



## ST-21

Argos Satellite Transmitter



### Overview

Campbell Scientific's ST-21\* is a Service Argos-certified Platform Transmitter Terminal (PTT) that transfers data from the datalogger site to the Argos Data Collection and Location System via NOAA polar orbiting satellites. This transmitter is well suited for

remote meteorological and environmental data collection applications, including mobile and high-latitude installations. The ST-21 is compatible with our newer dataloggers.

### Benefits and Features

- › Well-suited for remote meteorological and environmental data-collection applications, including mobile and high-latitude installations
- › Compatible with Campbell Scientific's CR800, CR850, CR1000, and CR3000 dataloggers
- › Provides uplink capability for up to eight unique ID codes, frequencies, and repetition periods
- › Supports up to seven independent Argos data buffers that can be populated in real-time
- › Transmits variable-length Argos messages with either 20- or 28-bit ID codes
- › Allows researchers to forgo a rigorous certification process
- › Includes an autorepeat feature that allows the ST-21 to repeat data without host intervention
- › Provides a fail safe feature that alerts users upon communication link or host failure
- › Allows the ID and repetition rates to be set in real-time or by Campbell Scientific

*\*While Campbell Scientific's ST-21 Argos PTT is based on Telonics' ST-21, they are not equivalent; our ST-21 includes a case, voltage regulator, and our SDC communication interface.*

questions & quotes: 435.227.9000

[www.campbellsci.com/st-21](http://www.campbellsci.com/st-21)



## Argos System, Pass Frequency, and Pass Duration

Service Argos data transceivers are aboard two of NOAA's sun-synchronous, polar-orbiting satellites. The polar orbits allow a single satellite to provide coverage of the entire Earth's surface as it rotates through the plane of the orbit.

The satellite can receive and decode data from several PTTs simultaneously, removing the timing constraints associated with GOES transmissions. In applications where the PTT is mobile (e.g., drifting oceanographic buoys), Argos can use Doppler shift data gleaned from several received transmissions to locate a PTT to within 150 m. The satellites' relatively low orbit of 850 km permits the PTT to operate with a small antenna and power supply.

The Service Argos transceiver receives messages from the PTT when passing overhead. Pass duration is 10 minutes on average. The orbital period for each satellite is 1 hour, 42 minutes; passes per day vary from six at the Equator to 28 at the poles. Typical transmissions occur in under 1 second and are spaced at 200 second intervals ( $\pm 6$  seconds).

The ST-21 transmitter supports up to eight Argos ID codes, allowing transmission of seven unique data sets per expected satellite pass. Because the PTT does not "know" when the satellite is overhead, messages are repeated to ensure reception. Each data transmission includes up to 32 bytes.

Our CR800, CR850, CR1000 and CR3000 dataloggers can format the data as bits per data point, allowing the user to select the resolution used for each data point.

Assuming a repetition period of 200 seconds, and two 32 byte buffers are used with one 20 bit ID number, the average data throughput by latitude is provided below.

Message repeat intervals, Argos ID numbers, and duty cycles are changed at Campbell Scientific or by using the datalogger. Data must be decoded by the user, or by Service Argos. The datalogger's CS I/O port provides power and I/O connections to the transmitter using the standard SC12 cable.

### Average Data Throughput Table

Site Latitude	Cumulative Visibility Over 24 hrs	Minimum Number of Passes Per 24 hrs	Mean Number of Passes Per 24 hrs	Maximum Number of Passes Per 24 hrs	Average Bytes Per 24 hrs
0°	80 minute	6	7	8	448
15°	88 minute	8	8	9	512
30°	100 minute	8	8	12	576
45°	128 minute	10	11	12	704
55°	170 minute	16	16	18	1024
65°	246 minute	21	22	23	1408
75°	322 minute	28	28	28	1792
90°	384 minute	28	28	28	1792

## Platform Transmitting Terminal (PTT) Equipment

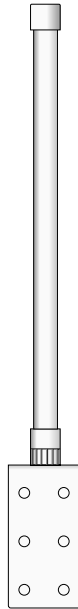
- › ST-21 Argos transmitter (includes an SC12 cable)
- › CR800, CR850, CR1000, or CR3000 datalogger
- › 12022 antenna (includes antenna cable and mounting bracket)
- › Environmental enclosure (ENC12/14, ENC14/16, ENC16/18, ENC24/30, or ENC24/30S)
- › Power supply consisting of our BP12 12-Ahr or BP24 24-Ahr battery pack, CH100 or CH200 regulator, and SP10 10-W or SP20 20-W solar panel

## Retrieving Data from the Ground Receiving Station

Choose one of the following methods:

- › Phone modem with MNP level 4 error correction (most Hayes-compatible modems contain this error-checking protocol; check the operator's manual for your modem) and user-supplied communication software (e.g., Procomm Plus, Crosstalk).
- › Internet
- › Telnet
- › Email

The 12022 Argos Marine Half Wave Antenna is a 401 MHz antenna that includes a 17 ft cable.



## Subscribing to Argos

To use the Argos system, you must receive formal permission from Service Argos and pay a fee. The data must be used for environmental purposes. Examples include meteorological/hydrological stations, ship tracking, volcano monitoring, and seismic data. To subscribe to Argos, the following steps must be completed:

1. Obtain a Program Application Form from the Service Argos website ([www.argosinc.com](http://www.argosinc.com)) or from one of the following:

### *North America*

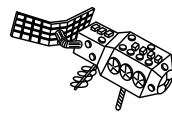
CLS America, Inc.  
1441 McCormick Drive, Suite 1050  
Largo, MD 20774  
Tel (301) 925-4411  
E-mail: [useroffice@argosinc.com](mailto:useroffice@argosinc.com)  
Website: [www.clsamerica.com](http://www.clsamerica.com)

### *Europe*

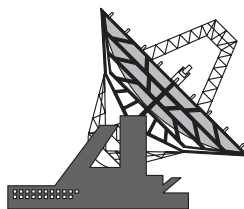
CLS/Service Argos  
8-10, rue Hermes  
Parc Technologique du Canal  
31520 Ramonville Saint-Agne, France  
Tel +33 (0)5 61 39 47 00  
Email: [info@cls.fr](mailto:info@cls.fr)  
Website: [www.cls.fr](http://www.cls.fr)

2. Fill out and submit the application form to the appropriate Service Argos office. Service Argos will send you a program review stating whether your program has been approved.
3. Following approval, send a Technical File that describes the required data processing and type of results to the appropriate Service Argos office.
4. Complete and return a Service Agreement to the appropriate Service Argos office.

## Typical System



NOAA Satellite



Service Argos



The environmental enclosure houses the transmitter, datalogger, and power supply

Platform Transmitting Terminal (PTT)

## Ordering Information

### Argos Transmitter

When ordering the transmitter, the customer needs to provide Campbell Scientific with the number of buffers, repetition rate, decimal ID, Dex ID, frequency, and fail safe information.

**ST-21** Argos Platform Transmitter Terminal PTT

### Antenna Cable/Bulkhead Installations

**12022** ARGOS 0 dBd OMNI Marine 1/2 Wave Dipole Antenna

**3659** 1 in. IPS Unthreaded Aluminum Pipe, 12 inches long for mounting the antenna to a crossarm via the CM210.

**CM210** Crossarm-To-Pole Mounting Kit for attaching the aluminum pipe to a crossarm.

**21212** Black Cold Shrink Tape, 10ft long Roll, 1in wide used to help protect the antenna connections.

## Specifications

- › Operating Temperature Range: -30° to 70°C
- › CE Compliant
- › Supply Voltage: 12 V, nominal
- › Output Impedance: 50  $\Omega$
- › High Power Level: 800 mW typical; 27 to 31 dbm
- › Argos Transmission Frequency: 401.618 to 401.680 MHz
- › Modulation (BPSK): -1.1 to +1.1  $\pm$ 0.1 radians
- › Spurious Emissions: -45 dB

› Length: 19.05 cm (7.5 in)

› Height: 5.72 cm (2.25 in)

› Width: 3.18 cm (1.25 in)

› Weight: 224 g (7.9 oz)

### Current Drain at 12 Vdc

› Quiescent: 1.12 mA

› Transmitting: 375 mA



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