CIGWELD Professional

400 i

TRANSMIG®

INVERTER ARC WELDER

Operating Manual

Revision: AA **Issue Date:** July 18, 2008 **Manual No.:** 0-4959

Operating Features:

GMAW FCAW | MMAW | GTAW | 3 PHASE | 50/60 Hz | DC | CC CV | 415 V | INVERTER

WE APPRECIATE YOUR BUSINESS!

Congratulations on your new CIGWELD product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and accredited service network. To locate your nearest distributor or service provider call +61-3-9474-7400, or visit us on the web at **www.cigweld.com.au.**

This Operating Manual has been designed to instruct you on the correct use and operation of your CIGWELD product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

YOU ARE IN GOOD COMPANY!

The Brand of Choice for Contractors and Fabricators Worldwide.

CIGWELD is a Market Leading Brand of Arc Equipment, Gas Equipment and Filler Metals for Thermadyne Industries Inc. We are a mainline supplier to major welding industry sectors in the Asia Pacific and emerging global markets including; Manufacturing, Construction, Mining, Automotive, Engineering, Rural and DIY.

We distinguish ourselves from our competition through market-leading, dependable products that have stood the test of time. We pride ourselves on technical innovation, competitive prices, excellent delivery, superior customer service and technical support, together with excellence in sales and marketing expertise.

Above all, we are committed to develop technologically advanced products to achieve a safer working environment for industry operators.

WARNINGS

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

Transmig 400 i Inverter Arc Welder
Operating Manual Number 0-4959 for:
Part Number 710014

Published by:
Thermadyne Industries Inc.
82 Benning Street
West Lebanon, New Hampshire, USA 03784
(603) 298-5711

www.thermadyne.com

Publication Date: July 18, 2008

Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Equipment Serial #: _____

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION 1:
ARC WELDING SAFETY INSTRUCTIONS AND WARNINGS

WARNING

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Some of these practices apply to equipment connected to power lines; other practices apply to engine driven equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld.

Safe practices are outlined in the Australian Standard AS1674.2-2007 entitled: Safety in welding and allied processes Part 2: Electrical. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions. **HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.**

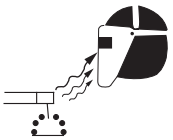
1.01 Arc Welding Hazards

WARNING

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.



WARNING

ARC RAYS can burn eyes and skin; NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.

WARNING

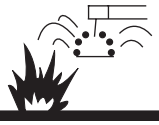
FUMES AND GASES can be hazardous to your health.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breath the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

Eye protection filter shade selector for welding or cutting (goggles or helmet), from AWS A 8.2-73

Welding or Cutting operation	Electrode size Metal Thickness or Welding Current	Filter shade no.	Welding or Cutting operation	Electrode size Metal Thickness or Welding Current	Filter shade no.
Torch soldering	All	2	Gas metal arc welding		
Torch brazing	All	2 or 3	Non Ferrous base metal	All	11
Oxygen cutting			Ferrous base metal	All	12
Light	Under 1 in., 25 mm	3 or 4	Gas tungsten arc welding (TIG)	All	12
Medium	1 – 6 in., 25 – 150 mm	4 or 5	Atomic Hydrogen welding	All	12
Heavy	Over 6 in., 150 mm	5 or 6	Carbon Arc welding	All	12
Gas welding			Plasma arc Welding	All	12
Light	Under 1/8 in., 3 mm	4 or 5	Carbon Arc Gouging		
Medium	1/8 – 1/2 in., 3 – 12 mm	5 or 6	Light		12
Heavy	Over 1/2 in., 12 mm	6 or 8	Heavy		14
Shielded metal-arc welding (stick) electrodes			Plasma arc cutting		
	Under 5/32 in., 4 mm	10	Light	Under 300 Amp	9
	Under 5/32 to ¼ in., 4 to 6.4mm	12	Medium	300 to 400 Amp	12
	Over ¼ in., 6.4 mm	14	Heavy	Over 400 Amp	14



WARNING

WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.

WARNING

FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.

WARNING

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

WARNING

Engines can be dangerous.

WARNING

ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

WARNING

ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank — allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

WARNING

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

WARNING

SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

WARNING

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

The coolant in the radiator can be very hot and under pressure.

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals know to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety code Sec. 25249.5 et seq.)

NOTE

Considerations About Welding And The Effects of Low Frequency Electric and Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "...there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields and interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures.

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cable around the body.
4. Keep welding power source and cables as far away from body as practical.

ABOUT PACEMAKERS:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

1.02 PRINCIPAL SAFETY STANDARDS

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safety in welding and allied processes Part 2: Electrical, AS1674.2-2007 from SAI Global Limited, www.saiglobal.com

1.03 DECLARATION OF CONFORMITY

Manufacturer: CIGWELD
Address: 71 Gower St, Preston
Victoria 3072

Australia

Description of equipment: Welding Equipment (GMAW, MMAW, GTAW). Including, but not limited to CIGWELD Transtig 200 Pi, Transtig 200 AC/DC, Transarc 300 Si, Transtig 300 Pi, Transtig 300 AC/DC, Transmig 400 i and associated accessories.

Serial numbers are unique with each individual piece of equipment and details description, parts used to manufacture a unit and date of manufacture.

The equipment conforms to all applicable aspects and regulations of the 'Low Voltage Directive' (Directive 73/23/EU, as recently changed in Directive 93/68/EU and to the National legislation for the enforcement of the Directive.

National Standard and Technical Specifications

The product is designed and manufactured to a number of standards and technical requirements among them are:

- AS/NZS 3652-(EMC Directive EN50199) applicable to arc welding equipment - generic emissions and regulations.
- EN60974-1 applicable to welding equipment and associated accessories.
- AS60974.1 applicable to welding equipment and associated accessories.

Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process, to ensure the product is safe and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

CIGWELD has been manufacturing and merchandising an extensive equipment range with superior performance, ultra safe operation and world class quality for more than 30 years and will continue to achieve excellence.

SECTION 2: INTRODUCTION

2.01 How To Use This Manual

This Owner's Manual applies to just specification or part numbers listed on page i.

To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

Throughout this manual, the words **WARNING, CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:

WARNING

A WARNING gives information regarding possible personal injury.

CAUTION

A CAUTION refers to possible equipment damage.

NOTE

A NOTE offers helpful information concerning certain operating procedures.

Additional copies of this manual may be purchased by contacting Cigweld at the address and phone number for your location listed in the inside back cover of this manual. Include the Owner's Manual number and equipment identification numbers.

Electronic copies of this manual can also be downloaded at no charge in Acrobat PDF format by going to the Cigweld web site listed below and clicking on the Literature Library link:

http://www.cigweld.com.au

2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the control panel. In some cases, the nameplate may be attached to the rear panel. Equipment which does not have a control panel such as gun and cable assemblies is identified only by the specification or part number printed on the shipping container. Record these numbers on the bottom of page i for future reference.

2.03 Receipt Of Equipment

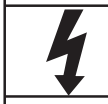
When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the location in your area listed in the inside back cover of this manual.

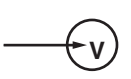
Include all equipment identification numbers as described above along with a full description of the parts in error.

Move the equipment to the installation site before uncrating the unit. Use care to avoid damaging the equipment when using bars, hammers, etc., to uncrate the unit.

2.04 Symbol Chart

Note that only some of these symbols will appear on your model.

	On
	Off
	Dangerous Voltage
	Increase/Decrease
	Circuit Breaker
	AC Auxiliary Power
	Fuse
	Amperage
	Voltage
	Hertz (cycles/sec)
	Frequency
	Negative
	Positive
	Direct Current (DC)
	Protective Earth (Ground)
	Line
	Line Connection
	Auxiliary Power
 115V 15A	Receptacle Rating- Auxiliary Power

	Single Phase
	Three Phase
	Three Phase Static Frequency Converter-Transformer-Rectifier
	Remote
	Duty Cycle
	Percentage
	Panel/Local
	Shielded Metal Arc Welding (SMAW)
	Gas Metal Arc Welding (GMAW)
	Gas Tungsten Arc Welding (GTAW)
	Air Carbon Arc Cutting (CAC-A)
	Constant Current
	Constant Voltage Or Constant Potential
	High Temperature
	Fault Indication
	Arc Force
	Touch Start (GTAW)
	Variable Inductance
 V	Voltage Input

	Wire Feed Function
	Wire Feed Towards Workpiece With Output Voltage Off.
	Welding Gun
	Purging Of Gas
	Continuous Weld Mode
	Spot Weld Mode
t	Spot Time
t1	Preflow Time
t2	Postflow Time
	2 Step Trigger Operation Press to initiate wirefeed and welding, release to stop.
	4 Step Trigger Operation Press and hold for preflow, release to start arc. Press to stop arc, and hold for preflow.
t	Burnback Time
	Disturbance In Ground System
IPM	Inches Per Minute
MPM	Meters Per Minute

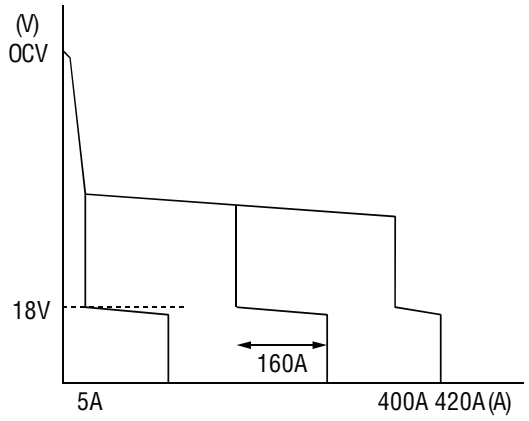
Art # A-04937

2.05 Description

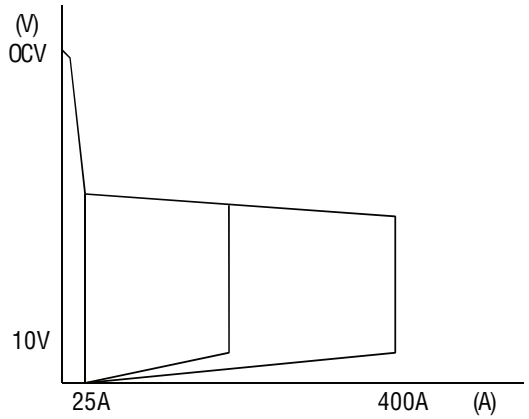
The Cigweld Transmig 400 i is a self contained three-phase DC arc welding power source with Constant Current (CC) and Constant Voltage (CV) output characteristics. This unit is equipped with a Digital Volt/Amperage Meter, lift arc starter for use with Gas Tungsten Arc Welding (GTAW), and Control and Hot Start for Shielded Metal Arc Welding (SMAW) processes. The power source is totally enclosed in an impact resistant, flame resistant and non-conductive plastic case.

NOTE

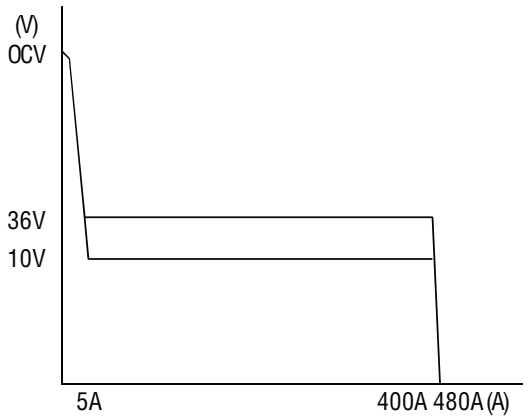
Volt-Ampere curves show the maximum Voltage and Amperage output capabilities of the welding power source. Curves of other settings will fall between the curves shown.



STICK Process



LIFT-TIG Process



MIG Process

Figure 2-1: Transmig 400 i Volt-Ampere Curves

2.06 Functional Block Diagrams

Figure 2-2 illustrates the functional block diagram of the Transmig 400 i power source.

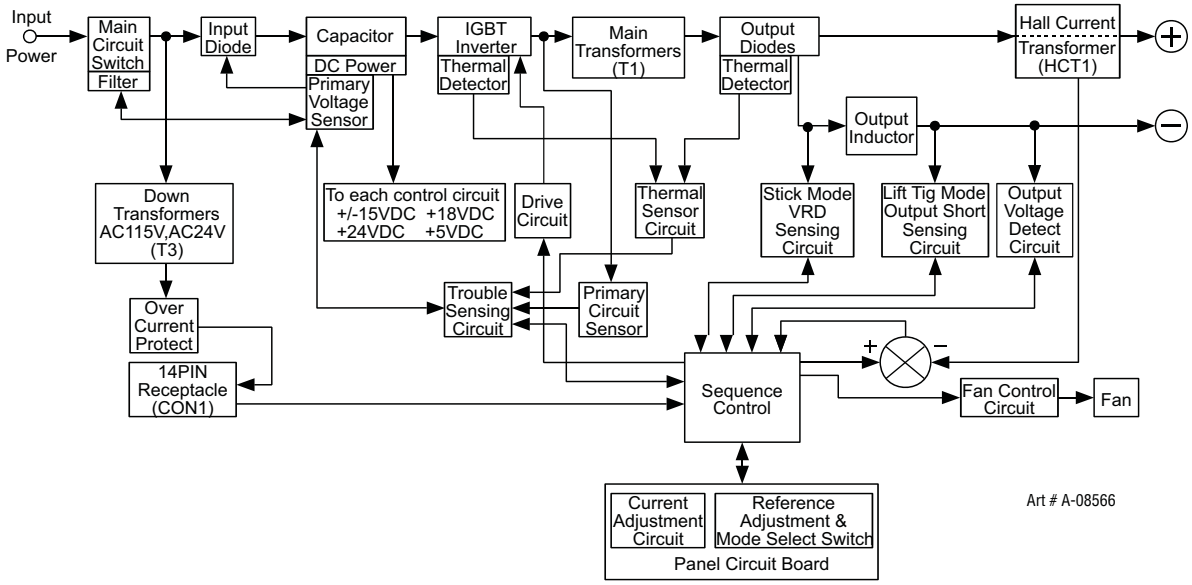


Figure 2-2: Transmig 400 i Functional Block Diagram

2.07 Transporting Methods

These units are equipped with a handle for carrying purposes.

WARNING

ELECTRIC SHOCK can kill. DO NOT TOUCH live electrical parts. Disconnect input power conductors from de-energized supply line before moving the welding power source.

WARNING

FALLING EQUIPMENT can cause serious personal injury and equipment damage.

Lift unit with handle on top of case.

Use handcart or similar device of adequate capacity.

If using a fork lift vehicle, place and secure unit on a proper skid before transporting.

2.08 Specifications

Parameter	Transmig 400i
Power Source Part Number	710014
Cooling	Fan Cooled
Welder Type	Inverter Power Source
Welding Power Source Mass	25kg
Dimensions	H 420mm x W 210mm x D 450mm
Manufactured to Australian Standard	AS 60974.1-2006
Number of Phases	3
Nominal Supply Voltage	415V ±15%
Nominal Supply Frequency	50Hz
Open Circuit Voltage	65V
Welding Current Range	5 - 400 Amps
Effective Input Current (I1eff)	16.7 Amps
Maximum Input Current (I1max)	33.4 Amps
Three Phase Generator Requirement	24.0 KVA
Welding Output, 40^{0}C, 10 min. (quoted figures refer to MMAW output)	400A @ 25%, 36.0V 300A @ 60%, 32.0V 200A @ 100%, 28.0V
Welding Output 40^{0}C, 10 min. (Quoted figures refer to GTAW output)	400A @ 25%, 26.0V 300A @ 60%, 22.0V 200A @ 100%, 18.0V
Welding Output 40^{0}C, 10 min. (Quoted figures refer to GMAW output)	400A @ 25%, 34.0V 300A @ 60%, 29.0V 200A @ 100%, 24.0V
Protection Class	IP23S

Table 2-1: Specifications

Cigweld continuously strives to produce the best product possible and therefore reserves the right to change, improve or revise the specifications or design of this or any product without prior notice. Such updates or changes do not entitle the buyer of equipment previously sold or shipped to the corresponding changes, updates, improvements or replacement of such items.

The values specified in the table above are optimal values, your values may differ. Individual equipment may differ from the above specifications due to in part, but not exclusively, to any one or more of the following; variations or changes in manufactured components, installation location and conditions and local power grid supply conditions.

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 3: INSTALLATION

3.01 Environment

The Transmig 400 i is designed for use in hazardous environments. Examples of environments with increased hazardous environments are:

a. In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts;

b. In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator, or

c. In wet or damp hot locations where humidity or perspiration considerably reduces the skin resistance of the human body and the insulation properties of accessories.

Environments with hazardous environments do not include places where electrically conductive parts in the near vicinity of the operator, which can cause increased hazard, have been insulated.

3.02 Location

Be sure to locate the welder according to the following guidelines:

- In areas, free from moisture and dust.
- Ambient temperature between 0 degrees C to 40 degrees C.
- In areas, free from oil, steam and corrosive gases.
- In areas, not subjected to abnormal vibration or shock.
- In areas, not exposed to direct sunlight or rain.
- Place at a distance of 12” (304.79mm) or more from walls or similar that could restrict natural airflow for cooling.

WARNING

Cigweld advises that this equipment be electrically connected by a qualified electrician.

3.03 Electrical Input Connections

WARNING

ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE is present after removal of input power.

DO NOT TOUCH live electrical parts.

SHUT DOWN welding power source, disconnect input power employing lockout/tagging procedures. Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

3.04 Mains Supply Voltage Requirements

The Mains supply voltage should be within ± 15% of the rated Mains supply voltage. Too low a voltage may cause the fuse or circuit breaker to rupture due to the increased primary current. Too high a supply voltage will cause the Power Source to fail.

415V Mains Current Circuit Requirements for the Transmig 400 i

The Welding Power Source must be:

- Correctly installed, if necessary, by a qualified electrician.
- Correctly earthed (electrically) in accordance with local regulations.
- Connected to the correct size 415V Mains Current Circuit as per the Specifications

WARNING

CIGWELD advises that this equipment be electrically connected by a qualified electrical trades-person.

The following 415V Mains Current Circuit recommendations are required to obtain the maximum welding current and duty cycle from this welding equipment:

Model	Minimum 240V Mains Current Circuit Size
Transmig 400 i	33.4 Amps

Table 3-1: 415V Mains Current Circuit Size to Achieve Maximum Current

3.05 High Frequency Introduction

The importance of correct installation of high frequency welding equipment cannot be overemphasized. Interference due to high frequency initiated or stabilized arc is almost invariably traced to improper installation. The following information is intended as a guide for personnel installing high frequency welding machines.

WARNING: EXPLOSIVES

The high frequency section of this machine has an output similar to a radio transmitter. The machine should NOT be used in the vicinity of blasting operations due to the danger of premature firing.

WARNING: COMPUTERS

It is also possible that operation close to computer installations may cause computer malfunction.

3.06 High Frequency Interference

Interference may be transmitted by a high frequency initiated or stabilized arc welding machine in the following ways:

1. **Direct Radiation:** Radiation from the machine can occur if the case is metal and is not properly grounded. It can occur through apertures such as open access panels. The shielding of the high frequency unit in the Power Source will prevent direct radiation if the equipment is properly grounded.
2. **Transmission via the Supply Lead:** Without adequate shielding and filtering, high frequency energy may be fed to the wiring within the installation (mains) by direct coupling. The energy is then transmitted by both radiation and conduction. Adequate shielding and filtering is provided in the Power Source.
3. **Radiation from Welding Leads:** Radiated interference from welding leads, although pronounced in the vicinity of the leads, diminishes rapidly with distance. Keeping leads as short as possible will minimize this type of interference. Looping and suspending of leads should be avoided where possible.
4. **Re-radiation from Unearthed Metallic Objects:** A major factor contributing to interference is re-radiation from unearthed metallic objects close to the welding leads. Effective grounding of such objects will prevent re-radiation in most cases.

3.07 Duty Cycle

The duty cycle of a welding power source is the percentage of a ten (10) minute period that it can be operated at a given output without causing overheating and damage to the unit. If the welding amperes decrease, the duty cycle increases. If the welding amperes are increased beyond the rated output, the duty cycle will decrease.

WARNING

Exceeding the duty cycle ratings will cause the thermal overload protection circuit to become energized and shut down the output until the unit has cooled to normal operating temperature.

CAUTION

Continually exceeding the duty cycle ratings can cause damage to the welding power source and will void the manufactures warranty.

NOTE

Due to variations that can occur in manufactured products, claimed performance, voltages, ratings, all capacities, measurements, dimensions and weights quoted are approximate only. Achievable capacities and ratings in use and operation will depend upon correct installation, use, applications, maintenance and service.

SECTION 4: OPERATION

4.01 Transmig 400 i Controls

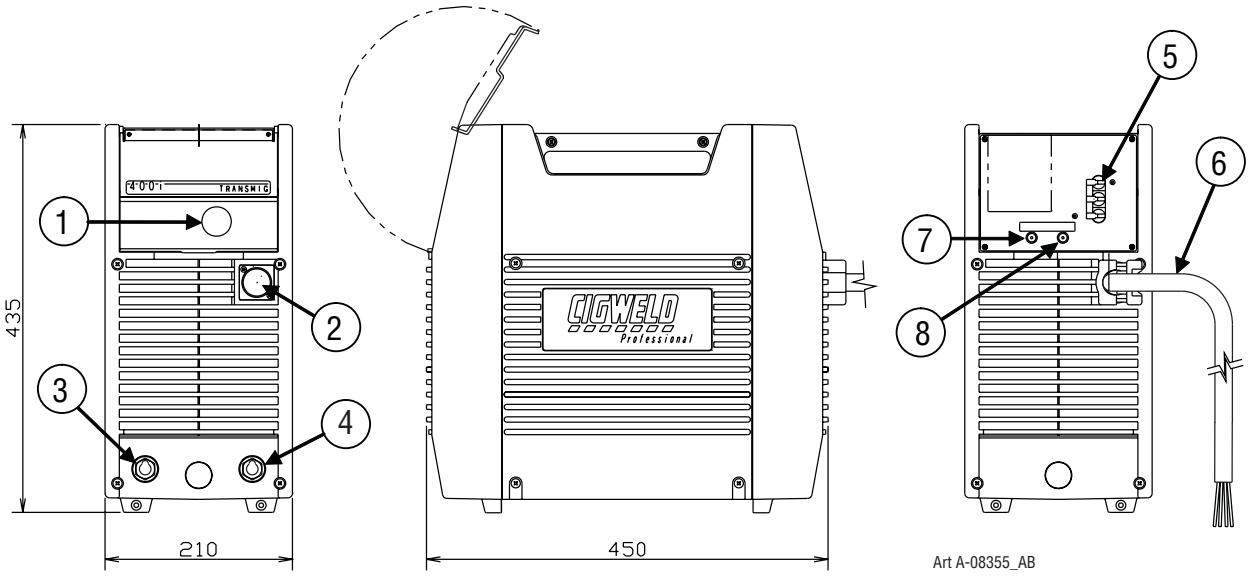


Figure 4-1: Transmig 400 i Power Source

1. **Control Knob:** This control sets the selected weld parameter, rotating it clockwise increases the parameter that is indicated on the digital meter. Pushing the knob inward displays the actual welding voltage.

2. **Remote Control Socket:** The 14 pin Remote Control Socket is used to connect remote current control devices to the welding Power Source. To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

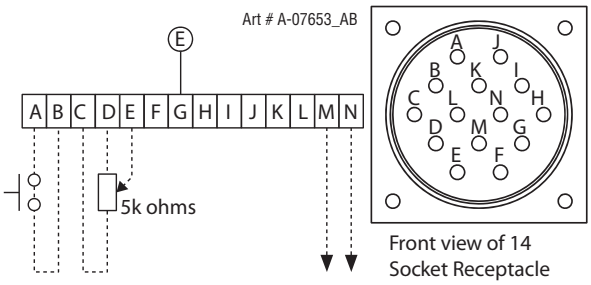


Figure 4-2: 14-Pin Socket Receptacle

Socket Pin	Function
A	Torch Switch Input (24V) to (connect pins A & B to turn on welding current).
B	Torch Switch Input (0V) to energize weld current (connect pins A & B to turn on welding current).
C	5k ohm (maximum) connection to 5k ohm remote control potentiometer.
D	Zero ohm (minimum) connection to 5k ohm remote control potentiometer.
E	Wiper arm connection to 5k ohm remote control potentiometer.
G	Mains Earth.
F,H,I,J, K,L	Not Used.
M	OK to move current detect signal for robotics applications.
N	OK to move current detect signal for robotics applications.

Table 4-1: Socket Pin Functions

3. **Positive Terminal:** Welding current flows from the Power Source via heavy duty Dinse type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

4. **Negative Terminal:** Welding current flows from the Power Source via heavy duty Dinse type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.

5. **ON/OFF Switch:** This switch connects the Primary supply voltage to the inverter when in the ON position. This enables the Power Supply.

WARNING

When the welder is connected to the Primary supply voltage, the internal electrical components may be at 240V potential with respect to earth.

6. **Input Cable:** The input cable connects the Primary supply voltage to the equipment.

7. **24VAC Remote Device C/B:** Push to reset. Controls the 24VAC power source for the wire feeders controlled through the Remote Control Sockets.

8. **115VAC Remote Device C/B:** Push to reset. Controls the 115VAC power source for the wire feeders controlled through the Remote Control Sockets.

4.02 Weld Process Selection

Weld Parameter	Weld Mode			Description
	STICK	MIG	LIFT TIG	
WELD (V)	✗	✓	✗	Weld voltage MIG Mode.
INDUCTANCE	✗	✓	✗	Inductance control in MIG Mode.
HOT START	✓	✗	✗	Start current in amps is added to the WELD (A).
WELD (A)	✓	✗	✓	WELD (A) current for STICK or LIFT TIG.
ARC CONTROL	✓	✗	✗	Adjusts percentage increase in welding current and is proportional to arc length (arc voltage).

Table 4-3: Weld Process selection versus Weld Mode for Transmig 400 i

4.03 Weld Parameter Descriptions

WELD (V):

This parameter sets the MIG weld arc voltage in MIG mode.

INDUCTANCE

This parameter sets the INDUCTANCE when MIG welding. It controls the dynamic properties of the arc in dip transfer welding mode. When this parameter is set to 0%, i.e. minimum inductance, the arc has a fast response with a resulting crisp arc noise and coarse spatter. When this parameter is set to 100%, i.e. maximum inductance, the arc has a slow response with a resulting soft arc and fine spatter.

NOTE

As the INDUCTANCE is increased, the WELD (V) may need to be adjusted to achieve the desired weld characteristic.

HOT START

This parameter operates in STICK mode and improves the start characteristics for stick electrodes. e.g. low hydrogen electrodes. It sets the peak start current on top of the WELD current. e.g. HOT START current = 150 amps when Weld Current = 100 amps & HOT START = 50A

WELD (A)

This parameter sets the STICK & Lift TIG weld current.

ARC CONTROL

This parameter operates in STICK mode only and is used to adjust percentage increase in welding current and is proportional to arc length (arc voltage). This control provides an adjustable amount of arc control (or dig). This feature can be particularly beneficial in providing the operator with the ability to compensate for variability in joint fit up in certain situations with particular electrodes, e.g. cellulose and hydrogen controlled electrodes. In all welding processes, the amount of penetration obtained is dependent on the welding current; i.e. the greater the penetration, the greater the current.

Arc Force Position	Current Increase when Arc Voltage is less than 18V	Effect on Welding Performance
Minimum (0)	0A	Soft arc, Low spatter, Low penetration
Medium (20%)	32A	Normal arc, Improved fusion characteristics, Normal penetration
Maximum (100%)	160A	Hard arc, Deep penetration

Table 4-4: Arc Control Parameters

In general, having the ARC CONTROL set at 100% (maximum) allows greater penetration control to be achieved. With the ARC CONTROL set at 0% (minimum) the Power Source has a constant current characteristic. In other words, varying the arc length does not significantly affect the welding current. When the ARC CONTROL set to 100%, it is possible to control the welding current by varying the arc length. This is very useful for controlling penetration on root runs and side wall wash on vertical up fillet welds.

Root Runs

During root runs the weld pool forms a "keyhole" shape. If too much weld current is used, the hole blows out and the weld collapses. If too little weld current is used, the hole closes up and penetration is lost. The size of the hole also determines the arc length; i.e. as the hole gets bigger, the arc gets longer.

If arc force is used, the increase in the arc length causes the weld current to decrease until the hole starts to close up but if the hole closes up to much then the arc length decreases which causes the weld current to increase. Too little or too much arc force makes this process unstable. The operator must adjust the arc force until a happy medium is reached.

Vertical Up Welding

When welding vertical up with arc force on, the operator can control the amount of current by changing arc length, i.e. voltage. Weld metal is deposited by "digging" the electrode into the side of the base metal joint and then increasing the arc length with a flicking motion, to allow the weld pool to freeze, before digging the electrode into the other side of the base metal joint.

Without arc force, increasing the arc length does not decrease the weld current sufficiently and the operator has to manually decrease the current via a remote current control to freeze the weld pool. This welding current reduction also reduces the penetration.

The arc force allows the weld pool to freeze during the "flick" phase without decreasing the amount of weld current available during the "dig" phase thus maximizing penetration.

4.04 Front Panel Weld Parameter Descriptions

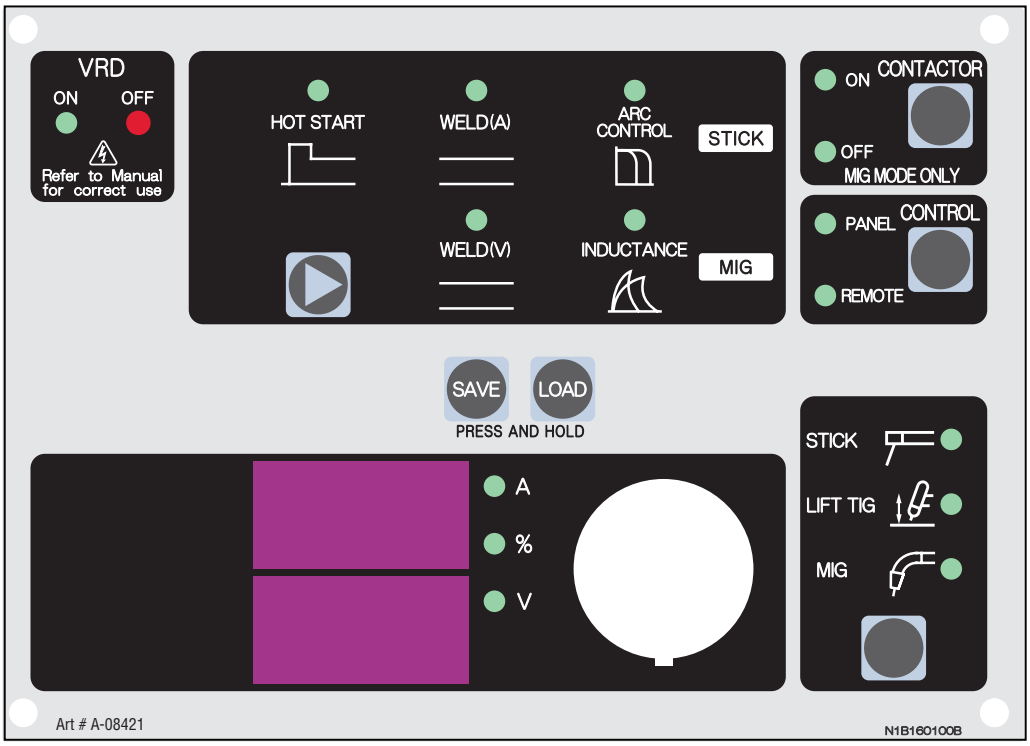


Figure 4-3: Transmig 400 i Front Panel

Parameter	Description
ARC CONTROL	This parameter provides a suitable short circuit current in STICK welding to improve electrode sticking and arc stability.
HOT START	This parameter operates in STICK weld mode and is used to improve the start characteristics for stick electrodes. e.g. low hydrogen electrodes. It sets the peak start current on top of the *(WELD)* current.
DC (A)	Weld Current (Amperage) - when lit parameter knob sets the STICK and TIG WELD current.
DC (V)	Weld Voltage (Volt) – when lit parameter knob sets the MIG voltage.

Parameter	Description
Contactor ON/OFF	Contactor operation in MIG Mode only.
Operation PANEL/REMOTE	Selects in operation: Panel or Remote.
INDUCTANCE	This parameter, similar to the ARC CONTROL in STICK mode, allows for the adjustment of the dynamic property of the arc. As the inductance is increased the output voltage may need to be adjusted to achieve the desired weld characteristics.
SAVE LOAD	The SAVE/LOAD buttons are used to save and retrieve a total number of 5 programs into the Transmig 400 i memory. The Save/Load buttons must be depressed for 3 seconds to store settings.

Table 4-4: Transmig 400 i Front Panel Parameter Description

4.05 Weld Parameters

Weld Parameter	Parameter Range	Factory Setting	Incremental Unit	Weld Mode		
				STICK	MIG	LIFT TIG
WELD (V) MIG	10.0 to 36.0V DC	17.0V	0.1V	✗	✓	✗
INDUCTANCE	0 to 100%	10%	1%	✗	✓	✗
HOT START	0 to 70A	20A	1A	✓	✗	✗
WELD (A) TIG or STICK	5 to 400A DC	80A	1A	✓	✗	✓
ARC CONTROL	0 to 100%	10%	1%	✓	✗	✗

4.06 Power Source Features

Feature	Description
Digital Control	• All welding parameters are adjustable
Touch Panel Switches	• Touch switches eliminate mechanical damage
Front Control Cover	• Protects front panel controls
Digital Meter Volt & Ammeter	• Displays selected weld parameter value • Displays average weld current when welding • Displays average weld current for 20 seconds after weld has been completed • A selected weld parameter value can be adjusted at any time even while welding
Intelligent Fan Control	• The intelligent cooling system is designed to reduce dust and foreign material build-up, while providing optimum cooling. • Fan speed reduces approximately 30 seconds after machine is turned on • Fan speed increases when internal components reaches operating temperature
ON/OFF Switch	• Primary voltage Supply ON/OFF switch located on rear panel
Voltage Reduction Device (VRD) (shipped activated, field-capable)	Reduces the OCV when the power supply is not in use. Eliminates the need for add on voltage reducers and has no effect on arc starting. • VRD fully complies to AS 60974.1 • When Stick mode is selected the green VRD light is ON when not welding and red when welding. • When in TIG modes VRD is OFF.

Control Knob	• For the selected weld parameter, rotating the knob clockwise increases the parameter. • Rotating the knob counter-clockwise decreases the parameter. • A selected weld parameter value can be adjusted at any time even while welding. • Pushing the knob in sets the selected parameter then displays the next parameter.
Self Diagnosis Using Error Codes	• An error code is displayed on the Digital Meter when a problem occurs with Mains supply voltage or internal component problems.
Save/Load Function	• A total number of 5 programs can be saved into the 400 i memory. ***SAVE* the Current Weld Parameters into Memory** • Press and HOLD the *SAVE* button for 3 seconds. Beep will sound and Digital Meter display will show a number 1. • Select a memory location by rotating the control knob, 1 to 5 is displayed on the meter. After selecting the desired memory location (i.e. 1 to 5), press the right scroll button and the machine will give a beep to confirm the weld parameters are loaded onto the control panel. ***LOAD* (retrieve) a Program to Control Panel** • Press and HOLD the *LOAD* button for 3 seconds. Beep will sound and Digital Meter display will show a number 1. • Select a memory location by rotating the control knob, 1 to 5 is displayed on the meter. After selecting the desired memory location (i.e. 1 to 5), press the right scroll button and the machine will give a beep to confirm the weld parameters are loaded onto the control panel.

4.07 Set-up for MMAW (STICK) and GTAW (TIG)

Conventional operating procedures apply when using the welding power source, i.e. connect work lead directly to work piece and electrode lead is used to hold electrode. Wide safety margins provided by the coil design ensure that the welding power source will withstand short-term overload without adverse effects. The welding current range values should be used as a guide only. Current delivered to the arc is dependent on the welding arc voltage, and as welding arc voltage varies between different classes of electrodes, welding current at any one setting would vary according to the type of electrode in use. The operator should use the welding current range values as a guide, then finally adjust the current setting to suit the application.

WARNING

Before connecting the work clamp to the work and inserting the electrode in the electrode holder make sure the primary power supply is switched off.

CAUTION

Remove any packaging material prior to use. Do not block the air vents at the front or rear or sides of the welding power source.

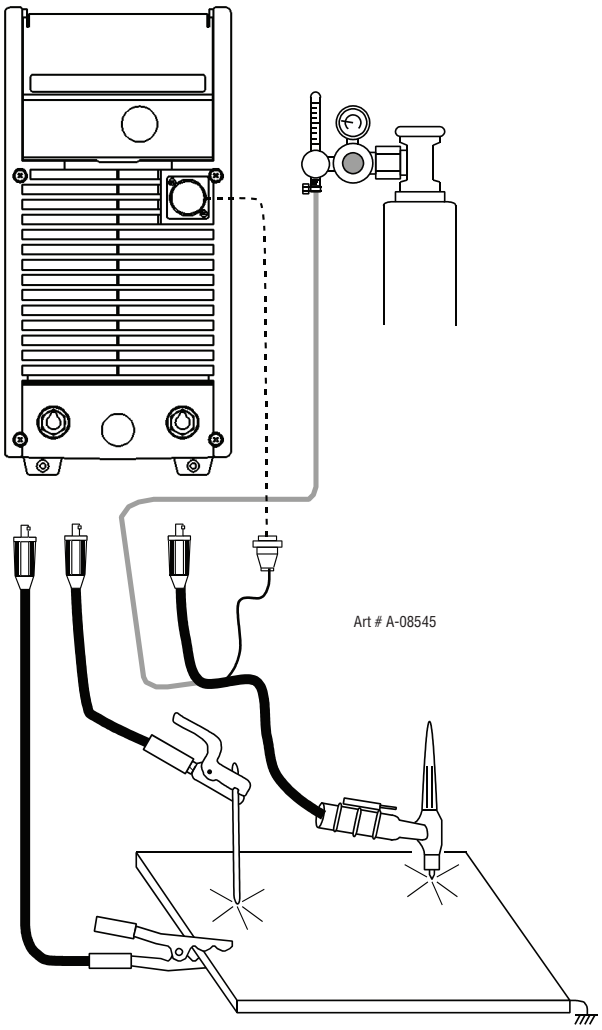


Figure 4-4: Transmig 400 i MMAW/GTAW Set-up

4.08 Set-up for GMAW/FCAW (MIG)

MIG welding with the Transmig 400 i requires the integration of a constant voltage (CV) wire feeder. Shielding gas will also usually be required in most cases except for some flux cored welding operations (FCAW). When setting up for flux cored welding, contact the welding wire manufacturer for lead polarity recommendations.

Refer to Figure 4-5 for a typical MIG welding configuration and connect your equipment accordingly.

NOTE

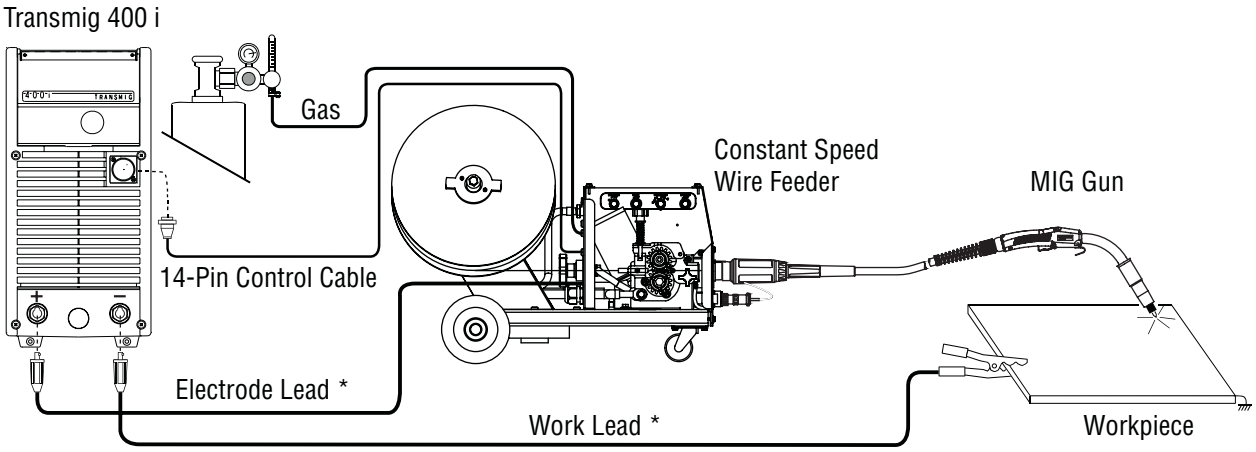
Consult the wire feeder manual on how to adjust the wire feed speed and connect the MIG gun.

WARNING

Before connecting the work clamp to the work and inserting the electrode in the electrode holder make sure the primary power supply is switched off.

CAUTION

Remove any packaging material prior to use. Do not block the air vents at the front or rear or sides of the welding power source.



* These leads may need to be reversed when using flux core welding wire. Contact the welding wire manufacturer for details.

Figure 4-5: Transmig 400 i GMAW (MIG) Set-up

4.09 Sequence Of Operation

NOTE:

Parameter Buttons are used to select the parameters to be set. The LED's show which function is being adjusted on the weld sequence graph. Refer to Symbols Table located in the front of the manual for Symbol descriptions.

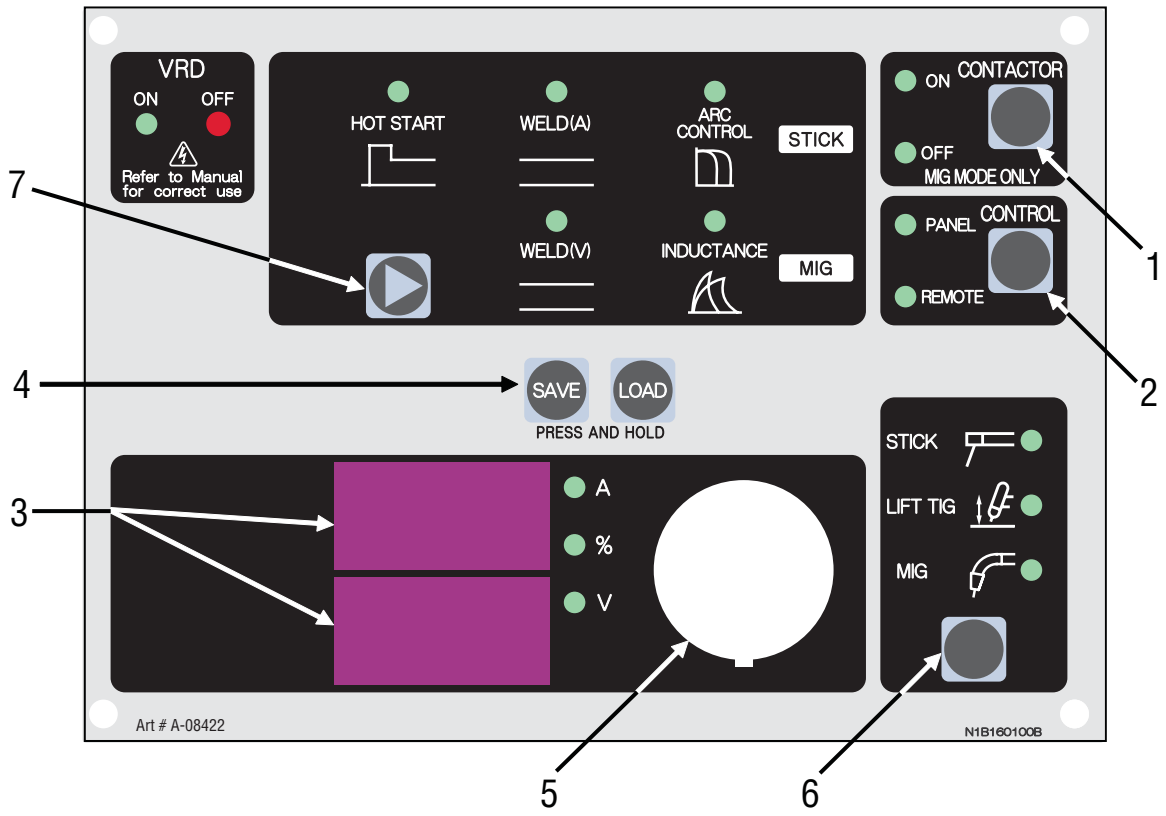


Figure 4-6: Transmig 400 i Front Panel

1. **Contactor Function:** Pressing this buttons enables Contactor functions. This function is operable in MIG mode only. It is used to enable the output such that a voltage sensing wirefeeder i.e. Transmig VS 212 can be connected.
2. **Remote Functions:** Pressing this buttons enables remote current functions.
3. **Digital LED Displays:** Welding amperage, Voltage and parameter values are displayed in this window. Internal warnings such as over temperature, low or high input voltage applied are signaled to the operator by a warning sound and error message on the screen.
4. **Save/Load Buttons:** By using the Save & Load buttons the operator can easily save up to 5 welding parameter programs. The Save/Load buttons must be depressed for 3 seconds to store settings.
5. **Control Knob:** Allows the operator to adjust the output amperage/voltage within the entire range of the power source, also used to set each parameter value.
6. **Process Button:** This button selects between STICK, Lift TIG, and MIG modes. MIG modes include MS for mild steel and SS for stainless steel.
7. **Parameter Button:** This button select between HOT START, WELD CURRENT, and ARC CONTROL while in STICK and Lift TIG modes and selects between WELD VOLTAGE and INDUCTANCE CONTROL while in MIG mode. This button is also used in conjunction with the Save/Load buttons to save and load welding programs.

4.10 Stick Welding

- Connect work lead to negative terminal.
- Connect electrode lead to positive terminal.
- Switch machine on.
- Set weld current.
- Set Contactor.
- Connect remote control device if required.

  Use the Scroll Buttons to move to the parameter to be set. The LED will show which function is being adjusted on the weld sequence graph. Use the control knob to adjust each parameter.
- Set HOT START.
- Set ARC CONTROL.
- Set WELD current.

Commence welding.

4.11 LIFT TIG Welding

- Connect work lead to positive terminal.
- Connect TIG torch to negative terminal.
- Switch machine on.
- Set weld current.
- Connect remote control device if required.

  Use the Scroll Buttons to move to the parameter to be set. The LED will show which function is being adjusted on the weld sequence graph. Use the control knob to adjust each parameter.

Commence welding.

4.12 MIG Welding

- Connect work lead to negative terminal.
  This lead may need to be reversed when using flux cored welding wire. Contact the welding wire manufacturer for details.
- Connect electrode lead to positive terminal.
  This lead may need to be reversed when using flux cored welding wire. Contact the welding wire manufacturer for details.
- Switch machine on.
- Set weld voltage.
- Set Inductance.
- Connect Wire feeder.
- Set wire feed speed (IPM).

  Use the Scroll Buttons to move to the parameter to be set. The LED will show which function is being adjusted on the weld sequence graph. Use the control knob to adjust each parameter.

Commence welding.

4.13 Save-Load Operation

A total number of 5 programs can be saved into the Transmig 400 i memory.

SAVE the Current Weld Parameters into Memory

- Press and HOLD the SAVE button for 3 seconds. Beep will sound and Digital Meter display will show a number 1.
- Select a memory location by rotating the control knob, 1 to 5 is displayed on the meter.
- After selecting the desired memory location (i.e. 1 to 5), press the right scroll button and the machine will give a beep to confirm the weld parameters from the control panel are saved. The Save/Load buttons must be depressed for 3 seconds to store settings.

LOAD (retrieve) a Program to Control Panel

- Press and HOLD the LOAD button for 3 seconds. Beep will sound and Digital Meter display will show a number 1.
- Select a memory location by rotating the control knob, 1 to 5 is displayed on the meter.
- After selecting the desired memory location (i.e. 1 to 5), press the right scroll button and the machine will give a beep to confirm the weld parameters are loaded onto the control panel. The Save/Load buttons must be depressed for 3 seconds to store settings.

SECTION 5:
BASIC WELDING GUIDE

5.01 Basic TIG Welding Guide

5.01.1 Electrode Polarity

Connect the TIG torch to the - / TORCH terminal and the work lead to the + / WORK terminal for direct current straight polarity. Direct current straight polarity is the most widely used polarity for DC TIG welding. It allows limited wear of the electrode since 70% of the heat is concentrated at the work piece.

5.01.2 Tungsten Electrode Current Ranges

Electrode Diameter	AC Current (Amps)	DC Current (Amps)
0.040" (1.0mm)	30 – 70	30 – 60
1/16" (1.6mm)	60 – 95	60 – 115
3/32" (2.4mm)	125 – 150	100 – 165
1/8" (3.2mm)	130 – 225	135 – 200
5/32" (4.0mm)	190 – 280	190 – 280
3/16" (4.8mm)	250 – 340	250 – 340

5.01.3 Tungsten Electrode Types

Electrode Type (Ground Finish)	Welding Application	Features	Color Code
Thoriated 2%	DC welding of mild steel, stainless steel and copper.	Excellent arc starting, Long life, High current carrying capacity.	Red
Zirconated 1%	High quality AC welding of aluminium, magnesium and their alloys.	Self cleaning, Long life, Maintains balled end, High current carrying capacity.	White
Ceriated 2%	AC & DC welding of mild steel, stainless steel, copper, aluminium, magnesium and their alloys	Longer life, More stable arc, Easier starting, Wider current range, Narrower more concentrated arc.	Grey

5.01.4 Guide for Selecting Filler Wire Diameter

Filler Wire Diameter	AC Current Range (Amps)	DC Current Range (Amps)
1/16” (1.6 mm)	30 - 95	20 - 90
3/32” (2.4 mm)	125 - 160	65 - 115
1/8” (3.2 mm)	180 - 240	100 - 165
3/16” (4.8 mm)	220 - 320	200 - 350

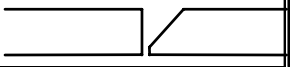
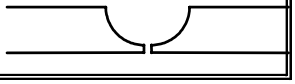
NOTE 1

The filler wire diameter specified in the above table is a guide only, other diameter wires may be used according to the welding application.

5.01.5 Shielding Gas Selection

Alloy	Shielding Gas
Aluminum & alloys	Welding Argon
Carbon Steel	Welding Argon
Stainless Steel	Welding Argon
Copper	Welding Argon

5.01.6 TIG Welding Parameters for Low Carbon & Low Alloy Steel Pipe

Electrode Type & Diameter	Current Range DC Amperes	Filler Rod for Root Pass	Joint Preparation
Thoriated 2% 3/32” (2.4 mm)	120 - 170	Yes	
Thoriated 2% 3/32” (2.4 mm)	100 - 160	Yes	
Thoriated 2% 3/32” (2.4 mm)	90 - 130	No	

5.01.7 Welding Parameters for Steel

Base Metal Thickness	DC Current for Mild Steel	DC Current for Stainless Steel	Tungsten Electrode Diameter	Filler Rod Diameter (if required)	Argon Gas Flow Rate Liters/min	Joint Type
0.040" 1.0mm	35-45 40-50	20-30 25-35	0.040" 1.0mm	1/16" 1.6mm	5-7	Butt/Corner Lap/ Fillet
0.045" 1.2mm	45-55 50-60	30-45 35-50	0.040" 1.0mm	1/16" 1.6mm	5-7	Butt/Corner Lap/ Fillet
1/16" 1.6mm	60-70 70-90	40-60 50-70	1/16" 1.6mm	1/16" 1.6mm	7	Butt/Corner Lap/ Fillet
1/8" 3.2mm	80-100 90-115	65-85 90-110	1/16" 1.6mm	3/32" 2.4mm	7	Butt/Corner Lap/ Fillet
3/16" 4.8mm	115-135 140-165	100-125 125-150	3/32" 2.4mm	1/8" 3.2mm	10	Butt/Corner Lap/ Fillet
¼" 6.4mm	160-175 170-200	135-160 160-180	1/8" 3.2mm	5/32" 4.0mm	10	Butt/Corner Lap/ Fillet

5.02 Basic STICK Welding Guide

5.02.1 Electrode Polarity

Stick electrodes are generally connected to the '+' terminal and the work lead to the '-' terminal but if in doubt consult the electrode manufacturers literature.

5.02.2 Effects of Stick Welding Various Materials

High tensile and alloy steels

The two most prominent effects of welding these steels are the formation of a hardened zone in the weld area, and, if suitable precautions are not taken, the occurrence in this zone of under-bead cracks. Hardened zone and under-bead cracks in the weld area may be reduced by using the correct electrodes, preheating, using higher current settings, using larger electrodes sizes, short runs for larger electrode deposits or tempering in a furnace.

Manganese steels

The effect on manganese steel of slow cooling from high temperatures is to make it brittle. For this reason it is absolutely essential to keep manganese steel cool during welding by quenching after each weld or skip welding to distribute the heat.

Cast Iron

Most types of cast iron, except white iron, are weldable. White iron, because of its extreme brittleness, generally cracks when attempts are made to weld it. Trouble may also be experienced when welding white-heart malleable, due to the porosity caused by gas held in this type of iron.

Copper and alloys

The most important factor is the high rate of heat conductivity of copper, making preheating of heavy sections necessary to give proper fusion of weld and base metal.

Types of Electrodes

Arc Welding electrodes are classified into a number of groups depending on their applications (refer to table below). There are a great number of electrodes used for specialized industrial purposes which are not of particular interest for everyday general work. These include some low hydrogen types for high tensile steel, cellulose types for welding large diameter pipes, etc. The range of electrodes dealt with in this publication will cover the vast majority of applications likely to be encountered; are all easy to use and all will work on even the most basic of welding machines.

Metals being joined	Electrode	Comments
Mild steel	6013	Ideal electrodes for all general purpose work. Features include out standing operator appeal, easy arc starting and low spatter.
Mild steel	7014	All positional electrodes for use on mild and galvanized steel furniture, plates, fences, gates, pipes and tanks etc. Especially suitable for vertical-down welding.
Cast iron	99% Nickel	Suitable for joining all cast irons except white cast iron.
Stainless steel	318L-16	High corrosion resistance. Ideal for dairy work, etc. on stainless steels.
Copper, Bronze, Brass, etc.	Bronze 5.7 ERCUSI-A	Easy to use electrode for marine fittings, water taps and valves, water trough float arms, etc. Also for joining copper to steel and for bronze overlays on steel shafts.
High Alloy Steels, Dissimilar Metals, Crack Resistance. All Hard-To-Weld Jobs.	312-16	It will weld most problematical jobs such as springs, shafts, broken joins mild steel to stainless and alloy steels. Not suitable for Aluminium.

5.03 Basic MIG Welding Guide

5.03.1 Setting of the Power Source

The setting of the Transmig 400 i requires some practice by the operator, the welding Power Source/Wirefeeder having two control settings that have to balance. These are the Wirespeed control and the Voltage Control. The welding current is determined by the Wirespeed control, the current will increase with increased Wirespeed, resulting in a shorter arc. Less wire speed will reduce the current and lengthen the arc. Increasing the welding voltage hardly alters the welding current level, but lengthens the arc. By decreasing the voltage, a shorter arc is obtained with little change in welding current.

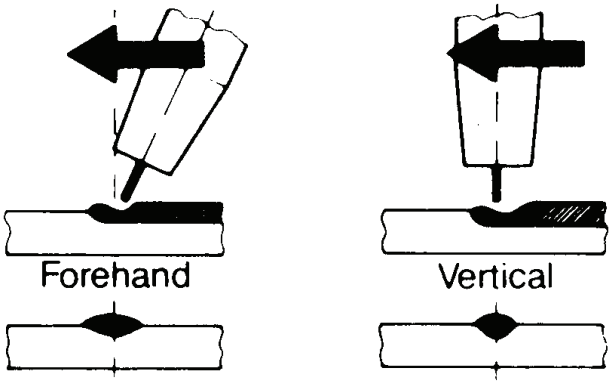
When changing to a different electrode wire diameter, different control settings are required. A thinner electrode wire needs more Wirespeed to achieve the same current level.

A satisfactory weld cannot be obtained if the wirespeed and voltage switch settings are not adjusted to suit the electrode wire diameter and dimensions of the workpiece.

If the Wirespeed is too high for the welding voltage, "stubbing" will occur as the wire dips into the molten pool and does not melt. Welding in these conditions normally produces a poor weld due to lack of fusion. If, however, the welding voltage is too high, large drops will form on the end of the electrode wire, causing spatter. The correct setting of voltage and Wirespeed can be seen in the shape of the weld deposit and heard by a smooth regular arc sound.

5.03.2 Position of MIG Torch

The angle of MIG torch to the weld has an effect on the width of the weld run.



5.03.3 Travel Speed

Speed at which a weld travels influences the width of the weld and penetration of the welding run.

5.03.4 Electrode Wire Size Selection

The choice of electrode wire size in conjunction with shielding gas used depends on:

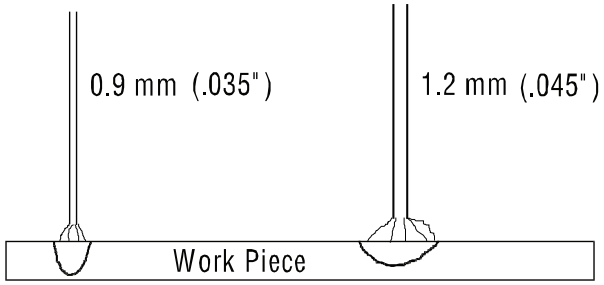
- The position of welding
- Thickness of the metal to be welded
- The deposition rate required
- Capacity of the wire feed unit and power source
- The bead profile desired
- The amount of penetration required
- Type of joint
- Cost of the electrode wire

Weld metal deposition rate is proportional to current density. Current density is defined as the current per cross sectional area of the electrode wire and is normally expressed as amps per mm2. An example is tabled below.

Electrode Wire Size	Current (Amps)	Current Density (Amps/mm^2)	Deposition Rate (lb/hour)
0.035" (0.9mm)	200	380	6.3
0.034" (1.2mm)	200	177	6.0

5.03.5 Deposition Rate Comparison

This demonstrates that where the upper limit of current is limited by machine capacity and duty cycle, higher deposition rates and therefore greater productivity will be achieved by using smaller electrode wire. The TRANSMIG 400 i is a particularly efficient MIG welder with the 0.9mm steel wire in spray transfer mode. The savings from decreased welding time will more than cover the small cost penalty of the smaller electrode wire sizes. 0.035" wire cost approximately 10% more than 0.045", but is deposited approximately 15% faster. Higher current density (or smaller diameter wire) also gives deeper penetration as shown.



Wire penetration comparison using the same current (200A) for both electrodes

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 6:
SERVICE

6.01 Routine Maintenance

The only routine maintenance required for the power supply is a thorough cleaning and inspection, with the frequency depending on the usage and the operating environment.

WARNING

Disconnect primary power at the source before opening the enclosure. Wait at least two minutes before opening the enclosure to allow the primary capacitors to discharge.

To clean the unit, open the enclosure and use a vacuum cleaner to remove any accumulated dirt and dust. The unit should also be wiped clean, if necessary; with solvents that are recommended for cleaning electrical apparatus.

CAUTION

Do not blow air into the power supply during cleaning. Blowing air into the unit can cause metal particles to interfere with sensitive electrical components and cause damage to the unit.

6.02 Maintenance Diagram

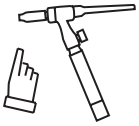
Warning!
Disconnect input power before maintaining.

Maintain more often if used under severe conditions

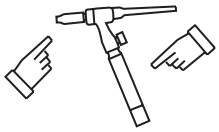
Each Use

Visual check of regulator and pressure

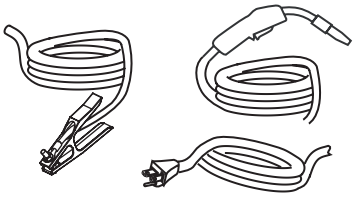
Visual check of torch Consumable parts



Weekly



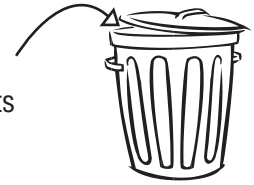
Visually inspect the torch body and consumables



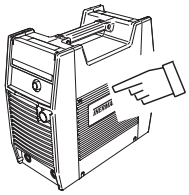
Visually inspect the cables and leads. Replace as needed

3 Months

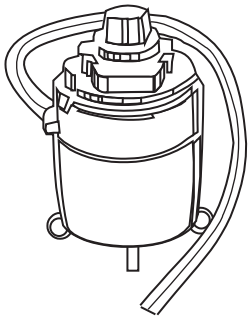
Replace all broken parts



Clean exterior of power supply

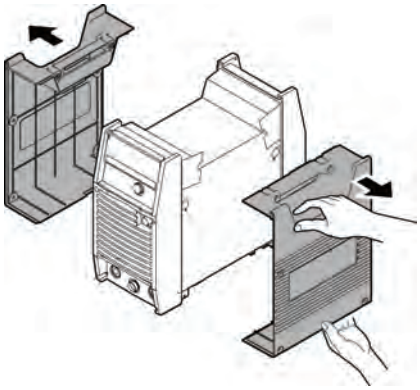


6 Months



Art # A-07681_AC

Bring the unit to an authorized CIGWELD Service Provider to remove any accumulated dirt and dust from the interior. This may need to be done more frequently under exceptionally dirty conditions.



6.03 Basic Troubleshooting

WARNING

There are extremely dangerous voltages and power levels present inside this product. Do not attempt to open or repair unless you are an Accredited Cigweld Service Provider and you have had training in power measurements and troubleshooting techniques.

If major complex subassemblies are faulty, then the Welding Power Source must be returned to an Accredited Cigweld Service Provider for repair.

The basic level of troubleshooting is that which can be performed without special equipment or knowledge.

6.04 Solving MIG Problems beyond the Welding Terminals

The general approach to fix Gas Metal Arc Welding (GMAW) problems is to start at the wire spool then work through to the MIG torch. There are two main areas where problems occur with GMAW:

Porosity

When there is a gas problem the result is usually porosity within the weld metal. Porosity always stems from some contaminant within the molten weld pool which is in the process of escaping during solidification of the molten metal.

Contaminants range from no gas around the welding arc to dirt on the work piece surface. Porosity can be reduced by checking the following points:

1. Gas cylinder contents and flow meter.	Ensure that the gas cylinder is not empty and the flow meter is correctly adjusted to 25 cubic feet per hour.
2. Gas leaks.	Check for gas leaks between the regulator/cylinder connection and in the gas hose to the Wire Feeder.
3. Internal gas hose in the Wire Feeder.	Ensure the hose from the solenoid valve to the MIG torch adapter has not fractured and that it is connected to the MIG torch adapter.
4. Welding in a windy environment.	Shield the weld area from the wind or increase the gas flow.
5. Welding dirty, oily, painted, oxidized or greasy plate.	Clean contaminates off the plate.
6. Distance between the MIG torch nozzle and the work piece.	Keep the distance between the MIG torch nozzle and the work piece to a minimum.
7. Maintain the MIG torch in good working order.	Ensure that the gas holes are not blocked and gas is exiting out of the torch nozzle.
	Do not restrict gas flow by allowing spatter to build up inside the MIG torch nozzle. Check that the MIG torch O-rings are not damaged.

WARNING

Disengage the drive roll when testing for gas flow by ear.

Inconsistent Wire Feed

Checking the following points can reduce wire-feeding problems:

1. Wire spool brake is too tight.	Feed roller driven by motor in the cabinet will slip.
2. Wire spool brake is too loose.	Wire spool can unwind and tangle.
3. Worn or incorrect feed roller size.	Use 'U' groove drive feed roller matched to the aluminium wire size you are welding. Use 'V' groove drive feed roller matched to the steel wire size you are welding. Use 'knurled V' groove drive feed roller matched to the flux cored wire size you are welding.
4. Misalignment of inlet/outlet guides.	Wire will rub against the misaligned guides and reduces wire feedability.
5. Liner blocked with wire debris.	Wire debris is produced by the wire passing through the feed roller, if excessive pressure is applied to the pressure roller adjuster. Wire debris can also be produced by the wire passing through an incorrect feed roller groove shape or size. Wire debris is fed into the liner where it accumulates thus reducing wire feedability.
6. Incorrect or worn contact tip.	The contact tip transfers the weld current to the electrode wire. If the hole in the contact tip is to large then arcing may occur inside the contact tip resulting in the electrode wire jamming in the contact tip. When using soft electrode wire such as aluminium it may become jammed in the contact tip due to expansion of the wire when heated. A contact tip designed for soft electrode wires should be used.
7. Poor work lead contact to work piece.	If the work lead has a poor electrical contact to the work piece then the connection point will heat up and result in a reduction of power at the arc.
8. Bent liner.	This will cause friction between the wire and the liner thus reducing wire feedability.

6.05 MIG Welding Problems

	Description	Possible Cause	Remedy
1	Undercut.	A Welding arc voltage too high.	A Reduce *WELD (V)* control or increase the wire feed speed.
		B Incorrect torch angle.	B Adjust angle.
		C Excessive heat input.	C Increase the torch travel speed and/or reduce welding current by reducing the *WELD (V)* control or reducing the wire feed speed.
2	Lack of penetration.	A Welding current too low.	A Increase welding current by increasing wire feed speed and increasing *WELD (V)* control.
		B Joint preparation too narrow or gap too tight.	B Increase joint angle or gap.
		C Shielding gas incorrect.	C Change to a gas which gives higher penetration.
3	Lack of fusion.	Voltage too low.	Increase *WELD (V)* control.
4	Excessive spatter.	A Voltage too high.	A Lower the voltage by reducing the *WELD (V)* control or increase wirespeed control.
		B Voltage too low.	B Raise the voltage by increasing the *WELD (V)* control or reduce wirespeed control.
5	Irregular weld shape.	A Incorrect voltage and current settings. Convex, voltage too low. Concave, voltage too high.	A Adjust voltage and current by adjusting the *WELD (V)* control and the wirespeed control.
		B Wire is wandering.	B Replace contact tip.
		C Incorrect shielding gas.	C Check shielding gas.
		D Insufficient or excessive heat input.	D Adjust the wirespeed control or the voltage selection switches.
6	Weld cracking.	A Weld beads too small.	A Decrease travel speed.
		B Weld penetration narrow and deep.	B Reduce current and voltage and increase MIG torch travel speed or select a lower penetration shielding gas.
		C Excessive weld stresses.	C Increase weld metal strength or revise design.
		D Excessive voltage.	D Decrease voltage by reducing the *WELD (V)* control.
		E Cooling rate too fast.	E Slow the cooling rate by preheating part to be welded or cool slowly.
7	Cold weld puddle.	A Loose welding cable connection.	A Check all welding cable connections.
		B Low Primary Voltage.	B Contact supply authority.
		C Faulty rectifier unit.	C Have an accredited Cigweld Service Provider to test then replace the faulty component.
8	Arc does not have the crisp sound that comes when the wirefeed speed and voltage are adjusted correctly.	The MIG torch has been connected to the wrong voltage polarity on the front panel.	Connect the MIG torch to the positive (+) welding terminal for solid wires and gas shielded flux cored wires. Refer to the electrode wire manufacturer for the correct polarity.

6.06 TIG Welding Problems

Weld quality is dependent on the selection of the correct consumables, maintenance of equipment and proper welding technique.

Description	Possible Cause	Remedy
1 Excessive bead build-up or poor penetration or poor fusion at edges of weld	Welding current is too low	Increase weld current and/or faulty joint preparation
2 Weld bead too wide and flat or undercut at edges of weld or excessive burn through	Welding current is too high	Decrease weld current
3 Weld bead too small or insufficient penetration or ripples in bead are widely spaced apart	Travel speed too fast	Reduce travel speed
4 Weld bead too wide or excessive bead build-up or excessive penetration in butt joint	Travel speed too slow	Increase travel speed
5 Uneven leg length in fillet joint	Wrong placement of filler rod	Re-position filler rod
6 Electrode melts when arc is struck	Electrode is connected to the '+' terminal	Connect the electrode to the '-' terminal
7 Dirty weld pool	A Electrode contaminated through contact with work piece or filler rod material B Gas contaminated with air	A Clean the electrode by grinding off the contaminates B Check gas lines for cuts and loose fitting or change gas cylinder
8 Electrode melts or oxidizes when an arc is struck	A No gas flowing to welding region B Torch is clogged with dust C Gas hose is cut D Gas passage contains impurities E Gas regulator turned off F Torch valve is turned off G The electrode is too small for the welding current	A Check the gas lines for kinks or breaks and gas cylinder contents B Clean torch C Replace gas hose D Disconnect gas hose from torch then raise gas pressure and blow out impurities E Turn on F Turn on G Increase electrode diameter or reduce the welding current
9 Poor weld finish	Inadequate shielding gas	Increase gas flow or check gas line for gas flow problems

Description	Possible Cause	Remedy
10 Arc flutters during TIG welding	A Tungsten electrode is too large for the welding current	A Select the right size electrode. Refer to Basic TIG Welding Guide
	B Absence of oxides in the weld pool	B Refer to Basic TIG Welding Guide for ways to reduce arc flutter
11 Welding arc cannot be established	A Work clamp is not connected to the work piece or the work/torch leads are not connected to the right terminals	A Connect the work clamp to the work piece or connect the work/torch leads to the right welding terminals
	B Torch lead is disconnected	B Connect it to the '-' terminal
	C Gas flow incorrectly set, cylinder empty or the torch valve is off	C Select the right flow rate, change cylinders or turn torch valve on
12 Arc start is not smooth	A Tungsten electrode is too large for the welding current	A Select the right size electrode. Refer to Basic TIG Welding Guide
	B The wrong electrode is being used for the welding job	B Select the right size electrode. Refer to Basic TIG Welding Guide
	C Gas flow rate is too high	C Select the correct rate for the welding job. Refer to Basic TIG Welding Guide
	D Incorrect shielding gas is being used	D Select the right shielding gas. Refer to Basic TIG Welding Guide
	E Poor work clamp connection to work piece	E Improve connection to work piece

6.07 Stick Welding Problems

Description	Possible Cause	Remedy
1 Gas pockets or voids in weld metal (Porosity)	A Electrodes are damp	A Dry electrodes before use
	B Welding current is too high	B Reduce welding current
	C Surface impurities such as oil, grease, paint, etc	C Clean joint before welding
2 Crack occurring in weld metal soon after solidification commences	A Rigidity of joint	A Redesign to relieve weld joint of severe stresses or use crack resistance electrodes
	B Insufficient throat thickness	B Travel slightly slower to alloy greater build-up in throat
	C Cooling rate is too high	C Preheat plate and cool slowly
3 A gap is left by failure of the weld metal to fill the root of the weld	A Welding current is too low	A Increase welding current
	B Electrode too large for joint	B Use smaller diameter electrode
	C Insufficient gap	C Allow wider gap
	D Incorrect sequence	D Use correct build-up sequence

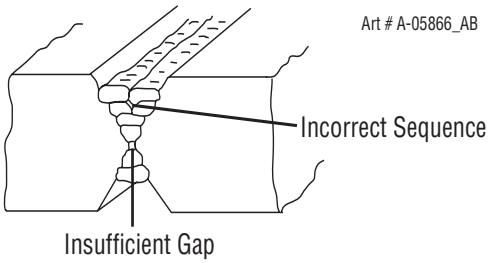


Figure 5-1: Example of Insufficient Gap or Incorrect Sequence

Description	Possible Cause	Remedy
4 Portions of the weld run do not fuse to the surface of the metal or edge of the joint	A Small electrodes used on heavy cold plate	A Use larger electrodes and preheat the plate
	B Welding current is too low	B Increase welding current
	C Wrong electrode angle	C Adjust angle so the welding arc is directed more into the base metal
	D Travel speed of electrode is too high	D Reduce travel speed of electrode
	E Scale or dirt on joint surface	E Clean surface before welding

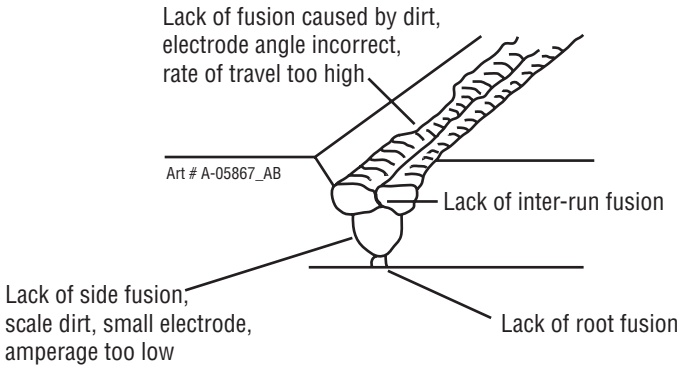


Figure 5-2: Example of Lack of Fusion

6.07 Stick Welding Problems (con't)

Description	Possible Cause	Remedy
5 Non-metallic particles are trapped in the weld metal (slag inclusion)	A Non-metallic particles may be trapped in undercut from previous run	A If bad undercut is present, clean slag out and cover with a run from a smaller diameter electrode
	B Joint preparation too restricted	B Allow for adequate penetration and room for cleaning out the slag
	C Irregular deposits allow slag to be trapped	C If very bad, chip or grind out irregularities
	D Lack of penetration with slag trapped beneath weld bead	D Use smaller electrode with sufficient current to give adequate penetration. Use suitable tools to remove all slag from corners
	E Rust or mill scale is preventing full fusion	E Clean joint before welding
	F Wrong electrode for position in which welding is done	F Use electrodes designed for position in which welding is done, otherwise proper control of slag is difficult

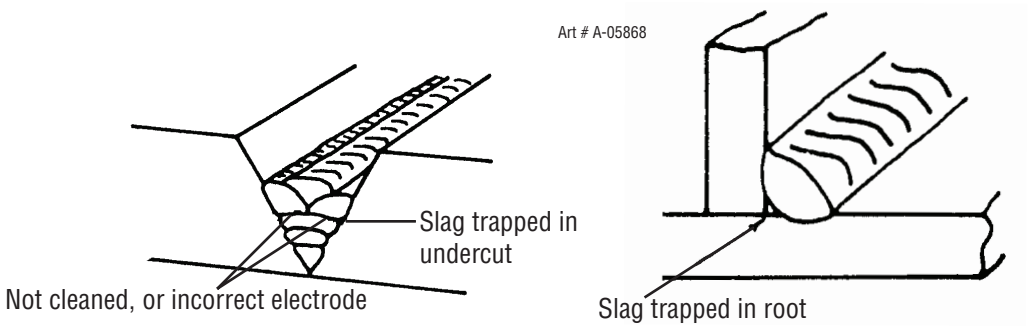


Figure 5-3: Examples of Slag Inclusion

6.08 Power Source Problems

Description	Possible Cause	Remedy
1 The welding arc cannot be established	A The Primary supply voltage has not been switched ON B The Welding Power Source switch is switched OFF C Loose connections internally	A Switch ON the Primary supply voltage B Switch ON the Welding Power Source C Have an Accredited Cigweld Service Provider repair the connection
2 Maximum output welding current cannot be achieved with nominal Mains supply voltage	Defective control circuit	Have an Accredited Cigweld Service Provider inspect then repair the welder
3 Welding current reduces when welding	Poor work lead connection to the work piece	Ensure that the work lead has a positive electrical connection to the work piece

6.09 Power Source Error Codes

	Description	Possible Cause	Remedy	Remarks
1	E01 error code displayed Temperature sensor TH1 (protects IGBTs) is greater than 80ºC for about 1 second.	A The Welding Power Source's duty cycle has been exceeded. B Fan ceases to operate. C Air flow is restricted by vents being blocked.	A Let Power Source cool down then keep within its duty cycle. Have an accredited B Cigweld Service Provider investigate. C Unblock vents then let Power Source cool down.	Weld current ceases. Buzzer sounds constantly. Fan operates at max speed. E01 resets when TH1 decreases to 70ºC for about 30 seconds.
2	E02 error code displayed Temperature sensor TH2 (protects secondary diodes) is greater than 80ºC for about 1 second.	A The Welding Power Source's duty cycle has been exceeded. B Fan ceases to operate. C Air flow is restricted by vents being blocked.	A Let Power Source cool down then keep within its duty cycle. Have an accredited B Cigweld Service Provider investigate. C Unblock vents then let Power Source cool down.	Weld current ceases. Buzzer sounds constantly. Fan operates at max speed. E02 resets when TH1 decreases to 70ºC for about 30 seconds.
3	E03 error code displayed Primary (input) current too high.	A Primary current is too high because welding arc is too long. B Mains supply voltage is more than 10% below nominal voltage.	A Reduce length of welding arc. B Have an accredited Cigweld Service Provider or a qualified electrician check for low Mains voltage.	Weld current ceases. Buzzer sounds constantly. Switch machine OFF then ON to reset E03 error.
4	E04 error code displayed Output voltage exceeds the secondary voltage specification.	TIG torch cable and/or work lead are too long or leads are coiled.	Reduce the length of the TIG torch cable and/or work lead or un-coiled leads.	Weld current ceases. Buzzer sounds constantly. Switch machine off then on to reset E04 error.
5	E11 error code displayed Over Primary supply (input) voltage at primary capacitors is exceeded for one second.	Primary supply voltage is greater than the nominal voltage plus 10%.	Have an accredited Cigweld Service Provider or a qualified electrician check the Primary voltage.	Weld current ceases. Buzzer sounds constantly. Error code E11 automatically will reset when the voltage reduces.
6	E12 error code displayed Under mains supply (input) voltage primary capacitors is reduced for one second.	Mains supply voltage is down to a dangerously low level.	Have an accredited Cigweld Service Provideror a qualified electrician check the Mains voltage.	Weld current ceases. Buzzer sounds constantly. Error code E12 automatically will reset when the voltage increases.

	Description	Possible Cause	Remedy	Remarks
7	E14 error code displayed Under mains supply (input) voltage warning primary capacitors is reduced for one second.	Mains supply voltage is less than the nominal operating voltage less 10%.	Have an accredited Cigweld Service Provider or a qualified electrician check the Mains voltage.	Weld current available. Buzzer sounds intermittently. Error code E14 automatically will reset when the voltage increases.
8	E81 error code displayed Wrong Primary supply (input) voltage connected.	When 3 phase machine is first turned ON with the wrong Primary supply (input) voltage connected.	Have an accredited Cigweld Service Provider or a qualified electrician check the Mains voltage.	No weld current is available. Buzzer sounds constantly. Switch machine OFF.
9	E82 error code displayed Link switch plug not connected.	Link switch plug not connected.	Have an accredited Cigweld Service Provider check connector plug on input PCB.	No weld current is available. Buzzer sounds constantly. Switch machine OFF.
10	E83 error code displayed CPU checks mains supply (input) voltage when the ON/OFF switch on rear panel of machine is turned ON.	The Primary supply (input) voltage fluctuates and is not stable.	Have an accredited Cigweld Service Provider check connector plug on input PCB and the Mains voltage.	No weld current is available. Buzzer sounds constantly. Switch machine OFF then ON to reset E83 error.
11	E85 error code displayed Pre-charge abnormality.	Due to malfunction inside the Welding Power Source, primary capacitors are not charging correctly.	Have an Accredited Cigweld Service Provider service the machine.	No weld current is available. Buzzer sounds constantly. Switch machine OFF then ON to reset E85 error.
12	E93 error code displayed Memory chip (EEPROM) on control PCB can not read/write weld parameters.	Memory chip (EEPROM) error.	Have an accredited Cigweld Service Provider check the control PCB.	Weld current ceases. Buzzer sounds constantly. Switch machine OFF.
13	E94 error code displayed Temperature sensor TH1 for IGBTs or sensor TH2 for secondary diodes are open circuit.	The Welding Power Source's temperature sensors have malfunctioned.	Have an accredited Cigweld Service Provider check or replace the temperature sensors.	Weld current ceases. Buzzer sounds constantly. Switch machine OFF.
14	E99 error code displayed Mains supply (input) voltage has been turned OFF but control circuit has power from the primary capacitors.	A Main ON/OFF switch on machine has been turned OFF. B Mains supply (input) voltage has been turned OFF.	A Turn ON/OFF Switch ON. B Have an accredited Cigweld Service Provider or a qualified electrician check the Mains voltage and fuses.	Weld current ceases. Buzzer sounds constantly. Must switch machine OFF then ON to reset E99 error.

6.10 Voltage Reduction Device (VRD)

1. VRD Specification:

Description	Transtig 400 i	Notes
VRD Open Circuit Voltage	15.3 to 19.8V	Open circuit voltage between welding terminals
VRD Resistance	148 to 193 ohms	The required resistance between welding terminals to turn ON the welding power
VRD Turn OFF Time	0.2 to 0.3 seconds	The time taken to turn OFF the welding power once the welding current has stopped

2. VRD Maintenance:

Routine inspection and testing (power source):

An inspection of the power source, an insulation resistance test and an earth resistance test shall be carried out.

a) For transportable equipment, at least once every 3 months; and

b) For fixed equipment, at least once every 12 months.

The owners of the equipment shall keep a suitable record of the periodic tests.

NOTE

A transportable power source is any equipment that is not permanently connected and fixed in the position in which it is operated.

In addition to the above tests and specifically in relation to the VRD fitted to this machine, the following periodic tests should also be conducted by an accredited Cigweld service agent.

Description	Required Parameters
VRD Open Circuit Voltage	Less than 20V; at Vin=415V
VRD Turn ON Resistance	Less than 200 ohms
VRD Turn OFF Time	Less than 0.3 seconds

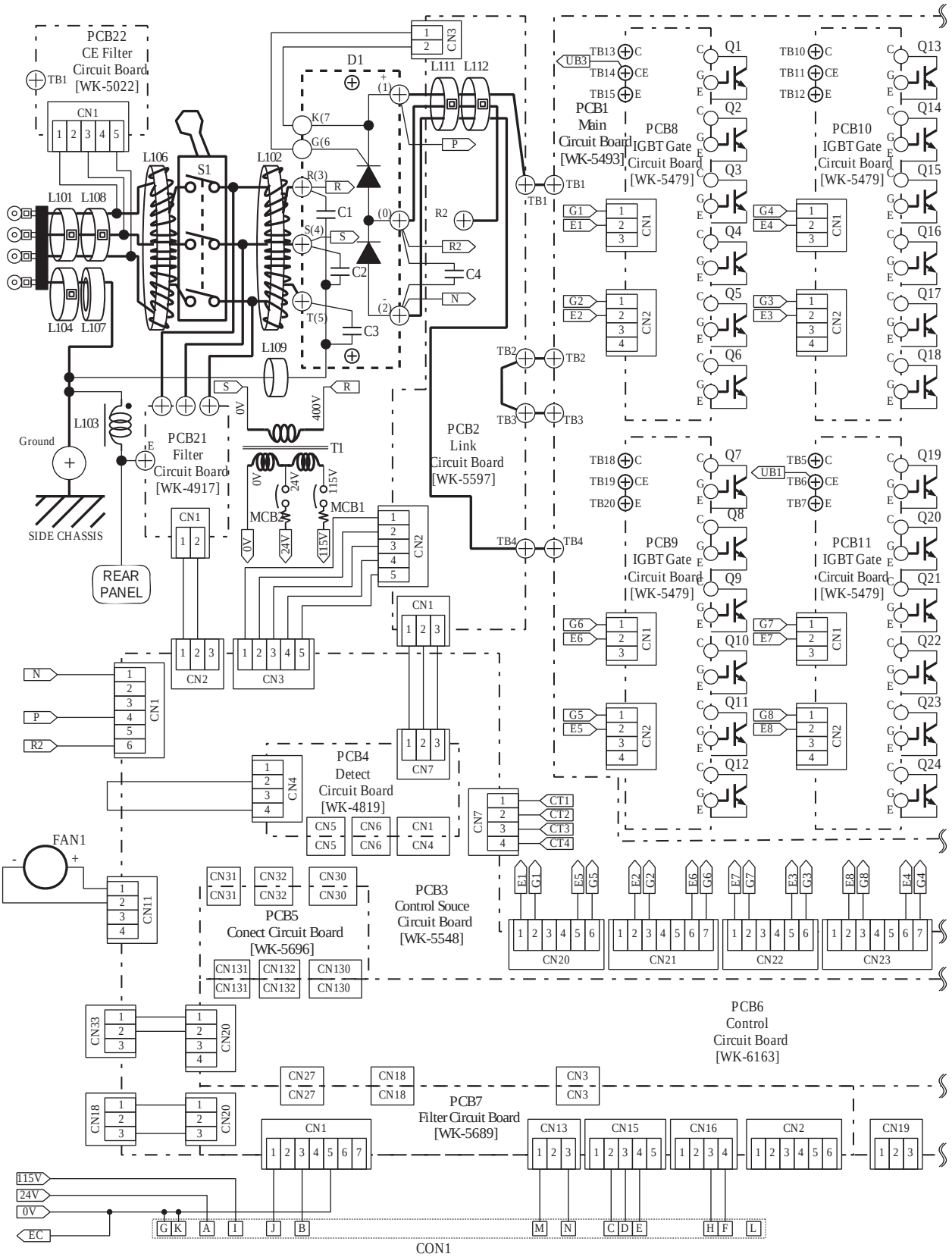
Periodic Tests

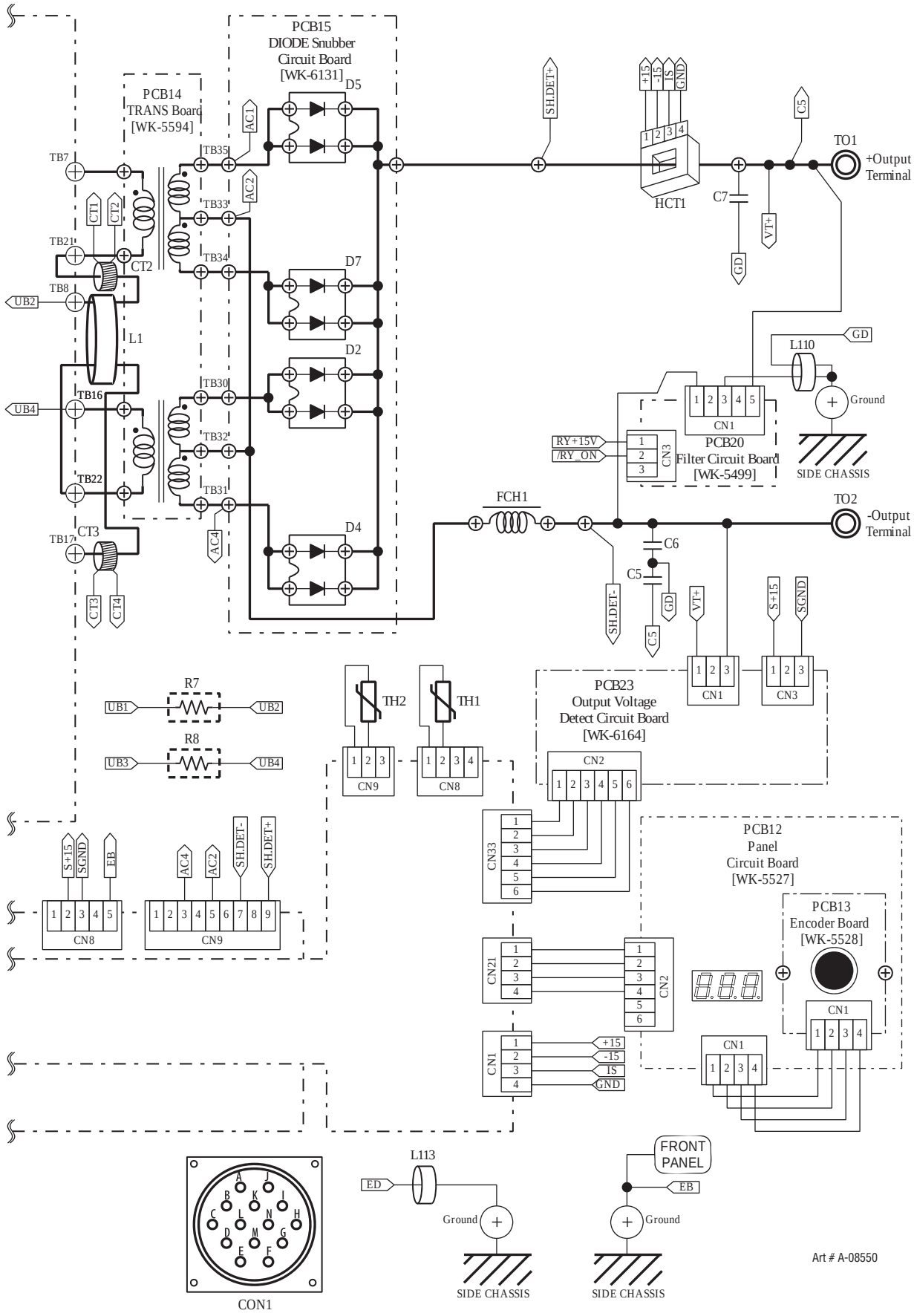
If this equipment is used in a hazardous location or environments with a high risk of electrocution then the above tests should be carried out prior to entering this location.

APPENDIX 1: OPTIONS AND ACCESSORIES

Description	Part No.	Details
17 Series air cooled TIG torch (suitable for TransTig 200Pi)	518710402	TIG torch with 4 metre cable & remote current control
26 Series air cooled TIG torch	538720401	TIG torch with 4 metre cable & remote current control
200 Amp lead set, 5 metre	646323	1 x 5m work lead; 1 x 5m electrode holder
400 Amp lead set, 8 metre	646325	1 x 8m work lead; 1 x 8m electrode holder
Slide controller	OTD 10/4013	200Pi, 200AC/DC slider only
	OTD 10/2004	300Pi, 300AC/DC, 400i slider only
Hand pendant	OTD 10/4014	200Pi, 200AC/DC hand pendant only
	OTD 10/2005	300Pi, 300AC/DC, 400i hand pendant only
Foot controller	OTD 10/4016	200Pi, 200AC/DC
	OTD 10/2007	300Pi, 300AC/DC, 400i
CIGWELD COMET argon regulator	301527	Regulator only
CIGWELD COMET argon flowmeter 0-15 lpm	301710	Flowmeter only
CIGWELD COMET argon flowmeter 10-40 lpm	301711	Flowmeter only
CIGWELD COMET argon regulator/flowmeter	301526	Regulator/flowmeter only
VAF-4 Wirefeeder (for 400i ONLY)	705700	VAF-4 wirefeeder, 8m interconnection, operating manual
VS212 Voltage sensing wirefeeder	W3512006	VS212 wirefeeder, operating manual
Tweco® 4 MIG Torch	717201	MIG torch with 3.6m cable, T4 connection
ArcMaster Pro Auto-darkening Helmet, 9-13 – blue	454294	Welding helmet, 2 x spare cover lenses, product bag, operating manual
ArcMaster Pro Auto-darkening Helmet, 9-13 – blue with graphic	454295	Welding helmet, 2 x spare cover lenses, product bag, operating manual
ArcMaster Pro Auto-darkening Helmet, 9-13 – black with graphic	454296	Welding helmet, 2 x spare cover lenses, product bag, operating manual

APPENDIX 2: TRANSMIG 400 i INTERCONNECT DIAGRAM




PCB15
DIODE Snubber
Circuit Board
[WK-6131]
PCB14
TRANS Board
[WK-5594]
D5
D7
D2
D4
AC1
AC2
AC4
TB7
TB21
TB8
TB16
TB22
TB17
TB35
TB33
TB34
TB30
TB32
TB31
CT1
CT2
CT3
CT4
L1
UB2
UB4
SH.DET+
+15
-15
IS
GND
HCT1
C7
C5
VT+
GD
TO1
+Output
Terminal
L110
Ground
SIDE CHASSIS
CN1
PCB20
Filter Circuit Board
[WK-5499]
RY+15V
/RY_ON
CN3
FCH1
TO2
-Output
Terminal
C6
SH.DET-
S+15
SGND
R7
R8
UB1
UB3
TH2
TH1
CN9
CN8
PCB23
Output Voltage
Detect Circuit Board
[WK-6164]
CN2
CN33
PCB12
Panel
Circuit Board
[WK-5527]
PCB13
Encoder Board
[WK-5528]
CN21
EB
CON1
L113
ED
FRONT
PANEL
Art # A-08550

THIS PAGE LEFT INTENTIONALLY BLANK

CIGWELD LIMITED WARRANTY

LIMITED WARRANTY: CIGWELD, A Thermadyne Company, hereafter, “CIGWELD” warrants to customers of its authorized distributors hereafter “Purchaser” that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the CIGWELD products as stated below, CIGWELD shall, upon notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with CIGWELD’s specifications, instructions, recommendations and recognized standard industry practice, and not subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at CIGWELD’s sole option, of any components or parts of the product determined by CIGWELD to be defective.

CIGWELD MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHERS, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF LIABILITY: CIGWELD SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, SUCH AS, BUT NOT LIMITED TO, LOST PROFITS AND BUSINESS INTERRUPTION. The remedies of the Purchaser set forth herein are exclusive and the liability of CIGWELD with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by CIGWELD whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based. No employee, agent, or representative of CIGWELD is authorized to change this warranty in any way or grant any other warranty.

PURCHASER’S RIGHTS UNDER THIS WARRANTY ARE VOID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH IN CIGWELD’S SOLE JUDGEMENT MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY CIGWELD PRODUCT. PURCHASER’S RIGHTS UNDER THIS WARRANTY ARE VOID IF THE PRODUCT IS SOLD TO PURCHASER BY NON-AUTHORIZED PERSONS.

The warranty is effective for the time stated below beginning on the date that the authorized distributor delivers the products to the Purchaser. Notwithstanding the foregoing, in no event shall the warranty period extend more than the time stated plus one year from the date CIGWELD delivered the product to the authorized distributor.

Terms of Warranty – January 2008

1. The Trade Practices Act 1974 (Commonwealth) and similar State Territory legislation relating to the supply of goods and services, protects consumers' interests by ensuring that consumers are entitled in certain situations to the benefit of various conditions, warranties, guarantees, rights and remedies (including warranties as to merchantability and fitness for purpose) associated with the supply of goods and services. A consumer should seek legal advice as to the nature and extent of these protected interests. In some circumstances, the supplier of goods and services may legally stipulate that the said conditions, warranties, guarantees, rights and remedies are limited or entirely excluded. The warranties set out in Clause 2 shall be additional to any nonexcludable warranties to which the Customer may be entitled pursuant to any statute.

2. Subject to Clause 3. CIGWELD gives the following warranties to the Customer:

   Insofar as they are manufactured or imported by CIGWELD, goods will upon delivery be of merchantable quality and reasonably fit for the purpose for which they are supplied by CIGWELD.

   CIGWELD will repair or, at its option, replace those of the goods which, upon examination, are found by CIGWELD to be defective in workmanship and/or materials.

   CIGWELD reserves the right to request documented evidence of date of purchase.

3. The Warranty in Clause 2;

   Is conditional upon:

   The Customer notifying CIGWELD or our Accredited Distributor in writing of its claim within seven (7) days of becoming aware of the basis thereof, and at its own expense returning the goods which are the subject of the claim to CIGWELD or nominated Accredited Distributor/Accredited Service Provider. The goods being used in accordance with the Manufacturer's Operating Manuals, and under competent supervision.

   Does not apply to:

   Obsolete goods sold at auction, second-hand goods and prototype goods.

   Breakdown or malfunction caused by accident, misuse or normal wear and tear.

   Repairs or replacement made other than by CIGWELD or Accredited Service Providers, unless by prior arrangement with CIGWELD.

   Replacement parts or accessories which may affect product safety or performance and which are not manufactured, distributed or approved by CIGWELD.

4. CIGWELD declares that, to the extent permitted by law, it hereby limits its liability in respect of the supply of goods which are not of a kind ordinarily acquired for personal, domestic or household use or consumption to any one or more of the following (the choice of which shall be at the option of CIGWELD).

   The replacement of the goods or the supply of equivalent goods.

   The repair of goods.

   The payment of cost of replacing the goods or acquiring equivalent goods.

   The payment of the cost of having goods repaired.

5. Except as provided in Clauses 2 to 4 above, to the extent permitted by statute, CIGWELD hereby excludes all liability for any loss, damage, death or injury of any kind whatsoever occasioned to the Customer in respect of the supply of goods including direct, indirect, consequential or incidental loss, damage or injury of any kind.

Warranty Schedule – January 2008

These warranty periods relate to the warranty conditions in clause 2. All warranty periods are from date of sale from the Accredited Distributor of the equipment. Notwithstanding the foregoing, in no event shall the warranty period extend more than the time stated plus one year from the date CIGWELD delivered the product to the Accredited Distributor. Unless otherwise stated the warranty period includes parts and labour. CIGWELD reserves the right to request documented evidence of date of purchase.

CIGWELD PROFESSIONAL INVERTER WELDING EQUIPMENT	WARRANTY PERIOD	LABOR
Transtig 200 Pi, Transtig 200 AC/DC, Transarc 300 Si, Transtig 300 Pi, Transtig 300 AC/DC, Transmig 400 i		
Original Main Power Magnetics	3 years	2 years
Original Main Power Rectifiers, Control P.C. Boards, power switch semi-conductors	2 years	2 years
All other circuits and components including, but not limited to, relays, switches, contactors, solenoids, fans, electric motors	1 year	1 year

Please note that the information detailed in this statement supersedes any prior published data produced by CIGWELD.

GLOBAL CUSTOMER SERVICE CONTACT INFORMATION

Thermadyne USA
2800 Airport Road
Denton, Tx 76207 USA
Telephone: (940) 566-2000
800-426-1888
Fax: 800-535-0557
Email: sales@thermalarc.com

Thermadyne Canada
2070 Wyecroft Road
Oakville, Ontario
Canada, L6L5V6
Telephone: (905)-827-1111
Fax: 905-827-3648

Thermadyne Europe
Europe Building
Chorley North Industrial Park
Chorley, Lancashire
England, PR6 7Bx
Telephone: 44-1257-261755
Fax: 44-1257-224800

Thermadyne, China
RM 102A
685 Ding Xi Rd
Chang Ning District
Shanghai, PR, 200052
Telephone: 86-21-69171135
Fax: 86-21-69171139

Thermadyne,Utama Indonesia
Kawasan Industri Jababeka
Jl Jababeka VI Blok P No. 3
Cikarang - Bekasi, 17550
Indonesia
Tel: +62 21 893 6071
Fax: +62 21 893 6067 / 6068
http://www.thermadyne.com

Thermadyne Asia Sdn Bhd
Lot 151, Jalan Industri 3/5A
Rawang Integrated Industrial Park - Jln Batu Arang
48000 Rawang Selangor Darul Ehsan
West Malaysia
Telephone: 603+ 6092 2988
Fax : 603+ 6092 1085

Cigweld, Australia
71 Gower Street
Preston, Victoria
Australia, 3072
Telephone: 61-3-9474-7400
Fax: 61-3-9474-7510

Thermadyne Italy
OCIM, S.r.L.
Via Benaco, 3
20098 S. Giuliano
Milan, Italy
Tel: (39) 02-98 80320
Fax: (39) 02-98 281773

Thermadyne International
2070 Wyecroft Road
Oakville, Ontario
Canada, L6L5V6
Telephone: (905)-827-9777
Fax: 905-827-9797

Asia Pacific Regional Headquarters
71 Gower Street
Preston, Victoria, Australia, 3072
Telephone: +61 3 9474 7400
FAX: +61 3 9474 7488
Email: cigweldsales@cigweld.com.au

www.cigweld.com.au

CIGWELD
By THERMADYNE®