

**KENWOOD**

DC POWER SUPPLY

**BP-70**

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**INSTRUCTION MANUAL**

KENWOOD CORPORATION

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# OVERVIEW AND CONFIGURATION

## Overview

The BP-70 DC Power Supply is the DC-DC converter for the CS-3035. It is extremely useful for use as an oscilloscope when there is no AC power supply because it can be operated by internal or external batteries. It can operate for a long time if a car battery is used for the external battery (+ 12 V). The batteries are installed internally and can be charged without removing them from the unit.

The unit is portable and economical.

## Configuration

1. Main Unit	DC Power Supply	1
2. Accessories	1. External battery connector	1
	2. Instruction manual	1

# SPECIFICATIONS

1. Batteries	NiCad Batteries: 4000mAh × 10 (internal) Other external battery: (+ 11.5 V to + 13.5 V)
2. Input current	2A (Approx. 2 hrs. use)
3. Output	+ 18 V, - 18 V, + 110 V, + 150 V (each output voltage is unregulated)
4. Charging current	300 mA (16 hrs/charge)
5. Charging frequency	17 kHz
6. Switch	CHG-OPE (front) Internal and external (rear)
7. Dimensions	180 (W) × 41 (H) × 220 (D) mm
Weight	2.5 Kg
8. Ambient temperature and humidity	5°C to 35°C, 85% RH
9. Leak current	(Input current when the power is off) 200 $\mu$ A max.
10. Other	<ul style="list-style-type: none"><li>• The input and output have a common ground.</li><li>• The negative side of the input can be connected to the unit ground.</li><li>• The oscilloscope cannot be used when the batteries are charging.</li></ul>

# OPERATION AND PRECAUTIONS

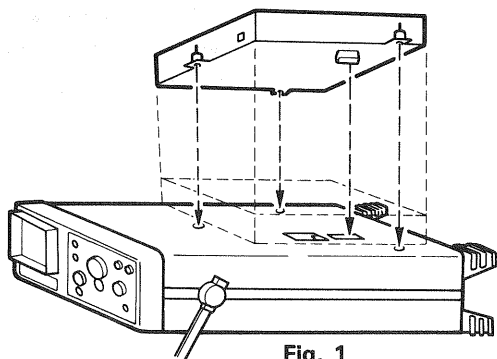


Fig. 1

## Main Unit Installation

Attach the unit as shown in the figure.

- 1) Turn the unit power supply switch OFF.
- 2) Loosen the screws on top of the main unit, turn it 180° and secure it to the blind plate.
- 3) Align the main unit connector with the oscilloscope connector.
- 4) Tighten the three screws with a Phillips head screwdriver to secure the main unit.

When the power supply is secured, operate the unit as described in the Operation Procedures section. The unit will operate properly when these procedures are performed. Be careful as the unit may be damaged if Step 1) described above is omitted.

# CONTROLS AND INDICATORS

## Front panel

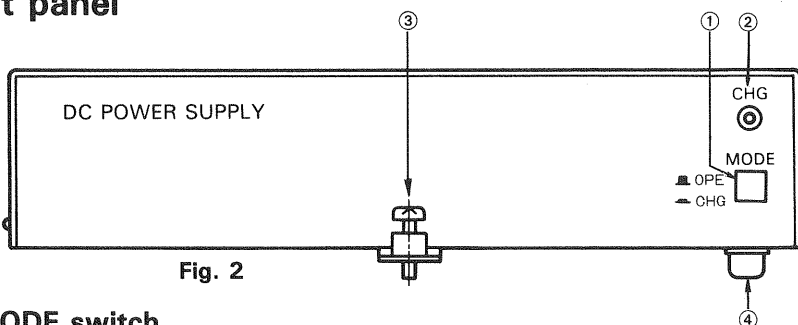


Fig. 2

### ① MODE switch

This switches between DC power operation and the charging operation for the internal batteries. When the switch is set to OPE, operations can be performed by either the internal batteries or an external DC power supply. When the switch is set to CHG, only the batteries can be charged from the oscilloscope unit.

## ② CHG Lamp

This lamp lights when the internal batteries are charging. The lamp goes out in the OPE mode.

## ③ Installation Screws

These screws are used to mount this unit to the oscilloscope securely.

## ④ Power Supply Connector

This connector is used for each DC power supply. If this unit is set to CHG, it is used for the internal battery charge supply terminal

## Rear Panel

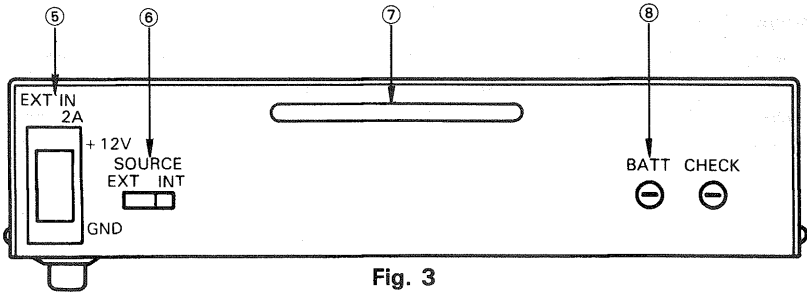


Fig. 3

## ⑤ EXT BATT Input terminal

This input terminal is used for connection to an external power source and is to be used with standard + 12V voltage. The input current is described in Chapter 2, Specifications.

## ⑥ Power Source Switch

This switch selects either the external power supply or the internal batteries for the DC power supply.

## ⑦ Supports

The supports are attached to the main unit and raised to prevent the unit from falling over when it is used upright position.

## ⑧ BATT CHECK Terminal

This terminal is used to check the terminal voltage of the internal batteries. The red terminal is the + 12V side and the black terminal is the ground side. This enables the remaining voltage of the internal batteries to be estimated. Refer to the section, Battery Charge and Discharge.

# OPERATING INSTRUCTIONS

## **Before Use**

This unit enables the CS-3035 to be used in locations where there is no AC power. Before this type of operation can be performed, it is first necessary to understand the assembly, functions and control operations.

## **Power Connector**

Pay close attention when using the connector for this unit because there is a possibility that it may be damaged by a short circuit. Never touch the connector with wet hands. Attach the connector cover when it is not being used.

## **External Power Supply**

Make sure that the positive and negative connections are correct when the unit is used with a car battery. If the unit frame touches the car frame when the positive side of the car battery is connected to the frame the power will short circuit, the internal fuse will cut off and operation will not be possible. (This unit and the CS-3035 frame are grounded.)

When the unit is used with the battery in a car, the battery will run down unless the car engine is run occasionally to charge the battery.

A rather large current flows when the CS-3035 is operated by this unit, so it is dangerous if the unit power switch is turned on when the external power source is connected. Make sure that the power switch is turned off before connecting the power supply.

## **Ambient Temperature**

Use the unit within a temperature range of 5° to 35°C. Damage may occur if the unit is not operated within the specified range.

## **Internal Battery**

Avoid overcharging or excessive discharge to avoid damaging the batteries.

The storage capacity decreases if the batteries have not been used for a long period of time, so be sure to charge them before use.

## Using the Exclusive Internal Batteries

Operate the unit in the following sequence after turning the main unit power switch OFF (Refer to the section "Installation Procedures" for an explanation of the installation of this unit.)

MODE switch  
SOURCE switch

OPE switch (not pressed)  
INT

After these settings have been performed, operate the oscilloscope in the regular manner. Note that the unit does not operate if MODE switch is set to CHG. When the unit operates normally, the operation time increases slightly if it is not used frequently.

## Charging the Internal Batteries

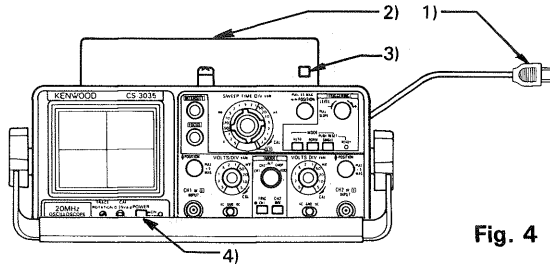


Fig. 4

- 1) Plug the main unit power supply cord into an electrical outlet.
- 2) Set the SOURCE switch on the rear of the main unit to INT.
- 3) Turn the main unit power switch ON.
- 4) Set the MODE switch on the front panel to CHG. (The CHG LED lights at this time).

If the main unit internal batteries are completely discharged, they must be charged 16 hours before they can be used. (After the batteries are completely charged, there is no problem if they continue to charge for another day or two, but do not allow them to charge for more than two days.)

### Ambient temperature at charging time

The temperature should be 10° to 30° C during charging to guarantee total performance of the batteries.

The batteries will not charge completely if they are charged when the temperature is high.

- **Oscilloscope operation is not possible during charging**

The oscilloscope does not operate while the internal batteries of the power supply are charging. The oscilloscope will not be damaged if operations are attempted. However, do not turn the power switch OFF because the charging operation is only performed when the power switch is turned ON.

- **External batteries cannot be charged**

## Oscilloscope Operation by External Batteries

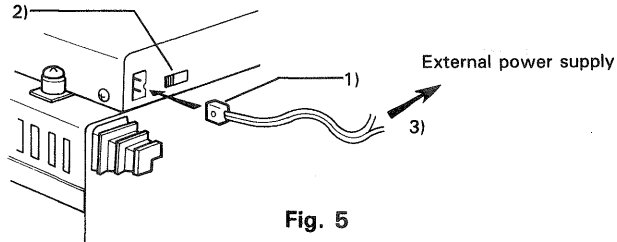


Fig. 5

- 1) Connect the external power supply connector to the external power input terminal in the rear side of the unit.
- 2) Set the SOURCE switch to EXT.
- 3) Connect the external power supply connector to the external power supply terminal.
- 4) Turn the oscilloscope power switch to ON.

Normal oscilloscope operations can be performed when these operations are completed.

- **Is the external power supply capacity adequate?**

When the oscilloscope is operated by using this power supply, the current described in Chapter 2, "Specifications" flows so make sure that the capacity is correct.

- **Be careful of the external power ground potential and voltage.**

When an automobile battery is used, be especially careful because the vehicle frame has a positive potential. This can be dangerous because a large current can flow instantaneously. Always verify the voltage of the external battery. If this occurs, the fuses in the power supply unit be replaced or further operations will not be possible.

- **External Battery Connector Poles**

Connect the external battery + 12 V side to the + 12 V side of the power supply as shown in the figure on the right.

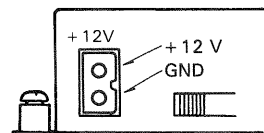


Fig. 6



# OPERATION CONDITION CHART

	AC POWER	CS-3035 Power Switch	BP-70 Mode Switch	Operation Mode
CS-3035 only	Yes	ON	——	CS-3035 Normal Operation
		OFF	——	No operation
	No	——	——	No operation
BP-70 DC POWER SUPPLY	Yes	ON	OPE	AC Power supply — no charge
			CHG	CS-3035 No operation *1 Only charging is performed.
		OFF	——	No operation
	No	ON	OPE	DC power supply operates *2 (Internal battery)
			CHG	No operation, no charge
		OFF	——	No operation

This chart describes the operations when the power supply and the internal batteries are used.

When operations are performed by using an external power supply (the power supply SOURCE switch is set to EXT), items \*1 and \*2 in the chart operate as described below. Other items operate as described in the chart.

\*1 CS-3035 does not operate and charging is not performed.

\*2 The DC power supply operates (external power)

# BATTERY CHARGE AND DISCHARGE CHARACTERISTICS (REFERENCE)

The data shown in the figure below indicate the measurements at the BATT CHECK terminal of the internal battery voltage when the main unit is combined with the CS-3035 and charging and discharging occur.

There is generally a large variation in the charge and discharge characteristics of NiCad batteries due to variations in the ambient temperature, elapsed time and the actual battery condition. Therefore, the remaining voltage in the batteries and the required charge time must be estimated. Accurate estimations can be performed by using this data for the batteries.

< DC POWER SUPPLY Charge and Discharge Characteristics Figure >

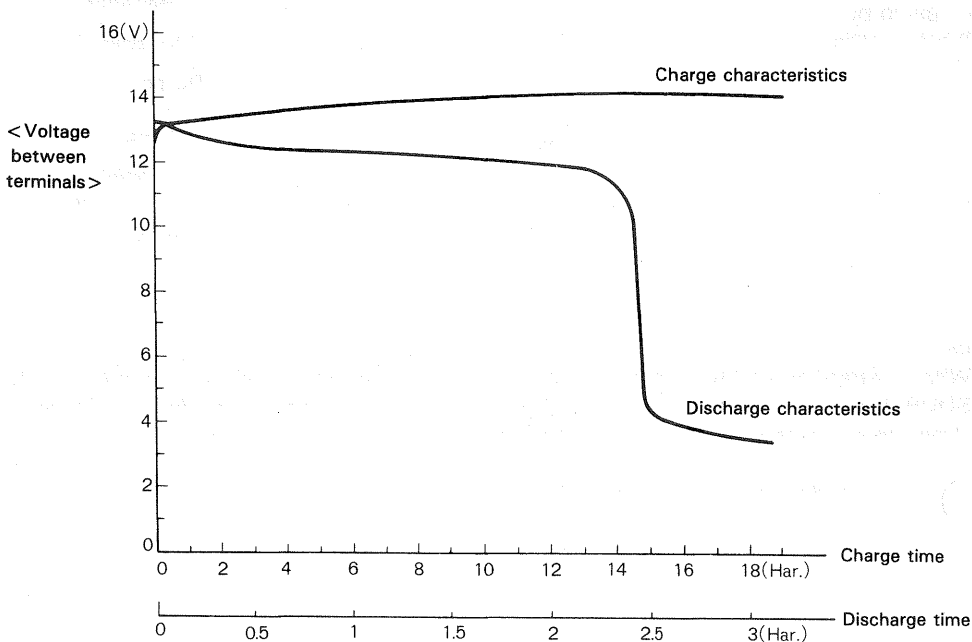


Fig. 7

# MAINTENANCE

## Maintenance

The power supply can operate properly in a variety of environmental conditions. Reliability is maintained and damage is prevented by performing proper operation and maintenance. When the unit is not used, be sure to attach the connector cover. Install the upper surface connector cover securely.

Do not use solvents or thinner to remove dirt from the set. Use a rag moisten with alcohol or neutral detergent to clean the set.

Always be sure to operate the unit correctly because excess voltage from external power supply operation in temperatures outside the specified operating range and strong impact shock can cause damage or decreased performances.

## If an Accident Occurs

Take adequate precautions when operating the power supply unit because NiCad batteries are used which can cause current overflow.

If the unit is damaged, do not remove the cover and contact your sales office immediately.

