MULTI-OUTPUT POWER SUPPLY
USER MANUAL

Declaration of Conformity

We

GOOD WILL INSTRUMENT CO., LTD.
No. 95-11, Pao-Chung Rd., Hsin-Tien City, Taipei Hsien, Taiwan
GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.
No.69 Lushan Road, Suzhou New District Jiangsu, China.

declares that the below mentioned products

GPS-2303/3303/4303/4302

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC, 92/31/EEC, 93/68/EEC) and Low Voltage Equipment Directive (73/23/EEC, 93/68/EEC).
For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Equipment Directive, the following standards were applied:

◎ EMC

EN 61326-1: Electrical equipment for measurement, control and laboratory use — EMC requirements **(1997+A1: 1998)**	
Conducted and Radiated Emissions EN 55011: 1998	Electrostatic Discharge EN 61000-4-2: 1995+A1:1998
Current Harmonic EN 61000-3-2: 1995+A1: 1998+A2: 1998 +A14: 2000	Radiated Immunity EN 61000-4-3: 1996+A1:1998
Voltage Fluctuation EN 61000-3-3: 1995	Electrical Fast Transients EN 61000-4-4: 1995
----------	Surge Immunity EN 61000-4-5: 1995
----------	Conducted Susceptibility EN 61000-4-6: 1996
----------	Voltage Dips/ Interrupts EN 61000-4-11: 1994

◎ **Safety**

Low Voltage Equipment Directive 73/23/EEC & amended by 93/68/EEC
EN 61010-1 : 2001 IEC 61010-1: 2001

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declares that the below mentioned products

GPS-4251(GPQ-2505D)

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC, 92/31/EEC, 93/68/EEC) and Low Voltage Equipment Directive (73/23/EEC).
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SAFETY TERMS AND SYMBOLS

Please take a moment to review these safety terms and symbols which may appear in this manual or on Equipment to prevent damage to the Function Generators.



WARNING. Warning statements identify condition or practices that could result in injury or loss of life.



CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.



DANGER High Voltage



ATTENTION refer to Manual



Protective Conductor Terminal



(ground) Earth Terminal



Frame or Chassis Terminal

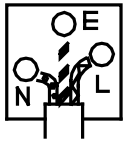
FOR UNITED KINGDOM ONLY

NOTE: This lead/appliance must only be wired by competent persons

WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow: Earth
Blue: Neutral
Brown: Live(Phase)



As the colours of the wires in main leads may not correspond with the colours marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with the letter E or by the earth symbol ⏚ or coloured Green or Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marke with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse : refer to the rating information on the equipment and/or user instructions for details. As a guide, cable of 0.75mm² should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any moulded mains connector that requires removal / replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if a engaged in live socket. Any re-wiring must be carried out in accordance with the information detailed on this label.

1. INTRODUCTION

The regulated DC power supply series is designed to be used in applications such as powering operational amplifier, push-pull stages, logic circuit and definition systems where plus and minus voltages are required to track with an insignificant error. To represent an operation convenience, GPS-4302, GPS-4303 and GPS-4251 have four independent power supplies (while GPS-2303 has two and GPS-3303 has three) housed in a single package.

GPS-4302, GPS-4303 and GPS-4251 consist of four identical, independent, adjustable DC power supplies (while two for GPS-2303 and three for GPS-3303). A front panel switch selects one of three operation modes of independent, series and parallel. In the independent mode, the output voltage and current of each supply are controlled separately, and each supply is isolated up to 300V from output to chassis or output to output. In the tracking mode, both outputs are automatically connected in series or parallel, and the controls of the left supply adjust the magnitudes of both the positive and negative output voltages. Because the outputs are connected in a tracking configuration, any internal disturbance in the master supply (such as drift or ripple) will cause an equal percentage change in the outputs of both the supplies.

Each power supply (except CH3 for GPS-3303 and CH4 for GPS-4302&4303&4251) is a completely transistorized, well-regulated, constant voltage/constant current supply that will provide full rated output voltage at the maximum output current or can be continuously adjusted throughout the output range. The front panel current controls can be used to establish the output current limit (overload or short circuit) when the supply is used as a constant voltage source (independent or tracking modes) and the voltage controls can be used to establish the voltage limit (ceiling) when the supply is used as a constant current source (independent mode only). The supply will automatically cross over from constant voltage to constant current operation (current limited operation in the tracking mode). Each power supply (CH1~CH4) has its own front panel meter that can measure output voltage or current. One power supply may be used as a CH1 supply controlling, one CH2 supplies furnishing various voltage or current for a system. When operate with the front panel mode switch in the tracking position, the instrument is automatically internally connected in auto-tracking configuration.

For audio production line, the continuous or dynamic load can be internally selected. When the connector (J111&J309) is connected to “ON” position the unit is suitable for audio power Amplifier application (Normal setting to “OFF” position).

2. SPECIFICATIONS

2-1. General

Main Supply (switch selectable) : 100V/120V/220V ± 10%(230V +10%~-6%) 50/60Hz.
Operation Environment :Indoor use.
Altitude up to 2000m.
Ambient temperature 0℃ to 40℃.
Relative humidity 80% (maximum).
Installation category II.
Pollution degree 2.
Storage Temperature & Humidity : -10℃ to 70℃.70% (maximum).
Accessories : Operation Manual X1.

Table 2-1:

MODEL				REPLACED FUSE TYPE		RATES INPUT		TEST LEAD	
	Independent	Series	Para	100V/120V	220V/230V	WATTS	VA	Current ≦3A	4A≦Current<10A
GPS-2303	0~30VX2 0~3AX2	60V 3A	30V 6A	T6A 250V	T3A 250V	350	450	0	2
GPS-3303	0~30VX2 0~3AX2	60V 3A	30V 6A	T6.3A 250V	T3.15A 250V	420	550	1	2
GPS-4303	0~30VX2 0~3AX2	60V 3A	30V 6A	T6.3A 250V	T3.15A 250V	420	550	2	2
GPS-4302	0~30VX2 0~2AX2	60V 2A	30V 4A	T5A 250V	T3A 250V	320	420	2	2
GPS-4251	0~25VX2 0~0.5AX2	50V 0.5A	25V 1A	T2.5A 250V	T1.25A 250V	150	185	4	0

Dimensions : 255(W) X145(H) X265(D) m/m
Weight (kg) : 7.0 kg.

2-2. Operation Mode

(1) Independent : Two independent outputs and
CH3: 2.2~5.2V output for GPS-4302/4303, 3~6V output for GPS-4251, Fixed 5V for GPS-3303.
CH4: 8~15V output for GPS-4302/4303/4251.
Output from 0 to rating volts and 0 to rating amperes.

(2) Series : Output from 0 to rating volts at rating amperes each.
: Output from 0 to double rating volts at rating amperes.

(3) Parallel : Output from 0 to double rating amperes at rating volts.

2-3. Constant Voltage Operation

(1) Output voltage range : 0 to rating voltage continuously adjustable.

(2) Regulation : Line regulation≦0.01% + 3mV.
: Load regulation≦0.01%+3mV(rating current≦3A).
: Load regulation≦0.02%+5mV (rating current>3A).
(3) Recovery time :≦100 μ s (50% load change, minimum load 0.5A).
(4) Ripple & Noise :≦1mVrms (5Hz-1MHz).
(5) Temperature coefficient :≦300ppm/℃.

2-4. Constant Current Operation

(1) Output current range : 0 to rating current continuously adjustable.
(2) Regulation : Line regulation≦0.2% + 3mA.
: Load regulation≦0.2% +3mA.
(3) Ripple current :≦3mArms.

2-5. Tracing Operation

(1) Parallel Operation
Regulation : Line regulation≦0.01% + 3mV.
: Load regulation≦0.01%+3mV (rating current≦3A).
≦0.02%+5mV (rating current >3A).
(2) Series Operation
Regulation : Line regulation≦0.01%+5mV.
: Load regulation≦300mV.
A. Positive and Negative supply (Fig 5-4) CH2 tracking error ≦0.5%+10mV of the CH1 (No load, with load add load regulation≦300mV)
B. Single supply (Fig. 5-3)

2-6. Meter

A. Display A : 3 digits panel meter×2 (0.5” Red LED display).
Display V : 3 digits panel meter × 2 (0.5” Green LED display).
B. Accuracy :OUT ON±(0.5% of rdg + 2 digits)
:OUT OFF ± (0.5% of rdg+8 digits)(invalid for GPS-2303)
C. Voltmeter : 99.9V of full scale.
D. Ammeter : 9.99A of full scale.

2-7. CH3 Output Specifications

(1) Regulation : Line regulation≦5mV, load regulation≦15mV.
(2) Ripple & Noise : ≦2mVrms.
(3) Outout Voltage range : GPS-4302/4303: 2.2~5.2V±8% continuous adjustment,
GPS-3303 fixed 5V±8% continuous adjustment,
GPS-4251 3~6V±8% continuous adjustment
(4) Output current : 3A for GPS-3303&4302, 1A for GPS-4303, 2.5A for GPS-4251.

2-8. CH4 Output Specifications

(1) Regulation : Line regulation≦5mV, load regulation≦10mV.

(2) Ripple & Noise :≦2mVrms.
(3) Outout Voltage range : GPS-4302/4303/4251: 8~15V±8% continuous adjustment.
(4) Output current : 1A

2-9. Insulation

Between chassis and output terminal : 20MΩ or above (DC 500V).
Between chassis and AC cord : 30MΩ or above (DC 500V).

3. THEORY OF OPERATION

The power supply consists of an AC input circuit and transformer; a bias supply consisting of an rectifier, filter, pre-regulator and reference voltage source; a main regulator circuit consisting of the main rectifier and filter, a series regulator, a current comparator, a voltage comparator, a reference voltage amplifier and a relay control circuit. The circuit element consists of integrated circuit U101, U102, U103, U104, U105, U108.

The circuit arrangement is shown as block diagram in Fig. 3-1. The circuitry is discussed with reference to the block diagram function description. Single phase input power is applied to transformer through the input circuit.

Auxiliary rectifier D1021~1024 provides a bias voltage, filtered by capacitor C103, C104 for the preregulator. U101, U108 that provides a regulator voltage for elements of action.

The main rectifier, a full wave bridge rectifier provides the power which is filtered by capacitor, C1021 and then regulated via a series regulator and delivers to the output.

U105 acts as a current limiter. When current is over predetermined rating it is activated and decreases the current.

U102 provides a reference voltage for U103, U105.U103 is a inverter amplifier.U104 is a comparator amplifier which compares reference voltage and feedback voltage, and then delivers to Q103, Q104, which then calibrates the output voltage.

Q113 is activated when the unit is overload. It controls Q103 current magnitude which limits the output current.

The relay control circuit provides limited power dissipation in series regulator.

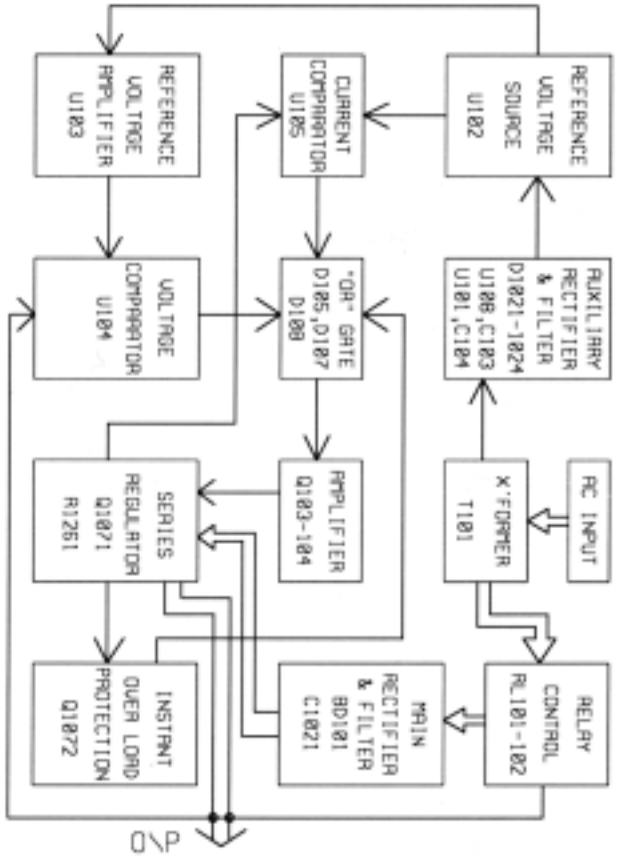


Figure 3-1 Block Diagram

4. PANEL CONTROLS AND INDICATORS

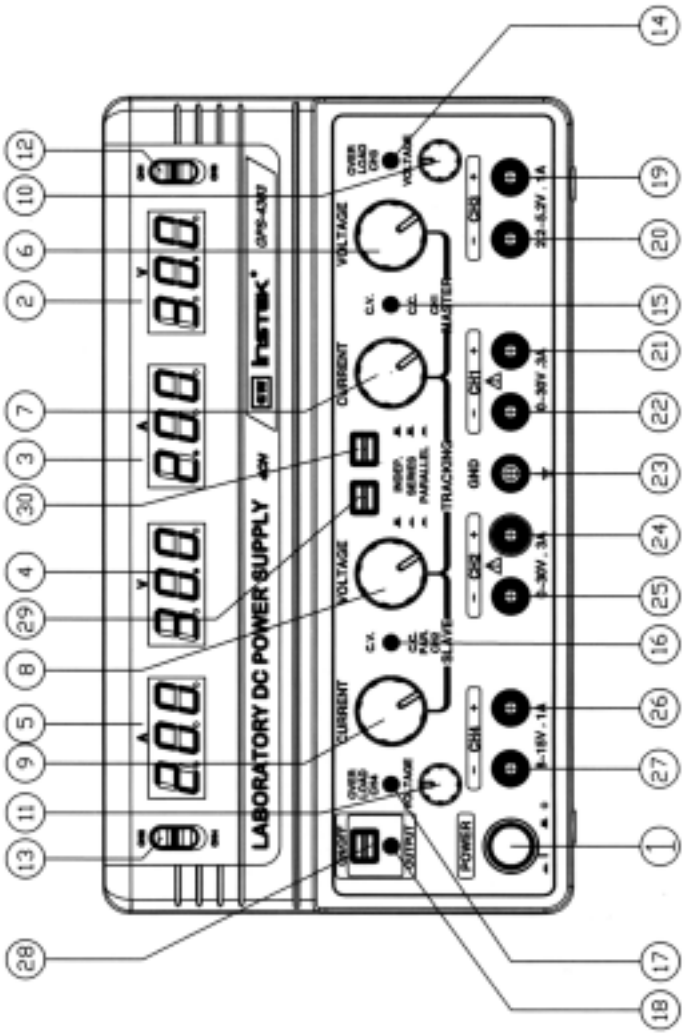


Fig. 4-1 Front Panel

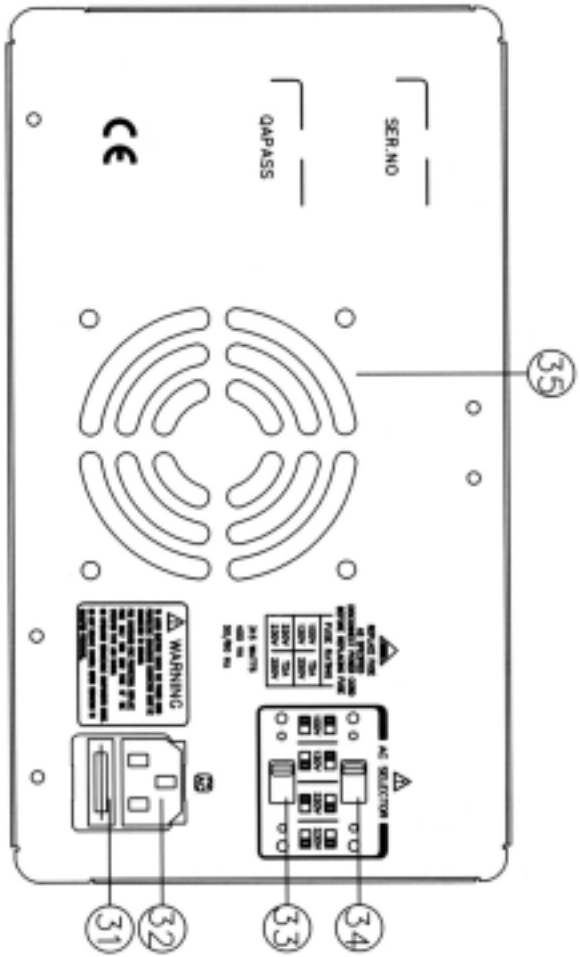


Fig. 4-2 Real Panel

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4-1. Front Panel

(1)	Power switch	: ON/OFF the power input.
(2)	Meter V	: Indicated the CH1 or CH3 output voltage.
(3)	Meter A	: Indicates the CH1 or CH3 output current.
(4)	Meter V	: Indicates the CH2 or CH4 output voltage.
(5)	Meter A	: Indicates the CH2 or CH4 output current.
(6)	Voltage Control	: Adjust the output voltage of the CH1 supply, and as the adjustment control for the maximum output voltage of the CH2 supply when either parallel or series tracking operation.
(7)	Current Control	: Adjust the output current of the CH1 supply, and as the adjustment control for the maximum output current of the CH2 supply when either parallel or series tracking operation.
(8)	Voltage Control	: Adjust the output voltage of the CH2 supply when in independent operation.
(9)	Current Control	: Adjust the output current of the CH2 supply.
(10)	Voltage Control	: Adjust the output voltage of the CH3 supply (invalid for GPS-2303&3303).
(11)	Voltage Control	: Adjust the output voltage of the CH4 supply (invalid for GPS-2303&3303).
(12)	CH1/CH3 selects switch	: Select CH1 or CH3 output voltage or current (invalid for GPS-2303&3303).
(13)	CH2/CH4 selects switch	: Select CH2 or CH4 output voltage or current (invalid for GPS-2303&3303).

(14) Overload Indicator : Lights when CH3 output load is larger than rating value (invalid for GPS-2303).

(15) CV&CC Indicator : The CV light (green light) is on when the CH1 supply is in the constant voltage operation, or when both the CH1 and CH2 supplies are in the constant voltage operation in either series or parallel tracking mode.
: The CC light (red light) is on when the CH1 supply is in the constant current operation.

(16) CV&CC Indicator : The CV light (green light) is on when the CH2 supply is in the constant voltage operation.
: The CC light (red light) is on when the CH2 supply is in the constant current operation or in parallel tracking mode.

(17) Overload Indicator : Lights when CH4 output load is larger than rating value (invalid for GPS-2303&3303).

(18) Output Indicator : Switch the light on.

(19) + output terminal : Positive polarity output terminal for the CH3 supply (invalid for GPS-2303).

(20) - output terminal : Negative polarity output terminal for the CH3 supply (invalid for GPS-2303).

(21) + output terminal : Positive polarity output terminal for the CH1 supply.

(22) - output terminal : Negative polarity output terminal for the CH1 supply.

(23) GND terminal : Earth and chassis ground.

(24) + output terminal : Positive polarity output terminal for the CH2 supply.

(25) - output terminal : Negative polarity output terminal for the CH2 supply.

(26) + output terminal : Positive polarity output terminal for the CH4 supply (invalid for GPS-2303&3303).

(27) - output terminal : Negative polarity output terminal for the CH4 supply (invalid for GPS-2303&3303).

(28) Output switches : ON/OFF the output.

(29) TRACKING & Mode Switch (30) Two push-button switches that select Independent mode, series tracking mode, or parallel tracking mode as follows:

a. When both switches are disengaged (out), the unit is in the Independent mode and the CH1 and CH2 power supplies are completely independent from each other.
b. When the left switch is engaged (in) and the right switch is disengaged (out), the unit is in the Tracking series mode, maximum voltage of both supplies is set using the CH1 VOLTAGE controls (voltage at output terminals of the CH2 supply tracks the voltage at the output terminals of the CH1 SUPPLY). Also, in this mode of operation, the positive terminal (Red) of the CH2 supply is connected to the negative terminal (Black) of the CH1 supply to allow the two supplies to be used as a 0 to double rating voltage supply.
c. When both switches are engaged (in), the unit is in the Tracking Parallel mode, the CH1 and CH2 supplies are wired together in parallel and both the maximum current and voltage are set using the CH1 controls. The CH1 and CH2 output can be used as two individual (but tracking) power supplies or just the CH1 output can be used as a 0 to rating voltage supply with a 0 to double rating current capability.

4-2. Real Panel

(31) Fuse holder

(32) Power socket

(33) AC selects switch & (34) HI-LO switch : Selects to permit operation from 100, 120, 220 or 230VAC, 50/60Hz line voltage by using (34) HI-LO switch.
: HI position selects high voltage range (120, 230V AC inputs), LO position selects low voltage range (100, 220V AC inputs).

(35) Cooling Fan : Ventilates the hot air out, to prevent output stage from thermo shock, and improves the temperature coefficient.

5. OPERATION INSTRUCTION

5-1. Precaution

(1) AC input

AC input should be within the range of line voltage ± 10% (230V +10%~-6%) 50/60Hz.

WANING. To avoid electrical shock, the power cord protective grounding conductor must be connected to ground. AVERTISS: Pour éviter les chocs électriques, le fil de terre du cordon secteur doit impérativement être relié à la terre.

(2) Installation

Avoid using the supply in a place where ambient temperature exceeds 40℃. The heat sink located at the rear of the supply must have sufficient air space for radiation.

CAUTION. To avoid damaging the power supply, don't use it in a place where ambient temperature exceeds 40℃.

(3) Output voltage overshoot

Voltage between output terminals never exceeds the preset value when the power is turned on or off.

5-2. Setting Current Limit

(1) Determine the maximum safe current for the device to be powered.
(2) Temporarily short the (+) and (-) terminals of the power supply together with a test lead.
(3) Rotate the VOLTAGE control away from zero sufficiently for the CC indicator to light.
(4) Set the meter selection switch to "A" position to select the current metering mode.
(5) Adjust the CURRENT control for the desired current limit. Read the current value on the Ammeter.
(6) The current limit (overload protection) has now been preset. Do not change the CURRENT control setting after this step.
(7) Remove the short between the (+) and (-) terminals and hook up for constant voltage operation.

5-3. Constant Voltage/Constant Current Characteristics

The working characteristic of these series Power Supplies is called a constant voltage/constant current automatic crossover type. This permits continuous transition from constant current to constant voltage modes in response to the load change. The intersection of constant voltage and constant current modes is called the crossover point. Fig. 5-1 shows the relationship between this crossover point and the load.

For example, if the load is such that the power supply is operating in the constant voltage mode, a regulated output voltage is provided. The output voltage remains constant as the load increases, up until the point where the present current limit is reached. At that point, the output current becomes constant and the output voltage drops in proportion to further increases in load. The point is indicated by the front panel LED indicators. The crossover point is reached when the CV indicator goes off and the CC indicator comes on.

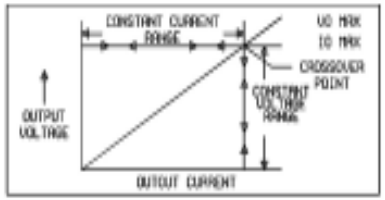


Fig. 5-1 Constant Voltage/Constant Current Characteristic

Similarly, crossover from the constant current to the constant voltage mode automatically occurs from a decrease in load. A good example of this would be seen when charging a 12 volt battery. Initially, the open circuit voltage of the power supply may be preset for 13.8 volts. A low battery will place a heavy load on the supply and it will operate in the constant current mode, which may be adjusted for a 1 amp charging rate. As the battery becomes charged, and its voltage approaches 13.8 volts, its load decreases to the point where it no longer demands the full 1 amp charging rate. This is the crossover point where the power supply goes into the constant voltage mode.

5-4. Operation Mode

(1) Independent Operation

The "CH1" and "CH2" supplies each provide a 0 to rating volts output at up to rating amps. This procedure covers the use of the CH1 and CH2 supplies only when they are used independently from each other. When used in the independent operating mode, the operation controls of the two power supplies are completely independent and either supply can be used individually or both can be used simultaneously.

A. Disengage both Tracking mode switches (both switches out) so that the power supply is in the independent operating mode.

B. Adjust "Voltage" control and "Current" control to the desired output voltage and current.

C. Turn off the power supply and the equipment to be powered during hook-up.

D. Connect the positive polarity of the device being powered to the red (+) terminal of the power supply.

E. Connect the negative polarity of the device being powered to the black (-) terminal of the power supply.

F. Fig.5-2 illustrates the connection procedure.

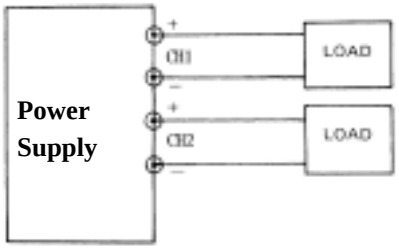


Fig. 5-2 Independent Operation

(2) Series Tracking Operation

When the series tracking mode of operation is selected, the position (Red) terminal of the CH2 supply output is internally connected to the negative (black) terminal of the CH1 supply.

In the series tracking mode, the maximum output voltage of both CH1 and CH2 supplies can be simultaneously varied with one control. The maximum CH2 supply voltage is automatically set to the same as the CH1 supply by using the CH1 VOLTAGE controls.

A. Set the power supplies to the Tracking series mode by engaging the left Tracking switch and release the right Tracking switch.

WARNING. Voltage more than 60V DC has a lethal shock hazard to the user. Be careful when connecting power supplies in series to achieve voltages higher than 60V DC total or 60V DC between any connection and earth ground.

Note:

Simultaneously metering of both current and voltage can be obtained in the mode of operation setting one of the displays for current metering and one for voltage metering. In this case, the output voltage (across the two supplies) is actually double the displayed value. For example, if the CH1 display is set for voltage metering and the CH2 display for current metering, the output voltage across the CH1 positive (red) terminal and the CH2 negative (black) terminal would be double the reading on the CH1 LED Display (since both supplies are putting out the same voltage). The actual output current would be the value read from the CH2 LED Display (since the two supplies are wired in series, current flowing through each supply must be equal).

B. Set the CH2 CURRENT control to the full clockwise position. The maximum current is set by using the CH1 CURREN control. Follow the instructions for "Setting current Limit" (select "CH1" or "CH2" supply independently by using the CH1 CURRENT control).

Note:

Because the supplies are being used in series, either CURRENT control can be used to set maximum current. If desired, the CH1 CURRENT control can be rotated fully clockwise and the CH2 CURRENT control can be used to

adjust the maximum current value. Because current through the two supplies must be equal when they are being used in series, the lowest CURRENT control setting will set the maximum output current.

C. Adjust the output voltage to the desired level by using the CH1 VOLTAGE controls.

D. Turn off the power supply and the equipment to be powered during hook-up.

E. If “single supply” operation is desired, this allows the power supply to be used as twice the voltage and rating current simply by using the negative (black) terminal of the CH2 supply and the positive (red) terminal of the CH1 supply, the configuration as shown in Fig. 5-3.

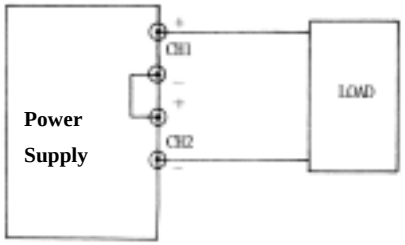


Fig. 5-3 Single Supply

F. If the chassis or common of the equipment being powered is separated from both the positive and negative polarity power inputs, the output of the CH2 (negative) supply tracking the output of the CH1 (positive) supply, the configuration as shown in Fig. 5-4.

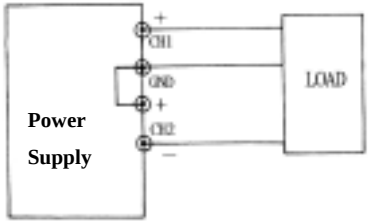


Fig. 5-4 Positive and Negative Supply

(3) Parallel Tracking Operation

In the parallel tracking mode of operation, both supplies are strapped together (in parallel). This allows for a rating voltage supply with a double rating current capability. Only the CH1 output terminals are used for parallel tracking operation. In the parallel tracking mode, the CH2 supply output voltage and current track the CH1 supply output voltage and current.

A. Set the power supplies to the Tracking Parallel mode by engaging both Tracking switches. .

B. Output voltage will now be read from the CH1 VOLTAGE display. Output current is exactly double the value read from the CH1 CURRENT display (because each supply is providing the same amount of current).

C.Because both voltage and current of the CH2 supply track the CH1 supply, the maximum current and voltage are set by using the CH1 controls. Using the CH1 supply output jacks, follow the instructions for “Setting Current Limit” (5-2 Section). Remember that the actual current output at the CH1 supply output jack is double the reading on the CH2 indicator meter.

D.Adjust the output voltage to the desired level by using the CH1 VOLTAGE controls.

E.Turn off the power supply and the equipment to be powered during hook-up.

F. Connect the positive polarity of the device being powered to the red (+) terminal of the CH1 power supply.

G. Connect the negative polarity of the device being powered to the black (-) terminal of the CH1 power supply. The configuration is shown as Fig. 5-5:

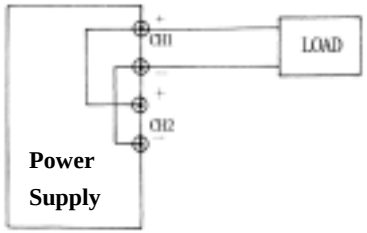


Fig. 5-5 Parallel Tracking Operation

(4) CH3 Power Supply Operation

The CH3 supply provides 2.2~5.2V(GPS-4302/4303) and 3~6V(GPS-4251) DC output with 3 amps (GPS-3303&4302), 1 amp (GPS-4303) and 2.5 amp (GPS-4251) current capacity. The supply is ideal for us with TTL circuits (GPS-3303 5V Fixed).

A. Turn off the power supply and the equipment to be powered during hook-up.

B. Connect the positive polarity of the device being powered to the red (+) terminal of the CH3 supply.

C. Connect the negative polarity of the device being powered to the black (-) terminal of the CH3 supply.

D. If the red OVERLOAD indicator lights, means exceeding load has been placed on the supply, it will cause voltage and current to drop and interfere the proper operation of the CH3 supply. To correct this situation, the load on the supply must be decreased so that no more than 3 amps (GPS-3303&4302), 1amp (GPS-4303) and 2.5 amps (GPS-4251) of current are required.

(5) CH4 Power Supply Operation

The CH4 supply provides a 8~15V(GPS-4302/4303/4251) DC output with a 1 amps current capacity.

A. Turn off the power supply and the equipment to be powered during hook-up.

B. Connect the positive polarity of the device being powered to the red (+) terminal of the CH4 supply.

C. Connect the negative polarity of the device being powered to the black (-) terminal of the CH4 supply.

D. If the red OVERLOAD indicator lights, exceeding load has been placed on the supply, it will cause voltage and current to drop and interfere proper operation of the CH4 supply. Under this situation, the load on the supply must be decreased so that no more than 1 amp of current is required.

(6) Dynamic Load Operation & Application

A. When select to dynamic load position, the max peak current is at 1.7 times rating current. The features are only applied for audio circuit of amplifier and audio production lines. Change the position of wafer J111 of CH1 and J309 of CH2 from “OFF” to “ON”. Please refer to Fig.6-1 Adjustment Location.

B. For other application and testing (Safety or CE. etc.), must set the wafer at “OFF” position

(7) Output ON/OFF Action

The output ON/OFF action is controlled with a single control, the output switch is pushed on, a high single output is on and output LED is on, while the output switch is pushed off, or tracking switch is pressed, output will disable.



CAUTION: The output terminals are for use only with the equipment which has no accessible live parts. The output terminals should not be connected to any hazardous live parts.

(8) Fan Control

1) The fan of the power supply will not work upon power on until the temperature of the heat sink rises up to 32℃±5℃ after adding load to output terminal. The more the temperature of the heat sink rises, the more the rolling speed of the fan gets fast. The fastest rolling speed is when the temperature reaches to 70℃.

2) To avoid damaging the power supply, if the fan fails to work when the temperature reached to the appropriate value, turn off the instrument and check the cause.

6. MAINTENANCE

WARNING

The following instructions are for use by qualified personnel only. To avoid electrical shock, do no perform any servicing other than the operation instruction of the manual unless you are qualified to do so.

6-1. Fuse Replacement

If the fuse blows, the CV or CC indicators will not light and the power supply will not operate. The fuse should not normally open unless a problem has developed in the unit. Try to determine and correct the cause of the blown fuse, then replace only with a fuse of the correct rating and type. The fuse is located on the rear panel (see Fig.4-2 & Table 2-1).



WARNING: For continued fire protection, replace fuse only with 250V fuse of the specified type and rating, and disconnect power cord before replacing fuse.

AVERTISS: Pour une protection contre les risques d'incendie, remplacer le fusible exclusivement par un modèle aux caractéristiques équivalentes.

6-2. Line Voltage Conversion

The primary winding of the power transformer is tapped to permit operation from 100, 120, 220, or 230VAC, 50/60Hz line voltage. Conversion from one line voltage to another is done by change AC selects switch as shown in Fig. 4-2.

The rear panel identifies the line voltage to which the unit was factory set. To convert to a different line voltage, perform the following procedure:

(1) Make sure the power cord is unplugged.

(2) Change the AC selects switch to the desired line voltage position.

(3) A change in line voltage may also require a corresponding change of fuse value. Install the correct fuse value as listed on rear panel.

6-3. Adjustments

This unit was accurately adjusted at the factory before shipment. Readjustment is recommended only if repairs have been made in a circuit affecting adjustment accuracy or if you have a reason to believe the unit is out of adjustment. The recommended calibration device is a multimeter with an accuracy of ±0.1% DCV or better (GOOD WILL model GDM-8145 or equivalent).

If readjustment is required, use the following procedure. The location of the adjustments is shown in Fig. 6-1.

(1) Independent Adjustment

A. Disengage both Tracking mode switches (both switches out) so that the power supply is in the independent operating mode.

B. Connect a 4-1/2 digital multimeter with an accuracy of ±0.1% DCV to measure the DC voltage at the output terminals of the CH1 (CH2) supply.

C. Set the CH1 (CH2) VOLTAGE control to maximum (fully clockwise).

D. Adjust trimmer potentiometer (VR101 CH1,VR301 CH2) on the circuit board (located on the right side of the supply) for a reading as close to rating voltage ×1.05 (on the multimeter) as possible.

E. Set output on by adjusting the trimmer potentiometer (VR801 CH2, VR201 CH1) from the CH1 (CH2) voltage indicator circuit board (located on the meter or A/D converter board) for a reading of rate voltage ×1.05 on the CH1 (CH2).

F. Set output off by adjusting trimmer potentiometer (VR802 CH2, VR202 CH1) from the CH1 (CH2) voltage indicator circuit board (located on the meter or A/D converter board) for a reading of rate voltage on the CH1 (CH2)(invalid for GPS-2303)

G. Connect the external multimeter across the CH1 (CH2) SUPPLY output terminals to read the output current (so that the meter causes a short circuit across the terminals) and adjust the CH1 (CH2) CURRENT control so that rating amps is read on the multimeter.

H. Set output on by adjusting the trimmer potentiometer (VR901 CH2, VR701 CH1) so that the CH1(CH2) meter also reads rating amps.

I. Rotate the CH1(CH2) current control fully clockwise (maximum).

J. Adjust VR103 on the CH1 (VR303 CH2)supply circuit board (located on the right side of the supply) to obtain an output current of rating amps ×1.05 (read on the meter or LED display).

K. Set output off by adjusting the trimmer potentiometer (VR903 CH2, VR703 CH1) so that the CH1(CH2) meter also reads rating amps (invalid for GPS-2303).

(2) Series Tracking Adjustment

A. Set the supply to Tracking series mode by engaging the left Tracking switch and releasing the right tracking switch.

B. Set the CH2 CURRENT control to midrange and set the CH1 supply voltage controls to minimum (fully counterclockwise).

C. Connect the multimeter to the CH1 SUPPLY outputs and measure the voltage.

D. Disconnect the multimeter from the CH1 supply outputs and connect it across the CH2 supply outputs.

E. Adjust trimmer potentiometer VR306 on the circuit board (located on the right side of the supply) to obtain the exact same reading for the CH2 supply output as was preset at the CH1 supply output (e.g., if the minimum CH1 supply output voltage is –10.00mV adjust VR306 to obtain an output voltage as close to -10.00mV at the CH2 supply as possible).

F. Set the CH2 CURRENT control to midrange and set the CH1 supply voltage controls to maximum (fully clockwise).

G. Connect the multimeter to the CH1supply outputs and measure the voltage.

H. Disconnect the multimeter from the CH1supply outputs and connect it across the CH2 supply outputs.

I. Set output on by adjusting VR501 (located at the left of the lower front panel circuit board, VOLTAGE/CURRENT CONTROL potentiometer board) until the voltage read from the multimeter is the same as it was across the CH1 output terminals. Return the multimeter to the CH1 output terminals and verify that the output voltage is identical. If not, repeat this step.

J. Set output off by adjusting VR804 (located at the left of the lower front panel circuit board, VOLTAGE/CURRENT CONTROL potentiometer board) until the voltage read from the multimeter is the same as it was

across the CH1 output terminals. Return the multimeter to the CH1 output terminals and verify that the output voltage is identical. If not, repeat this step (invalid for GPS-2303).

(3) Parallel Tracking Adjustment

A. Disengage both Tracking mode switches (both switches out) so that the power supply is in the independent operating mode.

B. Set the CH1 supply VOLTAGE and CURRENT controls to minimum (fully counterclockwise).

C. Connect the multimeter across the CH1 supply output terminals and measure the output current.

D. Set the CH1 supply VOLTAGE control to midrange and adjust the CURRENT control to obtain an output current of rating amps (read on the multimeter). Do not change the CURRENT control setting after this step.

E. Engaged both Tracking mode switches (both switches in), so that the power supply is in the parallel operating mode.

F. Set the CH2 supply CURRENT control to maximum (fully clockwise) and set the VOLTAGE control to midrange.

G. Set output on by adjusting the trimmer potentiometer VR502 on the circuit board (located on the right side of the supply) to obtain an output current of double rating amps on the multimeter.

(4) CH3 Supply Adjustment

A. Connect the multimeter across the output terminals of the CH3 supply to read output voltage and adjust the VR403 to obtain reading of 2.2~5.2V(GPS-4302/4303), 3~6V(GPS-4251) and fixed 5V(GPS-3303) on the multimeter.

B. Set the supply VOLTAGE control to maximum (fully clockwise), set output off by adjusting trimmer potentiometer VR203 on the CH3 voltage indicator circuit board (located on the meter or A/D converter board) for a reading of rate voltage on the CH3 (invalid for GPS-3303).

C. Turn VR401 on the main master circuit board (located on the right side of the supply) fully counterclockwise.

D. Set output on by adjusting VR702 so that the CH3 meter also reads rating amps (invalid for GPS-3303).
E. Connect a variable load (load must be rated to handle a power of at least 30W) across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 3.25A for GPS-3303&4302, 1.20A for GPS-4303 and 2.75A for GPS-4251.
F. Slowly adjust VR402 clockwise until the output voltage (read from the multimeter) drops 5mV to 6mV (start current limit point).
G. Connect a variable load across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 3.15A for GPS-3303&4302, 1.10A for GPS-4303, and 2.65A for GPS-4251.
H. Adjust VR402 until the 3A (GPS-3303&4302), 2.5A(GPS-4251) and 1A (GPS-4303) OVERLOAD indicator light.

(5) CH4 Supply Adjustment

A. Connect the multimeter across the output terminals of the CH4 SUPPLY to read output voltage and adjust VR603 to obtain a reading of 8~15V(GPS-4302/4303/4251) on the multimeter.
B. Set the supply VOLTAGE control to maximum (fully clockwise), set output off by adjusting the trimmer potentiometer VR803 from the CH4 voltage indicator circuit board (located on the meter or A/D converter board) for a reading of rate voltage on the CH4.
C. Turn VR601 on the main master circuit board (located on the right side of the supply) fully counterclockwise.
D. Set output on by adjusting VR902 so that the CH4 meter also reads rating amps.
E. Connect a variable load (load must be rated to handle a power of at least 30W) across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 1.20A.

F. Slowly adjust VR602 clockwise until the output voltage (read from the multimeter) drops to 5mV~6mV (start current limit point).
G. Connect a variable load across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 1.10A.
H. Adjust VR602 until the 1.10A OVERLOAD indicator first lights.

6-4. Cleaning

To clean the power supply, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage. Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents. Do not use abrasive cleaners on any portion of the instrument.

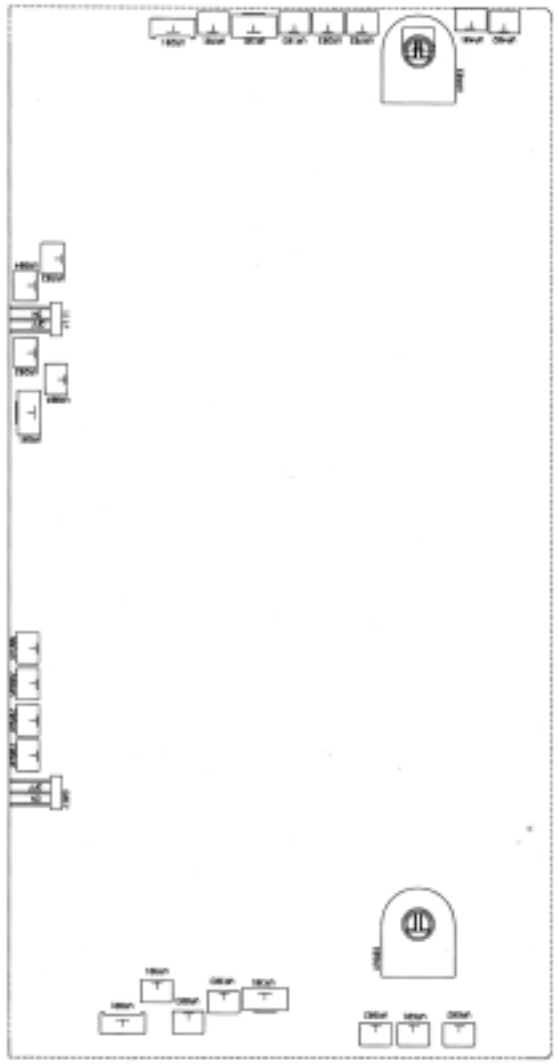


Fig. 6-1. Adjustment Location