USER'S GUIDE AND
TECHNICAL REFERENCE

BEHLMAN MODEL
PF1352 SERIES AC POWER SUPPLY

PART NO. 108-017-006

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:

PHONE: (631) 435-0410
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. Bellman'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 Bellman'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 Bellman'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

I) 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 d**ue 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 631-435-0410

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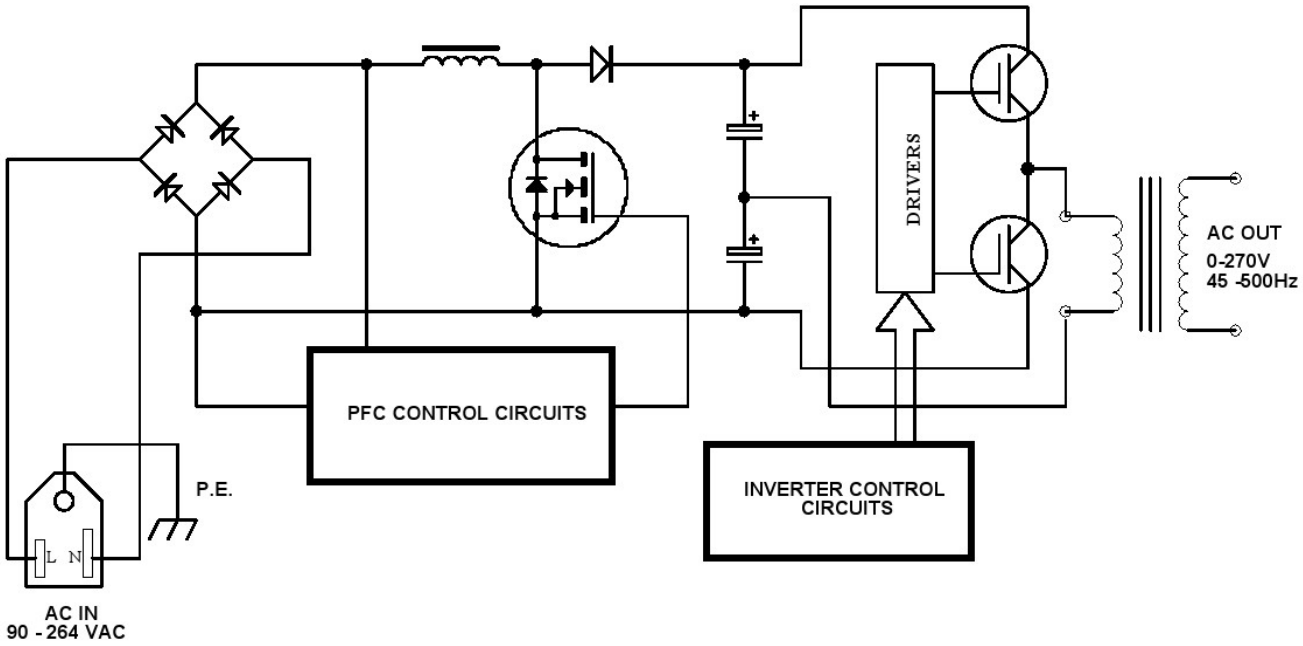
SECTION ONE
INTRODUCTION

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 PF135X SERIES

SECTION ONE
1.2 SPECIFICATIONS FOR AC POWER SUPPLY PF 1352 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 120 – 270 VAC Input)
OUTPUT FREQUENCY:	Variable from 45 – 500Hz (45 -1000 E opt.)
AC OUTPUT T.H.D.	1.5% TYPICAL @ 120V / 50Hz, resistive load.
AC OUTPUT CURRENT:	10A @ 135V RANGE, 5A @ 270V RANGE.
AC OUTPUT REGULATION:	0.7 % No load to Full load, (resistive).
LINE REGULATION:	0.7% for 10% line change.
METERING:	
VOLTAGE:	+/- (0.5% of reading +/- 2 LSD), 0.1V res.
CURRENT:	+/- (1% of reading + /- 5 LSD), 0.1A res.
FREQUENCY:	+/- 1Hz 0.1Hz res.
POWER:	+/- 2.5%, of F.S. (150–1200W) 1W res.
POWER FACTOR:	+/- 2.5% of F.S. (150-1200W) 0 - .99
PHYSICAL:	19”(482mm) W x 17”(431mm) D x 3.5”(88mm) H EIA standard 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, protection Class1, pollution level 2. OPTIONAL Remote interface safety and Isolation conform to IEC- 60950-1.

SECTION ONE

1. UNPACKING AND INSPECTION

Remove the equipment from its packaging and inspect it for shipping damage. If the shipping container shows signs of damage, retain it for inspection and file a claim 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 ships with a line cord and a copy of the user/technical manual provided. 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 manufacturers representatives..

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 supply’s 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.

WARNING !
INSTALLATION AND OPERATION
MAY EXPOSE PERSONNEL TO HAZARDOUS
VOLTAGE AND CURRENT LEVELS

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 (J1) 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 the rear panel AC output at TB1. TB1 is marked “H” and, “L”, 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 that can be applied between either output terminal and ground is 500VDC. Dielectric strength is 1500Vrms for 60 seconds. Refer to figure 2-1 for an illustration of a typical PF series power supply output circuit configuration.

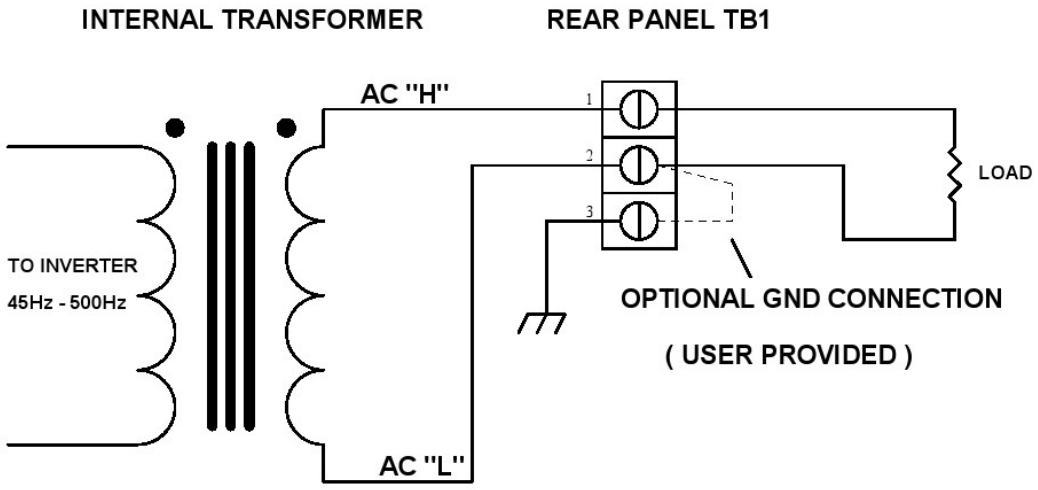


FIGURE 2-1 PF1352 OUTPUT CIRCUIT

SECTION THREE
OPERATION

3.1 CONTROLS AND INDICATORS

Table 3-1 below lists the controls, indicators, and other features associated with the model PF1352 AC power supply. Refer to figure 3-1 for locations.

TABLE 3-1

ITEM	DESIGNATION	COMMENT/DESCRIPTION
1	AC line **POWER** switch	Power on/off switch.
2	Alpha Numeric Display	Displays output parameters and settings
3	**OUTPUT** Switch	Push button switch controls application of AC voltage to output terminals. Push to turn on.
4	**RANGE** Switch	Push button switch controls range of AC output voltage. Selects between 0-135V (low) or 0 -270V (high). Push in for **HIGH** range.
5	LOCAL REMOTE switch	On older models, this switch selected between local and remote operation. A version units do not use this switch .
6	**SHIFT** “key”	Used in conjunction with control “keys” to set output parameters. Set s the adjustment resolution to x0.1, x1,x10, or x100
7	Control “Keys”	Used in conjunction with **SHIFT** key to set display and output parameters. **MODE** selects the parameter to be adjusted. **UP/DOWN** provides adjustment with the currently selected resolution.
8	LED indicators	Indicate status of : Output, Range, and com. function (**BUSY**)
9	Output Terminal Block	Enclosed type 3 position wire terminals.
10	AC input receptacle	IEC- 19 type AC receptacle.
11	Input Line fuse (F1)	6.3 x 32mm, 16A, 300Vac fuse. CAUTION, replace with same type and rating only.
12	REMOTE INTERFACE	Provides remote control via RS-232, USB, or Ethernet type hardware interface and boot switch.
13	**RESET**	Recessed push button , reset controller and interface to power on condition.

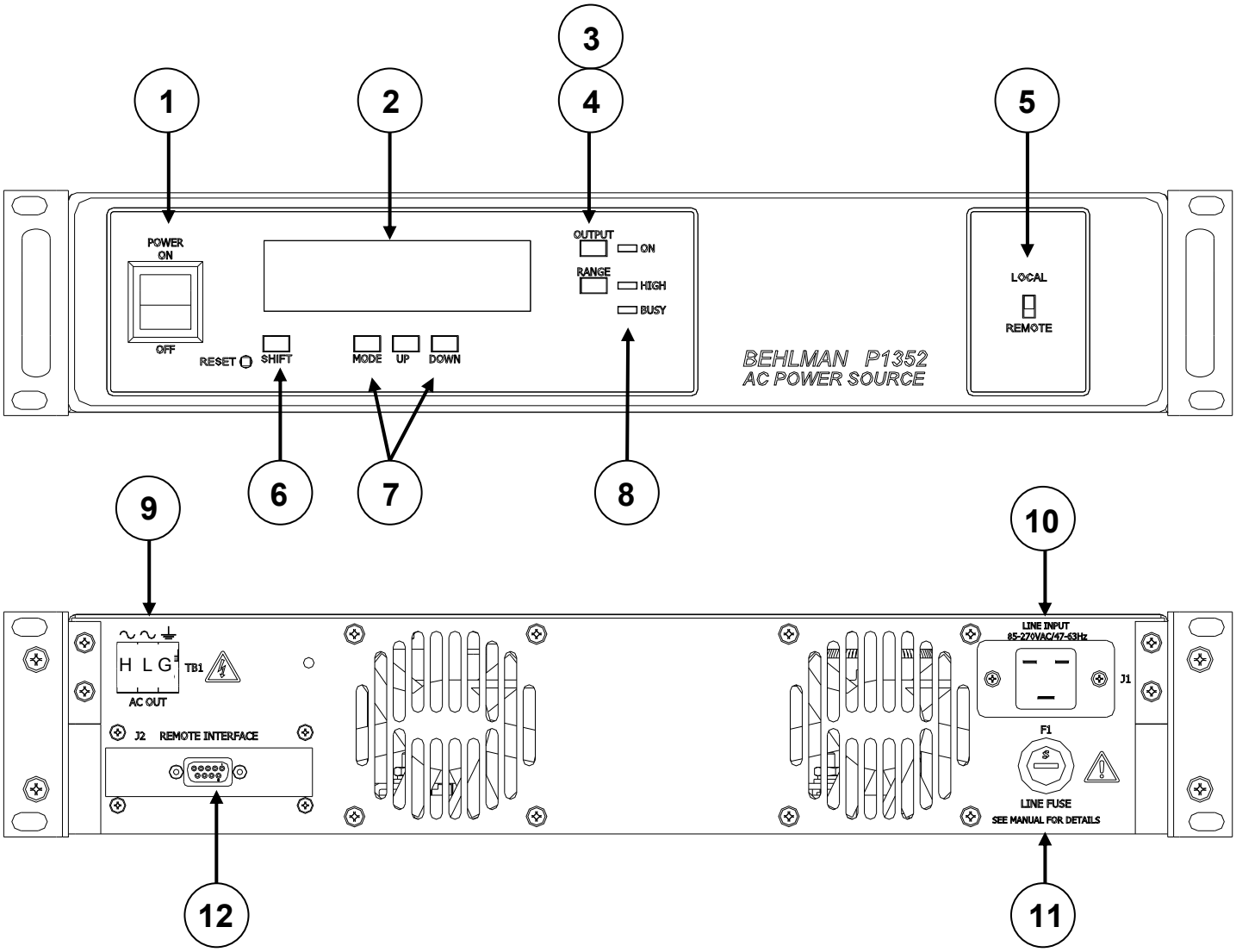


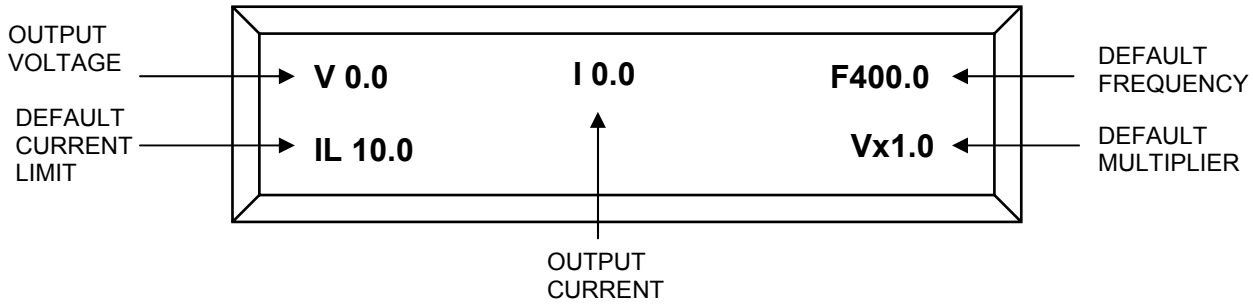
FIGURE 3-1 PF1352 CONTROLS AND INDICATORS

3.2 OPERATING INSTRUCTIONS

1. Connect the unit to a source of AC power between 95 & 267 VRMS and 47-63Hz. **NOTE: for full power operation, input must be at least 108V**. Conformance with IEC safety standards limits the input to 250VAC. See section 2 of this manual for specific wiring information.

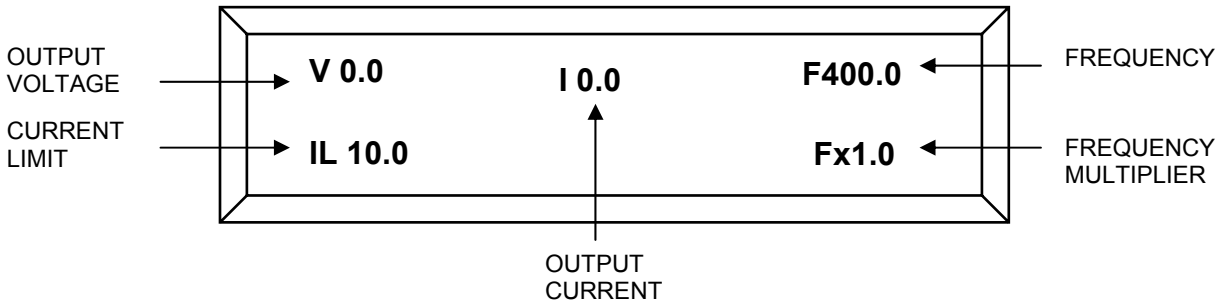
2. Connect the load to the rear panel output terminal block. The load is connected between H and L. A third terminal tied to the chassis is provided to allow attachment of a safety earth connection.

3. With loads connected and switched off (recommended), turn on the front panel power switch and allow a few seconds for the power supply to stabilize. The sound of the cooling fans should be evident and the front panel display should appear as in figure 3-2 below.



4. Note that the default multiplier is "**Vx1.0**". This indicates the output voltage may now be set in 1 volt increments using the **UP** or **DOWN** keys. To change the step size, hold in the **SHIFT** key. At the same time press the **MODE** key. Each time the **MODE** key is pressed the multiplier step size will increase by a factor of ten. The available step resolutions are: x0.1, x1.0, x10, x100. Note that the unit will automatically limit the maximum output voltage depending on the setting of the **RANGE** switch.

5. To set the output frequency, press the **MODE** key once. The display should now appear as in figure 3-3 below.



6. The “F” in front of the multiplier indicates that frequency is the parameter now controlled by the **UP/DOWN** keys. Use the **UP/DOWN** keys to set the frequency to the desired value. Remember that the “step size” or resolution can be changed by holding the **SHIFT** key and pressing the **MODE** key to select the desired multiplier value.

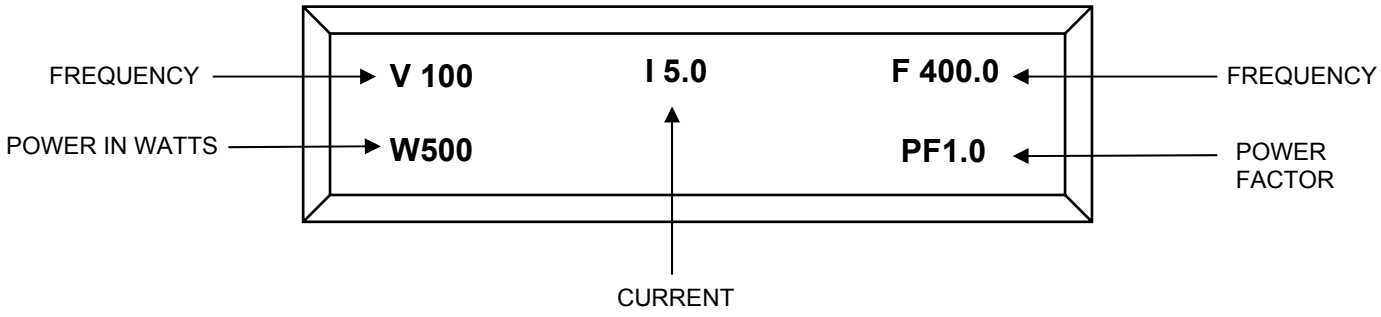
7. Use the **SHIFT** and **MODE** keys along with the **UP/DOWN** keys to set the output voltage to the desired value. Make sure the unit is set to the required output voltage range using the front panel **RANGE** switch. Remember holding the **SHIFT** key and pressing the **MODE** key sets the resolution multiplier.

8. After the voltage and frequency (and current limit if required) are set, the load may be energized by pressing the **OUTPUT** switch button. (Note that is also permissible to energize the load gradually by setting the voltage to zero, turning on the output, and stepping the voltage up.)

The voltage, frequency, and current limit may be set at any time during the operation of the power supply**.** Press the **MODE** key to change which parameter is to be adjusted. Use the **SHIFT** and **MODE** keys to select the step size as previously described. Then the output parameter may be adjusted with the **UP/DOWN** keys.

3.3 POWER DISPLAY MODE

A useful feature of the PF1352 is the power display mode. In this mode, the output power in watts and the load power factor are continuously displayed along with frequency, voltage, and current. When in this mode the **UP/DOWN** keys are disabled and will not change output parameters when pressed. Use the **MODE** key to set the unit in this mode. A typical power display is illustrated in figure 3-4 below.



3.4 OPERATING CONSIDERATIONS

The output voltage and frequency may be varied at any time while the unit is loaded. It is recommended that the load be disconnected (off) while changing the range setting. This will prevent potentially damaging transients from reaching the load.

3.5 CURRENT LIMIT AND CONSTANT CURRENT MODE

The PF1352 current limit feature allows the user to preset a current limit point. If the load current exceeds this value (RMS) the output of the unit will drop to zero and the display will indicate the event by flashing "**O/I**". This condition can be cleared by pressing the **MODE** button. This will return the unit back to power on status. If the current limit is not preset the default value of 10 amps for the 135V range and 5 amps for the 270V range will be used and the unit will go into a "constant current" mode when the default value is reached. In this mode, the output voltage will drop in response to an overload. This action will maintain the current at a fixed value. This can be a useful feature for trouble shooting. When the unit is in this mode the display will flash "**C/C**". The unit will come out of this mode once the load current is reduced below the default value.

3.6 OPERATION UNDER FAULT CONDITIONS.

The PF1352 AC source incorporates several modes of protection:

CURRENT LIMIT AND CONSTANT CURRENT	See paragraph 3.5 above.
OVER-VOLTAGE	(O/V) If the measured output voltage is 20% higher than the full scale value, the unit will revert to zero output and the display will flash **O/V**. This is a very rare and will most likely indicate that the unit needs service. Pressing the **MODE** button will reset this condition.
OVER-TEMPERATURE	If the power amplifier temperature exceeds a safe value, the output voltage will revert to zero and the display will flash **O/T**. Pressing the **MODE** key will reset this fault (assuming unit has cooled).
SHORT CIRCUIT	In the event that the output is short circuited, the unit will latch-up and the display will flash **O/L**. Power must be cycled to off for a period of about 60 seconds to reset this fault. If the short is removed, the unit should recover when switched back on. (Note if the unit has a light load or no load it may take a as much as 3 minutes for the circuit to reset. This is due to residual charges left on internal capacitors.)

These AC power supply models are based on electronic circuits that utilize various power semi-conductors. As such, there is a limit to the amount of current that can be supplied. Certain loads may draw short duration, very high peak currents that may activate protection circuits within the AC power supply. The Model PF1352 incorporates two distinctive over current circuits. The first responds to massive overloads like short circuits. This circuit can respond in a few tens of microseconds. Once activated, the AC output of the power supply is disabled and the front panel display will flash "**O/L**".

The second current limit circuit responds to long term overloads. Once the current is increased beyond the current limit setting, the unit will enter a constant current mode. In this mode, the output voltage will reduce to limit the current if the load resistance is reduced further. The voltage will recover automatically once the overload is removed. The front panel display may flash "**C/C**" under these conditions depending on the nature of the overload.

The internal temperature of the unit is monitored. If the temperature rises above a safe value, the output will be disabled and the front panel display will flash "**O/T**". Normal operation can resume once the unit has cooled to a safe level and the **MODE** key or reset button is pressed.

3.7 LIMITING LOAD IN RUSH CURRENTS

Loads that present high inrush currents may be started by limiting the current at start-up. This can be done externally with a simple series resistor and relay. The resistor is placed in series with the load for the estimated or measured inrush period. Once the inrush current has stabilized or tapered off, the relay is used to switch the resistor out of the circuit. NTC (Negative Temperature Coefficient) "thermistors" may also be used. These devices start off with a nominal resistance value when cold (off). Once power is applied the current flow causes the temperature of the resistor to increase which in turn reduces the value of the resistance. The "hot" value may be several times lower than the cold value. These devices are available for currents exceeding 15 Amps.

3.8 OPERATION INTO LINEAR LOADS

These models will provide the best overall performance into a linear load. A linear load is characterized by that fact that its current wave shape is sinusoidal. The phase relationship between the voltage and current may be anything between zero and 90 degrees (leading or lagging). Some examples of linear loads are as follows: Most AC Motors, Power Transformers, Heating Elements, Resistors, Capacitors, Most Inductors, Incandescent Lighting (without dimmers), and most Solenoids

Operation into these types of loads usually causes little interaction with the AC power supply. The main concern with a linear load is the inrush current associated with it. Most heating elements and resistors have little or no inrush concerns and usually do not present any problem for the power source. Inductive and capacitive loads may present a special problem based on their construction and the way in which they are energized. Motors and tungsten filament lamps also present some special start-up concerns. The following is intended to give the end user some insight into applying the AC source to these types of loads.

3.9 DRIVING REACTIVE LOADS

Capacitors and inductors are reactive in nature. If the load is applied during the peak of the AC cycle there may be a considerable inrush of current several magnitudes larger than the steady state current. This current is only limited by any series resistance that may be present in the load circuit. Under the right conditions, this could trip the overload protection circuits in the power source. Certain transformers and solenoids (inductance) present the same problem.

Several methods can be used to prevent tripping the protection circuits in the power source. One common method is to insert a limiting impedance in series with the load. This could be a fixed resistor or NTC (negative temperature coefficient) thermistor. Also, zero crossing switching can be employed. The most obvious way to prevent a high in rush current is to apply the load with the voltage set to zero (or some low value) and energize the load slowly by turning up the voltage.

3.10 DRIVING LAMPS

Tungsten filament lamps, when cold, present a very low resistance. Once they are energized, their resistance quickly climbs to a steady state value. This characteristic must be accounted for when driving tungsten filament lamps. The same methods for driving reactive loads can be applied to tungsten.

3.11 DRIVING MOTORS

Driving an AC motor presents a special problem. Most motors require a starting current that is several times higher than the running current. This current may last for a few cycles to several seconds depending on the construction and mechanical load on the motor. This current is sometimes referred to as the motor’s locked rotor current. This current is not to be confused with the inrush current that usually occurs over the course of one or two cycles of the AC waveform. The model PF1352's fold back current limiting can be an advantage when starting motors. During the starting period, the motor will attempt to draw excessive power from the power source. The fold-back circuit will reduce the output voltage in order to maintain the maximum current for the range in use.

3.12 OPERATION WITH REMOTE CONTROL

The PF1352 is available with several remote control options. These are:

1. RS-232 ,USB, or Ethernet computer control (standard)
2. IEEE-488 computer control (I option)
3. 0-10VDC Analog Remote Control (A option)

Each of the options allows control of the following:

1. Output Voltage Setting
2. Output Frequency Setting
3. Output on/off function
4. Output Range function
5. Current limit Setting* (* not available with analog remote).

In addition, the standard versions allow remote monitoring of output voltage, frequency current, power, and power factor. System status may also be “polled” to check for operational problems such as overloads or over temperature.

The specific information for each option will be included at the end of this document as an appendix. Note that only one option may be included. Check the rating label to see if options have been installed.

ISOLATION AND SAFETY

The provided remote control interface meets the general safety and isolation requirements of IEC 60950 for class1 equipment. This interface is intended to be connected to properly grounded “ITE” equipment. Contact Behlman for additional information.

SECTION 4
MAINTENANCE AND TROUBLE SHOOTING

4.1 MAINTENANCE

These power supplies are completely self contained solid state devices and do not require any routine maintenance. When used within their ratings they will provide many years of trouble free service. The only foreseen maintenance issue would be maintaining the ventilation “grills”. Any accumulation of dust and debris should be removed by brushing or vacuuming.

4.2 TROUBLESHOOTING

THESE UNITS DO NOT CONTAIN USER SERVICEABLE PARTS
REFER ALL SERVICING TO QUALIFIED PERSONNEL ONLY. DO NOT REMOVE COVERS AND DISCONNECT POWER BEFORE REMOVING FOR SERVICE.

Table 4-1 below should be consulted In the event a problem is encountered during the operation of this power supply.

OBSERVED SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No outputs, display indicates V0.0	Voltage not set	Set voltage per section 3
Load does not operate, unit indicates proper output	OUTPUT switch is off, load not connected between HI and Lo AC output.	Check load is switched on. Check load is connected properly, See section 2 and 3.
AC output low or fluctuates, constant current **C/C** flashes	Output overload.	Reduce load.
Output voltage does not change	Unit in power monitor mode	Set to adjust mode, see section 3
Output frequency does not change	Unit in power monitor mode	Set to adjust mode, see section 3
AC output distorted.	Hi harmonic content to load current. Non-linear load applied	Check load current waveform.
AC output drops to zero when load is switched on. Overload “**O/L**” is displayed.	Output overloaded or shorted by large in-rush current.	Check load requirement, see information in section 3 on starting difficult loads.
No outputs, no displays, input fuse blows repeatedly.	Internal fault.	Remove unit from use and refer to qualified service personnel. Contact factory for service.

WARNING! REPLACE FUSE WITH SAME TYPE AND RATING ONLY.

6.3x32mm cartridge type, 16A / 300VAC min voltage rating

4.3 PERFORMANCE VERIFICATION

The following procedure can be used to verify operation and calibration of the PF1352 AC power supply.

WARNING !

THE FOLLOWING PROCEDURE EXPOSES PERSONNEL TO HAZARDOUS VOLTAGE AND CURRENT LEVELS. REFER TO QUALIFIED PERSONS ONLY

4.3.1 EQUIPMENT REQUIRED

Table 4-1 lists the test equipment required to for performance verification. Other equipment may be substituted provided that it meets the minimum requirements set in the table.

#	DESCRIPTION	SUGGESTED TYPE	MINIMUM SPECIFICATIONS
1	AC WATTMETER	YOKAGAWA WT-230	AC volts, amps, & frequency 0.1% to 500Hz.
2	TEST LOAD BANKS	AVTRON	12 OHM +/- 5% @ 1.2KW 48 OHM +/-5% @ 1.2KW
3	OSCILLOSCOPE	TEK TDS 2000 SERIES	20 MHz Bandwidth.
4	VARIABLE AUTO-TRANSFORMER	SUPERIOR ELECTRIC MODEL 1020 or equal	0 TO 250V @ 2KW , 60Hz
5	DISTORTION METER	HP339A or equal	1.0% Full Scale to 500Hz Tuned rejection type.
6	TEST LEADS, PROBES	ANY / Fabricate	As required.

4.3.2 SETUP

Set up equipment as illustrated in figure 4-1. For the remainder of this procedure the AC power supply will be referred to as the DUT (Device Under Test). Turn on the power to test equipment and allow a 10 minute warm up period before commencing with the test.

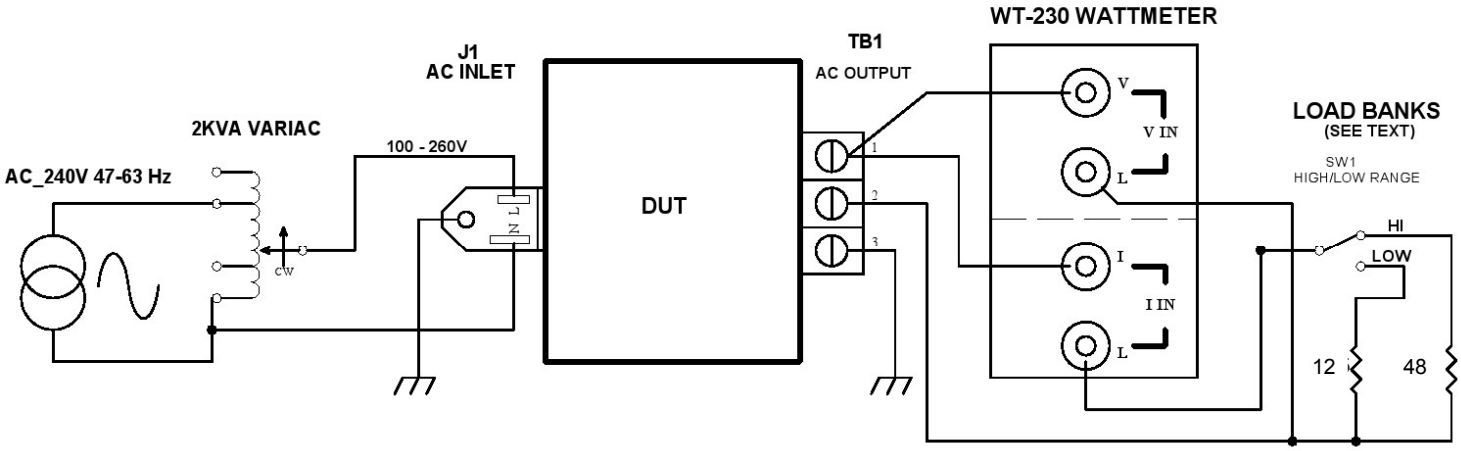


FIGURE 4-1 PERFORMANCE TEST SET UP

4.3.2 Set the PF1352 front panel controls as follows:

OUTPUT	=	Off (button out)
RANGE	=	Low (button out)
LOCAL/REMOTE	=	Local

4.3.3 Set the variac to provide 120V AC to the DUT. Switch the DUT on and confirm the displays are active and the cooling fans are on.

4.3.4 Set the DUT frequency control to provide a 100Hz output.

4.3.5 Set the DUT voltage to provide 100V output and set the output switch to on. Confirm an output of 100V @ 100Hz using the wattmeter.

4.3.6 With the load off, set the DUT voltage to the values listed in table 4-2. In each case record the actual output voltage vs. the displayed set value. These should agree within +/-0.5% of setting +/-0.2 volts.

TABLE 4-2

DISPLAYED SETTING	MEASURED OUTPUT VOLTAGE	LIMITS
25		24.77V - 25.22V
50		49.65V – 50.35V
75		74.52V – 75.47V
100		99.4V – 100.6V
135		134.22V – 135.77V

4.3.7 With the load off, set the DUT to the HIGH range. Set the DUT to the values listed in table 4-3. In each case, record the actual output voltage and confirm that it is with-in limits.

TABLE 4-3

DISPLAYED SETTING	MEASURED OUTPUT VOLTAGE	LIMITS
50		49.65V– 50.35V
100		99.4V – 100.6V
150		149.15V – 150.85V
200		198.9V – 201.1V
270		268.5V – 271.5V

4.3.8 With the load off, set the wattmeter to read frequency. Set the DUT to the frequencies listed in table 4-4. Confirm that the actual output frequency matches the display setting within the limits of +/-0.1Hz. +/- 1 digit.

TABLE 4-4

DISPLAY SETTING	MEASURED OUTPUT FREQUENCY	LIMITS
50 Hz		49.8Hz - 50.2Hz
100Hz		99.8 Hz – 100.2Hz
200Hz		199.8Hz – 200.2Hz
400Hz		399.8 Hz – 400.2Hz
500Hz		499.8 Hz – 500.2Hz

4.3.9 Set the DUT output voltage to zero and the output frequency to 100Hz. Connect the 12 ohm load (or closest value available) to the output of the DUT. Make sure the range is set to low (0-135V). Set the **MODE** to adjust voltage in 0.1 or 1.0 volt steps. Using the DUT voltage **UP** key, adjust the output to provide the currents listed in table 4-5. In each case, confirm that the displayed current matches the current indicated on the external wattmeter (+/- 1% of reading, +/- 0.5 amps).

TABLE 4-5

DISPLAYED SETTING	MEASURED OUTPUT AMPS	LIMITS
1.0A		.91A - 1.1A
2.0A		1.88A – 2.12A
5.0A		3.85A – 5.15A
7.5A		7.32A – 7.67A
10.0A		9.8A – 10.2A

4.3.10 With the 12 ohm load applied set the output voltage of the DUT to provide output the powers levels listed in table 4-6. At each setting, confirm that the output power reading on the DUT agrees with the external wattmeter. These values should be within 2.5% of reading +/- 1 digit.

TABLE 4-6

APPLIED LOAD	DISPLAYED WATTS	MEASURED WATTS	LIMITS
250W			242 - 257
500W			487.5 - 512.5
750W			730.3 - 769.7
1200W			1169 - 1231

Note:
When checking the power measurements, adjust the voltage to provide the indications in the column label “Applied Load”. The actual value applied should be as close as possible but these levels are approximate.

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4.3.10 CHECK OF LINE AND LOAD REGULATION

Set the DUT to 100V and 100Hz. The unit should be in the low range (0 -135v) and powering the 12 ohm load. While monitoring the output voltage on the wattmeter, adjust the AC line input with the variac from 105 to 250 VAC. Confirm that the DUT output voltage does not fluctuate more than 0.7volts from the initial set point.

Readjust the AC input to 120V. Set the load to 54 ohms and the DUT range to high, With the load off, set the output for exactly 200V as measured on the wattmeter. Connect the 48 ohm load and record the drop in voltage with load. This should be less than 2.0V. Note that the output voltage shall be measured as close to the output terminals as practical. The wattmeter voltage sense input should be tied to the rear panel of the DUT. Failure to do so may cause errors due to wiring voltage drops.

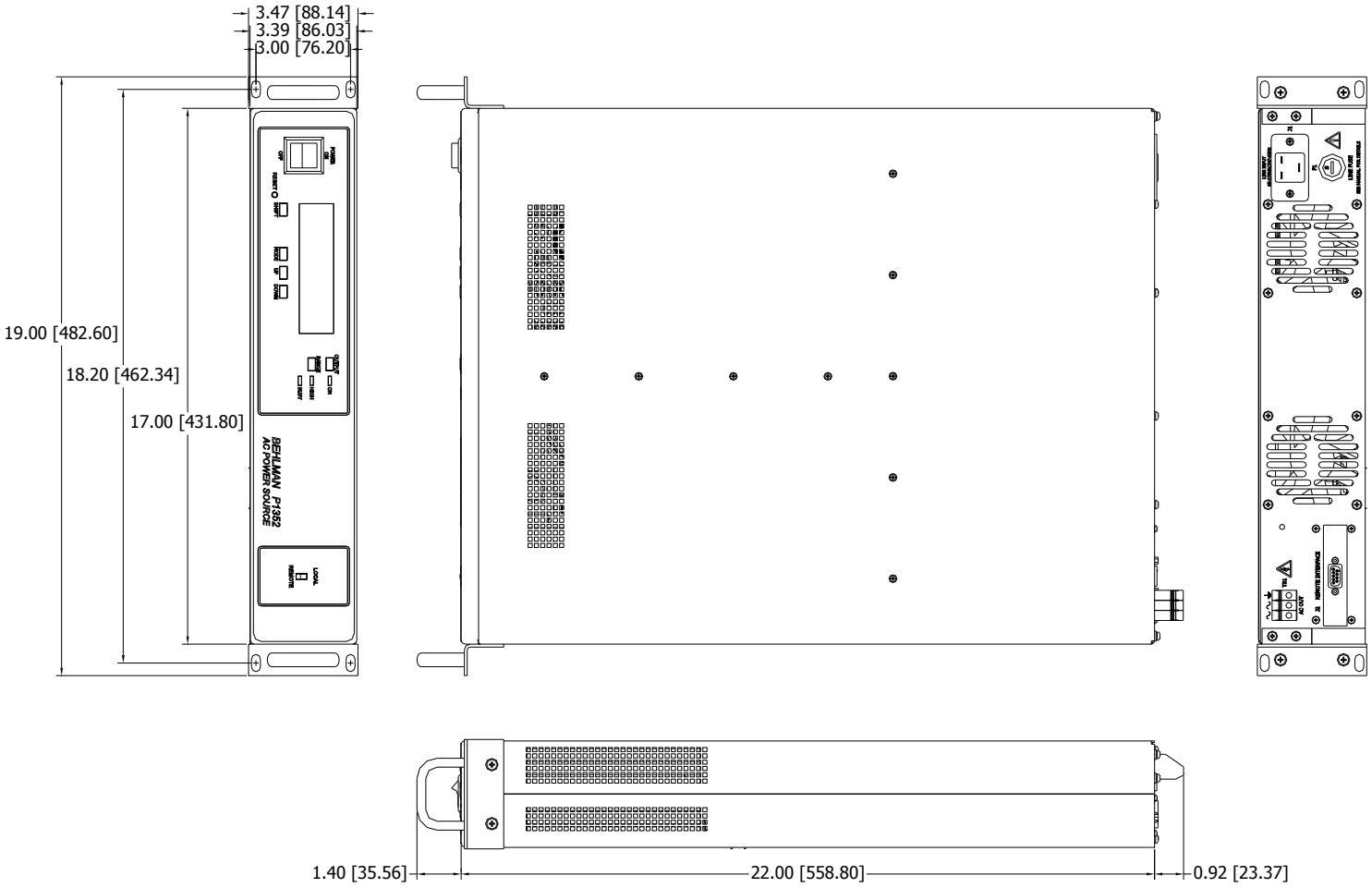
4.3.11 CHECK OF OUTPUT DISTORTION AND NOISE

Set the DUT as follows: RANGE =low, Frequency = 50Hz, output voltage 100V. Connect the 12 ohm load, distortion meter, and oscilloscope to the output of the DUT. Measure the distortion (THD) and confirm less than 1.5%.

Set the DUT output to zero and measure the residual noise level on the output using the oscilloscope. It should be less than 2.5V peak to peak.

For units with remote control options, see specific appendix at rear of this manual.

SECTION 5
MECHANICAL OUTLINE



PF1352 MECHANICAL OUTLINE = inches (millimeters)

SECTION 6
REMOTE INTERFACE

6.1 INTRODUCTION

Behlman's Remote Interface application software is designed to ease control of power supplies with remote SCPI interface capabilities. The software provides the ability to program and retrieve the power supplies output parameters.

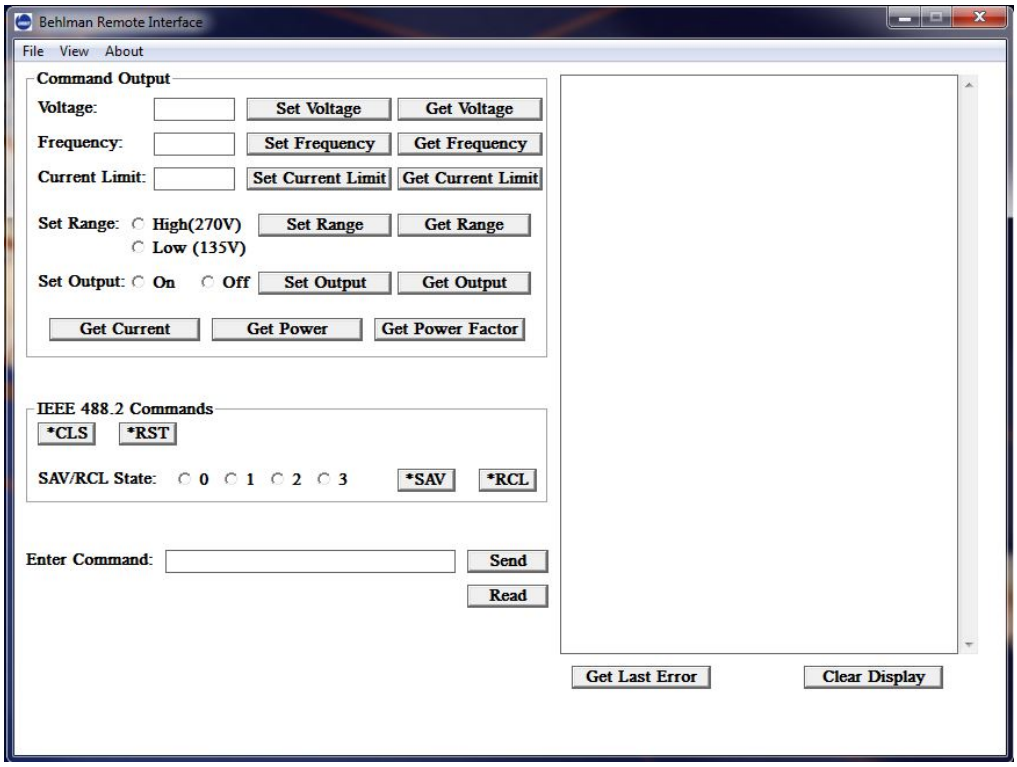


Figure 6-1 Behlman Remote Interface Command Tab

There are 5 tabs that can be accessed through the View menu:

1. Command Tab: Use this tab to set and retrieve the power supplies output parameters such as Voltage, Current Limit, Frequency, Output and Voltage Range settings. This tab also provides the ability to save and recall a power supplies state.
2. Trigger Tab: Use this tab to setup and run a trigger event. Events can be defined for Voltage, Frequency and Current Limit.
3. Status Tab: Use this tab to read the power supplies status registers.
4. Communication Tab: Use this tab to setup the communication parameters for Ethernet and RS-232.
5. Manufacturer Tab: Use this tab to setup the system password and to read the manufacturer ID string.

6.2 INSTALLATION

To install the application the user must run the Setup.msi file. The Setup.msi file installs the USB setup file and Behlman's Remote Interface application software to C:\Program Files\Behlman Electronics\Behlman Remote Interface\ by default.

The Setup.msi file can be downloaded from the Support tab in Behlman's website www.behlman.com.

After installation there will be four executable files placed into this folder:

- Behlman Boot Loader_Win7.exe
- Behlman Boot Loader_WinXP.exe
- Behlman Remote Interface_Win7.exe
- Behlman Remote Interface_WinXP.exe

The Win7 and WinXP extensions are used to differentiate between the windows operating systems. Windows 7 and above should use the applications with the Win7 extension. Windows XP or Windows Vista operating systems should use the applications with the WinXP extension.

Note: While the power supply is in Boot Loader mode, it will also reset all power on configuration parameters to their factory default state. To exit Boot Loader mode without uploading new firmware, move the external switch to the down position while the power supply is still powered on. See table 6-1 for the factory default states.
More information can be found in the programming manual of the power supply.

Ethernet Settings	
Configuration	DHCP
IP Address, Subnet, Mask	Setup by DHCP Server
Hostname	BEHLMAN
Port Number	5025
RS-232 Settings	
Baud Rate	9600
Manufacturer Settings	
Username	admin
Password	DEFAULT

TABLE 6-1 Factory Default Settings

6.3 BEHLMAN REMOTE INTERFACE

6.3.1 CONFIGURATION

Figure 6-2 shows the Configuration dialog box, which can be opened from Behlman Remote Interface File -> Configuration. This dialog box allows the user to configure the interface used for communication.

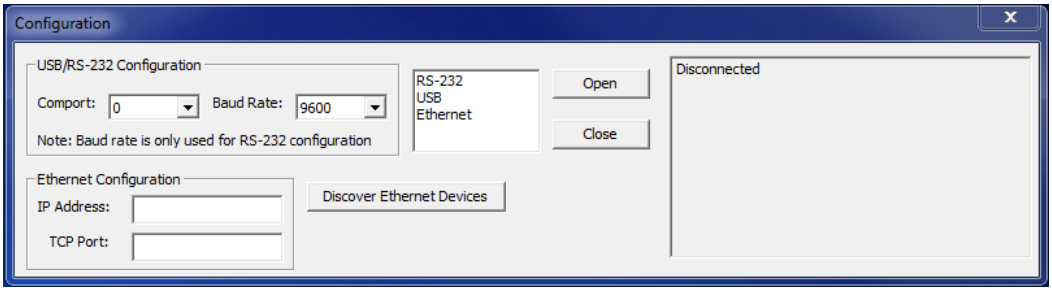


Figure 6-2 Configuration Dialog Box

If the initialization fails at any step for any interface, a pop up window describing the error will appear.

RS-232 Configuration
To setup a RS-232 port, the user must select the Comport and Baud Rate into the appropriate drop down fields, select the RS-232 interface and click Open. If the initialization of the port is successful, “Serial Connection Opened” will appear in the display box.

USB Configuration
To setup a USB port, the user must select the Comport into the appropriate drop down fields, select the USB interface and click Open. If the initialization of the port is successful, “Serial Connection Opened” will appear in the display box.

Ethernet Configuration
To setup an Ethernet port, the user must enter the IP address and the TCP port into the appropriate text box fields, select the Ethernet interface, and click Open. If the initialization of the port is successful, “Connected to Server” will appear in the display box.

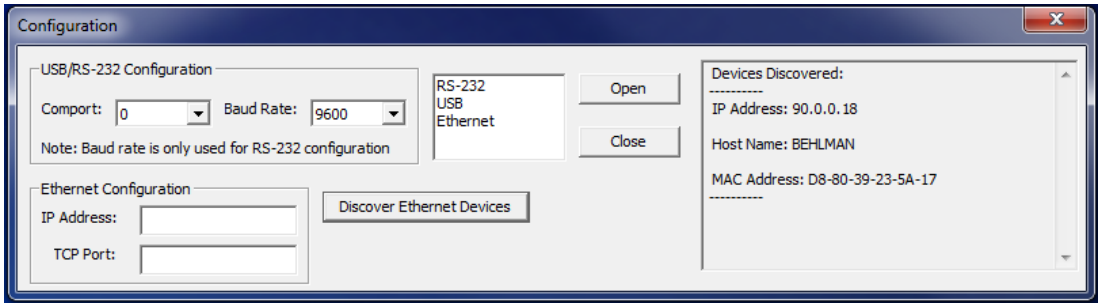


Figure 6-3 Configuration Dialog Box Devices Discovered

Use the *Discover Ethernet Devices* button to determine the IP address of the unit after power on. Figure 6-3 shows the configuration dialog box output after the *Discover Ethernet Devices* button was clicked.

6.3.2 COMMAND TAB

Figure 6-4 shows the Command Tab, which contains the main SCPI commands for controlling the output of the power supply.

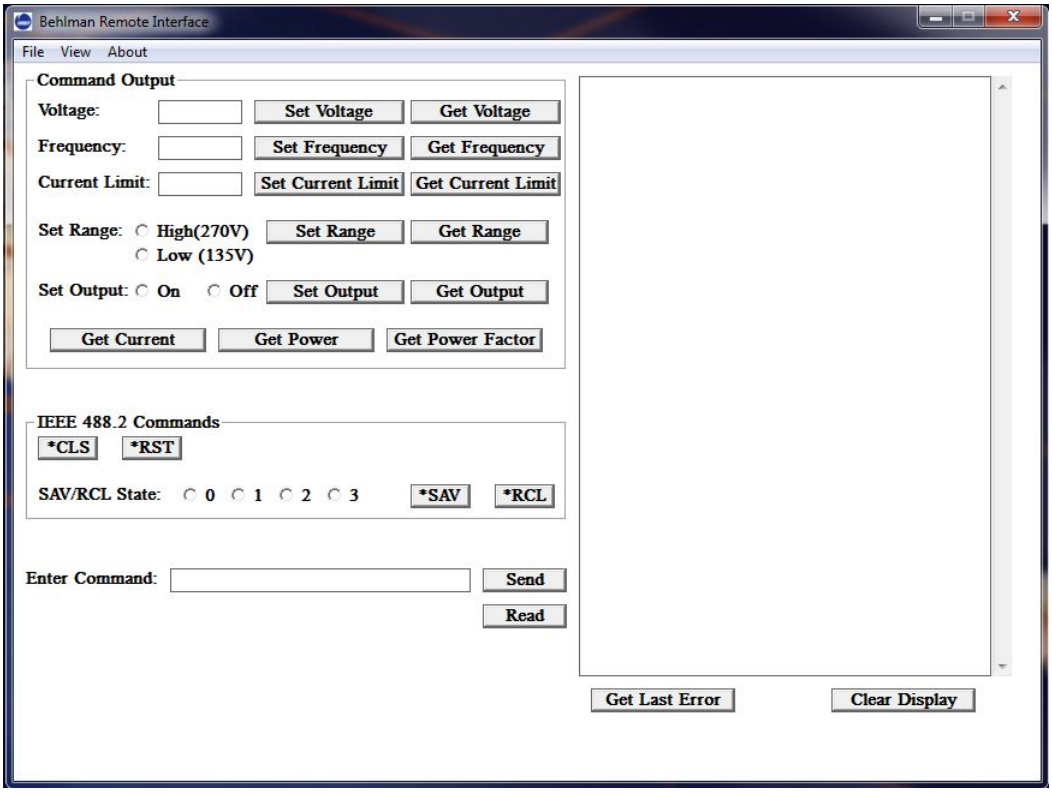


Figure 6-4 Command Tab

6.3.2 COMMAND TAB (continued)

The *Set Voltage* button sets the power supply output voltage to the value entered in the Voltage text box. The *Get Voltage* button queries the power supply for the voltage and displays the response. Frequency and Current Limit set and get buttons work similarly.

The *Set Range* button sets the power supplies voltage range to the value entered, either High(270V) or Low(135V). The *Get Range* button queries the power supply for the range setting and displays the response.

The *Set Output* button set the power supplies output to the value entered, either On or Off. The *Get Output* button queries the power supply for the output setting and displays the response.

The *Get Current* button queries the power supply for the current and displays the response. The Get Power and Power Factor buttons work similarly.

**CLS* or **RST* buttons send the clear or reset commands to the power supply.
**SAV* and **RCL* buttons take the selected state value, 0 1 2 or 3 and sends the save or recall command for the selected state to the power supply.

The *Send* button allows the user to enter a command into the Enter Command text box and send it to the power supply. The *Read* button can be used to read the response from the power supply.

The *Send* button can be used to send multiple program messages in a single command string. For example, the user could enter *VOLT 100;*WAI;:MEAS:VOLT?\n*, which would set the voltage to 100V, wait until the set voltage command is complete, and then return the measured voltage. Note, the colon in front of the *MEAS:VOLT?* command is the root specifier used to reset the parser back to the root node. More information regarding the root specifier can be found in the programming manual for the power supply.

The *Get Last Error* button sends the *SYST:ERR?\n* query and displays the response.

6.3.3 TRIGGER TAB

Figure 6-5 shows the Trigger Tab, which contains the main SCPI commands used for setting up the *TRIGger* subsystem.

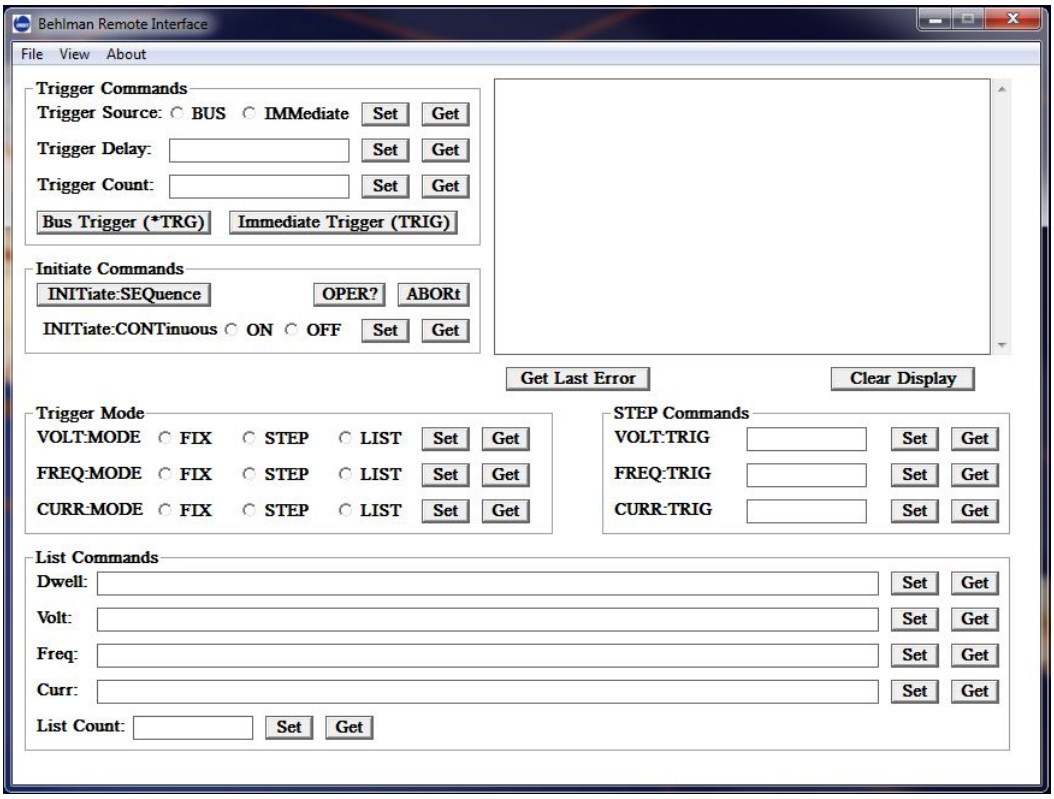


Figure 6-5 Trigger Tab

More information regarding the *TRIGger* subsystem can be found in the programming manual for the power supply.

Steps for setting up a trigger event:

- Set Trigger Source: select BUS or IMMediate and click the *Set* button. Use the *Get* button to query the trigger source and display the response.
    - BUS trigger source will wait for *TRG bus trigger or TRIG command to enter the Sweeping state.

- IMMediate trigger source will immediately go into Sweeping state after the Trigger subsystem is initiated. A trigger command is not required to start the event.

- Set Trigger Delay: enter a value into the Trigger Delay text box and click the *Set* button. Use the *Get* button to query the trigger delay and display the response.

  The trigger delay is the time delay between receiving a trigger and starting the event. A trigger delay is not required to trigger an event. When the trigger source is set to IMMediate, the trigger delay will be ignored.

- Set Trigger Count: enter a value into the Trigger Count text box and click the *Set* button. Use the *Get* button to query the trigger count and display the response.

  The trigger count is the amount of times a trigger event, including waiting for the trigger, will be repeated. A trigger count is not required to trigger an event.

- Select Trigger Mode: select FIX, STEP or LIST for each trigger event function (VOLT, FREQ and CURR), and click the *Set* button for that function. Use the *Get* button to query the mode and display the response.
  - LIST: when the mode is set to LIST, define the list points in the List Commands text box for that function. The list points should be separated by commas. Up to ten list points can be defined. Use the *Set* button to submit the points, and the *Get* button to query and display the points.

    Define the Dwell list points in the Dwell text box and click *Set*. The Dwell list points define the time delay between the executions of each list point. Use the *Get* button to query and display the Dwell list points.

    Define the list count in the List Count text box and click *Set*. Use the *Get* button to query and display the count. The list count is the amount of times a list event, not including the wait for trigger, will be repeated. A list count is not required to trigger an event.

  - STEP: when the mode is set to STEP, define the step trigger value in the STEP Commands text box for that function, and click *Set*. Use the *Get* button to query and display the response.

  - FIX: when the mode is set to FIX, no event values need to be defined.

- Initiate the Trigger subsystem: use the *INITiate:SEQuence* button, or set *INITiate:CONTinuous* ON to initiate the event.

- *ABORt* button can be used to abort the trigger event.

OPER? button can be used to get the *TRIGger* subsystem state. The Operation Event register has two bits, WTRG (Wait for Trigger, bit 5) and SWEeping (Trigger Event in Process, bit 3) that define the *TRIGger* subsystem state.

6.3.4 STATUS TAB

Figure 6-6 shows the Status Tab, which contains the SCPI status commands for the power supply. The user can query the power supply for the operational, questionable, status byte and standard event status registers.

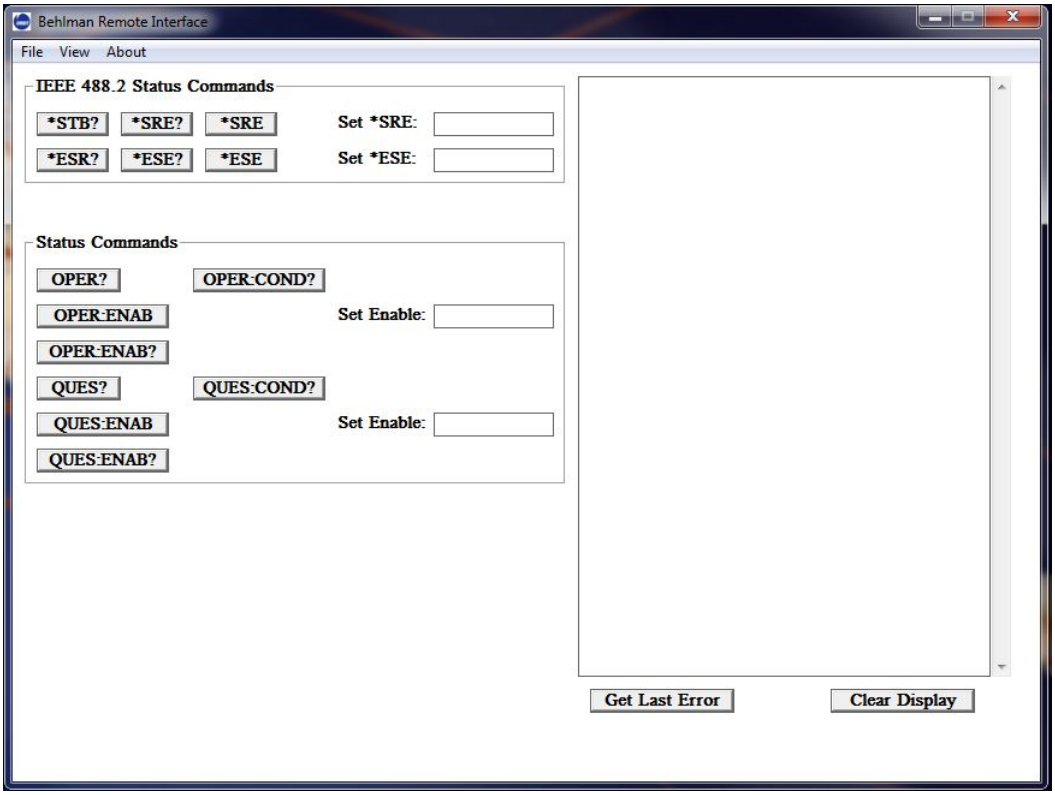


Figure 6-6 Status Tab

Figure 6-6 shows the Status Tab, which contains the SCPI status commands for the power supply. The user can query the power supply for the operational, questionable, status byte and standard event status registers.

More information regarding status register bit definitions can be found in the programming manual for the power supply.

The **STB?* button queries the power supply for the Status Byte register and displays the response.

The **SRE* button sets the Service Request Enable register to the decimal value in the *SRE text box.
The **SRE?* button queries the power supply for the Service Request Enable register and displays the response.

The **ESR?* button queries the power supply for the Standard Event Status register and displays the response.

The **ESE* button sets the Standard Event Status Enable register to the decimal value in the *ESE text box.
The **ESE?* button queries the power supply for the Standard Event Status Enable register and displays the response.

The *OPER?* and *OPER:COND?* buttons queries the power supply for the Operation Event register and Operation Condition register and displays their response. The *QUES?* and *QUES:COND?* buttons work similarly for the Questionable registers.

The *OPER:ENAB* button sets the Operation Event Enable register to the decimal value in the Set Enable text. The *OPER:ENAB?* button queries the power supply for the Operation Event Enable register and displays the response. The *QUES:ENAB* and *QUES:ENAB?* buttons work similarly for the Questionable Enable registers.

6.3.5 COMMUNICATION TAB

Figure 6-7 shows the Communication Tab, which contains the SCPI commands used to set up the communication parameters for the Ethernet and RS-232 ports.
All Ethernet and RS-232 parameters are saved in nonvolatile memory. The parameters are reset to their factory default values after the power supply is powered on in Boot Loader mode, allowing the user to reset the communication parameters if the power supply becomes unresponsive after a parameter change. To exit Boot Loader mode without uploading new firmware, move the external switch to the down position while the power supply is still powered on. More information regarding the Boot Loader mode can be found in the Boot Loader section.

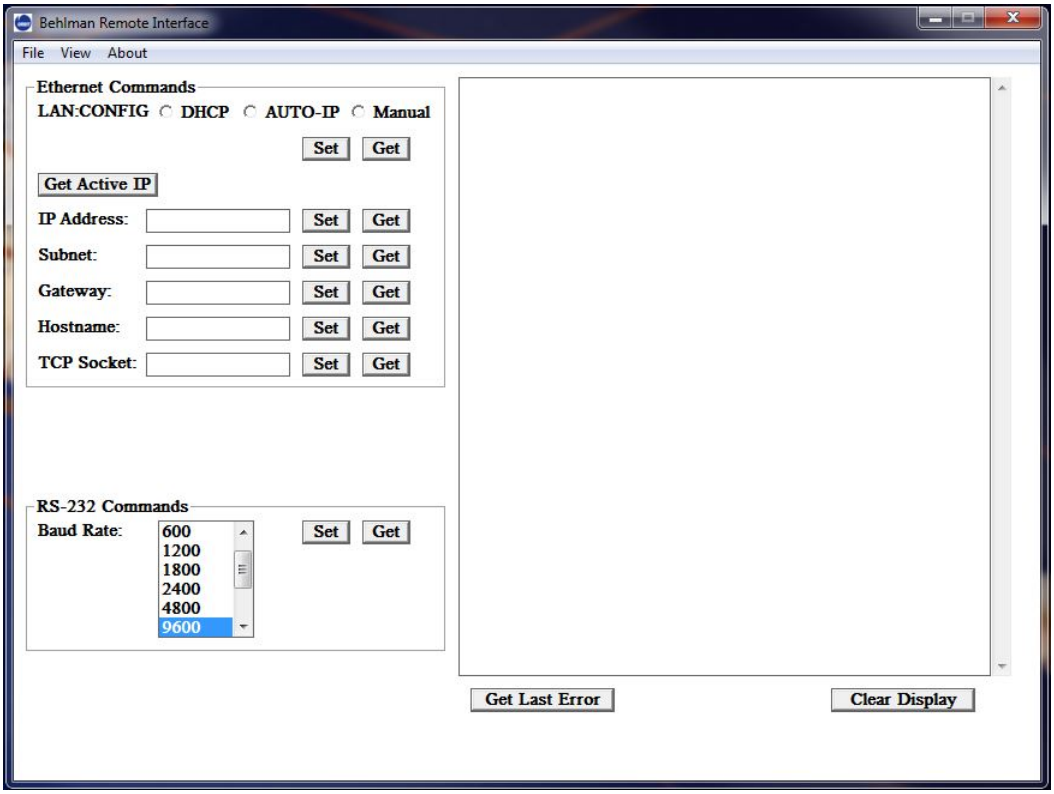


Figure 6-7 Communication Tab

More information regarding communication setup commands can be found in the programming manual for the power supply.

See table 6-1 for the RS-232 and Ethernet factory default settings.

Ethernet Commands:

To setup the Ethernet configuration protocol, select DHCP, AUTO-IP or Manual and click *Set*. The *Get* button queries the power supply for the Ethernet configuration and displays the response.

For DHCP and AUTO-IP configuration, the IP address, subnet and gateway are automatically set.

For Manual configuration, the user must setup the Ethernet configuration parameters. The manual IP address can be entered in the IP Address text box. Quotations around the IP address should NOT be included in the textbox, they are added automatically by the application before sending the command. The *Set* button set the IP address, and the *Get* button queries the power supply for the IP address set. The subnet and gateway Set and Get buttons work similarly to IP Address Set and Get.

The hostname *Set* button takes the string entered in the Hostname text box and sets the power supplies hostname. Quotations around the hostname should NOT be included in the textbox, they are added automatically by the application before sending the command. The *Get* button queries the power supply for the hostname and displays the response.

The TCP socket *Set* button takes the new socket decimal value in the TCP Socket textbox and sets the TCP socket number on the power supply. The *Get* button queries the power supply for the TCP socket number and displays the value.

Get Active IP button queries the power supply for the active IP address and displays the response. While the Ethernet configuration is set to MANual, the active IP address is the same value as *Get* IP address. While the Ethernet configuration is set to DHCP or Auto-IP, the active IP address is the IP address that is assigned by the router.

RS-232 Commands:

The RS-232 baud rate *Set* button takes the value from the Baud Rate drop down menu and sets the baud rate. The *Get* button queries the power supply for the baud rate and displays the response.

6.3.6 MANUFACTURER TAB

Figure 6-8 shows the Manufacturer Tab, which contains password protection commands and manufacturer identification commands.

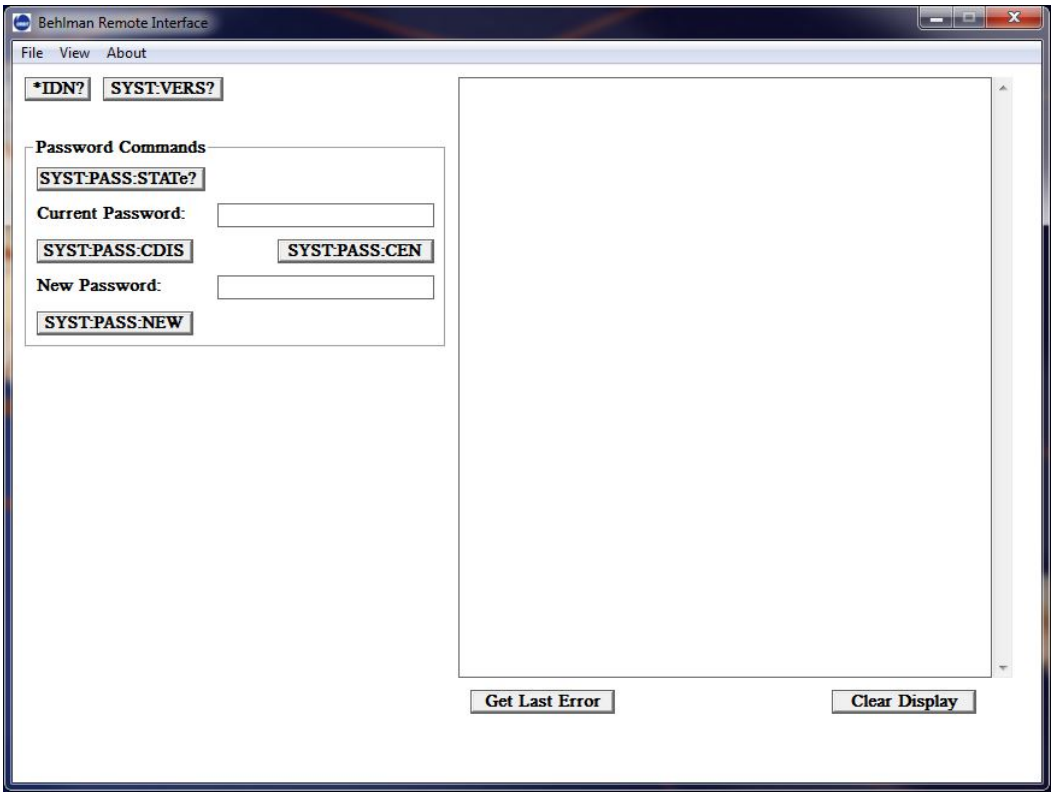


Figure 6-8 Manufacturer Tab

The password shipped with the unit is “DEFAULT”, and is stored in nonvolatile memory. The password is reset to “DEFAULT” after the power supply is powered on in Boot Loader mode, allowing the user to reset the password if the password is forgotten. To exit Boot Loader mode without uploading new firmware, move the external switch to the down position while the power supply is still powered on. More information regarding the Boot Loader mode can be found in the Boot Loader section.

More information regarding password protection commands can be found in the programming manual of the power supply.

Remember, passwords are case sensitive. DO NOT include quotation marks into the textbox’s, they will be added automatically by the application before sending the command.

To disable password protected commands:

- Enter the current password into Current Password textbox.
- Click the button *SYST:PASS:CDIS*.

To enable password protected commands:

- Enter the current password into Current Password textbox.
- Click the button *SYST:PASS:CEN*.

To set a new password:

- Enter the current password into Current Password textbox.
- Enter the new password into the New Password textbox.
- Click the button *SYST:PASS:NEW*.

SYST:PASS:STATe? button queries the power supply for the password state and displays the response.

IDN? button queries the power supply for the identification string and displays the response.
SYST:VERS? queries the power supply for the SCPI version and displays the response.

6.3.7 Boot Loader

Behlman Remote Interface software offers a Boot Loader application that can be opened from File -> Boot Loader.

The external switch, located next to the USB port, determines the mode that the power supply is placed in when powered on. When the external switch is in the up position at power on, the power supply will be loaded in Boot Loader mode, allowing new firmware to be uploaded.

While the power supply is in Boot Loader mode, it will also reset the **SAV* 0 state, RS-232 and Ethernet configuration parameters, and the password to their factory default states. To exit Boot Loader mode without uploading new firmware, move the external switch to the down position while the power supply is still powered on. More information regarding the factory default states can be found in Table 6-1 of the Behlman SCPI programming manual

To upload new firmware: (Note this can only be done with the USB port of the power supply)

1. Power on the power supply with the external switch up. Connect the USB power supply to the computer.
2. Open up Behlman's Boot Loader application.

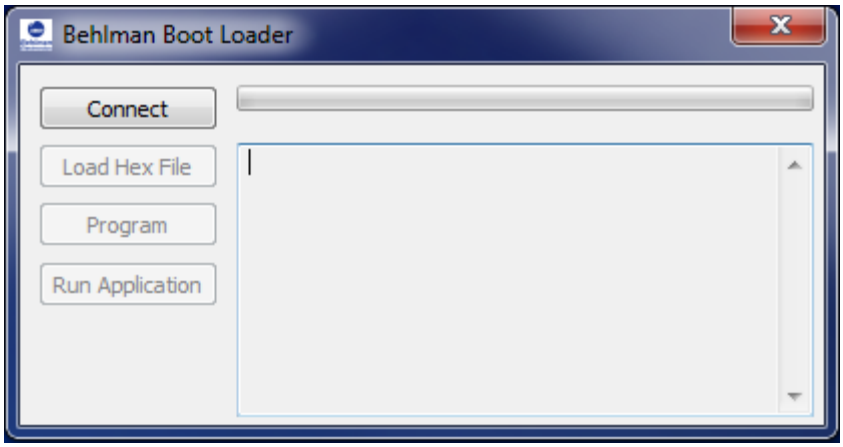


Figure 6-9 Behlman's Boot Loader Application

3. Connect to the USB power supply by clicking the Connect button.

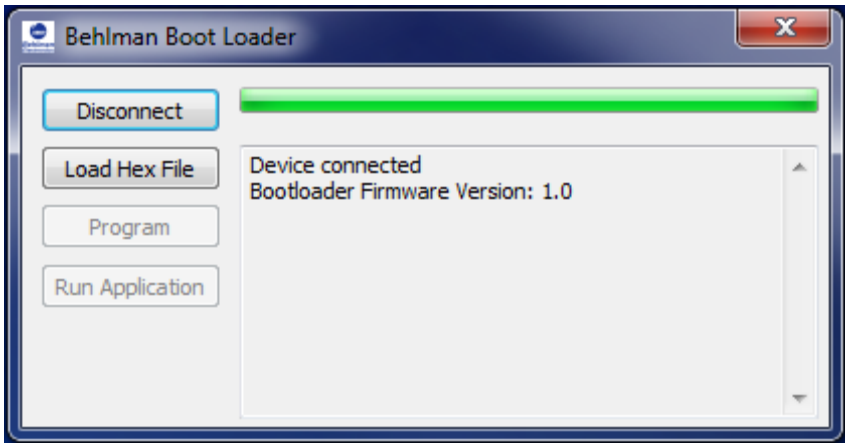


Figure 6-10 After Clicking Connect

4. Load the hex file containing the new program by clicking the Load Hex File button.

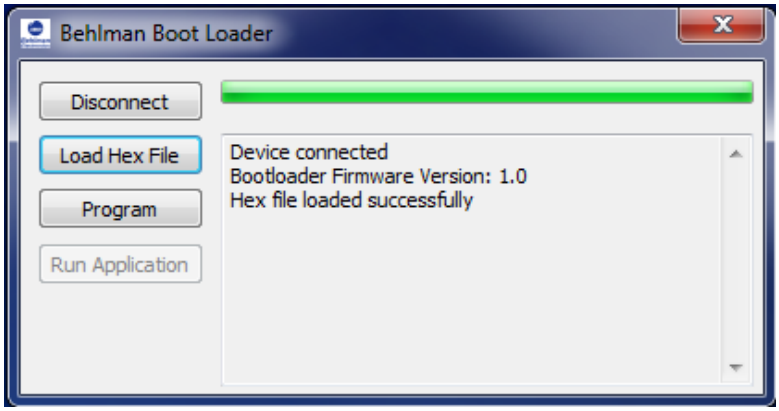


Figure 6-11 After Loading Hex File

5. Erase the flash, program the power supply, and verify the program by clicking the Program button.

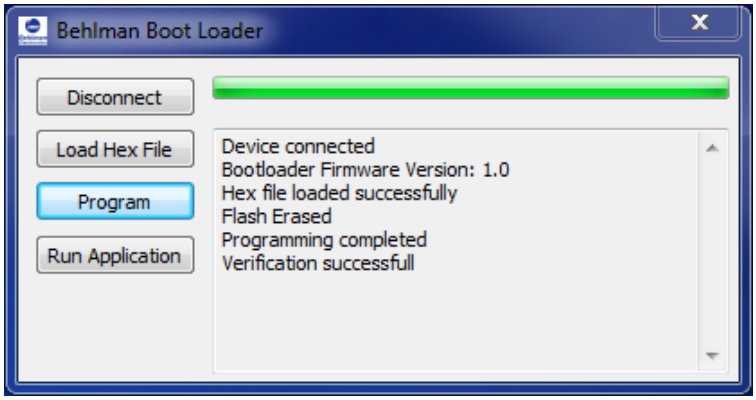


Figure 6-12 Program

6. Run the program by clicking the Run Application button.

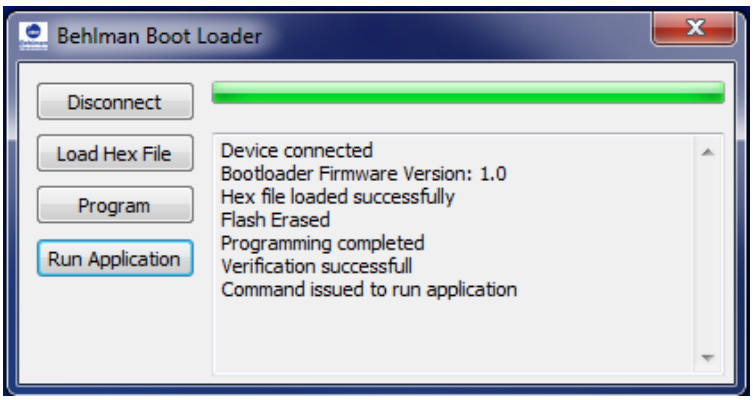


Figure 6-13. Run Application

6.4 Webpage

The power supply hosts a webpage that can be accessed through any W3C web compliant browser using the IP address or hostname of the power supply. By factory default, the Hostname is “BEHLMAN” and the IP address is set up through the DHCP server. Figure 6-14 shows the webpage’s Overview tab.

Figure 6-14 Overview Tab

Note: If two power supplies have the SAME hostname, the power supply with the lowest IP address value will respond to the browsers request to view the webpage. For example, if two power supplies have IP addresses 90.0.0.32 and 90.0.0.34, the power supply with IP address 90.0.0.32 will respond to the webpage request. The hostname can be changed using the *SYSTem:COMMunicate:LAN:HOSTname* command. More information about the hostname can be found in section 6.2.5.

The System Control tab, Trigger Control tab, and Network Configuration tab are password protected. In order to view those tabs, the user must enter the username and password.

Factory default:

Username: “admin”
Password: “DEFAULT”

The username and password are both case sensitive. The password can be changed using the *SYSTem:PASSword:NEW* command. The password can be reset to factory default by turning the power supply on in boot loader mode. More information about the password can be found in section 6.2.6. More information about the boot loader operation and the reset conditions can be found in section 6.2.7.

Figure 6-15 shows the System Control tab, which can control the output of the power supply. This tab allows the user to set the voltage, frequency, current limit, output state, and voltage range of the power supply by entering the values into the *Control Output* section and clicking *Submit*. The current output of the power supply is tracked in the *Output* section.

The System Control tab also displays the last error in the error queue, similar to what *SYSTem:ERRor[:NEXT]?* command would return. The last error can be removed from the error queue using the *Remove Error* button.

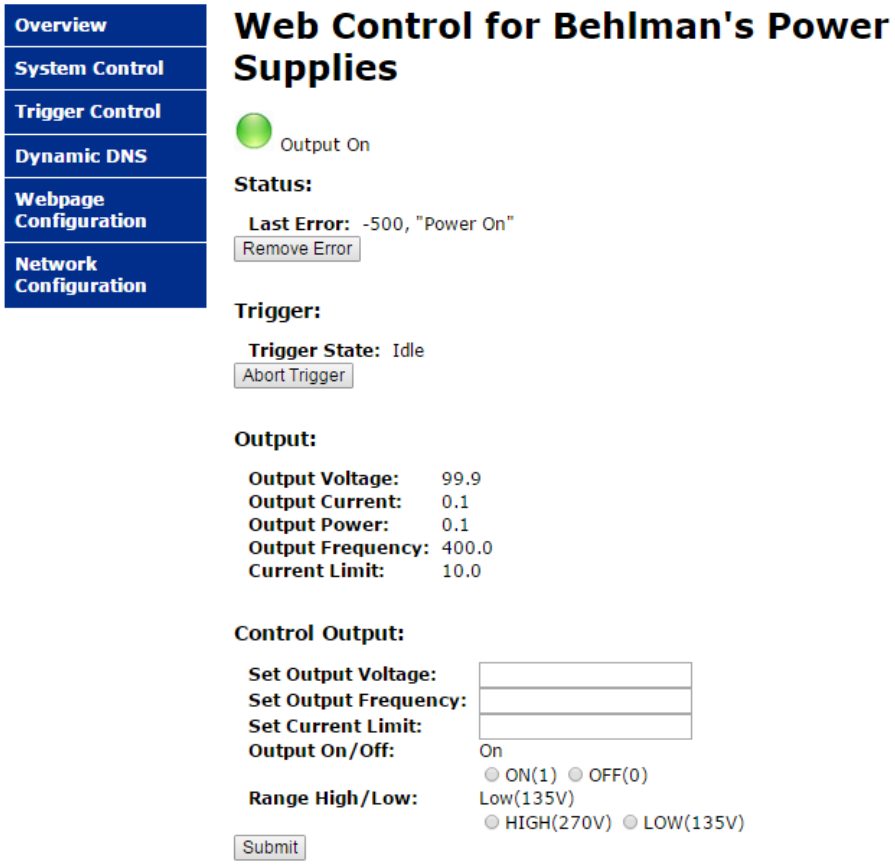


Figure 6-15 System Control Tab

The measurements displayed in the *Output* section are not updated while the trigger state is not in IDLE, in order to preserve dwell time consistency. Attempting to control the output while the trigger state is not in IDLE will add the error *+212, "Command Ignored LIST in Progress"* to the error queue. Click the *Abort Trigger* button to force the trigger state to *IDLE*; this button will not affect the *INITiate:CONTinuous* state. Figure 6-16 shows the System Control Tab while the trigger state is not in IDLE.

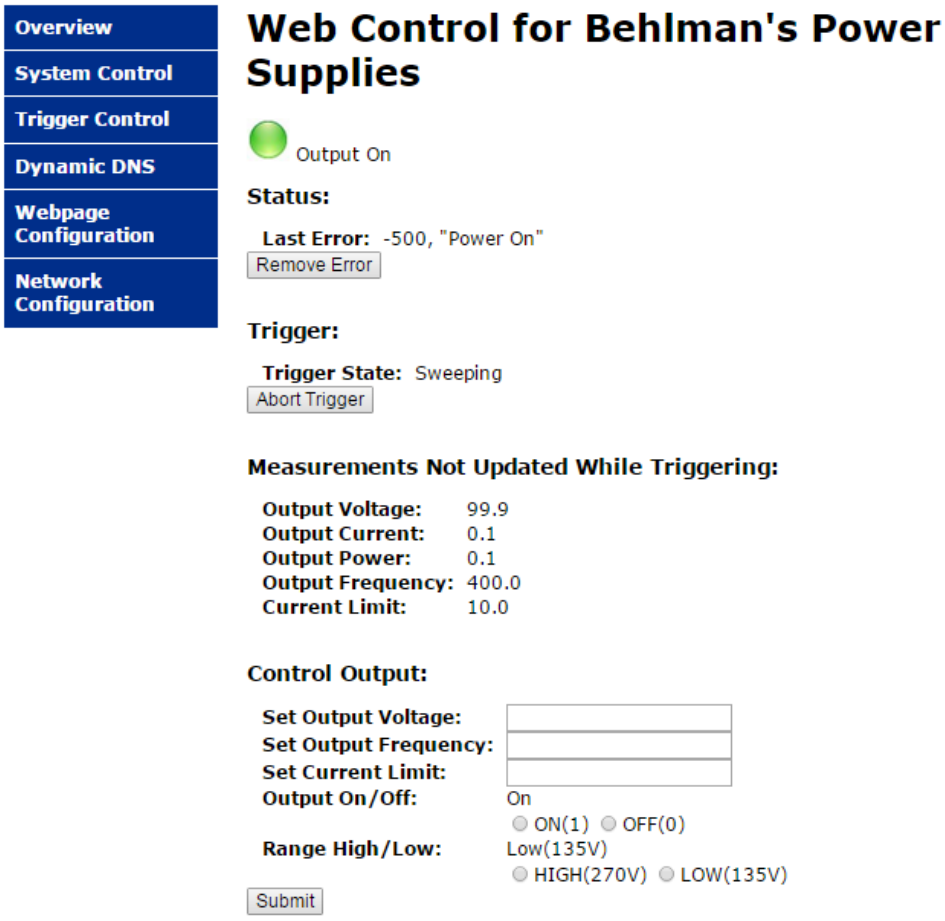


Figure 6-16 System Control Tab while Sweeping

Figure 6-17 shows the Trigger Control tab, which controls the *TRIGger* subsystem. This tab allows the user to set up a trigger event, initiate the *TRIGger* subsystem, and trigger the event.

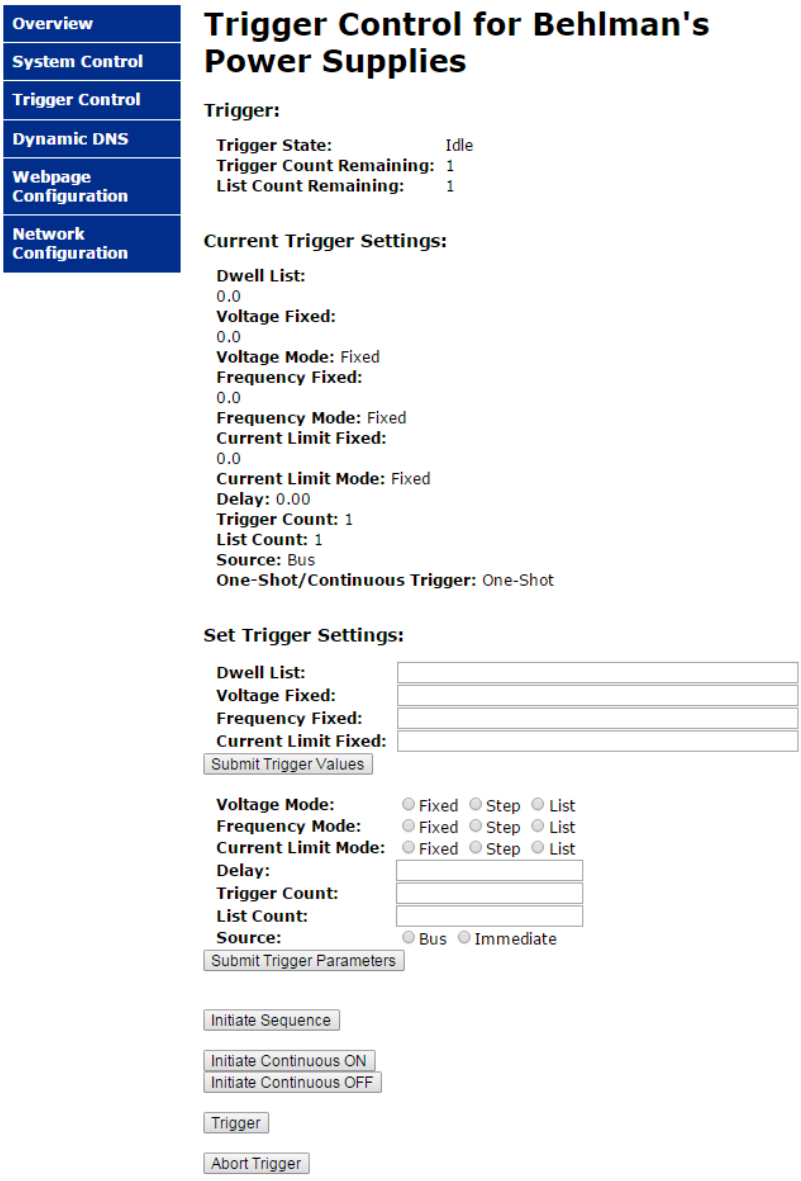


Figure 6-17 Trigger Control Tab

To enter the trigger event points, the user must first set the trigger mode to either List or Step and click the *Submit Trigger Parameters* button. Up to ten event points separated by commas may be entered in the textbox when the mode is set to List, and only one point can be entered in the textbox when the mode is set to Step. The power supply will ignore any additional points or characters entered.

For example, the voltage mode is set to List, frequency mode is set to Step, and current limit mode is set to Fixed, as shown in figure 18. If the user clicks the *Submit Trigger Values* button, only the voltage list and frequency step will be updated. The voltage list will accept the full parameter list of 50.0, 100.0, 115.0, 125.0. The frequency step will only accept the first parameter given, 305.0. The current limit will ignore the parameters given, since the current limit mode is set to Fixed. The result is shown in figure 6-19.

More information about the *TRIGger* subsystem can be found in section 6.2.3.

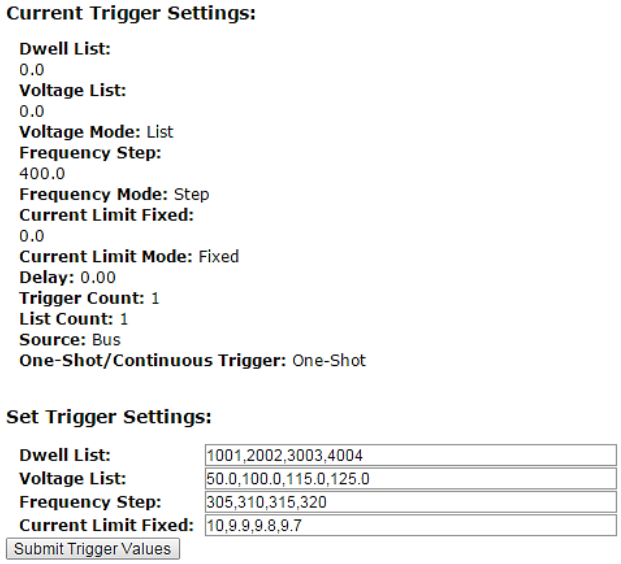


Figure 6-18 Before Updating Trigger Values

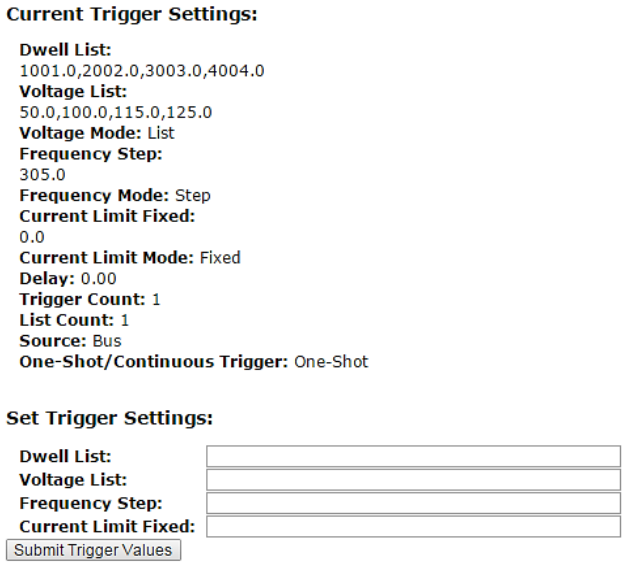


Figure 6-19 After Updating Trigger Values

Figure 6-20 shows the Network Configuration tab, which is used to configure the network parameters. The information displayed in the *Modify Network Configuration* section are the parameters stored in nonvolatile memory that the power supply will use during power on or reboot. Changes to the Ethernet parameters can be made in this section and saved to nonvolatile memory by clicking the *Save Configuration* button. In order for the new parameters to take effect, the power supply must be restarted, either by a power cycle or by clicking the *Reboot* button.

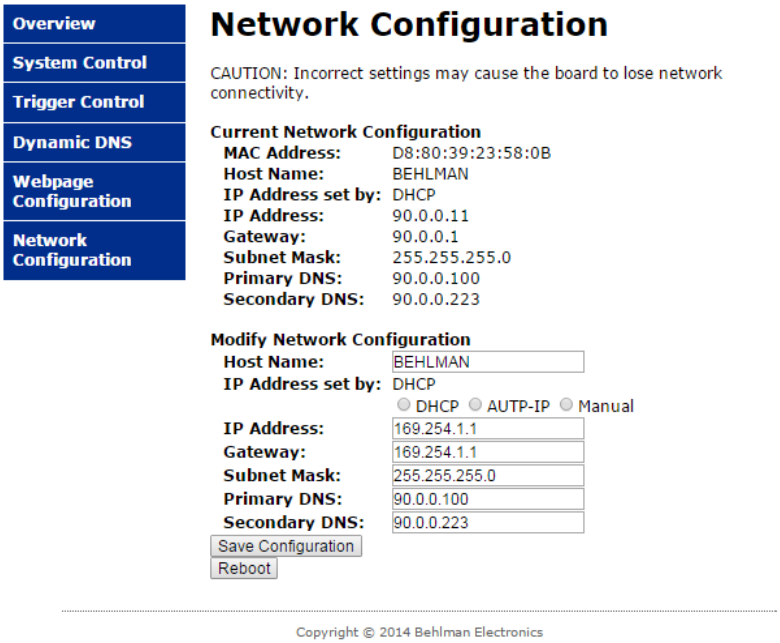


Figure 6-20 Network Configuration Tab

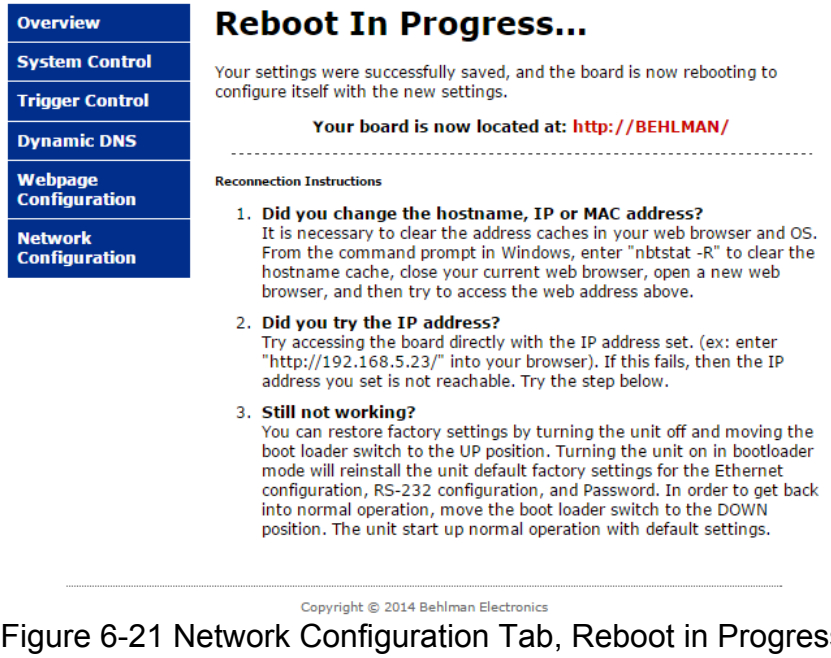


Figure 6-21 Network Configuration Tab, Reboot in Progress

Note: The *Reboot* button is a software reset. The error queue, status registers, and trigger parameters will be reset to their default states.

Figure 6-21 shows the Network Configuration tab after reboot. Important reconnection steps can be found on this page.