

## KS-21764 TELETRAINER

### DESCRIPTION, OPERATION, AND MAINTENANCE

#### 1. GENERAL

**1.01** This section covers the description, operation, and maintenance of the KS-21764 Teletrainer which replaces the KS-16605 Teletrainer, now rated MD. Associated equipment, including carrying case, telephones, and cords, are also covered.

**1.02** Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

**1.03** The Teletrainer (Fig. 1) is provided by the telephone company to schools for teaching students correct and effective use of the telephone. It realistically simulates normal telephone operation, with dial tone, busy tone, ringing, and 2-way conversation. The signals and conversation can be amplified for general classroom participation or applied to a recorder. The Teletrainer is self-contained; it requires connection to a standard ac power source but not to the telephone network.

#### 2. DESCRIPTION

**2.01** The Teletrainer consists of the following items, all of which must be ordered separately:

- Unit, Control, KS-21764, List 1 (Fig. 1 and 2)
- Case, Carrying, KS-16606, List 5 (Fig. 3)
- Set, Telephone, 500DM-58 (Fig. 1)
- Set, Telephone, 2702BM-57 (Fig. 1)
- Cord, H4DU-58 (6-foot handset cord)
- Cord, H4DU-57 (6-foot handset cord)
- Cord, D4BU-29 (25-foot mounting cord; 2 required)

#### Control Unit

**2.02** The KS-21764,L1 control unit is mounted in a modified 108A loudspeaker housing. It measures 6-1/2 inches wide, 4 inches high, and 5 inches deep and weighs approximately 3 pounds. It is available in yellow only. All controls and jacks are located on the back of the unit so that, when unit is placed on the teacher's desk, the loudspeaker can be directed toward the classroom with the controls easily accessible to the teacher (Table A). A student telephone can be located up to 25 feet away on each side.

**2.03** The control unit supplies talking battery to the telephone sets. It also generates simulated dial tone, busy tone, and ring voltage, and applies these signals to the telephones in a semiautomated fashion. An amplifier and a loudspeaker allow all signals and conversations to be monitored by the teacher and other students.

#### Carrying Case

**2.04** The KS-16606,L5 carrying case (Fig. 3) is standard fiberglass luggage provided with special molded inserts to hold the control unit and two telephones securely in place.

#### Telephone Sets and Cords

**2.05** The 500DM telephone set is a general purpose desk model with rotary dial. The 2702BM is a residential PRINCESS® model with TOUCH-TONE® dial. Both sets are modular. The H4DU cord connects handset to base, and the D4BU cord connects the telephone to a PHONE jack on the control unit.

**2.06** As shown in Fig. 4 and 5, each telephone must be modified to function properly with the control unit. It is also recommended that both ends of the handset cords and the telephone set end of the mounting cords be modified as shown

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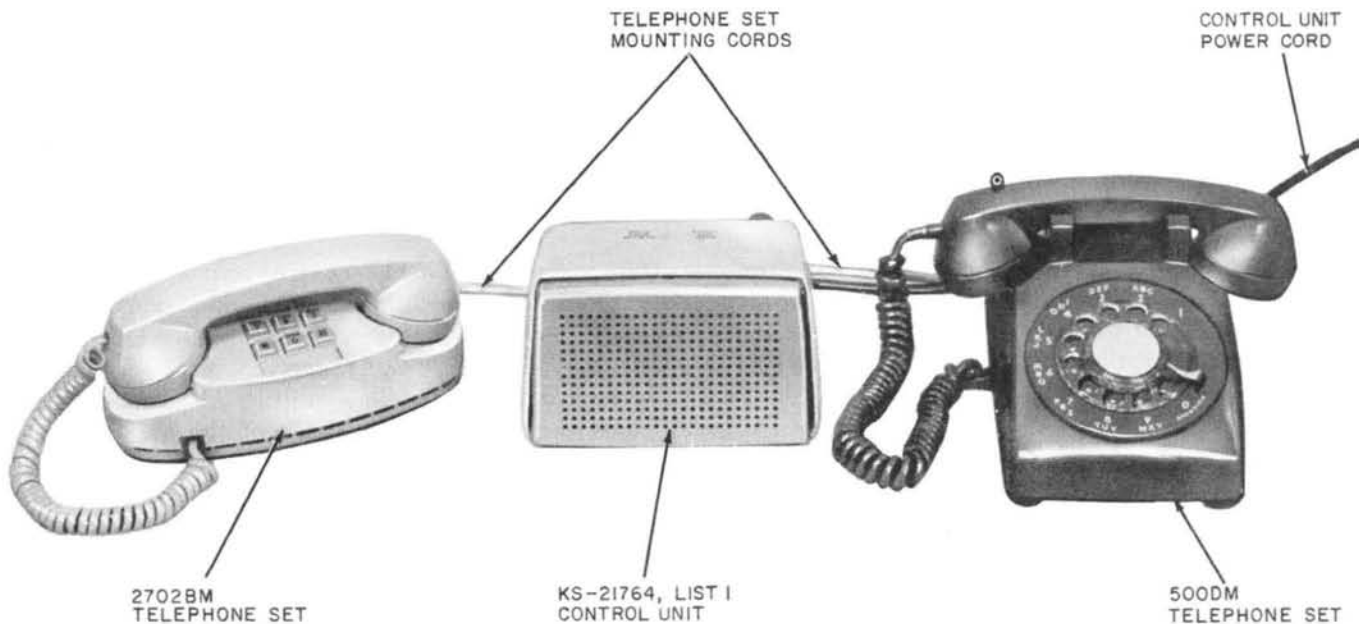


Fig. 1—Teletrainer Set Up for Classroom Use



Fig. 2—KS-21764, List 1 Control Unit—Rear View

in Fig. 6. Clipping off part of the finger tabs on the modular plugs will prevent students from accidentally disconnecting the cords. The control unit ends of the mounting cords should not be modified, so that they can easily be unplugged when the Teletrainer is packed up.

**2.07** A white 500-type telephone and a blue PRINCESS phone are recommended for use

with the control unit. However, any color is permissible as long as the proper types are used.

### 3. OPERATION

**3.01** Remove the control unit and the two telephones from the carrying case.



*Before operating the Teletrainer, be sure that the two telephones have been modified as specified in Fig. 4 and 5.*

**3.02** Place the control unit on a table or desk with the loudspeaker facing the group to be instructed and the rear control panel accessible to the teacher.

**3.03** Plug the telephones into the PHONE jacks on the rear panel of the control unit and place the telephones in their desired locations.

**3.04** Plug the transformer on the end of the control unit power cord into a suitable 115V 60-Hz outlet. Turn on the control unit by turning the VOLUME knob clockwise. The red lamp should light. Arrange the telephones and adjust the VOLUME control so that feedback does not occur between the telephone and the loudspeaker.

**TABLE A**  
**CONTROLS, INDICATORS, AND CONNECTORS ON CONTROL UNIT**

VOLUME knob/ OFF switch	Turns control unit on and increases volume of loudspeaker output when rotated clockwise past OFF position.
RING/TALK/TONES 3-position toggle switch	Selects mode of operation of Teletrainer.
REMOTE BUSY TONE pushbutton switch	Sends busy tone to off-hook telephone when pushbutton switch is depressed and RING/TALK/TONES switch is in TONES position.
ON lamp	Indicates that control unit is turned on.
RECORD jack	Allows tones, ringback, and conversation to be applied to recorder or PA system.
PHONE jacks	Modular jacks for connecting student telephones.

**3.05** Use of the Teletrainer is summarized in the operational logic diagram (Fig. 7) and the call sequence diagram (Fig. 8). The teacher is responsible for operating the RING-TALK-TONES 3-position toggle switch and the REMOTE BUSY TONE button to apply the proper signals to the calling and called telephones and for adjusting the output level of the loudspeaker with the VOLUME knob.

**3.06** In a normal call, the function switch should be in the TONE position when the calling station goes off hook. Dial tone is automatically sent to the calling station. (If for any reason the other station is off hook too, busy tone will automatically be sent to the calling station.) The calling party can then dial a 7-digit number to simulate a realistic situation, although the two phones are actually connected directly together. At this point, either ringing should be applied to the called station or busy tone to the calling station, as determined by the instructor. Ringing voltage is applied to the called phone only when the instructor puts the function switch in the RING position; ringback is heard in the calling phone. To send busy tone to the calling phone, the instructor sets the switch to TONES and presses the REMOTE BUSY TONE button. When the called phone answers, the instructor should set the function switch to TALK, turning off the ringing voltage generator.

**Note:** Ringing will cease when called party goes off-hook. However, with the generator still on, ringback will continue.

#### **4. MAINTENANCE**

**4.01** Local maintenance of the Teletrainer is normally limited to repair and replacement of defective telephones and cords. Trouble associated with the control unit is considered beyond the scope of on-site repair; a defective control unit should be returned to the local service center for repair. Telephones should be maintained according to information in the following Bell System Practices:

500DM Telephone—Section 502-521-402  
 2702BM Telephone—Section 502-703-100

**4.02 Operational Troubles**—When a problem develops with the operation of the Teletrainer, determine whether the control unit or one of the telephones (including cords) is at fault. Make sure the power cord is plugged into an active ac outlet, that the control unit is turned on, and that telephones and cords are properly connected.

- If one phone receives tone and ringing properly but the other does not, the latter set or cord is probably defective. Verify by swapping phones and cords to isolate the defective item.



Fig. 3—KS-16606, List 5 Carrying Case With Control Unit and Telephones

- If one phone fails to ring, check the setting of the ringer bias spring; it should be in the weak notch position.
- If both phones fail to receive any or all tones or ringing, the control unit is probably defective.
- If a talking path cannot be established between any two telephones, the control

unit is probably defective; if replacing a phone or cord clears the trouble, the replaced item was at fault.



*Be sure that the loudspeaker level is not so high that it covers up the output of the telephone receivers; when this happens, the users may think that the telephones are "dead".*

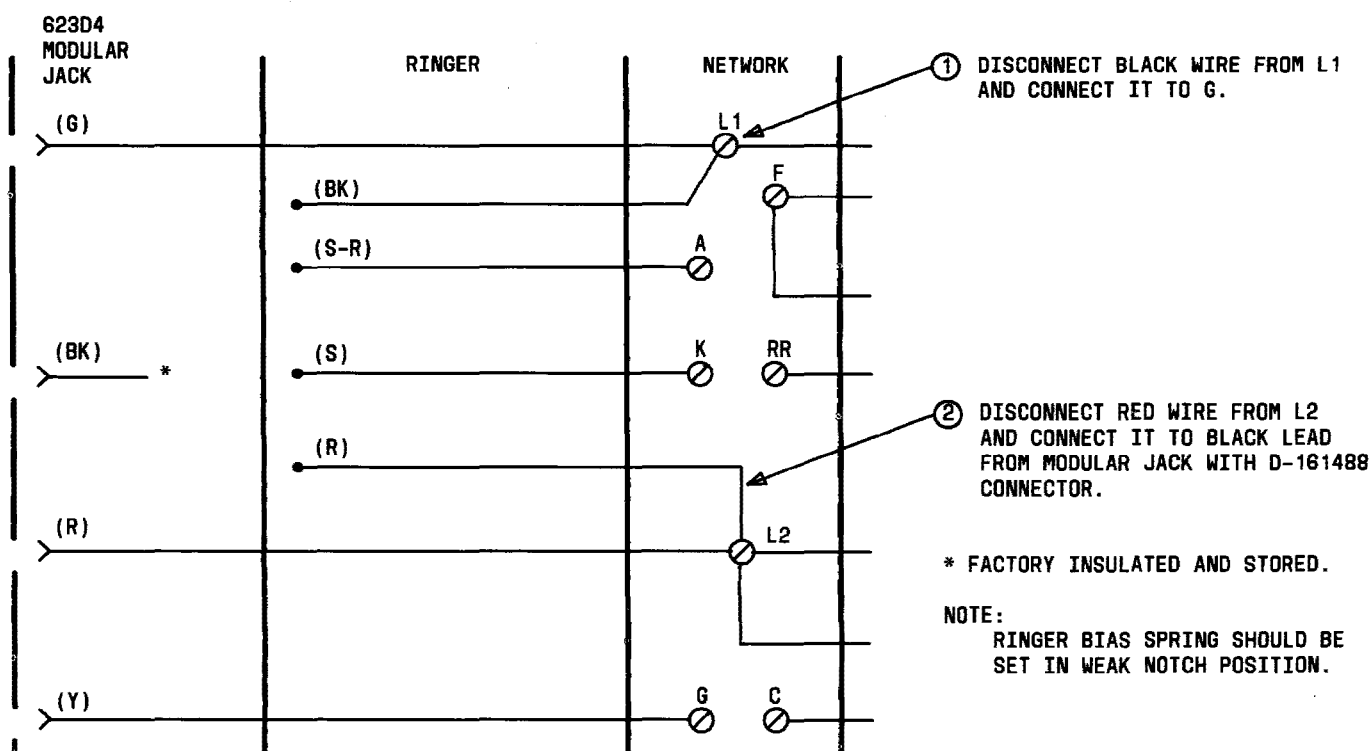


Fig. 4—Modification of 500DM Telephone Set

- If tones, talking, and ringback are heard in the phones but not in the loudspeaker, turn up the VOLUME control. If this does not clear the trouble, the control unit is probably defective.

**4.03 Power Troubles**—The customer is responsible for providing a suitable 115V 60-Hz outlet to power the Teletrainer. If the Teletrainer fails to operate when plugged in and turned on, check the ac power at the outlet. If the circuit fuse is blown, have the customer replace it; if the outlet is controlled by a switch, be sure that it is turned on. Failure of these steps to restore power indicates that the control unit power supply circuit is defective.

## 5. CIRCUIT DESCRIPTION (Fig. 9)

**5.01 Power**—AC line voltage is applied to the rectifier/regulator to produce +V and ground. The dc output is applied continuously as talk battery for the telephones and dc bias for the relay drivers and the amplifier. It is also divided equally to produce the bipolar supply required by the amplifier.

Bias is routed to the busy tone/dial tone generator and the ringing generator through the RING-TALK-TONES function switch.

**5.02 Talking Circuit**—Talk battery is supplied to both phones through the primary of the talk circuit transformer. When either phone goes off-hook, a path is completed through the phone back to a relay driver circuit operating either K1 or K2. When the other phone goes off-hook, the talking path is completed between the two phones.

**5.03 Busy Tone/Dial Tone Generator**—Dial tone is generated by one half of a timer circuit. When dc bias is applied to the reset terminal, the timer is enabled. The other half of this timer is an interrupt generator. When its output is applied to the reset of the dial tone generator, dial tone is interrupted to produce busy tone. Dial or busy tone is supplied to the off-hook phone through the dial tone output circuit and the transformer.

**5.04 Ring Voltage Generator**—This circuit consists of a dc to dc converter and a

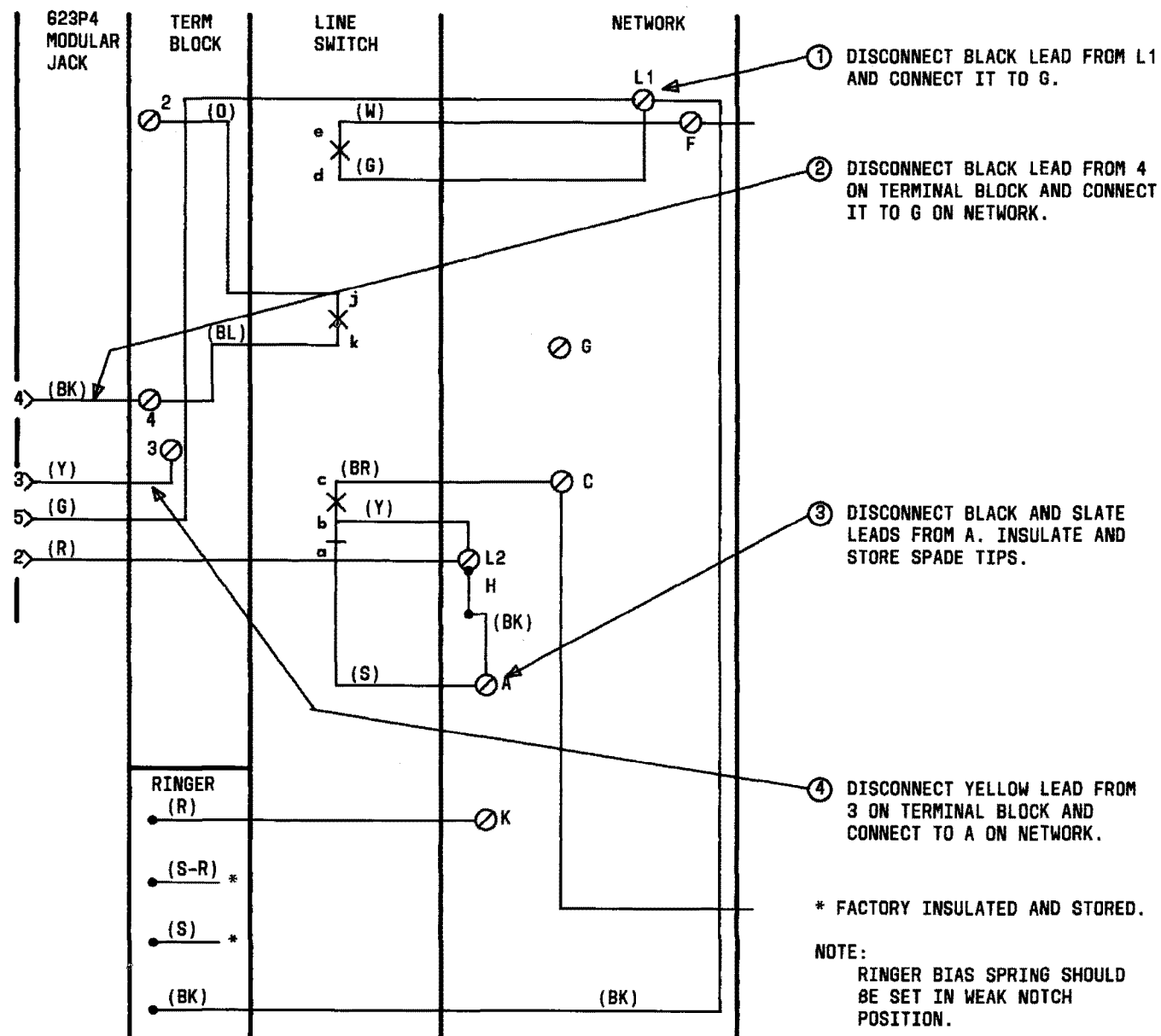


Fig 5—Modification of 2702BM Telephone Set

chopper. The output of the converter is applied through the contacts of relay K3, which is pulsed at a 20-Hz rate, to the called phone. The relay contacts are wired to reverse the polarity of the converter output. The relay is pulsed at the 20-Hz rate. The dc bias for the 20-Hz timer is supplied by the interrupt timer, establishing the make-break interval of the ring burst. Ringback is supplied

to the off-hook phone through the dial tone output circuit and the transformer.

**5.05 Amplifier/Loudspeaker**—Dial tone, busy tone, ringback, and conversation between the two phones are applied through the amplifier circuit to the loudspeaker. Output level is controlled manually with the VOLUME control.

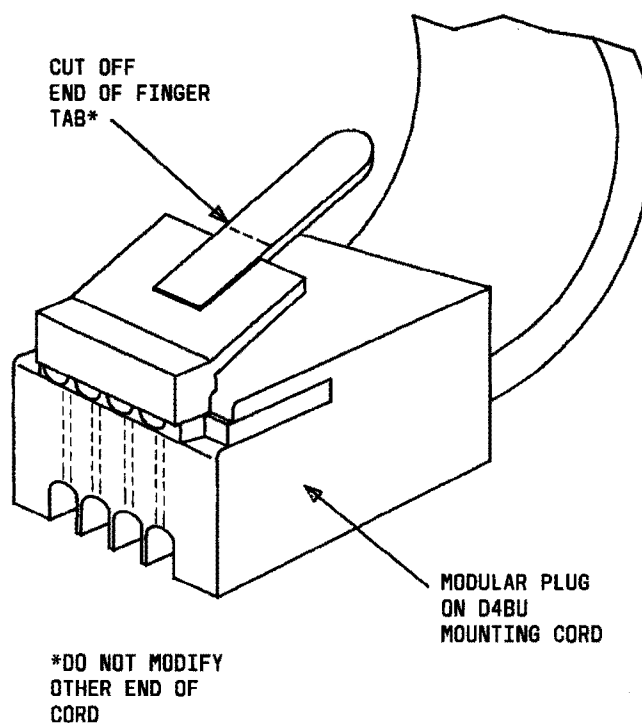


Fig. 6—Modification of D4BU Mounting Cord

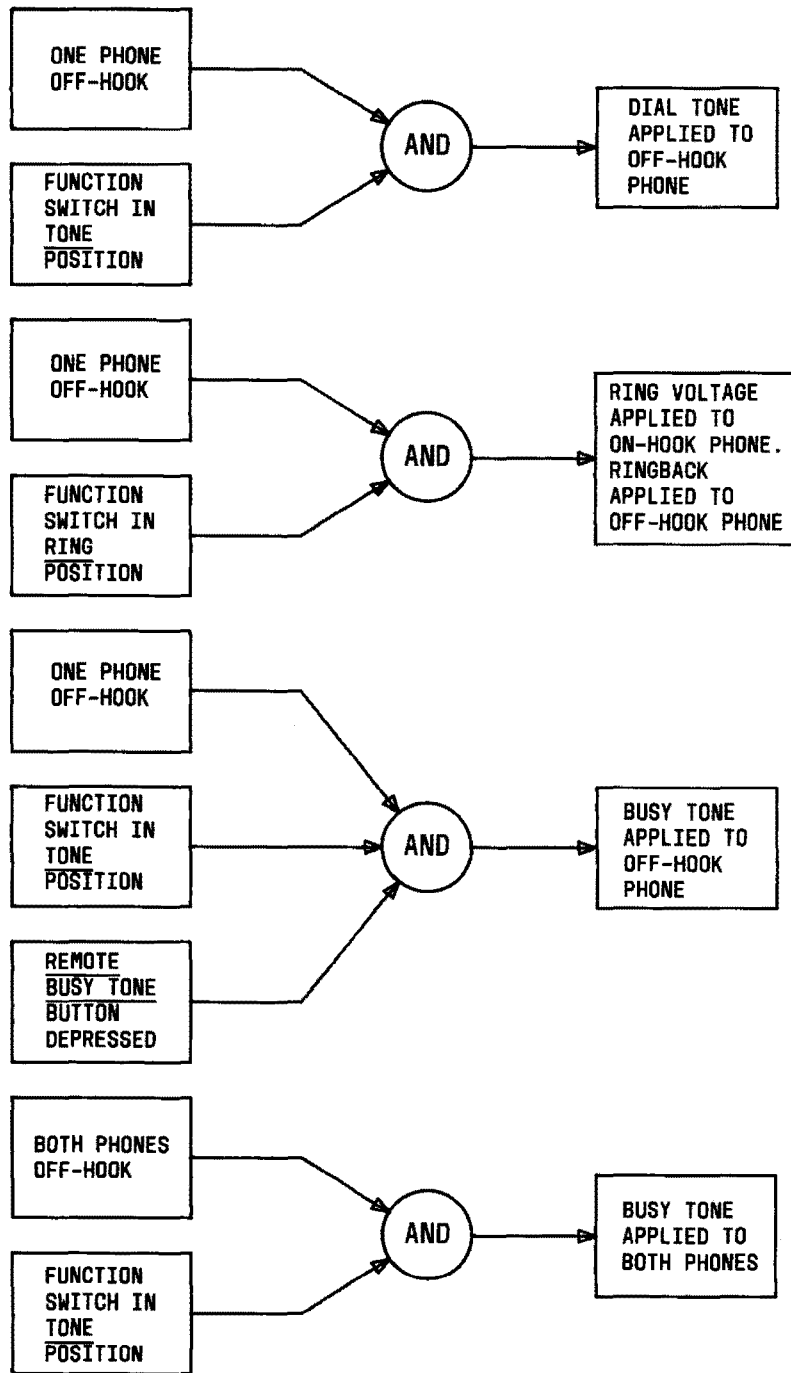


Fig. 7—Teletrainer Operational Logic



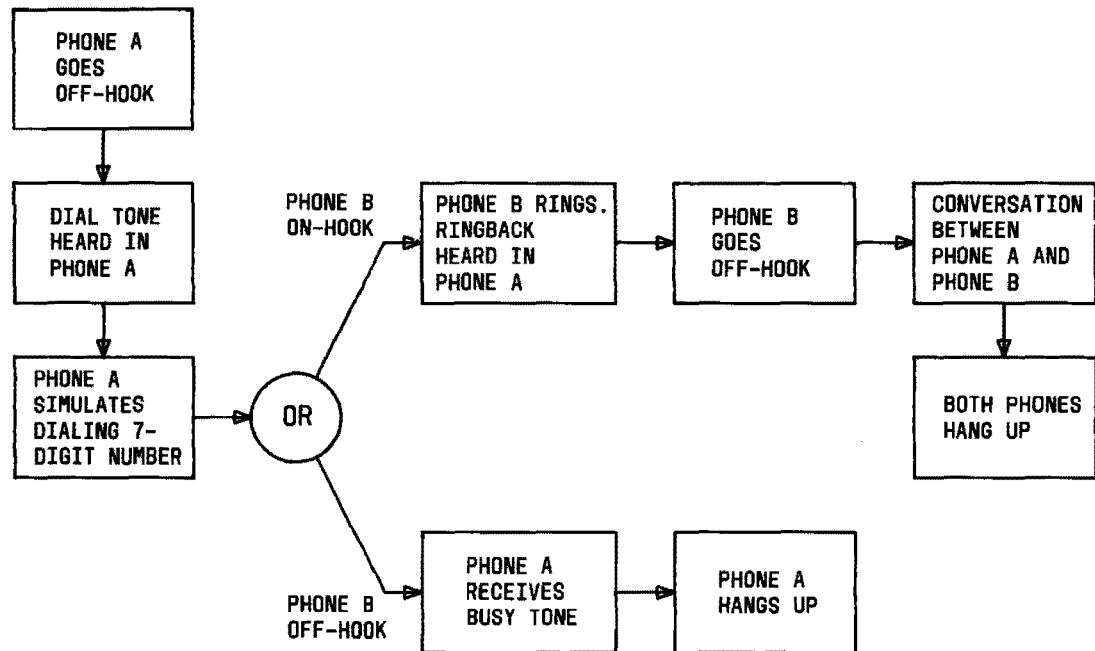
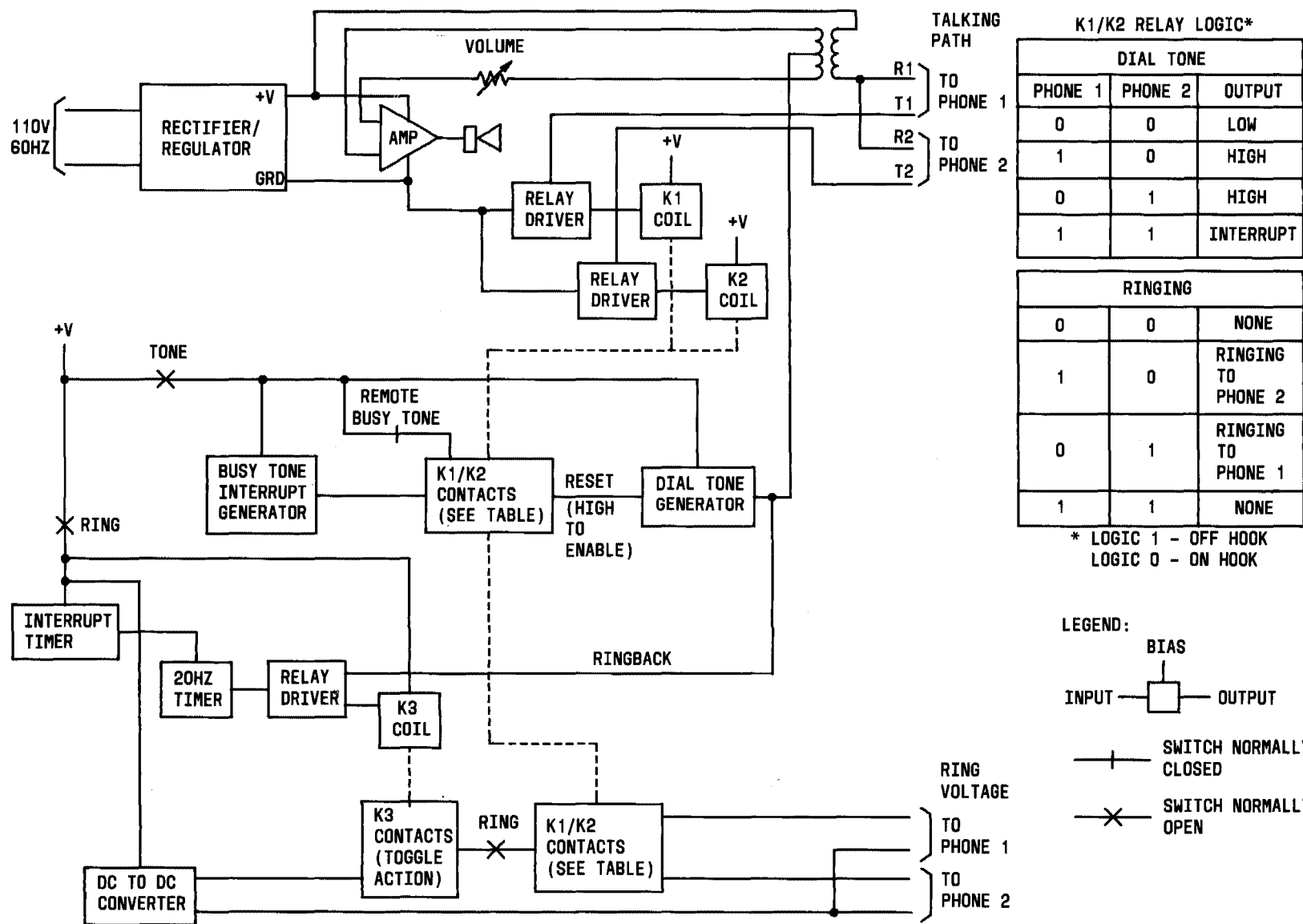


Fig. 8—Normal Call Sequence



**Fig. 9—Block Diagram of Control Unit**