

Airborne Telemetry

Airborne Bit Synchronizer and Decom

ABS400

- Data Links
- Up-Link Command and Control
- Laboratory Test
- Multiple Bit Syncs
- Decommutator
- Output Modules Available
- Embedded Decryption available



The ABS400 is a miniature programmable airborne telemetry bit synchronizer and decommutator in a rugged design specifically tailored for command and control applications. The basic system consists of a bit synchronizer, frame synchronizer, programming circuitry and power supply. The system is also expandable to include analog and/or digital output ports.

The frame synchronizer examines the reconstructed digital data stream from the bit synchronizer on a bit-by-bit basis for the "best fit" pattern and outputs a sync pulse when correlation is achieved. Lock is accomplished and maintained with up to eight errors in the sync code.

An RS-232 port on the frame synchronizer board allows many parameters, such as bits-per-word, words-per-frame, sync pattern, etc., to be programmed. Reprogramming can be accomplished in the field with a minimum of equipment.

The unit can be configured with multiple bit synchronizers for applications requiring independent synchronization to multiple inputs.



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The ABS400 is a miniature state-of-the-art programmable airborne bit synchronizer with optional decommutator, which may be used in a multitude of applications, and is ideal for uplink command and control applications. The design employs programmable gate arrays and surface mount techniques in a modular configuration to satisfy customer specific requirements in an extremely small package.

The basic ABS400 model consists of a Bit Synchronizer and optional Decommutator module with an open architecture that allows other module types to be incorporated into the system. The design allows for a configuration of up to 16 modules attached to the first bit synchronizer. Although standard building blocks are used in figuring the ABS400, each unit is custom tailored to each customer's specific application.

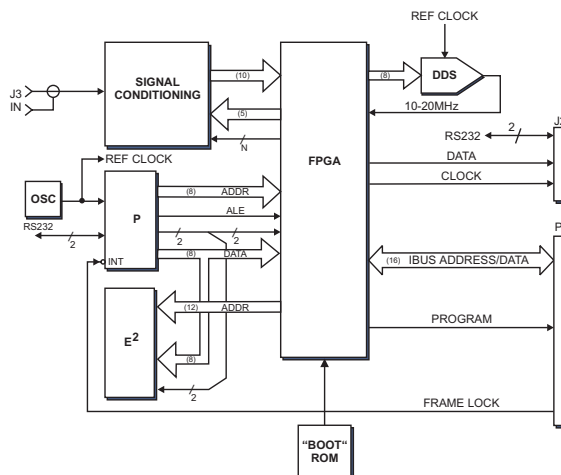
A variety of port modules may be provided, including analog port modules, discrete port modules, serial data port modules and specialized bus modules. Custom modules can also be created to meet specific customer needs, by either cloning existing modules or by creating new modules from inception.

Because of its modular construction, the unit is reconfigurable to contain one to sixteen modules in addition to the Bit Synchronizer. Modules are stacked onto the Bit Synchronizer and Decommutator modules in virtually any order, and are bolted together with provided hardware. The unit is then programmed for the appropriate system configuration. A variety of mounting configurations are available, and custom mounting can also be provided.

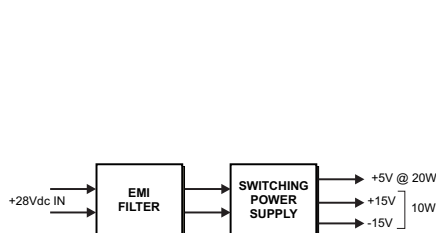
30W Base Unit

70W Base Unit

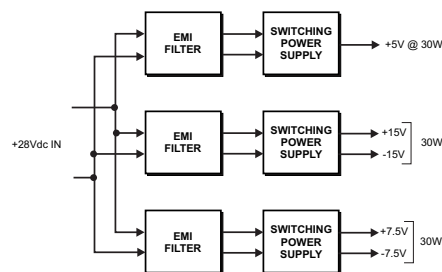
Every ABS400 contains a Base Unit, which in turn contains a Bit Synchronizer assembly and a power supply assembly. Additional bit synchronizer modules, a decom module and/or output port modules are then stacked onto the Base Unit in a building block approach to create the desired configuration. The Bit Synchronizer assembly provides for the clock and data recovery of the input data stream, and outputs serial data and clock. The Power Supply assembly converts raw 28V input power to the regulated voltages required within the ABS400. Two types of power supplies are offered, and their choice is dependent upon the types of data acquisition modules in the specific encoder configuration. The Standard 30W Power Supply delivers up to 30W of internal power to the ABS400, and is the common choice for smaller configurations. The 70W Power Supply is typically used for larger configurations where there are many output port modules, and theoretically could deliver up to 90W of internal power. For thermal reasons, it is recommended that the power not exceed 70W.



Block Diagram
Bit Synchronizer



Block Diagram
Standard 30W
Power Supply

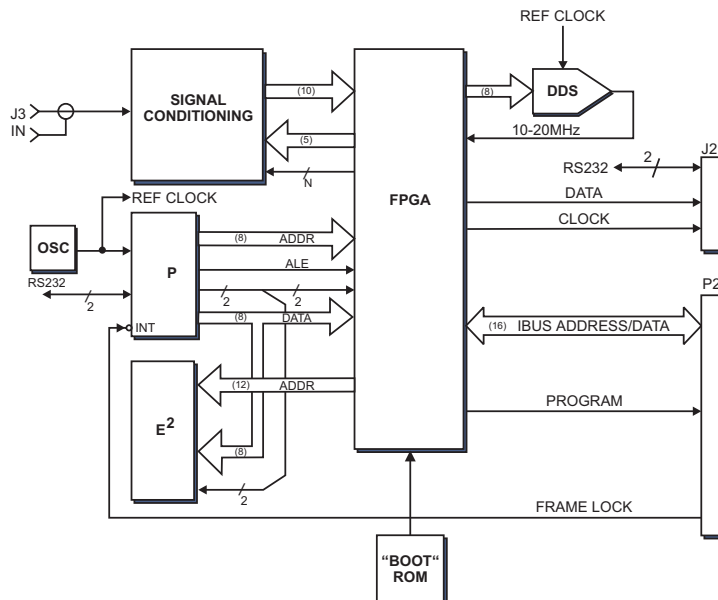


Block Diagram
Standard 70W
Power Supply

Most ABS400 modules can be configured in an infinite number of ways, either through factory installed options or via programming by the user. In addition, modules can be customized for specific applications either by design modification of existing modules as required, or through creation of specialty modules specific to a customer's application. The following pages describe the most current and popular modules available. For specific application information, please contact us.

BSM410 - Bit Synchronizer Module

The BSM410 Bit Synchronizer Module accepts a raw data input from a receiver, extracts timing from that signal, resamples the incoming data with the recovered clock and regenerates a replica of the original digital data. The output from the unit is RS-422 data and clock. Multiple BSM410 modules may be installed in a single unit, to provide the capability of recovering data and clock from multiple receivers.



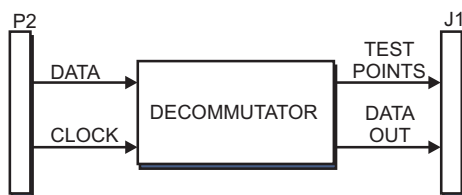
Block Diagram
BSM410

Specifications:

Data Codes	
(Programmable)	NRZ-L,M,S; BiΦ-L,M,S; RNRZ-L(15)
Bit Rate	
(Programmable)	100 bps to 10 Mbps (NRZ); 100 bps to 5 Mbps (Bi-Φ)
Input	Single ended
Input Range	100mV to 10Vp-p
DC Common Mode	± 10V
AC Baseline Variation	100% FS to 0.05% of bit rate
Tuning Resolution	0.1%
Loop Bandwidth	
(Programmable)	0.1%, 0.2% 0.4%, 0.8%, 1.6%
Track Range	3 x loop bandwidth
Acquisition Range	3 x loop bandwidth
Acquisition Time,	
SNR 12dB	<100 bits
BER	Within 1dB of theoretical to 1 Mbps (NRZ-L)
Data & Clock Outputs:	RS-422

DCM410 - Decommulator Module

The DCM410 Decommulator Module accepts data and clock from the Bit Synchronizer module, providing frame and word synchronization and data distribution to successive modules within the ABS400 system. The DCM410 also provides serial (RS-232/RS-485) output data with programmable baud rates



Block Diagram
DCM410

Specifications:

Bits Per Word	
(Programmable)	8 to 16
Words Per Frame	
(Programmable)	16 to 2032
Data Orientation	
(Programmable)	Left / Right Justify
Bit Order	
(Programmable)	LSB First / MSB First
Parity	No
Frame Sync Length	
(Programmable)	8 to 64 Bits
Subcoms	No
Frame Sync Errors	
(Programmable)	0 to 15, not to exceed 25%
Search To Lock	
(Programmable)	1 to 4
Lock To Search	
(Programmable)	1 to 4
Serial Port	8 Bits per Word, 1 Start, 1 Stop, No Parity
Baud Rate	
(Programmable)	0 (serial output port disabled), 9600, 14.4K, 19.2K, 28.8K, 38.4K, 57.6K, 115.2K
Interface	
(Programmable)	RS-232/RS-485
Include Frame Sync	
(Programmable)	On/Off

DEC420 - Decryption Module

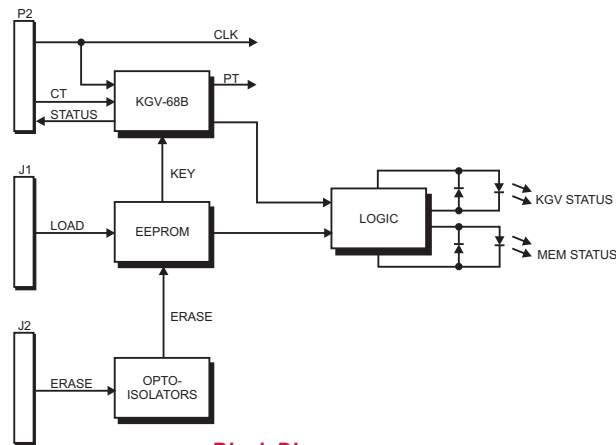
Embedded decryption is available for the ABS400 for specific programs. The use of the DEC420 is typically for use on U.S. programs only, and is always subect to approval for use by NSA. This option is typically not available for foreign applications.

The DEC420 module provides all required decryption and key management functions.

All usages of the embedded decryption module must be co-ordinated with NSA in advance of any sale of hardware.

Specifications:

Please refer to the Embedded Encryption Supplement to this data sheet, available to authorized users only.



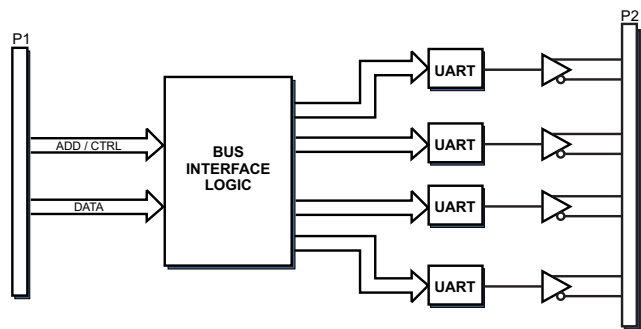
Block Diagram
DEC420

SDM410, SDM411 - Serial Output Data Modules

The SDM41x Serial Output Data Modules provide four independent serial output channels. Each channel of the SDM41x may be configured individually for output format (RS-422 or RS-232), baud rate, bits per word, parity check (odd), stale bit check and enable/disable. Disabling a channel puts its output in a high impedance state. Various baud rate selections are also available.

Specifications:

Number of channels	4
Interface	RS-422 or RS-232 (Each channel individually programmable)
SDM410 Baud Rates	.0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4 Kbaud (Each channel individually programmable)
SDM411 Baud Rates	4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 115.2 Kbaud (Each channel individually programmable)



Block Diagram
SDM410

ABS400 User Interface Software & Technical Manual

The ABS400 can be configured in many ways, using a combination of factory set items in combination with a wide array of user programmable features. Factory configurable items are typically for parameters which rely on specific component values ... impedance resistors for example. User programmable features are typically hardware related and format related. Hardware related programmable features are parameters such as gains and offsets, baud rates, delay times, etc. Format related features are those things that allow the user to construct the overall frame format, and to assign words in the format in the order that matches the incoming data, using the provided software.

The user software is Windows based and is very easy to use. Using the setup software requires a methodical sequence of events, first defining the physical configuration of the unit, and then configuring the programmable parameters for each module. Once the hardware has been defined and set up, the user then defines the overall frame structure, assigning sync patterns. Finally, the user then assigns each word in the format to specific measurements.

A detailed technical manual is also provided which describes the details of each module, how to program each module, and, in general, how to use and program the ABS400. The user software and technical manual is provided free to each customer, upon delivery of the hardware.

DCM410 Decom Setup

Format

Words Per Frame: 256 Sync Error Tolerance: 3

Default Bits Per Word: 8 Search To Lock: 3

Default Data Orientation: Right Justify Lock To Search: 1

Default Bit Order: MSB First

Sync Pattern: ☒ Hex ☐ Octal ☐ Binary

EB90

Serial Data Out

Serial Port: On Interface Standard: RS-485

Serial Baud Rate: 9600 ☒ Include Sync Pattern

View/Edit Setup

Label	Start	Word Inc	Last	Bits/Word	Justify	Bit Order	Dest	Channel
CH1	1	4	13	8	RIGHT	MSB FIRST	SDM410-01	1
CH2	2	4	14	8	RIGHT	MSB FIRST	SDM410-01	2

Edit Module

Module Label	Start Word	Word Increment	Last Word	Bits/Word	R/L Justify	Bit Order	Destination Module	Dest Channel
CH3	3	4	15	8	RIGHT	MSB FIRST	SDM410-01	3

SDM410 - Module 1

Channel 1

☒ Enable

Mode: ☐ RS232 ☒ RS422

Character Length: 7 + Parity

Baud Rate: 38400

☐ Parity Check ☐ State Bit Check

Channel 2

☒ Enable

Mode: ☒ RS232 ☐ RS422

Character Length: 8 + Parity

Baud Rate: 300

☐ Parity Check ☒ State Bit Check

Channel 3

☒ Enable

Mode: ☐ RS232 ☒ RS422

Character Length: 7 + Parity

Baud Rate: 9600

☒ Parity Check ☐ State Bit Check

Channel 4

☒ Enable

Mode: ☐ RS232 ☒ RS422

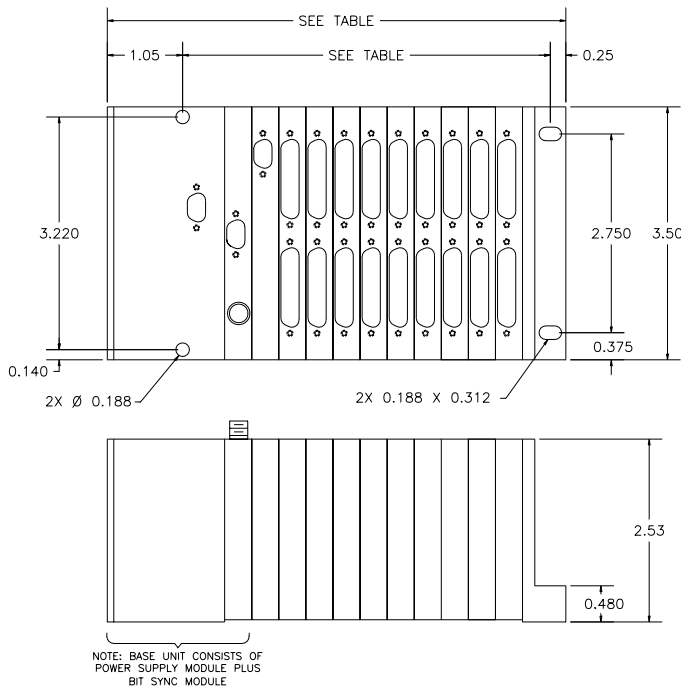
Character Length: 7 + Parity

Baud Rate: 19200

☒ Parity Check ☒ State Bit Check

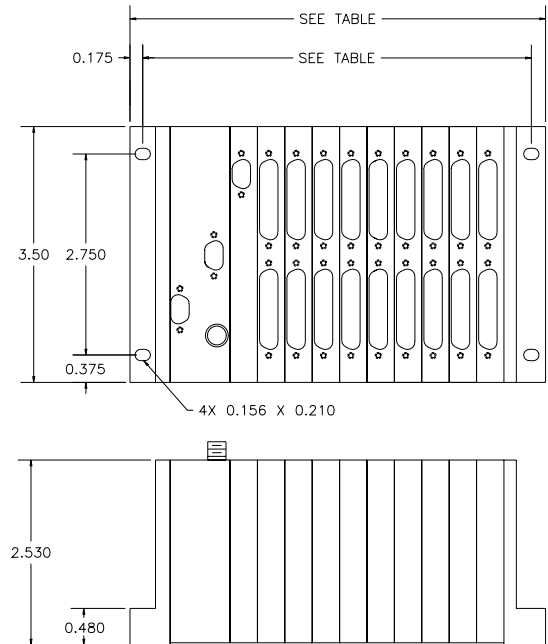
70 W BASE - HORIZONTAL MOUNT

BASE MODULE & COVER			
	LENGTH (INCHES)	MTG CENTERS	WEIGHT (OUNCES)
BASE ONLY	2.635		21
DATA MODULES			
1	3.010	1.710	24
2	3.385	2.085	27
3	3.760	2.460	30
4	4.135	2.835	33
5	4.510	3.210	36
6	4.885	3.585	39
7	5.260	3.960	42
8	5.635	4.335	45
9	6.010	4.710	48
10	6.385	5.085	51
11	6.760	5.460	54
12	7.135	5.835	57
13	7.510	6.210	60
14	7.885	6.585	63
15	8.260	6.960	66
16	8.635	7.335	69
CEM630+BLK610	+ 1.235	+ 1.235	+ 10



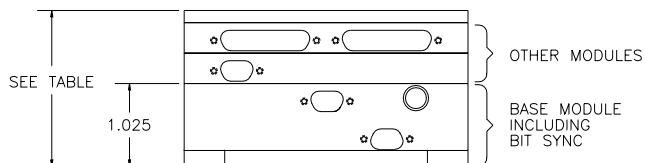
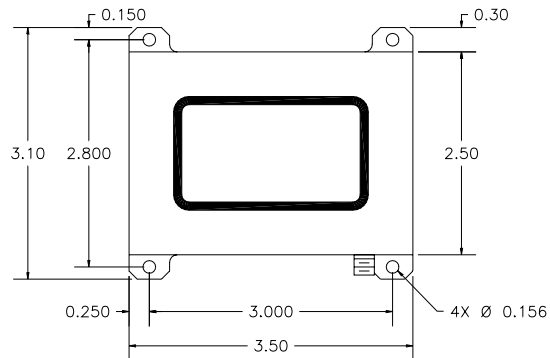
30 W BASE - HORIZONTAL MOUNT

BASE MODULE & COVER			
	LENGTH (INCHES)	MTG CENTERS	WEIGHT (OUNCES)
BASE ONLY	1.875		13
DATA MODULES			
1	2.250	1.900	16
2	2.625	2.275	19
3	3.000	2.650	22
4	3.375	3.025	25
5	3.750	3.400	28
6	4.125	3.775	31
7	4.500	4.150	34
8	4.875	4.525	37
9	5.250	4.900	40
10	5.625	5.275	43
11	6.000	5.650	46
12	6.375	6.025	49
13	6.750	6.400	52
14	7.125	6.775	55
15	7.500	7.150	58
16	7.875	7.525	61
CEM630+BLK610	+ 1.235	+ 1.235	+ 10



30 W BASE - VERTICAL MOUNT

BASE MODULE & COVER		
	HEIGHT (INCHES)	WEIGHT (OUNCES)
BASE ONLY	1.175	11
DATA MODULES		
1	1.550	14
2	1.925	17
3	2.300	20
4	2.675	23
5	3.050	26
6	3.425	29
7	3.800	32
8	4.175	35
CEM630+BLK610	+ 1.235	+ 10



ABS400 Specifications

Environmental

Operating Temperature -40°C to +85°C
 Storage Temperature -54°C to +125°C
 Vibration
 Sine 10g 50-2000 Hz
 Random 20g 20-2000 Hz
 Shock 275g half sine, 1 mS
 Humidity 1-98% relative

Outputs

Data RS422
 Clock RS422
 Serial RS422 / RS232

Programmable Variables

All Programmable Thru Standard RS-232 Port
 Bits/Word 8-16
 Words/Frame 2048 maximum
 Sync Pattern 64 bits maximum
 Sync Correlation 8 errors maximum
 Sync Lock Strategy 1-4 consecutive sync
 patterns for lock
 Sync Loss Strategy 1-4 consecutive sync
 patterns missing
 before loss of lock

Power Requirements

Voltage 28 Vdc, ±6 Vdc
 Overvoltage 40 V
 EMI MIL-STD-461C

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