YAESU

www.yaesu.com

Sept_2012_v2 902PEC12232102

YAESU

Regulated
DC Power Supply Model FP-1023

USER MANUAL

OWNER'S MANUAL | Index

SECTION 1 | Important Safety Instructions

⚠ CAUTION !

RISK OF ELECTRIC SHOCK! DO NOT OPEN! WARNING – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. THERE ARE NO USER SERVICEABLE PARTS INSIDE—REFER TO QUALIFIED SERVICE PERSONNEL.
IMPORTANT SAFETY INSTRUCTIONS

Please Read Before Using Your Power Supply.

1. It Is recommended that you return your power supply to a qualified Yaesu dealer for any service or repair. Incorrect assembly may result in electric shock or fire.

2. To reduce the risk of electric shock, unplug the power supply from the outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

3. An extension cord should not be used unless absolutely necessary. *If an extension cord must be used make sure that the pins on the plug are the same number, size and shape as those of the original power supply plug.*

4. Place the unit in an area that will allow air to flow freely around the unit. DO NOT block or obstruct vent openings on the side/bottom of the unit.

5. Keep the unit away from moisture and water.

6. NEVER OPERATE THE UNITS IN PARALLEL.

WARNING – YOUR POWER SUPPLY SHOULD BE GROUNDED TO REDUCE THE RISK OF ELECTRIC SHOCK. THE POWER SUPPLY IS EQUIPPED WITH GROUNDING CONDUCTOR AND GROUNDING PLUG.

The cord must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. Never alter the AC cord of plug provided. If the cord will not fit the outlet, have a proper outlet installed by qualified electrician. Improper connection can result in risk of electric shock.

DO NOT USE THE POWER SUPPLY FOR DIRECT CHARGING OF BATTERY OR DIRECT CONNECTION TO A BATTERY FOR BATTERY BACK-UP. (Please read the section on Battery Back-up).

SECTION 2 | Description & Features

Description
FP-1023 is a switched mode power supply which converts AC mains voltage to regulated 13.8 VDC based on pulse width modulation (PWM) control.

Features
- Based on switched mode technology and pwm control
- Compact and lightweight
- High efficiency and less heat dissipation
- Protected against short circuit, over current and over voltage (through pwm controller)
- Forced air cooling and over temperature shut down
- Complies with fcc part 15(b) for radiated & conduct

AC Input Voltage
The unit is preset to operate from an AC input voltage of 120 VAC, 60Hz. It can also operate from 230 VAC, 50/60Hz by internal jumper setting.

Input Voltage Conversion From 120 VAC To 230 VAC

WARNING! TO REDUCE THE RISK OF ELECTRICAL SHOCK, IT IS RECOMMENDED THAT THE FOLLOWING SERVICE BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN

1. Unplug the power supply from the AC outlet
2. Remove the top cover
3. Points "C" and "E" on the printed circuit board are connected with a flexible wire jumper for 120 VAC input. Disconnect the jumper at point "C" by pulling the female quick connect upwards. Tape the end of this quick connect with insulation tape. Change the fuse to 4A (see fuse rating at page 11)
4. Replace the top cover
5. Use a power cord with plug suitable for the 230 VAC receptacle (Ensure plug and receptacle are 2 pole, 3 wire grounding type)

SECTION 3 | Connection & Operation

WARNING! Before plugging the unit to the AC outlet, please check that your local supply voltage is 120 VAC. (If the input voltage is 230 VAC, an internal jumper setting will be required - see page 4)

NOTE: The DC output connector (RED + & BLACK -) has a tubular hole of dia. 0.2"(5mm) with a set screw. For a firm connection, crimp/solder a pin type copper terminal on the cable ends of your 12V DC device.

Ensure that the power supply's ON/OFF switch is off and it is unplugged from the AC outlet. Switch off your 12 V DC device and connect its positive and negative to the RED (Positive) and BLACK (Negative) terminals respectively. Ensure that the connections are secure and tight.

Plug the power supply into the AC outlet. Press the ON/Off switch of the power supply to ON and observe that the neon indicator in the switch illuminates. If the indicator fails to light, recheck the connection, AC outlet and the fuse inside the power supply.

Your 12 V DC device may now be switched on.

SECTION 4 | Cooling & Fan Control

Cooling & Fan Control / Thermal Shut Down
FP-1023 is cooled by convection and forced air. A temperature controlled fan has been provided to improve cooling at higher loads. The fan is controlled by a sensor mounted on the power transformer. THE FAN WILL BE OFF AT LOWER LOADS. It will come on only when the temperature of the power transformer is above 70°C due to higher loads. In case the fan fails or the air flow is blocked, a second temperature sensor mounted on the power transformer will activate over temperature shut down at 100°C. The output voltage will be automatically resumed once the unit cools down.

OPERATE THE UNIT IN A WELL VENTILATED OPEN AND COOL AREA. DO NOT BLOCK THE OPENINGS AT THE FAN DISCHARGE ON THE BOTTOM AND THE SUCTION OPENINGS ON THE SIDES .

SECTION 5 | Battery Charging & Battery Backup

Battery Charging and Battery Back-Up

WARNING ! THIS UNIT IS A POWER SUPPLY AND NOT A BATTERY CHARGER. DO NOT CONNECT THIS UNIT DIRECTLY TO A BATTERY.

This unit should NOT BE DIRECTLY CONNECTED TO A BATTERY for charging or for battery back-up. Battery charging and battery back-up may be undertaken only when the battery is connected through suitable external isolating diodes and charge limiting resistor. The isolating diode will ensure that the battery does not back power the power supply. When a battery is deeply discharged, it will initially draw a very large charging current and thus, will force the power supply into current limit mode for prolonged periods. This is harmful for the power supply. The charge limiting resistor will limit the charging current, thereby, ensuring that the maximum charging current is well below the current limit value of the power supply.

SECTION 6 | Troubleshooting

PROBLEM	
POWER ON/OFF SWITCH DOES NOT ILLUMINATE WHEN TURNED ON	
Probable Cause	**Suggested Remedy**
No power in the AC outlet	Check there is power in the outlet
AC side fuse inside the power supply is blown	Replace the fuse inside the unit See fuse ratings at page 11

PROBLEM	
AC SIDE FUSE BLOWS AS SOON AS POWER IS TURNED ON	
Probable Cause	**Suggested Remedy**
Unit set to120 VAC, but has been connected to 230 VAC	Check voltage setting before powering the unit
Unit is defective	Call technical support

SECTION 6 | Troubleshooting

PROBLEM	
THE OUTPUT VOLTAGE IS 0V OR VERY LOW	
Probable Cause	**Suggested Remedy**
Input voltage is very low or the unit has been set for 230 VAC input, but has been connected to 120 VAC	Check that the input voltage is within the range and also corresponds to the input voltage setting on the unit
The unit is in current limit condition due to overload caused by large reactive loading or by the output being short circuited	Check the output terminals are not shorted. Remove the load. If the output voltage gets restored, the load is shorted or is offering large reactive impedance
Unit is shut down due to over temperature	Check that the fan has not failed or the vent openings are not blocked

PROBLEM	
OUTPUT VOLTAGE DROPS AS SOON AS THE LOAD IS SWITCHED ON	
Probable Cause	**Suggested Remedy**
The unit is going into current limit protection mode	Reduce the load current to less than the current limit value. Motors, pumps, compressors, relays, incandescent and halogen lamps and large capacitors in the input section of the DC devices draw very high inrush or starting currents of up to 10 times their normal operating currents. Ensure that these inrush/starting currents are below the current limit value of the power supply
The unit has been set for 230 VAC input but has been connected to 120 VAC	Check that the input voltage corresponds to the input voltage setting of the unit

SECTION 7 | Limiting Electromagnetic Interference

Limiting Electromagnetic Interference (EMI)

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15(B) of the FCC Rules. These limits are designed to provide reasonable protection against a harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, this does not guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio / TV technician for help

SECTION 8 | Switching Power Supplies & RF Noise

1. Switched mode power supplies (SMPS) employ high frequency switching and thus, are a source of radio interference, a recipient of radio interference and a conduit of radio interference. (Older linear type trans-former based power supplies do not employ high frequency switching volt-ages and will be quieter as compared to switching type of supplies).
2. The primary emission sources originate in the switching devices due to their fast switching current transitions: harmonics of the switching frequency and broadband noise created by under-damped oscillations in the switching circuit. The secondary source is from the bridge rectifier, both rectifier noise and diode recovery. The AC input rectifier / capacitor in the front end of the switching power supplies (excepting those with power factor correction) are notorious for generating power supply harmonics due to the non linear input current waveform. The noise is both conducted and radiated through the input power cord and the DC output wiring to the radio.
3. Switching power supplies are also recipients of radio interference. The normal operation of the power supply can be disturbed due to RF noise getting coupled into the power supply. Thus, the power supply may generate excessive RF noise and lose output voltage regulation due to excessive transmitter energy being coupled through the AC / DC lines to the power supply's regulator feedback path. This may be due to antenna being too close or due to the antenna or feed system not radiating properly. First check the antenna system SWR. Then, if necessary, relocate either the antenna or the power supply farther apart.

SECTION 8 | Switching Power Supplies & RF Noise

4. The receiver may "hear" the power supply. A slowly moving, slightly buzzing carrier heard in the receiver may be caused by the antenna being too close. As with the transmitter related noise pick up, a loose coaxial connector or a broken or a missing ground may aggravate this problem. Normally these noises will be below the background or "band" noise. Increase the separation between the power supply and the receiving antenna. Use an outdoor antenna. This will reduce the amount of signal picked up from the power supply and also increase the amount of the desired signal.
5. The conducted and radiated noises are limited as per the applicable national / international standards. In North America, the applicable standard is as per FCC Part 15(B) for Class "B" digital devices. The European standard is as per EN55022, Class "B" & EN610000-3-2, 3.

Thus, the RF interference is limited but not entirely eliminated.

6. The conducted RF noise from these power supplies is limited to the maximum allowable levels by internal filtration. The filtered RF noise currents (normally < 5mA) are bypassed to the chassis of the power supply. The chassis is, in turn connected to the earth ground pin of the AC input power cord (for Class 1 units). Thus, the filtered noise currents are intentionally leaked to the earth ground. This is termed as the "Earth Leakage Current". For safety against electric shock, this earth leakage current is also required to be limited. It will be seen that these two requirements are conflicting.

NOTE: In some cases, to prevent electric shock hazard due to abnormal leakage current (like in marinas, spas, hot tubs, wet spaces etc.), the AC outlet circuits / receptacles in these areas are served through a GFCI (Ground Fault Circuit Interrupter). This GFCI is normally set to trip when it senses an earth leakage current > 5 mA. A single GFCI may be serving multiple AC outlet circuits / receptacles and therefore, will be sensing the sum of all the leakage currents of the devices connected to these. As the switching power supplies have intentional leakage current as explained above, it may trip a GFCI feeding multiple AC outlet circuits / receptacles. In such cases, disconnect devices connected to the other AC outlet circuits / receptacles served by this GFCI.

7. Following additional guidelines may be followed to reduce the effects of RF noise:
   a. Use additional appropriate AC radio frequency interference (RFI) power line filter immediately before the ac input of the power supply.
   Recommended: Corcom Inc. (www.cor.com) "Q" series. Filtered, ferrite coated cord set (www.emceu-pen.com) is another choice. These cord sets, with integral line interference filters, reduce common and differential mode interferences over a wide frequency range. Because they are shielded, they are also effective against radiated interferences. In addition to the built-in filter networks, the cable conductors are coated with an RF absorbing ferrite compound. This provides additional attenuation at high frequencies that is lacking in most regular LC filters. The RF absorption of the ferrite-coated cable avoids resonance's at high frequencies, reducing the conducted and radiated RF noises even further.

SECTION 8 | Switching Power Supplies & RF Noise

b. Use additional appropriate DC radio frequency interference (RFI) power line filter immediately after the dc output of the power supply.
Recommended: Corcom Inc.(www.cor.com) "DA" / "DC" series.

c. Twist the positive and negative wires from the output of the power supply to the radio.

d. The DC side positive and negative outputs of these power supplies are isolated from the chassis. As explained at paragraph 6 above, the noise currents are filtered to the chassis ground and the chassis ground is connected to the earth ground through the earth ground pin of the AC power outlet receptacle. Avoid connecting (referencing) the DC negative output terminal of the power supply to the earth ground.

e. Connect a 1/4" wave length of wire on the negative terminal of the power supply. Connect one end of the wire to the negative terminal and leave the other end free. The wave length corresponds to the wave length of the interfering frequency. (May not be practical for long wave lengths)

[Formula: Wave length (Meters) = 300 / frequency in MHz]

SECTION 9 | Specifications

INPUT VOLTAGE (nominal)	120 VAC, 60 Hz (Pre-Set) 230 VAC, 50 Hz (Requires Internal Jumper Setting) – See Page 4
OUTPUT VOLTAGE	13.8 VDC
OUTPUT RIPPLE & NOISE (ON FULL LOAD)	150 Mv Peak To Peak
OUTPUT CURRENT, CONTINUOUS	23A
CURRENT LIMIT	25A
COOLING	Temperature Controlled Fan
PROTECTIONS	Over Current, Short Circuit And Over Voltage (Through Pwm Controller) Over Temperature Shut Down
ENVIRONMENTAL TEMPERATURE RANGE	0 - 40°C
CONNECTIONS: AC INPUT DC INPUT	 Detachable Power Cord comes with Nema 5-15P Plug Terminals With Tubular Hole Dia. 0.2" (5mm) with Set Screw
FUSE RATING	5 mm X 20 mm Glass Fuse, 250V
	(Time Delay / Slow Blow)
	120 VAC Input 6.3A
	230 VAC Input 4.0A
DIMENSIONS (W X D X H), INCHES	7.0 X 8.25 X 2.2
WEIGHT	3.5 Lbs. Net
EMC CONFORMITY	FCC Part 15(B), Class B Digital Device

NOTE: SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE