

INSTRUCTIONS FOR USE OF ARC WELDER.

PART NO. 120642

ARC WELDER
Model No. AP90



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WARNING

1. The arc welder must only be plugged into the PTO outlet on the Electric tractor. To use the arc welder with a power source other than the Electric tractor may cause the unit to malfunction, and injure the welder.
2. The Electric arc welder should not be used without adequate protective gloves and helmet as provided in the Welder Accessory Kit. A protective apron or heavy clothing, not affected by welder sparks, should also be worn. (See Page 5 , Clothing.)
3. Never look at the arc without approved eye protection such as a welder's helmet, which is fitted with at least a No. 10 filter plate. Warn bystanders not to look at the arc. (See the Safe Welding Practices section of these instructions.) Serious personal injury could result from failure to observe these precautions.
4. Use the arc welder only for its intended purpose of welding.
5. To prevent accidental tractor movement while welding, put the range selector in neutral and set the parking brake.
6. Unless you are thoroughly experienced in welding practices, do not weld parts where failure of the weld might result in hazard or injury.
7. Do not weld on parts whose temperature is below 60 F, or on wet material.

WELDER DESCRIPTION

The three-heat Electric Welder 120642 is designed to give safe and efficient service. The heat ranges are selected by connecting the lead of the electrode holder to one of the three negative terminals on the front of the welder. Figure 1 shows the front of the welder with the protective cover removed. Figure 2 shows the medium range being connected. Make sure connections are tight to prevent arcing.

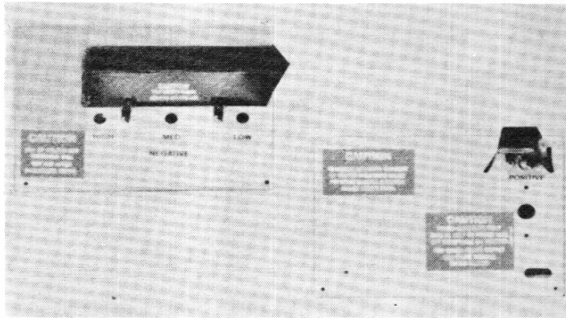


Figure 1 Welder Front and Back with Protective Covers Opened

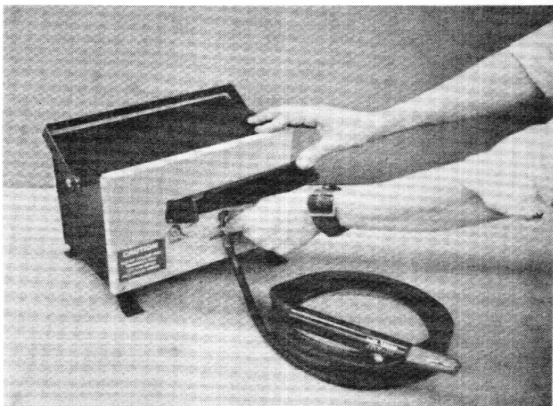


Figure 2 Welder and Electrode Holder Cable.

The heavy-duty electrode holder is fully insulated and has jaws which will hold the welding rod in seven different positions. The perpendicular position, being the most frequently used, has duplicate accommodations. The holder can be used in either the left or right hand, which gives additional versatility. The jaws are covered with a high quality of heat-resistant

plastic, but to avoid damaging the protectors and the jaws, never burn the rod any closer to the jaws than 1-1/4 inch.

CAUTION: While welding, make certain that the cable is not beneath the work area where pieces of hot metal may drop and burn its insulation.

Figure 3 illustrates proper connection of the ground clamp cable on the rear side of the welder. This is the positive welder terminal. Although the ground clamp has a heavy jaw spring, it may be necessary to twist the clamp from side to side a few times on dirty or rusty metal so that the jaws will make contact with clean metal.



Figure 3 Back View of Welder Showing Ground Clamp Cable and Cord.

CAUTION: The cable on the ground clamp is the same material as on the electrode holder, so the same caution must be used regarding hot metal burning its insulation.

NOTE: Replace cables only with replacement parts listed on page 12. The cables are designed for optimum performance in the total Electric tractor system.

ACCESSORIES

The Welder Accessory Kit 120643 contains a high-quality fully adjustable helmet, full-cuffed leather gloves, and an assortment of welding rods suitable for mild steel. (See Fig. 4).



Figure 4 Welder Accessory Kit

HELMET

The helmet is equipped with a No. 10 filter plate which keeps the ultraviolet rays from the arc down to an acceptable level. On the outside of the filter lens is a clear cover plate to protect the filter from the splatter, dirt, and damage brought about by use. This clear plate should be replaced whenever necessary to provide maximum vision.

The helmet head band is adjustable in two directions to give comfort to any operator. The adjustment indicated as letter A in Fig. 5 accommodates various head sizes, while the adjustment at B can be used to adjust the level of the plate in front of the eyes. The nuts referenced as C, adjust the "flip-down" tension of the face shield relative to the head band, which allows a "hands-off" ability to raise and lower the face shield for rapid welding.

WELDING RODS

The electrodes (welding rods) included with your accessories, are a starter supply to be used in gaining experience with the Electric Welder. These rods are for mild steel. Additional rods should be purchased to meet the job requirements.

NOTE: Welding electrode must be kept dry to prevent poor operation during use. Store welding electrodes indoors in a warm, dry location.

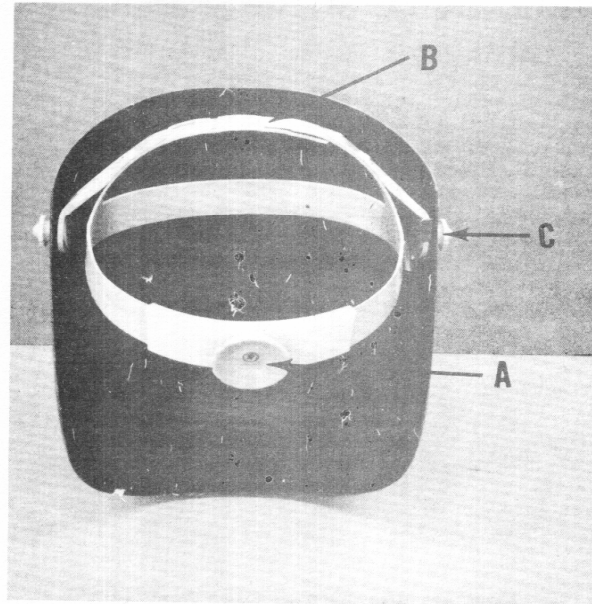


Figure 5 Helmet Headband Adjustment

FUNDAMENTALS OF ARC WELDING

FUSION OF METAL

Welding is the process of uniting metals by melting and fusing them together by heat. In arc welding, this heat is produced by the energy released when an electric current is forced to jump a gap in the circuit. The circuit ground consists of the metals being welded together, known as the "parent" or "base" metals. The other pole is the welding rod, or "electrode". These electrodes are made of steel, cast iron, and special alloys required for various welding jobs. When an arc is produced between the electrode and parent metal, heat is released, which melts down both the parent metal and rod metal, forming the "bead". Penetration is the term used to describe the depth to which the rod metal mixes and fuses with the parent metal. The average welding job requires a medium amount of penetration. The amount of heat produced is controlled by the current applied to the arc, and the length of the arc. The shorter the arc, the higher the temperature, and vice versa. In the case of the Elec-Trak welder, the current is determined by the selection of one of the three taps on the front of the welder (High, Med, Low). Figure 6 illustrates the principles of arc welding.

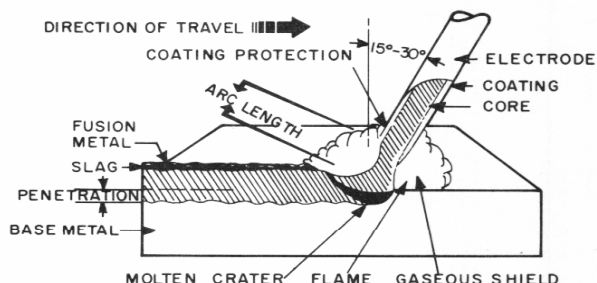


Figure 6 Arc Welding Principles

PREPARING TO WELD

WARNING: The heat and spatter of hot particles during welding can be a fire hazard. Where practicable, move the object to be welded to a safe location. Precautions should be taken to avoid spatter through holes in floors, walls, open doorways, or windows that might expose combustible materials to sparks or spatter. Remove all inflammable materials such as gasoline, kerosene, greasy rags, wood shavings, etc. in the welding area.

Do not weld pressurized containers or those which are holding or have held flammable or combustible materials, because an explosion may occur which might cause injury to you and to bystanders.

There are two fundamental rules which will aid you in doing a good job of welding. They are: **GET COMFORTABLE** and **TAKE YOUR TIME**.

CAUTION: Before welding, thoroughly familiarize yourself with the operating instructions in these instructions and all safety procedures associated with welding.

CLOTHING

Welding gloves must be worn, not only for the protection from the electric arc, but also to reduce the danger of accidentally picking up a hot piece of iron or touching hot metal that has been welded. Gauntlet-type gloves are preferable, and are furnished in the accessory kit, 120643

Clothing should cover all parts of the skin to prevent "sunburning". Do not wear loose fitting clothing with big pockets into which sparks might fall while welding. Care should also be taken to see that sparks do not fall in the cuffs of trousers and shoe tops.

EYE PROTECTION

The arc produces ultra-violet rays which are the same as those found in sunshine. These rays will cause sunburn the same as sunlight. If the eyeballs are exposed to direct sunlight or arc light, they will be sunburned and considerable pain will follow. Like any sunburn the pain in time passes, but eye damage may remain.

The eyes must be protected from the arc while welding. The government-approved plate found in the helmet in Welder Accessory

is designed to exclude most of these rays. Goggles used in oxy-acetylene welding are not adequate and not approved for arc welding. You should not attempt to use them with an arc welder at any time. If the colored filter plate is broken but not smashed, it should be removed and the break covered with a tape which will exclude the rays. Replace as soon as possible.

ARC WELDING WITH THE ELECTRIC WELDER

Observe the "Safe Welding Practices" when welding. There is a manual-reset circuit breaker on the back of the arc welder which will open the circuit if the current becomes too high. The red button must be pushed hard to reclose the circuit breaker.

CAUTION: The Electric arc welder is intended to provide a portable means of making light repairs to equipment and components around the home or farm. It is not suitable for heavy welding which requires continuous periods of welding time or very high currents. The circuit breaker is selected to trip when the equipment is being overloaded. Do not bypass this protection, because doing so may result in burning wiring or other components in the tractor as well as in the arc welder.

CAUTION: Do not weld with the tractor hood open or allow the batteries to be exposed to the sparks produced during welding.

OPERATION

NOTE: These instructions cover the welding of plain, low-carbon steels primarily, using commercially available electrodes designed for thin (sheet-metal) steel welding. For other welding applications or materials, refer to a book on welding.

There are three current connections at the front of the welder; high (Hi), medium (Med) and low (Lo). (See Fig. 1). There is a ground clamp connection on the rear. (See Fig. 3). The electrode holder cable must be connected to one of the three negative current-connection terminals on the front panel, and the ground clamp cable must be connected to the positive connection terminals at the rear of the welder (dc-straight polarity welding using E6013 electrodes).

WARNING: Turn the PTO switch OFF before connecting or changing leads to the arc welder.

The choice of the current-connection terminal will be dictated by the size of electrode used. The electrode size, in turn, is selected for the thickness of the parts to be welded. The thicker the material, the larger the electrode needed. In general, a 1/8-inch diameter electrode will be the choice for general maintenance and hobby craft work. For welding light-gauge sheets, the electrode should be slightly larger than the sheet (1/16-inch thick sheet requires 3/32-inch diameter electrode).

The following table will assist in selecting the proper electrode size and current-connection terminal:

TABLE I			
Electrode Size	Current Connection Terminal	Current Amps	Approx. Range of Work Thickness
1/16	Lo	20-30	Sheet - 1/16 in.
1/16	Med	Not recom.	-
1/16	Hi	Not recom.	-
3/32	Lo	50-70	1/16
3/32	Med	70-90	to
3/32	Hi	Not recom.	1/8
1/8	Lo	60-70	1/8
1/8	Med	70-90	thru
1/8	Hi	100-140	1/4
5/32	Lo	Not recom.	1/4
5/32	Med	80-90	thru
5/32	Hi	130-160	3/8

CAUTION: Choices of electrode size and current connections are limited. In the case of a small electrode on Hi or Med setting, the current will be too great and the electrode will overheat. It is not recommended to use a large-diameter electrode on the Lo or Med settings, since the current will be too low and the weld will not penetrate into the material being welded; this would result in a weld of insufficient strength. The arc welder should not be used for production applications, but only for home, farm, and non-industrial maintenance type applications.

The ground clamp is connected to the work, and should make a good electrical connection. Alternatively, the work can be clamped tightly to a metal table or plate and the ground clamp attached to the table (or plate). The electrode rod is inserted into the electrode holder to make good electrical contact at the "grip" end. Do not insert the rod in the holder so far that the jaws will seat on the flux and not on the rod. (See Fig. 7)

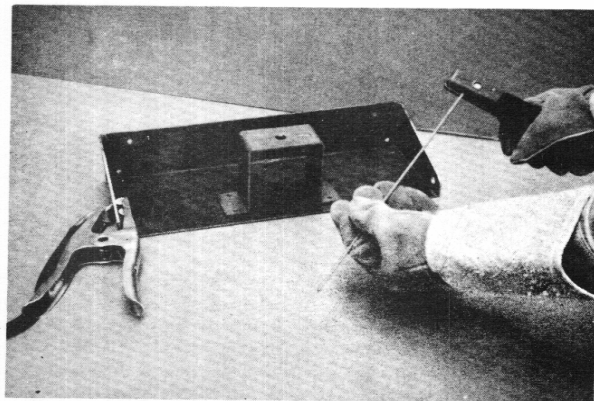


Figure 7 - Workpiece Connections For Welding

Insert the three-prong welder plug into the tractor PTO receptacle. The safety lead must then be connected to the tractor seat switch connectors to make the PTO receptacle operable. (Initial installation requires two U-connectors to be attached to the seat switch wires as shown in Fig. 8.) Open the tractor seat cover to expose this switch, and connect the safety lead clips to each of the switch connectors. This is a non-polarized connection, and either clip may be connected to either switch connector. See Fig. 8 and 9. Be sure the power disconnect is engaged.

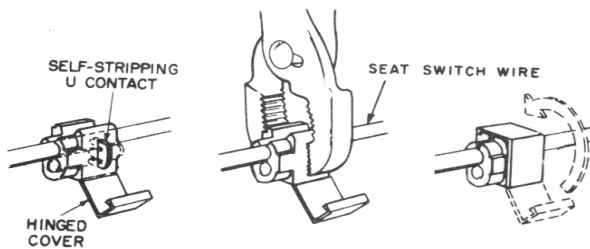


Figure 8 U-Connector Installation

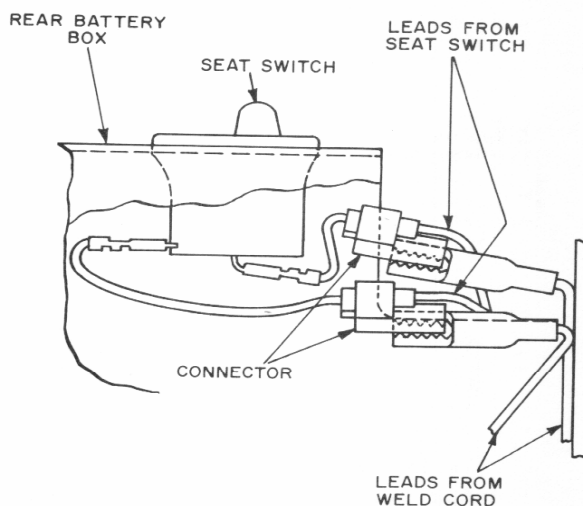


Figure 9 Safety Lead Connection

Turn the key ON. Turn the PTO switch ON. The welding unit is now turned on and powered for welding.

WARNING: Do not lay the electrode holder on the work table or the grounded work plate, as this could cause a short circuit. Turn the PTO switch off when leaving the work, stopping for any appreciable time, or changing cable connections, or when the tractor is to be moved.

STRIKING AN ARC AND RUNNING A BEAD INSTRUCTIONS

To obtain full benefit of your Electric arc welder, you should become well informed about

welding by reading several of the many books on the subject which are available at your local library. In many areas, there are adult evening classes in arc welding offered by your local school system.

The correct preparation of the piece is very important in order to assure good quality welds. All dirt, oil, grease and paint should be removed from the weld area. Failure to do this often results in poor quality welds and lack of fusion. Easy removal can often be accomplished by grinding; or brushing with a wire brush.

Adjust the helmet to the correct size. Check to make sure that there are no people who might look at the arc without protection of a helmet. Bring the electrode close to the work (avoid touching the work, or the arc will initiate). Close the helmet over your face.

Get into a comfortable position for welding. Do not become tense. Control the rod so far as is possible with the wrist; muscular tension is likely to cause the rod to stick.

It is necessary to practice how to strike an arc easily. Experienced welders occasionally stick the electrodes or fail to establish an arc on the first try, so there is no need to be discouraged over an unsuccessful attempt.

The easiest way to strike an arc is to use the scratching method shown in Fig. 10. Draw the end of the rod on the grounded base metal as though you were striking a match. When you have drawn the rod an inch or two, lift it from the surface about 1/4 inch and the arc is formed. Once the arc is started, the intense heat melts a portion of the base metal, and the metal from the rod is fused with it. Tapping or pecking the rod tends to freeze it to the base metal.

NOTE: New electrodes have one end clean of flux coating (about 1-1/8 inch); this end is clamped in the electrode holder. The other (striking) end has been cleaned only to provide for arc striking. Once the electrode has been partially used, the covering will protect the core wire and will make it difficult to restrike the arc. In this case, tapping the end of the electrode on a piece of metal (not the workpiece) will break off enough of the covering to permit re-striking the arc.

STRIKE ELECTRODE AS
YOU WOULD A MATCH

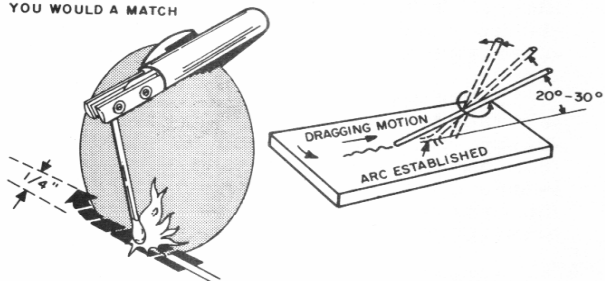


Figure 10 Striking an Arc

If you should happen to stick the electrode to the workpiece, break it free by bending it backward and forward. If the electrode is not broken free quickly, release it from the electrode holder. Frequent release of an electrode from the holder will burn the clamping jaws, so this practice should be used only as a last resort.

CAUTION: Do not remove welder's helmet while trying to break away a stuck electrode. An arc will be established when the electrode breaks free, so you must still be protected from the flash of the arc.

After the arc is established, a molten pool or crater of the correct size should be formed. Then, travel along the practice plate so as to permit a uniform bead (metal deposit) to be formed. Slant the electrode forward about 20 degrees in the direction of travel and maintain this angle while welding. For instance, in making a flat weld from left to right, the electrode would slant about 20 degrees from a vertical position, with the upper end leaning toward the right. The motion of the rod while welding should be uniform and slow to make a smooth bead. Since the rod is continually burning off, the hand must be lowered to compensate for shortening of the rod. (Fig. 11).

It takes practice to hold a steady arc length; remember the electrode gets shorter as it melts off. If the arc is too long, the penetration (depth of fusion of base metal) will be slight, and metal spattered from the arc will be heavy. If the arc is too short the bead deposited will be high and overlapping, and the weld will be porous. (See Fig. 13). When the bead is being laid correctly, the crater of molten metal will be oval shaped and symmetrical as in Fig. 12-13. When the sound of the arc is like that of frying, the arc is

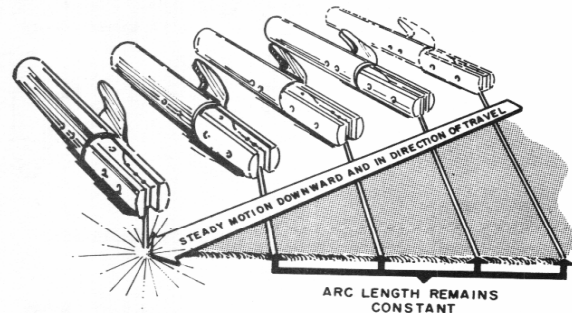
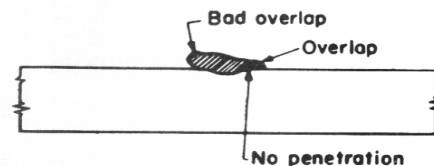
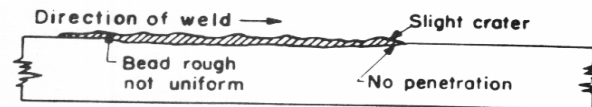
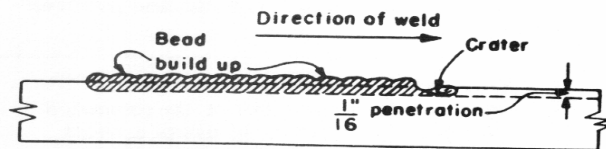


Figure 11 Electrode Motion

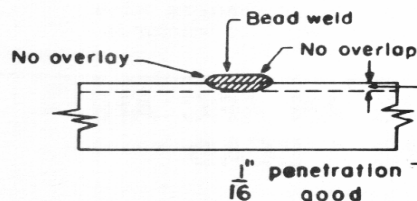


b. End view

Figure 12A. Cross sections of poor bead.



a. Side view



b. End view

Figure 12B. Cross sections of good bead.

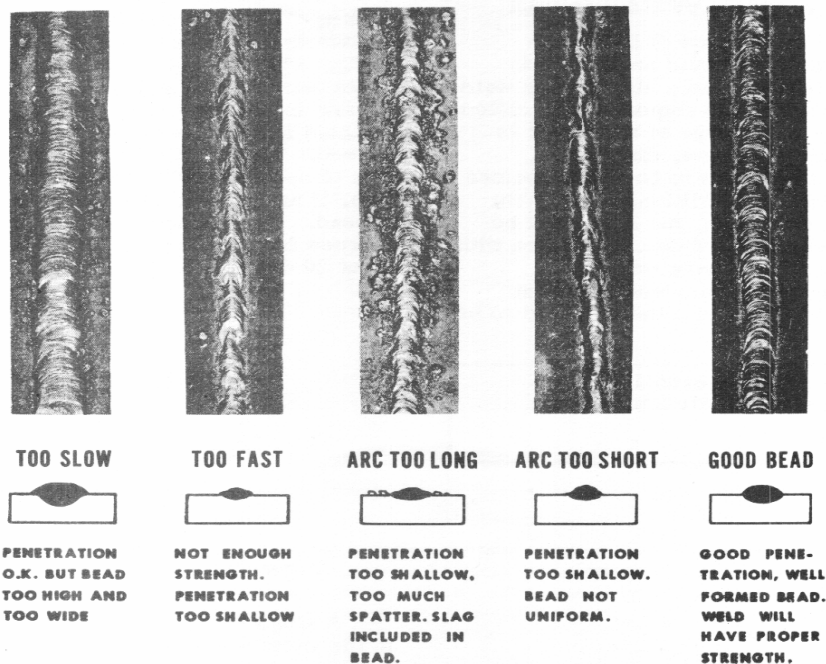


Figure 13 Bead Variations and Causes

of the correct length and a good bead is being formed. To learn a proper welding technique, it is necessary to practice running beads on a flat plate. Study Fig. 13. It shows a good bead and the results of some common mistakes.

ACTION

Hold the rod approximately in the same position shown in Fig. 11.

Drag the end of the rod an inch or two on the surface of the base metal. At the end of the drag, the rod should almost be vertical and should be lifted about 1/4 inch from the surface. The arc is now formed and it will be noted that the base metal below the end of the rod is being melted. This crater is the width of the bead. Move the rod slowly in the direction of travel and observe the bead being built up. Lower hand to keep the length of arc uniform. When about 1-1/4 inch of the rod remains, insert a new one - using too short a rod may damage the holder.

RUNNING CONTINUOUS STRAIGHT BEADS

An uneven bead usually indicates a shaky hand which may be practically overcome by

correct welding position. If you are seated, your elbow can be supported on your knee which will result in a much steadier hand. If you are standing, your elbow may be held tightly against your side, or rested on the welding bench or vise. Some find it best to hold the rod holder with both hands. A weld is successful only if the parent metal and the metal from the welding rod are thoroughly fused as indicated in Fig. 12.

Practice several beads with the work flat on the table. Test the beads by trying to chip them loose or by grinding the end of the weld so you may study the penetration (See Fig. 12).

"Travel time" is the speed with which the rod is moved in the direction of travel. If travel time is too fast, not enough rod metal is deposited, and the parent metal hasn't received enough heat to form a good bond. If the travel time is too slow, the bead becomes too large and the parent metal becomes too hot.

Arc length should remain the same as the rod is moved. Remember that as the bead is formed, two motions of the hand are in the direction of travel and downward.

GUIDE TO ARC WELDING

Figure 14 illustrates some of the more-common types of welds. A weld made with a single run or bead is known as a single-pass weld. Where more than one bead is required it is called a multi-pass weld. In any type of welding, it is very important to clean grease, dirt, and excessive rust from surfaces to be welded before the welding is started. In addition, after each weld pass has been completed, the slag must be removed from the surface. This can be done with a cold chisel and hammer, wire brush, or grinder. If the slag is not removed, the next pass will not fuse properly with the material to be welded.

CAUTION: Be sure the eyes are protected with clear safety glasses while removing slag.

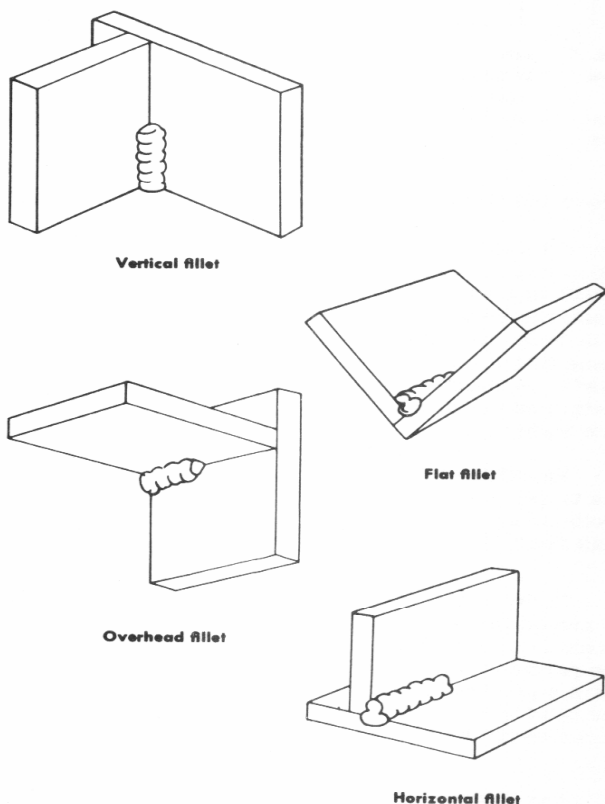


Figure 14 Types of Welds

After confidence and skill are acquired in holding the proper arc and laying a good bead, it is time to progress to the flat fillet weld, shown in Fig. 15. This is one of the most common joints encountered and the easiest to weld. Strike the arc at one end of the joint (usually the left) and hold it until the proper size crater has been formed. Then, travel down the joint at a steady rate of speed, moving the electrode from side to side, if necessary, to maintain a uniform width of bead. The electrode should be held about 45 degrees from either side of the joint and tilted about 20 degrees in the direction of travel.

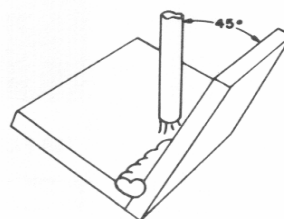


Figure 15 Making a Flat Fillet Weld

A single-pass, horizontal fillet weld is made in the same way, except that the electrode may be tilted at 30 or 45 degrees from the horizontal leg of the fillet. See Fig. 16. The beads for a multi-pass fillet weld should be laid as shown in Fig. 17.

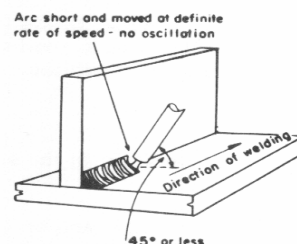


Figure 16 Making a Horizontal Fillet Weld

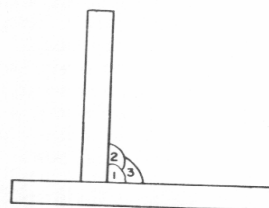


Figure 17 - Cross Section of a Multi-Pass Horizontal Fillet Weld

A vertical fillet weld is more difficult to make than the flat fillet weld. The arc is struck at the bottom of the joint, a proper bead is established, and travel is started up the joint with the electrode pointed slightly downward. After the first inch or so, tilt the electrode slightly upward. As the pool of molten metal becomes too large you can lift the electrode slightly from the puddle for just an instant, and then return it before the puddle completely solidifies. See Fig. 18. This is called "whipping" the electrode, and the whip should not exceed $\frac{3}{8}$ inch for best results. After this bead has been laid the length of the joint, following passes are made by starting at the bottom and weaving the electrode from side to side, hesitating slightly at each side to prevent melting out the original base material (undercutting). If the proper heat and speed are used, no whipping will be necessary.

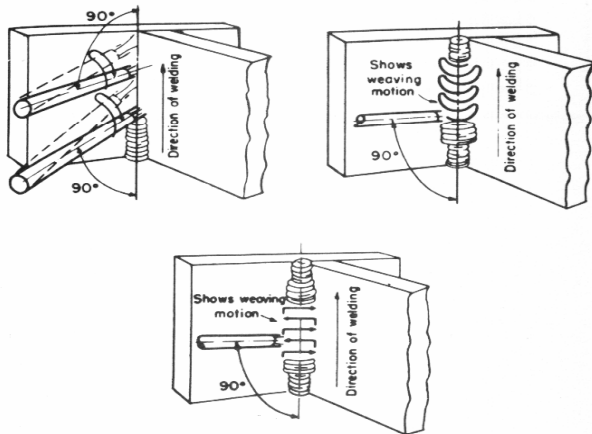


Figure 18 Methods of Laying Bead for a Vertical Fillet Weld

Overhead welding is easier than it sounds, and actually is not much harder than welding in the horizontal position. It will simplify the job to wear enough protective clothes and to get in the most comfortable position possible before striking the arc and establishing bead size, since molten slag will be dropping. It may be necessary to whip the electrode from time to time to prevent the puddle from getting too hot, and to weave the bead sideways to prevent undercutting. See Figures 19 and 20.

WARNING: Since the operator is below the arc while welding overhead, additional precautions must be taken to prevent injury from molten slag and hot sparks. High-cuffed gloves and a tight jacket without large pockets are a must for this operation.

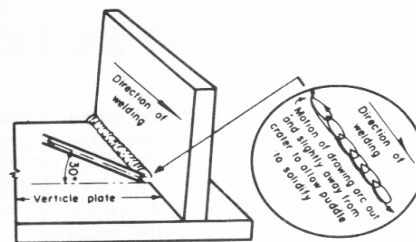


Figure 19 Making an Overhead Fillet Weld

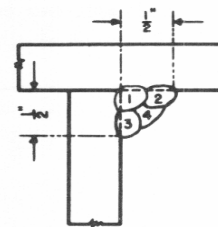


Figure 20 Cross Section of an Overhead Fillet Weld

The procedure for welding butt joints is similar to that used for fillet welds. Where the metal is over $\frac{1}{8}$ -inch thick, however, the edges to be welded should be beveled to permit complete penetration, as shown in Fig. 21.



Figure 21 Plates Beveled for a Butt Weld

No book can teach all the tricks of welding, since real skill comes only after practice and experience.

SHUTTING DOWN

The arc welder is turned off by turning off the PTO switch and then the ignition key.

WARNING: Always disconnect the arc welder power plug from the tractor when the welder is not in use. Also remove the electrode from the holder. Care should be taken to prevent use of the welder by unauthorized individuals, such as children.

CARE AND MAINTENANCE OF WELDER

Welding equipment should be maintained in good mechanical and electrical condition to avoid unnecessary hazards. The enclosure, especially the ventilation openings, should be kept clean and free from dirt and grease. The cables should be frequently inspected for wear and damage. Cables with damaged insulation or exposed bare conductors should be replaced. The cables should be kept dry and free from grease and oil.

Welding equipment used in the open should be protected from inclement weather conditions. A

protective cover must not obstruct the ventilation necessary to prevent overheating.

WARNING: Do not attempt to weld in the rain.

When not in use, store the equipment in a clean, dry place. If the arc welder becomes wet, it should be thoroughly dried before using it again.

The arc welder should not be used to thaw water pipes because high currents flowing for long periods of time may damage the tractor wiring.

CAUTION: Using the arc welder with the tractor charger plugged into 110-volts increases the voltage at the electrodes and will cause higher current to flow. This practice is not recommended, however, as it may cause overheating of electrical circuits in the tractor, and create a possible hazard by generating sparks near the batteries during charging, etc.

WELDER TROUBLESHOOTING GUIDE

TROUBLE	CAUSE	REMEDY
No arc at work.	Power Disconnect disengaged	Close Disconnect
	Key Switch Off	Turn Key On
	PTO Switch Off	Turn PTO Switch On
	Not Plugged Into Tractor	Insert Plug Into PTO Receptacle
	Safety Lead Not Connected	Connected Safety Lead Clips to Seat Switch
	Welder Circuit Breaker Open	Reset Circuit Breaker By Pushing In On The Red Button
	Electrode and/or Ground Cable Not Connected	Tighten Cable Connections At The Welder
	Reversed Cable Connections	Refer To Description Section For Proper Connection
	Ground Clamp Not Making Good Contact	Twist Clamp To Penetrate Rust or Dirt
	Electrode Not Making Good Contact In Holder	Insert "Grip" End of Rod Into Holder and Knock Coating Off Bottom
Low Heat	Wet or Poor Rod	Replace Rod
	Control Fuse Blown in Tractor	Replace Fuse
Low Heat	Low Battery Voltage	Charge Batteries
	Poor Connections	Tighten Cable Connections

COMMON WELDING TROUBLES AND HOW TO CORRECT THEM

TROUBLE	CAUSE	REMEDY
Undercutting	Excessive welding current	Reduce current
	Arc too long	Shorten arc
	Electrode being held at 90 degree angle	Tilt electrode in direction of travel
	Travel too fast	Reduce speed of travel

COMMON WELDING TROUBLES AND HOW TO CORRECT THEM

TROUBLE	CAUSE	REMEDY
Convex head (bulging)	Arc too short	Lengthen arc
	Travel too slow	Increase speed of travel
Slag included in bead	Current too low	Increase current
	Arc too short	Lengthen arc
Bead is porous	Excessive current	Reduce current
	Travel too fast	Reduce speed, weave electrode to allow time for gas to escape.
Cracks	Small throat (light penetration)	Check value of current Reduce arc length Reduce travel speed
	Craters	Improve welding technique, back step and fill craters
	Contaminated deposit	Remove slag, improve welding technique to prevent pickup from base metal

SAFE WELDING PRACTICES

1. Before welding, check that the electrical connections are secure and tight, and that the cables are in good condition.

2. Use an approved welder's helmet fitted with at least a No. 10 filter plate when looking at the arc. Only special lenses for welding should be used. Warn bystanders not to look at the arc. Viewing the arc with the naked eye can cause painful irritation of the eye and in some instances, permanent eye damage. If your eyes become irritated, see your doctor immediately.

The filter plate used in the helmet or shield should conform to USA Standard Z2.1-1959. Use shade No. 10 for electrodes up to 5/32 inch. A clear cover plate should be used to protect the filter plate from spatter and scratches. (The helmet is available in the Electric Welder's kit, Model 120643.

Protect the eyes from slag particles during weld cleaning (or any chipping or grinding operation) by wearing safety glasses.

3. The welding area should be properly ventilated to prevent inhaling the fumes caused by the coatings on the electrodes or the coatings on the metals being welded, if any.

4. Protective gloves and non-combustible clothing should be worn to prevent possible burns from the spatter of molten particles and the rays of the welding arc. Never grab the electrode with bare hands, particularly after welding.

Sparks may lodge in rolled-up sleeves or pockets of clothing, or cuffs of trousers. Sleeves and collars should be kept buttoned and trousers should not be turned up on the outside.

5. Protect the cables to the electrode holder and the ground clamp from abuse and from the hot objects being welded. Do not lay them over the top of the arc welder during the welding operations or shortly thereafter, since this area will become hot if much welding is done. Cables should be spread out before use, to avoid overheating which might result if the cables are coiled over one another.

6. Do not lay the electrode holder on the work table or the grounded work plate, as this could cause a short circuit. Turn the PTO switch OFF when leaving the work, stopping for any appreciable time, or changing cable connections, or when the tractor is to be moved.

7. The heat and spatter of hot particles during welding can be a fire hazard. Always keep the

object to be welded in a safe location. Precautions should be taken to avoid spatter through holes in floors, walls, open doorways, or windows that might expose combustible materials to sparks or spatter. Do not weld in the vicinity of combustible or flammable materials.

Do not weld pressurized containers or those which are holding or have held flammable or combustible materials, because an explosion may occur which might cause injury to you and to bystanders.

8. Do not weld with the tractor hood open or allow the batteries to be exposed to the sparks produced during welding.

9. Disconnect the arc welder from the tractor when not in use. Also remove the electrode from the holder.