HOPPER HAMMER™ Models PASTD583-2 & PASTD978 Rev4

Installation, Operating and Maintenance Manual

1. Technical Note - Hopper Hammer Initial Settings

Pages 7 and 8 of the Hopper Hammer Models PASTD583-2 & PASTD978 Installation, Operating and Maintenance Manual discuss the switch settings. The PASTD978 Hopper Hammers ship set to 4444. Most likely a setting of 5555 could be a normal setting. This equates to 90ms ON TIME for medium to medium high impact, one rap per second for 5 seconds with a 5 second dwell before it starts over. This will be adjusted as necessary at install time.

Once installed if the impacts don't seem to be enough then the switches can be adjusted to something like 3 raps/sec for On Time of 1-2 seconds and a 3-5 second dwell (Off Time). This would be 5625 on the switches.

Changing the Impact switch to 6 raises the time to 100ms which is Heavy Rapping. You can only use this setting if you reduce the Frequency (raps/second) and On Time and insure that there is enough Off Time to allow the coil to cool down.

Please note that the Hopper Hammers should not be run in the heavy rapping setting for a period greater than 24 hrs. at a time. Doing so will void the warranty.

Setting the switches is done during startup. We can't know what the final settings will be until all the hardware is installed and we see how efficiently the penetration hardware transmits the rapping energy to the screen.

2. Overview

The *Hopper Hammer*™ is a self-contained electromechanical device that dislodges collected material from the inside walls of hoppers, bins, chutes, bunkers, etc. by delivering discrete impacts of variable intensity to the outside wall of the structure. The *Hopper Hammer*™ can be installed in areas where the ambient continuous air temperature does not exceed 70°C (160°F) and the surface temperature of the striking surface does not exceed 120°C (250°F). If the surface temperature exceeds a continuous 120°C, then a thermal isolation mount must be included in the installation.

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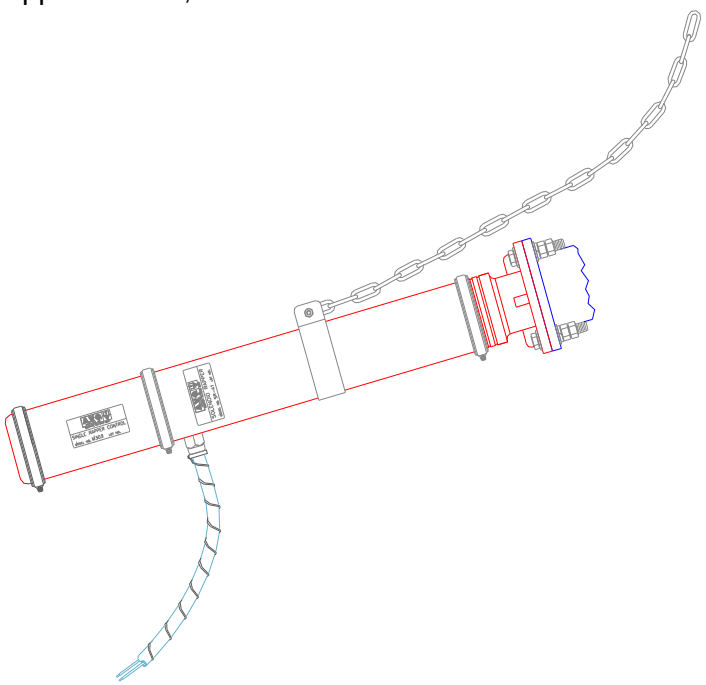
3. Components

The standard A.V.C. Specialists *Hopper Hammer*™, Part Number PASTD583-2, consists of the following components

A. Hopper Rapper, Model SR-A1, Part Number PASDT726.
B. Safety Chain with Clamp
C. Single Rapper Control, Model Series 303



The Model PASTD978 Hopper Hammer™consists of the model PASTD101 Shaft Mount SR-A1 rapper, safety chain and M303 Single Rapper Control.

4. Installation

A. Installing *Hopper Hammer*™ on Striking Surface

In order to optimize the transmission of energy to the wall of the vessel being rapped, the *Hopper Hammer*™ must bolted to an existing striking surface when used as a hopper rapper. The use of Grade 8 or 9, ½" bolts with flat washers, lock washers and lock nuts. After a few days of operation all nuts should be checked for tightness. If the *Hopper Hammer*™ is to be used to rap internals of the precipitator using tapered adapter it is important to insure that the safety chain holds it in place while it is rapping for the first several cycles. This will allow the tapered connection to snug and bond.

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The use of the Hopper Hammer Surface Mount (PASTD802) or similar item is recommended to distribute the impact energy over a large area of the surface to be rapped is recommend.

If the temperature of the surface to be rapped exceeds 120°C, then the use of a High-Temperature Isolator (FASTD794-4.5) or similar item is required.

A safety chain is provided for those installations where the *Hopper Hammer*™ might be installed over a walkway or personnel area. The safety chain clamp should be placed as close as possible to the strike end of the *Hopper Rapper*™. The other end of the chain should be fastened to a structure member above the rapper with a minimum of slack.

B. Installing the Single Rapper Control

i. Power Connection

A 120 or 240 VAC, 50/60 Hz, 10A, single phase source of power is required to operate the *Hopper Hammer*™. The power source is attached through the conduit hub to the "120VAC". 240VAC may be connected to the Model 303 SRC and will determine the voltage and frequency (50 Hz or 60Hz) and automatically adjust to the power supplied to operate the *Hopper Hammer*™. The two power wires that project from the SRC are terminated on the power input terminals of the rapper. Also the green ground wire from the Single Rapper Control (SRC) is terminated on the ground tab of the rapper.

Caution

Do not attach the input power to the switch connection. Applying power at this point will destroy the SRC and void any warranties.

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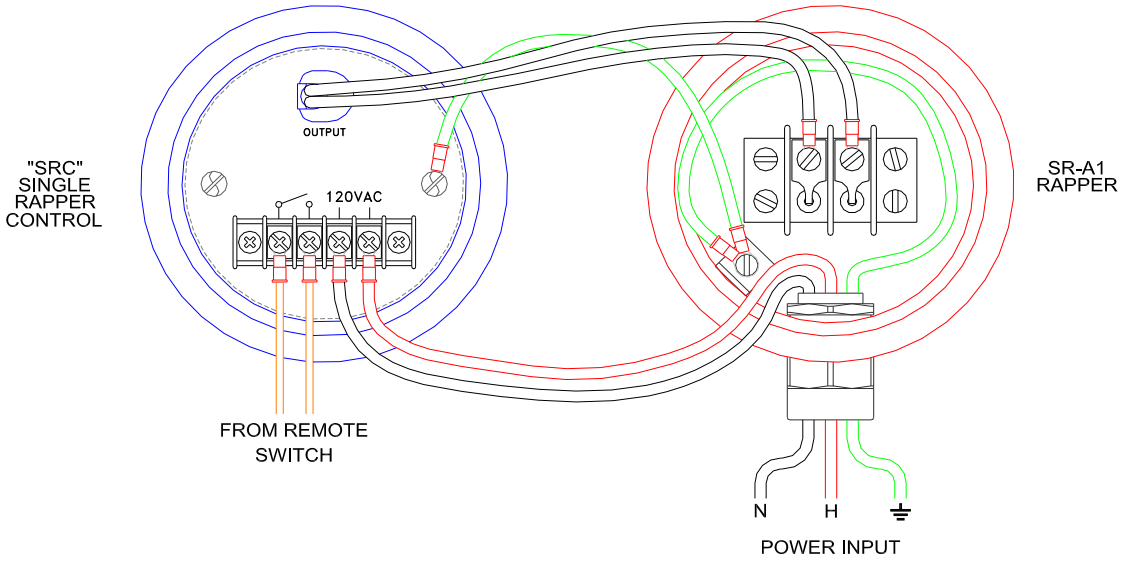
Use the drawing below as reference for field wiring the Hopper Hammer:



Due to vibration, motor lead type wire should be used for all wiring with a minimum of 41 strands.

ii. Switch Block Connection (Remote Switch)

The wiring of the switch block will determine the MODE of operation of the *Hopper Hammer*™

DEMAND MODE

If Demand Mode is selected, then a pair of isolated wires must be brought out from the controller terminals marked with the “Switch Symbol” to isolated user switch contacts. The switch signal is a 10VDC, 0.1A generated by the SRC. The *Hopper Hammer*™ will only operate when the switch is closed.

AUTOMATIC MODE

If Automatic Mode is selected, simply connected a jumper across the control terminals marked with the “Switch Symbol. The *Hopper Hammer*™ will operate continuously and alternate between RUNTIME and INTERVAL.

Because of vibration, all wiring shall be of ”motor” quality and the screw connections must be firmly tightened.

After the electrical connections have been made, attach the SRC to the rapper case with the case clamp. To ensure weatherproof integrity, the rubber gasket must be in place

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and the case clamp must be firmly tightened. Be sure the case clamp lock nut is snugly installed. The clamp bolt/nut should be torqued to 18 ft-lbs and the lock nut tightly secured to insure the SRC does not come loose during operation.

Once switch settings are complete the cap and gasket should be mounted on the top of the SRC using the clamp torqued to 15 ft-lb. This will insure a good seal to keep contaminants out of the SRC enclosure.

NOTE: At field installation insure that the clamp bolts are physically "down" underneath the rapper assembly to insure water or debris does not collect and potentially create a problem.

Installation of Model PASTD978 with tapered base:

Since this model does not have nuts and bolts to hold it to the mating tapered shaft the installation requires at least two persons to (1) hold the rapper onto the male taper while (2) the other installs the safety chain such that it is welded snugly (no sag) to the support member above, so that it is pulling the Hopper Hammer onto the mating shaft. Once power is applied and the rapper runs a few cycles it will snug itself onto the mating taper and you will note a small amount of sag in the safety chain.

5. Operating Settings, Indicators and Special Features

The Model 303, Single Rapper Control (PASDT980) has four thumb-wheel switches on the control panel for selecting operating settings:

A.	IMPACT	Controls how hard the rapper hits and whether the control starts with Run Time or Interval Time.
B.	RUNTIME	Controls how long the rapper will rap in seconds.
C.	INTERVAL	Controls the rest time (recycle interval) in minutes, or fraction thereof, before beginning the next RUNTIME.
D.	RAPS/SECOND	Sets the Rate of Impacts per Second during the RUNTIME
E.	TEST	Pressing this button will cause the *Hopper Hammer*™ to operate once at the selected IMPACT, RAPS/SECOND and RUNTIME.
F.	Power Switch	Power On or Off.

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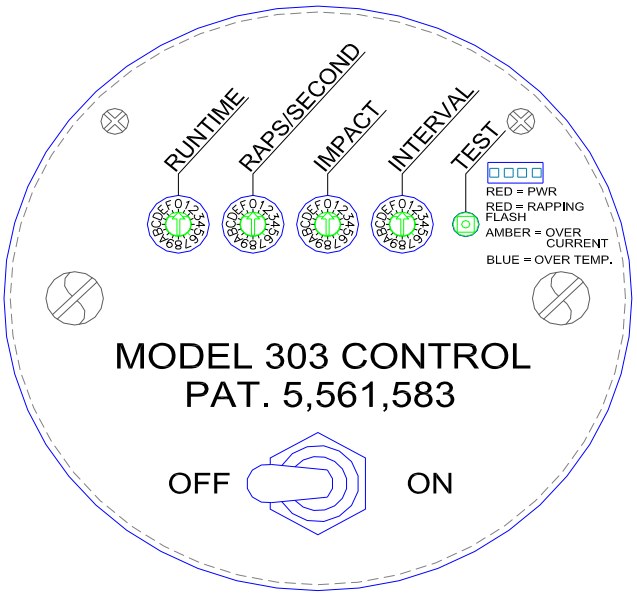
G. Indicating LEDs

i.	Red (Steady)	Power ON.
ii.	Red (Flashing)	Rapping.
iii.	Amber	Overcurrent, will automatically reset and operate at the next RUNTIME.
iv.	Blue	Over-temperature, resets automatically when temp is in range.

H. Features

i.	Overcurrent	There is a current sensor on the output line. If there is a current draw greater than 20 amps peak, the control will cease operation and illuminate the AMBER LED. At the beginning of the next RUNTIME, the Overcurrent will automatically reset and operate the rapper.
ii.	Overtemp.	If the internal temperature of the control exceeds 165°F (74°C) the control will stop its output until the temperature drops below that temperature. It will illuminate the Blue LED.



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6. Parameters

The basic rule of thumb is to rap just hard enough to dislodge the dust, just often enough to prevent deterioration of the collection efficiency of the precipitator fields and minimize both instantaneous (puffing) and total outlet emissions. Set switches accordingly.

The Hopper Hammer cannot be operated with high impact settings for more than 24 hours. This is a theoretical maximum as it is not a good idea to continuously rap at a high impact due to the potential of damaging the hopper/screen/electrode that it is attached to. **If these conditions are not met the warranty will be voided.**

A. IMPACT

Impact energy is adjustable in 8 distinct values. Settings from 1-8 increases the impact strength and, upon initiation of operation the *Hopper Hammer*™*,* will start with RUNTIME then operate the INTERVAL. Settings from 9-16 are increasing impacts but upon initiation will start the INTERVAL before the RUNTIME. The settings required to achieve maximum impact will vary slightly due to local power sources. A mid-range setting of 4 or 5 (12-13) normally gives good results.

B. RUNTIME

RUNTIME is adjustable from 1 to 16 seconds. During the RUNTIME period, the rapper will operate at the selected IMPACT and RAPS/SECONDS. At the end of the RUNTIME, the SRC will begin a new INTERVAL. *Hopper Hammer*™ operation only is only enabled while the switch contact closure is maintained. If the switch closure is interrupted, the rapper will stop until the switch setting is again closed.

Pressing the TEST button will cause a single RUNTIME operation.

C. INTERVAL

Interval is adjustable in sixteen discrete steps with a multiplier provided by the setting of the RAPS/SECOND switch. The base line for the switch settings is 1 to 16 minutes. The minute value is multiplied by a factor from the RAPS/SECOND of 1/2, 1, 2 or 5 (see the RAPS/SECOND Switch Table). *Hopper Hammer*™ operation only is only enabled while the switch contact closure is maintained

D. RAPS/SECOND

RAPS/SECOND or frequency will cause impacts of the hammer at a different rates during the RUNTIME. Four rates are available 1 rap per second, 3 raps per second, 5 raps per second or Sweep rate. Sweep will operate *Hopper Hammer*™ at 1 impact the first second of operation, then 3 raps the during the 2nd second of operation and then 5 raps during the 3rd second of operation and then the Sweep will continue to repeat.

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	SW1	SW2		SW3			SW4	
Switch Setting	RUNTIME Seconds	Frequency Off Time Multiplier	Raps/Sec	Impact Half Cycles	120V	240V	INTERVAL Off Time Minutes x Multiplier	Pulse Time
1	1	0.5	1	Run First	6	3	1	50 ms
2	2		3		7	4	2	58 ms
3	3		5		8	5	3	67 ms LIGHT RAPPING IMPACT SW
4	4		Sweep		9	6	4	75 ms
5	5	1	1		11	7	5	92 ms MEDIUM RAPPING IMPACT SW
6	6		3		12	8	6	100 ms HEAVY RAPPING IMPACT SW
7	7		5		13	9	7	108 ms USE THESE IMPACT SW SETTINGS ONLY FOR A SHORT TIME TO INSURE NO DAMAGE TO THE RAPPER
8	8		Sweep		14	10	8	117 ms
9	9	2	1	Delay First	6	3	9	50 ms
A	10		3		7	4	10	58 ms
B	11		5		8	5	11	67 ms LIGHT RAPPING IMPACT SW
C	12		Sweep		9	6	12	75 ms
D	13	5	1		11	7	13	92 ms MEDIUM RAPPING IMPACT SW
E	14		3		12	8	14	100 ms HEAVY RAPPING IMPACT SW
F	15		5		13	9	15	108 ms USE THESE IMPACT SW SETTINGS ONLY FOR A SHORT TIME TO INSURE NO DAMAGE TO THE RAPPER
0	16		Sweep		14	10	16	117 ms
Special Settings								
	X			D		1	0	1 Rap every 80 Minutes

7. Additional Information

   A. The power switch must be on for the control to operate.
   B. Pressing the TEST button will cause a single operation of the RUNTIME
   C. The SRC has no user-serviceable parts. Disassembly of the Model 303 Single Rapper Control voids all warranties.

8. Important Information

   The Model 300 Single Rapper Control has been designed to offer considerable flexibility under a wide range of operating conditions. This flexibility makes it possible to select settings that can damage either the control or the rapper or both.

   A. Impact

      The control has been designed to deliver maximum impact with a less than optimum power source. As a result, the maximum impact setting of 9 is not necessarily required to achieve maximum impact. IF THE RAPPER IS DRIVEN

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TOO HARD, IT WILL CAUSE THE HAMMER TO "TOP OUT." That is the hammer will hit the top of its chamber on the up-stroke. This condition can be detected audibly by the sound of a double hit, once at the top, and once as the hammer hits the strike area of the shaft mount. Topping out can cause the rapper to draw extra current and can also damage the control. IT IS IMPORTANT THAT THE IMPACT SETTING BE REDUCED TO A SETTING WHERE NO DOUBLE HIT IS HEARD. This does not reduce the maximum impact delivered by the rapper.

B. Continuous Operation in Automatic Mode.

The *Hopper Hammer*™ is designed to operate continuously but is limited to a duty cycle of 10% or less. If short Intervals are selected 30 seconds to 2 minutes then the RUNTIME duration should be limited.

9. Maintenance

The *Hopper Hammer*™ provides long-life operation with a minimum of maintenance. The hammer of the Hopper Rapper is sealed in a contaminant free cylinder that allows hammer movement with a minimum of wear from abrasive materials.

A. After Initial Operation

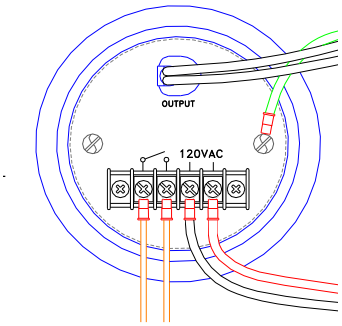
Approximately one week regular operation, tighten all attachment bolts.

B. Two Years.

Every two years, the rapper should be disassembled at the "lower" clamp to remove and examine the moving parts (Refer to parts assembly drawing, page 10). Replace the hammer rings, spring or rubber bumper if sign of excessive wear are evident.

10. Remote Wiring Example

The standard SRC wiring diagram is as follows, also shown in section 3B:



TO REMOTE CONTACT

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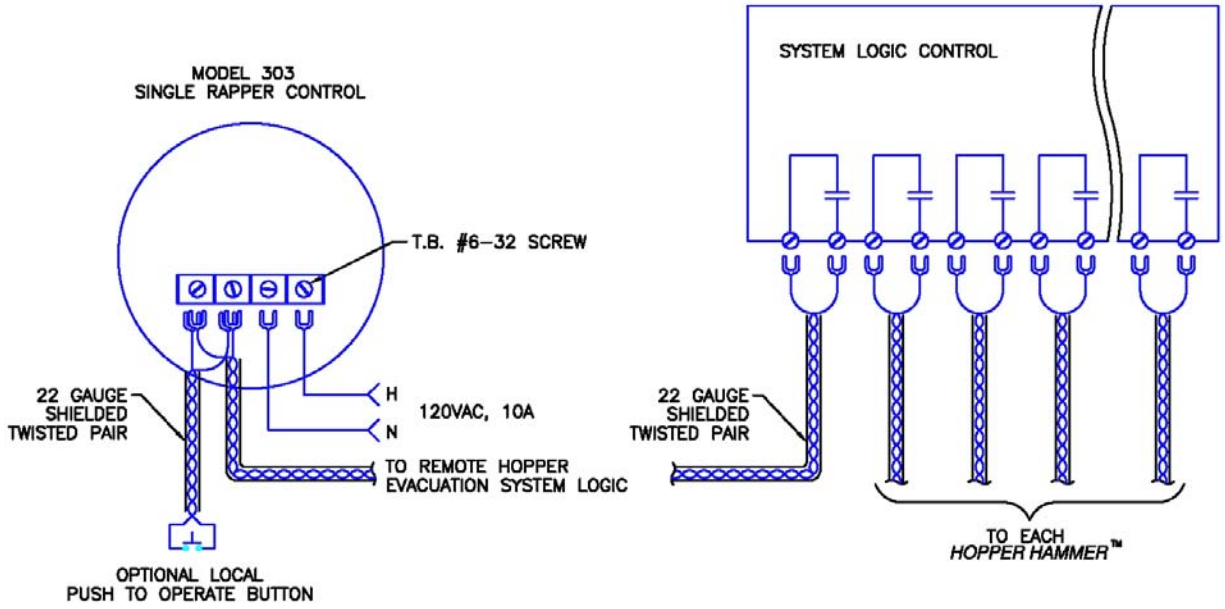
The two terminals designated for Remote Enable/Disable are wired as follows:



As you can see in this figure the contacts can be wired to a switch or to remote relay contacts that are energized closed when the outlet of the hopper is open or the rotary valve is running. When the contact is open the Hopper Hammer is disabled.

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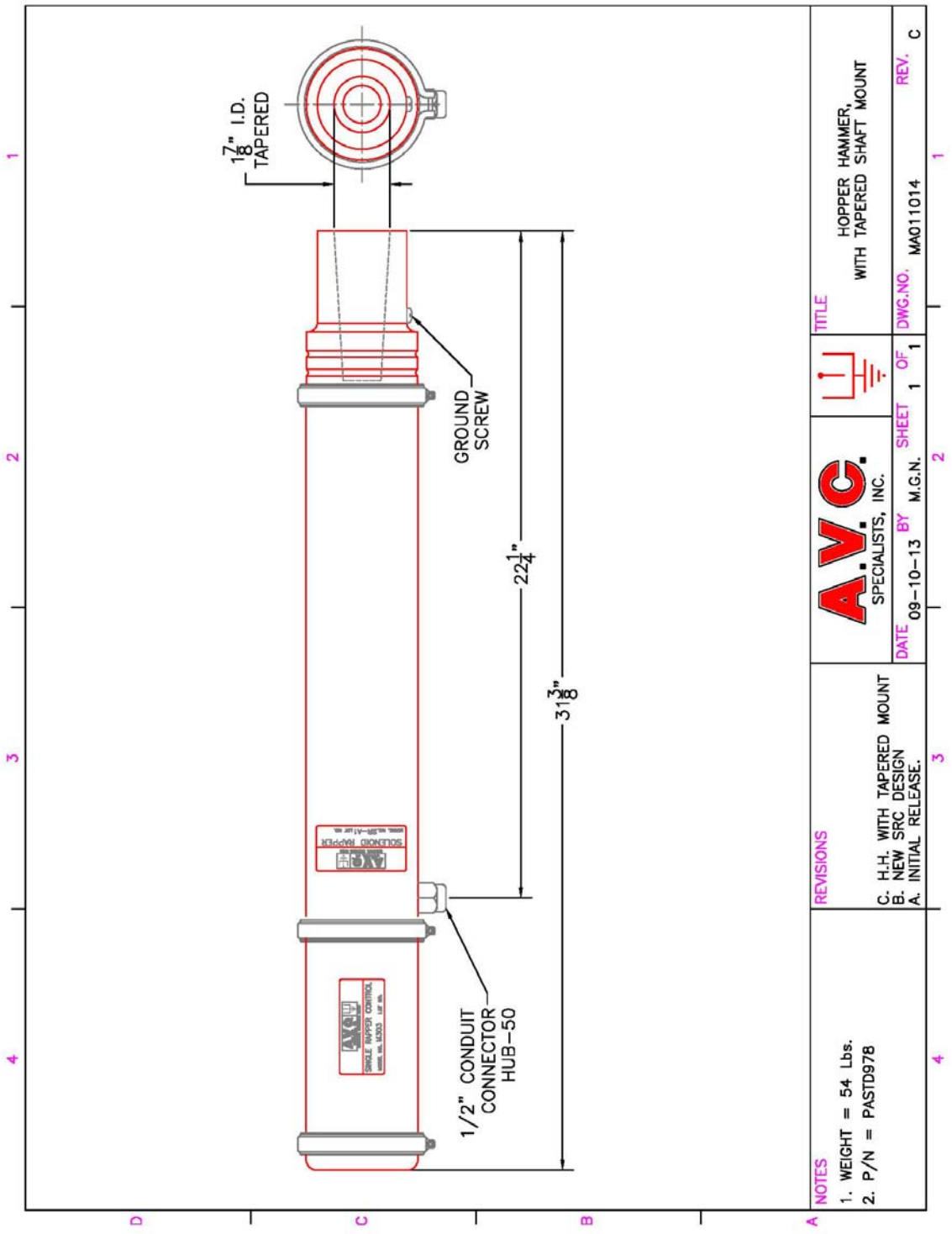

Model PASTD978 Hopper Hammer with Tapered Mount

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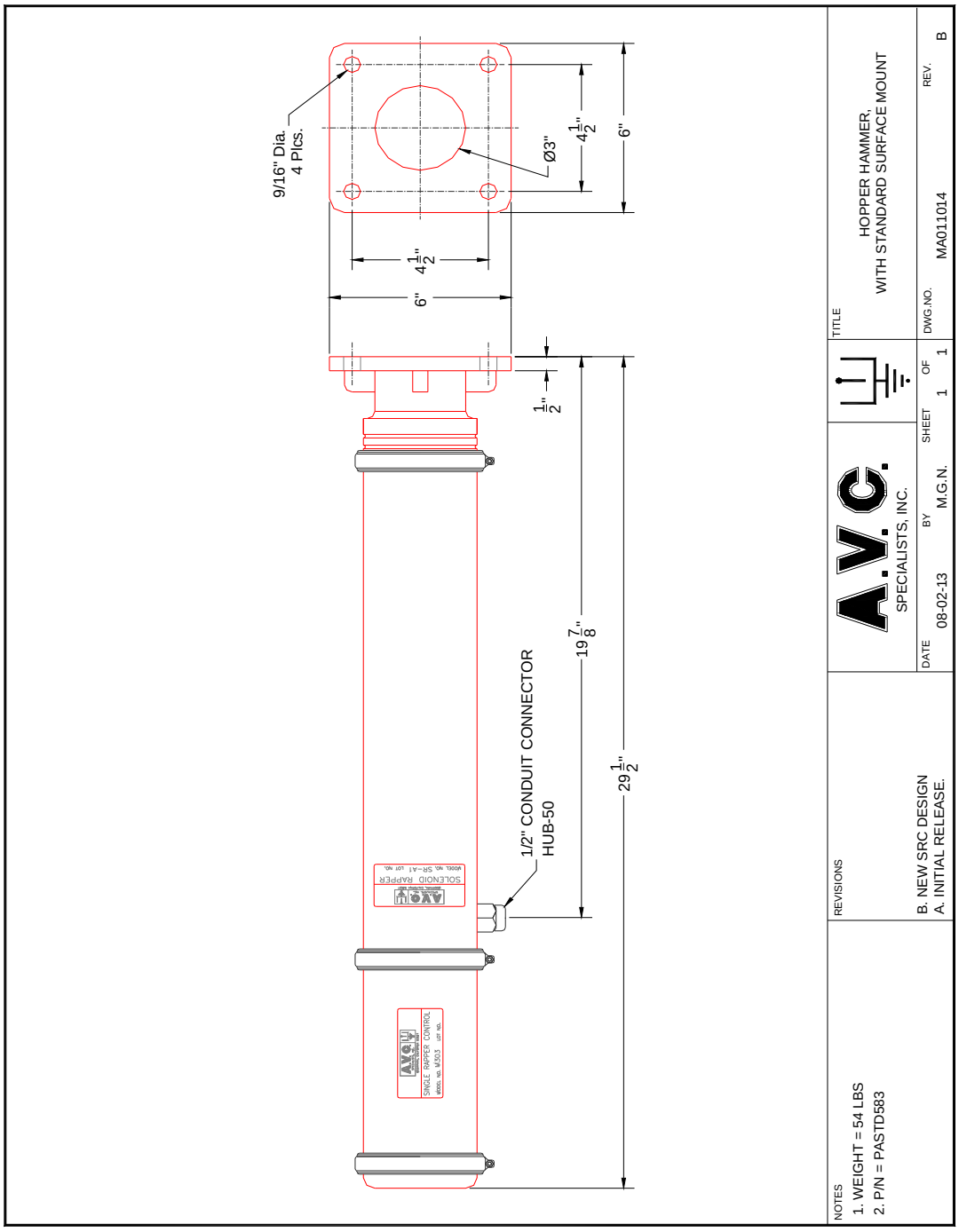

Model PASTD583-2 Standard Hopper Hammer with 6” Flange Mount

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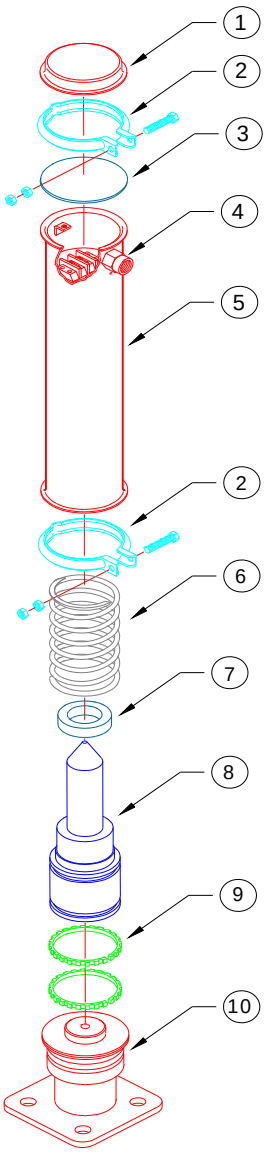

SR-A1 SOLENOID RAPPER ASSEMBLY P/N PASTD726

ITEM	DESCRIPTION	PART NO.
A.	COMPLETE RAPPER	PASTD726
B.	COMPLETE RAPPER LESS SHAFT MOUNT	PASTD565
1.	CAP	FESTD108-8
2.	CLAMP ASSEMBLY	AESTD112-2
3.	CAP GASKET	FESTD109-6
4.	CONDUIT HUB FITTING	HUB-50
5.	ENCASED MAGNETIC ASSEMBLY	PASTD550
6.	SPRING (HORIZONTAL)	FESTD108-13
7.	RUBBER BUMPER	FESTD109-5
8.	HAMMER	FESTD109-1
9.	HAMMER RING	FESTD108-10
10.	HOPPER RAPPER MOUNT	FASTD669

REVISIONS	A.V.C. SPECIALISTS, INC.	TITLE: SR-AI SOLENOID RAPPER ASSY. P/N PASTD726
	DATE: 09-30-04 BY: M.G.N. SHEET: 1 OF: 1	DWG.NO.: MA015001 REV.: A

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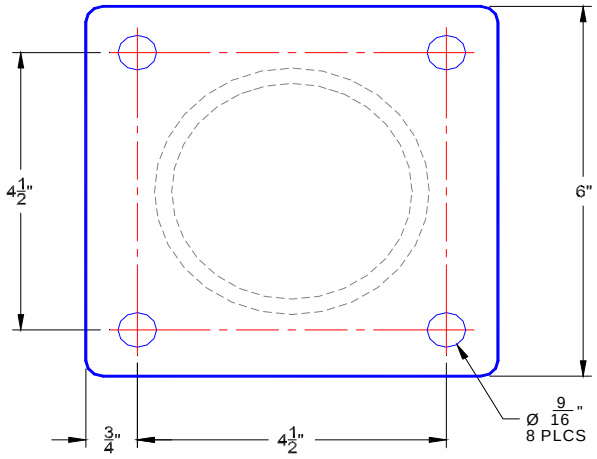

STANDOFF MOUNT

-XX = HEIGHT IN INCHES

REVISIONS		TITLE
A. 021807, RELEASE	SPECIALISTS, INC.	HIGH TEMPERATURE STANDOFF MOUNT
	DATE 05-02-02 BY M.G.N. SHEET 1 OF 1	DWG.NO. FASTD794-XX REV. A

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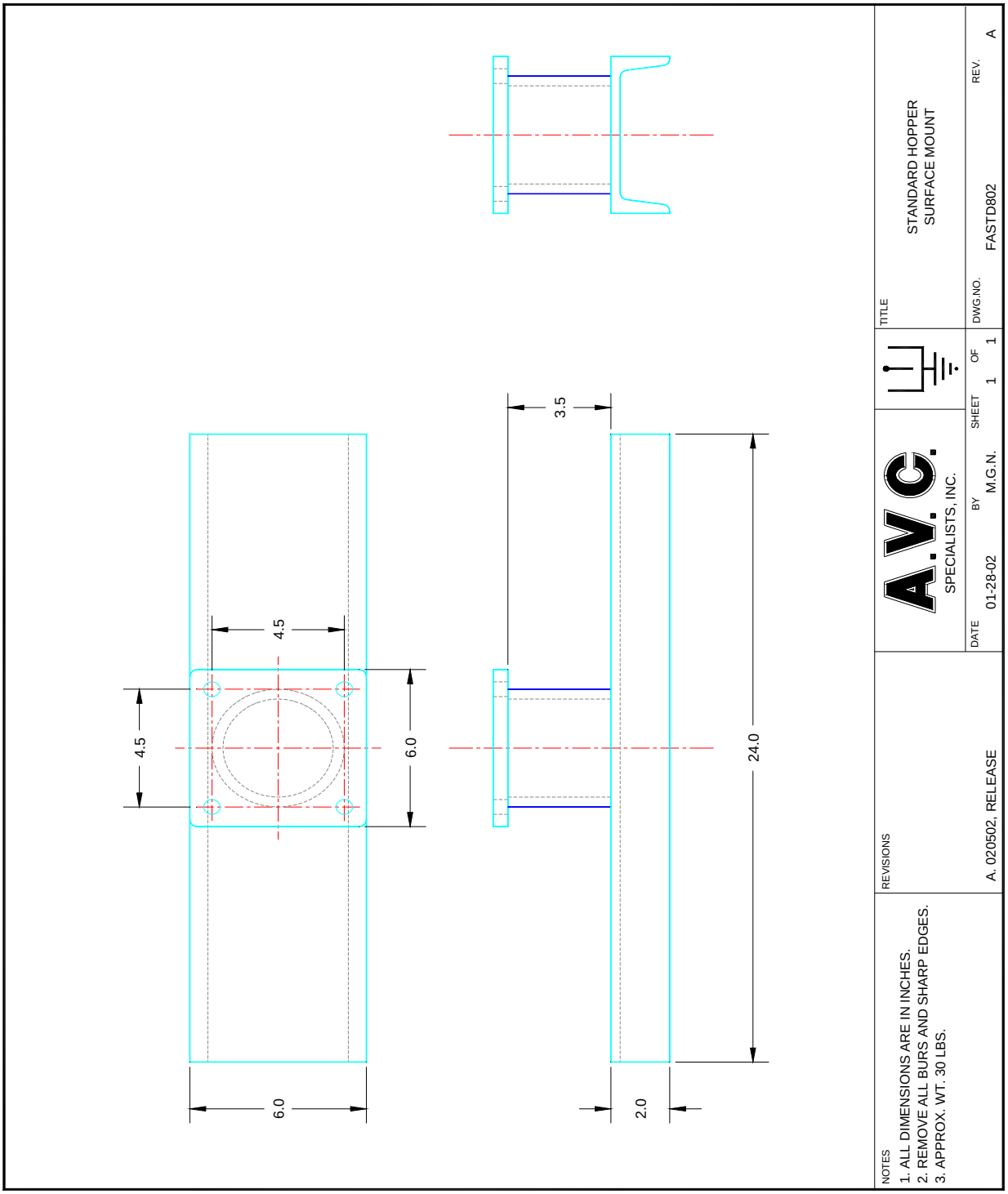

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