



### Multi Stream Bit Synchronizer Model 2950AP

#### Features:

- Up to 16 Channels in 4u
  - \* Just 22.5 inches in depth!
- Bit Rate Range, all codes
  - \* 8 bps to 40 Mbps, *standard*
- Processes all IRIG Codes
  - \* NRZ-L/M/S, DBiø-M/S, DM-M/S, MDM-M/S, RZ
  - \* Randomizer/Derandomizer
  - \* IRIG 218 TMOIP (*output only*)
- Best in Class Performance
  - \* within 0.50 db of theory, *all codes*
- Fast Sync Acquisition
  - \* within 50 bit transitions, typical
- Best in Class Sync Retention
  - \* to 1024 bits without transition
- Bit Sync Status Monitors
  - \* Front Panel LED Lock/Search/Loss
  - \* On screen Performance Monitor
    - Input Amplitude, Offset, Rate Deviation and Lock Status
- Data Quality and Signal Test:
  - \* BERT/PRN BER Link Test Mode
  - \* Frame Sync PCM BER Monitor
  - \* Frame Lock/Loss Monitor
  - \* Eb/No Signal Quality Output
  - \* Viterbi Error Monitor Stats
- Data Simulator/Generator
  - \* Programmable rate, PRN Code, PCM Format and Code - to 40 Mbps
- Descrambler
  - \* CCITT V.35, INTELSAT, G2 Invert

Network compatible, includes Windows remote software.

#### General Description

Model 2950AP Multi-Stream Bit Synchronizer consists of up to sixteen 40 Mbps capable PCM Bit Synchronizers in a single 4U chassis. The Model 2950AP features a high intensity 8" LCD Touchscreen operator display & control panel as a standard feature, supporting both individual and group bit synchronizer parameter set-up, operation and status monitoring. Remote control of the unit is supported via Ethernet or serial remote interface, with Remote Control software provided to enable integrated remote set-up, control and monitoring of up to eight 8-stream Model 2950AP units from a single integrated remote operator interface. In addition, directly coupled LED status indicators provide precise bit sync lock and (with FSN option) live PCM frame sync lock status of each bit sync channel.



Each Model 2950AP bit sync is set-up, either individually or as a group, from the user-friendly GUI touchscreen operator interface. Storage for up to 20 system and individual channel set-ups is provided. Hot-swappable redundant power supplies assure rock solid system operation, while at the heart of the Model 2950AP Acroamatics' newest generation of industry leading bit synchronizer modules - our all new Model 1611P and 474DM Advanced Digital Bit Sync modules assure industry leading signal processing to assure the best possible lock and error performance under even the most trying difficult circumstances.

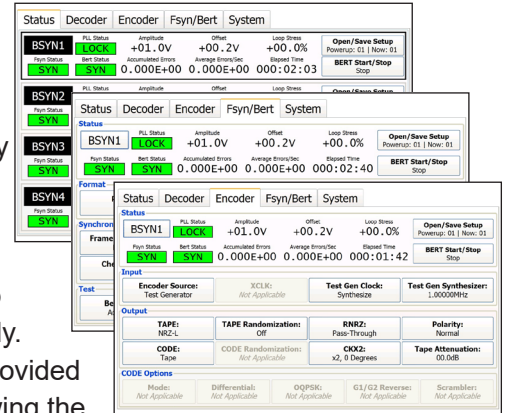
The Model 2950AP and its constituent internal 1611AP and 474DM bit sync module designs represent the first truly new "clean sheet" approach to modern bit sync design in a generation. Incorporation of the latest PGA based digital FIR filtering, digital phase locked-loop, NCO clock reconstruction, and digital amplitude and offset control design techniques are the underlying reasons for the astounding performance of our new Advanced Digital bit synchronizer. The Model 2950AP offers users programmable rates from 8 Hz to 40 Mbps with a variety of standard input and output code, format, and validation capabilities.

Standard PCM Sync Pattern/BERT test and monitoring, and Viterbi and QPSK encoder/decoder options assure state-of-the-art data format compatibility with the latest telemetry code and data formatting standards.



### System Software

The Model 2950AP includes a distinctive and easily mastered operator interface accessed via its large high output front-panel LCD touchscreen display. Each of the high performance Bit Synchronizers installed within the system are controlled via its easy to follow GUI oriented, menu driven display panel. Clear and well labeled menu choices are provided, with distinctive status indicators and system setting choices. The 2950AP automatically recognizes its bit synchronizer hardware configuration, allowing upgrade and hardware changes without concern for hardware setting changes. Setup configurations are easily stored and retrieved, either as a group or individually. Remote users can control the unit via Ethernet port or serial interface with provided Acroamatics Remote Bit Sync Windows utility software. If two users are viewing the system simultaneously, both see the changes made in real-time by either user, in order to avoid errors.



### System Functions

- Operating Software: Local touch-screen GUI set-up, operations and status
- GUI Interface: Front panel high intensity 8" touchscreen display standard, with local keyboard/monitor connections provided.
- Operating System: Windows 7 Embedded
- Configuration Storage: Yes, to 20 set-ups stored in NV local memory, any of which are assignable as default at start-up
- Special Features: Auto-sensing configuration management, provided remote Windows remote software, hot-swappable redundant power

### Chassis

- Form Factor: Standard 19" RETMA, 4u with integrated BNC/Triax rear panel signal I/O
- Available Slots: Accommodates to eight sets of Acroamatics single or dual channel PCI Bit Sync Modules
- Storage: Front panel removable HDD, and DVD/CD-RW
- Display: 8" LCD high res touchscreen, front panel mounted. Rear panel located SVGA monitor and keyboard/mouse interfaces provided via LCD touchscreen, or optional rackmount 1u retractable keyboard
- Keyboard: 4 USB Ports, 1 RS-232
- I/O Ports: 10/100/100BT Ethernet
- Network: Dual Hot-swappable Redundant 110/220v
- Power: Pre-configured 88 BNC's, user definable

### Signal Inputs

- Source: Program selectable: one of four inputs - only limited by total rear panel BNC/Triax count (88) in units with 9 or more bit syncs
- Inputs: Three (3) each BNC single-ended (75 Ohm or Hi-Z), One (1) each Triax differential (150 Ohm or Hi-Z), standard. Custom options available.
- Isolation: Greater than 60dB at 40MHz
- Impedance: Program Selectable: Hi-Z/Lo-Z. Single-ended: 4kΩ/75Ω , Differential: 10kΩ /150Ω .
- Signal Level: Single Ended: 0.1 to 15V p-p, Differential: 0.2 to 10V p-p
- DC Offset: 20V max Single-Ended, Hi-Z
- Baseline Variation: Tracks sinusoidal offsets to 100% p-p signal amplitude at 0.1% bit rate
- PCM Codes: Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, DM-M/S, MDM-M/S, RZ
- Derandomizer: Program selectable: RNRZ 9/11/15/17/23, forward/reverse

### Synchronization

- Bit Rate Range: 8 bps to 44 Mbps all codes. Each channel individually assignable. To 72 Mbps NRZ Codes optionally available.
- Tuning Resolution: 0.1% of bit rate
- Capture Range: 3 times the programmed loopwidth, typical
- Tracking Range: ±12% typical, with programmable limiter
- Loop Bandwidth: 0.1% to 3.2%, program selectable in 0.1% increments
- Sync Threshold: 0dB for NRZ-L and Biø-L codes
- Sync Maintenance: (LW=0.1%) -2dB NRZ-L and Biø-L codes
- Sync Acquisition: (LW=1.6%, SNR > 12dB) Typically less than 50 bit pixels
- Sync Retention: (LW=0.1%, SNR > 3dB) Retains sync through > 1024 consecutive dropouts
- Bit Error Rate: (LW=0.1%) within 0.5 of ideal bit error rate performance curves, in all codes and at all data rates



### Multi Stream Bit Synchronizer Model 2950AP

#### Remote Control Software

Remote GUI Setup and Operation Status Windows software is provided with the Model 2950AP allowing remote network or serial remote unit operations. Multiple 2950AP units and other Acroamatics bit synchronizer products may be remotely operated using the provided software, such that up to 64 bit sync channels can be controlled by a single host computer.

#### Data/Clock Outputs, NRZ-L

NRZ-L Data One each, NRZ-L data/clock pair, RS422/TTL (jumper selectable)  
Data Clock 0°, 90°, 180°, 270°, operator program selectable  
Data Polarity Program selectable: normal/inverted

#### Data/Clock Outputs, Code (Dual PCM Encoders)

Code Data/Clk Outpus Program selectable: Recovered Data (Bit Sync NRZ-L Data/Clock Out) or External data/clock. Defaults to recovered Data. **Three each:** One each TTL data/clock (0° & 180° selectable, 1x or 2x rate). **Code** (selectable) PCM and Clock, One each TTL data RNRZL, One each **TAPE** (code selectable) TTL or ±2 Volts balanced output, 50mA drive current.  
Randomizer Program selectable: RNRZ 9/11/15/17/23, forward/reverse  
PCM Codes Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, MDM-MS, RZ

#### Soft Bit Decision Output

Data/Clock Four bits Offset Binary plus 0° clock; TTL (open collector)  
Sample Rate Programmable to beyond 20 mega samples per second

#### PCM Encoder

Data Source Program selectable: Recovered Data or External data/clock  
Outputs One bipolar, 4V p-p; Two TTL; One RS-422/TTL  
Randomizer Program selectable; TNTZ 9/11/15/17/23  
PCM Codes Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, DM-M/S, MDM-M/S, RZ

#### External Data/Clock Output

Signal Type Jumper selectable: RS-422 or TTL  
Impedance 120Ω RS-422, 75Ω TTL  
Data Code Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, DM-M/S, MDM-M/S, RZ  
Data Clock Program selectable: Normal/Inverted, 1x or 2x

#### Convolution Encoder/Decoder (Optional)

Viterbi Decoder Rate 1/2, k=7: Includes differential decoding, V.35 descrambling, and G2 inverter  
Symbol Formats Serial, parallel, and staggered parallel  
Convolutional Encoder Rate 1/2, k=7: Includes differential encoder, V.35 scrambler, and G2 inverter  
Symbol Formats Serial, parallel, and staggered parallel

#### Format Generator/Synchronizer (Optional)

Format Generator Programmable frame length, sync pattern and mask  
Synchronizer Source Recovered data, external data, or test generator  
Synchronizer Strategy Pattern match in "search", programmable error limits for "check" and "lock" states  
Other Features Bit slip enable, auto polarity enable, data source/ambiguity resolution

#### Bit Error Rate Tester (Optional)

Transmitter Pattern PRN sequence: 211=1, 27-1, 29-1, 215-1 (forward/reverse)  
Pattern Clock Source Program selectable: Bit Rate Clock or External Clock  
Blanking Program selectable: 32, 64, 128 bits  
BER Sample Period Program selectable: 103 to 109 bit periods, or continuous accumulate  
Other Features Automatic pattern synchronization, forced error ON/OFF

#### Physical

Power 90-132V or 180-264V auto select 50-60Hz, 4A max  
Dimensions 4u 7" (31.12cm) H x 19.0" (48.26cm) W x 22.5" (57.15cm) D  
Temperature Operating: 0 to +40°C, Non-operating -40 to +86°C  
Relative Humidity Up to 90% non-condensing  
Shock Operating 6G, Non-operating 50G  
Vibration Operating 0.5G, 5 to 2000 Hz, Non-operating 1.2G, 5 to 500 Hz  
Signal I/O 88 BNC Connectors, with all I/O connections supported for up to eight channels.  
In 9-16 channel configurations, customer defined I/O assignment (to a max of 88 BNCs) is required.

