

# COMPUTER CONVERSIONS CORPORATION

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## 14 & 16 Bit Reference Powered Digital to Synchro Converter DSP60/40 and DSP 616/416 Series

### FEATURES

- No  $\pm 15V$  DC Supplies
- CMOS & TTL Compatible  
Parallel Binary Angle Input
- Transformer Isolated Output
- Protection & Thermal Cutoff
- Small Size and No Adjustments
- Only  $\pm 5V$  DC Input Power Required
- Driving 1.5VA at 60Hz. Dissipates 3w
- Output Short Circuit Proof, as well as  
Current Limited with Limited Transient
- Optimum Thermal Design with a Thermally  
Conductive Encapsulant & Metal Plate on Top
- High Reliability Mil M38510 or 883 B Units Available

### Applications

- Fire Control Systems
- Naval Retransmission Systems
- Antenna/Radars
- Synchro Retrofits
- Simulators & Flight Trainers
- Driving CT's & CDX's



### Description

The DSP Series are high efficiency, AC Reference powered, Transformer Isolated, continuously updating "whole" Digital to Synchro Converters, designed for high performance Military and Industrial applications.

This series is especially well suited to assimilate the low output impedance of actual synchros without requiring large  $\pm 15VDC$  power supplies, abundant cooling, or large external transformers (60 Hz.).

The modules will accept 14 or 16 Bits natural binary angle data and convert it into a isolated, high power, 3 wire synchro output accurately representing the digital binary command angle, and capable of driving common synchro loads. 400 Hz. units drive 4.5VA, 60 Hz. units drive 1.5VA synchro loads, and 400/60 Hz. units are capable of driving 1.5VA loads over a wide frequency range of 57 to 440 Hz.

The outputs are virtually indestructible, completely isolated and short circuit protected, feature over-voltage transient protection, current limiting, and thermal cutoff. This provides complete protection against inductive kickbacks on the load, transients, short circuits, and overheating.

Extremely high efficiency is obtained by the use of internal AC pulsating power supplies. The outputs are powered by an internal, transformer isolated, purely AC dynamic power supply that efficiently transfers the AC reference

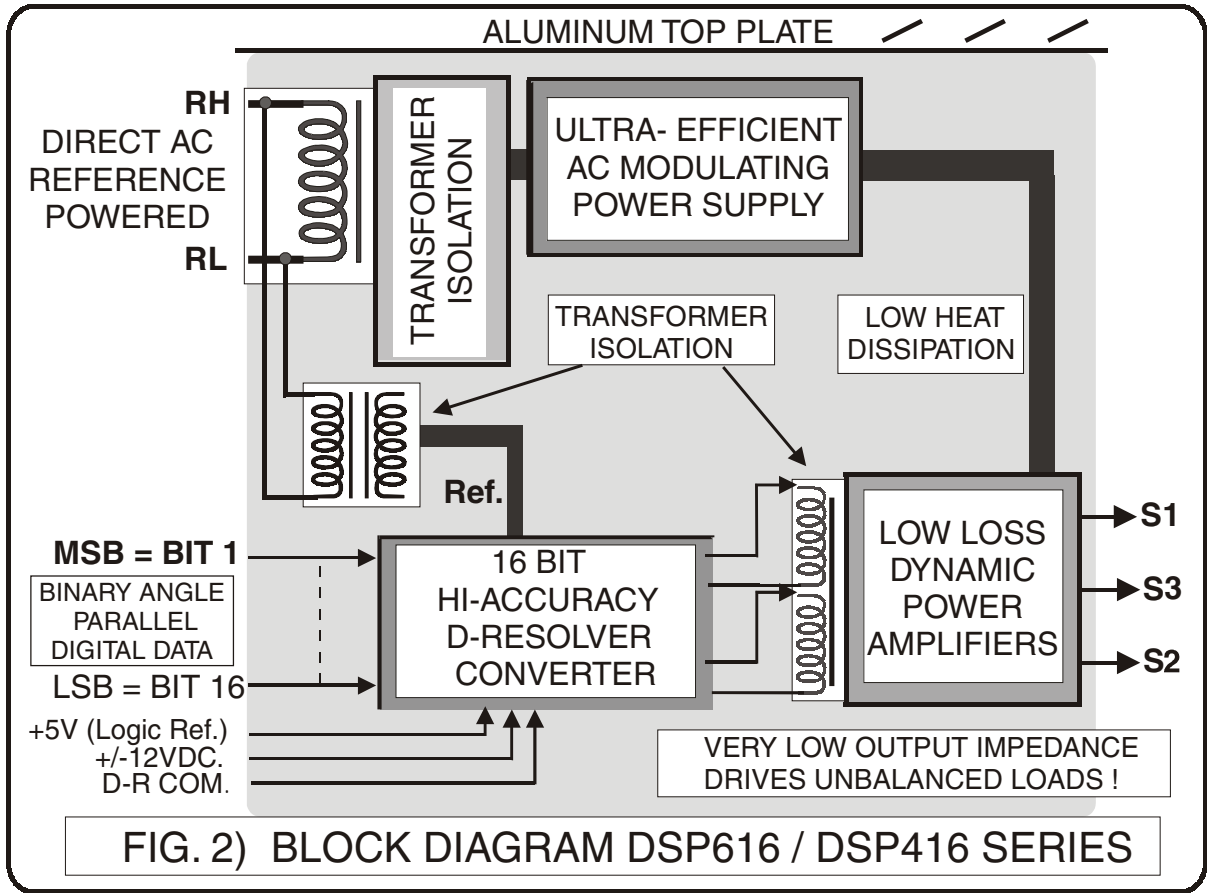
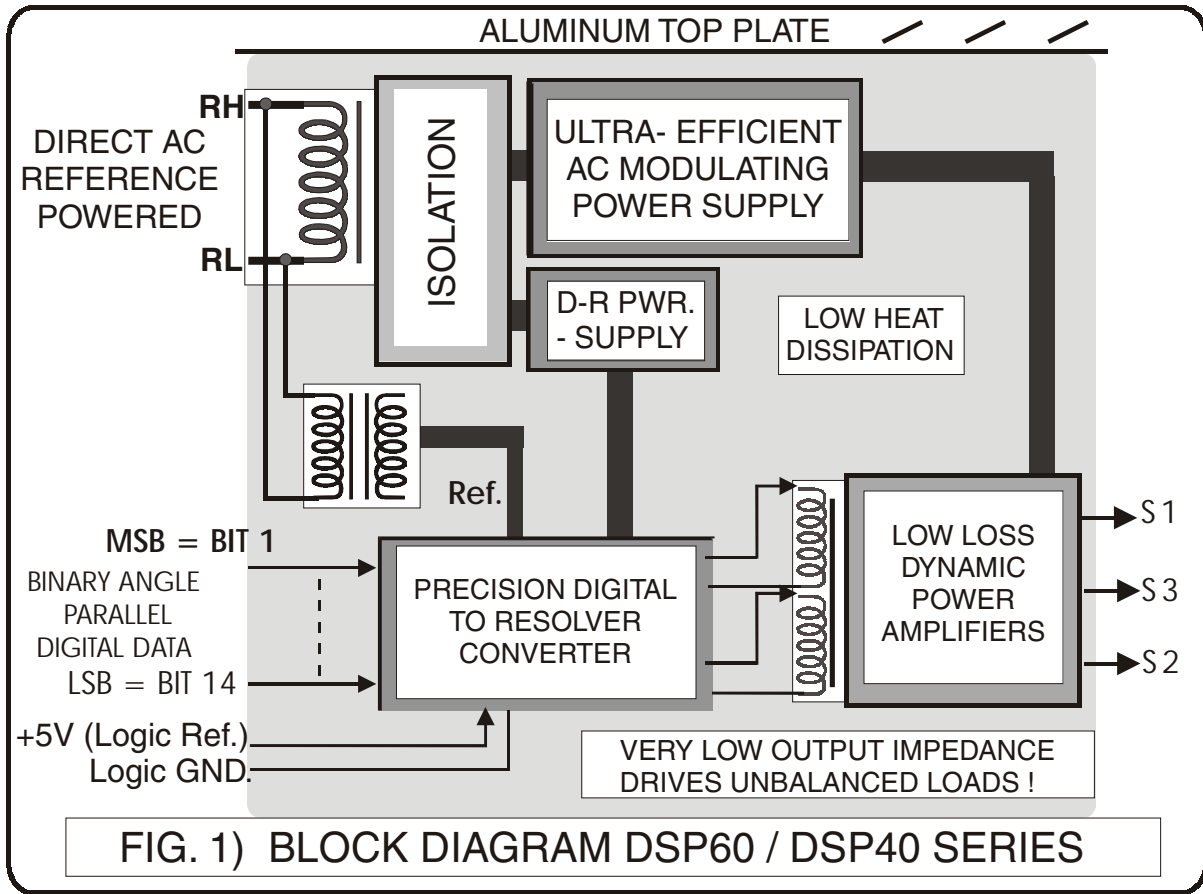
input power to the outputs, in a natural AC flowing format with very low loss.

Optimum efficiency is achieved by essentially using as much AC direct power transfer as possible to drive the AC outputs. The power supply produces full-wave rectified positive and negative voltages for driving the internal AC power rails that need only be a few volts greater than the voltages driven on the outputs. These close relationships assure that there is very little power loss, and the power loss dissipated in heat is thereby kept to a minimum, allowing cooler continuous operation.

Although the DSP Series are AC Reference powered units, the outputs track the AC reference input with tight regulation over the transformation ratio, providing accurate continuous AC signals without pulse modulations or discontinuity.

When driving reactive loads the power dissipation is typically less half that of conventional DC powered converters.

Because the outputs derive their power from the AC reference input, there is no concern regarding large in-rush



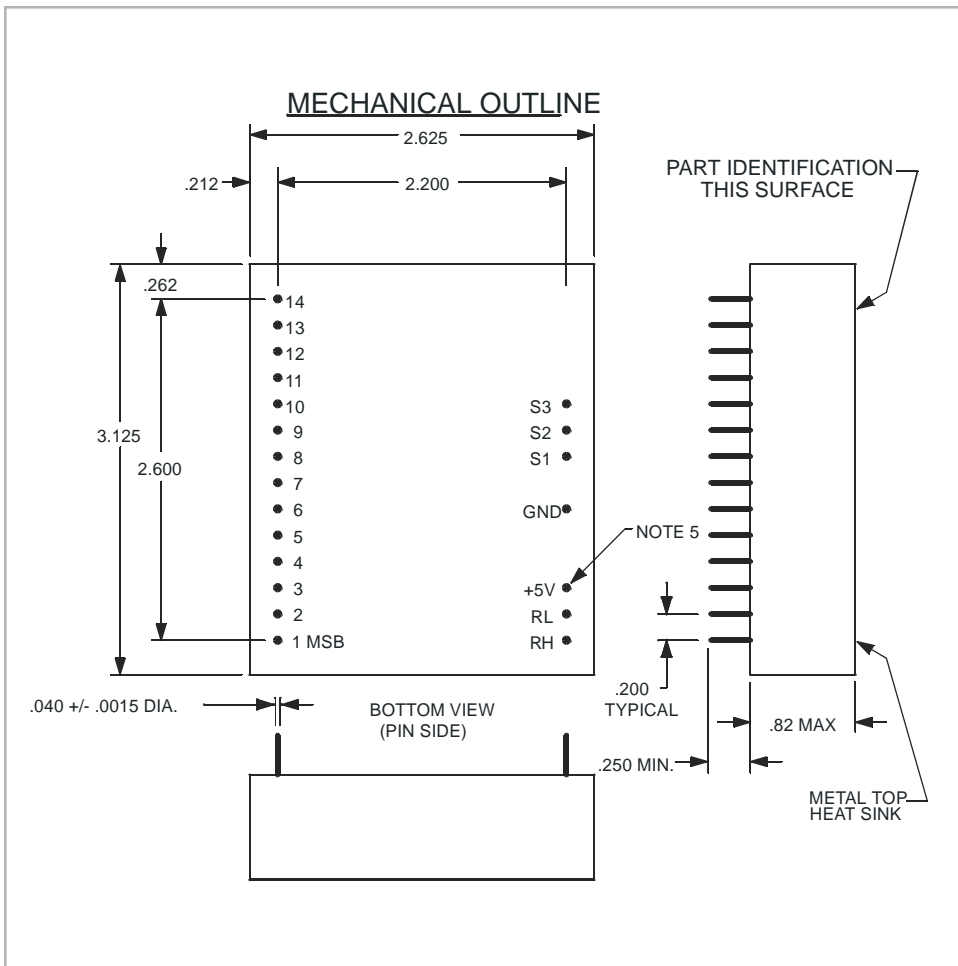
currents on power ups typical of conventional DC powered converters.

The higher efficiency, and lower heat generation, assure much greater long term reliability, while the low output impedance drive capability assures accurate synchro representation driving more difficult synchro related loads.

Reliability and Heat dissipation is further improved by the use of Aluminum Top plate that serves as a passive heat sink with a large surface area. Proprietary techniques are used to assure that all the heat generated within is directly transferred to the metallic cover, so that air flow across the surface effectively cools the entire unit, and internal hot spots are avoided.

The converters very low output impedance allows these units to provide excellent regulation on the 3 wire synchro outputs, assuring both a quick and accurate synchro response and better toleration of imbalances in the actual synchro loads. These converters are well suited to drive both resistive and inductive loads.

MODEL SELECTION GUIDE	
example:	<b>DSP60-H-1-RP</b>
Prefix Base Model "DSP" then add:	
60	Resolution and Frequency: 60 = 14 Bits 60Hz. (57-63Hz.) 40 = 14 Bits 400 Hz. (360-440Hz.) 64 = 14 Bits 60/400Hz. (57-440Hz.) 616 = 16 Bits 60Hz. 416 = 16 Bits 400Hz. 646 = 16 Bits 60/400Hz.
H	Reference Voltage in / Synchro Output Voltage: -L = 26V RMS L-L / 11.8V L-L -H = 115V RMS L-L / 90V L-L -LH = 115V RMS L-L / 11.8V L-L
1	Operating Temperature Range (case top): -1 = 0 to 70°C -2 = -55°C to +85°C -3 = -40°C to +85°C
ER	-ER = Enhanced Reliability
RP	-RP = Conventional RH-RL Phasing



**Safety and construct:**

All modules are encapsulated in an inert polymer that is self-extinguishing, flame retardant to U.L. 94VO, and will not feed or combust. Printed Circuit card material is flame retardant FR4, assemblies are conformal-coated for moisture resistance. Transformers are manufactured to MIL-T-27 and capable of withstanding high-pot to 500 VDC. Case is flame resistant Diallyl Phthalate. Because all the high voltage circuitry is encapsulated within the self-extinguishing and flame retardant potting material; added protection is provided with respect to the potential for component failure, shock and vibration.

DSP series converters feature a truly Transformer Isolated AC Reference / Power input, and Transformer Isolated high power outputs.

The use of internal Isolation Transformers on the reference input provides phasing flexibility, immunity from ground loops or ground reference induced electrical noise. The reference isolation transformer is an effective barrier to prevent any electrical noise on the reference source input from effecting the users digital control system, the +5VDC supply bus and it's common/ground. Because the AC Reference source is commonly shared or tied to many different destinations (other hardware) in a typical system; isolation on the reference inputs protects not only the user circuitry of the D-S converter, but also every user tied to the reference source in the system. When integrated on applications as add-on hardware; the isolation assures the user that the add-on hardware is non-obtrusive, and causes no conflict with any existing apparatus. Internal voltage clamps in the power section are also provided to protect against transients on the AC reference input.

The DSP Series are available in 3 different operating grades of temperature: commercial 0°C to +70°C, industrial-COTS Mil -40°C. to +85°C., and, Military -55°C to +85°C operating temperature range. Enhanced reliability models also available.

14 Bit units provide an accuracy of +/-4 arc minutes, and 16 Bit units provide an accuracy of +/-1.75 arc. minutes. All units are provided with printed test data and certificate of compliance.

Modules use the industry standard format; 2.6" x 3.1", x .82"H. They are encapsulated to withstand high shock and vibration. And are suitable for the most demanding applications.

SPECIFICATIONS			
Resolution	14 Bits	16 Bits	
Output Accuracy	± 4 Minutes	+1.75 Arc Minutes	
Differential Linearity	± 1 LSB Max.		
Synchro Output	90v L-L Balanced		
(Transformer Isolated, Short Circuit Proof, Thermal Cutoff)	57-63Hz., 4K OHM Load Minimum 360-440Hz., 1.33 OHM Load Minimum		
Digital Input	Transient Protected CMOS CMOS and TTL Compatible Fan-in to .13 TTL Load Binary Format, MSB=180°		
Reference Input (Transformer Isolated)	115V RMS ±10% (138V RMS Max.)  50 ma. Max. @No Load  Addition with Load: 1 ma. Max. Per ma. of Load		
D.C. Power	+5VDC	20 ma. Max. (to +7 VDC)	100 ma. Max. ±5%
	±12VDC to ±15VDC	N/A	30 ma. ea. Max.
Output Scale Factor	±1% Max. Amplitude Variation		
Storage Temperature	-55°C to +125°C		
Operating Temperature (At Metal Plate)	(-1 Units)	0° to +70°C	
	(-2 Units)	-55°C to +85°C	
	(-3 Units)	-40°C to +85°C	
Size	2.625 x 3.125 x .82"H		
Weight	8 oz. Maximum		
Notes:			
1. Specifications Apply with ± 10% Reference Variation. ±5% P/S Variation, & ±10% Harmonic Distortion Over Operating Frequency & Temperature Range & from No Load to Full Load.			
2. Minimum Load Impedence Specified to 1.5VA when Frequency and Voltage Levels are at their Nominal Values.			
3. Output Amplitude Tracks Reference Input Voltage.			