Posidata EMT 16OP IF Card Documentation

This information is to assist in connecting an EMT 16OP IF card to a Posidata controlled Matchmaker that has the standard tool changer and up down spindle speed controller. The information also applies to many Matchmakers that have a Numericon control and stepper drives as these often replaced an original Posidata control.

We recommend that you first fit the main EMT IF card following the instructions provided and get the basic electrics and the axis movements under control with all limit switches and emergency stop circuits fully operational and correctly adjusted.

Posidata/Matchmaker Speed & Tool change principle of operation

Tool Changing

The original Posidata control activates the TOOL OUT output when an M61 is programmed and if in auto suspends the programme. The output signals the tool change mechanism to remove the tool from the spindle and place it in the current bucket. The mechanism then sends a pulse signal to the control RESET input which reactivates the programme. The next line is normally an M62 or M63. This activates the CW OUTPUT or the CCW OUTPUT and again if in auto suspends the programme The output signals the tool change mechanism to index the buckets one place either clock wise (M62) or counter clockwise (M63). On completion the same RESET signal is pulsed and the programme moves on to the next line. If several bucket need to be indexed a succession of M62 or M63 commands are programmed. When the bucket with the next tool required is in the current bucket position an M64 is programmed. This activates the TOOL IN output and the mechanism takes the tool from the bucket and places it in the spindle. On completion the reset input is pulsed and programme carries on as normal.

Speed changing

Speed change is activated by a programme line with an S code where Snnn equals the speed required in rpm e.g. S1000 is 1000 rpm. The control suspends the programme if in auto and calculates if the speed required is a high range or low range speed. The control then checks the HI RANGE input and LO RANGE input to establish the current range selected. If the current range is low and the range required is high the control activates the HI RANGE output and the COG OUTPUT causing the speed change mechanism attempts to change to high range which it continues to do so until the HI RANGE feed back input detected. If the current range is high and the low range is required the control deactivates the HI RANGE output (which signals low range is required) and activates the COG output causing the speed change mechanism attempts to change to low range which it continues to do so until the LO RANGE feed back input detected. If the machine is in the correct range no action takes place. The control then starts the spindle and sets the ANALOGUE signal to a value that equates to the rpm needed. There is a Tacho circuit on the machine that checks the current rpm and operates the CONTROL SPEED input to indicate if the speed is too high or to low. If the input is high the control activates the INCREASE SPEED output that causes the speed change motor to run in the direction that increases spindle speed. Eventually the tacho board signals to the control that the speed is reached and sets the CONTROL SPEED input low and the control deactivates the INCREASE SPEED output. If the SPEED INPUT signal is low the control activates the DECREASE SPEED output that causes the speed change motor to run in the opposite direction until the speed decreases to the speed required at which point the tacho board takes the CONTROL SPEED input low. The control then deactivates the DECREASE SPEED output. On completion the control carries on to the next line of the programme as normal

Using Ah-ha! To operate the speed and tool change

There are two issues to deal with. The first is to mimic the inputs and outputs of the old control so that the machine functions continue to operate exactly as they did with the original control. This is best achieved using a feature of the Ah-ha! software called the PLC macro. This is a special program that must be named MCDMAP.AGC and must be located in the CNC directory. If this programme exists it is always loaded into memory when the Ah-ha! software is started (This brings up a VERY important point. If you edit the MCDMAP.AGC programme using the Ah-ha! built in editor you must exit the programme and restart the software for your changes to be effected) The function of this programme is that it can have many different sections and each section has a label at the start. If for example there is a section labelled O%M61 whenever any main programme executes an M61 command control passes to the M61 section of the MCDMAP.AGC programme and executes the code in the section. Please note the O before the % character is the letter O and not the digit zero. We provide an MCDMAP.AGC programme for machines with the Posidata type tool change that operates inputs and outputs exactly as the original control. A printout of the programme is included later in this documentation. We also provide a copy on the same disk as the pck file. To load this into the correct directory on the computer put the disk in drive a and type go {enter}. For this programme to be used you need to connect the inputs and outputs on the IF card as we have dedicated them and these are listed as follows

ATC Connections

AUXOUT 9	Tool out	M61	Plug 1 pin 20	A2 pin W
AUXOUT 10	Index tools clockwise	M62	Plug 1 pin 8	A2 pin X
AUXOUT 11	Index tools counter clockwise	M63	Plug 1 pin 9	A2 pin Y
AUXOUT 12	Tool in	M64	Plug 1 pin 10	A2 pin S
AUXIN 11	Reset	n/a	Plug 1 pin 3	A2 pin Z

SPEED CONNECTIONS

AUXIN 8	High range feed back switch	n/a	TO BE ADDED	A2 pin H
AUXIN 9	Low range feed back switch	n/a	TO BE ADDED	A2 pin K
AUXOUT 13	High Range	n/a	TO BE ADDED	A2 pin A
AUXOUT 14	Cog	n/a	TO BE ADDED	A2 pin B
AUXOUT 15	Increase speed	n/a	TO BE ADDED	A2 pin C
AUXOUT 16	Decrease speed	n/a	TO BE ADDED	A2 pin D
AUXIN 10	Speed matched	n/a	TO BE ADDED	
ANA1	Speed command	n/a	TO BE ADDED	A2 pin F
ANA GND	Speed command	n/a	TO BE ADDED	A2 pin G

Note that AUXOUT 13 is called high range but is in effect a dual command, if it is activated it means change to high range but if it is deactivated it means change to low range

The second issue is to modify some of the inputs and outputs on the machine to match the EMT 16OP IF board. All our switched outputs are +24vdc and go high to activate and low to deactivate and all our inputs need a 24V DC signal. Also the Posidata outputs were pulsed signals and we provide permanent signals. This means that any Auxiliary box relays that have a latch circuit need the latch eliminated.

The ATC modifications require that you locate the ATC pcb in the auxiliary cabinet mounted on the side or back of the machine. The card should be marked Ass 335 022. To remove the latch cut the tracks to pin 8 of relays K1, K2, K3 and K4. This track is 24V DC. To make the reset signal switch high cut the track between input 9 (GND) and pin 13 of relays K7 and K8. Link the relay side of the cut track, the side

still connected to pin 13 of the relays, to the 24V track. This is the main section of the track you just cut leading to pin 8 of relays K1 to K4.

You now need to connect the input and output terminals on the EMT IF card to the relays in the auxiliary box. The easiest way to do this is via the A2 cable connections that should already exist. On the Posidata most of these connections are normally bought up to a 25 Pin D type plug referred to as plug 1. The connections are listed above . If the machine has been converted to a Numericon control the D-type connectors have probably been removed and the connections taken to a separate card that Numericon supplied called a MIF card. This is usually mounted in the cabinet fitted below the control. Hopefully the conversion used the same A cable connections as the original Posidata and all you will have to do is move the connections from the MIF card to the EMT IF card
We strongly recommend that you make only one Auxout connection and test it before you proceed further to make sure our instructions make sense. The best output to use is probably Auxout 9 as this will move remove the tool from the spindle and put it in the current bucket on the carousel provided you have the tool change in AUTO mode. To operate any output from the Ah-ha! you press function key F6 which brings up the auxiliary output window. Move the cursor to the output you want to switch and the enter key will toggle the output on and off. Don't forget to turn the output off after testing. The tool operation you should get is the same as you get if you switch the tool change into LOCAL mode and press the tool out button on the tool change.
If all is well you can now complete all the ATC connections. You should then be able to operate a complete tool change cycle from the output window.

We have not got full instructons for the speed modifications due to the number of different methods available. All of them require control of the range change mechanism so you will need to locate the Spindle Speed Interface pcb in the auxiliary cabinet mounted on the side or back of the machine and connect the Auxin connections to the range feed back micro switches. You can operate the switches by hand. If all is well the signal LED on the EMT IF card will signal the switch state.

If you are using the old speed mechanism and not changing to an inverter contact us and we will try to supply the information needed for your particular machine

Posidata A2 cable pin designations

Old Posidata Function	New Ahha Function	
A2 FUNCTION	A2 FUNCTION	PIN
HI RANGE	HI RANGE	A
COG	COG	B
INCREASE SPEED	INCREASE SPEED	C
DECREASE SPEED	DECREASE SPEED	D
REMOTE JOG X		E
TACHO +VE	TACHO +VE	F
TACHO -VE	TACHO -VE	G
IN HI RANGE FEED BACK	IN HI RANGE FEED BACK	H
AUTO		J
IN LO RANGE FEED BACK	IN LO RANGE FEED BACK	K
REMOTE JOG Y		L
INDEXER FEED BACK	INDEXER FEED BACK	M
SPINDLE OFF	SPINDLE OFF	N
REMOTE JOG A		P
2ND RTC (M93/M94)		Q
REMOTE JOG A		R
ATC TOOL IN (M64)	ATC TOOL IN (M64)	S
TURRET RETURN HOME	TURRET RETURN HOME	T
CLAW INTERLOCK	CLAW INTERLOCK	U
REMOTE JOG		V
ATC TOOL OUT (M61)	ATC TOOL OUT (M61)	W
ATC TOOLS INDEX CW (M62)	ATC TOOLS INDEX CW (M62)	X
ATC TOOLS INDEX CCW (M63)	ATC TOOLS INDEX CCW (M63)	Y
RESET ATC FEED BACK	RESET ATC FEED BACK	Z

NB Input Output relative to control

; Posidata mcdmap.agc programme
; This feature is only supported in the Artisan package.

O%M61
AOUT 109,1
WTAIN 211,1
AOUT 109,0
G04 P1.0
M99

O%M62
AOUT 110,1
WTAIN 211,1
AOUT 110,0
G04 P1.0
M99

O%M63
AOUT 111,1
WTAIN 211,1
AOUT 111,0
G04 P1.0
M99

O%M64
AOUT 112,1
WTAIN 211,1
AOUT 112,0
G04 P1.0
M99

O%S
; Spindle speed control in RPM.
;
%MXSPDL=480.0   ; maximum spindle speed LOW
%MNSPDL=80.   ; minimum spindle speed LOW
%MXSPDH=3600.0   ; maximum spindle speed HIGH
%MNSPDH=600.0   ; minimum spindle speed HIGH
%MNSAOUT=13.5   ; voltage for bottom speed as S value
%MXSAOUT=69.2   ; voltage for top speed as S value

%TP1=S ; assign RPM to var %TP1
%TP2=ABS(%TP1)

IF (%TP2 GE %MNSPDH) GOTO %HRANGE ; above 600 jump to high range calcs

; low range calcs
IF (%TP2 LT %MXSPDL) GOTO %SSC200 ; checks for out of range S number

```
%TP2=%MXSPDL                    ; correct out of range S number
%SSC200:

IF (%TP2 GT %MNSPDL) GOTO %SSC220  ; checks for out of range S number
%TP2=%MNSPDL+.1                 ; correct out of range S number
%SSC220:

; calculate the percent based on the desired value and the RPM range
%TP3=(%TP2-%MNSPDL) / (%MXSPDL-%MNSPDL)
%TP3=%TP3 MLT 100.0

; calculate the percentage corrected for min/max voltages
%TP3=((%MXSAOUT-%MNSAOUT)/(100/%TP3))+%MNSAOUT

; check if in low range if not take action
%DEVST=AIN 209                  ; Low range feed back switch
IF (%DEVST GT 0.50) GOTO %ROK      ; If input 9 High in low range
M05
G4 P2.
AOUT 113,0
AOUT 114,1
WTAIN 209,1
AOUT 114,0
AOUT 113,0
G4 P2.
GOTO %ROK                       ; jump round high range calcs

%HRANGE:

IF (%TP2 LT %MXSPDH) GOTO %SSC300
%TP2=%MXSPDH

%SSC300:

IF (%TP2 GT %MNSPDH) GOTO %SSC320
%TP2=%MNSPDH+.1

%SSC320:
;
; calculate the percent based on the desired value and the RPM range
%TP3=(%TP2-%MNSPDH) / (%MXSPDH-%MNSPDH)
%TP3=%TP3 MLT 100.0

; calculate the percentage corrected for min/max voltages
%TP3=((%MXSAOUT-%MNSAOUT)/(100/%TP3))+%MNSAOUT

%DEVST=AIN 208                  ; high range feed back switch
IF (%DEVST GT 0.50) GOTO %ROK   ; If input 8 High in high range
```

Page6

```
M05
G4 P2.
AOUT 113,1
AOUT 114,1
WTAIN 208,1
AOUT 114,0
AOUT 113,0
G4 P2.


%ROK:
; operates actual speed change
M03                     ; starts spindle
AOUT 701,%TP3           ; outputs analogue
G4P2.                   ; delay

%DDD=AIN 210            ; if high increase if low decrease
IF (%DDD GT .95) GOTO %INC

; decrease until input 10 goes high
AOUT 116,1              ; decrease output
WTAIN 210,1             ; match indicated
AOUT 116,0             ; turn off decrease
GOTO %SPDOK            ; go to speed correct

%INC:
; increase until input 10 goes low
AOUT 115,1             ; increase output
WTAIN 210,0            ; match indicated
AOUT 115,0            ; turn off increase

%SPDOK:              ; speed is ok

AOUT 701,0            ; turn off analogue
G4P2.               ; delay

M99
```

EMT 16OP IF Card Documentation

Ah-ha auxiliary inputs Terminal block 5

The Ahha inputs are all 5 volts switched to ground. Our board operates these inputs through a reed relay isolating the machine electrics which are all 24 volt DC. Our inputs are all operated by +24VDC. Therefore to operate an input connect the 24 Volt power supply ground (24 Volt Return) to 24VRET T5-1 terminal and connect the +24V of the power supply via a suitable switch to the input you wish to operate. Note that if you are using AUXIN 11 & AUXIN 12 jumpers JR1 and JR2 must be fitted so that they bridge the pin marked AUX to the centre pin. (This is the default position)

Ah-ha outputs Terminal block 1

The Ahha outputs are all low current 5 volt signals. Our board uses these inputs to operate a solid state relay switching 24 volts again isolating the machine electrics. Therefore to operate an output connect +24VDC to T1-10 terminal .The maximum loading is 130Ma and outputs should be used to drive a relay if you are operating any devices on the machine. A suitable relay is the one fitted on the EMT main IF card to operate the Emergency Stop and spindle circuits. It is capable of switching 1 Amp up to a maximum of 100V ac/dc.

Analogue Connections Terminal block 3

The analogue connections on T2 are connected straight through to the analogue connections from the Ah-ha board in the PC. They do however pass through very low current fuses as a measure of protection when connecting to older spindle drives

Encoder Connections Terminal block 3

This is for a spindle encoder when used in lathe applications. The encoder signal connections pass straight through to the connections from the Ah-ha board in the PC and the power connections pass to terminal block 4 as described below. If you are using an encoder jumpers JR1 and JR2 must be moved so that they bridge the pin marked ENC to the centre pin. There are also 2 jumpers located just below the 25 way ribbon cable on the Card fitted in the PC that must also be removed when a spindle encoder is used.

5V Connections Terminal block 4

This is provided as a convenient place to connect a +5VDC supply so that the encoder connections are all on a single plug

Eagland Machine Tools Ltd Tel. 01297-446000 Fax. 01297-446001

Title
Circuit for EMT/Ahha 16DP IF Board

Drawn By
R.I.E.

10/2/98

DWG NO.
F0632

Revision

25 WAY SOCKET

24
6 > GND
1 > GND
2 > AUXOUT 9
15 > AUXOUT 10
3 > AUXOUT 11
16 > AUXOUT 12
4 > AUXOUT 13
17 > AUXOUT 14
5 > AUXOUT 15
18 > AUXOUT 16
13 >
25 >
12 >

100R 1/4W
FN331-132 IR PVA235E

AUXOUT 9
AUXOUT 10
AUXOUT 11
AUXOUT 12
AUXOUT 13
AUXOUT 14
AUXOUT 15
AUXOUT 16
T+24DC
T1

25 WAY SOCKET

14 > +5VPC
7 > AUXIN 8
20 > AUXIN 9
8 > AUXIN 10
21 > AUXIN 11
9 > AUXIN 12

JR1 3 Way Jumper — Auxin 11
JR2 3 Way Jumper — Auxin 12

3K3

ASTRALUX 131A6
24VDC FN331-041

24VRET
AUXIN 8
AUXIN 9
AUXIN 10
AUXIN 11
AUXIN 12
T5

RD 330R 1/4W

0VDC
+5VDC
+5VDC
0VDC

Encoder A
Encoder B
Encoder Zero
Analogue Ground
T3
T4

Fuse 3
Fuse 2
Fuse 1
Analogue 2
Analogue 1
T2

ALL LEDS T13 4/5mm SIEMENS Lx5360-K
SOCKET 25-Way D Type PCB Mount
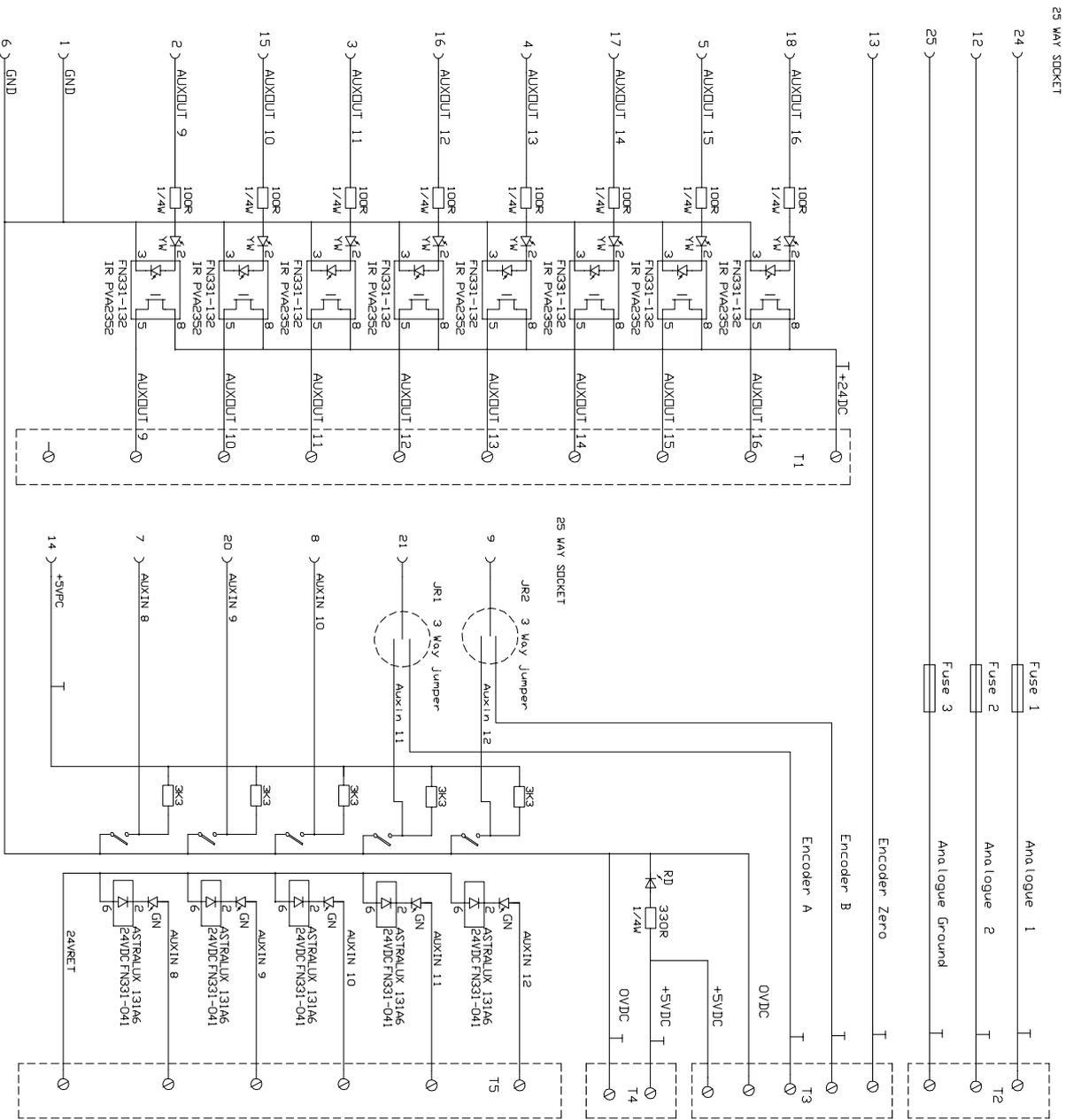
BCD allocation

Auxout 9 = BCD 1
Auxout 10 = BCD 2
Auxout 11 = BCD 4
Auxout 12 = BCD 8
Auxout 13 = BCD 10
Auxout 14 = BCD 20
Auxout 15 = BCD 40
Auxout 16 = BCD 80
Auxout 6 = M Strobe
Auxout 7 = S Strobe
Auxout 8 = T Strobe
Auxin 8 = BCD Finish