

Attachment 5 Communication Systems Description

Insitu Insight A-20 Communication System

Normal communications equipment used on the Insitu Insight A-20 can be categorized by one of two functions:

- tracking, telemetry and control (TT&C); or
- Payload and sensor downlink.

The system can also support a user-defined payload that acts as a stand-alone communication relay. In this case, the aircraft serves primarily as a support platform and provides accommodations for electrical power and suitable antenna(s).

The TT&C function provides for reporting of aircraft position and velocity (automatic dependent surveillance), reporting of aircraft status (telemetry), and uplink of commands to operate the aircraft and attached payloads.

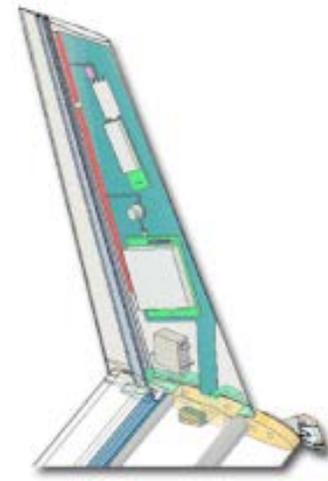
The TT&C communications link is provided by a two-way frequency hopping radio system housed in the left winglet. The frequency-hopping pattern can be tailored to match the regulatory constraints of various locations and tailored for the possibility of local interference. Effective data throughput depends on the mode of operation and is typically in the range of 50-100 kbps. Privacy against casual eavesdropping is provided by a commercial encryption technique internal to the radio.

The TT&C system operates in either of two frequency bands depending on customer and spectrum availability:

- TT&C Option 1: 902 – 928 MHz
- TT&C Option 2: 1,350 – 1,390 MHz

The University of Alaska's Insight A-20 system operates either with either option. Plans for this Bering Sea operation are the 1,350-1,390 MHz..

The TT&C aircraft transmitter broadcasts with 1 watt from the transmitter through a center fed vertically polarized dipole antenna. The ground station broadcasts to the aircraft through either a ¼ wave omni-directional antenna, a 1.8m parabolic dish with 20dB gain, or custom horn antennas with 16dB gain.



TT&C Radio in the Winglet

The Insight A-20 provides wideband downlink for one or two attached payloads. Each of the two winglets house one of these two radio transmitters. These downlinks are analog with any 200 MHz bandwidth within the frequency range 2300 MHz to 2500 MHz. The transmit antennas are omni-directional and RF transmit power is in the range of 1-2W depending on local constraints. These transmitter broadcast through another center fed vertically polarized dipole antenna

The figure at the right illustrates placement of a TT&C radio, as well as a payload downlink radio, in a left winglet.