MISCELLANEOUS KEY PANEL PA8/287

Introduction

The PA8/287 is an auxiliary panel in the Type-D range of sound control equipment. It carries a number of miscellaneous facilities which are not included in the other panels of the range. These facilities are controlled by two rows of miniature lever switches with associated indicator lamps. The whole assembly is contained within a plug-in module Type CH1/37C which is 178 mm high, 171 mm wide and 267 mm deep (7 by 6¾ by 10¼ inches).

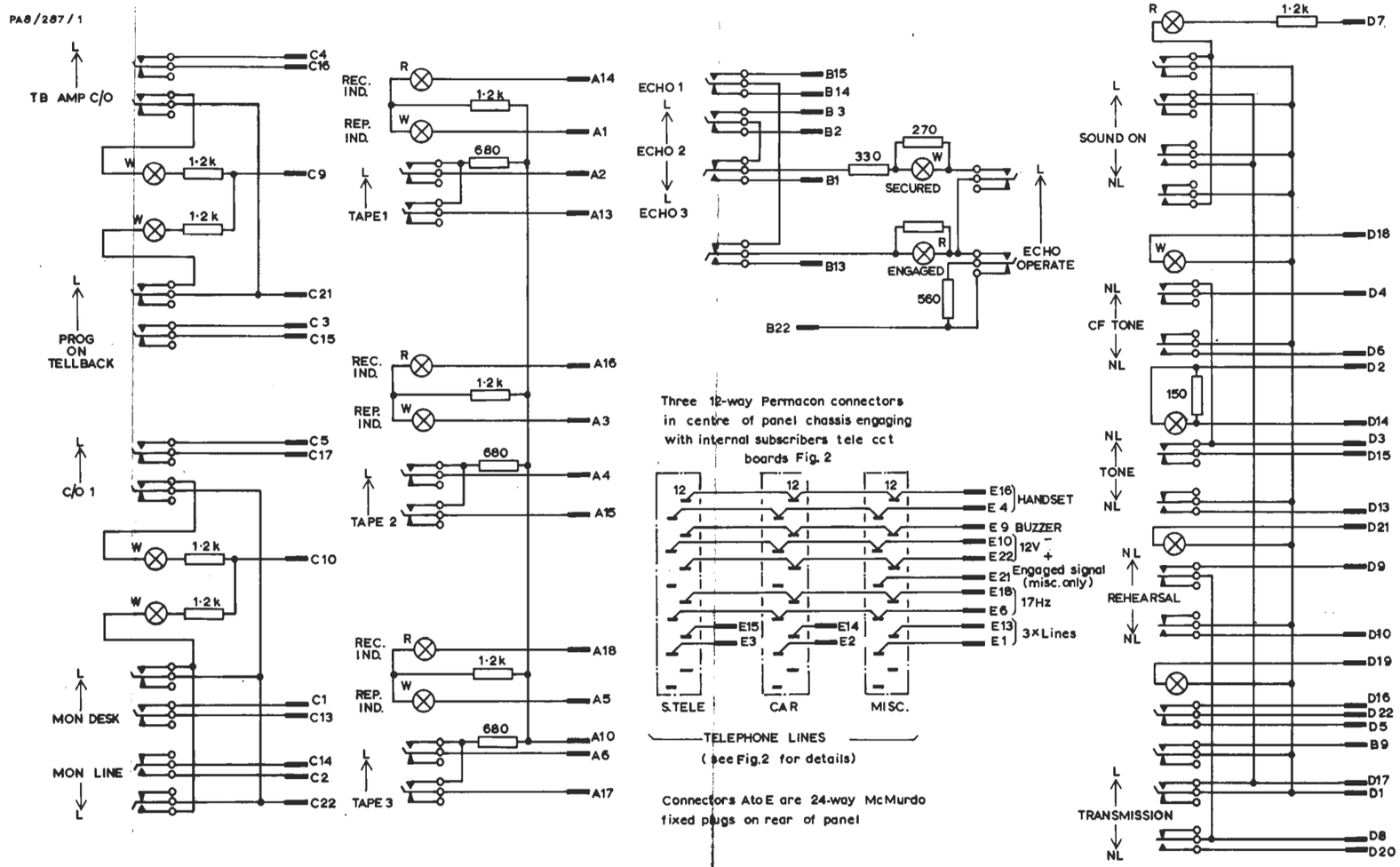

Fig. 1. Circuit of the PA8/287

General Description

The upper row of controls, viewed from the front from left to right, consists of the following:

(a) A transmission key and lamp.
(b) A rehearsal key and lamp.
(c) Two tone keys, each with its associated lamp, one key sending tone to line and the other key sending tone to clean feed.
(d) A Sound On light-operating key and indicator lamp.
(e) A monitoring selection key able to select either desk or line output, with a lamp to indicate the Mon Desk position.
(f) A key to superimpose programme on talk-back, with an indicator lamp.
(g) A talkback amplifier changeover key with associated lamp.
(h) An auxiliary changeover key and indicator lamp. (This key operates a relay which changes over an input jack on a jackfield from output 1 to output 2.)

The lower row consists of:

(a) Three sets of controls for internal subscribers' telephone lines, each of which has a ring and answer pushbutton switch incorporating a lamp. These switches are mounted on printed circuit boards which are wired via three 12-way Permacon edge connectors.
(b) Two echo keys and lamps. One key selects any one of three echo routes, and the other key will secure this selection if it is not already engaged. The lamps show if a selected route is already engaged and when a free route has been secured.
(c) Three tape remote start positions. Each start key has two associated lamps, to indicate either the record or the replay mode of the tape machine.

The CH1/37C chassis is divided vertically by a plate fitted with the three Permacon edge connectors used to connect the printed boards for internal subscribers' lines.

External connections to the PA8/287 are made via six 24-way McMurdo fixed plugs.

Circuit Description

General (Fig. 1)

Circuit details are shown in Fig. 1. In all instances the keys operate remote relays and the lamps are lit either by relay-operated circuits or by auxiliary contacts on the keys. For further information on the operation of these circuits reference should be made to station drawings containing the overall switching schematic of the circuits concerned.

Internal Subscribers' Telephone Boards (Fig.2)

The internal subscribers' telephone boards are equipped with ring and answer illuminated pushbutton switches. All three board circuits are similar. Their circuit is shown in Fig. 2 and they work as follows.

The incoming telephone line connects to the printed circuit board via a 12-way Permacon connector, pins 3 and 4. With neither switch operated, the line is routed directly to a bridge rectifier network which detects incoming ringing tone (of 17 Hz to 25 Hz). There are two 10-kilohm resistors in series with the bridge; these limit the current drawn from the ringing tone source and also desensitise the circuit so as to prevent spurious operation from small signals picked up by the open line.

The output from the rectifier performs two functions. Firstly, it is routed via a diode to an alarm buzzer, to provide an audible warning of an incoming call; this connection is via pin 7 on the 12-way Permacon connector. Secondly, the output of the receifier is also routed, via a smoothing circuit, to a controlled silicon rectifier grid, and when this receives a signal from the bridge it switches on, allowing current to pass from the 12-volt positive battery connection (pin 8) via a break contact on the Answer switch and a white Call lamp to earth (pin 9). The lamp lights and remains lit until the circuit is broken by operating the Answer switch.

The smoothing circuit on the controlled silicon rectifier grid comprises a 4-μF capacitor in parallel with a 2-kilohm resistor, both in series with a 10-kilohm resistor. This circuit has two functions. Firstly, it requires the ringing current to be applied to the bridge for a short time (about 0.5 second) before the capacitor is sufficiently charged to trigger the silicon rectifier grid. This guards against spurious signals, such as clicks and so on, operating the Call lamp when not required. Secondly, the 2-kilohm resistor discharges the capacitor when the ringing current ceases; this allows the lamp driving circuit to return to the off condition awaiting a new ringing signal after the Answer switch has been operated and deoperated again at the end of the telephone conversation.

The diode fitted in the lead to the alarm buzzer is necessary because all three internal subscriber boards on the PA8/287 are connected to the same buzzer, and if the diode were not fitted a ringing signal on the buzzer from one panel would flow back into the other panels and operate their Call lamps.

When the Answer switch is operated, it puts on the red Engaged lamp, and also removes the line from the ringing detector circuit and connects it to the handset (external to the PA8/287) via pins 11 and 12.

To ring out, the Ring switch is pressed. This removes the line from the handset or ringing detector circuit (according to the position of the Answer switch) and connects it directly to a 17-Hz supply, via pins 5 and 6 of the Permacon connector.

There are also facilities for external connections to the line and the Engaged signal lamp. See Fig. 2. The full telephone circuit including details of other panels in the telephone system is shown in Drawing No. SP 20366.9.1 AO.

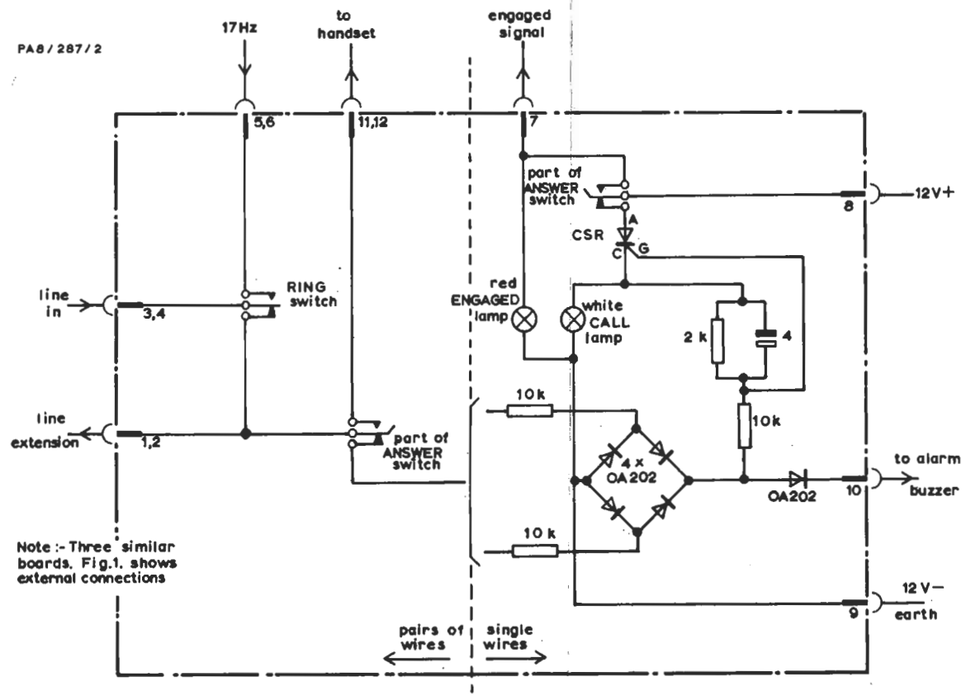

Fig. 2. Internal Subscriber's Telephone: Printed Board Circuit

Test Procedure

Apparatus Required

Avometer
Tone source
17-Hz supply
A.C. test meter ATM/1
12-volt d.c. supply

D.C. Circuits

Test all d.c. circuits with the Avometer, ensuring that they all operate in accordance with the details shown in the circuit diagram, Fig. 1.

Internal Subscribers' Telephone Positions

Test each internal subscriber's telephone position as follows:

1. Apply 17 Hz at about 80 volts r.m.s. to the line input and 12 volts d.c. to the power pins. Check that the Call and Engaged lamps operate as described earlier.
2. Apply 17 Hz to the 17-Hz input and with the ATM/1 check that operation of the Ring switch connects this to the line.
3. Connect the tone source to the line input. Check that the output at the handset, and the line extension connections, are in accordance with the switch positions as shown in the circuit diagram.