

# SECTION III

## OPERATION

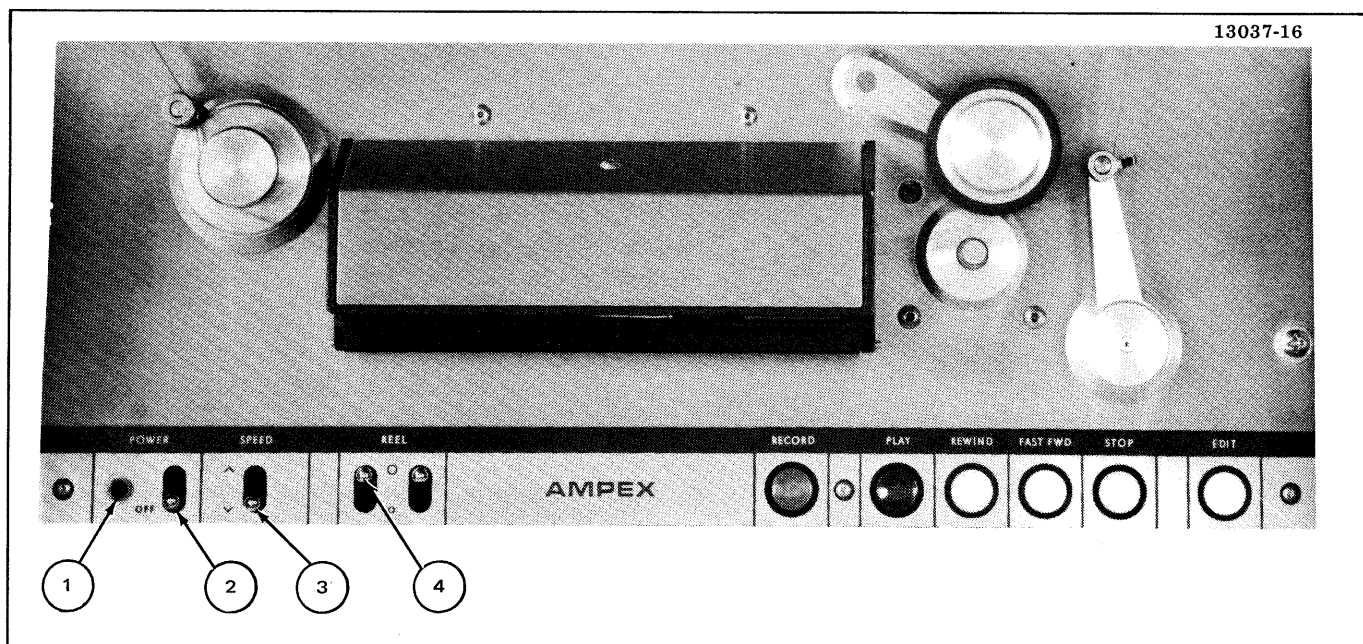
### GENERAL

This section contains the following information: location and function of the operating controls and indicators, operating instructions for the various operating modes, and the tape speed capabilities of servo system equipped tape transports.

### CONTROLS AND INDICATORS

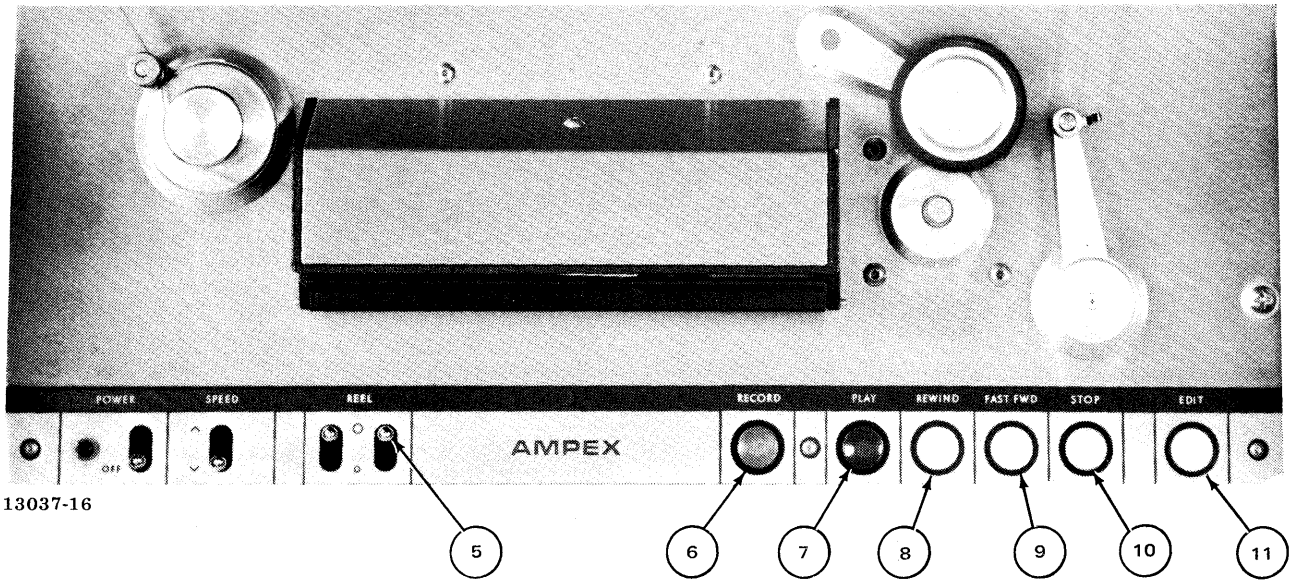
Operator controls and indicators are located on the tape transport and record/reproduce unit. Table 3-1 shows the location and function of each control and indicator on the tape transport, and Table 3-2 shows those on the record/reproduce unit.

Table 3-1. Tape Transport, Controls and Indicators



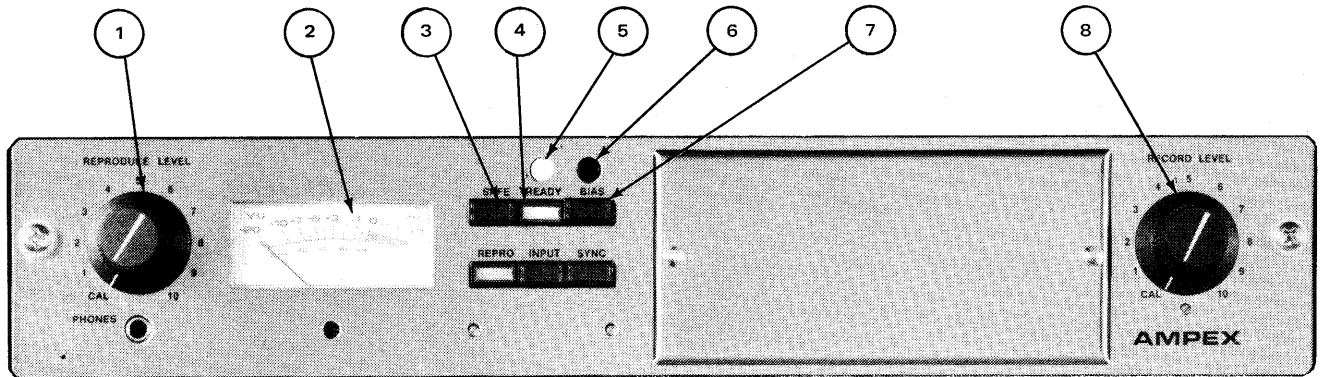
INDEX NO.	NAME	FUNCTION
1	POWER indicator	Lights when AC power is applied.
2	POWER toggle switch	Turns power to the tape recorder on and off.
3	SPEED toggle switch	Selects low (V) or high (^) tape speed. (Equalization is automatically switched in accordance with speed selection.)
4	Supply REEL toggle switch	Used to select appropriate tape tension for large (O) or small (o) supply-reel hubs.

Table 3-1. Tape Transport, Controls and Indicators (Continued)



INDEX NO.	NAME	FUNCTION
5	Takeup REEL toggle switch	Used to select appropriate tape tension for large (O) or small (o) takeup reel hubs.
6	RECORD pushbutton	Used in conjunction with PLAY (index No. 7, this table) and READY pushbuttons (index No. 4, Table 3-2). With READY pushbutton depressed, pressing PLAY pushbutton and then RECORD pushbutton initiates record mode.
7	PLAY pushbutton	Used to select play mode or used with RECORD (index No. 6, this table) and READY pushbuttons (index No. 4, Table 3-2) to select record mode. Pressing PLAY pushbutton during a fast-wind mode stops the tape and then automatically starts play mode.
8	REWIND pushbutton	Used to select rewind mode. Rewind can be initiated during any mode except record and play/edit modes.
9	FAST FWD pushbutton	Used to select fast forward mode. Fast forward can be initiated during any mode except record and play/edit modes.
10	STOP pushbutton	Used to stop the tape transport and cancel existing mode of operation.
11	EDIT pushbutton	<p>Used to initiate one of the following edit modes:</p> <p><b>Stop/Edit.</b> If tape is stopped or not threaded, pressing EDIT pushbutton reduces braking force for easier tape threading or manual tape movement.</p> <p><b>Play/Edit.</b> If play or record mode is active, pressing EDIT pushbutton removes power to takeup reel, causing tape to be spilled at takeup side of transport. Play/edit mode can be entered from stop mode by holding down EDIT pushbutton, pressing PLAY pushbutton, and then releasing EDIT pushbutton.</p> <p><b>Fast/Edit.</b> If rewind or fast-forward mode is active, pressing EDIT pushbutton causes tape lifters to lower tape onto head to permit audio monitoring.</p>

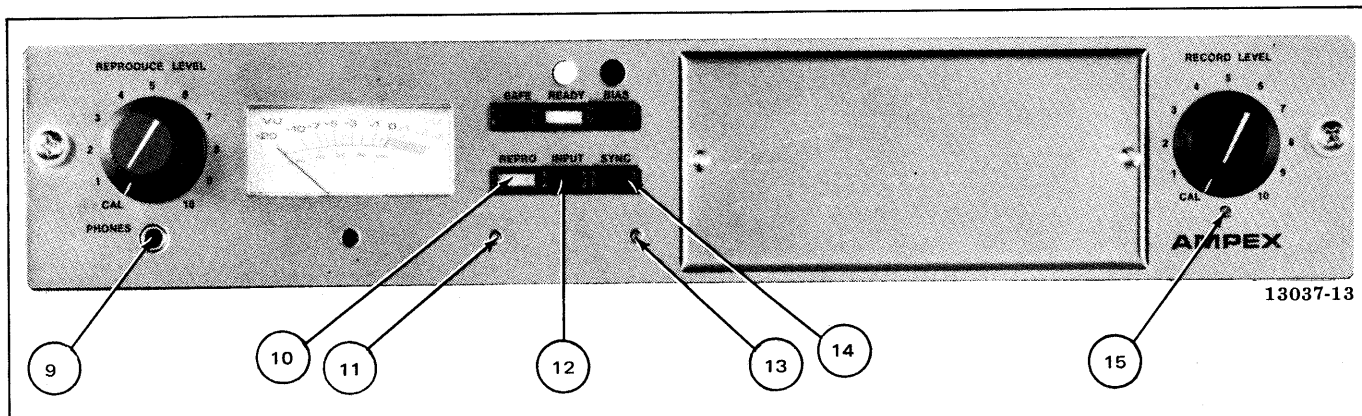
Table 3-2. Record/Reproduce Unit, Controls and Indicators



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INDEX NO.	NAME	FUNCTION
1	REPRODUCE LEVEL rotary control	REPRODUCE-LEVEL range of control used to vary normal or Sel-Sync reproduce level of associated channel. CAL position switches level-adjustment function to reproduce calibrate potentiometer (index No. 11, this table).
2	VU meter	Indicates signal level present at audio output of associated channel except when BIAS pushbutton (index No. 7, this table) is depressed while recording. Meter lights when recorder/reproducer is turned on.
3	SAFE latching pushbutton	In depressed position, prevents selection of record mode.
4	READY latching pushbutton	In depressed position, allows selection of record mode.
5	READY indicator (yellow)	Lights when READY pushbutton is depressed.
6	RECORD indicator (red)	Lights when record mode is selected.
7	BIAS latching pushbutton	In record mode, depressing BIAS pushbutton causes VU meter (index No. 2, this table) to indicate bias-signal level of associated channel. In other modes, depressing BIAS pushbutton disconnects VU meter from audio output.
8	RECORD LEVEL rotary control	RECORD-LEVEL range of control used to adjust gain of record amplifier of associated channel. CAL position switches gain-adjustment function to input calibrate potentiometer (index No. 15, this table).

Table 3-2. Record/Reproduce Unit, Controls and Indicators (Continued)



INDEX NO.	NAME	FUNCTION
9	PHONES jack	Receptacle for headphones plug. Reproduced audio of associated channel can be heard on headphones.
10	REPRO pushbutton switch	In depressed position, connects signal reproduced by reproduce head of associated channel to audio output, PHONES jack, and VU metering circuit of that channel.
11	Reproduce calibrate adjustment	Used to set operating level. (See <i>Operating Level Adjustment</i> in Maintenance section.)
12	INPUT pushbutton switch	In depressed position, connects signal to be recorded on associated channel to audio output, PHONES jack, and VU metering circuit of that channel.
13	Sync calibrate adjustment	Used to set Sel-Sync signal level.
14	SYNC pushbutton switch	Used to initiate Sel-Sync function. In reproduce mode, depressing SYNC pushbutton connects signal reproduced by record head of associated channel to audio output, PHONES jack, and VU metering circuit of that channel. If SYNC pushbutton is depressed during record mode, input signal being recorded is connected to audio output, PHONES jack, and VU metering circuit of associated channel.
15	Input calibrate adjustment	Used to adjust input level.

### OPERATING INFORMATION

#### NOTE

In order to ensure optimum equipment performance and maximum service life, routine maintenance (refer to *Preventive Maintenance* in Section V) must be faithfully performed.

### PRE-OPERATING PROCEDURES

Proceed as follows:

1. Set the transport POWER switch to on position. POWER indicator on tape transport and VU meter on record/reproduce unit will light.

2. Set transport SPEED switch to high-speed ( $\wedge$ ) or low-speed ( $\vee$ ) position as required. Tape speeds of 3-3/4 ( $\vee$ ) and 7-1/2 ( $\wedge$ ) in/s, 7-1/2 ( $\vee$ ) and 15 ( $\wedge$ ) in/s, or 15 ( $\vee$ ) and 30 ( $\wedge$ ) in/s are available. Appropriate record and playback equalizations are automatically selected to agree with the setting of the SPEED switch.

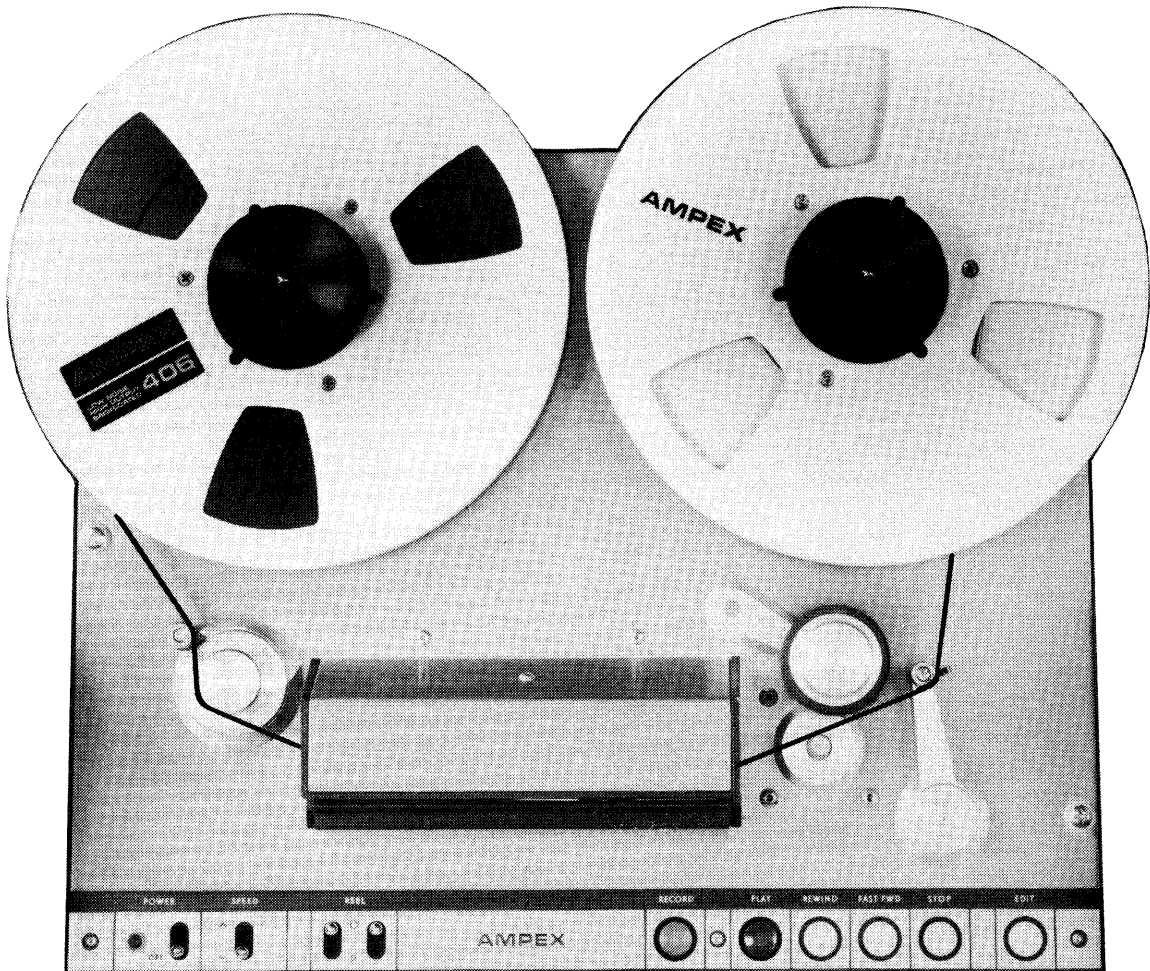
3. Set supply and takeup REEL switches to conform with the size of the hubs of the reels being used. For NAB hubs (4-1/2 inch diameter), set appropriate REEL switch to O. For EIA hubs (2-1/4 inch diameter), set appropriate switch to o. If desired, an NAB hub can be used on one turntable and an EIA hub on the other.

#### NOTE

When using a recorder/reproducer having 3-3/4 in/s and 7-1/2 in/s tape speeds, an AC capstan motor, and an NAB supply reel, set supply REEL switch to o (small reel position) if a fast start is to be made with less than a one-inch tape pack on supply reel. Fast starts may not be possible with an EIA reel on the supply turntable when the supply pack is less than 3/4 inch.

4. Install reel of tape on supply turntable and empty reel on takeup turntable.

5. Thread tape as shown in Figure 3-1. To facilitate tape threading, turn on recorder/reproducer and depress EDIT pushbutton,



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Figure 3-1. Tape Path

which reduces turntable braking force so the reels can be easily turned by hand.

6. Anchor tape to hub of takeup reel and turn takeup reel by hand until supply reel moves. This technique removes all tape slack, which causes the tape-tension arm to close the safety switch.

7. If desired, a headset or speaker can be connected to the PHONES jack on a record/reproduce unit of the recorder/reproducer.

## RECORDING

Proceed as follows:

1. Perform all steps of pre-operating procedures.
2. Depress READY pushbutton of record/reproduce unit for each channel to be recorded. The associated READY indicator(s) (yellow) will light.
3. Depress SAFE pushbutton of record/reproduce unit for each channel that is not to be recorded.
4. Depress INPUT pushbutton.
5. Connect signal(s) to be recorded to appropriate rear-panel INPUT connector(s).
6. Adjust RECORD LEVEL control so that VU meter indicates 0 for most audio peaks. (Extreme peaks may reach +2 or +3 VU.)
7. Depress PLAY pushbutton to start tape in motion. Then depress RECORD pushbutton to begin recording on selected channel(s). Record indicator (red) will light.

### NOTE

While recording, the input signal of each channel can be compared with the recorded signal on that channel by alternately depressing the associated INPUT and REPRO pushbuttons.

8. When recording is complete, depress STOP pushbutton to stop tape motion and deactivate record mode.

### NOTE

The recorder/reproducer automatically stops tape motion and deactivates the record mode if the tape runs completely off the supply reel.

## REPRODUCING

Proceed as follows:

1. Perform all steps of pre-operating procedures.
2. Depress SAFE pushbutton of record/reproduce units.
3. For two-channel recorder/reproducers having a two-track head and a 2-Ch 4-Tr head, push the knob on head assembly down to select the two-track head or up to select the 2-Ch 4-Tr head.
4. Depress REPRO pushbutton.
5. Depress PLAY pushbutton to begin reproducing recorded material.
6. When desired material has been reproduced, depress STOP pushbutton to stop tape motion and deactivate play mode.

### NOTE

If the tape runs completely off the supply reel the recorder/reproducer automatically stops tape motion and deactivates the play mode.

## SEL-SYNC FUNCTION

The Sel-Sync function of a given channel can be selected by depressing the SYNC pushbutton on the record/reproduce unit for that channel. Selecting the Sel-Sync function in conjunction with reproduce mode causes the reproduced audio to be derived from the record head rather than the

reproduce head. This combination of the Sel-Sync function with the reproduce mode is used in three ways.

1. Sel-Sync recording
2. Over-dubbing
3. Ping ponging

In Sel-Sync recording, a performer listens to one or more previously recorded tape tracks using the Sel-Sync/reproduce mode while recording material on another track. For example, assume a four-channel recorder/reproducer is equipped with a tape having two prerecorded tracks and two blank tracks. Typically, the two prerecorded tracks are reproduced (using two of the record heads for pickup), mixed together using studio equipment, and fed to a performer's earphones. The performer then listens to the prerecorded material while recording material on one of the blank-track channels. Thus, the new material is recorded in synchronism with the prerecorded material.

In overdubbing, a performer listens to material that he previously recorded on one or more tape tracks using the Sel-Sync/reproduce mode. The performer can repeat his previous performance (but not record it) and get into proper timing with the original material. At the point where the overdub is desired, the track(s) to be overdubbed is (are) switched to the record mode. The audio that the performer hears is automatically switched from the off-tape audio to the input audio the performer is recording when the record mode is selected.

Ping ponging is a process of reproducing two or more tracks of previously recorded material using the Sel-Sync/reproduce mode, mixing the reproduced signals together, and simultaneously rerecording the mixed signals on another track.

### **CAUTION**

**OFTEN IT IS NOT POSSIBLE TO RERECORD THE MIXED SIGNALS ON A TRACK ADJACENT TO THE HOME TRACK OF EITHER OF THE MIXED SIGNALS. THIS RECORDING PROBLEM IS CAUSED BY THE CROSSTALK BETWEEN THE HIGH-LEVEL SIGNAL BEING RECORDED ON ONE CHANNEL AND THE LOW-LEVEL SIGNAL BEING REPRODUCED FROM THE ADJACENT**

**CHANNEL. THE CROSSTALK CAUSES A FEEDBACK CONDITION THAT CAUSES THE CIRCUITS TO OSCILLATE. THEREFORE, IT MAY NOT BE POSSIBLE TO PING PONG ON A TWO-TRACK RECORDER/REPRODUCER. USING A FOUR-TRACK RECORDER/REPRODUCER, THE POSSIBILITIES FOR PING PONGING ARE RECORDING CHANNELS 1 AND 2 ON CHANNEL 4 OR CHANNELS 3 AND 4 ON CHANNEL 1.**

### **FAST-WINDING**

For fast-winding operations press either the REWIND or FAST FWD pushbutton. For editing and cueing operations, these pushbuttons can be pressed alternately without having to press STOP between fast-winding selections. Either fast-winding mode can be entered from the stop or play mode but is locked-out when in record or play/edit mode. To enter the play mode from either fast-winding mode, simply press the PLAY pushbutton.

Two automatic tape-lifter arms, which move the tape away from the heads, are automatically actuated in both fast-winding modes. To monitor audio in either fast-winding mode, press EDIT pushbutton, which overrides tape lifters and allows the tape to move across the heads. When manual override is desired, open head gate and push back either tape lifter.

### **NOTE**

**If the tape runs completely off the supply reel the recorder/reproducer automatically stops tape motion and deactivates the play mode.**

### **EDITING**

Three edit modes are available; they are: stop/edit, play/edit, and fast/edit. These modes are selected as specified in Table 3-1.

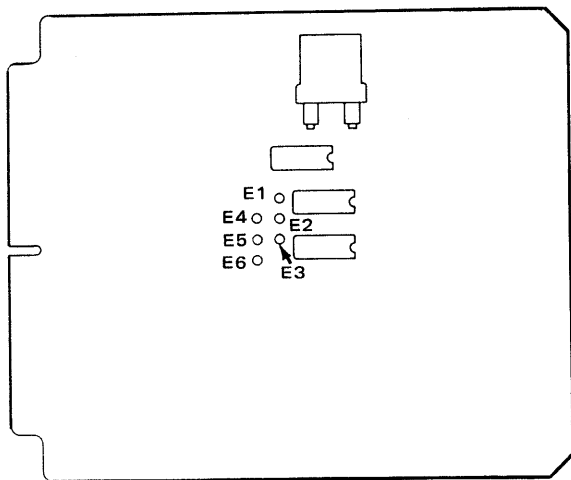
### **SERVO EQUIPPED TRANSPORT**

#### **Speed Pair Selection**

The front panel SPEED switch on the AG-440C permits the selection of the high or low operating

speed. The assignment of high or low operating speed is determined by a strapping arrangement on the servo printed wiring assembly. Selected operating speeds may be any two of the following: 30 in/s, 15 in/s, 7-1/2 in/s and 3-3/4 in/s. Strap the speed pair as follows:

1. On the transport control panel, set the POWER switch to OFF.
2. Remove the servo printed wiring assembly (Figure 3-2) from the servo chassis (Figure 3-3).
3. Connect a jumper from the terminal associated with the low position of the SPEED switch, designated E2, to the terminal associated with the desired low tape speed (E1, E3 or E4). Refer to Figure 3-2.
4. Connect a jumper from the terminal associated with the high position of the SPEED switch, designated E5, to the terminal associated with the desired high tape speed (E3, E4 or E6).



SPEED STRAPPING				
RANGE		30/15	15/7½	7½/3¾
HI	E5 TO	E6	E3	E4
LO	E2 TO	E3	E4	E1

Figure 3-2. Tape Speed Pin Strapping

5. Replace the servo printed wiring assembly in the servo chassis, component side rearward (i.e., facing away from the AG-440C).

### Variable Speed Mode

The use of the dummy plug in J4 of the servo chassis (Figure 3-3) causes the capstan servo to operate with a fixed reference frequency of 9.6 kHz. To operate the system at variable speeds, remove the dummy plug from J4 and connect a sine or square wave generator having an output of 3 to 30 Vrms across pins 2 and 3 (ground) of a similar plug. Refer to Figure 3-4.

Insert the new plug into J4 on the servo chassis. If a similar plug is not available, the dummy plug can be modified by removing the existing jumper between pins 1 and 2 and connecting the generator as described above. Once connected, the frequency of the generator can be used to control the speed of the tape in accordance with the values given in Table 3-3.

Table 3-3. Tape Speeds for Various Reference Frequency Inputs

TAPE SPEED (IN/S)	INPUT FREQUENCY
3-3/4	1200
7-1/2	2400
15	4800
30	9600

### NOTE

The values given in Table 3-3 are with the SPEED switch in the "high" position and jumper set for 30 in/s.

### Capstan Operational Options

Three capstan operational options are available; they are:

1. Capstan rotates at selected speed whenever tape is threaded and recorder/reproducer



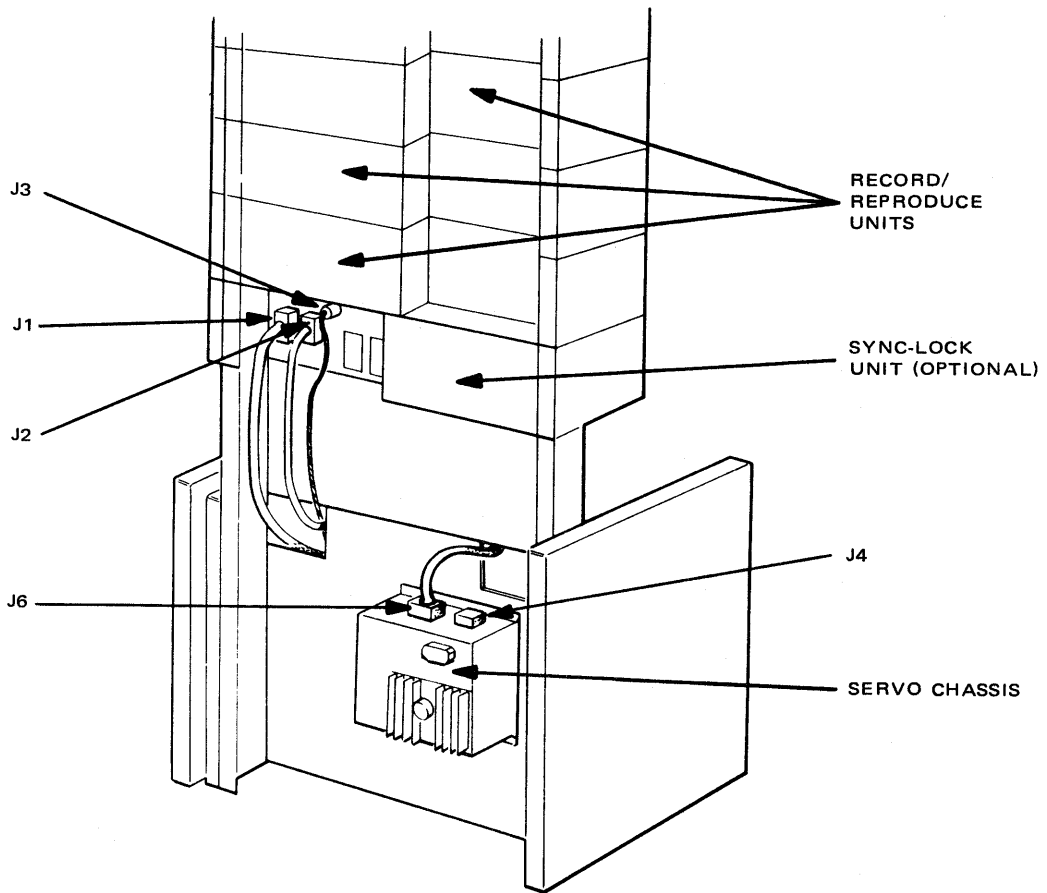


Figure 3-3. Servo Chassis Location

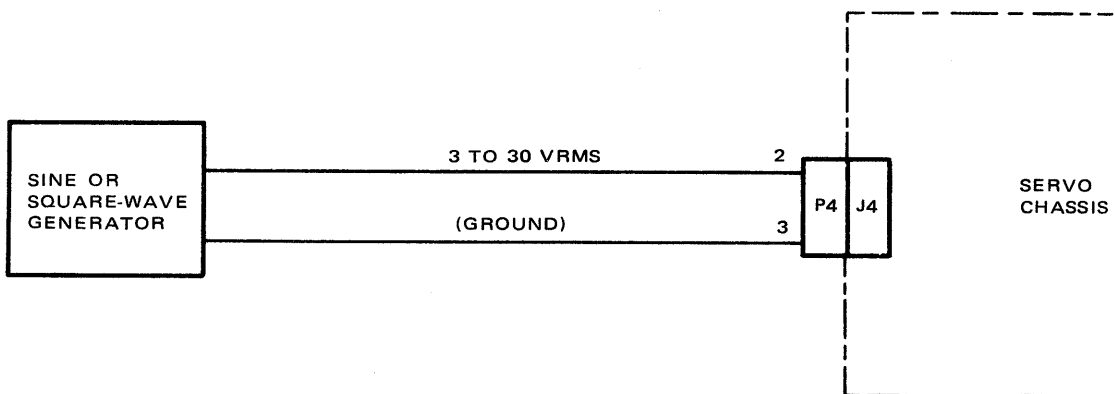


Figure 3-4. Variable Speed Operation

is turned on. To select this option, remove relay K1 from its socket on the servo electronics chassis (located at rear of console). This option may be used at 3-3/4 in/s, 7-1/2 in/s, and 15 in/s tape speeds but not at 30 in/s tape speed because a tape loop is normally thrown that opens the safety switch. Opening the safety switch stops the tape and cancels the current mode of operation.

2. Capstan rotates when tape is threaded, recorder/reproducer is turned on, and low tape speed is selected; however, for high tape speed, capstan only rotates after the play or record mode is initiated. This option is used for 15 in/s and 30 in/s recorder/reproducers when fast starts are to be made at 15 in/s tape speed. To select this option, set the CAPSTAN STOP switch on the servo chassis to HIGH SPEED.

3. Capstan only rotates when in play or record mode at both speeds. To select this option, place the capstan stop switch on the servo chassis in the BOTH SPEED position. If a fast start is desired in this mode, press and

hold STOP pushbutton and then PLAY pushbutton. The capstan motor will start and lock up in less than two seconds. When fast start is desired, release STOP and then PLAY pushbuttons. The tape will start moving the instant the STOP pushbutton is released.

## REMOTE CONTROL OPERATION

Transport operation from the Ampex Remote Control Unit (Part No. 4010080) duplicates the record, play, rewind, fast forward and stop controls on the tape transport. On the remote control box, the EDIT pushbutton only performs the fast wind/edit function of defeating the tape lifters.

The standby lamp (located between the STOP and EDIT pushbuttons) indicates that the tape is threaded and the remote controls may be operated. If the transport is left in the stop/edit mode, with the tape threaded, the standby lamp will not light. To operate the transport under this condition, press the remote STOP pushbutton to cancel the stop/edit mode; the standby lamp will come on and the remainder of the remote controls will function.