



Tarfala Research Station automatic weather station, 2005

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1 Instrumentation

The TRS met station consisted of the following instruments during 2005

Sensor	Serial number	Remark
Pt100		in Stevenson screen
Pt100		in Young screen
T/Rh		at 2 m (Young screen) removed
Young Wind Monitor		at 3 m
LiCor Li-200SB pyranometer		at 2 m
Tipping bucket precipitation gauge		at 2 m
Ventilated T/Rh (broken/removed)		at 2 m
New vent HygroClip T/Rh		at 2 m
CR10 data logger		removed
CR10X-2M data logger		added

2 Notes on the station data

- The old CR-10 data logger was removed and replaced with a new CR10X-2M causing a gap from 2005-04-22 15:00:00 (JD 112 @1400 hrs) to 2005-04-24 16:00:00 (JD 114 @1600)
- Old ventilated Rh sensor appears malfunctioning. T sensor works but appears to malfunction later in spring.
- Due to a broken fan motor the ventilated T/Rh probe was removed from the station before 2005-04-28 18:00:00 (JD 118 1800 hrs).
- A new ventilated probe was installed on 2005-07-10 18:00:00 (JD 191 effective @1800 hrs).
- In conjunction with the addition of the new sensor, the program was modified and daily output variables increased.
- Reprogramming etc. produced a break in the data on JD 191 from 1000 to 1500hrs.
- New Rh sensor (vent) appears to malfunction in November/December

2005-04-22 15:00:00 2005-04-24 16:00:00

3 Data coverage

- General data gap:
2005-04-22 15:00:00 to 2005-04-24 17:00:00 (logger change)
2005-07-10 11:00:00 to 2005-07-10 14:00:00 (reprogramming)
- Relative humidity (ventilated) data missing from
2005-03-25 16:00:00 to 2005-03-25 18:00:00
2005-03-26 09:00:00 to 2005-03-26 16:00:00
2005-03-27 09:00:00 to 2005-03-27 17:00:00
2005-03-28 12:00:00 to 2005-03-29 09:00:00
2005-03-29 11:00:00 to 2005-03-29 20:00:00
2005-03-30 11:00:00
2005-03-30 13:00:00 to 2005-03-30 16:00:00
2005-03-31 12:00:00 to 2005-03-31 15:00:00
2005-04-01 14:00:00 to 2005-04-01 16:00:00
2005-04-02 11:00:00 to 2005-04-02 17:00:00
2005-04-17 17:00:00 to end of year (removed)
2005-04-24 17:00:00 to end of year (T young removed)

- Temperature (ventilated unless stated otherwise) data missing from
2005-03-25 10:00:00 to 2005-03-26 17:00:00
2005-03-27 09:00:00 to 2005-04-11 18:00:00
2005-04-12 11:00:00 to 2005-04-12 19:00:00
2005-04-13 08:00:00 to end of year (removed)
2005-04-24 17:00:00 to end of year (T young removed)

2005-04-25 00:00:00 to 2005-07-01 00:00:00

4 Notes on data storage

Example of hourly data until:

101,2005,185,1300,16.56,17.06,15.62,43.11,3.381,274.3,.026,437.8,0,0,0,5.566,1225

Column	Example data	Description
01:	101	ID
02:	2005	Year
03:	185	Day of Year
04:	1300	hour-minute (hhmm)
05:	16.56	2 Pt100 T in Stevenson screen)
06:	17.06	3 T in Young screen
07:	15.62	4 Pt100 in new Young screen
08:	43.11	5 Rh in Young screen
09:	3.381	6 Mean horizontal wind speed
10:	274.3	7 resultant mean wind direction
11:	.026	8 Standard deviation of wind direction
12:	437.8	9 Global radiation
13:	0	10 Precipitation/SR50
14:	0	11 ventilated T
15:	0	12 ventilated Rh
16:	5.566	13 hourly max wind speed
17:	1225	14 time for max wind speed

Example of hourly data after:

101,2005,191,1600,11.03,11.34,10.33,83.3,3.779,337.2,.035,86.6,0,0,0,12.49,1540,
10.77,11.06,9.99,85,10.76,1505,9.96,1547

Column	Example data	Description
01:	101	ID
02:	2005	Year
03:	191	Day of Year
04:	1600	hour-minute (hhmm)
05:	11.03	2 Pt100 T in Stevenson screen)
06:	11.34	3 Pt100 in new Young screen
07:	10.33	4 Ventilated T
08:	83.3	5 Ventilated T
09:	3.779	6 Mean horizontal wind speed
10:	337.1	7 resultant mean wind direction
11:	.035	8 Standard deviation of wind direction
12:	86.6	9 Global radiation
13:	0	10 Precipitation/SR50
14:	0	11 Not used
15:	0	12 Not used
16:	12.49	13 hourly max wind speed
17:	1540	14 time for max wind speed
18:	10.77	15 Sample T Stevenson
19:	11.06	16 Sample T Young
20:	9.99	17 Sample ventilated T
21:	85	18 Sample ventilated Rh
22:	10.76	19 Max T
23:	1505	20 time for max T
24:	9.96	21 Min T
25:	1547	22 time for min T

Example of daily data summaries:
124,2005,185,2400,13.57,14.13,12.83,50.29,19.44,1315,8.17,416,5.821,1832,2.804,316,
202.1,0,13.9,0,0

Column	Example data	Description
01:	124	ID
02:	2005	Year
03:	185	Day of Year
04:	2400	hour-minute (hhmm)
05:	13.57	2 Daily average T in Stevenson screen)
06:	14.13	3 Daily T from T/Rh in Young screen
07:	12.83	4 Daily T from T/Rh in Young screen/ventilated
08:	50.29	5 daily average Rh in Young screen/ventilated
08:	19.44	6 Daily maximum temperature in Young screen
10:	1315	7 hhmm for maximum daily temperature
11:	8.17	8 Daily minimum temperature in Young screen
12:	416	9 hhmm for minimum daily temperature
13:	5.821	10 Maximum wind speed
14:	1832	11 hhmm for maximum wind speed
15:	2.804	12 Average wind speed
16:	316	13 Average wind direction
17:	202.1	14 Incoming radiation
18:	0	15 Totalized precipitation
19:	13.9	16 Battery voltage
20:	0	17 Average ventilated T/Not used
21:	0	18 Average ventilated Rh/not used

Example of 'Synoptic' output:
103,2005,185,1300,18.79

Column	Example data	Description
01:	103	ID
02:	2005	Year
03:	185	Day of Year
04:	1300	hour-minute (hhmm)
05:	18.79	Pt100 in Young screen

5 Data files and content

TRSmets2005.csv Raw data file

TRS_met_2005_Precipitation.csv

Date-time, Precipitation

2005-01-01 01:00:00,0.00

TRS_met_2005_Radiation.csv

Date-time, Global radiation

2005-01-01 01:00:00,3.85

TRS_met_2005_Relative_humidity.csv

Date-time, hourly average Rh/new vent Rh, old ventilated Rh, sample new ventilated Rh

2005-01-01 01:00:00,63.1,0.0

2005-09-17 09:00:00,67.0,0.0,68.1

TRS_met_2005_Temperature.csv

Date-time, hourly average T (Stevenson), hourly average T (Young), hourly average T/Rh (Young)/new vent T/Rh, old ventilated T/Rh, sample T (Stevenson), Sample T (Young), sample T vent, max T vent, time for max T vent, min T vent, time for min T vent

2005-01-01 01:00:00,-5.95,-5.73,-5.34,-5.88,0.00,0.00,0.00,0.00,0,0.00,0

2005-12-31 23:00:00,-12.45,-10.74,-11.62,0.00,-13.75,-12.44,-13.39,-8.26,2209,-14.86,2249

TRS_met_2005_Wind.csv

Date-time, Mean horizontal wind speed, resultant mean wind direction, hourly max wind speed, time of max wind spd

2005-01-01 01:00:00,3.8,50.3,0.1450,8.20,1

TRS_met_2005_Daily_data.csv

Data columns follows description above

2005-01-02 00:00:00,-4.59,-4.33,-3.65,61.8,-2.30,927,-8.51,2344,16.2,334,4.3,4.6,3.2,0.0,13.93

TRS_met_2005_Synop_data.csv

Date-time, sample temperature

2005-01-01 01:00:00,-5.95

The data collected during 2005 is summarized the figure 1 and Table 1.

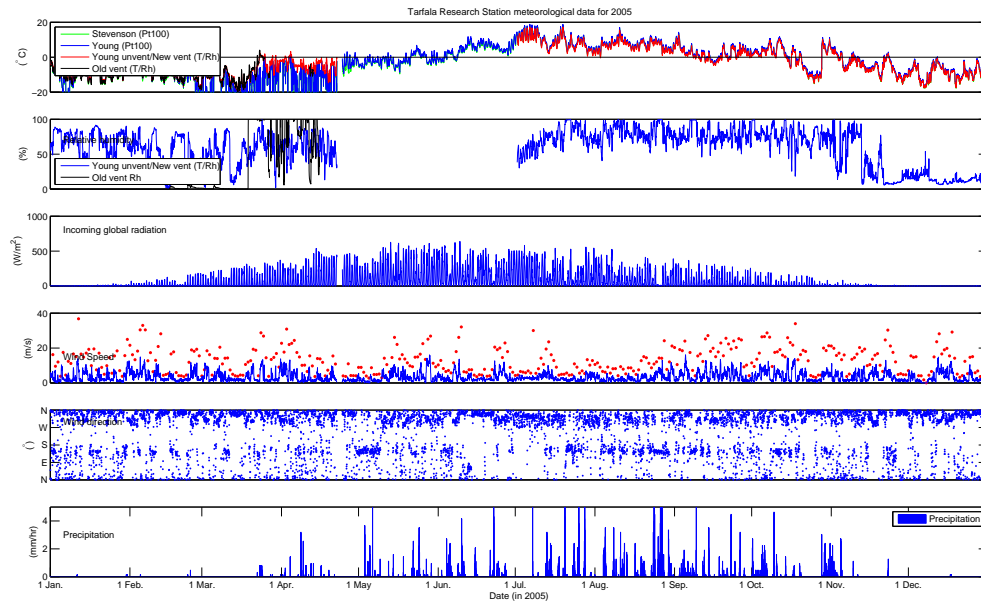


Figure. 1. Summary of meteorological data from Tarfala Research Station automatic weather station 2005.

Table. 1. Monthly averages of meteorological parameters from the Tarfala Research Station automatic weather station 2005.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average air temperature (Stevenson)												
(°C)	−10.4	−9.7	−20.6	−10.7	−2.1	4.1	9.4	7.1	2.3	0.1	−4.5	−9.4
<i>n</i>	743	671	767	693	743	743	739	767	743	767	743	767
Average air temperature (Young)												
(°C)	−10.0	−9.1	−20.1	−10.2	−1.6	4.7	9.8	7.6	2.7	0.7	−3.9	−8.8
<i>n</i>	743	671	767	693	743	743	739	767	743	767	743	767
Average air temperature												
(°C)	−8.7	−8.4	—	−4.6	—	—	8.7	6.5	1.7	−0.3	−4.8	−9.6
<i>n</i>	743	671	767	—	—	—	722	767	743	767	743	767
Positive degree sum												
(°C)	0	0	38	34	—	—	—	4968	1684	1869	376	0
<i>n</i>	0	0	50	35	—	—	—	765	508	479	137	0
Average relative humidity												
(%)	68.9	52.9	51.8	61.7	—	—	71.7	80.6	77.4	75.8	39.3	13.9
<i>n</i>	743	671	767	542	—	—	722	767	743	767	743	767
Average incoming global radiation												
(W m ^{−2})	2.1	13.6	56.2	113.4	155.9	158.1	133.5	79.6	50.8	19.5	2.5	0.3
<i>n</i>	743	671	767	693	743	743	739	767	743	767	743	767
Global incoming energy sum												
(W m ^{−2})	1588	9109	43130	—	115811	117457	—	61055	37777	14962	1854	229
<i>n</i>	666	591	700	—	728	743	—	731	661	656	459	337
Totalized precipitation												
(mm)	0.48	1.12	8.16	26.40	60.00	95.52	129.44	232.00	90.56	98.88	36.96	0.32
<i>n</i>	743	671	767	694	743	743	739	767	743	767	743	767
Average wind speed												
(m s ^{−1})	3.3	4.1	3.4	3.1	3.4	3.3	2.9	3.0	4.3	4.2	3.4	3.1
<i>n</i>	743	671	767	694	743	743	739	767	743	767	743	767

Logger program

5.1 Program valid until 2005-07-10 15:00:00 (copy from 2001–2004)

```

;{CR10}
*Table 1 Program
  01: 10.0000   Execution Interval (seconds)

;-----
; B A T T E R Y   voltage
;-----
; Measure battery voltage and skip to end of program
; if voltage is < 1.71.5 V
1:  Batt Voltage (P10)
  1: 10      Loc [ Battery   ]

2:  If (X<=>F) (P89)
  1: 10      X Loc [ Battery   ]
  2: 4       <
  3: 9.7     F
  4: 0       Go to end of Program Table

;-----
; T E M P E R A T U R E   measurements
;-----
;
3:  3W Half Bridge (P7)
  1: 1       Reps
  2: 33      25 mV 50 Hz Rejection Range
  3: 1       SE Channel
  4: 2       Excite all reps w/Exchan 2
  5: 2100    mV Excitation
  6: 21      Loc [ _____ ]
  7: 100.1   Mult
  8: 0       Offset

4:  3W Half Bridge (P7)
  1: 1       Reps
  2: 33      25 mV 50 Hz Rejection Range
  3: 3       SE Channel
  4: 2       Excite all reps w/Exchan 2
  5: 2100    mV Excitation
  6: 22      Loc [ _____ ]
  7: 100.2   Mult
  8: 0       Offset

5:  Temperature RTD (P16)
  1: 2       Reps
  2: 21      R/R0 Loc [ _____ ]
  3: 1       Loc [ _____ ]
  4: 1       Mult
  5: 0       Offset

6:  Do (P86)
  1: 41      Set Port 1 High

7:  Volt (Diff) (P2)
  1: 1       Reps
  2: 35      2500 mV 50 Hz Rejection Range
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3: 3      DIFF Channel
4: 3      Loc [ _____ ]
5: .1     Mult
6: 0      Offset

8: Volt (SE) (P1)
1: 1      Reps
2: 35     2500 mV 50 Hz Rejection Range
3: 7      SE Channel
4: 4      Loc [ _____ ]
5: .1     Mult
6: 0      Offset

9: 3W Half Bridge (P7)
1: 1      Reps
2: 33     25 mV 50 Hz Rejection Range
3: 11     SE Channel
4: 3      Excite all reps w/Exchan 3
5: 2100   mV Excitation
6: 23     Loc [ _____ ]
7: 100    Mult
8: 0      Offset

10: Temperature RTD (P16)
1: 1      Reps
2: 23     R/R0 Loc [ _____ ]
3: 11     Loc [ _____ ]
4: 1      Mult
5: 0      Offset

11: Volt (SE) (P1)
1: 1      Reps
2: 35     2500 mV 50 Hz Rejection Range
3: 8      SE Channel
4: 12     Loc [ _____ ]
5: .1     Mult
6: 0      Offset

;-----
; P R E C I P I T A T I O N measurement
;-----
; Measure calcibrated tipping bucket. 0.16 mm/pulse
12: Pulse (P3)
1: 1      Reps
2: 1      Pulse Input Channel
3: 21     Low Level AC, Output Hz
4: 5      Loc [ _____ ]
5: .098   Mult
6: 0      Offset

13: Excite-Delay (SE) (P4)
1: 1      Reps
2: 5      2500 mV Slow Range
3: 9      SE Channel
4: 1      Excite all reps w/Exchan 1
5: 2      Delay (0.01 sec units)
6: 2500   mV Excitation
7: 6      Loc [ _____ ]

```

```

8: .142      Mult
9: -135      Offset

14: If (X<=>F) (P89)
  1: 6        X Loc [ _____ ]
  2: 4        <
  3: 0        F
  4: 30       Then Do

15: Z=X+F (P34)
  1: 6        X Loc [ _____ ]
  2: 360      F
  3: 6        Z Loc [ _____ ]

16: End (P95)

17: Volt (SE) (P1)
  1: 1        Reps
  2: 33       25 mV 50 Hz Rejection Range
  3: 10       SE Channel
  4: 7        Loc [ _____ ]
  5: 116.55   Mult
  6: 0        Offset

18: Pulse (P3)
  1: 1        Reps
  2: 2        Pulse Input Channel
  3: 2        Switch Closure, All Counts
  4: 8        Loc [ _____ ]
  5: .16      Mult
  6: 0        Offset

19: Internal Temperature (P17)
  1: 9        Loc [ _____ ]

;-----
; O U T P U T 1 hr means
;-----

20: If time is (P92)
  1: 0        Minutes (Seconds --) into a
  2: 60       Interval (same units as above)
  3: 10       Set Output Flag High

; Create special ID
21: Set Active Storage Area (P80)
  1: 1        Final Storage Area 1
  2: 101      Array ID

22: Real Time (P77)
  1: 1220     Year,Day,Hour/Minute (midnight = 2400)

23: Average (P71)
  1: 4        Reps
  2: 1        Loc [ _____ ]

24: Wind Vector (P69)

```

```

1: 1      Reps
2: 1      Samples per Sub-Interval
3: 0      S, theta(1), sigma(theta(1)) with polar sensor
4: 5      Wind Speed/East Loc [ _____ ]
5: 6      Wind Direction/North Loc [ _____ ]

25: Average (P71)
1: 1      Reps
2: 7      Loc [ _____ ]

26: Totalize (P72)
1: 1      Reps
2: 8      Loc [ _____ ]

27: Average (P71)
1: 2      Reps
2: 11     Loc [ _____ ]

28: Maximum (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 5      Loc [ _____ ]

29: Serial Out (P96)
1: 71     Storage Module

;-----
; O U T P U T  24 hr means
;-----

30: If time is (P92)
1: 0      Minutes (Seconds --) into a
2: 1440   Interval (same units as above)
3: 10     Set Output Flag High

31: Set Active Storage Area (P80)
1: 1      Final Storage Area 1
2: 124    Array ID

32: Real Time (P77)
1: 1220   Year,Day,Hour/Minute (midnight = 2400)

33: Average (P71)
1: 4      Reps
2: 1      Loc [ _____ ]

34: Maximum (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 2      Loc [ _____ ]

35: Minimum (P74)
1: 1      Reps
2: 10     Value with Hr-Min
3: 2      Loc [ _____ ]

36: Maximum (P73)
1: 1      Reps
2: 10     Value with Hr-Min

```

```

3: 5      Loc [ _____ ]

37: Wind Vector (P69)
1: 1      Reps
2: 1      Samples per Sub-Interval
3: 1      S, theta(1) with polar sensor
4: 5      Wind Speed/East Loc [ _____ ]
5: 6      Wind Direction/North Loc [ _____ ]

38: Average (P71)
1: 1      Reps
2: 7      Loc [ _____ ]

39: Totalize (P72)
1: 1      Reps
2: 8      Loc [ _____ ]

40: Sample (P70)
1: 1      Reps
2: 10     Loc [ Battery   ]

41: Average (P71)
1: 2      Reps
2: 11     Loc [ _____ ]

42: Serial Out (P96)
1: 71     Storage Module

;-----
;O U T P U T 3 hour (synoptic standard) data
;-----
; Data at 0100
43: If time is (P92)
1: 60     Minutes (Seconds --) into a
2: 180    Interval (same units as above)
3: 10     Set Output Flag High

44: Set Active Storage Area (P80)
1: 1      Final Storage Area 1
2: 103    Array ID

45: Real Time (P77)
1: 1220   Year,Day,Hour/Minute (midnight = 2400)

46: Sample (P70)
1: 1      Reps
2: 2      Loc [ _____ ]

*Table 2 Program
01: 0.0000 Execution Interval (seconds)

*Table 3 Subroutines

End Program

1      [ _____ ] RW-- 2      1      Start ----- ---
2      [ _____ ] RW-- 5      1      ----- End
3      [ _____ ] RW-- 2      1      ----- ---

```

4	[_____]	RW--	2	1	-----	-----	---
5	[_____]	RW--	4	1	-----	-----	---
6	[_____]	RW--	4	2	-----	-----	---
7	[_____]	RW--	2	1	-----	-----	---
8	[_____]	RW--	2	1	-----	-----	---
9	[_____]	-W--	0	1	-----	-----	---
10	[Battery]	RW--	2	1	-----	-----	---
11	[_____]	RW--	2	1	-----	-----	---
12	[_____]	RW--	2	1	-----	-----	---
13	[_____]	----	0	0	-----	-----	---
14	[_____]	----	0	0	-----	-----	---
15	[_____]	----	0	0	-----	-----	---
16	[_____]	----	0	0	-----	-----	---
17	[_____]	----	0	0	-----	-----	---
18	[_____]	----	0	0	-----	-----	---
19	[_____]	----	0	0	-----	-----	---
20	[_____]	----	0	0	-----	-----	---
21	[_____]	RW--	1	1	-----	-----	---
22	[_____]	RW--	1	1	-----	-----	---
23	[_____]	RW--	1	1	-----	-----	---

5.2 Program valid after reprogramming 2005-07-10 15:00:00 (new vent T/Rh and output)

```

;{CR10X}
*Table 1 Program
  01: 10.0000   Execution Interval (seconds)

;-----
; Check battery voltage
; and stop execution if lower than 9.7V
1:  Batt Voltage (P10)
  1: 10      Loc [ Battery  ]

2:  If (X<=>F) (P89)
  1: 10      X Loc [ Battery  ]
  2: 4       <
  3: 9.7     F
  4: 0       Go to end of Program Table

;-----
; A I R   T E M P E R A T U R E
; Measure R/R0 for old met cage Rt100
3:  3W Half Bridge (P7)
  1: 1       Reps
  2: 33      25 mV 50 Hz Rejection Range
  3: 1       SE Channel
  4: 2       Excite all reps w/Exchan 2
  5: 2100    mV Excitation
  6: 21      Loc [ R_R0_T_1  ]
  7: 100.1   Mult
  8: 0       Offset

; Meaasure R/R0 for Young screen Rt100
4:  3W Half Bridge (P7)
  1: 1       Reps
  2: 33      25 mV 50 Hz Rejection Range
  3: 3       SE Channel
  4: 2       Excite all reps w/Exchan 2

```

```

5: 2100      mV Excitation
6: 22      Loc [ R_R0_T_2  ]
7: 100.2    Mult
8: 0       Offset

; Calculate T for both Rt100
5: Temperature RTD (P16)
1: 2       Reps
2: 21      R/R0 Loc [ R_R0_T_1  ]
3: 1       Loc [ T_1      ]
4: 1       Mult
5: 0       Offset

;-----
; V E N T I L A T E D T & Rh
; Measure temperature from ventilated
; HygroClip sensor
6: Volt (Diff) (P2)
1: 1       Reps
2: 35      2500 mV 50 Hz Rejection Range
3: 3       DIFF Channel
4: 3       Loc [ T_vent    ]
5: .1      Mult
6: -40     Offset

; Measure humidity from ventilated
; HygroClip sensor
7: Volt (Diff) (P2)
1: 1       Reps
2: 35      2500 mV 50 Hz Rejection Range
3: 4       DIFF Channel
4: 4       Loc [ rH_vent   ]
5: .1      Mult
6: 0.0     Offset

;-----
; W I N D
; Measure wind speed on Young Wind Monitor
8: Pulse (P3)
1: 1       Reps
2: 1       Pulse Channel 1
3: 21      Low Level AC, Output Hz
4: 5       Loc [ Wind_spd  ]
5: .098    Mult
6: 0       Offset

; Measure wind direction on Young Wind Monitor
9: Excite-Delay (SE) (P4)
1: 1       Reps
2: 5       2500 mV Slow Range
3: 9       SE Channel
4: 1       Excite all reps w/Exchan 1
5: 2       Delay (0.01 sec units)
6: 2500    mV Excitation
7: 6       Loc [ Wind_dir  ]
8: .142    Mult
9: -135    Offset

```

```

; Make corrections to wind direction
10: If (X<=>F) (P89)
  1: 6      X Loc [ Wind_dir ]
  2: 4      <
  3: 0      F
  4: 30     Then Do

11: Z=X+F (P34)
  1: 6      X Loc [ Wind_dir ]
  2: 360    F
  3: 6      Z Loc [ Wind_dir ]

12: End (P95)

;-----
; G L O B A L   R A D I A T I O N
; Measure Li200s Pyranometer
13: Volt (SE) (P1)
  1: 1      Reps
  2: 33     25 mV 50 Hz Rejection Range
  3: 10     SE Channel
  4: 7      Loc [ Li200S   ]
  5: 116.55 Mult
  6: 0      Offset

;-----
; P R E C I P I T A T I O N
; Measure tipping bucket rain gauge
14: Pulse (P3)
  1: 1      Reps
  2: 2      Pulse Channel 2
  3: 2      Switch Closure, All Counts
  4: 8      Loc [ Precip   ]
  5: .16    Mult
  6: 0      Offset

;-----
; I N T E R N A L   T E M P E R A T U R E
15: Internal Temperature (P17)
  1: 9      Loc [ T_int    ]

;-----
; H O U R L Y   O U T P U T
16: If time is (P92)
  1: 0      Minutes (Seconds --) into a
  2: 60     Interval (same units as above)
  3: 10     Set Output Flag High (Flag 0)

17: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 101    Array ID

18: Real Time (P77)
  1: 1220   Year,Day,Hour/Minute (midnight = 2400)

; Store average unvent and vent T and Rh
19: Average (P71)
  1: 4      Reps

```

```

2: 1      Loc [ T_1      ]

; Store wind speed, dir and std dev
20: Wind Vector (P69)
1: 1      Reps
2: 1      Samples per Sub-Interval
3: 0      S, theta(1), sigma(theta(1)) with polar sensor
4: 5      Wind Speed/East Loc [ Wind_spd  ]
5: 6      Wind Direction/North Loc [ Wind_dir ]

; Store average global rad
21: Average (P71)
1: 1      Reps
2: 7      Loc [ Li200S   ]

; Store hourly precipitation
22: Totalize (P72)
1: 1      Reps
2: 8      Loc [ Precip   ]

; no data
23: Average (P71)
1: 2      Reps
2: 11     Loc [ _____ ]

; Store maximum wind speed during last hour
24: Maximum (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 5      Loc [ Wind_spd  ]

; Store transient unvent and vent T and Rh
25: Sample (P70)
1: 4      Reps
2: 1      Loc [ T_1      ]

; Store max vent T
26: Maximum (P73)
1: 1      Reps
2: 10     Value with Hr-Min
3: 3      Loc [ T_vent    ]

; Store min vent T
27: Minimum (P74)
1: 1      Reps
2: 10     Value with Hr-Min
3: 3      Loc [ T_vent    ]

; Write to card
28: Serial Out (P96)
1: 71     Storage Module

;-----
; D A I L Y   O U T P U T
29: If time is (P92)
1: 0      Minutes (Seconds --) into a
2: 1440   Interval (same units as above)
3: 10     Set Output Flag High (Flag 0)

```



```

30: Set Active Storage Area (P80)
  1: 1      Final Storage Area 1
  2: 124    Array ID

31: Real Time (P77)
  1: 1220   Year,Day,Hour/Minute (midnight = 2400)

; Store daily average unvent and vent T & Rh
32: Average (P71)
  1: 4      Reps
  2: 1      Loc [ T_1      ]

; Store daily max unvent T
33: Maximum (P73)
  1: 1      Reps
  2: 10     Value with Hr-Min
  3: 2      Loc [ T_2      ]

; Store daily min unvent T
34: Minimum (P74)
  1: 1      Reps
  2: 10     Value with Hr-Min
  3: 2      Loc [ T_2      ]

; Store daily max wind speed
35: Maximum (P73)
  1: 1      Reps
  2: 10     Value with Hr-Min
  3: 5      Loc [ Wind_spd  ]

; Store average wind vector
36: Wind Vector (P69)
  1: 1      Reps
  2: 1      Samples per Sub-Interval
  3: 1      S, theta(1) with polar sensor
  4: 5      Wind Speed/East Loc [ Wind_spd  ]
  5: 6      Wind Direction/North Loc [ Wind_dir  ]

; Store daily avg global radioation
37: Average (P71)
  1: 1      Reps
  2: 7      Loc [ Li200S    ]

; Store daily precipitation
38: Totalize (P72)
  1: 1      Reps
  2: 8      Loc [ Precip    ]

; Store sample of battery voltage
39: Sample (P70)
  1: 1      Reps
  2: 10     Loc [ Battery   ]

; no data
40: Average (P71)
  1: 2      Reps
  2: 11     Loc [ _____ ]

```

```

; Write to card
41:  Serial Out (P96)
    1: 71      Storage Module

;-----
; S Y N O P T I C   O U T P U T
; transient T data is stored every 3 hrs
; according to synoptic standards.
42:  If time is (P92)
    1: 60      Minutes (Seconds --) into a
    2: 1440    Interval (same units as above)
    3: 10      Set Output Flag High (Flag 0)

43:  Set Active Storage Area (P80)
    1: 1       Final Storage Area 1
    2: 103     Array ID

44:  Real Time (P77)
    1: 1220    Year,Day,Hour/Minute (midnight = 2400)

45:  Sample (P70)
    1: 1       Reps
    2: 2       Loc [ T_2      ]

46:  If time is (P92)
    1: 240     Minutes (Seconds --) into a
    2: 1440    Interval (same units as above)
    3: 10      Set Output Flag High (Flag 0)

47:  Set Active Storage Area (P80)
    1: 1       Final Storage Area 1
    2: 103     Array ID

48:  Real Time (P77)
    1: 1220    Year,Day,Hour/Minute (midnight = 2400)

49:  Sample (P70)
    1: 1       Reps
    2: 2       Loc [ T_2      ]

50:  If time is (P92)
    1: 420     Minutes (Seconds --) into a
    2: 1440    Interval (same units as above)
    3: 10      Set Output Flag High (Flag 0)

51:  Set Active Storage Area (P80)
    1: 1       Final Storage Area 1
    2: 103     Array ID

52:  Real Time (P77)
    1: 1220    Year,Day,Hour/Minute (midnight = 2400)

53:  Sample (P70)
    1: 1       Reps
    2: 2       Loc [ T_2      ]

54:  If time is (P92)

```

```

1: 600      Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High (Flag 0)

55: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

56: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

57: Sample (P70)
1: 1        Reps
2: 2        Loc [ T_2      ]

58: If time is (P92)
1: 780      Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High (Flag 0)

59: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

60: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

61: Sample (P70)
1: 1        Reps
2: 2        Loc [ T_2      ]

62: If time is (P92)
1: 960      Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High (Flag 0)

63: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

64: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

65: Sample (P70)
1: 1        Reps
2: 2        Loc [ T_2      ]

66: If time is (P92)
1: 1140     Minutes (Seconds --) into a
2: 1440     Interval (same units as above)
3: 10       Set Output Flag High (Flag 0)

67: Set Active Storage Area (P80)
1: 1        Final Storage Area 1
2: 103      Array ID

68: Real Time (P77)
1: 1220     Year,Day,Hour/Minute (midnight = 2400)

```

```

69: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T_2      ]

70: If time is (P92)
   1: 1320    Minutes (Seconds --) into a
   2: 1440    Interval (same units as above)
   3: 10      Set Output Flag High (Flag 0)

71: Set Active Storage Area (P80)
   1: 1      Final Storage Area 1
   2: 103     Array ID

72: Real Time (P77)
   1: 1220    Year,Day,Hour/Minute (midnight = 2400)

73: Sample (P70)
   1: 1      Reps
   2: 2      Loc [ T_2      ]

```

```

*Table 2 Program
  01: 0.0000    Execution Interval (seconds)

```

```

*Table 3 Subroutines

```

```

End Program

```

1	[T_1]	RW--	3	1	Start	-----	---
2	[T_2]	RW--	13	1	-----	-----	End
3	[T_vent]	RW--	5	1	-----	-----	---
4	[rH_vent]	RW--	3	1	-----	-----	---
5	[Wind_spd]	RW--	4	1	-----	-----	---
6	[Wind_dir]	RW--	4	2	-----	-----	---
7	[Li200S]	RW--	2	1	-----	-----	---
8	[Precip]	RW--	2	1	-----	-----	---
9	[T_int]	-W--	0	1	-----	-----	---
10	[Battery]	RW--	2	1	-----	-----	---
11	[-----]	R---	2	0	-----	-----	---
12	[-----]	R---	2	0	-----	-----	---
13	[-----]	----	0	0	-----	-----	---
14	[-----]	----	0	0	-----	-----	---
15	[-----]	----	0	0	-----	-----	---
16	[-----]	----	0	0	-----	-----	---
17	[-----]	----	0	0	-----	-----	---
18	[-----]	----	0	0	-----	-----	---
19	[-----]	----	0	0	-----	-----	---
20	[-----]	----	0	0	-----	-----	---
21	[R_RO_T_1]	RW--	1	1	-----	-----	---
22	[R_RO_T_2]	RW--	1	1	-----	-----	---