I/O Panel

Advanced Users Manual

TigerStop®

fast and accurate...every time

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SAFETY FIRST!

IMPORTANT SAFETY INFORMATION. READ ALL WARNINGS BEFORE OPERATING THIS PRODUCT.

GENERAL WARNINGS

WARNING: Installation of your TigerStop® Product must be done by a person trained in the safe design and installation of automation products, and in the safe operation of power equipment. Ensure that such installation meets all legally required safety requirements and guidelines, and that proper guarding and safety devices are provided on all sides of the equipment to preclude unintended access during operation. Consult with and follow the recommendations of a qualified safety engineer.

WARNING: TigerStop® Products are components intended for use in conjunction with potentially dangerous machinery. The use of TigerStop® Products does not make other machinery safe. TigerStop® Products are not intended to substitute, in any manner, for safe operating practices in general, or for safety features present in other machines designed to make those machines as safe as possible. TIGERSTOP® PRODUCTS, IF USED OR INSTALLED IMPROPERLY, MAY CAUSE PERSONAL INJURY OR DEATH AND SHOULD ONLY BE OPERATED BY PERSONS TRAINED IN THEIR SAFE OPERATING PROCEDURES. Illustrations of TigerStop® Products in use do not show, and are not intended to show, all safety features and practices necessary for their safe operation.

INSTALLATION WARNINGS

WARNING: TigerStop® Products must be installed in accordance with all local, state, and federal regulations. Only personnel properly trained in the safe design and installation of automation machinery and related power equipment should install TigerStop® Products onto other equipment, to ensure a safe and proper work station. TigerStop® Products should not be operated without proper training, both in the operation of TigerStop® Products, and in the operation of related equipment.

IMPORTANT CAUTION:
The motor box (compartment) contains high voltage with potentially FATAL amperage. NEVER attempt any unauthorized actions inside the motor box.

INTERCONNECTS

WARNING: Using a TigerStop® interconnect does not relieve you of the responsibility for making sure that your saw or other tool has all the necessary safety equipment in place. All installations must meet all legally required safety requirements and guidelines. Installation and training should be done following the recommendations of a qualified safety engineer.

OPERATION

DANGER: This machine can start, move and stop automatically. Keep hands and loose clothing clear of moving parts while operating. Moving parts can crush and cut. When used with a saw or other cutting equipment, bodily injury and death may result if operated without safety guards on all machines. Do not operate with guards removed. Operators must wear adequate eye and ear protection.

IMPORTANT SAFETY INFORMATION. READ ALL WARNINGS BEFORE OPERATING THIS PRODUCT.

Warning! This machine can start, move and stop automatically. Keep hands and loose clothing clear of moving parts while operating. Moving parts can crush and cut.

Keep the work area clean and well-lighted to avoid accidental injury.

Do not use TigerStop® machines in a dangerous environment. Always install TigerStop® machines indoors and according to the installation instructions.

Do not use TigerStop® machines in damp or wet locations or in rain. These conditions may result in shock or electrocution.

Do not operate near flammable liquids or in gaseous or explosive atmospheres!

Wear proper apparel: no loose clothes, long hair, or jewelry which could get pulled into moving machinery or materials.

Wear proper personal protective equipment: non-slip footwear, safety glasses, ear protection, gloves, and a dust mask.

Do not use extension cords with TigerStop® machines.

Do not open motor compartment or controller. High voltage with potentially FATAL amperage present! Disconnect power before servicing. No user-serviceable parts inside.

DO NOT operate this or any machine under the influence of drugs or alcohol!

Only fully-qualified personnel should operate this machine.

Read the entire manual before operation of this machine.

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Overview

The I/O Panel is a device that is used to expand the number of inputs and outputs (I/O's) available on the TigerStop® system. Most of these inputs and outputs are intended for various TigerStop® add-ons and upgrades. However, there are a number of 'extra' I/O's that are available for custom use.

Intended Audience

This manual is intended for experienced machine integrators and controls engineers, only. This manual assumes the reader is familiar with basic DC circuit theory and controls communication methods. It will leave many points, obvious to an engineer, out of the text.

⚠ If you are not an integrator nor experienced controls engineer, please do not attempt to use the I/O Panel beyond its intended purposes. You risk damage to the machine, yourself, and others.

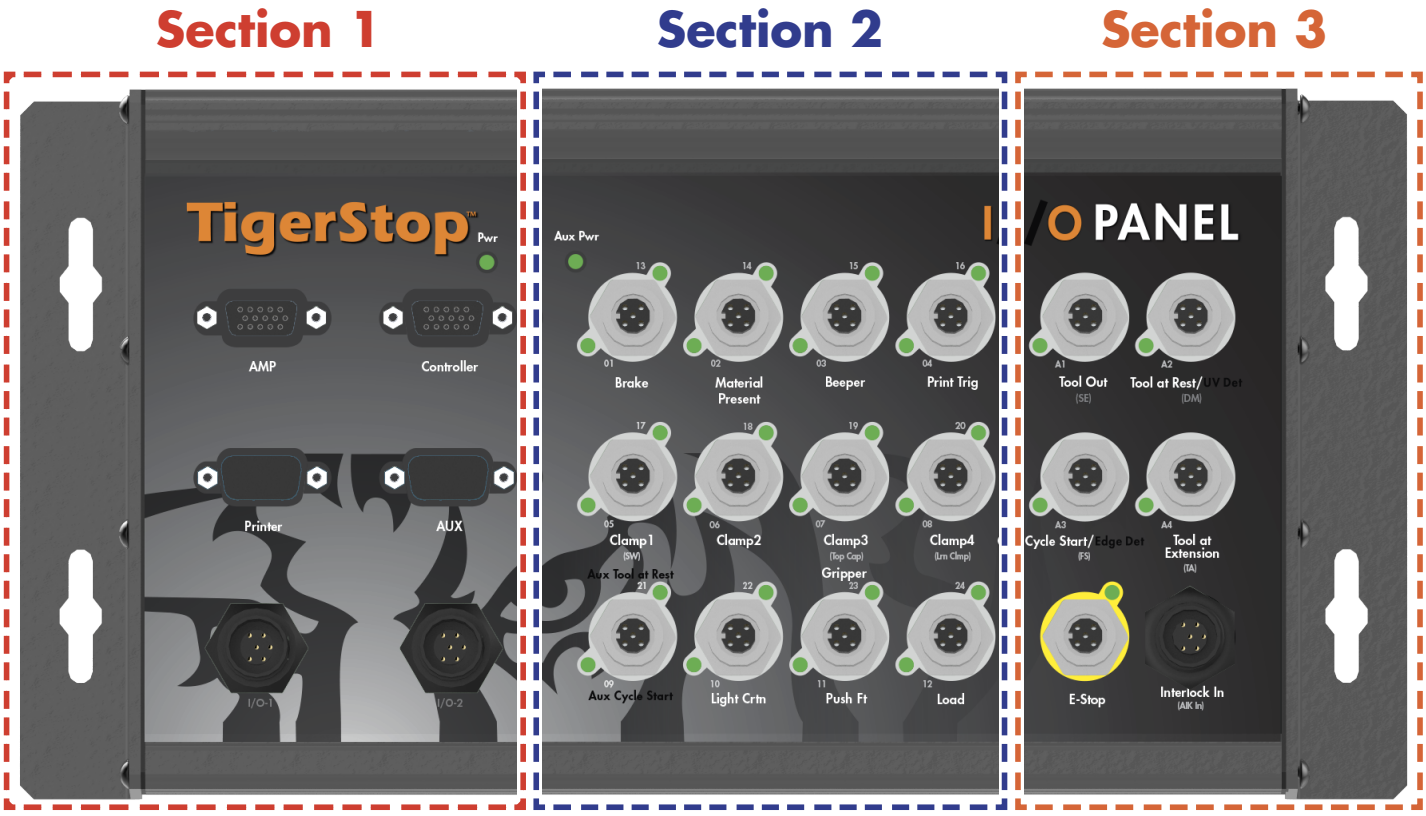
Anatomy of the I/O Panel

The I/O Panel is divided into 3 sections.

Section 1: I/O's used to connect the I/O panel to TigerStop® products and their various upgrade devices. Some I/O Panels have two round 8 pin connectors in section 1. These are for backwards compatibility for older TigerStop® systems. They are electrically connected to second section of M12 connectors. This section cannot be used by an integrator.

Section 2: Contains all of the available integration I/O's (via M12 connectors). There are 12 plugs, each with two I/O points. Depending on the TigerStop® system's configuration, some I/O's may be occupied.

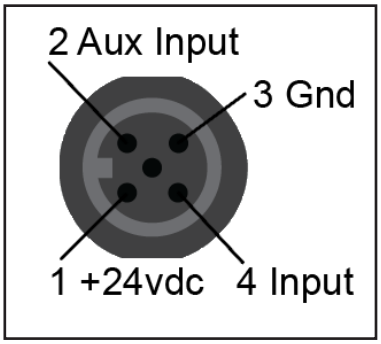
Section 3: I/O's intended for the Advanced Interconnect Kit. This section cannot be used by an integrator.



Wiring

I/O Points

Acess each I/O point via a 4-pin M12 connector. All I/O Panel inputs are sinking inputs. Never short voltage to an input. It is possible to independently configure the two I/O points of each M12 plug.



Power Budgeting

The amplifier delivers power to both the I/O Panel and the controller. By default, the amplifier supplies 24v DC @ 1 Amp. The controller takes 5 Watts and the I/O Panel takes 5 Watts. 14 Watts remain for your use.

Auxiliary +24v DC

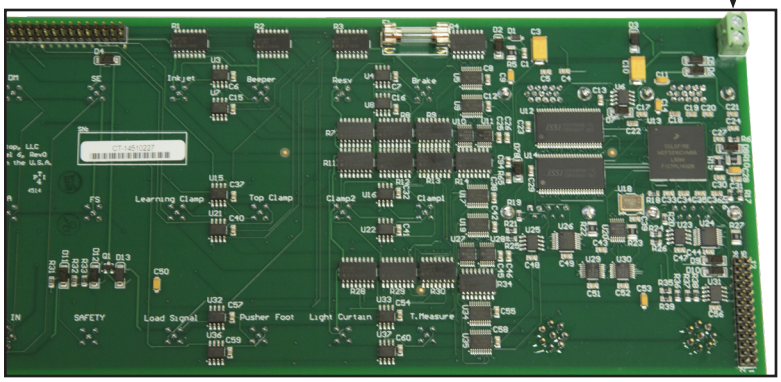
WARNING!

WARNING! Read all instructions before performing any parts installation! **NEVER** power up the system while the motor box or I/O Panel is open! **ALWAYS** lock out/tag out TigerStop® machinery before installing parts!

Connect an auxiliary power supply to the I/O panel if you have applications that exceed the amplifier's power supply. The auxillary supply powers the I/O points in section 2, only. Wiring an auxiliary +24v power supply requires you to remove the back of the I/O Panel and locate the auxiliary power input plug. The auxillary power input plug is mounted to the I/O Panel's circuit board. You will need to modify the I/O panel case to route cables.

1. Remove the fasteners from the sides of the I/O Panel and disconnect the side panels.

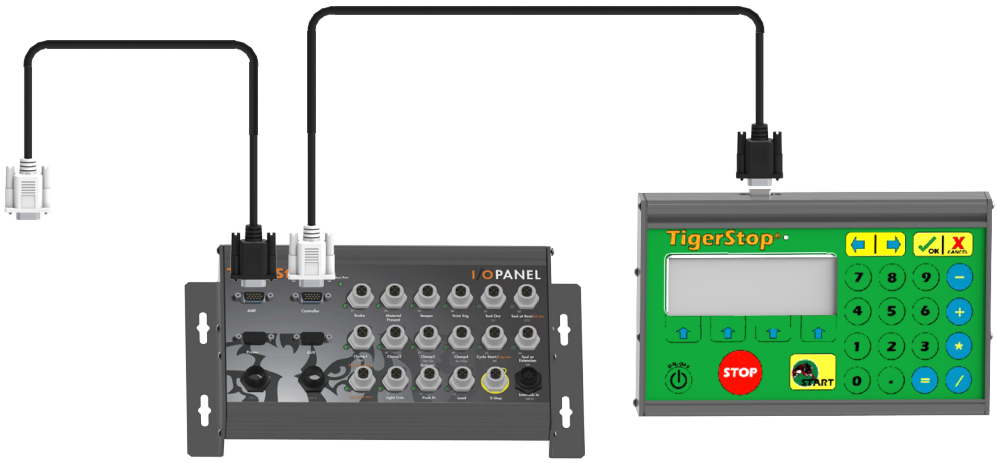
2. Slide the front and back of the I/O Panel apart.



3. Find the positive terminal of the auxiliary power input plug is labeled “P1+”.
4. Connect your auxiliary power supply, modify the case, as needed, and then close up the I/O Panel.

Connect I/O Panel to TigerStop®

The I/O Panel receives all its operating power from the TigerStop®. It is wired between the TigerStop® controller and the amplifier, using an extra TigerStop® controller cable. Connect the I/O Panel to TigerStop®.



Note: Connect the cables in the orientation shown in the picture. Connecting the controller cables backwards prevents the cable shielding from working properly.

Configurable I/O Points

Each I/O point on the I/O Panel is labeled with a small number. There are 24 configurable I/O points, some of which will not be available for use depending on TigerStop® system configuration. This table explains each I/O and its function, if it has a TigerStop® upgrade function.

I/O Number	I/O Point Function
01	**Brake** The brake output is used to control the brake system on a TigerRack. This output will close after TigerRack has come to a complete stop to lock the brake system. If you are not integrating with a TigerRack, then this I/O point is available for use.
02	**Aux Tool at Rest** The Auxiliary Tool at Rest input is used to connect the DM sensor from the Advanced Interconnect Kit, when using a TigerSaw system with UV Defect Detection. If you are not integrating to a TigerSaw system, then this bit is available for use.
03	**Beeper** Beeper is used with the TigerStop Non-contact Laser Defecting System. The Beeper input will briefly close 1, 2 or 3 times, depending on what the Non-contact Defecting System is doing. If you are not integrating with a TigerStop product that has Non-contact Laser Defecting, then this I/O point is available for use.
04	**Print Trig** Print Trig (short for Print Trigger) is an output used with any TigerStop product that uses an ink jet printing upgrade. The print trigger output will briefly close when TigerStop determines its time to print information while in a push feed or pattern parts list. This output may not be used for integration purposes.
05	**Clamp 1 (SW)** Clamp 1 (SW) is an output used for triggering in feed clamps or a swing clamp when running a full automatic pusher list with a TigerStop Advanced Interconnect Kit. This output will close when TigerStop stops at a cut location, but before the Advanced Interconnect triggers the tool cycle. The clamp output will open after the tool cycle, but before TigerStop moves to the next cut location. Clamp 1 will not close if the TigerStop pusher foot comes within the value of the Clamp 1 setting in the Part List Menu. Clamp 1 can also work in Swing Clamp mode by using the Swing Clamp setting in the Part List Menu. When in Swing Clamp mode, the clamp 1 bit will close when TigerStop starts processing a stock length, and the bit will open when the TigerStop pusher foot comes within the value of the Swing Clamp setting. If you are not using the Advanced Interconnect Kit, then this I/O point is available for use.
06	**Clamp 2** Clamp 2 is an output used for triggering out feed clamps when running a full automatic pusher list with a TigerStop Advanced Interconnect Kit. This output will close when TigerStop stops at a cut location, but before the Advanced Interconnect Kit triggers the tool cycle. The Clamp 2 output will open after the tool cycle, but before TigerStop moves to the next cut location. Clamp 2 will not activate if stock is not within the value of the Clamp 2 setting in the Part List Menu. If you are not using the Advanced Interconnect Kit, then this I/O point is available for use.
07	**Clamp 3 (Top Cap)** Clamp 3 is an output normally used to trigger the top cap clamp on TigerSaw saw systems. This bit will trigger on every cut cycle. If you are not using the Advanced Interconnect Kit, then this I/O point is available for use.

I/O Number	I/O Point Function
08	**Clamp 4 (Lrn Clmp)** Clamp 4 is an output normally used to trigger a learning clamp on TigerSaw saw systems. If you are not using an Advanced Interconnect Kit, then this I/O point is available for use.
09	**Aux Cycle Start** The Auxiliary Cycle Start input is used with the Advanced Interconnect Kit as an alternate way to start the saw cycle. If you are not using the TigerMeasure upgrade or you do not have a TigerSaw system, then this I/O point is available for use.
10	**Light Crtn** The Light Curtain input is used when integrating a light curtain into a TigerStop product. This input requires an activate signal from a light curtain system before it will allow TigerStop to move. This functionality requires an Enable Code from TigerStop Customer Service. If you are not using a light curtain, then this I/O point is available for use.
11	**Push Ft** The Pusher Foot output raises and lowers the pneumatic pusher foot on a TigerSaw saw system. At what length the foot lowers and raises is controlled by the Pusher Foot Down setting in the Laser Menu. If you are not using a TigerSaw saw system, then this output is available for use.
12	**Load** The Load output will close when TigerStop is ready for material to be loaded. This means that any time TigerStop reaches the Load Offset position, it will trigger this bit. This is normally used when integrating an automatic loading system.
13	Bit 13 is the second bit on the Brake plug. It is available for use at all times.
14	**Material Present** The material present bit is an open bit that is available for use unless you are integrating a TigerSaw saw system.
15	Bit 15 is the second bit on the Beeper plug. It is available for use at all times.
16	Bit 16 is the second bit on the Print Trigger plug. It is available for use at all times.
17	Bit 17 is the second bit on the Clamp 1 plug. It is available for use at all times.
18	Bit 18 is the second bit on the Clamp 2 plug. It is available for use at all times.
19	Bit 19 is the second bit on the Clamp 3 plug. It is available for use at all times.
20	Bit 20 is the second bit on the Clamp 4 plug. It is available for use at all times.
21	Bit 21 is the second bit on the Aux Cycle Start plug. It is available for use at all times.
22	Bit 22 is the second bit on the Light Curtain plug. It is available for use at all times.
23	Bit 23 is the second bit on the Push Ft plug. It is available for use at all times.
24	Bit 24 is the second bit on the Load plug. It is available for use at all times.

Software

Sending Commands to TigerStop®

All communication with the I/O Panel is done through the TigerStop® amplifier. The TigerStop® amplifier has one 9-pin RS232 port that handles all communication from outside systems. It is important to note that the TigerStop® only has one communication port that accepts the full TigerStop® command set. If the TigerStop® you are integrating is using the downloading or the TigerTouch touch screen upgrade, this port will not be available for use. Alternatively, you can send movement commands (G commands) through the "Aux" serial port on the I/O panel (9600 baud).

Addressing the I/O Panel

Commands going to the I/O Panel need to be addressed to the I/O panel. All changes to the I/O panel bits are sent using a mask. This allows you to send multiple I/O changes with one command. The syntax is below:

WW1 wData = # wMask = # cr

WW1 - The Write Word command. It tells TigerStop that you are writing to the I/O Panel.

wData = # - A decimal, octal, hexadecimal or binary number that tells TigerStop which I/O bits you wish to turn on.

wMask = # - Masks the bits so that you can control which I/O's are updated. Can be a decimal, octal, hexadecimal or binary number. If wMask is left blank, it will assume a mask of 0x0FFF. This means that all I/O points not written to by wData will be turned off.

cr - Carriage return

Example: I want to turn on I/O number 13, and turn off all the other I/O's

WW1 wData=13 wMask= cr

This command tells TigerStop that this is a command for the I/O panel (WW1). It tells the I/O panel that I want to toggle I/O number 13 (1101 in binary, 0015 in octal or 0xD in hexadecimal). By leaving the wMask command blank, I am telling the I/O panel to turn off all the other I/O points.

Example: I want to turn on I/O number 13, without toggling any other I/O point

WW1 wData=13 wMask=13 cr

Once again, we are telling TigerStop that we want to write to the I/O panel (WW1). We are using the wData command to tell the I/O panel we want to write to bit 13, but now we are using the wMask command to mask the bits and only change the one I/O point we are interested in. All other I/O points will remain unchanged.

Example: I want to turn on I/O number 13 and I/O number 20, and leave all other I/O's unchanged

WW1 wData= 23 wMask=23 cr

When writing to the I/O points, you can add the bits to toggle more than one bit.

Basic communication can be achieved through a terminal program.

Use a straight through pinned RS232 cable with the following port settings;

Baud Rate: 57600 (this is the default baud rate. It can be changed in the System Information menu)

Data Bits: 8

Stop Bits: 1

Parity: None

Flow Control: None

Appendix

TigerStop® Communication Specification

Command Overview:

Command	Function	Command	Function
A	Analog Interface	O	I/O Status
B	Command & Error Log	P	Comm 1 Position Command
C	Counter Interface	R	Comm 1 Read Command
D	System Data Interface	S	Comm 1 Status + S record loaded to controller
E	Comm 1 Estop	U	Setlist Interface
F	Special Functions	V	Comm 1 Version
G	Comm 1 Go Comd	W	Comm 2 Write Commands
H	Comm 1 Home Comd	X	Just to Loader
I	Comm 1 Input Comd	Z	RTOS Status
L	Comm 2 Look Comds	0	Display 3-phase motor drive data
M	Move Interface	?	Help

Rs232 interface overview:

Most commands are one or two letters followed by an ENTER key. To read the current TigerStop® position enter "Pcr". The amp will return "xx.yyycr". For a two letter command you can enter as "MTcr" or "M Tcr". The amp returns an X for neg ACK (nack) or an A for ACK. Some commands like 'D' have 3 ways to use.

RS232 interface command format:

"Dcr" Display all system data at one time.
"D1cr" Display system data item '1'.
"D1 1.123cr" Enter 1.123 to system data item '1'.

Command Details:

Note: r = read only, w = write only, and r/w = read and write

'A' Analog interface, Serial.
There are 6 analog subcomds
0 = r all 5 channels
1 = r Drive current
2 = r High Voltage
3 = r +15 volts
4 = r Amp temp in C
5 = r +24 volts

'B' Comd & Error Log, Serial only.
B with no number will display the last 20 entries
B with an index number will display entries starting with your index and working back 20 entries.
B20 will display entries 20-40 with 20 the newest and 40 the oldest

'C' Counter interface Serial.
There are 25 subcomds
C or C0 = r all subcomds will display on serial
Cn = r n entry, n = 0-25

'D' System data interface, Serial.
There are 102 system data subcomds
D or D0 will display most 102 entries, serial only
Dn = r/w n entry, n = 0-102

'E' Comm 1 Estop
E Stop is redirected to ME for Move E Stop

'F' Special functions, Serial
There are 4 subcomds
1 = w Save Factory
2 = w Load Factory
3 = w Load Defaults
4 = w Load HV Defaults
5 = w Controller loader interface
6 = w Sleep mode
7 = w Wake up
Note: You will get unpredictable results for 6 and 7 if the controller is in sleep mode.

'G' Comm 1 Go comd, Serial
This comd is redirected to the MG comd

'H' Comm 1 Home comd, Serial
This comd is redirected to the MH comd

'I' Comm 1 Input comd, Serial

'L' comm 2 Look comds,Serial
There are 4 submcomds
p = r position
R = r Raw Data
S = r State
T = r Latched
w = r read word from comm controller (ver5.41)

'M' Move interface, Serial
There are 6 subcomds
G = w go to position
H = w Home
S = w Stop
E = w E Stop
M = w MinMax
D = drive Test

'O' I/O status

'P' Comm 1 position comd

'R' Comm1 R comd

'S' Comm 1 Status + S record loader to controller

'U' Setlist interface
There are 3 subcomds
H = w Header to amp to start the SetList DL
K = w Keyboard char to amp
S = w Set data

'V' Comm 1 Version

'W' Comm 2 write comds
W = w write word to Comm controller (ver5.41)

'Z' RTOS status

'0' Display 3-phase motor drive data

Examples:

'A' Analog interface
Serial: "Acr", "A0cr", 'A' = (0x41), '0' = (0x30), cr = Enter (0x0D)

Serial ret:
"1, Drive Current, 1.1cr"
"2, High Voltage, 160.0cr"
"3, +15 Volts, 15.0cr"
"4, Amp temp, 25.9c, 78.6fcr"
"5, +24 volt, 24.6cr"

Serial: "AXcr", A = (0x41), X = 1-5 (0x31-0x35), cr = Enter (0x0D)

Serial ret:
"A datacr", A = ACK (0x41), data = return data,cr = Enter (oxoD)

Serial Error:
"X EC=2 Bad Arg", index outside 0-5 range, X = NAK, EC = error code, Bad Arg = error text

'B' Comd & Error Log, Serial only

Serial: "Bcr", 'B' = 0x42, cr = Enter 0x0D

Serial ret:
"Comdt= d,Comd= w,Src = -1,P Gain= 31.000,time= 0d:0h:12m:23s"
"Comdt= M,Comd= W,Src= -1,Move to= 50.000,time= 0d:0h:10m:13s"
"ERROR = Move Max Limit, time = 0d:0h:10m:13scr"

Comdt is the command type, same as the command overview list above
Comd is the sub command for the given command type ie MG
Src is the source of the command for the data write
Controller = 18
Serial is -1

time is ON time from first power up

'B' will display the last 20 entries with the newest at top of list.

Serial: "B20cr", B = 0x42, 20 first entry to display 0x32 0x30, cr

Will display the same as above up to 20 lines but starting with entry 20.
To display 20-40 use B20cr, to display 40-60 use B40cr.

'C' Counter interface
Serial: "Ccr", "C0cr", 'C' = (0x43), '0' = (0x30), cr = Enter (0x0D)

Serial ret:
1, UpTime = 6020
2, PowerOns = 1
3, WLMoves = 0
4, ManualMoves = 0
5, Total Moves = 0
6, SerComds = 9
7, CanComds = 0
8, Total Comds = 9
9, CNTRuserWrt = 0
10, CNTRbuWrts = 0
11, SIuserWrts = 0
12, SIbuWrts = 0
13, SIfactWrts = 0
14, Total Inchs = 0, ft=0.0, miles=0.000, meters=0.000
15, C log Index = 0
16, E log Index = 0
19,Amp Temp Avg = 0.0c 32.0f
20,Amp Temp Max = 0.0c 32.0f
21,MotorAmp Avg = 0.0, HP = 0.0
22,MotorAmp Max = 0.0, HP = 0.0
23,Tool Time ms = 0
24,IJ Hard Errs = 0
25,IJ Soft Errs = 0

Serial: "CXcr", C = (0x43), X = 1-18 (0x31-0x31 0x38), cr = Enter (0x0D)

Serial ret:
"C datacr", C = ACK (0x43), data = return data,cr = Enter (oxoD)

Serial Error:
"X EC=2 Bad Arg", index outside 0-5 range, X = NAK, EC = error code, Bad Arg = error text

'D' System data interface

Serial: "D?cr" list of new D commands
Serial ret:
"D" all data but Controller and Timers
"DC" controller data
"DD" drive data
"DM" move data

“DT” timer data
“D15 ?” debug help

Serial: “D15 ?cr” list of D15 debug enables
Serial ret:
Can debug = 32 - 0x20,
MoveErrs = 64 - 0x40,
Drv LB = 128 - 0x80,
Pnt debug = 256 - 0x100
MemSegs”y”= 512 - 0x200,
I/O debug = 1024 - 0x400,
PntDummy = 8192 - 0x2000,
Position = 16384 - 0x4000,
Debug = 32768 - 0x8000
SingleStep= 65535 - 0x10000,
State Disp=131972 - 0x20000

‘D’ will return all SystemInfo data but Timers and Controller only data
Serial: “Dcr”, “D0cr”, ‘D’ = (0x44), ‘0’ = (0x30), cr = Enter (0x0D)

Serial ret:
1-P Gain =2.0 2-I Gain =0.50 3-D Gain =20.0 4-Vel In =25.0
5-Vel Out =25.0 6-Acc In =75.0 7-Acc Out =75.0 8-Dec In =75.0
9-Dec Out =75.0 10-Lim Max =78.0 11-Lim Min =6.0 12-Calib =78.0
13-Scale =2.3620 14-Dither =850 15-Debug =0 16-Clamp 1 =5.0
17-Clamp 2 =-5.0 18-Position=0 19-PrtType =0 20-PrtBaud =9600
21-CommBaud=57600 22-JetOffse=0 23-Kerf =0.125 24-Head Cut=2.0
25-Tail Cut=2.0 26-Outfeed =0 27-Backoff =0 28-Retract =0
29-Ret Offs=0 30-Feed Haz=0 31-Load Off=0 32-Max SPL =178.0
33-opti Sco=2.0 34-opti Tim=2.0 35-opti Pen=1.0 36-Move Del=0
37-Lash =0.030 38-SM Table=0 40-Motor Ty=0 41-ME Zero =1
42-language=0 43-conSleep=0 44-MM ratio=0 45-contrast=100
46-prt Name=0 47-prt Cuts=0 48-prtBarco=0 49-IOReadMa=0
50-IOWritMa=0 51-presetty=0 52-wastefir=0 53-conPW = ******
64-AutoTest=0 77-S cpi =5.50 78-L cpi =2.825 79-Pnt Dly =-0.20
80-TH LV M =600 81-TH LV B =15000 82-Can Dly =3.0 88-SC Rel =20.0
89-TH HV M =300 90-TH HV B =8000 91-StallMEP=1.0 92-StallMES=1.0
93-Run MEP =1.0 94-Run MES =0.20 95-BrkVel =32.0 96-BrkGain%=30.0
97-SetPntSy=1.0 98-FindMax =0 99-FindVel =10.0 100-FindErr=300.0
103-IR Type=1.0 105-Pd Gain=0.50 106-Id Gain=0 107-Pq Gain=0.50
108-Iq Gain=0

--->>>> NOTE NEVER change the values for 105-108 <<<<---

‘DD’ will return data used in Drive calculations
Serial ret:

1-P Gain =2.0 2-I Gain =0.50 3-D Gain =20.0 4-Vel In =25.0
5-Vel Out =25.0 6-Acc In =75.0 7-Acc Out =75.0 8-Dec In =75.0
9-Dec Out =75.0 10-Lim Max =78.0 11-Lim Min =6.0 14-Dither =35
105-Pd Gain=0.50 106-Id Gain=0 107-Pq Gain=0.50 108-Iq Gain=0

‘DM’ will return data used in movement control

Serial ret:
10-Lim Max =78.0 11-Lim Min =6.0 80-TH LV M =600 81-TH LV B =15000
89-TH HV M =300 90-TH HV B =8000 91-StallMEP=1.0 92-StallMES=1.0
93-Run MEP =1.0 94-Run MES =0.20 95-BrkVel =32.0 96-BrkGain%=30.0
97-SetPntSy=1.0 98-FindMax =0 99-FindVel =10.0

'DT' will return Timer data
Serial ret:
54-ClampOn_=0.10 55-SawOn_D =0.10 56-DMOff_TO=5.0 57-TAOn_TO =5.0
58-TAOff_TO=5.0 59-DMOn_TO =5.0 60-ClampOff=0.10 61-SawCyc_D=0.10
62-RSD_Rdy_=0.70 63-Timer10 =0.20

'DC' will return data used by the Controller only, not used by the amp
Serial ret:
39-Sys Type=0 42-language=0 65-CrossCal=60.0 66-CrossAla=0
67-HandyOpt=0 68-Waste =2.0 69-DropBox =2.0 70-Defect =0
71-L Range =0.20 72-L Count =0 73-Laser ME=0 74-L Limit =144.0
75-L Ref =5.0 76-Cld Sty =0 83-Inf =0 84-PetClear=0
85-Pet Dim =0 86-Banana1 =24.0 87-Banana2 =36.0 101-DrillMo=0
102-MMRatio=0

Serial: "DXcr", D = (0x44), X = 1-102 (0x31-0x31 0x30 0x32), cr = Enter (0x0D)

Serial ret:
"d5
25.000"

Serial Error:
"d200
X EC=3 BAD INDEX"

'F' Special functions

Serial: "FXcr", F = (0x46), X = 1-4 (0x31-0x34), cr = Enter (0x0D)

Serial Ret:
"Acr", A = ACK, cr = Enter (oxoD)

Serial Error:
"X EC= N TEXT",X = NAK, N = Error Code, TEXT = EC Text

'G' Comm 1 Go comd

'L' comm 2 Look comds

The LR comd has been updated in 5.41 to now do 8 bits of data read. This command now has the same functionality as the LR from 4.72. The bottom 4 bits are read from the amp port and the top 6 bits come from IO1 on the first comm panel. Plus one new command has been added, "LW" for look word.

Serial: serial commands only
"LW#cr" Will read 12 bits from comm panel 1 I/O 1 and I/O 2

"#" is the comm controller # 1-4, if no '#' is given then 1 is assumed.
"LWcr" read word from comm panel 1
"LW1cr"read word from comm panel 1.

'M' Move interface

Serial: "MG123.456cr", M = 0x4D, G = 0x47, 123.456 = position,
cr = Enter (0x0D)
"MHcr", M = 0x4D, H = 0x48, cr = Enter (0x0D)
"MScr", M = 0x4D, S = 0x53, cr = Enter (0x0D)
"MEcr", M = 0x4D, E = 0x45, cr = Enter (0x0D)
"MMcr", M = 0x4D, M = 0x4D, cr = Enter (0x0D)
"MDcr", M = 0x4D, D = 0x44, cr = Enter (0x0D)

Serial Ret:
"Acr", A = ACK, cr = Enter (oxoD)

Serial Error:
"X EC= N TEXT",X = NAK, N = Error Code, TEXT = EC Text

'O' I/O status, Serial only

Serial: "Ocr", O = 0x4F,cr = Enter (ox0D)

Serial Ret:
"SE=OFF,DM=ON,TA=OFF,L1=ON,L2=ON,FS=OFF,FST=OFF,SC=ON,OSM=0,SM=65cr"

'P' Comm 1 position comd

'S' Comm 1 Status + S record loader to controller

'V' Comm 1 Version

'W' Comm 2 write comds, 8/25/10 added commands to the W comd

The WB comd has been updated in 5.41 to now do 8 bits of data read and write. This command now has the same functionality as the wb from 4.72. The bottom 4 bits come out on the amp port and the top 6 bits come out on IO1 on the first comm panel.

Serial: serial commands only
"WB 3cr" will write a 3 to the bottom 2 bits on the amp and set the top 2 bits to 0 along with the 6 bits on the first port on the first Comm controller. This is the SAME action as the 4.72 WB to both of the IO connectors on the 2C amp. The amp2C 4 bit port covers bits 0,1,2,3 the 6 bit port covers bits 2,3, 4,5,6,7 and yes bits 2 and 3 are the same for both ports. The difference between the 2C and 3A is the 6 bit port is the first port on the first Comm controller for 3A(5.XX).

BIT	pin	
0 (1)	5 on amp	SE AIK SIK

1 (2)	2 on amp	DM AIK SIK	
2 (4)	4 on amp & 2 on I/O1	FS AIK	
3 (8)	3 on amp & 3 on I/O1	TA AIK	
4 (10)	4 on I/O 1	Beeper SAW	
5 (20)	5 on I/O 1	Printer SAW	
6 (40)	6 on I/O 2	Clamp1 SAW	
7 (80)	7 on I/O 2	Clamp2	SAW

The WW comd is new to v5.41. Data can be in decimal,hex or octal.
125 will be taken as a decimal number
0x7D will be taken as a HEX number
0175 will be taken as an octal number

"WW# wData wMaskcr" Write Word with mask, # = 1,2,3,4 for 1 of 4 comm controllers. If # is not used 1 is assumed.
Logic for word write operation.

"pins = pins AND ~wMask OR wData"

to turn on bit 2 wData = 4, wMask = 4
to turn off bit 2 wData = 0, wMask = 4

If you don't give a wMask then 0x0FFF is assumed meaning any bit you do not turn on with the wData will be turned off (all 12 bits will be updated)

port 1 = 6 bits 0,1,2,3,4,5, port 2 = 6,7,8,9,10, 11,only 12 bits are used.

BIT	pin		
0 (1)	2 on I/O 1	SHARED with Amp pin 4 (FS)	
1 (2)	3 on I/O 1	SHARED with Amp pin 3 (TA)	
2 (4)	4 on I/O 1	Beeper	TigerSaw
3 (8)	5 on I/O 1	Print trigger	TigerSaw
4 (10)	6 on I/O 1	Clamp1 & SwingClamp	
5 (20)	7 on I/O 1	Clamp2	
6 (40)	2 on I/O 2	Top Clamp	TigerSaw
7 (80)	3 on I/O 2	Learning Clamp	TigerSaw
8 (100)	4 on I/O 2		
9 (200)	5 on I/O 2		
10(400)	6 on I/O 2	PusherFoot	TigerSaw
11(800)	7 on I/O 2		

'Z' RTOS status, Serial only

Serial: "Zcr", Z = 0x5A,cr = Enter (ox0D)

Serial Ret:
UpTime = 0d:0h:4m:47s LFS = 5400 MemSegs = 2/4
Task Name Pri Stack f/u
SI Mutex Pri 3 0/ 0

```
CanTask       4    504/ 296
Rs232Task     5    400/ 400
XmitTask      6   1556/ 244
ComdTask      7    544/1256
SM Task       8    528/ 272
MoveTask      9   1028/ 172
Analog Task  10    468/ 332
FunTask      11    660/ 140
SITask       13    440/ 160
CntrTask     14    656/ 144
HK Task      16    404/ 396
pos =  0.000, drive =    10
```

LFS Largest Free Segment, largest free memory segment from the memory pool.
MemSegs X/Y, X = memory segments allocated now, Y = Max number allocated

'0' Display 3phase motor drive data

Serial: "0cr", 0 = 0x30,cr = Enter (0x0D)

```
ITarget =       0, IErr =    0
ang =    0, drv =    0, off =    0
snA =    0, snB =    0, snC =    0
dv1 =    0, dv2 =    0, dv3 =    0
```

'?' Help, Serial only

Serial: "?cr", ? = 0x3F,cr = Enter (0x0D)

Serial Ret:
A ->Analog#-RD, B ->comd Log-D, C ->Counters#-RD, D ->Data#-RWD
DC->Data Controller,DD->Data Drive, DM->Data Move, DT->Data Timer
D?->Data Help, G ->Go pos,vel,accel,decel-W
ME->Move Estop-W, MG->Move Go pos,vel,accel ,decel-W, MH-> Move Home-W
MM-> Move MinMax-W, MS->Move Stop-W,
O ->Input-R, P ->Position-R, V ->Version-R
XYZZY ->Jump to Loader-W, Z ->OS Data-D ? help-R
Comd# where # is 0 - n, 0 = display all, ComdN = read Comd index n
R = read used with # to read one item at a time,W same as R but writing
D = Display, all items at once in term mode only

Status States:

PS_HALT	= 0	drive is online and not moving
PS_ACCEL	= 1	drive is accelerating
PS_CONST	= 2	drive is at constant speed
PS_DECEL	= 3	drive is decelerating
PS_DISABLE	= 4	
PS_LASHSEEK	= 5	drive is doing last seek
PS_DELAY	= 6	
PS_STOP	= 7	drive is decelerating to stop NOT at Goal
PS_SLEEP	= 8	drive is sleeping
PS_DDRIVE	= 9	drive is under direct control of controller

Return Error Codes:

ERR_NONE,	= 0	no errors
ERR_COMD,	= 1	bad command type
ERR_ARG,	= 2	bad Arg
ERR_RS232INDEX,	= 3	bad index
ERR_MOVEPARA,	= 4	bad parameter
ERR_MOVEBUSY,	= 5	Move system is in use at this time
ERR_MOVEMAX,	= 6	MAX move error
ERR_MOVEMIN,	= 7	MIN move error
ERR_MOVEFAR,	= 8	Far limit trip error
ERR_MOVENEAR,	= 9	Near limit trip error
ERR_MOVENOTRDY,	= 10	sub system not ready for command
ERR_FLASHWRT,	= 11	error in writing to flash
ERR_SERECNA,	= 12	Enable Code NOT Available
ERR_SERECINDEX,	= 13	bad EC index
ERR_SEREXIST,	= 14	Serial number already exist
ERR_ECDUP,	= 15	EC already exist in EC history buffer
ERR_ECTO,	= 16	EC Time Out on write operation
ERR_FACT_CS,	= 17	factory checksum error
ERR_H1MOVE,	= 18	home stge 1 error
ERR_H2MOVE,	= 19	home stge 2 error
ERR_H3MOVE,	= 20	home stge 3 error
ERR_MM1MOVE,	= 21	MinMax 1 error
ERR_MM2MOVE,	= 22	MinMax 2 error
ERR_MM3MOVE,	= 23	MinMax 3 error
ERR_MM4MOVE,	= 24	MinMax 4 error
ERR_MM5MOVE,	= 25	MinMax 5 error
ERR_SOC,	= 26	Safe Operation Code error in SM
ERR_NOTKNOWN,	= 27	error not known
ERR_AIK_NE,	= 28	AIK system not enabled
ERR_FA_NE,	= 29	AIK Full Auto not enabled
ERR_ESTOP,	= 30	ESTOP
ERR_MAXERR,	= 31	over max error limit during movement
ERR_BAD_EC,	= 32	bad EC does for current serial number
ERR_MLA,	= 33	Miss-aligned access error
ERR_COMDQF,	= 34	Command Que is full, message lost
ERR_ITRIP,	= 35	current trip in amp module
ERR_RSDR,	= 36	the RSD return from the client timed out
ERR_DMALLOC,	= 37	Malloc over run error

Selectable Baud rates:

9600, 19200, 38400, 57600*, 115200, 230400

* default baud

Note 1:

The MG command also supports Velocity, ramps for one movement. To use the full comd enter

Serial:

“MG 123.456 23.000 50.000 45.000cr”

M = move command

G = Go sub comd

123.456 = position to move to

23.000 = velocity for this movement

50.000 = accell for this movement
45.000 = decel for this movement
cr = Enter

debug enable bits "D15 0x40" display max errors at end of movement

32	0x20	send data from the amp-con comm out the serial port
64	0x40	displays Error values at knees
128	0x80	loopback target to pos, no movement but pid happy
256	0x100	label print via the onboard serial for debugging
512	0x200	debug mem allocation requester
1024	0x400	turn in verbose for the IO controller
2048	0x800	drives the IO pin 1 (saw enable) 2 x SI_IOREAD in MS
4096	0x1000	Flips the trigger for the inkjet printer
8192	0x2000	print 4 dummy fields, inkjet
16384	0x4000	display position and move errors
32768	0x8000	debug data display
65536	0x10000	single step state machine
131972	0x20000	display the state number at change in state
262144	0x40000	display the 3 phase data every 200ms if moving

Note: you can turn on more then one item at a time by adding the number for the items you want on. To turn on amp-con data and Error values both 32 + 64 = 96 so set D15 to 96.

COMPARISON CHART

	Product		Max Load Push	Power Requirement	Drive Type	Accuracy	Working Length
CORE		TigerSPC	Caliper	2 AA Battery	N/A	+/- .008” +/- 0.2mm	0’ - 20’ 0m - 6m
		SawGear	Stop Only	110 Vac	32mm Belt Steel Reinforced	+/- .008” +/- 0.2mm	8’ - 20’ 2.4m - 6m
		SawGear Touch	Stop Only	110 Vac	32mm Belt Steel Reinforced	+/- .008” +/- 0.2mm	8’ - 20’ 2.4m - 6m
		TigerStop	90lbs/41kg Solid Tables 180lbs/81kg Roller Tables	110 / 240 Vac	32mm Belt Steel Reinforced	+/- .004” +/- 0.1mm	4’ -30’ 1.2m - 9.1m
		TigerStop Pro	150lbs/68kg Solid Tables 300lbs/136kg Roller Tables	120 / 240 Vac	32mm Belt Steel Reinforced	+/- .004” +/- 0.1mm	4’ -30’ 1.2m - 9.1m
		TigerFence	Stop Only	110 / 240 Vac	3/4” Hi-Lead Screw	+/- .003” +/- 0.08mm	51” or 70” 1.29m - 1.77m
		TigerRack	300lbs/136kg Solid Tables 720lbs/327kg Roller Tables	240 Vac	Rack & Pinion	+/- .008” +/- 0.2mm	12’ - 108’ 3.7m - 32.9m
		TigerTurbo	350lbs/159kg Solid Tables 840lbs/381kg Roller Tables	240 Vac	75mm Belt Steel Reinforced	+/- .008” +/- 0.2mm	12’ - 42’ 3.7m - 12.8m
		HeavyDuty 2	490lbs/222kg Solid Tables 2100lbs/952kg Roller Tables	240 Vac	Rack & Pinion	+/- .008” +/- 0.2mm	12’ - 108’ 3.7m - 32.9m
SAW SYSTEMS		TigerSaw Ferrous	490lbs/222kg Solid Tables 840lbs/381kg Roller Tables	208 / 480 Vac	32 or 75mm Belt Steel Reinforced	+/- .015” +/- 0.4mm	8’ - 42’ 2.4m - 12.8m
		TigerSaw 2000 Compact	90lbs/41kg Solid Tables 180lbs/81kg Roller Tables	208 / 480 Vac	32mm Belt Steel Reinforced	+/- .015” +/- 0.4mm	4’ -30’ 1.2m - 9.1m
		TigerSaw 1000 Compact	90lbs/41kg Solid Tables 180lbs/81kg Roller Tables	208 / 480 Vac	32mm Belt Steel Reinforced	+/- .015” +/- 0.4mm	4’ -30’ 1.2m - 9.1m
		TigerSaw 2000	490lbs/222kg Solid Tables 2100lbs/952kg Roller Tables	208 / 480 Vac	32 or 75mm Belt Steel Reinforced or Rack & Pinion	+/- .012” +/- 0.3mm	8’- 108’ 2.4m - 32.9m
		TigerSaw 1000	490lbs/222kg Solid Tables 2100lbs/952kg Roller Tables	208 / 480 Vac	32 or 75mm Belt Steel Reinforced or Rack & Pinion	+/- .012” +/- 0.3mm	8’ - 108’ 2.4m - 32.9m
		TigerSaw MiterXL	490lbs/222kg Solid Tables 2100lbs/952kg Roller Tables	400 - 480 Vac	32 or 75mm Belt Steel Reinforced or Rack & Pinion	+/- 0.1° +/- .012”	8’ - 108’ 2.4m - 32.9m

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• Made in USA from domestic and foreign components.

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