112A KEY EQUIPMENT

RADIO PATCH AND TEST PANEL

CABINET EQUIPMENT J53022BA

1.00 INTRODUCTION

1.01 This section is issued to furnish description and operation information pertaining to the radio patch and test panel installed at the radio site to provide facilities for transferring and testing between the channels from a SAGE or a manual direction center to the Air Force radio equipment.

1.02 A channel, as referred to in this practice, consists of wire lines or trunks, in the case of common user group equipment, connected through the air-ground voice communication system 2-way trunk circuit and through the radio patch and test panel to customer-owned radio equipment.

1.03 A radio equipment consists of a radio transmitter or a remote control circuit for a radio transmitter, and a radio receiver or a remote control circuit for a radio receiver or a radio receiver group transfer circuit.

1.04 At the radio patch and test panel each channel from the SAGE direction center is connected to a radio equipment. In addition, facilities are provided for the following functions:

- **Disconnecting** a channel from its radio equipment and patching it to spare radio equipment by means of a patch cord.
- **Patching** a radio equipment to a channel from a manual direction center.
- **Monitoring** on the radio and on the channel.
- **Talking** on the radio transmitter and to either direction center.
- **Remotely selecting** a frequency on certain spare radio equipment.
- **Rerouting** the radio equipment lines.

1.05 Schematic drawings of the radio patch and test panel circuit are shown on SD-69279-01.

1.06 The following circuits are connected to this panel.

- Air-ground voice communication system.
  1. Two-way trunk circuit (SD-95805-01).
  2. Jack, lamp, and key circuit (SD-1G037-01).
  3. Cabinet miscellaneous circuit (SD-1G054-01).
- Air Force radio circuits.

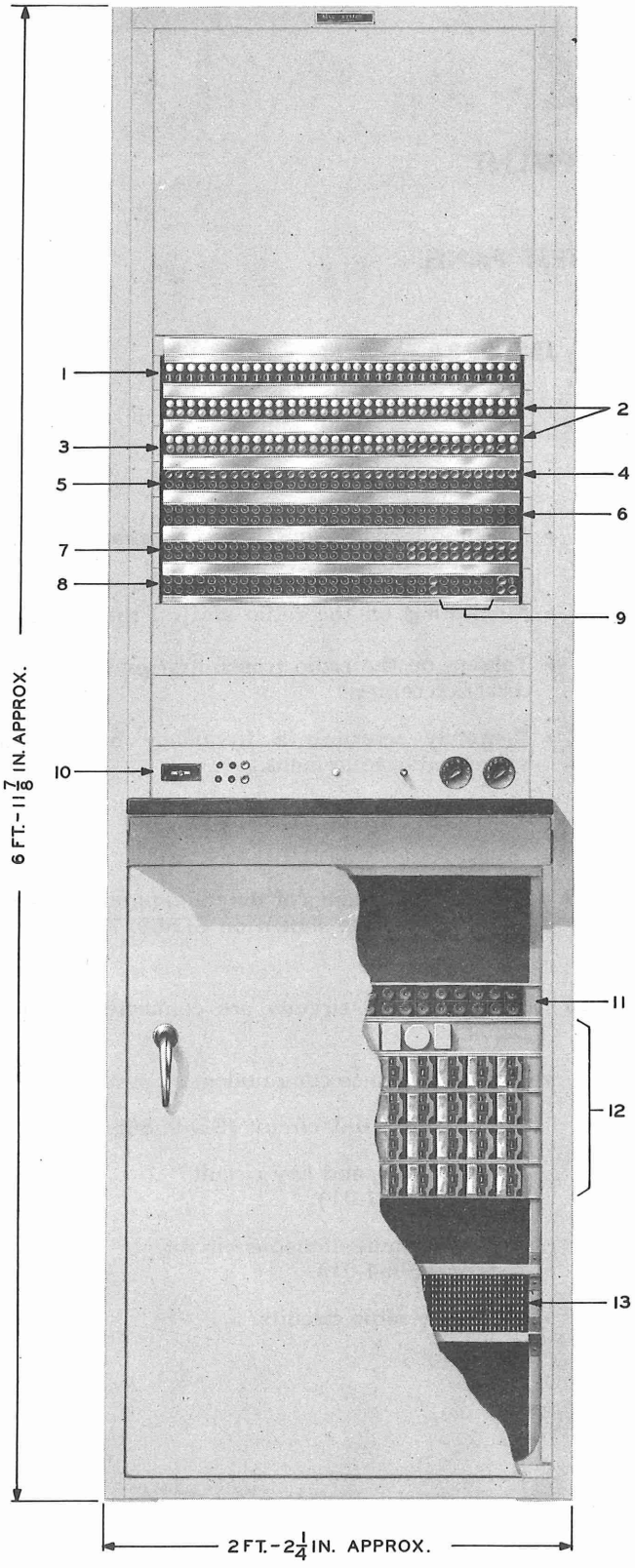

FIG. 1 — RADIO PATCH AND TEST PANEL

2.00 DESCRIPTION

2.01 The radio patch and test panel is one bay of rack-mounted equipment consisting of the following items in their order of appearance on the bay from the top down (see Fig. 1):

1. EQ AV lamps and keys to indicate when a radio equipment is available for use. All channels are equipped.
2. PTT, XMT, and COD lamps associated with each radio equipment to indicate when and in which direction it is in use. All channels are equipped.
3. TR lamps, associated with each channel, to indicate operation of the line transfer key in the SAGE direction center and to signal the site attendant. Channels 1 through 22 are equipped.
4. AR keys to retire the TR lamps.
5. MON jacks associated with each channel to permit monitoring and talking. All channels are equipped.
6. RAD EQ jacks, connected to each radio equipment, to permit connecting them to other CHAN channels or to MAN channels by means of patch cords. All channels are equipped.
7. CHAN jacks connected to the channels from the SAGE direction center to spare radio equipment by means of a patch cord, or to permit connecting to the CHAN TST jack by means of a patch cord for testing and talking with the direction center. Channels 1 through 22 are equipped.
8. MAN jacks connected to the channels from the manual direction center to permit connecting to a RAD EQ jack by means of a patch cord. Channels 1 through 24 are equipped.
9. SIG TST jacks to provide a shunt through the sleeve of a patch cord for testing from the SAGE direction center. Jacks 26 through 30 are equipped.
10. The attendant's panel with a TALK key, a TEL jack, a CHAN TST jack and a PT lamp, and a MON plug to enable the attendant to connect to any channel or radio equipment for monitoring, testing, or talking. Also, two REMOTE FREQ SEL switches used to transfer two spare radio equipments to any of ten frequencies each.
11. A fuse panel beneath the shelf to furnish protection on the various circuits.
12. Five plates of relay equipment.
13. A terminal strip where channels from the SAGE and manual direction centers, and to Air Force radio equipment, are terminated.

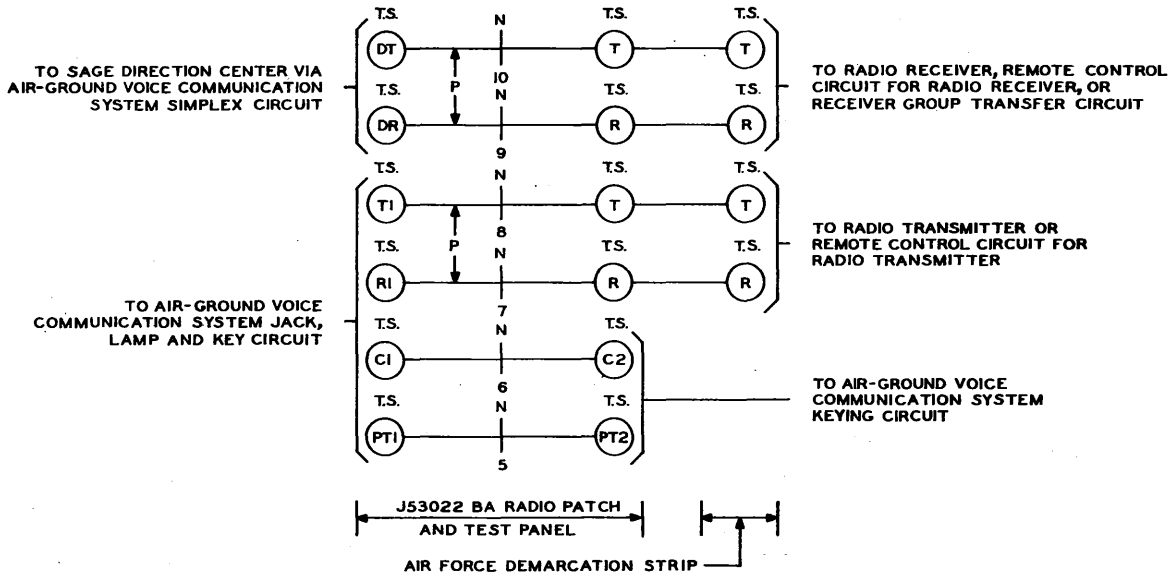

FIG. 2 — CHANNEL FROM THE SAGE DIRECTION CENTER

3.00 OPERATION

CHANNEL FROM SAGE DIRECTION CENTER

3.01 A radio equipment is assigned to each channel from the SAGE direction center and is connected to it through the break contacts of the unoperated *N* relay (Fig. 2).

3.02 When the attendant at the SAGE direction center connects to a channel and operates the push-to-talk switch, ground over the *PTL* lead lights the PTT lamp. When ground over the *PT1* to *PT2* lead starts the radio transmitter, ground on the *ACL* lead lights the XMT lamp to indicate that the entire channel is in usable transmitting condition. Actuating of the radio receiver by a codan signal from the plane puts ground on the *CL* lead to light the COD lamp, indicating that the receiving circuit is in use.

3.03 For patching and testing purposes each channel from a SAGE direction center is connected to a CHAN jack and each radio equipment is connected to a RAD EQ jack.

SPARE RADIO EQUIPMENT

3.04 RAD EQ jacks 22 through 32 are the terminations for spare radio equipment.

3.05 Radio equipment on jacks 22 through 30 is tuned to the same frequency as the radio equipment of certain of the regular channels and may be patched to those channels as replacements.

3.06 Radio equipment on jacks 31 and 32 is connected through REMOTE FREQ SEL NO. 1 and NO. 2. Each radio equipment may be tuned to any of ten frequencies from the radio site.

3.07 Operation of the EQ AV key lights the EQ AV lamp to indicate to the site attendant that the radio equipment having the same number is available for patching to a CHAN jack or to a MAN jack in place of the regular radio equipment.

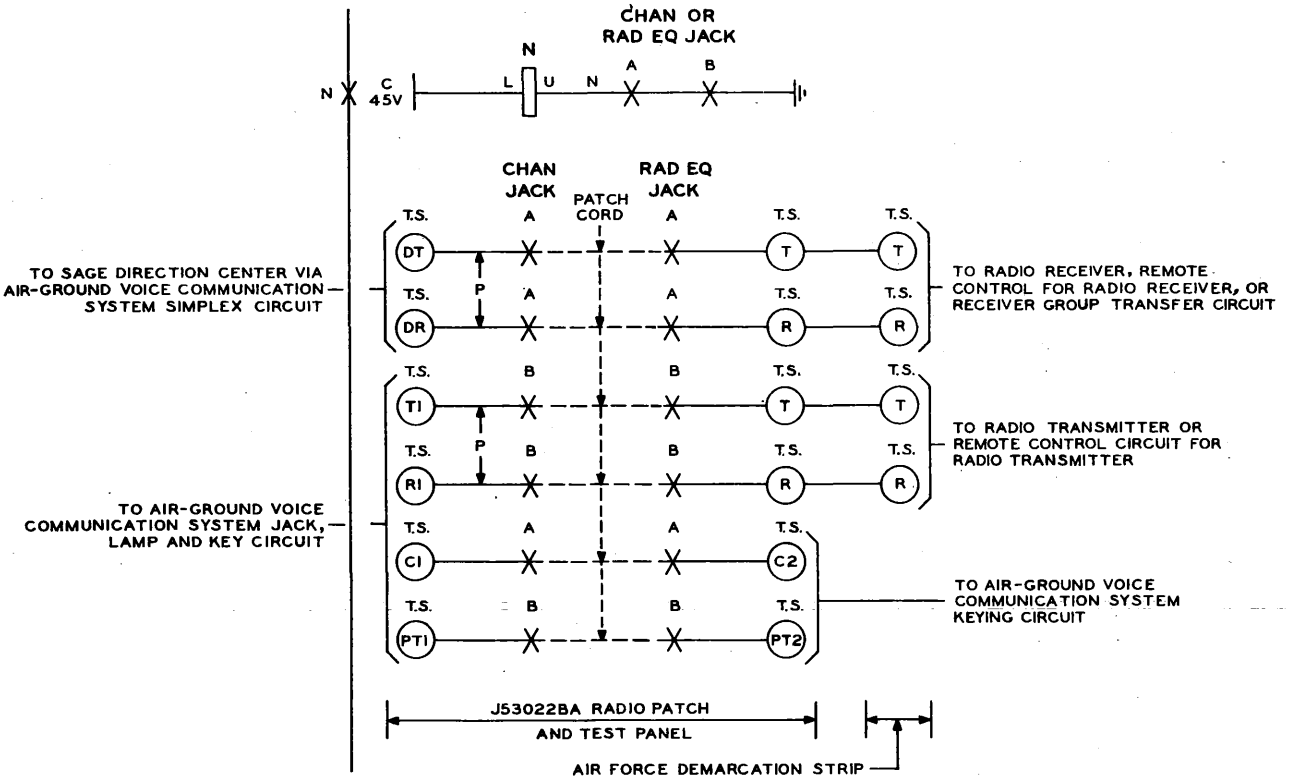

FIG. 3 — CHANNEL PATCHED TO RADIO EQUIPMENT

PATCHING

CHAN to RAD EQ:

3.08 Inserting one end of a P6E patch cord in a CHAN jack puts ground through the auxiliary contacts of the B and A jacks to the *N* lead to operate the *N* relay. This opens the six leads to the associated radio equipment (Fig. 3).

3.09 Inserting the other end of the patch cord in a RAD EQ jack connects the channel to the radio equipment. Ground through B and A jacks to the *N* lead operates the *N* relay to disconnect the channel, if one is connected.

3.10 The PTT, XMT, and COD lamps, associated with the radio equipment in use, provide supervision as explained in 3.02.

CONNECTING A RADIO EQUIPMENT TO A MANUAL DIRECTION CENTER

3.11 When a patch cord is inserted in the RAD EQ jack, ground through the auxiliary contacts of the B and A jacks over the *N* lead operates the *N* relay to disconnect the radio equipment and the signaling leads from the channel. With the other end of the patch cord in the MAN jack, the manual direction center is connected to the radio equipment.

MONITORING

3.12 The MON monitor jack provides a means to connect the attendant's telephone circuit to a radio equipment and to the channel with which it is associated, either through the unoperated *N* relay or through a patch cord.

3.13 When the MON plug is inserted in the MON jack, ground through the auxiliary contacts of the jack operates the *M* relay. The operated *M* relay connects the attendant's telephone set through the unoperated *SW* and *PT* relays and the TEL jack to the radio receiving circuit in order to monitor messages from the radio receiver to the direction center (Fig. 4).

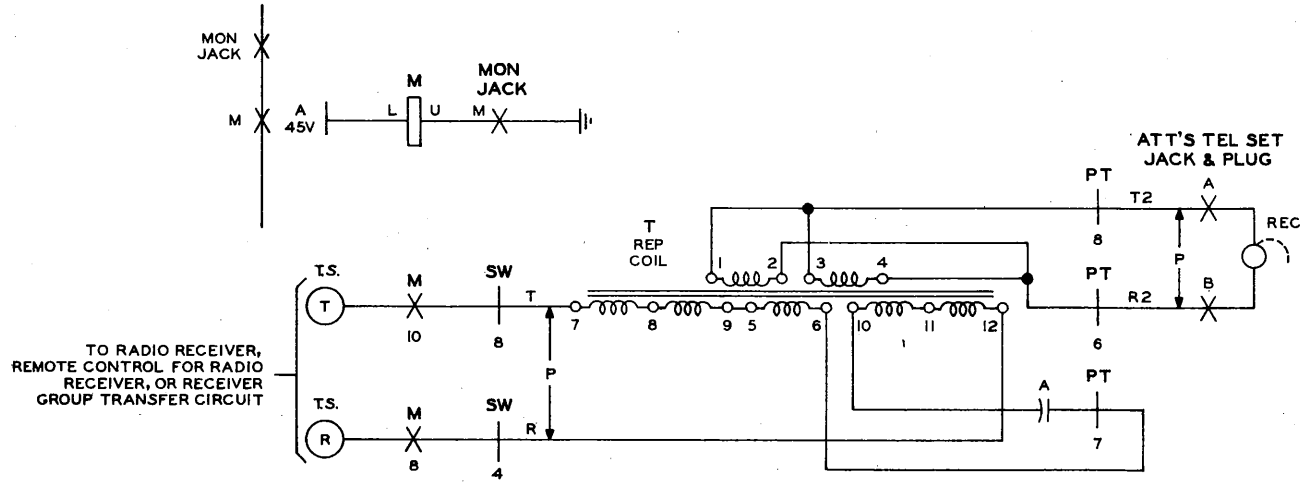

FIG. 4 — MONITOR ON RADIO RECEIVER

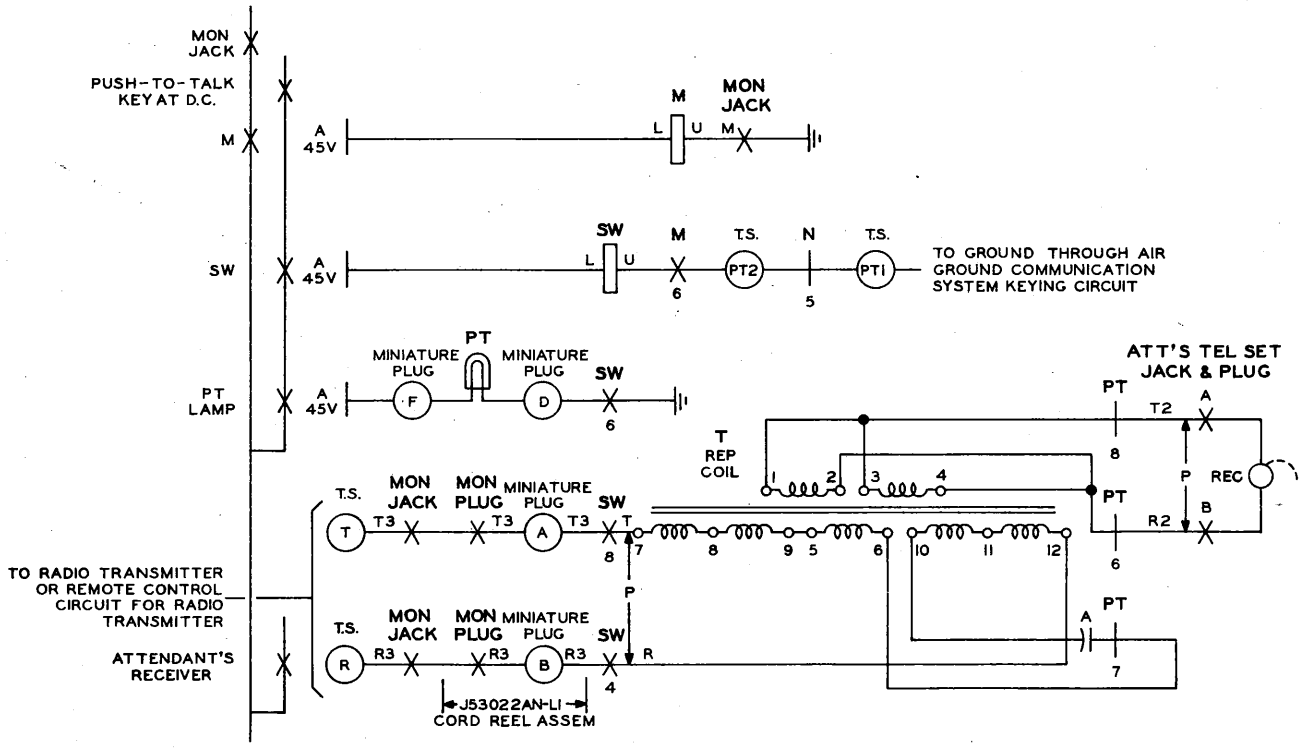

FIG. 5 — MONITOR ON RADIO TRANSMITTER

3.14 When an attendant at the SAGE direction center operates his push-to-talk switch, ground on the *PT1* lead through the unoperated *N* relay, the *PT2* lead, and the operated *M* relay operates the *SW* relay. This connects the site attendant's telephone circuit through the *T3* and *R3* leads of the MON plug to the *T* and *R* leads of the radio transmitter circuit, to monitor messages from the SAGE direction center to the radio transmitter (Fig. 5).

3.15 Operation of the *SW* relay connects ground on the *L* lead through the miniature plug of the MON cord reel circuit to light the PT lamp.

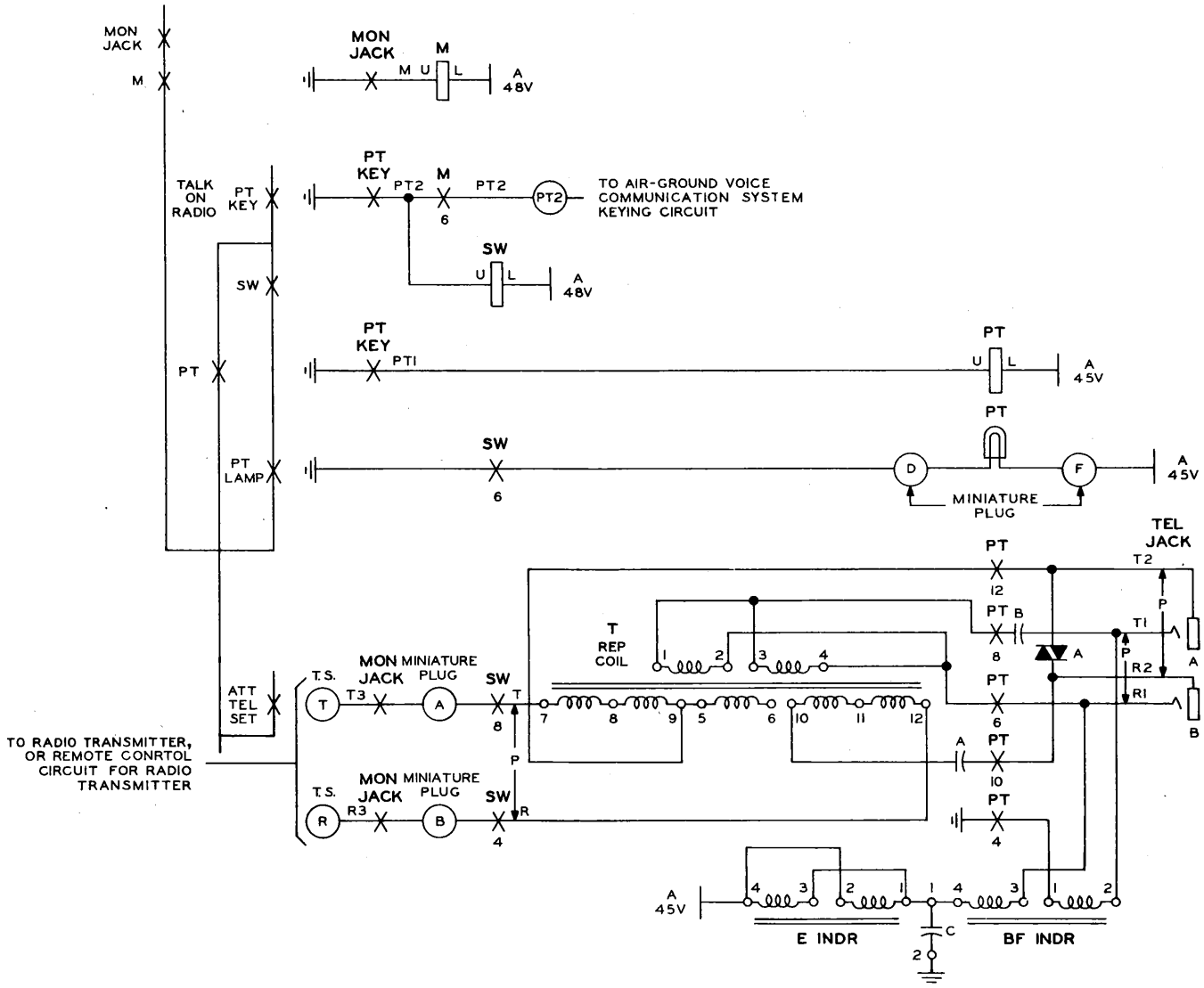

FIG. 6 — TALK ON RADIO WITH MONITOR CORD

TALKING WITH MONITOR CORD

3.16 A 2-way PT key is provided to permit the monitor to talk out over the radio transmitter for test purposes (Fig. 6) and to talk and signal toward the SAGE direction center (Fig. 7).

3.17 The MON plug inserted in the MON jack and the PT key operated to the TALK ON RADIO position connects ground (Fig. 6) as follows:

- To the *PT2* lead to operate the *SW* relay to switch the monitor's telephone circuit to the radio transmitter. Ground on the *PT2* lead also completes the circuit through a contact of the *M* relay to the radio transmitter keying circuit to turn on the radio transmitter.
- To the *PT1* lead to operate the *PT* relay which connects the monitor's telephone transmitter.
- Through the operated *SW* relay to light the PT lamp.

3.18 The monitor's telephone transmitter is connected to the secondary winding of the *T* repeating coil through the *B* capacitor. The monitor's

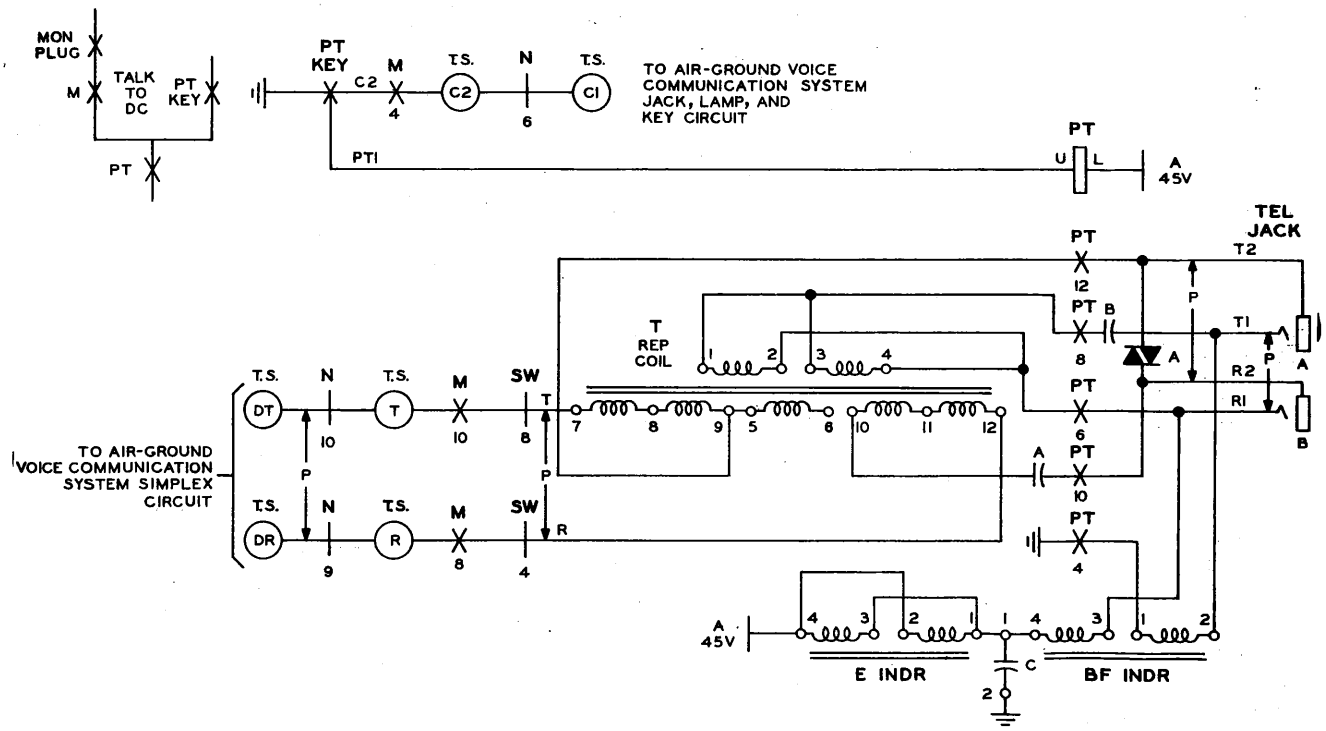

FIG. 7 — TALK TO DIRECTION CENTER WITH MONITOR CORD

receiver is, at the same time, connected in the sidetone path. The shunt is removed from across the *T* resistor to balance the circuit properly. Operation of the *PT* relay also provides talking current to the monitor's transmitter by grounding the BF inductor.

3.19 The PT key in the TALK TO DC position (Fig. 7) connects ground to the following:

- To the *C2* lead through the operated *M* relay and unoperated *N* relay to stimulate codan signals to the direction center.
- To the *PT1* lead to connect the monitor's telephone circuit as in the TALK TO RADIO position. However, since the *SW* relay is unoperated, the telephone circuit is connected through the operated *M* relay and the unoperated *N* relay to create a talking path to the direction center.

3.20 Restoring the PT key to normal returns the monitor's telephone and key circuit to the listening position.

TALKING AND TESTING THROUGH THE CHAN TST JACKS

3.21 To test on a channel, disconnected from its associated radio equipment, the channel can be connected from the CHAN jack to the CHAN TST jack by means of a patch cord. This connects the attendant's telephone circuit to the channel (Figs. 8 and 9).

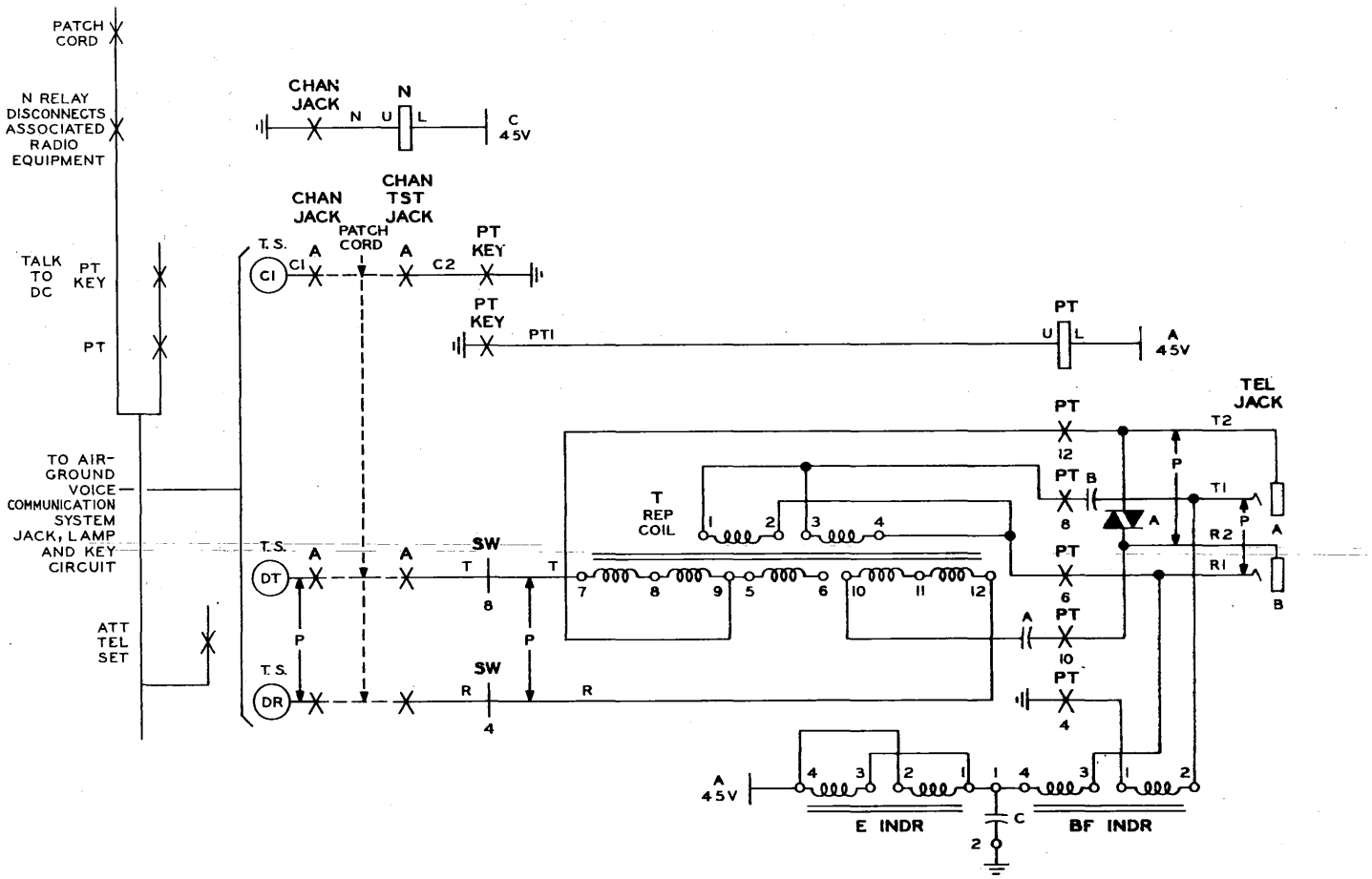

FIG. 8 — TALKING THROUGH THE CHAN TST JACK RADIO SITE TO DIRECTION CENTER

3.22 When the patch cord is inserted in the CHAN jack, ground on the *N* lead through the auxiliary contacts of the B and A jacks operates the *N* relay to disconnect the radio equipment from the channel.

3.23 The other end of the patch cord inserted in the CHAN TST jack, with the PT key in the TALK TO DC position (to operate the *PT* relay and signal over the *C2* and *C1* leads) permits the attendant to talk to the SAGE direction center over the attendant's telephone circuit, through the unoperated *SW* relay and over the radio receiver path. Ground from the PT key over the *PT1* lead operates the *PT* relay to provide talking current to the attendant's telephone circuit (Fig. 8).

3.24 When the attendant at the SAGE direction center operates the push-to-talk switch (Fig. 9), ground over the *PT1* lead through the CHAN and CHAN TST jacks to the *PT2* lead operates the *SW* relay and permits the SAGE direction center to talk to the radio site attendant over the radio transmitter path. Ground through the operated *SW* relay lights the PT lamp to test the operation of the signaling features of the radio transmitter circuit between the direction center and the site.

SIGNAL TEST JACKS

3.25 Signal test jacks are provided to permit testing of the signaling leads by the SAGE direction center.

3.26 The patch cord inserted in the CHAN jack puts ground through the auxiliary contacts of the B and A jacks and *N* lead to operate the *N* relay to disconnect the radio equipment and signaling leads.

3.27 Ground from the SAGE direction center, over the *PT1* lead through the sleeve of the B CHAN jack, the patch cord, the sleeve of the B SIG TST jack, which is strapped to the sleeve of the A SIG TST jack, to the A CHAN jack over the *C1* lead to the direction center establishes continuity of the signaling and keying circuits.

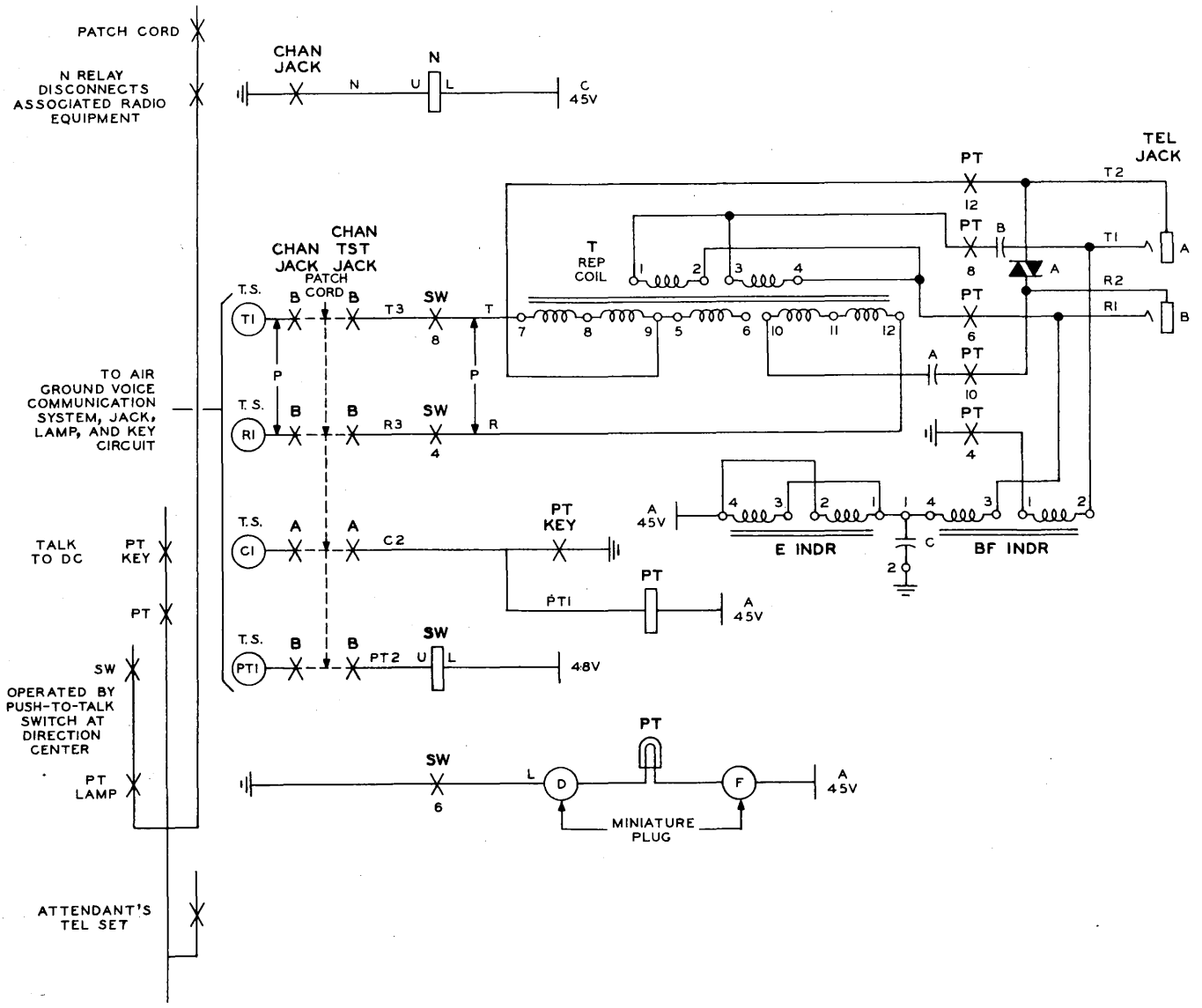

FIG. 9 — TALKING THROUGH THE CHAN TST JACK DIRECTION CENTER TO RADIO SITE

ROUTE TRANSFER KEY

3.28 When the radio receiver is remotely located from the radio site, two sets of lines over separate routes are provided. In case a fault develops on one of these routes, traffic is transferred to the other route by operation of the ROUTE TRANS key. A similar operation must be performed at the radio receiver.

REMOTE CHANNEL SELECTION

3.29 Ground on a lead, or a combination of leads as indicated below, from the selector to both a radio transmitter control circuit and a radio receiver control circuit operates a remote seeking switch and a stepping relay at the radio transmitter and at the radio receiver to select the frequency indicated on the selector.