

SPEAKERPHONE SYSTEM—3-TYPE

1. GENERAL

1.01 This section is reissued to:

- Include information formerly found in Section 512-620-200 which is canceled
- Include information on 666B and 670A transmitters modified for RF interference
- Provide information to cutoff ringer or buzzer with control unit to prevent pickup by speakerphone transmitter
- Add statement indicating specific telephone sets for speakerphone use are covered in separate sections within this division. Refer to SD-69403-01
- Provide simplified schematics of units used in system
- Delete schematics of components used in speakerphone conference systems. This information is contained in sections on speakerphone conference system in Division 512.

2. IDENTIFICATION

2.01 The 3-type speakerphone system consists primarily of a loudspeaker, transmitter, and control unit that, when connected to a suitable telephone set, provides:

- Hands-free telephone operation
- On-hook dialing (when dial is not obstructed)
- Automatic switching from speakerphone to handset operation
- Transmitter muting for private conversation
- Visual indication when system is in use
- Cutoff common ringer or other signaling devices when desired.

2.02 Components of the 3-type speakerphone system are shown in Fig. 1, along with features of each component.

2.03 Apparatus which makes up the 3-type speakerphone system is ordered separately. Replaceable parts should be limited to those parts available through supply channels, i.e., lamps, mounting cords, etc.

2.04 Control units are coded as follows:

- Rotary dial service—55A (MD)
- Rotary or TOUCH-TONE[®] service—55A* (See note)
- Rotary or TOUCH-TONE service—55B

Note: The 55A control unit can be modified at the distributing house for TOUCH-TONE use. Modified units are identified by an asterisk following the code. Order as: Unit, Control, 55A—modified for TOUCH-TONE service.

2.05 The 55-type control unit features:

- Four plug-in printed wiring boards incorporating transistorized amplifiers and associated transmission transformers
- Voice-switching circuitry to control transmit and receive level
- Metal basepan for wall or desk mounting.

2.06 3-type speakerphone circuitry:

- (1) The 3-type speakerphone incorporates a voice-switching circuit which permits a substantial increase in receiving volume, eliminates singing, and essentially eliminates far-end talker echo.
- (2) When there is no transmission of speech, gain is automatically removed from the transmitter circuit and added to the loudspeaker



TRANSMITTER

- SPEAKERPHONE ON-OFF SWITCH AND TRANSMITTER DISABLING
- VOLUME CONTROL.
- TRANSISTORIZED AMPLIFIER.



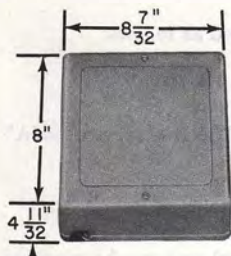
TELEPHONE SET

- SWITCH HOOK CONTROL.
- HANDSET OPERATION (NORMAL TELEPHONE SET USE).
- DIALING ON-HOOK IN SPEAKERPHONE MODE



LOUDSPEAKER

- PM SPEAKER UNIT



55-TYPE CONTROL UNIT

- CONTAINS RELAY AND PRINTED WIRING BOARDS.
- LINE HYBRID COIL.
- FOR USE WITH ROTARY DIAL [55A (MD), 55A * MODIFIED, OR 55B] OR TOUCH-TONE DIAL EQUIPPED TELEPHONE SETS (55B OR 55A * MODIFIED)



TRANSFORMER, 20I2B

- SUPPLIES POWER FOR CONTROL UNIT
- 18 V OUTPUT
- 115 V 60 HZ INPUT
- PLUGS INTO STANDARD AC RECEPTACLE

Fig. 1—Typical 3-Type Speakerphone System, Basic Components

circuit. This avoids a singing condition while receiving.

(3) When speech is transmitted, the gain of the transmitter circuit increases to normal. Simultaneously, the gain of the loudspeaker circuit lowers to avoid singing as a result of the increased transmitter gain. The amount of the gain change depends upon the setting of the receiver volume control. The gain change is smaller at the lower (counterclockwise) settings and greater at the higher (clockwise) settings.

(4) A circuit, referred to as a switch guard, utilizes the voltage across the loudspeaker to reduce the possibility that surrounding room noise will cause false operation of the switching circuit while receiving speech.

(5) A predetermined voice level is necessary to switch from the receiving to the transmitting condition. In the presence of steady room noise, a special circuit automatically raises the required threshold level to prevent operation of the

switching control circuit by the noise. Talkers will still switch satisfactorily because they increase their levels under noisy conditions.

Loudspeakers

2.07 External—760A equipped with R2FK mounting cord. Consist of permanent magnet, dynamic loudspeaker mounted on a metal base with plastic housing.

2.08 Internal—762A used with 752-, 1752-, and 2752-type panel sets. Consists of a P-21F246 speaker, neoprene rubber acoustic shield, plastic cover, and 13-inch spade-tipped leads.

Transmitters

2.09 External 666-type transmitters consists of an AC1 transmitter unit, transistorized amplifier, etc. The 666A (MD) is equipped with a T11A mounting cord. The 666B has a T7A cord.

2.10 External 670A and 671A are used in conference arrangements of 3-type speakerphone:

- 670A consists of an AC1 transmitter unit, transistorized amplifier, ON-OFF switch with 2-position ON switch for control of auxiliary 671A transmitters, volume control, plastic housing, and T9A mounting cord.

- 671A consists of an AC1 transmitter unit and used as auxiliary station in conference arrangement, encased in a plastic housing; no cord is provided.

2.11 In areas where R.F. interference is a problem, install a modified 666B or 670A transmitter. These transmitters have been modified by the Western Electric Service center. Modified units are identified by a stamp "MOD FOR RF" located near unit code stamping. Order units as follows: "Transmitter, 666B or 670A Modified per Specification X-4200."

2.12 Internal transmitters are all modular, designed to be an integral part of the telephone set or console. Connections are made through a KS-type connector or receptacle block and plugs. Components are similar to those in external transmitters.

- 667B—used in CALL DIRECTOR® sets equipped with 590- or 650-series keys.

- 672A—used in 3640 and 3641 CALLDIRECTOR telephone sets

- 673A—used in nurses console in 3A hospital interphone system

- 674A—intended for use in 3673A-type telephone set

- 674B—use in 2671-type CALL-A-MATIC® telephone set

- 679—used in current production CALL DIRECTOR sets equipped with 635-type keys.

Power Supply

2.13 Power to operate the 55-type control units must be supplied by a 2012B transformer (ordered separately). Due to lower voltage rating, a 2012A transformer should not be used.

3. INSTALLATION

3.01 The telephone set intended for use in 3-type speakerphone system must meet the following requirements:

- (1) Provide a set of line switch transfer contacts to disconnect the speakerphone when the handset is lifted.

- (2) Rotary dial sets dialed in an on-hook condition must provide two sets of off-normal (make) contacts in the dial for loudspeaker and receiver muting during dialing.

- (3) TOUCH-TONE sets dialed in the on-hook condition must provide a set of make contacts (s and t) in the dial common switch to connect line power (IR) from the control unit to the dial oscillator. If a polarity guard is provided these contacts (s and t) must be isolated from the oscillator by the polarity guard.

3.02 Planning an installation:

- (1) Avoid placing apparatus with plastic covers or parts in locations where ambient temperatures may exceed 140 degrees F.

- (2) Control unit chassis is part of the electrical circuit and must be mounted on an insulated surface.

- (3) Control unit can be located a maximum of 100 feet from other system components (transmitter, loudspeaker, etc.) when (A1) leads are connected between both the control unit and transmitter and the control unit and the telephone set.

- (4) Locate transformer no more than 100 feet from control unit. The AC receptacle should not be controlled by a switch.

- (5) Place loudspeaker and transmitter within convenient reach of user and with nominal 3 feet spacing between the units and not facing one another.

- (6) There should be no obstructions between the user, loudspeaker, and transmitter.

- (7) To prevent inductive interference on conference system installations, use no more than 30

feet of shielded cable from master 670A transmitter to auxiliary 671A transmitters. Refer to section on speakerphone conference system for connections.

- (8) Make connections as shown in appropriate figures of this section or other sections in Division 512 for specific telephone set connections.

3.03 The 55-type control unit can be used where necessary to cut off common ringers or signals to prevent pickup by speakerphone. This feature can be provided through break contacts of K1 relay in control unit. Refer to section in Division 512 for specific telephone set involved.

D-180196 Kit of Parts

3.04 The 667B transmitter, when installed in certain CALL DIRECTOR telephone sets is subject to pickup of mechanical spring vibrations when a held line button is released and the speakerphone system is on. This vibration is transmitted through the control unit and back over the line. To eliminate this condition the 667B transmitter should be replaced with one modified by Western Electric service center, ordered as follows: "Transmitter, 667B, Modified per D-180196."

3.05 Packed with the modified 667B transmitter is a piece of split vinyl tubing to be assembled to the key pivot bar spring of the telephone set during installation of the transmitter.

Note: CALL DIRECTOR telephone sets may be ordered with the modification installed by specifying "Modified per D-180196."

4. OPERATION

Note: 3-type speakerphone system permits normal use of the telephone set for originating, receiving, or transferring calls.

4.01 To originate a call using speakerphone:

- (1) Depress transmitter ON button and release. ON lamp will illuminate indicating speakerphone is in the talking condition. Listen for dial tone transmitted through loudspeaker. Telephone set handset is not lifted (except where handset covers dial).
- (2) Operate dial of telephone set in normal manner.

(3) When complete number is dialed, ringing tones, busy signals, and called party answer will be heard from the loudspeaker.

(4) When called party answers, transmitter and loudspeaker are used to carry on a hands-free conversation. Adjust volume level as desired.

Note: Best **operational** results are obtained at the lowest acceptable volume settings.

(5) When originating calls from telephone sets which require off-hook dialing, the ON button must be depressed and held upon completion of dialing until the handset is restored.

4.02 To answer an incoming call using speakerphone:

- (1) Telephone set ringer signals an incoming call.
- (2) Depress ON button on transmitter. Ringing is tripped and system is automatically connected to the line by the control unit.

4.03 To disable transmitter when it is desired not to transmit conversation in the room to a distant party:

- (1) Depress ON button to full extent of its travel and hold down during entire time transmitter is to be disabled.

Note: With transmitter disabled conversation will not be transmitted to the distant party, however, distant party can still be heard over the loudspeaker.

(2) After private conversation is completed and it is desired to transmit to distant party again, release ON button. System is now restored to full hands-free capability.

4.04 To terminate a call on speakerphone: Depress OFF button on transmitter. ON lamp will extinguish and control unit will be restored to the idle condition.

4.05 Transferring from handset to speakerphone operation:

- (1) After dialing or during a conversation depress and hold ON button of transmitter.

(2) Return handset to mounting, and release ON button.

(3) Adjust volume as required.

4.06 Transferring from speakerphone to handset operation. Lift handset during speakerphone operation to automatically transfer to handset operation. When it is necessary to transfer back to speakerphone, refer to 4.05 to prevent disconnect.

Conference Speakerphone Arrangement

4.07 The 670A (master) transmitter may initiate and receive calls with or without the 671A auxiliary transmitters in the circuit. To operate with master transmitter and auxiliary transmitters, turn the ON button so the white line is parallel to the front of the transmitter. To operate the master independently, turn the ON button so the white line is perpendicular to the front of the transmitter.

4.08 Disabling the 670A transmitter also disables the 671A transmitters if the auxiliary transmitters are connected to the master circuit. (White line of the ON button is parallel to the front of the transmitter.)

5. MAINTENANCE



Remove power from 55-type control unit before attempting any maintenance of speakerphone components.

Tests and Adjustments

5.01 When system is installed or maintenance is performed on any component, make the following tests of speakerphone operation:

- (1) Place a call to the test desk and switch to speakerphone.
- (2) Adjust loudspeaker volume to moderately loud listening level by turning volume control of transmitter clockwise.
- (3) Have test center repeat the question "In what suburb does Joe live?" several times.

(4) If choppiness is detected in the sentence, particularly in the first b in **suburb** and the t in **what**, make loudspeaker adjustment per 5.02.

(5) Repeat this test at a high listening level by turning the volume control to the extreme clockwise position.

5.02 An alternate loudspeaker connection is provided in each 55-type control unit to compensate for room conditions which causes voice-switching during reception. The effect of voice-switching is to chop portions of the incoming speech. To compensate for this condition, move loudspeaker lead (SP2) from terminal 33 to terminal 24 [55A (MD) or 55A* Modified] or terminal 29 to terminal 30 (55B).

5.03 If radio frequency interference is experienced:

(1) In 666A (MD) transmitter; place KS-13814L7 (0.02 mf) capacitor across terminals of AC1 transmitter unit, and/or place a 542C capacitor (0.25 mf) between terminal 9 of the terminal strip and one of the mounting screws used to secure the printed wiring board to the base.

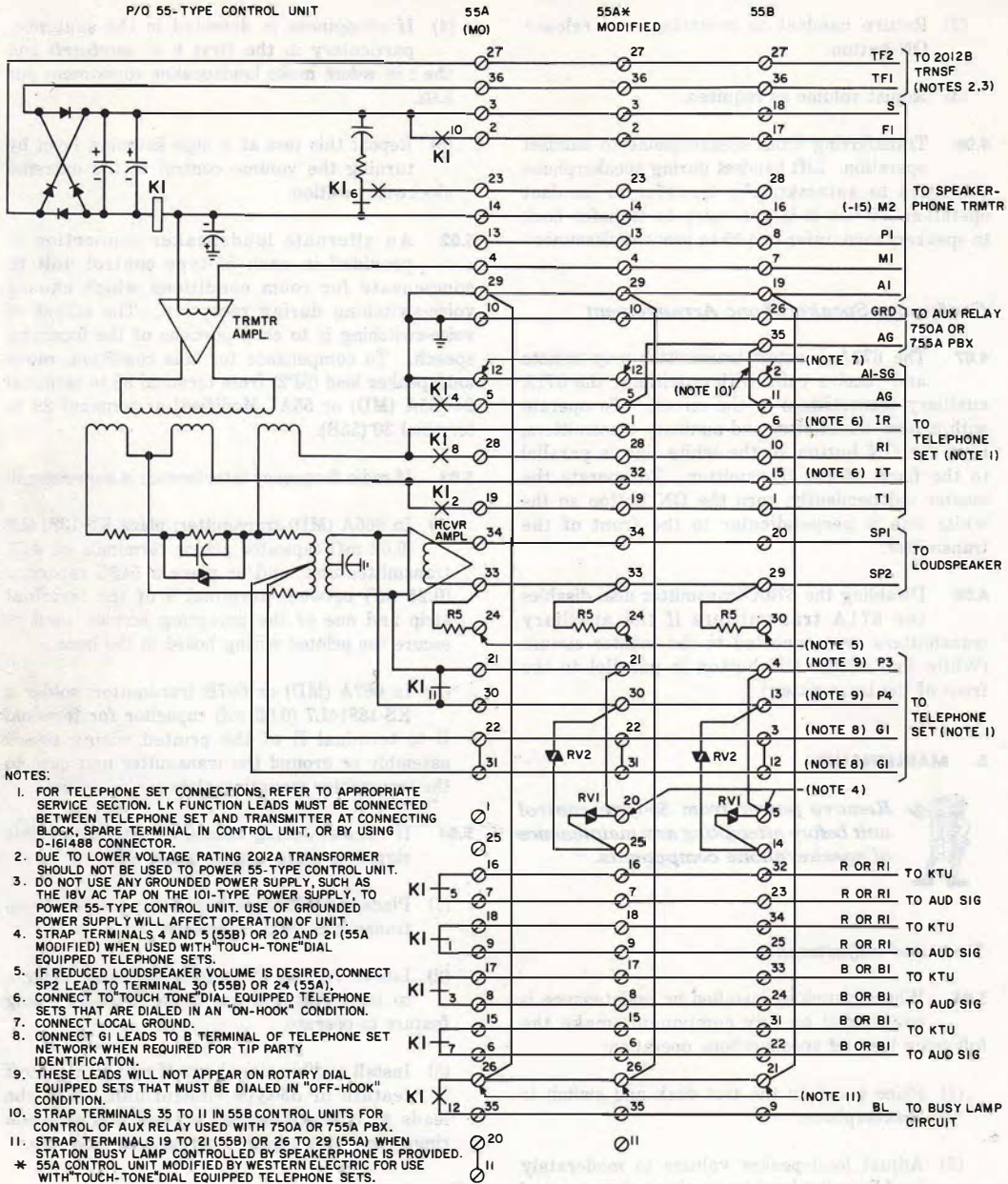
(2) In 667A (MD) or 667B transmitter; solder a KS-13814L7 (0.02 mf) capacitor for terminal B to terminal D of the printed wiring board assembly or ground the transmitter unit case to the transmitter mounting plate.

5.04 If voice-switching caused by external audible signaling devices is encountered:

- (1) Place audible signaling devices away from transmitter unit, if possible.
- (2) Lower volume of audible signaling devices to level that will not cause voice-switching feature to operate.
- (3) Install audible signal cutoff using the cutoff feature of 55-type control unit. Use the leads to common signal control and common ringer or buzzer circuit for this cutoff feature.

Cleaning

5.05 Clean plastic covers and housings with water dampened KS-2423 cloth equivalent. Do not use scouring powders or cleaners.



- NOTES:
- FOR TELEPHONE SET CONNECTIONS, REFER TO APPROPRIATE SERVICE SECTION. LK FUNCTION LEADS MUST BE CONNECTED BETWEEN TELEPHONE SET AND TRANSMITTER AT CONNECTING BLOCK, SPARE TERMINAL IN CONTROL UNIT, OR BY USING D-161488 CONNECTOR.
 - DUE TO LOWER VOLTAGE RATING 2012A TRANSFORMER SHOULD NOT BE USED TO POWER 55-TYPE CONTROL UNIT.
 - DO NOT USE ANY GROUNDED POWER SUPPLY, SUCH AS THE 18V AC TAP ON THE 101-TYPE POWER SUPPLY, TO POWER 55-TYPE CONTROL UNIT. USE OF GROUNDED POWER SUPPLY WILL AFFECT OPERATION OF UNIT.
 - STRAP TERMINALS 4 AND 5 (55B) OR 20 AND 21 (55A MODIFIED) WHEN USED WITH "TOUCH-TONE" DIAL EQUIPPED TELEPHONE SETS.
 - IF REDUCED LOUDSPEAKER VOLUME IS DESIRED, CONNECT SP2 LEAD TO TERMINAL 30 (55B) OR 24 (55A).
 - CONNECT TO "TOUCH-TONE" DIAL EQUIPPED TELEPHONE SETS THAT ARE DIALED IN AN "ON-HOOK" CONDITION.
 - CONNECT LOCAL GROUND.
 - CONNECT G1 LEADS TO B TERMINAL OF TELEPHONE SET NETWORK WHEN REQUIRED FOR TIP PARTY IDENTIFICATION.
 - THESE LEADS WILL NOT APPEAR ON ROTARY DIAL EQUIPPED SETS THAT MUST BE DIALED IN "OFF-HOOK" CONDITION.
 - STRAP TERMINALS 35 TO 11 IN 55B CONTROL UNITS FOR CONTROL OF AUX RELAY USED WITH 750A OR 755A PBX.
 - STRAP TERMINALS 19 TO 21 (55B) OR 26 TO 28 (55A) WHEN STATION BUSY LAMP CONTROLLED BY SPEAKERPHONE IS PROVIDED.
 - 55A CONTROL UNIT MODIFIED BY WESTERN ELECTRIC FOR USE WITH "TOUCH-TONE" DIAL EQUIPPED TELEPHONE SETS.

Fig. 2—55-Type Control Unit Connections

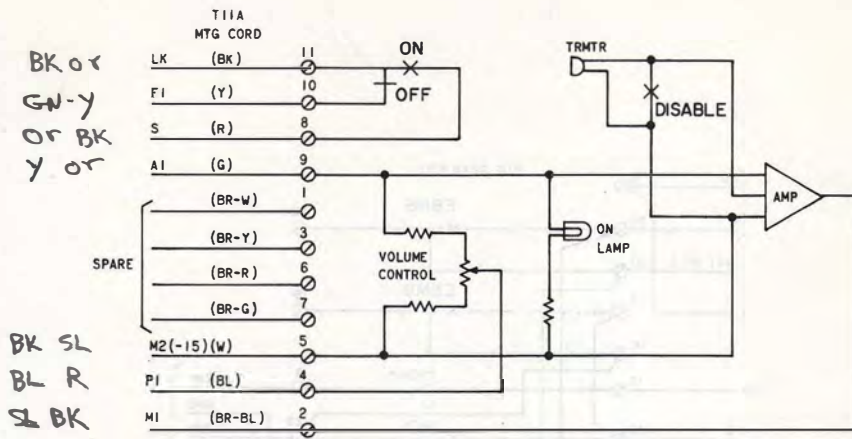


Fig. 3—666A (MD) Transmitter Connections

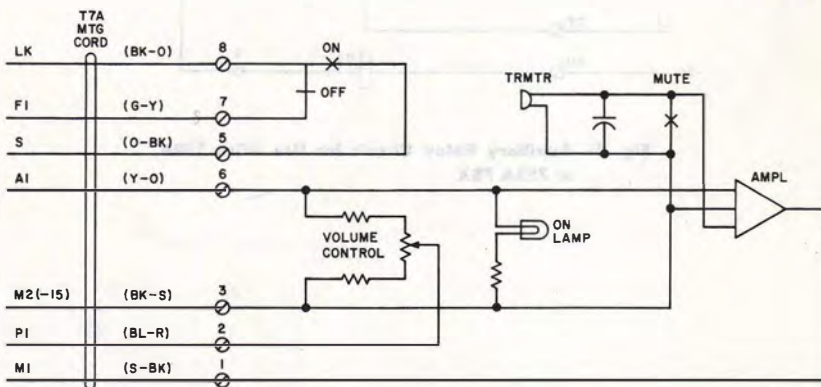


Fig. 4—666B Transmitter Connections

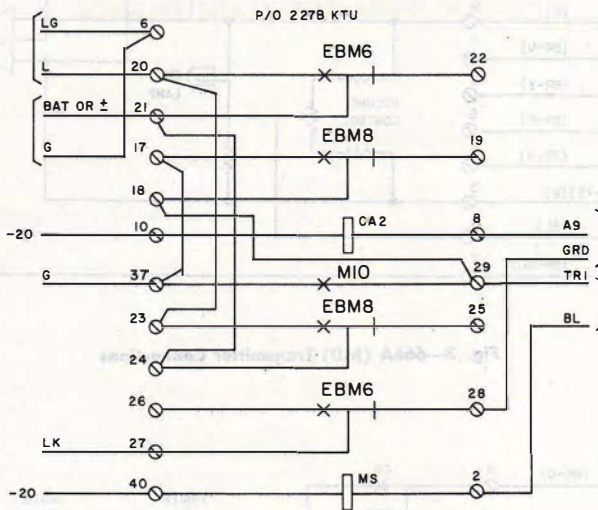


Fig. 5—Auxiliary Relay Circuit for Use With 750A or 755A PBX