Factual Report – Attachment 6

Email and phone dialogue with the FWB AWOS technician and the All Weather Inc. AWOS Maintenance Manual 907-027.

METEOROLOGY

DCA18MM028

Submitted by: Mike Richards
NTSB, AS-30

Richards Michael

From: Tom Nichols RSI [redacted]@remotesys.com>
Sent: Tuesday, August 7, 2018 12:52 PM
To: Richards Michael [redacted]@ntsb.gov>
Subject: Re[8]: FWB wx observations

I have accessed the printer archives from the KFWB Branson West AWOS. Even though they don't use the printer any more, it was configured to print every 1 minute, so I was able to retrieve the 1-minute observations. The document is attached.

I also checked the maintenance logs. There were no errors or alarms during the period. The AWOS was working normally with all sensors reporting. There were no power failures.

HOWEVER - and I'm sure this will be important - the old AWOS system clocks have a tendency to drift. **The KFWB clock was 11 minutes slow. Therefore, you will need to add 11 minutes to every observation time to get the correct time of the recorded conditions.

The format is a little different from the METAR output, so I have used the observation with the highest sustained winds to provide you with a short lesson on what this is telling you:

KFWB 200 2345 360/ 31G 49 8 VCTS FEW055 FEW120 29/ 21 61
2996 3200 340V 40 434 W-NE

KFWB - Site ID
200 - Julian Date (200th day of the year is 7/19)
2345 Time in Zulu - ACTUAL TIME WOULD BE 2356!

360 / 31G 49 Winds 360 degrees (North) at a two minute average of 31 Knots with gusts to 49 knots
8 Visibility 8 statute miles

VCTS Thunderstorm in the vicinity

FEW055 FEW120 Few clouds at 5500 feet 2nd layer few clouds at 12000 feet . No 3rd layer

29/21 Temperature and Dew point in C
61 Relative Humidity in percent

2996 Altimeter setting 29.96 inches of mercury

3200 Density altitude 3200 feet

340 V 40 - Winds were variable from 340 degrees through 40 degrees

434 Incremental rain counter 1/100 of an inch. Using this, the onset of the rain seems to have been at 0013 at the airport

W-NE Lightning detected west through Northeast.

If you have any more questions, let me know.

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted]com

Richards Michael

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Tuesday, August 7, 2018 1:45 PM
To: Richards Michael <[redacted]@ntsb.gov>
Subject: Re[10]: FWB wx observations

Here are your answers but feel free to call me. I'm waiting on a conference call so if you get voice mail leave me your number. 800-[redacted]

1. You indicate that the AWOS clock was slow by 11 minutes, and 11 minutes need to be added to the time of the reports to be accurate. It appears that in the 5-min data (screen captures I sent) also have the same time, and 11 minutes would need to be added to that too, correct?

Correct. Any time stamp generated by the AWOS would need the correction.

2. This is very important. It looks like the publicly disseminated METAR for 2355Z…

```
KFWB 192355Z AUTO 35027G45KT 7SM TS SCT055 BKN065 27/17 A3000 RMK AO2 LTG DSNT ALQDS
```

…reports conditions that were retrieved by the AWOS at AWOS-clock time of 2355Z…

```
KFWB 200 2355 350/ 27G 45 7      TS        SCT055 BKN065     27/ 17  55 3000  2900            434 DALQDS
```

…which means the METAR time was also off by 11 minutes. Does this mean that the 2355 METAR would not have been disseminated publicly until about 0006 (11 minutes later)? Any information about when this METAR would have been publicly available? How does this dissemination work with local AWOS-clock time?

Yes. The 2355 METAR would have been sent at 0006. The METARS generated by the AWOS are not altered in any way by the dessimination system That is an FAA rule. It usually takes 10-70 seconds for the dessimination system to send to the FAA, and 3-5 minutes for a METAR to be published after the FAA receives it. However, it also means the 2335 METAR would have been sent at 2346.

3. Were you able to determine if this is a SPECI-capable AWOS and if so, what criteria there is for issuing a SPECI?

This is not a SPECI capable AWOS

4. Were you able to determine why a 2335Z METAR was not disseminated?

Partially. The :35, :45, and :55 reports were not received by the dessimination ingest system from the site. The system uses a cellular modem. I suspect but cannot prove that either the cell site dropped the link during the storm or that there was a quick power glitch that reset the cellular device but did not affect the AWOS...but that's just a theory.

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted].com

Richards Michael

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Tuesday, August 7, 2018 5:14 PM
To: Richards Michael <[redacted]@ntsb.gov>
Subject: Re[10]: FWB wx observations

My WMSCR system also logs all transmitted data. The batch containing the KFWB 2355 observation was transmitted at 0004Z to the WMSCR gateway. You can see there were other sites with incorrect clocks included in the batch, both fast and slow. This wasn't the last batch to include 2355 reports from other sites.

####
SAUS27 RSYS 200004
METAR KS32 200015Z AUTO 17006KT 10SM CLR 23/21 A2982 RMK AO2=
METAR KBXK 192355Z AUTO 23010G16KT 10SM CLR 40/17 A2979 RMK AO1 =
METAR KM25 200015Z AUTO 00000KT 10SM SCT055 29/24 A2988 RMK AO2
PWINO=
METAR KFWB 192355Z AUTO 35027G45KT 7SM TS SCT055 BKN065 27/17 A3000
RMK AO2 LTG DSNT ALQDS =
5f46936dd41a5e1bc5306cca4e093be6

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted].com

Richards Michael

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Wednesday, August 8, 2018 10:52 AM
To: Richards Michael <[redacted]@ntsb.gov>
Subject: Re[12]: FWB wx observations

- Do you have other transmission logs you can provide?

Yes.

- So if the system logs and has capability to transmit every minute, it looks like S32 and M25 had clocks that were 11 minutes fast and transmitted data 11 minutes "early" (transmitted at observation time but with a timestamp that was 11 minutes off and 11 minutes prior to when an observation should have been transmitted). BXK and FWB had clocks that were 9 minutes slow and transmitted data 9 minutes "late" (transmitted at observation time but with a timestamp that was 9 minutes off and 9 minutes later than when an observation should have been transmitted). Is this the right way to explain it?

That sounds about right. A system with a clock 10 minutes slow would transmit the observation time stamped 2355 when its system clock reached 2355, but the actual time would be 0005.

- It seems as though an AWOS decides when to transmit and observation according to its internal clock (send to WMSCR at 0015, 0035, 0055, etc…). Correct?

Yes.

- When you compare the AWOS time to "truth" (when you fix the clock) what source for the accurate time are you using?

My Remote Maintenance and Monitoring computer here at the office uses a program called NTP monitor which syncs the system clock on my local machine to an average of several different time servers. When setting the AWOS clock, I simply sync it to my local machine. The SAUS time stamp (the 0004) in the batch file comes from our datacenter, which is synced to a Stratum 1 time server on-site.

- We are going to need to document this well. I may need to sit down with you at some point in the near future. We could do this by phone or I may be in Branson week after next for some interviews (I don't know where you are physically located and if there is something to lay eyes on that would help in documenting this).

Branson, Branson West and some other sites in Camden are all due for periodic inspections. I can schedule them the week of the 20th if you like. You can see an actual AWOS.

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted].com

Richards Michael

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Monday, August 20, 2018 11:25 AM
To: Richards Michael
Subject: Re[2]: follow up items
Attachments: T_SAUS27_C_RSYS_20180820142151.txt; T_SAUS27_C_RSYS_20180820142003.txt; T_SAUS27_C_RSYS_20180820142819.txt; AC_150_5220-16E.pdf; AWOS-900-Maintenance-Manual1.pdf

There are 5 attachments in this e-mail. Let me know if you have any issues with any of them.

I was thinking about our conversations over the past few weeks, and your concerns about the data timeliness and such. Understand that the NWS is only a secondary beneficiary of this data. It is intended for pilots. So, the 20 minute interval is quite adequate for en route planning, since the pilots can receive the 1-minute reports directly over the radio within 20 miles or so of the airport to make real-time landing decisions. So I don't think you're going to get much enthusiasm for shortening the interval of the reports because it needs the aviation community's needs, and WMSCR has always been concerned about capacity.

However...We have the capability to transport real-time streaming data to anyone who wants it. We currently stream to airportview.net, an aviation web site. They post both the real-time and the official 20 minute reports on their website. We also stream to Iowa DOT and Missouri DOT.

When this service was first developed, about 8 years ago, I approached a few NWS offices to see if they wanted the real-time feed. No one was interested. It would require the NWS office to set up a dedicated server, so I'm sure it was funding.

In any case, it is an FAA mandate that any weather coming from any source other than through WMSCR cannot be used for flight operations. The streaming data is sent over the public Internet and thus you will see disclaimers that it is not to be used for flight. This is true with other non-wmscr data as well.

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted]com

------ Original Message ------
From: "Richards Michael" <[redacted]@ntsb.gov>
To: "Tom Nichols RSI" <[redacted]@remotesys.com>

Cc: "Kelsey Angle - NOAA Federal" <[redacted]@noaa.gov>; "Richards Michael" <[redacted]@ntsb.gov>
Sent: 8/15/2018 01:39:31 PM
Subject: RE: follow up items

Tom, my apologies, I forgot one follow-up question we did not discuss, I have included it as #9 below. Thank you, Mike

1. A copy of the maintenance manual for the FWB AWOS

2. The AWOS manual for the type at FWB (if different from #1 above) - Attached, They are the same

3. The relevant FAA pubs (maybe Advisory Circulars) that speak to maintenance of these systems - Attached

4. How far have you seen these clocks drift before? You indicated you could peruse your data. - A quick look shows a few at 14-17 minutes

5. Can you provide additional SAUS messages that identify clock drift in the AWOSs. - Three attached. You will see that they also drift forward, causing a timestamp in the future.

6. When was the last time the FWB AWOS clock was resynched prior to July 19, 2018? - That will have to wait until I can look at the site logs

7. On the OMO data, is the second to last parameter variable wind (variable between 300 true and 020 true)? That is correct.

KFWB 200 2347 340/ 27G 49 8 VCTS FEW055 SCT120 29/ 19 54
2997 3200 310V 20 434 DW-NE -

8. Using the same OMO example above, does the last column mean "lightning distant to the west through northeast"? I believe the "D" denotes "distant" but in the data you sent, I only see a cardinal direction(s), to me meaning 0-5 miles from the aerodrome, or a distant indication, meaning over 10 miles from the aerodrome. I don't see any indication of lightning in "the vicinity" (5-10 miles from the aerodrome). Can you help with the explanation of the lightning parameter options?

Yes, it is distant but that's not what the D means. As I mentioned, this is the printer output and not a METAR format. The visibility sensor has a day/night sensor built in. That's the state of that sensor. If there are any directions listed, I.E. W-NE in this example, it is distant. In the vicinity would be shown as VCTS. A thunderstorm at the airport is shown as TS. So when this report was generated, there was a thunderstorm in the vicinity and also distant lightning West though Northeast.

9. Is the protocol of waiting until 40 observations are received and waiting 70 seconds to disseminate observations if 40 are not received, to WMSCR, an industry standard or requirement for 3rd part vendors? Or is their flexibility in this?

It isn't a standard per se, but the FAA doesn't want "streaming data" and it is a requirement that the data be batched with multiple reports. The 40 count seems to work for us in that it gives WMSCR a good sized batch without unduly delaying the reports. Other 3rd party vendors may do it differently, but I don't know.

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Richards Michael

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Friday, August 24, 2018 2:42 PM
To: Richards Michael <[redacted]@ntsb.gov>
Cc: Kelsey Angle - NOAA Federal <[redacted]@noaa.gov>; Richards Michael <[redacted]@ntsb.gov>
Subject: Re[4]: follow up items

See below

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
[redacted].com

------ Original Message ------
From: "Richards Michael" <[redacted]@ntsb.gov>
To: "Tom Nichols RSI" <[redacted]@remotesys.com>
Cc: "Kelsey Angle - NOAA Federal" <[redacted]@noaa.gov>; "Richards Michael" <[redacted]@ntsb.gov>
Sent: 8/23/2018 03:22:28 PM
Subject: RE: Re[2]: follow up items

> Ooops, of course there is one item I forgot to include. I have added one more question here to others I sent before. Thanks again
>
> - This is confusing. The FAA AC section 4.4 talks about setting the clock being a minimum tri-annual maintenance item. The AWI AWOS maintenance manual identifies checking the clock as a monthly maintenance item. I am guessing this AWI manual from 2008 is a bit old since it does not conform to the current maintenance frequencies (i.e., tri-annual) identifies in the newer -3000 model AWOS manual and the FAA AC. I assume this clock could be checked by Don Rogers or someone else trained to do so. In any event, do you know if anyone checks the clock on the monthly schedule? Or can you clarify the FAA/AWI guidance here on this?

Quite frankly I have about 2 out of 75 airports that do monthly maintenance, and it's a little ambiguous on the rules. Yes, the monthly maintenance does include setting the clock...but the FAA rules prohibit anyone but the Technician of Record from making adjustments to the AWOS. To me, that's contradictory. They will ususally call me if it's noticed between maintenance visits, and I will correct it remotely.

- Are the SAUS bulletins you provided timestamped for July 20, 2018 (UTC time)? I just wasn't sure if 20 meant July or the day you sent them to me in August.

August. It was a coincidence I pulled them on the 20th.

- Previous, to the question of "Were you able to determine why a 2335Z METAR was not disseminated?" you answered: *"Partially. The **:35, :45, and :55** reports were not received by the dessimination ingest system from the site. The system uses a cellular modem. I suspect but cannot prove that either the cell site dropped the link during the storm or that there was a quick power glitch that reset the cellular device but did not affect the AWOS...but that's just a theory."* Were there issues with the 2355 UTC METAR as well? Or with a 2345 UTC ob? Sorry, this part just confused me since we didn't discuss any dissemination issues except for the 2335 UTC ob. Can you help clarify this for me on what happened?

That was a mistake. It was only the :35 ob that was missing,

- Just so I don't forget, I am just reincluding this request (I know you said you need to review site logs): When was the last time the FWB AWOS clock was resynched prior to July 19, 2018?

I will be there the first week of September.

Thank you for your time,
Mike

RECORD OF CONVERSATION

Date:	**August 15, 2018**
Time:	**About 1000-1100 central daylight time**
Location:	**Telephone**
Person Contacted:	**Mr. Tom Nichols, Remote Systems Integration, LLC, RSINet, LLC**
Persons Present:	**Mr. Mike Richards, National Transportation Safety Board** **Mr. Kelsey Angle, National Weather Service**
Subject:	**Accident Investigation DCA18MM028**

On August 15, 2018, at approximately 1000 central daylight time (CDT), Mr. Mike Richards of the National Transportation Safety Board and Mr. Kelsey Angle of the National Weather Service had a telephone conversation with Mr. Tom Nichols. During the conversation Mr. Nichols reported the following:

He is the owner of Remote Systems Integration, LLC, and RSINet, LLC, and has been the owner for roughly 25 years. He has been working on AWOS systems for about 22-23 years. He is the maintenance technician for the AWOS system at the Branson West Municipal Airport/Emerson Field (FWB) in Branson West, Missouri.

As of July 19, 2018, the AWOS at FWB is an "All Weather Inc 900" -type system and has an ultrasonic anemometer. He has had no problems with the anemometer and the FWB AWOS is one of his more reliable systems. The AWOS was installed in 2011. Average wind reporting is a 2-minute average and wind gusts are reported when the difference between the maximum and minimum wind magnitudes over the previous 10 minutes are 10 knots or greater. The wind is sampled every 5 seconds. The average and gust wind criteria are the same for the METAR observations and the one-minute observations. The FWB AWOS disseminates public observations every twenty minutes because that is what the FAA mandates. The criteria for what times the FWB AWOS shall disseminate the public observations has always been 15, 35 and 55 minutes past the hour, but he is aware that other NADIN distribution companies disseminate at other times, but still only 3 times per hour.

An FWB AWOS observation leaves the AWOS through a serial port and is sent to a 3rd party nonFed AWOS service provider via a cellular connection in Tennessee. The time it takes for an observation to go from the AWOS to the 3rd party nonFed AWOS service provider is "on the order

of seconds." The FWB AWOS nonFed service provider is RSINet [one of Mr. Nichols' companies]. RSINet delivers the FWB AWOS observations to the WMSCR center in Salt Lake City via a secure server in the FAA's Oklahoma City facility in a "SAUS" message. WMSCR then "QC's" the data and puts it on the gateway.

[With regard to the bulletin provided below in blue text] These bulletins are created by RSINet and package up observations they receive from nonFed AWOS sites (as a 3rd party nonFed service provider for various nonFed AWOSs) and are delivered to the FAA WMSCR site in Salt Lake City. The "RSYS" in the header line identifies that this information is coming from RSINet, and the "200004" is the date/time stamp [in DDHHMM format] that RSINet applies to indicate the time this message is created and sent to WMSCR. RSINet uses a "Stratum 1 accuracy" time server to time stamp these bulletins, so it is very accurate. RSINet will only send a SAUS bulletin to WMSCR once 40 observations have been collected from their sites, however if 70 seconds elapse without 40 messages having been received, RSINet will send WMSCR what has been received. This means that an observation will not sit at RSINet more than 70 seconds after it is received before it is sent to WMSCR, however it is not possible to determine how long an observation had been at RSI prior to delivery to WMSCR from looking at the bulletin.

####
SAUS27 RSYS 200004
METAR KS32 200015Z AUTO 17006KT 10SM CLR 23/21 A2982 RMK AO2=
METAR KBXK 192355Z AUTO 23010G16KT 10SM CLR 40/17 A2979 RMK AO1 =
METAR KM25 200015Z AUTO 00000KT 10SM SCT055 29/24 A2988 RMK AO2
PWINO=
METAR KFWB 192355Z AUTO 35027G45KT 7SM TS SCT055 BKN065 27/17 A3000
RMK AO2 LTG DSNT ALQDS =
5f46936dd41a5e1bc5306cca4e093be6

There has been an issue with clock drift on AWOS systems going back 25 years. The issue occurs because older AWOS systems are based on DOS and their clocks tend to drift fast or slow. This issue affects every single DOS-based AWOS. Resetting the clock is a regular maintenance item and every AWOS technician knows about this issue. He believes that FAA tolerance for an offset clock is 3 minutes but is not sure. He is required to check the clock, and reset if necessary, once every 4 months. Prior to the accident, the FWB AWOS clock was reset in late-May 2018 during a routine maintenance visit, and again remotely in mid-June 2018 when a remote maintenance session was initiated to check the operation of the ceilometer. The factory specification for clock tolerance is 1 minute.

He does not know exactly how many AWOS systems affected by the clock drift issue are currently operational in the national airspace system. 10 years ago, he would have said that the majority of AWOS systems in the national airspace system had this issue, but the number is getting better. Vaisala has attempted to mitigate this issue by providing a feature on their AWOS systems that sync the AWOS clock via the incoming power line. It has been a feature as long as he can remember, and this has worked as a fix, but it doesn't work all the time. All Weather Inc has introduced new AWOS systems that now sync the AWOS clock via GPS and there are no problems with time drift with these newer All Weather Inc systems. He is not aware of any mitigation efforts

by the FAA except that he believes WMSCR will reject observations determined to be off by 15-20 minutes. FAA Advisory Circular 150/5220-16E warns that reports off by more than 5 minutes may be rejected, but in actual practice WMSCR's tolerances seem to be a bit looser. Occasionally he will get a call from the people working with WMSCR to advise that they see an AWOS site that looks to have a clock that is off by 20 or 30 minutes, and he will fix it, or if it is not one of the AWOS systems he provides maintenance for, he will advise WMSCR of the technician's name if it is known. WMSCR is supposed to have this information on file for all sites. He does not know how fast these clocks can drift, but they are usually on the order of 5-10 minutes over a 4-month period, but he has seen clocks drift faster than that. Sometimes when there is a power failure to an AWOS, and the motherboard CMOS batteries are old, the system can boot back up with an erroneous time.

The AWOS clock drift issue can affect observations because these AWOS systems will observe and report an observation according to its local clock. If the AWOS is supposed to report at 1055Z, and the AWOS clock is 10 minutes slow and shows 1045Z, it will take the 1055Z observation at when it thinks it is 1055Z (but is really 1105Z). This means that (assuming no latency in the observation moving from the AWOS to the public) the public will not see the 1055Z-timestamped observation until 1105Z, and that 1055Z-timestamped observation actually represents conditions taken at 1105Z.

[With regard to the FWB METAR timestamped 2355Z in the blue bulletin above] Due to the FWB AWOS clock being off by 7, 8 or 9 minutes, this observation wasn't taken and disseminated to RSINet until 0002Z, 0003Z or 0004Z.

Conversation about the AWOS clock drift issue amongst industry is mainly that it is annoying. There are solutions to the clock issue that any technician or manufacturer could implement, however they are "hamstrung" by the FAA as those fixes would not be allowed since they would change the systems from what the FAA has certified. FAA certification of changes can be a lengthy process and must be initiated by the manufacturer. Further, 3rd party vendors could change the timestamp on the observations to accommodate any clock drift. He has not attempted any of these mitigation options because modification of the METARs by the 3rd party vendor is prohibited by the FAA.

Conversation ended at approximately 1100 CDT.

Mike Richards
Senior Meteorologist
Operational Factors Division
National Transportation Safety Board

Kelsey Angle
Meteorologist In Charge
Springfield, Missouri, Weather Forecast Office
National Weather Service

Richards Michael

From: Tom Nichols RSI [redacted]@remotesys.com>
Sent: Wednesday, February 20, 2019 2:36 PM
To: Richards Michael <[redacted]@ntsb.gov>
Subject: Re[2]: AWOS time errors

See below.

Tom Nichols
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www.remotesys.com

------ Original Message ------
From: "Richards Michael" <[redacted]@ntsb.gov>
To: "Tom Nichols RSI" [redacted]@remotesys.com>
Sent: 2/20/2019 02:21:20 PM
Subject: RE: AWOS time errors

Hi Tom, just wanted to come back around on these questions, if you have another moment to address…

Thanks,
Mike

From: Richards Michael <[redacted]@ntsb.gov>
Sent: Monday, February 11, 2019 12:20 PM
To: Tom Nichols RSI <[redacted]@remotesys.com>
Cc: Richards Michael <[redacted]@ntsb.gov>; [redacted]@faa.gov
Subject: RE: AWOS time errors

Hi Tom, just so we are clear on what this is saying, can you verify (or correct) my interpretation here, and a few questions below just to clarify what we are looking at…

The attached is a log of observations being sent to RSINet (third-party vendor) by AWOSs around the country during a 30-second period around 0045Z on 28 January 2019. The difference in time between what is timestamped on an observation in this log, and 0045Z, is a measure of how “off” the AWOS’s clock is from real-time (or more precisely the time RSINet is using for creating this log). Correct?

Correct.

- If these are observations received at 0045, than a later timestamp certainly suggests that an AWOS clock is fast. However is it possible that the AWOS observations with times before 0045Z (slow clocks) have just taken too long to get to you? Perhaps I don't completely understand what the log is exactly.

It's possible, but the maximum latency we've observed is on the order of seconds.

- If most AWOSs send data at :15, :35 and :55, are they also sending RSINet data at other times like :45, hence your log at this time? Again, maybe a better understanding of the log is needed here.

AWOS sites send in 1 or 5 minute intervals depending on the settings. The FAA only wants the :15, :35, and :55 observations. I just took :45 for an example.

- The FAA recently published an update (Change 1) to AC 150/-5220-16E.
http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5220-16E_w-chg1.pdf
Is there anything in here that has changed any rules regarding what we have been speaking about (namely maintenance/monitoring standards)? I don't see much but wanted to verify with you.

I have a copy but haven't read it yet.

Thanks,
Mike

From: Tom Nichols RSI <[redacted]@remotesys.com>
Sent: Sunday, January 27, 2019 7:04 PM
To: Richards Michael <[redacted]@ntsb.gov>
Subject: AWOS time errors

Just thought I'd show you some additional data, since it's available now that we've instituted some better monitoring of the data center. Here is a log of about 30 seconds of data coming in from all over the country. This log was generated for a 30 second period around 0045 Zulu. In a perfect world, all of the incoming reports would be timestamped 0045 plus or minus a minute. But take a look at how widely the timestamps vary. Remember we are not allowed to change the timestamps, and only transmit data timestamped :15, :35, and :55, but you can see how much the AWOS system clocks vary across the nation.

Tom Nichols
Remote Systems Integration, LLC
RSINet, LLC
www.remotesys.com

(1.390) METAR KHPT 280045Z AUTO 13013KT 1 1/4SM -SN OVC009 M13/M16 A2970 RMK AO2
(2.500) METAR KC62 280103Z AUTO 00000KT 10SM CLR M15/M18 A3006 RMK AO2 T11501184
(0.281) METAR KLRO 280045Z AUTO 00000KT 10SM CLR 08/05 A3002 RMK AO2
(0.000) METAR K2P2 280046Z AUTO 00000KT 10SM CLR M25/M27 A3004 RMK AO2 T12511273
(1.343) METAR KLUX 280055Z AUTO 00000KT 10SM CLR 07/00 A3002 RMK AO2
(0.328) METAR KY23 280045Z AUTO 12009KT 10SM OVC090 M17/M25 A2986 RMK AO2 T11701247
(0.203) METAR KFRH 280045Z AUTO 03003KT 10SM OVC026 M03/M11 A3005 RMK AO1
(0.203) METAR KAID 280045Z AUTO 00000KT 10SM OVC090 M11/M16 A3007 RMK AO2 T11151159
(1.296) METAR KRRL 280058Z AUTO 00000KT 10SM OVC110 M19/M27 A2991 RMK AO2 T11871270 TSNO
(0.171) METAR KJVY 280046Z AUTO 00000KT 10SM CLR M03/M05 A3007 RMK AO2 T10281049
(0.406) METAR KFSW 280045Z AUTO 13005KT 10SM OVC021 M08/M12 A2989 RMK AO2
(1.281) METAR KCLS 280045Z AUTO 03007KT 7SM OVC007 06/05 A3034 RMK AO2
(0.734) METAR KBUU 280046Z AUTO 00000KT 10SM CLR M21/M24 A3003 RMK AO2 T12091245
(0.203) METAR KM25 280050Z AUTO 06003KT 10SM CLR 03/M01 A3002 RMK AO2 PWINO
(1.218) METAR KI67 280045Z AUTO 02003KT 10SM CLR M06/M11 A3010 RMK AO1
(0.218) METAR KPDC 280046Z AUTO 11008KT 10SM OVC048 M14/M20 A2989 RMK AO2 T11371204
(0.359) METAR KSUW 280103Z AUTO 08007KT 10SM OVC070 M18/M26 A2991 RMK AO2 T11761258
(2.500) METAR KOOA 280045Z AUTO 14015KT 7SM BKN017 OVC060 M10/M12 A2980 RMK AO2 T11031122
(1.015) METAR KOEO 280045Z AUTO 11010KT 10SM OVC060 M16/M23 A2983 RMK AO2 T11601228
(1.703) METAR KHVS 280045Z AUTO 00000KT 10SM CLR 05/02 A3001 RMK AO2
(1.843) METAR KOLE 280045Z AUTO 25003KT 10SM SCT031 BKN038 M11/M16 A2992 RMK AO2
(0.000) METAR KCBK 280045Z AUTO 23013KT 10SM CLR 06/M02 A2966 RMK AO2
(0.312) METAR KSDC 280100Z AUTO 25003KT 10SM CLR M10/M16 A3006 RMK AO2
(0.468) METAR KMRJ 280040Z AUTO 11009KT 10SM OVC055 M15/M18 A2990 RMK AO2
(0.171) METAR KMAW 280050Z AUTO 14003KT 10SM CLR 05/01 A3001 RMK AO2
(2.734) METAR KSTE 280043Z AUTO 10003KT 10SM SCT100 BKN120 M20/M27 A2995 RMK AO2 T11961270
(0.000) METAR KUBE 280045Z AUTO 12013KT 10SM OVC075 M17/M26 A2980 RMK AO2
(0.000) METAR KRZN 280042Z AUTO 12007KT 10SM OVC060 M17/M28 A2983 RMK AO2 T11671280
(0.265) METAR KTKV 280045Z AUTO 00000KT 10SM SCT090 M20/M28 A2989 RMK AO2 T12031280
(0.281) METAR KAIG 280045Z AUTO 13005KT 10SM BKN110 M20/M27 A2990 RMK AO2 T12011267
(0.609) METAR KI68 280046Z AUTO 00000KT 10SM CLR M06/M12 A3008 RMK AO1 T10631125
(0.000) METAR KGCD 280045Z AUTO 26005KT 10SM CLR 10/01 A3024 RMK AO2 T00970005
(0.390) METAR KGGI 280100Z AUTO 13012KT 7SM -SN OVC017 M11/M13 A2978 RMK AO2 T11151131
(1.296) METAR KY51 280049Z AUTO 13009KT 10SM BKN050 OVC070 M16/M21 A2983 RMK AO1 T11611211
(0.000) METAR K96D 280050Z AUTO 08010KT 1 1/4SM -SN M19/M20 A2966 RMK AO2
(1.125) METAR KMCJ 280050Z AUTO 00000KT 10SM CLR 15/01 A3006 RMK A01
(0.171) METAR KD25 280045Z AUTO 00000KT 10SM SCT110 M21/M27 A2985 RMK AO2 T12081274
(0.625) METAR K4S2 280046Z AUTO 35005KT 10SM CLR 07/04 A3025 RMK AO2
(0.625) METAR KFGX 280045Z AUTO 02005KT 10SM CLR M02/M07 A3008 RMK AO2 T10221071
(0.375) METAR KCKP 280045Z AUTO 17013G19KT 7SM OVC012 M08/M09 A2954 RMK AO2 T10841093
(0.578) METAR KRCV 280045Z AUTO 33004KT 10SM CLR M08/M14 A3005 RMK AO2 T10831143
(0.000) METAR KUES 280045Z AUTO 00000KT 10SM CLR M20/M25 A3002 RMK AO2
(0.468) METAR KSTF 280048Z AUTO 00000KT 10SM BKN050 BKN065 06/04 A3003 RMK AO2 PWINO
(1.484) METAR KJXI 280045Z AUTO 00000KT 10SM CLR 10/M01 A3000 RMK AO2 T01001011
(0.000) METAR KPCD 280045Z AUTO 10SM CLR M02/M04 A2998 RMK AO2 T10181036
(0.312) METAR KFXY 280045Z AUTO 14016G22KT 3/4SM SN OVC007 M13/M15 A2965 RMK AO2
(1.359) METAR K2V5 280048Z AUTO 27009KT 10SM CLR 08/M02 A2964 RMK AO2
(0.906) METAR KRAW 280046Z AUTO 18007KT 10SM SCT085 A2983 RMK AO2
(0.312) METAR KEVU 280045Z AUTO 14013KT 10SM SCT075 BKN100 M01/M06 A2966 RMK AO2
(0.437) METAR KN03 280045Z AUTO 00000KT 10SM -SN SCT045 M12/M13 A2998 RMK AO2
(0.000) METAR K6S2 280046Z AUTO 00000KT 4SM BR CLR 11/09 A3022 RMK AO2
(0.000) METAR KGPH 280059Z AUTO 16004KT 10SM BKN100 03/00 A2975 RMK AO2
(0.406) METAR KLZZ 280045Z AUTO 26003KT 10SM CLR 10/00 A3003 RMK AO2 T01030003
(0.000) METAR KUYF 280045Z AUTO 00000KT 10SM CLR M11/M15 A3007 RMK AO2
(0.515) METAR KEDC 280045Z AUTO 00000KT 10SM CLR 13/00 A3005 RMK AO2
(1.906) METAR KLMO 280046Z AUTO 25008G14KT 10SM CLR 11/M07 A2972 RMK AO2 T01081069
(1.156) METAR KMBY 280101Z AUTO 12007KT 10SM SCT080 M01/M05 A2981 RMK AO2
(0.531) METAR K74V 280050Z AUTO 00000KT 10SM CLR M06/M10 A3012 RMK AO2
(0.437) METAR KCIC 280045Z AUTO 32006KT 10SM CLR 19/05 A3007 RMK AO1
(0.140) METAR KOQN 280047Z AUTO 26004KT 10SM CLR 03/M03 A2997 RMK AO2
(1.140) METAR KVNC 280055Z AUTO 01013KT 3SM -RA OVC009 12/12 A2987 RMK AO2
(0.000) METAR KCLI 280058Z AUTO 00000KT 10SM SCT110 M18/M26 A3001 RMK AO2 T11801263

(0.000) METAR K4R5 280046Z AUTO 00000KT 10SM SCT027 BKN110 M18/M23 A2995 RMK AO2 T11811230
(3.125) METAR KRPD 280059Z AUTO 12011G15KT 10SM OVC075 M17/M25 A2985 RMK AO2 T11661251
(0.296) METAR KSXU 280045Z AUTO 24012G18KT 10SM CLR 09/M07 A2989 RMK AO2 T00931073
(0.328) METAR KPCZ 280050Z AUTO 11004KT 10SM SCT110 M17/M25 A3000 RMK AO2 T11701249
(1.156) METAR KUNU 280100Z AUTO 11004KT 10SM CLR M20/M25 A3000 RMK AO2 T12031253 TSNO
(0.390) METAR KEFT 280046Z AUTO 10SM BKN060 OVC075 M17/M21 A2994 RMK AO2 T11671209
(0.609) METAR KOCQ 280044Z AUTO 00000KT 10SM CLR M19/M26 A3004 RMK AO1 T11931258
(0.000) METAR KCWA 280046Z AUTO 13005KT 10SM CLR M18/M26 A2992 RMK AO2
(1.234) METAR KBXK 280045Z AUTO 23004KT 10SM CLR 18/00 A3001 RMK AO1
(0.734) METAR KPVB 280045Z AUTO 10011KT 10SM OVC050 M15/M17 A2991 RMK AO1 T11541172
(1.000) METAR KBBP 280045Z AUTO 00000KT 10SM CLR 06/03 A3004 RMK AO2
(0.734) METAR KBCK 280046Z AUTO 10004KT 10SM BKN090 M16/M25 A2991 RMK AO2 T11561255
(2.546) METAR KBBG 280045Z AUTO 00000KT 10SM OVC085 08/M04 A2991 RMK AO2
(2.312) METAR KVNW 280112Z AUTO RMK AO2 PWINO
(0.187) METAR KHAE 280045Z AUTO 13008KT 10SM OVC080 M02/M08 A2986 RMK AO2
(0.171) METAR KBYL 280045Z AUTO 00000KT 10SM OVC075 02/M04 A3003 RMK AO1
(0.453) METAR KGZL 280045Z AUTO 15004KT 10SM CLR 04/M05 A2994 RMK AO2
(0.031) METAR KAEG 280045Z AUTO 34011KT 10SM CLR 07/M07 A3007 RMK AO2 T00651070
(0.000) METAR KPLD 280056Z AUTO 00000KT 10SM CLR M15/M16 A3008 RMK AO2
(0.218) METAR KJAQ 280045Z AUTO 32006KT 10SM CLR 16/06 A3010 RMK AO1 T01630063
(0.421) METAR K57C 280047Z AUTO 00000KT 10SM CLR M20/M25 A3002 RMK AO2 T12001248
(0.687) METAR KFLY 280046Z AUTO 31013G27KT 10SM CLR 07/M09 A2983 RMK AO2 T00721094
(0.171) METAR KARW 280045Z AUTO 00000KT 7SM SCT100 08/03 A3001 RMK AO2
(0.984) METAR KTVK 280040Z AUTO 13012KT 10SM BKN015 M08/M10 A2979 RMK AO2
(1.296) METAR KEZS 280100Z AUTO 00000KT 10SM CLR M16/M26 A3001 RMK AO2 T11651260
(0.000) METAR KALM 280045Z AUTO 04005KT 10SM CLR 10/M11 A3005 RMK AO2
(1.437) METAR KMAO 280100Z AUTO 00000KT 10SM CLR 06/03 A3005 RMK AO2
(0.218) METAR KCMY 280045Z AUTO 00000KT 10SM CLR M15/M22 A2991 RMK AO2 T11521221
(0.437) METAR KRUG 280050Z AUTO 03017KT 6SM BR FEW005 BKN025 OVC040 M16/M18 A2950 RMK AO2
(0.406) METAR K3T5 280045Z AUTO 00000KT 10SM CLR 11/06 A3004 RMK AO2 T01060061
(0.218) METAR KC62 280104Z AUTO 00000KT 10SM CLR M15/M18 A3006 RMK AO2 T11491184
(1.640) METAR KJSO 280050Z AUTO 26003KT 10SM CLR 11/M01 A3004 RMK AO2 T01101011
(0.000) METAR K2P2 280047Z AUTO 00000KT 10SM CLR M25/M27 A3004 RMK AO2 T12511273
(0.468) METAR KCKI 280050Z AUTO 00000KT 10SM CLR 06/05 A3002 RMK AO2
(1.515) METAR KAID 280046Z AUTO 00000KT 10SM OVC090 M11/M16 A3007 RMK AO2 T11151159
(1.328) METAR KRRL 280059Z AUTO 00000KT 10SM OVC110 M19/M27 A2991 RMK AO2 T11871269 TSNO
(0.203) METAR KJVY 280047Z AUTO 00000KT 10SM CLR M03/M05 A3007 RMK AO2 T10281049
(1.843) METAR KZPH 280110Z AUTO 36013G16KT 7SM BKN007 OVC013 09/08 A2991 RMK AO2 P0001 T00920084 PWINO
(0.562) METAR KETB 280045Z AUTO 00000KT 10SM CLR M21/M26 A3001 RMK AO2
(0.000) METAR KBUU 280047Z AUTO 00000KT 10SM CLR M21/M24 A3004 RMK AO2 T12071245
(0.750) METAR KI67 280046Z AUTO 02003KT 10SM CLR M06/M11 A3010 RMK AO1
(0.000) METAR KLKR 280050Z AUTO 00000KT 10SM CLR 07/M01 A3003 RMK AO2
(0.890) METAR KPDC 280047Z AUTO 11008KT 10SM OVC046 M14/M20 A2989 RMK AO2 T11371205
(0.390) METAR KSUW 280104Z AUTO 08006KT 10SM OVC070 M18/M26 A2991 RMK AO2 T11761257

Automated Weather Observing System (AWOS)

Maintenance Manual

903-027

allweatherinc

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CONTENTS

Overview

This manual provides instructions for maintaining and revalidating All Weather Inc. AWOS systems. It includes forms for recording the results of monthly, quarterly, and annual maintenance procedures, the complete instructions for which are provided in the individual sensor and system component manuals. The following sections explain the requirements for maintenance of an AWOS system, and direct the user to where the appropriate information can be found.

System Description

A full description of the AWOS system can be found in the Model 2090 Central Data Platform (CDP) Manual (2090-001), which includes system drawings, descriptions of software operation and operator terminal screens, and the possible sensor and component configurations of an AWOS.

System Performance Parameters

System performance parameters are given in the individual sensor and component manuals. Detailed specifications are provided for each component, along with the maintenance and corrective action procedures required. An overall description of the AWOS system's performance parameters can be found in the Model 2090 Central Data Platform (CDP) Manual (2090-001).

Maintenance Procedures

Monthly, quarterly, and annual maintenance procedures for all AWOS components are found in the individual sensor and component manuals. Maintenance procedures for the Model 2020 Wind Vane, for example, are found in the Model 2020 User's Manual (2020-001). The Technical Performance Records and the Comprehensive Facility Performance and Adjustment Data Form included in this manual are used in conjunction with these instructions to record the results of the specified tests and procedures.

Data Recording Forms

Three data recording forms are included in this manual: The Comprehensive Facility Performance and Adjustment Data Form is to be completed at system commissioning, after major repair work, and during annual revalidation. The Monthly Technical Performance Record, Quarterly Technical Performance Record, and Annual Technical Performance Record are used during periodic maintenance, and include space to record the results of the monthly, quarterly, and annual maintenance procedures described in the individual sensor and component manuals.

Installation & Checkout Manual

Rather than a system-wide Installation & Checkout Manual, each sensor and AWOS component manual includes specific installation and checkout procedures for that instrument. This provides a simple means of easily locating the required procedures for a given component or sensor.

Operating Instructions

Operating instructions for each sensor and AWOS component are found in their respective manuals. The ***Operation*** chapter of each manual provides full instructions for using a component and interpreting the data, where applicable, for that instrument.

Training Program

AWOS technicians are fully qualified in electronic and electrical applications, with a comprehensive knowledge of the operations, testing, and maintenance of the AWOS down to the board component level. They have the capabilities to evaluate and make recommendations for system component changes that would enhance the reliability or functionality of the AWOS. All Weather Inc. provides a comprehensive training and certification program for all AWOS technicians to ensure thorough knowledge and competence in working with AWOS systems.

Annual System Revalidation Plan

Annual system revalidation is carried out by following the instructions for annual maintenance provided in the individual manuals, taking any required corrective action, and recording the results on the Comprehensive Facility Performance and Adjustment Data Form.

Annual Revalidation Test Equipment

The following list gives the test equipment required during validation and annual revalidation of the AWOS.

Description	**Part/Model No.**	**Specifications**
Visibility calibrator	M104744	
Psychrometer	5211 (Sling) or 5230 (Assmann)	°C
Psychrometric calculator	5282-A	°C
Pressure standard	Z003919	600-1000 mb
Wind Speed Calibrator	1231	
Vis. Sensor Handheld Terminal	M403321	required for all vis. sensors but 8364-E
Zero Wind Chamber	M105548-00	required for 2040 Ultrasonic Wind Sensor

Annual Revalidation Tools and Supplies

The following list gives the tools and supplies required during validation and annual revalidation of the AWOS.

Description	Part/Model No.	Specifications
Assorted hand tools		
Extension cord, 50'		18-3
Digital voltmeter, 4-1/2 digit		
Clean dry cloth		Lint free
Lens cleaning solution		Non-ammonia-based
Lightweight greaseless oil		(e.g., 3-in-1 or equivalent)
8329 Ceilometer desiccant cartridge	M028113	
8329 Ceilometer blower filter (fine)	M028121	
8329 Ceilometer blower filter (coarse)	M103966	
8339 Ceilometer desiccant cartridge	M028181-00	
Black component bag		
RTV sealant	RTV 162	
Paint		
Sandpaper		

Optional Sensor Simulator

An optional Sensor Simulator (11920) is available from All Weather Inc. that connects directly to the DCP and can be used to simulate sensor outputs during maintenance of the AWOS.

Radio Annual Revalidation

The procedures required for annual revalidation of UHF and VHF radios should be performed by a qualified radio shop equipped with the necessary test equipment and staffed by FCC certified technicians.

AWOS Lowest Replaceable Units (LRUs)

The following list shows the lowest replaceable units (LRUs) for the 900 Series AWOS. When a sensor is replaced, the annual procedure for that sensor should be performed.

NOTES:
** Indicates Optional Equipment

Description	Model #
AUTOMATED WEATHER OBSERVING SYSTEM	900 Series
DATA COLLECTION PLATFORM	1190
PCB AWOS Data Collection	M404804
DCP Firmware	M469050
Sensor Interface Controller	M404806
Ceilometer Interface Firmware	M469052
Visibility Interface Firmware	M469051
Present Weather Interface Firmware	M469053
Freezing Rain Interface Firmware	M469066
Power Supply Assembly	M403318
Fuse 1/2A Slow Blow	M442060
Fuse 10A Slow Blow	M442071
Fuse 5A Slow Blow	M442070
AC Power PCB Assembly	M404802
** Data Link Radio	20980-A
Barometric Pressure Sensor	7190
Quad Plate Pressure Port	M105037
CENTRAL DATA PLATFORM	2090
System Unit	20901
Software	20908
Display	20902
Voice Synthesizer PCB	20903
Speakers	20904
Telephone Voice PCB	20905
Time Standard PCB	20907
Peripheral Interface Unit	20909
** NADIN Interface Processor	M404806
NADIN Interface Firmware	M469054
** Data Link Radio	20980-A
** Ground-to-Air Radio	1791

Description	Model #
AWOS SENSORS	
Wind Direction Sensor	2020
Tail Vane	T802000
Pot, 5K	M480114
Bearings (1)	T710100
Wind Speed Sensor	2030
Cup Assembly	T800303
Photon Chopper Assembly	T801600
Bearings (2)	M025057
Skyvane Wind Sensor	2100
Transducer, H.F. Tach., Skyvane	M100227
Propeller, Skyvane	M104500
Pot., 5K, Skyvane	M480114
Ultrasonic Wind Sensor (unheated)	2040
Ultrasonic Wind Sensor (heated)	2040-H
Heater Kit	M488274-00
Motor Aspirated Radiation Shield (MARS)	8190
Temperature Sensor/RH Sensor	5190-D
Fan	M444021
Rain Gauge (heated)	6021-A
Rain Gauge (unheated)	6011-A
Day/Night Detector	
(with 8364-C Vis.)	83339-A
(with 8364-E Vis.)	M403326
Visibility Sensor	8364-C
Emitter Assembly	M104863
Detector Assembly	M104864
Controller Assembly	M403261
Firmware	M596031
Fuse 1/4A Slo Blo	M442027
Fuse 5A Slo Blo	M442059
Fuse 4A	M442058
Visibility Sensor	8364-E
Emitter Assembly	M105061
Detector Assembly	M105060
Controller Assembly	M403322
Firmware	M469058
Fuse 10A Slo Blo	M442071
Fuse 5A Slo Blo	M442070
Fuse 2A	M442046
Fuse 4A	M442048
Fuse .5A	M442057

Description	Model #
8329 Cloud Height Sensor	8329-A
Transmitter	M403194
Receiver	M403197
Electro-Optics Assy w/laser	M403200
CPU PCB	M404602
Master Firmware	M595060
Slave Firmware	M595061
Control PCB	M404601
Signal Detector PCB	M404605
8329 Cloud Height Sensor (Cont.)	
Power Supply	M438105
Blower Fan/Heater Assy	83291-C
Blower Filter-Coarse	M103966
Blower Filter-Fine	M028121
Desiccant Cartridge	M028113
Fuse 2A	M442046
Fuse 3.15A	M442047
Fuse 4.0A	M442048
Fuse 25A	M442062
Outer Shield	M103950
Inner Cover	M103951
8339 Cloud Height Sensor (CE version)	8339-F
Optical and Laser Module	M403434-01
DAC & Power PCB	M404848-02
Blower 320 CFM, 110 Vac	M403414-00
Fuse 5x20mm, 5A, 250V	M442088-00
Fuse 5x20mm, 10A, 250V	M442089-00
Desiccant	M028181-00
Battery	83395-00
8339 Cloud Height Sensor (non-CE version)	8339-D
Optical and Laser Module	M403434-00/M403434-01
DAC & Power PCB	M404848-01/M404848-02
Blower 320 CFM, 110 Vac	M403414-00
Fuse 5x20mm, 5A, 250V	M442088-00
Fuse 5x20mm, 10A, 250V	M442089-00
Desiccant	M028181-00
Battery	83395-00
Present Weather Sensor	6490
Sensor Head Assembly	M482105
Transmitter Modulator (TXM) Card	M406053
Automatic Gain Control (AGC) Card	M406054
Signal Processor 1 (SP1) Card	M406055
Signal Processor 2 (SP2) Card	M406056
Microprocessor (MPU) Card	M406057
Electronics Power Supply	M438150

	Description	Model #
	Heater Power Supply	M438151
	PCB Sensor Interface	M404806
	Present Weather Firmware EPROM	M469053
	Lightning/Thunderstorm Sensor	6500
	Freezing Rain Sensor	6495
	MISCELLANEOUS EQUIPMENT	
**	Printer Ribbon	20911
**	Printer	20910-A
**	Microphone	20906
**	Speakers	20904
**	UHF/VHF Antenna	M489103
**	VHF Radio	1791
**	UPS, 10 Min CDP	20913-A
**	UPS, 60 Min CDP	20913-C
**	UPS, 5 Min CDP	20913-E

Warranty

This equipment has been manufactured and will perform in accordance with requirements of FAA Advisory Circular 150/5220-16C. Any defect in design, materials, or workmanship which may occur during proper and normal use during a period of 1 year from date of installation or a maximum of 2 years from shipment will be corrected by repair or replacement by All Weather Inc..

Forms

The following pages contain the Comprehensive Facility Performance and Adjustment Data Form and the Monthly and Quarterly Technical Performance Records. These master forms should be copied and sufficient copies stored at a convenient location in each site's Facility Reference Data File (FRDF). The Comprehensive Facility Performance and Adjustment Data Form is to be completed at system commissioning, after major repair work, and during annual revalidation. The Technical Performance Records are used during periodic maintenance, and include space to record the results of the monthly and quarterly maintenance procedures described in the individual sensor and component manuals.

AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

		Accomplished
I	Notify local users	_____
II	Complete monthly tasks and log	_____
III	Power up pressure standard	_____
IV	Apply touch-up paint where needed	_____
V	Inspect Data Collection Platform	_____
	a. Drain and clean pressure port	_____

b. Check reference voltages

Item	Counts	Acceptable Range	Pass	Fail
+5.0V Reference	_____	4090-4095	_____	_____
-5.0V Reference	_____	0-5	_____	_____

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VI Inspect tower and tower lights _____

a. 8518-A Foldover Tower, apply grease and oil _____

VII Wind Direction SN _____ 2100 _____ 2020 _____ 2040 _____

a. Align to benchmark (2020 & 2100)

	Acceptable Tolerance	Pass	Fail
Benchmark direction _____	Visually aligned	_____	_____

b. Direction linearity test (2020 & 2100)

Display wind direction on LCD display; rotate full 360°

Any dropouts observed? Y ____ N ____

Any sudden changes observed? Y ____ N ____

360°	±10°	Observed _____
90°	±3°	Observed _____
180°	±3°	Observed _____
270°	±3°	Observed _____

c. Bearing wear test: Vane turns freely (2020 & 2100) _____ _____

VIII Wind Speed SN _____ 2100 _____ 2020 _____ 2040 _____

		Pass	Fail
a. Using 1800 rpm run-up motor, DCP LCD reads:			
79-81 knots (2030)		_____	_____
78-80 knots (2100)		_____	_____
b. Bearing wear test: Cups/Propeller turn freely (2020 & 2100)		_____	_____
c. Lubricate felt washer (2100)	Accomplished _____		
d. Field Zero Wind Check (2040)	0 knots	_____	_____

System Checked and Verified By: _____ Date/Time: _____

AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

IX Temperature/Humidity SN _____

Time	Psychrometer Temperature	AWOS Temperature	Psychrometer Wet Bulb	AWOS Dew Point
1.5 min	_____	_____	_____	_____
3.0 min	_____	_____	_____	_____
4.5 min	_____	_____	_____	_____
6.0 min	_____	_____	_____	_____
7.5 min	_____	_____	_____	_____

Average Within ±1°F (±.55°C) A_____ B_____ Average Within ±.5°F (±.28°C) C_____ D_____

Dew Point From A & C E_____

B-A _____ Acceptable Tolerance ±2°F (±1.1°C) D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of 8190 MARS fan Pass _____ Fail _____

X Visibility SN _____

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

Item	Initial Value	New Value	% Diff	Acceptable Tolerance	Pass	Fail
Calibration	_____	_____	_____	±3%	_____	_____

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

XI Day/Night Sensor SN _____

Item	Indication (A)	Reference (B)	Acceptable Tolerance	Pass	Fail
Nighttime	_____	Night	A=B	_____	_____
Daytime	_____	Day	A=B	_____	_____

XII Precipitation Sensor SN _____

a. Check for level Accomplished _____

b. Check for internal damage Accomplished _____

c. Check heaters Accomplished _____

d. Switch test

Item	Measured Value (A)	Reference Value (B)	A-B	Acceptable Tolerance	Pass	Fail
1 cycle	_____	2 counts	_____	±0	_____	_____

XIII Cloud Height Sensor SN _____

Model 8329

Item	Value	Tolerance	Acceptable Pass	Fail
Check Desiccant	_____ (Color)	Blue	_____	_____
Laser Indicator	_____ (Cycles)	On/Off	_____	_____
Check Blower	_____ (Turn-On Time)	3 Minutes	_____	_____

Replace Blower Filters Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XIII Cloud Height Sensor (cont.)

CDP Maintenance Menu:

Status errors _____

Clouds detected when rainfall reported? Yes ____ No ____

Any ceilometer pilot reports logged? Yes ____ No ____

If yes, note report(s): _____

Minimum ceiling check (white paper over lens) Expected: 100 feet Reported: _____ feet

Model 8339

Item	Value	Acceptable Tolerance	Pass	Fail
Check Blower	_____ (Turns on)	Yes	_____	_____
Blower cleared of debris		Accomplished	_____	
Desiccant replaced		Accomplished	_____	

XIV Barometric Pressure

	Serial Number	Reference Standard (A)	Reading (B)	A-B	Acceptable Tolerance	Adjustment Required	Adj. Value A-B
BP1	_____	_____	_____	____	0.005	Y____N____	_____
BP2	_____	_____	_____	____	0.005	Y____N____	_____

Note: Adjustment is required if A-B is greater than the acceptable tolerance.

Altimeter Setting Check Calculated _____inHg Reported _____inHg

XV Present Weather Checks

Field	Display	Acceptable Tolerance	Pass	Fail
Present Weather (W)	_____	Empty if no precip.	_____	_____
Status (Sssss)	_____	S0000	_____	_____
Xnnn	_____	405-420	_____	_____
Lnnn	_____	-30 to 50	_____	_____
Knnn	_____	0 to 150	_____	_____
Hnnn	_____	40 to 120	_____	_____
Tnnn	_____	Ambient ±5° F	_____	_____

XVI Lightning/Thunderstorm Sensor SN _____

a. Check antenna for damage/corrosion Accomplished _____

b. Check antenna sealant Accomplished _____

c. Clean all surfaces Accomplished _____

d. Check hardware and cable connections Accomplished _____

XVII Freezing Rain Sensor SN _____

a. Check sensor and mast for damage/corrosion Accomplished _____

b. Check cables and hardware connections Accomplished _____

c. Clean all surfaces Accomplished _____

XVIII Hardware Inspection Accomplished _____

All rust, corrosion, etc. has been sanded and touch-up paint applied Accomplished _____

Defects: _____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XIX UHF Radio at the Sensor Site (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	1.0W	±0.5W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

XX Central Data Platform

a. Perform monthly procedures Accomplished _____

b. Barometric pressure adjustment

Sensor	Correction	Accomplished
BP1	_____	_____
BP2	_____	_____

c. Voice check (listen to telephone or radio message)

Voice data is clear, no data missing Pass _____ Fail _____

Record observations on monthly form Accomplished _____

d. Voice data check

Estimate the weather conditions, and compare the manual observation with the output of the AWOS obtained above. Agree _____ Disagree _____

If observations disagree, log and correct the failed condition.

_____

e. Voice remark check

Input a test remark using the microphone, verify using the speakers.

Acceptable if the same. Acceptable _____ Unacceptable _____

Delete the test remark. Verify using the speakers. Accomplished _____

XXI UHF Radio at the CDP (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	1.0W	±0.5W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XXII UHF Radio at the CDP Antenna - for cables longer than 50' (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at ant.)	_____	0.20 W	±0.15 W	_____	_____
VSWR (at ant.)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

XXIII VHF Radio (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	2.5 W	±1.0 W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.0 kHz	_____	_____
Modulation	_____	80%	65-95%	_____	_____

XXIV VHF Radio at the Antenna - for cables longer than 50' (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at ant.)	_____	1.0 W	±0.5 W	_____	_____
VSWR (at ant.)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.0 kHz	_____	_____
Modulation	_____	80%	65-95%	_____	_____

XXV NADIN Interface (as applicable)

Operation of the link confirmed with CLH — Accomplished _____

XXVI Monthly and Quarterly Logs Review

Review all monthly and quarterly log sheets for compliance with manual — Accomplished _____

System Checked and Verified By: _____ Date/Time: _____

AWOS Monthly
Technical Performance Record

Name and Location _____ Date _____

Data Collection Platform	Accomplished
I Toggle maintenance switch	_____
II Inspect system and:	
a) Clean cloud height, Day/Night, Visibility Sensor, and Present Weather Sensor optics	_____
b) Remove debris from system	_____
c) Check for mechanical damage	_____
d) Check for movement of wind speed and direction sensors	_____
e) Check obstruction lights	_____
f) Check operation of fan on Temperature/RH enclosure	_____

Central Data Platform	
I Inspect system and:	
a) Check display operation	_____
b) Check keyboard operation	_____
c) Check printer operation; check and replace ribbon and paper as necessary	_____
d) Check microphone operation	_____
e) Check dial-up telephone operation	_____
f) Check VHF radio operation	_____
g) Check system clock; adjust if error >1 minute	_____
h) Check speaker operation	_____
i) Check UPS operation, if installed	_____
II Listen to and view the observation	_____
III Record observation	

_____ _____ _____ _____ _____
Location Time Wind Visibility Present Weather

_____ _____ _____ _____
Sky Condition Temperature Dew Point Alt. Setting

_____
Remarks

General

I Note any "missing" parameter or any other obvious failures._____

II Inform AWI of any discrepancies above.
(Note: Failures must be logged on Facilities Maintenance Log)_____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Quarterly Technical Performance Record

Name and Location _____ Date _____

		Accomplished
I	Notify local users	_____
II	Complete monthly tasks and log	_____
III	Apply touch-up paint where needed	_____
IV	Drain and clean pressure port	_____
V	Perform CDP monthly procedures	_____
VI	Inspect Data Collection Platform	_____

VII Sensor Interface Processor

Item	Counts	Acceptable Range	Pass	Fail
+5.0V Reference	_____	4090-4095	_____	_____
-5.0V Reference	_____	0-5	_____	_____

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VIII Wind

Quarterly procedures performed per sensor manual **Y** ____ **N** ____

IX Temperature/Dew Point

Clean probe filter Accomplished _____

Time	Psychrometer Temperature	AWOS Temperature	Psychrometer Wet Bulb	AWOS Dew Point
1.5 min	_____	_____	_____	_____
3.0 min	_____	_____	_____	_____
4.5 min	_____	_____	_____	_____
6.0 min	_____	_____	_____	_____
7.5 min	_____	_____	_____	_____

Average Within ±1°F (±.55°C) A_____ B_____

Average Within ±.5°F (±.28°C) C_____ D_____

Dew Point From A & C E_____

B-A _____ Acceptable Tolerance ±2°F (±1.1°C)

D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of MARS fan Pass _____ Fail _____

X Visibility

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

Item	Initial Value	New Value	% Diff	Acceptable Tolerance	Pass	Fail
Calibration	_____	_____	_____	±3%	_____	_____

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Quarterly Technical Performance Record

Name and Location _____ Date _____

XI Day/Night Sensor

Quarterly procedures performed per sensor manual ____

XII Precipitation Sensor

Quarterly procedures performed per sensor manual ____

XIII Barometric Pressure Sensor

	Serial Number	Reference Standard (A)	Reading (B)	A-B	Acceptable Tolerance	Adjustment Required	Adj. Value A-B
BP1	_____	_____	_____	____	0.005	Y___ N___	_____
BP2	_____	_____	_____	____	0.005	Y___ N___	_____

Note: Adjustment is required if A-B is greater than the acceptable tolerance.

XIV Cloud Height Sensor

Model 8329

Item	Value	Acceptable Tolerance	Pass	Fail
Check Desiccant	_____ (Color)	Blue	_____	_____
Laser Indicator	_____ (Cycles)	On/Off	_____	_____
Check Blower	_____ (Turn-On Time)	3 Minutes	_____	_____

Model 8339

Item	Value	Acceptable Tolerance	Pass	Fail
Check Blower	_____ (Turns on)	Yes	_____	_____
Desiccant replaced		Accomplished	_____	

XV Reasonableness of Output Data

Item	AWOS	Observation Estimate	Acceptable Tolerance	Pass	Fail
Sky Condition*	_____	_____	Consistency	_____	_____
Visibility	_____	_____	±2 Increments	_____	_____
Temperature—Measured Value					
Dew Point—Measured Value					
Wind Direction	_____	_____	±30°	_____	_____
Wind Speed	_____	_____	±5 Knots	_____	_____

* If observation is clear (no clouds), AWOS must be CLR.
If observation has clouds below 12,000, AWOS must be the same.

XVI Present Weather Checks

Field	Display	Acceptable Tolerance	Pass	Fail
Present Weather (W)	_____	Empty if no precip.	_____	_____
Status (Sssss)	_____	S0000	_____	_____
Xnnn	_____	405-420	_____	_____
Lnnn	_____	-30 to 50	_____	_____
Knnn	_____	0 to 150	_____	_____
Hnnn	_____	40 to 120	_____	_____
Tnnn	_____	Ambient ±5° F	_____	_____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Quarterly Technical Performance Record

Name and Location _____ Date _____

XVII Lightning/Thunderstorm Sensor

Quarterly procedures performed per sensor manual ___

XVIII Freezing Rain Sensor

Quarterly procedures performed per sensor manual ___

System Checked and Verified By: Date/Time:

_____ _____

AWOS Annual Technical Performance Record

Name and Location _____ Date _____

		Accomplished
I	Notify local users	_____
II	Complete monthly tasks and log	_____
III	Power up pressure standard	_____
IV	Apply touch-up paint where needed	_____
V	Inspect Data Collection Platform	_____
	a. Drain and clean pressure port	_____

b. Check reference voltages

Item	Counts	Acceptable Range	Pass	Fail
+5.0V Reference	_____	4090-4095	_____	_____
-5.0V Reference	_____	0-5	_____	_____

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VI Inspect tower and tower lights _____

a. 8518-A Foldover Tower, apply grease and oil _____

VII Wind Direction SN _____ 2100 _____ 2020 _____ 2040 _____

a. Align to benchmark (2020 & 2100)

	Acceptable Tolerance	Pass	Fail
Benchmark direction _____	Visually aligned	_____	_____

b. Direction linearity test (2020 & 2100)

Display wind direction on LCD display; rotate full 360°

Any dropouts observed? Y ____ N ____

Any sudden changes observed? Y ____ N ____

360°	±10°	Observed _____
90°	±3°	Observed _____
180°	±3°	Observed _____
270°	±3°	Observed _____

c. Bearing wear test: Vane turns freely (2020 & 2100) _____ _____

VIII Wind Speed SN _____ 2100 _____ 2020 _____ 2040 _____

		Pass	Fail
a. Using 1800 rpm run-up motor, DCP LCD reads:			
79-81 knots (2030)		_____	_____
78-80 knots (2100)		_____	_____
b. Bearing wear test: Cups/Propeller turn freely (2020 & 2100)		_____	_____
c. Lubricate felt washer (2100)	Accomplished _____		
d. Field Zero Wind Check (2040)	0 knots	_____	_____

System Checked and Verified By: _____ Date/Time: _____

AWOS Annual Technical Performance Record

Name and Location _____ Date _____

IX Temperature/Humidity SN _____

Time	Psychrometer Temperature	AWOS Temperature		Psychrometer Wet Bulb	AWOS Dew Point
1.5 min	_____	_____		_____	_____
3.0 min	_____	_____		_____	_____
4.5 min	_____	_____		_____	_____
6.0 min	_____	_____		_____	_____
7.5 min	_____	_____		_____	_____
Average Within ±1°F (±.55°C)	A_____	B_____	Average Within ±.5°F (±.28°C)	C_____	D_____
			Dew Point From A & C	E_____	

B-A _____ Acceptable Tolerance ±2°F (±1.1°C)

D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of 8190 MARS fan Pass _____ Fail _____

X Visibility SN _____

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

Item	Initial Value	New Value	% Diff	Acceptable Tolerance	Pass	Fail
Calibration	_____	_____	_____	±3%	_____	_____

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

XI Day/Night Sensor SN _____

Item	Indication (A)	Reference (B)	Acceptable Tolerance	Pass	Fail
Nighttime	_____	Night	A=B	_____	_____
Daytime	_____	Day	A=B	_____	_____

XII Precipitation Sensor SN _____

a. Check for level Accomplished _____

b. Check for internal damage Accomplished _____

c. Check heaters Accomplished _____

d. Switch test

Item	Measured Value (A)	Reference Value (B)	A-B	Acceptable Tolerance	Pass	Fail
1 cycle	_____	2 counts	_____	±0	_____	_____

XIII Cloud Height Sensor SN _____

Model 8329

Item	Value		Acceptable Tolerance	Pass	Fail
Check Desiccant	_____	(Color)	Blue	_____	_____
Laser Indicator	_____	(Cycles)	On/Off	_____	_____
Check Blower	_____	(Turn-On Time)	3 Minutes	_____	_____

Replace Blower Filters Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XIII Cloud Height Sensor (cont.)

CDP Maintenance Menu:

Status errors _____

Clouds detected when rainfall reported? Yes ____ No ____

Any ceilometer pilot reports logged? Yes ____ No ____

If yes, note report(s): _____

Minimum ceiling check (white paper over lens) Expected: 100 feet Reported: _____ feet

Model 8339

Item	Value	Acceptable Tolerance	Pass	Fail
Check Blower	_____ (Turns on)	Yes	_____	_____
Blower cleared of debris		Accomplished	_____	
Desiccant replaced		Accomplished	_____	

XIV Barometric Pressure

	Serial Number	Reference Standard (A)	Reading (B)	A-B	Acceptable Tolerance	Adjustment Required	Adj. Value A-B
BP1	_____	_____	_____	____	0.005	Y____N____	_____
BP2	_____	_____	_____	____	0.005	Y____N____	_____

Note: Adjustment is required if A-B is greater than the acceptable tolerance.

Altimeter Setting Check Calculated _____inHg Reported _____inHg

XV Present Weather Checks

Field	Display	Acceptable Tolerance	Pass	Fail
Present Weather (W)	_____	Empty if no precip.	_____	_____
Status (Sssss)	_____	S0000	_____	_____
Xnnn	_____	405-420	_____	_____
Lnnn	_____	-30 to 50	_____	_____
Knnn	_____	0 to 150	_____	_____
Hnnn	_____	40 to 120	_____	_____
Tnnn	_____	Ambient ±5° F	_____	_____

XVI Lightning/Thunderstorm Sensor SN _____

a. Check antenna for damage/corrosion Accomplished _____

b. Check antenna sealant Accomplished _____

c. Clean all surfaces Accomplished _____

d. Check hardware and cable connections Accomplished _____

XVII Freezing Rain Sensor SN _____

a. Check sensor and mast for damage/corrosion Accomplished _____

b. Check cables and hardware connections Accomplished _____

c. Clean all surfaces Accomplished _____

XVIII Hardware Inspection Accomplished _____

All rust, corrosion, etc. has been sanded and touch-up paint applied Accomplished _____

Defects: _____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XIX UHF Radio at the Sensor Site (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	1.0W	±0.5W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

XX Central Data Platform

a. Perform monthly procedures Accomplished _____

b. Barometric pressure adjustment

Sensor	Correction	Accomplished
BP1	_____	_____
BP2	_____	_____

c. Voice check (listen to telephone or radio message)

Voice data is clear, no data missing Pass _____ Fail _____

Record observations on monthly form Accomplished _____

d. Voice data check

Estimate the weather conditions, and compare the manual observation with the output of the AWOS obtained above. Agree _____ Disagree _____

If observations disagree, log and correct the failed condition.

_____

e. Voice remark check

Input a test remark using the microphone, verify using the speakers.

Acceptable if the same. Acceptable _____ Unacceptable _____

Delete the test remark. Verify using the speakers. Accomplished _____

XXI UHF Radio at the CDP (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	1.0W	±0.5W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

System Checked and Verified By: Date/Time:

_____ _____

AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XXII UHF Radio at the CDP Antenna - for cables longer than 50' (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at ant.)	_____	0.20W	±0.15W	_____	_____
VSWR (at ant.)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.5 kHz	_____	_____
Deviation	_____	3.0 kHz	2.4-3.8 kHz	_____	_____

XXIII VHF Radio (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at Xmtr)	_____	2.5 W	±1.0 W	_____	_____
VSWR (at Xmtr)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.0 kHz	_____	_____
Modulation	_____	80%	65-95%	_____	_____

XXIV VHF Radio at the Antenna - for cables longer than 50' (performed by FCC certified shop)

Parameter	Measured Value (A)	Standard Value (B)	Acceptable Tolerance (A-B)	Pass	Fail
Radio Pwr (at ant.)	_____	1.0 W	±0.5 W	_____	_____
VSWR (at ant.)	_____	1.0:1	Initial value 2.0:1 (max.)	_____	_____
			Operating value 3.0:1 (max.)	_____	_____
Frequency	_____	_____	±1.0 kHz	_____	_____
Modulation	_____	80%	65-95%	_____	_____

XXV NADIN Interface (as applicable)

Operation of the link confirmed with CLH — Accomplished _____

XXVI Monthly and Quarterly Logs Review

Review all monthly and quarterly log sheets for compliance with manual — Accomplished _____

System Checked and Verified By: _____ Date/Time: _____

TEMPERATURE/DEW POINT WORK SHEET

VERIFICATION EXPERIMENT NUMBER: _____ DATE: _____ OBSERVER: _____

TABLE I, EXPERIMENTAL DATA

PROCEDURE STEP	TIME	AWOS TEMPERATURE/ DEW POINT SENSOR INDICATIONS		CORRECTED VALUES			
				REFERENCE PSYCHROMETER #1 IDENTIFICATION: _____		REFERENCE PSYCHROMETER #2 IDENTIFICATION: _____	
		TEMP T_{ind} (°F)	DEW POINT DP_{ind} (°F)	T_{dry} (°F)	T_{wet} (°F)	T_{dry} (°F)	T_{wet} (°F)
AFTER 1.5 MIN.							
AFTER 2.5 MIN.							
AFTER 3.5 MIN.							
AFTER 4.5 MIN.							
AFTER 5.5 MIN.							

TABLE II, REFERENCE VALIDITY CHECK

IS T_{dry} FROM REFERENCE #1 WITHIN 1°F OF REFERENCE #2? (YES/NO)	IS T_{wet} FROM REFERENCE #1 WITHIN 1°F OF REFERENCE #2? (YES/NO)	IS T_{wet} FROM REFERENCE #1 WITHIN 0.5°F OF FOLLOWING T_{wet}? (YES/NO)	IS T_{wet} FROM REFERENCE #2 WITHIN 0.5°F OF FOLLOWING T_{wet}? (YES/NO)	IF ALL 'YES' ENTER 'PASS', OTHERWISE ENTER 'FAIL'	NUMBER EACH 'PASS' CHECK *
		X	X	X	X

*NOTE:
IF NUMBER OF PASS CHECKS IN TABLE II IS LESS THAN 3, DO NOT CONTINUE WITH EXPERIMENT. IF PASS CHECKS NUMBER 3 OR MORE, CONTINUE ON TO TABLE III, AND COMPUTE DEW POINT TEMPERATURE FROM CORRESPONDING WET/DRY TEMPERATURE DATA. (USE STANDARD PSYCHROMETRIC TABLES).

TABLE III, DEW POINT CALCULATION

NUMBER OF PASS CHECK	REFERENCE PSYCHROMETER #1		REFERENCE PSYCHROMETER #2	
	TEMP T_{dry} (°F)	DEW POINT (°F)	TEMP T_{dry} (°F)	DEW POINT (°F)
1				
2				
3				
4				

TABLE IV, TEMPERATURE ANALYSIS

AVERAGE REFERENCE TEMP T_{ref} (°F)	CORRESPONDING AWOS SENSOR TEMP. INDICATION T_{ind} (°F)	$T_{ref} - T_{ind}$ (°F)	$(T_{ref} - T_{ind})^2$ (°F)

TABLE V, DEW POINT ANALYSIS

AVERAGE REFERENCE DEW POINT DP_{ref} (°F)	CORRESPONDING AWOS SENSOR DEW PT. INDICATION DP_{ind} (°F)	$DP_{ref} - DP_{ind}$ (°F)	$(DP_{ref} - DP_{ind})^2$ (°F)

TABLE i, UNCORRECTED VALUES

REFERENCE PSYCHROMETER #1 IDENTIFICATION: _____		REFERENCE PSYCHROMETER #2 IDENTIFICATION: _____	
T_{dry} (°F)	T_{wet} (°F)	T_{dry} (°F)	T_{wet} (°F)

ADD ALL $(T_{ref} - T_{ind})^2$ VALUES		
DIVIDE ABOVE VALUE BY NUMBER OF 'PASS' CHECKS		
CALCULATE SQUARE ROOT		°F RMSE

ADD ALL $(DP_{ref} - DP_{ind})^2$ VALUES		
DIVIDE ABOVE VALUE BY NUMBER OF 'PASS' CHECKS		
CALCULATE SQUARE ROOT		°F RMSE

AWOS-WS.DWG

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903-027
Revision P
ECO 1691
November, 2008