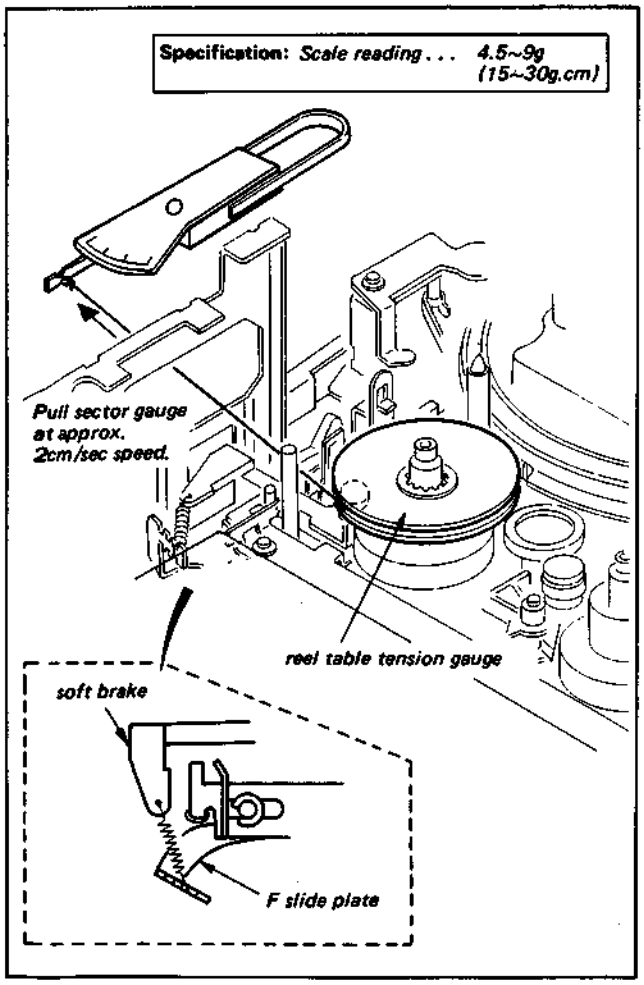


Fig. 3-42. Check of soft brake torque

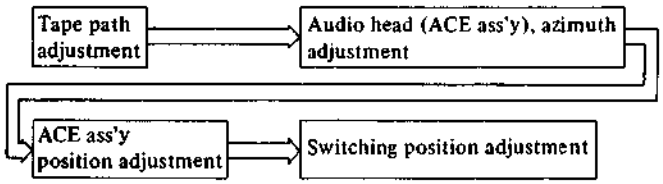
3-18. ADJUSTMENT OF FWD BACK TENSION

- The ideal measurement of the FWD back tension is to measure it under the same conditions as during the actual tape running state. The simple measurement procedure of the FWD back tension is described here. The measurement error due to the different measurement procedure is corrected in the specification.

1. Set up the STOP mode without the cassette. (Refer to Section 1-3.)
2. Place the FWD back tension jig (Tool Kit Ref. No. J-6) on the supply reel table assembly and thread the tape as shown in Fig. 3-43. Hook the sector type gauge (100g full scale, Tool Kit Ref. No. J-8) to the end of the tape.
3. Set up the PLAY mode.
4. Pull the sector type gauge at a speed of approx. 2cm/sec. and confirm that the gauge reading is within the specification. If not, perform Steps 5 and 6.
5. Loosen the screw mounting the BT adjusting plate and move the BT adjusting plate in the direction shown by the arrow for the adjustment.
6. Repeat Steps 2 to 4 again.

3-19. ADJUSTMENT OF TRACKING

- Sequence of tracking adjustment



[Preparation]

1. Fixtures and Tools Required:
   - Alignment tape (KR5-1J)
   - Dual trace oscilloscope
   - Inspection mirror
   - Methanol or Isopropyl Alcohol
   - Chamois
   - 3 mm flat tip screwdriver
2. Oscilloscope connection

RF envelope waveform:	TP2005	RF-2 board
External trigger:	TP2003	RF-2 board
AUDIO OUT:	TP3406	AS-3 board
VIDEO OUT:	TP1017	YC-12 board
Switching waveform:	TP2003	RF-2 board

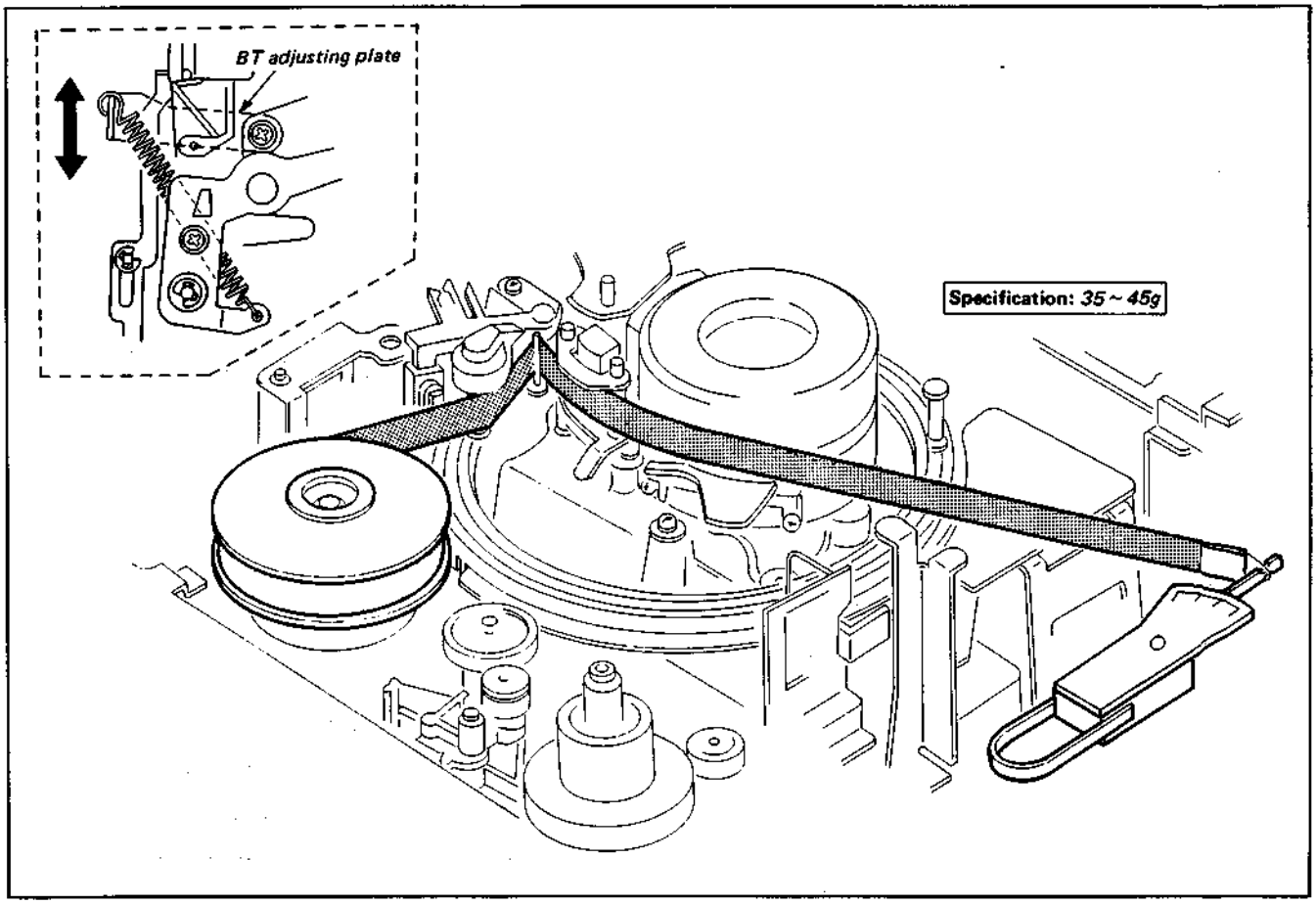


Fig. 3-43. Adjustment of FWD back tension

4. Location of circuit boards

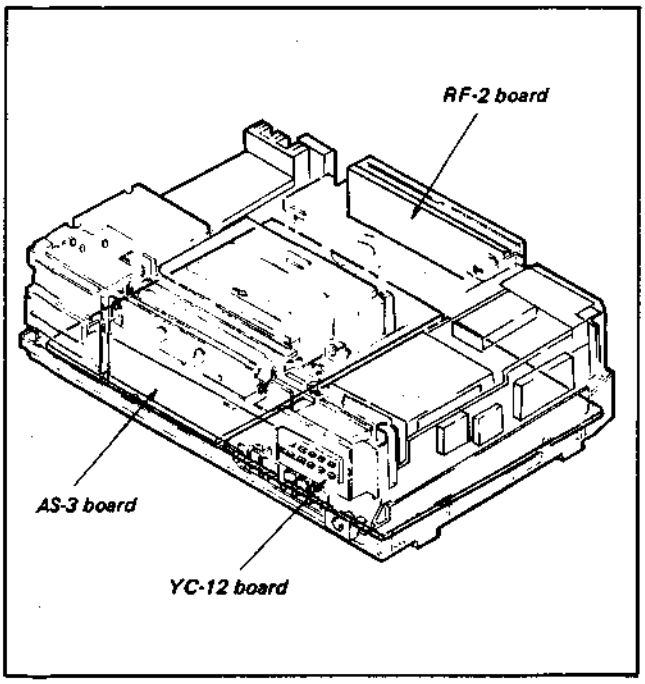


Fig. 3-44. Location of circuit boards

5. Location tape guides

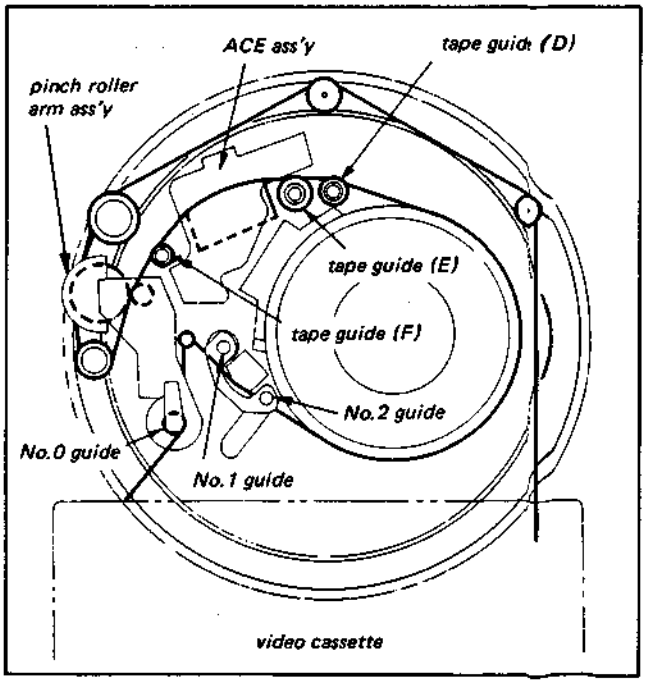


Fig. 3-45. Location of tape guides

3-19-1. Adjustment of Tape Path

- Perform this adjustment carefully because poor adjustment reduces tape interchangeability and picture quality.

1. Clean the tape movement faces (the tape guide, drum, capstan and pinch roller) with chamois dampened with methanol or isopropyl alcohol.
2. Connect the oscilloscope to TP-2005 on the RF-2 board and the external trigger to TP-2003.
3. Play back the 1 MHz segment of the alignment tape (KR5-1J).
4. Confirm that the RF output waveform envelope on the oscilloscope screen increases and decreases, while remaining flat, when the TRACKING control knob is turned to the left and the right from its center detent position. If the RF waveform does not increase and decrease while remaining flat, perform Step 6 for the adjustment.

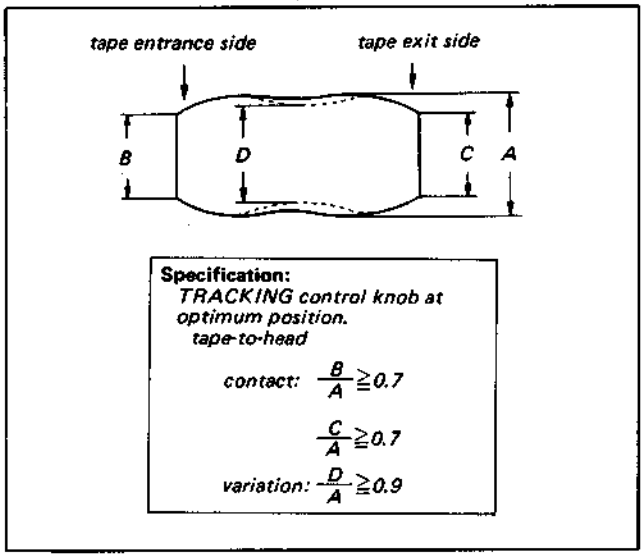


Fig. 3-46. Adjustment of tape path

5. Confirm that the fluctuation and the tape-to-head contact satisfy the specification shown in Fig. 3-46. If they do not, perform Step 6 for the adjustment.

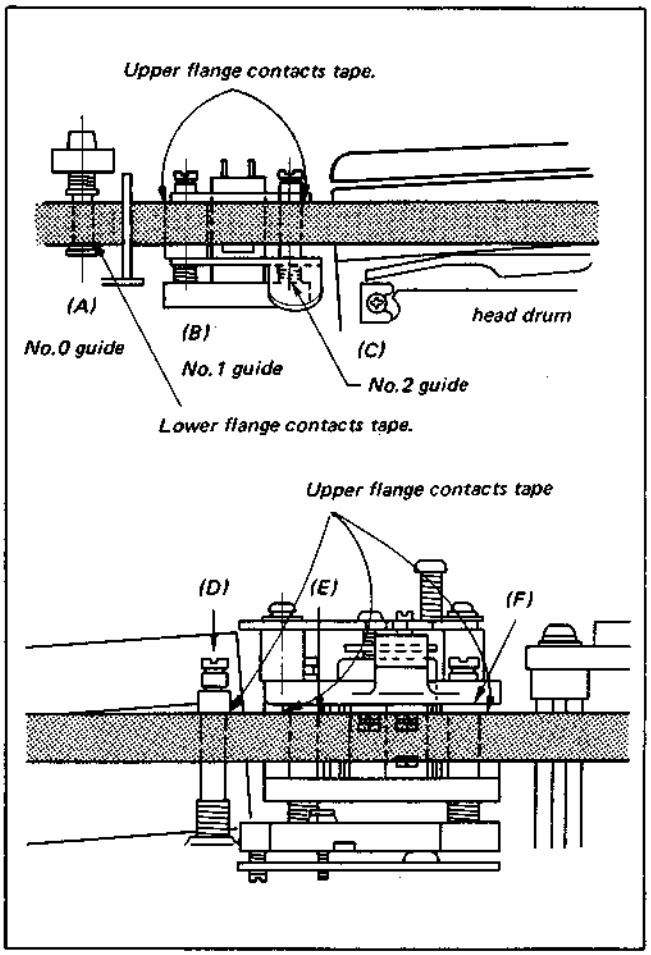


Fig. 3-48. Adjustment of tape path

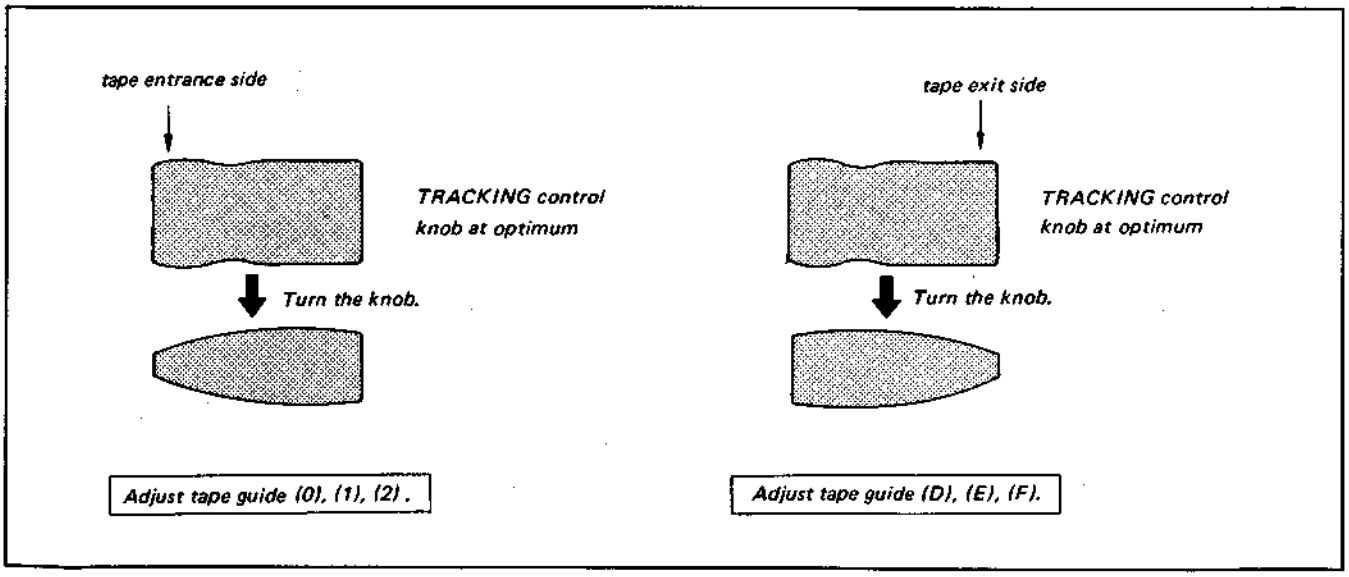


Fig. 3-47. Adjustment of tape path

6. When the waveform at the tape entrance side is not flat as shown in Fig. 3-47 for the clockwise and counterclockwise turning of the TRACKING control knob from center, detent position, adjust the heights of tape guides (0), (1), and (2). When the waveform at the tape exit side is not flat, adjust the heights of tape guides (D), (E), and (F). The height adjustment must be performed so that the tape contacts the drum heads, and there is a minimum curl (not more than 2 mm) at the flange of each tape guide, the upper or lower flanges contact the tape as shown in Fig. 3-48, and the RF waveform is flat.

Note: The construction of the ACE assembly enables the assembly to be adjusted so that its top plate is perpendicular to the face of the moving tape as a whole, but this "Zenith" adjustment is not necessary except after ACE assembly replacement.
Since tape guide (D) regulates the movement of the tape around the drum exit, raise tape guide (D) about 0.5 mm before the adjustment of the tape path on the exit side. Then lower tape guide (D) to the point immediately before the RF waveform varies, and with less than 2 mm curl after the tape path adjustment.

3-19-2. Adjustment of Exit Side Tracking after ACE Assembly Replacement

1. The ACE assembly can be removed if the three screws shown in Fig. 3-49 are removed.

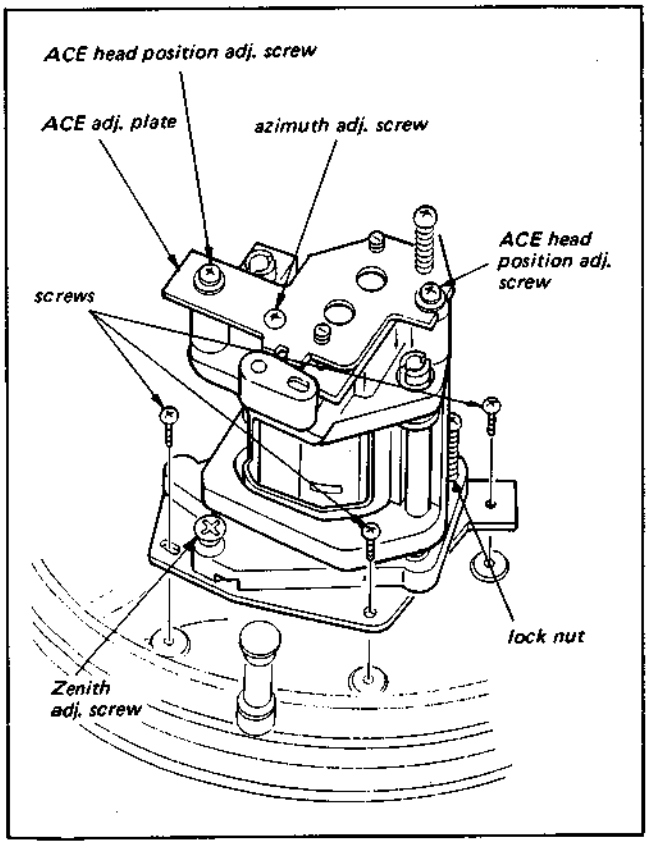


Fig. 3-49. Removal of ACE assembly

2. Perform the adjustment following Step 3 after the completion of the replacement.
3. Raise the tape guide (D) shown in Fig. 3-48 by 0.5 mm. (Turn the nut one turn.)
4. Play back the 1 MHz segment of the alignment tape (KR5-1J). Confirm that the RF wave output (see Fig. 3-46) satisfies the specification and there is a minimum curl (not more than 2 mm) on the tape edge contacting the tape guide. Confirm that the RF waveform varied from the flat state when the tape guides (E) and (F) are raised and adjust the heights of the tape guides so that the waveform output becomes flat.
5. When the waveform does not vary if the tape guides (E) and (F) are raised in Step 4 or when the waveform does not become flat if the tape guides are lowered, perform the adjustment, following the procedure below.
   (i) Loosen the lock nut shown in Fig. 3-49.
   (ii) Turn the zenith adjusting screw counterclockwise (↺) a little more than 30 degrees and turn it clockwise (↻) until the screw returns to the point 30 degrees counterclockwise from its original point.
   (iii) Perform Step 4 again. If the specification is not satisfied, perform Step 5 again. Since the ACE assembly was adjusted perpendicularly when assembled at the factory, do not turn the zenith adjusting screw more than 60 degrees to the right and left from the original position.
   (iv) After the adjustment, tighten the lock nut until a slight resistance for the tightening is felt and confirm that the specification in Step 4 is satisfied.
6. When there is an edge curl at the tape contacting the tape guide in Step 4, perform the adjustment, following the procedure below.
   (i) Loosen the lock nut shown in Fig. 3-49.
   (ii) Tighten the zenith adjusting screw clockwise only 15 degrees.
   (iii) Perform Step 4 again. If the specification is not satisfied, perform Steps 5 and 6 again, but do not turn the zenith adjusting screw to the right and left more than 60 degrees from its original position.
   (iv) Tighten the lock nut until a slight resistance is felt after the adjustment. Confirm that the specification in Step 4 is satisfied.

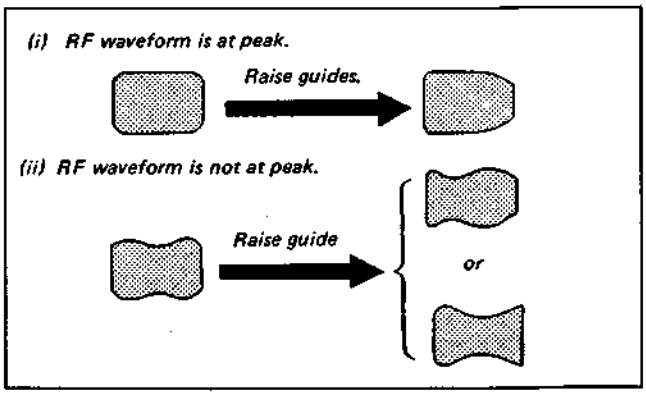


Fig. 3-50. Adjustment of exit side tracking after ACE assembly replacement

3-19-3. Audio Head Azimuth Adjustment

[Connection of Relative Equipment]

The connections of the equipments to the input/output terminals are shown in Fig. 3-51.

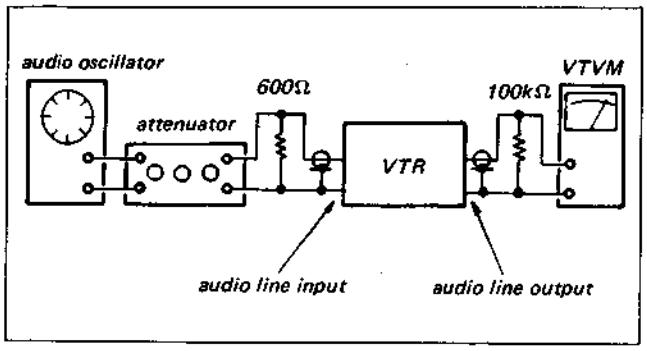


Fig. 3-51. Connections

1. Terminate the audio line output terminal with a 100 kΩ resistor and connect a VTVM.
2. Play back the 5 kHz signal segment of the alignment tape.
3. Adjust the azimuth adjustment screw on the audio head for a maximum VTVM reading. (See Fig. 3-51).

   Note: Loosen azimuth adjustment screw before the adjustment and tighten it after the completion.

3-19-4. Position Adjustment of ACE Assembly

- This adjustment includes the mechanical head mounting position adjustment and the electrical tracking control center adjustment.
- The adjustment sequence is to perform the tracking control center adjustment and then the mechanical adjustment of the head mounting position. If this sequence is reversed, poor tracking occurs.

1. Connect a dual-trace oscilloscope as follows.

   CH-1 . . . . . TP-2005 (RF-2 board)
   CH-2 . . . . . TP-3406 (AS-3 board)
   Ext trigger . . . . . TP-2003 (RF-2 board)

2. Play back the 1 MHz segment of alignment tape KR5-1J. (See Fig. 3-52).
3. Set the tracking control to the center, detent, position and confirm that the output waveform level is maximum and the 0 level point of the audio signal appears at the Bch waveform point as shown in Fig. 3-52. If the specification is not satisfied, perform the following Step 4.

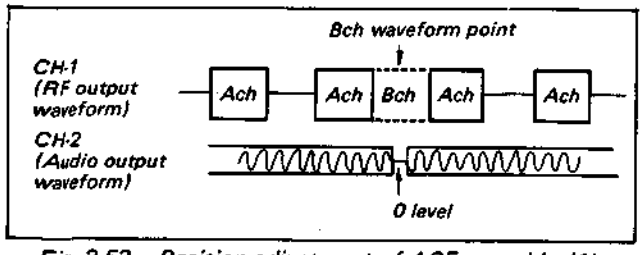


Fig. 3-52. Position adjustment of ACE assembly (1)

4. Perform the tracking control center adjustment. [Refer to section 4-3-2(2)].
5. Set the TRACKING control knob to its center detent point and play back the 1 MHz segment of the alignment tape (KR5-1J).
6. Loosen the two position adjusting screws of the ACE head and adjust the cut-out section of section A for maximum RF output waveform and a 0 level of audio signal at the Bch waveform point. (See Fig. 3-52.)

   Note: Perform the adjustment so that the center of the cut-out section of the A section will almost match the center of the round hole.

7. Play back the 1 MHz segment of the alignment tape and confirm the proper picture appearance.
8. Tighten the position adjusting screw of the ACE head.

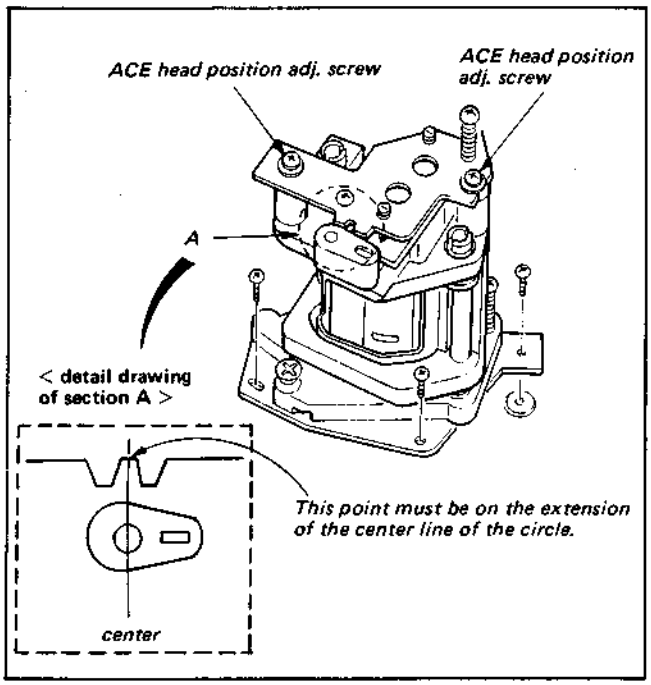


Fig. 3-53. Position adjustment of ACE assembly (2)

3-19-5. Video Head Dihedral Adjustment

- Generally this adjustment is not necessary except after the video head disk replacement.

  Note: The dihedron of a video head disk for replacement purposes was adjusted precisely with a microscope at the factory and the readjustment is usually not necessary.

- The ACE assembly position adjustment has been completed prior to this dihedral adjustment.
- The judgment of the video head dihedron must be performed in the condition that the monoscope signal segment of the alignment tape (KR5-1J) is played back and the TRACKING control knob is set to the center detent position. (See Fig. 3-54.)

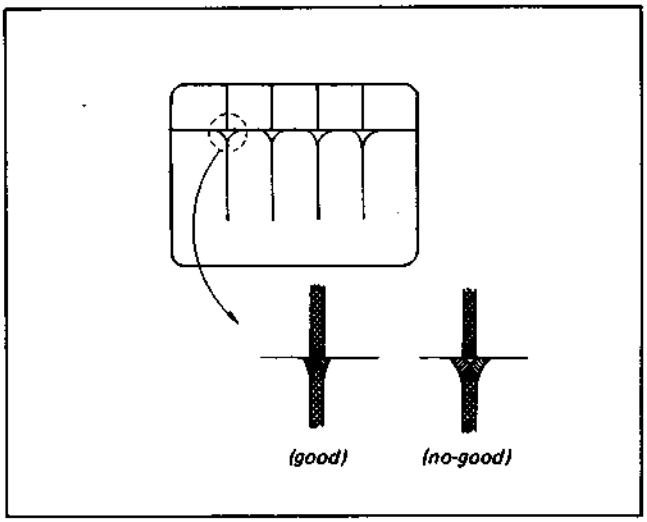


Fig. 3-54.

- When the dihedron is no-good, the preparation of the video head dihedral adjustment is to install two dihedral adjusting screws in the holes close to the small mark (•) shown in Fig. 3-55 and tighten them until the screw heads are level with the top surface of the video head disk. (If the screws are not tightened until their heads become level with the surface, the upper drum of the video head disk is caught by the adjusting screw heads and the video head disk cannot rotate. If the screws are tightened excessively, the head base is moved and the dihedral distortion becomes larger.)

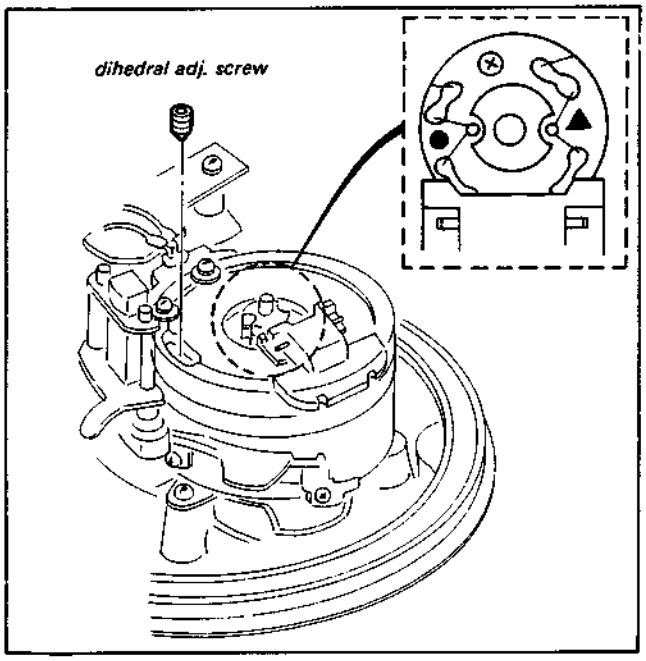


Fig. 3-55.

When the dihedron is no-good;

(1) When the split becomes small for the clockwise turn of the TRACKING control knob, the B head shifts by C in the arrow direction as shown in Fig. 3-56 and is tracing the magnetic pattern on the tape. The adjusting screw in adjustment hole E shown in the figure must be tightened further to shift the B head in the left direction until the good dihedron shown in Fig. 3-54 is obtained.
Set the TRACKING control knob to the center detent point.

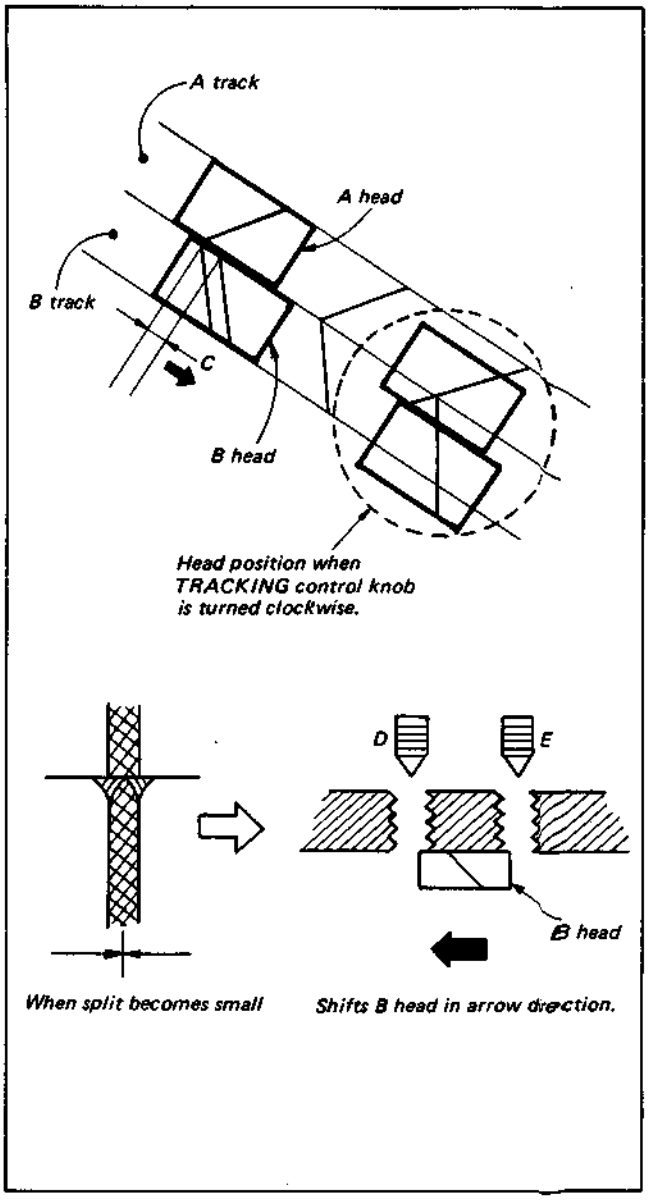


Fig. 3-56.

(2) When the split becomes large for the clockwise turn of the TRACKING control knob, the B head shifts by C in the arrow direction as shown in Fig. 3-57 and is tracing the magnetic pattern. The adjusting screw in adjustment hole D shown in the figure, must be tightened further to shift the B head in the right direction until the good dihedron shown in Fig. 3-54 is obtained.
Set the TRACKING control knob to the center detent point.

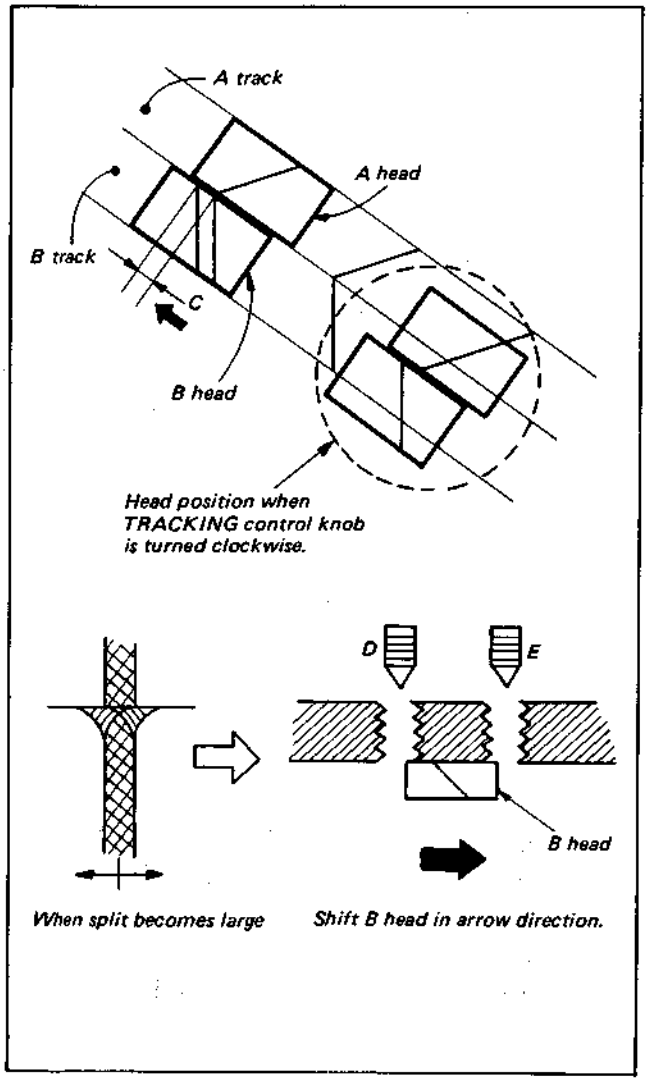


Fig. 3-57.

(3) Remove the adjusting screws after the completion of the adjustment and check the dihedron again.

SECTION 4
ELECTRICAL ALIGNMENT

All the electrical alignment can be performed by using the equipment mentioned below, the alignment tape, and the SECAM colour bar signal (100%).

[Equipment Required]

(1) Colour Monitor TV

(2) Oscilloscope, Dual-trace, Bandwidth . . . more than 10 MHz with delay mode

(3) Frequency Counter

(4) **SECAM Colour-Bar Generator**

(5) Digital voltmeter

(6) VOM (20 KΩ/V)

(7) Audio Signal Generator

(8) Vectorscope

(9) Attenuator

(10) Alignment Tape, type: **KR5-1J, Code No. 8-969-996-03**

(11) Alignment Tool (Adjusting screwdriver for semi-fixed resistors and coils)
Jig No. SL-0001, Code No. J-6080-001-A

[Setup for Alignment]

The antenna should be connected correctly to the antenna input terminal of the videocassette recorder.

It is important that the video output signal satisfies the specification because the telecast signal received by the incorporated tuner of the videocassette recorder is utilized as the adjustment signal of the machine. The incorporated tuner should be set to the channel with the best reception. The video signal should be checked with an oscilloscope connected to video in terminal on the YC-12 board. Verify that the sync signal amplitude is approx. 0.3 Vp-p and the video signal amplitude is approx. 0.7 Vp-p at peak. Adjust the fine tuning while observing the signal and the TV screen so that the burst signal amplitude becomes approx. 0.3 V ± 0.1 Vp-p. Also confirm that there is no spikes observed at the sync signal portion. (See Fig. 4-1.)

The video (colour bar) signal for the alignment is shown in Fig. 4-1.

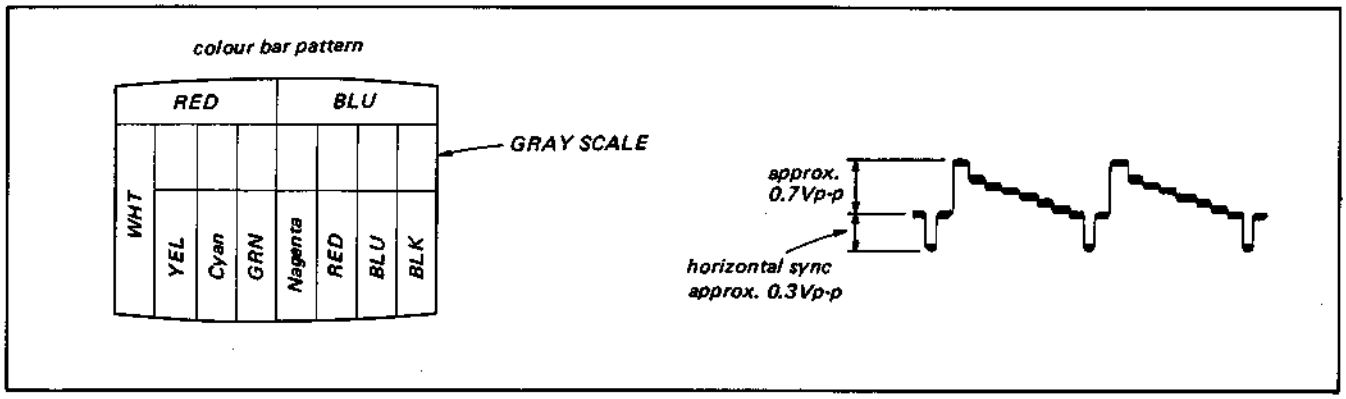


Fig. 4-1. Video (colour bar) signal

[Alignment Tape]

KR5-1J

	Video signal	Audio signal	Playing time	Use for
1.	Colour bars	3 kHz – 5 dB	5 min	General performance, tape speed checks, switching position adjustment.
2.	Monoscope	333 Hz – 25 dB	5 min	Video head dihedral, audio level adjustment.
3.	RF sweep	5 kHz – 25 dB	5 min	Video, audio frequency characteristics, audio azimuth adjustment marker: 1, 2, 3.58, 4.5, 5.2 MHz
4.	Tracking 1 MHz (CH-A) *1 (Channel B is inserted in every 3 frames.)	1 kHz – 5 dB *2 (Signal is dropped out in the positions where channel B is inserted.)	5 min	Tracking, Audio height adjustments CTL Position check (Check if *1 and *2 are the same position.)

[Alignment Tool for Semi-fixed Variable Resistors and Coils]

Semi-fixed variable resistors and inductances should be adjusted with the alignment tool exclusively prepared for the adjustment of the components. A common screwdriver is too large for adjusting the components from the conductor side of a printed cricuit board.

The metal blade of the alignment tool is used for variable resistors and trimmer capacitors and the plastic tip is used for variable inductances.

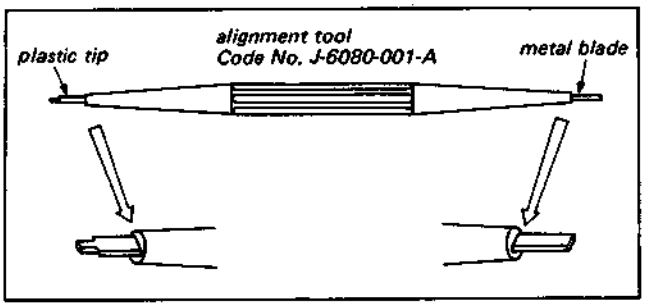


Fig. 4-2. Alignment tool

[Required Levels and Impedances of Input and Output]

VIDEO

Input ..... VIDEO IN: BNC connector
1.0 Vp-p, 75 ohms
unbalnced, sync negative

Output ..... VIDEO OUT: BNC connector
1.0 Vp-p, 75 ohms
unbalanced, sync negative

AUDIO

Input ..... AUDIO IN: Phono connector, 47 kohms, −10 dBs
MIC: mini jack, −60 dBs, suitable for microphone with 600-ohm impedance

Output ..... AUDIO OUT: Phono connector, Less than 10 kohms, −5 dBs (47 kohm load), unbalanced

[Colour Bar Signal]

The 100% colour bar signal recorded on the Alignment tape is shown in Fig. 4-3.

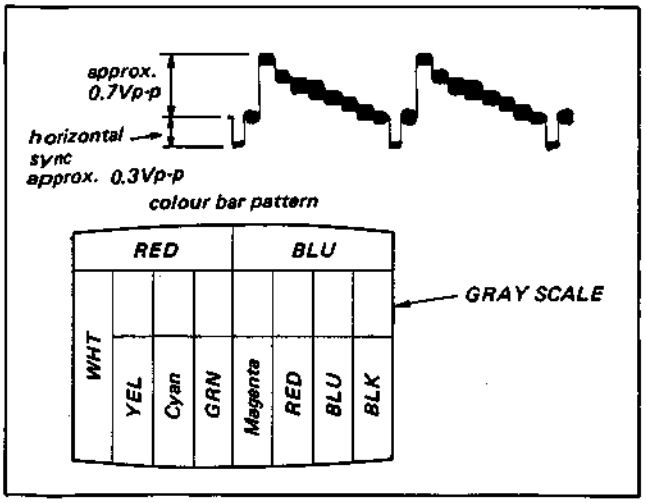
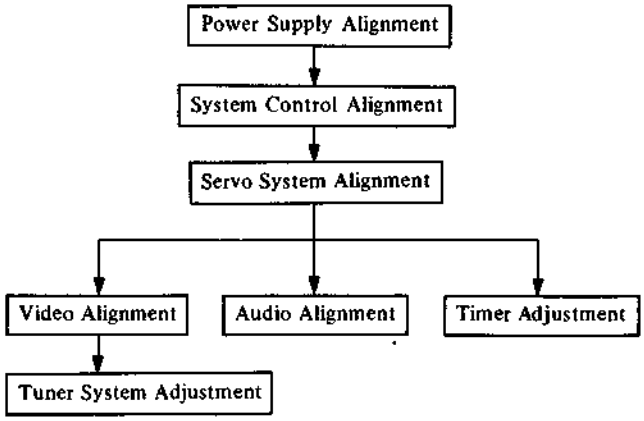


Fig. 4-3. Colour bar signal recorded on the alignment tape

[Alignment Sequence]

The alignment should be performed following the sequence below.



4-1. POWER SUPPLY ALIGNMENT AND CHECK

1. Output Voltage Check (FS-6 board)

Note: Set up the E-E mode.

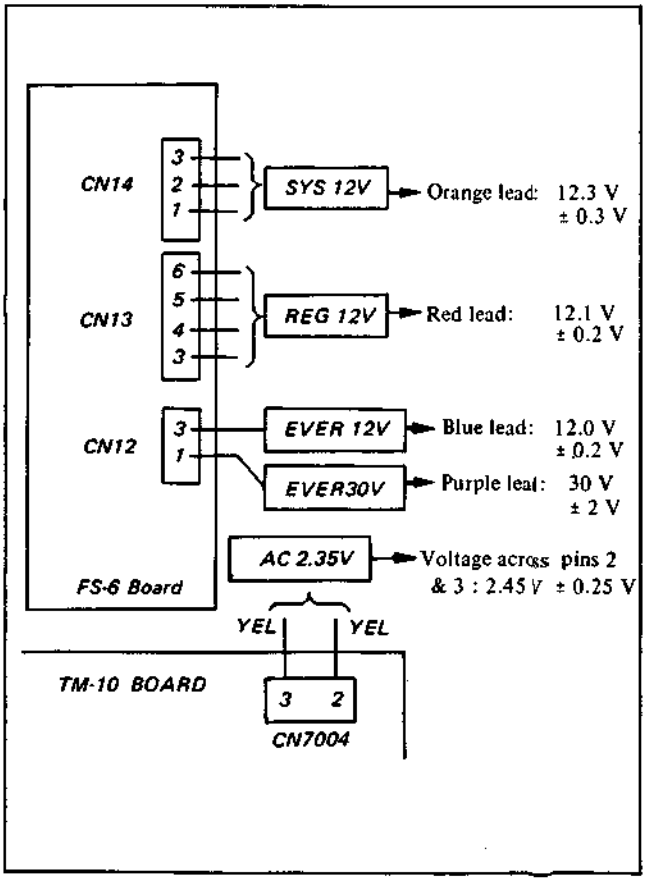


Fig. 4-1-1.

2. REG 12V Adjustment

This adjustment should be executed after the replacement of IC1, R210, through R213, and RV201.

Caution: Discharge C108 with a resistor of 1kΩ (more than 2W). If it is not discharged, you will get a shock.

(1) Remove CN0010 off the FS-6 board.

(2) Connect the VOM at the point shown in Fig. 4-1-2.

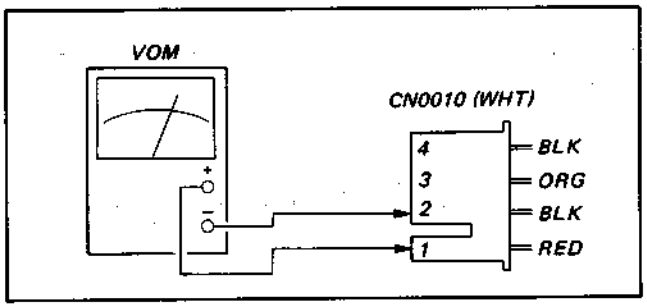


Fig. 4-1-2.

(3) Adjust RV201 for 12.1 ± 0.1 V.

(4) Connect CN0010 as it was.

(5) Set up the PLAY mode.

(6) Check that the VOM reading is with in the value in step (3). If it is not, readjust RV201.

3. EVER 12V Adjustment

This adjustment should be executed after the replacement of R220 through R222, RV202, and D209.

Caution: Discharge C108 with a resistor of 1kΩ (more than 2W). If it is not discharged, you will get a shock.

(1) Remove CN0011 off the FS-6 board and CN7004 off the TM-11 board.

(2) Connect the VOM at the point shown in Fig. 4-1-3.

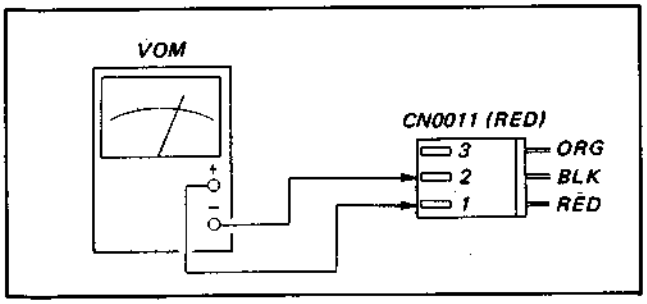


Fig. 4-1-3.

(3) Adjust RV202 for 12 V ± 0.1 V.

(4) Connect CN0011 and CN7004 as they were.

(5) Place the VTR into an optional mode.

(6) Check the VOM reading is within the value in Step (3). If it is not, adjust RV202.

4-2. SYSTEM CONTROL ALIGNMENT AND CHECK (SY-10 & SY-11 board)

1. Clock Oscillating Frequency Adjustment (SY-10 board)

(1) Connect the frequency counter to pin 42 of IC502.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T501 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

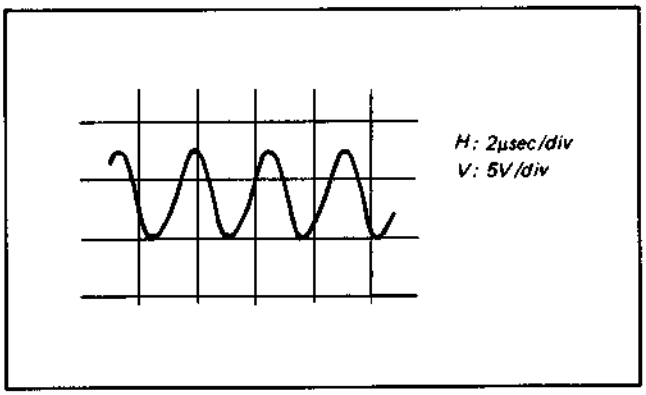


Fig. 4-2-1. Adjustment of clock oscillating frequency

2. Clock Oscillating Frequency Adjustment (SY-11 board)

(1) Connect the frequency counter to pin 43 of IC06.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T1 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

3. Clock Oscillating Frequency Adjustment (SY-11 board)

(1) Connect the frequency counter to pin 42 of IC07.

Note: The input impedance of the frequency counter should be more than 10 MΩ.

(2) Adjust T2 for 400 kHz ± 0.5 kHz. (See Fig. 4-2-1.)

4. Threading Check

(1) Load a cassette.

(2) Check that the threading is performed.
Threading time: about 3 seconds

5. Unthreading Check

(1) Press the EJECT button.

(2) Check that the unthreading is performed as soon as the EJECT lamp turns on, the lamp turns off after the completion of the unthreading, and the cassette lift assembly rises.
Unthreading time: about 4 seconds

6. Auto-Rewind Check

(1) Check that the auto-rewind is done automatically so that the tape is rewound at the tape end in the F.FWD, REC, PB, or CUE mode after the end alarm sounds 10 seconds if the END ALARM switch is in the on position.

4-3. SERVO SYSTEM ALIGNMENT

4-3-1. Drum Servo System Adjustment

1. Drum Free Speed Adjustment (AS-3 board)

   (1) Set up the REC mode.
   (2) Connect the oscilloscope as follows.

   CH-1 . . . . . pin 1 of IC1
   CH-2 . . . . . pin 7 of IC1

   (3) Confirm that the waveform locks as shown in Fig. 4-3-1.

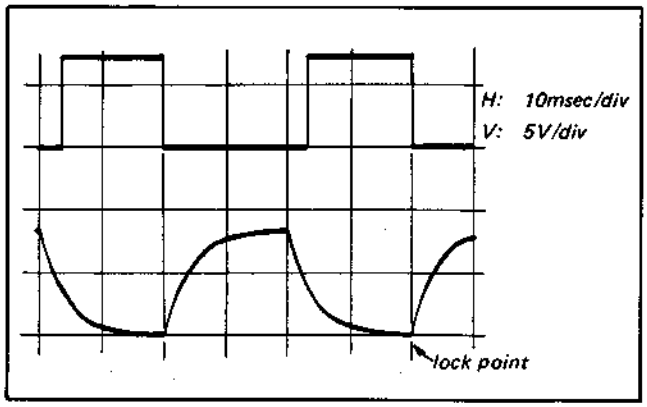


Fig. 4-3-1. Drum free speed adjustment

   (4) Connect the CH-1 probe of the oscilloscope to TP2 (pin 10 of IC1).

   Input range: DC

   (5) Adjust RV10 for 5.2 V ± 0.3 V. (See Fig. 4-3-2.)

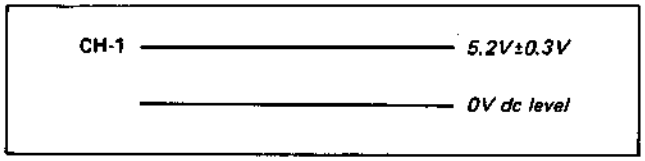


Fig. 4-3-2. Drum free speed adjustment

2. RF Switching Position Adjustment (YC-12, RF-2, & AS-3 boards)

   (1) Play back the coulor bar segment of the alignment tape.

   (2) Connect the oscilloscope to TP5 on the RF-2 board.

   (3) Adjust the TRACKING knob for maximum output. (See Fig. 4-3-3.)

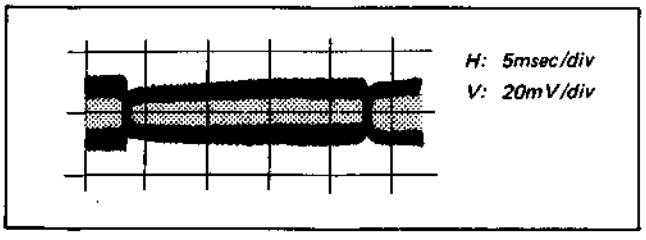


Fig. 4-3-3. RF output level adjustment

   (4) Connect the oscilloscope as follows.

   CH-1 . . . . . TP1/AS-3 board
   CH-2 . . . . . Emitter of Q21/YC-12 board

   (5) Adjust RV2 on the AS-3 board so that the phase difference between the falling section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-4.)

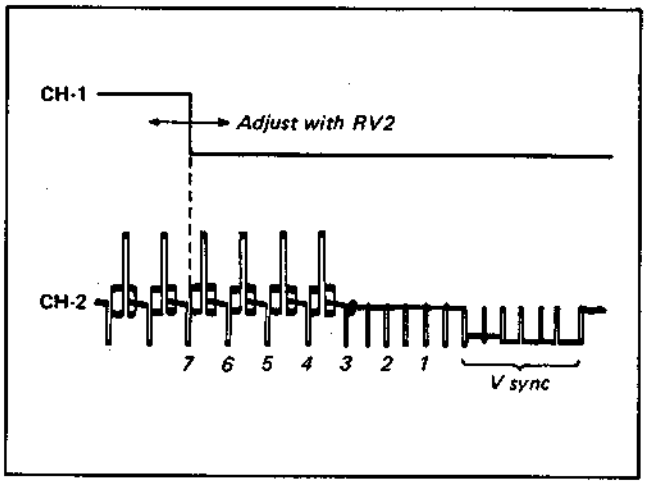


Fig. 4-3-4. RF switching position adjustment (1)

   (6) Adjust RV1 on the AS-3 board so that the phase difference between the rising section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-5.)

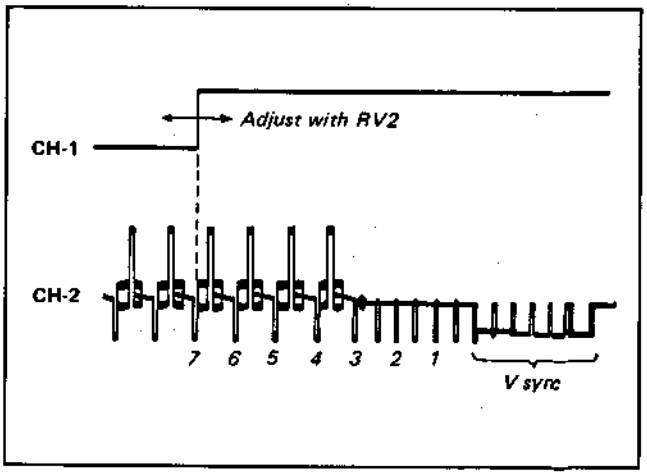


Fig. 4-3-5. RF switching position adjustment (2)

3. Record-Servo Lock Phase Adjustment (YC-12 & AS-3 boards)

   (1) Record a video signal.

   (2) Connect the oscilloscope as follows.

   CH-1 . . . . . TP1/AS-3 board
   CH-2 . . . . .,pin 20 of IC1/YC-12 board

   (3) Adjust RV3 on the AS-3 board so that the phases of the falling section of the CH-1 waveform and the vertical sync signal of the CH-2 video signal are 7 H ± 2 H. (See Fig. 4-3-6.)

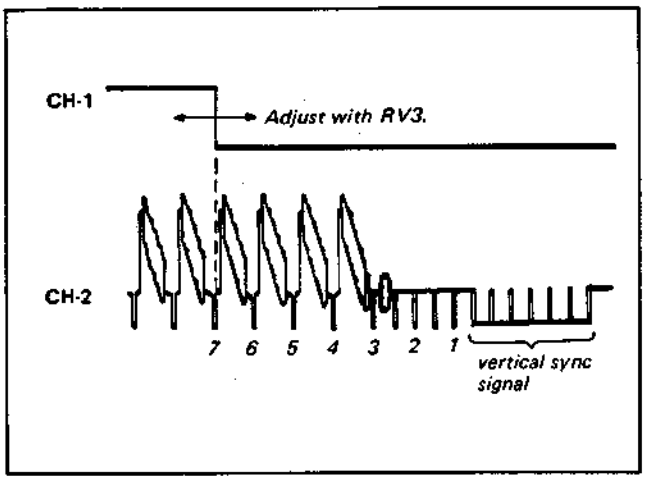


Fig. 4-3-6. Record-servo lock phase adjustment

4. Picture Search (High-Speed Picture) (AS-3 board)

(1) Record a video signal.

(2) Play back the recorded segment.

(3) Connect the oscilloscope to pin 10 of IC7 on the YC-12 board.

(4) Position the positive-going edge of the waveform at the exact center of the oscilloscope scale. (See Fig. 4-3-7.)

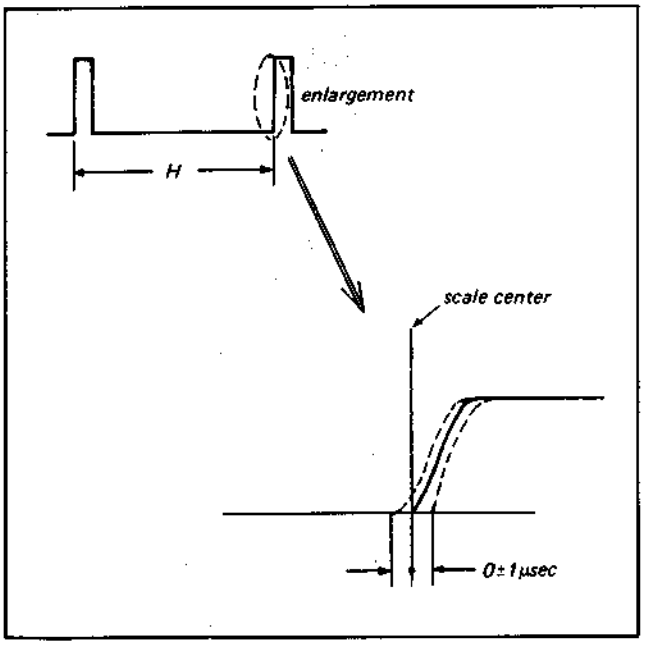


Fig. 4-3-7. Picture search free speed adjustment

(5) Set up the CUE mode.

(6) Adjust RV11 so that the fluctuation of the rising of the waveform is within 0 ± 1 μsec. for the scale center.

(7) Set up the REVIEW mode.

(8) Adjust RV12 so that the fluctuation of the rising of the waveform is within 0 ± 1 μsec. for the scale center.

4-3-2. Capstan Servo System Alignment

1. Capstan Free Speed Adjustment (AS-3 board)

(1) Play back the colour bar segment of the alignment tape.

(2) Connect the oscilloscope as follows.
CH-1 . . . . . pin 19 of IC2
CH-2 . . . . . pin 20 of IC2

(3) Adjust RV8 for the phase lock shown in Fig. 4-3-8.)

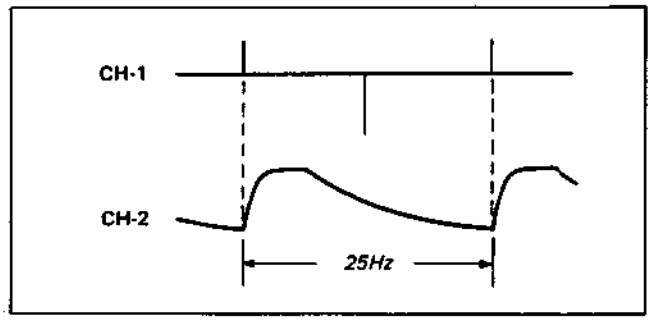


Fig. 4-3-8. Phase lock

(4) Connect the oscilloscope to TP4.
Input range: DC range

(5) Adjust RV8 for 5.5 V ± 0.3 V.

(6) Play back the coulor bar signal in the TRIPLE speed.

(7) Adjust RV9 for 5.5 V ± 0.3 V.

2. Tracking Control Center Adjustment (AS-3 board)

(1) Set the TRACKING knob to the center detent position.

(2) Play back the colour bar signal segment of the alignment tape.

(3) Connect the oscilloscope as follows.
CH-1 . . . . . TP11
CH-2 . . . . . TP6

(4) Adjust RV4 so that the phases of the falling sections of the waveforms become the same. (See Fig. 4-3-9.)

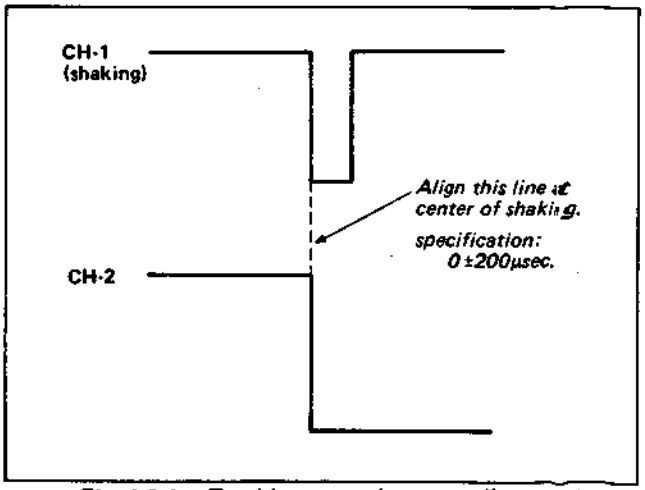


Fig. 4-3-9. Tracking control center adjustment

3. Triple Speed Noise Position Adjustment (AS-3 board)

(1) Record an optional signal.

(2) Set the TRACKING knob to the center detent position.

(3) Play back the recorded segment in the TRIPLE speed.

(4) Adjust RV5 so that the noise disappears from the monitor TV screen. (See Fig. 4-3-10.)

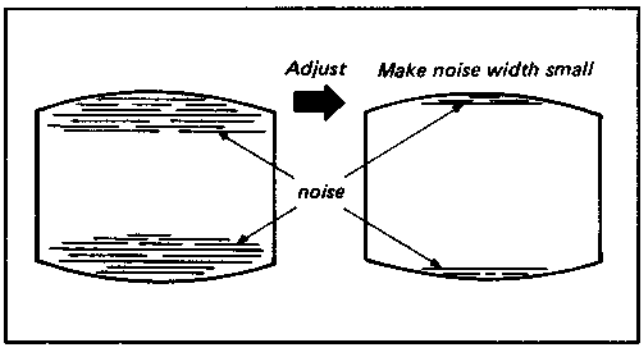


Fig. 4-3-10. Triple speed noise position adjustment

4-3-3. Slow Speed Circuit Adjustment

1. Slow Speed Adjustment (AS-3 board)

(1) Set up the slow-motion mode.

(2) Connect the oscilloscope to the emitter of Q6.

(3) Adjust RV6 for a pulse width of 18 msec ± 1 msec. (See Fig. 4-3-11.)

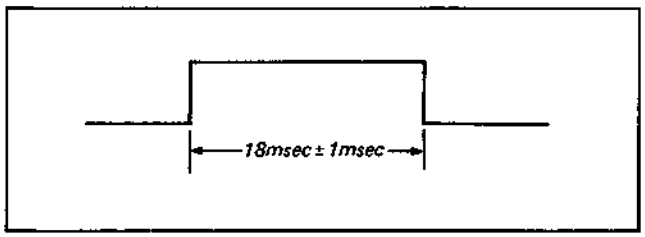


Fig. 4-3-11. Slow speed adjustment

4-4. VIDEO SYSTEM ALIGNMENT (CF-2, YC-12 AND RF-2 BOARDS)

[CF-2 Board]

1. Burst Gate Pulse Width Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope probe (A) to the point between R28 and R29, and probe (B) to the VIDEO OUT.

(3) Adjust RV2 and RV4 so that the burst gate pulse is as shown in Fig. 4-4-1.

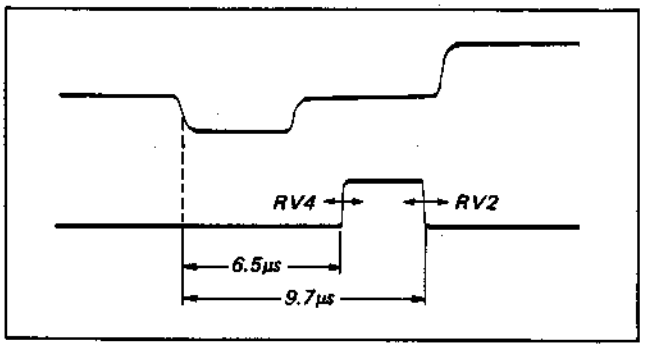


Fig. 4-4-1. Burst gate pulse

2. DC Bias Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 13 of IC7.

(3) Adjust RV5 so that the waveform is as shown in Fig. 4-4-2.

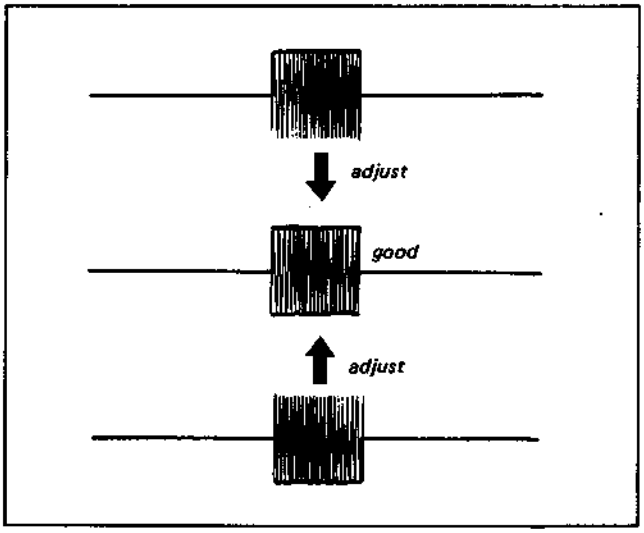


Fig. 4-4-2. DC bias adjustment

3. HID Discriminator Frequency Adjustment

(1) Supply the VTR with the colour bar signa and set up the E-E mode.

(2) Connect the oscilloscope to pin 11 of IC7.

(3) Adjust LV4 so that the waveform is as shown in Fig. 4-4-3.

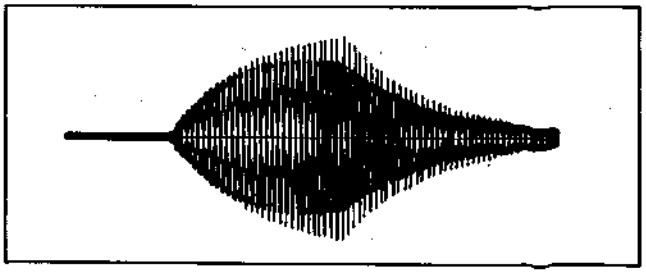


Fig. 4-4-3. HID discriminator frequency adjustment

4. Phase shifter Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope probe (A) to pin 9 of IC1, and probe (B) to VIDEO OUT.

(3) Adjust RV3 so that the beginning position of boost strap waveform for shifter is at 6.2μs.

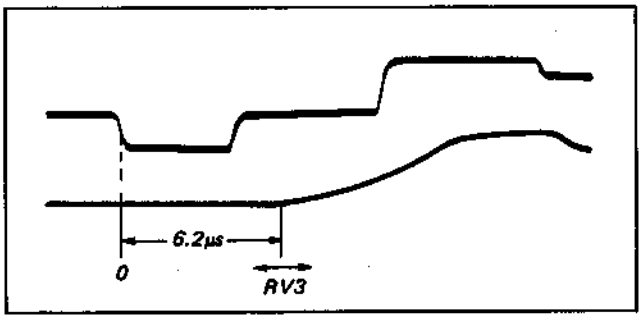


Fig. 4-4-4. Phase shifter adjustment

5. Burst Signal Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 1 of IC6.

(3) Adjust LV1 for maximum level, and make sure that envelope of the waveform is modulated as shown in Fig. 4-4-5.

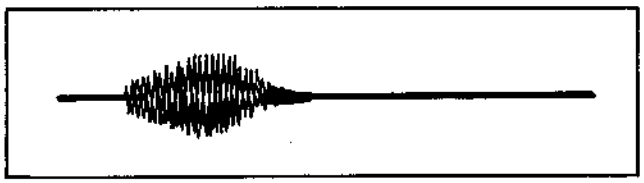


Fig. 4-4-5. Envelope waveform

(4) Turn RV1 fully clockwise viewed from component side.

(5) Readjust the LV1 for maximum level.

6. Injection Oscillator Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to collector of Q4.

(3) Make sure that injection level is 5–6V and does not saturate as shown in Fig. 4-4-6.

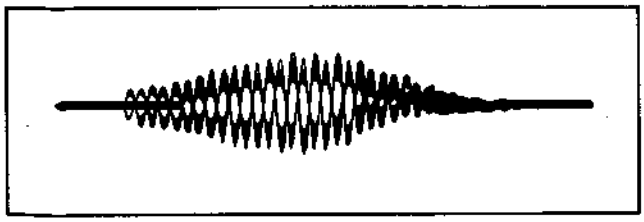


Fig. 4-4-6. Injection oscillator (1)

(4) Short-circuit between collector and emitter of Q14 with the jumper.

(5) Connect the frequency counter as shown in Fig. 4-4-7.

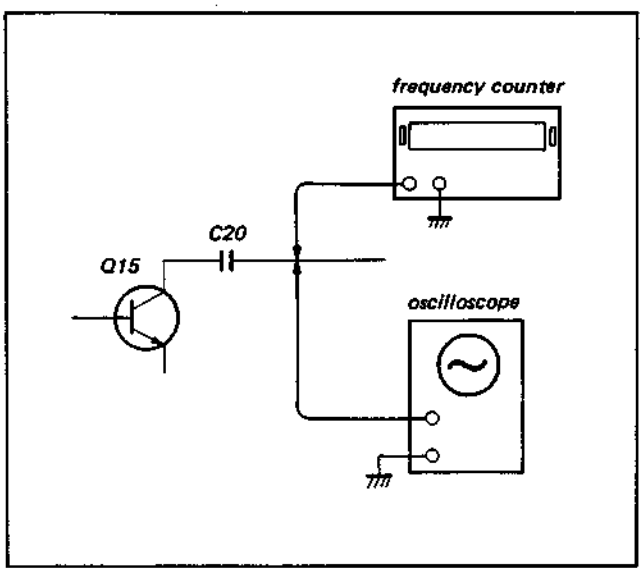


Fig. 4-4-7. Injection oscillator (2)

(6) Adjust LV2 for 4.40625 MHz ± 1 kHz reading and LV3 for maximum.

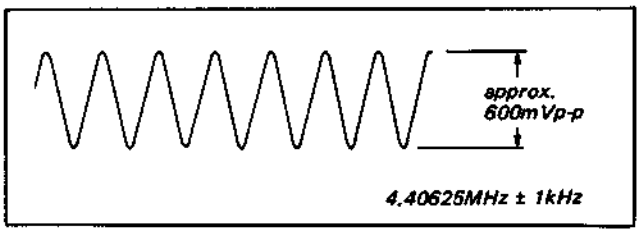


Fig. 4-4-8. Injection oscillator (3)

(7) Connect the oscilloscope as shown in Fig. 4-4-7.

(8) Remove the jumper in step (4).

(9) Make sure that the waveform is as shown in Fig. 4-4-9.

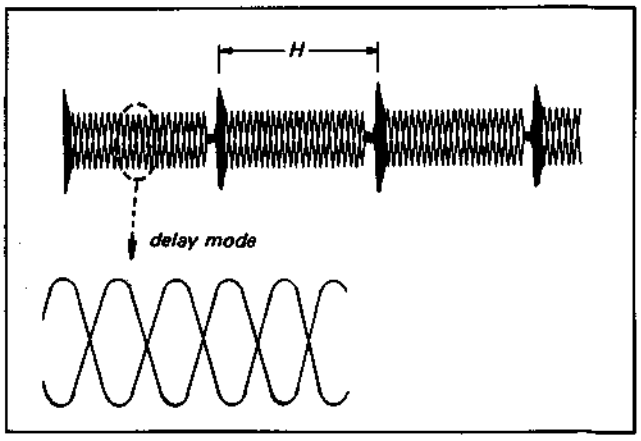


Fig. 4-4-9. Injection oscillator (4)

7. Bell Filter Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 15 of IC5 on the YC-12 board, and to collector of Q11 on the CF-2 board.

Note: The waveform of pin 15 of IC5 is low level (approx. 0.1Vp-p), so earth terminal of oscilloscope probe should be terminated to ground pattern.

(3) Adjust LV5 and T1 so that the two waveforms become the same as shown in Fig. 4-4-10.

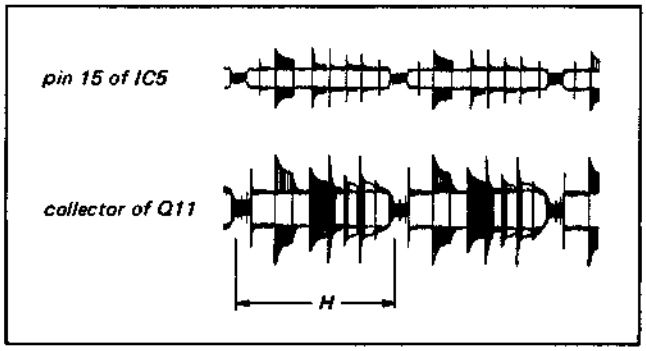


Fig. 4-4-10. Bell filter adjustment

(4) Play back the colour bar signal segment of the alignment tape.

(5) Readjust the LV5 and T1 so that colour saturation is not taken place.

[YC-12 Board]

1. SYNC AGC Preset Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Check the following points with the oscilloscope.
IC1 Pin 3 ...Sync ..... Approx. 6 Vp-p
Pin 4 ...Burst flag ..... Approx. 4 Vp-p
Pulse width: Approx. 4 μsec
Pin 5 ...AGC CONT ..... Approx. 1.4 Vdc
Pin 17 ..MONO/COLOUR .... Approx. 0 Vdc

(3) Connect the oscilloscope to pin 24 of IC1.

(4) Adjust RV7 for the sync signal level of 300mV ± 12mVp-p. (See Fig. 4-4-11.)

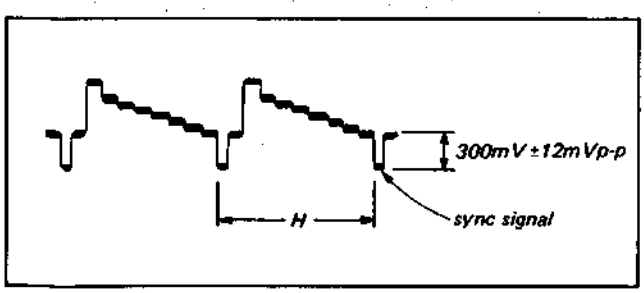


Fig. 4-4-11. Lebel adjustment of sync signal

2. Colour E-E Level Adjustment

(1) Supply the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 22 of IC1.

(3) Adjust RV1 for the sync signal level of 300 mV ± 15 mVp-p. (See Fig. 4-4-12.)

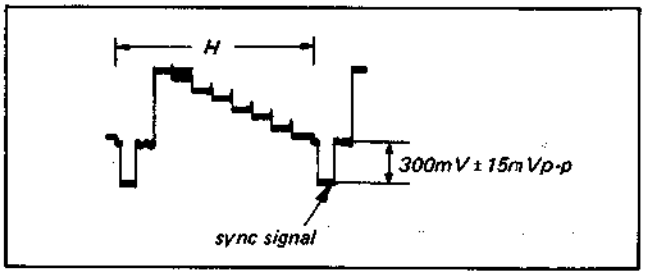


Fig. 4-4-12. Level adjustment of sync signal

3. Peak AGC (E-E Video Output Level) Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 24 of IC1.

(3) Adjust RV7 for maximum output level of the video signal and then adjust RV2 so that the output level of the video signal becomes 1.1 V ± 0.05 Vp-p. (See Fig. 4-4-13.)

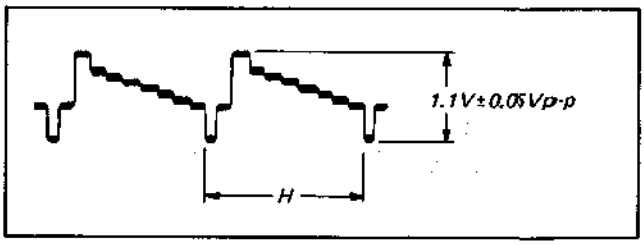


Fig. 4-4-13. Peak AGC adjustment

4. SYNC AGC Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 24 of IC1.

Note: The voltage at pin 17 of IC1 is approximately 0 Vdc

(3) Adjust RV7 so that the sync signal level is 300 mV ± 12 mVp-p. (See Fig. 4-4-14.)

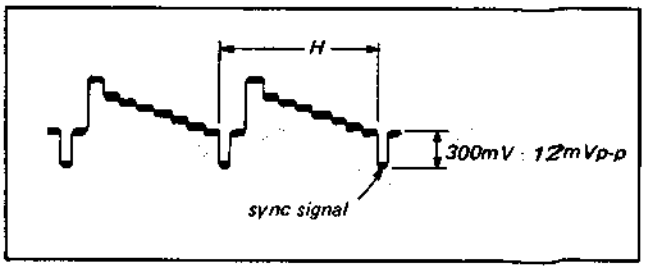


Fig. 4-4-14. Sync AGC adjustment

5. Compress Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the digital voltmeter to the points shown in Fig. 4-4-15.

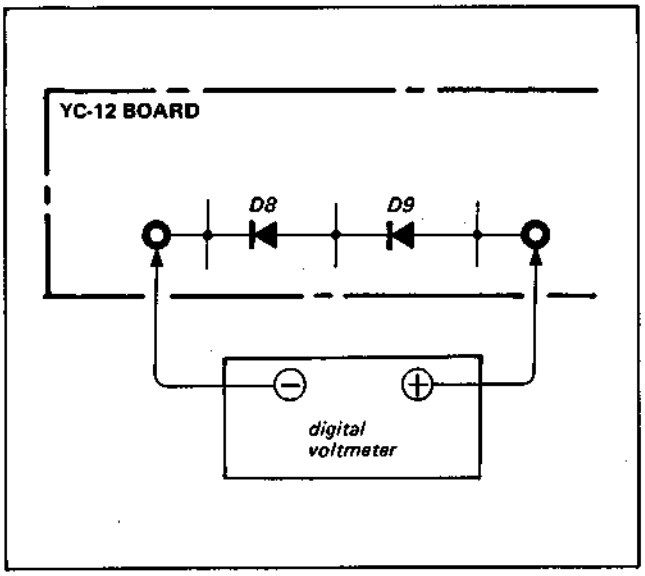


Fig. 4-4-15. Measurement points

(3) Adjust RV8 for 0.454 Vdc.

6. White Clip Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to collector of Q34.

(3) Adjust RV10 so that the signal tip (white peak) is 220% ± 5%. (See Fig. 4-4-16.)

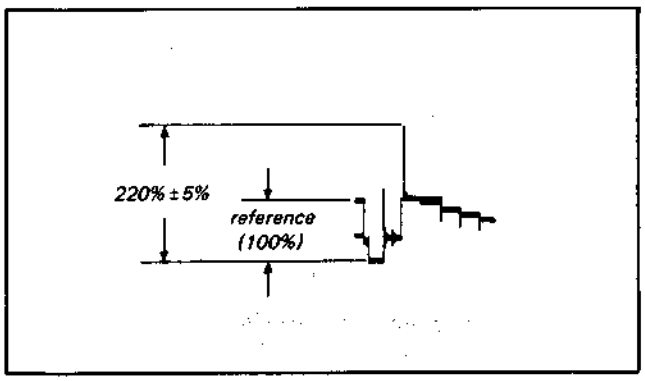


Fig. 4-4-16. White clip adjustment

7. Dark Clip Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to collector of Q34.

(3) Adjust RV9 so that the signal tip (dark peak) is 170% ± 5%. (See Fig. 4-4-17.)

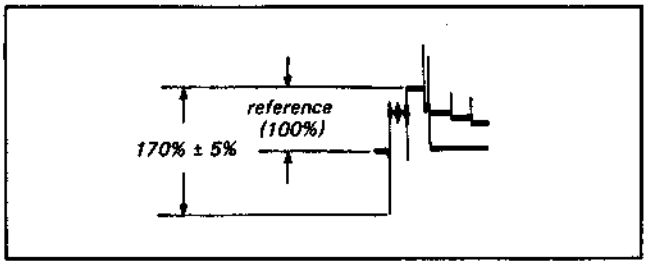


Fig. 4-4-17. Dark clip adjustment

8. Expand Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the digital voltmeter to the points shown in Fig. 4-4-18.

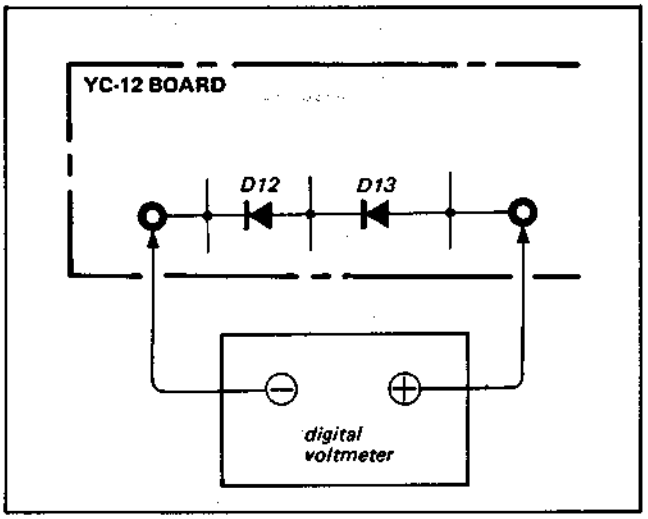


Fig. 4-4-18. Measurement points

(3) Adjust RV14 for 0.52 Vdc.

9. AFC Adjustment

(1) Supply the VTR with a video signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 5 of IC6.
TRIG: EXT (IC1-4 pin, H.Sync)

(3) Adjust RV22 so that the lock point is the center of the trapezoidal waveform. (See Fig. 4-4-19.)

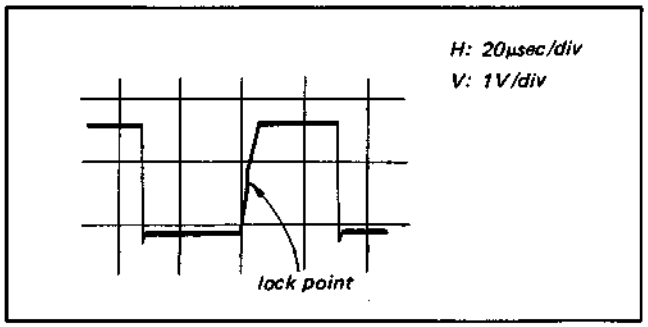


Fig. 4-4-19. AFC adjustment

10. AFC Offset Adjustment

(1) Supply the VTR with the video signal and set up the RECORD mode.

(2) Connect the oscilloscope to pin 5 of IC6.
TRIG: EXT (TP3, RF SW PULSE, on RF-2 board)

(3) Adjust RV23 so that the lock points of the A-CH and the B-CH are at the points shown in Fig. 4-4-20.

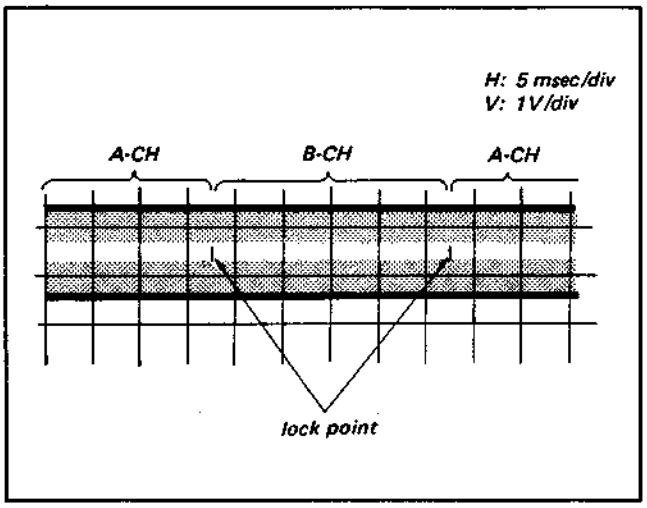


Fig. 4-4-20. AFC offset adjustment

11. ACC Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to pin 8 of IC5.

(3) Adjust T4 for minimum output level.

(4) Adjust RV24 for 1.3V ± 0.05 Vp-p. (See Fig. 4-4-21.)

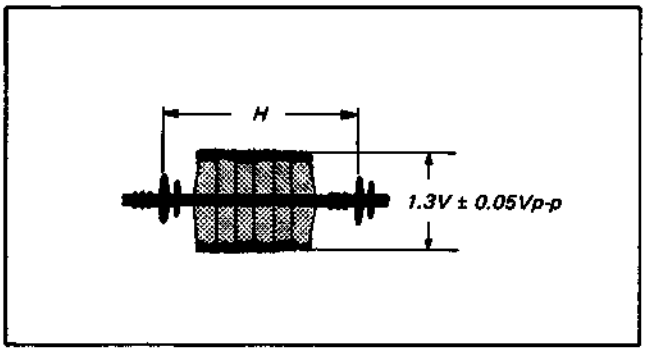


Fig. 4-4-21. ACC adjustment

12. X'tal Oscillation Adjustment

(1) Set up the PLAY mode.

(2) Connect the frequency counter to emitter of Q90.

(3) Adjust T7 for an oscillating frequency of 4.40625 MHz.

(4) Check that the output level is 0.6 V ± 0.1 Vp-p. (See Fig. 4-4-22.)

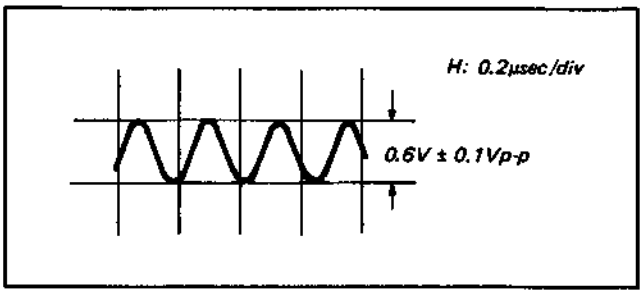


Fig. 4-4-22. Output level check

13. Injection Oscillating Frequency Adjustment

(1) Do not supply the VTR with any signal and set up the E-E mode.

(2) Connect the frequency counter to emitter of Q91.

(3) Adjust LV2 on the CF-2 board so that the oscillating frequency is 4.40625 MHz ± 1 kHz.

(4) Check that the output level is 0.8 V ± 0.2 Vp-p. (See Fig. 4-4-23.)

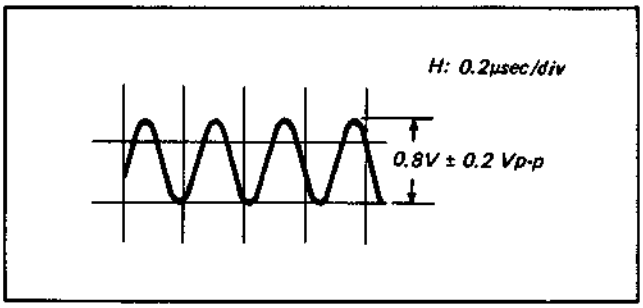


Fig. 4-4-23. Output level check

14. Chroma Record Current Adjustment

(1) Supply the VTR with the colour bar signal and set up the E-E mode.

(2) Connect the oscilloscope to center tap of RV20.

(3) Adjust RV20 for a chroma signal level of 170mV ± 10 mVp-p. (See Fig. 4-4-24.)

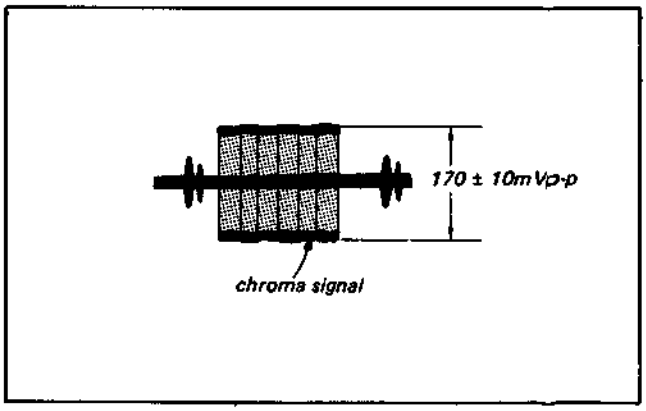


Fig. 4-4-24. Chroma record current adjustment

(4) Check that the level of the pilot burst signal is 0.4 V ± 0.05 Vp-p. If not, adjust RV18. (See Fig. 4-4-24.)

15. Test Signal Frequency Adjustment

[Adjustment with Frequency Counter]

(1) Turn on the TEST SIG switch.

(2) Connect the frequency counter to collector of Q60.

(3) Adjust RV13 for 15.625 kHz ± 100 Hz.

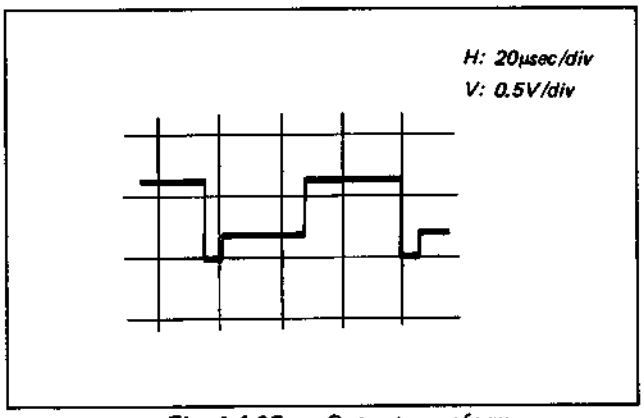


Fig. 4-4-25. Output waveform

[Adjustment by Observing Monitor TV]

(1) Turn on the TEST SIG switch.

(2) Adjust RV13 so that the monitor TV picture becomes as shown in Fig. 4-4-26.

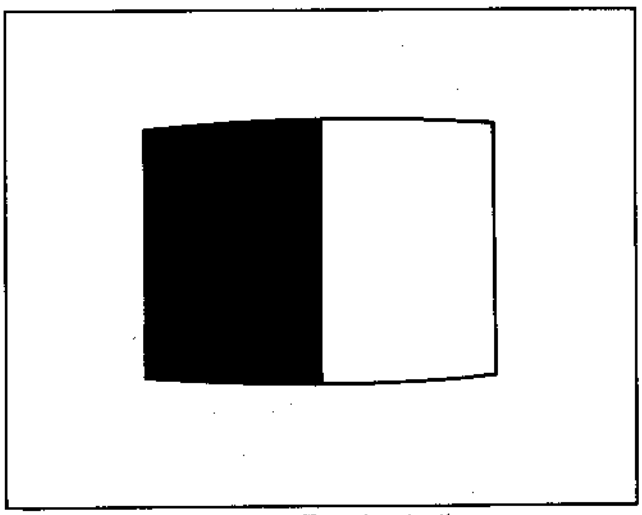


Fig. 4-4-26. Test signal adjustment

[RF-2 Board]

1. Record Current Frequency Characteristic Adjustment

(1) Set up the no-signal input state and set up the RECORD mode.

(2) Connect the oscilloscope to TP1 and the GND probe to TP2.

Note: Since TP2 is the REG 12 V line, do not connect the GND probe to the points other than TP2.

(3) Adjust RV6 for a signal level of 130 mVp-p. (See Fig. 4-4-27.)

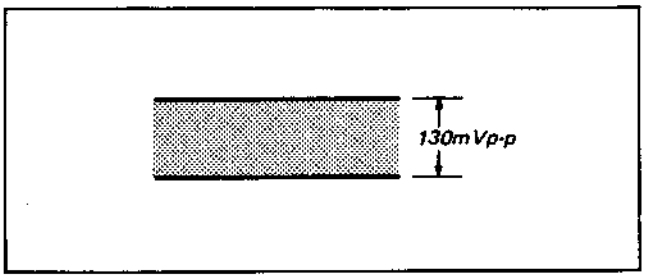


Fig. 4-4-27. Record current frequency characteristic adjustment

2. Playback Amplifier Frequency Characteristic Adjustment

(1) Play back the RF sweep signal segment of the alignment tape.

(2) Connect the oscilloscope to TP5.
TRIG: EXT (TP3, RF SW PULSE)
TRIG SLOPE { + ... CH-B / − ... CH-A

(3) Adjust the TRACKING knob for maximum signal level.

(4) Make the signal level from 1 MHz to 5.2 MHz flat.

A-CH RV1
B-CH RV2

(See Fig. 4-4-31.)

(5) Adjust RV3 so that the signal levels between 1 MHz and 2 MHz are all the same in the A-CH and B-CH.

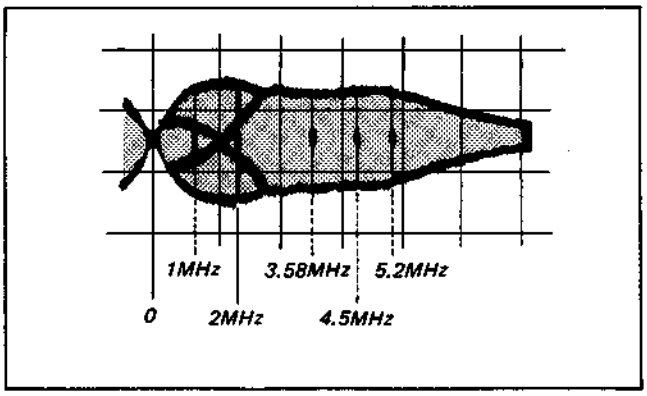


Fig. 4-4-28. Playback amplifier frequency characteristic adjustment

3. Dropout Compensation Adjustment

(1) Play back a blank tape.

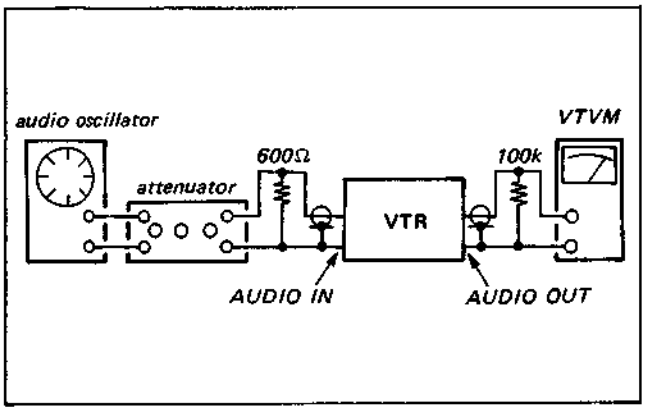
(2) Connect the oscilloscope to pin 2 of IC1.
INPUT: DC range

(3) Set RV4 to the point where the voltage at pin 2 of IC1 changes to 0.6 Vdc from 0 Vdc.

(4) Play back a recorded tape which has dropouts and check that the dropouts are compensated.

4-5. AUDIO SYSTEM ALIGNMENT (AS-3 Board)

[Connection of Relative Equipment]



[Adjustment Sequence]

1. Audio Head Adjustment
2. Playback Frequency Characteristic Adjustment
3. Playback Output Level Adjustment
4. Bias Oscillator Check
5. Bias Trap Adjustment
6. Record Bias Adjustment
7. Record Level Adjustment
8. Audio Dubbing Bias Adjustment
9. Overall Frequency Characteristic Check
10. Overall S/N Ratio Check
11. Overall Distortion Check

1. Audio Head Adjustment (Refer to the SECTION 3-19)
2. Playback Frequency Characteristic Adjustment
   (1) Play back the 333 Hz and 5 kHz segments of the alignment tape.
   (2) Adjust RV404 so that the output level difference between 333 Hz and 5 kHz is within +1.5 ± 1 dB.
3. Playback Output Level Adjustment
   (1) Play back the 333 Hz segment of the alignment tape.
   (2) Adjust RV403 so that the output level is within −25 ± 1 dB.
4. Bias Oscillator Check
   (1) Insert the cassette and set up the RECORD mode.
   (2) Connect a pickup coil (approx. 33mH) to the frequency counter and move the counter to T401 (in the shield case).
   (3) Check that the oscillating frequency is 65 kHz ± 6.5 kHz.
5. Bias Trap Adjustment
   (1) Set the input signal level to zero. (Set the audio oscillator output to zero and the attenuator to maximum.)
   (2) Connect the oscilloscope to the collector of Q406.
   (3) Adjust LV401 for minimum bias leak.
   Value: minimum level below 1 Vp-p.
6. Record Bias Adjustment

   Check that the playback frequency characteristic adjustment has been completed.
   (1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.
   (2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −25 dB.
   (3) Record the signal.
   (4) Change the audio signal to 7 kHz at −25 dB.
   (5) Record the signal.
   (6) Play back the recorded signals.
   (7) Ensure that the output level of 7 kHz is within ±1 dB against the one of 333 Hz.
   (8) If not, adjust RV402 and repeat Steps (2) through (7) until the specification is satisfied.
   (9) Remove the jumper connected to TP402.
7. Record Level Adjustment
   (1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.
   (2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −5 dB.
   (3) Record the signal.
   (4) Play back the recorded signal.
   (5) Ensure that the output level is within −5 ± 1 dB.
   (6) If not, adjust RV401 and repeat Steps (2) through (5) until the specification is satisfied.
   (7) Remove the jumper connected to TP402.
8. Audio Dubbing Bias Adjustment
   (1) Connect TP402 and TP403 (GND) with a jumper so as to turn off the AGC operation.
   (2) Set the oscillator frequency to 333 Hz and adjust the AUDIO OUT terminal level with the attenuator for −25 dB.
   (3) Set up the AUDIO DUB mode.
   (4) Change the oscillator signal to 7 kHz, −25 dB and set up the AUDIO DUB mode.
   (5) Play back the signals.
   (6) Ensure that the output level of 7 kHz is 0 ± 1 dB against the one of 333 Hz.

(7) If not, adjust LV402 and repeat Steps (2) through (6) until the specification is satisfied.

(8) Remove the jumper connected to TP402.

9. Overall Frequency Characteristic Check

(1) Set the oscillator frequency to 333 Hz and adjust the AUDIO terminal level with the attenuator for −25 dB.

(2) Record the signal.

(3) Change the oscillator signal to 50 Hz, 100 Hz, 3 kHz, 5 kHz, 7 kHz and 10 kHz.

(4) Record the signals.

(5) Play back the recorded signals.

(6) Ensure that the output levels are within the specified values. (See Fig. 4-5-1.)

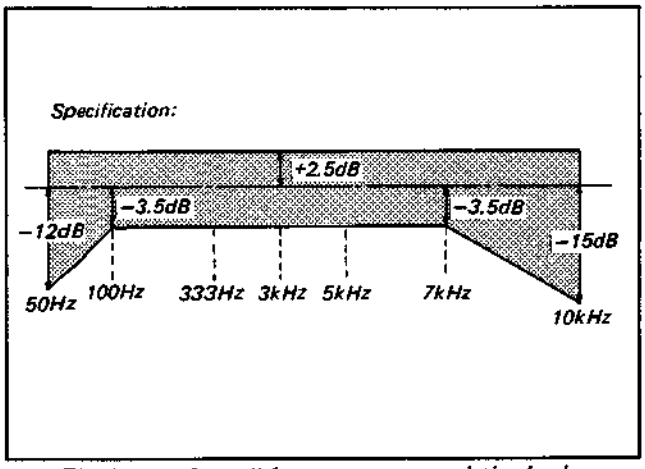


Fig. 4-5-1. Overall frequency caracteristic check

10. Overall S/N Ratio Check

(1) Terminate the AUDIO IN terminal.
(no signal input)

(2) Insert the cassette and set up the record mode.

(3) Open the AUDIO IN terminal and supply the 333 Hz at −10 dB signal to AUDIO IN terminal.

(4) Record the signal

(5) Play back the two segments.

(6) Ensure that the output level difference between two segments is more than 40 dB.

11. Overall Distortion Check

(1) Set the oscillator frequency to 400 Hz and adjust the AUDIO OUT terminal level with the attenuator for −10 dB.

(2) Record the signal.

(3) Connect the distortion meter to the AUDIO OUT terminal.

(4) Play back the recorded signal and ensure that the distorition is less than 4%.

4-6. TUNER BLOCK SYSTEM ALIGNMENT

1. CH-7 Board Clock Adjustment

(1) Connect the frequency counter to pin 3 of IC4.

(2) Adjust RV001 for 15.625 ± 0.3 kHz.

2. Video Output Level & Tuner AGC Adjustment (TU-13 Board)

(1) Receive the colour-bar signal (UHF, level 66 dBμ)

(2) Connect the oscilloscope to TP19 (Emitter of Q4).

(3) Adjust RV002 for 2.8 Vp-p.

(4) Connect the digital voltmeter to TP15.

(5) Adjust RV001 for $6.0 \pm \frac{0.1}{0.3}$ V.

4-7. TIMER SYSTEM ALIGNMENT (TM-10 Board)

1. Oscillating Frequency Adjustment

(1) Connect the frequency counter to TP2 (pin 1 of IC6).

(2) Adjust CV1 for 60 Hz.
Specification: within 60 Hz ± 0.5 Hz/day

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