

**USER'S GUIDE AND
TECHNICAL REFERENCE**

**BEHLMAN MODEL
PF1351 SERIES AC POWER SUPPLY**

PART NO. 108-017-005

FOR SERVICE ASSISTANCE

CONTACT BEHLMAN
CUSTOMER SERVICE DEPARTMENT

PHONE TOLL FREE 1-800-874-6727

OR WRITE

BEHLMAN
CUSTOMER ELECTRONICS DEPARTMENT
80 CABOT COURT
HAUPPAUGE, NY 11788

PHONE: (631) 435-0410

FAX : (631) 951-4341

FOR SALES INFORMATION:

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USA : (800) 874-6727

FAX : (631) 951-4341

LIMITED WARRANTY

Behlman Electronics, Inc. warrants, to the original purchaser, for a period of one (1) year from the date of shipment from Behlman, each item to be free from defects in material and workmanship. Behlman's obligation and the Purchaser's sole remedy for any breach or violation of this agreement is limited to adjustments, repair or replacement for parts which have been promptly reported by the Purchaser as having been, in its opinion, defective and so found by Behlman upon inspection. All replacement parts will become the property of Behlman on an exchange basis. This warranty will not apply if such adjustments, repair or parts replacement is required because of accident, neglect, misuse, failure of environmental controls, transportation damage or causes other than normal use.

If during the warranty period a defect should impair the performance of the unit, Behlman agrees, at its option, to repair or replace the unit or its defective components F.O.B. Behlman at 80 Cabot Court, Hauppauge New York 11788 or at another Behlman service facility at Behlman's option. To obtain service under this warranty, the original Purchaser shall notify Behlman at the above address or by Telephone at 631-435-0410 and provide information about the defect or impairment of performance. Behlman will then supply the Purchaser a Return Material Authorization (RMA) number. This number must be attached to the equipment sent back for warranty repair. Equipment must be shipped back to Behlman prepaid. No collect shipments will be accepted.

Behlman shall be excused from supplying warranty service if the equipment covers have been removed or if the unit has been subject to unauthorized repair. All service outside the scope of this Warranty shall be paid for by the Purchaser at Behlman's rates in effect at the time of repair. Behlman will not perform any repairs outside of the Warranty without written authorization by the Purchaser. If the repair is a warranty repair, Behlman will ship the unit back to the Purchaser, by a method determined solely by Behlman, prepaid. If the Purchaser requests any other means of transportation it shall be at the Purchaser's expense.

The use of the equipment shall be under the Purchaser's exclusive management and control. The Purchaser will be responsible for assuring the proper installation, use, management and supervision of the equipment. Behlman will not be liable for personal injury or property damage.

The foregoing warranties are in lieu of all other warranties, expressed or implied including without limitation warranties of merchantability and fitness for purpose.

In no event shall Behlman be liable for loss of profits, loss of use, or any other indirect, consequential or incidental damages. Purchaser agrees that Behlman will not be liable for any damages caused by the Purchaser's failure to fulfill any of the Purchaser's responsibilities set forth herein.

CLAIM FOR DAMAGE IN SHIPMENT

Under the FOB factory terms of sale, ownership and responsibility are transferred to the customer when the equipment leaves the factory. Each Behlman instrument is shipped from the factory in proper operating condition.

Immediately upon receiving equipment, unpack and inspect it for evidence of damage incurred in shipment. If equipment is damaged, file a claim with the freight carrier. Forward a copy of the damage claim report to Behlman. Include the model number, serial number and date the shipment was received. Behlman will advise the disposition of the equipment and will arrange for necessary repair or replacement.

RETURNING EQUIPMENT TO FACTORY

Do not return equipment to the factory without prior authorization from Behlman.

This equipment, like all precision electronic equipment, is susceptible to shipping damage. It contains heavy magnetic components as well as delicate electronics components. If equipment is returned without prior authorization, the shipment will be refused and the customer will be liable for all shipping, handling and repair costs. When packing for reshipment, use the original shock absorbent material and shipping container to prevent additional damage to the equipment.

Ensure that the return authorization numbers (RMA) is available on the container.

PACKING INSTRUCTIONS

RACK MOUNTED UNITS

- 1) Box(es) must be double wall with minimum 350 lbs. bursting test.
- 2) Box(es) must provide for a minimum of 2 to 3 inches of clearance around sides, top and bottom of unit.
- 3) When packing unit, utilize either a foam-in-place system or high density foam. Clearance provided for above must be completely filled with foam.

**FAILURE TO COMPLETELY SECURE UNIT IN BOX WILL ALLOW MOVEMENT
DURING SHIPPING, RESULTING IN DAMAGE.**

DO NOT USE PEANUTS OR BUBBLE WRAP

- 4) Secure box(es) to pallet(s). This is necessary to insure proper handling and protection during shipping.
- 5) Place the following warning label on box(es)

DO NOT STACK

- 6) Ship unit using a freight cargo carrier; air or ground.

SAFETY SUMMARY

The following safety precautions must be observed during all phases of operation, service, and maintenance of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in the manual violates safety standards associated with the design and intended use of this equipment. This manual forms an integral part of the equipment and must be available to operating personnel.

GROUND THE EQUIPMENT

This equipment may have high leakage current to chassis due to EMI filtering requirements. To minimize shock hazard, the equipment chassis(s) must be connected to an electrical safety ground. This equipment is supplied with a three conductor line connection for single phase applications and/or a five wire connection for three phase applications. Both types include an earth terminal intended for safety ground connections. In addition, isolated installation sites may require neutral to earth connections as per NEC section 250 (National Electrical Code). Refer installation to licensed electrician or other qualified personnel.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERE

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove equipment covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power applied. Under certain conditions, dangerous voltage may exist even with the power removed. To avoid injuries, always disconnect power and discharge circuits before touching them. During normal operation the operator does not have access to internal hazardous voltages. However, depending on the user's application configuration, **HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY** may be normally generated at the output terminals. The customer/user must insure that the output power lines are labeled properly as to the safety hazard and that any inadvertent contact is eliminated.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to this equipment. Contact Behlman Electronics for proper replacement parts and specific service information.

DANGEROUS PROCEDURE WARNINGS



Warnings will precede potentially dangerous procedures in this manual. Instructions contained in the warning must be followed. Warnings will be preceded by the caution symbol (above).

RISK OF ELECTRIC SHOCK



This symbol warns personnel of hazardous conditions due to the exposure of hazardous voltage that can be lethal if contacted.

Neither Behlman Electronics, Hauppauge, NY, USA, nor any of the subsidiary sales organizations can accept any responsibility for personnel, material or inconsequential injury, loss or damage that may result from improper use of the equipment and/or accessories provided.

For additional safety related technical information, contact the Behlman Electronics sales department or local sales representative.

sales@behlman.com

or call in N.Y.

631-435-0410

TECHNICAL MANUAL PF1351 AC POWER SUPPLY

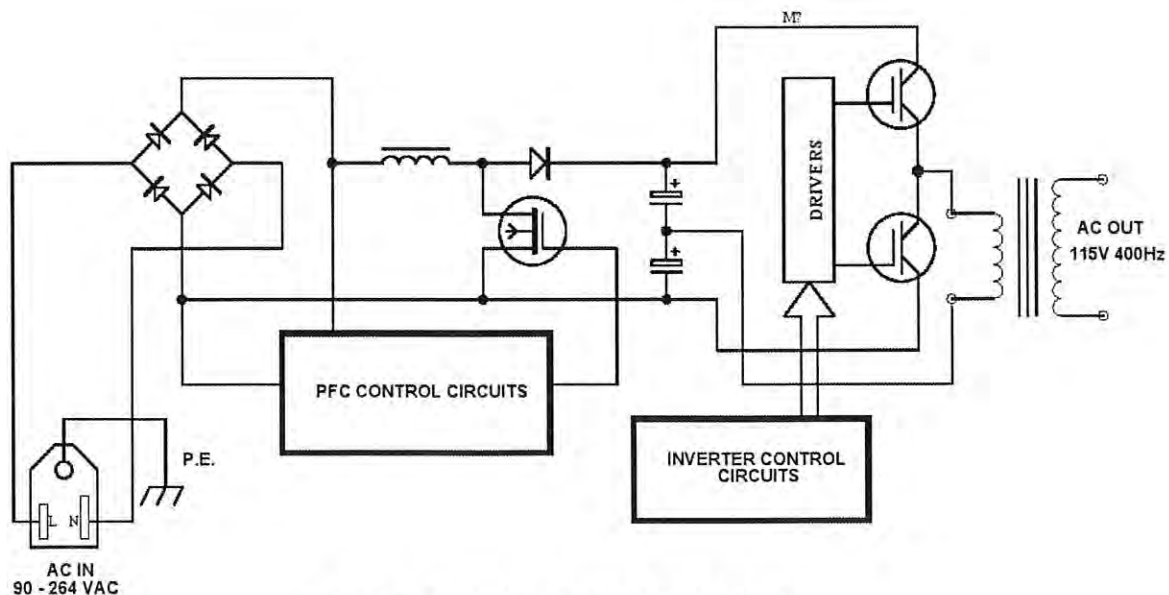
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SECTION ONE INTRODUCTION

1.0 The Behlman PF series of AC power supplies are designed to provide regulated AC power at frequencies and /or voltages not available from local utilities. All models are completely solid state, PWM switching types that provide high efficiency and overall reliability. These devices require very little maintenance and will provide years of trouble free service when used within their ratings. The models in this series include an active power factor correction circuit to reduce input harmonics associated with the conversion process used. These models are housed in an all steel, EIA rack mountable enclosure.

The block diagram below illustrates the conversion process performed by this equipment. AC power is applied and converted to DC by an active power factor corrected boost converter. This DC is then used to provide raw power for a class D amplifier. The amplifier is driven from a reference signal at the desired output frequency. The resulting amplified signal is applied to a step-up transformer to provide both isolation and the desired output voltage. Short circuit protection and current limit are performed by the control electronics.



SIMPLIFIED BLOCK DIAGRAM BL1350PF

SECTION ONE

1.2 SPECIFICATIONS FOR AC POWER SUPPLY PF 1351 SERIES

INPUT POWER REQUIREMENTS:	95* to 270 VAC** 47 - 63 Hz @ 16A Max. (Full power from 108V – 267V) (*) input current limited to 16A.
AC OUTPUT POWER:	1200W (with 108 - 270VAC Input) 1350W @ 120V – 270V input @ 25C
OUTPUT FREQUENCY:	Variable from 45 – 500Hz
AC OUTPUT T.H.D.	1.5% TYPICAL @ 120V / 50Hz, resistive.
AC OUTPUT CURRENT:	10A @ 135V RANGE, 5A @ 270V RANGE.
AC REGULATION:	1 % No load to Full load, resistive.
AC REGULATION RESPONSE TIME	250 – 300 mSec, typical.
METERING:	
VOLTAGE:	+/- (0.5% of reading + 1% of range), 1V res.
CURRENT:	+/- (1% of reading + 1% of range), 0.1A res.
FREQUENCY:	+/- (1% of reading + (+/- 1Hz) 1Hz res.
PHYSICAL:	19" W x 17" D x 3.5" H EIA standard for 19" rack-mount cabinets (with RM kit).
WEIGHT:	39 lbs. (17.6 kgs)
OPERATING TEMPERATURE:	0 to +40 degrees Celsius.
STORAGE TEMPERATURE:	-10 to +60 Degrees Celsius.
SAFETY:	Evaluated to IEC-61010, general safety, Class1, pollution level 2. ** To conform, input voltage is limited to 250VAC. EMC-IEC61000 OPTIONAL Remote interface conforms to IEC- 60950 where applicable.

SECTION ONE

1.3 UNPACKING AND INSPECTION

Remove the equipment from its packaging and inspect it for shipping damage. If the box shows signs of damage, retain it in case a claim needs to be filed with the shipping carrier. If the equipment shows signs of damage, **DO NOT** attempt to operate it. Contact Behlman immediately and file a damage claim with the shipper. Prior authorization is required before sending any equipment back to Behlman. This is in the form of a Returned Material Authorization number that must be obtained from Behlman. Any shipment sent without an RMA # will be refused and the customer will be liable for all shipping costs.

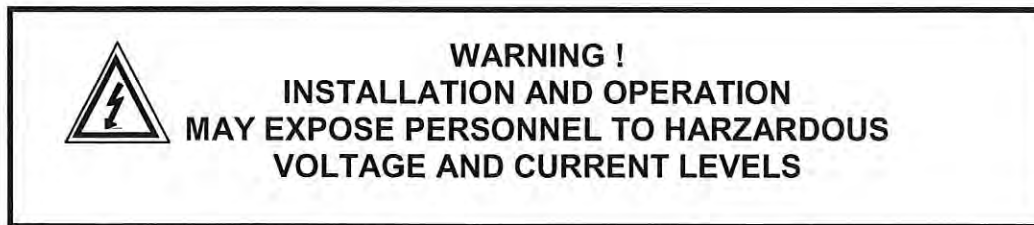
This equipment does not ship with any other accessories. A copy of the user/technical manual is provided in the shipping container. It is recommended that the serial number be verified and retained in case of any warranty claims. The warranty for this unit is one year for parts and labor. See the Warranty statement at the beginning of this document for specific information. All warranty repairs must be performed by Behlman or one of its authorized representatives. Contact sales@behlman.com for information regarding warranty repair or Reps.

SECTION TWO INSTALLATION AND WIRING

2.1 INSTALLATION

This device is designed primarily for desktop or bench top operation. This model may also be mounted in an EIA standard equipment rack using the RM adaptor kit available from Behlman. If the unit is to be rack mounted, it must be placed so as not to block the cooling vents on the sides, top, and rear panels. Rear support must also be provided. This may be in the form of internal support "rails" or chassis slides. Many equipment rack manufacturers can supply generic support brackets or shelves to be used with their racks. Racks that are completely sealed will require ventilation to remove heat generated by the AC power supplies exhaust.

The installation site must protect the power supply from moisture and any conductive particulate matter. **IN NO CASE** should this unit be operated in the presence of dripping or misting fluids. For continuous full power output, the ambient operating temperature should not exceed 40 degrees Celsius.



2.2 INPUT POWER CONNECTION

This unit operates from any AC voltage from 95 -270V with a frequency between 47 and 63 Hertz. A detachable line cord is provided that mates with the IEC-19 type receptacle (JI) on the rear panel. The other end of the supplied line cord is left un-terminated so that the end user can affix the proper plug to mate with power receptacles available at the installation site. Conformance to IEC safety standards limits the input to 250VAC.



WARNING

THIS DEVICE IS SUPPLIED WITH A 3 WIRE LINE CONNECTION THAT INCLUDES A PROTECTIVE EARTH CONDUCTOR (YEL/GREEN WIRE). THIS CONNECTION IS CRITICAL TO OPERATOR SAFETY AND MUST BE TIED TO THE INSTALLATION SITE PROTECTIVE EARTH. DUE TO COMPONENTS USED FOR EMI REDUCTION, THIS DEVICE MAY PRODUCE LEAKAGE CURRENTS THAT ARE HAZARDOUS. THE EARTH CONNECTION PROVIDES A RETURN PATH FOR THESE CURRENTS.

2.3 AC OUTPUT LOAD CONNECTIONS

Connect the load to either the front panel AC output safety sockets (4mm banana jacks) or the rear panel AC output at TB1. TB1 is marked "H" (AC high side), "L" (AC low side), and "G" (chassis). Note that this device produces output voltages that are hazardous under normal conditions. The end user must make sure that all output wiring is installed in a way that prevents inadvertent contact with operating personnel. **The use of warning labels is highly recommended.**

The output circuit of this device is transformer coupled and floating with respect to the input line. Either side of the AC output may be tied to earth or other potential. The maximum continuous floating voltage between either output terminal and ground must be limited to 500VDC. Refer to figure 2-1 for an illustration of typical output circuit configurations.

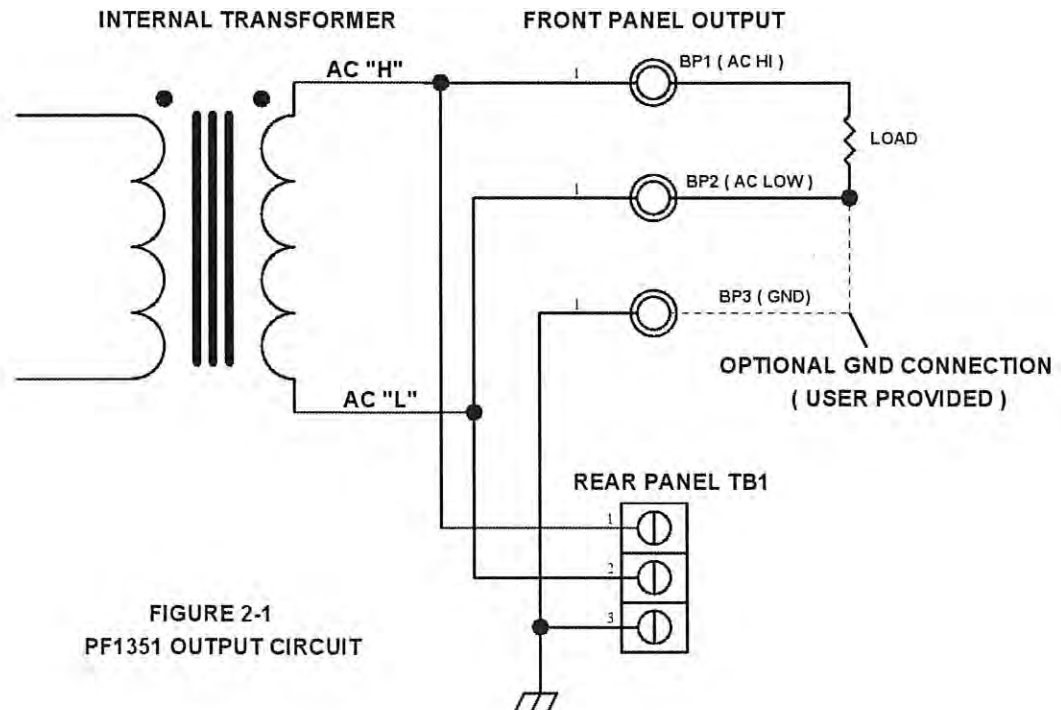


FIGURE 2-1
PF1351 OUTPUT CIRCUIT

SECTION THREE OPERATION

3.1 CONTROLS AND INDICATORS

Table 3-1 below lists the controls, indicators, and other features associated with the model PF1351 AC power supply. Refer to figure 3-1 for locations.

ITEM	DESIGNATION	COMMENT/DESCRIPTION
1	AC Line switch	Power on/off switch.
2	LED indicators	Illuminates during output faults caused by either over temperature or over current or output short circuits (see text).
3	Digital Voltage Display	3 digit readout to display output volts.
4	Digital Current Display	3 digit readout, displays output current or frequency. Parameter to be displayed is selected by the SELECT switch (item 5).
5	Display SELECT Switch	Push button switch selects function of current /frequency display (4). When pushed LED will indicate which Parameter is selected.
6	VOLTS adjust	Multi-turn control sets output voltage.
7	FREQ adjust	Multi-turn control sets output frequency.
8	OUTPUT switch	Push in to turn output on. OUTPUT LED will illuminate when pushed.
9	RANGE switch	Push in to set unit to high range (0- 270V) RANGE LED illuminates when pushed.
10	Front Panel Output	Safety "sockets" in parallel with rear panel TB1. These mate with 4mm type safety "banana" jacks.
11	Rear Panel Output (TB1)	AC output terminals up to 10 AWG wire. In parallel with front panel output.
12	J1 AC Line input	IEC-20 receptacle.
13	F1 line Fuse	6.3 x 32 mm 16A /300V fuse. WARNING! Replace with same type and rating only.
14	Fan exhaust	Heated air exists via these openings.
15	Remote interface (optional)	May be one of three options. RS-232, IEEE 488 or Analog remote control. See manual text for additional information.

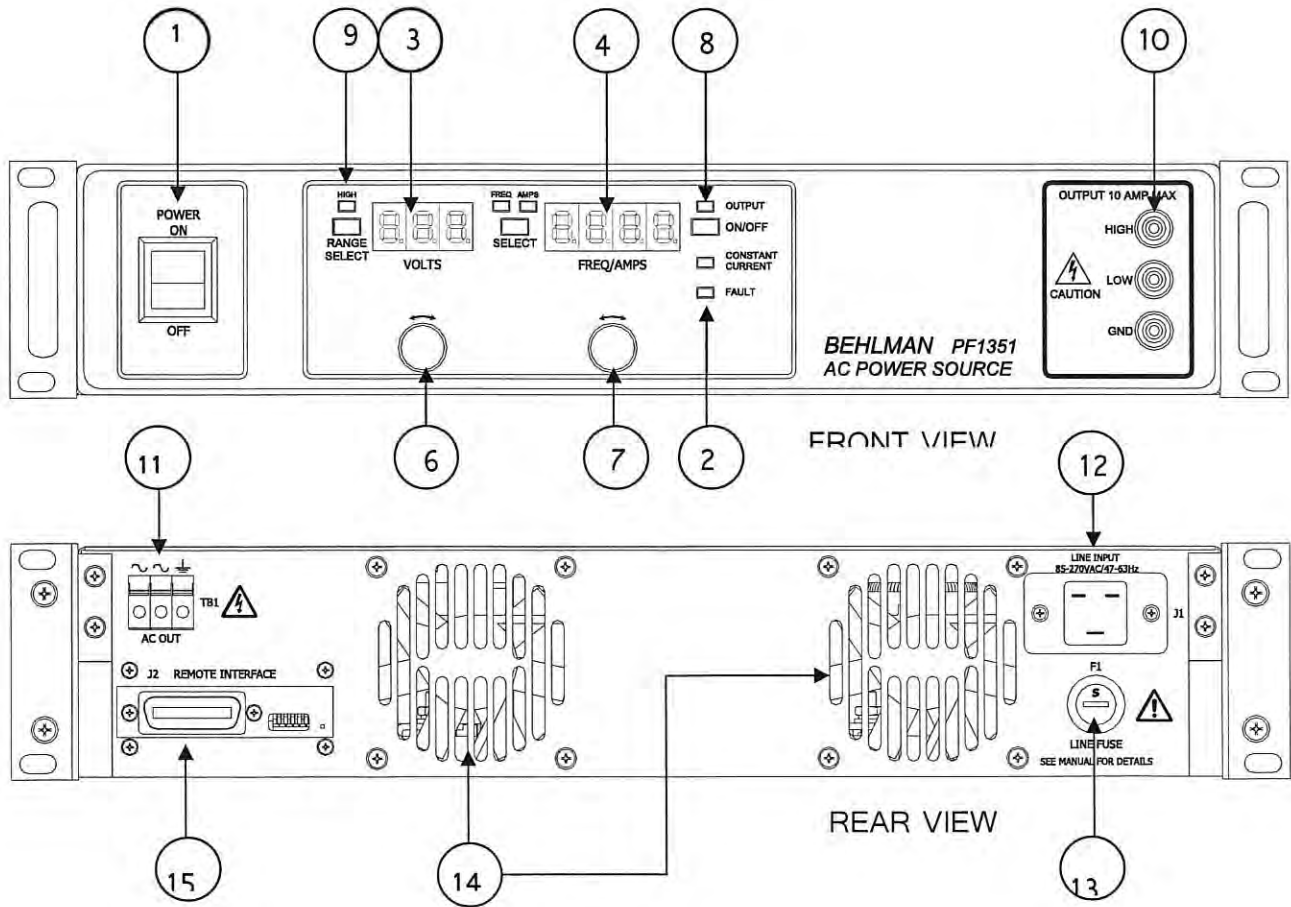


Figure 3-1 PF1351 Controls and Indicators