MECHANICAL FILTERS MF-455K SERIES

for vacuum tube circuits, popular model

Patents: 237178, 239079 (Japan)
810523 (UK) 1158746, 1160290 (France)

KOKUSAI ELECTRIC Mechanical Filters are widely used by government agencies and manufacturers of communication equipment, and are well known for their excellent. Because of their superior performance being highly rated abroad, they are exported in large quantities. To meet the demands from DXers throughout the country, KOKUSAI ELECTRIC now presents a special model at popular price. Use of KOKUSAI Mechanical Filters will improve remarkably the performance of your equipment.

ELECTRIC Mechanical Filters possess the following features:

1. High Selectivity. With the sharp cutoff virtually impossible to obtain with conventional filters, ideal square top bandpass characteristics are afforded for positive elimination of cross-talk.
2. Extreme Stability. Because resonating elements of special metal alloy are used, these mechanical filters are proof against vibration, shock, moisture, atmospheric pressure and other external conditions.
3. Compact, Lightweight. Compared with filters giving similar performance, KOKUSAI ELECTRIC Mechanical Filters are less than 1/5 in bulk and weight.
4. Adjustment Unnecessary. The characteristics of these filters comprising concentrations of composite filter elements are predetermined by precision fabrication methods, and are fixed. Consequently, no adjustment is necessary, and their use is extremely simple.

KOKUSAI ELECTRIC Mechanical Filters are made of selected materials and are subjected to the most rigorous inspection and tests. They are quality products of the highest precision.

By following the cautions given in the explanation below, you will obtain 100% satisfaction from the superior performance offered by KOKUSAI ELECTRIC Mechanical Filters.

KOKUSAI ELECTRIC CO., LTD.

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Factory:

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MF-455K Series Specifications

TYPE	Center Frequency (kHz)	Max. Deviation from Center Frequency (kHz)	Min. Band-width at 6 dB Attenuation (kHz)	Max. band-width at 60 dB Attenuation (kHz)	Standard Gain at 4 Millimhos (dB)	Working Temperature Range (°C)
MF-455-10CK	455	± 0.3	2.0	6.0	20	0 to +70
MF-455-15CK	455	± 0.3	3.0	9.0	20	0 to +70

Standard Test Circuit The circuit shown below is used for obtaining the performance data accompanying each mechanical filter.

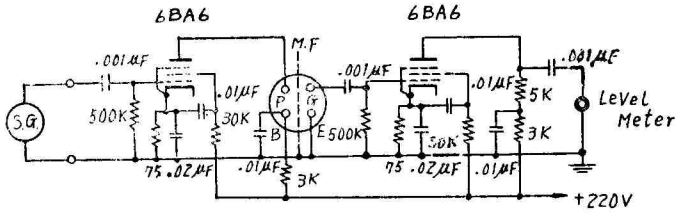


Fig. 1

General Information

1) Internal Circuitry of the Mechanical Filter

The component parts vary somewhat from type to type, but the basic circuitry is as shown in Fig. 2.

2) Maximum Input Voltage

Maximum signal voltage across the terminals P and B should not exceed 10 volts (r. m. s.).

3) Temperature Characteristics

The frequency / temperature coefficient is less than $\pm 1 \times 10^{-5}$ while gain fluctuation within the working temperature range of 0 to +70°C is not more than 2 dB from the room temperature standard.

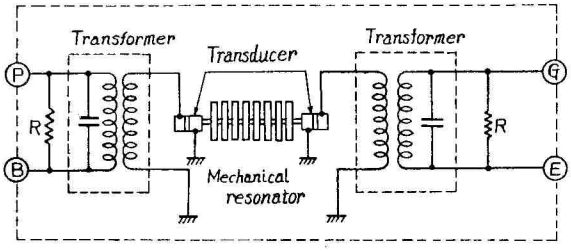


Fig. 2

4) Insertion Point

It is desirable to work mechanical filters at low power levels, while loss of reception sensitivity as a result of interference must be avoided as far as possible. Consequently, it is best to insert the mechanical filter immediately after the converter tube or after the 1st stage IF amplifier tube. Normal practice is to use the mechanical filter in the output circuit of the mixer tube, as shown in Fig. 3.

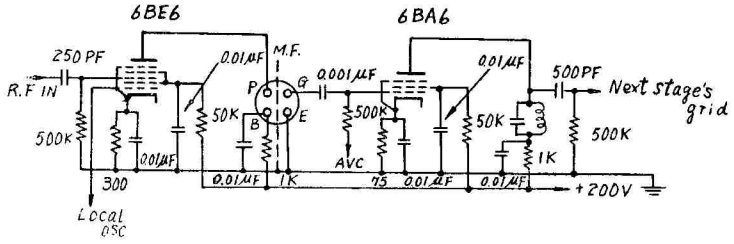


Fig. 3

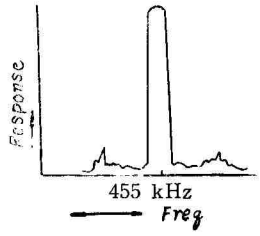


Fig. 4

5) Spurious Resonance Characteristics

Representative response characteristics is as shown in Fig. 4.

6) Single Side Band Use

The mechanical filter, because of its sharp cutoff characteristic, is suitable for SSB use. The performance data include, for reference, the 20~30-dB attenuation point (position of the carrier wave).

7) Gain

Because mechanical filters are made with less impedance than intermediate frequency transformers, their use instead of IFT results in a diminution of gain by about 20 dB. Consequently, in some instances, the loss of gain must be compensated for by the addition of an extra stage of amplification.

Cautions

1) Maximum DC Voltage across the Input Terminals, Polarity. Do not impress on the input terminals DC voltages in excess of 250V, and never impress on either the input or output terminals of the mechanical filter at negative DC voltage.

2) External Impedances

The mechanical filter is relatively sensitive to external impedances on both the input and output sides. Therefore, the external capacitances coming in parallel should be kept as small as possible(not more than 15 PF, including inter-electrode capacitance, which is a satisfactory value for all normal conditions)so that the external impedance does not drop to less than 100,000 ohms.

3) Shielding

The mechanical filter, in one unit, provides much sharper cutoff than is possible with several conventional filters.

Consequently, more care must be directed toward avoidance of coupling between the input and output sides of the filter.

Even the slightest coupling will result in change of passband characteristics as is shown in Fig. 5 (dotted line as against solid). The degree of deterioration is governed by positioning and the manner of wiring.

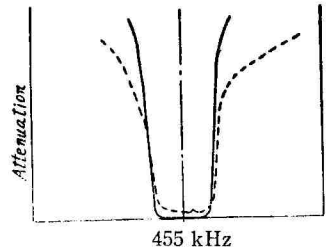


Fig. 5

a. Always put in the shield plate (provided as an accessory) between the input and output terminals of the mechanical filter.
b. The P and G circuit leads should be as short as possible, not more than 3 centimeters in length.
c. Keep IF output wiring away from the mechanical filter.
d. Position the components before and after the mechanical filter so that intercoupling does not occur.

4) Supplementary Tuned Circuit

The extreme selectivity of the mechanical filter is adequate for the IF stages, but for the purpose of spurious resonance suppression and supplementation of gain, normal practice is to add another stage of amplification. Fig. 6 is an example, showing two stage amplification of 455 kHz IF.

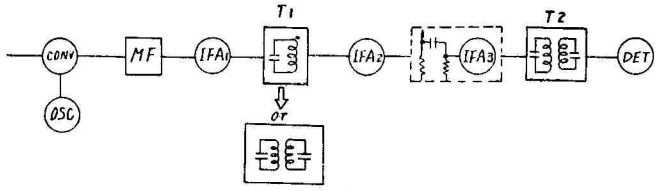


Fig. 6

※ add the article enclosed by dotted line in case of insufficient gain

In this case, care must be taken to see that the passband of $T_1 + T_2$ is sufficiently wide in comparison with that of the mechanical filter, otherwise the square characteristics of the mechanical filter will be impaired.

5) Mounting

When mounting on a new chassis refer to Fig. 7 for hole dimensions

When replacing an IF transformer with a mechanical filter, use subchassis (provided as an accessory) and make appropriate holes in the subchassis (Fig. 8).

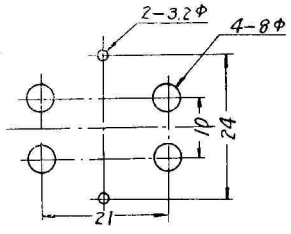


Fig. 7

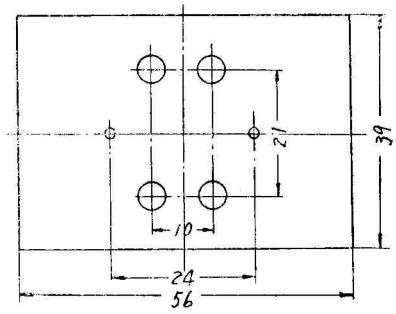


Fig. 8

6) Component Arrangement

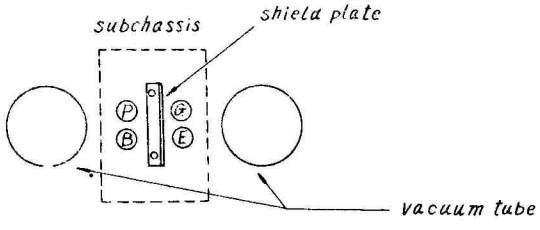
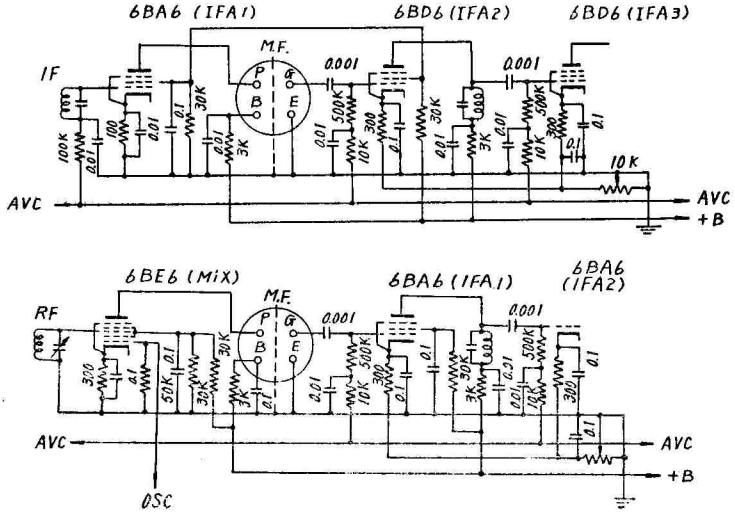


Fig. 9

7) Circuit Examples



TOKYO **KOKUSAI ELECTRIC CO., LTD.** JAPAN

Mechanical Filter Characteristics	Made by K.Itoh	Checked by S.NONAKA	Approvals K.Takahashi
Type MF455- 10C K	Series No. 13455		Date MAY. 15.1974
			Temp. 23°C
Center Frequency	+ ⊖ 0.03 kHz	Gain per stage	26.0 dB
Bandwidth at 6dB Attenuation	+ 1.06 kHz − 1.12 kHz	Insulation (More than DC 500V200MΩ)	OK
20dB attenuation (SSB)	+ 456.34 kHz − 453.68 kHz		
30dB attenuation (SSB)	+ 456.58 kHz − 453.55 kHz		
Bandwidth at 60dB Attenuation	+ 2.36 kHz − 1.87 kHz		

Note 1. The gain per stage is equal to 20 $\log_{10} e_2/e_1$, where e_1 is input signal voltage and e_2 is output signal voltage of mechanical filter, if the mutual conductance gm of input tube is 4 millimho.

Note 2. When this mechanical filter is used for SSB equipment, any desired frequency is to be decided by drawing a line between the points of the frequency at 6 dB and 30 dB which are to be marked on the graph (attenuation at vertical axis, frequency at horizontal axis), thus the carrier frequency with desired attenuation can be obtained.