

Operator's Manual

TORCHMATE® CLASSIC 5 x 10



Shown with customer-supplied slats

For Product # TMS-024-0510-01



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Updated on: July 10, 2015

Need Help?

Call TORCHMATE TECHNICAL SUPPORT:
866-571-1066 to talk to a
Technical Support Representative

Hours of Operation:

6:00 AM to 4:00 PM (PT) Mon. thru Fri.
(0600 to 1600)

After Hours:

Send a detailed email message to:
support@torchmate.com

A Technical Support Representative will
contact you the following business day.

For service outside the USA:

Call 775-673-2200 or send an email to
support@torchmate.com

LINCOLN
ELECTRIC | **Cutting
Systems**
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The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

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**Cutting
Systems**

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Statement of Warranty

Lincoln Electric Cutting Systems equipment is designed and built with quality in mind. However, your overall satisfaction with our products generally can be increased by proper installation ... and thoughtful operation on your part.

30 Day Guarantee

If Buyer is not satisfied with the performance of the Goods within 30 days from the date the Goods were shipped from the Seller, Buyer may return the Goods in the original carton(s) for a full refund less Shipping, Handling, Damages and Freight Charges. All sales become final after this 30 day period. Buyer should determine the satisfactory performance of the Goods by using the software, and inspecting and bench running the motors and/or accessory items. Any items to be returned for full refund must be in new, unused (except for bench testing), and saleable condition at the sole determination of the Seller. Items that, in the Seller's judgment, have been used or modified in any way, or kits that have been partially or fully completed will be subject to a restocking fee to be determined by the Seller. A return merchandise authorization number (RMA) must be obtained by the customer prior to any return. Shipments of returned items not marked with a valid RMA will be refused.

Warranty

Electronics and motors are warranted by their manufacturer to the original purchaser for 12 months from the date of Torchmate, Inc.'s sale invoice. Mechanical components are standard industrial parts and are not warranted except by their respective manufacturers. If any of the warranted items are found by Seller to be defective, such Goods will, at Seller's option, be replaced or repaired at Seller's cost. No defective goods are to be returned without written authorization of seller. The sole purpose of the stipulated exclusive remedy shall be to provide the Buyer with free repair and replacement of defective Goods in the manner provided herein. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as the Seller is willing and able to repair or replace defective Goods in the prescribed manner. The foregoing warranty is in lieu of all other warranties, express or implied, including those of merchantability or fitness for any purpose not expressly set forth herein. No affirmation of Seller, by words or action, other than as set forth in this Section shall constitute a warranty. Seller's warranty does not apply to any Goods which have been subjected to misuse, mishandling, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, modification (including by not limited to use of unauthorized parts or attachments), or adjustment or repair performed by anyone other than Seller or one of Seller's authorized agents. When returning products to Seller packaging must be adequate or all warranty is null and void. Buyer will pay for the cost of Shipping to and from the Seller for all warranty repairs.

Before returning any goods, please contact
Lincoln Electric Cutting Systems Technical Support

Monday through Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone

Toll Free: 1-866-571-1066

International: 775-673-2200

Fax: 775-673-2206

Email: support@torchmate.com



Any claim by Buyer with reference to the Goods sold hereunder shall be deemed waived by the Buyer unless submitted in writing to seller within the earlier of (i) thirty (30) days following the date Buyer discovered or by reasonable inspection should have discovered, any claimed breach of foregoing warranty, or (ii) 12 months following the date of shipment. Any cause of action for breach of the foregoing warranty shall be brought within one year from the date the alleged breach was discovered or should have been discovered, whichever occurs first.

Seller's liability (whether under the theories of breach of contract or warranty, negligence, or strict liability) for its Goods shall be limited to repairing or replacing Goods found by Seller to be defective, or at Seller's option, to refunding the purchase price of such Goods or parts thereof.

In no event shall seller be liable for consequential damages arising out of or in connection with this agreement, including without limitation, breach of any obligation imposed on seller hereunder. Consequential damages shall include without limitation, loss of use, income or profit, or loss sustained as the result of injury (including death) to any person, or loss of or damage to property (including without limitation property handled or processed by the use of the goods). Buyer shall indemnify seller against all liability, cost or expense which may be sustained by seller on account of any such loss, damage, or injury.

Upon buyer's receipt of shipment, Buyer shall immediately inspect the Goods. Unless Buyer provides Seller with written notice of any claim for shortage, overcharge, or damage of Goods within ten (10) days from invoice date, such Goods shall be deemed finally inspected, checked and accepted by Buyer and no allowances shall be made thereafter. In absence of shipping and packaging instructions, Seller shall use its own discretion in the choice of carrier and method of packing. Seller shall not be responsible for insuring shipments unless specifically requested by Buyer and any insurance or special packaging so requested shall be at Buyer's expense and valuation.

Title to any Goods sold and risk of loss of such Goods passes to Buyer upon delivery by Seller to carrier and any claims for losses or damages shall be made by Buyer directly with carrier.

- A. In addition to the rights and remedies conferred upon Seller by law, Seller shall not be required to proceed with the performance of any order or contract if the Buyer is in default in the performance of any order or contract with Seller, and in case of doubt as to Buyer's financial responsibility, shipments under this order may be suspended.
- B. No delay or omission by Seller in exercising any right or remedy provided for herein shall constitute a waiver of such right or remedy and shall not be constituted as a bar to or a waiver of any such right or remedy on any future occasion.
- C. The sale of Goods shall be governed by the laws of the State of Nevada. Seller agrees to comply with all applicable laws of the United States.

The invalidity or unenforceability of any one or more phrases, sentences, or sections shall not affect the validity or enforceability of the remaining portions of this Agreement.

Limitation of liability

Disclaimer of consequential damages

Acceptance and transportation

Title and risk of loss

General conditions

Severability

Welcome to Lincoln Electric Cutting Systems

Welcome Letter

To the newest member of our Torchmate Family:

Thank You! Thank you for putting your faith and trust in Torchmate. When you purchased your Torchmate CNC Cutting System, you purchased more than just a machine. You purchased a team. The Torchmate team was built with the goal in mind of helping you get the most value out of your automation investment.

For some, this Torchmate CNC Cutting System purchase is their first endeavor into the world of automation. Others may consider themselves seasoned automation experts. No matter which category you fall into it is important that you realize that investing in a Torchmate is unlike any other machinery purchase you have made. We consider your success our success as well as your challenges our challenges.

The Torchmate product line is designed to be simple, reliable and accurate. While there is no "Easy" button on your new system, I can promise that you will get out of it what you put in. Operating any machinery is a skill and does have a learning curve.

Call us for help



The first and perhaps most important item we want to give you today is the Torchmate Technical Support Hotline: [866] 571-1066. This number is toll free for those within the United States. For those outside the United States, use the following telephone number: [775] 673-2200.

There is a dedicated professional support staff available Monday – Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone, to assist you in any way that they can. We pride ourselves on offering free, unlimited telephone support for your machine and all we expect in return is communication, understanding, and patience. We are here for you as long as you need us.

Please don't be a stranger. If you have questions or problems, call us. No matter how trivial your issue may seem it is not trivial if it cuts into your productivity. Call, Call, Call! We are here for you! Thank you again for putting your trust in us. We will do our best to not let you down.

Sincerely,

The Torchmate Technical Support Team
Lincoln Electric Cutting Systems

The year was 1979. After spending his childhood working with metal and hot rods, William (Bill) Kunz, Sr. began selling his first shape-cutting machine. He called it the "Torchmate."

Bill had read about pantograph flame-cutting machines in an automotive magazine, so he set out to bring this technology to hobbyists and small shop owners like himself. His fundamental idea? Find a way to lower the \$1,400 cost (a big investment 30 years ago) down to just \$400—thanks to the first Torchmate Pantograph Machine Kits.

Torchmate sold thousands of pantograph machines over the next 18 years, and the company's objective has remained steadfast: cutting technology should not be limited only to the metal-working elite.

Not content to rest on his laurels, Bill launched Torchmate's line of CNC (Computer Numerically Controlled) Cutting Machines in the late 1990s. The pantograph evolved into an automated, two-axis cutting table featuring a rugged yet precise plasma torch.

Following the same fundamental idea from the company's founding, the Torchmate tables brought major cost reductions, allowing plasma cutting (which had been expensively out of reach for most shops) to be widely affordable. The cut quality, increased production, and precise replication were also highly appreciated capabilities of the new machines.

In early 2001 and with the help of Kunz's son, Bill Jr., the company unveiled the Torchmate 2, which used an extruded aluminum gantry. It cut customer fabrication time from 40 hours down to just 16. Adding a third axis expanded functionality into the Routermate, which cuts wood, plastic, foam, and other materials using a router / drill, in 3-D.

Then came the Torchmate 3, with its strong aluminum-extrusion frame that assembles in less than a day—and a price point under \$10,000.

The most recent new Torchmate products include the large Torchmate X table and, more recently, the revolutionary new Growth Series: the Torchmate 2x2, 2x4, and 4x4 CNC Systems.

In 2011, the Kunz' family vision was realized when Lincoln Electric, the venerated welding products company from Cleveland, Ohio, acquired Torchmate. To bring world-class metal cutting equipment to its customers world-wide, Lincoln Electric Cutting Systems will continue to create, sell, and support Torchmate products in Reno, NV.



www.torchmate.com

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Call, Fax, or Email

- When building the table if a question or concern arises or a part is missing, please contact Torchmate technical support.
- Technical support will also help you with operating the CNC system, and troubleshooting problems.
- Technical support is available Monday through Friday from 6:00 AM to 4:00 PM (06:00 to 16:00), Pacific Time Zone.



Toll Free: 1-866-571-1066
 International: 775-673-2200
 Fax: 775-673-2206
 Email: support@torchmate.com

Call us for Consumables, or visit our web store

Safety Information

Please read this section thoroughly

www.torchmate.com

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Safety First

Lincoln Electric Cutting Systems equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part.

WARNING

DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THE SAFETY WARNINGS CONTAINED THROUGHOUT THIS MANUAL

Think before you act— and be careful.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.
KEEP CHILDREN AWAY.
IF YOU WEAR A PACEMAKER, CONSULT WITH YOUR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

Electric shock



1. ELECTRIC SHOCK can kill.
 - 1.1 The electrode and work (or ground) circuits are electrically "hot" when the power source is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
 - 1.2 Disconnect the power source before performing any service or repairs. When the power source is operating, voltages in excess of 250 volts are produced. This creates the potential for serious electrical shock - possibly even fatal.
 - 1.3 Insulate yourself from work and ground using dry insulation. Wear dry gloves and clothing. Take extra care when the work place is moist or damp.
 - 1.4 Always be sure the work cable makes a good electrical connection with the metal being cut or gouged. The connection should be as close as possible to the area being cut or gouged.
 - 1.5 Ground the work or metal to be cut or gouged to a good electrical (earth) ground.
 - 1.6 Maintain the plasma torch, cable and work clamp in good, safe operating condition. Repair or replace all worn or damaged parts. Replace damaged insulation.
 - 1.7 Never dip the torch in water for cooling or plasma cut or gouge in or under water.
 - 1.8 When working above floor level, protect yourself from a fall should you get a shock.
 - 1.9 Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.
 - 1.10 Also see Items 4.3 and 6.

2. ARC RAYS can burn.

- 2.1 Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultraviolet and infrared rays. These will damage your eyes and burn your skin if you are not properly protected.
- 2.2 Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses, head-shield, and filter lens should conform to ANSI Z87.1 standards.

Arc Current	Minimum Shade No.	Suggested Shade No.
Less than 20A	4	4
20A-40A	5	5
40A-60A	6	6
60A-300A	8	9
300A-400A	9	12
400A-800A	10	14

- 2.3 Use suitable clothing including gloves made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 2.4 Protect other nearby personnel with suitable non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

3. FUMES AND GASES can be dangerous.

- 3.1 Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone.
- 3.2 Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- 3.3 When plasma cutting or gouging on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required.
- 3.4 Additional precautions are also required when cutting [zinc] galvanized steel or materials containing or coated with any of the following:

Antimony	Beryllium	Cobalt	Manganese	Selenium
Arsenic	Cadmium	Copper	Mercury	Silver
Barium	Chromium	Lead	Nickel	Vanadium

Arc rays



Fumes, gases, and dust



- 3.5 The operation of plasma cutting or gouging fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment, and the specific procedure and application involved. Worker exposure levels should be checked upon installation and periodically thereafter to be certain levels are within applicable OSHA PEL and ACGIH TLV limits. For information on how to test for fumes and gases in your work place, refer to publications section of this manual.
- 3.6 Do not use plasma cutting or gouging equipment in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products. Remove all sources of these vapors.
- 3.7 Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 3.8 Read and understand the manufacturer's instructions for this equipment and follow your employer's safety practices.
- 3.9 This product, when used for cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects
- 3.10 Some dust created by routing, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Avoid prolonged contact with this dust. Wear protective clothing and wash exposed areas with soap and water. Allowing dust to get into your mouth, eyes, or lay on the skin may promote absorption of harmful chemicals.

Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks and cement and other masonry products.
- Arsenic and chromium from chemically-treated lumber (CCA).

- 3.11 Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

Fire or Explosion



4. Cutting flame and sparks can cause FIRE OR EXPLOSION.
 - 4.1 Fire and explosion can be caused by hot slag, sparks, oxygen fueled cutting flame, or the plasma arc.
 - 4.2 Have a fire extinguisher readily available. Provide a fire watch when working in an area where fire hazards may exist.
 - 4.3 When not cutting or gouging, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
 - 4.4 Be sure there are no combustible or flammable materials in the workplace. Any material that cannot be removed must be protected.
 - 4.4.1 Sparks and hot materials from cutting or gouging can easily go through small cracks and openings to adjacent areas.

- 4.4.2 Avoid cutting or gouging near hydraulic lines.
- 4.4.3 Do not cut or gouge tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 4.4.4 Vent hollow castings or containers before heating, cutting or gouging. They may explode.
- 4.5 Do not add fuel to engine driven equipment near an area where plasma cutting or gouging is being done.
- 4.6 Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 4.7 Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.
- 4.8 Read and follow NFPA 51B "Standard for Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.
- 5. CYLINDER may EXPLODE if damaged.
 - 5.1 Use only compressed gas cylinders containing the correct gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc., should be suitable for the application and maintained in good condition.
 - 5.2 Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
 - 5.3 Cylinders should be located:
 - Away from areas where they may be struck or subjected to physical damage.
 - A safe distance from plasma cutting or gouging, arc welding operations and any other source of heat, sparks, or flame.
 - 5.4 Never allow any part of the electrode, torch or any other electrically "hot" parts to touch a cylinder.
 - 5.5 Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
 - 5.6 Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
 - 5.7 Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

Cylinder Explosion



Safety First (continued)

Electrical power



6. FOR ELECTRICALLY powered equipment.
 - 6.1 Turn off input power using the disconnect switch at the fuse box before working on the equipment.
 - 6.2 Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
 - 6.3 Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Plasma arc



7. PLASMA ARC can injure.
 - 7.1 Keep your body away from nozzle and plasma arc.
 - 7.2 Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.

Electric and magnetic fields



8. ELECTRIC AND MAGNETIC FIELDS may be dangerous
 - 8.1 Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Cutting or gouging current creates EMF fields around torch cables and cutting machines.
 - 8.2 EMF fields may interfere with some pacemakers, so operators having a pacemaker should consult their physician before cutting or gouging.
 - 8.3 Exposure to EMF fields during cutting or gouging may have other health effects which are now not known.
 - 8.4 All operators should use the following procedures in order to minimize exposure to EMF fields from the cutting or gouging circuit:
 - 8.4.1 Route the torch and work cables together - Secure them with tape when possible.
 - 8.4.2 Never coil the torch cable around your body.
 - 8.4.3 Do not place your body between the torch and work cables. If the torch cable is on your right side, the work cable should also be on your right side.
 - 8.4.4 Connect the work cable to the workpiece as close as possible to the area being cut or gouged.
 - 8.4.5 Do not work next to cutting power source.

9. AUTOMATIC OPERATION

- 9.1 Any CNC machine may begin to operate automatically without warning. Only a trained individual familiar with the software, machine, and computer system should operate this equipment.
- 9.2 Keep the immediate area around the CNC machine clear of materials that may cause interference. Keep area clear of bystanders.
- 9.3 All untrained persons should not work on or near a CNC machine. Do not leave the CNC machine unattended while power is on to any electronics.

10. NOISE

- 10.1 Noise can cause permanent hearing loss. CNC operation, plasma arc cutting, plate marking, routing, and drilling can cause noise levels that exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.
 - 10.1.1 To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs. Protect others in the workplace.
 - 10.1.2 Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- 10.2 For information on how to test for noise refer to the publications section of this manual.

11. HEAVY PARTS

- 11.1 Parts of CNC machines are heavy. Also, material you are cutting may be heavy. Use caution when lifting or moving them. To avoid injury, get someone to help you, or use a mechanical lifter. When using a mechanical lifter, follow all the manufacturer's safety guidelines.
- 11.2 Review the Occupational Safety & Health Administration (OSHA) technical manual Sect. 7, Ch 1.5. See the publications section that follows.

12. FLYING DEBRIS

- 12.1 Metal cutting and marking operations create waste that can fragment and fly. Make sure you have proper eye protection and that everyone close to the CNC operations has proper eye protection, too.
- 12.2 Review the ANSI Z87.1 requirements. See the publications section for additional information.

Automatic operation



Noise



Heavy parts



Flying debris



Safety First (continued)

Pinch & crush points



13. PINCH AND CRUSH POINTS

- 13.1 Pinch and crush points are those normally moving parts of machinery, like CNC machines, that can pinch, capture, crush, or sever parts of your body. Be aware of hazardous pinch and crush points.
- 13.2 Don't repair or adjust the machine with the controls on.
- 13.3 When the end of a CNC machine's travel creates a "hard stop," it creates a crush point. Keep fingers and hands away from this.
- 13.4 Do not stack or store any additional items in contact with the machine. These could create additional pinch or crush points, or could create a falling hazard.

Rotary Tools



14. SHARP ROTARY TOOLS

- 14.1 Routing and drilling use high-speed rotating bits and cutters with sharp edges. Keep clear of bits when in use.
- 14.2 Turn the router, spindle, or drill off when changing bits. Be careful of the sharp edges.

Hot Material



15. HOT MATERIAL

- 15.1 Plasma cutting uses an electric arc that can reach temperatures of 45,000°F (25,000°C). Oxygen-fuel cutting flames can be up to 6,330°F (3,500°C). Any parts and scrap will be very hot after cutting. Use extreme care.
- 15.2 Use tongs and wear protective gloves when handling recently cut material. Also, consider other devices for safe hot material handling.
- 15.3 It is safest to let material cool completely before handling.

Mechanical Drives



16. MECHANICAL DRIVES

- 16.1 High-speed mechanical drives made of gears, belts, and or drive screws are used by CNC machines. Keep clear of them during operation.
- 16.2 Do not attempt to service, adjust, or otherwise touch these components while the machine is on.
- 16.3 Secure any loose clothing and cables to prevent entanglement.

Pressurized Air Lines



17. AIR LINES UNDER PRESSURE

- 17.1 Some tools use compressed air or gases. Often flexible tubing (lines) bring the high-pressure air or gas to the machine. Inspect these lines periodically. Repair or replace damaged lines.
- 17.2 Hot sparks, flying debris, other objects, or vehicles can melt, burn, or puncture these lines. Check them for punctures, burns, or other damage or defects that could cause failure.
- 17.3 Check the routing of the lines to keep them away from traffic and from underfoot.

Refer to the following standards or their latest revisions for more information:

- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
- NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
- CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
- NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
- ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

Other Important Publications

www.torchmate.com

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Updated on: July 10, 2015



Cutting
Systems

Call, fax, or email

- When making the connections and setting up the table if a question or concern arises or a part seems to be missing, please contact Torchmate technical support.
- Technical support will also help you with operating the CNC system, and troubleshooting problems.
- Torchmate technical support is available Monday through Friday, from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone.



Toll Free: 1-866-571-1066
 International: 775-673-2200
 Fax: 775-673-2206
 Email: support@torchmate.com

Call us for Consumables, or visit our web store

The screenshot shows the website interface for Lincoln Electric's Cutting Systems. The main navigation bar includes 'home', 'about us', 'my account', 'contact us', and 'visit torchmate.com'. A search bar is located on the right. The page title is 'Tomahawk 1000' under the 'Lincoln Plasma Consumables' category. A sidebar on the left lists various product categories like 'Lincoln Protective Gear' and 'Thermal Dynamics Plasma'. The main content area displays a grid of 6 product listings, each with a diagram of the consumable and an 'Add To Cart' button. The products include Lincoln Retaining Cap, Lincoln Nozzle (Gouging), Lincoln Nozzle (Shielded Contact), Lincoln Nozzle (Shielded Contact) - 50A, Lincoln Nozzle (Direct Contact) - 40A, and Lincoln Nozzle - 60A. A 'Top Sellers' section on the right features Thermal Dynamics products with their prices and review counts.

Account for parts

www.torchmate.com

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Updated on: July 10, 2015

LINCOLN
ELECTRIC | **Cutting
Systems**
1170 Trademark Drive | Reno, NV 89521 | USA
Phone: 775-673-2200 | 866-571-1066

Page 21

Preparations before assembly

When installing a Torchmate CNC Cutting System in your workshop, there are preparations you can make that influence shop productivity and ease of use of the machine—as well as the safety of the operator. The main factors to prepare for include the physical layout and placement of the machine in the shop and the availability of power, compressed gas or air (or both), and ventilation.

Space

- When preparing to install the Torchmate CNC Cutting System, provide sufficient space for efficient operation. This includes considering the room to safely load and unload the material being cut, and storage for the raw materials and finished products.
- If your system is too far from your material storage or from the stations where additional operations may be performed, it reduces your overall efficiency. A good goal is to arrange a balance between space and efficiency.
- Consider placing the equipment in an area that can handle any expansion, as needed.
- Orient the machine with the Y-axis cable carrier against a wall:



Electrically-powered modules

- The following components of the system must be supplied with power.
 - CNC Control box
 - Plasma power supply (possibly a separate purchase)
 - Computer (possibly a separate purchase)
 - Air compressor (separate purchase)

Power distribution panel circuits

- Always consult with your electrical service provider or a qualified electrician to ensure that each circuit meets the equipment's requirements for power and EMI—and is safe to operate.

Shielding and Grounding

- Many pieces of shop equipment can generate enough high frequency electromagnetic and radio waves to interfere with the operation of the CNC Control box or the computer or both. Consider installing a ground rod near the Torchmate CNC Cutting System to help reduce electromagnetic interference (EMI).
- Always consult with your electrical service provider or a qualified electrician regarding electrical code requirements in your local area for grounding rods and other measures you can take to reduce EMI. For additional information, see the "Shielding and Grounding.pdf" file located on your USB drive, or search Torchmate.com for "EMI."

- Plasma operations and the oxyfuel processes require compressed gas supplies. These may require the placement of gas cylinders, regulators, and lines in the space near the CNC cutting system.
- Leave adequate space for moving empty and replacement cylinders and for safe placement of pressurized and flammable gases well away from the operation of the cutting torch.
- Recognize that smoke and dust are created by the cutting processes. Plan to remove it and to provide a supply of clean air.

Compressed
air and gas

Fumes and smoke



The Lincoln Electric
Modular Extraction Hood
removes dust and smoke.



The Lincoln Electric
Mobile Welding Fume
Extractor with Filtration
can also be positioned
near the cutting area.

- If you know the types of materials and the thicknesses you will be cutting, you can plan to keep a good stock of consumables on hand. This will avoid machine downtime and the scramble to obtain replacement consumables on short notice.
- To order consumables, just call Torchmate Parts Support—or visit our store website.

Consumables

Toll Free: 1-866-571-1066
 International: 775-673-2200
 Fax: 775-673-2206
 Email: parts@torchmate.com
www.TorchmateStore.com



Step by-step setup

These instructions are arranged to be as simple as **A–B–C–D**: **Account** for the parts, **Build** the cutting table, **Connect** the Accumove® controller,, and **Deploy** the selected tools. Each individual step provides a list of parts, instructions for the step, and an illustration.

A-B-C-D sections

- **A steps—Account** for the parts. This includes:
 - Count and identify the parts included in your shipment.
 - Resolve any issues with damaged or missing parts with our **Tech Support** staff at this stage.
 - Arrange the parts in the order that you will use them during assembly (space permitting).
- **B steps—Build** the cutting table. This requires:
 - Mechanically assemble the table sides and gantry.
 - Adjust the table for level and square.
- **C steps—Connect** the Accumove® CNC controller and configure the computer. This involves:
 - Install the VMD software on the computer.
 - Establish communication between the computer and the controller.
 - Connect the table motor cables to the controller.
 - Connect the VFC unit to the plasma cutter and to the controller.
 - Re-adjust the table to get it square and tight by moving the gantry with the software.
- **D steps—Deploy** the selected tooling. The steps here vary by tool type:
 - Mount the tool
 - Run the cable(s), gas lines, etc.
 - Set up the tool in the VMD software

A → B → C → D

Step A1: Accounting for parts

Your Torchmate 5 x 10 Classic Series CNC Cutting System will arrive in a shipping crate. If your order contains additional components such as the optional *Classic 5 x 10 Water Table*, a plasma cutter, or a computer, you will usually receive two or more crates. Please take the time to check your shipment as soon as it arrives. Inspect carefully for freight damage. Check for missing parts. Contact Torchmate Technical Support for any issues or concerns.

Receiving shipping crates and cartons

- Your Torchmate 5 x 10 Classic Series CNC Cutting System is carefully packaged and should arrive in good condition. However, even with the best of precautions, damage during shipping can happen. You can ensure your new product will be ready to use as soon as possible, if you inspect it immediately when it arrives.

Inspect for shipping damage

- Check the crates. If you find any damage, inform the freight company, and contact Torchmate Technical Support.
- As soon as possible after delivery, carefully inspect your shipment. Look for dented, bent, or broken parts. Immediately contact Torchmate Technical Support if any damage is found.

Crates and weights



- The crate containing the cutting table components weighs well over 1,000 lbs. The optional crates will also be very heavy.
- Take care to observe safety procedures when moving and unpacking these crates.

Check for missing parts

- Check that all parts have arrived and that your shipment is complete as soon as possible using the parts checklists on the following pages. If you have purchased the optional water table, check these parts as well. Although we carefully pack your shipment, there is a small possibility that some component or quantity does not correspond to the parts list.
- The parts checklist is arranged in the order of assembly to make layout of the parts easy.

Technical Support



- Contact Torchmate Technical Support if you find any damaged or missing parts. The sooner you call, the sooner any problems can be resolved.
- If you are not sure about something, call us. If you have a question about something, call us.

TECHNICAL SUPPORT

Toll Free: 1-866-571-1066

International: 775-673-2200

Fax: 775-673-2206

Email: support@torchmate.com

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




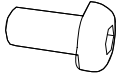



Cutting
Systems



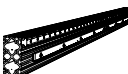

Parts checklist

On the next few pages, the parts included in your Torchmate 5 x 10 Classic Series CNC Cutting System shipment are listed in the order you assemble them. To make it easier to complete the assembly of your cutting system, you can lay out the received parts in this order as you check them against this list.

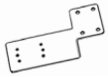
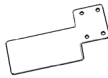



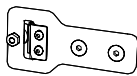


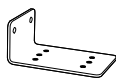
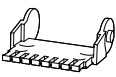
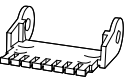



Torchmate Classic Hardware Kit Contents
TMS-144-0052-01

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	160		T-bolt, BSCS, flanged, 5/16"-18 X 5/8"	TMS-410-5016-10	B1
	170		T-nut, 5/16"-18, plain finish	TMS-414-3101-16	B1, B5
	10		Flanged screw, BSCS, 5/16"-18 x 1"	TMS-410-5016-16	B19
	4		Split lock-washer, M10, 18-8 stainless steel	TMS-429-0033-01	B21
	4		Screw, BSCS, M 10 x 1.5 x 25 mm, steel	TMS-429-0034-01	B21
	16		Screw, FSCS, #10-32 x 1/2", hex drive	TMS-410-0111-08	B22
	2		Screw, BSCS, 1/4"-20 x 1/2", hex drive	TMS-410-0214-08	B22
	10		Flanged screw, BSCS, 5/16"-18 x 1/2"	TMS-410-5016-08	B5

Torchmate Classic 5 x 10 Bolt-together
TMS-024-0510-01








<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	20		Gusset, inside corner, 8-hole	TMS-440-0031-01	B1
	6		Assembled leg, 27 ³ / ₈ "	TMS-144-0002-01	B2, B3
	1		Y-axis rail assembly with "side V-rail"	TMS-144-0006-01	B4
	1		Y-axis rail assembly with "top V-rail"	TMS-144-0011-01	B4

Torchmate Classic 5 x 10 Bolt-together
TMS-024-0510-01 (continued)




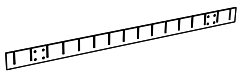
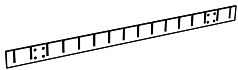


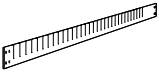
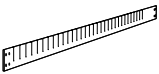


☑	Qty.	Part	Description	Part Number	Step
	1		Cable carrier support bracket for fixed-mount chain end	TMS-144-0009-01	B5
	4		Cable carrier support bracket	TMS-144-0008-01	B5
	4		Cross-member extrusion, 3030 T-slot, 60.000"	TMS-144-0003-01	B10
	1		Carriage assembly for Y-axis, flat	TMS-144-0020-00	B14
	1		Carriage assembly for Y-axis L-angle	TMS-144-0025-00	B14
	4		Limit switch stop assembly	TMS-144-0032-01	B16
	1		X-axis gantry assembly, 4 ft.	TMS-144-0012-01	B19
	1		Swing-arm motor assembly, X-axis	TMS-144-0023-00	B21
	1		Cable carrier moving-mount bracket	TMS-144-0010-01	B22
	2		Cable carrier mount link, pin, 2070-2PZB	TMS-105-0002-24	B22
	2		Cable carrier mount link, socket, 2070-1PZB	TMS-105-0002-23	B22
	1		Cable carrier, 240-07-125—7 ft. (125 mm bend radius)	TMS-105-0002-02	B23
	1		Cable carrier, 240-07-100—6 ft. (100 mm bend radius)	TMS-105-0002-27	B23
	1		4 ft. arched end plate	TMS-144-0028-01	B32

Parts checklist (continued)

Accumove 3 Control Package
TMS-100-2001-01







☑	Qty.	Part	Description	Part Number	Step
	1		Accumove 3 Controller, 4 axis	TMS-407-0072-01	C1
	1		Motor cable, 6P male moles to 6P female JST, 50 ft.	TMS-402-0071-50	C1
	3		Motor cable, 6P male molex to XLR female, 50 ft.	TMS-402-0070-01	C1
	1		Accumove VFC height control	TMS-101-1100-01	C2
	1		Accumove VFC height control cable, 25 ft.	TMS-103-5000-01	C2
	As req'd.		Circuit grounding wire, 18 to 22 ga	<i>(customer supplied)</i>	C2
	1		Plasma power supply with CNC interface cable, plasma cable, and work cable	<i>(separate purchase)</i>	C3
	1		Terminal block plug, 2 pos., 5.08 mm	TMS-403-0076-01	C3
	1		Accumove input cable	TMS-103-5000-01	C3
	1		Arc voltage Ohmic Cable	TMS-101-1109-01	C3, C4
	1		Limit switch input cable	TMS-402-0074-01	C4
	1		Magnetic breakaway cable	TMS-103-5000-06	C4
	1		Crossover Ethernet cable	TMS-103-5000-07	C5
	1		AC power cable	TMS-402-0069-01	C5
	1		Laptop or PC with Microsoft® Windows® 10, Windows 8, or Windows 7	<i>(separate purchase)</i>	C5
	1		USB flash drive with VMD software and Torchmate Classic manuals and more.	TMS-100-1000-11	C6

Torchmate Classic 5 x 10 Slat Support Kit Contents
TMS-144-0035-01

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	64		T-nut, 5/16"-18, plain finish	TMS-414-3101-16	B4, B11
	80		T-bolt, BSCS, flanged, 5/16"-18 X 5/8"	TMS-410-5016-10	B27, B28, B29
	12		Slat support bracket	TMS-144-0033-00	B27
	2		Slat support - 2'	TMS-102-1000-02	B28
	4		Slat support - 4'	TMS-102-1000-03	B28
	4		Middle slat support L-bracket	TMS-144-0051-01	B29
	16		Screw, FSCS, #10-32 x 1/2, hex drive	TMS-410-0111-08	B22
	1		Middle slat support, A (long)	TMS-102-1000-23	B30
	1		Middle slat support, B (short)	TMS-102-1000-22	B30
	12		Screw, BSCS, flanged, 5/16-18 x 1	TMS-410-5016-16	B30
	12		Nylock nut, 5/16-18, zinc-plated steel	TMS-414-0201-16	B30

Technical Support

Additional required equipment and tools

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number
N.A.	1		19 mm wrench	<i>{from your toolkit}</i>
N.A.	1		5/8" wrench	<i>{from your toolkit}</i>
N.A.	1		17 mm socket / wrench	<i>{from your toolkit}</i>
N.A.	1		5/32" to 1/4" hex key set	<i>{from your toolkit}</i>
N.A.	1		Tape measure, level, square, and screwdriver	<i>{from your toolkit}</i>
N.A.	1		Battery power for computer (Uninterruptible power supply or UPS) – with surge protection	<i>{recommended separate purchase}</i>

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Auto-Cut XT301 Torch

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Thermal Dynamics XT301 Plasma Tip, 55A MS, (pkg of 5), #35-1051

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Thermal Dynamics XT301 Plasma Gas Distributor, 200A #35-1046

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Top Sellers

1

NO IMAGE AVAILABLE

Thermal Dynamics 80 Amp Tips, .P/N: 9-8211 (Comes in Packages of 5)

\$27.75

[more details](#)

2

NO IMAGE AVAILABLE

Thermal Dynamics Electrode, .P/N: 9-8215. (Comes in Packages of 5)

\$40.15

[more details](#)

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Cutting Systems

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Build the cutting table

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Systems**
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Page 31

Building the cutting table—overview

In the following steps, you will assemble the Torchmate Classic CNC Cutting System table. This table precisely controls the motion of a plasma torch or of other tools. A number of steps are required for **Building**. Additional steps will be used in **Connecting** the controller to the table, **Deploying** tools, and **Extending** the functionality with an (optional) Torchmate Water Table.

Torchmate
Water Table
Option?



- **Note:** If you have purchased an optional Torchmate Water Table, please refer to the Assembly Instructions included with that product, and assemble the water table completely before assembling the Torchmate Classic CNC Cutting System frame.

Because the water table is optional, and attached to the Classic table, certain steps in the following assembly instructions will be different with or without water tables. Look for the **water drop** icon that indicates special procedures for integrating the water table.

Building steps

- Assemble the cutting table by following these easy **Building** steps. Allow about 4 to 5 hours:

Step B1: Build the leg gusset assemblies	Step B17: Position carriages against stops
Step B2: Build the middle legs	Step B18: Engage carriage spur gears with gear racks
Step B3: Build the corner legs	Step B19: Lower gantry onto frame and secure to carriages
Step B4: Add T-nuts to Y-axis extrusions for later use	Step B20: Move gantry from end-to-end while tightening "top V-rail"
Step B5: Assemble cable carrier brackets	Step B21: Attach X-axis carriage
Step B6: Add middle leg and cable carrier brackets to "top V-rail" extrusion	Step B22: Attach cable carrier end brackets
Step B7: Build side with "top V-rail"	Step B23: Attach cable carrier links
Step B8: Build side with "side V-rail"	Step B24: Prepare cable carriers for cables and stretch out the cables
Step B9: Add gussets to both side assemblies	Step B25: Attach the cables to the table, then route through the cable carriers
Step B10: Attach cross members to side with "side V-rail"	Step B26: Run cables to their destinations
Step B11: Add T-nuts to both upper cross-members for later use	Step B27: Add side slat support brackets
Step B12: Attach cross members to "top V-rail" side	Step B28: Add side slat supports
Step B13: Square and level frame	Step B29: Add end slat support brackets
Step B14: Add gantry carriages to both V-rails	Step B30: Add center slat support
Step B15: Loosen the "top V-rail" and adjust V-wheel eccentrics	Step B31: Add (customer-supplied) slats
Step B16: Attach gantry travel stops	Step B32: Add face plates to table ends

- The C-steps follow with steps to Connect the controller and power source to the cutting table—with detailed wiring diagrams.
- The D-steps are for **Deploying** tooling options, such as a plate marker or laser crosshairs.

~1400 lbs
~600 kg



- The completed CNC cutting table is sturdy and heavy-duty, so that it can precisely and accurately move the torch and support your material.
- After being removed from the crate and assembly, the combined weight of the table components is approximately 1,400 lbs (600 kg), before adding slats, and approximately 1,700 lbs (775 kg) after adding slats.
- **Do not** drag the cutting table when moving it to a new location.
 - If you drag the CNC cutting table / water table , you can damage it and get it out of square.
- **Do not** try to move the cutting table without mechanical help whether or not a water table is being used.
 - Even if you must only re-position the CNC cutting table / water table slightly or move it to an entirely new location, drain all the water and use the proper equipment to carefully lift it.

Other required steps




Weight of completed
CNC cutting table



Step B1: Build leg gusset assemblies

To assemble the Torchmate Classic 5 x 10 Cutting System, with its extruded aluminum channel frame, you use the 8-hole gussets to connect the main components. Begin by preparing the gussets with their T-nuts and T-bolts.

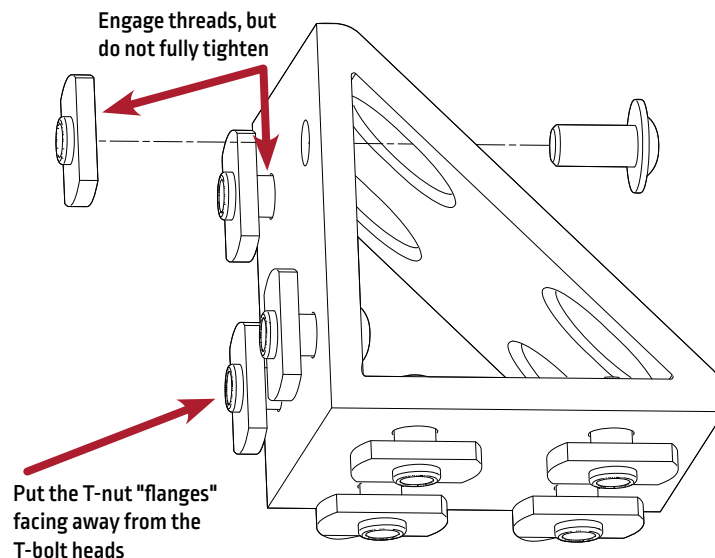
Required parts / components

Qty	Part	Description	Part #
20		Gusset, inside corner, 8-hole	TMS-440-0031-01
160		T-bolt, BSCS, flanged, 5/16"-18 X 5/8" long	TMS-410-5016-10
160		T-nut, 5/16"-18, plain finish	TMS-414-3101-16

Instructions



- Prepare each of the gussets by adding 8 T-bolts and 8 T-nuts.
- Insert the T-bolts through the holes in the diagonal face, and add the T-nuts to each bolt.
- Orient the T-nuts so that the "flange" containing additional threads faces away from the T-bolt heads (that is, they should face away from the entire assembly).
- Engage the threads so that the T-nuts do not fall off, but leave them loose so that they may easily slide into the extrusion slots in the next step.

Illustration



Step B2: Build middle legs

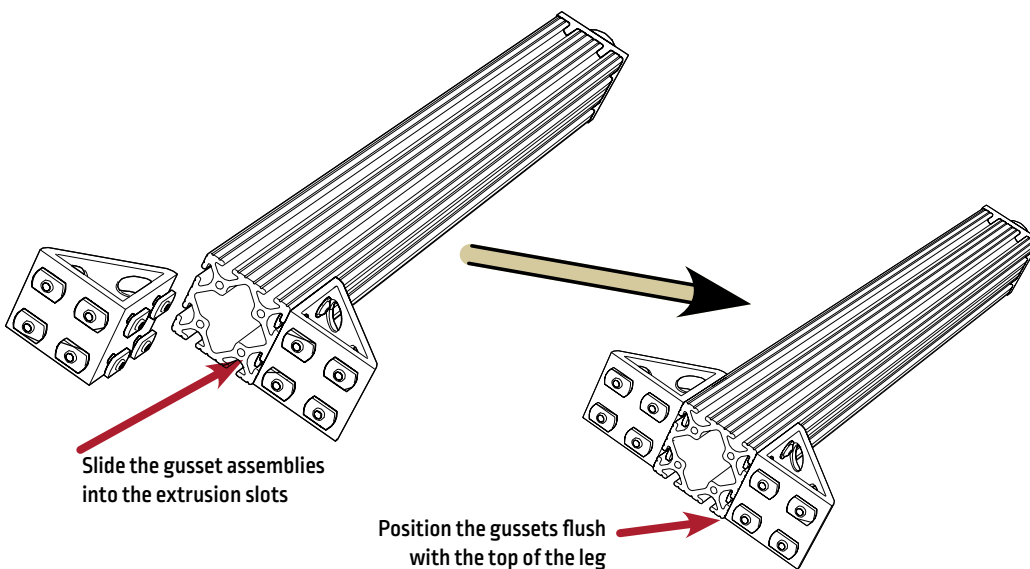
Build the table's two middle legs with two upper 8-hole gusset assemblies. Slide the gussets into the leg extrusions, facing opposite directions flush with the extrusion top, then tighten their T-bolts

Qty	Part	Description	Part #
2		Assembled leg, 27 ³ / ₈ "	TMS-144-0002-01
4		Assembled leg gusset assemblies	From Step B1

Required parts /
components

- Add two gusset assemblies to each of two leg extrusions.
 - Put the assemblies on opposite sides and set them flush with the top of the extrusion. Tighten the T-bolts to hold them securely.

Instructions





Illustration

Step B3: Build corner legs

Build each of the table's four corner legs with two upper and one lower 8-hole gusset assemblies. Slide these into the leg extrusions, facing opposite directions on top, and a third direction on the bottom.

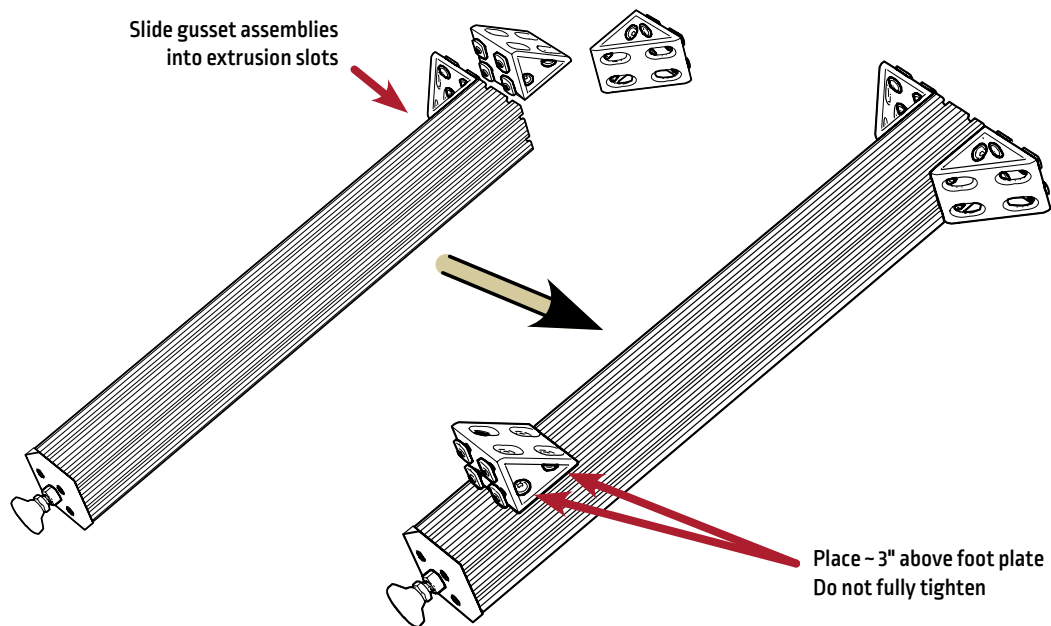
Required parts / components

Qty	Part	Description	Part #
4		Assembled leg, 27 ³ / ₈ "	TMS-144-0002-01
12		Assembled leg gusset assemblies	From Step B1

Instructions

- Add three gusset assemblies to each of four leg extrusions, sliding them down from the leg top.
 - Put the top two on opposite sides and set them flush with the top of the extrusion. Tighten the T-bolts to hold them securely.
 - Add the third gusset on one of the other sides, leaving enough room to add the cross-member extrusion in a later step. The T-bolts should be snug but not tight, to allow adjustment later.

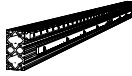
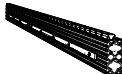

Illustration



Step B4: Add T-nuts to Y-axis extrusions for later use



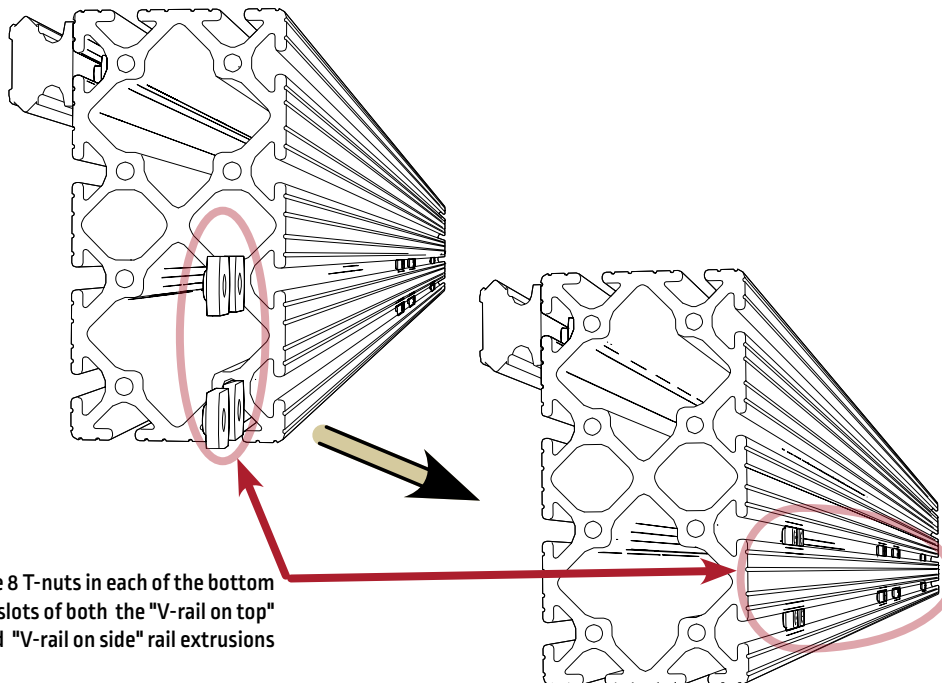
If you are assembling a *Classic 5 x 10 Water Table* as an option, you can skip this step. There are two different Y-axis rails: one with motion control rail on top, and one with a motion control rail on the side. For this step, you will add T-nuts to both Y-axis rails to be used for adding slat supports in a later step. Perform this assembly with the parts flat on the floor where you want your table installed.

Qty	Part	Description	Part #
1		Y-axis rail assembly with "side V-rail"	TMS-144-0043-01
1		Y-axis rail assembly with "top V-rail"	TMS-144-0044-01
32		T-nut 5/16"-18, plain finish	TMS-414-3101-16

Required parts / components

- If you have purchased the optional *Torchmate Classic 5 x 10 Water Table*, this step is not needed. Otherwise, slat system support brackets will later be installed using these T-nuts.
- With the rails on the floor, slide 8 T-nuts into the each of the bottom two slots in each of the side rail extrusions (32 T-nuts in total).
 - Note that the gear rack occupies one of the lower slots on the opposite side of the rail, indicating the other side's slots should be used.
 - The T-nuts should slide freely, so be careful that they do not fall out during later steps.

Instructions



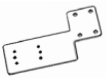
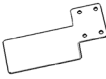


Illustration

Slide 8 T-nuts in each of the bottom two slots of both the "V-rail on top" and "V-rail on side" rail extrusions

Step B5: Assemble cable carrier brackets

The cable carriers keep motor cables, plasma cables, and signal cables in order. This protects them during machine operation. The cable carrier brackets support the cable carrier links and cables which will be added in a later step. In this step, T-nuts and T-bolts are added to the two bracket types, so that they may be inserted into the rail with the "top V-rail" during the next step.

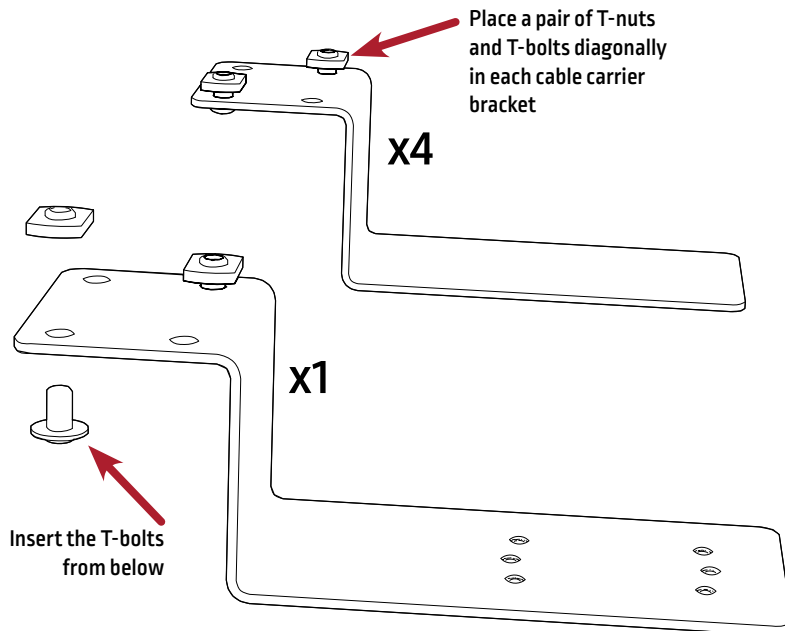
Required parts /
components

Qty	Part	Description	Part #
1		Cable carrier support bracket for fixed-mount chain end	TMS-144-0009-01
4		Cable carrier support bracket	TMS-144-0008-01
10		Flanged screw, BSCS, 5/16"-18 x 1/2"	TMS-410-5016-08
10		T-nut, 5/16"-18, plain finish	TMS-414-3101-16

Instructions

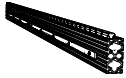



- The end position of the cable carrier links has a "fixed-mount" link. This link will be mounted to the cable carrier support bracket which has holes for this purpose.
- There are 4 mounting holes on each of the 5 cable carrier support brackets. Combine a T-nut and T-bolt in two of the mounting holes, diagonally.
- Get the threads started on the T-nuts, but don't tighten them yet.

Illustration



Step B6: Add middle leg and cable carrier brackets to "top V-rail" extrusion

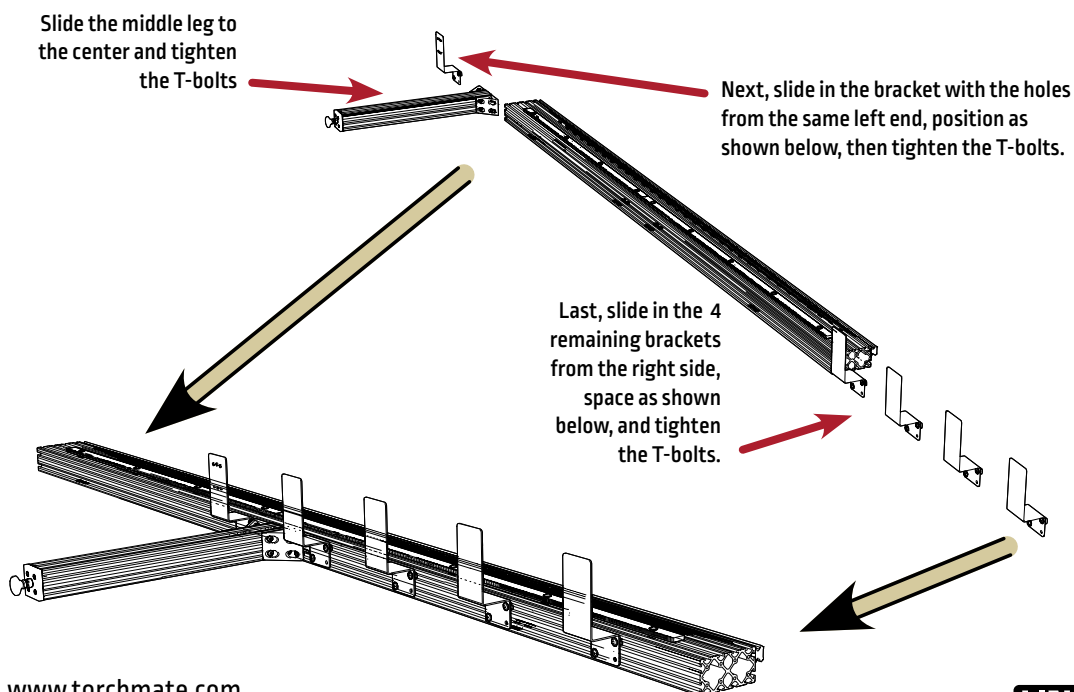
When adding the cable carrier brackets to the bottom of the "top V-rail" extrusion, take care to get the brackets oriented correctly and placed correctly relative to the middle leg. The cable carrier bracket with the holes for mounting the end link in the cable carrier chain goes on one side of the leg, while the other brackets go on the other side.

Qty	Part	Description	Part #
1		Rail with "top V-rail"	From Step B4
1		Middle leg assembly	From Step B2
1		Cable carrier chain end assembly	From Step B5
4		Cable carrier assembly	From Step B5

Required parts / components

- Begin by laying the extrusion on the floor with the "top V-rail" facing away from you and the gear rack facing up. Slide the middle leg's T-nuts into the slots on the bottom of the extrusion. Position the leg in the center of the extrusion. Tighten the T-bolts.
- Next slide the cable carrier bracket with the holes (for the chain end "fixed-mount" link) in from the left side and bring it near the leg as shown below. Tighten the T-bolts.
- Slide the remaining four cable carrier support brackets in from the right, spacing them as shown, and tighten the T-bolts.

Instructions





Illustration

Step B7: Build side with "top V-rail"

The assembly of the table's side with the "top V-rail" is completed when you add the corner legs to each end of the extrusion. This step is made easier if you use an object to elevate the end of the middle leg, so that the lower gussets on the corner legs (which face downward) will not cause binding of the T-nuts.

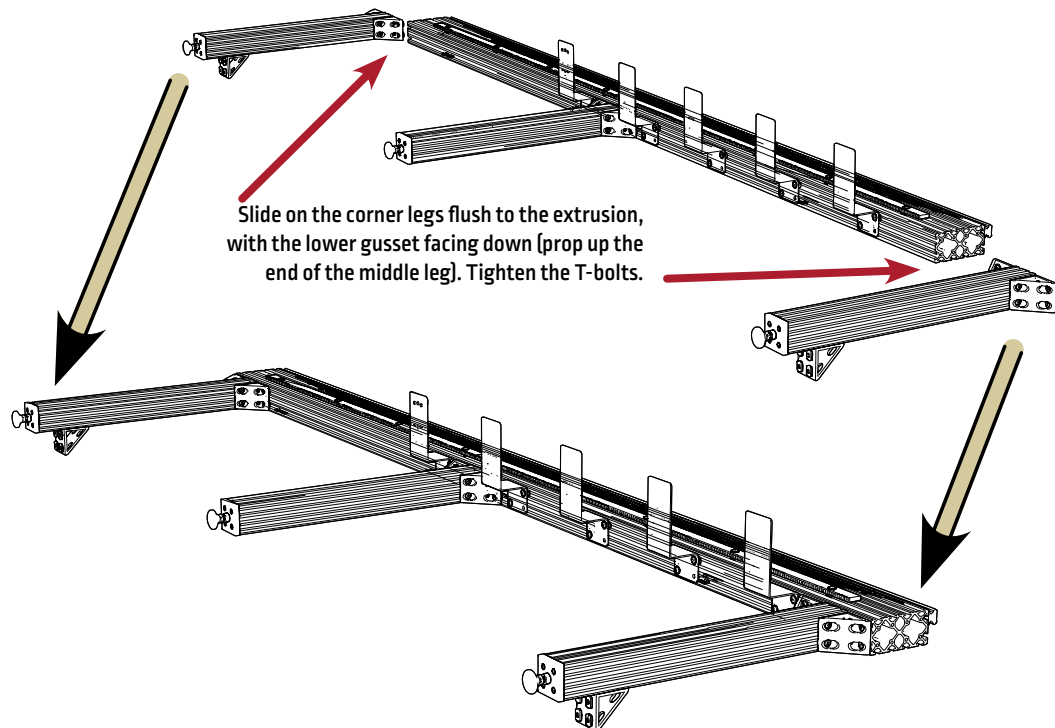
Required parts / components

Qty	Part	Description	Part #
1		"Top V-rail" assembly with middle leg and cable carrier brackets	From Step B6
2		Corner leg assemblies	From Step B3

Instructions

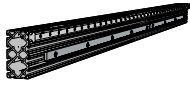


- Prop up the end of the middle leg to a height of about 3".
- Slide a corner leg onto each end of the extrusion, bringing the edge of the gusset flush with the edge of the extrusion.
- Tighten the T-bolts.
- Stand the side on its feet making room to build the other side.

Illustration



Step B8: Build side with "side V-rail "

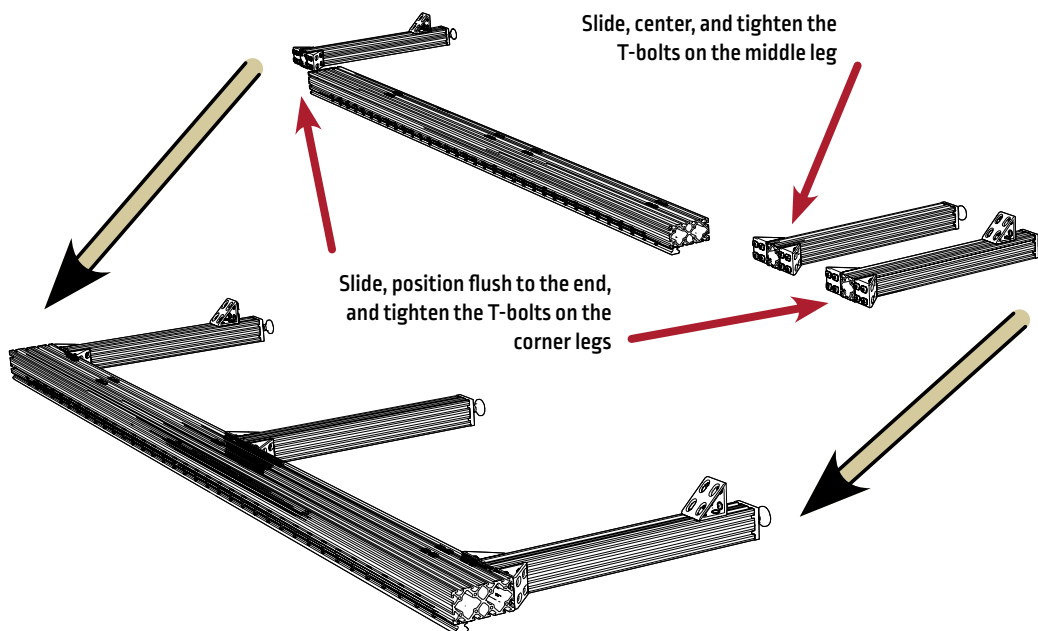
Add the middle leg to the center of the extrusion and the corner legs to the end of the extrusion by sliding in the T-nuts of the gussets, positioning the legs, and tightening the T-bolts.

Qty	Part	Description	Part #
1		Y-axis rail assembly with side rail	From Step B4
2		Corner leg assembly	From Step B2
1		Middle leg assembly	From Step B3

Required parts / components

- Lay cardboard or a blanket on the floor to protect the machined components from damage, then lay the "side V-rail" extrusion on the floor with the rail and gear rack down.
- Using the same technique used on previous steps, slide the legs into the bottom extrusion slots: one middle leg and two corner legs.
 - Center the middle leg and tighten its T-bolts.
 - Position the corner leg lower gussets facing up. Bring the edges of the upper gussets flush with the end of the extrusion. Tighten the T-bolts.
- Leave the side on the floor for the next step.

Instructions






Illustration

Step B9: Add gussets to both side assemblies

In this step, you add gussets for attaching the cross-members to the frame. The lower leg gussets are already in place. Place the upper gussets so they are aligned with the lower leg gussets and with the leg assembly extrusion. Do this for both the side being assembled on the floor and also for the other side previously assembled.

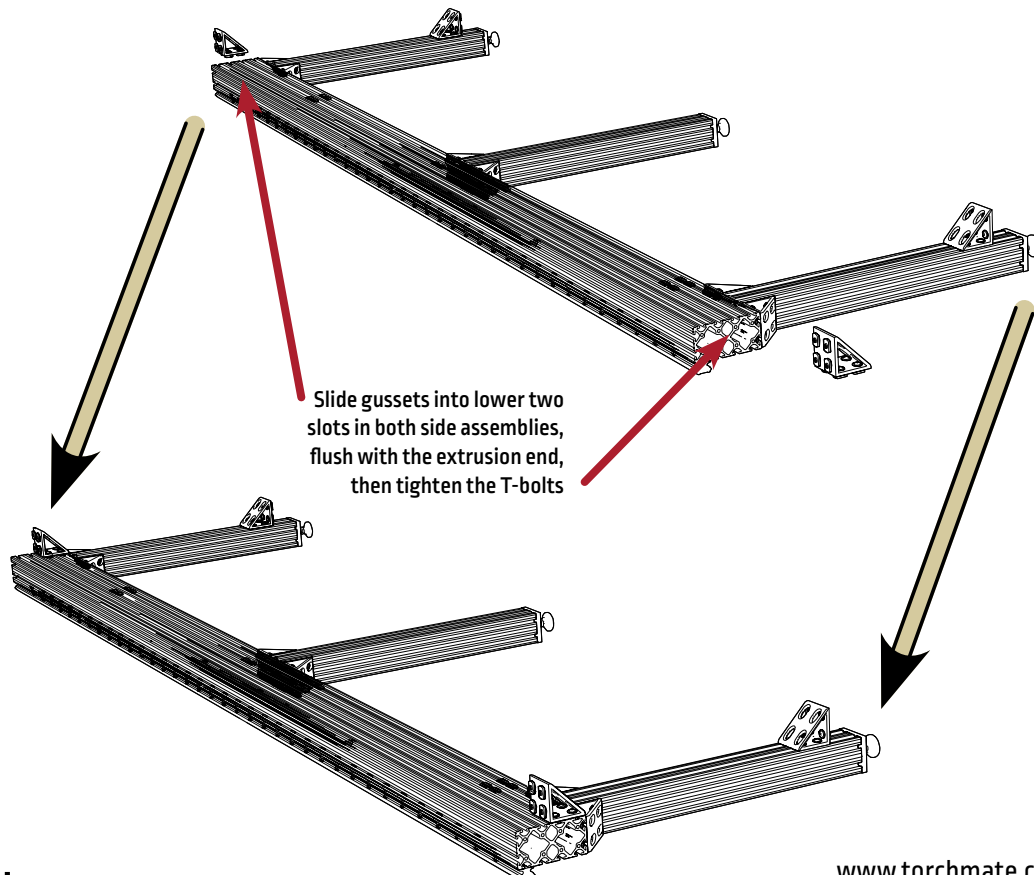
Required parts / components

Qty	Part	Description	Part #
1		Side assembly with "top V-rail"	From Step B7
1		Side assembly with "side V-rail"	From Step B8
4		Assembled leg gusset assemblies	From Step B1

Instructions

- Take care to remember the T-nuts previously inserted in the slots. Make sure they do not fall out. They will be held in place by the gussets.
- Add gussets to both ends of each side assembly in the lower two slots of the extrusion.
- Align the gussets with the leg assembly extrusions and tighten the T-bolts

Illustration



Step B10: Attach cross-members to side with "side V-rail"

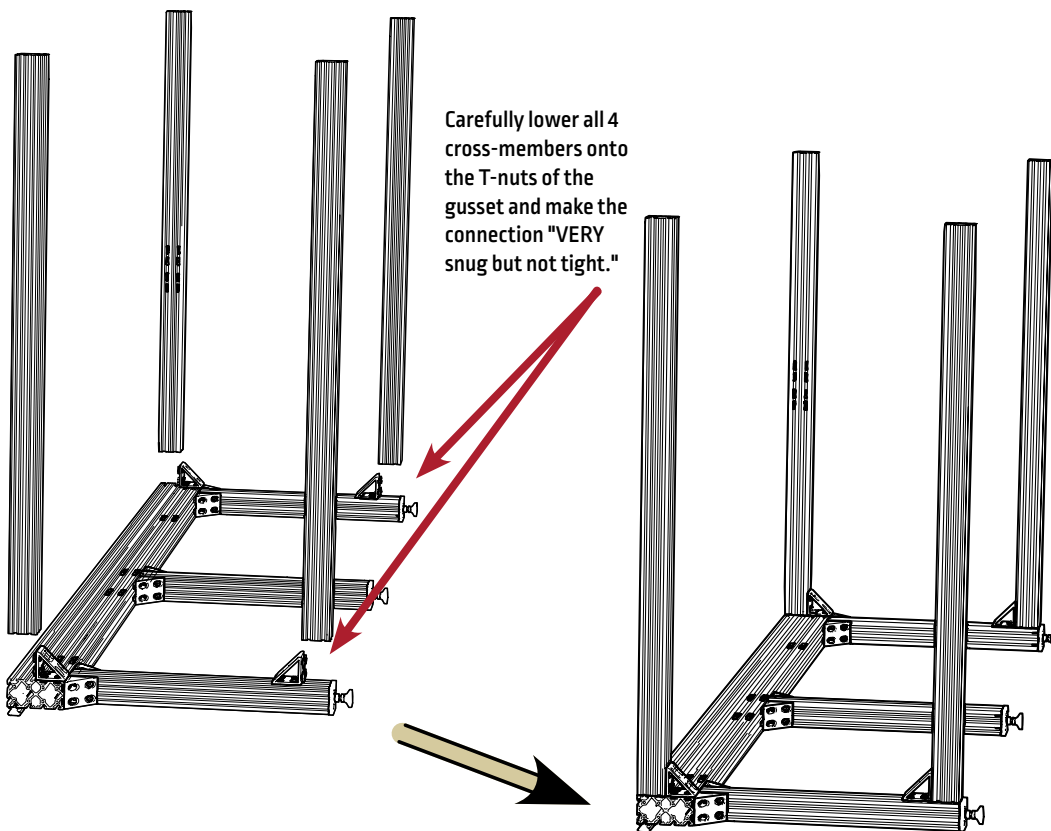
This step and several of the following steps may require some assistance. In this step, add the cross-members to the side assembly with the "side V-rail" that's on the floor. These extrusions will be near vertical but can exert strong forces when they vary from vertical. Slide the extrusions over the gusset T-nuts and get them very snug, but not tight.

Qty	Part	Description	Part #
1		Side assembly with "side V-rail"	From Step 9
4		Cross-member extrusion, 3030 T-slot, 60.00"	TMS-144-0003-01

Required parts / components

- For this step, it can be helpful to shim under the side assembly so it is level in both directions.
- Please **exercise caution** not to drop the cross members or let them fall over.
- Insert each cross member over the T-nuts in the gussets on the sides, as illustrated below.
- Tighten the T-bolts on the gussets very snug, but not tight, as adjustment is part of a later step.

Instructions



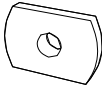

Illustration



Step B11: Add T-nuts to both upper cross-members for later use

If you are using the built in material support slat system, you will need to perform this step. If you have purchased the *Torchmate Classic 5 x 10 Water Table* option, you may skip this step. In this step, T-nuts are added to the cross member slots.

Required parts / components

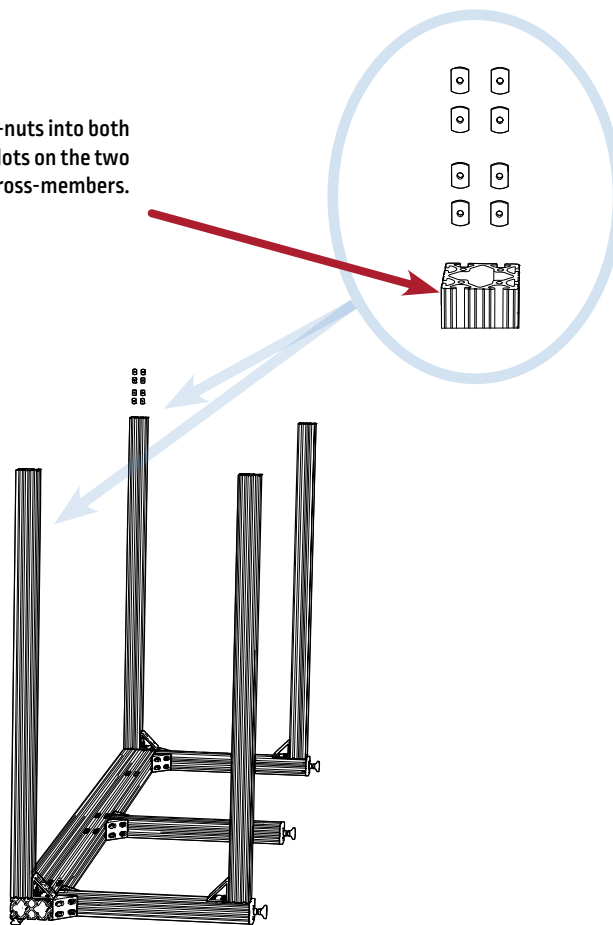
Qty	Part	Description	Part #
16		T-nut, 5/16"-18, plain finish	TMS-414-3101-16
1		Side with cross-members	From Step B9

Instructions

- Drop four T-nuts into each of the inward-facing slots on each of the top cross-members. These T-nuts remain loose until they are connected in a later step.



Illustration

Insert four T-nuts into both inward facing slots on the two top cross-members.

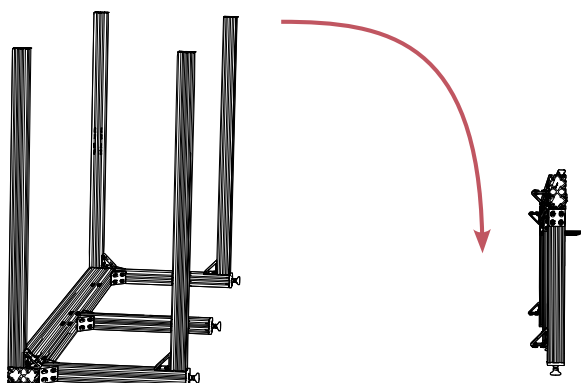


Step B12: Attach cross-members to "top V-rail" side

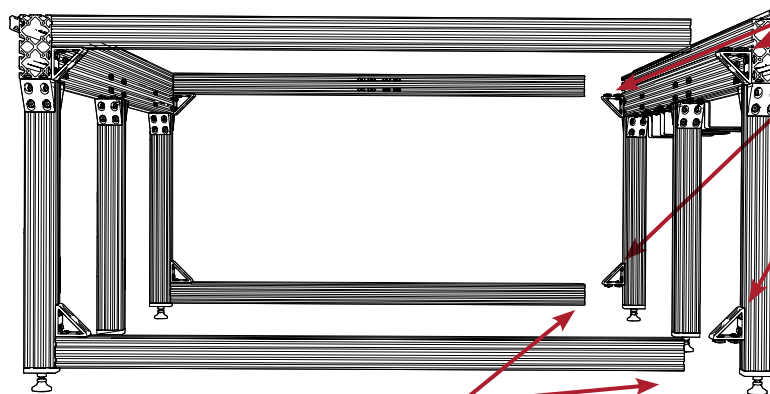
You will need some assistance at this step. Exercise some care as you tilt the side with the cross-members over so that it rests on its feet. It is recommended that you rest the cross-member ends on blocks to level them. Slide the other side into place by placing the side's gusset's T-nuts into the slots in the cross members. Then tighten the T-bolts so they are snug, but not tight.

Qty	Part	Description	Part #
1		Side assembly with cross-members	From Step B11
1		Side assembly without cross-members	From Step 9

- **CAUTION:** Get some help to perform this step. At this stage, the table frame is heavy enough to require two or more people to tilt it over safely.
- After lowering the table and supporting the cross-members on blocks, slide the side and cross-members together. Then tighten the T-nuts.



After lowering the cross-members into position, with help, gradually slide the gusset T-nuts from the "top V-rail" side into the cross-members, front and back, and tighten snugly



Support cross-members with blocks here.

Required parts / components



Instructions

Illustration

Step B13: Square and level frame

The control of your Torchmate Classic CNC Cutting System depends on having not only a base that is stable, but that has consistent and reliable dimensions. By applying your measuring and adjustment skills, your table can be made level and square.

Required parts / components

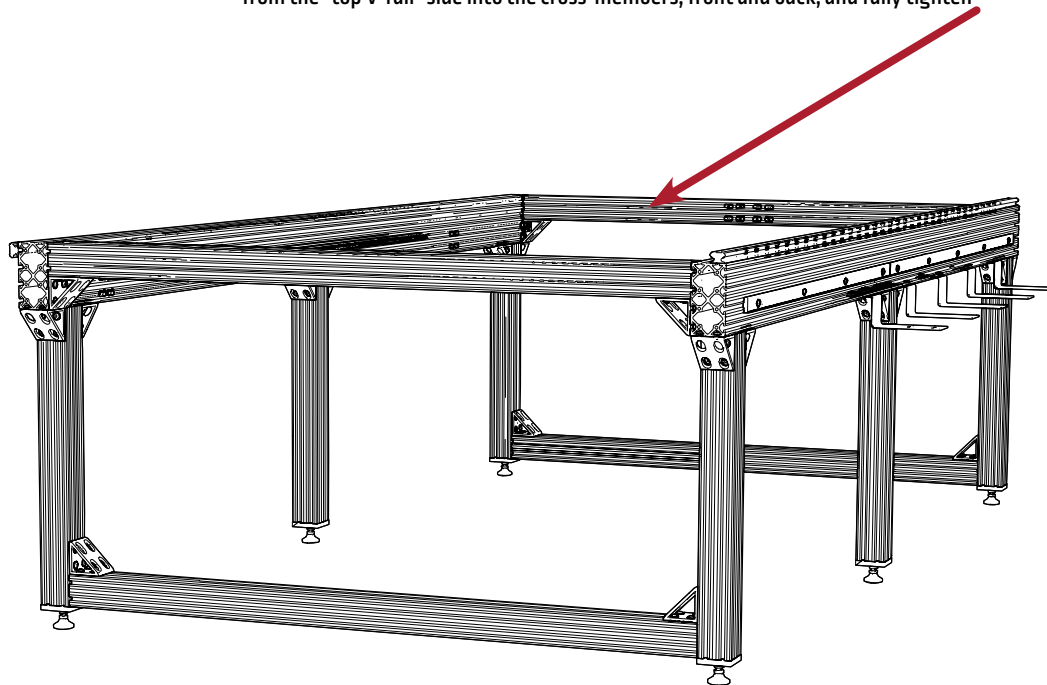
Qty	Part	Description	Part #
1		Completed table frame assemble	From Step B11
1		Square and level tools	From your toolbox

Instructions

- Begin by adjusting the heights of all legs to 36"
- Use a spirit level (or better) to adjust your table for level.
 - Raise and lower the leveling feet to achieve level in both the rails and the cross-members.
 - Some adjustment of the cross member gussets may be required
- Use a good carpenter's square (or better) to measure the corner square
- Measure across the diagonal corners of the table. Make adjustments as required.




Illustration

After lowering the cross-members into position, with help, gradually slide the gusset T-nuts from the "top V-rail" side into the cross-members, front and back, and fully tighten



Step B14: Add gantry carriages to both V-rails

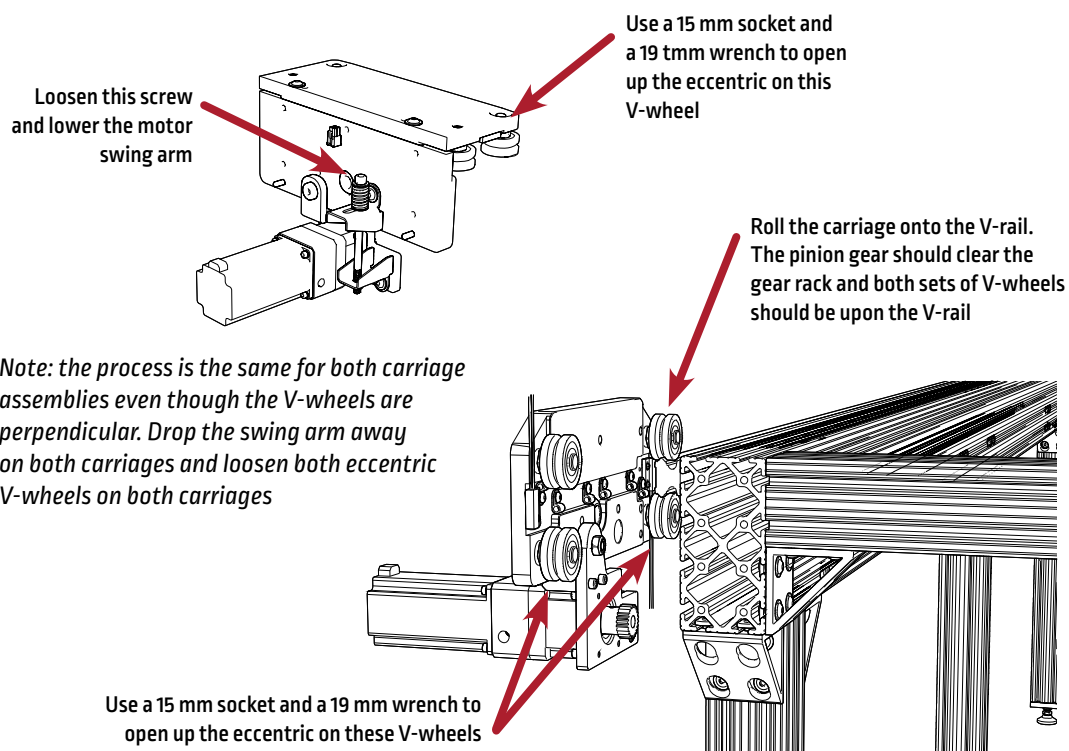
There is a different gantry carriage for each side of your table: one for the "top V-rail" side and another for the "side V-rail" side. For this step, engage the V-wheels on each carriage with the corresponding V-rail.

Qty	Part	Description	Part #
1		Completed and leveled table frame assemble	From Step B11
1		Carriage assembly for Y-axis, flat	TMS-144-0020-00
1		Carriage assembly for Y-axis L-angle	TMS-144-0025-00

Required parts / components

- Both the flat and L-angle carriage assemblies have a spring-retained motor swing arm and also both have a set of eccentric V-wheels. The swing arm is used to control gear-rack engagement of the motor pinion gear, and the eccentric V-wheels set the clearance with the V-rails.
- Drop down the swing arm by fully loosening the spring-loaded screw.
- Use a wrench and socket to adjust the eccentric V-wheel enough to allow it to move.
- Roll both carriages onto their respective V-rails until they are fully on the rails.

Instructions




Illustration

Step B15: Loosen the "top V-rail" and adjust V-wheel eccentrics

To ensure your gantry travels on parallel rails, adjust the position of one of the rails with respect to the other. By loosening each mounting screw on the "top V-rail" until the rail is just movable, you will make the adjustment for the length of the table once the gantry is mounted. You also adjust the tightness of the V-wheel eccentrics.

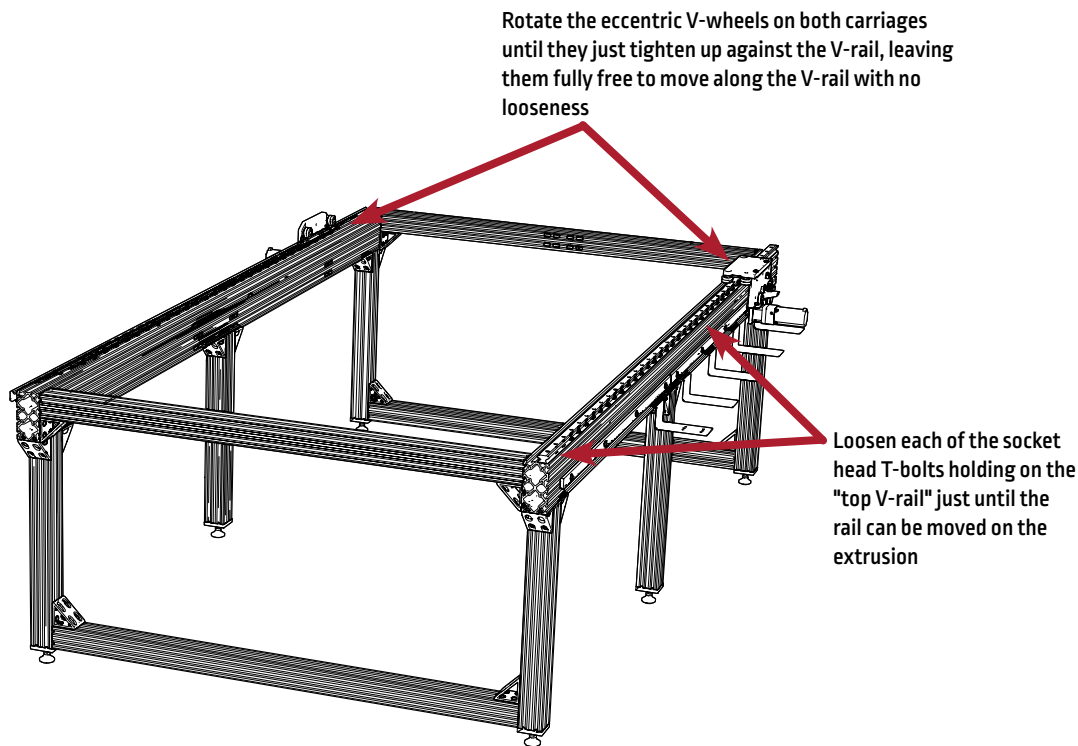
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with gantry carriages	From Step 14

Instructions


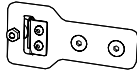
- This step consists of two related sub-steps, both of which involve the adjustment of the table's Y-axis movement:
 - First, adjust the tightness of the V-wheels against the V-rail. You want the V-wheel tight enough to show no looseness, but loose enough to eliminate any mechanical binding. The adjustment is made with the 15 mm socket and the 19 mm wrench on both eccentric wheels on both carriages.
 - Check the eccentric wheel tightness by running the carriages up and down the rails by hand. A pull of 2 to 5 lbs should easily move each carriage.
 - Second, loosen up the bolts holding the "top V-rail" against the extrusion. The position of this rail will be tightly set after the gantry is in place, but for now, it should be able to be adjusted.

Illustration



Step B16: Attach gantry travel stops

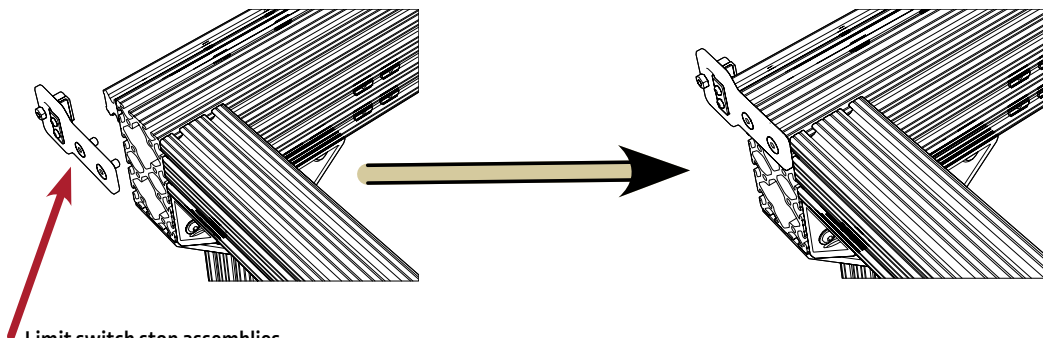
The gantry travel stops prevent the gantry from exceeding its travel limits and also function as the supports for the limit switch actuators. The stops are positioned at each end of the Y-axis rails. Mount the stops with their assembly hardware in the threaded holes in the ends of the rail extrusions.

Qty	Part	Description	Part #
1		Table frame assembly with gantry carriages	From Step 15
4		Limit switch stop assembly	TMS-144-0032-01

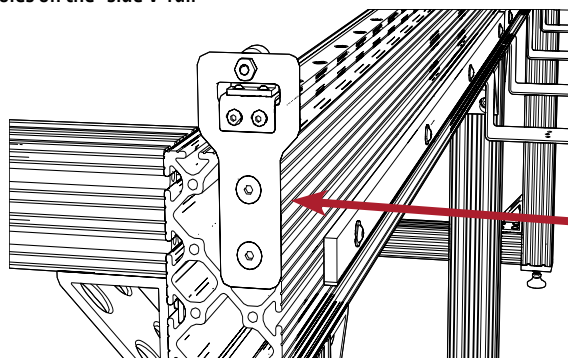
Required parts / components

Instructions

- Install the four limit switch stop assemblies at each corner of the table. The holes in the extrusion are pre-tapped.
 - Two stops mount vertically on the outer edge of the "top V-rail."
 - Two stops mount horizontally on the upper edge of the "side V-rail."



Limit switch stop assemblies mount horizontally in the top two holes on the "side V-rail" side.



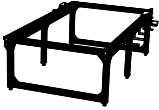
On the "top V-rail" side, the limit switch stop assemblies mount vertically in the outer holes

Illustration

Step B17: Position carriages against stops

With the stops in place, roll the carriages up to the stop at the front end of the table. This will be the position they will be in when you lower the gantry onto them in a following step.

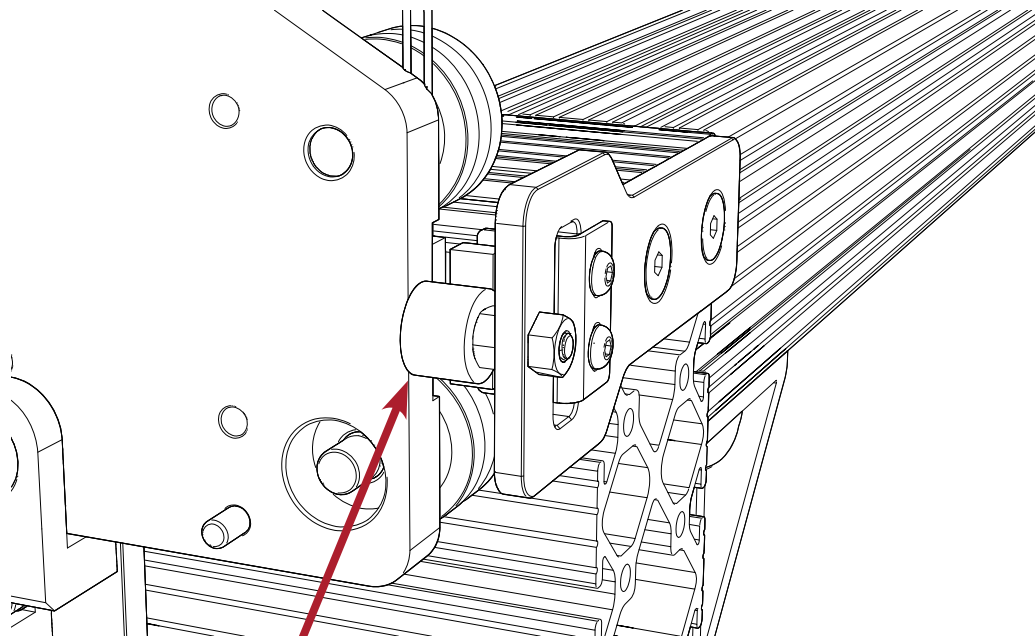
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with limit switch stops installed	From Step 16

Instructions

- This simple step involves only rolling the gantry carriages up to the stops at the front end of the table.




Illustration



The gantry carriage at the other rail will just contact the limit switch stop, as this one does

Step B18: Lower gantry onto frame and secure to carriages

The pre-assembled gantry must now be lowered onto the frame. You will need help to perform this step, as the gantry is heavy. As you lower the gantry, be careful not to pinch your fingers. The gantry initially rests on pins that project from the carriages. You will then add screws that will fully secure the gantry to the carriages.

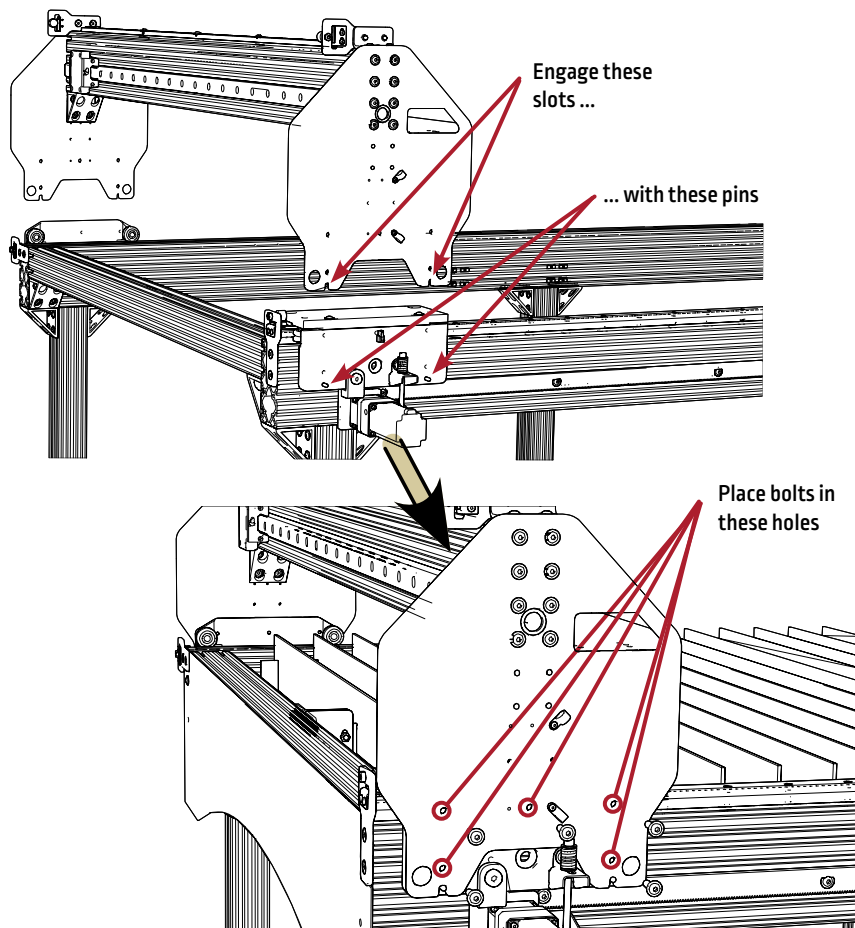
Qty	Part	Description	Part #
1		Table frame assembly with gantry carriages against limit switch stops	From Step 17
1		X-axis gantry assembly, 5 ft.	TMS-144-0045-00
10		Flanged screw, BSCS, 5/16"–18 x 1"	TMS-410-5016-16

Required parts / components

- Be sure the top rail is loose and pushed toward the center.
- With help, lower the gantry assembly onto the carriages.
- Engage the pins, then secure with screws.

Instructions

Illustration



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Step B19: Move gantry from end-to-end while tightening "top V-rail"

In a previous step, you loosened the bolts holding the "top V-rail" to its extrusion. Now with the gantry installed, you can align the loosened rail to the "side V-rail" by moving the gantry slowly from end-to-end, tightening the rail bolts as you go.

Required parts / components

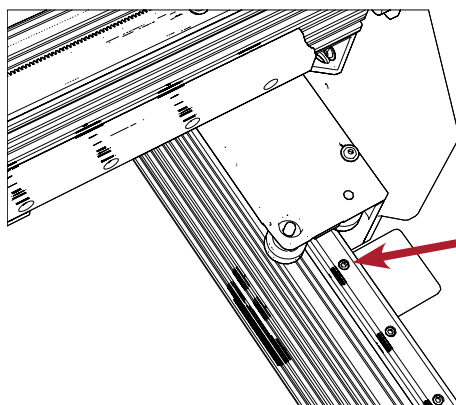
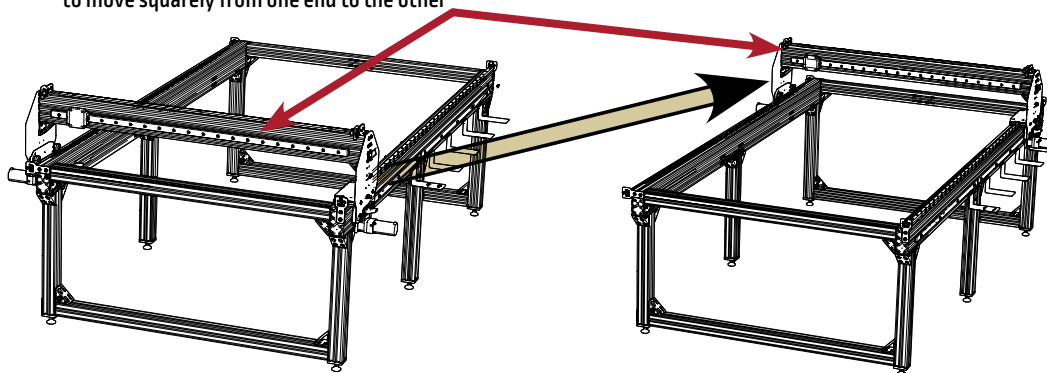
Qty	Part	Description	Part #
1		Table frame assembly with gantry	From Step 19

Instructions

- Pushing evenly, move the gantry the full length of the table several times to adjust the rail position.
- Begin at the front, where you installed the gantry, tighten the rail bolts on the "top V-rail" nearest to the gantry.
- Then, slowly move the gantry toward the back. This should require very little effort, as motion should be smooth and free.
- Allow the rail to adjust its position under the gantry. As each new bolt is approached, tighten the bolt to hold the adjusted position.
- After tightening the entire rail, roll the gantry from one end to the other several additional times to check for binding, removing any found.

Illustration


Smoothly pull or push the middle of the gantry to move squarely from one end to the other



Tighten these bolts to secure the rail as you move it from end to end, ensuring no binding

Step B20: Engage carriage spurs gears with gear racks

The engagement of the motor gears and the gear rack is controlled by spring-loading the motor swing arm. The spring keeps the gears engaged, even as they wear. This initial adjustment should be checked several times during initial operation, as the parts go through their initial "break-in" period. Later, the adjustment should be infrequent.

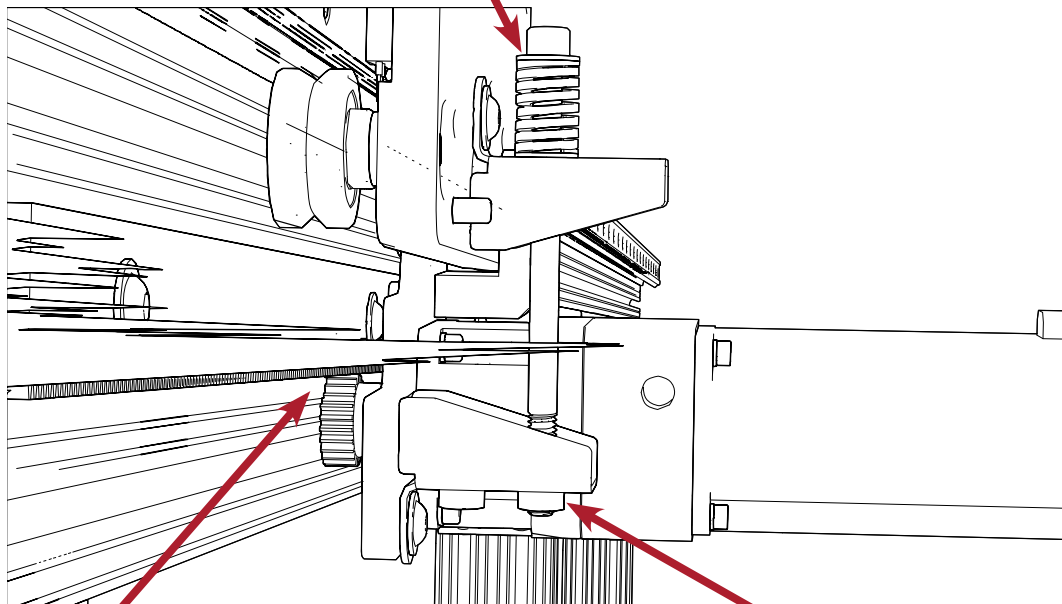
Qty	Part	Description	Part #
1		Table frame assembly with gantry carriages against limit switch stops	From Step 17

Required parts / components

- Roll the gantry up to the front stops.
- Move the motor swing arm upward on each gantry carriage so that you can re-engage the threads on the spring-loaded screw.
- Watch the pinion gear and the gear rack teeth engage as you continue to tighten the screw. Stop tightening when the spring compresses $\frac{1}{16}$ " to $\frac{1}{8}$ ".

Instructions

To engage the gantry, raise the motor swing arm and engage the threads and compress the spring slightly



The threads engage in this retained nut





Illustration

Continue to tighten the screw to raise the motor pinion gear engaging the gear rack teeth fully. There should be about 0.004" clearance between the gear teeth (about the thickness of a sheet of paper).

Step B21: Attach X-axis carriage

This step attaches the X-axis tool mount carriage to the gantry cassette. Use four bolts with lock washers for the mounting. Engage the motor pinion gear to the gear rack with the spring control as you did for the Y-axis motors.

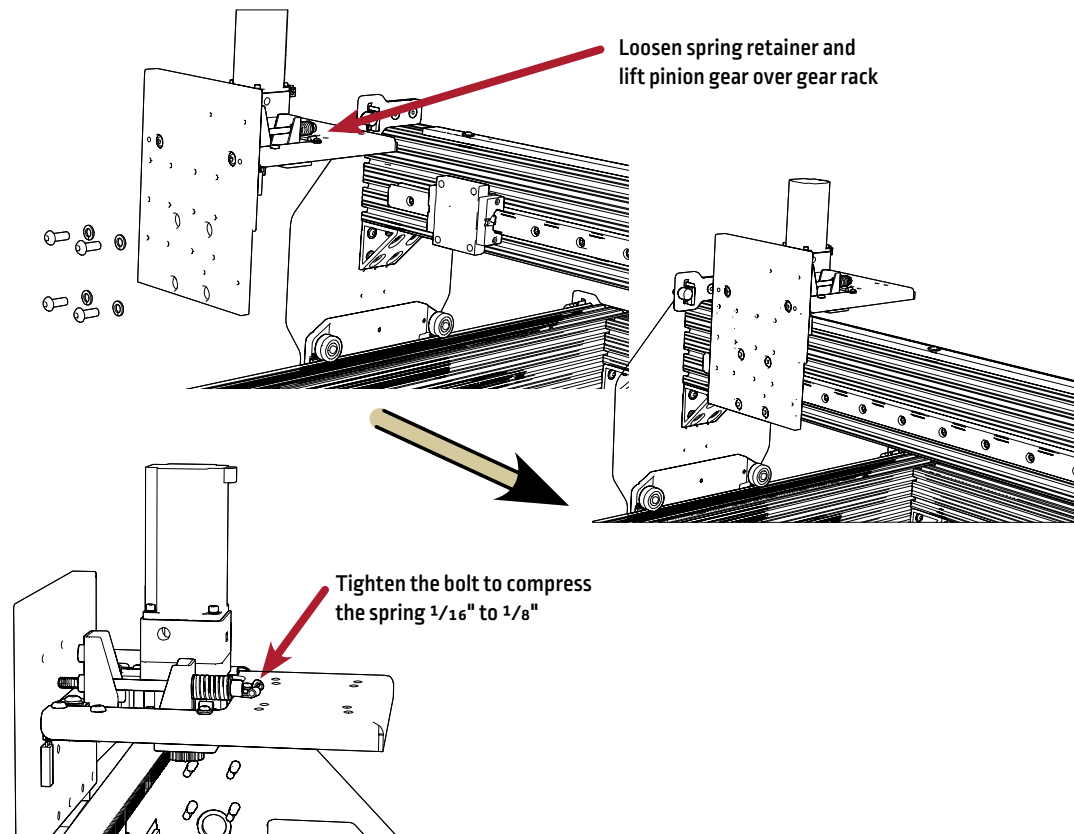
Required parts /
components

Qty	Part	Description	Part #
1		Table frame assembly with gantry and aligned rails	From Step B19
1		Swingarm motor assembly, X-axis	TMS-144-0023-00
4		Screw, BSCS, M10 x 1.5 x 25 mm, steel	TMS-429-0034-01
4		Split lock-washer, M10, 18-8 stainless steel	TMS-413-0600-18

Instructions







- The X-axis motor carriage assembly easily installs with 4 screws. Loosen the spring on the swing-away as needed, then re-tighten the spring after the carriage is attached.

Illustration



Step B22: Attach cable carrier end brackets

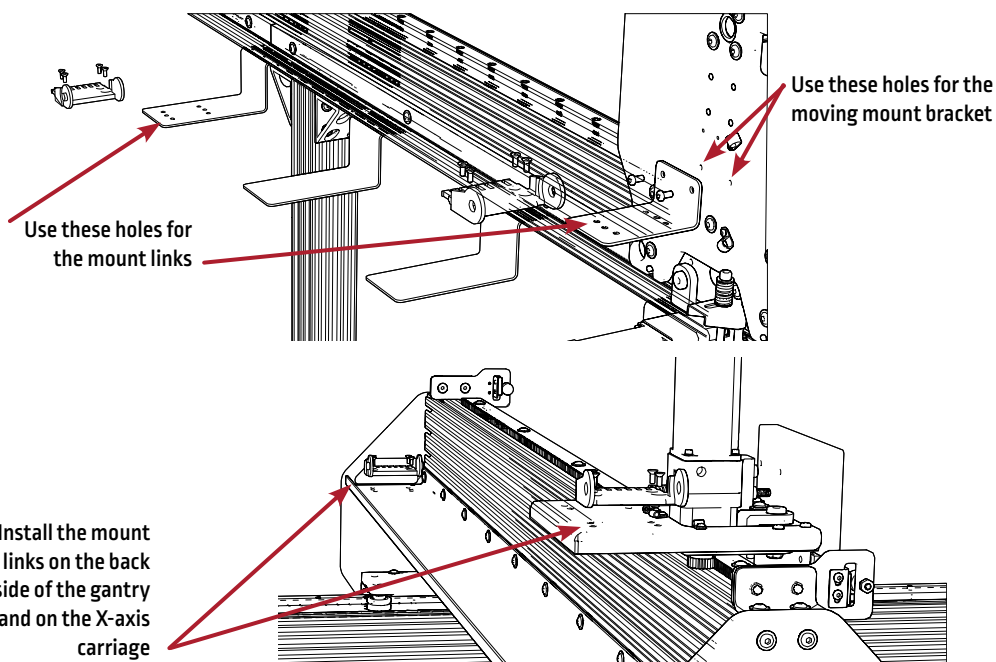
The Y-axis and X-axis cable carriers are supported by brackets and, in the case of the X-axis, a shelf. The ends of both sets of links are held in place by cable carrier end brackets. This step mounts the brackets in preparation for installation of the cable carrier links.

Qty	Part	Description	Part #
1		Table frame assembly with X-axis carriage	From Step B21
1		Cable carrier moving-mount bracket	TMS-144-0010-01
2		Screw, BSCS, 1/4"-20 x 1/2", hex drive	TMS-410-0214-08
2		Cable carrier mount link, pin, 2070-2PZB	TMS-105-0002-24
2		Cable carrier mount link, socket, 2070-1PZB	TMS-105-0002-23
16		Screw, FSCS, #10-32 x 1/2", hex drive	TMS-410-0111-08

Required parts / components

- Mount the cable carrier moving-mount bracket to the gantry end plate with two button head screws.
- Mount the cable carrier mount links to the Y-axis brackets and on the back of the gantry.

Instructions



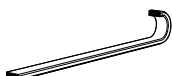


Illustration

Step B23: Attach cable carrier links

The cable carrier system uses pivoting links to keep the essential motor cables, signal cables, and other cutting cables or hoses safely and neatly away from the moving parts. You can handle the cable carrier as a unit and attach its ends to the end brackets installed in the previous step. The plastic links are flexible and can be installed with just hand pressure.

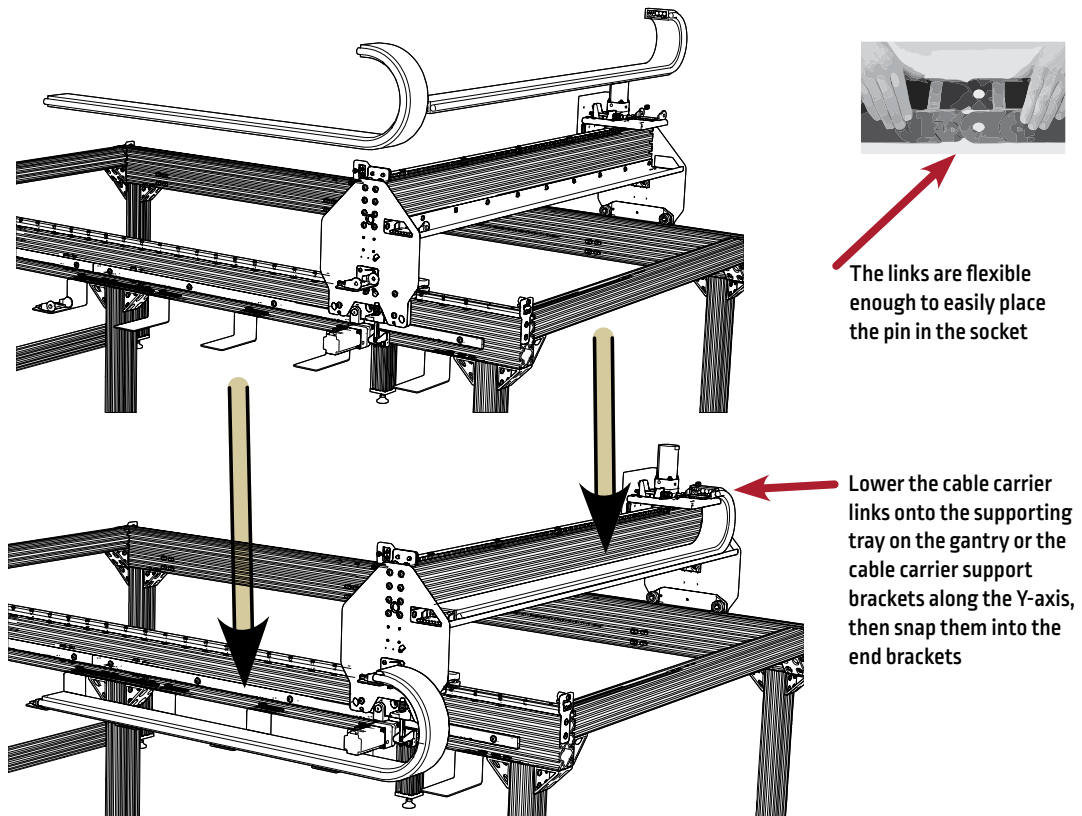
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with cable carrier end brackets	From Step B22
1		Cable carrier, 240-07-125, 7 ft. (125 mm bend radius)	TMS-105-0002-02
1		Cable carrier, 240-07-100, 6 ft. (100 mm bend radius)	TMS-105-0002-27

Instructions


- Install the cable carrier lengths by attaching them to the cable carrier end brackets mounted in the previous step. The socket end of the cable carrier attaches to the (stationary) pin end of the bracket.
- The X-axis (gantry) cable carrier is shorter and has a smaller bend radius than the Y-axis cable carrier.

Illustration



Step B24: Prepare cable carriers for cables and stretch out the cables

Open up the cable carrier links for the cables for your system, using a screwdriver to snap them open. Where the cable carrier curls up, the crosspieces hang down. Straighten the cables to get the twists out of them prior to laying them in the carriers.

Qty	Part	Description	Part #
1		Table frame with cable carrier	From Step B23
NA	NA	Cables supplied with the table and tools	[many]
NA	NA	Cable marking tape or tags	[from your toolbox]

Required parts / components

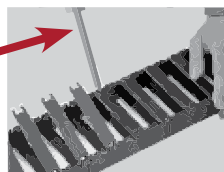
- Open each of the cable carrier crossbars with a $\frac{3}{16}$ " flat-blade screwdriver.
 - The crossbars will open from either side, and they will open downwards where the cable carrier curls up on the moving end.
- Lay the cables out on the floor next to the table.
 - Stretch the cables gently to eliminate twists and kinks. Find the ends of each cable that will be connected to the table and gather them together, laying out the cables along the floor.
 - You may have to refer to the wiring diagrams in the Connect Cables sections later in this book to help identify cable ends.
 - The other ends will be connected later. There is plenty of cable to extend well beyond the cable carrier, so stow the excess neatly, avoiding any new twists or kinks.
 - Primarily, you are looking for the motor cable ends that connect to the motor and the limit switch cable ends that connect to the limit switches. There will be four of each, although the Z-axis motor cable's connector is different from the other three.
- Use tape or wire marking tags to make it easy to match the ends of each cable after they have been enclosed in the cable carrier.

Instructions

An easy way to match the ends of the cables is to tag each end with a matching stick-on label, offered by many electrical distributors.



Pry up the crosspieces of the cable carrier with a screwdriver or other suitable tool. The crosspieces snap back into place after you lay the cables into the cable carriers.




Illustrations

Step B25: Attach the cables to the table components, then route the cables

Locate one of the three cables for the horizontal motors and a limit switch cable and "fish" them through the gantry. Connect all the motor cables and the corresponding limit cables, and route them through the cable carriers. Connect additional signal cables, power cables, or gas lines and run them through the cable carriers, as well, keeping power and signal cables as far from each other as possible.

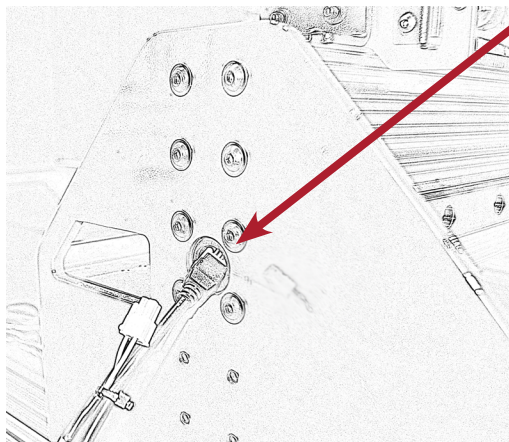
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with open cable carrier crosspieces	From Step B24
1		Bundle of marked cables	From Step B24

Instructions

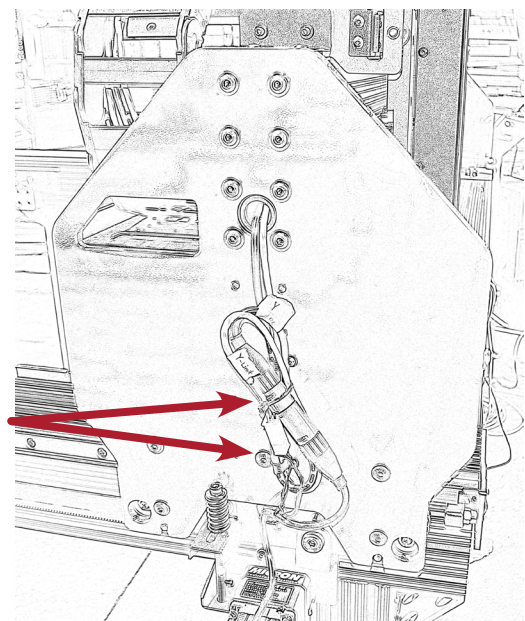
- Tag both ends of one motor cable and one limit switch cable as "Y" with tape or wire marking tags.
- Starting from the end of the gantry that rides on the "side V-rail," thread the (or "fish") the Accumove controller end of the cables through the large round hole in the gantry end plate and through the gantry extrusion to the other end.
- Leave sufficient cable to connect to the Y-axis motor and limit switch (but minimal extra). Use the gantry end cable straps to further route the cables after making the XLR motor connection and the limit switch cable connection.

Illustration



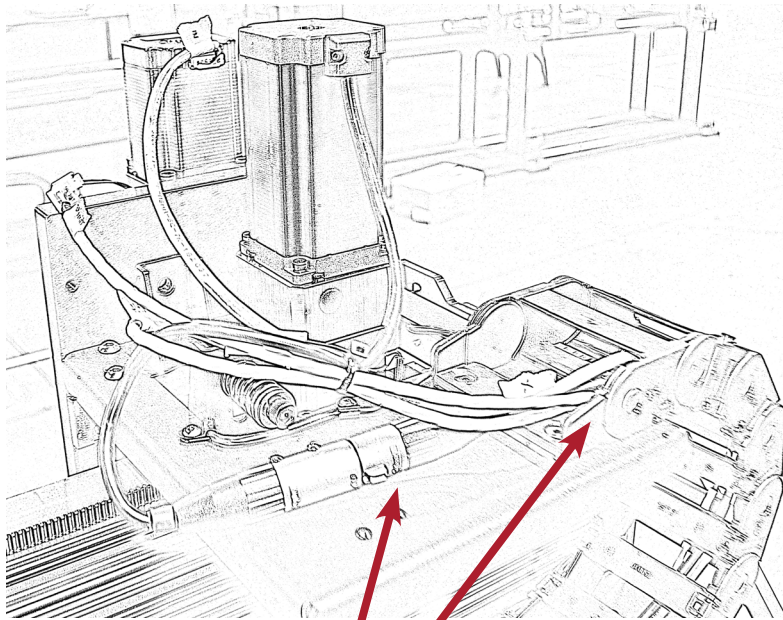
"Fish" the first set of cables through the larger round holes and through the gantry extrusion--

-- then make the connections to the motor and limit switches and use the straps to provide strain relief

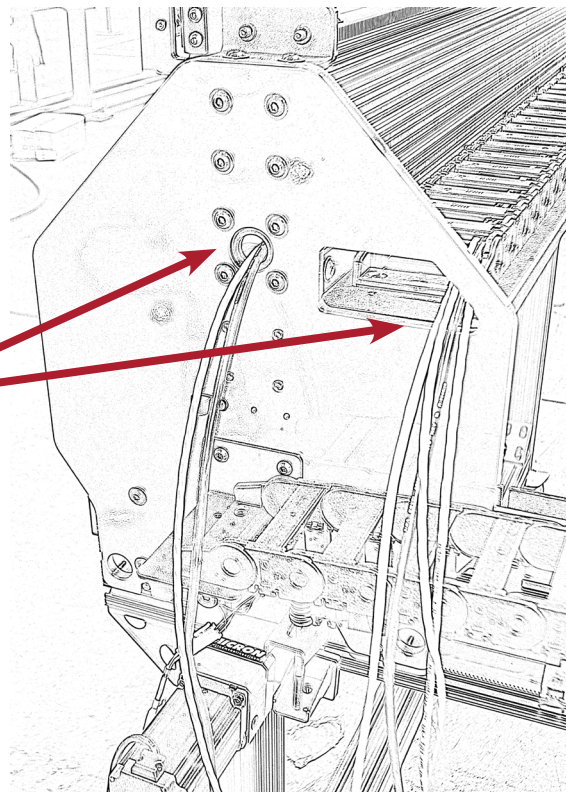


Step B25: Route cables and attach to table components (continued)

Illustration



Tag and connect the X-axis and Z-axis motor cables and limit switch cables. Use cable ties around the wires, and route them through the gantry cable carrier



The Y-axis cables routed through the gantry extrusion and the X-axis and Z-axis cables routed through the gantry cable carrier should look like this. Make sure both ends of each cable have ID tags

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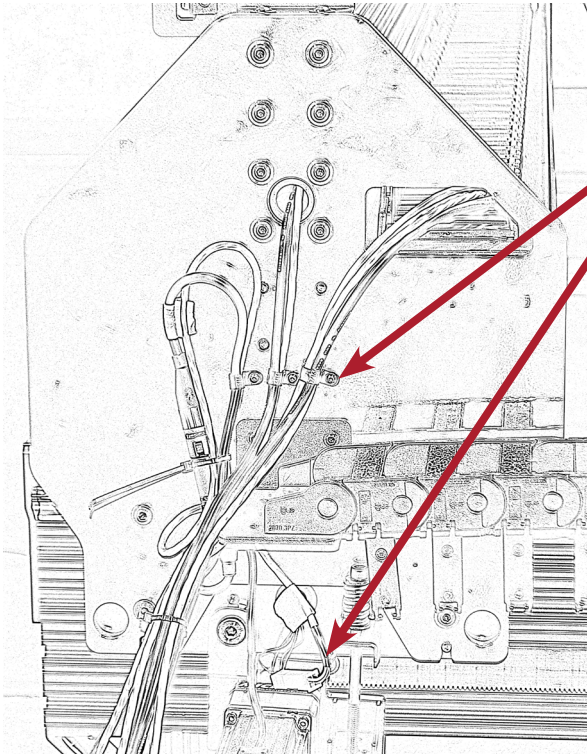
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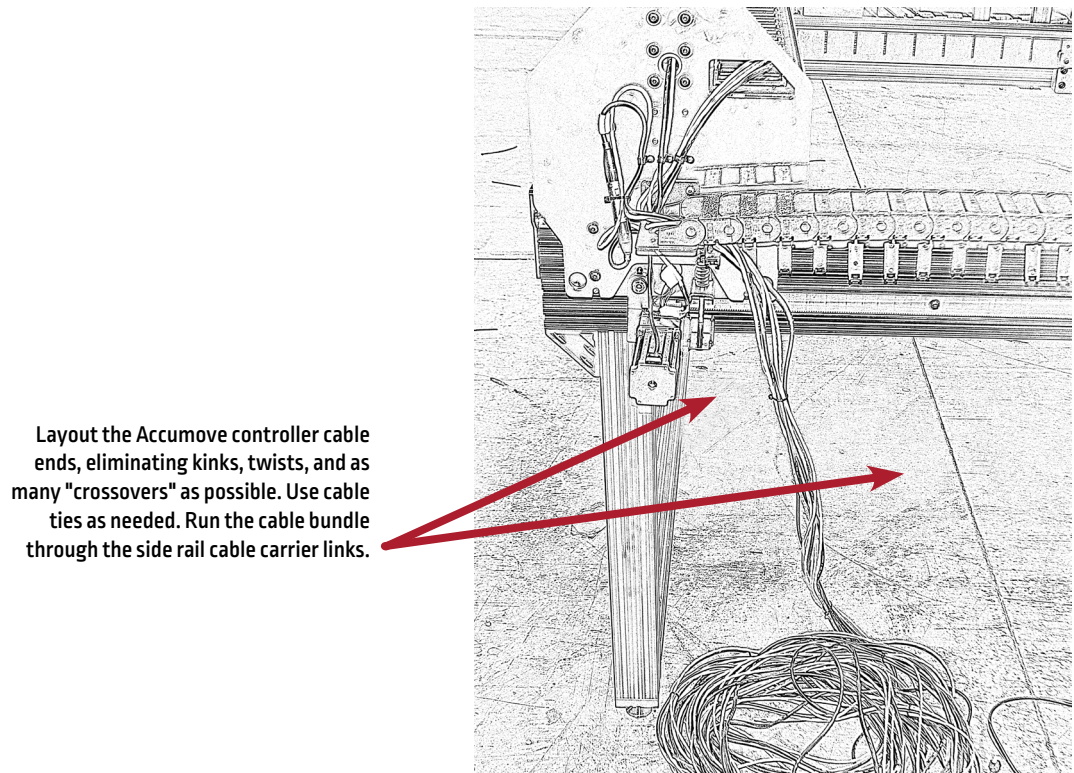
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Step B25: Route cables and attach to table components (continued)

Illustration



Tag and connect the U-axis motor cables and limit switch cables. (The U-axis motor is on the "top V-rail" side of the table and the Y-axis motor is on the "side V-rail" side of the table). Route all the cables through the strain-relief straps. Add cable ties as needed.



Layout the Accumove controller cable ends, eliminating kinks, twists, and as many "crossovers" as possible. Use cable ties as needed. Run the cable bundle through the side rail cable carrier links.

Step B26: Run cables to their destinations

Cables routed from the table through the cable carriers will either terminate at the plasma cutter (when plasma cutting is employed) or another tool.... or at the Accumove controller. Most will connect with a simple plug-in connection.

- All four motor cables and all four sets of limit switch cables terminate at the Accumove controller.
- For the majority of tables using plasma cutters, the ohmic cap and magnetic breakaway wires will also be routed through both cable carriers and to the Accumove controller.
- For specific details check the table below:

Instructions

Qty	Part#	From	Through	To
1	TMS-401-0070-01	Left Y-motor	Gantry extrusion and rail CC	Accumove motor port 2
1	TMS-402-0075-50	Left Y-motor limit switches	Gantry extrusion and rail cc	Accumove limit input port pigtail
1	TMS-401-0070-01	Right Y-motor	Rail CC	Accumove motor port 4
1	TMS-402-0075-50	Right Y-motor limit switches	Rail CC	Accumove limit input port pigtail
1	TMS-401-0070-01	X-motor	Gantry CC and Rail CC	Accumove motor port 1
1	TMS-402-0075-50	X-motor limit switches	Gantry CC and Rail CC	Accumove limit input port pigtail
1	TMS-402-0071-50	Z-motor	Gantry CC and Rail CC	Accumove motor port 3
1	TMS-402-0075-50	Z-motor limit switches	Gantry CC and Rail CC	Accumove input port pigtail
1	TMS-103-5000-06	Magnetic breakaway switch	Gantry CC and Rail CC	Accumove magnetic breakaway port
1	TMS-101-1109-01	Ohmic cap cable (at torch tip)	Gantry CC and Rail CC	Accumove VFC port (pin 4)
1	NA	Plasma torch cable	Gantry CC and Rail CC (cable tie to outside of CC links)	Plasma power source
1	NA	Oxy-fuel torch	Gantry CC and Rail CC	Oxy-fuel gas regulators
1	NA	Oxy-fuel solenoid cables	Gantry CC and Rail CC	Accumove output port
	NA	Other (typical)	Gantry CC and Rail CC	Accumove or 115 VAC power




Table of typical cable routing



Step B27: Add side slat support brackets

If you purchased the *Torchmate Classic 5 x 10 Water Table*, skip this step. Otherwise, there are eight brackets to hold on the side slat supports, which you add in this step. The T-nuts for these brackets were previously loaded into the extrusions.

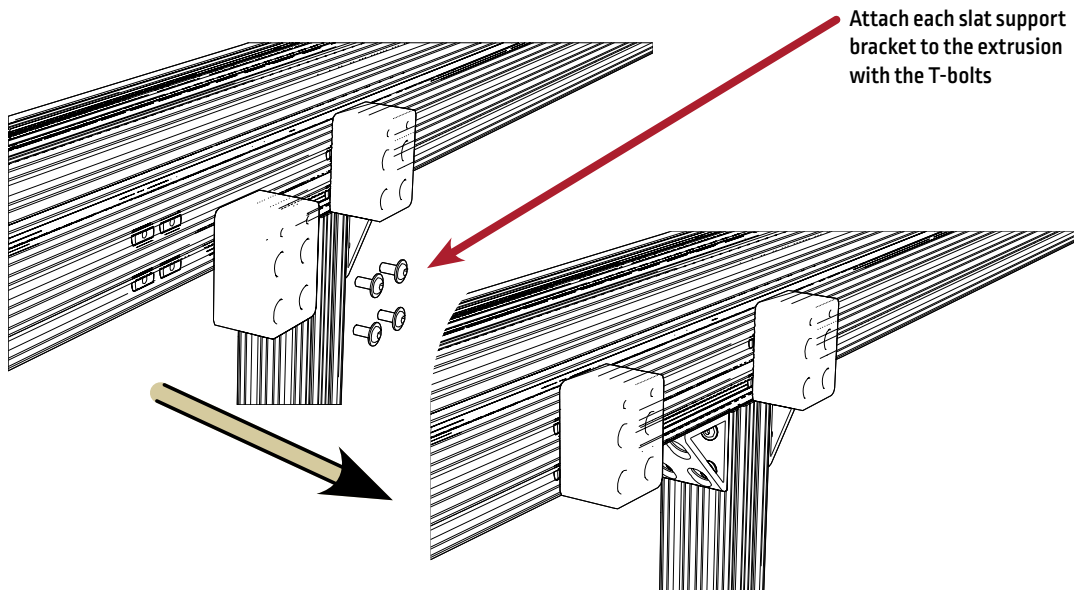
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with cables routed	From Step B26
12		Slat support bracket	TMS-144-0033-00
48		Screw, BSCS, 5/16"-18 x 5/8"	TMS-410-5016-10

Instructions

- Locate the T-nuts inserted into the two lower extrusion slots in Step B4 and position them along the extrusion so that a set of four T-nuts is near each end, and two sets of four T-nuts are near the middle leg.
- Insert the T-bolt (screws) through the slat support brackets and then into the T-nuts.
- Leave the T-bolts loose, so that the brackets can be repositioned during a later step.



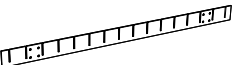
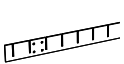
Illustration



Step B28: Add side slat supports



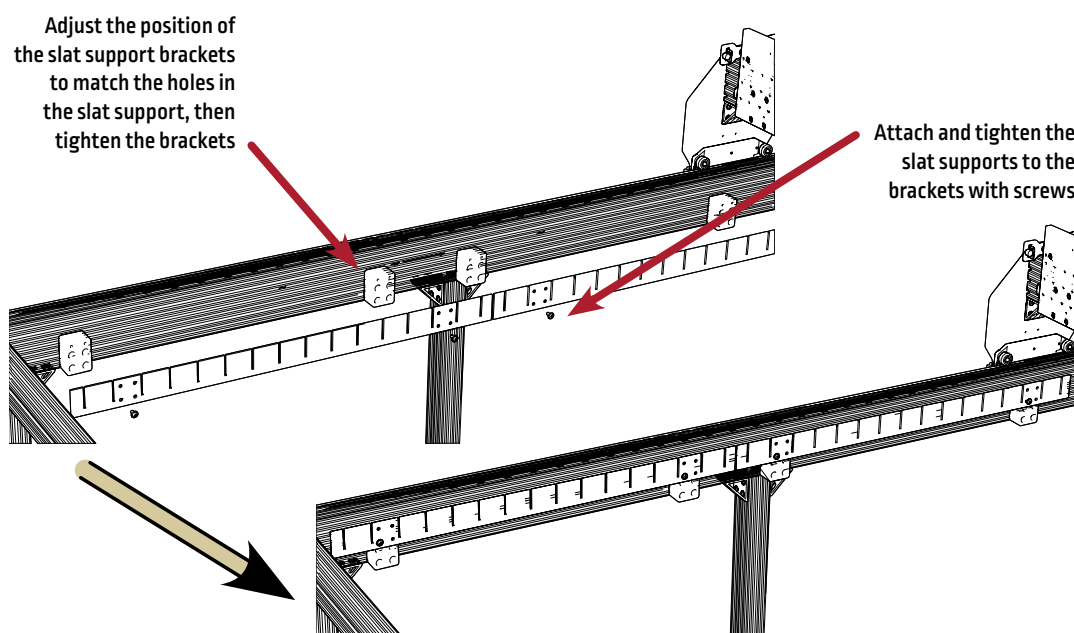
If you purchased the *Torchmate Classic 5 x 10 Water Table*, again skip this step. Otherwise, continue from the previous step by adding the side slat supports to the side slat support brackets on both rails

Qty	Part	Description	Part #
1		Table frame assembly with side slat support brackets	From Step B26
16		T-bolt, BSCS, flanged, 5/16"-18 x 5/8"	TMS-410-5016-10
4		Long slat support - 4 ft., unpainted	TMS-102-1000-03
2		Short slat support - 2 ft., unpainted	TMS-102-1000-02

Required parts / components

- Use a 4-foot length of slat support as a guide and starting from the front end of the rail. Slide the side slat support brackets so they line up with the holes in the support—and at the same time, make sure there is room on each rail for two long supports and one short support.
- Once the slat support brackets are lined up, fully-tighten their T-bolts.
- Install the slat supports on the brackets with the additional T-bolts.
 - Note: the diagram shows only a single T-bolt being installed, but use two for more strength.
- **Note:** The slat supports are unpainted to help maintain overall electrical conductivity between the slats and the cutting material.

Instructions



Illustration

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
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Step B29: Add end slat support brackets

If you purchased the *Torchmate Classic 5 x 10 Water Table*, skip this step. Otherwise, there are four L-shaped brackets to hold the center slat support, added in this step. The T-nuts for these brackets were previously installed in the extrusions.

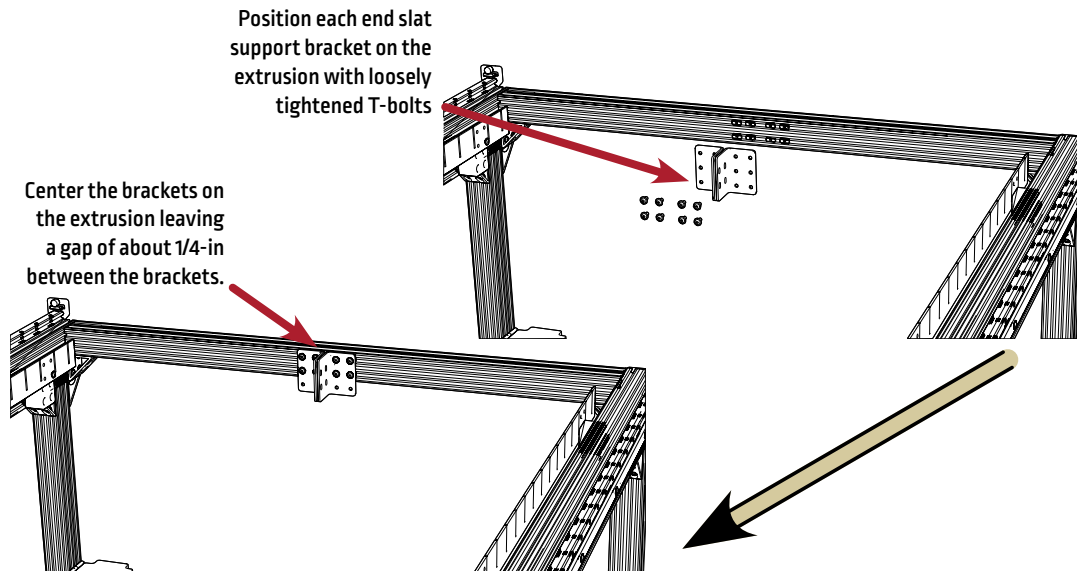
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with side slat supports	From Step B28
4		Middle slat support L-bracket	TMS-144-0051-01
16		T-bolt, BSCS, flanged, $\frac{5}{16}$ -18 X $\frac{5}{8}$ long	TMS-410-5016-10

Instructions

- Locate the T-nuts inserted into the two extrusion slots in Step B11 and position them near the middle of the extrusion.
- Insert the T-bolt (screws) through the end slat support brackets and then into the T-nuts.
- Leave a gap between the brackets, then leave loose, so that the brackets can be repositioned during a later step.


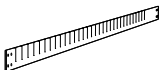
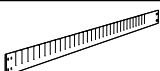


Illustration



Step B30: Add center slat support



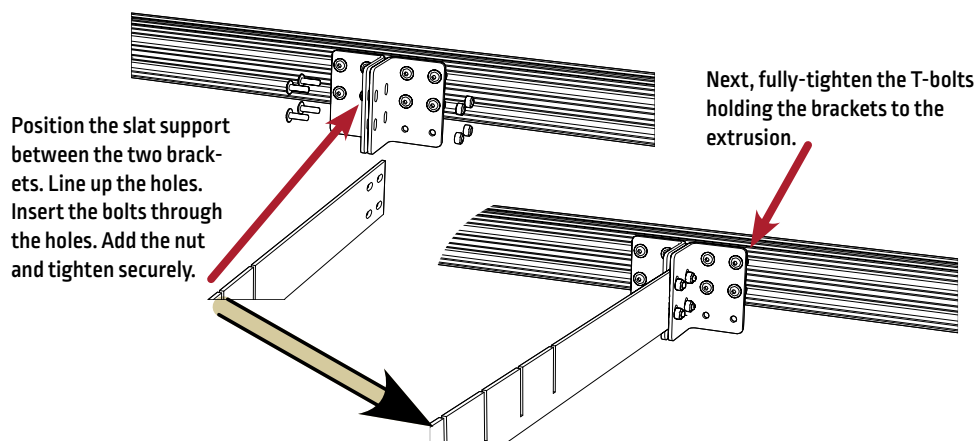
If you purchased the *Torchmate Classic 5 x 10 Water Table*, skip this step. Otherwise, add the center slat support in this step. By starting on one end, then completing the other end, and finally finishing the first end, this step can be performed by one person.

Qty	Part	Description	Part #
1		Table frame assembly with end slat support brackets	From Step B29
1		Middle slat support, A (long)	TMS-102-1000-23
1		Middle slat support, B (short)	TMS-102-1000-22
12		Screw, BSCS, flanged, 5/16-18 x 1	TMS-410-5016-16
12		Nylock nut, 5/16-18, zinc-plated steel	TMS-414-0201-16

Required parts / components

- Begin by bolting the long and short middle slat supports together using four screws and locknuts.
- Raise one end of the middle slat support through the middle support brackets at one end of the table. Stabilize the slat support by placing a screw (bolt) through one of the holes.
- At the other end, raise the support into the support brackets, insert all four bolts, add the nuts and tighten them fully.
- Return to the first end, add the remaining bolts and nuts and tighten them.
- Tighten all T-bolts holding the brackets to the extrusions at both ends.

Instructions



Illustration

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Step B31: Add (customer-supplied) slats

If you purchased the *Torchmate Classic 5 x 10 Water Table*, skip this step. Otherwise, obtain the (customer-supplied) slats and insert them into the slat supports. The slats should be unpainted to provide electrical conduction between the slats through the slat supports.

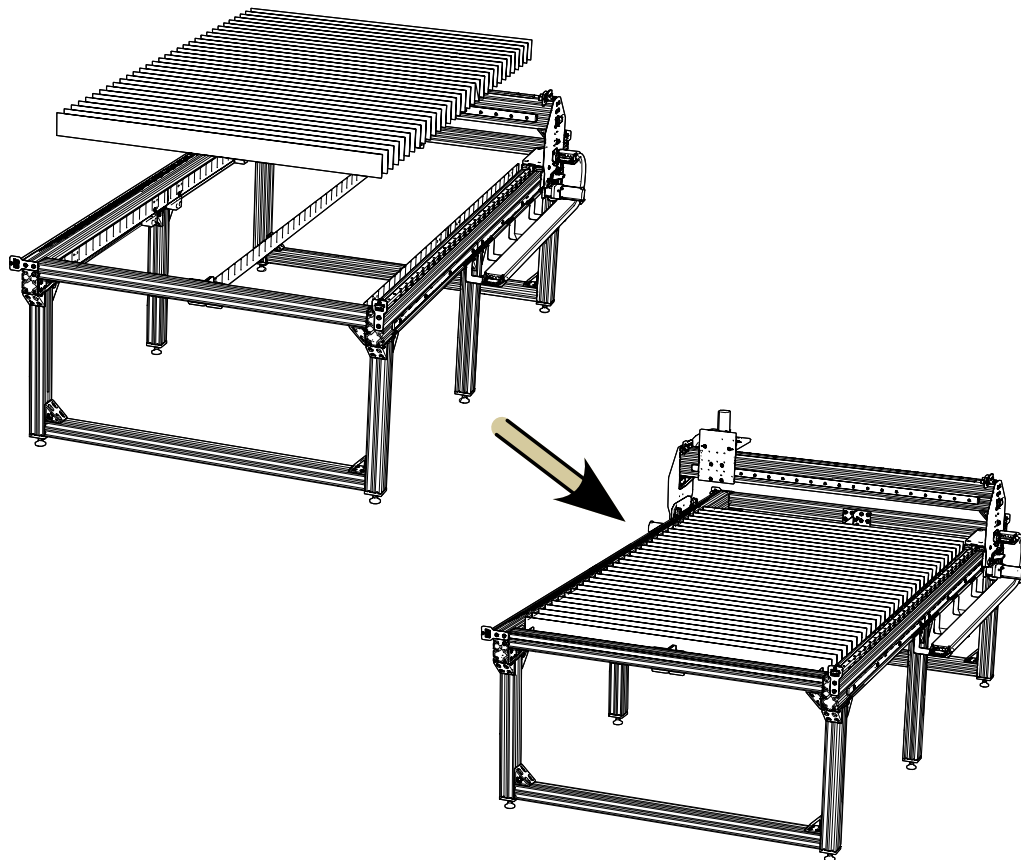
Required parts / components

Qty	Part	Description	Part #
1		Table frame assembly with slat supports	From Step B30
32		Flat bar slat, 4" x 59" x 3/16" [Customer supplied], unpainted	TMS-144-0034-01

Instructions




- Obtain **32 slats of 3/16" x 4" flat bar stock, 59" long**, from a local supplier.
- Insert the slats in to the slat supports. The slats will have some offset and curvature to add strength and stability.

Illustration



Step B32: Add end plate to table end

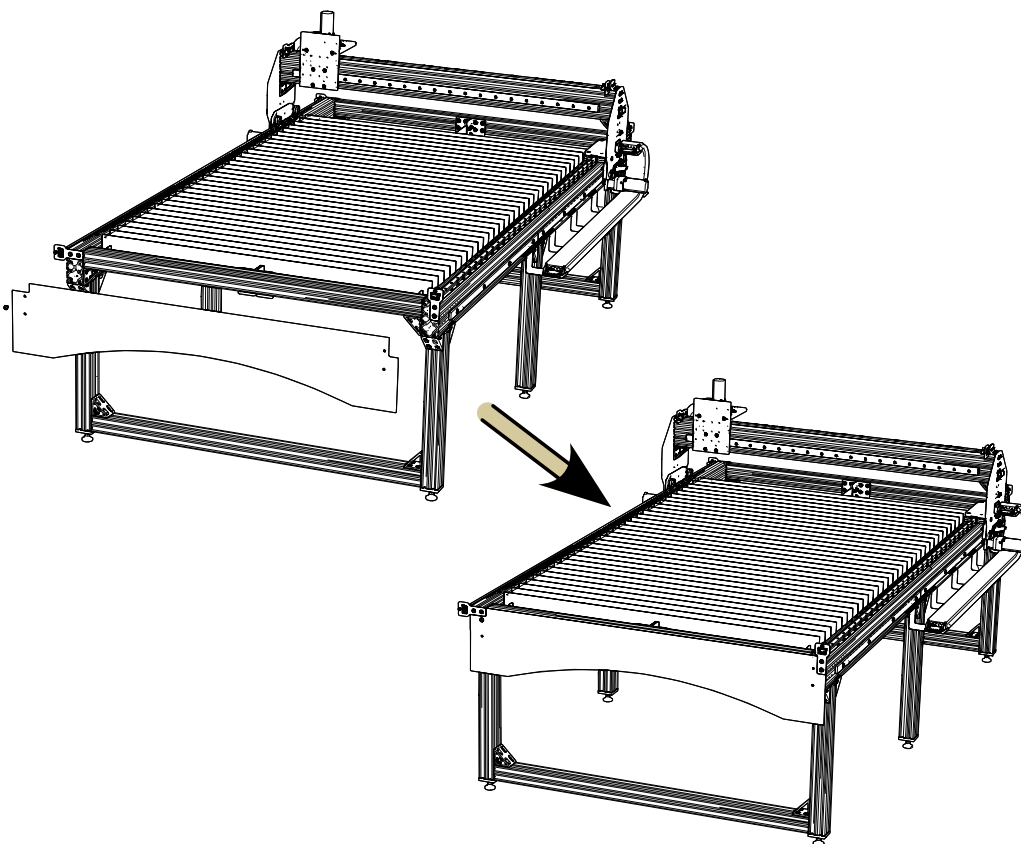
The final step in assembling the Torchmate Classic 5 x 10 CNC Cutting System is to install the face plate to the end of the table.

Qty	Part	Description	Part #
1		Table frame assembly with slats	From Step B31
1		5 ft. arched end plate	TMS-144-0049-01
4		T-bolt, BSCS, flanged, $\frac{5}{16}$ "-18 x $\frac{5}{8}$ " long	TMS-410-5016-10

Required parts / components

- Attach the end plate to the table using T-bolts that thread into the holes in the end of the extrusions.

Instructions



Illustration

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Systems**

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**Cutting
Systems**

Connect the Accumove[®] Controller

- **IMPORTANT:** Never connect a motor cable while the Accumove3 is powered on. This will cause irreversible damage to the Accumove3.

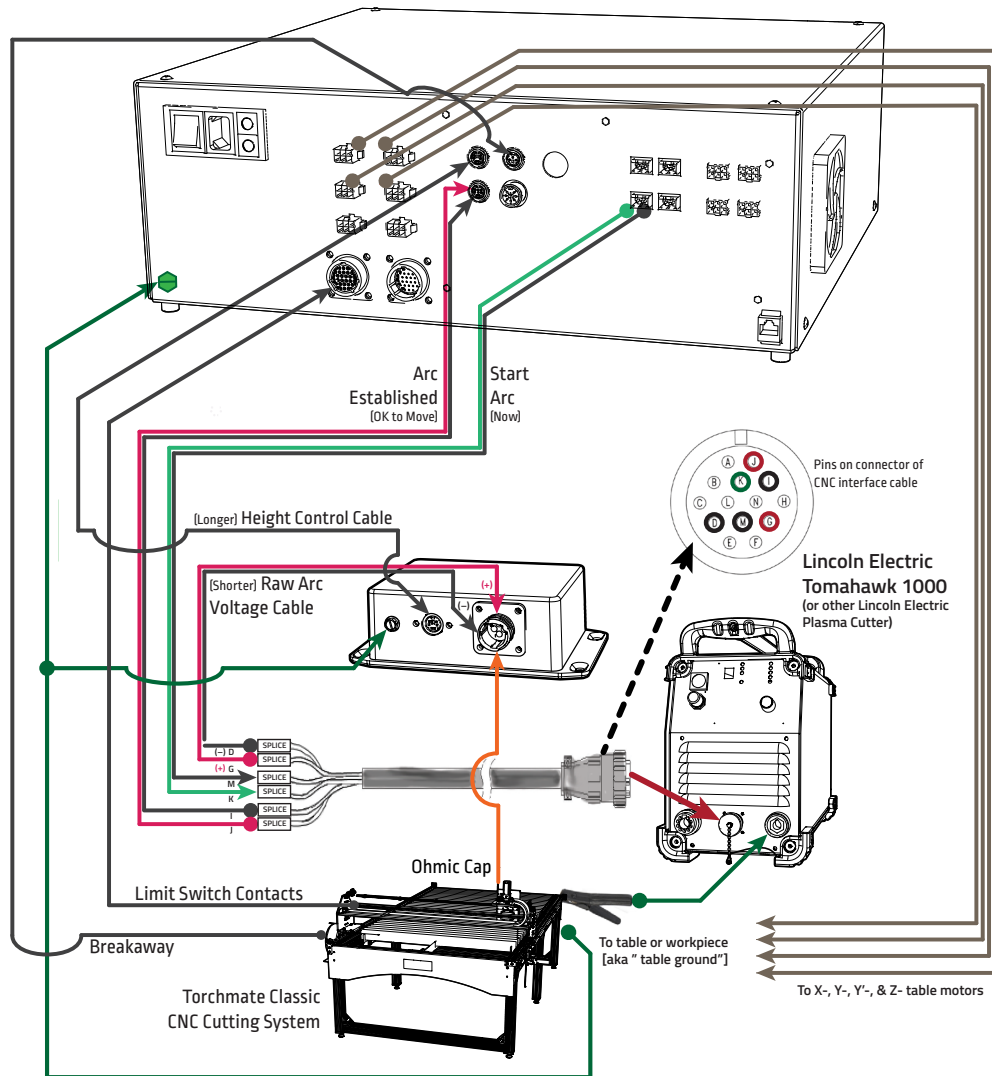
Connection overview—wiring

For operations, the Torchmate Classic CNC Cutting System uses only small number of cables to communicate between the plasma power supply, the torch, the table motors (X-, Y-, and Z-axes) and sensors, the computer running VMD software, and the Accumove CNC controller. The diagram on this page provides an overview, and following pages will provide details.

Summary





- The Accumove 3 controller is the destination for the table's motor cables, the computer's Ethernet crossover cable, and signal cables from the plasma cutter, height control, and table inputs. The cable ends are ready to plug in to the back of the box, requiring only some splicing.
- The Accumove box should be located so that it is not exposed to cutting spatter (or splashing from a water table), and so that the motor cables do not need to be coiled.
 - Coiled cables can introduce troublesome noise into the electronic signals and should be avoided.

Illustration of initial wiring



Step C1: Connect the motor cables

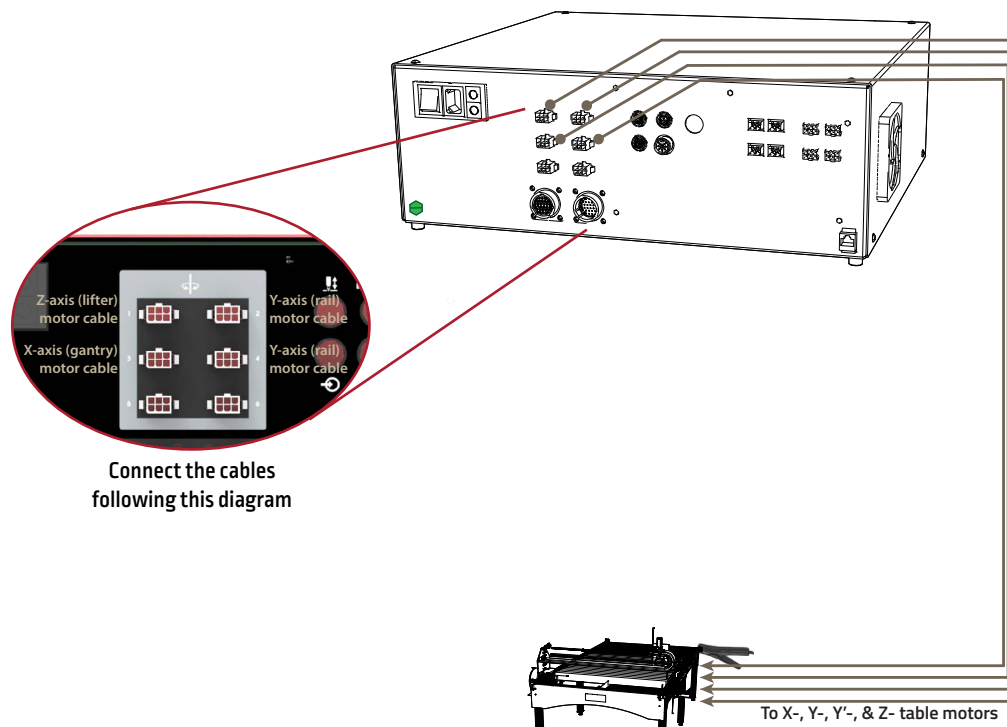
The Accumove 3 controller controls the motion of the tool in three dimensions above the workpiece using stepper motors. The laptop (or desktop) computer that runs Torchmate VMD software sends commands to the Accumove 3, which then sends signals to the table's motors through the 4 motor cables connected in this step.

Qty	Part	Description	Part #
1		Completed Classic Table	From Step B32
1		Accumove 3 Controller, 4 axis	TMS-407-0072-01
1		Motor cable, 6P male moles to 6P female JST, 50 ft.	TMS-402-0071-50
3		Motor cable, 6P male mox to XLR female, 50 ft.	TMS-402-0070-01

Required parts / components

- Locate and connect the motor cables. Match up the wire tags placed in Step B24 to locate the correct connectors:
 - Three of the cables have XLR connectors at one end. These are used for the X-axis motor and the two Y-axis motors. The other end has a molex connector for the Accumove 3 back panel. Refer to Step B-25 for routing of the left side Y-axis motor cable.
 - One of the cables also has a molex connector for the Accumove 3 back panel, but a JST connector for the Z-axis motor.

Instructions



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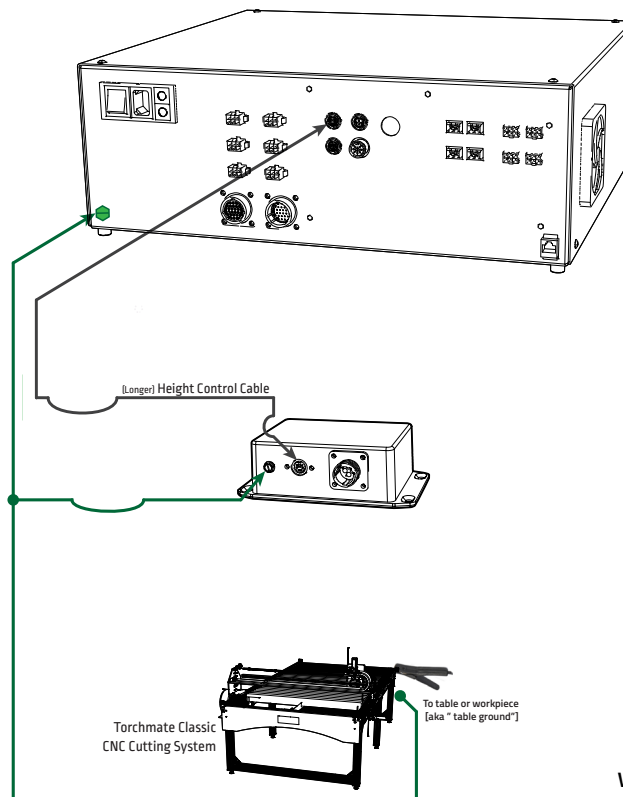
Step C2: Connect the VFC to the Accumove controller and add circuit ground wires

The VFC height control works with the Accumove 3 controller to provide plasma arc length control based on the raw arc voltage provided by the power supply. The VFC height control modifies the raw voltage signal to a frequency-based signal before sending it to the Accumove 3. For proper operation these circuits must share a common circuit ground. This step connects the VFC height control to the Accumove 3 with a cable and adds circuit ground conductors.

Required parts / components	Qty	Part	Description	Part #
	1		Completed Classic Table with motor cables connected to Accumove 3 unit	From Step C1
	1		Accumove VFC height control	TMS-101-1100-01
	1		Accumove VFC height control cable, 25 ft.	TMS-103-5000-01
	As req'd.		Circuit grounding wire, 18 to 22 ga	<i>[customer supplied]</i>






Instructions

- Connect the Accumove VFC height control to the Accumove 3 with the Accumove VFC height control cable.
- Connect the circuit grounding lug on the Accumove 3 controller with the circuit grounding lug on the Accumove VFC and also with the Torchmate Classic table.



Step C3: Connect the plasma power supply

Use splices to make the signal connections to the CNC interface cable, connect them to the Accumove 3 controller and to the Accumove VFC, then plug the CNC interface, the plasma cable, and the work cable into the plasma power supply.

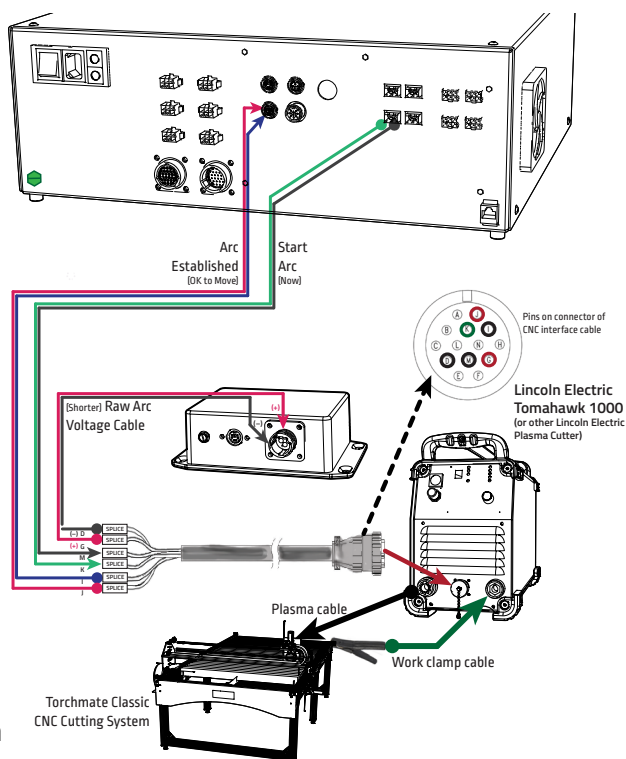
Qty	Part	Description	Part #
1		Completed Classic Table with Accumove 3 unit and Accumove VFC	From Step C2
1		Plasma power supply with CNC interface cable, plasma cable, and work cable	<i>[separate purchase]</i>
1		Terminal block plug, 2 pos., 5.08 mm	TMS-403-0076-01
1		Accumove input cable	TMS-103-5000-01
1		Arc voltage Ohmic Cable	TMS-101-1109-01

Required parts / components

- Splice the terminal block plug (lower left position) cable to the Start Arc terminal wires (M and K) on the CNC interface cable.
- Splice the blue and red wires of the input connector to the Arc Established terminal wires (I and J) on the CNC interface cable.
- Splice the black and red wires of the Arc Voltage cable from the VFC to the raw arc voltage terminal wires (D– black and G+ red) on the CNC interface cable, observing the polarities.
- Connect the CNC cable, the plasma cable and the work clamp cable to the plasma cutter.

Instructions

Illustration



Note:
See the following pages for information about using other brands of plasma cutters.

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Step C4: Connect the limit switch cables, ohmic cap cable, and magnetic breakaway

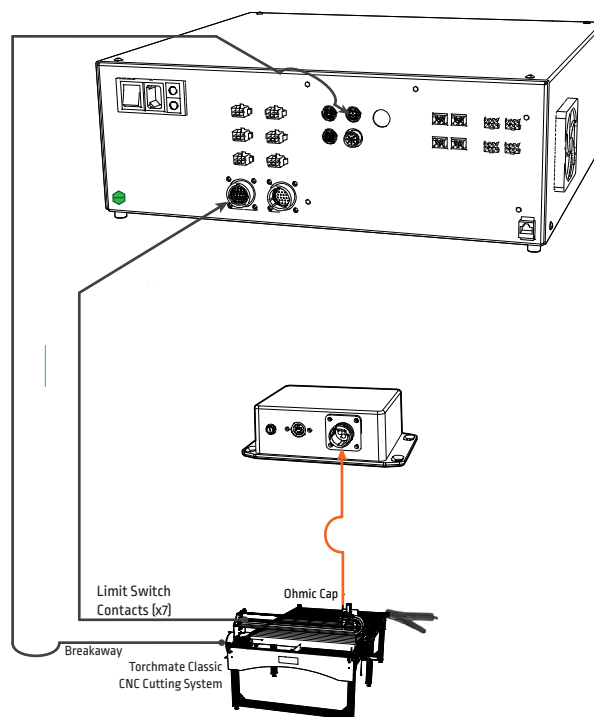
The table uses a number of limit switches to indicate the table's travel limits to the Accumove 3 controller. The ohmic sensing circuit uses the torch's ohmic cap to similarly find the position of "zero arc length" on a given cutting job.

Required parts / components

Qty	Part	Description	Part #
1		Completed Classic Table with Accumove 3 unit and Accumove VFC	From Step C2
0*		Arc voltage Ohmic Cable (already partly installed in Step C3)	TMS-101-1109-01
1		Limit switch input cable	TMS-402-0074-01
1		Magnetic breakaway cable	TMS-103-5000-04





Instructions

- Locate and connect the limit switch cables and splice them to the limit switch pigtail that connects to the Accumove 3.
- Locate the orange ohmic wire from the Arc Voltage Ohmic cable at the Accumove VFC and with a quick disconnect clip, connect it to the ohmic cap on the torch (when it is mounted).



Step C5: Run crossover Ethernet cable

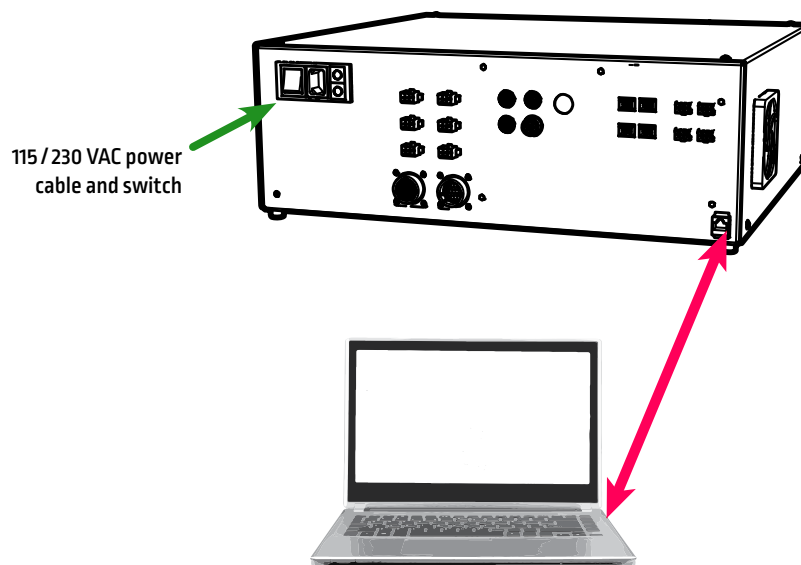
The Torchmate Accumove 3 communicates with the Visual Machine Designer (VMD) software that runs on the laptop (or PC) using an Ethernet cable connection and an Internet Protocol. To make it easy to begin operations, an Ethernet crossover cable (red) is installed in this step. It requires no other network devices to establish communication. The Accumove 3 power cable is also installed in this step.

Qty	Part	Description	Part #
1		Completed Classic Table with Accumove 3 unit and Accumove VFC	From Step C4
1		Crossover Ethernet cable	TMS-103-5000-07
1		AC power cable	TMS-402-0069-01
1		Laptop or PC with Microsoft® Windows® 10, Windows® 8, or Windows 7	(separate purchase)

Required parts / components

- The Accumove CNC controller comes with a power supply and a red crossover Ethernet communication cable.
 - A regular Ethernet cable cannot be used in place of the crossover cable, because the wires are arranged in a different order on the connectors. Be sure to use the red crossover Ethernet cable to connect directly from the computer to the Accumove CNC controller.
- Run the red crossover cable from the computer's Ethernet port to the port on the Accumove CNC controller box.
- Connect the power supply cable to the Accumove box and to 115 / 230 VAC power.
 - A dedicated electrical circuit is advised to help reduce electromagnetic noise.

Instructions



Direct connection with red crossover Ethernet cable

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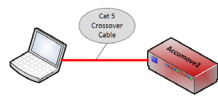

**Cutting
Systems**

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Step C6: Install the VMD software

The VMD software controls the operation of the Accumove 3 controller. The laptop (or desktop) computer that runs the Torchmate VMD software sends commands to the Accumove 3, which then sends signals to the table's motors and also (typically) to the plasma cutter to fire the torch. The software must be installed on the computer from the USB flash drive.

Required parts / components

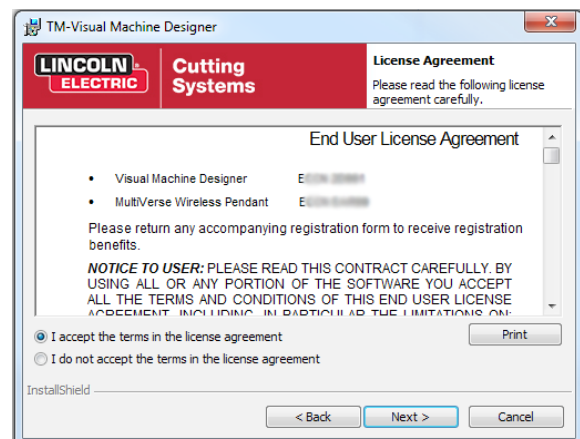
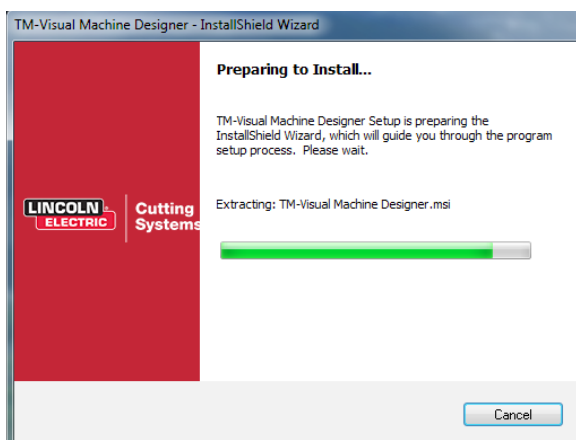
Qty	Part	Description	Part #
1		Laptop or PC connected to Accumove 3	From Step C1
1		USB flash drive with VMD software and Torchmate Classic manuals and more.	TMS-100-1000-11

Instructions

- Insert the USB Flash drive into one of the computer's USB ports.
- Launch the installer: **TM-VMD Setup-v1.0.0.0-vmd-22.exe**.
 - The installer copies the software onto your computer and continues the installation.
- To complete the installation, click the radio button that accepts the End User License Agreement (EULA).
- Under Customer Information, enter a User Name and Organization, then click Next.
- For the Destination Location, accept the default, and click Next.
- When the installer completes, click the Finish button. The program's icon will be in the operating system's Start menu or screen.
- After you locate the additional documentation on the USB flash drive, you can now remove it from the computer or laptop and store it safely away.

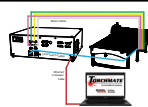


Installation screens



Step C7: Set the IP address

The Internet Protocols use "IP addresses" to identify the sources and destinations for communication channels. For security, the Accumove 3 controller restricts its communication to only a computer with a known (static) IP address running the VMD software. The Accumove 3 controller also uses a static IP address.

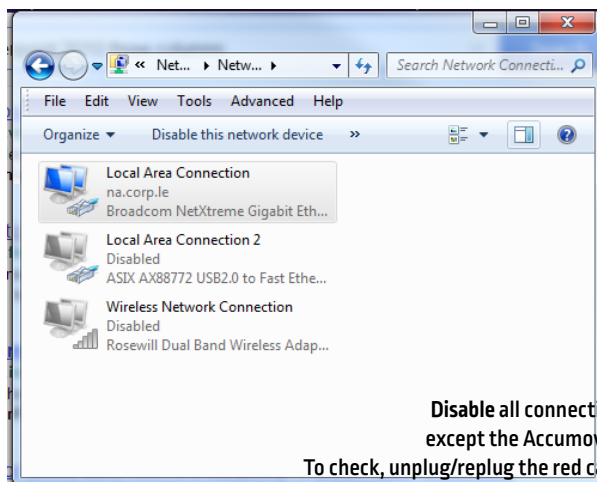
Qty	Part	Description	Part #
1		Accumove 3, Classic Table, computer with VMD software	From Step C2

Required parts / components

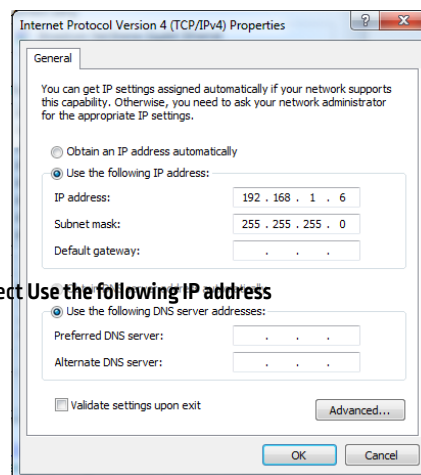
- The first time you use the Accumove 3, its IP address is pre-set to 192.168.1.7 and it also requires the computer to use 192.168.1.6. After installing the crossover cable, set the computer's address.
 - From your computer's Control Panel, open the **Network and Sharing** control panel. On the left side, select **Change Adapter Settings**.
 - In the **Network Connections** window, disable all connections except for the wired crossover cable connection by right clicking on the icon(s) and selecting **Disable**.
 - Right click on the crossover connection and select **Properties**. Select **Internet protocol version 4 (TCP/IPv4)**. Select the **Properties** button below the list.
 - Select **Use the following IP address**. Enter **192.168.1.6** in the IP address field. Press the **Tab** key to fill in the Subnet mask. Click **OK** to save.
- Power on the Accumove 3, then start the VMD software.

Instructions

Installation screens



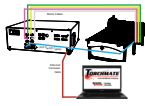
Select **Use the following IP address**



Step C8: Start the Accumove controller and log on to VMD

So that the VMD can begin communicating position information with the Accumove 3, the first requirement is to complete the machine setup by loading the configuration file. The VMD software protects your machine setup by requiring an "Admin" user name and password to log on before allowing configuration changes.

Required parts / components

Qty	Part	Description	Part #
1		Accumove 3, Classic Table, computer with VMD software	From Step C3

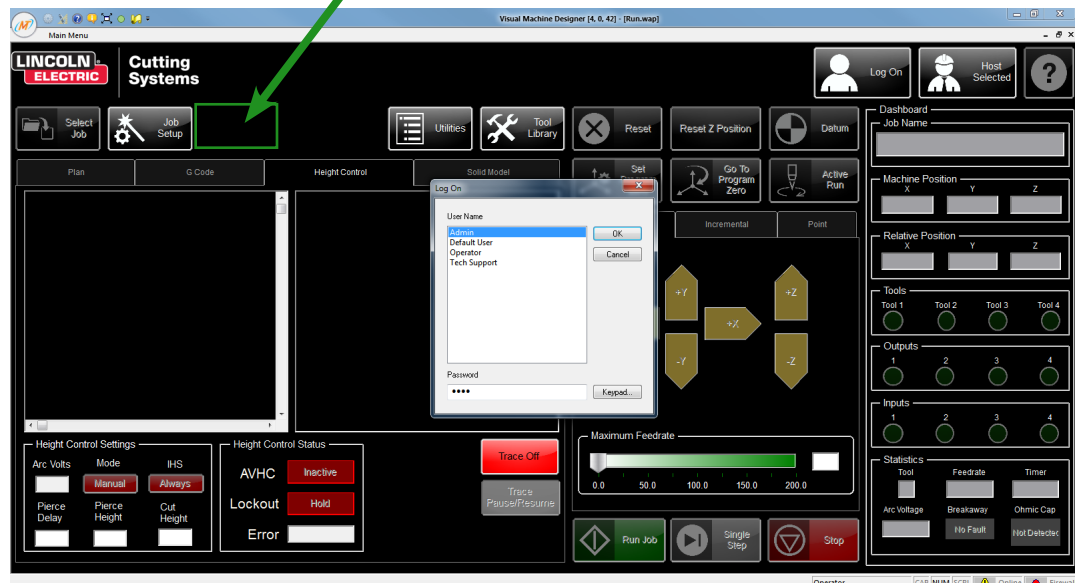
Instructions

- **IMPORTANT:** Never connect or disconnect a motor cable while the Accumove 3 is powered on. This will cause irreversible damage to the Accumove 3.
- If you haven't powered on the Accumove 3 and started the VMD software, perform these steps. Until the Accumove 3 completes its start up process, you may see a "Not Connected" screen which should soon disappear.
- If a notice box requests "Please switch the drives on," click Hide. The drives are automatically switched on when the table Datum is set in a later step.
- Click the **Log On** button to bring up the log on screen. Select the Admin user name and enter the password for that name. When the Accumove 3 is first powered up, the default password for the Admin user is "aaaa." This may be changed to protect the Accumove 3 from configuration changes by unauthorized personnel.
 - The Operator user name requires no password by default, but this may be changed as well.
- When the Admin user log on is completed, you will see a new button on the Run screen labeled **Machine Settings**.

User name and password Log On screen

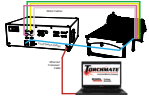


The Machine Settings button will appear here



Step C9: Load configuration file

The configuration for each type of table and each type of tool is saved in a configuration file. Here we will find the file for this table and tool combination and load it.

Qty	Part	Description	Part #
1		Accumove 3, Classic Table, computer with VMD software	From Step C4

Required parts / components

- Click on the Machine Settings button to display the Configuration control panel, then click the Load Configuration button.
- Select the your machine's configuration file, and click OK.
 - Unless your table is reconfigured, you will not need to change any of the settings.
 - When you install the VMD software, the standard configuration files for Torchmate tables are placed in the C:\Torchmate Controller Data\Configurations folder. After any custom configurations are performed on your table, the new configuration can be saved for future use, but for now, the standard configuration is all that is needed.

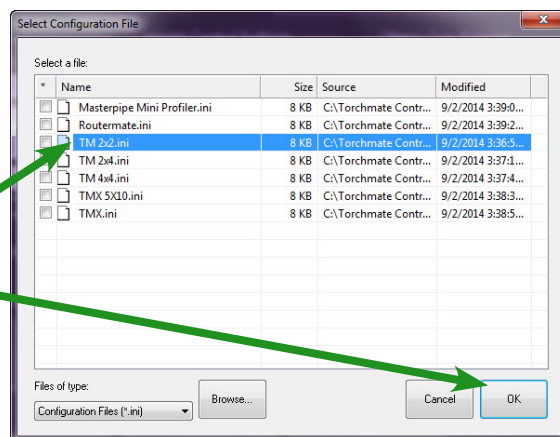
Instructions

Illustrations

Click the Load Configuration button



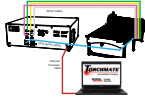
Click on the file name to highlight it, then click OK



Step C10: Set and reset the table's datum

The Accumove 3 controller calculates all position offsets and speeds by referring to a 3-axis zero point. This point is known as the table's "datum." Without its datum set, your table cannot operate. It must be set each time the controller is powered on. Setting the datum tells the controller to use the *current* X, Y, and Z coordinates as the zero point for each of the axes (0, 0, 0). On power up, first set the datum to the current position (to enable movement), move the carriage to the desired zero position using the jog buttons, then reset the datum.

Required parts / components

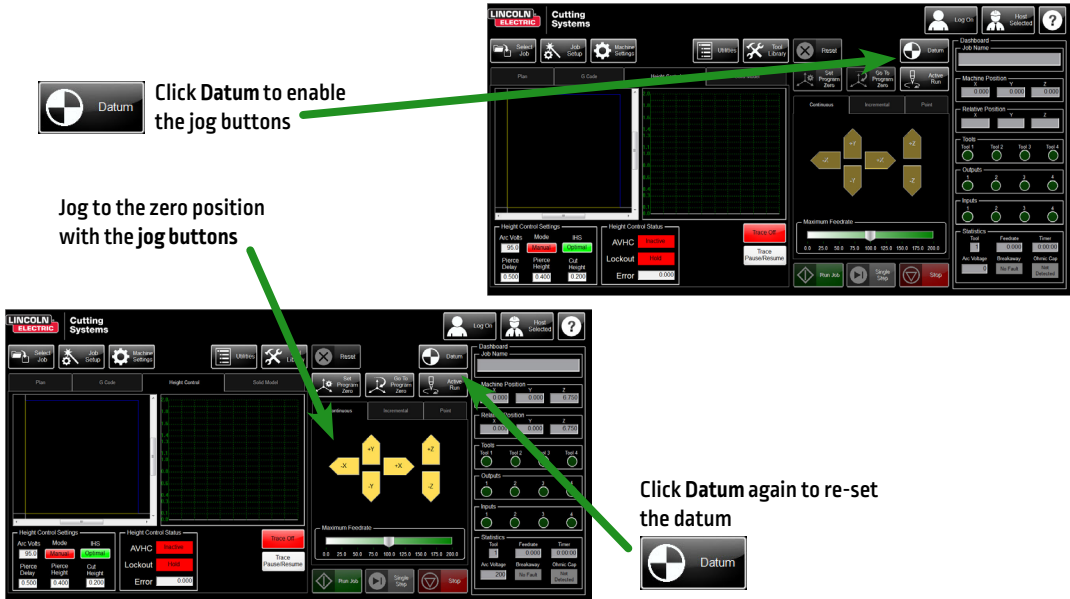
Qty	Part	Description	Part #
1		Accumove 3, Classic Table, computer with VMD software	From Step C5

Instructions

- The jog buttons on the run screen appear dark yellow until the drives are enabled by setting the datum. Click the Datum button to enable the jog buttons.
- If the table's gantry is not already at the table's zero X-position limit, it will need to be jogged there. At this point in the setup and adjustment of the table, the tool's Y-position on the gantry is not critical, but jogging to the table's zero Y-position limit is good practice.
- The Accumove 3 controller is designed to operate in the +X / +Y quadrant. For safety, it limits motion in the other three quadrants to a very slow speed. Be patient and bring the table to the desired zero X- and zero Y-position.
 - Setting the datum will be done again once the Z-axis is installed, and every time the Accumove 3 controller is powered on.
 - Remember to return the tool to the datum position before turning off the Accumove 3 controller to make setting the datum easier at the next start up.

- / + slow	+ / + fast
- / - slow	+ / - slow

Illustrations



Click Datum to enable the jog buttons

Jog to the zero position with the jog buttons

Click Datum again to re-set the datum



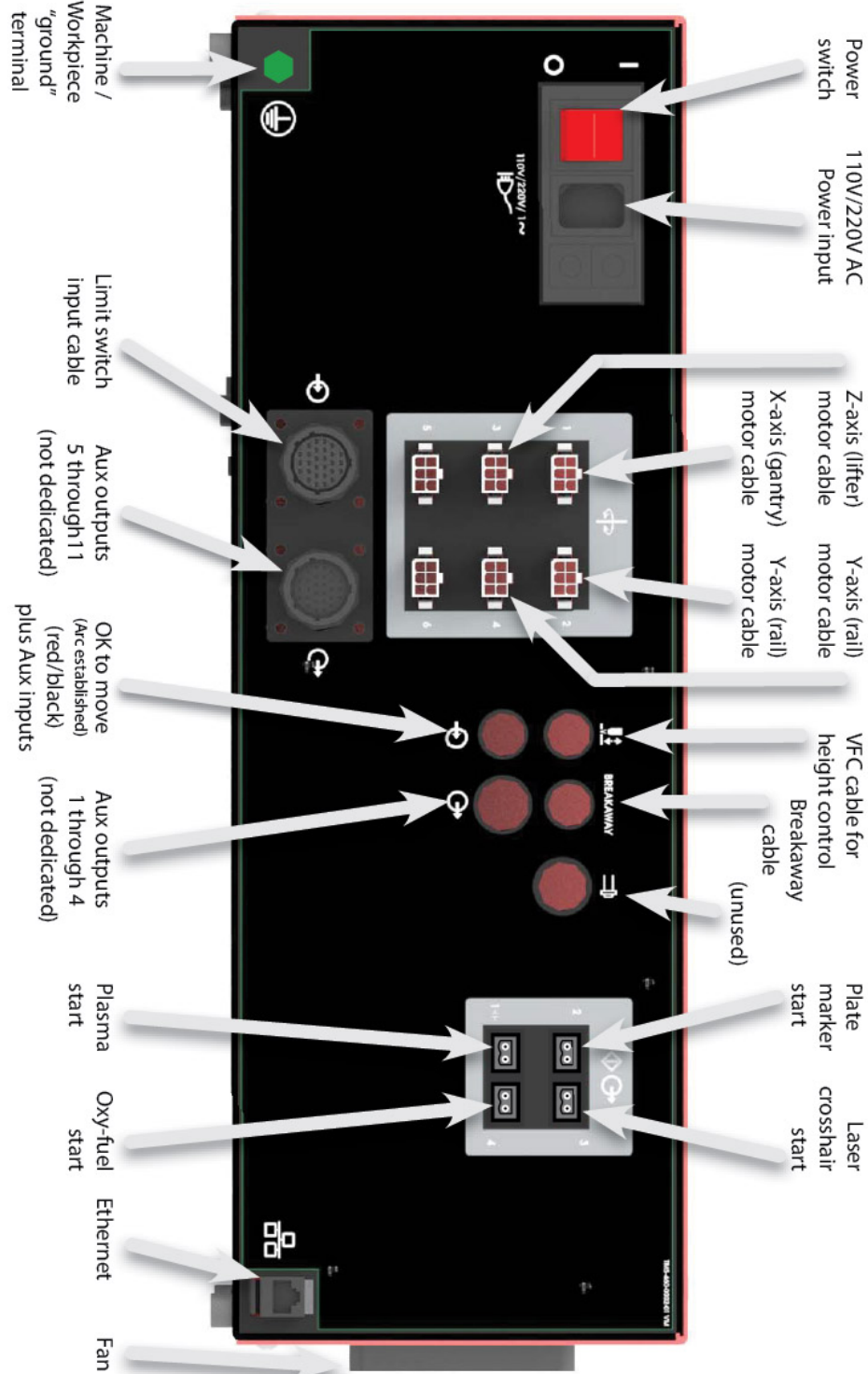
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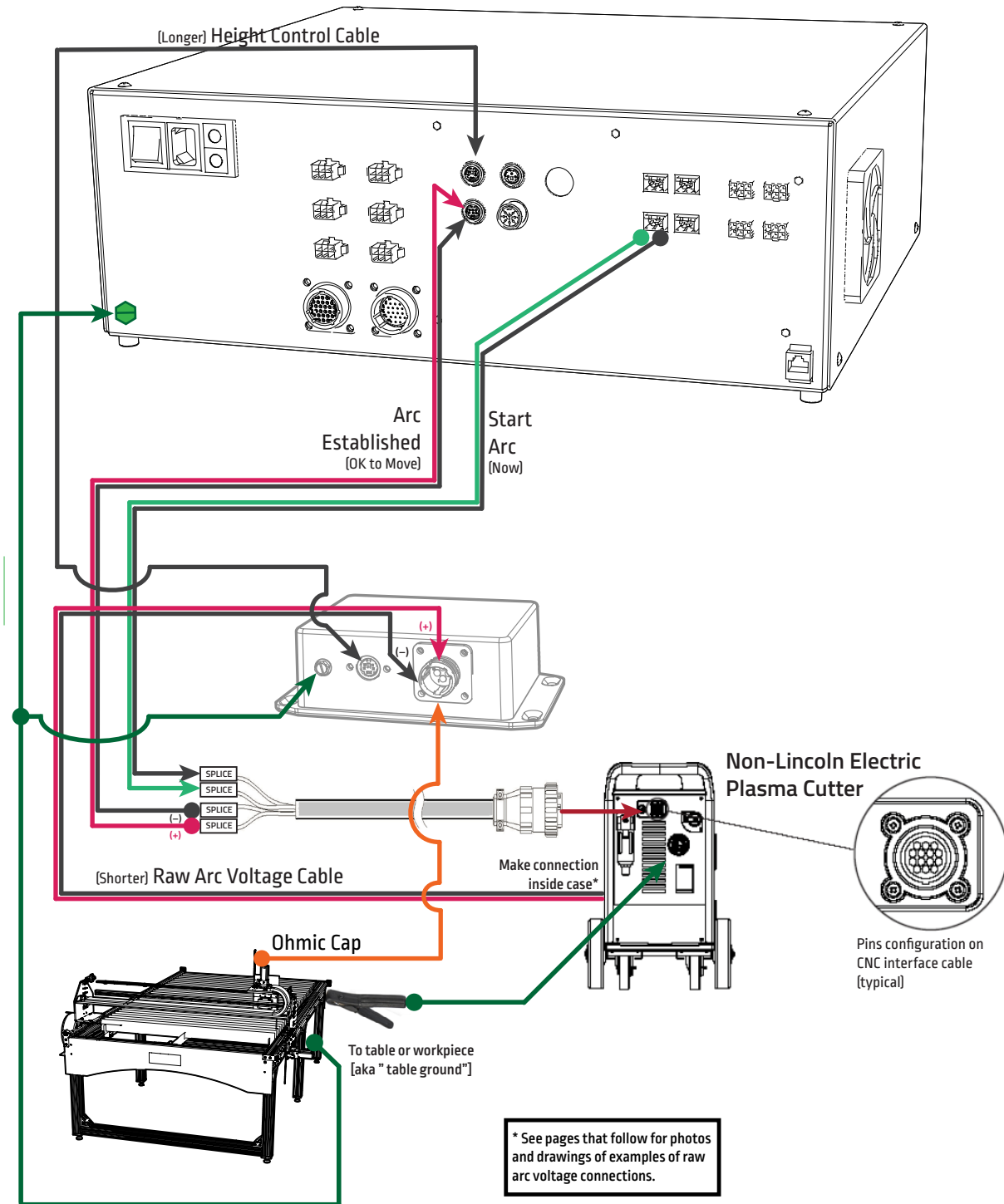
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Accumove™ 3 back panel connectors

- IMPORTANT:** Never connect a motor cable while the Accumove 3 controller is powered on. This will cause irreversible damage to the Accumove 3 controller.



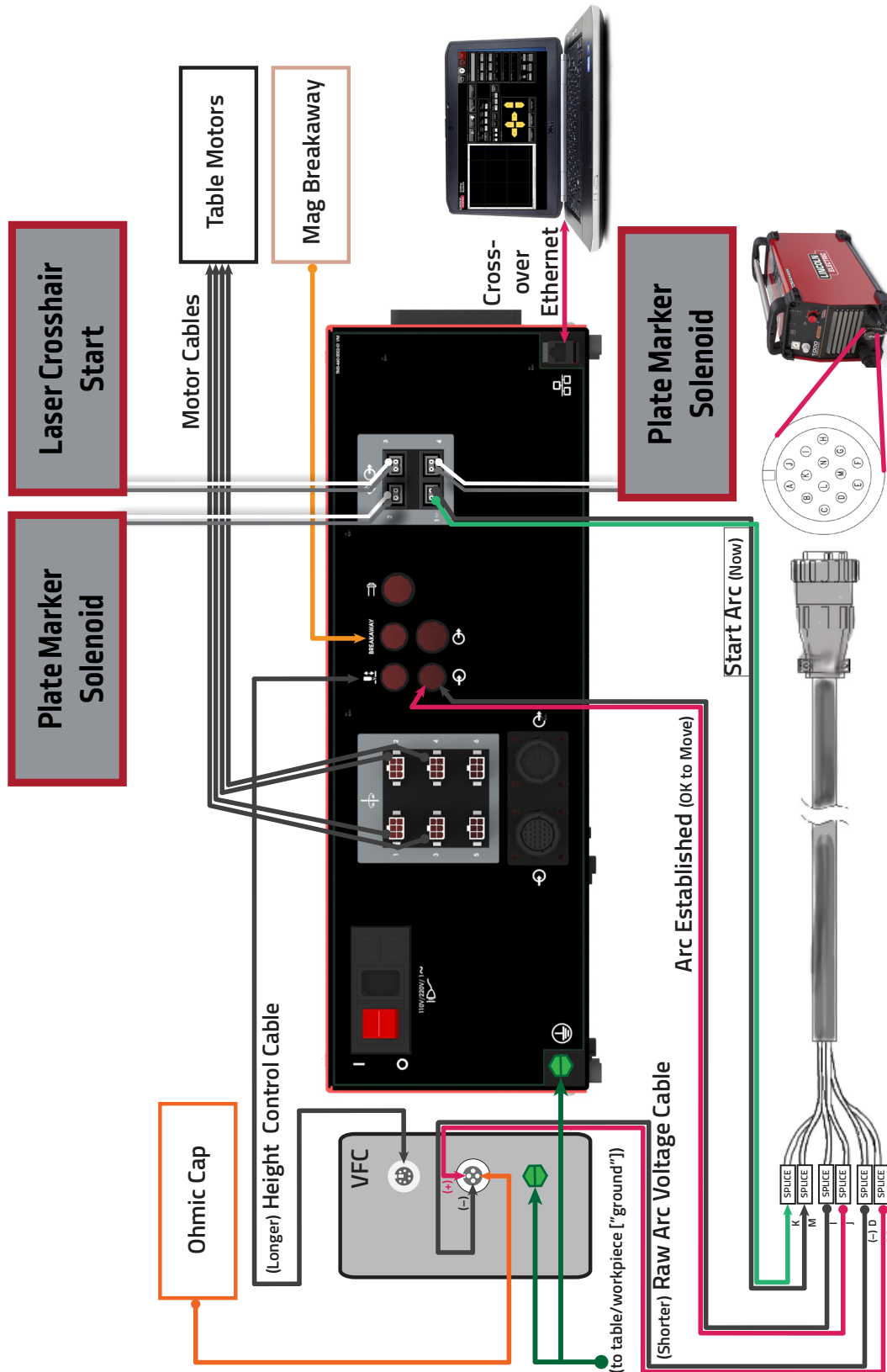
Plasma cutting wiring diagram (non-Lincoln Electric plasma cutter)



Note: Connect the wires from the the Accumove3 ground lug and the VFC ground screw to the machine table near the work clamp, or clamp them to the the material near the work clamp.

Note: See pages that follow for photos of Raw Arc Voltage connection points.

Plasma cutting plus one or more accessories



Raw Arc Voltage Points for VFC

The Accumove VFC should be mounted close to the plasma cutter. If you are using a Lincoln Electric plasma cutter, the CNC cable will provide wires that can be connected to the VFC Arc Voltage cable observing the correct polarity. For other plasma cutters, the raw arc voltage signal is generally obtained by connecting to connection points within the plasma cutter case. Refer to the following photos for guidance.

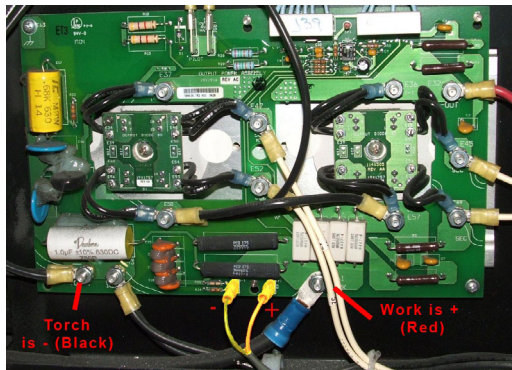
Cable

- Use the raw arc voltage points on your plasma cutter unit to provide the input signal for the Accumove VFC.
 - The 25' Raw Arc Voltage Wire is packaged with the 10' start wire, as pictured to the right. It is a pair of shielded 16 or 18 gauge wires rated for up to 300 volts DC.
 - Connectors for the plasma cutter are not provided as they can vary greatly between models.



- The following pages contain photos and diagrams that will help to locate the connection points (on most common makes and models of Plasma Cutters).
- Please find the picture for your model Plasma Cutter and refer to it. Refer also to the wiring diagrams
- If your model is not listed, contact the Torchmate Support Department: phone 866-571-1066 or email support@torchmate.com.

Thermal Dynamics®



Cutmaster 51, Cutmaster 81, Cutmaster 101, and Cutmaster 151

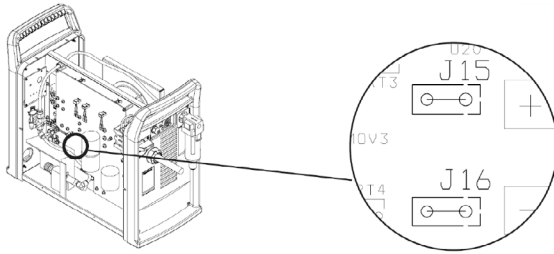
Cutmaster 52, Cutmaster 82, Cutmaster 102, Cutmaster 152, Cutmaster A40, Cutmaster A60, Cutmaster A80, and Cutmaster A120

Connection locations may vary between models, but the points will be labeled as shown



ELECTRODE (-)

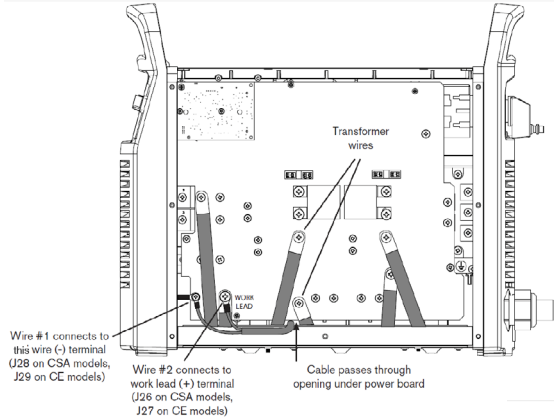
WORK (+)



Powermax 1000, Powermax 1100, Powermax 1250, and Powermax 1650

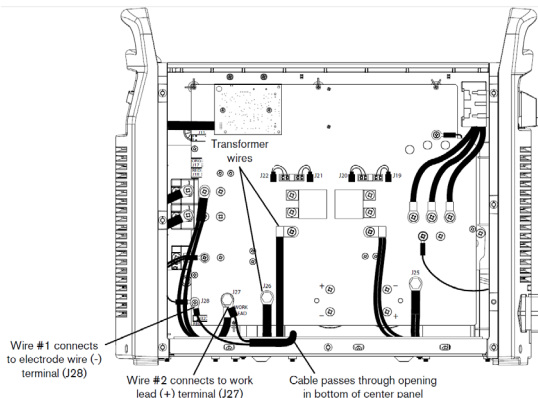
Signal:	Arc voltage (torch height control)
Type:	Output
Notes:	Full arc voltage. No voltage divider. 300VDC maximum. (Signal not available on rear panel connector.)
J15	+VDC Red
J16	-VDC Black

Powermax 45



Powermax 65 and Powermax 85

Powermax 105



Deploy the lifter station, tools, and accessories

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Cutting tools for Torchmate Classic™ tables

The Classic Series tables with Accumove 3 Technology include an Accumove VFC plasma height control and Z-axis lifter for automated plasma cutting. The steps that follow illustrate the mounting and wiring for a plasma cutter. It is optional to use a variety of different types of tools to perform other CNC cutting or engraving operations. For instructions on how to mount and configure other tool options, refer to the manuals supplied with them.

Intelligent height control for plasma

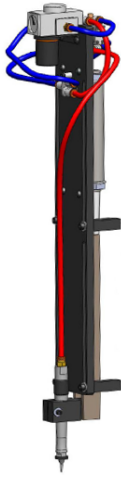
- Approximately 95% of Classic Series customers use their equipment with plasma for cutting metal sheet and plate and this number seems to be growing. With this in mind, the Classic Series CNC tables with Accumove 3 Technology come with an advanced system for achieving high quality cutting, with intelligent Height Control.

Intelligent AVHC components



Other tooling options

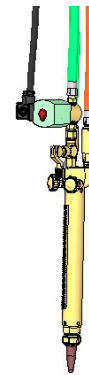
- There are a number of tooling options that can be added to the Classic Series CNC tables, so that you can increase the versatility of your machine.
- Most of these options can be mounted at the same time as the plasma height control, but some cannot. Consult with your sales representative to review the options that best suit your needs.
- Each of the other tooling options includes detailed instructions on how to mount and configure that option for use on your Classic Series table. If you have purchased one of these options, refer to the included Installation Guide during installation.
- As always, if you have any difficulties, please call Torchmate Technical Support.



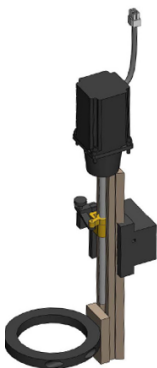
- The plate marker option is a CNC controlled, pneumatically operated tool that strikes the plate with a hardened tip. Each strike by the tool upon the plate produces a small crater or indent, and by producing a series or array of these, you can create text, outline, and fill effects on many surfaces.
- For some types of jobs, you may want to use a mounting option for the plate marker that allows both the plate marker and the plasma cutter to be mounted at the same time. Consult with your Torchmate Sales representative for more information about the availability of dual tool mounting.
- Review the installation manual that comes with the plate marker for detailed instructions.

Plate Marker

- With special optional mounting adapters, an oxy-fuel torch may be installed upon your Growth Series CNC table to facilitate cutting heavier plate than plasma can cut.
- Review the installation manual that comes with the oxy-fuel torch for detailed instructions on setup and configuration.



Oxy-fuel



- With special optional mounting adapters, a router z-axis and motor may be installed upon your Growth Series CNC table to enable three-dimensional routing of wood, plastic, and foam, and the light-duty machining of metals and composites.
- Review the installation manual that comes with the router tool option for detailed instructions on setup and configuration.

Router Z-axis

Features of the Accumove 3 height control and VFC

The Classic Series tables with Accumove 3 Technology includes an intelligent height control system to produce cuts with a high quality level. Other than good quality consumables, the primary factor governing cut quality is the length of the plasma arc. Standard arc lengths are published for each plasma cutter and the AVHC system uses the arc voltage measuring technique to control the height of the torch above the material being cut.

Height control components

- The height control system consists of:
 - A motor driven Z-axis that raises and lowers the torch under control of the Accumove 3 controller
 - An ohmic cap sensor for finding the “zero height” of the torch prior to starting an arc
 - A VFC electronics box that measures the arc voltage when the arc has started and sends a signal to the Accumove 3 controller indicating that voltage.
 - An optional magnetic breakaway sensor to protect the torch from collisions with tipped up parts
 - Cables to connect the components to the Accumove 3 controller, the sensors, and the plasma power unit

What is arc voltage?

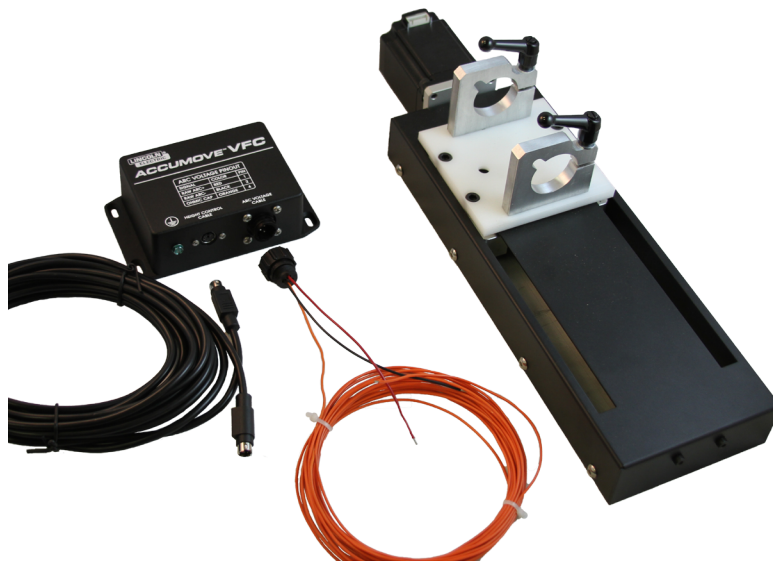
- Plasma cutters are designed to produce a constant electrical current in the plasma arc. If the distance between the torch and the workpiece is longer, a higher voltage must be used to maintain the current than if the distance is shorter (because of the resistance of the air).
- Cut bevel is created when the arc length is either too long or too short or the torch travel speed is too fast or too slow.
 - The optimum arc length for a given material type, thickness, and amperage (current), will produce the best quality. The cut charts supplied with the plasma cutter give the preferred starting point for determining the optimum arc length.
- Using sophisticated computations, the Accumove 3 controller adjusts the speed and torch height at various points along curves and at corners to compensate for the changes in effective arc length that happen in those parts of the cuts. This is done to achieve greater quality and reliability.

Ohmic cap sensing

- Before an arc is initiated by the Accumove 3 controller, the height control must raise the torch tip to the recommended pierce height (typically some distance greater than the established cutting arc length). Because of the non-uniformity of the material being cut, this pierce height is measured by using an ohmic cap to sense the zero distance.
- To determine the position of the material, the Accumove 3 controller lowers the torch until the torch cap just touches the material. A wire connected between the VFC and the cap lets the VFC know when the cap touches the material and completes it's circuit.
- Following this, the Accumove 3 controller raises the torch to the level of the initial pierce height. This height is also found in the plasma cutter's cut charts.

- The VFC box, placed close to the plasma power unit to minimize EMI interference, measures the voltage the power supply is producing to achieve it's set amperage. The VFC transforms the voltage to a kind of signal that has greater noise-immunity (than the raw voltage) and sends it to the Accumove 3 controller. The Accumove 3 controller then sends signals to the Z-axis motor to adjust the torch height to maintain a constant voltage.
- Because of the industrial environment of the typical CNC plasma cutting table, electronic noise, especially Electromagnetic Interference (EMI) can disrupt the operation of the controllers and other electronics leading to problems in achieving optimal cut quality. The design of the VFC unit reduces the effect of any EMI present in your shop environment.
- For more information on what you can do to reduce EMI effects and ensure the highest cut quality for your Classic Series with Accumove 3 Technology CNC system, please search the Torchmate.com web site for "EMI Reduction." or look on the Torchmate / Lincoln Electric Cutting Systems USB Flash Drive supplied with your system.

What is the VFC?



VFC, lifter, and cables

- A magnetic breakaway is an available option for your height control torch holder. The torch is held securely to the Z-axis carriage on the lifter station by magnetic force. If the torch encounters an obstacle and collides with it, rather than breaking the torch body, the collision overcomes the magnetic force and the torch body breaks away from its mounting. This feature has saved countless torch replacements.
- In addition, a sensor switch in the magnetic breakaway signals the Accumove 3 controller to stop all table movements and turn off the plasma power unit's current.

Magnetic breakaway

www.torchmate.com

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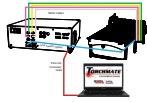

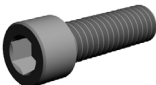


**Cutting
Systems**

Step D1: Mount the AVHC lifter

Mount the Arc Voltage Height Control (AVHC) machine torch lifter station to the tool-mounting bracket (or directly to the tool mounting plate) on the Classic Series gantry using the included hardware.

Required parts / components

Qty	Part	Description	Part #
1		Accumove 3 controller, Classic Table, computer with VMD software	From Step C6
1		Height Control Lifter, ACCUMOVE	TMS-101-1100-02
4		Screw, SCS, $\frac{5}{16}$ "-18 X 1.0" lg, hex drive	TMS-410-0016-16

How to install the lifter station

- The tool mounting plate is part of the gantry carriage and provides mounting holes for two tools. One of these is a plasma torch on the plasmac height control Z-axis lifter, typically.
- To mount the plasma height control Z-axis lifter to the tool mounting plate:
 - Insert the 4 screws through the back of the bracket and into the threaded holes in the back of the lifter station. There are two sets of holes, to the right and to the left of the plate's center.
 - There is some adjustment available for the height in the lifter station slots. Mount the Z-axis lifter station as high above the cutting surface as possible.
- Insert the torch body into the mounting clamps. Adjust the height of the torch body, then tighten the clamping levers.

Illustration

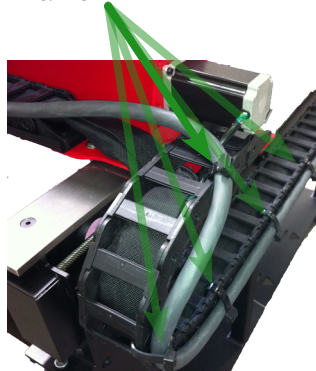


There are six threaded mounting holes in a rectangular array on the back of the Z-axis lifter. Use the four holes that are closest to the end of the Z-axis lifter to mount it to the tool mounting bracket or tool mounting plate.

- Run the cables for the torch power, z-axis motor, the ohmic cap, and the [optional] magnetic breakaway using the cable carrier.
- You may help reduce EMI effects by separating the motor signal cables from the torch power cables, by running the torch power cable on the outside of the cable carriers.

Connect the plasma torch cables



Use cable-ties to run the torch power cable outside the cable carrier



Step D2: Prepare the plasma cutter

The plasma cutter works with CNC systems like Accumove 3 controller because it can produce signals indicating its state for the CNC system, and it can respond to signals when the CNC system tells it to start and stop cutting. All these signals go through the CNC interface cable on Lincoln Electric plasma cutters. Other plasma cutters must use additional wiring. These cables must be prepared for connection to the Accumove 3 controller and VFC. Other preparation involves power and air / gas supplies

Required parts / components

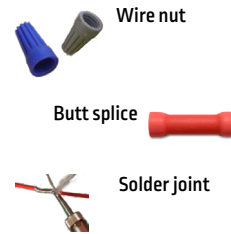
Qty	Part	Description	Part #
1		Plasma cutter power supply unit	<i>Purchased separately</i>
1		CNC Interface cable	<i>Supplied with plasma cutter</i>

Verify power and compressed gas/ air availability and quality

- The quality of the power and compressed air / gas you provide for your plasma power unit has a direct and immediate effect on the quality of the cuts you make.
- Check the documentation for your plasma power unit model and verify that you have met the requirements for power and compressed gas / air.
 - If you have an air compressor, remember to follow the recommended maintenance for ensuring that the air is dry and clean.
 - Make sure the voltage and amperage of your electrical service are stable and within the required specifications. Consult with qualified electrical personnel or your power service company.

Making wire splices to the CNC cable and other cables

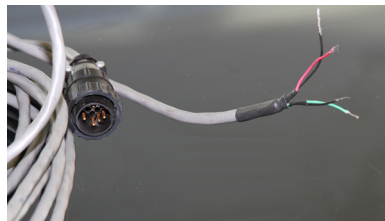
- Several wire-to-wire device connections are required to complete the wiring, for instance connections for the ohmic cap wire, the [optional] magnetic breakaway wires, **Start Arc** wires, **Arc Initiated** (OK to Move) wires, and the raw arc voltage wires can be made by wire splicing. There are several methods that are suitable:
 - 20 gauge twist-on wire nut connectors (typically gray or blue)
 - Crimp-on butt splice connectors (be sure to use the proper size connector and the proper crimping tool)
 - Solder joints with shrink wrap
- If the CNC cable ends have lug connectors, clip these connectors off and remove about 3/8" of insulation for use in making your connections.



- The Lincoln Electric plasma power units have a specially designed CNC cable that directly supports the use of raw arc voltage for controlling the torch height. This cable simplifies wiring for the Accumove 3 controller.
- For other plasma power units, the raw arc voltage signal is frequently not available on the CNC cable.
 - If you purchased one of these units with your Torchmate Classic Series CNC System, the factory will have installed the necessary raw arc voltage cable before shipping.
 - If your plasma power unit was not part of the package, you will have to install the cable for the raw arc voltage in order to complete the setup. Call Torchmate Technical Support and give them the make and model of your plasma power unit. They will provide the information you will need to make the connection.



The connector may be mounted at a very different angle, so be sure to check the markings on the connector before making any wiring changes that require identifying the cable letters



The CNC cable may not include raw arc voltage wires. These will be added as a separate cable either at the Torchmate factory, or, if your plasma cutter was not part of your system order, by your shop during assembly. Call Torchmate Technical Support for specific instructions for your model plasma cutter.

- Torchmate Technical support is available Monday through Friday from 6 AM to 4 PM [06:00 to 16:00, Pacific Time Zone].

Toll Free: 1-866-571-1066
 International: 775-673-2200
 Fax: 775-673-2206
 Email: support@torchmate.com

Differences between plasma power units

Pinouts on the Lincoln Electric plasma power unit




CNC interface cables for other types of plasma power units



Step D3: Place the VFC unit

The Accumove VFC unit processes the raw arc voltage signal from the plasma power unit and the ohmic cap sense signal from the torch tip. It relays the processed signals to the Accumove 3 controller. Electromagnetic Interference (EMI) problems are reduced when the arc voltage cable is kept short by locating the Accumove VFC close to the plasma power unit.

Required parts / components

Qty	Part	Description	Part #
1		Plasma cutter power supply unit	<i>Purchased separately</i>
1		CNC Interface cable	<i>Supplied with plasma cutter</i>
1		Height Control VFC unit	TMS-101-1100-01

Inspect the VFC unit

- The Accumove VFC unit is a small electronics enclosure that supports three connections. No external power connection is needed.
- The three connections are:
 - Arc voltage cable connector (connects to the plasma power unit and also to the ohmic cap on the torch tip)
 - Height control cable connector (connects to the Accumove2)
 - Ground wire screw terminal
- The enclosure has mounting flanges and 4 holes for mounting.

Mount the VFC unit

- Select a suitable location for mounting the Accumove VFC unit. It should be close to the plasma power unit to keep the raw arc voltage wires short. The benefit of this is it reduces EMI problems.
- EMI is an important consideration for producing high quality cutting with your CNC system. For more information on EMI, look for a PDF file on your USB drive, or search the Torchmate.com website for "EMI."
- To reduce the length of the raw arc voltage wires, you can trim the entire CNC interface cable so that

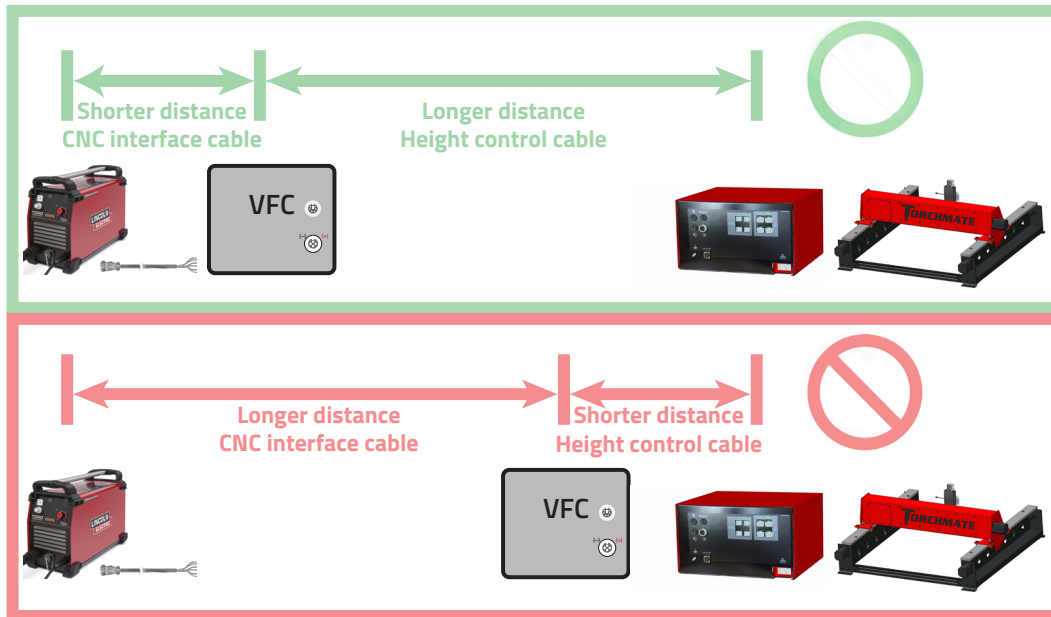
Mount the Accumove VFC securely

Use the mounting holes



Adjust the length of the raw arc voltage cable so that it just reaches the Accumove VFC unit .

Trim the CNC inter-
face cable



Locate the Accumove
VFC near the plasma
power unit to trim
the length of the raw
arc voltage cable



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