WESCOM 420 DUAL 2-WIRE/6-WAY CONFERENCE BRIDGE CIRCUIT DESCRIPTION, INSTALLATION, AND TESTS

1. GENERAL

1.01 This section is a cover sheet for the Wescom 420 Dual 2-Wire/6-Way Conference Bridge instruction, Section 420-101/3. 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 420 bridge is a plug-in printed circuit module. It is used to provide coupling for up to 6 voice or data circuits.

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1.06 When revised instructions reflect changes due to modification of equipment, retain the superseded information until equipment is modified.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

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 420-101/3, Issue 1, January 1976

420 Dual 2-Wire/6-Way Conference Bridge

CONTENTS PAGE

1. GENERAL

1.01 This Practice provides circuit description installation procedures, and basic testing information for the Wescom® 420 Dual 2-Wire/6-Way Conference Bridge.

1.02 This Practice has been reprinted to incorporate corrections to earlier printings and to add a description of later circuit revisions. Note that the latest revisions to Issue 1 are described in this printing. Changes and additions are indicated by a revision bar (▮) in the margin adjacent to the change.

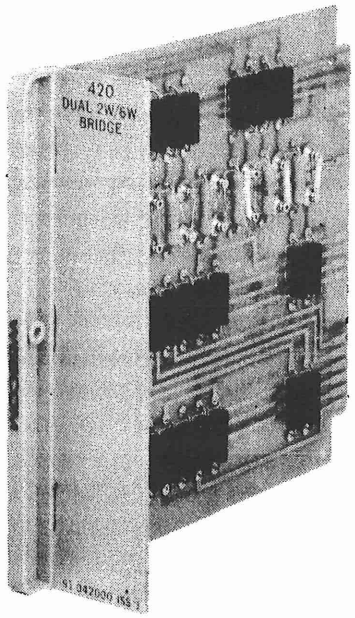


Figure 1. 420 Dual 2-Wire/6-Way Conference Bridge

1.03 The 420 Dual 2-Wire/6-Way Conference Bridge (Figure 1) is a plug-in printed-circuit module used to provide passive coupling (resistance bridge) of up to six voice or data circuits.

1.04 The 420 is designed to mount in one position of a Wescom Type 400 Mounting Assembly. Type 400 Mounting Assemblies are available in capacities of from 1 to 13 modules and allow for either Key Telephone Unit (KTU) apparatus-case or relay-rack mounting.

1.05 The 420 makes electrical connection to the system through one of the 56-pin, wire-wrapped card-edge connectors provided as part of the mounting assembly.

2. APPLICATIONS

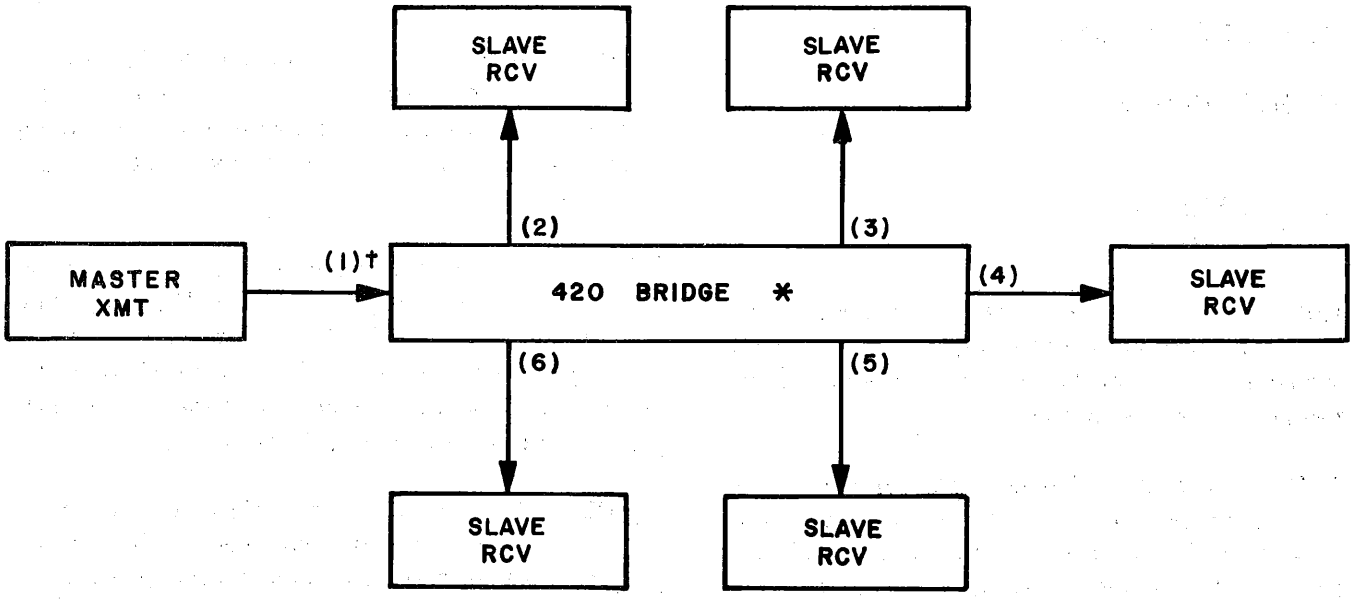
2.01 The 420 Dual 2-Wire/6-Way Conference Bridge provides alternate voice/data service on multipoint channels. The two most common types of multipoint channel configurations include broadcast multipoint and broadcast polling multipoint.

2.02 The broadcast multipoint (simplex) configuration provides one master station or port which transmits to two or more remote (slave) stations. Refer to Figure 2 which shows a 6-point multipoint with five remote stations served from a bridge location. In this configuration, there is no return path from the remote slave stations to the master station. In addition, slave stations are unable to communicate with other slave stations.

Broadcast Polling Multipoint

2.03 The broadcast polling multipoint configuration also provides one master station with two or more remote (slave) stations. However, in this configuration, the remote stations also communicate with the master. Figure 3 illustrates a typical application requiring dual 2-wire bridges and a 4-wire channel. In this application, the master station transmits a continuous carrier to all remote stations. All the remote stations receive the transmitted discrete computer generated address code; however, only the one slave station which is assigned the particular address code is activated. As the master polls each remote station, it senses the presence of a negative or affirmative response from the slave. If the slave station has business to transact, it generates an affirmative response when polled and data transferral takes place. When business is completed, the master polls another station; if the next remote unit has no business to transact, it generates a negative response and the master polls the next remote unit.

2.04 All transactions between remote slave stations are first directed to the master station which then directs the data to a particular remote slave station. Only in this way may slave stations communicate with other slave stations.



* 1 SECTION

† PORT NOS. ARE SHOWN IN PARENTHESES

Figure 2. Broadcast Multipoint

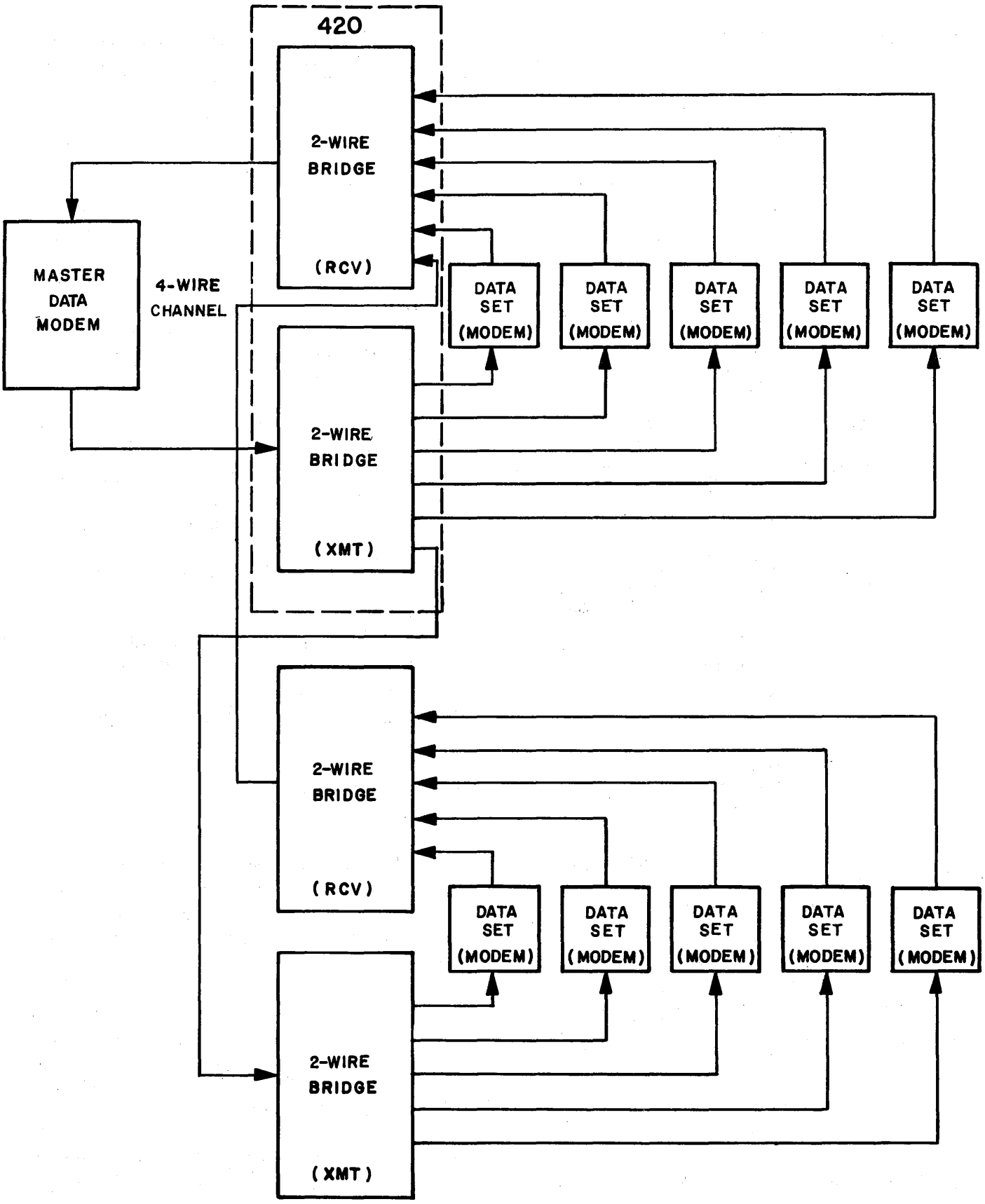
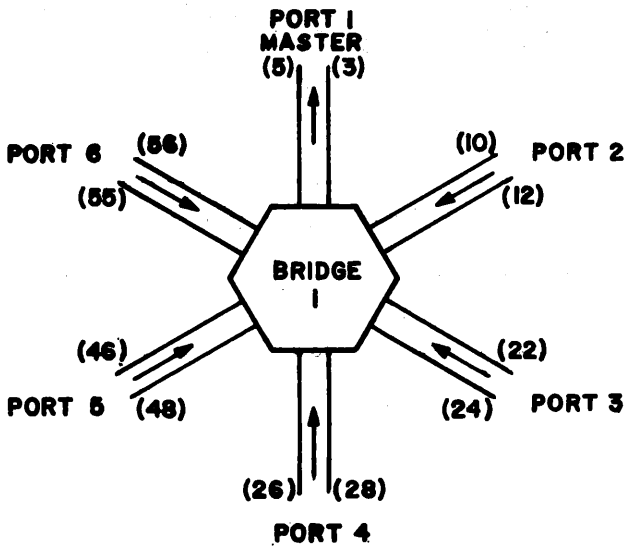
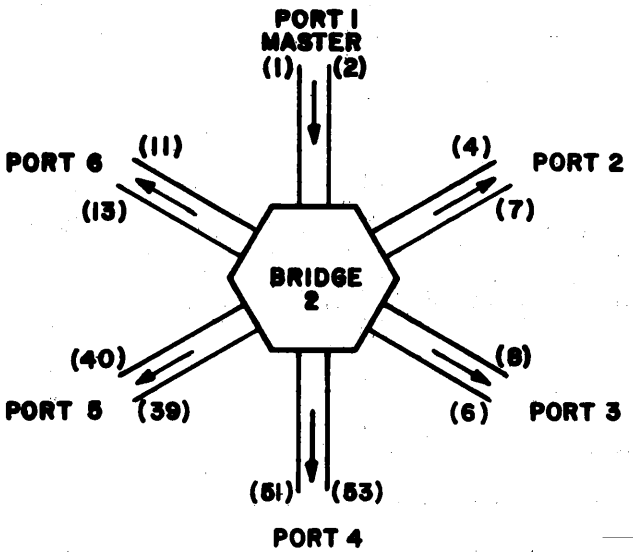


Figure 3. Broadcast Polling Multipoint

3. CIRCUIT DESCRIPTION

3.01 The 420 Dual 2-Wire/6-Way Conference Bridge provides passive coupling of voice or data circuits by means of a dual 2-wire/6-way resistive bridge. During the following circuit description, refer to Figure 4, which is a functional diagram of bridges 1 and 2. In addition, reference should also be made to the schematic diagram in Figure 6.





CONNECTOR PIN NO. ARE SHOWN IN PARENTHEIS

Figure 4. 420 Dual 2-Wire/6-Way Bridge

3.02 In examining a 6-way conference bridge, it is convenient for the purpose of discussion to refer to signals entering the bridge module as "receive" and signals leaving the module as "transmit." Note however, that this is an arbitrary designation for reference only because any port on either bridge section may be considered transmit or receive, depending on the direction of signal flow. Therefore, in the following discussion of bridge 1, port number 1 will be referred to as the transmit port and ports 2 through 6 will be referred to as the receive ports. In bridge 2, port 1 will be referred to as the receive port and ports 2 through 6 will be referred to as the transmit ports.

3.03 The 420 module usually finds service on computer-controlled data networks. In such an application, bridge 2, port 1 is assigned to the transmit terminal of a master computer. This port would receive the signal flow from the main computer and directly couple it through the resistive network which transmits this data signal to external circuits.

3.04 Using bridge 1 as an example, the data signal is received on ports 2 through 6 and is routed through the resistive network to port 1 which transmits this data to the master computer.

4. INSPECTION

4.01 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.

4.02 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.

5. MOUNTING

5.01 The 420 is designed to mount in one module position of a Type 400 Mounting Assembly. Type 400 Mounting Assemblies are available in capacities of 1 to 13 modules and allow for either KTU apparatus-case or relay-rack mounting. The Wescom 15A KTU apparatus case is equivalent to WECo 31B and the Wescom 16C is equivalent to WECo 16C.

6. INSTALLER CONNECTIONS

6.01 When the 420 module is installed in a Type 400 Mounting Assembly, it makes electrical connection to associated equipment through a 56-pin, wire-wrapped card-edge connector provided as part of the mounting assembly. Make all installer connections to this connector in accordance with Table 1.

CAUTION

Remove power from the equipment prior to making electrical connections and before installing modules into the mounting assembly.

7. OPTIONS

7.01 The 420 Dual 2-Wire/6-Way Bridge is equipped with option posts, allowing it to be operated as a dual 2-wire/5-, 4-, or 3-way bridge. When these option posts are strapped, they connect a 600-ohm resistor across unassigned ports, thereby terminating the unassigned ports.

7.02 The 420 module is factory conditioned with ports 4, 5, and 6 terminated. If it becomes necessary to assign equipment to ports 4, 5, and 6, refer to Figure 5, which shows strapping option locations and remove the appropriate straps according to the following paragraphs. The following information is applicable to both bridges when consideration is made for the difference in installer connections.

7.03 If a 4-way bridge is required, remove the straps from port 4 and make the installer connections as indicated in Table 1.

7.04 If a 5-way bridge is required, remove the straps from ports 4 and 5 and make the installer connections as indicated in Table 1. If a 6-way bridge is required, remove the straps from ports 4, 5, and 6; make the installer connections as indicated in Table 1.

Table 1. 420 Installer Connections

INSTRUCTION	SCHEMATIC DESIGNATION	56-PIN CONNECTOR ASSIGNMENT
Connect:		To:
BRIDGE 1		
Line 1 T&R	PORT NO. 1; TT, TR	5, 3
Line 2 T&R	PORT NO. 2; RT, RR	10, 12
Line 3 T&R	PORT NO. 3; RT, RR	22, 24
Line 4 T&R	PORT NO. 4; RT, RR	26, 28
Line 5 T&R	PORT NO. 5; RT, RR	46, 48
Line 6 T&R	PORT NO. 6; RT, RR	55, 56
BRIDGE 2		
Line 1 T&R	PORT NO. 1; RT, RR	1, 2
Line 2 T&R	PORT NO. 2; TT, TR	4, 7
Line 3 T&R	PORT NO. 3; TT, TR	8, 6
Line 4 T&R	PORT NO. 4; TT, TR	51, 53
Line 5 T&R	PORT NO. 5; TT, TR	40, 39
Line 6 T&R	PORT NO. 6; TT, TR	13, 11

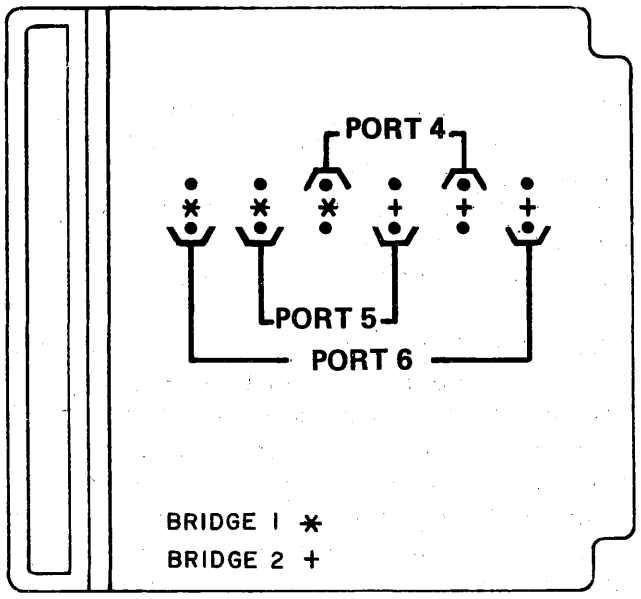


Figure 5. 420 Dual 2-Wire/6-Way Option Locations

NOTE

If test jacks are desired, the 428 jack panel may be used to obtain access to the ports on the 420 Conference Bridge. It incorporates 12 front panel jacks for access to each port. However, the 428 is a separate 400 type module and therefore, it is not included as part of the 420 module.

8. TESTING

8.01 If trouble is encountered with the operation of the 420 module, verify that all installer connections have been properly made in accordance with Table 1 and that all options have been added or removed, as required. Make certain that the module is making good connection with the mounting-assembly card connector; remove and reinsert the module. If trouble persists, attempt to determine whether the cause of malfunction exists within the 420 module or elsewhere in the system. If technical assistance is required, contact the Wescom Technical Services Department by calling:

(312) 971-2010,
TWX 910-695-4735, or
DATAPHONE (312) 971-1698.

Canadian Customers:
(416) 453-2222 or
TWX 610-492-2697.

9. WARRANTY

9.01 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 WHATEVER, EXPRESSED OR IMPLIED; AND ALL IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE AFORESAID OBLIGATIONS IS HEREBY DISCLAIMED BY WESCOM.

9.02 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.

9.03 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 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.
287 Glidden Road
Brampton, Ontario L6W1H9
Canada

9.04 **Repair or Exchange Services**

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 for either complete repair and quality testing or exchanged for a replacement unit. To obtain details of this service and a schedule of prices, contact your local Wescom Sales Representative.

10. SPECIFICATIONS

10.01 Electrical and physical characteristics of the 420 Dual 2-Wire/6-Way are as follows:

(a) INPUT/OUTPUT PORTS: Six (dual).

(b) INPUT/OUTPUT IMPEDANCE: 600 ohms, balanced.

(c) TWO-WIRE RETURN LOSS: Greater than 25dB.

(d) INSERTION LOSS: 14.0dB, nominal.

(e) MAXIMUM INPUT LEVEL: +20dBm.

(f) FREQUENCY RESPONSE: 100Hz to 20kHz, ±0.25dB.

(g) ENVELOPE DELAY: Less than 2us.

(h) ISOLATION BETWEEN BRIDGES: Greater than 70dB.

(i) OPERATING ENVIRONMENT: Temperature, 35° to 120°F (1.5° to 48°C); humidity 0 to 95% (no condensation).

(j) WEIGHT: 4 oz (114g).

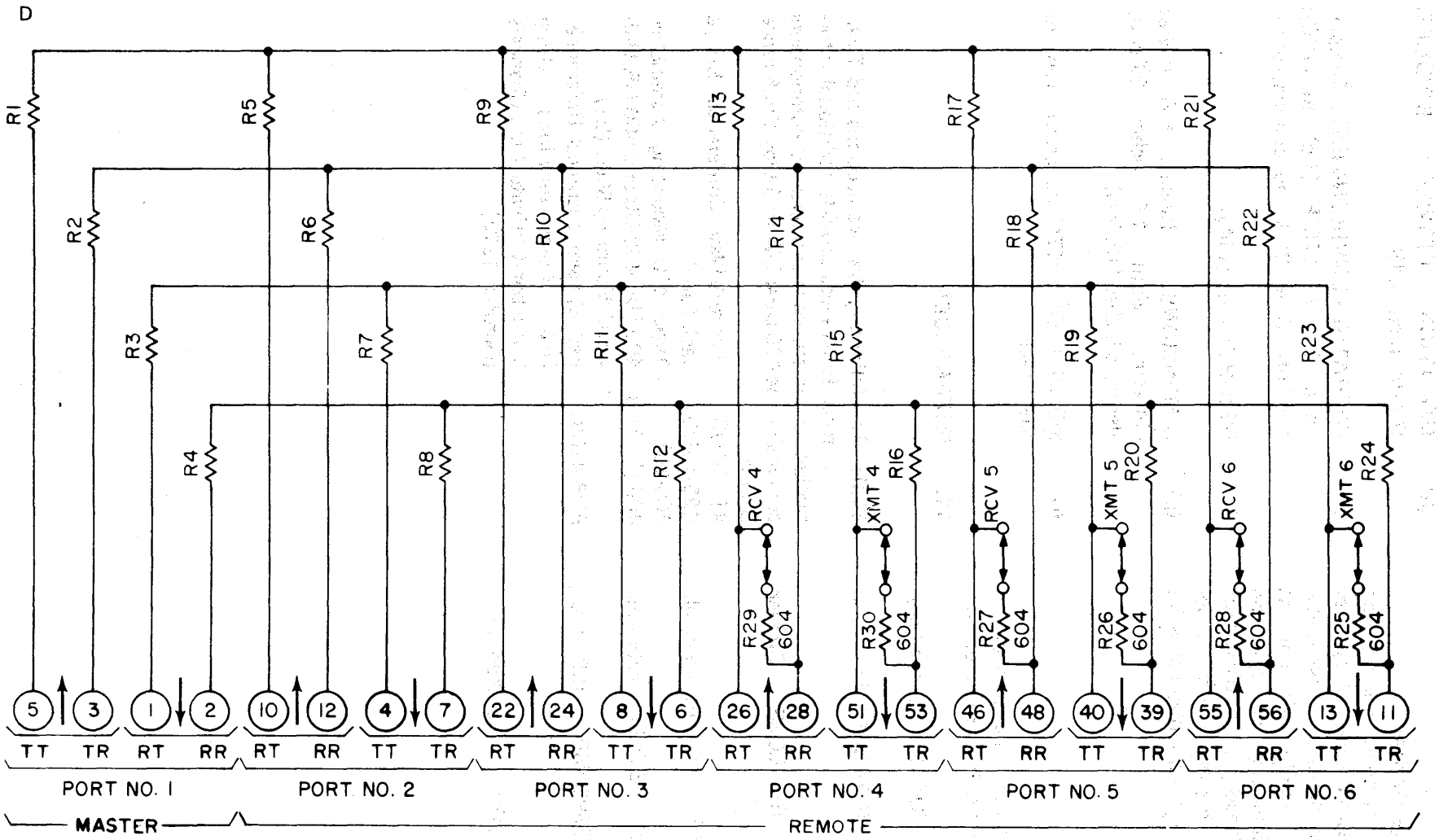
(k) DIMENSIONS: Height, 5.6 inches (14.2cm); width, 1.5 inches (3.8cm); depth, 6 inches (13.2cm).

(l) MOUNTING: KTU apparatus case or relay rack.

11. REFERENCES

11.01 The following Practice Sections and Technical References provide additional information on the standard and optional components comprising the 420 Dual 2-Wire/6-Way Conference Bridge.

419-101/3	2-Wire/8-Way Conference Bridge
428-101/3	Jack Panel
400-103	Type 400 Mounting Assemblies
400-U-101/3	400-UA, 400-UB and 400-UR Universal Mounting Shelf (ES)
PUB 41004	Bell Syetem Technical Reference: Data Communications Using Voice-band Private Line Channels (October 1973)



NOTES:

1 – ALL RESISTORS ARE 200Ω 1/2 WATT, ± 1% UNLESS OTHERWISE SPECIFIED.
2 – BRIDGE IMPEDANCE: 600 OHMS.
3 – PORT-TO-PORT INSERTION LOSS: 14 DB
4 ⟷ FACTORY STRAP

Figure 6. 420 Dual 2-Wire/6-Way Conference Bridge Schematic Diagram