

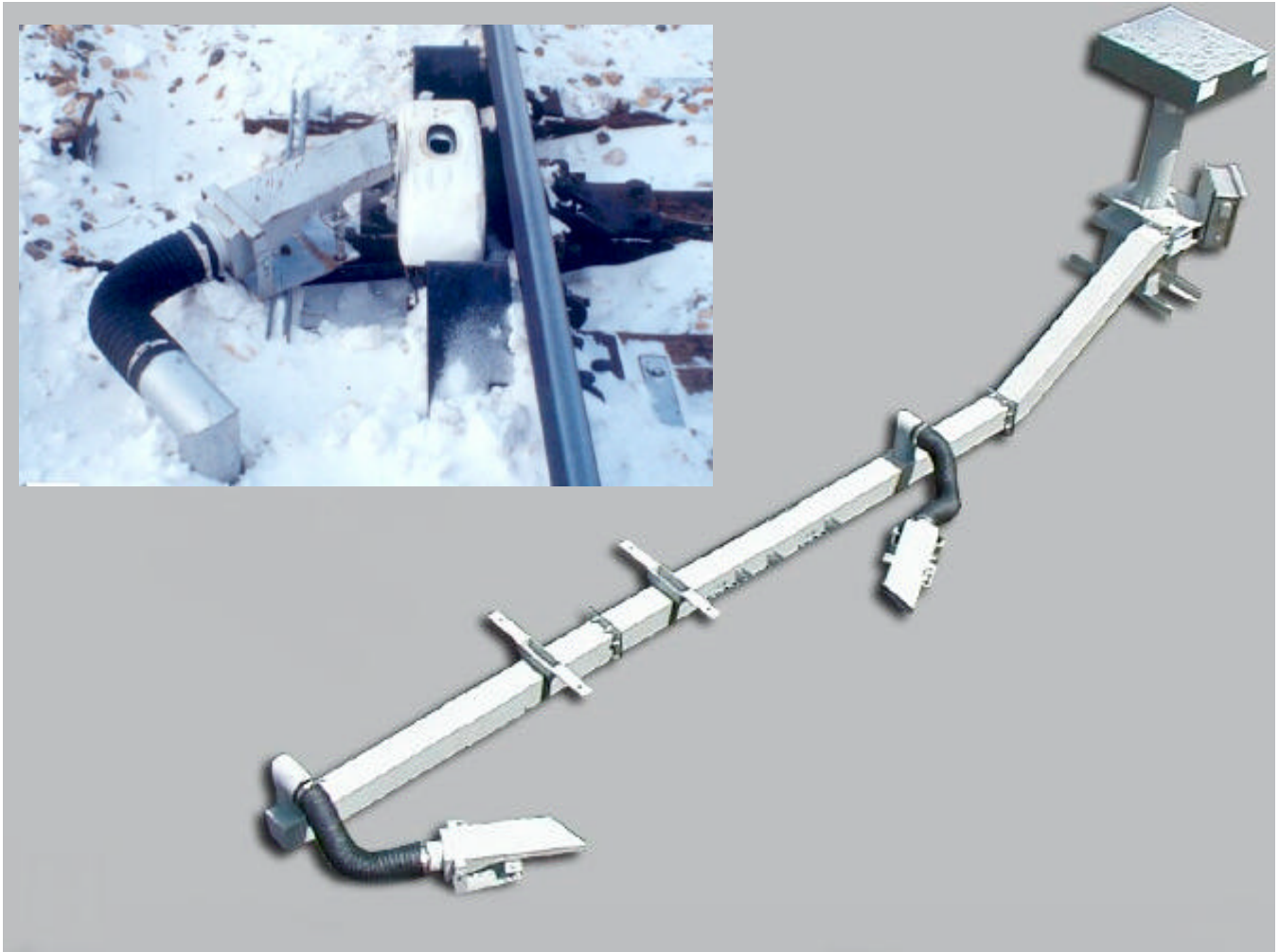
HORIZONTAL AIR CURTAIN

for

HOT BOX DETECTORS

(HAC/HBD)

Installation, Operation and Parts Manual



Part No. 10709

Feb, 2007
Rev J



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Printed in Canada

CONGRATULATIONS **on your purchase of a** **Hovey Horizontal Air Curtain** **for Hot Box Detectors**

The Horizontal Air Curtain for Hot Box Detectors [HAC/HBD] ensures the reliable operation of Hot Box Detectors all winter long. The scanners line of sight is kept clear by preventing the accumulation of snow and freezing rain. It does this by covering the rail mounted detector with a high velocity curtain of air at ambient temperature.

When left to run continuously, an HAC takes advantage of a phenomenon called sublimation(*) to provide additional clearing capability, by evaporating ice which occurs from frost build up.



* - Sublimation is the change of state from solid ice directly to water vapour.

Feature

- *100 mph nozzle air velocity
- *Ambient air
- *Slide mounted, height adjustable, rotatable nozzles
- *Spring loaded nozzles
- *High profile air intake
- *14 gauge construction
- *Balanced fan and motor sets
- *Remote/Auto/Manual Control
- *Optional temperature switch

Benefit

- *Maximum clearing performance.
- *Minimized energy cost. No need for heated air.
- *Easily adjusted to put the air where you need it.
- *Resist damage from dragging equipment and Hy-rail truck tires.
- *Ensures maximum performance by preventing blockage of intake during heavy snowfalls.
- *Ruggedness and durability to withstand the railroad environment.
- *Long vibration free life
- *Allows control by remote dispatcher, or automatically by temperature switch, or locally by track maintainer.
- *Conserves energy by turning the HAC/HBD off when the temperature rises above freezing.

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SPECIFICATIONS

Compatibility

Servo and Southern Technologies detectors

Performance

A 1.5 Hp HAC delivers a peak nozzle velocity of 100 mph.

Construction

14 gauge cold rolled steel, including nozzles
Red oxide primed blower, intake, and duct work
Direct drive centrifugal blower
Painted steel electrical box
Match balanced motor and impeller sets, to less than 0.2 ips pk-pk

Size and operating voltage

1.5 Hp, 240 Vac, 8 amps, single phase.

Controls

Weathertight NEMA 3R electrical enclosure
Remote/Auto/Manual modes
Magnetic motor starter complete with thermal overload protection

Terminal block wire size

#12 to #4 AWG Copper

Electrical Isolation

Ducting, nozzle connections and unistruts are electrically isolated to eliminate the possibility of short circuiting rails. Connections are designed and tested to withstand a maximum of 1500 Vac for 3 seconds.

HOVEY INDUSTRIES INC.

W A R R A N T Y

Hovey Industries Inc. guarantees all products of its manufacture to be free from defects in material and workmanship for a period of twelve (12) months from date of delivery to the Purchaser for material supplied, and twelve (12) months from the date of commissioning of any Snow Clearing Devices which are installed by Hovey Industries Inc.

This warranty excludes all other warranties expressed or implied.

Products or parts returned within the warranty period, transportation prepaid "FOB Hovey Industries Inc., Gloucester", which are found by Hovey Industries Inc. to be defective in material or workmanship shall, at their option, be returned, replaced, or credited. Claims will not be allowed which, in the opinion of Hovey Industries Inc., result from abuse, poor maintenance, or improper installation.

Only Hovey Industries Inc., assumes any liability or expense in the replacement of parts or servicing units within the warranty period unless advance authorization is given in writing by Hovey Industries Inc.

Hovey Industries Inc., shall not be responsible for consequential damages or contingent liability of any sort arising through the failure of any complete unit or part.

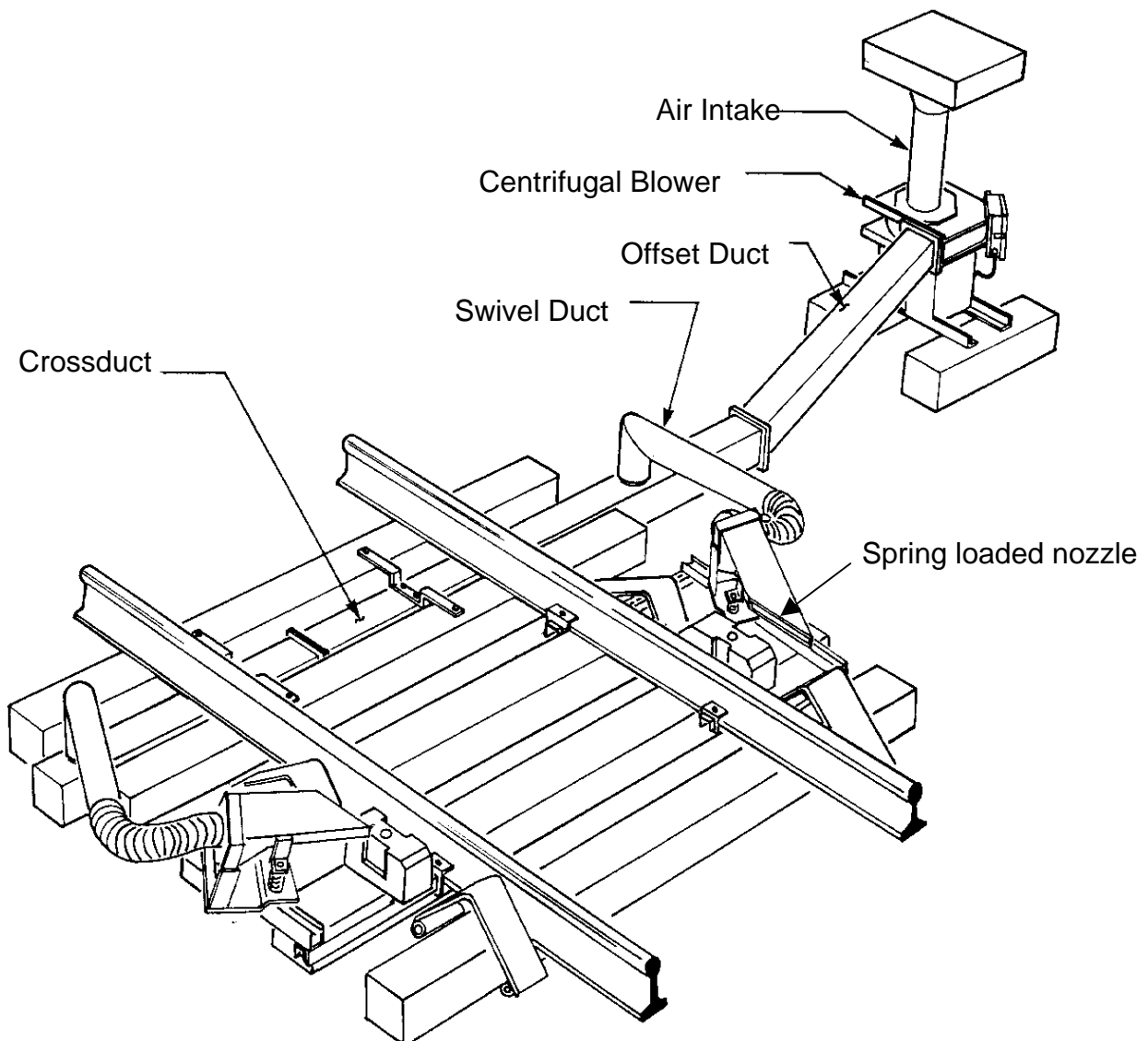
Hovey Industries Inc., reserves the right to make changes in design and material without obligation to products or prior manufacture.

1.0 INTRODUCTION

The Horizontal Air Curtain for Hot Box Detectors [HAC/HBD] keeps the scanner line of sight clear by preventing the accumulation of snow and freezing rain. It does this by covering the rail mounted detector with a high velocity curtain of air at ambient temperature.

The Hovey HAC/HBD is intended for use with detectors mounted straddling a tie. If the detector is to be crib mounted please refer to section 2.2 regarding compatibility.

The HAC/HBD consists of a compact electrically powered centrifugal blower equipped with a low velocity intake, ducting and two nozzles. The air from the blower is ducted below the rails, exits the rail mounted nozzles at approximately 100 mph [160 kph], and is directed over the detector, as shown.



2.0 INSTALLATION

The HAC/HBD blower can be conveniently located on either side of the Hot Box Detector. The ducting allows flexibility for various crib and tie dimensions. The following sections detail the installation instructions for the HAC/HBD.

2.1 Recommended Tools

The following are recommended to ease the installation,

- A source of power to operate power tools (portable generator)
- Impact wrench, 1/2" drive with 1/2", 9/16" and 3/4" sockets
- Drill, 3/8" drive and drill bits
- Two 9/16" wrenches and/or socket wrench
- Lining and tamping bars
- Sledge hammer
- Shovels
- Reciprocating Saw
- Cold Chisel and hammer
- Measuring tape
- Multimeter
- Clip on ammeter
- 4 foot Level

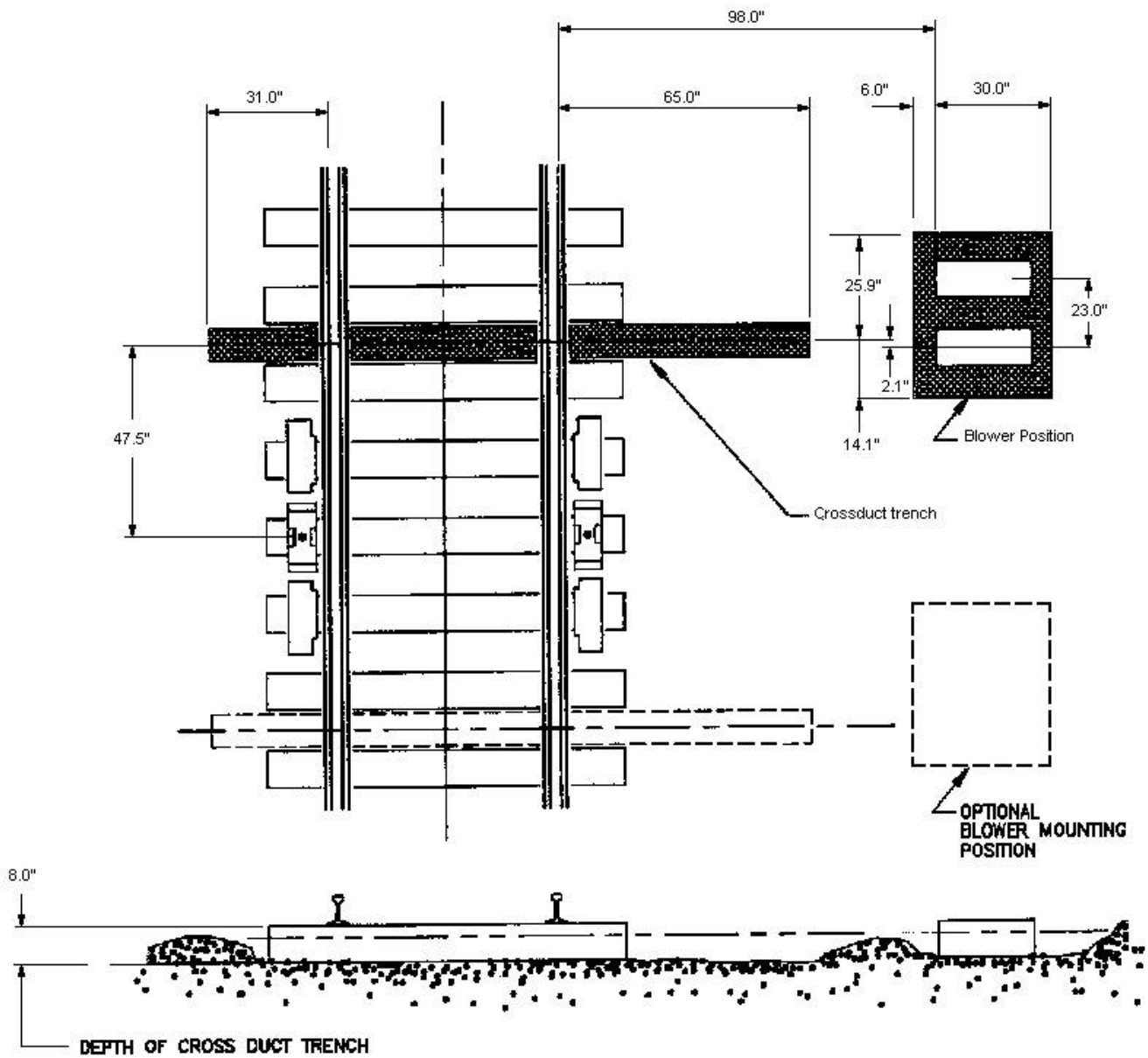
2.2 Mechanical

To install the HAC/HBD ducting, the ballast in the crib which receives the crossduct must be cleared to 8 inches below the bottom of the rail.

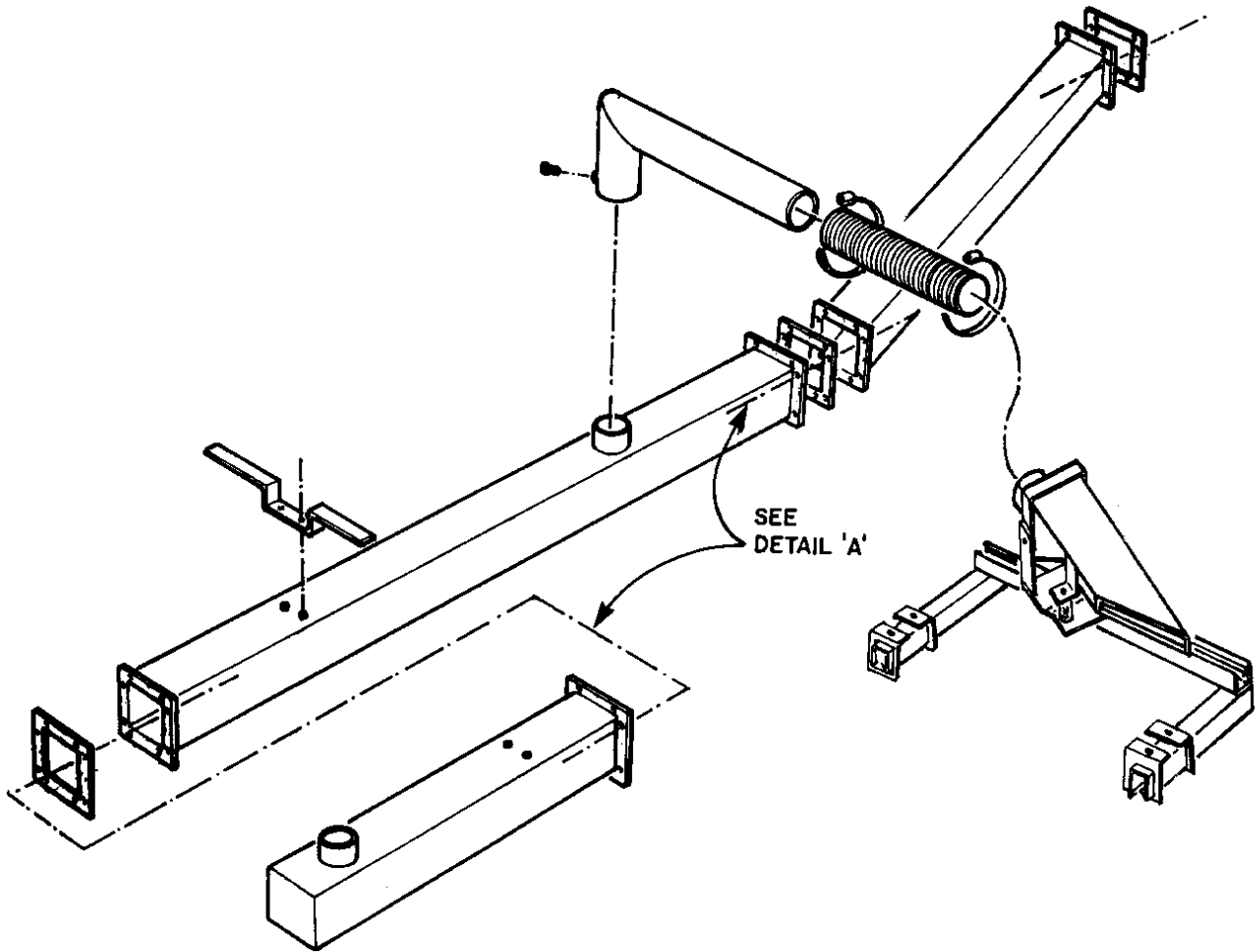
Assemble the crossducts. Install crossduct gasket kits between the flanges and secure together using the fastening hardware supplied. (see detail 'A'). Slide the assembled crossducts beneath the rails into position, such that the nozzle collars are centered about the track centre line. Once centered, fasten the crossduct mounting brackets to the crossduct with the supplied bolts, and to the wood tie with the supplied lag bolts. Attach the offset duct to the crossduct.

Prepare the foundation for the blower, level the ground and provide two 24 inch long sections of solid railroad ties on which to mount and secure the blower. Ensure that the ties are level and at the same height as the rail ties so that the blower flange aligns with the offset duct flange. Slide the blower into position and install the offset gasket kit between the two flanges and fasten together using the hardware supplied (see detail 'A'). Fasten the blower to the mounting ties with the supplied lag bolts.

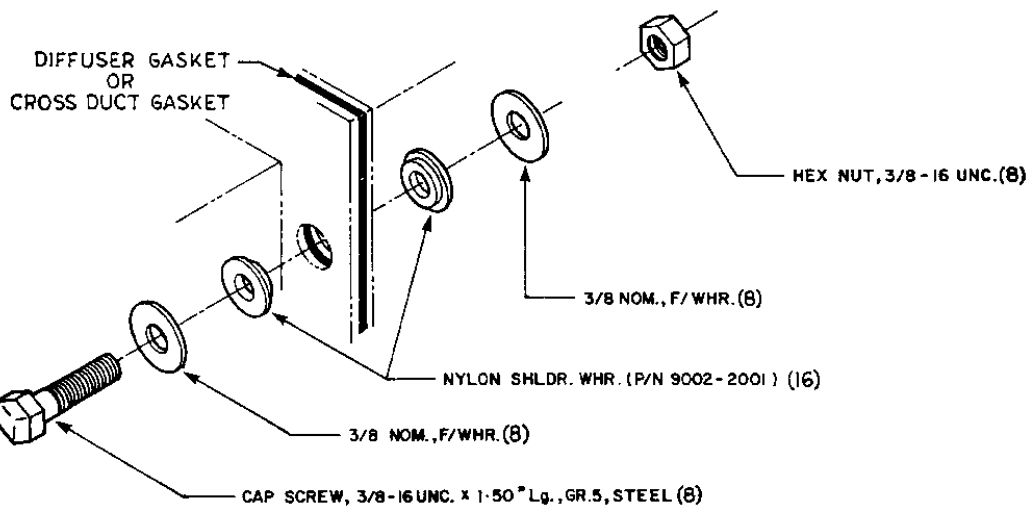
Place the swivel ducts over the collars on the crossduct, align, and tighten the collar bolts.



Site preparation

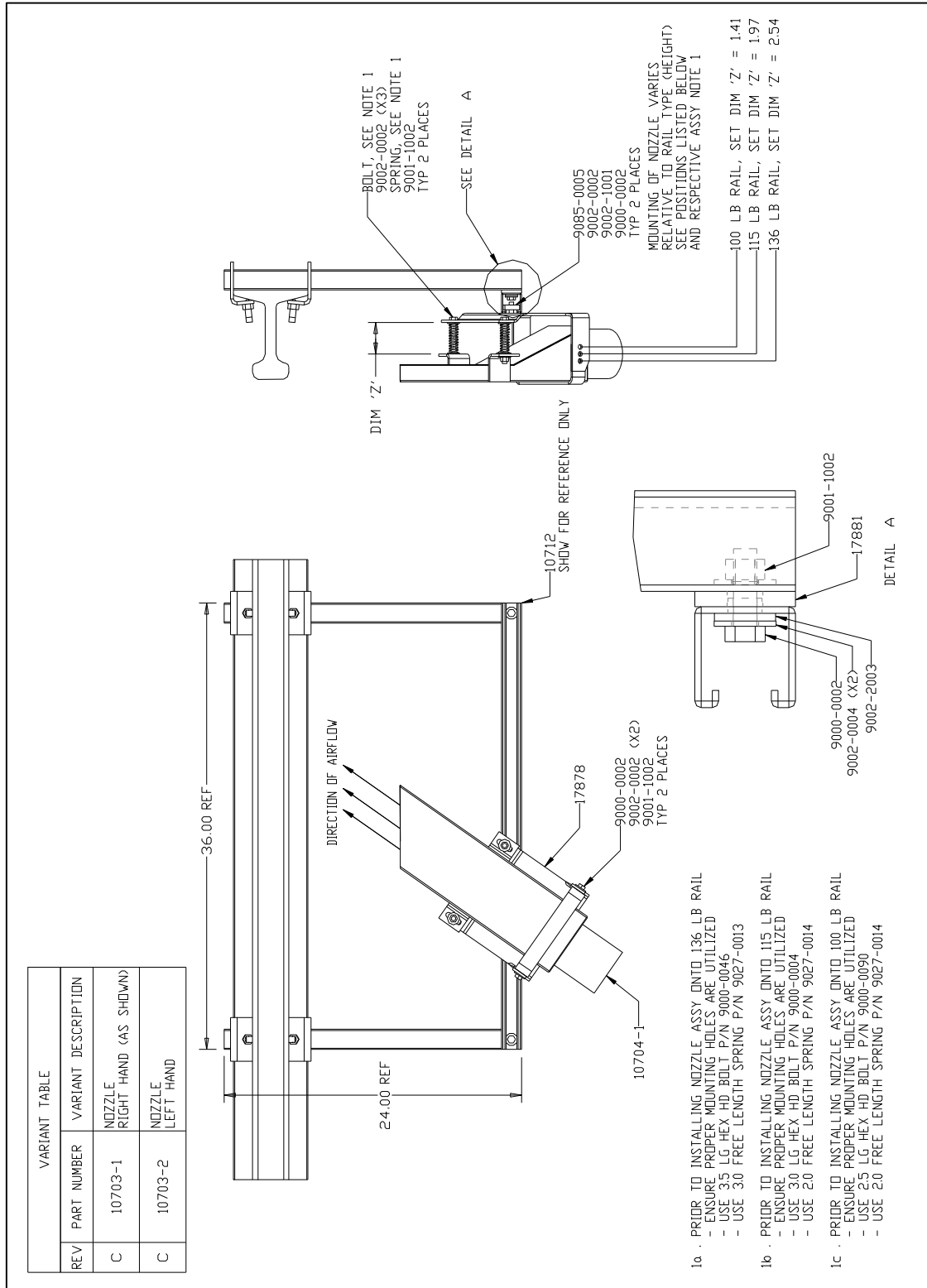


Ducting assembly

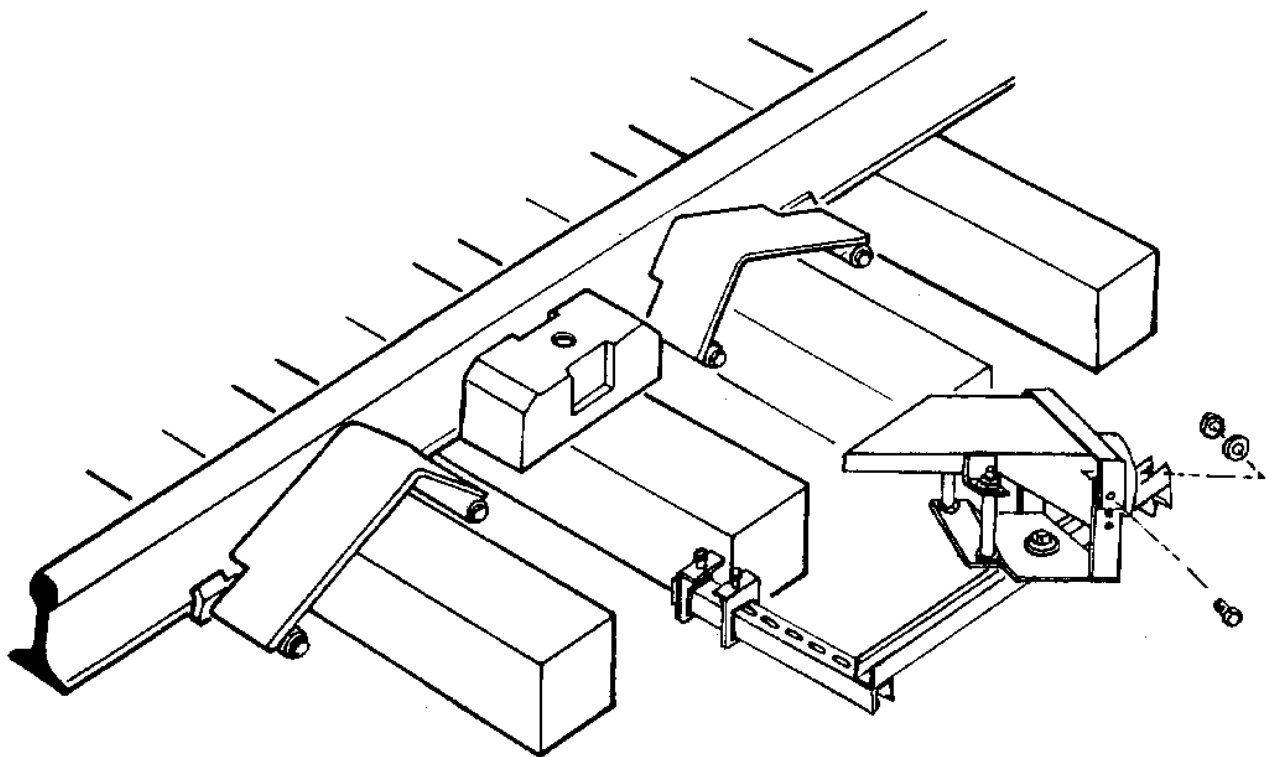
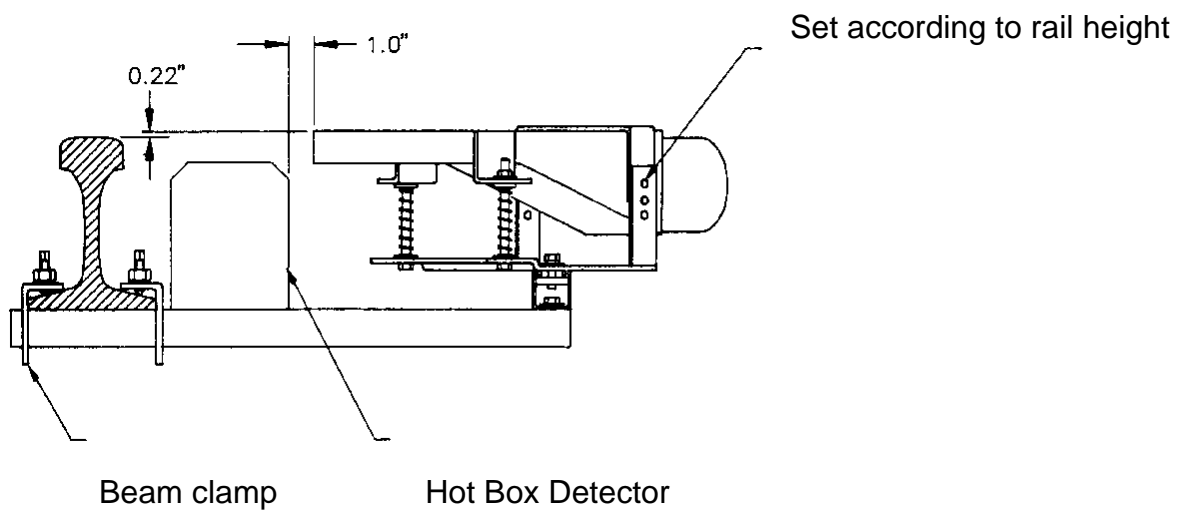


Detail 'A' – Diffuser and crossduct gasket kit hardware

When mounting the HAC/HDB with a detector that straddles a tie; Attach the nozzle mounting brackets to the under side of the rails, as shown, and tighten the locking nut on each beam clamp.

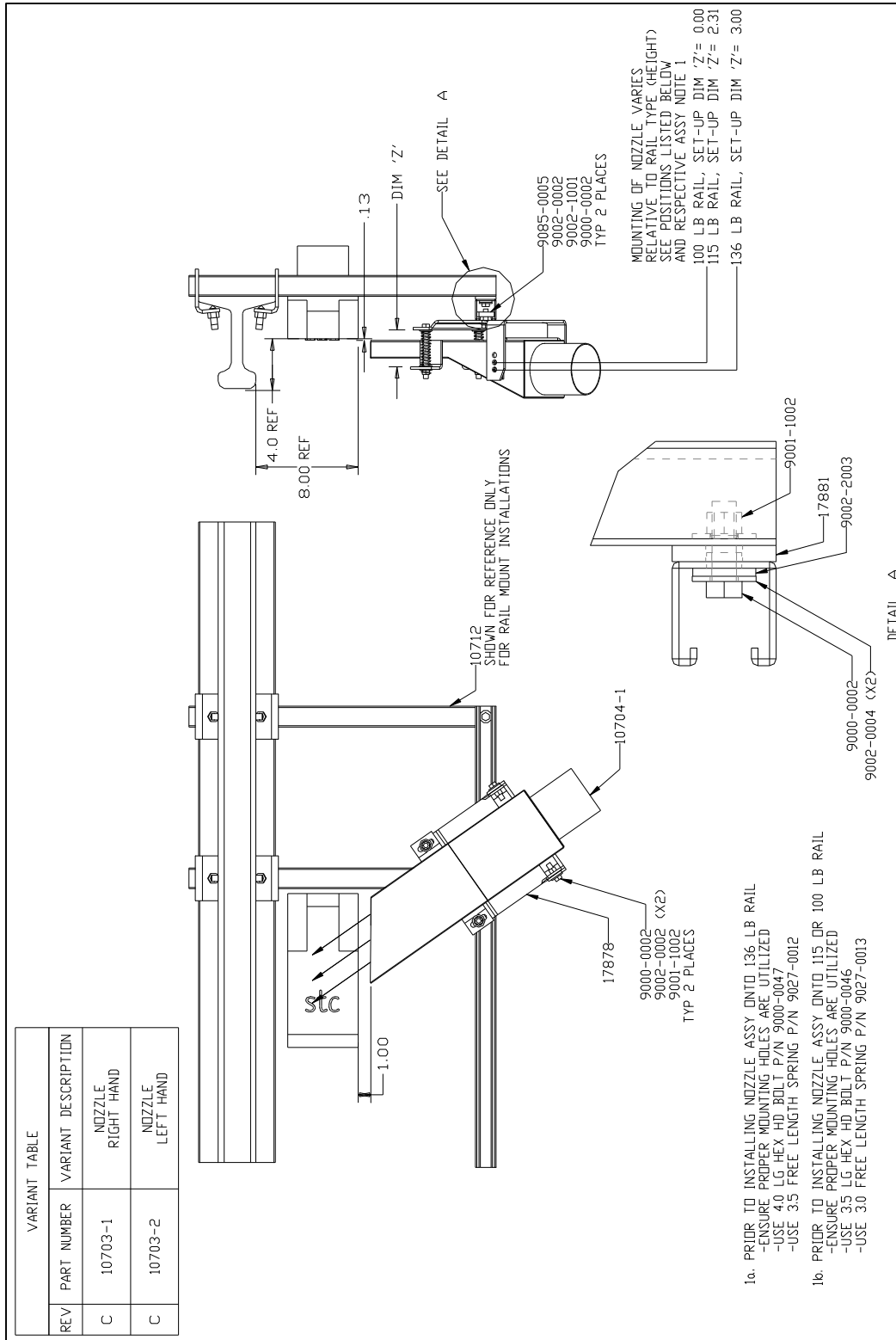


Nozzle assembly and installation (Servo/Harmon type detector)

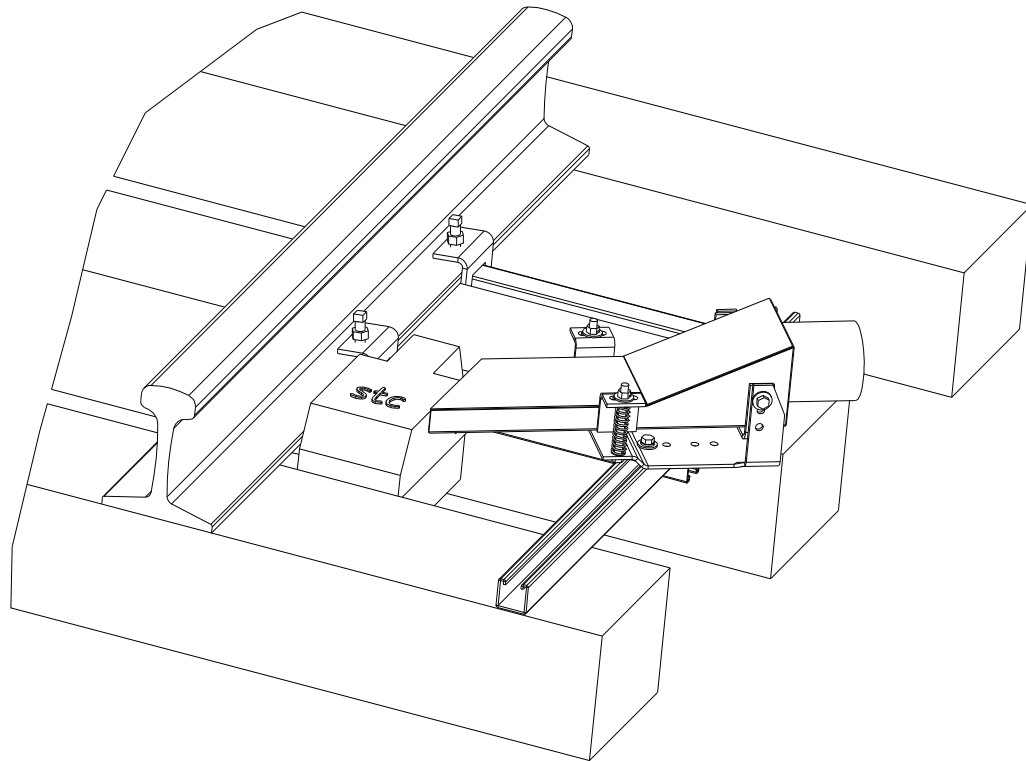
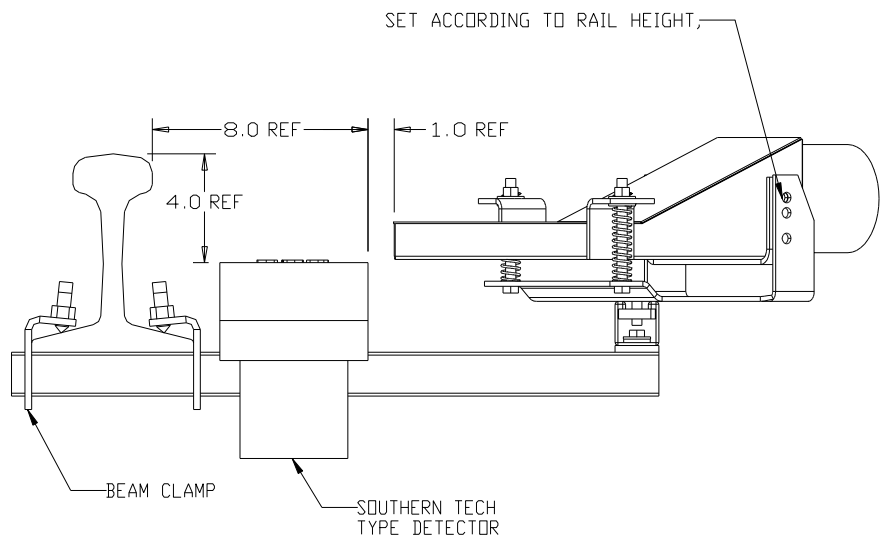


Nozzle location (Servo/Harmon Detector)

For crib mounted detectors (Southern technologies), the nozzles have to be turned up side down (RHS becomes LHS) in the base plate P/N 17878 and mounted in a cantilever manner.



Nozzle assembly and installation (Southern Technologies Detector)



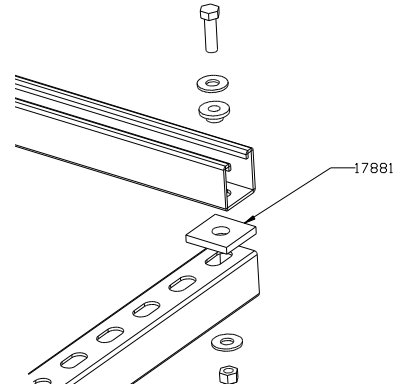
Nozzle location (Southern Technologies detector)

In a case where there is little space between the top of the mounting beams and the detector chassis, ensure the necessary electrical isolation by installing Isolation Kit, 16974.

Any contact between the mounting beams and the detector body will defeat the electrical isolation of the detector and can shunt the track circuit. Please see the appendix for details.

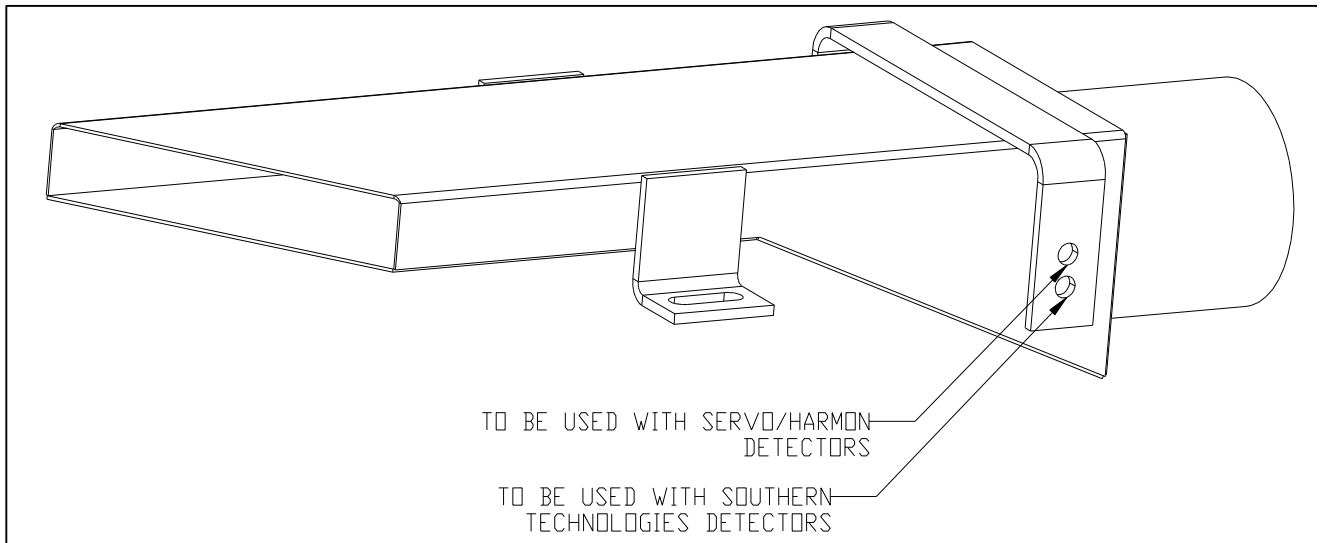
This kit will provide isolation for detectors that mount up to 3@inch below the bottom of rail at the lowest point. Low profile detector mounting brackets, such as the SERVO # 400082-XX series, used in crib applications are not compatible with the supplied Hovey Industries HAC/HDB mounting hardware.

Install the unistrut electrical insulator (P/N 17881).



Assemble and set the nozzles to the specified height above the detectors, as shown for Servo/Harmon or for Southern Tech detectors using the correct mounting holes on the nozzles. Attach the flex hose between the swivel ducts and the nozzles, using the supplied hose clamps.

Backfill and tamp the crib containing the crossduct and the trenches containing the blower mounting ties.



Nozzle, mounting holes based on detector type

2.3 Electrical Connection

Electrical connections are to be performed by personnel approved by the local electrical authority.

Power must be brought to the HAC/HBD through a customer supplied fused or breakered power line. The fuse ratings are dependent on the motor full load amps and should be the 'motor start, time delay' type. The following tables can be used as an aid to select the appropriate size wire based on the running amps of the HAC/HBD, the distance to the power supply, and the maximum allowable voltage drop. The recommended maximum voltage drop is 5%.

VOLTAGE DROP vs CURRENT DRAW for copper wire.
and Recommended Circuit Breaker Sizes

Voltage drop/1000 ft

Wire Size, AWG	12	10	8	6	4	Recommended Circuit Breaker Size
OHMs/1000ft	1.65	1.00	0.65	0.41	0.26	*4
Current						
8	13.2	8.0	5.2	3.3	2.1	20

*1 - Standard HAC/HBD power terminal block will accept #12 to #4 AWG copper wire.

*2 - Allowable voltage drop to be determined by local authority

*3 - Recommended voltage drop of not more than 5%

*4 - As per Canadian Electrical Code, Part 1

Units must be wired in accordance with local electrical codes.

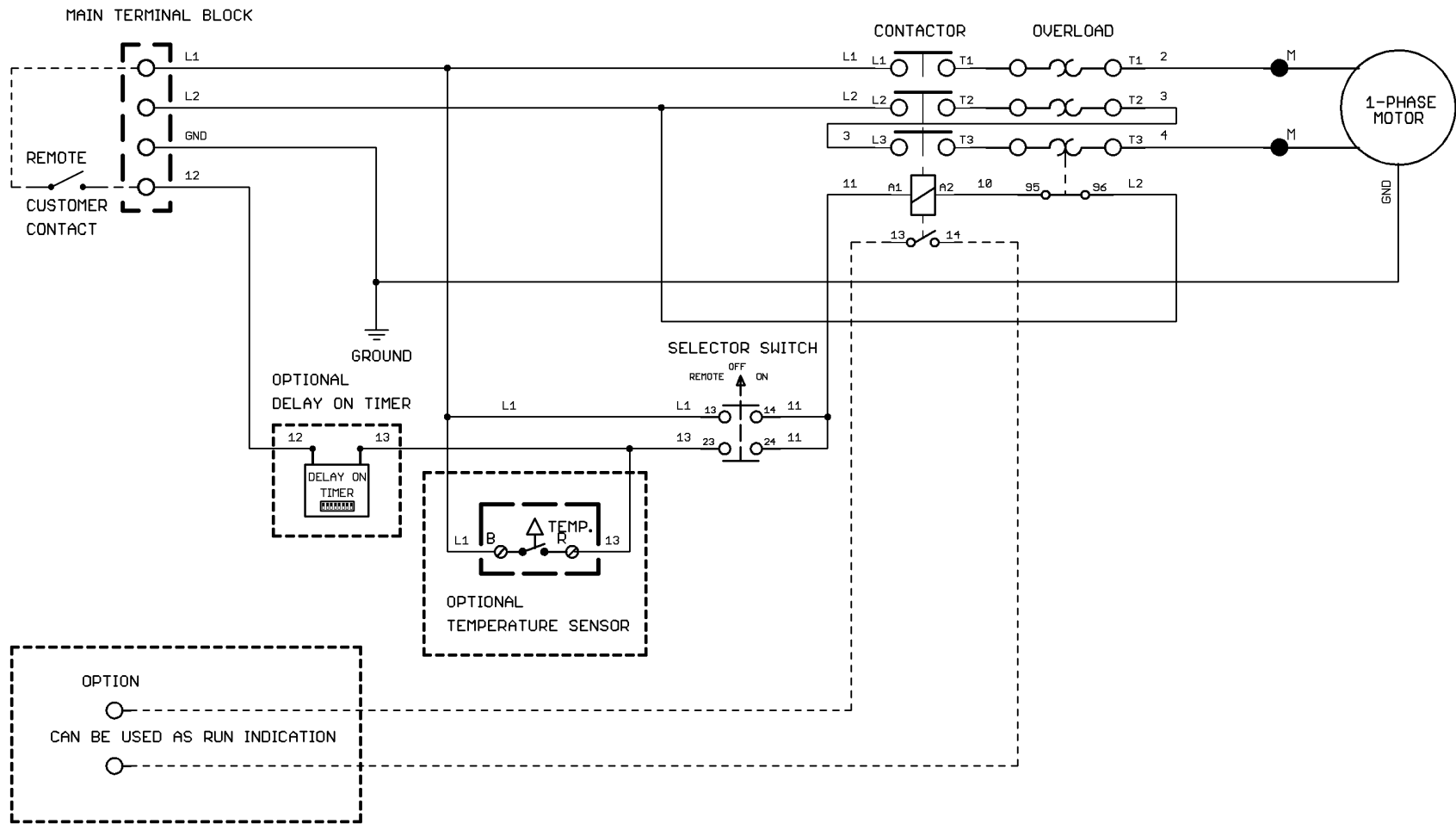
Terminals are provided for all power, control, and ground wires.

For remote control applications, the customer must supply a set of contacts with a minimum rating of 240 Vac, 1 amp.

Connect the HAC/HBD according to the applicable schematic. One conduit hole is provided, which accommodates a 3/4" conduit fitting, for the power and signal wires. These are located on the side of the electrical box. The terminal block will accept #12 - #4 AWG copper wires.

Energize the circuit, and switch the HAC/HBD on by turning the selector switch to manual. Ensure that the blower wheel is turning freely and that the motor is rotating in a clockwise direction as viewed from the top. Examine the system for air leaks and ensure that all mountings and connections are secure.

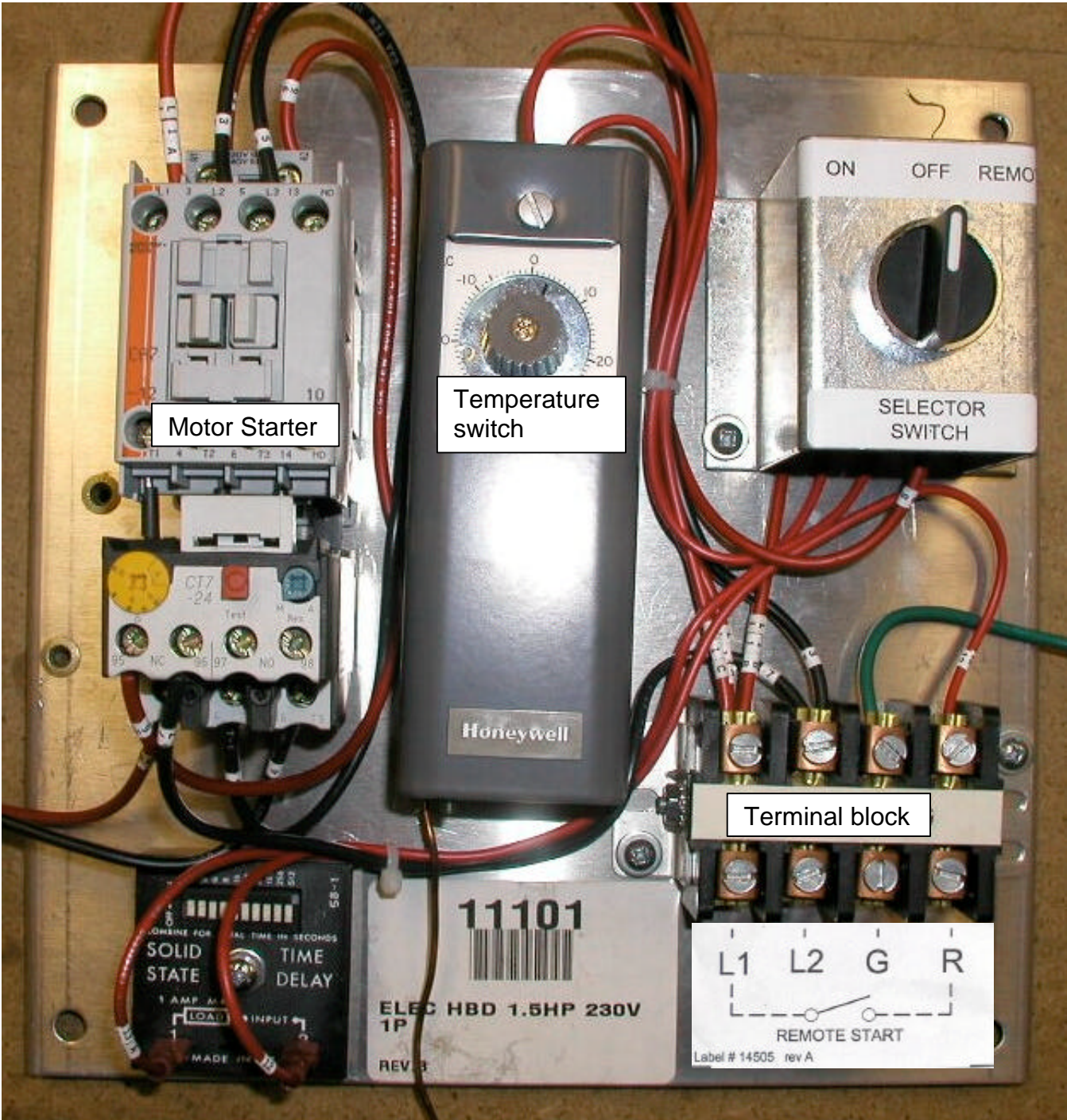
Set the selector switch to "**AUTO**" for operation using the temperature switch or remote starting.



Combination schematic and wiring diagram

3.0 OPERATION

3.1 Key Components



3.2 General

Switch on the HAC/HBD whenever there is snow or freezing rain in the vicinity.

There are three methods of starting:

1) MANUALLY, by turning the selector switch to "ON".

or,

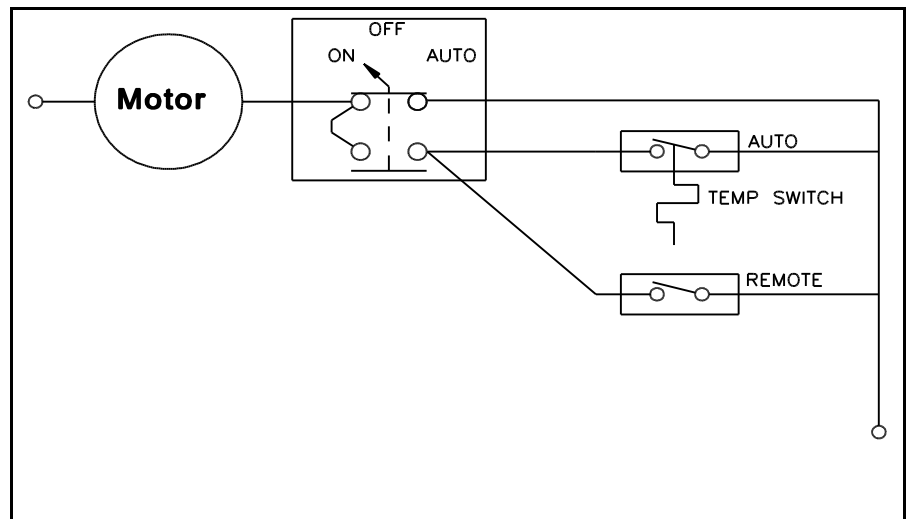
2) REMOTELY, when the selector switch is set on "AUTO" and the customer supplied contacts are closed.

or,

3) AUTOMATICALLY, on units supplied with a temperature switch, when the selector switch is set to "AUTO" and the ambient temperature drops below the temperature switch set point.

NOTE the "AUTO" and "REMOTE" features work in parallel.

Therefore, either the auto or the remote feature will start the HAC/HBD, but both have to be off, in order for the HAC to turn off.



The HAC/HBD should be turned on before it starts to snow or rain since its function is to prevent the build up of snow and ice rather than to remove it. Let the HAC/HBD run for a sufficient time after a snowfall to prevent the accumulation of drifting snow or snow dragged in by passing trains.

For maximum switch clearing performance, leave the HAC/HBD running for the entire winter. This ensures that the HAC/HBD will be on before any snow can fall onto the detector, and the continuous operation will sublimate any frost build up.

or,

To conserve energy the HAC should be turned off whenever weather conditions permit.

3.3 Temperature Switch

The temperature switch is located inside the electrical box.

To activate the temperature switch, turn the control panel selector switch to "AUTO".

For most effective operation, it is recommended that the front dial of the temperature switch be set to 3°C (37.4°F). The differential setting on the unit has been factory set at 2°C (4°F). With these settings the unit will turn on when the temperature drops to 3°C (37.4°F) and continue running until the ambient temperature rises above 5°C (41°F).

Operation in "AUTO " mode with the temperature switch will limit HAC/HBD running time saving electrical energy and increasing unit life expectancy.



3.4 Motor Overload Protection

Inside the electrical cabinet is an "over current" protection device. The purpose of this device is to protect the motor from continuous overload current. Overload current can occur as a result of repeated starts and stops within a short period of time, low supply voltage, incorrectly installed fan, or bearing failure.

The yellow thermal overload dial is set to the motors nameplate full load amperage X 1.0. DO NOT increase dial setting.

The reset selector switch is set to MANUAL. DO NOT set to Automatic.



Once tripped the overload requires 5 to 10 minutes before it can be reset.

To reset, push the blue manual /auto reset button.

Delay Start Timer

For installations of multiple blowers controlled by one start relay, the delay start timer can be added to each blower to allow staggered start up and reduce the maximum inrush current, and reduce the power cable size.

Set the delay by toggling the dipswitches to ON. The combined total is the delay time.



4.0 INSPECTION

The frequency of inspection is dependent on local conditions, but should not be less than once annually.

Before start up each year

Visually inspect the installation to check that all parts are secure, free from damage, and firmly fastened together.

Inspect the lag bolts, which fasten the HAC/HBD to its wood tie foundation, and ensure they are firmly fastened.

Start the HAC

Check for any undue vibration or noise at the blower and ensure that air is blowing freely from both nozzles.

Location	Mounting Channels	Motor bearings
Vibration level (in/sec) rms	Less than 0.1	0.04 to 0.12 Acceptable ----- 0.13 to 0.29 Tolerable ----- 0.30 to 0.71 Excessive ----- 0.72 or more Extreme * - Units leave the plant with no more than 0.20 in/sec (rms)

Note:

- A vibration PEN may be purchased from Hovey Industries Inc. to check the vibration level of the equipment, Hovey Part # 9074-0013.
- Motor bearing vibration levels can be charted on a graph vs time to predict when the motor requires replacement or maintenance.
- Mark locations on motor to ensure repeatable measurements for trend analysis.
- Do not measure on covers or guards.
- If vibration levels on the mounting channels exceed 0.1, ensure that mounting ties are fully supported and lag bolts fully tightened.

Examine all joints for leaks. Examine exposed duct surfaces for leaks from puncture and/or corrosion holes.

Measure the supply voltage at the power terminal block. It needs to be within 5% of the motor nameplate voltage.

Using a clip on ammeter, measure the running amps. It is to be within 85 to 115% of the motor nameplate running amps. Running amps greater than 115%, the motor rated full load amps, can indicate failed bearings, incorrect fan/intake clearance from an improperly installed fan, excessive air leaks in the duct work, inadequately sized power supply wires, or poor electrical connections.

5.0 MAINTENANCE

5.1 General

All units are supplied with motors with sealed bearings and require no lubrication.

Replace all damaged intake ducts, crossducts, and nozzles since damaged ducts will degrade detector-cleaning ability.

With the supply power turned off, tighten all mounting and electrical connections to the recommended tightening torques.

Thread size	Tightening Torque(in.Lbs)
8-32	19
10-32	31
1/4-28, Power Terminal Lugs	56

5.2 Blower Wheel and Motor Removal

Turn off the power at the local disconnect.

Remove the air intake at the blower housing to gain access to the blower wheel. The blower wheel is fitted with a tapered shaft bushing with three tapped 3/8 - 16 UNC holes. Remove the two hub set screws and insert a set screw into the third hole and tighten. This will drive the blower wheel off of the shaft. These units should be returned for factory match balancing to maximize motor bearing life. All units match balanced by Hovey Industries bear the following sticker on the motor base:

**IMPELLER/MOTOR SETS NOT MATCH
BALANCED BY HOVEY INDUSTRIES
VOID FUTURE WARRANTY CLAIMS**

To remove the motor, open the electrical junction box on the side of the motor and disconnect the wires and the conduit from the box. Next, remove the four bolts, which fasten the motor to the base, and remove the motor.

To install the motor and blower wheel, reverse the sequence for removal. Ensure that the blower wheel is installed at the same position on the shaft as previously.

6.0 TROUBLESHOOTING

The following Troubleshooting Chart is included as a guide for correcting minor problems that may arise.

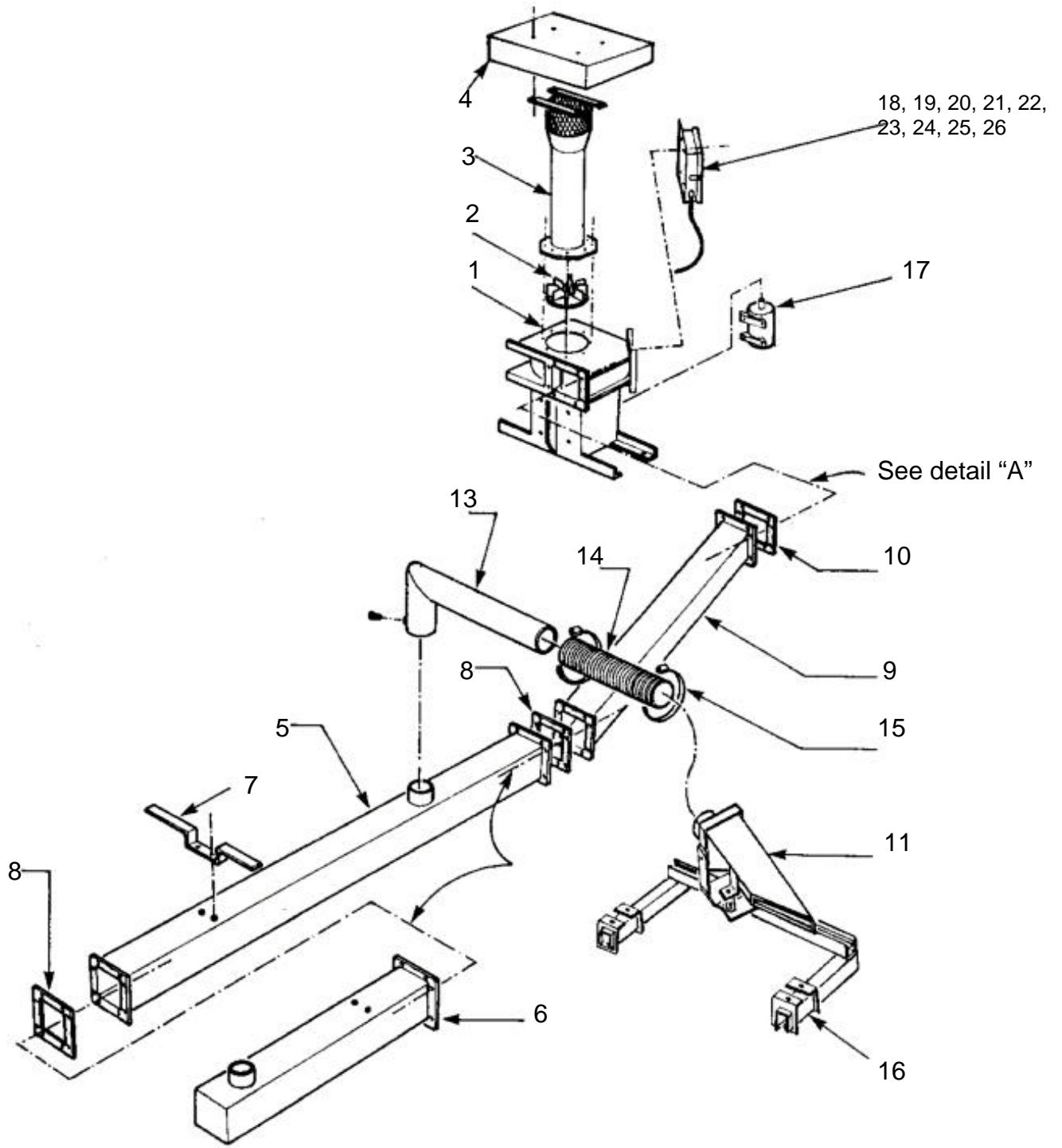
TROUBLESHOOTING CHART

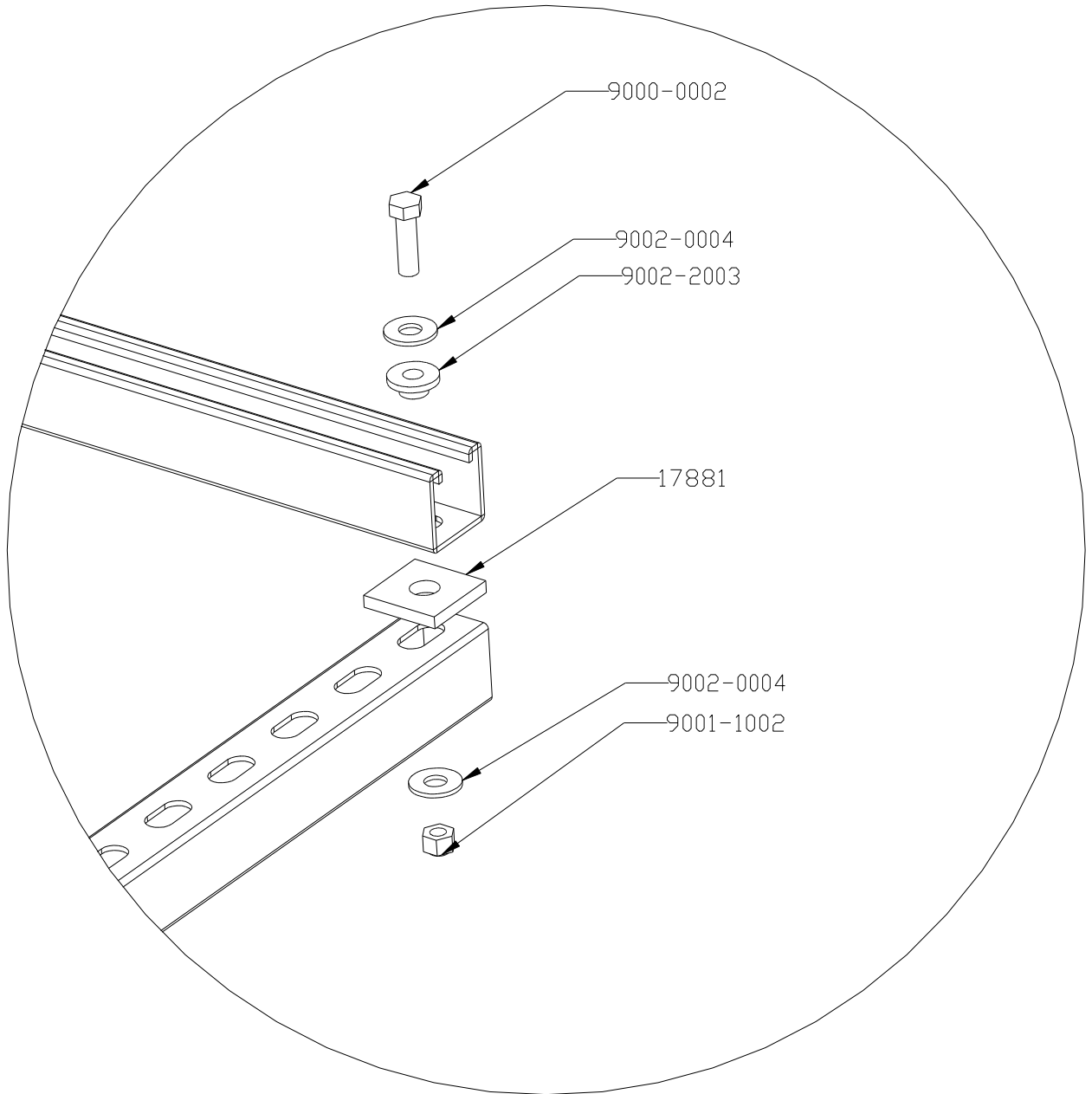
PROBLEM	CAUSE	REMEDY
High Amperage Draw	Icing on blower wheel or air intake assembly	*Remove ice
	Obstruction in blower or crossduct	*Remove obstruction
	Low operating voltage from undersized wiring	* Increase line voltage, or install heavier gauge wire
	Defective motor	*Replace motor
Excessive Vibration or Noise	Ice or other objects adhered to blower wheel creating an imbalance	*Check blower wheel and remove any debris
	High vibration persists	*Return base plate assembly, motor and blower wheel to manufacturer for re-balance
	Defective motor	*Replace motor
Inadequate Air Flow	Nozzle, diffuser or crossduct obstructed	*Check and clean ducting of any water or debris.
	Poor duct connections	*Check all seals between flanges and replace gasket as required (See Sect. 2.2)
	Icing or debris on intake screen	*Remove ice or debris
Improper Detector Cleaning	Nozzles are improperly aligned or have been damaged	*Align nozzles as shown in installation section or replace as required.
Overload Tripped	High amperage draw	*Low operating voltage. Increase supply voltage or increase supply wire gauge.
	Loose connection	*Tighten all electrical connections including those between the overload and contactor.
	Improperly set overload relay.	*Set overload amperage to motor name plate, full load amps(FLA) X1.0
	Frequent starts and stops in a short period of time	*Check remote start circuit

7.0 PART LIST

HORIZONTAL AIR CURTAIN for HOT BOX DETECTORS

ITEM #	PART NUMBER	DESCRIPTION	QUANTITY / UNIT
1	15717	Blower Housing	1
2	15724	Blower Wheel	1
3	15727	Air Stack Assembly	1
4	15734	Hood	1
5	15735	Section 1, Crossduct	1
6	15736	Section 2, Crossduct	1
7	15741	Crossduct Mounting Bracket	2
8	15742	Gasket Kit, Crossduct	2
9	15743	Diffuser	1
10	15747	Gasket Kit, Diffuser	1
11	10703-2	Nozzle, Hot Box Detector [LH]	1
12	10703-1	Nozzle, Hot Box Detector [RH],	1
13	15748	Nozzle, Swivel	2
14	15749	Flexhaust [4" ID x 36" Lg]	2
15	9022-0004	SST Hose Clamp	4
16	10712	Nozzle Mounting Bracket	2
17	9016-0028	Motor, 1.5 HP	1
18	9016-1026	Selector Switch	1
19	9043-0012	Terminal block, 4 pole	1
20	15752	Electrical Box	1
21	18425	Temperature Switch kit	1
22	9080-0003	Temperature Switch only (part of kit 18425)	1
23	18420	Delay start timer kit	1
24	9038-0039	Delay start timer only (part of kit 18420)	1
25	9078-0121	Contactator	1
26	9040-0120	Thermal overload relay	1





Detail B – Unistrut electrical insulation

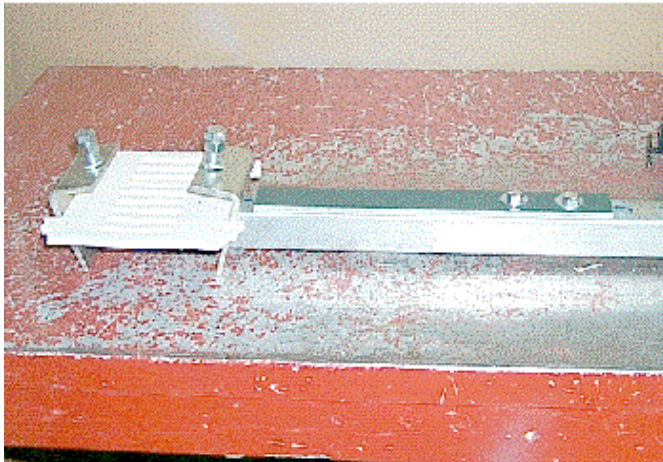
Appendix A

Electrical Isolation Kit, 16974

In some HAC/HBD installations a problem can occur resulting in a closed track circuit, giving false track circuit indications. In these cases one of the mounting rails for the blower nozzle is completing a circuit between the body of the hot bearing detector and the rail. The resulting shunt is completed through the ground wiring for the two detectors. The simple cure for this problem is aligning the two mounting rails in such a manner that no contact is made with the hot box detector.

However some detectors and certain situations make this solution impractical, or impossible. In these cases, if the lowest point on the detector body is not more than 3" below the bottom of rail, it is suggested that an Electrical Isolation Kit be installed.

The kit consists of a rail spacer, a piece of G10 fibreglass insulating board, and mounting hardware. Installation is best demonstrated in the photos below.



NOTES/COMMENTS

Your local distributor is

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