



GE HARRIS
Railway Electronics

Document No. 5001366

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Exhibit J

Wilmore® DC-to-DC Converter

User's Information



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J.1 DC-to-DC Converter

The Wilmore Model 1620-74-13-7.5 is a commercially available DC-to-DC power converter. The LCM utilizes this converter to change the 74 volts supplied by the locomotive to 12 volts.

The following pages are a copy of the Wilmore 1620-74-13-7.5 user's guide.

MODEL 1620-74-13-7.5

DC-TO-DC CONVERTER

USER'S INFORMATION

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USER'S INFORMATION

I. GENERAL DESCRIPTION

The Model 1620-74-13-7.5 dc-to-dc power converter provides an isolated, regulated 13.6 Vdc output from nominal 74 Vdc vehicle battery systems aboard locomotives and rail vehicles. The operating input voltage range is 50.0 to 90.0 Vdc. The output current rating is 0-7.5 amperes (depending upon output load and ambient temperature, a duty-cycle restriction may apply). Isolation capable of passing a 2500 Vdc "hipot" test is provided between the input and output and between the input and chassis. The converter output is galvanically isolated from the chassis ground and, therefore, may be connected as either a positive or negative output.

This converter is electronically protected against overloads and short circuits. Recovery to normal operating conditions is automatic upon removal of an overload or short-circuit fault. Protection against accidental reversal of the input-voltage polarity during installation is provided by a shunt diode working in conjunction with a user-supplied input fuse (see Section II: Installation and Operation).

This converter is a constant-output-power device, i.e., with a constant load, the input current and input voltage are inversely proportional. This means that the maximum input current is drawn at the minimum input voltage. An approximation of input current for a specific input voltage and output load current can be determined as follows:

$$I_{\text{input}} = \frac{(V_{\text{output}}) (I_{\text{output}})}{(0.75) (V_{\text{input}})}$$

This approximation applies for output load currents equal to or greater than 20% of maximum rated load current. For loads less than 20% of the maximum rating, linearly decrease I_{input} from its calculated value at 20% load to 70 milliamperes at no load.

II. INSTALLATION AND OPERATION

CAUTION: SERIES 1620 CONVERTERS ARE NOT INTERNALLY FUSED.
EXTERNALLY FUSE INPUT AT 20 AMPERES.

Good installation practice for mobile electronic equipment dictates that input fuses or circuit breakers should be located at the power distribution end of the cables feeding the converter. For this reason, no protection devices are built inside Series 1620 converters to protect against fault conditions at the input to the converter. It is recommended, instead, that a 20-A fuse or circuit breaker be connected near the dc-input source in series with the input lines to the converter.

Connection and operation of the Series 1620 converters is almost entirely self-explanatory from the front-panel markings on each unit. The positive and the negative terminals are clearly marked beside each input and output terminal block and deliberate caution should be exercised to avoid polarity mistakes. Both the input and the output of the converter are dc isolated from the chassis and from each other.

The terminal block screws accept lugs for use with #6 hardware. It is suggested that the following size input and output power cables be used. These cables should be kept as short as possible, and if their length must be more than 10 feet, it may be desirable that larger cable be used.

<u>MODEL NUMBER</u>	<u>INPUT CABLE</u>	<u>OUTPUT CABLE</u>
1620-74-13-15	#14 AWG	#10 AWG
1620-74-13-7.5	#16 AWG	#14 AWG
1620-48-13-15	#12 AWG	#10 AWG
1620-48-13-7.5	#14 AWG	#14 AWG
1620-36-13-15	#10 AWG	#10 AWG
1620-36-13-7.5	#12 AWG	#14 AWG

III. MAINTENANCE INFORMATION

Other than preventing dust accumulation on external surfaces of the converter, no periodic maintenance should be required.

Normally, a damaged or malfunctioning unit should be returned to Wilmore for repair. Multiple-component cascade failures in power conversion circuitry can greatly complicate trouble-shooting procedures, and factory technicians familiar with the circuitry can locate the problem quickly, explore adjacent circuitry for stressed or damaged components, and subject the converter to a thorough retest.

There may be instances, however, in which a field repair must be attempted. A schematic and parts list are, therefore, provided herein. It will be noted that the components are identified by manufacturer and commercial type designations rather than by a coded Wilmore part number.

Wilmore maintains a **RETURN MATERIAL AUTHORIZATION** system in order to efficiently track your inbound shipment and expedite its repair and return to you. Before shipping material for repair to Wilmore, please call (919)732-9351 or fax (919)732-9359 and request an **RMA NUMBER** for your shipment. If possible, please provide the complete model number of the equipment, its serial number, and a brief description of the problem. Place this **RMA NUMBER** on the outside of the package and ship prepaid to:

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