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APPLICATIONS NOTES

GUIDE TO THE SELECTION OF FILTERS FOR USE ON FIRE AND INTRUDER ALARM CIRCUITS

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INTRODUCTION

Many modern alarm circuits are quoted as being dc control circuits but often have digital pulse superimposed for interrogation or clocking purposes. In these cases, a normal dc control line filter may not be suitable as it is likely to remove the digital control pulses because of its high performance and high capacitance values. Even signal filters may do this depending on their pass band and the frequency of the digital pulses.

There are a number of parameters which can affect the compatibility between an alarm system and a filter. Some of these can be checked by discussion with the alarm manufacturer, but because of the peculiarities of different alarm circuits, it is always best to check compatibility by testing a filter with the alarm circuit.

In some cases the pulse frequency is high enough to prevent a suitable filter being used to meet a shielding attenuation requirement or a filter performance specification. In this case, an alternative alarm system has to be considered or there must be a compromise on the shielding attenuation specification, and on the filter performance.

INITIAL SELECTION OF FILTER

The first considerations when selecting a filter will be:

1) Rated voltage, ac or dc

2) Rated current

3) Insertion loss performance

4) Number of lines

5) Size

FILTER PARAMETERS WHICH CAN AFFECT COMPATIBILITY

Where compatibility needs to be confirmed, MPE can supply the following information on proposed filters for the alarm manufacturer to consider. He should then be able to identify values against each parameter which his alarm system can tolerate or requires to operate correctly.

1. Total shunt capacitance

2. Total series inductance

3. DC resistance

4. Filter matched impedance

5. Filter pass-band or cut-off frequency

In general, as filter performance increases, the capacitance and inductance values will also increase and the pass-band will decrease. Alarm circuits with pulse signalling will be more compatible with lower filter capacitance and inductance values, and hence lower filter performance.

SELECTION OF SPECIFIC FILTER TYPES

As most alarm circuits tend to be low voltage and low current, the first approach is normally to choose a telephone line filter circuit which meets the required insertion loss performance. This type of circuit will normally have the lowest capacitance and inductance values for a given performance so is likely to be the most compatible.

The detailed filter component parameters should then be checked against known requirements of the alarm system. If none are known , they should be requested from the alarm manufacturer and the filter parameters should also be forwarded to him for him to check.

Where digital pulses are known to be present, we would normally suggest that a filter pass-band of 10 times the digital data rate is needed to successfully pass the pulses. However, this does depend on the alarm circuitry and sometimes a pass-band of as little as twice the data rate is acceptable. This may well be the case where pulse regeneration circuitry is used.

If the filter with the required performance seems unlikely to be compatible because of pass-band etc then the next highest performance filter should be considered, and so on, until a filter is found which seems likely to be compatible.

It is then normal to propose to the client both the full performance filter declaring that the alarm circuit it unlikely to be compatible with it, and also the lower performance filter with which the alarm circuit is likely to work.

Because of the individual nature of alarm circuits, it must be the responsibility of the alarm manufacturer to confirm compatibility of his circuit with a given filter. It may be necessary to supply a filter for him to test to finally confirm this.

Where a lower performance filter has to be offered to enable the alarm to work, both filter types should be proposed to the client, indicating that it is the alarm circuit rather than the filter which is preventing compliance with the performance specification. The client then has to decide if this is acceptable or if he should choose a different alarm system.

It should be remembered that once a filter circuit has been selected, it can be offered in a wide variety of different packages from 2 to 200 lines, many of which are not in current catalogues.

PARAMETERS OF SELECTED STANDARD FILTER CIRCUITS

FILTER TYPE	DS23559	DS23402	DS23974	DS23611	DS23975	DS23776	DS23778
Filter circuit	High Perf. telephone	Standard telephone	2.4kB data	100kHz data	9.6kB data	dc control	ac control
Rated voltage	100	250	100	100	100	100	250
AC / DC	ac/dc	ac/dc	ac/dc	ac/dc	ac/dc	dc	ac
Rated Current	125mA	300mA	300mA	300mA	300mA	2A	1A
Pass-Band (kHz)	4	8	-	100	-	-	-
100dB @ kHz	14	25	700	450	2000	14	14
Total cap (μF)	0.75	0.4	0.1	0.02	0.02	24	3
Total Inductance (mH)	64	36	9	2.1	2.1	2.4	30
DC resistance (Ω)	9	8	5	1.4	1.4	0.25	2.7
Impedance (Ω)	300	300	-	300	-	-	-

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