

Jobber Plus

Instruction Manual

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Press Control

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TECH
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Notes

Safety Message

Please read this message first!

The **Jobber Plus** is a partial revolution punch press control which also acts as an interface between light curtains which in turn are designed to guard personnel working around moving machinery. Whenever the operator's safety is dependent on the machine's ability to stop quickly enough to prevent an injury, it is absolutely imperative that the safe stopping time of the machine shall be known and the light curtains be set the proper distance from the nearest pinch point as is regulated in the United States by the Occupational Safety and Health Administration (OSHA). The **Jobber Plus** is totally dependent on the proper operation of the light curtains used to safeguard the operator. Be certain the light curtains used meet all OSHA requirements before interfacing them to the **Jobber Plus**. Be certain that the light curtains are mounted the proper distance from the nearest pinch point as prescribed by the light curtain manufacturer. Regardless of the calculated distance, you should never mount the light curtains closer than 7.5 inches (191 mm) from the nearest pinch point. This is required by OSHA Table 0-10 in OSHA 1910-217 and Table 1 in ANSI B11-19-1990.

The **Jobber Plus** can and should be used to monitor the machine stopping time and the drive mechanism of the E-Cam for loss of motion. Proper setting of the programmable set-point is the sole responsibility of the employer, purchaser and final owner of the equipment.

The proper application, installation, maintenance and operation of the **Jobber Plus**, the light curtains used and the machine itself is the responsibility of the purchaser and or employer.

It is the purchaser's and or employer's responsibility to inspect the **Jobber Plus**, the light curtains, and any other pertinent equipment daily for proper operation. It is also the purchaser's and or employer's responsibility to know that the brake monitoring Set points and the mute Set points are proper and safe for the operator.

The purchaser and or employer is also responsible for the selection and training of the personnel necessary to properly install, operate and maintain the machine and its safeguarding systems. For example; the **Jobber Plus** should only be installed, checked out and maintained by a qualified person, as "a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work." (ANSI B30.2-1983)

The user is the person(s) identified and designated by the employer as being appropriately

Trained and qualified to perform a specific procedure. Often the user is the installer, die setter, electrician, maintenance personnel, supervisor, foreman, etc. involved with the setup, daily test and checkout of the machine and the safety devices.

The **Jobber Plus** should never be accessed by anyone other than properly trained personnel so designated by the purchaser and or employer. If the machine operator is not properly trained to set up the machine or the **Jobber Plus**, then a setup person so designated should perform the setup.

The machine operator must receive specific proper training on exactly which machinery is protected by the light curtains, the machine's operating controls, warning signs and safety instructions. The machine operator must thoroughly understand and follow the company's safety rules and always use the safeguards and proper hand tools provided by the employer. The machine operator must notify management if the machine, tooling or safety devices are not operating properly. Never use the machine if it or the safety equipment is not in proper working order.

The **Jobber Plus** is provided with keyed selector switches. The purpose is to prevent untrained and unauthorized personnel from changing or modifying the operating modes. It is the purchaser's and or employer's responsibility to insure that only trained and authorized personnel have access to these functions.

The following are additional requirements the purchaser and or employer must meet before using the **Jobber Plus**.

The machine on which the **Jobber Plus** and light curtains are to be installed **MUST** be capable of stopping motion anywhere in the stroke or cycle in a safe time as prescribed by the OSHA formula for safe stopping times.

Do not use the **Jobber Plus** or light curtains on any device with inconsistent stopping time or inadequate control devices or mechanisms.

When the **Jobber Plus** and light curtains are used to protect a machine operator from a hazard, the purchaser and or employer has the responsibility to ensure that all applicable federal, state and local Occupational Safety and Health Act (OSHA) requirements and any such rules, codes and regulations which may apply are satisfied.

All Safety related machine control circuit elements, including pneumatic, electric or hydraulic controls must be control reliable.

Any power press which uses the **Jobber Plus** and light curtains must meet the requirements and inspection procedures of OSHA regulation 1910.217, ANSI standards B11.3-1988 and B11-19-1990 plus any other applicable state and local regulations.

All brakes and other stopping mechanisms and controls must be inspected regularly to ensure proper working order. If the stop mechanisms and associated controls are not working properly, the machine may not stop safely even though the **Jobber Plus** and the light curtains are functioning properly and should be taken out of service until repairs are made.

DO NOT OPERATE A MACHINE IN AN UNSAFE CONDITION.

A daily test must be performed by properly trained and designated personnel of the light curtains as prescribed by the manufacturer and the **Jobber Plus** and its associated equipment must be tested for proper functioning.

The enforcement of these regulations are beyond Metal-Tech Controls. Corp.'s and its agent's control. The purchaser and or employer has the sole responsibility to follow the proceeding requirements and any other procedures, conditions and requirements specific to the machine.

Installation Instructions

If you follow this step by step procedure, you will find that installing the **Jobber Plus** is easier than any other punch press control on the market.

Jumpers

Do NOT remove any of the factory installed jumpers until the control is installed and functioning without any additional components. i.e. Light Curtains, Foot Switches, Remote Top Stop or E-Stop buttons, Tonnage Monitors, Die Protection, etc. In this way you know that the control is operating properly before you add additional components. You can pull the necessary wires for these additional components, but don't hook them up until the machine is operating properly without them. When adding them, do so one at a time, testing the machine and the control's operation after each one is wired.

Direction of Rotation

Determine the machine's direction of rotation , CW or . You will need this information later during the installation process. Rotation is determined by facing the front surface of the E-Cam chain sprocket.

Move the ram to TDC (top dead center).

Mounting The jobber Plus

Determine where on the machine you want to mount the **jobber Plus**. Always mount the control so that the control is easily accessible to the operator and easy to view the display. Use the shock mounts supplied with the control. **Failure to shock mount the jobber Plus will void the warranty!**

Mounting brackets are available for both side mounting and for mounting from the rear of the control.

E-Cam Installation

With the machine **positioned at TDC** install the E-CAM. Be certain that the drive chain and sprockets are secure and aligned properly. Do NOT load the E-CAM drive shaft. There should be some slack in the chain so that the bearings are not overloaded. The E-CAM is supplied pre-wired from the factory with a 12 foot long cable and connectors (longer length cables are available). Do not, under any circumstances remove the E-CAM cover or alter the wiring in any way. **Doing so will void the warranty!** Connect the E-CAM cable to the control. Make sure the connector on the E-Cam is tightened properly.

Palm Buttons

Wire the operator palm buttons to the control. **NOTE: All inputs are 12 to 48 vdc.** 12 vdc is supplied at the terminal and could be used for dc voltage inputs. The palm button inputs require a normally open contact for each palm button and a normally closed contact. (The normally closed contacts are wired in series).

Air Pressure Switches

Wire the air pressure switches. Again using 12 to 48 vdc to the switch's normally open (held closed) contacts and back to the air pressure input. If there is a pressure switch for a counter balance, wire that to input otherwise jumper the terminal to 12 to 24 vdc.

Remember: Do not remove any of the jumpers from the user side of the wire terminals until the control has been tested and is working properly.

Grounding

The machine **MUST** have a true earth ground and the control transformer must be grounded to the machine.

Dual Solenoid

Connect the dual solenoid coils. (**NOTE!! You MUST wire both coils separately.**) The common for the dual valve coils should be connected to the controller board

Double check the wiring. Turn the power on with the fuse block open. Check for proper voltage. Close the fuse block, turn the key to 'ON'. If it does not come on check the fuse and wiring.

If you have not removed any of the jumpers from the user side of the terminals the control should come on and be ready for setting up the E-CAM.

Programming

Programming the machine setup is done from a special setup menu using the programming keypad (Part No. 900-E00146).

To enter the programmable functions of the Jobber Plus the machine cannot be in motion. Plug the ribbon cable into the back of the LCD display. The socket is keyed so it only goes in one way. Press the MENU key and the following messages will be displayed. Enter your password, (1234 is assigned from the factory). On the next screen use the UP and DOWN arrow keys to traverse the menus.

ENTER YOUR PASSWORD
Password **1234**

*** SETUP MENU ***
1=SET ROTATION CW
2=SETUP TDC
Press DOWN For More

Machine Program Screen

E-Cam Programming

Programming the E-CAM for machine operation. This function is used to program the machine's top dead center, direction of rotation and top stop settings.

If it is a variable speed machine, you will be prompted to program cam settings for the machine's speed ranges.

Press 1 to SET ROTATION and then ENTER

THE MACHINE MUST BE AT IT'S TDC POSITION TO PERFORM THIS FUNCTION!

The following menu will appear. Choose the direction that the machine rotates, clock wise or counter clock wise.

<p>ROTATION SETTING</p> <p>Select Rotation Dir</p> <p>1=CWise 2=CCWise</p>
--

Note: Direction of rotation is determined by facing the front of the E-Cam and looking at the chain sprocket.

Once the selection has been made the screen will display "Ctr Clock Saved" or "Clock Wise Saved". The LCD will return to the MAIN MENU.

<p>MACHINE SPEED TYPE</p> <p>Make Selection</p> <p>1=Single Speed</p> <p>2=Variable Speed</p>
--

If the machine is a single speed machine press 1. If the machine is a variable speed machine press 2.

If you selected "Single Speed" you will be asked to cycle the machine for a number of times until the control has determined that the machine is stopping within 5 degrees of TDC.

Because of limited space on the display instructions are sometimes truncated to fit the screen. The display above is asking you to cycle the machine by pressing the palm buttons and holding them until the machine attempts to stop at TDC. When it stops, the display will show the angular position in degrees.

Cycle machine until
it stops at Mach TDC
PRESS PALM BUTTONS
HOLD UNTIL PRESS TDC

The LCD prompts you to cycle the machine until it stops a precisely at TDC. All you need to do is hold the palm buttons in until the control automatically top stops the machine. If the machine does not stop at TDC within a few degrees the Display will ask you to cycle the machine again. Each time the machine comes to a stop the angle is displayed.

Mach. Pos. Angle 008

PRESS PALM BUTTONS
HOLD UNTIL PRESS TDC

Repeat cycling the machine until the control displays the following message.

Stop angle is within
5 degrees of TDC

There will be a delay and then the message.

TDC stop angle has
been determined for
machine speed #1
Turn Key to FOOT to Save

Variable Speed Machines

The controller requires 4 speed tests for variable speed machines. You will need to divide the machine's speed range into four parts - slowest speed, highest speed and two speeds in the middle. You do not need to know the actual SPM (strokes per minute) If the machine has a SPM or RPM indicator then write down the speed settings:

EXAMPLE: Low speed - 40 SPM, 2nd speed - 60 SPM, third speed - 90 SPM, highest speed - 120 SPM.

If you do not have a digital speed readout, mark the dial for the lowest speed, the 2nd speed, the third speed, and the highest speed. When changing from one speed to the next, simply move the dial to the next speed mark and follow the instructions.

Start with the slowest speed setting. The machine **MUST BE AT TDC!** Do exactly as described previously for single speed machines for the first variable speed (slowest speed).

Once the slowest speed has been entered the following screen will appear.

Adjust Motor Speed For
Setting No. 2
Press ENTER When OK
to continue setup.

Change the machine's speed to the next speed setting. (Second speed)

SPEED SETUP FOR No. 2

READY to CYCLE
PRESS PALM BUTTONS

You will be asked to prepare for the next two speeds by increasing the machine's speed to the third and fourth speed range until all four settings are determined.

MACHINE SPEED SET UP
COMPLETED

Just as with the first (slowest setting) done previously, cycle the machine until the control determines the proper stopping angle.

Adjusting TDC

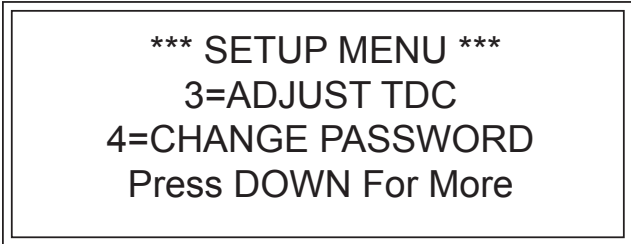
There may be times when you will need to make adjustments to the stop angle factor programmed into the Jobber Plus. But before you do, answer these questions:

Did you check to see if you have the proper counter balance pressure set? Proper counter balance pressure improves your stopping time and therefore the stopping angle can be more accurate. It also reduces the wear on the clutch and brake.

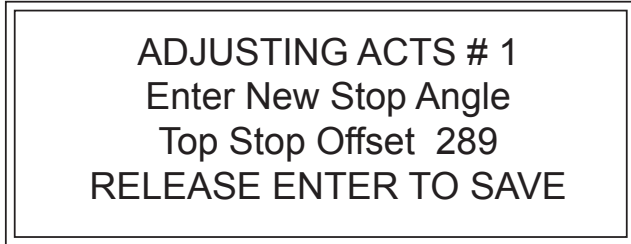
Have you gotten machine stop time errors? If so you probably need to perform maintenance on the machine's clutch and or brake or - your counter balance pressures are not set correctly.

Have you had to change the stop time setting that was determined in the machine's initial setup? If you had to change the stop time settings the cause is in the clutch/brake or improper counter balance air pressures.

To make adjustment to a single speed machine follow the instructions from the E-CAM programming section to get to the programming menu, scroll down to the following screen and press 3 then ENTER.



*** SETUP MENU ***
3=ADJUST TDC
4=CHANGE PASSWORD
Press DOWN For More



ADJUSTING ACTS # 1
Enter New Stop Angle
Top Stop Offset 289
RELEASE ENTER TO SAVE

WARNING: You cannot set the stop angle less than 212 degrees. It will not show but any setting below 212 degrees is automatically reset to 212 degrees. If the machine is taking this long to stop, it is unsafe and should be repaired!



NEW OFFSET SAVED

VARIABLE SPEED MACHINES:

The Jobber Plus version provides automatically compensated top stop, “ACTS”. ACTS is only available when the user has selected VARIABLE SPEED from the machine setup menu.

When you entered the four speed ranges during the initial machine setup the control automatically created a speed table by inserting additional angle settings between the four speed ranges, creating a total of seven speed ranges. These seven angle settings can be adjusted in the same way as for a single speed machine. For variable speed machines the following menu will appear after setting the first speed range.

ADJUSTING ACTS # 2
Enter New Stop Angle
Top Stop Offset 289
RELEASE ENTER TO SAVE

When instructed by the display enter each new Top Stop Offset.

When completed you will be advised that all settings have been changed.

Changing Passwords

This function allows you to change the required password to any six digit or less number (up to 999999) The factory password is 1234. Once you change it, it is gone. It is **VERY IMPORTANT** that this password does not become available to unauthorized persons. **Improper settings could cause serious injury to personnel!** Keep a copy of you password in a safe place where only authorized personnel have access to it.

Stop Time Test

This function performs a stop time test at 90 degrees of the machines stroke for determining the worst case stop time. It is advisable to mount your heaviest upper die to the ram for the most accurate test. Make sure the machine is at TDC, then select STOP TEST. Follow the instructions on the screen, you will make 10 strokes. Each time the machine will be stopped at 90 degrees. When the test is completed the stop time is averaged and the maximum averaged stop time will be stored in Flash Ram for reference each time the machine’s ram is stopped. If the stop time should exceed this parameter a STOP-TIME ERROR will be displayed and the machine will have to be reset. If this occurs it is an indication that the stopping time of the machine is erratic and the clutch/brake system should be serviced.

Adjusting the STOP MAX

If after operating the machine you find that the stopping time is higher than determined by the test (usually caused by the normal heating of the brake lining during use), you can adjust the setting by entering the SETUP menu as previously described and selecting function CHANGE STOP MAX. A new screen will appear. Change the stop max value to the highest stop time you have been getting plus 10% . Remember to move any light curtains, operator stations, etc. to the new safe distance as required by OSHA.

Setting and Adjusting Lost Motion Detection

The lost motion function is used to determine if the E-CAM is functioning properly. E-CAM failures can have several causes. A broken chain drive. A chain sprocket could be slipping or the cable and even the E-Cam itself could be defective.

The reason the lost motion time can be programmed is because every machine has some delay before it starts moving after the press is initiated. Obviously the quicker any of these errors are detected the safer the machine will be. If the factory default of 350 milliseconds causes lost motion faults. Try setting the time to 450 milliseconds. Test cycle the machine several times. If there are no lost motion errors, reduce the time by half. If there is a lost motion error, increase the time by half and test cycle the machine. Continue until you obtain the lowest possible setting without causing a lost motion error.

To adjust the setting enter the SETUP menu as previously described and select the function SET LOST MOTION. A new screen will appear. Change the value as described above.

! WARNING ! Setting the lost motion time too high could result in personal injury!

MTS (Machine Test Signal)

As a additional light curtain safety check the light curtain's output (relays) can be checked once during each stroke of the machine. The purpose of this test is to be certain the light curtain relays are working properly. Should the relay contacts weld closed the machine would not stop if the light curtains are interrupted during the downward portion of the stroke.

Some light curtain manufacturers do not have this input function. If they don't, we would advise against buying this type light curtain. However, if you have a set of light curtains without this function, the control will accept a light curtain interrupt caused by the operator or the part breaking the beam during the up stroke of the machine. Most operations cause this to happen anyway. This function can be turned off, however, it is very strongly recommended that it is left on for safety.

NOTE: If the machine cycles 500 or more strokes per minute and the light curtain relays are slow you could get MTS faults. In this case you will have to turn the MTS function to off.

Micro Inch

Micro inch is used in die setting. If the control is in inch mode and set to MICRO INCH the palm buttons may both be held in and the machine will increment 'jog' for a timed interval.

To turn on Micro Inch:

The control must be in inch mode. Press and quickly release the Continuous Arm button. The display will read MICRO INCH MODE.

To turn off Micro Inch:

Press and quickly release the Continuous Arm button.

The interval is programmable. The setting can be adjusted by entering the SETUP menu as previously described and selecting function MICRO INCH TIME.

MICRO INCH TIMING
Micro Time mSec
Enter New Time 0010
Press ENTER to Save

The time increments are 1/100 of a second. Adjust to a time that best meets the machines clutch/brake timing.

User Programmable Outputs

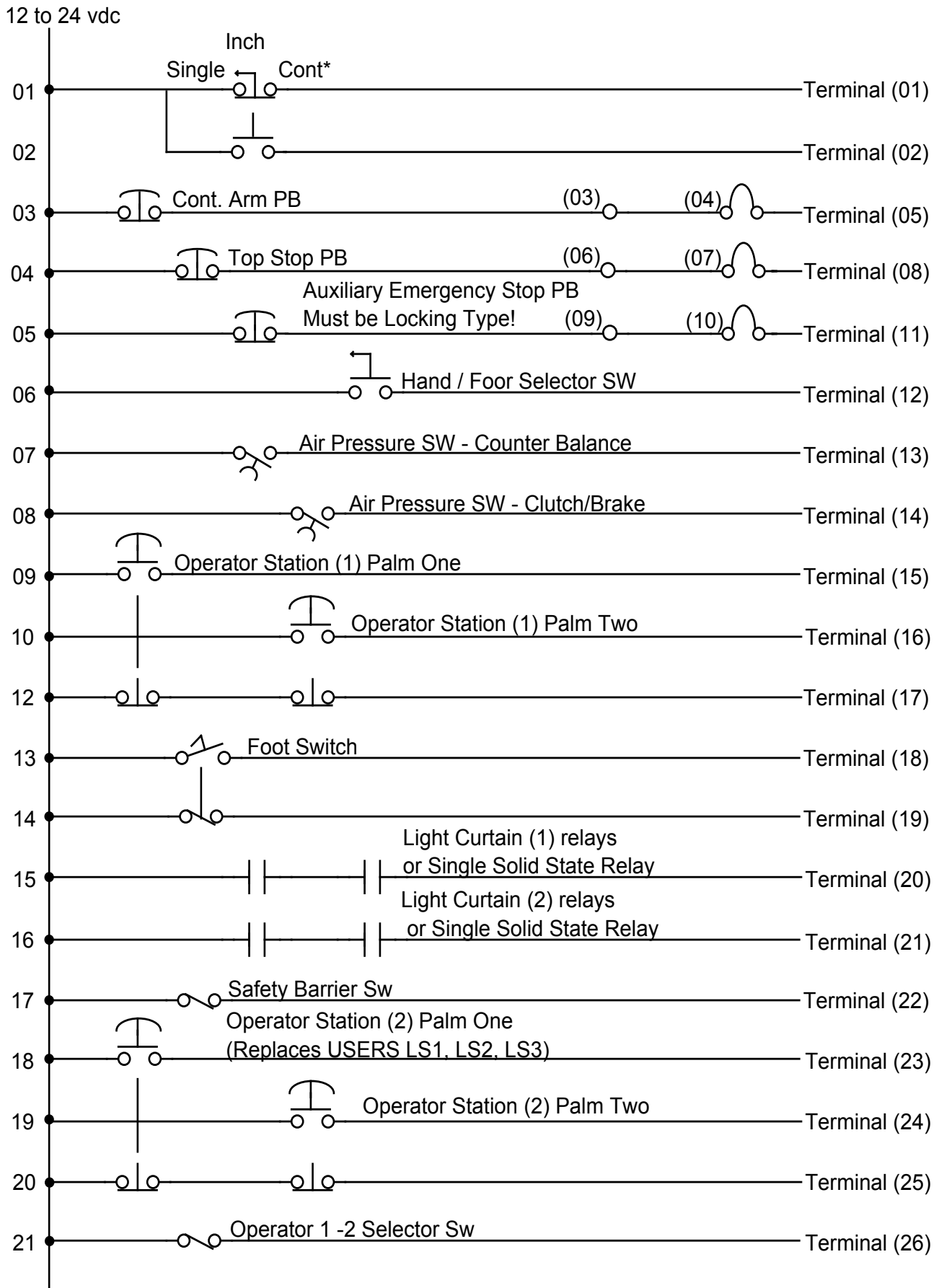
The Jobber Plus version comes with two user programmable output relays. These relays will come on and go off at any programmed angle (rotary position of the machine). To set the cam relays enter the SETUP menu as previously described and select the SETUP USER RELAYS function. After making the selection the LCD will display the following.

SET USER RELAYS
CAM(1) CAM(2)
025< 270 125 015
Use The Up Key to Select

Use the UP Arrow key to move from cam angle to cam angle. An < or > will appear next to the angle to be edited. Pressing the ENTER key saves the angles to Flash Ram. The left two settings are Cam(1) (relay 1) ON and OFF and the right two are Cam(2) (relay 2) ON and OFF. Enter any number between 1 and 360. The relays will be energized (contact closed) when the first angle is encountered and off (de-energized) when the second angle is encountered. The relay contacts are rated at 6 amps 220 ac/dc. If you need N/C contacts simply reverse the starting and ending angle.

To prevent the relays from going ON and OFF set both on and off angle to 360.

Wiring Diagram- Low Voltage



Multipule Operator Stations

The Jobber Plus provides for the use of two operator stations. The first operator station is wired to terminals 15, 16 and 17.

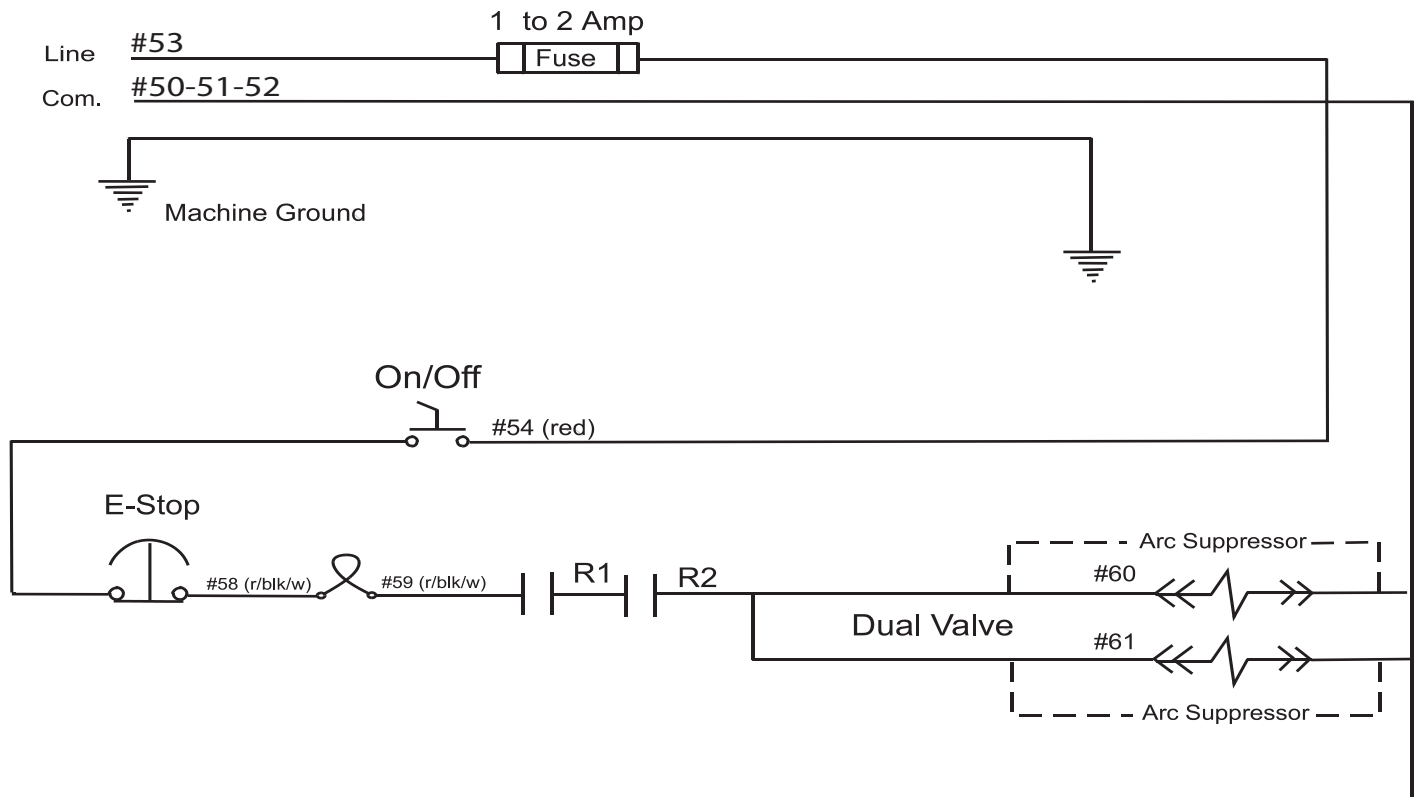
Operator Installation of two operator stations requires a "keyed" selector switch connected to terminal 26. This terminal is 12 to 24 vdc. The switch is wired so that when the switch is ON an input current is supplied to terminal 26. 'ON' indicates that two operator stations are being used.

Depending on this switch position the message "TWO OPERATOR" or "ONE OPERATOR" is displayed on the bottom line of the LCD.

For safety reasons the operator stations should be wired so that when TWO stations are selected an indicator light on the second operator stations is lit. A CAUTION label should be placed on the second operator station warning that if the light is not 'ON' the station is disabled and unsafe!

Wiring Diagram- High Voltage

110/220 Volts AC



Board layout & Connections

Resolver (E-CAM) Terminal

New Computer Cable

- 70 - Orange/White
- 71 - White/Orange
- 72 - Not Used
- 73 - Blue/White
- 74 - Bare Wire (Grd)
- 75 - White/Blue

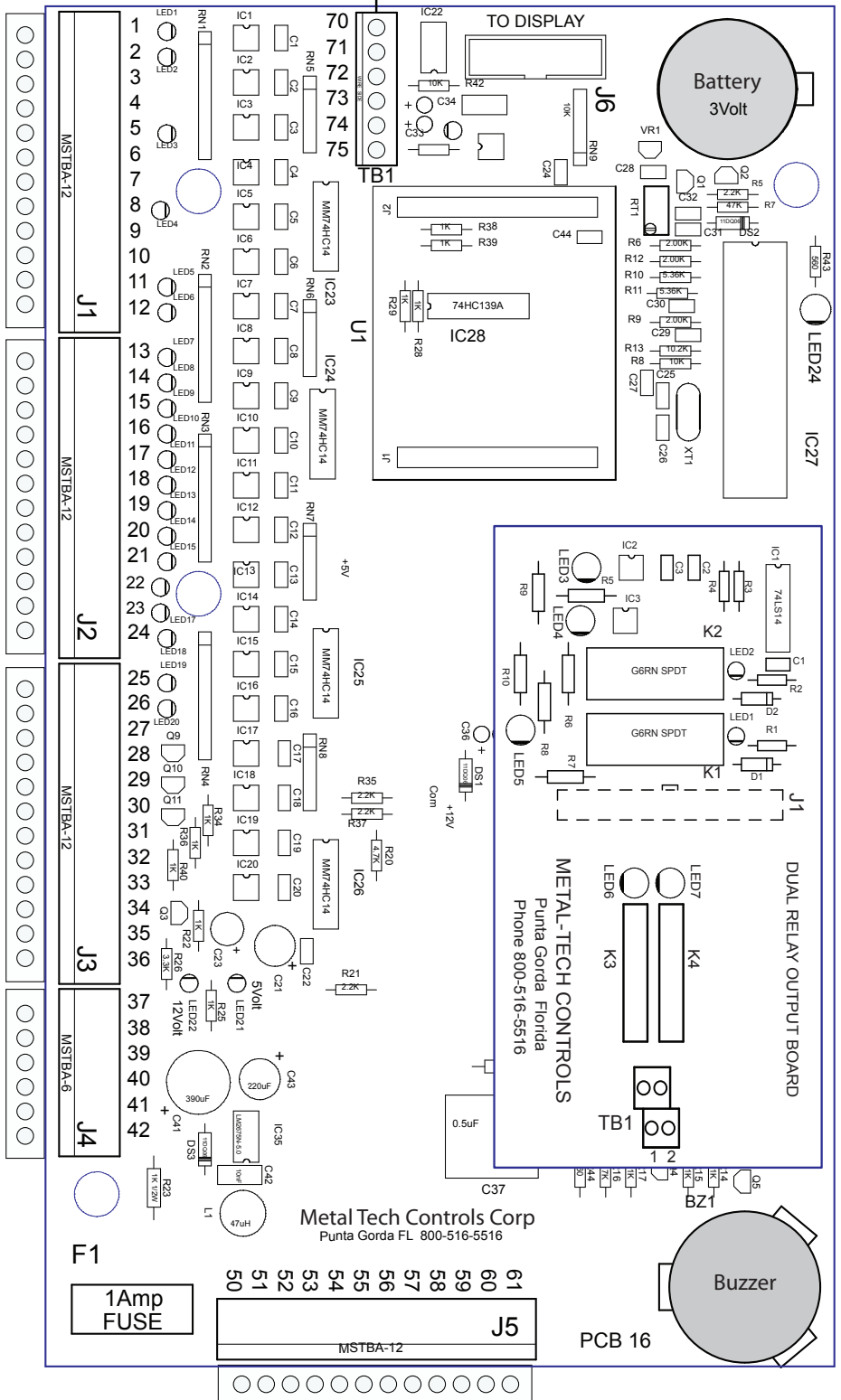
Old Euro Cable

- 70 - Black
- 71 - White
- 72 - Not Used
- 73 - Blue
- 74 - Bare Wire (Grd)
- 75 - Brown

- Black --- Single Switch
- Black/White- Continuous Switch
- White/Black --- Continuous Arm PB
- Ext. Cont. Arm PB
- Ext. Cont. Arm PB
- Orange/Black --- Top Stop PB
- Ext. Top Stop PB
- Ext. Top Stop PB
- Orange --- E-Stop PB
- Ext. E-Stop PB
- Ext. E-Stop PB
- W / Blue --- Hand/Foot Key Sw

- Low Air Pressure, Balance
- Low Air Pressure, Brake
- Palm #1 N/O PB
- Palm #2 N/O PB
- Palm 1 & 2 N/C
- Foot Sw. N/O
- Foot Sw. N/C
- Light Curtain Input #1
- Light Curtain Input #2
- Safety Barrier Sw.
- Opt Station 2 - Palm #1 N/O or LS1
- Or Continuous on Demand Input
- Opt Station 2 - Palm #2 N/O or L.S2
- Or Continuous on Demand Input

- Opt Station Palm 1 & 2 N/O or LS3
- Users Key Sw to Select Opt Stations 1 or 1 & 2
- Red/White Neg. Term. Red LED
- Green/White Neg. Term. Green LED
- Counter Output
- Counter Common
- MTS
- MTS Common
- Blue --- Door Feed +12 VDC
- +12 VDC
- +12 VDC
- +12 VDC
- +12 VDC
- Red --- +12 VDC
- +12 VDC from Pwr Supply
- Black---Common from Pwr Supply
- Green --- Ground



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NOTE:

All inputs that are not used must be jumpered to 12VDC

- Dual Valve Coil #2
- Dual Valve Coil #1
- Ext. E-Stop Switch
- Ext. E-Stop Switch
- Ext. E-Stop Switch - Blue/Black
- Return from Key Switch --- Red/Black
- Power ON/OFF Key Switch --- Red
- 120VAC IN
- Neutral In
- DC Pwr Supply Neutral --- White
- Dual Valves Neutral

Operating the Press

Inch Mode

Press the palm buttons, as long as the palm buttons are maintained the press will cycle until the ram reaches TDC. Releasing the palm buttons will initiate an immediate stop. Once the ram has reached TDC you are required to release both palm buttons before initiating another stroke. Only two hand control is allowed in Inch Mode.

Micro Inch

Micro inch is provided to allow for very short precise jogs of the ram usually used when setting the die. The amount of ram movement is controlled by the setting chosen from the Machine Setup Menu.

Single Stroke

Single stroke is initiated in two ways, Two hand control and Foot Switch. When using the Foot Switch Mode the machine MUST be guarded by either physical barriers or light curtains.

To initiate a single stroke, the machine must be at TDC. Press both palm buttons and hold them in until the machine has passed the bottom of the stroke (actual 175 degrees), the control will automatically auto return the ram to TDC. If you release the palm buttons or foot switch before 175 degrees the machine will immediately stop.

Continuous Stroke

Continuous stroke is initiated using the palm buttons only. Press the Continuous Arm button, a timer will start. You have 3.5 seconds to initiate the stroke. Hold the palm buttons in until the ram has passed through 175 degrees (bottom of stroke). Press the Top Stop Button to stop the ram.

Continuous on Demand

WARNING! When using Continuous on Demand mode the machine must be fully guarded to protect all personnel. Hard guards with safety interlocks, light curtains or some other means of safe guarding that meet OSHA requirements must be applied. You, the end user are solely responsible for operator safety!!!!

To use the Continuous on Demand mode of operation:

Place machine at top dead center (TDC), inputs 23 and 24 should be de-energized, press the continuous arm (green) button for 3 to 4 seconds, (you will see the words "CONTINUOUS ON DEMAND" appear on the screen. The Red and Green panel lights will flash in this mode of operation.

The Jobber Plus is now ready to run. Apply 12 to 24 vdc to terminals 23 and 24, (these inputs should be from separate sources, and independent of each other for safe operation). The machine will cycle continuously until inputs 23-24 go low (de-energized), the Top-Stop push button is pressed or there is an emergency situation. ie. e-stop, light curtain fault, etc. The machine will top stop when 23 and or 24 are de-energized.

Dual operator stations cannot be used with CONTINUOUS ON DEMAND. There cannot be any voltage applied to terminal 26 (Select Opt Stations 1 & 2). If there is an error message will appear, "Two Operation Stations Cannot be Used". You may wire the stations in but you cannot use them in this mode.

Diagnostic Error Messages

Whenever an error occurs, the red indicator light will come on and an error message along with a helpful hint as to how to find the cause of the error will be displayed. There will be times when an error occurs and is cleared so rapidly that the error message is replaced by the next appropriate message i.e. SINGLE STROKE MODE This is caused by the extremely fast scan time of the processors. To help with this situation a special diagnostic tool is provided. Each time an error occurs the message is stored in the controller's memory. You can access this message by pressing the Top-Stop button while the machine is idle. Do not turn the power off before reading the message. If you do, you will get the message POWER FAILURE, which was the last error to occur.

WARRANTY

Metal-Tech Controls Corp. - herein after referred to as MTCC warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair any equipment found defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within TWO years from date of shipment. At MTCC's option: Upon receipt of a purchase order from the owner for the price of the part needing replacement or repair MTCC may opt to send a replacement part. Upon receipt of the defective part from the owner and inspection by MTCC and where the part is found to be defective by no cause of the owner a credit will be issued.

Ten Year Controller Board exchange warranty and policy: After the initial 2 year warranty period MTCC will replace the defective controller board for the exchange fee of \$600.00 provided the defective board is repairable. A purchase order for the full price of an exchange board must be provided to MTCC. Upon receipt of the defective board from the owner and inspection by MTCC and where the part is found to be defective by no cause of the owner a credit will be issued less the \$600.00 exchange fee.

Warranty is specifically at the MTCC's factory. Any on site service will be provided at the sole expense of the purchaser at MTCC's standard field service rates.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

No representation or warranty, express or implied, made by any sales representative, distributor, or other agent or representative of MTCC which is not specifically set forth herein shall be binding upon MTCC. MTCC shall not be liable for any incidental or consequential damages or loss arising from reduced or lost production, or expenses directly or indirect arising from the sale, handling, improper application or use of goods or from any other cause relating thereto and MTCC's liability thereunder, in any case is expressly limited to the repair or replacement (at MTCC's option) of goods supplied by MTCC.

All associated equipment must be protected by properly rated electronic/electrical protection devices. MTCC shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.

Returns and allowances must be authorized by MTCC in advance. There will be a 30 percent restocking charge on items normally held in inventory. There will be a percent restocking charge for custom or special request items. MTCC will assign a RETURNED GOODS AUTHORIZATION (RGA) number which must appear on all related papers and outside of the shipping carton.

WARNING! Any attempt to repair or troubleshoot MTCC's products except as limited to the user replaceable components will void the warranty and may render the product unsafe for use. MTCC's products contain complex electronics which may only be tested and repaired by an authorized MTCC trained technician.

Notes

