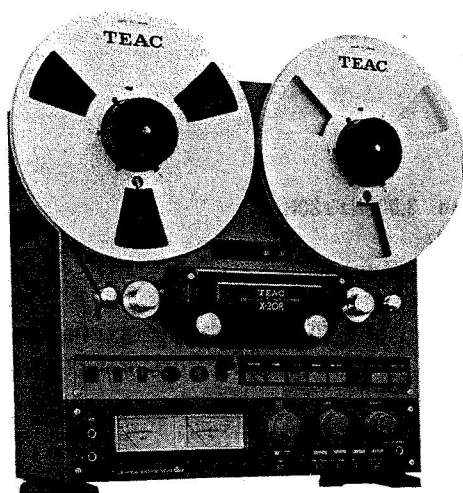




TEAC®

SERVICE MANUAL

X-20R

Stereo Tape Deck

dbx noise reduction system made under license from dbx, Incorporated. The word dbx and the dbx Symbol are trademarks of dbx, Incorporated.

⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components – refer to the TEAC Parts List and ensure exact replacement.

1 SPECIFICATIONS AND SERVICE DATA

SPECIFICATIONS

Track System ¼-track, 2-channel stereo

Head System

6 heads: forward erase, forward record, reverse playback, forward playback, reverse record, reverse erase.

Reel Size 10-½ and 7"

Tape Speed 19 cm/s (7-½ ips) and 9.5 cm/s (3-¾ ips)

Inputs (level and impedance)

MIC: Specified input level: -60dB (0.775mV)/10kohms
Min. input level: -70dB (245µV)

LINE IN: Specified input level: -12dB (195mV)/50kohms
Min. input level: -22dB (61.5mV)

Outputs (level and impedance)

OUTPUT: Specified output level: -5dB (436mV)/10kohms
Max. output level: +1dB (0.869V)

PHONES: Specified output level: -24dB (48.9mV)/8ohms

Playback Equalization

19cm/s: 3,180µs + 50µs (NAB)

9.5cm/s: 3,180µs + 90µs (NAB)

Motors

Capstan motor: FG servo DC motor

Reel motor: 2 DC slotless motors

Bias Frequency: 100kHz

Operating Position Vertical, horizontal, angled

Power Requirements

100/117/220/240V, AC 50/60Hz 80W (General export model)

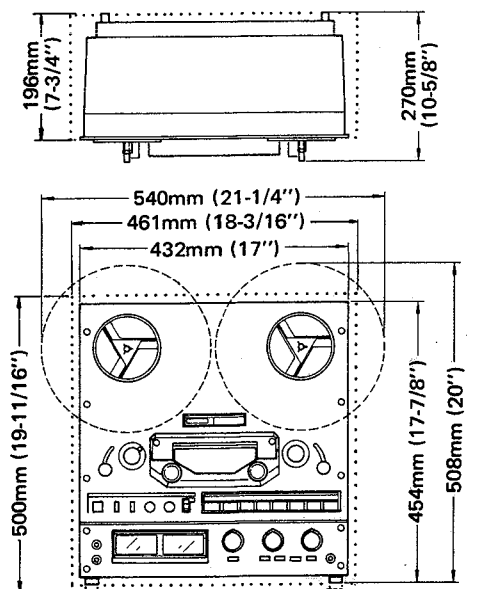
220V AC 50Hz, 80W (Europe model)

240V AC 50Hz, 80W (U.K./Australia model)

117V AC 60Hz, 80W (U.S.A./Canada model)

Weight 21.5 kg (47-6/16 lbs) net

24.2 kg (53-6/16 lbs) net (General export models in certain limited areas have wooden cases.)



Dotted line indicates General Export Models for Limited Areas.

Fig. 1-1 Dimensions

SERVICE DATA

MECHANICAL

Tape Speed Deviation 3,000Hz ±30Hz

Tape Speed Drift 15Hz

FWD/REV Tape Speed Differential 30Hz

Wow and Flutter

Playback: 0.05% (WRMS), 0.10% (RMS) at 19cm/s
0.07% (WRMS), 0.12% (RMS) at 9.5cm/s

Record/Playback: 0.12% (RMS) at 19cm/s
0.15% (RMS) at 9.5cm/s

Pinch Roller Pressure 1.35kg ~ 1.9kg (3.0 lbs ~ 4.2 lbs)

Reel Torque

Play mode:

Take-up (LARGE): 480 ±40 g-cm (6.1 ~ 7.2 oz-inch)

(SMALL): 260 ±40 g-cm (3.1 ~ 4.2 oz-inch)

Back tension (LARGE): 300 ±40 g-cm (3.6 ~ 4.7 oz-inch)

(SMALL): 180 ±40 g-cm (1.9 ~ 3.1 oz-inch)

Fast winding mode:

Take-up: 1100 g-cm (15.3 oz-inch)

Back tension: 50 g-cm (0.7 oz-inch)

Brake Torque

Forward direction: 1.2 ~ 1.7 kg-cm (17 ~ 24 oz-inch)

Reverse direction: 0.6 kg-cm (8.3 oz-inch) or less

Left/right deviation: 0.2 kg-cm (2.8 oz-inch) or less

Fast Winding Time 80 seconds or less for 550m (1800 feet)

Pitch Control Standard tape speed ±6% or more

FWD/REV Change Time 3.5 sec. ±0.5 sec.

TIMER Activate Time 4 sec. ±2 sec.

ELECTRICAL

Frequency Response

Playback: 40Hz ~ 22kHz ±3 dB at 19cm/s

40Hz ~ 14kHz ±3dB at 9.5cm/s

Overall: 40Hz ~ 20kHz ±3dB at 19cm/s

40Hz ~ 16kHz ±3dB at 9.5cm/s

Overall (dbx): 40Hz ~ 20kHz ±6dB at 19cm/s

40Hz ~ 16kHz ±6 dB at 9.5cm/s

Signal to Noise Ratio

Playback: 50dB min. at 19cm/s

49dB min. at 9.5cm/s

Overall: 48dB min. at 19cm/s

46dB min. at 9.5cm/s

Overall (dbx): 65dB min. at both speeds

Erase Efficiency 68dB min. at 1kHz (measured with input 10dB higher than the specified input level)

Channel Separation 50dB min. at 1kHz

Adjacent Track Crosstalk 40dB min. at 125Hz

Total Harmonic Distortion 0.8% or less at 1kHz

- Improvements may result in SPECIFICATIONS AND SERVICE DATA changes.
- Value of "dB" in the data refers to 0dB (0.775V), except where specified.

2 MECHANICAL ADJUSTMENTS AND CHECKS

2-1 CONTROL PCB ASSY REMOVAL

Hooking CONTROL PCB ass'y can be done as shown.

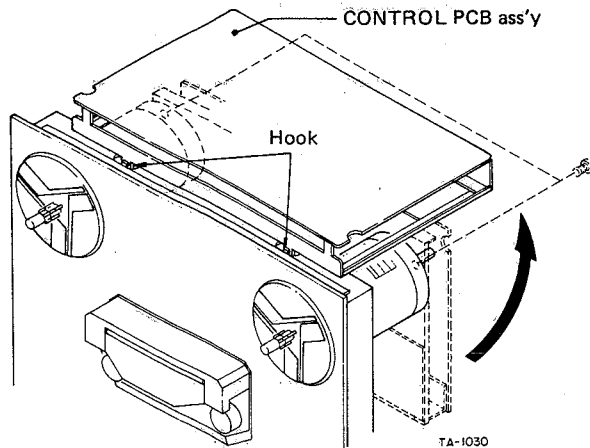


Fig. 2-1

2-2 BRAKE ADJUSTMENT

NOTE: The explanation and figure in this paragraph are for the left side brake, similar checks and adjustments are applicable for the right side one.

1. Adjust by moving the brake band bracket in either direction (arrow (A)) so that the reel motor chassis is in parallel with the brake arm, and so that the brake band makes proper clearance equally all around the reel table base.
2. Adjust by moving the brake solenoid in either direction (arrow (D)) so that the stroke of the solenoid-plunger is about 2 mm.
3. Adjust by moving the band ass'y retaining plate as shown in (B, C, E) so that, when the plunger is pushed in the direction of the solenoid housing, the reel table base is not rubbed by the brake band and is properly spaced.

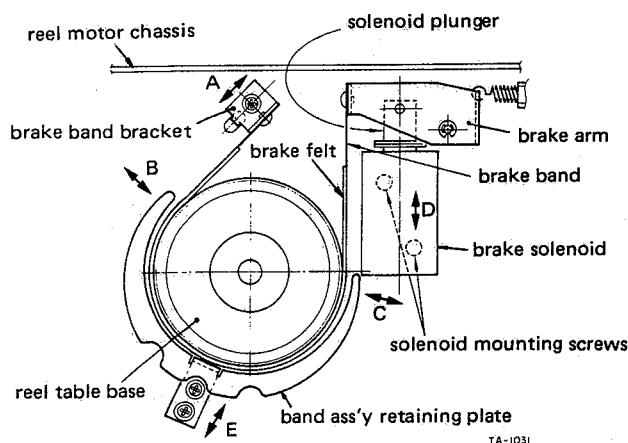
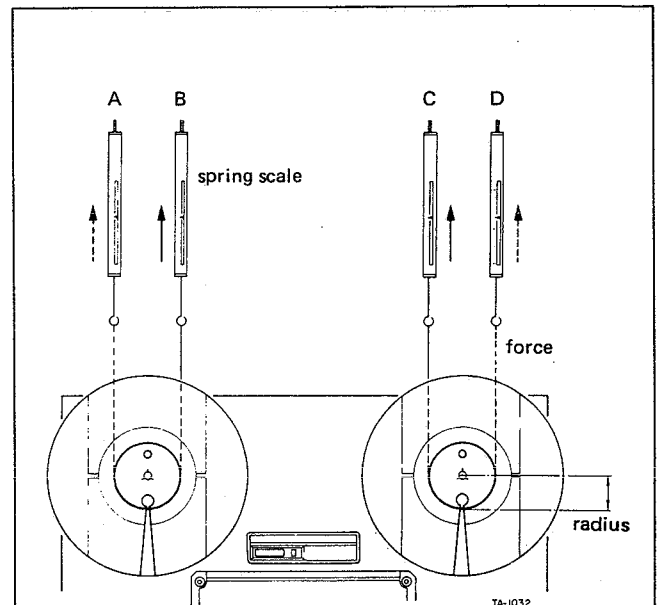


Fig. 2-2

2-3 BRAKE TORQUE MEASUREMENT

1. Place an empty 7" reel, connected to a spring scale by a string, on the reel table.
2. Pull the scale away from the reel and read the scale indication only when the reel table is steady motion.
3. Do steps 1 and 2 for each measuring condition, (A) through (D) in Fig. 2-3.
4. The values are as chart in Fig. 2-3.



↑ Forward direction (B) (C)	1.2 to 1.7 kg-cm (17 to 24 oz-inch)
↑ Reverse direction (A) (D)	0.6 kg-cm (8.3 oz-inch) or less
Left/right deviation	0.2 kg-cm (2.8 oz-inch) or less

NOTES: 1. The reverse direction values are reference.
2. The specification of left/right deviation only applies for forward direction torques.

Torque calculating formulas:

- (1) Torque (in g-cm or oz-inch)
= Force or Weight (in g or oz) x Radius (in cm or inch)
- (2) Conversion of g-cm to oz-inch:
g-cm x 0.0139 = oz-inch

Fig. 2-3

2-4 REEL MOTOR TORQUE MEASUREMENT

1. Hold both left and right tension arms in the upper position using rubber bands.
2. See Fig. 2-4. Measure torques for each operating mode with the conditions specified in the chart.
3. Since all the torque values are reference values, it is allowable that the take-up torque during the fast forward or rewind mode is 1 kg-cm or more, and that the back tension torque during these mode is good unless the left or right tension arms are shut off.
4. There is no specially provided adjustment, so if any torque correction are needed, repair or replace defective part(s) and/or circuit(s).

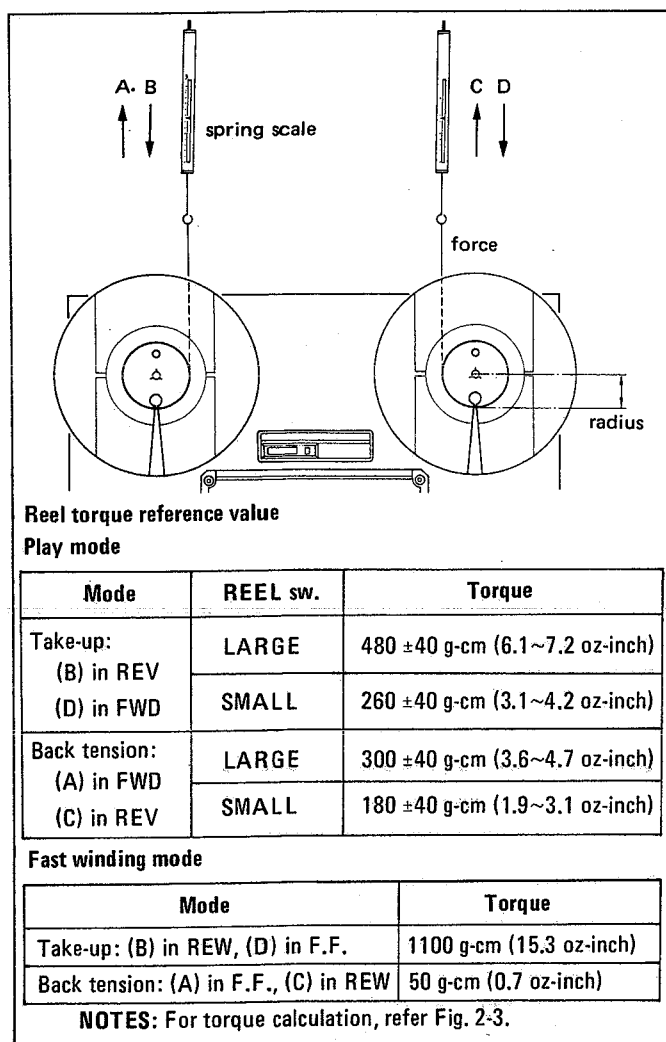


Fig. 2-4

2-5 PAUSE POSITION ADJUSTMENT

1. Place the deck in the pause mode.
2. Adjust by turning the pause positioning nut so that the clearance between the capstan shaft and the tape is 0.5 mm to 1.0 mm.
3. Of the two capstan shaft/pinch rollers, adjustment is allowable only for the side having the narrower clearance.
4. Check that, by repetition of play mode to pause mode and stop mode to pause mode, there is clearance at both sides.

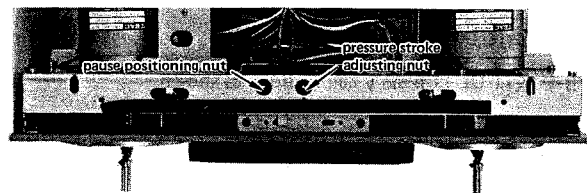


Fig. 2-5 Pause position and pinch roller pressure stroke adjustments

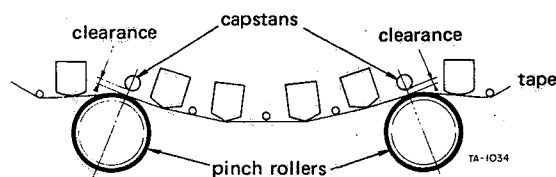
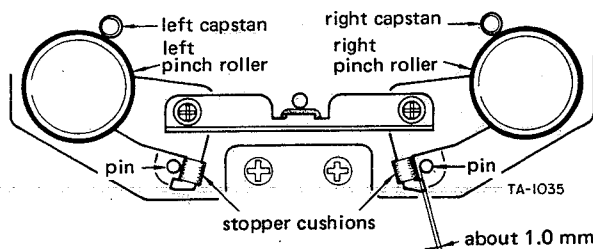


Fig. 2-6 Pause position adjustment

2-6 PINCH ROLLER PRESSURE STROKE ADJUSTMENT

1. Set the deck in the forward or reverse play mode.
2. Adjust by turning the pressure stroke adj. nut (Fig. 2-5) so that the clearance between the pin and the stopper cushion is about 1.0 mm.
3. Since the clearance is produced at one side (left or right), adjustment for this side only is permissible.



Either the left or right should have a clearance of about 1.0 mm.

Fig. 2-7

2-7 PINCH ROLLER PRESSURE MEASUREMENT

- NOTES:**
1. The explanation below applies to both the left and right pinch rollers.
 2. Both pinch roller pressures are automatically set with equal value.

1. Hold both the left and right tension arms in the upper positions using rubber bands, string etc.
2. Set the deck in either play mode with no tape loaded.
3. Attach the spring scale to the pinch roller as shown in the figure.
4. Draw the pinch roller away from the capstan shaft (in the direction of a line intersecting the centers of the capstan shaft and the pinch roller) until the capstan shaft and the pinch roller are separated.
5. Return the scale back until the pinch roller just begins to turn. The scale should then be reading as follow.
Reference value: 1.35 kg to 1.9 kg. (3.0 lbs to 4.2 lbs)
6. If the reading is out of specification, replace defective part(s). There are no adjustable parts.

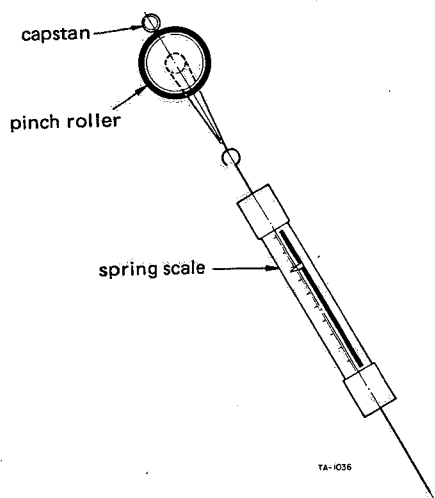


Fig. 2-8

2-8 TENSION ARM HEIGHT ADJUSTMENT

1. Thread any standard tape on the deck using a standard empty reels such as TEAC RE-702.
2. Set the deck in the forward or reverse play mode.
3. Stop left (right) guide roller's rotation by hand. Adjust by turning the left (right) tension arm adjusting nut (refer Fig. 2-9) so that the tape moves in the center of the guide roller.

4. Release the guide roller. Fine-adjust the adjusting nut again until there is no tape curling at the tape guide pin between the erase head and the left (right) guide roller.
5. After adjusting the height of both left and right tension arms, check that the tape running condition is good by repetition of fast forward and rewind modes.
6. If the tape running position is different when the guide roller stops and when it turns, the condition when the guide roller is rotating has priority.

2-9 TENSION ARM FORCE ADJUSTMENT

NOTE: The description below applies to both left and right sides.

1. Check the shut-off switch operates correctly with the deck in the horizontal and vertical positions.
2. Adjustment can be done by changing the hooking position of the tension arm spring against the spring hook.

2-10 DAMPER FUNCTION CHECK

NOTE: The explanation below applies to both left and right sides.

1. Check that the damper string begins to function after the tension arm has moved 10 to 15 mm from the lowest position, while the damping function is working, there is a feeling of resistance.
2. Check that the tension arm returns freely from the above position to the lowest position.

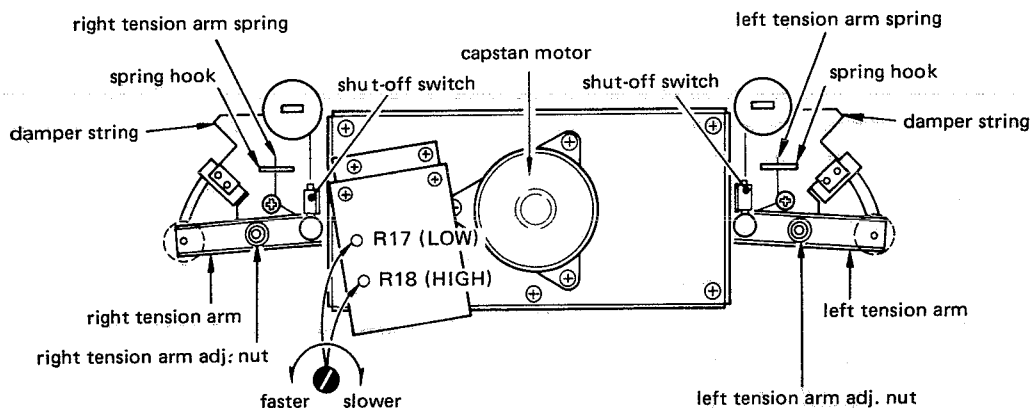


Fig. 2-9 Tension arm height, tension arm force, damper function, and tape speed.

2-11 REEL TABLE HEIGHT ADJUSTMENT

1. Adjust the tension arm height beforehand. (See 2-8)
2. Check each reel table height using a TEAC RE-702 empty reel and letting the tape run in each tape operating mode.
3. If the tape rubs against the reel flanges, adjust the reel table height by means of the two reel table mounting screws.

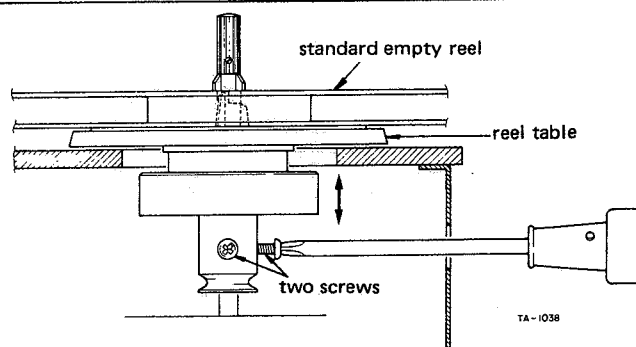
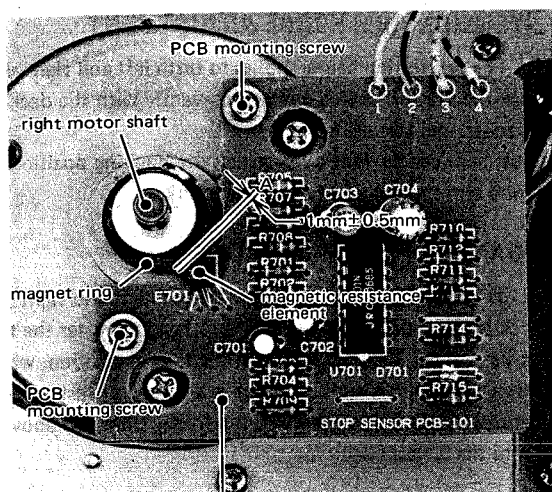


Fig. 2-10

2-12 STOP SENSOR ASS'Y (MAGNETIC RESISTANCE ELEMENT) POSITION ADJUSTMENT

1. Adjust by moving the stop sensor PCB ass'y so that the clearance (A) is about 1 mm $\pm$ 0.5 mm.
2. Be careful not to adjust only the position of the magnetic resistance element when making this adjustment.

Photo seen from the rear of the right reel motor.



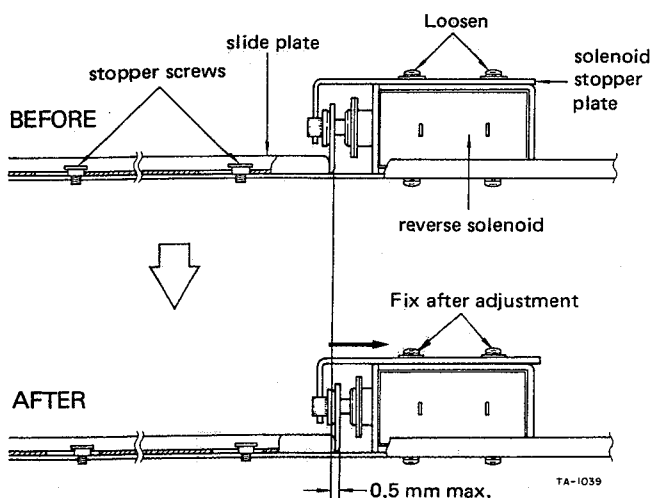
STOP SENSOR PCB ass'y

Fig. 2-11

2-13 REVERSE SOLENOID ADJUSTMENT

1. When the reverse solenoid releases, if the slide plate hits the stopper screw/s noisily, the solenoid stopper plate may be adjusted in the direction of the solenoid housing. See illustration.

Parts below are accessible from the rear of the amplifier chassis.



Adjustment range is 0.5 mm max. in solenoid-off condition.

Fig. 2-12

2-14 ROTATING PART THRUST CLEARANCE CHECKS

Reference values

Capstan shaft:	0.1 mm to 0.25 mm (magnefloat type)
Guide roller:	0.05 mm to 0.3 mm
Tension arm guide roller:	0.05 mm to 0.3 mm
Reel motor:	0 (spring type)
Tension arm:	0 (spring type)

NOTE: Since the capstan shaft is a magnefloat type, check that it is forced towards the rear of the deck while rotating.

2-15 CAPSTAN MOTOR REPLACEMENT

1. When the capstan motor is replaced, install it with its lead wires and washers as shown.
2. Check that, when the deck is operated by repeating the forward and reverse play modes, the capstan drive belt changes position on the flywheels smoothly.

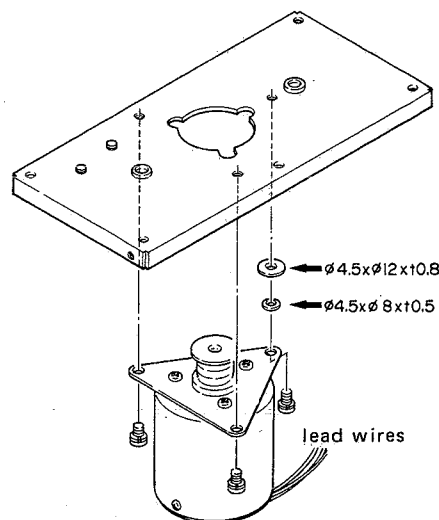


Fig. 2-13

2-16 TAPE SPEED ADJUSTMENT

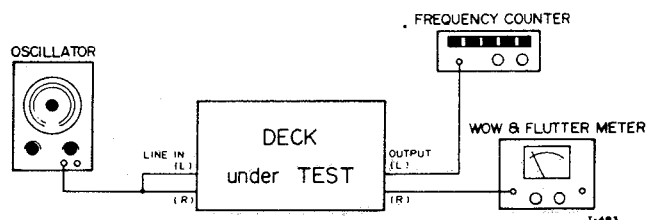


Fig. 2-14

- NOTES:**
1. Conduct all the following in both forward and reverse play modes.
 2. When ordering test tapes, allow for the longer delivery time that is required for them.

1. Connect a frequency counter to either OUTPUT terminal.
2. Load a TEAC YTT-2003 test tape. Set the SPEED switch—HIGH, and PITCH CONT knob—OFF.
3. Play the tape. Adjust R18 (see Fig. 2-9) for a reading of 3,000 Hz $\pm$ 5 Hz.
4. Check the following at the beginning and the end of the tape.

Specifications:

Tape Speed deviation	3,000 Hz $\pm$ 30 Hz
Tape speed drift	15 Hz
FWD/REV tape speed differential	30 Hz

5. Change the test tape to a TEAC YTT-2002, and SPEED switch setting to LOW.
6. Repeat steps 3 through 4. Adjust R17 if necessary.
7. Pull the PITCH CONT knob out. Set SPEED switch HIGH. Play a YTT-2003 tape.
8. Check if the speed variation of at least 3,000 Hz $\pm$ 180 Hz is obtained when the PITCH CONT knob is rotated fully in both directions.
9. Change the test tape to YTT-2002, SPEED switch setting to LOW. Repeat step 8.

2-17 WOW AND FLUTTER CHECKS

- NOTES:**
1. All the following apply to both forward and reverse play modes.
 2. The following measurements should be made at the beginning and the end of the tape.
 3. When ordering test tapes, allow for the longer delivery time that is required for them.

Playback

1. Connect the test equipment to the deck as shown in Fig. 2-14.
2. Load and play a TEAC YTT-2003 test tape for HIGH speed (19 cm/s or 7-1/2 ips), or a TEAC YTT-2002 test tape for LOW speed (9.5 cm/s or 3-3/4 ips).
3. Read the indication on the wow and flutter meter.

Specifications:

HIGH speed:	0.05% WRMS
	0.10% RMS
LOW speed:	0.07% WRMS
	0.12% RMS

Overall

4. Load a TEAC YTT-8013 test tape (blank). Apply and record a 3,000 Hz signal.
5. During simultaneous tape monitoring (playing) the recorded signal, read the wow and flutter meter display.

Specifications:

HIGH speed:	0.12% RMS
LOW speed:	0.15% RMS

2-18 VOLTAGE CONVERSION (FOR GENERAL EXPORT MODELS)

Always disconnect the power line cord before making these adjustments.

Frequency Conversion

Since the X series uses DC motors, frequency conversion is not necessary.

Voltage Conversion

1. First remove the two feet by removing the screws in each one.
2. Unscrew the left and right sides of the cabinet.
3. Locate the voltage selector to the right of the power transformer as seen from the rear of the deck.
4. Turn the slotted center post of the selector with a screw-driver until the desired voltage numerals appear in the cut-out section of the selector.
5. Replace the cabinet and feet.



Fig. 2-15

2-19 LUBRICATION

Oiling is needed after every 1,000 hours of operation or once a year if the deck is infrequently used. For this purpose, TEAC spindle oil (from TEAC TZ-255 oil kit), Mobil D.T.E. Oil Light, etc. are recommended. Lubrication is normally not necessary except at the points shown.

1. Place the deck in the horizontal position.
2. Apply a few drops of oil to the respective spindles shown, excluding capstans, then spread the oil evenly on the spindle surfaces using a cotton cloth, etc.
3. For capstans, apply a few drops to the indicated position.
4. After oiling all the points, leave the deck for 1 to 2 hours until the oil is thoroughly absorbed.

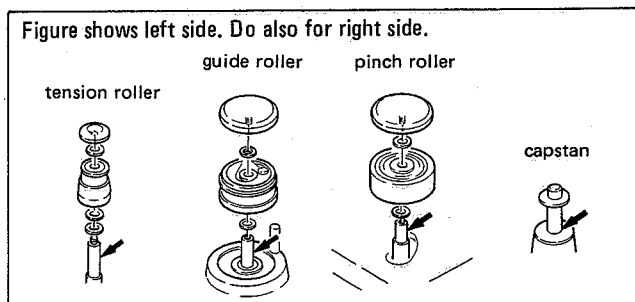


Fig. 2-16

2-20 HEAD AND TAPE PATH ALIGNMENTS

NOTE: 1. For detailed alignment principles, refer to the book "Audio Fundamental —TAPE DECK—, 8. Mechanical Adjustments" published by TEAC CORPORATION.

2-20-1 HEAD ARRANGEMENT

Head adjusting screws

Erase	Record and playback
⊕ Tilt	⊕ Azimuth
⊕ Height and azimuth	⊕ Height and tilt
⊕ Tangency	⊕ Tangency

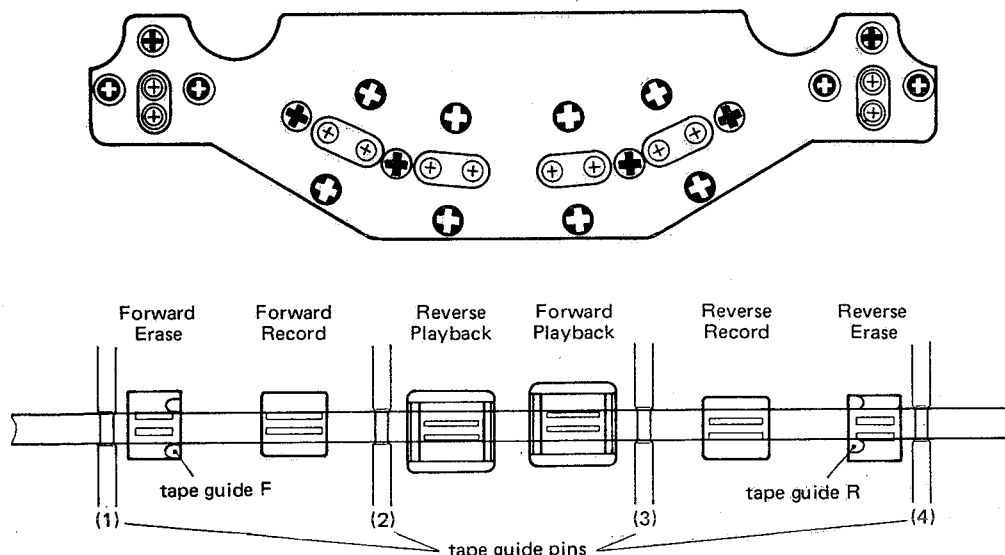


Fig. 2-17 Head arrangement

2-20-2 HEAD REGULATION ELEMENTS

Adjust each head to satisfy each of the following:

TILT The head surface should be parallel to the tape guide pin surface.	
AZIMUTH The gap of the head core should be perpendicular to the tape travel.	
HEIGHT The upper (lower) core of the head should be level with the upper (lower) edge of the tape.	
TANGENCY The dotted line should be perpendicular to the surface of the tape.	

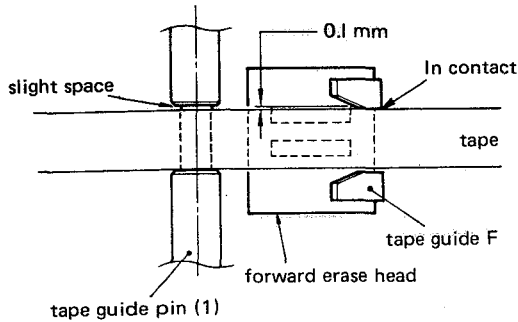
Fig. 2-18 Head regulation elements

2-20-3 ALIGNMENT PROCEDURE

1. Visually make the tilt adjustment of each record and playback head based on nearest tape guide pin.
2. Make coarse azimuth adjustments of the record and playback heads by viewing each head from in front (without tape).

3. Adjust the erase head's azimuth as seen from the front of the head. Then adjust its tilt using an adjacent tape guide pin for reference. Do this for both forward and reverse heads.
4. Temporarily adjust the height of both erase heads visually (with no tape loaded) so that the tape guide on the erase head matches the neighboring tape guide pin. Note that unless the three adjusting screws are turned equally, the tilt and azimuth adjustments (step 3) are likely to be disturbed.
5. Thread a TEAC YTT-8013 test tape (thickness = 35 μ m). With the tape running in the forward direction, fine-adjust the height of the forward erase head so that the upper edge of the tape is just in contact with the upper edge of the tape guide, F, on the head. The lower edge of the tape should just touch the lower edge of the tape guide pin (1). See Fig. 2-19.
6. Check that the forward erase head core protrudes 0.1 mm above the moving tape. If not, adjust its azimuth, and recheck its tilt and height, then correct tilt and height if necessary.
7. Do exactly the same adjustment (steps 5 and 6) for the reverse erase head. Substitute reverse play mode for forward play mode.
8. Check that, by pulling the tape away from the head assembly then setting in either play mode, the tape guide on the erase head has about 1 mm clearance against the pinch roller. Do this for both the left and right sides.

Fig. shows forward erase head.

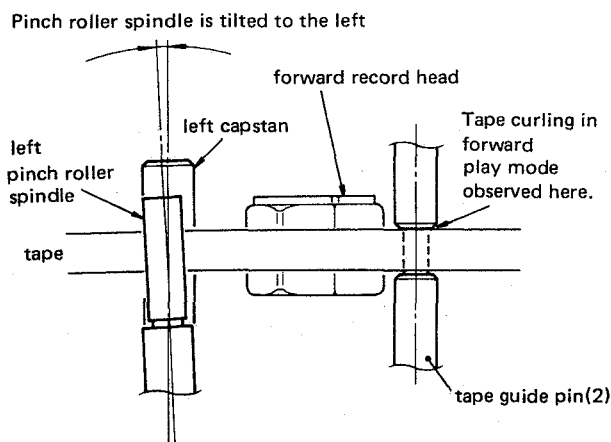


NOTE: In the case of the reverse erase head the tape should contact the upper tape guide plate and the tape guide pin lower surface in the same way.

Fig. 2-19 Erase head height fine-adjustment

9. If there is a narrower space, correct the erase head position by loosening the erase head's tangency adjusting screws and moving the head away from pinch roller.
10. Check to see if there is any tape curling at either tape guide pin in the closed loop portion of the tape (i.e., between the capstans).
11. If, during forward play, there is any tape curling at tape guide pin (2), conduct the following: Unthread the tape from the head assembly front. Remove both pinch rollers. Set the deck in the play mode. Visually line-up the capstan and pinch roller spindles.

Fig. shows left side.



If the pinch roller spindle is tilted to the left (right) side from the capstan shaft, tape curling may occur at the upper (lower) edge of the tape guide pin (2).

Fig. 2-20 Example of non-parallel pinch roller/capstan

12. If not parallel, loosen the two screws mounting the reinforcement plate then adjust using the correction jig (TEAC P/N 5736000100) as shown in Fig. 2-21.

Note that:

- (1) Use the jig as near as possible to the pinch roller spindle.
- (2) Do not touch the surface of spindle.
- (3) Use no other tool for this adjustment!

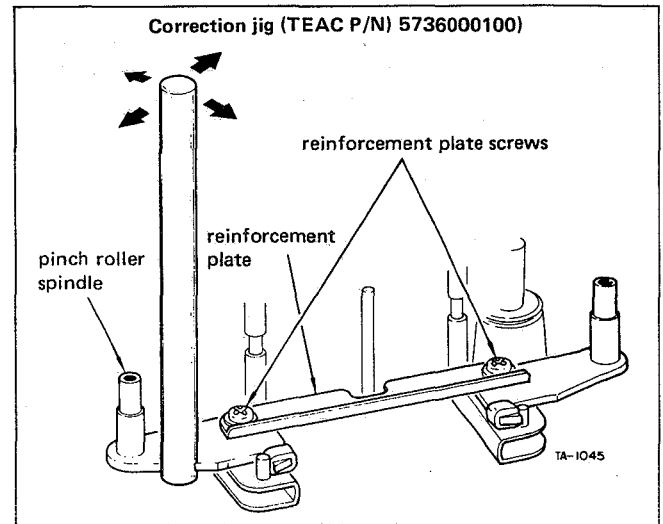


Fig. 2-21 Correction of pinch roller/capstan non-parallelism

13. If the tape curls at tape guide pin (3) in reverse play, correct in the same way (steps 11 and 12).
14. After it is entirely corrected that there is no tape curling condition in the head assembly, fine-adjust each record and playback height so that the brass-colored spacer of forward (reverse) direction purpose head will show above (below) the moving tape. (About as thick as a thin pencil line). Adjustment should be done by equally turning three screws required correction not to disturb tilt and azimuth regulation conducted before.
15. Finally, if necessary, make rough tangency adjustment of respective head with tape running. After doing for erase head/s recheck steps 8 and 9 (erase head/pinch roller space).

3 ELECTRICAL ADJUSTMENTS AND CHECKS

NOTES:

- Before performing adjustments and checks, clean and demagnetize the entire tape path.
- Check that the deck is properly set for the voltage in your locality.
- In general, adjustments and checks are done in the order of L-ch then R-ch. Double REF. Nos. indicate L-ch/R-ch. (Example: R371/R372)
- The value of "dB" refers to 0 dB (0.775 V). If an AC voltmeter calibrated to 0 dB (1 V) is to be used, appropriate compensation should be made.
- The AC voltmeter used in the procedures must have an input impedance of 1 M-ohms or more.

3-1 MONITOR PERFORMANCE

ITEM	CONNECTION	MODE/INSTRUCTION	SIGNAL SOURCE	ADJUST (or CHECK)	RESULT	REMARKS
1. Monitor level	1-1	OSC → ATT to LINE IN (L) AC voltmeter to REC AND PLAY AMPL. PCB term. #14. DBX sw. — OUT (Leave OUT up to step 25, "DBX PERFORMANCE" section). MONITOR sw. — SOURCE OUTPUT cont. — CAL LINE cont. — MAX MIC cont. — MIN	400 Hz/—22 dB (61.5 mV)	R369(L)	—8 dB (308 mV)	LINE min. input level (L)
	1-2	"	"	LINE cont. (L/R)	"	LINE spec. input level (L)
	1-3	" , but LINE IN (L) → LINE IN (R) #14 → #17	"	R370 (R)	"	LINE spec. input level (R)
2. Output level	2-1	Fig. 3-1	LINE spec. input level condition	400 Hz/—12 dB (195 mV)	R403/R404	—5 dB (436 mV)
3. VU meter	3-1	Fig. 3-1	LINE spec. input level condition	400 Hz/—12 dB (195 mV)	R371/R372	0 VU on VU meter
4. MIC input level	4-1	Fig. 3-1, but LINE IN → MIC	LINE cont. — MIN MIC cont. — MAX	400 Hz/—70 dB ±2 dB (195 μV ~ 308 μV)	Check	—5 dB (436 mV)
	4-2	"	"	400 Hz/—60 dB (0.775 mV)	MIC cont. (L/R)	"
	4-3	Fig. 3-1	LINE cont. — spec. position (Item 1-2) MIC cont. — MIN	—	—	—
						IMPORTANT: Do not disturb these cont's during later checks.

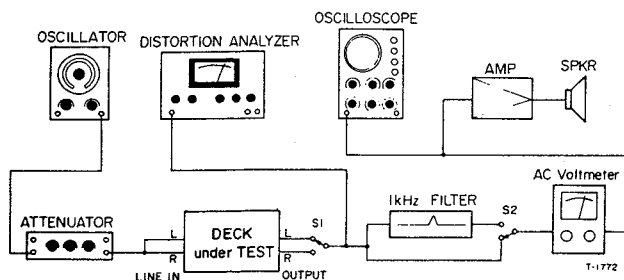


Fig. 3-1 Basic connection

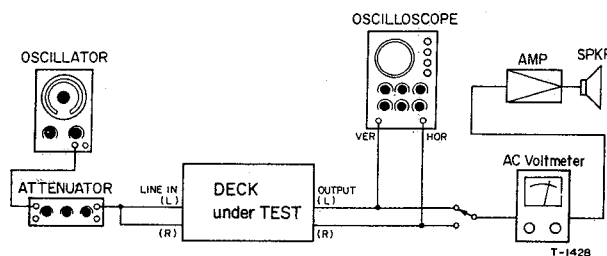


Fig. 3-2 Connection for phase check

TEAC test tape: YTT-1002: For playback alignment (9.5 cm/s or 3- $\frac{3}{4}$ ips)
 YTT-1003: For playback alignment (19 cm/s or 7- $\frac{1}{2}$ ips)
 YTT-8013: For recording alignment (blank)

3-2 PLAYBACK PERFORMANCE

ITEM	CONNECTION	MODE/ INSTRUCTION	SIGNAL SOURCE	ADJUST (or CHECK)	RESULT	REMARKS
5. Playback head azimuth	5-1 Fig. 3-2	Do for both FWD & REV heads MONITOR sw.—TAPE SPEED sw.—HIGH	YTT-1003 (16 kHz/—10 dB)	Azimuth adj. screw/s of head (Fig. 2-17)	Phase: within 45° on oscilloscope (Fig. 3-3)	
6. Playback level	6-1 Fig. 3-1	FWD & REV OUTPUT cont.—CAL SPEED sw.—HIGH	YTT-1003 (400 Hz/0 dB)	R313/R314 (FWD) R315/R316 (REV)	—5 dB (436 mV)	Spec. PB condition
	6-2 "	OUTPUT cont.—MAX	"	Check	+1 dB $\pm$ 2 dB (690 mV $\sim$ 1.09 V)	Max. output level
	6-3 "	OUTPUT cont.—CAL	"	—	—5 dB (436 mV)	Spec. PB condition IMPORTANT: Do not disturb OUTPUT cont. during later checks.
7. VU meter	7-1 Fig. 3-1	FWD Spec. PB condition	YTT-1003 (400 Hz/0 dB)	R389/R390	0 VU on VU meter	
8. Frequency response	8-1 Fig. 3-1	FWD & REV SPEED—HIGH	YTT-1003	R327/R328 (FWD) R329/R330 (REV)	40 Hz $\sim$ 22 kHz $\pm$ 3 dB	Reference: 400 Hz
	8-2 "	" SPEED—LOW	YTT-1002	R333/R334 (FWD) R335/R336 (REV)	40 Hz $\sim$ 14 kHz $\pm$ 3 dB	
9. Phase shift	9-1 Fig. 3-2	FWD & REV SPEED—HIGH	YTT-1003	Check	Phase: within 45° on oscilloscope (50 Hz $\sim$ 18 kHz) (Fig. 3-3)	
	9-2 "	" SPEED—LOW	YTT-1002	"	" (50 Hz $\sim$ 10 kHz)	
10. PHONES output level	10-1 Fig. 3-4	Spec. PB condition	YTT-1003 (400 Hz/0 dB)	Check	—24 dB $\pm$ 2 dB (38.8 mV $\sim$ 61.5 mV) (at PHONES jack)	When OUTPUT terminal is at —5 dB
11. Signal to noise ratio	11-1 Fig. 3-1	FWD & REV Spec. PB condition Use fully erased tape (Use bulk tape eraser)	YTT-8013	Check	HIGH, 50 dB min. ratio LOW 49 dB min. ratio	-Ratio of spec.—5dB to noise -Change-over the polarity of the AC Line plug. The worse reading should be within spec.

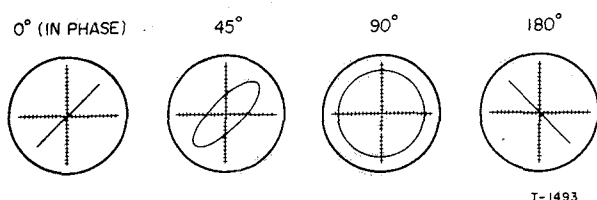


Fig. 3-3 Confirming phase relationship

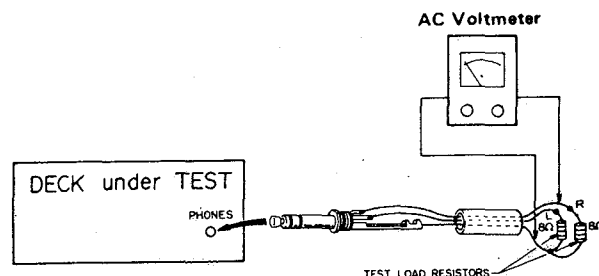


Fig. 3-4 Connection for PHONES level check

3-3 RECORDING PERFORMANCE

TEAC test tape: YTT-8013: For recording alignment (blank)

ITEM		CONNECTION	MODE/ INSTRUCTION	SIGNAL SOURCE	ADJUST (or CHECK)	RESULT	REMARKS
12. Bias trap	12-1	AC voltmeter between BIAS TRAP TP & GND	Rec-pause mode	—	L303/L304	Min. reading	Bias freq.: 100 kHz $\pm$ 5 kHz
	12-2	Fig. 3-1	Rec-pause mode MONITOR sw.— TAPE OUTPUT cont.— CAL	—	Check	Min. reading (–45 dB or more (4.36 mV or less))	
	12-3	"	"	—	Check	VU: no deflection	
13. Record head azimuth	13-1	Fig. 3-2	Do for both FWD & REV heads MONITOR sw.— TAPE	10 kHz/–32 dB (19.5 mV)	Azimuth adj. screw/s of head (Fig. 2- 17)	Phase: within 45° on oscilloscope (Fig. 3-3)	
14. Record bias (position 1)	14-1	Fig. 3-1	FWD & REV Test tape: YTT-8013 SPEED sw.—LOW REC BIAS sw.—1 REC EQ sw.—1 MONITOR sw.— TAPE	7 kHz/–22 dB (61.5 mV)	C301/C302 (FWD) C303/C304 (REV)	Over-bias value 3.5 dB $\pm$ 0.5 dB (from peak)	Simultaneous monitoring
15. Record level	15-1	Fig. 3-1	Same as above SPEED sw.— HIGH	400 Hz/–12 dB (195 mV)	R429/R430 (FWD) R431/R432 (REV)	–5 dB (436 mV)	Spec. REC condition
16. Distortion	16-1	Fig. 3-1	FWD & REV Spec. REC condition	1 kHz/–12 dB (195 mV)	Check	0.8% or less	
17. Signal to noise ratio	17-1	Fig. 3-1	FWD & REV Spec. REC condition SPEED— HIGH & LOW	1 kHz/–12 dB (195 mV) then No signal recording	Check	HIGH: 48 dB min. ratio LOW: 46 dB min. ratio	Ratio of spec. –5 dB to noise
18. Erase efficiency	18-1	Fig. 3-1 switch on 1 kHz filter	FWD & REV Spec. REC condition SPEED sw.— HIGH	1 kHz/–2 dB (615 mV) (+10 VU) then erasing	Check	OUTPUT: –63 dB or more (548 μ V or less) (68 dB min. ratio)	-Reference output level: +5 dB -The worst value should be within spec.
19. REC MUTE function	19-1	Fig. 3-1 switch on 1 kHz filter	FWD & REV Spec. REC condition rec-mute mode	1 kHz/–2 dB (615 mV) (+10 VU) then record muting	Check	OUTPUT: –60 dB or more (775 μ V or less) (65 dB min. ratio)	-Reference output level: +5 dB -The worst value should be within spec.
20. Frequency response	20-1	Fig. 3-1	FWD & REV Spec. REC condition SPEED— LOW	40 Hz~16 kHz/ –32 dB (19.5 mV)	L305/L306 (FWD) L307/L308 (REV)	40 Hz~16 kHz $\pm$ 3 dB	Reference: 400 Hz
	20-2	"	" SPEED— HIGH	40 Hz~20 kHz/ –32 dB	Check	40 Hz~20kHz $\pm$ 3 dB	
21. Phase shift	21-1	Fig. 3-2	FWD & REV Spec. REC condition SPEED sw.— HIGH	40 Hz~16 kHz/ –32 dB (19.5 mV)	Check	Phase: within 45° on oscilloscope (40 Hz ~ 16 kHz) (Fig. 3-3)	
22. Record Bias (position 2)	22-1	Fig. 3-1	FWD & REV Spec. REC condition Test tape— YTT-8013 SPEED sw.— HIGH	10 kHz/–32 dB (19.5 mV)	Check	When BIAS/EQ sw's are changed 1 $\rightarrow$ 2, output level should raise +4 dB $\pm$ 1 dB	
	22-2	"	"	16 kHz/–32 dB	Check	" +6 dB $\pm$ 2 dB	

ITEM		CONNECTION	MODE/ INSTRUCTION	SIGNAL SOURCE	ADJUST (or CHECK)	RESULT	REMARKS
23. Adjacent track crosstalk	23-1	Fig. 3-1	FWD record. Spec. REC condition SPEED sw.— HIGH REC BIAS sw.— 1 REC EQ sw.— 1	125 Hz/—12 dB (195 mV)	—	—	For FWD record.
	23-2	"	REV playback the portion recorded above	—	Check	At both L-and R-ch 125 Hz: —45 dB or more (4.36 mV) or less) (40 dB min. ratio)	
	23-3	"	Interchange R & L reels then do FWD playback	—	"	"	
	23-4	Repeat 23-1 through 23-3, but interchange FWD and REV.					For REV record.
24. Channel separation	24-1	Fig. 3-1 switch on 1 kHz filter	Same as 23-1	L: 1 kHz/—12 dB (195 mV) R: No signal record.	Check	R, —55 dB or more (1.38 mV or less) (50 dB min. ratio)	For FWD record.
	24-2	"	"	L: No signal record. R: 1 kHz/—12 dB	"	L, "	
	24-3	Repeat 24-1 and 24-2 with REV recording.					For REV record.

—70 dB or more ... What does it mean?

In reference to some specifications, you may come across an expression like: "—70 dB or more". This means that the lower the value of this specification, the greater the absolute value of the specification and the better the performance of the deck. For instance, a noise floor of —76 dB is better than —70 dB, because this means that the level of noise is lower. So in this case, "—70 dB or more" means at least as good a value as —70 dB and maybe even better, i.e., —71 dB.

3-4 DBX PERFORMANCE

NOTE:

Test this performance only after you are sure that the "3-6 DBX UNIT ADJUSTMENT is correct.

ITEM	CONNECTION	MODE/ INSTRUCTION	SIGNAL SOURCE	ADJUST (or CHECK)	RESULT	REMARKS
25. Encoder level	25-1	OSC → ATT to LINE IN (both L- & R-ch's) AC voltmeter to REC AND PLAY AMPL. PCB term. #46	DBX sw.— OUT MONITOR sw.— SOURCE OUTPUT cont.— CAL LINE cont.— Spec. position (item 1-2) MIC cont.— MIN	1 kHz/—12 dB (195 mV)	Check	—8 dB (308 mV)
	25-2	"	Same as above, but DBX sw.— IN	"	VR814/ VR814	—8 dB ±0.5 dB (291 mV~327 mV)
	25-3	Repeat 25-1 ~ 25-2 by changing to REC AND PLAY AMPL. PCB term. #47. IMPORTANT: Do not disturb all MIC, LINE and OUTPUT controls during later checks.				
26. Decoder level	26-1	Fig. 3-1	FWD only Test tape — YTT-8013 DBX sw.— OUT SPEED sw.— HIGH REC MODE — ON REC BIAS sw.— 1 REC EQ sw.— 1 MONITOR sw.— TAPE	1 kHz/—12 dB (195 mV)	Check	Note the measured output as reference.
	26-2	"	Same as above but DBX sw.— IN	"	VR624/ VR624	±0.5 dB deviation from ref.
27. Frequency response	27-1	Fig. 3-1	Same as 26-1, but DBX sw.— IN check also with REV.	40 Hz~20 kHz/—32 dB (19.5 mV)	Check	40Hz~20 kHz ±6 dB
	27-2	"	Same as above, but SPEED sw.— LOW	40 Hz~16 kHz/—32 dB	"	40Hz~16 kHz ±6 dB
28. Signal to noise ratio	28-1	Fig. 3-1	Same as 26-1, but DBX sw.— IN SPEED sw.— HIGH & LOW, also check with REV.	1 kHz/—12 dB (195 mV) then no signal recording	Check	HIGH & LOW both: 65 dB min. ratio
29. Distortion	29-1	Fig. 3-1	Same as 26-2	1 kHz/—12 dB (195 mV)	Check	0.8% or less
	29-2	"	"	1 kHz/+8 dB (1.95 V)	"	3% or less

3-5 ADJUSTMENT AND TEST POINT LOCATIONS (1)

NOTE: Adjustor locations for DBX PERFORMANCE and for DBX UNIT ADJUSTMENT (3-6) are provided separately. See page 18.

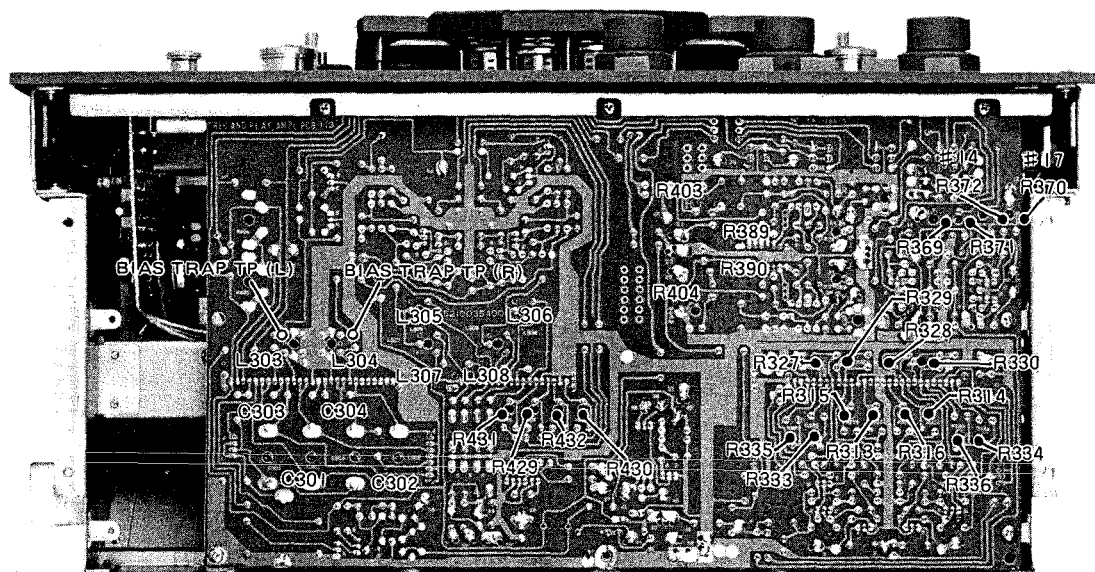


Fig. 3-5 REC AND PLAY AMPL PCB

C301/C302	Record Bias 1 (FWD)
C303/C304	Record Bias 1 (REV)
L303/L304	Bias trap (record)
L305/L306	Record EQ (FWD)
L307/L308	Record EQ (REV)
R313/R314	Playback level (FWD)
R315/R316	Playback level (REV)
R327/R328	Playback EQ (HIGH FWD)
R329/R330	Playback EQ (HIGH REV)
R333/R334	Playback EQ (LOW FWD)
R335/R336	Playback EQ (LOW REV)
R369/R370	Monitor level
R371/R372	VU meter (monitor)
R389/R390	VU meter (playback)
R403/R404	Output level
R429/R430	Record level (FWD)
R431/R432	Record level (REV)

3-6 DBX UNIT ADJUSTMENT

NOTES:

1. This section adjustment is not usually needed since ENCODER UNIT and DECODER UNIT both have been precisely adjusted in the factory unless any alteration of adjustor(s) or any damage of unit(s) occurs.
2. Should adjustment be required, turn the deck OFF to prevent accidental damage when removing or replacing the UNIT card(s).
3. Simply press POWER switch to ON (because this section adjustment is non-effective from setting of each switch on front panel, and operation mode), then make this section adjustment.

3-6-1 ENCODER ADJUSTMENT

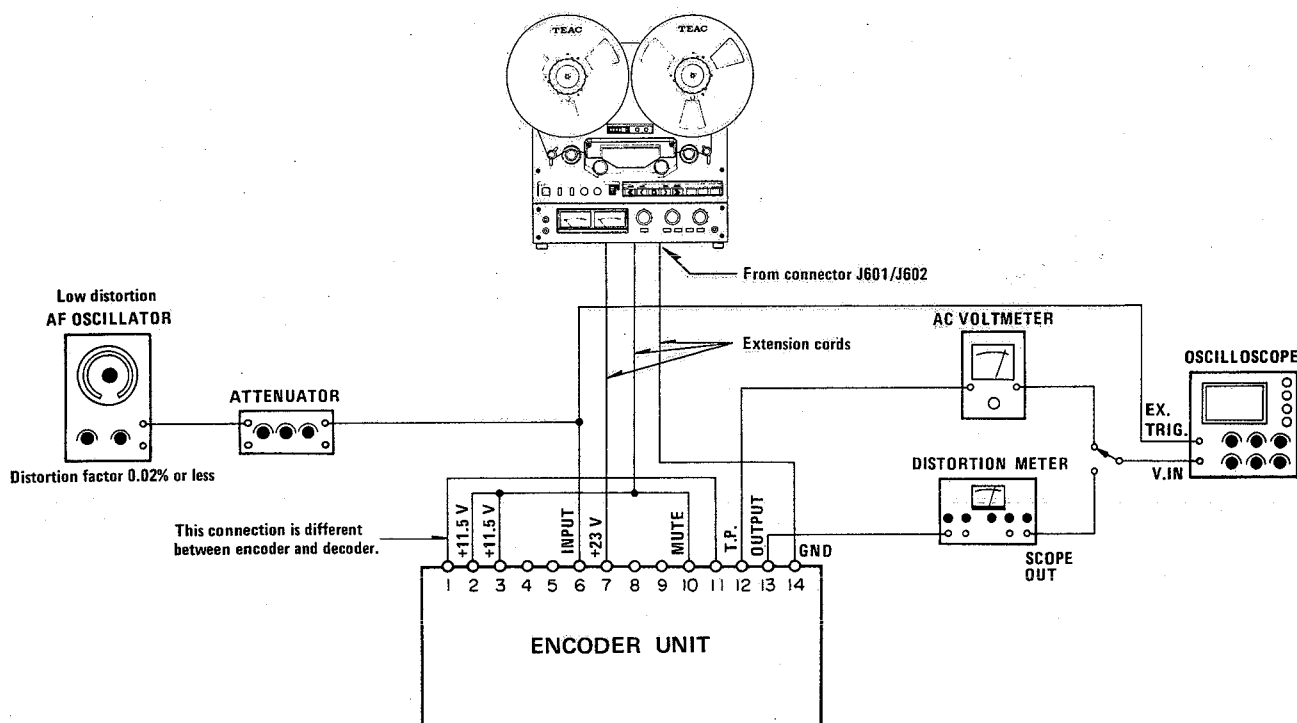


Fig. 3-6 Connection for encoder unit adjustment

1. Make connection as shown in Fig. 3-6.
2. Pre-set all variable resistors approximately to center position.
3. Feed 100 Hz 308 mV (-8 dB) to No. 6 (INPUT) terminal of ENCODER UNIT.
4. Connect oscilloscope to No. 12 (T.P.) terminal through AC voltmeter.
5. Adjust VR813 (RMS SYM) to obtain a clean 200 Hz sine-wave on the oscilloscope so that the reading on the AC voltmeter indicates minimum value ($0.41 \text{ mV} \pm 1 \text{ dB}$). See Fig. 3-8.
6. Connect oscilloscope to No. 13 (OUTPUT) terminal through distortion meter.
7. Feed 1 kHz 308 mV (-8 dB) to No. 6 terminal then adjust VR812 (EM ADJ) to obtain the minimum distortion level and clean 3 kHz sine-wave (output from the distortion meter) on the oscilloscope.
8. Feed 1 kHz 95 mV (-18 dB) to No. 6 then adjust VR811 (VCA SYM) to obtain clean sine-wave on the oscilloscope. As a result, distortion level shows minimum.
9. Repeat above steps 7 and 8 until clean 3 kHz sine-wave is obtained in both procedures. As a result, distortion level shows the same level in both procedures and it should be minimum. See Fig. 3-8.
10. After whole procedure in this paragraph is completed, adjustment by VR814 may be done for the encoder level (item 25 in 3-4).

3-6-2 DECODER ADJUSTMENT

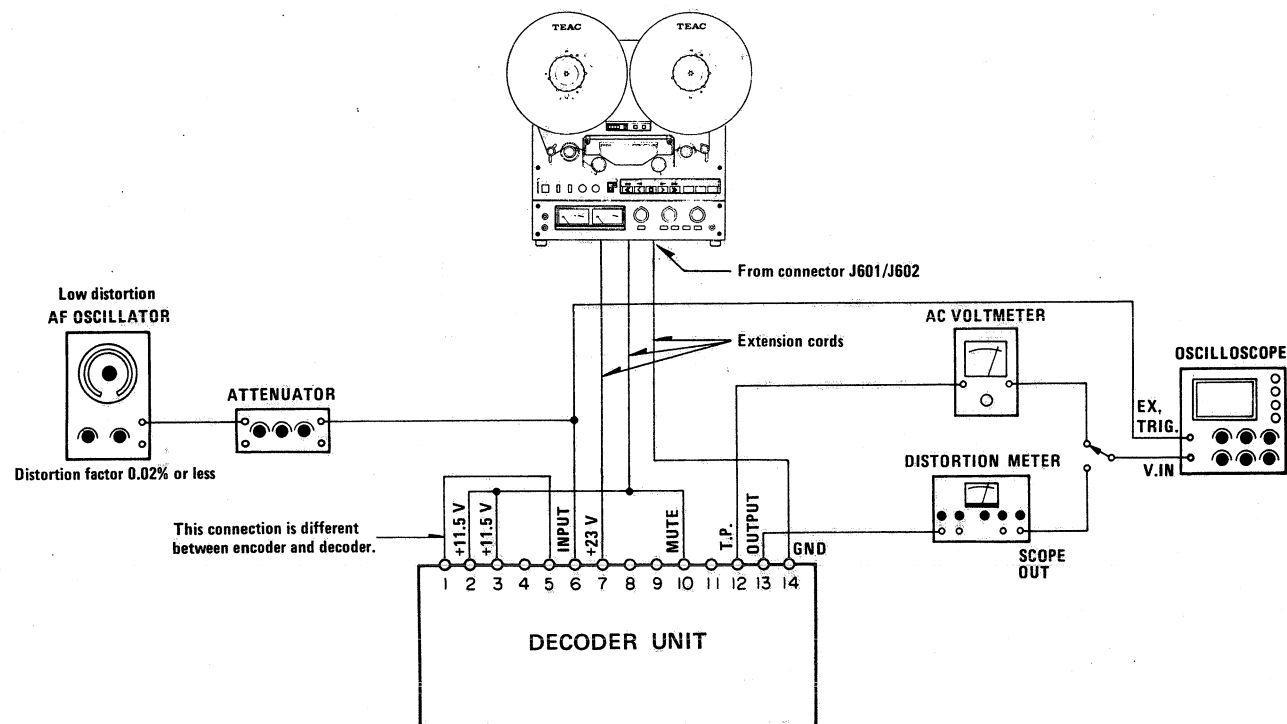


Fig. 3-7 Connection for decoder unit adjustment

1. Make connection as shown in Fig. 3-7.
2. Pre-set all variable resistors approximately to center position.
3. Feed 100 Hz 308 mV (−8 dB) to No. 6 terminal of DECODER UNIT.
4. By VR623 (RMS SYM), follow the same procedures as steps 4 then 5 described in the "3-6-1 ENCODER ADJUSTMENT".
5. Connect oscilloscope to No. 13 (OUTPUT) terminal through distortion meter.
6. Feed 1 kHz 308 mV (−8 dB) to No. 6 terminal then adjust VR622 (EM ADJ) to obtain the minimum distortion level and clean 3 kHz sine-wave (output from the distortion meter) on the oscilloscope.
7. Feed 1 kHz 173 mV (−13 dB) to No. 6 terminal then adjust VR621 (VCA SYM) and the same procedure as step 9 described in the "3-6-1 ENCODER ADJUSTMENT".
8. After whole procedure in this paragraph is completed, adjustment by VR624 may be done for the decoder level (item 26 in 3-4).

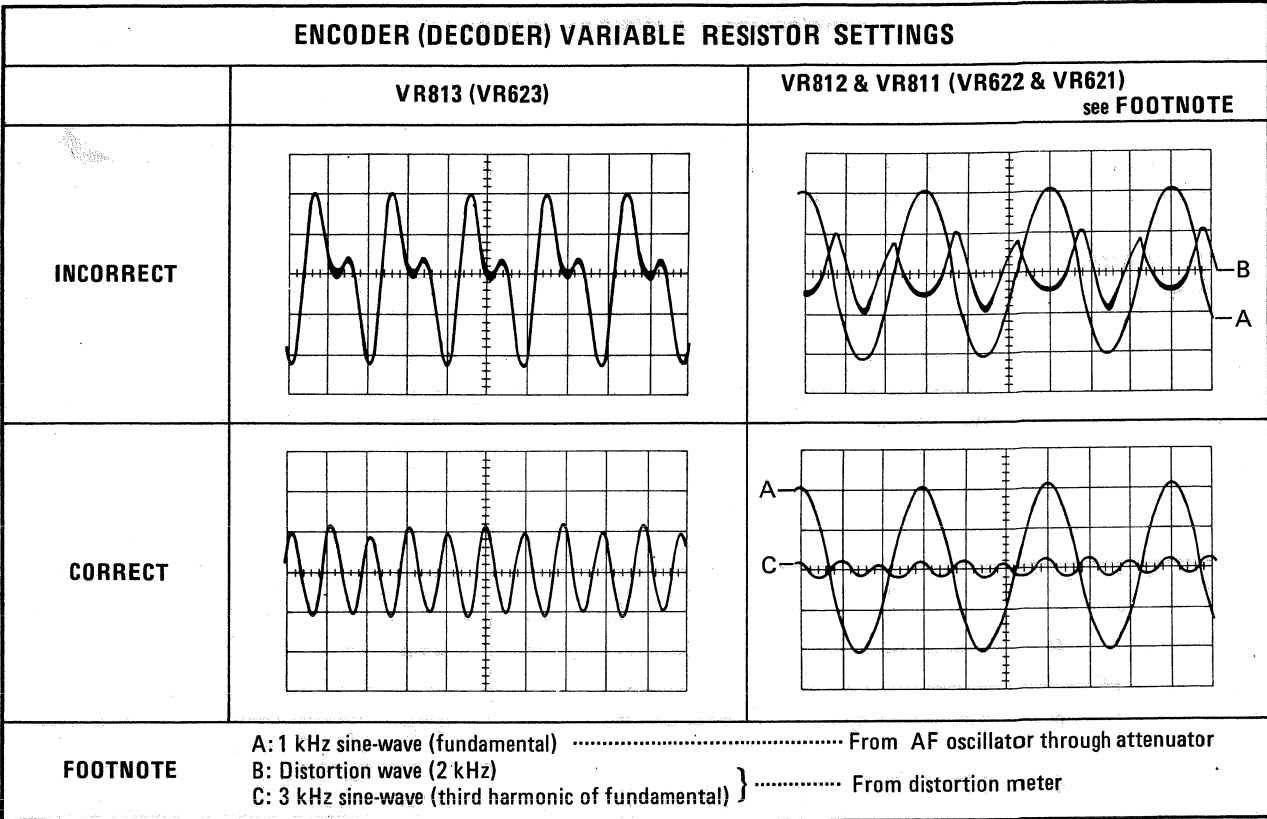


Fig. 3-8

3-7 ADJUSTMENT LOCATIONS (2)

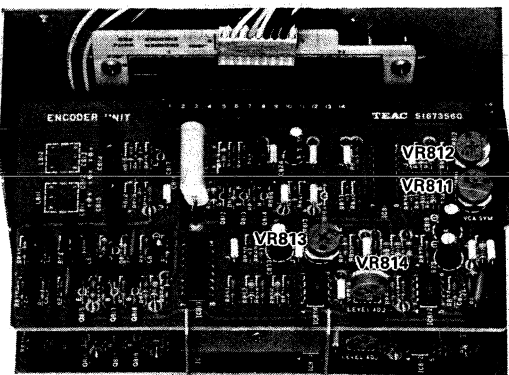


Fig. 3-9 ENCODER UNIT

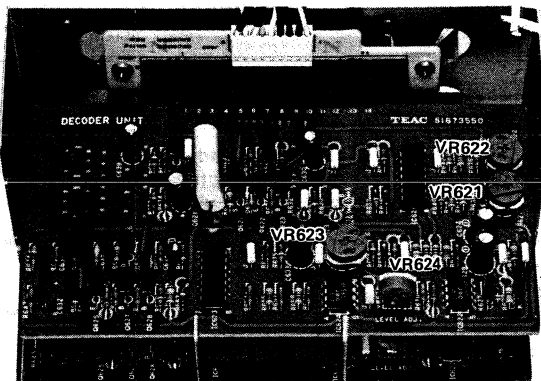


Fig. 3-10 DECODER UNIT

VR621	VCA SYM (DECODER)
VR622	EM ADJ (DECODER)
VR623	RMS SYM (DECODER)
VR624	Decoder level
VR811	VCA SYM (ENCODER)
VR812	EM ADJ (ENCODER)
VR813	RMS SYM (ENCODER)
VR814	Encoder level

NOTE: One per channel

6 EXPLODED VIEWS AND PARTS LIST

EXPLODED VIEW - 1

ASSEMBLING HARDWARE CODING LIST

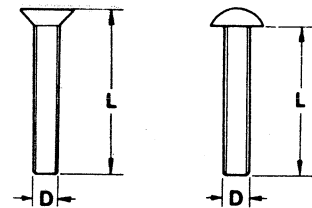
All screws conform to ISO standards, and have crossrecessed heads, unless otherwise noted.
ISO screws have the head inscribed with a point as in the figure to the right.

FOR EXAMPLE:

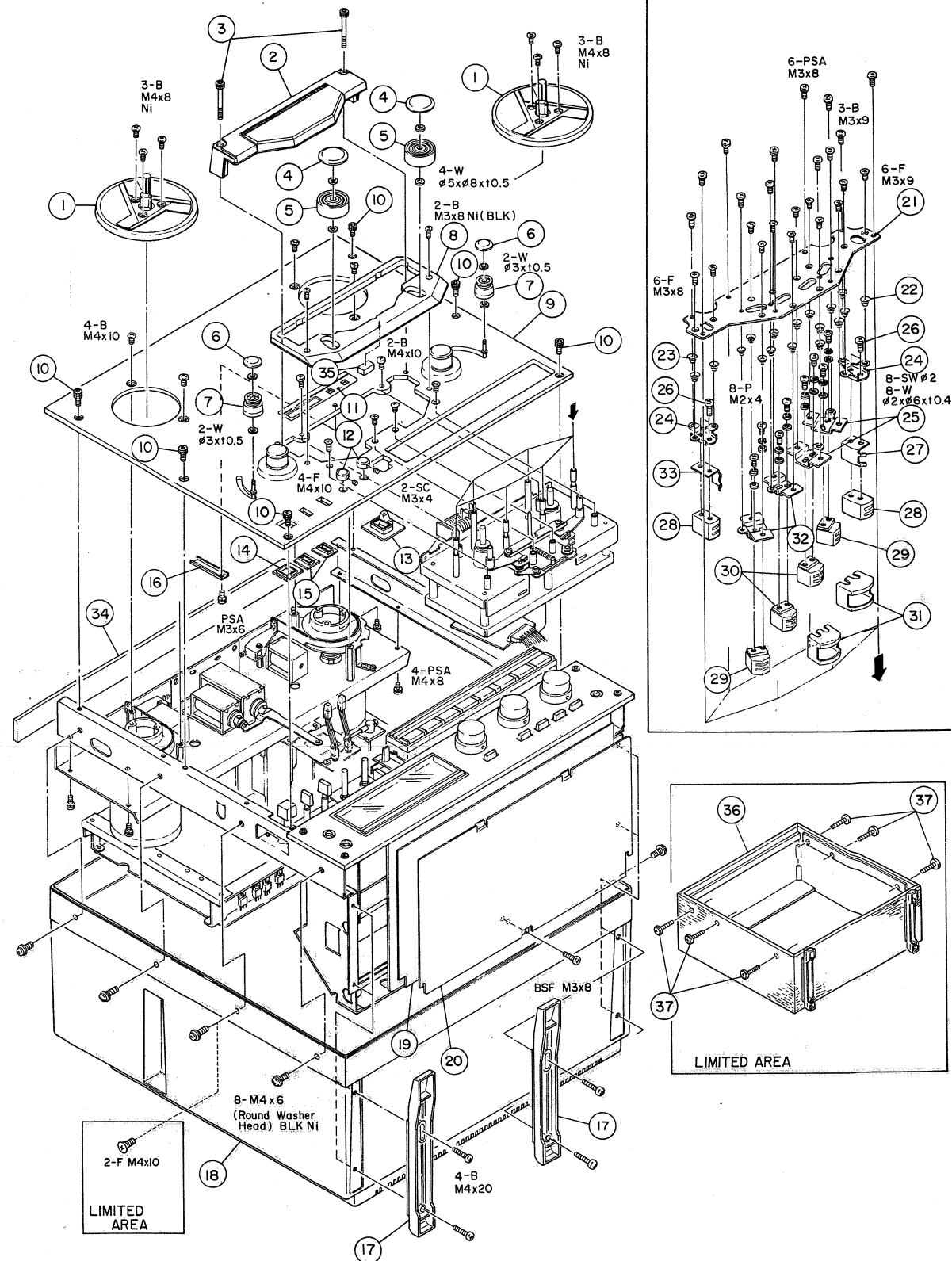
B M 3 x 6

----- Length in mm (L)
----- Diameter in mm (D) *
----- Metric System
----- Nomenclature

* Inner dia. for washers and nuts



	Code	Name	Type		Code	Name	Type
MACHINE SCREW	R	Round Head Screw		TAPPING SCREW	BTA	Binding Head Tapping Screw(A Type)	
	P	Pan Head Screw			BTB	Binding Head Tapping Screw(B Type)	
	T	Stove Head Screw (Truss)			RTA	Round Head Tapping Screw(A Type)	
	B	Binding Head Screw			RTB	Round Head Tapping Screw(B Type)	
	F	Flat Countersunk Head Screw		SETSCREW	SF	Hex Socket Setscrew(Flat Point)	
	O	Oval Countersunk Head Screw			SC	Hex Socket Setscrew(Cup Point)	
WOOD SCREW	RW	Round Head Wood Screw			SS	Slotted Socket Setscrew(Flat Point)	
TAPTITE SCREW	PTT	Pan Head Taptite Screw		WASHER	E	E-Ring (Retaining Washer)	
	WTT	Washer Head Taptite Screw			W	Flat Washer (Plain)	
SEMS SCREW	BSA	Binding Head SEMS Screw(A Type)			SW	Lock Washer (Spring)	
	BSB	Binding Head SEMS Screw(B Type)			LWI	Lock Washer (Internal Teeth)	
	BSF	Binding Head SEMS Screw(F Type)			LWE	Lock Washer (External Teeth)	
	PSA	Pan Head SEMS Screw(A Type)			TW	Trim Washer (Countersunk)	
	PSB	Pan Head SEMS Screw(B Type)		NUT	N	Hex Nut	



EXPLODED VIEW - 1

Parts marked with *require longer delivery time.

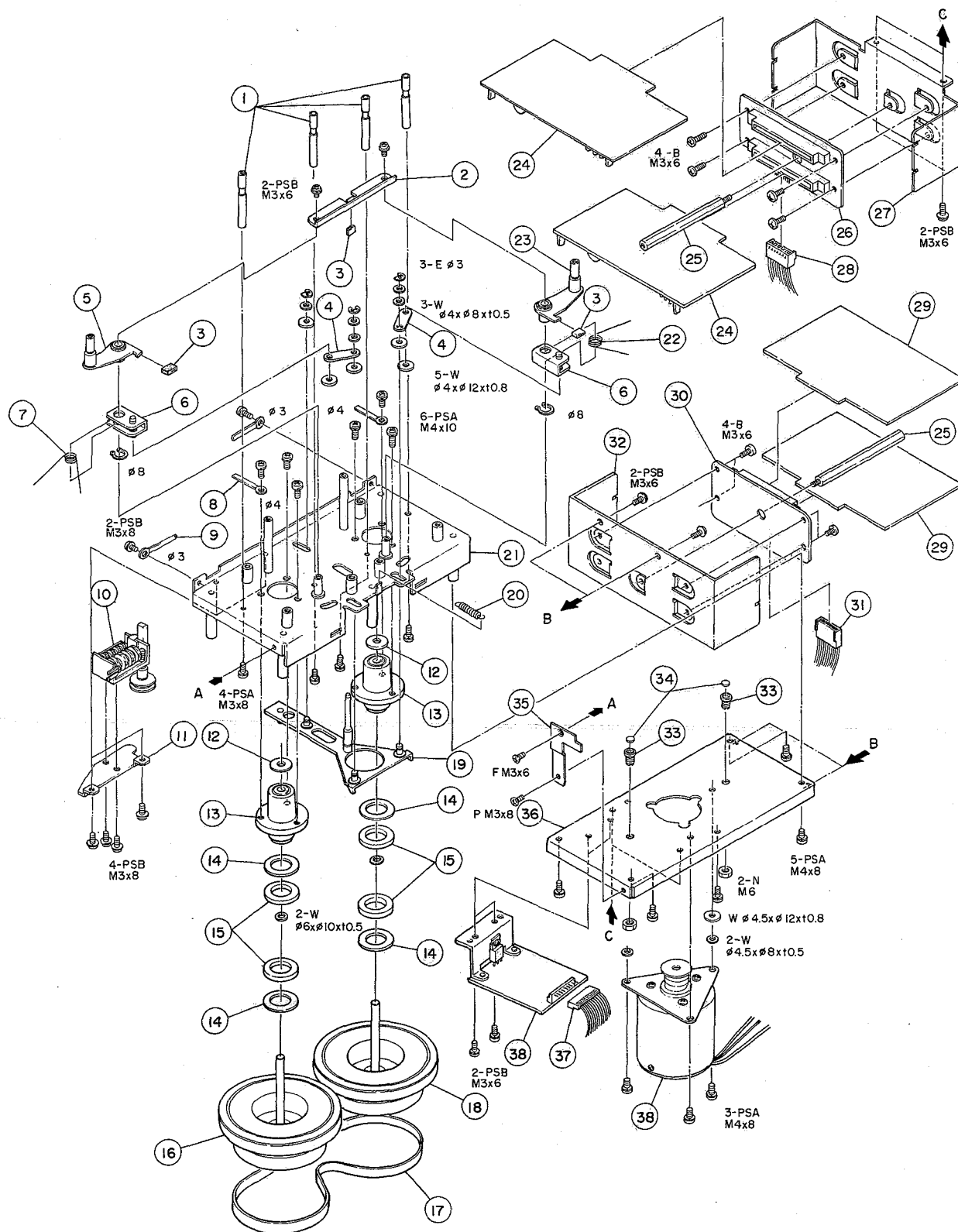
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1 - 1	5504744000	Reel Table Assy	X-10R
1 - 2	*5800139000	Head Housing, F	
1 - 3	*5581065000	Screw, Head Housing; A	X-10R
1 - 4	5545014000	Cap, Pinch Roller	X-10R
1 - 5	5534691101	Pinch Roller	
1 - 6	5545009000	Cap, Tension Roller	X-10R
1 - 7	5504718100	Roller Assy, Tension	X-10R
1 - 8	*5532061000	Cover, Head Base Plate	X-10R
1 - 9	*5800138800	Panel, Top; F	
1 - 10	*5581067000	Screw, Top Panel; B	
1 - 11	*5534709100	Escutcheon, Counter; R	X-10R
1 - 12	5800139200	Knob, VR; F	
1 - 13	*5534708000	Escutcheon, Cue	X-10R
1 - 14	*5534707000	Escutcheon, Power Switch	X-10R
1 - 15	*5534706000	Escutcheon, Button	X-10R
1 - 16	*5555698000	Plate, Escutcheon Pressure	X-10R
1 - 17	*5533190000	Foot	X-10R
1 - 18	*5800002801	Case Assy, Deck; L	X-10R
1 - 19	*5553308001	Paper, Ampl. Insulating	X-10R
1 - 20	*5553306000	Plate, Ampl. Shield	X-7
1 - 21	*5553289100	Plate, Head Base	X-10R
1 - 22	*5520182000	Spring; D	A-5300
1 - 23	*5022050000	Spring; B	
1 - 24	*5555674100	Bracket, Erase Head	X-10R
1 - 25	*5555673000	Bracket, Head; R	X-10R
1 - 26	*5783012005	Screw, B M2 x 5	
1 - 27	*5555670100	Guide, Tape; R	X-10R
1 - 28	5569209000	Head, Erase	X-10
1 - 29	5569203000	Head, Record	X-10
1 - 30	5569202000	Head, Playback	X-10
1 - 31	*5013389100	Head Shield, A	A-4020
1 - 32	*5555672000	Bracket, Head; L	X-10R
1 - 33	*5555669100	Guide, Tape; F	X-10R
1 - 34	*5555887000	Cushion, Case	X-10R
1 - 35	*5800002700	Cushion, Head Base Plate Cover	X-10R
1 - 36	*5502277001	Case Assy, Wooden [L]	X-10R
1 - 37	*5504499000	Screw Assy, Case [L]	A-480

INCLUDED ACCESSORIES

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
	5350008500	Cord, Input-Output Connection	
	5062962000	Splicing Tape	
	5027288000	Sensing Foil	
	5598054001	Reel Adapter, Clamp (TZ-612A)	
	5101337100	Open Reel Supplement [U]	
	5101708000	Open Reel Supplement [All except U]	
	5700014000	X - 20R Owners Manual [U]	
	5700014100	X - 20R Owners Manual [All except U]	

[U]: U.S.A. [C]: CANADA [GE]: GENERAL EXPORT
 [A]: AUSTRALIA [E]: EUROPE [UK]: U.K.
 [L]: LIMITED AREA

EXPLODED VIEW - 2



EXPLODED VIEW - 2

Parts marked with *require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
2 - 1	*5545023000	Pin, Tape Guide	X-10R
2 - 2	*5555666000	Plate, Reinforcement	X-10R
2 - 3	*5534694000	Cushion, Stopper	X-10R
2 - 4	*5555667000	Plate, Joint	X-10R
2 - 5	*5504730000	Arm Assy, Pinch Roller; L	X-10R
2 - 6	*5504731000	Bracket Assy, Pinch Roller Arm	X-10R
2 - 7	*5524217000	Spring, Pinch Roller; L	X-10R
2 - 8	*5786714000	Clamper, Cord, $\phi 4$	
2 - 9	*5786713000	Clamper, Cord, $\phi 3$	
2 - 10	5504724000	Counter Assy, Index; A	X-10R
2 - 11	*5555665000	Bracket, Counter Assy	X-10R
2 - 12	*5534695000	Washer, Oil Retaining	X-10R
2 - 13	5504726100	Housing Assy, Capstan Flywheel	X-10R
2 - 14	*5555704000	Tape, Adhesive	X-10R
2 - 15	*5534715000	Ring, Magnet; Thrust	X-10R
2 - 16	5504728000	Flywheel Assy, Capstan; L	X-10R
2 - 17	5534692000	Belt, Capstan Drive	X-10R
2 - 18	*5504727000	Flywheel Assy, Capstan; R	X-10R
2 - 19	*5504733000	Plate Assy, Slide	X-10R
2 - 20	*5524219000	Spring, Slide Plate	X-10R
2 - 21	*5503196000	Chassis, Capstan	X-10R
2 - 22	*5524217000	Spring, Pinch Roller; L	X-10R
2 - 23	*5504729000	Arm Assy, Pinch Roller; R	X-10R
2 - 24	*5200036300	PCB Assy, DECODER	
2 - 25	*5800139800	Shaft, Pressure	
2 - 26	*5200036100	PCB Assy, MOTHER; D	
2 - 27	*5800139700	Bracket, PCB; LF	
2 - 28	*5122171000	Connector, Socket; 9P (WHT)	
2 - 29	*5200036400	PCB Assy, ENCODER	
2 - 30	*5200036200	PCB Assy, MOTHER; E	
2 - 31	*5122287000	Connector, Socket; 9P (RED)	
2 - 32	*5800139600	Bracket, PCB; RF	
2 - 33	*5544003000	Screw, Bearing	A-7300
2 - 34	*5555703000	Bearing	X-10R
2 - 35	*5555914100	Plate, Capstan Chassis	X-10R
2 - 36	*5800138000	Plate, Bearing	
2 - 37	*5122172000	Connector Socket, 10P (WHT)	
2 - 38	*7105018001	DC Motor Assy, Capstan; E	X-7R
	5168886000	PCB Assy, CAPSTAN SERVO	

[U]: U.S.A.

[C]: CANADA

[GE]: GENERAL EXPORT

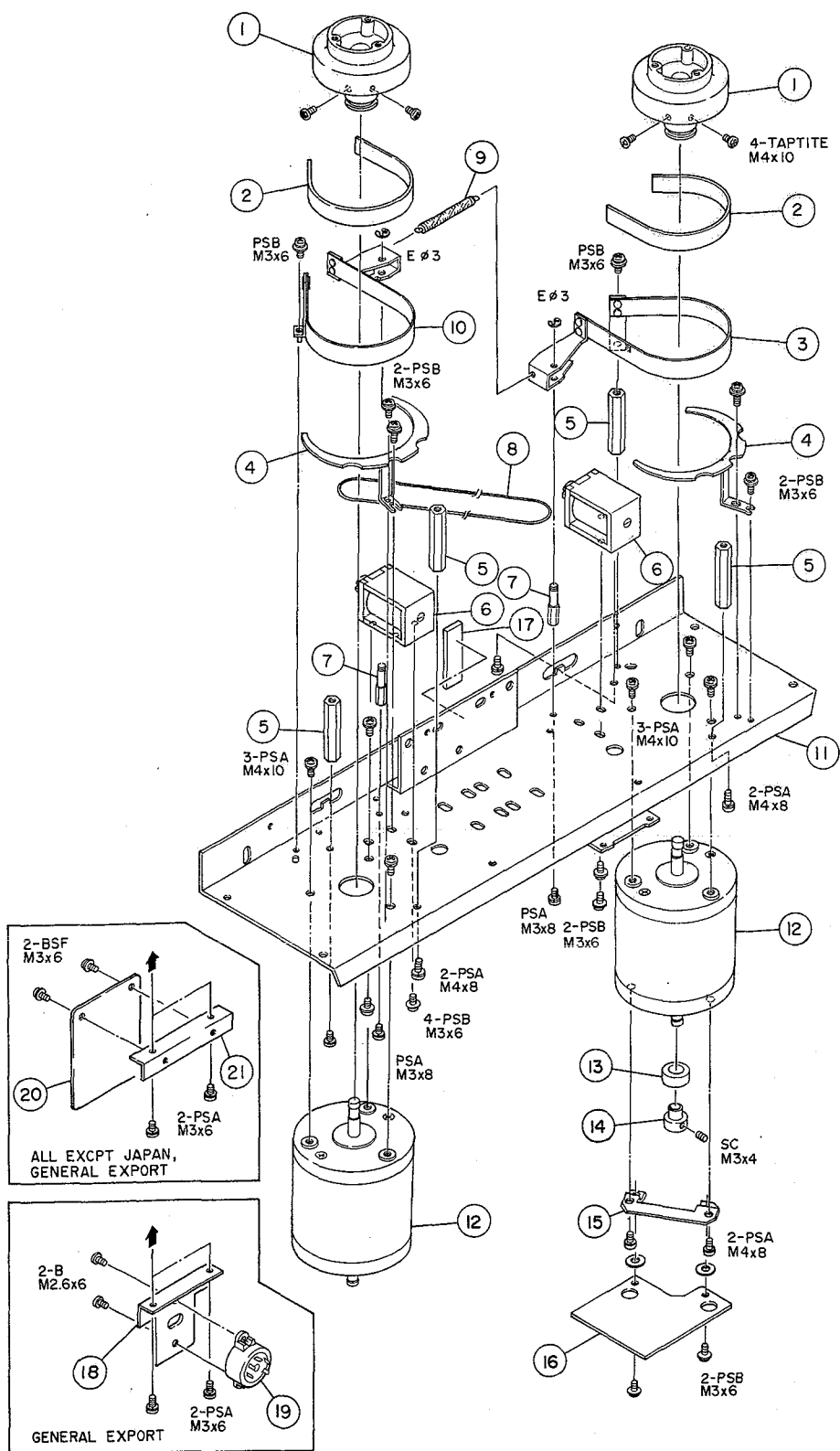
[A]: AUSTRALIA

[E]: EUROPE

[UK]: U.K.

[L]: LIMITED AREA

EXPLODED VIEW - 3



X-20R V-3

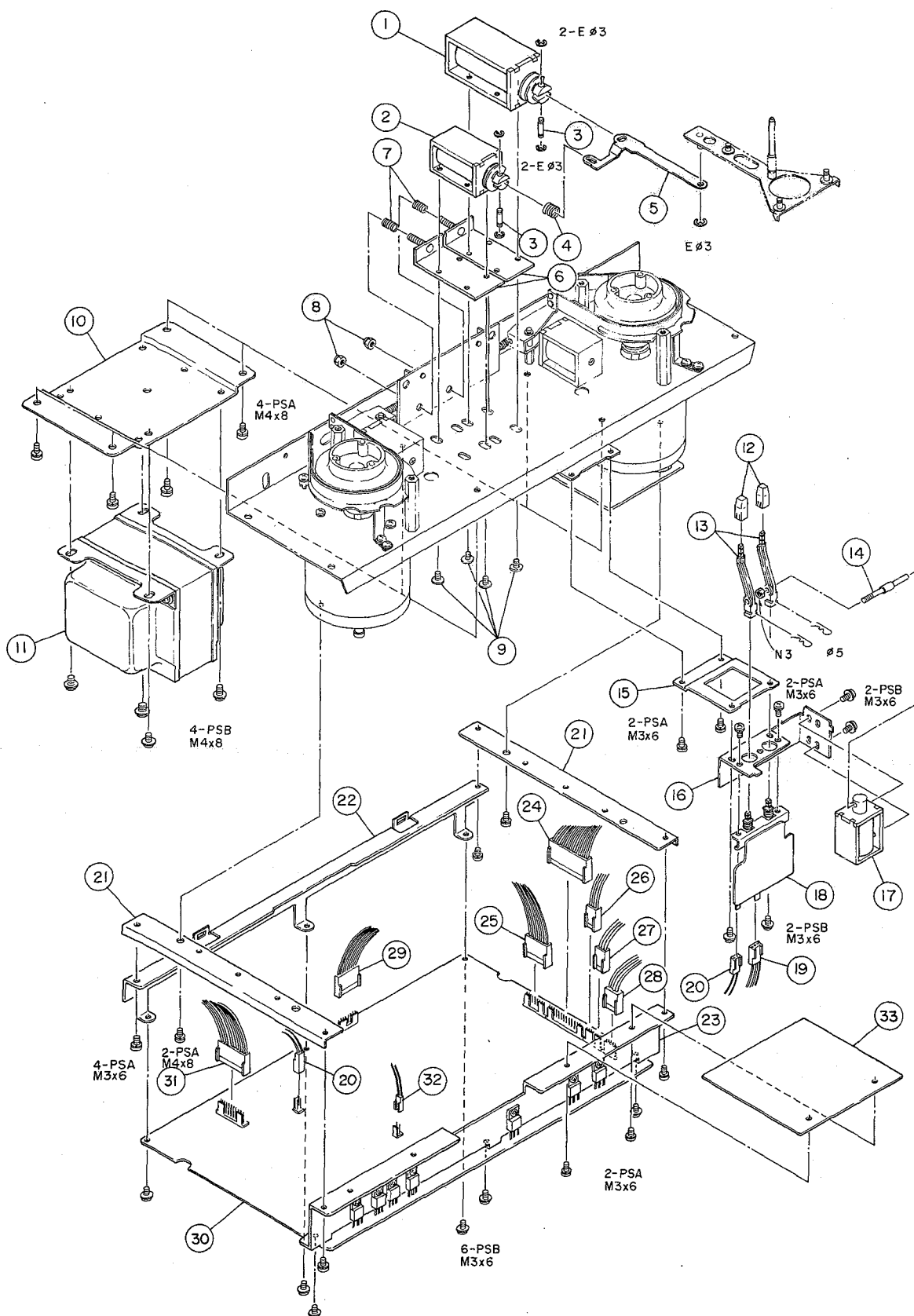
EXPLODED VIEW - 3

Parts marked with *require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
3 - 1	5533189000	Base Assy, Reel Table	X-10R
3 - 2	*5555274000	Shoe, Brake	A-3300SX
3 - 3	*5504736000	Band Assy, Brake; R	X-10R
3 - 4	*5555685000	Plate, Band Assy Retaining	X-10R
3 - 5	*5544916000	Stay, Top Panel; A	A-6100MK2
3 - 6	5163044000	Solenoid, Brake	
3 - 7	*5545033000	Shaft, Brake Band	X-10R
3 - 8	5534370000	Belt, Counter	A-6600
3 - 9	*5524294000	Spring, Brake	X-10R
3 - 10	*5504735000	Band Assy, Brake; L	X-10R
3 - 11	*5503194002	Chassis Assy, Reel Motor	X-10R
3 - 12	7105019000	DC Motor, Reel	X-7
3 - 13	*5534487000	Ring, Magnet	40-4
3 - 14	*5545036000	Collar, Magnet Ring	X-10R
3 - 15	*5555695100	Bracket, PCB	X-10R
3 - 16	*5168940000	PCB Assy, STOP SENSOR	
3 - 17	*5555570000	Cushion	f-500
3 - 18	*5168997000	PCB Assy, FUSE [U, C]	
	*5158105000	PCB Assy, FUSE [E, A, UK]	
3 - 19	*5555789000	Bracket, FUSE PCB Assy [All except GE]	
3 - 20	*5131007000	Switch, Voltage Selector [GE]	
3 - 21	*5555790000	Bracket, Switch [GE]	

[U]: U.S.A. [C]: CANADA [GE]: GENERAL EXPORT
[A]: AUSTRALIA [E]: EUROPE [UK]: U.K.
[L]: LIMITED AREA

EXPLODED VIEW - 4



EXPLODED VIEW - 4

Parts marked with *require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
4 - 1	5163041001	Solenoid, Pinch Roller	
4 - 2	5163042000	Solenoid, Pause	
4 - 3	*5545022000	Pin, Solenoid	X-10R
4 - 4	*5524071000	Spring, Solenoid	AL-700
4 - 5	*5555668000	Plate; C	X-10R
4 - 6	*5504732000	Plate Assy, Solenoid	X-10R
4 - 7	*5524218000	Spring, Pinch Roller Pressure	X-10R
4 - 8	*5581066000	Nut, Nylon; M4	
4 - 9	*5800022600	Screw, Shoulder; G	X-10R
4 - 10	*5555681100	Bracket, Power Transformer	X-10R
4 - 11	△ *5152225000	Transformer, Power [U, C]	
	△ *5152239000	Transformer, Power [E, A, UK]	
	△ *5320006600	Transformer, Power [GE]	
4 - 12	5534714000	Button; B	X-10R
4 - 13	*5534685000	Rod, Switch	X-10R
4 - 14	*5545024001	Shaft, Timer Solenoid	X-10R
4 - 15	*5555664000	Plate, Joint	X-10R
4 - 16	*5555671100	Bracket, Timer Switch	X-10R
4 - 17	5163045000	Solenoid, Timer	
4 - 18	*5168926100	PCB Assy, TIMER	
4 - 19	*5122281000	Connector Socket, 3P (RED)	
4 - 20	*5122164000	Connector Socket, 2P (WHT)	
4 - 21	*5553296000	Frame, Joint	X-10R
4 - 22	*5552390000	Frame, PCB	X-10R
4 - 23	*5552391000	Frame, H.S	X-10R
4 - 24	*5122177000	Connector Socket, 15P (WHT)	
4 - 25	*5122170000	Connector Socket, 8P (WHT)	
4 - 26	*5122222000	Connector Socket, 3P (BLK)	
4 - 27	*5122165000	Connector Socket, 3P (WHT)	
4 - 28	*5122166000	Connector Socket, 4P (WHT)	
4 - 29	*5122169000	Connector Socket, 7P (WHT)	
4 - 30	*5200004522	PCB Assy, CONTROL	X-10R
4 - 31	*5122173000	Connector, Socket, 11P (WHT)	
4 - 32	*5122280000	Connector, Socket, 2P (RED)	
4 - 33	*5555888000	Heat Sink; C	X-10R

(Continued from page 29)

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
5 - 55	*5122168000	Connector Socket, 6P	
5 - 56	*5168928000	PCB Assy, SWITCH	
5 - 57	*5168938000	PCB Assy, PITCH CONT	
5 - 58	*5800140000	Plate, Pressure; RF	
5 - 59	*5552392001	Chassis, Control	X-10R
5 - 60	*5555699000	Bracket, Speed Switch	X-10R
5 - 61	*5534713000	Rod, Power Switch; C	
5 - 62	*5524230001	Spring, Tension Arm; R	
5 - 63	*5168929000	PCB Assy, OPERATION SW	
5 - 64	5504743001	Roller Assy, B	
5 - 65	*5130003000	Switch, Micro; SS-L08-L13	

[U]: U.S.A.

[C]: CANADA

[GE]: GENERAL EXPORT

[A]: AUSTRALIA

[E]: EUROPE

[UK]: U.K.

[L]: LIMITED AREA

EXPLODED VIEW - 5

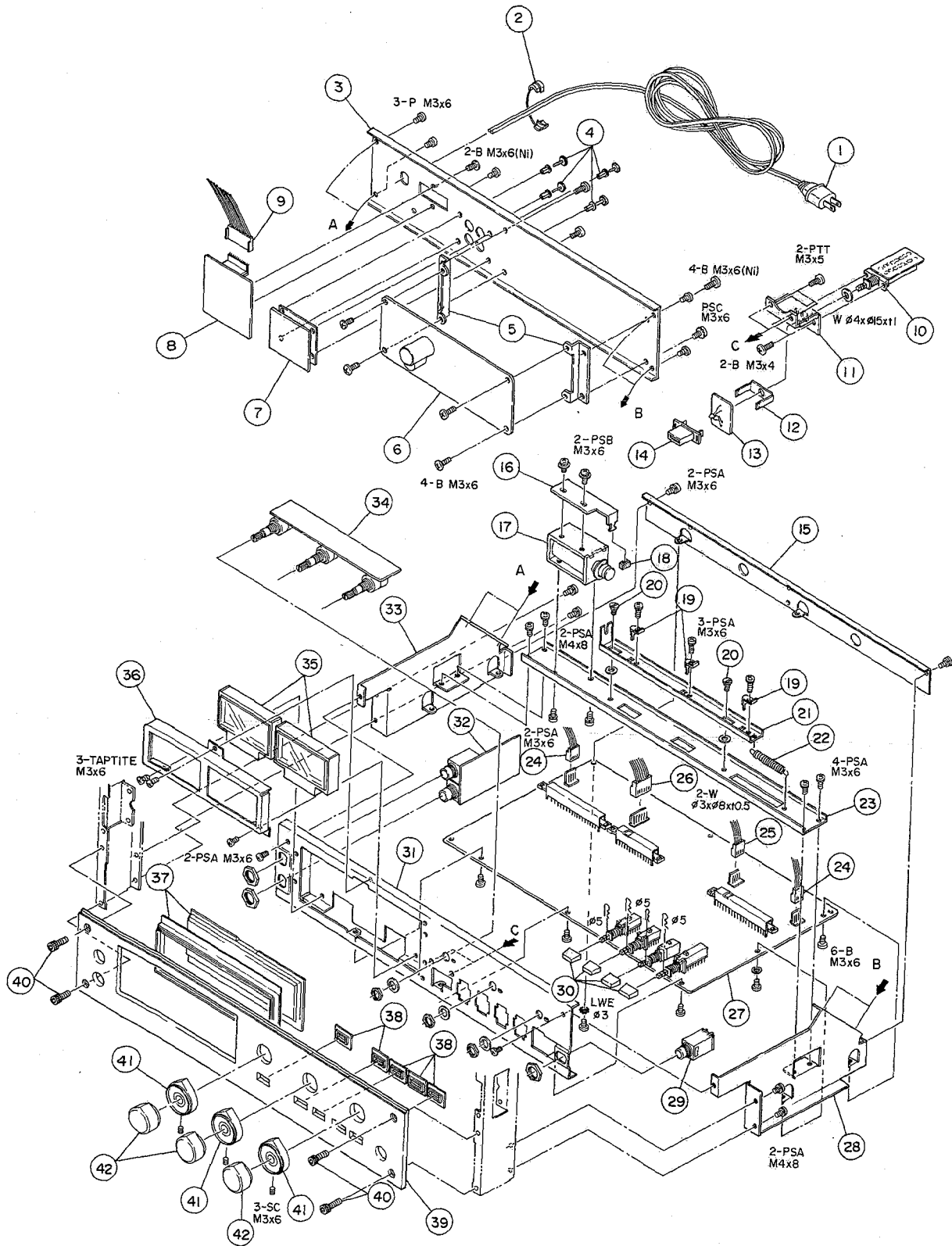
Parts marked with *require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
5 - 1	*5545037000	Cap, Roller	X-10R
5 - 2	*5524225000	Spring, GND	X-10R
5 - 3	5504740001	Roller Assy; A	X-10R
5 - 4	*5504739000	Base Assy, Roller; A	X-10R
5 - 5	*5504742000	Base Assy, Roller; B	X-10R
5 - 6	*5545042000	Post, Sensing	X-10R
5 - 7	*5534716000	Post, Insulating	X-10R
5 - 8	*5534368100	Washer, Insulating	A-6600
5 - 9	*5027699000	Collar, Rubber	
5 - 10	*5504719102	Base Assy, Shut off; L	X-10R
5 - 11	*5524215000	Wire, String Stopper	X-10R
5 - 12	*5550025100	Plate, Insulating	A-450
5 - 13	*5054230000	Capacitor, Ceramic; 0.047 μ F 50V	
5 - 14	5301455500	Switch, Micro	
5 - 15	*5504721000	String Assy, Damper	X-10R
5 - 16	*5524183000	Spring, Motor Switch Lever	A-601R
5 - 17	*5534684000	Drum, Damper	X-10R
5 - 18	*5581045000	Nut, Nylon	
5 - 19	*5524069000	Spring, Roller Arm	AL-700
5 - 20	*5524229001	Spring, Tension Arm; L	X-10R
5 - 21	*5581064000	Screw, Shoulder; E	
5 - 22	*5800002600	Screw, Shoulder; F	
5 - 23	5504723000	Arm Assy, Tension	X-10R
5 - 24	*5545010000	Weight, Counter	X-10R
5 - 25	*5534686001	Cushion	X-10R
5 - 26	*5504720101	Base Assy, Shut Off; R	X-10R
5 - 27	*5800140200	Plate, Button Escutcheon; F	
5 - 28	*5800140100	Plate, Pressure; LF	
5 - 29	*5552393102	Angle, Side; R	X-10R
5 - 30	5800139100	Knob, Cue; F	
5 - 31	*5555697000	Lever, Cue	X-10R
5 - 32	*5524223001	Spring, Cue	X-10R
5 - 33	*5504737000	Bracket Assy, Cue	X-10R
5 - 34	5800139300	Button, Switch; F	
5 - 35	5534702000	Button, Power Switch	X-10R
5 - 36	5533199000	Button, G	X-10R
5 - 37	5533219000	Button; H	X-10R
5 - 38	5533198000	Button, F	X-10R
5 - 39	5533195000	Button, C	X-10R
5 - 40	5533193000	Button; A	X-10R
5 - 41	5533197000	Button, E	X-10R
5 - 42	5533194000	Button, B	X-10R
5 - 43	5533196000	Button, D	X-10R
5 - 44	*5533192000	Escutcheon, Button; Operation	X-10R
5 - 45	*5503204001	Base Assy, Button; Operation	X-10R
5 - 46	5143139000	LED (GREEN)	
5 - 47	5143140000	LED (RED)	
5 - 48	*5545150001	Stay, Button Escutcheon	X-10R
5 - 49	5138011000	Switch, Tact	
5 - 50	*5553300000	Angle, Button Base; A	X-10R
5 - 51	*5552394101	Angle, Side; L	X-10R
5 - 52	△ 5134037000	Switch, Power [U]	
	△ 5134018000	Switch, Power [C]	
	△ 5134036000	Switch, Power [GE, L]	
	△ 5134011000	Switch, Power [E, UK, A]	
5 - 53	△ 5052907000	Spark Killer, 0.01 μ F + 300 Ω /300V [GE, L]	
	△ 5052910000	Spark Killer, 0.033 μ F + 120 Ω /125V [U]	
	△ 5052911000	Spark Killer, 0.033 μ F + 120 Ω /250V [C]	
	△ 5267702500	Spark Killer, 0.047 μ F 250V [E, UK, A]	
5 - 54	*5168927200	PCB Assy, SPEED SW	

(Continued on page 27)

[U]: U.S.A. [C]: CANADA [GE]: GENERAL EXPORT
 [A]: AUSTRALIA [E]: EUROPE [UK]: U.K.
 [L]: LIMITED AREA

EXPLODED VIEW - 6



EXPLODED VIEW - 6

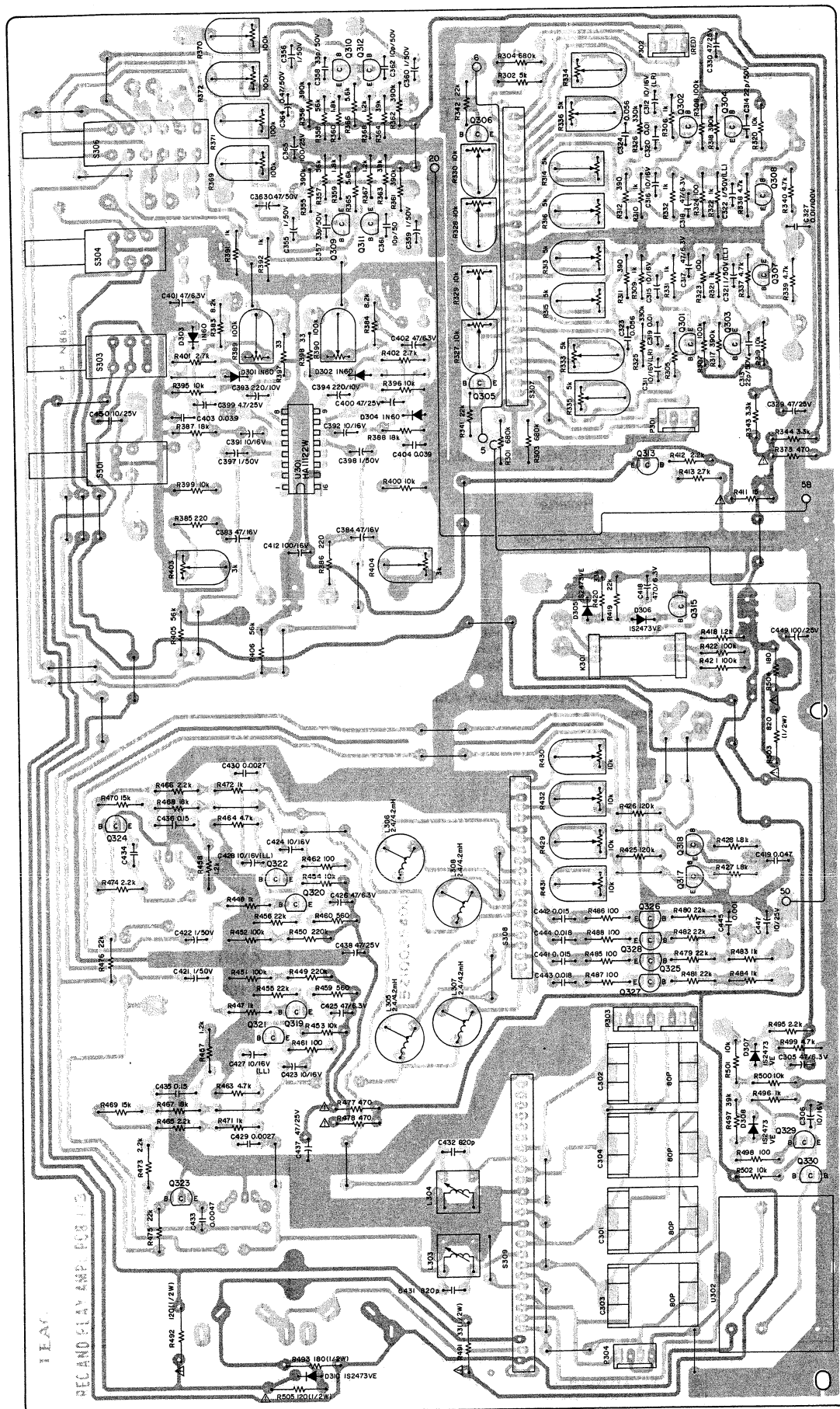
Parts marked with *require longer delivery time.

REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
6 - 1	△ 5128075000	Cord, AC Power [U, C, GE, L]	
	△ 5350008200	Cord, AC Power [E]	
	△ 5350008300	Cord, AC Power [A]	
	△ 5128047000	Cord, AC Power [UK]	
6 - 2	*5534660000	Strain Relief, AC Power Cord [All except UK]	
	*5534661000	Strain Relief, AC Power Cord [UK]	
6 - 3	*5800140600	Panel, Ampl.; Rear; F	A-400
6 - 4	*5534118000	Push Rivet	
6 - 5	*5800140300	Bracket, Line Ampl; F	
6 - 6	*5200035600	PCB Assy, Line Ampl	
6 - 7	*5200036000	PCB Assy, IN/OUTPUT	
6 - 8	*5168931100	PCB Assy, CONNECTOR; A	
6 - 9	*5122177000	Connector Socket, 15P (WHT)	
6 - 10	*5200035700	PCB Assy, DBX SW	
6 - 11	*5800140400	Bracket, Push SW	
6 - 12	*5800140500	Button, Holder; F	
6 - 13	*5200035800	PCB Assy, LED	X-10R
6 - 14	5800139500	Button, DBX; F	
6 - 15	*5553297100	Bracket, REC AND PLAY AMPL PCB	X-10R
6 - 16	*5555701000	Plate, Solenoid Stopper	
6 - 17	5163043000	Solenoid, Reverse	A-400
6 - 18	*5534116000	Cushion	
6 - 19	*5524224000	Spring, Plate; Change	X-10R
6 - 20	*5581056000	Screw, Shoulder	A-304
6 - 21	*5555694000	Plate, Slide	X-10R
6 - 22	*5524222000	Spring, Return	X-10R
6 - 23	*5553298000	Bracket, Solenoid	X-10R
6 - 24	*5122282000	Connector Socket, 4P (RED)	
6 - 25	*5122166000	Connector Socket, 4P (WHT)	
6 - 26	*5122170000	Connector Socket, 8P (WHT)	
6 - 27	*5200055400	PCB Assy, REC AND PLAY AMPL	X-10R
6 - 28	*5553295100	Frame, Ampl.; A, R	
6 - 29	*5124026000	Jack, PHONES	
6 - 30	5800139400	Button, F	
6 - 31	*5503195101	Chassis, Ampl.; A	X-10R
6 - 32	*5200045500	PCB Assy, MIC AMP	X-10R
6 - 33	*5553294100	Frame; Ampl.; A, L	
6 - 34	*5200035900	PCB Assy, VR	
6 - 35	*5296002600	Meter, VU	
6 - 36	*5553293000	Plate, Meter	X-10R
6 - 37	*5504748001	Cover Assy, Meter	X-10R
6 - 38	*5534706000	Escutcheon, Button	
6 - 39	*5800138900	Panel, Ampl.; F	
6 - 40	*5581067000	Screw, Ampl. Panel; B	
6 - 41	5534704000	Knob, VR; B	X-10R
6 - 42	5533188000	Knob, VR; A	X-10R

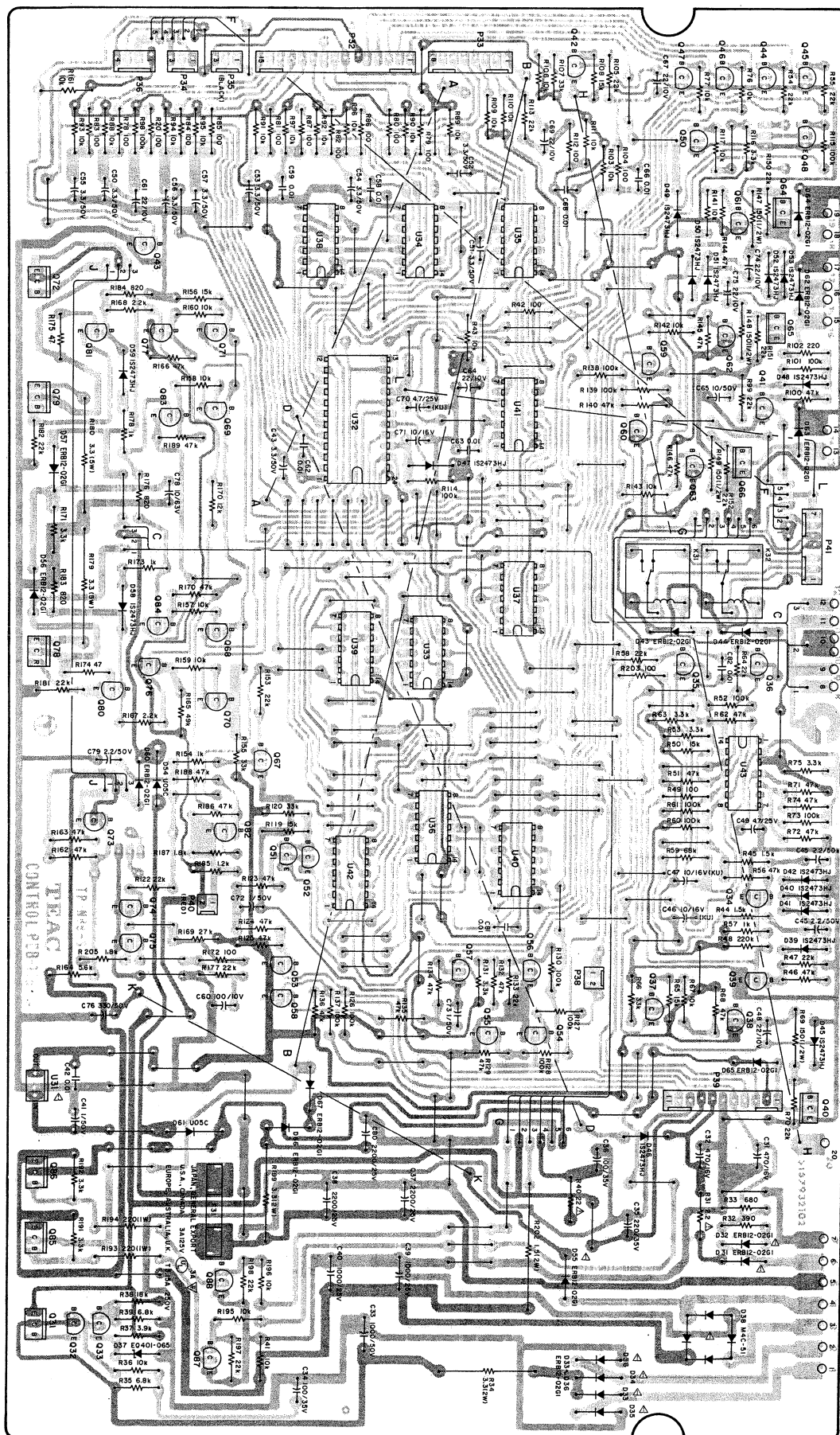
[U]: U.S.A. [C]: CANADA [GE]: GENERAL EXPORT
 [A]: AUSTRALIA [E]: EUROPE [UK]: U.K.
 [L]: LIMITED AREA

7 PC BOARDS AND PARTS LIST

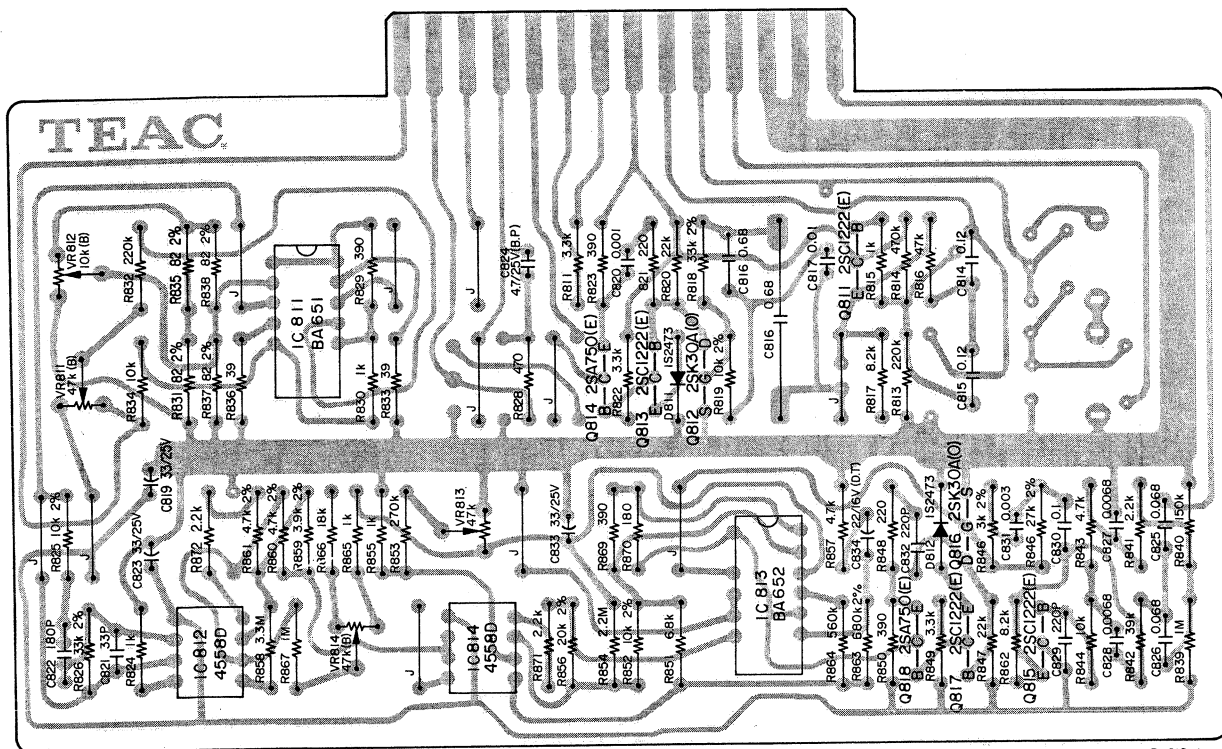
PC Boards shown viewed from foil side
REC AND PLAY AMPL. PCB ASSY



CONTROL PCB ASSY

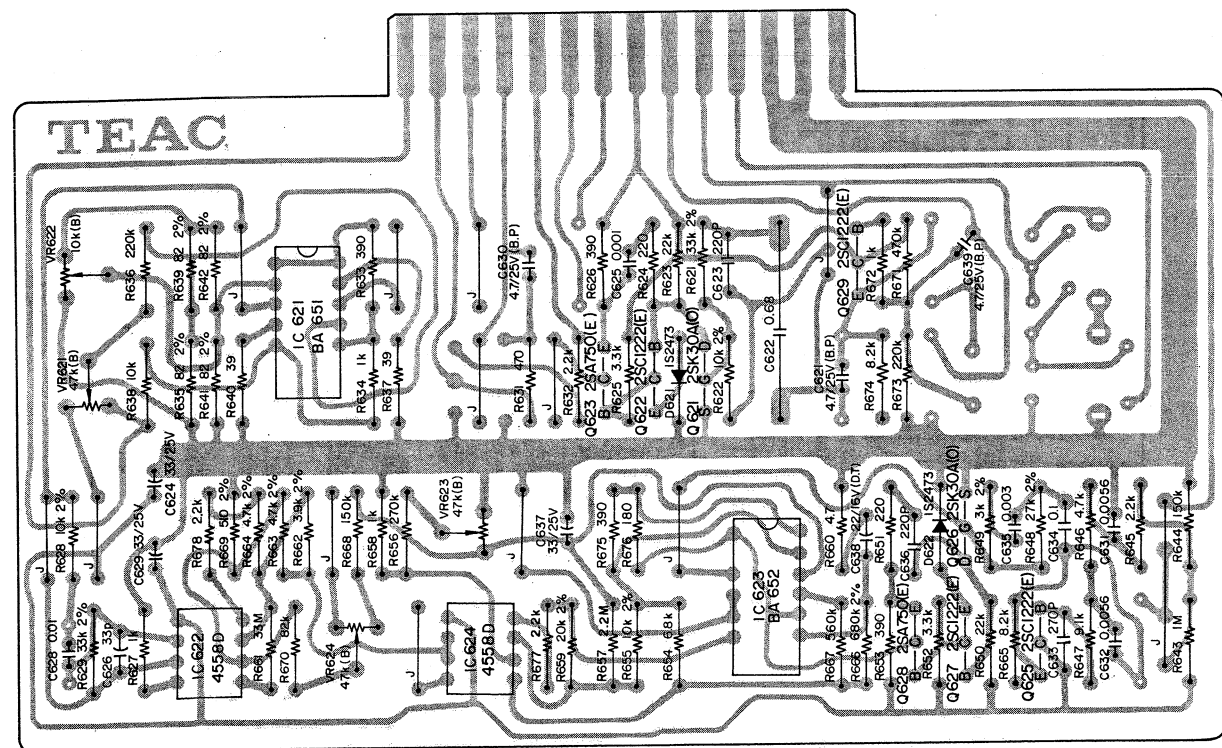


ENCODER PCB ASSY



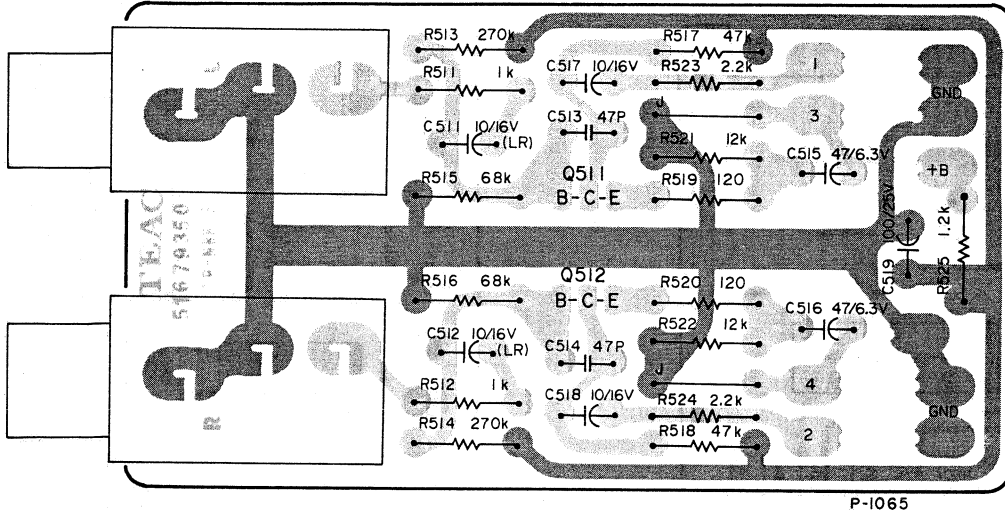
P-210-1

DECODER PCB ASSY

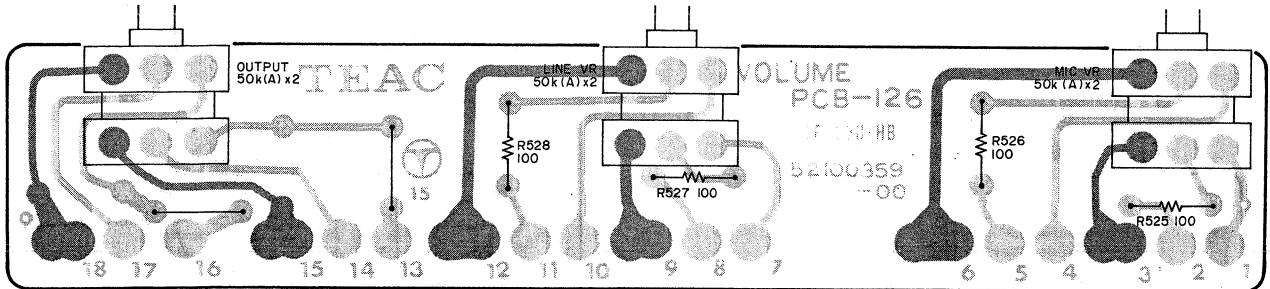


P-209-1

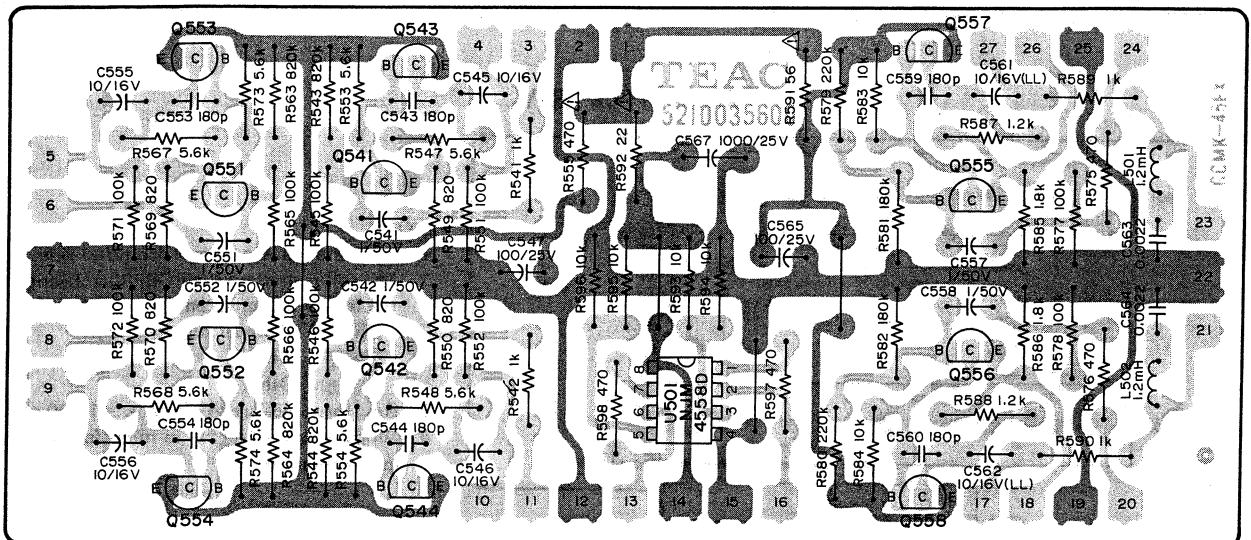
MIC AMPL. PCB ASSY



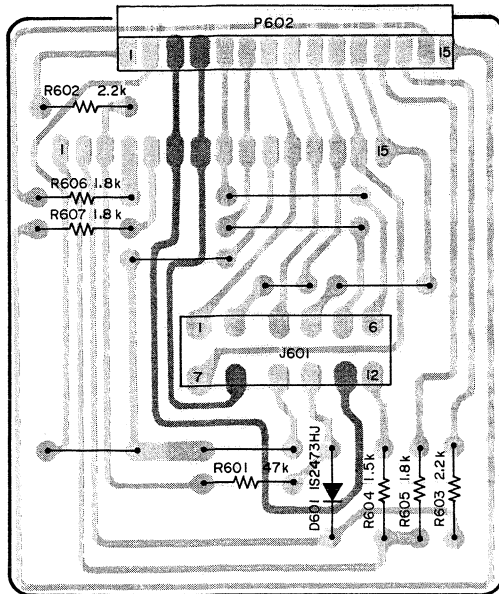
VR PCB ASSY



LINE AMPL. PCB ASSY

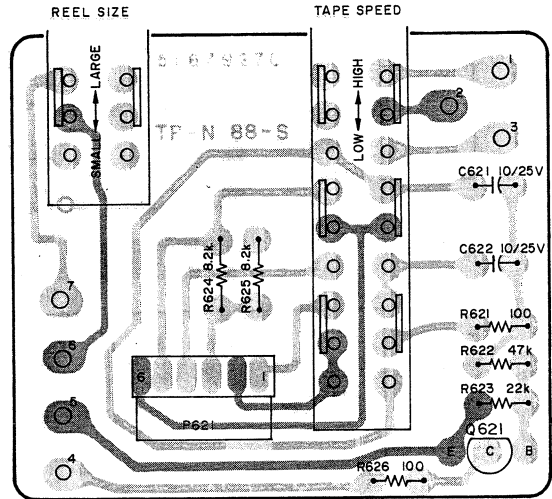


CONNECTOR PCB ASSY

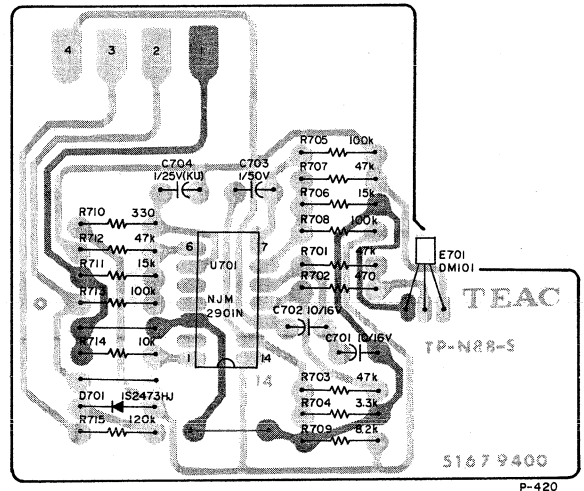


P-1009

SPEED SW PCB ASSY

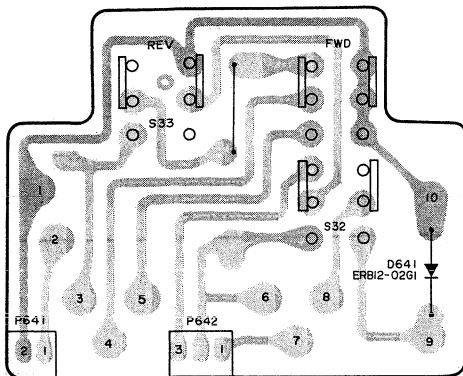


STOP SENSOR PCB ASSY

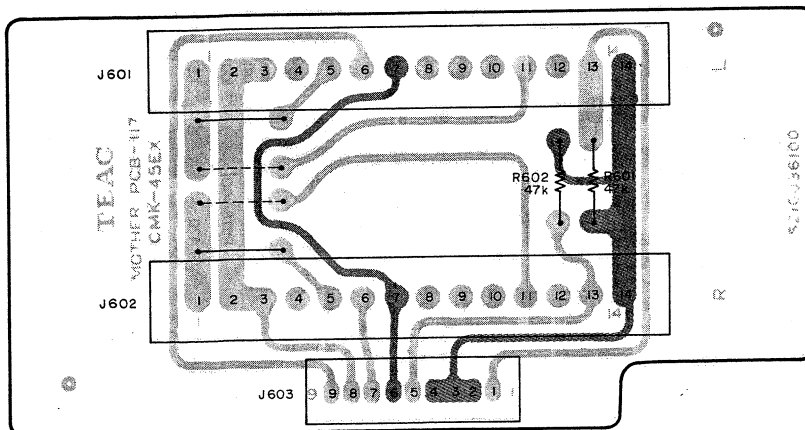


P-420

TIMER PCB ASSY



MOTHER PCB ASSY



NOTES

1. PC Boards shown viewed from foil side.
2. The colors used on the PCB illustrations have the following significance:
 : +B power supply circuit
 : GND
 : Other
3. Resistor values are in ohms (k = 1,000 ohms).
4. All capacitor values are in microfarads (p = picofarads).

REC AND PLAY AMPL. PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200035400	PCB Assy
	5210035400	PCB
TRANSISTORS		
Q301, Q302	5042461000	2SC-1327T
Q303~Q308	5145036000	2SC-945LK
Q309~Q312	5145151000	2SC-1815GR
Q313	5145135000	2SD-400MPE
Q315	5145036000	2SC-945LK
Q317, Q318	5145185000	2SD-655E
Q319, Q320	5145092000	2SC-1740LNS
Q321, Q322	5145095000	2SA-826LNS
Q323~Q329	5145036000	2SC-945LK
Q330	5145185000	2SD-655E
IC		
V301	5147053000	HA-11122W
DIODES		
D301~D304	5042213000	IN60
D305~D308	5042517000	IS2473VE
D310	5042517000	IS2473VE
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R301~R304	5183150000	680k Ω
R305, R306	5183082000	1k Ω
R307, R308	5183130000	100k Ω
R309, R310	5183082000	1k Ω
R311, R312	5183072000	390 Ω
R317, R318	5183144000	390k Ω
R319, R320	5183106000	10k Ω
R321, R322	5183082000	1k Ω
R323, R324	5183058000	100k Ω
R325, R326	5183142000	330k Ω
R331, R332	5183082000	1k Ω
R337, R340	5183098000	4.7k Ω
R341, R342	5183114000	22k Ω
R343, R344	5183094000	3.3k Ω
R355, R356	5183144000	390k Ω
R357, R358	5183124000	56k Ω
R359, R360	5183088000	1.8k Ω
R361, R362	5183144000	390k Ω
R363, R364	5183120000	39k Ω
R365, R366	5183100000	5.6k Ω
R367, R368	5183084000	1.2k Ω
R373	△ 5184265000	470 Ω Nonflammable
R383, R384	5183104000	8.2k Ω
R385, R386	5183066000	220 Ω
R387, R388	5183112000	18k Ω
R391, R392	5183082000	1k Ω
R395, R396	5183106000	10k Ω
R397, R398	5183046000	33 Ω
R399, R400	5183106000	10k Ω
R401, R402	5183092000	2.7k Ω
R405, R406	5183124000	56k Ω
R411	△ 5184229000	15 Ω Nonflammable
R412	5183090000	2.2k Ω
R413	5183092000	2.7k Ω
R418	5183084000	1.2k Ω
R419	5183114000	22k Ω
R420	5183118000	33k Ω
R421, R422	5183130000	100k Ω
R425, R426	5183132000	120k Ω
R427, R428	5183088000	1.8k Ω

REF. NO.	PARTS NO.	DESCRIPTION
R447, R448	5183082000	1k Ω
R449, R450	5183138000	220k Ω
R451, R452	5183130000	100k Ω
R453, R454	5183106000	10k Ω
R455, R456	5183114000	22k Ω
R457, R458	5183084000	1.2k Ω
R459, R460	5183076000	560 Ω
R461, R462	5183058000	100 Ω
R463, R464	5183098000	4.7k Ω
R465, R466	5183090000	2.2k Ω
R467, R468	5183112000	18k Ω
R469, R470	5183110000	15k Ω
R471, R472	5183082000	1k Ω
R473, R474	5183090000	2.2k Ω
R475, R476	5183114000	2.2k Ω
R477, R478	△ 5184265000	470 Ω Nonflammable
R479~R482	5183114000	22k Ω
R483, R484	5183082000	1k Ω
R485~R488	5183058000	100 Ω
R491	△ 5181986000	33 Ω Nonflammable
R492	△ 5182000000	120 Ω Nonflammable
R493	△ 5182004000	180 Ω Nonflammable
R495	5183090000	2.2k Ω
R496	5183082000	1k Ω
R497	5183120000	39k Ω
R498	5183058000	100 Ω
R499	5183098000	4.7k Ω
R500~R502	5183106000	10k Ω
R503	△ 5182020000	820 Ω Nonflammable
R504	△ 5184255000	180 Ω Nonflammable
CAPACITORS		
C301~C304	5054707000	TRIMMER 5-80pF
C305	5172923000	Elec. 47 μ F 6.3V
C306	5172900000	Elec. 10 μ F 16V
C311, C312	5171565000	Elec. 10 μ F 16V (LR)
C313, C314	5172304000	Ceramic 22pF 50V 10%
C315, C316	5172900000	Elec. 10pF 16V
C317, C318	5172923000	Elec. 47 μ F 6.3V
C319, C320	5054877500	Mylar 0.01 μ F 100V 5%
C321, C322	5260221110	Elec. 1 μ F 50V
C323, C324	5054739500	Mylar 0.056 μ F 100V 5%
C327	5054877500	Mylar 0.01 μ F 100V 5%
C329, C330	5172926000	Elec. 47 μ F 25V
C355, C356	5172882000	Elec. 1 μ F 50V
C357, C358	5172306000	Ceramic 33pF 50V 10%
C359, C360	5172882000	Elec. 1 μ F 50V
C361, C362	5172300000	Ceramic 10pF 50V 10%
C363, C364	5172880000	Elec. 0.47 μ F 50V
C365	5172935000	Elec. 100 μ F 25V
C383, C384	5172925000	Elec. 47 μ F 16V
C391, C392	5172900000	Elec. 10 μ F 16V
C393, C394	5172942000	Elec. 220 μ F 10V
C397, C398	5172882000	Elec. 1 μ F 50V
C399, C400	5172894000	Elec. 4.7 μ F 25V
C401, C402	5172923000	Elec. 47 μ F 6.3V
C403, C404	5054924500	Mylar 0.039 μ F 100V 5%
C412	5172994000	Elec. 100 μ F 16V
C418	5172959000	Elec. 470 μ F 6.3V
C419	5054738000	Mylar 0.047 μ F 50V 5%
C421, C422	5172882000	Elec. 1 μ F 50V
C423, C424	5172900000	Elec. 10 μ F 16V
C425, C426	5172923000	Elec. 47 μ F 6.3V
C427, C428	5260221910	Elec. 10 μ F 16V
C429, C430	5054889500	Mylar 0.0027 μ F 100V 5%

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

REF. NO.	PARTS NO.	DESCRIPTION
C431, C432	5054844000	Polyst. 820pF 50V 10%
C433, C434	5054891500	Mylar 0.0047 μ F 100V 5%
C435, C436	5054930500	Mylar 0.15 μ F 100V
C437, C438	5172926000	Elec. 47 μ F 25V
C441, C442	5054887500	Mylar 0.015 μ F 100V 5%
C443, C444	5054897500	Mylar 0.018 μ F 100V 5%
C445	5054878500	Mylar 0.001 μ F 100V 5%
C447	5172901000	Elec. 10 μ F 25V
C449	5172935000	Elec. 100 μ F 25V
C450	5172901000	Elec. 10 μ F 25V
VARIABLE RESISTORS		
R313~R316	5280003302	Semi-fixed 5k Ω (B)
R327~R330	5280003502	Semi-fixed 10k Ω (B)
R333~R336	5280003302	Semi-fixed 5k Ω (B)
R369~R372	5280004202	Semi-fixed 100k Ω (B)
R389, R390	5280004202	Semi-fixed 100k Ω (B)
R403, R404	5280003102	Semi-fixed 3k Ω (B)
R429~R432	5280003502	Semi-fixed 10k Ω (B)
SWITCHES		
S301	5134094000	Push, 2-2
S303, S304	5134094000	Push, 2-2
S306	5134095000	Push, 4-2
S307	5131044000	Slide, 9-2
S308	5131045000	Slide, 9-2
S309	5131044000	Slide, 9-2
CONNECTOR PLUG		
P301	5122128000	4P
P302	5122301000	4P (RED)
P303	5122132000	8P
P304	5122128000	4P
COILS		
L303, L304	5056659000	Trap, 3mH 20%
L305~L308	5056637000	Record; EQ, 2.4-4.2mH 20%
MISCELLANEOUS		
K301	5061137000	Relay, Reed; LAB2L 12V
U302	5040090000	OSC Unit

CONTROL PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200004502	PCB Assy [U, C]
	5200004512	PCB Assy [E, UK, A]
	5200004522	PCB Assy [GE, L]
	5167932102	PCB
IC's		
U31	5147058000	NJM-78M05A
U32	5147054000	AN6251
U33~U37	5147056000	HD-7400P
U38~U42	5147057000	HD-7402P
U43	5147039000	NJM-2901N
TRANSISTORS		
Q31	5145087000	2SD-313E
Q32	5042625000	2SC-1318S
Q33~Q37	5042383000	2SC-536F

REF. NO.	PARTS NO.	DESCRIPTION
Q38	5042553000	2SA-733P
Q39	5042383000	2SC-536F
Q40	5042564000	2SC-1061C
Q41~Q48	5042383000	2SC-536F
Q50~Q52	5042383000	2SC-536F
Q53	5042553000	2SA-733P
Q54~Q57	5042383000	2SC-536P
Q58	5042553000	2SA-733P
Q59	5042383000	2SC-536P
Q60~Q63	5042553000	2SA-733P
Q64~Q66	5042564000	2SA-1061C
Q67~Q71	5042383000	2SC-536F
Q72	5145087000	2SD-313E
Q73	5042625000	2SC-1318S
Q74, Q75	5042383000	2SC-536F
Q76, Q77	5042553000	2SA-733P
Q78, Q79	5145087000	2SD-313E
Q80, Q81	5042625000	2SC-1318S
Q82~Q84	5042553000	2SA-733P
Q85, Q86	5145129000	2SB-507E
Q87, Q88	5042625000	2SC-1318S
DIODES		
D31~D36	5143243000	ERB12-02G1
D37	5143154000	Zener, EQA01-06S
D38	5143142000	M4C-51
D39~D42	5143118000	IS2473HJ
D43, D44	5143243000	ERB12-02G1
D45~D53	5143118000	IS2473HJ
D54	5143017000	U05C
D55~D57	5143243000	ERB12-02G1
D58, D59	5143118000	IS2473HJ
D60	5143243000	ERB12-02G1
D61	5143017000	U05C
D62, D67	5143243000	ERB12-02G1
CARBON RESISTORS		
All Resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R31	5184209000	2.2 Ω Nonflammable
R32	5183072000	390 Ω
R33	5183078000	680 Ω
R34	5184306000	3.3 Ω 10% Cement
R35	5183102000	6.8k Ω
R36	5183106000	10k Ω
R37	5183096000	3.9k Ω
R38	5183112000	18k Ω
R39	5183102000	6.8k Ω
R40	5184233000	22 Ω Nonflammable
R41	5183106000	10k Ω
R42	5183058000	100 Ω
R43	5183106000	10k Ω
R44, R45	5183086000	1.5k Ω
R46	5183122000	4.7k Ω
R47	5183114000	22k Ω
R48	5183138000	220k Ω
R49	5183058000	100 Ω
R50	5183110000	15k Ω
R51	5183122000	47k Ω
R52	5183130000	100k Ω
R53	5183094000	3.3k Ω
R54, R55	5183114000	2.2k Ω
R56	5183122000	47k Ω
R57	5183082000	1k Ω

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

REF. NO.	PARTS NO.	DESCRIPTION
R58	5183114000	22k Ω
R59	5183126000	68k Ω
R60, R61	5183130000	100k Ω
R62	5183122000	47k Ω
R63	5183094000	3.3k Ω
R64	5183114000	22k Ω
R65	5183110000	15k Ω
R66	5183118000	33k Ω
R67	5183106000	10k Ω
R68	5183122000	47k Ω
R69	5180062000	150 Ω
R70	5183114000	22k Ω
R71, R72	5183122000	47k Ω
R73	5183130000	100k Ω
R74	5183122000	47k Ω
R75	5183094000	3.3k Ω
R76, R77	5183106000	10k Ω
R78	5183058000	100 Ω
R87	5183058000	100 Ω
R88	5183106000	10k Ω
R97	5183106000	10k Ω
R98	5183130000	100k Ω
R99	5183114000	22k Ω
R100	5183122000	47k Ω
R101	5183130000	100k Ω
R102	5183138000	220k Ω
R103	5183106000	10k Ω
R104	5183058000	100 Ω
R105	5183114000	22k Ω
R106	5183106000	10k Ω
R107	5183118000	33k Ω
R108	5183110000	15k Ω
R109~R111	5183106000	10k Ω
R112	5183058000	100 Ω
R113	5183114000	22k Ω
R114, R115	5183130000	100k Ω
R116	5183094000	3.3k Ω
R117	5183106000	10k Ω
R119	5183110000	15k Ω
R120	5183118000	33k Ω
R121	5183122000	47k Ω
R122	5183114000	22k Ω
R123~R125	5183122000	47k Ω
R126~R128	5183130000	100k Ω
R129, R130	5183122000	47k Ω
R131	5183094000	3.3k Ω
R132	5183122000	47k Ω
R133	5183114000	22k Ω
R134	5183058000	100 Ω
R135, R136	5183122000	47k Ω
R137~R139	5183130000	100k Ω
R140	5183122000	47k Ω
R141~R143	5183106000	10k Ω
R144~R146	5183122000	47k Ω
R147~R149	5183062000	150 Ω
R150~R152	5183114000	22k Ω
R153	5183114000	22k Ω
R154	5183082000	1k Ω
R155	5183118000	33k Ω
R156	5183110000	15k Ω
R157~R161	5183106000	10k Ω
R162, R163	5183122000	47k Ω
R164	5183100000	5.6k Ω
R165, R166	5183122000	47k Ω

REF. NO.	PARTS NO.	DESCRIPTION
R167, R168	5183090000	2.2k Ω
R169	5183116000	27k Ω
R170	5183108000	12k Ω
R171	5183094000	3.3k Ω
R172	5183058000	100 Ω
R173	5183082000	1k Ω
R174, R175	5183050000	47 Ω
R176	5183080000	820 Ω
R177	5183114000	2.2k Ω
R178	5183082000	1k Ω
R179, R180	5184410000	3.3 Ω 5W Cement
R181, R182	5183114000	22k Ω
R183, R184	5183080000	820 Ω
R185	5183084000	1.2k Ω
R186	5183122000	47k Ω
R187	5183088000	1.8k Ω
R188, R190	5183122000	47k Ω
R191, R192	5183094000	3.3k Ω
R193, R194	5184763000	220 Ω 1W Nonflammable
R195, R196	5183106000	10k Ω
R197, R198	5183114000	22k Ω
R199	5184306000	3.3 Ω 2W $\pm$ 10% Cement
R201	5183058000	100 Ω
R202	5184302000	1.5 Ω 2W $\pm$ 10% Cement
R203	5183058000	100 Ω
CAPACITORS		
C31, C32	5172961000	Elec. 470 μ F 16V
C33	5172973000	Elec. 1000 μ F 50V
C34	5172936000	Elec. 100 μ F 35V
C35	5172945000	Elec. 220 μ F 35V
C36	5172936000	Elec. 100 μ F 35V
C37, C38	5055714800	Elec. 2200 μ F 25V
C39, C40	5172973000	Elec. 1000 μ F 50V
C41	5172882000	Elec. 1 μ F 50V
C42	5054204000	Ceramic 0.01 μ F 50V 10%
C43	5172890000	Elec. 3.3 μ F 50V
C44, C45	5172886000	Elec. 2.2 μ F 50V
C46, C47	5172900000	Elec. 10 μ F 16V
C48	5172907000	Elec. 22 μ F 10V
C50~C57	5172890000	Elec. 3.3 μ F 50V
C58, C59	5054204000	Elec. 0.01 μ F 50V
C60	5172933000	Elec. 100 μ F 10V
C61	5172907000	Elec. 22 μ F 10V
C62, C63	5054204000	Ceramic 0.01 μ F 50V 10%
C64	5172907000	Elec. 22 μ F 10V
C65	5172903000	Elec. 10 μ F 50V
C66	5054204000	Ceramic 0.01 μ F 50V 10%
C67	5172907000	Elec. 22 μ F 10V
C68	5054204000	Ceramic 0.01 μ F 50V 10%
C69	5172907000	Elec. 22 μ F 10V
C70	5172894000	Elec. 47 μ F 25V
C71	5172900000	Elec. 10 μ F 16V
C72, C73	5172882000	Elec. 1 μ F 50V
C74, C75	5172907000	Elec. 2.2 μ F 10V
C76	5172955000	Elec. 330 μ F 50V
C78	5172904000	Elec. 10 μ F 63V
C79	5172886000	Elec. 2.2 μ F 50V
C80	5055714800	Elec. 2200 μ F 25V
C81, C82	5054204000	Ceramic 0.01 μ F 50V 10%

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

REF. NO.	PARTS NO.	DESCRIPTION
MISCELLANEOUS		
K31, K32	5061144000	Relay; G2U-113P 24V
	5033291000	Plate, Insulating
	5033295000	Tube, Insulating
	5122126000	Connector Plug 2P
	5122127000	Connector Plug 3P
	5122128000	Connector Plug 4P
	5122131000	Connector Plug 7P
	5122132000	Connector Plug 8P
	5122135000	Connector Plug 11P
	5122139000	Connector Plug 14P
	5122184000	Connector Plug 3P (BLK)
	5142087000	Connector Plug 2P (RED)
	5142087000	Fuse Holder
	5142231000	Mini Fuse 3A 250V

ENCODER PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200036400	PCB Assy
	5167356000	PCB
IC's		
U811	5147020000	BA-651
U812	5042738000	NJM4558D
U813	5147021100	BA-652
U814	5042738000	NJM4558D
TRANSISTORS		
Q811	5042495000	2SC-1222E
Q812	5042548000	FET 2SK-30A0
Q813	5042495000	2SC-1222E
Q814	5145038000	2SA-750E
Q815	5042495000	2SC-1222E
Q816	5042480000	FET-2SK-30A0
Q817	5042495000	2SC-1222E
Q818	5145038000	2SA-750E
DIODES		
D811, D812	5042550000	1S2473
RESISTORS		
All resistors are rated $\pm 5\%$ tolerance, $\frac{1}{4}W$ and of carbon type unless otherwise noted.		
R813	5183138000	220k Ω
R814	5183146000	470k Ω
R815	5183082000	1k Ω
R816	5183122000	47k Ω
R817	5183104000	8.2k Ω
R818	5181384000	33k Ω $\frac{1}{4}W$ Metal Film
R819	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R820	5183114000	22k Ω
R821	5183066000	220 Ω
R822	5183094000	3.3k Ω
R823	5183072000	390 Ω
R824	5183082000	1k Ω
R825	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R826	5181384000	33k Ω $\frac{1}{4}W$ Metal Film
R828	5183074000	470 Ω

REF. NO.	PARTS NO.	DESCRIPTION
R829	5183072000	390 Ω
R830	5183082000	1k Ω
R831	5181376000	82 Ω $\frac{1}{4}W$ Metal Film
R832	5183138000	220k Ω
R833	5183048000	39 Ω
R834	5183106000	10k Ω
R835	5181376000	82 Ω $\frac{1}{4}W$ Metal Film
R836	5183048000	39k Ω
R837, R838	5181376000	82 Ω $\frac{1}{4}W$ Metal Film
R839	5183154000	1M Ω
R840	5183134000	150k Ω
R841	5183090000	2.2k Ω
R842	5183120000	39k Ω
R843	5183098000	4.7k Ω
R844	5183106000	10k Ω
R845	5181383000	27k Ω $\frac{1}{4}W$ Metal Film
R846	5181378000	3k Ω $\frac{1}{4}W$ Metal Film
R847	5183114000	22k Ω
R848	5183066000	220 Ω
R849	5183094000	3.3k Ω
R850	5183072000	390 Ω
R851	5183102000	6.8k Ω
R852	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R853	5183140000	270k Ω
R854	5183162000	2.2M Ω
R855	5183082000	1k Ω
R856	5181382000	20k Ω $\frac{1}{4}W$ Metal Film
R857	5183026000	4.7k Ω
R858	5183166000	3.3M Ω
R860, R861	5181379000	3.9k Ω $\frac{1}{4}W$ Metal Film
R862	5183104000	8.2k Ω
	5181395000	680k Ω $\frac{1}{4}W$ Metal Film
R864	5183148000	560k Ω
R866	5183312000	6.8k Ω
R867	5183154000	1M Ω
R869, R870	5183072000	390 Ω
R871, R872	5183090000	2.2k Ω
CAPACITORS		
C814, C815	5054929500	Mylar 0.12 μF 100V 5%
C816	5170021000	Metalized 0.68 μF 250V
C817	5054877500	Mylar 0.01 μF 100V 5%
C819	5172917000	Elec. 33 μF 25V
C820	5054878500	Mylar 0.001 μF 100V 5%
C821	5054351000	Dip. Mica 33pF 50V 10%
C822	5054260000	Dip. Mica 180pF 50V 10%
C823	5172917000	Elec. 33 μF 25V
C824	5172894000	Elec. 4.7 μF 25V
C825, C826	5054926500	Mylar 0.068 μF 100V 5%
C827, C828	5054893500	Mylar 0.0068 μF 100V 5%
C829	5054745000	Dip. Mica 220pF 50V 10%
C830	5054928500	Mylar 0.1 μF 100V 5%
C831	5054726500	Mylar 0.003 μF 100V 5%
C832	5054745000	Dip. Mica 220pF 50V 10%
C833	5172917000	Elec. 33 μF 25V
C834	5054678000	Dip. Tant. 22 μF 16V 10%
VARIABLE RESISTORS		
V811	5280122100	Semi-fixed 47k Ω (B)
V812	5280121701	Semi-fixed 10k Ω (B)
V813	5280122100	Semi-fixed 47k Ω (B)
V814	5280152101	Semi-fixed 47k Ω (B)

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

DECODE PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200036300	PCB Assy
	5167355000	PCB
	IC's	
U621	5147020000	BA-651
U622	5042738000	NJM4558D
U623	5147021100	BA-652
U624	5042738000	NJM4558D
	TRANSISTORS	
Q621	5042548000	FET 2SK-30A0
Q622	5042495000	2SC-1222E
Q623	5145038000	2SA-750E
Q625	5042495000	2SC-1222E
Q626	5042548000	FET 2SK-30A0
Q627	5042495000	2SC-1222E
Q628	5145038000	2SA-750E
Q629	5042495000	2SC-1222E
	DIODES	
D621, D622	5042550000	IS2473HJ
	RESISTORS	
All resistors are rated $\pm 5\%$ tolerance, $\frac{1}{4}W$ and of carbon type unless otherwise noted.		
R621	5181284000	33k Ω $\frac{1}{4}W$ Metal Film
R622	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R623	5183114000	22k Ω
R624	5183066000	220 Ω
R625	5183094000	3.3k Ω
R626	5183072000	390 Ω
R627	5183082000	1k Ω
R628	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R629	5181384000	33k Ω $\frac{1}{4}W$ Metal Film
R631	5183074000	470 Ω
R633	5183072000	390 Ω
R635	5181376000	82 Ω $\frac{1}{4}W$
R636	5183138000	220k Ω
R637	5183048000	39 Ω
R638	5183106000	10k Ω
R639	5181376000	82 Ω $\frac{1}{4}W$ Metal Film
R640	5183048000	39 Ω
R641, R642	5181376000	82 Ω $\frac{1}{4}W$ Metal Film
R643	5183154000	1M Ω
R644	5183134000	150k Ω
R645	5183090000	2.2k Ω
R646	5183098000	4.7k Ω
R647	5183105000	9.1k Ω
R648	5181383000	27k Ω $\frac{1}{4}W$ Metal Film
R649	5181378000	3k Ω $\frac{1}{4}W$ Metal Film
R650	5183114000	22k Ω
R651	5183066000	220 Ω
R652	5183094000	3.3k Ω
R653	5183072000	390 Ω
R654	5183102000	6.8k Ω
R655	5181381000	10k Ω $\frac{1}{4}W$ Metal Film
R656	5183140000	270k Ω
R657	5183162000	2.2M Ω
R658	5183082000	1k Ω
R659	5181382000	20k Ω $\frac{1}{4}W$ Metal Film

REF. NO.	PARTS NO.	DESCRIPTION
R660	5183026000	47 Ω
R661	5183166000	3.3M Ω
R662	5181379000	3.9k Ω $\frac{1}{4}W$ Metal Film
R663, R664	5181380000	4.7k Ω $\frac{1}{4}W$ Metal Film
R665	5183104000	8.2k Ω
R666	5181395000	680k Ω $\frac{1}{4}W$ Metal Film
R667	5183148000	560k Ω
R668	5183134000	150k Ω
R669	5181377000	510 Ω $\frac{1}{4}W$ Metal Film
R670	5183128000	82k Ω
R671	5183146000	470k Ω
R672	5183082000	1k Ω
R673	5183138000	220k Ω
R674	5183104000	8.2k Ω
R675, R676	5183072000	390 Ω
R677, R678	5183090000	2.2k Ω
	CAPACITORS	
C621	5055909000	Elec. 4.7 μF 25V
C622	5170021000	Metalized 0.68 μF 250V
C623	5054745000	Dip. Mica 330pF 50V 10%
C624	5054928500	Mylar 0.1 μF 100V 5%
C625	5054726500	Mylar 0.003 μF 100V 5%
C636	5054745000	Dip. Mica 220pF 50V 10%
C637	5172917000	Elec. 33 μF 25V
C638	5054678000	Dip. Tant. 22 μF 16V 10%
C639	5172894000	Elec. 4.7 μF 25V
	VARIABLE RESISTORS	
V621	5280122101	Semi-fixed 47k Ω (B)
V622	5280121701	Semi-fixed 10k Ω (B)
V623	5280122101	Semi-fixed 47k Ω (B)
V624	5280152101	Semi-fixed 47k Ω (B)

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

MIC AMPL. PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200045500	PCB Assy
	5167935000	PCB
TRANSISTORS		
Q511, Q512	5042461000	2SC-1327T
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R511, R512	5183082000	1k Ω
R513, R514	5183140000	270k Ω
R515, R516	5183126000	68k Ω
R517, R518	5183122000	47k Ω
R519, R520	5183060000	120 Ω
R521, R522	5183108000	12k Ω
R525	5183084000	1.2k Ω
CAPACITORS		
C511, C512	5170077000	Elec. 10 μF 16V
C513, C514	5172300000	Ceramic 10 μF 50V 10%
C515, C516	5055403000	Elec. 47 μF 6.3V
C517, C518	5055405000	Elec. 10 μF 16V
C519	5055417000	Elec. 100 μF 25V
MISCELLANEOUS		
	5124045000	Jack, MIC

VR PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200035900	PCB Assy
	5210035900	PCB
CARBON RESISTORS		
R525~R528	5183058000	100 Ω $\frac{1}{4}W$ 5%
VARIABLE RESISTORS		
R529, R530	5282706002	Semi-fixed 50k Ω (A)
R537~R540	5282706002	Semi-fixed 50k Ω (A)

LINE AMPL. PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200035600	PCB Assy
	5210035600	PCB
TRANSISTORS		
Q541, Q542	5145151000	2SC-1815GR
Q543, Q544	5145095000	2SA-826LNS
Q551, Q552	5145151000	2SC-1815GR
Q553, Q554	5145095000	2SA-826LNS
Q557, Q558	5145095000	2SA-826LNS
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R541, R542	5183082000	1k Ω
R543, R544	5183152000	820k Ω
R545, R546	5183130000	100k Ω
R547, R548	5183100000	5.6k Ω
R549, R550	5183080000	820 Ω
R551, R552	5183130000	100k Ω
R553, R554	5183100000	5.6k Ω
R555	5184265000	4.7k Ω Nonflammable
R563, R564	5183152000	820k Ω
R565, R566	5183130000	100k Ω
R567, R568	5183100000	5.6k Ω
R569, R570	5183080000	820 Ω
R571, R572	5183130000	100k Ω
R573, R574	5183100000	5.6k Ω
R575, R576	5183074000	470 Ω
R577, R578	5183130000	100k Ω
R579, R580	5183138000	220k Ω
R581, R582	5183136000	180k Ω
R583, R584	5183106000	10k Ω
R585, R586	5183088000	1.8k Ω
R587, R588	5183084000	1.2k Ω
R589, R590	5183082000	1k Ω
R591	5184243000	56 Ω Nonflammable
R592	5184233000	22 Ω Nonflammable
R593~R596	5183106000	10k Ω
R597, R598	5183082000	1k Ω
CAPACITORS		
C541, C542	5172882000	Elec. 1 μF 50V
C543, C544	5172315000	Ceramic 180pF 50V 10%
C545, C546	5172900000	Elec. 10 μF 16V
C547	5172935000	Elec. 100 μF 25V
C551, C552	5172882000	Elec. 1 μF 50V
C553, C554	5172315000	Ceramic 180 μF 50V 10%
C555, C556	5172900000	Elec. 10 μF 16V
C557, C558	5172882000	Elec. 1 μF 50V
C559, C560	5172315000	Ceramic 180pF 50V
C561, C562	5260221910	Elec. 10 μF 16V
C563, C564	5170409000	Mylar 0.0022 μF 100V 5%
C565	5172935000	Elec. 100 μF 25V
C567	5172971000	Elec. 1000 μF 25V
MISCELLANEOUS		
L501, L502	5160107000	Choke Coil 1200 μF 5%

[U]: U.S.A. [C]: CANADA
[A]: AUSTRALIA [E]: EUROPE
[L]: LIMITED AREA

[GE]: GENERAL EXPORT
[UK]: U.K.

CONNECTOR PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168931100	PCB Assy
	5167931000	PCB
DIODE		
D601	5143118000	1S2473HJ
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R601	5183122000	47k Ω
R602, R603	5183090000	2.2k Ω
R604	5183086000	1.5k Ω
R605~R607	5183088000	1.8k Ω
MISCELLANEOUS		
P602	5122158000	Connector Plug, 15P
J601	5122336000	Connector Plug, 12P
	5554099100	Bracket, Connector

SPEED SW PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168927200	PCB Assy
	5167927100	PCB
TRANSISTOR		
Q621	5042383000	2SC-536F
CARBON RESISTORS		
R621	5057058000	100 Ω $\frac{1}{4}W$ 5%
R622	5057122000	47k Ω $\frac{1}{4}W$ 5%
R623	5057114000	22k Ω $\frac{1}{4}W$ 5%
R626	5057058000	100 Ω $\frac{1}{4}W$ 5%
CAPACITORS		
C621, C622	5055404000	Elec. 10 μF 25V
MISCELLANEOUS		
P621	5122149000	Connector Plug, 6P
	5134093000	Push Switch
	5134092000	Push Switch

TIMER PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168926100	PCB Assy
	5167926000	PCB
DIODE		
D641	5143243000	ERB12-02
MISCELLANEOUS		
P641	5122145000	Connector Plug, 2P (WHT)
P642	5122454000	Connector Plug, 3P (RED)
S32	5134090000	Push Switch

STOP SENSOR PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168940000	PCB Assy
	5167940000	PCB
IC		
U701	5147039000	NJN-2901N
DIODE		
D701	5143118000	1S2473HJ
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance and $\frac{1}{4}W$.		
R701	5183122000	47k Ω
R702	5183074000	470 Ω
R703	5183122000	47k Ω
R704	5183094000	3.3k Ω
R705	5183130000	100k Ω
R706	5183110000	15k Ω
R707	5183122000	47k Ω
R708	5183130000	100k Ω
R709	5183104000	8.2k Ω
R710	5183070000	330 Ω
R711	5183110000	15k Ω
R712	5183122000	47k Ω
R713	5183130000	100k Ω
R714	5183106000	10k Ω
R715	5183132000	120k Ω
CAPACITORS		
C701, C702	5055405000	Elec. 10 μF 16V
C703	5055454800	Elec. 1 μF 50V
C704	5054966000	Elec. 1 μF 25V
MISCELLANEOUS		
E701	5143105000	Magnetic Resistance Element, DM-101
J36	5122166000	Connector Socket 4P

MOTHER PCB ASSY E

REF. NO.	PARTS NO.	DESCRIPTION
	5200036200	PCB Assy
	5210036100	PCB
CARBON RESISTORS		
R601, P602	5183122000	47k Ω $\frac{1}{4}W$ 5%
MISCELLANEOUS		
J601, J602	5334011700	Connector Socket, 14P
J603	5122460000	Connector Plug, 9P (RED)

[U]: U.S.A.
[A]: AUSTRALIA
[L]: LIMITED AREA

[C]: CANADA
[E]: EUROPE

[GE]: GENERAL EXPORT
[UK]: U.K.

MOTHER PCB ASSY D

REF. NO.	PARTS NO.	DESCRIPTION
	5200036100	PCB Assy
	5210036100	PCB
CARBON RESISTORS		
R601, R602	5183122000	47k Ω 1/4W 5%
MISCELLANEOUS		
J601, J602	5334011700	Connector Socket, 14P
J603	5122152000	Connector Plug, 9P (WHT)

OPERATION PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5168929000	PCB Assy
	5167929000	PCB
D801~D803	5143139000	LED SLB-260GG (GREEN)
D804, D805	5143140000	LED SLB-26UR (RED)

SWITCH PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5168928000	PCB Assy
	5167928000	PCB
S34	5133013000	Rotary Switch

PITCH CONT PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5168938000	PCB Assy
	5167988000	PCB
VARIABLE RESISTORS		
S36	5150239000	5k Ω (B)

DBX SWITCH PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5200035700	PCB Assy
	5210035700	PCB
S501	5134093000	Push Switch

LED PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5200035800	PCB Assy
	5210035800	PCB
D501, D502	5225000700	LED TLG124A (GREEN)

FUSE PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5168997000	FUSE PCB Assy [U, C]
	5167997000	PCB
F1, F2	△ 5307004700	Fuse 7A 127V
F3	△ 5307004100	Fuse 2A 250V
	5041237000	Fuse Holder
	5158105000	Fuse PCB Assy [E, UK, A]
	5157105000	PCB Assy
	△ 5142193000	Mini Fuse 5A 250V
	△ 5142189000	Mini Fuse 2A 250V
	5142087000	Fuse Holder

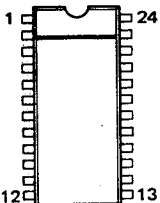
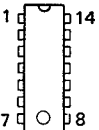
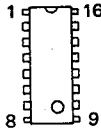
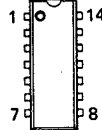
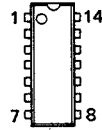
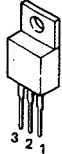
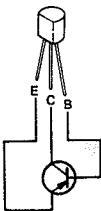
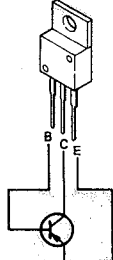
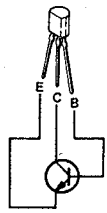
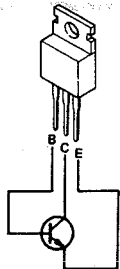
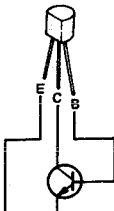
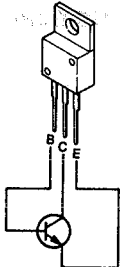
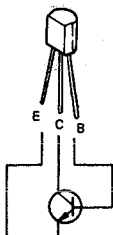
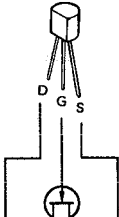
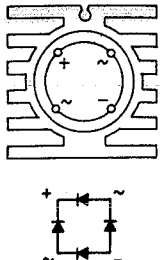
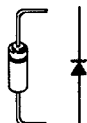
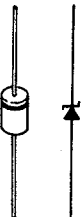
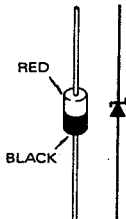
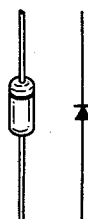
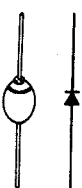
IN/OUTPUT TERMINAL PCB ASSY (PC Board Omitted.)

REF. NO.	PARTS NO.	DESCRIPTION
	5200036000	PCB Assy
	5167987101	PCB
	5124058000	Jack, 4P
CARBON RESISTORS		
R535, R536	5183120000	39k Ω 1/4W 5%

[U]: U.S.A. [C]: CANADA
 [A]: AUSTRALIA [E]: EUROPE
 [L]: LIMITED AREA

[GE]: GENERAL EXPORT
 [UK]: U.K.

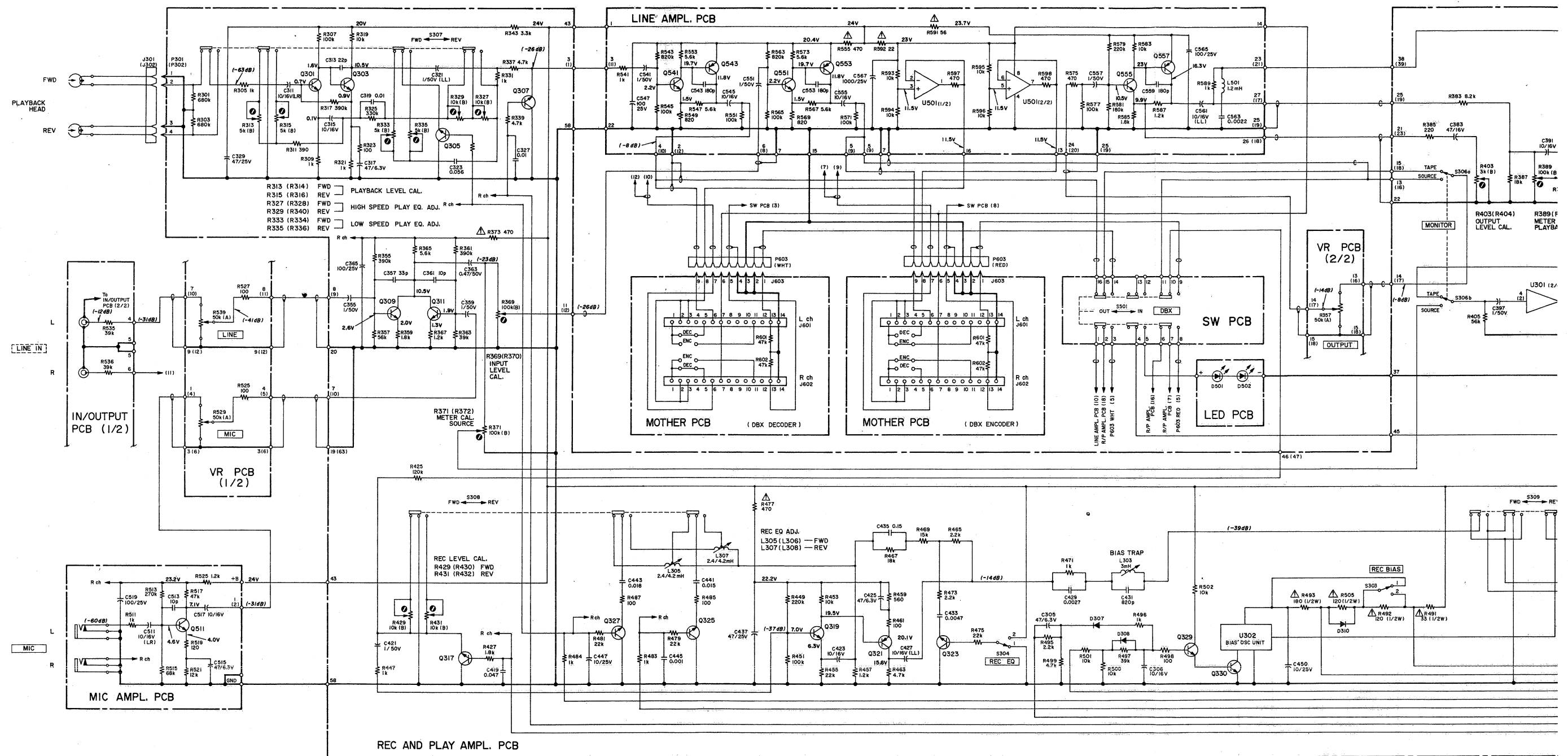
SEMICONDUCTOR ELECTRODES

AN6251 (TOP VIEW) 	BA651 BA652 (TOP VIEW) 	HA11122W (TOP VIEW) 	HD7400P HD7402P (TOP VIEW) 	NJM2901N NSM2901N (TOP VIEW) 	NJM203D NJM4558D (TOP VIEW) 
NJM78M05A  1: OUT 2: GND 3: IN	2SA733(P) 2SA750(E) 2SA564(A) 2SA826LN(S) 	2SB507(E) 	2SC536(F) 	2SC1061(C) 2SD235(Q) 	
2SC945L(K) 2SC1222(E) 2SC1318(S) 2SC1327(T) 2SC1740LN(S) 2SC1815(GR) 2SD655(E) 	2SD313(E) 	2SD400E 	2SK30A(O) 	M4C-51 (BOTTOM VIEW) 	
1S2473 1S2473HJ 1S2473VE 	EQA01-06S 	ERB12-02G1 	1N60 	U05C 	

TEAC SCHEMATIC DIAGRAM (AMPLIFIER) X-20R

1 2 3 4 5 6 7 8

A
B
C
D
E



MIC AMPL. PCB
Q511 (Q512) 2SC1327(T)

REC AND PLAY AMPL. PCB

U301	HA11122W	Q309 (Q310)	2SC1815 (GR)	Q321 (Q322)	2SA826LN (S)	D301 (D302)	IN60
Q301 (Q302)	2SC1327(T)	Q311 (Q312)	2SC1815 (GR)	Q323 (Q324)	2SC945L (K)	D303 (D304)	IN60
Q303 (Q304)	2SC945L (K)	Q313	2SD400 (E)	Q325 (Q326)	2SC945L (K)	Q305, D306	IS2473
Q305 (Q306)	2SC945L (K)	Q315	2SC945L (K)	Q327 (Q328)	2SC945L (K)	D307, D308	IS2473
Q307 (Q308)	2SC945L (K)	Q317 (Q318)	2SD655 (E)	Q329	2SC945L (K)	D310	IS2473
		Q319 (Q320)	2SC1740LN (S)	Q330	2SD655 (E)		

LED PCB

D501, D502 TLG 124A

LINE AMPL. PCB

U501	NUM4558D
Q541 (Q542)	2SC1815 (GR)
Q543 (Q544)	2SA826LN (S)
Q551 (Q552)	2SC1815 (GR)
Q553 (Q554)	2SA826LN (S)
Q555 (Q556)	2SC1815 (GR)
Q557 (Q558)	2SA826LN (S)

NO
1
2
3
4
5
6
7
8



A

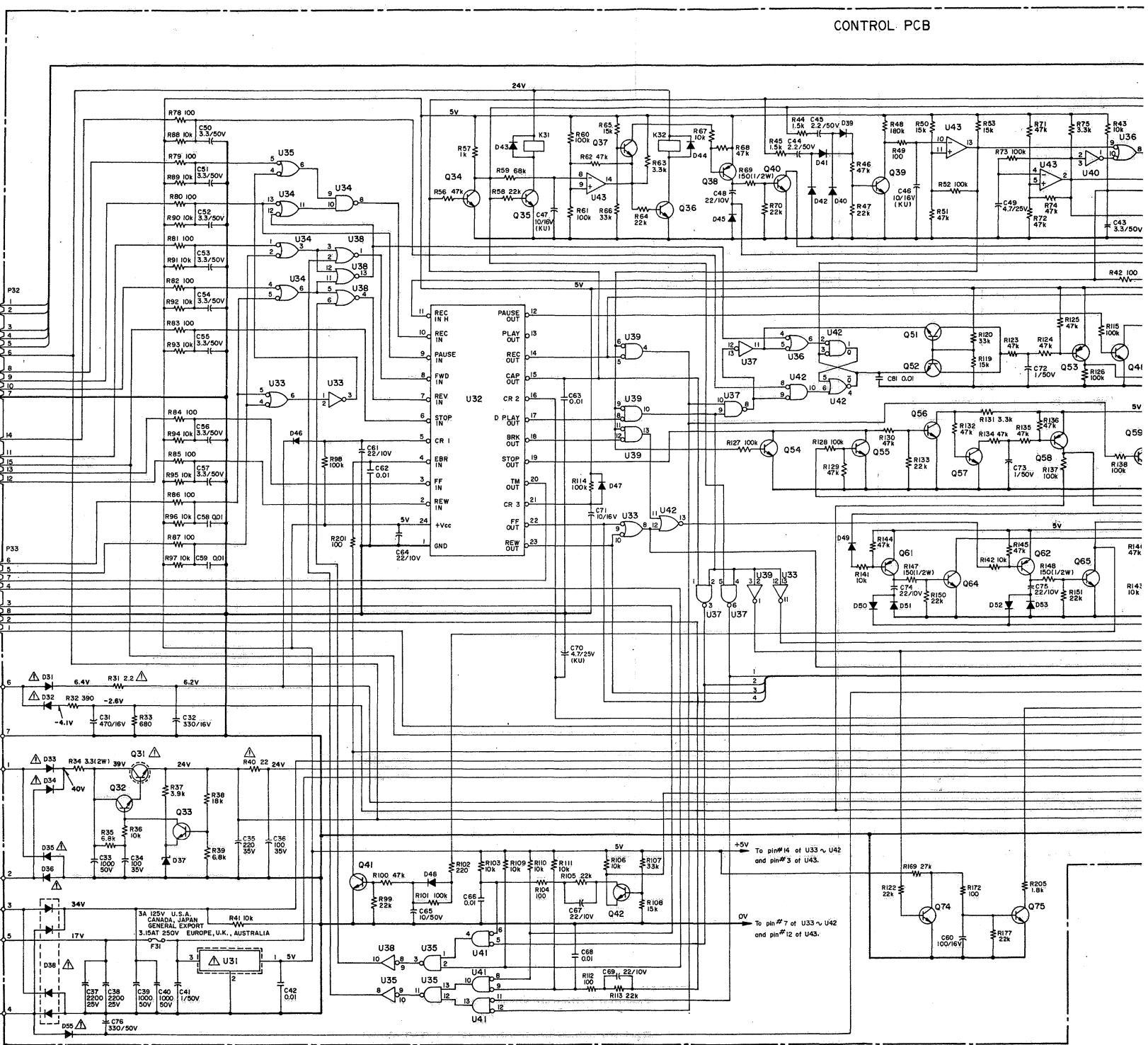
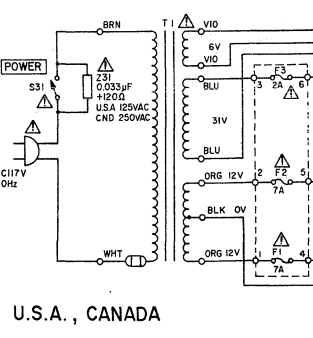
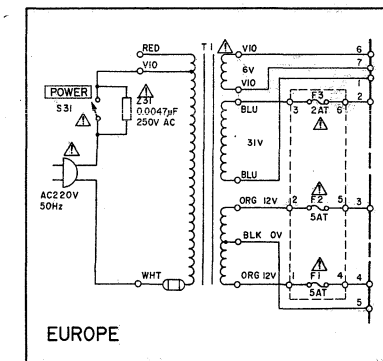
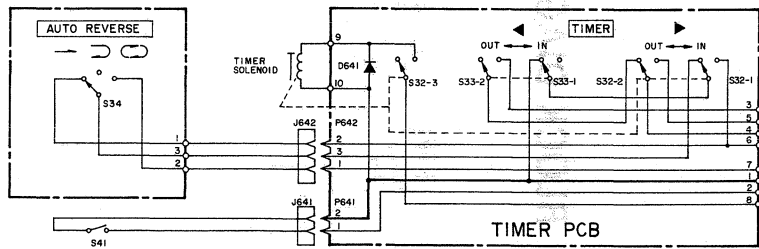
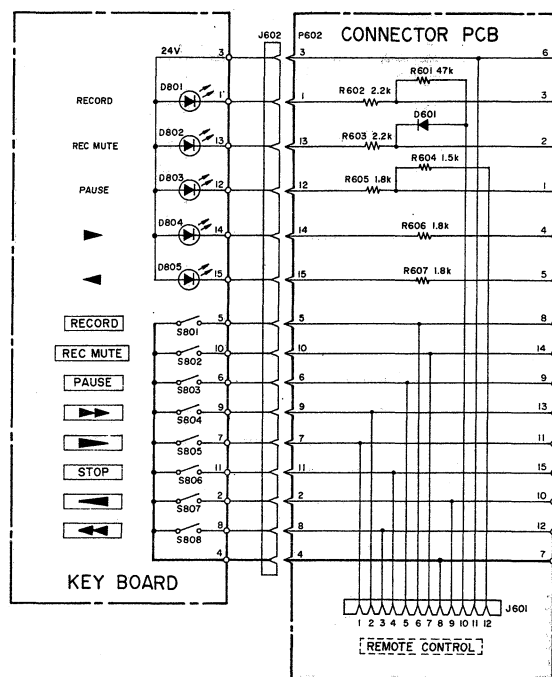
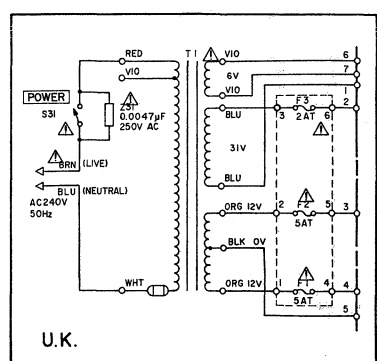
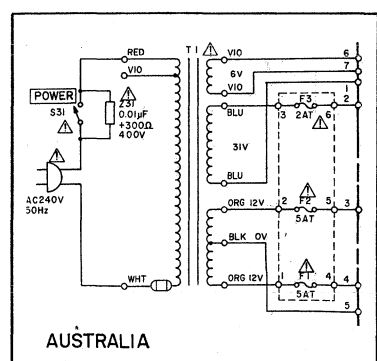
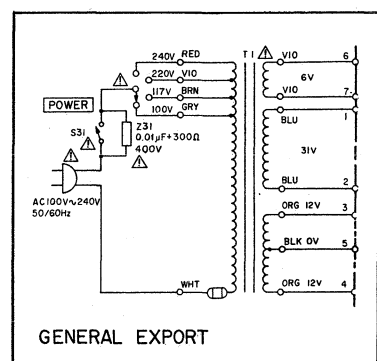
B

C

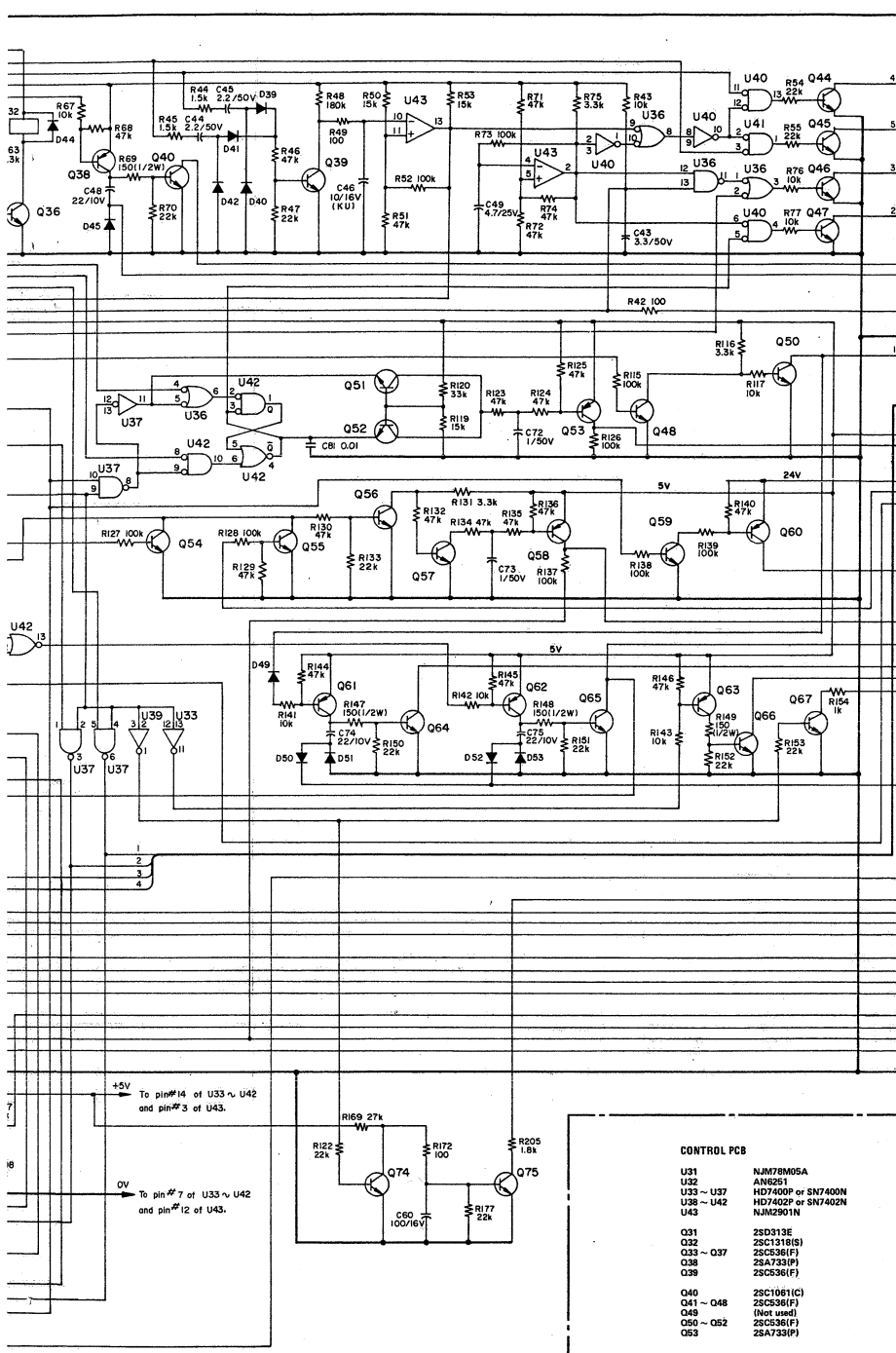
D

E

1 2 3 4 5 6 7 8



CONTROL PCB



CONTROL PCB

U31 NJM78M05A
U32 AN6251
U33 HD7400P or SN7400N
U38 HD7402P or SN7402N
U43 NJM2901N

Q31 2SD313E
Q32 2SC1318(S)
Q33 2SC36(F)
Q38 2SA733(P)
Q39 2SC536(F)

Q40 2SC1061(C)
Q41 2SC36(F)
Q48 (Not used)
Q50 2SC536(F)
Q52 2SA733(P)

Q54 ~ Q57 2SC536(F)
Q58 2SA733(P)
Q59 2SC536(F)
Q60 ~ Q63 2SA733(P)
Q64 ~ Q66 2SC1061(C)

Q67 ~ Q71 2SC536(F)
Q72 2SC313E(S)
Q73 2SC1318(S)
Q74 2SC536(F)
Q76 2SC536(F)
Q77 2SA733(P)

Q78, Q79 2SD313E(S)
Q80, Q81 2SC1318(S)
Q82 ~ Q84 2SA733(P)
Q85, Q86 2SC536(F)
Q87, Q88 2SC1318(S)

D31 ~ D36 ERB12-02G1
D37 EQA01-06S
D38 MAC-81
D39 ~ D42 1S2473HJ
D43, D44 ERB12-02G1

D45 ~ D53 1S2473HJ
D54 U8C
D55 ~ D57 ERB12-02G1
D58, D59 1S2473HJ
D60 ERB12-02G1

D61 U8C
D62 ~ D67 ERB12-02G1

CAPSTAN MOTOR SERVO PCB

IC1 NJM2030
Q1 2SC828A(R) or 2SC945(P)
Q2 2SA564A(R) or 2SA733(P)
Q3 2SC1318(S)
Q4 2SD235(O)
Q5 1S2473VE

STOP SENSOR PCB

U701 NSM2901N
D701 1S2473HJ

CONNECTOR PCB

D601 1S2473HJ

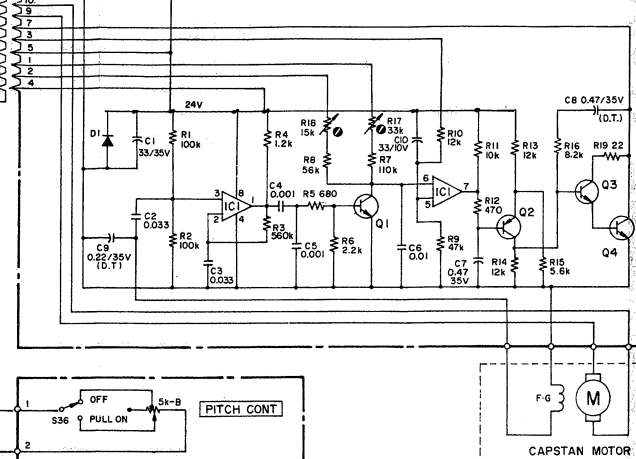
SPEED SW PCB

Q621 2SC536(F)

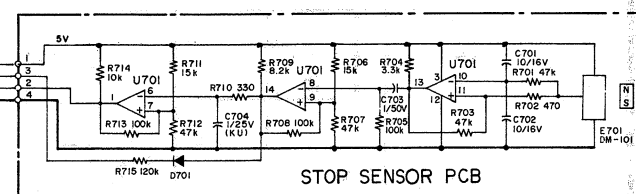
TIMER PCB

D641 ERB12-02G1

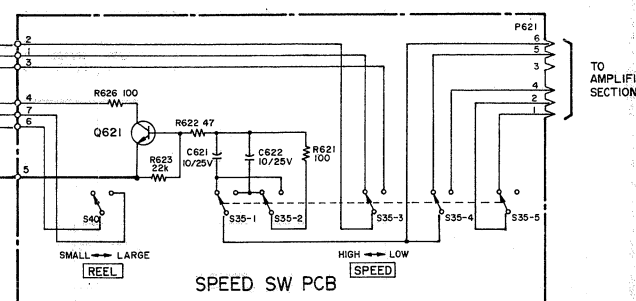
CAPSTAN MOTOR SERVO PCB



STOP SENSOR PCB



SPEED SW PCB



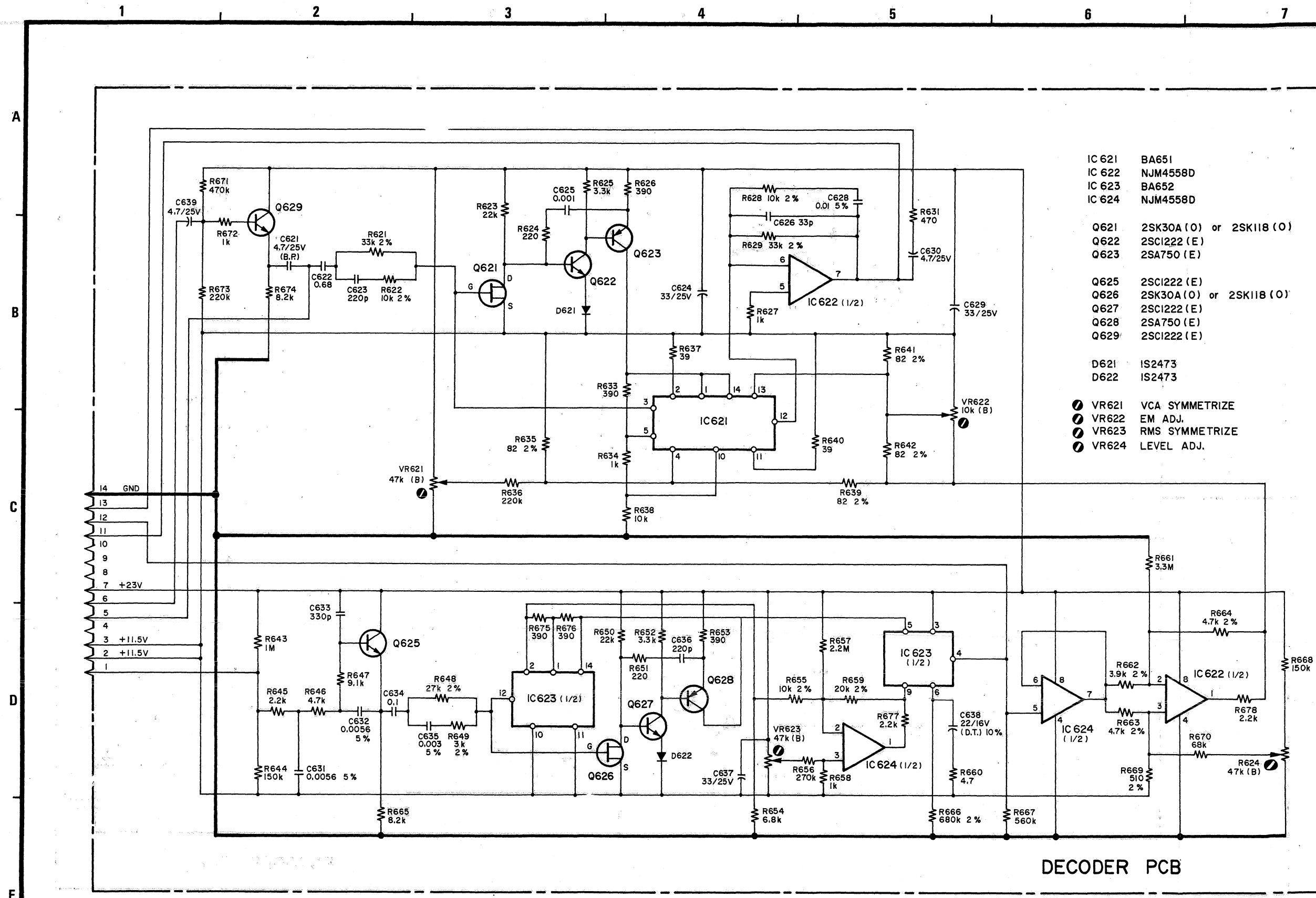
NOTES

1. All resistors are 1/4 watt, $\pm 5\%$, unless marked otherwise. Resistor values are in ohms ($k = 1,000$ ohms).
2. All capacitor values are in microfarads ($p = \text{picofarads}$).
3. Δ Parts marked with this sign are safety critical components. They must always be replaced with identical components—refer to the TEAC parts list and ensure exact replacement.
4. Each Voltage value shown above is the one measured in REC/PAUSE position and each mode.
5. : front panel indication
6. : rear panel indication
7. : +B power supply circuit

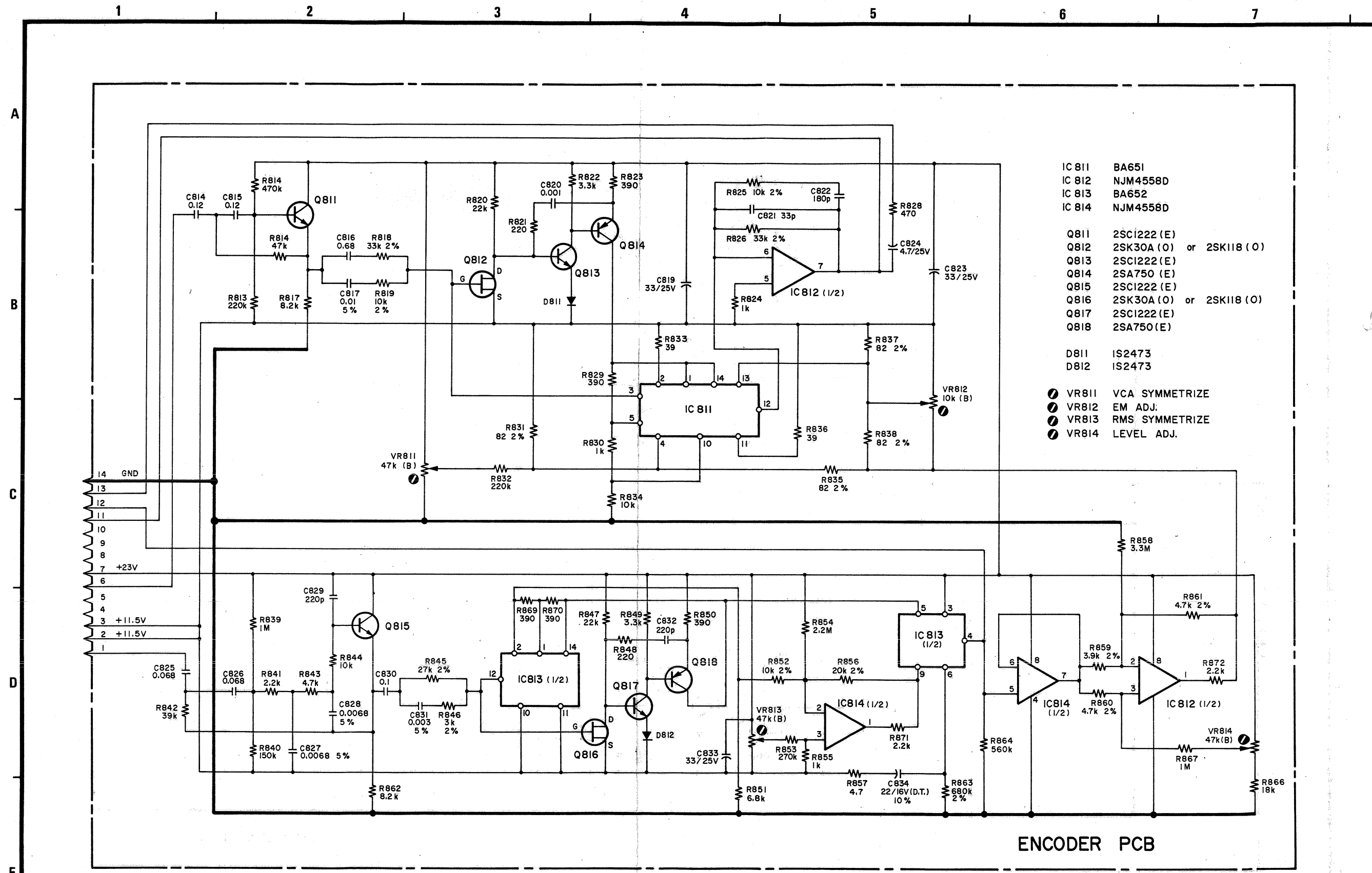
X-20R

Stereo Tape Deck

TEAC SCHEMATIC DIAGRAM (DECODER) X-20R



X-20R
Stereo Tape Deck



- | | |
|--------|--------------------------|
| IC 811 | BA651 |
| IC 812 | NJM4558D |
| IC 813 | BA652 |
| IC 814 | NJM4558D |
| Q811 | 2SC1222 (E) |
| Q812 | 2SK30A (O) or 2SK118 (O) |
| Q813 | 2SC1222 (E) |
| Q814 | 2SA750 (E) |
| Q815 | 2SC1222 (E) |
| Q816 | 2SK30A (O) or 2SK118 (O) |
| Q817 | 2SC1222 (E) |
| Q818 | 2SA750 (E) |
| D811 | 1S2473 |
| D812 | 1S2473 |
| VR811 | VCA SYMMETRIZE |
| VR812 | EM ADJ. |
| VR813 | RMS SYMMETRIZE |
| VR814 | LEVEL ADJ. |