

# EXPANDER

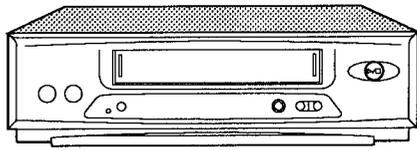
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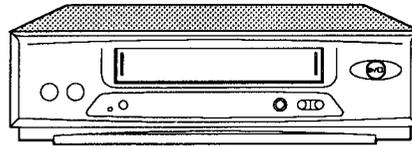


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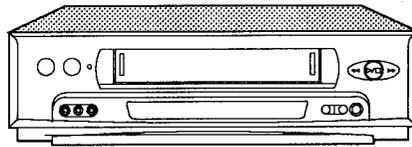
# U-Deck Tape Mode Position Circuitry



HS-U120



HS-U270/HS-U420



HS-U520/HS-U570

The VCR models shown above all use the new U-Deck Tape Transport. One change in the U-Deck, is the use of acrylic light guides to direct light to the various status sensors for the deck.

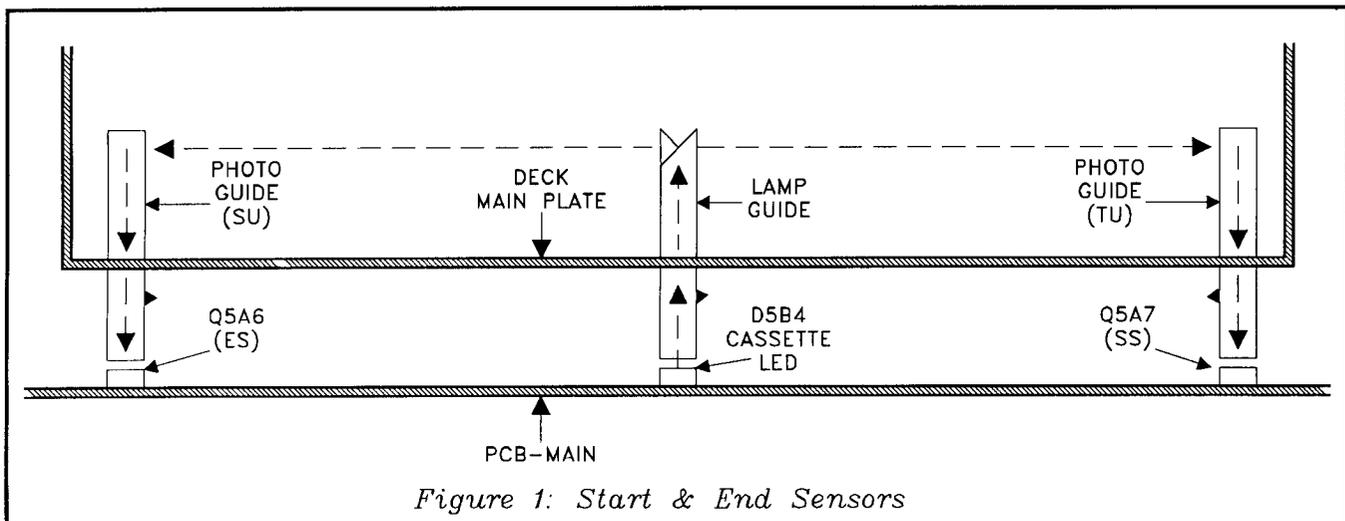
The light guides allow the Status Sensor LEDs and Photo Transistors to be mounted flush on the PCB-MAIN under the deck. The acrylic light guides direct the light from LEDs up into the deck transport and back to the appropriate Photo Transistor(s) on the PCB-MAIN.

The Start and End Sensors have always been optical. *Figure 1* illustrates how acrylic light guides

direct light to the Start and End Sensors in the U-Deck.

The Cassette Lamp (D5B4), End Sensor (Q5A6), and Start Sensor (Q5A7) are all mounted flush on the PCB-MAIN. The Lamp Guide directs the light from D5B4 up into the deck assembly and then towards the sides of the VCR. Light received at the Photo Guides (SU and TU) is directed down to the PCB-MAIN and the Photo Transistor Sensors.

Light guides are also used for the Reel Rotation Sensors, directing light from the LEDs, up to the reels and back to the Photo Transistor Sensors.



*Figure 1: Start & End Sensors*

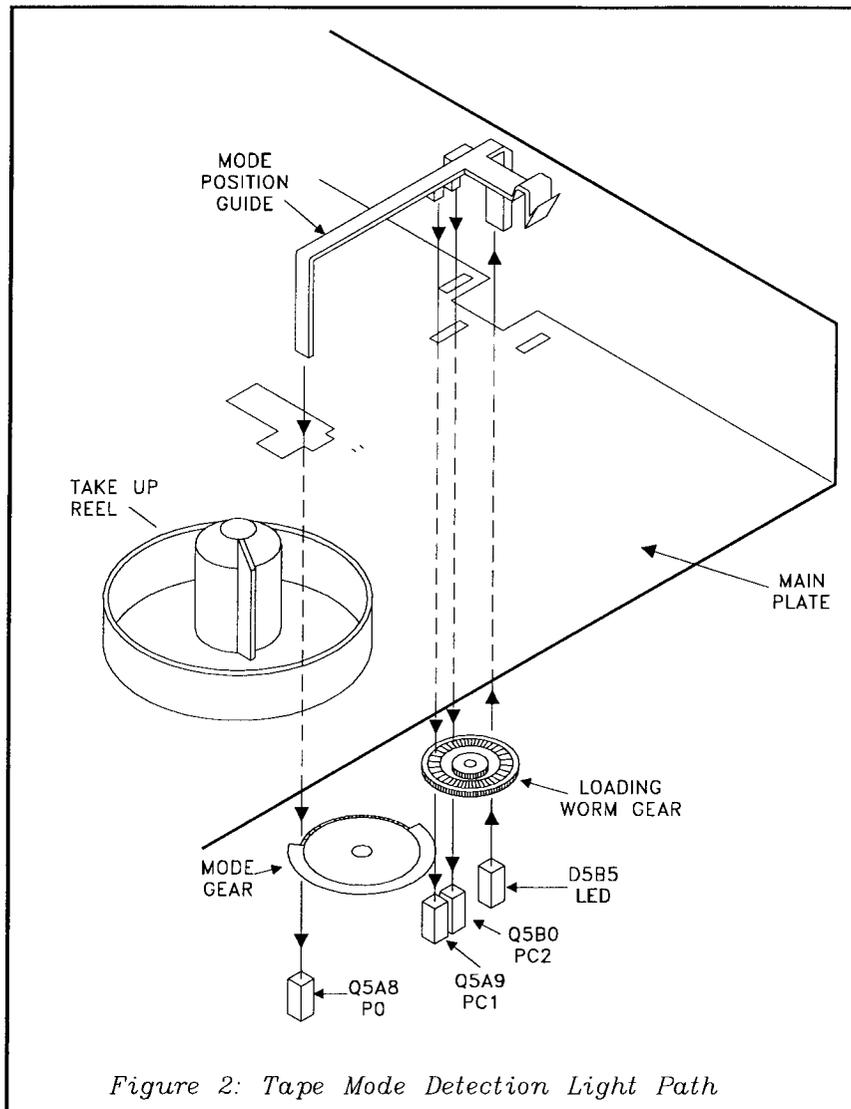


Figure 2: Tape Mode Detection Light Path

By using light guides, the mechanical Record Inhibit Switch and Tape Mode Position Switch, have been eliminated and replaced with optical sensors.

### Tape Mode Position Light Paths

Figure 2 illustrates the components in the Tape Mode Position Sensor light path. A single LED (D5B5) on the PCB-MAIN is the light source for the Mode Position Sensors. Light from D5B5 is directed upward to the Mode Position Guide, mounted on the top of the Deck Main Plate.

**In the Guide, the light is directed over three paths:**

- 1) Out of the extreme end of the Guide, through the Main Plate, to the outer edge of the Mode Gear, and then to Q5A8.

- 2) Out **two ports** near the light entry point, through the Main Plate, through slots in Loading Worm Gear, and then to transistors Q5A9 and Q5B0.

The output of each Photo Transistor controls the logic on a status line applied to the Control uPC. Q5A8 controls the logic on the P0 line. When the cutout in the perimeter of the Mode Gear allows light to pass, the conduction of Q5A8 drives the P0 line HIGH.

Transistor Q5A9 controls the PC1 line, and Q5B0 controls the PC2 line. Since the light to Q5A9 and Q5B0 passes through slots in the Loading Worm Gear, the output from these transistors is a series of

MODE POSITION	VCR STATUS
<b>EJ</b> (Eject)	No cassette in the VCR.
<b>CIN</b> (Cassette In)	Cassette is on the Reel Hubs.
<b>UL</b> (Unload)	Momentary Stop while a Slow Rewind removes tape slack.
<b>PR</b> (Play/Record)	-- Initial Stop Position (5 minutes maximum). -- 8 msec reverse drive (relaxes tape tension). -- Position for Play, Forward Search & Record.
<b>FLS</b> (Forward Slow)	Still & Forward Slow Motion
<b>RSL</b> (Reverse Slow)	One second reverse drive during Record Preroll.
<b>RS</b> (Reverse Search)	Reverse Search
<b>STP</b> (Stop)	-- Stop position -- after five minutes. -- Tape tension is relaxed. -- Pinch Roller moves away from the Capstan. -- Drum rotation stops.
<b>FR</b> (Forward/Reverse)	Rewind & Fast Forward.

Table 1: Mode Position versus Tape Status

pulses. The uPC determines the Tape Mode Position by counting the pulses from Q5A9 and Q5B0.

### Tape Mode Positions

The Tape Mode Positions are the same, and serve the same purpose, as those in VCRs using the J-Deck. Table 1 lists the Mode Positions and describes their purpose.

### Tape Mode Position Circuitry

Figure 3 shows the Tape Mode Position Circuitry. The light from LED D5B5 is directed to the Mode Position Guide on the Deck Assembly. The light is output from the guide and directed to three Photo Transistors, Q5A8, Q5A9, and Q5B0.

The light path to Q5A8 is through the perimeter of the Mode Gear. When the cut-out in the perimeter of the Mode Gear allows light to pass, Q5A8 conducts, driving the P0 status line HIGH.

The light paths to Q5A9 and Q5B0 are through slots in the Loading Worm Gear. As the Gear rotates pulses of light are applied to the two Photo Transistors, resulting in a series of pulses from each transistor. Q5A9 generates a series of pulses on the PC1 line, and Q5B0 on the PC2 line.

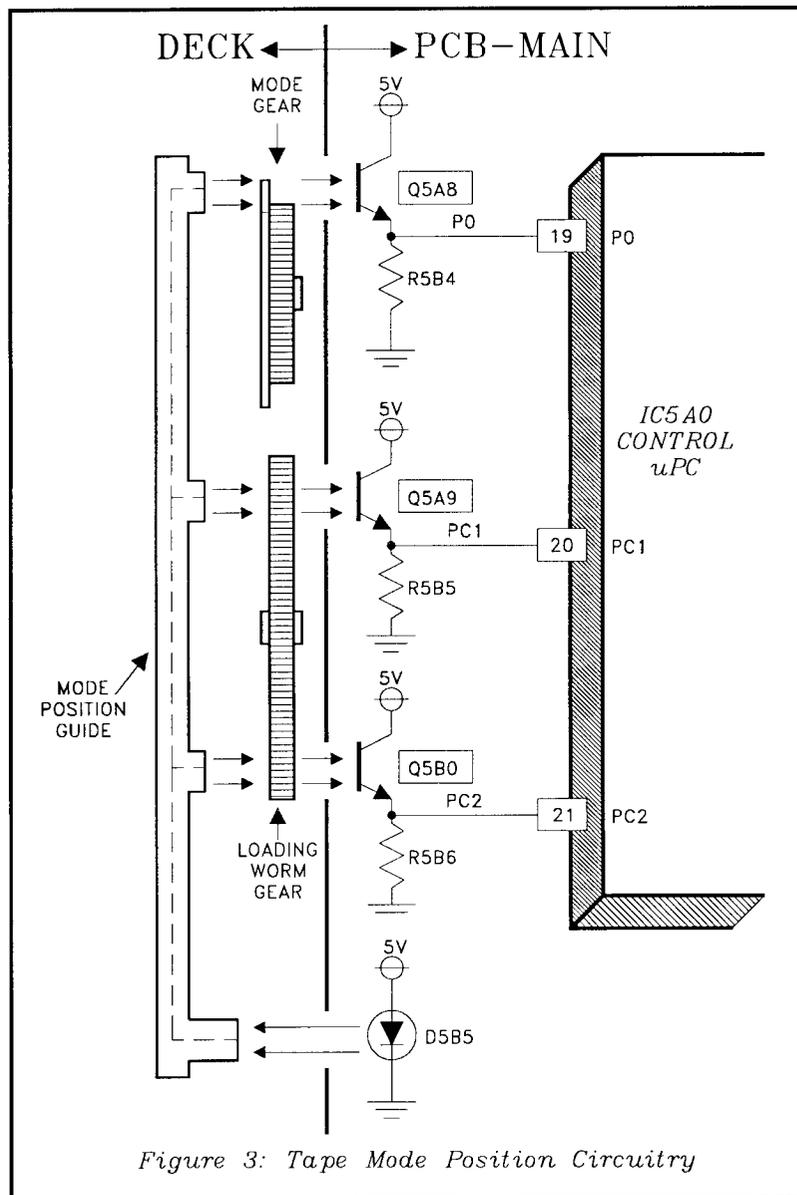
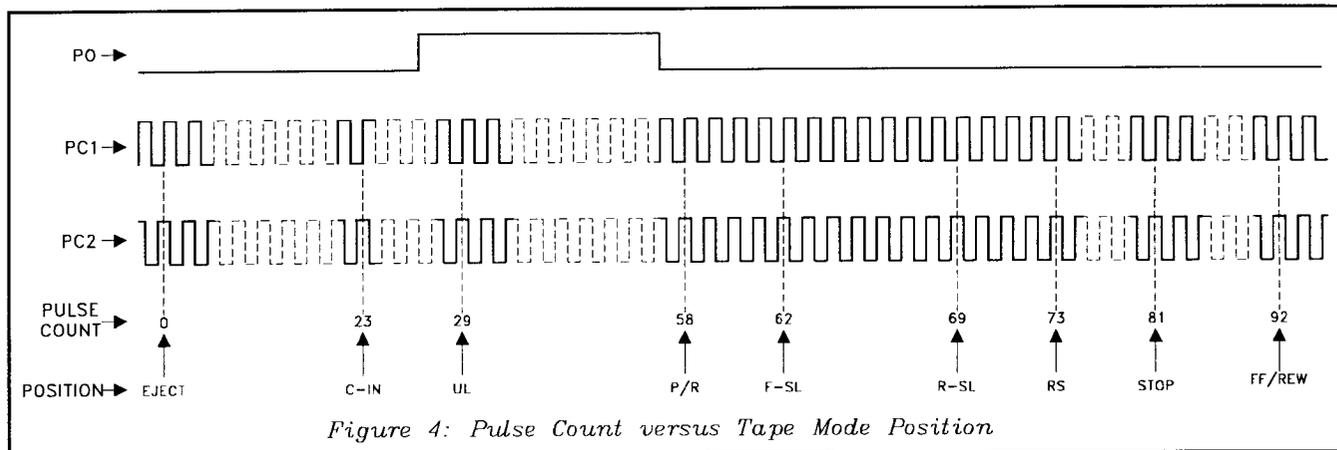


Figure 3: Tape Mode Position Circuitry



There is a 90 degree phase difference between the two pulse trains.

The uPC determines the Tape Mode Position by counting pulses on the PC1 line, when the PC2 line is HIGH. In the forward (loading) direction, the pulse count is at the rise of the PC1 signal. In the reverse direction the pulse count occurs on the fall of the PC1 signal. *Figure 4* illustrates the pulse count in respect to the various Tape Mode Positions.

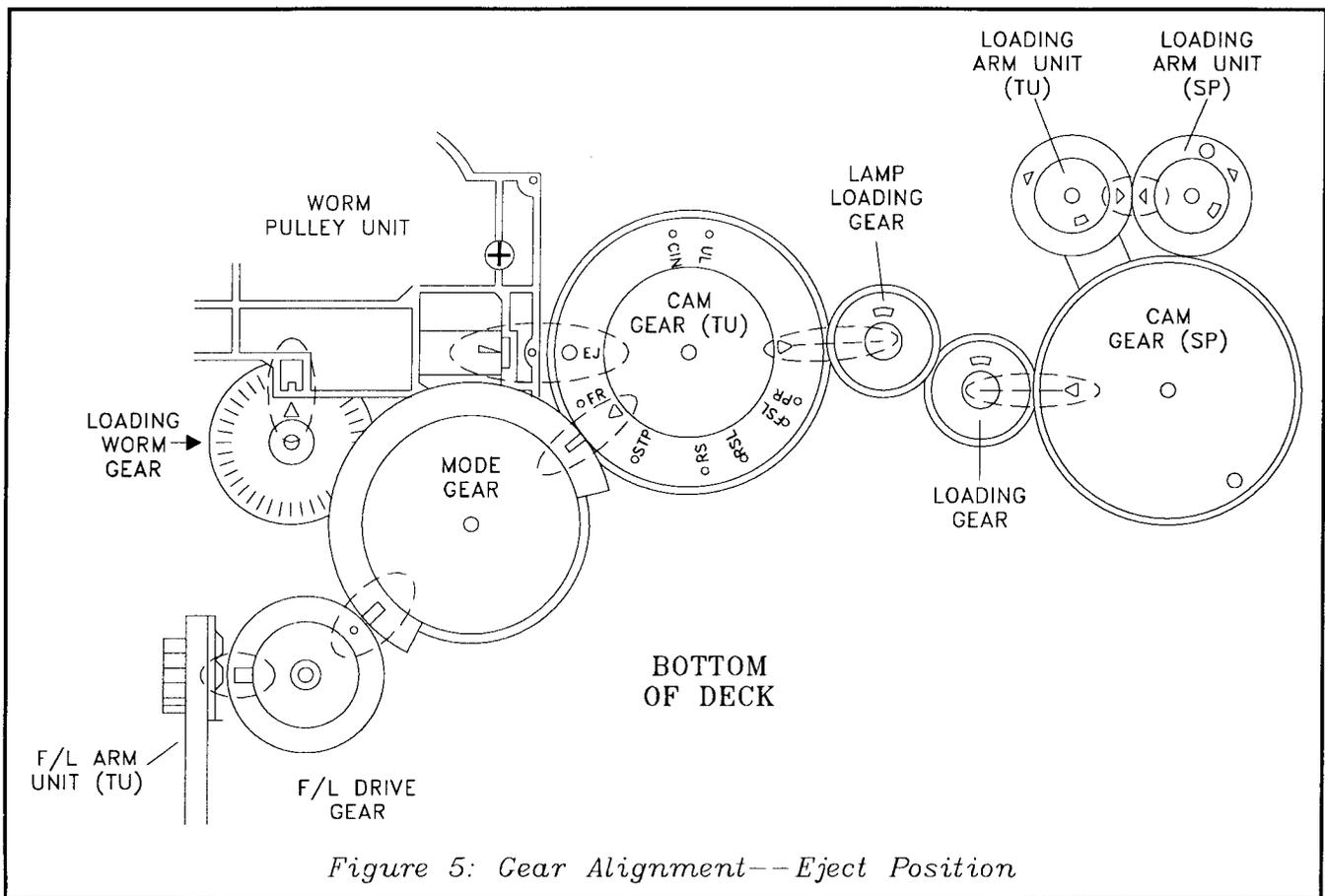
### Incorrect Mode Logic Symptoms

A defect in the Mode Position Sensors usually results in a status line being a constant HIGH, or a constant LOW.

The most common symptom is the cassette starts to load, then loading drive reverses and the cassette is ejected. In most instances this cycle will repeat a second time. The specific symptoms for each status line at a constant HIGH, and at a constant LOW, are listed in *Table 2* for a quick reference.

INCORRECT LOGIC	SYMPTOM
P0 Line = Constant LOW	Cassette loads -- the Tape starts to load, then reverses and the Cassette is ejected.
P0 Line = Constant HIGH	1) Power Applied -- Cassette assembly partially loads then Ejects, and the Play indicator is lit. 2) Play button pressed -- The cycle repeats. 3) Inserting a Cassette -- the Loading Motor does not start.
PC1 Line = Constant LOW	Cassette partially loads then Ejects (twice)
PC1 Line = Constant HIGH	Cassette partially loads then Ejects (twice).
PC2 Line = Constant LOW	Cassette partially loads then Ejects (twice)
PC2 Line = constant HIGH	The following sequence occurs: 1) Cassette loads -- Tape loads -- no Drum rotation 2) Cassette Ejects without unloading the Tape 3) Cassette partially loads then Ejects 4) The Tape may be damaged.

*Table 2: Incorrect Logic Symptom Table*



Since Mode Positions are detected by pulse count, the Mode Position cannot be determined by checking the logic on status lines, as in the J-Deck. To verify the Tape Mode Position, gear alignment on the bottom of the Deck must be checked.

### Loading Gear Drive

Figure 5 illustrates a simplified drawing of the Loading/Unloading gears on the bottom of the Deck.

**The normal loading gear drive is described in the following:**

- 1) When a cassette is inserted, the Shut Lever clears the light path to the Start Sensor (not shown in the diagram).
- 2) The logic change at the Start Sensor initiates drive to the Loading Motor.
- 3) The Loading Motor drive belt drives a Worm Gear (not shown in the diagram)
- 4) The Worm Gear drives the Loading Worm Gear which drives both the Mode Gear, and the F/L Drive Gear.
- 5) The F/L Drive Gear Drives the Front Loading Mechanism, drawing the Cassette into the VCR.
- 6) At the last gear tooth on the F/L Drive Gear, the cassette is on the reel hubs, and the F/L Drive Gear rotation stops.
- 7) Loading Motor drive continues driving the Mode Gear and Cam Gear (TU) towards the PR position.
- 8) After passing the UL position, the Cam Gear (TU) drives the Lamp Loading Gear, which drives the Cam Gear (SP), through the Loading Gear.
- 9) Rotation of the Cam Gear (SP) drives the Loading Arm Unit (SP) which in turn drives the Loading Arm Unit (TU).

- 10) The Supply and Take Up Loading Arms move the Guide Roller Assemblies towards the Drum, pulling the tape from the cassette and routing it along the tape path.
- 11) At the PR position the tape is fully loaded and waiting for a tape function command.

At the same time that the tape is being loaded, the worm gear is driving the Pinch Roller Assembly. The Pinch Roller is lowered and moves to the Capstan once the tape is loaded.

## **Gear Alignment**

The Gear Alignment, in the Eject position, is shown in *Figure 5*. Each Tape Mode Position is imprinted on the Cam Gear (TU). The extreme left edge of the Cam Gear (TU) indicates the current position. The alignment points between the various gears, in the Eject Position, are shown in the dashed ovals in the diagram.

Since you cannot verify Tape Mode Position by checking the logic on the P0, PC1 and PC2 lines, gear alignment must be correct before the deck is mounted on the PCB-MAIN.