



AMET HF Arc Starter Description – 300 Amp & 500 Amp

Our present HF arc starter design was inherited from the Hobart VP-500 power supplies, dating from the late 1980's. AMET purchased Hobart's VP-500 business about 11 years ago, and the design became available to us. We have repackaged it, but have made very few circuit changes. It is still typical of arc starter designs found in other systems.

It runs off the power line (50 / 60 Hz). A transformer steps up the voltage to about 3,000 VAC. This is applied to a spark-gap, induction coil, and a resonating capacitor. When the gap conducts, the capacitor discharges into the primary of the induction coil (actually itself a transformer), and damped oscillations ensue.

The secondary of this induction coil is connected in series with one output (almost always the "torch" lead, not the "work" lead) of the Lincoln power supply. The welding current from the power supply flows through the secondary of this coil. When the spark-gap conducts, oscillations are coupled to the secondary as a high voltage, typically 4 to 11 kV in magnitude (before the arc ignites).

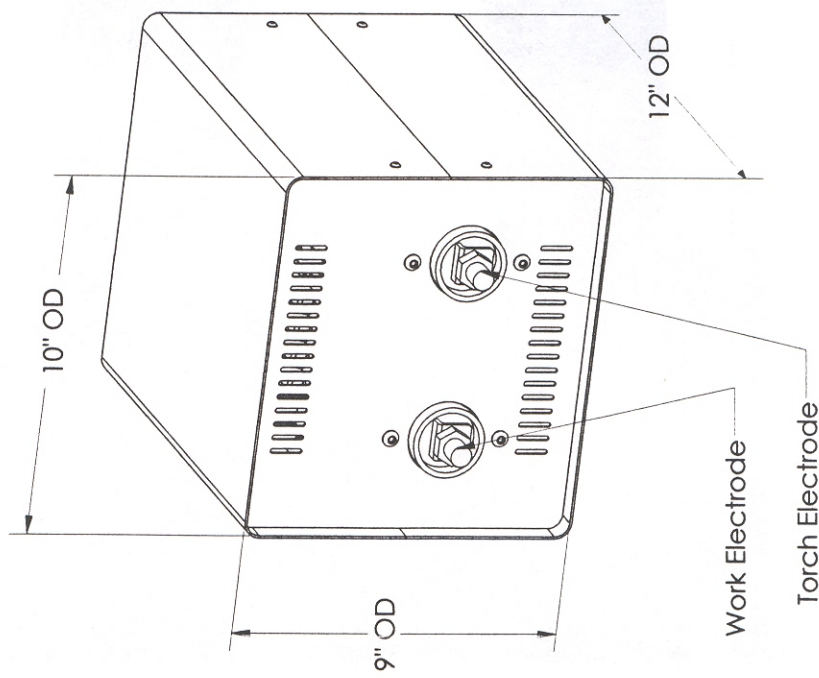
Because of the series connection, the path of the HF current goes through the welding power supply (e.g. Lincoln power supply). Generally in such systems, through high-frequency bypass capacitors inside the case of the power supply. I do not yet know what Lincoln uses to protect its supplies against the flow of HF currents. Typically with another manufacturer, we find 27 nF 1000 V capacitors from each output leg to safety ground (chassis ground, also known as potential earth).

We have sometimes found it useful to connect a capacitor from one welding output lead to the other, so that the HF currents will preferentially flow through the capacitor rather than through long welding leads or through the power supply circuitry. If we use a capacitor like this, it is generally located near the arc, not near the power supply.

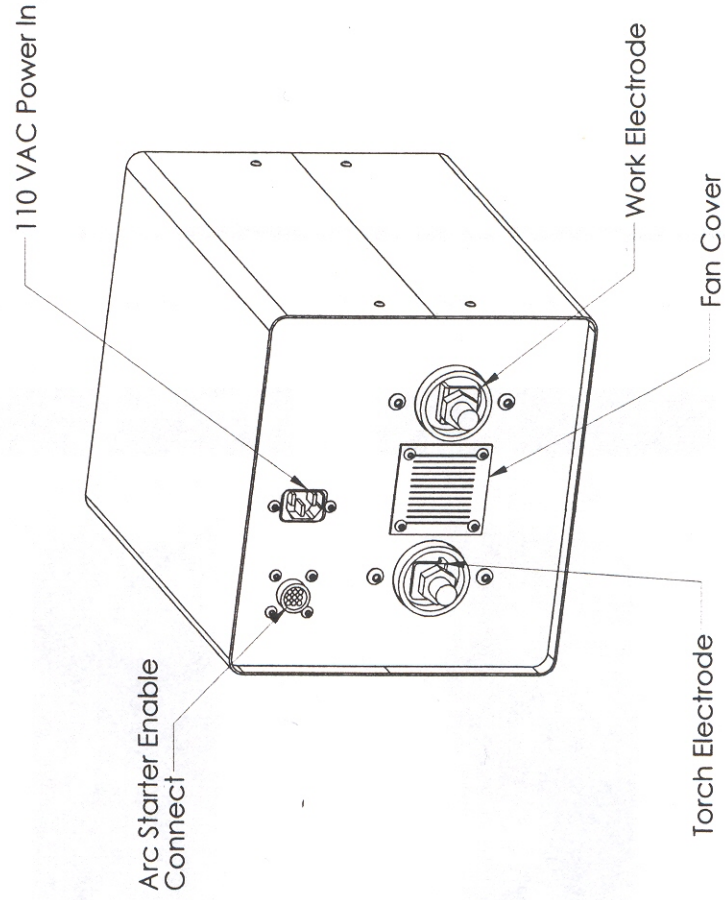
One effort that has often been taken, is to shorten the HF current-path loop, by installing the HF bypass capacitor in the arc starter box, located on the boom of the welding machine. One lead of the induction coil's secondary goes through a short path to the welding electrode. The other induction coil lead goes to the HF bypass capacitor, typically metal-foil polypropylene, 0.33 uF 2000 V. The other end of the capacitor hooks through a short "work" cable from the arc starter box to the work piece. HF current preferentially flows through the HF capacitor through this short "work" path. This not only provides a stronger HF current to the arc, but also the HF current is partly shunted away from the Lincoln power supply. Typically the Lincoln power supply is located many feet away from the arc, connected to the induction coil secondary by a long cable. The inductance of that cable presents a significant impedance to HF current.

Revision			
Rev.	ECN	Date	Approved
-		2/25/2005	
A		10/2/2007	

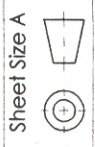
FRONT 3D VIEW



REAR 3D VIEW



Default Tolerances:
 Fraction $\pm 1/16$ X.X ± 0.1
 X.XXX ± 0.010 X ± 0.5
 X.XX ± 0.03 Angle $\pm 5^\circ$
 Finish 100 RMS
 Break Edge, No Burrs Allowed
 Contract:



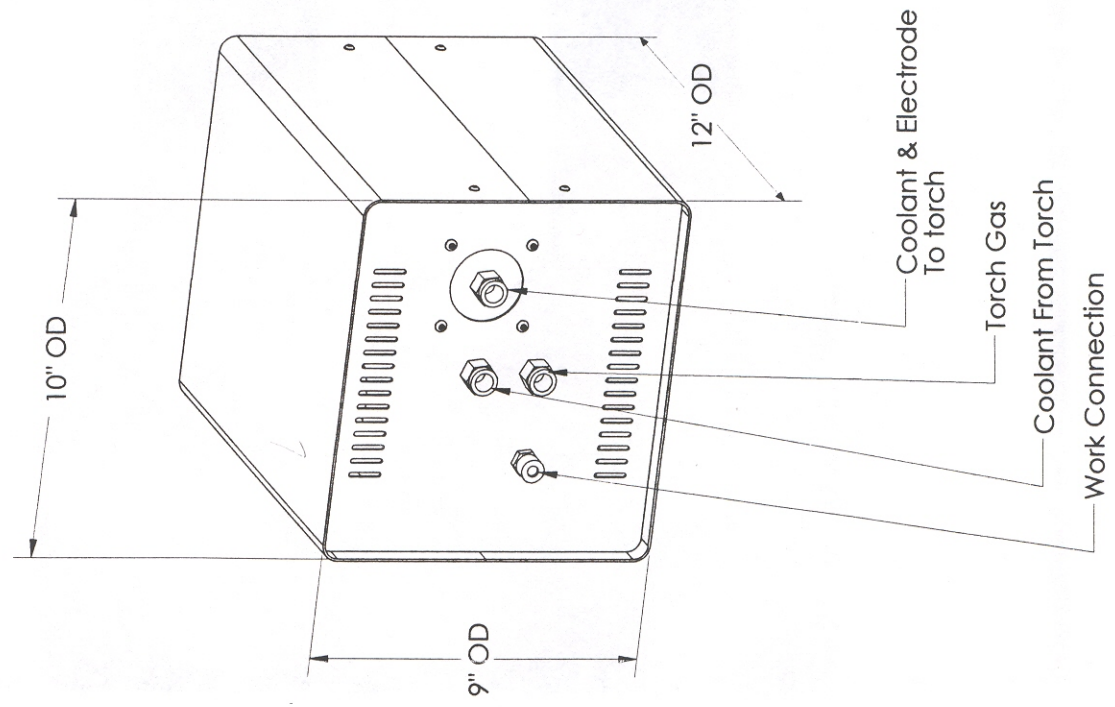
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AMET
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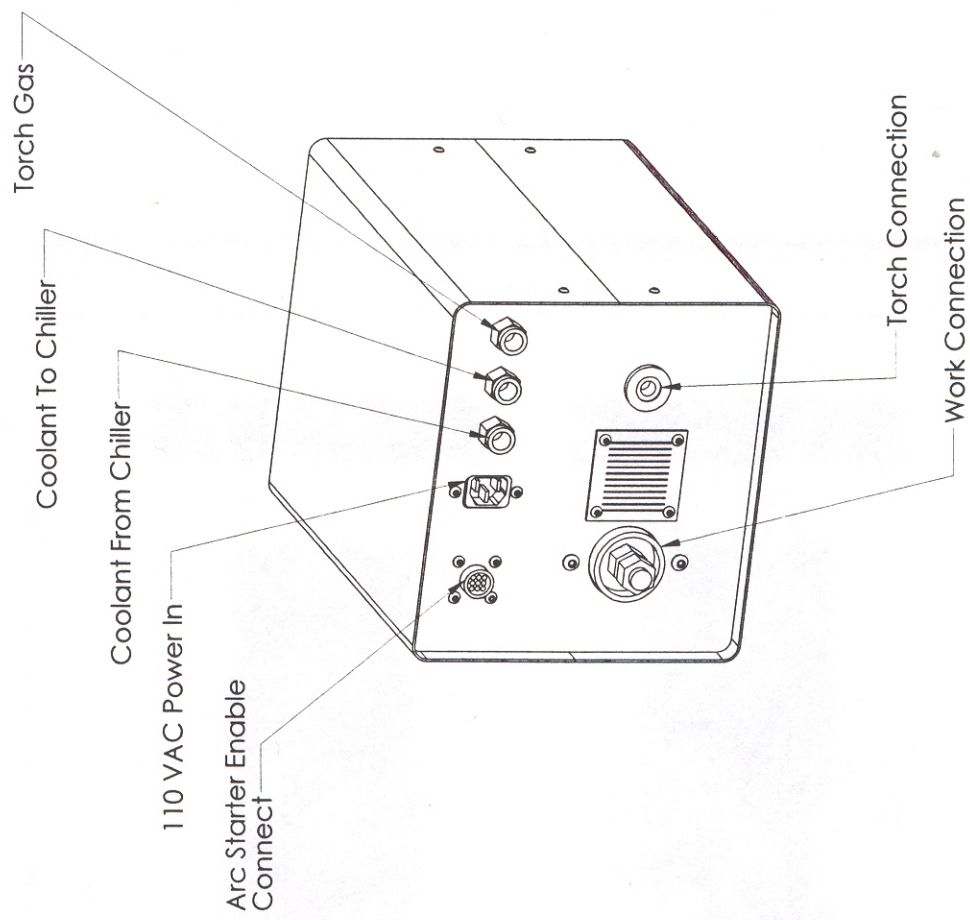
Title: 500 Amp Arc Starter_ No Bulkhead/Cust
 Dwg Num: ARCST-500NB-CUST
 Drawn By: JY
 Sheet 1 of 1
 Rev. -

Revision			Approved	
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REAR 3D VIEW



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 Contract:



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35 North 1st East
 Rexburg, ID 83440

Title: 500 Amp Arc Starter Bulkhead/Cust
 Dwg Num: ARCST-500BLK-CUST

Drawn By: JY
 Sheet 1 of 1
 Rev. -