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Tactical Control System Segment to Air Vehicle Standard Segment Interface Design Description

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1. Scope

This document defines the interface between the Air Vehicle Standard Segment and the TCS Real Time Processing Segment. For the implementations of TCS for the foreseeable future, the Air Vehicle Standard Segment shall be implemented as a Datalink Control Module (DCM).

1.1 Tactical Control System Introduction

The purpose of the Tactical Control System (TCS) is to provide the military services with a single command, control, data receipt, data processing, data export and dissemination system that is interoperable with the family of all present and future tactical unmanned aerial vehicles (UAVs). These UAVs shall include the Tactical Unmanned Aerial Vehicle (TUAV) and the Medium Altitude and Endurance (MAE) UAV (henceforth referred to as Outrider and Predator respectively), their associated payloads, and other network communication systems. TCS will also be capable of receiving and processing information from High Altitude and Endurance (HAE) UAVs, their associated payloads, and future development UAVs and payloads.

1.1.1 TCS Program, Phases, and UAV Interaction

The Unmanned Aerial Vehicle Joint Project Office (UAV JPO) has undertaken development of a TCS for UAVs. Design and development of the TCS will be conducted in two phases. Phase 1 is defined as the Program Definition and Risk Reduction phase, and Phase 2 is defined as the Engineering and Manufacturing Development phase in accordance with Department Of Defense Instruction (DODI) - 5000.2R. During Phase 2, TCS Low Rate Initial Production (LRIP) will commence. Phase 1 will be a 24 month period and will demonstrate Level 1 through Level 5 interaction (as defined below) in an Incremental and Evolutionary strategy as described in accordance with MIL-STD-498. The five discrete levels of multiple UAV interaction to be provided by the TCS are:

Level 1: receipt and transmission of secondary imagery and/or data

Level 2: direct receipt of imagery and/or data

Level 3: control of the UAV payload in addition to direct receipt of imagery/data

Level 4: control of the UAV, less launch and recovery, plus all the functions of level three

Level 5: capability to have full function and control of the UAV from takeoff to landing

1.1.2 Tactical Control System

The TCS consists of the software, software-related hardware and the extra ground support hardware necessary for the control of the TUAV, the MAE UAV, and future tactical UAVs. The TCS will also provide connectivity to specifically identified Command, Control, Communications, Computers, and Intelligence (C4I) systems. TCS will have the objective capability of receiving High Altitude Endurance (HAE) UAV payload information. Although developed as a total package, the TCS will be scaleable to meet the user's requirements for deployment. TCS will provide a common Human-Computer Interface (HCI) for tactical airborne platforms to simplify user operations, training, and facilitate seamless integration into the Services' joint C4I infrastructure across all levels of interaction.

1.1.2.1 Software

The major focus of the TCS program is software. The software will provide the UAV operator the necessary tools for computer related communications, mission tasking, mission planning, mission execution, data receipt, data processing, limited data exploitation, and data dissemination. The software will provide a high resolution computer generated graphics user interface that enables a UAV operator trained on one system to control different types of UAVs or UAV payloads with a minimum of additional training. The TCS will operate in an open architecture and be capable of being hosted on computers that are typically supported by the using Service. Software developed will be Defense Information Infrastructure / Common Operating Environment (DII/COE) compliant, non-proprietary, and the architectural standard for all future tactical UAVs. To the extent possible, the TCS will use standard Department of Defense (DoD) software components to achieve commonality. TCS will provide software portability, scaleable functionality, and support for operational configurations tailored to the users' needs.

1.1.2.2 Hardware

To the extent possible, the TCS will use standard DoD components in order to achieve commonality. The TCS will use the computing hardware specified by the service specific procurement contracts. The individual armed services will identify TCS computing hardware, the desired level of TCS functionality, the battlefield C4I connectivity, and the particular type of air vehicle and payloads to be operated depending upon the deployment concept and area of operations. TCS hardware must be capable of being scaled or modularized to meet varying Service needs. TCS hardware will permit long range communications from one TCS to another, data storage expansion, access to other computers to share in processing capability, and multiple external peripherals.

1.1.3 Integration with Joint C4I Systems

TCS integration with C4I systems will be accomplished through development of interfaces that permit information exchange between the TCS and specified C4I systems. TCS will be capable of entering DII/COE compliant networks. Network interoperability will include but not be limited to:

Advanced Tactical Weapons Control Station (ATWCS)

Advanced Field Artillery Tactical Data System (AFATDS)

Air Force Mission Support System (AFMSS)

All Source Analysis System(ASAS)

Automated Deep Operations Coordination System (ADOCS)

Automated Target Hand-off System (ATHS)

Closed Circuit Television (CCTV)

Common Operational Modeling, Planning, and Simulation Strategy (COMPASS)

Contingency Airborne Reconnaissance System (CARS)

Enhanced Tactical Radar Correlator (ETRAC)

Guardrail Common Sensor (GRCS)/Aerial Common Sensor (ACS) Integrated Processing Facility (IPF)

Intelligence Analysis System (IAS)

Joint Deployable Intelligence Support System (JDISS)

Joint Maritime Command Information System (JMCIS)

Joint Service Imagery Processing System - Navy (JSIPS-N)

Joint Surveillance Target Attack Radar System (JSTARS) Ground Station Module/Common Ground Station (GSM/CGS)

Modernized Imagery Exploitation System (MIES)

Tactical Aircraft Mission Planning System (TAMPS)

JSIPS Tactical Exploitation Group (TEG)

Theater Battle Management Core System (TBMCS)

TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) II

The TCS will export and disseminate UAV imagery products, tactical communication messages, as well as mission plans and target coordinates. TCS will also receive, process, and display tasking orders, and operational information from Service specific mission planning systems.

1.1.4 System Compliance

The TCS will be developed in compliance with the following military and

commercial computing systems architecture, communications processing, and imagery architecture standards:

a) Defense Information Infrastructure (DII) / Common Operating Environment (COE)
b) Computer Open Systems Implementation Program (COSIP)
c) Common Imagery Ground/Surface System (CIGSS) Handbook
d) Variable Message Format (VMF) and Joint Message Format (JMF)
e) National Imagery Transmission Format (NITF)
f) Assistant Secretary of Defense (ASD) (C3I) Joint Technical Architecture (JTA)
g) Airborne Reconnaissance Information Technical Architecture (AIRTA)

1.2 Document Overview

This document defines the requirements and design of the TCS Standard Segment to Air Vehicle Standard Segment Interface (AV Standard Interface). This document was developed using MIL-STD-498 (Data Item Description DI-IPSC 84136) as a guide. A requirements section was added to allow this document to function as both an Interface Requirements Specification and an Interface Design Description. The document is divided into the following sections:

Section 1 - Scope: Provides a description of the overall development effort and objectives of the program.

Section 2 - Applicable Documents: Lists all reference documents applicable to this development effort.

Section 3 - Requirements: Defines the requirements imposed on the interface by higher level documents. Expands and clarifies interpretation of higher level requirements.

Section 4 -Interface Design: Defines the design of the interface. This includes the interface hardware as well as the messages transferred across the interface.

Section 5 - Requirement Traceability: Defines the traceability of the requirements of this interface to higher level requirements.

Section 6 - Notes: Provides background information on the intended uses of the system. Also included in this section is a list of acronyms.

Section 7 - Predator Specific Appendix: Provides any Predator specific implementation data.

Section 8 - Outrider Specific Appendix: Provides any Outrider specific implementation data.

2. Applicable documents

MIL-STD-498 5 Dec. 94	Software Development and Documentation
DI-IPSC-81436 5 Dec. 94	MIL-STD-498 DID
RFC 1014	External Data Representation Standard
DODI 5000.2R	Department Of Defense Instruction
TCS 102	Tactical Control System System Subsystem Specification
TCS 104	Tactical Control System System Subsystem Design Description

3. Requirements

AVSTD1 - The AV Standard interface shall provide a reliable transport mechanism to pass messages between the TCS and the AV Standard Segment.

AVSTD2 - The AV Standard interface shall support levels 2 through 5 of UAV interaction defined in the TCS Joint Operational Requirements Document.

AVSTD3 - The AV Standard interface shall provide the functionality required to operate with the Predator and Outrider UAVs.

AVSTD4 - The AV Standard interface shall be based on a standard, open system, network interface.

AVSTD5 - The AV Standard Interface is Mission Critical during level 2 operations and both Mission Critical and Flight Critical during levels 3, 4 and 5 operations. As a minimum, the portion of the AV Standard Interface that supports Flight Critical operations shall be segregated from other networks and interfaces in the TCS system.

AVSTD6 - The AV Standard interface shall be designed to be stable and pseudo-deterministic.

AVSTD7 - The AV Standard interface shall be capable of passing two analog RS-170 video feeds from the AV Standard Segment to the TCS.

AVSTD8 - The AV Standard interface shall be scaleable to provide high bandwidth digital service to support digital video and imagery applications.

AVSTD9 - The AV Standard interface shall be easily scaleable to provide the messages and data fields required to safely command any fixed wing unmanned air vehicle which has an autopilot which controls flight surfaces and understands waypoints.

AVSTD10 - Intentionally deleted.

AVSTD11 - The AV Standard Interface shall not support the direct control of AV flight surfaces except while the AV is undergoing maintenance or preflight checkout on the ground. The interface shall only pass flight path commands to the autopilot.

AVSTD12 - The AV Standard interface shall have the capability to transfer flight route plans from the TCS to the DCM.

AVSTD13 - The AV Standard interface will provide the functionality to command all EO/IR payloads currently on the Predator or the Outrider UAVs. For version 1.0 of this IDD, the payloads supported shall be the Versatron Skyball for Predator, and the Israeli Aircraft Industries POP-100 for Outrider.

AVSTD14 - The AV Standard interface will provide the functionality to receive all telemetry and products from all payloads currently on the Predator or Outrider UAVs. For version 1.0 of this IDD, the AV Standard interface shall support the receipt of telemetry and imagery from the Versatron Skyball for Predator, and the Israeli Aircraft Industries POP-100 for Outrider. The AV Standard interface shall support the receipt of telemetry from the Predator SAR payload.

AVSTD15 - The AV Standard interface shall be scaleable to command future payloads to be carried by an UAV which is integrated with TCS.

AVSTD16 - The AV Standard interface shall be scaleable to receive telemetry and products from future payloads carried by an UAV which is integrated with TCS.

AVSTD17 - The AV Standard Interface shall have adequate bandwidth to support transfer of all available commands, telemetry, and imagery available from the AV with an average utilization less than 50%.

AVSTD18 - If the AV Standard Interface does not have its own dedicated physical interface, then the total average utilization of the physical interface including the AV Standard Interface and any other traffic present shall be less than 25%.

AVSTD19 - Intentionally deleted.

AVSTD20 - Intentionally deleted.

AVSTD21 - Intentionally deleted.

AVSTD22 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the Satellite Communications (SATCOM) Air Data Terminal on all AVs which have been integrated with TCS and have a SATCOM capability.

AVSTD23 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to fully command and monitor the Identify Friend or Foe capability of all AVs which have been integrated with TCS.

AVSTD24 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to switch the data link between LOS and SATCOM while the AV is in operation.

AVSTD25 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the LOS ADT antenna selection, pointing, and transmission modes.

AVSTD26 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the LOS ADT transmit power, transmit frequencies, and receive frequencies.

AVSTD27 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the SATCOM ADT antenna pointing and transmission mode.

AVSTD28 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the SATCOM ADT transmit power, transmit frequencies, and receive frequencies.

AVSTD29 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to send ephemeris data required by the SATCOM ADT to the AV.

AVSTD30 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to dynamically change the AV flight path by commanding heading, altitude, and airspeed.

AVSTD31 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to dynamically command an Electro-Optical (EO) payload's operating parameters, including azimuth, depression, iris, and zoom.

AVSTD32 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to dynamically command an Infrared (IR) payload's operating parameters, including, azimuth, depression, polarity, zoom, and gain.

AVSTD33 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to dynamically command the Synthetic Aperture Radar (SAR) payload's operating parameters, including, TBD.

AVSTD34 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to command and monitor the AV's emergency recovery system if the AV has an emergency recovery system.

AVSTD35 - The AV Standard Interface shall provide the capability to transfer to the TCS the status of all subsystems on the AV which report status information.

AVSTD36 - The AV Standard Interface shall be designed to support the capability to monitor the payload of an AV which is being flown by another TCS.

AVSTD37 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to select, command, and monitor all of the navigation systems present on the AVs which have been integrated with TCS. The navigation system types currently supported are Inertial Navigation System (INS), Global Positioning System (GPS), barometric altimeter, radar altimeter, and magnetometer.

AVSTD38 - The AV Standard Interfaces shall be capable of transferring the data required to allow TCS to run AV maintenance software and report the status and results to the TCS.

AVSTD39 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to override the automated navigation systems in the AV and set the flight path manually with autopilot commands.

AVSTD40 - The AV Standard Interface shall be designed such that no single hardware failure or software error results in an unsafe command to be transmitted to and accepted by the air vehicle. The AV Standard interface shall be built on the guaranteed delivery services of TCP and all messages sent across the AV Standard interface shall contain a check sum.

AVSTD41 - The AV Standard Interface shall be designed to support the hand off of AVs between two different TCSs.

AVSTD42 - The TCS shall be capable of transferring the data required to allow TCS to perform flight route plan upload through the DCM to the AV via the selected system data link or direct ground connection.

AVSTD43 - The Flight Route Plan, as a minimum, shall include AV flight path information, Loss of Link plan, AV VCR control tasking if supported, and data link control information if supported.

AVSTD44 - Intentionally deleted.

AVSTD45 - The AV Standard Interface shall be capable of transferring the data required to allow TCS receive of AV analog payload video information from the DCM. Analog video shall be received in RS-170A format.

AVSTD46 - The AV Standard Interface shall support the capability to sequentially control and monitor multiple AVs.

AVSTD47 - The AV Standard Interface shall support flight controls which provide Operator command and Autonomous Control with operator override.

AVSTD48 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control the flight of the selected AV in accordance with the specific AV's operational performance capabilities.

AVSTD49 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to perform air vehicle flight control beyond line of sight via up link command to two air vehicles of the same type using sequential communication techniques.

AVSTD50 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control the flight behavior characteristics inherent to the selected AV.

AVSTD51 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to initiate or change flight behaviors by sending the proper control commands to the UAV.

AVSTD52 - The AV Standard Interface shall be capable of communicating fuel parameters to the TCS to include as a minimum, fuel status, flow rate, and bingo fuel.

AVSTD53 - The AV Standard Interface shall support the necessary system capabilities required for payload control beyond line of sight via up link command of two air vehicles of the same type using sequential communication techniques.

AVSTD54 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control the payload via preprogrammed or manual commands, assuming the AV supports each mode of operation.

AVSTD55 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to receive, process, and present payload data to the operator so that the status of the payload can be determined.

AVSTD56 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to automatically control the payload using the methods supported by the AV payload being controlled.

AVSTD57 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to override payload automated or preprogrammed inputs.

AVSTD58 - Intentionally deleted.

AVSTD59 - Intentionally deleted.

AVSTD60 - Intentionally deleted.

AVSTD61 - The AV Standard Interface shall be capable of transferring the data required by TCS to determine target coordinates.

AVSTD62 - The AV Standard Interface shall be capable of transferring the data required by TCS to estimate target coordinate accuracy.

AVSTD63 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control and monitor the AV's Fault Detection/Location (FD/L).

AVSTD64 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control and monitor the Payload's FD/L.

AVSTD65 - The AV Standard Interface shall be capable of transferring the data required to allow TCS to control and monitor the data link FD/L when the AV Data link Control Module is controlling the data link.

AVSTD66 - The AV Standard Interface shall support a concurrent up link and down link capability.

AVSTD67 - The AV Standard Interface shall provide the capability to transfer a caution/warning to the TCS when the UAV and/or DCM has identified a malfunction.

AVSTD68 - Intentionally deleted.

AVSTD69 - The AV Standard Interface hardware shall support the data rate characteristics of the AV, data link and payload to ensure interoperability.

AVSTD70 - For each TUAV system, the AV Standard Interface shall support TCS full independent computer redundancy.

AVSTD71 - Intentionally deleted.

AVSTD72 - THE AV Standard Interface throughput shall not exceed 50% of the throughput capability delivered. For an 10 megabit per second Ethernet connection, the throughput shall not exceed 400 kilobytes per second when measured over any 5 second interval. TCP/IP overhead shall be included in the calculation. Ethernet overhead will not be included in the calculation.

AVSTD73 - As an objective, AV Standard Interface throughput shall not exceed 25% of the throughput capability delivered. For an 10 megabit per second Ethernet connection, the throughput shall not exceed 200 kilobytes per

second when measured over any 5 second interval. TCP/IP overhead shall be included in the calculation. Ethernet overhead will not be included in the calculation.

AVSTD74 - The AV Standard Interface software shall be non-proprietary. The AV Standard Interface shall be based on a Berkley Sockets implementation.

AVSTD75 - The AV Standard Interface data latency shall not be greater than that present in the Predator ground control station or the Outrider ground control station, which ever is smaller. The latency from queuing of messages to be transferred across the AV Standard Interface shall not exceed TBD milliseconds. This does not include the mandatory throttling of commands by the TCS RTP or the DCM not to exceed maximum message frequencies.

AVSTD76 - Intentionally deleted.

AVSTD77 - Hardware and software shall be selected for use in the AV Standard Interface with the goal of providing ease of future changes to the AV Standard Interface elements. The object of portability for the AV Standard Interface is to select or develop hardware which will readily host emerging software packages and software which will be as independent of host hardware as possible.

AVSTD78 - The selection of interface cards for communications interfaces, video, networking equipment, and all other hardware for use in the AV Standard Interface shall be made according to standards for production of an open architecture.

AVSTD79 - Control techniques to minimize electromagnetic interference, emanation, and susceptibility shall be incorporated into the design of AV Standard Interface equipment.

AVSTD80 - A modular architecture shall be used by the AV Standard Interface software and data elements in order to support future interoperability with multiple types of UAVs and payloads while maintaining consistent system interfaces.

AVSTD81 - AV Standard Interface hardware flexibility and expansion shall be provided through use of GFE, NSDI and COTS hardware designed to be upgraded and expanded.

4. Interface design

4.1 Interface identification and diagrams

This document defines the interface between the Air Vehicle Standard Segment and the TCS Real Time Processing Segment. For the implementations of TCS for the foreseeable future, the Air Vehicle Standard Segment shall be implemented as a Datalink Control Module (DCM).

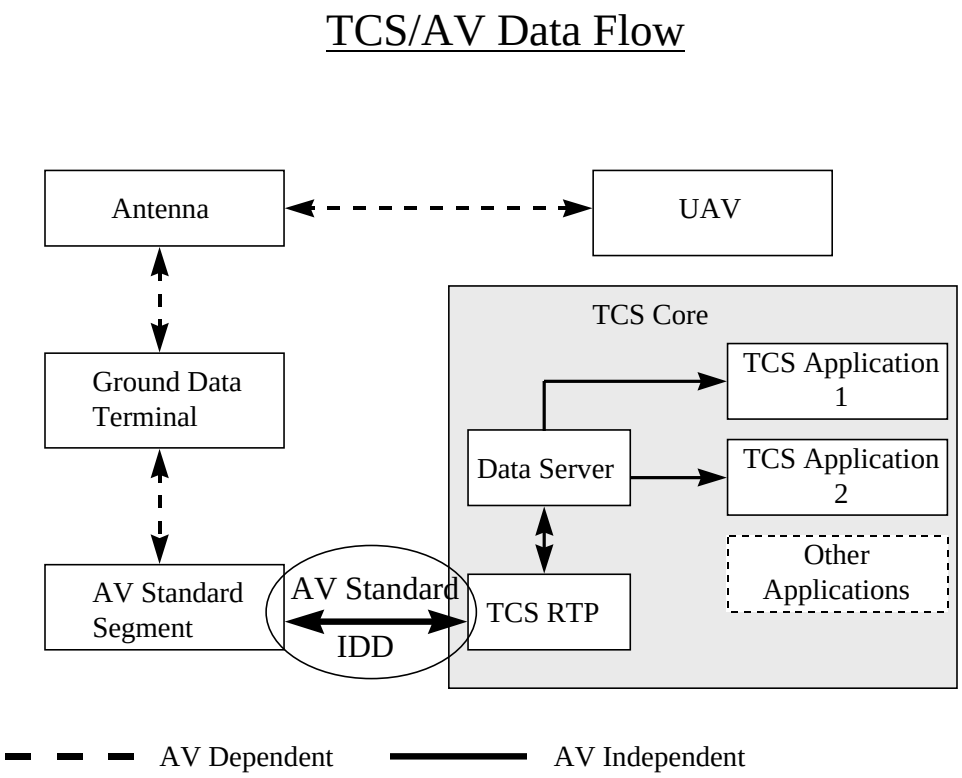

Figure 4-1 TCS AV Data Flow

4.2 Command and Telemetry interface

This section describes the command and telemetry interface between the TCS Real Time Processing (RTP) and the Datalink Control Modules (DCM).

4.2.1 Physical Interface

This section describes the physical interface between the TSC RTP and the DCMs.

4.2.1.1 Near Term Interface

For TCS Phase 1 demonstrations, an implementation using 10Base2 Ethernet (Thinnet) will be used. The Thinnet segment used to implement this interface shall be a standalone segment which does not pass through any hubs or repeaters. This reduces the amount of hardware which is flight critical. The only devices to be connected to this Thinnet segment shall be the Air Vehicle Datalink Control Modules and the TCS Real Time Processor. This is to ensure the AV Standard Interface, which is flight critical, will not experience any interference or degradation in capability due to other network traffic. This is extremely important to maintain when connecting the TCS to external C4I networks.

This implementation shall use TCP/IP Berkley sockets. The TCS shall act as a sockets client and the Datalink Control Modules (DCMs) shall act as servers. The TCS is responsible for initiating all TCP/IP connections. This interface shall be implemented in a manner to allow transition to a different physical interface still using TCP/IP sockets with little or no source code change required. The port names are defined below.

System	Port Name
TCS	TCS_AV_Standard_Interface
AV Datalink Control Module	DCM_AV_Standard_Interface

For Phase 1, IP addresses assigned to the TCS Real Time Processor, and the Air Vehicle Datalink Control Modules shall be static. IP addresses shall be assigned as specified in the table below. The manufacturer of each component is responsible for ensuring the IP address assigned to that component is configurable without the use of additional hardware.

System	IP Address Range
Reserved	X.X.X.1 - X.X.X.20
TCS Real Time Processor	X.X.X.21 - X.X.X.40
Predator Datalink Control Module	X.X.X.41 - X.X.X.60
Outrider Datalink Control Module	X.X.X.61 - X.X.X.80
Reserved for Growth Datalink Control Modules	X.X.X.81 - X.X.X.255

4.2.2 Data Elements

The command and telemetry interface is a real time message passing interface. All data elements shall comply with ARPA Standard RFC1014 External Data Representation Standard. Specifically, all data elements shall map to the XDR data types Integer, Unsigned Integer, Double-precision Floating Point (Double), or String. This implies big-endian byte order, 32 bit integer, and 64 bit floating point representation.

4.2.3 Message Architecture

Messages shall be treated as packets at the application level. No fragmentation of messages shall be allowed at the application level. Messages shall be immediately preceded by a START_SYNC. All messages shall be a length which is a multiple of 4 bytes. Message length does not include the TCP header, START_SYNC, and message checksum fields, but does include the message length. Messages shall be followed by a 32 bit message checksum. The entire message structure shall be the sole payload of a TCP datagram. The message structure, with TCP header included, is depicted in Table 4-1. XDR Remote Procedure Calls (RPC) shall not be used to implement this interface.

Field	Size in bytes	Value
TCP Header	20	Defined by TCP
START_SYNC	8	0xFFFFFFFFFFFFFFFF
Message length	4	multiple of 4
Message	multiple of 4	see message definitions
Message Checksum	4	see checksum definition

Table 4-1 AV Standard Interface Message Structure

The Checksum is defined as a byte-wise unsigned sum over the Message length and Message fields in to a 32 bit Integer. For the purposes of generating the Checksum, each 4 byte word will be interpreted as 4 Unsigned Characters. A functional algorithm for computing the Checksum is given below.

```
checksum = 0;
for (i=0; i<message_length; i++)
        checksum += (int)*(((unsigned char *)message) + i);
```

If a message is received with an invalid check sum, the receiver shall discard the entire message. If the DCM is the receiver of the invalid check sum, it shall generate an AV Warning Message with a new warning with the alert ID set to 1000XXX where XXX is the message ID padded with leading zeros of the offending message and the alert level set to 2. Once a valid message is received following the error, the warning shall be cleared with another AV Warning Message.

If a start sync error is detected, the receiver shall discard the message immediately preceding the start sync error. If the DCM is the receiver of the invalid check sum, it shall generate an AV Warning Message with a new warning with the alert ID set to 1001XXX where XXX is the message ID padded with leading zeros of the last successfully received message with the alert level set to 2. Once a valid message is received following the error, the warning shall be cleared with another AV Warning Message.

If the DCM receives a value from the AV which is outside of the valid ranges allowed by the AV Standard interface, the DCM shall fill that field with either 2**31-1 if the field is an Integer or an IEEE positive infinity if the field is a Double. The DCM shall then generate an AV Warning Message with a new warning with the alert ID set to 1002XXX where XXX is the message ID padded with leading zeros of the message with the out of range field with the alert level set to 2. Once a message is sent from the DCM to the TCS RTP with a valid value in the offending field, the warning shall be cleared with another AV Warning Message.

The message formats used to transfer the command and telemetry data are defined in the sections which follow. Fields within messages shall be in the order specified in this document. The combination of field position and field data type fully specify the position of the field within the message. All fields within a message shall be contiguous and there shall be no padding between subsequent fields. Care should be taken in implementing these messages to prevent compilers from including padding to perform boundary alignment. Implementations may convert the message definitions as XDR source code and compile the source with RPCGEN to automate the generation of the interface management software, but this is not required. Note that RPCGEN is being used to implement standard Berkley Sockets not the RPC protocol.

All references to Global Positioning System (GPS) time assume the correction factors embedded in the GPS timing signals to correct to Greenwich Mean Time (GMT) have been applied.

All references to position and orientation, including but not limited to latitude, longitude, altitude, roll, pitch, and heading, are referenced to the World Geodetic System 84 (WGS 84) datum.

4.2.4 Messages

Below is a summary of the messages transferred across the AV Standard Interface.

DCM to TCS Messages

Message Name	Message ID
AV Position Status Message	1
AV INS Status Message	2
AV GPS Status Message	3
AV EOIR Status Message	4
AV Line of Sight Ground Data Terminal Status Message	5
AV Line of Sight Air Data Terminal Status Message	6
AV Piston Engine Status Message	7
AV Fuel Status Message	8
AV Electrical System Status Message	9
AV Analog Video System Status Message	10
AV Lights and Landing Gear Status Message	11
AV IFF Status Message	12
AV SAR Status Message	15
AV Warning Message	19
DTED Lookup Request Message	32

TCS to DCM Messages

Message Name	Message ID
AV Flight Mode Command Message	13
AV Flight Envelope Command Message	14
AV Lights Command Message	24
TCS Position Uplink Message	35
TCS Environmental Data Uplink Message	27
EOIR Command Message	28
AV Analog Video Command Message	22
AV Waypoint Begin Message	33

AV Waypoint End Message	34
AV Piston Engine Command Message	25
AV IFF Command Message	26
AV Fuel System Command Message	23
DTED Lookup Response Message	35
Ground Line of Sight Datalink Command Message	29
Airborne Line of Sight Datalink Command Message	30
Airborne SATCOM Datalink Command Message	31

4.2.4.1 DCM to TCS Messages

The message contained in 4.2.4.1 are transferred from the DCM to the TCS.

4.2.4.1.1 AV Position Status Message

The length of the AV Position Status Message is 228 bytes.

AV Position Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	1	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV Position Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length field making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Current_Nav_Altitude_Source** Identifies the Air Vehicle's current primary altitude source for navigation.	Integer	None	1 <= x <= 4	1 = Barometer 2 = GPS 3 = INS 4 = Radar Altimeter
7	**AV_Altitude** If AV_Current_Nav_Altitude_Source = 4, Identifies the Air Vehicles altitude above ground. Else, Identifies the Air Vehicles altitude above mean sea level currently used for navigation.	Double	Feet	-2,000 <= x <= 100,000	
8	**AV_Climb_Rate** Indicates the vertical airspeed of the Air Vehicle currently used for navigation	Double	Feet Per Minute	-5000 <= x <= 5000	
9	**AV_Current_Nav_Position_Source** Identifies the Air Vehicle's current primary position source for navigation.	Integer	None	1 <= x <= 4	1 = INS 2 = GPS 3 = Dead Reckoning 4 = GDT Tracking

AV Position Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
10	**AV_Latitude** Identifies the Air Vehicle's latitude currently used for navigation	Double	Degrees	-90 <= x <= 90	Positive value indicates North latitude.
11	**AV_Longitude** Identifies the Air Vehicle's longitude currently used for navigation	Double	Degrees	-180 < x <= 180	Positive value indicates East longitude.
12	**AV_NAV_Orientation_Source** Identifies the Air Vehicle's current primary source for autopilot control	Integer	None	1 <= x <= 4	1 = INS 2 = GPS 3 = Gyro 4 = Magnetometer
13	**AV_Roll** Indicates the current attitude of the Air Vehicle in the roll axis with respect to local level plane.	Double	Degrees	-180 <= x <= 180	Positive values indicates starboard wing down. This field is not valid for magnetometer.
14	**AV_Pitch** Indicates the current attitude of the Air Vehicle in the pitch axis with respect to local level plane.	Double	Degrees	-90 <= x <= 90	Positive values indicate nose up. This field is not valid for magnetometer.
15	**AV_Heading** Indicates the Air Vehicle's heading with respect to true north.	Double	Degrees	0<= x < 360	This does not necessarily indicate the current ground track.
16	**AV_Pitch_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the pitch axis.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_Pitch.
17	**AV_Roll_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the roll axis.	Double	Degrees Per Second	-180 <= x <= 180	Positive value indicates increasing AV_Roll.
18	**AV_Yaw_Rate** Indicates the rate of change of the Air Vehicle's heading.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_Heading.
19	**AV_Angle_Of_Attack** Indicates the Air Vehicle's current angle of attack.	Double	Degrees	-90 <= x <= 90	

AV Position Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
20	**AV_GPS_Time_Week** Indicates the GPS time in weeks.	Integer	Weeks	0 <= x < 1024	This value will roll over to 0 in August 1999.
21	**AV_GPS_Time_Second** Indicates the GPS time in seconds.	Integer	Seconds	0 <= x < 604800	
22	**AV_GPS_Time_Ns** Indicates the GPS time in nanoseconds.	Integer	Nanoseconds	0 <= x < 1000000000	
23	**AV_Baro_Altitude** Identifies the Air Vehicle barometric altitude.	Double	Feet	-2,000 <= x <= 100,000	
24	**AV_Radar_Altitude** Identifies the Air Vehicle altitude from the radar altimeter.	Double	Feet	-2,000 <= x <= 100,000	
25	**AV_Magnetometer_Heading** Identifies the Air Vehicle heading from the magnetometer.	Double	Degrees	0 <= x < 360	
26	**AV_Ground_Track** Provides the UAV course with respect to the ground track	Double	Degrees	0 <= x < 360	
27	**AV_Ground_Speed** Indicates the calculated UAV ground speed.	Double	Knots	0 <= x <= 800	
28	**AV_Airspeed** Represents the Indicated airspeed of the Air Vehicle.	Double	Knots	0 <= x <= 600	
29	**AV_Measured_Wind_Heading** Indicates the wind heading measured by the Air Vehicle referenced to true north.	Double	Degrees	0 <= x < 360	If AV_Type=1, Derived from AV airspeed, AV heading, and GPS velocity.

AV Position Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
30	**AV_Measured_Wind_Speed** Indicates the wind speed measured by the Air Vehicle.	Double	Knots	0 <= x <= 200	If AV_Type=1, Derived from AV airspeed, AV heading, and GPS velocity
31	**AV_Nav_Mode** Identifies the Air Vehicle navigation mode.	Integer	None	1 <= x <= 7	1 = Follow waypoints in current mission. 2 = Follow heading, altitude, and airspeed hold values. 3 = Fly to point using best speed. 4 = Fly to point using most fuel efficient speed. 5 = Fly to point to arrive at specified time. 6 = Loiter at point. 7 = Direct flight control by DCM.
32	**AV_Next_Waypoint** Identifies the next waypoint in the mission the plan the air vehicle is flying towards.	Integer	None	0 <= x <= 65535	0 = Not currently in waypoint flight mode.
33	**AV_TTG_Next_Waypoint** Identifies the estimated time to go to the next waypoint the air vehicle is flying towards.	Integer	Seconds	0 <= x <= 100000	
34	**AV_Air_Temperature** Indicates the air temperature measured by the Air Vehicle.	Double	Degrees Fahrenheit	-200 <= x <= 200	

4.2.4.1.2 AV INS Status Message

The length of the AV INS Status Message is 192 bytes.

AV INS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments

AV INS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	2	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_INS_Er_NS** Identifies the Air Vehicle's INS north south position error.	Double	Feet	-2000 <= x <= 2000	
7	**AV_INS_Er_EW** Identifies the Air Vehicle's INS east west position error	Double	Feet	-2000 <= x <= 2000	
8	**AV_INS_Er_Alt** Identifies the Air Vehicle's INS altitude position error.	Double	Feet	-2000 <= x <= 2000	
9	**AV_INS_Mode** Identifies the Air Vehicle's INS mode.	Integer	None	0 <= x <= 100	See AV Specific appendices for values.

AV INS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
10	**AV_INS_Alt** Identifies the Air Vehicle altitude above mean sea level from the internal navigation system.	Double	Feet	-2,000 <= x <= 100,000	Referenced to the WGS 84 datum.
11	**AV_INS_Lat** Identifies the Air Vehicle latitude from the internal navigation system.	Double	Degrees	-90 <= x <= 90	Referenced to the WGS 84 datum.
12	**AV_INS_Lon** Identifies the Air Vehicle longitude from the inertial navigation system.	Double	Degrees	-180 < x <= 180	Referenced to the WGS 84 datum.
13	**AV_INS_East_Velocity** Indicates the East component of the Air Vehicle's velocity.	Double	Feet Per Second	-2000 <= x <= 2000	
14	**AV_INS_North_Velocity** Indicates the North component of the Air Vehicle's velocity.	Double	Feet Per Second	-2000 <= x <= 2000	
15	**AV_INS_Altitude_Velocity** Indicates the altitude component of the Air Vehicle's velocity.	Double	Feet Per Second	-1000 <= x <= 1000	Positive value indicates gaining altitude
16	**AV_INS_East_Acceleration** Indicates the East component of the Air Vehicle's acceleration.	Double	Feet Per Second^2	-300 <= x <= 300	
17	**AV_INS_North_Acceleration** Indicates the North component of the Air Vehicle's acceleration.	Double	Feet Per Second^2	-300 <= x <= 300	
18	**AV_INS_Altitude_Acceleration** Indicates the Altitude component of the Air Vehicle's acceleration.	Double	Feet Per Second^2	-300 <= x <= 300	
19	**AV_INS_Pitch** Indicates the current attitude of the Air Vehicle in the pitch axis with respect to local level plane reported from the inertial navigation system.	Double	Degrees	-90 < x <= 90	Positive value indicates nose up.

AV INS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
20	**AV_INS_Roll** Indicates the current attitude of the Air Vehicle in the roll axis with respect to local level plane reported from the inertial navigation system.	Double	Degrees	-180 <= x <= 180	Positive value indicates starboard wing down.
21	**AV_INS_Heading** Indicates the Air Vehicle's heading with respect to true north reported from the inertial navigation system.	Double	Degrees	0 <= x < 360	Heading is referenced to true North and does not necessarily indicate ground track.
22	**AV_INS_Pitch_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the pitch axis.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_INS_Pitch.
23	**AV_INS_Roll_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the roll axis.	Double	Degrees Per Second	-180 <= x <= 180	Positive value indicates increasing AV_INS_Roll.
24	**AV_INS_Yaw_Rate** Indicates the rate of change of the Air Vehicle's heading.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_INS_Heading.
25	**AV_INS_Time_Week** Indicates the current time reported by the Air Vehicle's INS system.	Integer	Weeks	0 <= x <= 1024	Time is in standard GPS time format. This field will roll over to 0 in August 1999.
26	**AV_INS_Time_Second** Indicates the current time reported by the Air Vehicle's INS system.	Integer	Seconds	0 <= x <= 604800	Time is in standard GPS time format.
27	**AV_INS_Time _Ns** Indicates the current time reported by the Air Vehicle's INS system.	Integer	Nanoseconds	0 <= x <= 1000000000	

4.2.4.1.3 AV GPS Status Message

The length of the AV GPS Status Message is 256 bytes.

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	3	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_GPS_Time_Week** Indicates the GPS time is weeks.	Integer	Weeks	0 <= x < 1024	This value will roll over to 0 in August 1999.
7	**AV_GPS_Time_Second** Indicates the GPS time in seconds.	Integer	Seconds	0 <= x < 604800	
8	**AV_GPS_Time_Ns** Indicates the GPS time in nanoseconds	Integer	Nanoseconds	0 <= x < 1000000000	

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**AV_GPS_Mode** Indicates the current operating mode of the GPS.	Integer	None	1 <= x <= 4	1 = Standard Positioning 2 = Standard Positioning with Differential Correction 3 = Precise Positioning 4 = Precise Positioning with attitude determination
10	**AV_GPS_Alt** Identifies the Air Vehicles altitude above mean sea level from the GPS receiver.	Double	Feet	-2,000 <= x <= 100,000	
11	**AV_GPS_Lat** Identifies the Air Vehicles latitude from the GPS receiver.	Double	Degrees	-90 <= x <= 90	
12	**AV_GPS_Lon** Identifies the Air Vehicles longitude from the GPS receiver.	Double	Degrees	-180 < x <= 180	
13	**AV_GPS_Roll** Indicates the current attitude of the Air Vehicle in the roll axis with respect to local level plane reported from the receiver.	Double	Degrees	-180 <= x <= 180	Positive value indicates starboard wing down. This field valid only if AV_GPS_Mode = 4.
14	**AV_GPS_Pitch** Indicates the current attitude of the Air Vehicle in the pitch axis with respect to local level plane reported from the GPS receiver.	Double	Degrees	-90 < x <= 90	Positive value indicates nose up. This field valid only if AV_GPS_Mode = 4.
15	**AV_GPS_Heading** Indicates the Air Vehicle's heading with respect to true north reported from the GPS receiver.	Double	Degrees	0 <= x < 360	This field is valid only for GPS receivers which can determine heading instantaneously, not from subsequent position measurements. This field valid only if AV_GPS_Mode = 4. This does not necessarily indicate the current ground track.
16	**AV_GPS_Ground_Track** Idenitifies the ground track of the Air Vehicle with respect to true north.	Double	Degrees	0 <= x <= 360	

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
17	**AV_GPS_Ground_Speed** Indicates the ground speed of the Air Vehicle.	Double	Knots	0 <= x <= 800	
18	**AV_GPS_Pitch_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the pitch axis.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_GPS_Pitch.
19	**AV_GPS_Roll_Rate** Indicates the current rate of change in attitude of the Air Vehicle in the roll axis.	Double	Degrees Per Second	-180 <= x <= 180	Positive value indicates increasing AV_GPS_Roll.
20	**AV_GPS_Yaw_Rate** Indicates the rate of change of the Air Vehicle's heading.	Double	Degrees Per Second	-90 <= x <= 90	Positive value indicates increasing AV_GPS_Heading.
21	**AV_GPS_CEP** Specifies the estimated error in the GPS horizontal position.	Double	Feet	0 <= x <= 2000	Estimated horizontal Position Error
22	**AV_GPS_Alt_Err** Specifies the estimated error in the GPS vertical position.	Double	Feet	-2000 <= x <= 2000	Estimated error for GPS altitude above MSL
23	**AV_GPS_Stat** Identifies the status of the Air Vehicle's GPS receiver.	Integer	None	0 <= x <= 6	0 = Off 1 = On, becoming ready 2 = On, internal error detected 3 = Acquiring satellites for first fix 4 = 2D positioning, good signal 5 = 2D positioning, weak signal 6 = 3D positioning, good signal
24	**AV_GPS_Satellites_In_Fix** Indicates the number of satellites currently being used in the GPS position solution.	Integer	None	0 <= x <= 12	
25	**AV_GPS_Sat1_SVN_ID** Identifies the Air Vehicle's GPS satellite number one.	Integer	None	1 <= x < 1024	0 = Not received

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
26	**AV_GPS_Sat2_ SVN_ID** Identifies the Air Vehicle's GPS satellite number two.	Integer	None	1 <= x < 1024	0 = Not received
27	**AV_GPS_Sat3_ SVN_ID** Identifies the Air Vehicle's GPS satellite number three.	Integer	None	1 <= x < 1024	0 = Not received
28	**AV_GPS_Sat4_ SVN_ID** Identifies the Air Vehicle's GPS satellite number four.	Integer	None	1 <= x < 1024	0 = Not received
29	**AV_GPS_Sat5_ SVN_ID** Identifies the Air Vehicle's GPS satellite number five.	Integer	None	1 <= x < 1024	0 = Not received
30	**AV_GPS_Sat6_ SVN_ID** Identifies the Air Vehicle's GPS satellite number six.	Integer	None	1 <= x < 1024	0 = Not received
31	**AV_GPS_Sat7_ SVN_ID** Identifies the Air Vehicle's GPS satellite number seven.	Integer	None	1 <= x < 1024	0 = Not received
32	**AV_GPS_Sat8_ SVN_ID** Identifies the Air Vehicle's GPS satellite number eight.	Integer	None	1 <= x < 1024	0 = Not received
33	**AV_GPS_Sat9_ SVN_ID** Identifies the Air Vehicle's GPS satellite number nine.	Integer	None	1 <= x < 1024	0 = Not received
34	**AV_GPS_Sat10_ SVN_ID** Identifies the Air Vehicle's GPS satellite number ten.	Integer	None	1 <= x < 1024	0 = Not received
35	**AV_GPS_Sat11_ SVN_ID** Identifies the Air Vehicle's GPS satellite number eleven.	Integer	None	1 <= x < 1024	0 = Not received
36	**AV_GPS_Sat12_ SVN_ID** Identifies the Air Vehicle's GPS satellite number twelve.	Integer	None	1 <= x < 1024	0 = Not received

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
37	**AV_GPS_Sig_Str_1** Indentures the Air Vehicle's GPS receiver satellite 1 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
38	**AV_GPS_Sig_Str_2** Identifies the Air Vehicle's GPS receiver satellite 2 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
39	**AV_GPS_Sig_Str_3** Identifies the Air Vehicle's GPS receiver satellite 3 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
40	**AV_GPS_Sig_Str_4** Identifies the Air Vehicle's GPS receiver satellite 4 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
41	**AV_GPS_Sig_Str_5** Identifies the Air Vehicle's GPS receiver satellite 5 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
42	**AV_GPS_Sig_Str_6** Identifies the Air Vehicle's GPS receiver satellite 6 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
43	**AV_GPS_Sig_Str_7** Identifies the Air Vehicle's GPS receiver satellite 7 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
44	**AV_GPS_Sig_Str_8** Identifies the Air Vehicle's GPS receiver satellite 8 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
45	**AV_GPS_Sig_Str_9** Identifies the Air Vehicle's GPS receiver satellite 9 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
46	**AV_GPS_Sig_Str_10** Identifies the Air Vehicle's GPS receiver satellite 10 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength
47	**AV_GPS_Sig_Str_11** Identifies the Air Vehicle's GPS receiver satellite 11 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength

AV GPS Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
48	**AV_GPS_Sig_Str_12** Identifies the Air Vehicle's GPS receiver satellite 12 signal strength.	Integer	Percent	0 <= x <= 100	0 = No Signal 100 = Full Signal Strength

4.2.4.1.4 AV EOIR Status Message

The length of the AV EOIR Status Message is 204 bytes.

AV EOIR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	4	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	

AV EOIR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
6	**PL_ID** Indicates which EO/IR payload is reporting in this message	Integer	None	See AV Specific Appendices	See AV Specific Appendices
7	**PL_Active_Sensor** Identifies the Air Vehicle's active sensor.	Integer	None	0 <= x <= 2	0 = None 1 = Electro-optical 2 = Infrared
8	**PL_Active_Sensor_Status**	Integer	None	0 <= x <= 5	0 = Off, Stowed 1 = Off, Not Stowed 2 = On, Becoming Ready 3 = On, Calibrating 4 = On, Ready 5 = On, Operating
9	**PL_Pointer_Lat** Indicates the commanded center point latitude of the EO/IR payload fixing point.	Double	Degrees	-90 <= x <= 90	Positive value indicates North latitude.
10	**PL_Pointer_Lon** Indicates the commanded center point longitude of the EO/IR payload fixing point.	Double	Degrees	-180 < x <= 180	Positive value indicates East longitude.
11	**PL_Depression_Angle** Specifies the pointing depression of the EO/IR payload referenced to the AV.	Double	Degrees	-90 <= x <= 120	In reference to the Air Vehicle. Positive depression indicates payload is pointing down.
12	**PL_Azimuth_Angle** Specifies the pointing azimuth of EO/IR payload referenced to the AV.	Double	Degrees	0<= x < 360	In reference to Air Vehicle heading.
13	**PL_Depression_Rate** Identifies the payload depression angle change rate.	Double	Degrees Per Second	-60 <= x <= 60	
14	**PL_Azimuth_Rate** Identifies the payload azimuth change rate.	Double	Degrees Per Second	-90 <= x <= 90	
15	**PL_LOS_Range_to_Target** Identifies the payload range to the center of field of view.	Double	Nautical Miles	0 <= x <= 200	

AV EOIR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
16	**PL_Ground_Range_to_Target** Identifies the range to center of field of view from Air Vehicle projected position on the ground.	Double	Nautical Miles	0 <= x <= 200	
17	**PL_Focal_Length** Identifies the focal length of the active sensor.	Double	Millimeters	1 < = x <= 5000	
18	**PL_FOV_Horizontal** Identifies the horizontal field of view of the active sensor.	Double	Degrees	1 <= x <= 90	
19	**PL_FOV_Vertical** Identifies the vertical field of view of the active sensor.	Double	Degrees	1 <= x <= 90	
20	**PL_IR_Polarity** Identifies the infrared payload polarity.	Integer	None	0 <= x <= 1	0 = White hot 1 = Black hot
21	**PL_IR_Gain** Indicates the gain setting for the IR payload.	Double	None	0 <= x <= 100	
22	**PL_Image_Ang_to_North** Angle in degrees from the first row of the image to true north.	Double	Degrees	-180< x <= 180	Clockwise is positive.
23	**PL_Image_Datum** Identifies the map datum used to derive the target coordinate.	Integer	None	0	0 = WGS 84

AV EOIR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
24	**PL_Image_Category** Identifies the specific category of imagery.	Integer	None	0 <= x <= TBD	0 = Slide Looking Radar 1 = Thermal Infrared 2 = Forward Looking Infrared 3 = Radar 4 = Electro-Optical 5 = Optical 6 = High Resolution Radar 7 = Hyperspectral 8 = Color Frame Photography 9 = Black/White Frame Photography
25	**PL_Image_Obliquity_Angle** Indicates the obliquity angle of image expressed in degrees.	Double	Degrees	0 <= x <= 90	
26	**PL_Center_Point_Accuracy** Identifies the accuracy of center point positional data provided. Expressed as error standard deviation in meters.	Double	Meters	0 <= x <= 2000	
27	**PL_Center_Point_Lat** Identifies the center point target latitude.	Double	Degrees	-90 <= x <= 90	
28	**PL_Center_Point_Lon** Identifies the center point target longitude.	Double	Degrees	-180 < x <= 180	
29	**PL_Image_Collection_Time_Week** Indicates the date and time an image was captured by a collector expressed in standard GPS time format.	Integer	Weeks	0 <= x < 1024	This is the weeks field of the current time in standard GPS data format.
30	**PL_Image_Collection_Time_Second** Indicates the date and time an image was captured by a collector expressed in standard GPS time format.	Integer	Seconds	0 <= x < 604800	This is the seconds field of the current time in standard GPS data format.
31	**PL_Image_Collection_Time_Ns** Indicates the date and time an image was captured by a collector in nanoseconds.	Integer	Nanoseconds	0 <= x < 1000000000	

4.2.4.1.5 AV Line of Sight Ground Data Terminal Status Message

This message is 200 bytes long.

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	5	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**LOS_GDT_ID** Identifies the GDT which is reporting this status information.	Integer	None	1 <= x <= 5	1 = Predator GDT 2 = APL GDT 3 = Outrider GDT 4 = Integrated Data Terminal 5 = TCDL
7	**LOS_GDT _Signal_Strength_1** Indicates the strength of the signal received by receiver 1.	Integer	Percent	0 <= x <= 100	0 = No signal. 100 = Full signal.

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
8	**LOS_GDT _Signal_Strength_2** Indicates the strength of the signal received by receiver 2.	Integer	Percent	0 <= x <= 100	0 = No signal. 100 = Full signal.
9	**LOS_GDT_PLL_Status_1** Indicates if receiver 1's phase locked loop is currently locked.	Integer	N/A	0 <= x <= 1	0 = Not locked. 1 = Locked.
10	**LOS_GDT_PLL_Status_2** Indicates if receiver 2's phase locked loop is currently locked.	Integer	N/A	0 <= x <= 1	0 = Not locked. 1 = Locked.
11	**LOS_GDT_Carrier_Detect_1** Indicates if receiver 1 detects a valid carrier.	Integer	N/A	0 <= x <= 1	0 = No carrier. 1 = Carrier detected.
12	**LOS_GDT_Carrier_Detect_2** Indicates if receiver 2 detects a valid carrier.	Integer	N/A	0 <= x <= 1	0 = No carrier. 1 = Carrier detected.
13	**LOS_GDT_Range** Indicates the range to the AV as sensed by the GDT.	Double	Miles	0 <= x <= 500	
14	**LOS_GDT_Uplink_Power_1** Indicates the commanded transmit power for transmitter 1.	Double	Watts	0 <= x <= 1000	0 = Not transmitting.
15	**LOS_GDT_Uplink_Power_2** Indicates the commanded transmit power for transmitter 2.	Double	Watts	0 <= x <= 1000	0 = Not transmitting.
16	**LOS_GDT_CPU_Temp** Indicates the temperature measured at the GDT's CPU.	Double	Degrees Fahrenheit	-80 <= x <= 250	
17	**LOS_GDT_TX1_Temp** Indicates the temperature measured at transmitter 1.	Double	Degrees Fahrenheit	-80 <= x <= 250	

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
18	**LOS_GDT_TX2_Temp** Indicates the temperature measured at transmitter 2.	Double	Degrees Fahrenheit	-80 <= x <= 250	
19	**LOS_GDT_TX1_Power_Temp** Indicates the temperature measured at transmitter 1's power supply.	Double	Degrees Fahrenheit	-80 <= x <= 250	
20	**LOS_GDT_TX2_Power_Temp** Indicates the temperature measured at transmitter 2's power supply.	Double	Degrees Fahrenheit	-80 <= x <= 250	
21	**LOS_GDT_TX1_Uplink_Freq** Indicates the commanded transmission frequency for transmitter 1.	Double	Megahertz	4400 <= x <= 18000	
22	**LOS_GDT_TX2_Uplink_Freq** Indicates the commanded transmission frequency for transmitter 2.	Double	Megahertz	4400 <= x <= 18000	
23	**LOS_GDT_RX1_Downlink_Freq** Indicates the commanded receive frequency for receiver 1.	Double	Megahertz	4400 <= x <= 18000	
24	**LOS_GDT_RX2_Downlink_Freq** Indicates the commanded transmission frequency for receiver 2.	Double	Megahertz	4400 <= x <= 18000	
25	**LOS_GDT_Transmitter_Selected** Indicates the transmitter currently selected for uplink data.	Integer	None	0 <= x <= 2	0 = No transmitter selected. 1 = Transmitter 1 selected. 2 = Transmitter 2 selected.
26	**LOS_GDT_Cooling_Mode** Indicates the current mode of operation of the GDT's cooling system.	Integer	None	0 <= x <= 2	0 = Off 1 = On, Manual 2 = Automatic
27	**LOS_GDT_28V_Power_Level** Indicates the current output voltage of the GDT's 28 volt power supply.	Double	Volts	0 <= x <= 100	

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
28	**LOS_GDT_Serial_Comm_Errors** Indicates the number of communication errors detected by the GDT in the serial GDT communications and control channel.	Integer	Errors	0 <= x <= 1000000	
29	**LOS_GDT_Antenna_Selected** Indicates the antenna currently selected by the GDT.	Integer	None	0 <= x <= 2	0 = None 1 = Omni 2 = Directional
30	**LOS_GDT_Pointing_Azimuth** Indicates the current pointing azimuth of the directional antenna.	Double	Degrees	0 <= x < 360	Referenced to true North.
31	**LOS_GDT_Pointing_Elevation** Indicates the current pointing elevation of the directional antenna.	Double	Degrees	-90 <= x <= 90	Referenced to horizontal with positive up.
32	**LOS_GDT_Tracking_Mode** Indicates the current mode for determining directional antenna pointing information.	Integer	None	0 <= x <= 2	0 = Manual pointing by GDT operator. 1 = Monopulse tracking. 2 = Pointing commands from TCS.

4.2.4.1.6 AV Line of Sight Air Data Terminal Status Message

This message is 140 bytes long.

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	6	

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_LOS_Data_Link_Active** Indicates which LOS data links are currently active on the AV.	Integer	None	0 <= x <= 3	0 = None, SATCOM Control 1 = C-band analog 2 = C-band digital 3 = Ku-band
7	**AV_LOS_Ch_1_Uplink_Freq** Indicates the current frequency for ADT receiver 1.	Double	Megahertz	4400 <= x <= 18000	
8	**AV_LOS_Ch_2_Uplink_Freq** Indicates the current frequency for ADT receiver 2.	Double	Megahertz	4400 <= x <= 18000	
9	**AV_LOS_Ch_1_Downlink_Freq** Indicates the current frequency for ADT transmitter 1.	Double	Megahertz	4400 <= x <= 18000	

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
10	**AV_LOS_Ch_2_Downlink_Freq** Indicates the current frequency for ADT transmitter 2.	Double	Megahertz	4400 <= x <= 18000	
11	**AV_LOS_ADT_Antenna_Selected** Identifies the antenna(s) currently being used by the AV for the Line Of Sight data link.	Integer	None	0 <= x <= 7	0 = None 1 = Omni 1 2 = Omni 2 3 = Omni 1 and Omni 2 4 = Directional 5 = Directional and Omni 1 6 = Directional and Omni 2 7 = Directional, Omni 1, and Omni 2
12	**AV_LOS_ADT_Ant_Select_Mode** Identifies the method the ADT uses to select the antenna to use for the LOS data link.	Integer	None	0 <= x <= 1	0 = Manual Selection by operator 1 = Automatic selection by AV
13	**AV_LOS_Pointing_Azimuth** Indicates the pointing azimuth of the antenna relative to true north.	Double	None	0 <= x <= 360	Referenced to true North.
14	**AV_LOS_Pointing_Elevation** Indicates the pointing elevation of the antenna relative to the local horizontal.	Double	None	-90 <= x <= 90	Positive value indicates up.
15	**AV_LOS_ADT_Transmitter_1_Stat** Indicates the current status of ADT transmitter 1.	Integer	None	0 <= x <= 4	0 = Off 1 = Becoming Ready 2 = Standby 3 = Active 4 = Failed
16	**AV_LOS_ADT_Transmitter_2_Stat** Indicates the current status of ADT transmitter 2.	Integer	None	0 <= x <= 4	0 = Off 1 = Becoming Ready 2 = Standby 3 = Active 4 = Failed

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
17	**AV_LOS_ADT_Tx_1_Power** Indicates the commanded transmission power for ADT transmitter 1.	Double	Watts	0 <= x <= 1000	
18	**AV_LOS_ADT_Tx_2_Power** Indicates the commanded transmission power for ADT transmitter 2.	Double	Watts	0 <= x <= 1000	
19	**AV_LOS_Receiver_1_Status** Indicates the current status of ADT receiver 1.	Integer	None	0 <= x <= 3	0 = Off 1 = Becoming Ready 2 = Active 3 = Failed
20	**AV_LOS_Receiver _2_Status** Indicates the current status of ADT receiver 2.	Integer	None	0 <= x <= 3	0 = Off 1 = Becoming Ready 2 = Active 3 = Failed
21	**AV_LOS_Sgnl_Strngth_1** Indicates the signal strength detected by ADT receiver 1.	Integer	Percent	0 <= x <= 100	0 = No signal 100 = Full signal
22	**AV_LOS_Sgnl_Strngth_2** Indicates the signal strength detected by ADT receiver 2.	Integer	Percent	0 <= x <= 100	0 = No signal 100 = Full signal
23	**AV_LOS_Rcvr_1_Cumul_Err** Indicates the cumulative number of bit errors detected by receiver 1.	Integer	None	0 <= x <= 100000	
24	**AV_LOS_Rcvr_2_Cumul_Err** Indicates the cumulative number of bit errors detected by receiver 2.	Integer	None	0 <= x <= 100000	

4.2.4.1.7 AV Piston Engine Status Message

This message is 168 bytes long.

AV Piston Engine Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	7	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**Engine_ID** Identifies the engine reporting in this message.	Integer	None	1 <= x <= 2	1 = Forward or Starboard Engine 2 = Aft or Port Engine
7	**Engine_Status** Indicates the current running status of the engine.	Integer	None	0 <= x <= 2	0 = Off 1 = On, warming up 2 = On, normal
8	**Engine_Speed** Indicates the current engine speed in revolutions per minute (RPM)	Integer	Revolutions Per Minute	0 <= x <= 10000	

AV Piston Engine Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**Engine_Oil_Pressure** Indicates the current engine oil pressure in pounds per square inch (PSI).	Double	Pounds Per Square Inch	0 <= x <= 300	
10	**Engine_Coolant_Pressure** Indicates the current engine coolant pressure in pounds per square inch (PSI).	Double	Pounds Per Square Inch	0 <= x <= 300	
11	**Engine_Manifold_Pressure** Indicates the current engine manifold pressure in pounds per square inch (PSI).	Double	Pounds Per Square Inch	0 <= x <= 300	
12	**Engine_Fuel_Pressure** Indicates the current engine fuel pressure in pounds per square inch (PSI).	Double	Pounds Per Square Inch	0 <= x <= 300	
13	**Engine_Oil_Temperature** Indicates the current engine oil temperature in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 500	
14	**Engine_Coolant_Temperature** Indicates the current engine coolant temperature in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 500	
15	**Engine_Exhaust_Temperature_1** Indicates the current engine exhaust temperature at point 1 in the engine in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	
16	**Engine_Exhaust_Temperature_2** Indicates the current engine exhaust temperature at point 2 in the engine in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	
17	**Engine_Exhaust_Temperature_3** Indicates the current engine exhaust temperature at point 3 in the engine in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	
18	**Engine_Exhaust_Temperature_4** Indicates the current engine exhaust temperature at point 4 in the engine in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	

AV Piston Engine Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
19	**Engine_Cyl_Head_Temperature** Indicates the current engine cylinder head temperature in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	
20	**Engine_Manifold_Temperature** Indicates the current engine manifold temperature in degrees Fahrenheit.	Double	Degrees Fahrenheit	-80 <= x <= 2000	
21	**Engine_Oil_Level** Indicates the current engine oil level in quarts.	Double	Quarts	0 <= x <= 20	
22	**Engine_Fuel_Tank_Selected** Indicates the fuel tank currently supplying fuel to the engine reporting this message.	Integer	None	0 <= x <= 2,99	0 = None 1 = Fuel Tank 1 2 = Fuel Tank 2 99 = Fuel Tanks 1 and 2
23	**Engine_Alternator_Current** Indicates the output current of the alternator of the engine reporting this message.	Double	Amps	0 <= x <= 200	
24	**Engine_Alternator_Voltage** Indicates the output voltage of the alternator of the engine reporting this message.	Double	Volts	0 <= x <= 400	

4.2.4.1.8 AV Fuel Status Message

This message is 68 bytes long.

AV Fuel Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	8	

AV Fuel Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**Fuel_Tank_ID** Identifies the fuel tank reporting in this status message	Integer	None	1 <= x <= 4	See AV Specific Appendices for definition of values.
7	**Fuel_Tank_Current_Level** Fuel remaining in this tank.	Double	Pounds	0 <= x <= 1000	
8	**Fuel_Tank_Flow_Rate_Out** Identifies the rate at which fuel is exiting this tank.	Double	Pounds per Hour	0 <= x <= 100	Positive as fuel exits tank
9	**Fuel_Tank_Flow_Rate_In** Identifies the rate at which fuel is entering this tank.	Double	Pounds per Hour	0 <= x <= 100	Positive as fuel enters tank
10	**Fuel_Tank_Pressure** Identifies the current pressure in this fuel tank.	Double	Pounds per Square Inch	0 <= x <= 100	

4.2.4.1.9 AV Electrical System Status Message

This message is 112 bytes long.

AV Electrical System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	9	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_40VDC_Bus_Voltage** Indicates the Air Vehicles 40 VDC power distribution bus voltage	Double	Volts	-100 <= x <= 100	

AV Electrical System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
7	**AV_28VDC_Bus_Voltage** Indicates the Air Vehicle's 24 VDC power distribution bus voltage	Double	Volts	-100 <= x <= 100	
8	**AV_Battery_Voltage_1** Indicates the voltage across battery 1's terminals.	Double	Volts	0 <= x <= 400	
9	**AV_Battery_Current_1** Indicates the current into battery 1.	Double	Amps	-100 <= x <= 100	Positive value indicates battery is charging.
10	**AV_Battery_Voltage_2** Indicates the voltage across battery 2's terminals.	Double	Volts	0 <= x <= 400	
11	**AV_Battery_Current_2** Indicates the current into battery 2.	Double	Amps	-100 <= x <= 100	Positive value indicates battery is charging.
12	**AV_Battery_Voltage_3** Indicates the voltage across battery 3's terminals.	Double	Volts	0 <= x <= 400	
13	**AV_Battery_Current_3** Indicates the current into battery 3.	Double	Amps	-100 <= x <= 100	Positive value indicates battery is charging.
14	**AV_Battery_Voltage_4** Indicates the voltage across battery 4's terminals.	Double	Volts	0 <= x <= 400	
15	**AV_Battery_Current_4** Indicates the current into battery 4.	Double	Amps	-100 <= x <= 100	Positive value indicates battery is charging.

4.2.4.1.10 AV Analog Video System Status Message

This message is 116 bytes long.

AV Analog Video System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	10	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Video_Mux_Power** Indicates if power is applied to the AV's video distribution MUX.	Integer	None	0 <= x <= 1	0 = Off 1 = On
7	**AV_Video_Downlink_Ch_1_Source** Indicates the video source routed to channel 1 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices

AV Analog Video System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
8	**AV_Video_Downlink_Ch_2_Source** Indicates the video source routed to channel 2 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
9	**AV_Video_Downlink_Ch_3_Source** Indicates the video source routed to channel 3 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
10	**AV_Video_Downlink_Ch_4_Source** Indicates the video source routed to channel 4 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
11	**AV_VCR_Power_1** Indicates if the AV's VCR 1 is currently powered on.	Integer	None	0 <= x <= 1	0 = Off 1 = On
12	**AV _VCR_Mode_1** Indicates the current operating mode of the AV's VCR 1.	Integer	None	0 <= x <= 5	0 = Tape not loaded 1 = Stopped 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
13	**AV_VCR_Counter_1** Indicates the current value of the AV VCR 1's tape counter.	Integer	Seconds	-21600 <= x <= 21600	
14	**AV_VCR_Record_Source_1** Indicates the video source currently routed to the AV's VCR 1 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
15	**AV_VCR_Power_2** Indicates if the AV's VCR 2 is currently powered on.	Integer	None	0 <= x <= 1	0 = Off 1 = On

AV Analog Video System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
16	**AV _VCR_Mode_2** Indicates the current operating mode of the AV's VCR 2.	Integer	None	0 <= x <= 5	0 = Tape not loaded 1 = Stopped 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
17	**AV_VCR_Counter_2** Indicates the current value of the AV VCR 2's tape counter.	Integer	Seconds	-21600 <= x <= 21600	
18	**AV_VCR_Record_Source_2** Indicates the video source currently routed to the AV's VCR 2 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
19	**AV_VCR_Power_3** Indicates if the AV's VCR 3 is currently powered on.	Integer	None	0 <= x <= 1	0 = Off 1 = On
20	**AV _VCR_Mode_3** Indicates the current operating mode of the AV's VCR 3.	Integer	None	0 <= x <= 5	0 = Tape not loaded 1 = Stopped 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
21	**AV_VCR_Counter_3** Indicates the current value of the AV VCR 3's tape counter.	Integer	Seconds	-21600 <= x <= 21600	
22	**AV_VCR_Record_Source_3** Indicates the video source currently routed to the AV's VCR 3 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
23	**AV_VCR_Power_4** Indicates if the AV's VCR 4 is currently powered on.	Integer	None	0 <= x <= 1	0 = Off 1 = On

AV Analog Video System Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
24	**AV _VCR_Mode_4** Indicates the current operating mode of the AV's VCR 4.	Integer	None	0 <= x <= 5	0 = Tape not loaded 1 = Stopped 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
25	**AV_VCR_Counter_4** Indicates the current value of the AV VCR 4's tape counter.	Integer	Seconds	-21600 <= x <= 21600	
26	**AV_VCR_Record_Source_4** Indicates the video source currently routed to the AV's VCR 4 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices

4.2.4.1.11 AV Lights and Landing Gear Status Message

This message is 60 bytes long.

AV Lights and Landing Gear Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	11	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0

AV Lights and Landing Gear Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Navigation_Lights** Indicates if the navigation lights are on or off.	Integer	None	0 <= x <= 1	0 = off 1 = on
7	**AV_Landing_Lights** Indicates if the landing lights are on or off.	Integer	None	0 <= x <= 1	0 = off 1 = on
8	**AV_Strobe_Light** Indicates if the strobe light is on or off.	Integer	None	0 <= x <= 1	0 = off 1 = on
9	**AV_Hazard_Beacon** Indicates if the radiation hazard beacon is on or off.	Integer	None	0 <= x <= 1	0 = off 1 = on
10	**AV_Nose_Landing_Gear** Indicates the status of the Air Vehicle's nose landing gear.	Integer	None	0 <= x <= 2	0 = up 1 = down 2 = down and locked

AV Lights and Landing Gear Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
11	**AV_Port_Landing_Gear** Indicates the status of the Air Vehicle's port side landing gear.	Integer	None	0 <= x <= 2	0 = up 1 = down 2 = down and locked
12	**AV_Starboard_Landing_Gear** Indicates the status of the Air Vehicle's starboard side landing gear.	Integer	None	0 <= x <= 2	0 = up 1 = down 2 = down and locked

4.2.4.1.12 AV IFF Status Message

This message is 76 bytes long.

AV IFF Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	12	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV IFF Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_IFF_Power** Indicates if the Air Vehicle's IFF is powered on.	Integer	None	0 <= x <= 1	0 = Off 1 = On
7	**AV_IFF_Mode_C** Indicates if the Air Vehicle's IFF Mode C capability is enabled.	Integer	None	0 <= x <= 1	0 = Off 1 = On
8	**AV_IFF_Mode_1** Indicates if the Air Vehicle's IFF Mode 1 capability is enabled.	Integer	None	0 <= x <= 1	0 = Off 1 = On
9	**AV_IFF_Mode_1_Code** Indicates the code the IFF will squawk.	Integer	None	1 <= x <= 4096	This value is the decimal value of the octal code.
10	**AV_IFF_Mode_2** Indicates if the Air Vehicle's IFF Mode 2 capability is enabled.	Integer	None	0 <= x <= 1	0 = Off 1 = On
11	**AV_IFF_Mode_3A** Indicates if the Air Vehicle's IFF Mode 3A capability is enabled.	Integer	None	0 <= x <= 1	0 = Mode 3A disabled 1 = Mode 3A enabled
12	**AV_IFF_Mode_3A_Code** Indicates the code the IFF will squawk.	Integer	None	1 <= x <= 4096	This value is the decimal value of the octal code.

AV IFF Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
13	**AV_IFF_Mode_4** Indicates if the Air Vehicle's IFF Mode 4 capability is enabled.	Integer	None	0 <= x <= 1	0 = Mode 4 disabled 1 = Mode 4 enabled
14	**AV_IFF_Mode_4_Code** Indicates the code the IFF will squawk.	Integer	None	1 <= x <= 4096	This value is the decimal value of the octal code.
15	**AV_IFF_Mode_4_Hold** Indicates if the mode 4 hold is on.	Integer	None	0 <= x <= 1	0 = No hold 1 = Hold
16	**AV_IFF_Operational_Mode** Indicates the current operating mode of the IFF.	Integer	None	1 <= x <= 3	1 = Standby 2 = Normal 3 = Emergency

4.2.4.1.13 AV SAR Status Message

This message is 128 bytes long.

AV SAR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	15	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV SAR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**SAR_State** Indicates the state of SAR payload.	Integer	None	0 <= x <= 4	0 = Off 1 = Standby 2 = Power-on self test 3 = Initiated test 4 = Active
7	**SAR_Resolution_X** Indicates the resolution in pixels of the SAR frame along the axis parallel to the top and bottom edges of the frame.	Integer	Pixels	512 <= x <= 4096	
8	**SAR_Resolution_Y** Indicates the resolution of the SAR frame along the axis parallel to the left and right edges of the frame.	Integer	Pixels	512 <= x <= 4096	
9	**SAR_Scene_Nbr** Indicates the current scene number of the SAR payload.	Integer	None	0 <= x <= 33000	
10	**SAR_Center_FOV_Lat** Indicates the latitude of the center of the FOV for the most recent SAR frame collected	Double	Degrees	-90 <= x <= 90	Positive value indicates North latitude.
11	**SAR_Center_FOV_Lon** Indicates the longitude of the center of the FOV for the most recent SAR frame collected	Double	Degrees	-180 < x <= 180	Positive value indicates East longitude.

AV SAR Status Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
12	**SAR_Frame_Corner_1_Lat** Indicates the latitude of corner 1 of the current SAR footprint.	Double	Degrees	-90 <= x <= 90	Corners are numbered consecutively around the footprint.
13	**SAR_Frame_Corner_1_Lon** Indicates the longitude of corner 1 of the current SAR footprint.	Double	Degrees	-180 < x <= 180	Corners are numbered consecutively around the footprint.
14	**SAR_Frame_Corner_2_Lat** Indicates the latitude of corner 2 of the current SAR footprint.	Double	Degrees	-90 <= x <= 90	Corners are numbered consecutively around the footprint.
15	**SAR_Frame_Corner_2_Lon** Indicates the longitude of corner 2 of the current SAR footprint.	Double	Degrees	-180 < x <= 180	Corners are numbered consecutively around the footprint.
16	**SAR_Frame_Corner_3_Lat** Indicates the latitude of corner 3 of the current SAR footprint.	Double	Degrees	-90 <= x <= 90	Corners are numbered consecutively around the footprint.
17	**SAR_Frame_Corner_3_Lon** Indicates the longitude of corner 3 of the current SAR footprint.	Double	Degrees	-180 < x <= 180	Corners are numbered consecutively around the footprint.
18	**SAR_Frame_Corner_4_Lat** Indicates the latitude of corner 4 of the current SAR footprint.	Double	Degrees	-90 <= x <= 90	Corners are numbered consecutively around the footprint.
19	**SAR_Frame_Corner_4_Lon** Indicates the longitude of corner 4 of the current SAR footprint.	Double	Degrees	-180 < x <= 180	Corners are numbered consecutively around the footprint.

4.2.4.1.14 AV Warning Message

This message is used to pass alerts and warnings from the DCM to the TCS Real Time Component. It shall be generated by the DCM at a rate between 0.25 Hz and 4 Hz. All alerts are considered to be edge triggered and once set will be held high by the TCS Real Time Component until they are cleared by the DCM. The AV Warning Message contains 25 alert fields with associated alert level fields allowing multiple alerts to be included in a single message.

For the N alert set or clear events to be included in a single message, the appropriate alert IDs will be placed in the first AV_Number_Alert_Updates alert fields with the associated set or clear values in the first AV_Number_Alert_Updates alert level fields.
The remaining 25 - AV_Number_Alert_Updates alert fields shall be filled with the current status of 25-AV_Number_Alert_Updates alerts which may or may not be have been set or cleared in this message. The alerts included in these 25- AV_Number_Alert_Updates fields shall be selected such that the status of all the possible alerts is transferred from the DCM to the TCS Real Time Component before the status of an alert is retransmitted in this manner. This is done to ensure the alert state information in the DCM and the TCS Real Time Component is synchronized and in the event an alert set or clear event is missed by the TCS, it will eventually be updated by this alert state update mechanism.

This message is 236 bytes long.

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	19	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Number_Alert_Updates** Identifies how many of the alert statuses below are new conditions.	Integer	N/A	0 <= x <= 25	
7	**AV_Alert_1** Indicates the Alert ID of alert 1 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
8	**AV_Alert_Level_1** Indicates the new level of alert 1.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
9	**AV_Alert_2** Indicates the Alert ID of alert 2 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
10	**AV_Alert_Level_2** Indicates the new level of alert 2.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
11	**AV_Alert_3** Indicates the Alert ID of alert 3 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
12	**AV_Alert_Level_3** Indicates the new level of alert 3.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
13	**AV_Alert_4** Indicates the Alert ID of alert 4 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
14	**AV_Alert_Level_4** Indicates the new level of alert 4.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
15	**AV_Alert_5** Indicates the Alert ID of alert 5 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
16	**AV_Alert_Level_5** Indicates the new level of alert 5.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
17	**AV_Alert_6** Indicates the Alert ID of alert 6 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
18	**AV_Alert_Level_6** Indicates the new level of alert 6.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
19	**AV_Alert_7** Indicates the Alert ID of alert 7 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
20	**AV_Alert_Level_7** Indicates the new level of alert 7.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
21	**AV_Alert_8** Indicates the Alert ID of alert 8 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
22	**AV_Alert_Level_8** Indicates the new level of alert 8.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
23	**AV_Alert_9** Indicates the Alert ID of alert 9 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
24	**AV_Alert_Level_9** Indicates the new level of alert 9.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
25	**AV_Alert_10** Indicates the Alert ID of alert 10 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
26	**AV_Alert_Level_10** Indicates the new level of alert 10.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
27	**AV_Alert_11** Indicates the Alert ID of alert 11 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
28	**AV_Alert_Level_11** Indicates the new level of alert 11.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
29	**AV_Alert_12** Indicates the Alert ID of alert 12 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
30	**AV_Alert_Level_12** Indicates the new level of alert 12.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
31	**AV_Alert_13** Indicates the Alert ID of alert 13 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
32	**AV_Alert_Level_13** Indicates the new level of alert 13.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
33	**AV_Alert_14** Indicates the Alert ID of alert 14in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
34	**AV_Alert_Level_14** Indicates the new level of alert 14.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
35	**AV_Alert_15** Indicates the Alert ID of alert 15 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
36	**AV_Alert_Level_15** Indicates the new level of alert 15.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
37	**AV_Alert_16** Indicates the Alert ID of alert 16 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
38	**AV_Alert_Level_16** Indicates the new level of alert 16.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
39	**AV_Alert_17** Indicates the Alert ID of alert 17 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
40	**AV_Alert_Level_17** Indicates the new level of alert 17.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
41	**AV_Alert_18** Indicates the Alert ID of alert 18 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
42	**AV_Alert_Level_18** Indicates the new level of alert 18.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
43	**AV_Alert_19** Indicates the Alert ID of alert 19 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
44	**AV_Alert_Level_19** Indicates the new level of alert 19.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
45	**AV_Alert_20** Indicates the Alert ID of alert 20 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
46	**AV_Alert_Level_20** Indicates the new level of alert 20.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
47	**AV_Alert_21** Indicates the Alert ID of alert 21 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
48	**AV_Alert_Level_21** Indicates the new level of alert 21.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red

AV Warning Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
49	**AV_Alert_22** Indicates the Alert ID of alert 22 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
50	**AV_Alert_Level_22** Indicates the new level of alert 22.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
51	**AV_Alert_23** Indicates the Alert ID of alert 23 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
52	**AV_Alert_Level_23** Indicates the new level of alert 23.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
53	**AV_Alert_24** Indicates the Alert ID of alert 24 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
54	**AV_Alert_Level_24** Indicates the new level of alert 24.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red
55	**AV_Alert_25** Indicates the Alert ID of alert 25 in this message.	Integer	N/A		The values of the alerts are defined in the AV Specific Appendices.
56	**AV_Alert_Level_25** Indicates the new level of alert 25.	Integer	N/A	0 <= x <= 2	0 = Clear 1 = Yellow 2 = Red

4.2.4.1.15 DTED Lookup Request Message

This messages is used by the DCM to request Digital Terrain Elevation Data (DTED) information from the TCS. Upon receipt of a DTED Lookup Request Message, the TCS shall respond with a DTED Lookup Response Message within 250 milliseconds. The DCM shall generate DTED Lookup Request Messages at a rate no greater than 4 Hz.

This message is 48 bytes long.

AV DTED Lookup Request Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	32	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**DTED_Lookup_Latitude** Indicates the latitude for the data request.	Double	Degrees	-90 <= x <= 90	Referenced to WGS 84
7	**DTED_Lookup_Longitude** Indicates the longitude for the data request.	Double	Degrees	-180 < x <= 180	Referenced to WGS 84

4.2.4.2 TCS to DCM Messages

The messages in section 4.2.4.2 are transferred from the TCS to the DCM.

4.2.4.2.1 AV Flight Mode Command Message

This message is 140 bytes long.

AV Flight Mode Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	13	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	

AV Flight Mode Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
6	**AV_Flight_Mode** Commands the Air Vehicles current mode of control.	Integer	None	1 <= x <= 6	1 = Follow waypoints in current mission. 2 = Follow heading, airspeed, and altitude hold values. 3 = Fly to point specified by latitude, longitude, altitude, using best speed. 4 = Fly to point specified by latitude, longitude, altitude, using most fuel efficient speed. 5 = Fly to point specified by latitude, longitude, altitude, to arrive at specified time. 6 = Loiter at latitude, longitude, altitude.
7	**AV_Activate_New_Mission** Commands the Air Vehicle to set the mission identified in AV_New_Mission_ID as the current mission.	Integer	None	0 <= x <= 1	0 = Do not activate new mission. 1 = Activate new mission.
8	**AV_New_Mission_ID** Identifies the mission to be set at the current mission.	Integer	None	0 <= x <= 65535	
9	**AV_Set_Altitude** Commands the Air Vehicle to maintain the altitude specified in AV_New_Altitude.	Integer	None	0 <= x <= 1	0 = Do not change the altitude the Air Vehicle is to maintain. 1 = Change the altitude the Air Vehicle is to maintain to AV_New_Altitude.
10	**AV_New_Altitude** Specifies the altitude the Air Vehicle is commanded to maintain.	Integer	None	-2000 <= x <= 100000	Altitude is above mean sea level.
11	**AV_Set_Airspeed** Commands the Air Vehicle to maintain the airspeed specified in AV_New_Airspeed	Integer	None	0 <= x <= 1	0 = Do not change the airspeed the Air Vehicle is to maintain. 1 = Change the airspeed the Air Vehicle is to maintain to AV_New_Airspeed.
12	**AV_New_Airspeed** Specifies the airspeed the Air Vehicle is commanded to maintain.	Double	Knots	0 <= x <= 800	

AV Flight Mode Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
13	**AV_Set_Heading** Commands the Air Vehicle to maintain the heading specified in AV_New_Heading	Integer	None	0 <= x <= 1	0 = Do not change the heading the Air Vehicle is to maintain. 1 = Change the heading the Air Vehicle is to maintain to AV_New_Heading.
14	**AV_New_Heading** Specifies the heading the Air Vehicle is commanded to maintain.	Double	Degrees	0 <= x < 360	Referenced to true north.
15	**AV_Fly_To_Latitude** Specifies the latitude of the point the Air Vehicle is commanded to fly to.	Double	Degrees	-90 <= x <= 90	Referenced to WGS 84.
16	**AV_Fly_To_Longitude** Specifies the longitude of the point the Air Vehicle is commanded to fly to.	Double	Degrees	-180 < x <= 180	Referenced to WGS 84.
17	**AV_Fly_To_Altitude** Specifies the altitude above MSL the Air Vehicle is commanded to fly to.	Double	Feet	-3000 <= x <= 100000	Referenced to WGS 84.
18	**AV_Arrival_Time_Weeks** Specifies the commanded arrival time for the Air Vehicle at the commanded fly to point.	Integer	Weeks	0 <= x < 1024	Standard GPS time format.
19	**AV_Arrival_Time_Second** Specifies the commanded arrival time for the Air Vehicle at the commanded fly to point.	Integer	Seconds	0 <= x < 604800	Standard GPS time format.
20	**AV_Loiter_Latitude** Specifies the latitude of the center of the loiter pattern the Air Vehicle is commanded to fly.	Double	Degrees	-90 <= x <= 90	Referenced to WGS 84.
21	**AV_Loiter_Longitude** Specifies the longitude of the center of the loiter pattern the Air Vehicle is commanded to fly.	Double	Degrees	-180 < x <= 180	Referenced to WGS 84.
22	**AV_Loiter_Altitude** Specifies the altitude above MSL of the loiter pattern the Air Vehicle is commanded to fly.	Double	Feet	-3000 <= x <= 100000	Referenced to WGS 84.

AV Flight Mode Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
23	**AV_Loiter_Pattern** Specifies the loiter pattern the Air Vehicle is commanded to fly.	Integer	None	0 <= x <= 3	0 = No loiter. 1 = Oval/Circle. 2 = Race track. This pattern is oriented so the straight sides are parallel to the width axis of the loiter box. 3 = Figure 8. This pattern is oriented so the top and bottom of the 8 touch the length sides of the loiter box.
24	**AV_Loiter_Length** Specifies the length of the box which outlines the loiter area. The loiter pattern will touch the edges of the box.	Double	Feet	500 <= x <= 500000	
25	**AV_Loiter_Width** Specifies the width of the box which outlines the loiter area. The loiter pattern will touch the edges of the box.	Double	Feet	500 <= x <= 500000	
26	**AV_Loiter_Orientation** Specifies the orientation of the box which outlines the loiter area. Orientation is defined as the angular difference between a line drawn parallel to the width dimension of the box and true north.	Double	Degrees	0 <= x < 360	
27	**AV_Loiter_Time** Specifies the length of time for the Air Vehicle to maintain the loiter pattern.	Integer	Seconds	0 <= x <= 100000	0 = Until next command. If this message is not sent as part of a flight route plan, then the value of this field must be 0.

4.2.4.2.2 AV Flight Envelope Command Message

This message is 168 bytes long.

AV Flight Envelope Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	14	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Min_Altitude_Above_MSL** Identifies the minimum altitude above mean sea level for the Air Vehicle.	Double	Feet	-2000 <= x <= 100000	
7	**AV_Max_Altitude_Above_MSL** Identifies the maximum altitude above mean sea level for the Air Vehicle.	Double	Feet	-2000 <= x <= 100000	
8	**AV_Min_Altitude_Above_Ground** Identifies the minimum altitude above ground level for the Air Vehicle.	Double	Feet	-2000 <= x <= 100000	
9	**AV_Max_Decent_Rate** Indicates the maximum decent rate for the Air Vehicle.	Double	Feet Per Minute	0 <= x <= 10000	

AV Flight Envelope Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
10	**AV_Max_Climb_Rate** Indicates the maximum climb rate for the Air Vehicle.	Double	Feet Per Minute	0 <= x <= 10000	
11	**AV_Min_Airspeed** Indicates the minimum airspeed to always be maintained by the Air Vehicle.	Double	Knots	0 <= x <= 600	
12	**AV_Max_Airspeed** Indicates the airspeed to not be exceeded by the Air Vehicle.	Double	Knots	0 <= x <= 600	
13	**AV_Max_Positive_Acceleration** Indicates the positive acceleration not to be exceeded by the Air Vehicle during a maneuver.	Double	G's	0 <= x <= 10	
14	**AV_Max_Negative Acceleration** Indicates the negative acceleration not to be exceeded by the Air Vehicle during a maneuver.	Double	G's	-10 <= x <= 0	
15	**AV_Min_Angle_of_Attack** Indicates the minimum angle of attack for the Air Vehicle.	Double	Degrees	-180 <= x <= 180	
16	**AV_Max_Angle_of_Attack** Indicates the maximum angle of attack for the Air Vehicle.	Double	Degrees	-180 <= x <= 180	
17	**AV_Max_Pitch_Angle** Indicates the value which the absolute value of the Air Vehicle pitch shall not exceed.	Double	Degrees	0 <= x <= 90	
18	**AV_Max_Pitch_Rate** Indicates the value which the absolute value of the Air Vehicle pitch rate shall not exceed.	Double	Degrees Per Second	0 <= x <= 180	
19	**AV_Max_Roll_Angle** Indicates the value which the absolute value of the Air Vehicle roll shall not exceed.	Double	Degrees	0 <= x <= 180	
20	**AV_Max_Roll_Rate** Indicates the value which the absolute value of the Air Vehicle roll rate shall not exceed.	Double	Degrees per Second	0 <= x <= 180	

AV Flight Envelope Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
21	**AV_Max_Yaw_Rate** Indicates the value which the absolute value of the Air Vehicle yaw rate shall not exceed.	Double	Degrees per Second	0 <= x <= 180	
22	**AV_Max_Sideslip**	Double	TBD	TBD	

4.2.4.2.3 AV Lights Command Message

This message is 60 bytes long.

AV Lights Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	24	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV Lights Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Nav_Lights** Controls the navigation lights on the Air Vehicle.	Integer	None	0 <= x <= 1	0 = Off 1 = On
7	**AV_Strobe_Lights** Controls the Air Vehicle's strobe lights.	Integer	None	0 <= x <= 1	0 = Off 1 = On
8	**AV_Landing_Lights** Controls the Air Vehicle's landing lights.	Integer	None	0 <= x <= 1	0 = Off 1 = On
9	**AV_Rad_Haz_Strobe** Controls the Air Vehicle's radiation hazard strobe light.	Integer	None	0 <= x <= 1	0 = Disabled 1 = Enabled
10	**AV_Lights_Out_Range** Sets the Air Vehicle's lights out range from the GDT.	Double	Nautical Miles	0 <= x <= 255	
11	**AV_Lights_Out_Range_Enable** Enables the AV's automatic lights out range.	Integer	None	0 <= x <= 1	0 = Disabled 1 = Enabled

4.2.4.2.4 TCS Position Uplink Message

This message is 64 bytes long.

TCS Position Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments

TCS Position Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	35	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**TCS_Latitude** Indicates the current latitude of the TCS.	Double	Degrees	-90 <= x <= 90	Positive value indicates North latitude.
7	**TCS_Longitude** Indicates the current longitude of the TCS.	Double	Degrees	-180 <= x <= 180	Positive value indicates East longitude.
8	**TCS_Altitude** Indicates the current altitude of the TCS above MSL.	Double	Feet	-2000 <= x <= 20000	
9	**TCS_Magnetic_Variation** Indicates the magnetic variation at the TCS.	Double	Degrees	-90 <= x <= 90	Positive value indicates east variation.

4.2.4.2.5 TCS Environmental Data Uplink Message

This message is 280 bytes long.

TCS Environmental Data Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	27	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**TCS_Barometric** Indicates the current barometric pressure at the TCS.	Double	Inches Of Mercury	20 <= x <= 40	
7	**TCS_Air_Temperature** Indicates the current air temperature at the TCS.	Double	Degrees Fahrenheit	-60 <= x <= 130	
8	**TCS_Wind_Speed_Surface** Indicates the current wind speed at the TCS.	Double	Knots	0 <= x <= 80	

TCS Environmental Data Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**TCS_Wind_Direction_Surface** Indicates the current direction the wind is blowing from.	Double	Degrees	0 <= x < 360	
10	**Fcst_Wind_Speed_3000_Ft** Forecast wind speed at 3000 feet above MSL.	Double	Knots	0 <= x <= 200	
11	**Fcst_Wind_Direction_3000_Ft** Forecast wind direction at 3000 feet above MSL.	Double	Degrees	0 <= x < 360	
12	**Fcst_Air_Temp_3000_Ft** Forecast air temperature at 3000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
13	**Fcst_Wind_Speed_6000_Ft** Forecast wind speed at 6000 feet above MSL.	Double	Knots	0 <= x <= 200	
14	**Fcst_Wind_Direction_6000_Ft** Forecast wind direction at 6000 feet above MSL.	Double	Degrees	0 <= x < 360	
15	**Fcst_Air_Temp_6000_Ft** Forecast air temperature at 6000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
16	**Fcst_Wind_Speed_9000_Ft** Forecast wind speed at 9000 feet above MSL.	Double	Knots	0 <= x <= 200	
17	**Fcst_Wind_Direction_9000_Ft** Forecast wind direction at 9000 feet above MSL.	Double	Degrees	0 <= x < 360	
18	**Fcst_Air_Temp_9000_Ft** Forecast air temperature at 9000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
19	**Fcst_Wind_Speed_12000_Ft** Forecast wind speed at 12000 feet above MSL.	Double	Knots	0 <= x <= 200	
20	**Fcst_Wind_Direction_12000_Ft** Forecast wind direction at 12000 feet above MSL.	Double	Degrees	0 <= x < 360	
21	**Fcst_Air_Temp_12000_Ft** Forecast air temperature at 12000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
22	**Fcst_Wind_Speed_18000_Ft** Forecast wind speed at 18000 feet above MSL.	Double	Knots	0 <= x <= 200	

TCS Environmental Data Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
23	**Fcst_Wind_Direction_18000_Ft** Forecast wind direction at 18000 feet above MSL.	Double	Degrees	0 <= x < 360	
24	**Fcst_Air_Temp_18000_Ft** Forecast air temperature at 18000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
25	**Fcst_Wind_Speed_24000_Ft** Forecast wind speed at 24000 feet above MSL.	Double	Knots	0 <= x <= 200	
26	**Fcst_Wind_Direction_24000_Ft** Forecast wind direction at 24000 feet above MSL.	Double	Degrees	0 <= x < 360	
27	**Fcst_Air_Temp_24000_Ft** Forecast air temperature at 24000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
28	**Fcst_Wind_Speed_30000_Ft** Forecast wind speed at 30000 feet above MSL.	Double	Knots	0 <= x <= 200	
29	**Fcst_Wind_Direction_30000_Ft** Forecast wind direction at 30000 feet above MSL.	Double	Degrees	0 <= x < 360	
30	**Fcst_Air_Temp_30000_Ft** Forecast air temperature at 30000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
31	**Fcst_Wind_Speed_34000_Ft** Forecast wind speed at 34000 feet above MSL.	Double	Knots	0 <= x <= 200	
32	**Fcst_Wind_Direction_34000_Ft** Forecast wind direction at 34000 feet above MSL.	Double	Degrees	0 <= x < 360	
33	**Fcst_Air_Temp_34000_Ft** Forecast air temperature at 34000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	
34	**Fcst_Wind_Speed_39000_Ft** Forecast wind speed at 39000 feet above MSL.	Double	Knots	0 <= x <= 200	
35	**Fcst_Wind_Direction_39000_Ft** Forecast wind direction at 39000 feet above MSL.	Double	Degrees	0 <= x < 360	

TCS Environmental Data Uplink Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
36	**Fcst_Air_Temp_39000_Ft** Forecast air temperature at 39000 feet above MSL.	Double	Degrees Fahrenheit	-200 <= x <= 130	

4.2.4.2.6 EOIR Command Message

This message is 160 bytes long.

EOIR Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	28	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.

EOIR Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**EOIR_Identifier** Identifies the specific payload being commanded.	Integer	None	1 <= x <= 2	1 = POP 100 2 = Skyball
7	**EO_Power** Controls the Electro-optical payload's power status.	Integer	None	0 <= x <= 1	0 = Off 1 = On
8	**IR_Power** Controls the Infrared payload's power status.	Integer	None	0 <= x <= 1	0 = Off 1 = On
9	**EOIR_Payload_Active** Controls which payload is currently active.	Integer	None	0 <= x <= 2	0 = None 1 = EO 2 = IR
10	**EOIR_Payload_Pointing_Mode** Controls the pointing mode of the payload.	Integer	None	0 <= x <= 1	0 = Point at position given be EO/IR Pointer Latitude, EO/IR Pointer Longitude 1 = Point at EO/IR Azimuth, EO/IR Depression
11	**EOIR_Pointer_Latitude** Commands the latitude of the EO/IR pointing position.	Double	Degrees	-90 <= x <= 90	Positive value indicates North latitude.
12	**EOIR_Pointer_Longitude** Commands the longitude of the EO/IR pointing position.	Double	Degrees	-180 < x <= 180	Positive value indicates East longitude.
13	**EOIR_Pointer_Altitude** Commands the altitude above MSL of the EO/IR pointing position.	Double	Feet	-3000 <= x <= 100000	Referenced to WGS 84.
14	**EOIR_Depression** Controls the EO/IR pointing depression.	Double	Degrees	-90 <= x <=120	Positive value indicates down. Depression is given in reference to the Air Vehicle.
15	**EOIR_Azimuth** Controls the EO/IR pointing azimuth.	Double	Degrees	0 <= x < 360	Azimuth is given in reference to the Air Vehicle with 0 parallel to the Air Vehicle's length axis.
16	**EO_Payload_Camera_Select** Controls which EO camera is active.	Integer	None	0 <= x <= 3	See AV Specific appendix for values.

EOIR Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
17	**EO_Payload_Zoom** Controls the active EO camera's zoom setting.	Double	None	0 <= x <= 100	0 = Minimum zoom 100 = maximum zoom The mapping between values and actual zoom settings shall be linear.
18	**EO_Payload_Focus** Controls the active EO camera's focus setting.	Double	None	-1 <= x <= 100	<0 = Auto-focus 0 = Closest focus setting. 100 = Longest focus setting. The mapping between values and actual focus settings shall be linear.
19	**EO_Iris** Controls the active EO camera's iris setting.	Double	None	-1 <= x <= 100	<0 = Auto-exposure 0 = Smallest iris setting. 100 = Largest iris setting. The mapping between values and actual iris settings shall be linear.
20	**IR_Payload_Camera_Select** Controls which IR camera is active.	Integer	None	0 <= x <= 3	See AV specific appendices for values.
21	**IR_Payload_Zoom** Controls the active IR camera's zoom setting.	Double	None	0 <= x <= 100	0 = Minimum zoom 100 = maximum zoom The mapping between values and actual zoom settings shall be linear. If there are discrete settings for zoom, then they should be mapped linearly between 0 and 100 and the allowed range for this field should be discrete values.
22	**IR_Payload_Focus** Controls the active IR camera's focus setting.	Double	None	-1 <= x <= 100	<0 = Auto-focus 0 = Closest focus setting. 100 = Longest focus setting. The mapping between values and actual focus settings shall be linear.
23	**IR_Contrast** Controls the active IR camera's contrast setting.	Double	None	0 <= x <= 100	0 = Minimum contrast. 100 = maximum contrast. The mapping between values and actual iris settings shall be linear.

EOIR Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
24	**IR_Gain** Controls the active IR camera's gain setting.	Double	None	-1 <= x <= 100	<0 = Auto-gain 0 = Lowest gain setting. 100 = Highest gain setting. The mapping between values and actual gain settings shall be linear.
25	**IR_White_Hot** Controls if the active IR camera is white equals hot or black equals hot**.**	Integer	None	0 <= x <= 1	0 = Black is hot. 1 = White is hot.

4.2.4.2.7 AV Analog Video Command Message

This message is 116 bytes long.

AV Analog Video Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	22	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV Analog Video Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Video_Mux_Power** Indicates if power is applied to the AV's video distribution MUX.	Integer	None	0 <= x <= 1	0 = Off 1 = On
7	**AV_Video_Downlink_Ch_1_Source** Commands the video source routed to the channel 1 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
8	**AV_Video_Downlink_Ch_2_Source** Commands the video source routed to the channel 2 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
9	**AV_Video_Downlink_Ch_3_Source** Commands the video source routed to the channel 3 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
10	**AV_Video_Downlink_Ch_4_Source** Commands the video source routed to the channel 4 of the video downlink.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
11	**AV_VCR_Power_1** Commands the Air Vehicle's VCR 1 power status.	Integer	None	0 <= x <= 1	0 = Off 1 = On

AV Analog Video Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
12	**AV _VCR_Mode_1** Commands the current operating mode of the Air Vehicle's VCR 1.	Integer	None	0 <= x <= 5	0 = Eject 1 = Stop 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
13	**AV_VCR_Counter_Reset_1** Commands the Air Vehicle's VCR 1to reset it's tape counter to 0.	Integer	None	0 <= x <= 1	0 = Do not reset counter 1 = Reset counter
14	**AV_VCR_Record_Source_1** Indicates the video source currently routed to the AV's VCR 1 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
15	**AV_VCR_Power_2** Commands the Air Vehicle's VCR 2 power status.	Integer	None	0 <= x <= 1	0 = Off 1 = On
16	**AV _VCR_Mode_2** Commands the current operating mode of the Air Vehicle's VCR 2.	Integer	None	0 <= x <= 5	0 = Eject 1 = Stop 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
17	**AV_VCR_Counter_Reset_2** Commands the Air Vehicle's VCR 2 to reset it's tape counter to 0.	Integer	None	0 <= x <= 1	0 = Do not reset counter 1 = Reset counter
18	**AV_VCR_Record_Source_2** Indicates the video source currently routed to the AV's VCR 2 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
19	**AV_VCR_Power_3** Commands the Air Vehicle's VCR 3 power status..	Integer	None	0 <= x <= 1	0 = Off 1 = On

AV Analog Video Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
20	**AV _VCR_Mode_3** Commands the current operating mode of the Air Vehicle's VCR 3.	Integer	None	0 <= x <= 5	0 = Eject 1 = Stop 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
21	**AV_VCR_Counter_Reset_3** Commands the Air Vehicle's VCR 3to reset it's tape counter to 0.	Integer	None	0 <= x <= 1	0 = Do not reset counter 1 = Reset counter
22	**AV_VCR_Record_Source_3** Indicates the video source currently routed to the AV's VCR 3 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices
23	**AV_VCR_Power_4** Commands the Air Vehicle's VCR 4 power status.	Integer	None	0 <= x <= 1	0 = Off 1 = On
24	**AV _VCR_Mode_4** Commands the current operating mode of the Air Vehicle's VCR 4.	Integer	None	0 <= x <= 5	0 = Eject 1 = Stop 2 = Fast Forward 3 = Rewind 4 = Play 5 = Record
25	**AV_VCR_Counter_Reset_4** Commands the Air Vehicle's VCR 4to reset it's tape counter to 0.	Integer	None	0 <= x <= 1	0 = Do not reset counter 1 = Reset counter
26	**AV_VCR_Record_Source_4** Indicates the video source currently routed to the AV's VCR 4 by the AV's video MUX.	Integer	None	0 <= x <= 10	0 = None For other values see AV specific appendices

4.2.4.2.8 AV Waypoint Begin Message

This message is used to delimit the beginning of a waypoint to be sent to the DCM to be translated to the Air Vehicle's specific flight route plan format. Waypoints are represented as a set of command messages which are grouped by AV Waypoint Begin and AV Waypoint End messages. All of the messages in a waypoint shall be transferred sequentially from the TCS to the DCM with no other messages intermixed. As a minimum, a waypoint shall contain an AV Flight Mode Command Message. To prevent a flight route plan transfer from locking out other commands from being transferred from the TCS to the DCM, the TCS shall transmit not more than 5 waypoints per second.

This message is 76 bytes long.

AV Waypoint Begin Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	33	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	

AV Waypoint Begin Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
6	**AV_Flight_Route_Plan_ID** Identifies the flight route plan being uploaded.	Integer	None	1 <= x <= 8000	<= 4000 indicates normal flight route plan > 4000 indicates emergency flight route plan
7	**AV_Waypoint_Number** Indicates the number of this waypoint. Waypoints are numbered sequentially beginning with 1.	Integer	None	1 <= x <= 999	
8	**AV_Number_Waypoints_In_Plan** Indicates the number of waypoints in the plan being up loaded.	Integer	Waypoints	1 <= x <= 999	
9	**AV_Number_Commands_In_Waypoint** Indicates the total number of command messages in this waypoint. The number of command messages does not include the AV Waypoint Begin Message or the AV Waypoint End Message.	Integer	Messages	1 <= x <= 20	
10	**AV_Waypoint_Emergency_Action** Indicates the action to be taken when a loss of link condition occurs.	Integer	None		0 = Continue to next waypoint. 1 = Follow flight route in reverse order. 2 = Immediately Activate emergency plan identified in field AV_Emergency_Plan_ID_1. 3 = Activate emergency plan identified in field AV_Emergency_Plan_ID_1 after a delay of AV_Emergency_Plan_Delay seconds. 4 = Initiate conditional emergency plan selection.
11	**AV_Emergency_Plan_Delay** Indicates the number of seconds the AV should follow the normal flight route plan after a loss of link condition occurs.	Integer	Seconds	0 <= x <= 3600	
12	**AV_Emergency_Plan_Conditional_Select_Mode** The functionality of this field is TBD.	Integer	None	0	

AV Waypoint Begin Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
13	**AV_Emergency_Plan_ID_1** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
14	**AV_Emergency_Plan_ID_2** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
15	**AV_Emergency_Plan_ID_3** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
16	**AV_Emergency_Plan_ID_4** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.

4.2.4.2.9 AV Waypoint End Message

If the contents of this message do not match the contents of the associated AV Waypoint Begin Message then the waypoint shall not be considered valid and the DCM shall generate a warning to be reported to the TCS.

This message is 76 bytes long.

AV Waypoint End Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	34	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV Waypoint End Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Flight_Route_Plan_ID** Identifies the flight route plan being uploaded.	Integer	None	1 <= x <= 8000	<= 4000 indicates normal flight route plan > 4000 indicates emergency flight route plan
7	**AV_Waypoint_Number** Indicates the number of this waypoint. Waypoints are numbered sequentially beginning with 1.	Integer	None	1 <= x <= 999	
8	**AV_Number_Waypoints_In_Plan** Indicates the number of waypoints in the plan being up loaded.	Integer	Waypoints	1 <= x <= 999	
9	**AV_Number_Commands_In_Waypoint** Indicates the total number of command messages in this waypoint. The number of command messages does not include the AV Waypoint Begin Message or the AV Waypoint End Message.	Integer	Messages	1 <= x <= 20	

AV Waypoint End Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
10	**AV_Waypoint_Emergency_Action** Indicates the action to be taken when a loss of link condition occurs.	Integer	None		0 = Continue to next waypoint. 1 = Follow flight route in reverse order. 2 = Immediately Activate emergency plan identified in field AV_Emergency_Plan_ID_1. 3 = Activate emergency plan identified in field AV_Emergency_Plan_ID_1 after a delay of AV_Emergency_Plan_Delay seconds. 4 = Initiate conditional emergency plan selection.
11	**AV_Emergency_Plan_Delay** Indicates the number of seconds the AV should follow the normal flight route plan after a loss of link condition occurs.	Integer	Seconds	0 <= x <= 3600	
12	**AV_Emergency_Plan_Conditional_Select_Mode** The functionality of this field is TBD.	Integer	None	0	
13	**AV_Emergency_Plan_ID_1** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
14	**AV_Emergency_Plan_ID_2** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
15	**AV_Emergency_Plan_ID_3** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.
16	**AV_Emergency_Plan_ID_4** Indicates the AV_Flight_Route_Plan_ID of the flight route plan to follow when activated.	Integer	None	4000 < x <= 8000	Used for conditional emergency plan selection only.

4.2.4.2.10 AV Piston Engine Command Message

This message is 52 bytes long.

AV Piston Engine Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	25	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**Engine_ID** Identifies the engine commanded in this message.	Integer	None	1 <= x <= 2	1 = Forward or Starboard Engine 2 = Aft or Port Engine
7	**Engine_Speed_Hold** Commands the engine to hold the RPM setting commanded in Engine_Speed field.	Integer	None	0 <= x <= 1	0 = Engine speed commanded by autopilot. 1 = Engine speed hold enabled.
8	**Engine_Speed** Commands the engine speed if the engine speed hold is enabled.	Integer	RPM	0 <= x <= 12000	0 = Idle

AV Piston Engine Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**Engine_Start** Commands the engine to start.	Integer	None	0 <= x <= 1	0 = Continue in current run/stop state 1 = Start engine
10	**Engine_Stop** Commands the engine to stop.	Integer	None	0 <= x <= 1	0 = Continue in current run/stop state 1 = Stop engine

4.2.4.2.11 AV IFF Command Message

This message is 76 bytes long.

AV IFF Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	26	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.

AV IFF Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_IFF_Power** Commands power to be applied to the Air Vehicle's IFF.	Integer	None	0 <= x <= 1	0 = Off 1 = On
7	**AV_IFF_Mode_C_Enable** Commands the Air Vehicle's IFF Mode C capability to be enabled.	Integer	None	0 <= x <= 1	0 = Mode C disabled 1 = Mode C enabled
8	**AV_IFF_Mode_1_Code** Commands the code for the IFF to squawk.	Integer	None	1 <= x <= 4096	
9	**AV_IFF_Mode_1_Enable** Commands the Air Vehicle's IFF Mode 1 capability to be enabled.	Integer	None	0 <= x <= 1	0 = Mode 1 disabled 1 = Mode 1 enabled
10	**AV_IFF_Mode_2_Enable** Commands the Air Vehicle's IFF Mode 2 capability to be enabled.	Integer	None	0 <= x <= 1	0 = Mode 2 disabled 1 = Mode 2 enabled
11	**AV_IFF_Mode_3A_Code** Commands the code for the IFF to squawk.	Integer	None	1 <= x <= 4096	This value is the decimal value of the octal code.
12	**AV_IFF_Mode_3A_Enable** Commands the Air Vehicle's IFF Mode 3A capability to be enabled.	Integer	None	0 <= x <= 1	0 = Mode 3A disabled 1 = Mode 3A enabled
13	**AV_IFF_Mode_4_Code** Commands the code for the IFF to squawk.	Integer	None	1 <= x <= 4096	
14	**AV_IFF_Mode_4_Hold_No_Hold**	Integer	None	0 <= x < <= 1	0 = No hold 1 = Hold
15	**AV_IFF_Mode_4_Off_On** Commands the Air Vehicle's IFF Mode 4 capability to be enabled.	Integer	None	0 <= x <= 1	0 = Mode 4 disabled 1 = Mode 4 enabled
16	**AV_IFF_Operational_Mode** Commands the operational mode of the IFF.	Integer	None	1 <= x <= 3	1 = Standby 2 = Normal 3 = Emergency

4.2.4.2.12 AV Fuel System Command Message

The length of this message is 56 bytes.

AV Fuel System Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	23	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_Engine_1_Fuel_Source_Tank** Commands which tank engine 1 will draw fuel from.	Integer	None	0 <= x <= 4	See AV Specific Appendices for definition of values.
7	**AV_Engine_2_Fuel_Source_Tank** Commands which tank engine 2 will draw fuel from.	Integer	None	0 <= x <= 4	See AV Specific Appendices for definition of values.
8	**AV_Fuel_Tank_Transfer_Rate** Commands flow rate for transfer of fuel from one tank to another.	Double	Pounds Per Minute	0<= x <= 1000	

AV Fuel System Command Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**AV_Fuel_Transfer_Source_Tank** Commands which tank to transfer fuel from.	Integer	None	0 <= x <= 4	See AV Specific Appendices for definition of values.
10	**AV_Fuel_Transfer_Destination_Tank** Commands which tank to transfer fuel to.	Integer	None	0 <= x <= 4	See AV Specific Appendices for definition of values.

4.2.4.2.13 DTED Lookup Response Message

This messages is used by the TCS to request to reply to DTED Lookup Request messages from the DCM.

This message is 56 bytes long.

AV DTED Lookup Request Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	35	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

AV DTED Lookup Request Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**DTED_Lookup_Latitude** Indicates the latitude for the data request.	Double	Degrees	-90 <= x <= 90	Referenced to WGS 84
7	**DTED_Lookup_Longitude** Indicates the longitude for the data request.	Double	Degrees	-180 < x <= 180	Referenced to WGS 84
8	**DTED_Altitude** Indicates the altitude above MSL of the specified point.	Double	Feet	-3000 <= x <= 30000	Referenced to WGS 84

4.2.4.2.14 Ground Line of Sight Datalink Command Message

This message is for the control of Air Vehicle's native GDT.

The length of this message is 104 bytes.

Ground Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	29	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**LOS_GDT_Uplink_Power_1** Commands the transmit power for transmitter 1.	Integer	Watts	0 <= x <= 1000	0 = Not transmitting, Standby.
7	**LOS_GDT_Uplink_Power_2** Commands the transmit power for transmitter 2.	Integer	Watts	0 <= x <= 1000	0 = Not transmitting, Standby.
8	**LOS_GDT_Uplink_Frequency_1** Commands the transmit frequency for transmitter 1.	Double	Megahertz	4400 <= x <= 18000	

Ground Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
9	**LOS_GDT_Uplink_Frequency_2** Commands the transmit frequency for transmitter 2.	Double	Megahertz	4400 <= x <= 18000	
10	**LOS_GDT_Downlink_Frequency_1** Commands the transmit frequency for receiver 1.	Double	Megahertz	4400 <= x <= 18000	
11	**LOS_GDT_Downlink_Frequency_2** Commands the transmit frequency for receiver 2.	Double	Megahertz	4400 <= x <= 18000	
12	**LOS_GDT_Transmitter_Selected** Commands the transmitter currently selected for uplink data.	Integer	None	0 <= x <= 2	0 = No transmitter selected. 1 = Transmitter 1 is primary. 2 = Transmitter 2 is primary.
13	**LOS_GDT_Cooling_Mode** Commands the current mode of operation of the GDT's cooling system.	Integer	None	0 <= x <= 2	0 = Off. 1 = On, manual. 2 = Automatic.
14	**LOS_GDT_Power** Commands the input power to be applied to the GDT's transmitters.	Integer	None	0 <= x <= 1	0 = Off. 1 = On.
15	**LOS_GDT_Transmit_Antenna_Select** Commands which antenna the GDT is transmitting through.	Integer	None	0 <= x <= 4	0 = Dummy load. 1 = Omnidirectional. 2 = Directional. 3 = Omnidirectional and Directional. 4 = Auto select.
16	**LOS_GDT_Receive_Antenna_Select** Commands which antenna the GDT is receiving with.	Integer	None	0 <= x <= 3	0 = Omnidirectional. 1 = Directional. 2 = Omnidirectional and Directional. 3 = Auto select.
17	**LOS_GDT_Tracking_Mode** Commands the method of antenna pointing to use.	Integer	None	0 <= x <= 3	0 = Manual pointing by GDT operator. 1 = Monopulse tracking. 2 = Pointing commands from the TCS. 3 = Automated acquisition search pattern.

Ground Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
18	**LOS_GDT_Pointing_Azimuth** Commands the pointing azimuth for the directional antenna.	Integer	None	0 <= x <= 360	Referenced to true North.
19	**LOS_GDT_Pointing_Elevation** Commands the pointing elevation for the directional antenna.	Integer	None	-90 <= x <= 90	Referenced to horizontal with positive up.

4.2.4.2.15 Airborne Line of Sight Datalink Command Message

The length of this message is TBD bytes.

Airborne Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	30	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider

Airborne Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
6	**AV_LOS_Ch_1_Uplink_Freq** Commands the current frequency for ADT receiver 1.	Double	Megahertz	4400 <= x <= 18000	
7	**AV_LOS_Ch_2_Uplink_Freq** Commands the current frequency for ADT receiver 2.	Double	Megahertz	4400 <= x <= 18000	
8	**AV_LOS_Ch_1_Downlink_Freq** Commands the current frequency for ADT transmitter 1.	Double	Megahertz	4400 <= x <= 18000	
9	**AV_LOS_Ch_2_Downlink_Freq** Commands the current frequency for ADT transmitter 2.	Double	Megahertz	4400 <= x <= 18000	
10	**AV_LOS_ADT_Antenna_Selected** Commands the antenna(s) currently being used by the AV for the Line Of Sight data link.	Integer	None	0 <= x <= 8	0 = None 1 = Omni 1 2 = Omni 2 3 = Omni 1 and Omni 2 4 = Directional 5 = Directional and Omni 1 6 = Directional and Omni 2 7 = Directional, Omni 1, and Omni 2 8 = Auto select.

Airborne Line of Sight Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
11	**AV_LOS_ADT_Pointing_Mode** Commands the pointing mode of the LOS directional antenna.	Integer	None		0 = Automatic by signal strength. 1 = AV directed derived from GPS/INS position. 2 = Commanded by TCS.
12	**AV_LOS_Pointing_Azimuth** Indicates the pointing azimuth of the antenna relative to true north.	Double	None	0 <= x <= 360	Referenced to true North.
13	**AV_LOS_Pointing_Elevation** Indicates the pointing elevation of the antenna relative to the local horizontal.	Double	None	-90 <= x <= 90	Positive value indicates up.
14	**AV_LOS_ADT_Transmitter_1_Mode** Commands the operating mode of ADT transmitter 1.	Integer	None	0 <= x <= 2	0 = Off. 1 = Standby. 2 = Transmitting.
15	**AV_LOS_ADT_Transmitter_2_Mode** Commands the operating mode of ADT transmitter 2.	Integer	None	0 <= x <= 2	0 = Off. 1 = Standby. 2 = Transmitting.
16	**AV_LOS_ADT_Tx_1_Power** Commands the transmission power for ADT transmitter 1.	Double	Watts	0 <= x <= 1000	
17	**AV_LOS_ADT_Tx_2_Power** Commands the transmission power for ADT transmitter 2.	Double	Watts	0 <= x <= 1000	

4.2.4.2.16 Airborne SATCOM Datalink Command Message

The length of this message is 112 bytes.

Airborne SATCOM Datalink Control Message Field	Data Element Name & Description	Data Type	Data Units	Range Values	Comments
1	**Message_ID** Identifies the message being transmitted.	Integer	None	31	
2	**Message_Version** Identifies the version of the IDD this message is defined by.	Integer	None	1	1 = Version 1.0
3	**AV_Type** Identifies the Air Vehicle which TCS is flying.	Integer	None	1 < = x <= 2	1 = Predator 2 = Outrider
4	**AV_Tail_Number** Identifies the specific Air Vehicle which is flying.	String	None	N/A	This field contains the alphanumeric tail number of the air vehicle. It shall always be a 12 character fixed length string with the tail number in ASCII format left justified. Unused character positions shall be space filled. Note that the XDR String data type includes a 4 byte string length element making the total field length 16 bytes.
5	**Mission_ID** Identifies the Mission the Air Vehicle is flying.	Integer	None	1 <= x <= 65535	
	The contents of this message is TBD.				

4.3 Analog Video Interface

Analog video shall enter TCS in NTSC format on a RS-170 interface.

4.4 Digital Video Interface

Digital video shall be transferred over a high speed network interface TBD. The protocol is TBD.

5. Requirements traceability

The final IDD will have full requirements traceability. Currently the traceability is TBD.

6. Notes

background information, rationale
glossary

6.1 Acronym List

ACS	Aerial Common Sensor
ADOCS	Automated Deep Operations Coordination System
ADT	Air Data Terminal
AFATDS	Advanced Field Artillery Tactical Data System
AFMSS	Air Force Mission Support System
AIRTA	Airborne Reconnaissance Information Technical Architecture
ASAS	All Source Analysis System
ASD	Assistant Secretary of Defense
ATHS	Automated Target Hand-off System
ATM	Asynchronous Transfer Mode
ATWCS	Advanced Tactical Weapons Control Station
AV	Air Vehicle
C4I	Command, Control, Communications, Computers, and Intelligence
CARS	Contingency Airborne Reconnaissance System
CCTV	Closed Circuit Television
CGS	Common Ground Station
CIGSS	Common Imagery Ground/Surface System
COMPASS	Common Operational Modeling, Planning, And Simulation System
COSIP	Computer Open Systems Implementation Program
COTS	Commercial Off The Shelf
DCM	Datalink Control Module

DII/COE	Defense Information Infrastructure / Common Operating Environment
DoD	Department of Defense
DODI	Department Of Defense Instruction
DTED	Digital Terrain Elevation Data
EO	Electro-optical
ETRAC	Enhanced Tactical Radar Correlator
FD/L	Fault Detection / Location
FOV	Field Of View
GDT	Ground Data Terminal
GFE	Government Furnished Equipment
GMT	Greenwich Mean Time
GPS	Global Positioning System
GRCS	Guardrail Common Sensor
GSM	Ground Station Module
HAE	High Altitude and Endurance
HCI	Human-Computer Interface
IAS	Intelligence Analysis System
IDD	Interface Design Description
IDT	Integrated Data Terminal
IFF	Identify Friend or Foe
IIRS	Imagery Interpretability Rating Scale
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
I/O	Input / Output
IP	Internet Protocol
IPF	Integrated Processing Facility
IR	Infrared
JDISS	Joint Deployable Intelligence Support System
JMCIS	Joint Maritime Command Information System
JMF	Joint Message Format
JPO	Joint Program Office
JSIPS TEG	Joint Service Imagery Processing System Tactical Exploitation Group
JSIPS-N	Joint Service Imagery Processing System - Navy
JSTARS	Joint Standoff Target Attack Radar System
JTA	Joint Technical Architecture
LOS	Line of Sight
LRIP	Low Rate Initial Production
MAE	Medium Altitude and Endurance
MIES	Modernized Imagery Exploitation System
MIL-STD	Military Standard
MSL	Mean Sea Level
NITF	National Imagery Transmission Format

NDI	Non-Developmental Item
NTSC	National Television Standards Committee
PEO	Program Executive Office
PVC	Permanent Virtual Circuits
RTP	Real Time Processor
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communication
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
TAMPS	Tactical Aircraft Mission Planning System
TBD	To Be Determined
TBMCS	Theater Battle Management Core System
TCP	Transmission Control Protocol
TCS	Tactical Control System
TUAV	Tactical Unmanned Aerial Vehicle
UAV	Unmanned Aerial Vehicle
UAVJPO	Unmanned Aerial Vehicle Joint Project Office
UTM	Universal Time Macerator
VCR	Video Cassette Recorder
VDC	Volts Direct Current
VMF	Variable Message Format
WGS 84	World Geodetic System 84
XDR	External Data Representation

7. Predator specific appendix

This section discusses the predator specific implementation of the AV Standard Interface. It includes information on which messages and fields are supported by Predator and any Predator specific range values if applicable.

7.1 Predator supported messages

The following messages and fields are supported by Predator. All fields which are not supported shall be set to zero.

7.1.1 PDCM To TCS Messages

PDCM to TCS Messages

Message Name	Message ID	Supported	Frequency	Length	TCP/IP Overhead	Bandwidth Required
AV Position Status Message	1	yes	10 Hz	228	40	2680
AV INS Status Message	2	yes	10 Hz	192	40	2320
AV GPS Status Message	3	yes	1 Hz	256	40	2960
AV EOIR Status Message	4	yes	5 Hz	204	40	2440
AV Line of Sight Ground Data Terminal Status Message	5	yes	5 Hz	200	40	1200
AV Line of Sight Air Data Terminal Status Message	6	yes	5 Hz	140	40	900
AV Piston Engine Status Message	7	yes	5 Hz	168	40	1040
AV Fuel Status Message	8	yes	1 Hz	68	40	108
AV Electrical System Status Message	9	yes	5 Hz	112	40	760
AV Analog Video System Status Message	10	yes	1 Hz	116	40	146
AV Lights and Landing Gear Status Message	11	yes	1 Hz	60	40	100
AV IFF Status Message	12	yes	1 Hz	76	40	116
AV SAR Status Message	15	yes	TBD	128	40	TBD
AV Warning Message	19	yes	1 Hz	236	40	276
DTED Lookup Request Message	32	yes	Max 4 Hz	48	40	352

The total bandwidth required for the messages sent from the Predator DCM to the TCS is 15399 bytes per second or approximately 123 kilobits per second.

7.1.1.1 AV Position Status Message

AV Position Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	1	1 = AV Position Status Message
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Current_Nav_Altitude_Source**	yes	standard	
7	**AV_Altitude**	yes	-3000 <= x <= 60000	
8	**AV_Climb_Rate**	yes	standard	
9	**AV_Current_Nav_Position_Source**	yes	standard	
10	**AV_Latitude**	yes	standard	
11	**AV_Longitude**	yes	standard	
12	**AV_NAV_Orientation_Source**	yes	standard	
13	**AV_Roll**	yes	standard	
14	**AV_Pitch**	yes	standard	
15	**AV_Heading**	yes	standard	
16	**AV_Pitch_Rate**	yes	standard	
17	**AV_Roll_Rate**	yes	standard	
18	**AV_Yaw_Rate**	yes	standard	
19	**AV_Angle_Of_Attack**	yes	standard	
20	**AV_GPS_Time_Week**	yes	standard	
21	**AV_GPS_Time_Second**	yes	standard	
22	**AV_GPS_Time_Ns**	no	0	
23	**AV_Baro_Altitude**	yes	-3000 <= x <= 60000	
24	**AV_Radar_Altitude**	no	0	
25	**AV_Magnetometer_Heading**	yes	standard	
26	**AV_Ground_Track**	yes	standard	

AV Position Status Message Field	Data Element Name	Supported	Range Values	Comments
27	**AV_Ground_Speed**	yes	standard	
28	**AV_Airspeed**	yes	standard	
29	**AV_Measured_Wind_Heading**	yes	standard	
30	**AV_Measured_Wind_Speed**	yes	standard	
31	**AV_Nav_Mode**	yes	standard	
32	**AV_Next_Waypoint**	yes	0 <= x <= 255	0 = Not in waypoint control mode.
33	**AV_TTG_Next_Waypoint**	yes	standard	
34	**AV_Air_Temperature**	yes	standard	

7.1.1.2 AV INS Status Message

AV INS Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	2	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_INS_Er_NS**	no	0	
7	**AV_INS_Er_EW**	no	0	
8	**AV_INS_Er_Alt**	no	0	
9	**AV_INS_Mode**	yes	TBD	
10	**AV_INS_Alt**	yes	-3000 <= x <= 60000	
11	**AV_INS_Lat**	yes	0	
12	**AV_INS_Lon**	yes	standard	

AV INS Status Message Field	Data Element Name	Supported	Range Values	Comments
13	AV_INS_East_Velocity	no	0	
14	AV_INS_North_Velocity	no	0	
15	AV_INS_Altitude_Velocity	no	0	
16	AV_INS_East_Acceleration	no	0	
17	AV_INS_North_Acceleration	no	0	
18	AV_INS_Altitude_Acceleration	no	0	
19	AV_INS_Pitch	yes	standard	
20	AV_INS_Roll	yes	standard	
21	AV_INS_Heading	yes	standard	
22	AV_INS_Pitch_Rate	no	0	
23	AV_INS_Roll_Rate	no	0	
24	AV_INS_Yaw_Rate	no	0	
25	AV_INS_Time_Week	yes	standard	
26	AV_INS_Time_Second	yes	standard	
27	AV_INS_Time_Ns	no	0	

7.1.1.3 AV GPS Status Message

AV GPS Status Message Field	Data Element Name	Supported	Range Values	Comments
1	Message_ID	yes	3	
2	Message_Version	yes	standard	
3	AV_Type	yes	1	
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	AV_GPS_Time_Week	yes	standard	

AV GPS Status Message Field	Data Element Name	Supported	Range Values	Comments
7	**AV_GPS_Time_Second**	yes	standard	
8	**AV_GPS_Time_Ns**	no	0	
9	**AV_GPS_Mode**	yes	1,3	
10	**AV_GPS_Alt**	yes	-3000 <= x <= 60000	
11	**AV_GPS_Lat**	yes	standard	
12	**AV_GPS_Lon**	yes	standard	
13	**AV_GPS_Roll**	no	0	
14	**AV_GPS_Pitch**	no	0	
15	**AV_GPS_Heading**	no	0	
16	**AV_GPS_Ground_Track**	yes	standard	
17	**AV_GPS_Ground_Speed**	yes	0 <= x <= 800	
18	**AV_GPS_Pitch_Rate**	no	0	
19	**AV_GPS_Roll_Rate**	no	0	
20	**AV_GPS_Yaw_Rate**	no	0	
21	**AV_GPS_CEP**	yes	standard	
22	**AV_GPS_Alt_Err**	yes	standard	
23	**AV_GPS_Stat**	yes	x = 0-4,6	
24	**AV_GPS_Satellites_In_Fix**	yes	0 <= x <= 4	
25	**AV_GPS_Sat1_SVN_ID**	yes	standard	
26	**AV_GPS_Sat2_ SVN_ID**	yes	standard	
27	**AV_GPS_Sat3_ SVN_ID**	yes	standard	
28	**AV_GPS_Sat4_ SVN_ID**	yes	standard	
29	**AV_GPS_Sat5_ SVN_ID**	no	0	
30	**AV_GPS_Sat6_ SVN_ID**	no	0	
31	**AV_GPS_Sat7_ SVN_ID**	no	0	
32	**AV_GPS_Sat8_ SVN_ID**	no	0	
33	**AV_GPS_Sat9_ SVN_ID**	no	0	
34	**AV_GPS_Sat10_ SVN_ID**	no	0	
35	**AV_GPS_Sat11_ SVN_ID**	no	0	
36	**AV_GPS_Sat12_ SVN_ID**	no	0	

AV GPS Status Message Field	Data Element Name	Supported	Range Values	Comments
37	**AV_GPS_Sig_Str_1**	yes	standard	
38	**AV_GPS_Sig_Str_2**	yes	standard	
39	**AV_GPS_Sig_Str_3**	yes	standard	
40	**AV_GPS_Sig_Str_4**	yes	standard	
41	**AV_GPS_Sig_Str_5**	no	0	
42	**AV_GPS_Sig_Str_6**	no	0	
43	**AV_GPS_Sig_Str_7**	no	0	
44	**AV_GPS_Sig_Str_8**	no	0	
45	**AV_GPS_Sig_Str_9**	no	0	
46	**AV_GPS_Sig_Str_10**	no	0	
47	**AV_GPS_Sig_Str_11**	no	0	
48	**AV_GPS_Sig_Str_12**	no	0	

7.1.1.4 AV EOIR Status Message

AV EOIR Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	4	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**PL_ID**	no	0	

AV EOIR Status Message Field	Data Element Name	Supported	Range Values	Comments
7	**PL_Active_Sensor**	yes	0 <= x <= 3	0 = None 1 = Spotter 2 = Wide Angle 3 = IR
8	**PL_Active_Sensor_Status**	yes	standard	
9	**PL_Pointer_Lat**	yes	standard	
10	**PL_Pointer_Lon**	yes	standard	
11	**PL_Depression_Angle**	yes	standard	
12	**PL_Azimuth_Angle**	yes	standard	
13	**PL_Depression_Rate**	no	0	
14	**PL_Azimuth_Rate**	no	0	
15	**PL_LOS_Range_to_Target**	yes	standard	
16	**PL_Ground_Range_to_Target**	yes	standard	
17	**Focal_Length**	yes	standard	
18	**FOV_Horizontal**	yes	standard	
19	**FOV_Vertical**	yes	standard	
20	**PL_IR_Polarity**	yes	standard	
21	**PL_IR_Gain**	yes	standard	
22	**PL_Image_Ang_to_North**	no	0	
23	**PL_Image_Datum**	yes	standard	
24	**PL_Image_Category**	yes	standard	
25	**PL_Image_Obliquity_Angle**	no	0	
26	**PL_Center_Point_Accuracy**	no	0	
27	**PL_Center_Point_Lat**	yes	standard	
28	**PL_Center_Point_Lon**	yes	standard	
29	**PL_Image_Collection_Week**	yes	standard	
30	**PL_Image_Collection_Second**	yes	standard	
31	**PL_Image_Collection_Ns**	no	0	

7.1.1.5 AV Line of Sight Ground Data Terminal Status Message

AV Line Of Sight Ground Data Terminal Status Message	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	1 = Predator
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**LOS_GDT_ID**	yes	standard	
7	**LOS_GDT _Signal_Strength_1**	yes	standard	
8	**LOS_GDT _Signal_Strength_2**	yes	standard	
9	**LOS_GDT_PLL_Status_1**	no	0	
10	**LOS_GDT_PLL_Status_2**	no	0	
11	**LOS_GDT_Carrier_Detect_1**	yes	standard	
12	**LOS_GDT_Carrier_Detect_2**	yes	standard	
13	**LOS_GDT_Range**	no	0	
14	**LOS_GDT_Uplink_Power_1**	yes	0<= x <= 10	
15	**LOS_GDT_Uplink_Power_2**	yes	0 <= x <= 10	
16	**LOS_GDT_CPU_Temp**	yes	standard	
17	**LOS_GDT_TX1_Temp**	yes	standard	
18	**LOS_GDT_TX2_Temp**	yes	standard	
19	**LOS_GDT_TX1_Power_Temp**	yes	standard	
20	**LOS_GDT_TX2_Power_Temp**	yes	standard	
21	**LOS_GDT_TX1_Uplink_Freq**	yes	standard	
22	**LOS_GDT_TX2_Uplink_Freq**	yes	standard	
23	**LOS_GDT_RX1_Downlink_Freq**	yes	standard	
24	**LOS_GDT_RX2_Downlink_Freq**	yes	standard	

AV Line Of Sight Ground Data Terminal Status Message	Data Element Name	Supported	Range Values	Comments
25	LOS_GDT_Transmitter_Selected	yes	standard	
26	LOS_GDT_Cooling_Mode	yes	standard	
27	LOS_GDT_28V_Power_Level	yes	standard	
28	LOS_GDT_Serial_Comm_Errors	yes	standard	
29	LOS_GDT_Antenna_Selected	yes	standard	
30	LOS_GDT_Pointing_Azimuth	yes	standard	
31	LOS_GDT_Pointing_Elevation	yes	standard	
32	LOS_GDT_Tracking_Mode	yes	standard	

7.1.1.6 AV Line of Sight Air Data Terminal Status Message

AV Line Of Sight Air Data Terminal Status Message	Data Element Name	Supported	Range Values	Comments
1	Message_ID	yes	6	
2	Message_Version	yes	standard	
3	AV_Type	yes	1	1 = Predator
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	AV_LOS_Data_Link_Active	yes	standard	
7	AV_LOS_Ch_1_Uplink_Freq	yes	standard	
8	AV_LOS_Ch_2_Uplink_Freq	yes	standard	

AV Line Of Sight Air Data Terminal Status Message	Data Element Name	Supported	Range Values	Comments
9	**AV_LOS_Ch_1_Downlink_Freq**	yes	standard	
10	**AV_LOS_Ch_2_Downlink_Freq**	yes	standard	
11	**AV_LOS_ADT_Antenna_Selected**	yes	standard	
12	**AV_LOS_ADT_Ant_Select_Mode**	yes	standard	
13	**AV_LOS_Pointing_Azimuth**	yes	standard	
14	**AV_LOS_Pointing_Elevation**	yes	standard	
15	**AV_LOS_ADT_Transmitter_1_Stat**	yes	standard	
16	**AV_LOS_ADT_Transmitter_2_Stat**	yes	standard	
17	**AV_LOS_ADT_Tx_1_Power**	yes	0 <= x <= 100	
18	**AV_LOS_ADT_Tx_2_Power**	yes	0 <= x <= 100	
19	**AV_LOS_Receiver_1_Status**	yes	standard	
20	**AV_LOS_Receiver _2_Status**	yes	standard	
21	**AV_LOS_Sgnl_Strngth_1**	yes	standard	
22	**AV_LOS_Sgnl_Strngth_2**	yes	standard	
23	**AV_LOS_Rcvr_1_Cumul_Err**	yes	standard	
24	**AV_LOS_Rcvr_2_Cumul_Err**	yes	standard	

7.1.1.7 AV Piston Engine Status Message

AV Piston Engine Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	7	
2	**Message_Version**	yes	standard	

AV Piston Engine Status Message Field	Data Element Name	Supported	Range Values	Comments
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Engine_ID**	yes	2	
7	**Engine_Status**	yes	0,2	
8	**Engine_Speed**	yes	0 <= x <= 65535	
9	**Engine_Oil_Pressure**	yes	0 <= x <= 100	
10	**Engine_Coolant_Pressure**	no	0	
11	**Engine_Manifold_Pressure**	yes	standard	
12	**Engine_Fuel_Pressure**	yes	standard	
13	**Engine_Oil_Temperature**	yes	-60 <= x <= 451	
14	**Engine_Coolant_Temperature**	yes	-60 <= x <= 451	
15	**Engine_Exhaust_Temperature_1**	yes	-55 <= x <= 1600	
16	**Engine_Exhaust_Temperature_2**	yes	-55 <= x <= 1600	
17	**Engine_Exhaust_Temperature_3**	yes	-55 <= x <= 1600	
18	**Engine_Exhaust_Temperature_4**	yes	-55 <= x <= 1600	
19	**Engine_Cyl_Head_Temperature**	yes	-60 <= x <= 451	
20	**Engine_Manifold_Temperature**	no	0	
21	**Engine_Oil_Level**	yes	standard	
22	**Engine_Fuel_Tank_Selected**	no	0	
23	**Engine_Alternator_Current**	no	0	
24	**Engine_Alternator_Voltage**	yes	standard	

7.1.1.8 AV Fuel Status Message

One copy of this message shall be sent from the PDCM for each fuel tank in the AV.

AV Fuel Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	8	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Fuel_Tank_ID**	yes	0 <= x <= 1	0 = Forward tank 1 = Aft tank
7	**Fuel_Tank_Current_Level**	yes	standard	
8	**Fuel_Tank_Flow_Rate_Out**	yes	standard	
9	**Fuel_Tank_Flow_Rate_In**	yes	standard	
10	**Fuel_Tank_Pressure**	yes	standard	

7.1.1.9 AV Electrical System Status Message

AV Electrical System Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	9	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_40VDC_Bus_Voltage**	yes	0 <= x <= 51.1	
7	**AV_28VDC_Bus_Voltage**	yes	0 <= x <= 40.5	
8	**AV_Battery_Voltage_1**	yes	0 <= x <= 40.5	
9	**AV_Battery_Current_1**	yes	-20 <= x <= 82	

AV Electrical System Status Message Field	Data Element Name	Supported	Range Values	Comments
10	**AV_Battery_Voltage_2**	no	0	
11	**AV_Battery_Current_2**	no	0	
12	**AV_Battery_Voltage_3**	no	0	
13	**AV_Battery_Current_3**	no	0	
14	**AV_Battery_Voltage_4**	no	0	
15	**AV_Battery_Current_4**	no	0	

7.1.1.10 AV Analog Video System Status Message

AV Analog Video System Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	10	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Video_Mux_Power**	yes	standard	
7	**AV_Video_Downlink_Ch_1_Source**	yes	0 <= x <= 10	0 = None
8	**AV_Video_Downlink_Ch_2_Source**	yes	0 <= x <= 10	0 = None

AV Analog Video System Status Message Field	Data Element Name	Supported	Range Values	Comments
9	**AV_Video_Downlink_Ch_3_Source**	yes	0 <= x <= 10	0 = None
10	**AV_Video_Downlink_Ch_4_Source**	yes	0 <= x <= 10	0 = None
11	**AV_VCR_Power_1**	yes	standard	
12	**AV _VCR_Mode_1**	yes	standard	
13	**AV_VCR_Counter_1**	yes	standard	
14	**AV_VCR_Record_Source_1**	yes	0 <= x <= 4	0 = None 1 = Spotter 2 = Wide angle 3 = IR 4= Nose camera
15	**AV_VCR_Power_2**	yes	standard	
16	**AV _VCR_Mode_2**	yes	standard	
17	**AV_VCR_Counter_2**	yes	standard	
18	**AV_VCR_Record_Source_2**	yes	0 <= x <= 4	0 = None 1 = Spotter 2 = Wide angle 3 = IR 4= Nose camera
19	**AV_VCR_Power_3**	yes	standard	
20	**AV _VCR_Mode_3**	yes	standard	
21	**AV_VCR_Counter_3**	yes	standard	
22	**AV_VCR_Record_Source_3**	yes	0 <= x <= 4	0 = None 1 = Spotter 2 = Wide angle 3 = IR 4= Nose camera
23	**AV_VCR_Power_4**	no	0	

AV Analog Video System Status Message Field	Data Element Name	Supported	Range Values	Comments
24	**AV _VCR_Mode_4**	no	0	
25	**AV_VCR_Counter_4**	no	0	
26	**AV_VCR_Record_Source_4**	no	0	

7.1.1.11 AV Lights and Landing Gear Status Message

AV Lights And landing Gear Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	11	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	1 <= x <= 65535	
6	**AV_Navigation_Lights**	yes	standard	
7	**AV_Landing_Lights**	no	0	
8	**AV_Strobe_Light**	yes	standard	
9	**AV_Hazzard_Beacon**	yes	standard	
10	**AV_Nose_Landing_Gear**	yes	0 <= x <= 1	Indicates commanded position
11	**AV_Port_Landing_Gear**	yes	0 <= x <= 1	Indicates commanded position
12	**AV_Starboard_Landing_Gear**	yes	0 <= x <= 1	Indicates commanded position

7.1.1.12 AV IFF Status Message

AV IFF Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_IFF_Power**	yes	standard	
7	**AV_IFF_Identity**	yes	standard	
8	**AV_IFF_Mode_C**	yes	standard	
9	**AV_IFF_Mode_1**	yes	standard	
10	**AV_IFF_Mode_1_Code**	yes	standard	
11	**AV_IFF_Mode_2**	yes	standard	
12	**AV_IFF_Mode_3A**	yes	standard	
13	**AV_IFF_Mode_3A_Code**	yes	standard	
14	**AV_IFF_Mode_4**	yes	standard	
15	**AV_IFF_Mode_4_Code**	yes	standard	
16	**AV_IFF_Mode_4_Hold**	yes	standard	
17	**AV_IFF_Operational_Mode**	yes	standard	

7.1.1.13 AV SAR Status Message

AV SAR Status Message Field	Data Element Name	Supported	Range Values	Comments

AV SAR Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**SAR_State**	yes	standard	
7	**SAR_Resolution_X**	yes	standard	
8	**SAR_Resolution_Y**	yes	standard	
9	**SAR_Scene_Nbr**	yes	standard	
10	**SAR_Center_FOV_Lat**	yes	standard	
11	**SAR_Center_FOV_Lon**	yes	standard	
12	**SAR_Frame_Corner_1_Lat**	yes	standard	
13	**SAR_Frame_Corner_1_Lon**	yes	standard	
14	**SAR_Frame_Corner_2_Lat**	yes	standard	
15	**SAR_Frame_Corner_2_Lon**	yes	standard	
16	**SAR_Frame_Corner_3_Lat**	yes	standard	
17	**SAR_Frame_Corner_3_Lon**	yes	standard	
18	**SAR_Frame_Corner_4_Lat**	yes	standard	
19	**SAR_Frame_Corner_4_Lon**	yes	standard	

7.1.1.14 AV Warning Message

AV Warning Message Field	Data Element	Supported	Range Values	Comments
1	**Message_ID**	yes	19	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	

AV Warning Message Field	Data Element	Supported	Range Values	Comments
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Number_Alert_Updates**	yes	standard	
7	**AV_Alert_1**	yes	See Predator Alert Table	
8	**AV_Alert_Level_1**	yes	standard	
9	**AV_Alert_2**	yes	See Predator Alert Table	
10	**AV_Alert_Level_2**	yes	standard	
11	**AV_Alert_3**	yes	See Predator Alert Table	
12	**AV_Alert_Level_3**	yes	standard	
13	**AV_Alert_4**	yes	See Predator Alert Table	
14	**AV_Alert_Level_4**	yes	standard	
15	**AV_Alert_5**	yes	See Predator Alert Table	
16	**AV_Alert_Level_5**	yes	standard	
17	**AV_Alert_6**	yes	See Predator Alert Table	
18	**AV_Alert_Level_6**	yes	standard	
19	**AV_Alert_7**	yes	See Predator Alert Table	
20	**AV_Alert_Level_7**	yes	standard	
21	**AV_Alert_8**	yes	See Predator Alert Table	
22	**AV_Alert_Level_8**	yes	standard	
23	**AV_Alert_9**	yes	See Predator Alert Table	
24	**AV_Alert_Level_9**	yes	standard	
25	**AV_Alert_10**	yes	See Predator Alert Table	
26	**AV_Alert_Level_10**	yes	standard	
27	**AV_Alert_11**	yes	See Predator Alert Table	
28	**AV_Alert_Level_11**	yes	standard	
29	**AV_Alert_12**	yes	See Predator Alert Table	
30	**AV_Alert_Level_12**	yes	standard	
31	**AV_Alert_13**	yes	See Predator Alert Table	
32	**AV_Alert_Level_13**	yes	standard	
33	**AV_Alert_14**	yes	See Predator Alert Table	

AV Warning Message Field	Data Element	Supported	Range Values	Comments
34	**AV_Alert_Level_14**	yes	standard	
35	**AV_Alert_15**	yes	See Predator Alert Table	
36	**AV_Alert_Level_15**	yes	standard	
37	**AV_Alert_16**	yes	See Predator Alert Table	
38	**AV_Alert_Level_16**	yes	standard	
39	**AV_Alert_17**	yes	See Predator Alert Table	
40	**AV_Alert_Level_17**	yes	standard	
41	**AV_Alert_18**	yes	See Predator Alert Table	
42	**AV_Alert_Level_18**	yes	standard	
43	**AV_Alert_19**	yes	See Predator Alert Table	
44	**AV_Alert_Level_19**	yes	standard	
45	**AV_Alert_20**	yes	See Predator Alert Table	
46	**AV_Alert_Level_20**	yes	standard	
47	**AV_Alert_21**	yes	See Predator Alert Table	
48	**AV_Alert_Level_21**	yes	standard	
49	**AV_Alert_22**	yes	See Predator Alert Table	
50	**AV_Alert_Level_22**	yes	standard	
51	**AV_Alert_23**	yes	See Predator Alert Table	
52	**AV_Alert_Level_23**	yes	standard	
53	**AV_Alert_24**	yes	See Predator Alert Table	
54	**AV_Alert_Level_24**	yes	standard	
55	**AV_Alert_25**	yes	See Predator Alert Table	
56	**AV_Alert_Level_25**	yes	standard	

Predator Alert Table

Alert ID	Alert Level Range	Alert Text
1001	0 <= x <= 2	28 volt bus is low.
1002	0,2	A/V range is too close for GPS tracking.
1003	0,2	Accelerometer detects high g forces.

Alert ID	Alert Level Range	Alert Text
1004	0 <= x <= 1	Air Vehicle configured for RELAY mode.
1005	0 <= x <= 2	Air Vehicle Datalink board overheating.
1006	0 <= x <= 2	Air Vehicle Interface board overheating.
1007	0 <= x <= 2	Air Vehicle Servo board overheating.
1008	0,2	Airborne Receiver #1 PLL unlocked.
1009	0,2	Airborne Receiver #2 PLL unlocked.
1010	0,2	Airborne Transmitter #1 not installed.
1011	0 <= x <= 2	Airborne Transmitter #1 overheating.
1012	0,2	Airborne Transmitter #1 PLL unlocked.
1013	0,2	Airborne Transmitter #2 not installed.
1014	0 <= x <= 2	Airborne Transmitter #2 overheating.
1015	0,2	Airborne Transmitter #2 PLL unlocked.
1016	0 <= x <= 1	Airspeed is low.
1017	0,2	AOA sensor pot failed, stall protect off.
1018	0 <= x <= 1	AV & GDT uplink freq #1 don’t match.
1019	0 <= x <= 1	AV & GDT uplink freq #2 don’t match.
1020	0 <= x <= 1	Automatic receiver select override.
1021	0 <= x <= 1	AV TX 1 directional antenna in manual.
1022	0 <= x <= 1	AV TX 3 directional antenna in manual.
1023	0 <= x <= 1	Battery leaking current.
1024	0 <= x <= 1	Battery in line.
1025	0,2	Cowl flap servo pot failure.
1026	0,2	Datalink board not installed.
1027	0,2	Datalink board not ready.
1028	0,2	DFCS in running in simulation mode.
1029	0 <= x <= 1	Directly connected.
1030	0,2	DLC board detects flight comp failure.
1031	0,2	EEPROM read failed.
1032	0,2	EEPROM write failed.
1033	0,2	Engine computer lost RX.
1034	0,2	Engine computer lost TX.
1035	0,2	Engine computer RAM failure.
1036	0,2	Engine computer ROM failure.

Alert ID	Alert Level Range	Alert Text
1037	0,2	Engine RPM is too high - overspeed.
1038	0,2	Engine RPM is very low.
1039	0,2	Engine stopped.
1040	0 <= x <= 1	Error in snooping mission command.
1041	0 <= x <= 1	Flaps are being commanded down at high speed.
1042	0,2	Flight computer EEPROM error.
1043	0,2	Flight computer EPROM error.
1044	0 <= x <= 1	Front bay cooling fans are disabled.
1045	0,2	Fuel pressure drop detected.
1046	0,2	Fuel Pump failure detected.
1047	0,2	Fuel tank selection on override.
1048	0 <= x <= 1	GCS analog output off bus.
1049	0 <= x <= 1	GCS Bit-Sync board off bus.
1050	0 <= x <= 1	GCS Command Graph off bus.
1051	0,2	GCS commanding forced lost uplink mode.
1052	0 <= x <= 1	GCS Headsup dgtzr off bus.
1053	0 <= x <= 1	GCS Headsup Graph off bus.
1054	0 <= x <= 1	GCS is commanding RF to RELAY mode.
1055	0 <= x <= 1	GCS No tracker graphics board(s) found.
1056	0,2	GCS serial processor failure.
1057	0 <= x <= 1	GCS Status graph off bus.
1058	0,2	GCS sysvars[] bad order.
1059	0,2	GCS UHF transmitter is overheating.
1060	0,2	GCS battery is very low.
1061	0,2	GCS is operating on batttery power.
1062	0,2	GDT Receiver #1 PLL unlocked.
1063	0,2	GDT Receiver#2 PLL unlocked.
1064	0,2	GDT Receiver has failed.
1065	0 <= x <= 1	GDT Receiver is intermittent.
1066	0,2	GDT to GCS serial interface failed.
1067	0,2	GDT Transmitter #1 not installed.
1068	0 <= x <= 2	GDT Transmitter #1 is overheating.
1069	0,2	GDT Transmitter #1 PLL unlocked.

Alert ID	Alert Level Range	Alert Text
1070	0,2	GDT Transmitter #1 not installed.
1071	0 <= x <= 2	GDT Transmitter #1 is overheating.
1072	0,2	GDT Transmitter #1 PLL unlocked.
1073	0 <= x <= 1	GDT Transmitter is intermittent.
1074	0 <= x <= 1	GPS receiver #1 is NOT online.
1075	0 <= x <= 1	GPS receiver #2 is NOT online.
1076	0,2	GPS receivers A/V positions don't match.
1077	0 <= x <= 2	High Air Vehicle 12 v Vicor Temperature.
1078	0 <= x <= 2	High Air Vehicle 5 v Vicor Temperature.
1079	0 <= x <= 2	High Air Vehicle Tx #1 Vicor Temperature.
1080	0 <= x <= 2	High Air Vehicle Tx #2 Vicor Temperature.
1081	0 <= x <= 2	High Air Vehicle Tx #3 Vicor Temperature.
1082	0 <= x <=1	High exhaust gas temp.
1083	0,2	High side switch #1 overheating.
1084	0,2	High side switch #2 overheating.
1085	0,2	High side switch #3 overheating.
1086	0,2	High side switch #4 overheating.
1087	0,2	High sideslip condition.
1088	0,2	Icing condition detected.
1089	0 <= x <= 1	Illegal inlink packet received.
1090	0,2	Incompatible version of DFS software.
1091	0,2	Incompatible version of DGCS software.
1092	0,2	INF board detects flight comp failure.
1093	0 <= x <= 1	INS unit has lost GPS satellites.
1094	0 <= x <= 1	INS unit is initializing.
1095	0 <= x <= 1	INS unit is not fully functional.
1096	0 <= x <= 1	INS unit is NOT on-line.
1097	0 <= x <= 1	INS unit is waiting for initialization.
1098	0,2	Instructor overriding uplink.
1099	0 <= x <= 1	Inter-console link packet #01 received.
1100	0,2	Inter-console transmit failure.
1101	0,2	Interface board not installed.
1102	0,2	Interface board not ready to fly.

Alert ID	Alert Level Range	Alert Text
1103	0,2	Ku LMA is offline.
1104	0,2	Ku SPMA is auto-resetting, standby.
1105	0,2	Ku SPMA is offline.
1106	0 <= x <= 1	Landing gear down in cruise mode.
1107	0,2	Left aileron computer lost Rx.
1108	0,2	Left aileron computer lost Tx.
1109	0,2	Left aileron RAM failure.
1110	0,2	Left aileron ROM failure.
1111	0,2	Left aileron servo disabled.
1112	0 <= x <= 1	Left aileron servo overheating.
1113	0,2	Left aileron servo pot failure.
1114	0,2	Left brake servo disabled.
1115	0,2	Left brake servo overheating.
1116	0,2	Left brake servo pot failure.
1117	0,2	Left flap servo pot failure.
1118	0,2	Left main gear retract malfunction.
1119	0,2	Left main gear retract overheating.
1120	0,2	Left main retract servo disabled.
1121	0,2	Left tail computer lost RX.
1122	0,2	Left tail computer lost TX.
1123	0,2	Left tail RAM failure.
1124	0,2	Left tail ROM failure.
1125	0,2	Left tail servo disabled.
1126	0,2	Left tail servo overheating.
1127	0,2	Left tail servo pot failure.
1128	0,2	Lost Ku command link.
1129	0,2	Lost Ku return link.
1130	0,2	Lost LOS downlink.
1131	0,2	Lost LOS uplink.
1132	0,2	Lost UHF downlink.
1133	0,2	Lost UHF uplink.
1134	0,2	Lost uplink disabled in this mission leg.
1135	0 <= x <= 1	Low downlink signal on GDT receiver #1.

Alert ID	Alert Level Range	Alert Text
1136	0 <= x <= 1	Low downlink signal on GDT receiver #2.
1137	0 <= x <= 1	Low fuel condition.
1138	0 <= x <= 1	Low oil condition.
1139	0 <= x <= 1	Low uplink signal on AV receiver #1.
1140	0 <= x <= 1	Low uplink signal on AV receiver #2.
1141	0,2	MAP sensor failure detected; using backup.
1142	0 <= x <= 2	MCT is high.
1143	0,2	MCT sensor failure detected; using backup.
1144	0,2	Miss-Match in TX #1 Omni/Direc. Selection.
1145	0,2	Miss-Match in TX #3 Omni/Direc. Selection.
1146	0 <= x <= 1	Mission is too small. Aborted.
1147	0 <= x <= 1	Mission upload has failed; RESEND.
1148	0,2	Navigation sensor failure using backup sensor.
1149	0,2	Need to enter ADR latitude.
1150	0,2	Need to enter ADR longitude.
1151	0,2	Need to enter air vehicle weight.
1152	0,2	Need to enter fuel at start of flight.
1153	0,2	Need to enter GCS altitude.
1154	0,2	Need to enter GCS latitude.
1155	0,2	Need to enter ground baro.
1156	0,2	Need to enter lost link initial altitude.
1157	0,2	Need to enter lost link initial heading.
1158	0,2	Need to enter magnetic variation.
1159	0,2	Need to enter minimum altitude MSL.
1160	0,2	Need to select AV Tail #.
1161	0 <= x <= 1	No emergency mission program loaded.
1162	0 <= x <=1	No operational mission program loaded.
1163	0,2	Nose gear retract malfunction.
1164	0,2	Nose gear retract overheating.
1165	0,2	Nose steering servo pot failure.
1166	0,2	Oil pressure is very low.
1167	0 <= x <= 1	OP Mission has Lost Link OK in every leg.
1168	0,2	Payload CCSM Bad Address Byte Received.

Alert ID	Alert Level Range	Alert Text
1169	0,2	Payload CCSM Bad Sync Byte Received.
1170	0,2	Payload CCSM EPROM Error Detected.
1171	0,2	Payload CCSM Lost Communication.
1172	0,2	Payload CCSM Lost Rx.
1173	0,2	Payload CCSM Lost Tx.
1174	0,2	Payload CCSM RAM Error Detected.
1175	0,2	Payload Power Board lost RX.
1176	0,2	Payload Power Board lost TX.
1177	0,2	Payload Power Board RAM failure.
1178	0,2	Payload Power Board ROM failure.
1179	0,2	Payload Power Board switch #1 fault.
1180	0,2	Payload Power Board switch #2 fault.
1181	0,2	Payload Power Board switch #3 fault.
1182	0,2	Payload Power Board switch #4 fault.
1183	0,2	Payload Power Board switch #5 fault.
1184	0,2	Payload Power Board switch #6 fault.
1185	0,2	Payload Power Board switch #7 fault.
1186	0,2	Payload Power Board switch #8 fault.
1187	0,2	Pilot CCSM Bad Address Byte Received.
1188	0,2	Pilot CCSM Bad Sync Byte Received.
1189	0,2	Pilot CCSM EPROM Error Detected.
1190	0,2	Pilot CCSM Lost Communication.
1191	0,2	Pilot CCSM Lost Rx.
1192	0,2	Pilot CCSM Lost Tx.
1193	0,2	Pilot CCSM RAM Error Detected.
1194	0,2	PPO 1 is offline.
1195	0,2	PPO 2 is offline.
1196	0,2	Prim/secon airspeeds differ (>5 kn.).
1197	0,2	Prop pitch servo pot failure.
1198	0,2	Radar processor is offline.
1199	0,2	Receiver Overrun on FARM Port A.
1200	0,2	Receiver Overrun on FARM Port B.
1201	0 <= x <= 1	Receiving Ku broadcast uplink.

Alert ID	Alert Level Range	Alert Text
1202	0 <= x <= 1	Remote downlink connection.
1203	0,2	Right aileron computer lost RX.
1204	0,2	Right aileron computer lost TX.
1205	0,2	Right aileron RAM failure.
1206	0,2	Right aileron ROM failure.
1207	0,2	Right aileron servo disabled.
1208	0 <= x <= 1	Right aileron servo overheating.
1209	0,2	Right aileron servo pot failure.
1210	0,2	Right brake servo disabled.
1211	0,2	Right brake servo overheating.
1212	0,2	Right brake servo failure.
1213	0,2	Right flap servo pot failure.
1214	0,2	Right main gear retract malfunction.
1215	0,2	Right main gear retract overheating.
1216	0,2	Right main retract servo disabled.
1217	0,2	Right tail computer lost RX.
1218	0,2	Right tail computer lost TX.
1219	0,2	Right tail RAM failure.
1220	0,2	Right tail ROM failure.
1221	0,2	Right tail servo disabled.
1222	0,2	Right tail servo overheating.
1223	0,2	Right tail servo pot failure.
1224	0,2	S-Band Tx #3 battery override imminent.
1225	0 <= x <= 1	SAR antenna status flag set.
1226	0 <= x <= 1	SAR processor status flag set.
1227	0 <= x <= 1	SAR Tx/Rx status flag set.
1228	0,2	SCM Payload Power Board lost Rx.
1229	0,2	SCM Payload Power Board lost Tx.
1230	0,2	SCM Payload Power Board RAM failure.
1231	0,2	SCM Payload Power Board ROM failure.
1232	0 <= x <= 1	Send Ku RF command.
1233	0 <= x <= 1	Send Ku satellite command.
1234	0,2	Servo board not installed.

Alert ID	Alert Level Range	Alert Text
1235	0,2	Servo board not ready.
1236	0,2	Severe stall conditions.
1237	0,2	Stall alpha.
1238	0,2	Stall conditions.
1239	0,2	Steering servo/pot failed/overheating.
1240	0 <= x <= 1	SV_SPLIT case un-supported in datalink.c
1241	0 <= x <= 1	SVB board detects flight comp failure.
1242	0,2	Throttle servo pot failure.
1243	0,2	Transmitter in direct connect mode.
1244	0,2	Transmitter Underrun on FARM Port B.
1245	0 <= x <= 1	Transmitting operational mission.
1246	0 <= x <= 1	Transmitting SAR collection plan.
1247	0,2	UAV UHF transmitter is overheating.
1248	0,2	UHF GCS in Built-In-Test mode.
1249	0,2	UHF GCS in master order wire acquisition mode.
1250	0,2	UHF GCS in ranging acquisition mode.
1251	0,2	UHF GCS master order wire is bad.
1252	0,2	UHF GCS order wire is bad.
1253	0,2	UHF GCS radio is off-line.
1254	0,2	UHF link without Emer/Oper missions.
1255	0,2	UHF UAV in Built-In-Test mode.
1256	0,2	UHF UAV in master order acquisition mode.
1257	0,2	UHF UAV in order wire acquisition mode.
1258	0,2	UHF UAV in ranging acquisition mode.
1259	0,2	UHF UAV master order wire bad.
1260	0,2	UHF UAV order wire bad.
1270	0,2	UHF UAV radio is off-line.
1271	0,2	Uplink transmit failure.
1272	0,2	Variable pitch prop servo overheating.
1273	0 <= x <= 1	VCR Command Error Detected.
1274	0,2	Vertical gyro power failure.
1275	0,2	Very high exhaust gas temp.
1276	0,2	Very high water temperature.

Alert ID	Alert Level Range	Alert Text
1277	0,2	Very low water temperature.
1278	0,2	Warning: No left aileron board airdata.

7.1.1.15 DTED Lookup Request Message

Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**DTED_Lookup_Latitude**	yes	standard	
7	**DTED_Lookup_Longitude**	yes	standard	

7.1.2 TCS to Predator DCM Messages

TCS to PDCM Messages

Message Name	Message ID	Supported	Frequency
AV Flight Mode Command Message	13	yes	On TCS operator action
AV Flight Envelope Command Message	14	no	
AV Lights Command Message	24	yes	On TCS operator action
TCS Position Uplink Message	35	yes	1 Hz
TCS Environmental Data Uplink Message	27	no	
EOIR Command Message	28	yes	Manual Control 10Hz, otherwise on TCS operator action

AV Analog Video Command Message	22	yes	On TCS operator action
AV Waypoint Begin Message	33	yes	5 Hz during flight route plan transfer only
AV Waypoint End Message	34	yes	5 Hz during flight route plan transfer only
AV Piston Engine Command Message	25	yes	On TCS operator action
AV IFF Command Message	26	yes	On TCS operator action
AV Fuel System Command Message	23	yes	On TCS operator action
DTED Lookup Response Message	35	yes	Within 250 ms of DTED Lookup Request Message
Ground Line of Sight Datalink Command Message	29	yes	On TCS operator action
Airborne Line of Sight Datalink Command Message	30	yes	On TCS operator action
Airborne SATCOM Datalink Command Message	31	yes	On TCS operator action

7.1.2.1 AV Flight Mode Command Message

AV Flight Mode Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	13	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	

AV Flight Mode Command Message Field	Data Element Name	Supported	Range Values	Comments
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Flight_mode**	yes	standard	
7	**AV_Activate_New_Mission**	yes	standard	
8	**AV_New_Mission_ID**	yes	0 <= x <= 255	
9	**AV_Set_Altitude**	yes	standard	
10	**AV_New_Altitude**	yes	-3000 <= x <= 128070	
11	**AV_Set_Airspeed**	yes	standard	
12	**AV_New_Airspeed**	yes	standard	
13	**AV_Set_Heading**	yes	standard	
14	**AV_New_Heading**	yes	standard	
15	**AV_Fly_To_Latitude**	yes	standard	
16	**AV_Fly_To_Longitude**	yes	standard	
17	**AV_Fly_To_Altitude**	yes	standard	
18	**AV_Arrival_Time_Weeks**	yes	standard	
19	**AV_Arrival_Time_Second**	yes	standard	
20	**AV_Loiter_Latitude**	yes	standard	
21	**AV_Loiter_Longitude**	yes	standard	
22	**AV_Loiter_Altitude**	yes	standard	
23	**AV_Loiter_Pattern**	yes	standard	
24	**AV_Loiter_Length**	yes	standard	
25	**AV_Loiter_Width**	yes	standard	
26	**AV_Loiter_Orientation**	yes	standard	
27	**AV_Loiter_Time**	yes	standard	

7.1.2.2 AV Flight Envelope Command Message

This message is not currently supported by Predator.

7.1.2.3 AV Lights Command Message

AV Lights Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	24	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Nav_Lights**	yes	standard	
7	**AV_Strobe_Lights**	yes	standard	
8	**AV_Landing_Lights**	no	0	
9	**AV_Rad_Haz_Strobe**	no	0	There is no override for the radiation hazard strobe. It is only disabled by the lights out range.
10	**AV_Lights_Out_Range**	yes	0 <= x <= 127.5	
11	**AV_Lights_Out_Range_Enable**	yes	standard	

7.1.2.4 TCS Position Uplink Message

TCS Position Uplink Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	

TCS Position Uplink Message Field	Data Element Name	Supported	Range Values	Comments
3	AV_Type	yes	1	
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	TCS_Latitude	yes	standard	
7	TCS_Longitude	yes	standard	
8	TCS_Altitude	yes	standard	
9	TCS_Magnetic_Variation	yes	standard	

7.1.2.5 TCS Environmental Data Uplink Message

TCS Environmental Data Uplink Message Field	Data Element Name	Supported	Range Values	Comments
1	Message_ID	yes	27	
2	Message_Version	yes	standard	
3	AV_Type	yes	1	
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	TCS_Barometric	yes	standard	
7	TCS_Air_Temperature	no	0	
8	TCS_Wind_Speed_Surface	no	0	
9	TCS_Wind_Direction_Surface	no	0	
10	Fcst_Wind_Speed_3000_Ft	no	0	
11	Fcst_Wind_Direction_3000_Ft	no	0	
12	Fcst_Wind_Speed_6000_Ft	no	0	

TCS Environmental Data Uplink Message Field	Data Element Name	Supported	Range Values	Comments
13	Fcst_Wind_Direction_6000_Ft	no	0	
14	Fcst_Air_Temp_6000_Ft	no	0	
15	Fcst_Wind_Speed_9000_Ft	no	0	
16	Fcst_Wind_Direction_9000_Ft	no	0	
17	Fcst_Air_Temp_9000_Ft	no	0	
18	Fcst_Wind_Speed_12000_Ft	no	0	
19	Fcst_Wind_Direction_12000_Ft	no	0	
20	Fcst_Air_Temp_12000_Ft	no	0	
21	Fcst_Wind_Speed_18000_Ft	no	0	
22	Fcst_Wind_Direction_18000_Ft	no	0	
23	Fcst_Air_Temp_18000_Ft	no	0	
24	Fcst_Wind_Speed_24000_Ft	no	0	
25	Fcst_Wind_Direction_24000_Ft	no	0	
26	Fcst_Air_Temp_24000_Ft	no	0	
27	Fcst_Wind_Speed_30000_Ft	no	0	
28	Fcst_Wind_Direction_30000_Ft	no	0	
29	Fcst_Air_Temp_30000_Ft	no	0	
30	Fcst_Wind_Speed_34000_Ft	no	0	
31	Fcst_Wind_Direction_34000_Ft	no	0	
32	Fcst_Air_Temp_34000_Ft	no	0	
33	Fcst_Wind_Speed_39000_Ft	no	0	
34	Fcst_Wind_Direction_39000_Ft	no	0	
35	Fcst_Air_Temp_39000_Ft	no	0	

7.1.2.6 AV EOIR Command Message

AV EOIR Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	28	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**EOIR_Identifier**	yes	standard	
7	**EO_Power**	yes	standard	
8	**IR_Power**	yes	standard	
9	**EOIR_Payload Active**	yes	standard	
10	**EOIR_Payload_Pointing_Mode**	yes	standard	
11	**EOIR_Pointer_Latitude**	yes	standard	
12	**EOIR_Pointer_Longitude**	yes	standard	
13	**EOIR_Depression**	yes	standard	
14	**EOIR_Azimuth**	yes	standard	
15	**EO_Payload_Camera_Select**	yes	standard	
16	**EO_Payload_Zoom**	yes	standard	
17	**EO_Payload_Focus**	yes	standard	
18	**EO_Iris**	yes	standard	
19	**IR_Payload_Camera_Select**	yes	standard	
20	**IR_Payload_Zoom**	yes	standard	
21	**IR_Payload_Focus**	yes	standard	
22	**IR_Conrtast**	yes	standard	
23	**IR_Gain**	yes	standard	
24	**IR_White_Hot**	yes	standard	

7.1.2.7 AV Analog Video Command Message

AV Analog Video Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Video_Mux_Power**	yes	standard	
7	**AV_Video_Downlink_Ch_1_Source**	yes	standard	
8	**AV_Video_Downlink_Ch_2_Source**	yes	standard	
9	**AV_Video_Downlink_Ch_3_Source**	no	0	
10	**AV_Video_Downlink_Ch_4_Source**	no	0	
11	**AV_VCR_Power_1**	yes	standard	
12	**AV _VCR_Mode_1**	yes	standard	
13	**AV_VCR_Counter_Reset_1**	yes	standard	
14	**AV_VCR_Record_Source_1**	yes	standard	
15	**AV_VCR_Power_2**	yes	standard	
16	**AV _VCR_Mode_2**	yes	standard	
17	**AV_VCR_Counter_Reset_2**	yes	standard	
18	**AV_VCR_Record_Source_2**	yes	standard	
19	**AV_VCR_Power_3**	yes	standard	
20	**AV _VCR_Mode_3**	yes	standard	
21	**AV_VCR_Counter_Reset_3**	yes	standard	
22	**AV_VCR_Record_Source_3**	yes	standard	
23	**AV_VCR_Power_4**	no	0	
24	**AV _VCR_Mode_4**	no	0	
25	**AV_VCR_Counter_Reset_4**	no	0	

AV Analog Video Command Message Field	Data Element Name	Supported	Range Values	Comments
26	AV_VCR_Record_Source_4	no	0	

7.1.2.8 AV Waypoint Begin Message

AV Waypoint Begin Message Field	Data Element Name	Supported	Range Values	Comments
1	Message_ID	yes	standard	
2	Message_Version	yes	standard	
3	AV_Type	yes	standard	
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	AV_Flight_Route_Plan_ID	yes	standard	
7	AV_Waypoint_Number	yes	standard	
8	AV_Number_Waypoints_In_Plan	yes	standard	
9	AV_Number_Commands_In_Waypoint	yes	standard	
10	AV_Waypoint_Emergency_Action	yes	standard	
11	AV_Emergency_Plan_Delay	yes	standard	
12	AV_Emergency_Plan_Conditional_Select_Mode	no		
13	AV_Emergency_Plan_ID_1	yes	standard	
14	AV_Emergency_Plan_ID_2	no		
15	AV_Emergency_Plan_ID_3	no		
16	AV_Emergency_Plan_ID_4	no		

7.1.2.9 AV Waypoint End Message

AV Waypoint End Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Flight_Route_Plan_ID**	yes	standard	
7	**AV_Waypoint_Number**	yes	standard	
8	**AV_Number_Waypoints_In_Plan**	yes	standard	
9	**AV_Number_Commands_In_Waypoint**	yes	standard	
10	**AV_Waypoint_Emergency_Action**	yes	standard	
11	**AV_Emergency_Plan_Delay**	yes	standard	
12	**AV_Emergency_Plan_Conditional_Select_Mode**	no		
13	**AV_Emergency_Plan_ID_1**	yes	standard	
14	**AV_Emergency_Plan_ID_2**	no		
15	**AV_Emergency_Plan_ID_3**	no		
16	**AV_Emergency_Plan_ID_4**	no		

7.1.2.10 AV Piston Engine Command Message

AV Piston Engine Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Engine_ID**	yes	1	
7	**Engine_Speed_Hold**	yes	standard	
8	**Engine_Speed**	yes	standard	
9	**Engine_Start**	yes	standard	
10	**Engine_Stop**	yes	standard	

7.1.2.11 AV IFF Command Message

AV IFF Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_IFF_Power**	yes	standard	
7	**AV_IFF_Mode_C**	yes	standard	
8	**AV_IFF_Mode_1**	yes	standard	
9	**AV_IFF_Mode_1_Code**	yes	standard	
10	**AV_IFF_Mode_2**	yes	standard	

AV IFF Command Message Field	Data Element Name	Supported	Range Values	Comments
11	AV_IFF_Mode_3A	yes	standard	
12	AV_IFF_Mode_3A_Code	yes	standard	
13	AV_IFF_Mode_4	yes	standard	
14	AV_IFF_Mode_4_Code	yes	standard	
15	AV_IFF_Mode_4_Hold	yes	standard	
16	AV_IFF_Operational_Mode	yes	standard	

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7.1.2.12 AV Fuel System Command Message

AV Fuel System Command Message Field	Data Element Name	Supported	Range Values	Comments
1	Message_ID	yes	standard	
2	Message_Version	yes	standard	
3	AV_Type	yes	1	
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	AV_Engine_1_Fuel_Source_Tank	yes	standard	
7	AV_Engine_2_Fuel_Source_Tank	yes	standard	
8	AV_Fuel_Tank_Transfer_Rate	yes	standard	
9	AV_Fuel_Transfer_Source_Tank	yes	standard	
10	AV_Fuel_Transfer_Destination_Tank	yes	standard	

7.1.2.13 DTED Lookup Response Message

DTED Lookup Response Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version.**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**DTED_Lookup_Latitude**	yes	standard	
7	**DTED_Lookup_Longitude**	yes	standard	
8	**DTED_Altitude**	yes	standard	

7.1.2.14 AV Line of Sight Ground Data Terminal Control Message

AV Line of Sight Ground Data Terminal Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	

AV Line of Sight Ground Data Terminal Control Message Field	Data Element Name	Supported	Range Values	Comments
4	AV_Tail_Number	yes	standard	
5	Mission_ID	yes	standard	
6	LOS_GDT_Uplink_Power_1	yes	standard	
7	LOS_GDT_Uplink_Power_2	yes	standard	
8	LOS_GDT_Uplink_Frequency_1	yes	standard	
9	LOS_GDT_Uplink_Frequency_2	yes	standard	
10	LOS_GDT_Downlink_Frequency_1	yes	standard	
11	LOS_GDT_Downlink_Frequency_2	yes	standard	
12	LOS_GDT_Transmitter_Selected	yes	standard	
13	LOS_GDT_Cooling_Mode	yes	standard	
14	LOS_GDT_Power	yes	standard	
15	LOS_GDT_Transmit_Antenna_Select	yes	standard	
16	LOS_GDT_Receive_Antenna_Select	yes	standard	
17	LOS_GDT_Tracking_Mode	yes	standard	
18	LOS_GDT_Pointing_Azimuth	yes	standard	
19	LOS_GDT_Pointing_Elevation	yes	standard	

7.1.2.15 Airborne Line of Sight Datalink Control Message

Airborne Line of Sight Datalink Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_LOS_Ch_1_Uplink_Freq**	yes	standard	
7	**AV_LOS_Ch_2_Uplink_Freq**	yes	standard	
8	**AV_LOS_Ch_1_Downlink_Freq**	yes	standard	
9	**AV_LOS_Ch_2_Downlink_Freq**	yes	standard	
10	**AV_LOS_ADT_Antenna_Selected**	yes	standard	
11	**AV_LOS_ADT_Pointing_Mode**	yes	standard	
12	**AV_LOS_Pointing_Azimuth**	yes	standard	
13	**AV_LOS_Pointing_Elevation**	yes	standard	
14	**AV_LOS_ADT_Transmitter_1_Mode**	yes	standard	
15	**AV_LOS_ADT_Transmitter_2_Mode**	yes	standard	
16	**AV_LOS_ADT_Tx_1_Power**	yes	standard	
17	**AV_LOS_ADT_Tx_2_Power**	yes	standard	

7.1.2.16 Airborne SATCOM Datalink Control Message

Airborne SATCOM Datalink Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	

8. Outrider specific appendix

This section discusses the Outrider specific implementation of the AV Standard interface. It includes information on which messages and fields are supported by Outrider and any Outrider specific range values if applicable.

8.1 Outrider supported messages

The following messages and fields are supported by Outrider.
All fields which are not supported shall be set to zero.

8.1.1 Outrider DCM to TCS Messages

ODCM to TCS Messages

Message Name	Message ID	Supported	Frequency	Length	TCP/IP Overhead	Bandwidth
AV Position Status Message	1	yes	8	228	40	2144
AV INS Status Message	2	yes	8	192	40	1856
AV GPS Status Message	3	no				
AV EOIR Status Message	4	yes	10	204	40	2440
AV Line of Sight Ground Data Terminal Status Message	5	yes	1	200	40	240
AV Line of Sight Air Data Terminal Status Message	6	yes	1	140	40	180
AV Piston Engine Status Message	7	yes	1	168	40	208
AV Fuel Status Message	8	yes	1	68	40	108
AV Electrical System Status Message	9	yes	1	112	40	152
AV Analog Video System Status Message	10	no				
AV Lights and Landing Gear Status Message	11	yes	1	60	40	100
AV IFF Status Message	12	no				
AV SAR Status Message	15	no				
AV Warning Message	19	yes	Max 4 Hz	236	40	1104
DTED Lookup Request Message	32	yes	Max 4 Hz	48	40	352

8.1.1.1 AV Position Status Message

AV Position Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	1	1 = AV Position Status Message
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	2 = Outrider
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Current_Nav_Altitude_Source**.	yes	2 <= x <= 3	2 = GPS 3 = INS (IMU)
7	**AV_Altitude**	yes	standard	
8	**AV_Climb_Rate**	yes	standard	
9	**AV_Current_Nav_Position_Source**	yes	standard	1 = INS (IMU)
10	**AV_Latitude**	yes	standard	
11	**AV_Longitude**	yes	standard	
12	**AV_NAV_Orientation_Source**	yes	1	1 = INS (IMU)
13	**AV_Roll**	yes	standard	
14	**AV_Pitch**	yes	standard	
15	**AV_Heading**	yes	standard	
16	**AV_Pitch_Rate**	yes	standard	
17	**AV_Roll_Rate**	yes	standard	
18	**AV_Yaw_Rate**	yes	standard	
19	**AV_Angle_Of_Attack**	yes	standard	
20	**AV_GPS_Time_Week**	no	0	
21	**AV_GPS_Time_Second**	no	0	
22	**AV_GPS_Time_Ns**	no	0	
23	**AV_Baro_Altitude**	yes	0 <= x <= 15000	
24	**AV_Radar_Altitude**	no	0	
25	**AV_Magnetometer_Heading**	no	0	
26	**AV_Ground_Track**	yes	standard	Computed at ODCM.
27	**AV_Ground_Speed**	yes	0 <= x <= 255	Computed at ODCM.

AV Position Status Message Field	Data Element Name	Supported	Range Values	Comments
28	**AV_Airspeed**	yes	standard	
29	**AV_Measured_Wind_Heading**	no	0	
30	**AV_Measured_Wind_Speed**	no	0	
31	**AV_Nav_Mode**	yes	standard	
32	**AV_Next_Waypoint**	yes	0 <= x <= 99	
33	**AV_TTG_Next_Waypoint**	yes	standard	
34	**AV_Air_Temperature**	yes	-100 <= x <= 100	

8.1.1.2 AV INS Status Message

This message is only provided by Outrider when the INS (IMU) is the current position source for navigation. It is not provided when the AV is navigating by GPS or magnetometer.

AV INS Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	2	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_INS_Er_NS**	no	0	
7	**AV_INS_Er_EW**	no	0	
8	**AV_INS_Er_Alt**	no	0	

AV INS Status Message Field	Data Element Name	Supported	Range Values	Comments
9	**AV_INS_Mode**	yes	1 <= x <= 7	1 = IMU/DGPS - IMU with differential GPS 2 = IBLS/DGPS - IBLS with differential GPS 3 = IMU/GPS - IMU with normal GPS 4 = IBLS/GPS - IBLS with normal GPS 5 = IMU dead reckoning - IMU without GPS aiding 6 = ACP dead reckoning - Autopilot without IMU or GPS 7 = GCS Nav - Ground Control Station is tracking the air vehicle using the GDT
10	**AV_INS_Alt**	yes	-2,000 <= x <= 100,000	
11	**AV_INS_Lat**	yes	standard	
12	**AV_INS_Lon.**	yes	standard	
13	**AV_INS_East_Velocity**	yes	standard	
14	**AV_INS_North_Velocity**	yes	standard	
15	**AV_INS_Altitude_Velocity**	yes	standard	
16	**AV_INS_East_Acceleration**	yes	standard	
17	**AV_INS_North_Acceleration**	yes	standard	
18	**AV_INS_Altitude_Acceleration**	yes	standard	
19	**AV_INS_Pitch**	yes	standard	
20	**AV_INS_Roll**	yes	standard	
21	**AV_INS_Heading**	yes	standard	
22	**AV_INS_Pitch_Rate**	yes	standard	
23	**AV_INS_Roll_Rate**	yes	standard	
24	**AV_INS_Yaw_Rate**	yes	standard	
25	**AV_INS_Time_Week**	no	0	
26	**AV_INS_Time_Second**	no	0	
27	**AV_INS_Time_Ns**	no	0	

8.1.1.3 AV GPS Status Message

Outrider does not support the AV GPS Status Message.

8.1.1.4 AV EOIR Status Message

AV EOIR Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	4	
2	**Message_Version**	yes	standard	
3	**AV_Type**.	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**PL_ID**	yes	0 <= x <= 1	0 = No EO/IR Payload 1 = POP 100 Payload
7	**PL_Active_Sensor**	yes	standard	
8	**PL_Active_Sensor_Status**	yes	standard	
9	**PL_Pointer_Lat**	yes	standard	
10	**PL_Pointer_Lon**	yes	standard	
11	**PL_Depression_Angle**	yes	standard	
12	**PL_Azimuth_Angle**	yes	standard	
13	**PL_Depression_Rate**	yes	standard	
14	**PL_Azimuth_Rate**	yes	standard	
15	**PL_LOS_Range_to_Target**	no	0	
16	**PL_Ground_Range_to_Target**	no	0	
17	**PL_Focal_Length**	yes	standard	
18	**PL_FOV_Horizontal**	yes	standard	
19	**PL_FOV_Vertical**	yes	standard	
20	**PL_IR_Polarity**	yes	standard	
21	**PL_IR_Gain**	no	0	
22	**PL_Image_Ang_to_North**	yes	standard	

AV EOIR Status Message Field	Data Element Name	Supported	Range Values	Comments
23	**PL_Image_Datum**	yes	standard	
24	**PL_Image_Category**	yes	standard	
25	**PL_Image_Obliquity_Angle**	no	0	
26	**PL_Center_Point_Accuracy**	no	0	
27	**PL_Center_Point_Lat**	yes	standard	Calculations are in the ODCM and use DTED data if available.
28	**PL_Center_Point_Lon**	yes	standard	Calculations are in the ODCM and use DTED data if available.
29	**PL_Image_Collection_Time_Week**	no	0	
30	**PL_Image_Collection_Time_Second**	no	0	
31	**PL_Image_Collection_Time_Ns**	no	0	

8.1.1.5 AV Line of Sight Ground Data Terminal Status Message

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**LOS_GDT_ID**	yes	standard	

AV Line of Sight Ground Data Terminal Status Message Field	Data Element Name	Supported	Range Values	Comments
7	**LOS_GDT _Signal_Strength_1**	yes	standard	
8	**LOS_GDT _Signal_Strength_2**	no	0	
9	**LOS_GDT_PLL_Status_1**	yes	standard	
10	**LOS_GDT_PLL_Status_2**	no	0	
11	**LOS_GDT_Carrier_Detect_1**	yes	standard	
12	**LOS_GDT_Carrier_Detect_2**	no	0	
13	**LOS_GDT_Range**	yes	standard	
14	**LOS_GDT_Uplink_Power_1**	yes	0<= x <= 10	
15	**LOS_GDT_Uplink_Power_2**	yes	0 <= x <= 10	
16	**LOS_GDT_CPU_Temp**	no	0	
17	**LOS_GDT_TX1_Temp**	no	0	
18	**LOS_GDT_TX2_Temp**	no	0	
19	**LOS_GDT_TX1_Power_Temp**	no	0	
20	**LOS_GDT_TX2_Power_Temp**	no	0	
21	**LOS_GDT_TX1_Uplink_Freq**	yes	standard	
22	**LOS_GDT_TX2_Uplink_Freq**	no	0	
23	**LOS_GDT_RX1_Downlink_Freq**	yes	standard	
24	**LOS_GDT_RX2_Downlink_Freq**	no	0	
25	**LOS_GDT_Transmitter_Selected**	yes	1	Outrider has 1 GDT transmitter
26	**LOS_GDT_Cooling_Mode**	no	0	
27	**LOS_GDT_28V_Power_Level**	no	0	
28	**LOS_GDT_Serial_Comm_Errors**	no	0	
29	**LOS_GDT_Antenna_Selected**	yes	2	Outrider GDT has directional antenna only
30	**LOS_GDT_Pointing_Azimuth**	yes	standard	
31	**LOS_GDT_Pointing_Elevation**	yes	standard	
32	**LOS_GDT_Tracking_Mode**	yes	standard	

8.1.1.6 AV Line of Sight Air Data Terminal Status Message

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	6	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_LOS_Data_Link_Active**	yes	1	
7	**AV_LOS_Ch_1_Uplink_Freq**	yes	4400 <= x <= 4625	
8	**AV_LOS_Ch_2_Uplink_Freq**	no	0	
9	**AV_LOS_Ch_1_Downlink_Freq**	yes	4775 <= x <= 4999	
10	**AV_LOS_Ch_2_Downlink_Freq**	no	0	
11	**AV_LOS_ADT_Antenna_Selected**	yes	1,4,5	
12	**AV_LOS_ADT_Ant_Select_Mode**	yes	standard	
13	**AV_LOS_Pointing_Azimuth**	yes	standard	
14	**AV_LOS_Pointing_Elevation**	yes	standard	
15	**AV_LOS_ADT_Transmitter_1_Stat**	yes	0,3	
16	**AV_LOS_ADT_Transmitter_2_Stat**	no	0	
17	**AV_LOS_ADT_Tx_1_Power**	yes	standard	
18	**AV_LOS_ADT_Tx_2_Power**	no	0	
19	**AV_LOS_Receiver_1_Status**	yes	0,3	
20	**AV_LOS_Receiver _2_Status**	no	0	
21	**AV_LOS_Sgnl_Strngth_1**	yes	standard	
22	**AV_LOS_Sgnl_Strngth_2**	no	0	

AV Line of Sight Air Data Terminal Status Message Field	Data Element Name	Supported	Range Values	Comments
23	**AV_LOS_Rcvr_1_Cumul_Err**	no	0	
24	**AV_LOS_Rcvr_2_Cumul_Err**	no	0	

8.1.1.7 AV Piston Engine Status Message

AV Piston Engine Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	7	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Engine_ID**	yes	2	
7	**Engine_Status**	yes	0,2	
8	**Engine_Speed**	yes	standard	
9	**Engine_Oil_Pressure**	no	0	
10	**Engine_Coolant_Pressure**	no	0	
11	**Engine_Manifold_Pressure**	no	0	
12	**Engine_Fuel_Pressure**	yes	standard	
13	**Engine_Oil_Temperature**	no	0	
14	**Engine_Coolant_Temperature**	no	0	
15	**Engine_Exhaust_Temperature_1**	yes	standard	
16	**Engine_Exhaust_Temperature_2**	yes	standard	

AV Piston Engine Status Message Field	Data Element Name	Supported	Range Values	Comments
17	**Engine_Exhaust_Temperature_3**	no	0	
18	**Engine_Exhaust_Temperature_4**	no	0	
19	**Engine_Cyl_Head_Temperature**	yes	standard	This data element is the average of the 4 thermocouples in the Outrider engine
20	**Engine_Manifold_Temperature**	yes	standard	
21	**Engine_Oil_Level**	no	0	
22	**Engine_Fuel_Tank_Selected**	yes	1	Outrider has only 1 fuel tank
23	**Engine_Alternator_Current**	no	0	
24	**Engine_Alternator_Voltage**	yes	0 <= x <= 400	

8.1.1.8 AV Fuel Status Message

AV Fuel Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	8	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Fuel_Tank_ID**	yes	1	Outrider has only 1 fuel tank
7	**Fuel_Tank_Current_Level**	yes	standard	Computed by ODCM
8	**Fuel_Tank_Flow_Rate_Out**	yes	standard	Computed by ODCM
9	**Fuel_Tank_Flow_Rate_In**	no	0	
10	**Fuel_Tank_Pressure**	no	0	

8.1.1.9 AV Electrical System Status Message

AV Electrical System Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	9	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_40VDC_Bus_Voltage**	no	0	
7	**AV_28VDC_Bus_Voltage**	no	0	
8	**AV_Battery_Voltage_1**	yes	standard	
9	**AV_Battery_Current_1**	no	0	
10	**AV_Battery_Voltage_2**	no	0	
11	**AV_Battery_Current_2**	no	0	
12	**AV_Battery_Voltage_3**	no	0	
13	**AV_Battery_Current_3**	no	0	
14	**AV_Battery_Voltage_4**	no	0	
15	**AV_Battery_Current_4**	no	0	

8.1.1.10 AV Analog Video System Status Message

This message is not supported by Outrider.

8.1.1.11 AV Lights and Landing Gear Status Message

AV Lights and Landing Gear Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	11	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	1 <= x <= 65535	
6	**AV_Navigation_Lights**	yes	standard	
7	**AV_Landing_Lights**	no	0	
8	**AV_Strobe_Light**	yes	standard	
9	**AV_Hazzard_Beacon**	no	0	
10	**AV_Nose_Landing_Gear**	yes	1	
11	**AV_Port_Landing_Gear**	yes	1	
12	**AV_Starboard_Landing_Gear**	yes	1	

8.1.1.12 AV IFF Status Message

AV IFF Status Message Field	Data Element Name	Supported	Range Values	Comments

AV IFF Status Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	12	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_IFF_Power**	no	0	
7	**AV_IFF_Identity**	yes	standard	
8	**AV_IFF_Mode_C**	yes	standard	
9	**AV_IFF_Mode_1**	no	0	
10	**AV_IFF_Mode_1_Code**	no	0	
11	**AV_IFF_Mode_2**	no	0	
12	**AV_IFF_Mode_3A**	yes	standard	
13	**AV_IFF_Mode_3A_Code**	no	0	Manual entry on AV
14	**AV_IFF_Mode_4**	no	0	
15	**AV_IFF_Mode_4_Code**	no	0	
16	**AV_IFF_Mode_4_Hold**	no	0	
17	**AV_IFF_Operational_Mode**	yes	standard	

8.1.1.13 AV SAR Status Message

This message is not supported by Outrider.

8.1.1.14 AV Warning Message

AV Warning Message Field	Data Element	Supported	Range Values	Comments

AV Warning Message Field	Data Element	Supported	Range Values	Comments
1	**Message_ID**	yes	19	
2	**AV_Type**	yes	2	
3	**Message_Version**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Number_Alert_Updates**	yes	standard	
7	**AV_Alert_1**	yes	See Outrider Alert Table	
8	**AV_Alert_Level_1**	yes	standard	
9	**AV_Alert_2**	yes	See Outrider Alert Table	
10	**AV_Alert_Level_2**	yes	standard	
11	**AV_Alert_3**	yes	See Outrider Alert Table	
12	**AV_Alert_Level_3**	yes	standard	
13	**AV_Alert_4**	yes	See Outrider Alert Table	
14	**AV_Alert_Level_4**	yes	standard	
15	**AV_Alert_5**	yes	See Outrider Alert Table	
16	**AV_Alert_Level_5**	yes	standard	
17	**AV_Alert_6**	yes	See Outrider Alert Table	
18	**AV_Alert_Level_6**	yes	standard	
19	**AV_Alert_7**	yes	See Outrider Alert Table	
20	**AV_Alert_Level_7**	yes	standard	
21	**AV_Alert_8**	yes	See Outrider Alert Table	
22	**AV_Alert_Level_8**	yes	standard	
23	**AV_Alert_9**	yes	See Outrider Alert Table	
24	**AV_Alert_Level_9**	yes	standard	
25	**AV_Alert_10**	yes	See Outrider Alert Table	
26	**AV_Alert_Level_10**	yes	standard	
27	**AV_Alert_11**	yes	See Outrider Alert Table	
28	**AV_Alert_Level_11**	yes	standard	
29	**AV_Alert_12**	yes	See Outrider Alert Table	
30	**AV_Alert_Level_12**	yes	standard	

AV Warning Message Field	Data Element	Supported	Range Values	Comments
31	**AV_Alert_13**	yes	See Outrider Alert Table	
32	**AV_Alert_Level_13**	yes	standard	
33	**AV_Alert_14**	yes	See Outrider Alert Table	
34	**AV_Alert_Level_14**	yes	standard	
35	**AV_Alert_15**	yes	See Outrider Alert Table	
36	**AV_Alert_Level_15**	yes	standard	
37	**AV_Alert_16**	yes	See Outrider Alert Table	
38	**AV_Alert_Level_16**	yes	standard	
39	**AV_Alert_17**	yes	See Outrider Alert Table	
40	**AV_Alert_Level_17**	yes	standard	
41	**AV_Alert_18**	yes	See Outrider Alert Table	
42	**AV_Alert_Level_18**	yes	standard	
43	**AV_Alert_19**	yes	See Outrider Alert Table	
44	**AV_Alert_Level_19**	yes	standard	
45	**AV_Alert_20**	yes	See Outrider Alert Table	
46	**AV_Alert_Level_20**	yes	standard	
47	**AV_Alert_21**	yes	See Outrider Alert Table	
48	**AV_Alert_Level_21**	yes	standard	
49	**AV_Alert_22**	yes	See Outrider Alert Table	
50	**AV_Alert_Level_22**	yes	standard	
51	**AV_Alert_23**	yes	See Outrider Alert Table	
52	**AV_Alert_Level_23**	yes	standard	
53	**AV_Alert_24**	yes	See Outrider Alert Table	
54	**AV_Alert_Level_24**	yes	standard	
55	**AV_Alert_25**	yes	See Outrider Alert Table	
56	**AV_Alert_Level_25**	yes	standard	

Outrider Alert Table

Alert ID	Alert Level Range	Alert Text

Alert ID	Alert Level Range	Alert Text
2001	TBD	TBD
2002	TBD	TBD
2003	TBD	TBD
2004	TBD	TBD
2005	TBD	TBD
2006	TBD	TBD
2007	TBD	TBD
2008		
2009		

8.1.1.15 DTED Lookup Request Message

Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**DTED_Lookup_Latitude**	yes	standard	
7	**DTED_Lookup_Longitude**	yes	standard	

8.1.2 TCS to Outrider DCM Messages

Below is a summary of the messages sent from the TCS to the Outrider DCM.

TCS to ODCM Messages

Message Name	Message ID	Supported	Frequency
AV Flight Mode Command Message	13		
AV Flight Envelope Command Message	14		
AV Lights Command Message	24		
TCS Position Uplink Message	35		

TCS Environmental Data Uplink Message	27		
EOIR Command Message	28		
AV Analog Video Command Message	22		
AV Waypoint Begin Message	33		
AV Waypoint End Message	34		
AV Piston Engine Command Message	25		
AV IFF Command Message	26		
AV Fuel System Command Message	23		
DTED Lookup Response Message	35		
Ground Line of Sight Datalink Command Message	29		
Airborne Line of Sight Datalink Command Message	30		
Airborne SATCOM Datalink Command Message	31		

8.1.2.1 AV Flight Mode Command Message

AV Flight Mode Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	13	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Flight_mode**	yes	standard	
7	**AV_Activate_New_Mission**	yes	standard	
8	**AV_New_Mission_ID**	yes	standard	
9	**AV_Set_Altitude**	no	0	
10	**AV_New_Altitude**	no	0	
11	**AV_Set_Airspeed**	no	0	
12	**AV_New_Airspeed**	no	0	

AV Flight Mode Command Message Field	Data Element Name	Supported	Range Values	Comments
13	AV_Set_Heading	no	0	
14	AV_New_Heading	no	0	
15	AV_Fly_To_Latitude	yes	standard	
16	AV_Fly_To_Longitude	yes	standard	
17	AV_Fly_To_Altitude	yes	standard	
18	AV_Arrival_Time_Weeks	yes	standard	
19	AV_Arrival_Time_Second	yes	standard	
20	AV_Loiter_Latitude	yes	standard	
21	AV_Loiter_Longitude	yes	standard	
22	AV_Loiter_Altitude	yes	standard	
23	AV_Loiter_Pattern	yes	standard	
24	AV_Loiter_Length	yes	standard	
25	AV_Loiter_Width	yes	standard	
26	AV_Loiter_Orientation	yes	standard	
27	AV_Loiter_Time	yes	standard	

8.1.2.2 AV Flight Envelope Command Message

Outrider does not support this message.

8.1.2.3 AV Lights Command Message

AV Lights Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	24	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Nav_Lights**	yes	standard	
7	**AV_Strobe_Lights**	yes	standard	
8	**AV_Landing_Lights**	no	0	
9	**AV_Rad_Haz_Strobe**	no	0	
10	**AV_Lights_Out_Range**	no	0	
11	**AV_Lights_Out_Range_Enable**	no	0	

8.1.2.4 TCS Position Uplink Message

Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	1	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**TCS_Latitude**	yes	standard	
7	**TCS_Longitude**	yes	standard	
8	**TCS_Altitude**	yes	standard	
9	**TCS_Magnetic_Variation**	yes	standard	

8.1.2.5 TCS Environmental Data Uplink Message

This message is not supported by Outrider.

8.1.2.6 AV EOIR Command Message

AV EOIR Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**		28	
2	**Message_Version**	yes	standard	
3	**AV_Type**		2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**EOIR_Identifier**	yes	standard	
7	**EO_Power**	yes	standard	
8	**IR_Power**	yes	standard	
9	**EOIR_Payload Active**	yes	standard	
10	**EOIR_Payload_Pointing_Mode**	yes	standard	
11	**EOIR_Pointer_Latitude**	yes	standard	
12	**EOIR_Pointer_Longitude**	yes	standard	
13	**EOIR_Depression**	yes	standard	
14	**EOIR_Azimuth**	yes	standard	
15	**EO_Payload_Camera_Select**	yes	1	
16	**EO_Payload_Zoom**	yes	standard	
17	**EO_Payload_Focus**	yes	standard	
18	**EO_Iris**	yes	standard	
19	**IR_Payload_Camera_Select**	yes	1	
20	**IR_Payload_Zoom**	yes	standard	
21	**IR_Payload_Focus**	yes	standard	

AV EOIR Command Message Field	Data Element Name	Supported	Range Values	Comments
22	**IR_Contrast**	yes	standard	
23	**IR_Gain**	yes	standard	
24	**IR_White_Hot**	yes	standard	

8.1.2.7 AV Analog Video Command Message

This message is not currently supported by Outrider.

8.1.2.8 AV Waypoint Begin Message

AV Waypoint Begin Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Flight_Route_Plan_ID**	yes	standard	
7	**AV_Waypoint_Number**	yes	standard	
8	**AV_Number_Waypoints_In_Plan**	yes	standard	
9	**AV_Number_Commands_In_Waypoint**	yes	standard	
10	**AV_Waypoint_Emergency_Action**	yes	standard	

AV Waypoint Begin Message Field	Data Element Name	Supported	Range Values	Comments
11	**AV_Emergency_Plan_Delay**	yes	standard	
12	**AV_Emergency_Plan_Conditional_ Select_Mode**	no		
13	**AV_Emergency_Plan_ID_1**	yes	standard	
14	**AV_Emergency_Plan_ID_2**	no		
15	**AV_Emergency_Plan_ID_3**	no		
16	**AV_Emergency_Plan_ID_4**	no		

8.1.2.9 AV Waypoint End Message

AV Waypoint End Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_Flight_Route_Plan_ID**	yes	standard	
7	**AV_Waypoint_Number**	yes	standard	
8	**AV_Number_Waypoints_In_Plan**	yes	standard	
9	**AV_Number_Commands_In_Wayp oint**	yes	standard	
10	**AV_Waypoint_Emergency_Action**	yes	standard	
11	**AV_Emergency_Plan_Delay**	yes	standard	

AV Waypoint End Message Field	Data Element Name	Supported	Range Values	Comments
12	**AV_Emergency_Plan_Conditional_ Select_Mode**	no		
13	**AV_Emergency_Plan_ID_1**	yes	standard	
14	**AV_Emergency_Plan_ID_2**	no		
15	**AV_Emergency_Plan_ID_3**	no		
16	**AV_Emergency_Plan_ID_4**	no		

8.1.2.10 AV Piston Engine Command Message

AV Piston Engine Command Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**Engine_ID**	yes	1	
7	**Engine_Speed_Hold**	yes	standard	
8	**Engine_Speed**	yes	standard	
9	**Engine_Start**	yes	standard	
10	**Engine_Stop**	yes	standard	

8.1.2.11 AV IFF Command Message

This message is not currently supported by Outrider.

8.1.2.12 AV Fuel System Command Message

This message is not currently supported by Outrider.

8.1.2.13 DTED Lookup Response Message

DTED Lookup Response Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version.**	yes	standard	
3	**AV_Type**	yes	2	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**DTED_Lookup_Latitude**	yes	standard	
7	**DTED_Lookup_Longitude**	yes	standard	
8	**DTED_Altitude**	yes	standard	

8.1.2.14 Ground Line of Sight Datalink Control Message

Ground Line of Sight Datalink Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**LOS_GDT_Uplink_Power_1**	yes	standard	
7	**LOS_GDT_Uplink_Power_2**	no	0	
8	**LOS_GDT_Uplink_Frequency_1**	yes	standard	
9	**LOS_GDT_Uplink_Frequency_2**	no	0	
10	**LOS_GDT_Downlink_Frequency_1**	yes	standard	
11	**LOS_GDT_Downlink_Frequency_2**	no	0	
12	**LOS_GDT_Transmitter_Selected**	no	0	
13	**LOS_GDT_Cooling_Mode**	no	0	
14	**LOS_GDT_Power**	yes	standard	
15	**LOS_GDT_Transmit_Antenna_Select**	yes	standard	
16	**LOS_GDT_Receive_Antenna_Select**	yes	standard	
17	**LOS_GDT_Tracking_Mode**	yes	standard	
18	**LOS_GDT_Pointing_Azimuth**	yes	standard	
19	**LOS_GDT_Pointing_Elevation**	yes	standard	

8.1.2.15 Airborne Line of Sight Datalink Control Message

Airborne Line of Sight Datalink Control Message Field	Data Element Name	Supported	Range Values	Comments
1	**Message_ID**	yes	standard	
2	**Message_Version**	yes	standard	
3	**AV_Type**	yes	standard	
4	**AV_Tail_Number**	yes	standard	
5	**Mission_ID**	yes	standard	
6	**AV_LOS_Ch_1_Uplink_Freq**	yes	standard	
7	**AV_LOS_Ch_2_Uplink_Freq**	yes	standard	
8	**AV_LOS_Ch_1_Downlink_Freq**	yes	standard	
9	**AV_LOS_Ch_2_Downlink_Freq**	yes	standard	
10	**AV_LOS_ADT_Antenna_Selected**	yes	standard	
11	**AV_LOS_ADT_Pointing_Mode**	yes	standard	
12	**AV_LOS_Pointing_Azimuth**	yes	standard	
13	**AV_LOS_Pointing_Elevation**	yes	standard	
14	**AV_LOS_ADT_Transmitter_1_Mode**	yes	standard	
15	**AV_LOS_ADT_Transmitter_2_Mode**	no	0	
16	**AV_LOS_ADT_Tx_1_Power**	yes	standard	
17	**AV_LOS_ADT_Tx_2_Power**	no	0	

8.1.2.16 Airborne SATCOM Datalink Control Message

This message is not supported by Outrider.