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PROGRAM LIBRARY

DECUS NO.	FOCAL8-181
TITLE	FILTER DESIGN
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DATE	June 30, 1971
SOURCE LANGUAGE	FOCAL, 1969

ATTENTION

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FILTER DESIGN

DECUS Program Library Write-Up

DECUS No. FOCAL8-181

ABSTRACT

"Filter Design" is a program for the design of five passive filters:

1. Constant K High Pass Filter.
2. Constant K Low Pass Filter.
3. Bridged T Notch Filter.
4. Parallel T Notch Filter.
5. Lumped Parameter Constant K Delay Line.

On line interaction with the program facilitates a compromise between operational parameters and available components.

REQUIREMENTS

- A. Standard PDP8, PDP8/S, PDP8/I, PDP8/L or PDP8/e
- B. FOCAL

SUBROUTINES USED

None

RESTRICTIONS

None

USAGE

Load FOCAL using the Binary Loader. When FOCAL is successfully loaded and started the initial dialogue will begin. The user need not retain Log, Exp, Atn, Sine or Cosine. FOCAL concludes the initial dialogue by telling the user to PROCEED followed by an * and waits for user input. At this time FILTER DESIGN is loaded by placing the source tape in the ASR 33 reader and switching the reader to "ON".

COMMENTS

The appropriate filter is selected by typing GO followed by the line number of the filter:

- | | |
|-----------|--|
| *GO 1.01, | Calls Constant K High Pass Filter. |
| *GO 2.01, | Calls Constant K Low Pass Filter |
| *GO 3.01, | Calls Bridged T Notch Filter |
| *GO 4.01, | Calls Parallel T Notch Filter |
| *GO 5.01, | Calls Lumped Parameter Constant K Delay Line |

*GO 1.01

CONSTANT K HI PASS FILTER.
LOAD RESISTANCE?:1000
FREQ. IN HZ?:0.5125E+4

L = 0.155356E-01 HENRIES.
C = 0.155356E-07 FARADS.

*GO 2.01

CONSTANT K LO PASS FILTER.
LOAD RESISTANCE?:2000
FREQ. IN HZ?:706.35

L = 0.900403E+00 HENRIES.
C = 0.225101E-06 FARADS.

*GO 3.01

BRIDGED T NOTCH FILTER.
LOAD RESISTANCE?:1000
FREQ. IN HZ?:360
NOTCH RATIO (NR<0.5)?:.05

C1 = 0.147222E-06 FARADS.
C2 = 0.132500E-05
R = 0.100000E+04 OHMS.

*GO 4.01

PARALLEL T NOTCH FILTER.
LOAD RESISTANCE?:500
FREQ. IN HZ?:7200

C = 0.313889E-07 FARADS.
R = 0.353500E+03 OHMS.

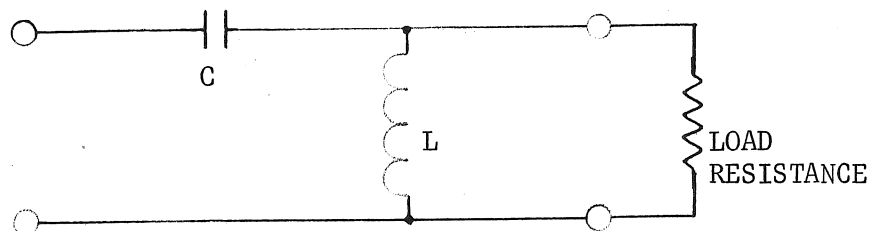
*GO 5.01

LUMPED PARAMETER CONSTANT K DELAY LINE.
LOAD RESISTANCE?:500
DELAY IN MICROSECONDS?:50
RISE TIME IN MICROSECONDS?:5

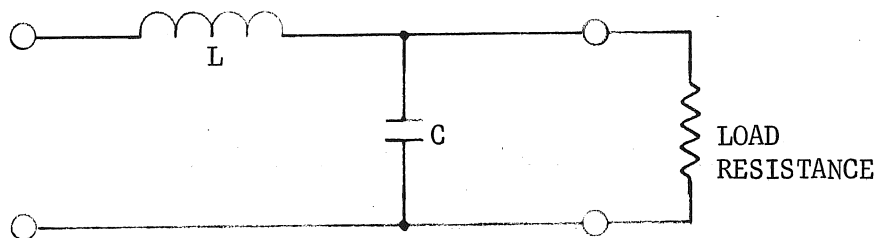
N = 0.370000E+02 SECTIONS.
L = 0.658808E-03 HENRIES.
C = 0.263523E-08 FARADS.

*

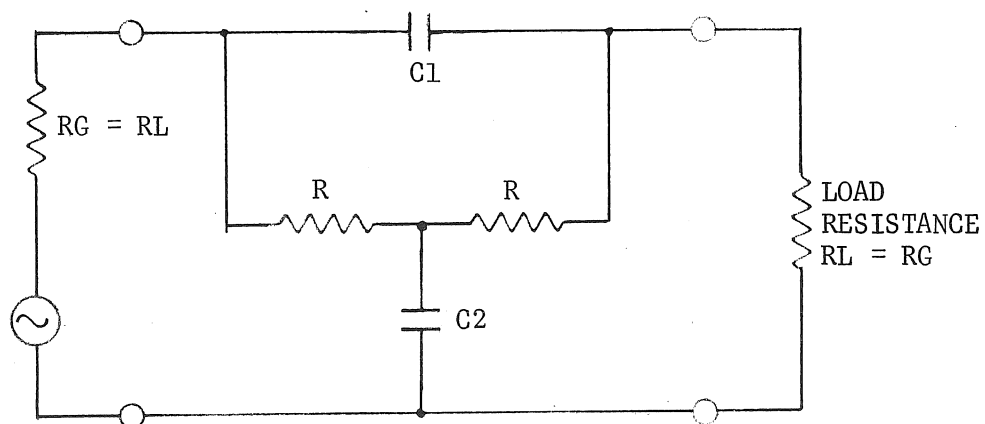
1.01 CONSTANT K HIGH PASS FILTER.



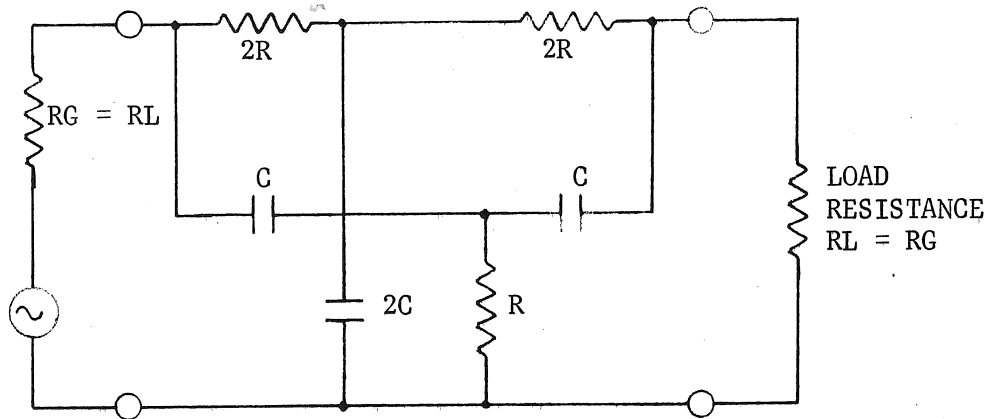
2.01 CONSTANT K LOW PASS FILTER.



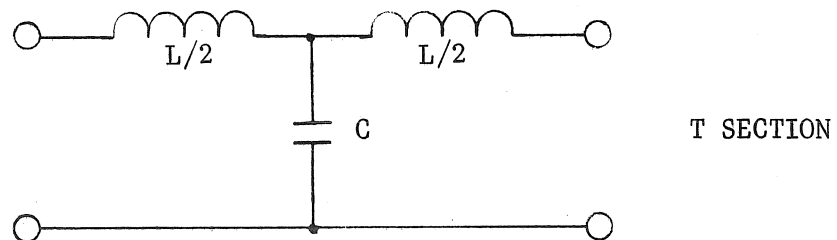
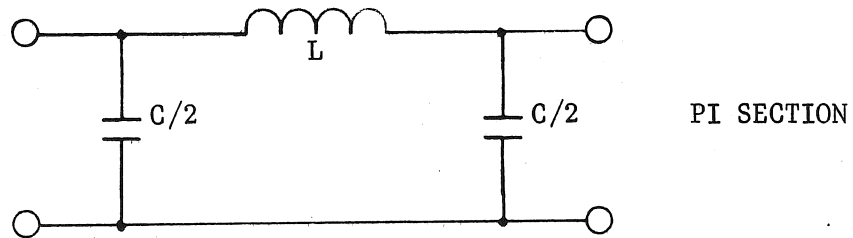
3.01 BRIDGED T NOTCH FILTER.



4.01 PARALLEL T NOTCH FILTER.



5.01 LUMPED PARAMETER CONSTANT K DELAY LINE.



C-FOCAL, 1969

01.01 TYPE %,!"CONSTANT K HI PASS FILTER."!
01.02 ASK "LOAD RESISTANCE?", R
01.03 ASK "FREQ. IN HZ?", XF
01.04 TYPE !"L ",.07962*R/XF, " HENRIES."
01.05 TYPE !"C ",.07962/(XF*R), " FARADS.", !!
01.06 QUIT

02.01 TYPE %,!"CONSTANT K LO PASS FILTER."!
02.02 ASK "LOAD RESISTANCE?", R
02.03 ASK "FREQ. IN HZ?", XF
02.04 TYPE !"L ",.318*R/XF, " HENRIES."
02.05 TYPE !"C ",.318/(R*XF), " FARADS.", !!
02.06 QUIT

03.01 TYPE %,!"BRIDGED T NOTCH FILTER."!
03.02 ASK "LOAD RESISTANCE?" R
03.03 ASK "FREQ. IN HZ?" XF
03.04 ASK "NOTCH RATIO (NR<0.5)?" RN
03.05 IF (0.5-RN) 3.06, 3.06, 3.08
03.06 TYPE " ??",!
03.07 GO 3.04
03.08 TYPE !"C1 ",.159/R/XF/FSQT(1/2/RN-1), " FARADS."
03.09 TYPE !"C2 ",.159*FSQT(1/2/RN-1)/R/XF
03.10 TYPE !"R ", R, " OHMS.", !!
03.11 QUIT

04.01 TYPE %,!"PARALLEL T NOTCH FILTER."!
04.02 ASK "LOAD RESISTANCE?" R
04.03 ASK "FREQ. IN HZ?" XF
04.04 TYPE !"C ",.113/XF/R, " FARADS."
04.05 TYPE !"R ",.707*R, " OHMS.", !!
04.06 QUIT

05.01 TYPE %,!"LUMPED PARAMETER CONSTANT K DELAY LINE."!
05.02 ASK "LOAD RESISTANCE?" R
05.03 ASK "DELAY IN MICROSECONDS?" TD
05.04 ASK "RISE TIME IN MICROSECONDS?" TR
05.05 SET A=1.2*FSQT((TD/TR)+3)
05.06 TYPE !"N ",FITR(A), " SECTIONS."
05.07 SET TS=TD/A
05.08 TYPE !"L ",TS*R*.1E-5, " HENRIES."
05.09 TYPE !"C ",TS*.1E-5/R, " FARADS.", !!
05.10 QUIT

*

