

# G-SIGNALING COMMON CONTROL UNIT

## J99395YA

### DESCRIPTION

### TYPE G SIGNALING SYSTEM

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. UNIT DESCRIPTION . . . . .	1
3. UNIT REQUIREMENTS . . . . .	2
4. OPERATIONAL DESCRIPTION . . . . .	2
5. APPLICATION . . . . .	5
6. DIAGNOSTICS . . . . .	5
7. MAINTENANCE . . . . .	5

### 2. UNIT DESCRIPTION

**2.01** The GYA plug-in unit is assembled on two metallic-base printed wiring boards 7.3 inches high and 10.3 inches long having a faceplate 7.94 inches high and 2.97 inches wide. Interconnections between the unit and the module shelf are made by two 50-pin connectors which are part of the printed wiring boards. The unit is placed into service by insertion into the appropriate guides on the shelf and sliding toward the rear of the bay. A locking device on the faceplate locks the unit in place when sufficient contact with the bay mounting is made.

**2.02** The GYA unit provides a two-level urgency alarm system with the associated indicators and controls located on the faceplate (see Fig. 1). The alarm indicators exhibit the following conditions:

#### MAJOR ALARM

- 2600 Hz not present
- -48V circuit breaker operated
- Loss of  $\pm 12V$  and +5V

#### MINOR ALARM

- Loss of 20-Hz ringing voltage.

There are three pairs of contacts each for the MAJOR and MINOR alarms: one pair for visual, one pair for audible, and a pair for remote maintenance system use. A circuit breaker, also located on the faceplate, provides current overload protection for the entire G module, and acts as a -48V off-on switch.

### 1. GENERAL

**1.01** This section describes the G-signaling common control unit (SD-7C051-01). The unit is generically identified as GYA and is a component part of the Type G Signaling System. The Type G Signaling System supersedes the Type E and F Signaling Systems.

**1.02** Whenever this section is reissued, the reason for reissue will be stated in this paragraph.

**1.03** The GYA unit provides power control and overload protection, certain failure identifications, 2600-Hz tone supply, 20-Hz ringing voltage, and alarm functions for 24 G signaling units in the G module. The alarm functions reflect the associated carrier status as well as source voltage, 20-Hz ringing, and signaling tone conditions.

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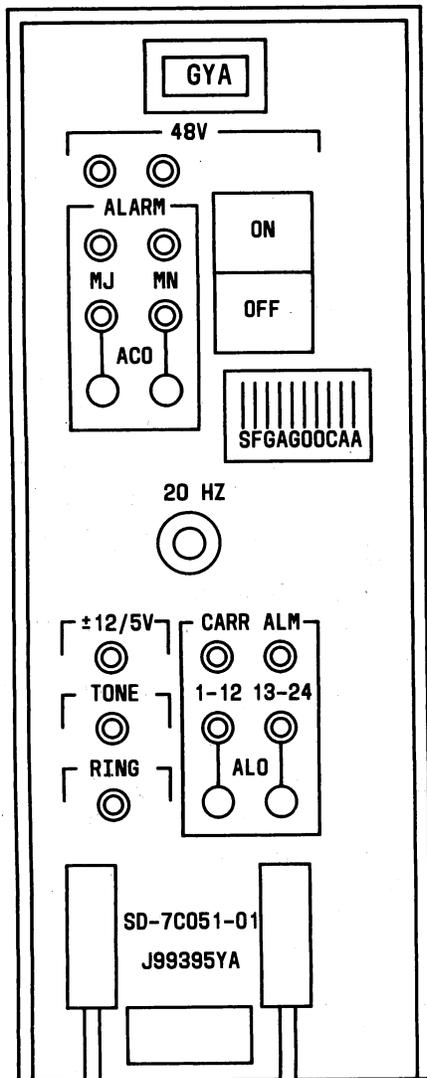


Fig. 1—GYA Faceplate

**2.03** The GYA unit contains two identical carrier group alarm (CGA) circuits supporting 24 signaling units in two groups of 12. The CGA circuits provide trunk release and make-busy functions in the event of carrier failure. This prevents massive seizure of the switching network and terminates calls in progress, preventing the continuation of customer charge. CGA and alarm override indicators on the faceplate show the associated carrier status. Should carrier failure occur, alarm override switches, also located on the faceplate, allow special lines or trunks to be returned to service by patching to idle channels of other facilities.

### 3. UNIT REQUIREMENTS

**3.01** The GYA unit is a common assembly in the G module and performs several specific functions. They are as follows:

- Distributes, monitors, and controls the -48 volt CO battery to the associated power converter and G signaling units and initiates a major alarm for a -48 volt overload condition
- Generates, monitors, and distributes a 2600-Hz signaling tone and clock source to the G module (up to 24 SF units) and initiates a major alarm for a 2600-Hz tone failure
- Distributes and monitors the 20-Hz ringing source to the associated G signaling units (up to 24) and initiates a minor alarm for a loss of 20-Hz ringing
- Monitors the associated 258A power converter and initiates a major alarm for loss of  $\pm 12$  and +5 volts
- Monitors the carrier terminals for each of the two groups of 12 signaling units and initiates an alarm in the event of carrier failure and identifies the affected SF signaling unit group
- Provides trunk release for the office switching network and a make-busy condition for the associated signaling units
- Provides carrier override control allowing each of the two groups of 12 signaling units to be restored to service by patching to idle channels of other facilities.

### 4. OPERATIONAL DESCRIPTION

**4.01** The GYA unit can be divided into three functional areas: (1) the power control and alarm section, (2) the 2600-Hz tone generator, and (3) the carrier group alarm section. The power control and alarm section provides circuit breaker protection for the -48 volts and 20-Hz ringing voltage. This section also initiates the following alarm conditions:

- 48V off (major)
- $\pm 12V$ , +5V off (major)

2600-Hz tone off (major)

20-Hz ringing off (minor).

The 2600-Hz tone generator provides the common 2600-Hz signaling tone for distribution to the 24 signaling units in the G module. The carrier group alarm section provides the trunk release and make-busy functions when carrier failure occurs. This section also initiates the appropriate alarms and facilitates trunk restoration.

#### POWER CONTROL AND ALARM SECTION

**4.02** The power control and alarm section is powered directly from the -48 volt office battery upon insertion into the G module. The -48 volt source is applied to a circuit breaker mounted on the unit faceplate. The circuit breaker also serves as an off-on switch distributing the -48 volts to the 285A dc to dc converter and the 24 signaling units. The circuit breaker is rated at 6 amps, providing -48V overload protection for the entire G module.

**4.03** The GYA unit uses LED indicators, located on the faceplate, to visually display the G module power and alarm status. The GYA unit is placed into service by inserting it into the assigned shelf position and placing the -48V circuit breaker to the on position (should be in off position prior to insertion). A green LED is lighted, indicating that -48V has been applied to the entire G module.

**4.04** The power control and alarm section monitors the various source power and signal states and initiates an appropriate major and/or minor alarm for a failed condition. This section also provides an LED indication identifying the failed condition. A red LED (MJ) indicating a major alarm will be lighted for the following conditions:

- (a) Loss of  $\pm 12$  or +5 volts from the dc to dc converter
- (b) A current overload in the G module circuitry
- (c) Loss of 2600-Hz signaling tone and clock source.

One or more of three red LEDs (-48V,  $\pm 12/+5V$ , and/or TONE) representing the above malfunctions will be lighted coincident with the MJ LED identifying the failed condition. Any one of the three major

alarm functions will operate the MJ relay which furnishes two loop closures (audio and visual) to the office alarm system; one loop closure is available for remote maintenance system use.

**4.05** A yellow LED (MN) indicating a minor alarm will be lighted when there is a loss of the 20-Hz ringing voltage or when the recircuit device (20 Hz) is tripped. The recircuit device is a type of circuit breaker (looks like a fuse holder) located on the faceplate of the unit. The device is rated at 1 amp and will open circuit in the event of a 20-Hz ringing current overload in the G-module. An overload is indicated by an outward displacement of a reset button in the center of the device. The recircuit device may be restored by pressing the reset button when the overload condition has been cleared.

**4.06** The major and minor alarm circuits have an alarm cutoff (ACO) switch to deactivate external audio and visual alarm systems for the ensuing troubleshooting and repair interval. Even though the ACO switches are activated, the major and/or minor alarm indicators along with the failure identity indicator will remain lighted as a reminder of the failed condition. When the maintenance effort has been completed, the ACO switches must be in the off position to restore the alarm relays to a state of readiness.

#### 2600-HZ TONE SUPPLY

**4.07** The 2600-Hz tone supply provides the single-frequency (SF) signaling tone for distribution to the 24 signaling units in the G module. The frequency is derived from a 332.8 kHz crystal that is frequency divided by 128, providing an accurate and stable 2600-Hz source. The 2600-Hz tone is also used as a clock signal providing a time base for the signal timing functions required in most SF units. The tone supply will furnish an output of  $0.246 \pm 0.01$  VRMS with a frequency accuracy of better than  $\pm 5$  Hz. Since the oscillator in the tone supply is crystal controlled, routine frequency checks are not necessary.

#### CARRIER GROUP ALARM

**4.08** The G signaling system is primarily intended for use in conjunction with the A5, A6, A6B, N2, N3, and N4 analog carrier terminals. Should a failure occur in the associated carrier terminal, the carrier group alarm (CGA) section of

the GYA unit provides the trunk release and make-busy functions. This protects the switching network by preventing massive office seizures. The trunk release function will also terminate calls in progress, thereby preventing the customer from being erroneously charged. A typical CGA application is shown in Fig. 2.

**4.09** The trunk release and make-busy circuits are activated by a single indication from a failed carrier. For the type N series of carriers, the indication is a ground applied to the SA/PA lead from the carrier terminal. For the A series of carriers, the indication is a loop closure to the SA/PA and SA/PA GRD leads from the carrier failure alarm (CFA) units.

**4.10** When a failure occurs in a carrier group, a ground or loop closure is applied to the SA/PA lead of the associated CGA circuit in the GYA unit. This causes the ALM and ALB leads to change from +5 Vdc to -12 Vdc and operates the W and GA relays. The -12 Vdc on both the ALM and ALB leads forces the assigned groups of 12 signaling units to an idle state, terminating any calls in progress, and releases the associated

trunk circuits. Coincident with the failure, the 2.5 second delay make-busy timer is started. At the end of the 2.5 second period, the ALB lead is switched back to +5 Vdc, forcing the associated signaling units to appear busy to outgoing traffic.

**4.11** In step-by-step (SXS) offices, the wink (W) leads, controlled by the W relay, are used to force the associated signaling unit group to a busy state. As previously mentioned, a carrier failure causes the operation of the W relay. This produces a ground on 12 of the 24 wink leads (W1-W12 or W13-W24), placing the signaling unit group in a busy state. The termination of the 2.5 second period of the delay make-busy timer also starts the 45 millisecond wink timer. This causes the W relay to release, opening the winks contacts for 45 milliseconds which momentarily removes ground from the W leads. This releases the switch train in the SXS office and returns the signaling unit group back to a busy state.

**4.12** Carrier group failure also results in the operation of the GA relay which provides an open loop condition on the GA and GAR leads in each of the two control and alarm circuits. This

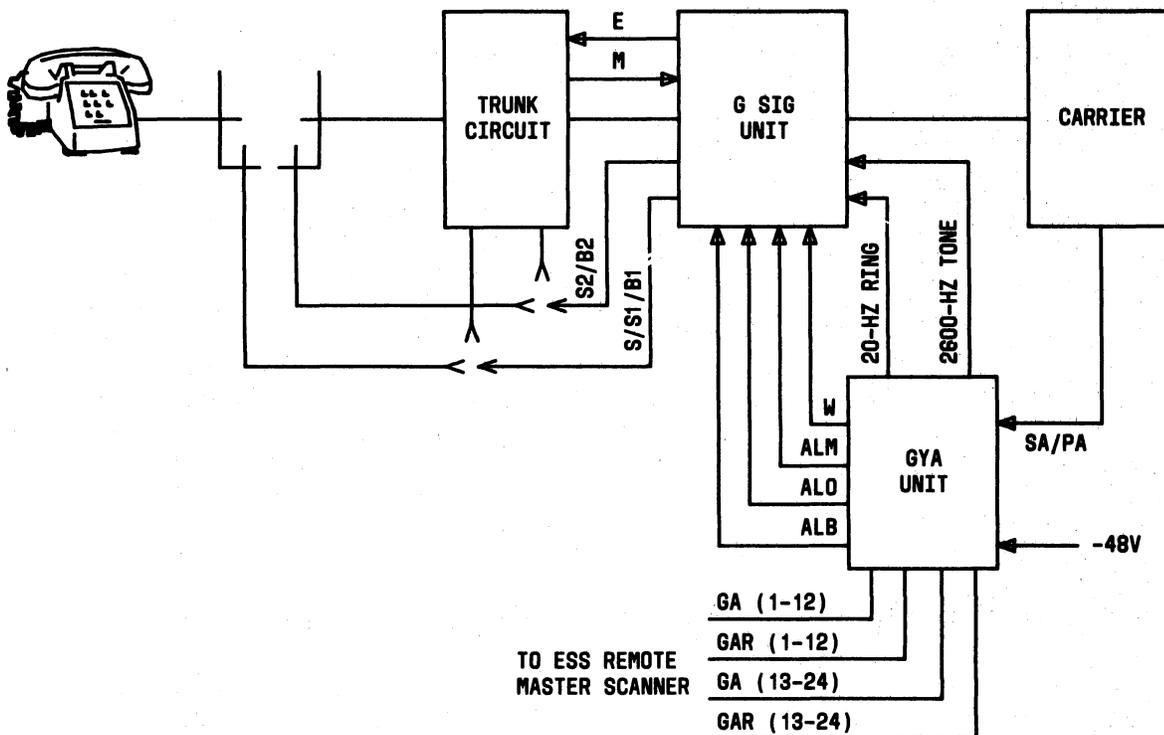


Fig. 2—Typical Application of GYA Unit

function is used when signaling unit groups are assigned to electronic switching systems (ESS). An open loop on the GA and GAR leads is a signal to the ESS remote master scanner that a carrier failure has occurred. The trunk release and make-busy function is then initiated by an ESS stored program.

**4.13** As previously mentioned, the CGA section of the GYA unit is comprised of two identical control and alarm circuits supporting 24 signaling units in two groups of 12 each. Each circuit has a red carrier alarm (CXR ALM) indicator, located on the faceplate, showing the carrier status of each carrier group. If a carrier failure should occur, the appropriate CXR ALM indicator will be lighted showing which of the two carrier groups (1-12 or 13-24) has failed. Each CGA circuit also has an alarm override (ALO) switch and indicator located on the faceplate. During a carrier failure, special lines or trunks may be returned to service by patching to idle channels of other facilities (see Fig. 3). This is accomplished by making the patch and then operating the ALO toggle switch to the on (up) position. A green ALO indicator will be lighted showing which of the two carrier groups is being overridden. The ALO indicator will remain lighted as long as the ALO switch is operated. The red CXR ALM indicator will be lighted as long as a carrier failure is in progress, even with the override switch operated. When the carrier failure is cleared, the red CXR ALM indicator will go off. If the affected signaling unit group has been patched to other facilities, it may be restored to the regular assigned carrier by removing the patch and placing the ALO switch in the off (down)

position. A remote carrier override (RCO) lead is provided for each CGA circuit. A ground on the RCO lead causes the same circuit function as placing the ACO toggle switch in the operate position.

## 5. APPLICATION

**5.01** The GYA unit is designed specifically for use in the G module and the associated carrier and trunk equipment. A typical CGA application of the GYA unit is shown in Fig. 2.

## 6. DIAGNOSTICS

**6.01** The GYA unit affords the user a means of diagnosing several trouble conditions that could arise in the G module and associated equipment. The unit not only initiates a two-level (major and minor) urgency alarm, but also provides indicators identifying a particular trouble area. Table A is provided as a diagnostic aid relating the symptom of a malfunction to the corresponding alarm and fault identity indicators and recommends an appropriate corrective action.

## 7. MAINTENANCE

**7.01** There are no field adjustments provided on the GYA unit. A unit that does not meet circuit requirements should be returned to the Western Electric Company for repair.

**7.02** Descriptive and test practices on other related components within the Type G Signaling System may be found under individual component headings in the BSP index 179-000-000.

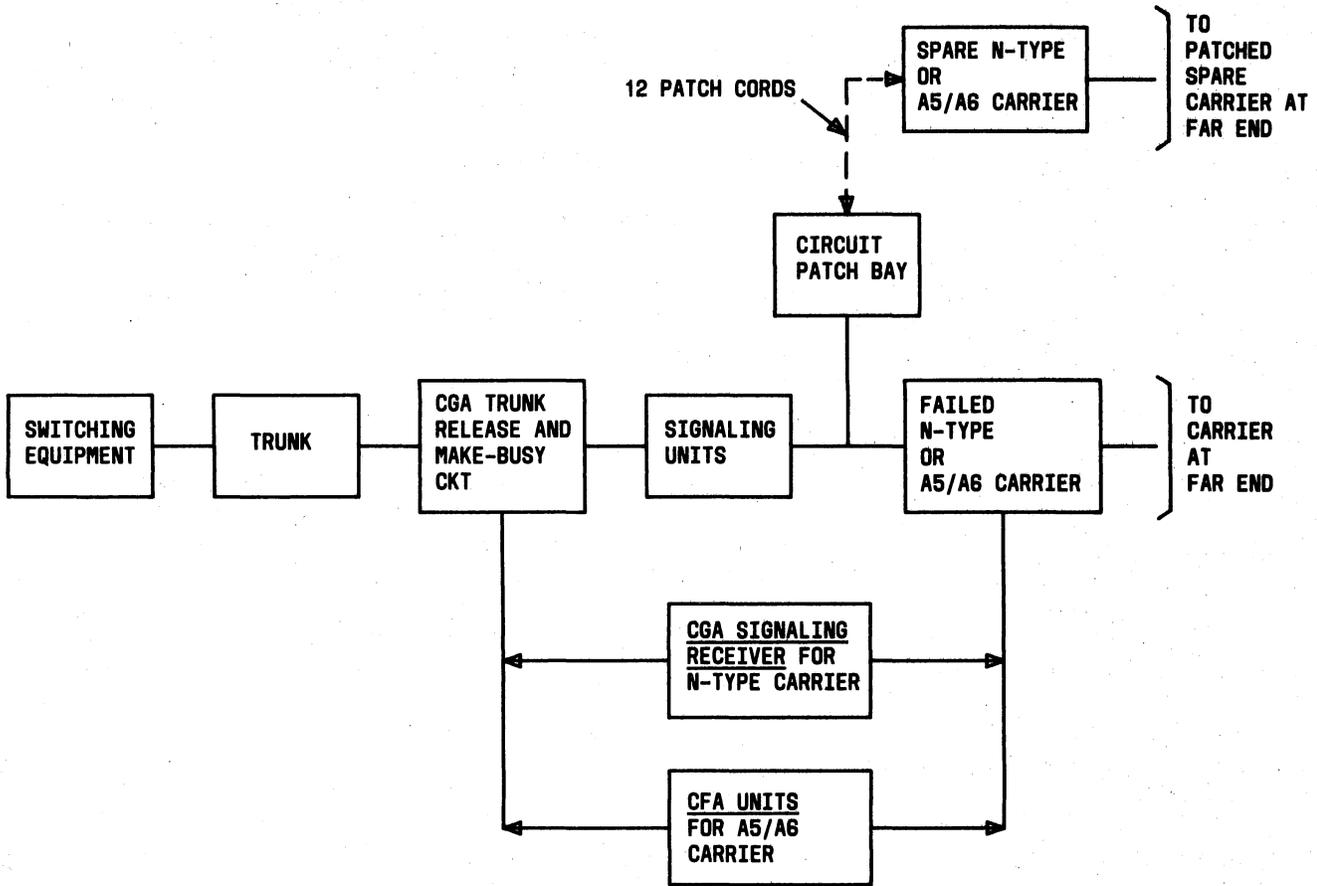


Fig. 3—Illustration of Spare Carrier Patched Across Failed Carrier

TABLE A  
GYA DIAGNOSTIC SCHEME

CONTROLS		INDICATORS										DIAGNOSTIC	ACTION			
-48V CKT BRKR	20-HZ CKT BRKR	-48V ON	-48V OFF	ALARM MJ	ALARM MN	ACO MJ	ACO MN	±12V +5V	T O N E	20 HZ	ALM 1-12			ALM 13-24	ALO 1-12	ALO 13-24
ON	IN	G	-	-	-	-	-	-	-	-	-	-	-	-	Normal -48V CKT BRKR ON	None
OFF	IN	-	R	R	-	-	-	R	-	-	-	-	-	-	-48V CKT BRKR inadvertently placed in OFF position (not tripped)	
OFF	IN	-	R	R	-	-	-	R	-	-	-	-	-	-	-48V CKT BRKR tripped	Operate -48V CKT BRKR—Replace GYA— Check for current overload in G-module (see Notes 1,2, & 3)
ON	IN	G	-	R	-	-	-	R	-	-	-	-	-	-	285A Converter failure	Replace 285A converter—Check -48V from GYA to 285A converter (see Notes 1 & 3)
ON	IN	G	-	R	-	-	-	-	R	-	-	-	-	-	2600-Hz tone supply failure	Replace GYA (see Note 2)
ON	IN	G	-	-	Y	-	-	-	-	Y	-	-	-	-	20-Hz CKT BRKR tripped	Check for current overload in 20-Hz ringing distribution—Replace GYA (see Notes 1 & 2)
ON	OUT	G	-	-	Y	-	-	-	-	Y	-	-	-	-	20-Hz ringing failure	Check for application of 20-Hz ringing to G-module— Replace GYA (see Notes 1 & 2)
ON	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	No -48V to G-module	Remove 285A converter to silence office alarms— Check -48V distribution to G-module and/or bay (see Note 1)
ON	IN	G	-	-	-	-	-	-	-	-	R	-	-	-	CXR group failure on channel group 1-12	Follow office procedures
ON	IN	G	-	-	-	-	-	-	-	-	-	R	-	-	CXR group failure on channel group 13-24	Follow office procedures
ON	IN	G	-	-	-	-	-	-	-	-	-	-	-	-	One or both channel groups reported failed	Replace GYA—Check -48V distribution from GYA to the affected shelf (see Notes 1 & 2)
ON	IN	G	-	-	-	-	-	-	-	-	-	-	-	-	Complaints on some channels with no fixed pattern	Check 285A converter voltages— Replace 285A converter and/or GYA (see Notes 1,2, & 3)

**Notes:**

1. When the ACTION column contains more than one corrective step, perform the steps in order until trouble is located.
2. GYA unit should not be removed from G-module until replacement is in hand.
3. Failure of the 285A converter may result from high voltage transient. Should this occur, flip the ON-OFF switch from ON to OFF to ON.
4. The ACO indicators will be on only when the ACO switches are turned on to silence office alarms.
5. The ALO indicators will be on only when the ALO switches are turned on to remove the make-busy state.

**LED INDICATORS**

R—Red  
Y—Yellow  
G—Green

**Important:** The above LED indications are based on a fully loaded (all plug-ins in place) G-module.