which is chosen to prevent excessive tape slack being thrown in the stopping process from the normal or fast winding modes of operation.

Reel Idlers

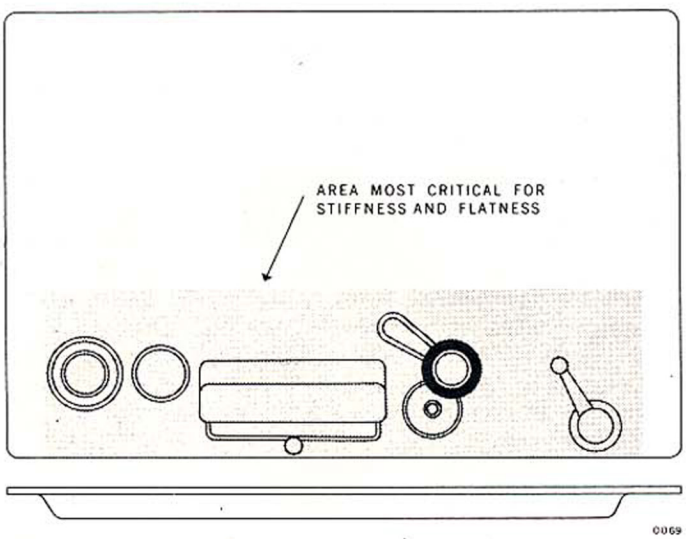
The main purpose of the reel idler is to isolate the heads from the disturbances originating in the supply motor, by tape scraping against the reel flanges, by splices as they leave the reel, or by tape layers slipping as the reel unwinds. (This last effect may be quite prevalent if tape is wound so fast that air is trapped between the layers, thereby producing a very loose pack.)

While the reel idler minimizes such disturbances, we must use care or we will create more flutter than we eliminate. Reel idlers should have minimum run-out, bearings must be selected for low noise and smoothness of operation, and flywheels must be dynamically balanced to close limits. And the diameter of the idler and the tape wrap around it must ensure positive coupling between the tape and the idler. As with the capstan flywheel, a damping arrangement might be necessary.

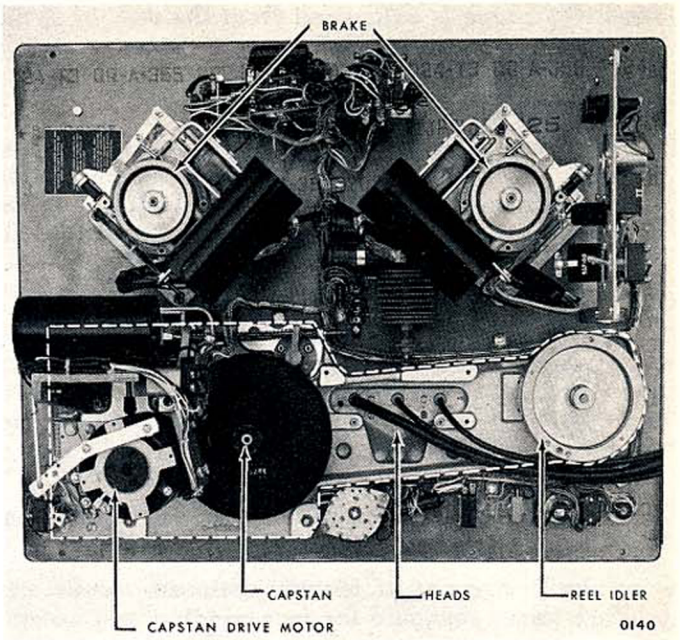
Mounting Plates

Mounting plates should be sufficiently rigid to maintain a natural resonance above 300 cps — or notably higher than the 60 and 120 cps exciting frequencies which emit from torque motors and drive motors. This rigidity is most important in the area surrounding the reel idler, heads and capstan; any flexure in this area will cause flutter.

Of course, another reason for a rigid mounting plate is to hold alignment between the various components that control the tracking of the tape. This is more important on ½-inch tape or 1-inch tape than it is with ¼-inch.



The most critical area of the transport for rigidity and flatness is shown by the shading.



Back view of a typical professional tape transport. Dashed line indicates heavy mounting casting employed in area where rigid construction is critical. (Ampex Model 300.)

Tape Guiding

Next to flutter, our most difficult problem of tape transport design is the tape guiding. Certain design rules must be followed. All components in the tape threading path must be kept in accurate alignment — this means maintaining exacting tolerances on the perpendicularity and flatness of all such components (turntables, reel idlers, heads, capstans, etc.)

The capstan idler must hit the capstan squarely, or the tape will be diverted up or down. Tape guides, either rotary or fixed, should not be too small in diameter, and guide widths must be held to close tolerances — normally not more than 2 mils over tape width and preferably less. (Tape itself is slit to a tolerance of 0 to 6 mils under the nominal dimension.)

Tape guiding problems are multiplied when we use thin base tapes. This is caused by the loss of stiffness at the edge and because we must use lower tensions with this type tape.

Incidently, if we have a well designed tape transport that has received good maintenance and suddenly have tracking problems, we can suspect the tape itself. A quick check on the tape is to stretch out an approximate three foot length beside a straightedge. If it does not line up with the straightedge it has been poorly slitted, or stored on a poorly wound reel, and the best thing to do is dispose of it — quickly!

Takeup Tension Arm

The main duty of the takeup tension arm is to act as a tape storage loop and thus takeup any tape slack that occurs during starting. It also usually incorporates a safety switch that automatically stops oper-