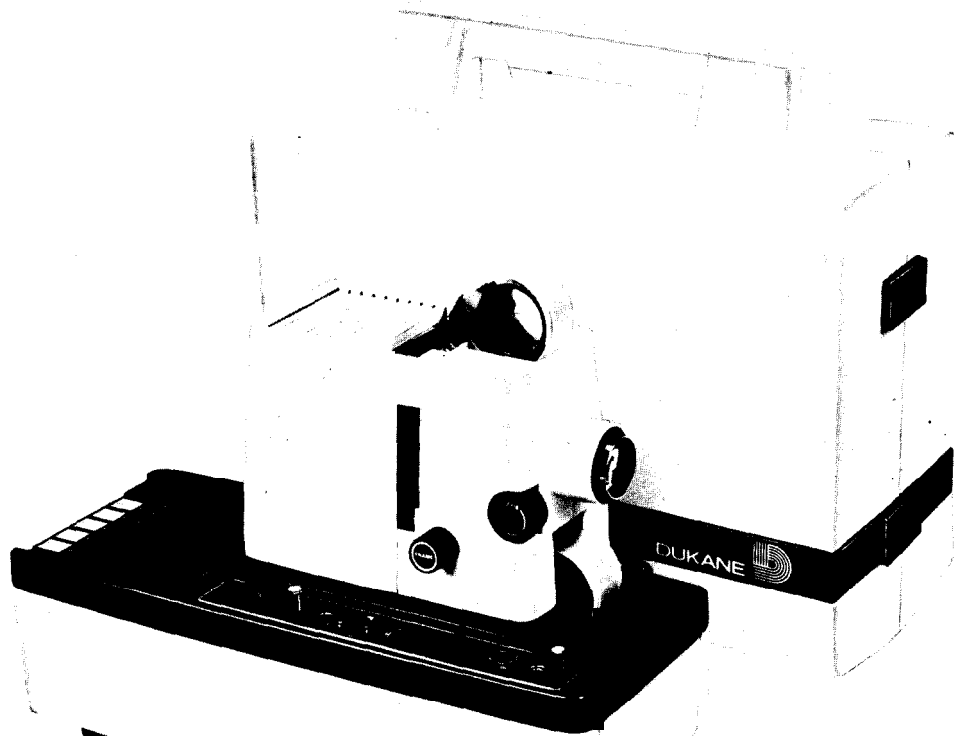




SERVICE AND PARTS MANUAL  
MODEL 28A81, 28A81-5  
28A82, 28A83-5

2 8C 81      28C81-5



Original Issue  
May, 1978

DUKANE CORPORATION | AUDIO VISUAL DIVISION | ST. CHARLES,

ILLINOIS 60174

## MICROMATIC II SPECIFICATIONS

28A81	CAL 300 WATT LAMP:	120 Volts, 50/60 Hz. 350 Watts, 2.9 amps.
28A8 1-5, 28A83-5	BCK 500 WATT LAMP: <b>CZA</b>	120 Volts, 50/60 Hz. 550 Watts, 4.5 amps.
28A82	CXH 300 WATT LAMP:	240 Volts, 50/60 Hz. 350 Watts, 1.5 amps.
TAPE SPEED:		1-7/8 inches per second + 3 percent.
TAPE:		C-60 Format or less (30 minutes per side).
PROJECTION LENS:		3" f 2.5 (Standard) No. 463-170. 1.5" f 3.0 - No. 463-173 5" f 2.8 - No. 463-174
FILM:		Single frame 35mm.
FILM CAPACITY:		200 single frames.
2 x 2 SLIDES:		Using No. 178-20 Stack Loader or No. 178-25 Manual Changer.
REMOTE CONTROL: See Fig. #6		No. 1 10-1727A Models 28A81, 28A81-5, 28A82. No. 1 10-1730A Model 28A83-5.

## CHECK-OUT PROCEDURE

MODELS 28A81, 28A8 1-5, 28A82, 28A83-5

### EQUIPMENT:

1. Variac - Line Meter
2. Counter - Electronic
3. Wow-Flutter Meter
4. D . C . Voltmeter
5. Tape Head Demagnetizer
6. General Purpose Scope
7. Test Cassettes — Unrecorded C-60
  - Standard Reference #606-25
  - Wow-Flutter (3 KHz)
  - Sensitivity Adjust #606-27
  - Voice & Pulses #606-31
  - Take-Up Torque #606-33
  - Shut-Off Adjust #606-29
8. Dukane Test Film (O-100 frames)

## INSPECTION PROCEDURE

1. Clean tape head and pinch roller with alcohol. At the same time, if possible, clean drive belt and drive belt surfaces. Demagnetize the tape head and capstain.
2. Plug unit into 115-120V.A.C. 60 Hz or 240 V .A.C. for the 28A82 and turn unit on. Depress the PLAY key on the tape deck to make sure the deck is running. The unit should not false trip when initially turned on.
3. Insert the Take-Up Torque Cassette #606-33 and depress the PLAY key. The reading on the cassette should be 40-75 gm/cm. If the torque is incorrect, refer to the tape deck section.
4. Using the Unrecorded Cassette (C-60), depress the REWIND and FAST FORWARD keys with cassette full tape load on both spindles. At the same time inspect the tape guide making sure it is guiding the cassette tape properly.

5. Insert a high quality music cassette to check for tape head azimuth adjustment. If music sounds weak or lacks high frequency response, refer to tape deck section for adjustment.
6. The sensitivity is checked with the #606-27 cassette. On the side labeled -6 db and with the line voltage at 100 V.A.C., the advance should run and stop on the next frame. On the side labeled -9 db and with the line voltage at 125 V.A.C., the advance motor should not operate. Refer to Section II on Mechanical and Electrical Adjustments.
7. Set the Single - Fast switch on the control panel to the "Single" position. Depress the "Forward" pushbutton, and the unit shall advance once. Depress the "Reverse" pushbutton, and the unit shall reverse once.  
  
Set the Single - Fast switch to the "Fast" position. Depress the "Forward" pushbutton, and the unit shall advance continuously. Depress the "Reverse" pushbutton, and the unit shall run in the reverse direction continuously.
8. Insert a test film in the unit. Project an 18" picture on a test screen. Focus the unit for a sharp picture over the complete format of the picture with one focus setting. When focused, the image shall be essentially free of spherical and chromatic aberrations with a maximum distortion of + 1/2%.
9. The unit should fully load and retrieve 200 frames of film using the Single - Fast, Advance, and Reverse switches in all modes of operation.
10. Check the audio and trigger circuit with a Voice and Pulse Cassette #606-31. The unit shall advance and frame for each pulse. The audio shall be free from distortion.
11. Insert a Standard Reference Cassette #606-25 playing the side labeled 333 Hz. Using a 16 ohm load resistor, observe the waveform across the speaker terminals (Headphone Receptacle) at medium volume and note db reading on the voltmeter. Stop cassette and observe meter reading. The hum and noise should be more than 33 db below the initial reading with the fan and lamp on.
12. Set line voltage to 105 VAC. Place switch in the FAN position. Fan speed shall reach a minimum of 2800 R.P.M. at 105 V.A.C.
13. The 28A83-5 Response Micromatic II uses a #606-29 Shut-Off Adjust Tape to accommodate a 2 second pulse in the response mode. Insert tape and engage play button on tape deck. The unit should advance and operate in a normal manner for each 1.1 second pulse. Turn tape over and play the side marked 1.5 second pulse. The first full 1.5 second pulse should turn the tape deck off, but the projection light should remain on. When the tape deck is stopped, the red indicator light is on. The lighted pushbutton switch on the front panel will stop and start the tape deck on an alternate action basis. When the tape deck is on, the indicator light is off.

## GENERAL INFORMATION

### REFER TO FIGURE #4

The 1 lo-1713 Amplifier Board is a combination of an audio amplifier, a 50 Hz selective amplifier, a comparitor, a Bi-Polar flip flop, and three D .C. power supplies (22 Volts, 18 Volts, and 6 Volts).

Audio and 50 Hz advance pulses are fed into the 1 lo-1713 board at J3 - J6. The pre-amplifier consists of Q 1, Q2, and Q3. One branch of audio passes through the volume control and is amplified in a normal fashion by a Darlington amplifier. The second branch out of the preamplifier is fed into a 50 Hz selective circuit. A twin "T" filter and Q7 and Q8 comprise a low pass filter and amplifier section. The 50 Hz signal is then rectified and fed into the base of Q7 which acts as a switch turning the comparitor on.

The comparitor (Q24, Q25) shapes the advance pulse into a square wave. A positive pulse turns on Q24 on the forward slope. The falling voltage of the advance pulse turns Q24 off. The output of the comparitor has a high load factor which feeds into the Bi-Polar Flip Flop.

The function of the Bi-Polar Flip Flop (Q20, Q21, Q22, Q23) is to supply the proper voltage to the drive motor (B 102). An advance pulse out of the comparitor turns on Q21 and Q22, putting the proper polarity on the advance motor for a single advance in the forward direction. At the same time CR26 conducts, which turns on Q 10. Q 10 is a silicon controlled rectifier which directly controls the relay **K101** . Q20 and Q23 turn on to reverse the direction of the motor through the Reverse pushbutton. Note that the Forward and Reverse pushbuttons select the voltage polarity on the advance motor and at the same time turn on Q 10 through C3 1 or C32.

The cam switch (5106) operates in parallel with **Q10**. As the advance motor cam turns, the switch contacts fall off the ramp, thus keeping **K 101** engaged. This also resets **Q10**. As the switch contacts ride up on the opposite ramp, **S106** opens, and **K101** falls out.

**Q12** supplies 2 2 volts for the amplifier and comparitor. **CR5**, **CR6**, **CR7**, and **CR8** comprise the bridge rectifier. **Q 11** supplies a 6 volt supply to the tape deck motor. **CR27**, **CR28**, **CR29**, and **CR30** supply the voltage for the Bi-Polar Flip Flop. 18 volts to 22 volts direct current would be normal.

## SERVICE NOTES

### SECTION I

Before the troubleshooting procedure begins, it is recommended that a complete mechanical inspection be given the defective unit. The following list represents a few of the leading mechanical failures due to abusive shipping and handling.

1. Broken or cracked P.C . boards.
2. **Loose** screws and mounting hardware.
3. Component leads shorting together.
4. Projection lens broken or loose.
5. Main housing cracked.
6. Projection lamp out of socket.

### TROUBLES HOOTI NG CHART

<u>Symptom</u>	<u>Cause</u>
A. Unit appears dead. No light, no tape deck action.	<ol style="list-style-type: none"><li>1. Line cord open.</li><li>2. No 120 VAC Power.</li></ol>
B. Projector light operates, but no tape deck action.	<ol style="list-style-type: none"><li>1. Tape motor (80-40) defective.</li><li>2. Drive belt (80-42) broken.</li><li>3. Defective Tape Deck Power Supply (Q 11).</li><li>4. Defective switch (S101) under tape deck.</li><li>5. 28A83 - Response button (SI 10) on hold.</li></ol>
C. Tape deck operates, but dead projection light or fan motor.	<ol style="list-style-type: none"><li>1. Projection lamp (DS 101) defective.</li><li>2. Fan motor (B 103) defective.</li><li>3. Switch (S 103) defective.</li><li>4. Thermal switch (S 104) defective.</li></ol>
D. No automatic advance or manual advance.	<ol style="list-style-type: none"><li>1. Check 22 Volt Power Supply.</li><li>2. Q 10 defective.</li><li>3. Relay (K 101) defective.</li><li>4. Motor (B 102) defective.</li><li>5. Check Q20, Q21, Q22, Q23.</li></ol>

Symptom

Cause

- |  |  |
|--|--|
| E. No automatic advance, manual operates.                                      | 1. Check Q7, Q8, Q9, Q24, Q25.<br>2. Switch (S 105) in the manual position.<br>3. Sensitivity pot (R22) not adjusted.  |
| F. No manual advance, automatic operates.                                      | 1. Diode (CR32) defective.<br>2. Switch (S108 or S109) defective.<br>3. Diode (CR103, 104) defective.  |
| G. Erratic or double advance in automatic operation or manual.                 | 1. Contacts on K101 dirty.<br>2. Cam switch (S 106) not adjusted.<br>3. Defective 22 Volt Power Supply.<br>4. Sensitivity-pot (R22) not adjusted.              |
| H. No audio or automatic advance using a cassette.                             | 1. Tape deck head open.<br>2. Check Q 1, Q2, and Q3.<br>3. Defective cassette.<br>4. 22 Volt Power Supply defective.   |
| I. No audio, advance 0 .K . using a cassette .                                 | 1. Check Q4, Q5, and Q6.<br>2. Jack (J101) open.<br>3. Broken wire on volume control.  |
| J. Audio weak.   | 1. Azimuth on tape head off.<br>2. Cassette defective.<br>3. Dirty tape head.<br>4. Speaker (LS101) defective.<br>5. Q5 or Q6 defective.                       |
| K. Film advances two or more frames or intermittent advance using a cassette . | 1. Defective pulses on tape.<br>2. Sensitivity pot (R22) not adjusted properly.<br>3. Cam switch (S 106) not adjusted properly.<br>4. Relay (K 101) defective. |
| L. Static in speaker during automatic or manual advance.                       | 1. CI01 open.<br>2. Regulated Power Supply Q 12 not operating properly.<br>3. C9 defective.  |

Symptom

Cause

- |  |   |
|--|---|
| M. Audio varies in amplitude while tape is running.              | 1. Defective pressure roller on tape deck.<br>2. Dirty tape head.<br>3. Tape deck motor (B 101) defective.  |
| N. Focus knob turns, but difficult to focus picture.             | 1. Clean Item #I-44 and objective lens, Item #I-54.   |
| O. Film operates in forward advance, but unable to reverse film. | 1. Defective film (thin).<br>2. Adjust carrier # I-32.<br>3. Defective reverse switch.                      |
| P. Black spots on projected screen.                              | 1. Dirty aperture glass in film carrier.<br>2. Dirty lens system:   |
| Q. Low light output.   | 1. Line voltage low.<br>2. Wrong projection bulb.<br>3. Heat Ray Filter lens (I-10) defective.              |
| R. Cannot focus entire picture.                                  | 1. Projector lens (I-54) defective.<br>2. Damaged or warped film.<br>3. One or more condenser lenses loose. |
| S. Projection bulb seems to have a short life.                   | 1. Grease or contamination on bulb.<br>2. Defective or slow running fan.<br>3. High line voltage.           |
| T. Unit false trips when initially turned on.                    | 1. Change C7 (110-1713) to 1 mfd. at 15 volts.  |



## SERVICE NOTES

### SECTION II

#### MECHANICAL & ELECTRICAL ADJUSTMENTS

##### Motor Hum Adjustment.

If motor hum becomes objectionable, monitor the audio output with a meter and adjust the hum bracket (2-1 1) for the lowest reading. Tighten the bracket mounting screw (2-13).

##### Sensitivity .

Advance pulse sensitivity must be adjusted within a prescribed range to avoid false tripping or a no advance condition. Using a #606-27 test cassette on the -9 db side adjust the sensitivity pot (R22) CCW to a point just beyond the setting which causes intermittent operation of the advance mechanism. The -6 db side should advance only once when the play button is pushed.

##### Advance Mechanism Adjustment.

Noise or binding of the advance mechanism may be traced to the Geneva Wheel Assembly (1-51) improperly meshing with the gear drive wheel (2-45). In this case, loosen the mounting screw (2-55) and position assembly so as to eliminate the problem.

##### Shut-Off Response Adjustment (28A83-5).

Trim pot (R57) on the 1 lo-1715 board regulates the response pulse to shut off the tape deck. The #606-29 shut-off adjust tape is used for this purpose. One side of the tape is 1.1 seconds long and the other side is 1.5 seconds long. Adjust R57 so that the first full 1.5 second pulse turns the tape deck off.

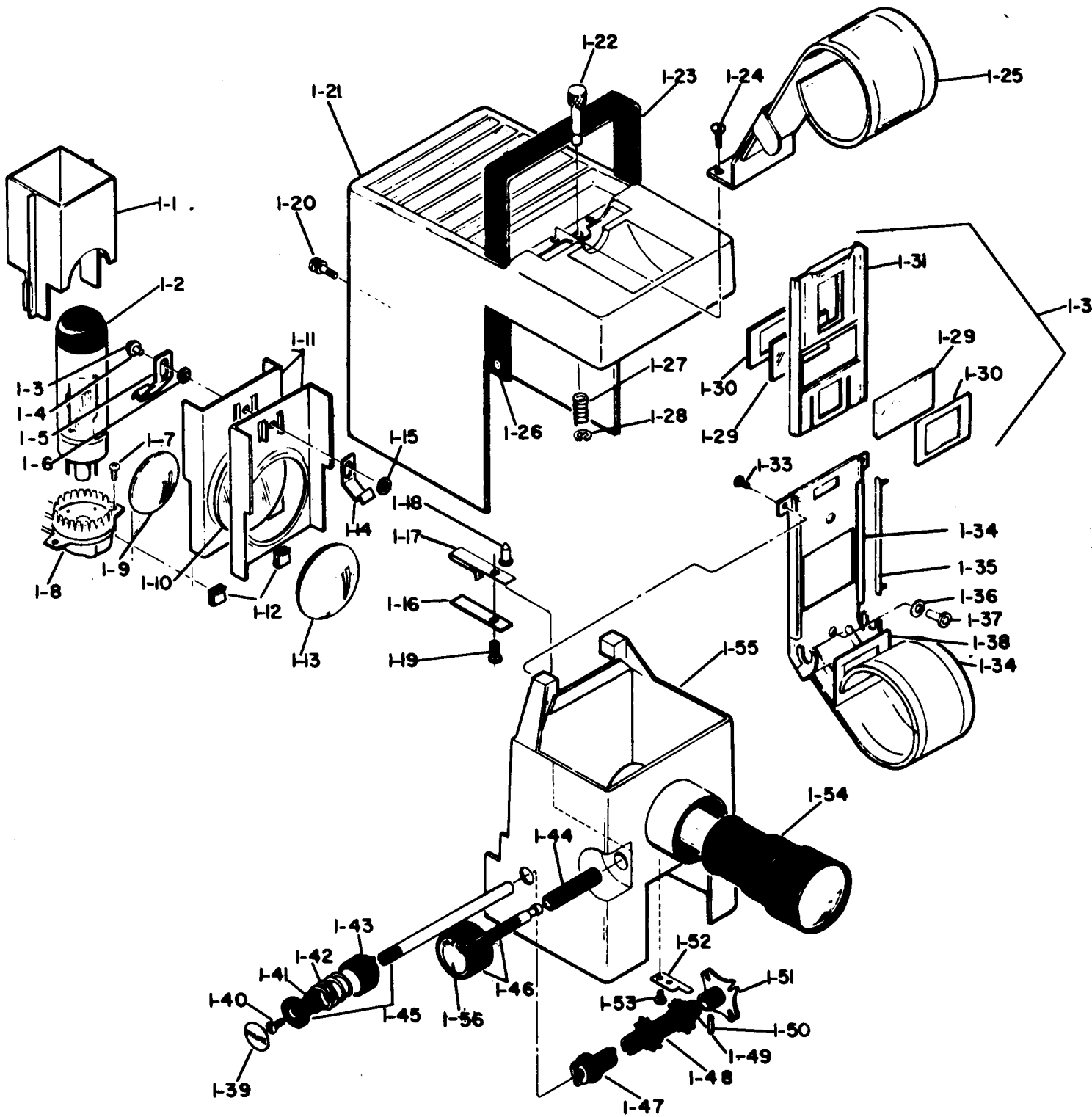


FIGURE #1  
 MODELS 28A81, 28A81-5, 28A82, 28A83-5

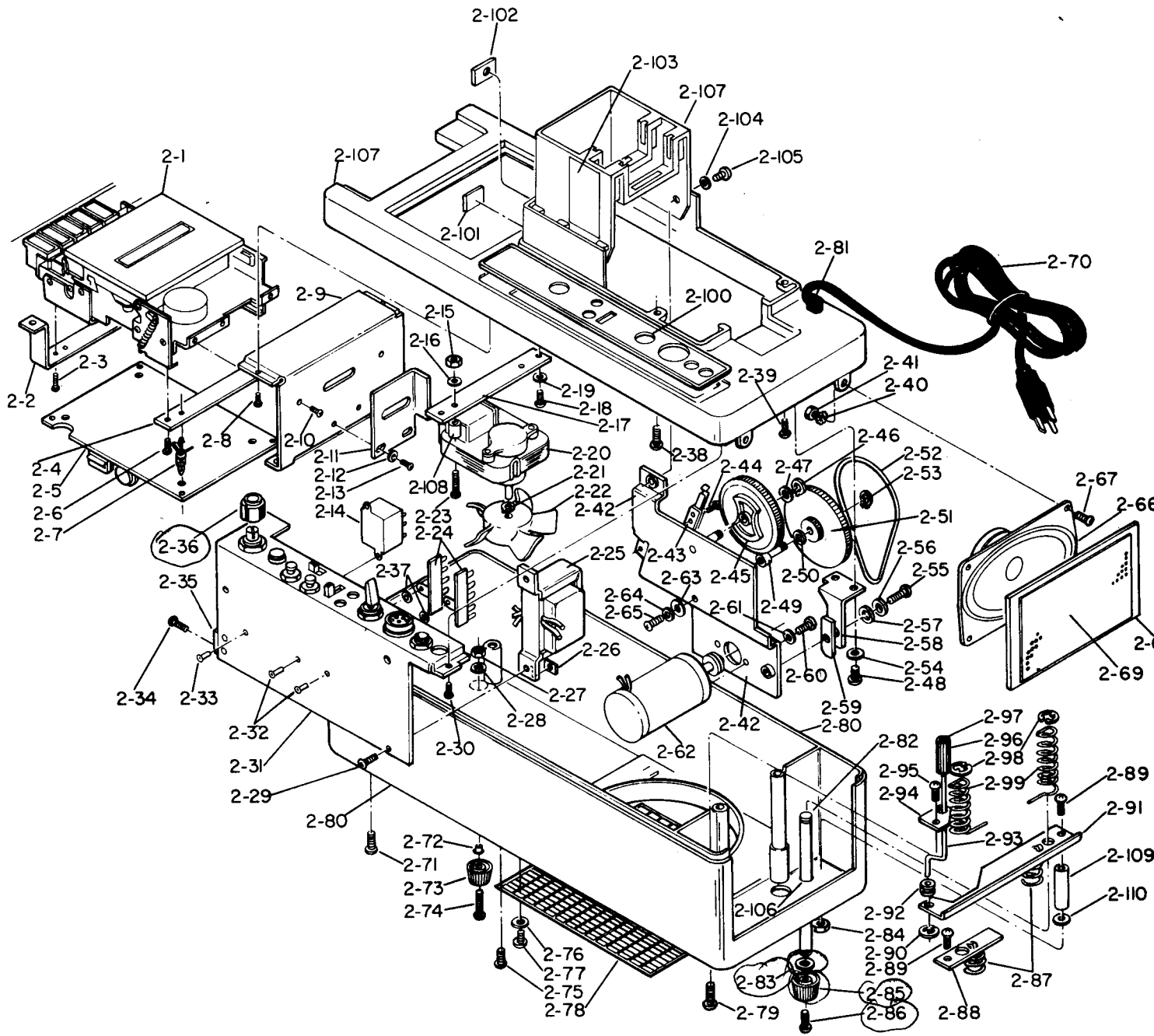
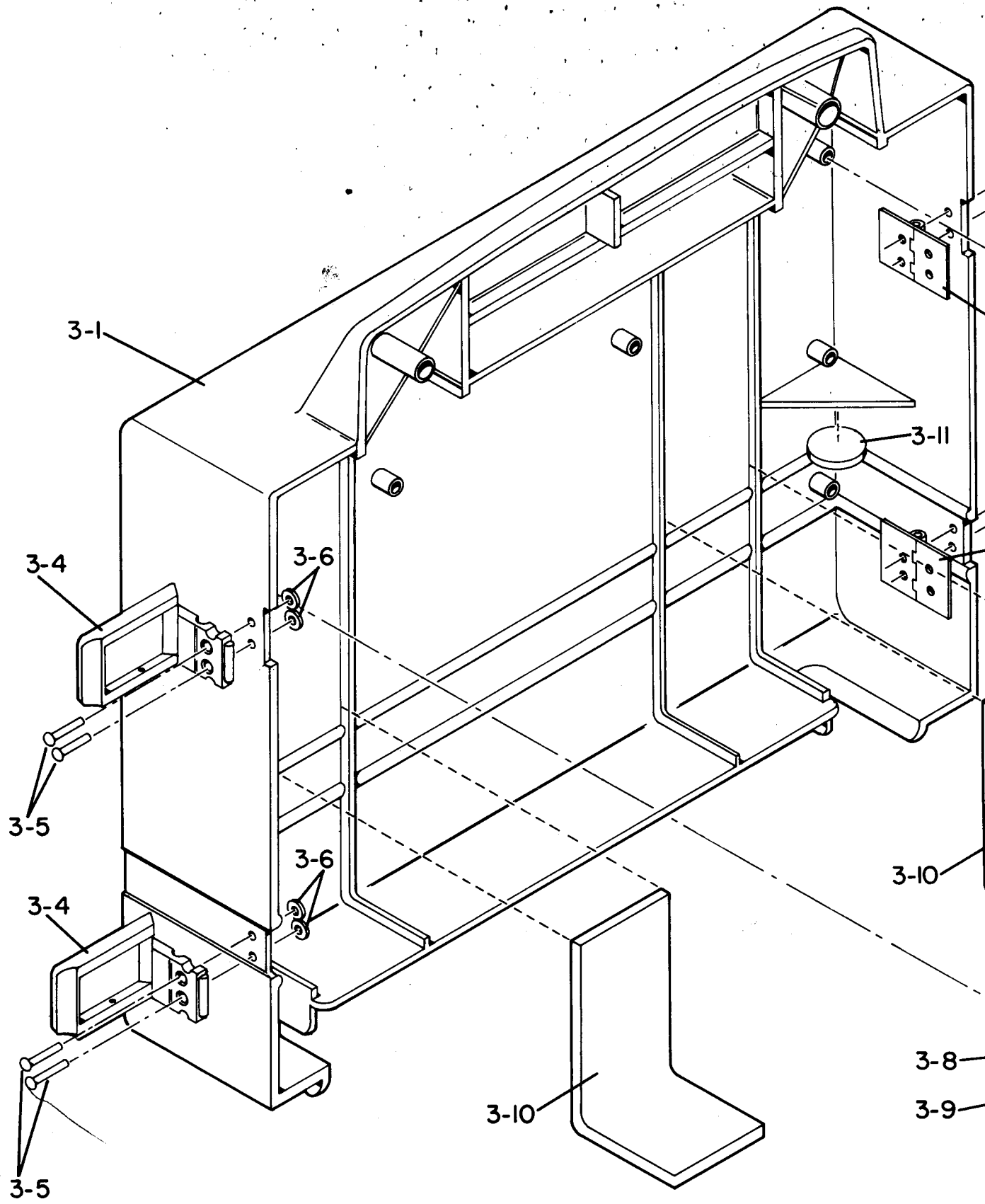


FIGURE #2  
 MODELS 28A81, 28A81-5, 28A82, 28A83-5



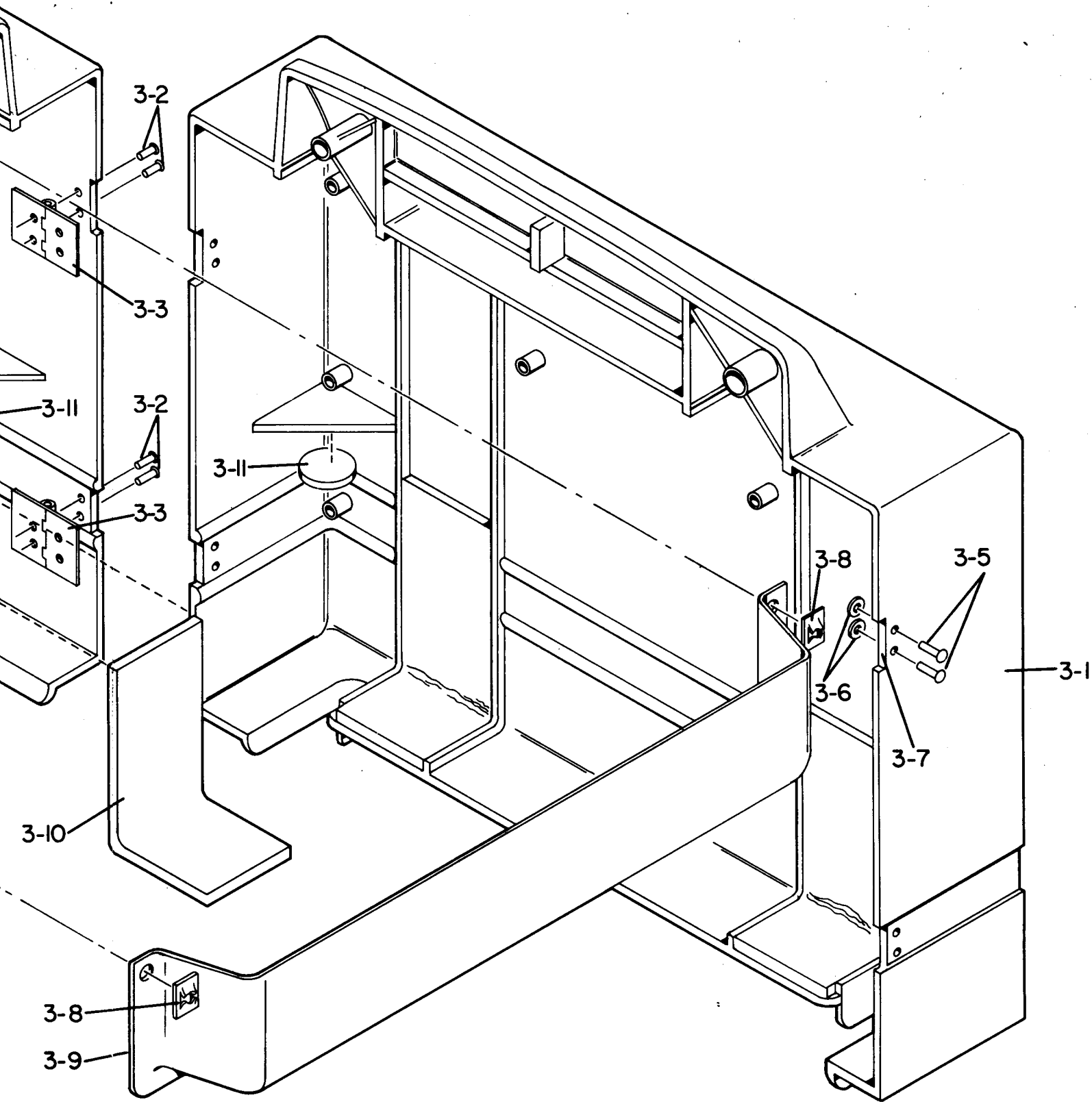
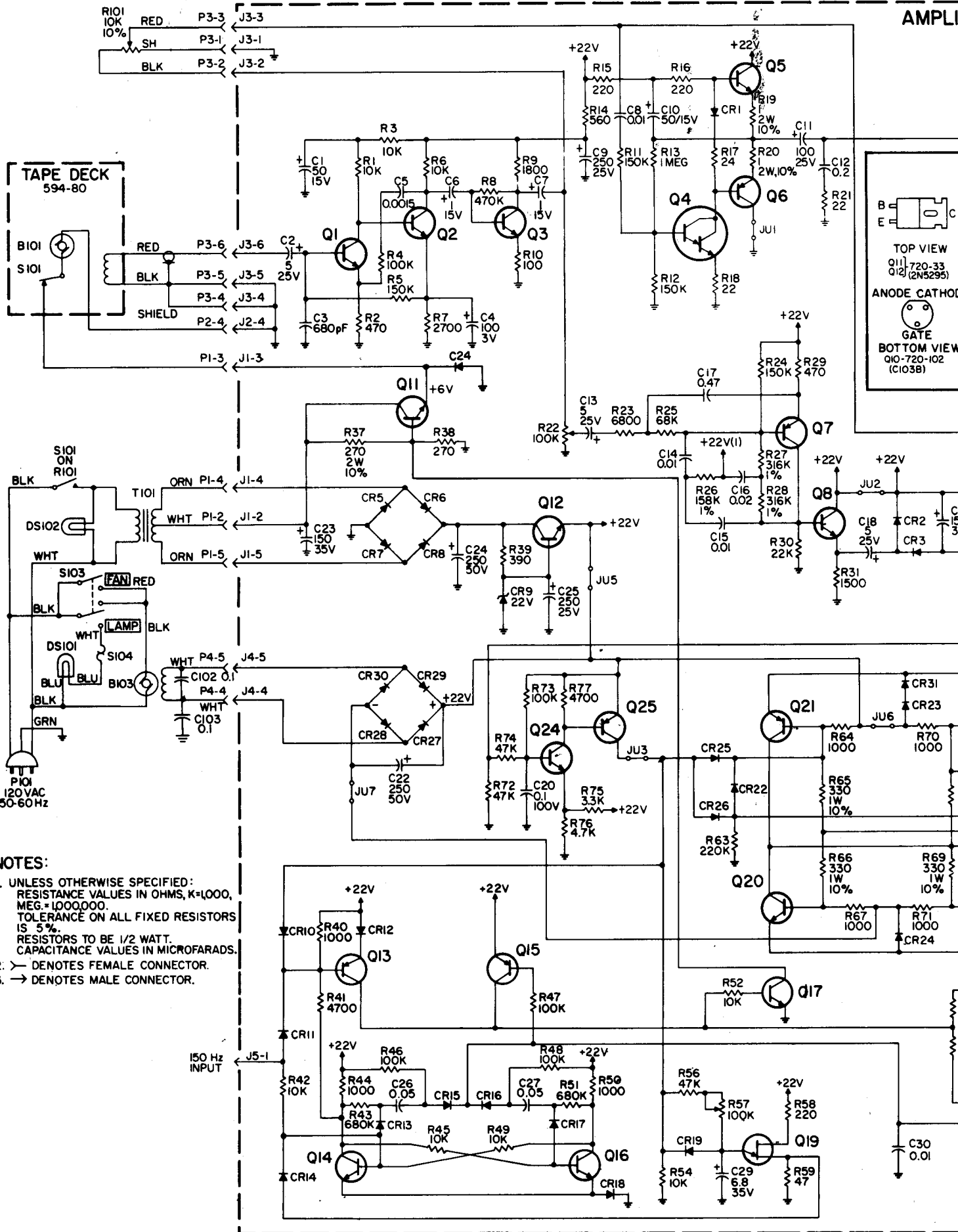


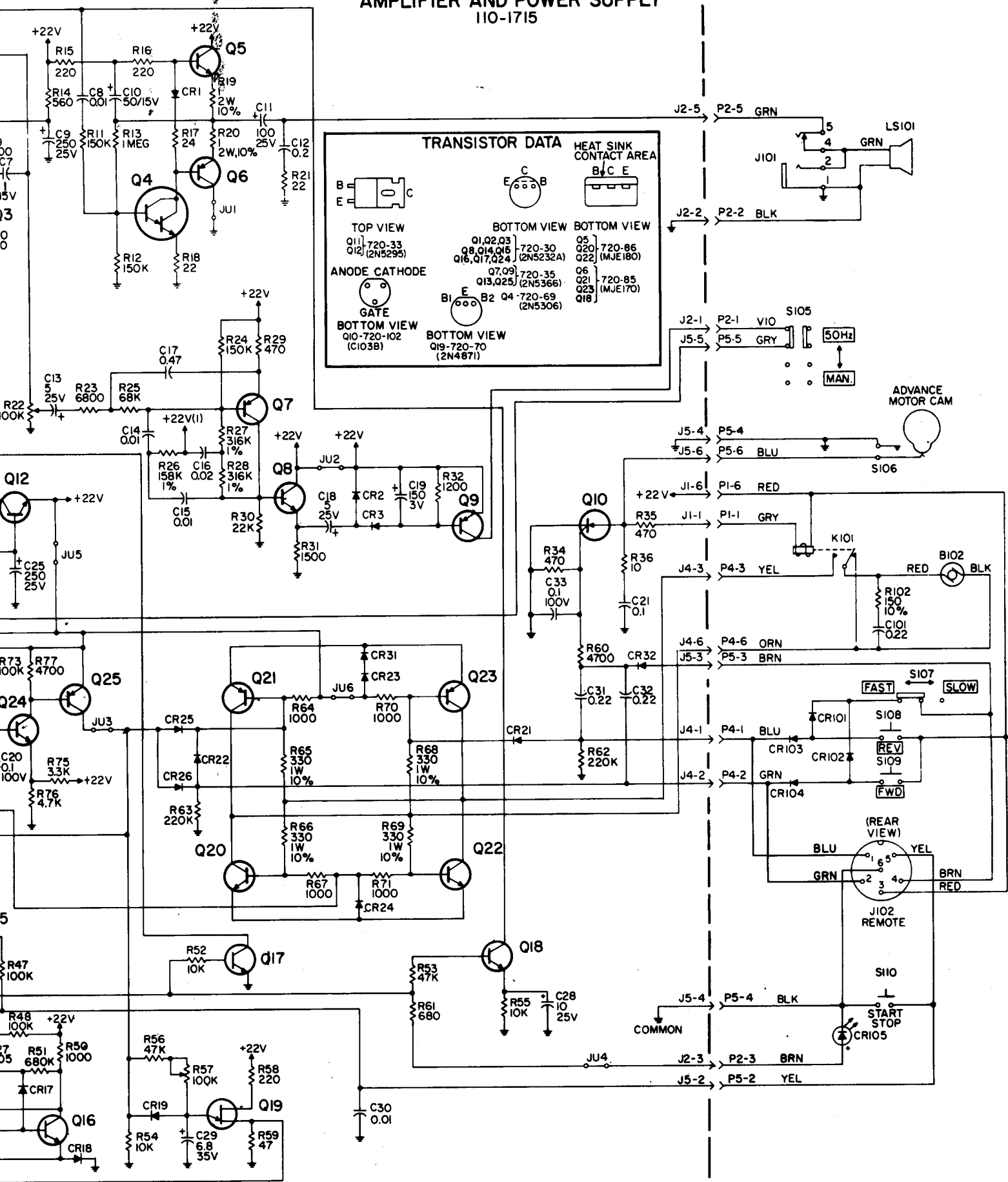
FIGURE #3  
MICROMATIC II  
MODELS 28A81, 28A81-5, 28A82, 28A83-5



**NOTES:**

1. UNLESS OTHERWISE SPECIFIED:  
RESISTANCE VALUES IN OHMS, K=1000,  
MEG.=1000,000.  
TOLERANCE ON ALL FIXED RESISTORS  
IS 5%.  
RESISTORS TO BE 1/2 WATT.  
CAPACITANCE VALUES IN MICROFARADS.
2. — DENOTES FEMALE CONNECTOR.
3. → DENOTES MALE CONNECTOR.

# AMPLIFIER AND POWER SUPPLY 110-1715



**FIGURE #5  
MICROMATIC II  
MODEL 28A83-5**

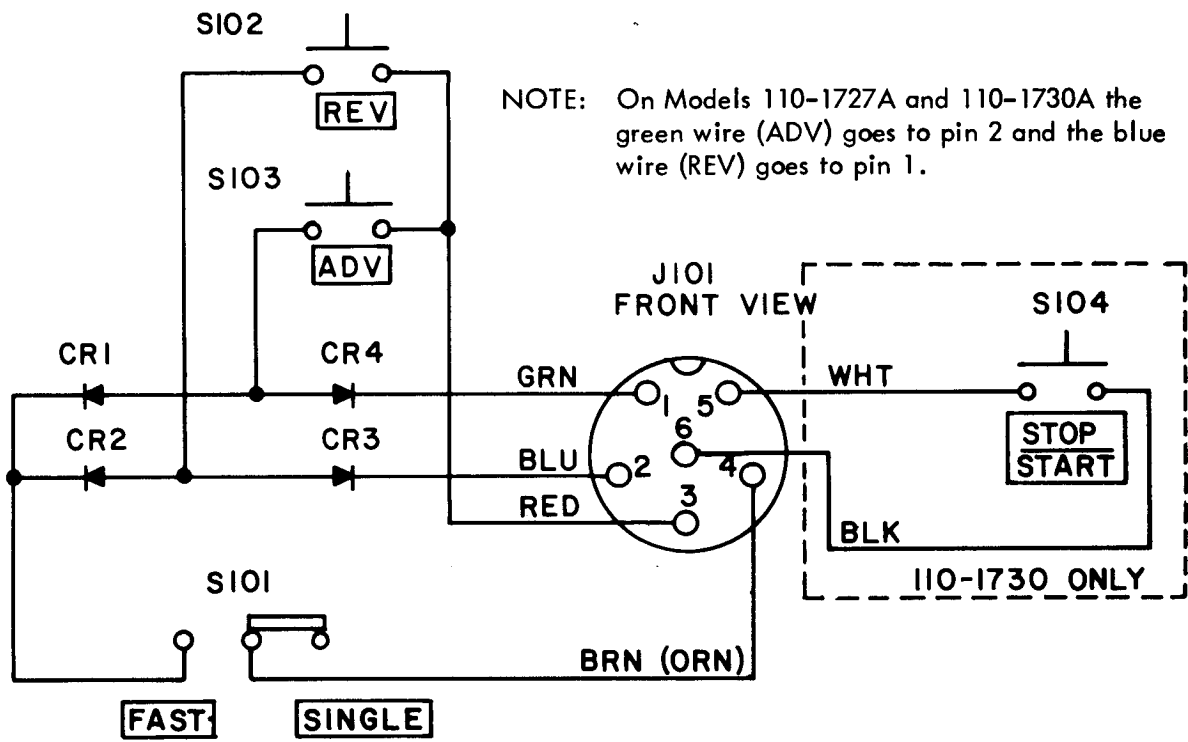
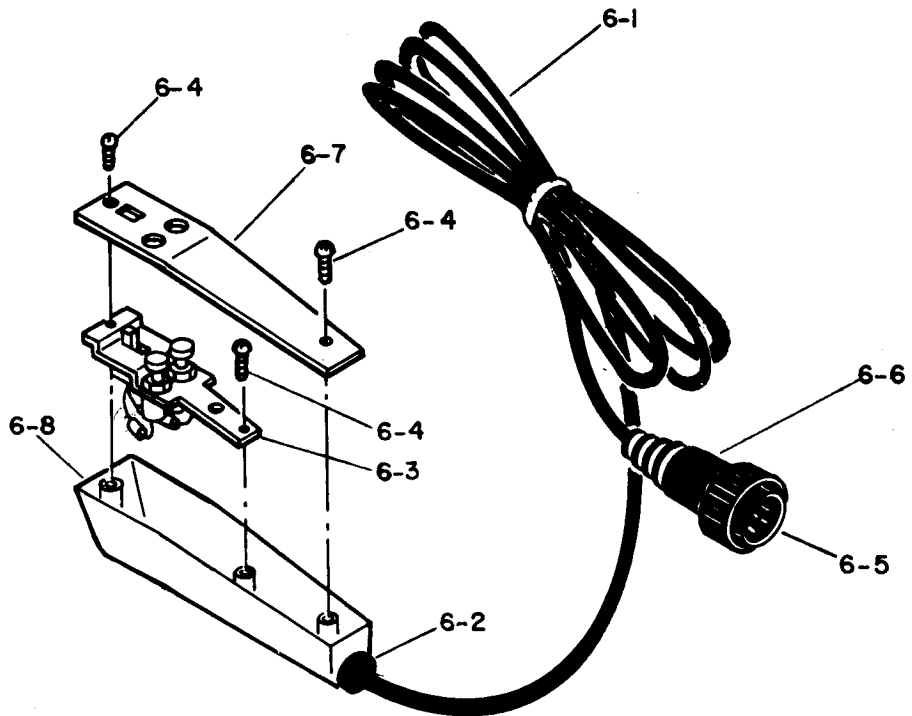


FIGURE #6  
 MODELS 110-1727, 110-1730  
 REMOTE CONTROL UNIT



### VOLTAGE MEASUREMENTS

	D. C. STATIC READING			A. C. (#606-25)			
	8	E	C	B	E	C	
Q1	1.0	0.4	2.2	---	---	0.0015	333 Hz
Q 2	2.2	1.5	13.0	0.0015	0.0	0.15	333 Hz
Q 3	1.2	0.5	9.0	0.15	0.15	2.0	333 Hz
Q 4	1.5	0.5	12.0	0.25	1.20	8.5	333 Hz
Q 5	13.5	12.5	22.5	8.25	8.0	22.5	333 Hz
Q 6	12.0	12.5	0.0	8.5	0.0	8.0	333 Hz
Q 7	21.5	22.0	16.0	0.06	0.06	2.4	50 Hz
Q 8	16.0	15.5	22.5	2.4	2.3	22.5	50 Hz
Q9	22.5	22.5	5.5	---	---	---	
Q11	8.0	7.5	15.5	---	---	---	
Q12	23.0	22.5	32.0				
Q24	11.0	13.0	22.5				
Q25	22.5	22.5	0.0				

### BIPOLAR POWER FLIP FLOP D. C. STATIC READINGS

	B		E		C	
	ADV.	REV.	ADV.	REV.	ADV.	REV.
Q20	7.7	6.8	6.5	6.5	7.0	21.0
Q21	21.2	20.0	21.0	21.0	7.0	21.0
Q22	6.5	7.5	7.0	7.0	21.0	7.0
Q23	19.5	21.0	21.0	21.0	21.0	7.0

### SCR

	GATE		CATHODE	ANODE	
	Fast Fwd.-Rev.	---		Fast Fwd.-Rev.	---
Q10	0.7	0.0	0.0	0.4	22.0

**VOLTAGE CHART**  
**MICROMATIC II (28A81 and 28A81-5)**  
**TEST POINT VOLTAGES**

TEST POINT	WRT	MEASURED PARAMETER	TEST CONDITIONS AMP TURNED ON
J1-1	Corn	(+) 20.2 - 22.5 VDC (+) 10-12 VDC	After momentary short of J5-6 to Corn. After momentary closure of "Forward" or "Reverse" film control push-button switch or detection of valid cue tone.
J1-2	Corn	(+) 16-20 VDC (+) 14-18 VDC	Tape Deck off. Tape Deck in "PLAY", "FAST FORWARD", or "REWIND" mode.
J1-3	Corn	(+) 5.4 - 7.5 VDC (+) 5.4 - 7.5 VDC (+) 0 - .6 VDC	(110-I 713) Continuous. (110-1715) START/STOP LED off. (110-1715) START/STOP LED on.
J1-4	J1-5	26-32 VAC	Continuous.
J1-6	Corn	(+) 20.2 - 22.5 VDC	Continuous.
J2-1	Corn	(+) 4.75 - 5.9 VDC (+) 19.5 - 21.8 VDC	No valid cue tone detected. Valid cue tone detected.
J2-2 (Corn)			
J2-3	Corn	NC 0 $\longleftrightarrow$ 1.2 VDC	(110-1713) (11 O-I 715) alternate closures of START/STOP pushbutton switch.
J2-4 (Corn)			
J2-5	Corn	Audio Output	
J2-6	Corn	$\approx$ 1.5 VRMS @ 50 Hz.	606-25 Test Tape (50 Hz) to produce cue tone.
J3-1 (Corn)			
J3-2	Corn	$\approx$ .8 VRMS	606-25 Test Tape (333 Hz) to produce audible tone.
J3-3	Corn	0-0.8VRMS	Depending upon position of volume control, using 606-25 Test Tape (333 Hz).

J3-4 (Corn)			
J3-5 (Corn)		Head input Common	Note: J3-5 should not be strapped to any of the common busses external to the PWC.
J3-6	Corn	≈ 150 ohms	Tape Head Resistance.
J4-1	Corn	(+) 20.2 - 22.5 VDC 0 VDC	"Reverse" film control button depressed. "Reverse" film control button normal.
J4-2	Corn	(+) 20.2 - 22.5 VDC 0 VDC	"Forward" film control button depressed. "Forward" film control button normal.
J4-3	J4	(+) 14-18 VDC  (-) 14-18 VDC	Fan on - During and after operation of the "Forward" film control button. Fan on - During and after operation of the "Reverse" film control button.
J4-4	J4-5	14-I 7 VAC	Fan on.
J5-1	Corn	NC (+) 1.2 - 1.6 VDC (+) 20.2 - 22.5 VDC	(110-1713) (110-I 715) Normal (110-1715) Presence of valid stop tone
J5-2	Corn	NC (+) 20.2 - 22.5 VDC  0 VDC	(110-1713) (11 O-I 715) START/STOP button normal. (110-1715) START/STOP button depressed.
J5-3	Corn	OVDC  (+) 20.2 - 22.5 VDC	Film control speed switch in "SINGLE" position & "FORWARD" or "REVERSE" button depressed. Film control speed switch in "FAST" position & "FORWARD" or "REVERSE" button depressed.
J5-4 (Corn)			
J5-5	Corn	Same as J2-1	Man. - 50 Hz Switch in "50 Hz" position.
J5-6	Corn	(+) 20.2 - 22.5 VDC (+) 0 - 1.4 VDC	After momentary short of J5-6 to Corn. "Forward" or "Reverse" film control buttons or detection of a valid cue tone.

# MODEL 594-80 CASSETTE TAPE DECK

## SPECIFICATIONS

TAPE SPEED:	1-7/8 inches per second + 3%.
REWIND TIME:	Less than 120 seconds for C-60 cassette.
FAST FORWARD:	Less than 120 seconds for C-60 cassette.
WOW/FLUTTER:	Less than 0.40% R.M.S.
TAKE-UP TORQUE:	40-75 gram-centimeters.
PRESSURE ROLLER:	280-400 gram-centimeters.
MOTOR:	4.5 -7V D.C.
HEAD:	2 track mono.

## ADJUSTMENT

Before any check-out or adjustments are performed, clean the tape heads, capstan, and pressure roller with alcohol on a cotton swab. Demagnetize the head with a suitable head demagnetizer. Check all push button functions for proper operation using a good quality C-60 cassette fully loaded with tape.

### Tape Head Azimuth

Using a high quality music cassette, turn azimuth adjustment (Item - 79) until the maximum output is obtained when playing both sides of the cassette.

### Cassette Release Mechanism

Screw (Item - 84) should be adjusted to release the cassette half way down the cassette aligning pins. The screw is secured into position by the locking nut (Item - 67).

### Take-Up Torque

Using the #606-33 torque test cassette, the indicated reading in the play position should be between 40-75 gm/cm. Be sure take-up roller is clean. If the reading still remains low, replace the take-up mechanism or the take-up spring. (Refer to Trouble Shooting .)

### Reel Table Assemblies

With a cassette in the play position, observe the location of the two reel table assemblies (Item - 30) in relation to the cassette hubs. The spindles should be centered in the cassette hubs. If not, carefully bend the appropriate spindles until proper alignment is obtained.

### Fly Wheel Adjustment

Adjust the fly wheel supporting bracket for a thrust gap of 0.008 - 0.019 inches.

## TROUBLE SHOOTING

**Note:** The quality of the cassette and the tape is important for the proper operation of the tape deck. Our tests indicate that Scotch, B.S.A.F., Norelco, T.D.K., and a number of others in the C-60 or less format are adequate. The C-90 and C-120 formats have demonstrated a lack of stability both mechanically and electronically, so we do not recommend their use.

### Spills Tape in Play Position

1. Pressure roller spring is unhooked or weak.
2. Take-up torque is low. Replace take-up mechanism (Item - 23).
3. Dirty belt and drive surfaces.

### Fails to Rewind Properly

1. Rewind roller dirty.
2. Weak spring on rewind assembly.

### Fails to Fast Forward Properly

1. Fast Forward mechanism dirty.
2. Spring on Fast Forward mechanism weak.
3. The brake plate touches the Reel Table.
4. Lubrication is needed.

### Deck runs slow or not at all

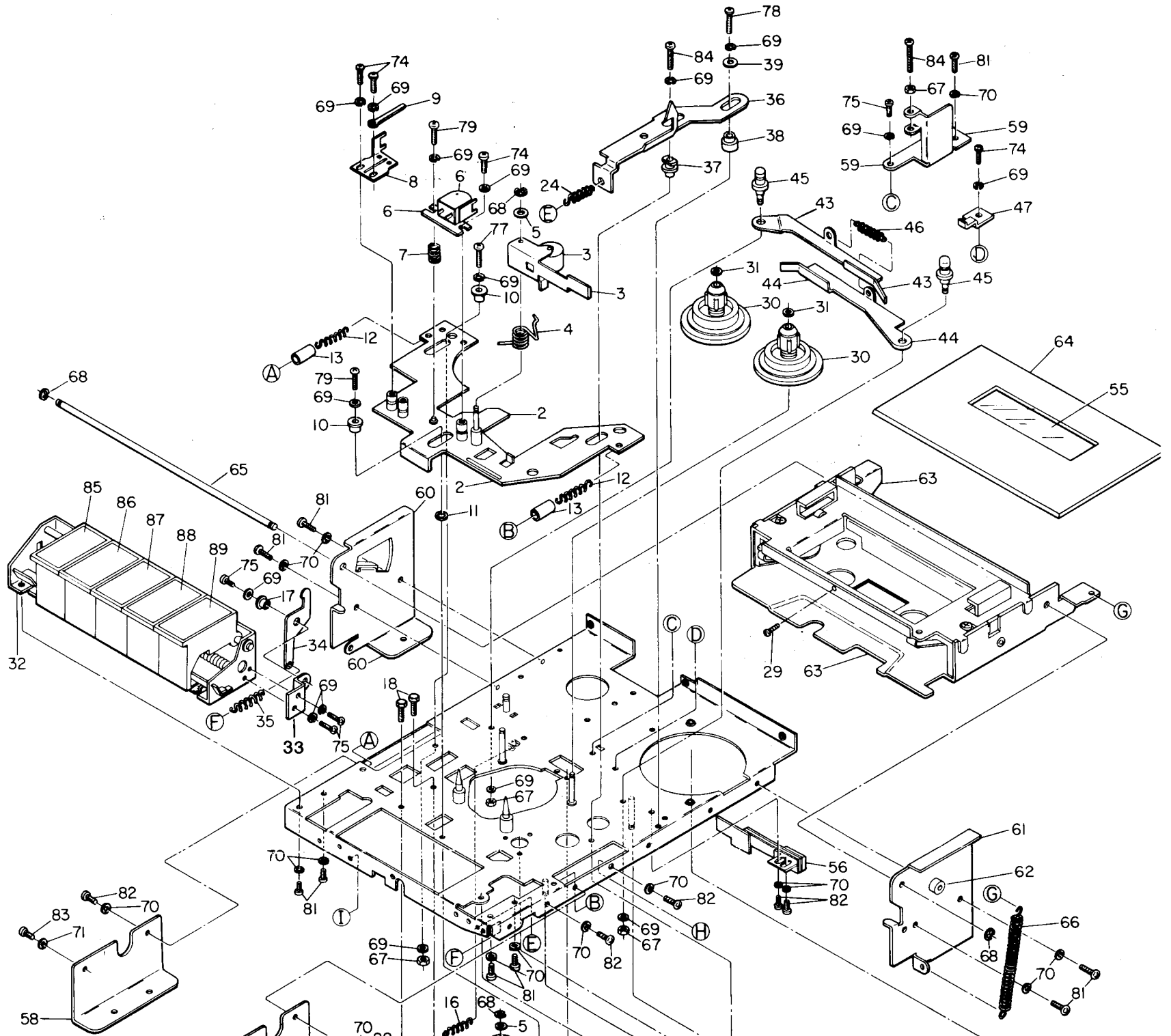
1. Pressure on pressure roller low.
2. The tape head too far forward and pinches the tape.
3. Defective or poor quality tape cassette.
4. Defective flywheel bearing.
5. Defective motor.

### Poor High Frequency Response

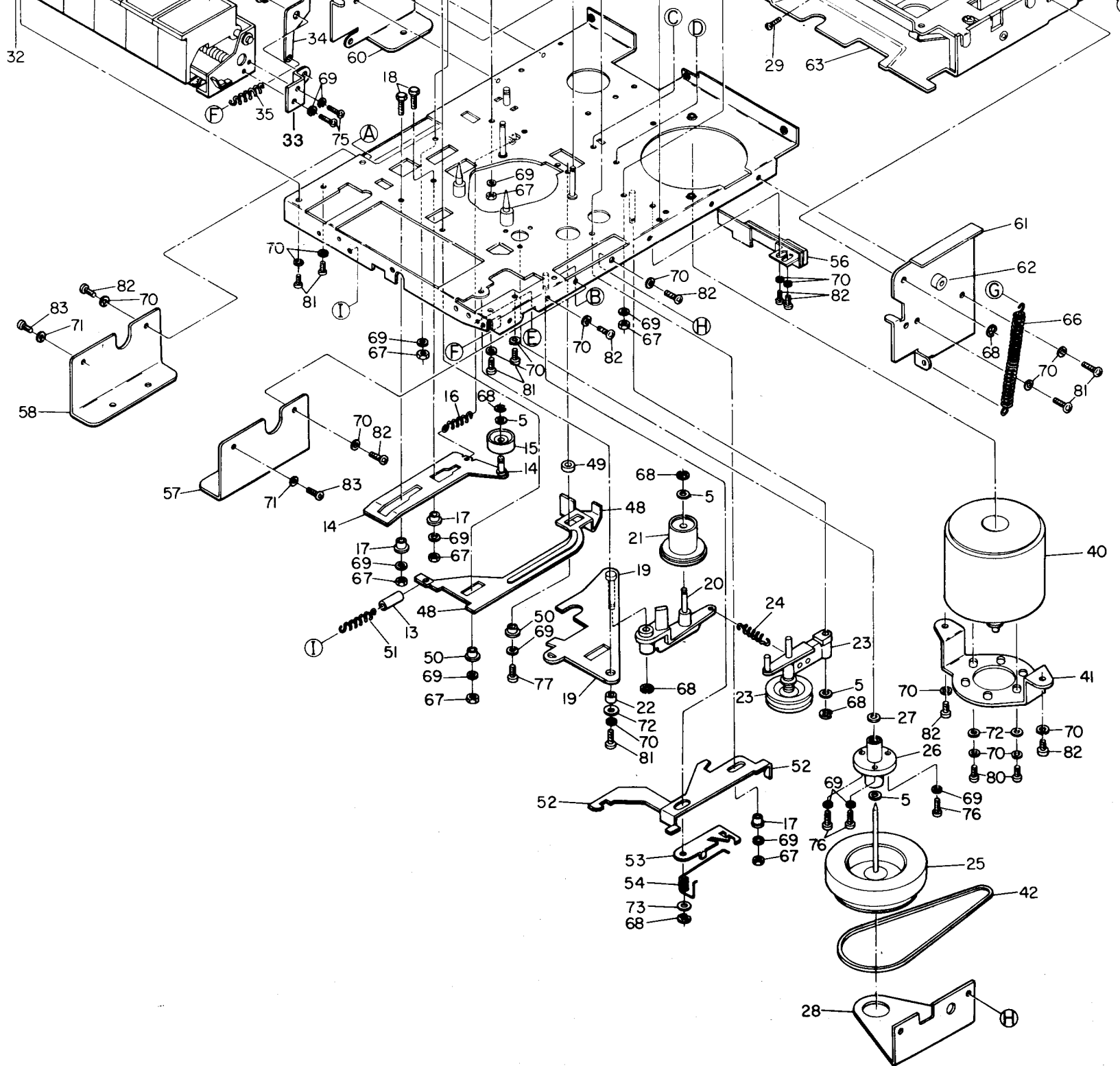
1. Azimuth off.
2. 'Improper mounting angle of the tape head.
3. Dirty head.
4. The tape cassette wobbles.
5. Defective head. (Replace)

### High Wow

1. The pad pressure of the cassette is off. The pressure should be 10-25 gm.
2. Pressure roller is dirty.
3. Oil on capstan shaft.
4. High take-up torque.
5. Flywheel loose and wobbling. The normal wobble is 0.008 - 0.019 inches. Oil if necessary.
6. The square belt is twisted.
7. Wrong pressure on pressure roller.
8. The alignment between motor pulley and the flywheel is off.







594-80  
TAPE DECK  
40