

ROTEL *hifi*

STEREO INTEGRATED AMPLIFIER

RA-960BX

TECHNICAL MANUAL

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THE ROTEL CO., LTD.

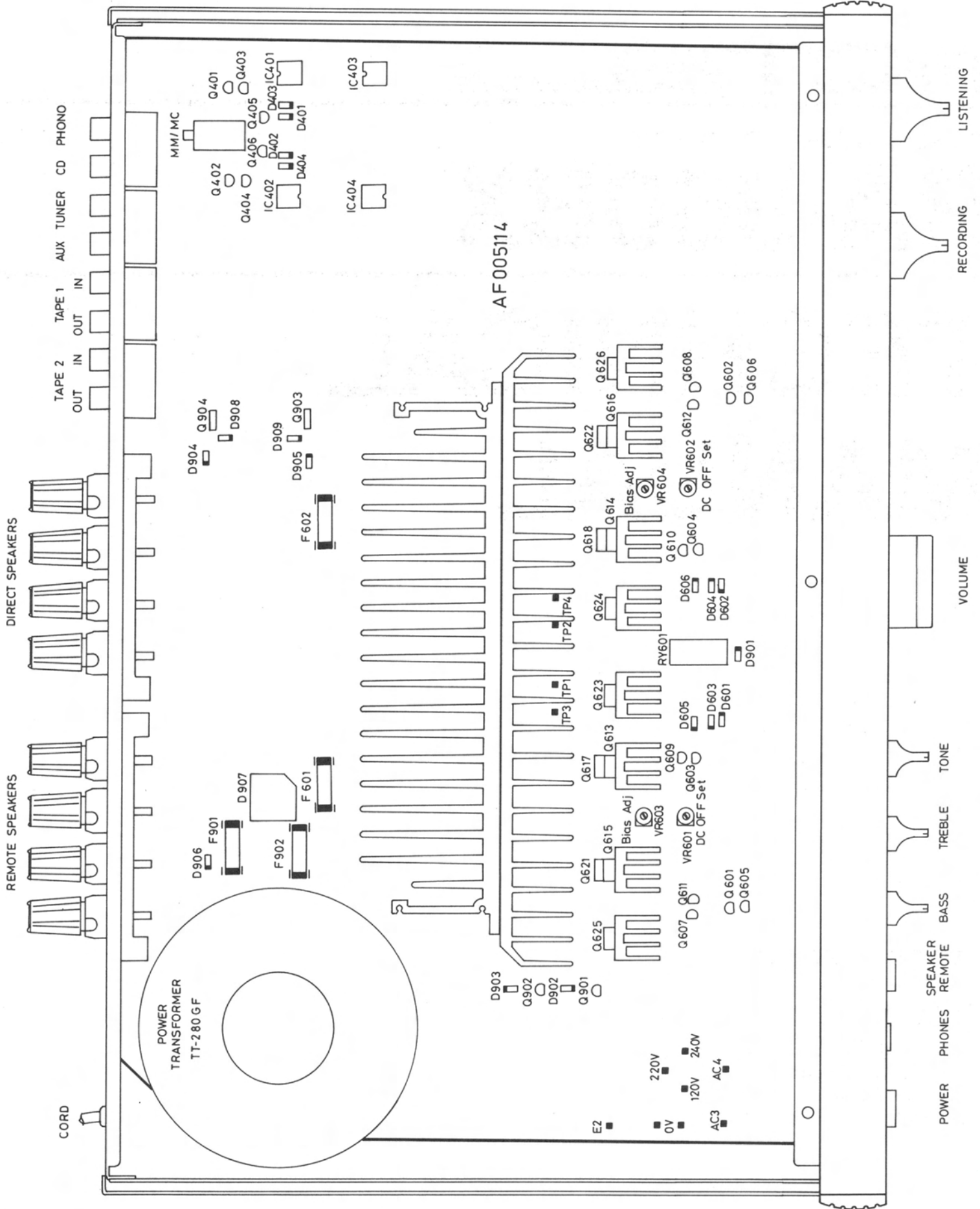
1-36-8, OHOKAYAMA, MEGURO-KU, TOKYO 152, JAPAN

ROTEL ELECTRONICS CO., LTD.

3F-2, NO.35, FU HSING NORTH ROAD, TAIPEI, TAIWAN, REPUBLIC OF CHINA

MN20001895

Chassis Layout



Specifications

RA-960BX

Continuous Power Output...60 watts* per channel, min.
 RMS both channels driven into
 8 ohms from 20 to 20,000 Hz
 with no more than 0.3 % total
 harmonic distortion.

DIN Output.....90 watts per channel (1 kHz, 4
 ohms, 1% THD)

Music Power.....210 watts

Total Harmonic Distortion...No more than 0.3% (contin-
 uous rated power output) No
 more than 0.1% (continuous 1/2
 rated power output) No more
 than 0.2% (1 watt per channel
 power output, 8 ohms)

Intermodulation Distortion...No more than 0.3% (contin-
 uous rated power output) No
 more than 0.1% (continuous 1/2
 rated power output) No more
 than 0.2% (1 watt per channel
 power output, 8 ohms)

Output: Speaker.....4 ohms minimum
 Headphone.....8 - 2,000 ohms

Damping Factor.....150 (20 to 20,000 Hz, 8 ohms)

Input Sensitivity/ Impedance:
 PHONO: MC.....250 uV/ 100 ohms
 MM.....2.5 mV/ 47 kohms
 CD, TUNER.....160 mV/ 8 kohms
 AUX, TAPE 1,2.....160 mV/ 8 kohms

Overload Level (THD 0.5% 1 kHz):
 PHONO: MC.....17 mV
 MM.....170 mV
 CD, TUNER.....5 V
 AUX, TAPE 1,2.....5 V

Frequency Response:
 PHONO.....20 to 20,000 Hz, +/- 0.3 dB
 (RIAA STD)
 CD.TUNER.....10 to 100 kHz, +1.0 dB,-3.0 dB
 AUX, TAPE 1,2.....10 to 100 kHz, +1.0 dB, -3.0 dB

Tone Control:
 BASS..... +/- 6.0 dB (100 Hz)
 TREBLE..... +/- 6.0 dB (10 kHz)

Signal to Noise Ratio (IHF, A network):
 PHONO: MC.....70 dB
 MM.....75 dB
 CD, TUNER.....95 dB
 AUX, TAPE 1,2.....95 dB

MISCELLANEOUS

Power Requirement.....120 V/ 60 Hz, 220 V/ 50 Hz,
 240 V/ 50 Hz (depending on
 destinations)

Power Consumption.....300 watts

Dimension (overall).....440 (W) x 92 (H) x 347 (D)mm
 17-3/8" x 3-5/8" x 13-11/16"

Weight (net).....6.2 kg/ 13.6 lbs

- Specifications and design subject to possible modifica-
 tion without notice.
- *Measured pursuant to the Federal Trade Commis-
 sion's Trade Regulation Rule or, Power Claims for
 Amplifiers (applicable to the U.S.A. only).

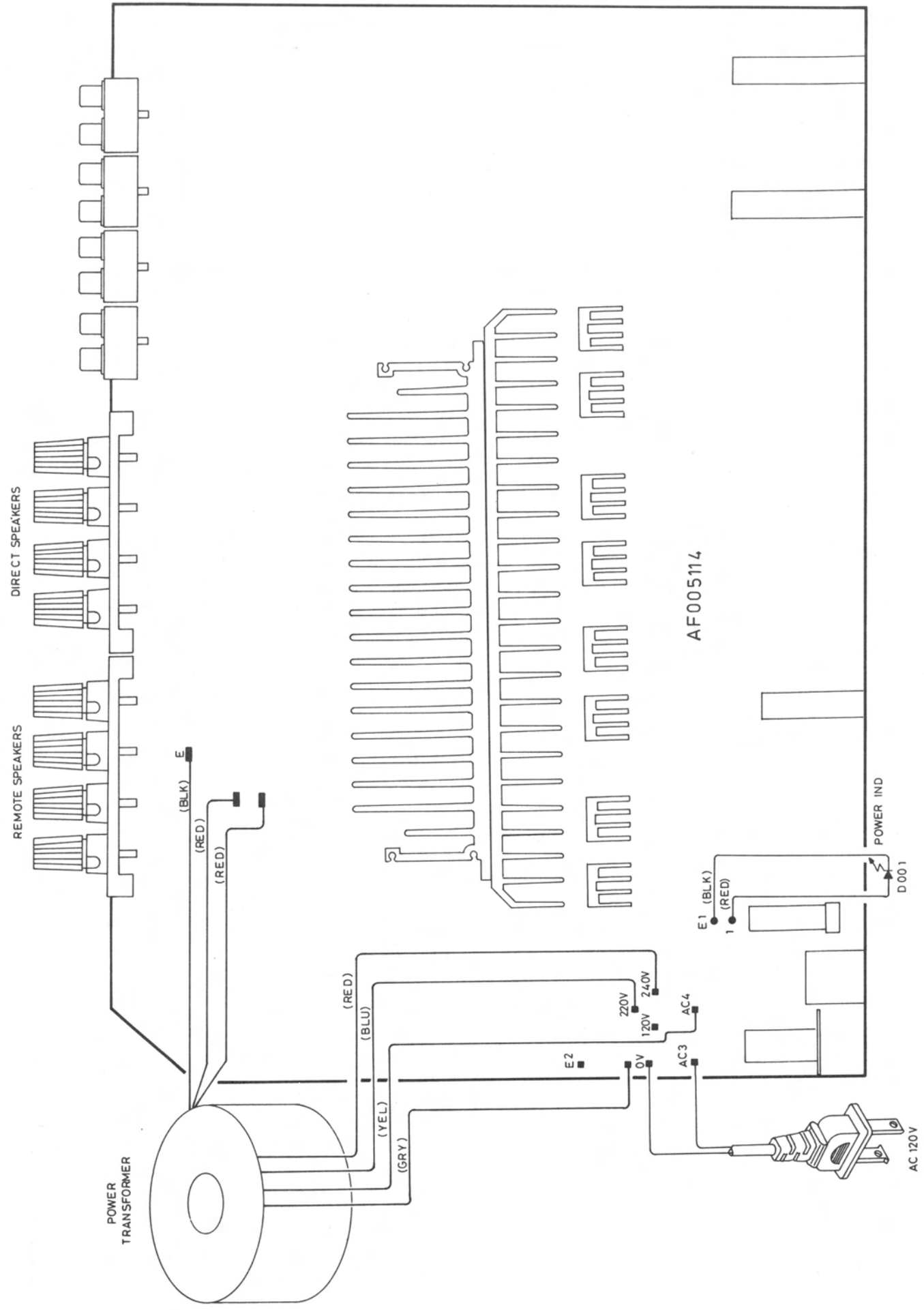
Power Amplifier Bias Adjustment

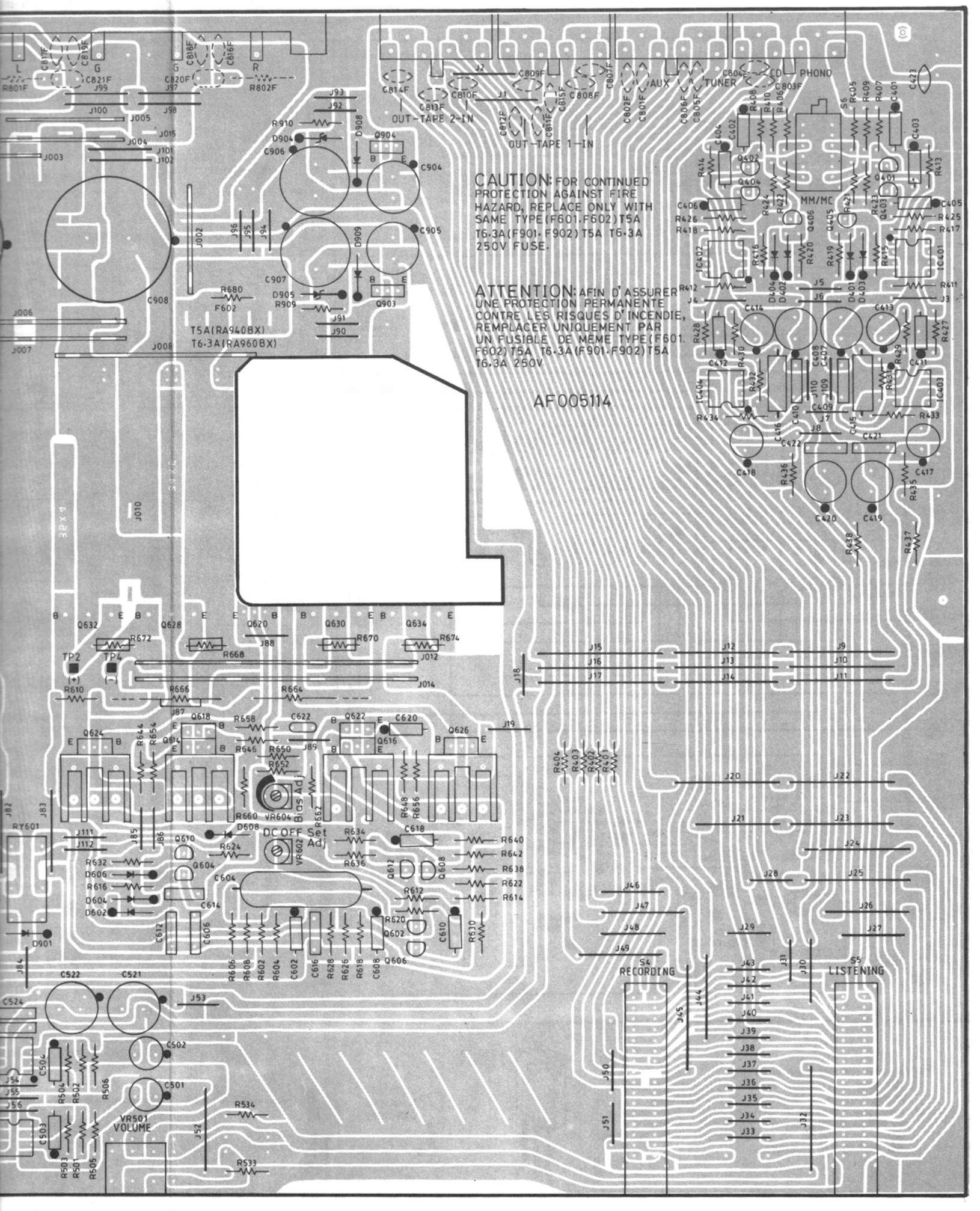
Instruments: DC milli-voltmeter

Notes: Prior to Bias Adjustment, run about 5 minutes with rated output
 (8 ohm) and warm up Power Transistor and Heat Sink.
 Set Volume control to minimum.

Step	Coupling		Adjust	Adjust for
	Plus Lead	Minus Lead		
1	TP1	TP3	VR603	DC milli-voltmeter reads 12 mV
2	TP2	TP4	VR604	
3	(L) SPKR +	(L) SPKR -	VR601	DC milli-voltmeter reads 0 mV
4	(R) SPKR +	(R) SPKR -	VR602	

Wiring Diagram





CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE (F601, F602) T5A T6-3A (F901, F902) T5A T6-3A 250V FUSE.

ATTENTION: AFIN D'ASSURER UNE PROTECTION PERMANENTE CONTRE LES RISQUES D'INCENDIE, REMPLACER UNIQUEMENT PAR UN FUSIBLE DE MEME TYPE (F601, F602) T5A T6-3A (F901, F902) T5A T6-3A 250V.

AF005114

T5A (RA940BX)
T6-3A (RA960BX)

RECORDING

LISTENING

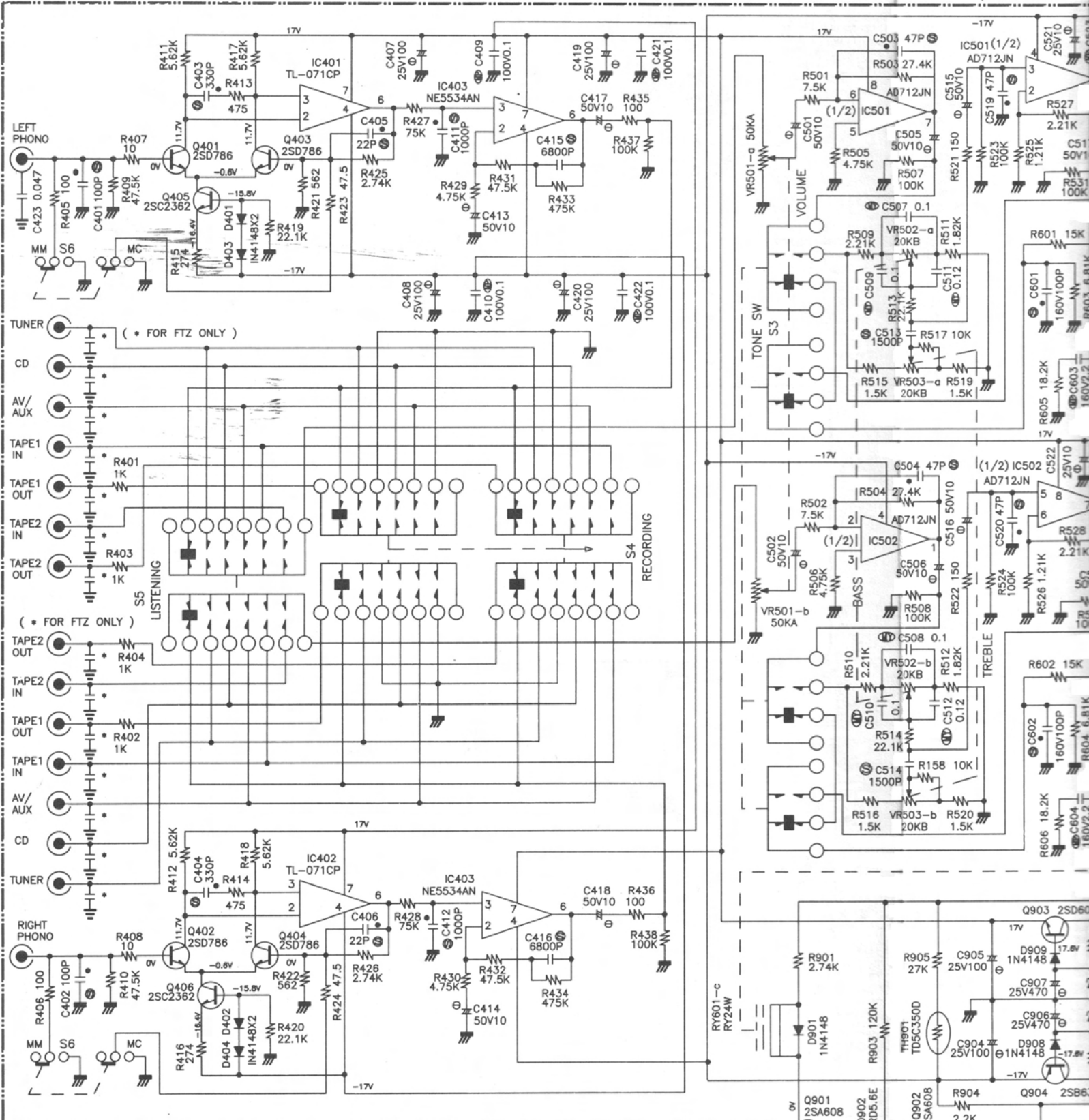
VR501 VOLUME

(C)

Schematic Diagram

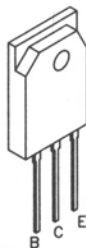
SCHEMATIC DIAGRAM RA-960BX

(NOTE: PARTS AND



INSTRUCTION FOR SERVICING PERSONNEL:

- 1). USE ONLY REPLACEMENT PARTS THAT HAVE THE CRITICAL CHARACTERISTICS RECOMMENDED BY MANUFACTURER.
- 2). MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE AC SUPPLY CIRCUIT BEFORE RETURNING THE UNIT TO THE CUSTOMER.



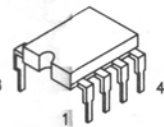
- 2SD1047
- 2SB817



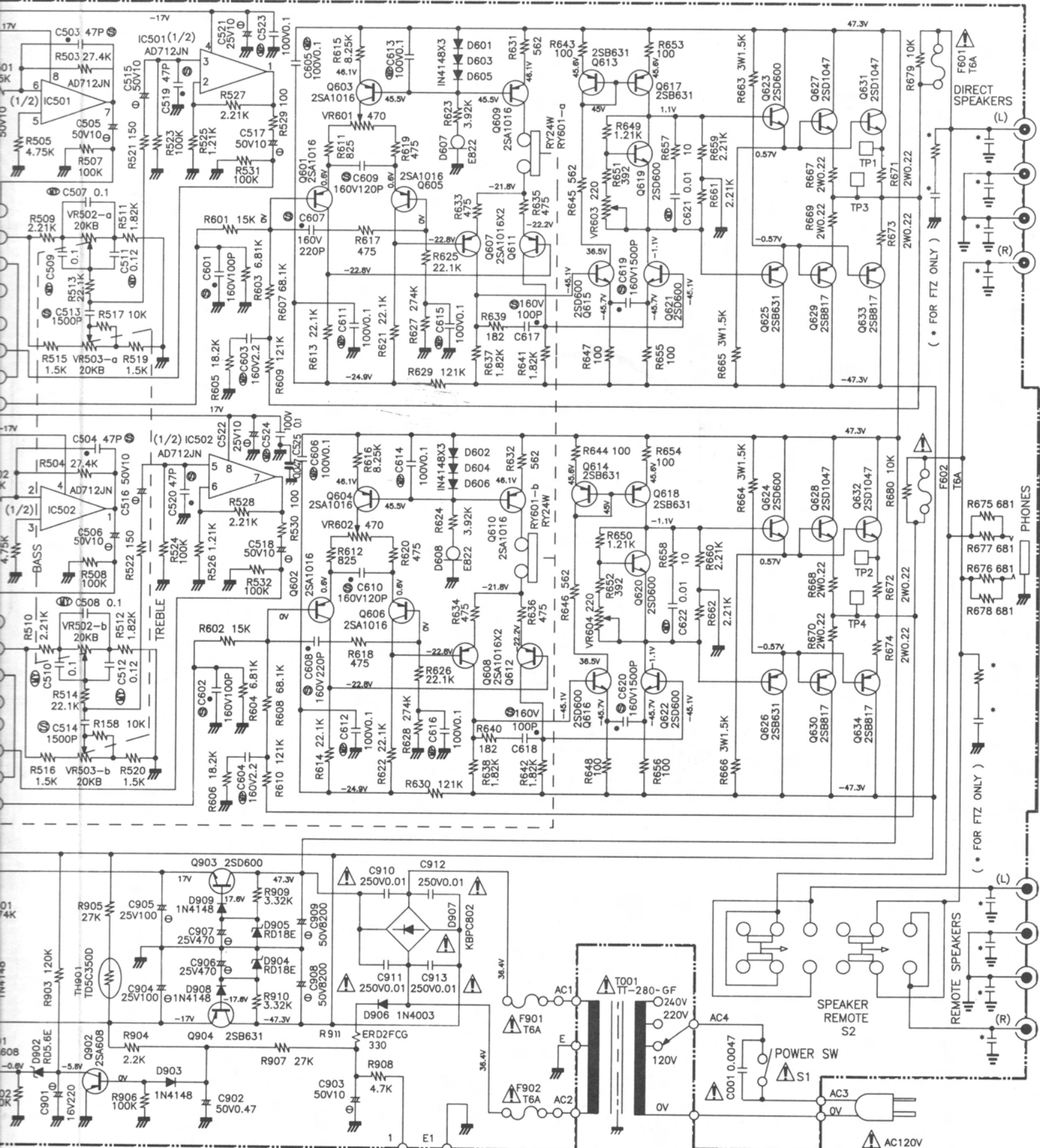
- 2SD786
- 2SA1016
- 2SC2362



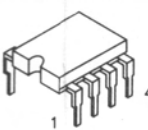
- 2SD600
- 2SB631



- NE5532AN
- AD712JN
- TL-071CP



- NE5532AN
- AD712JN
- TL-071CP



D001
SEL1124R

AC120V

(* FOR FTZ ONLY)

(* FOR FTZ ONLY)

(* FOR FTZ ONLY)

(* FOR FTZ ONLY)

Parts List

NOTE: THE COMPONENTS IDENTIFIED BY Δ MARK ARE FOR SAFETY. REPLACE ONLY WITH ORIGINAL PARTS. DO NOT SUBSTITUTE.

SYMBOL	PARTS NO.	DESCRIPTION
AF1005114 R-1 PCB ASSEMBLY		
R401, 402	RM81001612	R, STANDARD METAL MK2001KFECZ.
R403, 404	RM81001612	R, STANDARD METAL MK2001KFECZ.
R405, 406	RM81000619	R, STANDARD METAL MK2100RFECZ.
R407, 408	RM81009611	R, STANDARD METAL MK2010RFECZ.
R409, 410	RM84752616	R, STANDARD METAL MK247K5FECZ.
R411, 412	RM85621610	R, STANDARD METAL MK25K62FECZ.
R413, 414	RM84750619	R, STANDARD METAL MK2475RFECZ.
R415, 416	RM82740611	R, STANDARD METAL MK2274RFECZ.
R417, 418	RM85621610	R, STANDARD METAL MK25K62FECZ.
R419, 420	RM82212618	R, STANDARD METAL MK222K1FECZ.
R421, 422	RM85620616	R, STANDARD METAL MK2562RFECZ.
R423, 424	RM84759611	R, STANDARD METAL MK247R5FECZ.
R425, 426	RM82741615	R, STANDARD METAL MK22K74FECZ.
R427, 428	RM87502611	R, STANDARD METAL MK2075KFECZ.
R429, 430	RM84751612	R, STANDARD METAL MK24K75FECZ.
R431, 432	RM84753610	R, STANDARD METAL MK2475KFECZ.
R433, 434	RM84752616	R, STANDARD METAL MK247K5FECZ.
R435, 436	RM81000619	R, STANDARD METAL MK2100RFECZ.
R437, 438	RM81003610	R, STANDARD METAL MK2100KFECZ.
C401, 402	CS31011310	CAP, POLYSTYRENE 160V 100PF
C403, 404	CS33311310	CAP, POLYSTYRENE 160V 330PF
C405, 406	CS32212300	CAP, POLYSTYRENE 160V 22PF
C407, 408	CE51005679	CAP, ELEC. 25BGF100M
C409, 410	CP61008321	CAP, M.P 100V 104K
C411, 412	CS31010317	CAP, POLYSTYRENE 160V 1000PF
C413, 414	CE51006477	CAP, ELEC. 50BGF10M
C415, 416	CS36810300	CAP, POLYSTYRENE 160V 6800PF
C417, 418	CE51006477	CAP, ELEC. 50BGF10M
C419, 420	CE51005679	CAP, ELEC. 25BGF100M
C421, 422	CP61008321	CAP, M.P 100V 104K
C423	CC05009457	CAP, CERAMIC 50V 0.047uF
D401-404	DD80000021	DIODE IN4148
IC401, 402	IC00002430	IC TL071CP
IC403, 404	IC00001735	IC NE5534AN
Q401-404	TR40000069	TRANSISTOR 2SD786 (R, S)
Q405, 406	TR40000100	TRANSISTOR 2SC2362 (F, G)
R501, 502	RM87501618	R, STANDARD METAL MK207K5FECZ.
R503, 504	RM82742619	R, STANDARD METAL MK227K4FECZ.
R505, 506	RM84751612	R, STANDARD METAL MK24K75FECZ.
R507, 508	RM81003610	R, STANDARD METAL MK2100KFECZ.
R509, 510	RM82211614	R, STANDARD METAL MK22K21FECZ.
R511, 512	RM81821615	R, STANDARD METAL MK21K82FECZ.
R513, 514	RM82212618	R, STANDARD METAL MK222K1FECZ.
R515, 516	RM81501610	R, STANDARD METAL MK201K5FECZ.
R517, 518	RM81002616	R, STANDARD METAL MK2010KFECZ.
R519, 520	RM81501610	R, STANDARD METAL MK201K5FECZ.
R521, 522	RM81500616	R, STANDARD METAL MK2150RFECZ.
R523, 524	RM81003610	R, STANDARD METAL MK2100KFECZ.
R525, 526	RM81211618	R, STANDARD METAL MK21K21FECZ.
R527, 528	RM82211614	R, STANDARD METAL MK2100RFECZ.
R529, 530	RM81000619	R, STANDARD METAL MK2100RFECZ.
R531, 532	RM81003610	R, STANDARD METAL MK2100KFECZ.
C501, 502	CE51006477	CAP, ELEC. 50BGF10M
C503, 504	CS34712311	CAP, POLYSTYRENE 160V 47PF
C505, 506	CE51006477	CAP, ELEC. 50BGF10M
C507, 508	CM01008423	CAP, MYLAR 104 J 50V
C509, 510	CM01008423	CAP, MYLAR 104 J 50V
C511, 512	CM01208424	CAP, MYLAR 124 J 50V
C513, 514	CS41510414	CAP, STYROL 50V 1500PF
C515, 516	CE51006477	CAP, ELEC. 50BGF10M
C517, 518	CE51006477	CAP, ELEC. 50BGF10M
C519, 520	CS34712311	CAP, POLYSTYRENE 160V 47PF
C521, 522	CE72205645	CAP, ELEC. 25V 220uF (HFS)
C523, 524	CP61008321	CAP, MP. 100V 104K
C525	CC64709439	CAP, CERAMIC 50V 473K
IC501, 502	IC00002454	IC AD712JN
VR501	RV10001577	R, VARIABLE 50KAx2 C-4170A17

SYMBOL	PARTS NO.	DESCRIPTION
VR502, 503	RV10001541	R, VARIABLE 20KBx2 4TR-2774
R601, 602	RM81502613	R, STANDARD METAL MK2015KFECZ.
R603, 604	RM86811612	R, STANDARD METAL MK26K81FECZ.
R605, 606	RM81822619	R, STANDARD METAL MK218K2FECZ.
R607, 608	RM86812616	R, STANDARD METAL MK268K1FECZ.
R609, 610	RM81213615	R, STANDARD METAL MK2121KFECZ.
R611, 612	RM88250617	R, STANDARD METAL MK2825RFECZ.
R613, 614	RM82212618	R, STANDARD METAL MK222K1FECZ.
R615, 616	RM88251610	R, STANDARD METAL MK28K25FECZ.
R617, 618	RM84750619	R, STANDARD METAL MK2475RFECZ.
R619, 620	RM84750619	R, STANDARD METAL MK2475RFECZ.
R621, 622	RM82212618	R, STANDARD METAL MK222K1FECZ.
R623, 624	RM83921613	R, STANDARD METAL MK23K92FECZ.
R625, 626	RM82212618	R, STANDARD METAL MK222K1FECZ.
R627, 628	RM82743612	R, STANDARD METAL MK2274KFECZ.
R629, 630	RM81213615	R, STANDARD METAL MK2121KFECZ.
R631, 632	RM85620616	R, STANDARD METAL MK2562RFECZ.
R633, 634	RM84750619	R, STANDARD METAL MK2475RFECZ.
R635, 636	RM84750619	R, STANDARD METAL MK2475RFECZ.
R637, 638	RM81821615	R, STANDARD METAL MK21K82FECZ.
R639, 640	RM81820611	R, STANDARD METAL MK2182RFECZ.
R641, 642	RM81821615	R, STANDARD METAL MK21K82FECZ.
R643, 644	RM81000619	R, STANDARD METAL MK2100RFECZ.
R645, 646	RM85620616	R, STANDARD METAL MK2562RFECZ.
R647, 648	RM81000619	R, STANDARD METAL MK2100RFECZ.
R649, 650	RM81211618	R, STANDARD METAL MK21K21FECZ.
R651, 652	RM83920610	R, STANDARD METAL MK2392RFECZ.
R653, 654	RM81000619	R, STANDARD METAL MK2100RFECZ.
R655, 656	RM81000619	R, STANDARD METAL MK2100RFECZ.
R657, 658	RM81009611	R, STANDARD METAL MK2010RFECZ.
R659, 660	RM82211614	R, STANDARD METAL MK22K21FECZ.
R661, 662	RM82211614	R, STANDARD METAL MK22K21FECZ.
R663, 664	RM61501329	R, METAL 3W 1.5K
R665, 666	RM61001321	R, METAL ERD3TJ102
R667, 668	RS20228230	R, SQUARE TYPE MPC 70-0.22F
R669, 670	RS20228230	R, SQUARE TYPE MPC 70-0.22F
R671, 672	RS20228230	R, SQUARE TYPE MPC 70-0.22F
R673, 674	RS20228230	R, SQUARE TYPE MPC 70-0.22F
R675, 676	RM86810619	R, STANDARD METAL MK2681RFECZ.
R677, 678	RM86810619	R, STANDARD METAL MK2681RFECZ.
R679, 680	RM81002616	R, STANDARD METAL MK2010KFECZ.
C601, 602	CS31011310	CAP, POLYSTYRENE 160V 100PF
C603, 604	CP92207339	CAP, FILM PW 2U2K 160V
C605, 606	CP61008321	CAP, M.P 100V 104K
C607, 608	CS32211306	CAP, POLYSTYRENE 160V 220PF
C609, 610	CS31211300	CAP, POLYSTYRENE 160V 120PF
C611, 612	CP61008321	CAP, M.P 100V 104K
C613, 614	CP61008321	CAP, M.P 100V 104K
C615, 616	CP61008321	CAP, M.P 100V 104K
C617, 618	CS31011310	CAP, POLYSTYRENE 160V 100PF
C619, 620	CS31510302	CAP, POLYSTYRENE 160V 1500PF
C621, 622	CM01009427	CAP, MYLAR 103 J 50V
D601-606	DD80000021	DIODE IN4148
Q601-612	TR10000310	TRANSISTOR 2SA1016 (G)
Q613, 614	TR10000047	TRANSISTOR 2SB631K (E, F)
Q615, 616	TR40000069	TRANSISTOR 2SD600K (E, F)
Q617, 618	TR10000047	TRANSISTOR 2SB631K (E, F)
Q619-622	TR40000069	TRANSISTOR 2SD600K (E, F)
Q623, 624	TR40000069	TRANSISTOR 2SD600K (E, F)
Q625, 626	TR10000047	TRANSISTOR 2SB631K (E, F)
Q627, 628	TR40000045	TRANSISTOR 2SD1047 (D, E)
Q629, 630	TR20000040	TRANSISTOR 2SB817 (D, E)
Q631, 632	TR40000045	TRANSISTOR 2SD1047 (D, E)
Q633, 634	TR20000040	TRANSISTOR 2SB817 (D, E)
VR601, 602	RV40000058	R, SEMI-FIXED VM6CKPV-1S-B 470 OHM
VR603, 604	RV40000046	R, SEMI-FIXED VM6CKPV-1S-B 220 OHM
F601, 602	FU25000041	FUSE 125V 6A UL/CSA Δ
	FU23000219	FUSE 250V T6.3A S Δ

Parts List

SYMBOL	PARTS NO.	DESCRIPTION
RY601	LY00000277	RELAY RY-24W-KJ \triangle
R901	RM82741615	R, STANDARD METAL MK22K74FECZ.
R902	RD51003820	R, CARBON 100K 1/4W J
R903	RD51203821	R, CARBON 120K 1/4W J
R904	RD51821819	R, STANDARD METAL MK21K82FECZ.
R905	RM82742812	R, STANDARD METAL MK227K4FECZ.
R906	RD51003820	R, CARBON 100K 1/4W J
R907	RD51702821	R, CARBON 27K 1/4W J
R908	RD54701820	R, CARBON 4K7 1/4W J
R909, 910	RM83321610	R, STANDARD METAL, MK23K32FECZ.
R911	RF13309829	R, FUSIBLE TYPE ERD2FCG 330
C901	CE02205255	CAP, ELEC. 25V 220uF
C902	CN04708503	CAP, NP 50V 0.47uF
C903	CE01006500	CAP, ELEC. 50V10uF
C904, 905	CE71005259	CAP, ELEC. 25V100uF (HFS)
C906, 907	CE72205645	CAP, ELEC 25V 4700uF (HFS)
C908, 909	CE58204517	CAP, ELEC. 50V 8200uF \triangle
C910-913	CC01009256	CAP, CERAMIC 250V 0.01uF \triangle
D901	DD80000021	DIODE IN4148
D902	DD20000168	DIODE RD-5.6E
D903	DD80000021	DIODE IN4148
D904, 905	DD20000041	DIODE RD18E
D906	DD80000010	DIODE IN4003
D907	DD10000147	DIODE KBPC802 \triangle
D908, 909	DD80000021	DIODE IN4148
TH901	DD60000260	THERMISTOR TD5C350D \triangle
Q901, 902	TR10000126	TRANSISTOR 2SA608K (F, G)
Q903	TR40000069	TRANSISTOR 2SD600K (E, F)
Q904	TR10000047	TRANSISTOR 2SB631K (E, F)
F901, 902	FU25000041	FUSE 125V 6A UL/CSA \triangle
	FU230000219	FUSE 250V T6.3A S \triangle
C001	CK00000035	SPARK KILLER DE7150F472M \triangle
S1	SH40000120	POWER SW C-3600B-T \triangle
S2	SH10000434	1 KEY PUSH SW 4TR-2899
S3	SH30000500	FUNCTION SW 4TR-2780
S4, S5	SH30000511	FUNCTION SW 4TR-2781
S6	SH11000367	1 KEY PUSH SW 4TR-2783
OTHERS		
	AF20000258	FRONT CHASSIS 2TQF-2
	AR20000541	PRINTED REAR CHASSIS TRP-578
	AS01000270	SIDE CHASSIS 3TQF-4
	KB20002747	PUSH BUTTON PR4-07A00T 5F
	AB00000547	BOTTOM BOARD 1TQF-5
	DD40000095	L.E.D LN224R
	PT28007105	POWER TRANSFORMER TT-280GF \triangle
	SB00000601	P.V.C SHIELD PLATE(A)4TR-2824
	SB00000613	P.V.C SHIELD PLATE(B)4TR-2825
	SP10006363	P.T SUPPORT 3TQF-9
	NP00001949	NAME STICKER AC120V 4TR-2828#1 TNP-382
	NP00001974	NAME STICKER AC120V-C 4TR-2828#4 TNP-385
	NP00001962	NAME STICKER AC240V 4TR-2828#3 TNP-384
	NP00001950	NAME STICKER AC220V 4TR-2828#2 TNP-383
	NP00001998	NAME STICKER AC230V 4TR-2828#5 TNP-389
	NP00002012	NAME STICKER AC100V 4TR-2828#6 TNP-391
	CD00000218	AC CORD SPT-2 AWG#18 4TR-670#4 (C, A, J, U) \triangle
	CD00000292	AC POWER CORD UP-401F 4TR-2631#1 (D) \triangle
	CD00000048	AC POWER CORD 4TR-1037 (H, E, K2) \triangle
	CD00000085	AC POWER CORD C-2504A (K1) \triangle
	CD00000115	AC POWER CORD C-3763-T (G) \triangle
	SC00000131	AC CORD STOPPER SR-5N-4 \triangle

SYMBOL	PARTS NO.	DESCRIPTION
	SC00000039	AC CORD STOPPER SR-6W-1 \triangle
	SC00000027	AC CORD STOPPER SR-4N-4 \triangle
	AH20000801	HEAT SINKER BOARD 3TQF-6#1
	AA20000580	FRONT PANEL 2TQF-#1 TFP-617
	BU00001145	POWER RING 4TQF-13 14x14
	BU00001157	PUSH BUTTON RING 4TQF-14 5x10
	BU00001169	KNOB RING 4TQF-17 39F
	KB20002681	POWER BUTTON 4TQF-15 14x14
	KB20002693	PUSH BUTTON 4TQF-16 5x10
	OM10001272	ORNAMENTAL SIDE BOARD 4TR-2797#2 H=80MM
	OM70000065	PUSH BUTTON CONNECTOR 4TTL-15
	SN00000179	BUTTON SPRING 4TR-1988A#2 10F
	AU00001201	TOP COVER 3TTF-5#7 H=80MM
	KB10001722	KNOB 4TQF-18 13F
	KB10001734	KNOB 4TQF-19 24F
	KB10001746	KNOB 4TQF-20 33F
	KB10001758	KNOB 4TQF-21 33F
	FE00000067	FELT 4TR-1083B#1 22F
	FE00000079	FELT 4TR-1083B#3 46F
	FE00000092	FELT 4TR-1083B#2 30F
	SRO0000882	UPPER COVER SPACER 4TR-2418
	MN10002732	OWNER'S MANUAL
	PL00001051	STYROL SIDE MOULDING 2TR-2800 TZ-183
	TN10003720	INSIDE CARTON 4TR-2834#2