

TECHNICAL MANUAL  
CALIBRATION PROCEDURE  
FOR  
SYNCHRO STANDARD  
SS-1, SS-1760, SS-2AR, SS-4, SS-5AR  
(GERTSCH)  
SS-1333, SS-1678R, SS-2409R  
(SINGER)

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## SYNCHRO STANDARD

SS-1, SS-1760, SS-2AR, SS-4, SS-5AR

(GERTSCH)

SS-1333, SS-1678R, SS-2409R

(SINGER)

**1 CALIBRATION DESCRIPTION:**

Table 1.

Test Instrument (TI) Characteristics	Performance Specifications	Test Method
Synchro	Range: 0 to 360°  Accuracy: $\pm 2$ sec	Compare against AC Voltage Divider

**2 EQUIPMENT REQUIREMENTS:**

Noun	Minimum Use Specifications	Calibration Equipment	Sub- Item
2.1 AC GENERATOR DETECTOR	Range: 0 to 115 VAC  Accuracy: N/A Sensitivity: 1 $\mu$ V FS	ESI 861A	
2.2 AC RATIO ACCESSORY	Range: 0 to 90° quadrature  Accuracy: N/A	ESI RA79	
2.3 AC VOLTAGE DIVIDER	Range: .0000000 to .9038445, of setting  Ratio Accuracy: $\pm 2.8$ ppm	ESI DT72A	
2.4 AC VOLTMETER	Range: 0 to 115 VAC  Accuracy: $\pm 2\%$ of FS	Fluke 87	
2.5 VARIAC	Range: 0 to 115 VAC at 60 Hz  Accuracy: N/A	As Available	
2.6 VARIAC	Range: 0 to 115 VAC at 400 Hz  Accuracy: N/A	As Available	

**3 PRELIMINARY OPERATIONS:**

3.1 Review and become familiar with the entire procedure before beginning the Calibration Process.



Unless otherwise designated, and prior to beginning the Calibration Process, ensure that all test equipment voltage and/or current outputs are set to zero (0) or turned off, where applicable. Ensure that all equipment switches are set to the proper position before making connections or applying power.

3.2 Use only that portion of the Calibration Process that pertains to TI being calibrated.

3.3 Connect test equipment to an appropriate power source. Set POWER switches to ON and allow warm-up as required by the manufacturer.

3.4 Determine the voltage and frequency requirements of TI and connect equipment as shown in Figure 1 using the applicable Variac.

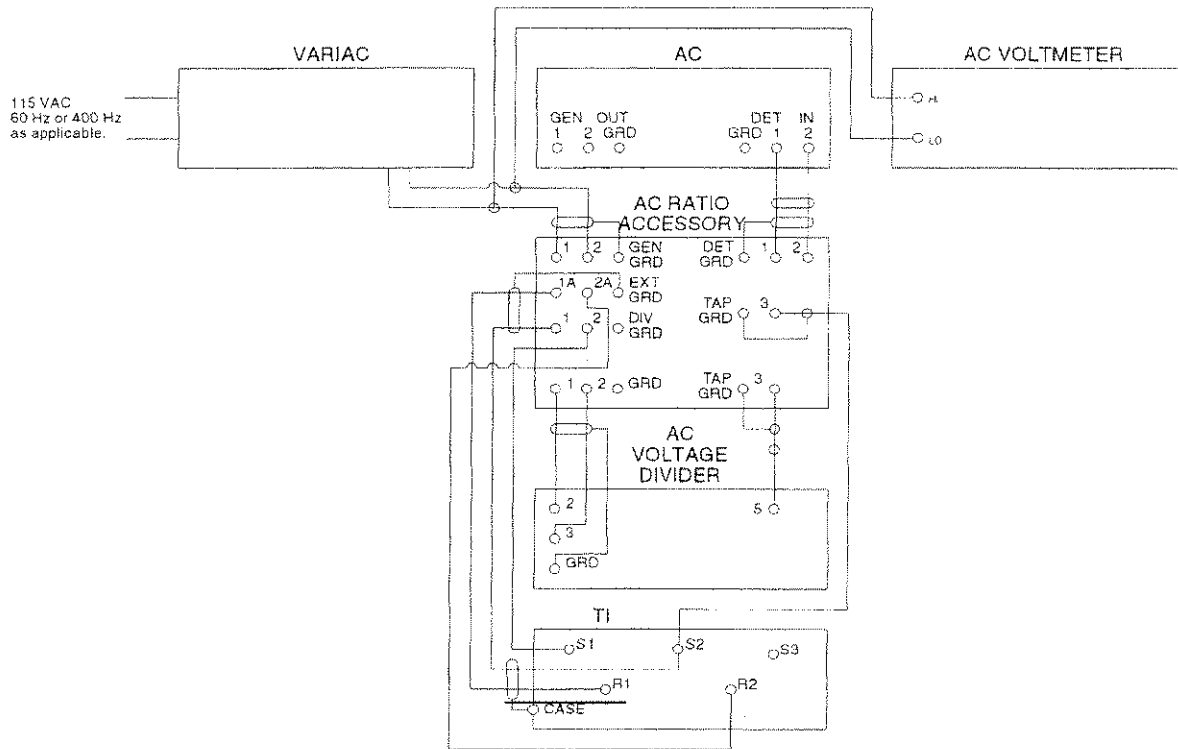


Figure 1.

3.5 Adjust the Variac for TI required voltage as monitored on the AC Voltmeter.

3.6 Set the AC Generator/Detector controls as follows:

FREQUENCY	Frequency requirements of TI
LOG-LINEAR	Optional
SELECTIVITY	SHARP
FINE TUNING	Maximum meter indication

#### **4 CALIBRATION PROCESS:**

##### **NOTE**

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met, before proceeding.

#### **4.1 SYNCHRO CALIBRATION:**

4.1.1 Set the AC Ratio Accessory INPUT SELECTOR switch to V21 and VOLTMETER switch to 300.

4.1.2 Set TI DEGREES dial to 0° and rotate OUTPUT VOLTAGE switch if applicable to 90 V, then set OPERATE switch to ON.

4.1.3 While adjusting the AC Generator/Detector SENSITIVITY for maximum gain with less than full scale meter deflection, adjust AC Voltage Divider dials and AC Ratio Accessory QUADRATURE control for minimum meter indication.

4.1.4 Decrease AC Generator/Detector SENSITIVITY to 1.

4.1.5 Record the AC Voltage Divider indication as S1.0.

4.1.6 Move the AC Ratio Accessory EXT DIV TAP leads to TI S-3 terminal.

4.1.7 Repeat step 4.1.3.

4.1.8 Record the AC Voltage Divider indication as S0.

4.1.9 Set TI DEGREES dial to the first value listed in the Applied column of Table 2.

4.1.10 Repeat step 4.1.3.

4.1.11 Record the AC Voltage Divider indication as SA.

4.1.12 Calculate true TI ratio with the following formula:

$$\text{True TI ratio} = \frac{SA - S0}{S1.0 - S0}$$

4.1.13 The TI true ratio calculated in step 4.1.12 must be within the corresponding values listed in the Limits column of Table 2.

4.1.14 Set TI DEGREES dial to each value listed in Table 2 and repeat steps 4.1.3 and 4.1.11 through 4.1.13.

Table 2.

TI (°)	TI Ratio Limits
5	.0961555 to .0961759
10	.1847830 to .1848020
15	.2679402 to .2679582
20	.3472877 to .3473050
25	.4242241 to .4242411
30	.4999916 to .5000084
35	.5757589 to .5757759
40	.6526950 to .6527123
45	.7320418 to .7320598
50	.8151980 to .8152170
55	.9038241 to .9038445

4.1.15 Set all Power switches to STANDBY/OFF. Disconnect and secure all equipment.

CALIBRATION PERFORMANCE TABLE

4.1 SYNCHRO CALIBRATION:

Range	Applied (°)	Limits (°, min, sec)
0-360	5	4, 59, 58 to 5, 0, 2
	10	9, 59, 58 to 10, 0, 2
	15	14, 59, 58 to 15, 0, 2
	20	19, 59, 58 to 20, 0, 2
	25	24, 59, 58 to 25, 0, 2
	30	29, 59, 58 to 30, 0, 2
	35	34, 59, 58 to 35, 0, 2
	40	39, 59, 58 to 40, 0, 2
	45	44, 59, 58 to 45, 0, 2
	50	49, 59, 58 to 50, 0, 2
	55	54, 59, 58 to 55, 0, 2