



## FEATURES

- Reference powered
- Convenient push-wheel switches
- 0.1° resolution
- ±4 minute accuracy
- 4.5VA output at 400Hz
- 1.5VA output at 60Hz
- Short and overload protected
- Small and lightweight

## APPLICATIONS

- Synchro Fault Isolation
- Field Testing
- System Testing
- Production Testing

## GENERAL DATA

The DST-400 is a series of hand-held decade synchro transmitters powered from the reference excitation. The transmitter is small and lightweight, measuring 8.5" x 5.5" x 2.0" and weighing only 30 ounces. The transmitter comes complete with cable assembly and padded carrying case.

The DST-400 is designed to simulate synchro control transmitters for the use in the test of synchro conversion equipment. It can even be used for fault isolation by connecting in place of a suspect synchro.

## THEORY OF OPERATION

The DST-400 is a precision instrument designed to simulate synchro control transmitter signals and consists of the following four basic functions:

1. 4 decade push-wheel switch
2. +5V power supply
3. BCD to binary logic
4. Digital to synchro converter

The push-wheel switch is used to encode the synchro output angle over a range of 0° to 359.9°. The +5V power supply provides the necessary voltage required by the internal logic. The BCD to binary logic converts the encoded push-wheel BCD angle to a parallel binary angle required by the digital to synchro converter that in turn generates the 3-wire synchro output signal.

## OPERATING THE DST-400

Using the DST-400 is simple and straightforward. Connect the cable assembly to the front panel connector of the DST-400 and then connect the two alligator clips labeled R1 and R2 to the excitation source. The front panel LED indicator lamp will indicate the presence of excitation voltage. The synchro output angle (S1-S2-S3) is set via the front panel decade push-wheel switches that read in degrees.

## DRIVE CAPABILITY

The DST-400 is available in three basic models:

1. 26V/11.8V 400Hz
2. 115V/90V 400Hz
3. 115V/90V 60Hz

Models operating at 400Hz have 4.5VA drive capability and 60Hz models have 1.5VA drive capability. The DST-400 is intended for driving passive synchro loads such as control transformers (CT) and control differential transmitters (CDX). Do not attempt to drive torque receiver loads (TR).

Most synchro manufacturers do not specify the load their synchro presents in VA. The loading is either specified as an impedance (Zso) or current.

## SPECIFICATIONS

Parameter	Value
<b>Reference Input (R1-R2)<sup>(1)</sup></b>	
Type	Transformer isolated
Voltage	
Operating	26V or 115V ±10%
Maximum	30V or 138V
Frequency	60Hz or 400Hz ±10%
Input Power	3.5VA + 1.5 (load power)
Protection	Internally fused
26V 400Hz	1A
115V 400Hz	2/10A
115V 60Hz	1/10A
<b>Synchro Output (S1-S2-S3)<sup>(1)</sup></b>	
Type	Transformer isolated
Voltage	11.8V L-L or 90V L-L
Load	
60Hz	1.5VA max.
400Hz	4.5VA max.
Output impedance	Virtually zero
Scale Factor Variation with Input Angle	±0.1%
Output Quadrature	±0.2%
<b>Accuracy<sup>(2)</sup></b>	±4 arc minutes
<b>Angular Input</b>	
Type	4 decade push-wheel switch
Range	0° to 359.9°
Resolution	0.1°
<b>Temperature Ranges</b>	
Operating	
Standard	0° to +70°C
IT Option	-25° to +85°C
Storage	-25° to +85°C
<b>Dimensions</b>	8.5" × 5.5" × 2.0"
<b>Weight</b>	30 oz.

### NOTES:

- See ordering information
- Accuracy applies for:
  - ±10% reference amplitude and frequency variations
  - 10% reference harmonic distortion
  - any balanced load from no load to full load
  - over operating temperature range

To compute the VA requirement of a control transformer (CT), use one of the following equations:

$$VA = .866IE$$

$$VA = \frac{.866E^2}{Z_{so}}$$

Where: I = primary input current  
E = primary input voltage  
Z<sub>so</sub> = primary input impedance

The output of a control differential transformer (CDX) is usually loaded with a CT. When computing the VA requirement of a CDX load, its load must be taken into account. To compute the VA requirement of an unloaded CDX, use the above equations. To compute the VA requirement of a loaded CDX, use one of the following equations:

$$VA = .866E(I + I')$$

$$VA = \frac{.866E^2(Z_{so} + Z_{so}')}{Z_{so} \times Z_{so}'}$$

Where: I = CDX primary input current  
I' = primary input current of CDX load  
Z<sub>so</sub> = CDX input impedance  
Z<sub>so'</sub> = primary input impedance of CDX load  
E = primary CDX voltage

### SYNCHRO TRANSMITTER CONVENTIONS

The analog synchro output signals S1-S2-S3 are described by the following equations:

$$E_{S1-S3} = KE_{R2-R1} \sin \Theta$$

$$E_{S3-S2} = KE_{R2-R1} \sin(\Theta + 120^\circ)$$

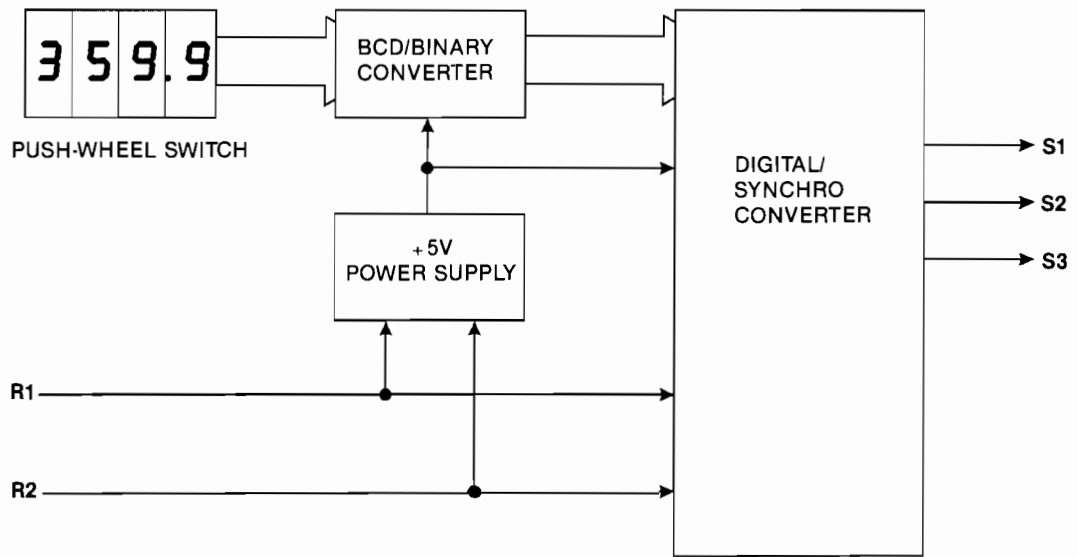
$$E_{S2-S1} = KE_{R2-R1} \sin(\Theta + 240^\circ)$$

Θ in the above equations is the decade front panel encoded angle. It is important to note that K in the above equation has the form NR. N is the transformation ratio of the transmitter, i.e., 26/11.8 or 115/90. R is the scale factor variation and varies between 0.999 and 1.001 every 11.25° without any discontinuities.

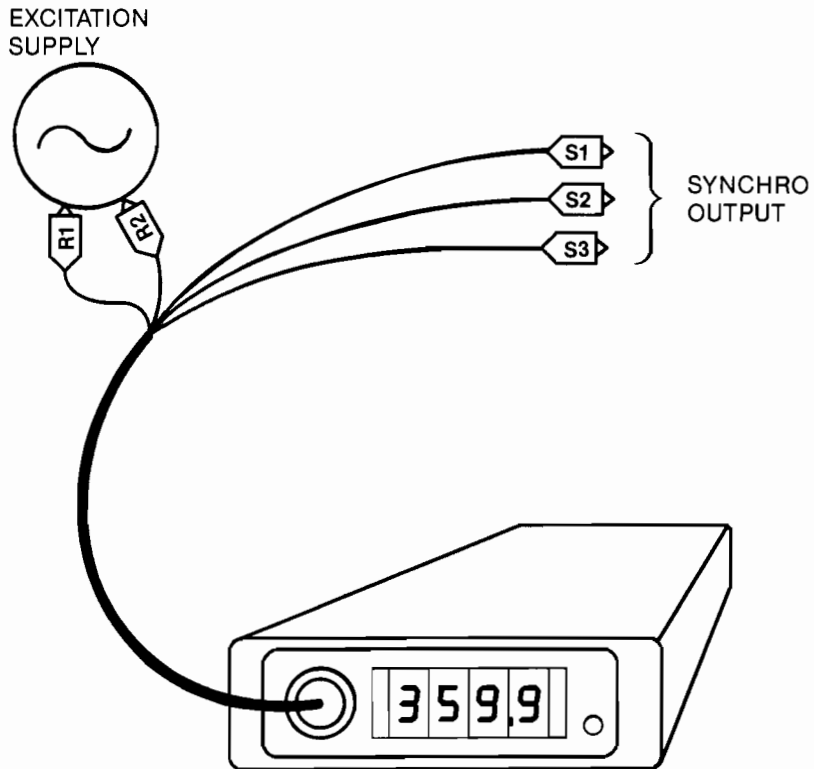
Conventions for polarities, terminal designation and direction of shaft rotation for synchros are most often defined in accordance with military specification MIL-S-20708. This unit is provided with terminal designations and electrical characteristics to this specification. To convert the terminal identifications to ARINC system nomenclature, the following relationships apply:

$$R1 = H, R2 = C, S1 = X, S2 = Z, S3 = Y$$

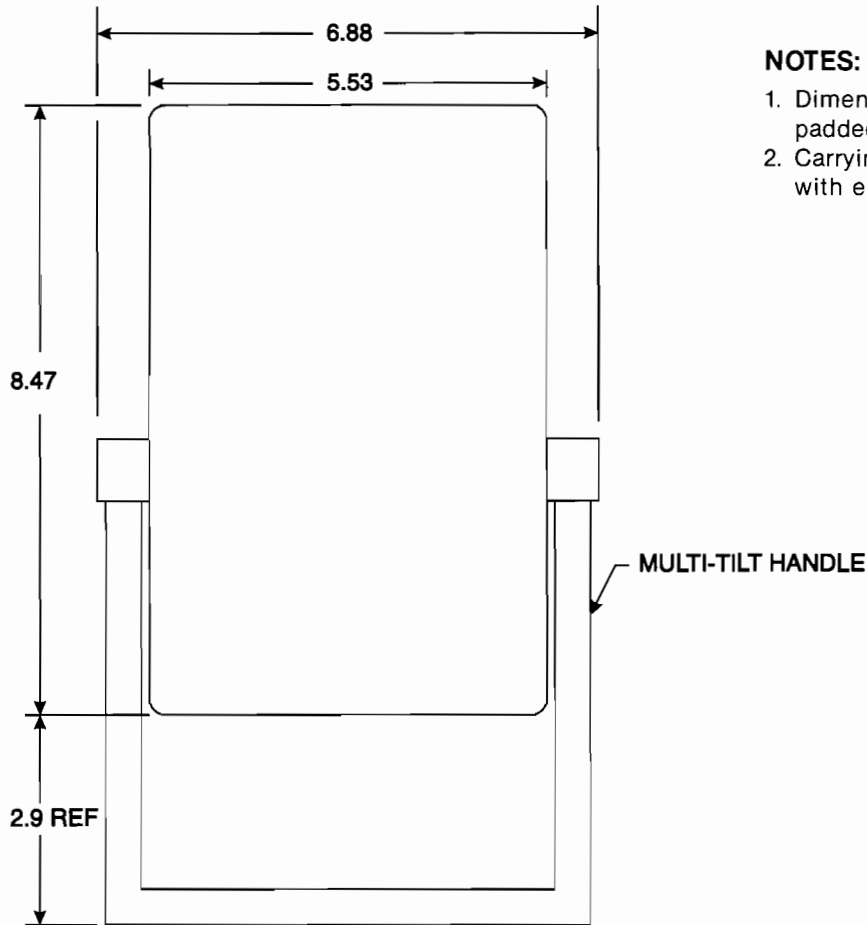
# BLOCK DIAGRAM



# CONNECTING THE DST-400

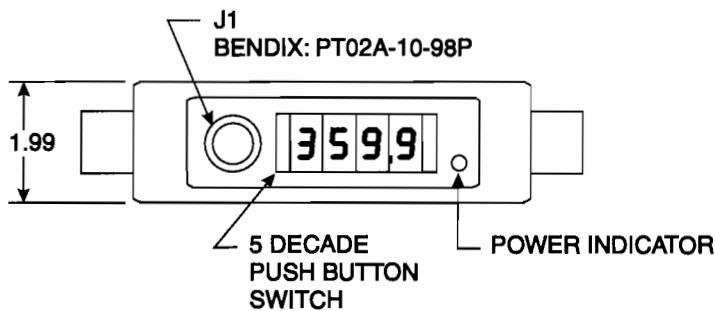


**MECHANICAL OUTLINE**



**NOTES:**

1. Dimensions shown do not include padded carrying case.
2. Carrying case and test cable included with each unit.



**ORDERING INFORMATION**

DST SUFFIX	REFERENCE VOLT/FREQ	SYNGHRO OUTPUT
401	26V/400Hz	11.8V L-L
402	115V/400Hz	90.0V L-L
403	115V/60Hz	90.0V L-L

**WARRANTY**

All units warranted against defects in materials and workmanship for 1 year from date of shipment. Liability is expressly limited to servicing, adjusting, or replacing any CSI product returned to our factory with delivery charges prepaid. In no case shall our liability exceed the original purchase price.



DST-400 Series  
Decade Synchro Transmitter

J1 Pin Assignment

PIN	FUNCTION		DST-401	DST-402	DST-403
A	S1	Synchro Output	11.8V L-L	90V L-L	90V L-L
B	S2				
C	S3				
D	NC	No Connection			
E	R1 (RH)	Reference Input	26V / 400Hz	115V / 400Hz	115V / 60Hz
F	R2 (RL)				

J1 Connector P/N: PT02A-10-98P (Bendix or Amphenol)

J1 Mating Connector P/N: PT06A-10-98S (SR) (Bendix or Amphenol)