

71 digital speed readout for turntables

72 driving LEDs from TTL

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73 variable regulated supply

71 The basis of the system is a magnetic sensor that picks up pulses from a magnetic tape around the periphery of the turntable. The tape is a premagnetised plasti-ferrite strip as used on wall planner charts, and sold under the name Sasco Magna Tape. This is available in 5 mm and 10 mm widths, either of which are suitable for this application. The tape is magnetised alternately N and S along its length with a pole-pitch of approximately 6.4 mm.

The tape may be stuck on the inside or outside of the outer rim of the turntable, depending on the type of turntable used. It should be as near the bottom of the rim as possible to avoid any pickup of field by the cartridge, although with such a small pole-pitch the field is negligible more than a few mm away from the tape.

Taking a numerical example, if the tape is stuck around the outside of the rim of a 12 inch (300 mm) platter, there will be approximately 148 pole pitches around the periphery. At a turntable speed of 33.3 r.p.m. this will give rise to a 82 Hz signal. To give a 3 digit readout the counter chain must count

333 pulses, so the counter gate period must be 4.06 secs. This seems slightly long, even though the speed being measured is nominally constant, but fortunately the necessary gate period can be halved by full-wave rectifying the input signal, thus doubling the frequency.

The circuit

Pulses from the pickup coil are amplified by IC1 and inverted by IC2. The positive half-cycles of the IC1 and IC2 outputs are selected by D3 and D4 and are clamped to CMOS compatible level by R5, R6 and D7. The pulses are counted by a 3-decade counter, the gate signal being provided by a 555 timer, which can be adjusted to suit the pulse rates produced by different lengths of magnetic strip on different diameter platters.

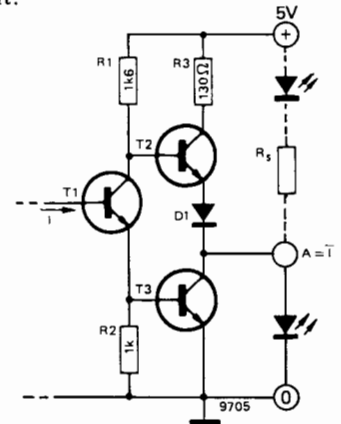
The pickup coil can be made by winding 500 turns of 0.2 mm wire (36 SWG) on a large nail.

On turntables having a built-in strobe around the rim of the platter a retro-reflective optical source/sensor arrangement may be used. In this case, on two-

speed 33/45 turntables the 33 strobe should be used as this has the most markings. The 33 r.p.m. strobe has 182 dots around the periphery of the turntable so the existing counter gating circuit can be used with no modification of component values.

72 The accompanying figure shows the output circuit of a normal TTL gate.

The usual way to drive an LED from such an output is shown dotted: the LED and a series resistor are connected between the positive supply and the TTL output. The LED is on when the output is 'low'; T3 is in saturation, so the series resistor is needed to limit the current.



However, if the LED is connected between the TTL output and supply common, as shown, the series resistor can be omitted. When the TTL output tries to go 'high' (T1 and T3 are blocked) the internal resistor R3 will limit the output current to a safe value. Note that this circuit can only be used with 'normal' TTL gates. It should not be tried at flipflop outputs, open collector gates, etc. Furthermore, not more than two outputs of one chip should be loaded in this way. It should also be noted that the output in question cannot be used to drive other TTL circuits: it will not give a true 'high' level output.

73 The $\mu A78G$ can be used to construct a very simple power supply which will deliver 1 A at any voltage from 5 - 30 V. The IC has four pins: the usual '1', 'out' and 'common' pins plus a control input. The input voltage must be at least 5 V higher than the required output voltage; the maximum input voltage is 40 V and

