AUXILIARY MACHINE INTERFACE

ACU-RITE®

REFERENCE MANUAL

Limited Warranty

The ACU-RITE Auxiliary Machine Interface (AMI) has a limited warranty against defects in material and workmanship for a period of one (1) year from the original date of purchase.

ACU-RITE will, at its option and expense, repair or replace any component(s) of the Auxiliary Machine Interface in question which fails to satisfy this warranty provided that ACU-RITE shall have received notice of the claimed defect(s) during the limited warranty period.

The limited warranty covers all components and accessories and applies only to those Auxiliary Machine Interface products which have been installed and operated in accordance with the instructions in the Auxiliary Machine Interface reference manual(s). ACU-RITE shall have no obligation with respect to any defect(s) or other condition(s) caused in whole or in part by the end user's abuse, incorrect use, improper maintenance, misuse, modification of the product(s), or by the repair or maintenance of such product(s) by any person except persons deemed qualified to do so by ACU-RITE.

Responsibility for loss in operating performance or other conditions beyond ACU-RITE's control cannot and will not be accepted by ACU-RITE.

The foregoing limited warranty obligations are in lieu of any and all expressed and/or implied warranties of fitness or merchantability or otherwise, and state ACU-RITE's entire liability and the end user's exclusive remedy, under any circumstance, for any claim of damage.

Table of Contents

This symbol alerts you to important information concerning the installation and/or operation of the Auxiliary Machine Interface (AMI).

Read these instructions carefully and place them in a safe and convenient location for future reference.

Introduction

This manual discusses how the Auxiliary Machine Interface (AMI) system works in conjunction with the ACU-RITE® **MILL*PWR*®** system.

Preparation

Read and understand all instructions in this manual before beginning the installation. Each item has an overview section which will explain their capabilities and will help ensure that each system is installed properly.

Before you begin, ensure the location where you are planning installation, can fully support the power supply requirements that are identified in the Electrical Specifications section at the end of this manual.

Tools

A typical AMI installation will require the following tools:

- Small, flat-tipped screwdriver
- Wire stripper
- Size “F” drill (0.257" diameter)
- 5/16"-18 tap

Components

There are two types of AMI systems currently available from ACU-RITE. One supports 115 volts and the other one supports 230 volts of power. Both AMIs include a cable for connecting the system to **MILL*PWR***. The 115V AMI also includes a cord for connecting the system to a **MILL*PWR*** servo motor.

115V AMI
(includes power cord)

230V AMI

Interface Cable
(included with both types of AMI)

AMI System Overview

The following is a quick reference guide with each connectors name, the page where its description appears, and their most common uses. Figure 1 on the next page shows all connector locations.

There are five connectors available. Four of them are to be used for multiple applications, while the J16 is limited to wiring an external 230V/115V AMI to a power source. Always identify the correct connector for your particular application and read its description in its entirety before beginning the wiring procedure.

Connector Descriptions

Device Input J2 (refer to page 5):
- Monitor the position of machine guards
- Monitor the oil level of automatic lubrication systems
- Remote Go Input

Device Output J18 (refer to page 8):
- Control up to four devices (i.e., coolant pumps and rotary indexers)
- Activate external devices during hole patterns and position/drill steps

Emergency Stop Input J4 (refer to page 13):
- Add table limit switches to the emergency stop circuitry
- Add an emergency stop button to the emergency stop circuitry

Emergency Stop Output J17 (refer to page 16):
- Add other controls to the emergency stop circuitry

Power Input J16 (refer to page 21):
- For use with 230V systems or with an alternate 115V power source—connects AMI to a power source

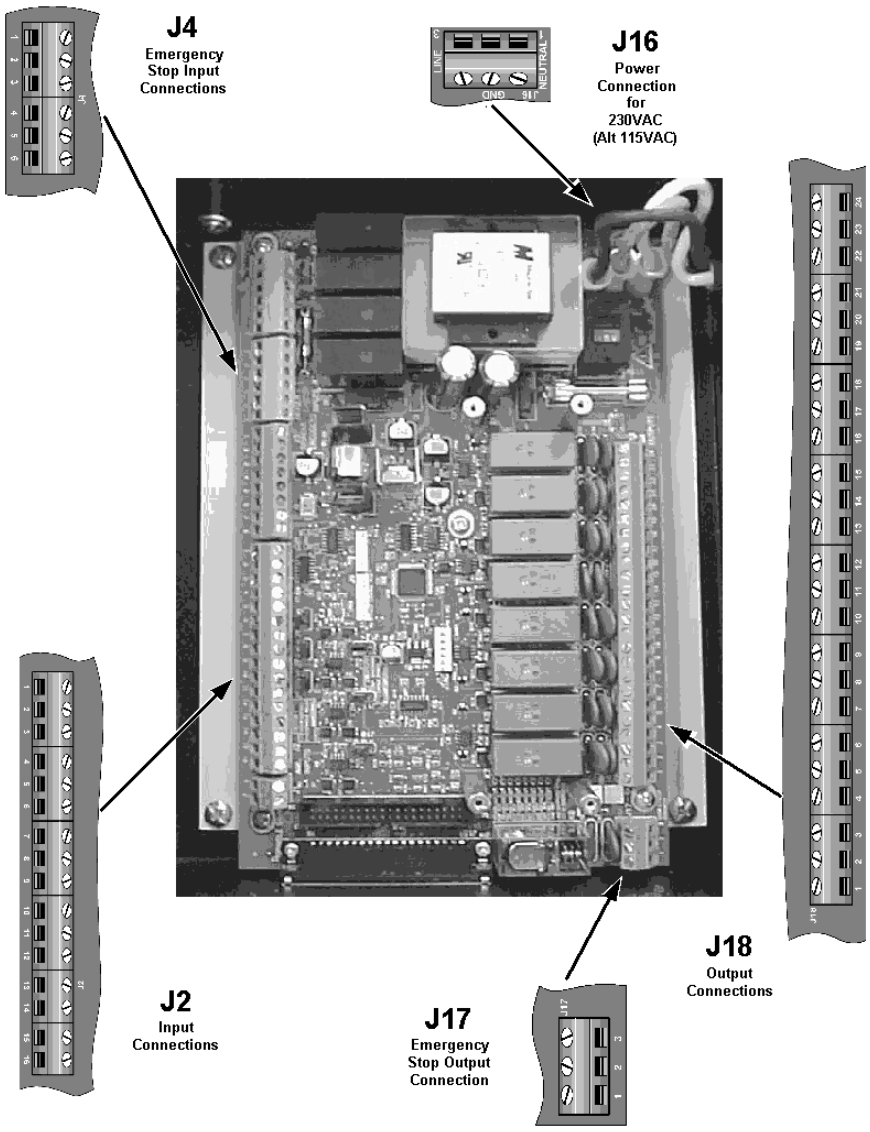

J4
Emergency
Stop Input
Connections
J16
Power
Connection
for
230VAC
(Alt 115VAC)
J18
Output
Connections
J2
Input
Connections
J17
Emergency
Stop Output
Connection

Fig. 1

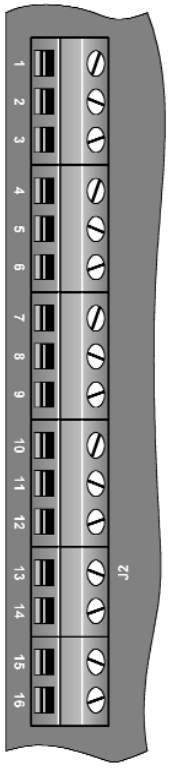
Input Devices (J2)

The J2 input connector is commonly used to:

- Monitor the position of machine guards
- Monitor the oil level of an automatic lubrication system
- Remote Go Input

Table 1 (J2)

Pin #	Description	Pin #	Description
1	Machine Guard input	**9**	Not active
2	Machine Guard input	**10**	Not active
3	Low Oil input	**11**	Not active
4	Low Oil input	**12**	Not active
5	Remote Go input	**13**	Not active
6	Remote Go input	**14**	Not active
7	Not active	**15**	Not active
8	Not active	**16**	Not active



Do not apply power directly to the AMI input pins.

Connector Definitions

Machine Guards are safety features that will alter the activity of certain program functions when they are open.

When guard switches are open:

1) Find Home feature cannot be initiated.
2) Single Cycle cannot be run.
3) A program cannot be run.
4) The table is still able to be moved.

If the guard switches are opened during these operations:

1) Find Home feature will be aborted.
2) The program currently operating will pause and the table will stop moving, but the program will not be aborted.
3) Single Cycle will pause.

Figure 2 shows a typical wiring diagram for machine guards. As the diagram illustrates, the machine guard switch should be wired to pins 1 and 2. When the machine guard switches are open, the contacts to those pins will open, and an Operator Intervention Message (OIM) message will appear on the **MILL*PWR*** screen.

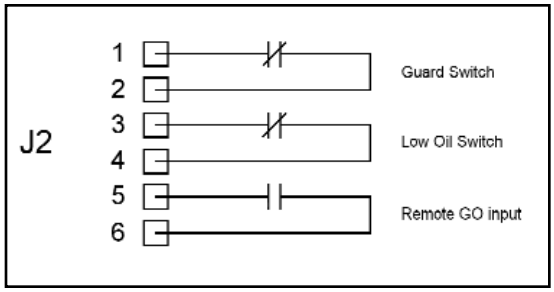


Fig. 2

Note: **If guards are not used then pin 1 and pin 2 of J2 must be jumpered.**

Low Oil is a safety feature that will, under certain conditions, stop program functions when the lubrication pump supply reaches a certain minimum level of oil. The normally closed low oil switch should be wired to pins 3 and 4.

When the low oil switch opens:

1) Find Home, Move Table, Single Cycle and all program functions cannot be initiated.

If the low oil feature activates during these operations:

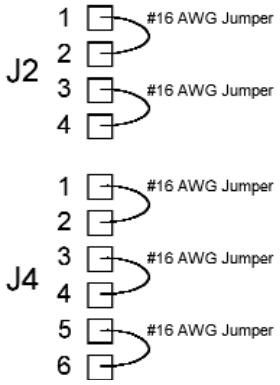
1) Find Home and Move Table functions will be aborted.
2) Single Cycle and program functions will complete their current path and then pause.

Note: **If a low oil sensor is not used, then pins 3 and 4 must be jumpered.**

Remote Go provides a switch input that can be used in place of the operator pressing the **GO** key. Pins 5 and 6 (J2) are reserved for this function.

Note: **The Remote Go input signal must be held for a minimum of 0.2 seconds in either ON or OFF mode in order for it to be recognized by the AMI.**

If you are not using the J2 or J4 connector on the AMI, you **must** wire a jumper at this time to close the circuitry. Otherwise, when you power on **MILL*PWR*** and the AMI, an emergency stop condition will automatically occur and neither system will run.



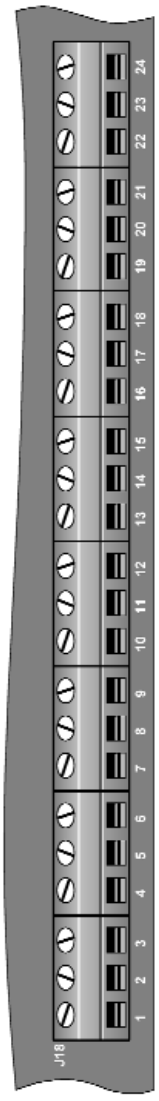
Output Devices (J18)

The J18 output connector is commonly used to:

- Control up to five devices (i.e., coolant pumps and rotary indexers) from within a **MILL*PWR*** program.
- Activate external devices during hole patterns and position/drill steps.

Table 2 (J18)

Pin #	Description	Output Function (Default State)
1	AMI output #1	Common relay contact
2	AMI output #1	Normally Open relay contact
3	AMI output #1	Normally Closed relay contact
4	AMI output #2	Common relay contact
5	AMI output #2	Normally Open relay contact
6	AMI output #2	Normally Closed relay contact
7	AMI output #3	Common relay contact
8	AMI output #3	Normally Open relay contact
9	AMI output #3	Normally Closed relay contact
10	AMI output #4	Common relay contact
11	AMI output #4	Normally Open relay contact
12	AMI output #4	Normally Closed relay contact
13	AMI output #5	Common relay contact
14	AMI output #5	Normally Open relay contact
15	AMI output #5	Normally Closed relay contact
16	AMI output #6	Common relay contact
17	AMI output #6	Normally Open relay contact
18	AMI output #6	Normally Closed relay contact
19	AMI output #7	Common relay contact
20	AMI output #7	Normally Open relay contact
21	AMI output #7	Normally Closed relay contact
22	AMI output #8	Common relay contact
23	AMI output #8	Normally Open relay contact
24	AMI output #8	Normally Closed relay contact



Normally = Relay de-energized

AMI Output Device Overview

MILL*PWR* AMI interface allows it to control four (4) separate functions such as mist and flood coolant, indexers,etc. There are three (3) programmable options available when programming an AMI step:

- PULSE - Sends a signal to a device for a programmable length of time. (The pulse duration can not exceed 999.9 seconds).
- ON - Sends a signal until program signals off, or at the completion of the program.
- OFF - Sends a signal to turn device off.

Each of the signals listed above can be set to display, or not display an Operator Intervention Message (OIM) at the auxiliary function step.

- NO - Will signal with no OIM. The signal is sent to the device and the program continues to run. No operator intervention is required.
- BEFORE - Will signal after an OIM. An OIM indicates that pressing “GO” will activate the programmed device. Pressing “GO” causes the signal to be sent, and the program continues to run.
- AFTER - Will signal before an OIM. The signal is sent to the device prior to displaying an OIM. After a signal has been sent, an OIM will be displayed prompting the operator to press “GO” and the program continues to run.

Connection Definitions

Auxiliary Outputs 1-4 are four sets of general purpose relay contacts.

1) These relay contacts can only be controlled through a **MILL*PWR*** program.
2) They must be set (programmed) to be either ON, OFF or PULSED.
3) Devices programmed to switch "on" will remain "on" for entire program, unless they are programmed to turn "off" later in the program.
4) Devices set to "pulse" will run for the length of time you define (refer to page 23 for auxiliary function programming).
5) When the program stops, all relays will turn off.

Auxiliary Output 5 - In Position

In-Position. The Auxiliary Machine Interface (AMI) has the ability to send a signal when **MILL*PWR*** is "in position" for Position Drill steps and Hole pattern steps which require manual Z-axis operation. This is when the table has moved to either the X, Y coordinates of the position drill step or to each hole of a hole pattern.

Output #5 (pins 13 through 15) are used for this function.

The In-Position function is configured through the AMI Outputs field under Installation Setup. This can be set to ON, OFF or PULSED mode.

Note: **For pulsed outputs, the cycle will complete before the program will continue.**

Pausing the program won't affect the auxiliary functions. Each device will continue to run normally. However, **MILL*PWR***, will shut off all relays automatically when the program ends. To shut off a device earlier in the program, insert another auxiliary step with the appropriate relay turned off.

Here is an example of how the Auxiliary Output functions work in conjunction with a rotary indexer:

1) Use Aux 3, Output #3 as the Cycle Start relay.
2) When the AMI Output #3 relay is pulsed, pins 7 and 8 of J18 are momentarily shorted for the amount of pulse time entered. This activity initiates the "Cycle Start" relay in the rotary indexer control, to start a cycle or step index.

   Note: **The pulse time must not exceed the indexer positioning time to start the next cycle.**

3) Once in position, the rotary indexer sends a "Cycle Finish" signal back to the AMI. The AMI input interprets this as a "GO" signal and performs the next milling operation (Refer to **Remote Go** on page 7).

This In-Position activity takes place without any outside intervention from the operator.

G-code Programs

When using a G-code program that requires coolant commands, certain outputs are configured to specific commands (M7, M8, M9). The following rules apply while running G-code programs:

1) M7 command turns on the Aux 1 as the coolant flood relay.
2) M8 command turns on Aux 2 as the coolant mist relay.
3) M9 turns off both Aux 1 and 2.
4) Only one output, Aux 1 or Aux 2, is permitted to be on at a time.
5) These outputs will be turned On and Off as defined in the G-code program.
6) Auxiliary outputs 3 and 4 are not used and are always off.

Devices that are connected to auxiliary outputs 1-4 (pins 1 through 12) on the AMI's J18 connector are programmable (refer to **Table 2**). **Figure 3** shows an example of AMI output wiring that would control a pump.

All of the J18 outputs will automatically return to their default settings (refer to **Table 2**) any time the Emergency Stop button on the front of the **MILL*PWR*** operator console is pressed, when an emergency stop input (via J4) occurs or when the software detects another emergency stop condition.

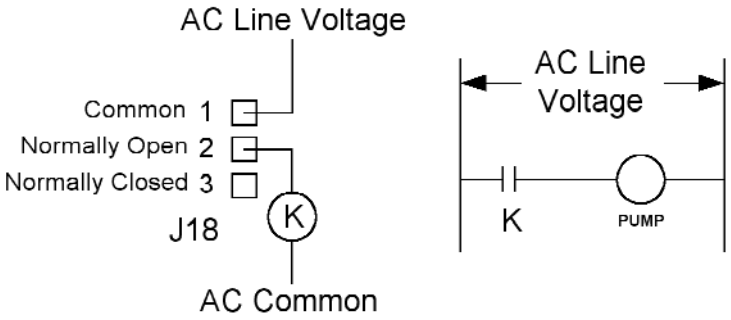


Fig. 3

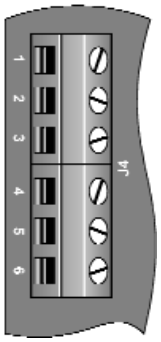
Emergency Stop Inputs (J4)

The J4 connector is commonly used to:

- Add table limit switches to the emergency stop circuitry
- Add an Emergency Stop button to the emergency stop circuitry

Table 3 (J4)

Pin #	Description
1	115V (for E-stop relay coil only)
2	Auxiliary E-stop relay coil (K1)
3	Auxiliary E-stop relay coil (K1)
4	AC Common (for E-stop relay coil only)
5	Table limit switch contact
6	Table limit switch contact



An emergency stop condition normally occurs when the system overheats, a fault occurs, or when the Emergency Stop button on the **MILL*PWR*** operator console is pressed. The AMI gives you the option of adding table limit switches and another Emergency Stop button into the system's emergency stop circuitry. When an emergency stop is activated, **MILL*PWR*** will immediately shut off the system's motors, shut off any external devices that are connected to the AMI, and stop all machine movement.

If you are not using the J2 or J4 connector on the AMI, you **must** wire a jumper at this time to close the circuitry. Otherwise, when you power on **MILL*PWR*** and the AMI, an emergency stop condition will automatically occur and neither system will run.

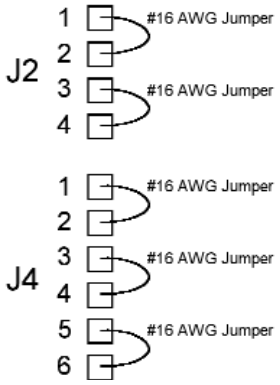


Figure 4 illustrates how a table limit switch can be wired into the emergency stop circuitry. Notice that the switches have been connected to pins 5 and 6, which are the table limit switch contacts (refer to Table 3). Because the table limit connections operate on internal 12V DC power, it's important to use a table limit switch with a 12V DC @ 100mA minimum rating. **Do not apply voltage directly to pins 5 or 6 on the J4 connector.**

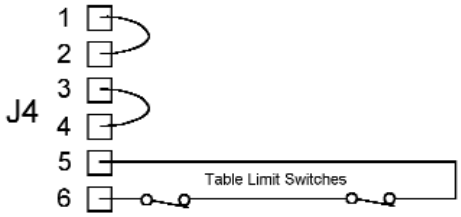


Fig. 4

There are two options for wiring the additional Emergency Stop button. It can be wired directly to the AMI's circuit board as a contact closure, or it can be wired into an external 115V AC system.

Figure 5 shows how an external Emergency Stop button can use the AMI circuit board as its power source (the table limit switches are shown for completeness). 115V AC is provided between pins 1 and 4 of J4 for the internal emergency stop relay coil.

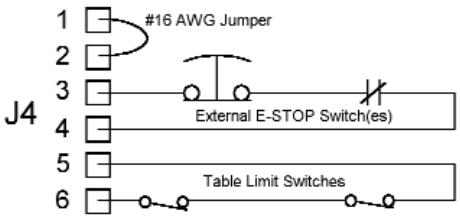


Fig. 5

When wiring the Emergency Stop button, use a switch with a 115V AC @ 100mA minimum rating. (Do not use this circuit to power any external devices.)

Figure 6 shows how the external emergency stop can be wired directly into an external 115V AC circuit.

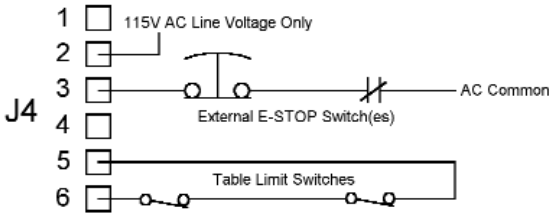


Fig. 6

Note: **If the existing emergency stop system is any other voltage than 115V AC, you must use the AMI as the power source (described above) for the AMI emergency stop input.**

> ⚠ Do not use the 115V AC connection for any other circuitry.

Table Stop Test

The table stop test shows whether or not an emergency stop (E-stop) condition has been detected or the internal switch has been pressed.

E-Stop Signal Status Reports on whether or not the system detects an emergency stop condition. An E-stop condition can originate from the operator console, Z-axis, or optional AMI.

Table Stop Button Displays the status of the table stop button (Pressed or Released) on the operator console.

Z-Limit If Z-axis control is enabled, a "Fault" or "No Fault" message will appear. A fault indicates that at least one of the limit switches on the spindle has been disengaged.

To display the table stop test:

- From the Job Setup screen, select Installation Setup and press **ENTER**. Then select the Diagnostics screen and press **ENTER** again.
- From the Diagnostics screen, highlight Table Stop Test and press **ENTER**. The test will run automatically.
- When the test is complete, press the EXIT TEST softkey to close the "Table Stop Test" screen.
- Continue with Diagnostics or press the USE NEW SETTINGS softkey.

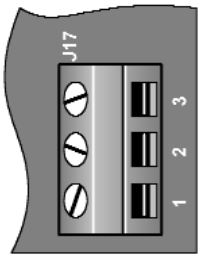
Emergency Stop Output (J17)

The J17 connector is commonly used to:

- Add other devices to the emergency stop circuitry.

Table 4 (J17)

Pin #	Description
1	Normally closed relay contact
2	Common relay contact
3	Normally open relay contact



> ⚠ The emergency stop outputs are *not* programmable. Do not wire external devices that you wish to control (pumps, automatic lubrication systems, etc.) directly into **MILL*PWR***'s emergency stop circuitry.

Whenever an "emergency stop" event occurs—such as when the Table Stop button on the **MILL*PWR*** operator console is pressed or the system detects a fault—**MILL*PWR*** will interrupt the milling machine's movement and all of the emergency stop outputs will return to their default state (refer to **Table 3**).

Figure 7 shows an example of how the AMI emergency stop output might be used to power down a spindle motor when an emergency stop condition occurs.

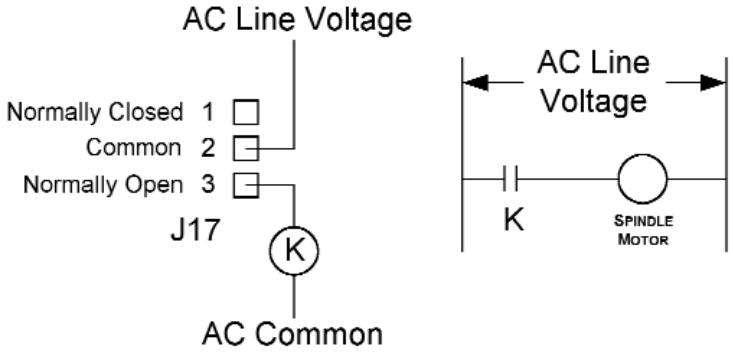


Fig. 7

AMI Installation

The installation procedure is divided into three sections—**Connecting to MILL*PWR***, **General Wiring Procedure**, and **Connecting to a Power Source**. Refer to the **General Wiring Procedure** section anytime you are installing a new input or output device.

Unless indicated otherwise, each section applies to both AMI versions (115V and 230V).

> ⚠ **All wiring should be performed by a qualified electrician.**

Connecting to MILL*PWR*

- Power down the **MILL*PWR*** system and disconnect it from its power source.
- Using four (4) 5/16"-18 machine screws, install the AMI in a convenient location on or near the machine, within close proximity of the **MILL*PWR*** operator console. Ensure that both the communication cable and the power cable, for 115V systems, will reach the **MILL*PWR.*** If the AMI is being installed on the machine, check that both are properly grounded. (Use star-toothed washers if necessary).
- Connect one end of the interface cable to the connector located on the AMI (refer to **Figure 8**). Tighten the two screws on the connector housing.
- Connect the opposite end of the cable to the AMI connector located on the rear of the **MILL*PWR*** operator console (refer to **Figure 9**). Tighten the two screws on the connector housing.
- Proceed to the **General Wiring Procedure** section (page 18).

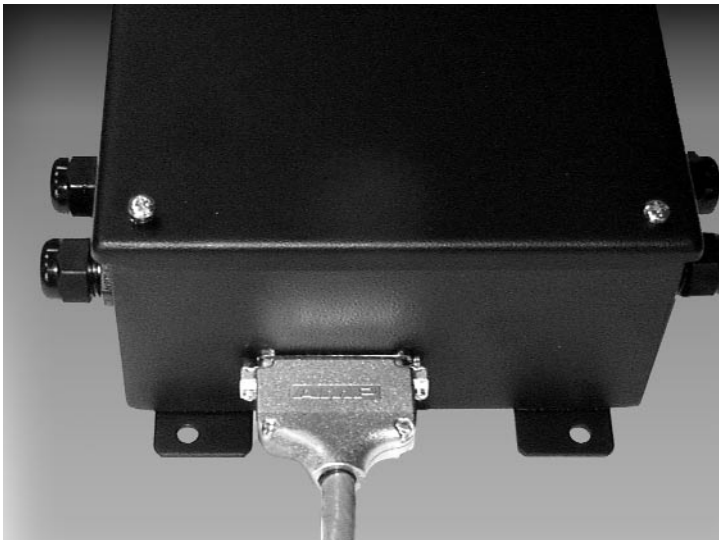


Fig. 8

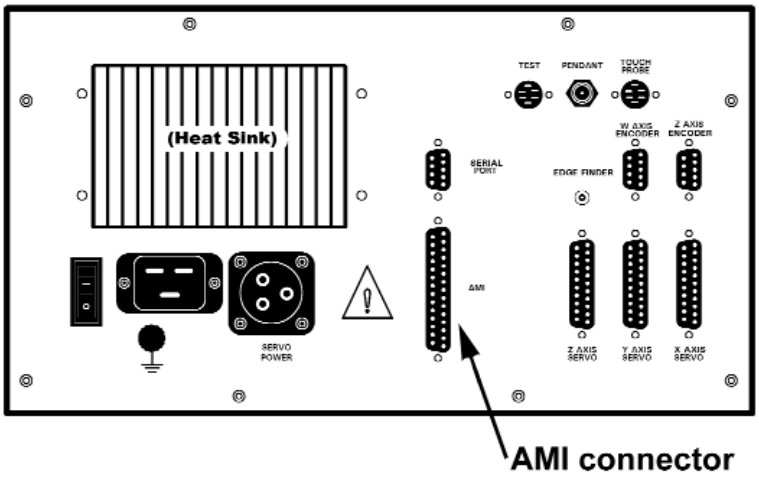

(Heat Sink)
TEST
PENDANT
TOUCH PROBE
W AXIS ENCODER
Z AXIS ENCODER
SERIAL PORT
EDGE FINDER
AMI
SERVO POWER
Z AXIS SERVO
Y AXIS SERVO
X AXIS SERVO
AMI connector

Fig. 9

General Wiring Procedure

The steps below explain the general procedure for wiring any device to the connections on the AMI.

Refer to **Figure 1** (page 4) for the location of each AMI and Emergency Stop (E-Stop) input and output connection. Also refer to the **AMI System Overview** section for common applications and descriptions of each connection.

> ⚠ **All wiring should be performed by a qualified electrician.**

- Check that the **MILL*PWR*** system is powered down and disconnected from its power source. Check that there is no power to the AMI.
- Remove the cover from the AMI.
- Insert a 0.17" to 0.47" diameter cable (with 24 -16 AWG maximum wires) through the liquid tight strain relief that's nearest the connector you are planning to use (refer to **Figure 10**).
- Tighten the strain relief until the cable is securely in place.
- Cut the cable to length, then strip approximately 3/8" insulation from the end of each wire.
- Loosen the appropriate connector screws, then insert the wires into the connectors (refer to **Figure 11**).
- Tighten the screws. Ensure the wire has been adequately clamped by applying a slight "tug".
- After all of the wires are properly connected, reinstall the AMI cover and insert rubber plugs into the unused holes.

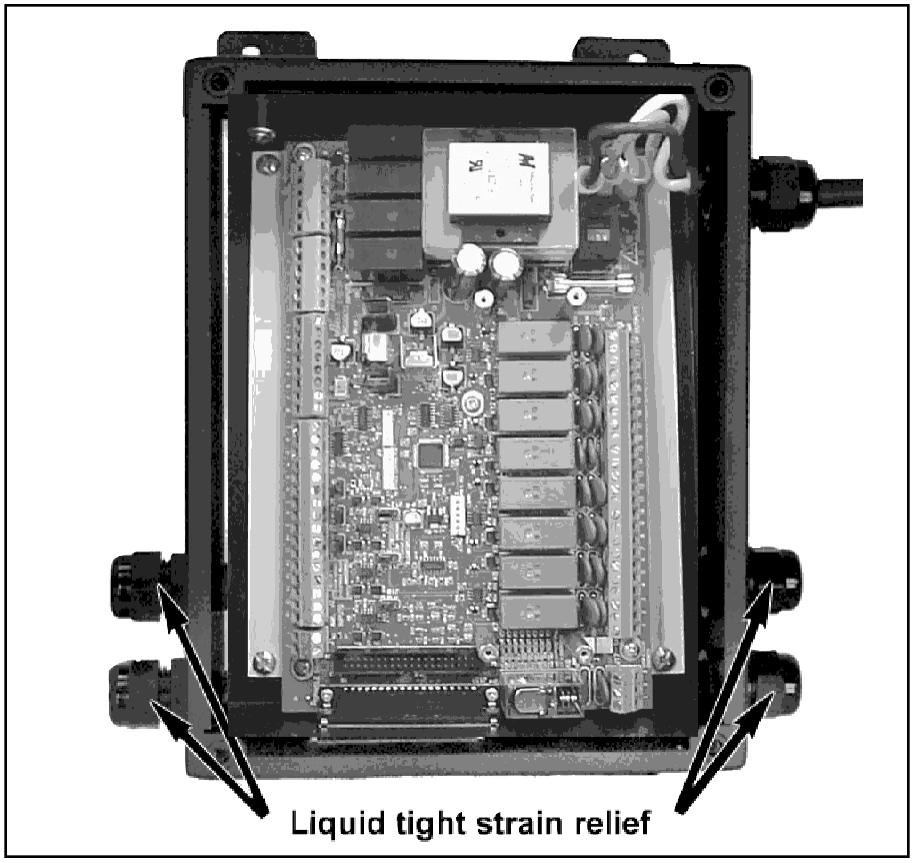


Fig. 10

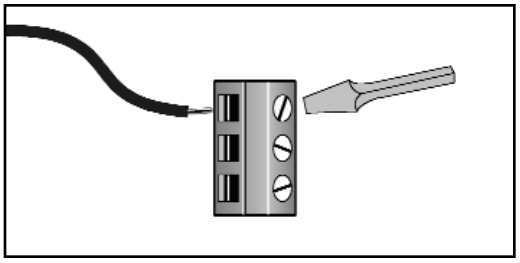


Fig. 11

Connecting to a Power Source

The AMI's electrical specifications determine which power source should be used. If the AMI is set to run at 115V, it can easily be incorporated into the **MILL*PWR*** servo motor power loop. AMIs that are set up for 230V must be connected directly into an existing electrical circuit using a cable with wires that are 24 -16AWG(max.). **Carefully follow the instructions for the type of AMI you are installing.**

> ⚠ **All wiring should be performed by a qualified electrician.**

115V AMI systems:

- Check that the **MILL*PWR*** system is powered down and disconnected from its power source.
- Locate the *last* motor assembly in the series of motors connected to the **MILL*PWR*** system.
- Connect the AMI power cable (it should already be attached to the AMI) to the last motor assembly's AC connector (refer to **Figure 12**).
- Twist the black plastic connector clockwise one-half (1/2) turn (You should feel the connectors "click").
- Check that:
  1) The AMI power cable and interface cable are both properly connected.
  2) The voltage selector switch is set at 115V.
  3) The correct fuse is installed (refer to **Electrical Specifications**).

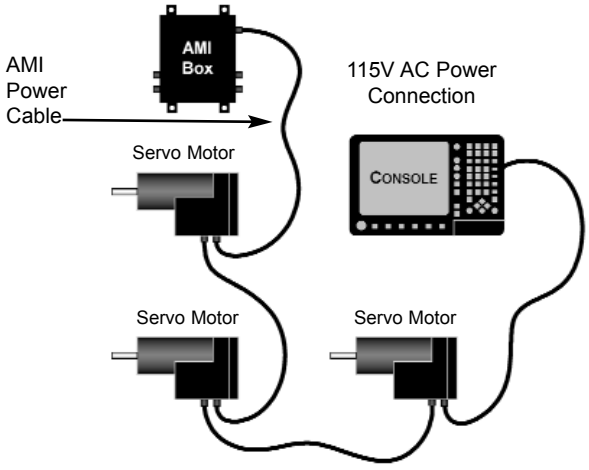


Fig. 12

- After all of the inputs/outputs have been properly wired, power up the **MILL*PWR*** system.

230V AMI systems (via the J16 connector):

- Check the **MILL*PWR*** system is powered down and disconnected from its power source. Check that there is no power to the AMI.

- Remove the cover from the AMI.

- Insert a 0.17” to 0.47” diameter cable (with 24-16 AWG maximum wires) through the liquid tight strain relief that’s nearest the power connector.

> ⚠ **All wiring should be performed by a qualified electrician.**

- Tighten the strain relief until the cable is securely in place.

- Cut the cable to length, then remove approximately 3/8” insulation from the end of each wire.

- Insert the proper wire into the line, ground and neutral inputs on the J16 connector (refer to **Figure 13**). Tighten the adjacent screws until each wire is securely in place.

- Check that:

  1) The AMI power cable and interface cable are both properly connected.
  2) The voltage selector switch is set at 230V.
  3) The correct fuse is installed (refer to **Electrical Specifications** located at the end of this manual).

- Reinstall the cover onto the AMI. Insert rubber plugs into the unused holes.

- After all of the inputs/outputs have been properly wired, power up the **MILL*PWR*** system.

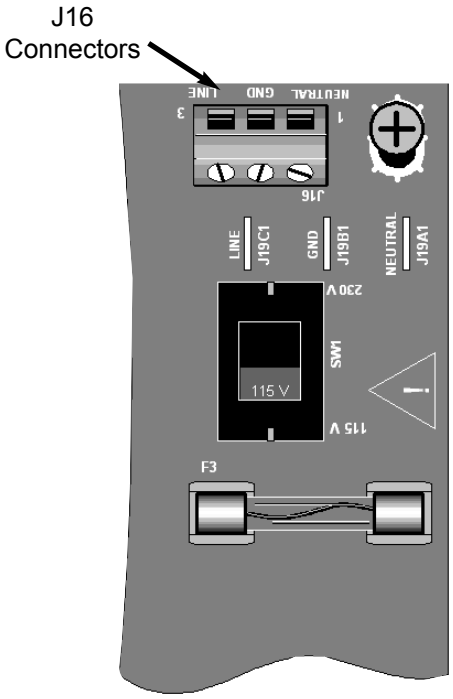

J16
Connectors
LINE
GND
NEUTRAL
3
1
J16
LINE
J19C1
GND
J19B1
NEUTRAL
J19A1
230 V
SW1
115 V
115 V
F3

Fig. 13

AMI Operation

Programming Auxiliary Output Devices Wired to J18 (Aux 1-4)

Devices that are connected to pins 1 through 12 of the AMI's J18 output connector can be controlled from within any **MILL*PWR*** part program. Simply insert an auxiliary function step at each point in the program where you want the appropriate device to turn on, off or pulse.

When **MILL*PWR*** reaches an auxiliary function step, an Operator Intervention Message (OIM) will appear. The OIM will display the status for each device. Press the **GO** key to activate the relays and continue running the program.

Pausing the program won't affect the auxiliary functions. Each device will continue to run normally; however, **MILL*PWR*** will shut off all of the relays automatically when the program ends. To shut off a device earlier in the program, insert another auxiliary step with the appropriate relay turned "off."

Devices programmed to switch "on" will run continuously as you machine; devices set to "pulse" will run for the length of time that you define.

Modes of Operation

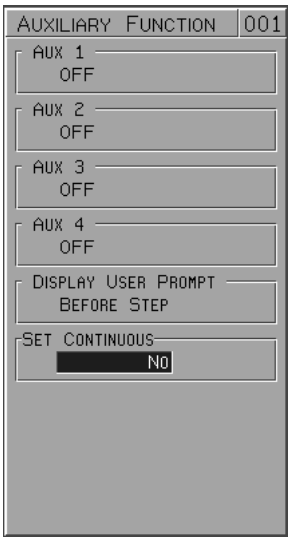
Using Auxiliaries 1-4

- First, check that each device is connected to the Auxiliary outputs (1-4) of J18, located on the AMI.

- From the PGM screen, highlight a step within the program where you want to add or insert an auxiliary function step.

- Press the MORE STEPS softkey.

- Press the MORE STEPS softkey two more times.
- Press the AUXILIARY FUNCTIONS softkey.
- Highlight the auxiliary relay(s) that you want to program. (The "AUX" numbers in each field correspond with the number on the AMI.) Select from the OFF, ON, and PULSED softkeys for each.



ON **The AMI output contacts will switch to an energized state.**

OFF **The AMI output contacts will switch to their default (de-energized) states.**

PULSED **The AMI output contacts will switch to an energized state for the length of time that you define.**

Display User Prompt **The AMI allows the operator, if desired, to pause the step before or after the relays are turned on or off.**

- If you selected PULSED, then enter the amount of time (in seconds or tenths of seconds) that you want the relay to remain on. The maximum amount of time that a relay can pulse is 999.9 seconds.

Note: **Pulse mode must time out before the steps of the program can continue.**

- Set the Display User Prompt for the step to pause before or after by pressing either the BEFORE STEP, AFTER STEP. If you choose not to include a pause, press the NO softkey.

Note: **The auxiliary function relays will not turn off automatically during an Operator Intervention Message (OIM).**

- Pressing YES for the Set Continuous field allows an Auxiliary Function Step to be entered (e.g. activate coolant) without interrupting the continuous milling path.
- Press the **USE** key.

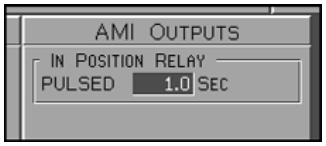
G-code Programs

When using a G-code program that requires coolant commands, certain outputs are configured to specific commands (M7, M8, M9). The following rules apply while running G-code programs:

1) M7 command turns on the Aux 1 as the coolant flood relay.
2) M8 command turns on Aux 2 as the coolant mist relay.
3) M9 turns off both Auxs 1 and 2.
4) Only one output, Aux 1 or Aux 2, is permitted to be on at a time.
5) These outputs will be turned On and Off as defined in the G-code program.
6) Auxiliary outputs 3 and 4 are not used and are always off.

Using the In-Position Relay

- Press the **SETUP** key.
- From the Installation Setup menu, cursor down to the AMI Outputs field and press the **ENTER** key.



- Along the bottom of the screen the OFF, ON and PULSED softkeys will also appear.

  If ON is selected, the output will be asserted when the desired X/Y position is reached and will remain on until the X and Y positions have moved out of position.

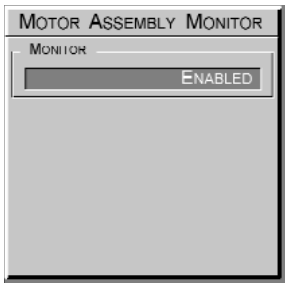
  If PULSED is selected, the desired pulse time must be entered in seconds. (Time may be entered to tenths of a second.) The In-Position relay will remain energized when in position and will be de-energized when the programmed time has elapsed or program step execution is completed or aborted.

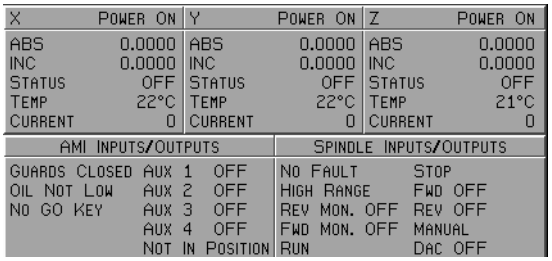
- To save an In-Position configuration, press the USE or the USE NEW SETTINGS softkey.

Note: **Check that the devices you are using are powered on before running the program.**

Motor Assembly Monitor

When the motor assembly monitor is enabled, it shows the real-time operating status of each axis and the AMI on the DRO screen. Use it to verify the status of all AMI inputs and outputs.





Top Bar (Power Status) Reports on the AC power status (On or Off); also reports system failures and emergency stop conditions when they occur.

INC Displays the table's incremental position (its position relative to incremental zero).

ABS Displays the table's absolute position (its position relative to datum).

Status Reports on each motor's operating status (On, Off, Not Present or Fault).

Temp Shows the internal air temperature for each motor. Temperatures should not exceed 75° C.

Current Monitors the DC motor current voltage. An "X" after the value indicates that the voltage inrush bypass circuit is active. It can also be seen when the E-Stop button is pressed and then released. The "X" should disappear within 2 - 3 seconds after the system is powered up.

Guards Closed	Safety feature that will alter the activity of certain program functions when they are open.
Oil Not Low	Safety feature that will, under certain conditions, stop program functions when the lubrication pump supply reaches a certain minimum level of oil.
No Go Key	Provides a switch input that can be used in place of the operator pressing the **GO** key or the remote Stop/Go switch.

To enable or disable the motor assembly monitor:

- From the Job Setup screen, select Installation Setup and press **ENTER**, enter the passcode. Select the Diagnostics screen and press **ENTER** again.
- From the Diagnostics screen, highlight Motor Assembly Monitor and press **ENTER**.
- Press either the ENABLED or DISABLED softkey. (If the ENABLED softkey is selected, the Motor Assembly Monitor display will appear on the DRO screen.)
- Press the **USE** key.
- Continue with Diagnostics or press the USE NEW SETTINGS softkey.

AMI Troubleshooting Guide

This troubleshooting guide is arranged in three columns—**Symptom**, **Probable Cause** and **Recommended Corrective Action**. Begin by locating the symptom and probable cause that best matches the problem you are experiencing, then follow the directions for each corrective action.

If the suggestions herein do not solve the problem, contact ACU-RITE for repair and/or replacement procedures.

Symptom	Probable Cause	Recommended Corrective Action
No operation or improper operation	No power or incorrect voltage to AMI	Check that the AMI is wired at the correct voltage. Also ensure that the power cables for the motors are properly daisy-chained to the **MILL*PWR*** operator console (refer to **Connecting to a Power Source**, page 20).
	Loose interface cable	Check that the cable is properly connected to **MILL*PWR*** and that the screws are secure.
	Ribbon connector to J14 is loose (European AMIs only)	Check the connection. Tighten or reconnect it as needed.
	Incorrect voltage setting	Verify that the voltage selector switch is set correctly—at 115 for 115 volt operation; at 220 for 220 volt operation.

Symptom	Probable Cause	Recommended Corrective Action
No operation or improper operation *(cont'd)*	F3 fuse is loose	Check that the F3 fuse is securely in place.
	F3 fuse is blown	Replace the F3 fuse with one that's appropriate for the AMI operation (refer to **Electrical Specifications**).
	Improper wiring	Ensure stripped end of the wire is adequately crimped by the terminal on the board (vs. insulation being crimped).
External emergency stop button does not work	Improper voltage	If circuit is wired using external power, ensure 120VAC (+/- 10%) is being used.
	F1 fuse is blown	Contact ACU-RITE for repair procedure.

Symptom	Probable Cause	Recommended Corrective Action
Emergency stop message is constantly displayed on **MILL*PWR*** operator console.	No External E-Stop is wired to the J4 connector, or it may be done so incorrectly.	This input must be configured. Either connect an external emergency stop switch to J4, or use a wire jumper to defeat it.
Machine guards and low oil messages are reversed	Improper wiring	Check the wiring to the AMI's J2 connector. The machine guard switch should be wired to pins 1 and 2, and the auto lube system should be wired to pins 3 and 4 (refer to **Input Devices (J2)**).
Table limit switches do not work	Improper wiring	Verify that the wires are connected to pins 5 and 6 on the AMI's J4 connector (refer to **Emergency Stop Inputs**).

Symptom	Probable Cause	Recommended Corrective Action
Table limit switches do not work *(cont'd)*	Improper wiring *(cont'd)*	Ensure that all of the table limit switches are normally closed and wired in series. If more than one table limit switch exists, verify that they are "normally closed" and wired in series.
"External E-Stop" and "Table Limits" messages are reversed	Incorrect wiring	Verify that the proper wires are connected to pins 5 and 6 on the J4 connector (refer to **Emergency Stop Inputs**).
No response to oil or guard switches	Loose interface cable	Check that the interface cable is properly connected to **MILL*PWR*** and that the screws are secure.
	Improper wiring	Check that the switches are properly wired to the J2 connector. The machine guard switch should be wired to pins 1 and 2, and the auto lube system should be wired to pins 3 and 4 (refer to **Input Devices (J2)**).

Symptom	Probable Cause	Recommended Corrective Action
No response to oil or guards switches *(cont'd)*	Improper wiring *(cont'd)*	Ensure that all of the wires are secure beneath the screw(s) on the J2 connector. Disconnect power to **MILL*PWR*** and the AMI. Completely loosen each screw on the connector. One by one, reinsert each wire into the connector, under the body of the screw. Tightening each screw as you do so.
Output devices not responding/not responding properly	AMI is not receiving power.	Check that the AMI is receiving power (also refer to probable causes and corrective actions under "No operation or improper operation," page 29).

Symptom	Probable Cause	Recommended Corrective Action
Output devices not responding/not responding properly *(cont'd)*	Improper wiring	Compare the wiring to the "normally closed" and "normally open" contacts for that connector, as described in the manual. Rewire as needed.
	One or more wires not secure in the J2 connector	Each wire must be secured under the corresponding screw. Disconnect power to **MILL*PWR*** and the AMI. Completely loosen each screw on the connector. Reinsert each wire one by one, retightening each screw as you do so.
	Output not functioning correctly	Check the auxiliary function steps within the program and verify that the information in each step is correct.

Electrical Specifications

The installation location must be able to support the AMI operating and electrical requirements listed below.

Characteristic	Specification
Operating conditions	0° to 40° C (32° to 104° F) 25% to 85% relative humidity (non-condensing)
Storage conditions	-20° to 60° C (-4° to 140° F) 25% to 95% relative humidity (non-condensing)
Input requirements:	
Voltage	115VAC ±10% 230VAC ±10%
Frequency	47-63Hz
Current	124mA (max.) @ 115VAC 62mA (max.) @ 230VAC
Fuse	200mA, 3AG, 250V SLO-BLO @ 115VAC 100mA, 3AG, 250V SLO-BLO @ 230VAC
AMI output relay contact ratings (J18)	4 Amps max. @ 230V AC
E-Stop Output ratings (J17)	14 Amps max. @ 230V AC
SCI Contact Specifications (J1, J2 & J5)	0.5 Amps max @ 125V AC
Compatibility	Compatible with ACU-RITE® **MILL*PWR*®** systems software versions 2.1.2 and 3.1.2 or later
FCC compliance	Part 15 of FCC rules for a class A computing device

ACU-RITE IS AN
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