Section R
General Processing Unit – Model GPU
Operators Manual

Section Table of Contents

R.1 Introduction

The SCAN-A-LINE™ General Processing Unit – Model GPU {Figure R.1-1} is a power supply and sensor signal routing and processing device. Enclosed in a steel enclosure, the Model GPU provides power for up to two SCAN-A-LINE™ EG-Series sensors – Model EG-30A (Section B), 10XAS-Series – Model 10XAAS or Model 10XAS (Section C), 10XBR-Series – Model 10XABR or 10XBR (Section G). The Model GPU may interconnect with other Harris Instrument Corporation processing units, such as the Model UCPU (Section V), Model PCPU (Section P), Model TCPU (Section Q), and Model MPPU (Section Z) as well as programmable logic controllers (PLCs) and other third party process controllers.

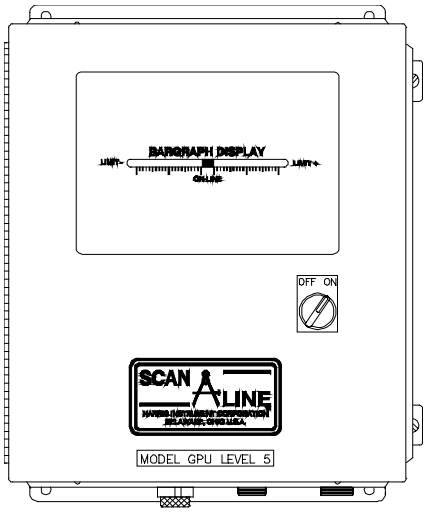

Figure R.1-1: Model GPU Level 5

R.1.a Functional Description

The Model GPU is designed to provide well-regulated +12VDC and -12VDC power for up to two SCAN-A-LINE™ sensors via the MS-style circular connectors. All SCAN-A-LINE™ sensors are compatible with one or more levels of the Model GPU. The +12VDC, -12VDC supplies and +5VDC regulated sources also can provide power for Harris Instrument Corporation approved optional circuits (such as a First Edge Video Option board).

Customer connections with the Model GPU are available on an sixteen- or twenty-pin terminal strips (depending upon the types of options supplied with the Model GPU) mounted on the inside-back panel of the Model GPU. A tag at the connector specifies the individual connections (Section R.4.c).

R.1.b Model GPU Levels

There are five levels of the Model GPU designed for their particular application. Each level is differentiated by sensors and/or circuitry. The five levels are:

Level	Description
Level 1	*Absolute Position Analog output for one or two EG-Series sensors.*
Level 2	*Route 10XAS-Series, 10XHD-Series, 10XSH-Series or 10XBR-Series sensor signals to another processing unit with Line Driver (Line Receiver MUST be mounted in other unit).*
Level 3	*One Deviation Centerline Position and One Absolute Width Analog outputs for one 10XAS-Series sensor. Includes sensor FAULT relay.*
Level 4	*One or Two Absolute Edge Position and One Deviation Centerline Position Analog outputs for single or dual 10XAS-Series sensors. Includes sensor FAULT relays.*
Level 5	*Two Absolute Edge Position, One Deviation Centerline Position and One Absolute Width outputs for dual 10XAS-Series sensors. Includes sensor FAULT relays.*

Table R.1-1: Model GPU Level Descriptions

R.2 Operational Considerations

The Model GPU is designed to operate in an industrial environment and can readily tolerate average factory conditions. Commonsense considerations for protection and maintenance of the Model GPU will ensure it's operation for years to come.

NOTE:

If any welding is to be performed near the Model GPU, or anywhere on the process line where the Model GPU is installed, disconnect ALL cables from the Model GPU. This prevents system overload by the current generated from welding.

The Model GPU is designed to operate with SCAN-A-LINE™ 10XAS-Series, 10XBR-Series or EG-Series sensors located within fifty linear cable feet [15.24m] of the unit. If the installation requires the Model GPU to be located over fifty linear cable feet [15.24m] (and less than 4000 linear cable feet [1219m]) from the sensors, a line receiver (LR Option) must be mounted in the Model GPU and a line driver (LD Option) mounted in the processing unit used to monitor the SCAN-A-LINE™ sensors (typically a Model GPU Level 2).

R.2.a Temperature Range

Operational temperatures should fall in the range from 32°F to 122°F [0°C to 50°C]. Temperatures above 140°F [60°C] for prolonged periods of operation or storage can lead to the degradation of the integrated circuits in the Model GPU. If temperatures outside the specified range are expected, special provisions should be made to protect the equipment.

R.2.b Vibration Considerations

SCAN-A-LINE™ processors can tolerate reasonable amounts of shock and vibration. The major problem with vibration is the increase in probability of loose hardware and/or connectors. Mount the Model GPU to a solid, fixed mounting where vibration is at a minimum. When high levels of vibration or shock are likely, shock absorbing mounts on the Model GPU will reduce maintenance problems.

R.3 Specifications for the Model GPU

The electronics for the Model GPU are housed in a NEMA-style steel enclosure. All enclosures are painted with corrosive resistant polane paint The Model GPU contains a universal switching power supply for both 117VAC operation and 220VAC operation under the cover panel inside the processing unit {Figure R.3-1}.

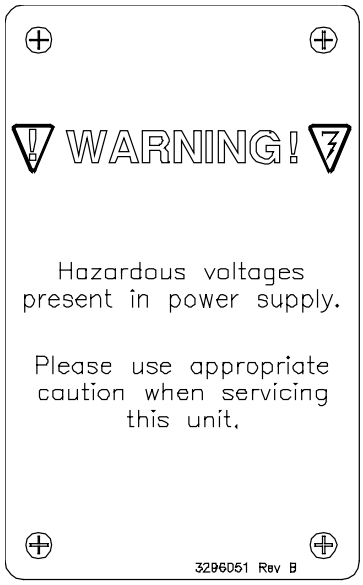

Figure R.3-1: Power Supply Protective Panel

R.3.a Power Requirements

The standard power requirements for all Model GPUs are 85VAC to 264VAC at 47Hz to 440Hz. The power supply has UL1950 and CSA C22.2 safety approvals and meets FCC Class B conducted as well as VDE 0878 PT3 Class B EMI conducted noise limits. The power supply will automatically adjust for voltages between 85VAC and 264VAC with no jumpers or switch settings necessary. The power line is filtered to suppress power line transient noise and power line induced RF interference. Quick disconnect power line connections are made directly to the internal power line filter inside the Model GPU enclosure. The power supply for the Model GPU is located under a red warning panel {Figure R.3-1} in the top-left corner inside the enclosure.

The input power is fused with a 3.15Amp fuse (Littlefuse® Part # V216 3.15 or equivalent, Harris Instrument Part # 5500005) Short circuits to the regulated supplies will usually cause a thermal shutdown of the regulators without causing the fuse to blow. See Figure R.3-2 for the power supply fuse location.

Some industrial power distribution systems can deliver voltages that fall outside these limits. This situation can be minimized by using a power drop that is separate from those supplying heavy equipment. Where wide fluctuation in power line voltages cannot be avoided, a Sola Line Regulating Transformer can overcome this problem. The CVS (sine wave) resonant types are more effective. Most SCAN-A-LINE™ systems require less than 250VA.

NOTE:

A good system earth ground can be helpful in reducing the possibility of interference from other electrical equipment. Care should be taken to insure that the SCAN-A-LINE™ earth ground is separate from the grounds used by other systems. This is most important when high current (ex. welding, cutting, etc.) and high voltage (ex. Hi Pot Testing) are involved.

3.15Amp Littlefuse® Part # V216-3.15

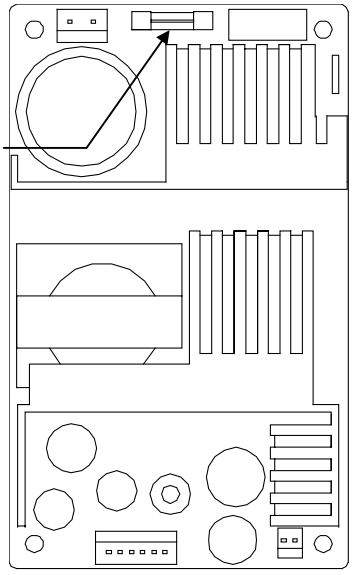

Figure R.3-2: Fuse Location on Power Supply

R.3.b Power Output

All output power specifications are rated at 122°F [50°C] ambient temperatureCustomer connections for power outputs are available upon request. These power connections are available ONLY FOR HARRIS INSTRUMENT CORPORATION APPROVED ACCESSORIES (such as line drivers, strip detectors, etc.).

Maximum Power	*60 Watts*
Adjustment Range	*-5, +10% minimum*
Cross Regulation	*±2% on output 1, ±5% on outputs 2 & 3*
Hold-up Time	*20ms at 60 Watt load & 115VAC nominal line*
Overload Protection	*5.7 to 6.7VDC on main output*
Regulation	*+12VDC = ±5% at 25°C, -12VDC = ±5% at 25°C, +5VDC = ±2% at 25°C*
Maximum Load	*+12VDC = 3 Amp, -12VDC = 0.7 Amp, +5VDC = 7 Amp*
Ripple	*+12VDC = 120mV, -12VDC = 120mV, +5VDC = 50mV*

Table R.3-1: Power Specifications for Universal Power Supply

NOTE:

All of the regulated supply voltages are momentary short circuit protected in the Model GPU. Extended short circuit times may cause overheating and damage to the equipment. Input line power should be removed from the Model GPU immediately when cable damage occurs or a short circuit is suspected.

R.3.c Physical Dimensions

The Model GPU is housed in a steel enclosure measuring 12 inches [305mm] wide by 14 inches [356mm] tall by 6 inches [152mm] deep. The Model GPU Level 1 has two 6-pin MS-style circular connectors on the bottom panel for connection of EG-Series sensors (Section R.4.a). Sensor connections for 10XAS-Series and 10XBR-Series sensors are located on the bottom panel through 7-pin MS-

style circular connectors for Model GPU Levels 2 for 10XBR-Series sensors and 3 through 5 for 10XAS-Series sensors (Section R.4.a). System power is connected through a IMC conduit cord grip located to the left of the sensor connectors on the bottom panel. Power lines attach to a Line Filter mounted on the bottom panel (Section R.4.b). See the 1200000 Series drawings in Section R.7 for more information on Model GPU dimensions and connector locations.

R.3.d Optional Configurations

The Model GPU is available in several optional configurations to meet a variety of application requirements. The various configurations may be specified as follows:

Model Number & Suffix	Description
4/20	*Indicates unit is installed with an isolated 4-20 milliamp current loop with isolated power supply (one required per 4-20 loop) for connection with a PLC that requires a 4/20 current loop input. See Section NN for more information (if applicable).*
ABC	*Indicates that the unit is configured Absolute-to-Bipolar Converter to convert 0-10VDC analog signal(s) to ±10VDC analog signal(s). See Section TT for more information.*
AZ	*Indicates that the unit is configured for the auto-zero function that allows the selection of any strip edge or centerline position as a reference guiding position. Compatible with Model GPU Levels 4 and 5 ONLY. See Section MM for more information.*
BGA	*Indicates the unit is configured with a Bargraph Display with annunciation and limit relays. See Section GG for more information (if applicable).*
BGA50	*Indicates the Bargraph Display is configured for remote operation (includes 50' [15.2m] cable). See Section GG for more information (if applicable).*
FEV	*Indicates the unit is configured with the First Edge Video circuitry. This detects the first edge viewed as the first edge of the material, ignoring all other edges detected. Dual-sensor systems ONLY. Compatible with Model GPU Levels 4 and 5 ONLY. See Section AC for more information.*
LR	*Indicates the unit is supplied with a Line Receiver (to allow communication at distance greater than 50' [15.2m] from a Model GPU Level 2). See Section OO for more information (if applicable).*

Table R.3-1: Optional Configurations for the Model GPU

R.3.e Model GPU Circuitry

The Model GPU Level 1 contains the following (other circuitry may be present in the Model GPU, depending upon options supplied with unit):

Universal Power Supply – HIC Part # 3900004, 16-position Customer Connections Terminal Strip

The Model GPU Level 2 contains the same items as the Level 1, plus:

Line Driver Circuitry – HIC Part # 3695153

The Model GPU Level 3 contains the same items as the Level 1, plus:

Single-Sensor Analog Output Device – HIC Part # 3694042

The Model GPU Level 4 contains the same items as the Level 1, plus:

Quad Analog Output Device – HIC Part # 3695002 Rev. A

The Model GPU Level 5 contains the same items as the Level 4, plus:

Analog Scaling Amplifier – HIC Part # 3692042

R.4 Installation

Mount the Model GPU vertically, with the cable and power connections pointed towards the floor. The Model GPU requires a good ground, so be sure to use the three-prong power cord for connecting 117VAC system power. If running the power through conduit, ensure that the system power has an adequate ground.

R.4.a Sensor Connection

Inspect all cables that will connect with the Model GPU. Verify that the connectors are free of foreign materials and check the number of pins on each connector.

Typically, the Model GPU will connect 7-pin emitter cables for 10XAS-Series and 10XBR-Series sensors; and six-pin emitter cables for EG-Series sensors. Processor interconnection cables, used to route the sensor signals from the Model GPU Level 3 through Level 5 to another controller (such as a Model MPPU), are typically connected through the 4-pin MS-style circular Feature Connector on the bottom panel. Connect the proper cable(s) to the appropriate MS-style circular connector(s) on the bottom panel of the Model GPU {See Figure R.4-1 & Table R.4-1}.

GPU Level	Sensor Type	Sensor A Connector	Sensor B Connector
Level 1	*EG-Series*	*A*	*B (if applicable)*
Level 2	*10XAS-Series, 10XBR-Series, 10XHD-Series, 10XSH-Series*	*C*	*D (if applicable)*
Level 3	*10XAS-Series*	*E*	*N/A*
Level 4	*10XAS-Series*	*F*	*G (if applicable)*
Level 5	*10XAS-Series*	*H*	*J*

Table R.4-1: Sensor Connections for Model GPUs

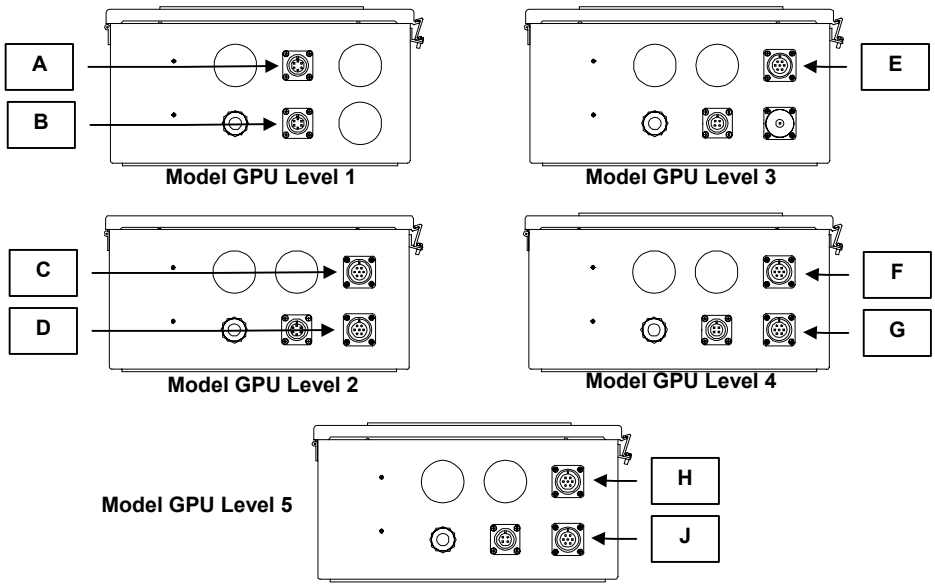

Figure R.4-1: Model GPU Bottom Panel Sensor Connections

R.4.b AC Power Connection

The Model GPU comes standard with an three-prong AC power cord for the switchable power supply. Figure R.4-2 shows the wire connections to the line filter located on the inside-back panel of the Model GPU enclosure. If replacing the standard three-prong AC power cord with conduit for 117VAC service or a 220VAC service power cord, BE SURE THAT THE LINE AND NEUTRAL CONNECTIONS MATCH FROM THE POWER SOURCE SIDE TO THE POWER SUPPLY SIDE!

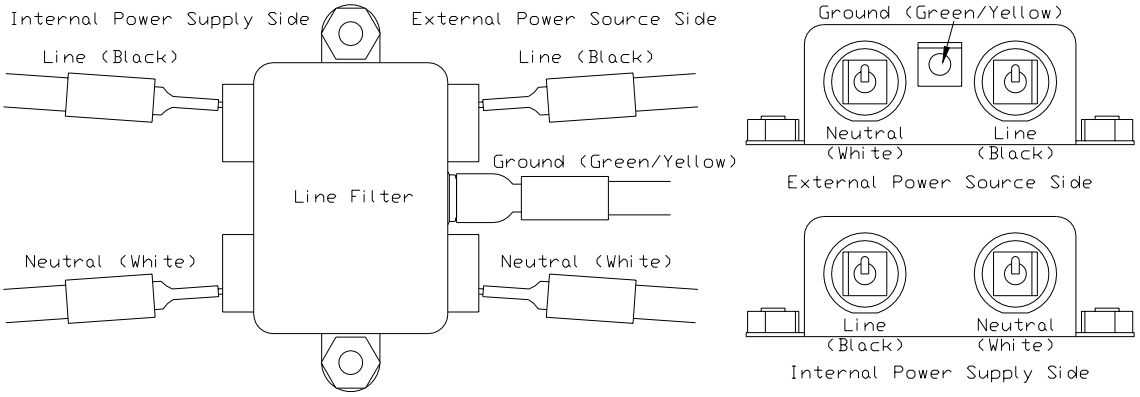

Figure R.4-2: AC Power Connections to Line Filter

R.4.c Customer Connections

Access to customer connections, such as analog outputs and limit relay connections, is typically available through the spare hole(s) located above the AC power connector on the bottom panel of the unit {Figure R.4-3}. These connections are attached to the sixteen- or twenty-pin terminal strip located on the inside-back panel of the processing unit {Figure R.4-4}.

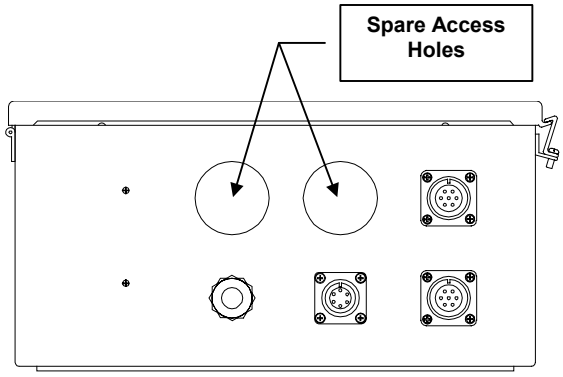

Figure R.4-3: Spare Access Holes on Model GPU

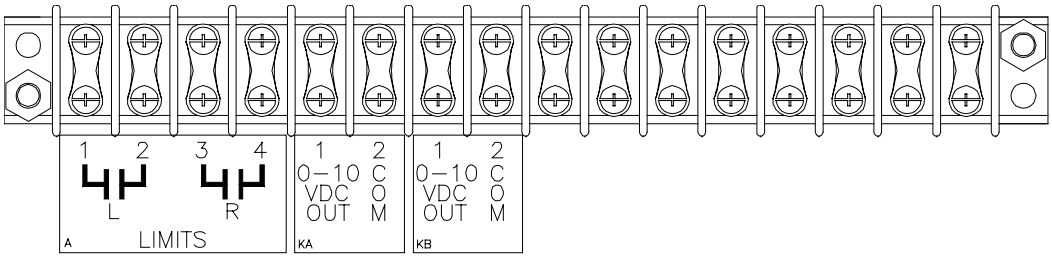

Figure R.4- 4: Typical Customer Connections for Model GPU with the BGA Option

R.5 General Maintenance

Maintenance of the Model GPU is relatively limited. All SCAN-A-LINE™ processing units are highly reliable and tolerant to most industrial environments. Maintenance of the Model GPU after installation is extremely limited. Since there are no moving parts in the Model GPU, there is nothing to lubricate. If any form of maintenance is performed on the line near the Model GPU processing unit, be sure to disconnect all cables from the unit.

NOTE:

If welding is to be performed anywhere on the process line where the Model GPU is installed, disconnect ALL cables from the Model GPU. This prevents a system overload (and associated damage) from the current generated by the welding.

The only typical maintenance for the Model GPU processing unit is:

1) Check all cable connections. All connections should be snug.
2) Make sure all cables are free of cuts, nicks or crimps. Replace cables if they are damaged.

NOTE:

Damage cables can cause serious damage to the entire Guide System. Repair or replace damaged cables as soon as the damage is discovered to prevent voiding the system warranty.

3) Check power connections and insure that power is available to the unit.
4) Check all mounting fixtures. Tighten if necessary. In high vibration environments, mounting plates can vibrate loose. If vibration is still causing problems, simple vibration dampening can solve most vibration interference.
5) If a bargraph display is installed, just wipe clean with a soft, slightly damp cloth when it becomes dirty.
6) Regularly check the front panel latches for tightness to ensure the door stays closed.

R.6 Trouble Shooting

CAUTION:

Hazardous voltages are present within the Model GPU enclosure. Care should be taken when making any of the tests in this manual.

NOTE:

Procedures in this section will assist in determining whether or not the Model GPU is operating within specifications. Always follow the instructions before replacing inoperative equipment. Installing a good spare part (sensor or other processing unit) in a defective system may cause unnecessary damage to the spare part.

Board level maintenance is NOT RECOMMENDED for the Model GPU. If a problem is experienced with the Model GPU, a few simple checks with a DC voltmeter can verify proper circuit function. A voltmeter with a 20VDC and/or 300VAC range is required. The meter should be able to measure within 1% and may be either analog or digital.

No power to the Model GPU. Sensors do not light.

Test 1: Check for AC power line input voltage – external system power may be off or unit may be unplugged.

Test 2: Verify AC power voltage {Figure R.6-1}.

a) Range meter for 300VAC or greater.
b) Connect negative lead (-) to Line Filter External Source Side **NEUTRAL** and positive lead (+) to Line Filter External Source Side **LINE**.
c) Voltage should read between *85VAC and 264VAC*.

If AC Line Voltage does not fall between *85VAC and 264VAC* from the external source, modify your power for this unit to fall within these voltages.

d) Connect negative lead (-) to Line Filter Internal Supply Side **NEUTRAL** and positive lead (+) to Line Filter Internal Supply Side **LINE**.
e) Voltage should read between *85VAC and 264VAC*.

If AC Line Voltage does not fall between *85VAC and 264VAC* from the internal line filter, the Line Filter is malfunctioning. Contact Harris Instrument Corporation for more information.

Test 3: If voltages at test points are not appropriate (or non-existent) and unit has

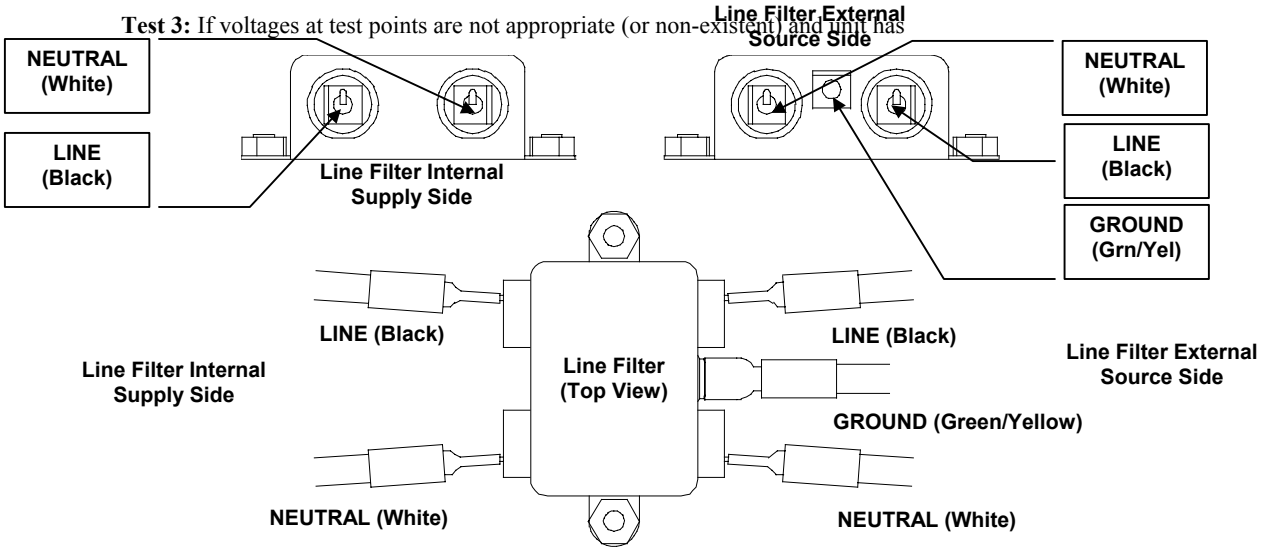

Figure R.6-1: Line Filter in Model GPU

proper AC power, remove power from the Model GPU and test the 3.15Amp Littlefuse® fuse under the universal power supply protective panel {Figure R.6-2}. Replace fuse if bad.

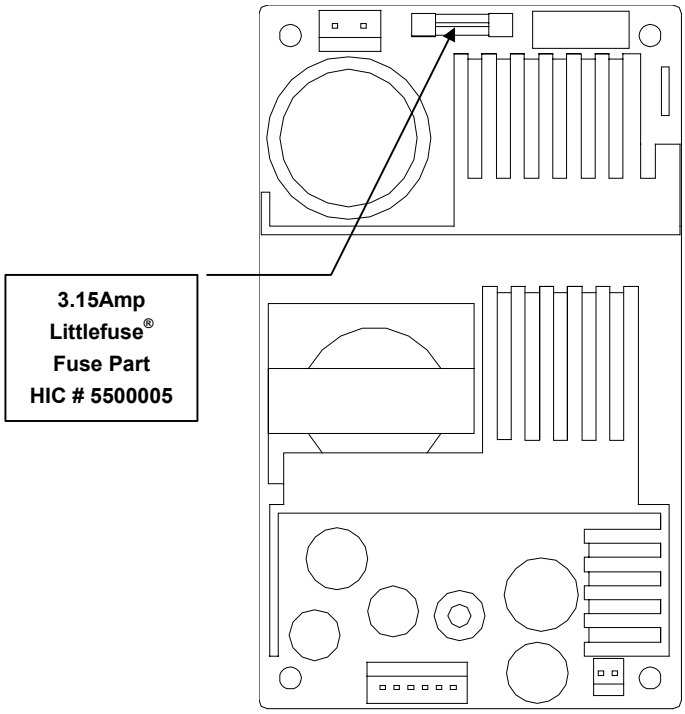

Figure R.6-3: Fuse Location on Universal Power Supply

Test 5: If fuse is good, system has proper power, and test points have appropriate voltage, remove all external sensor cables and any unpluggable customer connections (on inside back panel). Check voltages at test points again {Figure R.6-1}. If voltages test appropriately with all cables disconnected, connect cables one at a time and check voltages as each cable, internal connection, and customer connection are completed.

If system fails when replacing a cable/internal connection/customer connection, a short circuit is indicated on the cable/connection just attached. If the short circuit is in a cable, replace the cable with a spare. If the short circuit is in a module, obtain a Return Authorization Number from Harris Instrument Corporation Service and return the module to the Harris Instrument Corporation Factory. If the short circuit occurs when reattaching a customer connection, check the cable for that connection, check the device using the cable, or replace the cable/device. If this fails to solve the short circuit, contact Harris Instrument Corporation for technical assistance.

Various tests are available in the other sections of this manual for the different components of the Model GPU (DA4 Module & BGA Option for example). Refer to these sections for more information on trouble shooting these components. After all cables, internal connections and customer connections check good and the other tests check positive, the Model GPU is probably experiencing a component level failure. Component level trouble shooting of the Model GPU is not covered in this manual. Please obtain a Return Authorization Number from Harris Instrument Corporation Service and return unit to the Harris Instrument Corporation Factory.

R.7 Related Drawings

The following pages contain various drawings for the Model GPU. For drawings of other configurations, please contact Harris Instrument Corporation Engineering. All mechanical drawings are available as AutoCAD® .DWG files for a minimal charge. Please contact Harris Instrument Corporation Sales.

Drawing #	Description	Drawing Format
1298181	*Model GPU Level 1 Dimensions*	*AutoCAD LT Rel. 3*
1298182	*Model GPU Level 2 Dimensions*	*AutoCAD LT Rel. 3*
1298183	*Model GPU Level 3 Dimensions*	*AutoCAD LT Rel. 3*
1298184	*Model GPU Level 4 Dimensions*	*AutoCAD LT Rel. 3*
1298185	*Model GPU Level 5 Dimensions*	*AutoCAD LT Rel. 3*
1398181 Pg. 1	*Model GPU Level 1 Interior View*	*AutoCAD LT Rel. 3*
1398181 Pg. 2	*Model GPU Level 1 Interior View Legend*	*AutoCAD LT Rel. 3*
1398182 Pg. 1	*Model GPU Level 2 Interior View*	*AutoCAD LT Rel. 3*
1398182 Pg. 2	*Model GPU Level 2 Interior View Legend*	*AutoCAD LT Rel. 3*
1398183 Pg. 1	*Model GPU Level 3 Interior View*	*AutoCAD LT Rel. 3*
1398183 Pg. 2	*Model GPU Level 3 Interior View Legend*	*AutoCAD LT Rel. 3*
1398184 Pg. 1	*Model GPU Level 4 Interior View*	*AutoCAD LT Rel. 3*
1398184 Pg. 2	*Model GPU Level 4 Interior View Legend*	*AutoCAD LT Rel. 3*
1398185 Pg. 1	*Model GPU Level 5 Interior View*	*AutoCAD LT Rel. 3*
1398185 Pg. 2	*Model GPU Level 5 Interior View Legend*	*AutoCAD LT Rel. 3*

Table R.7-1: Drawing Information