MITEL CM7065

PRECISE DIAL TONE GENERATOR

INSTALLATION AND TESTING

STEP-BY-STEP OFFICES

1. GENERAL

1.01 This section is a cover sheet for the Mitel CM7065 Precise Dial Tone Generator, section MITL7065-22-200. GAEL 1914 authorizes the use of this equipment in the Pacific Company.

1.02 (Reserved for future use)

1.03 The CM7065 is a precise dial tone generator with redundant circuit operation. It is intended for use in 350, 355, 360 and XY community dial offices (CDO), as well as No. 1 step-by-step (SXS) offices.

1.04 If corrections are required in the manufacturer's instruction, use Form E3973-1PT 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 010-700-011PT for procedure on how to file an Engineering Complaint for General Trade Products (GTPs).

1.06 When revised instructions reflect changes due to modification of equipment, retain the superseded information until equipment is modified.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 or modification of components within this unit are not recommended.

2.02 Refer to the attached manufacturer's instruction for installation, operating and trouble-shooting procedures for the CM7065 Precise Dial Tone Generator.

3. ORDERING PROCEDURES

3.01 Order Mitel equipment direct from the manufacturer.

Mitel Incorporated
5600 South Syracuse Circle, Suite 201A
Englewood, CO 80110

3.02 When ordering Mitel equipment, use the Purchase Order Form GTP 2 as specified in SI 70, Section 2. Enter contract No. *78-44* on all orders. Send the blue copy of the Purchase Order as follows:

- For Northern California and Nevada —

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

- For Southern California —

  RPO
  2420 Yates Avenue, Room 210
  Commerce, CA 90040

Note: Detailed ordering information is contained in GAEL 1914 and the GTP Catalog.

4. REPAIR/RETURN

4.01 Mitel Incorporated provides a factory repair service. All defective units must be returned to the Mitel factory for repair.

4.02 A Mitel repair request card must be filled out and accompany the unit(s) being returned for repair. Returned unit(s) are to be shipped transportation prepaid to:

Mitel Incorporated
St. Lawrence Industrial Park
Ogdenburg, NY 13669
Attention: Service Department

4.03 Mitel CM7065 equipment has a warranty period of two years plus one month from date of shipment. The warranty on a repaired unit is for the remainder of the original warranty or 90 days, whichever is longer.

Note: A flat rate repair charge of $15.00 per card will be made for units requiring repair *after* the warranty has expired.

4.04 Under no conditions are field repairs to be attempted. To do so, renders the warranty null and void.

Attachment:

Mitel Corporation Standard Practice, Section MITL7065-22-200, Issue 1, October 1978

CM7065 PRECISE DIAL TONE GENERATOR UNPACKING, IDENTIFICATION INSTALLATION, TESTING, OPERATING INSTRUCTIONS, AND TROUBLESHOOTING

PART PAGE

1. GENERAL

1.01 This Section contains instructions for unpacking and identification of parts, installation, testing, operating and troubleshooting the MITEL CM7065 PRECISE DIAL TONE GENERATOR.

1.02 A separate Section, MITL7065-22-150, contains the general description, physical description, principle of operation, applications, specifications and ordering information.

2. UNPACKING AND IDENTIFICATION OF PARTS

CAUTION: STATIC SENSITIVE DEVICES
Circuit cards contain static sensitive devices and must be handled with care, using the front panel handle and where necessary, the card side edges.

2.01 Unpack all materials. Verify that the type and quantities received are correct according to the shipping list. The normal packing and shipping arrangement for a CM7065 is shown in Fig. 1. The rack mounting bracket hardware is located in a cutout in the upper foam packing piece. Parts are identified in Fig. 2.

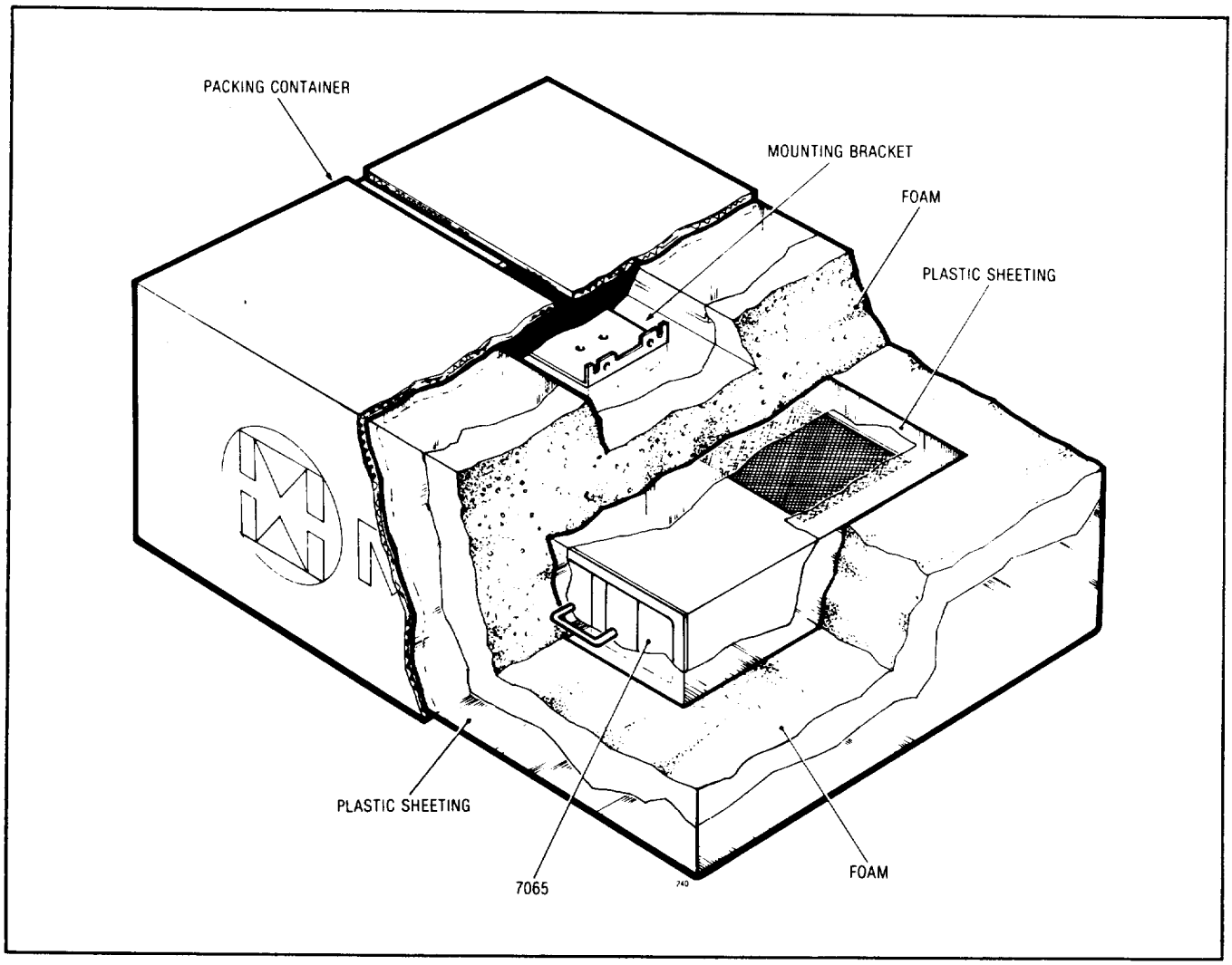

Fig. 1 CM7065 Packing

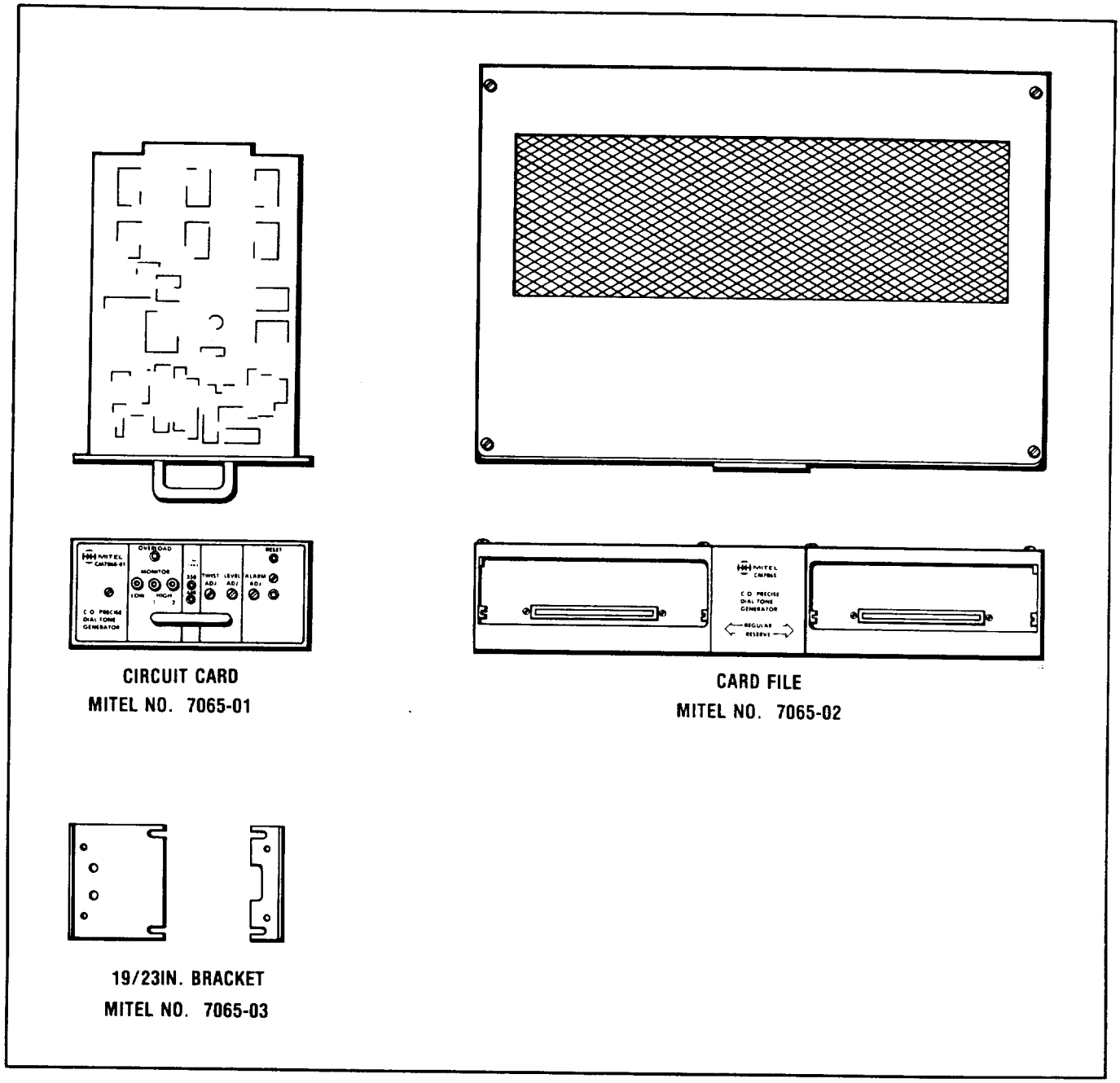

Fig. 2 Part Identification

2.02 For reordering purposes, descriptions and part numbers of individual parts are as follows:

Description	Part Number
Precise Dial Tone Generator complete with: Card file, backplane, output transformers, preloading capacitors, and two generator cards and two 19/23in. brackets.	CM7065-00
One tone generator card for use in Regular or Reserve position	CM7065-01
Card file complete with backplane, transformers, preloading capacitors and two 19/23in. brackets.	CM7065-02
One 19/23in. bracket	CM7065-03

3. INSTALLATION

A. Installation Material, Tools and Test Equipment

3.01 Before beginning installation of the card file, the following should be available:

- 20 AWG cable; pairs for power connections and dial tone output connections; triple for alarm connections
- Wire wrapping tools
- Screwdriver or wrench to fit rack mounting screws
- Screwdriver, flat bladed, 5/16th in., for attaching rack mounting brackets to card file
- Screwdriver, flat bladed, 3/16th in., for making card adjustments
- True RMS Voltmeter: Fluke type 8921A or equivalent
- Multimeter: AVO or equivalent

B. Card File Installation

3.02 Remove the dial tone generator circuit cards from the card file and store in a safe place. Do not refit until all card file wiring has been installed and tested.

19/23in. Brackets and Rack Mounting

3.03 The two brackets supplied can be used to mount the card file into a nineteen inch rack, or a twenty-three inch rack. There are also two configurations for each type of rack mount.

3.04 **Nineteen Inch Rack:** Refer to Fig. 3 and select the mounting configuration required. Attach each bracket using two of the screws provided, and using the 5/16th in. flat bladed screwdriver.

3.05 **Twenty-Three Inch Rack:** Refer to Fig. 4 and select the mounting configuration required. Attach each bracket using two of the screws provided, and a 5/16th in. flat bladed screwdriver.

3.06 Using suitable screws and a screwdriver or wrench, secure the card file to the rack.

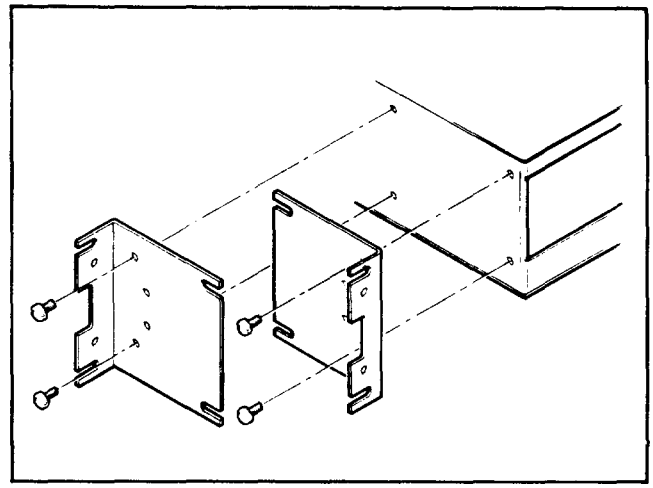

Fig. 3 Bracket Attachment 19 in. Rack Mounting

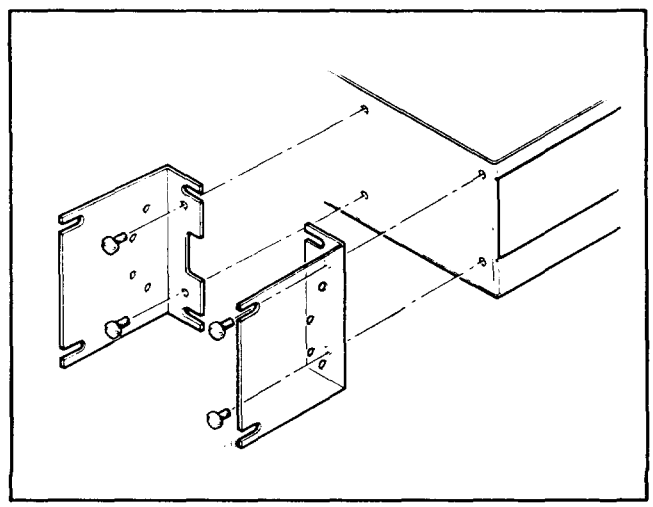

Fig. 4 Bracket Attachment 23 in. Rack Mounting

Wiring

3.07 All connections to the generator are made at the rear of the card file on the backplane. The method of connection is wire wrapping. A general view of the backplane is shown in Fig. 5. Typical unit connections are shown in Fig. 6. Connections should be made only to the posts shown in Table 1.

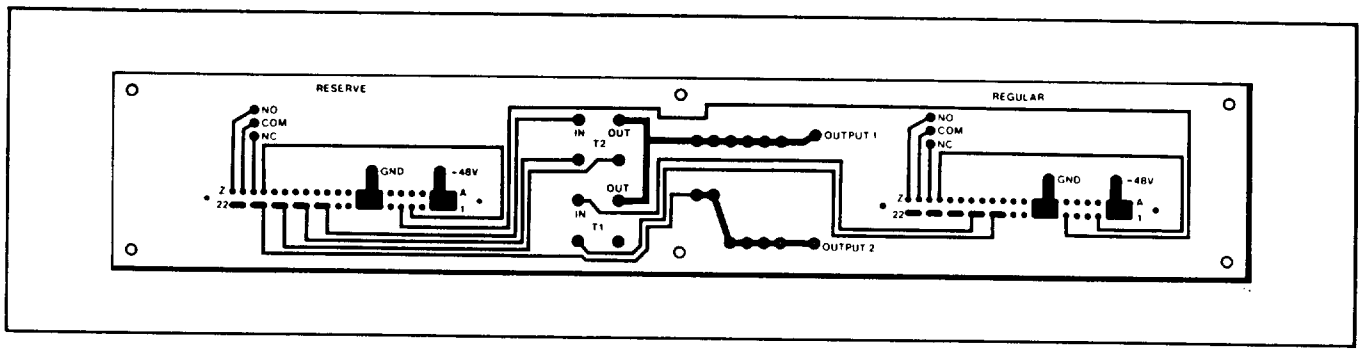

Fig. 5 Backplane Connections

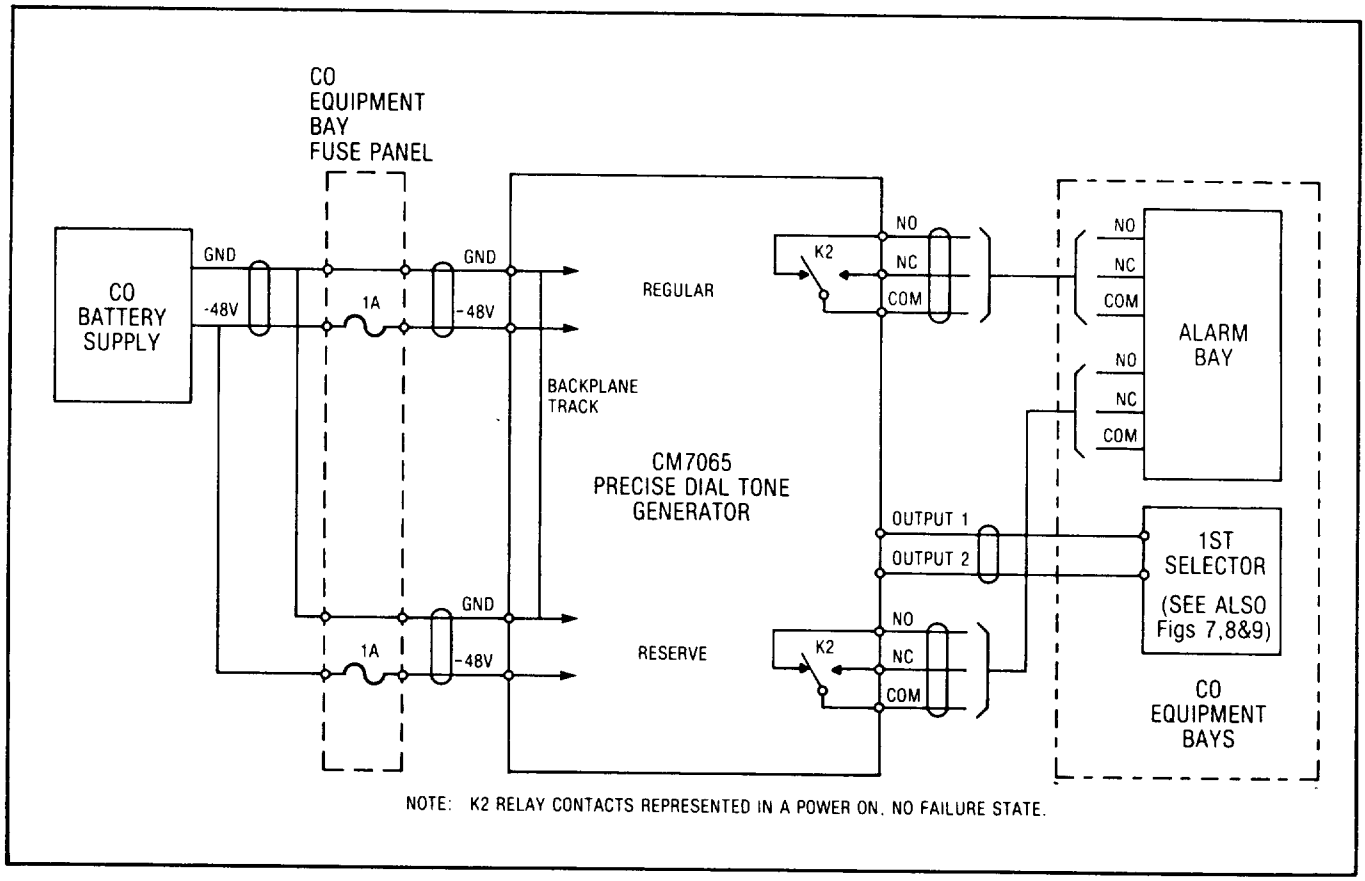

Fig. 6 Typical Connections

Output Connections

3.08 The output of the dial tone generator can drive up to a maximum of seventeen first selector dial tone transformers. A bussing arrangement to interconnect the transformer primaries should be implemented at the first selector equipment bay. Since the CM7065 contains a preloading circuit to tune the primary of the dial tone transformer, no additional external components are required.

TABLE 1
WIRE TAP CONNECTIONS

Generator Position	Designation	Function
REGULAR/RESERVE	OUTPUT 1 OUTPUT 2	Dial tone outputs for both generators
REGULAR	GND −48V	Ground and -48V supply input from fused CO supply
	NO NC COM	Changeover relay contacts for CO alarm system
RESERVE	GND −48V	Ground and −48V supply input from fused CO supply
	NO NC COM	Changeover relay contacts for CO alarm system

3.09 Output connections made depend on the type of CO equipment. Connections to Western Electric equipment are shown in Fig. 7; to Automatic Electric equipment in Fig. 8; and to Stromberg Carlson equipment in Fig. 9.

Alarm Connections

3.10 Connections to a set of changeover relay contacts for Regular, and Reserve generators are provided at the backplane. A typical wiring arrangement is shown in Fig. 6. The different relay state combinations are shown in Fig. 10 and are summarized in Table 2. K2 relay contact rating is:

48Vdc 8 Amps
110Vac 8 Amps

Connection Sequence

3.11 The recommended sequence for connecting the card file is as follows.

3.12 **Preliminary Operations:** Install the card file into the rack as described in 3.02 through 3.06.

3.13 **Alarm Connections:** Run two triples from the rear of the generator to the point of connection to the alarm circuits in the alarm bay. At the backplane of the generator, connect the first triple to the REGULAR NC, NO and COM wire wrap posts, and the other triple to the RESERVE NC, NO and COM wire wrap posts. Taking note of the color code observed at the generator backplane, connect the other ends of the triples to the alarm equipment.

3.14 **Power Connections:** Make the power connections as follows:

(a) Run two pairs from the rear of the generator to the nearest fuse panel. At the backplane, connect one pair to the REGULAR GND and −48V wire wrap posts and the other to the RESERVE GND and −48V wire wrap posts.

(b) At the fuse panel; remove the fuse holders, and connect the pairs to the GND and fused −48V terminals observing the color code used at the GND and −48V posts at the card files.

(c) Equip the fuse holders with 1 Amp 3AG type fuses and fit into fuse panel.

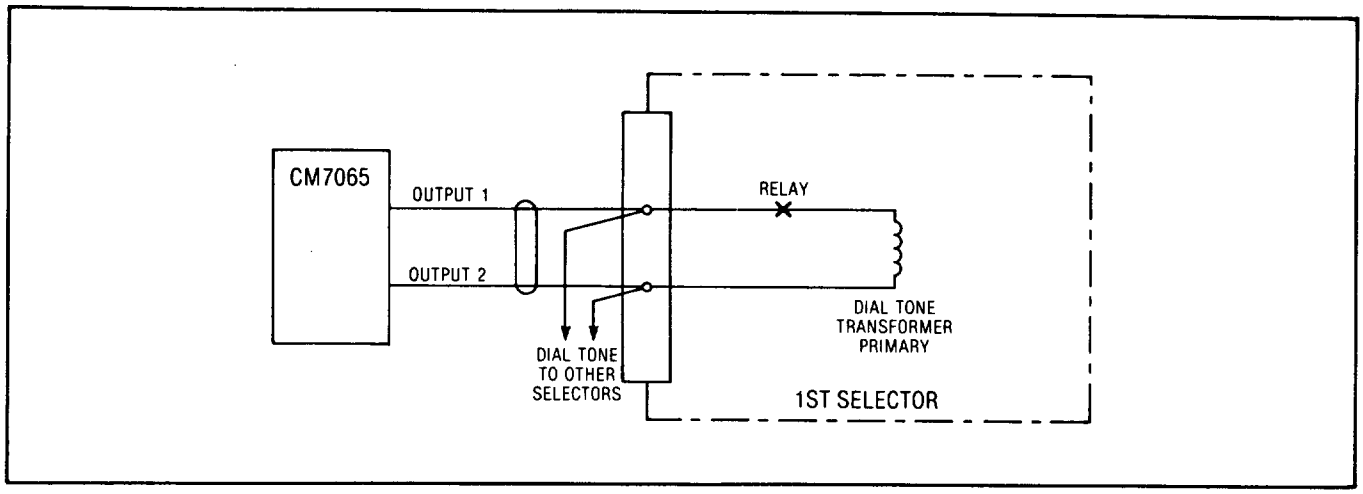

Fig. 7 1st Selector Connections: Western Electric

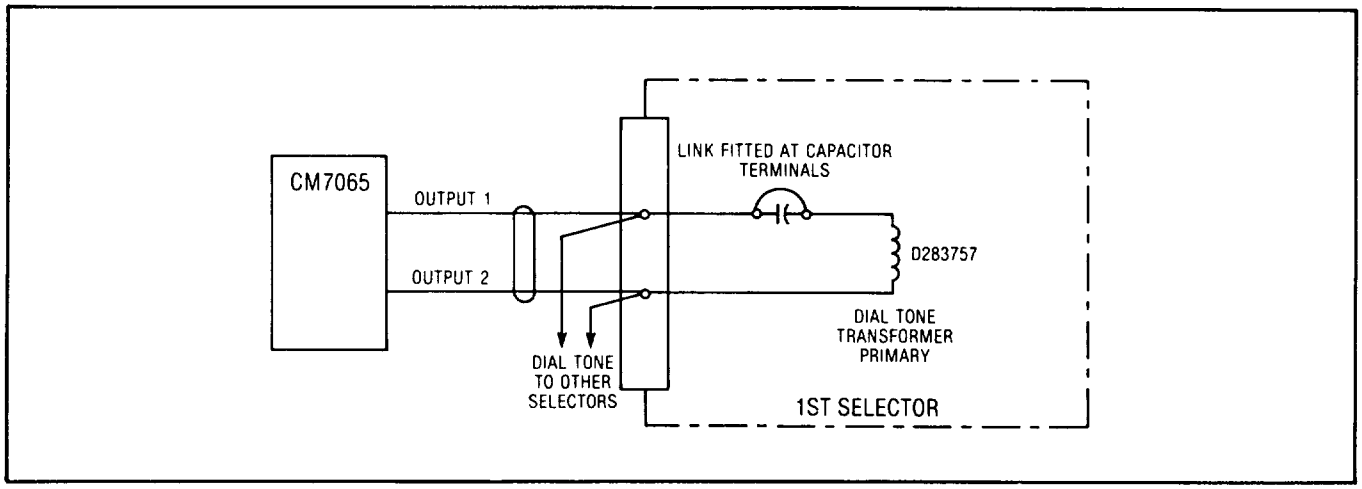

Fig. 8 1st Selector Connections: Automatic Electric

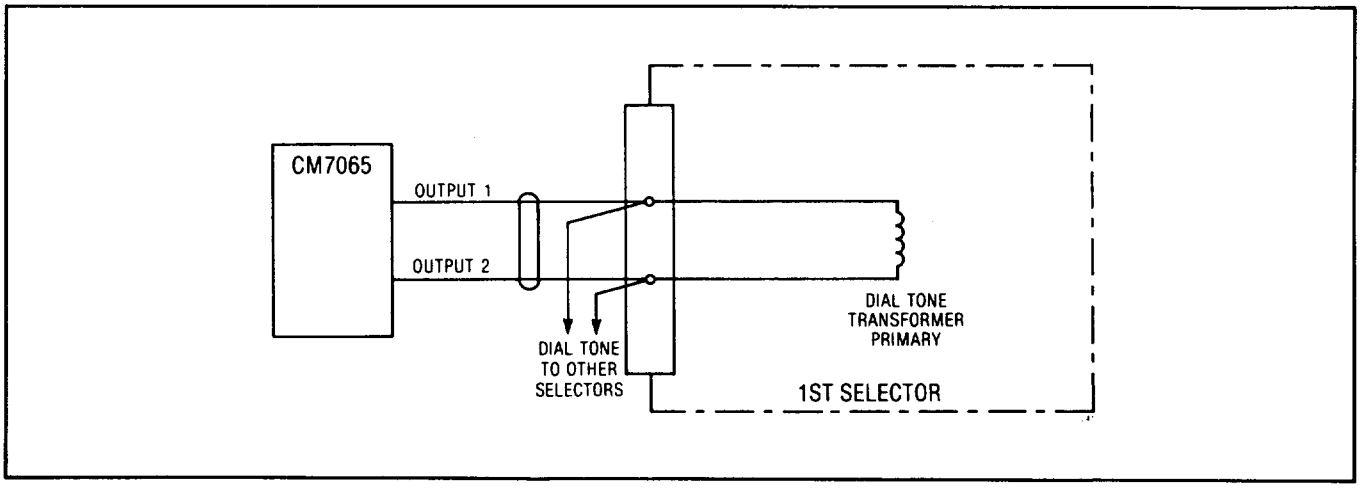

Fig. 9 1st Selector Connections: Stromberg Carlson

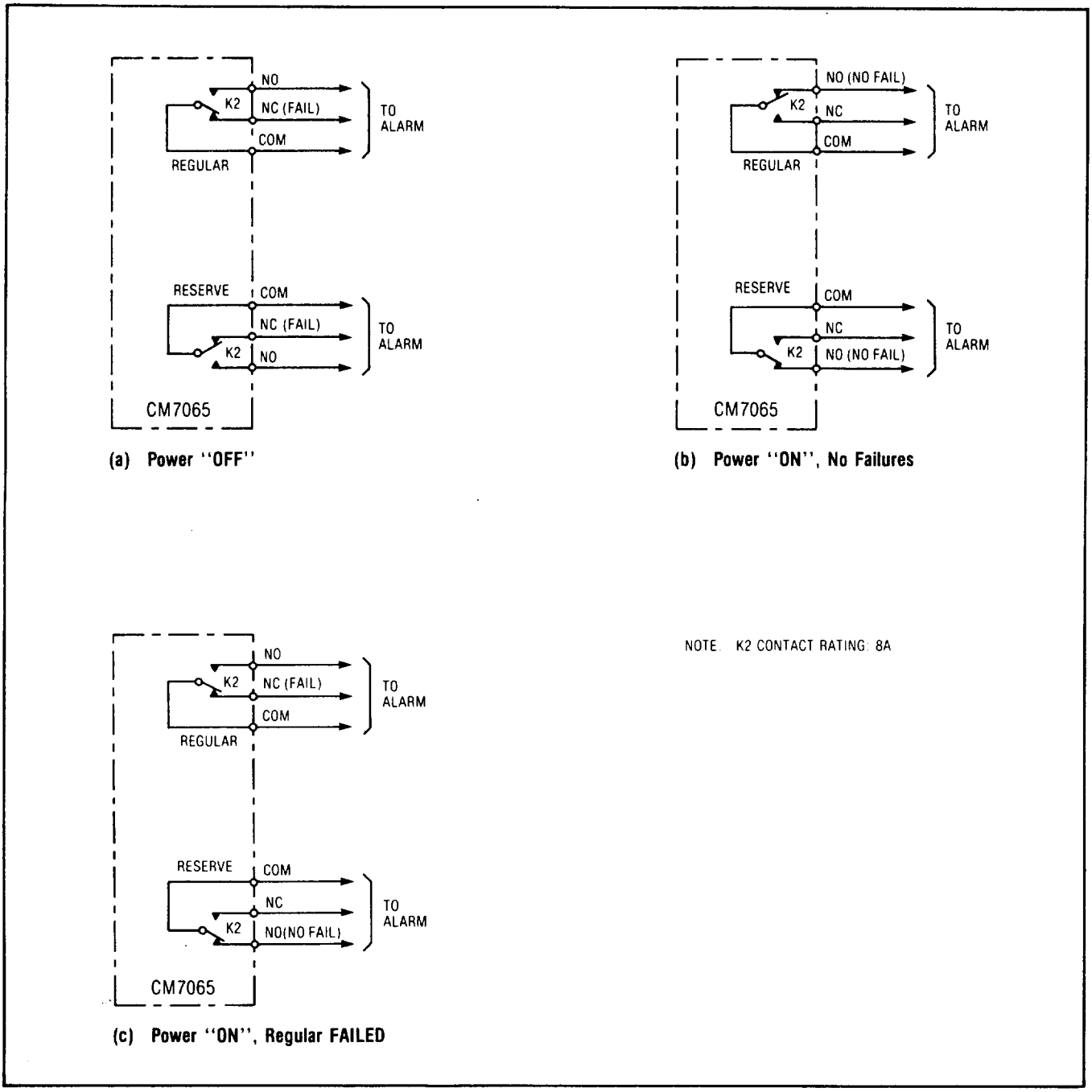

Fig. 10 Alarm Relay States

TABLE 2
ALARM RELAY CONTACT STATES

Power	Regular	Reserve	K2 Regular	K2 Reserve
OFF	Fail	Fail	COM to NC	COM to NC
ON	No Failure	No Failure	COM to NO	COM to NO
ON	Fail	No Failure	COM to NC	COM to NO

3.15 Output Connections: Run a twisted wire pair from the rear of the generator to the point of connection at the first selector. At the backplane of the generator, connect a pair to the OUTPUT 1 and OUTPUT 2 wire wrap posts. At the other end of the pair, connect a spare dial tone transformer.

CAUTION: 1. Do not disconnect existing dial tone supply to the first selector.
2. Do not connect pair from CM7065 to the first selector.

Wiring Test

3.16 New wiring may be checked as follows:

(a) **Power Connections:** Observing the correct polarity, connect the multimeter, range 100Vdc, across the generator backplane wire wrap posts, REGULAR GND and −48V. Check that with the rack fuse installed the meter reads between −44Vdc and −56Vdc, and when the rack fuse is removed the reading falls to 0Vdc. Repeat procedure for the RESERVE GND and −48V posts.

(b) **Alarm Connections:** Connect a shorting link between the backplane wire wrap posts REGULAR COM and NO. Check that the alarm is not triggered. Remove one end of the link from NO and connect to REGULAR NC. Check that the alarm is triggered. Remove the shorting link and reset the alarm. Repeat the procedure using the RESERVE COM, NC and NO posts.

(c) **Output Connections:** Connect a shorting link across the spare dial tone transformer. At the backplane wire wrap posts, OUTPUT 1 and OUTPUT 2, connect the Multimeter, set to Ohms x 1 range. Check the output connection loop for continuity.

CAUTION: At the completion of the wiring checks ensure that all shorting links installed at the backplane and the spare dial tone transformer are removed.

C. Circuit Card Installation

3.17 Circuit Cards should be installed using the following sequence:

(a) At the rack fuse panel, remove the fuses in the supply lines to the card file.

b) Before inserting the circuit cards into the card file, set all front panel controls to their mid positions.

(c) Insert both circuit cards into the card file, ensuring that they are properly seated in the connectors.

D. Initial Adjustments

3.18 Set the controls on the generators, referring to 4.12 through 4.19.

E. Cutting Over

3.19 When the initial adjustments have been made, the dial tone generator should be put into service in accordance with the following procedure.

CAUTION: INTERRUPTION OF SERVICE
Because the following procedure contains instructions to remove first selectors and associated line finders from service, it is recommended that cutover is carried out at minimum traffic periods and in accordance with local practice.

Output Connections

3.20 Remove the two fuses supplying power to the CM7065. Disconnect the spare dial transformer (connected at 3.15), from the CM7065 output.

3.21 Remove the first selectors and associated line finders from service. Remove the power from the present dial tone generator. Disconnect the output pair from the present dial tone generator at the first selector.

3.22 If necessary, rearrange the dial tone connections at the first selectors to allow the CM7065 to drive up to a maximum of seventeen dial tone inputs.

3.23 At the first selector, connect the pair from the CM7065 output posts OUTPUT 1 and OUTPUT 2 to the dial tone transformer input. If the equipment is Automatic Electric, connect a wire shorting link across the terminals of the capacitor adjacent to the dial tone transformer.

3.24 If one side of the dial tone supply is to be grounded it is recommended that the connection is made to the line from OUTPUT 1.

Operational Adjustments

3.25 Replace the fuses supplying power to the CM7065. Cancel any alarms by depressing the REGULAR and ALARM RESET buttons.

3.26 Carry out the adjustment procedure detailed in 4.20 through 4.33.

Cutover

3.27 Release all first selectors and line finders seized, back into service. The dial tone generator is now in service.

4. OPERATING INSTRUCTIONS

A. Front Panel Controls and Features

4.01 The following paragraphs contain descriptions of all front panel controls, switches, indicators and test jacks together with their functions. Refer to Fig. 11.

Controls

4.02 TWIST ADJ: Preset control with screwdriver adjustment. Set to compensate for relative level distortion caused by the lines or main frame distribution network. Twist can be adjusted from 0dB to 9dB.

4.03 LEVEL ADJ: Preset control with screwdriver adjustment. Sets the overall output level of the generator. Level can be adjusted over a 10dB range.

4.04 ALARM ADJ: Preset control with screwdriver adjustment. Sets the alarm circuit to detect a drop in output level greater than 1 to 3dB. The control is normally set 1dB below the signal level and halfway into the alarm hysteresis band to prevent toggling between REGULAR and RESERVE dial tone generators during failure conditions.

Switches

4.05 TONE DISABLE 350: Pushbutton switch. When depressed, disables the output from the 350Hz tone oscillator.

4.06 TONE DISABLE 440: Pushbutton switch. When depressed, disables the output from the 440Hz tone oscillator.

4.07 ALARM RESET: Pushbutton switch. When depressed, resets the dial tone generator alarm, assuming that the condition which brought about the alarm, has cleared. If the alarm condition has not cleared when the switch is depressed, the alarm will either not reset or will reset and then reappear, depending on the severity of the alarm.

Indicators

4.08 ALARM : LED; when on indicates an alarm condition. Turns off when ALARM RESET switch is depressed, but is also dependant on the conditions described in 4.07.

4.09 OVERLOAD : LED; flashes when the output of the dial tone generator is being overloaded by an external condition. Turns off when the overload condition is removed.

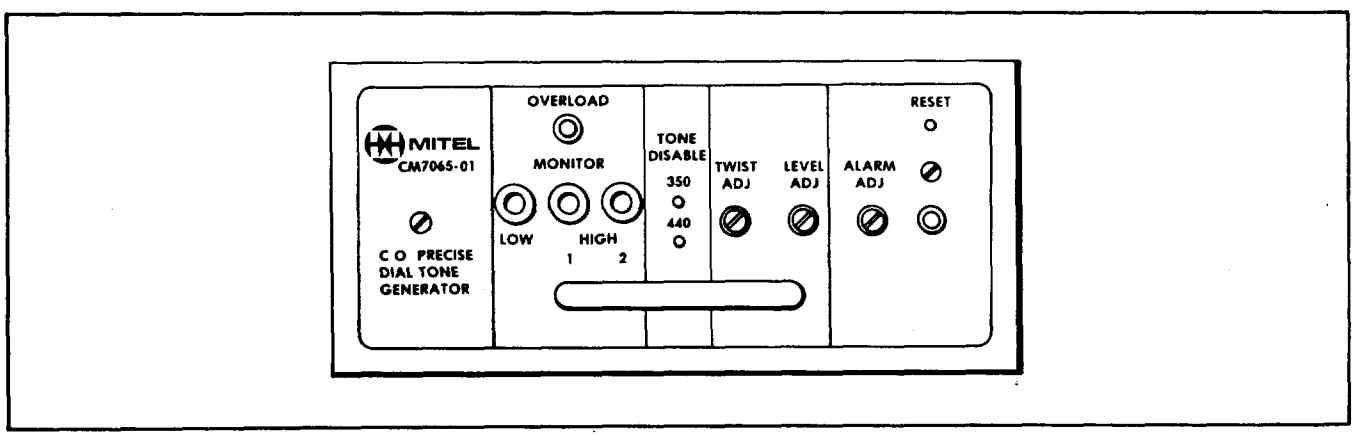

Fig. 11 Front Panel Layout

Test Jacks

4.10 LOW: Standard banana jack, color coded black. Connected to the ground side of the power supply input. May be used as a measuring reference when using HIGH 1 and 2 jacks.

4.11 HIGH 1 and HIGH 2: Standard banana jacks color coded red. Connected to the dial tone generator outputs on the primary side of the output transformer. Permits measurements to be made at the output of the dial tone power amplifier outputs.

B. Setting Up Instructions

4.12 Both REGULAR and RESERVE dial tone generators should be set up using the following procedure. The REGULAR should be adjusted first and then the procedure repeated to adjust the RESERVE generator.

4.13 Before starting to adjust the dial tone generator, make available the following tools and test equipment.

Screwdriver, flat bladed 3/16in.
True RMS Voltmeter; Fluke type 8921A or equivalent

Initial Adjustments - REGULAR and RESERVE

Note: It is assumed that the generator output is terminated with a load equal to at least one dial tone transformer input.

4.14 REGULAR Power Supply: At the rack fuse panel, fit the 1 Amp fuse into the power supply for the REGULAR dial tone generator.

4.15 REGULAR Twist and Level Adjustments: To set the output level, carry out the following adjustments:

(a) Connect the voltmeter, set to ac range, across the HIGH 1 and HIGH 2 test jacks at the front panel.

(b) Set the TWIST ADJ and LEVEL ADJ controls to the mid position. Set ALARM ADJ fully counterclockwise.

(c) Adjust the twist as follows:

(1) Depress the 440 button and note the voltmeter reading. Release the 440 button.

(2) Depress the 350 button and note the voltmeter reading. Rotate the TWIST ADJ control until the reading is the same as that indicated in (1) above.

(3) Repeat (1) and (2) above until a balance reading is obtained.

(d) Adjust the level as follows:

(1) Depress the 440 button. Rotate the LEVEL ADJ control until the reading at the voltmeter indicates the required level. Release the 440 button.

(2) Depress the 350 button and check that the reading obtained on the voltmeter is the same as that set in (1) above. Any difference in reading should be adjusted out using the TWIST ADJ control.

(3) When a balance in level for each frequency has been achieved, readjust the LEVEL ADJ control to obtain the required level per frequency.

(e) Disconnect the voltmeter from the front panel.

4.16 REGULAR Alarm Adjustments: To adjust the alarm circuit, carry out the following procedure:

(a) Rotate the ALARM ADJ control clockwise until the ALARM LED turns on. Note the position of the adjusting slot.

(b) Rotate the control counterclockwise to a position where the ALARM LED just turns off. Note the position of the adjusting slot.

(c) Rotate the control clockwise until the slot is situated approximately midway between the positions determined in (a) and (b) above.

4.17 RESERVE Power Supply: At the rack fuse panel, fit the 1 Amp fuse into the power supply for the RESERVE dial tone generator.

4.18 RESERVE Twist and Level Adjustments: To set the output level, carrry out the procedure described in 4.15 using the RESERVE LEVEL ADJ and TWIST ADJ controls.

4.19 RESERVE Alarm Adjustments: To adjust the alarm circuit, carry out the procedure set out in 4.16 using the RESERVE ALARM ADJ control.

Operational Adjustments - REGULAR and RESERVE (Fig. 12)

4.20 To ensure that the dial tone transmitted to subscribers has the correct characteristics, the following operational adjustments should be made. The dial tone should be set to the level required by local practice.

CAUTION: INTERRUPTION OF SERVICE
Because the following procedure contains instructions to remove first selectors and associated line finders from service, it is recommended that cutover is carried out at minimum traffic periods and in accordance with local practice.

4.21 All measurements should be made at the distribution frame, using a spare subscriber circuit. If the 1st selector(s) have not been previously seized and busied out (3.21), seize and busy out. Also seize and busy out the associated line finder(s).

4.22 Set the level meter to measure dBM into 900Ω. Check that the overall dial tone level is correct. If not make the following adjustments using the controls at the REGULAR generator front panel.

(a) Depress the 440 button and check the level of the 350Hz signal.

(b) Depress the 350 button and check the level of the 440Hz signal.

(c) Adjust the TWIST control to achieve the correct balance between the two tone signals. Reset any alarms occurring at this point.

(d) Adjust the level control at the front panel of the generator to give the correct level reading at the distribution frame.

CAUTION: If the level control is adjusted at this point, the alarm setting for the REGULAR generator must be re-adjusted using the Alarm Adjustment procedure set out in 4.16.

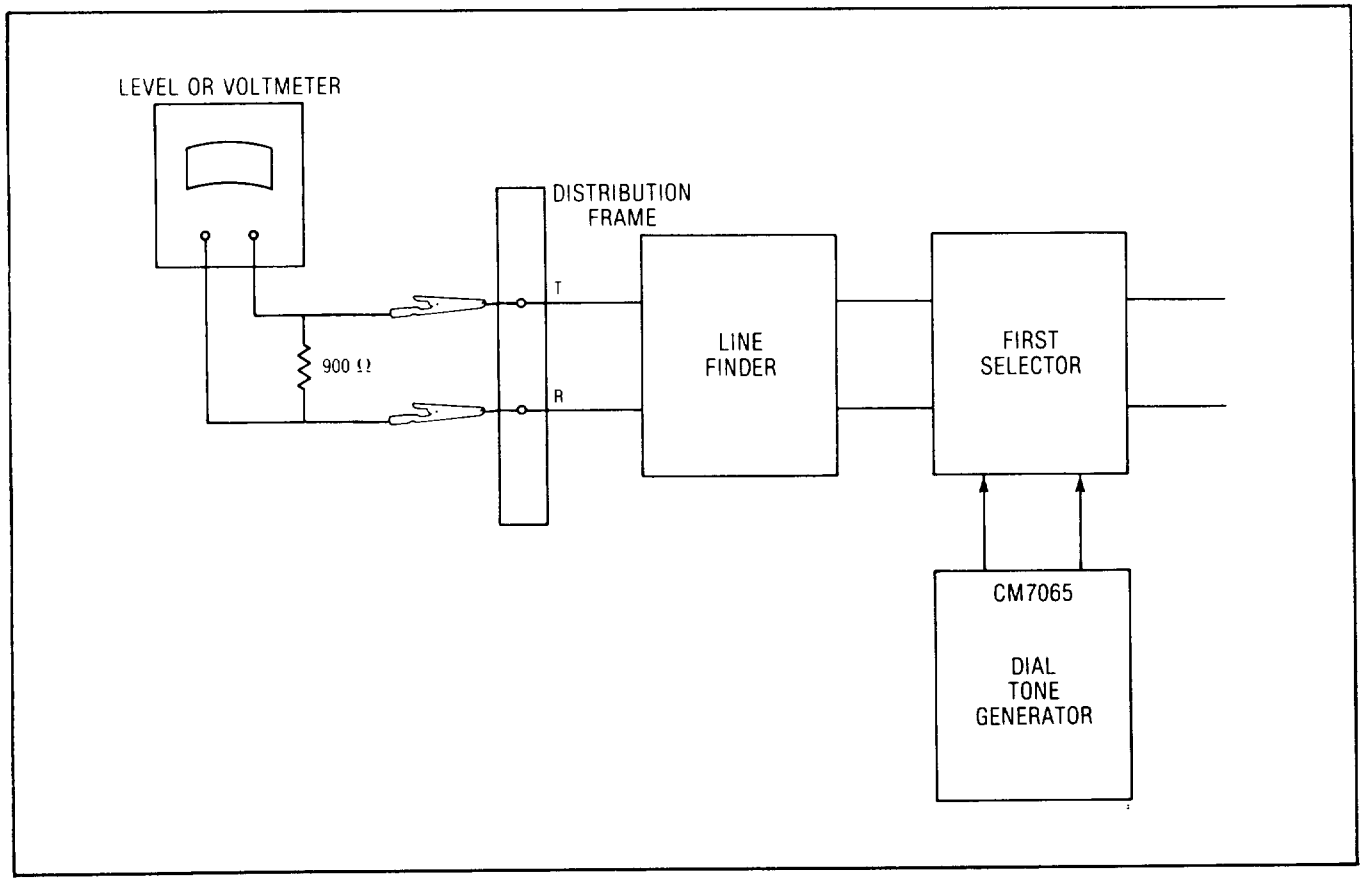

Fig. 12 Test Connections — Level Setting

4.23 At the rack fuse panel, remove the 1 Amp fuse in the REGULAR power supply line. The REGULAR generator is now failed and the CM7065 changes over to the RESERVE generator.

4.24 At the distribution frame check that the level indicated is correct. If any adjustment is required, carry out the procedure detailed in 4.23 using the RESERVE controls. If the LEVEL ADJ control is adjusted, the Cautionary Notice preceding 4.23 must be observed for the RESERVE generator.

4.25 Remove the test connections from the distribution frame. At the rack fuse panel, reinsert the 1 Amp fuse into the REGULAR generator's power supply line. Depress the RESET buttons to cancel any outstanding alarms.

Alarm Testing

4.26 The alarm indicators, relays and changeover operation should be tested as follows.

4.27 **REGULAR Failure:** Disable the REGULAR 350Hz or 440Hz tone (or both), and check the following:

(a) The Regular ALARM LED turns on.

(b) System changeover occurs as soon as the interruption is forced.

(c) The alarm is activated.

4.28 Release the tone disable button(s) and check the following:

(a) That system changeover from RESERVE to REGULAR does not occur.

(b) The ALARM LED remains on.

4.29 **Changeover RESERVE to REGULAR:** Depress the REGULAR ALARM RESET button, and check the following:

(a) The ALARM LED turns off.

(b) System changeover from RESERVE to REGULAR occurs.

4.30 **RESERVE Failure:** Disable the RESERVE 350Hz or 440Hz tone (or both) and check the following:

(a) The ALARM LED turns on.

(b) Reserve alarm is activated.

4.31 Release the tone disable button(s) and check that the ALARM LED remains on.

4.32 **RESERVE Alarm Reset:** Depress the RESERVE RESET button and check the following:

(a) The ALARM LED turns off.

(b) The alarm is cleared.

4.33 Release all first selectors and line finders seized, back into service. The dial tone generator is now in service.

5. TROUBLESHOOTING PROCEDURES

5.01 The following features of the CM7065 help in resolving problems encountered in the field.

- Alarm indicators
- Overload indicators
- Interchangeable circuit cards

A. No Dial Tone

5.02 If problems are encountered during installation, all wiring connections to and from the generator should be checked first.

5.03 If in-service problems occur, check the following:

(a) Power to generator: Verify that 1 Amp fuses in generator supply lines are serviceable. Check that −48Vdc is available at the card file backplane.

(b) **Generator Output:** Check that the generator output level is correct. If no output is apparent (Voltmeter across HIGH test points), the suspect circuit card should be removed and a known serviceable card (preadjusted), fitted in its place. If the output level is still nonexistant or low, refer to B, Low Dial Tone Level.

B. Low Dial Tone Level

5.03 If the dial tone level is low or cannot be adjusted to the correct level using the instructions set out in 4.20 through 4.25, carry out the following procedure.

5.04 At the card file backplane, measure and note the level between the OUTPUT 1 and OUTPUT 2 posts. If the level is normal, the circuits driven by the generator should be checked. If the level is low, carry out the instructions below.

5.05 At the rack fuse panel, remove the 1 Amp fuses supplying power to the generator.

5.06 At the card file backplane, unwrap the connections from the OUTPUT 1 and OUTPUT 2 posts.

5.07 At the rack fuse panel, replace the 1 Amp fuses supplying power to the generator.

5.08 At the dial tone generator, carry out the following procedure:

(a) Measure and note the level across the OUTPUT 1 and OUTPUT 2 posts.

(b) If the level is low compared to that measured in 5.04, substitute a preadjusted circuit for the suspect card. If the measured level now returns to normal, the card removed should be tested in isolation for level adjustment. If the level remains low, the card file should be replaced.

(c) If the level measured at (a) is normal, the CO wiring and circuit driven by the dial tone generator should be checked.

5.09 When the cause of the problem has been located and corrected, put the dial tone generator back into service as follows:

(a) At the rack fuse panel, remove the fuses in the power supply lines to the generator.

(b) At the card file backplane, reconnect the two wires removed from the OUTPUT 1 and OUTPUT 2 terminals.

(c) At the rack fuse panel, replace the fuses.

(d) Check the level settings in accordance with 4.20 through 4.25.

(e) Check the alarm settings in accordance with 4.26 through 4.32.

(f) Release the dial tone generator back into service.