



**COMPUTER  
CONVERSIONS  
CORPORATION**

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6 Dunton Ct., E. Northport, NY 11731 (631)261-3300 Fax: 261-3308

## DSL - DRL SERIES

Low Profile - DC Powered  
Digital to Synchro - Resolver Converters

### FEATURES

- High Accuracy, 12-16 Bit Resolution
- Virtually Indestructible Outputs:  
Short Circuit Proof w/ Thermal Cutoff,  
Over-Voltage and Transient Protected,  
Drives High Power w/ Current Limiting
- Commercial, Industrial-COTS, and Military Temp.
- $\pm 12$  and  $\pm 15$ VDC Powered Models
- Environmentals Gauranteed to MIL-STD-202E
- Optimal Thermal Construct
- Industry Standard Pin-Terminations
- Transformer Isolated Reference / MIL-STD-1399
- Low Scale factor Variation  $<0.05\%$  nominal
- High Reliability 883B-M38510 Units Available

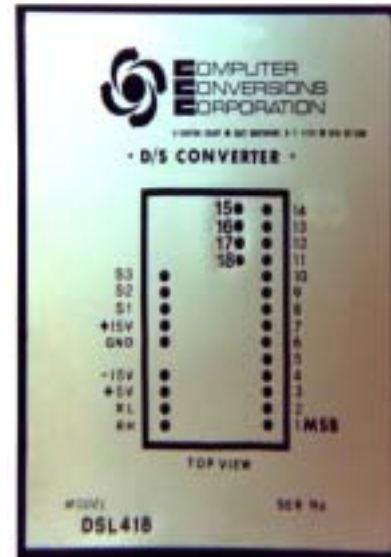
### Description:

The DSL - DRL Series are highly reliable, miniature, low profile and low cost, continuously updating Digital Synchro and Digital to Resolver (AC Sine / Cosine) Converters designed for military and industrial control applications.

They will accept 16, 14, 12 or 10 Bits natural binary angle data (unsigned integer), and convert it into a 3 wire synchro or 4 wire resolver data format with up to 2 arc minutes accuracy.

All of these synchro and resolver converters feature virtually indestructible short-circuit proof outputs, over-voltage and transient protection, internal heat sinks, current limiting, and automatic thermal cutoff.

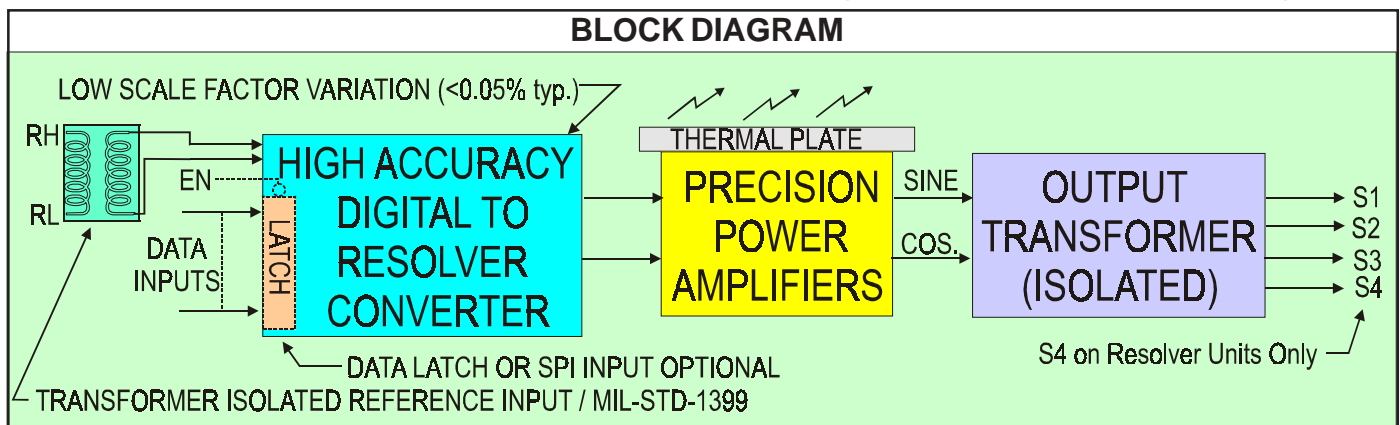
Complete transformer isolation is offered for all reference inputs and signal outputs to eliminate ground loops, differing potentials, and to keep any high voltage transients from affecting the host system they are employed in.



### Applications

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

The internal; reference and signal transformers, rugged power amplifiers, and large internal heat sinks, provide complete output drive with the best density verses heat dissipation per square inch, available for DC powered converters in the marketplace.





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SALIENT SPECIFICATIONS				
Model:	DSL or DRL 416 or 616	DSL or DRL 40 or 60	DSL or DRL 412 or 612	DSL or DRL 410 or 610
Resolution:	16 BITS	14 BITS	12 BITS	10 BITS
Accuracy <sup>(1)</sup> : Standard Models:	±2.3 min. +1LSB	±4 arc minutes	±8 arc min.	±30 arc min.
-HA Models:	±2.3 min.	±2.5 min.		
Scale Factor:	Variation low <0.05% nominal, Magnitude +/-2% max. all output lines Magnitude Tracks Reference Input Variation with angle input +/-0.1%			
Quadrature:	+/-0.3%			
Phase Shift:	Drives any phase angle from -90 ° to +90 °			
Digital Inputs:	Natural Binary Angle, Transient Protected CMOS, /TTL compatible, 33K OHM Pull-Up to +5V 0.13 Std. TTL Load("E" option units have input latches)			
Fan in:	1 LS TTL Loads			
Output <sup>(2)</sup> Voltages: (Transformer Isolated)	A. Synchro 11.8V RMS L-L 400 Hz (DSL40-L) B. Synchro 90V RMS L-L 400 Hz (DSL40-H) C. Synchro 90V RMS L-L 60 Hz (DSL60-) w/ext'l xfmr. D. Resolver 11.8V RMS 400 Hz (DRL40-L) E. Resolver 26V RMS 400 Hz (DRL40-26)			
Response Time:	100 Usec			
Reference Input: (Transformer Isolated as mandated / MIL-STD-1399) to rated +20% no damage	26V @ 5 ma. RMS 400 Hz (DSL40-DRL40-L) 115V @ 0.6 ma. RMS 400 Hz. (360 - 440 Hz.) (DSL40-H) 115V @ 0.6 ma. RMS 60 Hz. (47/57 - 440 Hz.) (DSL60)			
Temperature Range Operating <sup>(3)</sup> :	Commercial: 0°C to +70°C (DSL40-L OR H-1) Military: -55°C to +85°C (DSL40-L OR H-2) Industrial (COTS Mil): -40°C to +85°C (DSL40-L OR H-3)			
Storage:	-55°C to +125°C			
Size:	A. Standard Units: 2.625 x 3.125 x 0.60"H. B. -D and -S Suffix Units: 2.625 x 3.125 x 0.52"H. C. 60 Hz units have additional external transformer module(DSC60-N, DSC60-T, or DSC60-TD) D. 5VA units are 0.82"H,			

**NOTES:**

- 1) Accuracy applies over operating temperature range, ± 10% amplitude and frequency variations, ±5% variation of power supplies, ±10% harmonic distortion.
- 2) Different voltages and frequencies are available.
- 3) Units with 883 level B components available (-83).



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**DSL - DRL SERIES**  
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**DSL/DRL Units; Model Type, Drive/Load Verses Power Supply Load**

DC Power Supplies	+/-15VDC SUPPLIES (18V. Max.)						+/-12VDC SUPPLIES					
	60 Hz. Units			400 Hz. Units			60 Hz. Units			400 Hz. Units		
Model Type	**NL	Std.	-3L	Std.	-3L	*-5L	**NL	Std.	-3L	Std.	-3L	*-5L
Drive (VA)	0.025	1.5	2.2	1.5	2.9	5	0.025	1.2	1.7	1.2	2	3.4
90V. Synchro in Kohms		4	2.7	4	2	1.2		5	3.5	5	3	1.78
11.8V. Syn in ohms				70	36					87	52	
11.8V. Res in ohms				93	48					116	70	
Avg. DC Current (ma.)	120	150		150			150	220		200		
Avg. Peak Current(ma.)	120	330		330			150	485		440		

**Notes**

- \*\* These units used to power external power amplifiers to up to 300VA., +/-15V units are 7V, +/-12V. units are 6 V.L-L.
- All units should have sufficient forced air cooling. Internal Thermal cut-off is at 125°C. , auto-restored.
- 60 Hz, units require an external transformer see selections herein, DSC60-N for +/- 12V. or +/-15V. powered units.
- The +/-12 or +/-15VDC supplies should feature foldback current limiting to enable the supplies to gradually increase the voltage with the load surge caused durin g power-on (turn-on short circuit current). Most reasonable supplies (including switchers) feature this.
- Both the + and - supplies should power-up simultaneously to minimize turn-on surges (typical of all Class B type amplifiers). Tracking supplies should be considered where practical.

Description continued:

Models with a -D suffix: 0.52"H, include an electrically isolated aluminum top plate for improved thermal dissipation, internal transformer isolated reference input, and are phased for direct compatibility with competitive models.

For models that drive loads of 1.2VA or higher, internal output transformers are provided on all models with a rated frequency of 400Hz. or higher.

50-60 Hz. models use an external output transformer (for 60 Hz. converters that do not require output transformers Computer Conversions Reference Powered DSP Series converters can be considered).

These converters are suitable for driving most synchro control transformers and control differential transmitter type loads, synchro data transmission, and input to other synchro converters and solid state angle indicators. They have been proven to meet the requirements of MIL-STD-202E, including salt spray when mounted to a printed circuit card that is conformal coated.

The digital input is up to 16 Bits wide, both CMOS and TTL compatible 5 volt logic, representing binary weighted angle. The converters are continuously updating, input data is immediately transferred to the outputs, input to AC signal output through-put is less than 100µsec..

To allow for a synchronous latched interface or for multiplexing multiple converters from a common data bus; two different internal latching mechanisms are offered as options: suffix ED models latch data on the negative edge of it's enable input, and on the -E suffix models the input data is transparent (continuously updating) when the enable input is high and is latched when the enable input is at a logic level zero.

The transformer isolated outputs and hybrid power amplifiers will drive loads of up to 1.5VA with +/-15VDC supply models, 1.2VA with +/-12VDC supply models and higher power options are made available for driving loads of up to 5VA. The +/-12VDC power models provide an excellent option for Bus card backplane applications operating with these voltages, eliminating the need for external DC to DC converters.

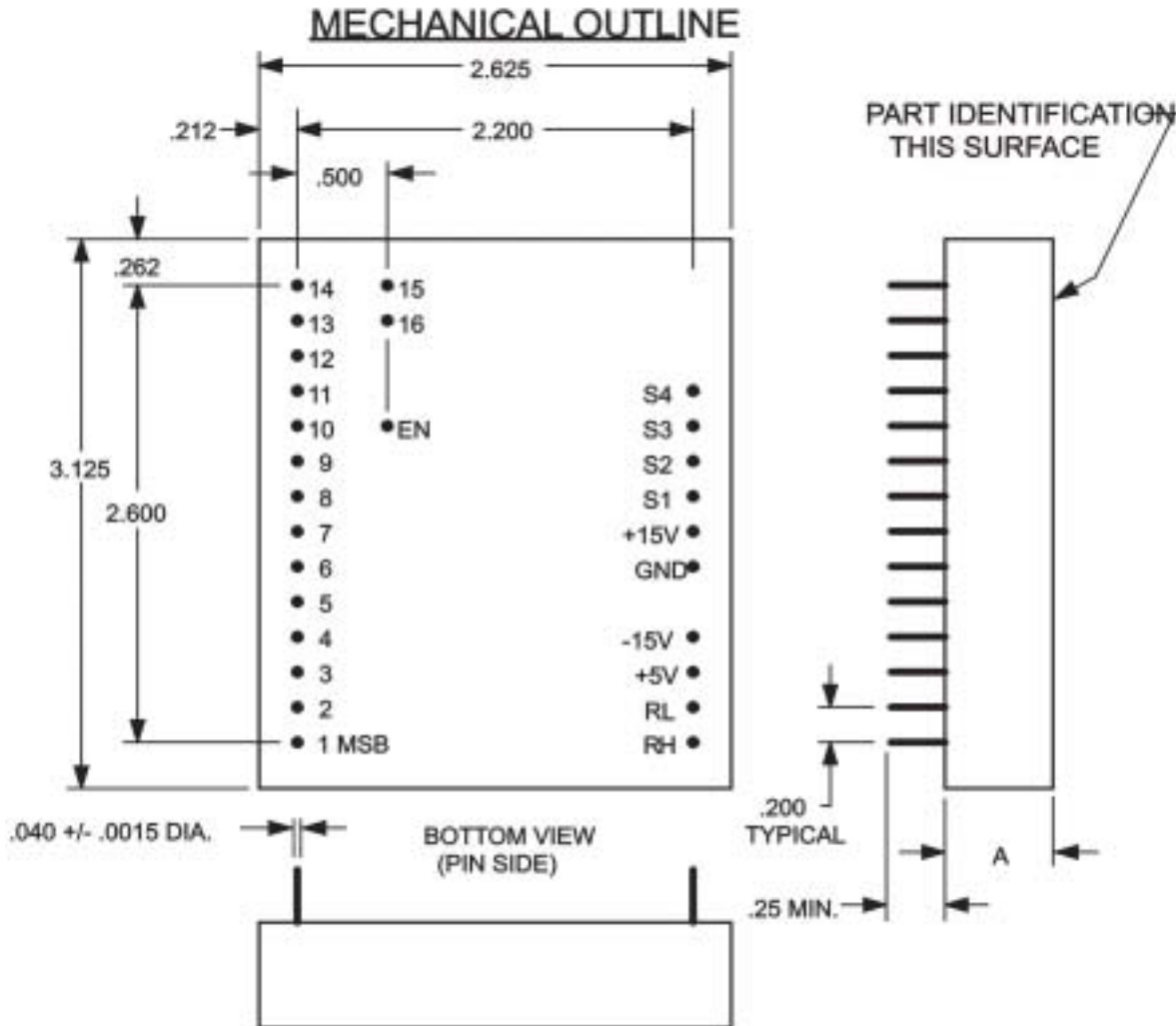
## Description Continued:

The DSL- DRL Series are available in three differing grades of operating temperature range to assure optimum price - performance ratio as needed:

- 1 suffix models: 0 C to +70 C Commercial
- 2 suffix models: -55 C to + 105 C Military
- 3 suffix: -40 C to +85 C Industrial and COTS-MIL

Frequencies of 400Hz and higher require no external components, and 2 different types of output transformers are offered for 50/60Hz., and 1 60Hz. only.

These converters have a proven track record for providing ultra-reliability in the most demanding military and industrial applications.



### APPLICATION INFORMATION:

- 1. POWER SUPPLIES**-The converter requires three (+15V, -15V or +12V, -12V. & +5V) current limited, regulated DC supplies. The +/-15V or +/-12V. supplies must be capable of supplying fold-back current limiting to accommodate turn-on surge currents. **CONNECT CAREFULLY BECAUSE REVERSAL OR IMPROPER CONNECTIONS CAN DAMAGE CONVERTER.**
- 2. PRINTED CIRCUIT CARD MOUNTING**-Logic level signals should be kept far away from AC and power signals. Do not put AC or power pins next to data pins at the connector. In addition, try to keep the AC and power pins separated as well.
- 3. DIGITAL INPUTS**-The DSC series will accept 16, 14 or 12 Bits of digital angle data. Data must be TTL/DTL compatible. Fan in is 2 standard TTL loads. If less than the full data input capability of the converter is used, ground the unused input pins. This will prevent a fixed rotation of the synchro output data and a resulting error.
- 4. REFERENCE INPUT**-Correctly connecting this input to the converter is essential for proper operation. Applying the reference to the digital or power inputs could result in injury or damage.



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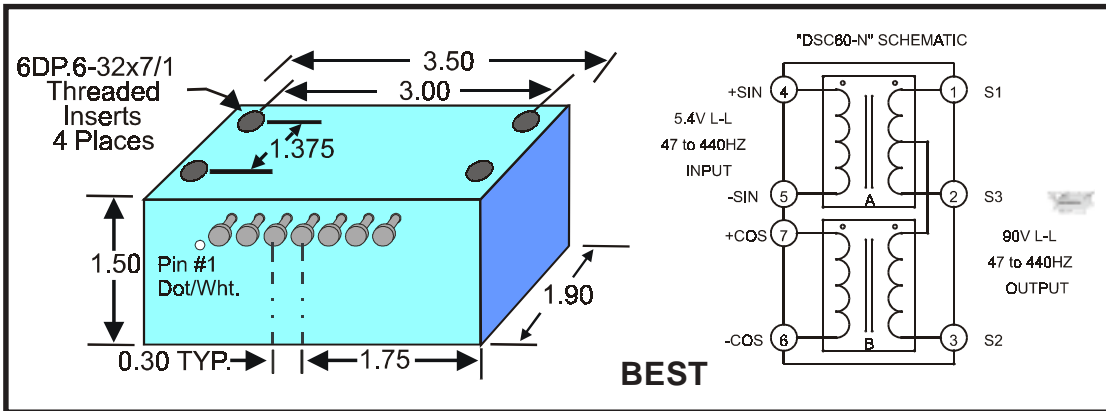
## DSL - DRL SERIES

50/60 and 60Hz.

Output Transformers

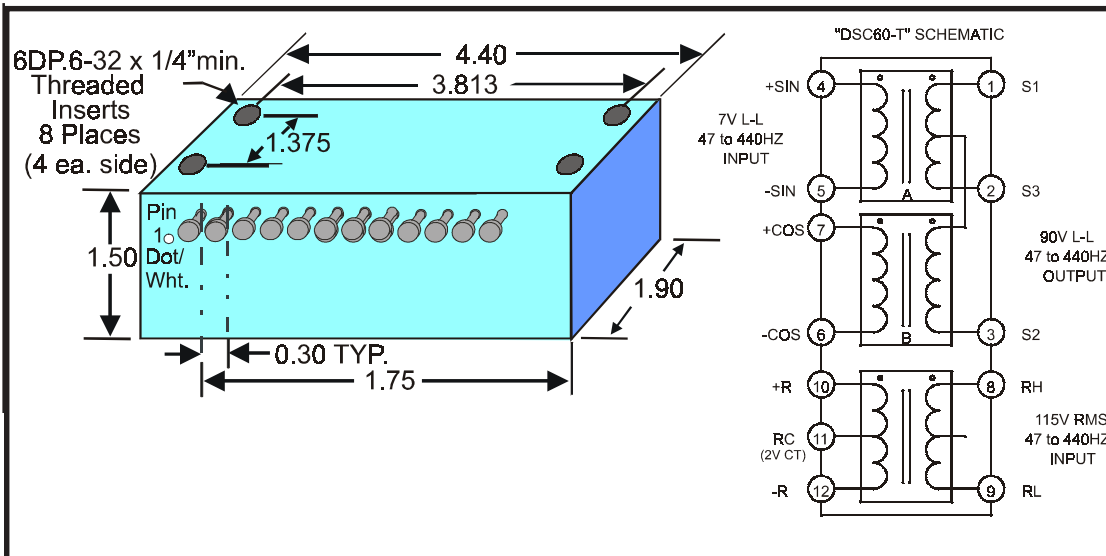
**50/60 and 60Hz. Output Transformer Selections: (Ordered Separately)**

**All 60 Hz. Models can drive 60 and 400Hz. loads.**



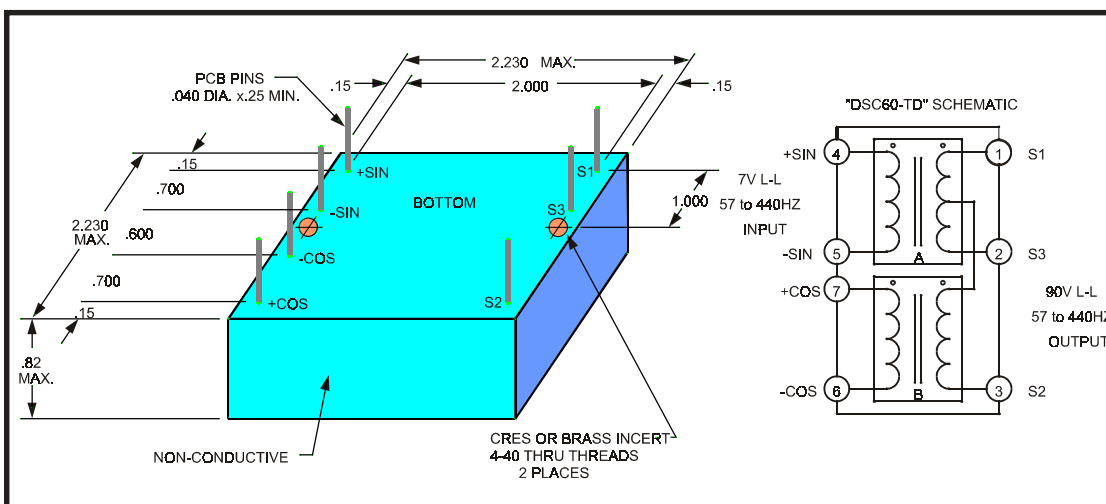
**Model: DSL60-N**  
Output Transformer  
For 50/60 Hz. units.

Converter: can be either +/-12VDC or +/-15VDC powered, Use converter model DSL...-5.4/H-... 115 V. Ref. to Conv.



**Model: DSL60-T**  
Output Transformer  
For 50/60 Hz. units.

Converter: must be +/-15VDC powered, Use converter model DSL...-7... 115 V. Reference is wired to Transformer and Transformer Reference Output is wired to converter.



**Model: DSL60-TD**  
PCB Mount Type  
Output Transformer  
For 60 Hz. units.

Converter: must be +/-15VDC powered, Use converter model DSL...-7/H... 115 V. Ref. to Conv.

**CAUTION: HIGH VOLTAGES, IMPROPER HANDLING CAN RESULT IN INJURY.**



MIL-STD-202 ENVIRONMENTALS		
ENVIRONMENT	METHOD	CONDITION
Shock: 50G, 11 msec	213	A
Vibration: 10G, 2k Hz	204	C
Thermal Shock	107	A
Moisture	106*	-
Salt Spray	101	B
Altitude	105	B

## MIL-STD-202 ENVIRONMENTALS & OUTPUT PHASING DETAILS

### Notes:

- 1) Environmentals applies to -2 and -3 suffix temp. variants.
- 2) \*When conformally coated on PCB.
- 3) Guaranteed to meet these environmental test criteria.

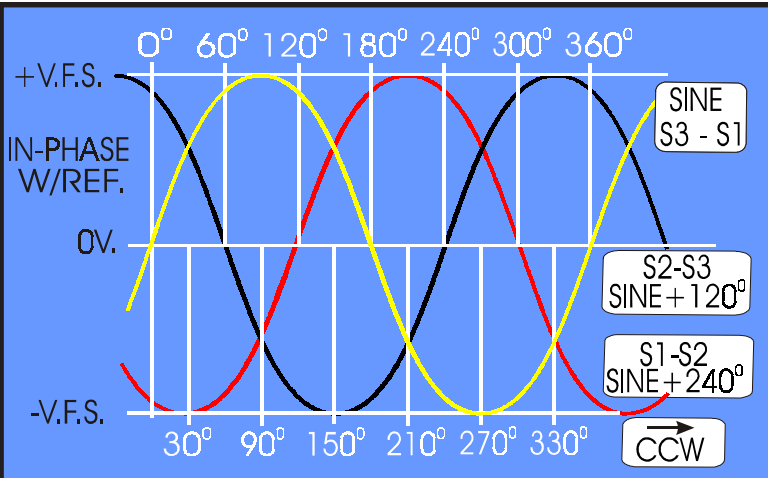


Fig 1.0

Standard Synchro Outputs per MIL-S-20708  
(Standard Models)

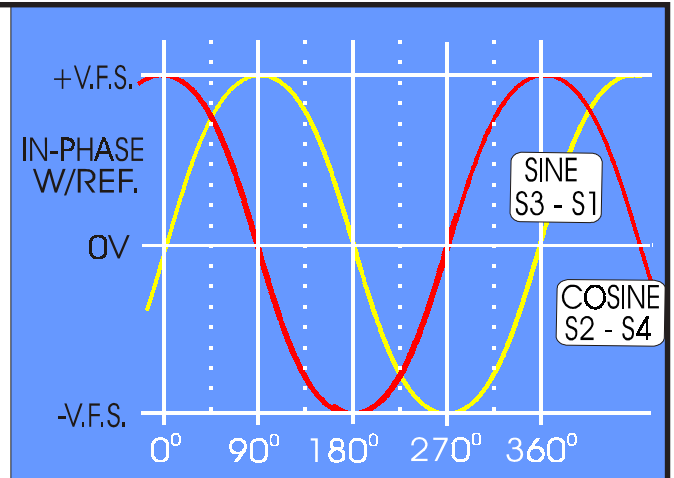


Fig 1.1

Standard Resolver Outputs  
(All Models, = same as Fig. 2.1)

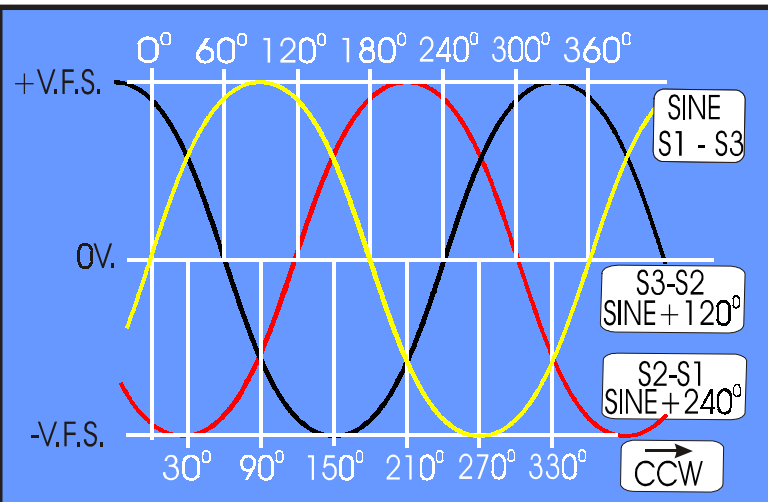


Fig 2.0

Synchro Outputs -D Models Only  
(Same as Fig. 1.0 if RH and RL were swapped)

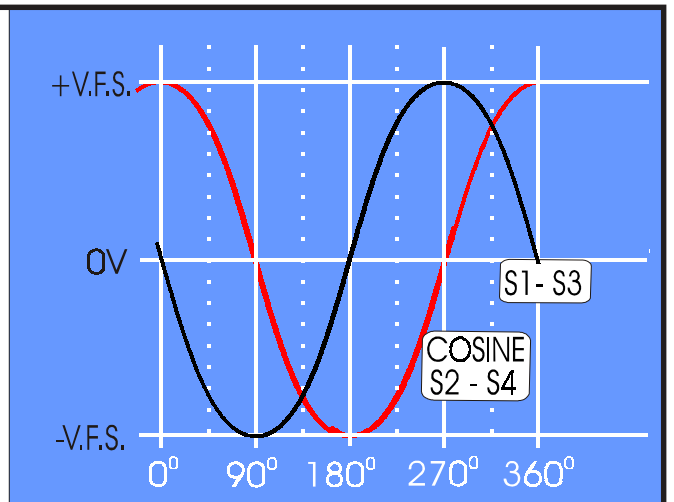


Fig 2.1

Standard Resolver Outputs  
(All Models, = same as Fig. 1.1)

### Application Notes:

- CAUTION HIGH VOLTAGES MAY BE PRESENT !**
- ARINC 407 : S1 =X, S3 = Y, S2 =Z (Z sometimes connected to ground)
- To Reverse Direction of Rotation: swap S1 with S3, else invert data.
- Reversing RH with RL will cause output to be 180 degrees out.
- RH = R1 = Normally Hot
- RH and RL inputs are (Internally) Transformer Isolated as required per MIL-STD-1399.





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## MODEL SELECTION GUIDE:

DSL 4 0 [ ] - H - 1 [ ]

**SERIES:**

DSL = DIGITAL to SYNCHRO CONVERTER  
DRL = DIGITAL to RESOLVER CONVERTER  
DSP = DIGITAL to SYNCHRO CONVERTER  
(REFERENCE POWERED)  
SEE NOTES

**FREQUENCY:**

4 = 400Hz.  
6 = 60Hz.  
5 = 50Hz.  
2 = 2KHz.  
3 = 3KHz.  
(UP TO 20KHz. AVAILABLE)

**RESOLUTION:**

10 = 10 Bit  
12 = 12 Bit  
0 = 14 Bit  
16 = 16 Bit

**REFERENCE INPUT: (NOTE 1)**

ST = Solid State Non - Isolated  
Blank = Internally Transformer Isolated

**OUTPUT/INPUT VOLTAGES:**

H = 90V L-L SIGNAL / 115V RMS REFERENCE  
L = 11.8V L-L SIGNAL / 26V RMS REFERENCE  
26 = 26V L-L SIGNAL / 26V RMS REFERENCE  
11.8 = 11.8V L-L SIGNAL / 11.8V RMS REFERENCE  
57 = 57V L-L SIGNAL / 57V RMS REFERENCE  
7/H = 7V L-L SIGNAL / 115V RMS REFERENCE  
L/H = 11.8V L-L SIGNAL / 115V RMS REFERENCE  
5.4/H = 5.4V L-L Signal / 115V RMS REFERENCE

OTHER VOLTAGES AVAILABLE

**SPECIAL FEATURES & OPTIONS:**

SPI = SERIAL SPI 3V/5V COMPLIANT  
SERIAL PERIPHERAL INTERFACE  
E = DATA LATCH: LOW = LATCH  
HI = TRANSPARENT  
EL = DATA LATCH ON NEGATIVE EDGE  
HA = HIGH ACCURACY  
3VA = 3VA OUTPUT DRIVE  
5VA = 5VA OUTPUT DRIVE  
P = INTERNAL +5V POWER SUPPLY  
12 = +/-12VDC POWER INPUT  
(INSTEAD OF THE STD. +/-15VDC)  
S = .52 "SHORT" PROFILE HEIGHT  
D = 0.52"H, INCLUDE ALUMINUM TOP  
PLATE AND ISOLATED REFERENCE  
INPUT PHASED  
N = LO-PWR OUTPUT FOR USE WITH  
EXTERNAL SYNCHRO BOOSTER  
AMPLIFIER

**TEMPERATURE RANGE & RELIABILITY LEVEL:**

1 = 0 C to +70 C (COMMERCIAL)  
2 = -55 C to +125 C (MILITARY)  
3 = -40 C to +85 C (INDUSTRIAL)  
283 = -55 C to +125 C  
(MILITARY 883 INTEGRATED CIRCUITS)  
283ER = -55 C to +125 C  
(MILITARY 883 INTEGRATED CIRCUITS  
AND ESTABLISHED RELIABILITY  
PARTS WHERE AVAILABLE)

**NOTES:**

1. REFERENCE INPUT MUST HAVE TRANSFORMER ISOLATION PER MIL-STD-1399, AVAILABLE AS STANDARD ON ALL MODELS. SOLID STATE NON-ISOLATED NOT AVAILABLE ON ALL MODELS.



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