OPERATION MANUAL
for
Longitudinal Seam
Welder

Model LWC

Effective with Serial Number 80116 and above

Revised December 1986

IMPORTANT

Read this manual carefully before installing,

commissioning or operating this product.

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NOTICE

The installation, operation and maintenance guidelines set out in this manual will enable you to maintain the equipment in peak condition and achieve maximum efficiency with your welding operation. Please read these instructions carefully to become aware of every advantage.

CAUTION

Only experienced personnel familiar with the operation and safe practice of welding equipment should install and/or use this equipment.

CONTENTS

SECTION I

GENERAL DESCRIPTION

This longitudinal seam welder is a standard design machine which uses the chill shunt principle of tooling to conduct heat away from the piecepart and minimize bum through, warping or excessive distortion. The piece- part is positioned on the mandrel insert and clamped by two parallel banks of fingers. Each bank is separately actuated by com- pressed air controlled by an electrical pendant control. The fingers are designed to roll as they are clamped to conform to the contour of the piecepart. Space between each bank of fingers is adjustable. The machine will accept interchangeable inserts and mandrels to cover a range of applications.

All conventional metals may be welded on these machines as well as stainless steel, weldable aluminum, magnesium alloys, zirconium, molybdenum, titanium and others. Welds can be made free of imperfections showing water white seams when x-rayed

Piecepart configurations which can be handled include flat sheets, plate, foil, cylinders, cones, truncated cones, also open ended boxes if equipped with appropriate tooling.

A. Mandrel Assembly

(See figure 1, item 12) This unit is usually furnished to customer specifications to suit the piecepart. Additional mandrels for other application may be ordered and are inter- changeable. Water cooling is also available.

B. Inserts

(See figure 2, item #1) These are available to suit a wide variety of applications. They are made of either copper, steel or stainless steel and a drop through groove is machined the length of the insert to control the weld root bead size and contour. Inserts providing inert gas back-up are available when required. Please refer to tabulation on page 8 and page 9 of this manual, all inserts are interchangeable.

C. Roundway Track

(See figure 1, item #14) The track is mounted by means of vertical support assemblies and is adjustable in both horizontal and vertical planes. The track is complete with gear rack for use with the gear driven carriage.

D. Tabletop and Mainstay

(See figure 1, item #4) This assembly consists of both banks of hold down fingers in the tabletop mounted as an integral unit on the mainstay. It includes pneumatic hoses, foot control panel, regulator and gage, filter and mandrel adjusting bars.

E. Support Latch

(See figure 1, item #7) This is manually operated swing-type latch for the outboard end of the mandrel. It includes a safety switch (figure 2, item #2) to ensure that the fingers cannot clamp unless the support latch is closed.

F. Pendant Control

(See figure 1, item #27) Individual control of each bank of fingers is provided by the pendant control which can reach over the entire length of the machine.

G. Carriage Drive System

The LWC model seamer uses a rack and pinion drive system.

H. Riser

The LWC model seamer comes standard with a removable riser for welding externally up to a 54" diameter piecepart.

SECTION II

INSTALLATION

Uncrate the machine, remove the skid and set the equipment at the desired location. The seamer can be left unsecured or grouted to the cement foundation, as desired. The following adjustments have been made at the factory. If during shipping, the machine has become misaligned, use the following instructions for adjustment.

Set-up the machine by adjusting the leveling screws in the base and using a machinists level. Tighten the jam nuts to lock.

Align the insert with the tabletop, first check the parallelism. Loosen the mounting plate nuts (figure 3, item 4) slightly and adjust the set screws (figure 3, item #8) in the face of the plate. The insert must become parallel with the underside of the fingers and the insert groove must become parallel with the tabletop lip when the nuts are re-tightened.

The insert groove position should be checked next; it must be midway between the lip of each side of the tabletop. Loosen the mounting plate nuts (figure 3, item #4) slightly and adjust the set screws (figure 3, item #2) in the mandrel plate. Check also that the mandrel is not rotated clockwise or counter-clockwise and re-tighten the nuts.

If more space is required between the fingers and the insert top surface (it should never be more than 1/4'' over the material thickness), this can be accomplished by adjusting the vertical set screw (figure 3, item #5) under the mounting plate. Loosen the mounting plate nuts (figure 3, item #2) also very slightly. Raise or lower by turning both the vertical set screws together (use two wrenches). Re-tighten and re-check alignment for both position and parallelism.

It may be necessary to re-adjust the mandrel support latch (figure 1, item #7) so that mandrel stub-end just touches the "V" block surface.

NOTE

Two vertical adjusting bolts are used on the 120" machines, one bolt is used, adjustment is accomplished in the same manner. Re-tighten and re-check alignment as above.

When the mandrel is properly aligned and spaced, the track should be checked for alignment. Place a suitable torch in the torch holder and secure. Lower the torch until the electrode tip is about 1/16" from the bottom of the insert groove and move the carriage by hand to determine if the track is parallel to the insert.

Loosen the holding screws (figure 4, item 1) slightly and adjust vertically by means of the support screw (figure 4, item #2). Re-tighten the holding screws. To adjust in and out, loosen the locking screws (figure 4, item #'4) and adjust the bracket as required using the adjusting screw (figure 4, item #3). Re-tight- en the locking screws.

Continuous copper hold-down strips are optional equipment and are used when welding titanium, inconel and other refractory material. These strips are shipped attached to the underside of the segmented fingers.

WARNING

Always have material of equal thickness under the full length of the strips to minimize damage to the machined edges.

To remove the strips, remove the button-head screws holding the strip to the segmented fingers and replace using the shorter screws shipped separately.

SECTION III

PREPARATION FOR WELDING

Connect the electrical power 115 volt 60 single phase line. Connect the shop air sup- ply to the inlet at the filter. Connect the ground cable from power supply to the ground lug.

Refer to the appropriate manual supplied by the welding apparatus manufacturer for instructions on hook-up of the electrode cable, inert gas, water supply and water drain.

WARNING

Damage to the welding torch and/or control can result from improper hook- up.

Both left and right banks of fingers may be adjusted in or out by means of the set screws (figure 3, item #1) located along the length of the tabletop. Each set of finger tips must be parallel to the insert groove. For distance between the fingers, refer to the tabulations on page 10. This pressure may be varied during operation for better weld results.

Turn on the power supply and support systems for the weld process.

SECTION IV

OPERATION

Set the carriage speed for the welding parameters and the weld process you have chosen, as recommended by the manufacturer of the welding apparatus.

1. Open the latch at the end of the mandrel (figure 1, item #7).
2. Slide the pieceparts over the insert (figure 2, item #1) so that the edges to be welded are at the top.
3. Close the latch.
4. Telescope down the extension arms (figure 5, item #1) of the piecepart centering devices and rotate the centering device blades (figure 5, item #2) down until they contact the center of the groove. Be sure that the backside of the blade is in alignment with the center of the groove.
5. Align the left and edge (back side) of the piecepart to be welded over the center of the insert groove placing the edge of the piecepart against the rear surface of the blade and push the "left" button on the pendant control to close the rear bank of fingers. Rotate the centering device blades (figure 5, item #2) up and telescope up the extension arms (figure 5, item #1) of the centering devices.
6. Align the right hand edge (front side) of the piecepart as close as possible to the piecepart which is clamped in the seamer and push the "right" button on the pendant control. The fingers will close and remain clamped. In addition, the fingers on this side will move the piece- part in towards the previously clamped edge. This will effectively close the gap between the edges to be welded, provided they were accurately sheared.
7. Set the welding parameter on the weld process you have selected. Refer to the appropriate manual supplied by the welding apparatus manufacturer.
8. On completion of welding, push both buttons on the pendant control to raise the fingers; open the latch and remove the part.

SECTION V

MAINTANANCE

Once a month check all the hoses and fittings for leaks or deterioration. A leaking hose can cause loss of clamping pressure and result in poor quality work (figure 7). Blow out water from the air filter on side of the mainstay by opening the drain valve at the bottom of the filter (figure 6, item #1) while the air is on.

Re-machine or replace, if necessary, the copper finger tips (figure 9, item #4) or continuous strips when they become marred by dents or excessive impression marks. Both the finger tips and the continuous strips are reversible for extended life.

A. Replacement of the Fingers

To remove the fingers (figure 9, item #5) back-off the finger adjusting screws (figure 3, item #1) until all the fingers are fully retracted. Loosen the finger screw (figure 9, item #3) while holding the finger against the tabletop. Loosen the screw until it becomes loose in the finger, then move it toward the finger tip and it will pass through the hole in the finger. Slide the finger toward the mandrel and it will drop down and out of the tabletop. If the finger screw (figure 9, item #3) comes out of the nut (figure 9, item #1) replace it before you install the finger. When removing the entire bank of fingers, start at the latch end of the seamer and work toward the vertical riser.

CAUTION

Do not interchange the front bank of fingers with the rear bank of fingers as they are not interchangeable.

With the fingers removed, the clamping hose will be exposed and will have a tendency to hang loose from the tabletop which is normal.

To replace the finger, start at the mainstay and work toward the latch end of the seamer. Fasten a "C" clamp onto the nesting bar (figure 3, item #7) to prevent the finger adjusting bar from rolling out of the nesting bar when the fingers are removed. Install the finger into the nesting bar and through the open space next to the finger, guide the finger adjusting screw through the finger and into tits seat. Tighten the screw until the finger contacts the edge of the tabletop. Continue to install the fingers in the above manner until all are in place. The screw in the last finger can be guided through the finger with a screwdriver. Tighten all the fingers proportionately so that they all return against the tabletop when the air is exhausted from the hoses.

When the copper finger tips become nicked, it will effect their heat sink efficiency. To remove them from the finger, remove the two button-head screws which retain them to the finger. Place the finger tip in a vice and draw file the clamping surface of the tip until the defects are removed. If the tip is damaged beyond repair, it can be turned over as the front and rear surfaces are the same with matched mounting holes. If both sides of the tip are damaged, the tip will have to be replaced.

B. Removal and Replacement of the Clamping Hoses

The clamping movement of the fingers is caused by inflating the flat hose located between the tabletop and the upper surface of the fingers. The hose may become damaged from extreme heat, weld spatter, or deterioration of the rubber in the hose. Should this happen, the hose cannot be repaired but must be replaced.

To replace the hose, use the following procedure:

Disconnect the 115 volts AC and air supply to the seamer. Remove the finger adjusting channels (figure 2, item #3) located between the left and right first fingers (figure 2, item #4) and the front plate (figure 2, item #5). With the finger adjusting channel removed, you will expose the pneumatic hose and hose clamps. The three hose clamp bolts serve two purposes. They clamp the ends of the hoses and clamp the hoses to the tabletop. Remove the three bolts from each clamp and remove the clamps from the hoses.

Open the hinged door at the rear of the mainstay (figure 3, item #8). On the door is mounted the CP-10B foot control panel The hoses and controls for the clamping system are located inside the mainstay. Remove the small white vinyl control hoses from the hose tee by pushing the hose locking collet and remove the hose from the collet. Remove the large hose (figure 7, items #8 & #9) from the air control valves (figure 7, Item #5). Fasten a length of wire, longer than the length of the hose, to the hose through the holes in the hose where the hose clamps were secured. Pull on the air valve and hose will pass through and between the tabletop and the fingers and at the same time will pull the wire through the tabletop. The wire will be used to pull the new hose into the tabletop.

Remove the wire from the hose but do not pull the wire out from the seamer. remove the hose clamps (figure 7, item #4) by sawing the clamps in half. Remove the old hose fitting from the hose.

Use the old hose to check the length of the new hose. To install the new hose, first install the hose fittings (figure 7, item #3) and clamp them with two new worm gear clamps (figure 7, item #10). Install the hose fitting and the valve assembly so that the valve assembly is in the bottom position when the hose is flat. Use Permatex #2 as a sealant on the hose fitting. Use the front hose clamp as a templet and drill the three front hose clamp mounting holes into the hoses. fasten the wire which was pulled through the tabletop by the old hose into these ho1es and pull the hoses into their proper position in the tabletop.

Reverse the above procedure for fastening the front hose clamp and use the Permatex #2 inside the hose as a sealant. Fasten the air supply and control hoses and wait before you pressurize the hose to allow the sealant to set-up. Pressurize the hoses and check for air leaks. Replace the finger adjusting channel finger right as it has to be able to flex when the air hose is inflated.

SECTION VI

INSERT SELECTION

Thickness		TIG-DCSP Group I* Base Metal: Steel Stainless Aluminum Magnesium Copper *Copper Insert	TIO-AC Group II** Base Metal: Aluminum Magnesium **Steel or Stainless Steel Insert	TIG-DCSP Group III Base Metal: Titanium Molybdenum Zircalloy Tantalum Rene 41 Hastelloy Inconel Haynes 25
.005 - .012	Fusion Filler	040W010D		040W125D
.013 - .020	Fusion Filler	063W010D		125W100D
.021 - .032	Fusion Filler	093W010D/125W020D	093W010D/093W015D	187W100D
.033 - .040	Fusion Filler	125W015D/187W025D	125W015D/125W020D	
.041 - .050	Fusion Filler	125W020D/187W025D	156W015D/156W020D	
.051 - .062	Fusion Filler	187W020D/250W040D	187W015D/187W020D	
.063 - .072	Fusion Filler	187W020D/250W040D	250W020D/250W025D	250W100D
.073 - .125	Fusion Filler	250W020D/312W040D	312W030D/312W030D	
.126 - .250	Fusion Filler	312W020D/375W050D	375W030D/375W040D	312W100D
.251 - .375	Fusion Filler		375W030D/375W040D	

Note: Group III inserts are all gas back-up part number reflects width & depth (040W010D is .040 wide & .010 deep).

A. MIG and Submerged Arc

Thickness		Group I* Base Metal Steel Stainless Aluminum Magnesium *Copper Insert	Group II** Base Metal Aluminum Magnesium **Steel or Stainless Insert
.005 - .012	MIG Sub-Arc		
.013 - .020	MIG Sub-Arc		
.021 - .032	MIG Sub-Arc	No Groove	No Groove
.033 - .040	MIG Sub-Arc	No Groove	No Groove
.041 - .050	MIG Sub-Arc	No Groove No Groove	No Groove
.051 - .062	MIG Sub-Arc	No Groove No Groove	No Groove
.063 - .072	MIG Sub-Arc	No Groove No Groove	No Groove
.073 - .125	MIG Sub-Arc	.125W .020D .125W .020D	.125W .020D
.126 - .250	MIG Sub-Arc	.187W .030D .125W .030D	.187W .030D
.251 - .375	MIG Sub-Arc	.250W .040D .250W .040D	.250W .040D

Note: Part number reflects width and depth.

B. Distance Between Finger Tips

Thickness	Group I* Base Metal: Steel, Stainless, Aluminum, Magnesium, Copper	Group II** Base Metal: Aluminum, Magnesium
.005 - .012	.063	
.013 - .020	.100	
.021 - .032	.125	.312
.033 - .040	.187	.375
.041 - .050	.250	.500
.051 - .080	.375	.625
.081 - .125	.438	.750
.126 - .250	.500	.875
.251 - .375	.565	1.000

C. Air Regulator Settings

Material Thickness	Regulator Settings (PSI)
.005 - .012	10
.013 - .024	15
.025 - .032	20
.033 - .050	25
.051 - .080	37
.081 - .125	50
.126 - .250	75

NOTE

Use these settings as a guide only. When the material to be welded has been formed to match well and lay flat, less hold-down pressure is required. Always use least amount necessary.

SECTION VII

TROUBLE SHOOTING

The following trouble shooting guide will help identify welding and equipment problems.

Problem	Cause and Correction
1. Misalignment of torch to seam.	A. Track and carriage not running parallel to groove in insert. Readjust per Section II. B. Alignment device not adjusting correctly. Readjust per Section IV C. Mandrel not adjusted parallel to the tabletop lip.
2. Weld bead oscillates (snakes).	A. Drive system dirty. Clean cam followers, roundway, pinion gear, and gear rack. B. Check the above items for excessive wear or damage. Replace damaged parts. C. Bottom bearing block on the carriage is adjusted too tight on the track roundway.
3. Carriage hesitates in certain areas when traversing	A. Check gear rack in the hesitation areas. B. Make sure that all lines connected to the torch head are not creating drag or tension. C. Bottom bearing block on the carriage is adjusted too tight on the track roundway. D. Check the roundway for warpage or damage. E. Check the carriage drive motor brushes, brush springs and brush caps.
4. Carriage will not (traverse) move when energized.	A. The main items to check are: 1. Input power to the carriage control. 2. The directional switch on the carriage control. 3. Check the carriage drive motor brushes, brush springs and brush caps. B. Refer to the supplied control manual for wiring information.
5. Carriage speed readout with optional 910 meter fluctuates.	A. Check the “O” ring which connects the carriage drive motor shaft to the tach-generator. Replace the “O” ring if worn or loose. B. If fluctuation remains, replace the directional toggle switch on the carriage control.

	C. If the discrepancy persists, replace the speed control (KBIC-120-1/8) inside the carriage control. D. Check the carriage drive motor. If the motor does not respond to incoming power, check brushes, brush springs, and brush caps.
6. Cannot establish tight, even butt-up of final sheared pieceparts.	A. When worn or misaligned, the cut-off shear knives can produce a concave cut, convex cut, or shear drag (burr). Once the cut-off shear blades are adjusted, sharpened, or replaced, the straightness of the cut should be checked against the straight edge.
7. Cannot initiate an arc when using TIG welding equipment.	A. Remove the tube assembly which holds the collet and electrode. If the weld tip of the electrode is blunted or contaminated, sharpen it or replace with a new sharpened electrode. If the orifice of the collet is worn or does not provide a tight grip of the electrode when installed in the torch, replace the collet with a new one. B. Check the shield gas pressure (PSI) and flow (CFH) at the bottle. The PSI should not be less than 50 PSI and the CFH should coincide with the established welding parameter. C. Make sure the “high frequency” control at the power supply is switched to the proper mode of “start” for DSCP welding or continuous for AC HF welding. If an arc will not establish take the following steps: 1. Shut off the power to the power supply. 2. Check contact point gap setting. Refer to the power supply manual. 3. If contact points are pitted or worn, replace.
8. Electrode sticks to workpiece when using TIG welding equipment.	A. This condition usually occurs at the start of the weld cycle. 1. Shut the welder off and stop the carriage from traversing. 2. Raise the torch head and try to free the electrode. 3. If that fails, unscrew the tube assembly of the torch head and pull the tube, collet and electrode out.

	4. As a last resort, make sure that the weld mode is in the "off" position, then cut the tungsten electrode with wire cutters.
9. Butted pieceparts rise when welding light gauge material.	A. Adjust the clamping pressure to eliminate any deformation of the butt seam once the piece parts are butted and clamped. B. Finger tip distance are too far apart (see chart). C. Amperage setting may be too high or the carriage speed too low. Adjust amperage first, then adjust carriage speed if needed.
10. Incomplete penetration.	A. Check the welding parameters for the material being welded. B. If the parameter is not listed, take the following steps: 1. Increase the amperage load in the power supply. 2. Once penetration adjust the carriage speed at the carriage control to assure uniformity of the weld bead. A rule of thumb is to never over-penetrate. If over-penetration occurs, increase the carriage speed or decrease the amperage.
11. Arc voltage raises or lowers during the weld cycle when using TIG welding equipment.	A. Make sure the electrode is sharp (clean) and the collet is tripping the electrode tightly. B. Check the insert for carriage parallelism. If a variation exists, adjust the track beam. C. Make sure all drive gearing, roundways and cam followers are clean.
12. Blowing holes in piecepart when using TIG welding equipment.	A. Improper piecepart butt-up alignment. B. Contaminated insert, electrode, or pieceparts. Clean, sharpen, or replace. C. Burred edges on pieceparts. Remove pieceparts, deburr by sanding (emery) or filing. D. Finger pressure is too low.
13. White smoke appears during the TIG welding process.	A. Check shield gas bottle for pressure. B. Check shield gas flow at flow meter. Check to see if C. Check electrode stick-out. Maximum stick-out is ¼" with standard collets, ½" with gas lens collet bodies. D. Inspect nozzle for tightness or cracking. A loosely fitting or defective nozzle permits

	aspiration. Check for too small nozzle orifice for size of tungsten.
14. Black smoke appears during TIG weld cycle.	A. The electrode is contaminated from usage or being ground on a contaminated wheel. Replace the electrode. B. The torch head is overheating. Check the coolant line (if so equipped) “to” and “from” the torch. C. Gas is not flowing. D. Amperage setting at the power supply may be too low to initiate an arc. Raise the amperage setting. E. Material to be welded may contain a coated or scaled surface. Remove the coating or scale by using a fine grit emery cloth.