MODEL MP257
SHEAR AND 2 PUNCH
CONTROLLER

AMS APPLIED MICROSYSTEMS
ST. LOUIS, MISSOURI

MODEL MP257
SHEAR, PUNCH, AND HOLE CONTROLLER

The Model MP257 is a 50 batch controller is designed to control a non-stop coil processing machine with a shear, and punch press, and a hole press. Up to 20 punch locations and 20 hole locations can be programed per part. The following four different types of parts can be made using the MP257.

Type 1 - Shear only. (No Punches or Holes.)
Type 2 - Shear and Punch only.
Type 3 - Shear and Hole only.
Type 4 - Shear and Punch and Hole.

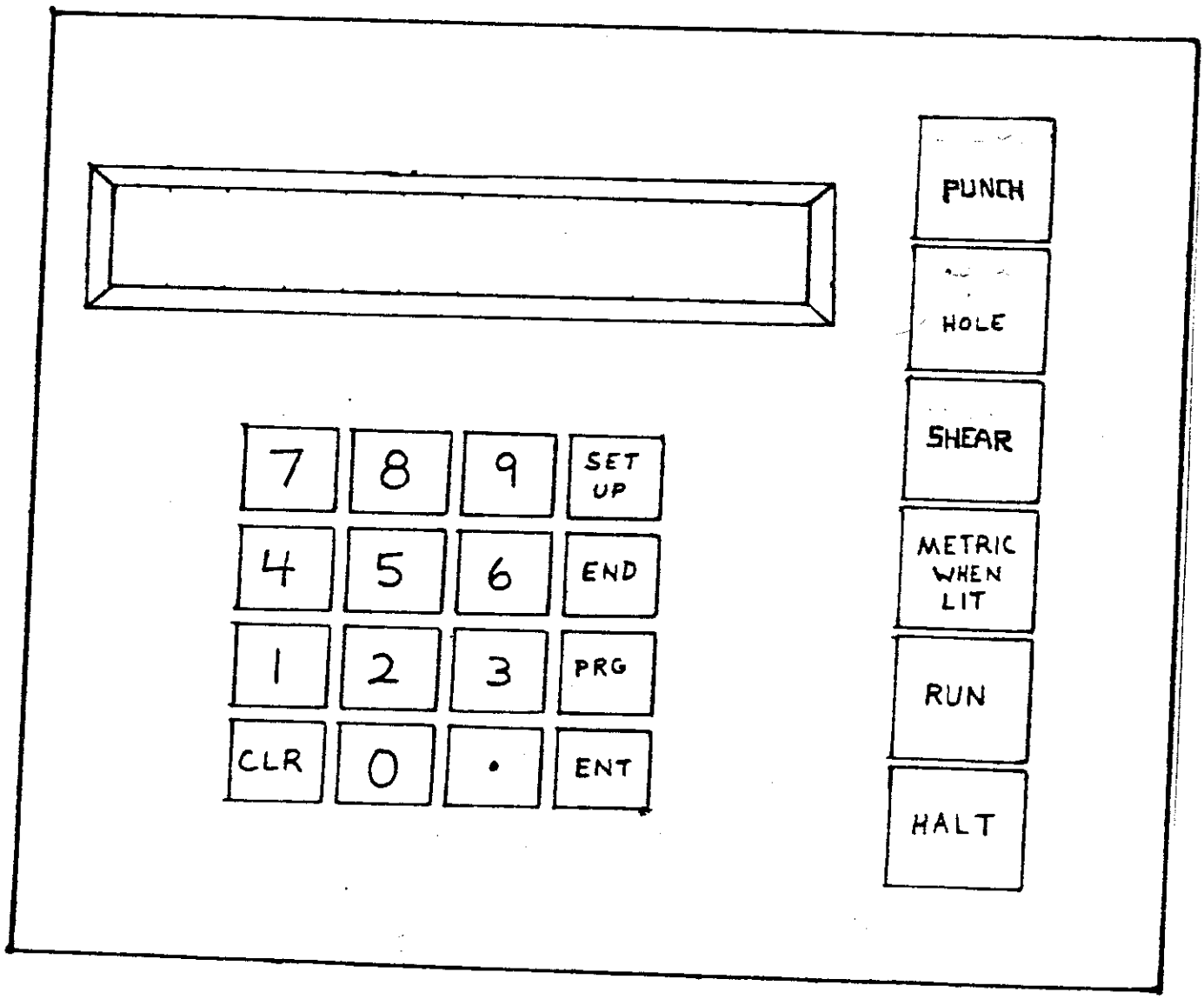
The MP257 controller is designed to make it easy for the operator to program. The operator only has to enter the type of part desired, the quantity and finished length, and the desired hole and punch locations. The MP257 then calculates the required offsets and patterns based on this information. The MP257 changes parts on-the-fly without generating any scrap between batches.

The operation of the machine itself is straight forward. The position of the metal is sensed by an incremental shaft angle encoder which generates an exact number of pulses to the MP257 for an exact amount of material movement. The controller then counts the pulses and activates the outputs when the programmed movement has occured.

The MP257 is programmed using a display and keyboard similar to an electronic calculator. The display prompts the operator by indicating what data is to be entered.

FRONT PANEL DESCRIPTION

The MP257 front panel consists of a 12 character LED display, a 16 key keypad, and 6 illuminated pushbutton switches. The layout of the keypad, pushbuttons and LED display are shown below.



KEYPAD

The function of each key is as follows:

SETUP

The SETUP key is used to enter the SETUP mode. The SETUP mode is used to enter the initial setup parameters such as the die spacing, press output timing, flow direction, etc....

END

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

PRG

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

ENT

The ENT key is the data ENTER key. It is used to store the values entered in the SETUP and PROGRAM modes.

CLR

The CLR key is the data CLEAR key and is used to erase an incorrect entry before the ENT key is pressed. It is also used to clear the accumulator value and error messages when displayed.

PUSHBUTTON SWITCHES

The function of each illuminated pushbutton switch is as follows:

PUNCH

The PUNCH pushbutton is used to manually cycle the PUNCH press when the line is in the HALT mode. The lamp indicates when the PUNCH output is on in both the HALT and RUN modes.

HOLE

The HOLE pushbutton is used to manually cycle the HOLE press when the line is in the HALT mode. The lamp indicates when the HOLE output is on in both the HALT and RUN modes.

SHEAR

The SHEAR pushbutton is used to manually cycle the SHEAR press when the line is in the HALT mode and to reset the controller. A system reset is needed after setup parameters are changed to put the changes into effect. The lamp indicates when the shear output is on in the RUN mode. See the section titled "RUN MODE" for more information on the RESET condition.

METRIC WHEN LIT

The METRIC WHEN LIT pushbutton is used to switch between metric and English units of measurements. When the lamp is lit, data is entered and displayed in centimeters. When the lamp is not lit, the data is displayed and entered in inches.

RUN

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

HALT

The HALT pushbutton is used to stop the machine. The red lamp indicates that the controller is in the HALT mode.

EXTERNAL SWITCHES

There are five external input switches into the MP257. The function of each is explained below.

JOG FORWARD

The JOG FORWARD input switch is used to jog the metal in the forward direction. It is not functional in the RUN mode and will be ignored if the MP257 is currently running.

JOG REVERSE

The JOG REVERSE input switch is used to jog the metal in the reverse direction. It in not functional in the RUN mode and will be ignored if the MP257 is currently running.

REMOTE RUN

The REMOTE RUN switch serves the same function as the RUN pushbutton on the front panel. From a reset condition, the switch has to be closed twice to initiate a run. Once the RUN mode is entered the switch need not remain closed.

REMOTE HALT

The REMOTE HALT switch serves the same function as the HALT pushbutton on the front panel. If the MP257 detects a REMOTE HALT switch closure while it is in the RUN mode, the MP257 will enter the HALT state. A closure of the switch must be detected. A closed HALT switch as the RUN mode is entered has no effect.

MOTOR STARTER

The MOTOR STARTER input is used by the MP257 to insure that the systems motor has been engaged before performing any operation. This input must be closed for the MP257 to begin a batch and must remain closed throughout the run. If the MOTOR STARTER input opens during a run the MP257 will enter the HALT mode and cannot be run again until the input is closed.

ROTOPULSER

Material movement is sensed by the MP257 through the rotopulser (rotary pulse generator) 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.

OUTPUT LINES

The MP257 has 5 outputs. These are 5 ampere, open collector transistors that switch load current to the DC ground. The function of each is as follows:

FORWARD

The FORWARD output is used to turn the machine drive rolls in the forward direction. This output stays on throughout the run and while jogging.

REVERSE

The REVERSE output is used to turn the machine drive rolls in the reverse direction.

SHEAR

The SHEAR output is used to engage the shear.

HOLE

The HOLE output is used to engage the hole punch.

PUNCH

The PUNCH output is used to engage the punch.

The control of all of the above mentioned hardware is provided by a microprocessor and its associated memory components. The operating program of the computer is contained in read-only-memory (ROM). 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 rechargable ni-cad battery in the unit that provides power to the RAMs when the unit is shut off. This battery is constantly charged when the unit is in operation.

MODES OF OPERATION

There are five modes of operation in the MP257: SETUP, PROGRAM, RUN, HALT, and ERROR. It is possible to be in two modes at the same time. This will become clearer upon explanation of the two "types" of modes. One type can be called the display mode, and the other can be called the machine mode. The display modes are SETUP, PROGRAM, RUN, or 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 either type of mode depending on the nature of the error. By making this distinction between the two types of modes, an operator can, for example, put the machine in the RUN mode and then put the display in the PROGRAM mode and thus program new data while previously programmed batches are being run.

SETUP MODE

The SETUP mode is used to enter machine parameters and some seldom changed part parameters. The 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 lists these parameters with the prompts used and the range of allowed values. It is important to record the setup data for your machine on this list. The setup parameters with the actual prompt in parentheses and their function in the machine are as follows:

ACCUMULATOR (Accu.)

The ACCUMULATOR prompt displays the total amount of material that has passed through the machine since the accumulator was last cleared. To clear this value, press the CLR key.

LENGTH FROM SHEAR TO PUNCH (LE. S-P)

The LENGTH FROM SHEAR TO PUNCH is the distance from the center of the shear die to the center of the punch die.

LENGTH FROM SHEAR TO HOLE (LE. S-H)

The LENGTH FROM SHEAR TO HOLE is the distance from the center of the shear die to the center to the hole die.

SHEAR TIME IN SECONDS (Sh. SEC.)

The SHEAR TIME IN SECONDS parameter sets the time duration for the shear press cycle. This is the amount of time that the shear signal output will remain on.

PUNCH TIME IN SECONDS (P1 SEC.)

The PUNCH TIME IN SECONDS parameter sets the time duration for the PUNCH press cycle. This is the amount of time that the punch signal output will remain on.

HOLE TIME IN SECONDS (H1 SEC.)

The HOLE TIME IN SECONDS parameter sets the time duration for the HOLE press cycle. This is the amount of time that the hole signal output will remain on.

BATCH HALT (bA. HALt)

This parameter determines whether the MP257 will automatically stop the line at the end of a batch or continue to process the next available batch in the system. This may be required in some installations to allow for packaging of the previous batch or for a required change of some downstream machinery because of a dimensional change in the parts being run. Pressing any numbered key will toggle between YES and NO. When the desired response is displayed, press the ENT key.

COUNTS PER REVOLUTION (CountS)

This parameter sets the number of counts or pulses generated by one revolution of the encoder shaft. Applied Microsystems 256Z Encoder generates 256 counts.

DISTANCE PER REVOLUTION (diSt.)

This parameter sets the distance traveled with one revolution of the encoder measuring wheel. This distance is equal to the circumference of the measuring wheel. Applied Microsystems encoder wheel circumference is 12 inches.

CORRECTION FACTOR (Corr.)

The CORRECTION FACTOR adjusts for any error between the length programmed and the length actually produced. Begin by setting this value to 100.000. Once this value is set, it should only need to be changed to compensate for normal encoder wheel wear. See page entitled "Determining the Proper Correction Factor" for additional information.

MINIMUM LENGTH (LEASt)

The MINIMUM LENGTH parameter allows a limit to be set for the shortest part that the MP257 can cut. This may be necessary because a part shorter than this length could become jammed in the machine.

START LENGTH (StArt)

The START LENGTH is a length of material that will be scraped when the line is started after the controller has been reset. The controller is reset when the SHEAR pushbutton is pressed. (Typically the SHEAR pushbutton should only be pressed to make a trim cut when a new coil is loaded.) This length is necessary to insure that the line is at full speed before shearing the leading edge of the first part. If the first part made from a reset condition is too long, it usually indicates that the line was not up to full speed when the leading edge of the first part was sheared. In this case, the START LENGTH should be gradually increased until the first part is the correct length.

SLUG LENGTH (SLU. LE.)

The SLUG LENGTH is the width of the slug that the shear may remove (if any) when it is cycled. This length is automatically added to each part run. If the shear does not remove a slug, set this value to zero.

DIRECTION (dirEction)

Depending on whether the encoder is mounted above or below the metal strip, the shaft could turn clockwise or counter-clockwise with a forward movement of the material. The DIRECTION parameter allows for an easy direction change. As the encoder is viewed from the shaft end, 1 is clockwise and Ø is counter-clockwise. Pressing any numbered key will toggle the display between Ø and 1. When the desired response is displayed, press the ENT key.

MEMORY RESET (FrESh)

The MEMORY RESET or FRESH parameter allows the operator to clear all setup and batch data by entering the code '1984'. Severe thunderstorms or other electrical shocks to the control circuitry can cause the computer's memory to be lost or altered resulting in erratic controller operation. If this condition is suspected, the operator should reset (or clear) the controller memory by entering the code number 1984. Any other codes are ignored to prevent accidental memory erasure.

IT IS VERY IMPORTANT TO RECORD YOUR SETUP DATA ON THE FORM PROVIDED. IF IT APPEARS THAT YOUR LINE OR THE MP857 IS OPERATING INCORRECTLY, THE FIRST THING YOU SHOULD ALWAYS DO IS VERIFY THAT THE SETUP DATA HAS NOT BEEN CHANGED.

MODEL MP257
SETUP DATA SHEET

PARAMETER	PROMPT		RANGE
LENGTH ACCUMULATOR	Accu.	_____	0-99999 FT
LENGTH FROM SHEAR TO PUNCH	LE. S-P	_____	0-999.99 IN
LENGTH FROM SHEAR TO HOLE	LE. S-H	_____	0-999.99 IN
SHEAR TIME IN SECONDS	Sh. SEC.	_____	0-34.000 SEC
PUNCH TIME IN SECONDS	P1 SEC.	_____	0-34.000 SEC
HOLE TIME IN SECONDS	H1 SEC.	_____	0-34.000 SEC
BATCH HALT	bA. HALt	_____	YES OR NO
COUNTS PER REVOLUTION	CountS	_____	100 TO 1000
DISTANCE PER REVOLUTION	diSt.	_____	2.50 TO 20.00
CORRECTION FACTOR	Corr.	_____	90.000 TO 110.000
MINIMUM LENGTH	LEASt	_____	0-999.99 IN
START LENGTH	StArt	_____	0-999.99 IN
SLUG LENGTH	SLU. LE.	_____	0-999.99 IN
DIRECTION	dirEction	_____	0 OR 1
MEMORY RESET	FrESh	_____	1984 TO CLEAR

PROGRAM MODE

The PROGRAM mode is used to enter batch information on the type of part to run. 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 the batch number displayed is the batch desired, simply press the ENT key. If another batch is desired, enter that number. The display will then prompt for the TYPE, which can be from 1 to 4. The display will then go through a sequence of prompts, asking for the data required for each particular type. The table below explains the four possible types.

TYPE	HOLE	PUNCH
1	NO	NO
2	NO	YES
3	YES	NO
4	YES	YES

After a type is selected, the operator is asked for the number of pieces desired. After the quantity has been entered, the operator will then be prompted for the finished length of the part. Once the length has been entered, the MP257 will prompt the operator for the punch locations (P1-P20) if type 2 was selected, the hole locations (H1-H20) if type 3 was selected, and both the punch and hole locations if type 4 was selected. If a type 1 part was chosen, the operator will not be prompted for any punch or hole locations. All punch and hole locations are entered as the distance from the leading edge of the part to the center of the hole or punch. An entry of zero terminates that batch entry and the next batch will be ready to program. For example, if only 2 holes need to be programed, entering 0 on H3 terminates that batch entry. Examples of part types and their programming sequence is provided at the end of this manual.

ERROR MESSAGES

The MP257 can detect operational errors and display an error message indicating the nature of the error. To clear an error message from the display, press the CLR key. The description of each error is as follows.

Error 1	Cycles per revolution out of range. (Must be 100 to 1000)
Error 2	Distance per revolution out of range. (Must be 2.50 to 20.00 inches)
Error 3	Correction Factor out of range. (Must be 90.000 to 110.000)
Error 4	Batch number out of range. (Must be 1 to 50)
Error 5	Batch type out of range. (Must be 1 to 4)
Error 6	An entry of zero is not allowed.
Error 7	A run was attempted with no jobs programed.
Error 8	Maximum capacity of 200 operations exceeded.

RUN MODE

The RUN mode is used to actually produce the parts. The mode is entered by pressing the RUN pushbutton and is exited by pressing the HALT pushbutton. There are two conditions in which the RUN mode can be entered. The first is the RESET condition which means that the computer will begin processing the material from the furthest required press and that the material from that point to the shear will be scrapped. The second condition is the NON-RESET condition which means that the computer will pick up from where it last left off and generate no scrap.

If the controller is in the RESET condition when the RUN button is pressed, the green RUN button will flash and the display will prompt for the batch number to be run and read, for example, "run bAtch 1". If the batch number displayed is the number you wish to run, simply press the RUN button a second time. If a different batch is desired, enter the new number and the run will begin at the entered batch number. If in the NON-RESET condition, no prompt will be given and the line will continue normally.

The RESET condition occurs under the following conditions:

1. When power is first applied to the controller. (Consider keeping power applied to the controller overnight.)
2. When the shear, hole, or punch press is manually cycled.
3. When all programed parts have been run. Because of this, you should always try to avoid running all of the batches out of the controller. Instead you should have the next batch to be processed programed and ready to run.
4. When the length counter is greater than the next part length. For example, if you making 12" parts but 24" of material is past the shear, the controller must reset itself and begin by shearing the leading edge of the first 12" part.

Typically you want to avoid doing any of the above because when the controller starts a batch from a reset condition a piece of scrap is generated.

Once set running, batches will be run in numerical order provided that they are programed. The programed batches are searched for in ascending order until batch 50 is reached. Then the search is begun over starting at batch 1. When the computer starts into the RUN mode, it sets up all of the operations that are required from a point 24 inches before the longest press distance. These operations are placed in memory in a place called the work stack. Since memory in the computer is not infinite, there is a finite number of operations that can be placed in the work stack. This finite number is 200. This means that for a large machine there could be many parts between the shear and the farthest press. If the number of operations in these parts times the number of parts between these points exceeds 200, then an Error 8 will occur. While in the RUN mode three numbers will be seen on the LED display. The number on the left side of the display indicates the batch currently being run. The number in the middle of the display indicates the number of pieces remaining to be run for that batch. The number on the right side indicates the current length of material past the shear.

DETERMINING THE PROPER CORRECTION FACTOR
(Calibration Procedure)

If the number of pulses per revolution of the encoder and the distance traveled per one revolution of the encoder wheel are entered accurately in the Setup Mode, the line should produce precision length parts. However if there is a difference between the length programed and the length actually produced, the following steps should be taken to correct this error.

First run a large number of short parts and measure the variation in length from the shortest part to the longest part produced. This total variation should be within the machine's specified tolerance. If not, further attempts to fine-tune your line should not be attempted until this variation tolerance is met. Once it has been determined that your equipment is running within the manufacturer's specified tolerance you should run several parts as long as possible and, carefully measuring each part, find the average length. A new correction factor can then be determined as follows:

New Correction Factor = Old Correction Factor times (PL/AL)
Where PL is the programed length and
AL is the actual measured length.

For example, with the old Correction Factor at 100.000, a 100 inch part was programed with the result being a 100.25 inch part being produced. The new Correction Factor would be figured as follows:

New Correction Factor = 100.000 x (100.00/100.25)
= 100.000 x .99751
= 99.751

This new value for the Correction Factor should then be entered into the controller. Remember the Correction factor will also allow you to compensate for normal encoder wheel wear and eliminate the need to purchase new measuring wheels to maintain precise measurements.

MODEL MP257
SPECIFICATIONS

Resolution	0.012 in. with 12 in. wheel
Maximum Line Speed	450 FPM
Maximum Length Part	9999.99 inches
Maximum Punches per Part	20
Maximum Holes per Part	20
Pattern Types	4 (1-4)
Input Power	115 VAC +/-10%, 50-60 Hz and 24 VDC @ 0.5 amps plus user load current.
Outputs	5 - Forward, Reverse, Shear, Hole, and Punch
Inputs	5 - Jog Forward, Jog Reverse, Remote Run, Remote Halt, and Motor Starter Interlock
Physical Size	6 in. X 9 in. X 10 in. with a 1"flange on the front panel
Weight	13 pounds
Warranty	One Year - Parts and Labor

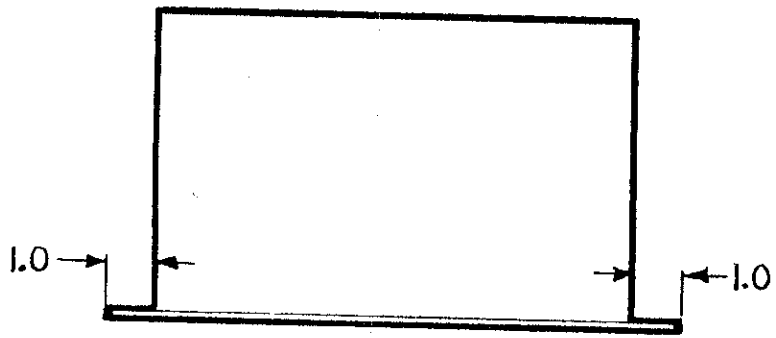
PART DATA SHEET

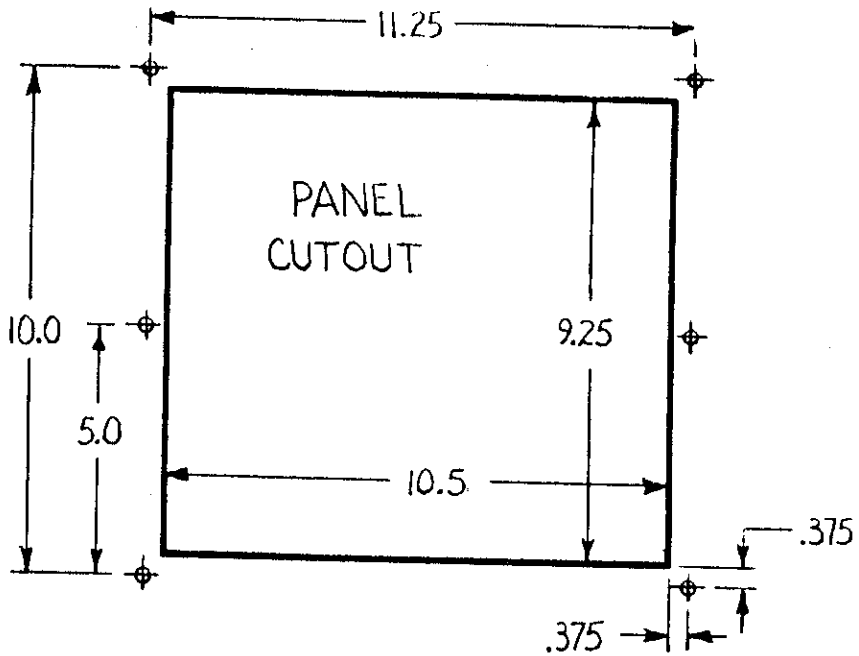
PART NUMBER _____

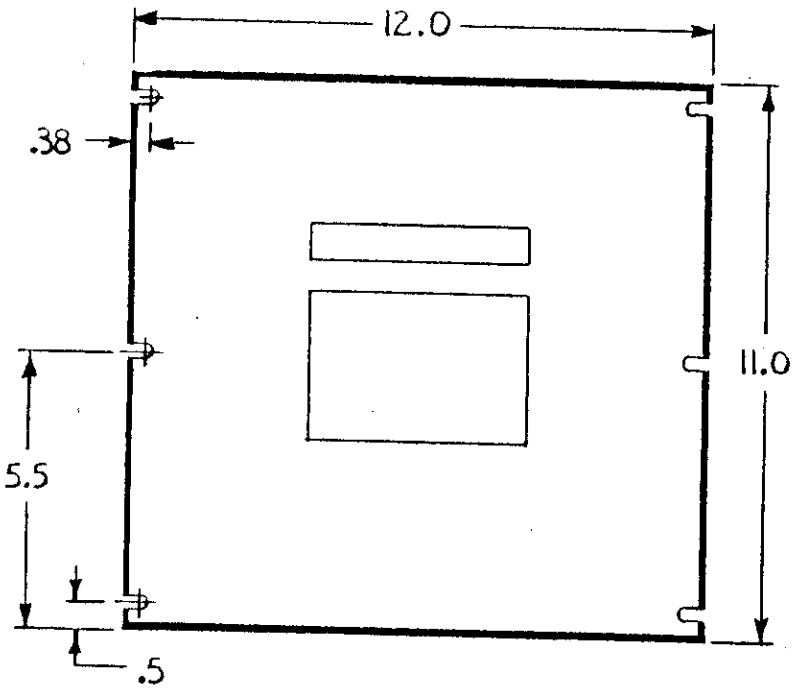
DESCRIPTION _____

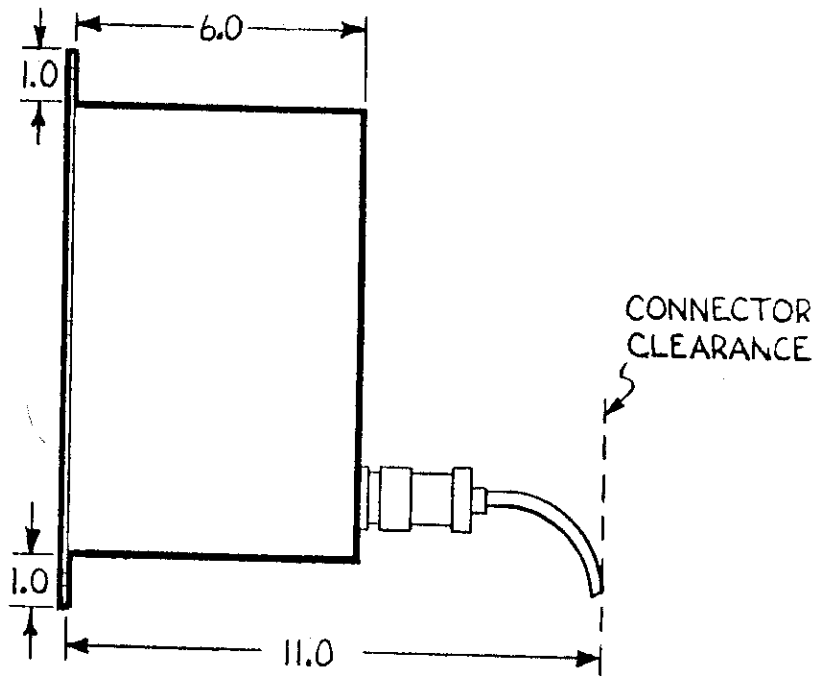
PARAMETER	PROMPT/ENTRY
QUANTITY	pc. _____
PART TYPE	tYPE _____
LENGTH	LEn. A. _____
PUNCH 1	P1 _____
PUNCH 2	P2 _____
PUNCH 3	P3 _____
PUNCH 4	P4 _____
PUNCH 5	P5 _____
PUNCH 6	P6 _____
PUNCH 7	P7 _____
PUNCH 8	P8 _____
PUNCH 9	P9 _____
PUNCH 10	P10 _____
PUNCH 11	P11 _____
PUNCH 12	P12 _____
PUNCH 13	P13 _____
PUNCH 14	P14 _____
PUNCH 15	P15 _____
PUNCH 16	P16 _____
PUNCH 17	P17 _____
PUNCH 18	P18 _____
PUNCH 19	P19 _____
PUNCH 20	P20 _____
HOLE 1	H1 _____
HOLE 2	H2 _____
HOLE 3	H3 _____
HOLE 4	H4 _____
HOLE 5	H5 _____
HOLE 6	H6 _____
HOLE 7	H7 _____
HOLE 8	H8 _____
HOLE 9	H9 _____
HOLE 10	H10 _____
HOLE 11	H11 _____
HOLE 12	H12 _____
HOLE 13	H13 _____
HOLE 14	H14 _____
HOLE 15	H15 _____
HOLE 16	H16 _____
HOLE 17	H17 _____
HOLE 18	H18 _____
HOLE 19	H19 _____
HOLE 20	H20 _____

ALL DIMENSIONS IN INCHES







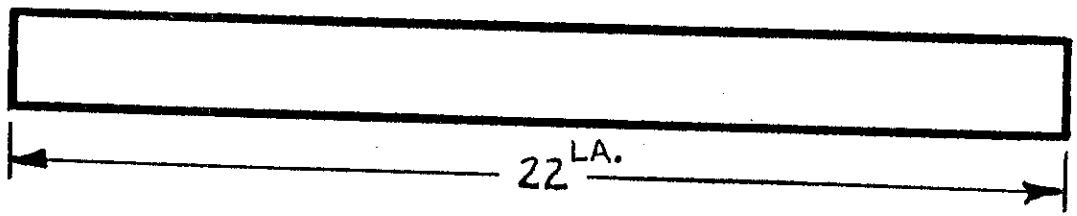


AMS APPLIED MICROSYSTEMS

MP257 Installation Drawing

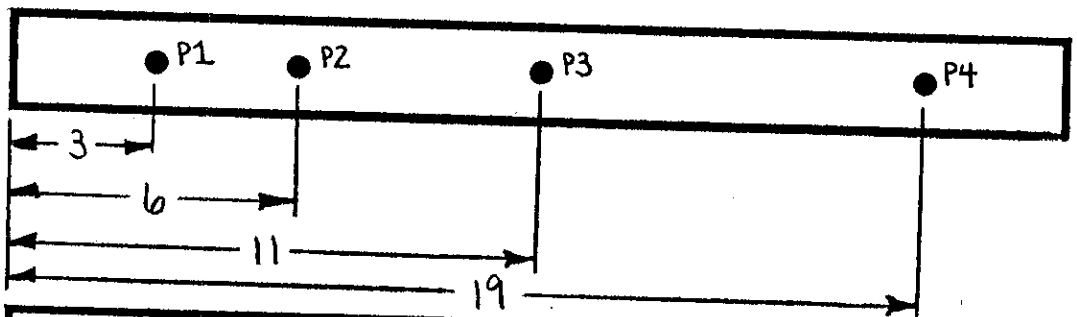
● PUNCH 1 ● HOLE (PUNCH 2)

PART NO. 12



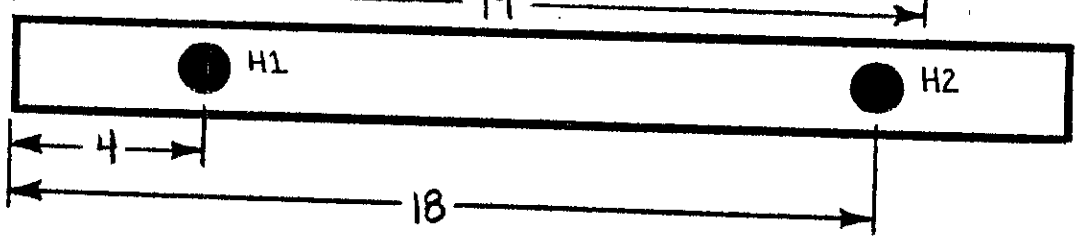
TYPE 1 - SHEAR ONLY.

PART NO. 17



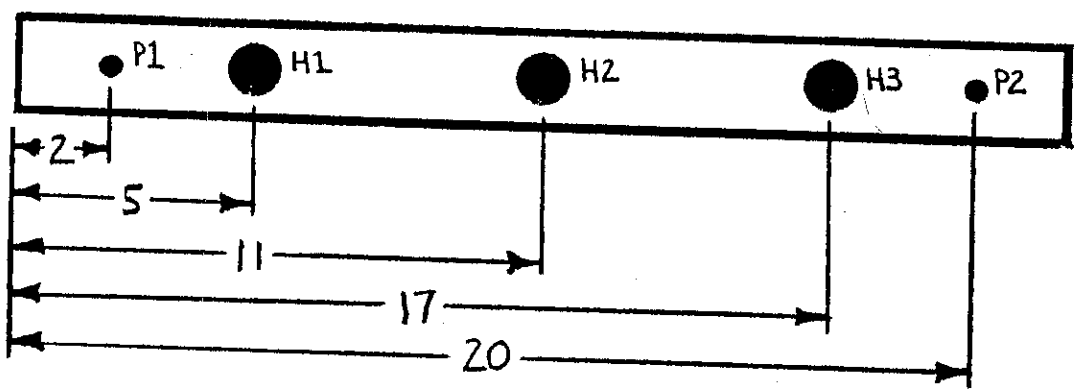
TYPE 2 - SHEAR AND PUNCH 1 ONLY.

PART NO. 28



TYPE 3 - SHEAR AND PUNCH 2 ONLY.

PART NO. 30



TYPE 4 - SHEAR AND PUNCH 1 AND PUNCH 2.

PART DATA SHEET

PART NUMBER 12

DESCRIPTION SHEAR ONLY

PARAMETER	PROMPT/ENTRY
QUANTITY	pc. 100
PART TYPE	tYPE 1
LENGTH	LEn. A. 22
PUNCH 1	P1
PUNCH 2	P2
PUNCH 3	P3
PUNCH 4	P4
PUNCH 5	P5
PUNCH 6	P6
PUNCH 7	P7
PUNCH 8	P8
PUNCH 9	P9
PUNCH 10	P10
PUNCH 11	P11
PUNCH 12	P12
PUNCH 13	P13
PUNCH 14	P14
PUNCH 15	P15
PUNCH 16	P16
PUNCH 17	P17
PUNCH 18	P18
PUNCH 19	P19
PUNCH 20	P20
HOLE 1	H1
HOLE 2	H2
HOLE 3	H3
HOLE 4	H4
HOLE 5	H5
HOLE 6	H6
HOLE 7	H7
HOLE 8	H8
HOLE 9	H9
HOLE 10	H10
HOLE 11	H11
HOLE 12	H12
HOLE 13	H13
HOLE 14	H14
HOLE 15	H15
HOLE 16	H16
HOLE 17	H17
HOLE 18	H18
HOLE 19	H19
HOLE 20	H20

PART DATA SHEET

PART NUMBER 17

DESCRIPTION SHEAR AND PUNCH

PARAMETER	PROMPT/ENTRY	
QUANTITY	pc.	100
PART TYPE	tYPE	2
LENGTH	LEn. A.	22
PUNCH 1	P1	3
PUNCH 2	P2	6
PUNCH 3	P3	11
PUNCH 4	P4	19
PUNCH 5	P5	Ø
PUNCH 6	P6	
PUNCH 7	P7	
PUNCH 8	P8	
PUNCH 9	P9	
PUNCH 10	P10	
PUNCH 11	P11	
PUNCH 12	P12	
PUNCH 13	P13	
PUNCH 14	P14	
PUNCH 15	P15	
PUNCH 16	P16	
PUNCH 17	P17	
PUNCH 18	P18	
PUNCH 19	P19	
PUNCH 20	P20	
HOLE 1	H1	
HOLE 2	H2	
HOLE 3	H3	
HOLE 4	H4	
HOLE 5	H5	
HOLE 6	H6	
HOLE 7	H7	
HOLE 8	H8	
HOLE 9	H9	
HOLE 10	H10	
HOLE 11	H11	
HOLE 12	H12	
HOLE 13	H13	
HOLE 14	H14	
HOLE 15	H15	
HOLE 16	H16	
HOLE 17	H17	
HOLE 18	H18	
HOLE 19	H19	
HOLE 20	H20	

PART DATA SHEET

PART NUMBER 28

DESCRIPTION SHEAR AND HOLE

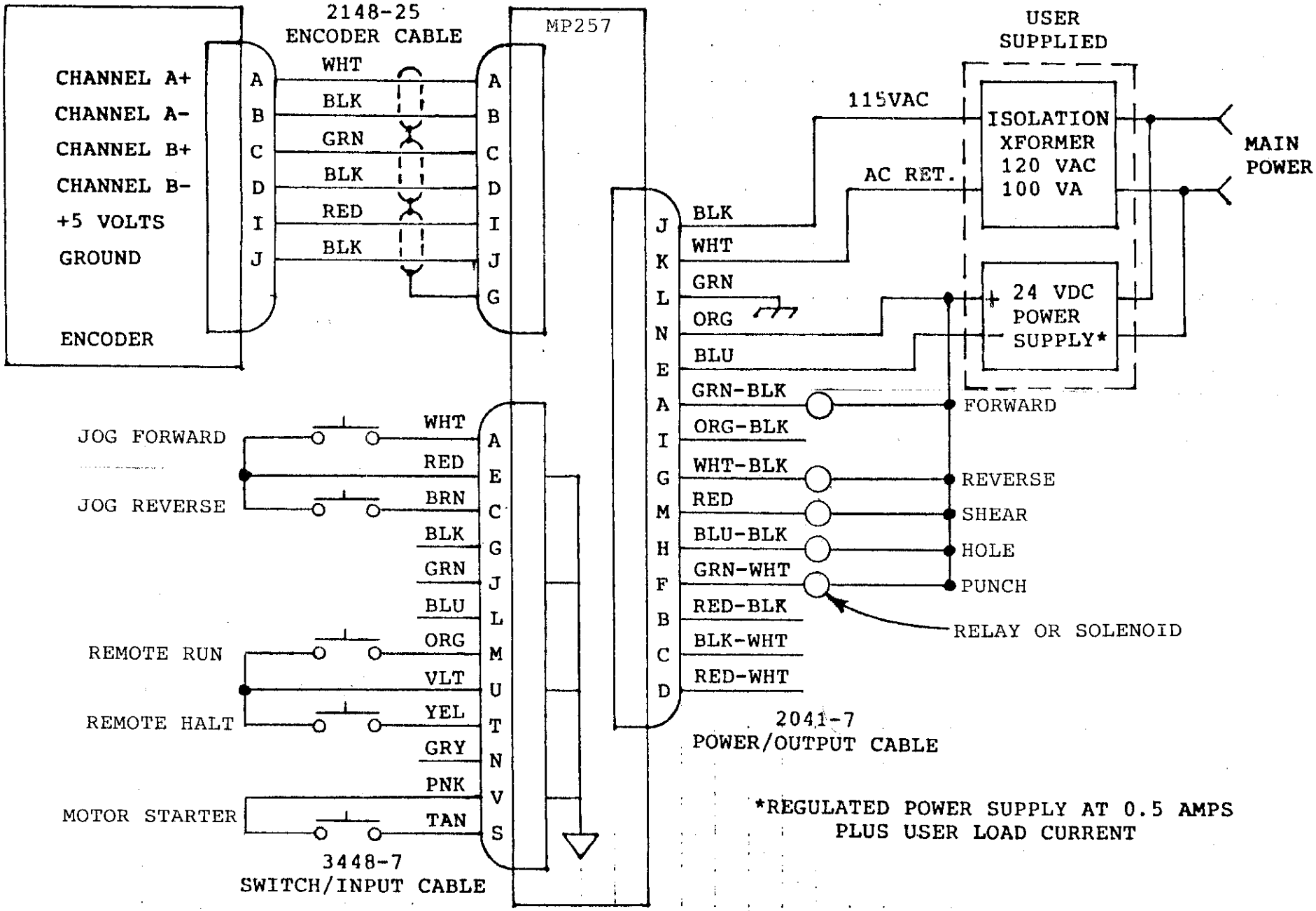
PARAMETER	PROMPT/ENTRY	
QUANTITY	pc.	100
PART TYPE	tYPE	3
LENGTH	LEn. A.	22
PUNCH 1	P1	
PUNCH 2	P2	
PUNCH 3	P3	
PUNCH 4	P4	
PUNCH 5	P5	
PUNCH 6	P6	
PUNCH 7	P7	
PUNCH 8	P8	
PUNCH 9	P9	
PUNCH 10	P10	
PUNCH 11	P11	
PUNCH 12	P12	
PUNCH 13	P13	
PUNCH 14	P14	
PUNCH 15	P15	
PUNCH 16	P16	
PUNCH 17	P17	
PUNCH 18	P18	
PUNCH 19	P19	
PUNCH 20	P20	
HOLE 1	H1	4
HOLE 2	H2	18
HOLE 3	H3	Ø
HOLE 4	H4	
HOLE 5	H5	
HOLE 6	H6	
HOLE 7	H7	
HOLE 8	H8	
HOLE 9	H9	
HOLE 10	H10	
HOLE 11	H11	
HOLE 12	H12	
HOLE 13	H13	
HOLE 14	H14	
HOLE 15	H15	
HOLE 16	H16	
HOLE 17	H17	
HOLE 18	H18	
HOLE 19	H19	
HOLE 20	H20	

PART DATA SHEET

PART NUMBER 30

DESCRIPTION SHEAR, PUNCH, AND HOLE

PARAMETER	PROMPT/ENTRY	
QUANTITY	pc.	100
PART TYPE	tYPE	4
LENGTH	LEn. A.	22
PUNCH 1	P1	2
PUNCH 2	P2	20
PUNCH 3	P3	Ø
PUNCH 4	P4	
PUNCH 5	P5	
PUNCH 6	P6	
PUNCH 7	P7	
PUNCH 8	P8	
PUNCH 9	P9	
PUNCH 10	P10	
PUNCH 11	P11	
PUNCH 12	P12	
PUNCH 13	P13	
PUNCH 14	P14	
PUNCH 15	P15	
PUNCH 16	P16	
PUNCH 17	P17	
PUNCH 18	P18	
PUNCH 19	P19	
PUNCH 20	P20	
HOLE 1	H1	5
HOLE 2	H2	11
HOLE 3	H3	17
HOLE 4	H4	Ø
HOLE 5	H5	
HOLE 6	H6	
HOLE 7	H7	
HOLE 8	H8	
HOLE 9	H9	
HOLE 10	H10	
HOLE 11	H11	
HOLE 12	H12	
HOLE 13	H13	
HOLE 14	H14	
HOLE 15	H15	
HOLE 16	H16	
HOLE 17	H17	
HOLE 18	H18	
HOLE 19	H19	
HOLE 20	H20	



AMS APPLIED MICROSYSTEMS

MP257 Machine Interface