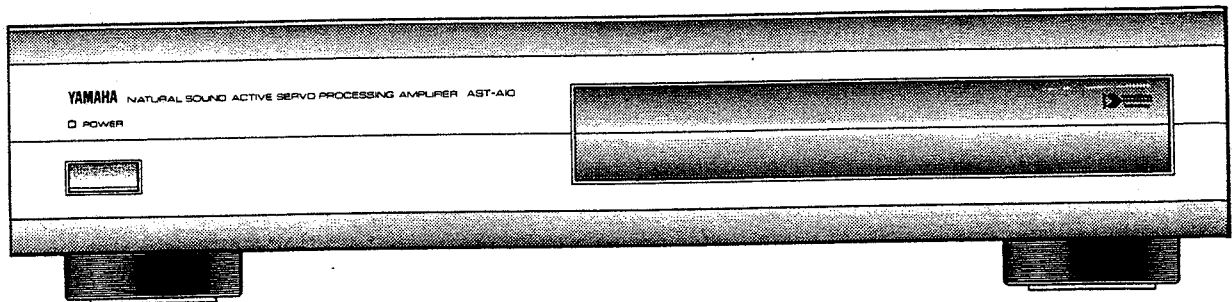


ACTIVE SERVO PROCESSING AMPLIFIER AST-A10

SERVICE MANUAL



IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification or recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and specifications are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).


IMPORTANT: Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

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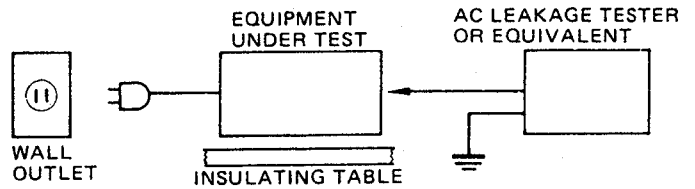
100246

YAMAHA
YAMAHA CORPORATION
P.O. Box 1, Hamamatsu, Japan

3.6K-541  Printed in Japan '89.2

■ TO SERVICE PERSONNEL

- Critical Components Information.**
Components having special characteristics are marked Δ and must be replaced with parts having specifications equal to those originally installed.
- Leakage Current Measurement (For 120V Model Only).**
When service has been completed, it is imperative that you verify that all exposed conductive surfaces are properly insulated from supply circuits.
 - Meter impedance should be equivalent to 1500 ohm shunted by 0.15 μ F.
 - Leakage current must not exceed 0.5mA.
 - Be sure to test for leakage with the AC plug in both polarities.

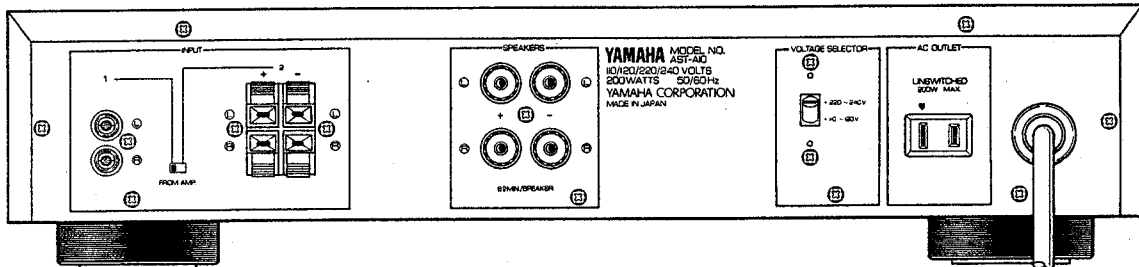


■ POLARIZATION

This amplifier product is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature.

■ REAR PANEL

R model only U, C, R models only



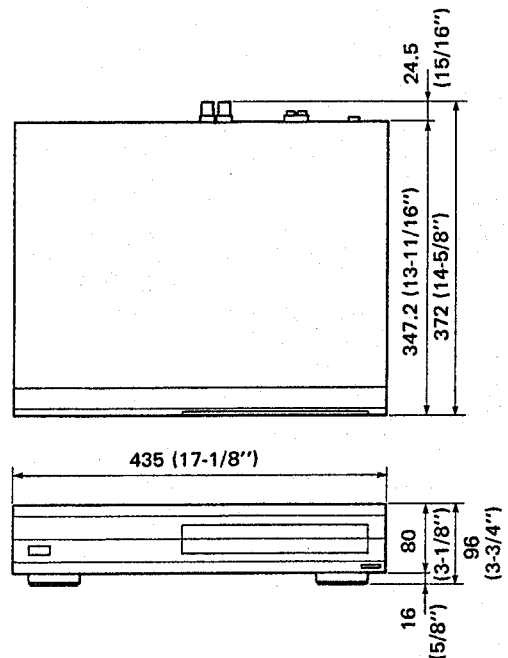
■ SPECIFICATIONS

Minimum RMS Output Power Per Channel 1kHz, 6 Ω	70W
Dynamic Power Per Channel (IHF) 6 Ω	100W
Input Sensitivity/Impedance	
Input 1	700mV/20k Ω
Input 2	10V/4.4k Ω
Power Supply	
U, C models	AC120V, 60Hz
R model	AC110/120/220/240V, 60/50Hz
G model	AC220V, 50Hz
A, B models	AC240V, 50Hz
Power Consumption	
U, C models	196W
R, A, B, G models	200W
AC Outlet (U, C, R model only)	
Un Switched x 1	200W max.
Dimension (W x H x D)	435 x 96 x 372 mm (17-1/8" x 3-3/4" x 14-5/8")
Weight	8.5 kg (18 lbs. 11 oz.)
Accessories	Active Servo Processing Cartridge (AST-K01) x 1

Specifications are subject to change without notice.

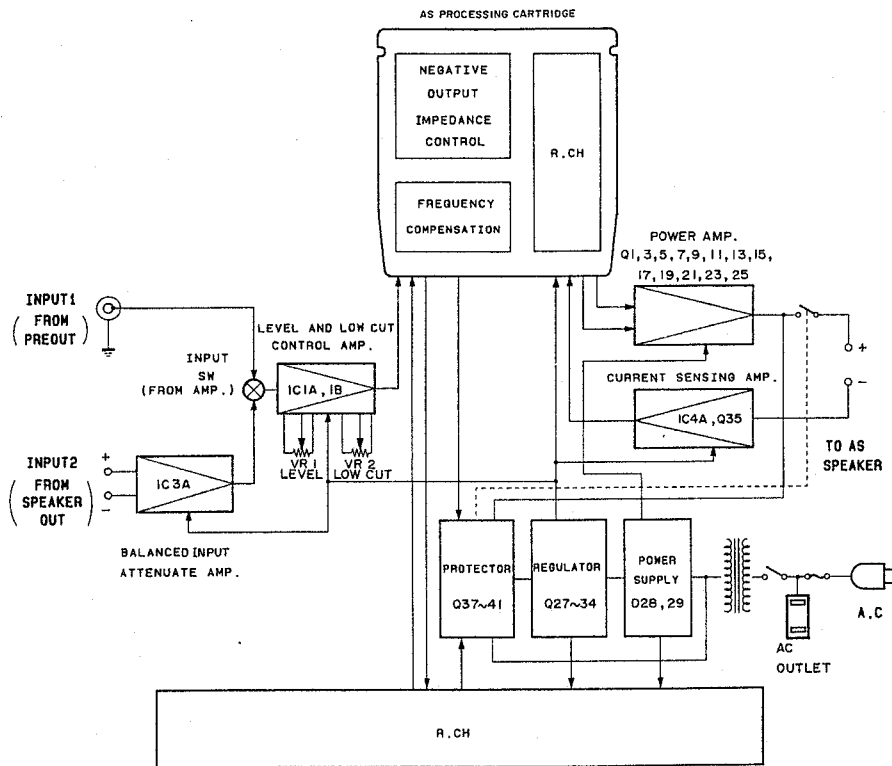
- (U) U.S.A. model
- (C) Canadian model
- (R) General model
- (A) Australian model
- (B) British model
- (G) European model

• Dimensions

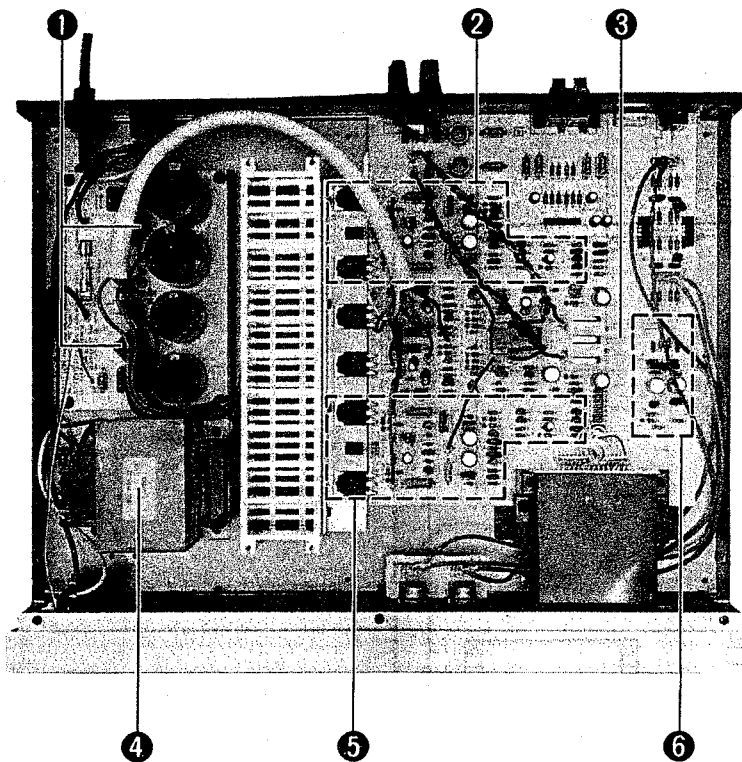


Unit: mm (inch)

BLOCK DIAGRAM



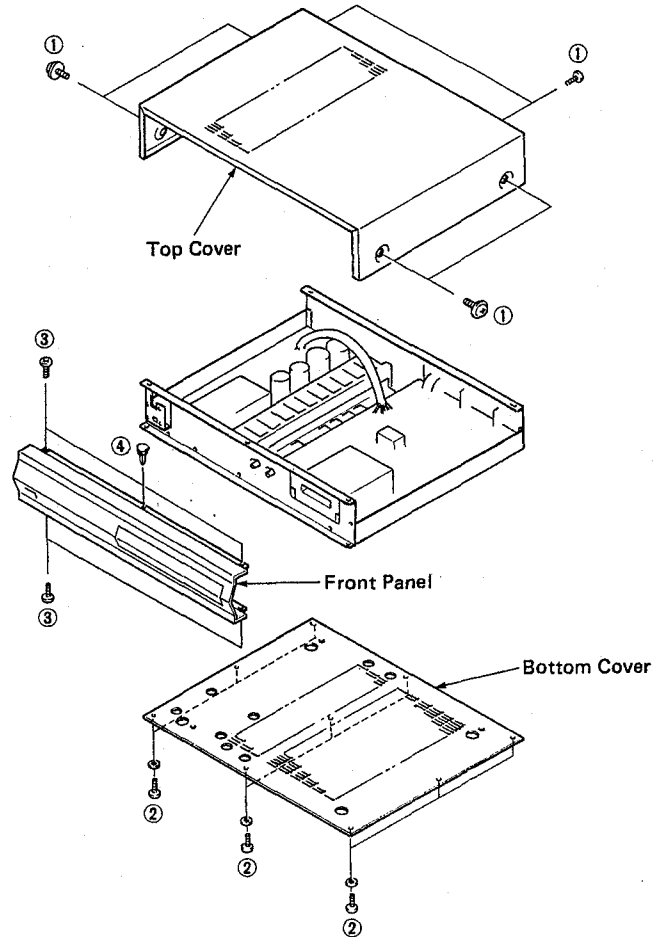
INTERNAL VIEW



- ① D28, 29: 4D4B41
- ② POWER AMP SECTION (Lch)
- ③ MAIN CIRCUIT BOARD (1)
- ④ POWER TRANSFORMER
- ⑤ POWER AMP SECTION (Rch)
- ⑥ CURRENT SENSING AMP SECTION

DISASSEMBLY PROCEDURES

1. **Removal of Top Cover**
Remove 6 screws (①).
2. **Removal of Bottom Cover**
Remove 9 screws (②).
3. **Removal of Front Panel**
Remove 4 screws (③) and plastic rivet (④).

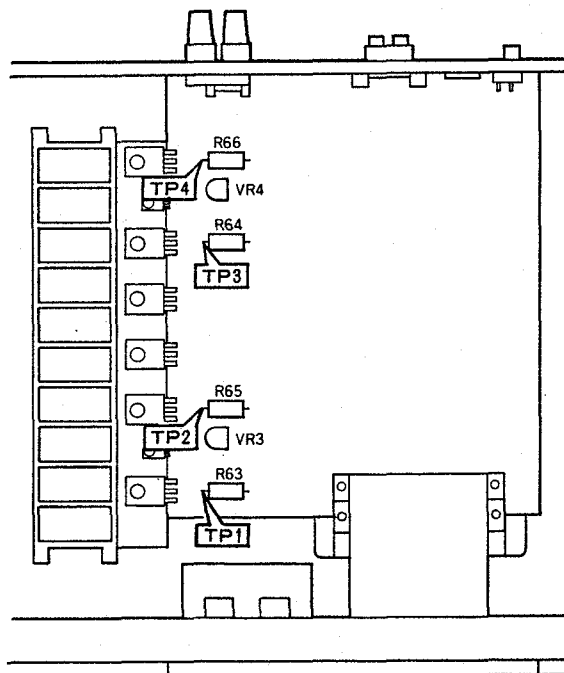


ADJUSTMENTS

- **Idling Current Adjustment**
Wait 1 minute after power ON to stabilize amplifier operation without signal.

Test Points	Adjustment Points	Rating
TP1 ~ TP2 (Lch)	VR3 (Lch)	25mV ±5mV DC.
TP3 ~ TP4 (Rch)	VR4 (Rch)	

- **Test Points**

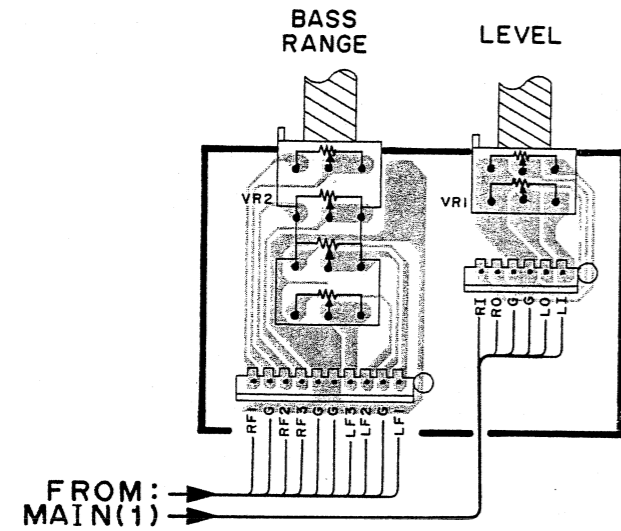


TOP VIEW

PRINTED CIRCUIT BOARD (Pattern side)

Note) 文字面 : Component side

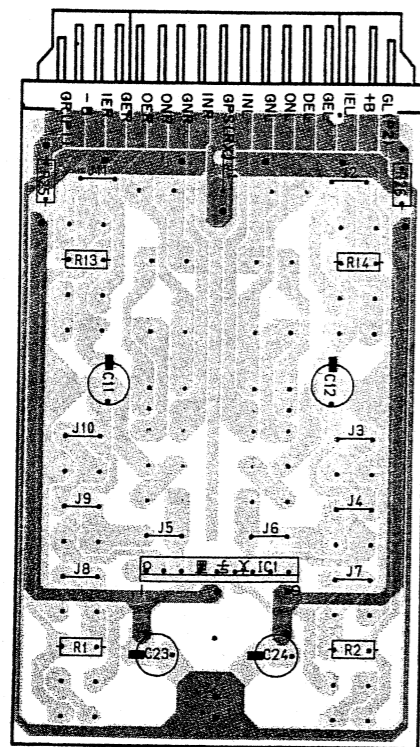
Main Circuit Board (4)



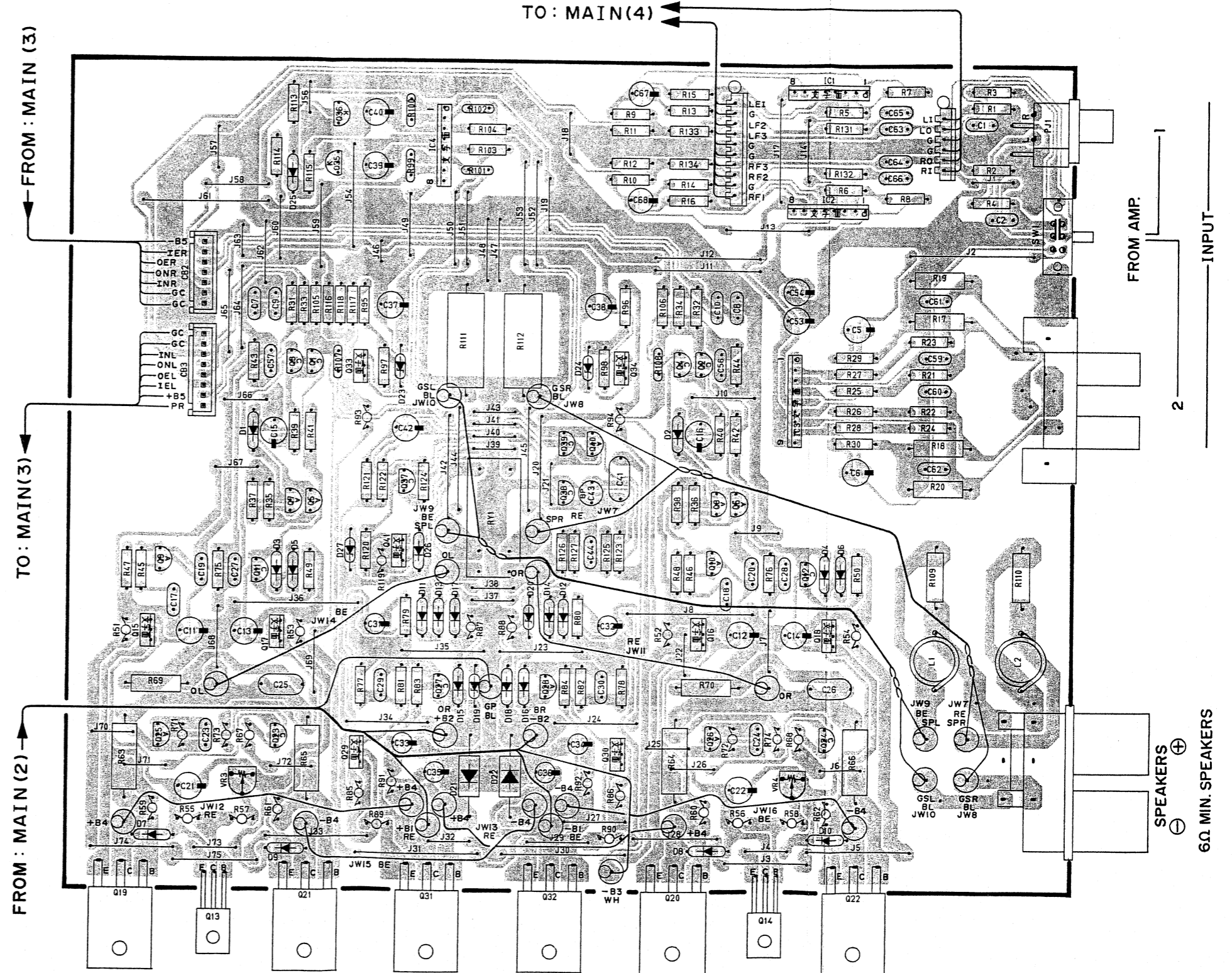
FROM: MAIN(1)

Cartridge Circuit Board

● AST-K01



Main Circuit Board (1)



TO: MAIN(4)

FROM: MAIN(3)

TO: MAIN(3)

FROM: MAIN(2)

FROM AMP.

INPUT

SPEAKERS

6Ω MIN. SPEAKERS

A

B

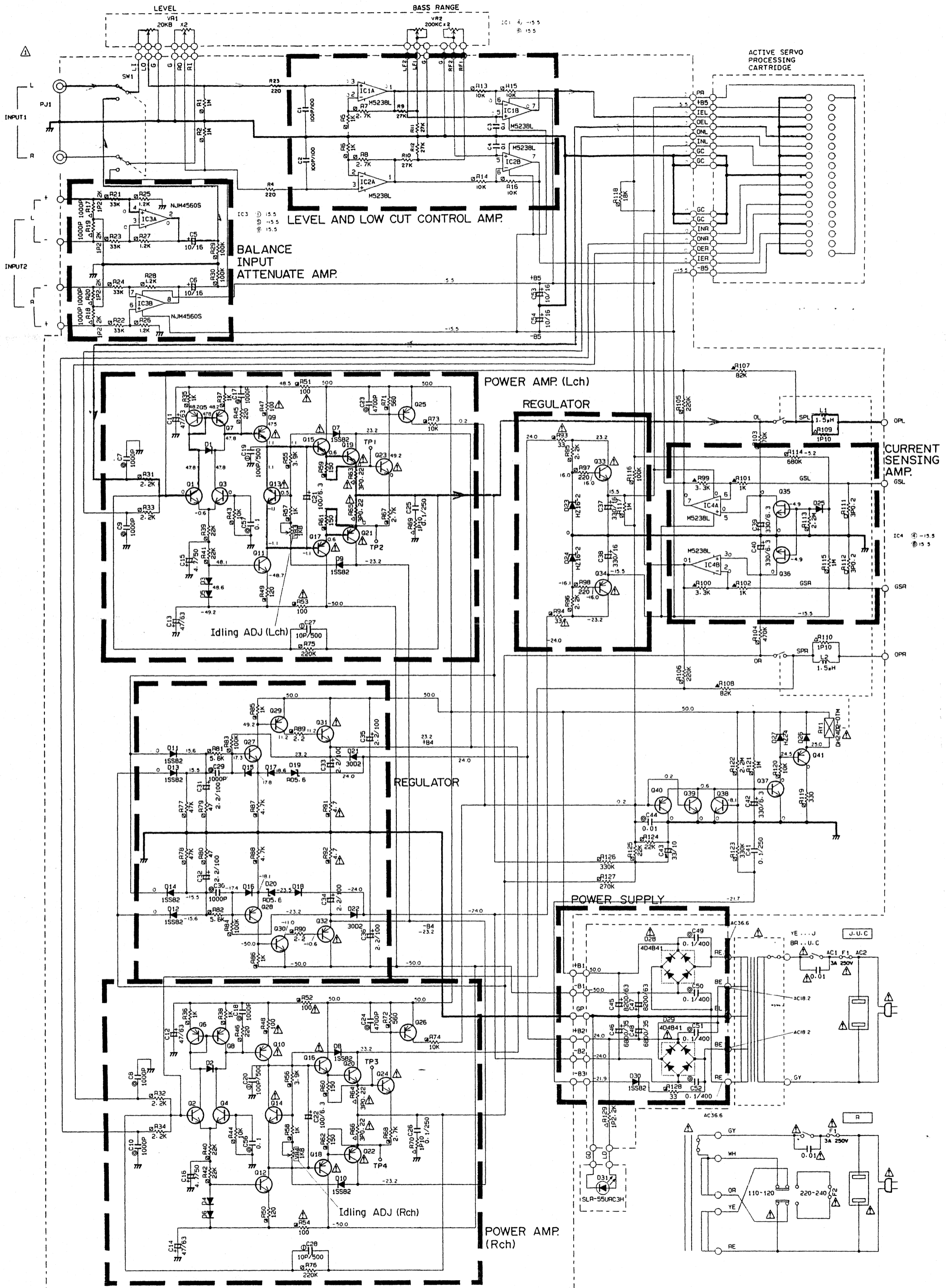
C

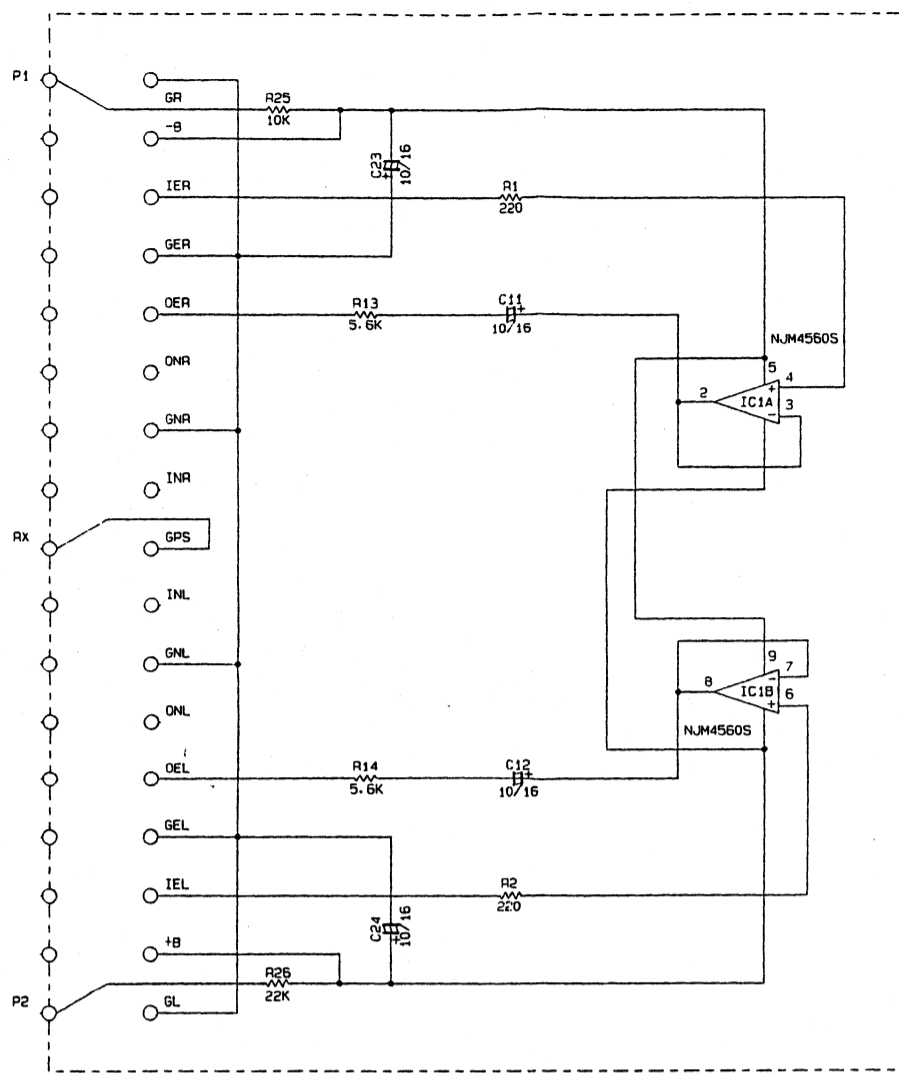
D

E

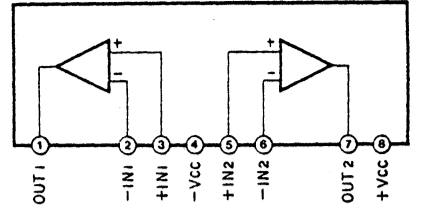
F

SCHEMATIC DIAGRAM

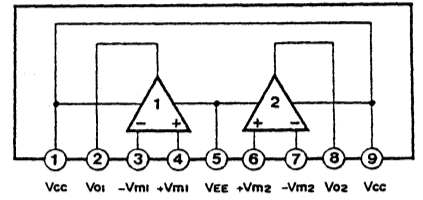




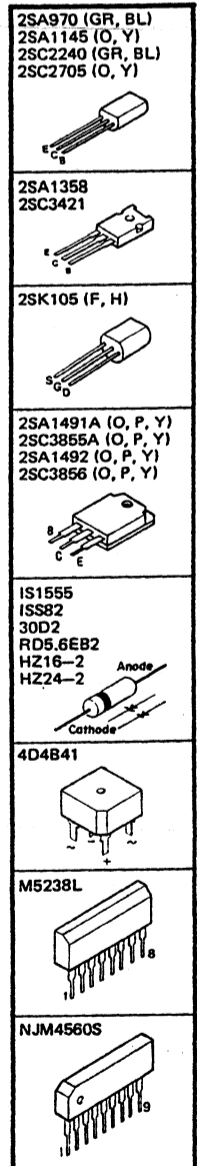
IC1, 2, 4: M5238L



IC3: NJM4560S



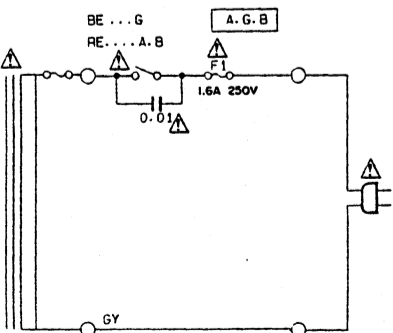
PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICs.



05-8, 25, 26, 28, 40	2SA970 (GR, BL)
09, 10	2SA1145 (O, Y)
017, 18, 29, 34, 41	2SA1358
01-4, 23, 24, 27, 37-39	2SC2240 (GR, BL)
011, 12	2SC2705 (O, Y)
013-16, 30, 33	2SC3421
035, 36	2SK105 (F, H)
021, 22	2SA1491A (O, P, Y)
019, 20	2SC3855A (O, P, Y)
032	2SA1492 (O, P, Y)
031	2SC3856 (O, P, Y)

F1	A, G, B	1.6A/250V
	J, C, U, R	3A/250V
F2	R	1.5A/250V

J	U	C	R	A, B	G
XF467A0	XF468A0	XF469A0	XF470A0	XF471A0	XF472A0



NOTICE

(J)..... Japanese model
 (U)..... U.S.A model
 (C)..... Canadian model
 (A)..... Australian model
 (G)..... European model
 (B)..... British model
 (R)..... General model
 (P)..... RP model

RESISTOR

REMARKS	PARTS NAME
NO MARK	CARBON FILM RESISTOR (1/6W)
☑	CARBON FILM RESISTOR (1/4W)
△	METAL OXIDE FILM RESISTOR
▲	METAL FILM RESISTOR
☒	METAL PLATE RESISTOR
☑	FIRE PROOF CARBON FILM RESISTOR
□	SEMENT MOLDED RESISTOR
⊗	SEMI VARIABLE RESISTOR
■	CHIP RESISTOR

	LAST NO.	UN LISTED NO.
C		
R		
Q		
D		
IC		

CAPACITOR

REMARKS	PARTS NAME
NO MARK	ELECTROLYTIC CAPACITOR
NO MARK	CERAMIC CAPACITOR
⊙	POLYESTER FILM CAPACITOR
○	POLYSTYRENE FILM CAPACITOR
⊖	MICA CAPACITOR
⊕	POLYPROPYLENE FILM CAPACITOR
●	SEMICONDUCTIVE CERAMIC CAPACITOR

Unless otherwise specified
 010E

* All voltages are measured with a 10MΩ/DC electric volt meter.
 * Components having special characteristics are marked △ and must be replaced with parts having specifications equal to those originally installed.
 * Schematic diagram is subject to change without notice.

PARTS LIST

■ WARNING

Components having special characteristics are marked Δ and must be replaced with parts having specifications equal to those originally installed.

● Carbon resistors (1/6W or 1/4W) are not included in the ELECTRICAL PARTS list. For the parts No. of the carbon resistors, refer to p. 14.

■ ELECTRICAL PARTS

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
* VG:50:16:00	Main Circuit Board		メインシート	Black, Titan		J	
* VG:50:17:00	"		"	"		U,C	
* VG:50:18:00	"		"	"		R	
* VG:50:20:00	"		"	"		A,B	
* VG:50:21:00	"		"	"		G	
FU:35:21:00	Mica Cap.	10pF 500V	マイカコン	C27,28			
FU:35:21:00	"	100pF 500V	"	C19,20			
FA:15:31:00	Mylar Cap.	1000pF 50V	マイラーコン	C7~10,17,18,29,30,59~62			
FA:15:34:70	"	4700pF 50V	"	C23,24			
FA:15:41:00	"	0.01 μ F 50V	"	C44			
FA:15:46:80	"	0.068 μ F 50V	"	C63~65			
FA:15:51:00	"	0.1 μ F 50V	"	C56,57			
FC:04:51:00	"	0.1 μ F 400V	"	C49~52			
FZ:00:46:60	Metalized Mylar Film Cap.	0.1 μ F 250V	M M コン	C25,26,41			
UT:45:21:00	Polypropylene Film Cap.	100pF 100V	ポリプロコン	C1,2			
UJ:11:81:00	Electrolytic Cap.	100 μ F 6.3V	ケミコン	C21,22			
UJ:41:83:30	"	330 μ F 6.3V	"	C39,40,42			
UJ:13:71:00	"	10 μ F 16V	"	C5,6,53,54			
UJ:16:62:20	"	2.2 μ F 50V	"	C67,68			
UJ:16:64:70	"	4.7 μ F 50V	"	C15,16			
UW:67:74:70	"	47 μ F 63V	"	C11~14			
UJ:13:83:30	"	330 μ F 16V	"	C37,38			
VE:02:17:00	"	2.2 μ F 100V	"	C31~36			
FM:12:73:30	"	33 μ F 10V	"	C43			
* VG:52:90:00	"	6800 μ F 35V	B P コン	C47,48			
* VG:52:91:00	"	8200 μ F 63V	ブロックケミコン	C45,46			
VC:79:37:00	Coil	1.5 μ	空芯コイル	L1,2			
HV:45:32:20	Flame Proof Carbon Resistor	2.2 Ω 1/4W	不燃化カーボン抵抗	R89,90			
HV:45:34:70	"	4.7 Ω 1/4W	"	R91,92			
HV:45:43:30	"	33 Ω 1/4W	"	R93,94,128			
HV:45:51:00	"	100 Ω 1/4W	"	R51~54			
HV:45:51:50	"	150 Ω 1/4W	"	R59~62			
HV:45:53:30	"	330 Ω 1/4W	"	R119			
HV:45:55:60	"	560 Ω 1/4W	"	R71,72			
HV:45:61:00	"	1k Ω 1/4W	"	R57,58,85,86			
HV:45:62:70	"	2.7k Ω 1/4W	"	R67,68			
HV:45:63:90	"	3.9k Ω 1/4W	"	R55,56			
HV:45:64:70	"	4.7k Ω 1/4W	"	R87,88			
HV:45:71:00	"	10k Ω 1/4W	"	R73,74			
HU:07:61:00	Metal Film Resistor	1k Ω 1/4W	金属皮膜抵抗	R101,102			
HU:07:63:30	"	3.3k Ω 1/4W	"	R99,100			
HU:07:78:20	"	82k Ω 1/4W	"	R107,108			
HL:31:41:00	Metal Oxide Film Resistor	10 Ω 1W	酸化金抵抗	R69,70,109,110			
HL:31:62:20	"	2.2k Ω 1W	"	R17~20,129			
VD:95:24:00	"	0.22 Ω 3W	"	R63~66			
* VG:52:92:00	Wire Wound Resistor	0.2 Ω 3W	セメント抵抗	R111,112			
* VG:93:57:00	Potentiometer	200kA \times 4	回線ロータリーボリューム	VR2			
* VG:52:94:00	"	20kB \times 2	"	VR1			
VB:86:11:00	Pre-Set Potentiometer	B1k Ω	半固定抵抗	VR3,4			

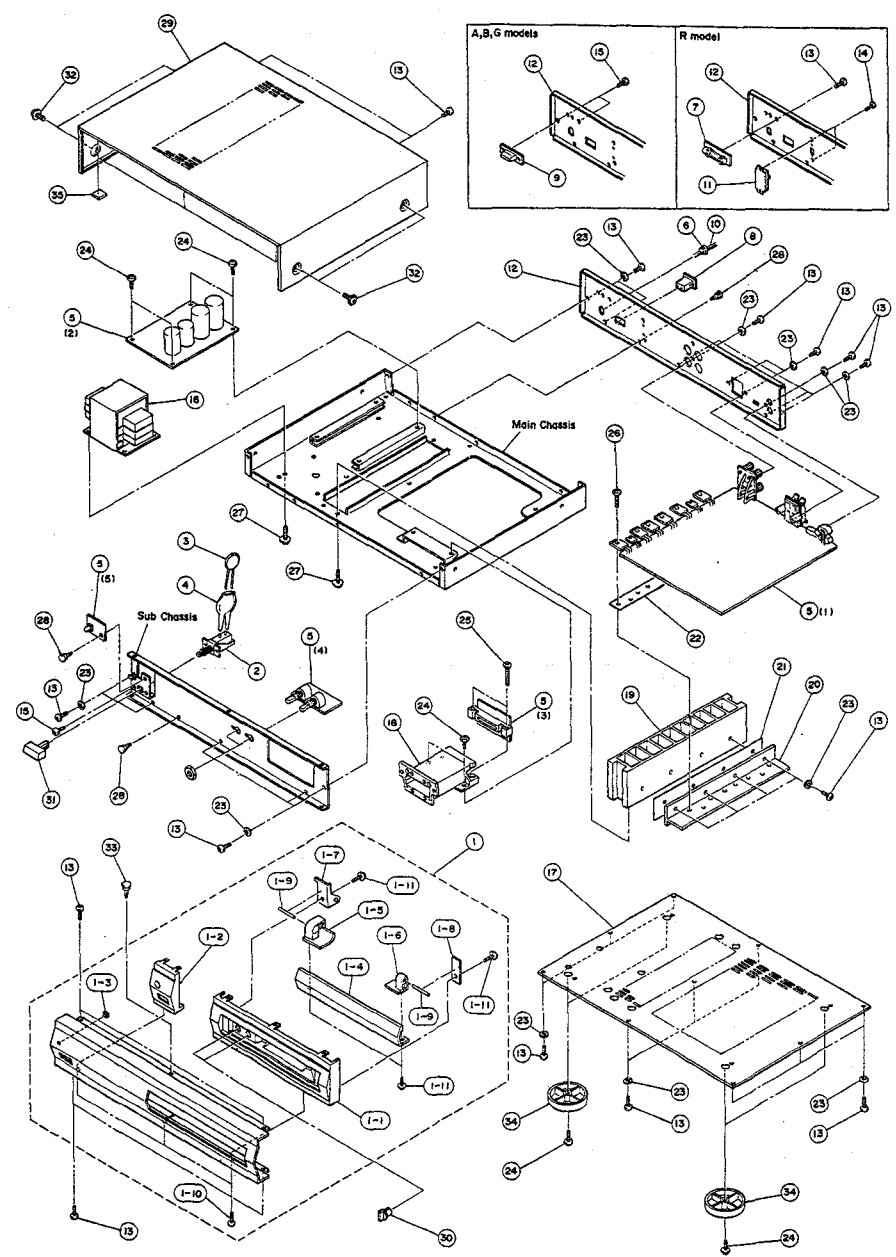
*New Parts (新規部品) NR

AST-A10

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
iA:09:70:00	Transistor	2SA970(GR, BL)	トランジスタ	Q5~8,25,26,28,40			
iA:11:45:00	"	2SA1145(O, Y)	"	Q9,10			Δ
iX:60:35:80	"	2SA1358	トランジスタ	Q17,18,29,34,41			Δ
iC:22:40:00	"	2SC2240(GR, BL)	"	Q1~4,23,24,27,37~39			Δ
iC:27:05:00	"	2SC2705(O, Y)	"	Q11,12			
iX:60:35:90	"	2SC3421	"	Q13~16,30,33			Δ
iX:60:97:30	"	2SA1491A(O, P, Y)	"	Q21,22	Pair		Δ
iX:60:97:40	"	2SC3855A(O, P, Y)	"	Q19,20			Δ
iX:60:97:50	"	2SA1492(O, P, Y)	"	Q32	Pair		Δ
iX:60:97:60	"	2SC3856(O, P, Y)	"	Q31			Δ
iE:10:12:20	FET	2SK105(F, H)	F E T	Q35,36			
iF:00:00:40	Diode	1S1555	ダイオード	D1~6,15~18,25,26			
iF:00:14:00	"	1SS82	"	D7~14,30			
iX:60:61:70	"	30D2	"	D21,22			
iF:00:21:40	Zener Diode	RD5.6E82	ツェナーダイオード	D19,20			
iX:60:84:50	"	HZ16-2	"	D23,24			
iF:00:19:40	"	HZ24-2	"	D27			
iH:00:11:60	Diode Bridge	4D4B41	ダイオードブリッジ	D28,29			Δ
iF:00:42:70	LED(RED)	SLR-55URC3H	L E D	D31			
iX:24:80:01	IC	M5238LS	I C	IC1,2,4			
iG:12:18:00	"	NJM4560S	"	IC3			
* VG:52:98:00	Slide Switch		スライドスイッチ	SW1			
KB:00:03:60	Fuse	T3A 250V	ヒューズ	F1		J,R	Δ
KB:00:10:40	"	3A 250V	"	"		U,C	Δ
KB:00:07:40	"	1.6A 250V	"	"		A,B,G	Δ
VE:33:29:00	Pin Jack	2P Gold	ピンジャック	PJ1			
KC:00:20:20	Relay	DH24D2-OTM	リレー	RY1			
LB:91:80:20	Base Pin	2P i-Type	X H ベースピン	CB1			
LB:91:80:70	"	7P i-Type	"	CB2			
LB:91:80:80	"	8P i-Type	"	CB3			
* VG:52:99:00	Connector	34P	コネクタ	CB4			
LA:00:23:40	Lapping Terminal	5P P=7.5 i-Type	i型ラッピング端子板				
LB:20:18:80	Fuse Holder Pin	PC-FH1	ヒューズホルダーピン				
* VB:57:01:00	Speaker Terminal	4P	スピーカターミナル				
VC:31:38:00	"	4P	"			J,U,C,R,A,B	
VC:72:10:00	"	4P	"			G	
		Cartridge Circuit Board	AST-K01B	カートリッジシート			
UJ:13:71:00	Electrolytic Cap	10 μ F 16V	ケミコン	C11,12,23,24			
iG:12:18:00	IC	NJM4560S	I C	IC1			
VG:55:30:00	Connector	34P	コネクタ				

*New Parts (新規部品) NR

EXPLODED VIEW



MECHANISM PARTS

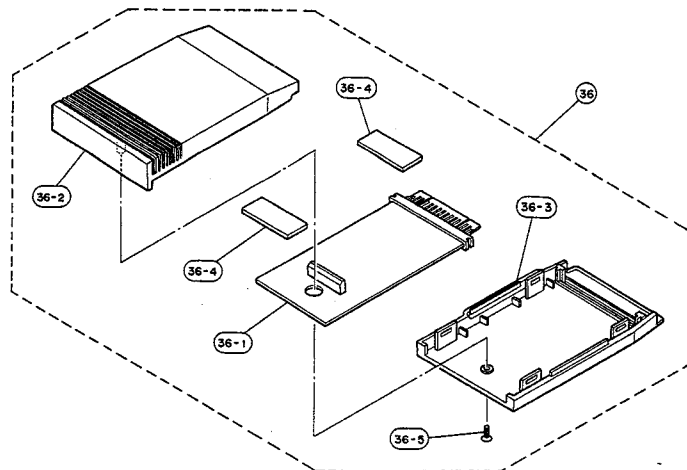
Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
* 1	VG:49:90:00	Front Panel unit	フロントパネルユニット	Black			
#	VG:49:92:00	//	//	Titan			
* 1-1	VG:25:46:00	Chassis, P	シャーシP	Black			
#	VG:25:47:00	//	//	Titan			
* 1-2	VG:06:99:00	Side Cover, L	サイドカバーL	Black			
#	VG:07:13:00	//	//	Titan			
* 1-3	VE:27:27:00	Lens	レンズ				
* 1-4	VG:25:50:00	Sub Panel	サブパネル	Black			
#	VG:25:51:00	//	//	Titan			
* 1-5	VG:25:48:00	Hinge, L	ヒンジL				
* 1-6	VG:25:49:00	//, R	// R				
* 1-7	VG:30:49:00	Spring, Hinge	バネ(ヒンジ)				
* 1-8	VG:82:70:00	Plate, Hinge	プレート(ヒンジ)				
* 1-9	VG:40:27:00	Shaft	シャフト				
* 1-10	EI:33:00:86	Binding Head Tapping Screw	3×8 FCRM3-BI	バインドタッピングネジ	PACK		
1-11	EK:33:60:10	BW Head Tapping Screw	3×8(φ8) FCRM3-BI	BWヘッドタッピングネジ			
2	VB:96:91:00	Power Switch	TV-3	パワースイッチ			△
3	FI:38:41:00	Ceramic Cap	0.01μF 400V	セラコン			△
4	CB:09:52:60	Cover		コンデンサカバー			
* 5	VG:50:16:00	Main Circuit Board		メインシート		J	
#	VG:50:17:00	//		//		U,C	
#	VG:50:18:00	//		//		R	
#	VG:50:20:00	//		//		A,B	
#	VG:50:21:00	//		//		G	
6	CB:62:01:90	Cord Stopper	CM-22B	コードストッパー		R,A,B,G	
#	CB:62:02:00	//	CM-22C	//		U,C	
7	LB:20:13:00	Fuse Holder		ヒューズホルダー		R	
8	LB:20:30:60	AC Outlet		A C アウトレット		J,U,C,R	△
9	VD:61:41:00	Terminal	2P	中継端子台		A,B,G	
10	VC:61:44:00	Power Cord	12A 125V	電源コード		J	△
#	MG:00:22:20	//	10A 125V	//		U,C	△
#	MG:00:16:30	//	6A 250V	//		R	△
#	MG:00:23:10	//	7.5A 250V	//		A	△
#	MG:00:23:30	//	300/300V	//		B	△
#	MG:00:23:20	//	2.5A 250V	//		G	△
11	VE:96:26:00	Slide Switch		スライドスイッチ		R	△
* 12	VG:06:77:00	Rear Panel		リアパネル		J	
#	VG:06:78:00	//		//		U,C	
#	VG:06:79:00	//		//		R	
#	VG:06:80:00	//		//		A,B	
#	VG:06:83:00	//		//		G	
13	EI:33:00:86	Binding Head Tapping Screw	3×8 FCRM3-BL	バインドタッピングネジ	PACK		
14	EJ:32:60:86	Pan Head Tapping Screw	2.6×8 FCRM3-BL	ナベタッピングネジ	PACK	R	
15	ED:33:00:66	Binding Head Screw	3×6 FCRM3-BL	バインド小ネジ	PACK	A,B,G	
* 16	XF:46:7A:00	Power Transformer		電源トランス		J	△
#	XF:46:8A:00	//		//		U	△
#	XF:46:9A:00	//		//		C	△
#	XF:47:0A:00	//		//		R	△
#	XF:47:1A:00	//		//		A,B	△
#	XF:47:2A:00	//		//		G	△
* 17	VG:06:84:00	Bottom Cover		ボトムカバー			
* 18	VG:07:06:00	Rom Box		ロムボックス			
* 19	VG:06:74:00	Radiator		ラジエーター			

*New Parts (新規部品) NR

Parts List for Carbon Resistors

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
20	VG:40:66:00	Block, TR	T R ブ ロ ッ ク				
21	VG:40:64:00	Sheet, Block	シ ー ト ブ ロ ッ ク				
22	VG:40:65:00	Sheet, TR	シ ー ト T R				
23	EV:42:30:36	Toothed Lock Washer	φ3 FCRM3-BI 歯 付 座 金	PACK			
24	EK:33:60:10	BW Head Tapping Screw	3×8(φ8) FCRM3-BI B Wヘッドタッピングネジ				
25	EI:33:01:46	Binding Head Tapping Screw	3×14 FCRM3-BI バイ ndタッピングネジ	PACK			
26	EK:33:00:30	BW Head Tapping Screw	3×10(φ8) FCRM3-BI B Wヘッドタッピングネジ				
27	EK:36:52:00	//	4×10(φ10) FCRM3-BI //				
28	CB:06:88:80	Plastic Rivet	プ ラ ス チ ャ ッ ク リ ベ ッ ト				
29	VG:06:85:00	Top Cover	ト ッ プ カ バ ー	Black			
30	VG:25:52:00	Knob	ツ マ ミ	Black			
31	VG:07:00:00	Button	ボ タ ン	Black POWER			
32	EX:60:10:80	Cup Screw	4×8(φ10) FCM3-BI カ ッ プ ス ク リ ュ ー (Sタ イ ト)	Black			
33	CB:60:56:20	Plastic Rivet	4×8(φ10) プ ラ ス チ ャ ッ ク リ ベ ッ ト				
34	VG:49:13:00	Leg	脚	Black			
35	VG:86:95:00	Damper	ダ ン パ ー	Titan			
	CB:06:92:51	Binding Tie	BK-I イ ン シ ュ ロ ッ ク タイ	PACK			
		Accessories	付 属 品				
36	VH:03:88:00	Cartridge Unit	AST-K01B カ ー ト リ ッ ジ ュ ニ ッ ト				
36-1	VG:71:13:00	Cartridge Circuit Board	カ ー ト リ ッ ジ シ ー ト				
36-2	VG:99:06:00	Rom Case, Top	ロ ム ケ ー ス T 0 1				
36-3	VG:06:93:00	Rom Case, Bottom	ロ ム ケ ー ス B				
36-4	VG:86:96:00	Cushion	ク ッ シ ョ ン				
36-5	EO:32:61:06	Flat Head Tapping Screw	2.6×10 FCRM3-BI 皿 タ ッ ピ ン グ ネ ジ	PACK			

*New Parts (新規部品) NR



Value	1/4W Type Part No.	1/6W Type Part No.	Value	1/4W Type Part No.	1/6W Type Part No.
1.0 Ω	HJ353100	HF853100	12K Ω	HJ357120	HF857120
1.8 "	HJ353180	*	15 "	HJ357150	HF857150
2.2 "	HJ353220	HF853220	18 "	HJ357180	HF857180
3.3 "	HJ353330	HF853330	22 "	HJ357220	HF857220
4.7 "	HJ353470	HF853470	27 "	HJ357270	HF857270
5.6 "	HJ353560	HF853560	33 "	HJ357330	HF857330
10 "	HJ354100	HF854100	39 "	HJ357390	HF857390
15 "	HJ354150	HF854150	47 "	HJ357470	HF857470
22 "	HJ354220	HF854220	56 "	HJ357560	HF857560
27 "	HJ354270	HF854270	68 "	HJ357680	HF857680
33 "	HJ354330	HF854330	82 "	HJ357820	HF857820
39 "	HJ354390	HF854390	91 "	HJ357910	HF857910
47 "	HJ354470	HF854470	100 "	HJ358100	HF858100
56 "	HJ354560	HF854560	120 "	HJ358120	HF858120
68 "	HJ354680	HF854680	150 "	HJ358150	HF858150
82 "	HJ354820	HF854820	180 "	HJ358180	HF858180
100 "	HJ355100	HF855100	220 "	HJ358220	HF858220
110 "	HJ355110	HF855110	270 "	HJ358270	HF858270
120 "	HJ355120	HF855120	330 "	HJ358330	HF858330
150 "	HJ355150	HF855150	390 "	HJ358390	HF858390
160 "	HJ355160	*	470 "	HJ358470	HF858470
180 "	HJ355180	HF855180	560 "	HJ358560	HF858560
220 "	HJ355220	HF855220	680 "	HJ358680	HF858680
270 "	HJ355270	HF855270	820 "	HJ358820	HF858820
330 "	HJ355330	HF855330	1.0M Ω	HJ359100	HF859100
390 "	HJ355390	HF855390	1.2 "	HJ359120	*
470 "	HJ355470	HF855470	1.5 "	HJ359150	HF859150
510 "	*	HF855510	1.8 "	HJ359180	HF859180
560 "	HJ355560	HF855560	2.2 "	HJ359220	HF859220
680 "	HJ355680	HF855680	3.3 "	HJ359330	HF859330
820 "	HJ355820	HF855820	3.9 "	HJ359390	*
910 "	HJ355910	HF855910	4.7 "	HJ359470	HF859470
1.0K Ω	HJ356100	HF856100			
1.2 "	HJ356120	HF856120			
1.5 "	HJ356150	HF856150			
1.8 "	HJ356180	HF856180			
2.0 "	HJ356200	HF856200			
2.2 "	HJ356220	HF856220			
2.4 "	HJ356240	HF856240			
2.7 "	HJ356270	HF856270			
3.0 "	HJ356300	HF856300			
3.3 "	HJ356330	HF856330			
3.6 "	HJ356360	HF856360			
3.9 "	HJ356390	HF856390			
4.7 "	HJ356470	HF856470			
5.1 "	HJ356510	HF856510			
5.6 "	HJ356560	HF856560			
6.8 "	HJ356680	HF856680			
8.2 "	HJ356820	HF856820			
9.1 "	HJ356910	HF856910			
10 "	HJ357100	HF857100			

