



FRASER ELECTRONICS

P.O. BOX 778 · EDMONTON, ALBERTA T5J 2L4 · (403) ~~454-9412~~ 424-2714

ELECTRONIC FILTER THEORY OF OPERATION

The filter unit consists of a voltage gain stage, the filter, an output attenuator and a power supply, along with an overdrive warning circuit.

The input amplifier consists of an Intersil 7650 chopper stabilized amplifier and a National LH0002C unity gain current driver. The current driver is needed as the output impedance of the 7650 is 18Kohms and it cannot drive the filter in its 1Khz range directly. A reference switch is on the input in order to allow the operator a convenient ground reference to set the offset.

The filter is a standard 18db/octave Butterworth type with five selectable ranges including a 1Khz range for ease of use. The parts for the filter were selected and come within 1% of the values theoretically required to get the frequencies required. This stage also has a current driver to ensure sufficient feedback energy on the 1 Khz range.

Following this is a conventional attenuator circuit using all 1% tolerance resistors. The power supply is a conventional bi-polar type with unregulator power feeding the overdrive indicator and power on indicator LED with a regulated plus and minus 8.6 Volts feeding the actual signal processing circuits.

The overdrive indicator consists of a 741 op amp as a unity gain buffer then a bilateral clipping indicator wired so that the LED will light on either positive or negative overdrives.

There is a multiturn potentiometer to adjust the offset of the filter and to allow the nulling of any error. Due to parts acquisition problems, different values are used in the two units, but this has no effect on performance as any value from 10K to 1Meg. will work okay with the action towards the ends of the resistance elements being slightly different, but with neither inferior to the other.

A copy of the spec sheet for the 7650 has been included with the data as this device cannot be found in most data books.



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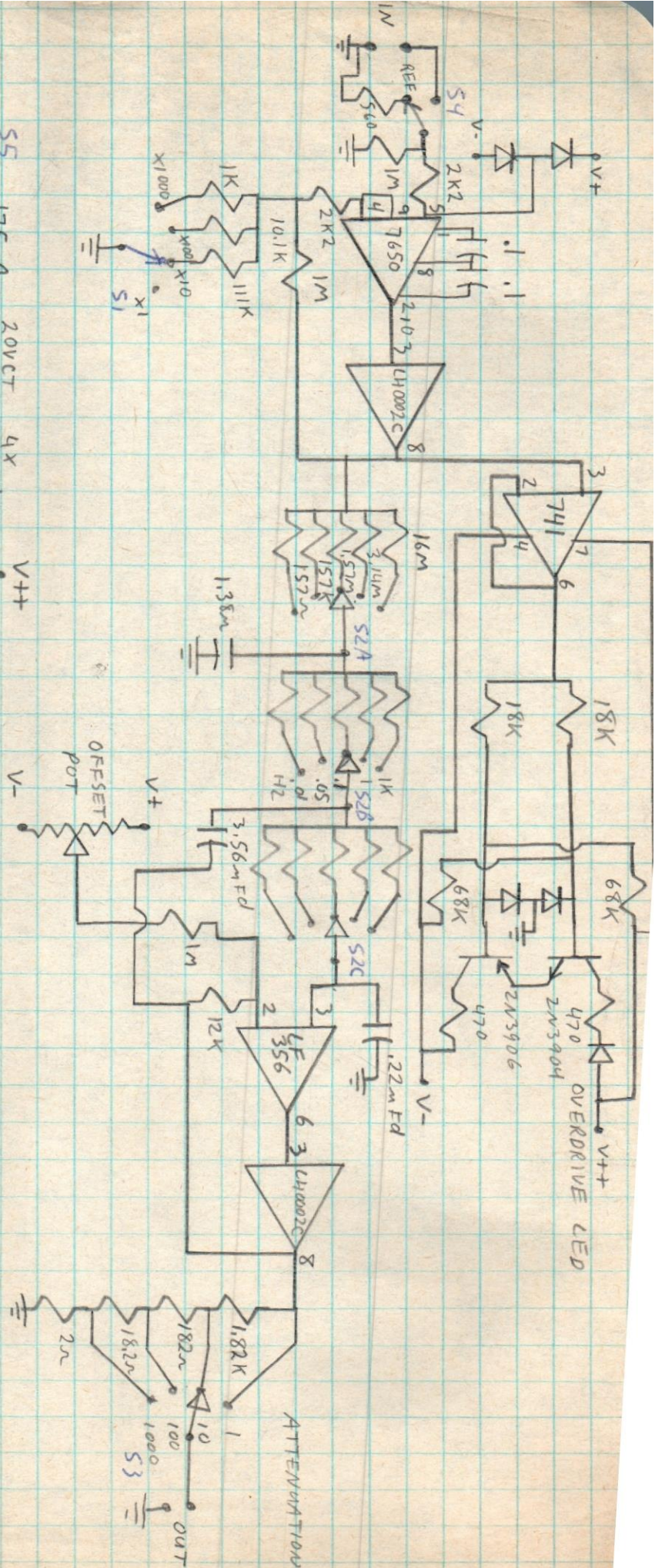
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PARTS-Semiconductors: The 7650 is the most obscure device but is available from R.A.E. Industrial Electronics at 11680-170 St. in Edmonton, while the LH0002C is made by National Semiconductor and may be purchased from Zentronics also in Edmonton. The LF356 is also from National and the device marked as 733W00 is a house numbered 741, available from most any semiconductor distributor. The voltage regulators, transistors, diodes and rectifiers are from Intek in Edmonton.

Resistors: To obtain large values of 1% resistors is almost impossible locally and for some values we had to use some of surplus origin, but only the highest quality that was available from this source. The remainder were either purchased from Intek, or made up by connecting in series as many as 4 resistors purchased from Intek. In non-critical areas we used standard 5% carbon film units available most anywhere.

Capacitors: To obtain the close tolerances needed we had to select capacitors from our own stock with a digital capacitance meter and therefore some values in the filter were made up of two capacitors connected in parallel to achieve the required values and avoiding delivery times of several months.

Misc.: The mechanical parts are mostly from Cardinal and any required spares may be obtained from them.



ALL DIODES = 1W4001
 EXCEPT AS MARKED
 ALL NON POLAR CAPACITORS
 WERE SELECTED FOR VALUE AND
 MAY CONSIST OF TWO IN PARALLEL
 TO PRODUCE THE CORRECT VALUE

JAN. 21/1981
 Daniel Fuzo

LH0002C V+ = 192 V- = 4985
 ICL7650 V+ = 11 V- = 7
 LF356 V+ = 7 V- = 4

7650 IS A CHOPPER STABILIZED ULTRA
 LOW OFFSET D.C. AMPLIFIER.

NOTE THAT SOME RESISTORS OF
 HIGH VALUES MAY BE MADE
 UP OF SEVERAL RESISTORS IN
 SERIES.