AC ADAPTOR BATTERY CHARGER for CAMCORDER

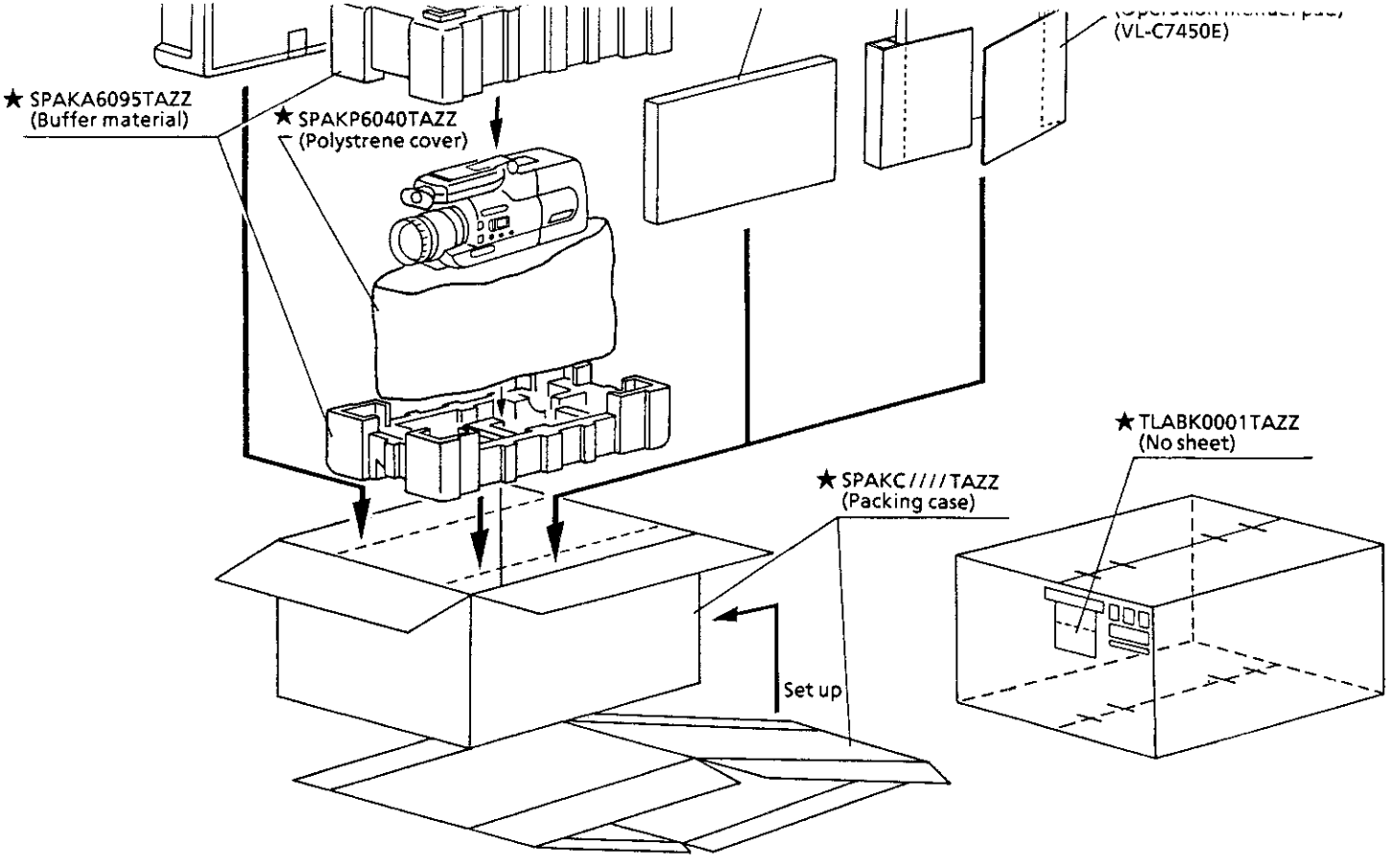
UADP-0114GEZZ
(VL-C790S)
UADP-0119GEZZ
(VL-C790H)
UADP-0120GEZZ
(VL-C790X)
UADP-0121GEZZ
UNIT No. (VL-C7450E)

Features

- Compact and light-weight design for easier portability.
- Automatic voltage change AC 110V to AC 240V allows the adaptor usage even in your trips abroad.
- Charging function with battery pack.
- Rapid charging function to enable the charging in a shorter period of time.

Specifications

Power requirement	AC 110~240V (50/60 Hz)
Power consumption	28W
Rated output voltage	DC9.6V
Rated output current	1.3A
Charging system	Constant current, peak detection, timer controlled
Dimensions	70 (W) x 43 (H) x 154 (D) mm
Weight	Approx. 380g



★Not Replacement Items

Accessory : Part code list by models

Model	AC adaptor	AV out cable	Packing case	Bagged printings
VL-C790S	UADP-0114GEZZ	QCNW-1069TAZZ	SPAKC6199TAZZ	CINSL0018RA01
VL-C790H	UADP-0119GEZZ	QCNW-1069TAZZ	SPAKC6200TAZZ	CINSE0089RA01
VL-V790X	UADP-0120GEZZ	QCNW-3593GEZZ	SPAKC6201TAZZ	CINSE0090RA01
VL-C7450E	UADP-0121GEZZ	QCNW-3593GEZZ	SPAKC6202TAZZ	CINSZ1321RA01

Operation of AC adaptor

1. Outline

This adaptor has been designed for supplying power to camcorders and for quickly charging their related batteries.

The unit consists of two main circuits; primary control circuit (separately excited switching regulator) and secondary multi-function circuit.

See the block diagram in Fig. 1.

Hybrid ICs are used for these circuits for simple and portable design in a small package. The input voltage levels are in a wide range of 110-240V (50/60 Hz) so that users can take the unit with them around the world.

The basic operation is under constant voltage control as well as constant current control by comparison with the reference voltage given in the secondary stage. The features include full-charge detection circuit and timer protection circuit. The unit serves also as a charger for nickel-cadmiun storage batteries. Batteries can be easily taken in and out of position. Charging method with $-\triangle V$ detection is adopted due to the quick and stable charging performance.

2. Operation

1) Adaptor mode

When no battery is in the adaptor, the adaptor output terminal continuously feeds stable DC voltage (10.5V, 1.3A) in order to run the camcorder.

The power consumption is also stable in the overall range of control input voltages; thus not affected by input voltage fluctuations.

The output characteristic is 1.5 times as high as the rated level, and the adaptor can withstand transient current such as starting current and rush current. The adaptor's output terminal is exposed and may be affected by external short-circuit. To cope with this, an over-current protector having an appropriate power control characteristic is employed to protect the adaptor against possible troubles and breakdowns as well as to avoid unusual heat inside.

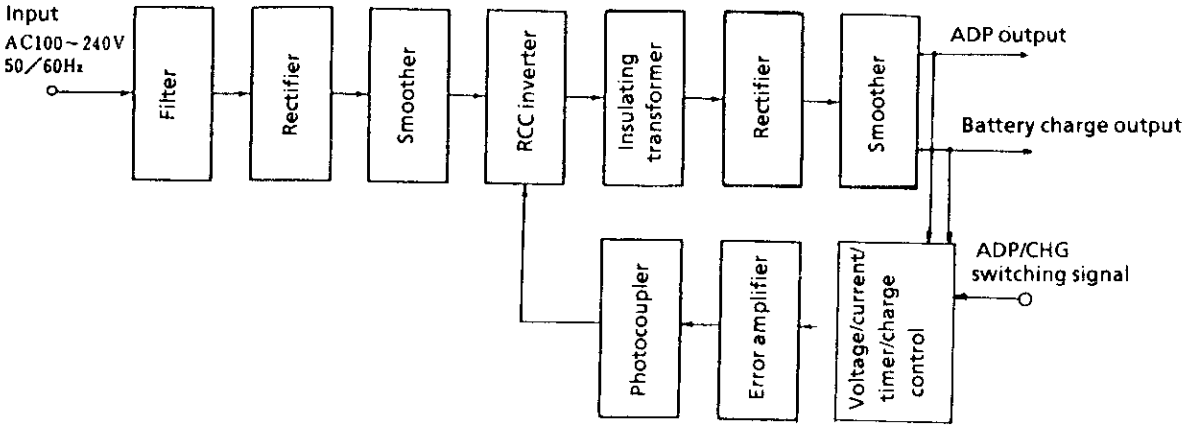
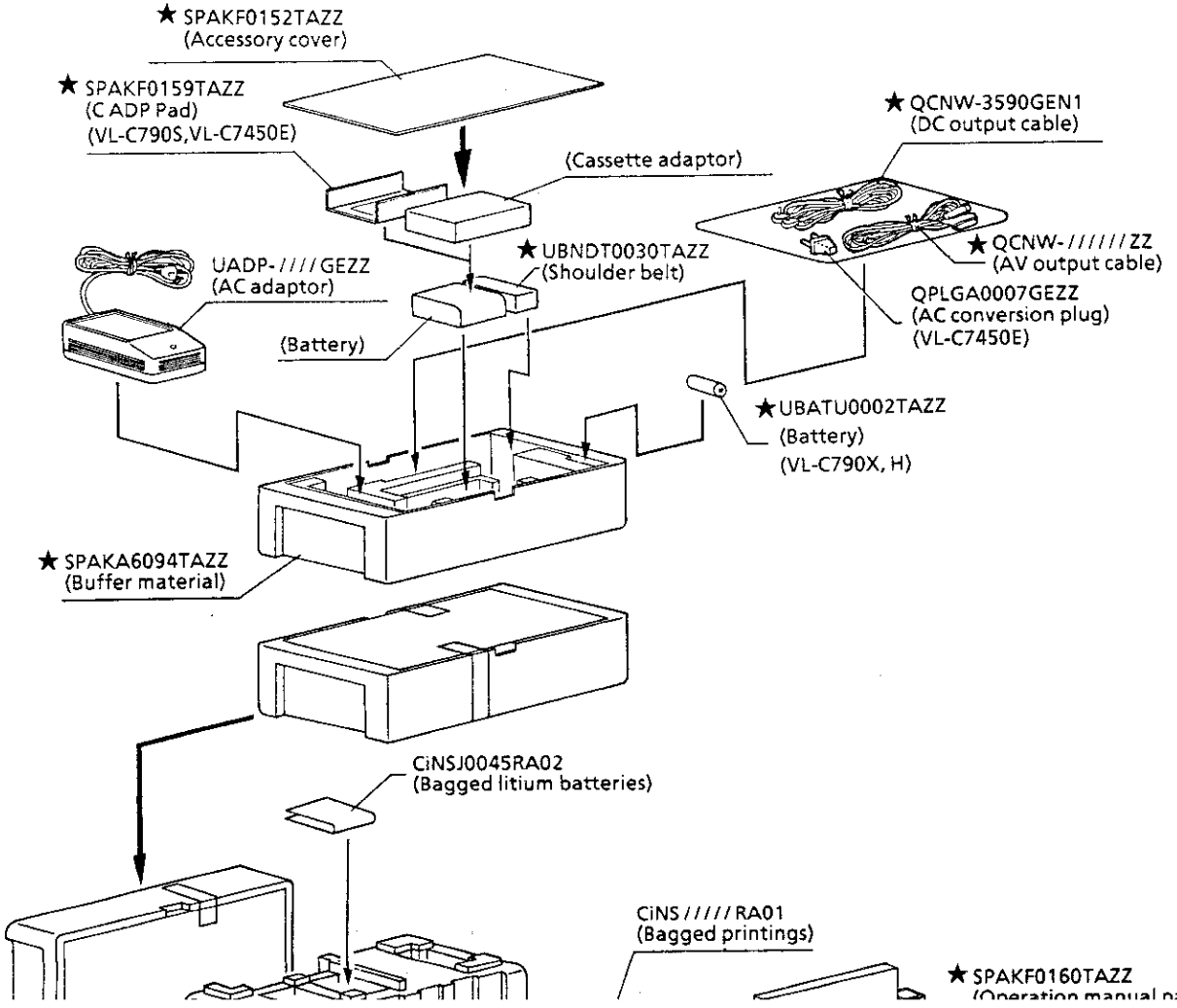


Fig. 1 Block diagram (camcorder adapter)

PACKING OF THE SET

- Setting positions of the Knobs

CAMECORDER	Focusing Ring Position	∞
	Zoom Lever Position	Tele
	Full Auto Switch	Auto
	Camera Rec/VCR Play Switch	Camera Auto
	Rec Speed Select button	SP
	Edit Switch	OFF



2) Charge mode

When the specific battery is put in the adaptor, the unit serves to quickly charge the battery.

The charging takes place in three stages which are taken one after another.

The first stage is called initial charge. A 1.1C constant current charging continues under the regulated 15.2V and for a limited time being controlled by the 3-minute timer. This voltage regulation is to protect the adaptor against an over-voltage, while the time regulation is to keep a fully charged battery from being recharged (over-charging protection) and to prevent a dead battery from causing a charging trouble due to the initial voltage drop. By so doing, the battery starts being charged smoothly.

The second stage is a rapid charging mode. Like in the initial stage, the voltage is regulated at 15.2V and the time is limited to 90 minutes by the timer. A 1.1C constant-current charging is kept on and at the same time a charge voltage drop ($-\triangle V$ phenomenon) that occurs at the end of charging is detected to stop the rapid charging. The 1.1C rapid charging is completed in about 60 minutes, but here the time is prolonged to about 90 minutes to prevent over-charging which might be caused by a $-\triangle V$ detection failure. The $-\triangle V$ level is preset to about 150-180 mV to keep off malfunction due to noises.

The third stage is a trickle charging. In this stage after the rapid charging has been completed, the battery is kept charged up to the full. This type of charging improves the charging by 1/20 to 1/30C.

The charging characteristics of these three stages are shown in Fig. 2.

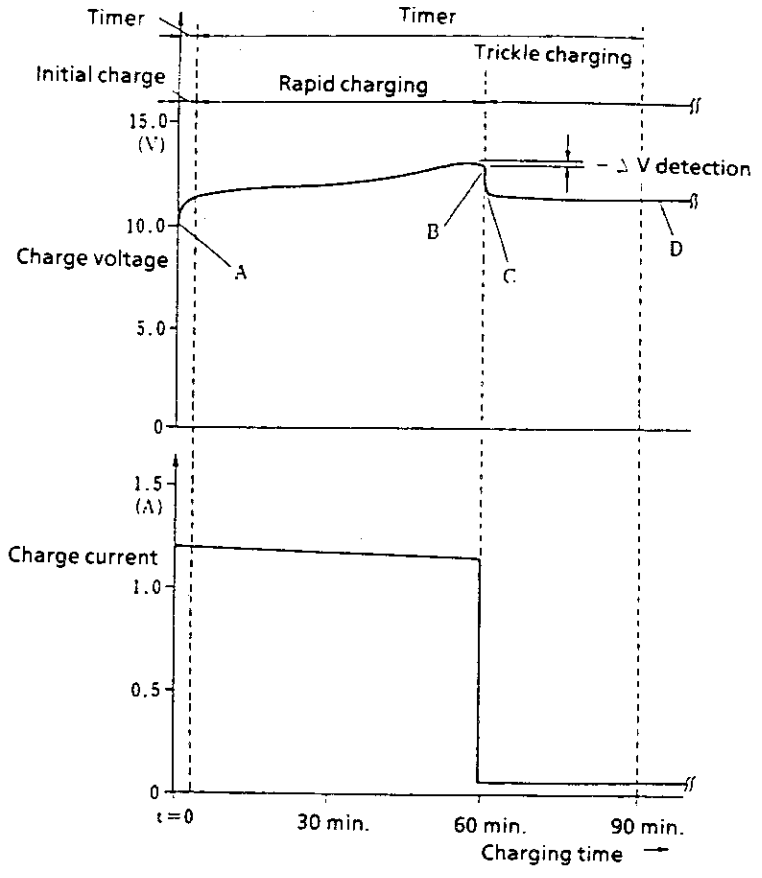


Fig. 2 Charging characteristics

3. Circuit description

Below discussed is the adaptor circuitry, referring to the circuit diagram in Fig. 3.

1) Input circuit

The input section is composed of a noise filter and a capacitor input rectifying/smoothing circuit. The noise filter, consisting of L1, C1, C3, C4 and C5, is used to reduce common-mode noises. the resistor R9 is intended to discharge the current that is left at the input AC plug when the power is turned off. The rush current which flows when the power is turned on is effectively controlled by the DC resistance of R1 and L1 and the working resistance of D1.

2) Switching circuit

In the switching circuit, the DC voltage

smoothed by C7 drives transistor Q1 to switch on and off according to the signal coming from the primary control circuit. A high-frequency inverter is formed by this transistor and transformer T1. R7 and C8 make a snubber circuit which absorbs a surge voltage being generated from the switching of Q1 after the rectification.

3) Primary control circuit

The signal that is fed through the photocoupler from the secondary control circuit is converted in its pulse width in order to drive the switching section.

The control IC, an MOS FET drive IC, has a built-in over-voltage protective circuit. D8 is used to detect an over-voltage and to stop the oscillation.

4) Output circuit

The secondary output switching is of ordinary on-off type. The choke, made of L2 and L3, works to keep down output ripples and common-mode noises. Q2 is used to switch between the rapid charging and the trickle charging. When Q2 is on, constant-current rapid charging is conducted. When it is off, trickle charge current flows through R13 and R21.

D15 is added so that a loaded battery is not discharged to the control circuit when the input is off.

5) Battery detection circuit

With no battery loaded, the output (pin (3)) of the comparator IC is kept at low level. Once a battery has been loaded, the levels of the positive and negative terminals are reversed to make the comparator output high an thus to turn on the switch Q4.

IC4 has a built-in extended-time timer and a built-in $-\triangle V$ detection circuit. When Q4 is turned on, Vcc is fed to start the time counting and to send the signal to the base of Q2 to initiate the rapid charging.

6) Secondary control circuit

The secondary control is intended to detect the output voltage and current, to feed the signal through the photocoupler to the primary control circuit, and to regulate the switching section.

The operational amplifier I is for setting and detecting the constant voltage. The switch Q6 serves to select between the adaptor mode (10.5V) and the charge mode (15.2V).

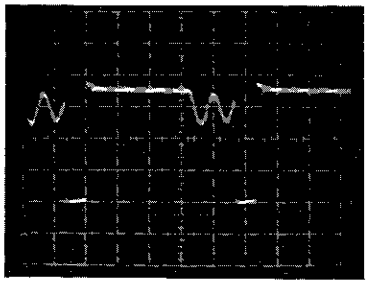
The operational amplifier II is for setting and detecting the constant current. The switch Q8 serves to select between the adaptor mode (2.7-3.0A) and the charge mode (1.1A).

The zener diode D11 makes the reference voltage.

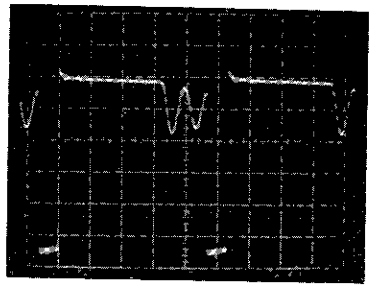
To the input terminals of these operational amplifiers, the reference voltage signal and the output voltage/current signals are applied for comparison.

7) Indicators

The LED D16 lights up when the adaptor mode is chosen. During the charge mode, on the other hand, the LEDs D16 and D17 are kept on. When the charging has been completed (in the trickle mode), the LED D17 alone goes out.

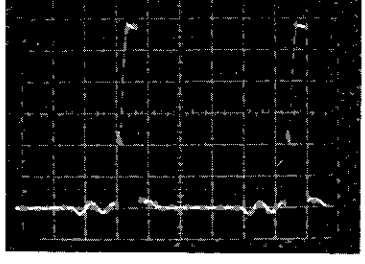


Q1
Voltage waveform at paints B-S
100V/div
2μsec/div

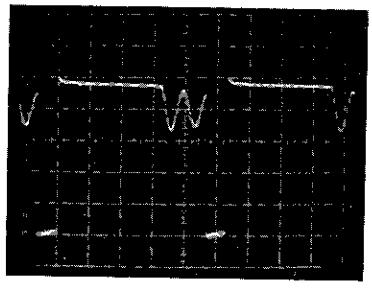


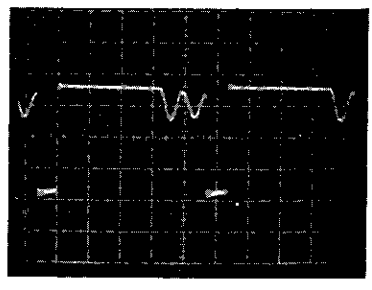
D9
Voltage waveform at point A
20V/div
2μsec/div

The AC power cord
UADP-0119GEZZ is
not provided with the plug.



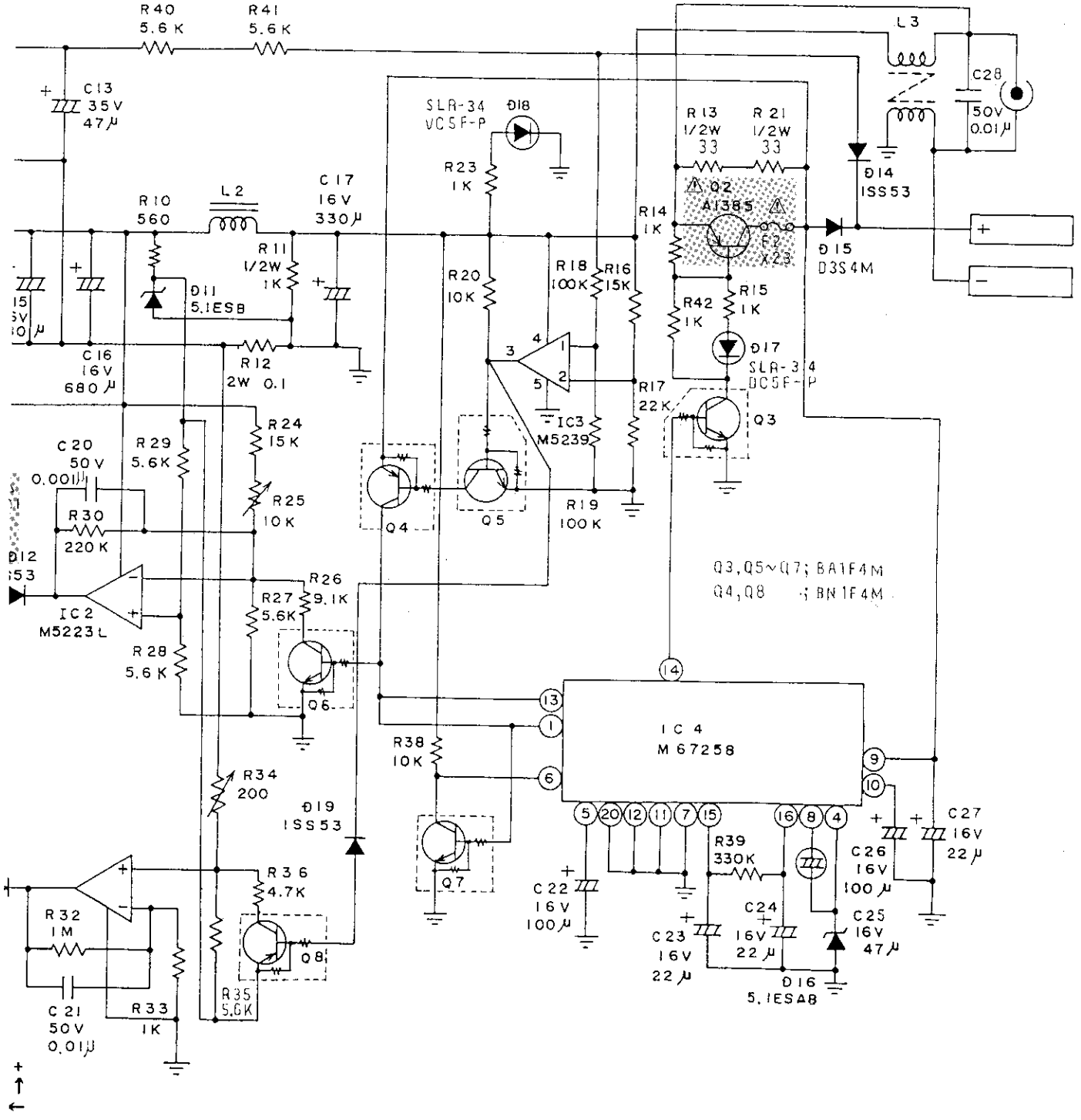
Q1
Voltage waveform at points S-G
2V/div
2μsec/div





D6
Voltage waveform at point A
20V/div
2μsec/div

⚠ AND SHADED COMPONENTS ⚠ - SAFETY RELATED PARTS



D10
Voltage waveform at point A
20V/div
2μsec/div

Measuring conditions: AC input 220 V
1.3 A (ADP mode)

7	8	9	10	11	12

Output voltage adjustment

Step 1: AC input 220 V

Step 2: Load current 1.3 A (ADP mode)

Step 3: Adjust control R25 so that the output voltage be 10.35-10.45 V.

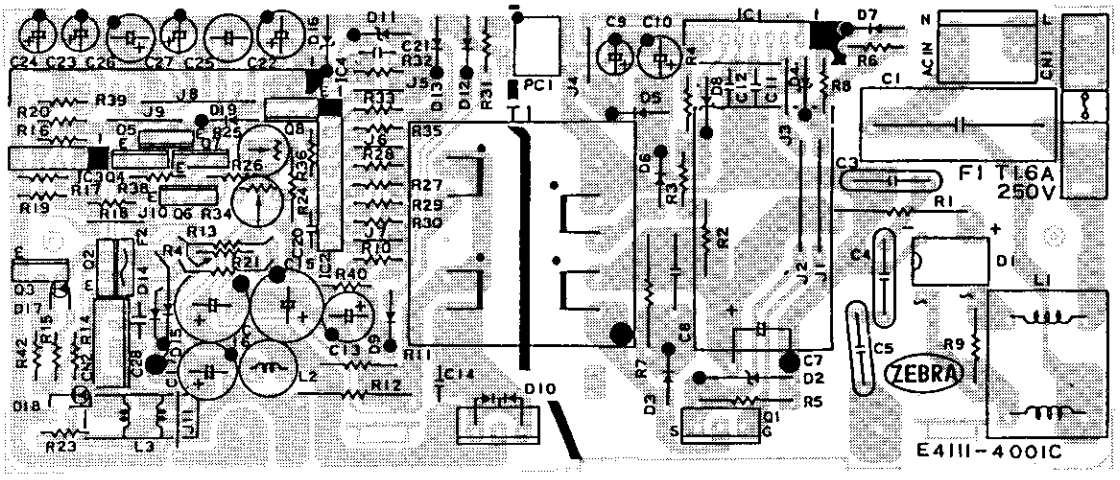
Constant-current adjustment

Step 1: AC input 220 V

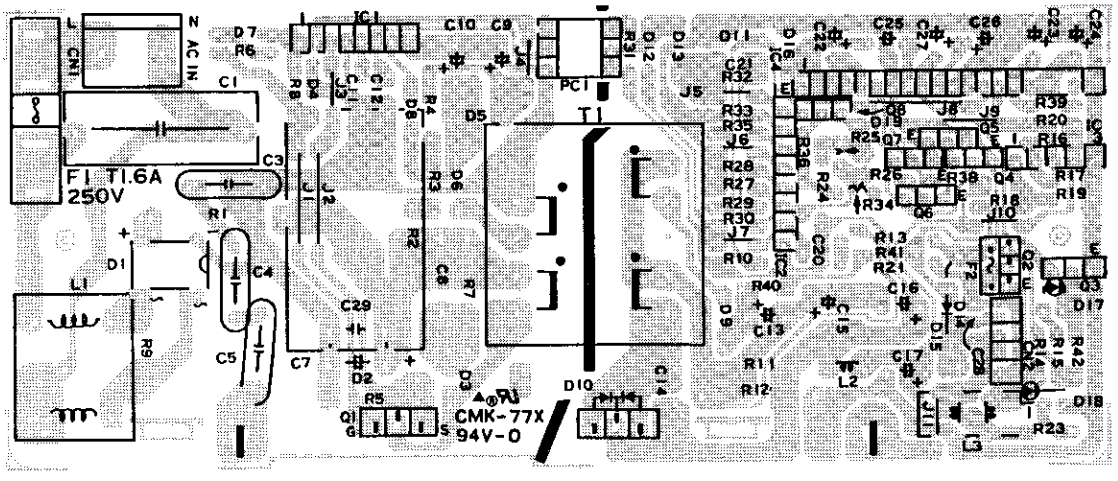
Step 2: Connect a 10-ohm resistor to the battery terminal. Make sure that the power consumption of this resistor is about 15 W.

Step 3: Adjust control R34 so that the output current be 1.05-1.15 A.

Component side



Soldering side



★ MARK : SPARE PARTS-DELIVERY SECTION

PARTS LIST

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by ⚠ in the Replacement Parts Lists.
The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER **2. REF. NO.**
3. PART NO. **4. DESCRIPTION**
5. CODE

• PWB Unit ..... Not Supplied.

⚠ MARK:SAFETY RELATED PARTS

Ref.No	Part No.	★	Description	Code
INTEGRATED CIRCUITS				
IC1	95KUCH0072ZZ		M67390	AS
IC2	95KUCC0026AZ		M5223L	AF
IC3	95KUCC0015AZ		M5239L	AF
IC4	95KUCH0087ZZ		M67258	AW
TRANSISTORS				
⚠ Q1	95KUAG0048AZ		2SK1142	AM
⚠ Q2	95KUAA0086AZ		2SA1385	AF
Q3 5, 6, 7	95KUAZ0004AZ		BA1F4M	AC
Q4, 8	95KUAZ0008AZ		BN1F4M	AC
⚠ PC1	95KUDC0093BZ		PS2652-K	AF
DIODES				
⚠ D1	95KUBB0148DZ		S1WB(A)60	AF
D2, 4	95KUBDAC120C		RD12ESAB2	AB
D3	95KUBC0169CZ		ERA22-06	AC
D5, 7, 12, 13, 14, 19	95KUBA0004AZ		ISS53	AB
D6, 9	95KUBC0221AZ		ERA18-02	AC
D8	95KUBDAC240C		RD24ESAB2	AB
⚠ D10	95KUBB0066ST		ESAB85M-009A	AF
D11	95KUBDAC5R1C		RD5.1ESAB2	AB
D15	95KUBC0160BZ		D3S4M	AG
D16	95KUBDAC5R1C		RD5.1ESAB2	AB
D17	95KUDC0066EZ		SLR-34DC5F-P	AC
D18	95KUDC0067EZ		SLR-34VC5F-P	AC
COILS AND TRANSFORMERS				
⚠ L1	95KUKZ0306ZZ			AK
L2	95KUKZ0251ZZ			AE
L3	95KUKZ0129ZZ			AK
⚠ T1	95K129035013			AK
CONTROLS				
R25	95KUFDB103AB		10kohm	AC
R34	95KUFBA201CD		200ohm	AC
CAPACITORS				
C1	95KUGFZ224EG		Film 0.22F	AB
⚠ C3, ⚠ 4, ⚠ 5	95KUGCQ472AB		Ceramic 4700pF	AD
C7	95KUGAQ470DC		Electrolytic 47μF, 400V	AD
C8	95KUGCZ103AB		Ceramic 0.01μF, 1000V	AE
C9	95KUGAD220DC		Electrolytic, 22μF, 25V	AB
C10	95KUGAD101DC		Electrolytic, 100μF, 25V	AC
C11	95KUGFF473AR		Film 0.047μF	AB
C12, 20	95KUGFF102AR		Film 0.001μF	AB
C13	95KUGAE470DC		Electrolytic 47μF, 35V	AE
C14	95KUGCZ102AD		Ceramic, 0.001F, 500V	AB
C15, 16	95KUGAC681DV		Electrolytic, 680μF, 16V	AE
C17	95KUGAC331DC		Electrolytic, 330μF, 16V	AD
C21	95KUGFF103AR		Film 0.01μF, 50V	AB
C22	95KUGAC101DC		Electrolytic, 100μF, 16V	AC
C23, 24, 26, 27	95KUGAC220DC		Electrolytic, 22μF, 16V	AB
C25	95KUGAC470LB		Electrolytic 47μF, 16V	AC
RESISTORS				
R1	95KUEAE2R2AC		2.2ohm 2W	AD
R2, 3, 4,	95kUEEB1048B		Carbon, 100kohm	AA

★ MARK : SPARE PARTS-DELIVERY SECTION

Ref.No	Part No.	★	Description	Code
R18, 19	95KUEEB104BB		Carbon, 100kohm	AA
R5	95KUEFCR39AK		Metal0.39ohm 1/2W	AA
R6	95KUEEB5R6BB		Carbon, 5.6ohm	AA
R7	95KUEFE683BL		Metal, 68kohm, 2W	AA
R8	95KUEFB221BB		Carbon 220ohm	AA
R9	95KUEEC474AK		Carbon 470kohm 1/2W	AA
R10	95KUEEB561BB		Carbon 560ohm	AA
R11	95KUEEC102AK		Carbon 1kohm 1/2W	AA
R12	95KUEFER1OBJ		Metal 0.1ohm, 2W	AA
R13, 21	95KUEEC330AK		Carbon 33ohm, 1/2W	AA
R14, 15, 23, 33, 42	95KUEEB102BB		Carbon 1kohm	AA
R16, 24	95KUEEB153BB		Carbon 15kohm	AA
R17	95KUEEB223BB		Carbon 22kohm	AA
R20, 38	95KUEEB103BB		Carbon 10kohm	AA
R26	95KUEEB912BB		Carbon 9.1kohm	AA
R27, 28, 29, 35, 40, 41,	95KUEEB562BB		Carbon 5.6kohm	AA
R30	95KUEEB224BB		Carbon 220kohm	AA
R31	95KUEEB272BB		Carbon 2.7kohm	AA
R32	95KUEEB105BB		Carbon 1Mohm	AA
R36	95KUEEB472BB		Carbon 4.7kohm	AA
R39	95KUEEB334BB		Carbon 330kohm	AA

MISCELLANEOUS

⚠ F1	95KPJCAY1601		Fuse, T1.6A 250V	AG
⚠ F2	95KPJT0089ZZ		Fuse 130°C	AD
⚠ *	95KEHS0475ZZ		AC Cord (VL-C790S)	AN
⚠	95KEHS0520ZZ		AC Cord (VL-C790H)	AN
⚠	95KEHS0521ZZ		AC Cord (VL-C790X)	AQ
⚠	95KEHS0523ZZ		AC Cord (VL-C7450E)	AN
	95KPZZ0265ZZ		Fuse CIIP	AA
	95KPGZ0015ZZ		Jack	AE

* Remark: When changing main cord the whole cord with connection plug must be changed.

* SWEDEN

The cable is kept as a spare part by SHARP ELECTRONICS (SVENSKA) AB.

* DENMARK

The cable is kept as a spare part by RUDOLPH SCHMIDT A/S.

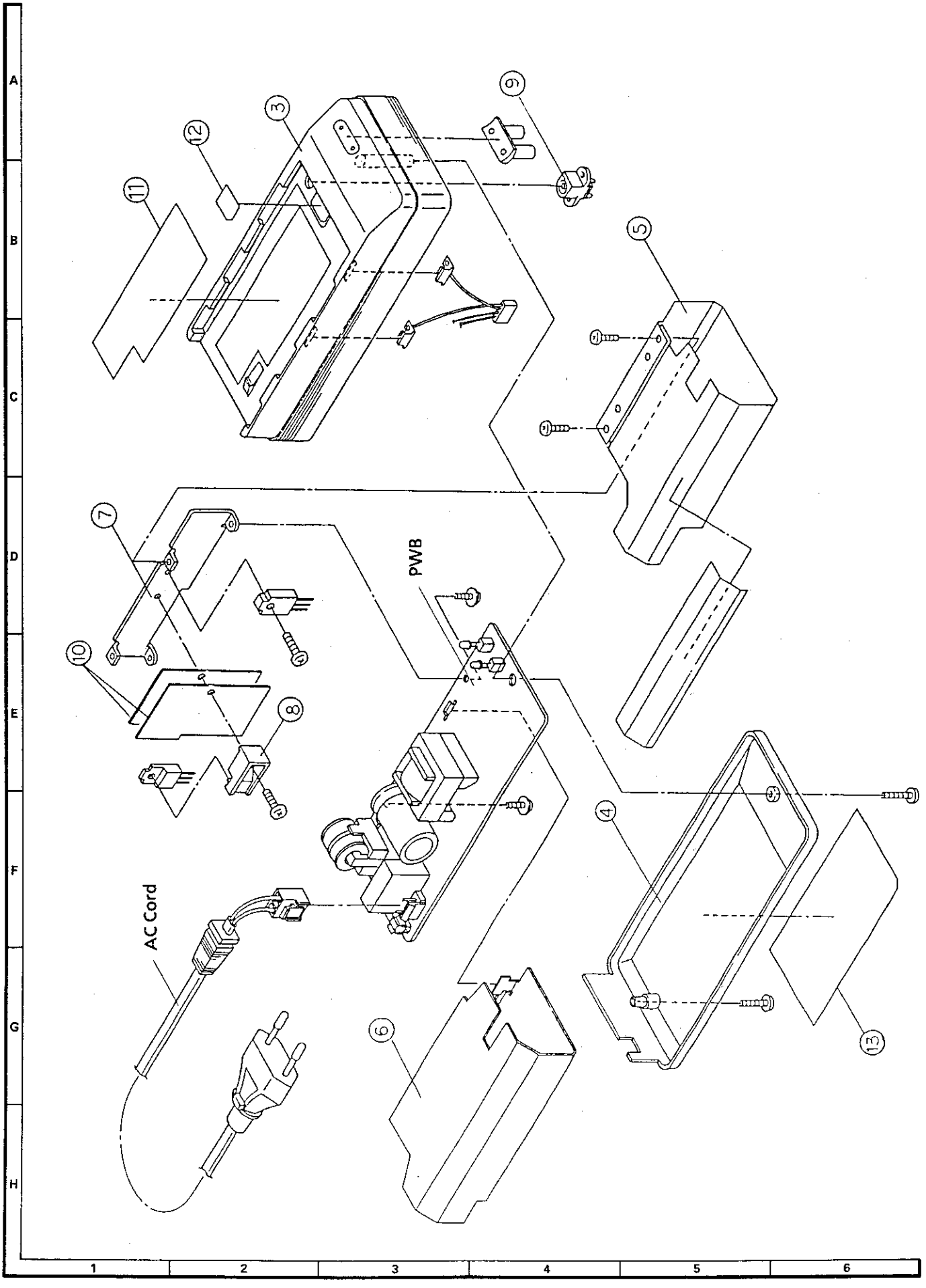
* FINLAND

The cable is kept as a spare part by ASA KULUTUS ELEKTRONIKKA OY.

* NORWAY

The cable is kept as a spare part by TRANSEL A/S.

Ref.No	Part No.	★	Description	Code
	CABINET AND MECHANICAL PARTS			
3	95KMRZ5094ZZ		Upper Cabinet	AQ
4	95KMRZ5105ZZ		Bottom Cabinet	AK
5	95KLRZ5602ZZ		Shield Case	AD
6	95KGZZ5006ZZ		Insulating barrier	AH
7	95KLRH5141ZR		Heat Sink	AF
8	95KMRZ5095ZZ		Supporter	AC
9	95KPGZ0015ZZ		Jack	AE
10	95KMRS5017ZZ		Heat sink sheet	AE
11	95KSBB1290ZZ		Caution Label (VL-C790S)	AD
11	95KSBB1323ZZ		Caution Label (VL-C790H, X, VL-C7450E)	AF
12	95KSBB1286ZZ		Label	AD
13	95KSAB0847ZZ		Model Label (VL-C790S)	AE
13	95KSAB0872ZZ		Model Label (VL-C790H)	AF
13	95KSAB0902ZZ		Model Label (VL-C790X)	AE
13	95KSAB0871ZZ		Model Label (VL-C7450E)	AE


PWB
AC Cord

VL-C790S/H/X
VL-C7450E

SHARP

T7946-S
Printed in Japan