



IRONHORSE 300S

**Stick / Lift Start TIG P/N 010350-006
700V DC**

OPERATING MANUAL

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Table of Contents

User Responsibility	3
General Information	4
Warranty	4
Introduction to Ironhorse Stickweld 300S	4
1. Safety Precautions	5
1.1 ELECTRIC SHOCK can kill!	5
1.2 ARC RAYS can burn!	5
1.3 FUMES AND GASES can be dangerous!	5
1.4 WELDING SPARKS can cause fire or explosion!	6
1.5 ELECTRIC AND MAGNETIC FIELDS may be dangerous!	6
1.6 PROTECT YOURSELF AND OTHERS!	7
2. Introduction and Installation	8
2.1 Unpacking and selecting a location	8
2.2 Input Connections	9
2.2.1 Connecting Input Power	9
2.3 Output Connections	9
3. Operation	10
3.1 Controls and Settings	10
3.1.1 Circuit Breaker (Power on/Off)	10
3.1.2 Thermostatically Controlled Cooling	10
3.1.3 Range Switch	10
3.1.4 Weld Power	10
3.1.5 Arc Force	10
3.1.6 Process Switch	11
3.1.7 Power On Indicator	11
3.1.8 Remote Control Connector – not used	
3.1.9 Input Power Cord	11
3.1.10 Output Terminals	12
Cable size table Table 3.0	12
Process Control Selector Figure 3.1	12
3.2 Welding Operation	13
4. Maintenance	14
5. Electrical Specifications	15
5.1 Product Specifications	15
5.2 Theory of Operation	16
5.3 Simplified Inverter Circuit	17
5.4 Main Control Board	19
5.5 Main Circuit Diagram	20
5.6 Front Panel	21
5.7 Rear Panel	22

User Responsibility

ARCON Welding warrants that **The Ironhorse** family of welders will perform in accordance with the product description in this manual. The Factory Warranty will be null and void should the user attempt to operate **The Ironhorse** after it has malfunctioned. Parts that are broken, missing or worn must be replaced immediately. Warranty Repairs are carried out by ARCON Welding LLC or its Authorized Repair Center.

The Ironhorse or any of its parts must not be altered without the prior written approval of ARCON Welding LLC. Any malfunction which results from improper use, faulty maintenance, physical damage, unapproved repair or alteration, shall be the sole responsibility of the user or owner and any repair requested to be done by ARCON Welding LLC will be charged based on Arcon's applicable hourly labor rate and cost of spare parts.

General Information

Warranty

The warranty of **The Ironhorse** welders covers any defect in materials or workmanship. The warranty period is three years for parts and one year for labor from the date of purchase. The warranty period for rental units begins with the first rental or 45 days from the date of shipment to the rental company, whichever is earlier.

Introduction to **The Ironhorse 300S 700V DC**

The Ironhorse 300 700V DC is a portable welder using an inverter type power supply to generate the output power.

The Ironhorse 300 700V DC is primarily designed for stick welding (SMAW). It can also be used for TIG (GTAW) welding, using the Lift Start principle, as well as arc gouging and stud welding. Use Range I when stickwelding, when possible. The first range produces a softer arc than that of Range 2. (See Paragraph 3.1.3)

The Ironhorse operates on DC input voltage 500V to 800V DC. The DC input voltage is connected to a circuit breaker. The output side of the breaker is connected to a diode, which protects the welder from being connected to the wrong polarity. The DC voltage is converted to AC by a DC to AC 60 HZ inverter. The 480V AC is connected to an auxiliary transformer which transforms the voltage to 48V AC for the fan motor and the control board.

1. Safety Precautions

1.1 ELECTRIC SHOCK

Precautionary measures must be taken to provide maximum protection against electrical shock.

1. Do not touch live electrical parts.
2. Turn OFF welding power source before servicing unless the procedure specifically requires an energized unit.
3. Do not leave live unit unattended.
4. When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free. Remove rings and watch.
5. Disconnect input power conductors from de-energized supply line BEFORE moving a welding power source.
6. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
7. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
8. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
9. Ground the work or metal to be welded to a good electrical (earth) ground.
10. Keep the electrode holder, work clamp, welding cable and welding machine in good and safe work condition. Replace damaged insulation and frayed cables.
11. Never dip the electrode in water for cooling.

1.2 ARC RAYS

1. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or while observing open arc welding.
2. Use protective clothing specifically intended for work with welding equipment. It should be made of durable flame-resistant material to provide ample protection from the arc rays.
3. Protect other nearby workers with suitable, non-flammable screening. Caution other workers not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

1.3 FUMES AND GASES

Fumes and gases can cause discomfort or harm, particularly in confined spaces. Take the following precautions for appropriate health considerations.

1. Read the Material Safety Data Sheets (MSDS) and the manufacturer’s instruction for metals, consumables, coatings, cleaners, and degreasers
2. Keep your head away from the fumes. Do not inhale welding fumes.
3. If welding is done indoors, make sure proper ventilation is provided by using an adequate exhaust system at the arc to remove welding fumes and gases.

- 4 When working in a confined space always have trained support personnel nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- 5 Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arcs can react with vapors to form highly toxic and irritating gases.
- 6 Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel. The coating must be removed from the area to be welded. Coatings and metals containing above elements can generate toxic fumes when heated to welding temperature.

1.4 WELDING SPARKS

Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions.

1. Remove all combustible materials from the work area or cover these materials with a protective non-flammable tarp. Combustible materials include wood, fabrics, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire. Make certain that such openings are protected from hot sparks and metal.
3. Do not weld, cut or perform other hot work until the work piece has been completely cleaned so that there are no substances on the work piece, which might produce flammable or toxic vapors. Do not weld on closed containers. They may explode.
4. Have fire-extinguishing equipment handy for instant use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After the welding is completed, inspect the work area to make certain there are no hot sparks or hot metal, which could cause a fire. Use fire watches when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association.

1.5 ELECTRIC AND MAGNETIC FIELDS

Electric current flowing through any conductor causes localized Electro-Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines.

1. Operators having pacemakers should consult their physician before welding. EMF may interfere with some type of pacemakers.
2. Exposure to EMF may have other health effects, which are unknown.
3. Operators should use the following procedures to minimize exposure to EMF:
 - a. Route the work cables together. Secure them with electrical tape when possible.
 - b. Never coil the work cable around any part of your body.
 - c. Do not place your body between the work cables. Route cables on the same side of your body.
 - d. Connect the work cable to the work piece as close as possible to the area being welded.
 - e. Keep welding power source and cables as far away from your body as possible.

1.6 PROTECT YOURSELF AND OTHERS!

Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and may injure skin and eyes. Hot metal can cause burns. Training in the proper use of welding processes and equipment is essential to prevent accidents.

1. Always wear safety glasses with side shields in any work area. In conjunction with eye protection, welding helmets or face shields are also required.
2. Use a face shield fitted with the correct filter cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric arc or hot metal.
3. Wear flameproof type gloves, heavy long-sleeve shirt, cuff less trousers, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtain.
6. Use safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear safety glasses.

7. DO NOT WELD ON LIVE 3RD RAIL.

2. Introduction and Installation



- **WARNING!**
 - Only qualified personnel should perform this installation.
 - Turn the input power off at the disconnect switch or fuse box before working on ***The Ironhorse.***
 - Do not touch electrically hot parts.

This section provides detailed instructions for the proper installation of ***The Ironhorse.*** It is recommended that these instructions be followed carefully to allow for the best possible operating environment.

2.1 Unpacking and selecting a Location

- a. Immediately upon receipt of the welder, inspect the shipping box for any damage and notify the carrier of such damage before accepting delivery. Then inspect the Ironhorse for damage, which may have occurred in transit. After removing the components from the shipping container(s), check the container for any loose parts. Remove all packing materials.
 - b. Check air passages of power source for any packing materials that may obstruct airflow through the welder.
 - c. If the equipment is not being installed immediately, store it in a clean, dry, well-ventilated area until installation.
- a. The location of the power source should be carefully selected to ensure satisfactory and dependable service. Choose a location relatively close to a properly fused source of electrical power.
 - b. It is important that the machine be located in an open area where air can circulate freely at front and rear openings. If space is at a premium, leave at least 1 foot (300 mm) of clearance between the rear of the power source and wall or other obstruction.

2.2 INPUT CONNECTIONS

2.2.1 CONNECTING INPUT POWER

The primary cable supplied with the power source has 2 conductors, which split into two 5ft long single conductors. The positive has red bands and will be connected to a third rail clamp, or a catenary pole. The negative will be connected to an alligator clamp.

2.3 OUTPUT CONNECTIONS

The standard supplied output connector types are female Dinse (DIX). Welders may be supplied with optional Tweco connectors as a special order.

3. OPERATION



WARNING!

PLEASE READ CHAPTER 1 REGARDING SAFETY

3.1 Controls and Settings

3.1.1 Circuit Breaker (Power On/Off)

The Circuit Breaker is located on the control panel at the rear of the machine. Move the switch lever up to the ON position to start the machine. This also activates the Thermostat- controlled Cooling Fan for approximately 6 minutes indicating that correct power connections have been applied.

It is imperative that you disconnect from the 3rd rail *before* switching off the circuit breaker. When resuming, it is equally imperative that you verify that the circuit breaker is in the “OFF” position before reconnecting to the 3rd rail.

3.1.2 Thermostat-controlled Cooling Fan

The cooling fan starts automatically when welding current exceeds 100 A. If the current drops below 100 A, the fan will stop after approximately 6 minutes. If the fan is operating when the work is discontinued, the fan will continue to run and stop after approximately six minutes.

3.1.3 Weld Current Range Selector

Two different settings (10 - 180 A and 80 - 400 A) are available. Each setting defines a specific range of output current for the welder.

3.1.4 Welding Power Control

This continuous control is used to adjust the welding current from minimum to maximum value, depending on the setting of the Weld Current Range Selector.

3.1.5 Arc Force Control

This control is used to adjust the Arc Force on constant current applications. The control is fully adjustable from 0 to 100%, with 0 being very soft and 100% being very hard. When adjusting the Arc Force, the low settings will produce a soft arc and the high settings will produce a more forceful or driving arc. Please note that the higher settings will produce higher levels of spatter.

The higher setting will create a more stable arc for electrodes that easily become unstable, such as cellulose (5P). If you do not know the optimal setting for the electrode you are using, start at the highest setting and lower it until the arc just begins to become unstable.

3.1.6 Process Control Selector

The Process control selector has three settings, **Stick, TIG and Stick**. The Ironhorse 700V DC has the same characteristics for both Stick settings. The pipe-welding version has a cellulose characteristic, allowing 1 inch of arc length when this method of whipping is used.

The TIG position allows Lift Start, which allows contact between material and electrode with no damage to the electrode.

When the tungsten (wolfram) electrode touches the work piece, 10 Amps of current will flow. When the electrode is lifted a small distance from the work surface the full welding current (as set on the Welding Power Control knob) will flow.

When the selector is at the TIG position, the open circuit (no-load) voltage is reduced from 78 V to 9 V. This feature prevents the tungsten electrode from sticking to the work piece.

3.1.7 Power-On Indicator

Indicates power on/off. The power indicator will blink if any component is overheated. Allow the welder to cool down. This may take 3 minutes or more depending on which component is overheated. The following components are temperature monitored

- **Main Transformer**

If a 30% duty cycle is exceeded when drawing 400A output current, the Main Transformer could overheat and shut down the welder. If overheating occurs, wait 1 minute before restarting. This condition can also occur if a 60% duty cycle is exceeded when drawing 300A output. Wait 3 minutes before restarting.

- **Main Inductor**

If welding at 250 A for more than 30 minutes without stopping, the Main Inductor will overheat and shut down the welder. If this occurs, wait 7-8 minutes before restarting.

- **Output Capacitor**

When welding at the lower current settings in Range 2, or when arc gouging for long periods, the Output Capacitor may overheat and shut down the welder. If this occurs, wait 10 minutes before restarting. The temperature sensor will protect the output capacitor.

- **Input Capacitor**

Should one phase be lost when welding with three-phase input power, current to the Input Capacitor could increase causing it to potentially overheat or be destroyed. Wait 10 minutes before restarting the welder

- **Fan Motor:** Some operation with restricted airflow will overheat the fan motor. Wait 10 minutes before restarting the welder.

3.1.9 Input Power Cord

The primary cable supplied with the power source has 2 conductors, which split into two 5ft long single conductors. Additional power cable length can be provided as an option if requested.

3.1.10 Output Terminals

Select output cable size based on table 3.0 below.

Duty cycle(%)	Current (A)	Length (Ft)	Cable Size (AWG)
30	180	1 – 50	8
60	300	1 – 150	1/0
60	300	150 – 200	2/0

TABLE 3.0

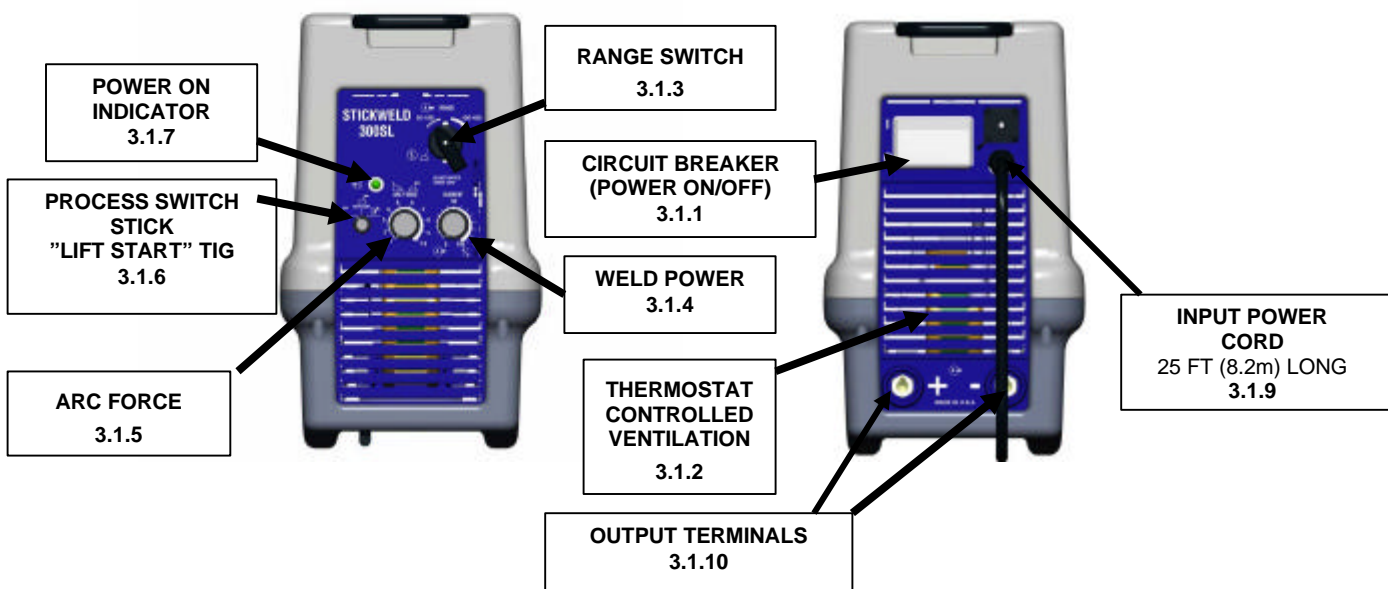


FIGURE 3.1

3.2 Welding Operation

1. After both the third rail clamp (or catenary pole clamp) and the ground clamp are connected, close the circuit breaker on the welder.
2. The Power-On light on the front panel will be lit.
3. Put the Mode Selector in the 'Stick' position. The welding output will be energized and the electrode holder will become "electrically-hot".
4. Put the Arc Force Control Selector in its mid position.
5. Adjust the Weld Power Control to fit the type and diameter of electrode to be used, as recommended by the electrode manufacturer.

4. Maintenance



WARNING!

Please see Chapter 1 regarding Safety

- Turn the input power OFF before working on any ARCON welder
- Do not touch electrically live parts or electrode with your skin or wet clothing
- Insulate yourself from work and ground
- Always wear dry insulating gloves
- Have an electrician install the ARCON welder
- All maintenance and repairs that require taking off the cover must be performed by a certified repair facility.

If **The Ironhorse** does not operate properly, stop work immediately and investigate the cause of the malfunction. Please note: Opening up the case voids the Warranty. Maintenance or repair should only be performed by an authorized ARCON Service Center, or by the factory. Do not permit untrained persons to inspect, clean, or repair **The Ironhorse**. Please call the factory for the location of the Authorized ARCON Service center nearest you.

Since there are no moving parts (other than the fan) in the power source, basic preventive maintenance consists mainly of keeping the interior of the cabinet clean. Periodically, you should ask your Authorized Service Center to remove the cover from the case, and wearing protective goggles, remove accumulated dust and dirt from the air passages and the interior components, using clean low-pressure air. It is imperative that the air passages to the interior of the unit be free of dirt to ensure adequate circulation of cooling air, especially over the rectifier bridge plates. The frequency of cleaning will depend on the location of the unit, the amount of dust in the atmosphere and number of operating hours.

5. Electrical Specifications

5.1 Product Specifications

THE IRONHORSE Stickweld 300 S 700 V DC Product Specifications

Primary Input	Rated Welding Current (Amps) 60% Duty Cycle	Welding Amp Range	Open Circuit Voltage	Input Amperes at			KW	Eff.	Dimensions	Weight, Including cable	
				Rated Load Output DC						Net	Ship
				500 V	600V	700V					
DC 500 to 800 V	400 amps @ 36V, 29% Duty Cycle 300A @32V 60% Duty Cycle 250 amps @ 28V, 100% Duty Cycle	Range 1 20A@10V- 180A TIG 10-180 Range 2 30-400	80 max	28	23	20	12.05	79.60%	Height: 17.9" (45.5 cm) Width: 10.5" (26.7 cm) Depth: 19.5" (49.5 cm)	95lb (43Kg)	105lb (47.7Kg)

5.2 Theory of Operations

The inverter function is perhaps easiest understood using the simplified circuit diagram below.

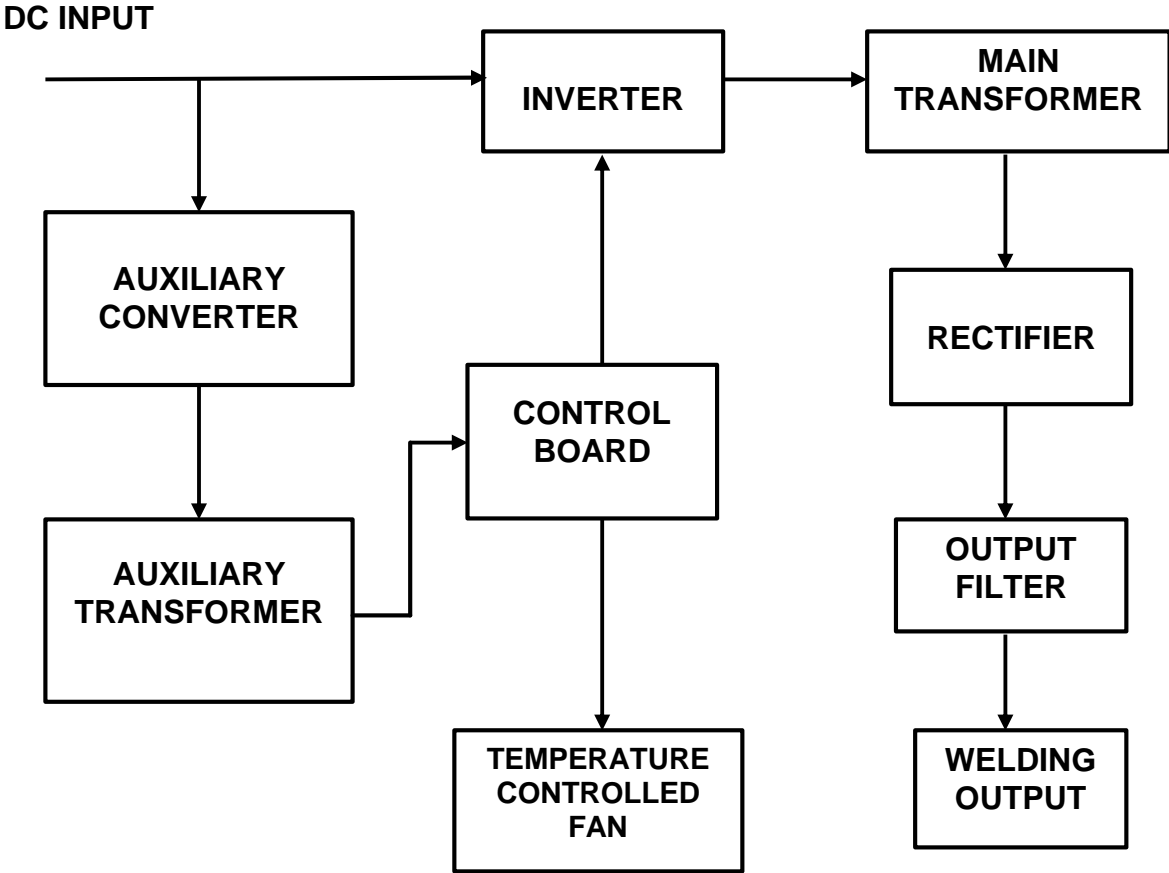
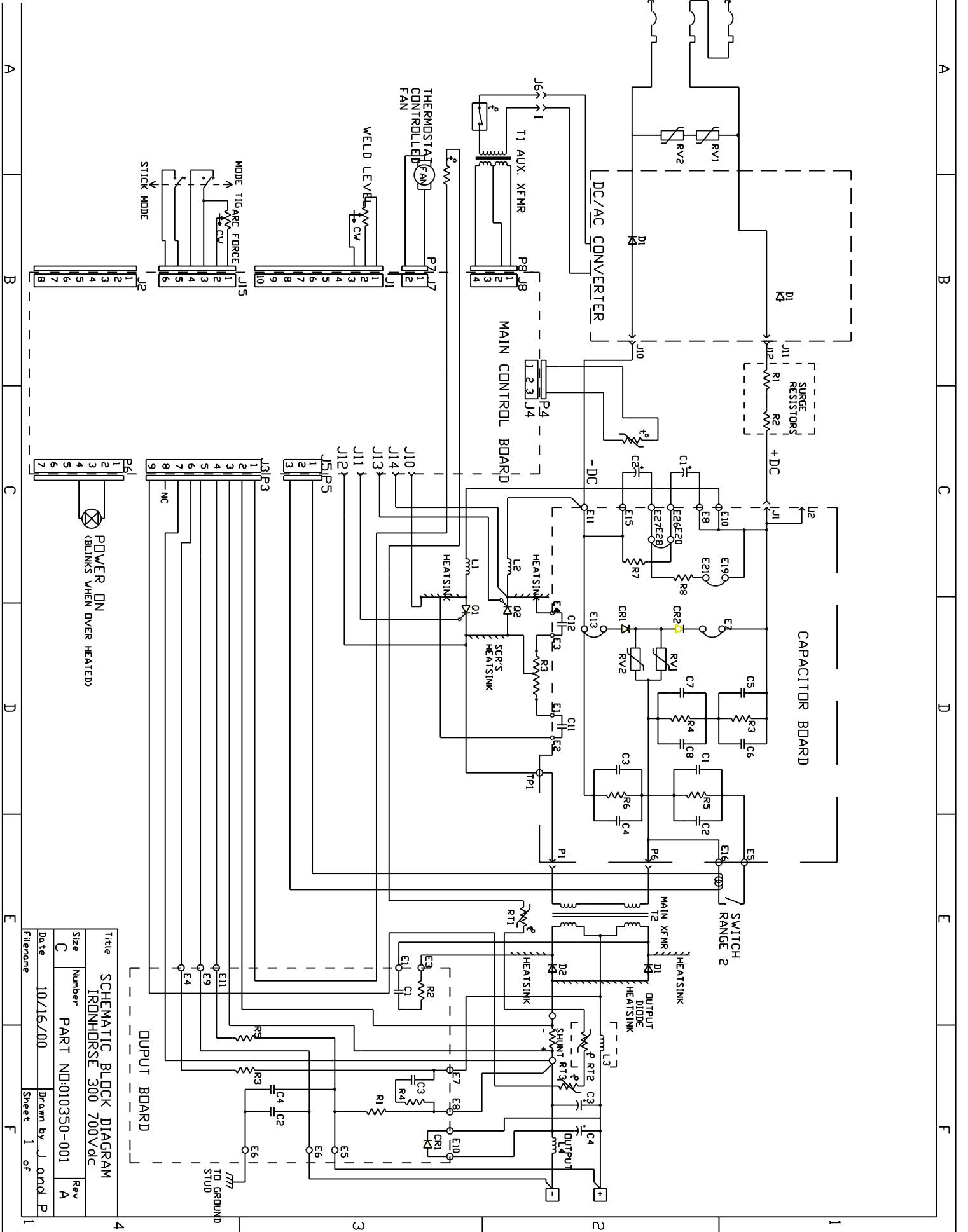


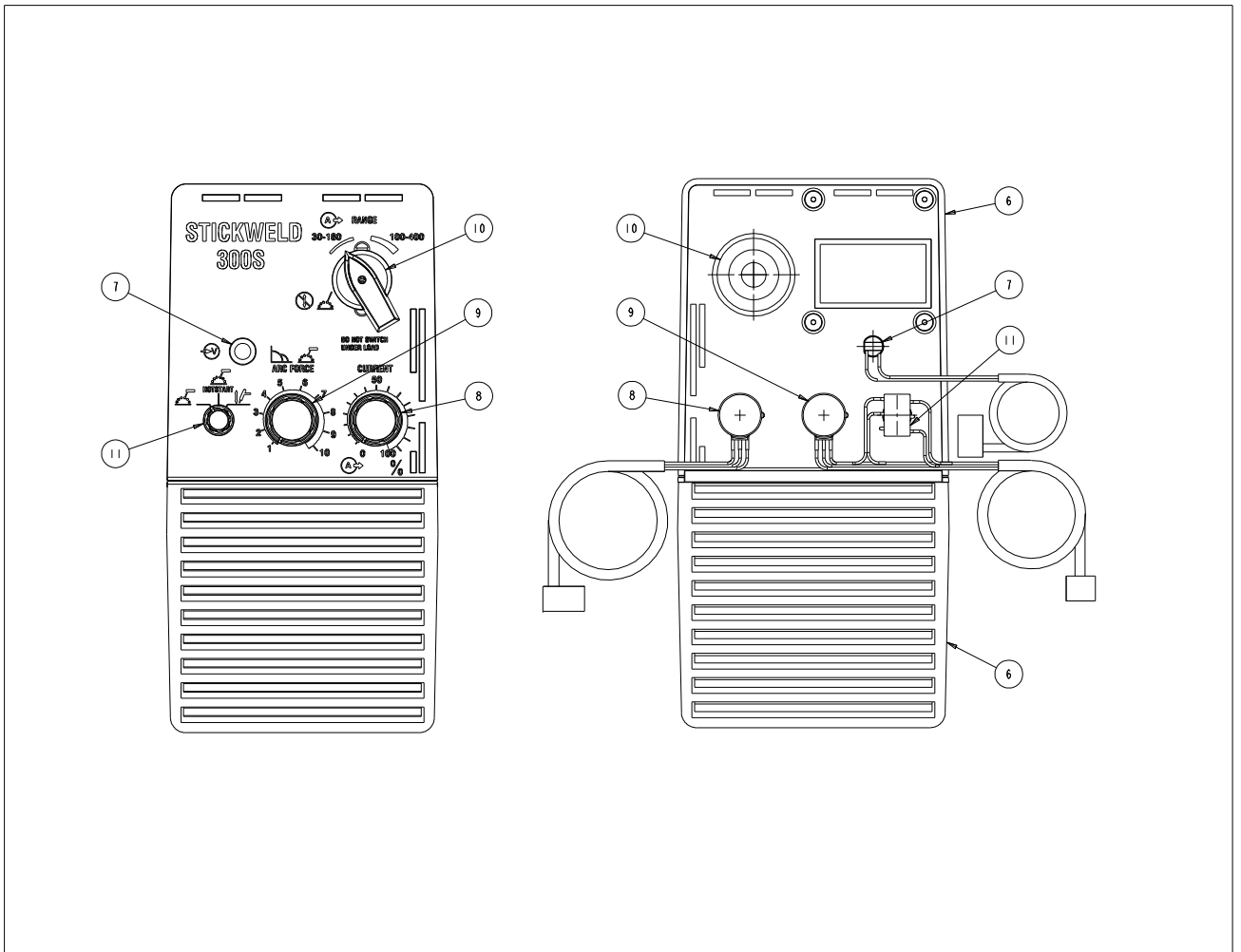
FIGURE 5.2

5.3 MAIN CIRCUIT DIAGRAM



Title		SCHEMATIC BLOCK DIAGRAM	
Size		IRONHORSE 300 700Vdc	
Number	Part No:	010350-001	Rev
C			A
Date	10/16/00	Drawn by	J and P
Filename		Sheet	1 of

5.4 FRONT PANEL DRAWING WITH PART NUMBER REFERENCE



5.5 REAR PANEL DRAWING WITH PART NUMBER REFERENCE

