METEOROLOGICAL INSTRUMENTS

INSTRUCTIONS

ASPIRATED RADIATION SHIELD
MODEL 43408F-7A

CE

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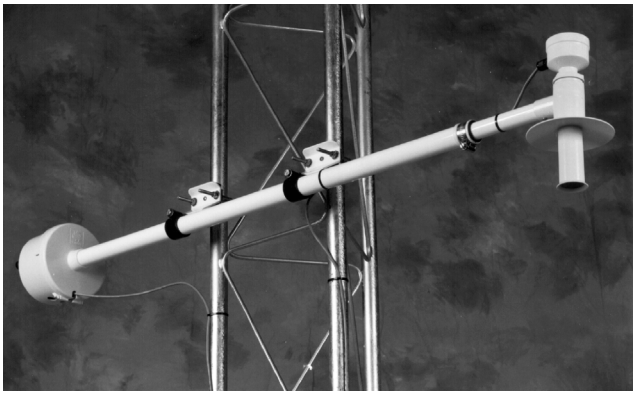
PN: 43408F-7A-90
REV: Feb-02

MODEL 43408F-7A
GILL ASPIRATED
RADIATION SHIELD



INTRODUCTION

Unique in its small size and exceptional performance, the Model 43408 Gill Aspirated Radiation Shield allows accurate ambient air temperature measurements. Conservatively rated, radiation errors are less than 0.2 C° RMS with the shield exposed to solar radiation of 1100 W/m^2.

The shield employs concentric downward facing intake tubes and a small canopy shade to isolate the temperature sensor from direct and indirect radiation. The temperature sensor mounts vertically in the center of the intake tubes. The blower housing and shield assembly are made from reflective white UV stable plastic.

Temperature Sensors may be RTD, thermocouple, or thermistor types with sheath diameters up to 6 mm (0.25 in) and 150 mm (6.0 in) in length. Longer probes may be used with the optional shield extender tube. Other types of sensors up to 19 mm diameter can also be accommodated.

The small shield size reduces the surface area exposed to incoming radiation during the day, significantly reducing the amount of heat that needs to be washed away from the intake tubes. Errors from outgoing radiation at night are similarly reduced.

A continuous duty brushless DC blower pulls ambient air into the shield and across the temperature sensor. Flow rate at the sensor is 3 to 7 m/s, depending upon sensor size.

The movable universal mounting brackets, which use tough UV stable plastic and corrosion resistant stainless steel U-bolts, accommodate a wide range of tower sizes. The telescoping mounting arm allows the shield to be conveniently extended away from the tower after installation.

The Model 43408 is ideally suited for lapse rate measurements. With identical shields and sensors at 2 m and 10 m levels, the temperature difference (delta T) can be measured with a relative accuracy of 0.05 C° RMS under conditions of maximum solar radiation.

EXPOSURE

The ideal sensor location is over dry, flat terrain with a grass surface. Avoid locations near large buildings, paved areas, roof tops, tunnels, or other structures which may exhaust warm air or radiate heat. Give careful consideration to the effects of lakes or ponds which can modify air temperature dramatically, low areas that hold standing water after rains, sheltered hollows, high vegetation, and steep slopes and valleys which are subject to air drainage from remote locations.

As a general rule, place the temperature sensors at a distance at least four times the height of any nearby obstructions and at least 30 m (100 ft) from paved areas.

Mount the shield on a tower or other supporting structure with the sensor end located into the prevailing wind or direction of primary interest and extend the telescoping mounting arm. These steps reduce the chance for errors introduced by blower exhaust or air warmed by the supporting structure.

For more detailed information refer to the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV - Meteorological Measurements* (U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC 27711).

INSTALLATION

See the accompanying exploded-view drawing for reference to names and locations of shield components.

The standard 43408 Gill Aspirated Radiation Shield is normally supplied with a threaded plug for holding the temperature sensor. It may be drilled to fit sensors up to 6 mm (0.25 in) in diameter.

Young temperature probes and relative humidity/temperature probes are supplied with a junction box and split bushing. The junction box provides terminals for cable connections and properly positions the sensor within the shield assembly.

Temperature sensors from other suppliers can also be used with the junction box which is available separately. It may be drilled to fit sensor diameters up to 10 mm (0.4 in). For the sensor to be properly positioned when the junction box is placed in the shield, mount the sensor so its tip projects 56 mm (2.2 in) beyond the end of the sensor mounting tube. For temperature probes too long to meet this requirement, use the optional shield extender tube to increase the distance between the shield assembly and the mounting tee. Mount the sensor so its tip will be 40 to 50 mm (1.6 to 2 in) from the bottom opening of the intake tube when the junction box is placed in the shield.

Thread the shield assembly into the appropriate threaded opening in the shield mounting tee at the end of the telescoping arm. Tighten the shield by hand being careful not to crossthread or overtighten.

Insert the junction box with its split bushing into the shield mounting tee. Adjust the position of the sensor tip if necessary. Tighten the threaded split bushing to secure the junction box in place. Do not overtighten.

The mounting brackets attach to horizontal, vertical, or diagonal tower members up to 5 cm (2 in) in diameter. Attach the mounting brackets to tower members so the two brackets are at least 30 cm (12 in) apart, the mounting arm is horizontal, and the blower exhaust vents are facing downward. Tighten the

mounting U-bolts sufficiently for a secure hold without distorting the plastic v-block.

Before extending the telescoping arm, complete the sensor cable connections in the junction box and secure the sensor cable to the outer end of the telescoping arm.

CONNECTIONS

Loosen the two thumb nuts on the back of the blower cover. Open the cover and connect blower power (12-14 VDC unless otherwise noted) to the terminals. Terminal designations positive (POS), negative (NEG), and ground (⏚) are located on the printed circuit board. Blower power is normally provided by a plug-in power supply adapter which is included. BE SURE TO OBSERVE CORRECT POLARITY. Red is positive--Black is negative. The blower motor draws approximately 420mA-480mA. Use sufficiently heavy gauge wire between the power supply adapter and the blower motor terminals to avoid any significant voltage drop.

Connect the ground terminal to an earth ground. Transient protection devices are installed from both positive and negative to ground as well as between positive and negative.

On units supplied with the optional flow switch three additional terminals are provided. The switch is a miniature glass encapsulated magnetic reed switch which is actuated by an air flow detector in front of the blower intake. The normally open (N.O.) and normally closed (N.C.) terminals refer to the switch position when the blower is stopped. The switch is rated at 24VAC/DC with a maximum switching current of 0.25 A. **DO NOT EXCEED THESE RATINGS.**

Unthread and remove the cover from the sensor junction box. Insert the sensor cable through the packing nut in the side of the junction box. Attach sensor conductors to the appropriate terminals on the circuit card inside. Replace the junction box cover.

Loosen the band clamp holding the telescoping mounting arm. Extend the arm so the shield intake is at least 60 cm (24 in) from the tower. Adjust the shield so the intake opening is facing vertically downward. Tighten the band clamp.

MAINTENANCE

Depending on conditions, the blower should provide trouble-free operation for several years. It is designed for continuous duty life of 80,000 hours at 25 C°. Blower life is somewhat reduced at higher temperature but it will perform satisfactorily at temperatures as high as 70 C°. The blower assembly is easily replaced. Simply disconnect the blower power (and optional flow switch) leads from the terminals and then remove the two plastic hex nuts that secure the blower clamp. After installation of the new blower assembly be sure to observe correct polarity when reconnecting the power leads to the motor terminals.

Inspect and clean the shield at regular intervals to maintain optimum performance. When the shield becomes coated with a film of dirt wash it thoroughly inside and out with mild soap and warm water. Use alcohol to remove any oil film. Do not use any other type of solvent.

Check mounting bolts periodically for possible loosening from tower vibration.

WARRANTY

This product is warranted to be free of defects in materials and construction for a period of 12 months from date of initial purchase. Liability is limited to repair or replacement of defective item. A copy of the warranty policy may be obtained from R. M. Young Company.

CE COMPLIANCE

This product has been tested and shown to comply with European CE requirements for the EMC Directive. Please note that shielded cable must be used.

Declaration of Conformity

Application of Council Directives:
89/336/EEC

Standards to which Conformity is Declared:
EN 50082-1 (IEC 801-2, 3, 4)

Manufacturer's Name and Address:
R. M. Young Company
Traverse City, MI, 49686, USA

Importer's Name and Address:
See Shipper or Invoice

Type of Equipment:
Meteorological Instruments

Model Number / Year of Manufacture:
43408/1996

I, the undersigned, hereby declare that the equipment specified conforms to the above Directives and Standards.

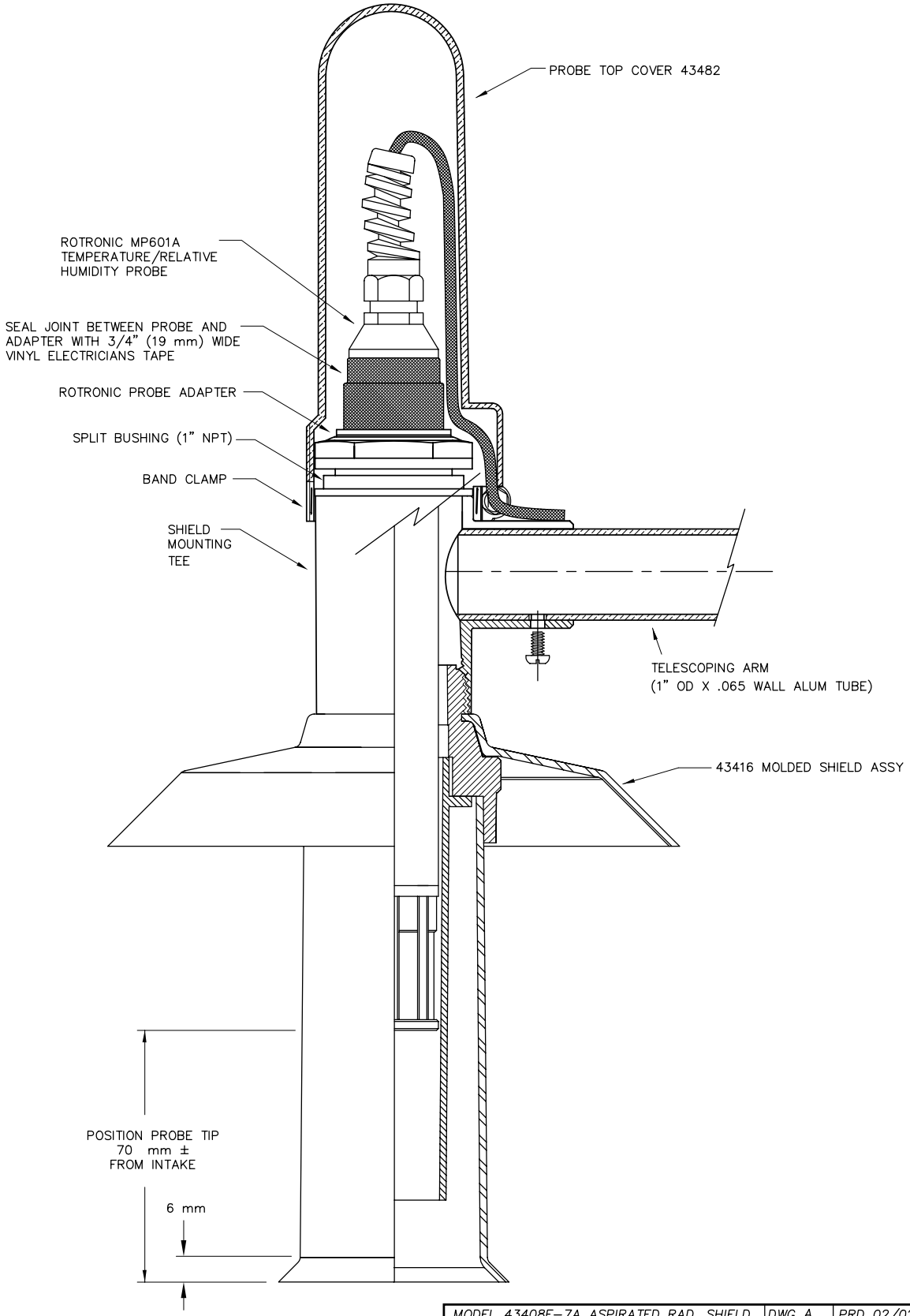
Date / Place:
Traverse City, Michigan, USA February 19, 1996

David Poinsett
R & D Manager, R. M. Young Company

YOUNG

MODEL 43408F–7A ASPIRATED RADIATION SHIELD

WITH ROTRONIC MP601A TEMPERATURE/HUMIDITY PROBE



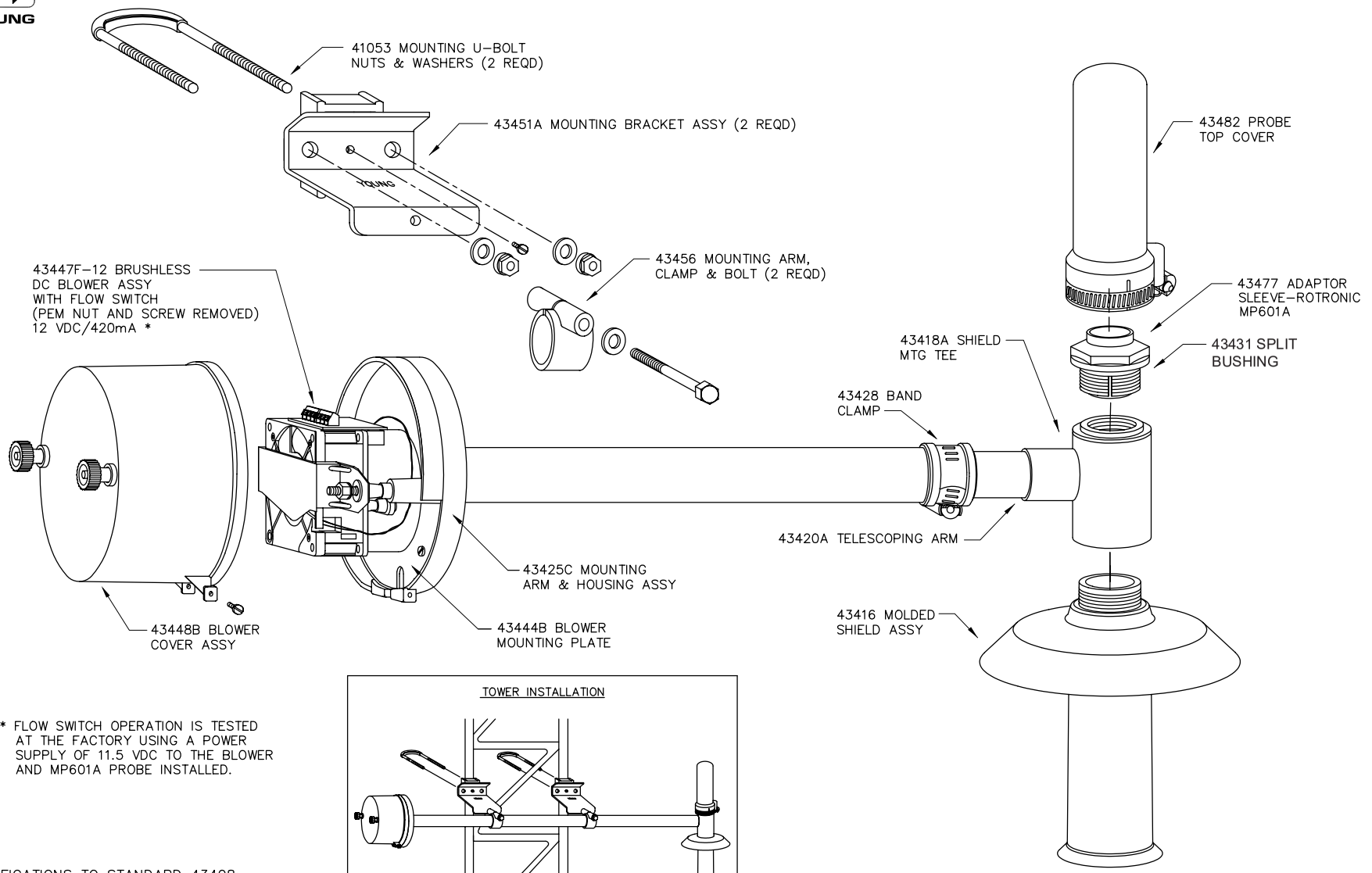
MODEL 43408F–7A ASPIRATED RAD. SHIELD	DWG A	PRD 02/02
SECTION VIEW WITH ROTRONIC MP601A	DWN JMT	DWG 02/02
RELATIVE HUMIDITY/TEMPERATURE PROBE	CHK	S43408F–7A
R.M. YOUNG CO. TRAVERSE CITY, MI 49686 U.S.A. 231–946–3980		

43408F-7A-90

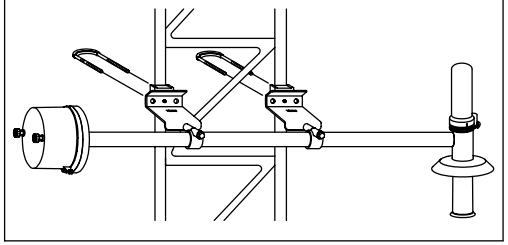
MODEL 43408F–7A ASPIRATED RADIATION SHIELD

WITH LOW POWER DC BLOWER

YOUNG



TOWER INSTALLATION



* FLOW SWITCH OPERATION IS TESTED AT THE FACTORY USING A POWER SUPPLY OF 11.5 VDC TO THE BLOWER AND MP601A PROBE INSTALLED.

MODIFICATIONS TO STANDARD 43408:

1. NEW SHIELD (PART #43416)
2. PROBE COVER (PART #43482)
3. MOUNTING ADAPTER FOR ROTRONIC MP601A (PART #43477)
4. #43447F–12 DC BLOWER WITH FLOW SWITCH
   (PEM NUT AND SCREW REMOVED FROM FLOW SWITCH PADDLE)
5. LESS AC ADAPTOR

MODEL 43408F–7A	DWG A	PRD 02/02
ASPIRATED RADIATION SHIELD	DWN JMT	DWG 02/02
GENERAL ASSY & REPLACEMENT PARTS	CHK	E43408F–7A
R.M. YOUNG CO. TRAVERSE CITY, MI 49686 U.S.A. 231–946–3980		