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Technical Practice

Issue 2, April 2001

MODEL 734 DC POWER SUPPLY WITH BATTERY BACK-UP

Contents

1. General Description

1.1 PRACTICE Issue 2 of the Model 734 Technical Practice is released to reflect a change in the product naming convention. What was initially named the Model 734-01 is now the Model 734XBL; the Model 734-02 is now the Model 734.

1.2 PRODUCT OVERVIEW The Model 734 DC Power Supply with Battery Back-Up provides a filtered and regulated source of 54Vdc with a maximum output current of 2A. The nominal input voltage is 120V, 60Hz. Rechargeable batteries contained within the Model 734 provide output back-up capability in the event of an AC input voltage interruption. Under battery operation, the Model 734 will continue to supply a 2A DC output for up to nominally 3 hours. For output loads of less than 2A the battery operating time will substantially increase. The unit is completely self-contained in a compact enclosure. Mounting kits, available separately, allow the unit to be wall or rack mounted. The Model 734 is Underwriters Laboratories, Inc. Listed under their CUL-1950 ITE category.

1.3 FEATURES Model 734 features include LED status indicators, filtered and regulated DC output, wide AC input-voltage operating range, uninterruptible output provided by internal back-up batteries, output short-circuit protection, two output connectors, status contact, and simple installation. Two LED indicators are provided to serve as installation, operation, and maintenance aids. The DC output is expressly designed to support a wide range of telecommunications and data applications. The AC input-voltage range, 95-135V, allows operation even when the AC power source deviates significantly from nominal 120V.

The Model 734's circuitry provides a full on-line uninterruptible power source for important applications. Events ranging from a momentary AC power loss to a sustained AC power outage will have minimal impact on the DC output. A 2A output load can be supported for up to 3 hours, nominal, with a direct increase in support time as the load current decreases. The internal batteries are precisely charged to ensure maximum output performance and long usable life.

The Model 734's circuitry is designed for robust performance. The DC output is short-circuit and over-current protected, returning to normal operation when a fault condition is removed. An electrically isolated status contact is provided for installer selected applications. This contact indicates when the incoming AC power has effectively failed and the Model 734 is operating under battery power.

The Model 734 is intended for wall- or rack-mounted applications. Mounting kits, available from Gordon Kapes, Inc., are purchased separately. Various wall-mounting kits are available, including specialized ones that allow co-mounting of equipment from other manufacturers. Kits are also available to allow the Model 734 to be mounted in 19- and 23-inch rack enclosures. Contact the factory for details, or access www.gkinc.com.

Two 6-position detachable connectors are accessible on the Model 734's front panel. These provide access to the ground, DC output, and status contact connections. These two connectors provide installation flexibility when powering multiple devices. Nominal 120V input power is connected using a nondetachable 3-conductor cord and standard NEMA 5-15P plug.

1.4 PHYSICAL DESCRIPTION The Model 734 consists of a steel enclosure that houses a precision-fabricated circuit board, four 12V, 7.2Ah sealed lead-acid batteries, and related interconnection wiring. The overall dimensions are 2.9 inches (7.4cm) high, 17.0 inches (43.2cm) wide, 9.1 inches (23.1cm) deep. The unit weighs a hefty 32.7 pounds (14.9kg).

2. Applications

2.1 PRIMARY APPLICATION The Model 734 DC Power Supply with Battery Back-Up is intended to provide telecommunications and data applications with an uninterruptible source of 54Vdc. The true on-line implementation ensures a reliable DC output even in the face of an uncertain AC power input. The DC output is directly applicable for equipment that requires a "–48Vdc" power source.

2.2 FLOATING OUTPUT The Model 734's DC output is isolated (floating) from ground, making it suitable to provide a positive or negative ground-referenced DC voltage. The DC output can float up to ±150V away from ground, allowing it to be connected in series with other telecommunications power supplies, e.g., ring voltage generators.

2.3 SAFETY COMPLIANCE The Model 734 has been tested and approved by Underwriters Laboratories, Inc. as a CUL (Canada-United States) Listed device under their CUL-1950 ITE category. A Listed product is one that has passed the requirements of a complete, independent unit. This helps to ensure that the Model 734 will perform in a safe manner, as well as complying with most local electrical codes.

3. Installation

3.1 WORDS OF CAUTION As with any product, installing the Model 734 requires a safety-first approach. Read the entire installation section of this practice before starting the installation process.

WARNING: Handle the Model 734 with great caution! It is very heavy relative to its physical dimensions. If dropped, it can be hazardous to people or property.

3.2 CHECKING FOR DAMAGE The Model 734 should be inspected for damage immediately upon receipt. A claim should be filed with the shipper if damage is found. A replacement should be ordered if necessary.

3.3 INSTALLATION KITS ARE REQUIRED In all cases, a separate mounting kit is required to install a Model 734. In most cases, no mounting kit will be included in the Model 734's shipping carton. Mounting kits, purchased separately, allow the unit to be wall- or rack-mounted. By offering a variety of mounting options, installations can be configured to meet the exact needs of a facility. Ensure that the desired mounting kit is specified and procured before attempting to install a Model 734.

3.4 TWO OUTPUT CONNECTORS Two 6-position connectors provide access to the ground, DC output, and status contact signals. The signals on both connectors are identical, with their pins internally connected together. The two connectors are provided for installation flexibility, allowing multiple devices to be connected without having to splice, create "Y-cords," or use external terminal blocks.

3.5 INTERCONNECTION CABLES ARE REQUIRED Depending on the requirements of the application, either one or two interconnecting cables are necessary to interface the Model 734 with the connected equipment. In most cases, no interconnecting cables will be included in the Model 734's shipping carton. Interconnecting cables can be purchased from Gordon Kapes, Inc. They are offered with various length and termination options. In all cases, one end of an interconnecting cable will have a 6-position plug to mate with one of the Model 734's connectors. The other end will have either unterminated leads, or be provided with a connector specifically selected to interface with the connected equipment. If unterminated leads are provided, refer to Figure 1 for the wire color code.

Alternately, a technician can fabricate a custom cable assembly. This requires both parts and a special crimp tool. These are available from Gordon Kapes, Inc., or other electronic parts suppliers.

Ensure that the desired interconnecting cable is specified and procured (or fabricated) before attempting to install a Model 734.

Pin Number	Function	Wire Color
1	Ground	Green
2	+DC	Red
3	–DC	Black
4	Status Contact	White
5	Status Contact	Brown
6	Not Used	

Figure 1 Output interconnecting cable wire color chart

3.6 SELECTING A MOUNTING LOCATION Whether wall or rack mounting is going to be performed, two factors come into play when selecting the "perfect" mounting location: unrestricted air flow and proximity to an AC outlet. Ventilation holes, located on the top, bottom, and sides of the enclosure, must remain clear to allow adequate airflow. Selecting a mounting location that provides convenient access to a 120V AC outlet is also important. The Model 734 contains a 6-foot (2-meter) 3-conductor power cord with a NEMA 5-15P plug attached.

3.7 WALL MOUNTING Several wall mounting kits, purchased separately, are available from Gordon Kapes, Inc. Included in each kit are two mounting brackets and a set of fasteners. The mounting brackets are symmetrical, allowing each bracket to be mounted on either the left or right side of the Model 734's enclosure. Each bracket is attached to the enclosure by means of four 10-32 x ½-inch pan-head machine screws. For safety it's important to use the fasteners provided in the wall mounting kit as they are the correct length and include an integral lock washer. Also included in the mounting kit are four #10 x ¾-inch self-tapping screws. These are used to secure the brackets to the recommended mounting surface.

Begin the mounting process by securing the two mounting brackets to the left and right sides of the Model 734's enclosure. Ensure that four screws are installed per bracket. Refer to Figure 2 for details. When using the wall mounting kit, the Model 734 is intended for use only with a wood backboard surface (minimum thickness ¾-inch). The unit is designed for mounting in a vertical orientation, with the front panel facing

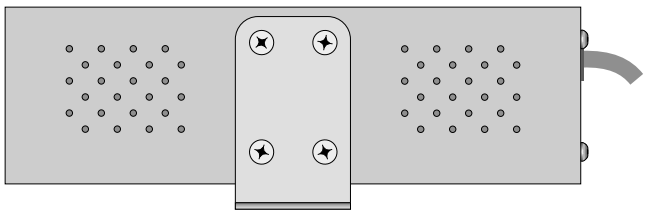

Figure 2 Right side view of Model 734 with wall mount bracket attached

left or right. Refer to Figure 3 for details. Select a mounting location that provides adequate air flow through the enclosure, as well as allows access to a source of AC power. Refer to Section 5.2 of this practice for temperature-issue details.

The actual mounting process is best done as a two-person procedure. One person should carefully hold the Model 734 into the desired mounting position. The second person should mark the locations of the four mounting screws: two on the top bracket and two on the bottom. Be certain that the correct two screw locations on each bracket are marked. The narrow part of the "keyhole" mounting slots should be on the top. Pilot holes can then be drilled at the marked locations. The #10 x ¾-inch screws provided in the mounting kit, as previously mentioned, are appropriate for use only on a minimum ¾-inch wood surface.

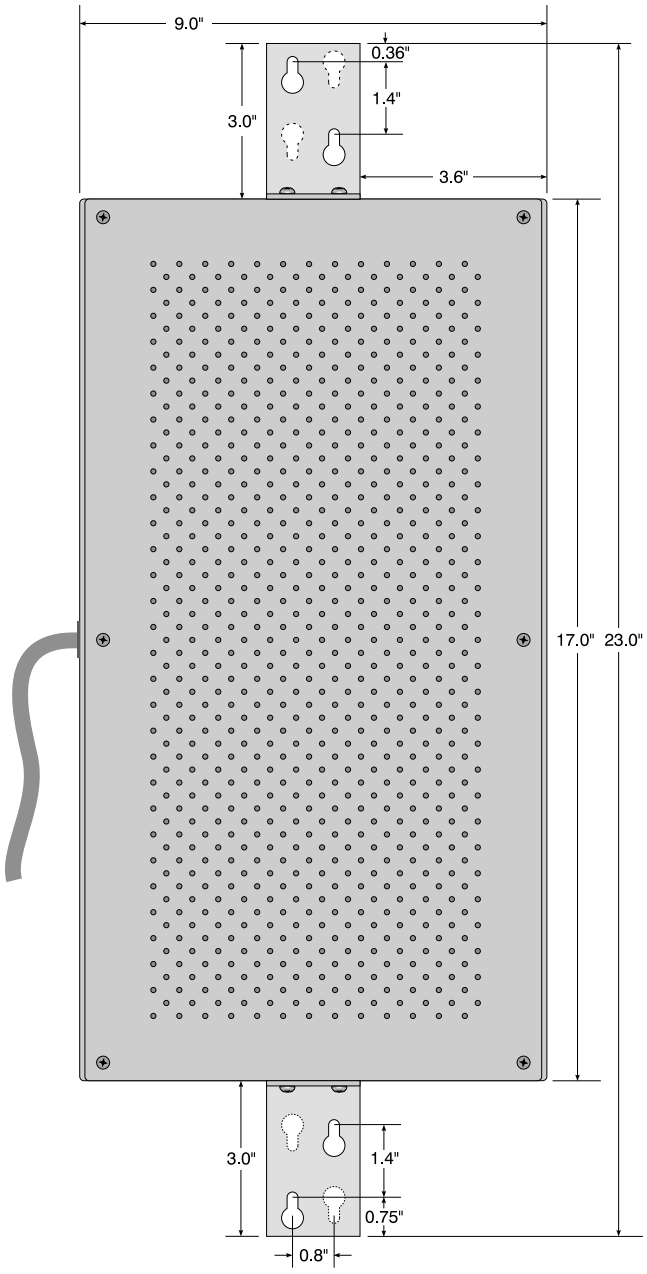

Figure 3 Recommended Model 734 wall mount configuration

3.8 RACK MOUNTING Several rack-mounting kits, purchased separately, are available from Gordon Kapes, Inc. Separate kits are available to allow a Model 734 to be mounted in either a 19- or 23-inch rack enclosure. Some kits allow the Model 734 to be mounted flush with the rack rails, others are designed for center mounting, providing superior weight balance. Included in each kit are a left and a right bracket, along with a set of fasteners. Each bracket is attached to the Model 734 using four 10-32 x ½-inch pan-head machine screws. For a secure attachment, these screws include an integral lock washer. Screws are not provided to secure the Model 734 with attached brackets to the rack enclosure. The installer must provide four screws; two per rack mounting "ear."

Begin the installation by selecting an appropriate mounting location. While the unit can be installed in any two "spaces" (3½ vertical inches) of a standard rack, selecting a location that allows proper cooling is critical. Adequate battery life depends on maintaining the Model 734's ambient temperature as close to 68 degrees F (20 degrees C) as possible. Refer to Section 5.2 of this practice for details. Attach the mounting brackets using four screws per bracket. Refer to Figure 4 for details. Then mount the completed assembly to the rack rails.

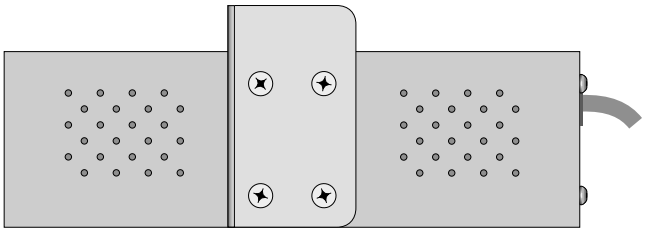

Figure 4 Right side view of Model 734 with center rack mount bracket attached

It's important to note that the Model 734's enclosure is 2.9-inches high, substantially less than the 3.5 inches taken by two full rack spaces. But with the brackets installed the completed assembly does use two full rack spaces. A gap is present between the top of the Model 734 and the bottom of the next piece of equipment. This gap is useful as it provides all-important cooling space around the Model 734. Refer to Figure 5 for details.

3.9 SAFETY GROUND CONNECTION One conductor of the 3-conductor AC power cord brings safety ground to the Model 734's enclosure. In addition, a separate safety ground connection must be made directly to the Model 734's enclosure. This will ensure that a safety ground connection is maintained, even if the AC power plug is unplugged from its associated outlet. A ground connection screw has been specifically provided on the back panel of the Model 734's enclosure. Using a #12 or #14 AWG wire, connect safety ground to this green-colored screw. The other end of the wire must be connected to a known-good safety ground location. Should there be any questions, a competent electrician is best able to identify an adequate safety ground connection point.

3.10 SAFETY FIRST Before making any output connections to the Model 734, ensure that a separate safety ground connection has been made and that the AC power plug is not plugged into an outlet. In addition, be certain that the DC output

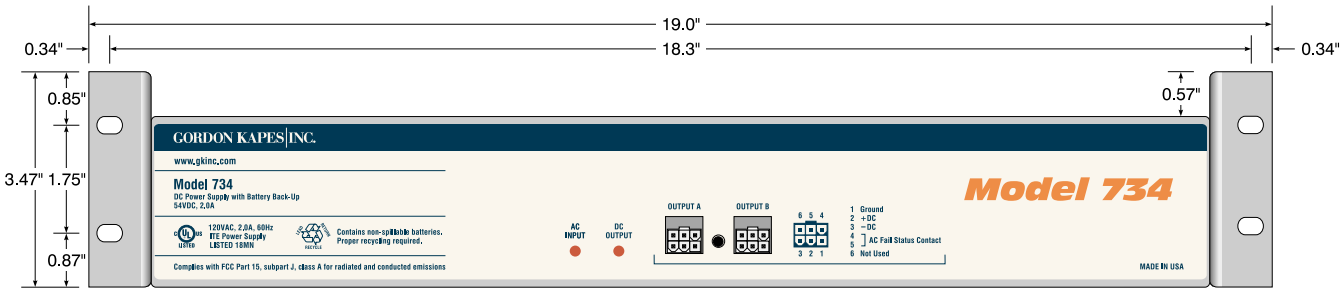

Figure 5 Front view of Model 734 with 19-inch rack mount brackets attached

is not active. This can be confirmed by observing the state of the DC output LED indicator, visible on the front of the unit. If the DC output LED is lit, refer to Section 8.3 for details on how to manually "shut down" the unit.

3.11 GROUND, DC OUTPUT, AND STATUS CONTACT Two 6-position connectors, accessible on the front panel, allow access to the ground, DC output, and status contact connections. Refer to Figure 6 for details.

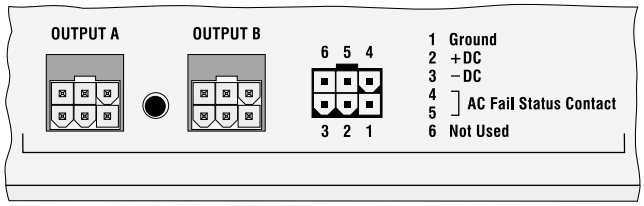

Figure 6 Front panel detail showing output connectors and pinout chart

Pin 1 of each output connector is connected, via the Model 734's internal circuitry, to ground. This ground is the same as that supplied by the AC line cord and the separate safety ground connection. This ground on pin 1 allows a safety ground connection to be provided to the connected equipment. Note that this ground connection must not be used as the primary safety ground connection for the connected equipment! This ground is provided strictly as a secondary path.

Pin 2 of each output connector provides the +DC connection of the 54Vdc output. Pin 3 provides the – DC connection of the 54Vdc output. Note that the 54V, 2A maximum output is shared by both connectors. No isolation is provided between them.

Pins 4 and 5 provide access to the AC failure status contact.

3.12 SELECTING THE DESIRED DC OUTPUT SCHEME As mentioned previously, the DC output is isolated (floating) with respect to ground. The DC output can be connected directly to the equipment to be powered in this manner, or it can be referenced to ground. In telecommunications applications it is typical to utilize a positive ground scheme, with the output configured to be –54Vdc with respect to safety (earth) ground. This is easily accomplished by connecting pin 1 (ground) to pin 2 (+DC) and using this combination as the ground connection for the load. Pin 3 (–DC) would provide the –54Vdc connection for the load. As would be expected, referencing the DC output to ground using pins on either output connectors will impact both output connectors.

3.13 STATUS CONTACT The status contact provides an indication of the Model 734's AC input voltage. It is accessible on pins 4 and 5 of both connectors. The status contact is intended for use in a variety of site-specific applications. It is isolated from ground, making it compatible with most monitoring and alarm equipment. When the Model 734 is producing 54V from the incoming AC power (nominally 120V) the status contact is open (not shorted). When the incoming AC power has failed, or is below approximately 85V, the status contact changes into, and maintains, a closed (shorted) state. Note that the status contact is intended only for use in low voltage (less than 60V AC or DC), and low current (less than 0.5A) applications.

3.14 CONNECTING AC POWER Before the Model 734's AC power plug is plugged into a 120V source, ensure that a separate safety ground connection has been made. The desired DC output connections should have been made by way of the two 6-position connectors. If desired, a status contact connection should have been made. One or two 6-position plugs should be firmly mated with the output connectors located on the front panel. Now the AC power plug can be plugged into the designated AC outlet. Upon connection to AC power, the AC input and DC output LED indicators, visible on the front panel, should light. The unit will now be producing nominal 54Vdc. Do not secure the AC power cord to any surface or other equipment. It must hang free to allow rapid disconnection if circumstances require. Attaching the AC power cord to any other surface or other equipment creates a safety hazard and may be an electrical-code violation.

4. Testing and Operation

4.1 INSTALLATION REVIEW By this point, the desired connections should have been made between the Model 734 and the associated equipment. A safety ground connection should have been made to the ground screw located on the back panel of the Model 734. The power plug should have been plugged into the selected AC outlet. Confirm that the power cord is hanging free. At this time the AC input and DC output LED indicators should be lit steadily. If the DC output LED does not light a wiring error may exist; most likely a short or over-current condition is present. Check the installation and refer to Section 7 of this practice for troubleshooting assistance.

4.2 STATUS LEDS The Model 734 contains two status LED indicators which are visible on the front panel of the unit. The AC input LED lights steadily whenever the AC input voltage is in excess of approximately 85V. The DC output LED lights steadily whenever nominal 54V is being produced, regardless of whether the unit is operating from incoming AC power or the internal batteries.

4.3 TESTING THE ASSOCIATED EQUIPMENT Now that 54V is being produced, check each piece of equipment that is being powered by the Model 734. If possible, use a digital voltmeter to check the DC output for nominal 54Vdc; a reading of 53 to 55V would be considered normal when AC power is present and the batteries are fully, or nearly fully, charged. A reading of 42 to 50V would be considered normal when the AC input has failed and the unit is operating under battery power. If the status contact has been utilized, check the associated equipment to ensure that it recognizes the Model 734's normal and AC failure operating states.

4.4 TESTING BATTERY OPERATION

WARNING: The testing method described in this section makes the assumption that a safety ground connection has been made to the ground screw located on the back panel of the Model 734's enclosure. This dedicated ground ensures that a safety ground connection will be maintained even if the AC power plug is disconnected from the outlet. If you are uncertain whether this safety ground connection has been made, review Section 3.9 of this practice.

The Model 734 does not include a direct means of placing the unit under battery operation. This design decision was made to enhance the reliability of the system and prevent "button pushers" from accidentally placing and leaving the unit in a test mode. To test the Model 734's back-up capability simply unplug the unit's AC plug from its associated outlet. The AC input LED should no longer be lit, while the DC output LED should remain lit. If the status contact has been connected to other equipment, ensure that this AC power fail state is recognized. After observing correct battery operation, again insert the Model 734's plug into the AC outlet. The AC input LED should again light; the DC output LED should remain lit.

4.5 PLACING THE MODEL 734 IN SERVICE The unit should now be ready for a long, uneventful life. Normal operation should find the two status LEDs lit steadily.

5. Technical Notes

5.1 BATTERY CHARGING TIME The rate at which the Model 734 will charge the internal batteries is directly related to the output load. The greater the output load the longer the battery recharge time will be. This is because the battery charging and DC output functions share the same DC energy generated by the circuitry. When the DC output is loaded to its 2A maximum rated value, the recharge time for fully discharged batteries is on the order of 24 hours. As the output load decreases, more energy is available to charge the batteries. An output load of 1A will reduce the recharge time to something less than 6 hours. With no load on the DC output, the recharge time will be in the range of just 3 hours.

Note that in most real-world cases the batteries will supply energy for only a limited period of time before being recharged. This is because most AC failures are of a relatively short duration. A recharge process would generally start with batteries that are not in their full discharged state. In this fairly typical scenario the recharge time would be considerably less than the 24-hour worst-case figure.

5.2 AMBIENT TEMPERATURE As previously mentioned, four 12V, 7.2Ah sealed lead-acid batteries are contained in the Model 734. A large book could be written on how various factors impact the long-term performance of such batteries. But instead of boring you with a book, we'll simply review a few of the issues. The battery charging voltage, charging rate, discharge rate, and discharge depth all greatly impact the length of time a battery will provide adequate performance. (This "adequate" performance would be measured in months or years.) The Model 734's circuitry was carefully optimized to correctly handle these parameters.

What is entirely installation dependent is ambient temperature. A simple rule of thumb is to strive to locate the Model 734 in an environment that is maintained at a 68-degree Fahrenheit (20-degree Celsius) ambient temperature. This is an excellent temperature as it promotes both optimum battery life and good battery performance. Note that an elevated ambient temperature serves as a very effective destroyer of battery life. For example, changing the ambient temperature to 104 degrees F (40 degrees C), compared to the recommended 68 degrees F (40 degrees C), will reduce the battery life by well over 50%! For more detailed information about sealed lead-acid batteries, please refer to the Panasonic web site. As of the date of this practice, a valid link is: http://www.panasonic.com/industrial_oem/battery/battery_oem/chem/seal/seal.htm.

Note that whatever the ambient temperature, the Model 734's air vents must remain clear. This ensures that airflow can be maintained.

5.3 BATTERY TYPE At the factory the Model 734 is assembled into several configurations to meet different performance goals. The serial number label, located on the back of the enclosure, will indicate the exact configuration. The Model 734 contains batteries that are optimized for general-purpose use. The specific batteries, Panasonic LC-R127R2P, are recommended for applications that have repeated charge/discharge cycles. In the Model 734 they should provide a minimum 3-year operating life. The Model 734XBL contains batteries that are optimized for intermittent-use applications. The "XBL" in the naming convention stands for extra battery life. The battery manufacturer, Panasonic, describes these batteries, part number LC-P127R2P, as being applicable for long life in trickle-charge setting. This scenario matches many Model 734 applications where the batteries are normally on "standby," awaiting infrequent failures of incoming AC power. By using these specific batteries, and maintaining the unit's temperature at the recommended value, it is expected that battery replacement will not be required for 6 or more years.

5.4 MINIMUM OUTPUT LOAD For optimal battery performance a minimum load of 50mA should be connected to the DC output. This will help ensure that the internal circuitry will maintain the correct charging voltage. Long-term operation of the Model 734 with no DC load connected could lead to destruction of the batteries.

6. Specifications

INPUT VOLTAGE
95-135V, 47-63Hz

INPUT CURRENT
2.0A, maximum

INPUT POWER CORD
Type: 3-conductor with NEMA 5-15P plug
Length: 6 feet (2 meters), nominal, not detachable

OUTPUT VOLTAGE
54Vdc, nominal, with AC input voltage present
48Vdc, nominal, battery operation; no AC input voltage present

OUTPUT CURRENT
2.0A continuous, maximum

RECOMMENDED MINIMUM OUTPUT LOAD CURRENT
50mA (maintains correct charge voltage)

OUTPUT RIPPLE VOLTAGE
Less than 100mV p-p; "talk-battery" quality

OUTPUT PROTECTION
Type: solid-state, automatic reset
Current required for automatic output shutoff: 5A, nominal

BATTERIES
Qty: 4
Type: 12V, 7.2Ah, sealed lead-acid (Model 734 uses Panasonic LC-R127R2P; Model 734XBL uses Panasonic LC-P127R2P)
Transportation: classed as "Non-Spillable"

BATTERY OPERATING TIME (NOMINAL)
3 hours, 2.0A output load
5 hours, 1.2A output load
10 hours, 0.6A output load
20 hours, 0.3A output load

BATTERY CHARGE TIME (NOMINAL)
24 hours, 2.0A output load
6 hours, 0.1A output load
3 hours, no output load
Figures reflect charging process beginning with batteries in fully discharged state

AUTOMATIC BATTERY DISCONNECT
Type: solid-state
Operating Threshold: 41V, nominal

INPUT TO OUTPUT EFFICIENCY
86%, nominal, measured with 2.0A output load

OUTPUT CONNECTORS
Qty: 2
Functions Supported: ground, DC output, status contact
Type: Molex® Mini-Fit, Jr.™ 6-position dual row header
Mating Connector: Molex Mini-Fit, Jr. 6-position dual row receptacle, suggested Molex part number 39-01-2060; suggested crimp-on female terminals Molex part number 39-00-0039

INTERCONNECTING CABLES
One or two interconnecting cables required for every installation; purchased separately, not included with Model 734. Various lengths and configurations available from Gordon Kapes, Inc.

LED STATUS INDICATORS
Qty: 2
Functions: AC input present, DC output present

STATUS CONTACT
Action: normally open (not shorted)
Type: sealed bifurcated relay contact, isolated
Rating: 0.5A maximum at 60Vac or 60Vdc (resistive)
Function: closes (shorts) upon loss of AC input power, defined as nominally less than 85Vac

SAFETY COMPLIANCE
Underwriters Laboratories, Inc. CUL-1950 ITE Listed

RADIATED NOISE COMPLIANCE
Complies with FCC Part 15, subpart J, class A for radiated and conducted emission

OPERATING ENVIRONMENT
68 degrees F (20 degrees C), nominal. Intended for operation in commercial environment where air conditioning is present. Operation at temperatures greater than recommended will significantly reduce battery life.

DIMENSIONS (OVERALL)
2.9 inches high (7.4cm)
17.0 inches wide (43.2cm)
9.1 inches deep (23.1cm)
Figures reflect no mounting brackets attached

WEIGHT
32.7 pounds (14.9kg)
35.2 pounds (16.0kg), shipping weight
Figures reflect no mounting brackets attached

MOUNTING
Wall, 19-inch rack, or 23-inch rack mounting kits available, purchased separately. A mounting kit is required for every installation; not included with Model 734.

7. Incorrect Operation

7.1 REVIEW PRACTICE Should problems arise in the operation of the Model 734, please review Section 3–Installation and Section 4–Testing and Operation in this practice.

7.2 AC OUTLET If the AC input LED does not light, reconfirm that the AC outlet is functioning by plugging another piece of equipment into it. If the AC outlet is okay, but the AC input LED doesn't light, the Model 734 needs to be returned to the factory for repair.

7.3 OUTPUT OVERLOAD OR SHORT CONDITION Finding the AC input LED lit, while the DC output LED is not, would typically indicate that an overload condition is being placed on the Model 734's DC output. This will occur whether the output is being fully shorted, or has a load that is attempting to draw more than approximately 3A. Carefully recheck the wiring and equipment being powered. "Shed" some or all of the load to ensure that an overload is not present. Once an acceptable

load is connected, the Model 734 may restart and the DC output LED will light steadily. In some cases the output protection circuitry may require that all loads be completely removed before the DC output again becomes active. Simply disconnect the loads from the output, observe the DC output LED until it lights, then reconnect the loads. Note that it may take several minutes for the protection components to cool sufficiently to again allow normal operation.

7.4 INTERNAL FUSES The Model 734 contains two internal fuses. One is connected in series with the incoming AC power. This fuse will open ("blow") if the unit experiences serious trauma. The other fuse is connected in series with the batteries. It will open if the batteries are connected incorrectly, or if excessive current is drawn from or sent to the batteries. An open fuse always indicates that the unit must be returned to the factory; neither fuse is intended for user or field replacement. Removing the unit's cover will expose you to hazardous voltages.

7.5 APPLICATION LIMITATIONS The Model 734 was designed to operate correctly in many applications. However, Gordon Kapes, Inc. does not guarantee the Model 734 to be compatible with every specific application. All functions of the installed Model 734 should be thoroughly tested before the unit is placed into service.

7.6 SAVE TIME You are encouraged to e-mail or call Gordon Kapes, Inc. for technical support. Please e-mail support@gkinc.com or refer to the web site, www.gkinc.com, for the applicable telephone number. We do not mind "walking" you through an installation, or performing a verbal review prior to your actually getting started. Please have these items with you: a copy of this technical practice, system configuration documentation, and adequate tools, including a digital volt-ohm meter (VOM).

8. Maintenance

8.1 MAINTENANCE The Model 734 requires no normal maintenance. It is recommended that the unit be examined not less than every three months to ensure that the vents on the enclosure are unobstructed and free of dirt.

8.2 BATTERY REPLACEMENT The Model 734's internal batteries should provide reliable service for a minimum of 3 years, with 6 or more years possible. Refer to Section 5.3 of this technical practice for details. Variables that can effect battery life include the number of charge/discharge cycles and ambient temperature. A label, attached to the back of the enclosure, indicates when the batteries were installed at the factory. This can be used to "guess" when the batteries will require replacement. However, the only true test of battery quality is to place a known load across the Model 734's DC output, disconnect the AC input power to place the unit under battery operation, and then measure the time until the unit automatically "shuts down." If the measured time deviates significantly from the published specification, the batteries need replacement.

WARNING: The batteries are not user replaceable, requiring the Model 734 to be returned to the factory or an authorized service center. Removing the Model 734's cover will expose you to potentially lethal voltages—don't do it!

8.3 MANUAL BATTERY SHUTDOWN By design, the Model 734 doesn't contain an on/off switch. The nominal 54V output is intended to be there whether incoming AC power is present or not. During battery operation, only when the batteries have discharged to their minimum acceptable voltage level will they automatically disconnect. This protects the batteries from damage due to deep discharge. There may be cases, e.g. testing or storage, where a Model 734's batteries will need to be manually "shut down." The Model 734 provides a "secret" button to allow this to happen. Personnel at the factory use this button to manually shut down new units, allowing them to be shipped with near-fully charged batteries. The button is located on the front panel, between the two output connectors. The button is accessible through a small hole in the panel, preventing accidental activation.

With the Model 734 operating under battery power (incoming AC power disconnected), press the button with a small nonconducting tool. To indicate that the unit has shut down, the DC output LED will not be lit. At this point, the batteries are disconnected from any load. The Model 734 can now be stored for up to six months without significant adverse effect on the batteries. Note that the storage temperature should not exceed the recommended 68 degrees F (20 degrees C) value. To return the Model 734 to normal operation, simply reconnect incoming AC power; both LEDs should light.

9. Repair and Replacement

9.1 NOT SO FAST Statistically, most equipment returned to Gordon Kapes, Inc. for repair actually has nothing wrong with it. An e-mail or telephone call to Gordon Kapes, Inc. technical support can often help get the equipment operating correctly. We don't mind spending time with our customers getting a site up and running.

9.2 SEND IT BACK If you determine that the Model 734 is defective, return it for repair or replacement according to the Gordon Kapes, Inc. Warranty/Repair and Return policy. We request that you obtain a return authorization number prior to returning any equipment.

9.3 ONLY WE FIX IT In the event repairs are ever needed on your Model 734, they should only be performed by Gordon Kapes, Inc. Do not remove the cover as it will expose you to hazardous voltages.

Specifications and information contained in this technical practice subject to change without notice.