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Document Title: ATU Compliance Report

For the Installation of an Additional Telemetry Unit (ATU) in Helicopters
Equipped with Water Bucket System or Tank System to comply with USFS
Solicitations for National Medium Exclusive Use Helicopters

Document Number: ETS131-USFSCR-1

Rev	Description of Change	Prepared By	Approved By	Date
IR	Initial Release	M. Reynolds	D. Barton	7 March 2018
A	Update to incorporate Solicitation Number 12024B19R0001 Requirements.	M. Reynolds	D. Barton	02 Dec 2019
B	Update to incorporate Solicitation Number 1202SA21R9005 Requirements.	M. Reynolds	M. Reynolds	24 Feb 2021
C	Miscellaneous updates to clarify compliance to Solicitation Number 1202SA21R9005. Clarify other compliance items	M. Reynolds	M. Reynolds	11 Feb 2022
D	Miscellaneous updates to clarify compliance to Solicitation Number 1202SA22R9201.	M. Reynolds	M. Reynolds	22 Aug 2022
E	Miscellaneous updates	M. Reynolds	M. Reynolds	16 April 2024
F	Add 606-E2-400/ETS-131-006 part numbers. Remove STC Reference.	M. Reynolds	M. Reynolds	21 July 2026

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1.0 Introduction

The purpose of this document is to provide a means to verify that the USFS National Medium Exclusive Use Helicopters contractual requirements have been considered and incorporated into the design and testing of an Olympic Aero ETS Additional Telemetry Unit (ATU). See Appendix B for the ATU specifications.

The USFS requirements are located in the USFS solicitations under Additional Telemetry Unit (ATU) and USFS ATU Inquiry Letter (file code: 6320) and other solicitations. These requirements have been extracted and delineated in Table 1.0.1. This Table 1.0.1 is cross referenced to Table 2.0.1 which indicates the ATU design feature that provides compliance to the respective ATU/AFF requirements.

1.1 Abbreviations

ACO Aircraft Certification Office

AFF Aircraft Flight Follower

ATU Additional Telemetry Unit

USFS United States Forest Service

1.2 Summary and Conclusions

The Olympic Aero ETS 583/606/[ETS-131](#) series ATU Installation fully complies (without exception) with the requirements disclosed by this report, USFS solicitations under Additional Telemetry Unit (ATU) and the USFS ATU Inquiry Letter (file code: 6320) dated February 22, 2018.

1.3 List of Solicitations and letters (File Codes)

The following list of solicitations and letters are not comprehensive, but represent a sample of various solicitations provided by the USFS. This document may be utilized as a compliance method for other solicitations not listed herein.

- a. Solicitation 12024B19R0001 Amendment 01
- b. Solicitation_12024B18R9301
- c. Solicitation_No._AG-024B-S-17-9002
- d. Solicitation_No._12024B18R9505
- e. Letter: File Code 6320
- f. Solicitation_No._1202SA21R9005
- g. Solicitation_No._1202SA22R9201
- h. Solicitation_No._1202SA21R9008

TABLE 1.0.1

USFS Solicitation Requirement	Table 2.0.1 Item Number	Compliance Provided
(A) Additional Telemetry Units must be powered by the aircraft's electrical system and operational in all phases of flight.	1	Yes
(B) The ATU must report tank/bucket open events	7	Yes
(B) The ATU must report tank/bucket close events	9	Yes
(B) The ATU must report tank/bucket gallons filled events	6	Yes
(B) The ATU must report tank/bucket gallons dropped events	8a	Yes
(B) with GPS data (Date, Time, Latitude, Longitude, Altitude, Speed and Heading) following the data format as specified in the AFFJSON requirement at https://www.aff.gov/documents/Json_Specification_Section_Supplement.pdf .	10	Yes
(C) Helicopters performing bucket operations must have a load cell system installed which provides data to the ATU.	2	Yes
(C) The ATU must use the difference in weight before and after water is filled or released to provide the data for gallons filled and gallons dropped events.	8b	Yes
(C) Actuation of the bucket open switch must be used to initiate the open, close, and drop events.	7, 8a, 9	Yes
(C) To prevent erroneous transmissions caused by metering loads, events may not be sent between filling the bucket and forward flight.	6, 11	Yes
(C) The fill event must be based on a significant gain in weight and sent when forward flight is established.	5, 11	Yes
(C) The aircraft and bucket must be configured to provide a ground to the ATU which indicates that a bucket is attached without any action required beyond installing the bucket. Type II and Type III helicopters must use the 9 Pin connector.	3 See Figure 2.0.1	Yes

TABLE 1.0.1 (CONTINUED)

USFS Solicitation Requirement	Table 2.0.1 Item Number	Compliance Provided
*(C) The aircraft and bucket must be configured to provide a ground to the ATU which indicates that a bucket is attached without any action required beyond installing the bucket. This ground connection must not be jumpered on the aircraft. All long lines used during bucket operations must use a dedicated conductor to carry the ground thru to each end. Remote hooks must not provide the ground. Type II and Type III helicopters must use Pin G of the 9 Pin connector for the ground signal that a bucket is connected.	3 See Figure 2.0.1	Yes
+(C) The aircraft and buckets must be configured to provide a ground to a discrete input of the ATU which indicates that a bucket is attached without any action required beyond installing the bucket. This ground connection must not be jumpered on the aircraft. All long lines used during bucket operations must use a dedicated conductor to carry the ground thru to each end. Remote hooks must not provide the ground. Type III helicopters must use the 9 Pin connector.	3 See Figure 2.0.1	Yes
(D) The ATU data must be delivered to the government within two minutes from the time of the event...	12	Yes
(D) ...and not interfere with any AFF position reports. A subscription service shall be maintained through the AFF equipment provider allowing AFF position reporting and ATU event data via the Government AFF program.	13	Yes
(E) Calibration event(s) including a fill, open, close and calculated volume drop shall be performed no more than seven calendar days prior to the aircraft inspection and shall be provided to the aircraft inspector. The vendor shall verify that the system is properly reporting all data correctly, specifically volume based on maximum typical contract load based on environmental conditions, and all GPS information is included per event.	14, 15	Yes: Operator Responsibility to accomplish Calibration Validation

* Modified per Solicitation_No._1202SA21R9005

+ Modified per Solicitation_No._1202SA22R9201

TABLE 1.0.1 (CONTINUED)

USFS Solicitation Requirement	Table 2.0.1 Item Number	Compliance Provided
*(E) Calibration event(s) including a fill, open, close and calculated volume drop shall be performed no more than seven calendar days prior to the aircraft inspection and shall be provided to the aircraft inspector. The vendor shall verify that the system is properly reporting all data correctly, and all GPS information is included per event. This must include volume based on maximum load allowed by the environmental conditions at the time of the flight.	14, 15	Yes: Operator Responsibility to accomplish Calibration Validation
(F)** Vendor shall complete Exhibit 33/Attachment 26 that clearly describes their ATU system.	See Appendix A	Yes
(G)(F)** Vendor shall verify data is correctly displayed on the ATU providers website and the Governments Application(s) it is required to report to.	NA	Operator Responsibility

* Modified per Solicitation_No._1202SA21R9005

** Not included in Solicitation_No._1202SA21R9005. G is now F.

TABLE 1.0.1 (CONTINUED)

USFS Solicitation Requirement	Table 2.0.1 Item Number	Compliance Provided
*(G) If the ATU becomes unreliable, the system shall be returned to full operational capability within 14 calendar days after the system is discovered to be unreliable.	NA	Operator Responsibility
(H) If the ATU becomes unreliable, the system shall be returned to full operational capability within 14 calendar days after the system is discovered to be unreliable.	NA	Operator Responsibility
+(H) If the ATU becomes unreliable, the system shall be returned to full operational capability within 5 calendar days after the system is discovered to be unreliable.	NA	Operator Responsibility
Contact the AFF Program Manager by emailing affadmin@firenet.gov for a list of systems known to meet the ATU requirements.	NA	Operator Responsibility
(i)(A) An MS3101A24-11S type connector...Pin D must be grounded... REF: Letter: File Code 6320	3 See Figure 2.0.1	Yes
(i)(A) Balance of Requirements of (i)(A).... REF: Letter: File Code 6320	NA	Yes: per Hook System Installation
(i)(B) Bucket open switch must be clearly labeled "Open"... REF: Letter: File Code 6320	NA	Yes: per Hook System Installation
(i)(C) Helicopters performing bucket operations...permanently installed 9 pin connector... REF: Letter: File Code 6320	3 See Figure 2.0.1	Yes

* Modified per Solicitation_No._1202SA21R9005

+ Modified per Solicitation_No._1202SA22R9201

TABLE 2.0.1

Item	ATU System Function	Description	Technical Description for Means of Compliance	Compliance Demonstrated
1	Interface to aircraft power distribution system	ATU must be powered by aircrafts electrical system	The ATU is powered from the aircraft's 28 VDC bus with a 3A MS type circuit breaker.	Yes
2	Interface to aircraft load cell system (bucket only)	Bucket operations must have load cell to provide data to the ATU.	The ATU monitors the bucket load cell data which is provided to P1A-A and P1A-C.	Yes
3	ATU checks J2A-C for connection to ground.	Aircraft and bucket must be configured to provide a ground...indicate that bucket is attached	The ATU checks J2A-C for ground connection. If no ground is provided the ATU will be in standby until a ground is provided to this pin. The ATU utility port will provide a serial message indicating "ATU Pin J2A-C not grounded". If a specific connector is not required by contract or a tank system is utilized, J2A-C must be grounded. See Figure 2.0.1 for an excerpt from the wire diagram. See wire diagrams (583-W1-001, 606-W1-001 and 606-W1-003 and ETS-131 series)	Yes
4	ATU checks P2A-D for system configuration.	P2A-D open = Bucket P2A-D ground=Tank	Provided to facilitate customer configurations. Not a USFS requirement	NA

TABLE 2.0.1 (CONTINUED)

Item	ATU/AFF System Function	Description	Means of Compliance	Compliance Demonstrated
5	ATU begins to monitor tank/bucket water quantity. In standby mode until > 100 gallons is detected.	The fill event must be based upon a significant weight gain... 100 gallons shall be considered significant.	The ATU processor continually monitors the load cell weight (bucket) OR the level probe signal (4-20mA or proportional voltage) tank. The ATU will not proceed or send data to AFF until the 100-gallon threshold is exceeded. NOTE: ATU input signals are converted to quantity in gallons by the use of a piecewise algorithm or data lookup table.	Yes
6	Once 100 gallons is exceeded, the ATU monitors water quantity for a filled value.	ATU must report "gallons filled" events	The ATU monitors the water quantity and determines a filled amount when the water quantity signal has been stable for at least 5 seconds and is > 100 gallons. This filled quantity in gallons is sent to the AFF for processing.	Yes

TABLE 2.0.1 (CONTINUED)

Item	ATU/AFF System Function	Description	Means of Compliance	Compliance Demonstrated
7	The ATU waits until the open signal is detected	ATU must report “tank/bucket open” events	The ATU monitors P2A-A for an open bucket signal (28 VDC = open) which is provided by the aircraft bucket/tank open switch. Once the open signal is detected the bucket/tank “open” message is sent to the AFF for processing. NOTE: Pin P2A-A may be configured as a ground seeking pin if required to detect bucket/tank open.	Yes
8a	The ATU determines Delta water quantity.	ATU must report “tank/bucket gallons dropped” events	Once the open signal is detected the ATU records the amount of water (W1), waits for a closed signal, allows for a stabilization period, then records the remaining water onboard (W2). Water Dropped = W1-W2 which is sent to the AFF for processing.	Yes
8b		ATU must muse use the difference before and after...to provide the data	The ATU utilizes the delta water quantity not the absolute water quantity for filled amounts and dropped amounts. The load cell signal is calibrated (tared) to account for the bucket/load cell weight. The tank quantity is an absolute value, but the delta quantity is utilized.	

TABLE 2.0.1 (CONTINUED)

Item	ATU/AFF System Function	Description	Means of Compliance	Compliance Demonstrated
9	The ATU waits until the closed signal is detected	ATU must report “tank/bucket closed” events	The ATU monitors P2A-A for closed bucket signal per the following: 1. Aircraft Control Switch: (open circuit = closed) which is provided by the aircraft bucket/tank open switch. Boolean AND 2. The water quantity is stable (where stable is defined as not decreasing significantly for 2 seconds) NOTE: Pin P2A-A may be configured as a ground seeking pin if required to detect bucket/tank open.	Yes
10	AFF send ATU data to WEB Portal	NA	NA	Yes
11	To prevent erroneous transmissions caused by metering loads, events may not be sent between filling the bucket and forward flight.	NA	AFF shall not send data until forward flight is established or forward flight is determined by derived airspeed from AFF data. Additionally, forward flight is determined by the ATU establishing that the quantity is >100 gallons as is stable indicating forward flight. Metered loads are ignored by the ATU if a stable signal is not established.	Yes

TABLE 2.0.1 (CONTINUED)

Item	ATU/AFF System Function	Description	Means of Compliance	Compliance Demonstrated
12	ATU sends data in near real time	Data from ATU must be delivered within 2 minutes	The ATU sends data to the AFF in near real-time. There are some designed delays of not more than 2 seconds to account for signal settling and ATU to AFF transmission protocols	Yes
13	The AFF shall send data in near real-time, will not interfere with AFF data and will provide a subscription service.		The existing AFF system/method is augmented with the ATU data.	Yes
14	ATU installation manual requires the load cell indicator (auxiliary output 0-5V) to be calibrated so that 5V = 8800 lbs. The ATU coverts this weight into a volume. The tank utilizes a “look up” table and does not require calibration	Calibration events shall be performed no less than seven calendar days prior to the aircraft inspection. The vendor shall verify that the system is properly reporting all data correctly and all GPS information is included per event.	ATU input signals are converted to quantity in gallons by the use of a piecewise algorithm or data lookup table. The bucket system is calibrated by setting the load cell auxiliary analog output voltage so that 0VDC = 0 additional load and 5V = maximum anticipated water weight. The tank system does not require calibration—it utilizes a lookup table stored in EEPROM. Bucket calibration is performed at the time of the installation per the installation manual requirements. Calibration information for the bucket is provided in the installation manual: 583/606-E1-100.	Yes

TABLE 2.0.1 (CONTINUED)

Item	ATU/AFF System Function	Description	Means of Compliance	Compliance Demonstrated
15	Provide <u>accurate</u> fire attack data to AFF. AFF to provide accurate/valid GPS data and fire attack messages	Provide <u>accurate</u> fire attack data for display on web-portals	Operator shall complete a Calibration Validation procedure per Appendix C or a similar procedure that contains all requirements with Appendix C.	Yes

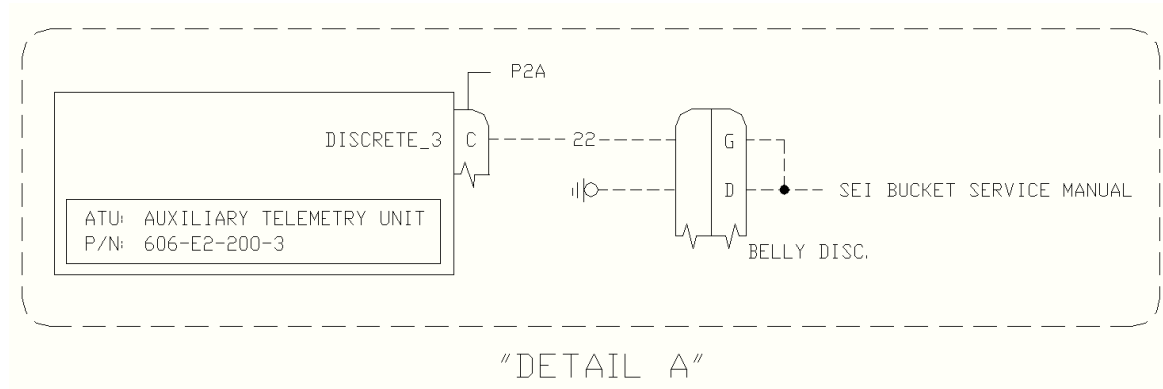


Figure 2.0.1

Excerpt of Ground Seeking Circuit Requirement

See wire diagrams (583-W1-1,-2,-3, 606-W1-001, 606-W1-003 and [EST131 series](#))

Appendix A (Exhibit 33/Attachment 26)

1. Clearly Describe the ATU System Installed

The ATU system is comprised of a solid-state module that includes circuitry to provide the USFS with fire attack data and associated AFF data. The ATU will report the following fire support events: tank door/bucket filled, tank door/bucket open, gallons dropped, tank door/bucket closed and the GPS data associated with these events.

The ATU will utilize the aircrafts existing AFF or new AFF equipment and associated network as shown in Figure A.1 to make the data available to the US Forest Service in near real time.

The ATU system is comprised of 3 AFF configurations and 3 ATU configurations:

Skyconnect AFF: This configuration utilizes the existing Honeywell Skyconnect AFF system. The ATU can interface to a Bambi Bucket or Water Tank Fire System. The configuration is selected by grounding a pin on the ATU (i.e. grounded = Tank configuration floating = Bucket). This configuration utilizes the 583/606-E2-100-3 and 606-E2-400-2 ATU [and ETS-131 series](#).

Spider AFF: This configuration utilizes a new SpiderTracks AFF system. The AFF is located on the glare shield so the internal GPS and Iridium antenna has a clear view of the sky. The AFF can also be remotely mounted with an external antenna. The ATU can interface to a Bambi Bucket or Water Tank Fire System. The configuration is selected by grounding a pin on the ATU (i.e. grounded = Tank configuration floating = Bucket). This configuration utilizes the 606-E2-100-4 and 606-E2-400-1 ATU [and ETS-131 series](#).

BlueSky AFF: This configuration utilizes the existing BlueSky AFF system. The ATU can interface to a Bambi Bucket or Water Tank Fire System. The configuration is selected by grounding a pin on the ATU (i.e. grounded = Tank configuration floating = Bucket). This configuration utilizes the 606-E2-100-5 ATU and 606-E2-400-2 [and ETS-131 series](#).

The Skyconnect, Spider and BlueSky systems are functionally equivalent, and no discernment within this report is provided. The ATU firmware is modified as required to accomplish the various ATU and AFF functions.

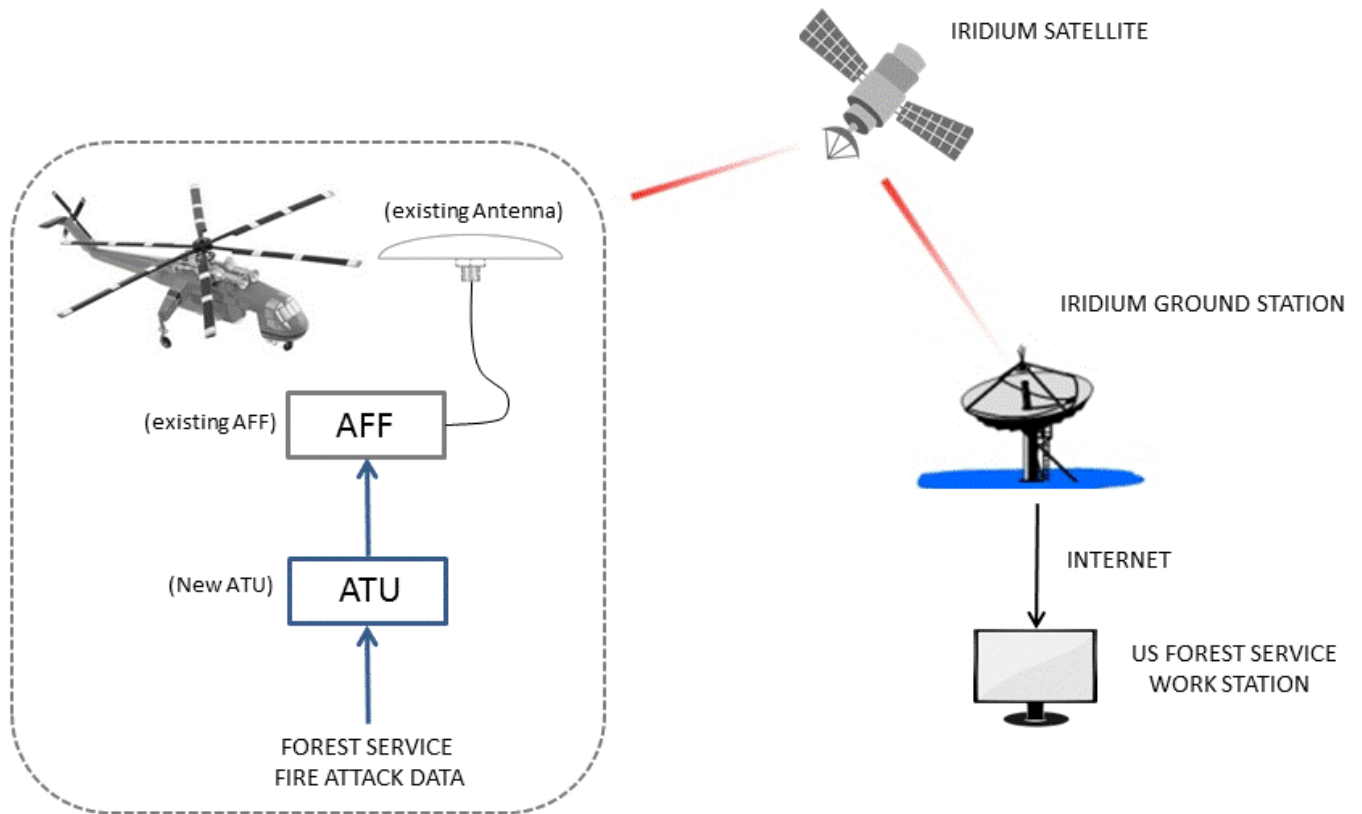


Figure A.1
ATU System

2. Hardware Configuration

Table A.1 Hardware Configuration

Manufactuerer/Company	Model Number
AFF Hardware	
Option#1: Spidertracks	Spider8, Spider X
Option#2: Skyconnect	1616-050 Series
Option#3: BlueSky	D1000 Series
AFF Service Provider	
Option#1: Spidertracks	NA
Option#2: TrooTracks	NA
Option#3: BlueSky	NA
ATU Hardware	583-E2-200-1 “Skyconnect – Simplex” 583-E2-200-2 “Skyconnect – AeroUnion” 583-E2-200-3 “Skyconnect – Erickson” 606-E2-200-3, 606-E2-400-2 “Skyconnect” 606-E2-200-4, 606-E2-400-1 “Spidertracks” 606-E2-200-5, 606-E2-400-2 “BlueSky” 606-E2-400/ETS-131-006
ATU Service Provider	
Olympic Aero ETS	NA
Tank/Bucket Provider	
Isolair	varies
Bambi (Max) (Torentula)	varies
Simplex	varies
AeroUnion	varies
Erickson	Varies
Cloud Burst	Varies
Drop Controller	
Isolair	Varies
Cloud Burst	
Load Weigh/Water Quantity	
Onboard Systems	C-39,C-40: 0-5 VDC systems
MSI	.5-5 VDC systems
Isolair	4-20mA (Tank Float)
Isolair and Simplex	4 discrete float switches (Incremental Level)
Other	Other 0-5 VDC systems Other 01-10V systems
Erickson (JBox), Helitak (PLC)	RS232 serial (9600)
Olympic Aero ETS	641 External Load System
Load Pin (4-20mA)	UART CMOS Level (9600)

3. What parameter logic determines the following:

Note: (see Table 2.0.1 for specific details)

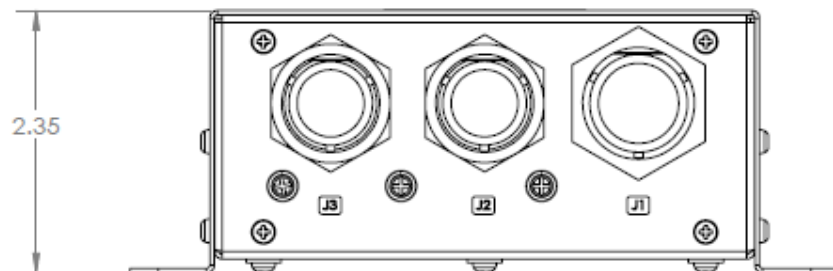
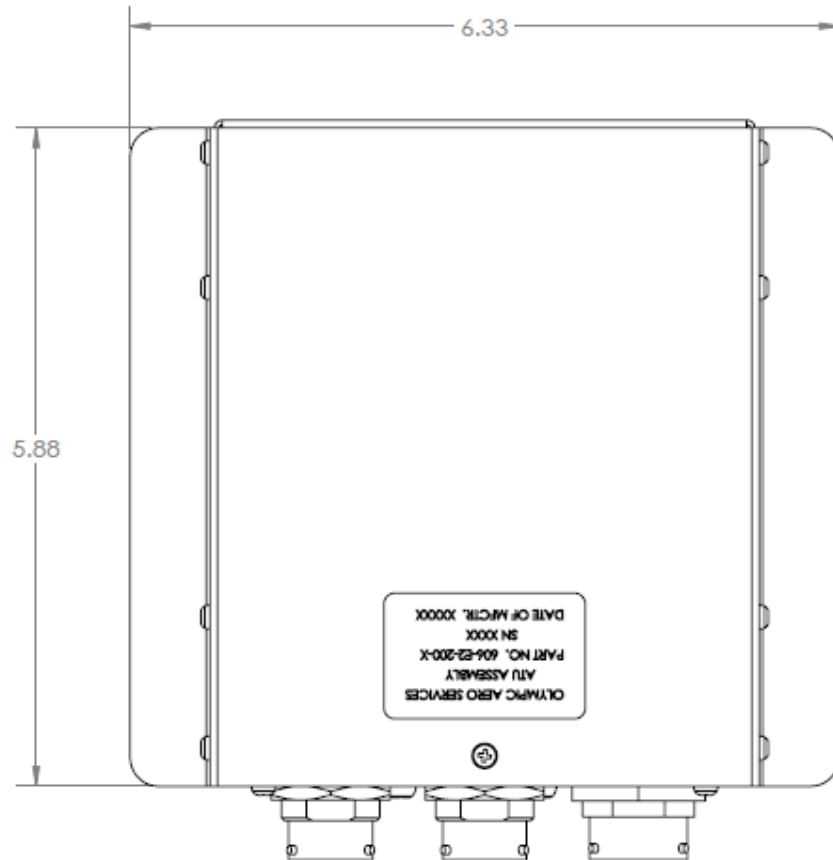
- a. Tank/Bucket Fill: When water quantity is:
 >100 gallons **AND** water quantity is stable (not significantly changing for 5 seconds)
- b. Gate or Door Open:
 Door/Gate Switch Open is determined by the ATU monitoring Door/Gate switch to be positioned to 28 VDC or Ground
- c. Gate or Door Closed:
 Door/Gate Switch Closed is determined by:
 ATU monitoring Door/Gate switch to be positioned to Open/Floating
 AND
 ATU determining water quantity has stopped decreasing
- d. Volume Dropped:
 The ATU records the water quantity Immediately before the door/gate opens (W1).
 When the door/gate closes (see item c above) the ATU records this quantity (W2).
 The water quantity dropped = $W1 - W2$

- 4 ATU Service Provider Website:
 www.olympicaeroets.com

Appendix B

*Additional
Telemetry Unit*

TM **Series 606**
ATU Tanker and Bucket



Additional Telemetry Unit

TM **Series 606** ATU Tanker and Bucket

Table B.1 Additional Telemetry Unit Specifications, Part Number 583/606-E2-200/606-E2-400/ETS-131-006

Physical

		Unit	Comments
Weight:	15	Oz.	
Material:	Aluminum Alloy		Enclosure
Coating:	Alodine		MIL-DTL-5541-F, CLASS 1A

Electrical

		Unit	Comments
Nominal Voltage:	28.0	VDC	
Under Voltage:	22.0	VDC	
Current Draw:	200	mA	
Ground:			Local Airframe Ground
Digital Output:	RS232		
Radiated Emissions	DO-160G Section 21		Category H
Conducted Emissions	DO-160G Section 21		Category H

Environmental

		Unit	Comments
Temperature:	-45 to 70	C	Operating
	-55 to 85	C	Storage
Vibration:	4.2	G RMS	5-500Hz
Shock:	+/- 6	G	11 ms

Appendix C

<u>Bucket Fire Attack System – Calibration Validation</u> Section B Paragraph E	
Description of Test:	
ATU Part #:	ATU SN:
Aircraft Model:	Aircraft SN:
Test Technician:	Test Witness:
Test Location:	Date of Test:

For a helicopter equipped with a **bucket system**:

1. Configure aircraft so that a bucket fill may be accomplished []
2. Locate to an area that may be readily identified on a map for later validation of location (e.g. in the vicinity of a man-made structure, a jetty other peninsula, etc.)
 - a. Report this location #1 to ground crew or otherwise record this location #1 []
3. Fill the bucket with the maximum amount allowed by the environmental conditions []
4. Hover the aircraft until a stable load cell reading is obtained (e.g. 3200 LBS)
 - a. Report this value to ground crew or otherwise record this value []
5. Locate to an area that may be readily identified on a map for later validation of location (e.g. in the vicinity of a man-made structure, a jetty other peninsula, etc.)
 - b. Report this location #2 and altitude #2 to ground crew or otherwise record this location #2 and altitude #2 []
6. Hover over this location #2 at altitude #2 and perform a water dump []
7. Return helicopter to base []
8. Calculate gallons of water using value obtained in step 4a.
 - c. $LBS/8.4 = \text{gallons of water:}$ _____
9. On AFF web portal verify:
 - d. GPS data for the following reports match the noted locations, velocity and altitude.
 - e. FILL Quantity and Location #1 per steps 2a and 4a []
 - f. BUCKET OPEN, DROP QTY*, BUCKET CLOSE are displayed at location #2 and altitude #2 of step 6a []

* NOTE: DROP QTY should match value of 8a (within +/-5% of maximum water quantity for this type of bucket). Bucket leaks may reduce this amount and should be considered if applicable.

Appendix C (continued)

<u>Tank Fire Attack System – Calibration Validation</u> Section B Paragraph E	
Description of Test:	
ATU Part #:	ATU SN:
Aircraft Model:	Aircraft SN:
Test Technician:	Test Witness:
Test Location:	Date of Test:

For a helicopter equipped with a **tank system**:

1. Configure aircraft so that a tank fill may be accomplished []
2. Locate to an area that may be readily identified on a map for later validation of location (e.g. in the vicinity of a man-made structure, a jetty other peninsula, etc.)
 - a. Report this location to ground crew or otherwise record this location #1 []
10. Fill the tank with the maximum amount allowed by the environmental conditions []
3. Hover the aircraft at this location #1 for 30 seconds []
4. Locate to an area that may be readily identified on a map for later validation of location (e.g. in the vicinity of a man-made structure, a jetty other peninsula, etc.)
 - a. Report this location #2 and altitude #2 to ground crew or otherwise record this location #2 and altitude #2 []
5. Hover over this location #2 at altitude #2 and perform a water dump []
6. Return helicopter to base []
7. Determine gallons of a full tank capacity
 - a. gallons of water: _____
8. On AFF web portal verify:
 - a. GPS data for the following reports match the noted locations, velocity and altitude
 - b. FILL Quantity and Location #1 per steps 2a and 4 []
 - c. TANK OPEN, DROP QTY*, TANK CLOSED are displayed at location #2 and altitude #2 of step 5a []

* NOTE: DROP QTY should match value of 8a (within +/-5% of maximum water quantity for this type of tank). Tank door leaks may reduce this amount and should be considered if applicable.