



Model 217P Tube Welding Power Supply



Operator's Manual

INTRODUCTION

The Model 217P is a power source and controller for automatic orbital tube welding. It is intended to be used in conjunction with AMI and EXEL by AMI orbital tube welding heads and accessories. The Model 217P power supply provides GTAW (Gas Tungsten Arc Welding) current with pulsation controls, high frequency arc starting, purge gas controls, weld head arc rotation and automatic timing functions. Users need only to supply input A.C. power, a regulated inert gas source with flow meter, and the appropriate weld head or accessories.

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Revision History

| Revision | ECO No. | Change Description | Date | Appr. |
|----------|---------|---|----------|-------|
| A | 1190162 | Initial release | 07/08/16 | RH |
| B | E7010 | Updated to clarify input voltage range, 2.1 & 2.2 | 4/5/2017 | SM |

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1.0 SAFETY PRECAUTIONS

The Model 217P is intended to be used with AMI or EXEL by AMI weld heads for the purpose of GTAW welding of metal tube. The system is not to be used for any other purpose, specifically heating or cutting.

1.1 SHOCK HAZARD WARNING

| ICON KEY | |
|--|-------------------|
|  | Warning |
|  | Electrical Hazard |

WARNING

The nature of the GTAW process creates **POTENTIAL HAZARDS**. In accordance with international safety regulations the **EXCLAMATION SYMBOL** indicates that this equipment is considered **HAZARDOUS**. The **LIGHTNING FLASH SYMBOL** indicates that there are potential electrical hazards. The use and display of these symbols make it the **OPERATOR'S RESPONSIBILITY TO ENSURE THAT HE HAS READ AND/OR BEEN MADE AWARE OF ALL SAFETY-RELATED ITEMS CONTAINED IN THIS MANUAL**.

HIGH VOLTAGE is present on exposed terminals. The **ELECTRODE** (tungsten/rotor) is also an **EXPOSED TERMINAL** and by its nature the **GTAW** process requires electrical potential to be present on the electrode during arc starting and during welding.



This manual is intended to assist users of this equipment in set up and basic operation, it is **NOT INTENDED AS A SUBSTITUTE FOR FACTORY TRAINING**.



The Model 217P is intended to be used with AMI and EXEL by AMI weld heads for GTAW welding of metal tube or pipe. The system is not to be used for any other purpose, specifically heating or cutting.



The Model 217P is intended for typical GTAW shielding gases **ONLY**. **NEVER CONNECT OXYGEN OR ACETYLENE** to the Model 217P or weld head.



All Power Supplies contain a “bleeder” circuit to ground any residual potential after welding or after an aborted or bad arc start attempt. These circuits take a few seconds to operate or could fail. Verify system discharge before any maintenance on the system.



The electrode should always be considered a possible shock hazard. This is especially true when the system is in “weld sequence”, ready to weld, is welding or has just finished welding. Equipment/component failure, system abuse or improper maintenance could result in electrical potential at the weld head even when not in “weld sequence”.



The users/operators of this equipment must take all precautions necessary to avoid contact with the **ELECTRODE** at “**ALL TIMES**”. The only exception is when replacing or adjusting the electrode and this should be done **WITH THE POWER TURNED OFF**.



If performed with the power “**ON**” the system must be in “**TEST**” mode out of weld sequence and the **USER MUST OBSERVE COMMON SAFETY PRACTICES** such as grounding the electrode to ensure discharge before touching it.



Most AMI Power Supplies feature High Frequency (HF) Arc Starting. This is a High Voltage/High Frequency electrical transmission process. To eliminate any HF shock possibility “**AVOID ALL CONTACT**” with the Welding **WORK** (ground), the **ELECTRODE** or the **WELD HEAD** during arc start.



Remember, there is a possible shock hazard in all welding power supplies at **ALL** times.

1.2 WARNING LABEL DEFINITIONS

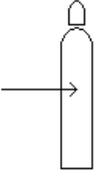
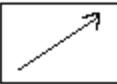
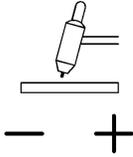
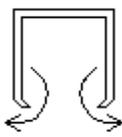
The table below contains caution and warning labels for the operation of this equipment. Before operating this or any welding equipment users should be familiar with “**ANSI-49.1 Safety in Welding and Cutting**”.

| | |
|---|--|
|  | <p>ELECTRIC SHOCK from welding electrode or wiring can kill.</p> |
|  | <p>HIGH FREQUENCY RADIO WAVE can cause interference and sometimes even damage to nearby electronic equipment (such as computers) that are un-protected.</p> |
|  | <p>MAGNETIC FIELDS can affect implanted medical devices. Wearers of pacemakers should keep away until consulting their doctor.</p> |
|  | <p>Welding can cause FIRE OR EXPLOSIONS. Do not weld near FLAMMABLE or EXPLOSIVE MATERIALS. Have proper type of extinguisher in work area.</p> |
|  | <p>WEAR NON-FLAMMABLE protective clothing, footwear and head gear at all times.</p> |
|  | <p>HOT PARTS can cause severe burns. Do not touch recently welded components. Avoid touching torch components and welding fixtures soon after welding.</p> |
|  | <p>ARC RAYS can burn the eyes and skin. The welding arc emits ultra-violet (UV) radiation and the molten weld gives off infrared. Both can burn eyes and skin if unprotected. Suitable eye and skin protection must be worn.</p> |
|  | <p>BUILD UP OF GAS can injure or kill. Weld materials can emit toxic fumes during welding. WELD ONLY IN AREAS WITH ADEQUATE VENTILATION.</p> |
|  | <p>FUMES AND GASES can be hazardous. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health. DO NOT weld in enclosed areas without proper ventilation or respirators.</p> |
|  | <p>MOVING PARTS - Keep hands and fingers clear from fans, gears, rotors, wire feed, rotation mechanisms.</p> |

| | |
|---|---|
|  | <p>WARNING: Exel factory training is essential for all Welding Operators and Maintenance Technicians who operate AMI or EXEL by AMI equipment.</p> |
|  | <p>WELDING WIRE and ELECTRODES are sharp and can cause injury.</p> |
|  | <p>MOVING PARTS may cause crush or pinch points.</p> |
|  | <p>WARNING: Disconnect the input power to the machine before opening or servicing. Discharge all circuits that store high voltage such as capacitor packs. Only AUTHORIZED and QUALIFIED service personnel should open this equipment.</p> |

1.3 SYSTEM SYMBOLS

The following symbols are present on the Model 217P:

| | |
|---|--|
|  | WARNING: Read this manual! This document contains information that could help prevent injury or damage to the equipment. |
|  | AC main input, 115/230 volts AC, 50/60 Hz. |
|  | On / Off switch (CB-1 main circuit breaker). |
|  | Input for the arc shielding gas. An external regulator and flow indicator must be used. |
|  | USB port. For importing and exporting weld schedules from an external storage device. Devices should not be left plugged in while welding. |
|  | Ethernet port. For networking capability. Devices should not be left plugged in while welding. |
|  | Remote control connection. |
|  | Weld head electrode and ground connections. |
|  | Output for the arc shielding gas connection. |
|  | Weld head control. Intended for AMI and EXEL by AMI weld heads. |

2.0 SPECIFICATIONS

These specifications pertain to the Model 217P power supply only. For weld heads, refer to the specification sheet of each individual model. For non-AMI supplied equipment such as gas tanks and regulators, refer to the original manufacturer's documentation. The Model 217P is a mobile system that is intended to be hand carried. The supporting equipment such as weld heads, water coolers, gas regulators, remote controls and extension cables can also be hand carried. Items such as gas tanks and welding fixtures should be moved with appropriate equipment and safety precautions. Gas tanks should be securely anchored to prevent toppling over.

2.1 ELECTRICAL

INPUT POWER DETAIL

The Model 217P can operate on the following Single Phase Auto Adjusting AC inputs:

| Input Power Single-Phase AC | Rated Welding Output | Welding Amperage Range | Max OCV DC (Uo) | Rated Peak Starting Voltage (Up) | Amperes Input At Rated Load Output, 50/60Hz, Single-Phase | KVA @ Duty Cycle |
|-----------------------------|--|------------------------|-----------------|----------------------------------|---|------------------|
| 110V/15A | 100A@11.0 Volts DC, 100% Duty Cycle* | 5 – 100A | 59V 11-16 | 15KV | 12A | 1.4 |
| 240V/15A | 150A/12.0 Volts DC, 100% Duty Cycle* | 5 – 150A | 59V 11-16 | 15KV | 11A | 2.4 |

*DUTY CYCLE is percentage of 10 minutes that unit can weld at rated load without overheating.



Input power must be grounded.

OUTPUT POWER DETAIL

Straight polarity, constant current DC regulation intended for GTAW welding only. Static characteristic of all power supplies is flat.

- 5 to 100 amperes DC using 100 to 120 VAC input (15 Ampere service).
- 5 to 150 amperes DC using 200 to 240 VAC input (20 Ampere service).

CIRCUIT BREAKER – ON/OFF, two pole, 30 Ampere at 250 VAC.

DUTY CYCLE – determined by the AC input voltage and the required output current. The Model 217P system has an internal thermal sensor that will limit operation should the temperature exceed the safe operating parameters.

2.2 ELECTRICAL SERVICE GUIDE

100 VAC + 32%, -10%, 50/60 Hz
 110 VAC + 20%, -18%, 50/60 Hz
 115 VAC + 15%, -22%, 50/60 Hz
 120 VAC + 10%, -25%, 50/60 Hz
 200 VAC + 32%, -10%, 50/60 Hz
 208 VAC + 27%, -13%, 50/60 Hz
 220 VAC + 20%, -18%, 50/60 Hz
 230 VAC + 15%, -22%, 50/60 Hz
 240 VAC + 10%, -25%, 50/60 Hz

+/- % indicates the allowable input voltage fluctuation to maintain specified performance.

| FUNCTION | RANGE |
|---|------------|
| INPUT AMPERE AT RATED OUTPUT | 12A |
| MAX RECOMMENDED STD. FUZE RATING IN AMPERES <ul style="list-style-type: none"> • CIRCUIT BREAKER, TIME DELAY • NORMAL OPERATING | 15A 20A |
| MIN. INPUT CONDUCTOR SIZE (AWG) | 14 |
| MAX. RECOMMENDED INPUT CONDUCTOR LENGTH IN FEET (METERS) | 91 (28) |
| MIN. GROUNDING CONDUCTOR SIZE (AWG) | 14 |

2.3 PHYSICAL DIMENSIONS

| | |
|---------------------|-----------------|
| POWER SUPPLY HEIGHT | 18" (457mm) |
| POWER SUPPLY WIDTH | 19" (483mm) |
| POWER SUPPLY DEPTH | 14.8" (356mm) |
| POWER SUPPLY WEIGHT | 60lbs. (27.2kg) |

2.4 PROGRAMMABLE AND OPERATIONAL FUNCTIONS

SINGLE ENTRY PARAMETERS AND FUNCTIONS

| FUNCTION | RANGE |
|---|-------------------|
| WELD TYPE (PULSED, NON-PULSED, STEP, TACK, S ³) | SELECTABLE |
| NUMBER OF LEVELS | 1 - 99 LEVELS |
| START CURRENT | 5 - 150 AMPS |
| PREPURGE | 10 - 1000 SECONDS |
| POSTPURGE | 10 - 1000 SECONDS |
| TRAVEL START DELAY | 0.0 - 100 SECONDS |
| TRAVEL DIRECTION | CW or CCW |

MULTI-LEVEL PARAMETERS AND FUNCTIONS

The following parameters and functions can be programmed in each level to change value during a weld sequence.

| | |
|---|-----------------------------|
| DOWN SLOPE | 0.0 – 99.9 SECONDS |
| LEVEL TIME | 0.0 – 999.9 SECONDS |
| PRIMARY (HIGH) AMPS* | 5 – 150 AMPS |
| BACKGROUND (LOW) AMPS | 5 – 150 AMPS |
| SLOPE TIME | CANNOT EXCEED LEVEL TIME |
| PRIMARY SPEED (RPM) | 0.0 RPM TO WELD HEAD MAX.** |
| PRIMARY SURFACE SPEED (INCHES PER MINUTE) | CALCULATED |
| AVERAGE AMPS | CALCULATED |
| FREQUENCY (Hz.) | CALCULATED |
| % PRIMARY AMPS | 1% – 100% |
| PRIMARY (HIGH) PULSE TIME | 0.01 – 9.99 SECONDS |
| BACKGROUND (LOW) PULSE TIME | 0.01 – 99.9 SECONDS |

MULTI-LEVEL PARAMETERS AND FUNCTIONS (cont'd)

| | |
|--------------------------|-----------------------------|
| BACKGROUND SPEED (RPM) | 0.0 RPM TO WELD HEAD MAX.** |
| BACKGROUND SURFACE SPEED | CALCULATED |
| AVERAGE SPEED | CALCULATED |

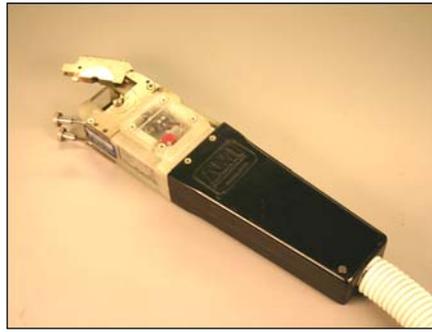
* For **S^3** schedules the **PRIMARY AMPS** parameter is replaced by **START AMPS** and **END AMPS** parameters.

** **TRAVEL** parameters are in **0.01 RPM** increments.

3.0 START-UP

3.1 REQUIRED PERIPHERALS

1. An orbital weld head is required to weld with the Model 217P. Shown below is the EXEL by AMI RDR-05 Rotor Driver (below left) and an AMI Model 9-750 orbital weld head.



2. An A.C. power cord rated for 600 VAC service (below left) and gas purge lines are provided to connect power and inert gas to the power supply.



Note

A.C. input power cords are shipped WITHOUT an attached utility plug. The customer must supply their own plug to connect to the main input power source.

3.2 OPTIONAL PERIPHERALS

All AMI power supplies have their own respective optional remote pendant. This gives the operator remote welding functions of the Model 217P power supply itself. The optional cooling unit is recommended for high production or heavy walled (.109"-.154") welding applications.



Model 217P Remote Pendant



Model 217P with optional Cooling Unit



24 inch "Cheaters"



15 foot "Adapter" cable

Note

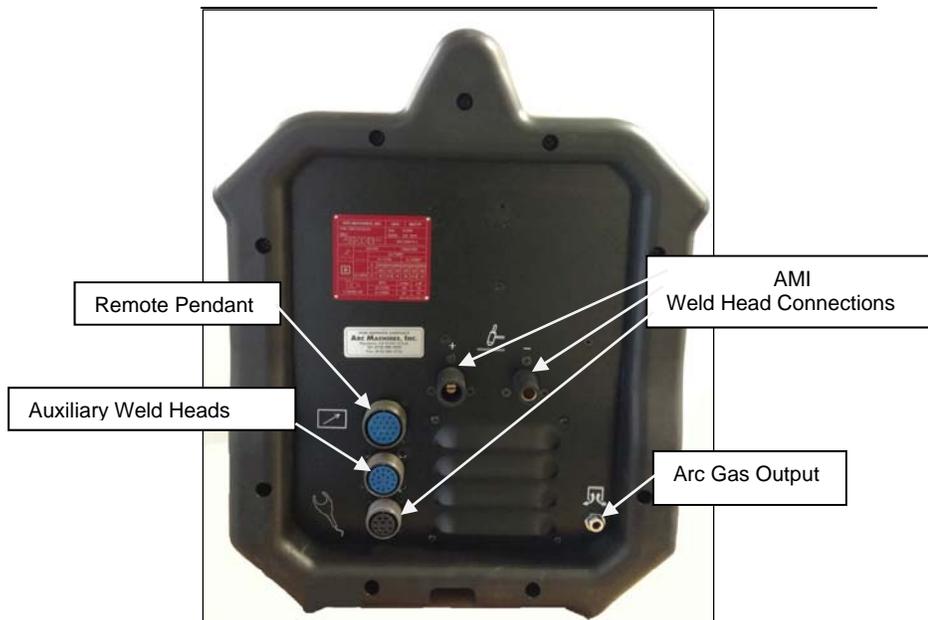
For available options such as remote pendants, water cooling units, longer adapter cables or extension cables, and more, contact Arc Machines, Inc.

3.3 POWER SUPPLY CONNECTION

1. Below is a view of the input and output sides of the Model 217P Power Supply with all connectors visible. Connect the A.C. power cord into a utility power source ranging from 115/230 volts, 50/60 hertz single phase.



2. Connect Argon (or mixed gas) from an external source to the Model 217P **ARC GAS INPUT** connector, **the ARC GAS is monitored by the computer and MUST be run through the power supply to avoid a FAULT**. Connect the weld head electrode, ground, motor control, and gas line via the 24 inch cheaters or 15-foot adapter cable to the power supply.





The Model 217P is intended for typical GTAW gases ONLY. **NEVER CONNECT OXYGEN OR ACETYLENE** to the Model 217P or weld head.

NOTE:

- It is recommended to connect the Model 217P to a dedicated A.C. circuit.
- Power Input: 115/230 VAC, 50/60 hertz
- Purge Input: 5 to 50 psi or 34 to 344 kPa.

3.4 MODEL 217P TO 217P-CW WATER COOLER HOOK UP



Always turn the power supply off before making any cable or connection changes to the power supply.

Non-liquid-cooled weldheads (Models 9-250 and 9-500) connect directly to the Model 217P. Liquid-cooled weldheads connect to the Model 217P / 217P-CW via a short pig-tail or adapter cable. If needed an extension cable can be used. The extension cable connects to the Model 217P and Model 217P-CW cooler on one end, then to the liquid-cooled weldhead on the other.

Pig-tail Connections

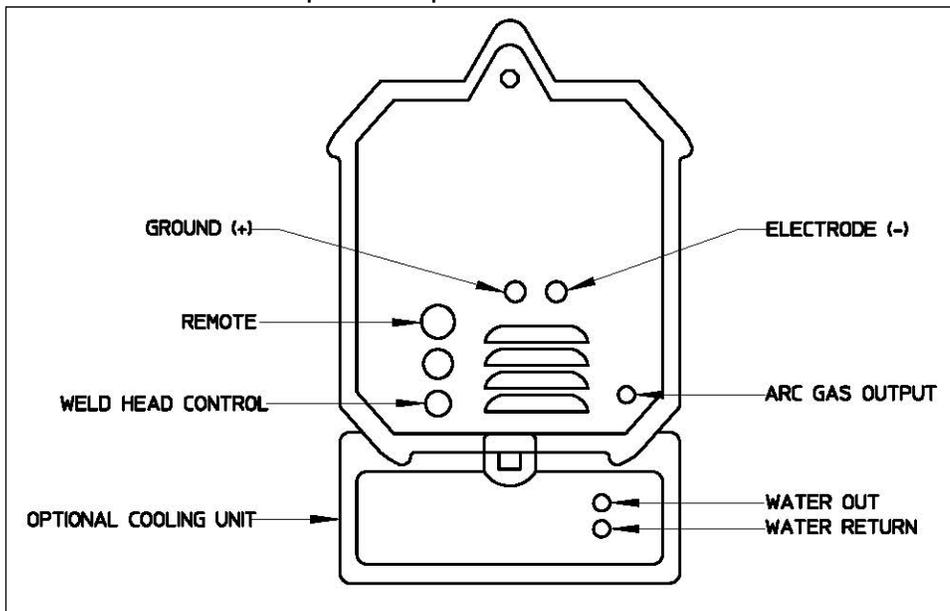
1. Connect the ground and electrode brass quick-disconnect fittings on the pig-tail to the mating fittings on the weldhead. Pull the knurled ring on the female fitting back and fully insert the male fitting. These connectors are fully seated when the ring will spring back to its original position. Slide the rubber boots together and secure them in place, being careful not to dislodge the connectors. Male boots should cover the connection first. The boots protect the connectors and prevent shorting to ground.
2. Attach the ground and electrode connectors on the pig-tail to their respective GROUND(+) and ELECTRODE(-) terminals  on the Model 217P. Align the keyways, push in and turn clockwise until fully locked.

3. Insert the two coolant line quick-disconnect fittings on the pig-tail into the mating WATER OUT  and WATER RETURN  connectors on the Model 217P-CW. These connectors are interchangeable so either connector may be connected to either mating fitting. To prevent accidental disconnection after making the connection, finger-tighten the lock screw on the male connectors.
4. Attach the weldhead control male connector on the weldhead to the WELDHEAD CONTROL connector  on the Model 217P. Note the positioning keyway and NEVER FORCE or use tools on the cable connectors. Hand-tighten the connecting ring being careful not to cross-thread the ring.
5. Insert the male gas quick-disconnect fitting on the weldhead to the mating ARC GAS OUTPUT connector  on the Model 217P and hand-tighten the lock screw to prevent accidental disconnection. Slide the rubber boot over the connection.

Adapter Cable Connections

1. Insert the two, coolant line quick-disconnect fittings on the adapter cable into the mating WATER OUT  and WATER RETURN  connectors on the Model 217P-CW. These connectors are interchangeable so either connector may be connected to either mating fitting. To prevent accidental disconnection after making the connection, finger-tighten the lock screw on the male connectors.

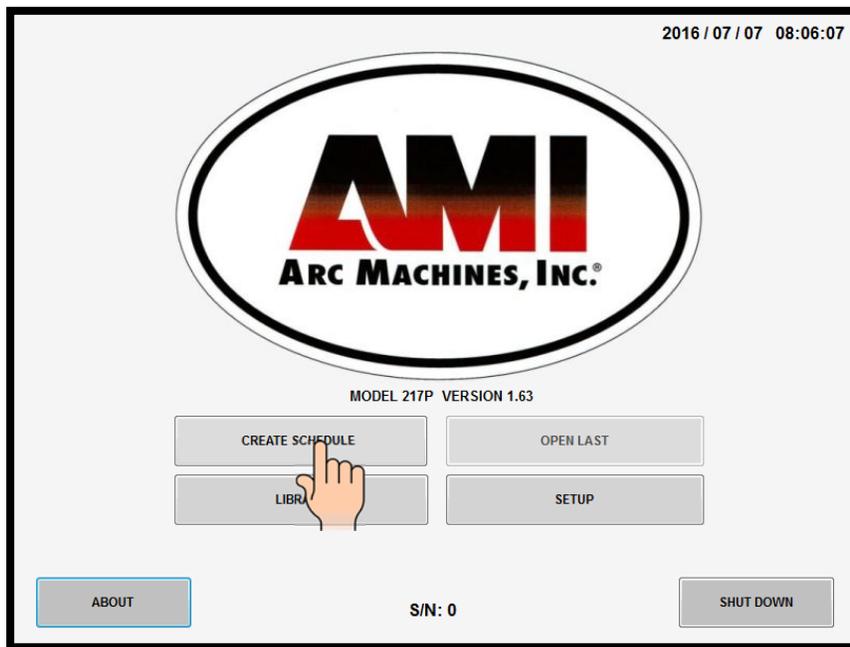
Fig. 1
Hookups for Liquid Cooled Weldheads



3.5 POWER-UP

Flip **ON** the main power switch (**CB-1**). Once the computer boots up the **MAIN SCREEN** will appear on the touch screen. The Main Screen allows the operator to **CREATE** new weld schedules, access the **LIBRARY**, **OPEN LAST** weld schedule that was used, select certain **SETUP** features, display information **ABOUT** Arc Machines, Inc., and properly **SHUT DOWN** the power supply.

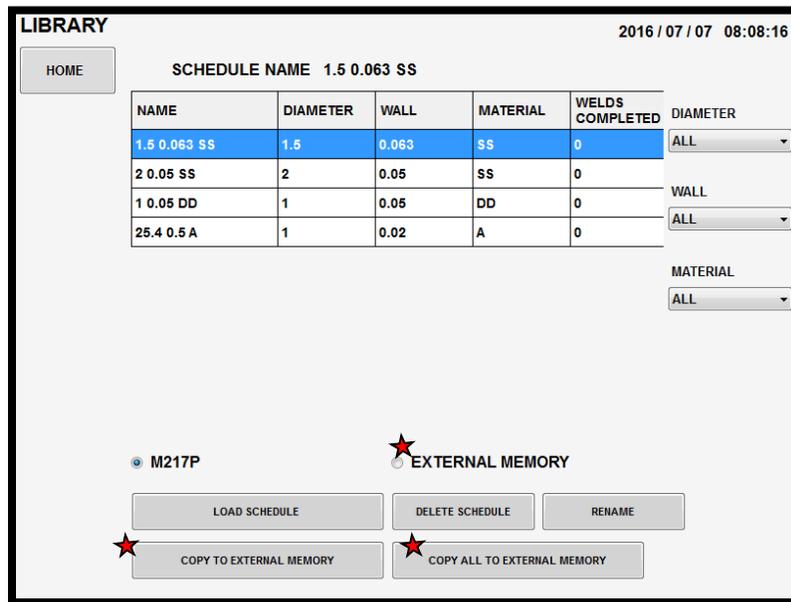
MAIN SCREEN



Touch **LIBRARY** pad to open the Model 217P's internal library which can store over 1,000 complete weld schedules. Each schedule having up to 99 individual levels allowing for precise manipulation of weld parameters to achieve optimum results based upon your unique welding application.

4.0 LIBRARY AND MEMORY

Touch the **LIBRARY** pad on the **MAIN SCREEN** and the Library will appear. The operator can select and **LOAD** a weld schedule (selected to weld), **DELETE** weld schedules, and **COPY** weld schedules to/from an external memory device.★



★ These modes are enabled and displayed only when a memory storage device is connected to the Model 217P's USB port(s).

The Model 217P's Library shows the weld schedules available and displays them by:

- Programmed Name.
- Programmed Actual Outside Diameter of Tube or Pipe.
- Programmed Actual Wall Thickness.
- Programmed material.

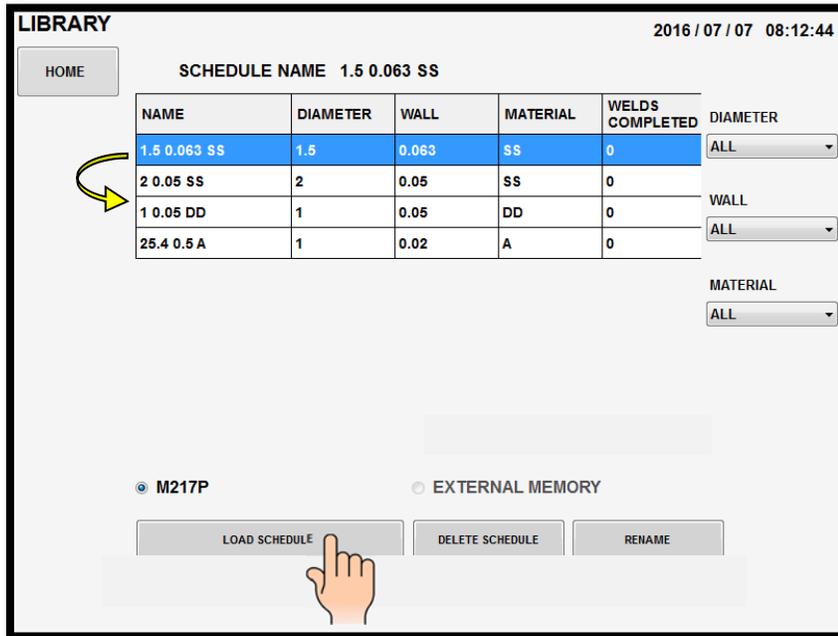
The Operator can select viewing the contents of the Library by specific:

- Outside **DIAMETER**.
- **WALL** Thickness.
- **MATERIAL**.
- Or **ALL** three variables.

4.1 LOADING A WELD SCHEDULE FROM THE MODEL 217P LIBRARY

1. Flip the main power switch (**CB-1**) of the Model 217P to the **ON** position.
2. Once the computer boots up touch **LIBRARY** on the **MAIN SCREEN**.
3. Peruse the **LIBRARY**, touch the desired weld schedule on the screen, it will become highlighted.

4. Touch **LOAD SCHEDULE**.

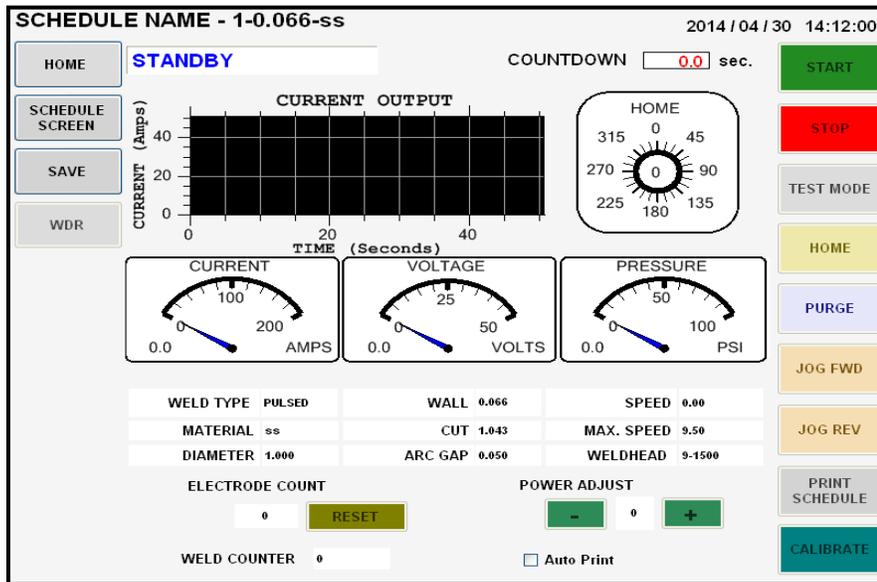


Note

Double clicking the desired (highlighted) weld schedule will also cause the weld schedule to load.

5. The selected weld schedule will be loaded and the **Weld Screen** will appear.

WELD SCREEN



From the Weld Screen the operator has access to all power supply, welding and weld head functions at a touch of the weld screen:

START: Starts the Weld sequence. (Pre purge, arc start, weld sequence, post purge, rotor returns home, finish weld).

STOP: Terminates weld sequence. (Arc off/rotation stops, post purge, rotor returns home, finish).

TEST MODE: Starts Test Run sequence. (No purge, no arc, weld schedule sequence, rotor returns home, finish).

WELD MODE: Starts Test Run sequence. (Purge, arc, weld schedule sequence, finish).

HOME: Manual rotor Return Home command.

PURGE: Manual ON/OFF override of Arc Gas solenoid. (Command to open and close gas solenoid for setting initial flow rate or continuous arc gas purge flow).

JOG FWD: Allows manual forward rotation of the rotor. Stops when released.

JOG REV: Allows manual reverse rotation of the rotor. Stops when released.

PRINT SCHEDULE: Provides printout of entire weld schedule parameters.

CALIBRATE: If weld heads differ when changing weld schedules, provides automatic weld head calibration to power supply. Follow on screen prompts to perform calibration.

POWER ADJUST: This value establishes the min/max % adjustment that the operator can make to the welding current. On the Weld screen the operator can then adjust the welding current up or down in 0.1% increments to this value. Once this adjustment is made and the operator presses the **SAVE** button, the Power Adjust value will be reset to 0 on the Weld screen and the High and Low current values on the Schedule Screen will be recalculated to the adjusted value.

ELECTRODE COUNT: Keeps a running count of how many arc starts a particular electrode has provided. For applications that require electrode change after a specified amount of arc starts.

SAVE: Offers the operator the ability to overwrite a weld schedule being used using the same name or copying and renaming the weld schedule being used when a change is made to the original weld schedule.

SCHEDULE SCREEN: Displays all pertinent data for that particular weld schedule.

- Page 1: Tube/Pipe information, Weld Head information, and Electrode data.
- Page 2. Weld Schedule Associated Data.
- Page 3. Weld Parameters.

HOME: Exits Weld Schedule and returns to MAIN SCREEN.

CURRENT OUTPUT SCREEN: Linear graph displays the AVERAGE current output throughout the entire weld sequence.

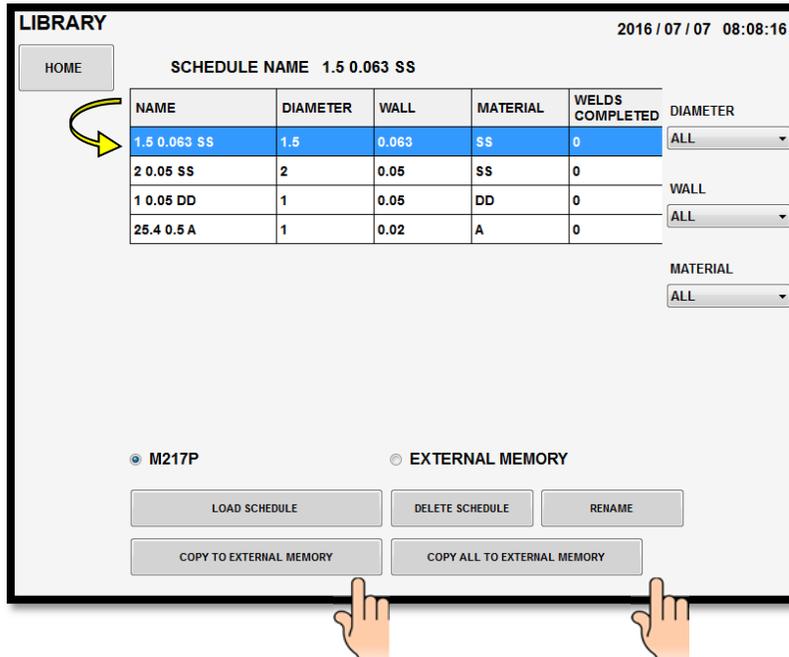
HOME SCREEN: Radial graph displaying relative electrode position from ARC START throughout the entire weld sequence.

ANALOG METERS:

- **CURRENT:** Analog and numeric display of average current output.
- **VOLTAGE:** Analog and numeric display of ARC VOLTAGE.
- **PRESSURE:** Analog and numeric display of ARC GAS and PURGE GAS pressure (dual meter).

ASSOCIATED DATA: Quick reference information of certain parameters and other pertinent data relevant to that particular weld schedule.

4.2 COPYING WELD SCHEDULES FROM THE MODEL 217P LIBRARY TO AN EXTERNAL MEMORY DEVICE

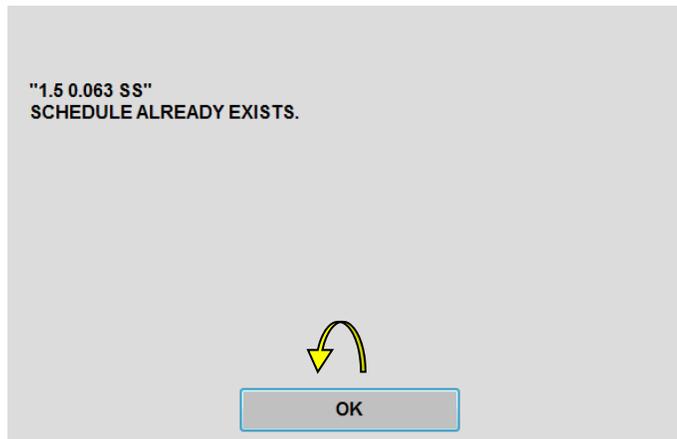


1. Open **LIBRARY**. Insert the external memory device into the **Model 217P USB port**.
2. Select (highlight) **one** weld schedule to be copied to the external memory device.

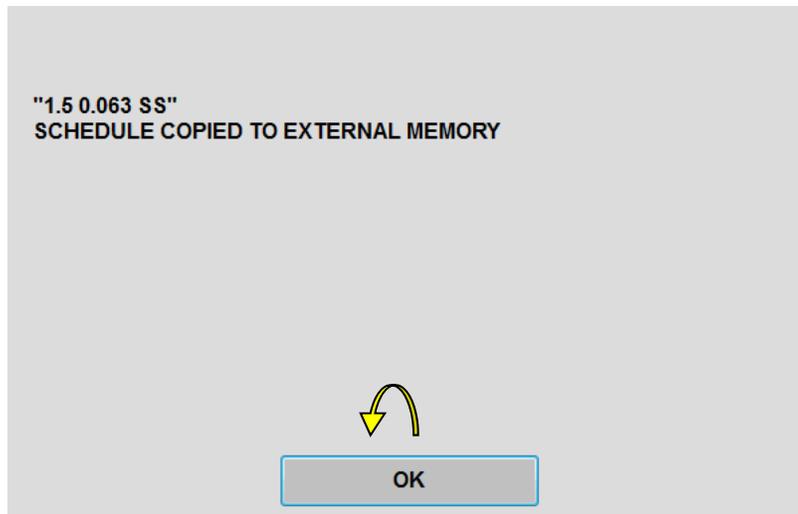
3. Touch **COPY TO EXTERNAL MEMORY** to copy that **one** weld schedule, or touch **COPY ALL TO EXTERNAL MEMORY** if you want **the entire Model 217P library** copied to the external memory device.

Note

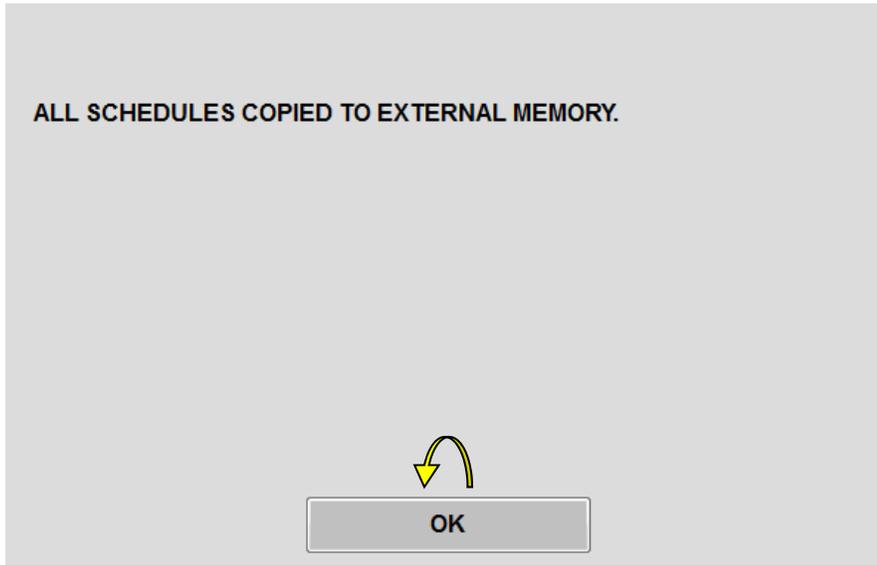
Should the weld schedule(s) you are trying to copy from the Model 217P library already exist in the external memory device the following screen be displayed (Next Page):



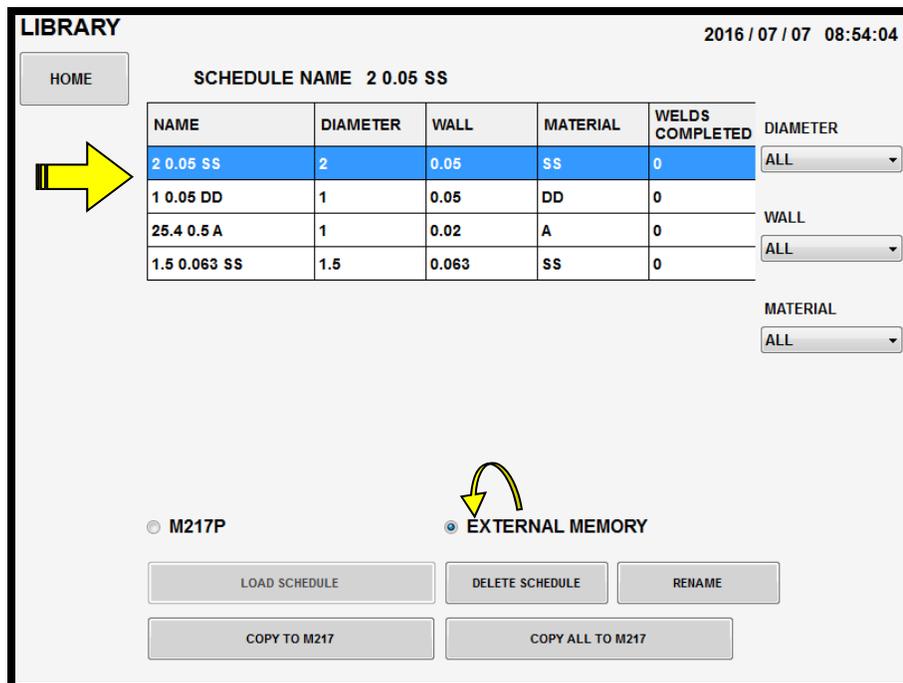
4. The screen below will be displayed to verify if **one** weld schedule was copied successfully to the external memory device.



5. OR the screen below will be displayed to verify if the entire Model 217P library has been copied successfully to the external memory device.

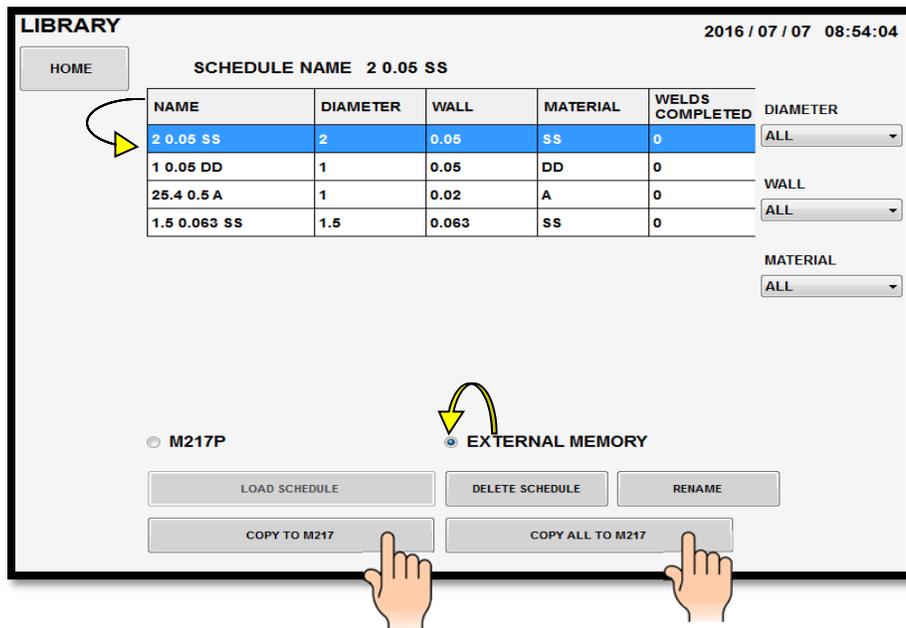


6. Touch **OK** to clear verification screen. Touch **EXTERNAL MEMORY** display.



7. Verify that the weld schedule or schedules have been copied to the external memory device.
8. Remove external memory device.

4.3 COPYING WELD SCHEDULES FROM AN EXTERNAL MEMORY DEVICE TO THE MODEL 217P LIBRARY



1. Open **LIBRARY**. Insert external memory device in the **Model 217P USB port**.
2. Touch **EXTERNAL MEMORY** to open and display external memory device library.
3. Select (highlight) **one** weld schedule to be copied to the Model 217P library.

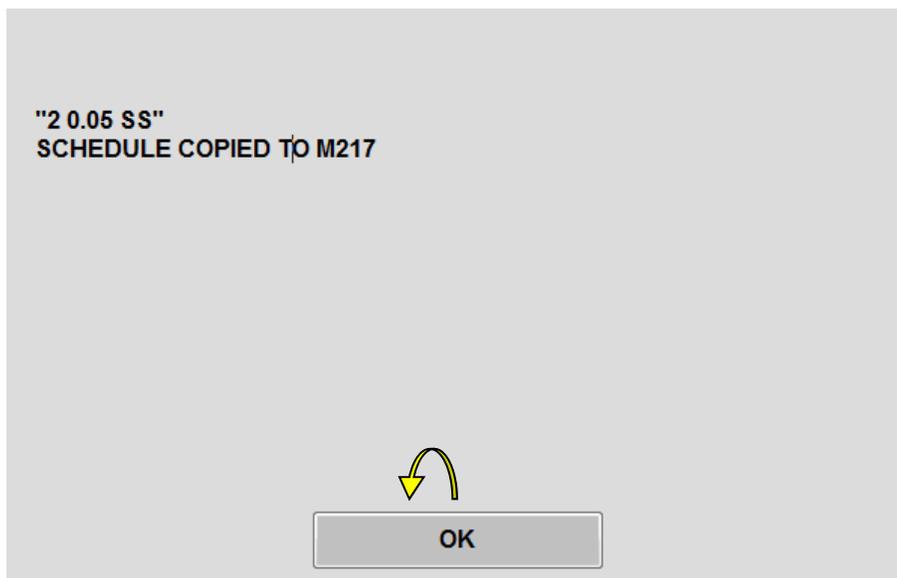
4. Touch **COPY TO M217P** to copy that **one** weld schedule, or touch **COPY ALL TO M217P** if you want **the entire external memory** library copied to the Model 217P library.

Note

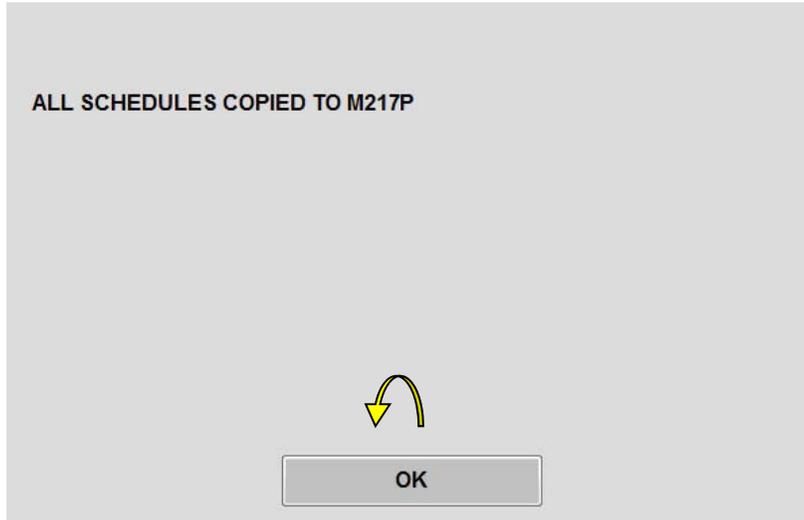
Should the weld schedule(s) you are trying to copy from the external memory device exist in the Model 217P library the following screen be displayed (Next Page):



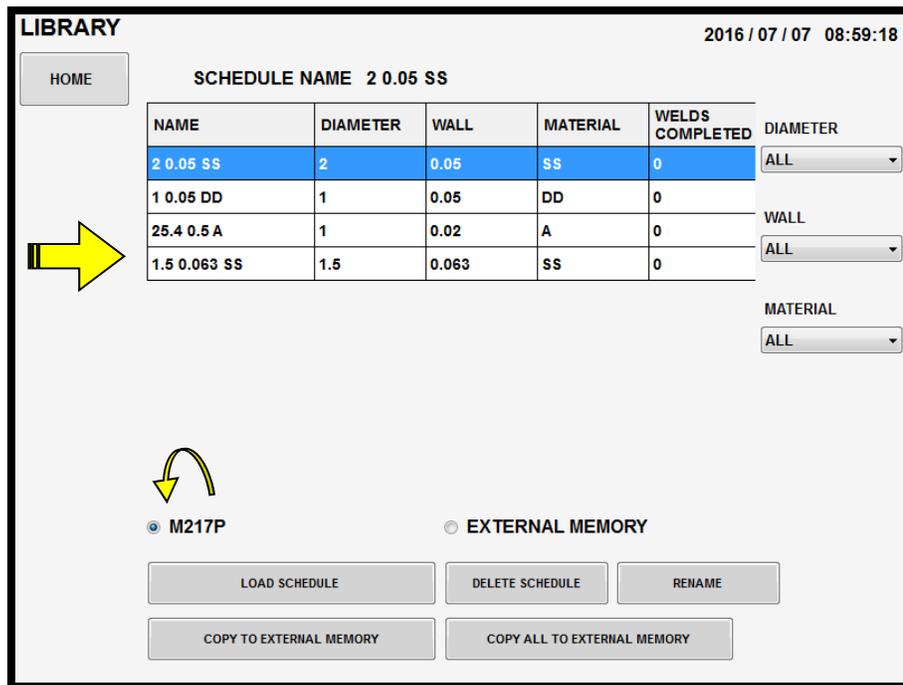
5. The screen below will be displayed to verify if **one** weld schedule was copied successfully to the Model 217P library.



- OR the screen below will be displayed to verify if **the entire external memory library** has been copied successfully to the Model 217P library.



- Touch **OK** to clear verification screen. Touch **M217P** display.

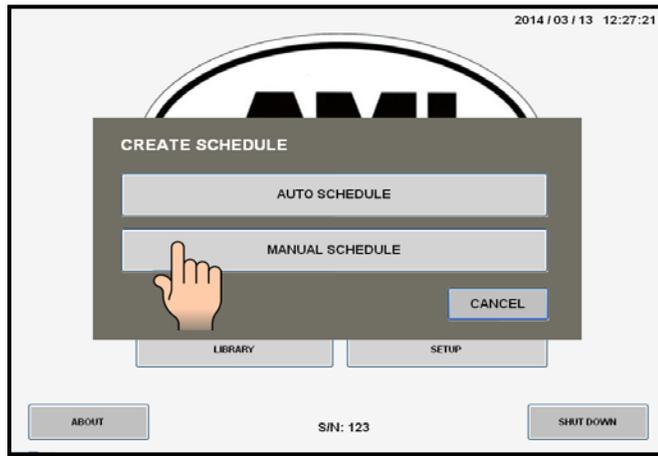


- Verify that the weld schedule or schedules have been copied to the Model 217P library.
- Remove external memory device.

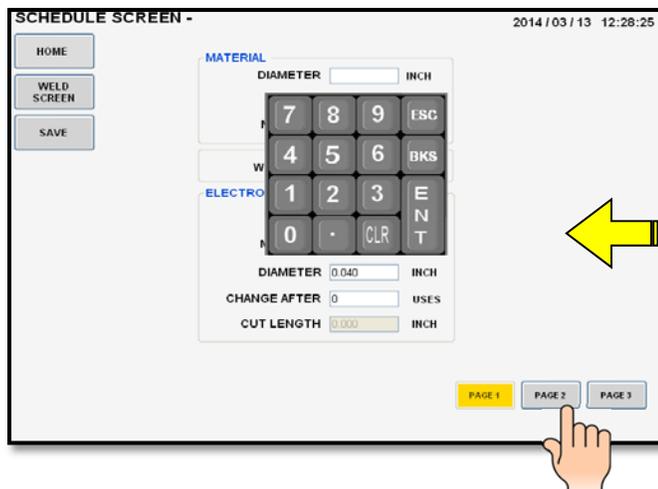
5.0 CREATING WELD SCHEDULES

5.1 CREATING A MANUAL 4 LEVEL WELD SCHEDULE

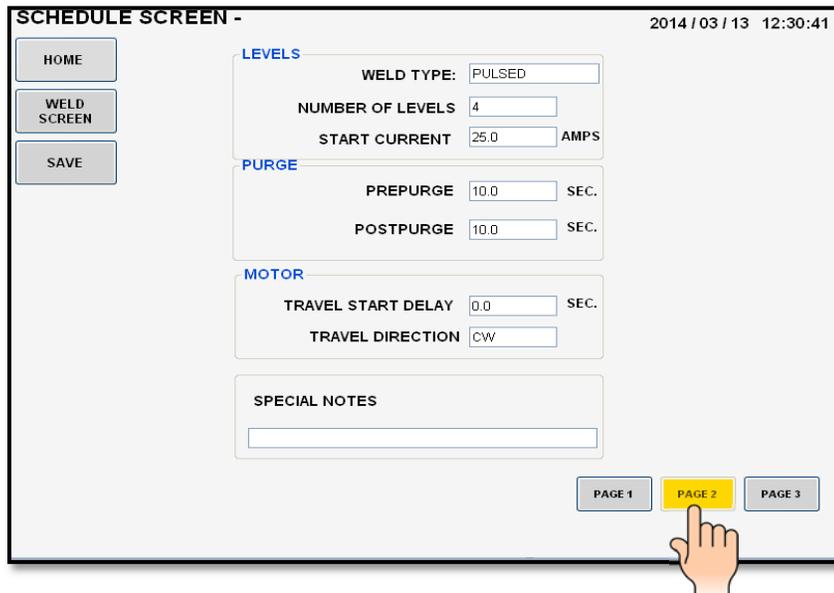
1. From the **MAIN SCREEN** touch the **CREATE SCHEDULE** pad and the create schedule menu will be displayed. Select **MANUAL SCHEDULE**.



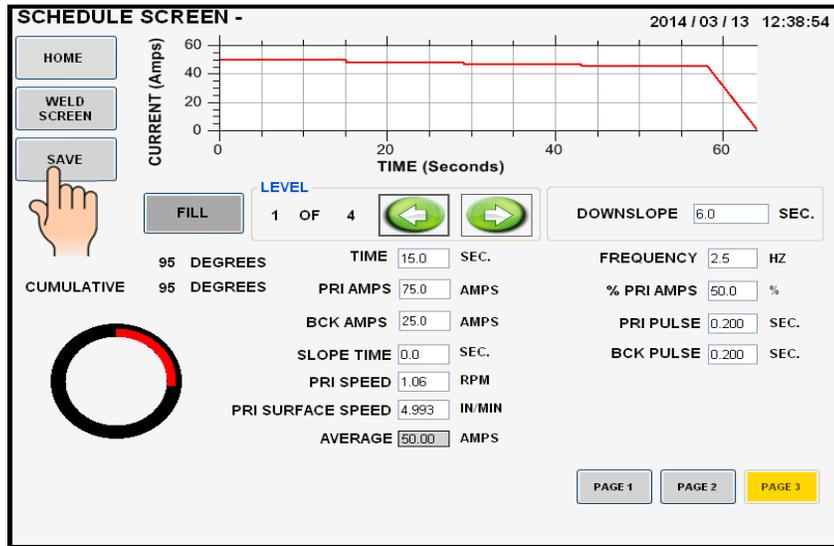
2. **Page 1** of the **SCHEDULE SCREEN** will be displayed. Select and enter all required **MATERIAL**, **WELD HEAD** and **ELECTRODE** parameters using the numerical key pad.



3. Press **Page 2**. Select and enter all required **LEVELS**, **PURGE** and **MOTOR** parameters. You may also enter any **SPECIAL NOTES** that you may have.

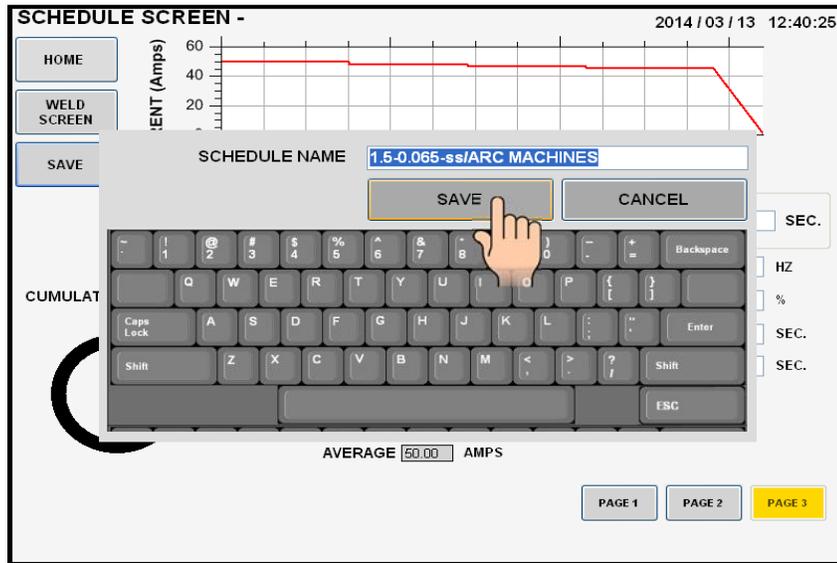


4. Press **Page 3**. Select and enter all required **WELDING** parameters for all 4 levels.

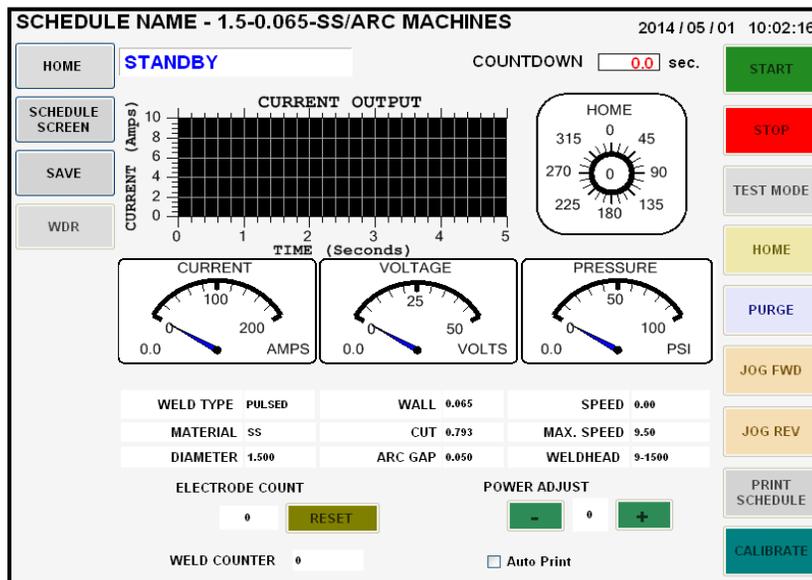


5. Press **SAVE**.

- The **SCHEDULE NAME** screen will be displayed. The default schedule name is based on the tube O.D., wall thickness and material you entered when creating this weld schedule. You may save it as is or use the keypad to assign your own personal weld schedule name. Press **SAVE** when finished.



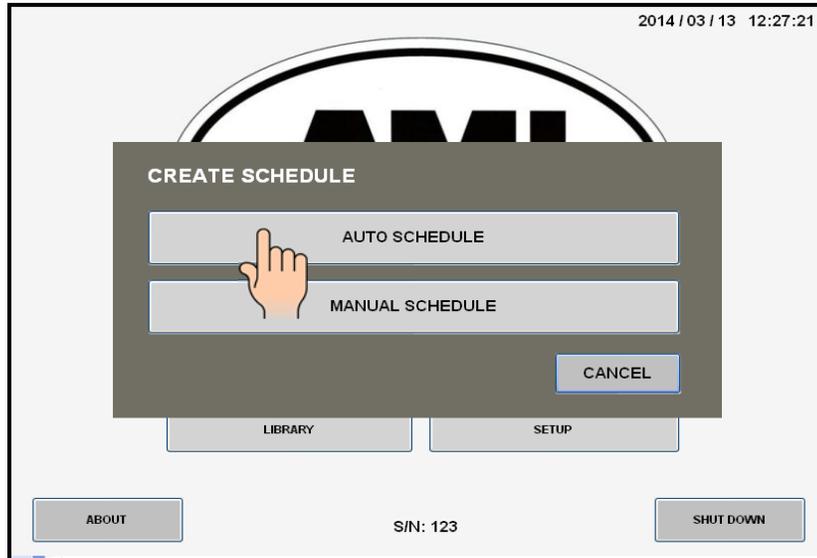
- Pressing **SAVE** will store all data in the library under the **SCHEDULE NAME** you selected and the **WELD SCREEN** will be displayed with the schedule name on top.



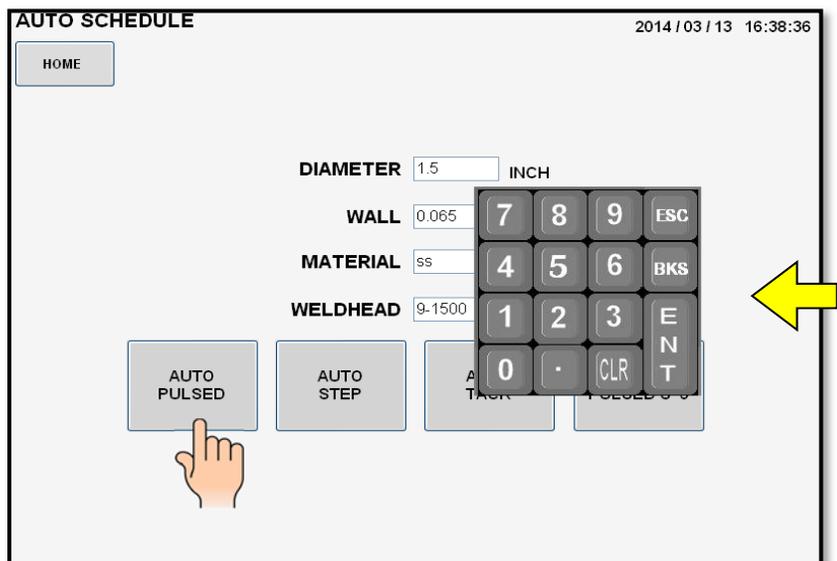
- The Model 217P is now loaded with the weld schedule and is in **STANDBY** mode, ready to weld.

5.2 CREATING AN AUTOMATIC 4 LEVEL WELD SCHEDULE

1. From the **MAIN SCREEN** touch the **CREATE SCHEDULE** pad and the create schedule menu will be displayed. Select **AUTO SCHEDULE**.

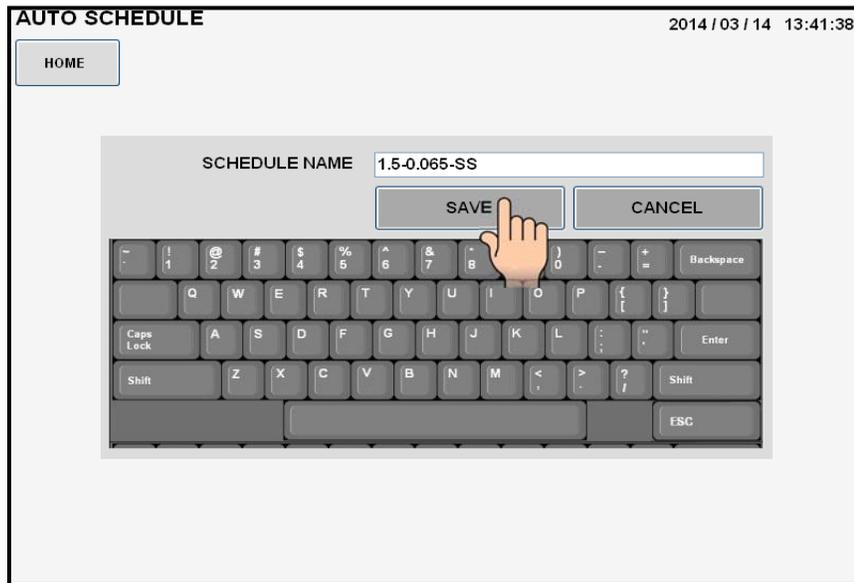


2. The **AUTO SCHEDULE** screen will be displayed. Select and enter all required **O.D.**, **WALL**, **MATERIAL** and **WELD HEAD** parameters using the numerical key pad.

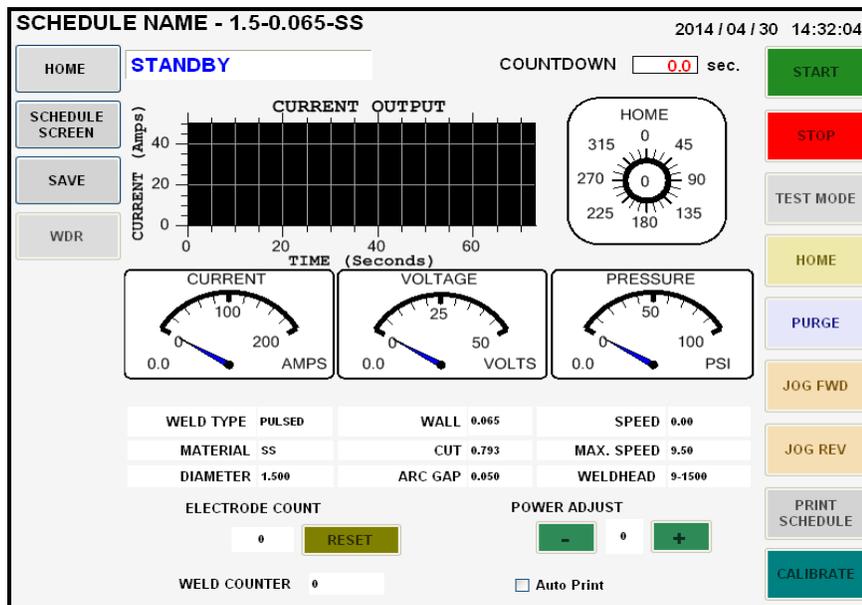


3. Press the **AUTO PULSED** pad.
4. The **AUTO SCHEDULE NAME** screen will be displayed. The default schedule name is based on the tube O.D., wall thickness and material you entered when creating this weld schedule.

You may save it as is or use the keypad to assign your own personal weld schedule name. Press **SAVE** when finished.



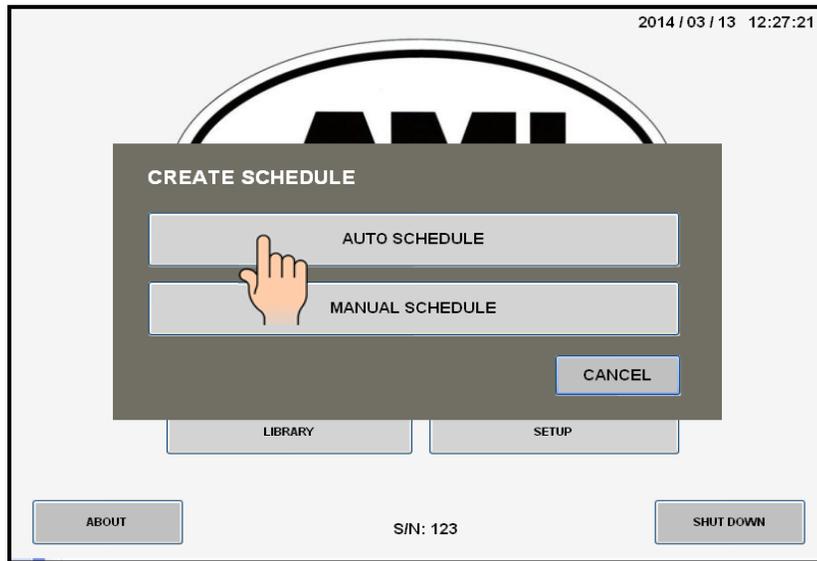
5. Pressing **SAVE** will store all data in the library under the **SCHEDULE NAME** you selected and the **WELD SCREEN** will be displayed with the schedule name on top.



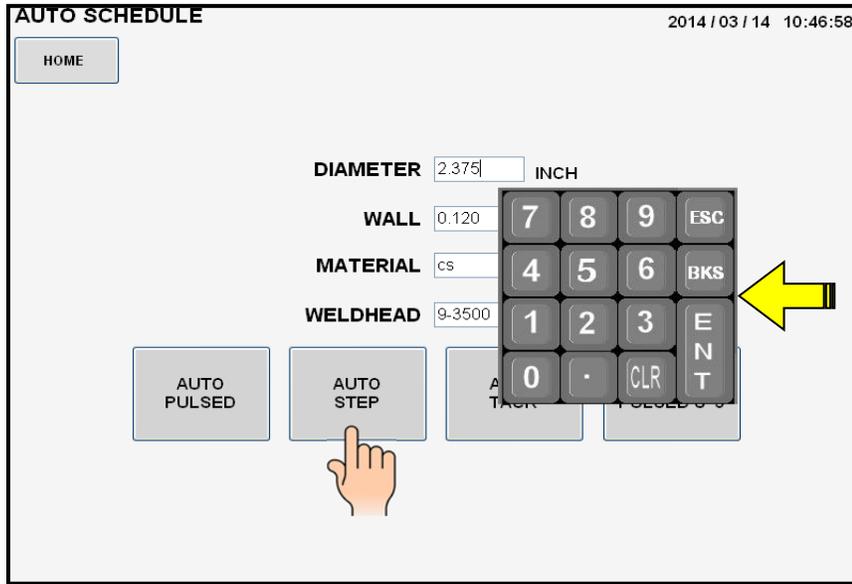
6. The Model 217P is now loaded with the weld schedule and is in **STANDBY** mode, ready to weld.

5.3 CREATING AN AUTO STEP WELD SCHEDULE

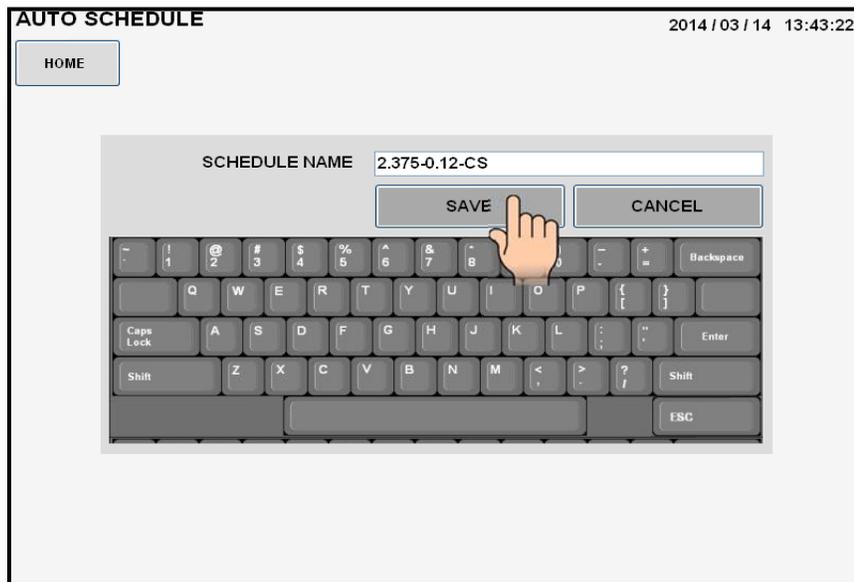
1. From the **MAIN SCREEN** touch the **CREATE SCHEDULE** pad and the create schedule menu will be displayed. Select **AUTO SCHEDULE**.



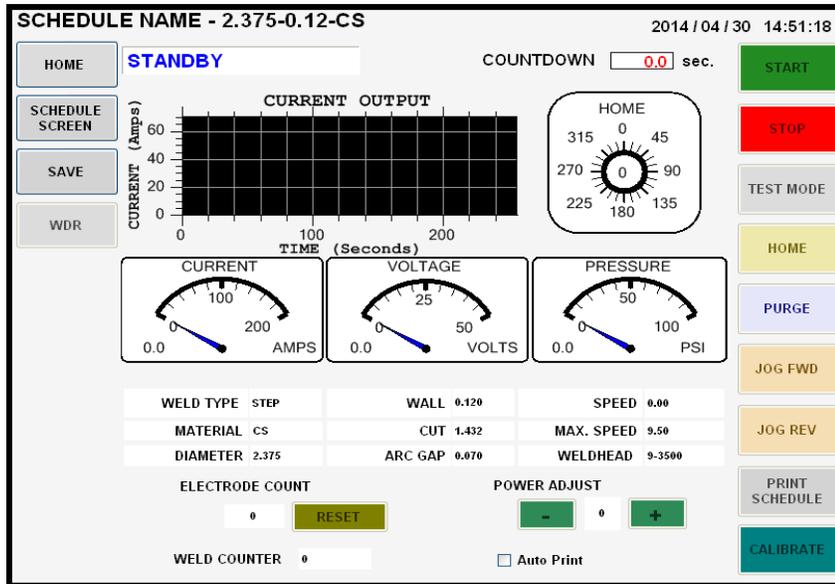
2. The **AUTO SCHEDULE** screen will be displayed. Select and enter all required **O.D.**, **WALL**, **MATERIAL** and **WELD HEAD** parameters using the numerical key pad.



3. Press the **AUTO STEP** pad.
4. The **AUTO SCHEDULE NAME** screen will be displayed. The default schedule name is based on the tube O.D., wall thickness and material you entered when creating this weld schedule. You may save it as is or use the keypad to assign your own personal weld schedule name. Press **SAVE** when finished.



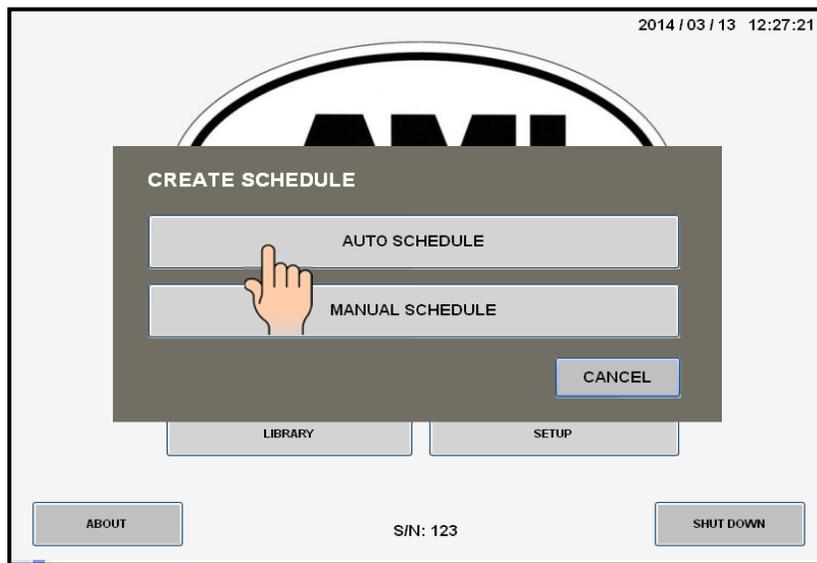
5. Pressing **SAVE** will store all data in the library under the **SCHEDULE NAME** you selected and the **WELD SCREEN** will be displayed with the schedule name on top.



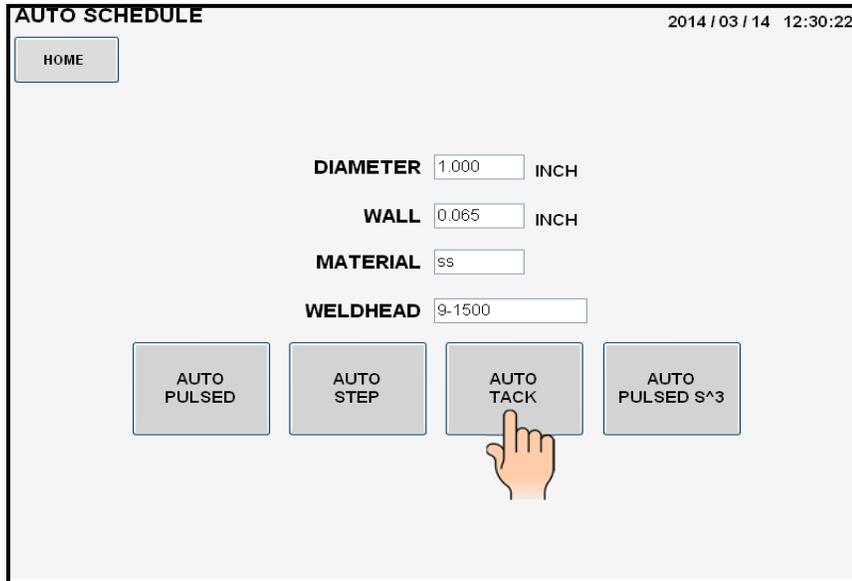
6. The Model 217P is now loaded with the weld schedule and is in **STANDBY** mode, ready to weld.

5.4 CREATING AN AUTO TACK WELD SCHEDULE

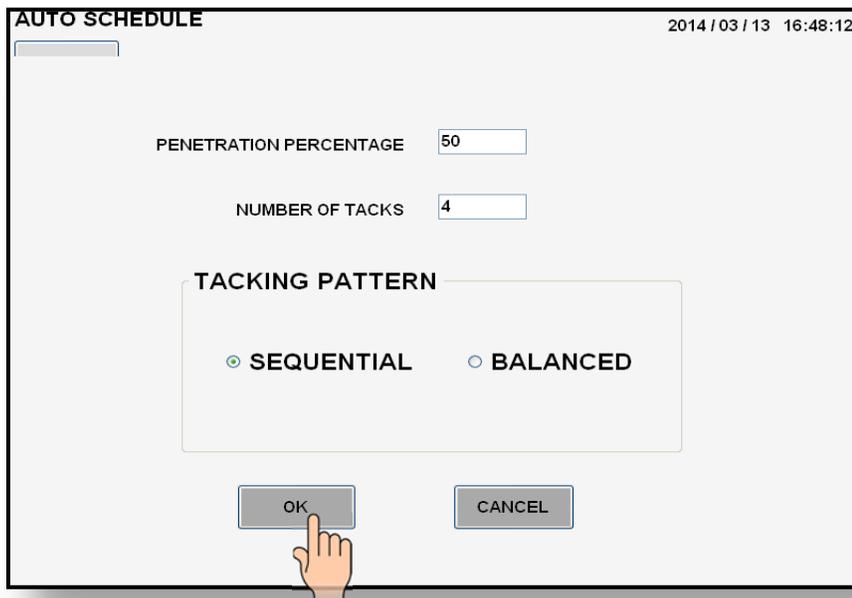
1. From the **MAIN SCREEN** touch the **CREATE SCHEDULE** pad and the create schedule menu will be displayed. Select **AUTO SCHEDULE**.



2. The **AUTO SCHEDULE** screen will be displayed. Select and enter all required **O.D.**, **WALL**, **MATERIAL** and **WELD HEAD** parameters using the numerical key pad.

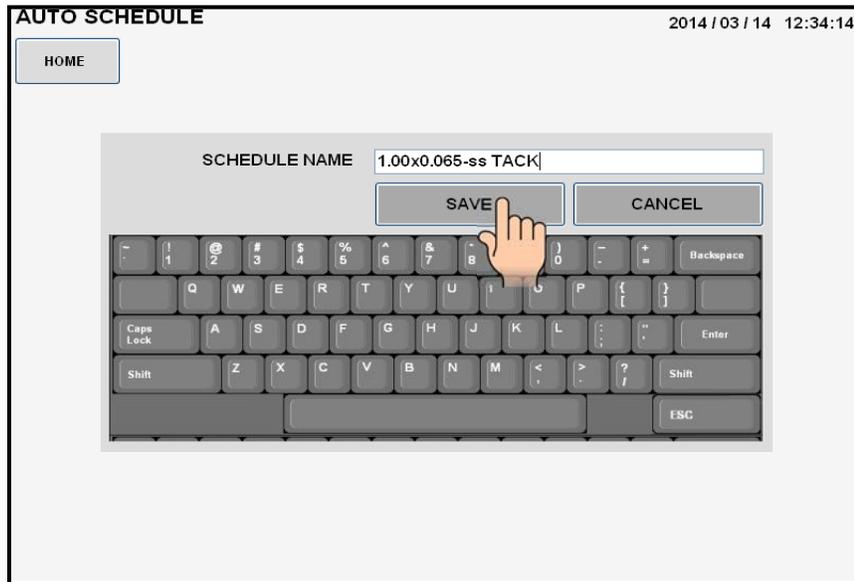


3. Press the **AUTO TACK** pad.
4. The **TACK PARAMETERS** screen will be displayed. You can select the amount of **PENETRATION PERCENTAGE (0% to 126%)** desired, the **NUMBER OF TACKS (1 to 40)** desired, and the **TACKING PATTERN – SEQUENTIAL** (consecutive) or **BALANCED** (180 degrees opposite each other) desired. Press **O.K.** when set.

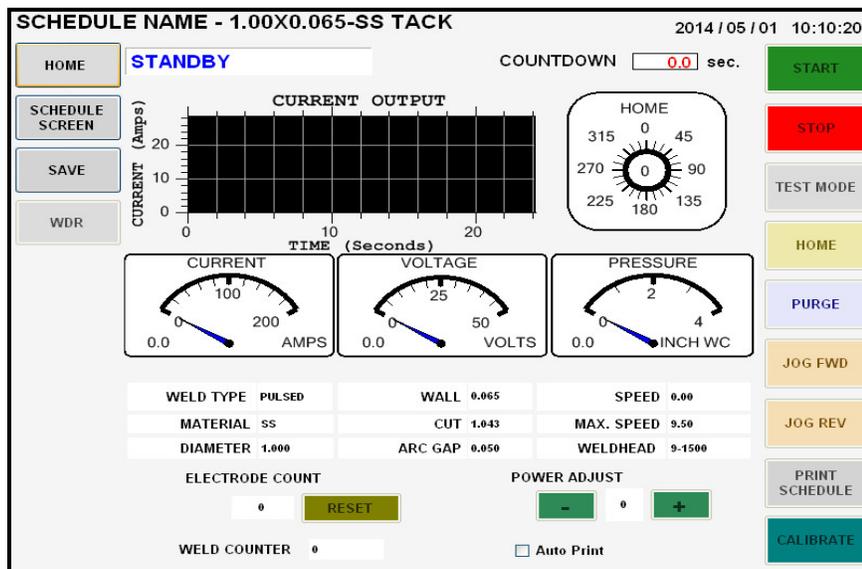


5. The **AUTO SCHEDULE NAME** screen will be displayed. The default schedule name is based on the tube O.D., wall thickness and material you entered when creating this weld schedule.

You may save it as is or use the keypad to assign your own personal weld schedule name. Press **SAVE** when finished.



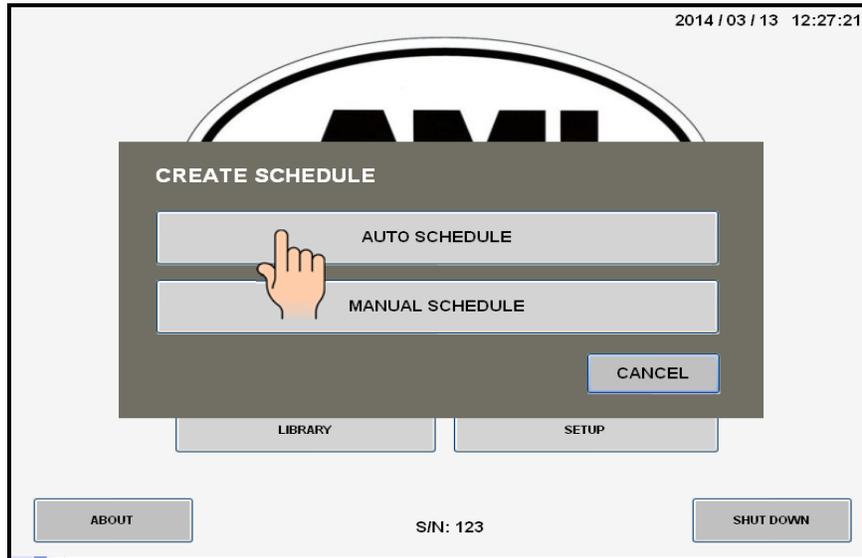
- Pressing **SAVE** will store all data in the library under the **SCHEDULE NAME** you selected and the **WELD SCREEN** will be displayed with the schedule name on top.



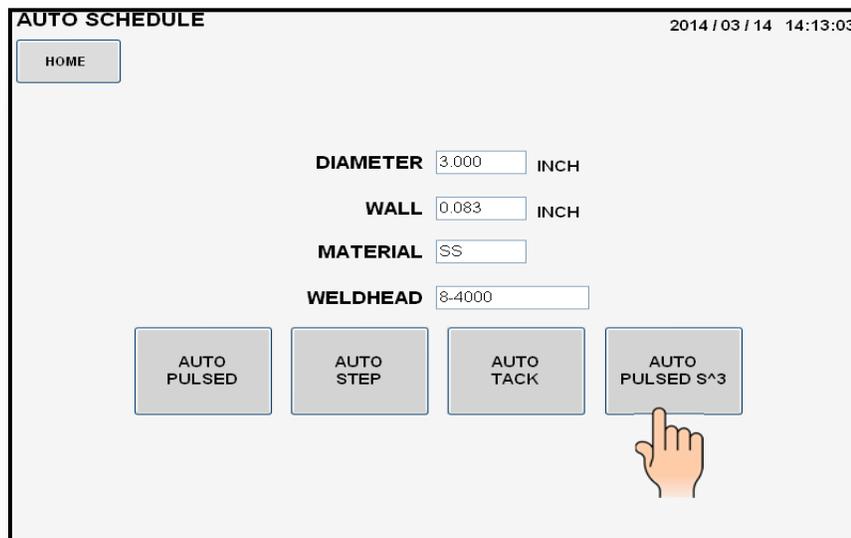
- The Model 217P is now loaded with the weld schedule and is in **STANDBY** mode, ready to tack.

5.5 CREATING AN AUTO S³ (S cubed) WELD SCHEDULE

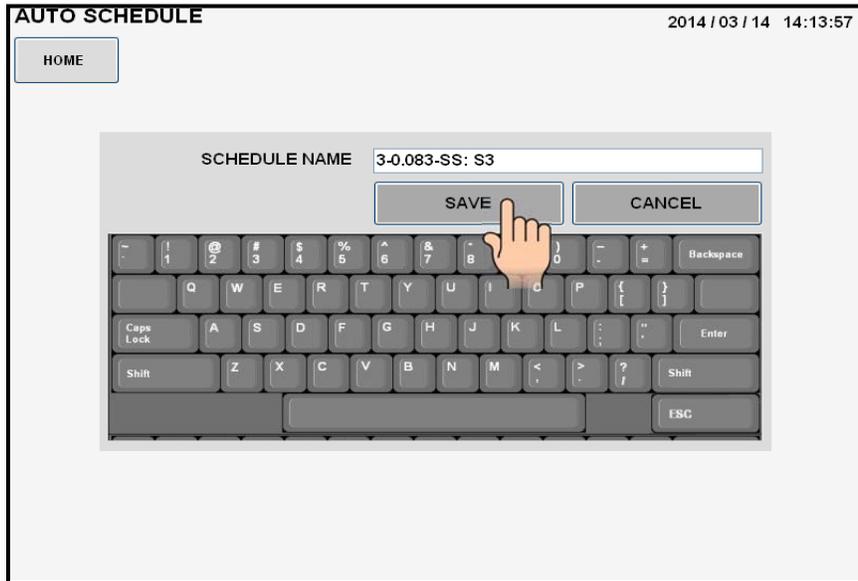
1. From the **MAIN SCREEN** touch the **CREATE SCHEDULE** pad and the create schedule menu will be displayed. Select **AUTO SCHEDULE**.



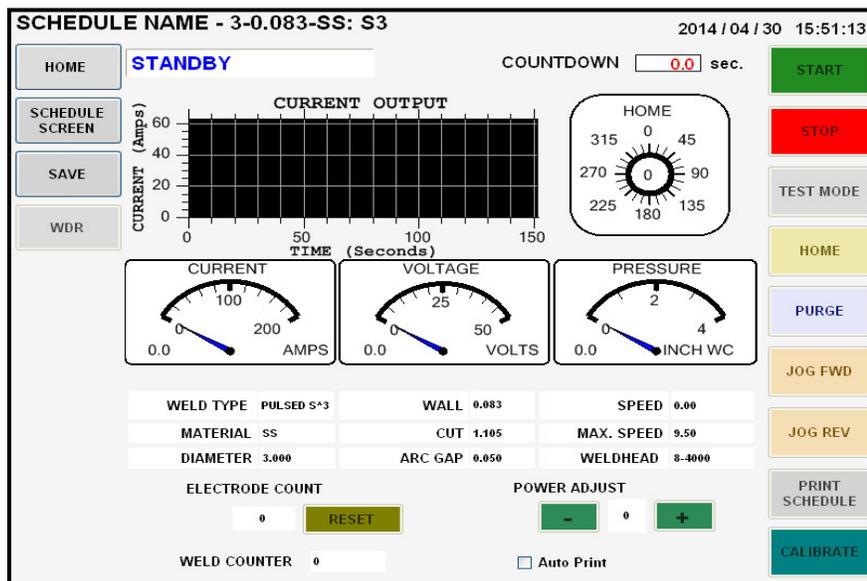
2. The **AUTO SCHEDULE** screen will be displayed. Select and enter all required **O.D.**, **WALL**, **MATERIAL** and **WELD HEAD** parameters using the numerical key pad.



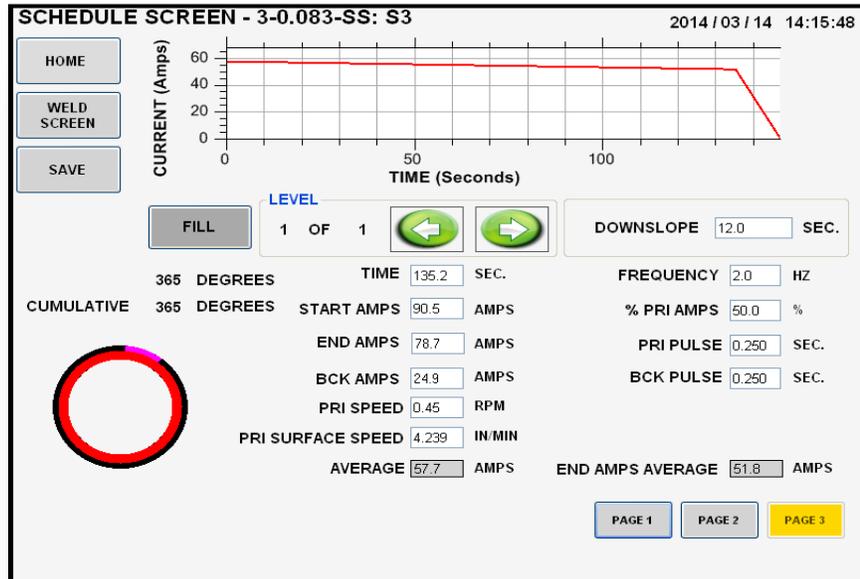
3. Press the **AUTO PULSED S³** pad.
4. The **AUTO SCHEDULE NAME** screen will be displayed. The default schedule name is based on the tube O.D., wall thickness and material you entered when creating this weld schedule. You may save it as is or use the keypad to assign your own personal weld schedule name. Press **SAVE** when finished.



5. Pressing **SAVE** will store all data in the library under the **SCHEDULE NAME** you selected and the **WELD SCREEN** will be displayed with the schedule name on top.



- The Model 217P is now loaded with the weld schedule and is in **STANDBY** mode, ready to weld.
- Below is an example of an **S³ (pronounced S cubed)** weld, it is named for the **three S's** defining the weld (**S**ingle **S**lope, **S**ingle pass). It is a linear reduction of current from a **START AMPS** to an **END AMPS** with a **LOW AMP PULSATION** for an **AVERAGE AMP OUTPUT**.



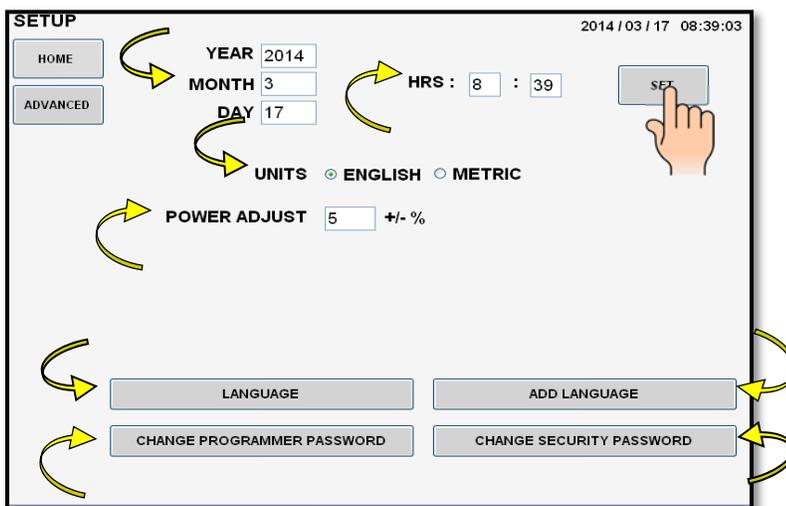
6.0 SETUP

6.1 PROGRAMMING BASIC SETUP FEATURES

1. From the **MAIN SCREEN** touch the **SETUP** pad.



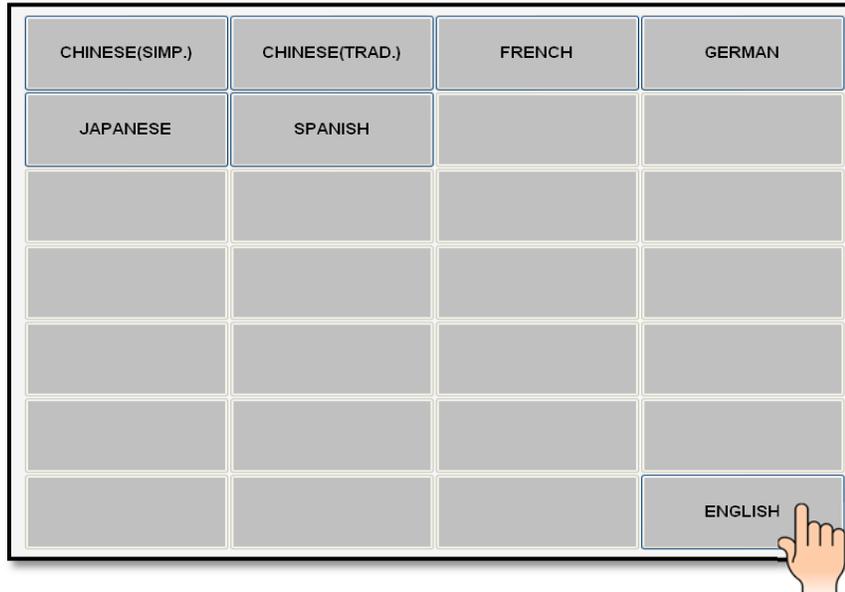
2. The **SETUP** screen will be displayed.



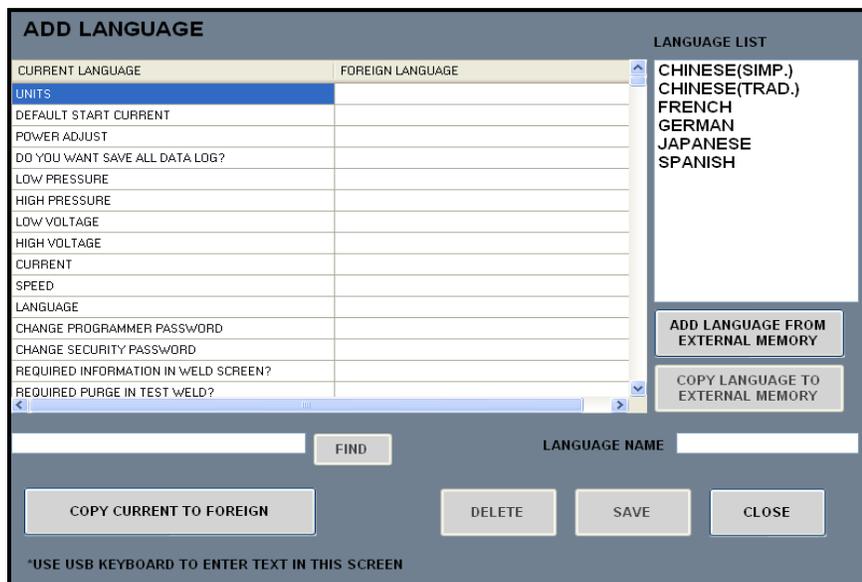
- From the **SETUP** screen is where the internal **CLOCK** (local time and year) is set, the libraries **UNITS OF MEASURE** (English or Metric) is selected, and the current override **POWER ADJUST** minimum and maximum limits are set.

6.2 PROGRAMMING THE LANGUAGE FEATURES

- The **LANGUAGE** pad displays the current languages available to use in the language library:



- Select **CHINESE, FRENCH, GERMAN, JAPANESE, SPANISH** or **ENGLISH**.
- The **ADD LANGUAGE** pad displays the language menu:



- The **ADD LANGUAGE** screen allows **IMPORTING** and **EXPORTING** different languages from an external memory device, **MODIFIES** selected words to **CUSTOM WORDS**, **DELETES** whole language files, and **SAVES** any changes made to existing languages.

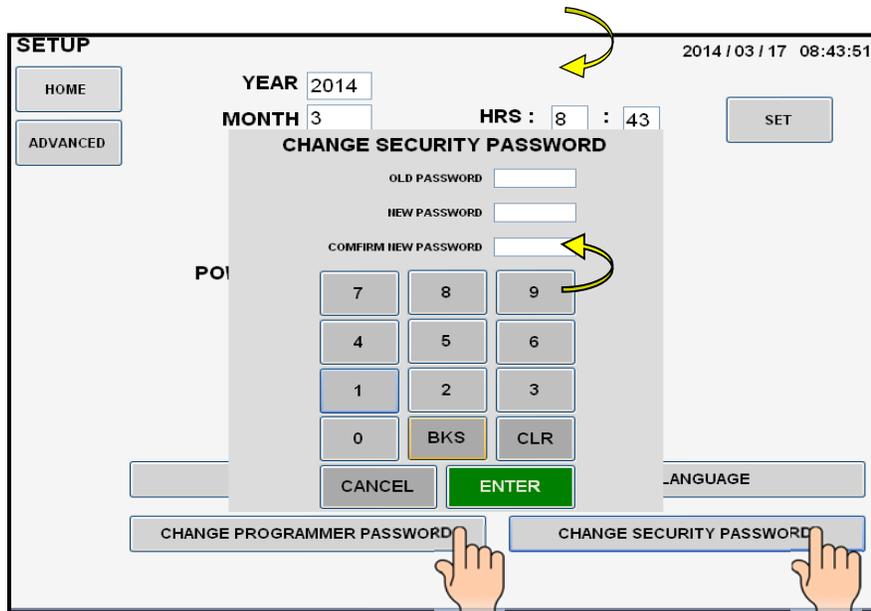
6.3 PROGRAMMING THE PASSWORD FEATURES

The **CHANGE PROGRAMMER PASSWORD** and **CHANGE SECURITY PASSWORD** pads allow management/supervisors to set passwords so as to minimize or limit operator access to certain screens and operational features of the Model 217P. This will determine what the operator can do, cannot do, or is limited in doing with the Model 217P.

! NOTE !

**ALL MODEL 217P LEAVE THE FACTORY WITH NO PASSWORDS SET (BLANK)!
OPERATORS WILL HAVE ACCESS TO ALL SCREENS, SETTINGS, AND
FUNCTIONS.**

- **SECURITY PASSWORD:** Required to **unlock limited access to the Model 217P**. Allows access to **LIBRARY** and **OPEN LAST** only. Weld schedules may only be loaded from the **LIBRARY** and welded with. No permanent program changes are allowed.
- **PROGRAMMER PASSWORD:** Required to **unlock entire access to the Model 217P**. Allows access to **CREATE SCHEDULE, LIBRARY, OPEN LAST** and **SETUP**. All features are accessible and all functions are available, any and all programmable changes are allowed and can be permanently saved in the library.



- To **CHANGE SECURITY PASSWORD**, enter **OLD PASSWORD**. (From the factory the passwords are **BLANK**, i.e. no numbers).
- Enter **NEW PASSWORD** (up to 5 numbers).

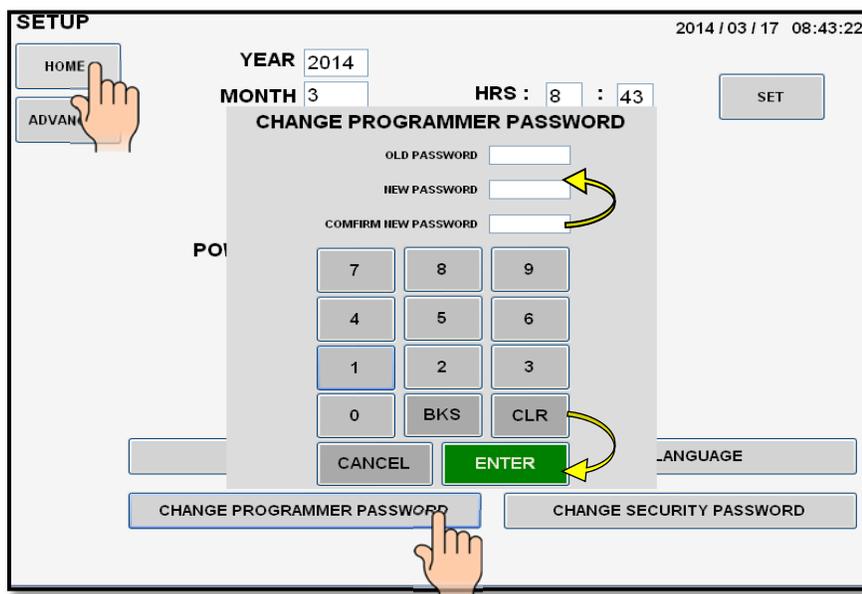
3. **CONFIRM** new password (re-enter same numbers) and press **ENTER**.
4. **NEW PASSWORD IS SET** will appear on screen if password is set properly.
5. Repeat to set **CHANGE PROGRAMMER PASSWORD**.

7.0 ALARMS AND FAULTS

7.1 PROGRAMMING ALARM SETTINGS

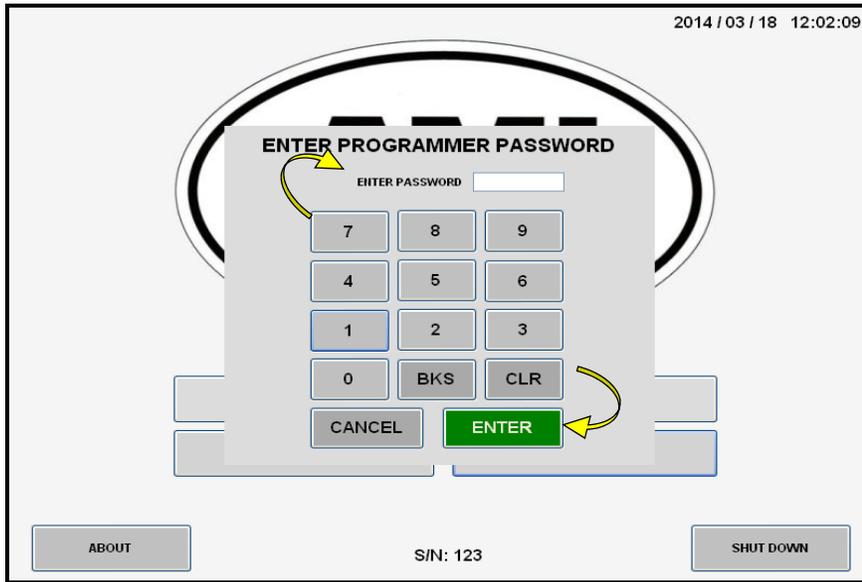
ALARM SETTINGS are only accessible using a 5 digit **“1-Day Programmer Password”**, which is only available by calling AMI Technical Support (In USA 818-896-9556).

1. From the **MAIN SCREEN** touch the **SETUP** pad. The **SETUP SCREEN** will be displayed. Touch the **CHANGE PROGRAMMER PASSWORD** pad and the password screen will appear.

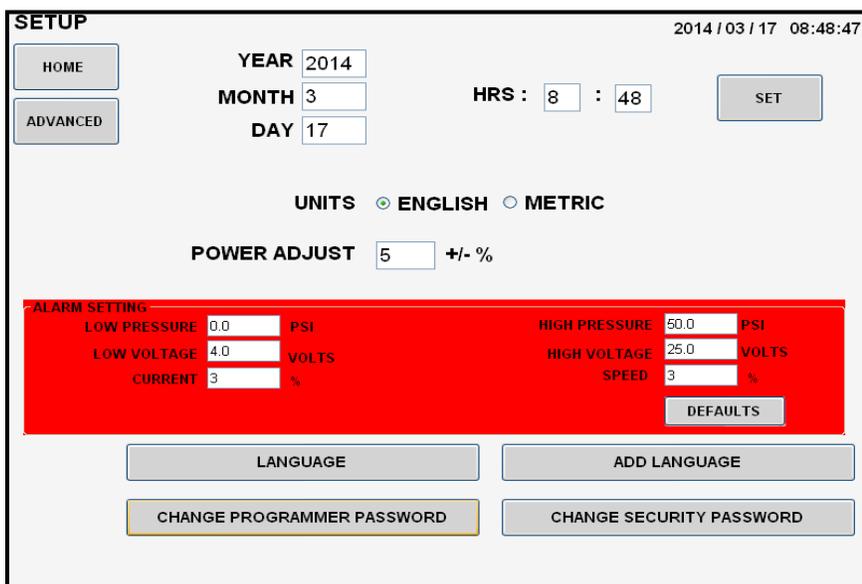


2. Enter and confirm the 5 digit **1-Day Programmer Password**. Press **ENTER**. **NEW PASSWORD IS SET** will appear on the screen if password is set properly.
3. Touch the **HOME** pad on the **SETUP SCREEN** to return to the **MAIN SCREEN**.
4. From the **MAIN SCREEN** follow standard **SHUT DOWN** procedure.
5. Once the **MAIN SCREEN** turns **OFF**, flip the **MAIN POWER SWITCH (CB-1)** to the **OFF** position.

- Wait 10 seconds, flip **CB-1** to the **ON** position, wait for computer to boot up.
- Once boot up is complete, the **MAIN SCREEN** will be displayed. On the **MAIN SCREEN** touch the **SETUP** pad.
- The **MAIN SCREEN** will prompt you for the **PROGRAMMER PASSWORD**.



- ENTER** the 5 digit **1-Day Programmer Password** and press **ENTER**.
- The **ALARM SETTINGS** will be displayed on **SETUP SCREEN**.



7.2 ALARM SETTINGS

LOW PRESSURE: The lowest allowable pressure desired for the purge inlet of the power supply. **Low Pressure value should be set to 0.0.** Inadequate flow will trigger a flow alarm on the touch screen.

HIGH PRESSURE: The highest allowable pressure desired for the purge inlet of the power supply. **The maximum value for this field is 50.0 psi.** Over pressure will trigger a flow alarm on the touch screen.

LOW VOLTAGE: The minimum allowable arc voltage. This setting is often used to indicate a stub out or insufficient gap between the electrode and work. This value is defaulted at **4.0 volts.**

HIGH VOLTAGE: The maximum allowable arc voltage. This setting is used to indicate excessive gap between the electrode and work and other anomalies such as insufficient or missing purge. This value is defaulted at **25.0 volts.**

CURRENT: The tolerance in terms of % variation from the average current, as measured in feedback. This should be set based on the requirements of the welding operation. The variation is **+/- 3%.**

SPEED: The tolerance in terms of % variation from the programmed speed, as measured in feedback. This should be set based on the requirements of the welding operation. The variation is **+/- 3%.**

DEFAULTS: On the lower right of the **ALARM SETTING SCREEN** there is a **DEFAULTS** pad. Touching this pad allows the user to quickly re-populate the **ALARM SETTING** values with the factory defaults.

7.3 ALARMS AND FAULTS

The following **FAULT SCREENS** appear when the value of the welding parameter has been exceeded, as programmed in the **ALARM SETTING** screen.

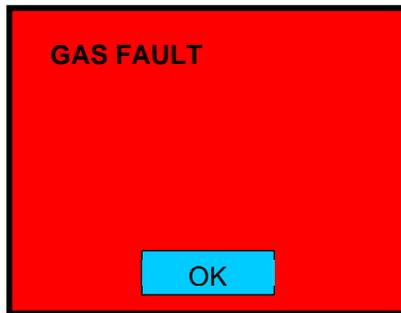
1. The message below left will appear if the arc fails to start. The message below right will appear if the weld head fails to rotate and/or is jammed.



- The message below left will appear if arc voltage goes above the set value. The message below right will appear if arc voltage goes below the set value.



- The message below left will appear if the gas fails to flow to the weld head. The message below right will appear if the input gas pressure is below minimum requirement.



- The message below will appear if the internal temperature of the unit rises above maximum value as registered by the thermocouple.

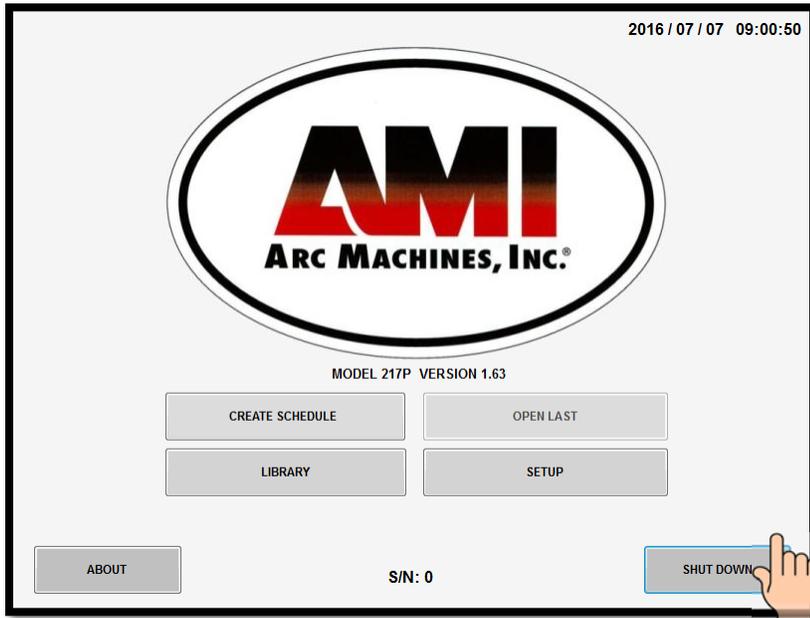


7.4 PRINTING

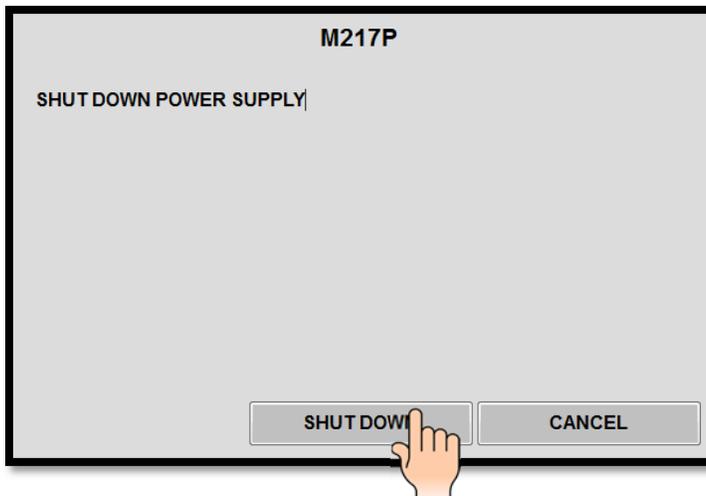
To print from the power supply, touch **PRINT SCHEDULE** on the **WELD SCREEN**. The onboard printer will print the weld schedule and applicable associated data.

7.5 PROPER SHUTDOWN OF THE MODEL 217P

1. Touch **HOME** from whatever screen you are on to return to the **MAIN SCREEN**.



2. Touch **SHUT DOWN**.



3. The screen above will appear to **CONFIRM SHUT DOWN**. Touch **SHUT DOWN**.
4. The **MAIN SCREEN** will reappear for approximately 5 seconds before screen turns **BLACK (computer turns OFF)**.
5. Flip the **MAIN POWER SWITCH (CB-1)** to the **OFF** position.

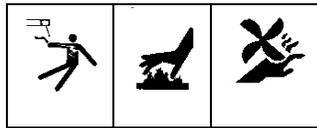
8.0 MAINTENANCE AND TROUBLESHOOTING



Always disconnect the AC power cable from the line voltage before attempting to work on this welding power supply.

There are no user serviceable components located inside the Model 217P. Do not open the unit in an attempt to repair it. Contact Arc Machines, Inc. if the unit is malfunctioning, or suspected of being broken. As such, no wiring diagram or internal circuit drawing is provided.

8.1 GENERAL MAINTENANCE



CLEANING EXTERIOR AND INTERIOR SURFACES - Prolonged use in dusty shop or outside environments may cause the outside surfaces to accumulate a coating of dirt and dust. Do not use shop air (usually too wet) to blow dust particles away from the panels. Use a vacuum cleaner with a soft brush. Where a vacuum brush cannot reach, use a clean, soft paint brush and then vacuum.

INPUT/OUTPUT PANEL CONNECTIONS - Periodic inspection of the Model 217P panel and the ground, electrode and gas quick-disconnects on all cables should be performed. Damaged, dented or deformed connectors may cause poor or unsafe operation or gas leakage. The O-rings inside the weld head ground, electrode and gas quick-disconnects should be periodically cleaned and re-greased.

Precautions to follow for storing or handling:

- Always keep weld heads in the protective containers they are shipped in, or optional carrying case, until ready for use

- Always keep the protective boots and dust caps on all connectors and fittings until cables are ready to install. A major cause of downtime in any automatic welding system is improper care and use of cables.
- Take extreme care to avoid dropping the power supply or the weld heads.



Always disconnect the power input cable from the junction box or wall-plug before cleaning the unit.



DO NOT USE acid, corrosives or any liquid substance on the Model 217P or any weld head. When cleaning, use only a light solution of isopropyl alcohol on a soft cloth.



DO NOT ADD lubrication such as graphite, oil or grease to the weld head or power supply unless it is specified in the operation manual for that equipment.

8.2 TROUBLESHOOTING

The Model 217P has the ability to monitor certain functions. If they are not working correctly a system fault will alert the operator to the problem.

When a System Fault occurs prior to or during welding it is required for the operator to clear the fault condition before welding. When a fault occurs during sequence or attempting sequence the **FAULT SCREEN** will appear.

Some faults are only temporary and the fault is corrected when the arc goes out. But all faults will cause the **FAULT SCREEN** to appear and let the operator know why the sequence was stopped.

The following is a general description of the cause of each type of fault and some recommendation for correction. In all cases, when the fault is corrected the operator must press the **OK** key to clear the **FAULT SCREEN**.

1. **TEMP** - The Model 217P has an internal temperature sensor (thermal switch). If the power supplies internal temperature rises above the safe limit, a **TEMP** fault occurs. This can only occur if there is some type of blockage of air circulation, fan failure or component failure within the power supply or the system is being operated in ambient air temps above or below its rating of **0 degrees C (32F) and 45 degrees C (104F), 95% humidity (non-condensing)**.

This fault should only occur during an actual weld sequence. If it occurs when the machine is not welding then a serious internal problem exists. In this case **turn the Power Supply OFF and call an Arc Machines Service representative.**

If it occurs during welding, check for blockage of the air intakes and exhaust on the sides of the machine.

2. **GAS** - This fault will only occur at the beginning of or during a weld sequence. If the arc gas flow through the system should stop, or fall below **7 CFH** a fault will occur.

Check that the gas source (user supplied) is turned on and that adequate gas is available. Check all gas hoses and connections for free flow, this is usually the problem.

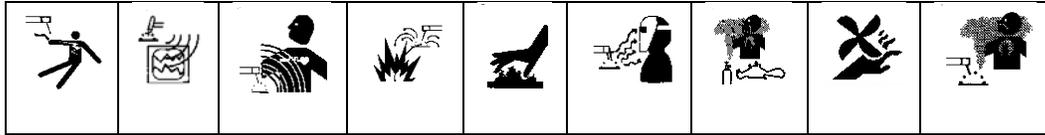
If there is no problem with the source or with hoses and connection then an internal failure of the flow switch, solenoid or internal hosing is possible. Contact an Arc Machines Service representative.

3. **ARC VOLTS (low) or STUB OUT** - This fault will only occur when an arc is present and the electrode gets too close to the work. **If the arc voltage gets too low (below 4 volts) or the electrode should touch the weld puddle an ARC VOLT fault will occur. It creates an ALL STOP and does not actuate the "return to home" function after POSTPURGE.**
4. **ARC VOLTS (high)** - **If the arc voltage is too high (above 25 volts) during a weld sequence this fault will occur.** It usually occurs if a hole should be made in the weld, causing the arc to wander over to the far side of the hole. The most common causes of this is either poor fit up or excessive I.D. gas pressure, causing the weld to blow out from the I.D. and creating a hole.
5. **BAD START** - If for any reason the Model 217P cannot establish a stable arc (**at the end of PREPURGE**) the system will display a **BAD START** fault. There can be several reasons for this to occur. The most common are poor ground or electrode connections, contaminated gas or contaminated electrode. Another common cause of a **BAD START** is too short of a **PREPURGE** time. This is especially true when a system or weld head is being used for the first time in a shift. While it sits (unused) atmosphere can propagate into the cables. Before performing the first weld of a shift, use the manual "PURGE" for a minute or two to initially purge (clear) the gas lines.

Note

Arc Machines recommends **2% Ceriated welding electrodes**. They have proven to be much more effective than Thoriated electrodes for RF transmission and are reported to have longer life than 2% Thoriated Electrodes.

9.0 OPTIONS



The following are installation and operation instructions for Model 217P options. Some options have their own manuals and these are not discussed in this section.

  **Always turn the power supply OFF before making any cable or connection changes to the Model 217P power supply.**

9.1 COOLING UNIT (Model 217P-CW)



SPECIFICATIONS

| | |
|------------------|---------------------------------|
| AC INPUT POWER | 90–260 VAC 1 Phase, 4 amps max. |
| COOLANT CAPACITY | 0.75 gallons (2.8 liters) |
| CIRCULATION | 0.5 GPM (2.8 LPM) |

PHYSICAL CONSTRUCTION

| | |
|------------------------|---------------------------------------|
| MATERIAL | Aluminum cabinet/Stainless Steel tank |
| HEIGHT | 6.25 inches (159 mm) |
| WIDTH | 19.0 inches (483 mm) |
| DEPTH | 14.0 inches (356 mm) |
| WEIGHT (with water) | 27 lbs (12.3 kg) |
| WEIGHT (without water) | 21.5 lbs (9.8 kg) |
| PUMP | 60 PSI (413 kPa) |

INSTALLATION

1. The cooling unit is shipped dry and requires 0.75 gallons (2.8 liters) of either:
 - CLEAN DISTILLED or *DE-IONIZED* water
 - CLEAN DISTILLED or *DE-IONIZED* water and **OPTISHIELD® 'Plus'** (mix per manufacturer's instructions)
 - A 50/50 mixture of ethylene glycol and CLEAN DISTILLED or *DE-IONIZED* water



DO NOT USE automotive antifreeze or STOP-LEAK type antifreeze

2. Before mounting the Model 217P-CW Cooling Unit to the Model 217P remove the fill cap  and add the coolant mixture. Replace the fill cap.
3. Place the Model 217P power supply onto the Model 217P--CW Cooling Unit and close the latches on each end.
4. For connections to the weldhead see Section 3.4.
5. The Model 217P-CW contains a flow sensor. The green lamp indicates that there is sufficient flow. The red lamp indicates insufficient flow. If the red lamp lights either the water level is too low or there is a blockage in the line. Add coolant or clear the blockage before continuing to weld.



DO NOT OPERATE the water cooling unit WITHOUT coolant in the tank OR WITHOUT a water flow path (water OUT to IN through a weldhead).



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