CONVERSION INSTRUCTIONS
for the
Linde SWM-2 (Series 2)
ARC-CUTOFF CONTROL

INTRODUCTION

Under some operating conditions in sigma welding, the arc is abnormally long. In the past, this condition led to burnbacks which froze the welding wire to the guide tube and presented a major problem. However, it was found that a simple relay and rheostat combination, properly connected across the arc and tied in with the controls, made a very satisfactory arc-cutoff control. This is the basis of the SWM-2, (Series 2) Arc-Cutoff Conversion Kit.

In addition to eliminating burnbacks during welding, the arc-cutoff control performs several other useful functions:

1. It automatically stops the machine at the end of a coil, a break in a coil or a tangle in a coil.
2. If the wire feed becomes erratic for any reason, it will usually stop the machine and cause the operator to correct the cause of the erratic feed.
3. When it is permissible to run off the end of the work at the completion of a weld, this control will automatically stop the machine.

Field installation of SWM-2, (Series 2) machines can be adapted to include the arc-cutoff feature simply by following the instructions outlined below.

INSTALLATION

A. Equipment Required

All parts required for arc-cutoff conversion are provided in the SWM-2, (Series 2) Arc-Cutoff Conversion Kit. (This includes leads of the correct lengths.) The circuit and control cabinet assembly diagrams, Figures 5 and 6, show the relationship of these parts to the rest of the SWM-2 setup. Replacement parts for the arc-cutoff circuit are shown in Figure 6.

B. Mounting the Relay and Rheostat

1. Lay out the centers of the six holes to be drilled, as indicated in Figure 1.
2. Drill all holes. If a "W" drill is not available, a 3/8-in. drill may be used for this hole only.
3. Countersink the four 5/32-in. holes and remove the burrs from all six holes.
4. Mount the relay (93W55) with the stationary contacts down, using the four 6-32 x 3/8-in. flat-head screws provided. The relay is mounted behind the front panel, on the four countersunk holes (see Figs. 2 and 4).

Be Sure this Booklet Reaches the Operator. You Can Get Extra Copies Through Any LINDE Office.
FIG. 2 – Front View of Control Box Upper Panel, Showing Relay and Rheostat Installed

5. Remove the upper 3/8-in. nut from the brass bushing on the rheostat (85W87). Insert the rheostat bushing through the large hole from behind, and locate the locating pin in the 5/32-in. hole. Place the dial plate (92W63) over the bushing and rotate it until "O" and "100" are symmetrically placed at the top (Fig. 2). Screw the 3/8-in. nut down on the bushing to hold the rheostat and dial plate in position.

6. Turn the rheostat shaft counterclockwise as far as it will go. Place the knob (89W81) on the shaft and turn it counterclockwise until it points to zero on the dial plate. Fasten the knob in position by tightening the recessed setscrew.

C Wiring Instructions

1. Take the blue wire attached to the arc-cutoff relay (ACR) and solder the free end to the left-hand connection of the VRL coil (see Figs. 3 and 4).

2. Solder the other blue wire to the right-hand side of the VRL coil, and to the third moving contact (from the top) on CR2.

3. Solder the free end of the green wire, attached to the voltage adjustment rheostat (VAR), to the third (from the top) normally open, stationary contact on CR2.

4. Solder the red wire from ACR1 to the top moving contact on CR2.

5. Solder the orange wire from ACR1 to the second moving contact (from the top) on CR2.

FIG. 3 – Wiring Connections for Arc-Cutoff Components

6. Harness the new wires tidily to the existing harnessed wires in the machine, so that they lie flat (Fig. 4).

CAUTION: Before connecting the unit to the power supply, check all new connections carefully against the wiring diagram, Fig. 5.

FIG. 4 – Rear View of Control Box Upper Panel, Showing Relay and Rheostat Installed and Wired

CHECKING AND ADJUSTMENT

A. Checking

1. Re-connect the machine to the power supply and prepare a test-weld setup.

2. Set the voltage adjusting rheostat (VAR) at 70. Start welding with an arc of normal length.

3. Slowly turn VAR counterclockwise. It should cause the machine to shut off before a setting of zero is reached.

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.
B. Adjustment

NOTE: In making the following adjustments and tests, be sure that the torch is always at a normal height above the work.

1. Establish a normal welding condition, with VAR set at 70.
2. Slowly decrease the rate of wire feed until the arc is abnormally long and the end of the welding wire is about 1/8-in. below the bottom of the guide tube.
3. Turn VAR counterclockwise until the machine shuts off. Do not alter the VAR setting.

4. As a check, establish the same conditions as in Step 1.
5. Slowly decrease the wire feed rate. The machine should shut off without burning back.
6. Establish the same welding conditions as in Steps 1 and 4.
7. With a gloved hand, grasp the wire reel and prevent it from turning. The machine should shut off without burnback. If burnback occurs in Steps 5 or 7, go back to Step 1. Set the arc slightly shorter than before, in Step 2.

OPERATION

The arc-cutoff circuit will now protect the machine against burnback. If the cutoff control stops the machine, find the cause (spatter on guide tube, governor fuse blown, etc.) before continuing with the weld.

It may be necessary to reset the arc-cutoff control if the type of welding wire used in the machine is changed, or if welding conditions are changed. In such a case, repeat the adjustment procedure as outlined above so that a satisfactory arc-cutoff is re-established.

HOW TO ORDER REPLACEMENT PARTS

1. All replacement parts are keyed on the drawings on the preceding pages. Two types of numbers are used on these drawings:
   (a) Standard Part Numbers which usually have two pairs of digits with a letter between (for example: 01N21, 18V69). A few parts are designated by a straight digit sequence (such as 3389) or one letter followed by several digits (such as A-654221). Each standard part number is accompanied by a description of the part.
   (b) Hardware Symbols usually have several letters preceding one or two digits (for example: M-LO-2, M-PP-S-3). Hardware symbols are not accompanied on drawings by descriptions.
2. Order standard parts by part number and description as given on the drawings. DO NOT ORDER BY PART NUMBER ALONE.
3. To order hardware, use the symbol given on the drawing, then refer to the hardware list below for the complete description. Hardware items can usually be purchased locally.
4. All arc-cutoff conversion parts on Figure 6 are noted with a symbol "ϕ." Parts so noted are made by other manufacturers. They can be obtained locally from the manufacturer or from a representative agency. All such parts are listed below with the manufacturer’s name, catalog number, or other nomenclature. When ordering these parts from the manufacturer, do not use the LINDE part number since it will have no significance. Orders handled in this manner will save you time, effort, and the costs of handling. However, if it becomes necessary to order these parts from LINDE, give the LINDE part number and complete description.
5. Be sure to state the quantity of each part needed.
6. State the series or serial number of the machine for which the parts are to be used.
7. Indicate clearly any special shipping instructions.
8. Order replacement parts from the nearest LINDE district office. A list is given on the back cover.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>88W81</td>
<td>Knob - Ohmite Mfg. Co. Cat. No. 5100</td>
</tr>
<tr>
<td>92W63</td>
<td>Dial Plate - Mallory No. 369</td>
</tr>
<tr>
<td>93W55</td>
<td>Relay - Allied Control Co., Inc. No. PO-146X</td>
</tr>
<tr>
<td>95W67</td>
<td>Rheostat - Ohmite Model H 750 Ohms, 25 Watts, Stock No. 0517 (incl. knob)</td>
</tr>
</tbody>
</table>

HARDWARE

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-FL-105</td>
<td>No. 6-32 x 7/16 in. Flat-Head Machine Screw (4 used)</td>
</tr>
</tbody>
</table>
FIG. 6 – Control Cabinet Assembly, Part No. 38V29, with Arc-Cutoff Components
LINDE Supplies These Quality Products to the Nation's Industries

INDUSTRIAL GASES
LINDE Oxygen, Nitrogen, Argon, Neon, Helium, Krypton, Xenon, Hydrogen
PREST-O-LITE Acetylene

CALCIUM CARBIDE
UNION Carbide
CARBIC Processed Carbide

OXY-ACETYLENE EQUIPMENT
OXWELD Apparatus for Cutting, Joining, Treating, and Forming Metals
Acetylene Generators
Manifolds, Regulators and Valves
Welding Rods and Supplies
PREST-O-WELD Welding and Cutting Apparatus
PUROX Welding and Cutting Apparatus
PREST-O-LITE Air-Acetylene Apparatus and Small Tanks
CARBIC Acetylene Flood Lights
Acetylene Generators

ELECTRIC WELDING EQUIPMENT
UNIONMELT Automatic Welding Apparatus and Supplies
HELIARC Welding Torches
LINDE Sigma Welding Equipment

SPECIAL EQUIPMENT
LINDE Jet-Piercing Equipment
Plate-Edge Preparation Equipment
Polyethylene Powder and Flame-Spraying Equipment
Steel-Conditioning Machines
Sub-Zero Cold Treatment Equipment

OXWELD Oxy-Acetylene Cutting Machines
Pressure-Welding Machines

OXYGEN THERAPY SUPPLIES
LINDE Oxygen U.S.P.
Oxygen Therapy Regulators
Oxygen Therapy Manifolds and Valves

SYNTHETIC CRYSTALS
LINDE Synthetic Sapphire, Ruby, Spinel, and Titania
Synthetic Calcium- and Cadmium Tungstates
Fine Alumina Abrasive

ORGANOSILICON
LINDE Silane Monomers
Polysiloxane Polymers and Resins


LINDE AIR PRODUCTS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

In Canada
DOMINION OXYGEN COMPANY, LIMITED, TORONTO

General Office
30 East 42nd Street, New York 17, N. Y.

Eastern States
BALTIMORE 18, MD.
532 East 35th Street
BOSTON 16, MASS.
441 Stuart Street
BUFFALO 2, N. Y.
250 Delaware Ave.
CHARLESTON 3, W. VA.
2 Virginia Street
NEW YORK 17, N. Y.
200 East 42nd Street
PHILADELPHIA 22, PA.
1421 North Broad Street
PITTSBURGH 19, PA.
311 Ross Street

Central States
CHICAGO 1, ILL.
230 North Michigan Avenue
CINCINNATI 25, OHIO
769 Melick Avenue
CLEVELAND 14, OHIO
1513-17 Superior Avenue
DETROIT 2, MICH.
6-240 General Motors Building
INDIANAPOLIS 4, IND.
729 North Pennsylvania Street
MILWAUKEE 46, WIS.
1621 South 30th Street
MINNEAPOLIS 2, MINN.
827 Second Avenue, South
ST. LOUIS 9, MO.
4228 Forest Park Boulevard

Southern States
ATLANTA 1, GA.
310 Peachtree Street, N. E.
BIRMINGHAM 1, ALA.
1003-13 South 22nd Street
JACKSONVILLE 3, FLA.
2510 Dennis Street
MEMPHIS 5, TENN.
46 West McLemore Avenue
NEW ORLEANS 13, LA.
828-32 Howard Avenue

Southwestern States
DALLAS 1, TEXAS
3535 Commerce Street
DENVER 9, COLORADO
685 South Broadway
HOUSTON 11, TEXAS
6119 Harrisburg Boulevard
KANSAS CITY 6, MO.
910 Baltimore Avenue
TULSA 3, OKLA.
614 National Bank of Tulsa Bldg.

Western States
LOS ANGELES 58, CALIF.
2770 Louis Boulevard
PHOENIX, ARIZ.
401 East Buchanan Street
PORTLAND 9, ORE.
1200 Northwest Marshall Street
SALT LAKE CITY 1, UTAH
362 Pierpont Avenue
SAN FRANCISCO 6, CALIF.
22 Battery Street
SEATTLE 4, WASH.
2501 First Avenue, South
SPokane 12, WASH.
2023 West Maxwell Avenue

In Canada
Dominion Oxygen Company, Limited
TORONTO • MONTREAL • WINNIPEG • VANCOUVER

Lithographed in U.S.A.
F-9478 IMD J-3332-53