



10kW Harmonic Filter

Type HA 131



7390

INTERFERENCE with television reception in the frequency band 40–70 Mc/s caused by short-wave (4–27.5 Mc/s) communication transmitters is presenting an increasing problem, and has necessitated the design of special filters for the elimination, from transmissions, of harmonic frequencies within this reception band. Such filters must necessarily be of high-precision construction and also of particular reliability.

The Type HA 131 is a 300 Ω low-pass filter conforming adequately with these requirements. The filter cuts off at 29 Mc/s and has a minimum attenuation over the band 40–70 Mc/s of the order of 50 dB.

It must be stressed that the effectiveness of the filter in an aerial circuit is subject to the adequate suppression of spurious radiation from other parts of the transmitter.

CONSTRUCTION

The main parts of the filter consist of copper tubing and wire-wound inductors, the tubes forming the capacitors of the filter. The inner tubes and the inductors are assembled on an axial rod consisting of alternate sections of threaded brass rod and insulators. These insulators serve to couple the sections of brass rod and to support the ends of the inductors. The brass rod sections between the insulators are each divided into two parts coupled by threaded brass bushes. By this means the filter can be separated into three parts for the purpose of adjustment. The capacitor and inductor assembly is mounted concentrically within the outer tube. Insulating plates are fixed at either end through which the ends of the brass rod project and to which the rod is secured.

CIRCUIT

The filter consists of three sections the series arms of which are parallel-tuned circuits and the shunt arms are capacitors. The capacitors, which are of the air dielectric type, have large factors of safety to prevent the filter being put out of commission by excessively high voltages such as can occur on transmission lines under certain circum-

stances. The maximum insertion loss in the passband is less than 0.2 dB provided that the standing wave ratio on the feeder is less than 2:1.

These filters are primarily intended to be used with 600 Ω twin-wire feeders. One filter is fitted in series with each feeder.

The effective operation of the filter in the presence of secondary sources of radiation from the transmitter, due to inefficient screening and decoupling, varies according to the phase relationship between these unwanted radiations and

those from the aerial. It can be shown that in certain conditions such a filter can prove ineffective – and even of negative value – where such radiations exist. Hence the necessity for effective screening of the transmitter and effective decoupling of the power supplies is emphasised. For adequate efficiency of operation a restriction of secondary radiation sources to less than one-tenth thousandth of the aerial radiation (after filtering) should be aimed at.

DATA SUMMARY

Frequency of cut-off: 29 Mc/s.

Attenuation: Greater than 50 dB over the frequency band 40–70 Mc/s.

Insertion loss over the passband: 0.2 dB max.

Feeder standing wave ratio: 2:1 max.

Input impedance: 300 Ω . (2 filters required for 600 Ω balanced feeders.)

Power rating: (per pair of filters on 600 Ω feeders)

7 kW on CW	} with convection cooling.
10–12 kW PEP on ISB	
20 kW on CW	} with forced-air cooling 40 cu.ft/min.
30 kW PEP on ISB	

Dimensions:	Length	Diameter	Weight
	15 in.	4 $\frac{3}{8}$ in.	10 lb
	(38 cm)	(12 cm)	(4.54 kg)

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