

ELECTRONIC SENTRY<sup>®</sup> MODEL 2 WARNING UNIT  
INSTALLATION, OPERATION, AND FIELD MAINTENANCE

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1. GENERAL

1.01 This Section describes the installation, operation, and field maintenance for the ELECTRONIC SENTRY Model 2 Warning Unit (see Figure 1).

1.02 The ELECTRONIC SENTRY Model 2 Warning Unit is a device which notifies a responsible person by telephone whenever a predetermined condition arises. This warning unit is connected to the telephone line, and a primary detecting device is connected to the warning unit. The detecting device may be a thermostat, pressure control, water level indicator, photocell or any control capable of closing and sustaining a switching circuit. When activated by the detection device, the Model 2 will automatically seize the telephone line. A prerecorded telephone number is dialed and a recorded message is transmitted to the called party. (The message and the called party's telephone number are prerecorded on tape.)

1.03 At the end of the first call, the Model 2 will release the telephone line. However, the unit will re-dial the telephone number

and deliver the warning message again. This operation is repeated periodically by the warning unit at intervals determined by an interval timer within the unit. The desired intervals can be selected by the customer. The Model 2 continues to deliver the warning message to the party it "dials-up" until the reported condition either is corrected or the unit is manually turned off.

1.04 With a special tape cartridge the Model 2 can be programmed to dial two different telephone numbers and deliver a warning. This application is useful where two people might be on duty at the same time and both of them might be needed, or when an individual may want to be reached at two different numbers. In this operation, the warning unit will seize the telephone line, dial the first telephone number and deliver the warning message on the first segment of the tape. When the first message is completed, the unit will release the telephone line. The unit will now seize the telephone line again, dial the second telephone number and deliver the second message on the later part of the tape. The repeat cycle operates in the same manner as a tape cartridge designed to call one number.

1.05 An optional piece of equipment that can effectively turn off the Model 2 from a remote station is the Remote Shut Off (RSO-1). For information concerning the RSO-1 unit, refer to the 478-111 series of the General System Practices.

1.06 A dial unit and dynamic microphone are ordered separately. Both of these units are easily removable, and are the means by which the customer records both the telephone number to be called and the warning message to be delivered (see Figure 2). Both the telephone number and the warning message are recorded on an endless, magnetic recording tape. The customer can "check" his warning message by playing it back through the microphone.

1.07 The standard type cartridge has a 90 second capacity, but any capacity from 60 seconds to 3 minutes is available. The microphone is a high quality dynamic microphone and earphone speaker.

1.08 The Model 2 has a recording speed of 3-3/4 inches per second, it weighs 29-3/4 pounds and is 8-7/32 inches high, 13-1/8 inches wide, and 8-1/4 inches deep.

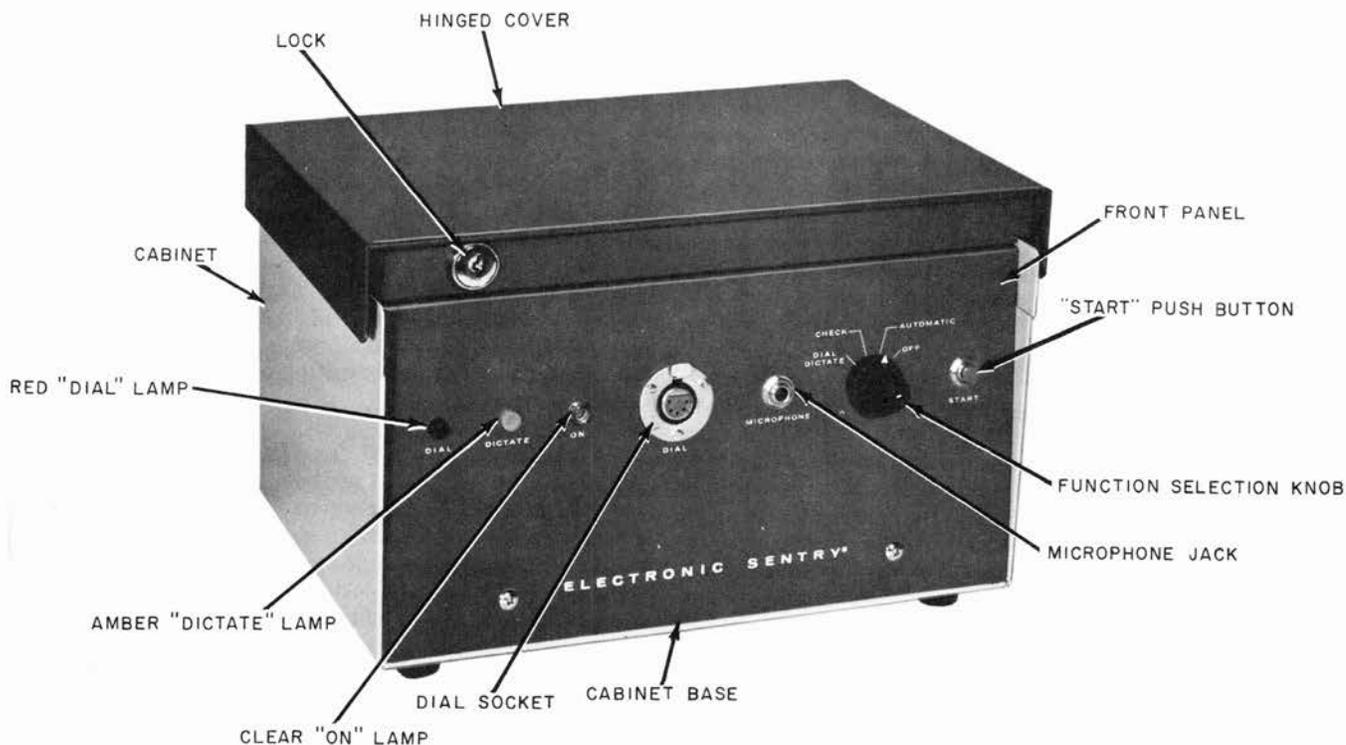


Figure 1. ELECTRONIC SENTRY Model 2 Warning Unit (Front View, Cover Down).

1.09 Oscillators, amplifiers, and electronic control circuits are entirely transistorized, and the use of printed circuit boards assures long life and dependability.

1.10 Cycling of the unit is controlled by a microswitch whose actuating lever either drops into, or is raised out of a slotted section in the recording tape (see Figure 2).

## 2. INSTALLATION

### Location

2.01 Locate the warning unit in accordance with the considerations outlined below. If the customer's wishes cannot be followed, explain the reason.

- (a) The unit may be located within easy reach of the customer's telephone instrument, however, this is not essential.
- (b) A satisfactory location would be a desk or table sufficiently strong to support the units' weight of approximately 29-3/4 pounds. (The unit is intended for desk or table installation, and need not be fastened.)

(c) A desk or table location where the ventilation is not entirely restricted is adequate. (Avoid locations that might subject the unit to excessive moisture, heat, or vibration.)

(d) Locate the unit within the restrictions of the power cord. The unit is equipped with an 8-foot power cord and two prong plug for connecting to standard a-c outlets.

### Power Supply

2.02 The Model 2 is designed to operate on a 117 volt (105V ac to 135V ac) 60-Hertz a-c power outlet. In no case should the unit be connected to a direct current (d-c) outlet. If only dc current is available, refer the matter through regular organization channels to the engineering department for advice before proceeding with the installation.

### Loading the Tape

2.03 Open the lid and remove the thumb nut on the tape cartridge post. Place the loaded tape cartridge on the post ("D" shaped spindle) and replace the thumb nut (Figure 2).

- 2.04 Insure that the unit is not connected to its a-c power outlet at this time.
- 2.05 Pull approximately 9 inches of tape out of the cartridge being careful not to twist the tape (see Figure 3). Thread the tape around the guide pillars, (see Figure 4), tape tension arm, and head assembly. Pull back on the tape switch actuator arm and allow it to rest itself against the tape. Pull back the pressure roller assembly and thread the tape between the rubber pressure roller and the capstan. Release the pressure roller assembly, making sure that the tape is properly positioned in the guides.
- 2.06 Insert the power cord into an 115-volt a-c 60-Hertz power outlet. Rotate the

selector knob to "AUTOMATIC". The motor will advance the tape. Observe that the tape is transported properly through the mechanism.

2.07 When the slotted actuating band splice appears, the tape switch actuator arm will drop into the slot, stopping the motor.

2.08 Rotate the selector knob to "OFF", and remove the power cord from the a-c outlet.

### Connections

2.09 Do not connect the warning unit to the a-c outlet power supply until the following installation has been completed.

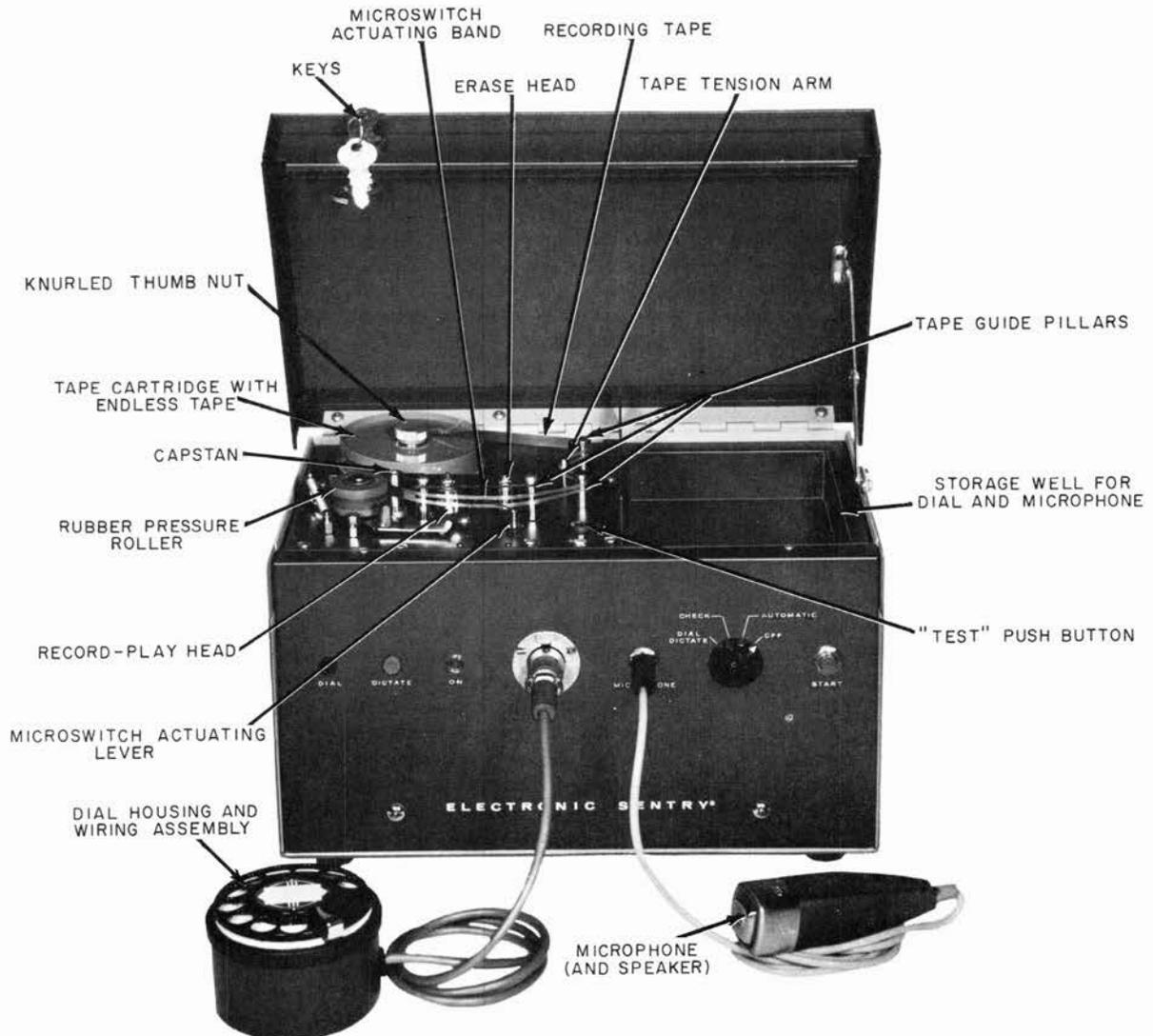


Figure 2. ELECTRONIC SENTRY Model 2 Warning Unit (Front View, Cover up, Microphone and Dial Connected).

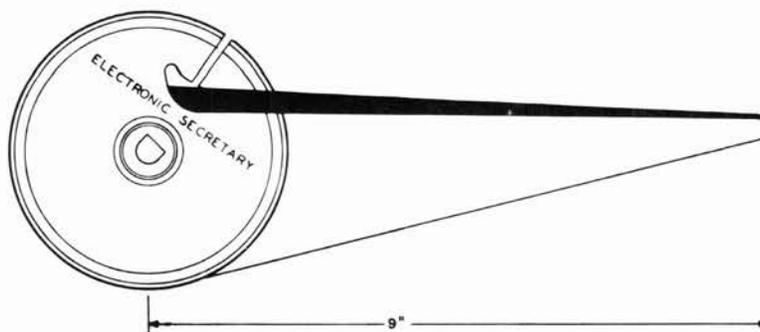


Figure 3. Cartridge Assembly and Tape Slack.

2.10 To initiate a call every third cycle, terminals T and 1, 1 and 4, P and 8, 8 and 9, 9 and 11, and 11 and 12 are strapped at the factory. If the customer desires not to have the unit call every third cycle, one of the OPTIONAL CALLING SEQUENCES can be arranged as follows:

- (1) Remove two screws from the side panels of the cabinet and four screws from the bottom surface of the cabinet. Slide the mechanism forward to remove it from the cabinet.
- (2) For a call every cycle, strap terminals T and 1, 1 and 3, 3 and 4, 4 and 5, and 5 and 2-6 of barrier strip TB302 (see Figure 5).
- (3) For a call every second cycle, strap terminals T and 1, 1 and 3, 3 and 5, P and 8, 8 and 10, and 10 and 12.
- (4) For a call every sixth cycle, strap terminals T and 1, P and 8, 8 and 9, 9 and 10, 10 and 11, and 11 and 12.

- (5) Return the mechanism to the cabinet.

2.11 Remove the cover of the telephone-detector block TB301 (see Figure 6). Connect the telephone line to the terminals marked L1 and L2. Connect the leads from the detection device to the terminals marked DET. 1 and DET. 2. Replace the cover.

NOTE: The detect lines must provide a closure of 3 seconds to operate the warning unit. The lines must not have more than 230 ohms resistance.

#### Testing

2.12 The standard test tape for the ELECTRONIC SENTRY Model 2 Warning Unit requires a minimum time length of one minute. The tape must be free of depressions, kinks, serrations, extrusions, and contaminations on the recording surface. If the recording tape has any of these defects, discard the tape and cartridge and replace with a new loaded tape cartridge.

2.13 Verify operation of the unit by performing the three basic functions described in Part 3 of this Section.

### 3. OPERATION

3.01 The Model 2 performs the following three basic functions: (1) Dial and Dictate; (2) Check; and (3) Automatic. The following paragraphs, in conjunction with Figure 2 explain the basic functions. The information contained in this part should be referred to when instructing the customer on the operation of his unit.

#### Dial Dictate

3.02 Prepare the unit as follows:

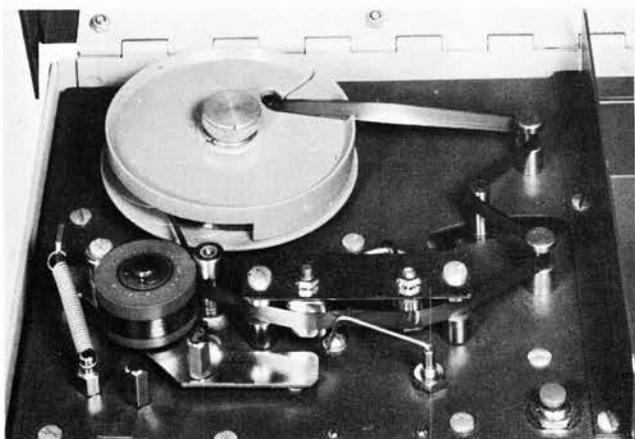


Figure 4. Cartridge Assembly Threaded on Tape Deck.

- (a) Power cord inserted into 115-volts a-c, 60-Hertz source.
- (b) Microphone inserted into MICROPHONE jack.
- (c) Dial inserted into DIAL jack.
- (d) Selector knob rotated to "DIAL DICTATE." (ON lamp will glow.)

3.03 Rotating the selector knob from "OFF" to "DIAL DICTATE" puts the unit in standby condition. Contacts of the selector switch apply a-c to illuminate the ON light and to energize the d-c power supply. In addition, other circuits and switches are energized, preparing the unit for "Dial Dictate" operation.

3.04 Depress the START button and hold it depressed for 3 seconds. This will energize the capstan motor and the dial light timing circuit. The capstan motor drives the capstan, through an intermediate idler wheel, which advances the recording tape.

3.05 During the 3 seconds that the START button is held depressed, the tape splice operates the tape microswitch. Contacts of the tape microswitch operate a relay whose contacts perform the following: establish an a-c

holding circuit to the capstan motor and the dial light timing circuit; activate the midcycle amplifier, thus starting a timing cycle; and connect the power supply to energize the erase and bias oscillator, 1400-Hertz oscillator, record amplifier and midcycle control potentiometer. Bias and erase current is applied to the record-play and erase heads, respectively.

3.06 Five (5) seconds after the START button is depressed, the red DIAL lamp illuminates. When the red DIAL lamp glows, dial the first digit of the telephone number.

NOTE: Begin dialing within 3 seconds after the red DIAL lamp glows. All succeeding digits of the telephone number must be dialed within 3 seconds of each other.

3.07 Normally the 1400-Hertz tone of the tone oscillator would be applied through a potentiometer to the input of the record amplifier, amplified, then delivered to the record head for recording. However, with the dial unit plugged in, the normally closed pulse springs ground out the input to the record amplifier, thus no 1400-Hertz tone is admitted for amplification and recording.

3.08 Each time the dial is wound up, its shunt springs close to partially reset the mid-

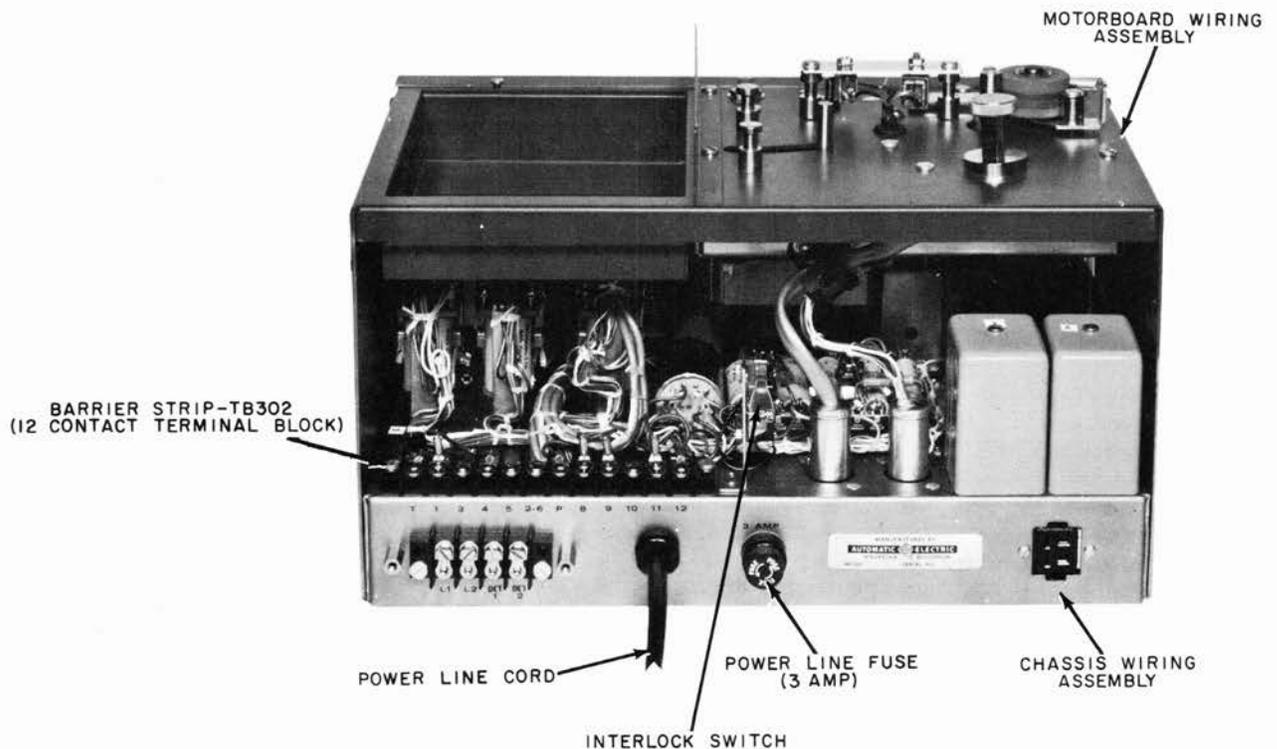


Figure 5. ELECTRONIC SENTRY Model 2 Warning Unit (Rear View, Cabinet Removed).

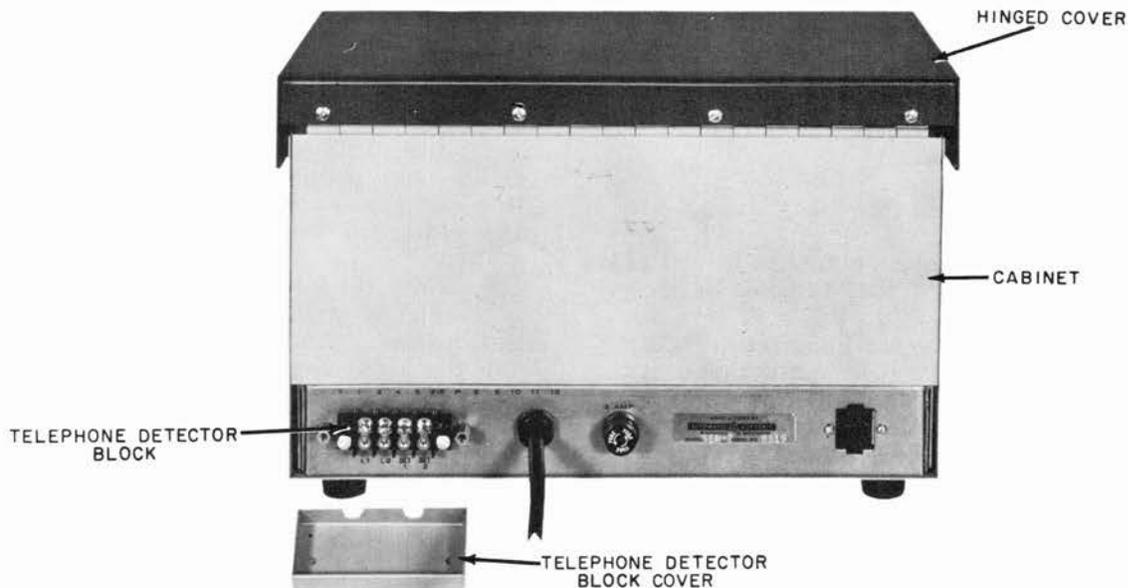


Figure 6. ELECTRONIC SENTRY Model 2 Warning Unit (Rear View, Telephone and Detector Terminal Block Cover Removed).

cycle timer amplifier. Thus, the midcycle timer amplifier allows time for wind-up and return of the dial for each digit dialed.

3.09 As the dial returns to normal, the pulse springs open and close to unground and ground, respectively, the input of the recording amplifier. When the springs open to unground the input of the amplifier, a burst of 1400-Hertz tone is applied to the amplifier, amplified, and recorded. Thus, if the number 5 were dialed, five tone bursts would be recorded on the tape.

3.10 After the telephone number has been dialed, wait until the amber DICTATE lamp illuminates. Then dictate the warning message.

3.11 After the last digit of the telephone number has been dialed, and the dial has returned to normal, the midcycle timer amplifier will "time out" within 7 seconds. At the end of the 7 second period, the midcycle amplifier will conduct to initiate relay action that performs the following: extinguishes the dial lamp; illuminates the DICTATE lamp; de-energizes the 1400-Hertz tone oscillator; disconnects the dial's shunt springs from the midcycle timer amplifier and pulse springs from the record amplifier; and connects the microphone to the input of the record amplifier.

3.12 The unit will now record signals from the microphone for a length of time determined by the cartridge used. Message must be completed before the DICTATE lamp extinguishes.

NOTE: Dialing a new number and recording a new message will erase the existing number and message simultaneously.

3.13 Audio signals from the microphone are applied to the input of a two-stage transistorized amplifier, where they are amplified, and then coupled together with record bias to the record-play head. The mixed bias and audio signals are connected to the record-play head for recording, while erase current is applied to the erase head.

3.14 The capstan motor will continue to operate until the slotted portion of tape reappears in front of the heads. When the actuating arm of the tape switch drops into the slotted portion of the tape splice, contacts of the switch will initiate relay action to extinguish the DICTATE lamp, cut off the midcycle timer amplifier, ground the input of the record amplifier, and break the latch paths to the power supply and the capstan motor. The capstan motor stops, ending the "Dial Dictate" cycle, and the unit rests in standby condition.

#### Check

3.15 Prepare the unit as follows:

- (a) Microphone in MICROPHONE jack.
- (b) Dial inserted into DIAL jack.
- (c) Selector knob rotated to "CHECK". (ON lamp will glow.)

3.16 Placing the selector knob in its "CHECK" position applies a-c line voltage, through its switch contacts, to light the ON lamp, activate the d-c power supply, and energize other circuits and switches, thus preparing the unit for operation in the "Check" function. In addition, the microphone is connected to the output of the recording amplifier and serves as a loudspeaker through which the recorded audio signals are heard.

3.17 Depress the START button and hold depressed until the tape switch is operated by the tape splice (3-seconds). Depressing the START button will energize the capstan motor. The capstan motor drives the capstan, through an intermediate idler wheel, which advances the recording tape.

3.18 When the tape splice operates the tape switch, contacts of the switch energize a relay whose contacts close to establish a holding circuit to the capstan motor thereby sustaining its operation. In addition, other contacts of the relay connect d-c power to the recording amplifier, permitting amplification of audio signals taken from the recording tape.

3.19 Audio signals, taken from the recording tape by the record and playback head, are applied through contacts of the selector switch to the input of the two-stage, transistorized recording amplifier. Amplified audio signals from the output of the amplifier are coupled through the selector switch to the microphone inserted in the MICROPHONE jack.

3.20 The recorded warning message can now be checked by listening to it as it is played back through the microphone.

3.21 After the message has been played back and checked, the capstan motor will continue to operate until the slotted portion of tape reappears in front of the heads. When the actuating arm of the tape microswitch drops into the slotted portion of the tape splice, contacts of the switch will initiate relay action that disconnects d-c power to the recording amplifier and opens the holding circuit to the capstan motor. The capstan motor stops, ending the "Check" cycle, and the unit rests in standby condition.

#### Automatic and Test Operation

3.22 Prepare the unit as follows:

- (a) Barrier strip TB302 strapped to initiate calling sequence desired. (Strapped at factory to initiate call every third cycle.)

- (b) Selector knob rotated to "AUTOMATIC," (ON lamp will glow).

3.23 Placing the selector knob in "AUTOMATIC" position will apply a-c line voltage through its switch contacts to light the ON lamp, energize the tape microswitch and activate the d-c power supply. D-c power is supplied to the TEST switch, detecting device, and midcycle timer amplifier. Likewise, a-c line voltage is applied to a stepping switch to insure that the unit is not connected internally to the telephone line until either the detecting device or TEST switch is operated.

3.24 Depress the TEST button (located on the motorboard) and hold depressed for 3 seconds. This simulates closure of the detecting device. The unit will dial the recorded telephone number and announce the information stored on the tape.

3.25 When a closure occurs across the DET. 1 and DET. 2 terminals or the TEST button is depressed, a relay is operated whose contacts connect a-c energizing paths to the capstan motor and a stepping relay. Likewise d-c power is connected to the announce-record-pulse amplifier, midcycle amplifier control potentiometer, an additional announce amplifier, and a separate pulse amplifier.

3.26 Energized with a-c, the capstan motor drives advancing the tape. The stepping relay operates, and its contacts internally connect the unit to one side of the telephone line, while the pulse amplifier conducts, operating a relay whose contacts close the telephone line loop, seizing the line.

3.27 As the tape is advanced by the capstan, the splice operates the tape microswitch and through relay action, de-energizes the stepping relay, connects latching circuits to the capstan drive motor and d-c power supply, and starts the midcycle amplifier to time the intervals between pulses.

3.28 Before the midcycle amplifier "times-out," the first 1400-Hertz tone signal of the recorded dial pulse train is picked off the tape by the record-play head. The signal is amplified and applied to the pulse amplifier. The pulse amplifier cuts off and restores the line pulsing relay whose contacts open releasing the line. When the 1400-Hertz tone pulse terminates, the pulse amplifier conducts again to re-operate the line pulsing relay whose contacts close and seize the line again. In this manner, succeeding pulses of the pulse train "dial" the recorded telephone number. During each pulse, the midcycle amplifier is reset by other contacts of the line pulsing relay. Within

7 seconds after the final pulsing of the last digit in the telephone number, the mid-cycle amplifier "times-out" to initiate the midcycle shift.

3.29 Upon termination of the 7-second "time-out" period, the midcycle amplifier conducts, and, through relay action, switches the output of the announce-record-pulse amplifier from the pulse amplifier to the announce amplifier. Likewise, the loading coil and line transformer are connected across the telephone line as the line-pulsing relay contacts are disconnected. The unit will now deliver the warning message to the telephone line.

3.30 Audio message signals are taken from the tape by the record-play head and applied to the input of a 3-stage transistorized amplifier. After amplification, the warning message is delivered to the telephone line through the line transformer.

3.31 After the recorded message is played out to the telephone line, the slotted portion of tape reappears in front of the tape microswitch. The actuating arm of the tape switch falls into the slot, opening the contacts of the switch. Contacts of the tape switch initiate action which pulses the stepping relay and cuts-off the midcycle amplifier. The stepping switch and relay action open the telephone line loop, releasing the telephone line. Cut-off of the midcycle amplifier, through relay action, reconnects the line pulsing relay contacts to the open telephone line and switches the output of the announce-record-pulse amplifier once more to the input of the pulse amplifier.

3.32 The unit is now ready to start another cycle and will do so when the splice in the tape closes the tape switch again. The unit cycles continuously (as long as the DET. 1 and DET. 2 terminals are closed, or the TEST button is held depressed), and will seize the line, "dial" and deliver the warning message at intervals determined by the strapping connections made at the terminal barrier.

#### 4. OPERATION FOR CALLING A SECOND NUMBER

4.01 The Model 2 will dial two different telephone numbers and deliver a warning with a special tape cartridge using two 1 or 1 1/2 minute tape segments. This special tape has two slotted sections that activate the microswitch and are spaced equidistant on the tape. If this second number feature is desired, when

ordering an ELECTRONIC SENTRY Model 2 Warning Unit, specify a tape cartridge with two 1 or 1 1/2 minute segments at no extra cost.

#### Strapping on TB-302

4.02 For the warning unit to dial two calls, the strapping on TB-302 must be arranged for a call on every cycle. Refer to step 2 in Paragraph 2.10 for the proper strapping arrangement. This strapping arrangement will set the interval timer to initiate the first call on the first cycle, followed immediately by the second call on the second cycle. This cycling operation is repeated until the unit is turned off, either manually or by means of the Remote Shut Off unit.

#### Programming Tape Cartridge

4.03 The procedure for the Dial and Dictate functions on this special tape cartridge are the same as a standard cartridge, except that the "Dial Dictate" function is operated twice. One number and message will be recorded on the first segment of the tape and the second number and message will be recorded on the second segment.

#### 5. FIELD MAINTENANCE

5.01 To help insure good customer relations, maintenance involving dismantling of the unit should not be undertaken on the customer's premises. In addition to checking obvious trouble sources such as loose power or telephone line terminations, perform the maintenance operations outlined in the following paragraphs.

5.02 Inspect the tape to assure that it is not kinked or scratched, and that the spliced joint is secure. No foreign material should be present on the tape surface, except for the lubricant applied at the time of manufacture. Should tape condition be otherwise, replacement is indicated.

5.03 Assure that the capstan, pressure roller surface, pillars and heads are clean. If cleaning is required, remove the tape cartridge from the mechanism. Use a soft lintless cloth moistened with denatured alcohol to clean the surfaces.

5.04 When in the mechanism, the tape should move freely around the pillars and heads. Assure that the tape does not bind in the cartridge and that there is sufficient tape slack (see Figures 3 and 4).