# Multi-Function Digital/Analog Audio/Video Synchronizers

- 12-Bit Component Digital Video Processing
- Proprietary Multi-Mode Adaptive Comb Filter Decoder
- ▶ DigiDuplex™ Mode Provides Bi-Directional Analog/Digital Interface
- Adjustable Spatial and Temporal Digital Noise Reduction
- Integrated Video Framestore with Linear Keyer
- Adjustable Digital Bandwidth Filtering
- Enhanced Digital Test Pattern Generator with Zone Plate
- Integrated Animated AV Logo Inserter Option
- DV (1394) I/O Option







on: Enable F: Strong Deiresteine Deirestei



## More Than Just a Synchronizer

Equally suited for use in analog, digital or hybrid facilities, the DPS-475 and DPS-575 Multi-Function Analog/Digital AV Synchronizers represent the ideal choice for broadcasters making the transition to DTV. Available in video only and audio/video configurations, these synchronizers provide an ideal bridge from analog video signals, such as satellite and microwave feeds, to digital production facilities. The DPS-475 is an NTSC only product while the DPS-575 is an auto-sensing dual standard (PAL/NTSC) device.

A host of innovative features, options and modes support the following functions: AV Synchronizer, Animated Logo Inserter, Linear Keyer, Auto Switch Time Base Corrector, Graphics Framestore, Bi-Directional Analog/Digital Transcoder, DV Transcoder, Digital Noise Reduction System, Video AGC, Video Test Signal Generator, Audio Test Signal Generator, VITS Inserter, Video Bandwidth Processor and Serial Digital Audio Embedder/De-Embedder.

#### Infinitely Flexible I/O

Unlike competitive products that share I/O connectors, DPS synchronizers provide separate connections for all video input and output formats. This enables convenient front panel selection between multiple input devices, all of which may be connected simultaneously. Four video input and output formats are standard: Composite Video, Serial Digital Video (SDI), Component Analog Video (Betacam) and Y/C (S-VHS/Hi-8). A separate RGB output supports sync on green or RGBS modes and is ideal for driving video projectors. The RGB output can also be configured to provide an additional composite video output. An optional DV I/O module makes it easy to interface DV camcorders and 1394 equipped digital VCRs. As an added convenience, front panel transport controls, including jog and shuttle, make it easy to control DV devices via the 1394 link.

### **Tradition of Innovation**

When it comes to synchronizers, DPS can demonstrate a long history of innovation. Our first product, the DPS-1, was introduced over twenty-five years ago. As broadcasters began to build new digital facilities, DPS introduced the DPS-465, the industry's first multi-format serial digital transcoding synchronizer. The DPS-465 made it easy and economical to interface a wide variety of analog and digital video sources to a digital plant. The DPS-465 was followed by the DPS-470, which incorporated an internal four channel digital audio synchronizer and quickly became the top choice of networks, broadcasters and mobile operators throughout the world. The DPS-475 and DPS-575 multi-function synchronizers continue this rich heritage of technical excellence, reliability and value.

## **Proprietary 12-Bit Comb Filter Decoder**

The most critical requirement for a component digital synchronizer is the ability to accurately decode composite NTSC or PAL signals. In that respect, the 12-bit adaptive 3-dimensional comb filter decoder used in the DPS-475 and DPS-575 offers unparalleled decoding ability. Three combing modes are available: Simple, Adaptive-2D and Adaptive-3D. 3D combing utilizes a proprietary DPS processing algorithm to combine information from previous frames in order to eliminate residual subcarrier artifacts, such as cross luminance and cross chroma. 3D processing can be engaged even when the composite input is not being utilized. For example, if a component video source was originally decoded by a less sophisticated tape machine decoder, the 3D comb filter in the DPS-475 and DPS-575 can be used to clean up the signal and remove the cross luminance and chroma artifacts. Removing these artifacts will save bandwidth if you encode the output to MPEG, because the residual subcarrier artifacts create significant entropy. Another unique feature broadcasters will appreciate is programmable line-by-line vertical interval comb filter bypass.

#### **Proprietary 12-Bit Video Encoder**

The DPS-475 and DPS-575 also incorporate a proprietary 12-bit video encoder. This wideband digital oversampling design provides ultra flat frequency response and extremely high quality encoding for both NTSC and PAL with exceptional signal-to-noise performance.

#### Testing, Testing, TSG

Over thirty 10-bit video test patterns, including zone plate, can be loaded from non-volatile memory into the synchronizer's graphic display buffer and bounce can be specified between any two test patterns. An integrated VITS inserter enables selected test signals to be displayed in the vertical blanking interval. It's also possible to insert a short text message, such as source I.D. information, into the VBI. When input video is lost, the synchronizer can be programmed to freeze, fade to black or drop to a user-defined trouble slide or test pattern.

#### **3-Dimensional Digital Noise Reduction**

Sophisticated digital noise reduction is standard with the DPS-475 and DPS-575. Convenient front panel controls provide for the independent adjustment of spatial and temporal noise reduction. Spatial noise reduction is effective at removing impulse type noise. Both luminance and chrominance temporal noise reduction are available.



## Don't Forget the Sound

With the addition of a DPS AS-475 or AS-575 four-channel audio synchronizer module, the unit can provide dual stereo audio and video synchronization in a single rack height package. The internal audio synchronizer option supports balanced or unbalanced analog, AES/EBU digital and embedded SDI audio I/O. All outputs are simultaneously active, which enables both analog and digital audio devices to be connected at the same time. Incoming stereo audio pairs can be selected from the analog, digital or embedded SDI inputs. All four audio channels dynamically track the internal delay of the video synchronizer whenever auto-track mode is enabled. Up to 1.75 seconds of total delay can be specified, ensuring proper lip sync regardless of the program source. All audio parameters are controlled from an easy to use front panel menu. Four separate audio tone generators enable different frequency test tones to be applied to each channel for easy left/right channel identification. User-definable audio test signals or arbitrary stereo waveforms can also be uploaded from a PC.

## "Gimme Bars" Automatic Proc Amp Setup

With a known input signal (75% color bars), you can automatically and accurately set the video proc amp controls with the press of a single button. Manual adjustments without the use of a scope or a monitor are also easy, since peak video levels are displayed as IRE units in real-time. The digital proc amp controls enable the adjustment of all signal parameters regardless of input source. This means you can even correct for color phase errors (hue) in SDI and component video streams. For dynamic level adjustments, a switchable video AGC circuit monitors sync-tip levels to continuously set video gain.

#### Video Framestore, Linear Keyer & Logo Inserter

An entire frame of video can be stored in the synchronizer's nonvolatile memory. The still image can be displayed full screen or keyed over live video. Stored images can include an associated linear key. Fill and key information can be grabbed from live video in separate passes or graphic files can be uploaded to the synchronizer using the supplied Windows® software. The built-in framestore/keyer also makes an ideal logo inserter or source I.D. generator. Multiple logos can easily be stored in the available RAM. For even more pizzazz, animated logos with synchronized audio are optionally available. Logo insertion can be initiated from the front panel, from an RC-4000 remote control or via GPI trigger. Two GPI inputs and one GPI output are standard.

## DigiDuplex<sup>™</sup> Supports Bi-Directional Processing

DPS' exclusive DigiDuplex feature provides bi-directional connectivity between analog tape machines and digital routing systems. DigiDuplex enables simultaneous transcoder and frame

synchronizer operation. DigiDuplex mode routes the synchronizer's SDI input directly to the analog video outputs which feed the inputs of an analog tape machine. The analog output of the tape machine can be simultaneously connected to one of the synchronizer's analog inputs where it can be processed and output via the SDI



port. Audio signals are handled in a similar fashion. DigiDuplex mode supports both AES/EBU and embedded SDI audio.

#### Adjustable Digital Bandwidth Filtering

In addition to digital noise reduction, the DPS-475 and DPS-575 offer adjustable 2D filtering with separate horizontal and vertical bandwidth controls. For MPEG preprocessing applications, digital bandwidth filtering provides entropy reduction prior to MPEG encoding.

## **Engineered for the Real World**

The rugged yet lightweight chassis is plenty tough for mobile use. Standard rear rack supports adjust for various rack depths and eliminate the need for rack slides. The all metal front panel provides expanded function buttons and additional status LEDs. A vacuum flourescent graphical display (VFD) features variable sized fonts for readability and can be dimmed to suit control room lighting conditions. The VFD also provides real time audio VU meter and video level indicators for peak luminance, minimum black and peak saturation.

### Easily Upgraded in the Field

The DPS-475 and DPS-575 employ flash upgradable microprocessors and field programmable gate arrays. Firmware updates can easily be installed without disassembling the unit or replacing any integrated circuits. Firmware updates are posted on the DPS web site, where they can be easily downloaded and installed using a PC or laptop.

#### The World's First Modular Pizza Box

Through the use of large-scale integration and surface mount components, the DPS-475 and DPS-575 synchronizers offer incredible functionality and I/O flexibility in a single unit of rack space. Even when equipped with an audio synchronizer module, animated logo inserter and DV I/O module, there is room to spare in our "pizza box" chassis. We used that extra space for an optional expansion slot, which provides access to all of the digital I/O and memory functions of the synchronizer. Optional processing cards are currently under development that will enable the DPS-475 and DPS-575 to assume entirely new personalities. Check the DPS web site for the latest developments.



## **Multi-Function Digital/Analog AV Synchronizers**

Number of Inputs ...... 2 Stereo Channels (Balanced or

Input Sampling Rate ...... 32 kHz, 44.1 kHz, 48 kHz

Connection ..... Removable Barrier Strip

Input Type (Menu Selectable) . . AES3-1992 Balanced XLR or

Maximum Input Level . . . . . . +24 dBu

Resolution ...... 24-bit, 96 kHz

Channel Status Information . . . . Professional, S/PDIF

Input ...... 2 Stereo AES/EBU Channels

Connection ..... BNC (via SDI video input)

Auxiliary Audio Input Stream . . . . . Uploaded WAV files can replace or

Number of Outputs ..... 2 Stereo Channels (Balanced

Maximum Output Level . . . . . . +24 dBu (-23 dBu into 600 $\Omega$ )

Connection ..... Removable Barrier Strip

Number of Outputs ..... 2 Stereo AES/EBU Channels

Output Type . . . . . . . . . . . . . . . . Balanced (AES3-1992) or

Connection ...... XLR or BNC Connectors on

Unbalanced)

SMPTE 276) Input Termination  $\ldots\ldots\ldots$  110 $\Omega$  Balanced or 75 $\Omega$  Unbalanced

Breakout Cable

audio streams

or Unbalanced)

SMPTE 276)

Number of Outputs ...... 2 Stereo Channels of Embedded Audio

Channel Status Format. . . . . . . AES3-1992 (Professional Mode) Connection ...... BNC (via SDI Video Output)

Processing ...... 24-bit Audio System

Maximum Total Delay. . . . . . . . 1.75 seconds at 48 kHz

Size ..... 17" x 1-3/4" x 20" (WHD),

Audio Test Tone Generators (x4).... 100 Hz to 20 kHz, 100 Hz steps,

Channel Separation . . . . . . . . . .

**General Specifications:** 

 THD+N
 <0.005% (Typical at +21dBu, 1 kHz)</td>

 Total Dynamic Range
 >90dB

>85dB

0 dBFS to -38 dBFS levels

43.2cm x 4.4cm x 50.8cm

Connection ...... XLR and BNC Connectors on Supplied

Unbalanced BNC (AES Data on Coax

. AES3-1992 (Professional Mode)

be mixed with real time processed

Unbalanced (AES Data on Coax

Supplied Breakout Cable

88.2 kHz, 96 kHz



DPS-475 and DPS-575 series synchronizers can also be ordered as "LC" models, less front panel controls.

**Audio Specifications:** 

Analog Inputs:

AES/EBU Inputs:

SDI Embedded Input:

Analog Outputs:

Resolution ...

AES/EBU Outputs:

SDI Embedded Output:

#### Video Specifications:

Inputs: Composite Video (BNC) . . . . . . 1 V p-p, 75 $\Omega$ Component Analog Video (BNC): ......1V p-p, 75**Ω** Serial Digital SDI (BNC)  $\ldots$  75 $\Omega$ , Auto EQ to 300M (With Reclocked & Buffered BNC Output) DV I/O Option (6-Pin Molex) . . . IEEE-1394 Genlock Reference (BNC Loop) . 1V p-p,  $75\Omega$ Outputs: Composite Video (BNC x2)..... 1V p-p,  $75\Omega$ Component Analog Video (BNC): RGB/RGBS Analog (BNC)\*†: RGB.....1V p-p, 75Ω DV I/O Option (6-Pin Molex)... IEEE-1394 Signal Processing: ADC/DAC and Composite Synchronizing Range..... Infinite Frequency Response: -1dB (5.5 - 5.75 MHz) TBC Mode  $\ldots$  -3 dB (0 – 4.2 MHz, Notch at 3.58/4.43 MHz) Signal to Noise: TSG/SDI Input Modes . . . . . . . >75 dB Luminance Weighted Luminance Jitter (TBC Mode)...... <15 nS Processor Controls: Video Level ..... +/- 3dB Horizontal Genlock Timing.....+/- 6 µS Subcarrier Genlock Timing..... 360° Y/C Horizontal Delay Adj ..... -592 nS/+518 nS Test Generator Mode ..... Select from 30+ 10-bit Test Patterns (Available at all Outputs) VITS/VIRS Inserter ..... Select any two (line repetitive) test patterns to display on alternate fields of lines 16-19 Remote Control: Serial Remote Port (DB-9F) . . . . RS-232/RS-422 Levels @ 9 600/38 400 BPS GPI Output/Audio Sync Pulse (RCA)\*.....TTL Pulse



HEADOUARTERS 70 Valleywood Drive Markham, Ontario L3R 4T5 Canada 905-944-4000 Fax: 905-944-4200 sales-ca@dps.com

THE AMERICAS 11 Spiral Drive Florence, KY 41042 859-371-5533 800-775-3314 Fax: 859-371-3729 sales-us@dps.com

EUROPE Romans Business Park, Unit 9 East Street, Farnham Surrey, GU9 7SX U.K. 1252-718300 Fax: 1252-718400 sales-uk@dps.com

DPS-475AV ... NTSC Integrated Audio/Video Synchronizer DPS-475LC ..... DPS-475 without front panel controls DPS-475LCAV . . DPS-475AV without front panel controls

**Ordering Information:** DPS-475..... NTSC Video Synchronizer Only

AS-475...... Four Channel Digital Audio Synchronizer Module (Upgrade DPS-475 to DPS-475AV)

AL-475 ..... Animated Logo Option (NTSC)

- DPS-575 ..... Dual Standard (PAL/NTSC) Auto-Switch Video Synchronizer
- DPS-575AV ... Dual Standard (PAL/NTSC) Integrated Audio/Video Synchronizer
- DPS-575LC.... DPS-575 without front panel controls
- DPS-575LCAV . DPS-575AV without front panel controls
- AS-575...... Four Channel Digital Audio Synchronizer Module (Upgrade DPS-575 to DPS-575AV)
- AL-575 ..... Animated Logo Option (PAL)

#### **Options:**



#### RC-475 Multi-Channel Remote Synchronizer Control With Ethernet Port

Compact 1U remote panel provides same controls as synchronizer front panel. Enables one or more DPS-475/575 series (including LC models) synchronizers to be operated via DCN, 10-base-T ethernet.



#### **RC-4000 Multi-Channel Remote Control**

Multiple DPS-475s, DPS-575s and other DPS studio products can be remotely controlled using one or more RC-4000 control panels. RS-232, RS-422 and DCN communication ports are standard. Dedicated proc amp controls, direct station selection buttons and dual backlit LCD status panels are provided.



#### DVM-4000 DV I/O Module

The DVM-4000 module adds DV (1394) I/O connectivity to the DPS-475 and DPS-575 synchronizers. A rear panel 6-pin molex connector provides a means to connect DV devices, such as camcorders and DV decks. Digital video, audio and transport commands are supported via the 1394 link. For added convenience, the DPS-475 and DPS-575 even provide front panel DV device transport controls, including jog and shuttle.

\* These connectors located on supplied breakout cable.

+ RGB port can alternately provide additional composite video output or framestore alpha channel output for use with external keyers.

> ASIA-PACIFIC 858 King Georges Road South Hurstville, NSW 2221 Sydney, Australia 61-2-9547-0088 Fax: 61-2-9547-0988 sales-au@dps.com

© Copyright 2000 Digital Processing Systems, Inc. All rights reserved. DPS and the DPS logo are registered trademarks and DigiDuplex is a trademark of Digital Processing Systems Inc. Other trademarks property of their respective holders. Features and specifications subject to change without notice

