

DESCRIPTION

The **SYC6714** is an accessory module that adjusts an electronic governor to obtain an equal AC phase relationship between the oncoming generator and the main bus. A SYNC CHECK function is provided to activate an internal relay whose contacts can be used to connect the generator to the main bus. The typical time for synchronization is usually less than 3 seconds when the generator set is at rated speed with optimum governor's performance settings.

INSTALLATION

The **SYC6714** was designed with the same rugged construction as a GAC electronic speed control unit and can be mounted in the cabinet with other equipment. Limit exposure of the unit to extreme temperatures. Mount the **SYC6714** vertically if exposed to moisture or wetness to prevent accumulation inside the unit.

Caution – High Voltage may be present at Terminals 1-4. Deenergize and check voltage before servicing.

Typical electrical connections are illustrated in **Wiring Diagram 1**. Connecting cables carry low currents so therefore special size wire is not required. The connection between the speed control unit and **Terminal 6** on the **SYC6714** is sensitive and must be shielded over its entire length. The shield must be connected at only one end, and must be terminated to the case as indicated in **Wiring Diagram 1**.

Note: The phasing of the mains and generator signals is such that when synchronized, Terminal 1 & 3 are in phase.

Since the **SYC6714** is a CE (Community Europe) approved unit, certain installation requirements must be met to maintain EMC capabilities. (see Declaration of Conformity to EC Directives, **Figure 1**.)

ADJUSTMENTS

The governor must be in good working order and adjusted correctly for the synchronizer to properly operate in the system. The **SYC6714** if factory set to near optimum setting, therefore, large increments of adjustments are not normally needed.

A. After connecting per **Wiring Diagram 1**, add a jumper between **Terminals 7 & 10** or disconnect the relay wires at **Terminals 13 & 14** or **Terminals 14 & 15**. This test mode allows for the generator set to synchronize to the mains without paralleling.

B. Trim the governor speed setting so that the generator frequency is within 0.1Hz of the mains (or other generator) frequency. Note the status of the LEDs. The **MAINS**, **GEN** (Generator), and **DC POWER** LEDs should illuminate RED. Close the switch connected from **Terminals 5 & 6** between the governing system and the **SYC6714**. Close auxiliary contacts [Parallel Cable +/-] as well. The RED **SYNC ENABLED** LED should illuminate and the **SYC6714** will attempt to synchronize.

C. **GAIN** Adjustment. Turn the **GAIN** adjustment as far CW as possible without causing instability in the system. Then, turn the **GAIN** adjustment one division CCW. When the system is unstable, the main breaker is inhibited from closing.

D. Optimization of the **GAIN** adjustment. Unsynchronize the system by opening the switch between **Terminals 5 & 6** or momentarily move the engine throttle. Reinstall the synchronizer and observe the speed and stability of the synchronization with a synchroscope or a phase meter. Readjust the **GAIN** adjustment if necessary.

E. **STABILITY** Adjustment - If necessary, adjust the **STABILITY** for fast, smooth synchronization without instability. A more CCW setting will result in a slower (more damped) but smoother response.

F. **PHASE ERROR** Adjustment - Set the **PHASE ERROR** Adjustment for exact zero phase error. Verify this on a synchroscope, as a measurement of near zero AC voltage or a null in AC voltage between **Terminals 1 & 3** when the mains and generator voltage are equal.

G. **BREAKER CLOSURE ANGLE** Adjustment - With the system operating and synchronized, set the breaker closure angle to zero (fully CW) degree phase angle. Adjust the **BREAKER CLOSURE** adjustment CCW until the **BREAKER CLOSURE RELAY** LED lights. The relay should open. Turn the adjustment CCW one additional division. Approximate phase angle window values may also be used for setting the breaker closure angle. (see **Table 1**.)

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Caution: None of GAC products are flight certified controls including this item.

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Table 1.

Adjustment Setting	Breaker Closure Angle
100	0°
70	6°
50	12°
20	18°
0	25°

H. Reenable Breaker Control Function – Remove the jumper wire between **Terminal 7 & 10** and /or reconnect the relay wire between **Terminal 13 & 14** or **Terminal 14 & 15**. Synchronization and paralleling may now be preformed.

I. For a final check, start the engine and synchronize the system to insure that all adjustments are optimized. If performance is unsatisfactory, consult the trouble shooting section.

TROUBLE SHOOTING

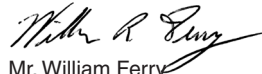
If the system fails to operate or synchronize properly, make the following measurements (+) or (-) refers to meter polarity.

MEASUREMENTS	
1	Measure the Battery Voltage between Terminals 8 (+) and 10 (-) . It should be 12 or 24 VDC nominal.
2	Note the RED DC POWER LED. Measure the internal 10 VDC supply between Terminals 12 (+) and 10 (-) . It should be 9.6 – 10.4 VDC.
3	Note the RED GEN LED. Measure the AC Voltage between Terminals 1 & 2 . It should be 50-500 VAC.
4	Note the RED MAINS LED. Measure the AC Voltage between Terminals 3 & 4 . It should be 50-500 VAC
5	Note the RED SYNC ENABLE LED. Check (ON/OFF) switch (at Terminals 5 & 6) and auxiliary contacts (Parallel Cable +/-). Measure the DC voltage between Terminals 5 (+) & 10 (-) . It must be greater than 8 VDC. (see Wiring Diagram 1.)
6	Check the DC voltage between Terminals 7 (+) & 10 (-) . This should be 10 VDC when in phase. Check the Test switch position. It must be opened to synchronized.
7	Also check the enable signal from the voltage matching unit if used.

8	Measure the internal Phase Error Voltage, between Terminals 11 (+) and 10 (-) . These reading should be as follows: If in phase, 5.1VDC If less than 5.1 VDC, the generator frequency is higher than the mains frequency. Decrease the governor speed until the system is synchronized. If greater than 5.1 VDC, the generator frequency is lower than the mains frequency. Increase the governor speed until the system is synchronized.
9	Measure the synchronizers output analog voltage between Terminals 6 (+) and 10 (-) . If the generator frequency is lower than mains, the voltage should be lower than 5.1 VDC and visa versa. Adjust the governor speed until 5.1 VDC is measured between Terminals 6 & 10 .
10	If the GREEN SYNCHRONIZED LED does not light, the breaker closure angle may be set too narrow. Adjust the BREAKER ANGLE control CCW until the GREEN LED lights.
11	If the GREEN SYNCHRONIZED LED lights continuously but the internal breaker closure relay fails to close, go to step 6 (relay inhibited).
12	If the unit synchronizes but does not close the breaker, check that the N.O. contacts at Terminal 13 & 14 have closed. If not the synchronizer is defective.

FAILURE TO SYNCHRONIZE OR SLOW SYNCHRONIZATION	
1	The problem is usually caused by the governor performance not being tightly controlled. The governor performance must be excellent to obtain fast, consistent synchronization. Controlling the phase of the generator is a more demanding operation than basic speed control. Review and optimize the governor system before attempting to service the synchronizer. Other issues may lie within the engine and how well it is operating.
2	Severe harmonic distortion of the AC wave from the power converters can disturb the synchronizer. If the wave form has more than 10% distortion, or other wave form issues are suspected, contact GAC for an external AC filter recommendation.

Figure 1.

DECLARATION OF CONFORMITY TO EC DIRECTIVES	
Application to Council Directives	Heavy & Light Industrial Applications
Standard to which Conformity is Declared	EN55011, EN50081-2, and EN50082-2
Manufacturer's Name	GOVERNORS AMERICA CORPORATION
Manufacturer's Address	Agawam, MA 01001 USA
Importer's Name	
Importer's Address	
Type of Equipment	Electronic Synchronizer
Model Number	SYC6714
Serial Number	Above J7000
Year of Manufacture	1996 and later
<i>I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives & Standards.</i>	
Place: Agawam, MA USA	Signature: 
Date: 06-10-96	Full Name: Mr. William Ferry
	Position: President

In order to be compliance with the above directives, the installer is obligated to install the equipment in strict accordance with the following guidelines.

1. The synchronizer must be mounted against a metal ground plate with four bolts which make positive electrical connections between the case and the back plane, or backing plate PL128, available from **GAC**, must be installed.
2. All cable shields on connections to the synchronizer must be connected to the case at the screw on the case as shown on **Wiring Diagram 1**.
3. The battery minus connection to **Terminal 10** must be jumper wired to the case as shown in the **Wiring Diagram 1**.
4. The installer must refer to **Wiring Diagram 1** provided in the literature for proper electrical connections.

SPECIFICATIONS

Generator & Main Bus AC Input

Sensitivity50 VRMS – 500 VRMS (line to line or line-neutral)
 Frequency 50 or 60 Hz Nominal (400 Hz, special order)
 Isolation1000 V min.
 Burden less than 2.5 VA

Battery/DC Power Supply Requirements (Terminals 8-10)

Low Voltage Range (Terminals 8 & 9 connected) 10 - 16 VDC
 High Voltage Range 14 - 40 VDC
 Current Required less than 200 mA

Performance (with ESD Series)

Capture Range +4% based on 3250 Hz
 *Output Voltage 3 - 7 VDC
 Breaker Closure Window Size 1° - 25°
 Relay Contact Rating (N.O. or N.C.) 10 A @ 28 VDC
 Phase Error Adjust Range +/- 10° typical

LEDs

Synchronization Indicator Green LED
 Mains Red LED
 Generator Red LED
 DC Supply Red LED
 Synchronizer Enabled Red LED
 Relay Closure Red LED

Environmental*

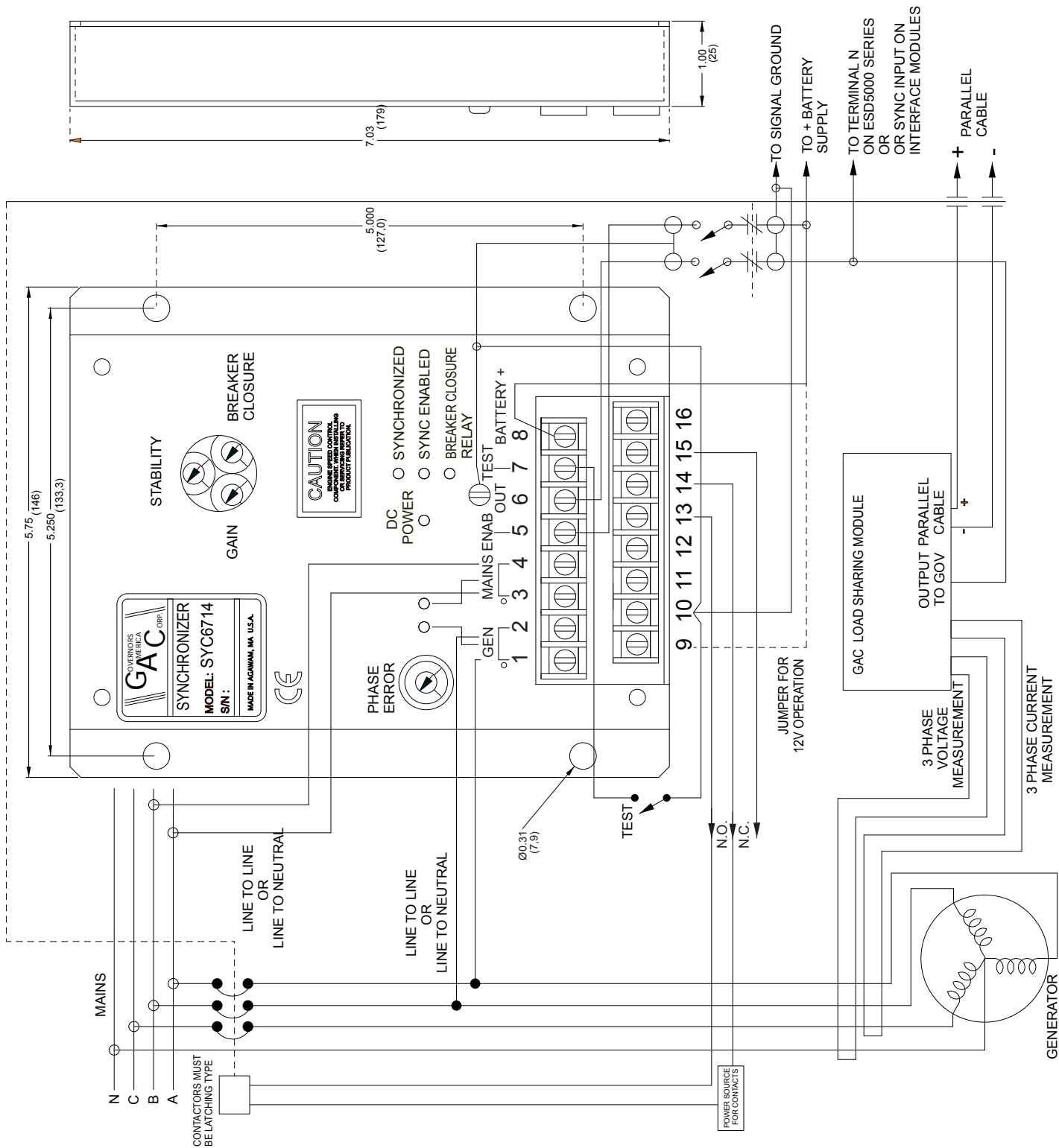
Temperature Range -40°F to +180°F (-40°C to +85°C)
 Humidity up to 100%
 Vibration 5G (20 – 200 Hz)
 Case Corrosion resistant and fungus proof
 IP22 with terminal cover in place

Physical

Dimensions 5.72" [146] x 7.03" [179] x 1" [25]
 Weight 1.5lbs (0.68kg)
 Mounting any position, vertical preferred

*Circuit boards are fully coated and sealed with a heavy formal coating.

Wiring Diagram 1.



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