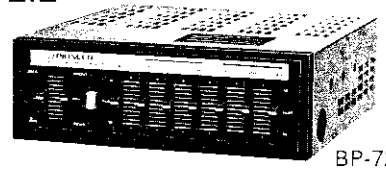
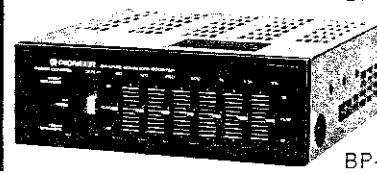
Service Manual

PIONEER



BP-720



BP-520

ORDER NO.
CRT - 271 - 0

7 BAND GRAPHIC EQUALIZER / HIGH POWER BOOSTER

BP-720 US, CA, E

BP-520 US, CA, E

SPECIFICATIONS

Power source . . . . . DC 14.4V (10.8~15.6V allowable)
Grounding system . . . . . Negative type
Max. current consumption 4A
Dimensions . . . . . 150(W)×50(H)×151(D)mm (5-7/8(W)×2(H)×5-7/8(D) in.)
Weight . . . . . 1.1kg (2.4 lbs.)
Continuous power output is 10W per channel min. into 4 ohms, both channels driven 50 to 20,000Hz with no more than 5% THD. (BP-720/US, CA, BP-520/US, CA)
Maximum power output . . . . . 20W + 20W
Continuous power output . . . . 12W + 12W (1% dist. at 1kHz) (BP-720/E, BP-520/E)
Load impedance . . . . . 4Ω (4~8Ω allowable)
Frequency response . . . . . 50~20,000Hz (±3 dB)
Signal-to-noise ratio . . . . . 70 dB (IHF-A network, at 1W)
Distortion . . . . . 0.5% (at 1.5W, 1kHz)
Equalization frequency . . . . . 60Hz, 125Hz, 250 Hz, 500Hz, 1kHz, 3.5kHz, 10kHz
Equalization range . . . . . ±12 dB
Reverberation time . . . . . 0~5 sec.; adjustable (BP-720)

These specifications were determined and are presented in accordance with specification standards established by the Ad Hoc Committee of Car Stereo Manufacturers.

Note:
Specifications and the design are subject to possible modification without notice due to improvements.

PIONEER ELECTRONIC CORPORATION 4-1 Meguro 1-Chome Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS OF AMERICA 1925 E. Dominguez St., Long Beach, Calif. 90810
PIONEER ELECTRONIC (EUROPE) N.V. Luithagen-Haven 9, 2030 Antwerp, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia

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1. DISASSEMBLY

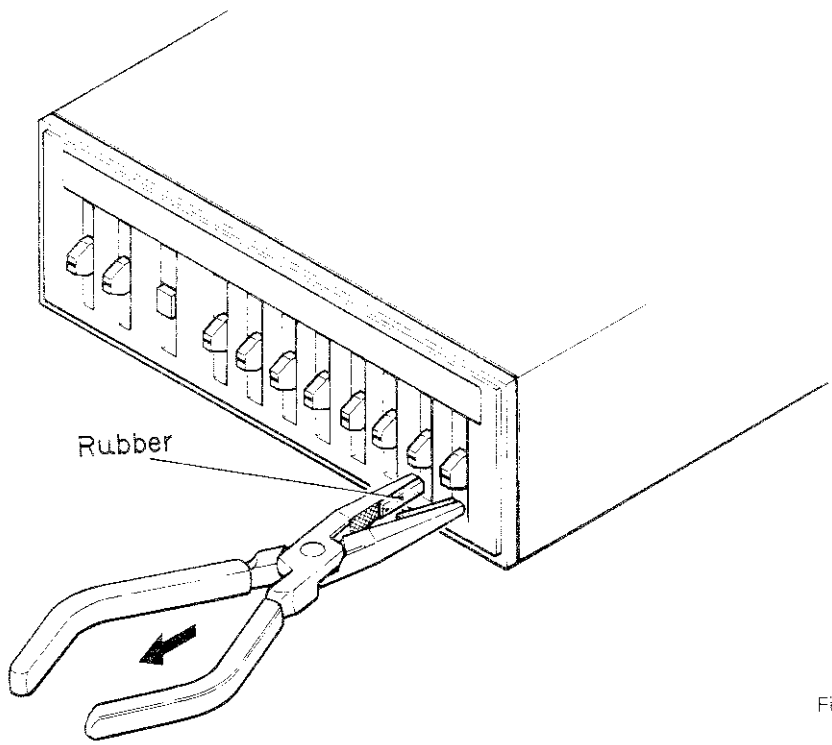


Fig. 1

To remove the knobs, use a pair of pliers as shown in fig. 1. (Note: To avoid damage to the knobs, glue two pieces of rubber to the pliers.)

2. PARTS LOCATION

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

BP-720

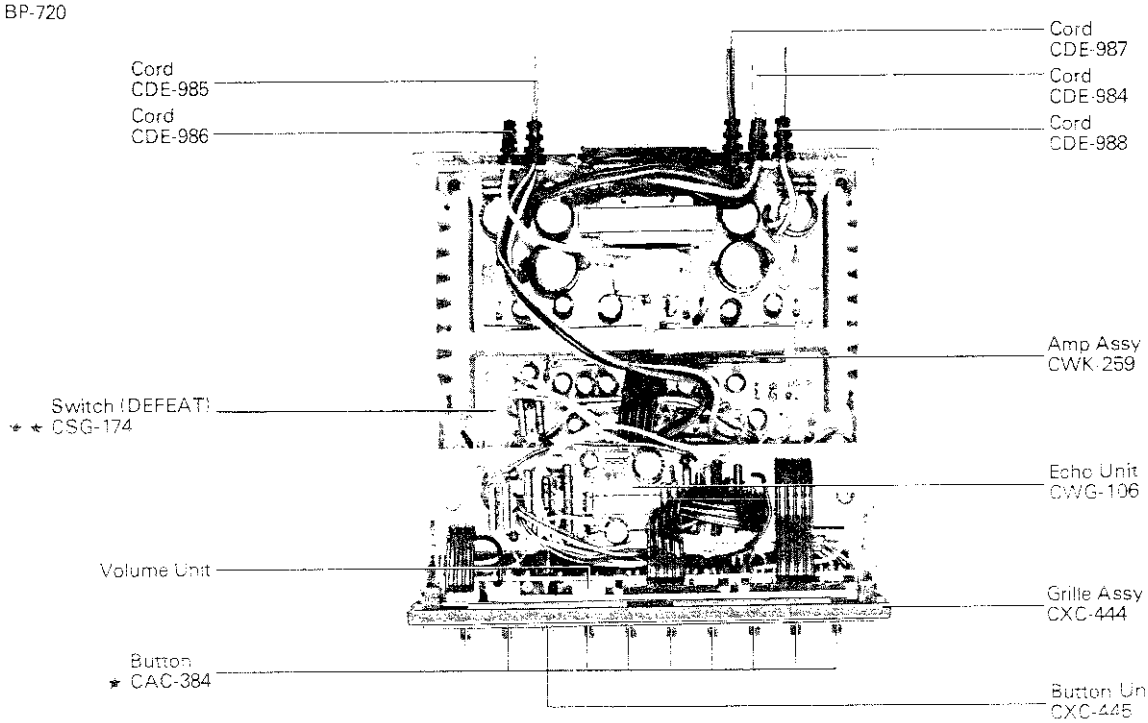


Fig. 2

BP-620

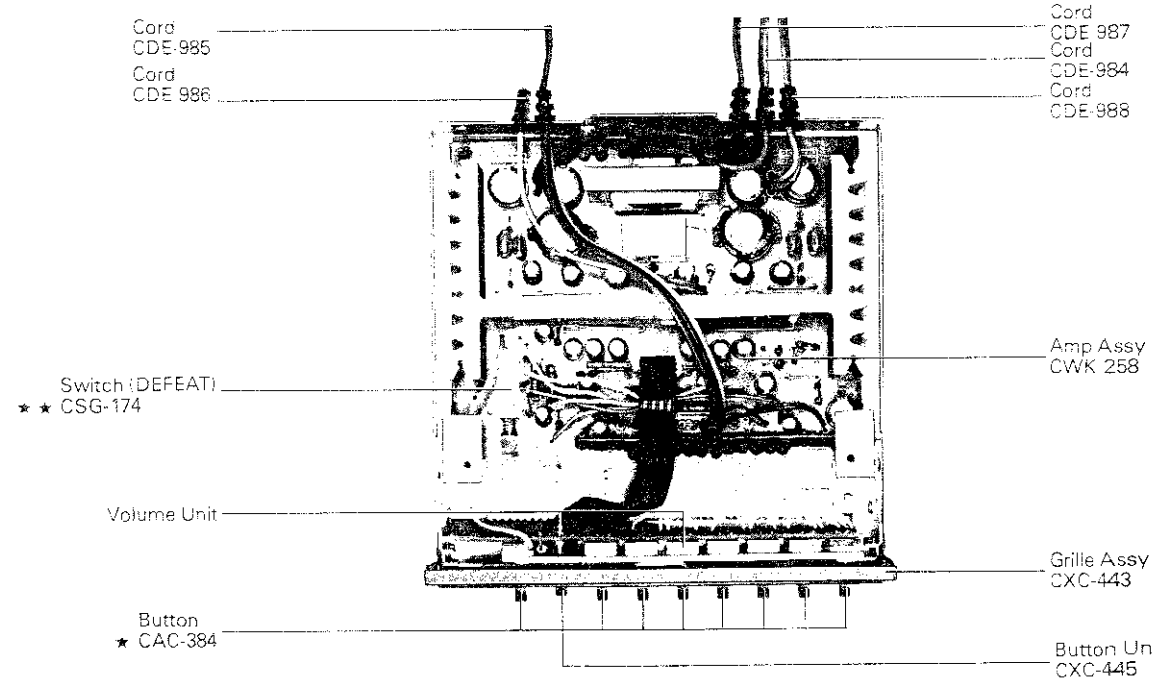


Fig. 3

3. CIRCUIT DESCRIPTION

• Level Diagram

BP-720

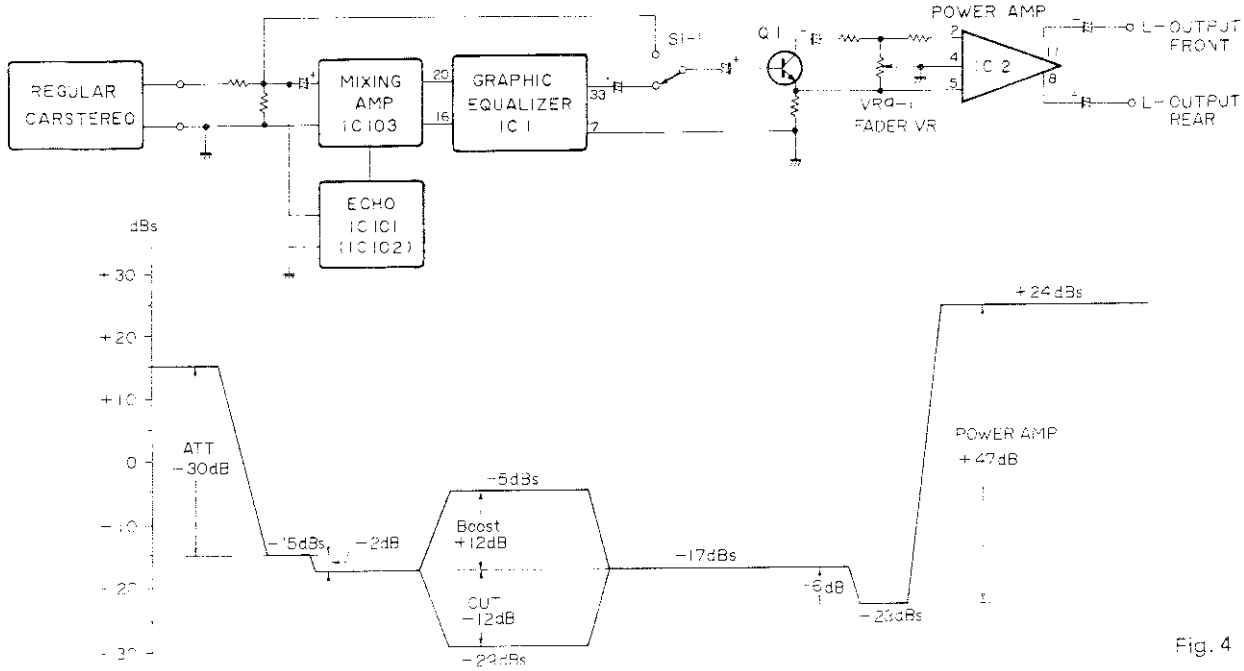


Fig. 4

BP-520

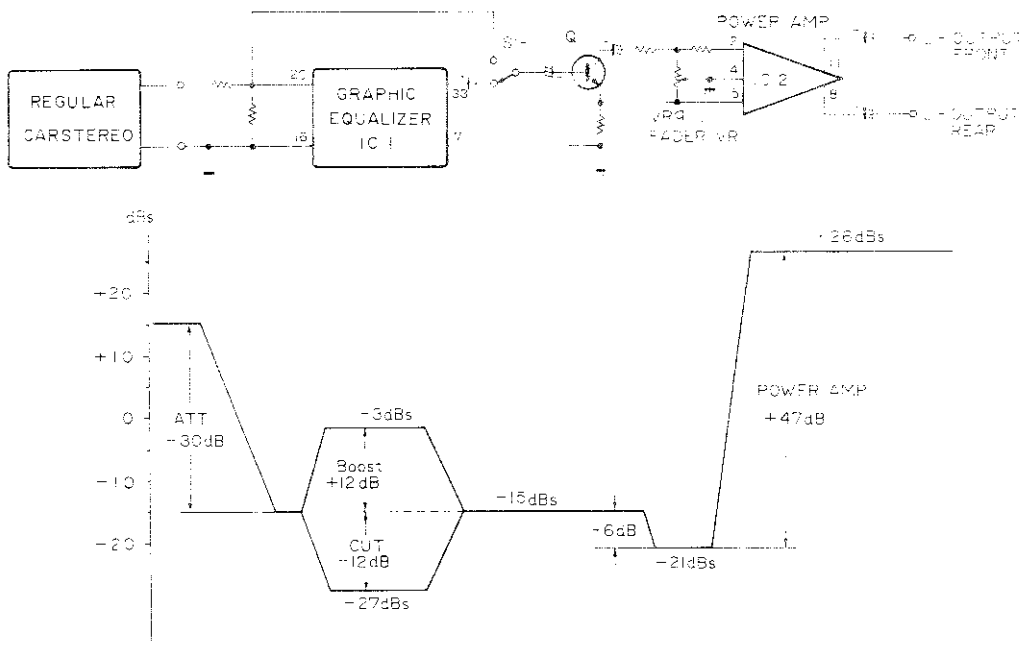


Fig. 5

The BP-520 consists of a graphic equalizer, a fader, and an amplifier (booster).
The BP-720 consists of a graphic equalizer, an IC reverberation unit, a level indicator circuit, a fader, and an amplifier (booster).
Details of each circuit are as follows:

1) Amplifier (booster)
IB1 (120Ω by 3.9Ω), the input attenuator of the unit, attenuates the input signals (from the car stereo) by 30 dB. Transistors Q1 and Q2 create signals of opposite phases, enabling BTL (balanced transformerless) operation.

2) Graphic equalizer
The graphic equalizer uses a hybrid IC specifically designed for this purpose. The IC consists of resonant circuits made of semiconductor inductance (operational emplifier), and is capable of boosting or attenuating at seven frequencies.
The frequencies are 60, 140(125), 250, 500, 1k, 3,5k, and 9.1(10)kHz. The variable resistors in this circuit are slide variable resistors with 11 clicks, and have a stroke of 20mm.

3) IC reverberation circuit (BP-720)
The IC reverberation circuit consists of a delay circuit formed by 3328 stages of BBD (bucket brigade device), an active filter (IC104, IC105) with an operational amplifier, and a mixing circuit (IC103). Since the BBD used in this circuit has a center tap, an ample reverberation effect and a long reverberation time are obtained.
The reverberation effect can be modified by changing the ratio of the original signal and the echo.

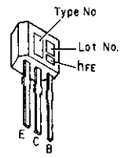
4) Level indicator circuit (BP-720)
The level indicator circuit uses two ICs (BA6104) to drive LEDs of left and right channels. Each IC lights five LEDs (four greens and one yellow which indicates peak output).
The input signal to this circuit is obtained by rectifying the output signal from the power amplifier through diodes. The signal then goes through a circuit that determines the lighting threshold level and the time constant; the signal then feeds into the IC (IC106 and IC107). All five LEDs light at nominal output.

5) Fader
In a 4-speaker operation, the fader adjusts the output balance of the front and rear speakers. This is done by attenuating the signal from the inverter through R15 (10kΩ) and a variable resistor (20kΩ).

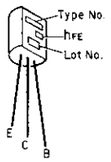
6) Other circuits
When power is supplied to the car stereo, Q4 turns on, which in turn activates the relay turning the power circuit on.
The defeat switch, when turned on, bypasses the graphic equalizer and the IC reverberation circuit.

• IC's and Transistors

2SC536SP

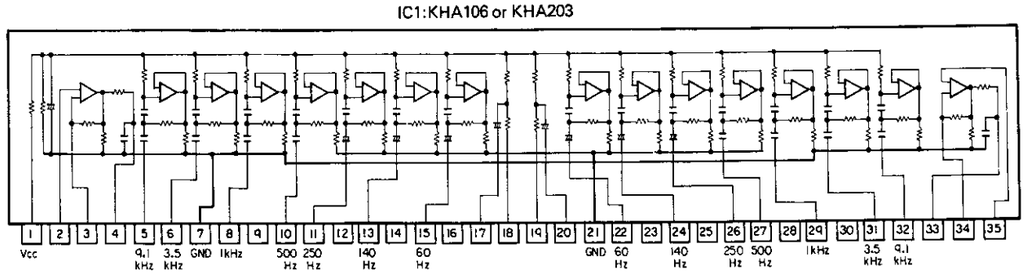


2SB562

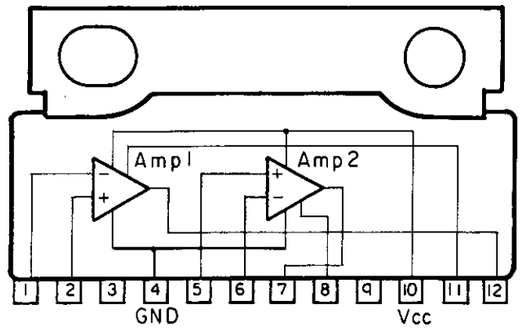


AMP UNIT

IC1:KHA106 or KHA203

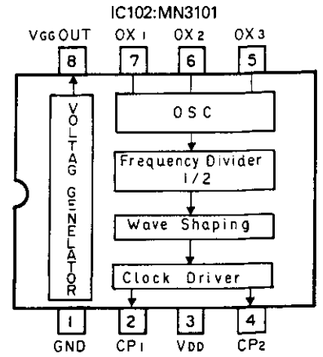


IC2,IC3:HA1398

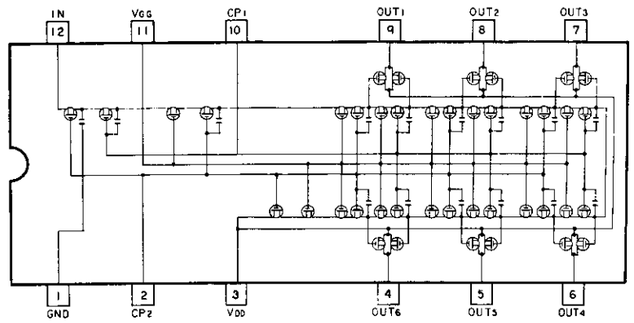


ECHO UNIT

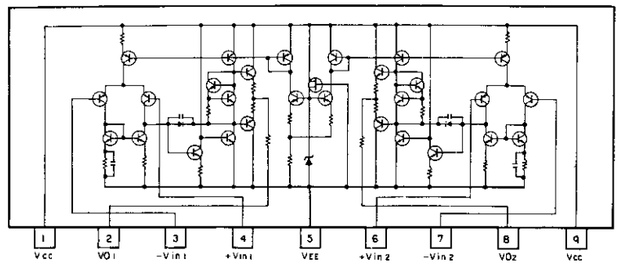
IC102:MN3101



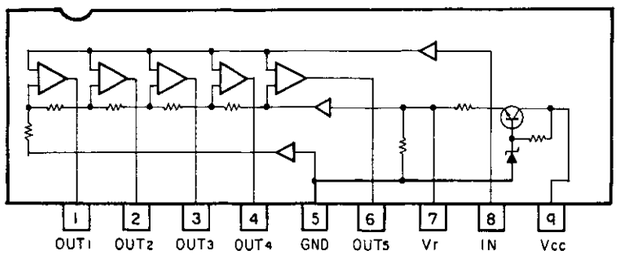
IC101:MN3011



IC103—IC105:AN6551



IC106,IC107:BA6104



4. SCHEMATIC CIRCUIT DIAGRAM (BP-520)

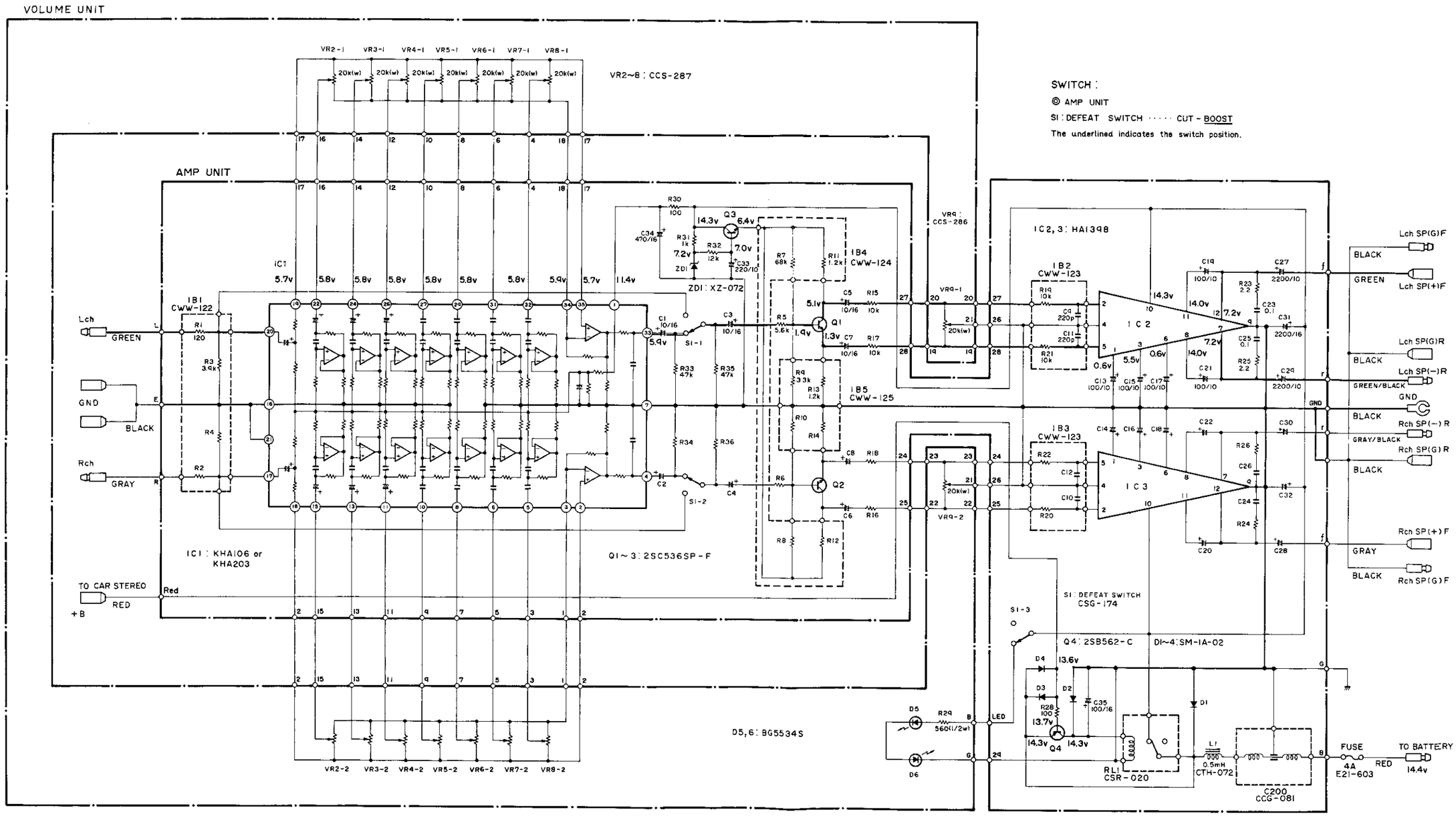
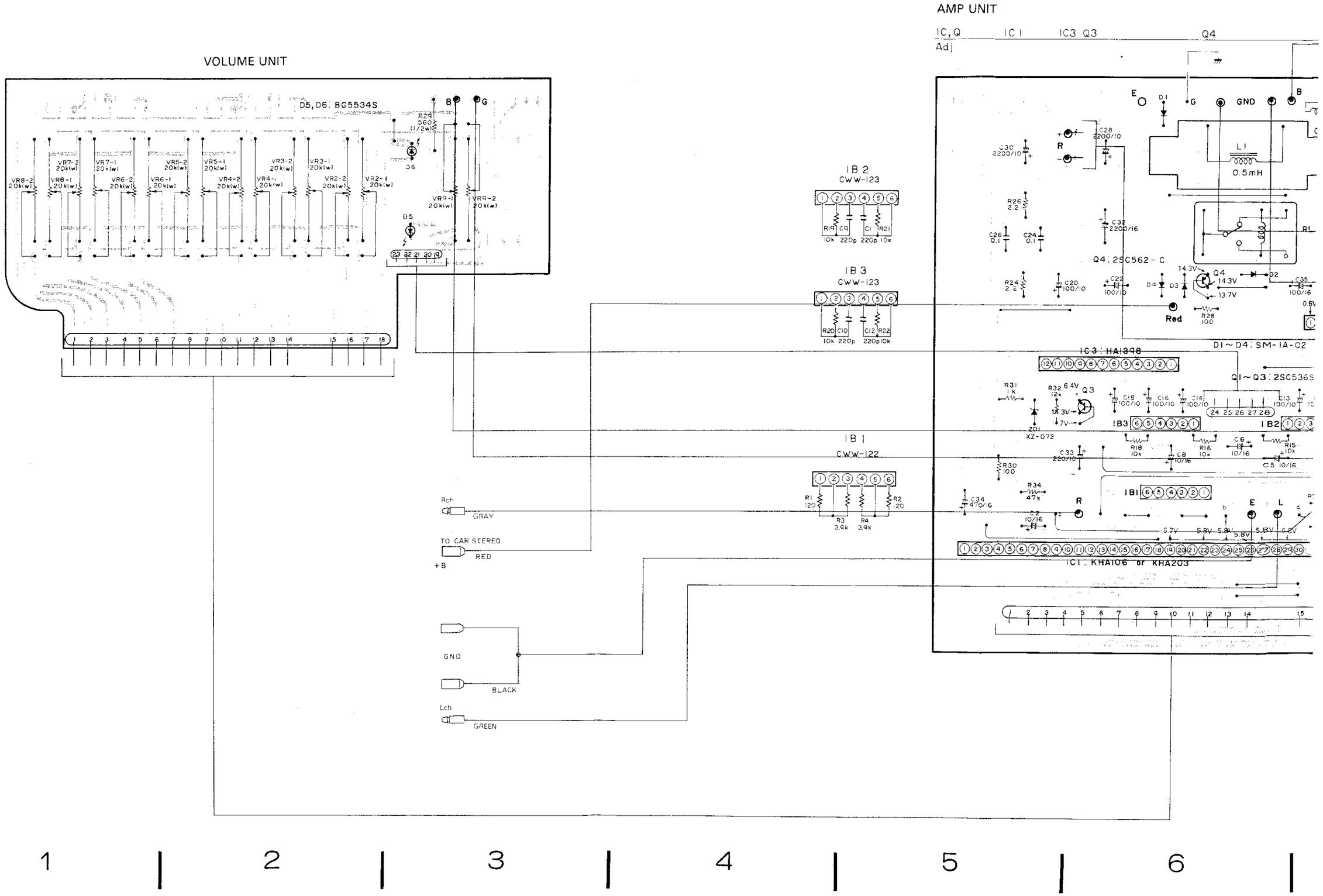
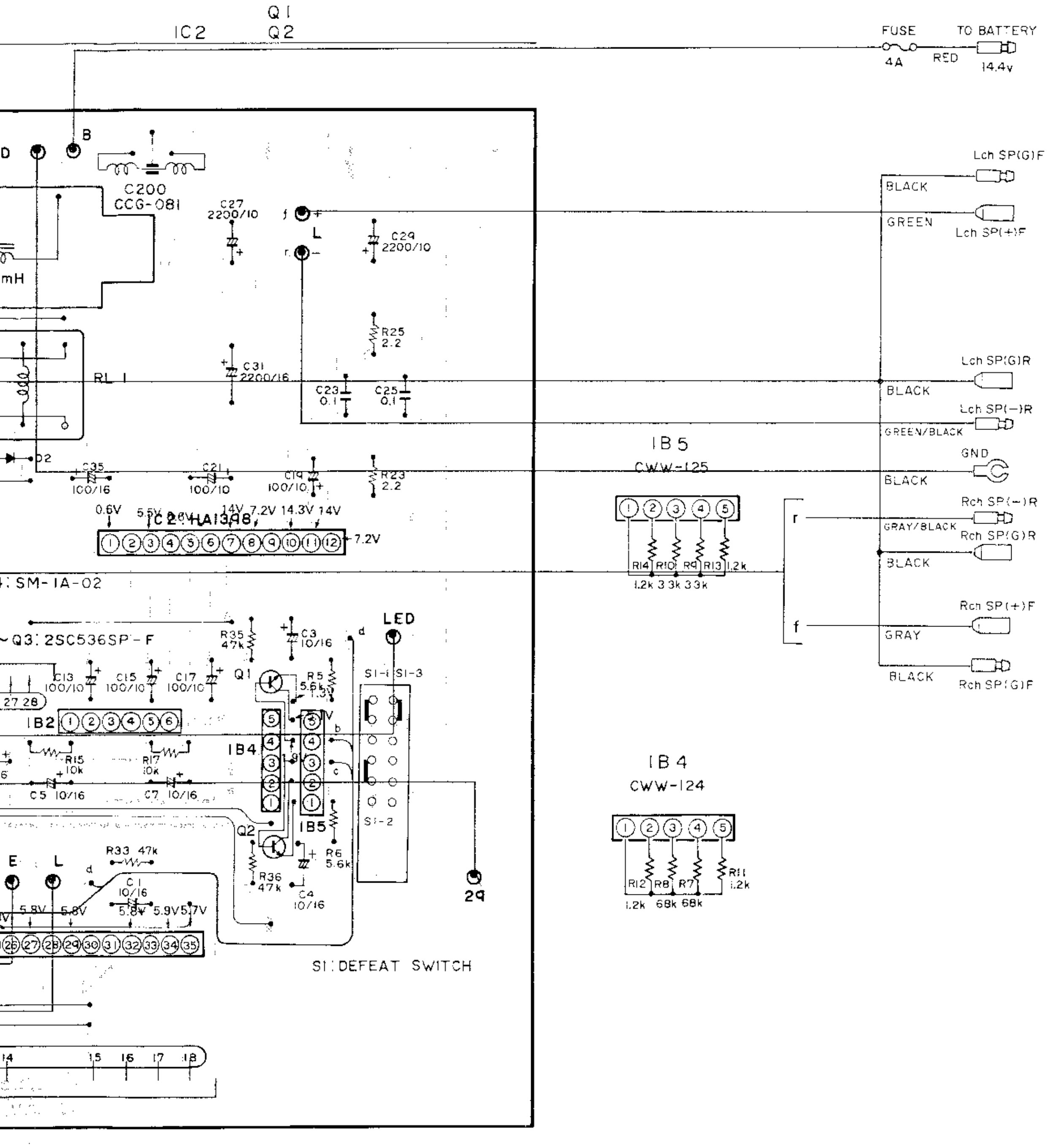


Fig. 6

5. CONNECTION DIAGRAM (BP-520)



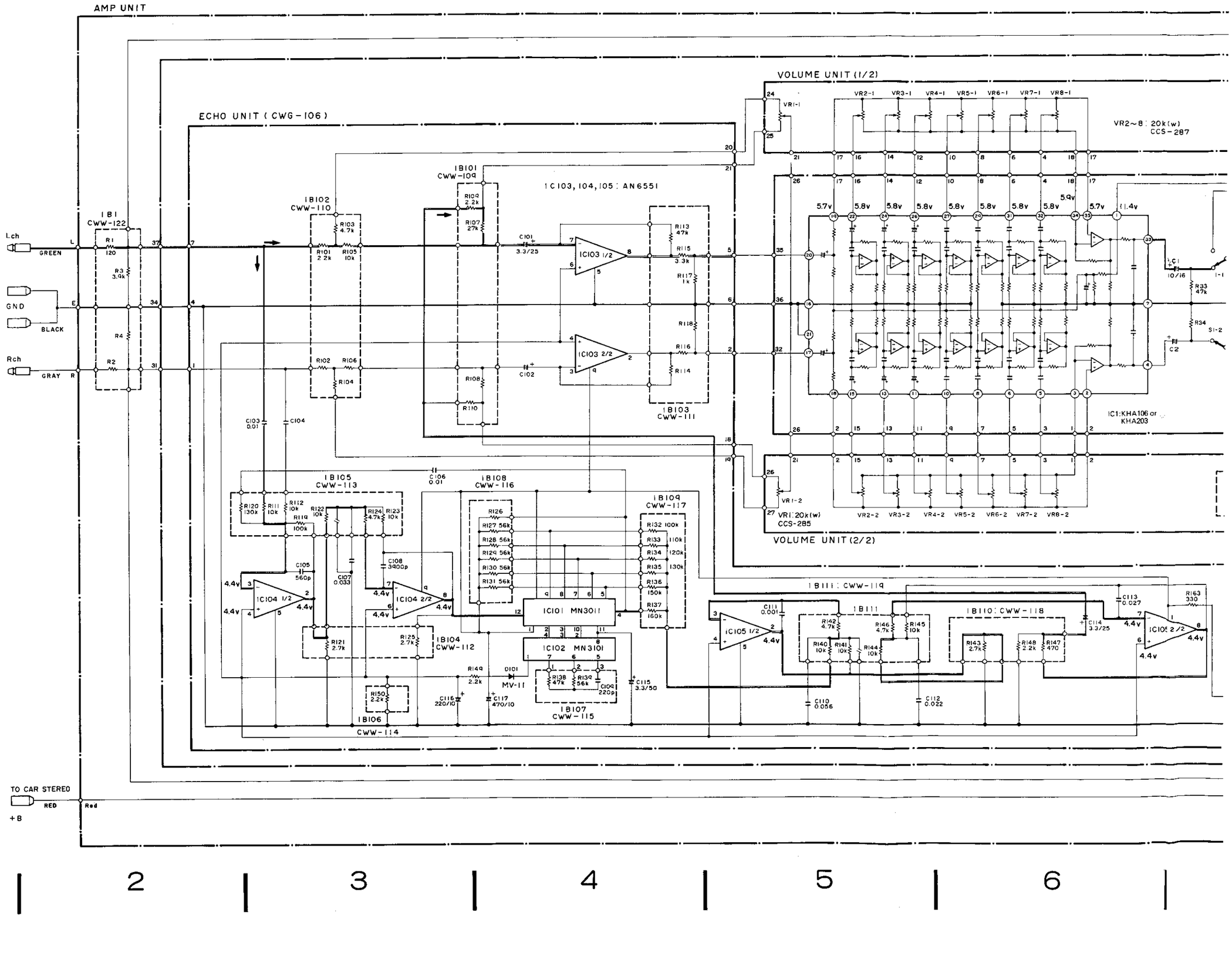


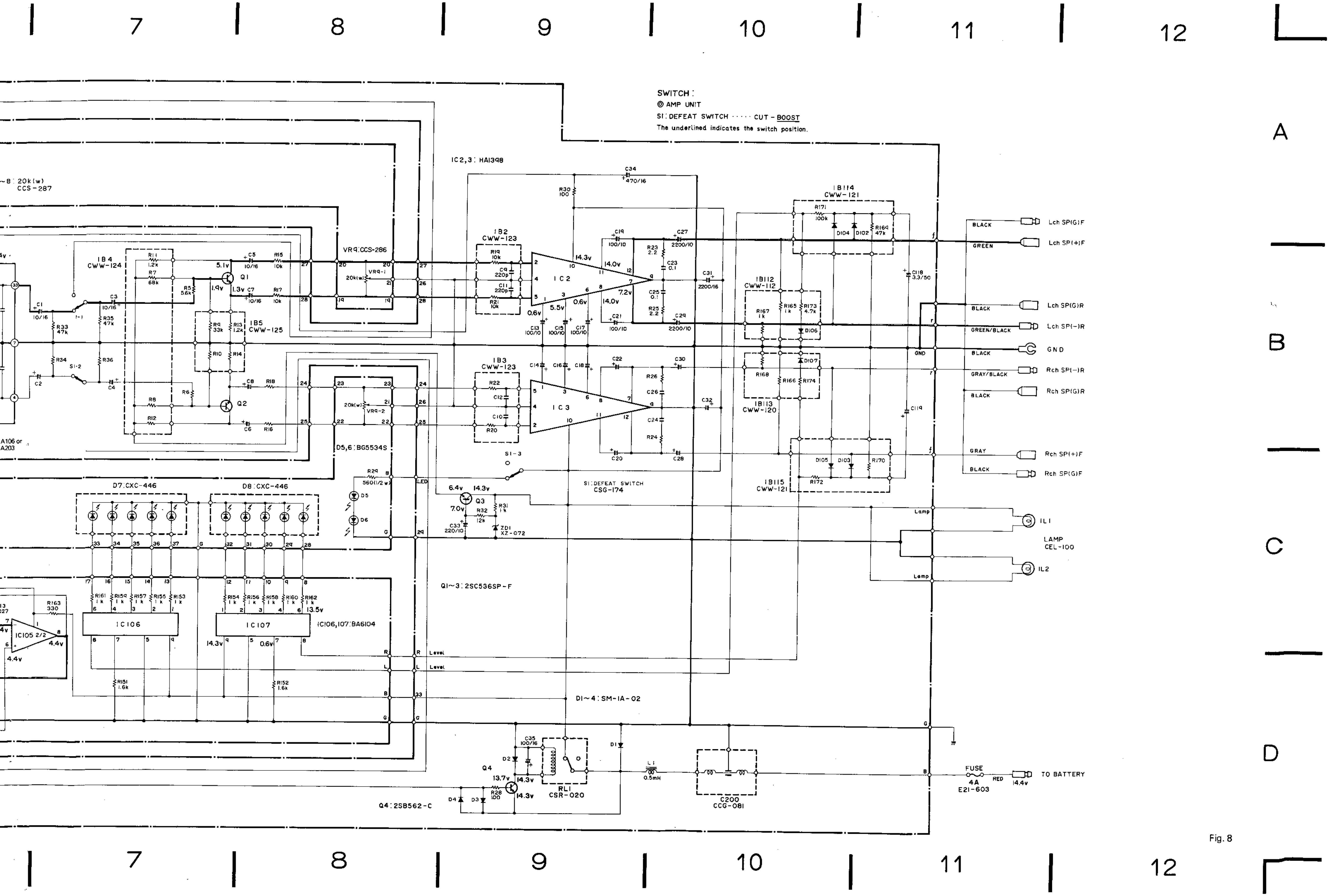
IC2
Q1
Q2
FUSE
4A
RED
TO BATTERY
14.4v
C200
CCG-081
C27 2200/10
C29 2200/10
R25 2.2
C31 2200/16
RL1
C23 0.1
C25 0.1
C35 100/16
C21 100/10
C19 100/10
R23 2.2
IC2: HA1398
7.2V
LED
Q3: 2SC536SP-F
C13 100/10
C15 100/10
C17 100/10
R35 47k
C3 10/16
R5 5.6k
IB2
IB4
IB5
R15 10k
R17 10k
C5 10/16
C7 10/16
R33 47k
C1 10/16
R36 47k
C4 10/16
R6 5.6k
S1-1
S1-3
S1-2
S1: DEFEAT SWITCH
29
BLACK
GREEN
Lch SP(G)F
Lch SP(+)F
Lch SP(G)R
Lch SP(−)R
GREEN/BLACK
GND
Rch SP(−)R
Rch SP(G)R
GRAY/BLACK
Rch SP(+)F
GRAY
Rch SP(G)F
IB5
CWW-125
R14 R10 R9 R13
1.2k 3.3k 3.3k 1.2k
IB4
CWW-124
R12 R8 R7 R11
1.2k 68k 68k 1.2k

Fig. 7

MEMO

6. SCHEMATIC CIRCUIT DIAGRAM (BP-720)

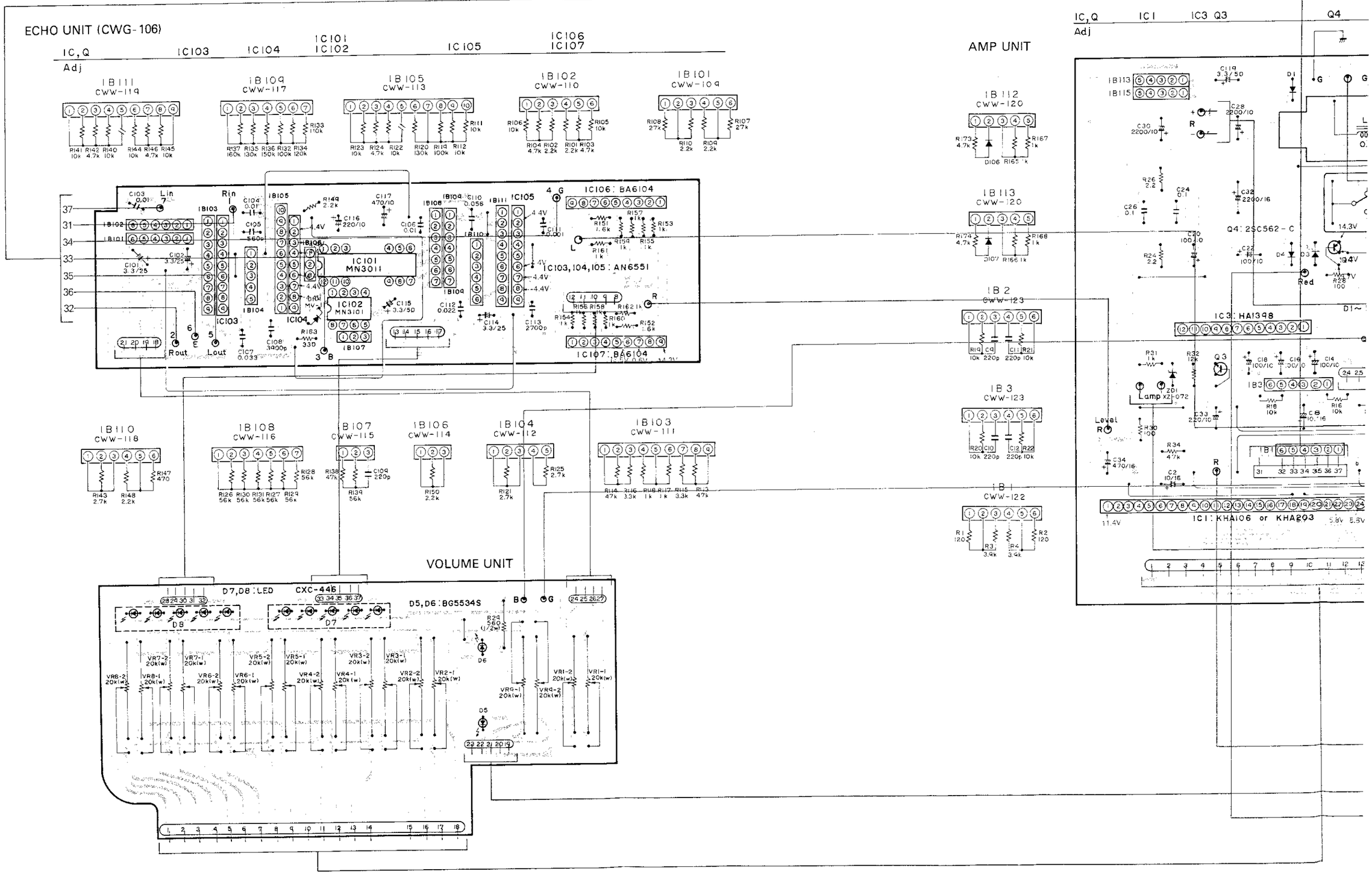




SWITCH :
◎ AMP UNIT
S1: DEFEAT SWITCH ····· CUT - BOOST
The underlined indicates the switch position.
IC2,3 : HA1398
VR9 : CCS-286
~8 : 20k(w) CCS-287
IB4 CWW-124
IB5 CWW-125
IB2 CWW-123
IB3 CWW-123
IB114 CWW-121
IB112 CWW-112
IB113 CWW-120
IB115 CWW-121
IC2
IC3
Q1
Q2
Q3
Q4
D5,6 : BG5534S
D7 : CXC-446
D8 : CXC-446
IC106
IC107
IC105 2/2
IC106,107 : BA6104
Q1~3 : 2SC536SP-F
Q4 : 2SB562-C
D1~4 : SM-1A-02
S1 : DEFEAT SWITCH CSG-174
RL1 CSR-020
C200 CCG-081
FUSE 4A E21-603
TO BATTERY
LAMP CEL-100
IL1
IL2
Lch SP(G)F
Lch SP(+)F
Lch SP(G)R
Lch SP(−)R
GND
Rch SP(−)R
Rch SP(G)R
Rch SP(+)F
Rch SP(G)F
BLACK
GREEN
GREEN/BLACK
GRAY/BLACK
GRAY
RED
Level
Lamp
7
8
9
10
11
12
A
B
C
D

Fig. 8

7. CONNECTION DIAGRAM (BP-720)



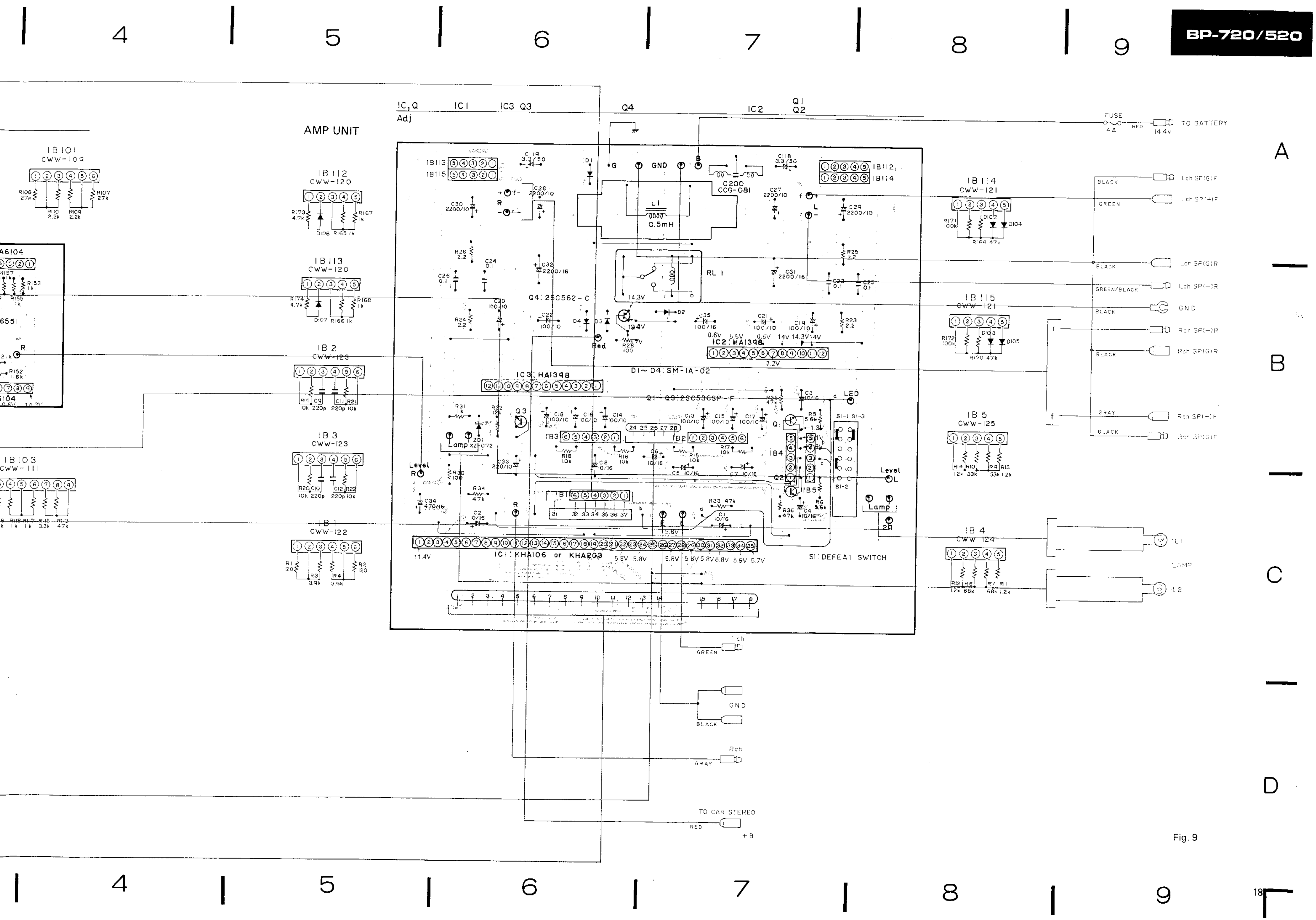

4
5
6
7
8
9
A
B
C
D
AMP UNIT
IC,Q Adj
IC1
IC3 Q3
Q4
IC2
Q1 Q2
FUSE 4A
RED
14.4V
TO BATTERY
IB101 CWW-109
IB112 CWW-120
IB113 CWW-120
IB2 CWW-123
IB3 CWW-123
IB1 CWW-122
IB103 CWW-111
IB114 CWW-121
IB115 CWW-121
IB5 CWW-125
IB4 CWW-124
C200 CCG-081
L1 0.5mH
RL1
Q4: 2SC562-C
IC2: HA1398
IC3: HA1398
D1~D4: SM-1A-02
Q1~Q3: 2SC536SP-F
IC1: KHA106 or KHA203
S1: DEFEAT SWITCH
LED
Level R
Level L
Lamp
Lch SP(G)F
Lch SP(+)F
Lch SP(G)R
Lch SP(-)R
GND
Rch SP(-)R
Rch SP(G)R
Rch SP(+)F
Rch SP(G)F
BLACK
GREEN
GREEN/BLACK
GRAY
LAMP
L1
L2
Lch
GREEN
GND
BLACK
Rch
GRAY
TO CAR STEREO
RED
+B

Fig. 9

8. EXPLODED VIEW

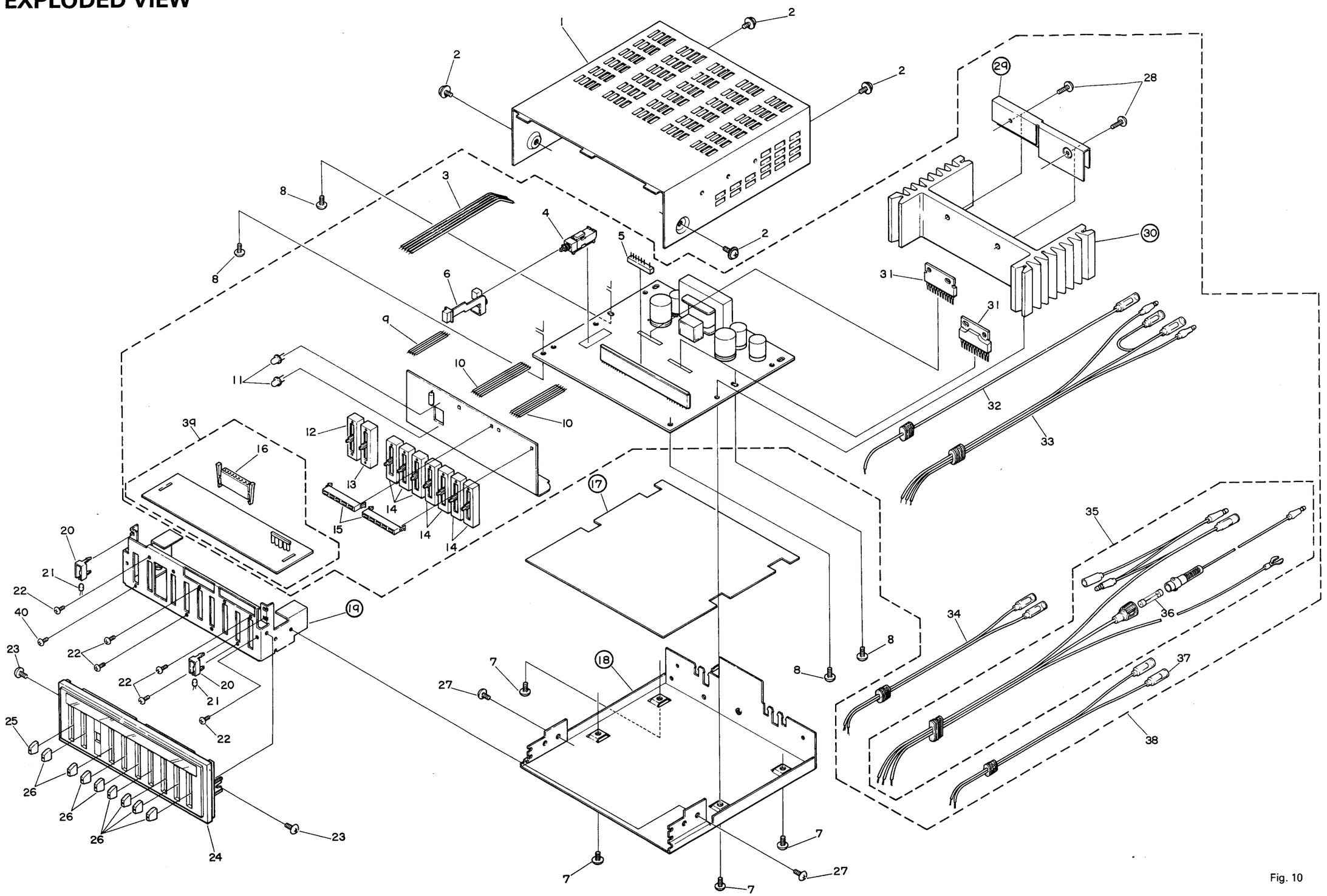


Fig. 10

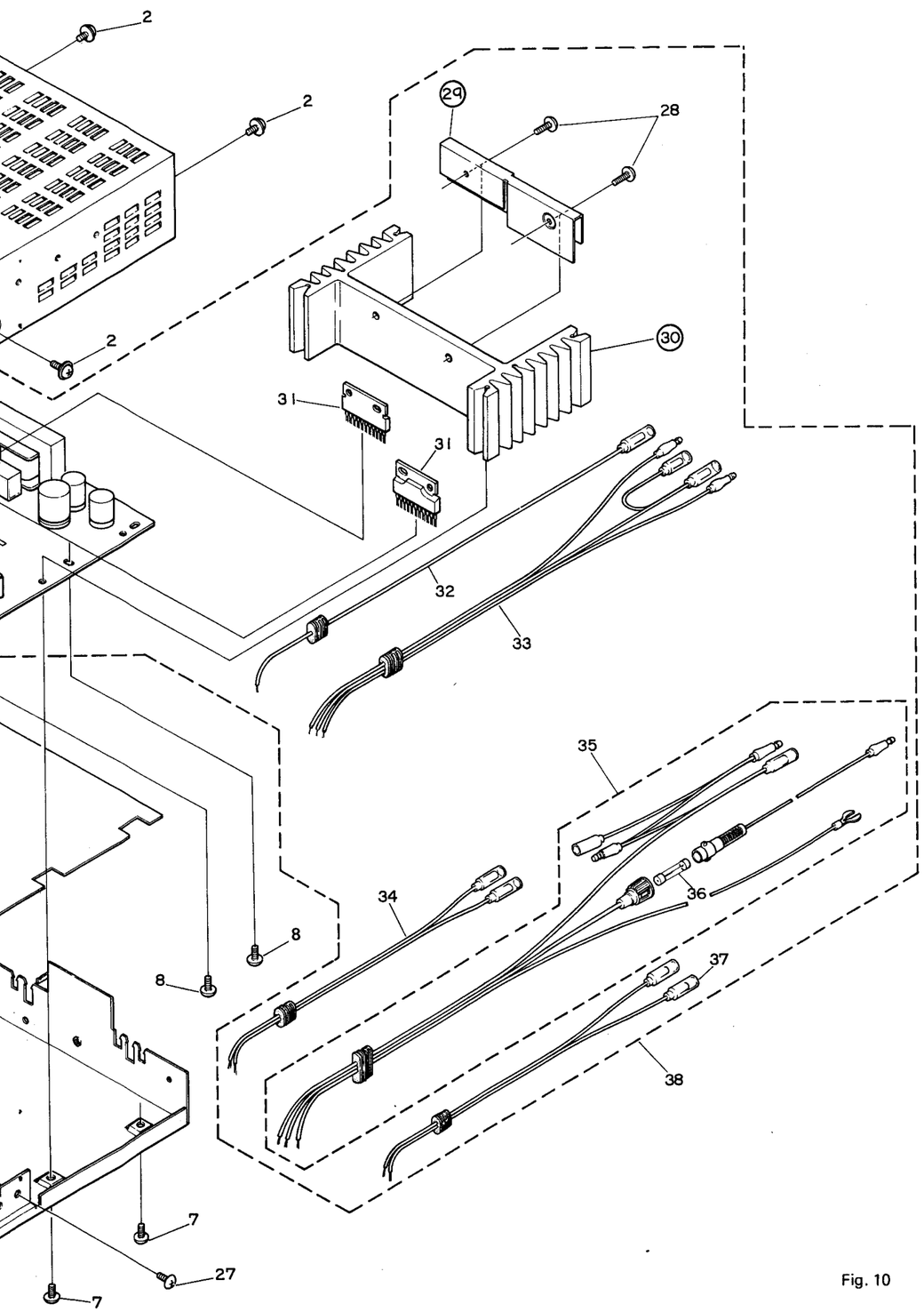


Fig. 10

• Parts List

NOTE:

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Mark	No.	Part No.	Description
	1.	CNB-658	Case
	2.	BMN30P060FBK	Screw
	3.	CDE-989	Connector
★★	4.	CSG-174	Switch (DEFEAT)
	5.	CKS-066	Plug
★	6.	CXC-445	Button Unit
	7.	BMZ30P080FMC	Screw
	8.	BMS30P050FMC	Screw
	9.	CDE-990	Connector (BP-720)
	10.	CDE-991	Connector (BP-720)
★	11.	BG5534S	LED
★★	12.	CCS-285	Volume, 20kΩ(W) (ECHO) (BP-720)
★★	13.	CCS-286	Volume, 20kΩ(W) (FADER)
★★	14.	CCS-287	Volume, 20kΩ(W)
★	15.	CXC-446	LED Array (BP-720)
	16.	CDF-001	Connector (BP-720)
	17.		Insulator
	18.		Chassis
	19.		Frame
	20.	CNW-318	Holder (BP-720)
★★	21.	CEL-100	Lamp (BP-720)
	22.	BMZ20P030FMC	Screw
	23.	BMF30P050FMC	Screw
	24.	CXC-443	Grille Assy (BP-520)
		CXC-444	Grille Assy (BP-720)
★	25.	CAC-384	Button (ECHO) (BP-720)
★	26.	CAC-384	Button
	27.	BMZ30P050FMC	Screw
	28.	BMZ30P100FMC	Screw
	29.		Heat Sink
	30.		Heat Sink
★★	31.	HA1398	IC
	32.	CDE-986	Cord
	33.	CDE-985	Cord
	34.	CDE-987	Cord
	35.	CDE-984	Cord
★★	36.	E21-603	Fuse, 4A
	37.	CDE-988	Cord
	38.	CWK-258	Amp Assy (BP-520)
		CWK-259	Amp Assy (BP-720)
	39.	CWG-106	Echo Unit (BP-720)
	40.	BMZ20P030FMC	Screw (BP-720)

9. ELECTRICAL PARTS LIST

NOTE:

When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*RN1/4SR 5 6 2 1 F*

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Amp Unit (BP-520) (BP-720)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★★	KHA106 or KHA203	IC1
★★	HA1398	IC2, IC3
★★	2SC536SP	Q1 – Q3
★★	2SB562	Q4
★	SM-1A-02	D1 – D4
★	XZ-072	ZD1
	CWW-122	IB1 (R1 – R4)
	CWW-123	IB2 (R19, R21, C9, C11), IB3 (R20, R22, C10, C12)
	CWW-124	IB4 (R7, R8, R11, R12)
	CWW-125	IB5 (R9, R10, R13, R14)
	CWW-120	IB112 (R165, R167, R173) (BP-720) IB113 (R166, R168, R174) (BP-720)
	CWW-121	IB114 (R169, R171, D102, D104) (BP-720) IB115 (R170, R172, D103, D105) (BP-720)
	CTH-072	L1 Coil
	CSR-020	RL1 Relay
★★	CSG-174	S1 Switch (DEFEAT)

RESISTORS

Mark	Part No.	Symbol & Description
	RD1/4VM□□□J	R5, R6, R15 – R18, R23 – R26, R28, R30 – R36
	VACANT	R27, R29

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA100M16L	C1 – C5, C7, C8
	CEAH100M16L	C6
	CEA101M10L	C13 – C22
	CQMA104J50L	C23 – C26
	CCH-087 (2200μF/10V)	C27 – C30
	CCH-050 (2200μF/16V)	C31, C32
	CEA221M10L	C33
	CEA471M16L	C34
	CEA101M16L	C35
	CEAH3R3M50L	C118, C119 (BP-720)

Volume Unit (BP-520) (BP-720)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★	BG5534S	D5, D6
★	CXC-446	D7, D8 (BP-720)
★★	CCS-285	VR1 Volume, 20kΩ(W) (BP-720)
★★	CCS-287	VR2 — VR8 Volume, 20kΩ(W)
★★	CCS-286	VR9 Volume, 20kΩ(W)

RESISTOR

Mark	Part No.	Symbol & Description
	RD1/2PS□□□J	R29

Echo Unit (CWG-106) (BP-720)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★★	MN3011	IC101
★★	MN3101	IC102
★★	AN6551	IC103 — IC105
★★	BA6104	IC106, IC107
★	MV-11	D101
	CWW-109	IB101 (R107 — R110)
	CWW-110	IB102 (R101 — R106)
	CWW-111	IB103 (R113 — R118)
	CWW-112	IB104 (R121, R125)
	CWW-113	IB105 (R111, R112, R119, R120, R122-R124)
	CWW-144	IB106 (R150)
	CWW-115	IB107 (R138, R139, C109)
	CWW-116	IB108 (R126 — R131)
	CWW-117	IB109 (R132 — R137)
	CWW-118	IB110 (R143, R147, R148)
	CWW-119	IB111 (R140 — R142, R144 — R146)

RESISTORS

Mark	Part No.	Symbol & Description
	RD1/4VM□□□J	R149, R151 — R163

CAPACITORS

Mark	Part No.	Symbol & Description
	CSZAH3R3K25 or CSZA3R3K25	C101, C102
	CQMA103J50L	C103, C104, C106
	CQMA561J50L	C105
	CQMA333J50L	C107
	CQMA392J50L	C108
	CQMA563J50L	C110
	CQMA102J50L	C111
	CQMA223J50L	C112
	CQMA272J50L	C113
	CSZA3R3K25	C114
	CEA3R3M50L	C115
	CEA221M10L	C116
	CCH-086 (470μF/10V)	C117

Miscellaneous Parts List (BP-520) (BP-720)

Mark	Part No.	Symbol & Description
★★	E21-603	Fuse, 4A
★★	CEL-100	IL1, IL2 Lamp (BP-720)

10. PACKING METHOD

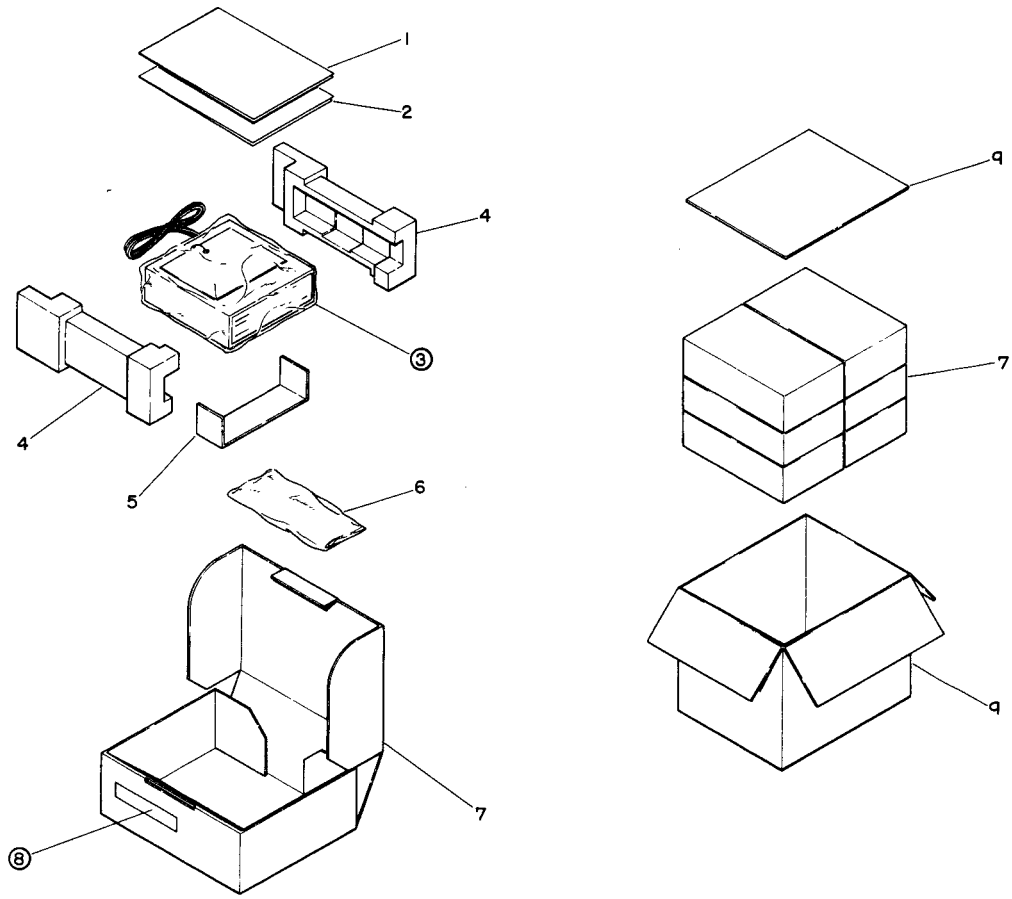


Fig. 11

Parts List

NOTE:

- *Parts whose parts numbers are omitted are subject to being not supplied.*

Mark	No.	Part No.	Description
	1.	CRB-448	Owner's Manual (BP-520/US) (English)
		CRD-225	Owner's Manual (BP-520/CA) (English, French)
		CRD-226	Owner's Manual (BP-520/E) (English, French, German, Spanish)
		CRB-449	Owner's Manual (BP-720/US) (English)
		CRD-228	Owner's Manual (BP-720/CA) (English, French)
		CRD-229	Owner's Manual (BP-720/E) (English, French, German, Spanish)
	2.	CRD-227	Owner's Manual (BP-520/E) (Swedish, Norwegian, Dutch, Italian)
		CRD-230	Owner's Manual (BP-720/E) (Swedish, Norwegian, Dutch, Italian)
	3.		Cover
	4.	CHC-315	Styrofoam (1 set pair)
	5.	CNB-198	Mounting Bracket
	6.	CEA-466	Accessory Kit
	6-1.	CNF-111	Strap
	6-2.	CDE-437	Cord
	6-3.	CBA-028-A	Screw for Strap
	6-4.	CBA-101-0	Screw, M4×6
	6-5.	CBA-102-0	Screw, M5×6
	6-6.	B70-055-A	WN4ϕ×4.5t
	6-7.	B70-056-A	WN5ϕ×5.3t
	6-8.	WS40FMC	SW4ϕ×1t
	7.	CHC-311	Carton (BP-520/US, CA)
		CHC-313	Carton (BP-520/E)
		CHC-316	Carton (BP-720/US, CA)
		CHC-318	Carton (BP-720/E)
	8.		Seal (These seals are applied only to the Model (BP-720/E, BP-520/E)
	9.	CHC-312	Contain Box (BP-520/US, CA)
		CHC-317	Contain Box (BP-720/US, CA)