Debut® MINI (Argos)

MINI (Argos) is an PMT (Platform Messaging Transceiver) that supports both uplink and downlink transmission through the Argos constellation of polar-orbiting satellites modules.

It provides both GPS data and Doppler locations estimated by Argos. Besides, it is also equipped with multiple sensors to generate environmental and behavioral data.

Except from scheduled Argos transmission schedules, MINI (Argos) is capable of collecting data at much higher frequency and send it back through patented INTELINK® technology, which also enables tracker recovery and raw-acceleration data-based in-situ modeling.

APPEARANCE & MEASUREMENT

- Dimensions: 20.6 mm × 20.6 mm × 11.5 mm (antenna not included)
- Weight: 5.8±0.1g
- Antenna: External antenna made from pliable and tough titanium alloy material
- Housing: ASA injection molding with excellent toughness and environment tolerance, multiple harness threading holes.

OPERATIONAL ENVIRONMENT

- Working temperature: -10°C~60°C
- Waterproof: IP 68

POWER SUPPLY

- Solar type: GaAs solar unit (30% efficiency) with good weak light performance
- Battery type: Lithium polymer rechargeable battery with under-and-over-charging protection
- Battery capacity: 30mAh

Under completely darkness, a fully charged battery is able to transmit 200~300 times via Argos. Or it can log over 1000 GPS positions under optimal GPS satellite view without transmission (200 GPS for on-bird tests in field with 5 min GPS interval).

GPS MODULE

- GPS precision: CEP （50%） 5m
- Maximum update rate: 10 Hz

DATA TYPES

- GPS: longitude, latitude, altitude, geoid height, course, satellite quantity
- ENV: light intensity, temperature, inner air pressure, voltage
- BHV: ODBA (overall dynamic body acceleration)
- ACC: x/y/z acceleration data (available only through INTELINK®)
- Doppler location*

Doppler locations is estimated by the Argos system. Each time a satellite passes over an Argos device, it collects messages transmitted by the device and measures the frequency of the received signals to derive a rough location with the accuracy at 250~1500m.

TRANSMISSION SCHEDULE

The device will send the latest data during each transmission session. The user can choose from the following four transmission modes, and specify the related parameters to suit the condition and objective of the study.

■ **Periodical Mode**

The device transmits data to Argos periodically. The following three parameters are programmable:

- Period: from 1 hour to 10 days
- Transmission interval: from 45s to the period length
- Duty ratio: 0~100%

■ **On-Time Mode**

The device transmits data to Argos at certain hour(s) of a day. The following four parameters are programmable:

- Starting hour: from 0:00 to 24:00
- Period: from 1 hour to 24 hours
- Transmission interval: from 45s to the period length
- Duty ratio: 0~100%

■ **Monitored Mode**

The device transmits only when it predicts or detects an Argos satellite passing overhead.

■ **Trigger Mode**

The device transmits on a certain triggering condition. This condition is customized and sometimes requires extra hardware design. (For example, you might set the device to start transmitting when the animal is out of water, and stops transmitting when it is under water.)

DATA COLLECTION MODES

The user can choose from the following two data collection modes, and specify the related parameters to suit the condition and objective of the study.
After the bird is released with the tracker, the user can still adjust the data collecting settings over-the-air.

■ **Regular-Interval Mode**

- GPS interval: 5 min ~1 day

- ENV interval: 5 min ~1 day

- ODBA interval: 10 min/30 min

- ACC interval: 25 Hz, 3 seconds in every 10 min (by default)

Above ranges are selectable on website data platform or App. Contact us if other settings are required.

■ Sleep Mode

This mode is to deactivate certain type of data collection for:

- a certain period (from minutes to months)

- a regular period each day (a maximum of 16 hours)

INTELLIGENT FREQUENCY OPTIMIZATION (BOOST)

The BOOST function intelligently increases the frequency for data collection & transmission when the charging condition is good or the bird is flying. The default setting is as below:

• Frequency Optimization: GPS at every 1/2/10 min and transmission at 5min/1 hour
• Flight Detection: GPS at 10 min and transmission at 10 min

With BOOST, the device portrays detailed movement tracks and attempts more frequent data transmission without manual intervention, keeping long-term energy balance and avoiding the possibility of battery drain caused by radical settings during bad weather.

DATA STORAGE

Due to the limited transmission volume of Argos, much valuable data that cannot be transmitted will be stored in memory for later downloading.

• Flash memory: 16 MB
• Regular data storage: 460 days at default setting (1h GPS+1h ENV+10min ODBA)
• BOOST data storage: 280,000 pieces
• ACC data storage: 28,700 pieces

EXTRA FUNCTIONS brought by INTELINK®

INTELINK® technology enables remote connection to your MINI (Argos) devices to perform various operations and realize many amazing functions.

To establish such connection, you only need an ordinary smart phone or/and a Debut series

gateway device.

■ Tracker Recovery

With DEBUT app, a device and a mobile phone will automatically function as a beacon system. The mobile phone will ring if the device is detected nearby. The closer they are, the louder the ringing sound will be. This provides a convenient way to find lost devices.

■ Firmware Upgrade & Setting Modification

The user can easily upgrade the firmware or change data collection settings and Argos transmission schedules for a device nearby using Debut APP.

■ Remote Data Downloading

MINI is capable of collecting much more data than the Argos transmission throughput limitation.

If the bird deployed with a MINI (Argos) flies to somewhere near a Debut gateway*, the data in the memory can be automatically downloaded and sent to the researcher. Such high-definition data could provide valuable information for the study.

■ Raw Acceleration Data Collecting

Raw x/y/x acceleration data could be very useful for behavioral research, especially when the data can be combined with timestamps, GPS, environmental data, and the bird's activity rhythm. However, the raw data can seldom be obtained due to its large size.

With INTELINK, the user can not only download the raw data from memory, but also obtain real-time raw acceleration data by connecting a mobile phone to a MINI device.

■ In-situ Modeling

During the process of obtaining real-time raw data described as above, the user can also mark the data with behavior tags. Debut App provides comprehensive tools for In-situ modeling, which includes real-time x/y/z acceleration visualization and data downloading, video shooting, and behavior tagging. All these data will be combined under the timestamps and saved for later verification and analysis.

With the help of Druid's AniAct® behavior algorithm platform, the user will be able to generate acceleration-based behavior algorithm for different species.

Furthermore, such algorithm can be loaded into the tracker and be conducted on board. Then, the tracker will be able to send back continuous computed result of behavior tags instead of discontinuous raw data. This will expand the data dimensions and bring

breakthrough on bird research and ecology conservation.

Druid Technology reserves the right to interpret the technical specifications and to make changes of the same without prior notice.