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Section 1

1A-HHT62 INSTRUCTIONS FOR OPENCNC INTEGRATION:

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BEFORE THE .exe FILE CAN BE COMPILED. . .

This file is provided as a guide for the OpenCNC integrator on how to install the 1A-HHT Hand Held Terminal and its associated controller program.

We require that all software is pre-registered. Please provide the following information to the S3 application engineer. . .

- 1) End user company name:
- 2) End user full address:
- 3) Machine Description:
- 4) Machine Serial Number:
- 5) Machine ID# that will be used in the .ost, shortcut, and SEV config files:

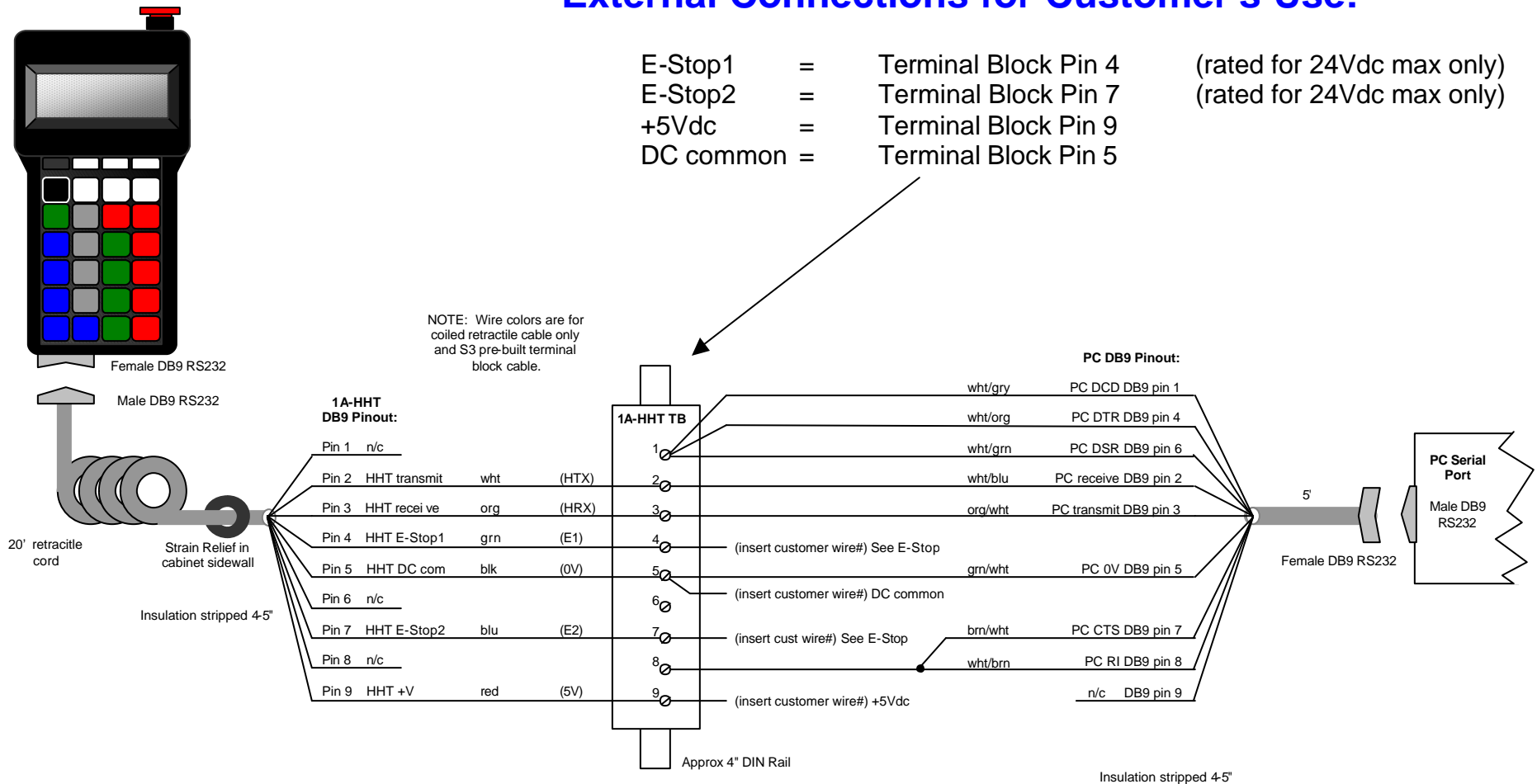
When the above info has been filled in, save it, and send this file back to the S3 application engineer. Your exe file will be compiled and sent to you.

WIRING DIAGRAM

(not viewable in 'text only' type doc)

External Connections for Customer's Use:

- E-Stop1 = Terminal Block Pin 4 (rated for 24Vdc max only)
- E-Stop2 = Terminal Block Pin 7 (rated for 24Vdc max only)
- +5Vdc = Terminal Block Pin 9
- DC common = Terminal Block Pin 5



AFTER YOU RECEIVE THE .exe FILE AND OTHER RUNTIME FILES. . .

If an install shield is provided, simply run that setup file. . OR ELSE. .

Create a new directory as c:\Program Files\1A-HHT62\
Copy the runtime files into this new directory.

In your .men file add a line to run the HHT following this example format. . .

0:HHT:"C:\Program Files\1A-HHT62\1A-HHT62.exe":mid=4533 jsid=0

** NOTE: Make sure to change the mid value to the correct Machine ID instead of 4533 shown above!

WHAT THE 1A-HHT UNIT & PROGRAM DOES:

The 1A-HHT unit communicates over a standard RS-232 serial port for both sending (for key presses) and receiving (for LCD display and LED's). The 1A-HHT62 program manages the serial port, monitors OpenCNC variables, changes OpenCNC variables on the fly and sends commands to the message application. The 1A-HHT62 program works in a very similar manner to the gen screen program.

Upon starting OpenCNC, the 1A-HHT62 program reads OpenCNC variables to obtain information about which axes are present with valid settings, and which axes are rotaries.

Communication between the 1A-HHT unit and the 1A-HHT62 program is not important in reference to machine integration, and therefore is not detailed here. The outline below regards how the 1A-HHT62 program talks to OpenCNC. Note: This assumes that the serial port, 1A-HHT hardware, and OpenCNC connection, are all working properly as well as the HHT On/Off state is ON.

Key Press Effect on OpenCNC

HHT On/Off If HHT is ON and HHT is in any active jog mode, then axJogRate[0-9] are set to 0.
 If HHT is ON and plcJogType = 5, then plcJogType set to 0

Option Stop If mOptionalStop = 0, then set to 1. Otherwise (including value of 2) mOptionalStop set to 0.

Block Delete Toggles mBlockDeleteReq

EndBlk Stop Toggles mSingleBlockOn

Cycle Start Sends a command to the message application:
 3,3
 (DIOM_USER, DIOU_CYCLESTART)

Aux 1 Sends a command to the message application:
 3, 61
 (DIOM_USER, 61)

Cycle Stop Sends a command to the message application:
 3, 60
 (DIOM_USER, 60)

Feed Hold Sends a command to the message application:
 3, 4
 (DIOM_USER, DIOU_FEEDHOLD)

Axis Select Toggles thru the available axes and updates hhtActiveAxis

Aux 2 Sends a command to the message application:
 3, 62
 (DIOM_USER, 62)

FRO Incr If jsPctFeedOvRide[0] < 200 then adds 5 to jsPctFeedOvRide

- FRO Zero Sets jsPctFeedOvRide[0] to 0
- Jog + If in JOG:Cont, repeatedly sets hhtOutMdsiJog to 1 while button held. When released, sets hhtOutMdsiJog to 0 and axJogRate[0-9] to 0.
- If in JOG:Incr, then sends a command to the message application:
 2, 3, 2, activeAxis
 (DIOM_SYSTEM, DIOS_JOG, plus direction, activeAxis)
- Aux 3 Sends a command to the message application:
 3, 63
 (DIOM_USER, 63)
- RpdOv Incr If mPctRapidOvRide < 100 then adds 5 to mPctRapidOvRide
- RpdOv Zero Sets mPctRapidOvRide to 0
- Jog - If in JOG:Cont, repeatedly sets hhtOutMdsiJog to 2 while button held. When released, sets hhtOutMdsiJog to 0 and axJogRate[0-9] to 0.
- If in JOG:Incr, then sends a command to the message application:
 2, 3, 3, activeAxis
 (DIOM_SYSTEM, DIOS_JOG, minus direction, activeAxis)
- Aux 4 Sends a command to the message application:
 3, 64
 (DIOM_USER, 64)
- JogOv Incr If mPctJogOvRide < 100 then adds 5 to mPctJogOvRide
- JogOv Zero Sets mPctJogOvRide to 0
- Jog Select Sets hhtActiveAxis, axJogRate[0-9] to 0.
 If (plcJogType = 0 or 5), and (mRunMode = 0) and (not DIOR_SYNC) and (dioEnergizeState = 1) then:

When in JOG:Off, sends a command to the message application:

2,8,0

(DIOM_SYSTEM, SEQCALCRESET, job stream)

and sets plcJogDist to 0.

When in JOG:Cont, sends a command to the message application:

2,8,0

(DIOM_SYSTEM, SEQCALCRESET, job stream)

When in JOG:Incr, sends a command to the message application:

2,8,0

(DIOM_SYSTEM, SEQCALCRESET, job stream)

Jog Res When in JOG:Cont, sets hhtContJogRate to 10

When in JOG:Incr and rotary axis active, toggles plcJogAngle value

When in JOG:Incr and linear metric axis active, toggles plcJogDist value in metric

When in JOG:Incr and linear inch axis active, toggles plcJogDist value in inches

SpnOv Incr If spPctOvRide < 100 then adds 5 to spPctOvRide

SpnOv Decr If spPctOvRide > then subtracts 5 from spPctOvRide

USAGE IN THE ISAGRAF DIO APPLICATION:

(NOTE: See the Maintenance Viewer Section for instructions on setting the COM Port)

We have provided sample logic for the HHT continuous jog mode. When using the installation wizard, it is saved as c:\Program Files\1A-HHT62\dioHHT62.pia , as an Isagraf archive file. It includes the hhtJog SFC program, plus the following variables:

hhtActiveAxis Integer Variable
hhtContJogRate Integer Variable
hhtKeyRepeatInt Integer Variable
hhtKeyRepeatTmr Timer Variable
hhtOutMdsiJog Integer Variable

You will need to change your dio logic by:

- 1) Adding the hhtJog SFC to your logic as a child of the RESET SFC
- 2) Adding the Gstart(hhtJog) and Gkill(hhtJog) commands in your RESET SFC
- 3) Adding the above variables to your dictionary

NOTE: All of the above changes can be cut & pasted from the dioHHT62.pia file that we have provided.

OTHER POSSIBLE BUGS: (depending on the configuration of your logic when starting)

ISAGRAF: You may have to add the OpenCNC integer **plcJogType** to the dictionary, if not already there.

GEN SCREEN: If the following lines are not already present, then you will have to add them to your .gen screen under the jog button text.

```
plcJogType, 5, " H H T", jogTypeText;
```

GEN SCREEN: If you are using the old variable for feed override **mPctFeedOvRide** then you must replace it with the new name **jsPctFeedOvRide[0]**.

You will need to review your logic to guarantee the safe operation of the machine. The HHT unit never sends a axJogRate[#] (other than a value of 0) to OpenCNC, but instead only sends changes to hhtOutMdsiJog and hhtActiveAxis and hhtContJogRate. Your Isagraf dio project must then command the machine to move **ONLY WHEN IT IS SAFE TO DO SO**. Your Isagraf dio project must also time out during continuous jogs if no concurrent jog commands are received from the HHT within 250ms(or less). This is an important safeguard in the event that the HHT is disconnected during a continuous jog.

NOTE: Any active HHT jog mode will be immediately shut off if plcJogType is changed from 5 to any other value. Bear this in mind when other areas of the PLC need to shut off a jog mode. Just set plcJogType = 0.

USAGE IN THE ISAGRAF MSG APPLICATION:

For some applications, there are no changes REQUIRED in the message application. However, if you wish to use the Cycle Stop, Aux 1, Aux 2, Aux 3, or Aux 4 keys, then the following text can be cut & pasted near the bottom of the diomUSER ST program as a starting point:

(* START OF 1A-HHT LOGIC *)

60: (* 1A-HHT Hand Held Terminal - CYCLE STOP key press *)

 If genCycleOn AND (NOT DIOR_SOFTSTOP) Then

 DIOR_SOFTSTOP := True;

 z := msgPutSt('INFO: Cycle Stop Requested by Operator on HHT');

 End_if;

61: (* 1A-HHT Hand Held Terminal - Aux 1 key press *)

 z := msgPutSt('ERROR: Hand Held Terminal Aux 1 key is not used');

62: (* 1A-HHT Hand Held Terminal - Aux 2 key press *)

 z := msgPutSt('ERROR: Hand Held Terminal Aux 2 key is not used');

63: (* 1A-HHT Hand Held Terminal - Aux 3 key press *)

 z := msgPutSt('ERROR: Hand Held Terminal Aux 3 key is not used');

64: (* 1A-HHT Hand Held Terminal - Aux 4 key press *)

 z := msgPutSt('ERROR: Hand Held Terminal Aux 4 key is not used');

(* END OF 1A-HHT LOGIC *)

Section 2

1A-HHT62 MAINTENANCE VIEWER

The Maintenance viewer provides a way to setup the COM Port to be used by the hand held terminal and test the COM Port to make sure that the HHT is communicating properly with the PC. This should be done prior to trying to connect to OpenCNC.

To open this program click on:

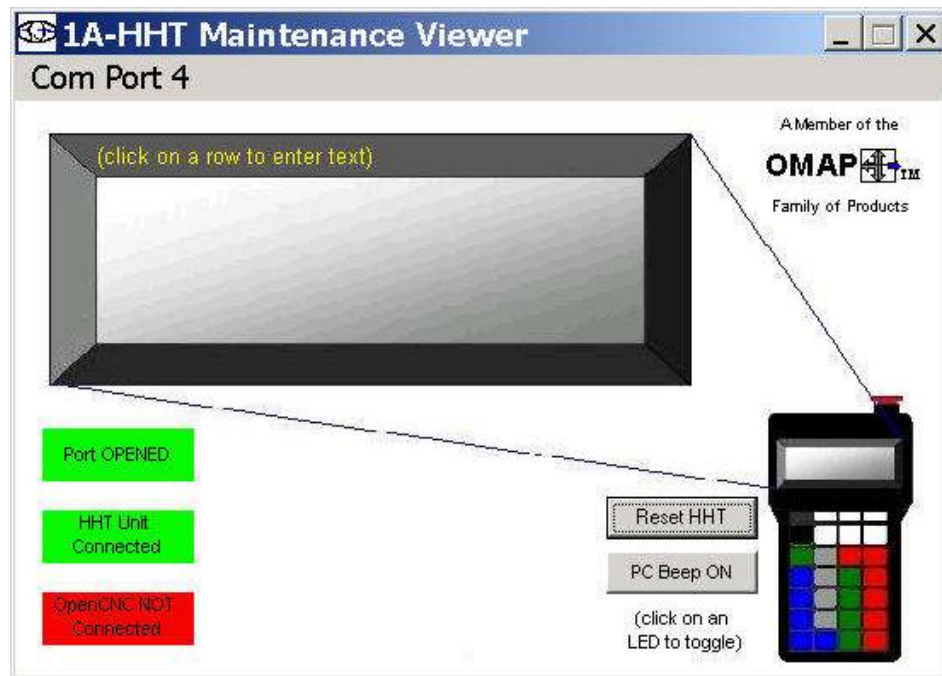
Start button

Programs

1A-HHT62 Hand Held Terminal

1A-HHT62 Maintenance Viewer

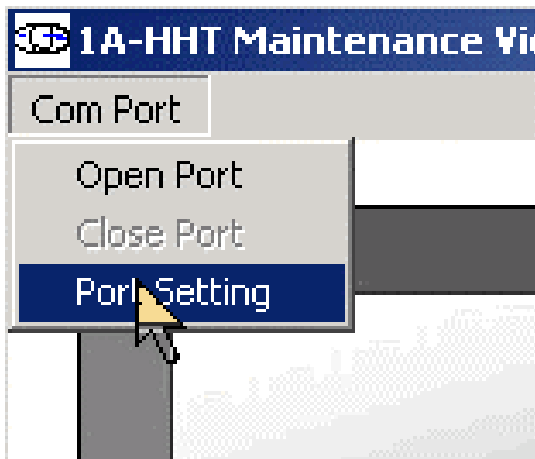
The program screen below should come up on the screen.



If this program is being run for the first time there may be some error messages that pop up in the screen. Just click Ok and the program should come up on the screen.

Click on Com Port

Port Setting to set up the serial port



Select the Com Port you wish to use and click OK.

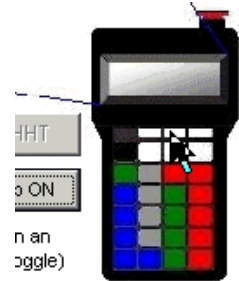
Next click on Com Port again and then click on Open Port. This should connect to the 1A-HHT62 hardware. The red box that said Port Closed should now be green and say Port Open. The red box that said HHT Unit Not Connected should be green and say HHT Unit connected. If this does not happen check to see if the HHT is connected to the right serial port and all associated wiring is correct.

NOTE: If a new user is created in windows after the Com Port is selected and opened, this step will have to be repeated the first time the the Maintenance Viewer of OpenCNC is run.

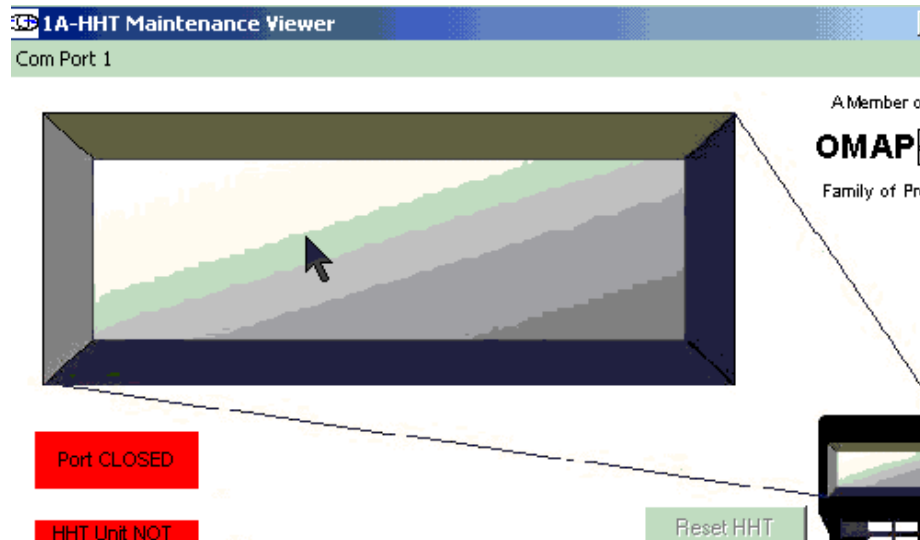
Testing the 1A-HHT62

The Maintenance Viewer will also check that the HHT is communicating correctly.

Pressing a key on the HHT will cause the Key to light up on the Maintenance Viewer screen. Clicking on one of the LED's on the Maintenance Viewer HHT picture will cause the corresponding LED to light up on the HHT.



Clicking on the Maintenance Viewer LCD display will let you type a line that will be echoed on the HHT.



If OpenCNC is running the red OpenCNC Not Connected tab will turn green and say that it is connected to OpenCNC. This will only flash on the screen, and then the Maintenance Viewer will be hidden for normal operation.

The Reset HHT button will cause the HHT to reset itself.

The PC Beep On/Off tab will toggle a PC beep on and off, this will not work if the PC does not have a internal speaker. If it is on the PC will beep every time a key is pressed on the HHT.

Section 3

1A-HHT62 OPERATOR MANUAL

The 1A-HHT62 consists of an LCD Screen for displaying Axis position for a selected Axis, Axis Jog Type and Jog Resolution and override settings. A Keypad for entering commands and an E-Stop Push Button.



There are also five LED's, four across the top and one in the Jog Select button to indicate that the corresponding functions are turned on.

Push Button Functions

The keypad has 24 keys (or push buttons) and an Emergency Stop push button on top of the HHT.

The **E-Stop button** will put the machine into an E-Stop condition if pressed. This button is a maintained push button & will need to be manually reset by turning the button if it is pressed.

The **HHT On/Off button** toggles the HHT on and off. The HHT needs to be on to be used, the LED above this button will light up to indicate the HHT is turned on.

The **Option Stop button** turns on the Option Stop function on the control, the LED above this button will light up indicating that the Option Stop function of the control is active.

The **Block Delete button** turns the Block Delete function on the control, the LED above this button will light up indicating that the Block Delete function of the control is active.

The **EndBlk Stop button** turns the End of Block Stop (or Single Block Stop) function on the control, the LED above this button will light up indicating that the End of Block Stop function of the control is active.

The **Cycle Start button** sends a Cycle Start command to the control.

The **Cycle Stop button** sends a Cycle Stop command to the control.

The **Feed Hold button** sends a feed hold command to the control placing the machine in feed hold.

The **FRO Incr button** increments the feed rate override in the positive direction 5% at a time.

The **FRO Zero button** sets the feed rate override to zero.

The **RpdOv Incr button** increments the rapid override in the positive direction 5% at a time.

The **RpdOv Zero button** sets the rapid override to zero.

The **JogOv Incr button** increments the jog override in the positive direction 5% at a time.

The **JogOv Zero button** sets the jog rate override to zero.

The **SpnOv Incr button** increments the spindle speed override in the positive direction 5% at a time.

The **SpnOv Decr button** decrements the spindle speed override in the negative direction 5% at a time.

The **Axis Select button** selects the axis to jog, this is also the axis that will have its position displayed on the LCD display. Pressing this button repeatedly will toggle through all of the machines axes.

The **Jog Select button** selects the axis jog type. This will either be Off, Continuous Jog or Incremental Jog. Pressing this button repeatedly will toggle through all of the jog functions. If either Continuous Jog or Incremental Jog are selected the LED in the upper right corner of the button will light up to indicate that a jog function is active.

The **Jog Res button** selects the jog resolution. If continuous jog is selected the jog resolutions will be Low, Medium and High. If incremental jog is selected it will toggle through the English increments if the machine is in English mode, Metric increments if the machine is in Metric mode or degrees if the selected axis is a rotary axis

The **Plus (+) button** will move the selected axis in the positive direction, if continuous jog is selected it will move the selected axis as long as the button is pressed. If incremental jog is selected it will move the selected axis in the positive direction one increment every time button is pushed.

The **Minus (-) button** will move the selected axis in the negative direction, if continuous jog is selected it will move the selected axis as long as the button is pressed. If incremental jog is selected it will move the selected axis in the negative direction one increment every time button is pushed.

There are also four auxiliary buttons **Aux 1**, **Aux 2**, **Aux 3** and **Aux 4**, the machine integrator programs these buttons and have no standard function.

Liquid Crystal Display (LCD) Functions

The LCD will display the selected axis and its position in Part Coordinates, Axis Jog Type and Resolution or if E-Stop is active, and the settings for feed rate override, rapid override, jog override and spindle speed override.

