



Federal Aviation Administration

Memorandum

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Subject: Updated Approval of Standalone and Backup Weather Equipment for Federal Contract Towers, Non-FAA Control Towers and Other Aviation Facilities

The purpose of this memo is three-fold:

1. To reiterate the need for the use of acceptable standalone and backup weather equipment to ensure that pilots obtain all appropriate weather information from approved sources to meet the weather requirements of part 121 and 135 flight operations.
2. To provide further insight into what constitutes acceptable aviation weather sources and
3. To augment the previously issued lists of approved standalone and backup weather equipment found in the FAA memorandum dated June 12, 2014.

BACKGROUND

As discussed in the FAA memorandum dated February 29, 2012, it was determined that weather equipment was being used to provide unacceptable aviation weather information. Several orders, most notably FAA Order 7900.5C, identify the need for weather equipment to be approved by the FAA. However, other than requiring the use of approved weather equipment, these orders do not identify the criteria to be used to determine approval or the FAA organization responsible for establishing the criteria and approving the equipment. The referenced April 16, 2012 memorandum recommended that the non-Fed AWOS sensor range, accuracy, operating environment, siting and maintenance criteria be used for standalone and backup weather equipment. As stated in the October 20, 2014 memorandum, the plan is to incorporate standalone and backup weather equipment into a revision of the non-Federal Automated Weather Observing System Advisory Circular, 150/5220-16 by October 1, 2016.

For the purposes of this memorandum, the term "weather observer" includes Certified Weather Observers (CWOs), Limited Aviation Weather Reporting Station (LAWRS) observers, Non-

Federal Observers (NF-OBS) and in accordance with FAA Order 7900.5C, anyone else certified by the FAA to provide aviation weather information.

Throughout this process, the need for accurate and reliable reporting of aviation weather information has been and will continue to be an FAA requirement. In accordance with FAA order 7900.5C, the weather observer is responsible for providing certified weather information in a timely manner based on FAA approved equipment. The weather observer is responsible for using this information and other approved resources, including a reliable time source, in the creation of the certified weather information. Without the necessary reliable weather information, part 121 and 135 flights may need to be canceled, delayed or diverted elsewhere.

CHARACTERISTICS

For the purposes of this memorandum, weather equipment can be grouped into three different types, primary, standalone and backup.

- Primary weather equipment includes advanced automated weather systems, e.g. ASOS or AWOS, that include information from multiple diverse sensors and other capabilities. (The discussion of primary weather equipment is beyond the scope of this memorandum.)
- Standalone weather equipment includes free standing individual weather sensors and their displays. Standalone weather equipment normally serves as backups to primary weather equipment. In the absence of primary weather equipment, standalone weather equipment can serve as the primary source of weather information.
- Backup weather equipment includes limited capability weather equipment that is to be used when no other acceptable source of the weather information is available.

Given that standalone and backup weather equipment is used for the same purpose as primary weather equipment, it should meet the same accuracy, siting, certification, maintenance, etc. criteria as primary equipment to the greatest extent possible. At no time is standalone or backup weather equipment to be used beyond the manufacturer's specifications or limitations.

While providing the same parameter as the primary weather equipment, there may be differences in the nature of the information provided by standalone and backup weather equipment. Primary weather equipment frequently provides values that have been averaged over time whereas standalone or backup equipment may provide instantaneous values and it is up to the user to determine the average, range or maximum as appropriate. A good example of this is wind. Primary systems provide wind speed, direction and gust information that has been processed using FAA defined algorithms over the most recent 2 minutes whereas standalone or backup equipment will provide frequently updated instantaneous values and the user must estimate the appropriate average speed and direction values and identify gust conditions.

EVALUATION PROCESS

Weather equipment that has been brought to AJW-1444's attention is carefully evaluated against the appropriate criteria found in the advisory circular. The results of these evaluations may be found in the most recent approved equipment and sensors lists included in attachment 2. Sensor approval only indicates that it meets the advisory circular criteria. Conditional approval indicates that it can be used, provided it is used in accordance with the identified limitations.

During the course of these evaluations, several general concerns have been identified. These are discussed below.

ALTIMETRY CONCERNS

Local barometric pressure, sea level pressure and altimeter setting are not the same and cannot be used interchangeably. For aviation purposes the properly calculated altimeter setting must be provided.

For example, based on correspondence received from RM Young, their Meteorological Translator, Model 26800, "...displays/stores barometric pressure. It doesn't provide altimeter settings". For this reason, this standalone device cannot be approved as an altimeter setting source.

SITING CONCERNS

Weather sensors must be properly sited so as to not be adversely influenced by local conditions. To the greatest extent possible, standalone and backup weather sensors should be sited in accordance with the sensor specific siting criteria contained in the latest edition of FAA Order 6560.20. The use of handheld backup weather equipment should also take into consideration the same siting criteria to the greatest extent possible.

With the exception of the barometric pressure sensor's pressure port, the mounting of primary, standalone and backup weather equipment on the control tower building or any other building is not acceptable. These locations do not meet the criteria identified in the siting order and can result in weather information that is significantly different from that encountered by aircraft. In accordance with the siting order, the barometric pressure sensor's pressure port may be mounted on the exterior of the control tower building. The barometric pressure sensor must be vented to the outside to assure that the altimeter setting reflects the outdoor environment. (The indoor pressure created by positive pressure ventilation systems can significantly influence the altimeter setting which can result in dangerously significant differences in altimeter setting values.)

In some cases, siting criteria are mutually exclusive and cannot be properly addressed for the sensors included in a multi-sensor or "all-in-one" device. Only multi-sensors devices having sensors that are subject to the same siting criteria should be considered when considering a multi-sensor device.

The combination of the wind sensor and the temperature/dew point sensor is particularly problematic. These two sensors have mutually exclusive elevation siting criteria, an elevation that works for one doesn't work for the other.

COMMUNICATION CONCERNS

In keeping with the agency's ban on the use of unlicensed transmitters, the use of unlicensed spread spectrum devices to transmit weather information is not permitted. Properly licensed RF modems may be used to communicate weather information wirelessly. Additional information regarding this issue may be found in the following documents:

Advisory Circular 150/5220-16D, Automated Weather Observing Systems (AWOS) for Non-Federal Applications, dated 4/28/2011.

FAA Order 1370.94A, Wireless Technologies Security Policy, dated 9/10/08 and

FAA Memorandum, Use of Wireless Devices in the National Airspace System, dated 9/9/09.

In order for hardwired connections between remotely located sensors and the indicators in the tower cab or elsewhere to be acceptable, the same surge protection requirements and practices used for any other power, communication or data line entering the building must be applied to standalone and backup weather equipment interfaces.

MAINTENANCE CONCERNS

Just like the primary weather equipment, it is important that standalone and backup weather equipment be properly maintained, calibrated and inspected in accordance with the manufacturer's information so that when it is called upon to perform, it will. Backup weather equipment is used infrequently - when the primary weather equipment is not available, thus it should be periodically compared to the primary to assure it is functioning properly.

On-site checklists should be used to periodically check the equipment to make sure it is in working order. The backup weather equipment site should be checked to make sure it continues to meet the siting criteria and is not being encroached upon.

OPERATIONAL/PROGRAMATIC CONCERNS

Weather equipment displays should be located in secure protected areas to prevent accidental damage or setting changes (e.g. accidentally changing the displayed units). Before using backup equipment, make sure it is functioning properly. (E.g. displaying the correct units, sensor is clear of obstructions, etc.

CONCLUSION

Please share this information with contract control towers, non-FAA control towers, non-towered airports and others within your area with the reminder that only weather observers that have been properly certified and using FAA approved equipment are authorized to provide aviation weather information.

Please contact 9-AMC-Weather-Systems-Support@faa.gov for the current equipment list, should you have any questions, e.g. regarding the suitability of a particular device not found on the list, or desire further information.

Attachments (References)

This page's contact information was updated on March 3, 2021. This memo remains otherwise unchanged from its original version.

Attachment 1: References

- References: FAA Memorandum, Ongoing Approval of Standalone and Backup Weather Equipment for Federal Contract Towers, Non-FAA Control Towers and Other Aviation Facilities, dated June 12, 2014.
- FAA Memorandum, Approval of Standalone and Backup Weather Equipment for Federal Contract Towers, Non-FAA Control Towers and Other Aviation Facilities, dated March 25, 2014.
- FAA Memorandum, Clarification of Federal Aviation Administration (FAA) Approved Weather Equipment Criteria for Contract Towers, dated April 16, 2012.
- FAA Memorandum, Use of Non-FAA Approved Weather Equipment, dated February 29, 2012.
- FAA Memorandum, Extension of Weather Equipment Usage Waiver for Federal Contract Towers and Non-FAA Control Towers, dated October 20, 2014.
- FAA Advisory Circular 150/5220-16D, Automated Weather Observing Systems (AWOS) for Non-Federal Applications, dated April 28, 2011.
- FAA Order 6560.20B, Siting Criteria for Automated Weather Observing Systems (AWOS), dated July 20, 1998.
- FAA Order 7900.5C, Surface Weather Observing, dated December 21, 2012.

Attachment 2: Approved Standalone and Backup Weather Equipment and Sensors as of 8/20/2015

The most recent version of these lists of approved, conditionally approved, and handheld equipment should be used when acquiring equipment. These lists will be revised and reissued as needed.

Approved Equipment

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|------------------|-------------------|------------------------|------------------------|---------------|-----------------|--|
| Sensor & Display | BP/Alt | DME | DASI | Grandfathered | N/A | Existing sites may continue to use. Currently not in production. |
| Sensor & Display | BP/Alt | Kollsman | 1130-031 AP180502 | Grandfathered | N/A | Existing sites may continue to use. Currently not in production. |
| Interface | BP | RM Young | 61002 Pressure Port | Grandfathered | NA | This pressure port has been used on many FAA AWOS systems. |
| Interface | BP | Gill | 61002 Pressure Port | Approved | Prior to 2013 | This pressure port is also known as the RM Young 61002 pressure port. |
| Sensor | T/DP | Technical Services Lab | FA Type 1088 | Grandfathered | N/A | <p>This sensor has been used by the FAA and the NWS for many years.</p> <p>This hygrometer transmitter unit is approved for use as an integral part of the ASOS.</p> <p>This sensor must be sited in accordance with the siting criteria. The information generated by this unit must be interpreted in accordance with the ASOS temperature and dew point algorithms.</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|------------------|-------------------|--------------|---------------------|----------|-----------------|--|
| Sensor & Display | Alt | Various | Aircraft Altimeters | Approved | 8/19/15 | <p>Aircraft altimeters may be used as the altimeter setting source under the following conditions: Two aircraft altimeters are needed when used as the primary altimeter source. Only one aircraft altimeter is needed if it is used as the backup altimeter source.</p> <p>Aircraft altimeters must be calibrated annually by an FAA approved altimeter calibration facility and crosschecked monthly.</p> <p>Please note, the altimeter's pressure sensor must be installed in a suitable environment and properly vented to the outside using crush proof tubing, especially in areas subject to movement or wear.</p> <p>Need to be at a known, surveyed height.</p> |

Conditionally Approved Equipment

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|------------------|-------------------|--------------|----------------------------------|------------------------|-----------------|---|
| Interface | | RM Young | Serial Interface 32400 | Conditionally Approved | 6/2/14 | <p>This settable interface device converts and combines one or more weather sensor outputs into a message that can be communicated serially via RS-232 or RS-485 to the display or processor.</p> <p>It is conditionally approved for use when used with a hardwired connection to the display or processor or when used with a licensed RF modem. It is not approved for use with unlicensed, e.g. spread spectrum, modems.</p> |
| Sensor | BP | RM Young | 61302 Barometric Pressure Sensor | Conditionally Approved | 6/2/14 | <p>Based on its data sheet, it appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>This sensor does not provide altimeter setting information. In order for it to be suitable for aviation purposes, its output must be properly converted to an altimeter setting. Its normal display, the RM Young Meteorological Translator, 26800 is not capable of performing this function.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert sensed pressure values into altimeter setting values in accordance with the criteria identified in the advisory circular.</p> |
| Sensor & Display | BP/Alt | Setra | 370 | Conditionally Approved | 8/20/12 | <p>Based on its data sheet, it appears to meet the advisory circular defined indoor environmental, range and accuracy criteria.</p> <p>This device is able to display altimeter (sea level pressure) information provided it has been properly set up in accordance with the instruction manual and the sensor's properly surveyed elevation has been entered into the device.</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|------------------|-------------------|--------------|-------------------------------------|------------------------|-----------------|---|
| | | | | | | The sensor must be installed in a suitable indoor environment and properly vented to the outside. |
| Display | T/DP | RM Young | 46203 Temperature Tracker | Conditionally Approved | 3/17/14 | <p>This is the display device used with the RM Young 41382 temperature/dew point sensor.</p> <p>This device meets the advisory circular indoor environmental criteria.</p> <p>This device must be set up to display dew point. This can be done by changing a setup setting. A “DEW POINT” label is provided to be placed over the “RELATIVE HUMIDITY” label silk screened on the front of the display.</p> |
| Radiation Shield | T/DP | RM Young | 43408 Aspirated Radiation Shield | Conditionally Approved | 3/17/14 | <p>Please refer to the siting order for the appropriate temperature/dew point sensor siting criteria.</p> <p>This device meets the advisory circular outdoor environmental criteria.</p> |
| Sensor | T/DP | RM Young | 41382 Temperature/Relative Humidity | Conditionally Approved | 6/2/14 | <p>This sensor is valid for use within the manufacturer’s specified range of -50°C to +50°C only. (The advisory circular, 150/5220-16D, temperature range is -35°C to +55°C.)</p> <p>It must be used with the 43502 aspirated radiation shield and the membrane filter.</p> |
| Display | WS/WD | RM Young | 06201 Wind Tracker | Conditionally Approved | 6/2/14 | <p>This display device meets the advisory circular indoor environmental criteria.</p> <p>This display provides instantaneous wind speed and direction as well as recent wind direction information and can be set up to provide average wind speed or maximum wind speed over a user defined period of time.</p> <p>The displayed maximum wind speed is not consistent with the aviation definition for gust information.</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|--------|-------------------|--------------|--|---------------------------|-----------------|--|
| Sensor | WS/WD | RM Young | 05108 Heavy Duty Wind Monitor | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor does not appear to fully meet the advisory circular defined outdoor environmental temperature or icing criteria. This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> <p>Icing: While not heated, this sensor is designed to minimize the impact of freezing rain. In freezing rain conditions it is possible for the vane (wind direction) and/or the propeller (wind speed) to be adversely impacted by ice accretion which may inhibit its ability to report wind speed and/or direction correctly. For this reason, this sensor is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.)</p> |
| Sensor | WS/WD | RM Young | 85004 Ultrasonic | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor appears to meet the advisory circular defined icing environmental criteria, however, it does not appear to meet the defined environmental temperature criteria.</p> <p>Temp range: This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|--------|-------------------|--------------|--------------------------|---------------------------|-----------------|--|
| | | | | | | <p>Icing: This sensor has thermostatically controlled heaters in the transducer and housing surfaces to minimize the impact of freezing rain. However it is still possible for freezing rain to adversely impact the performance of this sensor. For this reason, it is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.)</p> |
| Sensor | WS/WD | RM Young | 05103 Wind Monitor | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor does not appear to fully meet the advisory circular defined outdoor environmental temperature or icing criteria. This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> <p>Icing: While not heated, this sensor is designed to minimize the impact of freezing rain. In freezing rain conditions it is possible for the vane (wind direction) and/or the propeller (wind speed) to be adversely impacted by ice accretion which may inhibit its ability to report wind speed and/or direction correctly. For this reason, this sensor is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|--------|-------------------|--------------|-----------------------------|---------------------------|-----------------|--|
| | | | | | | freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.) |
| Sensor | WS/WD | RM Young | 05305 Wind Monitor-AQ | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor does not appear to fully meet the advisory circular defined outdoor environmental temperature or icing criteria. This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> <p>Icing: While not heated, this sensor is designed to minimize the impact of freezing rain. In freezing rain conditions it is possible for the vane (wind direction) and/or the propeller (wind speed) to be adversely impacted by ice accretion which may inhibit its ability to report wind speed and/or direction correctly. For this reason, this sensor is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.)</p> |
| Sensor | WS/WD | RM Young | 03002 Wind Sentry | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor does not appear to fully meet the advisory circular defined outdoor environmental temperature or icing criteria. This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|--------|-------------------|--------------|--------------------------|---------------------------|-----------------|---|
| | | | | | | <p>Icing: While not heated, this sensor is designed to minimize the impact of freezing rain. In freezing rain conditions it is possible for the vane (wind direction) and/or the propeller (wind speed) to be adversely impacted by ice accretion which may inhibit its ability to report wind speed and/or direction correctly. For this reason, this sensor is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.)</p> |
| Sensor | WS/WD | RM Young | 05106 Wind Monitor | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor does not appear to fully meet the advisory circular defined outdoor environmental temperature or icing criteria. This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> <p>Icing: While not heated, this sensor is designed to minimize the impact of freezing rain. In freezing rain conditions it is possible for the vane (wind direction) and/or the propeller (wind speed) to be adversely impacted by ice accretion which may inhibit its ability to report wind speed and/or direction correctly. For this reason, this sensor is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|-----------------------------|-------------------|------------------------------|------------------|------------------------|-----------------|---|
| | | | | | | range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.) |
| Sensor | WS/WD | RM Young | 85000 Ultrasonic | Conditionally Approved | 6/3/14 | <p>Based on its wind speed and wind direction specifications, this sensor appears to meet the advisory circular range and accuracy criteria.</p> <p>This sensor appears to meet the advisory circular defined icing environmental criteria; however, it does not appear to meet the defined environmental temperature criteria.</p> <p>Temp range: This sensor is valid for use within the manufacturer's specified range of -50°C to +50°C only.</p> <p>Icing: This sensor has thermostatically controlled heaters in the transducer and housing surfaces to minimize the impact of freezing rain. However it is still possible for freezing rain to adversely impact the performance of this sensor. For this reason, it is not approved for aviation purposes when icing events or freezing rain conditions exist.</p> <p>(The advisory circular, 150/5220-16D, temperature range criteria is -35°C to +55°C. The icing criteria state that it should continue to operate during freezing rain at a rate equivalent to a buildup of 1/2 inch per hour, lasting for a period of 1 hour with up to 40 knot winds.)</p> |
| Sensor, Display & Interface | WS/WD | Electric Speed Indicator Co. | F420C | Conditionally Approved | 5/1/14 | <p>This wind speed and direction package consisting of the following components is approved for use based on its approval and use by the FAA at Federal facilities:</p> <p style="text-align: center;">F420C Wind Speed Transmitter</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|--------|-------------------|--------------|-----------|------------------------|-----------------|---|
| | | | | | | <p>F420C Wind Direction Transmitter F420C Wind Speed Indicator F420C Wind Direction Indicator F420C Wireless (Licensed UHF) Telemetry System</p> <p>It is conditionally approved based on the need to site the wind speed and wind direction transmitters in accordance with the siting order and the use of hardwired connections or the licensed frequency UHF telemetry system to communicate between the sensors and the tower cab.</p> |
| Sensor | WS/WD | Vaisala | 425 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind speed and direction values in accordance with the criteria identified in the advisory circular.</p> |
| Sensor | BP | Setra | 470 | Conditionally Approved | 7/16/15 | <p>Based on its data sheet, it appears to meet the advisory circular defined indoor environmental, range and accuracy criteria.</p> <p>This sensor does not provide altimeter setting information. It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert sensed pressure values into altimeter setting values in accordance with the criteria identified in the advisory circular. It must be properly set up including entering the sensor's properly surveyed elevation into the device.</p> <p>The sensor must be installed in a suitable indoor environment and properly vented to the outside.</p> |
| Sensor | BP | Setra | 470T | Conditionally Approved | 7/16/15 | <p>Based on its data sheet, it appears to meet the advisory circular defined environmental, range and</p> |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|------------------|-------------------|----------------|-----------|------------------------|-----------------|--|
| | | | | | | <p>accuracy criteria.</p> <p>This sensor does not provide altimeter setting information. It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert sensed pressure values into altimeter setting values in accordance with the criteria identified in the advisory circular. It must be properly set up including entering the sensor's properly surveyed elevation into the device.</p> <p>The sensor must be installed in a suitable environment and properly vented to the outside.</p> |
| Sensor & Display | BP/Alt. | Paroscientific | 765-16B | Conditionally Approved | 7/16/15 | <p>Based on its data sheet, it appears to meet the advisory circular defined indoor environmental, range and accuracy criteria.</p> <p>This device is able to display altimeter information provided it has been properly set up in accordance with the instruction manual and the sensor's properly surveyed elevation has been entered into the device.</p> <p>The sensor must be installed in a suitable indoor environment and properly vented to the outside.</p> |
| Sensor | WD | All Weather | 2020 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind direction values in accordance with the criteria identified in the advisory circular.</p> |
| Sensor | WS | All Weather | 2030 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> |

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|--------|-------------------|--------------|-----------|------------------------|-----------------|---|
| | | | | | | It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind speed values in accordance with the criteria identified in the advisory circular. |
| Sensor | WS/WD | All Weather | 2100 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind speed and direction values in accordance with the criteria identified in the advisory circular.</p> |
| Sensor | WS/WD | All Weather | 2040 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind speed and direction values in accordance with the criteria identified in the advisory circular.</p> |
| Sensor | WS/WD | Vaisala | WA15 | Conditionally Approved | 7/16/15 | <p>Based on its specifications, this sensor appears to meet the advisory circular defined environmental, range and accuracy criteria.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed wind information into wind speed and direction values in accordance with the criteria identified in the advisory circular.</p> |

Handheld Equipment

By their very nature, handheld devices require additional effort by the user to make sure they are being used properly and the values they provide correctly reflect local conditions. For this reason, all handheld equipment is conditionally approved for backup use only. It is not approved as primary or standalone equipment.

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
|---------------------------|-------------------|--------------|-----------|------------------------|-----------------|---|
| Handheld Sensor & Display | BP | Druck | 740 | Conditionally Approved | 6/9/14 | <p>When properly maintained, calibrated and used, the Druck 740 is an acceptable source of backup barometric pressure.</p> <p>The Druck 740 provides barometric pressure only. It does not provide altimeter setting. (It does provide an altitude measurement which must not be confused with an FAA acceptable altimeter setting.)</p> <ul style="list-style-type: none"> The Druck 740 is valid for use only within the manufacturer's specified range of -10°C to +50°C and 750 mbar (22.15 inHg) to 1150 mbar (33.96 inHg). (The advisory circular, 150/5220-16D temperature range is -35°C to +55°C and the pressure range is 17.58 inHg to 31.53 inHg.) The pressure sensor must be used and maintained in accordance with the manufacturer's instructions. <p>While the Druck 740 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>Processing Restriction:</p> <ul style="list-style-type: none"> The Druck's barometric pressure measurement must be properly converted to an altimeter setting using NOAA or NWS provided altimeter equations and the |

| Device | Weather Parameter | Manufacturer | Model No. | Status | Evaluation Date | Evaluation & Discussion |
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| | | | | | | <p>surveyed elevation of the observation point by the weather observer.</p> <p>Temperature Restrictions:</p> <ul style="list-style-type: none"> • Due to the LCD display's characteristics, the Druck 740 can only be reliably read between the temperatures of -10°C and +50°C (+14°F and +122°F). This is due to the LCD display's characteristics. The display unit should be kept in a warmer environment where the display will function properly (e.g. inside a coat pocket where it can be removed for a brief look to capture the pressure information. <p>Location Restrictions:</p> <ul style="list-style-type: none"> • The Druck 740 is to be used outdoors at a known elevation above mean sea level as determined by a qualified surveyor. (Indoor pressure measurements are not suitable for aviation purposes.) • It is to be used in an open area, away from external influences including, but not limited to jarring vibration, rapid temperature fluctuations (i.e. jet blast), direct sunlight and air currents from heating or cooling systems. • The readings must be allowed to stabilize for no less than 1 minute. |
| Handheld Sensor & Display | T/DP | Rotronic | HP22/HC-2S | Approved | 7/24/13 | <p>When properly maintained and calibrated, the Rotronic HP22 Humidity Temperature Meter combined with the Rotronic HC2-S sensor probe is an acceptable source of standalone and backup temperature, relative humidity and dew point.</p> <p>Because it is a handheld device, it is recommended that a cable be used between the probe and the display to allow the probe to be outside while the</p> |

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| | | | | | | <p>display is in a more suitable environment for it to function properly (e.g. inside the users coat) as the display is only good to -10°C.</p> <p>While the Rotronic HP22 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>Temperature Restrictions:</p> <ul style="list-style-type: none"> • Due to the LCD display's characteristics, the Rotronic HP22 can only be reliably read between the temperatures of -10 and +55°C (+14 and +131°F). Readings outside this range are to be taken using the cable (Rotronic part no. E2-02A) between the probe and the display unit. The display unit should be kept in a warmer environment where the display will function properly (e.g. inside a coat pocket where it can be removed for a brief look to capture the temperature and dew point information. <p>Location Restrictions:</p> <ul style="list-style-type: none"> • The Rotronic HP22 is to be used in an open area, away from external influences including, but not limited to roof tops and expanses of blacktop or concrete. • The sensor probe is to be held at arms-length upwind of the user. • Any sources of heat and humidity, including the user's hand, must be kept as far from the sensor probe as practical. • The readings must be allowed to stabilize for no less than 1 minute. • It is to be shaded from direct or reflected |

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| | | | | | | sunlight. |
| Handheld Sensor & Display | T/DP | Kestrel | 4000 | Conditionally Approved | 3/12/14 | <p>While the Kestrel 4000 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>The Kestrel 4000 Pocket Weather Tracker™ is capable of measuring various weather parameters. For aviation purposes as a backup weather device, its use is restricted to reporting temperature and dew point. It is not approved for the measurement or reporting of any other weather parameter.</p> <p>Location Restrictions:</p> <ul style="list-style-type: none"> • The Kestrel 4000 is to be used in an open area, away from external influences including, but not limited to roof tops and expanses of blacktop or concrete. • It is to be held at arms-length upwind of the user. • It is to be held by its sides on the lower half of the body only. (The temperature and relative humidity sensors are located near the impeller.) Any sources of heat and humidity, including the user's hand, must be kept as far from the sensors as practical. • The readings must be allowed to stabilize for no less than 1 minute. • It is to be shaded from direct or reflected sunlight. <p>Temperature Restrictions:</p> <ul style="list-style-type: none"> • The Kestrel 4000's operational temperature limits are -10 and +55°C (+14 to +131°F). This is due to the LCD display's characteristics where the display can be read |

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| | | | | | | <p>reliably.</p> <ul style="list-style-type: none"> Readings outside this range are to be taken using the Kestrel 4000's manually store current conditions to memory function, noting the date and time of the save. After saving the current conditions, the unit is to be returned to a warmer environment where the display will function properly. Then, using the chart viewing capability, the user would go to the temperature and dew point history information screen, verify the date and time and read the captured data. |
| Handheld Sensor & Display | T/DP | NovaLynx Sling Psychrometer | 225-570-A 225-571-A | Conditionally Approved | 6/2/14 | <p>The NovaLynx sling psychrometers, model 225-571-A and 225-570-A, are conditionally approved for use for the measurement of temperature and dew point for aviation purposes. The 225-571-A psychrometer is graduated in degrees Celsius whereas the 225-570-A psychrometer is graduated in degrees Fahrenheit.</p> <p>Please note, this evaluation was based solely on its ability to measure temperature and dew point. This evaluation does not address any other aspects of this device.</p> <p>The following conditions apply:</p> <ul style="list-style-type: none"> The 225-571-A psychrometer is valid for use only within the manufacturer's specified range of -30°C to +50°C. The 225-570-A psychrometer is valid for use only within the manufacturer's specified range of -20 to +120°F. (The advisory circular, 150/5220-16D, temperature range is -35°C to +55°C.) The psychrometer must be used and maintained in accordance with the manufacturer's instructions. This psychrometer must be used in a suitable open area to ensure that |

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| | | | | | | <p>measurements are representative of the free air circulating in the locality and not influenced by artificial conditions such as large buildings, cooling towers, and expanses of concrete or tarmac.</p> <ul style="list-style-type: none"> This psychrometer must be used with due consideration for the safety of the user and others in the area and away from any equipment or structures that may interfere with the proper use of the device. |
| Handheld Sensor | T/DP | Rotronic | HC2-HK25 | Conditionally Approved | 7/15/15 | <p>While the Rotronic HC2-HK25 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>Dew point is calculated, not measured.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been demonstrated to convert it sensed information into temperature and dew point values in accordance with the criteria identified in the advisory circular.</p> |
| Handheld Sensor | T/DP | Vaisala | HMP155 | Conditionally Approved | 7/15/15 | <p>Based on its temperature and dew point specifications, this sensor does not appear to fully meet the advisory circular defined temperature and humidity sensor criteria.</p> <p>While the Vaisala HMP155 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>It is conditionally approved for use only when used with an interface and display device that have been</p> |

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| | | | | | | demonstrated to convert it sensed information into temperature and dew point values in accordance with the criteria identified in the advisory circular. |
| Handheld Sensor & Display | T/DP | Kestrel | 3500 | Conditionally Approved | 7/15/15 | <p>While the Kestrel 3500 may be a useful, reliable device, it does not fully meet the criteria identified in the advisory circular. It is a handheld device. It is not designed for permanent outdoor installation. Certain restrictions must be in place in order for it to be used in the aviation environment.</p> <p>The Kestrel 3500 Pocket Weather Tracker™ is capable of measuring various weather parameters. For aviation purposes as a backup weather device, its use is restricted to reporting temperature and dew point. It is not approved for the measurement or reporting of any other weather parameter.</p> <p>Location Restrictions:</p> <ul style="list-style-type: none"> • The Kestrel 3500 is to be used in an open area, away from external influences including, but not limited to roof tops and expanses of blacktop or concrete. • It is to be held at arms-length upwind of the user. • It is to be held by its sides on the lower half of the body only. (The temperature and relative humidity sensors are located near the impeller.) Any sources of heat and humidity, including the user's hand, must be kept as far from the sensors as practical. • The readings must be allowed to stabilize for no less than 1 minute. • It is to be shaded from direct or reflected sunlight. <p>Temperature Restrictions:</p> <ul style="list-style-type: none"> • The Kestrel 3500's operational temperature limits are -10 and +55°C (+14 to +131°F). |

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| | | | | | | <p>This is due to the LCD display's characteristics where the display can be read reliably. Readings outside this range are to be taken using the Kestrel 3500's manually store current conditions to memory function, noting the date and time of the save. After saving the current conditions, the unit is to be returned to a warmer environment where the display will function properly. Then, using the chart viewing capability, the user would go to the temperature and dew point history information screen, verify the date and time and read the captured data.</p> |