AMS APPLIED MICROSYSTEMS

MP56

CONTROLLER

REFERENCE MANUAL

APPLIED MICROSYSTEMS, INC.
9410 Aero Space Drive
St. Louis, MO 63134

MP56 CONTROLLER MANUAL

INTRODUCTION

The Model MP56 Controller is a special purpose computer designed to control a sheet metal processing machine. The controller supports 5 types of operations; shear, side holes, cross holes, end notches, and corner notches and can be used with pre-cut sheets or coil sheet stock.

The MP56 is designed to make it easy for the operator to program. The operator has only to enter the quantity and type of part, the finished length, and the desired hole spacing. The computer then calculates the required press pattern based on this information and some internal dimensional constants and the part is ready for production. The MP56 can produce 21 different part types in use with either pre-cut sheets or coil stock.

A simple diagram of the machine is shown in figure 1. The rotopulser, or rotary pulse generator, transmits a pulse to the computer for each linear movement of the material. The computer keeps track of these pulses and then controls the driving rolls and the press solenoids in order to fabricate the patterns that were programed.

This manual consists of 6 more sections that explain its ooeration and use. The following is a list of the sections as they appear in this manual:

1. SPECIFICATION
2. HARDWARE DESCRIPTION
3. INPUT/OUTPUT DATA
4. MODES OF OPERATION
    A. SETUP MODE
    B. PROGRAM MODE
    C. ERROR MODES
5. CALIBRATION
6. ENTERING A NUMBER

If the operator is unfamiliar with entering data into the unit, they should proceed to the ENTERING A NUMBER section for more details.

MP56 CONTROLLER MANUAL

SPECIFICATION

Resolution	.012 inches with a 12 in. wheel
Accuracy	Output turned on within 1 count
	(does not include machine errors)
Maximum Line Speed	200 FPM
Maximum Length Part	9999.99 inches
Maximum Batch Quantity	9999
Number of Batches	50
Pattern Types	21
Input Power	115VAC +/- 10%, 60 HZ, 1 Amp max
	5-24VDC, 1 Amp(excluding loads)
Outputs	8 (FWD, SLOW, REV, SHEAR, END NOTCH,
	CROSS HOLE, SIDE HOLE, CORNER NOTCH)
Speed Logic	Non-stop
	Fwd-Slow
	Fwd-Fast
	Fast-Slow
Length Totalizer	999999 FT or Meters
Physical size	6 in. X 9 in, X 10 in.
	Front panel with 1 in. flange
Weight	13 pounds

HARDWARE DESCRIPTION

Figure 2 shows the layout of the front panel and keys. There is a 16 key keypad, 6 illuminated pushbutton switches, and a 12 digit display. The function of each switch and key is as follows:

MANUAL END NOTCH

The MANUAL END NOTCH key is used to manually cycle the END NOTCH output when the line is in the HALT mode. The lamp indicates when the END NOTCH output is on in both the HALT and RUN modes. For an explanation of different operating modes, see the a MODES OF OPERATION section of this manual.

MANUAL SIDE HOLE

The MANUAL SIDE HOLE key is used to manually cycle the SIDE HOLE output when the line is in the HALT mode. The lamp indicates when the SIDE HOLE output is on in the HALT and RUN modes.

MANUAL SHEAR

The MANUAL SHEAR key is used to manually cycle the SHEAR output when the line is in the HALT mode. The lamp indicates when the SHEAR output is on in either the HALT or RUN modes. The SHEAR key also causes a RESET condition in the controller. The RESET means that all parts in progress will be terminated and the controller will re-calculate all the programed parts. This should be done to put into effect any setup parameters that were changed while the MP56 was running.

METRIC WHEN LIT

The METRIC WHEN LIT key is used to switch between metric and English units of measure. When the lamp is lit, data is entered and displayed in centimeters(meters in the accumulator). When the lamp is not lit, the data is displayed and entered in

inches(feet in the accumulator).

RUN

The RUN key is ued to initiate an automatic run of the machine. The green lamp indicates when the controller is in the RUN mode.

HALT

The HALT key is used to abort an automatic run of the machine. The red lamp indicates that the controller is in the HALT mode.

SETUP

The SETUP key is used to enter the SETUP mode. The SETUP mode is used to enter semi-permanent data about the machine, such as die spacing, cycle duration, die size, flow direction, etc. This mode is also used to view the accumulator which contains the total number of feet(or meters) run.

END

The END key is used to exit the PROGRAM or SETUP modes and return to the HALT or RUN mode display.

PRG

The PRG key is used to enter the PROGRAM mode to enter batch data on the parts to be run.

ENT

The ENT key is the data ENTER key and it is used by the operator to indicate to the computer to take the data that is present in the display window. Refer to the ENTERING A NUMBER section of this manual for more information.

CLR

The CLR key is the data CLEAR key and is used to erase key entry before the ENTER key. It is also the key that is used to set the total length accumulator to zero.

The display on the front panel is a 12 character 7-segment display that is used to show data and prompt the operator for information.

Material movement is sensed by the MP56 through the rotopulser, which is an incremental optical shaft angle encoder. This device generates a precise number of pulses for each revolution of its shaft. On the shaft is a precision measuring wheel which rides on the material. As the material moves through the machine, it turns this wheel and thus causes the rotopulser to generate pulses. The computer counts these pulses and by knowing the counts per revolution of the rotopulser and the circumference of the wheel, the computer can detect the amount of material that has moved through the machine.

The heart of the MP56 is the microprocessor and its associated memory components. The operating program of the computer is contained in read-only-memory (ROM) and user data such as setup parameters and batch data is contained in random-access-memory (RAM) that normally would not retain the information when power is off, except that there is a battery in the unit that provides power to the RAMs at all times. This battery should last for about 5 years. Should the unit fail to retain memory on a consistant basis, the battery should be replaced.

INPUT/OUTPUT DATA

There are 8 outputs and 8 inputs to the MP56. The outputs are 5 ampere open collector transistors that switch load current to the DC ground. The function of each input and output is as follows:

OUTPUTS

FORWARD

This output is used to turn the machine drive rolls in the forward direction.

SLOW

Depending on the speed logic selected, this output is used to turn the machine drive rolls at a slower rate of speed. See the SETUP section of this manual for more information.

REVERSE

This output is used to turn the machine drive rolls in a reverse direction.

SHEAR

The SHEAR output is used to cycle the shear or cutoff press.

END NOTCH

The END NOTCH output is used to cycle the end notch press.

SIDE HOLE

The SIDE HOLE output is used to cycle the side hole press.

CROSS HOLE

The CROSS HOLE output is used to cycle the cross hole press.

CORNER NOTCH

The CORNER NOTCH output is used to cycle the corner notch press.

INPUTS

JOG FORWARD

The JOG FORWARD input allows the operator to jog the metal in the forward direction. This input is only looked at in the HALT mode and no jogging is allowed while the controller is running.

JOG REVERSE

The JOG REVERSE input allows the operator to jog the metal in the reverse direction. This input is only recognized in the HALT mode.

METAL CONTACT

The METAL CONTACT input is used by the MP56 to detect the leading edge of a metal sheet as it enters the machine. This input is used only in the PRE-CUT mode with pre-cut sheets, it is not used when the MP56 is used in the COIL mode. For more information on these modes, see the SETUP section of this manual.

SHEAR COMPLETE

The SHEAR COMPLETE input is used to indicate that a shear press cycle has been completed. This input is not needed if the shear press cycle is to be timed by the use of the SHR SEC. parameter in the SETUP mode of the MP56. The MP56 will hold the SHEAR output on until it detects a SHEAR COMPLETE or the SHR SEC. time elapses.

END COMPLETE

The END COMPLETE indicates that a end notch press cycle has been completed. The MP56 will activate the END NOTCH output until it detects a END COMPLETE or the P1 SEC. parameter time in the SETUP MODE has elapsed.

SIDE HOLE COMPLETE

The SIDE HOLE COMPLETE input indicates that a side hole press

cycle has been completed. The MP56 will activate the SIDE HOLE output until it detects a SIDE HOLE COMPLETE or the P2 SEC. parameter time has elapsed.

CROSS HOLE COMPLETE

The CROSS HOLE COMPLETE input indicates that a cross hole press cycle has been completed. The MP56 will activate the CROSS HOLE output until it detects a CROSS HOLE COMPLETE or the P3 SEC. parameter time has elapsed.

CORNER NOTCH COMPLETE

The CORNER NOTCH COMPLETE input indicates that a corner notch press cycle has been completed. The MP56 will activate the CORNER NOTCH output until it detects a CORNER NOTCH COMPLETE or the P4 SEC. parameter time has elapsed.

MODES OF OPERATION

There are five modes of operation in the MP56: SETUP, PROGRAM, RUN, HALT, and ERROR. It is possible to be in two modes at the same time. It should be clearer to explain the two types of modes that one could encounter. One type can be called the display mode and the other can be called the machine mode. The display modes are SETUP, PROGRAM, RUN, and HALT. This refers to what the computer is showing on the display and what keys it will respond to. The machine modes are RUN and HALT, and they refer to what the machine is doing. The ERROR mode can be entered from any type of mode depending on what the error is. By making this distinction between the two types of modes, an operator can put the machine in the RUN mode and then put the display in the PROGRAM mode and thus program new data while older batches are being run.

SETUP MODE

The SETUP mode is used to enter machine parameters and some seldom changed part parameters. This mode is entered by pressing the SETUP key and is exited by pressing the END key or by stepping through all of the parameters. Table 1 shows a table of these parameters with the prompts used, range of allowed values, and a place to write the proper values for your machine if your machine is using coil stock. Table 2 shows a table of parameters for your machine if it is operating on pre-cut sheets. The setup parameters for both types of operation are presented together here since most of the parameters are identical. The setup parameters and their function in the machine are as follows:

MACHINE CONFIGURATION

This parameter allows the operator to select which type of metal stock the machine is to be punching on. Upon entering the SETUP mode, the operator is prompted with "CONF. COIL". By pressing in numbered key the prompt will toggle between the promot above and "CONF. PrEcut" prompt. If the machine is to use coil stock, toggle the promot until "CONF. COIL" is seen and then strike enter. If pre-cut sheets are to be used, toggle the prompt until "CONF. PrEcut" is seen and then strike enter. With the type of operation selected, the next parameter will appear.

LENGTH TOTALIZER (coil operation only)

The LENGTH TOTALIZER, or accumulator, indicates the total amount of material that has passed thrugh the machine since the accumulator was last cleared. The operator can only clear this amount to zero using the CLR key and he cannot set it to a number.

BATCH HALT (coil operation only)

The BATCH HALT function allows the operator to select either an automatic return to the HALT mode after each batch is run or a continuing run of the next batch. In either case the next batch may have been started by the machine with partial patterns being produced but no complete parts will be made if the BATCH HALT is set to YES. This may be required in some installations to allow for packing of the previous batch or for a required change of some downstream machinery because of a dimensional change in the parts being run.

LEADING EDGE SCRAP LENGTH (coil operation only)

The LEADING EDGE SCRAP LENGTH is the distance required on the leading edge of a part to allow for an orderly transition from a

shear only part to an end notched or corner notched part. Since a shear only part does not put a pattern on either the trailing edge of one part or the leading edge of the next part, when the last shear only part was completed, there would not be a pattern on the leading edge of the next part. If that part were to be an end notched part, this parameter will force an automatic double shear so that a piece of scrap will be produced and the first part of the end notch batch will have a notch pattern.

TRAILING EDGE SCRAP LENGTH (coil operation only)

The TRAILING EDGE SCRAP LENGTH is similar to the LEADING EDGE SCRAP LENGTH described above except that it applies to the scrap required at the transition from a end notched part to a shear only part.

START LENGTH (coil operation only)

The START LENGTH is used to specify the distance that the line should move before making an initial notch or shear when the line is reset. The MP56 will scrap this length each time the line is started from a reset condition, it will not produce any scrap between each batch under normal running conditions.

SLUG LENGTH (coil operation only)

The SLUG LENGTH parameter is the width of the slug that the shear may remove when it is cycled. This is automatically added to each part run with half being added to the front edge and half added to the rear edge.

SHEAR PAUSE (coil operation only)

The SHEAR PAUSE parameter is a time delay after the shear press cycle that will allow time for special handling of parts as they exit the machine.

SHEAR TIME (coil operation only)

The SHEAR TIME parameter sets the time duration of the shear

press cycle. The SHEAR output will stay on for this length of time unless a SHEAR COMPLETE is detected.

END NOTCH TIME

The END NOTCH TIME(P1) parameter sets the time duration of the end notch press cycle. The END NOTCH output will remain on until the time has elapsed or a END NOTCH COMPLETE is detected.

SIDE HOLE TIME

The SIDE HOLE TIME(P2) parameter sets the time duration of the side hole press cycle. The SIDE HOLE output will remain on until the time has elapsed or a SIDE HOLE COMPLETE is detected.

CROSS HOLE TIME

The CROSS HOLE TIME(P3) parameter sets the time duration of the side hole press cycle. The CROSS HOLE output will remain on until the time has elapsed or a CROSS HOLE COMPLETE is detected.

CORNER NOTCH TIME

The CORNER NOTCH TIME(P4) parameter sets the time duration of the corner notch press cycle. The CORNER NOTCH output will remain on until the time has elapsed or a CORNER NOTCH COMPLETE is detected.

MINIMUM LENGTH

The MINIMUM LENGTH parameter allows for a limit to be set for the smallest part that could be run through the machine. This factor may be necessary if short parts can jam the shear die.

COUNTS PER REVOLUTION

The COUNTS PER REVOLUTION parameter is the number of counts per revolution that are contained in the rotopulser being used with the unit. This information is used by the controller to calculate linear movement.

DISTANCE PER REVOLUTION

The DISTANCE PER REVOLUTION parameter is the distance that the

wheel which is attached to the rotopulser travels in one full revolution. This is equal to the circumference of the wheel and is used with the counts per revolution to calculate linear movement.

CORRECTION FACTOR

The CORRECTION FACTOR parameter is used to make minute corrections in the system after the counts per revolution and distance per revolution parameters have been correctly entered. This number is actually a multiplication factor to scale the actual system counts-per-inch of the unit. If the counts per revolution and the distance per revolution are correct, and the machine produces no length error, then a CORRECTION FACTOR of 1.00000 would be used. See the LENGTH CALIBRATION section of this manual for the proper way to calculate your CORRECTION FACTOR.

DIRECTION OF TRAVEL

The DIRECTION OF TRAVEL parameter allows the operator to change the counting direction by selecting either a 0 or a 1. The rotopulser provides direction of flow information to the controller but it can be physically mounted on the machine so that for forward movement of the material, either a clockwise or counter-clockwise rotation of the transducer will occur. This parameter allows for an easy direction change to achieve the desired material flow.

SLOWDOWN DISTANCE

The SLOWDOWN DISTANCE is the length required for the machine to dependably shift from fast speed to slow speed so that the material is moving at slow speed when a press operation occurs. This parameter has no function when non-stop speed logic is selected.

END NOTCH TO SHEAR DISTANCE

The END NOTCH TO SHEAR DISTANCE is the distance from the center of the end notch die to the center of the shear die. This is usually determined by loading the machine up with material and manually cycling the shear and end notch presses without moving the material. The material is then removed from the machine and the distance from the shear cut to the end notch pattern is measured. If the shear removes a slug of material then half of this slug width must be added to this measurement since the distance specified is from die center to die center.

SIDE HOLE TO SHEAR DISTANCE

The SIDE HOLE TO SHEAR DISTANCE is the distance from the center of the side hole die to the center of the shear die. The method to determine this distance is the same as with the end notch distance described above.

CROSS HOLE TO SHEAR DISTANCE

The CROSS HOLE TO SHEAR DISTANCE is the distance from the center of the cross hole die to the center of the shear die. To determine this distance, use the method described with the end notch to shear distance parameter.

CORNER NOTCH TO SHEAR DISTANCE

The CORNER NOTCH TO SHEAR DISTANCE is the distance from the center of the corner notch die to the center of the shear die. To determine this distance, use the method described with the end notch to shear distance parameter.

DETECTOR TO SHEAR DISTANCE

The DETECTOR TO SHEAR DISTANCE is the distance from the detector to the center of the shear die. This distance should be carefully measured and entered into the MP56.

END NOTCH DEPTH

The END NOTCH DEPTH (LEN. C1) is the distance from the leading edge of the part to the back of the end notch. This distance is added to the length of the finished part if it is larger than the CORNER NOTCH DEPTH. See figure 3 for a visual presentation of this parameter.

END NOTCH DIE SIZE

The END NOTCH DIE SIZE (LEN. C2) is the physical size of the die. This measurement is needed for internal calculations by the MP56.

CORNER NOTCH DEPTH

The CORNER NOTCH DEPTH (LEN. C4) is the distance from the leading edge of the part to the back of the end notch. This distance is added to the length of the finished part if it is larger than the END NOTCH DEPTH. See figure 3 for a visual presentation of this parameter.

CROSS HOLE OFFSET

The CROSS HOLE OFFSET (LEN. C3) is the distance from the leading edge of the metal to the first cross hole. The CORNER NOTCH DEPTH or the END NOTCH DEPTH, whichever is larger, must be taken into account in calculating the placement of this operation. If the cross hole is to be 2 inches from the edge of the finished part, and the CORNER NOTCH DEPTH is 3 inches, then LEN C3 would be 5 inches.

OUTPUT SPEED LOGIC

The OUTPUT SPEED LOGIC parameter is used to select the type of line that the MP56 will be controlling. By striking any numbered key, the following four choices will be displayed.

NON-STOP

FAST-SLOW

FORWARD-SLOW

With the correct type of logic displayed, press the enter key to complete the entry. A description of each type is below.

NON-STOP

A NON-STOP line runs continuously in fast and does not slow for any operation. The FORWARD comes on at the start of the run and stays on until the batch is completed or halted. A START LENGTH should be used with this line to allow the line to reach a normal operating speed before any operations occur.

FAST-SLOW

A FAST-SLOW line runs in fast(FORWARD output on) until a slowdown point(an operation point minus the SLOWDOWN LENGTH) is reached. At that point the FORWARD goes off and the SLOW comes on. The SLOW remains on until the operation occurs, then it is turned off as the operation occurs. After the operation is completed the FORWARD output is turned on and the cycle is repeated.

FORWARD-SLOW

A FORWARD-SLOW line runs in fast forward when the FORWARD output is on and slow when the FORWARD and SLOW outputs are on. When a batch is run, the MP56 will turn on the FORWARD output and run in fast until a slowdown point is reached. At that point the SLOW output is also turned on. As the operation occurs both outputs go off and the line is then started with the FORWARD output.

FORWARD-FAST

A FORWARD-FAST line is similar to a FORWARD-SLOW line except when the machine is running in slow, the FORWARD is on; when running in fast the FORWARD and FAST outputs are on. The SLOW output serves as the FAST output when this type of logic is selected.

MEMORY RESET OPTION

The MEMORY RESET OPTION, or FRESH, allows the operator to clear all setup and batch parameters by entering the code '1984'. If this code is entered, all batch and setup parameters will have to be re-entered before operation can resume.

SETUP DATA SHEET COIL OPERATION

PARAMETER	PROMPT		RANGE
MACHINE CONFIGURATION	CONF.	COIL/PrEcut (SELECT ONE)	
LENGTH TOTALIZER	Accu	_____	0-999999(CLEAR ONLY)
BATCH HALT	HALt	_____	YES/NO
LEADING EDGE SCRAP	L. Scr.	_____	0-999.99 IN
TRAILING EDGE SCRAP	t. Scr.	_____	0-999.99 IN
START LENGTH	Start	_____	0-999.99 IN
SLUG LENGTH	SLU. LE.	_____	0-999.99 IN
SHEAR PAUSE	Shr. PAU.	_____	0-99.99 SEC
SHEAR TIME	Shr. SEC.	_____	0-99.99 SEC
END NOTCH TIME	P1 SEC.	_____	0-99.99 SEC
SIDE HOLE TIME	P2 SEC.	_____	0-99.99 SEC
CROSS HOLE TIME	P3 SEC.	_____	0-99.99 SEC
CORNER NOTCH TIME	P4 SEC.	_____	0-99.99 SEC
MINIMUM LENGTH	Least	_____	0-999.99 IN
COUNTS PER REV.	Counts	_____	100-1000
DISTANCE PER REV.	dist.	_____	2.5-20 IN
CORRECTION FACTOR	Corr.	_____	.9-1.10000
DIRECTION	Direction	_____	0 or 1
SLOWDOWN LENGTH	Slo. LE.	_____	0-999.99 IN
END NOTCH-SHEAR DIST.	P1 LE.	_____	0-999.99 IN
SIDE HOLE-SHEAR DIST.	P2 LE.	_____	0-999.99 IN
CROSS HOLE-SHEAR DIST.	P3 LE.	_____	0-999.99 IN
CORNER NOTCH-SHEAR DIST.	P4 LE.	_____	0-999.99 IN
DETECTOR-SHEAR DIST.	L. dEt.	_____	0-999.99 IN
END NOTCH DEPTH	LEN. C1	_____	0-999.99 IN
END NOTCH DIE SIZE	LEN. C2	_____	0-999.99 IN
CROSS HOLE OFFSET	LEN. C3	_____	0-999.99 IN
CORNER NOTCH DEPTH	LEN. C4	_____	0-999.99 IN

OUTPUT SPEED LOGIC	For-SLO	_____	
	For-FSt	_____	
	FASt-SLO	_____	
	non-StOP	_____	(SELECT ONE)
MEMORY RESET	FrESH	_____	

Table 1.

SETUP DATA SHEET, PRECUT OPERATION

PARAMETER	PROMPT		RANGE
END NOTCH TIME	P1 SEC.	_____	0-99.99 SEC
SIDE HOLE TIME	P2 SEC.	_____	0-99.99 SEC
CROSS HOLE TIME	P3 SEC.	_____	0-99.99 SEC
CORNER NOTCH TIME	P4 SEC.	_____	0-99.99 SEC
MINIMUM LENGTH	Least	_____	0-999.99 IN
COUNTS PER REV.	Counts	_____	100-1000
DISTANCE PER REV.	dist.	_____	2.5-20 IN
CORRECTION FACTOR	Corr.	_____	.9-1.10000
DIRECTION	Direction	_____	0 or 1
SLOWDOWN LENGTH	Slo. LE.	_____	0-999.99 IN
END NOTCH-SHEAR DIST.	P1 LE.	_____	0-999.99 IN
SIDE HOLE-SHEAR DIST.	P2 LE.	_____	0-999.99 IN
CROSS HOLE-SHEAR DIST.	P3 LE.	_____	0-999.99 IN
CORNER NOTCH-SHEAR DIST.	P4 LE.	_____	0-999.99 IN
DETECTOR-SHEAR DIST.	L. dEt.	_____	0-999.99 IN
END NOTCH DEPTH	LEN. C1	_____	0-999.99 IN
END NOTCH DIE SIZE	LEN. C2	_____	0-999.99 IN
CROSS HOLE OFFSET	LEN. C3	_____	0-999.99 IN
CORNER NOTCH DEPTH	LEN. C4	_____	0-999.99 IN
OUTPUT SPEED LOGIC	For-SLO	_____	
	For-FSt	_____	
	FASt-SLO	_____	
	non-StOP	_____	(SELECT ONE)
MEMORY RESET	FrESH	_____	

Table 2.

PROGRAM MODE

The PROGRAM mode is used to enter batch information on the parts that are to be run. A batch is defined as a quantity of a particular part that the operator wishes to produce by the machine. There are 50 batches that can be programed at any one time. As batches are completed, new batch data can be entered in the place of completed batches.

The PROGRAM mode is entered by pressing the PRG key and is exited by pressing the END key. The first entry required is the batch number. It is initially set to the first empty batch number after the batch that is currently being run. If you are running batch 1 and batches 2 through 10 have been programed, then it will begin with batch 11. If this is the batch desired, then press the ENT key. If another batch is desired, enter that number. The display will then prompt for the number of pieces required. This can be from 0 to 9999. Entering a 0 will delete that batch. After entering the pieces, the display will prompt for the type, which must be a number between 1 and 21 inclusive. The display will then go through a sequence of prompts, asking for the data required for each particular type. Even numbered part types (2,4,6,...20), excluding type 14, will prompt only for the finished length. Odd numbered part types (1,3,5,...21) and type 14 will prompt for the finished length, PA, and PB.

The prompts PA and PB are parameters used whenever side holes are necessary. PA is the distance on the finished part from the leading edge to the first side hole; PB represents the distance between each following side holes until the end of the part. There is a 100 operation limit per part when entering the PA and PB values. If a

part is extremely long and the PB value is small, resulting in over 100 operations, the controller will not be able function properly and will reset. Should this occur, the PA or PB value will have to be increased to limit to number of operations to less than 100. A description of which operations are included in each part type is below:

PART TYPE	PART DESCRIPTION
TYPE 1	END NOTCH, CORNER NOTCH, CROSS HOLES, SIDE HOLES, SHEAR
TYPE 2	END NOTCH, CORNER NOTCH, CROSS HOLES, SHEAR
TYPE 3	END NOTCH, CORNER NOTCH, SIDE HOLES, SHEAR
TYPE 4	END NOTCH, CORNER NOTCH, SHEAR
TYPE 5	END NOTCH, CROSS HOLES, SIDE HOLES, SHEAR
TYPE 6	END NOTCH, CROSS HOLES, SHEAR
TYPE 7	END NOTCH, SIDE HOLES, SHEAR
TYPE 8	END NOTCH, SHEAR
TYPE 9	CORNER NOTCH, CROSS HOLES, SIDE HOLES, SHEAR
TYPE 10	CORNER NOTCH, END NOTCH, LEADING EDGE CROSS HOLES, SHEAR
TYPE 11	CORNER NOTCH, END NOTCH, LEADING EDGE CROSS HOLES, SIDE HOLES, SHEAR
TYPE 12	END NOTCH, LEADING EDGE CROSS HOLES, SHEAR
TYPE 13	END NOTCH, LEADING EDGE CROSS HOLES, SIDE HOLES, SHEAR
TYPE 14	CORNER NOTCH, LEADING EDGE CROSS HOLES, SHEAR, SIDE HOLES
TYPE 15	SIDE HOLES, SHEAR
TYPE 16	SHEAR ONLY
TYPE 17	END NOTCH, CORNER NOTCH, SIDE HOLES, TRAILING EDGE CROSS HOLES, SHEAR

TYPE 18	END NOTCH, CORNER NOTCH, TRAILING EDGE CROSS HOLES, SHEAR
TYPE 19	END NOTCH, SIDE HOLES, TRAILING EDGE CROSS HOLES, SHEAR
TYPE 20	END NOTCH, TRAILING EDGE CROSS HOLES, SHEAR
TYPE 21	CORNER NOTCH, SIDE HOLES, TRAILING EDGE CROSS HOLES, SHEAR

The part types listed above are valid in coil operation and pre-cut operation, except shears are not included if pre-cut operation is chosen. A Type 16 part in pre-cut would allow the metal to pass through without any operations.

It is important to note that if pre-cut operation is used, there is a limit to how short of a sheet may be used. For a sheet to be correctly punched, a press operation must take place before the trailing edge of the sheet passes over the METAL CONTACT input and opens it. If a sheet were too short and completely passed over the sheet detect before an operation took place, no operations would be performed on that sheet. To keep this minimum part length small, the METAL CONTACT switch should be close to the dies and die spacing should be kept to a minimum.

ERROR MODE

The MP56 computer can detect certain operational errors and it displays a message that shows 'Error N' where N is the error number. The MP56 will only respond to the CLR key in order to clear the error message. The description of each error type is as follows:

Error 1	The number entered is out of range of the CYCLES PER REVOLUTION parameter.
Error 2	The number entered is out of range of the DISTANCE PER REVOLUTION parameter.
Error 3	The number entered is out of range of the CORRECTION FACTOR parameter.
Error 4	The number entered is not a legal batch number.
Error 5	The number entered is not a legal part number.
Error 6	Zero entry is not allowed.
Error 7	No batches are programed that can be run by the MP56.
Error 8	There is a finite amount of memory in the MP56 controller, so there are some restraints on the number of operations allowed in a specific distance. The MP56 allows up to 200 operations in the work stack before it displays this error. This error is seldom seen in normal operation.
Error 9	This error is encountered if the MODE OF OPERTION is changed when the controller is not in the reset condition. The controller

must be reset if the type of operation, pre-cut or coil, is to be changed.

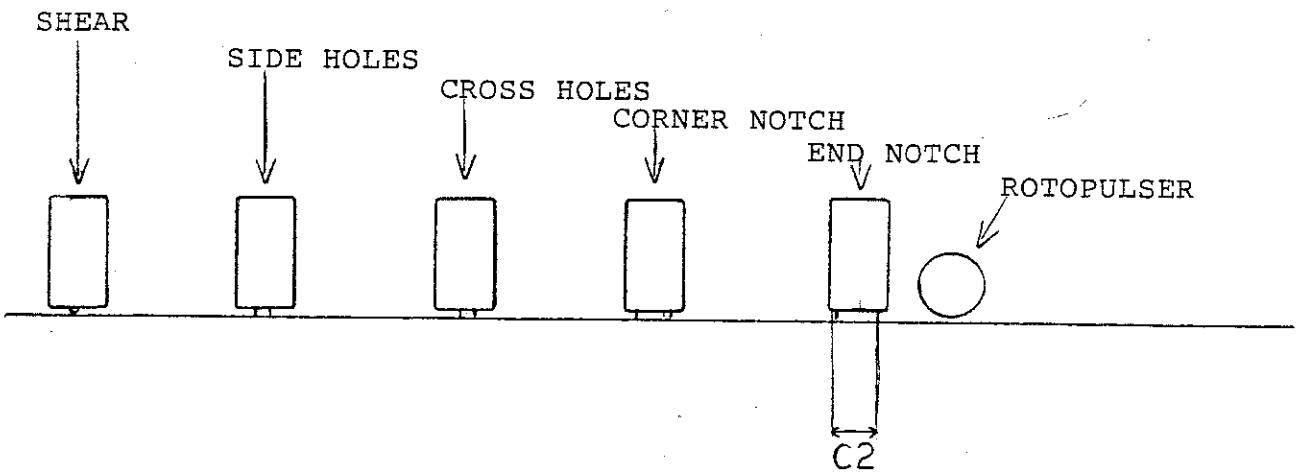

SHEAR
SIDE HOLES
CROSS HOLES
CORNER NOTCH
END NOTCH
ROTOPULSER
C2

FIGURE 1

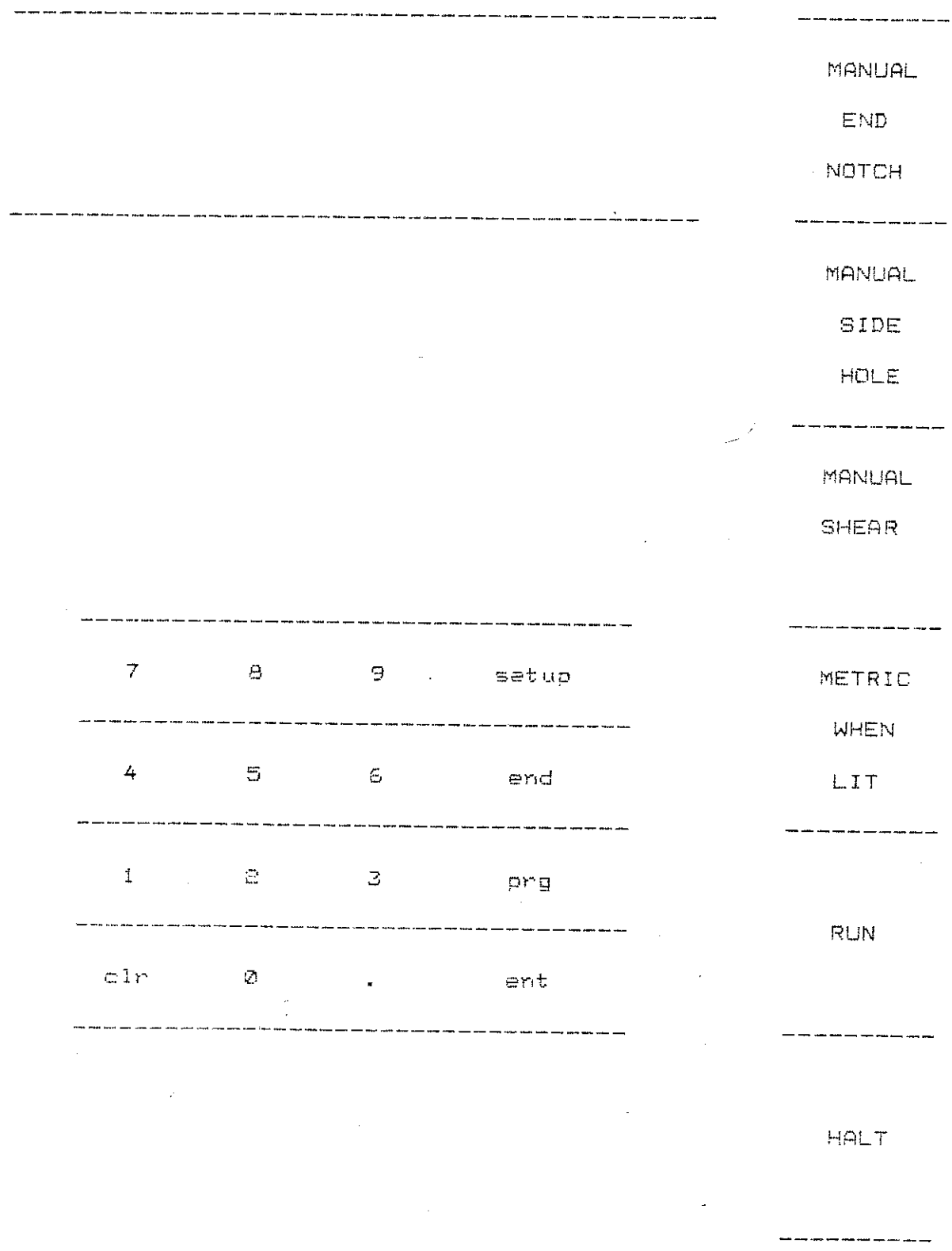

MANUAL
END
NOTCH
MANUAL
SIDE
HOLE
MANUAL
SHEAR
7
8
9
setup
METRIC
WHEN
4
5
6
end
LIT
1
2
3
prg
RUN
clr
0
.
ent
HALT

FIGURE 2

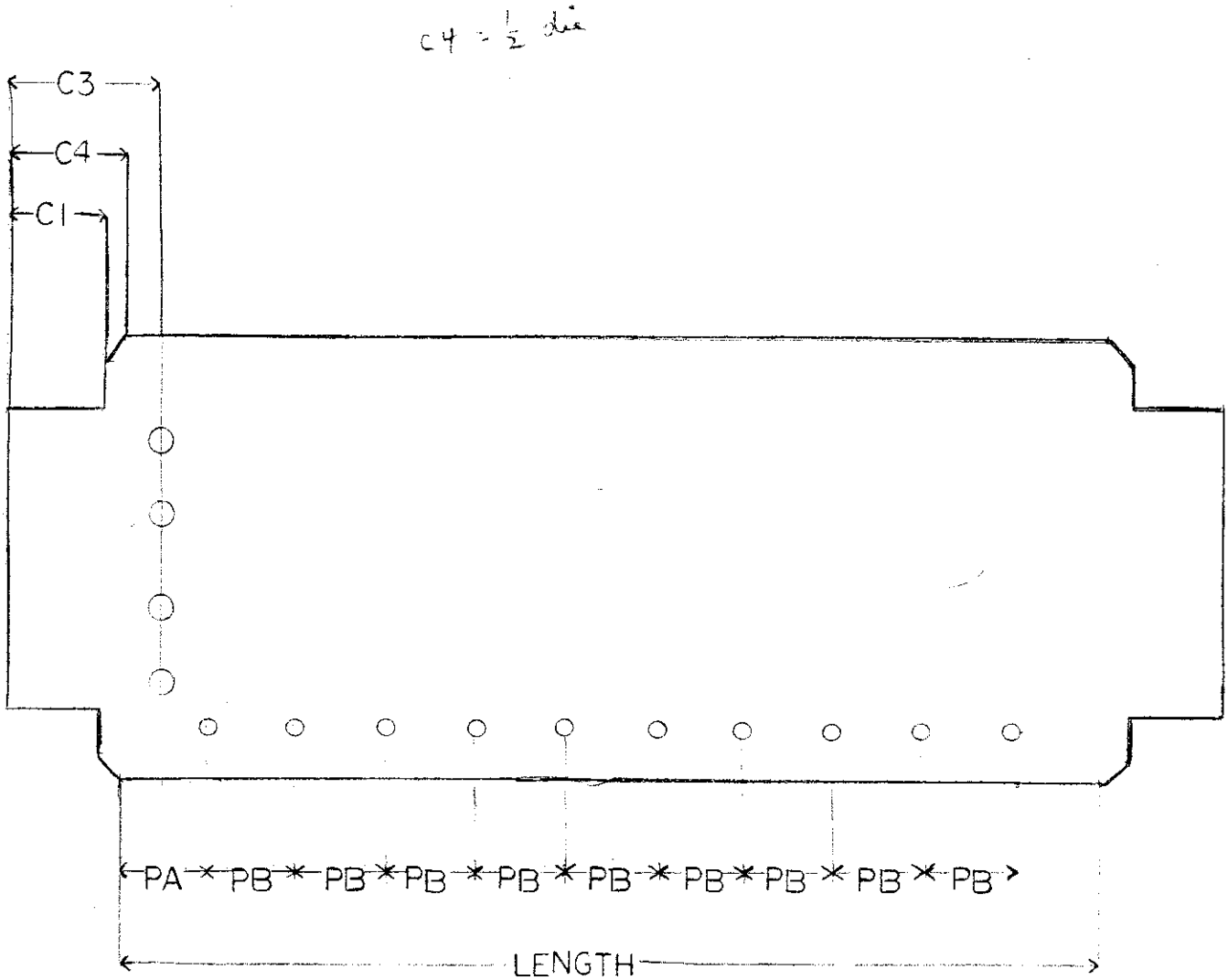
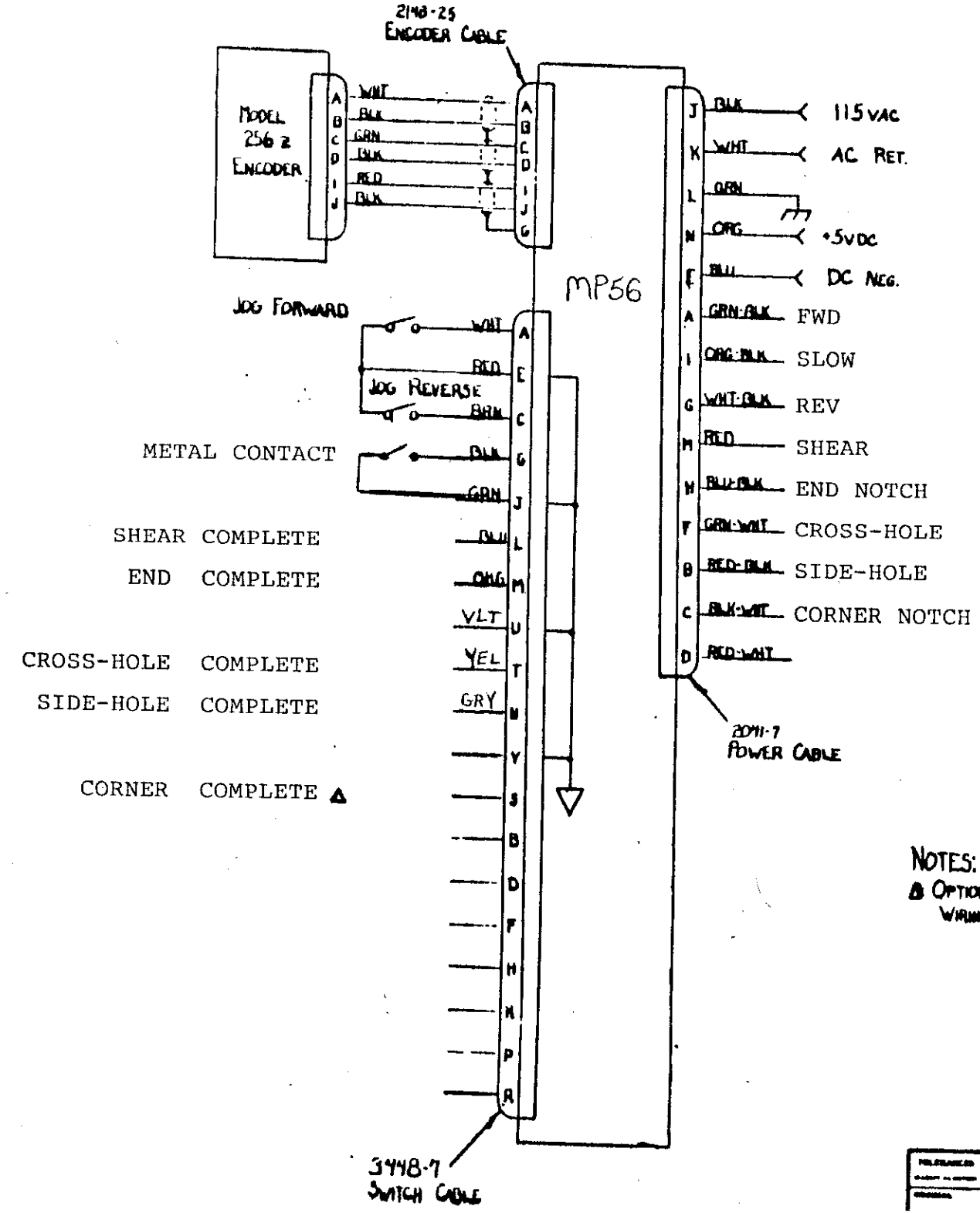


FIGURE 3

BATCH DATA SHEET

BATCH NUMBER	PART TYPE	LENGTH	PA	PB
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__
____	____	______.__	______.__	______.__



NOTES:

△ OPTIONAL INPUT, NOT WIRED IN WIRING HARNESS PROVIDED.

STD. CONTRACT

APPLIED MICROSYSTEMS INC.