



4370A

DVB Sync Source

STANDARD FEATURES

- 12-Channel GPS Receiver
- < 50ns Accuracy to UTC
- Flash Memory for Remote Upgrades
- Modular/Hot Swap Design
- Primary and Secondary Reference Inputs
- Multiple 10MHz Outputs
- Multiple 1PPS Outputs
- Dual Hot Swap Power Supplies
- Low Phase Noise
- SNMP for Configuration and Monitoring
- RoHS Compliant
- Output Squelching
- Alarm Relay Contacts

OPTIONAL FEATURES

- OCXO or Rubidium Internal Oscillator
- 2 MHz and 2 Mbit/sec Outputs
- 2 MHz and 2 Mbit/sec Input
- Redundant Chassis Configuration
- Dual Redundant GPS Receivers in One Chassis
- NTP

OVERVIEW

The 4370A DVB Sync Source is a flexible timing system designed for Single Frequency Network (SFN) synchronization for DVB/DAB applications. These applications require a precision time and frequency reference to synchronize transmitters across multiple locations. Without synchronization, networks are not able to reliably deliver video and audio content to the end user.

The 4370A enables DVB-T and DVB-H networks to be deployed across varied landscapes by providing access to low cost, reliable precision time and frequency reference signals, in multiple formats ensuring a robust and reliable network.

REDUNDANCY AND RELIABILITY

The 4370A receives reference-timing signals from GPS, fiber optic and E1 inputs and translates them to generate the output signals. In case of a loss of GPS, the 4370A automatically switches to and locks to the auxiliary fiber optic or 2 MHz, 2Mbit/sec input to continually provide outputs that are traceable to a primary reference clock. The 4370As can be linked together via the optional fiber optic transceiver on the input, to provide a double redundant system with no single point of failure allowing for the utmost in system reliability. In this configuration, one 4370A is designated primary and one secondary. The primary 4370A

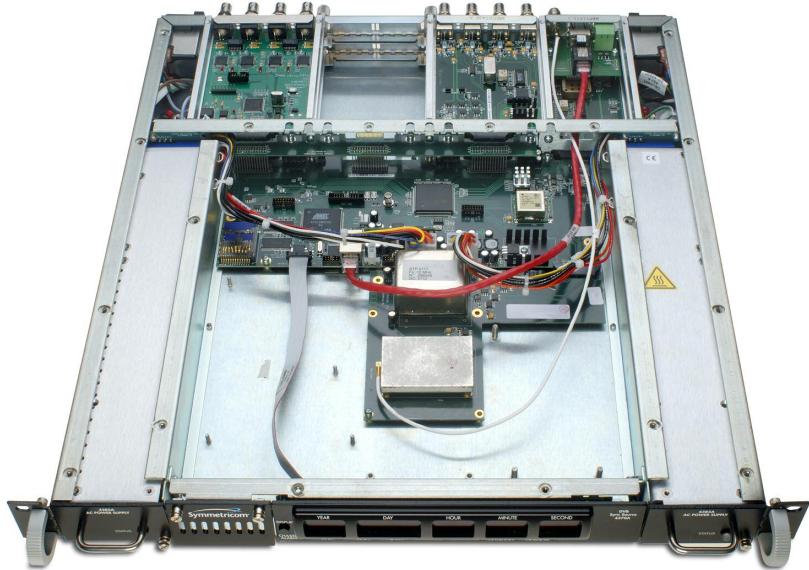
synchronizes to the primary synch source—GPS. The secondary 4370A synchronizes to the primary through the fiber. All RF and pulse outputs from the two units are therefore coherently maintained at the same frequency and phase.

The input synchronization sources are assigned a priority order of use. For example, GPS could be given the highest priority. If the GPS receiver in the primary 4370A unit fails, the secondary 4370A unit assumes the primary role, meaning that it starts to track its GPS receiver, which is still functioning properly. The 4370A with the failed GPS then tracks the new primary 4370A. Since each 4370A contains a flywheel oscillator, the necessary switching occurs without any discontinuity in the phase or frequency of the outputs. Should both GPS receivers fail; either 4370A can begin to track one of the secondary inputs while the other 4370A continues to track the primary. In this manner, all outputs of two interconnected 4370A can be derived coherently from any one of the references connected to either unit.

All of the 4370A outputs are provided on hot swappable modules so each one can be removed if needed or additional outputs can be added without the need for powering down your network.



4370A DVB Sync Source



STANDARD CONFIGURATION

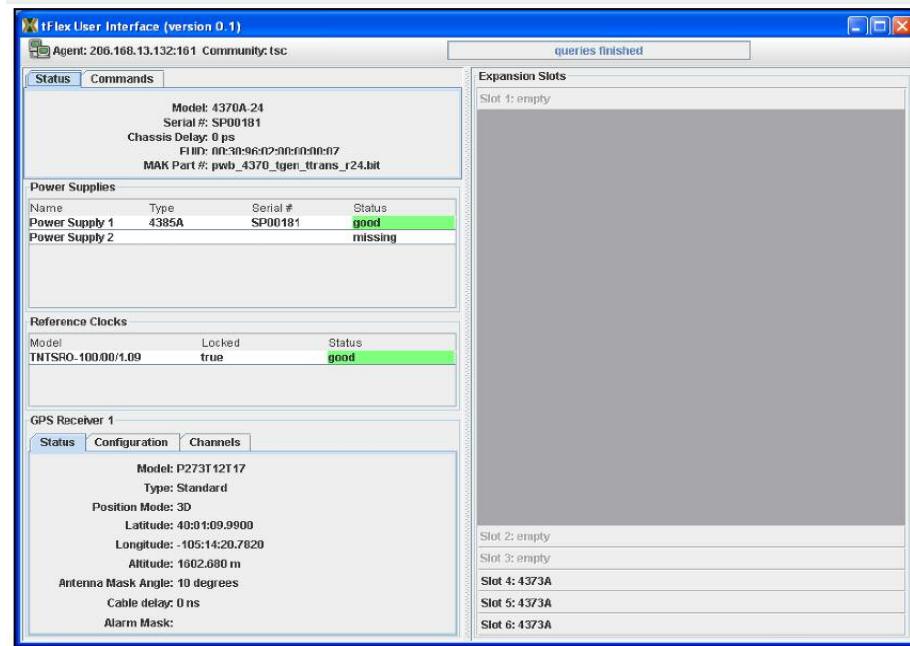
The standard 4370A comes configured with AC/DC hot swap power supplies, (1) 10MHz hot swap output module and (1) 1PPS hot swap output module providing a total of (4) 10MHz and (4) 1PPS outputs. If additional outputs are required, the 4370A 1U chassis can support up to six hot swap output modules which will provide 24 total outputs in a single 1U chassis. When fully configured, the 4370A still provides dual power supplies and multiple input sources. The front panel includes a time display, status and alarm indicators, and access to redundant power supply modules. It also includes push buttons to display the IP address and manually set the selected input and switching mode. The rear panel provides access to all input and output modules, power supply connections, alarm connections, and Ethernet port.

DVB SYNC SOURCE GRAPHICAL USER INTERFACE

The 4370A can be remotely configured and monitored using SNMP. MIB definitions can be obtained from the DVB Sync Source web server. Once you download the MIB definition bundle, you can extract it for import into MIB browser applications or SNMP management software. The bundle contains

MIB definitions for the chassis, plug-in module types, trap recipient registration, and a MIB module that holds only textual conventions used throughout the other MIB modules.

The pre installed GUI facilitates access to status of the power supply, reference clock, GPS receiver, and plug-in modules. The status information automatically updates about every 45 seconds. Third party SNMP management tools can alternatively be used to provide the same monitor and configuration capability.



A ROBUST DVB SYNC SOURCE

Robust DVB synchronization (high reliability + high precision) calls for key attributes in the SFN's timing reference. The DVB sync source addresses each of these key attributes within the core architecture and option modules.

HIGHLY ACCURATE TIMEKEEPING

Direct GPS input should provide < 50 nS accuracy to UTC (coordinated universal time — the international standard). This will maintain to the sub-millisecond level the spacing between bits traveling through the air — so bit echoes do not interfere with each other.

LOW PHASE NOISE

The timing source utilized to generate a signal on a channel can contribute to noise on that channel — which can interfere with clear reception of information. Low phase noise in the timing source reduces the likelihood of that occurring.

REDUNDANT TIME SOURCES THAT ARE ALSO HIGHLY ACCURATE

Planners should take into account what happens if GPS reception is lost. That requires a holdover clock that tracks GPS and maintains accuracy if GPS is lost — at least for a day, or longer should operators decide to protect against outages of greater duration. Alternatively, the sync source may also take advantage of other available timing sources, such as E1 networks.

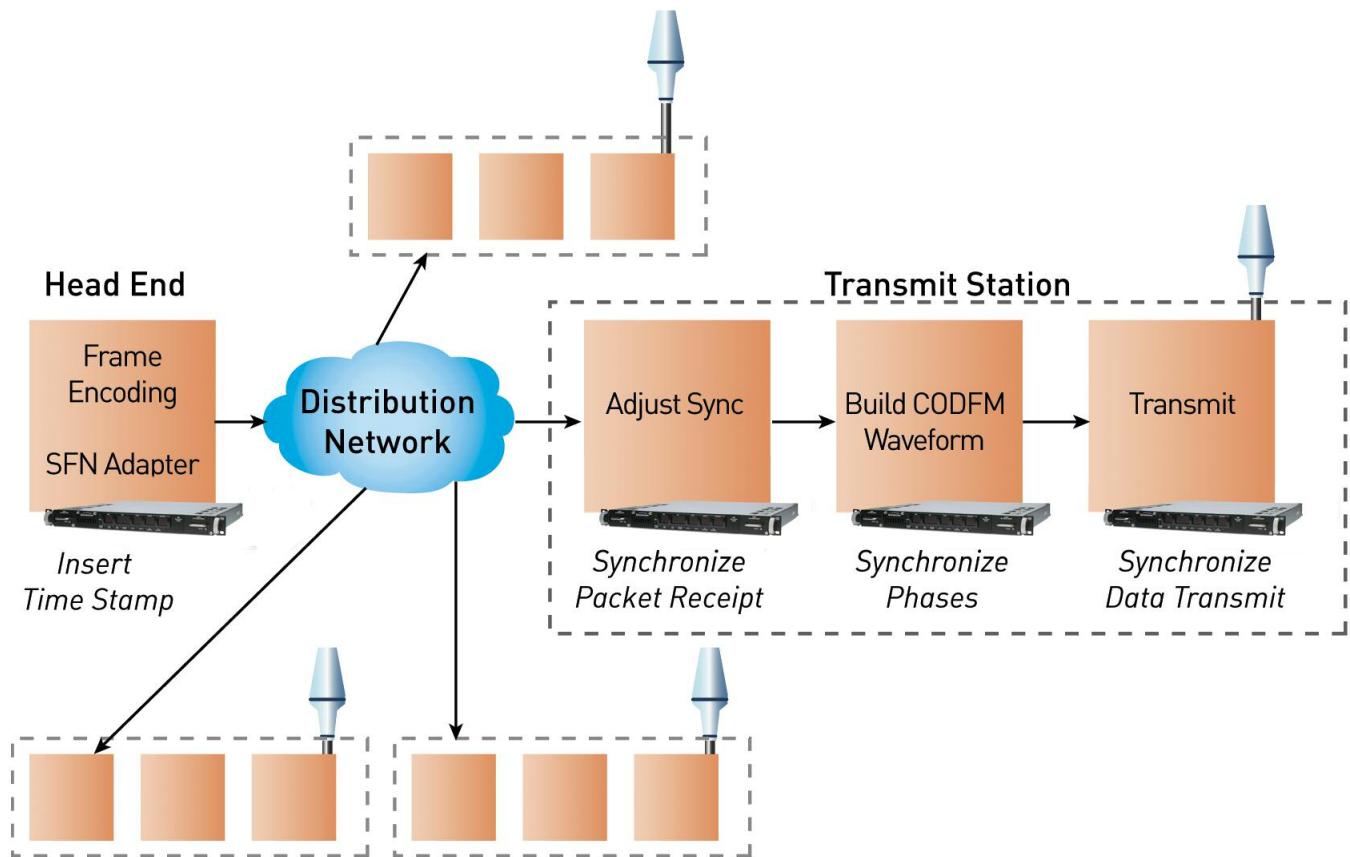
REDUNDANT HOT SWAPPABLE DESIGN

Planners may also want the option to configure two sync sources — one as primary and one as backup — for automatic switchover if the primary fails. Designation of "primary" should depend on which has GPS reception. Even if the primary source goes down, the secondary should still track the primary's GPS receiver if that receiver still functions

properly. Redundant GPS receivers are also an option SFN planners may wish to consider. Making devices hot swappable means that technicians can replace modules in a chassis without powering down the system or disrupting the network. For example, network operators can specify dual hot swappable power supplies to further enhance reliability.

SNMP FOR CONFIGURATION AND MONITORING

Technicians in the network operations center will want network-wide visibility to anywhere an out-of-spec condition may occur so they can take immediate action. The ability to monitor alarms and be able to diagnose errors at a glance ensures robust network operation.



4370A DVB SYNC SOURCE MODULES

Symmetricom makes it easy to configure the 4370A DVB Sync Source to meet varying time and frequency requirements. Below is a description of available modules.

10MHz Output Module



The 10MHz output card provides four low phase noise sine wave outputs through four BNC connectors. These outputs are phase locked to the host receiver's disciplined reference oscillator. They are automatically enabled upon initialization and are independently selectable by the user with no configuration setup required.

This option is a hot swap module that can be added or removed from the 4370A without hardware or software modification and without disturbance to the main system.

Outputs are preconfigured at the factory but can be configured by the user via the network SNMP interface.

10MHz Output Specifications

- Amplitude: 1Vrms into 50 ohms
- Harmonic distortion: <-40dBc
- Synchronization: Phase locked to 100MHz reference clock
- Accuracy: Function of input synchronization source
- Squelch: Automatic upon failure of output or internal frequency error
- Connector: BNC

1PPS Output Module



The 1PPS output card provides pulse outputs through four BNC connectors. These outputs are phase locked to the host receiver's disciplined reference oscillator. They are automatically enabled upon initialization and are independently selectable by the user with no configuration setup required.

This option is a hot swap module that can be added or removed from the 4370A without hardware or software modification and without disturbance to the main system.

Outputs are preconfigured at the factory but can be configured by the user via the network SNMP interface.

1PPS Output Specifications

- Amplitude: 1Vrms into 50 ohms
- Skew: <±2ns
- Jitter: <200ps
- Squelch: Automatic upon failure of output or internal frequency error
- Connector: BNC

Telecommunications Output Module



The E1 Output provides 2 MHz and 2 Mbit/sec outputs meeting the requirements of ITU-TG.703.10 and ITU-T G.703.6

Oscillators

The 4370A provides optional oscillator choices depending on different phase noise and hold over requirements. The 4370A comes standard with a low phase noise TCXO but can also be outfitted with an OCXO or Rubidium oscillator.

Oscillator Specifications

The below tables describe the Allan deviation and phase noise performance of each oscillator type.

Oscillator Specifications

- Allan Deviation (σ_{A})

	TCXO	OCXO	Rubidium
1s	4E-10	2E-11	3E-11
10s	5E-10	2E-11	1.6E-11
100s	1E-9	2E-11	1E-11
Holdover	5E-7/day	1E-10/day	5E11/month

- Phase Noise (dBc/Hz)

	TCXO	OCXO	Rubidium
1Hz	-60	-95	-67
10Hz	-90	-125	-90
100Hz	-105	-140	-114
1kHz	-125	-150	-130
10kHz	-140	-150	-140

Power Supply Module



The 4370A can be configured with dual redundant AC or DC hot swap power supply modules. Each module is inserted in the front of the 4370A for easy access.

Power Supply Module Specifications

- AC Power supply module
 - 100 - 240VAC, 45-65Hz
 - Hot swap module
 - Status LED
- DC Power supply module
 - 100 - 240VAC, 45-65Hz
 - Hot swap module
 - Status LED

4370A Specifications

GPS RECEIVER

• Receiver input:	1575.42MHz L1 C/A code		
• Tracking:	12 parallel channels		
• Acquisition time:	Cold start <20 min		
• 1PPS output accuracy:	UTC(IUSNO) ±50ns RMS 100ns peak when in fixed position mode, <500ns, 2sigma in 3D mode		
• Frequency output accuracy:	1E-11 @ 1 day		
• Allan deviation (Locked to GPS)			
Averaging time			
100s	<3E-12		
• Holdover			
TCXO	5E-7 / day		
OCXO	1E-10/day		
Rubidium	5E-11/month		
• Standard Input/Output Signals			
• Network Interface:	Standard 10/100Base-T RJ-45, 8 pin connector		
• Protocols:	TCP/IP and SNMP		
• 1PPS			
Level	>2.4V High <0.8V Low		
Pulse width	<100uS ±10µS		
Rise time	<15nS		
Jitter	<200pS		
Connector	BNC		
Squelch	When signal quality is compromised		
• 10MHz			
Level	13dBm ±2dBm		
Format	Sine wave		
Harmonic	<-40dBc		
Impedance	50Ω		
Connector	BNC		
Squelch	When signal quality is compromised		
• Phase noise (dBc/Hz)			
Offset (Hz)	TCXO	OCXO	Rb
1		-95	-67
10	-60	-125	-90
100	-90	-140	-114
1kHz	-105	-150	-130
10kHz	-125	-150	-140
100kHz	-140	-150	-140
• E1			
Format	2MHz per ITU-T Rec. G.703 §10 2Mb/s per ITU-T Rec. G.703 §6		
Connector	BNC		
Impedance	75Ω		

MECHANICAL/ENVIRONMENTAL

• Power	Dual redundant supplies 100 - 240VAC, 50-60Hz 40.5 - 70VDC 40W (full loaded chassis)	
• Size	Height: 1.75" Width: 17.00" Depth: 19.00"	
• Weight:	Approximately 8.4 kg (18.5 pounds) with two power supplies and six plug-in modules	
• Operating temperature:	0°C - 50°C	
• Humidity:	0 - 90% non-condensing	
• Display:	Year, Day, Hour, Minute, Second Loss of input signal Unlock	
• Optional antenna	Size: 3" dia x 3" H Input: BNC Female to GPS receiver Power: 12VDC Operating temperature: -55°C to +85°C Storage temperature: -55°C to +85°C Humidity: 95% non-condensing Certification: CE	

OPTIONS

- Telecommunications interface (2MHz & 2Mb/s outputs)
- Fiber optic interface
- Oscillator upgrades; (OCXO, Rubidium)
- NTP



Rear View



Rear View Fully Loaded Chassis



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