Basic Troubleshooting Guide

Revised June 2009

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TORCHMATE CNC CUTTING SYSTEMS®
TECHNICAL SUPPORT

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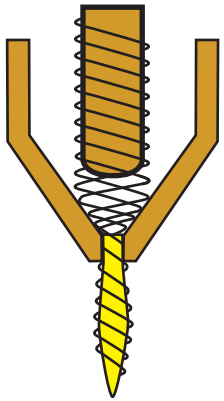
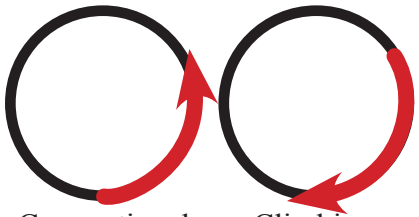
Bevel Basics

Bevel is caused by the motion of the plasma gas as it is emitted from the nozzle. In plasma cutting it is unavoidable. High definition plasma produces less bevel than a standard cutter.
Torch height, air pressure, quality of air, direction of cut, and consumable condition all contribute to how much bevel a cut has.

In the process to create a plasma arc for cutting the gas must be shaped into a vortex. Because of this an arc will have a direction of rotation. This will cause one side of the cut to have more bevel than the other. To ensure that the best bevel is on the part, proper direction of travel is necessary.

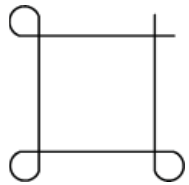


The direction of cuts are referred to as “conventional” and “climbing”. In a conventional cut the torch will go counter-clockwise on outside cuts and clockwise on inside cuts. A climbing cut is the opposite. For plasma the best bevel is achieved by using a climbing cut. Basically the best cut being to the right of the direction of travel.



Corners can also have a bit more bevel than a normal cut. This is caused when the machine slows down to make the direction change. This can be minimized by adjusting ramping rates and start stop values. It is also possible in some cases to use a lower amperage to allow for slower travel speeds. This reduces the amount of slowdown through corners.

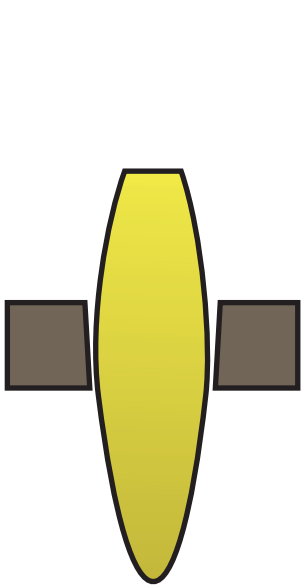
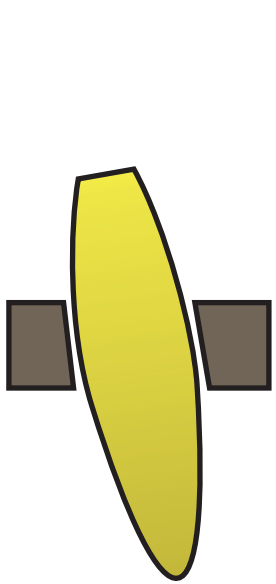
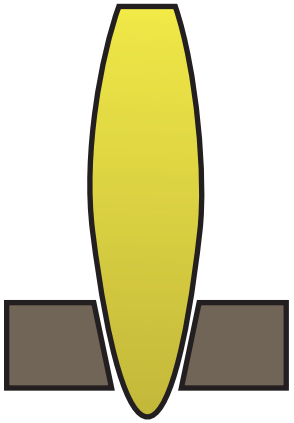
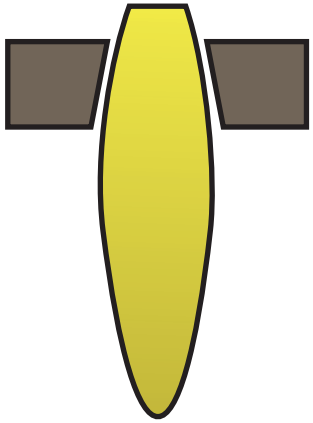
Sharp corners can be achieved by cutting a larger shape that puts the slow down and acceleration of the machine into a scrap area. This cut is used more on thick materials where the corner bevel is increased dramatically.



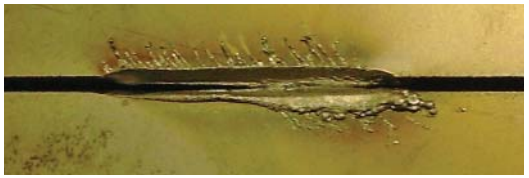
Consumables if not replaced regularly can cause bevel. If a tip wears out or slag builds on it the air flow is redirected in ways that can cause random bevel and inconsistent cut quality. Always check consumables when troubleshooting bevel.

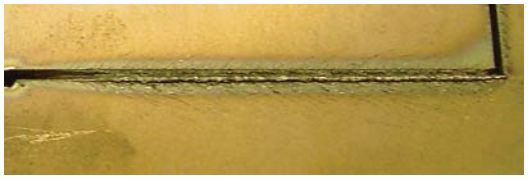
The easiest way to reduce bevel is by cutting at the proper speed and height for the material and amperage that is being cut. Constant air pressure and volume that is clean and dry also decreases the bevel. Using consumable in good condition also prevents excessive bevel.

How Torch Position Affects Bevel

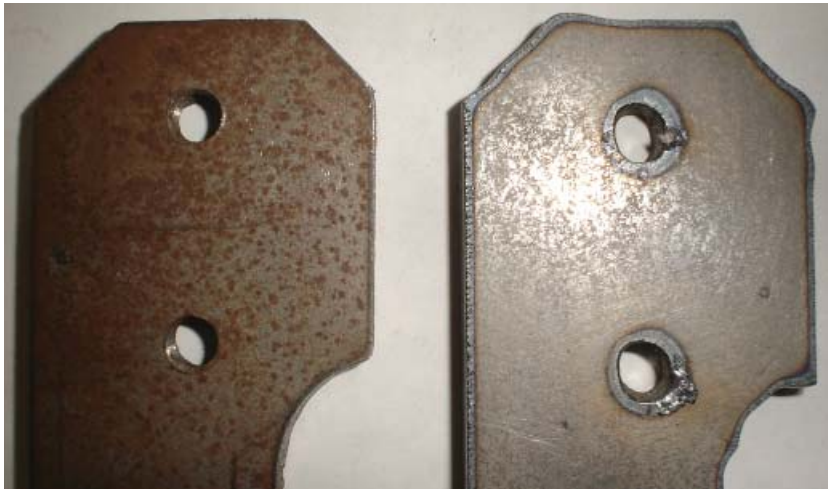
	Correct torch height Torch square to material	Torch angled to material	Incorrect torch height Torch too high	Incorrect torch height Torch too low
Position of torch while cutting				
Bevel of finished part				
	Equal bevel on all sides	Unequal bevel	Excessive bevel	Reversed bevel
	Minimal bevel	One side may be straight the another excessively beveled	Cut may not go all the way through material	Torch may contact material and short out or damage tip
	Longest consumable life	Can be caused by worn tip		

What Causes Bad Cuts





Instances where the metal was not fully cut indicate a few different problems. If the ground clamp was not properly attached to the material this can happen. A similar cut can happen if there was a drop in air pressure, moisture in the air line, or a drop in power. A third cause is if the torch contacts the material, most plasma cutters will go into a low power mode when this happens causing the cut not to penetrate all the way.



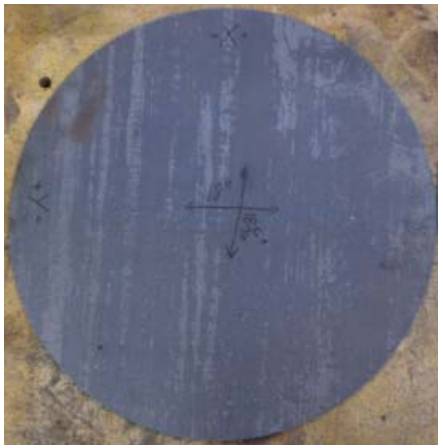
When a machine's performance suddenly changes or degrades gradually from one part to another this generally indicates something mechanical has changed. In cases like this check tightness of belts and set screws. Ensure that the gear to gear rack spacing is adjusted properly. The square of the gantry to the table can also cause parts to be out of shape.

A cut where the path does not return to the start point indicates mechanical slipping or binding. In some cases it will be clear which axis is losing position. Examine the particular axis for loose set screws, loose belts, or physical obstructions.

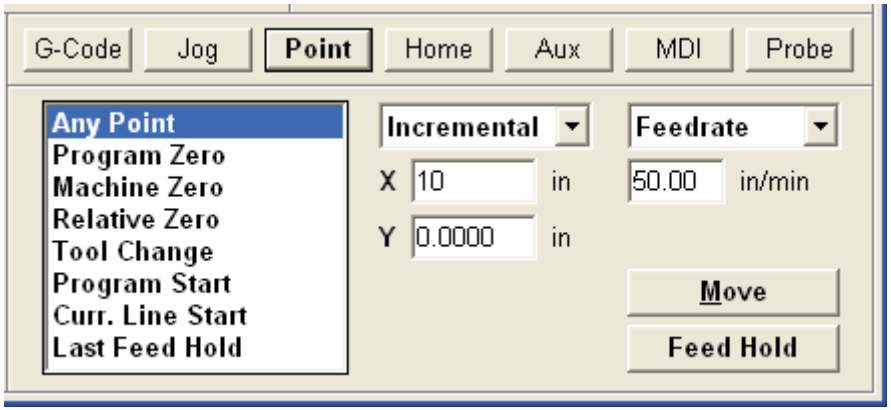
In some cases the slipping in one direction will be offset by slipping in the opposite direction of travel. This allows the part to be cut out but the tool path was not followed correctly. Set screws, belts, gear spacing, and square of the table should be checked.

When the machine begins to move before a pierce is completed the cut will not complete. In this case the dwell time or pierce delay must be adjusted to allow for enough time to pierce the material.

Gear Ratio Calibration



If one or both axes of travel move an incorrect distance but that distance is consistent this indicates an incorrect gear ratio. A gear ratio test is required to calibrate the table. Basically the machine will be told to move a certain distance and the actual distance moved will be measured.



To move the table a certain distance go to the point menu and type in the desired distance to move. Measure how far the table actually moves. Using those two numbers and the current gear ratio a corrected gear ratio can be found. To find the current gear ratio and to change it go to
"Configuration" ▶"Machine"▶ "Mechanics"

To Calculate the Gear Ratio

Take the distance told to travel and divide by the actual distance traveled.

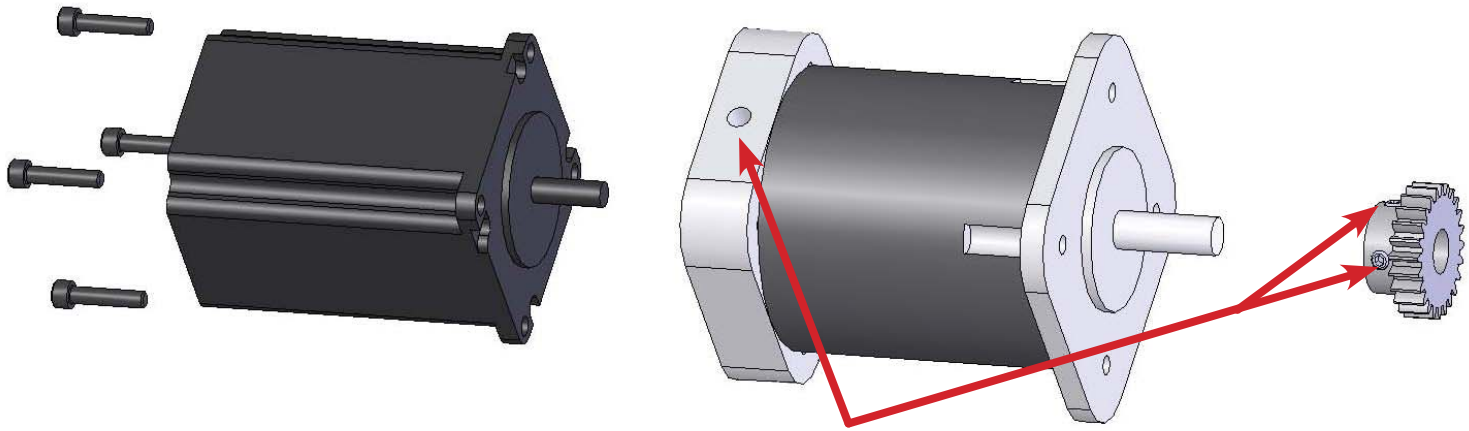
DISTANCE TOLD TO TRAVEL / ACTUAL DISTANCE TRAVELED

Take this number and multiply by the current gear ratio.

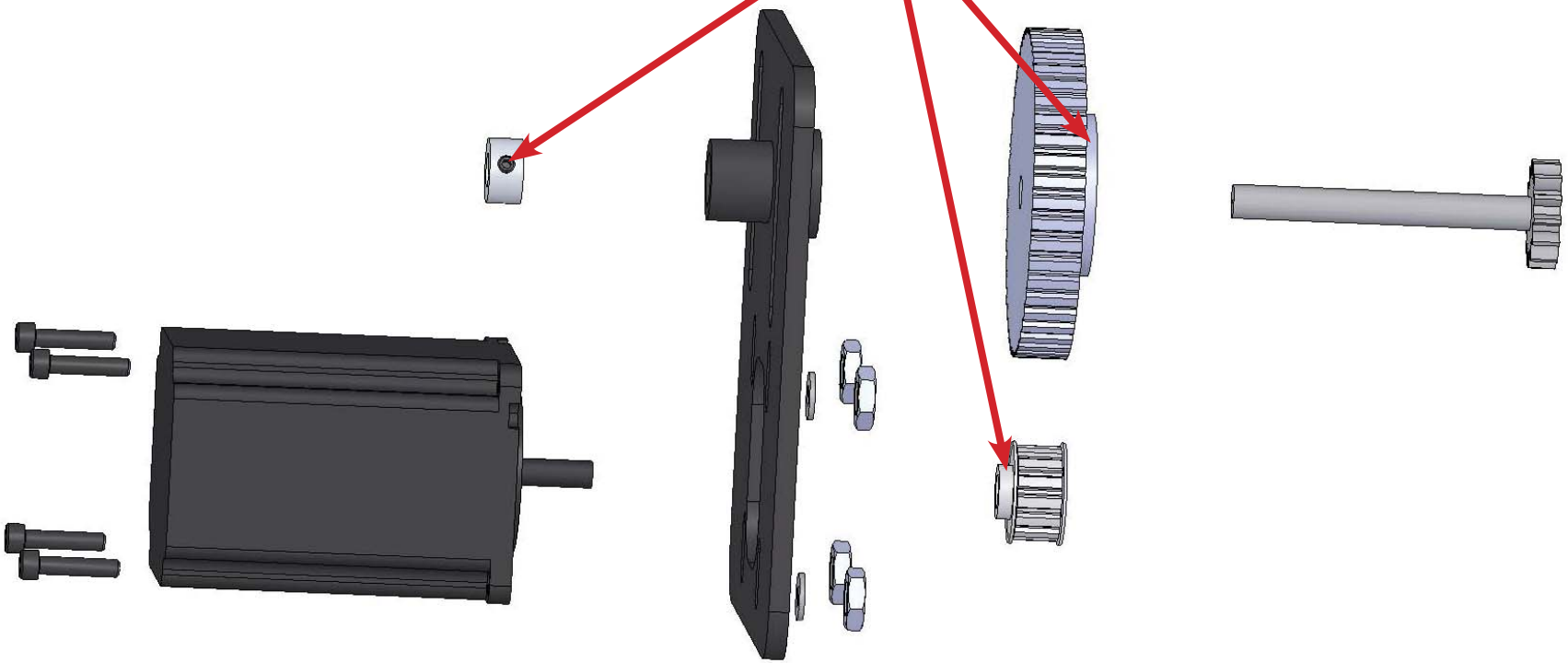
(DISTANCE TOLD TO TRAVEL / ACTUAL DISTANCE TRAVELED) X CURRENT GEAR RATIO

This number is the corrected gear ratio.

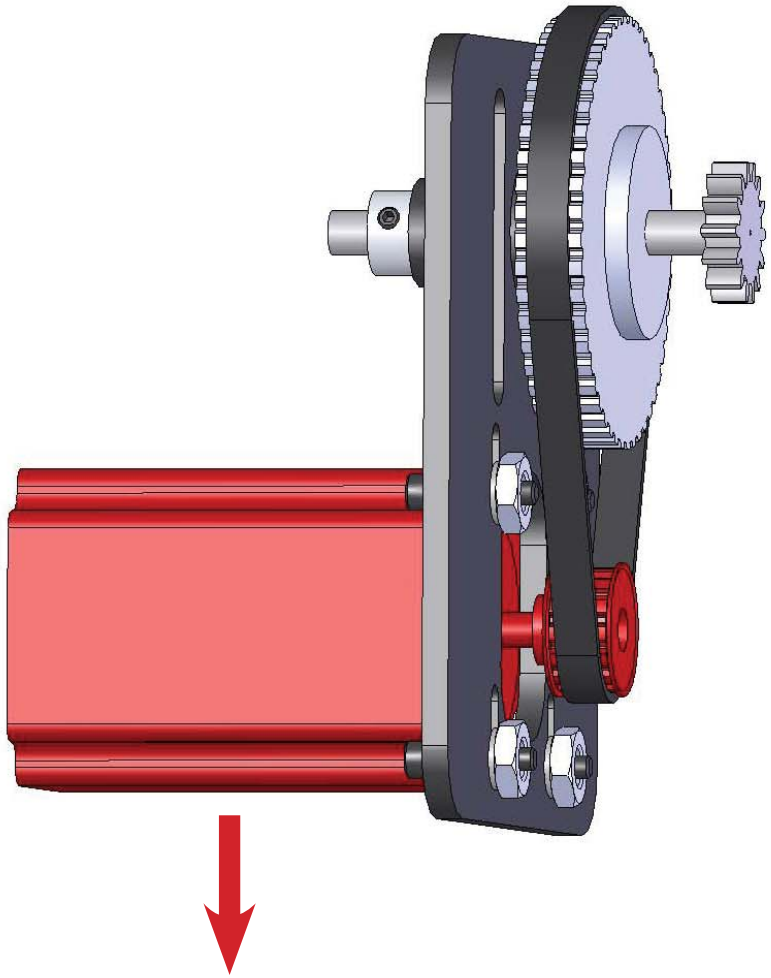
Tightening Set Screws



A loose set screw is the most common cause for poor cut shape. Ensure that these are checked for tightness regularly.



Adjusting Belt Tension



Belts should be adjusted hand tight. Ensure that there is no slop or backlash between the two pulleys.

Height Control Troubleshooting

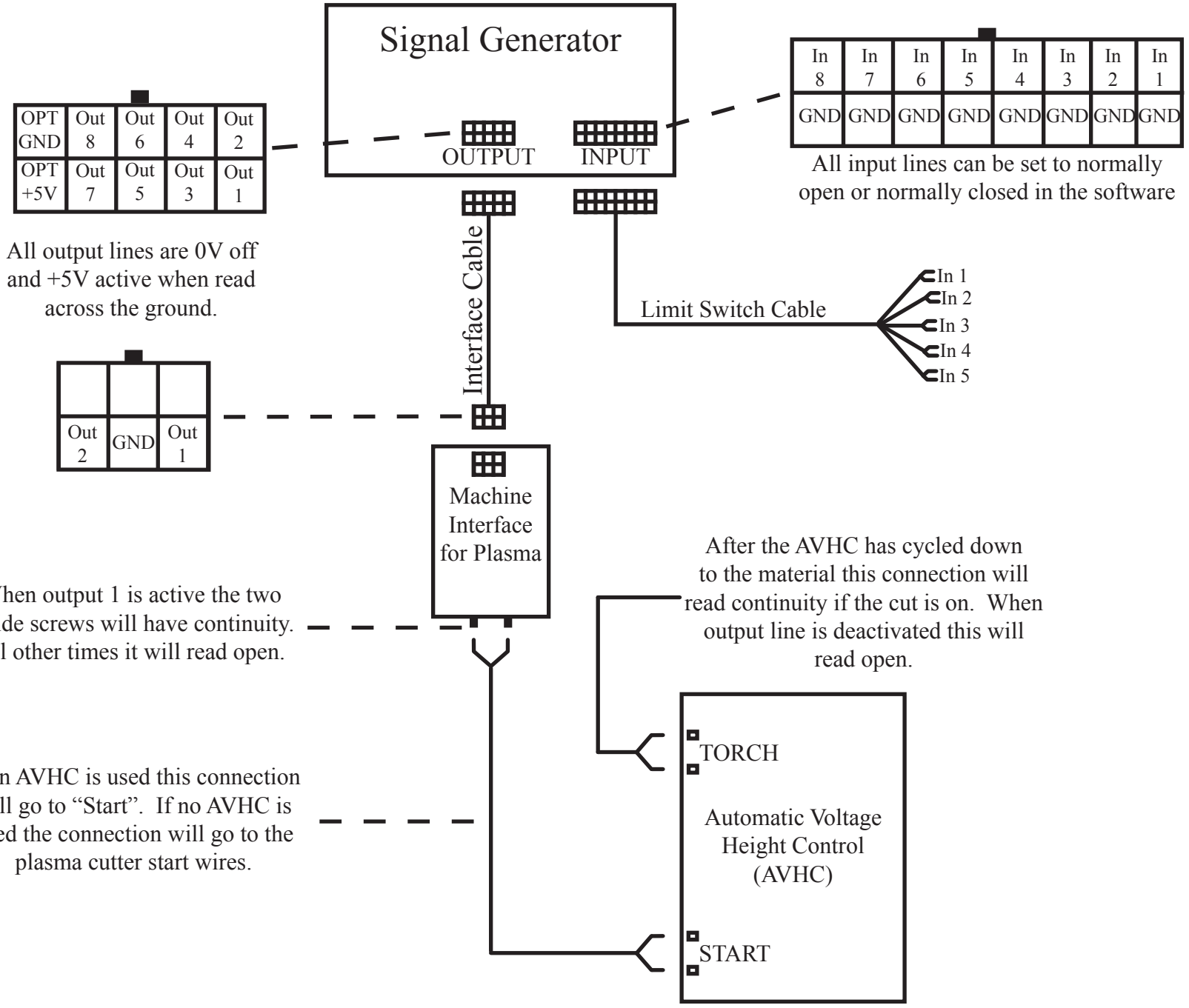
An automatic voltage height control relies on a connection to the plasma cutter to receive a raw arc voltage signal. This is used to maintain the height of the torch from the work piece. While cutting if the height climbs away from the material the “set voltage” is too high. Likewise if the torch tends to dive into the material the “set voltage” is too low.

Most issues with the height control happen when it comes down to sense where the material is. During this operation the motor is looking for a small amount of resistance. If the height control does not come down all the way to the material before trying to fire this indicates that enough resistance was sensed during travel.

The cause of this resistance can range from a small piece of slag getting caught in the acme screw to a severe lack of preventative cleaning that necessitates a full break down and clean up. The first step to try would be to wipe down the screw and rods to ensure that no small obstructions are present. If this step does not remedy the problem a full cleaning is necessary.

When reassembling or adjusting the lifter station it is also critical to ensure that the two guide rails are parallel. If they are not this can also cause binding and behavior similar to a dirty lifter station.

Basic System Test Points



AVHC Basic Overview

VOLTS- The volts connection is an input from the raw arc voltage points on a plasma cutter. This connection is polarity specific and accepts a DC voltage signal. With the connections removed the points should read a dead short when the AVHC is off and 1 MΩ when the unit is on.

TORCH- The torch connection is an output used to activate the plasma cutter. This connection is a normally open dry contact that will close to turn the torch on.

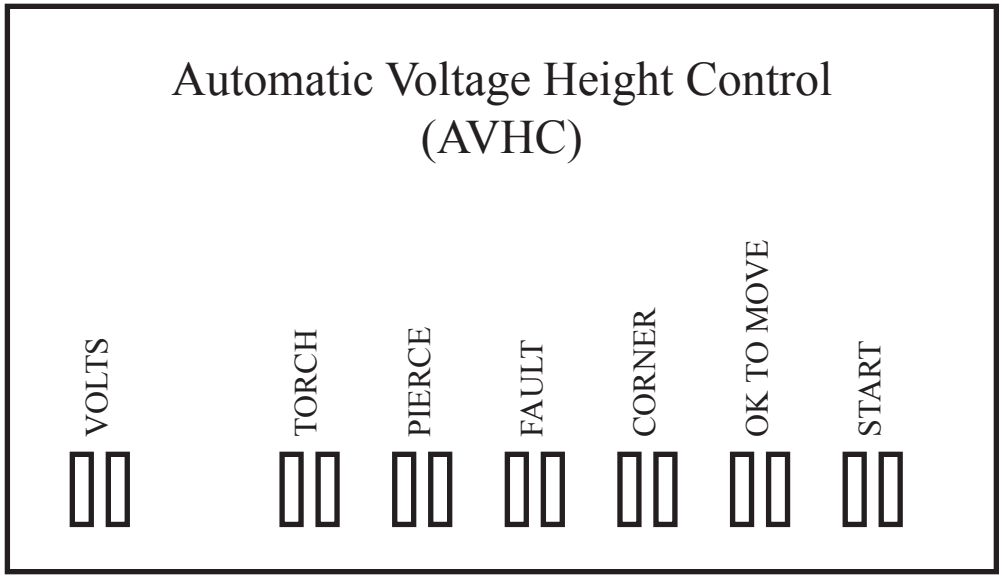
PIERCE- The pierce connection is an output used to relay the OK to move signal to the signal generator. This connection is a normally open dry contact that will close when a signal is received from the OK to move connection, or the pierce delay has expired depending on the configuration of the system components.

FAULT- The fault connection is an output connected to the signal generator. This connection is a normally open dry contact that will close if the program needs to be paused by the height control unit. The pause will generally occur if voltage is not detected in automatic mode or an OK to move signal was expected but not received.

CORNER- Corner is not used in Torchmate systems.

OK TO MOVE- The OK to move connection is an input that receives a normally open signal from the plasma cutter when it switches from a pilot arc. This signal is also called a transfer signal. Some plasma cutters do not send this signal, the connection is not necessary to run.

START- The start connection is an input that accepts a normally open signal from the machine interface for plasma to activate the AVHC's function.



M100/101 Time Out Error

M100/101 TIME OUT ERRORS- When operating the table an M100/101 time out error can happen if the signal generator never receives a signal from the pierce connection.

If a plasma cutter has an OK to move connection the signal originates when the plasma cutter transferrers from a pilot arc. This is received by the AVHC at the “OK TO MOVE” connection, from there it is sent along to the signal generator through the “PIERCE” connection. The pilot arc transition will not happen if the plasma is trying to start over air or an area that is already cut or if the ground clamp is not connected. The pierce signal will not be sent if “Piece Complete” is disabled in the AVHC setup menu.

If a plasma cutter does not have an OK to move connection to signal is sent from the AVHC through the ‘PIERCE” connection to the signal generator after the pierce delay time. If “OK to move” is enabled in the AVHC setup menu and no signal is received the signal will never be sent. Ensure that “OK to move” is disabled.

In both cases a loose connection on any of the wires will cause the error.