

ELECTRONIC SECRETARY MODEL MR-2  
MONITOR RECORDER

1. GENERAL

1.01 The ELECTRONIC SECRETARY Monitor Recorder, Model MR-2 (see Figure 1), a specialized telephone tape recorder, enables the customer to automatically record both sides of any incoming or outgoing telephone conversation.



**Model MR-2 Monitor-Recorder with microphone.**

Figure 1.

1.02 Utilizing magnetic tape as its recording medium, the Model MR-2 has a two-hour recording capacity and a recording speed of 3-3/4 inches per second. Three heavy duty motors transport lubricated computer-type tape between take-up and supply reels. Dynamic braking and a reserve power supply prevents tape spillage.

- 1.03 The unit weighs 53 pounds and is 8 inches high, 17 inches wide, and 12-3/4 inches deep. To comply with FCC regulations, a transistorized warning tone generator and timer delivers a "beep" tone every 15 seconds to the telephone line.
- 1.04 A foot control and headset are available for a typist to use in transcribing a tape recording of a telephone conversation. The typist simply plugs the foot control into the MR-2 and operates a switch. This transfers control of the playback mechanism to the foot switch thereby permitting the typist to start, stop, rewind, and backspace the tape leaving the hands free. The headset eliminates office noise and assures privacy when playing back messages. When the headset is plugged into the MR-2, the loudspeaker is automatically muted.

## 2. INSTALLATION

- 2.01 *Location:* Locate the unit in accordance with the considerations outlined below.
  - a. The Model MR-2 may be located within easy reach of the customer's telephone set; however, this is not essential.
  - b. A satisfactory location would be a desk sufficiently strong to support the unit's weight of approximately 53 pounds. (The MR-2 is arranged 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 MR-2 within the restrictions of its power cord. (The unit is equipped with an 8-foot power cord and two-prong plug for connecting to standard a-c outlets.)
- 2.02 *Power Supply:* The Model MR-2 is designed to operate on a 110/125 volt, 60 cycle a-c power supply. In no case should the unit be connected directly to a direct current (d-c) source. If only d-c current is available, refer the matter to your supervisor before proceeding with the installation. *Do not connect the MR-2 to the power supply until the following installation has been completed:*
  - a. Remove the six screws securing the back panel. Remove the panel. This will expose the connecting block (see Figure 2).

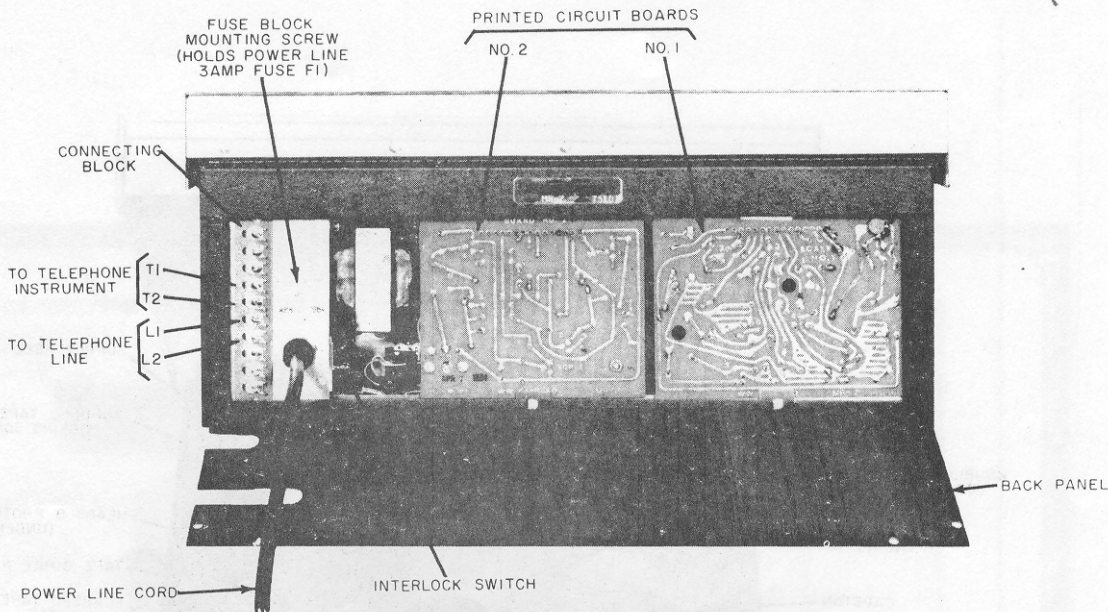


Figure 2. Monitor Recorder, Model MR-2 (Rear View - Back Panel Removed).

- b. Using a 3WD4-5-4 cord or equivalent, connect the tip side of the telephone line to terminal L1, and the ring side to terminal L2.
- c. Connect the telephone instrument to the terminals labeled T1 and T2.
- d. Replace the back panel and refasten the screws.

2.03 *Tape Loading:* Load the recording tape on the tape transport mechanism as follows:

- a. Remove both tape reel locking screws (see Figure 3).
- b. Place the empty reel on the left-hand (take-up) reel platform being sure side No. 1 of the reel is facing up.
- c. Place the full reel of tape on the right-hand (supply) reel platform as shown in Figure 3.
- d. Thread the free end of the transparent section of tape around the guide pillars, erase and record heads, and between the rubber pressure roller and capstan.
- e. Insert free end of tape into the hub slot of the take-up reel, and wind take-up reel manually one or two turns clockwise.
- f. Replace both tape reel locking screws.
- g. Connect the MR-2 to the power supply, and turn the unit ON by rotating the OFF VOLUME control knob clockwise.



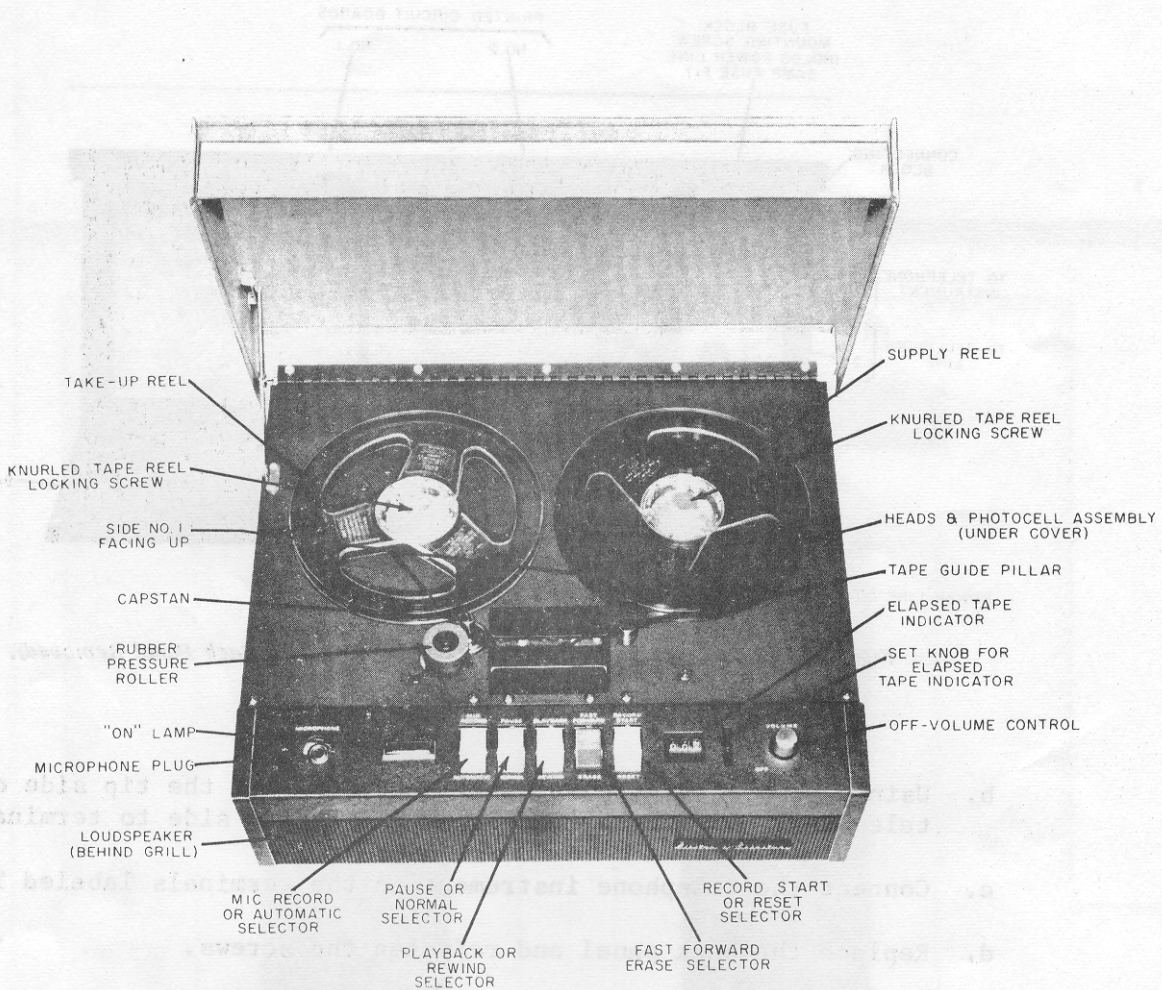


Figure 3. Monitor Recorder, Model MR-2 (Top of Tape Deck and Controls).

- h. Depress and hold depressed the FAST FORWARD and RESET rocker bars simultaneously until the opaque portion of tape is in front of the heads.
- i. Set the ELAPSED TAPE INDICATOR to "0-0-0" by turning the thumb wheel next to the indicator. The MR-2 is now ready to operate.

2.04 Testing: Verify operation of the MR-2 by performing its functions as described in Section 3.

### 3. DESCRIPTION OF OPERATION

3.01 The Model MR-2 performs the following basic functions: (1) Microphone record; (2) Automatic record; (3) Playback; (4) Fast-forward; and (5) Rewind. Manually controlled erasing is possible during rewind. Protection against accidentally unwinding the tape from either reel is also included. "Fail-safe" circuitry prevents tape spillage in the event of power interruption. Other electrical safeguards insure smooth transfer of operation from one function to another. The unit is capable of remaining in a standby condition, during which time the MR-2 is ON and waiting to perform any of its functions. In standby the forward and rewind motors are energized, each with approximately 15-20v a-c. Equally energized, the motors tend to pull the tape in opposite directions, thus maintaining tape tension. When the customer selects one of the functions by depressing the appropriate rocker bar, the unit proceeds from standby to whichever function has been selected. The following paragraphs, in conjunction with Figure 3, explain the basic functions. *The information contained in this part should be referred to when instructing the customer on the operation of the unit.*

3.02 *Microphone Record:* Prepare the unit as follows:

- a. Insert microphone into MICROPHONE jack.
- b. Rotate OFF-VOLUME control knob approximately three-quarters turn clockwise. (Verify that ON lamp illuminates.) It may be necessary to readjust this control slightly for a suitable record level.
- c. Depress AUTOMATIC-MIC RECORD rocker bar to "MIC RECORD." (Note reading on the elapsed tape indicator. Rewind to this reading prior to play-back.)
- d. Momentarily depress the RESET-RECORD START rocker bar to "RECORD START" position and begin dictating. Recording a new message will automatically erase a previously recorded message.
- e. If a pause is required while recording, depress and hold the "PAUSE" side of the NORMAL-PAUSE rocker bar. Release the rocker bar to resume recording.
- f. When dictation is completed, return the AUTOMATIC-MIC RECORD rocker bar to its center (OFF) position.

3.03 *Automatic Record:* Prepare the unit as follows:

- a. Rotate OFF-VOLUME control knob approximately three-quarters of a turn clockwise. Verify that ON lamp illuminates.
- b. Depress AUTOMATIC-MIC RECORD rocker bar to "AUTOMATIC" position.

- c. Call the telephone to which the MR-2 is connected. The unit will automatically start and record both sides of the conversation when the handset of the called telephone is lifted. The "beep" tone will be generated when the handset is lifted and every 15 seconds thereafter.
- d. When the test conversation is completed, return the AUTOMATIC-MIC RECORD rocker bar to its center (OFF) position.

3.04 *Playback:* Prepare the unit as follows:

- a. Rotate OFF-VOLUME control knob approximately three-quarters turn clockwise. Verify that ON lamp illuminates.
- b. Depress REWIND-PLAYBACK rocker bar to "PLAYBACK" position. (If the tape has been rewound too far, and the clear leader appears in front of the heads, depress the "RESET" side of the RESET-RECORD START rocker bar until the elapsed tape indicator displays "0-0-0".)
- c. Adjust OFF-VOLUME control to a suitable listening level.
- d. When playback is completed, return the REWIND-PLAYBACK rocker bar to the center (OFF) position.
- e. To transcribe a tape recorded telephone conversation, using foot pedal, prepare the unit for play-back operation. In addition, perform the following:
  - (1) Insert the 4-prong foot control plug into the foot control receptacle at the left-hand side of the MR-2 (refer to Figure 1).
  - (2) If privacy is desired, insert the headset plug into the jack at the right-hand side of the unit. This mutes the loud-speaker.
  - (3) Depress the PLAY switch (green pedal).
  - (4) To stop the playback, release the PLAY switch. The tape will rewind a portion before stopping.
  - (5) Depress the REWIND switch (red pedal). The tape will rewind until the REWIND switch is released.

3.05 *Fast Forward:* Prepare the unit as follows:

- a. Turn OFF-VOLUME control knob clockwise.
- b. Verify that ON lamp illuminates.
- c. Depress and hold depressed the ERASE-FAST FORWARD rocker bar in "FAST FORWARD" position.

- d. Release the ERASE-FAST FORWARD rocker bar. The rocker bar is spring-loaded and will return to its center (OFF) position.

3.06 *Rewind*: Prepare the unit as follows:

- a. Turn OFF-VOLUME control knob clockwise.
- b. Verify that ON lamp illuminates.
- c. Depress the REWIND-PLAYBACK rocker bar to "REWIND" position.
- d. To stop rewinding, return the REWIND-PLAYBACK rocker bar to its center (OFF) position.

3.07 *Rewind-Erase*: Prepare the unit as follows:

- a. Rotate OFF-VOLUME control knob clockwise.
- b. Verify that the ON lamp illuminates.
- c. Depress the REWIND-PLAYBACK rocker bar to "REWIND." Depress and hold depressed the ERASE-FAST FORWARD rocker bar to the "ERASE" position.
- d. When erasing is completed, release the ERASE-FAST FORWARD rocker bar. Return the REWIND-PLAYBACK rocker bar to its center (OFF) position.
- e. To verify that tape has been erased, depress REWIND-PLAYBACK rocker bar to "PLAYBACK" position.
- f. When verification is completed, return REWIND-PLAYBACK rocker bar to its center (OFF) position.
- g. Depress the REWIND-PLAYBACK rocker bar to "REWIND" position until the "ELAPSED TAPE INDICATOR" reads "0-0-0."
- h. Return the REWIND-PLAYBACK rocker bar to its center (OFF) position. The MR-2 is now ready for customer operation.

#### 4. CIRCUIT DESCRIPTION

- 4.01 *Microphone Record*: Positioning the AUTOMATIC-MIC-RECORD rocker bar to "MIC RECORD," and momentarily depressing the "RECORD START" side of the RESET-RECORD START rocker bar initiates relay action which establishes a recording circuit, energizes it, and, in addition, advances the recording tape. The recording circuit is established as one pair of relay contacts connects the microphone to the input of the microphone record amplifier while others switch the outputs of the microphone record amplifier and erase-bias oscillator to the record-play head. The recording circuit is energized as relay contacts connect the d-c power supply to the microphone record amplifier and erase-bias oscillator. At the same time, the tape transport mechanism begins to function: the capstan motor starts to operate; a pair of electromagnets energize and pull the rubber pressure roller and tape against the rotating capstan; and, the forward and rewind motors are energized to maintain tape tension.

- a. When the electromagnets press the pressure roller and tape against the rotating capstan, the tape is advanced by the capstan motor. As dictating commences, voice signals are transmitted from the microphone to the input of the two-stage, transistorized, microphone record amplifier. The voice signals are amplified and delivered to the record-play head, mixing there with record bias from the erase-bias oscillator.
- b. Recording a new message erases a previously recorded message automatically, since a portion of the erase-bias oscillator's output is applied to the erase-head when a new message is being recorded.
- c. Depressing the "PAUSE" side of the NORMAL-PAUSE rocker bar opens the a-c path to the capstan motor. Operated contacts of the rocker bar actuated switch now connect a d-c path to the capstan motor. Energized with d-c, the motor halts the capstan and the tape stops advancing. The capstan motor remains electrically "locked" until the NORMAL-PAUSE rocker bar is released, whereupon the d-c path to the motor is opened, the a-c path restored, and the motor again drives the capstan, advancing the tape.
- d. Returning AUTOMATIC-MIC RECORD rocker bar to its center position initiates relay operation resulting in the following action: the microphone is disconnected from the input of the microphone record amplifier; the record-play head is disconnected from the outputs of the microphone record amplifier and the erase-bias oscillator; d-c power to the microphone record amplifier and erase-bias oscillator is disconnected; and energizing paths to the capstan motor and pressure roller electromagnets are opened. Differential braking stops the tape transport mechanism, restoring the unit to standby.

4.02 *Automatic Record:* When the handset of the telephone instrument is lifted, talking battery voltage initiates relay action that maintains the forward and rewind motors energized, operates the capstan motor, and energizes both pressure roller electromagnets. Likewise, the d-c power supply is connected to the incoming record amplifier, warning tone timer, and erase-bias oscillator. In addition, the record-play head is connected to the outputs of the incoming record amplifier and the erase-bias oscillator. The MR-2, now properly energized and switched, is ready to automatically record both sides of the telephone conversation.

- a. Held taut by the energized forward and rewind motors, the tape is advanced by the capstan motor when the electromagnets press the pressure roller and the tape against the rotating capstan.
- b. Voice signals from the telephone line are connected through the line transformer to the input of the two-stage, incoming record amplifier. After amplification, the voice signals are delivered for recording to the record-play head, mixing there with record bias from the erase-bias oscillator. Recording a new message automatically erases a previously recorded message, since a portion of the erase-bias oscillator's output is applied to the erase head when a new message is being recorded.



- c. When the handset is lifted, d-c power applied to the warning tone timer is momentarily switched to the 1,400 cycle tone oscillator. Energized, the oscillator generates a "beep" tone which is amplified, then transmitted through the line transformer to the telephone line. The "beep" tone is recorded, but since it is partially rejected by a special filter in the incoming-record amplifier it is recorded at a low level. By alternately connecting and disconnecting the d-c power that energizes the 1,400 cycle "beep" tone oscillator, the warning tone timer electronically controls the intervals during which the "beep" tone is heard and not heard.
- d. As the handset of the telephone instrument is replaced at the end of the conversation, removal of talking battery voltage initiates relay operation resulting in the following action: the d-c power supply to the incoming record amplifier, warning tone amplifier, and erase-bias oscillator is disconnected; the record-play head is disconnected from the outputs of both the incoming record amplifier and the erase-bias oscillator; and, a-c power to the capstan motor is disconnected as is d-c power to the pressure roller electromagnets. Differential braking action occurs to bring the tape transport mechanism to a halt, reverting the unit to standby.

4.03 *Playback:* Depressing the REWIND-PLAYBACK rocker bar to "PLAYBACK" operates a pair of relays whose contacts maintain an energizing path to the forward and rewind motors, operate the capstan motor, and energize the pressure roller electromagnets. In addition, the rocker bar actuates a switch whose contacts connect the d-c power supply to the playback amplifier.

- a. The tape is advanced by the capstan motor when the electromagnets press the pressure roller and the tape against the rotating capstan. The energized forward and rewind motors apply tension to the tape as it is advanced forward.
- b. The tape passes in front of the record-play head which picks up audio signals from the tape and applies them to the input of a three-stage, transistorized audio amplifier. The output of the amplifier is coupled to the loudspeaker, which plays the recorded conversation back to the listener.
- c. Returning the REWIND-PLAYBACK rocker bar to the center (OFF) position disconnects the d-c power supply to the playback audio amplifier. In addition, the rocker bar, through relay action, disconnects the a-c power path to the capstan motor and the d-c path to the pressure roller electromagnets. Differential braking action follows to stop the tape mechanism and revert the unit to standby.

4.04 *Transcribing:* Inserting the foot control plug into its receptacle mechanically operates a microswitch. The microswitch contacts transfer control of the mechanism to the foot control. Depressing the PLAY switch (green pedal of the foot control) initiates relay action which starts the MR-2 operating in playback. The tape recorded message can now be transcribed as it is delivered to the headset.

- a. When the PLAY switch (green pedal) is released, relay action stops the mechanism from playback and starts it in rewind. The rewind motor will rewind (backspace) a portion of the recording tape before the mechanism automatically stops. This allows the transcriber to "pick-up" the conversation where it was left-off upon release of the green pedal. The amount of backspace required can be adjusted by means of a potentiometer in the foot control unit.
- b. Depressing the REWIND switch (red pedal) initiates relay action which starts the tape mechanism operating in rewind. The tape is rewound until the red pedal is released.

4.05 *Fast Forward*: Pressing and holding the rocker bar in "FAST FORWARD" causes relay action that connects a-c line voltage to the forward motor and d-c voltage to the rewind motor.

- a. Full a-c line voltage applied to the forward motor causes it to advance the tape rapidly from the supply reel to the take-up reel. The small amount of d-c applied to the rewind motor causes it to act as an artificial drag thus insuring a tight wind.
- b. To stop fast forward operation, release the ERASE-FAST FORWARD rocker bar. The rocker bar is spring-loaded and will return to its center (OFF) position. Upon its return to center, the rocker bar through relay action disconnects a-c line voltage to the forward motor and applies d-c braking voltage to the rewind motor for approximately 1-1/2 seconds to halt the tape transport mechanism. During this time, a small a-c voltage is applied to the forward motor to prevent a tape loop due to bounce of the take-up reel. At the end of the 1-1/2 second period, relay action disconnects the d-c feed to the rewind motor and the unit returns to standby.

4.06 *Rewind*: Placing the REWIND-PLAYBACK rocker bar in "REWIND" operates a pair of relays whose contacts apply a-c line voltage to the rewind motor and a small d-c voltage to the forward motor.

- a. The a-c energized rewind motor operates, rewinding the tape onto the supply reel while the d-c energized forward motor introduces an artificial drag, thus insuring a tight wind.
- b. To stop rewinding, return the REWIND-PLAYBACK rocker bar to its center (OFF) position. Resulting relay action disconnects a-c line voltage to the rewind motor and applies d-c braking voltage to the forward motor for approximately 1-1/2 seconds to bring the tape transport mechanism to a stop. During this time, a small a-c voltage is applied to the rewind motor to prevent a tape loop due to bounce of the rewind reel. At the end of the 1-1/2 second period, relay action disconnects the d-c voltage to the forward motor and the unit reverts to standby.

- 4.07 *Rewind-Erase:* Depress the REWIND-PLAYBACK rocker bar to "REWIND." Depressing the REWIND-PLAYBACK rocker bar to its "REWIND" position starts the tape transport mechanism rewinding the tape as described in paragraph 3.07.
- a. Depress and hold depressed the ERASE-FAST FORWARD rocker bar to the "ERASE" position. This connects the erase head to the low voltage d-c power supply. As the tape is rewound past the energized erase head, previous recordings are removed, restoring full recording capacity to the unit.
- 4.08 *Stop Mechanism at End of Tape:* The recording tape of the MR-2 passes between a photocell and a photocell lamp. The recording tape has 30 feet of clear leader attached to each end. Usually, the opaque recording tape shields the photocell from the light of the photocell lamp. Should the clear leader at either end of the tape pass in front of the photocell, the light from the photocell lamp energizes the photocell. The energized photocell actuates the AUTO STOP relay. The AUTO STOP relay contacts open the a-c line to the ON-OFF and rocker bar switches. Thus, the unit stops itself before the tape is unwound from either reel.
- a. In order to return the unit to normal control by the function rocker bars, the RESET-RECORD START rocker bar is depressed and held in "RESET" position. Then, either the FAST FORWARD, PLAYBACK, or REWIND rocker bar is depressed whichever will return the opaque portion of tape in front of the photocell.
  - b. Pressing and holding depressed the "RESET" side of the RESET-RECORD rocker bar closes a switch that bypasses the AUTO STOP relay whose contacts are holding open the a-c input to the ON-OFF and rocker bar switches. Contacts of the RESET switch apply a-c to operate the tape transport mechanism in either fast forward, playback, or rewind depending upon which of these rocker bars is depressed.
- 4.09 *Power Failure Protection:* If power fails, or is disconnected from the MR-2 while the tape transport mechanism is in operation, the relays controlling the tape transport mechanism will release. Since power would no longer be available for braking the tape transport mechanism, another means is provided that will prevent the tape reels from coasting and spilling tape onto the tape deck.
- a. Should power to the unit fail, or if the MR-2 becomes disconnected from its power supply, energy, stored within a large capacitor, is discharged for a short time through the forward and rewind motors. The motors stop, bringing the tape transport mechanism to a halt without spilling tape.
- 4.10 *Transfer of Operation:* The relays controlling the forward, rewind and capstan motors are electrically interconnected. When functions are changed, the unit will not switch into the newly selected function until the tape transport mechanism has first been brought to a stop upon termination of the previous function and the relays initiating same have been released.

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 a loose power plug, or loose 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 it is properly threaded in the machine. No foreign material should be present on the tape surface, except for the lubricant applied at the time of manufacture. The clear leader areas on the tape should be reasonably clean. 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, first remove the tape from the mechanism. Then use a soft, lintfree 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.
- 5.05 Follow the procedure in Section 3 "DESCRIPTION OF OPERATION" to verify operation/non-operation of the MR-2.