GOODWIN
ELECTRONICS

ELECTRONIC POSITIONING SYSTEM EPS 110

OPERATORS MANUAL

Version 2.0   07/92
Based on software v3.x

CONTENTS

1.0   INTRODUCTION.

The Electronic Position System series 110 (EPS 110) controller is a general purpose position controller suitable for closed loop position control of upto three axis. It is designed to be programmed in a simple manner and can be used with no knowledge of CNC programming techniques or languages.

Documentation - The EPS110 is available with two manuals; *Technical Specification* and *Operators Manual*. This is the Operators Manual which has been written for the operator to use and refer to when programming and using the EPS110 system in day - to - day operation i.e. Programming, Jogging and auto execution of programs.

Please note - The contents of this manual are designed to give the reader an understanding of how the EPS 110 controller operates. The product described is subject to continuous development and improvement. All information of a technical nature and particulars of the product, and its use are given by Goodwin Electronics in good faith. However, it is acknowledged that there may be errors and omissions in this document. We shall not be liable for loss or damage whatsoever arising from the use of any information or particulars in, or any omissions from, this document.
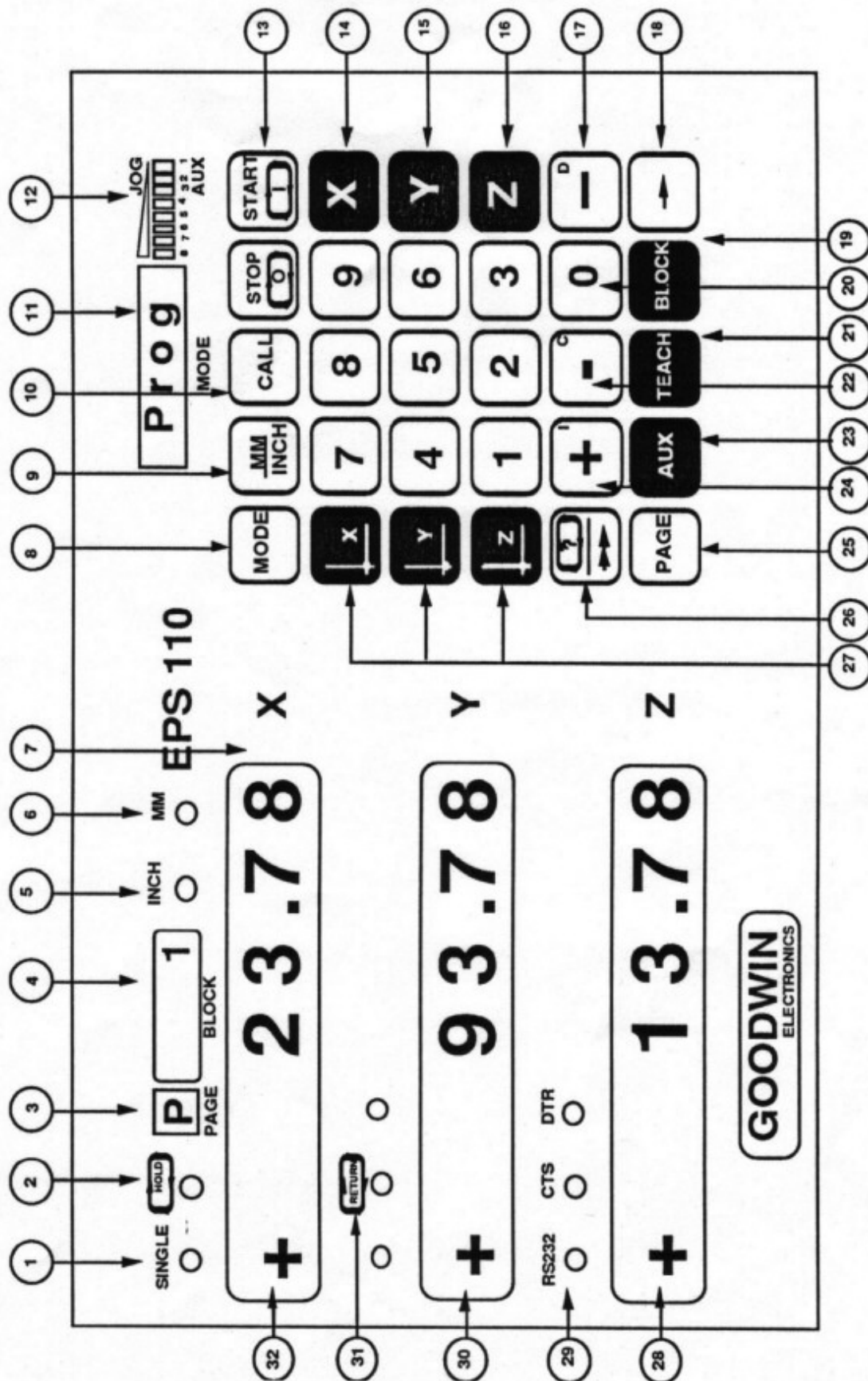
Description - The EPS110 has three main displays one each for the X ,Y and Z axes and can display numbers within the range +/- 1999999. The decimal point can be set to suit most applications and for the purpose of describing how the unit operates later in this manual it will be assumed it has been set to give two decimal places in the display. Generally the displays will indicate the absolute position of each axis or to display the program variables such as feed rate, dwell time etc.

To switch on the EPS 110 operate the toggle switch located on the rear panel adjacent to the power cable.

When switched on the controller powers up in the AUTO mode, out of cycle and with the displays indicating the absolute position of the machine.

2.0   FASCIA DESCRIPTION

1   This LED on indicates that the controller will only execute the currently selected block move (single block operation). If it is flashing it indicates that the current block is complete and that it is waiting for a command to step on to the next block. This feature is activated by an external input, refer to *Technical specification - input definitions*.

2.   This LED on indicates that a HOLD is programmed in the currently selected block. After completing the block move the LED will flash and the controller will await a cycle start command before continuing program execution.

3.   PAGE display window.   In Program mode this indicates Position (P), Feed (F),Dwell (d) or Subroutine call (c).
                              In Jog mode indicates Continuous (c) or incremental (i).
                              In Hand mode indicates Target position (t) or Feed (F).

4.   BLOCK display window indicates which block is being executed (AUTO mode) or being examined (PROG. mode).

5   LED on indicates the display is in imperial measurements.

6.   LED on indicates the display is in metric measurements.

7.   X, Y and Z axis displays are multifunction displays. Refer to this manual for display meaning in different modes

8.   Mode key. Allows PROG, JOG, HAND and AUTO modes to be selected.

9.   Changes display between imperial and metric displays, LEDs 5 and 6 above will change.

10.   Active in Program mode as a subroutine call command. The letter c appears in the page window.

11.   MODE window. Indicates AUTO, PROG, JOG or HAND (manual) modes.

12.   Auxiliary LEDS.
       In PROG mode indicates which auxiliaries are being used in the currently displayed block of data.
       In JOG c mode indicates the selected speed of jogging.
       In JOG i mode indicates the selected jog increment.
       In JOG mode with offset tuning selected it indicates the analogue servo command offset (see *Technical Specification - Installation*).

EPS 110

JOG
8 7 6 5 4 3 2 1
AUX

Prog
MODE

START 1
STOP 0
CALL
MM/INCH
MODE

X Y Z
9 6 3
8 5 2
7 4 1

D I
↑

0   BLOCK
G -   TEACH
'   +   AUX
?   ↕↑   PAGE

X↓ Y↓ Z↓

SINGLE
HOLD
P PAGE
1 BLOCK
INCH
MM

X
23.78 +

Y
93.78 +

Z
13.78 +

RETURN

RS232
CTS
DTR

GOODWIN
ELECTRONICS

---

13. Cycle START and Cycle STOP keys.
14. X select key. Use to select the X axis to enter data or jog the machine. The +/- will stop flashing when selected. Also use to deselect the X axis.
15. Y select key. Use to select the Y axis to enter data or jog the machine. The +/- will stop flashing when selected. Also use to deselect the Y axis.
16. Z select key. Use to select the Z axis to enter data or jog the machine. The +/- will stop flashing when selected. Also use to deselect the Z axis.
17. Minus key. Allows negative data to be entered in programming modes and jogging in the negative direction in the jog modes. It also allows negative offsets to be applied to the servo analogue voltage if in the analogue offset mode (see *Technical Specification - Installation*). In program mode this can be used to delete the current block.
18. Step key. Used to advance the block displayed.
19. BLOCK key. Used to select a block number to be displayed or executed (AUTO) or to extend the number of program blocks (PROG mode).
20. NUMERIC keys. Used to enter data.
21. TEACH key. Used to transfer the current position data to the selected program block. Active in JOG mode.
22. Decimal Point key. This allows non integer data values to be entered. In Program mode with no display flashing this can be used to clear the program from the currently selected block to the end of program.
23. AUX key. Used to select the auxiliary led function for programming
      In the PROG mode it sets/resets the auxiliary lines used in the selected block
      In the JOG c mode it allows the jogging speed to be set
      In the JOG i mode it allows the jog increment to be set
24. Plus key. Allows positive data to be entered in programming modes and jogging in the positive direction in the jog modes. It also allows positive offsets to be applied to the servo analogue voltage if in the analogue offset mode. In program mode this can be used to insert a block of data.
25   PAGE key. Allows various pages of information to be selected and edited.
      Position Feed and dwell data in PROG mode
      Continuous or incremental jog in JOG mode
      Position and Feed data in HAND mode.
26. Hold /Return/Fast key. Allows a hold and / or a subroutine return to be set / reset in a program block, or Fast feedrate to be programmed.
27. Zero keys. Only operational in the JOG modes and dependent on system configuration (see *Technical Specification - Datum Methods*).
28,30,32 Data sign indicators. Can be + or -. When flashing the axis is selected.
29. RS232 indication LED. Active during RS 232 operations.
31. RETURN LED. When illuminated indicates that a RETURN is programmed in the current block.

3.0   MODE SELECTION

There are four main operating modes available on the EPS 110 controller which are; Auto Mode, Program Mode, Jog Mode, Hand (semi automatic) mode. These can all be selected using the key,

MODE

There are also two special modes, the Datum mode and the Parameter Configure mode. These are used to datum the axes and to characterise EPS110 to the machine. These modes are explained in detail in the *Technical Specification* and are not generally required by the operator. The mode selected is indicated by letters displayed in the MODE window. Within certain modes it is possible to select different display pages using the key,

PAGE

The information displayed will depend on the mode selected. The following pages of this document describe what these displays mean and how to interpret the data.

4.0   AUTO MODE

When the EPS110 is switched on it will automatically select this mode. In this mode the unit can be made to automatically execute a program. The X, Y and Z displays show the current position of the machine relative to the user datum, the block display shows the currently selected block, the mode display will show the word "Auto" and the auxiliary display will show which auxiliary outputs are programmed to operate.

The Block display will show a four digit alpha-numeric value when the EPS110 is first switched on, this represents the system software that is installed in the unit and should be quoted to your supplier when requesting service support. When the first key is pressed it will remove this value and change the display to show the currently selected block number.

4.1   Cycle Start and Cycle Stop.

Using the cycle start and cycle stop keys i.e.

will cause the EPS110 to execute a move, and depending on the status of the single block/auto input the controller will either execute all of the program blocks continuously or simply execute the current block. Therefore, you should be aware of the program in the controller before you use these keys (refer to the section *Program Mode*).

If the unit is in the AUTO mode and no error code is being displayed then pressing the Cycle START key will put the unit in-cycle and the letter **r** (for run) will be displayed in the Page window. The unit will use the currently selected block to calculate the target co-ordinates of the X, Y and Z axis and the controller will provide a command signal to drive the machine to these target positions with the appropriate acceleration and deceleration characteristics. Whilst the unit is 'incycle' all keys except for the Cycle START and Cycle STOP are disabled. To stop the execution of the program press the Cycle STOP key. This will cause the unit to immediately disable *all* outputs, ie. Make the command signal zero therefore stopping all motors, de-energise all auxiliary outputs and cancel the letter **r** in the PAGE window.

4.2   Block Select.

Before executing a program it is possible to select any block of programmed data from which the program execution will start. For example to select block 8 the following key sequence can be used,
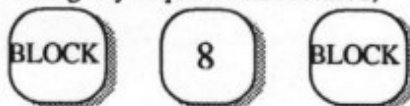
If you try and select a block that is greater than the program length the EPS110 will automatically select the highest programmed block.

Alternatively the block number can be advanced by one (up to the limit of blocks programmed) by pressing the STEP key.

5.0   PROGRAM MODE.

The Program mode is the mode in which the user can construct a series of *blocks* of data which will determine the movement and operation of the machine which the EPS 110 is controlling.

To assist in writing a program a programming sheet which can be copied, is included at the rear of this manual.

A program consists of a number of *BLOCKS* of data. The currently selected BLOCK number is displayed in the Block display window. Each Block of data contains the following information,

1. The **X target position** relative to the user datum or relative to the subroutine call position.
2. The **Y target position** relative to the user datum or relative to the subroutine call position.
3. The **Z target position** relative to the user datum or relative to the subroutine call position.
4. The **X axis feed value** as a percentage of max. feed allowed.
5. The **Y axis feed value** as a percentage of max. feed allowed.
6. The **Z axis feed value** as a percentage of max. feed allowed.
7. The **Auxiliary Output Lines** that are to be active.
8. A program **HOLD** if the machine is to stop once it has reached the target positions specified by 1, 2 and 3 above.
9. A **Dwell time** that represents a delay between completion of one positional block move and the start of the next.
10. A **Subroutine return.** On completion of the current block the program execution will return to the start or to where it was called from.

OR

11. Instead of a positional move program block a **Subroutine call** can be requested. In this case non of the above data is valid instead the programmer must enter the called block number, the number of times it is to be called and the type of positional values that is programmed, ie Incremental or Absolute.

When Program mode is selected the word 'Prog' will be displayed in the Mode window. This mode has three 'Pages' of display data which can be displayed using the PAGE key. The page of data being displayed is identified by the character in the PAGE display window. The display defaults to showing the Positional information for the program block selected when this mode is selected. This is confirmed by the letter P in the page window, pressing the PAGE key will change this letter to an F and the programmed Feed rates of the selected block are displayed as a percentage of full speed. Press PAGE a second time will display the dwell timer value, which is confirmed by a 'd' in the PAGE window. A third press of the page key will return the display to the Positional information.

5.1   Clear Function.

All or part of an existing program that is in the memory of the controller can be cleared in the program mode by pressing the decimal point key twice in quick succession, provided no parameter is selected (ie no displays are flashing),

If this is done when block one is selected the total program is cleared and the Block window will now display 1, all positional information will be set to zero, Feed rates will be 100%, Dwell time will be zero and all auxiliary outputs will be reset. The number of programmed blocks is also set to 1.

To clear part of the program, select the block that you wish to become the last programmed block then double press the decimal point. All blocks *after* the selected block are cleared.

5.2   Programming Additional Blocks.

On clearing all the programmed data (see above) the block limit is set to 1 (ie., the controller thinks that only one block

----

exists) but this can be expanded by 1 using the following sequence,

$$\boxed{BLOCK} \quad \boxed{\rightarrow} \quad \boxed{BLOCK}$$

If the user wishes to increase the block number by more than one then, the STEP key is pressed the appropriate number of times before pressing the BLOCK key. Each time the step is pressed the block number will increase by one.

Note that the data from block 1 is carried forward to block 2 , block 2 to block 3 etc. This operation can be repeated until all of the allowable blocks of data have been used.

5.3   Programming Target Position, Feedrate and Dwell Time.

Programming the target position for a block is carried out by selecting a display with the appropriate select key (X, Y or Z) and then entering the required target position using the numeric keys and then deselecting that axis again using the select key (X, Y or Z).

Thus, for example an X target position of 2.1 mm can be entered in the following manner,

$$\boxed{X} \quad \boxed{2} \quad \boxed{.} \quad \boxed{1} \quad \boxed{X}$$

This can be repeated for all axes and the appropriate target data entered. To program a negative target value press the minus key *after* entering the value

An alternative method for programming the target position is to use the Teach facility described in the section titled "*Jog Mode*".

Feed rate information can be entered by first selecting the FEED page by pressing the PAGE key until the Page window displays an F and then entering the appropriate data. If an X axis feed rate of 100% is required then proceed as follows,

$$\boxed{X} \quad \boxed{1} \quad \boxed{0} \quad \boxed{0} \quad \boxed{X}$$

This can be repeated for all axes and the appropriate feed rate data entered.

In some applications the maximum programmable servo command signal may be limited by the Parameter Configure mode (Refer to *Technical Specification - Parameter Configure Mode*). This can be overridden using the Hold/Return/Fast key by using it in the following sequence,

$$\boxed{X} \quad \boxed{?} \quad \boxed{X}$$

The X axis is now programmed to move at the fastest possible speed and the display will confirm this by displaying the word "Fast" on it.

To program a dwell time, press the PAGE key until a 'd' appears in the Page window. The EPS110 will display a value in the X window. This represents the time, in seconds between it reaching the programmed position and stepping on to the next block. To program a value of 1.5 seconds, for example proceed a follows,

$$\boxed{X} \quad \boxed{1} \quad \boxed{.} \quad \boxed{5} \quad \boxed{X}$$

5.4   Programming Auxiliary Outputs.

The EPS 110 Controller has 8 auxiliary on/off outputs for customers to use to control other machine functions such as

----

coolant, fans, tool change, etc. The program status of these outputs are displayed in the auxiliary window on the top right of the front fascia. The outputs are only active when in-cycle in the Auto and the Hand modes.

Programming of the auxiliary outputs can only be carried out in the program mode. If auxiliary 1 is required to operate during a program block, it can be programmed in the following way. Select the appropriate block, then with no functions selected (ie no flashing displays) proceed as follows,

Led 1 on the auxiliary display will now be flashing to confirm that auxiliary one is programmed. To program additional Auxiliaries at the same time, press the numeric keys corresponding to the required auxiliary before pressing the AUX key the second time. All eight auxiliaries can be programmed in this way.

To disable an auxiliary simply repeat the above operation and the Led corresponding to that auxiliary will turn off.

NOTE.
1.   If no auxiliary outputs are programmed when the AUX key is pressed the auxiliary Leds will strobe to indicate that the AUX key has been pressed and that auxiliary outputs can now be programmed, but there are no currently programmed outputs.
2.   The function of the outputs is determined by the configuration parameters defined in the *Technical Specification - Parameter Configure mode.*

5.5   Program Hold.

The program execution may be halted at the end of any block by inserting a program HOLD using the multifunction key,

Pressing this key once will illuminate the HOLD Led, pressing it again will illuminate both the HOLD and the RETURN Led (see *Subroutines* below), a third time will turn off the HOLD Led leaving the RETURN on, and a fourth time will turn both of them off. This key operates in this manner only if the EPS110 is in Program mode and not in Feed page.

A program HOLD can be programmed into every block if desired, this would have the same effect as single block operation (see *Technical Specification - Input Definitions*). The program will continue if the Cycle Start is pressed or a Cycle Start input signal is given. This feature can be used to pass control of the machine to something else (ie a PLC) or for inspection, and then continue from the point at which the HOLD was programmed. If for example a program was to be stopped at the end of block 5 then a HOLD would be programmed into the data of block 5. The controller would then stop after it has *completed* block 5. To continue it is only necessary to press cycle start.

When a HOLD is programmed in a block the HOLD Led on the front panel will be illuminated as soon as the block is selected. When the EPS110 has completed a block move during operation the HOLD Led will flash to indicate that the it is waiting for a 'Cycle Start' before it will continue. There is also a HOLD output which will only be activated when the block is completed.
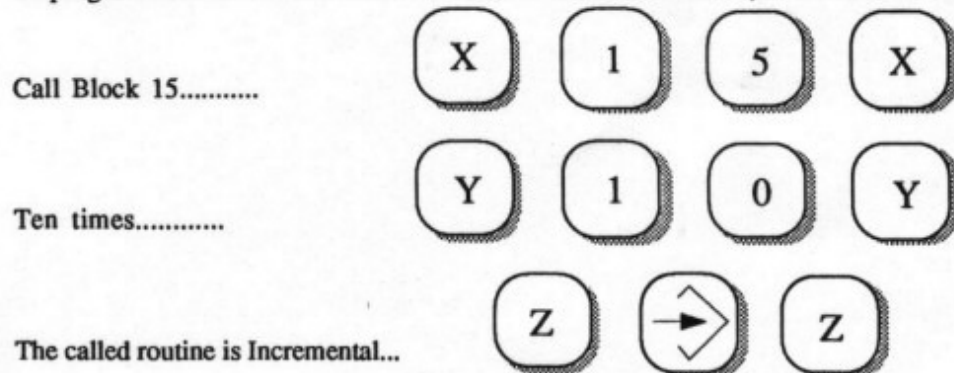
5.6   Subroutines.

A subroutine is a secondary program that can be executed (called) from anywhere in the main program. The subroutine normally contains a program with the positional moves associated with an operation that is repeated any number of times. Using the subroutine eliminates the need to write the same part of the program repeatedly. Any program block can be used to call a subroutine provided that the called block has been (or will be) programmed and that not more than ten subroutine calls are nested one after the other.

Pressing the CALL key in Program mode, with no display flashing will program a call and select the Subroutine Call

----

display. A small "c" will appear in the page window to confirm that the correct display is showing. All other programmed data relating to this block will now be ignored. Pressing the CALL key again will cancel this display and the Subroutine Call, and the old program data will be restored.

With a subroutine call selected the three main displays show the called block number, the number of times it will be called and if it is an Absolute or Incremental positional move, in the X, Y and Z displays respectively.

To program a call to an incremental subroutine written at block 15, to be called 10 times proceed as follows;

Call Block 15...........

X   1   5   X

Ten times............

Y   1   0   Y

The called routine is Incremental...

Z   →   Z

The Z display will show the characters "Abs" for an absolute positional call and "Inc" for an incremental positional call. Pressing Z - step - Z as indicated above will change the display between these two options.

An absolute subroutine call means the positional values programmed in it are all relative to the user datum. An Incremental call means that the positional values programmed are all relative to the position from which the routine is called.

If a call is made to a block that is not programmed or if more than 10 routines are nested, the controller will display "Err 5" during operation and switch off all I/O.

To return from a subroutine back to the main program use the Hold/Return/Fast key.

Pressing this key once will illuminate the HOLD Led (see *Hold* above), pressing it again will illuminate both the HOLD and the RETURN Led, a third time will turn off the HOLD Led leaving the RETURN on, and a fourth time will turn both of them off. Therefore it is possible to hold the program operation before returning from a subroutine. This key operates in this manner only if the EPS110 is in Program mode and not in Feed page.

If a Return is programmed with no call the EPS110 will return to Block 1.

5.7   Sample Program.

An example of a 9 block program is given below;

Block No	Call	X mm	Y mm	Z mm	AUX	X FEED	Y FEED	Z FEED	HOLD
1		+1.00	+2.00	+5.0	0	100.0	100.0	50.6	off
2		+10.00	.00	- 5.40	1	90.0	90.0	45.9	on
3		+10.00	.00	+20.00	2	90.0	65.0	45.9	on
4		+15.00	- 7.50	+20.00	0	50.0	45.0	45.9	off
5		+15.00	- 7.50	+ 3.00	3 and 4	30.0	90.0	45.9	off
6		+15.00	- 7.50	+20.00	8	90.0	90.0	45.9	off
7		.00	.00	+20.00	0	90.0	90.0	45.9	on
8		.00	+ 1.00	+10.00	6 and 3	90.0	90.0	45.9	on

| 9 | -2.00 | + 2.00 | +20.00 | 0 | 20.0 | 20.0 | 45.9 | on |

To enter the data given in this example proceed as follows,

      1. Select program mode.

      2. Clear any existing program.

      3. Enter the data for block 1 as described above.

      4. Select BLOCK and press STEP eight times to create 9 blocks.

      5. Return to block 2 and enter the data for block 2 given in the table above using the editing facilities described below

      6. Repeat step 5 for all the remaining blocks.

5.8   Editing a Program.

All editing can only be carried out in the *program mode*. Editing can be done in three ways, namely; Re-writing a data block, Inserting a data block and Deleting a data block.

Rewriting a Data Block - Select the block to be edited say block 1, in the following manner,

BLOCK   1   BLOCK
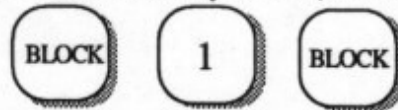
If the X position data is 5.90 and should be 6.90 then it can be changed as follows,

X   6   .   9   X

The X position data has now been changed to the required value. This can be repeated for the Y and Z axes if required and also for all of the other programmed data stored in that block of data.

The same editing procedure can be carried out on any of the programmed blocks of data. In general the procedure is, select the block of data to be edited, then change the data to the new values in the same way as originally programmed.

Inserting a Data Block - An additional block of data may be inserted between any 2 of the blocks that are already programmed in the memory. Assume that a programme of 12 blocks has been programmed and it is necessary to insert one additional block of data between block No 2 and block No 3. First select block 3 (the block number will be flashing) and then press the dual function + key,
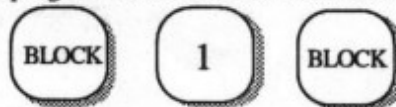
BLOCK   3   +

The data contained in block 3 is copied to a block 4, block 4 goes to block 5, etc. until the end of programmed data is reached. The data that was contained on block 3 is still resident in block 3 and this can now be edited by re-writing the data using the editing features described above. There are now 13 blocks in the program. If two or more blocks need to be inserted then the above procedure can be repeated at any position in the block sequence.

Deleting a Data Block - Any block of data may be deleted (*except* block 1 if only one block has been programmed). Assume that a programme of 12 blocks has been programmed and it is necessary to delete block 3. First select block 3 (the block number will be flashing), and then press the dual function - key,

BLOCK   3   -

The data contained in block 3 is deleted and the data in block 4, is transferred to block 3, block 5 goes to block 4, etc. until the end of programmed data is reached. The number of blocks in the program has been reduced by one. If two or more blocks need to be deleted then the above procedure can be repeated at any position in the block sequence.

Examining the Program - To examine a programme from block 1 select the program mode and proceed as follows:

BLOCK   1   BLOCK

The programmed contents of block 1 will now be displayed. Pressing the STEP key will advance the block number by 1 and display the complete contents of the next block. This can be continued up to and including the last block programmed, ie., the block limit. Pressing the page key will display the Positional data, Feed data and Dwell data if the block is not a subroutine call.

6.0   JOG MODE

Select Jog mode using the MODE key, the mode display window will show the word "Jog" to confirm that the Jog mode has been selected. With Jog mode selected it is possible to move the machine by directly commanding the motors to move. This is done in two ways, either Incremental or Continuous moves. The EPS110 defaults to Continuous move operation when Jog mode is selected. To switch between the two operations press the PAGE key with no display flashing.

6.1   Continuous Operation.

When this operation is selected it allows the user to jog each axis (in turn) in a specified direction at a specified speed. This operation is indicated by "Jog" being displayed in the mode display window and "c" in the page window. On selection of continuous jog operation the feed rate for the jogging movement is automatically set to 1% of the maximum feed rate. This is indicated on the auxiliary Led display next to the mode window, AUX 1 Led on indicates 1% feed set. The feed rate can be set in the following steps ; 1, 2, 5, 10, 50 and 100% of the maximum permitted feed rate by simply pressing any numeric key between 1 and 8 respectively.

To move a axis press the axis select key corresponding to the axis to be moved, X, Y or Z then press the pulse or minus key depending on which direction the axis must be moved in. The axis will move all the time the key is pressed and will stop when it is released. For example to jog the X axis in a positive direction proceed as follows;

    1.   Select the X axis using the select key, **X**.
    2.   Set the feed rate to the appropriate value.
    3.   Press and hold down the + key and the controller will move in the positive X direction for as long as the key is kept pressed. The motor speed gradually increases (following the acceleration ramp defined in the configuration parameters) up to the maximum allowed and the motor stops (following a rapid deceleration) as soon as the key is released.

To jog the machine in the negative direction follow the same procedure described above but use the - key in place of the + key.

6.2   Incremental Operation.

When this mode has been selected an "i" will be displayed in the PAGE display window and "Jog" in the mode window. This operation allows the user to jog an axis a specified distance in a given direction.

On entry into the incremental jog operation the distance for the jogging movement is automatically set to 1 display resolution. This means that the machine will move 0.1, 0.01 or 0.001 mm depending on how many decimal places the display is set for. *Note*: If the system resolution is set to 0.5, 0.2, 0.05, 0.02, 0.005 or 0.002 in the parameter configure mode the EPS110 will not be able to move one display resolution. The distance set is indicated on the auxiliary function display next to the mode window, AUX 1 Led on indicates 1 display resolution is set. The distance can be set in following steps; 1, 2, 5, 10, 50, 100 and 200 display resolutions by simply pressing any numeric key between 1 and 8 respectively.

To jog the X axis in a positive direction proceed as follows;

      1.   Select the X axis using the select key, **X**.
      2.   Set the distance to the appropriate value using keys 1 to 8.
      3.   Press the + key once and the controller will move the X axis the appropriate distance in the positive direction. The configured acceleration and deceleration curves will be followed.

To jog the machine in the negative direction follow the same procedure described above but use the - key in place of the + key.

6.3   Teach Function.

This facility can be used with either of the JOG operations and allows the user to "Teach" the controller a series of X, Y and Z positions which will be stored as a series of blocks of program data.

This facility will only allow the user to store absolute positional information ie., feed rates AUX functions and other program data cannot be taught using this facility and must be programmed in program mode.

To teach a program position, first select the program block to be taught. This block can either be an existing block which will be over written when the new position is "taught", or if a new program is to be generated, clear any existing program by following the instructions in program mode then continue as follows. Jog the machine to the position which is to be taught. Then select the Teach function using the key;

TEACH

and the pulse / minus signs on the axis displays together with the block number will flash. To allocate these positions to this block number now press the STEP key, or else the action can be cancelled by repressing the TEACH key again.

When the position is taught the current axes positions will form the axes position data of the selected block and all flashing displays will stop. Data for X, Y and Z axes are stored simultaneously. If you are teaching a new program, or are adding new positions to the end of an existing program the block number must be advanced by pressing BLOCK - STEP - BLOCK before teaching the next block. If you are editing an existing program press STEP to advance to the next block or use BLOCK - <block number to be edited> - BLOCK to select a specific block.

7.0   HAND MODE (SEMI-AUTOMATIC).

This mode allows the user to initiate a single move of one or more axes to an exact position without having to resort to writing a program in the program mode. It can be selected using the MODE key and when selected the message "Hand" will be displayed in the mode window.

Target positions for X, Y and Z can be entered using the axis select keys in exactly the same way as would be done in the program mode. When an axis is selected the letter t is displayed in the PAGE window which indicates that the main displays are now displaying the target position data which will initially be the current position. Pressing the axis select key again returns the display to showing the current position of the machine.

Feed values for each axis can be programmed by selecting the feed page by pressing the PAGE key such that an "F" is displayed in the page window, and entering the appropriate data in exactly the same manner as described in the *Program Mode* section of this manual.

Auxiliary functions can also be programmed for the manual move as they are in the program mode.

Once the data for the manual move has been set the machine can be made to execute the move by ensuring that all axis are deselected ie no flashing displays, and then pressing the CYCLE START key (give an external cycle start signal). The machine will execute the required move using the acceleration and deceleration characteristics set for the machine. Once the move has been completed the controller will automatically switch itself out of cycle.

GOODWIN ELECTRONICS - EPS110 PROGRAMMING SHEET.

Sheet Number:

Block	Call	X	Y	Z	X Feed	Y Feed	Z Feed	Hold	Ret.	Auxiliaries 1- 8	Dwell	Comments