THE USING RC FILTER AT THE TRANSMISSION OF CONTROL SIGNAL IN THE REMOTE CONTROL SYSTEM

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INTRODUCTION

The receiver of network sound frequent command- MTK receiver is convenient for MTK remote control systems, where control signals are transmitted through energetic leads of electric network on which MTK receiver is attached to. The receiver of network sound frequent command- MTK receiver separates carried frequency sound command f_0 that is imprinted in the network voltage, on which MTK receiver is attached to; and after that it does proposed command according to the registered memory program of the receiver.In this paper, the use of RC filter for repression of the network voltage and its basic frequence, instead of resistance divider, is described, which is placed at the input of MTK receiver. By using RC filter, network voltage and its basic frequence are repressed, and control signals, which are transmitted through energetic leads, are separated. These filters are based on the RC ladder structures, combined with one operational amplifier. The advantages that are obtained in the realization are described. The use of RC filter instead of resistance divider, network voltage and its basic frequence are repressed and control signal is not quite weakened- much less than with resistance divider.Resistance divider represses network voltage and its basic frequence, but at the same time it weakens control signal for the same value. By this realization of RC filter instead of resistance divider sensitivity of the MTK receiver increases. The RC filter is attached to the network voltage without additional weakening. The dynamic of the signal is maximum(it is limited by the operational amplifier at the output of the filter).

RC FILTER

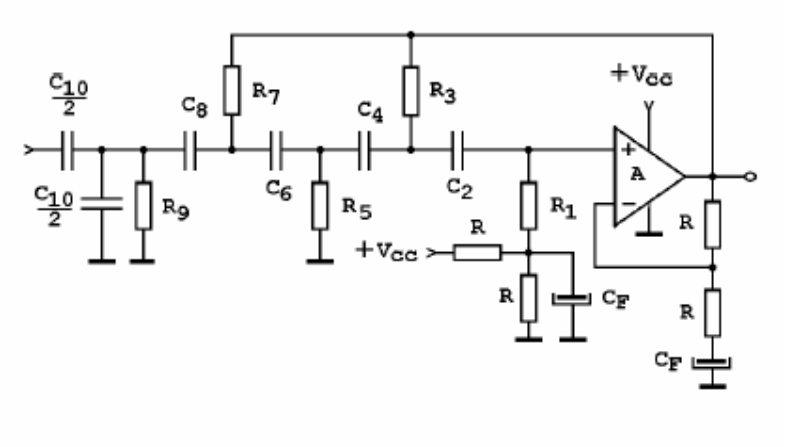
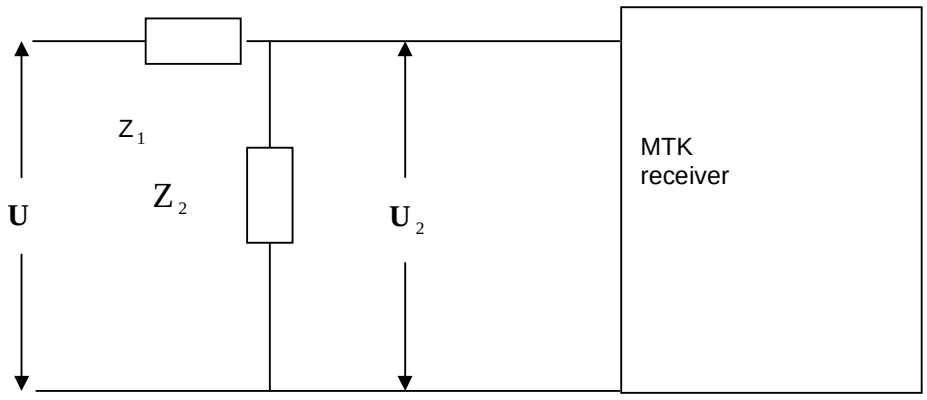


FIGURE 1- RC FILTER FOR REPRESSING NETWORK VOLTAGE AND ITS BASIC FREQUENCE

Filter for repressing network voltage and its basic frequence is described at the figure 1. and it is used for separating command signals which are transmitted through energetic leads.
At the input of the RC filter there is capacity divider which reduces network voltage for the 22.89dB but also compensates the amplifying of the filter is 0dB.
The value of the network voltage at the resistor R_9 is 16.15v. The network voltage at the output of the filter is 50mv and for the same value of the network voltage the weakening of the control signal is 0.5dB. Filter is attached to the network voltage of 220v.

ESTIMATE OF WEAKENING

Resistance divider



U

$$U_2 = U \frac{Z_2}{Z_1 + Z_2}$$

$$a = 20\log \frac{U_2}{U}$$

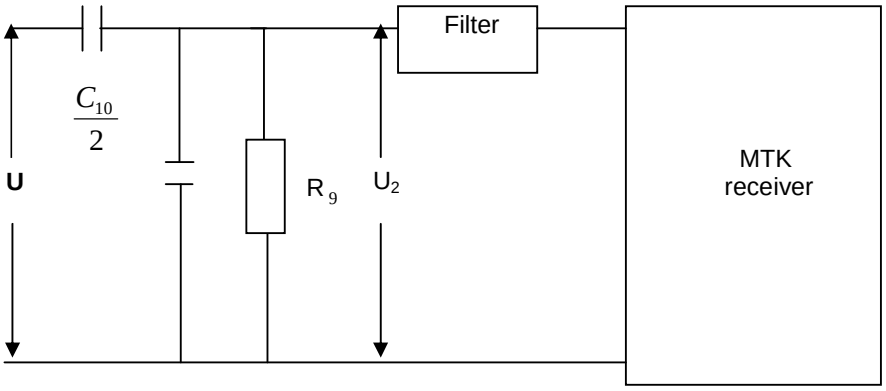
Z_1	Z_2	U	f	U_2	a
240k	10k	220v	50Hz	8.8v	27.96db

TABLE1 – WEAKENING OF THE NETWORK VOLTAGE AND ITS BASIC FREQUENCE AT THE RESISTANCE DIVIDER

Z_1	Z_2	U	f	U_2	a
240k	10k	10v	216Hz	0.4v	27.96db

TABLE2 –WEAKENING OF THE CONTROL SIGNAL AT THE RESISTANCE DIVIDER

CAPACITY DIVIDER



$$U_2 = U \frac{R\omega C}{1 + 2R\omega C}$$

$$a = 20\log \frac{U_2}{U}$$

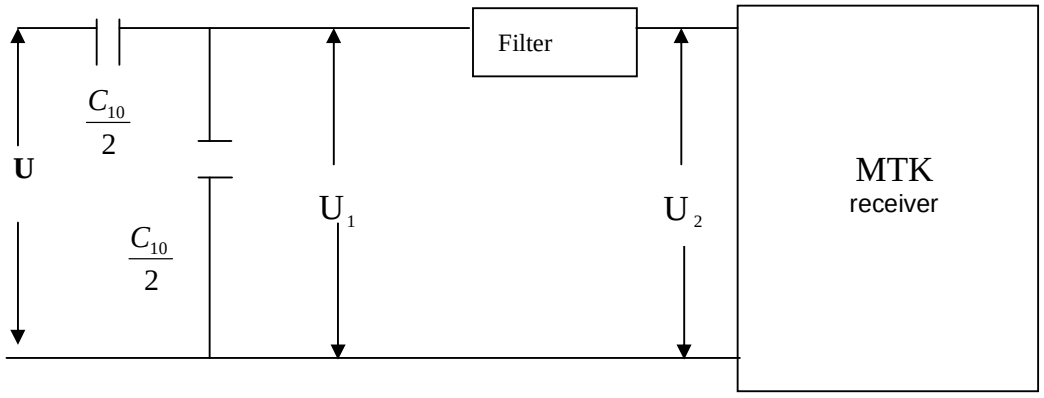
U	f	U_2	a
220v	50Hz	16.15v	22.69db

TABLE3 – WEAKENING OF THE NETWORK VOLTAGE AND ITS BASIC FREQUENCE AT THE CAPACITY DIVIDER

U	f	U_2	a
10v	216Hz	2.132v	13.42db

TABLE4 – WEAKENING OF THE CONTROL SIGNAL AT THE CAPACITY DIVIDER

FILTER WITHOUT CAPACITY DIVIDER



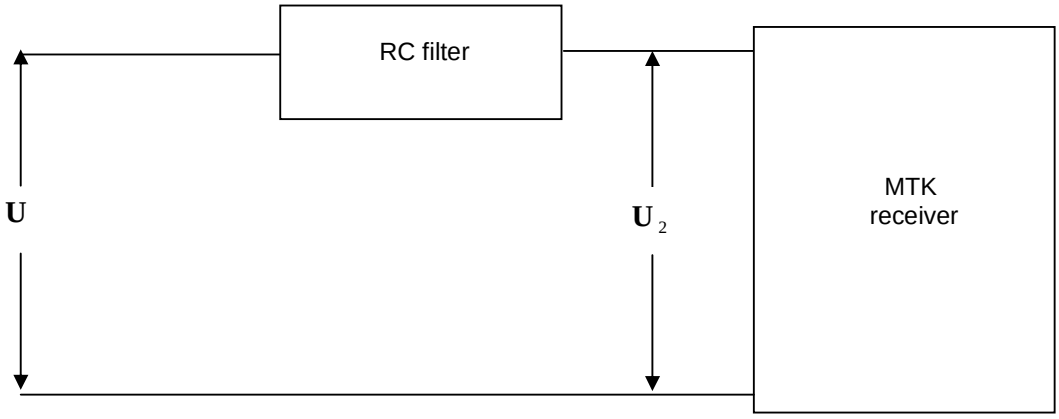
U	f	U_2	a
16.15v	50Hz	50mV	50.18db

TABLE5 –WEAKENING OF THE NETWORK VOLTAGE AND ITS BASIC FREQUENCE OF THE FILTER WITHOUT CAPACITY DIVIDER

U	f	U_2	a
2.132v	216Hz	2.012v	0.5db

TABLE6 –WEAKENING OF THE CONTROL SIGNAL OF THE FILTER WITHOUT CAPACITY DIVIDER

THE WHOLE RC FILTER



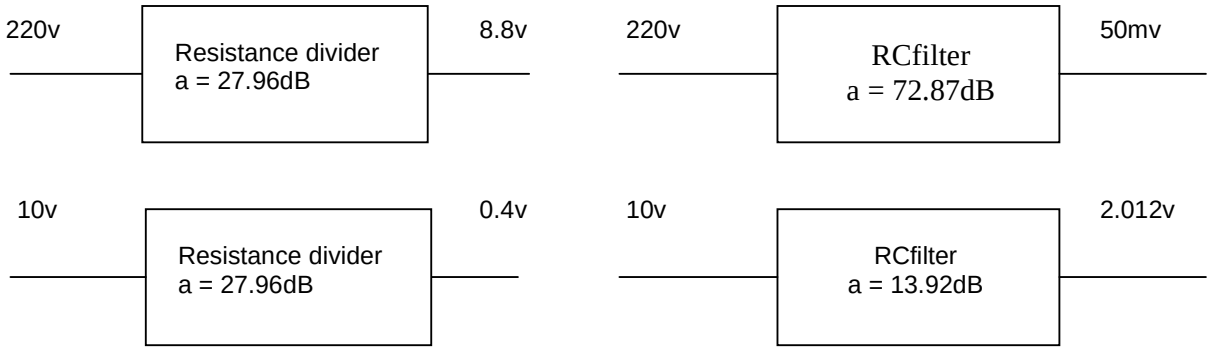
U	f	U_2	a
220v	50Hz	50mv	72.87db

TABLE7 – WEAKENING OF THE NETWORK VOLTAGE AND ITS BASIC FREQUENCE THROUGH WHOLE RC FILTER

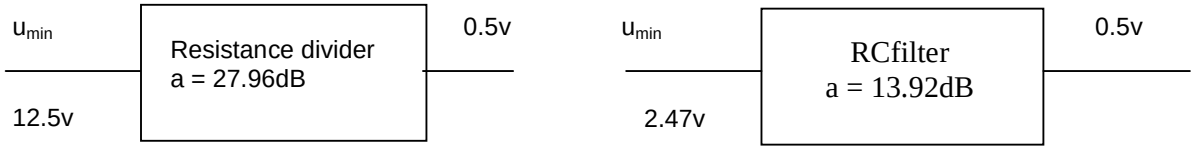
U	f	U_2	a
10v	216Hz	2.012v	13.92db

TABLE8 –WEAKENING OF THE CONTROL SIGNAL THROUGH WHOLE RC FILTER

METERING VALUE



FIGURE(a)



FIGURE(b)

CONCLUSION

In this paper the use of RC filter for repression network voltage and its basic frequency is described, because of the separation of the control signal which is imprinted in the network voltage. The use of RC filter instead of resistance divider is described at the input of the MTK receiver. Resistance divider weakens network voltage and its basic frequency for a= 27.96db, but at the same time it weakens the control signal (U=10v, f= 216Hz) for the a= 27.96db. Instead of the resistance divider at the input of MTK receiver the RC filter is placed. At the input RC filter is capacity divider that weakens network voltage and its basic frequency for a= 22.69db, so the voltage at the resistor R_9 =16.15v. Capacity divider weakens control signal for a= 13.42db. Capacity divider at the input of RC filter represses the network voltage and its basic frequency which enables attachment of RC filter to the network voltage without additional weakening. The voltage at the output of the filter is 50mv and weakening of network voltage and its basic frequency through RC filter without capacity divider is a=50.18db. The weakening of the control signal through RC filter without capacity divider is a=0.5db. The total weakening of the network voltage and its basic frequency through whole RC filter is a= 13.92db. Resistance divider weakens the network voltage and its basic frequency for a=27.96db, but RC filter weakens network voltage and its basic frequency for a=72.87db. Resistance divider weakens control signal for a= 27.96db (for twenty five times), but RC filter weakens control signal for a= 13.92db (for five times). We can conclude that by using RC filter instead of resistance divider at the input of the MTK receiver, weakening of the network voltage and its basic frequency is bigger (for 2.6times) and weakening of the control signal is reduced for five times, which was the goal of paper, to repress network voltage and its basic frequency, while the control signal is not quite weakened. If minimum value of network voltage of control signal at the input of the resistance divider(which carries the weakening of the control signal for a= 27.96db) is U_{min}= 12.5v-TABLE (a). If we use RC filter (which carries weakening of the control signal for a= 13.92db), the minimum sensitivity of the MTK receiver should be 0.5v then the minimnum value of the network voltage of control signal at the input of RC filter is U_{min}= 2.47v-TABLE(b). From all of these we can conclude that the MTK receiver in use of RC filter instead of resistance divider is more sensitivly for five times. From the obtained results we can conclude that the use of RC filter for repressing network voltage and its basic frequency instead of the resistance divider, at the input of the MTK receiver, in the remote control systems, we have the following advantages:

-The network voltage and its basic frequency are repressed but the control signal is not quite weakened
-The sensitivity of MTK receiver increased
-The RC filter is attached to the network voltage without additional weakening
-The dynamic of the signal is maximum (it is limited by operational amplifier at the input of the filter).

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SUMMARY

In this paper, the use of RC filter instead of resistance divider is described, at the input of MTK receiver, which is used for transmission of control signals in remote control system. The receivers of network sound-frequent command-MTK remote control systems. Control signals carry information about the command which should be done and they are transmitted through energetic leads of electric network on which MTK receiver is attached to. MTK receiver carries out the proposed command according to the registered memory program of the receiver.RC filter is used for repression of the network voltage and its basic frequency because of the separation of the control signals which are imprinted in the network voltage, that is transmitted through energetic leads to the facilities in which MTK receiver is placed. By using RC filter instead of resistance divider, which is placed at the input of MTK receiver, network voltage and its basic frequency are repressed and the control signal which is received by MTK receiver is not quite weakened. The resistance divider represses network voltage and its basic frequency, but at the same time it weakens the control signal for the same value. From the obtained results we can conclude that by using of RC filter for repressing the network voltage and its basic frequency instead of the resistance divider, which is placed at the input of the MTK receiver in remote control system, we have following advantages:

The network voltage and its basic frequency are repressed, but the control signal is not quite weakened.

The sensitivity of MTK receiver increases.

The RC filter is attached to the network voltage without additional weakening.

The dynamic of the signal is maximum (it is limited by the operational amplifier at the output of the filter).