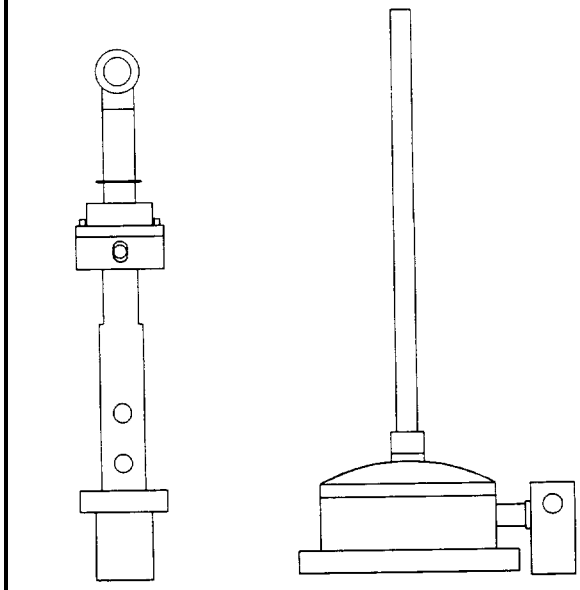
Commercial

Manual

INSTRUCTION MANUAL

HYDROGEN SAFETY SWITCH



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
Office of Systems Operations

Engineering Division
Instruction Manual
9-311

HYDROGEN SAFETY SWITCH

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HYDROGEN SAFETY SWITCH

CHAPTER I. DESCRIPTION

1.1 General - The hydrogen safety switch is an automatic cutoff valve designed to reduce personnel hazards. The switch uses commercially available intrinsically safe products. The intrinsically safe equipment cannot release enough electrical or thermal energy, under normal or abnormal conditions, to ignite the hydrogen environment.

The switch automatically stops the flow of gas to the balloon when the balloon reaches a predetermined amount of lift. It will also automatically stop the flow of gas if the balloon breaks during inflation.

1.2 Purpose - The switch's primary purpose is to improve personnel safety during balloon inflation when using hydrogen. Because the switch automatically stops the flow of gas when a predetermined amount enters the balloon, the user is free to do other tasks.

1.3 Parts - The switch consists of two basic assemblies.

1. Cutoff switch - Figure 1 shows the parts keyed to the parts list.

2. Control box - NWS Drawing J407-SD001 (Sheet 4 of 7) shows the control box parts keyed to the parts list.

The electrical and electronic parts are commercial items. The switching column and post are an NWS design.

1.3.1 Construction - Figure 1 shows a fixed switch post, part 1, projecting vertically from the cover of the junction box, part 11. The switch post contains two magnetically operated reed switches, one in the upper end and one in the lower end.

Parts 2 through 10 compose the switching column assembly. The switching column is free to move up and down on the switch post. The user can lift the switching column completely off the switch post when needed.

The switching column normally sits over the switch post and rests on the cover of the junction box. In this position, the lower magnets, part 8, are next to the lower reed switch in the switch post. The magnets close the lower reed switch. The switch remains closed while the magnets are next to it. Raising the switching column a short distance, about 2 inches, will open the reed switch.

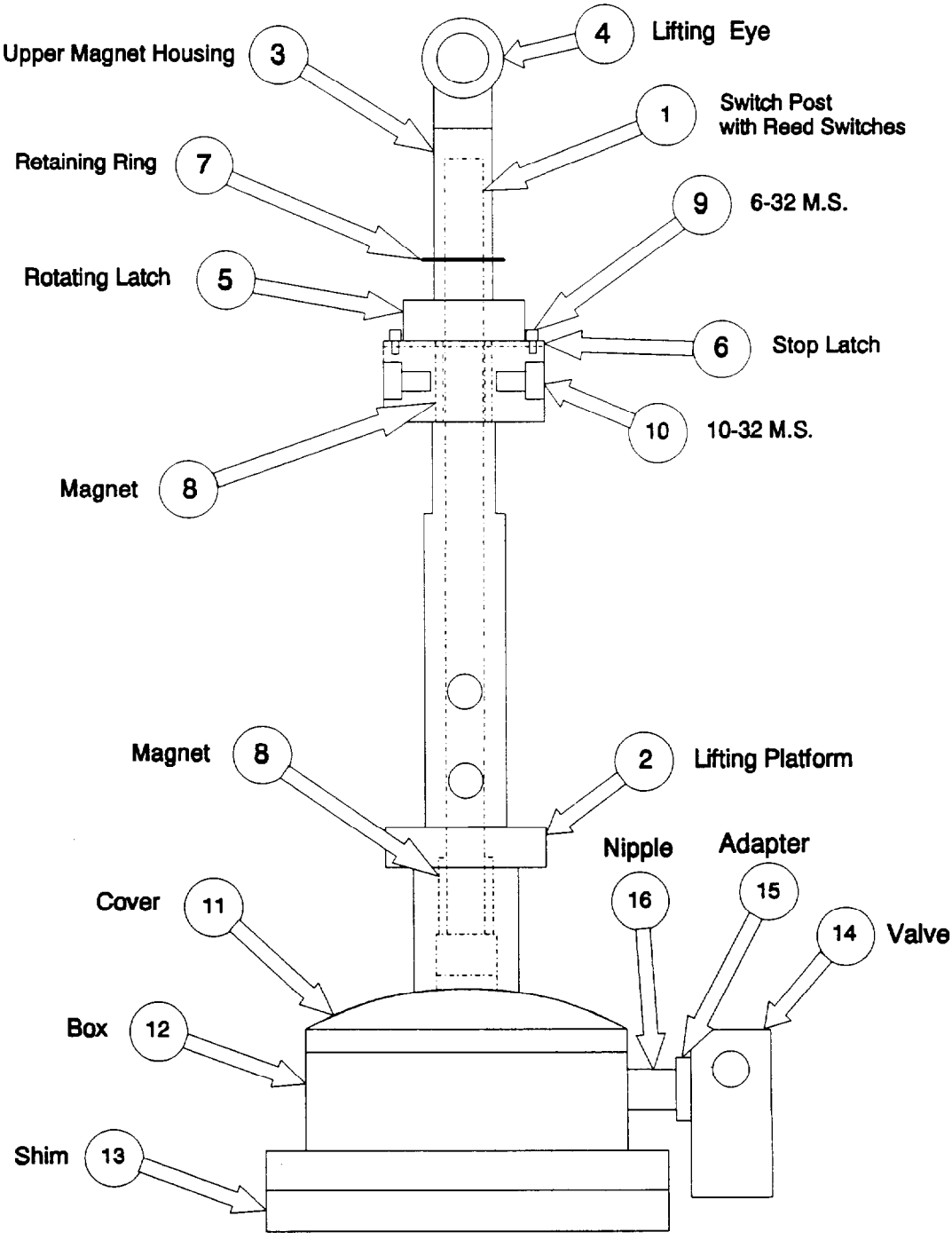

Upper Magnet Housing
3
4
Lifting Eye
1
Switch Post
with Reed Switches
Retaining Ring
7
9
6-32 M.S.
Rotating Latch
5
6
Stop Latch
10
10-32 M.S.
Magnet
8
Magnet
8
2
Lifting Platform
Nipple
Adapter
Cover
11
16
15
14
Valve
Box
12
Shim
13

Figure 1

Rotating latch, part 5, is an integral part of the switching column. The latch has a limited vertical travel of about 1 inch on the switching column. The user can lock the latch in the upper position. The rotating latch contains a pair of permanent magnets, part 8. These magnets operate the upper reed switch.

Placing the rotating latch in the lower rest position puts the magnets below the upper reed switch in the switch post. This puts the upper reed switch in a normally open position. Raising the rotating latch to the upper rest position magnetically closes the upper reed switch. The reed switch remains in the closed position as long as the rotating latch is in the raised position.

The user must align the latch with the oval-shaped hole in the lifting platform and raise the latch to the upper position. Rotating the latch locks it in the upper position.

The lifting platform, part 2, is the mount for the C-shaped weights used to set a predetermined value of balloon lift. The switching column assembly weighs 1000 +/- 5 grams.

1.3.2 Normal Circuit Operation - Refer to NWS Drawing J407-SCHEMATIC. In normal operation the switching column sits over the switch post and rests on the cover of the junction box. The rotating latch is in the lower rest position. Placing the switching column in this position opens the upper reed switch and closes the lower reed switch.

The schematic shows 115 VAC applied to the A.C. power switch, part 19. Closing the power switch applies 115 VAC to the +24 VDC power supply, part 27, and the switch amplifier, part 28. The amplifier connects the magnetic reed switches in series with the coil of the DPDT relay, part 25. Pressing the start switch provides a ground through the bottom reed switch circuit to energize the DPDT relay. Closing the relay connects 115 VAC through one set of contacts to the pilot light. It also connects +24 VDC through the other set of contacts to the safety barrier, part 29. Voltage through the barrier opens the solenoid valve, part 14, permitting the flow of hydrogen. The user must hold the start switch closed to keep the solenoid valve open and the gas flowing.

The balloon will fill until the switching column lifts from the normally seated position. When the switching column lifts, the magnets open the lower reed switch. This deactivates the relay and removes voltage from the solenoid valve and stops the flow of hydrogen.

1.3.3 Bypass Operation - Refer to NWS Drawing J407-SCHEMATIC. During bypass operation the switching column sits over the switch post and rests on the cover of the junction box. The rotating latch is in the upper locked position. Placing the switching column in this position closes both the upper and lower reed switches.

The schematic shows 115 VAC applied to the A.C. power switch, part 19. Closing the power switch applies 115 VAC to the +24 VDC power supply, part 27, and the switch amplifier, part 28. The amplifier connects the magnetic reed switches in series with the coil of the DPDT relay, part 25. Because the closed upper reed provides a ground, the DPDT relay energizes. Energizing the relay connects 115 VAC through one set of contacts to the pilot light. It also connects +24 VDC through the other set of contacts to the safety barrier, part 29. Voltage through the barrier opens the solenoid valve, part 14, permitting the flow of hydrogen. Pressing the A.C. power switch starts the flow of gas.

The balloon will fill until the switching column lifts from the normally seated position. When the switching column lifts, the magnets open the lower reed switch. This deactivates the relay and removes voltage from the solenoid valve and stops the flow of hydrogen.

1.3.4 Control Box - The control box contains the following:

A.C. power switch	part 19
Start switch	part 20
Lampholder	part 23
Relay	part 25
24 volt D.C. power supply	part 27
Safety barrier	part 29
Barrier fuse	part 30
A.C. power fuseholder	part 31

The 115 VAC power source connects to the A.C. power switch in the control box.

1.3.5 Remainina Parts - NWS Drawing J407-SD001 (Sheets 1 and 2) show the additional parts of the hydrogen switch installation. Conduits, part 41, connect the junction box, part 12, to the control box, part 17, located outside the shelter.

1.4 Balloon Inflation - The safety switch permits two inflation procedures. They differ only in the way the user starts the gas flow to the balloon. Either method is acceptable and is a matter of user preference.

1.4.1 Method 1 - This method requires that the user press and hold the start switch to maintain gas flow until the balloon lifts the rotating latch to the raised position. When the rotating latch reaches the raised position, the upper reed switch closes, bypassing the start switch. The user can then release the start switch and inflation will continue until the balloon lifts the switching column. When the switching column lifts, the lower reed switch opens. This deactivates the solenoid valve and stops the flow of hydrogen. To use Method 1, proceed as follows:

1. Close the valve on the hydrogen tank.

2. Turn off the A.C. power switch on the control box.

3. Connect the balloon neck to the inflation nozzle using the approved NWS procedure.

4. Attach the inflation nozzle to the lifting eye of the switching column with a short length of cord.

5. Place the predetermined number of C-shaped weights on the lifting platform to give the desired balloon lift. Consider the weight of the switching column, inflation nozzle, and inflation hose when selecting the number of weights.

6. Place the rotating latch in the lower rest position.

7. Align the rotating latch with the oval-shaped hole so it is free to rise to the upper limit of travel.

8. Set the regulator to the prescribed rate of gas flow.

9. Open the valve on the hydrogen tank.

10. Place the A.C. power switch on the control box to the “ON” position.

11. Press the start switch on the control box to start the flow of hydrogen. Check that the pilot lamp on the control box comes on. This shows that the solenoid valve opened. Hold the start switch on until the balloon raises the rotating latch to its upper limit of travel. Be sure to align the rotating latch with the oval-shaped hole. This will permit the rotating latch to drop to the lower rest position and automatically stop the flow of hydrogen if the balloon breaks during inflation.

12. Release the start button. Inflation will continue until the balloon lifts the switching column from the rest position. When the column lifts from the rest position, the lower reed switch in the switch post opens. This deactivates the solenoid valve and stops the flow of hydrogen.

13. Turn off the valve on the hydrogen tank.

14. Momentarily pull the lifting platform down on the switch post to the rest position. This momentarily opens the solenoid valve and relieves the pressure in the inflation hose between the hydrogen tank and the solenoid valve.

15. Turn the A.C. power switch on the control box to the “OFF” position.

16. Tie off the neck of the inflated balloon using the approved NWS procedure.

1.4.2 Method 2 - This method uses the rotating latch to start the gas flow. Raising the rotating latch from the lower rest position to the upper position bypasses the start switch and starts the gas flow. Inflation will continue until the balloon lifts the switching column. When the switching column lifts, the lower reed switch opens. This deactivates the solenoid valve and stops the flow of hydrogen.

WARNING

Locking the rotating latch in the upper position disables the automatic cut-off function of the safety switch. Hydrogen will continue to flow if the balloon breaks during inflation.

To use Method 2, proceed as follows:

1. Close the valve on the hydrogen tank.

2. Turn off the A.C. power switch on the control box.

3. Connect the balloon neck to the inflation nozzle using the approved NWS procedure.

4. Attach the inflation nozzle to the lifting eye of the switching column with a short length of cord.

5. Place the predetermined number of C-shaped weights on the lifting platform to give the desired balloon lift. Consider the weight of the switching column, inflation nozzle, and inflation hose when selecting the number of weights.

6. Place the rotating latch in the lower rest position. Align the rotating latch with the oval-shaped hole so the latch can rise to its upper limit of travel.

7. Set the regulator to the prescribed rate of gas flow.

8. Open the valve on the hydrogen tank.

9. Place the A.C. power switch on the control panel to the “ON” position.

10. Raise the rotating latch to its upper limit of travel and lock in position. This starts the flow of hydrogen into the balloon. Inflation will continue until the balloon lifts the switching column from the rest position. When the column lifts from the rest position the lower reed switch in the switch post opens. This deactivates the solenoid valve and stops the flow of hydrogen.

NOTE

Be sure to align the rotating latch with the oval-shaped hole after the balloon lifts the latch to the upper position. This will permit the rotating latch to drop to the lower rest position and automatically stop the flow of hydrogen if the balloon breaks during inflation.

11. Turn off the valve on the hydrogen tank.

12. Momentarily pull the switching column down on the switch post to the rest position. This momentarily opens the solenoid valve and relieves the pressure in the hose between the hydrogen tank and the solenoid valve.

13. Turn the A.C. power switch on the control box to the “OFF” position.

14. Tie off the neck of the inflated balloon using the approved NWS procedure.

1.5 Replacement Parts - The National Logistics Supply Center (NLSC) stocks some parts. The electronics technician must order a complete replacement switch for malfunctions not specified for local repair.

CHAPTER II. INSTALLATION

2.1 General - To install the hydrogen safety switch, proceed as follows:

1. Mount the control box, part 17, on the exterior wall of the inflation shelter.

2. Use local materials and make a shim plate, part 13, out of wood or aluminum. The shim plate thickness depends on the mounting location selected for the safety switch. Use NWS drawing J407-SD001 (Sheet 6 of 7) for the basic shim plate dimensions.

3. Fasten the junction box, part 12, and shim plate, part 13, to the balloon inflation support or table. Use corrosion resistant bolts or round head wood screws (brass) as appropriate.

4. Install the solenoid valve, part 14, to the junction box using adapter, part 15, and close nipple, part 16. Mount the valve with the valve body facing down. This provides the most protection for the valve body. The valve will operate in any position.

5. Install rigid conduit and pull wires between the control box, the solenoid valve, and the switching post. Use the molded “extension cord duct,” part 43, to prevent walking hazards. NWS Drawing J407SD001 (Sheet 1 of 7) shows the recommended conduit locations. This routing keeps current carrying wires out of the inflation room and gas storage areas. Install the conduit seal, part 42, where the conduit enters the inflation area.

6. Connect the electrical parts as shown in NWS Drawing J407-SCHEMATIC. It is important to observe the polarity of the solenoid valve connections. The blue lead is negative (-). Reverse wiring can damage the coil. Connect the hot leg of the incoming 115 VAC to terminal 1 of terminal block 1. Connect the incoming A.C. neutral to terminal 2 of terminal block 1. Connect a number 8 ground wire to the existing ground rod or building grounding network and the ground terminal of the barrier. Resistance to ground must not exceed 1 ohm. Set the red and yellow slide switches on the switch amplifier to the number 1 and 2 positions.

7. Connect the inlet side of the solenoid valve, port 1, to the regulator installed on the hydrogen supply tank using a standard length of grounded hose, part 36. Refer to NWS Drawing J407-SD001 (Sheet 2 of 7). If necessary, loosen the housing nut on top of the valve and align the valve body. Retighten the nut with an input torque of 43-53 in-lbs after positioning the valve body Parts 35, 37, 38, 41, 42, 43, 45, 48, and 49 are commercial items. Buy them locally according to regional instructions.

8. Connect the outlet side of the solenoid valve, port 2, to the inflation nozzle using a standard length of grounded hose, part 36.

NOTE

Use of thread compound or sealants is permissible on solenoid valve inlet and outlet connections. Do not exceed 175 in-lbs tightening torque.

9. Check the electrical circuits for proper connections and continuity. Use the test procedures in Chapter III to check for proper switch operation. Check all gas connections for leaks. Use of soapsuds applied with a brush is the most readily available method.

10. Install the labels marked “Intrinsic Safety Wiring” on the rigid conduit. Place the labels so they are visible and easily traced through the entire length of the installation. Do not space the labels more than 25 feet apart.

CHAPTER III. MAINTENANCE

3.1 General - Familiarity with the construction of the switch is helpful for effective maintenance of the equipment. The assembly needs no scheduled preventive maintenance under normal use. Conduct the tests outlined in Paragraph 3.5 when you suspect a malfunction.

3.2 Operator Inspection - The operator must visually inspect the hydrogen safety switch for obvious defects before each use. This helps guard against the chance of fire associated with the use of hydrogen. Using intrinsically safe equipment and placing the control box outdoors are two passive techniques for preventing fires. The field cannot repair the internally mounted magnets and reed switches. If they fail, the electronics technician must replace the complete switch assembly. Do not try to disassemble in the field.

3.3 Dailv Check - Manually lift the switching column off the switch post. Make sure there is no dust or other foreign material that could interfere with the switches. Do this before operating the start switch, part 20. Use a clean cotton cloth to wipe any foreign matter from the equipment. Replace the switching column on the switch post.

3.4 Troubleshooting - The following troubleshooting techniques are presented as an aid in locating the trouble:

Svmotom	Possible Cause
Pilot lamp doesn't glow*	Bad bulb - replace**
	Blown fuse - replace**
	Power not coming through A.C. power switch - replace.** Be sure to install the switch in the original orientation.
	Defective 24 VDC power supply or relay - replace**

* The solenoid valve can continue to operate even when the pilot light does not glow. The pilot light may glow properly when other parts of the circuits are inoperative.

** "Replace" refers to the electronics technician. The procedures can pose a shock hazard to personnel.

Gas does not flow	Blown fuse - replace**
	Defective 24 VDC power supply, barrier, or relay - replace**
	Bad solenoid - replace**
	#(Faulty wiring in the control box - replace)
	Defective reed switches - replace entire switch assembly**
	#(Defective reed switches - replace)
Other electrical problems	Perform continuity checks from A.C. power source to solenoid and replace faulty or defective parts.**
Gas leak	DANGEROUS. Do not try to repair part. Shut off gas and inflate with standby hose.
Gas does not cut off when balloon has desired lift	Shut off gas at tank as soon as malfunction is seen.
	Bad solenoid valve - replace**
	Defective reed switches - replace switch assembly**
	#(Defective reed switches - replace)
	Ice in solenoid - replace** valve and tell regional headquarters. The gas supplier must check for excess water vapor.

* The solenoid valve can continue to operate even when the pilot light does not glow. The pilot light may glow properly when other parts of the circuits are inoperative.

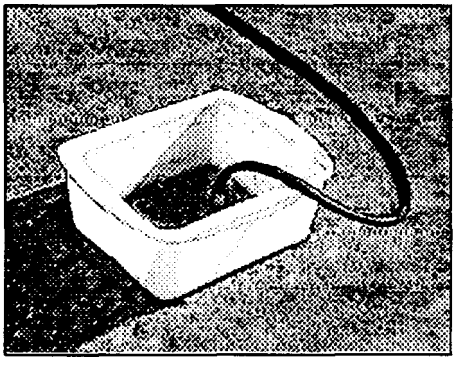
** “Replace” refers to the electronics technician. The procedures can pose a shock hazard to personnel.

\# The National Reconditioning Center performs the actions contained in parentheses.

3.5 Testing - The following procedure permits an orderly evaluation of the operating condition of the switch:

1. The following tests releases hydrogen into the air. Under dry run conditions, open one door of the inflation shelter to assure diffusion of the released hydrogen. (No balloon attached to nozzle.)

2. Place the nozzle in a pan containing clear water near the open door. Point the nozzle down to prevent trapping water in the inflation hose.



3. Turn the A.C. power switch to the "ON" position.

4. Depress the start switch. If pilot lamp glows, go to hydrogen bottle, set regulator for normal fill condition and open the tank valve.

5. Depress the start switch. Release the start switch if no bubbles appear in the water.

6. Lift the rotating latch, part 5, so the reed switch can cause the solenoid valve to open. Note whether bubbles appear in the water. If no bubbles appear, ask the electronics technician or the regional headquarters for repair and replacement help.

   Attach the standby filling hose, normally kept in the gas storage room, to the regulator at the hydrogen bottle. Use this by-pass as a temporary service until the electronics technician replaces the hydrogen switch.

7. The reed switch is working if bubbles appear and the pilot light stays on after releasing the start switch. Place the rotating latch in the lower position. Assure that the start switch and light are off. Check that the bubbles stop. If gas continues to flow, turn the valve on the hydrogen bottle off and stop the gas flow. Connect the temporary service as in step e. Use this by-pass as a temporary service until the electronics technician replaces the hydrogen switch.

3.6 Overhaul - The electronics technician must return defective switches to the National Reconditioning Center (NRC) when there is a malfunction not specified for local repair. The NRC will overhaul the complete switch assembly.

HYDROGEN SWITCH PARTS LIST

Part	Qtv	Description	Remarks
1	1	Switch Post, with Reed Switches	Parts numbered 1, 2, 3, 4, 5, and 6 are custom made. See NWS Drawing J407SDOOl.
2	1	Platform, Lifting	
3	1	Housing, Upper Magnet	
4	1	Eye, Lifting	
5	1	Latch, Rotating	
6	1	Latch, Stop	
7	1	Ring, Retaining	TRUARC 5100-75
8	4	Magnet, .187 inch dia., 1.00 inch long	#10409, Drawing 18266, Gems, Inc., Farmington, Conn. 06032
9	4	6-32 Hex SCH M.S., 3/8 inch	
10	2	lo-32 Hex SCH M.S., 3/8 inch	
11	1	Cover	Killark Co. JAH-1
12	1	Box, with hubs	Killark Co. JALX-10
13	1	Shim Plate	N WS Drawing J407-SD001 (Sheet 6 of 7)
14	1	Solenoid Valve	Skinner U121K06900890N7
15	1	Adapter, Valve	Skinner U22-003
16	1	Close Nipple, l/2 inch NPT	

17	1	Control Box	Vynckier A31-1207-H
18	1	Back Panel	Vynckier BP1207A
19	1	Switch, Toggle, SPST	MS24523-22
20	1	Switch, Toggle, 1 Pole, Momentary ON-OFF-ON	MS24523-27
21	2	Cover, Toggle Switch	M5423/01-01
22	1	Pilot Light, Incandescent Lamp	6S6, 6 watt, 125 v
23	1	Lampholder	VCH 5796-523
24	1	Lens, Red	VCH 78A-435(RED)
25	1	Relay, DPDT, 24 VDC	Potter-Brumfield KRP11DY-24
26	1	Socket, Relay	Potter-Brumfield 27E122
27	1	Power Supply, 24 VDC	Sola SLS-24-012
28	1	Amplifier, Switch	Crouse-Hinds SA20025R0003
29	1	Barrier, Safety New Switch	SA23025 MG103 Crouse-Hinds SB19240MD728
30	1	Fuse, Barrier	Crouse-Hinds SF10013R9
31	1	Fuseholder, in-line	Buss, HRJ
32	1	Fuse, 1 A, 3AG	
33	1	Terminal Strip	Kulka 600A-GP-6
34	1	Terminal Strip	Kulka 600A-GP-4

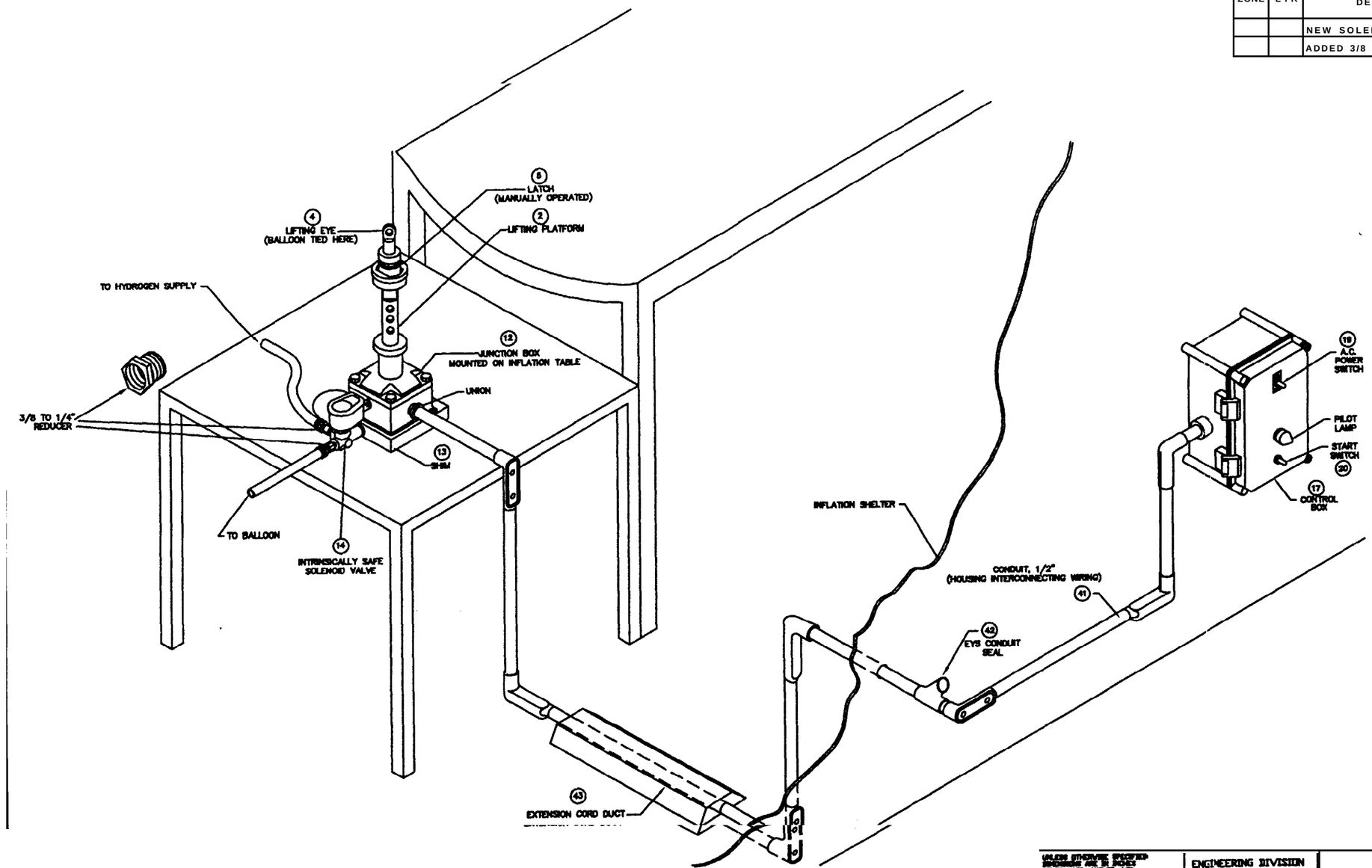
Reference NWS drawings J407-SD001

HYDROGEN SWITCH INSTALLATION ACCESSORIES LIST

Part	Qty	Description
35	2	Clamp hose, 3/8 inch stainless
36	1	Hose, 1/4 inch ID, high pressure, J4ll-7A
37	25 ft	Braid, 9/16 inch copper, wire, tin coated, tubular, Belden 8672, or equal.
38	1	Clamp, Battery, 2/#12 stranded pig-tail ground wire
39	1	Connector, Balloon Inflation, J411-4
40	2	Nozzle, Balloon Inflation, J420
41	110 ft	Conduit, metal, 1/2 inch, rigid
42	1	Conduit seal, 1/2 inch, Crouse-Hinds, EYS2
43	10 ft	Extension cord duct, molded rubber
44	1	Regulator, Multi-Stage, J411
45	4	Clamp, hose, 5/8 inch stainless
46	2	Connector, Imperial Eastman, KF04-04PS
47	1	Standby hose (3 ea of J4ll-7A)
48	10 ft	Wire, copper, bare, #8
49	240 ft	wire, copper, 14 AWG, TW stranded (120 ft. black, 120 ft. white)
50	2	Nipple, connector, 9/16 inch LH acetylene external thread, J411-6 (2 ea used to join standby hose sections - see part 47.)

See NWS Drawing J407-SD001 for location.

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	REV. BY	APPVD
		NEW SOLENOID VALVE	1/96	RHW	
		ADDED 3/8 - 1/4 In. REDUCER	1/96	RHW	



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES, ANGLES ±2°
2 PLACES DECIMALS ±.020
3 PLACES DECIMALS ±.010

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

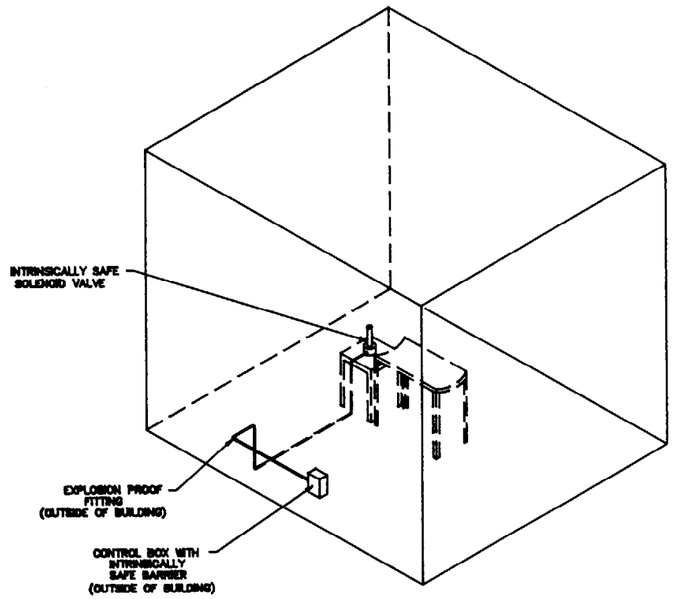
PREPARED	M.W.D.	5/28/92
CHECKED	R.E.R.	5/28/92
DESIGN	F.J.Z.	12/15/92
APPROVED	F.J. ZICHY	

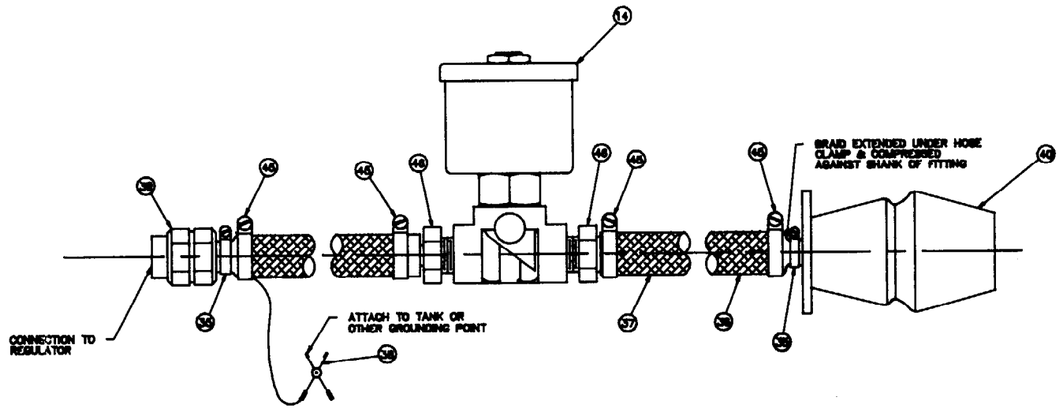
HYDROGEN SAFETY SWITCH
INSTALLATION DETAILS
(TYPICAL)

D | 1/23/96 | J407-SD001A

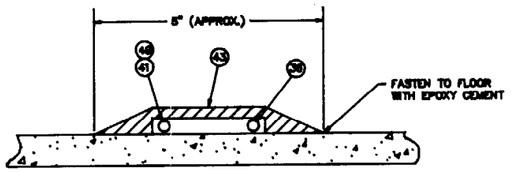
SCALE | SHEET 1 OF 7 | FILE AUTOCUT3

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	REV. BY	APP'D

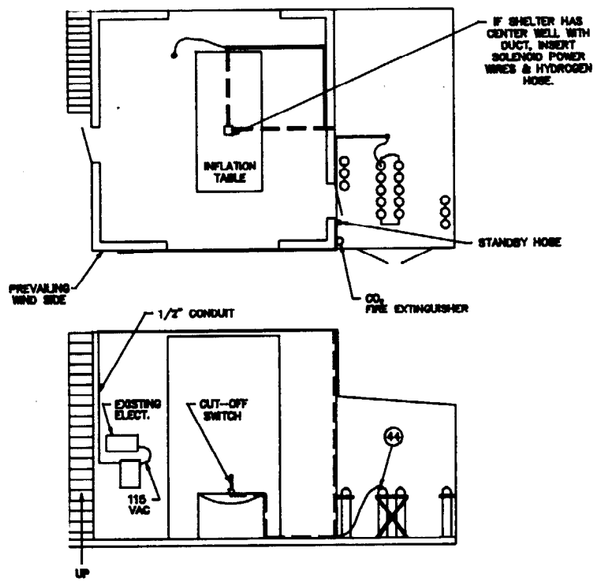




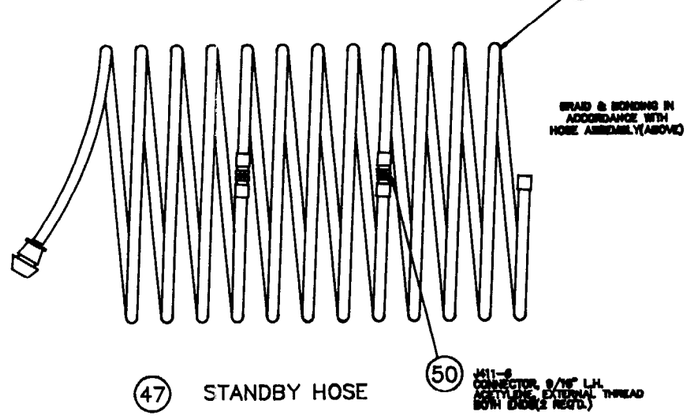
HOSE ASSEMBLY
(REGULATOR TO FILLING NOZZLE)



DUCT FLOOR



ELEVATION



47 STANDBY HOSE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGULAR ±.5° 2 PLACES DECIMALS ±.005 3 PLACES DECIMALS ±.010

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

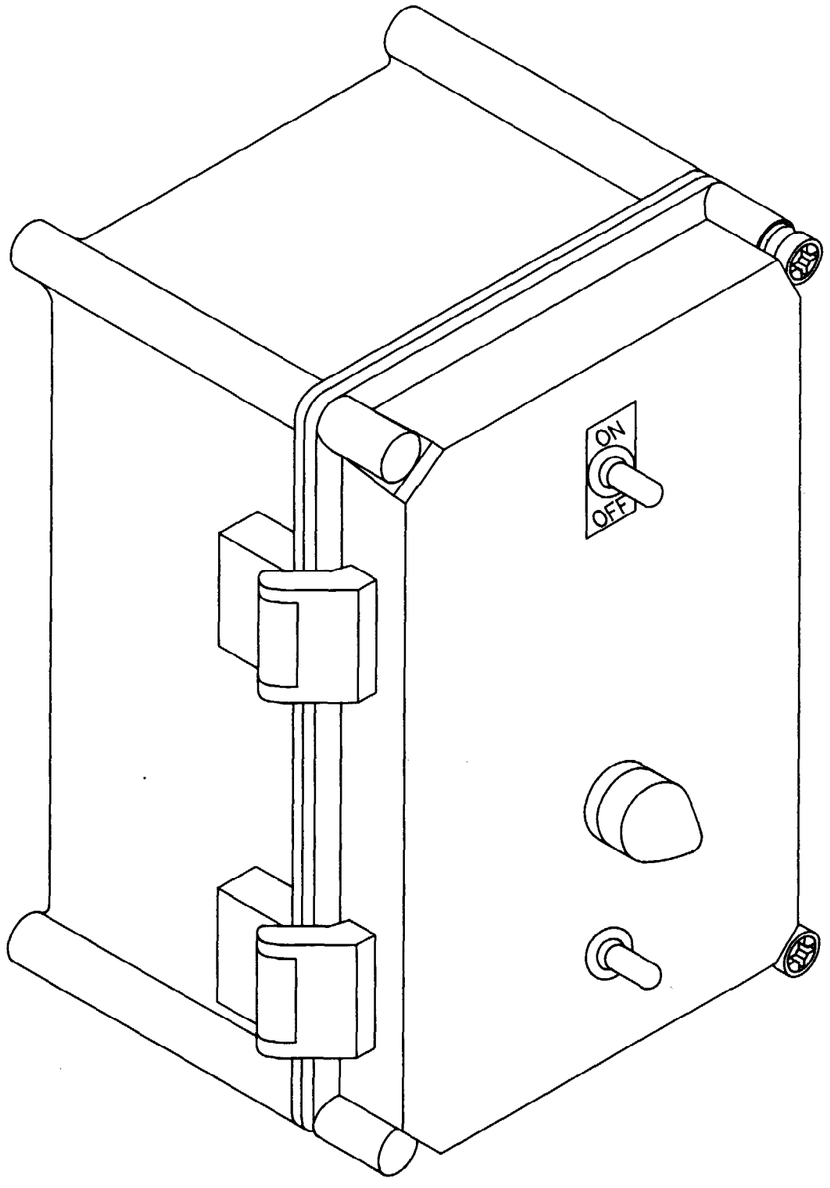
PREPARED	R.D.R.	10/92
CHECKED	R.E.R.	10/92
DESIGN	F.L.P.	10/92
APPROVED	F.L. PETERS	

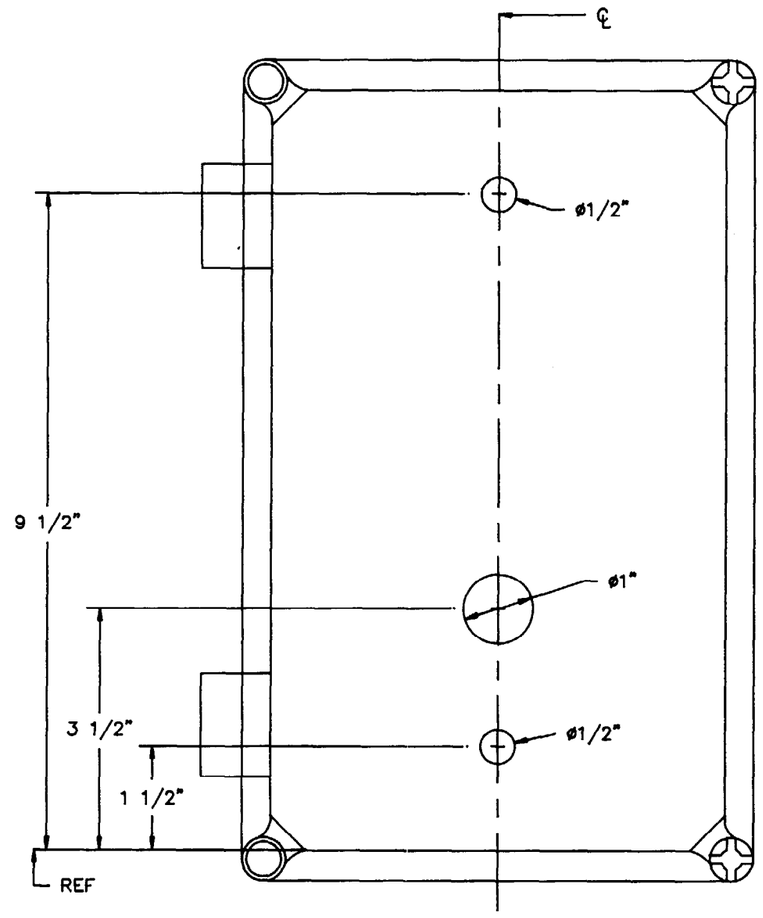
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

HYDROGEN SAFETY SWITCH INSTALLATION DETAILS (TYPICAL)

SIZE	DATE	DRAWING NO.
D	12/16/92	J407-SD001
SCALE	SHEET 2 OF 7	FILE AUTOCUT4

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	BY	APPVD





UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES, ANGLES, ARE 2 PLACES DECIMALS ±.010 3 PLACES DECIMALS ±.005

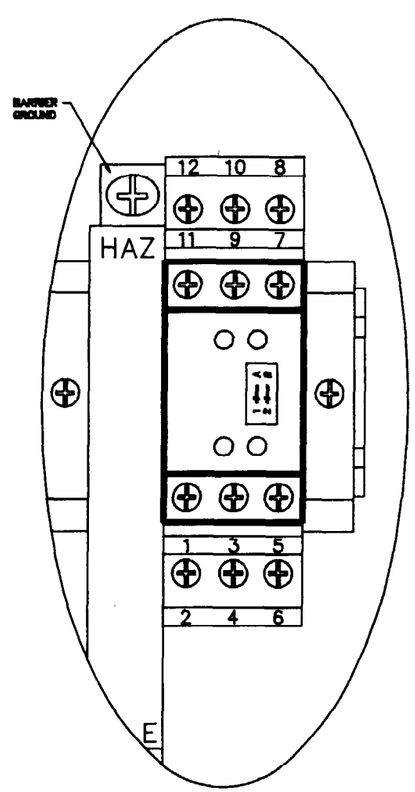
ENGINEERING DIVISION		
SILVER SPRING, MD. 20910		
PREPARED	M.W.D.	4/8/92
CHECKED	R.E.R.	12/15/92
DESIGN	F.L.P.	12/15/92
APPROVED	F.L.PETERS	

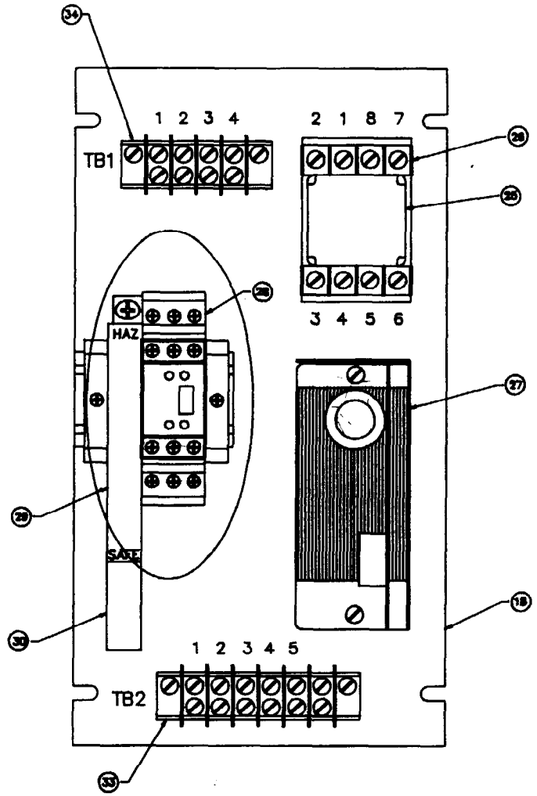
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

HYDROGEN SAFETY SWITCH CONTROL BOX ASSEMBLY

SIZE	DATE	DRAWING NO.
D	12/15/92	J407-SD001
SCALE		SHEET 3 OF 7 FILE AUTOCUTS

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	REV. BY	APP'D





UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES, ANGLES, ±1° 2 PLACES DECIMALS ±.010 3 PLACES DECIMALS ±.005

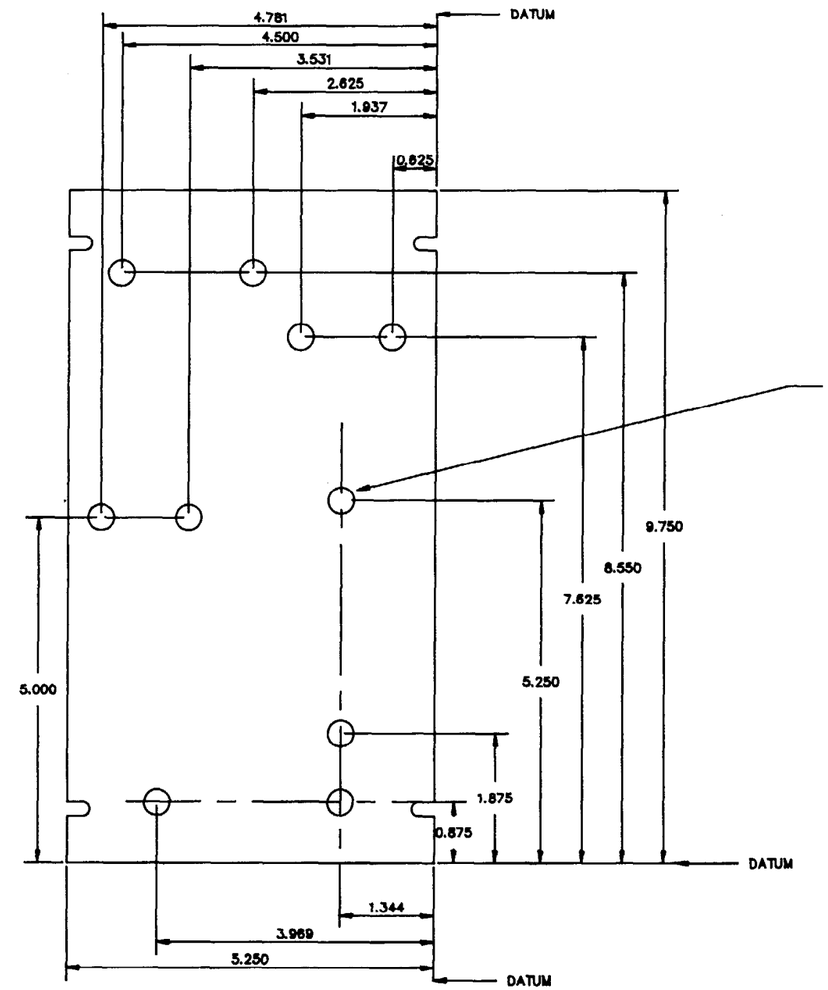
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	R.D.R.	4/92
CHECKED	R.E.R.	4/92
DESIGN	F.L.P.	4/92
APPROVED	F.L. PETERS	

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

HYDROGEN SAFETY SWITCH CONTROL BOX ASSEMBLY

SIZE	DATE	DRAWING NO.
D	12/16/92	J407-SD001
SCALE	SHEET 4 OF 7	FSA ASSY



DRILL THRU .1875 $^{+0.003}_{0.000}$ DIAMETER
FOR 6-32 PEM NUT
(10 PLACES)

FIND NO.	ELEC REF DES	NOMENCLATURE OR DESCRIPTION	QTY REQD	PART OR IDENTIFYING	DWG SIZE	CODE IDENT	SPECIFICATION OR MATERIAL

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ±.5° 3 PLACE DECIMALS ±.005 2 PLACE DECIMALS ±.01

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	M.W.D.	5/1/92
CHECKED	R.E.R.	12/15/92
DESIGN	F.L.P.	12/15/92
APPROVED	F.L. PETERS	

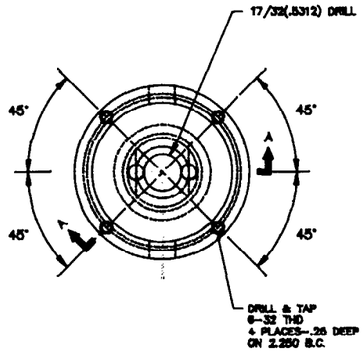
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

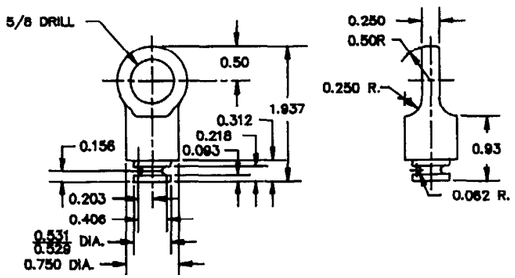
HYDROGEN SAFETY SWITCH CONTROL BOX BASE PLATE

SIZE	DATE	DRAWING NO.
D	12/15/92	J406-SD001

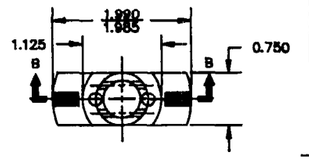
SCALE | SHEET 5 OF 7 | FILE AUTOCUTS

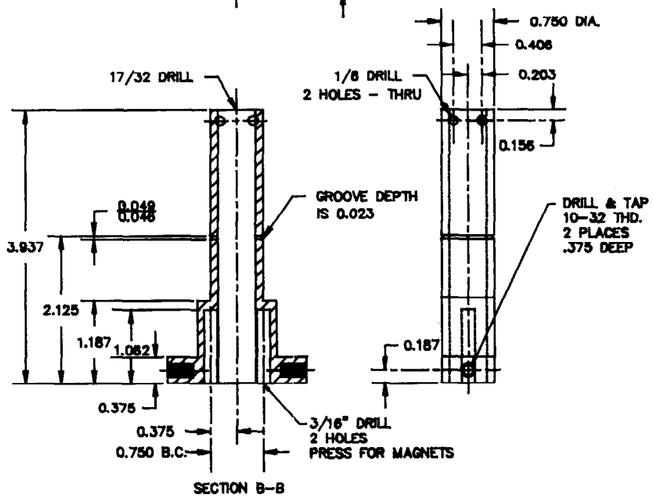
REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	REV. BY	APP'D



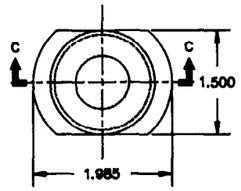


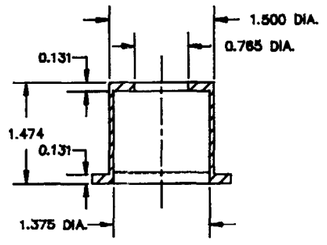
LIFTING EYE





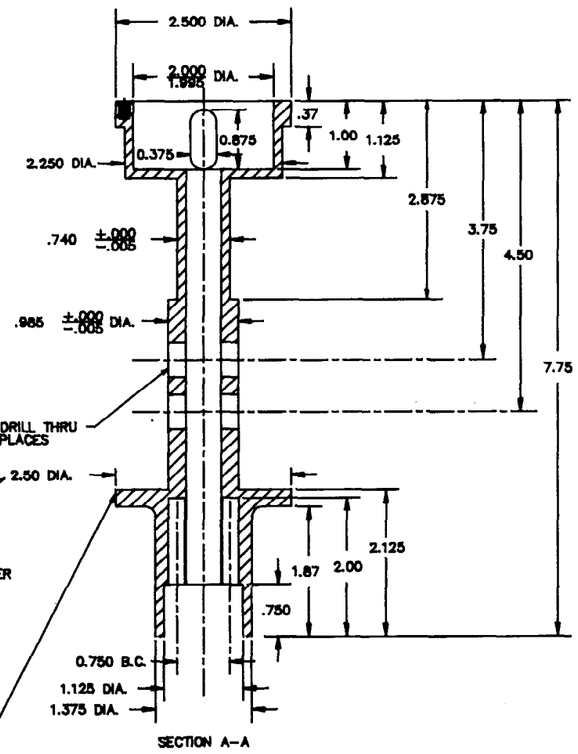
UPPER MAGNET HOUSING





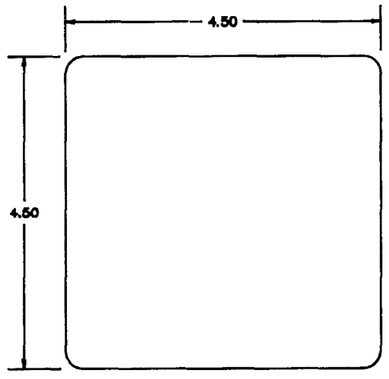
SECTION C-C

LATCH

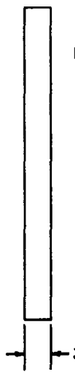


SECTION A-A

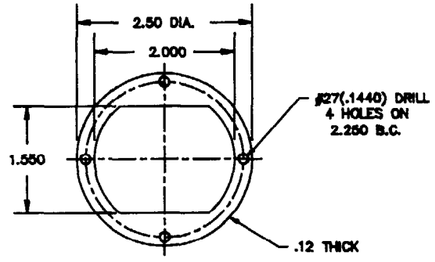
LIFTING PLATFORM



SHIM PLATE



NOTES:
1. DIMENSIONS SHOWN ARE FINISHED DIMENSIONS OF A CASING, IF USED.
2. FINISH 63 ALL OVER



LATCH STOP

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES: ±1° 3 PLACES DECIMALS ±.005 2 PLACES DECIMALS ±.02

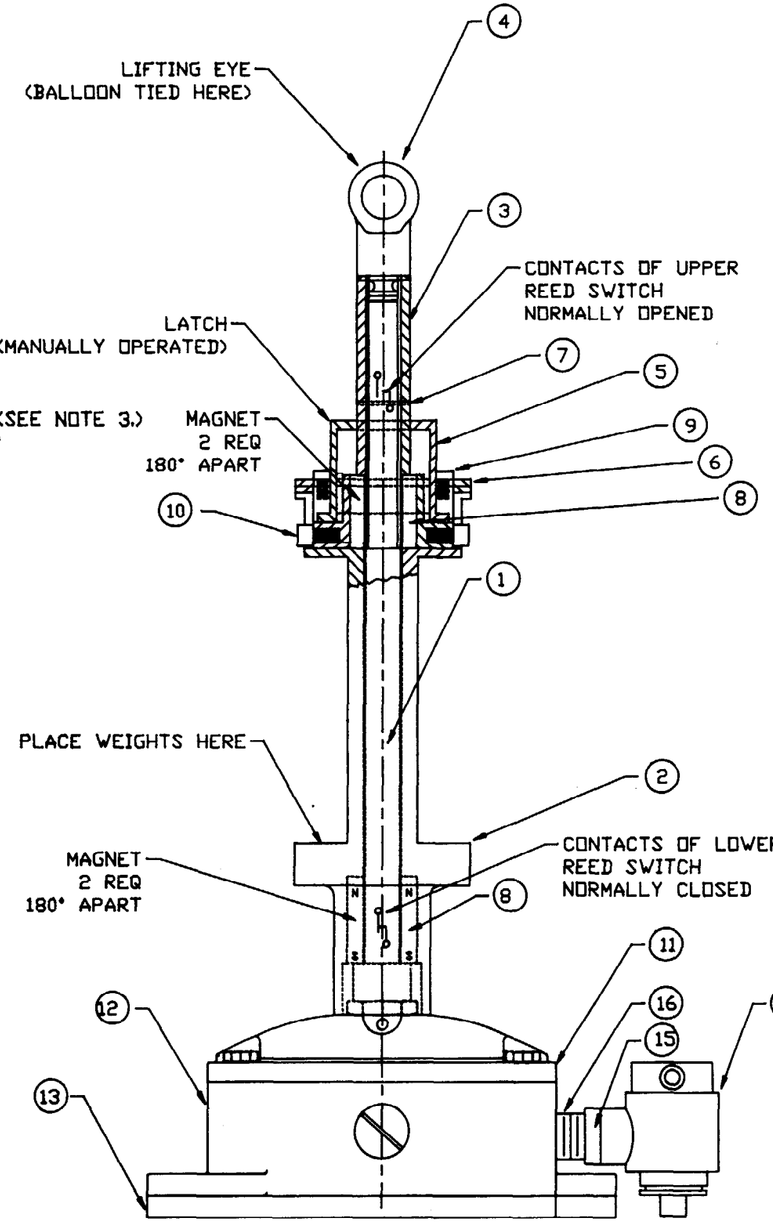
ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	R.D.R.	1/92
CHECKED	R.E.R.	1/92
DESIGN	F.L.P.	1/92
APPROVED	F.L. PETERS	

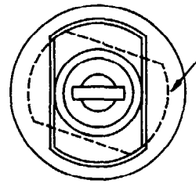
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

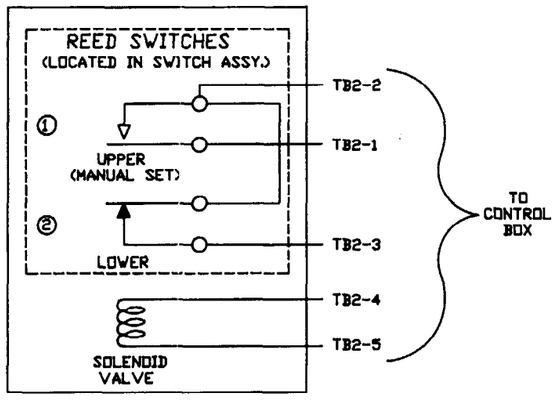
HYDROGEN SAFETY SWITCH

SIZE	DATE	DRAWING NO.
D	12/16/92	J407-SD001
SCALE	SHEET 8 OF 7	FILE WEIGHT



CUTOFF SWITCH





CUTOFF SWITCH
SCHEMATIC

REVISIONS					
ZONE	LTR	DESCRIPTION	DATE	REV. BY	APP'D

NOTES:

1. ALL ITEMS LISTED SHALL BE MANUFACTURER SHOWN OR EQUAL
2. THE COMBINED WEIGHT OF PT. NO.'S 2, 3, 4, 5, 6, 7, 8, 9, &10 SHALL BE 1000±10 GRAMS ASSEMBLED.
3. IN SOME INSTANCES THE MAGNET STRENGTH IS SUCH THAT ONLY ONE MAGNET IS REQUIRED IN THE UPPER MAGNET HOUSING. IN THIS INSTANCE TWO MAGNETS CAUSE MULTIPLE CLOSURES OF THE TOP REED SWITCH AND THUS CAUSE THE LIFT SWITCH TO MALFUNCTION. CARE SHOULD BE EXERCISED TO INSURE ALL MAGNETS OF A PURCHASED LOT ARE OF THE SAME APPROX. STRENGTH AND WHETER ONE OR TWO MAGNETS WILL BE REQUIRED IN THE UPPER MAGNET HOUSING. INSPECTION OF EACH LIFT SWITCH SHALL BE PERFORMED IN ACCORDANCE WITH TEST PROCEDURES INCLUDED IN THE INSTRUCTION MANUAL.

FIND NO.	QTY REQD	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	PART OR IDENTIFYING
16	1	CLOSE NIPPLE, 1/2 NPT	GALV. IRON		COMMERCIAL
15	1	ADAPTER, VALVE			SKINNER U82-003
14	1	SOLENOID VALVE, EP			SKINNER U82K06900B0N7
13	1	SHIM PLATE 4-1/2 X 4-1/2			
12	1	BOX, EP, 90° HUBS	ALUM.		KILLARK CO. JALX-10
11	1	COVER, EP	ALUM.		KILLARK CO. JAH-1
10	2	10-32 HEX. SCH H.S., .37 LG.	CRES.	00-S-763C	
9	4	6-32 HEX. SCH H.S., .37 LG.	CRES.	00-S-763C	
8	4	MAGNET, .187 DIA, 1.00 LG.			GEMS CO. 19409
7	1	RETAINING RING			TRUARC 5100-75
6	1	LATCH STOP	ALUM.	6061-T6	
5	1	LATCH	ALUM.	6061-T6	
4	1	LIFTING EYE	ALUM.	6061-T6	
3	1	UPPER MAGNET HOUSING	ALUM.	6061-T6	
2	1	LIFTING PLATFORM	BRASS CASTING		HALF-HARD
1	1	SWITCH ASSY. W/REED SW.	CRES.		GEMS CO.

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES, ANGLES, ±2° 2 PLACES DECIMALS ±.010 3 PLACES DECIMALS ±.005

ENGINEERING DIVISION
SILVER SPRING, MD. 20910

PREPARED	M.W.D.	1/92
CHECKED	R.E.R.	12/92
DESIGN	F.L.P.	12/92

APPROVED F.L. PETERS

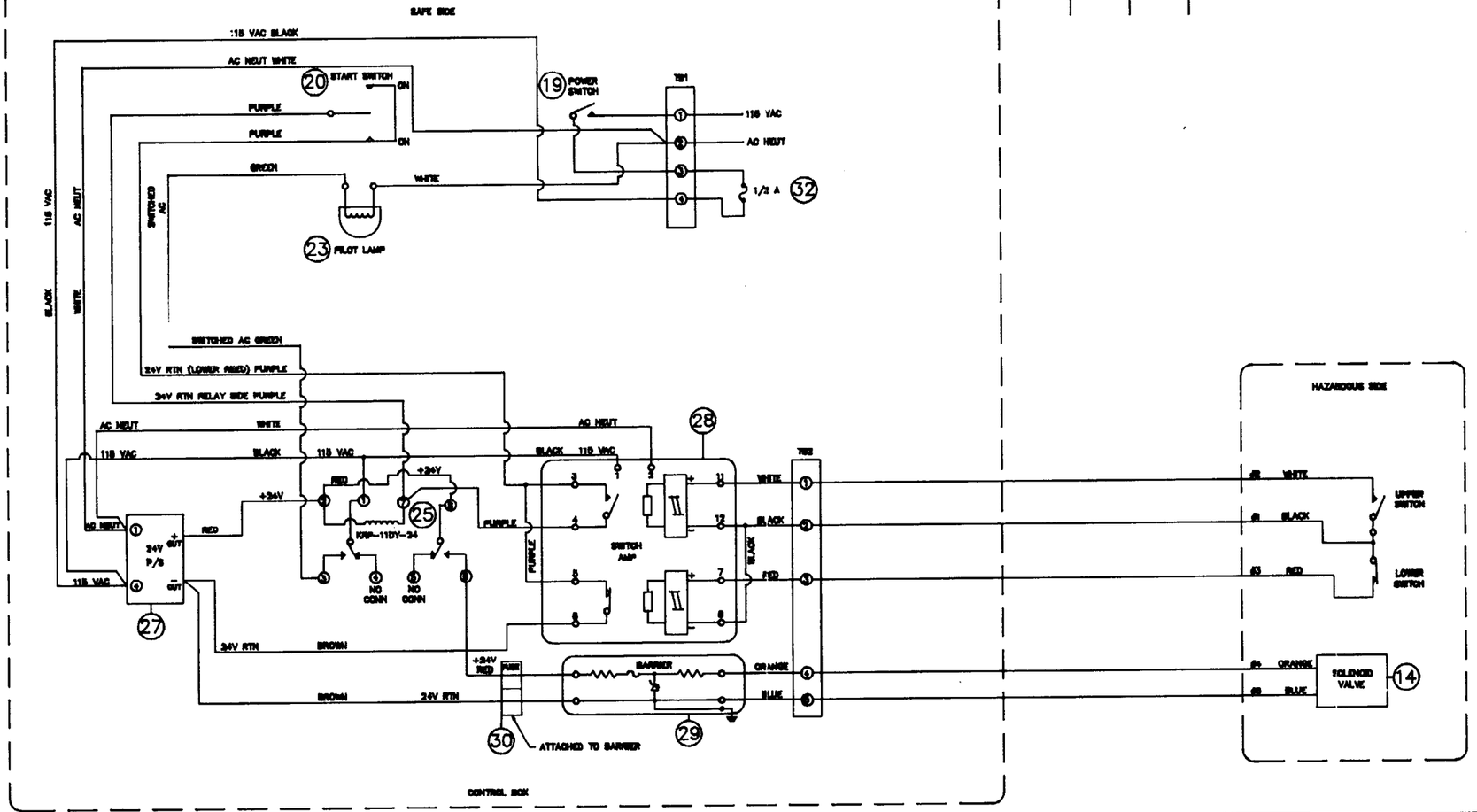
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

HYDROGEN SAFETY SWITCH

SIZE D | DATE 12/15/92 | DRAWING NO. J407-SD001

SCALE | SHEET 7 OF 7 | FILE AUTOCAD12

REVISIONS					
ZONE	LTR.	DESCRIPTION	REV. BY	DATE	APPD.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ±5° 3 PLACE DEC. ±.005 2 PLACE DEC. ±.02 2 PLACE DEC. ±.02	ENGINEERING DIVISION SILVER SPRING, MD. 20910	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE	
MATERIAL:	PREPARED R.D.R. 12/91 CHECKED R.E.R. 12/91 DESIGN F.L.P. 12/91 APPROVED BY F.L. PETERS	HYDROGEN SAFETY SWITCH SCHEMATIC	
		SIZE B	DATE 12/16/92
		DRAWING J407-SCHEMATIC	
		SCALE:	SHEET: 1 OF 1
		FILE: SCHEMATC	