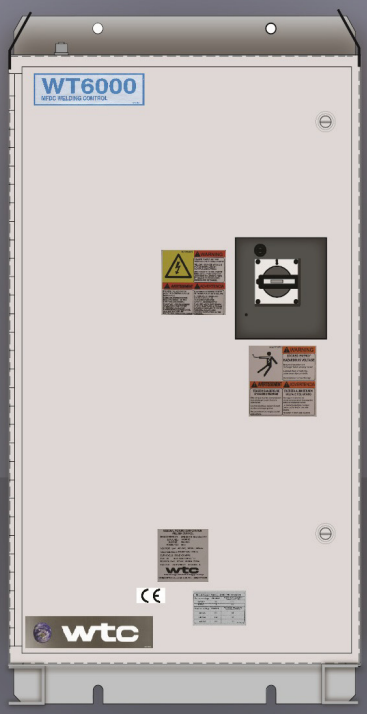
Welding Technology Corporation

WT6000 -G08300

USER MANUAL



G6 Weld Controls

TABLE OF CONTENTS

REGARDING THIS DOCUMENTATION

This documentation is written to support WT6000 Weld Control with timer software G08300-00-19

It has been designed for planning, programming, start-up personnel, operators, service technicians, plant operators, line builders and maintenance personnel to assist with procedures related to installing the weld control.

This instruction manual contains important information on the safe and appropriate assembly, transportation, commissioning, maintenance and simple trouble shooting of WTC6000 Weld Control

Some of the screen shots of the software application may appear different and are used for illustrative purpose only.

REVISION HISTORY

REVISION	REL. DATE	COMMENTS
1.0	12/10/09	Release of initial manual for G08300.
1.0.1	07/10	Add Tip Dress Motor control and corrections
2.0	12/07/10	Multiple changes to manual M-032200, Software G08300-00-09.
3.0	6/15/11	G08300-00-09: Added default DeviceNet I/O to Ch.E. Corrected default LIO tags in Ch. E. Added note to DNET Factory Default Settings section in Ch. 5.
4.0	8/19/14	Updated the entire manual to incorporate changes with software version G08300-00-19

LANGUAGES AVAILABLE

This documentation was originally published in English.

SYMBOLS USED IN THIS DOCUMENTATION

Danger! and **WARNING!** messages indicate high-voltage hazards in weld controls, MFDC inverters and weld monitoring equipment.

Danger! 	This symbol will be used wherever failure to observe safety measures may result in death, severe bodily injury o serious damage to property.
WARNING! 	This symbol will be used wherever insufficient or lacking compliance with instructions may result in personal injury.
Caution: 	This symbol denotes when insufficient or lacking compliance with instructions may damage equipment or files.
NOTE:	This symbol informs the user about special features, or where to find more information.
	This symbol draws attention to specific instructions or product features.
	This symbol will be used to notify the operator when an operation requires ESD safety precautions to be followed.Failure to follow ESD precautions when performing certain procedures may damage the equipment and void the warranty.
	This symbol indicates that only WTC service personnel or WTC repair partners should service or open this device. Breaking a warranty seal will void the warranty of this device.

COMMON TECHNIQUES USED IN THIS MANUAL

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.

① Numbered lists provide sequential steps or hierarchical information.

Italic type is used for emphasis.

WTC SUPPORT - INDUSTRIAL TECHNICAL SERVICES [ITS]

WTC tests all of our products to ensure that they are fully operational when shipped from the manufacturing facility. If you are experiencing installation or startup problems, please review the troubleshooting information contained in this publication. If you need assistance to get your module up and running, please contact Customer Support (see the table below); our trained technical specialists are available to help. When emailing please provide a photograph of the serial tag and Hardware Status Screen on the DEP 300s if possible.

If the product is not functioning and needs to be returned, contact your distributor. You must provide a Customer Support case number to your distributor in order to complete the return process.

Phone	United States/Canada	1.248.477.3900 Ext: 3020
	Outside United States/ Canada	
Internet	Worldwide	Go to http://support.wtc.com

SAFETY INSTRUCTIONS

Safety Instructions call your attention specifically to danger potentials or risks. We distinguish among the following places where safety instructions may be required.

SAVE THESE INSTRUCTIONS.

Danger!

FAILURE TO OBSERVE SAFETY MEASURES MAY RESULT IN DEATH, SEVERE BODILY INJURY OR SERIOUS DAMAGE TO PROPERTY.

Danger!

LETHAL VOLTAGES ARE PRESENT WHEN APPLYING POWER TO THE WELD CONTROL. EXPOSURE TO HIGH VOLTAGE WILL CAUSE SEVERE ELECTRICAL BURNS, INTERNAL INJURIES AND/OR DEATH.

REFER ALL NECESSARY SERVICE ON THIS MACHINE ONLY TO QUALIFIED MAINTENANCE PERSONNEL.

Caution:

WHEN LIFTING ANY WEIGHT OVER 20 KG (~45 LB.), USE EITHER A TWO-MAN LIFT OR AN ASSISTED LIFT.

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY FOLLOW THESE INSTRUCTIONS.

ONLY qualified personnel are allowed to service the weld cabinet and associated devices!

Make certain the circuit breaker handle on the enclosure is in the OFF position before attempting to open the door.

Inspect the enclosure for any potential shipping damage, loose connections, or packing materials inside the cabinet before operation!

WTC does NOT recommend drilling any holes in the cabinet! If additional holes are required, make certain all components are covered to adequately protect from metal debris.

NEVER remove circuit boards or establish electrical connections with power applied! Be certain to REMOVE POWER BEFORE servicing, installing or removing components.

Always ensure proper flow rate, temperature and chemistry of cooling water before operation. Obstructed or insufficient flow of cooling water may damage components.

Adjust the magnetic trip setting on the circuit breaker to a value appropriate for weld operation!

Verify all transformer tap voltages BEFORE attempting to apply power or weld.

Verify the setup parameter “Nominal Line Voltage” to your facility voltage if the operator ever reloads software to default settings.

Never use a personal grounding strap when working with voltages above 220V.

Cu 75^{O} ONLY

WORKING WITH STATIC-SENSITIVE DEVICES

ESD COSTS!

Electrostatic discharge (ESD) can ignite flammable materials and damage electronic components. Static electricity can attract contaminants in clean environments or cause products to stick together. Other costs of ESD-damaged electronic devices are in their replacement and production down time. Associated costs of repair and rework, shipping, labor and overhead can be significant. Reducing losses to ESD and static electricity is an ABSOLUTE NECESSITY.

NEVER use the personnel grounding system described below when working with voltages above 220 VAC.

PERSONNEL GROUNDING

Before touching any Electrostatic Discharge Sensitive (ESDS) devices or circuit boards, put on and wear an Electrostatic Discharge (ESD) wrist strap. Ground this strap through a one megohm (1 MΩ) resistor.

HANDLING OR MOVING ESDS DEVICES

Handle all circuit boards by their edges ONLY. NEVER touch the traces or edge pad connectors.

NOTE:

Use ONLY static-shielding containers for transporting ESDS devices or circuit boards.

WORKSTATION REQUIREMENTS

If diagnostics are required, move the circuit board to an approved ESD workstation. A static-safe workstation must include a grounded ESD mat, wrist strap and cord. The measured static voltage at a workstation MUST NOT exceed 50 volts.

For detailed information about ESD contact:
WTC Industrial Technical Services
Phone: +1 248-477-3900 | Fax: +1 248-477-8897
Email: service@weldtechcorp.com
Website: www.weldtechcorp.com

NOTES:

Chapter 1: UNPACKING THE CONTROL

WARNING!

It is extremely important to examine the crate/packaging immediately upon delivery to your freight dock. If there is evidence of any damage, note it on the bill of lading before signing. If there is severe damage to the crate/packaging, do not sign the bill of lading and refuse the shipment.

WARNING!

WTC's freight terms are FOB: Shipping Point. This means once the weld control is picked-up by the freight carrier at WTC's shipping dock, it becomes the customers' ownership and responsibility (the company who issued the purchase order). Therefore, if any damage occurs to the weld control by the freight carrier during transit, it is the customer's responsibility to identify it upon receipt and file the appropriate claim paperwork with the freight carrier to have it resolved.

WARNING!

Typically, domestic welding control shipments are either skidded standing upright, with multiple cabinet bolted together (back-to-back), or skidded laying flat (for taller enclosures). If the shipment is via ocean, welding controls are typically placed inside a special coated bag to prevent any potential salt water induced corrosive damage to the weld control.

WTC uses recycled shipping materials whenever possible (wood skids, packaging materials, etc.)

If you have any concerns or questions regarding this practice, please contact WTC at +1 248-477-3900.

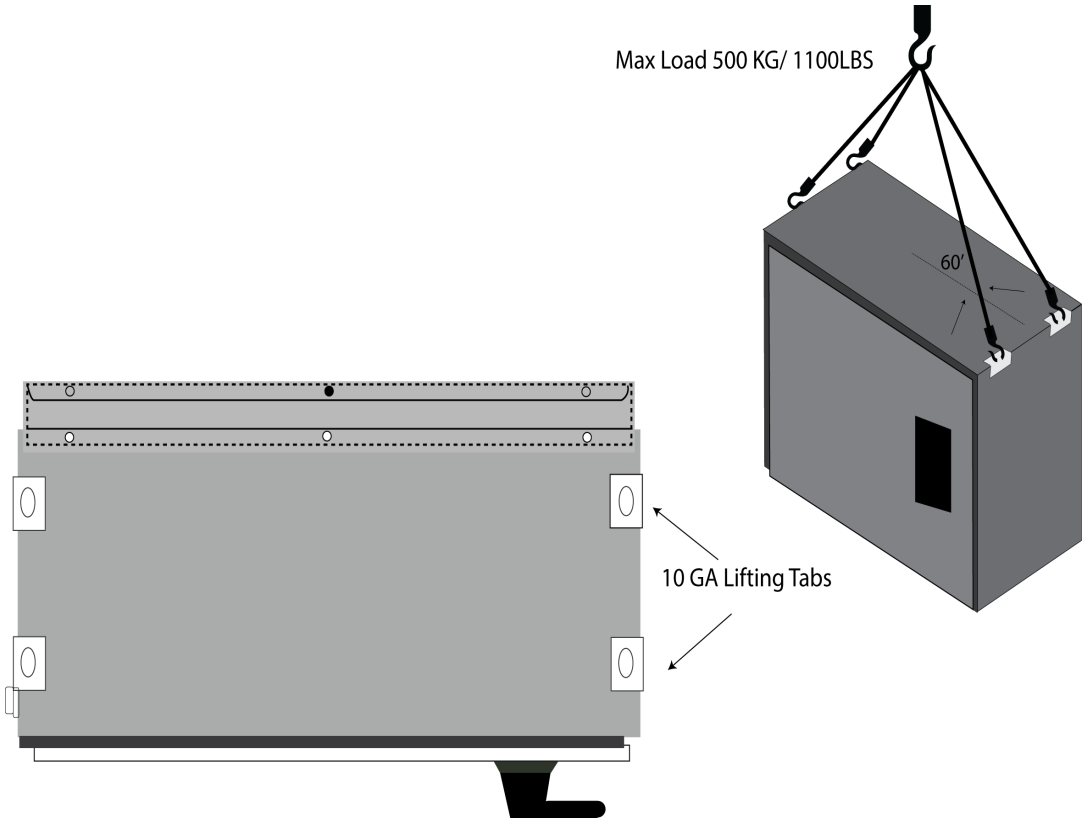
LIFTING AND MOVING THE WELD CONTROL CABINET

WARNING!

CRATED WELD CONTROLS ARE NOT INTENDED TO BE STACKED. MOVE ONLY BY EITHER FORKLIFT OR ASSISTED LIFT.

LIFTING BRACKETS / EYE BOLTS

WTC assembles most weld controls with a provision for lifting and moving the cabinet. Never attempt to lift any size weld control cabinet without using the lifting brackets or eye bolts. Dropping the welding control from even a short distance can cause severe damage and will void the warranty. **NEVER** put power on a welding control that has been dropped. If the weld control has been dropped, contact WTC as soon as possible.



IDENTIFYING DAMAGED OR MISSING ITEMS

WARNING!

THOROUGHLY INSPECT THE WELD CONTROL CABINET (INTERNALLY AND EXTERNALLY) FOR ANY SHIPPING DAMAGE (DAMAGED CABLES/ WIRING, BENT METAL, DAMAGED CIRCUIT BOARDS, ETC.) BEFORE OPERATION.

PROBLEM	SOLUTION
The welding control / parts order arrived, with items missing from bill of lading.	Obtain the shipping documentation that came with the weld control / parts order. Contact WTC's Customer Service Department to determine if the missing items are either on back-order or if they are actually missing from the ship-ment.

When contacting WTC for assistance, please have the following information ready:

1. Sales order number (example: 122435-00)
2. Company Name
3. Part number from the shipper or bill of lading for the missing/ damaged part.

WTC Industrial Technical Services:
Phone: +1 248-477-3900 | Fax: +1 248-477-8897
Email: service@weldtechcorp.com
Website: www.weldtechcorp.com

NOTE: When emailing WTC for support with a shipment issue, please include pictures of the problem (if possible), as they can be very helpful in quickly understanding and resolving your problem.

NOTE: WTC's firewall will not accept compressed (.zip) files as email attachments. If you need to email a .zip file to WTC, change the file extension to .piz prior to attaching it to the email message. This will allow both the email and the attachment to pass through the WTC firewall. Thank you for your understanding.

Chapter 2: SAFETY AND WARNINGS

WT6000 CABINET SAFETY CONCERNS

BEFORE YOU APPLY POWER!

Danger!

LETHAL VOLTAGES ARE PRESENT WHEN APPLYING POWER TO THE WELD CONTROL. EXPOSURE TO HIGH VOLTAGE WILL CAUSE SEVERE ELECTRICAL BURNS AND POSSIBLY DEATH.

ONLY QUALIFIED MAINTENANCE PERSONNEL SHOULD PERFORM SERVICE ON THIS MACHINE!

Danger!

NEVER DRILL INTO A WELD CONTROL CABINET WITHOUT FIRST REMOVING POWER FROM THE CABINET AND PROPERLY PROTECTING INTERNAL COMPONENTS FROM METAL DEBRIS / SHAVINGS.

FAILURE TO FOLLOW THIS REQUIREMENT MAY LEAD TO A POSSIBLE EXPLOSION HAZARD AND VOID THE WARRANTY.

Danger!

ENSURE PROPER FLOW RATE, TEMPERATURE AND CHEMISTRY OF COOLING WATER BEFORE RUNNING PART PRODUCTION

OBSTRUCTED WATER PATHS OR LOW WATER FLOW MAY DAMAGE THE WELDING EQUIPMENT.

Danger!

PRINTED CIRCUIT BOARDS MUST BE COMPLETELY POWERED DOWN PRIOR TO PERFORMING ANY MAINTENANCE, TROUBLESHOOTING OR REPLACEMENT.

CIRCUIT BOARDS OVER 24V SHOULD BE HANDLED WITH CARE AS THEY POSE A POTENTIAL SHOCK HAZARD TO THE OPERATOR.

VERIFY THE VOLTAGE TAPS ON THE CONTROL TRANSFORMER ARE SET CORRECTLY FOR YOUR PLANT LINE VOLTAGE PRIOR TO APPLYING POWER TO THE WELD CONTROL CABINET.

NEVER USE A PERSONAL GROUND STRAP WHEN WORKING WITH VOLTAGES ABOVE 220V.

OTHER INSTRUCTIONS:

Use CU 75° rated cable only.

Adjust the magnetic trip setting of the circuit breaker to a proper value based on your weld application.

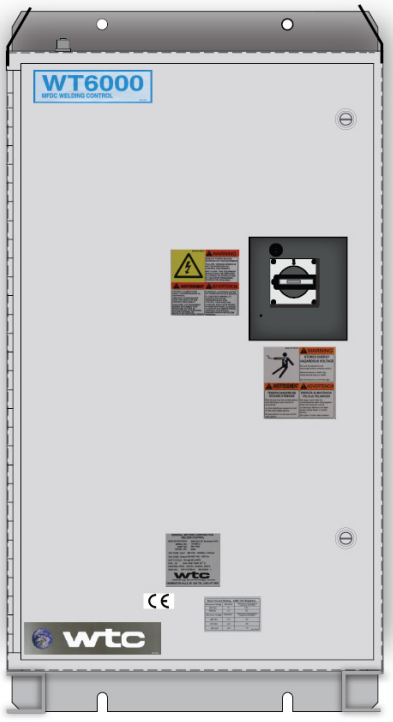
NOTE: IF YOU ARE UNSURE OF EITHER A SAFETY OR MAINTENANCE PROCEDURE, PLEASE CONTACT WTC'S SERVICE DEPARTMENT FOR ASSISTANCE.

Chapter 3: SYSTEM OVERVIEW

GEN6 WELD PROCESSOR

The WT6000 Weld Control converts three-phase (50/60Hz) AC line voltage into a single-phase (1000Hz- Default) AC square wave output. The square wave output is fed to the primary of a MFDC welding transformer, where it is rectified in the secondary to DC voltage. DC welding has many advantages over AC welding, including a more efficient consumption of plant power and the ability to make higher quality welds by having more control over the welding process.

NOTE: The enclosure configuration shown below is for illustration purposes only. Your cabinet configuration may differ depending on your specific application.



FEATURES

The weld processor module, internal to the WT6000, uses free format programming and "Flexible I/O" to create weld parameters and programs to fit any welding application.

- Up to 255 weld schedules.
- Built in Ethernet/IP.
- DeviceNet add-on available.
- 10 available linear current steppers, with 5 steps each.
- Internal web server allows the user to view and edit timer data from web browser, robot teach pendant or touch panel (HMI) device. [For additional information on this feature, refer to Web Pages Manual M032360]
- Two weld firing modes: Percent of Available Volt-Seconds (%VS) and Constant Current (nnnn0).
- Non-battery backed up memory.
- Inverter hardware supports either water or air cooling.
- Two weld timing modes: Cycles or Milliseconds.

INSIDE THE WELD CONTROL

The WT6000 Weld Control contains the following sub-assemblies:

- **INVERTER ASSEMBLY:** Converts three-phase (50/60Hz) AC line voltage to single-phase (1000Hz) AC.
- **WELD PROCESSOR ASSEMBLY (PROCESSOR):** Brains of the weld control and controls all Ethernet/DeviceNet communications.
- **ISOLATION CONTACTOR:** Located downstream of the inverter to interrupt voltage/current to the MFDC welding transformer.
- **CONTROL TRANSFORMER:** Steps down line voltage to 120V and 24V for the cabinet power.
- **CIRCUIT BREAKER:** Supplies or interrupts line voltage to the entire weld control cabinet.
- **AIR / WATER MANIFOLD:** Water standard, optional water cooling available.

SPACE SAVING ENCLOSURE DESIGN

The Minipak enclosure was designed for customers with plant floor space limitations.

- Designed to mount on top of a standard robot controller cabinet.
- Inverter hardware supports either water or air cooling

ROBOT OR HARD TOOL USAGE

The WT 6000 MiniPak can be configured fro either robot or hard tooling applications

Shown above Robot with MiniPak and mounting suggestion.

A1 CONTROL

CIOM MODULE: Local serial interface to the weld processor. Has signal power distribution and controls local I/O

CONTROL TRANSFORMER: Steps down line voltage to 120V and 24V for the cabinet power.

CIRCUIT BREAKER: Supplies or interrupts line voltage to the entire weld control cabinet.

Interior View for illustrative purpose only. Actual control configuration may vary.

WELD PROCESSOR ASSEMBLY: Brains of the weld control and controls all Ethernet/ DeviceNet communications

INVERTER ASSEMBLY: Converts three-phase (50/60Hz) AC line voltage to single-phase (400Hz- 1300Hz) AC output depending on the setup parameters

ISOLATION CONTACTOR: Located downstream of the inverter to interrupt voltage/current to the MFDC welding transformer.

WELD CONTROL SPECIFICATIONS

POWER SOURCE	
STANDARD LINE VOLTAGE CONFIGURATION	3-Phase AC 220V-480V (± 10%)
ALTERNATE LINE VOLTAGE CONFIGURATION	3-Phase AC 575V (± 10%)
LINE FREQUENCY:	50 / 60 Hz (Automatic Selection)
OUTPUT FREQUENCY	1,000 Hz Default (Range = 400Hz-2,000Hz)
STANDARD OUTPUT CURRENT CONFIGURATIONS AT 10% DUTY CYCLE	600 Amps Water (480 VAC) 400 Amps Water (600 VAC)
OUTPUT CURRENT OPTIONS AT 10% DUTY CYCLE	500 A Air-Cooled @ 480 VAC Line 350 A Water-Cooled @ 480 VAC Line 400 A Water-Cooled @ 480 VAC Line 1200 A Water-Cooled @ 480 VAC Line 600 A Water-Cooled @ 480 VAC Line 350 A Air-Cooled @600 VAC Line 400 A Water-Cooled @ 600 VAC Line 1000 A Water-Cooled @ 600 VAC Line 1800 A Water-Cooled @480 VAC/ 600 VAC Line
OUTPUT VOLTAGE OPTIONS @ 10% DUTY CYCLE	305 VAC Nominal @ 220 VAC Line 525 VAC Nominal @ 380 VAC Line 650 VAC Nominal @ 480 VAC Line 800 VAC Nominal @ 575 VAC Line
OUTPUT VOLTAGE OPTIONS @ 5% DUTY CYCLE	900 A Water-Cooled @ 480 VAC Line 1800 A Water-Cooled @ 480 VAC Line
OUTPUT VOLTAGE OPTIONS @ 3% DUTY CYCLE	900 A Water-Cooled @ 600 VAC Line
OUTPUT VOLTAGE OPTIONS @ 2% DUTY CYCLE	900 A Water-Cooled @ 480 VAC Line
MAXIMUM POWER	260 KVA @ 480 VAC Line Power
DEVICE TYPE	IGBT
CURRENT RISE TIME	< 4ms Into Resistive Load
POWER CONSUMPTION	70 VA (Idling condition)

MONITORING AND CONTROL FUNCTIONS	
FIRING CONTROL	Fixed Frequency, Pulse Width Modulation
CURRENT CONTROL	Primary Constant Current Percent of Available Volt-Seconds
TIMING CONTROL	Cycles or Milliseconds
PRIMARY CURRENT RANGE	10% TO RATED CURRENT LEVEL: 40 → 400 A 120 → 1200 A 100 → 1000 A 180 → 1800 A
PRIMARY CURRENT ACCURACY	± 1% SETTING, ± .5% REPEATABILITY
DC BUS VOLTAGE MEASUREMENT ACCURACY	± 1% SETTING, ± .5% REPEATABILITY
SECONDARY CURRENT ACCURACY	± 2% SETTING, ± 1% REPEATABILITY
SECONDARY VOLTAGE ACCURACY	± 3%
SECONDARY RESISTIVE ACCURACY	± 3%
MFDC TRANSFORMER FLUX PROTECTION	INCLUDED
DUTY CYCLE PROTECTION	MONITORS INVERTER AND WELD TRANSFORMER DUTY CYCLE
MFDC WELD TRANSFORMER MONITORING	DIODE SHORT MONITORING
POWER CONSUMPTION	70VA (Idling Condition)

PROCESSOR & FUNCTIONS	
WELD PROCESSOR	Series 6000
STANDARD COMMUNICATIONS	Ethernet IP 10/100 BaseT 1MB SSPI (Smart Serial Peripheral Interface) RS485
OPTIONAL COMMUNICATIONS	DeviceNet
ON BOARD INPUTS (LIO)	2 x 24VDC
ON BOARD OUTPUTS (LIO)	3 x 120VAC
NUMBER OF WELD SCHEDULES	255
NUMBER OF STEPPERS	10
PROCESSOR STORAGE TYPE	F-RAM (No Battery Required)
WELD PROCESSOR LANGUAGES	English

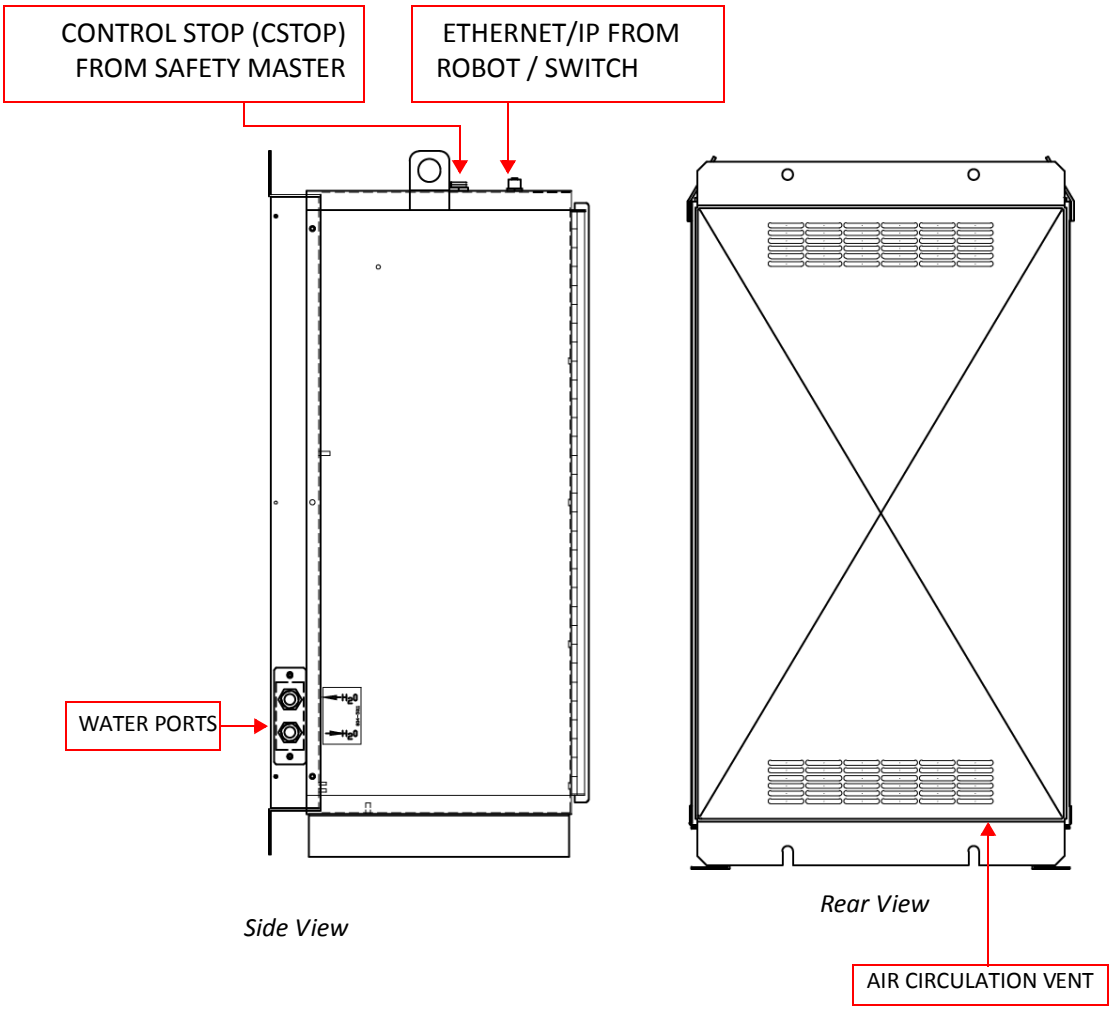
ENVIRONMENTAL CONDITIONS	
OPERATING TEMPERATURE	+5° C to +50° C
HUMIDITY	0 - 90% (Relative, without Condensation)
ESD	EN 61000-4-2 LEVEL 3
NOISE IMMUNITY	EN 61000-4-4 LEVEL 3
SURGE IMMUNITY	EN 61000-4-5 LEVEL 3

WATER COOLING REQUIREMENTS	
• Maximum temperature not to exceed 104° F. (40° C.), or fall below the dew point of ambient air at about 70° F. (21° C.) • pH maintained between 7.0 and 8.0 • Maximum chloride content 20 PPM (parts per million) • Maximum nitrate content 10 PPM • Maximum sulfate content 100 PPM • Maximum suspended solids content 100 PPM (non-abrasive) • Maximum total solids content 250 PPM (suspended and dissolved) • Maximum calcium carbonate content 250 PPM	
MINIMUM WATER FLOW RATE	Greater than 5 liters/min (1.32 gal/min)
MAX PRESSURE DROP @ 5 LITERS/MIN FLOW	Less than 70 kPa / .7 bar / 10 PSI
PRESSURE RATING	Less than 620 kPa / 6.2 bar / 90 PSI
ELECTRICAL RESISTIVITY OF WATER	Greater than 5000 ohms/cm
WATER INLET TEMPERATURE	LESS THAN 95° F (35° C)

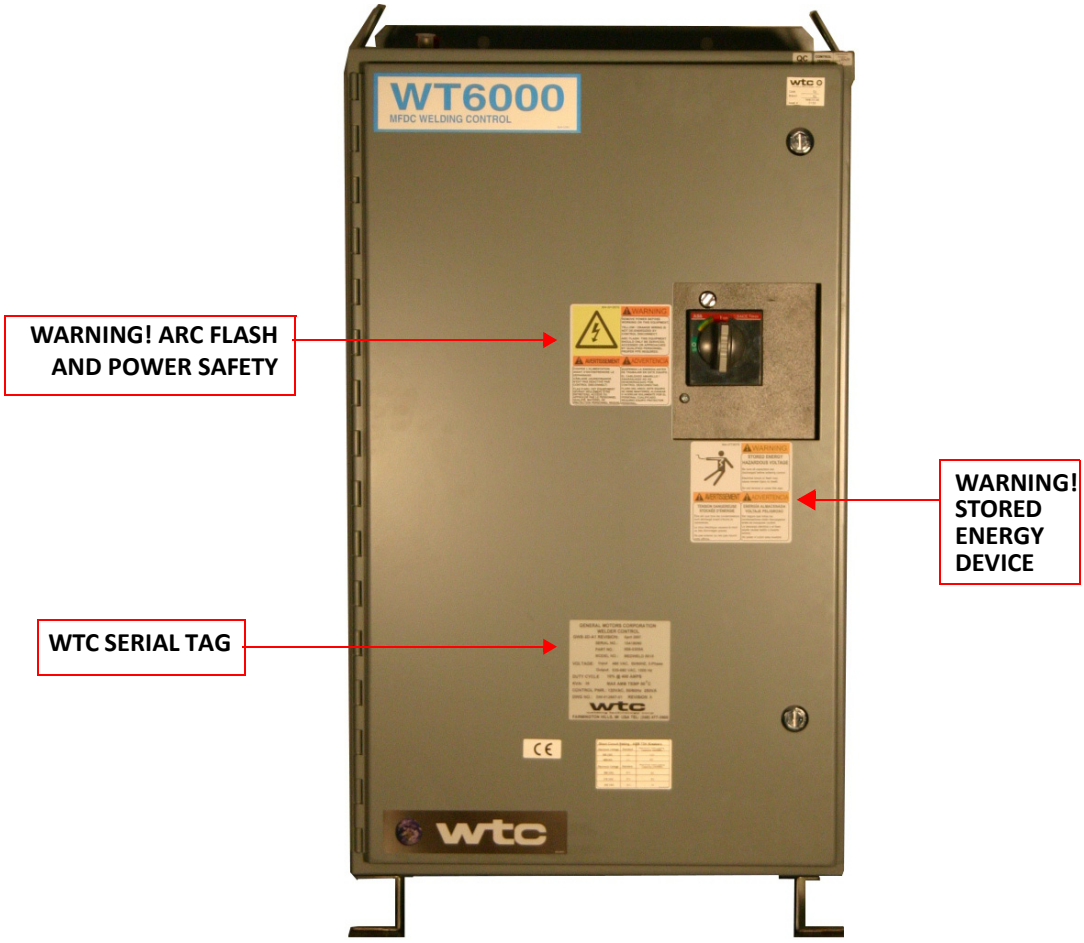
AIR COOLING REQUIREMENTS	
AMBIENT AIR TEMPERATURE	Less than 104° F (40° C)
MINIMUM FAN RATING	80 CFM
AIR MOUNTING LOCATION	Minimum 200mm (3 inches) from wall or object

Chapter 4: INSTALLING THE CONTROL

STANDARD CONNECTIONS



ENCLOSURE SAFETY LABELING



INSTALLATION CHECKLIST

USE THE FOLLOWING CHECKLIST AS A GUIDE DURING THE INSTALLATION PROCESS. IF YOU ARE UNSURE HOW TO PROPERLY INSTALL AND HOOKUP THE WELD CONTROL CABINET, CONTACT WTC FOR ASSISTANCE.

1. Ensure electricity is locked out at welding bus, power distribution panel, or other applicable power source.

2. Verify weld control cabinet circuit breaker is in the OFF position.

3. Inspect interior of both weld control and Servo cabinet for loose and/or missing parts. Inspect for any shipping damage.

4. Check and ensure the inverter cooling fan and all air circulation vents on the back of the cabinet are unobstructed (if applicable).

5. Check and ensure all water drain holes are open and unblocked.

6. Mount weld control at desired location using appropriate mounting hardware.

7. Remove access plates and drill / punch holes for:
   - Three-phase AC line power and ground.
   - Output power to MFDC welding transformer and ground.
   - I/ O connections (if applicable).

8. Plumb cooling water to Supply (water-in) and Return (water-out) bulk head fittings (if applicable).

9. Connect 3-phase AC line power cables (L1, L2, L3) to top of circuit breaker (line side) and tighten according to manufacturer specifications. Run cables through cover plate on side of enclosure.

10. Connect plant ground cable to copper grounding post inside cabinet. Run cable through cover plate on side of enclosure.

11. Connect power cables from output of weld control (H1, H2) to primary of welding transformer. Run cables through pilot hole on

bottom of enclosure.

12. Connect ground cable from copper ground bus inside cabinet to welding transformer. Run cable through pilot hole on bottom of enclosure.

13. Connect Data Entry Panel (DEP), EtherNet (MENET), EtherNet IP (WBDP), DeviceNet (DNWC) and Voltage Sense (***RAFT***™) cables to appropriate connectors on cabinet.

14. Wire I/O connections.

15. Verify magnetic and thermal trip settings on circuit breaker, per manufacturer specifications (if applicable).

16. Inspect cabinet and verify all wiring connections (high voltage, terminals, crimp connections, etc.) are secure.

17. Close weld control cabinet door and lock with 1/4-turn fasteners.

18. Ensure cooling water circuit has no leaks and water is flowing at specified rate (if applicable).

19. Remove electrical lock out devices.

20. Turn weld control cabinet circuit breaker ON.

21. Ensure cooling water is flowing at specified flow rate.

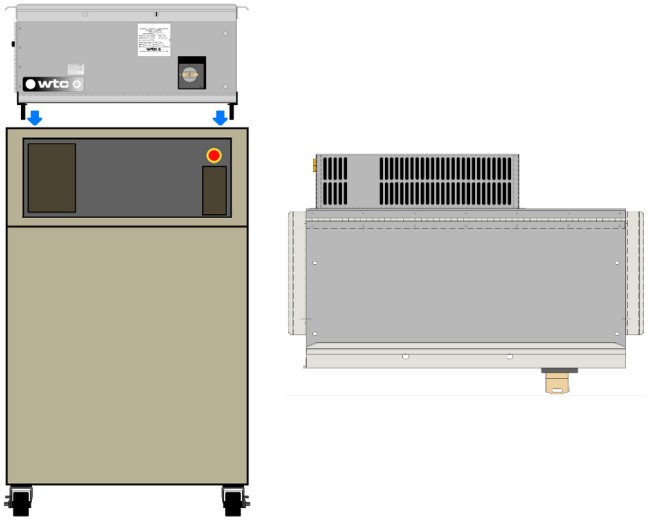
22. Use data entry panel or network software application to program I/O parameters for Device Net, Ethernet/IP or specialty communication modules.

23. Use data entry panel or network software application to program setup parameters, weld schedules and current steppers as required for customer application.

MECHANICAL INSTALLATION

The Mechanical installation of the WTC Weld Control requires the following:

- Control Placement
- Cabinet Mounting and Fastening
- Cooling Water and Connections



Shown above: Front and top view of the MiniPak weld control cabinet

MINIPAK CABINET PLACEMENT

The Minipak cabinet was primarily designed to mount on top of a robot controller cabinet, but it can also be mounted along a fence line or wall if required. The cabinet's water cooling circuit is externally mounted underneath the vented back cover and is physically isolated from the internal electrical components. Drain holes exist in the bottom of the vented back cover in the event of a hose rupture or water cooling manifold leak.

☞ **NOTE: In the event of a water hose rupture, keep external electrical cables and wiring away from the vented back cover.**

MINIPAK CABINET MOUNTING AND FASTENING

Depending on the customers application requirements, additional cabinet mounting hardware may be required. See the table below for available options:

FANUC ROBOT CONTROLLER CABINET MOUNTING HARDWARE		
QTY.	**DESCRIPTION**	**WTC PART NUMBER**
1	Robot Mounting Bracket Right - Fanuc	703-8320
1	Robot Mounting Bracket Left - Fanuc	703-8319
2	M12 Lock Washers	Customer Supplied
2	M12 Nut	Customer Supplied

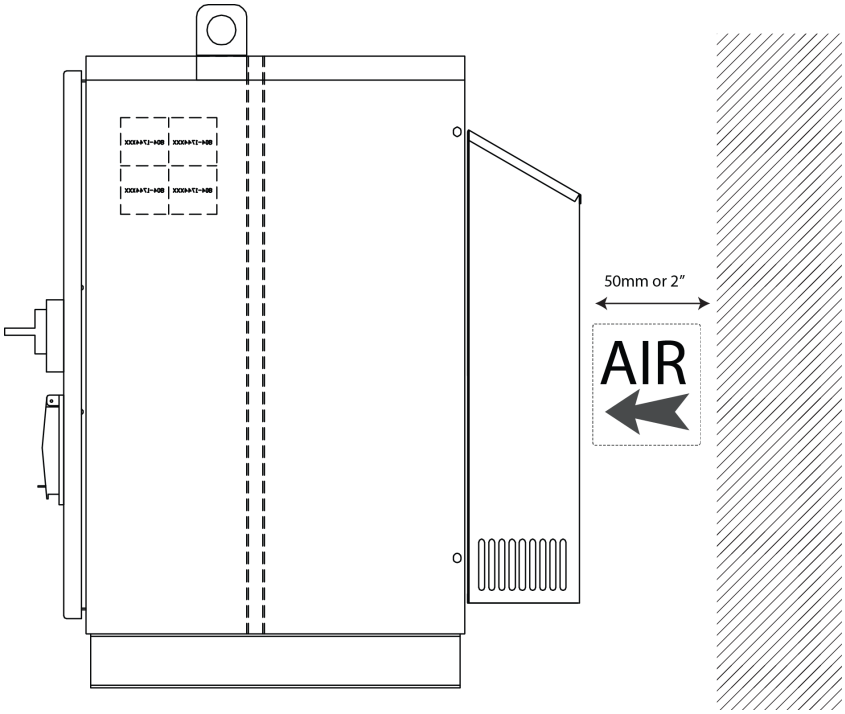
WALL OR FENCE MOUNTING HARDWARE		
QTY.	**DESCRIPTION**	**WTC PART NUMBER**
1	Wall Mount Bracket - Right	703-8321
1	Wall Mount Bracket - Left	703-8322

Caution:

IT IS IMPORTANT THAT THE WELD CONTROL IS MOUNTED ON A LEVEL SURFACE. IF THE WELD CONTROL IS MOUNTED ON AN UNEVEN SURFACE, THE CABINET DOORS MAY BE DIFFICULT TO OPEN. FAILURE TO USE APPROVED MOUNTING HARDWARE MAY VOID YOUR WARRANTY.

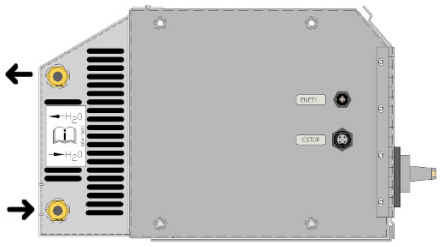
Caution:

IT IS RECOMMENDED THAT THE WELD CONTROL IS MOUNTED A MINIMUM OF 50 MILLIMETERS (2 IN) FROM A WALL OR OBJECT FOR PROPER VENTILATION AND COOLING OF AIR-COOLED CONTROLS



WATER COOLING CONNECTIONS

The MiniPak cabinet includes a vented back cover that isolates the water cooling circuit from the internal electrical components.



Shown above: MiniPak Supply and Return Water Fittings

WATER COOLING REQUIREMENTS

The cooling water provided must comply with chemical and physical specifications as stated in the Resistance Welder Manufacturers' Association Bulletin 5–005.05. See Chp. 3: System Overview for details.

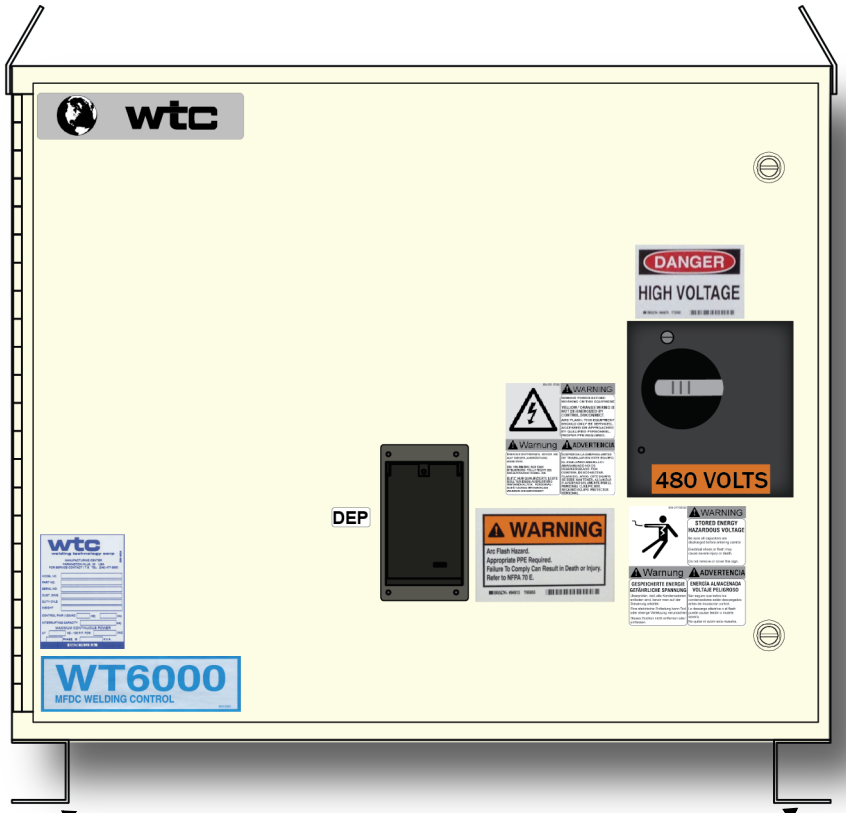
NOTE: Water that is safe for drinking is generally sufficient for cooling water, provided it is filtered to eliminate sand and rust particles. In addition, water temperature must NOT fall more than 2° C. below the temperature of the surrounding air - condensation may occur and damage components.

WARNING!

Failure to maintain proper water cooling to the weld control cabinet may cause damage to the weld control and void the warranty. contact WTC if you have any questions regarding the water cooling requirements listed above.

Caution:

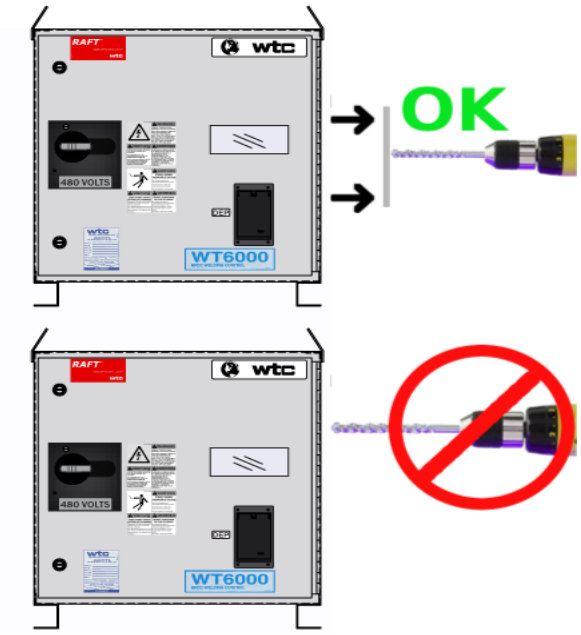
IF NECESSARY, REMOVE RIGHT AND LEFT FEET USED FOR SHIPPING PURPOSES PRIOR TO INSTALLATION



LEFT AND RIGHT FEET FOR SHIPPING PURPOSES ONLY. REMOVE DURING INSTALLATION.

Danger!

DO NOT DRILL HOLES IN REMOVABLE COVER PLATES WHILE ATTACHED TO THE CABINET. METAL SHAVINGS MAY CONTAMINATE INTERNAL COMPONENTS AND CAUSE ELECTRICAL DAMAGE. DRILL BIT OR HOLE SAW BLADE MAY CAUSE DAMAGE TO INTERNAL COMPONENTS.



ELECTRICAL INSTALLATION

Danger!

PRIOR TO MAKING ANY CONNECTION INSIDE THE WELD CONTROL CABINET:

1. REFER TO YOUR FACILITIES ELECTRICAL LOCKOUT POLICY AND PROCEDURES.
2. BEFORE PROCEEDING, VERIFY NO HIGH VOLTAGE IS PRESENT INSIDE THE CABINET WITH A MULTIMETER.

Danger!

THE DOOR OF THE WELD CONTROL CABINET IS INTERLOCKED WITH THE CIRCUIT BREAKER TO PREVENT THE DOOR FROM BEING OPENED WHILE POWER IS ON. NEVER ATTEMPT TO DEFEAT THIS SAFETY MECHANISM.

The weld control cabinet contains high voltage, grounding, and external input/output connections. This section explains the connection process.

PRIOR TO MAKING ANY CONNECTION INSIDE THE WELD CONTROL CABINET:

1. REFER TO YOUR FACILITIES ELECTRICAL LOCKOUT POLICY AND PROCEDURES.
2. BEFORE PROCEEDING, VERIFY NO HIGH VOLTAGE IS PRESENT INSIDE THE CABINET WITH A MULTIMETER.

Danger!

THE DOOR OF THE WELD CONTROL CABINET IS INTERLOCKED WITH THE CIRCUIT BREAKER TO PREVENT THE DOOR FROM BEING OPENED WHILE POWER IS ON. NEVER ATTEMPT TO DEFEAT THIS SAFETY MECHANISM.

NOTE: For illustration purposes, the air-cooled enclosure configuration is shown. Your cabinet configuration may differ depending on your specific application. For standard application specific electrical drawings, contact WTC.

WIRING DIAGRAM INDEX:

STEP	COLOR	DESCRIPTION
①		Connect line voltage to circuit breaker.
②		Connect ground for line voltage wiring
③		Connect isolation contactor to weld transformer
④		Connect ground for weld transformer.
⑤		Verify control transformer voltage tap setting for your application
⑥		Connect optional connectors

NOTES:

1.) (XX) WIRE NUMBER

2.) SNUBBER

3.) TWISTED WIRE PAIR

4.) BONDING/NOISE GROUND

5.) PROTECTIVE GROUND

6.) — — — CUSTOMER RESPONSIBILITY

7.) WIRE NUMBER/GAUGE CHART

WIRE NUMBERS	COLOR/GAUGE
1 THRU 49	— WHT/BLU, 18GA
50 THRU 99	— BLU, 16GA
100 THRU 169	— RED, 16GA
170 THRU 179	— WHT/RED, 16GA
180 THRU 199	— YEL, 16GA
1L1, 1L2, 1L1A, 1L2A	— BLK, 16GA

WIRE GAUGES AS LISTED, EXCEPT WHERE NOTED.

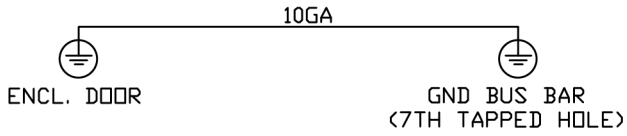
8.) WIRE (1L1A) IS CONNECTED TO THE TRANSFORMER LEAD NEAREST THE CUSTOMER LINE VOLTAGE.

9.) DUE TO TRANSFORMER AVAILABILITY, '1T' MAY NOT BE WIRED AS SHOWN. IN THIS INSTANCE, REFER TO THE HOOK–UP DIAGRAM FOUND ON EACH INDIVIDUAL XFMR.

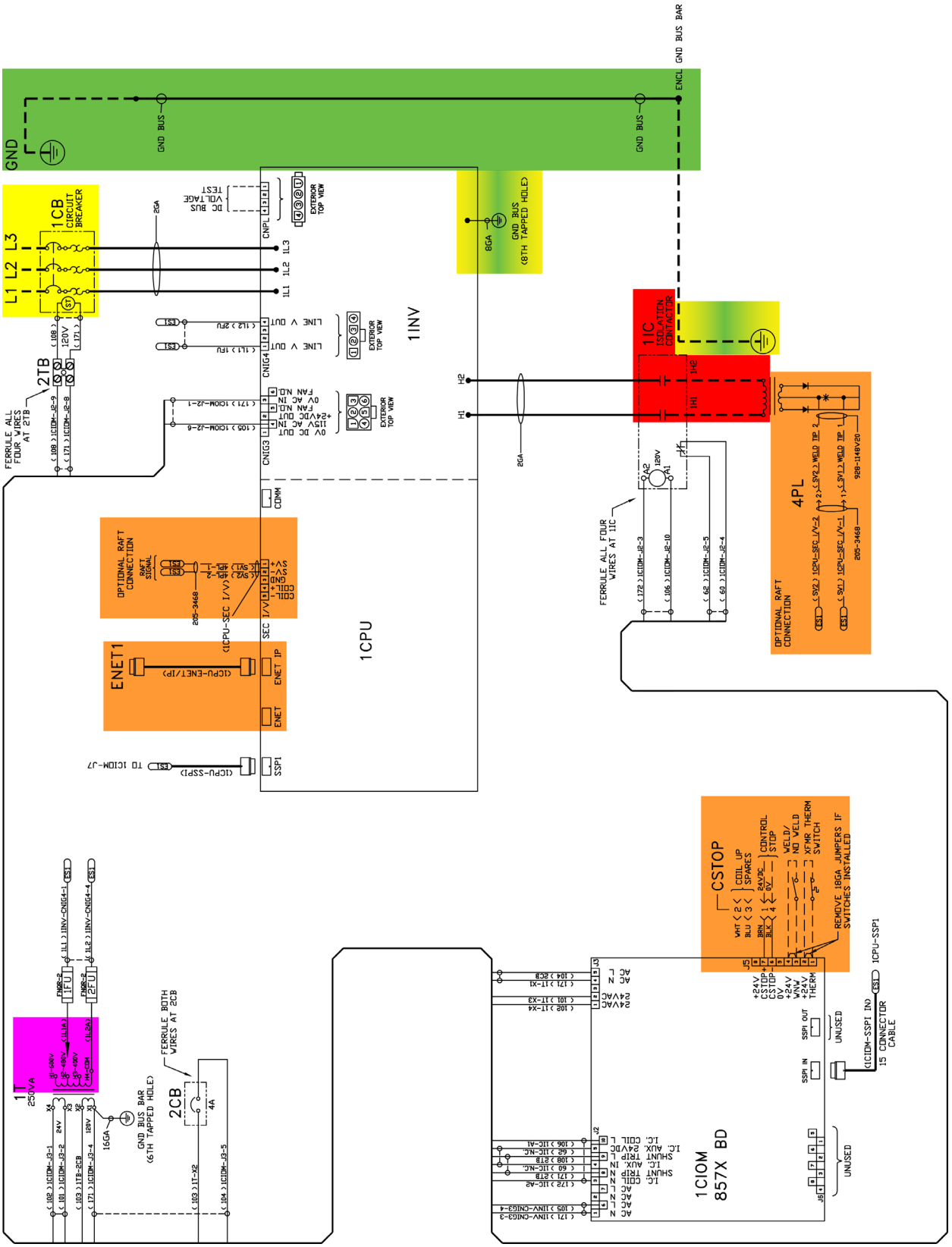
10.) THIS DWG IS INTENDED TO SHOW POINT TO POINT WIRE DESTINATIONS. WHILE THE TERMINAL DESIGNATORS ARE CORRECT, THE PHYSICAL REPRESENTATION MAY NOT BE. REFER TO THE COMPONENTS IN THE ENCLOSURE TO FIND THE ACTUAL TERMINAL ORIENTATIONS.

11.) (ES XX) CONNECTION TO OTHER SHEET

12.) DISCONNECT AND HEATSHRINK THIS WIRE



For technical support, contact WTC's Industrial Technical Services Department:
Phone: +1 248-477-3900 | Fax: +1 248-477-8897
EMAIL: service@weldtechcorp.com


GND
GND BUS
ENCL GND BUS BAR
L1 L2 L3
1CB
CIRCUIT BREAKER
2TB
FERRULE ALL WIRES AT 2TB
1INV
1CPU
1IC
ISOLATION CONTACTOR
4PL
OPTIONAL RAFT CONNECTION
ENET1
ENET IP
ENET
SSP1
1CIOM
857X BD
CSTOP
COIL UP
SPARES
CONTROL STOP
WELD/ NO WELD
XFMR THERM SWITCH
REMOVE 18GA JUMPERS IF SWITCHES INSTALLED
1T
250VA
2CB
4A
FERRULE BOTH WIRES AT 2CB
GND BUS BAR (6TH TAPPED HOLE)
FERRULE ALL FOUR WIRES AT 1IC
UNUSED
SSP IN
SSP OUT
1CIOM-SSP1 IN)
15 CONNECTOR CABLE
1CPU-SSP1

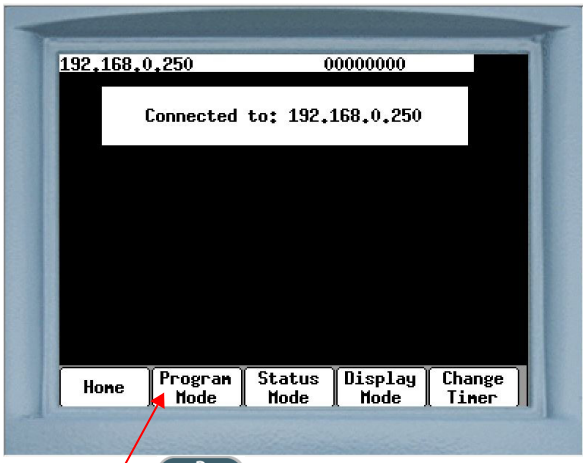
WELD CONTROL PROGRAMMING AND SETUP

Before welding can begin, the following parameters need to be programmed into the weld processor.

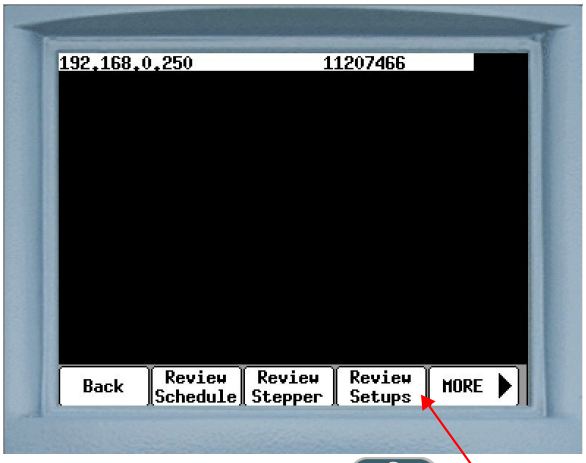
PROGRAM SETUP PARAMETERS

Review and program the Setup Parameters as required for the welding application.

The Review Setups Menu is found in the DEP-300s by pressing:



① Program Mode



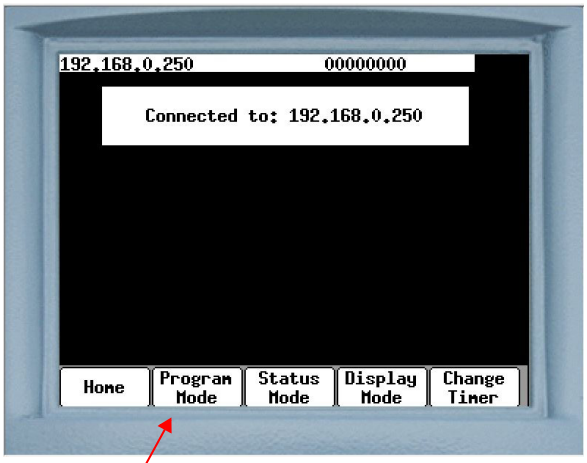
② Review Setups

NOTE: Refer to Chapter 7: Faults and Setup Parameters for detailed information regarding the description and programming of setup parameters.

PROGRAM WELD SCHEDULES

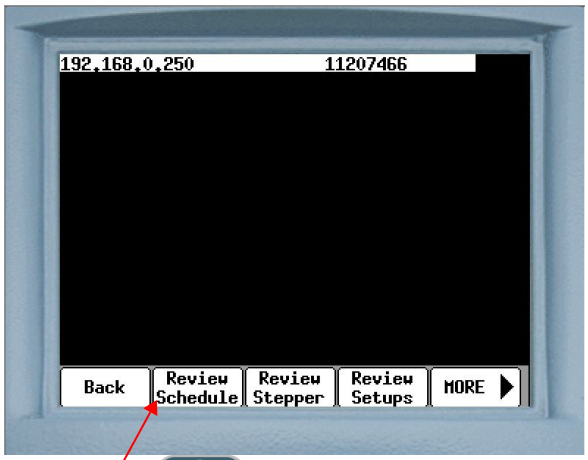
Review and program the Weld Schedules as required for the welding application.

The Review Schedule Menu is found in the DEP-300s by pressing:



B F2 ① Program Mode

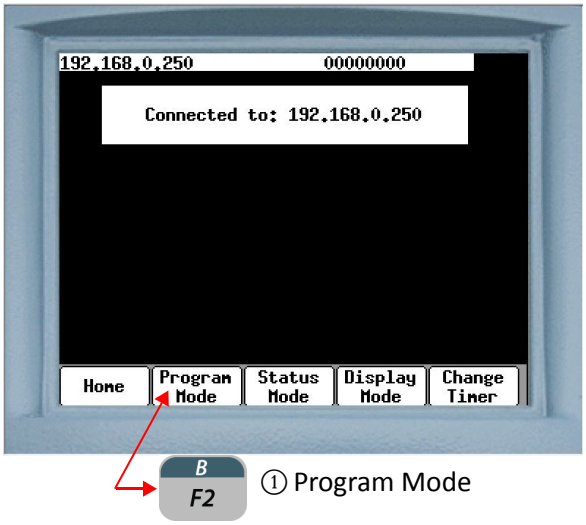
NOTE: Refer to Chapter 6: Programming Schedules or Glossary of Schedule Functions for detailed information regarding function descriptions and the programming of weld schedules.



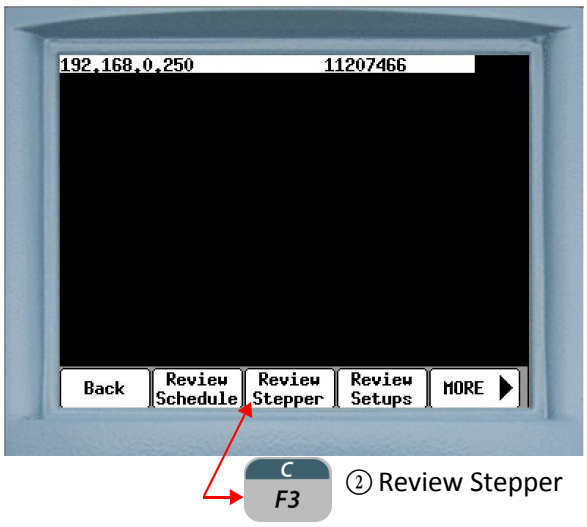
B F2 ② Review Schedule

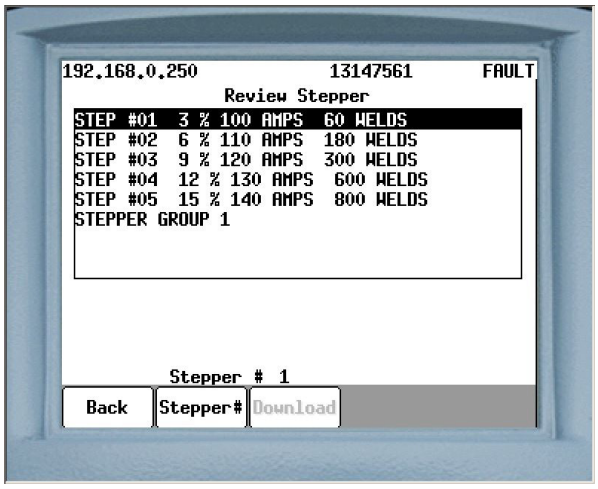
SETUP LINEAR CURRENT STEPPER FUNCTIONS

Review and program the Linear Current Stepper Functions as required for the welding application.

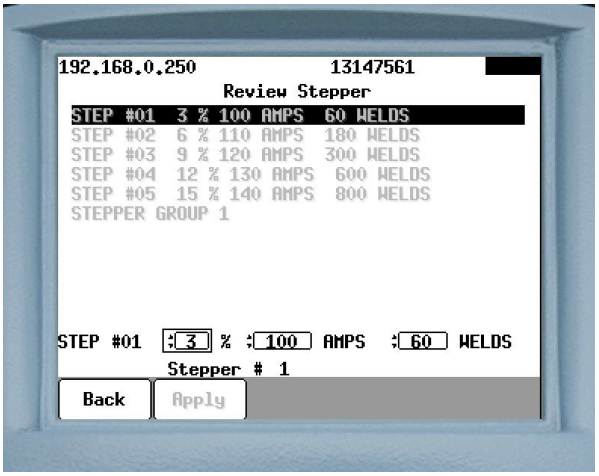


NOTE: Refer to Chapter 8: Linear Current Steppers for detailed information regarding the description and programming of linear current steppers.



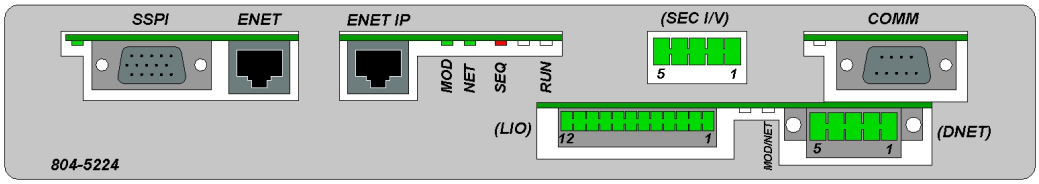


③ Using the ↑ and ↓ arrow keys navigate to the Stepper line to edit and press SPACE ENTER



③ Using the number keys edit the required functions and press SPACE ENTER. This will turn “Apply” from gray to black. Press B F2 to apply the changes.

Chapter 5: COMMUNICATIONS SETUP



The following describes the communication ports located on the WT6000 weld processor assembly with DeviceNet option shown above.

PORT NAME	COMMUNICATION TYPE	DESCRIPTION
ENET IP	Ethernet/IP (EIP)	ENET IP is used for I/O communication between the weld processor and other Ethernet enabled devices (e.g. a Robot or PLC). Also used to communicate with Weld Gateway and ***RAFT***™ Gateway networking software.
ENET	Ethernet	ENET is used for Standard Ethernet communications.
SSPI	WTC Proprietary I/O Communication Protocol (Optional)	SSPI supports communication with optional WTC I/O peripheral devices.
LIO	Local (Discrete) I/O	Inputs - 2 x 24VDC Outputs - 3 x 120VAC
COMM	RS485 Serial Interface	COMM is used for DEP-300s or DEP-100S data entry panel communications.
DNET	Device Net (Optional)	DNET is used for DeviceNet I/O communications (slave only).
SEC I/V	Secondary Current or Voltage Monitoring Input (Optional)	Location for input wires for Secondary Current or Secondary Voltage Monitoring.

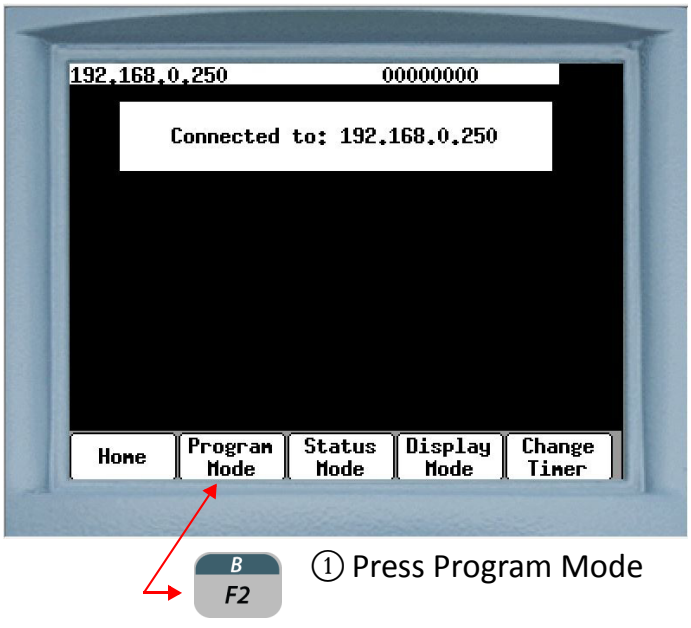
ETHERNET SETUP

The WT6000 weld processor has two Ethernet communication ports:

PORT NAME	COMMUNICATION TYPE	DESCRIPTION
ENET IP	Ethernet/IP (EIP)	ENET IP is used for I/O communication between the weld processor and other Ethernet enabled devices (e.g. a Robot or PLC). It also can be used for updating timer software and maintenance functions. ENET IP includes a web page interface for robot pendants or browser enabled devices.
ENET	Standard Ethernet	ENET is used for standard Ethernet communications. It also can be used for updating software and maintenance functions. ENET includes a web page interface for robot pendants or browser enabled devices.

ENET IP (EIP) FACTORY DEFAULT SETTINGS

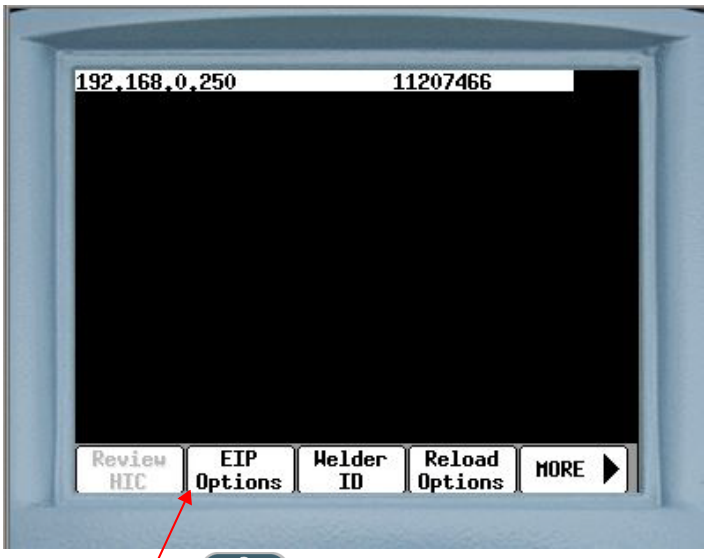
How to navigate through the DEP-300s to the EIP Options menu:



① Press Program Mode

② Press More

E F5



B F2

③ Press EIP Options

THE EIP FACTORY DEFAULT SETTINGS ARE AS FOLLOWS:

NAME	ADDRESS
IP Address	192.168.0.250
Sub Net Mask	255.255.255.0
Gateway	0.0.0.0
Name Server	0.0.0.0
Input Instance 150	Type: 8bit Size: 2
Output Instance 100	Type: 8bit Size: 2
MAC Address	00:18:ec:01:79:19
DHCP	On
DHCP MODE	Retry disabled
PORT MODE	Auto

SETTING THE NUMBER OF AVAILABLE EIP INPUTS AND OUTPUTS

In timer software G08300, there are a maximum of 56 inputs and 53 outputs that can be mapped. The number of mapped inputs and outputs is determined by selecting a Type and Size, whose product is less than or equal to 56.

In the default settings chart on previous page, the Type is 8 and the Size is 2 for both the inputs and outputs. Since the product of 8 and 2 is 16, the total mappable I/O is 16 for both the inputs and the outputs.

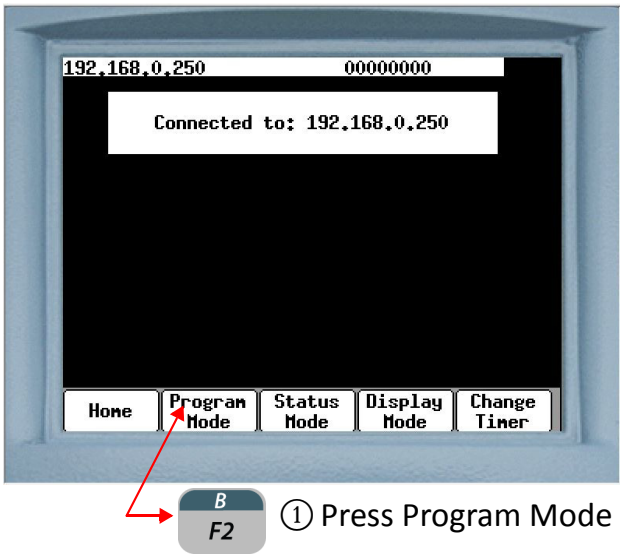
The chart below shows all the possible combinations in which the Type and Size can be configured and not exceed the maximum of 56

NOTE: If the Size is set to 0, the entire map is disabled and no I/O can be mapped.

TYPE	SIZE	PRODUCT
8	0	0
8	1	8
8	2	16
8	3	24
8	4	32
8	5	40
8	6	48
8	7	56
16	0	0
16	1	16
16	2	32
16	3	48
32	0	32
32	1	32

ENET (STANDARD ETHERNET) FACTORY DEFAULT SETTINGS

How to navigate through the DEP-300s to the Local Ethernet menu:



① Press Program Mode

② Press More

③ Press More

④ Press Local Ethernet

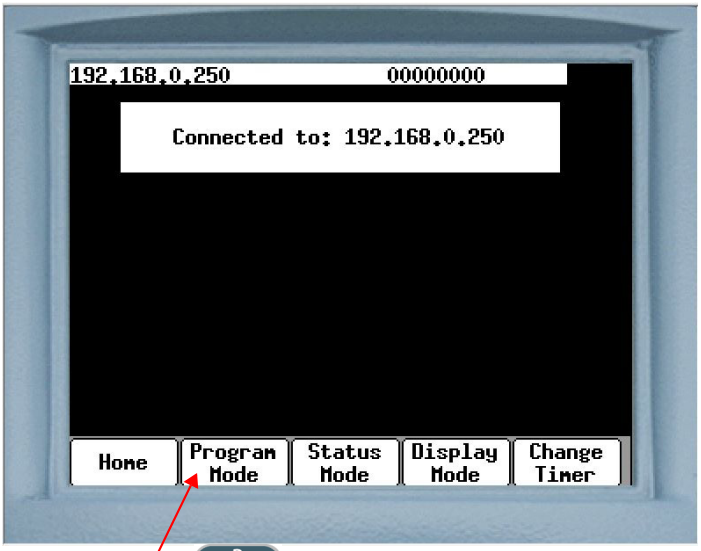
ENET FACTORY DEFAULT SETTINGS:

NAME	ADDRESS
IP Address	89.89.200.250
Sub Net Mask	255.0.0.0
Gateway	0.0.0.0

DEVICENET SETUP

The WT6000 weld processor is capable of DeviceNet I/O communications. This requires the installation of an optional DeviceNet peripheral board.

How to navigate through the DEP-300s to the FieldBus Mapping menu:

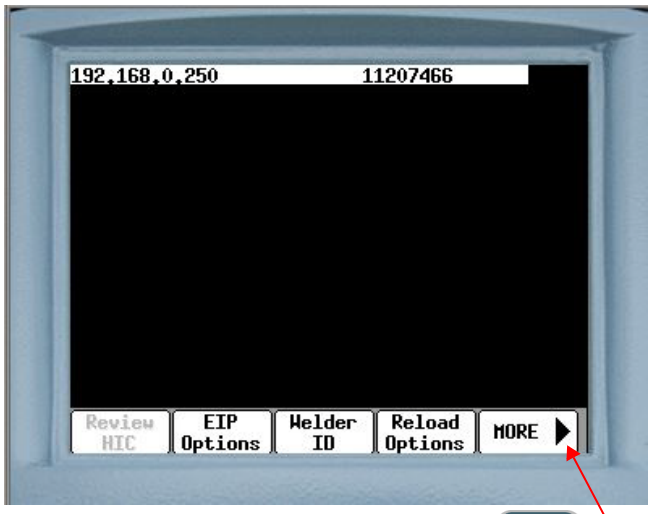


B
F2

① Press Program Mode

② Press More

E
F5



③ Press More

E F5

B F2

④ Press FieldBus Mapping

DEVICENET FACTORY DEFAULT SETTINGS:

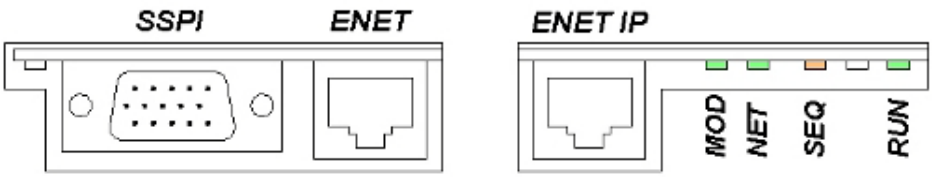
NOTE: These settings are the factory defaults. The customer's default settings may differ based on the welding application and the requirements of the DeviceNet master.

NAME	ADDRESS
Reload Default	OFF
Node Address	11
Baud Rate	500K
Byte Size	8by8
Network Response Delay in mSEC.	1

WT6000 PROCESSOR LED DESCRIPTION

The WT6000 processor (weld processor) has four status LED's. Through a combination of changing colors and flashing/solid states, the LED's indicate the status of the EtherNet/IP Module, the EtherNet/IP Status, Weld Sequence Status and the Weld Control Status.

Below is an illustration and description of the LED's located on the WT6000 weld processor:



	MOD (ETHERNET/ IP MODULE STATUS)	NET (ETHERNET/IP NETWORK STATUS)	SEQ (WELD SEQUENCE STATUS)	NOT USED	RUN (WELD CONTROL STATUS)
GREEN	EIP functioning properly	EIP Connection established	Processing functions prior to weld		Control Stop input high
FLASHING GREEN	EIP initializing	Waiting on EIP connection	Weld control in NO WELD mode		Control Stop input low
RED	Error Non-Recoverable	Duplicate EIP Address	Processing WELD/ HEAT functions		
FLASHING RED		EIP connection lost Waiting to re-establish connection			Fault
AMBER			Processing functions after weld		
FLASHING AMBER					Alert
OFF			In weld mode- not in a sequence		

Chapter 6: PROGRAMMING SCHEDULES

ABOUT WELD SCHEDULES

What is a weld schedule?

A weld schedule is a list of commands (or functions), which are used to instruct the weld control to deliver a combination of heat (weld current) and time (weld time) to the weld interface, to create a weld nugget.

Essentially, the weld schedule is a “recipe” and the functions within it are the “ingredients”. Just as it is important to use the right ingredients in the correct measure to make a good culinary dish, it is likewise important to use the right functions (properly programmed and in the correct order) to make a good weld nugget.

THE FOUR BASIC ELEMENTS

FUNCTION	DESCRIPTION
SQUEEZE	Apply pressure (electrode force) to the weld interface
WELD	Deliver weld current to the weld interface
HOLD	Apply wait time after the weld current stops to allow the nugget time to cool.
WELD COMPLETE	End of schedule.

WELD SCHEDULE FUNCTIONS

FUNCTION TYPE	DESCRIPTION
DELAY	Delay functions are used to cause a wait time to occur for a specified amount of time
WELD	Weld functions are used to provide a specified amount of weld current for a specified length of time
SLOPE	Slope functions are used to provide either a linear increase or decrease in welding current for a specified length of time
I/O	I/O functions are used to verify, change the status of, or wait for certain I/O points to change
EXTENDED	Extended functions are used to extend a particular function within a schedule until certain conditions are met
SPECIAL	Special functions are used to create special conditions within the weld schedule.

WELD SCHEDULE FUNCTION LIST

For a list of weld schedule functions and descriptions, see Chapter 13: Schedule Function List.

EXAMPLE OF A WELD SCHEDULE

The following is an example of a typical weld schedule. The functions used and how they are programmed, are solely dependent upon the customer's application. Notice that each function has a corresponding number. This allows the user to select functions by number when programming or editing weld schedules.

FUNCTION NO.	FUNCTION NAME
00	START OF SCHEDULE # 1
82	LINEAR STEPPER #1 ASSIGNED (0=OFF)
88	TURN ON ISOLATION CONTACTOR
58	TURN ON WELD IN PROGRESS
78	CURRENT WINDOW: HI=15% L0=10%
92	C-FACTOR LIMIT: HI=999 LO=0
81	TRANSFORMER TURNS RATIO 72:1
1	SQUEEZE 500 MSEC
60	IMPULSE= 232 HEAT MS, 16 COOL MS
30	WELD 1 IMP 9000 AMPS
3	HOLD 83 MSEC
59	TURN OFF WELD IN PROGRESS
63	TURN ON WELD COMPLETE
75	EXTEND UNTIL NO INITIATE
64	TURN OFF WELD COMPLETE
89	TURN OFF ISOLATION CONTACTOR
100	END OF SCHEDULE

NOTE: Functions (00) “Start of Schedule” and (100) “End of Schedule” are permanently programmed into each weld schedule and can be neither added nor deleted. Although, they appear in the weld schedules, they do not appear in the Insert Function Menu of any programming interface device.

HOW TO READ A WELD SCHEDULE

Weld schedules are read starting at the top and moving down, one line at a time. The time it takes the weld control to complete an entire weld schedule can be calculated by adding up all time parameters (cycle and/or milliseconds) programmed within each function throughout the entire schedule.

For example, in the weld schedule above, there is 500 milliseconds of squeeze time, 232 milliseconds of weld time, 16 milliseconds of cool time and 83 milliseconds of hold time. Thus, the time to complete the entire weld schedule is approximately 831 milliseconds (.83 seconds).

PROGRAMMING A WELD SCHEDULE

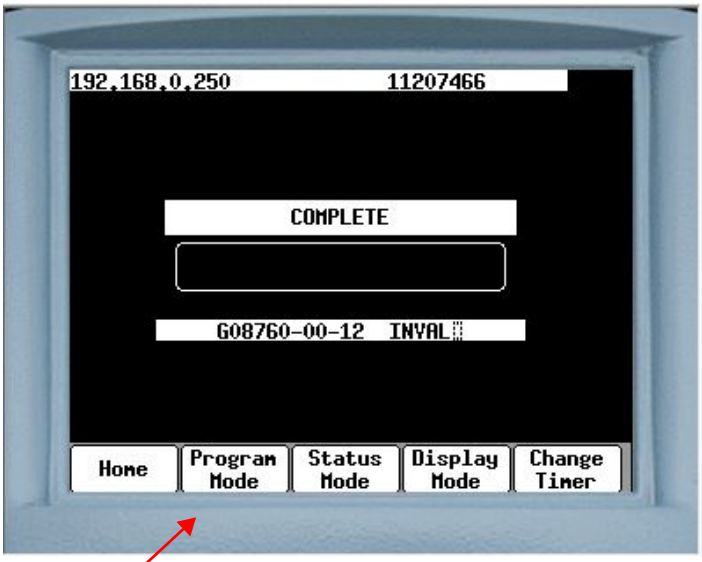
There are several user interface options available to program a weld schedule. They include the following:

- WTC DEP-300s Data Entry Panel
- WTC ***RAFT*** ™ Gateway or Weld Gateway Network Software
- Robot Teach Pendant (via WTC's built-in web server)
- Touch Screen (HMI) Devices (via WTC's built-in web server)

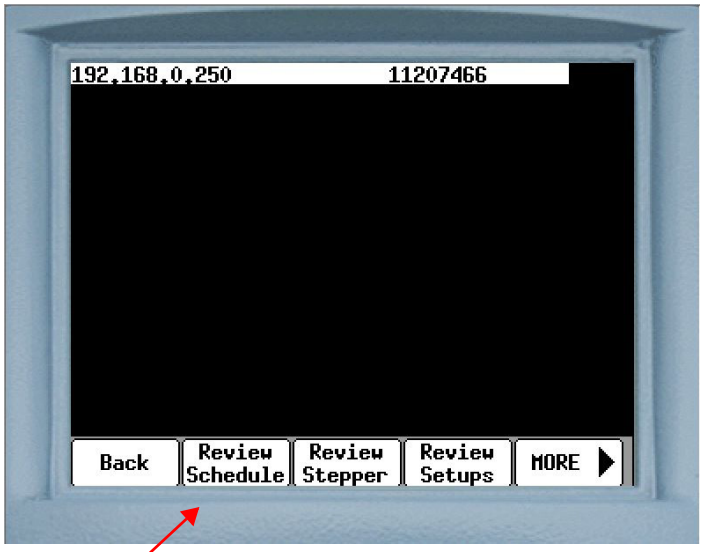
In this manual, the DEP-300s data entry panel is used in all programming instructions

INSERT A FUNCTION INTO A WELD SCHEDULE

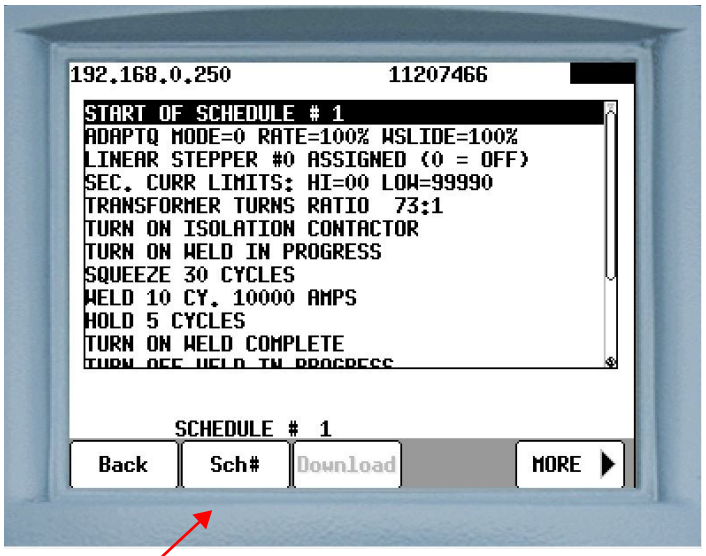
Perform the following steps on the DEP-300s to insert a function into a weld schedule:



B F2 ① Press Program Mode

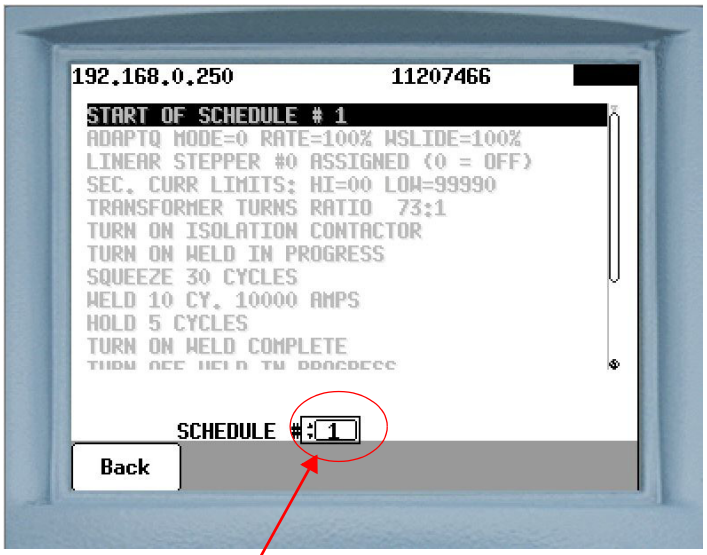


B F2 ② Press Review Schedule



B
F2

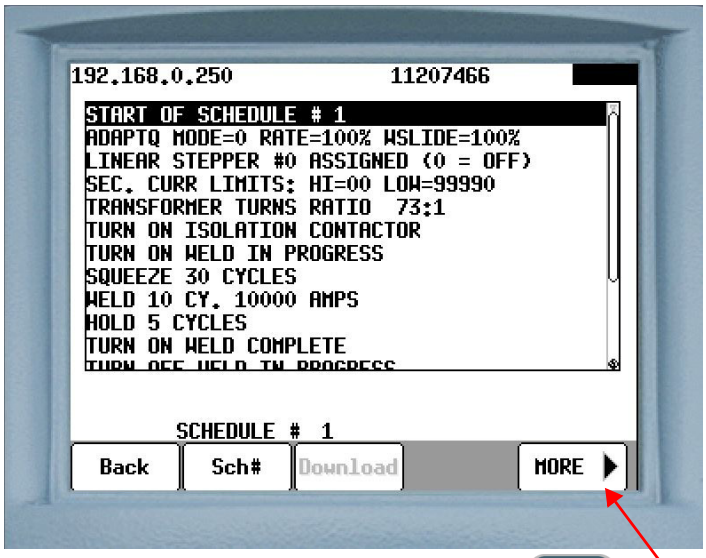
③ Press Sch#



④ Enter Schedule Number

SPACE
ENTER

⑤ Press ENTER

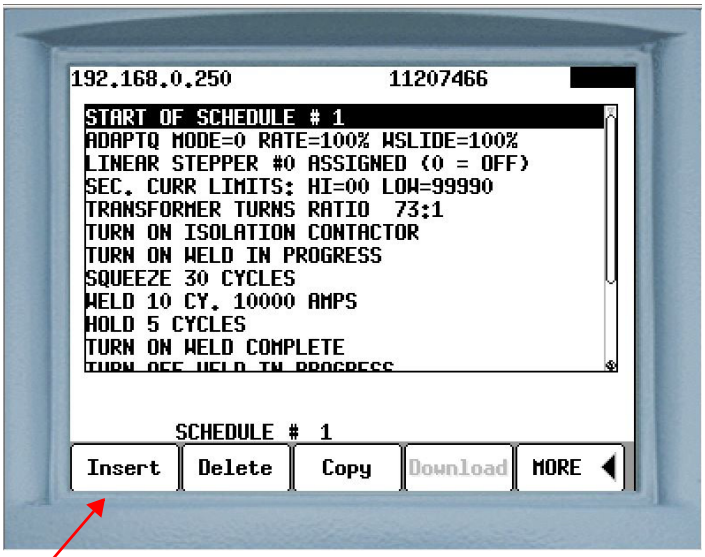


⑥ Press MORE 

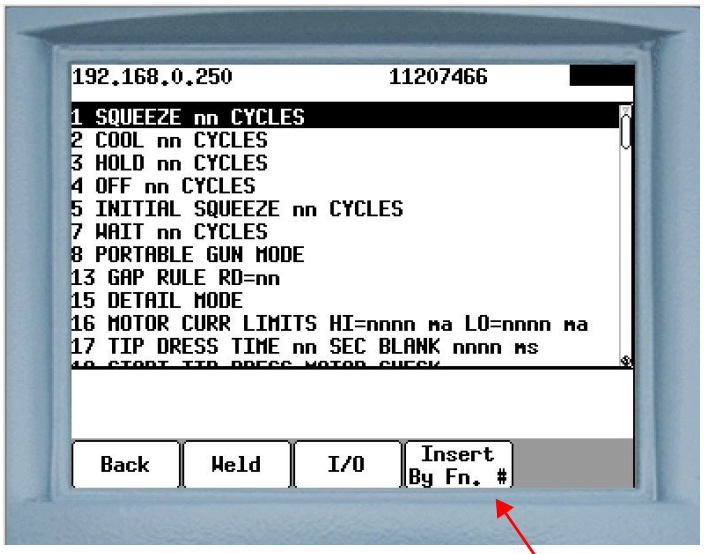
⑦ Press the 

or 

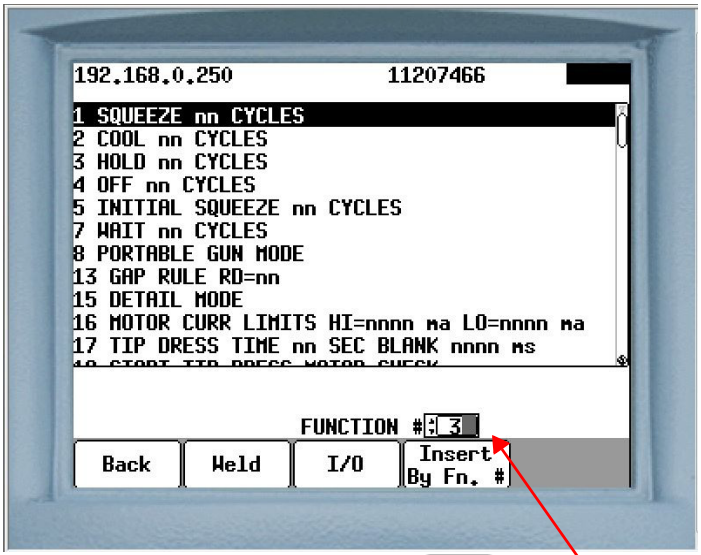
arrow keys to move the cursor to the line above where the function is to be inserted.



⑧ Press INSERT



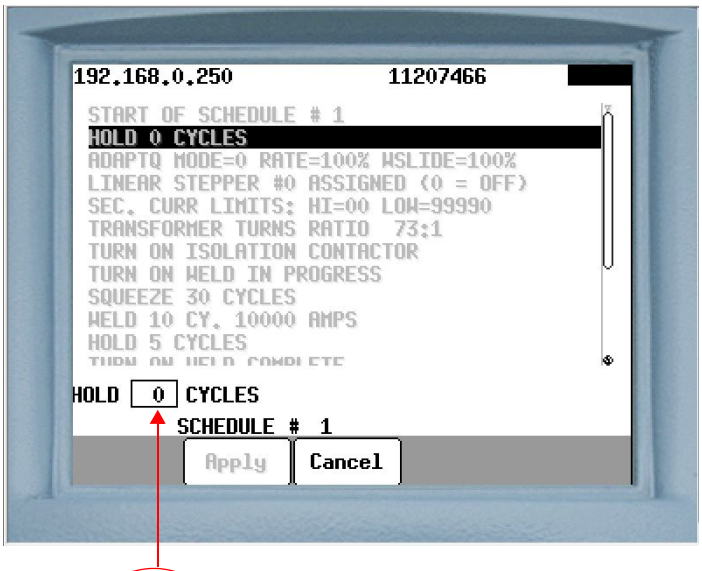
⑨ Press INSERT BY FN. # [Insert by Function Number.] D F4

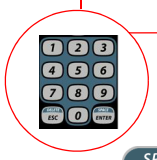


⑩ Enter the Function Number. D F4

SPACE ENTER ⑪ Press ENTER

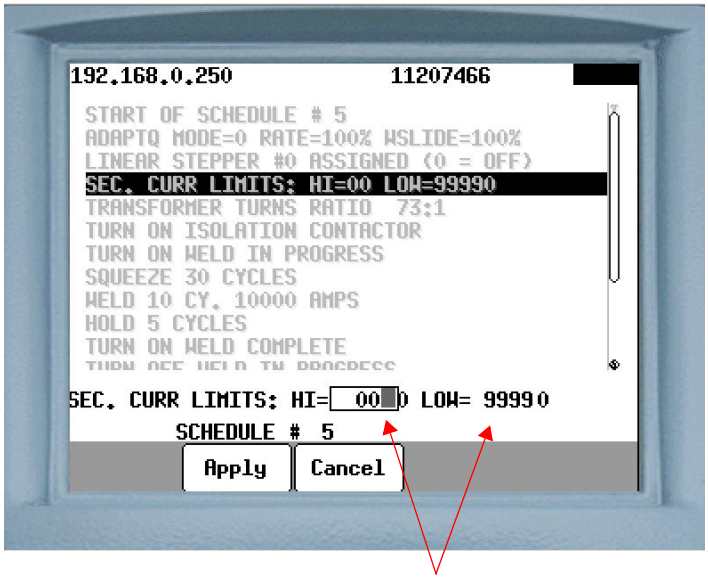
⑫ If the function requires parameters to be entered, proceed to step 13. If not, proceed to step 17





⑬ Enter parameter

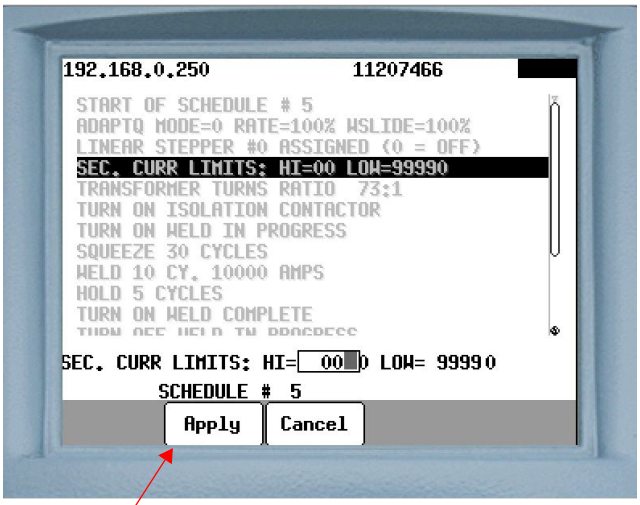
⑭ Press ENTER



⑮ For functions with two or more parameters, press the 

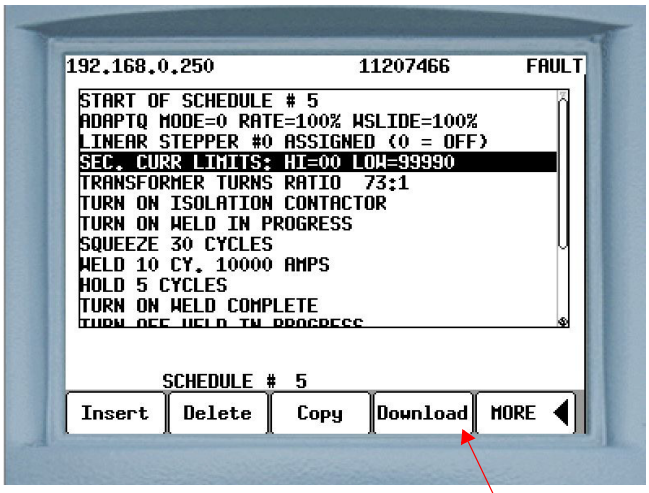
RIGHT arrow key to move the cursor to the next parameter box, then repeat steps 13 & 14. When complete, proceed to step 16.

*** NOTE:** In the ***RAFT***™ Gateway and DEP 300s the zero in the ones placed is fixed. The tenths, hundredths and thousandths place are programmable up to a maximum of 9999.
For example:
Enter 5O for 5OO Amps.



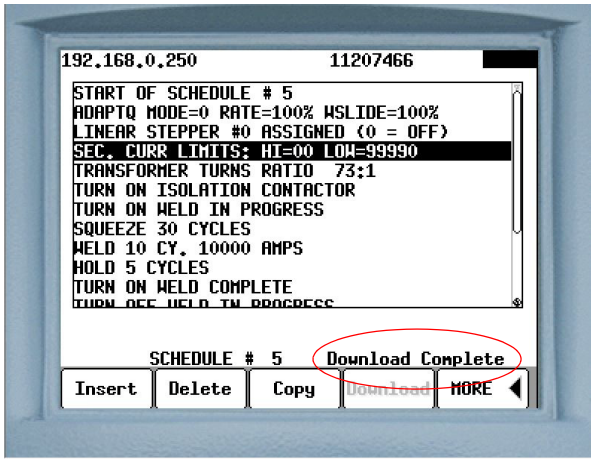
B F2

⑯ Press APPLY (F2).
[Saves changes to the DEP-300s only.]



⑰ Press DOWNLOAD.
[Downloads the changes to the weld processor].

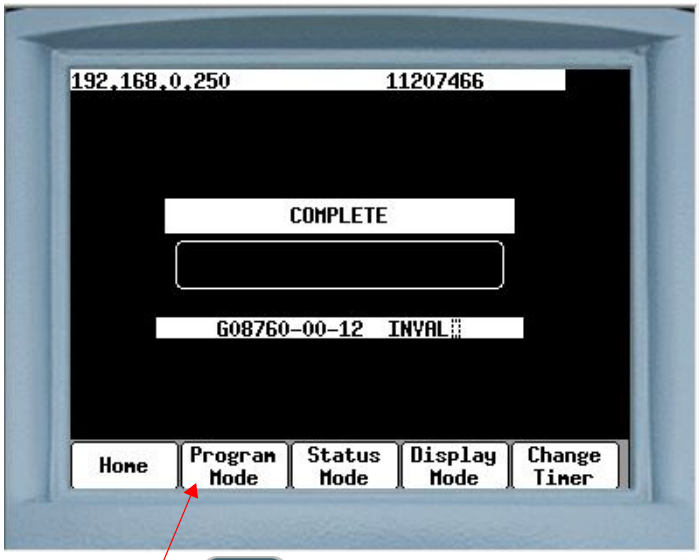
D F4



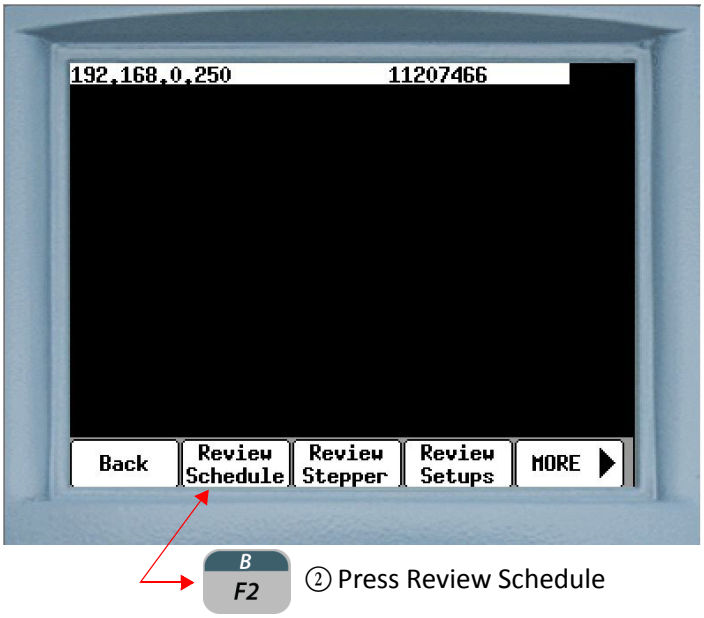
When complete, a “Download Complete” message will appear.

DELETE A FUNCTION FROM A WELD SCHEDULE

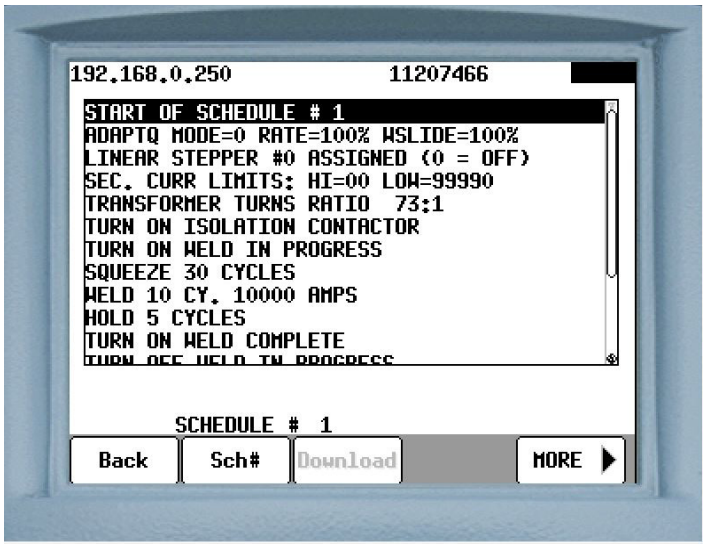
Perform the following steps on the DEP-300s to delete a function from a weld schedule:



① Press Program Mode

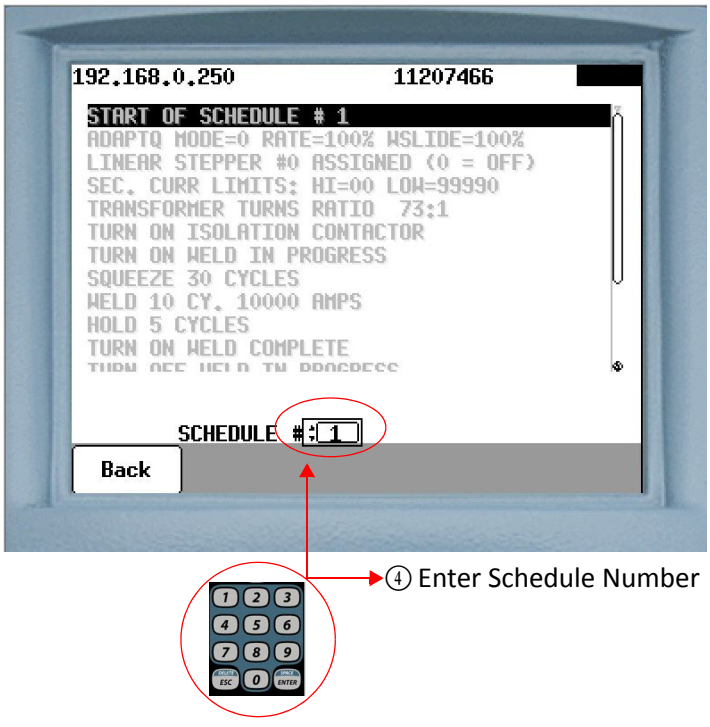


② Press Review Schedule



B
F2

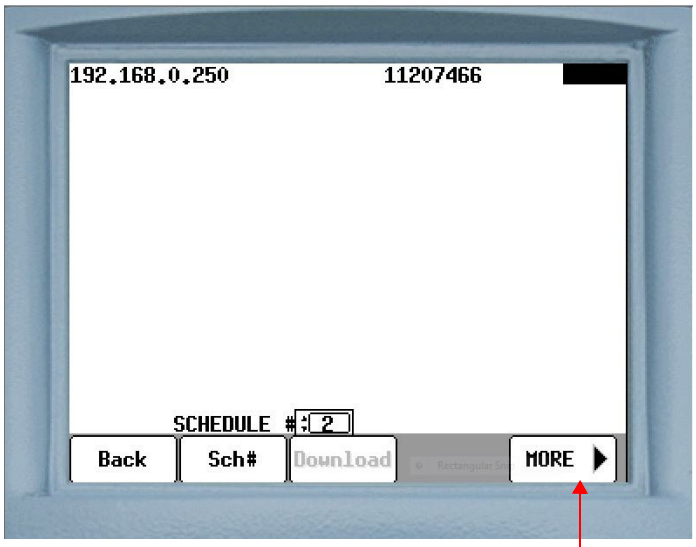
③ Press Sch#



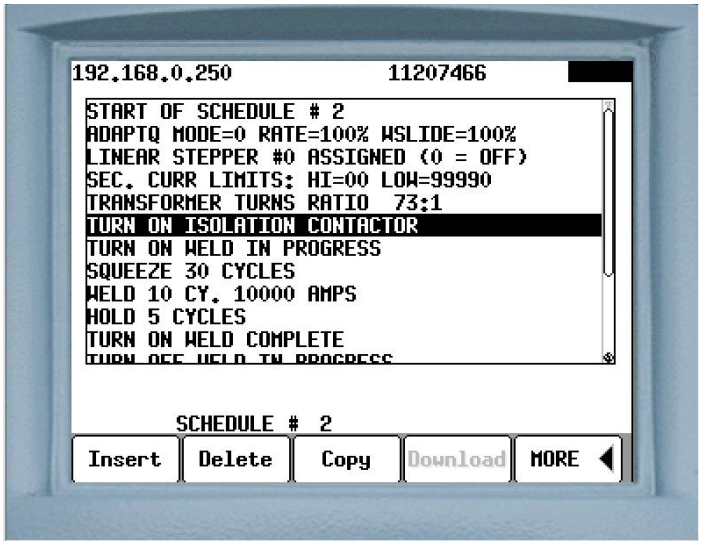
④ Enter Schedule Number

SPACE
ENTER

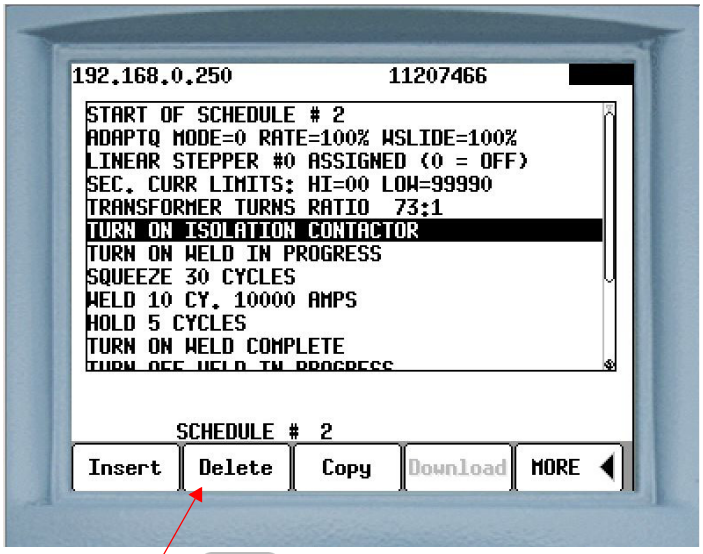
⑤ Press ENTER



⑥ Press MORE 

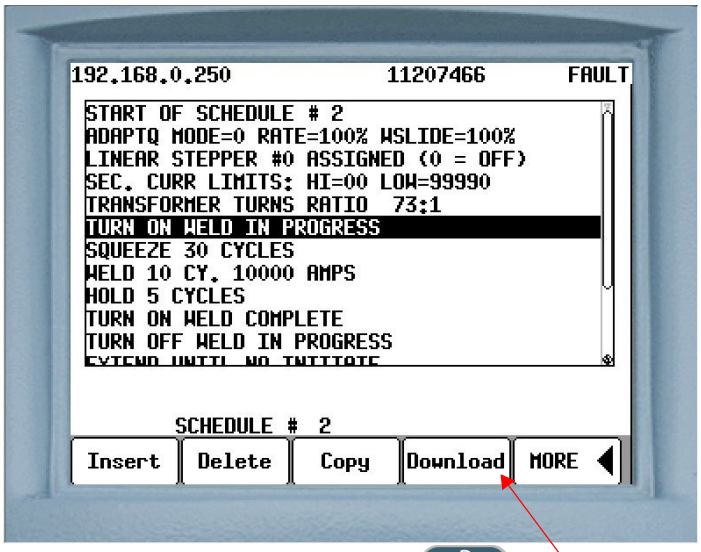


⑦ Press the  or  arrow keys to move the cursor onto the function line to be deleted



B
F2

⑧ Press DELETE.
[The function is immediately deleted from the DEP-300s.]

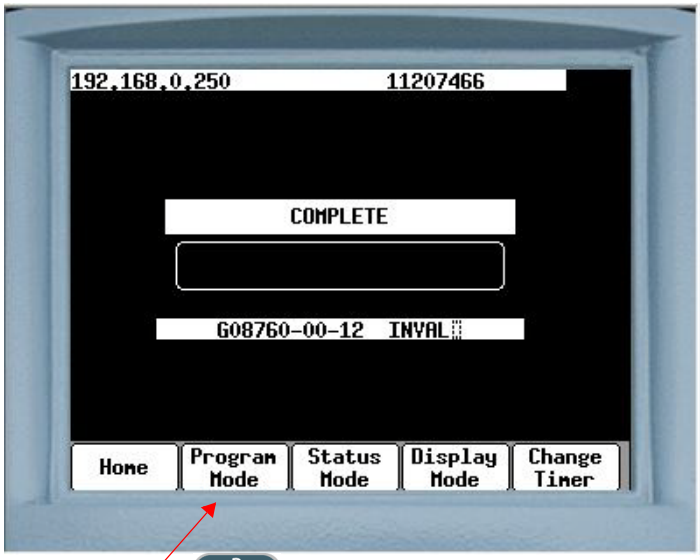


⑨ Press DOWNLOAD
[Downloads the changes to the weld processor. When complete, a "Download Complete" message will appear]

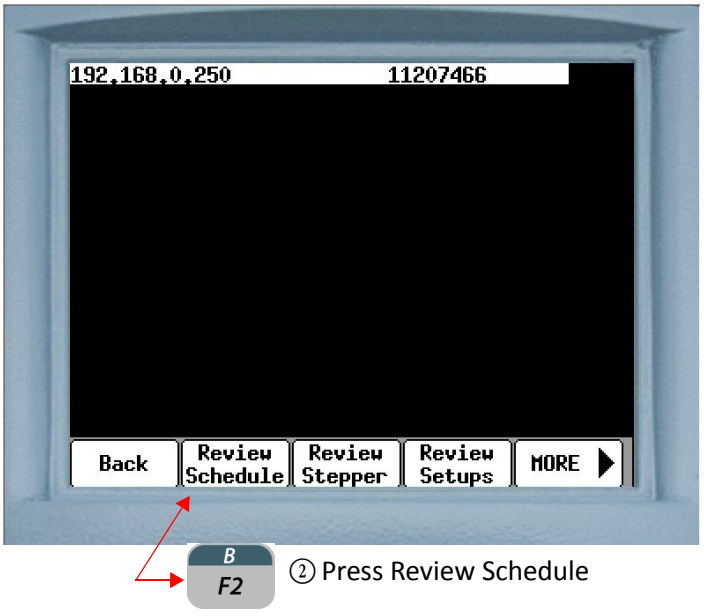
D
F4

COPYING A WELD SCHEDULE

Perform the following steps on the DEP-300s to copy an entire weld schedule from one location and paste it into another:



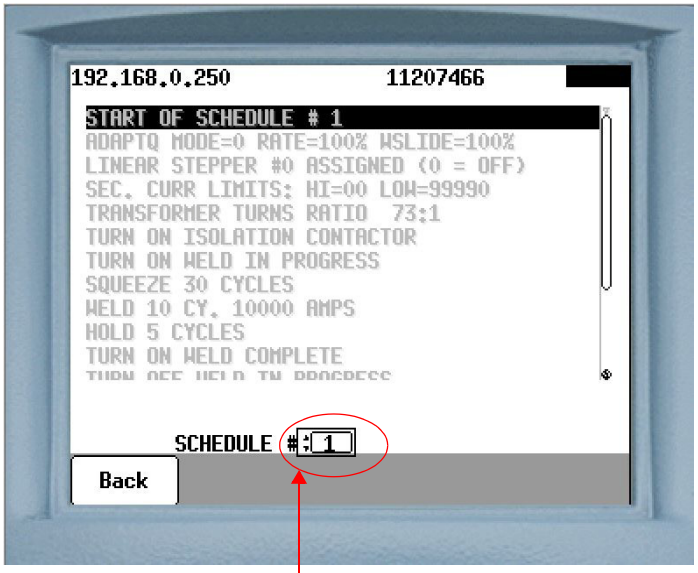
① Press Program Mode



② Press Review Schedule

B
F2

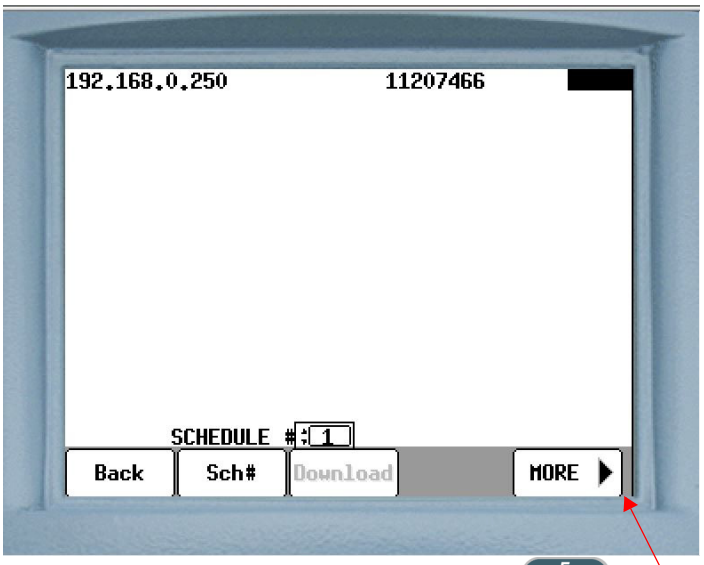
③ Press Sch#



④ Enter Schedule Number

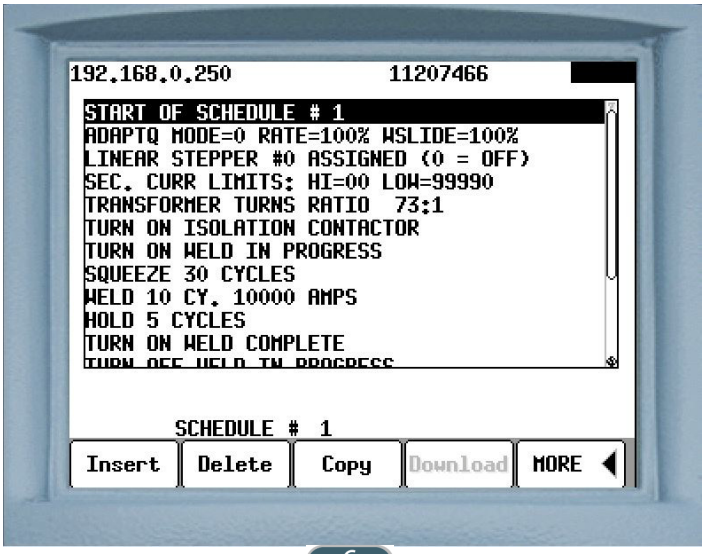
SPACE
ENTER

⑤ Press ENTER



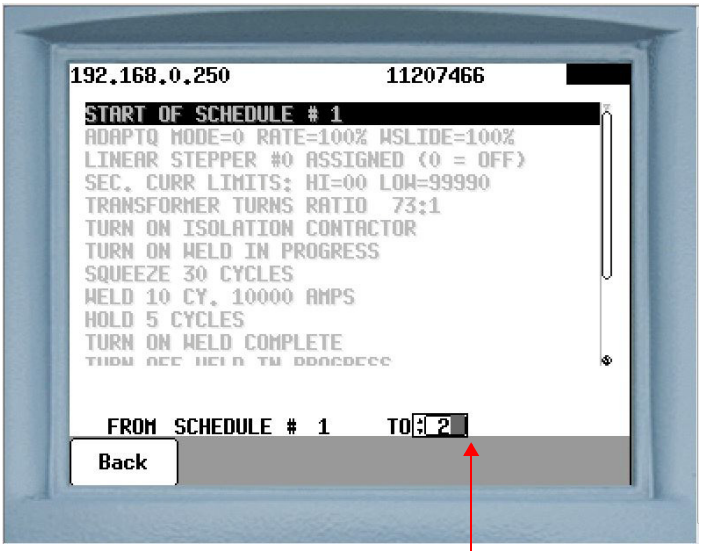
⑥ Press MORE

E
F5

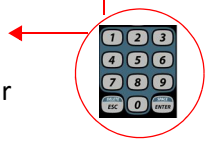


C
F3

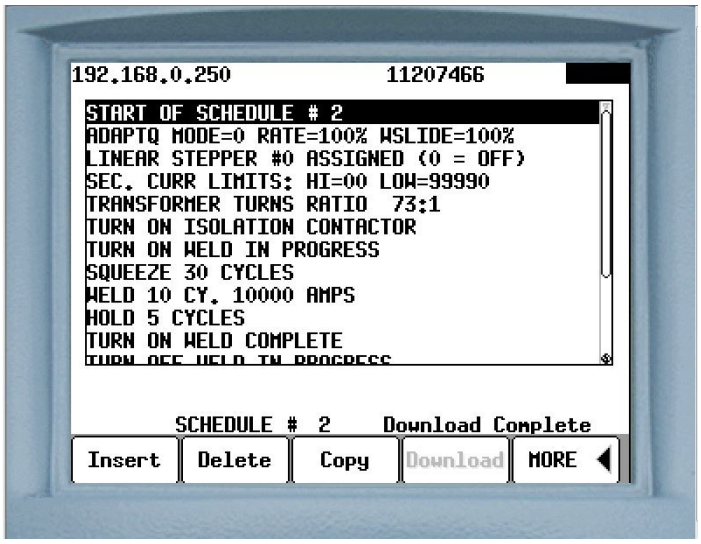
⑦ Press COPY



⑧ FROM SCHEDULE # (Current Schedule will be displayed) TO [Blank Field] enter the paste to Schedule Number



SPACE ENTER ⑨ Press ENTER



⑩ The copy is immediately downloaded to the weld processor. When complete, a “Download Complete” message will appear.

NOTE: When copying a weld schedule from one location to another, any existing data in the paste location will be completely overwritten and permanently lost.

SPOT ID PROGRAMMING

The SPOT ID feature allows enhanced flexibility in setting up welding schedules that are associated with spot numbers. This allows the user to associate the spot number of the weld with programming data used to create the spot and the welding data results of the spot. A second option with this feature is to initiate the weld control based on spot numbers instead of schedule numbers. There are 255 weld schedules available for spot selection 1 -255. Spot numbers higher than 255 can be assigned freely via the Spot ID system. These schedules are a continuation of the binary sequence select bits (1-255). With this feature additional schedules can be added to the 255 schedules already available. Individual schedules can also be customized and duplicated.

Another usage is to have all the spots of the plant programmed into one timer (as long as the number of unique welding schedules is under the 255 schedule maximum) and the Robot picks the schedule based on the spot number. This allows the welding timers to be preprogrammed with all the data required to operate in any welder in the plant.

There is a limitation of 1000 associations of spot numbers to weld schedules. If more than 1000 associations are attempted, then the programming device will provide an error message. However, there is no limit on how many of these 1000 associations can be assigned to a single schedule. It is possible to have all 1000 associations with one schedule if the programmer desires.

If the SPOT ID is assigned, then the weld schedule associated with it will be initiated. If the spot ID selected is not assigned, then an INVALID SEQUENCE SELECTED fault is set.

The user will be able to select a schedule for view or edit through the use of the spot numbers. When a schedule is chosen for edit based on a spot number, the schedule will be shown along with the other spot numbers which are associated with that schedule.

SETUP PARAMETERS

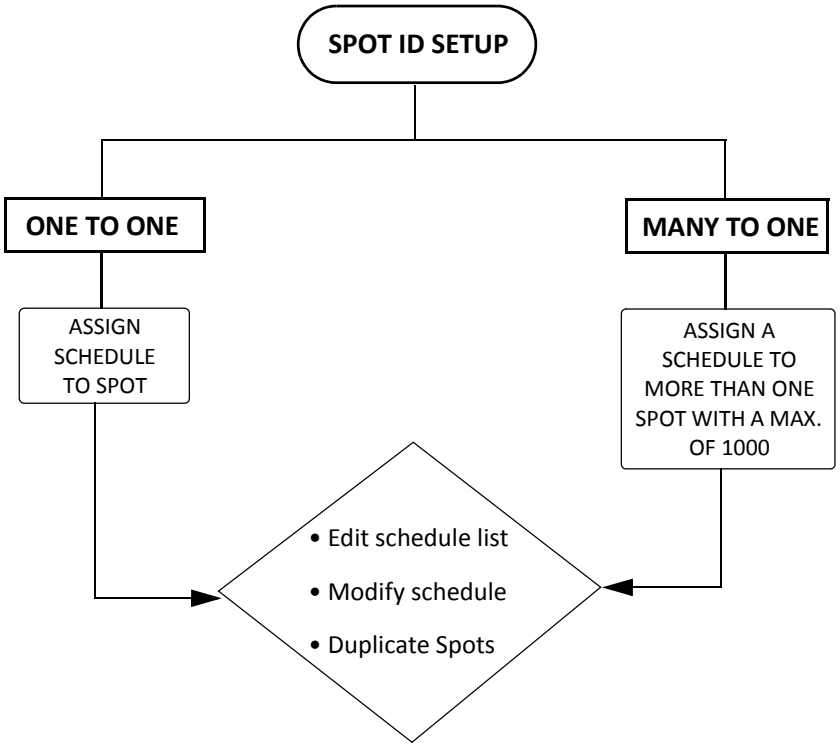
ONE TO ONE (Default)	One schedule assigned to one spot
MANY TO ONE	One schedule assigned to Many spots

SPOT No.	Min: 256
	Max: 1073741823

SETUP PROCEDURES

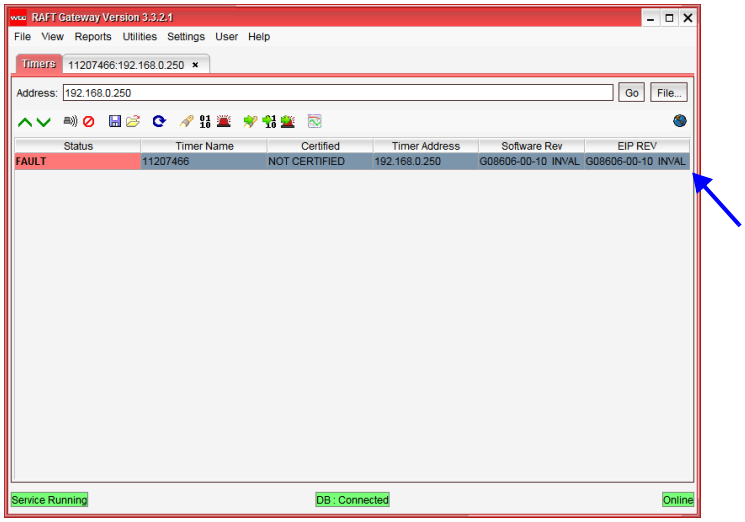
Weld schedules with Spot ID feature can be programed via the ***RAFT***™ Gateway, DEP 300s or the WebView.

At the onset it is important to establish the system configuration by selecting from the two modes available:



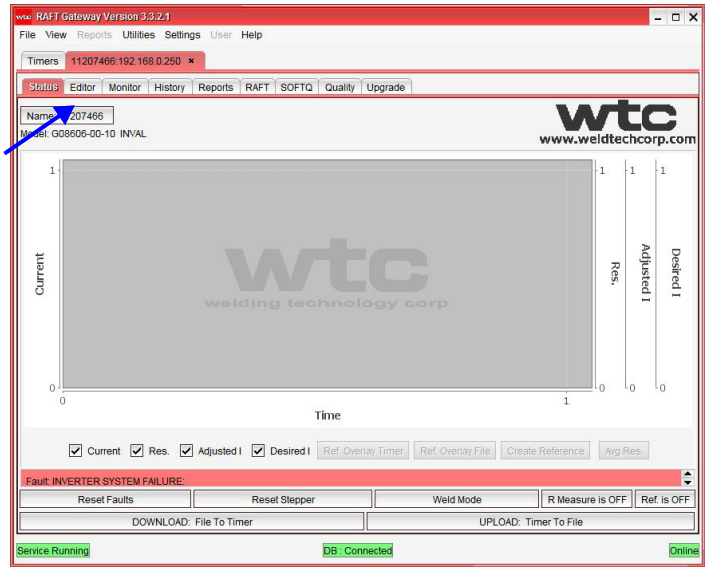
RAFT™ GATEWAY SETUP

SETTING UP A NEW SPOT ID IN ONE TO ONE MODE (DEFAULT)

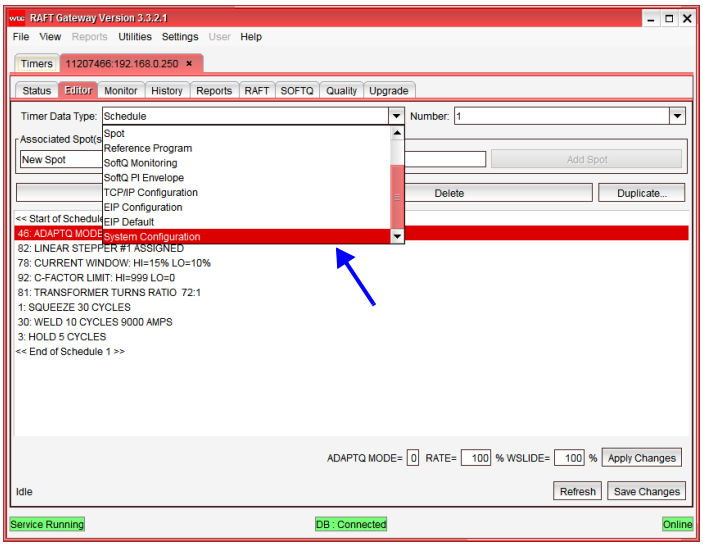


① Launch ***RAFT***™ Gateway and double-click the timer that is identified.

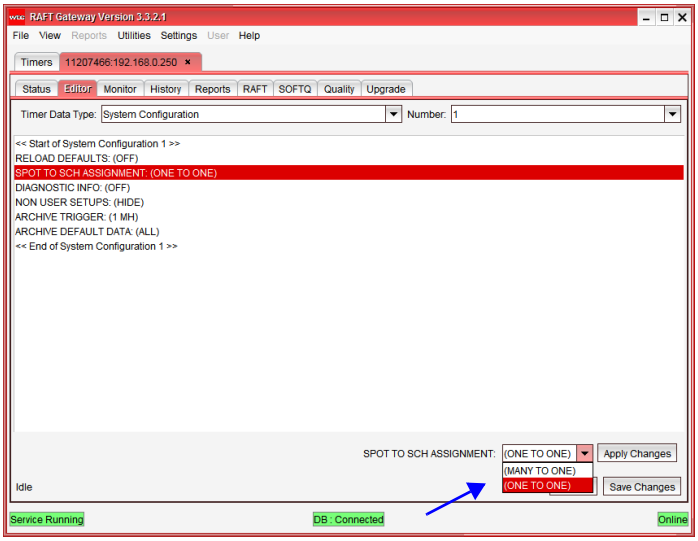
NOTE: Your timer screen may display different information depending on software installed. The screen shots used in the following procedures are for illustrative purpose only.



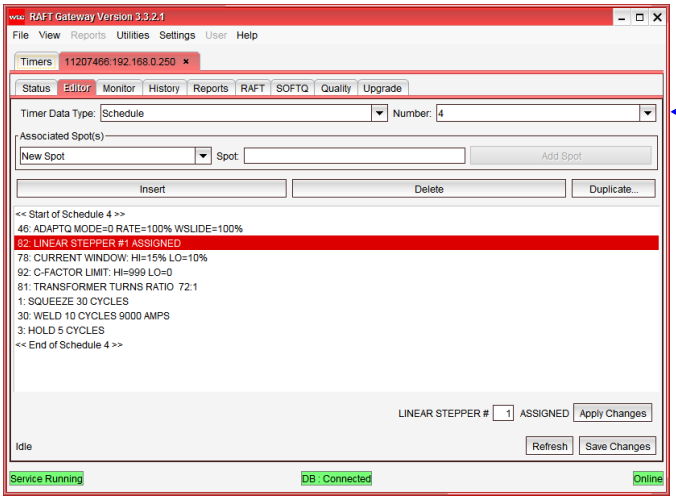
② Select the Editor tab by clicking.



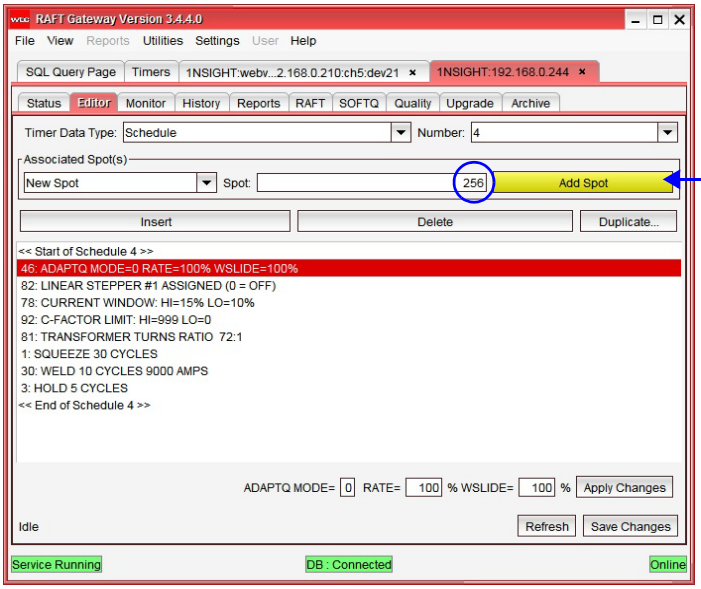
③ From Timer Data Type drop down list select System Configuration



④ Click on SPOT TO SCH ASSIGNMENT. Then select from one of the two modes available. In our example we will leave it at default mode ONE TO ONE.



⑤ Go back to SCHEDULE in Timer Data Type select schedule number (4*)



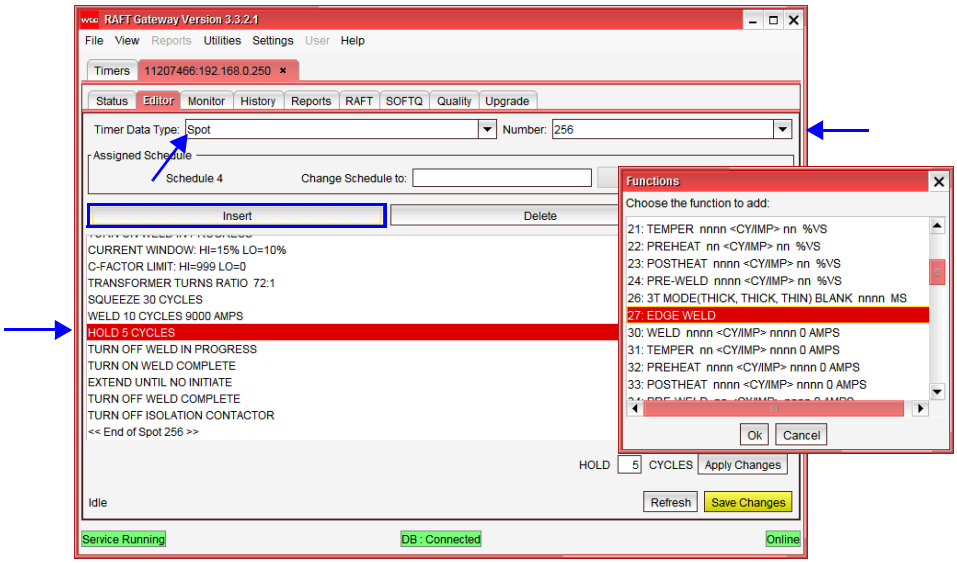
⑥ Enter valid spot number. This field will turn red if a number <256 is entered. The Add Spot button will now turn yellow. Indicating that schedule 4 has been assigned to spot 256.

⑦ Click the Yellow Add Spot button.

* For exemplary purpose only

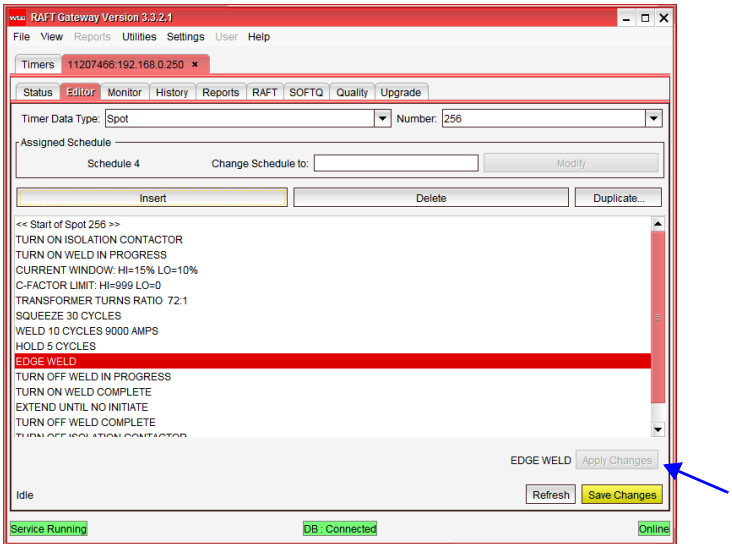
EDITING THE SCHEDULE FOR A NEW SPOT

The pre-programmed schedules 1-255 can be individually changed depending on specific spot requirements.



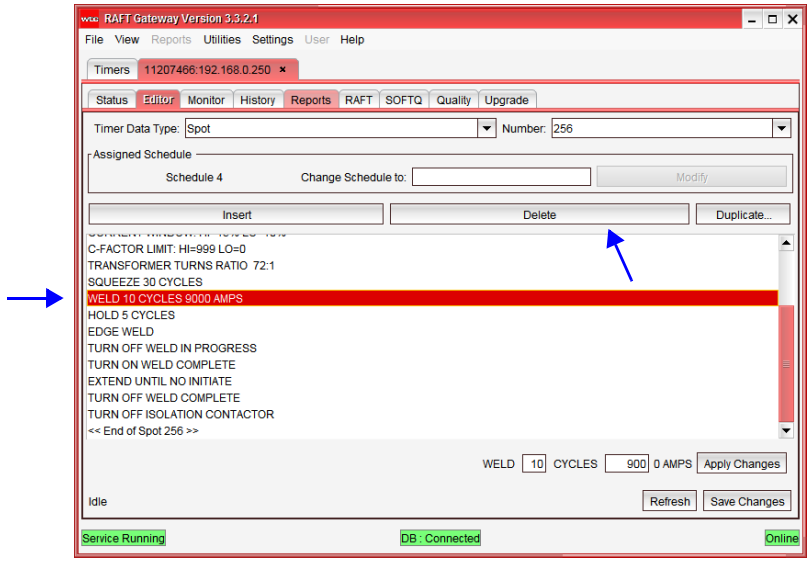
Note: Once a schedule is edited the change is carried over to all spots with the same schedule.

① To edit a schedule select the Spot from the Timer Data Type drop down menu. Then make sure that the right spot number is displayed in the Number field (256 in our example). Navigate to the line in the schedule that has to be edited and click Insert. This opens up a list of available schedule functions in a new window. Select EDGE WELD. Click OK.



② Click Apply Changes. Then Save Changes

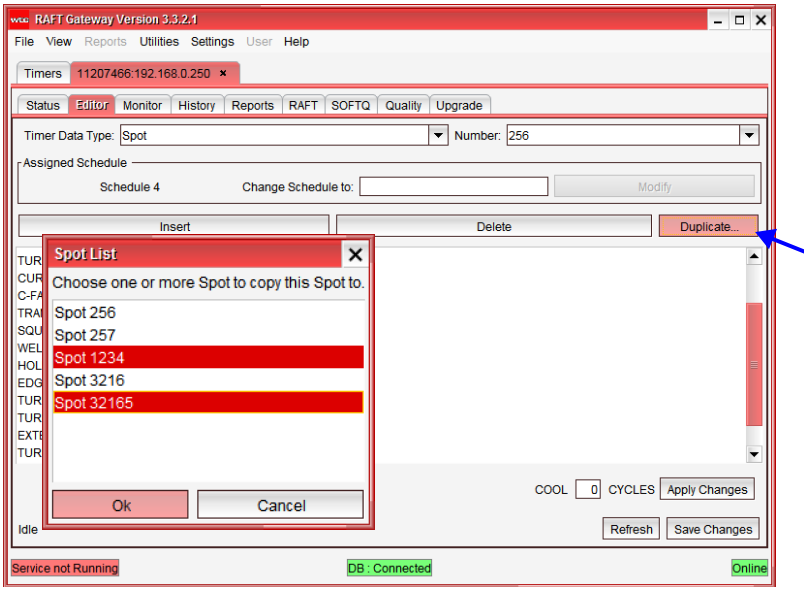
DELETING A FUNCTION FROM THE SCHEDULE



① Select the function line to be deleted and click the delete button.

② The Save Changes button will turn yellow, click to apply.

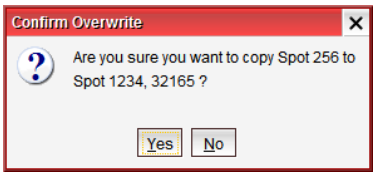
DUPLICATING A SPOT



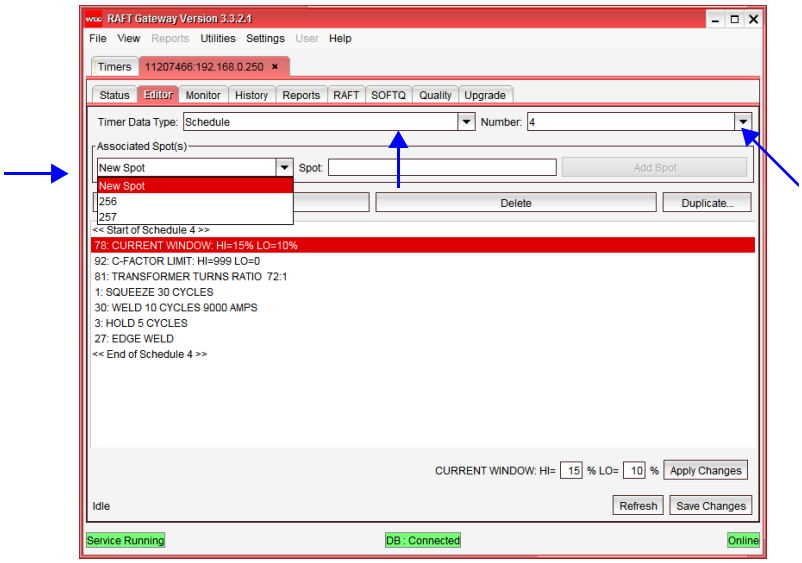
① To duplicate a Spot click the Duplicate button. This opens up the spots list in a new window. Select the spots and click OK.

- To select a group of spots listed in order hold Shift + click.
- To select specific spots hold Ctrl + click on the spot. Example Spots 1234 and 32165 as shown above.

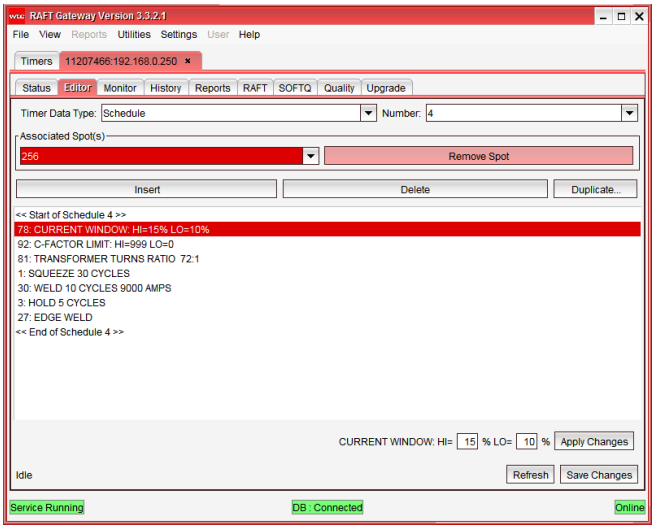
② An alert is annunciated.
Click Yes to confirm.



REMOVING A SPOT ID



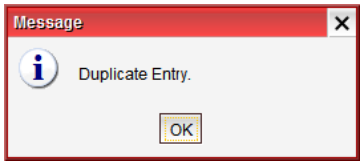
① Spots are associated with schedules. Select Schedule from Timer Data Type drop down menu. Then select the schedule number from the list to find all the spots associated with the schedule. Click on the down arrow under Associated Spots. This will display a list of spots associated with the schedule.



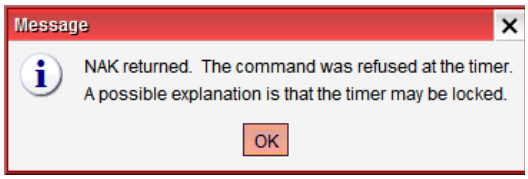
② Select the Spot to delete and click Remove Spot button. This also removes all changes made to the schedule associated with the particular spot.

POSSIBLE ERROR MESSAGES

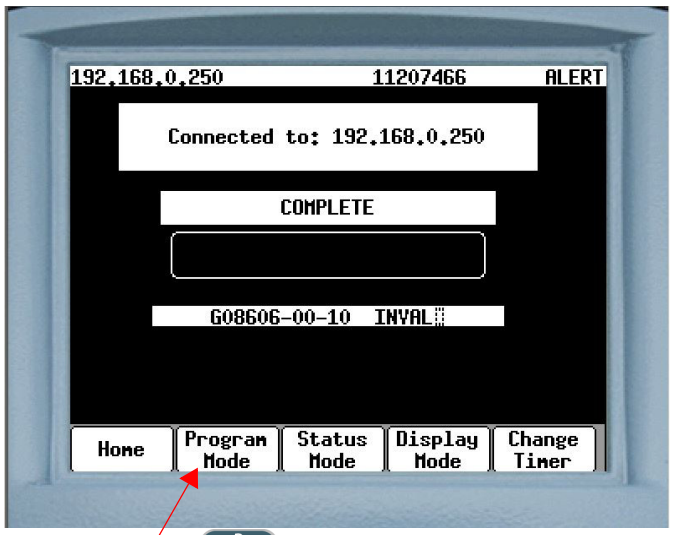
1. When the weld program is configured in ONE TO ONE mode a Duplicate Entry error message is generated when an attempt is made to assign a previously assigned schedule to a new spot



2. When the weld program is configured in MANY TO ONE mode a NAK returned is generated when an attempt is made to associate more that 1000 spots to a single weld schedule.

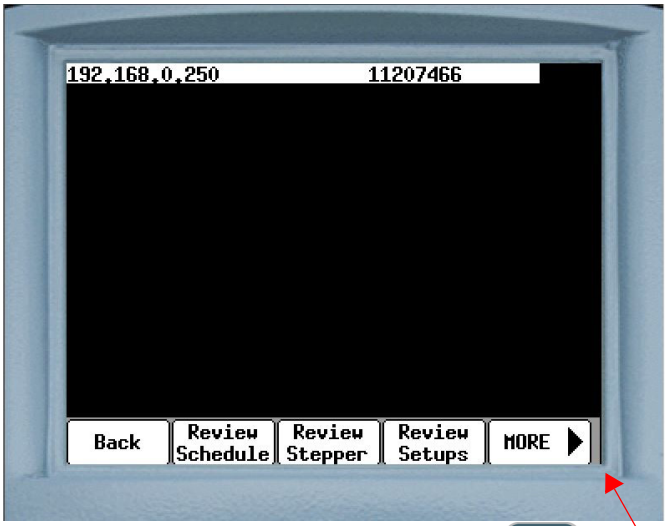


DEP 300s SETUP SETTING UP A NEW SPOT ID IN MANY TO ONE MODE

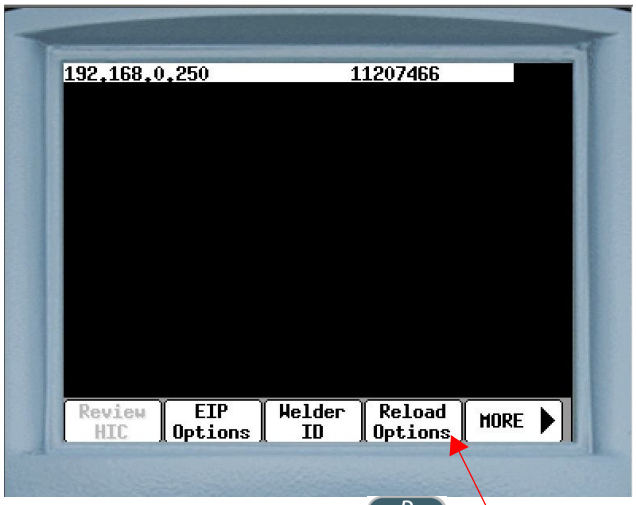


① Press Program Mode

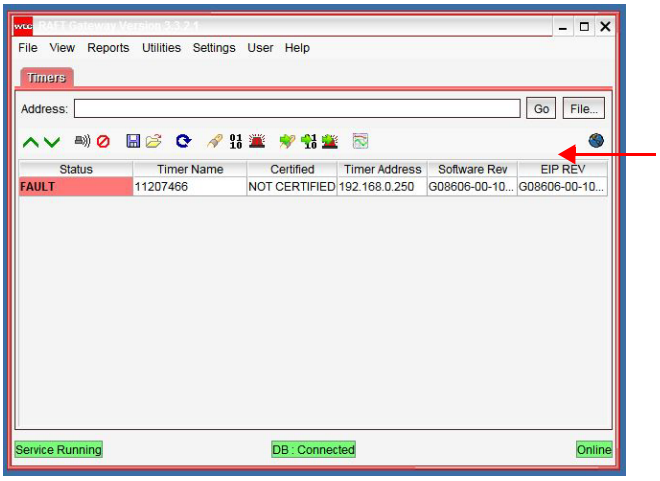
NOTE:
Check your DEP 300s communication settings - Local Ethernet, Global Ethernet or Serial before proceeding.



② Press More

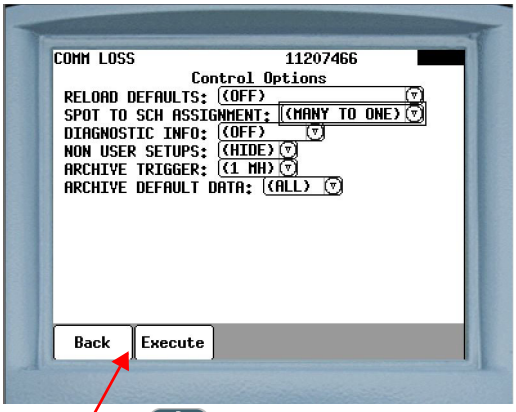


③ Press Reload Options D F4

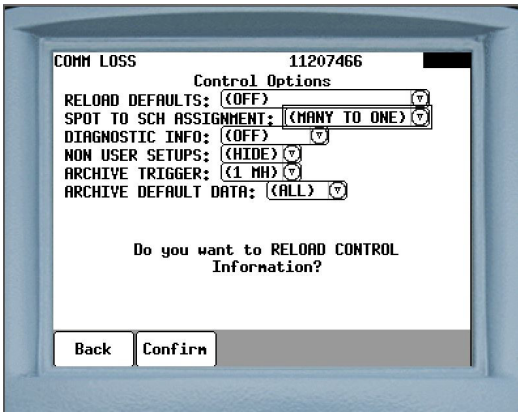


④ Press the S arrow key twice to bring the cursor to SPOT TO SCH ASSIGNMENT. Press SPACE ENTER This opens up a drop down box displaying the available modes. Press the I arrow key to select MANY TO ONE.

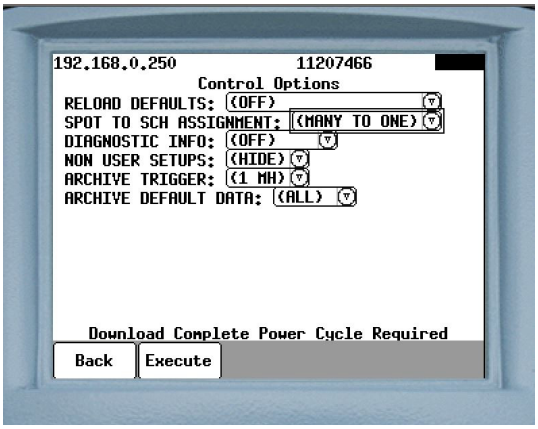
⑤ Press SPACE ENTER



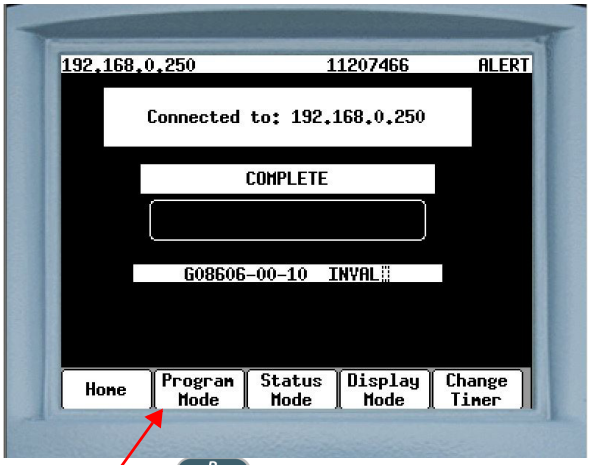
B F2 ⑤ Press Execute



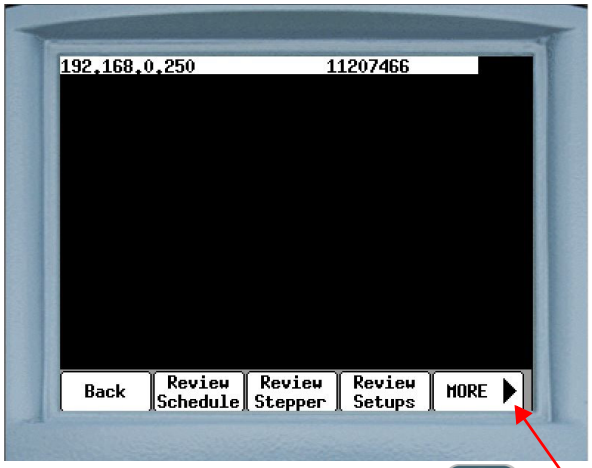
⑥ Do you want to RELOAD CONTROL information will be displayed. Press B F2 to confirm.



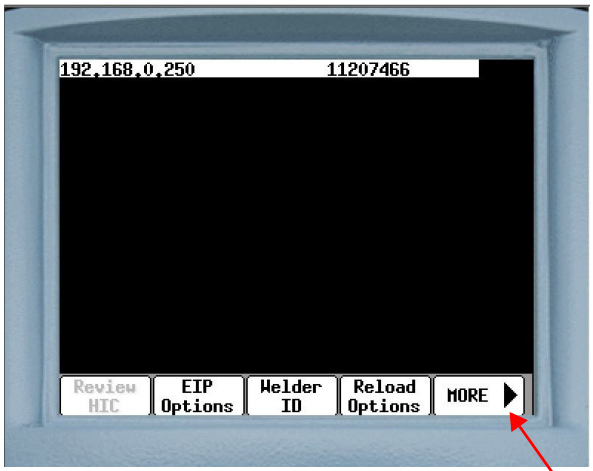
⑦ Press B F2 to Execute and cycle power to the timer confirm the change.



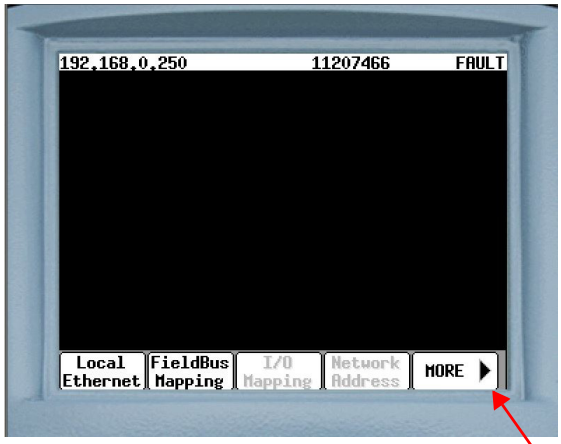
B F2 ⑧ Press Program Mode



⑨ Press More E F5

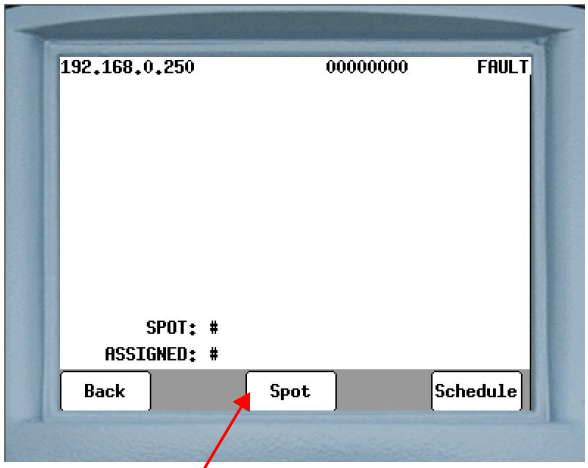


⑩ Press More E F5

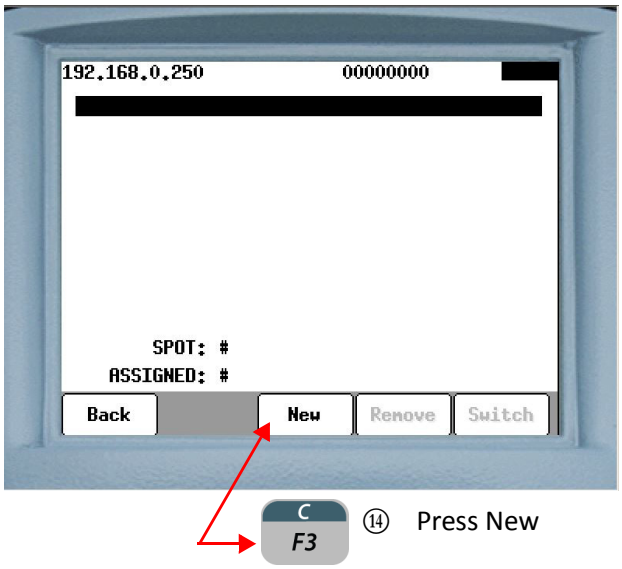


⑪ Press More E F5

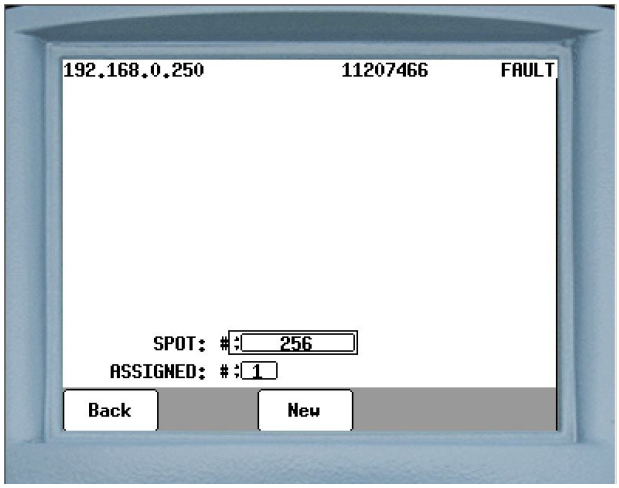
B F2 ⑫ Press Spots



C F3 ⑬ Press Spot

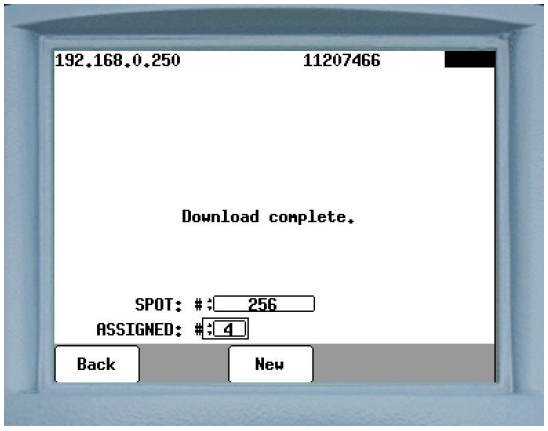


⑭ Press New



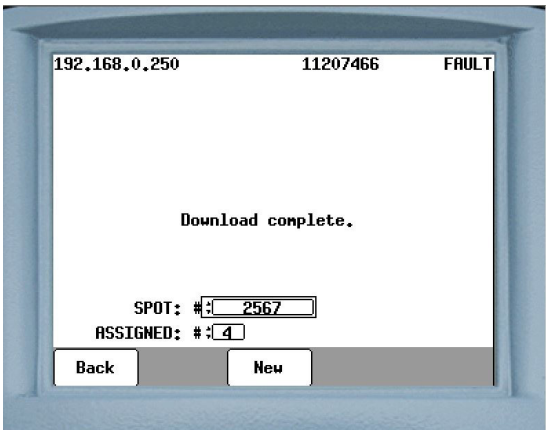
⑭ Press Enter SPACE ENTER . Using the number keys  enter spot n

(256 in our example)



⑮ Press the S arrow key to move the cursor to the Assigned # field. Enter the schedule number using the number keys 

Then press Enter SPACE ENTER Wait for the Download complete message before proceeding.

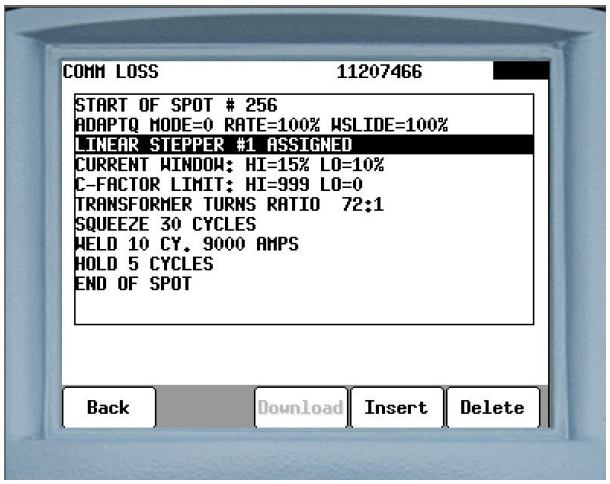


⑯ Press the I arrow key to move the cursor to the Spot # field. Enter the new spot number using the number keys 

Then press Enter SPACE ENTER Wait for the Download complete message before proceeding.

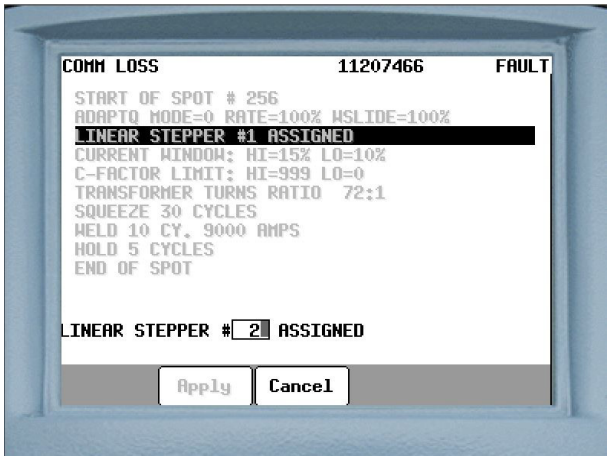
Repeat Step 16 to add new spots to the selected schedule. Up to a **maximum of 1000 associations to a single schedule are allowed**.

EDITING A SCHEDULE



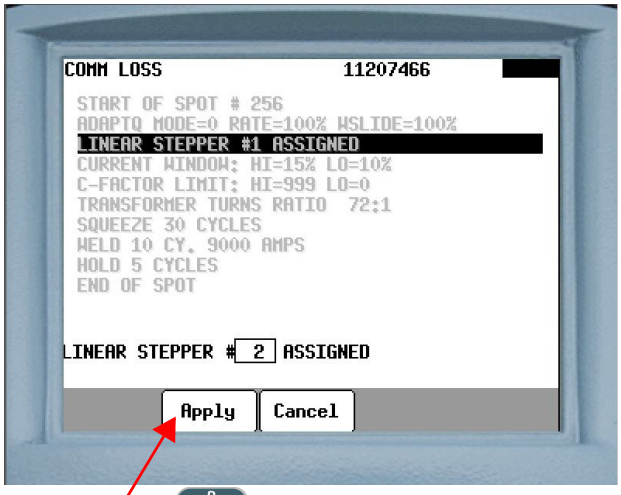
① Use the ↑ or ↓ arrow keys to navigate to the line of the Schedule that has to be edited.

② In this example we will edit the Stepper. Press Enter SPACE ENTER



③ Using the numbers pad  select the number to be assigned to the Linear Stepper. 2 is used in our example.

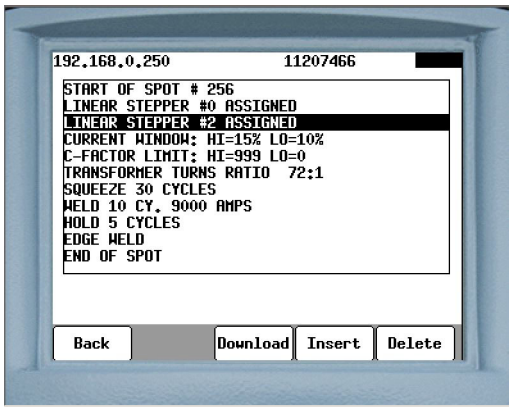
④ Press Enter SPACE ENTER



B F2 ⑤ Press Apply

To insert a new function in the schedule use the S I arrow keys to scroll to the line that new function will follow and click Insert.

To delete a function in the schedule use the S I arrow keys to scroll to the line that has to be deleted and click delete.



D F4 E F5

LIST OF SPOT I/O BITS

SPOT 9 (256)
SPOT 10 (512)
SPOT 11 (1024)
SPOT 12 (2048)
SPOT 13 (4096)
SPOT 14 (8192)
SPOT 15 (16384)
SPOT 16 (32768)
SPOT 17 (65536)
SPOT 18 (131072)
SPOT 19 (262144)
SPOT 20 (524288)
SPOT 21 (1048576)
SPOT 22 (2097152)
SPOT 23 (4194304)
SPOT 24 (8388608)
SPOT 25 (16777216)
SPOT 26 (33554432)
SPOT 27 (67108864)
SPOT 28 (134217728)
SPOT 29 (268435456)
SPOT 30 (536870912)

DEFAULT WELD SCHEDULES

ROBOT MODE - DEFAULT WELD SCHEDULES

SCHEDULE #	FUNC. #	DESCRIPTION
1-29 and 32 - 255	00	START OF SCHEDULE #N
	82	LINEAR STEPPER #0 ASSIGNED (0=0FF)
	76	SEC. CURR LIMITS: HI = 00 LO = 99990
	81	TRANSFORMER TURNS RATIO 73:1
	88	TURN ON ISOLATION CONTACTOR
	58	TURN ON WELD IN PROGRESS
	1	SQUEEZE 30 CYCLES
	30	WELD 10 CYCLES 1000 AMPS
	3	HOLD 5 CYCLES
	63	TURN ON WELD COMPLETE
	59	TURN ON WELD IN PROGRESS
	75	EXTEND UNTIL NO INITIATE
	64	TURN OFF WELD COMPLETE
	89	TURN OFF ISOLATION CONTACTOR
	100	END OF SCHEDULE

ROBOT MODE - DEFAULT TIP DRESS SCHEDULE

SCHEDULE #	FUNC. #	DESCRIPTION
30 and 31	00	START OF SCHEDULE #N
	58	TURN ON WELD IN PROGRESS
	1	SQUEEZE 30 CYCLES
	59	TURN OFF WELD IN PROGRESS
	63	TURN ON WELD COMPLETE
	3	HOLD 5 CYCLES
	64	TURN OFF WELD COMPLETE
	100	END OF SCHEDULE

MACHINE MODE - DEFAULT WELD SCHEDULE

SCHEDULE #	FUNC. #	DESCRIPTION
1-255	00	START OF SCHEDULE #N
	82	LINEAR STEPPER #0 ASSIGNED (0 = OFF)
	76	SEC. CURR LIMITS: HI =00 LOW =99990
	81	TRANSFORMER TURNS RATIO 73:1
	88	TURN ON ISOLATION CONTACTOR
	58	TURN ON WELD IN PROGRESS
	1	SQUEEZE 30 CYCLES
	30	WELD 10 CYCLES 10000 AMPS
	3	HOLD 5 CYCLES
	63	TURN ON WELD COMPLETE
	59	TURN OFF WELD IN PROGRESS
	75	EXTEND UNTIL NO INITIATE
	64	TURN OFF WELD COMPLETE
	89	TURN OFF ISOLATION CONTACTOR
	100	END OF SCHEDULE

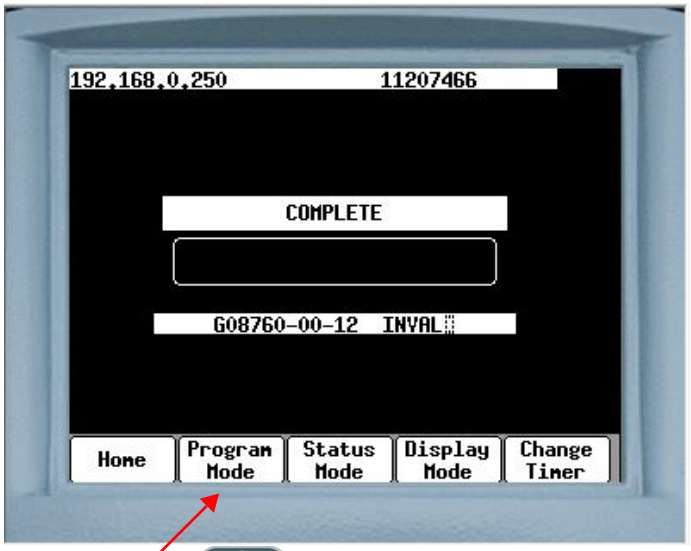
Chapter 7: FAULTS AND SETUP PARAMETERS

When Faults are detected, the WTC DEP-300s (Data Entry Panel) can be used edit a Programmable Fault or Setup Parameter.

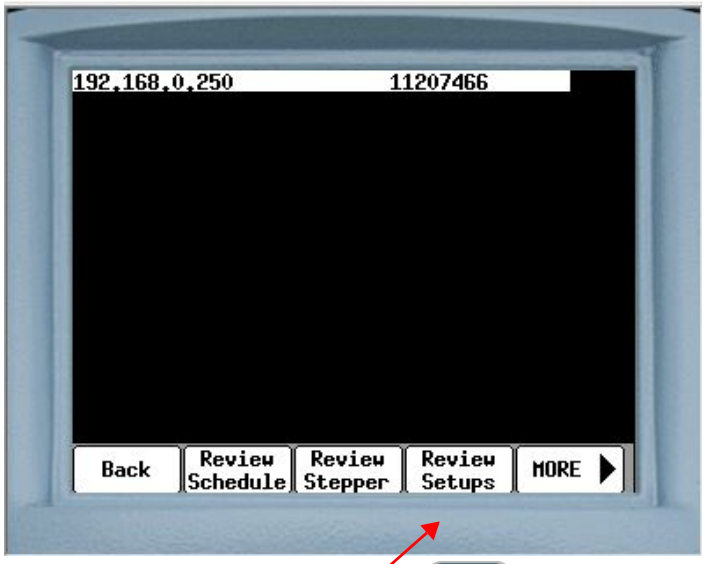
WTC DEP-300s is a portable, hand-held, programming device, used to communicate with WTC weld processors through an EtherNet IP network.

[For detailed information on how to use the DEP-300s refer to User Manual # M-035030]

PERFORM THE FOLLOWING STEPS ON THE DEP-300s TO EDIT A PROGRAMMABLE FAULT OR SETUP PARAMETER



B F2 ① Press Program Mode



D F4 ② Press Review Setups

③ Press the arrow keys to move the cursor to the fault or parameter line to be edited.

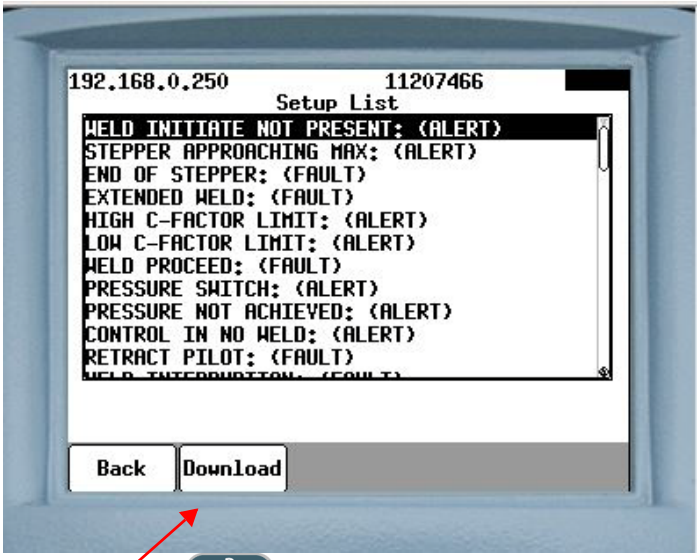
④ Press ENTER

⑤ Press the arrow keys to select a fault severity option or enter the required parameter

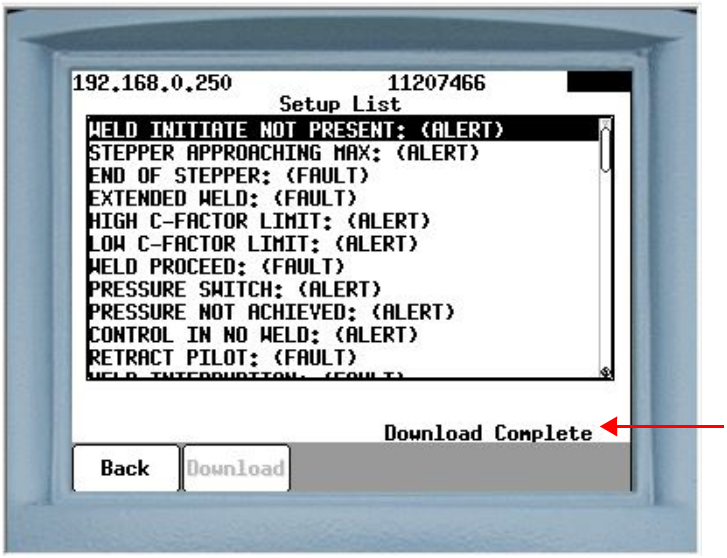
⑥ Press ENTER

B F2 ⑦ Press APPLY

[Saves changes to the DEP-300s only]



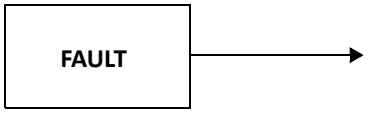
B F2 ⑧ Press DOWNLOAD



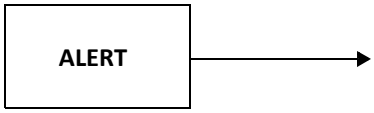
Downloads the changes to the weld processor. When complete, a **"Download Complete"** message will appear.

FAULT SEVERITY

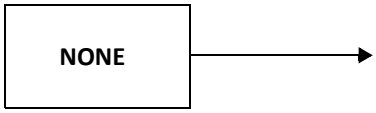
The user can set the severity of the programmable faults. The severity option tells the weld processor how to respond when a fault condition is detected. Conversely, the severity of non-programmable faults are fixed and cannot be changed. See Non-Programmable (Hidden) Faults on Page 115.



When a fault condition is detected by the weld processor, the Fault bit will go HIGH and the No Fault bit will go LOW. Fault conditions generally (with a few exceptions) inhibit the initiation of a weld schedule. A fault condition is remembered by the weld processor when power is re-cycled on the weld control cabinet.



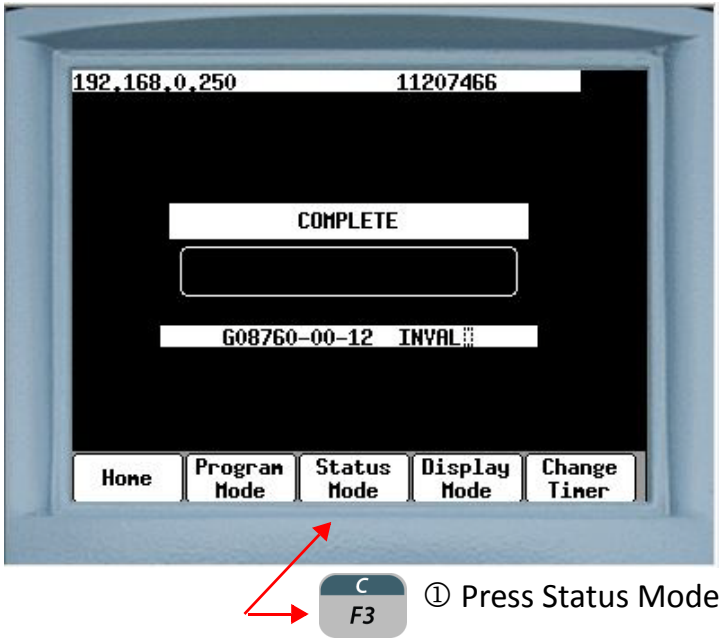
When an alert condition is detected by the weld processor, the Alert bit will go HIGH and the No Alert bit will go LOW. Alert conditions generally do not inhibit the initiation or execution of a weld schedule.



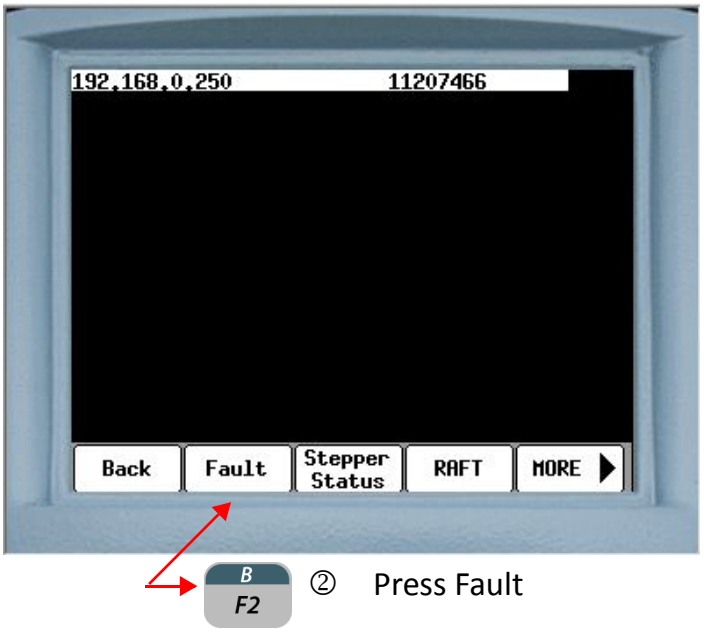
When a fault condition is detected, the weld processor still logs the fault, but inhibits the Fault or Alert bits from turning on (HIGH). This condition will not inhibit the initiation of a weld schedule.

FAULT RESET

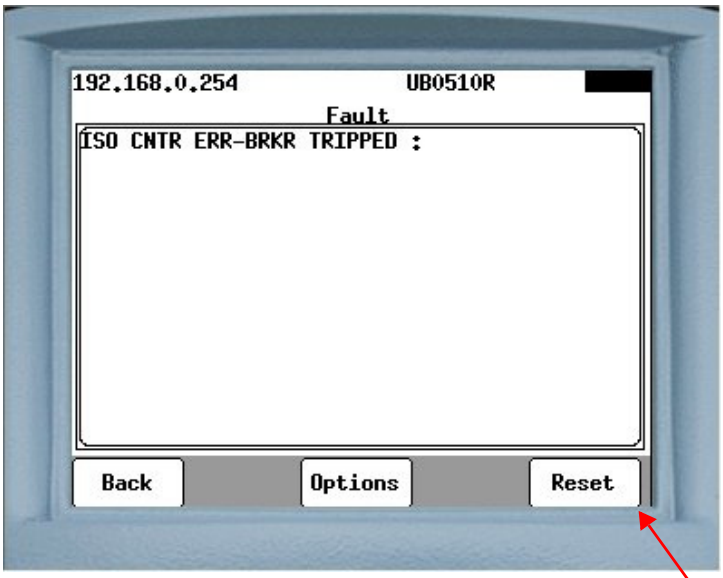
Faults can be reset by either pressing the Reset (F5) button on the Fault Status Menu in the DEP-300s or turning the Fault Reset input bit HIGH. Perform the following steps to reset faults via the DEP-300s



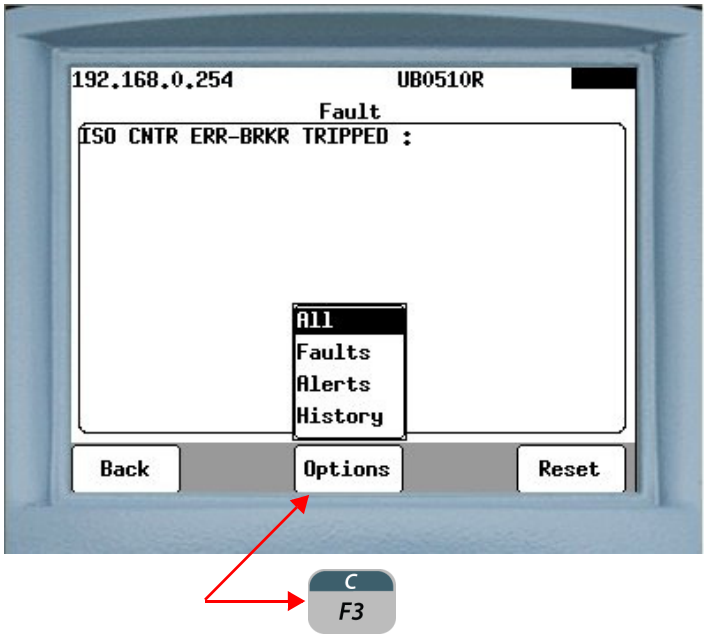
① Press Status Mode



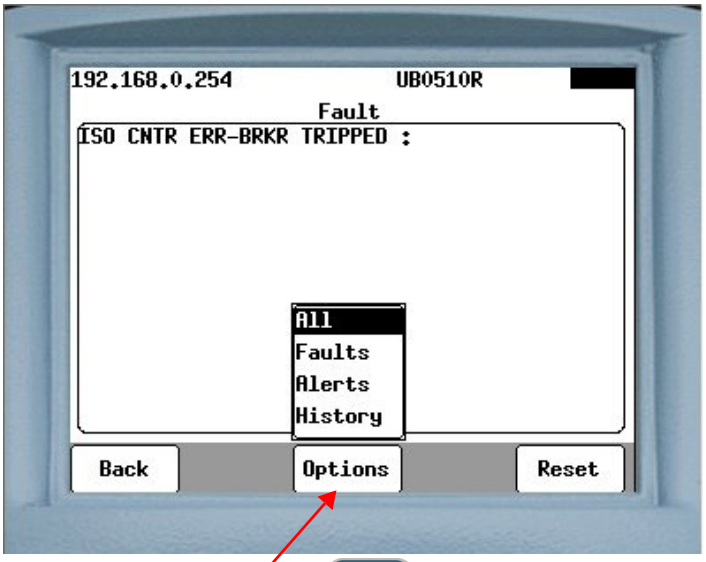
② Press Fault



③ Press Reset E F5



Press the Options to filter what is viewed on the Fault Status Menu.



C F3 ① Press Options

I ↑ S ↓ ② Press the arrow keys to move the cursor over the desired filter option

SPACE ENTER ③ Press Enter

PROGRAMMABLE FAULTS

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
WELD INITIATE NOT PRESENT	FAULT/ALERT	ALERT	Occurs when: 1. function #61 (ABORT IF NO INITIATE FOR nnnn CYCLES) is used in the weld schedule and the Weld Initiate bit goes LOW within the amount of time programmed in the function. 2. the Weld Initiate bit goes LOW before function #63 (TURN ON WELD COMPLETE) is executed in the weld schedule.	1. This is a pre-weld check. Ensure the master controller (i.e. robot, PLC, etc.) is maintaining the Weld Initiate bit HIGH during the time function #61 is monitoring the bit. 2. Ensure the master controller (i.e. robot, PLC, etc.) is maintaining the Weld Initiate bit HIGH until function #63 is executed in the weld schedule.
STEPPER APPROACHING MAX	FAULT/ ALERT	ALERT	Occurs at: 1 the 1st weld of step 2 in the stepper program, if the tip dress feature is enabled, and the Remaining Tip Dresses Count has decremented to 0. 2 the 1st weld of step 5 in the stepper program, if the Remaining Tip Dresses Count is > 0. Occurs at the 1st weld of step 5 in the stepper program, if the tip dress function is disabled in the Setup Parameters.	Indicates the final step in the stepper program has begun and End of Stepper is approaching. Perform a tip dress or tip change.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
END OF STEPPER	FAULT/ALERT	FAULT	Occurs at: 1 the 1st weld of step 3 in the stepper program, if the tip dress feature is enabled and the remaining Tip Dresses Count has decremented to 0. ***NOTE: The first 40 welds will be an ALERT. If the stepper program is not reset by the 41st weld, it will change to a FAULT.*** 2 the last weld of step 5 in the stepper program, if the Remaining Tip Dresses Count is > 0. 3 Occurs at the last weld of step 5 in the stepper program, if the tip dress function is disabled in the Setup Parameters.	Reset the stepper (using either the external reset input or the stepper display mode). You should also dress or replace the electrode caps.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
EXTENDED WELD	FAULT/ALERT	FAULT	Occurs when: 1. either function #94 (EXTEND WELD IF LOW CURRENT LIMIT FAULT) or #95 (EXTEND WELD IF CURRENT LESS THAN nnnn0) is used in the weld schedule and the condition is true. This typically occurs when the required current cannot be achieved. 2. if the extend weld (re-weld) is successful, an EXTENDED WELD (ALERT) will occur and the Weld Complete bit will go HIGH. If the extend weld (re-weld) is unsuccessful, both an EXTENDED WELD ALERT and a LOW CURRENT LIMIT FAULT will occur and the Weld Complete bit will stay LOW. 3. the Excessive Extend Weld Limit is reached in the Setup Parameters. ***NOTE: This fault must be set to (ALERT) for the Weld Complete bit to go HIGH after a successful extend weld (re-weld). Otherwise, if set to (FAULT), the Weld Complete bit will stay LOW.***	1. If using function #94, see corrective action for LOW CURRENT LIMIT FAULT. 2. If using function #95 ensure the programmed current value is correct for the welding application. 3. Ensure the value programmed into the Excessive Extend Weld Limit in the Setup Parameters is correct for the welding application. 4. Look for possible part fit-up and tooling wear issues. 5. Ensure proper air pressure is being supplied to the weld gun.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
HIGH C-FACTOR LIMIT	FAULT/ALERT	ALERT	Occurs when function #92 (C-FACTOR LIMIT: HI =nnnn LO =nnnn) is used in the weld schedule and the C-Factor value calculated by the weld processor exceeds the high limit value programmed in the function.	1. Ensure the "HI" value programmed into function #92 is correct for the welding application. 2. High C-Factor Limit usually indicates current shunting is occurring in the secondary circuit. Typically this is caused by a build-up of expulsion slag across the gun pinch-point, the part shorting to the electrode arms or shorting caused by broken leaf shunts. See Ch. 9: Advanced Topics for more information.
LOW C-FACTOR LIMIT	FAULT/ALERT	ALERT	Occurs when function #92 (C-FACTOR LIMIT: HI =nnnn LO =nnnn) is used in the weld schedule and the C-Factor value calculated by the weld processor exceeds the low limit value programmed in the function.	1. Ensure the "LO" value programmed into function #92 is correct for the welding application. 2. Low C-Factor Limit usually indicates an increase in the resistance of the secondary circuit. This can be caused by frayed or open welding cables. If water-cooled cables are used (braided copper inside rubber jacket), the frayed or open cable may not be externally visible and the cable resistance will need to be checked with a Micro Ohm Meter. See Ch. 9: Advanced Topics for more information

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
WELD PROCEED	FAULT/ALERT	FAULT	Occurs when: 1 function #70 [WAIT FOR WELD PROCEED] is used in the weld schedule and the Weld Initiate input bit goes LOW before the specified input bit goes either OFF or ON. 2 function #67 [WAIT FOR INPUT #n TO BE n (0 = OFF 1 = ON)] is used in the weld schedule and the Weld Initiate input bit goes LOW before the specified input bit goes either OFF or ON. 3 Occurs when function #66 [WAIT nnn CY INP #n TO BE n (0 = OFF 1 = ON)] is used in the weld schedule and the specified input bit does not go either OFF or ON within the number of cycles specified. ***NOTE: Allows welding current if set as an ALERT and inhibits welding current if set at a FAULT.***	WAIT FOR WELD PROCEED bit to go HIGH

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
PRESSURE SWITCH	FAULT/ALERT	ALERT	Occurs when: 1 function #69 (WAIT FOR PRESSURE SWITCH INPUT) is used in the weld schedule and the Weld Initiate bit goes LOW before the Pressure Switch bit goes HIGH. 2 function #68 (WAIT nnnn CY FOR PRESSURE SWITCH INPUT) is used in the weld schedule and the Pressure Switch bit does not go HIGH within the amount of time programmed in the function. ***NOTE: Allows welding current if set as an ALERT and inhibits welding current if set at a FAULT.***	1 Check analog feedback circuit for problems. 2 Check for mechanical problems with the weld gun related to air pressure, e.g. water in air lines, pressure regulator set too low, etc. 3 Check sequence initiated. If the pressure select input is not required, remove the function checking the input. 4 If the function is required, check the switch, contact or device providing the input. 5 If the error was caused by the initiates being removed while waiting for the input, check the initiates.
PRESSURE NOT ACHIEVED	FAULT/ALERT	ALERT	Occurs when function #74 (WAIT nnn MS FOR PRESSURE ACHIEVED) is used in the weld schedule and the programmed pressure is not achieved within the amount of time programmed in the function.	1. Check analog feedback circuit for problems. 2. Check for mechanical problems with the weld gun related to air pressure, e.g. water in air lines, pressure regulator set too low, etc. 3. Increase the time programmed in the function if incorrect to allow for pressure to achieve the set limit.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
CONTROL IN NO WELD	FAULT/ALERT	ALERT	Occurs when a weld schedule is initiated while the weld processor is in No Weld Mode (i.e. the Weld / No Weld bit is LOW).	1. Ensure jumper wire is securely connected to J5, Pins 3 and 4, on the CIOM module. This is the Weld / No Weld hard-wired input. If the hard-wired input is not used, the jumper must be installed. 2. Investigate why the master DeviceNet or Ether-Net IP controller (i.e. robot, PLC, etc.) held the Weld / No Weld input bit LOW when the weld sequence initiated. 3. Ensure the weld processor was not manually put into No Weld Mode through the DEP 300s (if used).
RETRACT PILOT	FAULT/ALERT	FAULT	Occurs during the welding sequence when: 1 function #86 (VERIFY CYLINDER #n IS OUT OF RETRACT) is inserted in the weld schedule, and the weld gun moved out of the weld position (Close Retract output bit HIGH) to the retract position (Close Retract output bit LOW) when checked by the weld processor. 2 when the weld gun is in the retract position (full open) and the weld sequence for that gun is initiated (Schedule Pilot input bit is HIGH). ***NOTE: Allows welding current if set as an ALERT and inhibits welding current if set at a FAULT.***	1 Troubleshoot why the retract cylinder is moving to the retract position (full open) during the welding sequence. 2 Press the retract button on the weld gun and verify the gun is out of retract (in the weld position) before initiating the weld sequence.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
WELD INTERRUPTION	FAULT/ ALERT	ALERT	Occurs when: 1. the Weld / No Weld bit goes LOW while the weld control is passing current during the execution of a weld schedule. 2. the circuit breaker on the weld cabinet is switched OFF while the weld control is passing current during the execution of a weld schedule. The fault will appear after the circuit breaker is switched back ON and the weld processor re-initializes. 3. the weld current is interrupted during the weld time.	Ensure weld gun is not opening early. Check for intermittent open connection in the weld tooling (primary or secondary).
LOW LINE VOLTAGE	FAULT/ALERT	FAULT	Occurs when the AC line voltage drops below a point where the DC power supply on the CIOM-TB module can no longer regulate the +24VDC it supplies to the devices downstream. This fault is monitored continuously.	Inspect plant power and correct what is causing the AC line voltage to drop.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
SOFT OVERCURRENT	FAULT/ALERT NONE	ALERT	Occurs when: 1. the impedance of the secondary circuit creates a current draw that causes the inverter to reach or exceed its maximum output current rating. 2. when the target secondary current programmed into the weld schedule causes the inverter to reach its maximum output current rating. *To determine the maximum target secondary current, multiply the inverter maximum output current rating by the transformer turns ratio. For example, 400A inverter x 50:1 turns ratio = 20,000A max target secondary current. Thus, programming more than 20,000A into the weld schedule may cause a SOFT OVERCURRENT FAULT.* 3. the inverter reaches its maximum IGBT on-time rating before the target secondary current is achieved. Thus, whatever current level is achieved at max IGBT on-time, is what will be delivered to the welding transformer. 4. the weld processor detects the MFDC inverter is passing weld current at a duty cycle that exceeds the duty cycle rating of the IGBT devices.	1. Check to make sure that the current is not exceeding the limits specified in the Setup Parameters. 2. Review the weld requirements and verify the turns ratio is specified correctly in the primary mode. ***NOTE: When this fault occurs, go to the Hardware Status screen in the DEP-300s by pressing the Display Mode (F4) key. The Hardware Status screen will provide more specific information regarding the nature of the fault.***

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
CURRENT REGULATION	FAULT/ALERT/ NONE	ALERT	This fault is generated when the inverter reaches its maximum IGBT on-time rating before the target secondary current is achieved. Thus, whatever current level is achieved at max IGBT on-time, is what will be delivered to the welding transformer. This results in: 1. Insufficient current 2. Missing weld on the part 3. Open circuit of the welding transformer primary or secondary	1. Verify the primary and secondary cables, isolation contactor and weld transformer for any damage. 2. Ensure that the electrodes and are making contact with pressure and NO insulation material is present on the part between the electrodes. 3. Using a weld meter determine if the secondary current matches the weld control's current reading. • If the secondary resistance is too high reduce the length of the secondary cable and install a cable with a larger diameter. • If the requested current reading is higher than the possible limit of the welding transformer and secondary resistance, correct the discrepancy in the weld schedule or stepper program. Tune the weld transformer tap to a higher ratio. • If the weld control and weld checker readings MATCH and the control continues to show insufficient current and weld expulsion occurs, the inverter current reading is defective. In this situation replace the inverter and weld processor.

FAULT	USER DEFINED PROGRAMMABLE OPTIONS	DEFAULT VALUE	POSSIBLE CAUSES	SOLUTIONS
HIGH / NO MOTOR CURRENT	FAULT/ALERT/ NONE	FAULT	1. Occurs when function #16 (MOTOR CURR LIMITS HI =nnnn ma LO =nnnn ma) is used in the weld schedule and the measured tip dress motor current is above the HIGH limit any time during the 8 ms checking period. When this fault occurs, the motor is immediately turned off. 2. Occurs when the measured tip dress motor current is <= 20 ma any time during the 8ms checking period. When this fault occurs, the motor is immediately turned off. ***NOTE: This parameter is used with weld controls built with the tip dress motor control option.***	1. When No Motor Current is detected check the wiring to confirm that the motor is properly connected. 2. In case of High Current check the following: • Shorted cables • Jammed Motor • Motor currents set improperly.
TIP DRESS	FAULT/ALERT/ NONE	FAULT	Occurs when function #16 (MOTOR CURR LIMITS HI =nnnn ma LO =nnnn ma) is used in the weld schedule and the measured tip dress motor current is above the value programmed into the LOW limit for less than (1) second of accumulated time. Conversely, this fault will not occur if the measured current remains above the LOW limit for (1) or more seconds of accumulated time.	1. Ensure the High and Low limit thresholds (MOTOR CURR LIMITS HI =nnnn ma LO =nnnn ma) are set correctly. 2. Verify the accumulated time limit is set to 1 sec. minimum since any time less than that will cause the fault to be annunciated. 3. Check the gun to see if it is closing on the cutter.
DUTY CYCLE	FAULT/ ALERT/ OFF	FAULT	Occurs when the weld processor detects the MFDC inverter is passing weld current at a duty cycle that exceeds the duty cycle rating of the IGBT devices.	1 Decrease the welding current or increase the time between welds. 2 Use an MFDC inverter with a higher current rating at 10% duty cycle.

NON-PROGRAMMABLE (HIDDEN) FAULTS

The following is a list of standard non-programmable faults in the WT6000. Their default values are fixed and cannot be changed. Since these faults are non-programmable, they are hidden from view in the DEP-300s View Setups Menu.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
INVALID SEQUENCE SELECTED	FAULT	Occurs when the Weld Initiate bit goes HIGH and a schedule (sequence) number is selected via the Binary Select bits, which is beyond the range of available schedules. ***NOTE: This fault will only occur when the Retract Pilot input bit is mapped in the I/O.***	Ensure the schedule (sequence) number selected via the Binary Select bits is not beyond the range of available schedules. For example, if there are 99 schedules available, selecting schedule 100 or higher via the Binary Select bits will generate an INVALID SEQUENCE SELECTED FAULT, when the Weld Initiate bit goes HIGH.
CONTROL STOP	FAULT	Occurs when: 1 the Control Stop input bit goes LOW anytime during the initiation of the weld sequence. This bit is normally maintained HIGH. 2 in a single gun welding application when the weld sequence is initiated without the jumper plug inserted into the weld gun 2 connector (2PL).	1 Ensure the red Control Stop push button on the 0perators Panel is pulled out. The Control Stop input bit should never go LOW unless a legitimate Control Stop event has occurred. 2 Ensure jumper wire is securely connected to J5, Pins 7 and 8, on the CIOM module. This is the Control Stop hard-wired input. If the hard-wired input is not used, the jumper must be installed. 3 Investigate why the master DeviceNet or EtherNet IP controller (i.e. robot, PLC, etc.) turned the Control Stop input bit LOW during the weld sequence (e.g. safety gates, light screens, robot E-Stop, master E-stop, etc).

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
HIGH CURRENT LIMIT FAULT	FAULT	Occurs when: 1 the weld processor detects that the current passed during the weld schedule exceeded the value programmed into the HIGH CURRENT LIMIT WINDOW% in the Setup Parameters. 2 the weld processor detects that the current passed during the weld schedule exceeded the HI value programmed into function #76 (SEC. CURR LIMITS: HI = nnnn0 LOW = nnnn0) in the weld schedule.	1 Ensure the percentage value programmed into HIGH CURRENT LIMIT WINDOW% in the Setup Parameters is correct for the welding application. 2 Ensure the HI value programmed into function #76 (SEC. CURR LIMITS: HI = nnnn0 LOW = nnnn0) in the weld schedule is correct for the welding application. 3 Ensure the value programmed into TRANSFORMER TURNS RATIO in the Setup Parameters is correct for the welding application.
LOW CURRENT LIMIT FAULT	FAULT	Occurs when: 1 the weld processor detects that the current passed during the weld schedule was less than the value programmed into the LOW CURRENT LIMIT WINDOW% in the Setup Parameters. 2 the weld processor detects that the current passed during the weld schedule was less than the LOW value programmed into either function #76 (SEC. CURR LIMITS: HI = nnnn0 LOW = nnnn0) in the weld schedule. 3 when mechanical issues exist in the weld transformer secondary circuit (weld tooling). <u>Typical issues include:</u> • Bad jumper cables or leaf shunts • Bad part fit-up • Contaminated weld caps • Insulation from sealer, tape or labels on part • Gun sticking or not closing properly • Loose or open secondary diodes in the welding transformer • Loose or bad primary cables. Inspect and correct as necessary.	1 Ensure the percentage value programmed into LOW CURRENT LIMIT WINDOW% in the Setup Parameters is correct for the welding application. 2 Ensure the LOW value programmed into function #76 (SEC. CURR LIMITS: HI = nnnn0 LOW = nnnn0) in the weld schedule is correct for the welding application (if used). 3 Ensure the value programmed into TRANSFORMER TURNS RATIO in the Setup Parameters is correct for the welding application. 4 Look for possible part fit-up and tooling wear issues. 5 Ensure proper air pressure is being supplied to the weld gun.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
ISO CNTR OFF WHEN NEEDED	FAULT	Occurs when the isolation contactor is not energized (closed) when required by the weld schedule. This is monitored by the state of the isolation contactor aux contact.	1. Ensure function #88 (TURN ON ISOLATION CONTACTOR) is in the weld schedule and inserted before the squeeze function. 2. Check for defective isolation contactor aux contact module (contacts possible stuck closed). Check for loose or open wire connections between the isolation contactor coil and the CIOM module. 3. If the isolation contactor is not defective, the solid state relay on the CIOM module, which drives the isolation contactor coil, may be open. Replace CIOM module. 4. The weld processor will not energize the isolation contactor if either the Control Stop bit or the Weld / No Weld bit are LOW. Ensure both bits are HIGH during the execution of the weld schedule.
ISO CNTR ERR-BRKR TRIPPED	FAULT	Occurs when the weld processor detects the isolation contactor is energized (closed) when it should be de-energized (open). When this fault occurs, the weld processor activates the shunt-trip mechanism on the circuit breaker. This is monitored by the state of the isolation contactor aux contact.	1 Typically, this fault is caused by a defective auxiliary contact block on the isolation contactor. The contacts can be cleaned by removing the auxiliary block, manually moving the aux contact up and down a few times and then reseting. If this does not resolve the problem, replace the auxiliary contact block. 2 Inspect the isolation contactor for damage. The high current contacts may be frozen shut. If so, replace isolation contactor. 3 Check for defective isolation contactor aux contact module (contacts possible stuck open). Check for loose or open wire connections between the aux contact module and the CIOM module. 4 If the isolation contactor is not defective, the solid state relay on the CIOM module, which drives the isolation contactor coil, may be shorted. Replace CIOM module.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
SYSTEM COOLING	FAULT	Occurs when the System Cooling bit goes LOW prior to and during the execution of the weld schedule. This bit is normally maintained HIGH. This bit can be used to set a weld processor fault when a system cooling problem exists somewhere in the welding process. For example, it could be used to indicate a transformer overtemp condition. ***NOTE: The inverter chill plate temperature can be viewed in the Display Mode screen of the DEP300s.***	1 Troubleshoot and find out why the system cooling input is going LOW. Could be a robot / PLC issue logic issue or a legitimate system cooling problem. 2 Identify and correct any water flow issues.
IO	FAULT	Occurs when: 1. an EtherNet/IP network communication timeout occurs. Once EtherNet/IP communication is re-established, the fault will automatically reset. 2. the weld processor looses communication with any device connected on the SSPI communication link: • CIOM (Contactor I/O Module) • AIOM (Analog I/O Module) • DIOM (Discrete I/O Module) • GFM (Ground Fault Module) • MCCM (Multi-Contactor Control Module) ***NOTE: Prior to resetting this fault, go to the Hardware Status screen in the DEP-300s by pressing the Display Mode (F4) key. The Hardware Status screen will provide more specific information regarding the nature of the fault.***	1. Determine why EtherNet communications with the weld processor have been lost. Inspect for loose EtherNet cable connections or defective cable. 2. Remove function #56 from the weld schedule. 3. Ensure all the 15-pin D-sub cables on the SSPI communication link are connected properly and not defective. This link starts at the SSPI port on the weld processor (1CPU) then goes to the - ▶ CIOM Module (1CIOM) ▶ The 1st ground fault module (1GFM) ▶ The 2nd ground fault module (2GFM) ▶ The discrete I/O module (1IO) and ▶ Finally to the analog I/O module (1AIOM). 4. Also verify the modules in the communication link are not defective. 5 Check to make sure that the screws attaching the 5-pin Phoenix connector are tight.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
INITIATION ON POWERUP	FAULT	Occurs when the weld cabinet is powered-up (i.e. circuit breaker is switched ON) and the weld processor detects that both the Weld Initiate bit is HIGH and one or more Binary Select bit is HIGH. In this condition, a weld schedule WILL NOT initiate.	Ensure the Weld Initiate and the Binary Select input bits are set low by the Robot / PLC logic at time of power-up of the weld control cabinet, clear faults and re-initiate weld schedule.
CONTROL TRANSFORMER VOLTAGE	FAULT	Occurs at power-up only, when an under or over voltage condition exists on the 24VAC secondary tap of the control transformer. The CIOM-TB module monitors the 24VAC secondary tap of the control transformer for either an under or over voltage condition. This ensures the primary of the control transformer is tapped properly for the incoming line voltage. ***NOTE: When an over voltage is detected at power-up, the CIOM shuts down the 24VDC to all downstream devices in the SSPI link to prevent damage. The over voltage condition must be corrected and the CIOM must be re-started to clear this condition and restore 24VDC power to the devices in the SSPI link.***	Inspect control transformer and ensure the primary is properly tapped for the incoming line voltage.
IGBT SATURATION	FAULT	Occurs when the weld processor detects an instantaneous over-current event, which exceeds the design rating of the IGBT modules within the inverter assembly. This can be caused by either a short across the welding transformer primary cables or a defective inverter assembly.	Replace shorted primary cables or replace inverter assembly.
IGBT POWER SUPPLY	FAULT	Occurs when: 1 There is a loss of power to the IGBT supply board within the inverter assembly. 2 Failed control transformer fuse caused by the Isolation Contactor mechanically hanging-up in the open state. 3 Loose cable connections at: • CNIG 3/4 @ 1 INV • J2/J3 @ 1 CIOM	1 Check to see if the 1FU and 2FU fuses have blown on the control transformer. If the fuses are blown, using a screwdriver, manually push the isolation contactor in and out a few times and make sure it is not stuck or frozen in the open position. 2 Replace the isolation contactor if suspected bad. If the isolation contactor is working, then- 3 Replace the CIOM module. 4 If the CIOM Module is working then - Replace the inverter assembly.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
AC LINE PHASE	FAULT	Occurs when the weld processor detects a line phase is either incorrect or missing. This fault is monitored continuously. This fault may also be accompanied by a Low Line Voltage Fault and/or Bus Voltage Fault.	Correct power problem or replace / install missing phase.
BUS VOLTAGE	FAULT	Occurs when: 1 The weld processor has detected the DC bus within the inverter assembly did not charge to the correct level. 2 The bus voltage drops below 300V (or 42% of the set-up parameter - transformer voltage) while the DC bus is charged or during welding. Should this occur during welding the weld time is truncated and the fault output is energized. This particular weld spot should be marked as suspect or should be re-welded.	1 Check to make sure that the Transformer Voltage Setup Parameters have been entered correctly. 2 Check for loose primary connections at the top or bottom of the circuit breaker or upper level bus fusing connections. **Danger!** **CAUTION:** Use proper safety lock-out procedures. 3 Improve the current carrying capacity of the welding bus. 4 Change the sequence of welding to reduce the voltage drops. 5 Verify incoming line power is balanced phase to phase (L1-L2, L2-L3, L3-L1). On a 480VAC line, the DC Bus voltage is approximately 700V (incoming power x 1.414) and can be measured at CNIG3. Prior to measuring the DC Bus voltage, verify the multimeter and test leads are rated for high voltage measurement. 6 If the AC line voltage is properly balanced, try resetting the circuit breaker on weld control cabinet. If problem persists, replace defective inverter assembly.
BUS CHARGING	FAULT	Occurs when the weld processor has detected the DC bus within the inverter assembly did not charge correctly (either too slow or too quickly). This fault is monitored continuously.	Reset circuit breaker on weld control cabinet. Replace inverter assembly if continually re-occurs.

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
SECONDARY DIODE	FAULT	Occurs when: 1 The weld processor has detected a shorted secondary diode within the welding transformer. 2 Missing gate signals from the weld processor	1. Verify the welding transformer diodes are not shorted. If it has been verified the welding transformer secondary diodes are not shorted, then - 2. Replace the weld processor. If replacing the weld processor does not correct the problem, then - 3. Replace the inverter assembly.
SECONDARY CURRENT SENSOR	FAULT	Occurs at the initiation of a weld sequence, when the weld processor does not detect a proper connection to the secondary current monitoring coil when it should. This fault will only occur when the weld processor is configured to either the (PRI/SEC) or (SEC/SEC) Firing Monitoring Mode in the Setup Parameters.	The secondary current coil is either improperly connected to the weld processor or it is bad. If proper connection has been verified and the fault still persists, replace the coil with a known good one.
OUTPUT GROUND	FAULT	Occurs when a current imbalance exists between the two output terminals of the inverter assembly.	Identify and correct unidirectional current path to ground between the output of the inverter assembly and the primary of the welding transformer.
TEMPERATURE	FAULT	This fault occurs when the timer senses a chill plate temperature of more than 60° C for an Air Cooled inverter or 70° deg C for a Water cooled inverter. To verify the real time temperature use the “Hardware Status Screen” of the timer and look for “CHILL PLATE TEMPERATURE”. If the fault is displayed during normal operation, the cooling system is unable to remove heat fast enough to protect the SCR/Diodes and IGBTs. Often this is because the inverter is passing too much current in a short amount of time or the cooling system is not functioning properly.	1 **WATER COOLED INVERTER:** Verify proper cooling water temperature and flow. 2 **AIR COOLED INVERTER:** Verify proper fan operation and cleanliness of the air fins. 3. Slow down the speed of welding (number of welds per minute) 4. Reduce welding current 5. Reduce welding time (and/or fewer weld pulses) 6. Reduce the ambient temperature around the inverter or supply cooler water temperature. 7. Select a higher tap setting (turns ratio) for the welding transformer (i.e. reduces the primary current for the same secondary current)

FAULT NAME	DEFAULT VALUE	POSSIBLE CAUSE	SOLUTION
INVERTER SYSTEM FAILURE	FAULT	Occurs when: 1 a hardware failure is detected within the inverter assembly or weld processor module. 2 the weld processor is unable to read the resistor that tell it what size inverter it is connected to. The resistor is located within the inverter assembly and is either open, missing or an unrecognizable value.	Replace inverter assembly and weld processor module.
POWER FAILURE	FAULT	Occurs when there is a detection of a bad circuit and 24V power source is being supplied power below 18V.	Verify the cause of power failure external to in WCU.

PROGRAMMABLE SETUP PARAMETERS

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
RETRACT MODE	The Retract Mode setup parameter determines how the mapped Retract Valve output bit will react when the control receives the mapped Retract Pilot input bit:	**LATCHED:** In Latched mode, a LOW to HIGH transition on the Retract Pilot input bit causes the state of the Retract Valve output bit to latch ON or OFF. **UNLATCHED:** In Unlatched mode, the Retract Valve output bit follows the state of the Retract Pilot input bit.	LATCHED

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
CYL	The Cylinder setup parameter defines the type of weld gun air cylinder being used:	**AIR-NORMAL:** In Air-Normal mode, the weld tooling uses an air-only cylinder that requires a HIGH Retract Valve output bit to close the gun to the retracted position. **AIR-INVERTED:** In Air-Inverted mode, the weld tooling uses an air-only cylinder that requires a LOW Retract Valve output bit to close the gun to the retracted position.	AIR-NORMAL
ISOLATION CONTACTOR DELAY (SEC)	When function #89 (TURN OFF ISOLATION CONTACTOR) is used in the weld schedule, this parameter delays the opening of the isolation contactor for the number of seconds programmed. Typically used in robot applications, this parameter reduces wear on the isolation contactor by preventing it from unnecessarily opening and closing during runs of multiple welds. **NOTE:** Function #65 (ISOLATION CONTACTOR DELAY = nnnn SEC.) overrides this global setup parameter, when used locally in a weld schedule. **NOTE:** This parameter and function #89 are both disabled when the Isolation Contactor Saver input bit is set LOW or not mapped.	0 to 99	10
HIGH CURRENT LIMIT WINDOW (%)	The High Current Limit Window is calculated as a percentage above the target secondary current (base current + stepper boost). This is a dynamic window, which contours with the linear current stepper program in use.	0% to 99%	20
LOW CURRENT LIMIT WINDOW (%)	The Low Current Limit Window is calculated as a percentage below the target secondary current (base current + stepper boost). This is a dynamic window, which contours with the linear current stepper program in use.	0% to 99%	20

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
DATA COLLECTION SAMPLE SIZE	This parameter sets a global command, which allows the weld processor (WCU) to sample data for analysis at controlled intervals. The sample size is the number of consecutive welds collected for analysis (per bin). For more information, see SPC Indexing Capabilities in Ch. 9: Advanced Topics.	0 to 99	5
DATA COLLECTION SAMPLE FREQUENCY	This parameter sets a global command, which allows the weld processor (WCU) to sample data for analysis at controlled intervals. The sample frequency is the total number of welds, from which the samples are taken from (per bin). For more information, see SPC Indexing Capabilities in Ch. 9: Advanced Topics.	1 to 9999	100
ANALOG INPUTS	This parameter tells the weld processor what type of analog signal will be sent to the Analog I/O Module (AIOM). Either a Voltage (0-10V) signal or a Current Loop (4-20ma) signal. ***NOTE: This parameter is used with weld controls built with an analog pressure control option.***	VOLTAGE / CURRENT LOOP	VOLTAGE
MAXIMUM ANALOG PRESSURE	This parameter sets the maximum pressure limit an analog device can achieve at full output (10V or 20mA). This value can represent any unit of measure (e.g. PSI, BAR, Mpa, etc.) ***NOTE: This parameter is used with weld controls built with an analog pressure control option.***	1 to 9999	100
VALVE 1 INITIAL PRESSURE	This parameter sets the initial pressure of the Valve 1 output bit. This value can represent any unit of measure (e.g. PSI, BAR, Mpa, etc.) ***NOTE: This parameter is used with weld controls built with an analog pressure control option.***	0 to 9999	5

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
VALVE 2 INITIAL PRESSURE	This parameter sets the initial pressure of the Valve 2 output bit. This value can represent any unit of measure (e.g. PSI, BAR, Mpa, etc.) ***NOTE: This parameter is used with weld controls built with an analog pressure control option.***	0 to 9999	5
TRANSFORMER TURNS RATIO	This parameter is the turns ratio for the welding transformer being used. The weld processor uses this value to calculate secondary current during a weld. (Secondary Current = Primary Current x Turns Ratio). ***NOTE: Function #81 (TRANSFORMER TURNS RATIO nnn:1) overrides this global setup parameter, when used locally in a weld schedule.***	1 to 256	73
TRANSFORMER RATED DC VOLTAGE	This parameter is the rated DC voltage of the welding transformer. This value can be found on the manufacturer's label affixed to the welding transformer. ***NOTE: If the manufacturer's label is either inaccessible or has been removed from the welding transformer, contact the manufacturer for assistance.***	300 to 900	678
TRANSFORMER RATED FREQUENCY	This parameter is the rated frequency of the welding transformer. This value can be found on the manufacturer's label affixed to the welding transformer. ***NOTE: It is critical the value programmed into this parameter is correct. An incorrect value could send the transformer into saturation, causing potential damage to the transformer. If the manufacturer's label is either inaccessible or has been removed, contact the manufacturer for assistance.***	400 to 2000	1000

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
FIRING / MONITOR MODE	The WT6000 inverter has three firing and monitoring modes. These modes are distinguished by 1. The method in which the current is regulated 2. The feedback monitoring method used to determine the proper output.	**PRI/PRI:** Primary Current Regulation / Primary Current Monitoring (Default Mode). **PRI/SEC:** Primary Current Regulation / Secondary Current Monitoring. ***NOTE: Requires additional hardware for secondary current feedback monitoring.*** **SEC/SEC:** Secondary Current Regulation / Secondary Current Monitoring. ***NOTE: Requires additional hardware for secondary current regulation and feedback monitoring.***	PRI/PRI
GROUND FAULT LIMIT (milliamps)	This parameter sets the maximum differential current between the two output terminals (H1 and H2) of the inverter assembly. This imbalance is caused by current leaking to ground on one of the legs. The weld processor monitors the current balance between the H1 and H2 terminals. If the differential current exceeds this parameter, a GROUND FAULT is generated.	0 to 9999	5000

SETUP	DESCRIPTION	PROGRAMMABLE OPTIONS	DEFAULT VALUE
SECONDARY COIL mV/Kamp	This parameter provides the weld control with information on the milli-Volts per 1000 AMPS that the Secondary Coil will output. The typical secondary coil outputs 150mV/KAmp. If this value is incorrect, the amount of secondary current displayed in the Weld Status screen on the DEP 300s will not match the actual current in the secondary. Changing this parameter will adjust the secondary current value read by the control. The output current value that is entered into the Secondary Coil setup parameter is specified by the secondary coil that is installed. An external weld checker can also be used to measure the secondary current. If the value read by the control does not match, this parameter can be adjusted. Caution must be used when using this method. The external weld checker should have it's blanking time set to 0 and longer weld times will produce better readings. **NOTE 1:** This setup is only used when the Firing/Monitoring Mode (See Setup Parameters Pg 124) is set to PRI/SEC or SEC/SEC. **NOTE 2:** Secondary current monitoring / control is supported in single-contactor controls only.	100 to 300	150

Chapter 8: LINEAR CURRENT STEPPERS

THE PURPOSE OF LINEAR CURRENT STEPPERS

During the welding process, the face of the welding cap gradually deforms or "mushrooms." As it does, the contact surface area with the work piece increases, which causes the current density at the weld interface to decrease. As a result, the weld nugget gradually becomes colder.

The purpose of a Linear Current Stepper is to gradually increase the welding current, in incremental steps, to compensate for the gradual decrease in current density at the weld interface, caused by the "mushrooming" of the welding caps. This gradual increase in welding current ensures the appropriate amount of heat is continuously present at the weld interface to continually make good weld nuggets.

HOW LINEAR CURRENT STEPPERS WORK

The WT6000 weld control with timer software G08300 has 10 available linear current stepper programs. Each stepper program has 5 programmable steps.

Within each of the 5 steps, the user can program the current boost (rise) over a number of welds (run). The current boost for each step can be expressed as either a percentage value or an absolute Amps value. The current boost (rise) is delivered in equal, incremental steps, over the total number of welds (run) in each step.

To use a linear current stepper, function #82 (LINEAR STEPPER #nn ASSIGNED) must be inserted before the main weld statement (Function #20 or #30) in the weld schedule.

Stepper programs are only active during the execution of a weld function and will increment when the following functions are used in the weld schedule:

FUNCTION #	PERCENTAGE OF AVAILABLE VOLT-SECONDS WELD FUNCTION
20	WELD nnnn <CY/IMP> nn %VS
21	TEMPER nnnn MS. nn %I
22	PREHEAT nnnn MS. nn %I
23	POSTHEAT nnnn MS. nn %I
24	PRE-WELD nnnn MS. nn %I
40	SLOPE nnnn MS. nn%I TO nn%I

FUNCTION #	CONSTANT CURRENT WELD FUNCTION
30	WELD nnnn <CY/IMP> nnnn0 AMPS
31	TEMPER nnnn MS. nnnn0 AMPS
32	PREHEAT nnnn MS. nnnn0 AMPS
33	POSTHEAT nnnn MS. nnnn0 AMPS
34	PRE-WELD nnnn MS. nnnn0 AMPS
45	SLOPE nnnn MS. nnnn0 A TO nnnn0 A

STEPPER PROFILES

Each stepper program has a stepper profile. In the example below, each step has two current values. The first value **(blue)** is a percentage value and the second value **(red)** is an absolute Amps value. If a Percentage of available Volt-Seconds weld function is used, the current boost (rise) must be expressed in a percentage value. If a Constant Current weld function is used, the current boost (rise) must be expressed in absolute Amps.

NOTE: *If a Percentage of Available Volt-Second weld function is used in the weld schedule and both a percentage and absolute amps value is entered in the step, the absolute amps value is ignored by the weld processor. Conversely, if a Constant Current weld function is used, the percentage value is ignored.*

EXAMPLE OF A STEPPER PROFILE

STEP	% VALUE	AMPS. VALUE	WELD FUNCTION
①	00%	1000 AMPS	100 WELDS
②	00%	500 AMPS	100 WELDS
③	00%	200 AMPS	100 WELDS
④	00%	100 AMPS	100 WELDS
⑤	00%	050 AMPS	100 WELDS

Stepper Group 1

Aux. Counter Max. Counts = 0

STEPPER GROUPS

In a typical welding application, multiple weld schedules can be assigned to a single stepper program. Also, if desired, the user may assign a single weld schedule to an individual stepper program.

In the case of a specific weld gun, it is advantageous that all the stepper programs used on that gun increment their weld counters, each time the gun makes a weld. Assigning these stepper programs to a common “Group” causes all the stepper programs within that group to increment together each time a weld is made by that gun, regardless of the weld schedule the stepper combination was initiated with. In addition, stepper grouping allows the user to advance or reset several stepper programs at one time. The stepper group range is 0-99.

EXAMPLE STEPPER PROGRAM #1 (NO TIP DRESS)

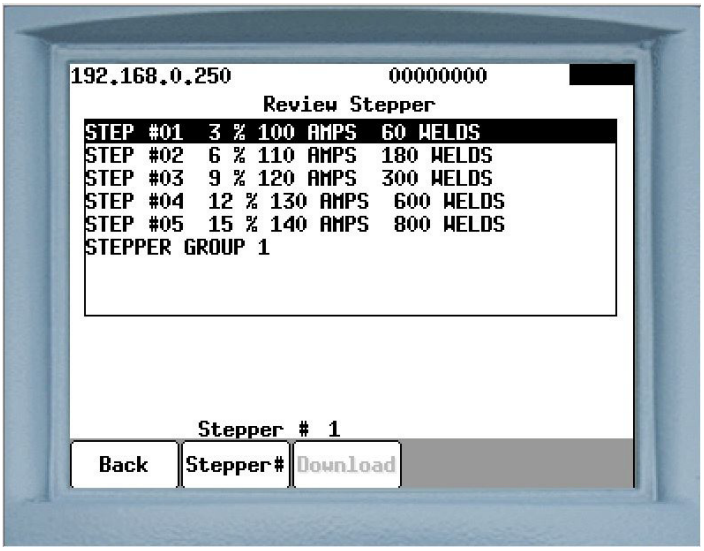
The following is an example of a linear stepper program without tip dressing. This example would typically be used in either a hard-tool welding application or any other application where dressing of the weld caps is not required.

1. Function #82 (LINEAR STEPPER #nn ASSIGNED) is inserted into the first line of Weld Schedule #1 and is assigned to Linear Stepper Program #1.

2. Current weld function #30 (WELD nnnn MS. nnnn0 AMPS) is used and is programmed to deliver 10000A of base current for 160 milliseconds.

EXAMPLE SCHEDULE #1	
00	START OF SCHEDULE # 1
82	LINEAR STEPPER # 1 ASSIGNED (0=OFF)
76	SEC. CURR LIMITS: HI=00 LOW=99990
81	TRANSFORMER TURNS RATIO 73:1
88	TURN ON ISOLATION CONTACTOR
58	TURN ON WELD IN PROGRESS
01	SQUEEZE 250 MSEC
30	WELD 160 MS 10000 AMPS
03	HOLD 80 MSEC
63	TURN ON WELD COMPLETE
59	TURN OFF WELD IN PROGRESS
75	EXTEND UNTIL NO INITIATE
64	TURN OFF WELD COMPLETE
89	TURN OFF ISOLATION CONTACTOR
100	END OF SCHEDULE # 1

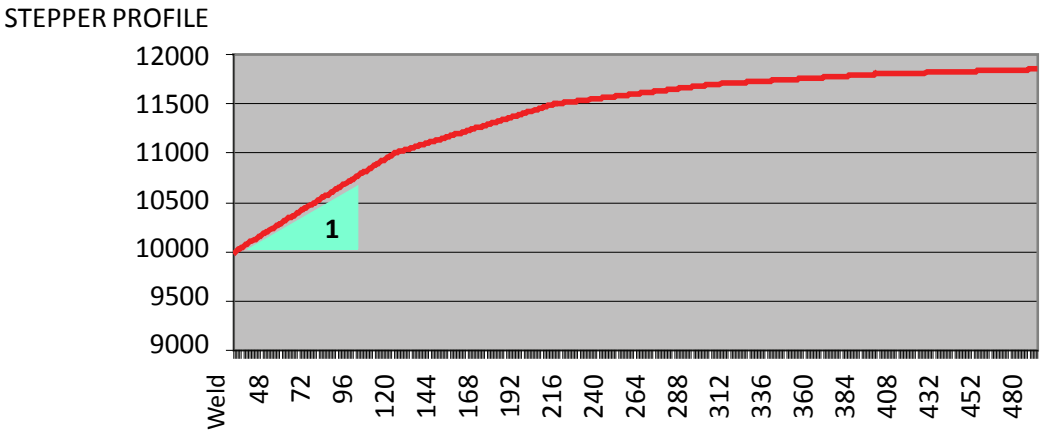
Below is the stepper profile as viewed from the DEP-300s Data Entry Panel.



THE FOLLOWING EXPLAINS EACH PARAMETER WITHIN THE PROFILE:

- **STEP #01 = +00% + 1000 A AFTER 0100 WELDS**

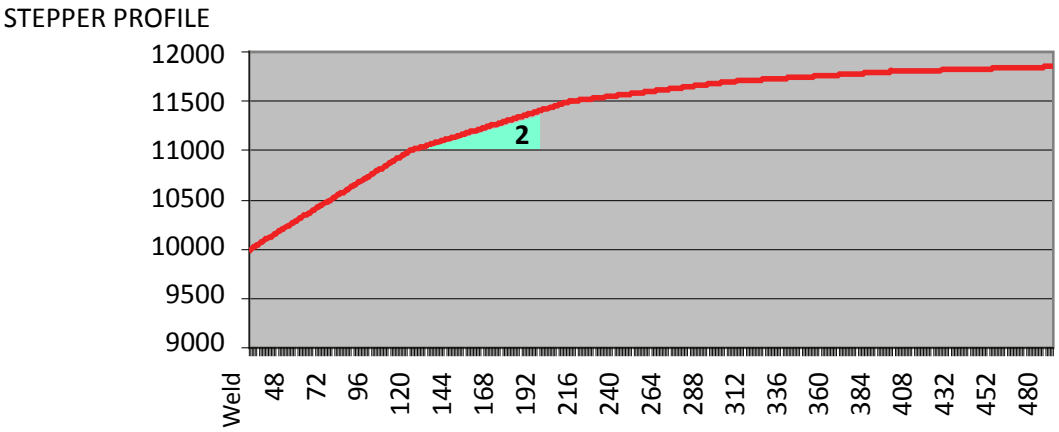
  Step 1 is programmed to deliver a 1000A boost over 100 welds. If the base current is 10000 Amps, the boost current will increment by 10A after each weld, thus by the 100th weld, the target current will be at 11000A.



F 30: Weld 160 Ms 1000 Amps - *Base Weld Current*

- **STEP # 02 = + 00% + 0500 A AFTER 0100 WELDS**

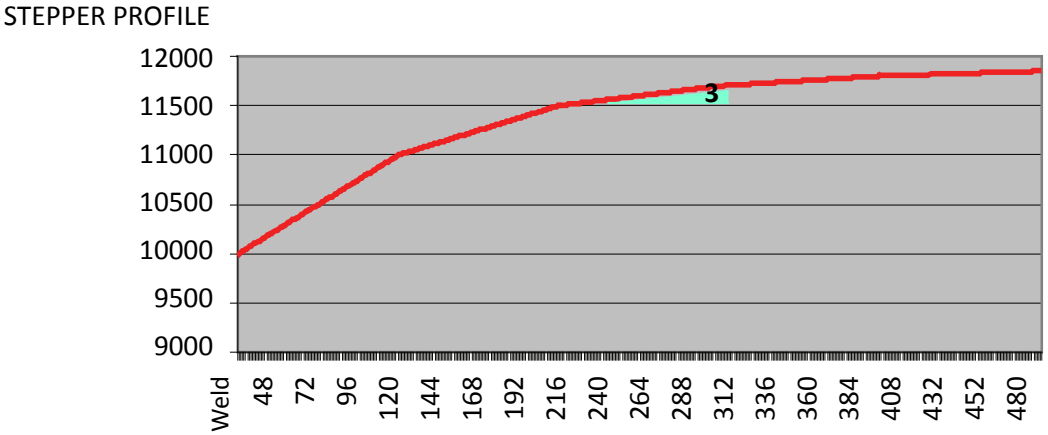
  Step # 02 is programmed to deliver a 500A boost over 100 welds. If the base current is 11000 Amps, the boost current will increment by 5A after each weld, thus by the 100th weld, the target current will be 11500A.



F 30: Weld 160 Ms 1000 Amps - *Base Weld Current*

- **STEP # 03 = + 00% + 0200 A AFTER 0100 WELDS**

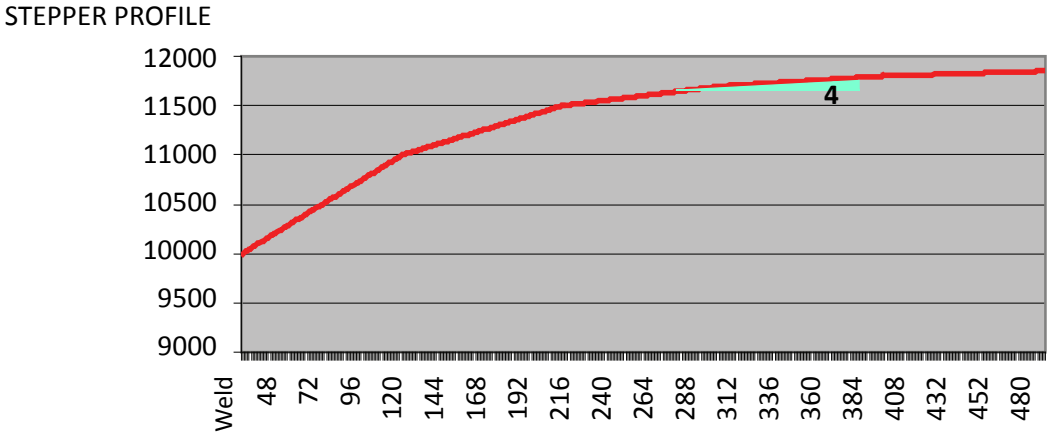
  Step 3 is programmed to deliver a 200A boost over 100 welds. If the base current is 11500 Amps, the boost current will increment by 2A after each weld, thus by the 100th weld, the target current will be 11700A.



F 30: Weld 160 Ms 1000 Amps - *Base Weld Current*

► **STEP # 04 = + 00% + 0100 A AFTER 0100 WELDS**

Step 4 is programmed to deliver a 100A boost over 100 welds. If the base current is 11700 Amps, the boost current will increment by 1A after each weld, thus by the 100th weld, the target current will be 11800A.



F 30: Weld 160 Ms 1000 Amps - *Base Weld Current*

► **STEP # 05 = + 00% + 0500 A AFTER 0100 WELDS**

Step 5 is programmed to deliver a 50A boost over 100 welds. If the base current is 11800 Amps, the boost current will increment by 0.5A after each weld, thus by the 100th weld, the target current will be 11850A.

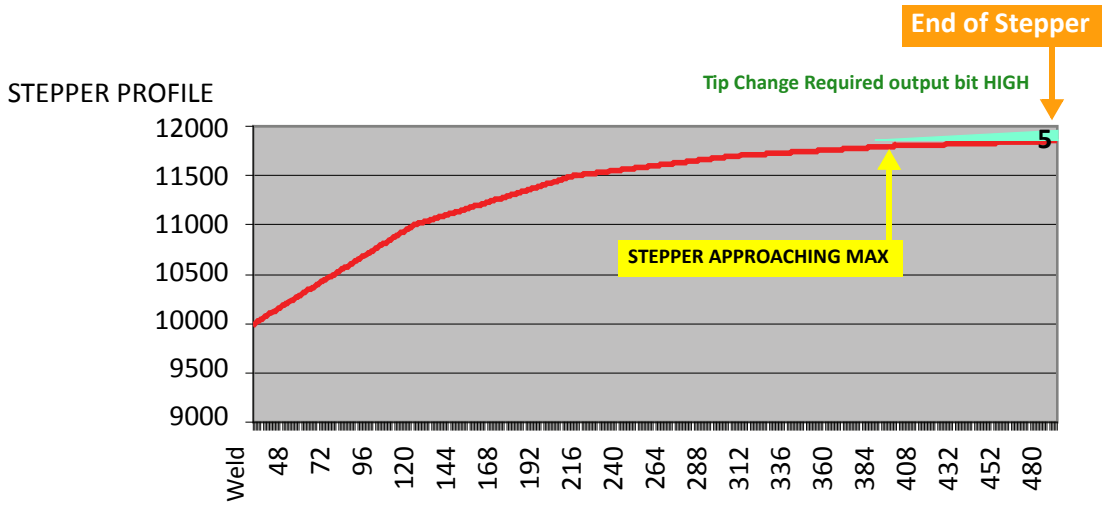
*The following alerts are annunciated on the DEP 300s, **RAFT**™ Gateway or other device used to communicate with the weld control*

STEPPER APPROACHING MAX ALERT:
At the first weld of Step 5, a STEPPER APPROACHING MAX ALERT is generated. This alert indicates the stepper program has started its final step.

END OF STEPPER ALERT / FAULT:
At the last weld of Step 5, an END OF STEPPER FAULT is generated. The first 50 welds thereafter will be an ALERT. If the stepper program is not reset by the 51st weld, the ALERT will change to a FAULT. For more information, see Stepper Reset Options below.

AVAILABLE IN SOFTWARE G08106

TIP CHANGE APPROACHING END:
When the tip dress counter decrements to 1, the "Tip Change Approaching End" output is annunciated. This output will turn off when the tip dress counter decrements to 0.



F 30: Weld 160 Ms 1000 Amps - *Base Weld Current*

AUX. COUNTER MAX COUNTS:

Attached to each stepper program is an Auxiliary Weld Counter, which is located in the Stepper Status Menu. When a stepper increments, its auxiliary weld counter also increments. When the counter reaches the value programmed in this parameter, the Aux Counter at Max output bit goes HIGH. This output bit can be used for any purpose by the user. Turning the Stepper Aux Weld Cntr Reset input bit HIGH resets the Auxiliary Weld Counter to zero and turns the Aux. Counter at Max output bit LOW. In example #1, the Aux. Counter Max Counts

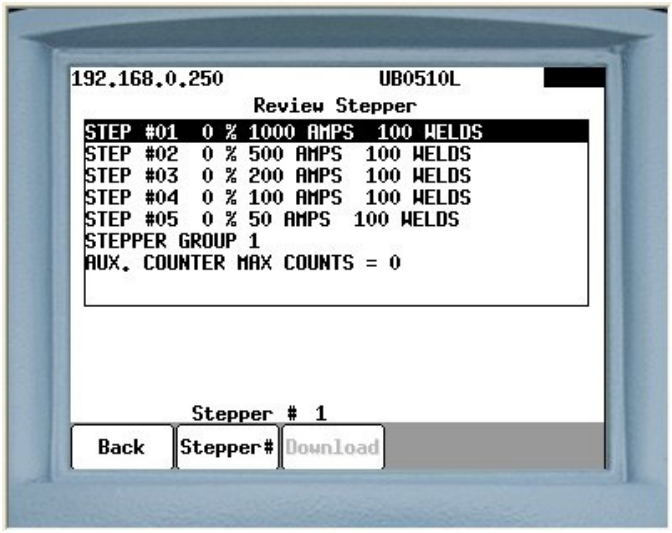
EXAMPLE STEPPER PROGRAM #2 (TIP DRESS)

The following is an example of a linear stepper program with tip dressing. This example would typically be used in a robot welding application.

- Function #82 (LINEAR STEPPER #nn ASSIGNED) is inserted into the first line of Weld Schedule #1 and is assigned to Linear Stepper Program #1.
- Current weld function #30 (WELD nnnn MSec. nnnn0 Amps) is used and programmed to deliver 10000 Amps. of base current for 160 Msec

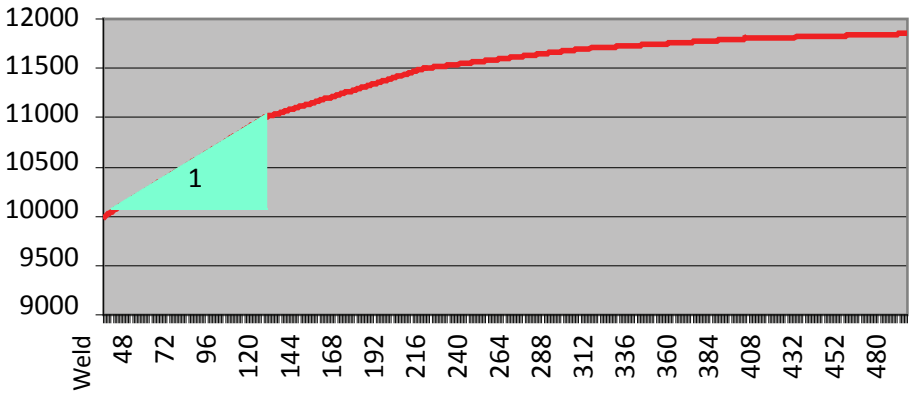
EXAMPLE SCHEDULE #1 (TIP DRESS)	
00	Start of Schedule # 1
82	Linear Stepper #1 Assigned (0 = OFF)
56	Set Pressure = 0
58	Turn ON Weld In Progress
52	Turn ON Isolation Contactor
01	Squeeze 100 Msec.
30	Weld 160 Ms. 10000 Amps
78	Process Weld Faults
03	Hold 80 Msec
50	Turn ON Weld Complete
59	Turn OFF Weld In Progress
75	Extend Until No Initiate
51	Turn OFF Weld Complete
56	Set Pressure = 0
53	Turn OFF Isolation Contactor
100	End of Schedule # 1

BELOW IS THE STEPPER PROFILE AS VIEWED FROM THE DEP-300S DATA ENTRY PANEL.



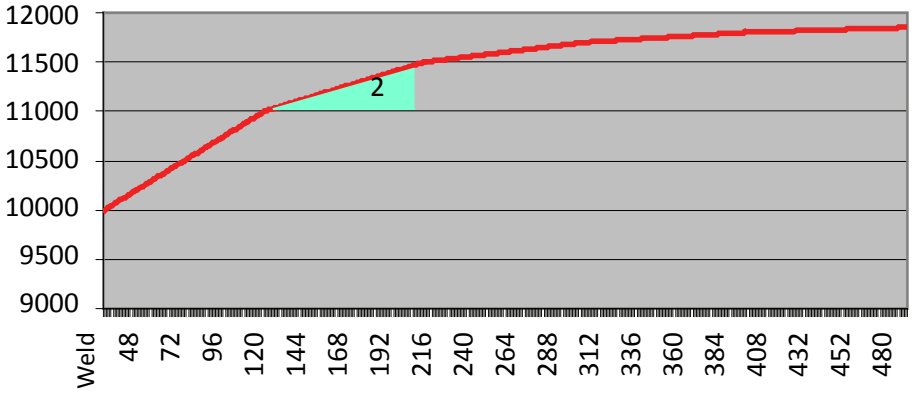
The following explains each parameter within the profile:

- **STEP # 01 = + 00% + 1000 A AFTER 100 WELDS**
  Step 1 is programmed to deliver a 1000A boost over 100 welds. If the base current is 10000 Amps, the boost current will increment by 10A after each weld, thus by the 100th weld, the target current will be at 11000A.



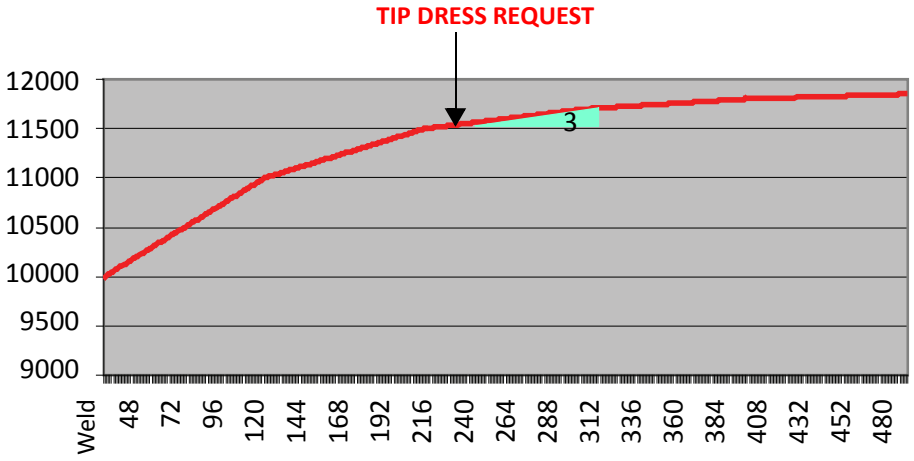
F 30: Weld 160 MS 1000 Amps - *Base Weld Current*

- **STEP # 02 = + 00% + 0500 A AFTER 100 WELDS**
  Step 2 is programmed to deliver a 500A boost over 100 welds. If the base current is 11000 Amps, the boost current will increment by 5A after each weld, thus by the 100th weld, the target current will be 11500A.



F 30: Weld 160 MS 1000 Amps - *Base Weld Current*

- **STEP # 03 = + 00% + 0200 A AFTER 100 WELDS (FIRST TIP DRESS)**
  At the first weld of Step 3 the weld processor will turn the Tip Dress Request output bit HIGH. Upon receiving the request, the robot initiates a tip dress schedule. Upon completion of the tip dress schedule, the weld processor will return the stepper program back to the first weld of Step 2.



F 30: Weld 160 MS 1000 Amps - *Base Weld Current*

ROBOT INITIATES A TIP DRESS SCHEDULE UPON RECEIVING REQUEST

TIP DRESS SCHEDULE	
00	Start of Schedule # 61
56	Set Pressure = 0
58	Turn ON Weld In Progress
86	Tip Dress Advance: Group 01 - Step 2
56	Set Pressure =00
50	Turn ON Weld Complete
59	Turn OFF Weld In Progress
75	Extend Until No Initiate
51	Turn OFF Weld Complete
100	End of Schedule # 1

Weld Control Unit will return all steppers of the Group to the first weld of Step 2 (as programmed)

- **STEP # 02**
  If the Remaining Tip Dresses Count is > 0, the stepper program will continue towards Step 3 again.

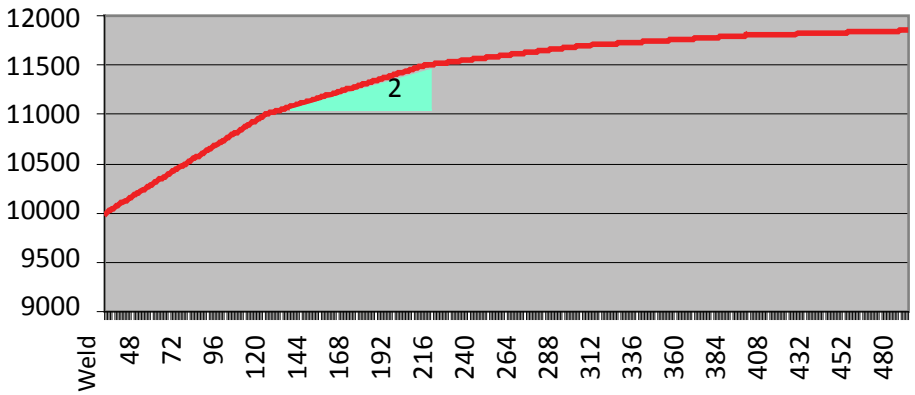
  Step 2 is programmed to deliver a 500A boost over 100 welds. If the base current is 11000 Amps, the boost current will increment by 5A after each weld, thus by the 100th weld, the target current will be 11500A.

- **STEP # 03: (SECOND TIP DRESS)**
  At the first weld of Step 3 the weld processor will turn the Tip Dress Request output bit HIGH. Upon receiving the request, the robot initiates a tip dress schedule. Upon completion of the tip dress schedule, the weld processor will return the stepper program back to the first weld of Step 2.

- **STEP 02: (ZERO TIP DRESSES REMAINING)**
  Step 2 is programmed to deliver a 500A boost over 100 welds. If the base current is 11000 Amps, the boost current will increment by 5A after each weld, thus by the 100th weld, the target current will be 11500A.

- **STEPPER APPROACHING MAX:**
  If the Remaining Tip Dresses Count has decremented to 0, a STEPPER APPROACHING MAX ALERT is generated at the first weld of Step 2.

TIP DRESSING



F 30: Weld 160 MS 1000 Amps - *Base Weld Current*

- **STEP #03 END OF STEPPER**
  If the Remaining Tip Dresses Count has decremented to 0, an END OF STEPPER ALERT is generated at the first weld of Step 3. The first 40 welds thereafter will be an ALERT. If the stepper program is not reset by the 41st weld, the ALERT will change to a FAULT. For more information, see Stepper Reset Options on Page.

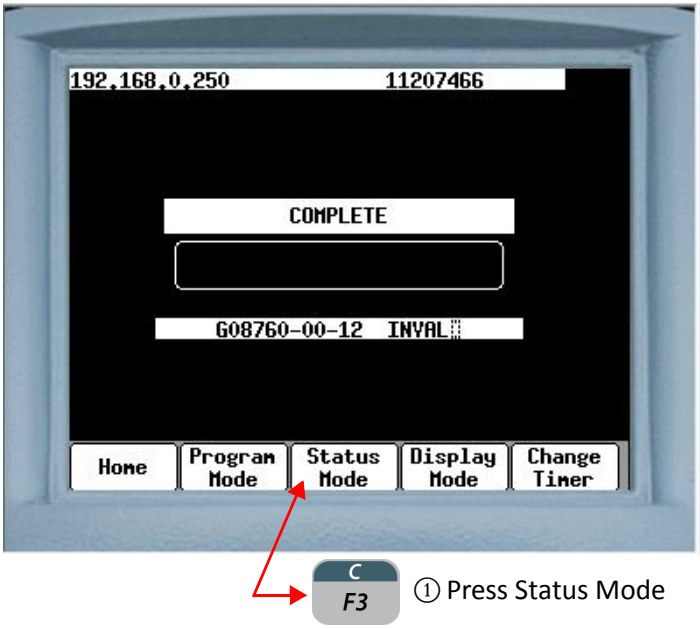
- **STEP #04 AND #05**
  Steps 4 & 5 are not used in stepper programs with tip dressing.

- **STEPPER GROUP:**
  In example #2, Stepper #1 is assigned to Stepper Group 1. For more information, see Stepper Groups.

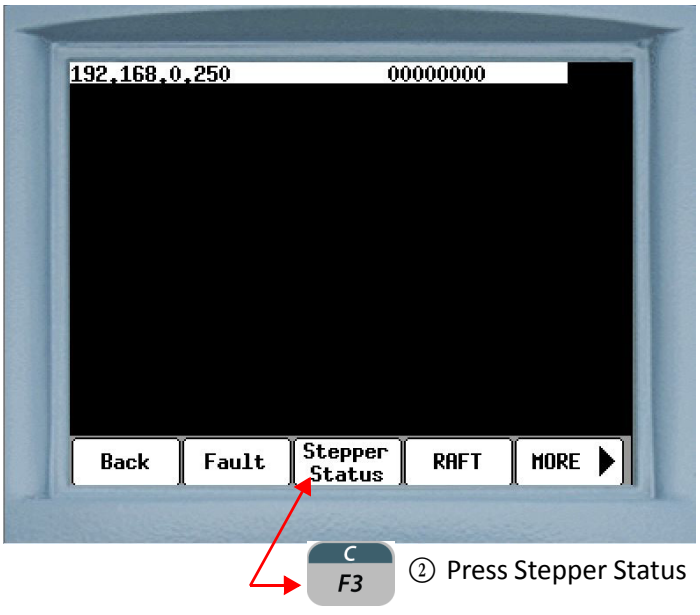
- **AUX. COUNTER MAX COUNTS:**
  Included in each stepper program is an Auxiliary Weld Counter, which is located in the Stepper Status screen. When a stepper increments, its auxiliary weld counter also increments. When the counter reaches the value programmed in this parameter, the Aux Counter at Max output bit goes HIGH. This output bit can be used for any purpose by the user. Turning the Stepper Aux Weld Cntr Reset input bit HIGH resets the Auxiliary Weld Counter to zero and turns the Aux. Counter at Max output bit LOW. In this example, the Aux. Counter Max Counts is set to zero. Therefore, the Aux Counter at Max output bit is disabled.

STEPPER STATUS

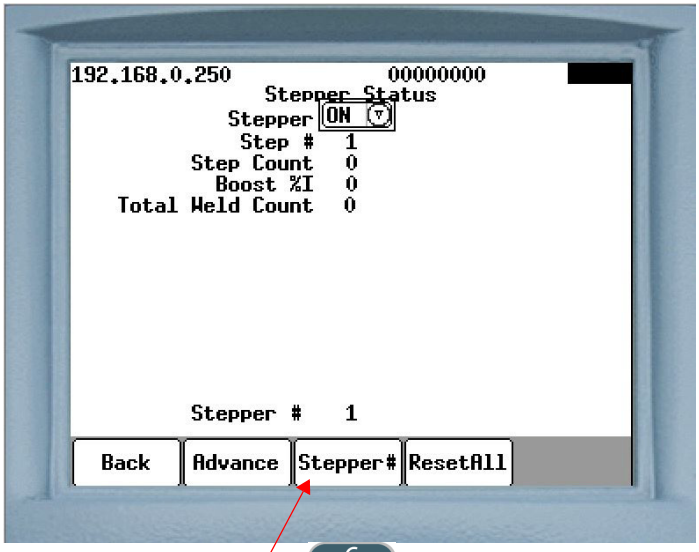
Perform the following steps on the DEP-300s to navigate to the Stepper Status Screen:



① Press Status Mode

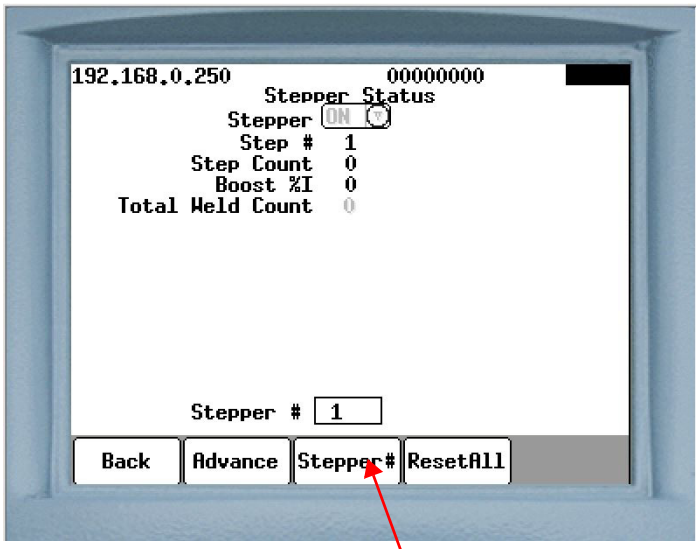


② Press Stepper Status

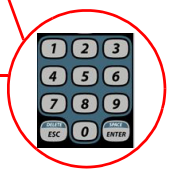


C
F3

③ Press Stepper#



④ Enter Stepper Number.



SPACE
ENTER

⑤ Press ENTER

The following chart describes the parameters, which appear on the Stepper Status Menu:

PARAMETER	DESCRIPTION
STEPPER	Turns the stepper either ON or OFF. The default position is ON. NOTE: This parameter is disabled in timer software version G08760
STEP #	The step number the stepper program is currently in (1 through 5)
STEP COUNT	The weld count within the step, the stepper program is currently in.
BOOST% I	The current boost being applied to each weld. NOTE: If a Percentage of Available Volt-Seconds weld function is used, this value will be displayed as a percentage. Conversely, if a Constant Current weld function is used, this value will be displayed in absolute amps.
TOTAL WELD COUNT	The total weld count since the beginning of the stepper program.
TIP DRESSES	The Remaining Tip Dresses Count is a decrementing counter, which starts at the number entered in GROUP (1-4) MAXIMUM TIP DRESSES in the setup parameters. This counter defines the maximum number of times the weld caps may be dressed before they must be changed. Each time the weld processor receives a tips dressed index, the Remaining Tip Dresses Count decrements by one. When this count decrements to zero, an END OF STEPPER FAULT is generated. This indicates the weld caps must be changed.
AUX. COUNTER	The Auxiliary Counter is an incrementing counter, which mirrors the Total Weld Count counter above. Its max count is set by the value entered in the Aux Counter Max Counts parameter in the stepper profile.
STEPPER #	The stepper program number currently displayed. Pressing the Stepper # (F3) key, allows the user to change the stepper program that is displayed.
ADVANCE	Pressing the Advance (F2) key, advances the stepper program to the first weld of the next step. When the stepper advances, the following changes will occur in the Stepper Status Menu: • The **STEP COUNT** will reset to zero. • The **TOTAL WELD COUNT** will advance to where its count would be at the first weld of the next step. • The Aux. Counter will not change when the stepper is advanced. If the user wants the Aux. Counter count to match the Total Weld Count, the value will have to be manually entered here.
RESET ALL	Pressing the Reset ALL (F4) key, globally resets all stepper programs.

STEPPER RESET OPTIONS

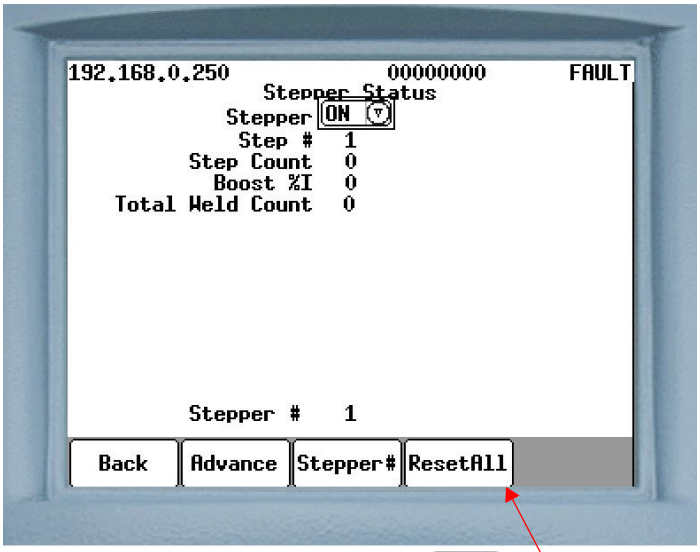
An END OF STEPPER FAULT indicates the stepper program has ended. At this point, the weld caps must be replaced on the gun and the stepper program(s) must be reset. Stepper Reset changes all counts within the stepper program back to their beginning value. See example below.

In weld processor software G08300, there are three ways in which the user can reset stepper programs:

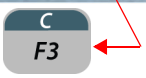
OPTION 1: GLOBAL STEPPER RESET

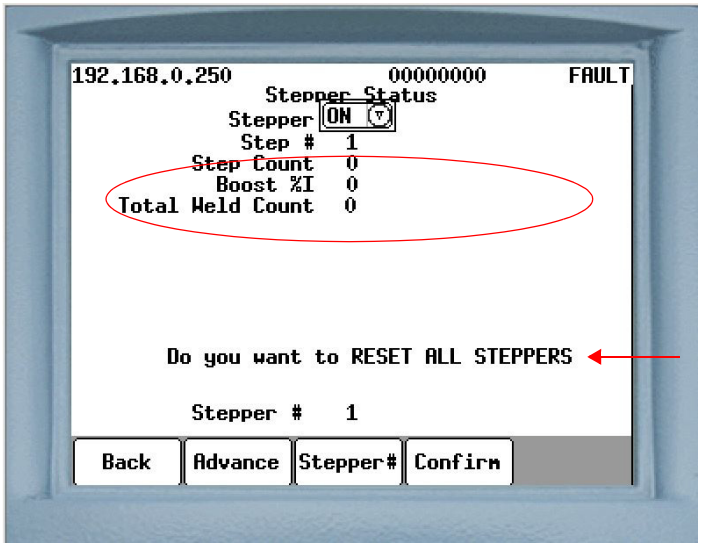
Stepper programs can be globally reset by pressing the Reset ALL (F4) button in the Stepper Status Menu. When this is done, all 10 stepper programs are “globally” reset, regardless of what group they are assigned to. The user needs to be cautious to only use this method if they are absolutely certain they want to globally reset every stepper program within the weld processor simultaneously.

Perform the following steps from the DEP-300s Stepper Status Menu to globally reset the stepper programs:



① Press Reset ALL





② The message “Do you want to reset all Steppers” will appear.

③ Press Confirm 

OPTION 2: GROUP STEPPER RESET (I/O)

Stepper programs can be globally reset by turning the Stepper Reset input bit HIGH. When this is done, all 10 stepper programs are “globally” reset, regardless of what group they are assigned to. The user needs to be cautious to only use this method if they are absolutely certain they want to globally reset every stepper program within the weld processor simultaneously.

OPTION 3: GROUP STEPPER RESET

Stepper programs assigned to either Group 1 or Group 2 can be reset as a group. When the Stepper Reset Group 1 input bit is turned HIGH, all the stepper programs assigned to Group 1 will be reset. Likewise, when the Stepper Reset Group 2 input bit is turned HIGH, all the stepper programs assigned to Group 2 will be reset.

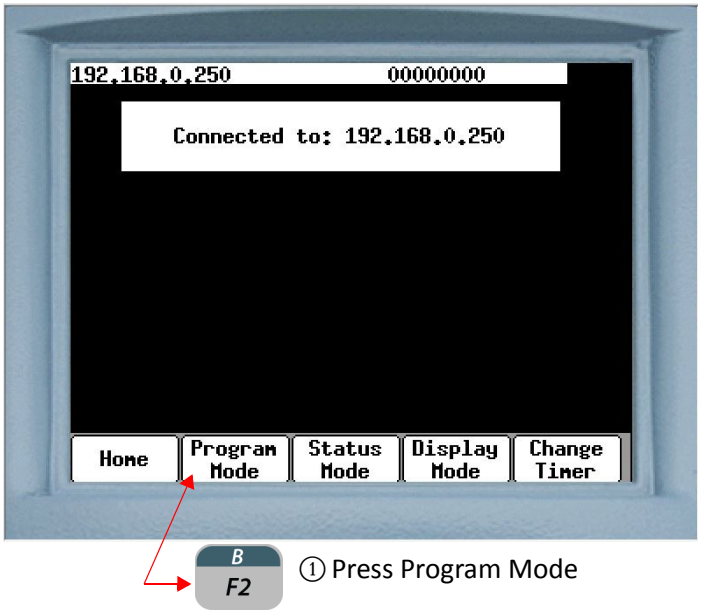
THE FOLLOWING OCCURS AT STEPPER RESET:

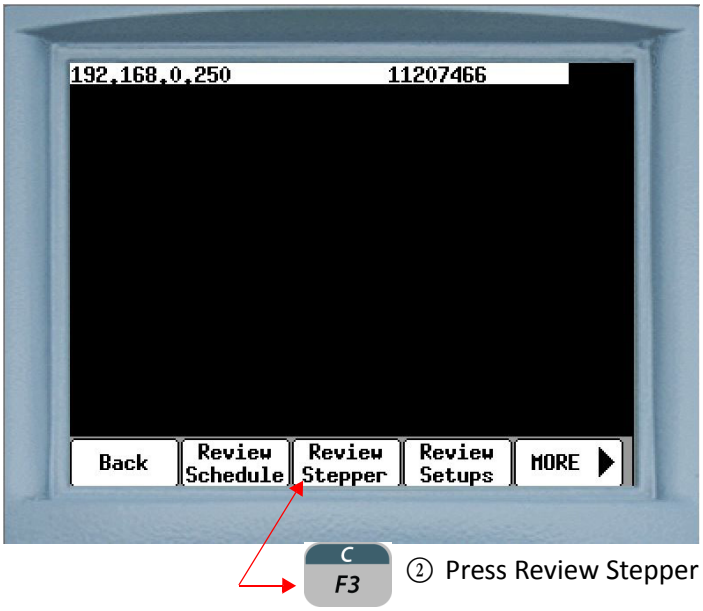
- STEPPER APPROACHING MAX ALERT is reset.
- END OF STEPPER FAULT is reset.
- All counts within the stepper program are changed back to their beginning value.

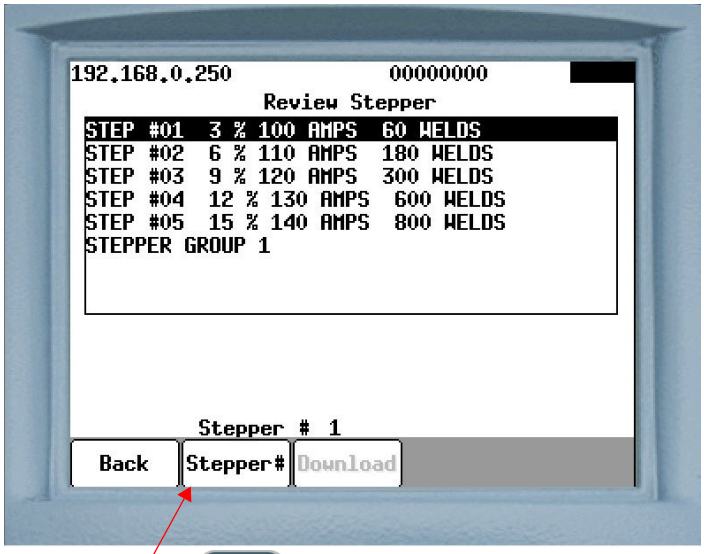
NOTE: Pressing the Fault Reset button on the DEP-300s will only reset the STEPPER APPROACHING MAX ALERT and the END OF STEPPER FAULT. It does not reset the stepper program(s)

EDITING THE STEPPER PROFILE

Perform the following steps on the DEP-300s to navigate to the Review Stepper Menu:

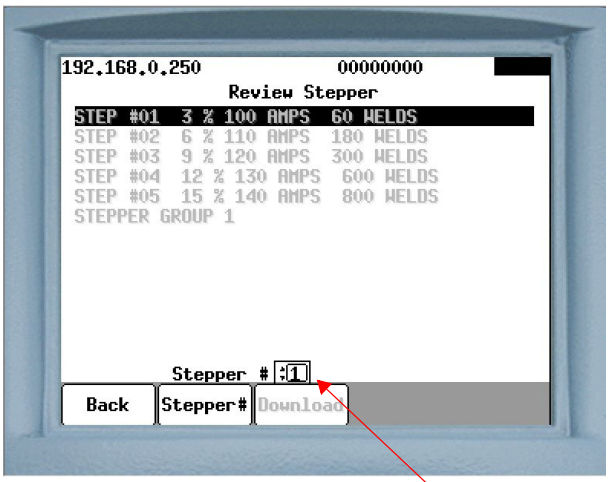




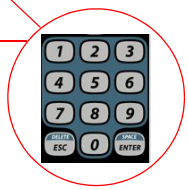


B
F2

③ Press Stepper #



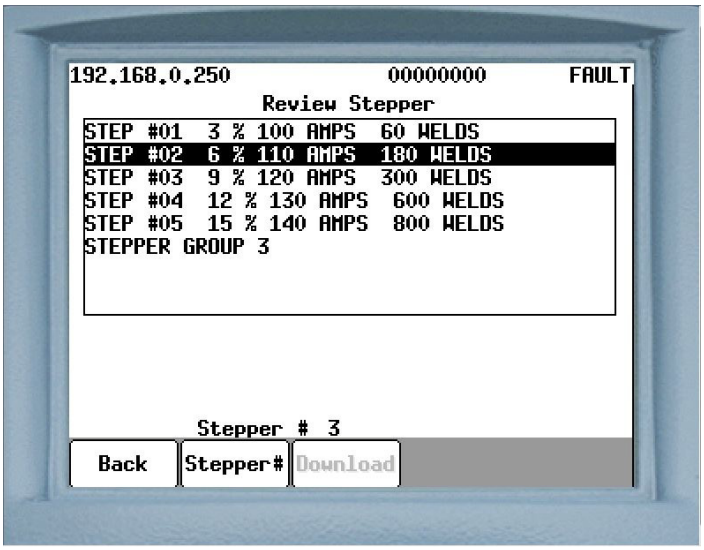
④ Enter Stepper Number



SPACE
ENTER

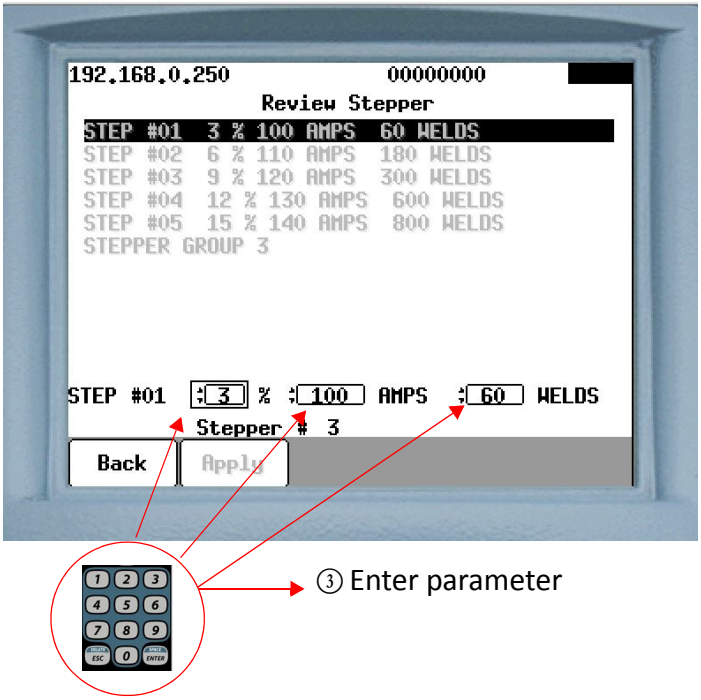
⑤ Press ENTER

EDITING A PARAMETER ON THE REVIEW STEPPER MENU ON THE DEP 300s:



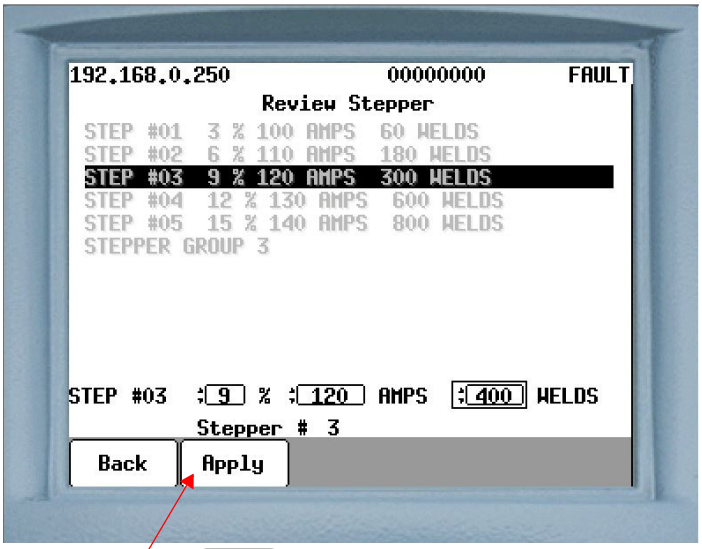
① Press the ↑ or ↓ arrow keys to move the cursor onto the parameter line to be edited.

SPACE ENTER ② Press ENTER



SPACE ENTER ④ Press ENTER

⑤ For parameters with two or more data fields, press the O → arrow key to move the cursor to the next data field box, then repeat steps 3 & 4. When complete, proceed to step 6.



B F2 ⑥ Press APPLY
[Saves changes to the DEP-300s only.]

⑦ To edit more parameter lines, repeat steps 1 through 6. When complete, proceed to step 8.

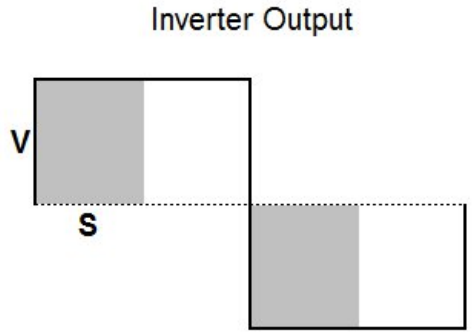
⑧ Press DOWNLOAD C F3

[Downloads the changes to the weld processor. When complete, a **"Download Complete"** message will appear]

Chapter 9: ADVANCED TOPICS

PERCENT OF AVAILABLE VOLT-SECONDS WELDING MODE

Percent of Available Volt-Second (%VS) welding can be viewed as a way of accomplishing AVC control in an MFDC inverter. In the example below, “S” (IGBT on-time) is adjusted to keep the effective voltage applied to the welding transformer constant. So, if the DC bus voltage goes higher, the IGBT's shut off earlier. Conversely, if the DC bus voltage goes lower, the IGBT's shut off later. This allows the volume of the shaded area to remain constant.



In the above example, let's assume that V=5 and S=4. Then the total shaded area would equal (V x S) or 20. Now suppose that V drops to 4. Then S would be increased to 5 to maintain a total value of 20 in the shaded area.

NOTE: Percent of Available Volt-Second welding only keeps the applied voltage to the welding transformer constant. Current will fluctuate depending on variations in the secondary resistance.

SETUP

1. To use Percent of Available Volt-Second welding, insert function #20 in the weld schedule. In the example below, the function was programmed to weld at 50% of Available Volt-Seconds for 500 milliseconds.

20	WELD 500 MS. 50%VS

2. Ensure the TRANSFORMER RATED DC VOLTAGE (programmed in the Setup Parameters) is set correctly. This parameter is the rated DC voltage of the welding transformer and can be found on the manufacturer's label affixed to the welding transformer. In the example below, the parameter is to 680V.

TRANSFORMER RATED DC VOLTAGE: 680

In this example, the weld function is programmed at 50% of the Transformer Rated DC Voltage (680V). Therefore, the effective voltage applied to the welding transformer will be 340V for 500 ms.

APPLICATION

It may be desirable to use Percent of Available Volt-Second welding instead of Constant Current welding in any application where extreme resistance changes occur during normal welding operations. Such applications may include:

- Projection Welding
- Butt Welding
- Flash-Butt Welding
- Aluminum Welding
- Welding through Sealant
- Poor Metal Fit-up / Gaps

You may also use a Percent of Available Volt-Second weld function in conjunction with a Constant Current weld function. For example, if you are welding through sealant, you may want to use a %VS up-slope or preheat weld function to displace the sealant and then form the weld nugget using a Constant Current weld function, for example:

40	SLOPE 500 MS. 20%VS TO 50%VS
30	WELD 500 MS. 10000 AMPS

CONSTANT CURRENT WELDING MODE

Constant Current welding is a method of keeping the current applied to the welding transformer constant, regardless of variations in secondary resistance, during normal welding operations.

To use Constant Current welding, insert function #30 in the weld schedule, for example:

30	WELD 500 MS. 10000 AMPS

In this example, 10,000 Amps target current is programmed into the weld function. The weld processor calculates secondary current by measuring the primary current at the output of the MFDC inverter and multiplying it by the transformer turns ratio (programmed in the Setup Parameters). If the calculated secondary current is less than the target current, the IGBT's shut off later. Conversely, if the calculated secondary current is greater than the target current, the IGBT's shut off earlier. This allows the current applied to the welding transformer to remain constant.

C-FACTOR

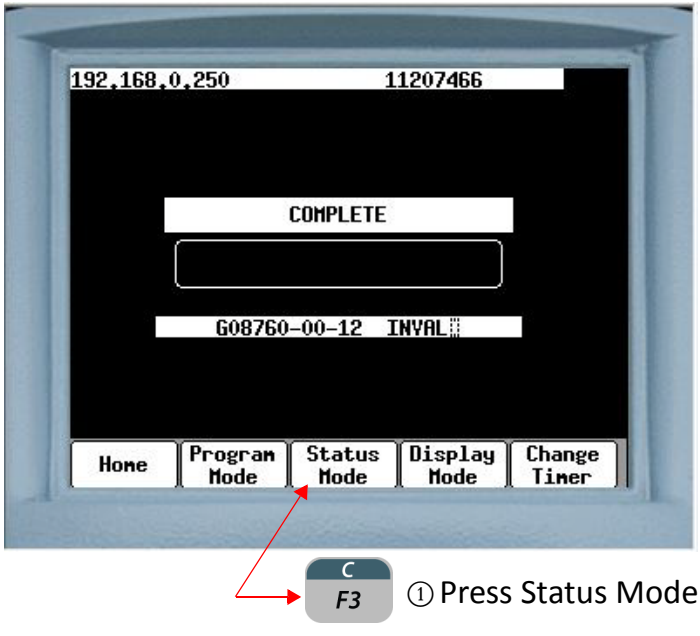
C-Factor (or Capacity Factor) is a parameter, which is used to track changes in the weld tooling. C-Factor is calculated by determining the amount of total capacity utilized to create the target current and dividing this value by the actual current created.

The C-Factor feature can be used as a maintenance tool to monitor the following:

- Weld tooling degradation
- Current shunting paths (primary or secondary)

C-Factor is calculated by the weld processor after each weld and is displayed in the Weld Data Display of the DEP-300s.

PERFORM THE FOLLOWING STEPS ON THE DEP-300S TO NAVIGATE TO THE WELD DATA MENU:



② Press More

E
F5

C
F3

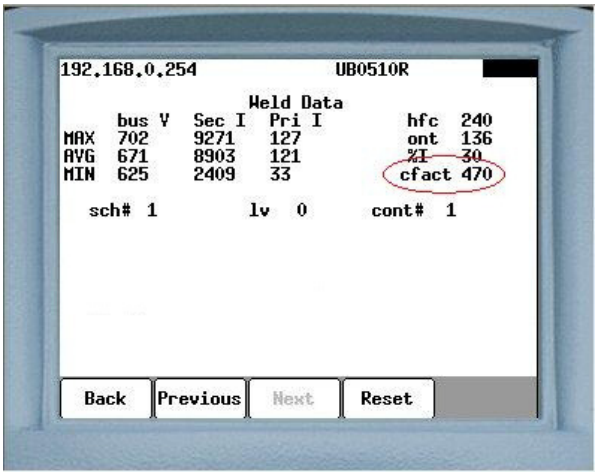
③ Press Weld Data

SPACE
ENTER

④ Press ENTER

DECREASING C-FACTOR

As the weld tooling degrades over time, its resistance (either primary or secondary) increases. As the resistance increases, the weld control must compensate for this change, otherwise the welds will gradually grow colder. Weld tooling degradation can be caused by the following conditions:



Example of the Weld Data Menu.
The C-Factor parameter is circled in red.

- Frayed or undersized (MCM) welding cables.
- Welding cables too long for application.
- Broken or undersized leaf shunts.
- Loose hardware connections.
- Incorrect hardware (mild steel vs. stainless steel).
- Incorrect weld caps for application.
- Lower tip pressure.

As the resistance of the weld tooling gradually increases, the weld control gradually increase its “on-time” (or use more of its available capacity) to deliver the requested target current. This gradual decrease in available capacity of the weld control is reflected by a gradually decreasing C-Factor parameter.

INCREASING C-FACTOR

Current shunting (either primary or secondary) is essentially an unintended, alternate path of current flow occurring in the weld tooling. Current shunting causes the overall resistance of the weld tooling to decrease. As current is shunted across the alternate path, less current passes through the work piece, resulting in colder welds. Secondary current shunting paths can be caused by the following conditions:

- Cable shorts to weld tooling or part.
- Weld expulsion (slag) build-up around the hinge of the weld gun
- Higher tip pressure
- Cooling water conductivity issues

As the resistance of the weld tooling gradually decreases, the weld control gradually decrease its “on-time” (or uses less of its available capacity) to deliver the requested target current. This gradual increase in available capacity of the weld control is reflected by a gradual increase in the C-Factor parameter.

C-FACTOR SETUP

1. Prior to using the C-Factor feature, it is important to establish a reference C-Factor parameter for a known good weld tool. After completing several test welds, record the C-Factor parameter displayed in the Weld Data Menu of the DEP-300s for future reference.

2. Insert function #92 (C-FACTOR LIMIT: HI= nnnn LOW= nnnn) near the beginning of the weld schedule. See example schedule below:

NOTE: Function #92 must be inserted in the weld schedule before functions #85 (PROCESS WELD FAULTS).

FUNCTION #	FUNCTION NAME
00	START OF SCHEDULE # 1
82	LINEAR STEPPER #1 ASSIGNED (0=0FF)
92	C-FACTOR LIMIT: HI= 220 LOW= 150
76	SET CURRENT LIMITS: HI=00 LOW= 99990
81	TRANSFORMER TURNS RATIO 73:1
88	TURN ON ISOLATION CONTACTOR
58	TURN ON WELD IN PROGRESS.
01	SQUEEZE 30 CYCLES
30	WELD 10 CYCLES 10000 AMPS
85	PROCESS WELD FAULTS
03	HOLD 5 CYCLES
63	TURN ON WELD COMPLETE
59	TURN OFF WELD IN PROGRESS
75	EXTEND UNTIL NO INITIATE
64	TURN OFF WELD COMPLETE
89	TURN OFF ISOLATION CONTACTOR
100	END OF SCHEDULE # 1

CALCULATE THE C-FACTOR HI / LOW LIMIT VALUES:

NOTE: The following instruction provides a starting point for the C-Factor HI / Low limits. These values will require adjustment as the user becomes more familiar with the weld tooling and what the C-Factor parameters are when weld quality issues occur (caused by either weld tooling degradation or current shunting).

Actual C-Factor variances may be less than or greater than 20%. Anything that effects change of the resistance during a weld will also change the C-Factor variance. Some examples are changing from mild to high strength steel, part fit-up, sealant on part, etc.

LOW C-FACTOR LIMIT

The Low C-Factor Limit is used to detect an increase in resistance in the weld tooling, which is caused by cable and connection degradation.

To calculate the Low C-Factor Limit value, subtract a 20% margin from the reference (tip-to-tip) C-Factor parameter for a known good weld tool.

For Example:

For example, if the reference C-Factor parameter is 200:
200 *.80 = 160. Therefore, the Low C-Factor Limit would be 160.

HIGH C-FACTOR LIMIT

The High C-Factor Limit is used to detect a decrease in resistance in the weld tooling, which is caused by shunting paths.
To calculate the High C-Factor limit value, add a 20% margin to the reference (tip-to-tip) C-Factor parameter for a known good weld tool.

For Example:

If the reference C-Factor parameter is 200:
200 * 1.2 = 240. Therefore, the High C-Factor Limit would be 240.

SETTING THE HI AND LOW C-FACTOR LIMIT FAULTS IN THE SETUP PARAMETERS:

FAULT NAME	VALUE
LOW C-FACTOR LIMIT	ALERT
HIGH C-FACTOR LIMIT	FAULT

- Gradual weld tool degradation is an expected process. Therefore, Low C-Factor is set as an ALERT.
- Secondary current shunting is not an expected process and requires immediate attention. Therefore, High C-Factor is set as a FAULT.

SPC INDEXING CAPABILITIES

SPC (STATISTICAL PROCESS CONTROL) FUNCTIONS

Function #90: SET SPC OFFSET TO nn

For the purpose of statistical data collection, each weld is assigned a data storage bin number (00-99). This function establishes the starting bin number for SPC Indexing.

Consider the following example:

CAR TYPE #1	
Weld Schedule #20	SET SPC OFFSET TO 01
Weld Schedule #01	15 Welds Made (Bins 1-15)
Weld Schedule #02	15 Welds Made (Bins 16-30)
Weld Schedule #03	15 Welds Made (Bins 31-48)

CAR TYPE #2	
Weld Schedule #21	SET SPC OFFSET TO 51
Weld Schedule #04	12 Welds Made (Bins 51-62)
Weld Schedule #05	12 Welds Made (Bins 63-74)
Weld Schedule #06	15 Welds Made (Bins 75-88)

After establishing a bin number, the processor stores the data for each weld made in its own individual bin. The bin numbers increase by one each time a weld is made. This will continue until another schedule containing function #90 (SET SPC OFFSET) is executed.

Bin #99 is the last usable bin. If the weld processor reaches bin #99 and is still collecting data, the data for each weld will be stored in bin #99 until a new offset is assigned, therefore making the data unsuitable for analysis.

NOTE: This function does not tell the weld processor to collect weld data. It only assigns a data storage bin number. To setup SPC data collection parameters, see SPC Setup Parameters.

Function #91: SEND ALL SAMPLES UNTIL NEXT SPC OFFSET

This function is useful to verify tool conditions after a tip-dress operation.

This function tells the weld processor to collect and sample 100% of the weld data within the schedule. It overrides the “global” Data Collection Sample Size and Data Collection Sample Frequency setup parameters, described in SPC Setup Parameters below.

Function #90 (SET SPC OFFSET) should be inserted before #91 in the weld schedule, to ensure the data is sent to the appropriate bin. Otherwise, it will be sent to default bin #0.

The processor will continue collecting and sampling 100% of the weld data within the schedule until the weld processor executes another weld schedule containing function #90 (SET SPC OFFSET). At which point, the “global” Data Collection Sample Size and Data Collection Sample Frequency setup parameters regain their hierarchical priority.

SPC SETUP PARAMETERS

PARAMETER	RANGE
Data Collection Sample Size: n	1-99
Data Collection Sample Frequency: nnn	1-9999

These two parameters set a global command, which allows the weld processor (WCU) to sample data for analysis at controlled intervals.

- The ***sample size*** is the number of consecutive welds collected for analysis (per bin).
- The ***sample frequency*** is the total number of welds, from which the samples are taken from (per bin).

FOR EXAMPLE:

Let's assume function #90 (SET SPC OFFSET) is inserted in the weld schedule and set to bin #1:

90	SET SPC OFFSET TO 01

Let's also assume in the Setup Parameters, the Data Collection Sample Size is set to (2) and the Data Collection Sample Frequency is set to (8):

DATA COLLECTION SAMPLE SIZE: 2
DATA COLLECTION SAMPLE FREQUENCY: 8

By setting the Data Collection Sample Size to (2) and the Data Collection Sample Frequency to (8), the WCU will collect data for the first two consecutive welds (in bin #1) and flag the WebView to retrieve the data. It will then collect data for the six remaining welds (without flagging the WebView) before repeating the process.

THE FOLLOWING TABLE ILLUSTRATES THE EXAMPLE ABOVE:

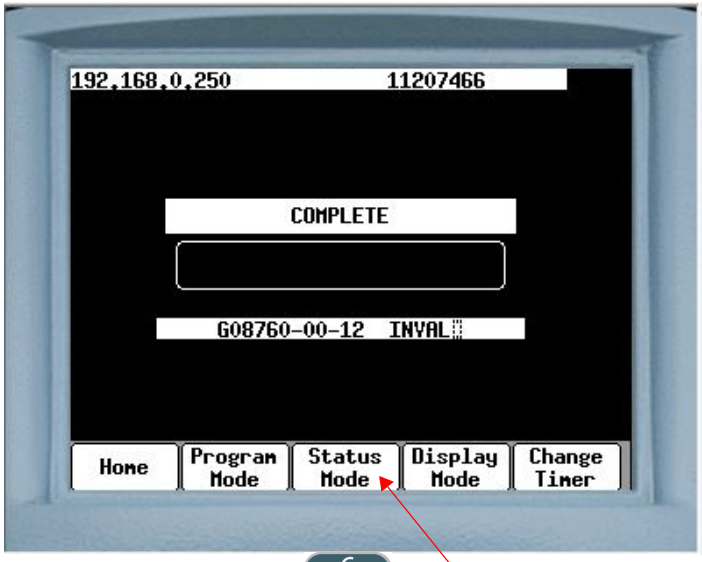
BIN # 1		
SAMPLE / FREQUENCY	WCU PROCESS	WEBVIEW PROCESS
1/8	Data Flagged for Retrieval	Data Uploaded
2/8	Data Flagged for Retrieval	Data Uploaded
3/8	Data Collected	Data Ignored
4/8	Data Collected	Data Ignored
5/8	Data Collected	Data Ignored
6/8	Data Collected	Data Ignored
7/8	Data Collected	Data Ignored
8/8	Data Collected	Data Ignored
1/8	Data Flagged for Retrieval	Data Uploaded
2/8	Data Flagged for Retrieval	Data Uploaded
3/8	Data Collected	Data Ignored
4/8	Data Collected	Data Ignored
5/8	Data Collected	Data Ignored
6/8	Data Collected	Data Ignored
7/8	Data Collected	Data Ignored
8/8	Data Collected	Data Ignored

NOTE: Weld data collection is bin dependent. Each bin has its own independent counter and is uploaded to the Web View separately.

APPLICATION ERROR CODES

I/O STATUS

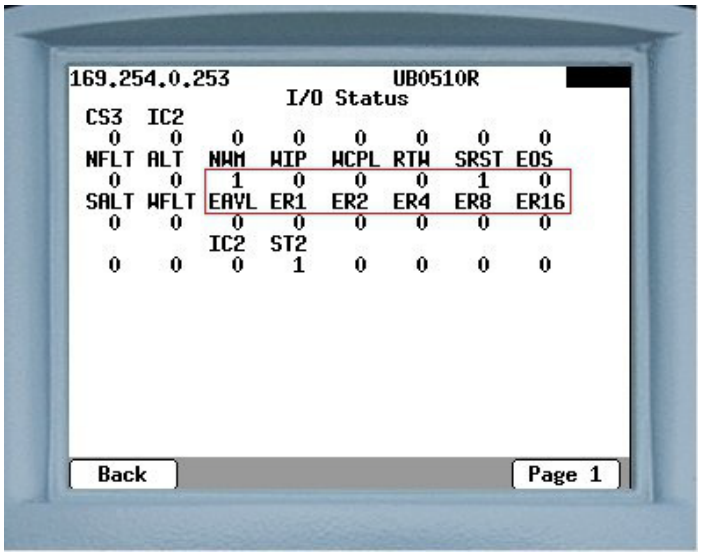
To navigate to the I/O Status Menu, perform the following steps on the DEP-300s



① Press Status Mode

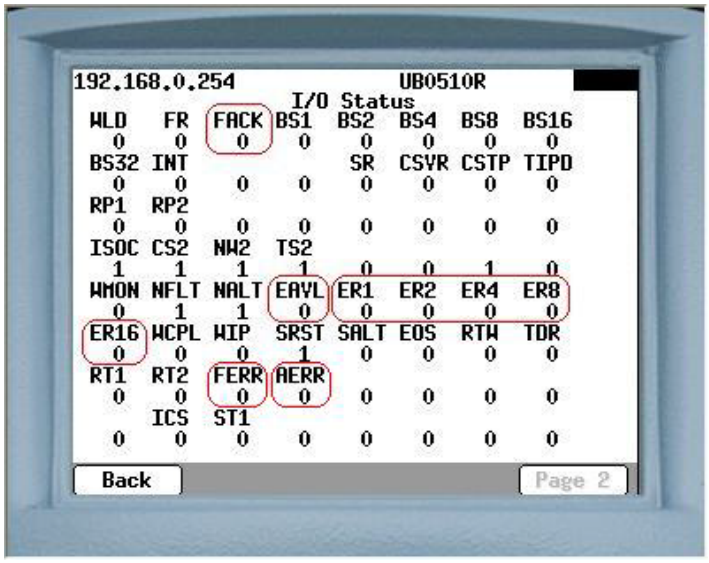
② Press More

B F2 ③ Press IO Status



④ Press Page 2 E F5 to view more bits (if applicable)

In this example the I/O Status Menu shows the mapped bits relating to the application error codes (circled in red). It should be noted this is a simplified example and the customers application requirements may prescribe these bits to be mapped to different I/O locations.



Each bit is represented by a tag. Each tag will have either a “1” or “0” underneath it:

- “1” indicates the bit is HIGH or ON.
- “0” indicates the bit is LOW or OFF.

TAG NAME	BIT NAME	BIT TYPE
FACK	APP ERR ACKNOWLEDGE	Input
EVAL	APP ERROR AVAILABLE	Output
ER1	APP ERROR BIT 1	Output
ER2	APP ERROR BIT 2	Output
ER4	APP ERROR BIT 4	Output
ER8	APP ERROR BIT 8	Output
ER16	APP ERROR BIT 16	Output
FERR	FAULT ERROR	Output
AERR	ALERT ERROR	Output

NOTE: For more information on mapping I/O bits, see Chapter 11: Inputs and Outputs.

HOW WTC ERROR CODES ARE REPORTED

The following example is a robot welding application where the weld processor is reporting three application error codes:

ERROR CODE	FAULT FAMILY	WELD CONTROL FAULT	TYPE
5	END OF STEPPER	End of Stepper	FAULT
7	HIGH/ LOW CURRENT LIMIT	Low Current Limit Fault	FAILT
19	C-FACTOR LIMIT	Low C-Factor Limit	ALERT

NOTE: Multiple application error codes are reported in ascending order.

1. When a faults occurs, the **EVAL** output bit goes HIGH and application error code (5) is binarily displayed on the **ER1-ER16** output bits. Since the End of Stepper is configured as a FAULT in the weld processor, the **FERR** output bit will also go HIGH.

2. The HIGH **EVAL** output bit tells the robot to read the **ER1-ER16** and **FERR** output bits.

3. When the robot has read these output bits, it toggles the **FACK** input bit.

4. The toggling **FACK** input bit causes the **EVAL** output bit to toggle. When this toggle occurs, the next application error code (7) is binarily displayed on the **ER1-ER16** output bits. Since the Low Current Limit Fault is configured as a FAULT in the weld processor, the **FERR** output bit will also go HIGH.

5. The toggling **EVAL** output bit tells the robot to read the **ER1-ER16** and **FERR** output bits a second time.

6. When the robot has read the **ER1-ER16** output bits, it toggles the **FACK** input bit.

7. The toggling **FACK** input bit causes the **EVAL** output bit to toggle. When this toggle occurs, the next application error code (19) is binarily displayed on the **ER1-ER16** output bits. Since the Low C-Factor Limit is configured as an ALERT in the weld processor, the **AERR** output bit will also go HIGH.

8. The toggling **EVAL** output bit tells the robot to read the **ER1-ER16** output bits a third time.

9. When the robot has read the **ER1-ER16** output bits, it toggles the **FACK** input bit.

10. The toggling **FACK** input bit causes the **EVAL** output bit to toggle. When this toggle occurs, the weld processor scrolls and re-displays application error code (5) on the **ER1-ER16** output bits. Since the End of Stepper is configured as a FAULT in the weld processor, the **FERR** output bit will also go HIGH.

11. The toggling **EVAL** output bit tells the robot to read the **ER1-ER16** and **FERR** output bits a fourth time.

12. When the robot reads the **ER1-ER16** output bits, it recognizes that it has previously read application error code (5) and the reporting process ends.

APPLICATION ERROR CODES FOR WT6000 TIMER FIRMWARE G08300

SETUP NO.	FAULT FAMILY	ERROR CODE	APPLICATION ERROR BINARY OUTPUT BITS				
			ER1	ER2	ER4	ER8	ER16
1.	INPUT / OUTPUT ERROR	1	1	0	0	0	0
2.	INPUT / OUTPUT ALARM	2	0	1	0	0	0
3.	INCOMPLETE WELD	3	1	1	0	0	0
4.	STEPPER APPROACHING MAX	4	0	0	1	0	0
5.	END OF STEPPER	5	1	0	1	0	0
6.	HIGH / LOW CURRENT LIMIT	7	1	1	1	0	0
7.	COMPENSATION ERROR	12	0	0	1	1	0
8.	INSUFFICIENT LINE VOLTAGE	13	1	0	1	1	0
9.	EXTENDED WELD	14	0	1	1	1	0
10.	ISOLATION CONTACTOR ERROR	15	1	1	1	1	0
11.	ANALOG PRESSURE	18	0	1	0	0	1
12.	C-FACTOR LIMIT	19	1	1	0	0	1
13.	EXTERNAL SENSOR	20	0	0	1	0	1
14.	WELDING TRANSFORMER	21	1	0	1	0	1
15.	OVER TEMPERATURE	22	0	1	1	0	1
16.	INVERTER FAULT	25	1	0	0	0	1

NOTE: This version of the program supports programming up to 16 binary bits.

FAULT FAMILY CROSS-REFERENCE TO WTC WELD CONTROL FAULT(S)

ERROR CODE	FAULT FAMILY	WTC WELD CONTROL FAULT(S)
1	**INPUT / OUTPUT ERROR**	• INVALID SEQUENCE SELECTED • WELD PROCEED • PRESSURE SWITCH • IO • INITIATION ON POWER-UP • RETRACT PILOT • SECONDARY CURRENT SENSOR • WELD INTERRUPTION
2	**INPUT / 0UTPUT ALARM**	• WELD INITIATE NOT PRESENT • CONTROL IN NO WELD
3	**INCOMPLETE WELD**	• CONTROL STOP • WELD INTERRUPTION
4	**STEPPER APPROACHING MAXIMUM**	• STEPPER APPROACHING MAX
5	**END OF STEPPER**	• END OF STEPPER
7	**HIGH / LOW CURRENT LIMIT**	• HIGH CURRENT LIMIT FAULT • LOW CURRENT LIMIT FAULT
12	**COMPENSATION ERROR**	• SOFT OVERCURRENT • CURRENT REGULATION
13	**INSUFFICIENT LINE VOLTAGE**	• CONTROL TRANSFORMER VOLTAGE • LOW LINE VOLTAGE • AC LINE PHASE
14	**EXTENDED WELD**	• EXTENDED WELD • EXCESSIVE REWELD
15	**ISOLATION CONTACTOR ERROR**	• ISO CNTR OFF WHEN NEEDED • ISO CNTR ERR BRKR TRIPPED
19	**C-FACTOR LIMIT**	• HIGH C-FACTOR LIMIT • LOW C-FACTOR LIMIT
21	**WELDING TRANSFORMER**	• SECONDARY DIODE • GROUND
22	**OVER TEMPERATURE**	• SYSTEM COOLING • TEMPERATURE
25	**INVERTER FAULT**	• IGBT SATURATION • IGBT POWER SUPPLY • BUS VOLTAGE • BUS CHARGING

TIP DRESS SCHEDULE SETUP

STANDARD TIP DRESS SCHEDULE

The following is an example tip dress schedule when the weld control is not controlling the tip dress motor.

FUNCTION #	FUNCTION NAME
00	START OF SCHEDULE # 1
58	TURN ON WELD IN PROGRESS
01	SQUEEZE 30 CYCLES
93	TIP DRESS ADVANCE: GROUP 1 - STEP 2
59	TURN OFF WELD IN PROGRESS
63	TURN ON WELD COMPLETE
03	HOLD 5 CYCLES
51	TURN OFF WELD COMPLETE
100	END OF SCHEDULE # 1

TIP DRESS CHECK SCHEDULE

The following is an example tip dress schedule where the weld control is controlling the tip dress motor. This feature requires an optional tip dress motor control circuit installed in the weld control cabinet (see note below). This schedule also monitors or "checks" the current draw of the tip dress motor.

The purpose of this check is to:

① Protect the motor from damage

② Determine if the weld caps were properly cut.

NOTE: If your weld control cabinet does not have the optional motor control circuit installed and you are interested in using this feature, contact your WTC sales representative for assistance.

FUNCTION #	FUNCTION NAME
00	START OF SCHEDULE # 1
16	MOTOR CURRENT LIMITS HI =6000 ma LO = 1000 ma
58	TURN ON WELD IN PROGRESS
18	START TIP DRESS MOTOR CHECK
17	TIP DRESS TIME 5 SEC BLANK 500 ms
19	STOP TIP DRESS MOTOR CHECK
59	TURN OFF WELD IN PROGRESS
63	TURN ON WELD COMPLETE
03	HOLD 5 CYCLES
51	TURN OFF WELD COMPLETE
100	END OF SCHEDULE # 1

DESCRIPTION OF THE SPECIAL FUNCTIONS (IN RED ABOVE) USED IN THE TIP DRESS CHECK SCHEDULE:

Function #16 (MOTOR CURRENT LIMITS HI =nnnn ma LO =nnnn ma) sets the HIGH and LOW current limits for the tip dress motor current being measured.

Function #18 (START TIP DRESS MOTOR CHECK) tells the weld processor to turn the tip dress motor ON.

NOTE: This function must be inserted in the schedule after function #16 (MOTOR CURRENT LIMITS HI =nnnn ma LO =nnnn ma).

Function #17 (TIP DRESS TIME nn SEC BLANK nnnn ms) sets the total amount of time (in seconds) the tip dress motor is ON. The blanking time (in milliseconds) is the period of time the weld processor does not measure the motor starting (in-rush) current.

NOTE: This function must be inserted in the schedule after function #18 (START TIP DRESS MOTOR CHECK) and before function #19 (STOP TIP DRESS MOTOR CHECK).

Function #19 (STOP TIP DRESS MOTOR CHECK) tells the weld processor to turn the tip dress motor OFF.

MODE OF OPERATION:

① After the blanking time, the motor current is checked every 8ms until either a function #19 (STOP TIP DRESS MOTOR CHECK) is reached or a fault occurs.

② If the measured motor current is above the LOW limit for 1 or more seconds of accumulated time, the tip dress is considered good.

③ If the measured current is above the LOW limit for less than 1 second of accumulated time, a TIP DRESS FAULT is generated. Probable causes include:

- Insufficient gun pressure on the cutting blades.
- Weld caps did not come in contact with cutting blades (no load on motor).
- Improper weld cap fit-up on the cutting blades.

④ If the measured motor current is above the HIGH limit any time during the 8ms checking period, the motor is immediately turned off and a HI / NO MOTOR CURRENT FAULT is generated. Probable causes include:

- Motor stall caused by a mechanical failure in the cutting head.
- Motor stall caused by a Jam in the cutting blades.
- Too much gun pressure on the cutting blades (excessive load on motor).

⑤ If the measured current is <=20ma any time during the 8ms checking period, the motor is immediately turned off and a HI / NO MOTOR CURRENT FAULT is generated. Probable causes include:

- Motor did not turn on (motor starter relay did not energize).
- Current feedback coil did not measure any current (loose/open wire).

NOTES:

① The Tip Dress Time includes the Blanking Time. Therefore, If the Tip Dress Time minus the Blanking Time is less than 1 second, a TIP DRESS FAULT will occur.

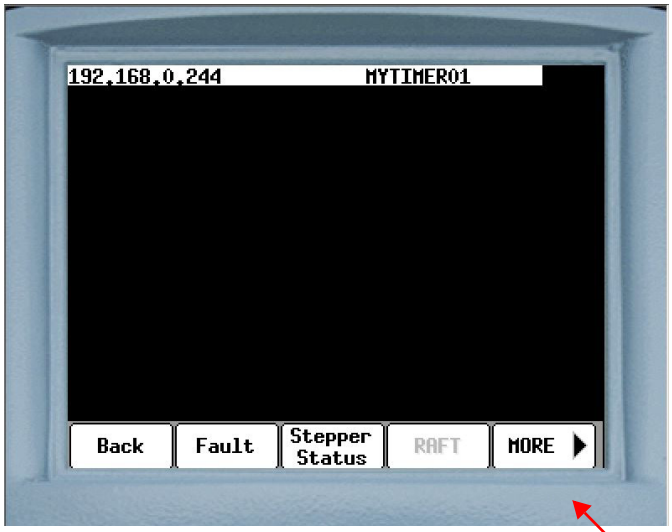
② As a good starting point:
Tip Dress Time = Blanking Time + 1010ms (1.01 sec). The idea is to ensure the time the motor current is actually being measured is greater than 1 second (1 second = 1000ms).

③ Set properly, the Blanking Time prevents erroneous HIGH / NO MOTOR CURRENT FAULTS from occurring, caused by the motor starting (in-rush) current. The Blanking Time will vary depending on the design specifications of the motor being used. The idea is to blank-out (or not measure) the motor starting (in-rush) current.

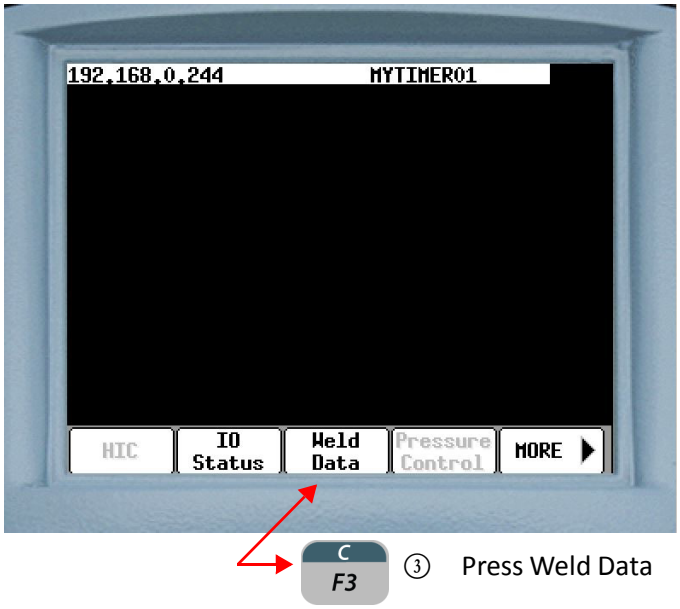
MOTOR CURRENT MEASUREMENT RESULTS

The results of the tip dress motor current check are displayed in the Weld Data Menu. Perform the following steps on the DEP-300s to navigate to the Weld Data Menu.

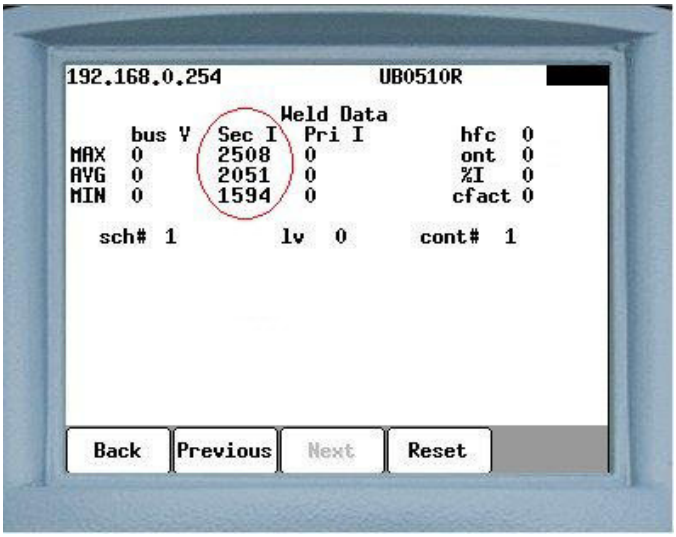
C F3 ① Press Status Mode



② Press More E F5



③ Press Weld Data



In the example above the results are displayed in the Sec I column (circled in red) in milliamps. There are three current measurements displayed: MAX current, AVG current and MIN current.

Chapter 10: PREVENTATIVE MAINTENANCE

The WT6000 weld control requires periodic preventative maintenance. The following chart can be used to design a preventative maintenance schedule for the entire weld control.

FREQUENCY	ACTION	CABINET POWER?
Monthly	**ISOLATION CONTACTOR** Ensure that the Contactor operates properly. Contactor should turn OFF/ON smoothly.	✔
Monthly	**CIRCUIT BREAKER** Test shunt trip button on circuit breaker.	✔
3 Months	**MOUNTING BOLTS** Verify all mounting bolts holding cabinet in place are tight.	✘
3 Months	**CABLES & CONNECTIONS INSIDE WELD CABINET** Verify tight connections and that internal cables show no wear.	✘
3 Months	**CABLING OUTSIDE CABINET** External cabling should be secure and show little to no wear.	✔

FREQUENCY	ACTION	CABINET POWER?
3 Months	**WATER COOLING SYSTEM** Inspect water-cooling circuit for leaking fittings, hoses, etc. Inspect for worn or cracked hoses and replace as required. Ensure all hose clamps are tight. Check for proper water flow in accordance with specifications in Chapter 1. (Water-Cooled models only)	✔
3 Months	**TERMINALS & TERMINAL STRIPS** All screw connections should be tightened.	✕
3 Months	**FUSES AND FUSE TERMINALS** Inspect for damaged fuses and that fuses fit properly in holders.	✕
6 Months	**INVERTER COOLING FINS AND FANS** Remove dust build-up between inverter cooling fins and within air circulation fans. Ensure fans are functioning properly. (Air-Cooled models only)	✔
12 Months	**EXTERNAL CABINET** Inspect for damage external to cabinet and that labels are intact.	✔
12 Months	**CABINET DOOR** Inspect that door opens and closes smoothly and that seals are not cracked or broken.	✔
12 Months	**LED'S & LAMPS** Inspect for damaged LED's or warning lamps internal and external to the weld controller.	✕
12 Months	**WELD CONTROL GROUNDING** Verify weld control cabinet is properly connected to earth ground, using either a multimeter or other suitable test equipment.	✕

Contact WTC for spare parts information:

WTC Industrial Technical Services
Phone: +1 248-477-3900 | Fax: +1 248-477-8897
Email: service@weldtechcorp.com
Website: www.weldtechcorp.com

Chapter 11: INPUTS AND OUTPUTS

I/O LIST

The following is a complete list of the available I/O bits for the WT6000 weld control with timer software G08300. Each I/O bit has a tag name assigned to it. The tag name is used to identify the bit on the DEP-300s I/O Status Menu. These bits are applicable to Ethernet IP (EIP), Fieldbus and Discrete I/O

INPUTS

INPUT NAME	TAG
NONE	(BLANK)
BINARY SELECT 1	BS1
BINARY SELECT 2	BS2
BINARY SELECT 4	BS4
BINARY SELECT 8	BS8
BINARY SELECT 16	BS16
BINARY SELECT 32	BS32
BINARY SELECT 64	BS64
BINARY SELECT 128	BS128
WELD INITIATE	INT
WELD / NO WELD	WLD
ISOLATION CONTACTOR SAVER	CSVR
FAULT RESET	FR
WELD PROCEED	WP1

STEPPER RESET	SR
STEPPER RESET GROUP 1	SRG1
STEPPER RESET GROUP 2	SRG2
TIP DRESS	TIPD
TIP DRESS GROUP 1	TDG1
TIP DRESS GROUP 2	TDG2
STEPPER AUX WELD CNTR RESET	SACR
APP ERR ACKNOWLEDGE	FACK
CONTROL STOP	CSTP
PRESSURE SWITCH	PS1
SYSTEM COOLING	COOL
PROGRAM DISPLAY SECURITY	PSEC
HEAT DISPLAY SECURITY	HSEC
USER INPUT 1	UI1
USER INPUT 2	UI2
USER INPUT 3	UI3
USER INPUT 4	UI4
USER INPUT 5	UI5
USER INPUT 6	UI6
RETRACT PILOT 1	RP1
RETRACT PILOT 2	RP2
SPOT 9 (256)	S9
SPOT 10 (512)	S10
SPOT 11 (1024)	S11
SPOT 12 (2048)	S12
SPOT 13 (4096)	S13
SPOT 14 (8192)	S14
SPOT 15 (16384)	S15
SPOT 16 (32768)	S16
SPOT 17 (65536)	S17
SPOT 18 (131072)	S18
SPOT 19 (262144)	S19
SPOT 20 (524288)	S20
SPOT 21 (1048576)	S21
SPOT 22 (2097152)	S22
SPOT 23 (4194304)	S23
SPOT 24 (8388608)	S24

SPOT 25 (16777216)	S25
SPOT 26 (33554432)	S26
SPOT 27 (67108864)	S27
SPOT 28 (134217728)	S28
SPOT 29 (268435456)	S29
SPOT 30 (536870912)	S30

OUTPUTS

OUTPUT NAME	TAG
NONE	(BLANK)
VALVE 1	V1
VALVE 2	V2
VALVE 3	V3
VALVE 4	V4
VALVE 5	V5
VALVE 6	V6
NO FAULT	NFLT
NO ALERT	NALT
FAULT	FLT
ALERT	ALT
WELD MODE ON	WMON
NO WELD	NWM
WELD IN PROGRESS	WIP
WELD COMPLETE	WCPL
READY TO WELD	RTW
STEPPERS ARE RESET	SRST
STEPPERS ARE RESET GROUP 1	SRG1
STEPPERS ARE RESET GROUP 2	SRG2
END OF STEPPER	EOS
END OF STEPPER GROUP 1	ESG1
END OF STEPPER GROUP 2	ESG2
STEPPER APPROACHING MAX	SALT
STPR APPROACHING MAX GROUP 1	SAG1
STPR APPROACHING MAX GROUP 2	SAG2

TIP CHANGE REQUIRED	TCR
TIP CHANGE REQUIRED GROUP 1	TCG1
TIP CHANGE REQUIRED GROUP 2	TCG2
TIP DRESS REQUEST	TDR
TIP DRESS REQUEST GROUP 1	TDG1
TIP DRESS REQUEST GROUP 2	TDG2
STEPPER AUX COUNTER AT MAX	SACM
APP ERROR AVAILABLE	EAVL
APP ERROR BIT 1	ER1
APP ERROR BIT 2	ER2
APP ERROR BIT 4	ER4
APP ERROR BIT 8	ER8
APP ERROR BIT 16	ER16
PRESSURE SELECT 1	PS1
PRESSURE SELECT 2	PS2
PRESSURE SELECT 3	PS3
PRESSURE SELECT 4	PS4
USER OUTPUT 1	UO1
USER OUTPUT 2	UO2
USER OUTPUT 3	UO3
USER OUTPUT 4	UO4
USER OUTPUT 5	UO5
USER OUTPUT 6	UO6
RETRACT VALVE 1	RT1
RETRACT VALVE 2	RT2
INVERTED RETRACT VALVE 1	IRT1
INVERTED RETRACT VALVE 2	AERR
WATER SAVER VALVE	WSVR
FORGE	FRG

FIXED CIOM INPUTS

INPUT NAME	TAG
ISOC AUX CONTACT	IC
CONTROL STOP 2	CS2
WELD / NO WELD 2	NW2
AUXILLIARY COOLING	TS2
OVER VOLTAGE	OV
UNDER VOLTAGE	UV
LOW VOLTAGE	LV

FIXED CIOM OUTPUTS

OUTPUT NAME	TAG
ISOC	ISOC
SHUNT TRIP 1	ST

FIXED LIO INPUTS

INPUT NAME	TAG
CONTROL STOP 2	CS2
ISOC AUX CONTACT	IC

FIXED LIO OUTPUTS

OUTPUT NAME	TAG
ISOC	ISOC
SHUNT TRIP 1	ST

I/O DESCRIPTIONS

INPUT DESCRIPTIONS

INPUT BIT NAME	DESCRIPTION
NONE	When the NONE bit is assigned to an input, the input is disabled and not used by the weld processor.
BINARY SELECT 1 / 2 / 4 / 8 / 16 / 32 / 64 / 128	These bits are used to binarily select which of the 255 available weld schedules to run. The schedule is selected by turning the appropriate bits HIGH.
WELD INITIATE	When this bit goes HIGH, the weld processor will initiate the weld schedule selected through the Binary Select Inputs.
WELD / NO WELD	When this bit is HIGH, the weld control is in WELD MODE. When this bit is LOW, the weld control is in NO WELD MODE.
ISOLATION CONTACTOR SAVER	This bit is used to either enable or disable the ISOLATION CONTACTOR DELAY feature in the Setup Parameters. If this bit is HIGH at the end of a weld schedule, the weld processor will hold the isolation contactor closed for the amount of time programmed into the ISOLATION CONTACTOR DELAY setup parameter. If this bit is LOW at the end of a weld schedule, the isolation contactor will drop out immediately at the end of the weld schedule.
FAULT RESET	This bit is HIGH when the Fault Status illuminated pushbutton in the operator's panel is pressed. When this bit goes HIGH, the weld processor will reset all faults.
WELD PROCEED	This bit is used to force the weld processor to pause the execution of a weld schedule until the bit goes HIGH. It is used with function #70 (WAIT FOR WELD PROCEED).
STEPPER RESET	When this bit goes HIGH the weld processor will “globally” reset all 10 stepper programs to Step 1 and Weld Count 0.
STEPPER RESET GROUP 1	When this bit goes HIGH the weld processor will reset only the stepper programs assigned to Group 1, to Step 1 and Weld Count 0.
STEPPER RESET GROUP 2	When this bit goes HIGH the weld processor will reset only the stepper programs assigned to Group 2, to Step 1 and Weld Count 0.
TIP DRESS	When this bit goes HIGH, the weld processor will: 1. Turn the Tip Dress Request output bit LOW 2. Return the stepper program to the 1st weld of step 2. This applies “globally” for all stepper programs.
STEPPER AUX WELD CNTR RESET	When this bit goes HIGH, the weld processor resets the Auxiliary Weld Counter to zero and turns the Aux. Counter at Max output bit LOW.

INPUT BIT NAME	DESCRIPTION
APP ERR ACKNOWLEDGE	The robot turns this bit HIGH to: 1 Send an acknowledgment to the weld processor that it has read the binary fault code from the App Error output bits. 2 To send the next binary fault code to the App Error output bits.
CONTROL STOP	This bit is normally maintained HIGH. When this bit goes LOW, the weld processor will generate a CONTROL STOP FAULT.
PRESSURE SWITCH	This bit is used to force the weld processor to pause the execution of a weld schedule until the bit goes HIGH or until the wait time in function #68 has elapsed. It is used with function #68 (WAIT nnnn CY FOR PRESSURE SWITCH INPUT) and function #69 (WAIT FOR PRESSURE SWITCH INPUT).
SYSTEM COOLING	This bit is normally maintained HIGH. When a System Cooling problem exists external to the weld control unit (i.e. welding transformer, gun, etc.) this bit will go LOW. The weld schedule will initiate if the bit is LOW, but no current will be passed. At the end of the schedule, the weld processor will generate a LOW CURRENT FAULT and SYTEM COOLING FAULT. If this bit goes LOW anytime during the execution of a weld schedule, the weld processor will generate a SYSTEM COOLING FAULT. Conversely, if this bit goes LOW before the weld function, a SYSTEM COOLING FAULT and LOW CURRENT LIMIT FAULT will occur.
PROGRAM DISPLAY SECURITY	When this bit is held LOW, only data within the Stepper Status menu can be edited. When this bit is held HIGH, all data can be edited.
HEAT DISPLAY SECURITY	When this bit is held HIGH, only data in the Stepper Status and Heat Display Menus can be edited. When the Heat Display Security and Program Display Security bits are held LOW simultaneously, only data in the Stepper Status, and Network Address menus can be edited.
USER INPUT 1 / 2 / 3 / 4 / 5 / 6	Spare user definable input bit. It is used with functions #66 (WAIT nnn CY INP #n TO BE n) and #67 (WAIT FOR INPUT #n TO BE n) in the weld schedule.
RETRACT PILOT 1	This input bit changes the state of the Close Retract 1 and Open Retract 1 output bits. A LOW to HIGH transition on the Retract Pilot input bit causes the state of the Close Retract 1 and Open Retract 1 output bits to change. **NOTE:** Both retract output bits remain off after the control is powered up and/or after a Control Stop condition. The retract input bit must always be toggled after these events to return the retract output bits to their expected states. **NOTE:** This bit must be mapped in the I/O to enable retraction. Operation is fixed in LATCHED mode only.

INPUT BIT NAME	DESCRIPTION
RETRACT PILOT 2	This input bit changes the state of both Retract Valve 2 and Inverted Retract Valve 2 output bits. How these output bits react to the input depends on the parameters programmed into the Retract Mode and Cylinder Setup Parameters.
SPOT 9 (256)	These bits are used to binarily select a weld sequence by spot ID. They are a continuation of the binary sequence select bits (1-255), but handled differently by the weld processor. If the spot ID selected is assigned, then the weld schedule associated with it will be initiated. If the spot ID selected is not assigned, then an INVALID SEQUENCE SELECTED fault is set.
SPOT 10 (512)	
SPOT 11 (1024)	
SPOT 12 (2048)	
SPOT 13 (4096)	
SPOT 14 (8192)	
SPOT 15 (16384)	
SPOT 16 (32768)	
SPOT 17 (65536)	
SPOT 18 (131072)	
SPOT 19 (262144)	
SPOT 20 (524288)	
SPOT 21 (1048576)	
SPOT 22 (2097152)	
SPOT 23 (4194304)	
SPOT 24 (8388608)	
SPOT 25 (16777216)	
SPOT 26 (33554432)	
SPOT 27 (67108864)	
SPOT 28 (134217728)	
SPOT 29 (268435456)	
SPOT 30 (536870912)	

OUTPUT DESCRIPTIONS

OUTPUT BIT NAME	DESCRIPTION
NONE	When the NONE bit is assigned to an output, the output is disabled and not used by the weld processor.
VALVE 1	This bit goes HIGH when function #50 (TURN ON VALVE 1) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 1) is executed.
VALVE 2	This bit goes HIGH when function #50 (TURN ON VALVE 2) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 2) is executed.
VALVE 3	This bit goes HIGH when function #50 (TURN ON VALVE 3) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 3) is executed.
VALVE 4	This bit goes HIGH when function #50 (TURN ON VALVE 4) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 4) is executed.
VALVE 5	This bit goes HIGH when function #50 (TURN ON VALVE 5) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 5) is executed.
VALVE 6	This bit goes HIGH when function #50 (TURN ON VALVE 6) is executed in the weld schedule and goes LOW when function #51 (TURN OFF VALVE 6) is executed.
NO FAULT	This bit is normally maintained HIGH and indicates a FAULT condition does not exist. When a FAULT occurs, this bit will go LOW.
NO ALERT	This bit is normally maintained HIGH and indicates an ALERT condition does not exist. When an ALERT occurs, this bit will go LOW.
FAULT	This bit will go HIGH when a FAULT condition exists.
ALERT	This bit will go HIGH when an ALERT condition exists.
WELD MODE ON	This bit goes HIGH when the weld control is in WELD MODE.
NO WELD	This bit goes HIGH when the weld control is in NO WELD MODE.
WELD IN PROGRESS	This bit goes HIGH when function #58 (TURN ON WELD IN PROGRESS) is executed in the weld schedule and goes LOW when function #59 (TURN OFF WELD IN PROGRESS) is executed.
WELD COMPLETE	This bit goes HIGH when function #63 (TURN ON WELD COMPLETE) is executed in the weld schedule and goes LOW when function #64 (TURN OFF WELD COMPLETE) is executed.

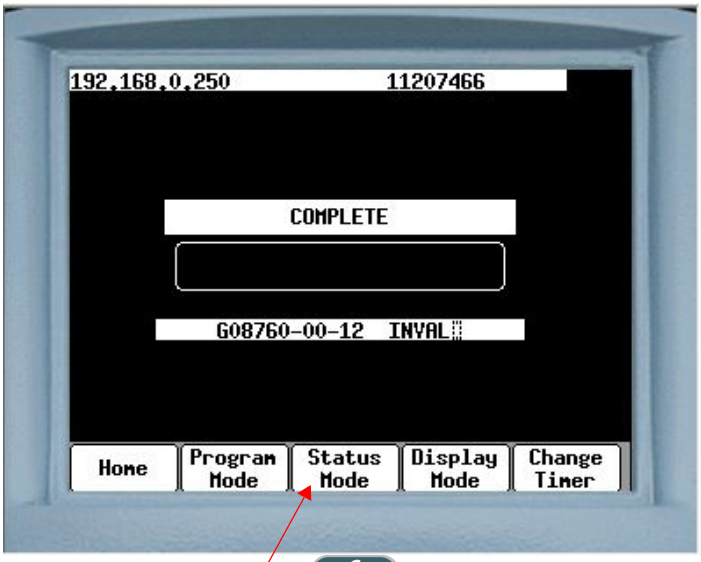
OUTPUT BIT NAME	DESCRIPTION
READY TO WELD	This bit goes HIGH when all the following conditions are true: 1 The weld control is in WELD MODE 2 No fault condition exists 3 The Control Stop input bit is HIGH 4 The System Cooling input bit is HIGH.
STEPPERS ARE RESET	This bit goes HIGH when all 10 stepper programs are globally reset.
STEPPERS ARE RESET GROUP 1	This bit goes HIGH when the stepper programs assigned to group 1 are reset.
STEPPERS ARE RESET GROUP 2	This bit goes HIGH when the stepper programs assigned to group 2 are reset.
END OF STEPPER	When the tip dress feature is enabled, this bit will go HIGH on the first weld of step 3 in the stepper program, if the Remaining Tip Dresses Count has decremented to 0. It will only go HIGH on the last weld of step 5 in the stepper program, if the tip dress function is disabled in the Setup Parameters or the tip dress count is greater than 0 when the tip dress feature is enabled. This bit will go LOW when either the Stepper Reset, Stepper Reset Group 1 or Stepper Reset Group 2 input bits go HIGH.
END OF STEPPER GROUP 1	This bit will go HIGH on the last weld of step 5 in the stepper program. This bit will go LOW when either the Stepper Reset or Stepper Reset Group 1 input bit goes HIGH.
END OF STEPPER GROUP 2	This bit will go HIGH on the last weld of step 5 in the stepper program. This bit will go LOW when either the Stepper Reset or Stepper Reset Group 2 input bit goes HIGH.
STEPPER APPROACHING MAX	When the tip dress feature is enabled, this bit will go HIGH on the 1st weld of step 2 in the stepper program, if the Remaining Tip Dresses Count has decremented to 0. It will only go HIGH on the 1st weld of step 5 in the stepper profile, if the tip dress function is disabled in the Setup Parameters or the tip dress count is greater than 0 when the tip dress feature is enabled. This bit will go LOW when either the Stepper Reset, Stepper Reset Group 1 or Stepper Reset Group 2 input bits go HIGH.
STPR APPROACHING MAX GROUP 1	This bit will go HIGH on the 1st weld of step 5 in the stepper profile. This bit will go LOW when either the Stepper Reset, Stepper Reset Group 1 or End of Stepper Group 1 input bit goes HIGH.
STPR APPROACHING MAX GROUP 2	This bit will go HIGH on the 1st weld of step 5 in the stepper profile. This bit will go LOW when either the Stepper Reset, Stepper Reset Group 2 or End of Stepper Group 2 input bit goes HIGH.
TIP CHANGE REQUIRED	This bit will go HIGH at the end of any stepper program, if the Remaining Tip Dress Count (Tip Dresses) has decremented to zero in the Stepper Status Menu. This bit will go LOW when the Stepper Reset input bit goes HIGH.
TIP CHANGE REQUIRED GROUP 1 / 2	This bit will go HIGH at the end of any stepper program assigned to Group 1, if the Remaining Tip Dress Count (Tip Dresses) has decremented to zero in the Stepper Status Menu. This bit will go LOW when either the Stepper Reset or Stepper Reset Group 1 / 2 input bit goes HIGH.

OUTPUT BIT NAME	DESCRIPTION
TIP DRESS REQUEST	This bit will go HIGH at the first weld of Step 3 in the stepper program, if the Remaining Tip Dresses Count is > 0. It is used as an indicator to the robot that a tip dress is required for the weld caps. This bit will go LOW when (1) the Tip Dress Request, Tip Dress Request Group 1 or Tip Dress Request Group 2 input bits go HIGH or (2) the tip dress schedule is initiated. **NOTE:** This bit does not latch on. It will turn off when the initiate bit is turned off.
TIP DRESS REQUEST GROUP I / 2	This bit will go HIGH at the first weld of Step 3 in the stepper program, if the Remaining Tip Dresses Count is > 0. It is used as an indicator to the robot that a tip dress is required for the weld caps. This bit will go LOW when the Tip Dress Group 1 / 2 input bit goes HIGH.
STEPPER AUX COUNTER AT MAX	This output bit goes HIGH when the Auxiliary Weld Counter has reached the value programmed in the Aux. Counter Max Counts field in the Stepper Profile.
APP ERROR AVAILABLE	When a fault occurs, this bit goes HIGH to advise the robot to read the binary fault code on the App Error Bit output bits.
APP ERROR BIT 1 / 2 / 4 / 8 / 16	These bits are used by the weld processor to send binary fault codes to the robot.
PRESSURE SELECT 1 / 2 / 3 / 4	During the execution of a weld schedule, the weld processor takes the value programmed in function #54 (TURN ON PRESSURE SELECT nnn) and turns the corresponding binary Pressure Select output bits HIGH. If SET PRESSURE = 0, all four bits (1, 2, 3, 4) are LOW.
USER OUTPUT 1 / 2 / 3 / 4 / 5 / 6	This bit goes HIGH when function #52 (TURN ON OUTPUT 1 / 2 / 3/ 4 / 5/ 6) is executed in the weld schedule and goes LOW when function #53 (TURN OFF OUTPUT 11 / 2 / 3/ 4 / 5/ 6) is executed.
RETRACT VALVE 1	The state of this bit changes according to the status of the Retract Valve 1 input bit. How this bits reacts depends on the parameters programmed into the Retract Mode and Cylinder Setup Parameters.
RETRACT VALVE 2	The state of this bit changes according to the status of the Retract Valve 2 input bit. How this bits reacts depends on the parameters programmed into the Retract Mode and Cylinder Setup Parameters.
INVERTED RETRACT VALVE 1	The state of this bit changes according to the status of the Retract Pilot 1 input bit. **NOTE:** This bit is functional when the Retract Pilot 1 input bit is mapped. **NOTE:** Both retract output bits remain off after the control is powered up and/or after a control stop condition. The retract input bit must always be toggled after these events to return the retract output bits to their expected states.
INVERTED RETRACT VALVE 2	The state of this bit changes according to the status of the Retract Valve 2 input bit. How this bits reacts depends on the parameter programmed into the Retract Mode Setup Parameter.

OUTPUT BIT NAME	DESCRIPTION
WATER SAVER	This bit goes HIGH when a weld schedule initiates. After the weld schedule is complete, the weld processor starts an internal timer holding the bit HIGH for an additional three minutes. When the timer has ended, the bit goes LOW.
FORGE	This bit goes HIGH when function #78 (TURN ON FORGE VALVE) is executed in the weld schedule and goes LOW when function #79 (TURN OFF FORGE VALVE) is executed.

I/O STATUS

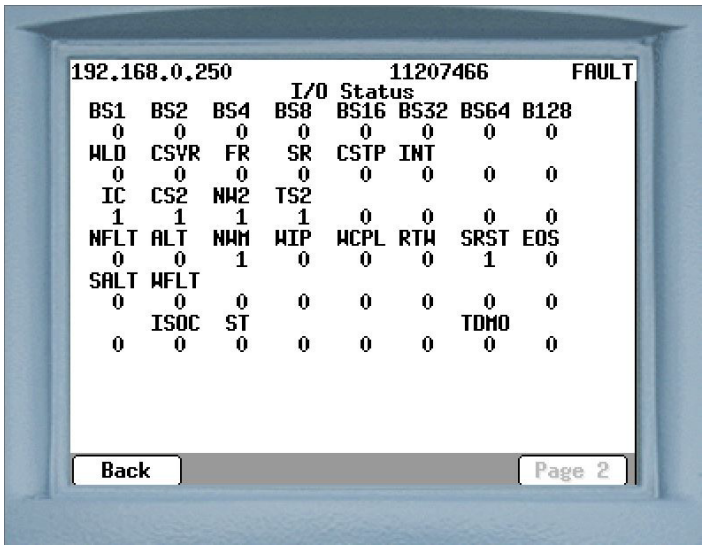
To navigate to the I/O Status Menu, perform the following steps on the DEP-300s:



① Press Status Mode

② Press More

③ Press IO Status



④ Press Page 2  to view more bits (if applicable).

The I/O Status Screen shows the status of every mapped I/O bit in the WT6000. Depending on the customer's application, this can include:

- Fieldbus I/O
- Ethernet I/O
- Local I/O

EACH I/O BIT IS REPRESENTED BY A TAG WHICH WILL HAVE EITHER A "1" OR "0" UNDERNEATH IT:

☞

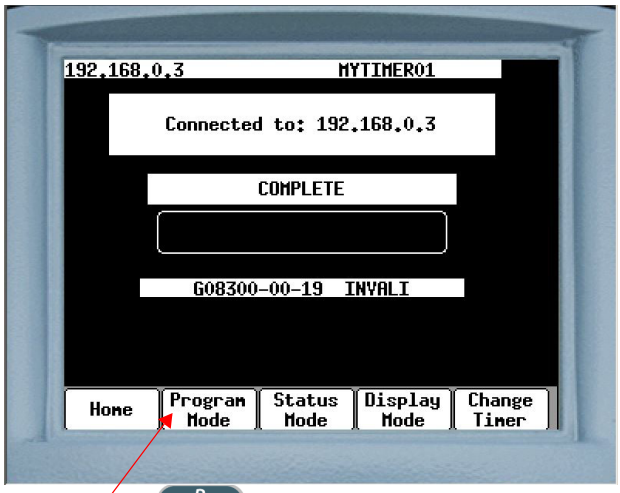
- "1" indicates the bit is HIGH or ON
- "0" indicates the bit is LOW or OFF

I/O DEFAULTS

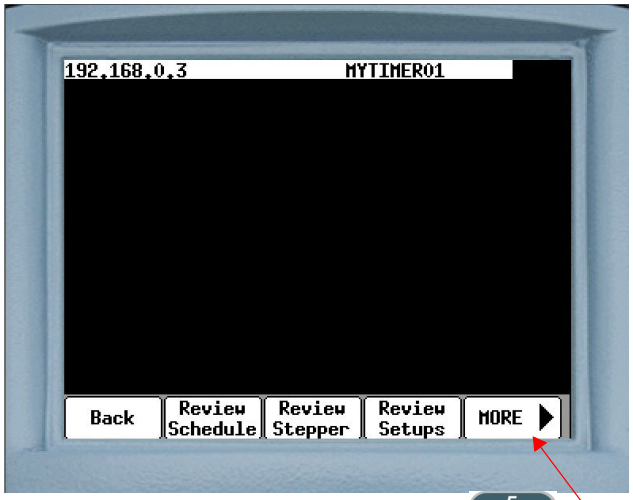
DISCRETE I/O

weld processor software G08300 offers two default Discrete I/O (DIO) lists. The following instructions show navigation to Default 1 on the DEP-300s. Use the same procedure to navigate to Default 2.

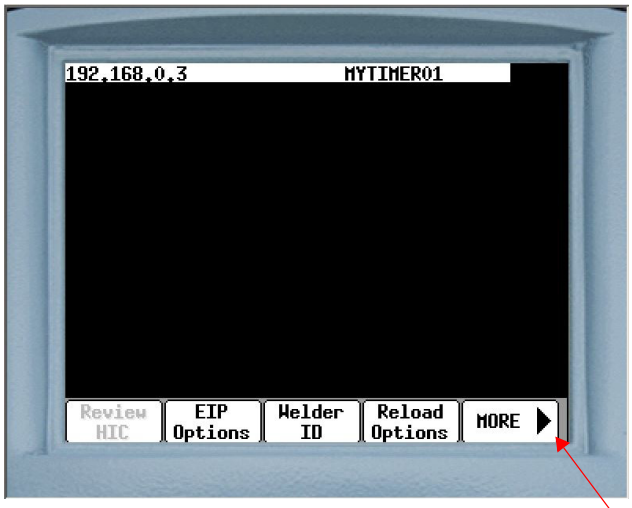
NOTE: The available DIO depends on the number of DIO cards installed. Each card allows 16 Mappable I/O. G08300 allows for a total of 32 DIO with two DIO cards installed.



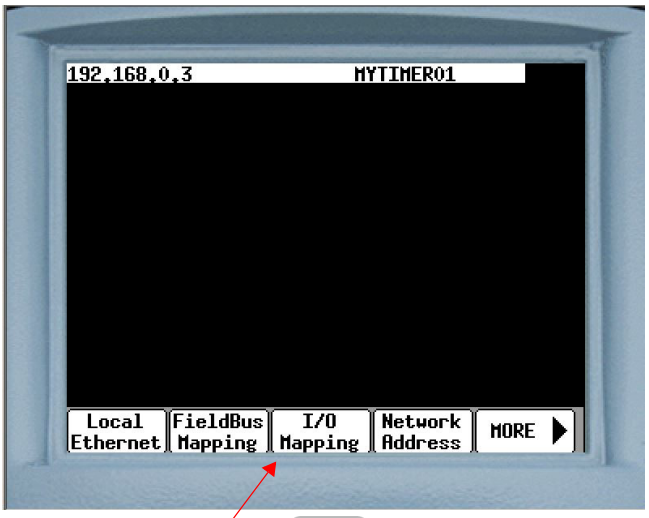
① Press Program Mode



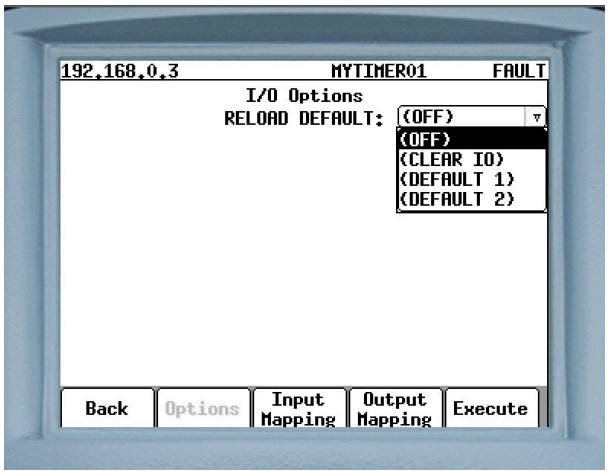
② Press More



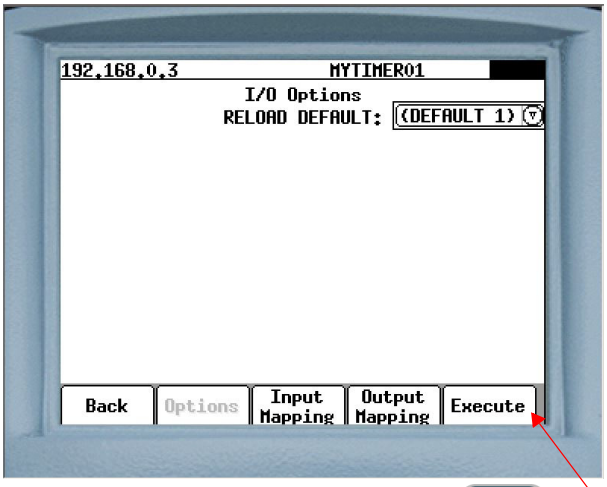
③ Press More 



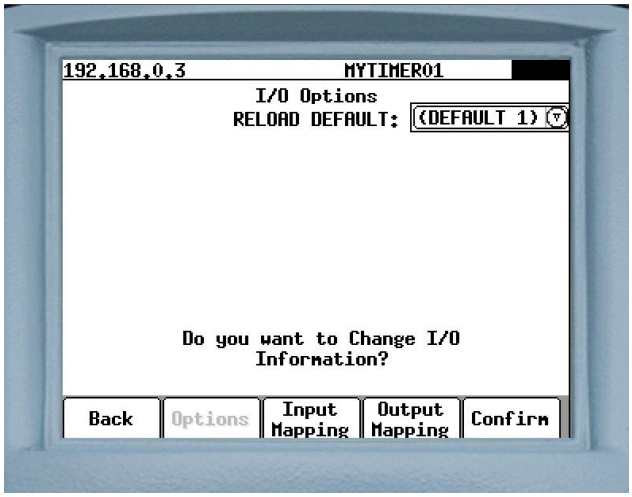
④ Press I/O Mapping.



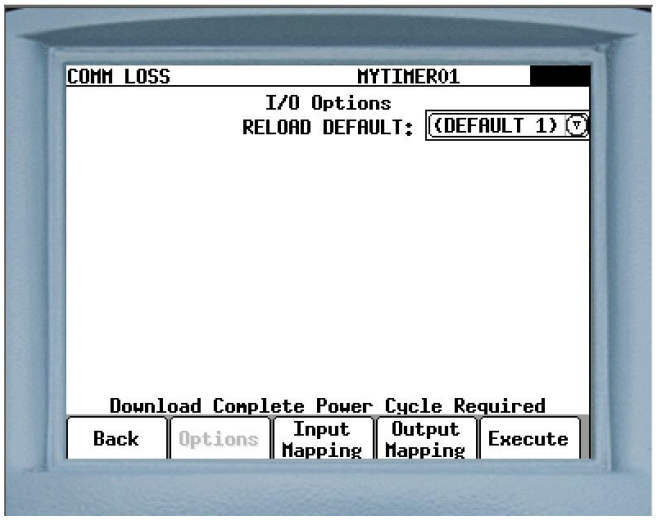
⑤ Press SPACE ENTER This opens a drop-down box with options available. Using the S ↓ arrow key navigate to the desired default (DEFAULT 1 or DEFAULT 2) and press SPACE ENTER



⑥ Press Execute E F5

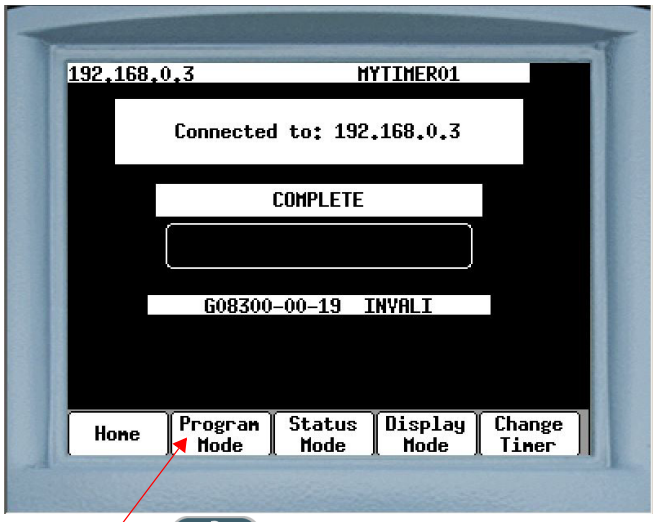


⑦ The message: “Do you want to change 1/O Information?” is displayed. Press E F5 to Confirm.



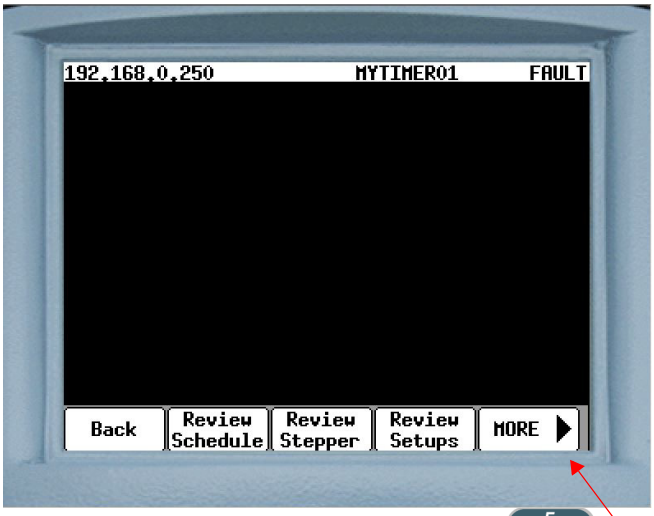
⑧ “Download Complete Power Cycle Required” is displayed. Cycle power to apply the selection.

MAPPING THE DISCRETE I/O (DIO)

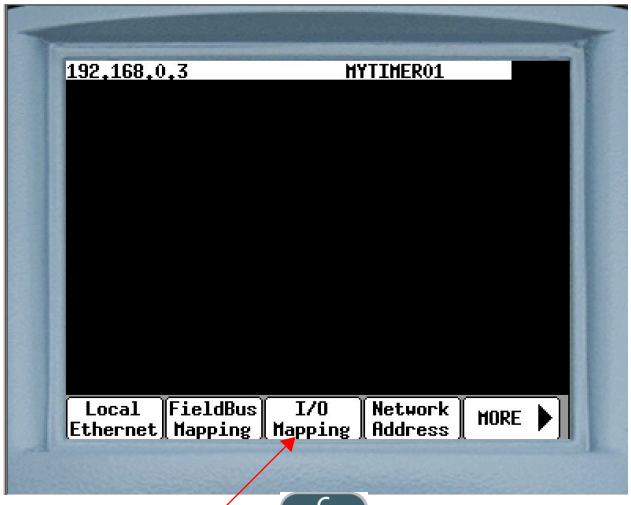


B F2 ① Press Program Mode

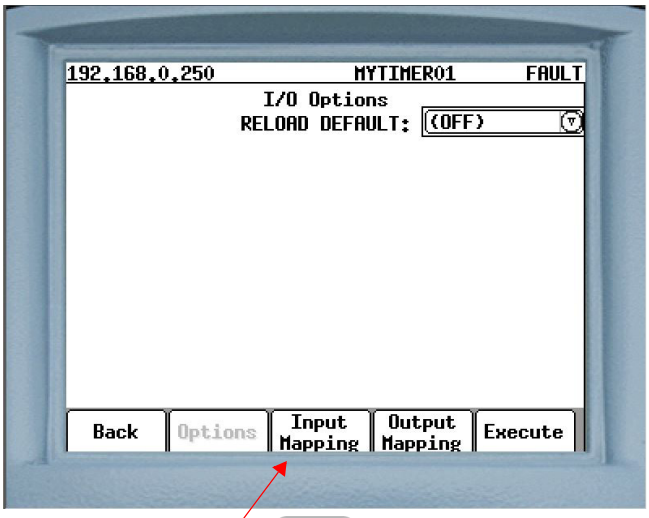
② Press More E F5



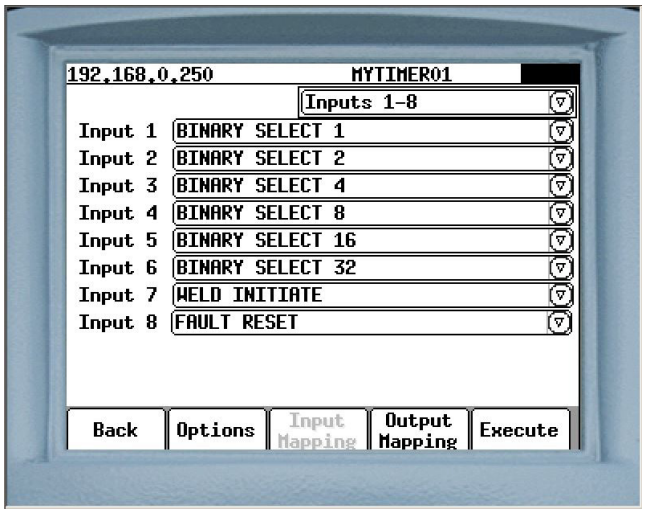
③ Press More



④ Press I/O Mapping.



C F3 ⑤ Press Input Mapping.



⑤ Press SPACE ENTER to open a drop down box which will show the available mappable inputs. The total number of available inputs is dependent on the type and number of I/O cards installed. They work in multiples of 8. A single card allows 16 inputs and 10 outputs and two cards allow 32 inputs and 20 outputs.

Using the S arrow key navigate to the default line you want mapped. For detailed instructions on mapping I/O refer to I/O Mapping on page 00

DIO (DISCRETE I/O) INPUTS - DEFAULT 1

INPUT #	INPUT NAME	TAG
1.	BINARY SELECT 1	BS1
2.	BINARY SELECT 2	BS2
3.	BINARY SELECT 4	BS4
4.	BINARY SELECT 8	BS8
5.	BINARY SELECT 16	BS16
6.	BINARY SELECT 32	BS32
7.	WELD INITIATE	INT
8.	FAULT RESET	FR
9.	PRESSURE SWITCH	PS1
10.	WELD PROCEED	WP1
11.	STEPPER RESET	SR
12.	TIP DRESS	TIPD
13.	SYSTEM COOLING	COOL
14.	WELD / NO WELD	WLD
15.	PROGRAM DISPLAY SECURITY	PSEC
16.	HEAT DISPLAY SECURITY	HSEC
17.	NONE	-
18.	NONE	-
19.	NONE	-
20.	NONE	-
21.	NONE	-
22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-

26.	NONE	-
27.	NONE	-
28.	NONE	-
29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-

DIO (DISCRETE I/O) OUTPUTS - DEFAULT 1

OUTPUT #	OUTPUT NAME	TAG
1.	VALVE 1	V1
2.	VALVE 2	V2
3.	VALVE 3	V3
4.	VALVE 4	V4
5.	PRESSURE SELECT 1	PS1
6.	PRESSURE SELEECT 2	PS2
7.	WELD COMPLETE	WCPL
8.	END OF STEPPER	EOS
9.	ALERT	ALT
10.	FAULT	FLT
11.	*NONE*	-
12.	*NONE*	-
13.	*NONE*	-
14.	*NONE*	-
15.	*NONE*	-
16.	*NONE*	-
17.	*NONE*	-
18.	*NONE*	-
19.	*NONE*	-
20.	*NONE*	-

21.	*NONE*	-
22.	*NONE*	-
23.	*NONE*	-
24.	*NONE*	-
25.	*NONE*	-
26.	*NONE*	-
27.	*NONE*	-
28.	*NONE*	-
29.	*NONE*	-
30.	*NONE*	-
31.	*NONE*	-
32.	*NONE*	-

☞

NOTE: Default lines 11 to 16 and 27 to 32 labeled NONE (shaded gray) are not mappable. If mapping is attempted at these points it will show in the window but will not be executed. The available I/O points are determined by the type and number of I/O cards installed. Software G08300 allows 10 mappable outputs when a single I/O card is installed and 20 if two I/O cards are installed.

DIO (DISCRETE I/O) INPUTS DEFAULT 2

INPUT #	INPUT NAME	TAG
1.	BINARY SELECT 1	BS1
2.	BINARY SELECT 2	BS2
3.	BINARY SELECT 4	BS4
4.	BINARY SELECT 8	BS8
5.	BINARY SELECT 16	BS16
6.	BINARY SELECT 32	BS32
7.	WELD INITIATE	INT
8.	WELD / NO WELD	WLD
9.	PRESSURE SWITCH	PS1
10.	FAULT RESET	FR
11.	WELD PROCEED	WP1
12.	STEPPER RESET	SR
13.	SYSTEM COOLING	COOL
14.	NONE	-
15.	CONTROL STOP	CSTP
16.	USER INPUT1	UI 1
17.	NONE	-
18.	NONE	-
19.	NONE	-
20.	NONE	-
21.	NONE	-
22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-
26.	NONE	-

27.	NONE	-
28.	NONE	-
29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-

DIO (DISCRETE I/O) OUTPUTS DEFAULT 2

OUTPUT #	OUTPUT NAME	TAG
1.	FAULT	FLT
2.	ALERT	ALT
3.	WELD COMPLETE	WCPL
4.	READY TO WELD	RTW
5.	END OF STEPPER	EOS
6.	STEPPER APPROACHING MAX	SALT
7.	VALVE 1	V1
8.	VALVE 2	V2
9.	VALVE 3	V3
10.	USER OUTPUT 1	UO1
11.	NONE	-
12.	NONE	-
13.	NONE	-
14.	NONE	-
15.	NONE	-
16.	NONE	-
17.	NONE	-
18.	NONE	-
19.	NONE	-
20.	NONE	-
21.	NONE	-

22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-
26.	NONE	-
27.	NONE	-
28.	NONE	-
29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-

FIELDBUS INPUTS- DEFAULT 1

INPUT #	FIELDBUS INPUT BIT NAME	TAG NAME	BYTE SIZE			
1	WELD / NO WELD	WLD				
2	FAULT RESET	FR				
3	APP ERR ACKNOWLEDGE	FACK				
4	BINARY SELECT 1	BS1				
5	BINARY SELECT 2	BS2				
6	BINARY SELECT 4	BS4				
7	BINARY SELECT 8	BS8				
8	BINARY SELECT 16	BS16				
9	BINARY SELECT 32	BS32	2 by 2			
10	WELD INITIATE	INT				
11	NONE	-				
12	NONE	-				
13	STEPPER RESET	SR				
14	ISOLATION CONTACTOR SAVER	CSVR				
15	CONTROL STOP	CSTP				
16	TIP DRESS	TIPD				
17	NONE	-				
18	STEPPER RESET GROUP 1	SRG1				
19	STEPPER RESET GROUP 2	SRG2				
20	NONE	-		4 by 4		
21	TIP DRESS GROUP 1	TDG1				
22	TIP DRESS GROUP 2	TDG2				
23	NONE	-				
24	NONE	-				
25	NONE	-				

26	NONE	-			6 by 6	8 by 8
27	NONE	-				
28	NONE	-				
29	NONE	-				
30	NONE	-				
31	NONE	-				
32	NONE	-				
33	NONE	-				
34	NONE	-				
35	NONE	-				
36	NONE	-				
37	NONE	-				
38	NONE	-				
39	NONE	-				
40	NONE	-				
41	NONE	-				
42	NONE	-				
43	NONE	-				
44	NONE	-				
45	NONE	-				
46	NONE	-				
47	NONE	-				
48	NONE	-				
49	NONE	-				
50	NONE	-				
51	NONE	-				
52	NONE	-				
53	NONE	-				
54	NONE	-				
55	NONE	-				
56	NONE	-				
57	NONE	-				
58	NONE	-				

59	NONE	-				
60	NONE	-				
61	NONE	-				
62	NONE	-				
63	NONE	-				
64	NONE	-				

FIELDBUS OUTPUTS - DEFAULT 1

OUTPUT #	FIELDBUS OUTPUT BIT NAME	TAG NAME	BYTE SIZE			
1	WELD MODE ON	WMON	2 by 2	4 by 4		
2	NO FAULT	NFLT				
3	NO ALERT	NALT				
4	APP ERROR AVAILABLE	EVAL				
5	APP ERROR BIT 1	ER1				
6	APP ERROR BIT 2	ER2				
7	APP ERROR BIT 4	ER4				
8	APP ERROR BIT 8	ER8				
9	APP ERROR BIT 16	ER16				
10	WELD COMPLETE	WCPL				
11	WELD IN PROGRESS	WIP				
12	STEPPERS ARE RESET	SRST				
13	STEPPER APPROACHING MAX	SALT				
14	END OF STEPPER	EOS				
15	READY TO WELD	RTW				
16	TIP DRESS REQUEST	TDR				
17	NONE	-				
18	STEPPERS ARE RESET GROUP 1	SRG1				
19	STEPPERS ARE RESET GROUP 2	SRG2				

20	NONE	-			6 by 6	8 by 8
21	END OF STEPPER GROUP 1	ESG1				
22	END OF STEPPER GROUP 2	ESG2				
23	NONE	-				
24	STPR APPROACHING MAX GROUP 1	SAG1				
25	STPR APPROACHING MAX GROUP 2	SAG2				
26	NONE	-				
27	TIP DRESS REQUEST GROUP 1	TDG1				
28	TIP DRESS REQUEST GROUP 2	TDG2				
29	NONE	-				
30	NONE	-				
31	NONE	-				
32	NONE	-				
33	NONE	-				
34	NONE	-				
35	NONE	-				
36	NONE	-				
37	NONE	-				
38	NONE	-				
39	NONE	-				
40	NONE	-				
41	NONE	-				
42	NONE	-				
43	NONE	-				
44	NONE	-				
45	NONE	-				
46	NONE	-				
47	NONE	-				
48	NONE	-				
49	NONE	-				
50	NONE	-				
51	NONE	-				
52	NONE	-				

53	NONE	-				
54	NONE	-				
55	NONE	-				
56	NONE	-				
57	NONE	-				
58	NONE	-				
59	NONE	-				
60	NONE	-				
61	NONE	-				
62	NONE	-				
63	NONE	-				
64	NONE	-				

FIELDBUS INPUTS DEFAULT 2

INPUT #	FIELDBUS INPUT BIT NAME	TAG NAME	BYTE SIZE			
1	WELD / NO WELD	WLD				
2	FAULT RESET	FR				
3	ISOLATION CONTACTOR SAVER	CSVR				
4	NONE	-				
5	NONE	-				
6	NONE	-				
7	WELD INITIATE	INT				
8	STEPPER RESET	SR				
9	BINARY SELECT 1	BS1				
10	BINARY SELECT 2	BS2				
11	BINARY SELECT 4	BS4	2 by 2			
12	BINARY SELECT 8	BS8				
13	BINARY SELECT 16	BS16				

14	BINARY SELECT 32	BS32		4 by 4	6 by 6	8 by 8
15	BINARY SELECT 64	BS64				
16	BINARY SELECT 128	BS128				
17	SPOT 9 (256)	S9				
18	SPOT 10 (512)	S10				
19	SPOT 11 (1024)	S11				
20	SPOT 12 (2048)	S12				
21	SPOT 13 (4096)	S13				
22	SPOT 14 (8192)	S14				
23	SPOT 15 (16384)	S15				
24	SPOT 16 (32768)	S16				
25	SPOT 17 (65536)	S17				
26	SPOT 18 (131072)	S18				
27	SPOT 19 (262144)	S19				
28	SPOT 20 (524288)	S20				
29	SPOT 21 (1048576)	S21				
30	SPOT 22 (2097152)	S22				
31	SPOT 23 (4194304)	S23				
32	SPOT 24 (8388608)	S24				
33	SPOT 25 (16777216)	S25				
34	SPOT 26 (33554432)	S26				
35	SPOT 27 (67108864)	S27				
36	SPOT 28 (134217728)	S28				
37	SPOT 29 (268435456)	S29				
38	SPOT 30 (536870912)	S30				
39	NONE	-				
40	NONE	-				
41	NONE	-				
42	NONE	-				
43	NONE	-				
44	NONE	-				
45	NONE	-				
46	NONE	-				

47	NONE	-				
48	NONE	-				
49	NONE	-				
50	NONE	-				
51	NONE	-				
52	NONE	-				
53	NONE	-				
54	NONE	-				
55	NONE	-				
56	NONE	-				
57	NONE	-				
58	NONE	-				
59	NONE	-				
60	NONE	-				
61	NONE	-				
62	NONE	-				
63	NONE	-				
64	NONE	-				

FIELDBUS OUTPUTS DEFAULT 2

OUTPUT #	FIELDBUS OUTPUT BIT NAME	TAG NAME	BYTE SIZE			
1	WELD MODE ON	WMON				
2	NO FAULT	NFLT				
3	NO ALERT	NALT				
4	APP ERROR AVAILABLE	EVAL				
5	APP ERROR BIT 1	ER1				
6	APP ERROR BIT 2	ER2	2 by 2			
7	APP ERROR BIT 4	ER4				

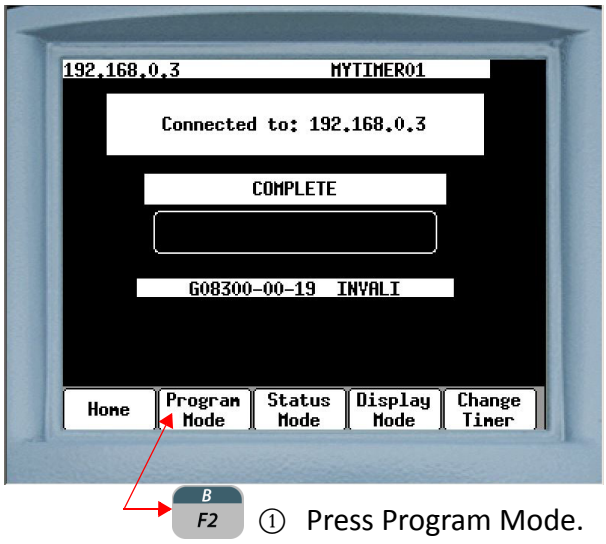
8	APP ERROR BIT 8	ER8		4 by 4	6 by 6	8 by 8
9	APP ERROR BIT 16	ER16				
10	WELD COMPLETE	WCPL				
11	WELD IN PROGRESS	WIP				
12	STEPPERS ARE RESET	SRST				
13	STEPPER APPROACHING MAX	SALT				
14	END OF STEPPER	EOS				
15	READY TO WELD	RTW				
16	TIP DRESS REQUEST	TDR				
17	NONE	-				
18	STEPPERS ARE RESET GROUP 1	SRG1				
19	STEPPERS ARE RESET GROUP 2	SRG2				
20	NONE	-				
21	END OF STEPPER GROUP 1	ESG1				
22	END OF STEPPER GROUP 2	ESG2				
23	NONE	-				
24	STEPPER APPROACHING MAX GROUP 1	SAG1				
25	STEPPER APPROACHING MAX GROUP 2	SAG2				
26	NONE	-				
27	TIP DRESS REQUEST GROUP 1	TDG1				
28	TIP DRESS GROUP 2	TDG2				
29	NONE	-				
30	NONE	-				
31	NONE	-				
32	NONE	-				
33	NONE	-				
34	NONE	-				
35	NONE	-				
36	NONE	-				
37	NONE	-				
38	NONE	-				
39	NONE	-				
40	NONE	-				

41	NONE	-				
42	NONE	-				
43	NONE	-				
44	NONE	-				
45	NONE	-				
46	NONE	-				
47	NONE	-				
48	NONE	-				
49	NONE	-				
50	NONE	-				
51	NONE	-				
52	NONE	-				
53	NONE	-				
54	NONE	-				
55	NONE	-				
56	NONE	-				
57	NONE	-				
58	NONE	-				
59	NONE	-				
60	NONE	-				
61	NONE	-				
62	NONE	-				
63	NONE	-				
64	NONE	-				

EIP IP I/O DEFAULTS

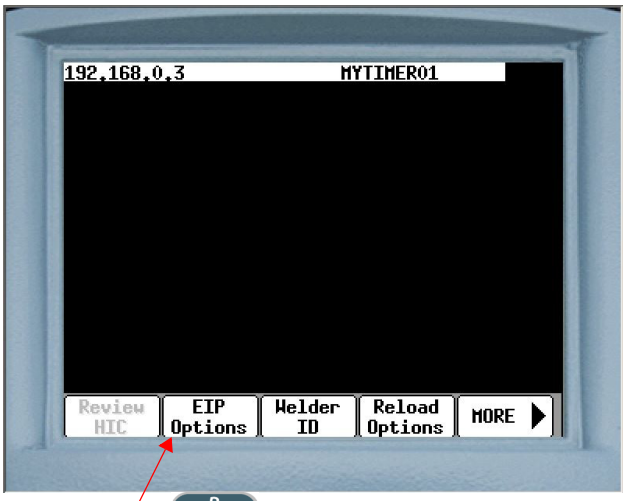
In weld processor software G08300, there are a maximum of 64 inputs and outputs that can be mapped. The number of mapped inputs and outputs is determined by selecting a Type and Size in the EIP configuration options, whose product is less than or equal to 64. The default map below is configured for 64 inputs and outputs. For more information, see EtherNet Setup in Chapter 5: Communications Setup.

Timer software G08300 offers 2 EIP I/O defaults. The following procedure describes navigation to EIP I/O Default 1 using the DEP 300s.

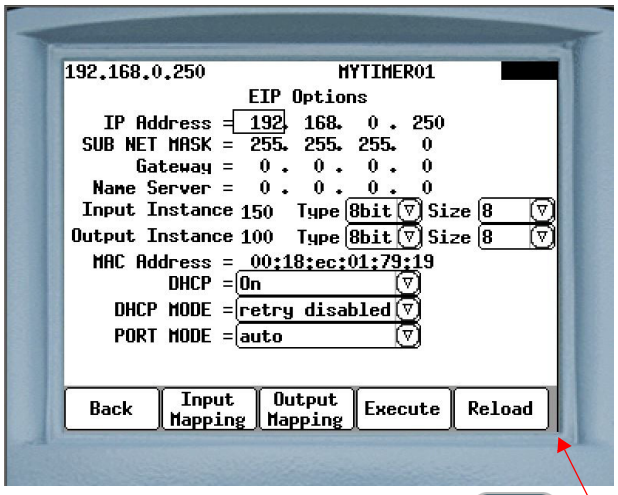


① Press Program Mode.

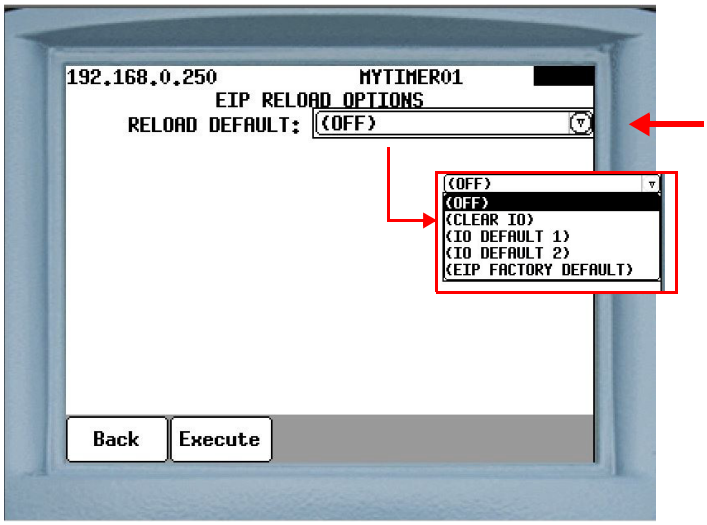
② Press More.



③ Press EIP Options

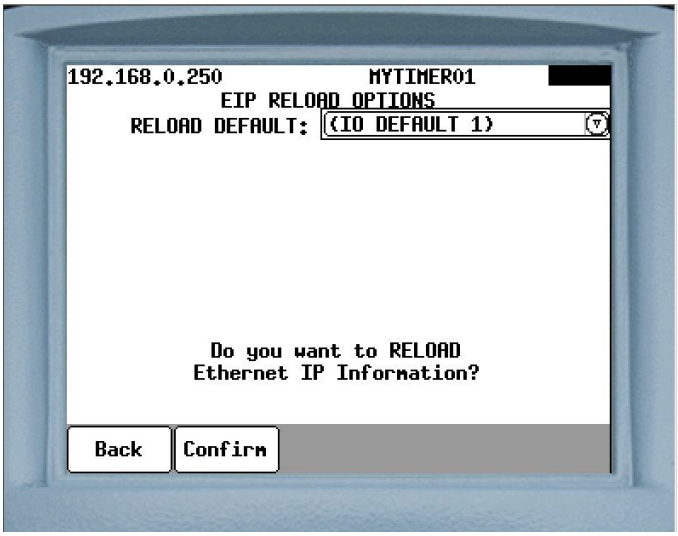


④ Press Reload



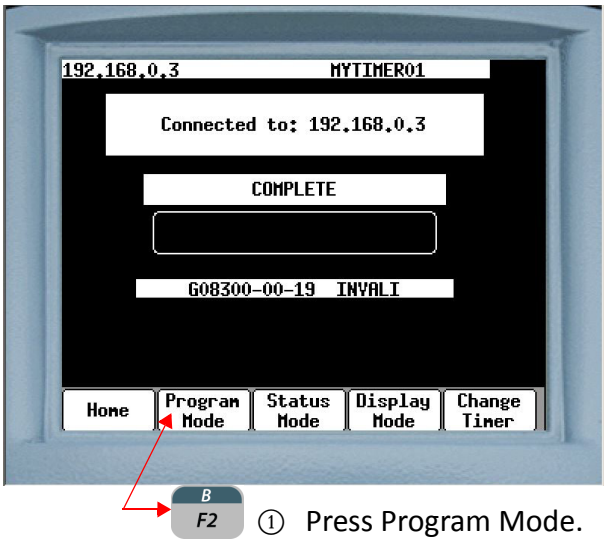
⑤ Press SPACE ENTER This opens a drop down list of Reload Defaults. Use the S ↓ Select your desired default option and press SPACE ENTER

As the selected default is displayed in the Reload Default window press Execute B F2



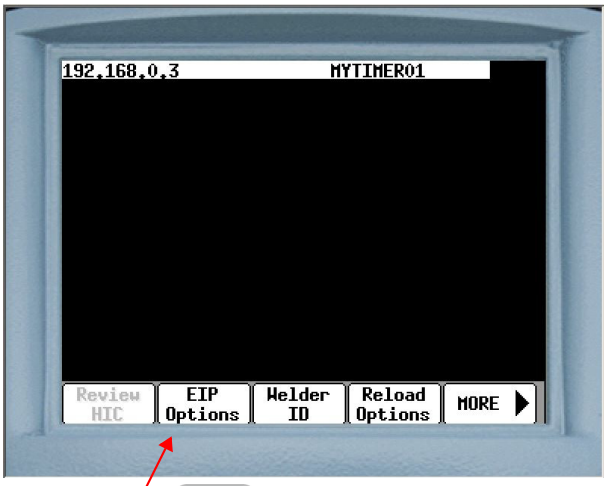
⑥ The message “Do you want to RELOAD Ethernet IP Information?” is displayed. Press B F2 to Confirm the selection. This is followed by the prompt “Download Complete Power Cycle Required.” Cycle power to apply the selection.

Having made the selection of default options (IO Default 1, IO Default 2, EIP Factory Default) as detailed in the procedure on the previous pages, follow the steps below to map the available EIP I/O points.

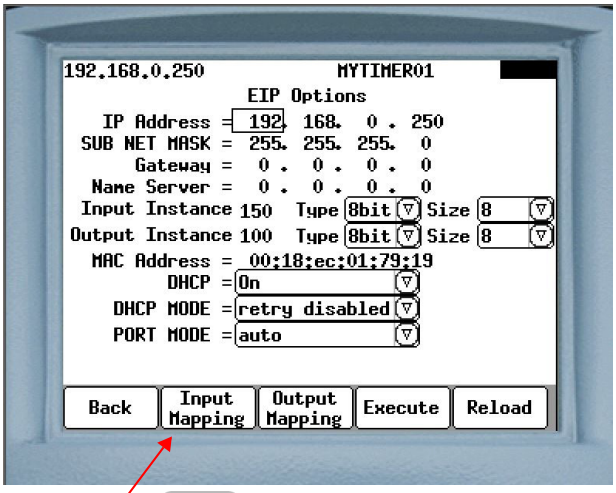


① Press Program Mode.

② Press More.



B F2 ③ Press EIP Options



B F2 ④ Press Input Mapping.

For Output Mapping follow the same procedure until step 4 and press C F3

For detailed I/O mapping instructions refer to Page 00

EIP I/O INPUTS DEFAULT 1

INPUT #	EIP INPUT BIT NAME	TAG NAME
1.	WELD / NO WELD	WLD
2.	FAULT RESET	FR
3.	ISOLATION CONTACTOR SAVER	CSVR
4.	NONE	-
5.	NONE	-
6.	NONE	-
7.	WELD INITIATE	INT
8.	STEPPER RESET	SR
9.	BINARY SELECT 1	BS1
10.	BINARY SELECT 2	BS2
11.	BINARY SELECT 4	BS4
12.	BINARY SELECT 8	BS8
13.	BINARY SELECT 16	BS16
14.	BINARY SELECT 32	BS32
15.	NONE	-
16.	NONE	-
17.	NONE	-
18.	NONE	-
19.	NONE	-
20.	NONE	-
21.	NONE	-
22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-
26.	NONE	-
27.	NONE	-
28.	NONE	-

29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-
33.	NONE	-
34.	NONE	-
35.	NONE	-
36.	NONE	-
37.	NONE	-
38.	NONE	-
39.	NONE	-
40.	NONE	-
41.	NONE	-
42.	NONE	-
43.	NONE	-
44.	NONE	-
45.	NONE	-
46.	NONE	-
47.	NONE	-
48.	NONE	-
49.	NONE	-
50.	NONE	-
51.	NONE	-
52.	NONE	-
53.	NONE	-
54.	NONE	-
55.	NONE	-
56.	NONE	-
57.	NONE	-
58.	NONE	-
59.	NONE	-

60.	NONE	-
61.	NONE	-
62.	NONE	-
63.	NONE	-
64.	NONE	-

EIP OUTPUTS DEFAULT 1

OUTPUT #	EIP OUTPUT BIT NAME	TAG NAME
1.	NO ALERT	NALT
2.	STEPPER APPROACHING MAX	SALT
3.	END OF STEPPER	EOS
4.	VALVE 1	V1
5.	VALVE 2	V2
6.	VALVE 3	V3
7.	VALVE 4	V4
8.	NONE	-
9.	NO FAULT	NFLT
10.	WELD MODE ON	WMON
11.	WELD COMPLETE	WCPL
12.	WELD IN PROGRESS	WIP
13.	STEPPERS ARE RESET	SRST
14.	TIP DRESS REQUEST	TDR
15.	NONE	-
16.	NONE	-
17.	NONE	-
18.	NONE	-
19.	NONE	-

20.	NONE	-
21.	NONE	-
22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-
26.	NONE	-
27.	NONE	-
28.	NONE	-
29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-
33.	NONE	-
34.	NONE	-
35.	NONE	-
36.	NONE	-
37.	NONE	-
38.	NONE	-
39.	NONE	-
40.	NONE	-
41.	NONE	-
42.	NONE	-
43.	NONE	-
44.	NONE	-
45.	NONE	-
46.	NONE	-
47.	NONE	-
48.	NONE	-
49.	NONE	-
50.	NONE	-

51.	NONE	-
52.	NONE	-
53.	NONE	-
54.	NONE	-
55.	NONE	-
56.	NONE	-
57.	NONE	-
58.	NONE	-
59.	NONE	-
60.	NONE	-
61.	NONE	-
62.	NONE	-
63.	NONE	-
64.	NONE	-

EIP INPUTS DEFAULT 2

INPUT #	EIP INPUT BIT NAME	TAG NAME
1.	WELD / NO WELD	WLD
2.	FAULT RESET	FR
3.	ISOLATION CONTACTOR SAVER	CSVR
4.	NONE	-
5.	NONE	-
6.	NONE	-
7.	WELD INITIATE	INT
8.	STEPPER RESET	SR
9.	BINARY SELECT 1	BS1
10.	BINARY SELECT 2	BS2
11.	BINARY SELECT 4	BS4
12.	BINARY SELECT 8	BS8

13.	BINARY SELECT 16	BS16
14.	BINARY SELECT 32	BS32
15.	BINARY SELECT 64	BS64
16.	BINARY SELECT 128	BS128
17.	SPOT 9 (256)	S9
18.	SPOT 10 (512)	S10
19.	SPOT 11 (1024)	S11
20.	SPOT 12 (2048)	S12
21.	SPOT 13 (4096)	S13
22.	SPOT 14 (8192)	S14
23.	SPOT 15 (16384)	S15
24.	SPOT 16 (32768)	S16
25.	SPOT 17 (65536)	S17
26.	SPOT 18 (131072)	S18
27.	SPOT 19 (262144)	S19
28.	SPOT 20 (524288)	S20
29.	SPOT 21 (1048576)	S21
30.	SPOT 22 (2097152)	S22
31.	SPOT 23 (4194304)	S23
32.	SPOT 24 (8388608)	S24
33.	SPOT 25 (16777216)	S25
34.	SPOT 26 (33554432)	S26
35.	SPOT 27 (67108864)	S27
36.	SPOT 28 (134217728)	S28
37.	SPOT 29 (268435456)	S29
38.	SPOT 30 (536870912)	S30
39.	NONE	-
40.	NONE	-
41.	NONE	-
42.	NONE	-
43.	NONE	-

44.	NONE	-
45.	NONE	-
46.	NONE	-
47.	NONE	-
48.	NONE	-
49.	NONE	-
50.	NONE	-
51.	NONE	-
52.	NONE	-
53.	NONE	-
54.	NONE	-
55.	NONE	-
56.	NONE	-
57.	NONE	-
58.	NONE	-
59.	NONE	-
60.	NONE	-
61.	NONE	-
62.	NONE	-
63.	NONE	-
64.	NONE	-

EIP OUTPUTS DEFAULT 2

OUTPUT #	EIP OUTPUT BIT NAME	TAG NAME
1.	NO ALERT	NALT
2.	STEPPER APPROACHING MAX	SALT
3.	END OF STEPPER	EOS
4.	VALVE 1	V1

5.	VALVE 2	V2
6.	VALVE 3	V3
7.	VALVE 4	V4
8.	NONE	-
9.	NO FAULT	NFLT
10.	WELD MODE ON	WMON
11.	WELD COMPLETE	WCPL
12.	WELD IN PROGRESS	WIP
13.	STEPPERS ARE RESET	SRST
14.	TIP DRESS REQUEST	TDR
15.	NONE	-
16.	NONE	-
17.	NONE	-
18.	NONE	-
19.	NONE	-
20.	NONE	-
21.	NONE	-
22.	NONE	-
23.	NONE	-
24.	NONE	-
25.	NONE	-
26.	NONE	-
27.	NONE	-
28.	NONE	-
29.	NONE	-
30.	NONE	-
31.	NONE	-
32.	NONE	-
33.	NONE	-
34.	NONE	-
35.	NONE	-

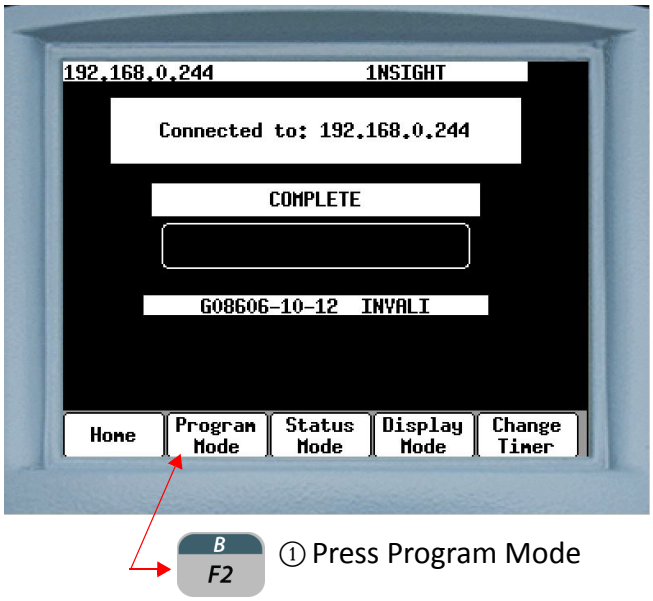
36.	NONE	-
37.	NONE	-
38.	NONE	-
39.	NONE	-
40.	NONE	-
41.	NONE	-
42.	NONE	-
43.	NONE	-
44.	NONE	-
45.	NONE	-
46.	NONE	-
47.	NONE	-
48.	NONE	-
49.	NONE	-
50.	NONE	-
51.	NONE	-
52.	NONE	-
53.	NONE	-
54.	NONE	-
55.	NONE	-
56.	NONE	-
57.	NONE	-
58.	NONE	-
59.	NONE	-
60.	NONE	-
61.	NONE	-
62.	NONE	-
63.	NONE	-
64.	NONE	-

I/O MAPPING

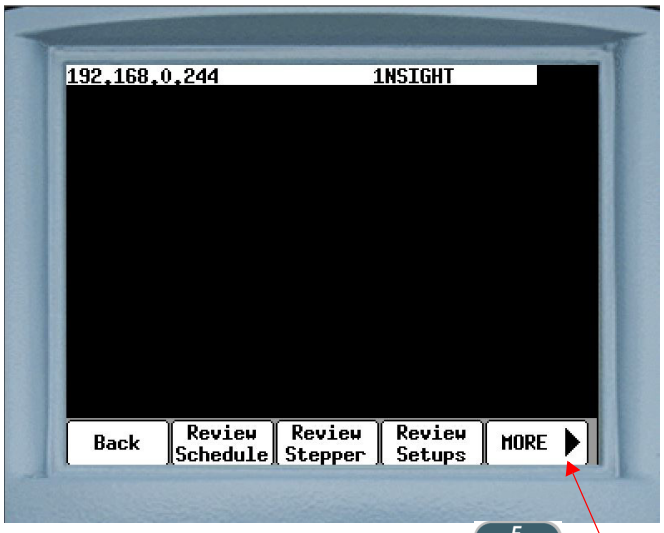
The WT6000 is designed with Flexible I/O. This means the user has the capability of reconfiguring the I/O to meet the requirements of a particular application. There are 16 configurable inputs and 10 configurable outputs.

FIELDBUS INPUT MAPPING

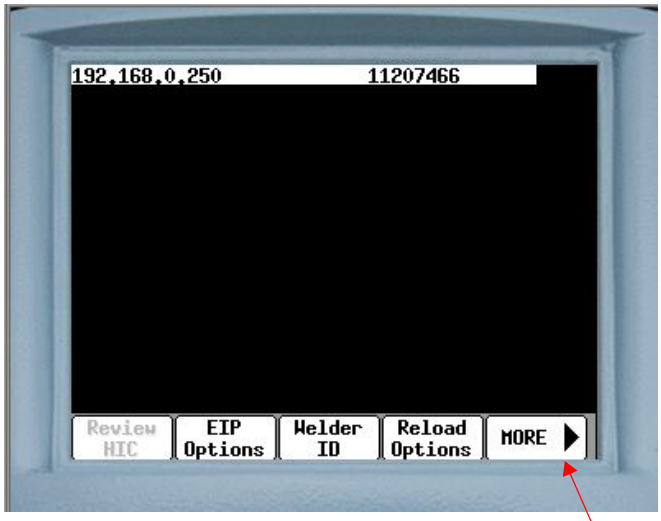
The following explains how to reconfigure the FieldBus Input Map. In this example, Input 8 will be re-mapped from the BINARY SELECT 128 bit to the TIP DRESS bit:



① Press Program Mode

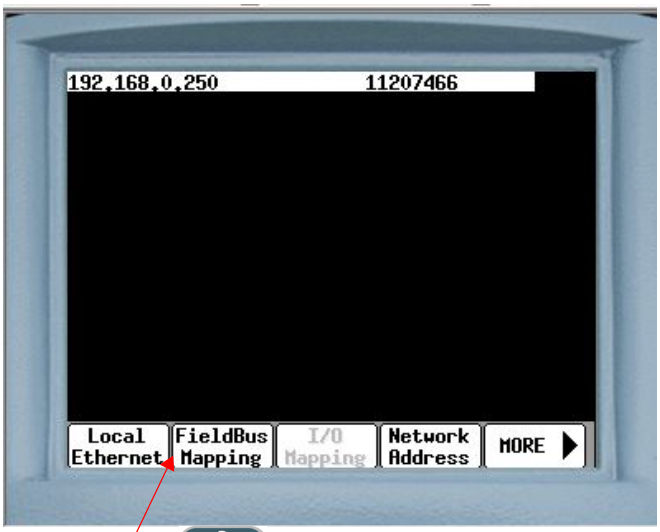


② Press More



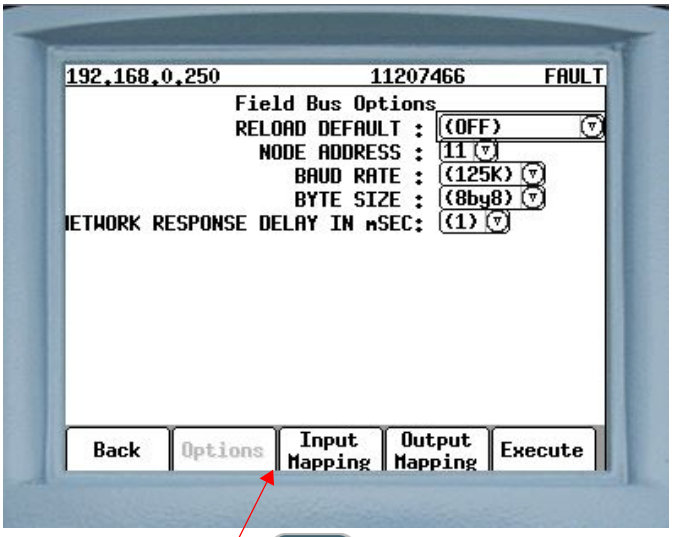
③ Press More

E
F5

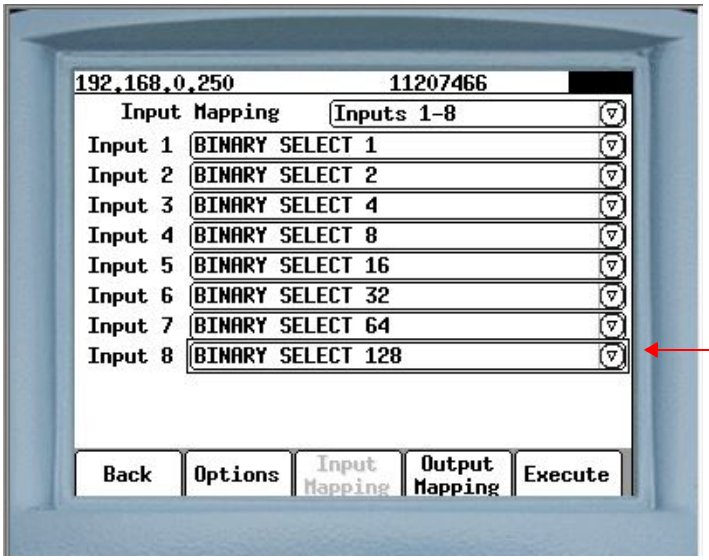


B
F2

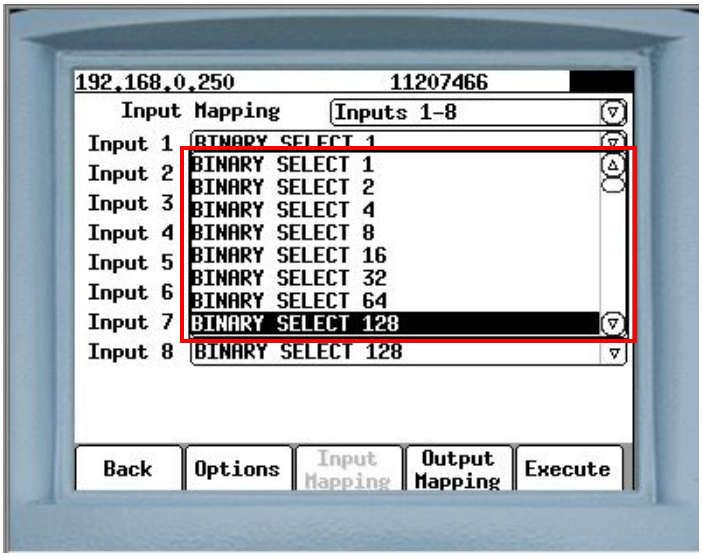
④ Press Fieldbus Mapping



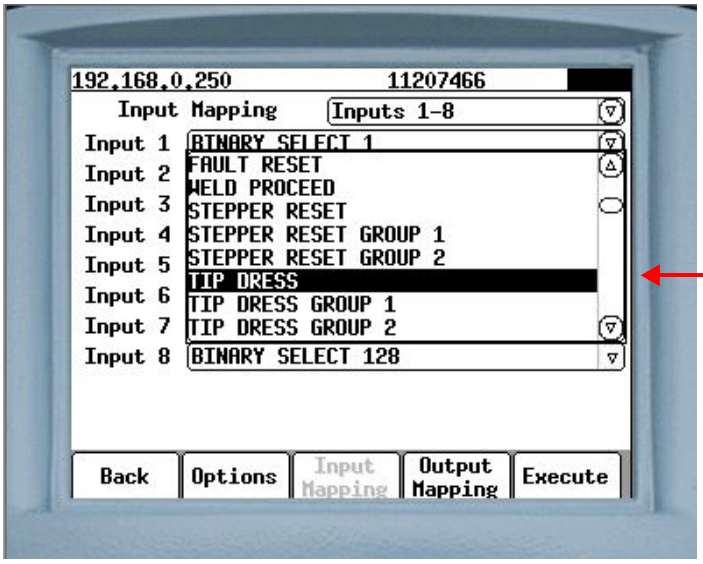
C F3 ⑤ Press Input Mapping



⑥ Press the S ↓ arrow key to move the cursor to the “Input 8" field.

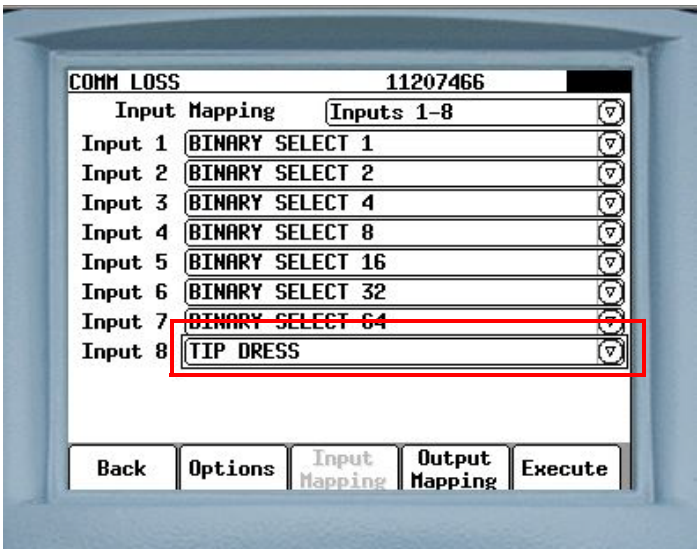


⑦ Press SPACE ENTER A drop-down box will appear containing all the available input bits.

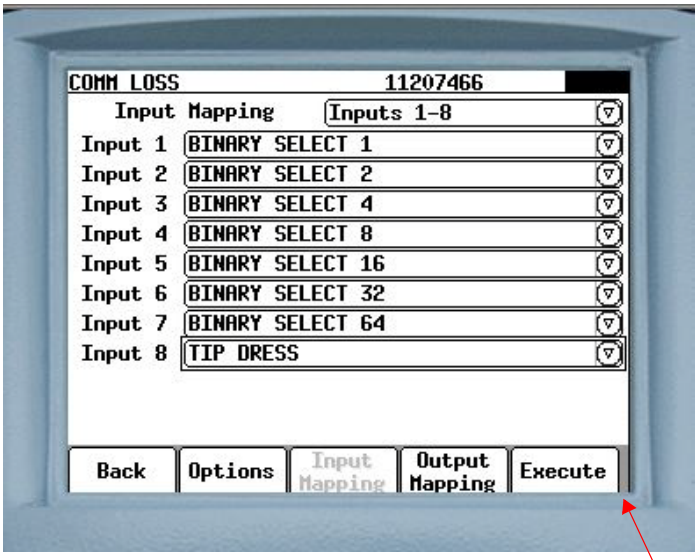


⑧ Press the S ↓ arrow key until the cursor is on the TIP DRESS bit.

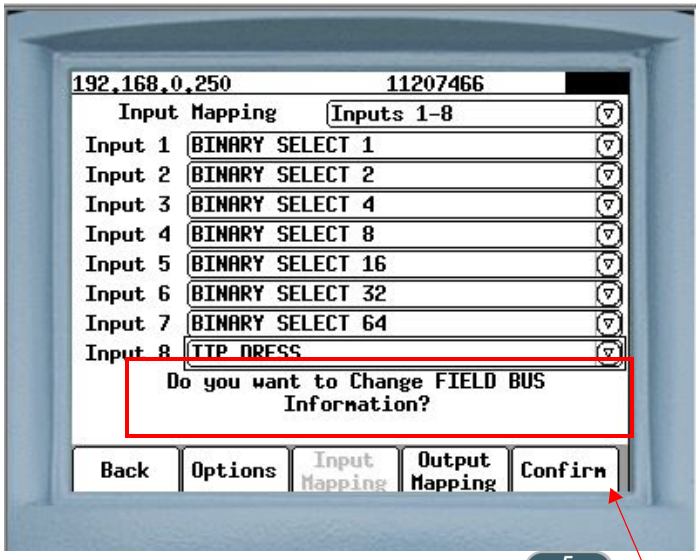
⑨ Press ENTER SPACE ENTER



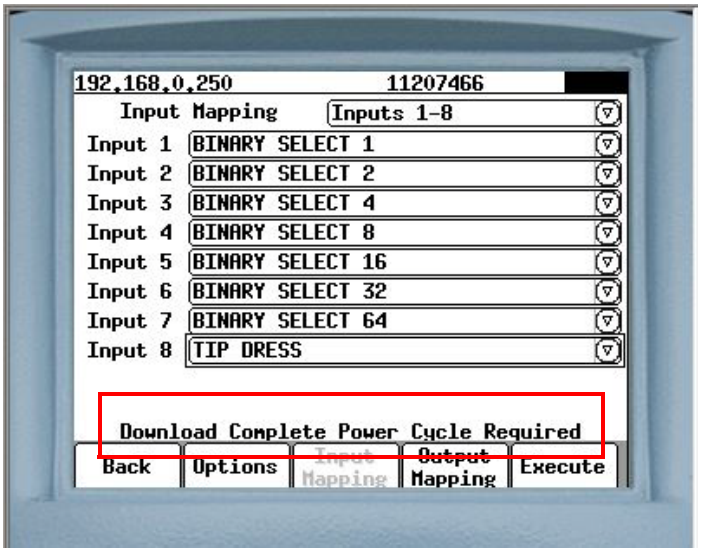
⑩ BINARY SELECT 128 will be replaced with TIP DRESS in the Input 8 field.



⑪ Press Execute. This begins the process to download the change to the weld processor.



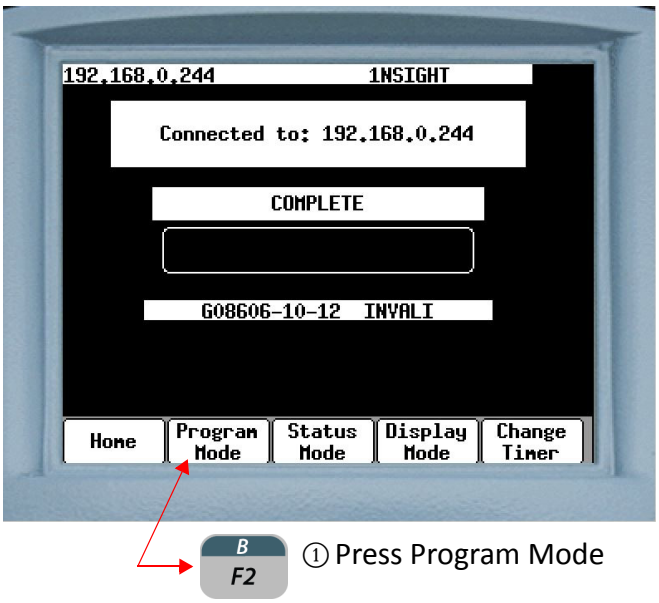
⑫ The message “Do you want to Change FIELD BUS Information” will appear. Press Confirm.



⑬ The message “Download Complete Power Cycle Required” will appear. Re-cycle power on the weld control to complete the process.

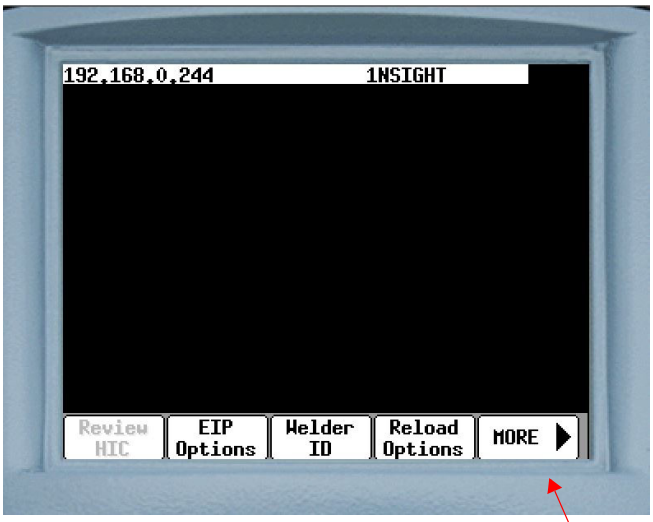
FIELDBUS OUTPUT MAPPING

The following explains how to reconfigure the FieldBus Output Map. In this example, Output 11 will be re-mapped from the NONE bit to the TIP DRESS REQUEST bit.



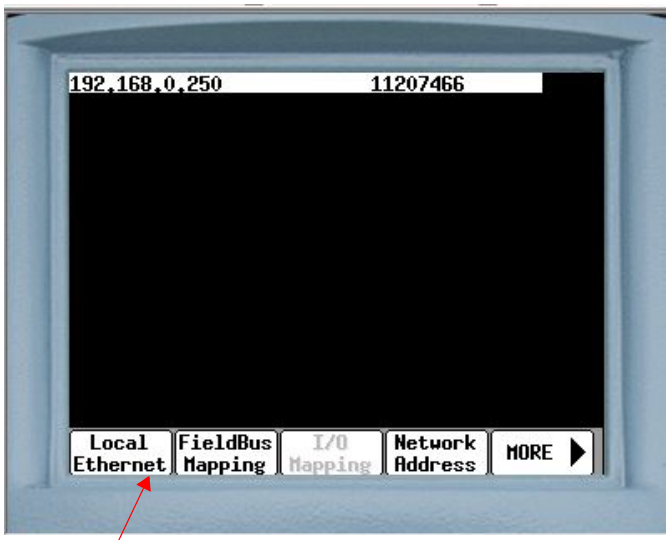
① Press Program Mode

② Press More



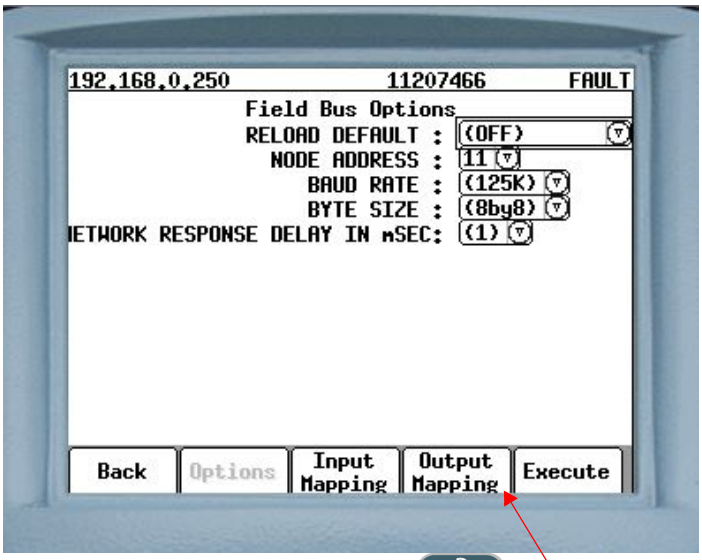
③ Press More

E
F5

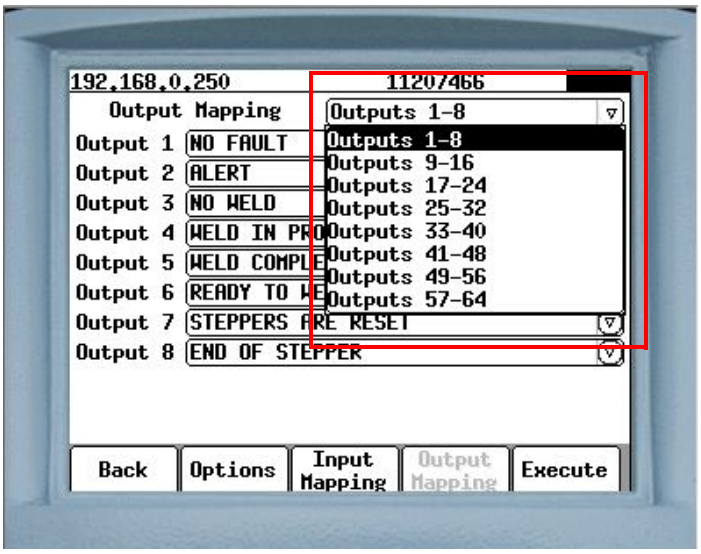


B
F2

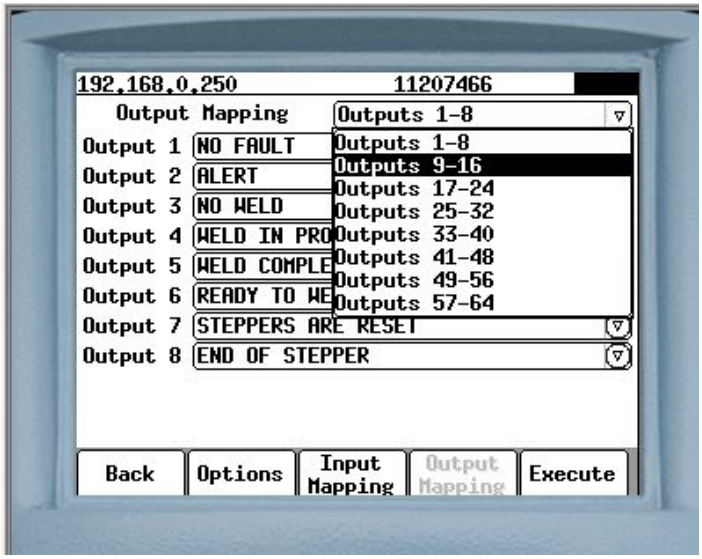
④ Press Fieldbus Mapping



⑤ Press output Mapping D F4

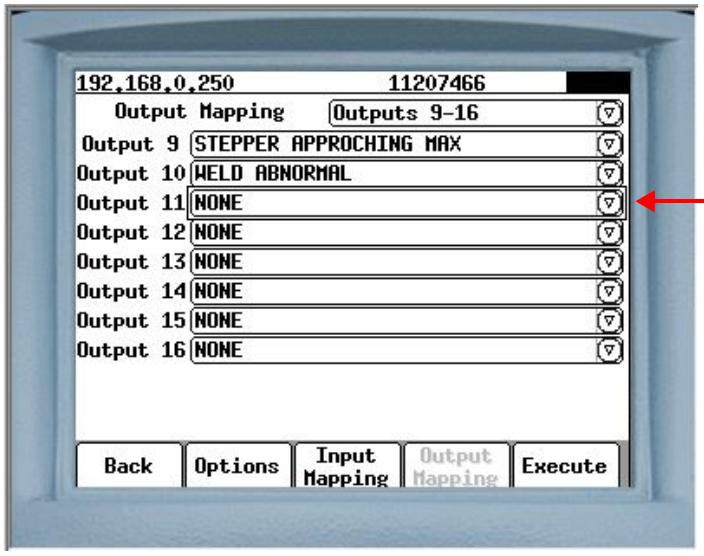


⑥ Press SPACE ENTER A drop-down box will appear.

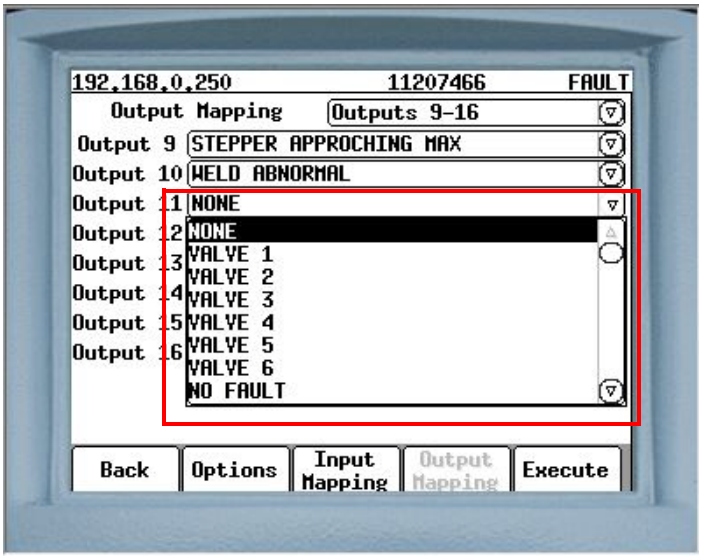


⑦ Press the S arrow key once to move the cursor to "Outputs 9-16"

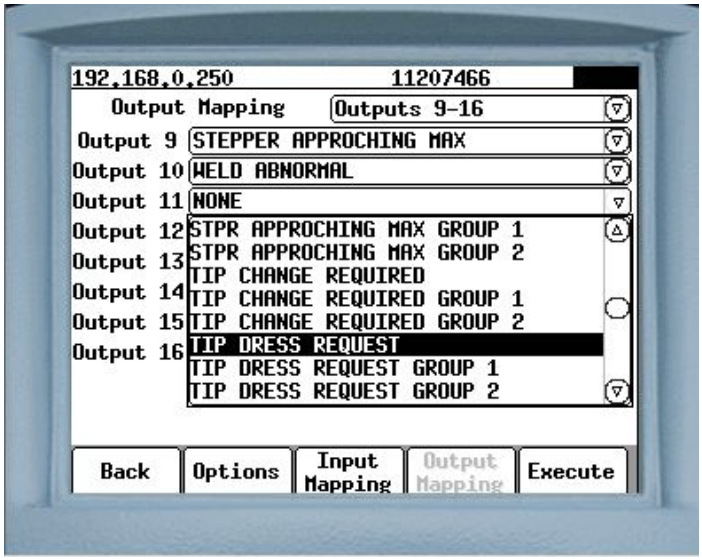
⑧ Press ENTER SPACE ENTER



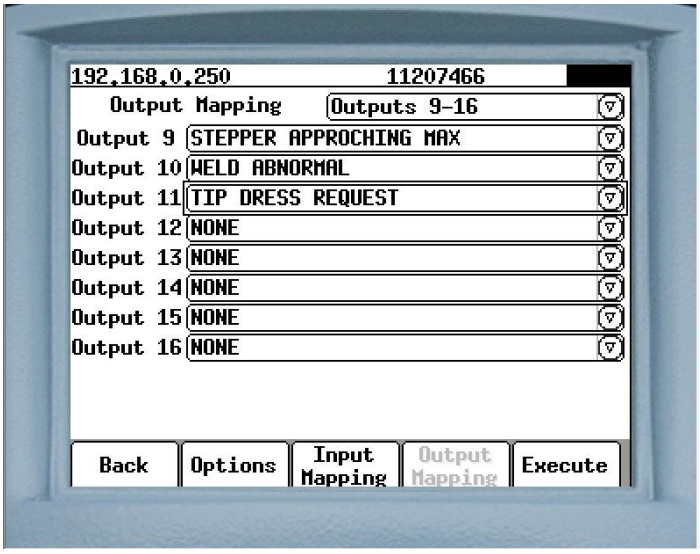
⑨ Press the S arrow key to move the cursor to the "Output 11" field.



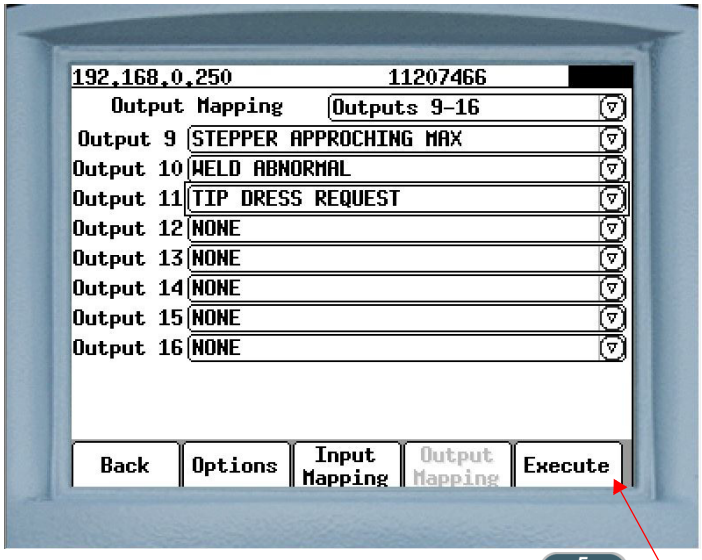
⑩ Press SPACE / ENTER A drop-down box will appear containing all the available output bits.



⑪ Press the S ↓ arrow key until the cursor is on the TIP DRESS REQUEST bit.

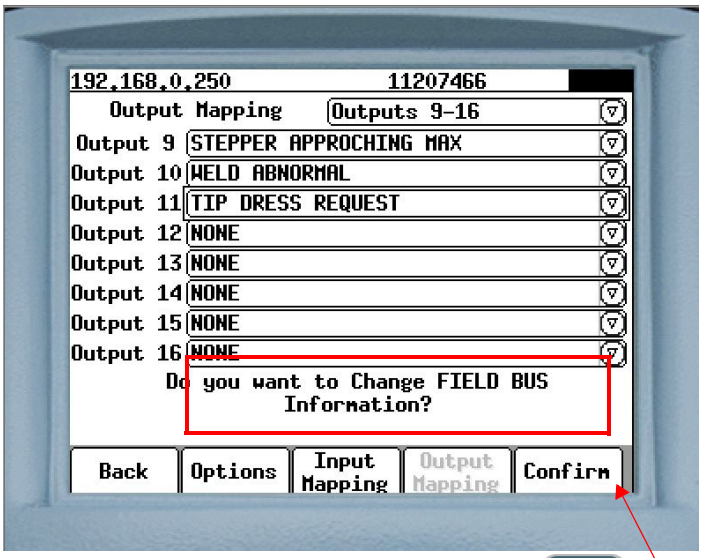


⑫ Press SPACE / ENTER NONE will be replaced with TIP DRESS REQUEST in the Output 11 field.

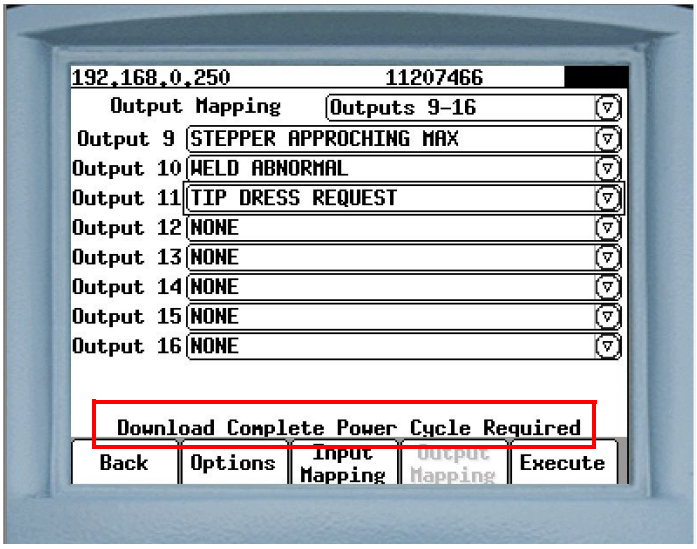


⑬ Press Execute E / F5

This begins the process to download the change to the weld processor.



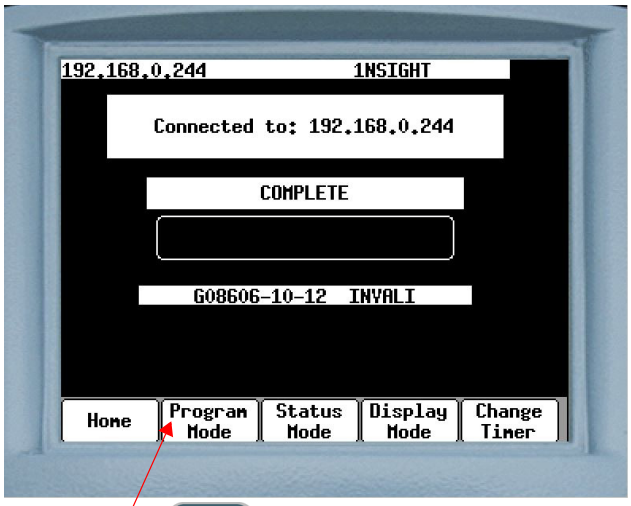
⑭ The message “Do you want to Change FIELD BUS Information” will appear. Press Confirm.



⑮ The message “Download Complete Power Cycle Required” will appear. Re-cycle power on the weld control to complete the process.

EIP I/O MAPPING

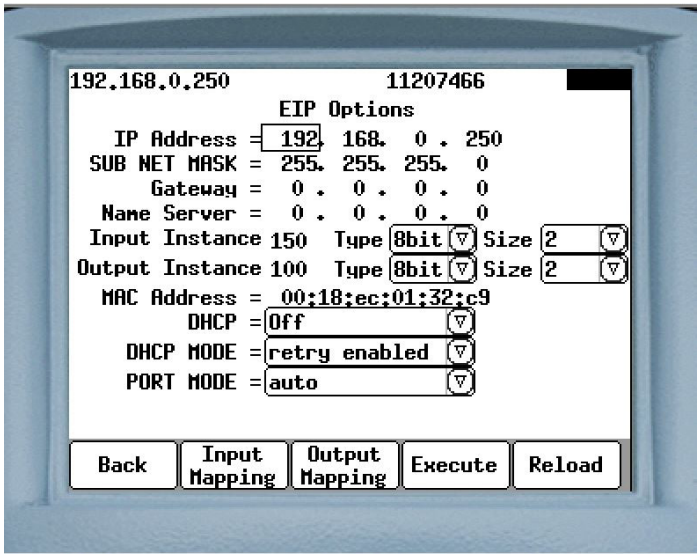
The steps to re-configure the EIP I/O Mapping is identical to the steps to re-configure the FieldBus I/O Mapping. First, follow the steps below to navigate to the EIP Options Menu on the DEP-300s. Then follow the steps explained in the previous pages on either FieldBus Input Mapping or FieldBus Output Mapping (whichever is applicable).



① Press Program Mode

② Press More

B F2 ③ Press EIP Options



④ Press either Input Mapping B F2 or

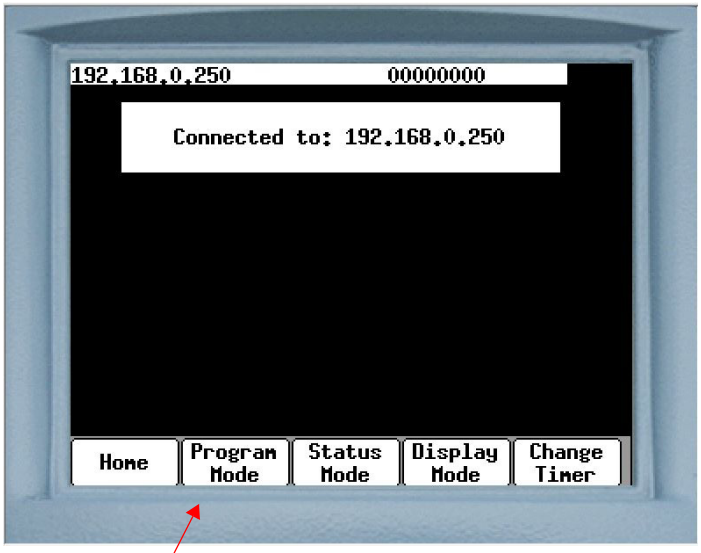
Output Mapping C F3

SCHEDULE FUNCTIONS

The default function timing for Schedule Functions is in Cycles (CY). To change the function timing to Milliseconds (MSEC), perform the following steps on the DEP-300s:

NOTE: When switching between Cycles to Milliseconds or vice versa. It is important to go back and check the timing on all weld schedules since the switch may not change the weld times.

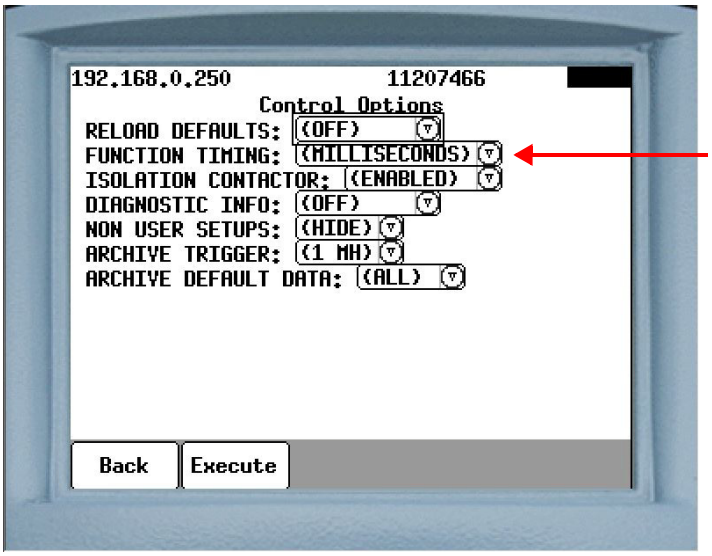
When using a DEP 300s pay close attention to the weld times since it displays only 2 digits and any number above 100 can be erroneously interpreted. For example 112 Msec from a Millisecond mode may show up as 12 Cycles in the Cycle mode which if not confirmed will weld 112 cycles.



B F2 ① Press Program Mode

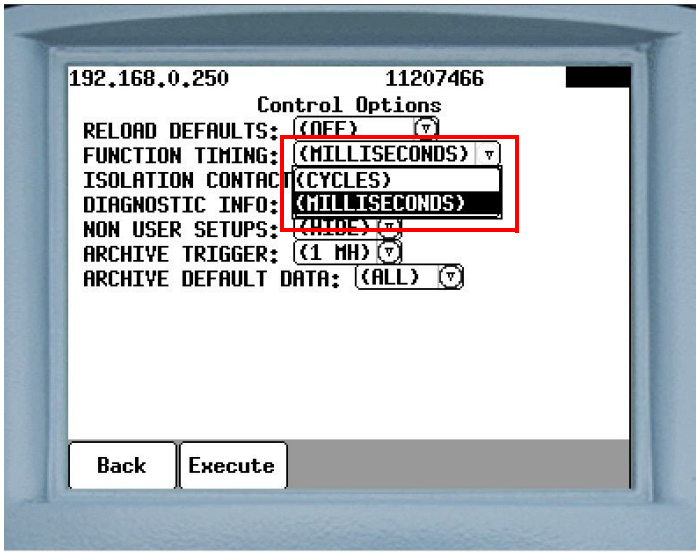
② Press More E F5

③ Press Reload Options D F4



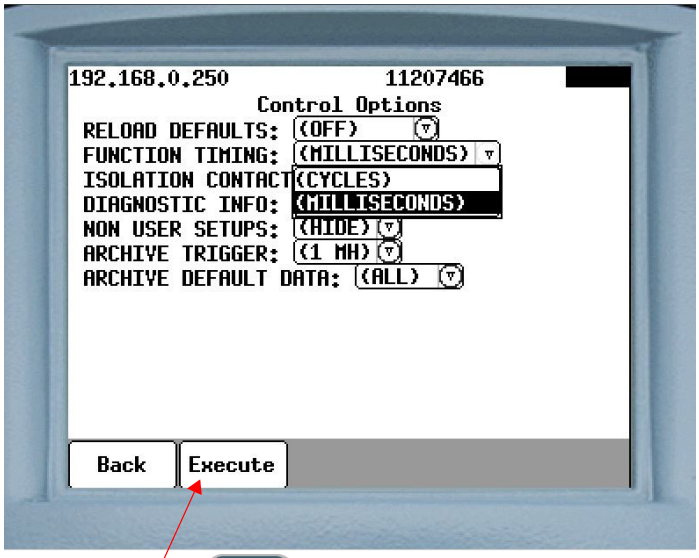
④ Press the S arrow key until the cursor is over the Function Timing field.

⑤ Press ENTER SPACE ENTER



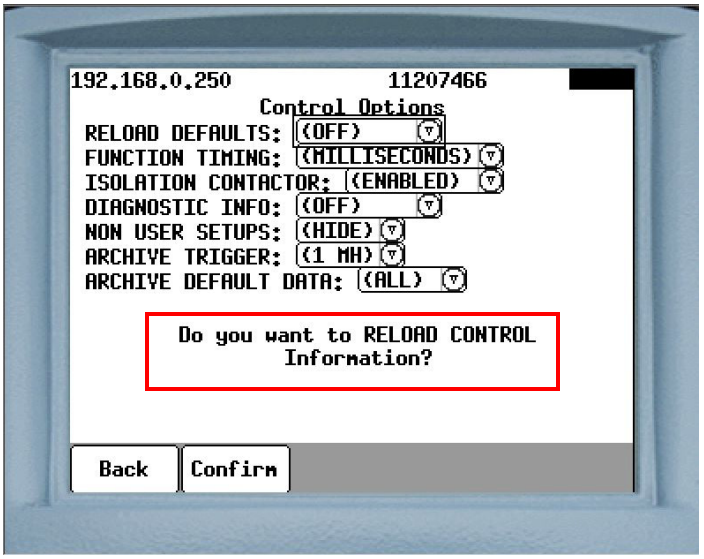
⑥ A drop-down box will appear. Press the S key until the cursor is over the (MILLISECONDS) option.

SPACE ENTER ⑦ Press ENTER

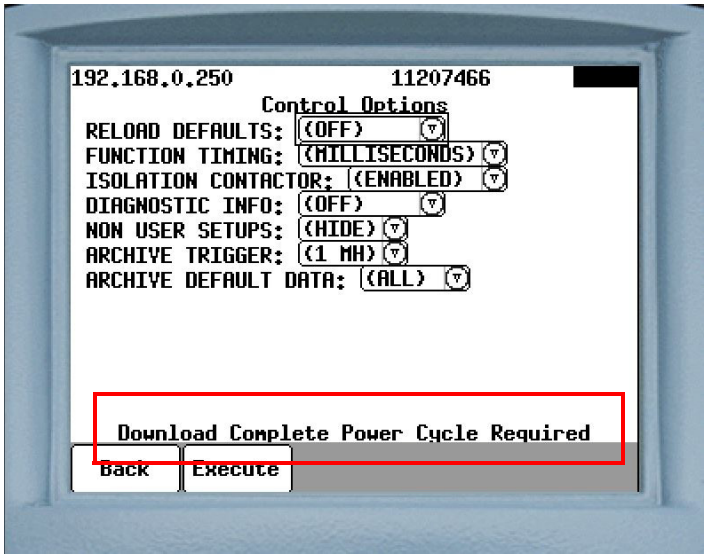


B F2 ⑧ Press Execute.

This begins the process to download the change to the weld processor.



⑨ The message “Do you want to RELOAD CONTROL information?” will appear. Press Confirm B F2



⑩ The message “Download Complete Power Cycle Required” will appear. Re-cycle power on the weld control to complete the process.

SCHEDULE FUNCTIONS LIST

FUNC. #	FUNCTION NAME	CATEGORY
1	SQUEEZE nnnn CYCLES	DELAY
2	COOL nnnn CYCLES	DELAY
3	HOLD nnnn CYCLES	DELAY
4	OFF nnnn CYCLES	DELAY
5	INITIAL SQUEEZE nnnn CYCLES	DELAY
6	"*"	
7	WAIT nn CYCLES	DELAY
8	"*"	
9	"*"	
10	"*"	
11	"*"	
12	"*"	
13	"*"	
14	"*"	
15	"*"	
16	MOTOR CURR LIMITS HI = nnn ma LO = nnn ma	SPECIAL
17	TIP DRESS TIME NNN SEC BLANK nnn MS	SPECIAL
18	START TIP DRESS MOTOR CHECK	SPECIAL
19	STOP TIP DRESS MOTOR CHECK	SPECIAL
20	WELD nnnn CY/IMP nn %VS	WELD
21	TEMPER nnnn CY/IMP nn %VS	WELD
22	PREHEAT nnnn CY/IMP nn %VS	WELD
23	POSTHEAT nnnn CY/IMP nn %VS	WELD
24	PRE-WELD nnnn MS/IMP nn %VS	WELD
25	"*"	
26	"*"	

27	“*”	
28	“*”	
29	“*”	
30	WELD nnnn CY/IMP nnnn0 AMPS	WELD
31	TEMPER nnnn CY/IMP nnnn0 AMPS	WELD
32	PREHEAT nnnn CY/IMP nnnn0 AMPS	WELD
33	POSTHEAT nnnn MS/IMP nnnn0 AMPS	WELD
34	PRE-WELD nnnn MS/IMP nnnn0 AMPS	WELD
35	“*”	
36	“*”	
37	WELD nnn IMP HI = nnnn 0A LO - nnnn 0A	WELD
38	“*”	
39	“*”	
40	SLOPE nn CY/IMP nn%VS TO nn%VS	SLOPE
41	“*”	
42	“*”	
43	“*”	
44	“*”	
45	SLOPE nnnn CY/IMP nnn0 A TO nnn0 A	SLOPE
46	“*”	
47	“*”	
48	“*”	
49	“*”	
50	TURN ON VALVE nnnn	I/O
51	TURN OFF VALVE nnnn	I/O
52	TURN ON OUTPUT nn	I/O
53	TURN OFF OUTPUT nnnn	I/O
54	TURN ON PRESSURE SELECT nnnn	I/O
55	TURN OFF PRESSURE SELECT nn	I/O
56	TURN ON CONTACTOR SELECT nnnn	I/O
57	TURN OFF CONTACTOR SELECT nnnn	I/O
58	TURN ON WELD IN PROGRESS	I/O
59	TURN OFF WELD IN PROGRESS	I/O

60	IMPULSE= nnnn HEAT CY nnnn COOL CY	WELD
61	ABORT IF NO INITIATE FOR nn CYCLES	I/O
62	REPEAT (AT NEXT FUNCTION)	SPECIAL
63	TURN ON WELD COMPLETE	I/O
64	TURN OFF WELD COMPLETE	I/O
65	ISOLATION CONTACTOR DELAY = nnnn SEC.	EXTEND
66	WAIT nnn CY INP #nn TO BE nn (0 = OFF 1 = ON)	I/O
67	WAIT FOR INPUT #nn TO BE nn (0 = OFF 1 = ON)	I/O
68	WAIT nnnn CY FOR PRESSURE SWITCH INPUT	I/O
69	WAIT FOR PRESSURE SWITCH INPUT	I/O
70	WAIT FOR WELD PROCEED	I/O
71	SET VALVE nnn CYLINDER PRESSURE nnn PSI	I/O
72	SET VALVE nnn TOUCH DOWN PRESSURE nnnn	I/O
73	SET VALVE nn TIP DRESS PRESSURE nnn PSI	I/O
74	WAIT nnn CY FOR PRESSURE ACHIEVED	I/O
75	EXTEND UNTIL NO INITIATE	EXTEND
76	SEC. CURR LIMITS: HI=nnnn0 LOW=nnnn0	SPECIAL
77	EXTEND WHILE INPUT #nnnn IS nn (0=OFF 1 = ON)	EXTEND
78	TURN ON FORGE VALVE	I/O
79	TURN OFF FORGE VALVE	I/O
80	FORGE DELAY nnn MS	I/O
81	TRANSFORMER TURNS RATIO	SPECIAL
82	LINEAR STEPPER #nn ASSIGNED (0 = OFF)	SPECIAL
83	“*”	
84	“*”	
85	PROCESS WELD FAULTS	SPECIAL
86	VERIFY CYLINDER # nnn IS OUT OF RETRACT	I/O
87	“*”	
88	TURN ON ISOLATION CONTACTOR	I/O
89	TURN OFF ISOLATION CONTACTOR	I/O
90	SET SPC OFFSET TO nnnn	SPECIAL
91	SEND ALL SAMPLES UNTIL NEXT SPC OFFSET	SPECIAL
92	C-FACTOR LIMIT: HI=nnnn LO=nnnn	SPECIAL

93	TIP DRESS ADVANCE: GROUP nnnn - STEP nn	SPECIAL
94	EXTEND WELD IF LOW CURRENT LIMIT FAULT	EXTEND
95	EXTEND WELD IF CURRENT LESS THAN nnnn0	EXTEND
96	"*"	
97	"*"	
98	"*"	
99	GOTO SEQ#nnn	SPECIAL

NOTE: Numbers with "*" appearing in the line, indicate no function is assigned to that number. Unassigned function numbers are not displayed.

DELAY FUNCTIONS

Delay functions cause a delay (or wait) time to occur in the weld schedule for a specified length of time. All delay functions essentially perform the same function, but are assigned different names to describe their purpose in the welding process. During delay functions, weld current does not flow and I/O status does not change.

FUNC. #	FUNCTION NAME	CATEGORY
01	SQUEEZE nnnn CYCLES	Squeeze time in cycles
02	COOL nnnn CYCLES	Cool time in cycles
03	HOLD nnnn CYCLES	Hold time in cycles
04	OFF nnnn MSEC	OFF time in cycles
05	INITIAL SQUEEZE nnnn CYCLES	Initial Squeeze time in cycles
07	WAIT nnnn CYCLES	Wait time in cycles

WELD FUNCTIONS

WELD FIRING MODES

The purpose of a weld function is to deliver a specific amount of weld current to the weld interface for a specific amount of time. The WT6000 weld control uses two modes to supply regulated current to the weld interface: Percent of Available Volt-Second Welding and Constant Current Welding. See Ch. 9: Advanced Topics for more information.

PERCENT OF AVAILABLE VOLT-SECOND WELD FUNCTIONS

In Percent of Available Volt-Second welding, the current value is entered as a percentage (e.g. 50%, 75%, etc.)

FUNC. #	FUNCTION NAME	CATEGORY
20	WELD nnnn CY. nn %VS	Weld time in cycles
21	TEMPER nnnn CY. nn %VS	Temper time in cycles
22	PREHEAT nnnn CY. nn %VS	Pre-Heat time in cycles
23	POSTHEAT nnnn CY. nn%VS	Post-Heat time in cycles
24	PRE-WELD nnnn CY. nn%VS	Pre-Weld time in cycles

CONSTANT CURRENT WELD FUNCTIONS

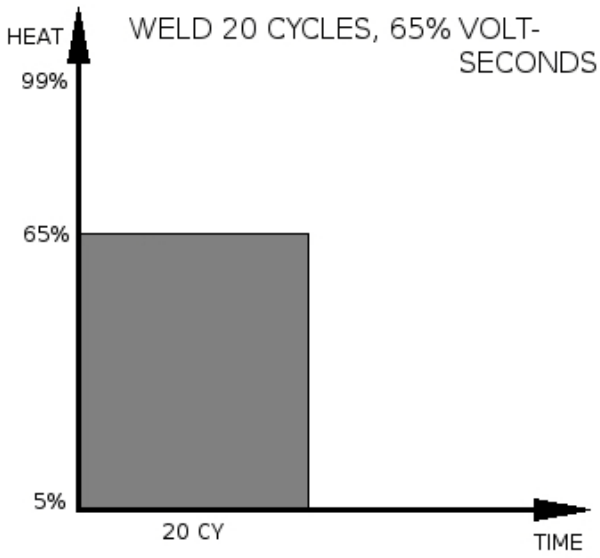
In Constant Current welding, current value is entered as the actual amount of secondary current required (e.g. 5,000A, 10,000A, etc.)

FUNC. #	FUNCTION NAME	CATEGORY
30	WELD nnnn CY. nnnn0 AMPS	Weld time in cycles
31	TEMPER nnnn CY. nnnn0 AMPS	Temper time in cycles
32	PREHEAT nnnn CY. nnnn0 AMPS	Pre-Heat time in cycles
33	POSTHEAT nnnn CY. nnnn0 AMPS	Post-Heat time in cycles
34	PRE-WELD nnnn CY. nnnn0 AMPS	Pre-Weld time in cycles

MAIN WELD FUNCTION (#20)

In the following Volt-Second Mode example, the processor will weld for 20 cycles at 65% volt-seconds:

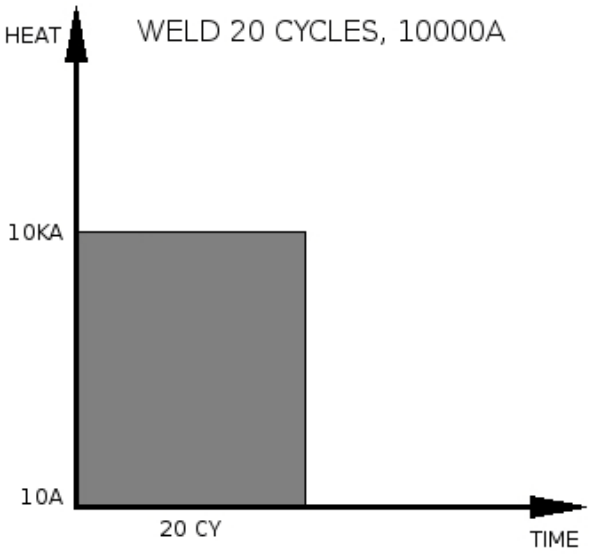
20	WELD 20 CY. 65%VS



MAIN WELD FUNCTION (#30)

In the following Constant Current Mode example, the processor will weld for 20 milliseconds at 10000A current:

30	WELD 20 MS. 10000 AMPS



TEMPER, PRE HEAT, POST HEAT AND PRE WELD FUNCTIONS

Temper, Pre-Heat, Post-Heat and Pre-Weld are material heating functions and are inserted either before or after main weld functions (#20 or #30). They all essentially perform the same function, but are assigned different names to describe their purpose in the welding process. These functions are not figured into the weld data collection algorithm. For example:

Example 1: Using a Pre-Heat Function Before the Weld Function

32	PREHEAT 20 CY. 5000 AMPS
30	WELD 20 CY. 10000 AMPS

When the weld sequence is complete, the last weld data in the Weld Data Menu will display 10,000 Amps. As mentioned above, the pre-heat function is not figured in the weld data collection algorithm.

Example 2: Using two weld functions, with the first as a pre-heat

30	WELD 20 CY. 5000 AMPS
30	WELD 20 CY. 10000 AMPS

When the weld sequence is complete, the last weld data in the Weld Data Menu will display 7,500 Amps. This is because when two or more weld functions are used in the same weld schedule, the weld data collection algorithm calculates the average current for all the weld functions and displays the results.

IMPULSE WELDING FUNCTION

weld processor software G08300 offers two different methods of pulsation (impulse) welding. The first method has NO-HEAT cool times between the impulses and the second has LOW-HEAT cool times between the impulses.

METHOD #1: IMPULSE WELDING WITH "NO-HEAT" COOL TIME:

In this method, the impulse instruction (function #60) is inserted in the weld schedule before the main weld function (#20 or #30).

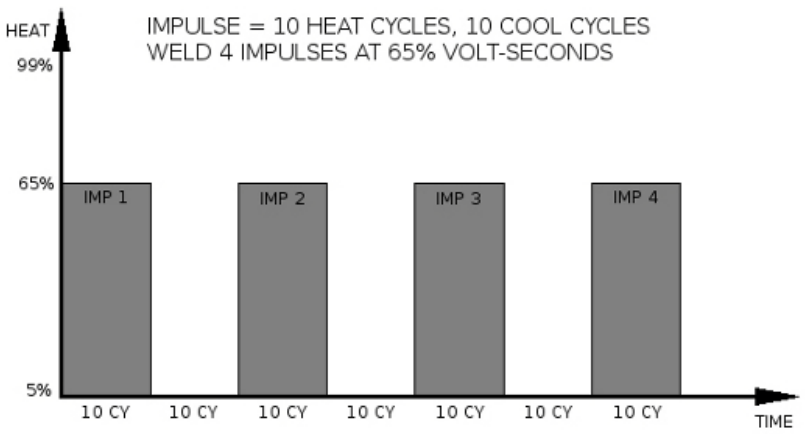
FUNC. #	FUNCTION NAME	DESCRIPTION
60	IMPULSE= nnnn HEAT CY nn COOL CY	Impulse heat and cool times in cycles

Function #60 defines the length of the impulse heat time and the length of the cool time between each impulse.

When this function is used in conjunction with the main weld function (#20 or #30), the weld processor changes the weld function to display impulses (IMP) rather than cycles (CY).

In the example below, the weld processor will weld (heat) for 10 cycles at 65% volt-seconds, then wait (cool) for 10 cycles. This heat and cool impulse pattern will occur (4) times. As illustrated in the timing chart, no current is flowing during the cool times.

60	IMPULSE= 10 HEAT CY 10 COOL CY
20	WELD **4 IMP** 65%VS



METHOD #2: IMPULSE WELDING WITH "LOW-HEAT" COOL TIME:

In this method, the impulse instruction (function #60) is inserted in the weld schedule before Constant Current function #37 (WELD nnn IMP HI=nnnn0 A LO=nnnn0 A).

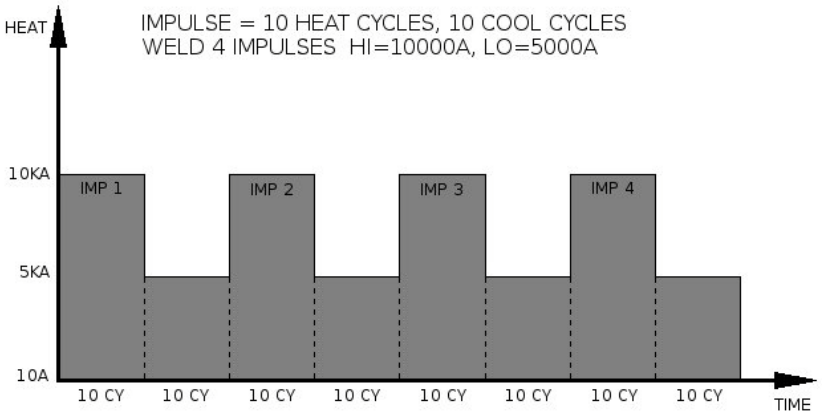
FUNC. #	FUNCTION NAME	DESCRIPTION
60	IMPULSE= nnnn HEAT CY nn COOL CY	Impulse heat and cool times in cycles
37	WELD nnn IMP HI =nnn A LO =nnn 0 A	The number of weld impulses and the amount of current during the impulse (HI) and cool (LO) times.

Function #60 defines the length of the impulse heat time and the length of the cool time after each impulse. Function #30 defines the number of impulses and the amount of current during each impulse and the LOW current during each cool time.

In the example below, the weld processor will weld (heat) for 10 cycles and then wait (cool) for 10 cycles. This heat and cool impulse pattern will occur (4) times at 10,000 Amps during each impulse and 5000 Amps during each cool time.

NOTE: Although function #60 is typically used in conjunction with main weld functions (#20 or #30), it can also be used before any weld or slope function.

60	IMPULSE= 10 HEAT CY 10 COOL CY
37	WELD **4 IMP** HI=10000 A LO=5000A



NOTE: Function # 37 may not be available in certain software.

SLOPE FUNCTIONS

Slope functions are used when either a linear increase (Up-Slope) or decrease (Down-Slope) in welding current is required over a specified amount of time.

UP-SLOPE: Provides current at the first value and increases it to the second value over the length of time specified.

DOWN-SLOPE: Provides current at the first value and decreases it to the second value over the length of time specified.

Typically, Up-Slope functions are used before main weld functions (#20 or #30) and Down-Slope functions are used after main weld functions (#20 or #30).

SLOPE FUNCTION (VOLT-SECOND MODE)

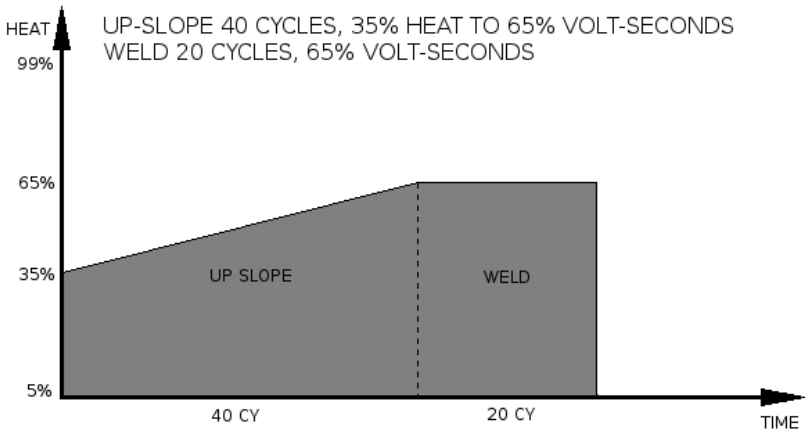
FUNC. #	FUNCTION NAME	DESCRIPTION
40	SLOPE nn CY. nn%VS TO nn%VS	Slope time in cycles from percent volt-second 1 (nn%VS) to percent volt-second 2 (nn%VS)

SLOPE FUNCTION (CONSTANT CURRENT MODE)

FUNC. #	FUNCTION NAME	DESCRIPTION
45	SLOPE nn MS. nnnn0 A TO nnnn0 A	Slope time in milliseconds from current value 1 (nnnn0 A) to current value 2 (nnnn0 A)

In the following up-slope weld example, the weld processor will begin welding at 35% volt-seconds and increase to 65% volt-seconds over a 40 cycle time period. Then the processor will weld at 65% volt-seconds for 20 cycles.

40	SLOPE 40 CY. 35%VS TO 65%VS
20	WELD 20 CY. 65%VS



NOTE: Just as the heat functions mentioned above, the slope functions are not figured into the weld data collection algorithm. Therefore, their value is not averaged into the last weld data viewed in the Weld Data Menu

I/O FUNCTIONS

I/O functions are used to verify the status of, change status of, or wait for certain I/O points to change states before continuing with the weld schedule.

There are two types of I/O Functions:

- Functions that interact with inputs
- Functions that interact with outputs

INPUT FUNCTIONS

FUNC. #	FUNCTION NAME	DESCRIPTION
61	ABORT IF NO INITIATE FOR nn CYCLES	This function monitors the Weld Initiate bit for the number of cycles specified. If the Weld Initiate bit goes LOW anytime during this period, the weld sequence will abort and a WELD INIITATE NOT PRESENT FAULT will be generated.
66	WAIT nnn CY INP #N TO BE n (0 =OFF 1 =ON)	This function waits the specified amount of time (cycles) for the specified User Input bit (1-6) to go either OFF (0) or ON (1). If the bit does not go either OFF or ON during this time period, a WELD PROCEED FAULT is generated. **NOTE:** If either function #66 or #67 are false and the WELD PROCEED fault is set to FAULT in the Setup Parameters, the weld processor will execute the weld schedule in NOWELD mode. If either function #66 or #67 are false and the WELD PROCEED fault is set to ALERT in the Setup Parameters, the weld processor will execute the weld schedule in WELD mode.
67	WAIT FOR INPUT #n TO BE n (0 =OFF 1= ON)	This function waits for the specified User Input bit (1-6) to go either OFF (0) or ON (1). If the Weld Initiate input bit goes LOW before this occurs, a WELD PROCEED FAULT is generated.

68	WAIT nnnn CYFOR PRESSURE SWITCH INPUT	This function waits for the specified amount of time (milliseconds) for the Pressure Switch bit to go HIGH. If the bit does not go HIGH during this time period, a PRESSURE SWITCH FAULT is generated. NOTE: If the Pressure Switch bit is LOW and the PRESSURE SWITCH parameter is set to FAULT, the weld processor will execute the weld schedule in NO-WELD mode. If the Pressure Switch bit is LOW and the PRESSURE SWITCH parameter is set to ALERT, the weld processor will execute the weld schedule in WELD mode
69	WAIT FOR PRESSURE SWITCH INPUT	This function waits for the Pressure Switch bit to go HIGH.
70	WAIT nnnn MS FOR WELD PROCEED INPUT	This function waits for the specified amount of time (milliseconds) for the Weld Proceed bit to go HIGH. If the bit does not go HIGH during this time period, a WELD PROCEED FAULT is generated. NOTE: If the Weld Proceed bit is LOW and the WELD PROCEED parameter is set to FAULT, the weld processor will execute the weld schedule in NO-WELD mode. If the Weld Proceed bit is LOW and the WELD PROCEED parameter is set to ALERT, the weld processor will execute the weld schedule in WELD mode.
71	WAIT FOR WELD PROCEED	This function waits for the Weld Proceed bit to go HIGH.
72	SET VALVE n TOUCH DOWN PRESSURE nnnn PSI	This function sets the specified valve bit (1-2) to the specified touch down pressure in PSI. NOTE: This function requires the optional Analog I/O Module (AIOM) to be installed in the weld control.
73	SET VALVE n TIP DRESS PRESSURE nnnn PSI	This function sets the specified valve bit (1-2) to the specified tip dress pressure in PSI. NOTE: This function requires the optional Analog I/O Module (AIOM) to be installed in the weld control.

74	WAIT nn MS FOR PRESSURE ACHIEVED	This function waits for the number of milliseconds specified for the cylinder pressure to be achieved. If the pressure is not achieved during this time period, a PRESSURE NOT ACHEIVED FAULT is generated. **NOTE 1:** This function must be used after any set pressure function. Otherwise, the weld processor will not know if pressure was achieved before executing the weld function. **NOTE 2:** This function requires the optional Analog I/O Module (AIOM) to be installed in the weld control.
79	WAIT nnnn MS FOR SYSTEM COOLING	This function waits the specified amount of time (milliseconds) for the System Cooling bit to go HIGH. If the bit does not go HIGH during this time period, a SYSTEM COOLING FAULT is generated.
86	TIP DRESS ADVANCE: GROUP nn - STEP n	This function advances all the steppers assigned to the specified GROUP number, to the specified STEP number. For example, if this function was programmed: TIP DRESS ADVANCE: GROUP 02 - STEP 05, every stepper assigned to Group #2 would advance to Step #5. NOTE: This function can advance several steppers simultaneously. For example, your application may use several different weld schedules to execute a weld on the same tool, but those schedules may be assigned to different steppers (to account for weld variations). This function allows you to advance every stepper assigned to a group, each time any schedule completes a weld.

OUTPUT FUNCTIONS

FUNC. #	FUNCTION NAME	DESCRIPTION
50	TURN ON VALVE n	Turn ON Valve bit (1-6).
51	TURN OFF VALVE n	Turn OFF Valve bit (1-6).
52	TURN ON OUTPUT n	Turn ON User Output bit (1-6).
53	TURN OFF OUTPUT n	Turn ON User Output bit (1-6).
54	TURN ON PRESSURE SELECT n	Turn ON Pressure Select bit (1-4).
55	TURN OFF PRESSURE SELECT n	Turn OFF Pressure Select bit (1-4).

56	TURN ON CONTACTOR SELECT n	Turn ON Contactor Select bit (1-6)
57	TURN OFF CONTACTOR SELECT n	Turn OFF Contactor Select bit (1-6)
58	TURN ON WELD IN PROGRESS	Turn on Weld in Progress bit.
59	TURN OFF WELD IN PROGRESS	Turn off Weld in Progress bit.
63	TURN ON WELD COMPLETE	Turn on the Weld Complete bit. **NOTE:** This function also processes weld faults. For more information, see function #85 PROCESS WELD FAULTS below.
64	TURN OFF WELD COMPLETE	Turn off the Weld Complete bit.
78	TURN ON FORGE VALVE	Turn on the Forge Valve bit.
79	TURN OFF FORGE VALVE	Turn off the Forge Valve bit.
80	FORGE DELAY nnn MSEC	Inserted in the weld schedule before function #78 (TURN ON FORGE VALVE), this function delays turning on the Forge Valve bit for the number of milliseconds specified
88	TURN ON ISOLATION CONTACTOR	Turn on the Isolation Contactor bit.
89	TURN OFF ISOLATION CONTACTOR	Turn off the Isolation Contactor bit.

EXTEND FUNCTIONS

Extend functions are used to extend a function under certain conditions.

FUNC. #	FUNCTION NAME	DESCRIPTION
65	ISOLATION CONTACTOR DELAY = nn SEC.	This function delays the opening of the isolation contactor for the number of seconds specified, if the Isolation Contactor Saver bit is HIGH.
75	EXTEND UNTIL NO INITIATE	This function tells the processor to monitor the status of the Weld Initiate bit and to repeat the previous function in the weld schedule until the Weld Initiate bit goes LOW.
77	EXTEND WHILE INPUT #n IS n (0=OFF 1 = ON)	This function tells the processor to monitor the status of the specified input bit (1-6) and to extend the previous function in the weld schedule while the specified input bit is either OFF (0) or ON (1). **NOTE:** Repeat and Extend functions are mutually exclusive. Do not use the Repeat function with any Extend function in a weld schedule.

94	EXTEND WELD IF LOW CURRENT LIMIT FAULT	This function tells the processor to extend the weld function if a LOW CURRENT LIMIT FAULT occurs. An EXTEND WELD FAULT is generated. The weld function is extended only once. If the desired current is not reached on the re-weld, a LOW CURRENT LIMIT FAULT is generated. **NOTE:** Repeat and Extend functions are mutually exclusive. Do not use the Repeat function with any Extend function in a weld schedule.
95	EXTEND WELD IF CURRENT LESS THAN nnnn0	This function tells the processor to extend the weld function if secondary current is less than the value programmed (nnnn0). The weld function is extended only once. If the desired current is not reached on the re-weld, an EXTEND WELD FAULT is generated. **NOTE:** Repeat and Extend functions are mutually exclusive. Do not use the Repeat function with any Extend function in a weld schedule

The following is an example of an extend function in a weld schedule:

30	WELD 20 CY. 5000 AMPS
75	EXTEND UNTIL NO INITIATE

NOTE: If the weld initiate input is removed before function #75 EXTEND UNTIL NO INITIATE is executed in the weld schedule, a WELD INITIATE NOT PRESENT FAULT will occur and only 20 cycles of weld time will be executed. Otherwise, the weld time would be extended indefinitely until the weld initiate input is removed. This example is how a seam weld is accomplished.

SPECIAL FUNCTIONS

Special functions are used to either create special conditions inside the welding schedule, set local schedule features that over-ride global setup parameters or to chain multiple weld schedules together.

FUNC. #	FUNCTION NAME	DESCRIPTION
16	MOTOR CURR LIMITS HI =nnnn	Used in a tip dress schedule, this function sets the HIGH and LOW current limits (in milliamps) for the tip dress motor. For more information see "Tip Dress Schedule Setup" in Ch 9 Advanced Topics. NOTE: This function must be inserted in the schedule before function #18 (START TIP DRESS MOTOR CHECK).
17	TIP DRESS TIME nn SEC BLANK nnnn ms	Used in a tip dress schedule, this function tells the weld processor to start measuring the current draw of the tip dress motor for the number of seconds specified. In addition, it identifies the blanking time. This is the time period at the start of the function, during which the motor current is not measured. For more information see "Tip Dress Schedule Setup" in Ch 9 Advanced Topics. NOTE 1: This function must be inserted in the schedule after function #18 (START TIP DRESS MOTOR CHECK). NOTE 2: If the welding application requires function #63 (TURN ON WELD COMPLETE) to be used in the tip dress schedule, function #17 must be inserted before function #63 to ensure proper measurement of the tip dress motor current.
18	START TIP DRESS MOTOR CHECK	Used in a tip dress schedule, this function tells the weld processor to turn the tip dress motor ON. For more information see "Tip Dress Schedule Setup " in Ch 9 Advanced Topics.
19	STOP TIP DRESS MOTOR CHECK	Used in a tip dress schedule, this function tells the weld processor to turn the tip dress motor OFF. For more information see "Tip Dress Schedule Setup " in Ch 9 Advanced Topics.

62	REPEAT (AT NEXT FUNCTION)	This function monitors the status of the Weld Initiate input bit. When the last function in the weld schedule is complete, the weld processor checks the status of the Weld Initiate input bit. If the bit is HIGH, the weld processor will repeat the weld schedule, starting at the first line following function #62. When the last function is again complete, the weld processor checks the status of the Weld Initiate input bit. If the bit is still HIGH, the weld processor repeats the weld schedule again, starting at the first line following function #62.This repeat loop will continue until the Weld Initiate input bit goes LOW. **NOTE 1:** This function should be placed in the weld schedule before the squeeze function. **NOTE 2:** Repeat and Extend functions are mutually exclusive. Do not use the Repeat function with any Extend function in a weld schedule.
76	SEC. CURR LIMITS: HI=nnnn0 LOW=nnnn0	This function assigns a static HI / LOW current limit window in the “local” weld schedule only. This function overrides the “Global” HI / LOW CURRENT LIMIT WINDOW parameters described in Ch. 7: Faults and Setup Parameters.
81	TRANSFORMER TURNS RATIO nnn :1	This function assigns a transformer turns ratio in the “Local” weld schedule only. It overrides the “Global” transformer turns ratio parameters described in Ch. 7: Faults and Setup Parameters.
82	LINEAR STEPPER #nn ASSIGNED (0 = OFF)	This function assign linear stepper 1-10 (0=OFF).
85	PROCESS WELD FAULTS	This function allows a one-cycle delay in the weld schedule for the weld processor to identify any fault conditions, which may have been generated thus far in the weld schedule. **NOTE 1:** This function must be inserted after the main weld function (#20 or #30) in the weld schedule. If it is inserted prior to the weld function, all zeros will be reported in the Weld Data Menu. **NOTE 2:** This function only processes the weld data and sets the fault bits. The FAULT and ALERT outputs are not turned on until the end of the schedule. **NOTE 3:** The weld processor will execute this function only once during the weld schedule. If the function appears in more than one location in the schedule, the first occurrence will be executed and all others will be ignored.

86	VERIFY CYLINDER #n IS OUT OF RETRACT	This function is inserted at the beginning of the weld schedule. It checks the status of the mapped Retract Valve output bit. A HIGH bit indicates the gun is out of retraction (closed) and it is OK to proceed with the weld schedule. A LOW bit indicates the gun is in retraction (open). When this occurs, a RETRACT PILOT FAULT is generated and the weld schedule is immediately terminated.
90	SET SPC OFFSET TO nn	This function assigns the starting bin number (0-99) for SPC Indexing. See Ch. 9: Advanced Topics for more information.
91	SEND ALL SAMPLES UNTIL NEXT SPC OFFSET	This function tells the processor to begin collecting weld data for all welds. This should follow function (#90) SET SPC OFFSET. See Ch. 9: Advanced Topics for more information.
92	C-FACTOR LIMIT: HI=nnnn LO=nnnn	This function sets HIGH and LOW C-Factor limits in the weld schedule. See Ch. 9: Advanced Topics for more information.
93	TIP DRESS ADVANCE: GROUP nn - STEP n	This function advances all the steppers assigned to the specified GROUP number, to the specified STEP number. For example, if this function was programmed: TIP DRESS ADVANCE: GROUP 02 - STEP 05, every stepper assigned to Group #2 would advance to Step #5. **NOTE 1:** This function must be inserted into a tip dress schedule, if the tip dress schedule is used in lieu of the Tip Dress input bit. **NOTE 2:** This function can advance several steppers simultaneously. For example, your application may use several different weld schedules to execute a weld on the same tool, but those schedules may be assigned to different steppers (to account for weld variations). This function allows you to advance every stepper assigned to a group, each time any schedule completes a weld.

99	GOTO SEQ#nnn	This function is an unconditional jump to another weld schedule. It tells the processor to stop the present schedule and continue with the first function in another schedule. This is also known as weld schedule chaining. **NOTE 1:** This function can be used to save memory in the weld processor by allowing multiple schedules to execute commonly used functions. **NOTE 2**: Caution should be observed when using this function. An infinite loop of repeatedly initiated weld schedules can be inadvertently created if the last schedule in the chain is programmed to return to the first schedule in the chain. **NOTE 3:** Only the originating weld schedule number is displayed in the weld data. **NOTE 4:** If function #85 (PROCESS WELD FAULTS) is inserted before function #99 in the originating schedule, only weld data from that schedule is displayed. If you wish to average weld data from all the schedules in the chain, function #85 (PROCESS WELD FAULTS) must be placed after function #99 in each schedule.

The following is an example of special function (#81) TRANSFORMER TURNS RATIO:

When this function is used in a weld schedule, its “local” parameters override the “global” turns ratio parameters described in Ch. 7: Faults and Setup Parameters. That is, the “local” turns ratio for schedule 1 is 50:1, but the “global” turns ratio for schedules 2 through 255 remain unchanged at 75:1.

00	START OF SCHEDULE # 1
54	TURN ON VALVE 1
90	TRANSFORMER TURNS RATIO 50:1
01	SQUEEZE 15 MSEC
30	WELD 80 MS. 4000 AMPS
78	PROCESS WELD FAULTS
03	HOLD 02 MSEC
55	TURN OFF VALVE 1
03	HOLD 10 MSEC
100	END OF SCHEDULE # 1

GLOSSARY

C-Factor

C-Factor (or Capacity Factor) is a parameter, which is used to track changes in the weld tooling. C-Factor is calculated by determining the amount of total capacity utilized to create the target current and dividing this value by the actual current created. The C-Factor feature can be used as a maintenance tool to monitor weld tooling degradation and current shunting paths (primary or secondary).

ENET

ENET is used for Standard Ethernet communications.

ENET IP

ENET IP is used for I/O communication between the weld processor and other Ethernet enabled devices (e.g. a Robot or PLC). Also used to communicate with Weld Gateway and ***RAFT***™ Gateway networking software.

FieldBus I/O

Configuration of fieldbus input output of the weld processor. Fieldbus network system is a real-time distributed control for industrial networks. Fieldbus works on a network structure which typically allows daisy-chain, star, ring, branch, and tree network topologies. Fieldbus communication scheme gives the weld processor the ability to control and allow multiple analog and digital points to be connected at the same time.

LIO

Local (Discrete) I/O. Inputs - 2 x 24VDC Outputs - 3 x 120VAC

Schedule

A (Weld) Schedule is a list of commands or functions which are used to instruct the weld processor to deliver a combination of heat (weld current) and time (weld time) to the weld interface to create a weld nugget.

SSPI

WTC Proprietary I/O Communication Protocol (Optional) . SSPI supports communication with optional WTC I/O peripheral devices.

SPC - Statistical Process Control

SPC data collection and binning provides the capability of compiling weld data within pre-defined criterion established in the Setup Parameters.

Spot

Another name for a weld.

Spot ID

User assigned unique identification number that defines a specific spot created with a weld schedule. This feature is only available with certain software.

Station ID

User defined identification number for the weld interface.

V Avg

Average secondary voltage drop of the last weld.

WebView

An interconnect between the ***RAFT***™ Gateway and WTC legacy weld timers that use either serial networks or are otherwise not compatible with the ***RAFT***™ Gateway.

Notes:

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