

# 417 Dual Voice Operated Switch Module

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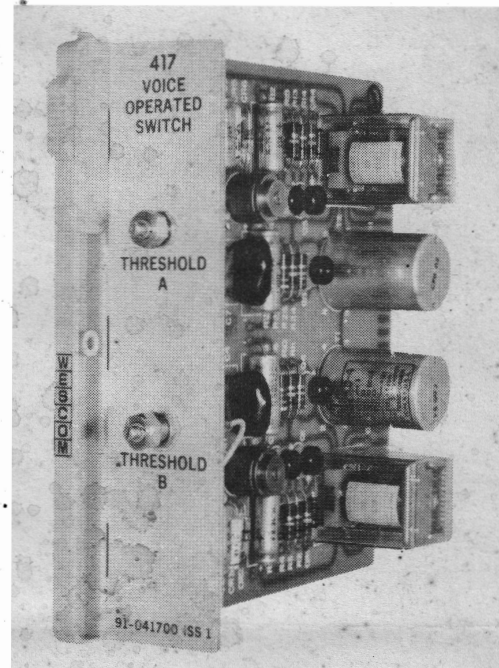


Figure 1. 417 Dual Voice Operated Switch Module.

## 1. GENERAL

1.01 This Section provides circuit description, installation, and basic testing information for the Wescom 417 Dual Voice Operated Switch Module.

1.02 The 417 Voice Operated Switch (Figure 1) is a plug-in, printed-circuit module which responds to voice signals present on a telephone line to operate a relay providing transfer contacts which may be used to operate visual or audible busy indications as required. The 417 module provides two independent and identical voice operated switching circuits.

1.03 Features provided by the 417 model are:

- (a) Transistorized circuitry and other state-of-the-art components, used wherever possible to reduce space requirements, power consumption, and maintenance, while increasing reliability.

- (b) Plug-in module construction to allow the application of the substitution approach which assures rapid servicing of the equipment and provides for minimum downtime.

1.04 The 417 is constructed as a plug-in module designed to mount in one position of the Wescom Type 400 Mounting Assembly. Type 400 Mounting Assemblies are available in capacities of from 1 to 13 modules and allow for either KTU apparatus-case or relay-rack mounting. The 417 module makes electrical connection to the system through one of the 56-pin, wire-wrap connectors provided as part of the mounting assembly.

## 2. SPECIFICATIONS

2.01 Specifications describing the electrical and physical characteristics of the 417 are as follows:

- (a) RELAY OPERATING TIME: 5-10 ms.
- (b) HANGOVER TIME: Adjustable from 3 to 5 sec. (nominal).
- (c) SENSITIVITY: Overall input threshold sensitivity control 0 to -40dBm at 600 ohms.
- (d) POWER REQUIREMENTS: -24 VDC Nominal; max idle current drain 25 ma, max operating current drain 75 ma.
- (e) OPERATING ENVIRONMENT: Temperature; 0° to 120° F, Humidity 10 to 100% (no condensation).
- (f) WEIGHT: 12.5 oz. (2.28 lbs including one-position mounting assembly).
- (g) MAXIMUM SWITCHED CURRENT: 3 amperes per contact, non-inductive.
- (h) BRIDGING IMPEDANCE: 10k ohms min.
- (i) MOUNTING: KTU apparatus case or relay rack.
- (j) DIMENSIONS: Height, 7 inches; Width, 1-13/16 inches; Depth, 7-3/8 (including one-position mounting assembly).

### 3. INSPECTION

3.01 Inspect the equipment thoroughly, as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately. If the equipment is to be stored for some time before installation, make an operational check at once. The purpose of this check is to make sure that the equipment is in proper working order as received from the factory. If this check indicates satisfactory performance, the equipment may be stored for future installation. If the System is to be installed at once, make an operational check after the installation is completed.

3.02 Wescom equipment is specifically identified by the model number and final-assembly number silk screened on the front panel of the plug-in module. At the start of production, the final-assembly number is assigned an issue number of 1 which becomes an integral

part of the final-assembly number. After the start of production, this issue number is advanced each time a major engineering change occurs. Therefore, be sure to use the model number and final-assembly number when making inquiries about the equipment. The issue number of the instruction manual and schematic diagram attached should be the same as the issue number assigned to the equipment. If a one-to-one correspondence does not exist between these items request from Wescom the instruction manual required for your equipment.

### 4. MOUNTING

4.01 Type 400 mounting assemblies are available in capacities of 1 to 13 modules and may be equipped and prewired to combine the 417 into a system with other modules from the Wescom product line.

#### KTU apparatus case mounting

4.02 Type 400-1 (one-module) through 400-5 (five-module) Mounting Assemblies may be installed in a 15A (equivalent to W.E. Co. 31B) KTU apparatus case. Type 400-1 through 400-13 Mounting Assemblies may be installed in a 16C (equivalent to W.E. Co. 16C) KTU apparatus case.

#### relay rack mounting

4.03 Type 400-1 through 400-9 Mounting Assemblies require the use of mounting bars, when mounted on either a 19- or 23-inch relay rack. 400-10 and 400-11 Mounting Assemblies are provided with mounting brackets for mounting directly across 19-inch relay racks. Type 400-12 and 400-13 Mounting Assemblies are also provided with mounting brackets for 23-inch relay rack mounting.

4.04 Because Type 400-1 through 400-9 Mounting Assemblies must be installed on mounting bars, 7 inches of vertical space (four-mounting spaces) are required for relay-rack mounting. Type 400-10 through 400-13 Mounting Assemblies, however, are provided with mounting extensions located on the sides of the mounting assembly and require only 6 inches of vertical rack space. Install the mounting assembly in a KTU apparatus case or on a relay rack (as described above) with mounting hardware provided.

**universal shelf mounting**

4.05 When a high degree of flexibility is required to provide for new circuit arrangements as well as circuit rearrangements, the 417 may be mounted in a Wescom Universal Shelf. The Universal Shelf permits all intermodule wiring and installer connections to be made at the front of the mounting assembly and provides maximum accessibility to these connections when changes are required. The Type 400UA-11 and 400UB-11 Universal Shelves provide mounting positions for for up to 11 modules and are designed for mounting in a 19-inch relay rack. Type 400UA-13 and 400UB-13 Universal Shelves provide mounting positions for up to 13 modules and are designed for mounting in a 23-inch relay rack.

**5. INSTALLER CONNECTIONS**

5.01 When the 417 is installed in a type 400

mounting assembly, the module makes electrical connection to associated equipment through a 56-pin, wire-wrap card connector provided as part of the mounting assembly. Make all installer connections to this connector in accordance with Table 1.

5.02 Type 400UA-11 and 400UA-13 Universal Shelves provide terminal block locations above the mounting assembly, whereas Type 400UB-11 and 400UB-13 Universal Shelves provide terminal block locations below the mounting assembly. When the 417 is installed in a universal shelf, make all installer connections to these terminal blocks in accordance with Table 1 and the cabling diagram on the back of the schematic.

**CAUTION:** Do not make any connections with power applied to the equipment.

Table 1. 417 Installer Connections

INSTRUCTION	56-PIN CONNECTOR ASSIGNMENT
<b>Connect: CIRCUIT A</b>	<b>At:</b>
Inputs	23,15
K1,4 thru 6 relay outputs	
*NC	9
*TC	11
*NO	13
K1,1 thru 3 relay outputs	
*NC	7
*TC	5
*NO	3
<b>CIRCUIT B</b>	
Inputs	33,31
K2, 4 thru 6 relay outputs	
*NC	49
*TC	51
*NO	53
K2, 1 thru 3 relay outputs	
*NC	47
*TC	45
*NO	43
<b>CIRCUIT A &amp; B</b>	
-24V	35
GRD	17
*NOTE: NC means normally closed when de-energized, TC means transfer contact, NO means normally open when de-energized.	

**inserting modules**

5.03 After completing all installer connections, insert the 417 module into the mounting assembly.

**CAUTION:** Do not force any module into place. If a module encounters excessive resistance while being installed, remove the module and check the card guides and connector for improper alignment or the presence of foreign particles.

**6. LINE-UP**

6.01 The alignment procedure for the 417 Dual Voice module consists of setting the threshold, and hangover controls. The sensitivity controls are located on the front panel while the hangover controls are located on the printed circuit board.

6.02 The test equipment (or functional equivalent) required to properly align the 417 Dual Voice Amplifier is as follows:

- (a) AC Voltmeter calibrated in dBm: Hewlett Packard 400 FL.
- (b) Variable Frequency Oscillator (VFO): Hewlett Packard 200 CD.

**sensitivity adjustment**

6.03 Perform the sensitivity adjustment procedure for the 417 dual voice operated switch as follows:

- (1) Connect the AC voltmeter across the input of circuit A.
- (2) Apply 1k-Hz test tone of variable amplitude across the input.
- (3) Adjust the front panel pot, R22 fully counter clockwise.
- (4) Adjust the test tone oscillator to produce -50 dB on the meter.
- (5) Increase the amplitude of the 1k Hz test tone slowly, noting the amplitude at which relay RLY 2 energizes. This should occur at -40 dB minimum.
- (6) Now set the test tone to the sensitivity

level required.

- (7) Adjust R22 clockwise slowly until RLY 2 de-energizes. Reverse rotation and adjust R22 carefully until RLY 2 just becomes energized.
- 6.04 Adjust the Hangover time for the 417 Module as follows:
- (1) Rotate R16 fully clockwise.
  - (2) Remove the input test tone.
  - (3) A minimum of 3 seconds should elapse before relay RLY 2 de-energizes.
  - (4) Turn R16 counterclockwise as required to shorten hangover time.

**7. CIRCUIT DESCRIPTION**

7.01 The 417 Dual Voice module has two identical voice operated switching circuits. The following circuit description entails only one switching circuit. Refer to the attached 417 schematic diagram during the following discussion.

**idle circuit condition**

7.02 During the quiescent condition, Q8 and Q7 are conducting idle current with no input signal to the amplifier. Q6 and Q5 are turned off and relay RLY 2 is de-energized.

**circuit operation**

7.03 Voice frequency signals received are coupled through transformer T2 to the base of Q8. Amplified signals from the collector of Q8 are coupled through R22, a threshold sensitivity control, to the base of Q7. From the collector of Q7, amplified voice frequency signals are applied to a rectifier circuit composed of C8, CR5, CR6 and C10. The rectified output turns on Q6, which turns on Q5 to energize relay RLY 2.

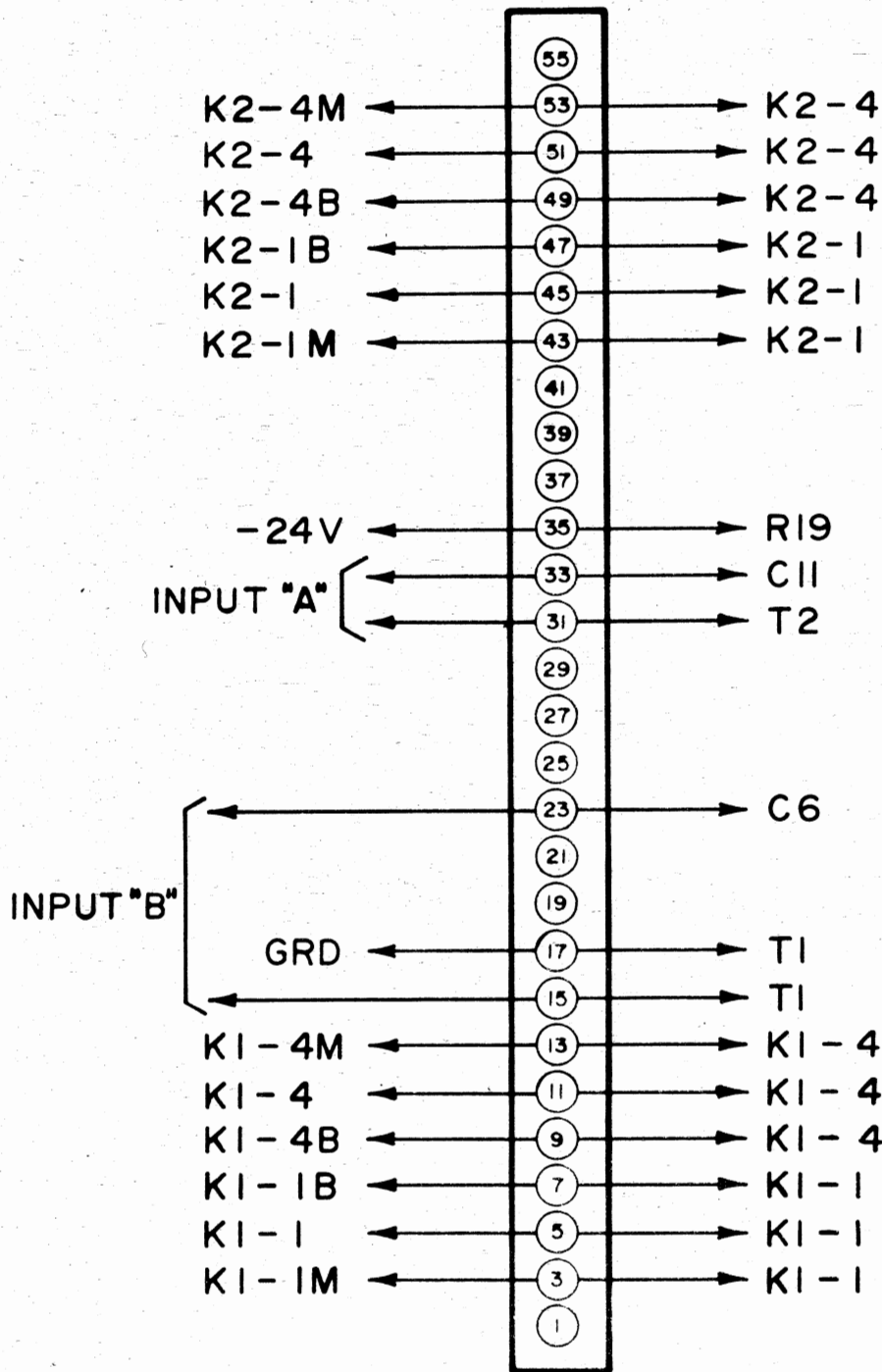
7.04 When a train of voice frequency input signals terminates, the output at the collector of transistor Q7 also terminates. C10 begins to discharge at a rate which is determined by potentiometer R16. R16 and C10 comprise the hangover circuit which determines how long relay RLY 2 will stay energized after the input signal ceases.

8. TESTING

8.01 If trouble is encountered with the operation of the 417 module, check the supply voltages for the proper potential. Make certain the installer connections are correct and that the module is making good connection with the mounting assembly card connector. If

failure persists return the module to Wescom for repair.

8.02 Field repairs involving replacement of components within a module are not recommended. All Wescom systems and component boards are warranted for 1 year from the date of purchase. Return to Wescom, Inc., 501 Rogers Street, Downers Grove, Illinois 60515. For technical assistance, call 312-971-2010 or TWX 910-695-4735.



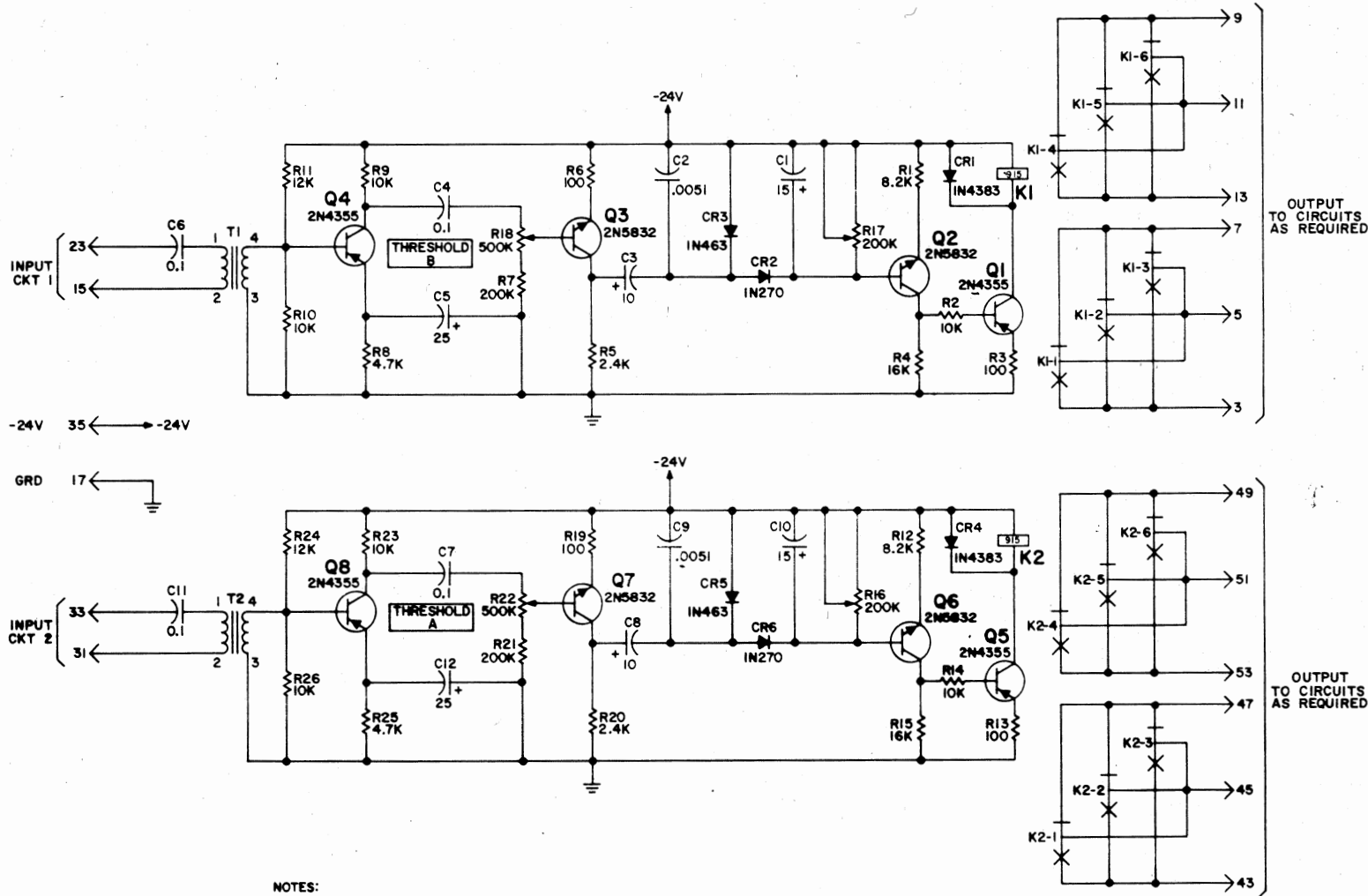
CAD DRAWING FOR 417 VOICE OPERATED BUSY SWITCH

1	1-19-71	CORRECTED DESIGNATION	RAR
REV NO.	DATE	E.C.O. NO.	BY
THIS PRINT IS THE PROPERTY OF WESCOM INC. AND SHALL NOT BE REPRODUCED, COPIED OR USED IN ANY MANNER DETRIMENTAL TO THEIR INTERESTS.			
DRAWN	RP	CHKD	APVD
MODEL		SCALE	NONE
DATE	12-9-70	SIZE	A
DRW NO.	393-000040		

TOLERANCES	UNLESS NOTED	MAT'L
.X ± .020	R.C.C./MECH. ± .010	FRESH
.XX ± .010	FRACTIONAL ± 1/32	
.XXX ± .005	ANGULAR ± 0°-30'	

**WESCOM** INC.

501 ROGERS  
DOWNERS GROVE  
ILL. 60518



NOTES:

1. UNLESS OTHERWISE SPECIFIED:  
ALL RESISTORS ARE IN OHMS, ±5%, 1/2 WATT.  
ALL CAPACITORS ARE IN UF.
2. [XX] DENOTES FRONT PANEL DESIGNATIONS.
3. —X— DENOTES NORMALLY OPEN RELAY CONTACT.
4. —|— DENOTES NORMALLY CLOSED RELAY CONTACT.
5. POTENTIOMETERS R18 AND R22 PROVIDE SENSITIVITY CONTROL.
6. POTENTIOMETERS R16 AND R17 PROVIDE VARIABLE HANGOVER TIME.

MODEL 417  
DUAL VOICE OPERATED SWITCH  
SCHEMATIC DIAGRAM

UNLESS OTHERWISE SPECIFIED	SCALE
.X ± .002	P.C.C./MESH ± .002
.XX ± .010	FRACTIONAL ± 1/32
.XXX ± .006	ANGULAR ± 6°-30'

**WESCOM** INC.

501 ROGERS  
BOWERS GROVE  
K.L. 0000

C	10-27-72	ECO 2209	AJM
B	10-9-70	Q2, Q3, Q6, AND Q7 WERE 2N3568	WPA
A	10-28-69	REL TO PROD	RDV
REV. NO.	DATE	ECO. NO.	BY
417	10-9-70	ISS: 1	SCALE
DATE	10-9-70	SIZE	C

191-041700