250-AMP
AC/DC WELDER

JOHN DEERE

OPERATORS MANUAL

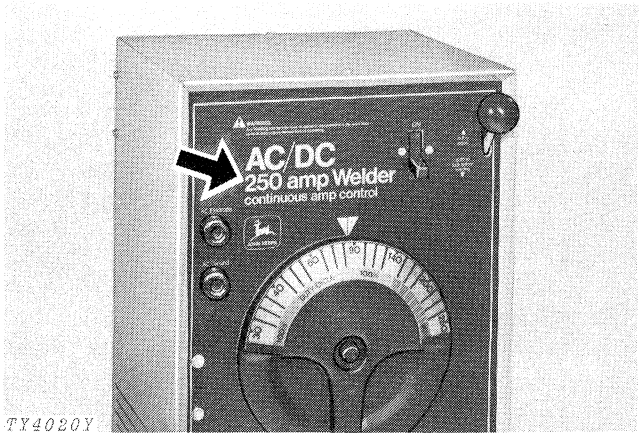
250-AMP
AC/DC WELDER

OMTY3894 F8 English

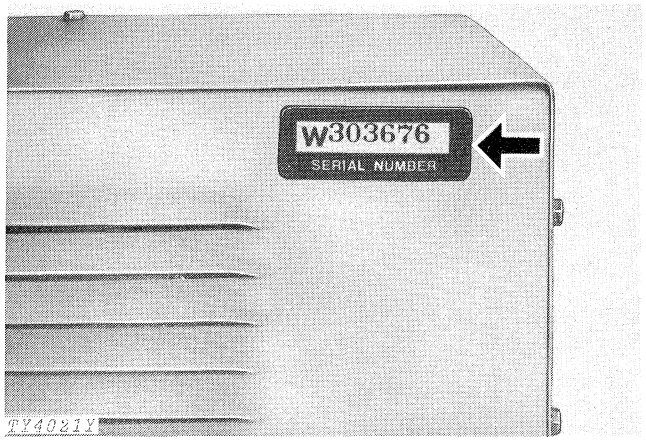
JOHN DEERE MERCHANDISE DIVISION
OMTY3894 F8

LITHO IN THE U.S.A.
ENGLISH

To The Operator



Model Number



Serial Number

Record the model number, serial number and date of purchase below.

John Deere AC/DC Welder

Model No. _____

Serial No. _____

Date of Purchase _____

(To be filled in by purchaser.)

This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

Because John Deere sells its products worldwide, U.S. units of measure are shown with their respective metric equivalents throughout this operator's manual. These equivalents are the SI (International System) Units of Measure.

Contents

Safety

Welding equipment should be installed according to provisions of the National Electric Code. The electrical circuit to the welder should be equipped with a disconnect switch conveniently located at or near the welder.

Be sure the welding area has a cement or masonry floor.

Keep all combustible materials at a safe distance.

Do not wear gloves or outer clothing that contain oil or grease.

Be sure all power wiring is correctly installed and maintained. Don't overload the welding cables.

Keep welding cables dry and free from oil and grease.

Never coil a welding cable carrying power around your shoulders.

Always be sure your welder is properly grounded. Never work in a damp area. Keep hands and clothing dry at all times. (Dampness on the body may cause an electric shock.)

Never strike an arc on a compressed gas cylinder.

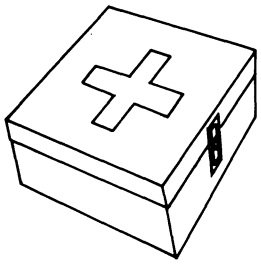
Keep the uninsulated portion of the electrode holder from touching the welding ground when the current is on. This will cause a flash.

To avoid shocks, shut off the welder before making repairs or adjustments.

Follow the manufacturer's rules on operating switches and making adjustments.

Protect others and yourself. Flying sparks are a danger. Arc rays can also cause painful burns. Wear the recommended protective clothing and never weld without protecting your eyes.

Be prepared if an accident or fire should occur. Know where the first aid kit and fire extinguisher are located. Know how to use them.



WARNING: Arc welding can be injurious to operator and persons in the work area—consult instruction manual before operating.

TY3709

ASSEMBLY

Remove the welder from the carton and check to see that no transportation damages have occurred.

NOTE: The welder is factory wired for 230-volt, 60-cycle, single-phase operation. To rewire for 208-volt, 60-cycle, single-phase operation, see "Service," page 24.

CONNECTING POWER SOURCE OR TY5146 POWER CORD (OPTIONAL)

The welder must be connected to a power source fused for at least 80 amperes. It may be wired directly to a disconnect switch located at or near the area where the welder will be used. Use No. 8 3-wire cord for lengths of 25 feet (7.6 m) or less. For lengths over 25 feet (7.6 m) use No. 6 3-wire cord.

Do not use cords over 50 feet (15.2 m) in length.

The Power Cord Kit (Optional) may also be used to connect the welder.

CUT HERE

⚠ CAUTION: Be sure power source to be used is disconnected before installing power source wiring.

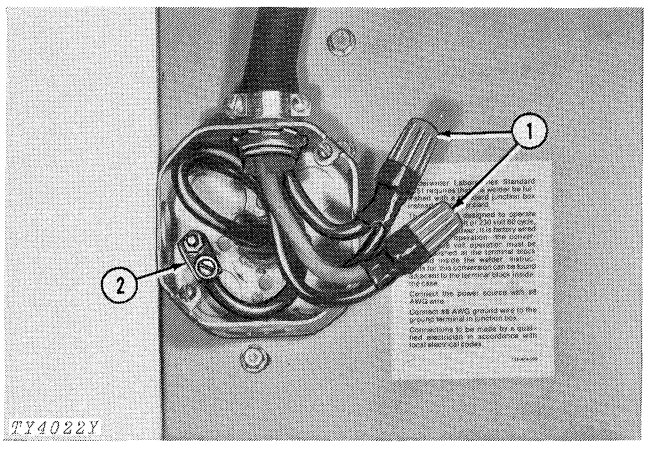
IMPORTANT: Before connecting welder to power source, make certain welder is wired compatably for power source. Welder is wired for 230-volt, 60-cycle, single-phase operation. To rewire for 208-volt, 60-cycle, single-phase operation, see "Service", page 24.

Connecting Welder Direct to Power Source

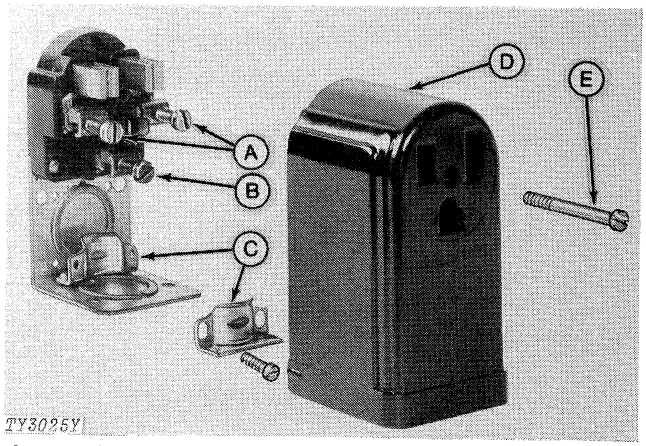
1. Connect power leads, (black) to respective terminals of power source. Use wire nuts and tape connections.
2. Connect ground lead to approved ground terminal at power source.

Connecting TY5146 Power Cord to Welder (Optional)

1. Remove cover from junction box at rear of welder. Connect other end of power leads or power cord leads to junction box. (Remove power cord terminals and strip wiring.) Use wire nuts and tape connections.
2. Connect ground wire in junction box.
3. Reinstall junction box cover.



TY8086 RECEPTACLE (OPTIONAL)

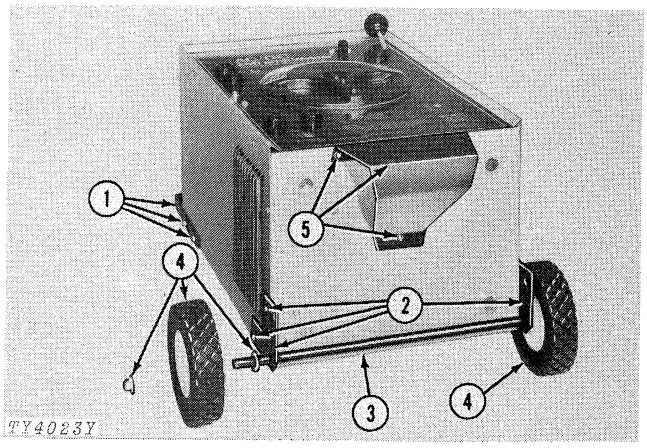


A—Terminals (Hot)
B—Terminal, Ground (Green)
C—Clamp
D—Cover
E—Screw

The 6 foot (1.83 m) No. 8 3-wire Power Cord Kit requires the TY8086 Receptacle.

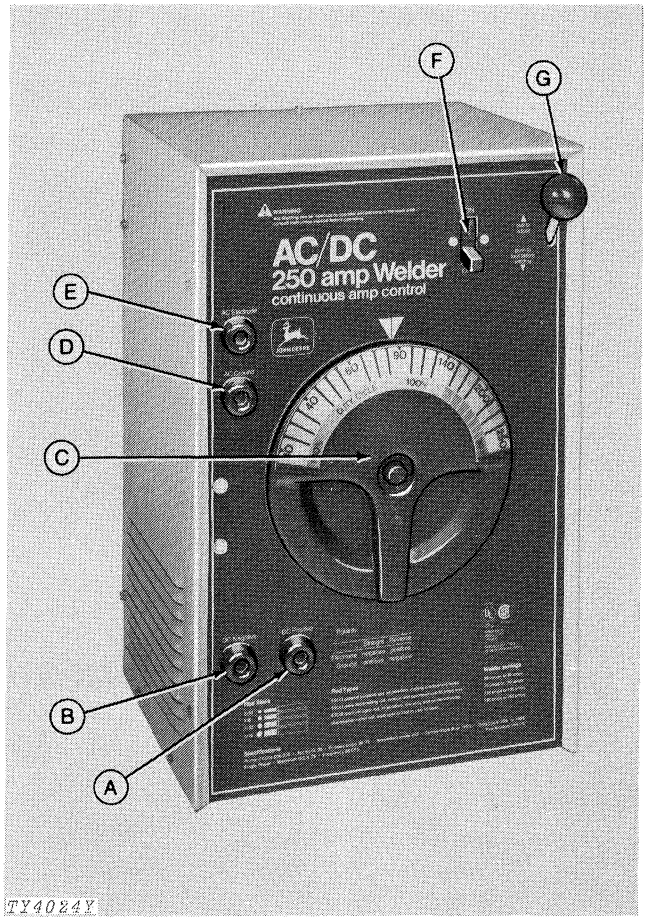
1. The receptacle ground terminal (B) must be connected to either the system ground, or to a ground specified and approved in the local electrical code.
2. Connect red or black (hot) service to receptacle terminals (A). Power source should be fused for at least 80 amperes.
3. Secure wiring cable with clamp (C). Cover (D) is held in place by screw (E).

TY5102 WHEEL KIT (ACCESSORY)



1. Remove screws (two each side) at top rear of cover. Attach handle to cover using four screws removed.
2. Remove screws (two each side) at the bottom rear of cover. Position two axle mounting brackets. Attach to cover using screws removed.
3. Install axle through mounting brackets.
4. Install washers and wheels. Secure wheels to each end of axle with hubs.
5. Attach foot with three screws furnished.

Identification

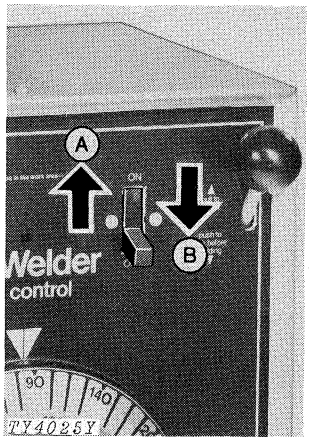


John Deere 250-Amp AC/DC Welder

A—DC Positve Jack
B—DC Negative Jack
C—Heat (Amps) Indicator Dial
D—AC Ground Jack
E—AC Electrode Jack
F—ON - OFF Switch
G—Heat (Amps) Control Locking Knob

Controls

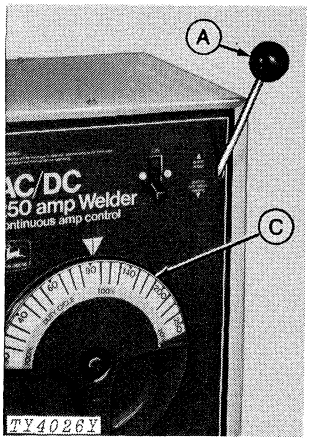
ON-OFF SWITCH



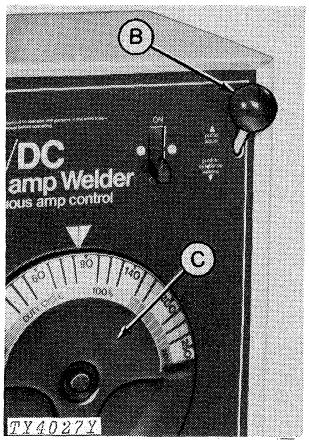
Turn welder on by moving switch up to "ON" position (A). Turn welder off by moving switch down to "OFF" position (B).

A—"ON" Position
B—"OFF" Position

HEAT (AMPS) INDICATOR DIAL



Unlocked



Locked

Pull locking knob (A) to unlock dial (C). Amp indicator dial (C) will rotate freely.

Set dial (C) at desired setting. Push locking knob down (over center) (B) to lock dial.

IMPORTANT: Do not operate welder with locking knob in unlocked position because damage to welder could result.

A—Locking Knob Up (Unlocked)
B—Locking Knob Down (Locked)
C—Heat (Amps) Indicator Dial

CABLE RECEPTACLES

Select proper welding mode and/or polarity. Insert cables as follows:

AC Welding

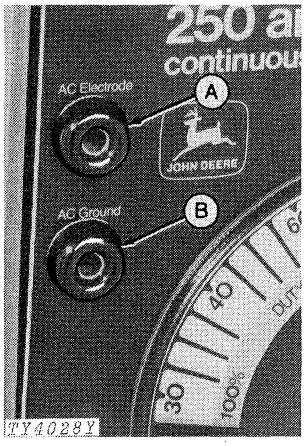
Insert electrode cable into AC electrode receptacle (A)
Insert ground cable into AC ground receptacle (B)

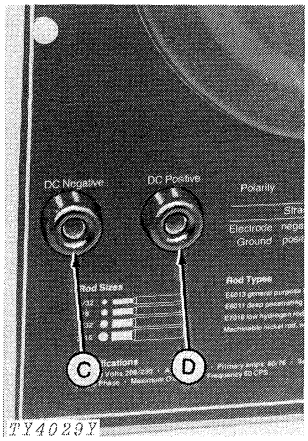
DC Straight Polarity

Insert electrode cable into DC negative receptacle (C)
Insert ground cable into DC positive receptacle (D)

DC Reversed Polarity

Insert electrode cable into DC positive receptacle (D)
Insert ground cable into DC negative receptacle (C)





A—AC Electrode Receptacle
B—AC Ground Receptacle
C—DC Negative Receptacle
D—DC Positive Receptacle

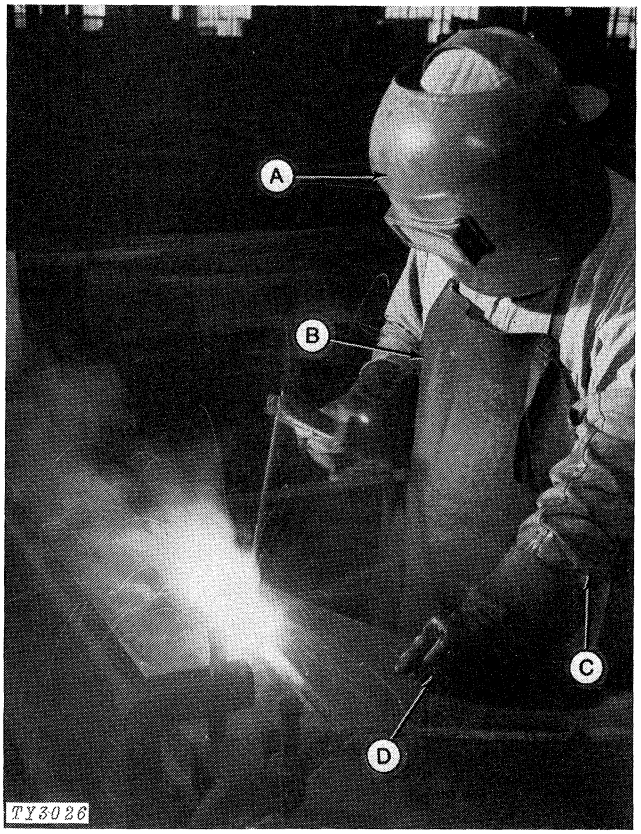
Preparation

PREPARATION FOR WELDING

To properly prepare for welding, it is necessary to:

1. Provide eye and skin protection for the person welding.
2. Select proper welding mode and/or polarity.
3. Adjust the heat (amps) control.
4. Set up the work piece and make the ground clamp connection.
5. Select the electrode (weld rod).

PROTECTIVE EQUIPMENT



A—Protective Helmet
B—Protective Apron
C—Leather Sleeves
D—Leather Gloves

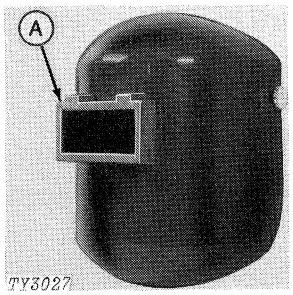
The heat and light radiating from a welding arc are much like intense sunlight. Prolonged exposure to the arc can result in painful burns to unprotected eyes or skin. Welding sparks are also dangerous.

Always wear a welding helmet or goggles to protect your eyes while welding. Also wear a protective cap under the helmet and flameproof gloves. If hot material is to be handled, wear asbestos gloves.

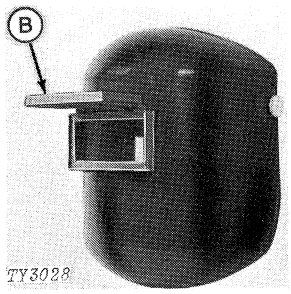
CAUTION: Exposure to a welding arc is extremely harmful to the eyes. Prolonged exposure can cause blindness. Never strike an arc or begin welding unless your eyes and those of persons in the work area are adequately protected.

The welding helmet (accessory) can be quickly and easily adjusted to any head size. When welding, the visor is to be in closed position (A). When not welding, an unobstructed view is obtained by flipping visor to open position (B). When not required, helmet may be tilted up away from face.

The helmet eyepiece is fitted with a replaceable glass. The glass should be replaced at once if cracked or broken.



A—Visor Closed



B—Visor Open

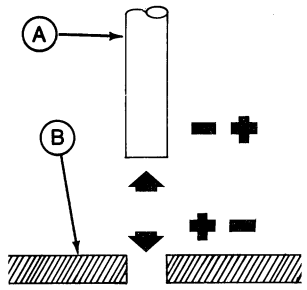
SELECTING PROPER WELDING MODE AND/OR POLARITY

The proper welding mode is determined by the work the welder is to perform.

AC Welding

Alternating current (AC) continuously changes polarity since the direction of flow is reversed 120 times per second for common 60-cycle electricity.
It is the ideal current for:

- Downhand Heavy Plate
- Fast Fill
- Aluminum Tungsten Inert Gas Welding
- Carbon Arc Torch

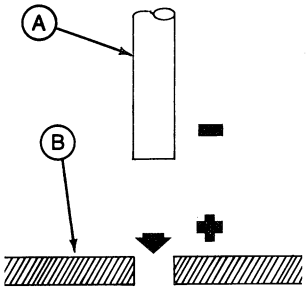


A—Electrode
B—Workpiece

DC Straight Polarity

With direct current straight polarity (DCSP), the electrode is negative and the current flows from the electrode to the work.
It is the ideal current for:

- Hard Facing
- Single Carbon Brazing
- Buildup-Heavy Deposits
- Stainless Steel Tungston Inert Gas Welding
- Cutting Steel

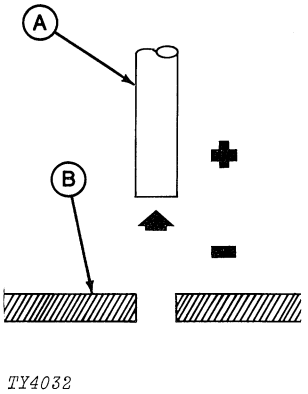


A—Electrode
B—Workpiece

DC Reverse Polarity

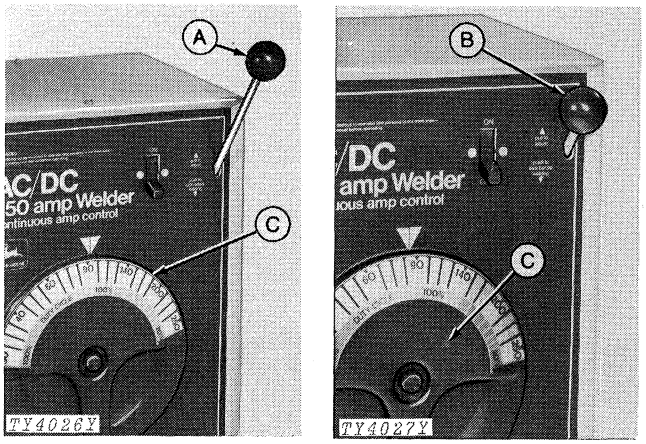
With direct current reverse polarity (DCRP), the electrode is positive and the current flows from the work to the electrode.
It is the ideal current for:

- Overhead Welding
- Vertical Welding
- Cast Iron Welding
- Heavy Aluminum
- Rivet Welding
- Sheet Metal
- Low Hydrogen Welding
- Arc Bronze Rod



A—Electrode
B—Workpiece

ADJUSTING THE HEAT (AMP) CONTROL



A—Locking Knob Up (Unlocked)
B—Locking Knob Down (Locked)
C—Heat (Amps) Indicator Dial

1. Pull locking knob up to unlocked postion (A) allowing heat (amp) indicator dial (C) to rotate freely.
2. Set dial (C) at desired setting, and push locking knob down (over center) to locked position (B) to maintain desired dial setting.

IMPORTANT: Do not operate welder with locking knob in unlocked position because damage to welder could result.

The electrode type and the thickness of the workpiece metal determines the amount of heat (amps) needed in the welding process. The heavier and thicker the metal, the more heat (AMPS) will be required. To check heat requirements for particular applications, experiment on scrap metal.

If TOO MUCH heat is used:
The arc will burn through light metals.
The bead will be flat and porous.
The bead will "undercut" the work.

If TOO LITTLE heat is used:
The bead will be high.
The bead will be irregular.

If PROPER HEAT is used:
The bead will lay smoothly over the work without ragged edges.
The base metal puddle will be as deep as the bead that rises above it.
The welding operation will make a crackling sound similar to the sound of eggs frying.

NOTE: Rate of travel over work also affects weld. To insure proper penetration, and enough deposit of rod, arc must be moved slowly and evenly along weld seam.

Approximate heat (amps) settings for the rod sizes and types listed can be determined from the chart.

ROD SIZE, TYPE AND HEAT (AMP) CHART

Rod Size	Rod Type	Amp Setting
3/32″ (2.4 mm)	E6013 gen. purpose, all position, cutting and burning holes.	Min.-90
1/8″ (3.2 mm)	E6011 deep penetrating, vertical and overheat - use 10 amps less.	70-150
5/32″ (4.0 mm)	E7018 low hydrogen, all positions, low alloy and hardened metal.	130-180
3/16″ (4.8 mm)	Machinable nickle rod, weld cast to cast or cast to steel	180-230

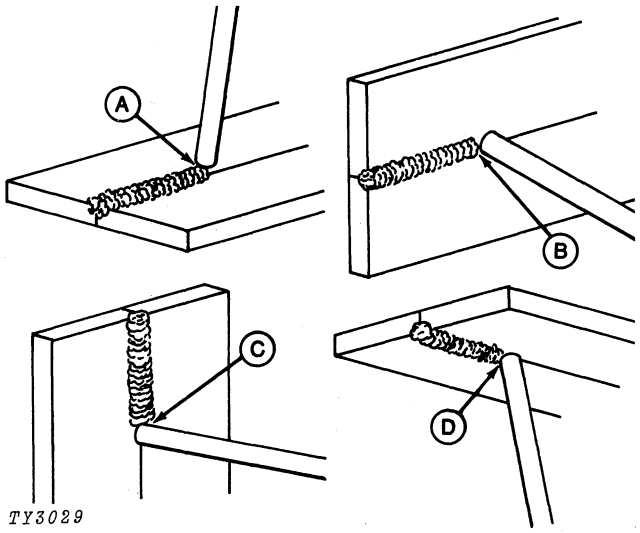
SETTING UP THE WORK PIECE

Welding Positions

Arc welding can be done in any of four basic positions: flat, horizontal, vertical, and overhead. Flat welding is generally easier, faster, and allows for better penetration. Overhead welding is the most difficult. The heat (amps), electrode (rod) and polarity selections will be affected by the welding position.

If possible, position workpiece so that bead will run on a flat surface.

See pages 15 and 16 for welding techniques required for various positions.



TY3029

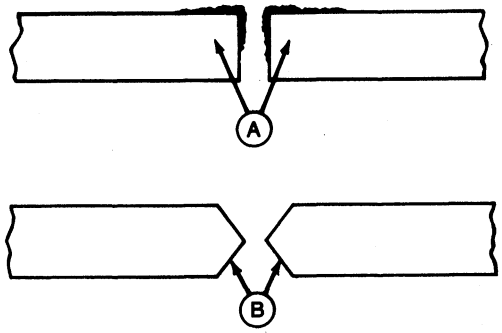
A—Flat
B—Horizontal
C—Vertical
D—Overhead

Preparing the Joint

For effective welding the surfaces to be joined must be free of dirt, rust, scale, oil, or paint. Welding on metals not properly cleaned will cause a brittle and porous weld.

If the base metal pieces to be joined are thick or heavy, it may be necessary to bevel the edges at the point of contact. The angle of the bevel should be approximately 60 degrees.

If possible, clamp workpieces into the position they will occupy when the welding is completed.



TY3030

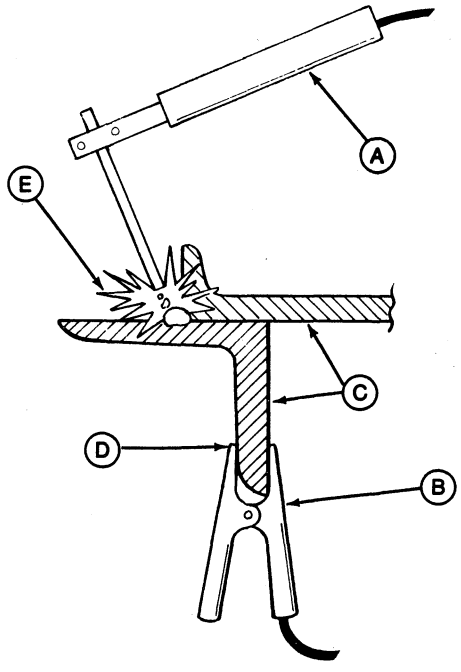
A—Wrong
B—Right

Connecting the Electrode and Ground Clamp Cables

Panel connections for electrode and ground clamp cables must be firm and secure.

For a solid connection and easy removal, twist cable connector as it is inserted into receptacle.

The ground clamp connection is part of the current circuit. A poor connection at the ground clamp will waste power, heat, or both. Scrape away all dirt, rust, scale, oil or paint. Make sure ground clamp touches base metal (D).



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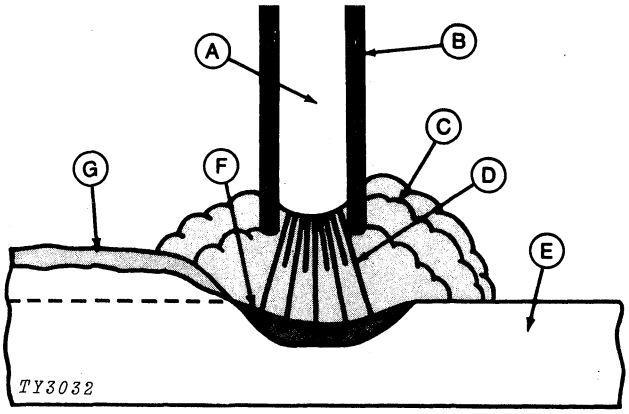
A—Electrode Holder and Cable
B—Ground Clamp and Cable
C—Workpiece (Base Metal)
D—Clamp Must Touch Base Metal
E—Arc

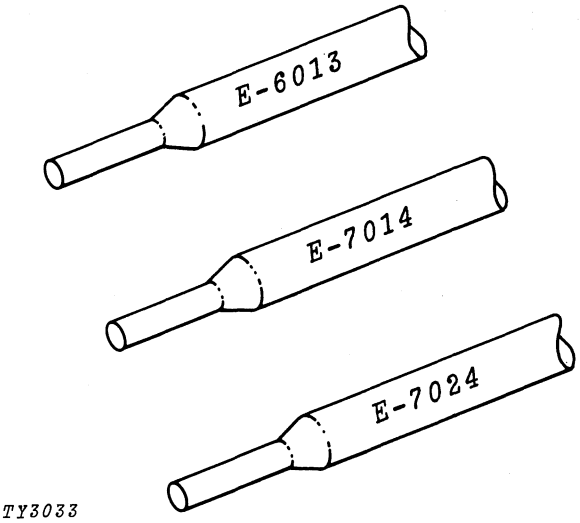
SELECTING THE ELECTRODE



A—Electrode
B—Extruded Coating
C—Gaseous Shield
D—Arc Stream
E—Base Metal
F—Molten Pool
G—Coating Deposited As Slag

The type and thickness of the metal to be welded and the position of the workpiece determine both the type of rod and the heat control setting required for the weld.

The welding electrode is a rod or wire of electrically conductive metal coated with a layer of specially compounded insulating material. The intense heat of the arc melts the rod and oxidizes the insulation. The rod metal joins with the base metal in the workpiece to form the weld bead. The burning coating forms a gas shield around the arc and helps to control the flow of the fusing metals which form the weld bead.



Electrode Marking

Electrode manufacturers have adopted a uniform marking code for welding electrodes. Each electrode is marked with a prefix letter and four numbers. Each of the numbers has a particular significance.

For example: A commonly used general purpose electrode is marked E-6013.

The E signifies the electrode is intended for Electric Arc applications.

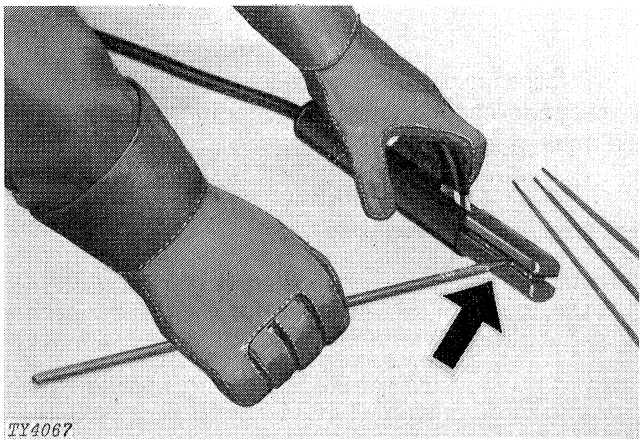
The first two digits in the numbers indicate the minimum tensile strength of the deposited metal in thousands of pounds per-square-inch. In this instance, 60 indicates the metal deposited by the melting rod will have a minimum tensile strength of 60,000 psi (413,685 kPa).

The third number in the digit series indicates the welding position for which the rod is intended. A number 1 indicates a rod compounded for all-position welding. A number 2 indicates the rod is intended for flat and horizontal welding only. A number 3 indicates the rod should be used for flat welding only.

The fourth digit in the series indicates special rod characteristics such as weld quality, current type or depth of penetration.

Clamping the Electrode in the Holder

Clamp electrode in the holder with teeth or jaws of clamp touching rod metal. Never clamp jaws of holder on coated surface of rod.



WELDING ELECTRODES

The following chart is a guide for the proper electrode to use and for correct heat (amp) settings for most standard welding applications. Only a setting range is given: The precise setting will be determined by operator speed and the line voltage available.

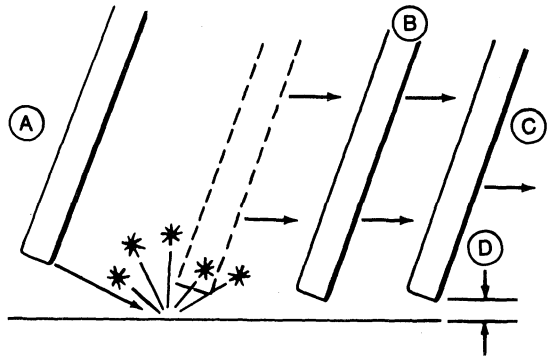
Rod Type	Description	John Deere No.	Dia.	Amp. Rating
GENERAL PURPOSE	All-position, high tensile strength, smooth deposit rod, with low spatter. For all mild steel and general purpose work, including cutting and burning holes.* For hardened steels, see STAINLESS rod (below). A.W.S.-A.S.T.M. Class E-6013. *When cutting and burning, use max. amperage. (Welds best on AC or DC straight polarity.)	TY1598 ---- TY2323 TY2324 ----	1/16″ (1.6 mm) 3/32″ (2.4 mm) 1/8″ (3.2 mm) 5/32″ (4.0 mm) 3/16″ (4.8 mm)	min.-60 min.-80 70-160 120-175 170-250
DEEP PENETRATING A.W.S.-A.S.T.M. Class E-6011	The strong arc force and rapid solidification of metal makes vertical and overhead welding easier with this rod. Ideal for poor fitups. Where time does not permit rust, scale, or paint removal, this rod penetrates rapidly and easily. (Welds best on DC reverse polarity. Also good for cutting and burning holes on AC or DC straight polarity.)	---- ----	1/8″ (3.2 mm) 5/32″ (4.0 mm)	80-140 100-170
LOW HYDROGEN A.W.S.-A.S.T.M. Class E-7018	An all-position, mold steel electrode designed to produce low hydrogen content combined with excellent mechanical properties. This electrode has a mild steel core wire with an extruded coating. Use this type of rod for welding low-alloy, hard, or hardenable steels. (Welds best on DC reverse polarity, especially for overhead and vertical welds.)	---- ----	1/8″ (3.2 mm) 5/32″ (4.0 mm)	80-120 120-190
CAST IRON Machinable (Nickel)	To weld cast iron, or cast to steel, weld a little, and cool a lot. "Skip" welding in beads about an inch (2.5 cm) long, with light peening immediately after, will produce best results. This rod welds castings the EASY way, and may be filed or machined after deposit. A.W.S.-A.S.T.M. Class E-Ni. (Welds best on DC reverse polarity.)	---- ----	3/32″ (2.4 mm) 1/8″ (3.2 mm)	50-70 80-120
HARDFACING	An all-position rod for applying deposits resistant to abrasion and impact. To make a wear resistant surface, hold a long arc, let rod "spray" on work. (Welds best on DC straight polarity.)	----	1/8″ (3.2 mm)	80-140
COATED ALUMINUM A.W.S.-A.S.T.M.	Use with Twin Carbon Torch. For flat welding only. Flux coating floats to prevent puddle from oxidizing while welding. Not recommended for beginners. Class AL-43	----	1/8″ (3.2 mm)	75-125
CAST IRON Non Machineable	This is a mild, steel-core wire, with special flux for cast work. If machinable deposits are required, use the MACHINABLE (nickel) rod described where results are less important than cost. (See directions above for "skip" welding).	----	1/8″ (3.2 mm)	80-120
GENERAL PURPOSE-IRON POWDER	A general purpose "drag" rod, all-position. The iron powder in the flux coating combines with the filler rod to make a smooth deposit with very little spatter. Ideal for ornamental work. A.W.S.-A.S.T.M. Class E-7014. (AC or DC straight polarity. Ideal for sheet metal when using 5/64″ or 3/32″ rod with DC reverse polarity.)	TY1782 TY1846 ---- ----	5/64″ (2.0 mm) 3/32″ (2.4 mm) 1/8″ (3.2 mm) 5/32″ (4.0 mm)	min.-100 40-100 100-170 140-250
BRAZING ROD	Use with Twin Carbon Torch. No flux required on light work. Forms dense sound, machinable weld. Especially suited to welding light gauge metals (such as machinery covers) which vibrate. Color marking: None. Melting point, 1866°F (1019°C). (Use AC.)	TY1848 ----	3/32″ (2.4 mm) 1/8″ (3.2 mm)	20-50 20-100
STAINLESS STEEL	HARDENED STEELS are easier to weld with this rod. When in doubt about the "Hardness" of your steel, use this rod for best results. STAINLESS STEELS come in a wide variety, and this rod handles most of them. Consult the original equipment manufacturer where expense warrants, as some of the "monel" type metals do not lend themselves to ordinary arc welding. A.W.S.-A.S.T.M. Class E-308-16. (Welds best on DC reverse polarity.)	---- ----	3/32″ (2.4 mm) 1/8″ (3.2 mm)	50-100 90-150
ALUMINUM FOR T.I.G. TORCH	Use on most Aluminum metals and aluminum castings. A.W.S.-A.S.T.M. R4043 A5. 10-57T. (Use AC.)	----	3/32″ x 36″ (2.4 mm x 91.4 cm)	
A.C. CARBON ELECTRODES	Copper coating carries power to the tip, where intense heat is concentrated. Provides useful heat for brazing, soldering, silver soldering, shaping, melting, burning, bending. Use carbon size in proportion to size of job. (Use AC.)	---- TY1847 TY2322	1/2″ (12.7 mm) 1/4″ (6.4 mm) 3/8″ (9.5 mm)	100-175 min.-40 min.-100

Using the Welder

STRIKING THE ARC

With a short stroke, rather like striking a match, move electrode across the base metal surface. Almost at once you will hear a sputter and see an arc develop.

As soon as arc has formed, lift electrode away from the base metal until the arc is crossing a gap of approximately 1/8 inch (3.2 mm). Maintain this gap during the welding process. If the gap becomes too wide, the arc will be extinguished. If the gap becomes too narrow, the electrode will "freeze" or stick to the workpiece.



TY3036

A—Start
B—Establish Arc
C—Finish
D—1/8″ (3.2 mm) Arc

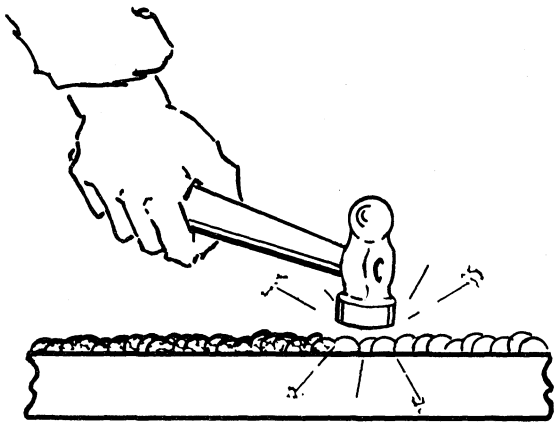
CHANGING ELECTRODES

If it becomes necessary to change the electrode or extinguish the arc before a weld is completed, refer to the following instructions.

1. Raise end of electrode from base metal to break arc. If required, remove and replace electrode in holder.
2. Before restarting weld, thoroughly clean unfinished weld with a wire brush. It may be necessary to remove flux or slag with a chipping hammer.
3. Strike a new arc just ahead of crater. Move arc to the crater, and fill with electrode metal. The welding procedure can then be continued.

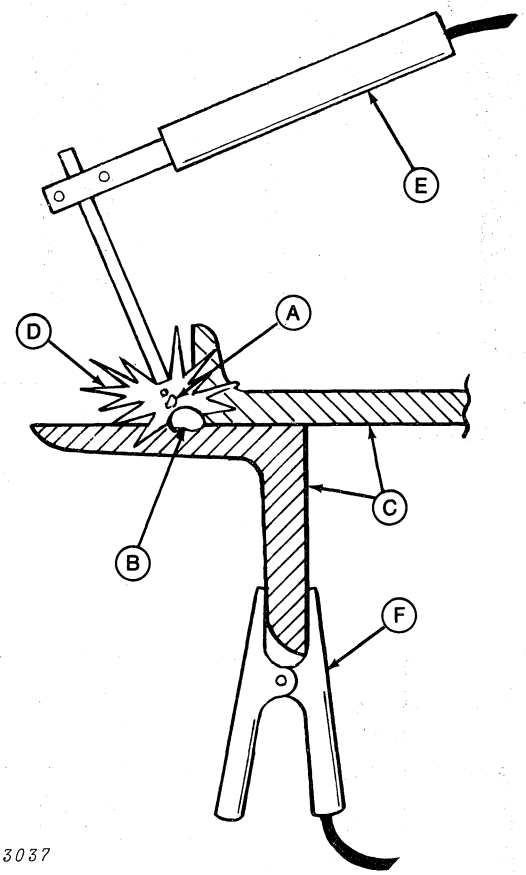
PEENING

Peening the weld (striking the weld bead with a hammer) removes the scale left behind in the welding and relieves the internal strains developed by the heating and cooling process.



TY3044

LAYING THE BEAD



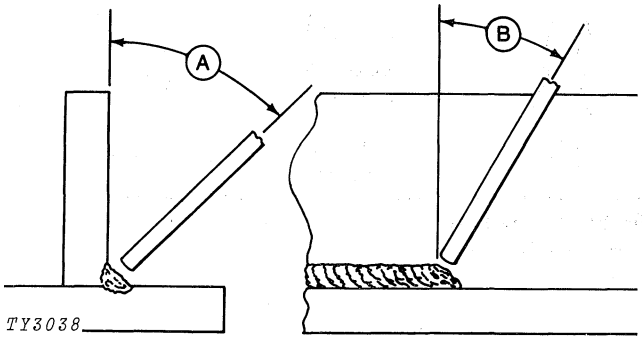
TY3037

The object of welding is to distribute metal from the melting electrode (A) in an even bead (B) along the welding seam or joint. The bead is formed by moving the arc slowly along the work so that droplets of molten electrode metal fuse with the molten base metal (C) in the "puddle" just beneath the arc (D).

Controlling the quality of the bead is a matter of (1) maintaining the proper electrode angle; (2) achieving maximum penetration of the arc; and (3) regulating the speed and pattern of electrode travel along the weld seam.

Remember that as the electrode melts, the holder must be brought closer and closer to the work.

A—Melting Electrode Metal
B—Weld Bead Being Formed
C—Workpiece (Base Metal)
D—Arc
E—Electrode Holder and Cable
F—Ground Clamp and Cable



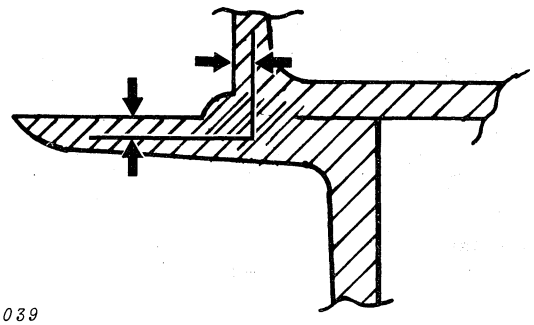
TY3038

A—Work Angle **B—Lead Angle**

Electrode Angle

The proper lead angle (B) will permit inspection of the "puddle" formed just behind the arc and of the newly deposited bead.

The proper work angle for a fillet weld is shown at (A). For electrode angles on other welding positions, see page 15.



TY3039

Penetration

The arc must "penetrate" the base metal and form a puddle of molten material into which the melting electrode can be fused.

A short arc, achieved by holding the electrode tip close to the workpiece, will produce the best penetration.

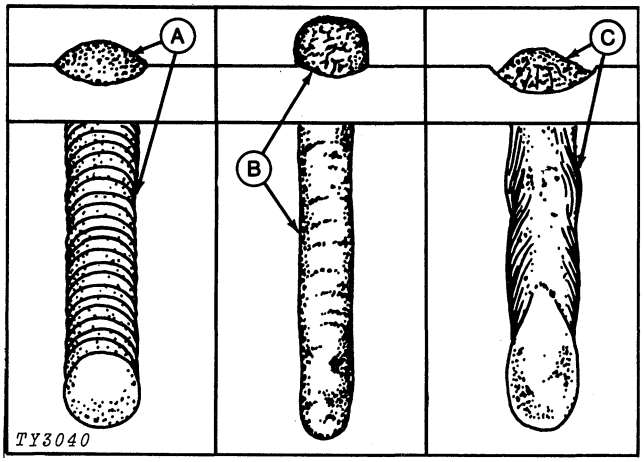
Electrode Speed and Pattern

A solid weld bead requires that the electrode be moved slowly and steadily along the weld seam.

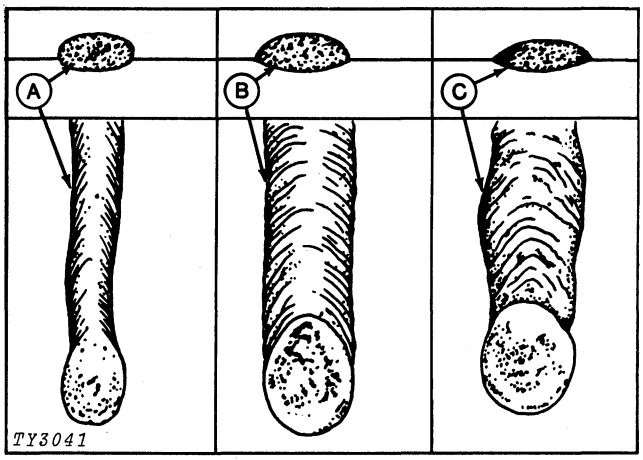
Moving the electrode rapidly or erratically will prevent proper fusion or create a lumpy, uneven bead.

A good weld bead will appear as a series of closely spaced ripples or waves. The new metal will be smooth and even - without porosity or hollow spots.

The height of the bead should be approximately equal to the diameter of the rod used.



A—Normal Weld
B—Current Too Low
C—Current Too High



A—Speed Too Fast
B—Speed Too Slow
C—Arc Too Long

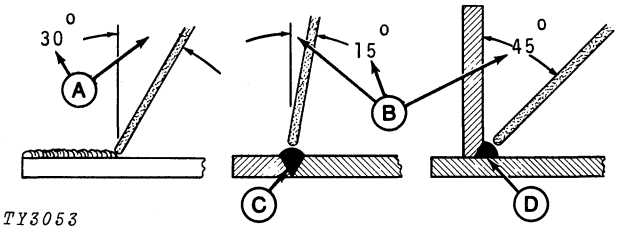
WELDING POSITIONS

Flat Welding

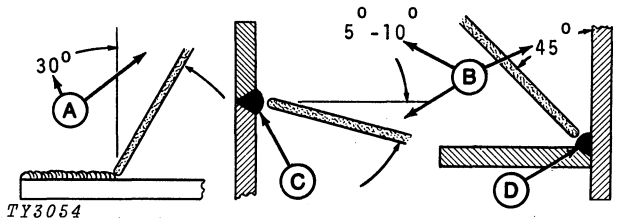
In flat welding, the bead is run on a surface laid parallel to the ground.

Flat welding is the easiest and yields the best results. If the work can be so arranged, it should be set up for flat welding.

Flat welding requires no special techniques and any general purpose, flat-weld, or all-position rod may be used.



A—Lead Angle
B—Work Angle
C—Butt Weld
D—Fillet Weld



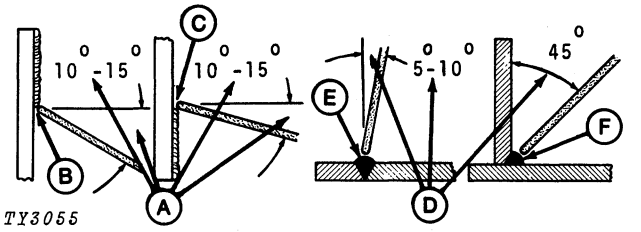
A—Lead Angle **C—Butt Weld**
B—Work Angle **D—Fillet Weld**

Horizontal Welding

In horizontal welding the bead is run parallel to the ground but on a vertical or near-vertical surface.

If the electrode is held 90 degrees to the work, the soft metal at the arc may droop and, as it cools, form a bead which is thicker at the bottom. This can be corrected by playing the arc more to the top side of the bead.

Any general-purpose or all-position rod may be used for horizontal welding.



A—Lead Angle **D—Work Angle**
B—Downward Pass **E—Butt Weld**
C—Upward Pass **F—Fillet Weld**

Vertical Welding

In vertical welding the bead is run vertically (up or down) on a vertical surface.

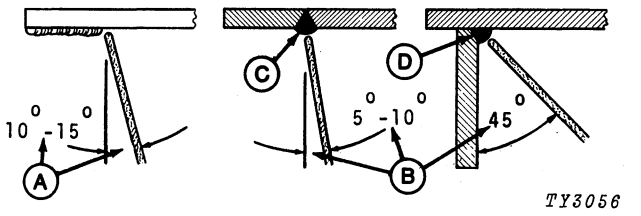
Vertical welding may be done from the bottom up or from the top down. No matter which direction is chosen, a short arc should be used. The short arc will insure quick heating and good penetration of the base metal.

For sheet metal or light work, welding from the top down is preferred. The electrode should be held perpendicular to the work. Because the penetration need not be great, the rate of travel may be faster than that used for flat work. This permits relatively rapid cooling of the bead and prevents it from falling away.

When heavier base metals must be joined along a vertical seam, welding from the bottom up is recommended. The electrode is held at a slight angle to lead the weld. The arc is kept short. When the bead begins to form, and enough metal has been added so that any more would tend to fall away from the weld, the arc is lengthened slightly and moved up along the seam a short distance. When the first deposit solidifies, the arc is brought back, shortened, and another deposit is laid on top of the first. The process is repeated, over and over, until the weld is completed.

Overhead Welding

Use DC Reverse Polarity for overhead welding.



A—Lead Angle **C—Butt Weld**
B—Work Angle **D—Fillet Weld**

CAUTION: Hot metal dropping from above can cause serious burns or start fires. Always protect your head, hands, feet and body during overhead welding. Do not overhead-weld where hot metal can fall on or into flammable materials.

Overhead welding requires that a bead be laid against an inverted flat or nearly flat surface.

In overhead welding, the electrode metal must be forced through the arc into the puddle crater on the base metal. The bead must be built up a little at a time and the puddle at the arc restricted to a relatively small area. The molten bead must solidify quickly or it will fall away from the joint.

A very short arc, a small electrode, and a lower heat setting must be used. Hold the electrode perpendicular to the work and use a stringer bead. As the bead first begins to form, move the electrode away from the crater and lengthen the arc slightly to permit the deposited metal to cool. Never break the arc; simply lengthen it during the momentary cooling. When the bead metal has solidified, return to the edge of the first deposit and add more metal. Repeat the process until the bead has been formed.

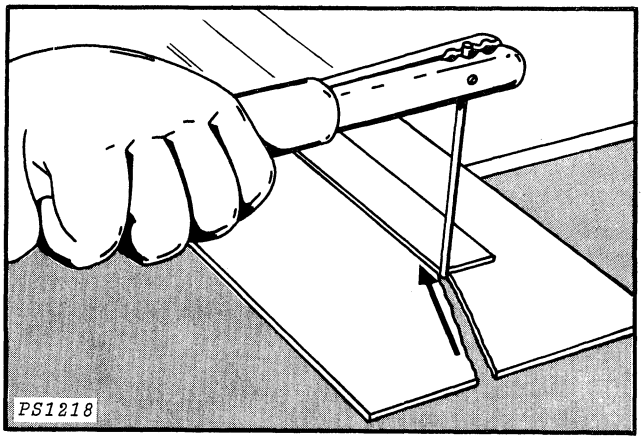
Overhead welding can be done only with all-position rod or with rod marked for overhead application.

SPECIAL APPLICATIONS

Cutting and Burning

Use DC Straight Polarity for cutting and burning.

CAUTION: Dropping hot metal can cause serious burns or start fires. Always protect your head, hands, feet and body when cutting or burning metal. Do not cut or burn where hot metal can fall on or into flammable materials.

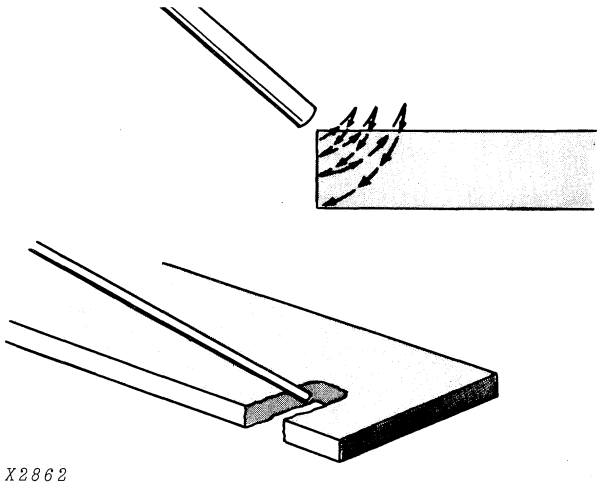


In cutting or burning the heat of the arc is used to melt or burn away the base metal.

Special cutting electrodes are available. If a general-purpose rod is used for cutting, less of the electrode will be consumed if it is soaked in water for a few minutes prior to use.

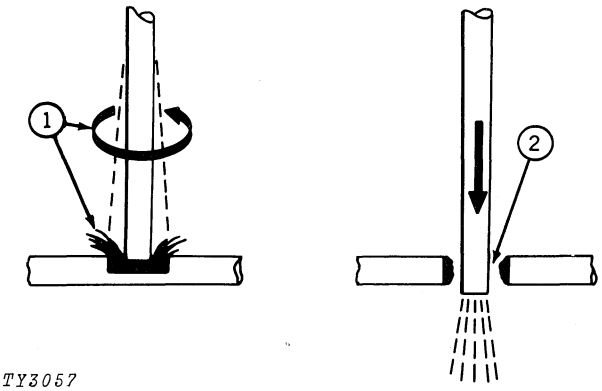
SUGGESTED AMPERAGE SETTING FOR ARC CUTTING

Metal Thickness (Inch) (mm)	Electrode Diameter (Inch) (mm)	Ampere Range
up to 1/8 (3.2)	3/32 (2.4)	75-230
1/8 to 1/4 (3.2 to 6.4)	1/8 (3.2)	180-250
over 1/4 (6.4)	5/32 (4.0)	180-250



X2862

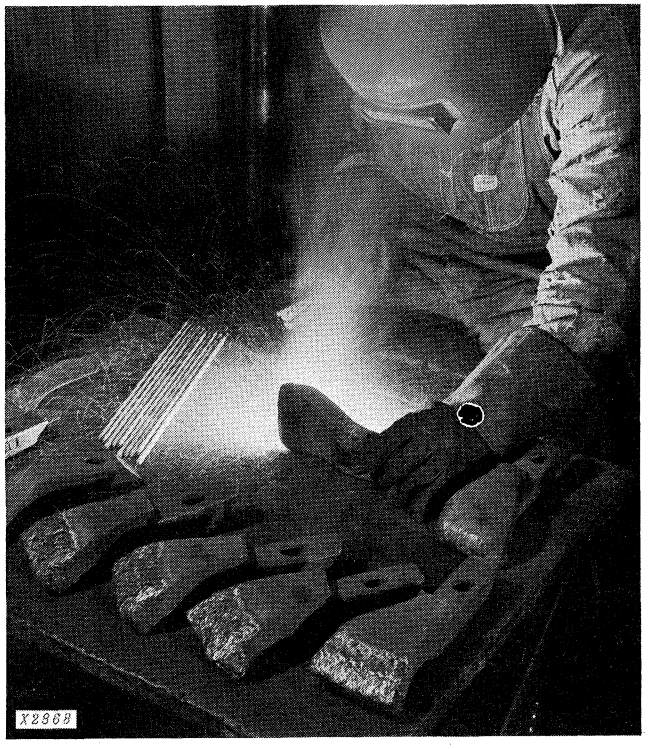
For cutting thick plate, cuts should start at the edge of the workpiece. Strike the arc and play the arc along the cut line. Concentrate the heat in a relatively small area. If the cut is long or if the material is heavy, make the cut as a series of short passes.



TY3057

1. To burn a hole in light material, strike the arc, hold the electrode perpendicular to the workpiece and rotate the arc in a small circle until the base metal softens.
2. Pushing or jabbing the soft spot with the electrode will open a hole through the metal. The pilot hole may be enlarged by burning away or melting the base metal around it.

Holes in heavier metal may be burned from the bottom. The melting base metal is permitted to drop away until the hole is opened or enlarged to the desired size.



X2868

Hard Surfacing

IMPORTANT: Never use a hard surface electrode for a weld which requires tensile strength. Hard surface electrodes are for hard surfacing and for no other purpose.

Hard surfacing is commonly used on cultivator points, plow shares, tractor rails and pads, and any other surfaces subject to abrasive action, friction, and hard wear. Usually it provides a new outer surface which is harder and has several times the lasting qualities of the original metal.

For most applications, use a 1/8 inch (3.2 mm) rod with an 80 to 140-amp heat setting.

The worn part, or area to be surfaced, should be built up to within about 1/8 inch (3.2 mm) of its original dimension with a mild steel, low alloy, or high carbon electrode. Only one layer of hard surface electrode should be applied. If more layers are applied, the hard surface may scale off because of its high hardness.

The arc length best suited for a particular application can be determined readily by a series of brief tests. Burn the electrode at various arc lengths and observe the results on the deposit. A fine spray-type arc with no explosive interruptions in the arc stream and a medium-to-long arc is most desirable. This arc may be easily controlled and very thin, smooth, hole-free deposits may be applied.

Use a wide weave bead to lay on the new metal. Slag removal is not necessary; the arc force is sufficient and the nature of the slag is such that the previously deposited slag is easily penetrated and floated to the surface. Speed of travel and heat setting will be determined largely by the depth of deposit desired and the welding conditions.

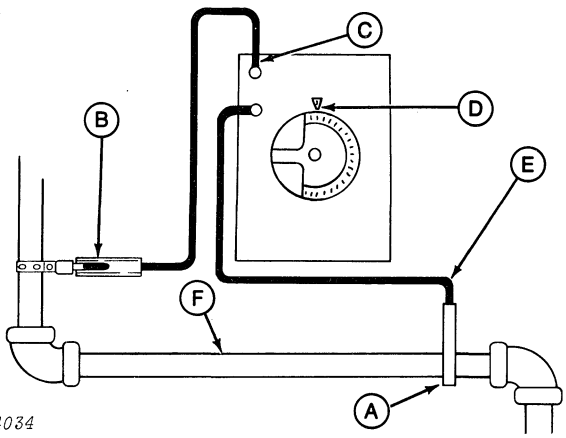
Thawing Water Pipes

Thawing frozen pipes, either underground or exposed, is accomplished by distributing the heat normally generated at the "arc" of the arc welder throughout the water (ice) inside the frozen pipe. The water and the pipe act as conductors. In conducting the current, they present resistance to the flow of electrical energy thus generating heat.

IMPORTANT: If an attempt is made to thaw a very large pipe, however, the pipe may present less resistance than the cable, and the cables will heat, leaving the pipe relatively cool. COPPER PIPE, being an excellent conductor, does NOT thaw with this treatment.

Observe the following points for a successful operation:

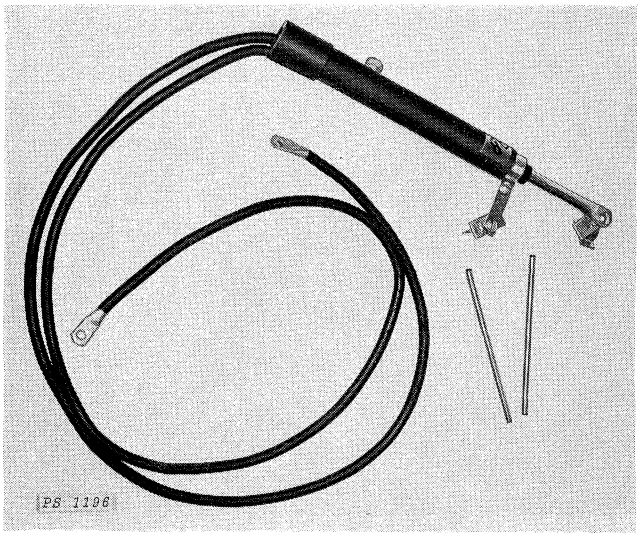
1. If possible, pressure must be kept on the system until the water thaws and begins to flow.
2. Connect the welder ground cable clamp (A) to one end of the frozen section, and the electrode clamp (B) to the other. The electrode cable should be plugged into the AC electrode jack (C) with the dial set on minimum amperage (D).
3. Where the length of pipe to be thawed is longer than can be reached with the ground and electrode cables, it may be necessary to use an extension. If you must use longer wire, check it occasionally. If it becomes hot to the touch, all the heat is being generated in the wire, and the frozen pipe is remaining cool.



TY4034

A—Ground Clamp
B—Electrode Clamp
C—AC Electrode Jack
D—Dial Minimum Amperage
E—Ground Cable
F—Frozen Pipe

CARBON ARC TORCH

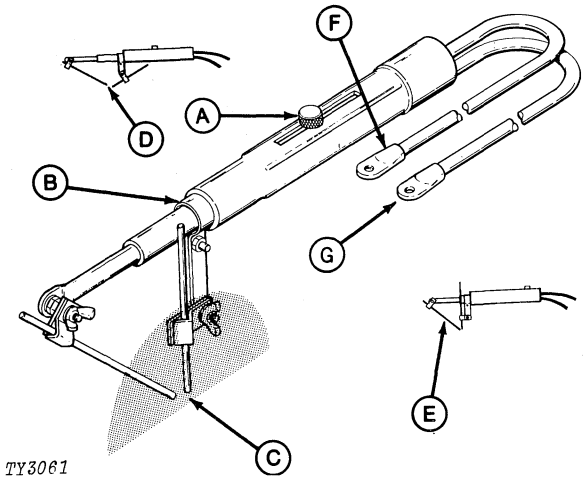


IMPORTANT: Use AC welding mode only with the carbon arc torch.

In the carbon arc torch the arc is created by the electrical current leaping the gap between two carbon electrodes. The arc produces a temperature of approximately 10,000° F (5538° C) at its center. Although the electrodes become very hot, they burn slowly and leave no metal deposits behind. Because the current passes from electrode-to-electrode and does not flow through the workpiece, a ground clamp connection from the workpiece to the welder is unnecessary.

Application	Carbon Electrode Size	Heat (Amp) Setting
Fine work, silver soldering, tin plate, small detail	1/4″ (6.4 mm)	30-40
Light brazing, heavy soldering	5/16″ (7.9 mm)	30-60
General purpose brazing, light heating	3/8″ (9.5 mm)	30-100
Heavy duty heating and bending	1/2″ (12.7 mm)	80-175

The size and intensity of the arc flame is determined by the size of the carbon electrodes and heat setting used. Different rods and settings are used for various applications.



A—Thumbscrew
B—Friction Ring
C—Carbons in Same Vertical Plane
D—Wide Angle
E—Shallow Angle
F—To Electrode Clamp
G—To Ground Clamp

Loosen the thumbscrew (A) and move the slide in or out until the thumbscrew is about midway along the slot. Tighten the thumbscrew very lightly. Properly set, the slide will position but will move easily when pressure is applied at the thumbscrew.

Always use two carbons of the same size.

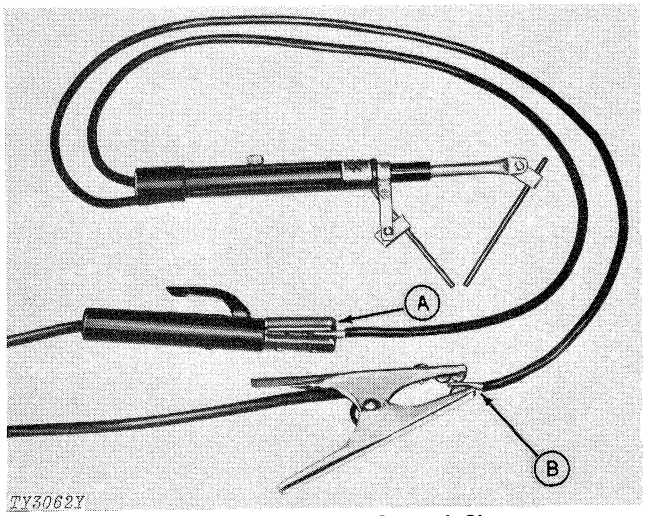
Fix the carbons in the clamps and adjust for alignment and angle. Alignment is regulated by adjusting the friction ring (B) right or left. The carbons should be aligned to be in the same plane (C). The angle at the tip may be set by adjusting the wing nuts at the electrode clamps. A wide angle (D) will produce a fine arc. A shallow angle (E) will produce a heavy arc. The torch is properly set when the thumbscrew (A) is midway along the slot and the electrodes are just touching.

CAUTION: Never replace the nylon thumbscrew with a metal fastener of any kind.

Connecting Torch

Clip one of the torch cable lugs in the jaws of the electrode holder (A). Clip the other in the ground clamp (B).

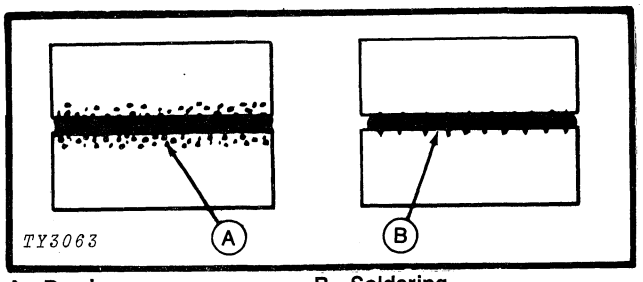
CAUTION: Exposure to the electric arc is extremely harmful to the eyes. Prolonged exposure can cause blindness. Never strike an arc unless your eyes are adequately protected.



A—Electrode Holder B—Ground Clamp

Brazing

Brazing is recommended where light metals must be joined or where arc welding is impractical. Brazing is similar to soldering in that the added metal is not fused to the base metals. It is different in that greater heat is used. The bonding metal is made to flow between the surfaces being joined.



A—Brazing B—Soldering

A bronze rod (A) is used for general-purpose brazing. The rod and the surfaces to be joined are heated with arc flame.

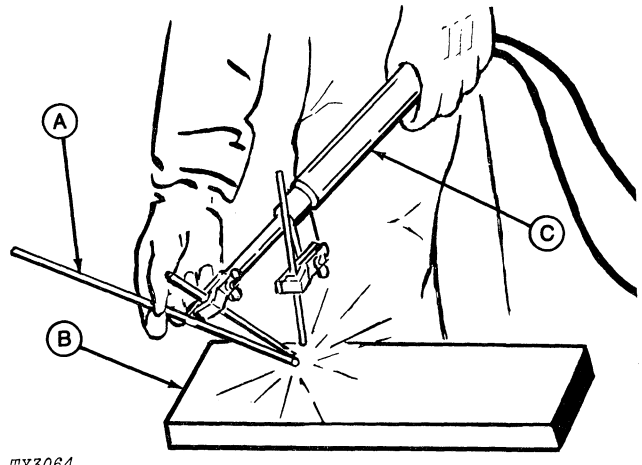
Play the torch along the seam to be closed to heat the base metal. When the base metal is hot enough, melt the filler rod in the arc and distribute the molten metal along the joint.

If the filler metal forms into balls or rolls away, the base metal is too cool. To raise the temperature, move the arc closer to the work. When the rod metal spreads into a flat puddle on contact, the base metal temperature is correct.

Bond is made when the molten filler rod and the base metal reach about the same temperature.

Care must be taken not to overheat the base metal. If the base metal shows signs of distorting, sagging or burning through, reduce the temperature by moving the arc away from the surface. The base metal must not be hot enough to show color when the torch is off and the helmet is raised.

When working at an angle, or in a vertical position, tack both ends, then work from the top down.



A—Rod
B—Workpiece
C—Carbon Arc Torch

Bending and Shaping

Heated to the proper temperature, most metals become soft enough to bend easily. For some metals, however, the critical bending and shaping temperature range is extremely narrow - only a few degrees separate the temperature at which the metal remains stiff and unpliable and that at which it liquifies, boils or burns away. The carbon arc torch develops more than enough heat to bring any metal up to bending temperature.

Aluminum Welding

The procedures used for aluminum welding are similar to those used for ferrous metals. Aluminum welding requires a special flux-coated weld rod. Because aluminum conducts heat very readily, and liquifies quickly when the critical temperature is reached, the workpiece metal must be preheated and handled carefully during the welding.

To Weld Aluminum:

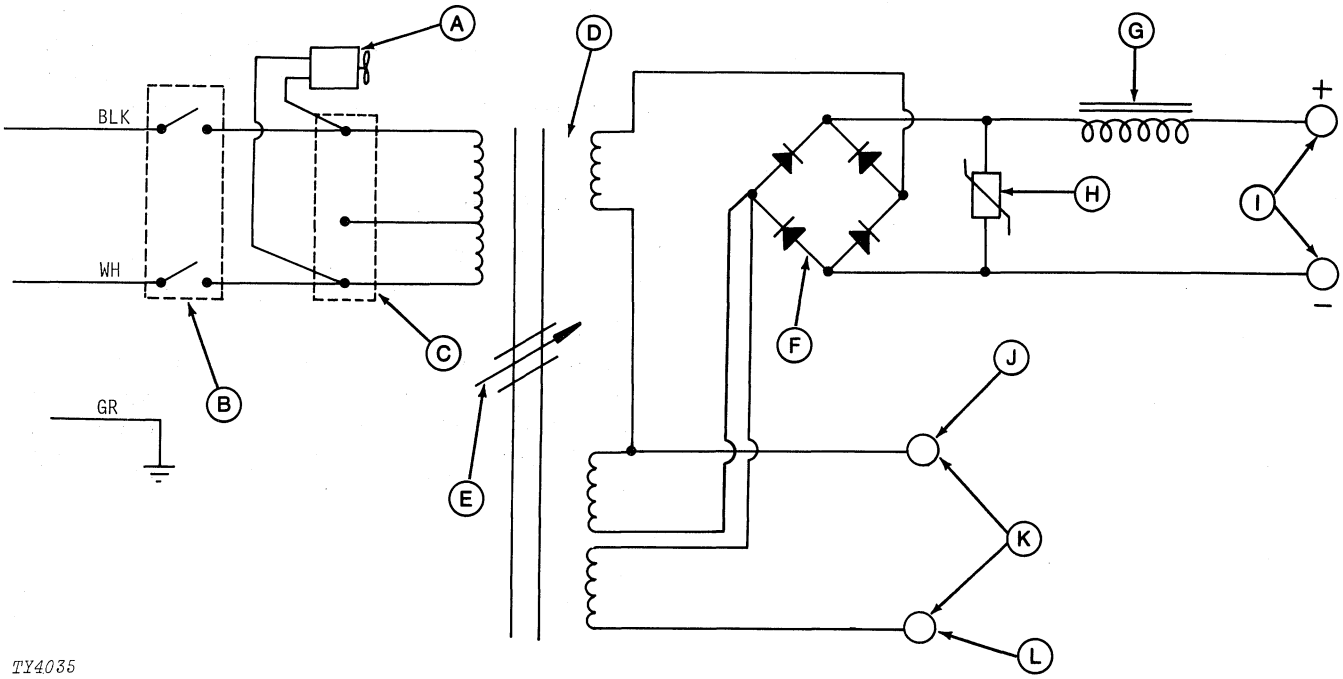
Clean the workpieces thoroughly. Use a wire brush or file. The surfaces to be joined must be clean, bright and shiny.

Use 3/8-inch (9.5 mm) carbons set at a relatively shallow angle. Play the flame over the workpiece until the work area and the surrounding metal is thoroughly heated; then, add aluminum filler rod as you would brazing rod.

Service

WIRING DIAGRAM

Refer to wiring diagram when servicing or repairing welder.

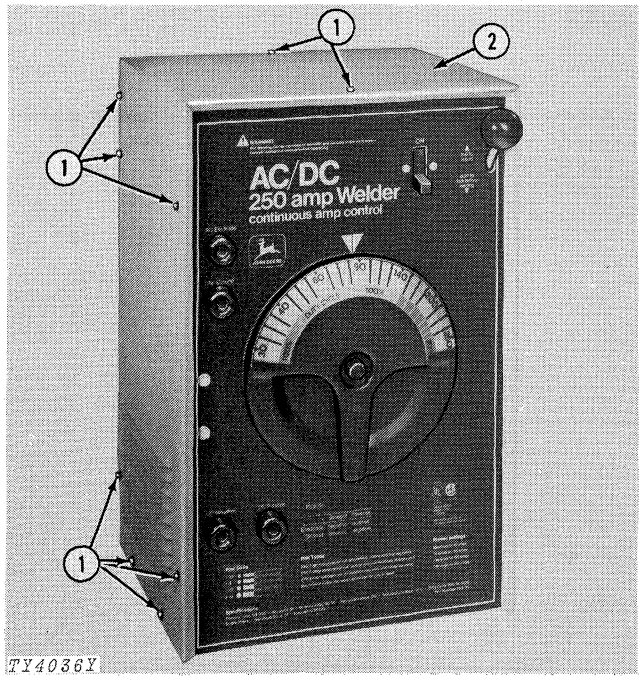


TY4035

BLK—Black
WH—White
GR—Green

A—Fan
B—Switch
C—Terminal Block
D—Transformer
E—Movable Shunt
F—Diodes
G—Reactor
H—Transient Voltage Protector
I —DC Output
J—Ground
K—AC Output
L—Electrode

REMOVING AND INSTALLING COVER

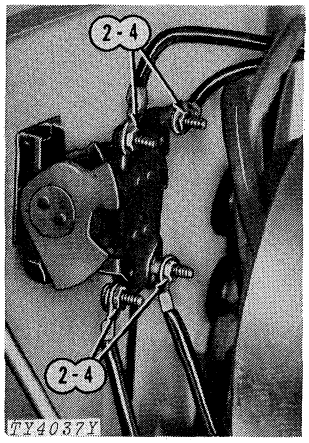


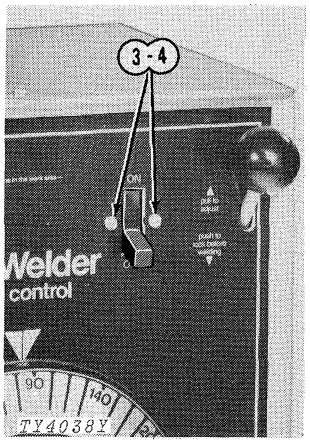
CAUTION: Disconnect welder or shut off power source before disassembly.

1. Remove 16 screws.
2. Remove cover.

Install cover in reverse order.

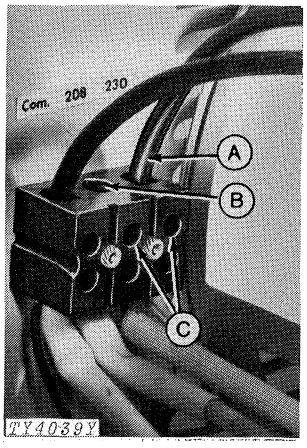
REPLACING SWITCH





1. See above to remove cover.
2. Disconnect wires from switch.
3. Remove screws securing switch to front cover.
4. Install switch and connect all wires.

CONVERTING FROM 230-VOLTS TO 208-VOLTS



A—230-Volt Terminal
B—208-Volt Terminal
C—Screws

NOTE: Welder is factory-wired for 230-volt, 60-cycle, single-phase operation.

To rewire for 208-volt, 60-cycle, single-phase operation:

1. See above to remove cover.
2. Loosen hex. head screws (C) and remove wire from 230-volt terminal (A).
3. Move wire to 208-volt terminal (B). Tighten hex. head screws.
4. Replace cover.

TESTING DIODES

A volt/ohmmeter is needed to test diodes.

1. Set heat (amps) dial at the lowest output.
2. Turn on welder.
3. Check welder output at the DC output receptacles.

DC Output Current	Action Required
50 to 75 Volts DC	Return welder to service
Below 50 Volts DC	Test all diodes

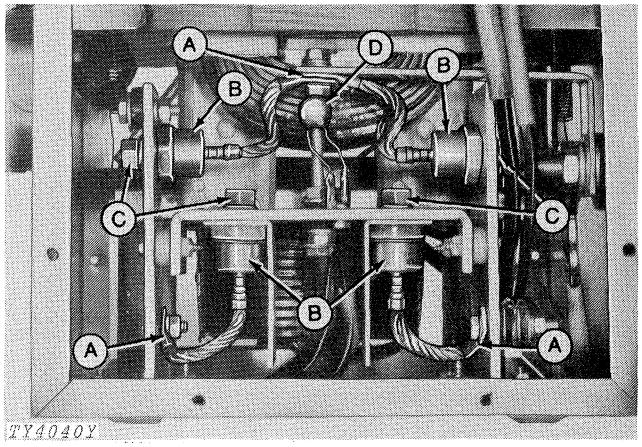
Testing Diodes

If welder output is below normal, test each diode with an ohmmeter.

1. Remove cover.
2. Set ohmmeter on the RX1 scale.
3. Remove diode leads (A).
4. Connect ohmmeter across the diode, that is, one lead on diode lead (A) and the other lead on diode base nut (C). Observe reading.
5. Reverse leads and observe reading.

Diodes are good when they show low resistance in one direction and high resistance in the opposite direction.

Diodes must be replaced if they show no or very low resistance in both directions or if they show high resistance in both directions.



A—Diode Lead
B—Diode
C—Diode Nut
D—Transient Voltage Protector

Replacing Diodes

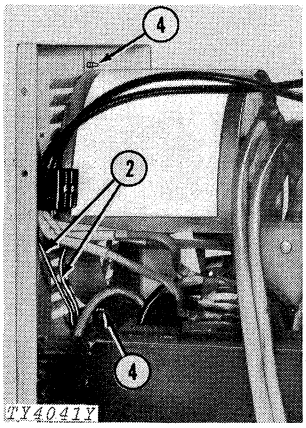
IMPORTANT: Whenever a diode is replaced, replace transient voltage protector (D) if physical damage is evident.

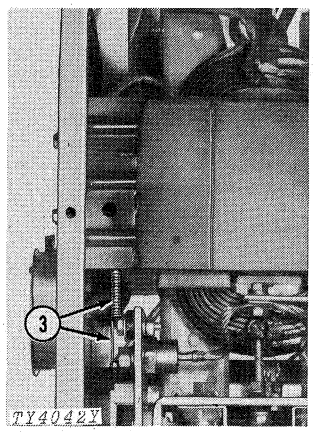
1. Remove diode lead (A).
2. Remove diode nut (C).

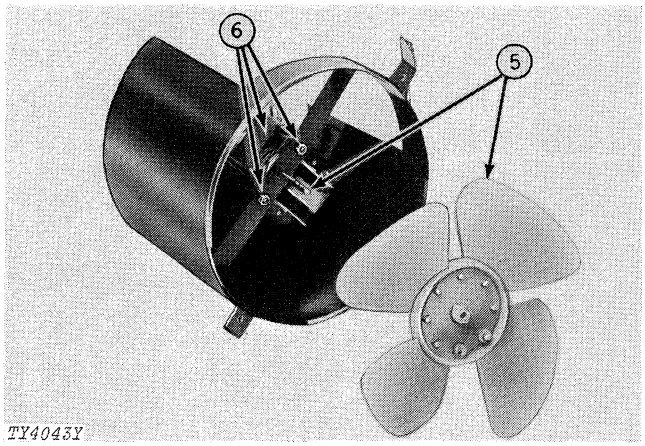
IMPORTANT: Clean mounting surface. Coat mounting surface with a silicon heat sink compound.

3. Replace diode and tighten diode nut (C) to 125 in-lbs (14.1 Nm) (1.4 kgm) maximum torque.

REPLACING FAN



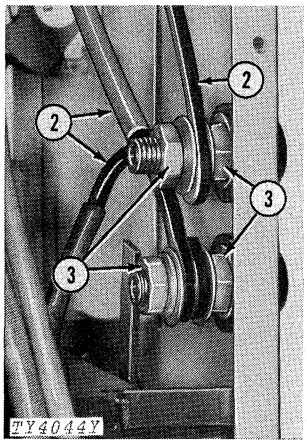




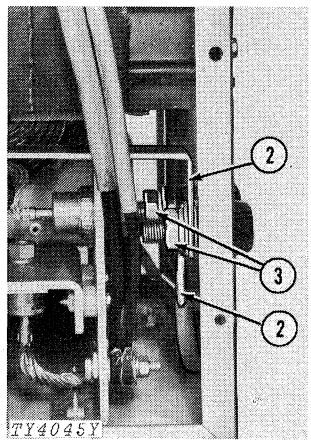
1. Remove cover, page 24.
2. Disconnect fan wires from terminal block.
3. Disconnect spring from rear of shunt.
4. Remove two screws from rear housing and remove fan assembly.
5. Grasp blade at hub and pull it from motor shaft.
6. Remove two screws and remove motor from baffle.

Reassemble in reverse order.

REPLACING RECEPTACLES



AC Output Receptacles



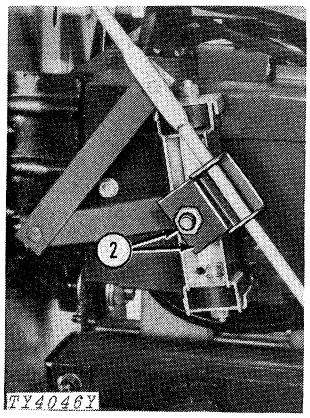
DC Output Receptacles

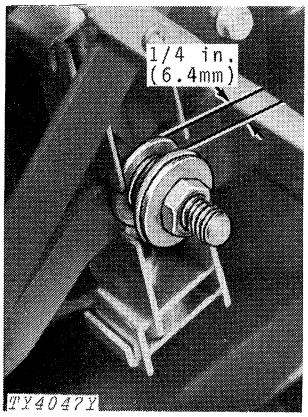
1. Remove cover, page 24.
2. Mark all leads for reconnection. Remove nuts and washers freeing leads from receptacles.
3. Remove nuts from receptacles and remove receptacles from front of panel.

Reassemble in reverse order.

NOTE: When reinstalling receptacles, do not overtighten nuts because plastic insulator will be damaged.

ADJUSTING SHUNT CLAMP





If amperage control moves when welding, readjust tension as follows:

1. Remove cover, page 24.
2. Remove outer lock nut and pivot guide from stud.
3. Tighten inner locking nut until there is 1/4 inch (6.4 mm) space between the insides of the flat washers.

Reassemble in reverse order.

NOTE: Do not overtighten outer lock nut. Pivot guide must be free to move smoothly and without binding.

Trouble Shooting

Symptom	Problem	Correction	Page
Welder noisy or arc intermittant on DC mode.	Faulty diode.	Test and replace diodes.	25
Welder does not hum when turned on.	No power at receptacle.	Check circuit and fuses or circuit-breakers back to meter.	—
	Broken or damaged power cable.	Replace power cable.	—
	Faulty switch.	Replace switch.	24
	Loose or broken connection at receptacles.	Tighten or repair receptacles.	26
	Faulty transformer element.	Replace transformer. (See your John Deere dealer.)	—
Welder hums but does not weld.	Inadequate power at receptacle.	Check power source.	—
	Inadequate current at the arc.	Check ground clamp cable and connection to workpiece. Check electrode cable and clamp at electrode.	9
	Poor connections at welder.	Check welding cable connections at jacks. Check transformer lead connections to jack receptacles inside welder.	—
Welder gives shocks.	Incorrect connections at power cord receptacle. ("Hot" wire connected to "ground" terminal.)	Rewire power cord receptacle.	—
	Welder wired to 3-phase current.	Check power source.	—
Welder gives trickle shocks.	Accidental contact with workpiece.	Avoid contact with workpiece.	—
	Current is grounding through electrode holder.	Stand on or work from dry surface when welding.	—
Welder heat setting difficult to adjust.	Linkage assembly too tight.	Adjust linkage assembly retaining nut.	—
	Dust or dirt in shunt assembly track.	Clean and lubricate shunt track.	—

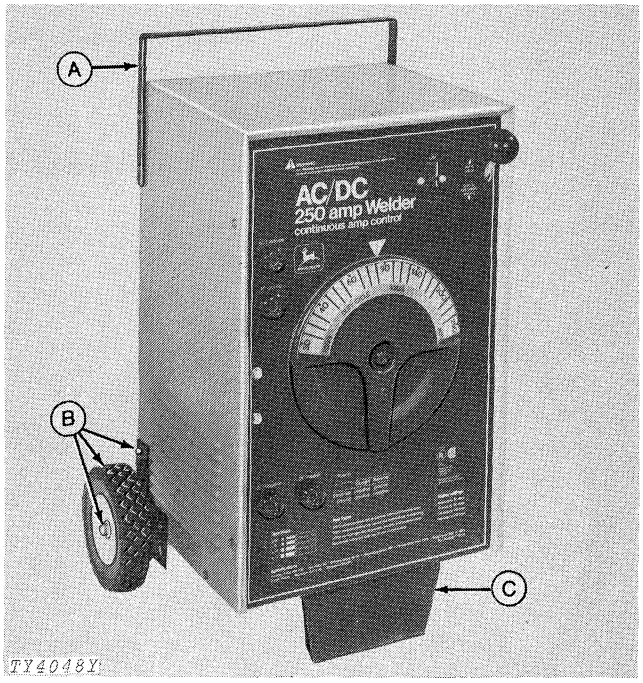
TROUBLE SHOOTING—Continued

Symptom	Problem	Correction	Page
Welder output is inconsistent. Dial moves when arc is struck.	Shunt moving inside transformer.	Tighten or repair shunt clamp.	26
Welder overheats - blows fuses.	Fan blades not turning. Blades loose or obstructed.	Replace and/or tighten fan blades. Clear obstructions.	—
	Fan blades not turning - fan motor burned out.	Replace fan motor.	26
	Fan turning too slowly - loose blade or misaligned bearings	Tighten blade - tap motor housing to realign bearings.	—
Arc hard to strike.	Wrong type of electrode.	Check to be sure electrode is correct type for welding mode.	12
	Electrode too large.	Try an electrode with a smaller diameter.	—
	Base metal not grounded properly.	Check ground carefully.	—
	Voltage from power line low due to heavy loads.	Schedule welding when less current is being used.	—
Bead too thin in places.	Uneven speed when moving electrode across base metal.	Slow down. Try to maintain a steady rate of travel across the surface to be welded.	—
Bead too thick in places.	Holding the electrode too long in one place or moving it too slowly across the base metal.	Speed up. Maintain a uniform rate of speed along the bead.	—
Excessive spatter.	Too long an arc.	Shorten the arc. As the welding progresses, feed the electrode down into the arc.	—
Ragged depressions at edge of weld.	Moving the electrode too rapidly or holding too short an arc.	Slow down. Lengthen the arc slightly.	—
Overlapping beads.	Heat too low, arc too long or rate of travel too fast.	Shorten the arc. Slow the electrode movement.	—
Electrode sticks to work.	Electrode is held in contact with base metal while arc is struck.	Move electrode away from the base metal immediately after the arc is struck.	—
Poor electrode performance. Electrodes sputter and stick.	Damp electrodes.	Store electrodes in a dry location.	—

Accessories

WHEEL KIT

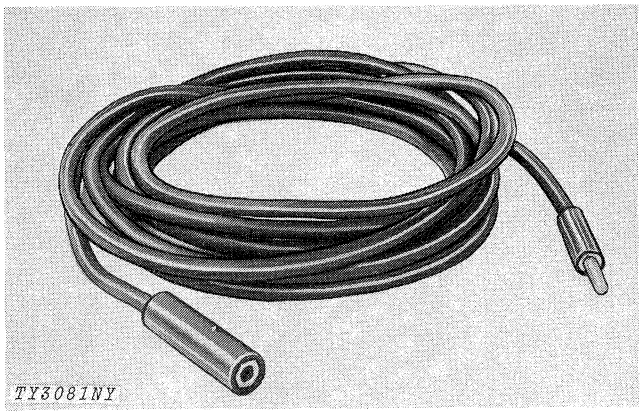
TY5102 Wheel Kit makes an easy job of moving the welder from one job location to another.



A—Handle
B—Wheel, Axle, and Mounting Brackets
C—Foot

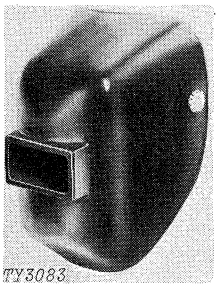
CABLE EXTENSIONS

Two different lengths of No. 3 welding cable extensions are available: TY2547 - 12 foot (3.7 m) and TY2680 - 25 foot (7.6 m).

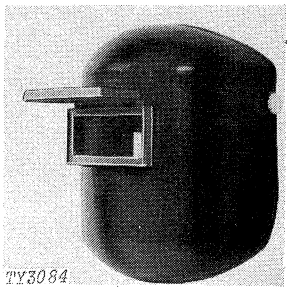


HELMETS

Two models of helmets are available: TY2682 Helmet with shade lens included in a flip visor and TY4605 Helmet with fixed position shade lens.

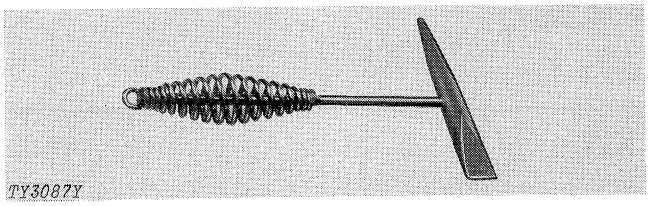


TY4605 Helmet



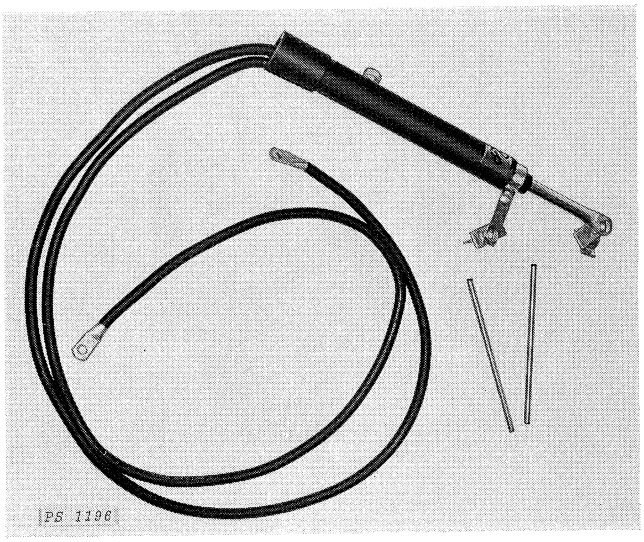
TY2682 Helmet

CHIPPING HAMMER



TY2681 Chipping Hammer

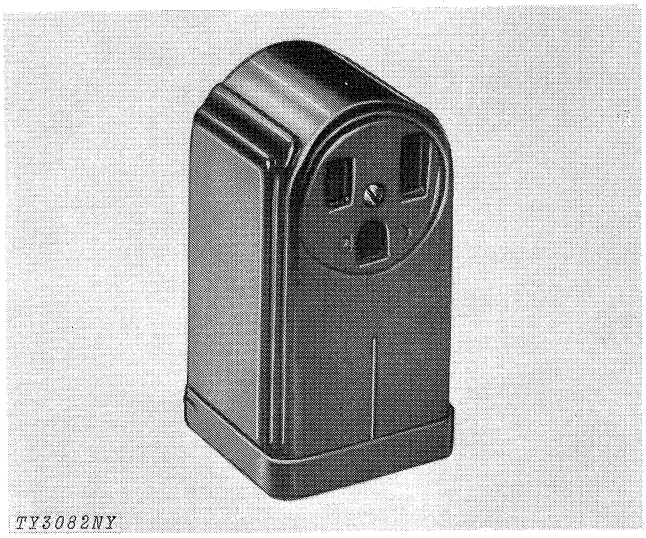
CARBON ARC TORCH



The TY2325 carbon arc torch is an accessory that greatly facilitates the pre-heating required for bending and shaping operations. It is also used to solder, braze and weld aluminum, brass, bronze, monel metal, cast-iron, malleable-iron and steel by the flame method.

IMPORTANT: Use the carbon arc torch only in the AC welding mode.

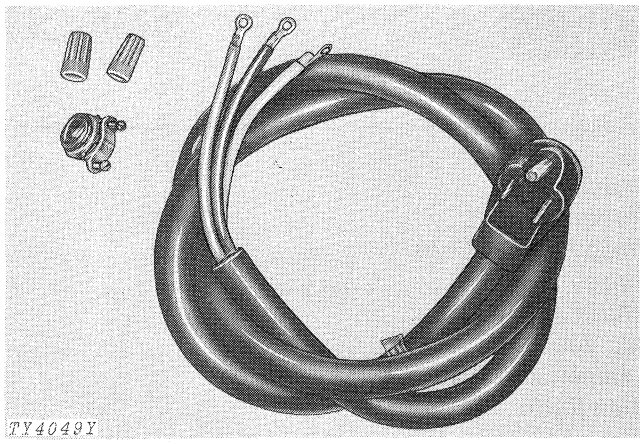
RECEPTACLE



Some outlet receptacles will not be compatible with the welder power cord plug. To insure having a receptacle that is compatible with the power cord plug, see your John Deere dealer for the TY8086 Receptacle.

POWER CORD

The TY5146 Power Cord is available for use with the TY8086 Receptacle.



ELECTRODES

A variety of electrodes and carbon rods may be used with your welder. See page 12 for a detailed description of electrodes and their uses.

TY1598 General-Purpose Welding Rods (E-6013) 1/16 inch (1.6 mm)

TY1782 Iron-Powder Welding Rods (E-7014) 5/64 inch (2.0 mm)

TY1846 Iron-Powder Welding Rods (E-7014) 3/32 inch (2.4 mm)

TY1847 Carbon Rods, Copper-Coated, 1/4 inch (6.4 mm)

TY1848 Brazing Rods, 3/32 inch (2.4 mm)

TY2322 Carbon Rods, Copper-Coated, 3/8 inch (9.5 mm)

TY2323 General-Purpose Welding Rods (E-6013) 1/8 inch (3.2 mm)

TY2324 General-Purpose Welding Rods (E-6013) 5/32 inch (4.0 mm)

Specifications

Primary Volts	208/230
Primary Amps	80/76
Open - Circuit Volts	78
Cycles (Hz)	60
Phase	Single
Arc Volt	30
Temperature Rise	115°C
Duty Cycle	100% at 110 amps-Tapering to 20% at 250 amps

Dimensions:

Height	21 in. (53.3 cm)
Width	13-1/2 in. (34.3 cm)
Depth	11-1/2 in. (29.2 cm)
Weight (approximate)	136 lbs. (61.2 kg)

(Specifications and design are subject to change without notice.)

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FMO Manual - Tractors	FMO-10102B	
FMO Manual - Tillage	FMO-11102B	
FMO Manual - Planting	FMO-12102B	
FMO Manual - Crop Chemicals	FMO-13102B	
FMO Manual - Hay & Forage Harvesting	FMO-14102B	
FMO Manual - Combine Harvesting	FMO-15102B	
FMO Manual - Preventive Maintenance	FMO-16103B	
FMO Manual - Machinery Management	FMO-17102B	
FMO Manual - Machine Safety	FMO-18102B	
FMO Set of 9 Manuals above	FMO-394 Set	
FOS Manual - Hydraulics	FOS-1003B	
FOS Manual - Electrical Systems	FOS-2005B	
FOS Manual - Engines	FOS-3005B	
FOS Manual - Power Trains	FOS-4005B	
FOUR FOS MANUALS (above)	FOS-90 Set	
FOS Manual - Shop Tools	FOS-5103B	
FOS Manual - Welding	FOS-5205B	
FOS Manual - Belts and Chains	FOS-5303B	
FOS Manual - Bearings and Seals	FOS-5403B	
FOS Manual - Tires and Tracks	FOS-5505B	
FOS Manual - Mowing and Spraying Equipment	FOS-5604B	
FOS Manual - Air Conditioning	FOS-5705B	
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FOS Manual - Fiber Glass	FOS-5902B	
FOS Manual - Fasteners	FOS-6002B	
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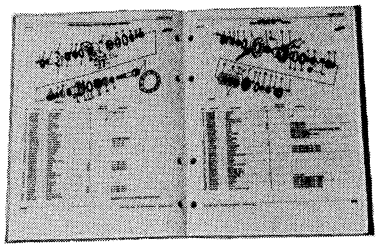
PARTS CATALOG

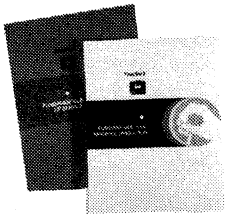


A parts catalog containing exploded view illustrations and lists of all parts is useful when purchasing service parts. Helps identify the correct parts. Useful in assembling and disassembling.

OPERATOR'S MANUAL

An extra copy of the operator's manual may be important if the copy furnished with your machine is misplaced.

FMO AND FOS MANUALS



These are basic manuals covering most all types and makes of agricultural machinery. FMO manuals tell you how to *operate* machines; FOS manuals tell you how to *service* machines. Each manual starts with basic theory and is fully illustrated with colorful diagrams and photographs. Both the "whys" and "hows" of adjustments and repairs are covered in this reference library.

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