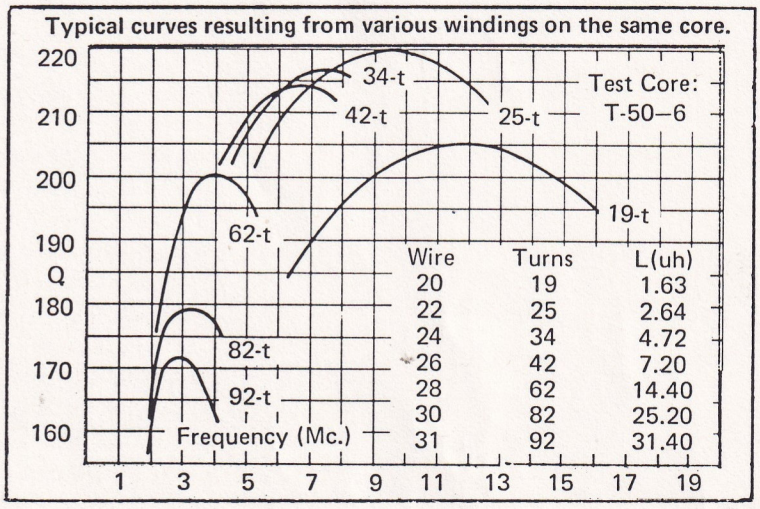
IRON POWDER TOROIDAL CORES

Q - FACTOR

When designing for the best figure of merit ("Q"), the following suggestions apply: Use the entire periphery of the core for winding and use the largest wire size that is practicable, space the turns if necessary. "Q" is the inductive reactance divided by the copper resistance, so the wire or wires offering the least resistance will yield the highest "Q". It is sometimes advantageous to use smaller wire sizes in a bifilar or trifilar "ribbon" to create a low resistance-high "Q" inductor. The "Q" can be measured on a Boonton or Heathkit "Q" Meter. Relative "Q" can be observed by noting the depth of the dip on a GDO or Tunnel Dipper. Such readings are difficult on the smaller toroids and the use of a simple temporary link between the toroid and the GDO is suggested.



The "Q" of a tuned circuit is sometimes purposely reduced by bridging the circuit with a "swamping" resistor. Inadvertant "Q" reduction can result from swamping the toroid by incorporating it into a low impedance circuit. Use links, taps or secondaries to match impedance and thus protect the toroid "Q". The toroid lends itself to broadband RF transformers that offer wide spectral excursion and good efficiency. These are made by winding the primary and the secondary(s) bifilar or trifilar. This method is particularly effective in interstage work where extra tuning controls are not wanted. The high "Q" of the toroid and the convenience of the "slug tuned" coil can be combined by connecting the two in series in a tuned circuit.

MAGNETIC PROPERTIES of IRON POWDER TOROIDAL CORES

Material	Color-code	Permeability	Temperature stability	Optimum frequency range	Typical frequency range
41 '-2'	Green	u = 75	975 ppm/°C	see note below	1KHz - 100KHz
3 'HP'	Gray	u = 35	370 ppm/°C	50KHz - 500KHz	20KHz - 1MHz
15 'GS6'	Red & Wh	u = 25	190 ppm/°C	100KHz - 2MHz	50KHz - 5MHz
1 'C'	Blue	u = 20	280 ppm/°C	500KHz - 5MHz	100KHz - 10MHz
2 'E'	Red	u = 10	95 ppm/°C	1MHz - 30MHz	150KHz - 50MHz
6 'SF'	Yellow	u = 8	35 ppm/°C	10MHz - 90MHz	1MHz - 120MHz
10 'W'	Black	u = 6	150 ppm/°C	60MHz - 150MHz	10MHz - 200MHz
12 'Irn-8'	Grn. & Wh	u = 3	*170 ppm/°C	100MHz - 200MHz	50MHz - 250MHz
0 'Ph'	Tan	u = 1		150MHz- 300MHz	100MHz - 350+MHz

*Not linear

For optimum 'Q' at a desired frequency, core size as well as material should be considered when selecting a core. In reference to the 'optimum-frequency-range column' the lower figure for any given material is based on the use of a large size test core. Likewise the higher figure is based on the use of a small size test core.

For some applications where 'Q' is not of prime importance, it is not necessary, and may not be desirable, to select the core from within the 'optimum-frequency-range' limits. One such application is the Broad-band Antenna Balun where a flat response is of prime consideration rather than high-Q.

The 41 - 'HP' material is primarily used in low frequency noise filters, low level pulse and power transformers, also solid state variable voltage and variable current devices where 'Q' is not an important factor. Its use in frequency determining circuits is not recommended.