

SENSORS

MANUAL - TIPPING BUCKET RAIN GAUGE P/N M100508 Rev A

1.0 INTRODUCTION

It is obvious that a clear and unobstructed mounting location is necessary to obtain accurate rainfall readings.

This transmitter is provided with 3 mounting feet for mounting on a flat surface and a side bracket for mast mounting, whichever is preferred. Normally, mast mounting should be the simplest method. The transmitter housing MUST be mounted in a LEVEL position and in a location free from vibration. If mast mounted, make sure that the mast is properly guyed so that vibration in high winds is kept to a minimum.

The funnel and tipping bucket mechanism should be cleaned periodically. An accumulation of dirt, bugs, etc. on the tipping bucket will adversely affect the calibration.

1.1 SPECIFICATIONS

Not Applicable.

2.0 PRECIPITATION GAUGES

Rain gages should be installed on a level plot of ground, at a distance from any object of at least two and preferably four times the height of the object above the top of the gage. All types of gages must be exposed with the rim of the receiver in a horizontal plane and at a level well above the average level of snow surfaces. Roof mounting of rain gages should be avoided when possible. Air currents at heights other than at ground level have been observed to cause an apparent decrease in rainfall catch commensurate with the increase in mounting height above ground level.

Objects which individually or in small groups constitute a "windbreak" reduce prevailing wind speed in the vicinity of the gage. This reduction of wind speed will, as a consequence, also reduce possible eddy currents and turbulence around the gage. The presence of such objects is usually beneficial in providing a more accurate rainfall catch. Ideally, the "windbreak" objects (fences, bushes, etc.)

should be generally uniform in height and distance from the gage. Height above the gage should not exceed about twice their distance from the gage.

3.0 INSTALLATION

Not Applicable.

4.0 I/O CONNECTIONS

Not Applicable.

5.0 USER DEFINED OPTIONS

Not Applicable.

6.0 USER INTERFACE

Not Applicable.

7.0 THEORY OF OPERATION

Not Applicable.

8.0 CALIBRATION/MAINTENANCE

Absolutely accurate calibration can be obtained only with laboratory equipment, but an approximate field check can be easily made. The tipping bucket mechanism is a highly reliable device. Most difficulties experienced are location difficulties rather than mechanism difficulties. It is self evident that the transmitter must be located in a clear area, away from trees, building, etc. It must also be mounted level. Accurate readings will not be obtained unless the transmitter is mounted in a level position.

The mechanism must be clean. Any accumulation of foreign material, dust, etc. will alter the calibration of this unit.

The transmitter must be calibrated with the rate of flow of water through the tipping bucket mechanism under control. At least 36 seconds should be allowed to fill one side of the tipping bucket. This represents a maximum flow rate of one inch of rain per hour. If the flow rate is increased, then the instrument will read low (if

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properly calibrated). Decreasing the rate of flow will not materially affect the calibration. The reason for this is obvious if the tipping bucket assembly is observed in operation. With water falling into one side of the tipping bucket, there comes a point when the weight of this water starts to tip the bucket. Some time is required for the bucket to tip (a few milliseconds). During the first 50% of this tipping time, water continues to flow into the filled bucket; the last 50% of this tipping time, water flowing during the first 50% if time is error, the faster the flow rate, the greater the error. Now at flow rates of one inch per hour (100 bucket fillings) or less, the water actually drips into the bucket rather than flowing. Under this condition, the bucket tips between drips, and no error water is added to a full moving bucket.

To check calibration, proceed as follows:

1. Secure a metal can that will hold at least one quart of water.
2. Punch a very, very small hole in the bottom of the can.
3. Place the can in the top funnel of the transmitter.
4. Pour exactly 16 fluid ounces of water into the can. A large sized (16 oz.) Coca Cola or other soft drink bottle is a satisfactory measuring device. If this is used, don't fill it all the way to the top. 16 oz. is about 2 1/2" below the very top of the bottle.
5. If it takes less than 45 minutes for this water to run out, then the hole (Step #2) is too large.
6. Rough field calibration of this sort should result in one hundred tips plus or minus two or at most three tips.
7. Adjusting screws are located on the bottom outside of the transmitter housing. These are the two screws located adjacent to the large bottom center drain hole. Adjust both equally, i.e. if you turn one a half turn, then turn the other a half turn. Turning these screws clockwise will increase the number of tips per 16 oz. of water. Turning the screws counterclockwise will decrease the number of tips per 16 oz. of water. One half turn of both screws normally results in a change of 2% to 3%.



Texas Electronics, Inc.

The Gold Standard in Weather Instrumentation Since 1957

SERIES 525 RAINFALL SENSORS USER'S MANUAL

5529 Redfield St. Dallas, TX 75235

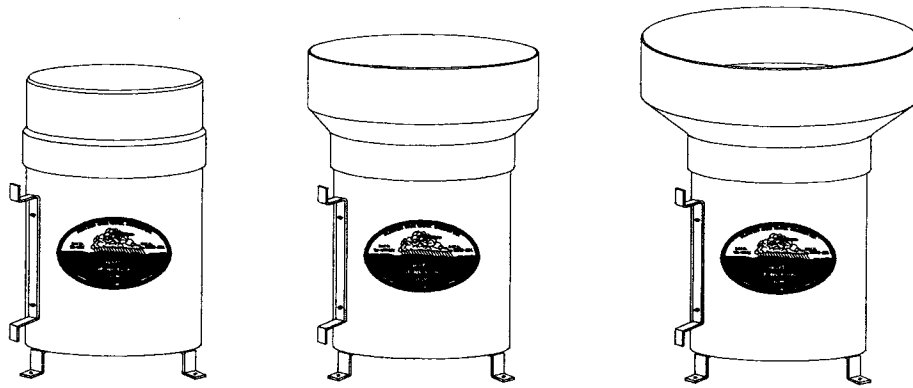
TEXAS ELECTRONICS, INC.

P.O. Box 7225 Dallas, TX 75209

Phone (214) 631-2490

Fax (214) 631-4218

Toll Free (800) 424-5651



SERIES 525 RAINFALL SENSORS

DESCRIPTION

The sensor consists of a gold anodized aluminum collector funnel with a knife-edge that diverts the water to a tipping bucket mechanism. The models TR-525I and TR-525USW are calibrated in inches (.01" per tip) and model TR-525M is calibrated in millimeters (.1mm per tip). A magnet is attached to the tipping bucket, which, as the bucket tips, actuates a magnetic switch. Thus, a momentary switch closure takes place with each tip of the bucket. Connecting the sensor to an event counter on an electronic datalogger or display module will allow record keeping of accumulated rainfall. If an analog signal representing rainfall accumulation is required, Texas Electronics, Inc. manufactures a suitable conditioning circuit.

The spent water drains out of the bottom of the housing; hence, the sensor requires no attention or servicing of any sort. It is completely automatic. The aluminum sensor housing is finished with a white baked enamel paint to withstand years of exposure to the environment.

SPECIFICATIONS

Resolution:	0.01" or 0.1 mm
Accuracy:	
English	1.0% at 1"/hr or less
Metric	1.0% at 10 mm/hr or less
Average Switch Closure Time:	135 ms
Maximum Bounce Settling Time:	0.75 ms
Maximum Switch Rating:	30 VDC @ 2 A, 115 VAC @ 1 A
Temperature Limits:	+32°F to +125°F
Humidity Limits:	0 to 100%
Height:	10.125"
Weight:	2.5 pounds
Receiving Orifice Diameter:	6.060" (English) 9.664" (Metric) 8.000" USW (English)
Cable:	60 feet, 2-conductor
Installation:	Consists of attaching the three sensor support legs to a firm platform or securing the side bracket to a stable vertical structure such as the lower end of weather station mast. Sensor cable is then connected to monitoring equipment.
Maintenance:	Occasional cleaning of debris from filter screen may be required.
Warranty:	Three Years

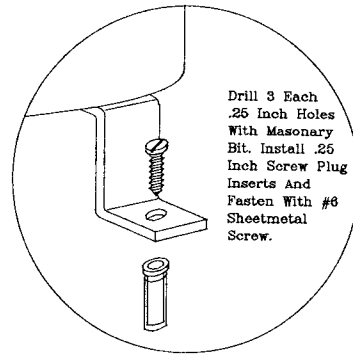
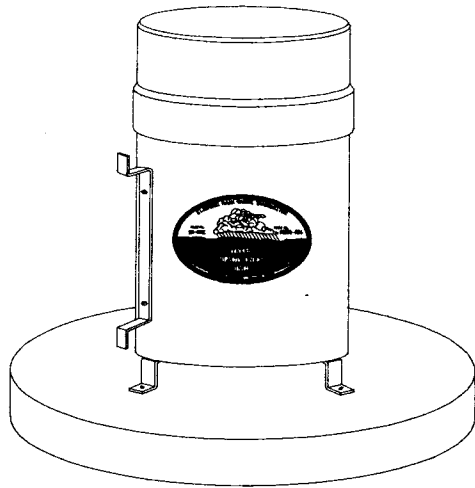
ORDERING INFORMATION

Model #	Description
TR-525I	Rain Gauge, 6.06" collector, English (Please specify for calibration of 0.2 mm/tip)
TR-525USW	Rain Gauge, 8.00" collector, English
TR-525M	Rain Gauge, 25 mm collector, Metric

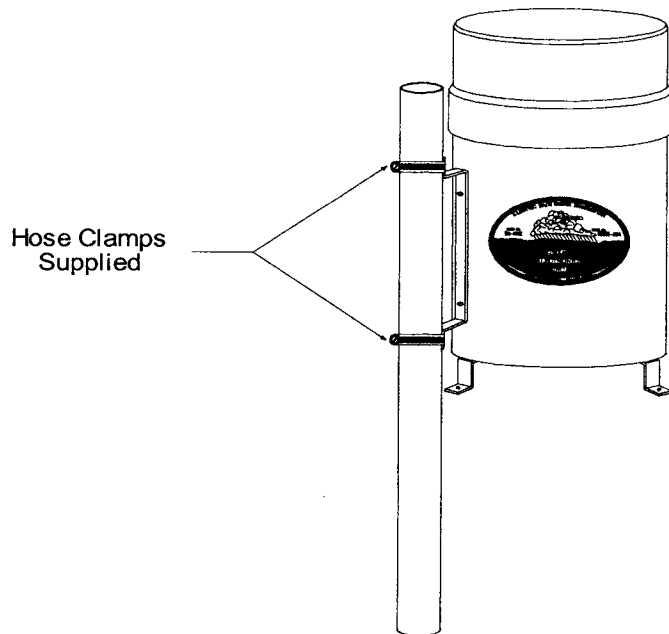
Optional Parts / Accessories

HOBO	Event Datalogger and Software
MB-525	Pole Mounting Base
FC-525	Field Calibration Kit
BB-525	Bird Repellant
HT-525	Heater, 120 VAC
Cable	Additional Cable

MODEL 525 MOUNTING EXAMPLES



Model 525 Surface Mounted On a Masonry Block



Model 525 Mast Mounted

MODEL 525

TIPPING BUCKET RAIN GAUGE TRANSMITTER

INSTALLATION INSTRUCTIONS

A clear and unobstructed mounting location is necessary to obtain accurate rainfall readings.

This transmitter has provisions for mounting two ways, surface mounting and mast mounting. Surface mounting is recommended where possible. The transmitter housing **MUST** be mounted in a **LEVEL** position and in a location free from vibration. If mast mounted, make sure that the mast is properly guyed so that vibration in high winds is kept to a minimum.

THE FOLLOWING IS VERY IMPORTANT:

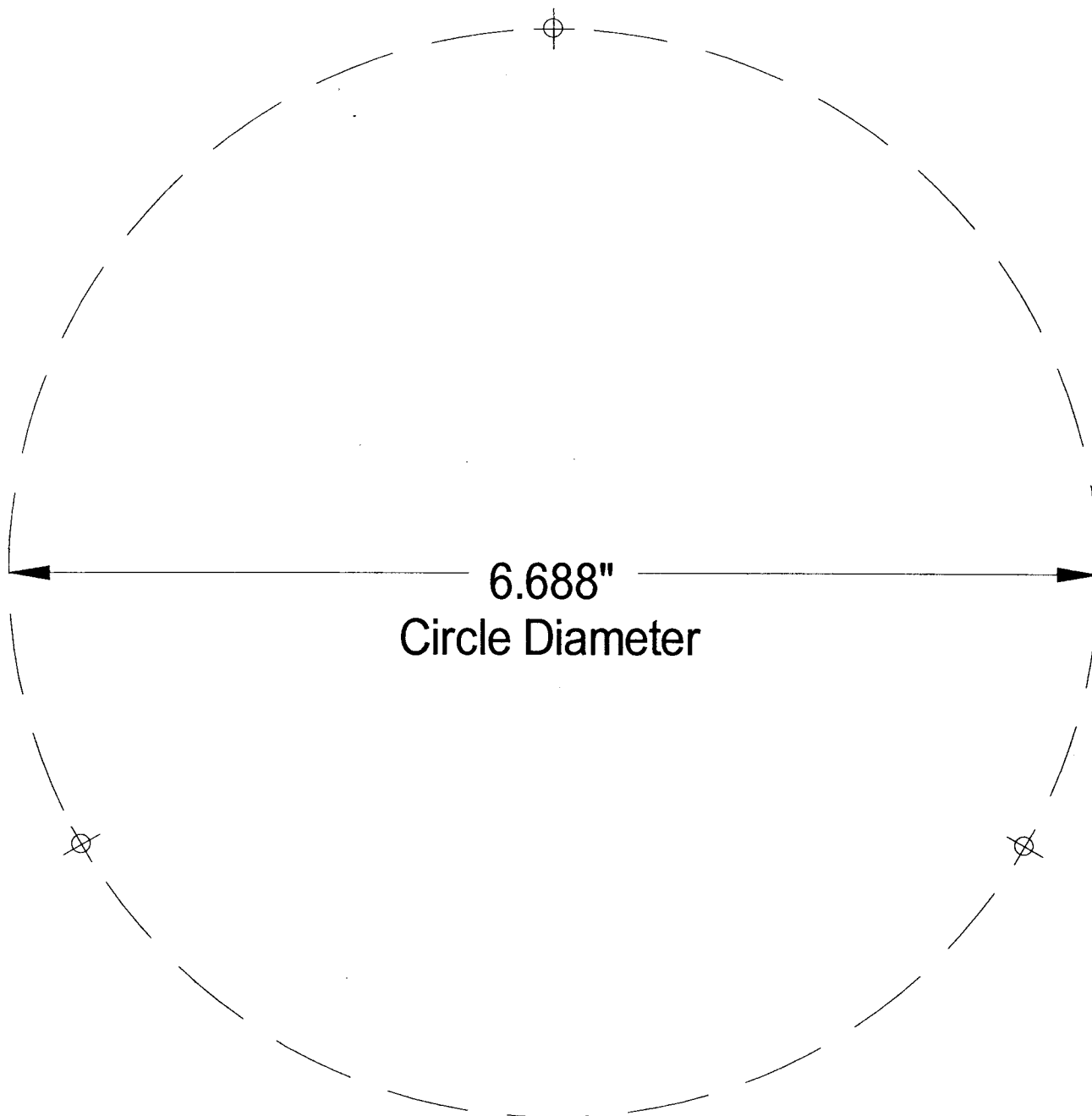
After the final transmitter installation has been made, remove the top gold funnel portion of the transmitter and observe the black tipping bucket. It should **NOT** (repeat **NOT**) be held in a dead center position by the magnetic attraction of the bucket magnet and the hermetically sealed magnetic switch. Press either end of the bucket down against the stop to be sure that it is not centered.

The transmitter to indicator connecting cable may be either shortened or lengthened as required.

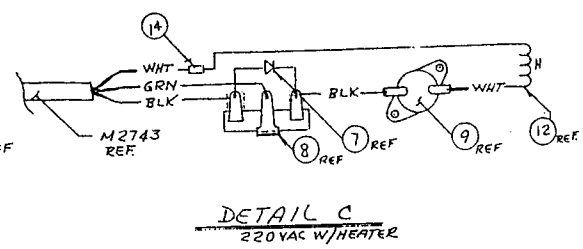
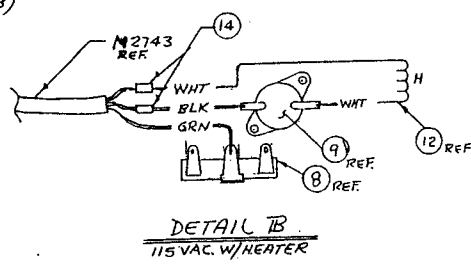
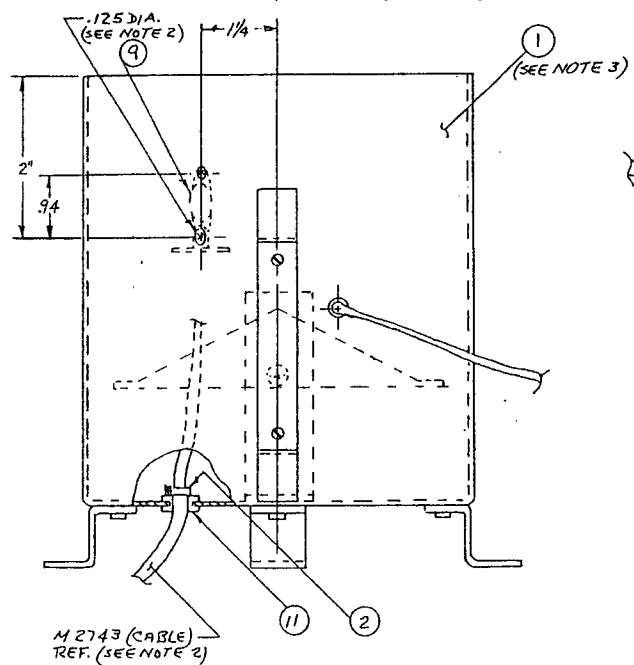
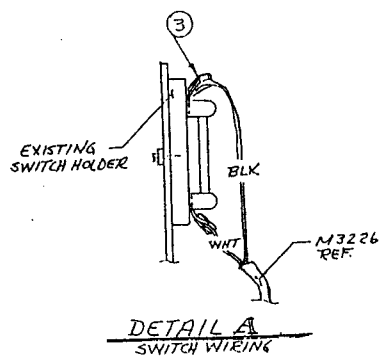
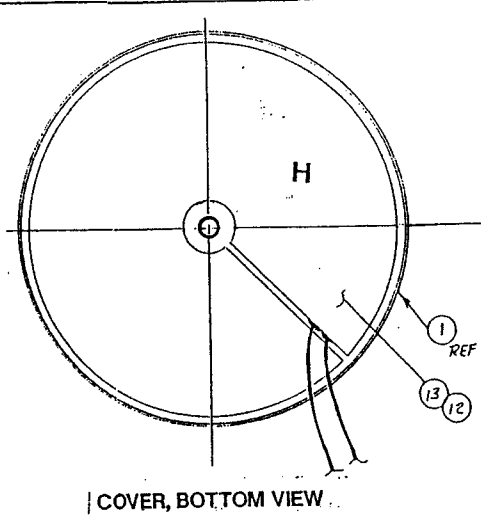
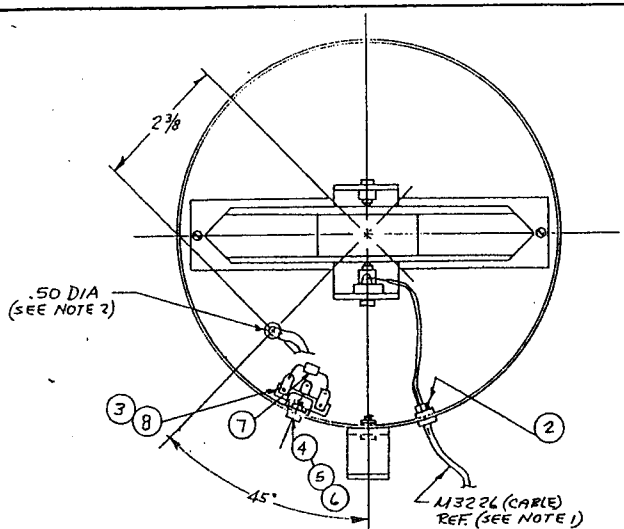
The funnel and tipping bucket mechanism should be cleaned periodically. An accumulation of dirt, bugs, etc. on the tipping bucket will adversely affect the calibration.

REMOVE AND USE THIS TEMPLATE TO BASE MOUNT THE RAINFALL SENSOR

**MODELS TRP-525I, TRP-525M, TRP-525USW
MOUNTING TEMPLATE**



REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	II	RE-DRAWN, SEE ECN 4275	4-1-52	JF
	I	ECN 4646	2-0-45	JF



- NOTES:
- 1) REMOVE THE EXISTING CABLE & INSTALL NEW CABLE P/N M3226, LENGTH TO BE SPECIFIED BY CUSTOMER. FOR WIRING, SEE DETAIL A.
 - 2) BEFORE INSTALLING CABLE (M2743), TERMINAL BLOCK (ITEM 8) OR THERMOSTAT (ITEM 9), DRILL HOLES PER DIMS. SHOWN.
 - 3) PART NO. 10050860 IS ONLY FOR PRECIPITATION GAUGE ASSY.
PART NO. 10050861 IS FOR PRECIPITATION GAUGE WITH HEATER & 115 VAC. FOR WIRING, SEE DETAIL B.
PART NO. 10050862 IS FOR PRECIPITATION GAUGE WITH HEATER & 220 VAC. FOR WIRING, SEE DETAIL C.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGLES		CONTRACT NO.		CLIMATRONICS	
DRAWN S. F. JACOBI		APPROVALS		PRECIPITATION GAUGE ASSY. 6" CAPACITY	
CHECKED ROBBINS		DATE 2-11-52		SIZE FSCM NO. DWG. NO.	
ISSUED R. TRENT		DATE 1-10-51		C 52332 100508	
PART ASSY. USED ON		SCALE 3/4"=1"		SHEET 1 OF 2	
APPLICATION		DO NOT SCALE DRAWING		REV. I	

100508

D
C
B
A

D
C

A

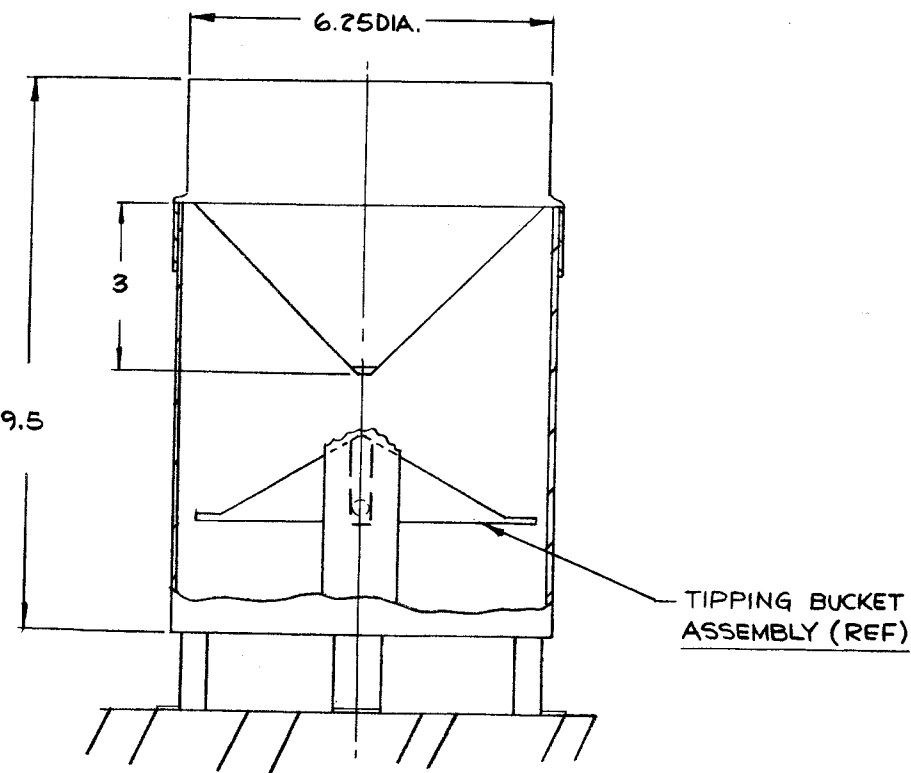
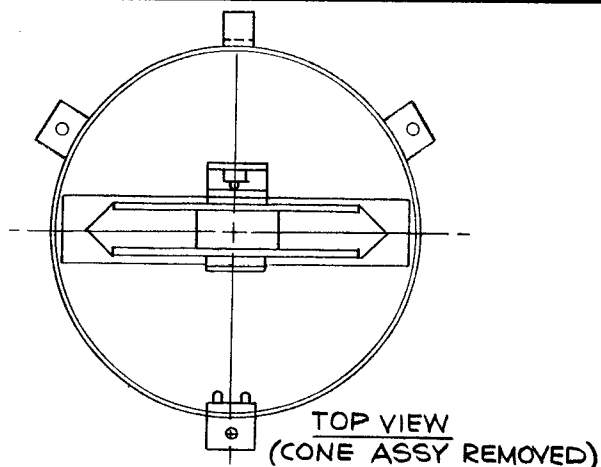
PRECIPITATION GAUGE, 6IN.
P/N 100508 Rev I
PARTS LIST
Sheet 2 of 2

ITEM	SYM.NO	QTY	PART NO.	DESCRIPTION
1		1.0	400621	PRECIP GAUGE TRANSMITTER
2		2.0	PLT2S	TY-WRAP
3		0.0	TAT-125-3/16	TUBING, SHRINK, 3/16 inch
4-14		0.0	100508G	SEE G LIST

SEE G LIST
P/N 1005086 Rev
PARTS LIST
Sheet 1 of 1

ITEM	SYM.NO	QTY	PART NO.	DESCRIPTION
		1.0	10050860	PRECIP GAUGE w/NO HEATER 115V
		1.0	10050861	PRECIP GAUGE w/HEATER 115V
		1.0	10050862	PRECIP GAUGE w/HEATER 220V

B400621A



ELECTRICAL SPECIFICATIONS

1. SWITCH ENVIRONMENTALLY SEALED
2. EACH SWITCH CLOSURE = .01" PRECIPITATION ACCUMULATION
3. ACCURACY : .5% @ 1"/hr
 2% @ 3"/hr
 4% @ 6"/hr
4. MAXIMUM CAPACITY: 10"/hr
5. REPEATABILITY: ±.01" WITHIN RATED ACCURACY
6. MEASUREMENT RESOLUTION: .01"
7. SWITCH IMPERVIOUS TO ENVIRONMENTAL CONDITIONS

ENVIRONMENTAL SPECIFICATIONS

1. UNIT CONSTRUCTED OF NON-CORROSIVE AND RUST PROOF MATERIALS
2. TEMP. OPERATING RANGE: 32°F TO 125°F
3. UNIT SUPPLIED WITH PROTECTIVE SCREEN ON FUNNEL
4. COLLECTOR AND HOUSING ASSY. WILL BE SELF-DRAINING
5. WT.- 2.5 lbs MAX.
6. UNIT SUPPLIED WITH HARDWARE FOR GROUND OR MAST MOUNTING

SUGGESTED SOURCES OF SUPPLY

TEXAS ELECTRONICS INC
 P.O. BOX 7225- INWOOD STATION
 5529 REDFIELD ST.
 DALLAS, TEXAS 75209 - MODEL 525

TOLERANCES (EXCEPT AS NOTED)		REVISIONS		CLIMATRONICS CORP.			
DECIMAL	±	NO.	DESCRIPTION	BY	PRECIP GAGE PART CONTROL DRAWING		
		A	ECN0420 REBORN	5-10-78 K. B. BAY	DRAWN BY <i>Robbins</i>	SCALE <i>NONE</i>	MATERIAL
		B			CHK'D	DATE <i>5-10-78</i>	DRAWING NO.
		C			TRACED	APP'D	B400621A
		D					
		E					

N/A 100508