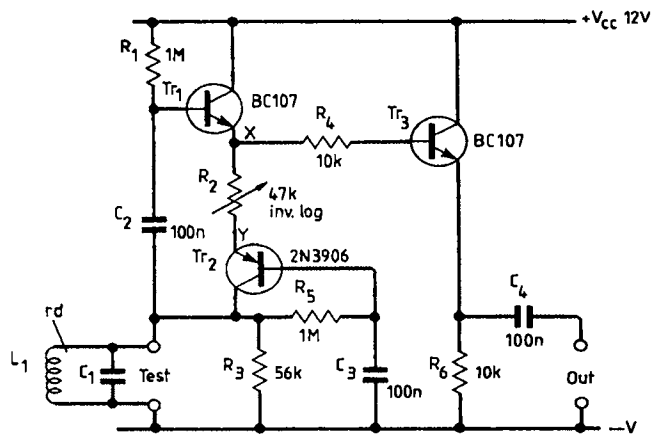
FEEDBACK



circuit under test. When R_2 is set at the critical point its scale is read off in the dynamic resistance (r_d) of the LC circuit.

If Tr_1 has a voltage gain of 1, and Tr_2 a current gain of 1, the circuit oscillates when R_2 is equal to or less than the collector load of Tr_2. In practice, the gains are less than 1, and the collector load is not simply the LC circuit, but this in parallel with R_1, R_3, R_5 and a couple of transistor impedances. The presence of the output buffer Tr_3 also has some effect.

Fortunately, all these uncertainties can be calibrated out. Calibration consists of substituting a physical resistor for the LC. The circuit can then be made to produce relaxation oscillations. So long as the amplification is the same at the (low) relaxation-oscillation frequency as at the LC frequency the value of the physical resistance is the same as the corresponding r_d and the scale of R_2 can be marked accordingly. Thus R_2 can be calibrated from a resistance box or a selection of known resistances. Strictly speaking, V_{CC} should be increased to compensate for the d.c. drop in the physical resistor but in practice it is not worth the trouble.

For R_2, use a carbon-track potentiometer with an earthed metal case. It is important to avoid stray capacitance from X to Y and from X to earth: both make the circuit read high. (R_4 buffers the effect of the input capacitance of Tr_3.)

Audio transistors can be used, since modern planar types have high cutoff frequencies. It is useful to choose types with low collector-base capacitances (C_{OB}) since these fall across the input terminals.

For many years I have kept one of these 'negative-resistance generators', made up in a two-ounce tobacco tin, handy on the work-bench. It is invaluable for quick checks on coils, capacitors, i.f. transformers, etc. Sometimes it is possible to make tests on components in-situ in other circuits, but care should then be used to avoid damagingly high amplitudes of oscillation. This entails starting with R_2 at maximum and reducing it slowly to find the critical setting. Two silicon diodes back-to-back parallel across the input will limit amplitude to about 1V peak. An inverse log. pot. is the best for R_2, since regeneration then increases with clockwise rotation and the tapering enables low values of r_d to be read off easily. The minimum achievable negative resistance depends on the maximum current through Tr_1 and Tr_2, hence on h_{fe} and V_{CC}. Values down to about 100Ω are readily obtainable.

G.W. Short,
Westminster,
London.

Relativity

Alan Watson (Feedback, October, 1986) asks for experimental evidence to contradict Einstein's second postulate. There isn't a lot, but what there is conclusively rules out the special theory of relativity (STR) as a conceivable explanation of physical phenomena.

In his original paper[1] Einstein developed the Lorentz transformations – on which STR is entirely dependent – from two equations which Einstein claimed expressed the form of the wavefront radiating from a flash of light, as seen by two observers in uniform mutual relative motion. In fact, at least one of the equations must be false, for the only way the equations could both be true would be that flashes of light could arise without any physical cause and that the flash should have zero duration in time. This is contrary to all experience – real flashes of light are of finite duration, however small, and require lamps of some kind. For a detailed discussion, see reference 2.

Another piece of observational evidence which contradicts Einstein, though perhaps not quite so conclusively, comes from spectroscopic binary stars. De Sitter[3] argued that measurements of the radial component of motion of a spectroscopic binary fit in with Kepler's laws if no allowance is made for different travelling times for light emitted at different points in the orbit of the star (and so for different velocities of the source relative to Earth). On the other hand, he claims, Kepler's laws would appear to be broken if the travelling times were actually different. De Sitter also points out that if the velocity of the light depends on the time of emission, some overlapping of the light emitted at different times is to be expected, causing an apparent splitting of spectrum lines into two or more components. This splitting, he says, is not observed.

De Sitter's points are hailed by supporters of STR as the best direct observational evidence for the theory. It is unfortunate, therefore, that neither of de Sitter's contentions is true[4]. Kepler's laws are not seen to be violated because the distances, separation of stars, and orbital velocities are such as to make it impossible to see a violation, and splitting of spectrum lines *is* observed. While the splitting does not *prove* that Einstein's second postulate is false, it cannot be held to be true until the splitting is explained in some other way. This point seems to escape the notice of the supporters of STR.

A further consideration is that by virtue of its paradoxical features, STR can be used to predict more than one outcome for more or less any experiment. At most, only one can be right. The actual outcome will contradict all the other predictions.

Prof. R.A. Waldron,
University of Ulster.

References

1. A. Einstein: *Annalen der Physik 17*, 891,(1905).
2. R.A. Waldron: The Wave and Ballistic Theories of Light – a Critical Review (Muller, 1977), pp. 73-77.
3. W. de Sitter: *Physikalische Zeitschrift 14*, 429, (1913).
4. R.A. Waldron: *loc. cit.*, pp. 98-103.

In his article of June, 1986, p.41, M.H. Butterfield states that the theory of relativity has changed very little since Einstein described it, and I therefore suggest, with respect, that he refers to my paper in the *Wireless World* of October 1978, p.44, and to my earlier papers mentioned there. In these I argue that the theory is demolished by its own internal errors and contradictions. Butterfield admits that Einstein's assumption of the constancy of the velocity of light might be difficult to swallow since it goes against common sense but what scientists seem to be unable to accept is that it also contravenes the foundations of science. Science is based on experimental results which are expressed in terms of the units of measurement, which must not be duplicated if contradictions are to be avoided. By making the velocity of light constant Einstein duplicated the units because the units of time and length were already defined.

Einstein committed another grave error by using thought experiments which are a travesty of science. They cannot give new results and when they appear to do so it is because errors or additional assumptions have been made. They are used by many writers, including Butterfield in their attempts to explain or support the theory of relativity.

L. Essen,
Great Bookham, Surrey.