

WESCOM 416 4-WIRE/6-WAY CONFERENCE BRIDGE  
CIRCUIT DESCRIPTION, INSTALLATION, AND TESTS

1. GENERAL

1.01 This section is a cover sheet for the Wescom 416 4-Wire/6-Way Conference Bridge instruction, Section 416-101/3. GAEL 1365 authorizes the use of this equipment in Pacific Company.

1.02 It is reissued to:

- Revise the section title.
- Transmit the latest issue of the Wescom instruction.
- Include procedures for ordering Wescom equipment.
- Provide maintenance and repair/return information.

*Note:* Marginal arrows used to designate changes are omitted.

1.03 The Wescom 416 module provides a passive coupling of voice and data circuits via 4-wire/6-way resistive bridge.

1.04 If corrections are required in the manufacturer's instruction, use form E 3973-1PT as described in Section 000-010-901PT to process the correct information.

1.05 If equipment design and/or manufacturing problems should occur, refer to Section 010-700-010PT for procedures on how to file an Engineering Complaint.

1.06 When revised instructions reflect changes due to modification of equipment, retain the superseded information until equipment is modified.

*Note:* Equipment shall *not* be modified without the approval of the Equipment Maintenance Engineer.

2. MAINTENANCE

2.01 Field repairs that involve replacement of components within this unit are not recommended.

3. ORDERING PROCEDURES

3.01 Order Wescom equipment direct from the manufacturer:

Wescom, Inc.  
P.O. Box 1458  
Downers Grove, IL 60515

3.02 When ordering Wescom equipment, use the Purchase Order, Form GTP 2, as specified in SI 70, Section 2. Enter Contract No. *ATT 109C* on all orders. Send the blue copy of the Purchase Order as follows:

- For Northern California and Nevada —

ROPSAC  
221 W. Winton Avenue, Room 140  
Hayward, CA 94544

- For Southern California —

ROPSAC  
2420 Yates Avenue, Room 210  
Commerce, CA 90040

*Note:* Additional ordering information is contained in the GTP Catalog.

NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement

Printed in U.S.A.

**SECTION 310-405-901PT**

**4. REPAIR/RETURN**

**4.01** Return defective units to the Plug-In Maintenance Pool for "like-for-like" exchange as specified in SI 60, Section 6, and Section 005-202-

**919PT.** The Supplies Superintendent shall forward defective units to the manufacturer for repair and return.

**4.02** This Wescom equipment has a warranty period of 18 months from date of shipment.

*Attachment:*

Wescom, Inc, Circuit Description/Installation Series, Section 416-101/3, Issue 1, January 1977.



## 416 4-Wire/6-Way Conference Bridge

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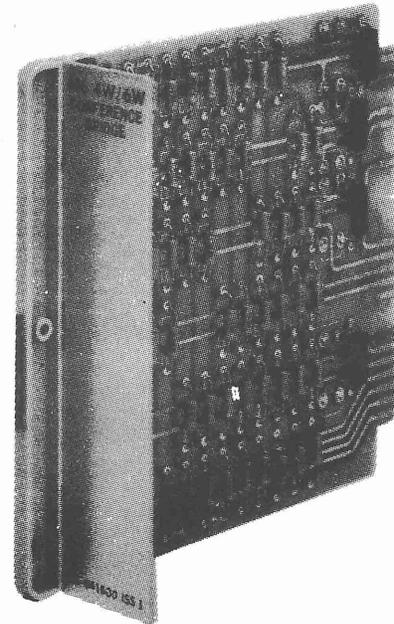


Figure 1. 416 4-Wire/6-Way Conference Bridge

### 1. GENERAL

1.01 This Practice provides circuit description, installation procedures, and basic testing information for the Wescom® 416 4-Wire/6-Way Conference Bridge (Figure 1).

1.02 This Practice has been reprinted to incorporate technical and editorial changes. Significant technical changes are indicated by a change bar (I) in the margin adjacent to the affected copy.

1.03 The 416 module provides passive coupling (resistance bridge) of up to six voice or data circuits on a 4-wire facility. It features a modular printed circuit board which plugs into one mounting position of the Wescom Type 400 Mounting Assembly. This assembly accommodates from 1 to 13 modules and allows for either KTU apparatus case or relay-rack mounting.

1.04 Electrical connections are made by a 56-pin, wire-wrapped card connector which is provided as part of the Type 400 Mounting Assembly.

### 2. CIRCUIT DESCRIPTION

2.01 The 416 4-Wire/6-Way Conference Bridge provides passive coupling of voice and data circuits by means of a 4-wire/6-way resistive bridge. Refer to Figure 2 and the schematic diagram in Figure 4 while reading the following circuit description.

2.02 When a signal enters the module through the "receive" path of port 1, it is bridged to the "transmit" paths of ports 2, 3, 4, 5, and 6 where it is "transmitted" to external voice or data acquisition equipment. As an example, consider an application where six, 4-wire telephone sets are required for conference purposes.

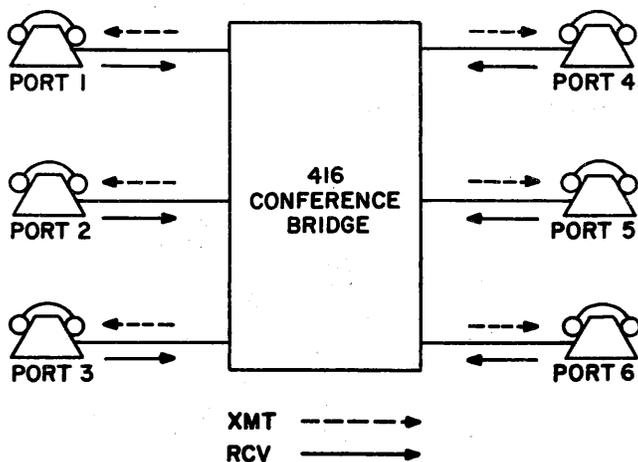


Figure 2. 416 Typical Application

In such an application, each 4-wire telephone would be tied to a "transmit" and a "receive" port; i.e., telephone 1 would be tied to the "transmit" and "receive" leads of port 1; telephone 2 would be tied to the "transmit" and "receive" leads of port 2; and so on.

2.03 With the telephones as connected, communications or data transfer takes place with each and every port. Port 1 "receives" and "transmits" data to and from ports 2 through 6; port 2 "receives" and "transmits" data to and from port 1 as well as to and from ports 3 through 6. The remaining ports provide a similar function.

### 3. INSPECTION

3.01 Inspect the equipment thoroughly as soon as possible after delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

3.02 Wescom equipment is identified by a model and issue number imprinted on the front panel. Each time a major engineering design change is made on the equipment, the issue number is advanced by one number on any following models that are manufactured. Therefore, be sure to include the issue number along with the model number when making inquiries about the equipment.

### 4. MOUNTING

4.01 The 416 4-Wire/6-Way Conference Bridge is designed to mount in one module position of a Type 400 Mounting Assembly. This assembly can accommodate from 1 to 13 modules and may be equipped and prewired for any combination of modules in the Wescom product line. In addition, Type 400 Mounting Assemblies allow for either Key Telephone Unit (KTU) apparatus-case or relay-rack mounting. For more information on these mounting assemblies, refer to Sections 400-103 and 400-U-101/3.

### 5. INSTALLER CONNECTIONS

5.01 When the 416 is installed in a Type 400 Mounting Assembly, it makes electrical connection to associated equipment through a 56-pin, wire-wrapped connector, which is provided as part of its mounting assembly. Make all installer connections to this connector in accordance with Table 1.

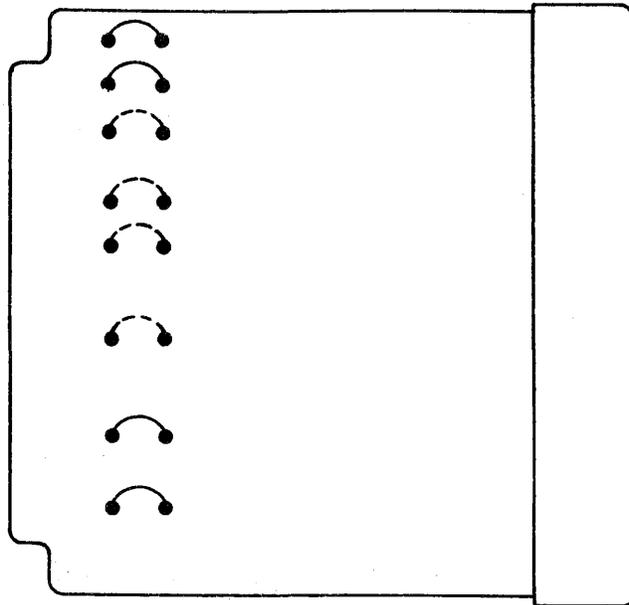
Table 1. 416 Installer Connections

LEAD DESIGNATION	PIN
Transmit line 1 T&R	5, 3
Receive line 1 T&R	1, 2
Transmit line 2 T&R	4, 7
Receive line 2 T&R	10, 12
Transmit line 3 T&R	8, 6
Receive line 3 T&R	22, 24
Transmit line 4 T&R	51, 53
Receive line 4 T&R	26, 28
Transmit line 5 T&R	40, 39
Receive line 5 T&R	46, 48
Transmit line 6 T&R	13, 11
Receive line 6 T&R	55, 56

### 6. OPTIONS

6.01 The 416 module is intended for 4-wire/6-way operation. However, ports 4 and 5 may be conditioned to permit the module to

function as a 4- or 5-way bridge. When conditioning the 416 module, refer to Figure 3, which shows option locations, and perform all optional conditioning in accordance with the following paragraphs.



PORT 5 ——— PORT 6 - - - -

**Figure 3. 416 Option Locations**

6.02 If the 416 is to be used as a 4-wire/6-way bridge, terminate ports 5 and 6 by strapping the posts which are associated with ports 5 and 6. These posts are grouped together and are located on the foil side of the printed circuit board. With ports 5 and 6 strapped, a 600-ohm impedance is reflected back to the other ports of the bridge.

6.03 If the application requires a 5-way bridge, strap port 6. This terminates port 6, thereby reflecting a 600-ohm impedance to the other ports.

## 7. TESTING

7.01 If trouble is encountered with the operation of the 416 module, verify that all installer connections have been made in accordance with Table 1 and that all required options have been completed. In addition, make certain

that the module mates well with the connector. This can be accomplished by removing and reinserting the module several times. If trouble persists, attempt to determine whether the cause of the malfunction exists within the 416 module or elsewhere in the system. If technical assistance is required, contact the Wescom Technical Services Department by calling:

(312) 971-2010  
TXW 910-695-4735  
DATAPHONE (312) 971-1698

Canadian Customers  
(416) 877-4191 or  
TWX 610-492-2646

## 8. WARRANTY

8.01 **STANDARD WARRANTY:** Wescom products are warranted to be free from defects in material, workmanship, and design, given proper installation and regular maintenance. Wescom's obligations under this warranty are limited to correction and replacement, at Wescom's production facility, of any defective items received by Wescom, transportation prepaid, for a period of five years from the date of original shipment. Warranty and remedies on products not manufactured by Wescom are in accordance with the warranty of the respective manufacturer. **WESCOM MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED; AND ALL IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE AFORESAID OBLIGATIONS IS HEREBY DISCLAIMED BY WESCOM.**

8.02 Field repairs involving the replacement of components within a unit are not recommended. If an item is found to be defective, contact Wescom, Inc., by telephone or TWX, for instructions regarding replacement or repair.

8.03 If a replacement unit is required, it will be shipped in the fastest manner consistent with the urgency of the situation. Upon receipt of a replacement unit, return the defective unit

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in the carton in which the replacement was shipped, using the shipping label provided, to:

Wescom, Inc.  
8245 Lemont Road  
Downers Grove, Illinois 60515

Canadian Customers:

Wescom Canada Ltd.  
45 Sinclair Ave.  
L7G 4X4  
Georgetown, Ontario

**Repair or Exchange Services**

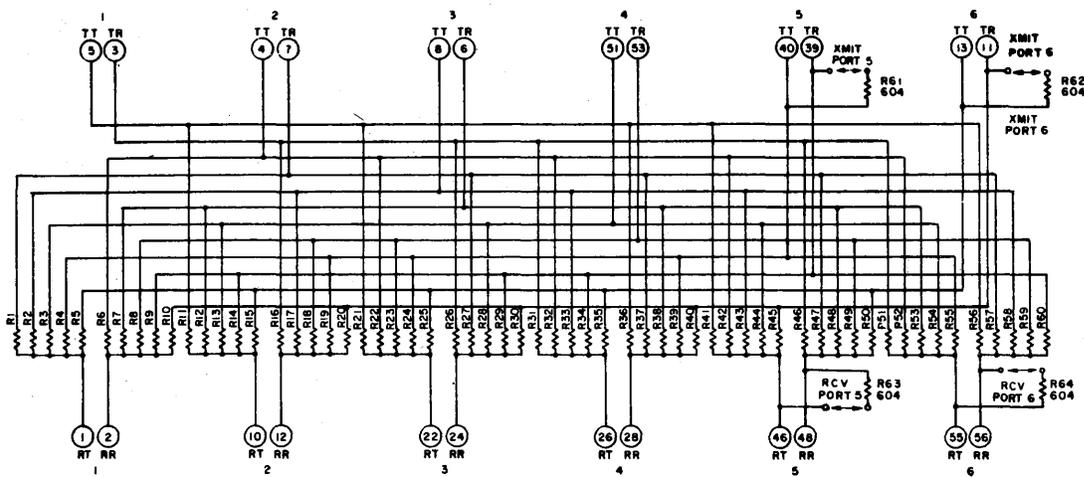
8.04 In addition to the standard Wescom Warranty Service, Wescom offers a repair or exchange service for those items out of warranty. Under this arrangement, faulty units may be shipped to Wescom and either completely repaired and quality tested or exchanged for a replacement unit. To obtain details of this service and a schedule of prices, contact your local Wescom Sales Representative.

**9. SPECIFICATIONS**

9.01 Electrical and physical characteristics of the 416 are as follows:

- (a) FACILITY: 4-wire.
- (b) INPUT/OUTPUT PORTS: 6.

- (c) INSERTION LOSS: 19.5dB ±0.5dB.
- (e) CROSS-COUPLING: -60dB.
- (f) FREQUENCY RESPONSE: 100Hz to 20kHz, 0.25dB.
- (g) FOUR-WIRE RETURN LOSS: 25dB with all posts terminated correctly.
- (h) MAXIMUM INPUT LEVEL: +18dBm.
- (i) ENVELOPE DELAY: Negligible.
- (j) ISOLATION BETWEEN ADJACENT PORTS: Better than 55dB properly terminated.
- (k) OPERATING ENVIRONMENT: Temperature, 32° to 120° F (0° to 49°C); humidity to 95 percent, no condensation.
- (l) DIMENSIONS: Height, 5.6 inches (14.2cm); width, 1.5 inches (3.8cm); depth, 6 inches (15.2cm).
- (m) WEIGHT: 0.25 lb (114g).
- (n) MOUNTING: One module mounting position in a Wescom 400 Mounting Assembly.



NOTE  
ALL RESISTORS ARE 1350 OHMS ±1% UNLESS OTHERWISE DESIGNATED

**Figure 4. 416 4-Wire/6-Way Conference Bridge Schematic Diagram (Issue 1)**