DIGEST

AUTOMATIC SLOT LOADING CASSETTE DECK

A slot loading transport mechanism for Philips-type tape cassettes, developed in Belgium by Staar SA, permits cassettes to be simply pushed into a slot in the transport to be engaged and played. The system lends itself to an automatic changer arrangement.

The basic Philips compact cassette system requires insertion of the cassette along the axes of the reel hubs and capstan. This is accomplished by broadside-loading, which is acceptable for home and portable use but unsuited for auto use where the space requirements and distraction were considered excessive.

Theo Staar, President of Staar SA, recognised this problem initially and in 1965 he filed a patent application which covered a mechanism that permitted slot-loading. As the cassette is pushed into the slot, it bears against pins attached to a plate on which is mounted the motor-flywheel-capstan system and the two hubs (figure 1). The plate is hinged at four points by parallel-action linkages attached to the main chassis. As the cassette is inserted the hubs and the capstan swing up into the appropriate openings, engaging the reels fully and pinching the tape between the capstan and pinch roller in the final position when contact is made between the tape and the head.

When the hinged plate is fully engaged, it is latched into position. Release of the plate and ejection of the cassette can be effected by several means:

1. A simple eject button which mechanically unlatches the plate.
2. A solenoid which duplicates the action of the eject button. This solenoid is connected to a sensing circuit which automatically ejects the cassette at the end of the tape.
3. This solenoid and sensing circuit provide a means of automatically ejecting the cartridge should the power be turned off while the cassette is engaged. This protects the capstan follower and tape.

Many systems have been devised to sense the end-of-tape condition. Those which sense program material are subject to unwanted false triggering by a long silence on the tape. Those which sense a conductive tab on the face of the tape are limited only to those cassettes that are so equipped. Space limitations preclude the insertion of tension-sensing switches in the cassette.

Staar devised an ingenious system based on the motion of the supply reel which avoided all of the limitations just outlined. By coupling a SPDT switch (S1) to a cam on the supply hub, shaft information is fed into the eject-solenoid circuit (figure 2).

The circuit consists of two direct-coupled transistors driving a solenoid. Ordinarily R1 and R2 bias Q1 to a cut-off condition which results in Q2 operating in saturation and activating the solenoid. When power is applied, however, the charging current of C1 drives Q1 to saturation for the brief period before the motor comes up to speed and the tape starts moving. When this occurs, the contacts of S1 alternately short C2 (through low-value resistor R5) and connect it across C1. The average recharging current of C2 is sufficient to bias Q1 to saturation, cutting off Q2 and keeping the solenoid unactivated. When the tape motion stops, C2 is either shorted out of the circuit or charged up fully. Soon Q1 is no longer forward-biased; it stops conducting and Q2 is driven to saturation, energising the solenoid. Time constants are such that after 1.5 seconds the solenoid is activated, the cassette is ejected, and the system is turned off.

Another interesting feature covered by Staar patents is the "Sensitune" device. In the basic unit, Fast-Forward and Rewind functions are initiated by the lateral motion of the Eject lever, which is spring-loaded and returns to the normal play mode when released. In the Sensitune model, this lever locks into either fast mode. An auxiliary tape head senses the program material on the tape and, in conjunction with associated circuitry, automatically senses the (minimum) four seconds of silence between selections. The circuit then automatically actuates a solenoid which unlocks the fast-mode lever, returning to the playback mode. This permits the user to skip a tune or replay a tune by simply activating the fast-mode lever in the desired direction.

A more recent development is a transport mechanism which automatically senses the end of the tape on the cassette and reverses tape direction to play the other tracks. The Fast-Forward and Rewind push-buttons automatically reverse function when the tape reverses so that the Fast-Forward button functions as Fast-Forward irrespective of the direction of tape motion.

A further development for home entertainment use is a cassette changer which incorporates the control features of the bi-directional unit just described. In this unit, a small tray which accepts up to eight cassettes is loaded on to the top of the machine. The first cassette drops into a slot, plays, reverses, plays the return tracks, and then rises to the tray. The tray advances to permit the next cassette to play. This process continues until the last cassette is played at which time the cassette returns to the tray and the mechanism shuts itself off. There is also a 24-cassette version of the changer which uses a rotating tray. ("Electronics World", December 1970.) ■

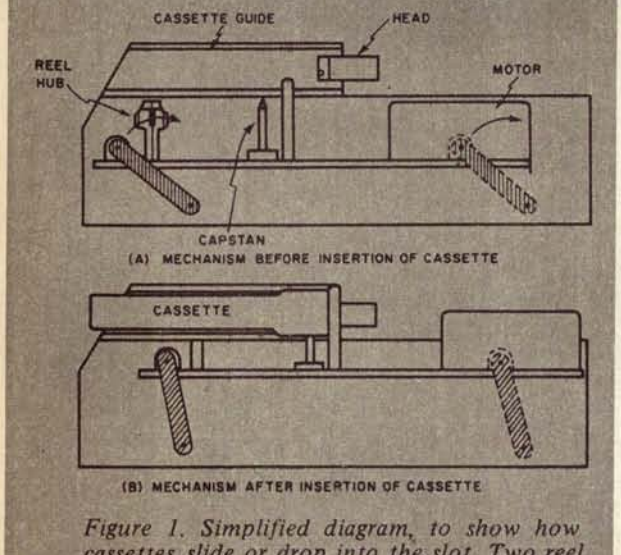

Figure 1. Simplified diagram, to show how cassettes slide or drop into the slot. Two reel hubs and capstan, mounted on a plate, move up into the cassette to drive the tape.

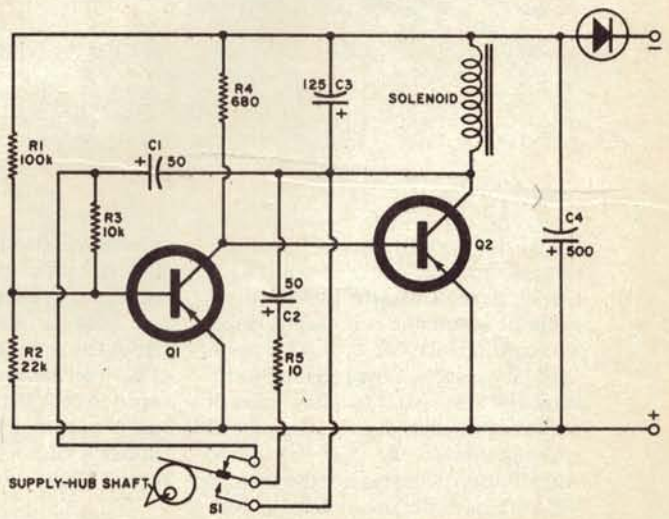

Figure 2. The cassette-eject circuit. When the supply reel stops turning at the end of the tape, the solenoid is energised. This unlatches the plate on which the hubs and capstan are mounted, and pushes the cassette out of the slot.