

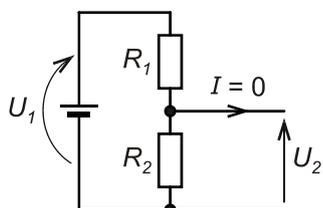
# RAZDELNICI NAPONA MERNIH UREĐAJA

SY387 • 13. decembar 2013.

Goran Kostić

## 1 Osnovne šeme razdelnika napona

### 1.1 Razdelnici za jednosmerne i niskofrekventne napone



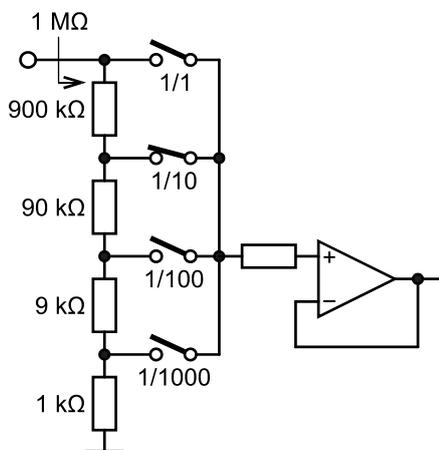
$$U_2 = U_1 \cdot \frac{R_2}{R_1 + R_2}$$

$$\frac{\partial U_2}{\partial U_1} = \frac{R_2}{R_1 + R_2}$$

$$\frac{\partial U_2}{\partial R_1} = -U_1 \cdot \frac{R_2}{(R_1 + R_2)^2}$$

$$\frac{\partial U_2}{\partial R_2} = U_1 \cdot \frac{R_1}{(R_1 + R_2)^2}$$

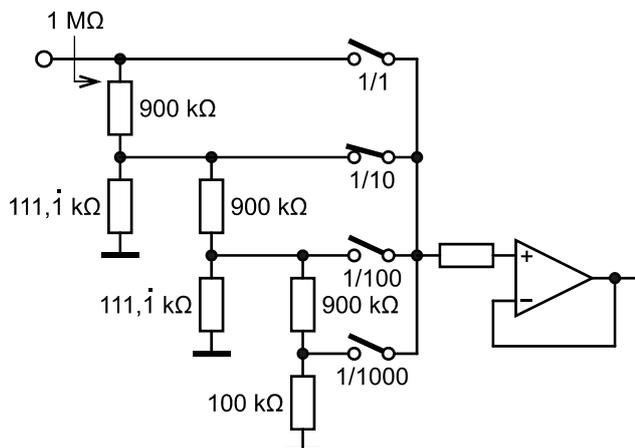
$$dU_2 = \frac{\partial U_2}{\partial U_1} \cdot dU_1 + \frac{\partial U_2}{\partial R_1} \cdot dR_1 + \frac{\partial U_2}{\partial R_2} \cdot dR_2$$



$$900 \text{ k}\Omega = 1,8 \text{ M}\Omega \parallel 1,8 \text{ M}\Omega$$

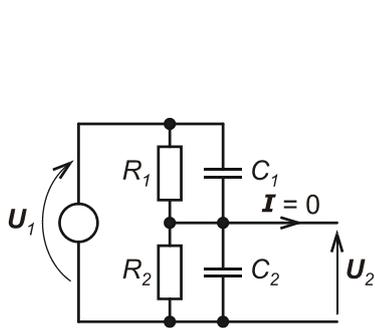
$$900,990 \text{ k}\Omega = 1 \text{ M}\Omega \parallel 9,1 \text{ M}\Omega$$

$$(900,990 / 900 = 1,0011)$$



$$111,1 \text{ k}\Omega = 120 \text{ k}\Omega \parallel 1,5 \text{ M}\Omega$$

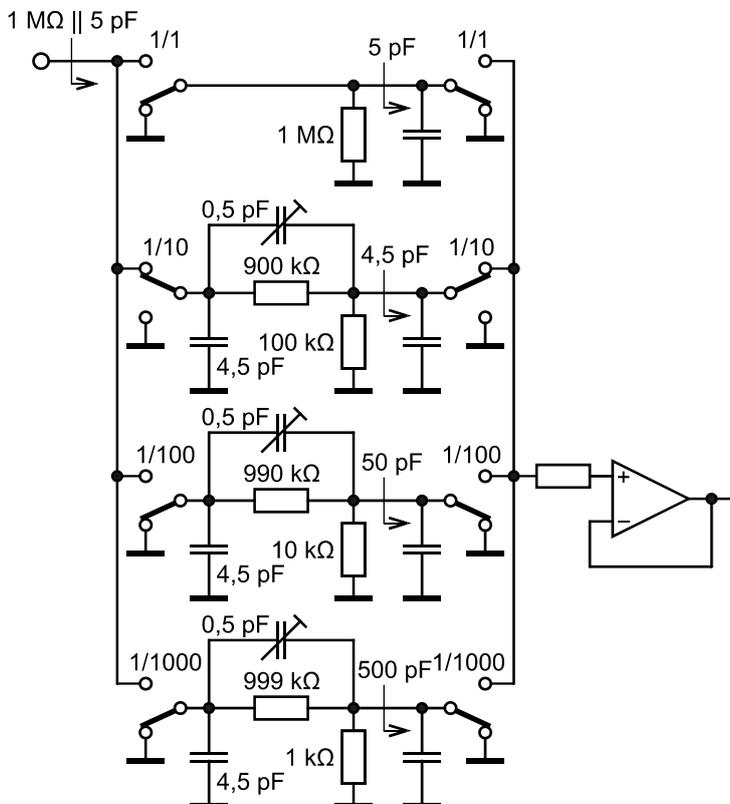
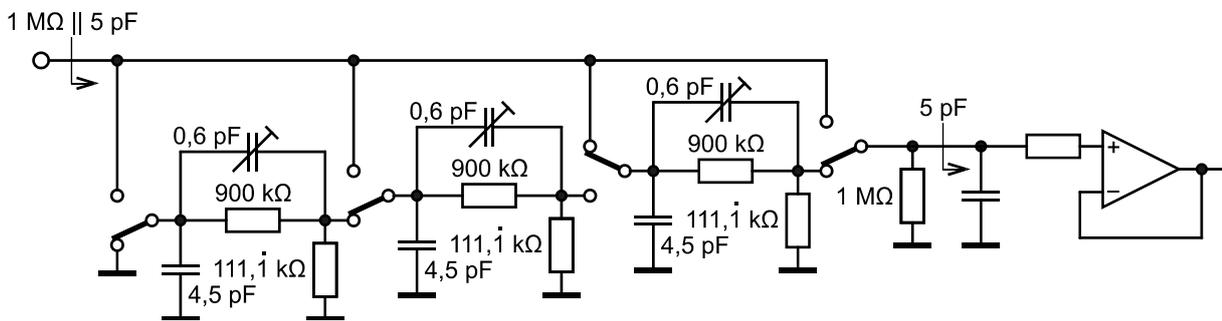
## 1.2 Razdelnici za jednosmerne do visokofrekventnih napona



$$U_2 = U_1 \cdot \frac{Z_2}{Z_1 + Z_2}$$

$$U_2 = U_1 \cdot \frac{\frac{R_2}{1 + i \cdot \omega \cdot R_2 \cdot C_2}}{\frac{R_1}{1 + i \cdot \omega \cdot R_1 \cdot C_1} + \frac{R_2}{1 + i \cdot \omega \cdot R_2 \cdot C_2}}$$

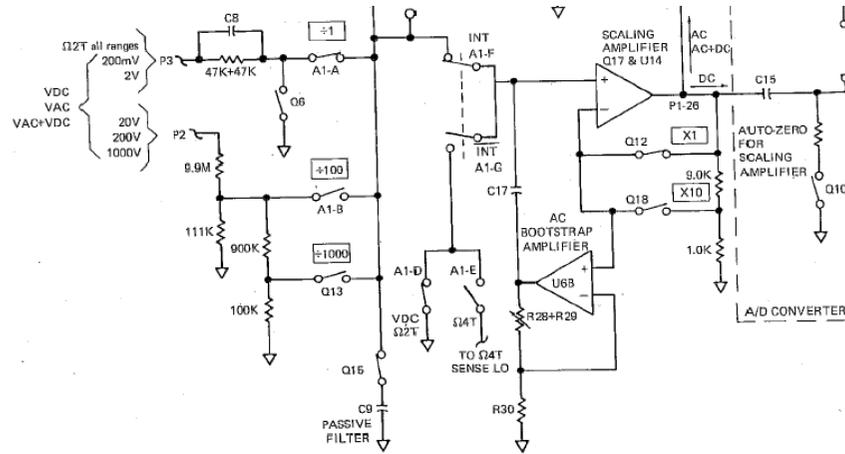
$$\text{Za } R_1 \cdot C_1 = R_2 \cdot C_2: U_2 = U_1 \cdot \frac{R_2}{R_1 + R_2}$$



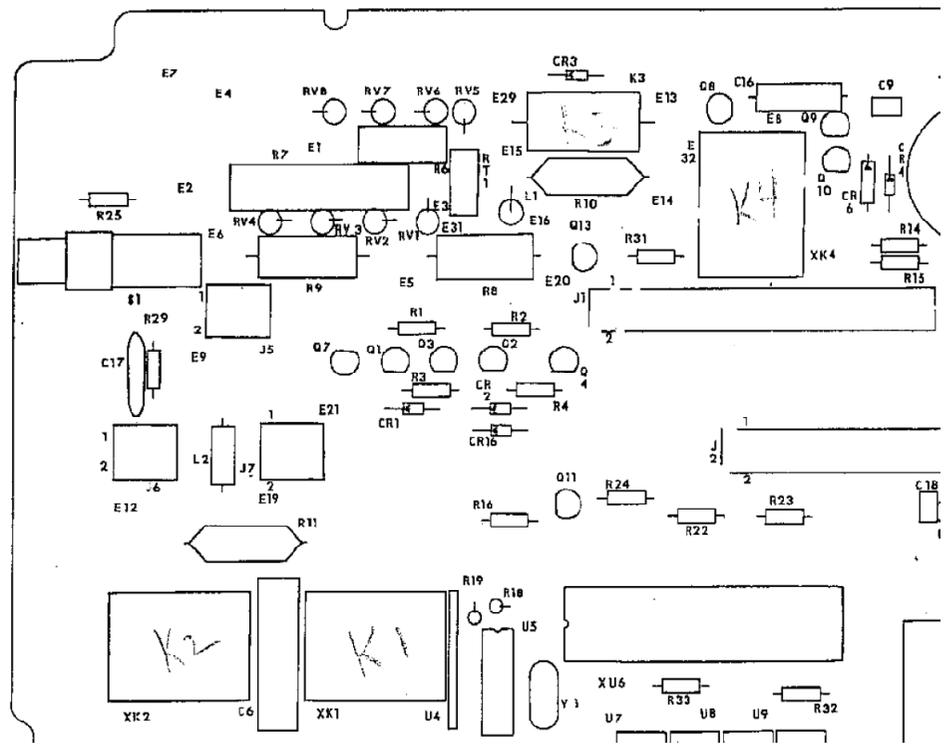
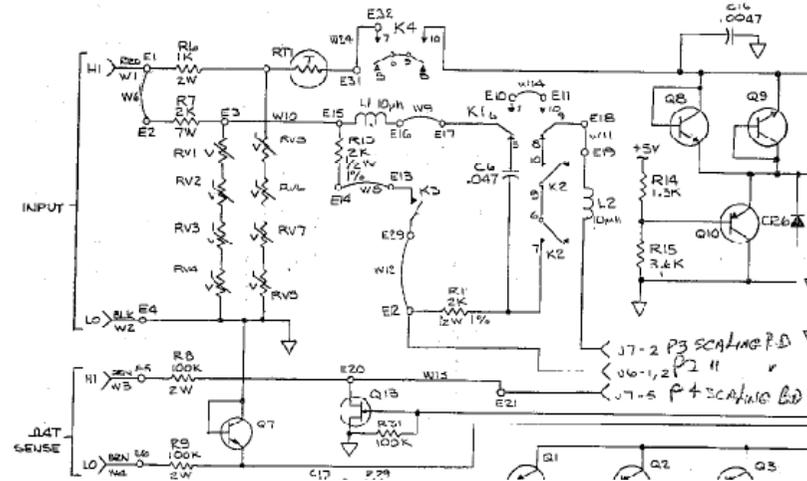
## 2 Primeri realizovanih razdelnika

### 2.1 Digitalni multimeter *Fluke 8860A*

300 kHz, 5½ cifara, AC: 10 MΩ || ≤ 70 pF, ≤ 1000 V P



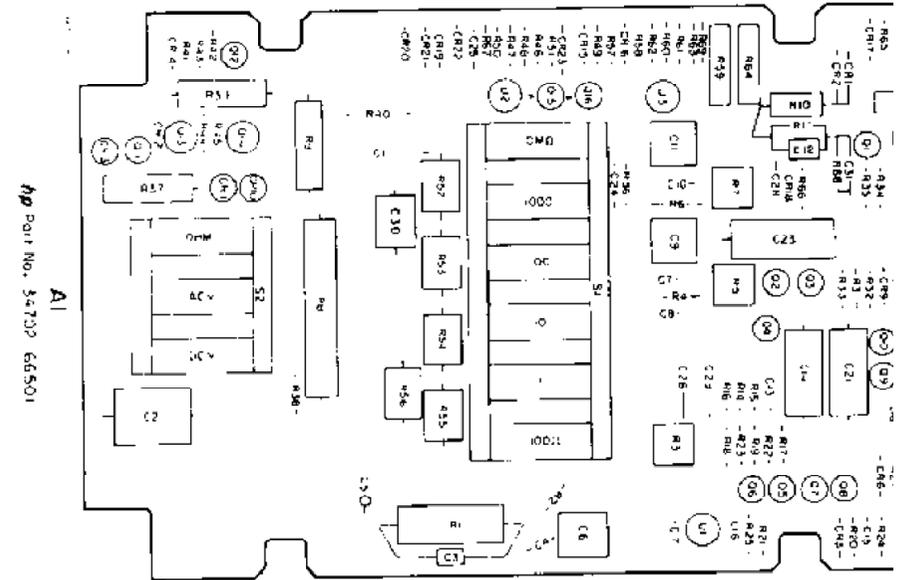
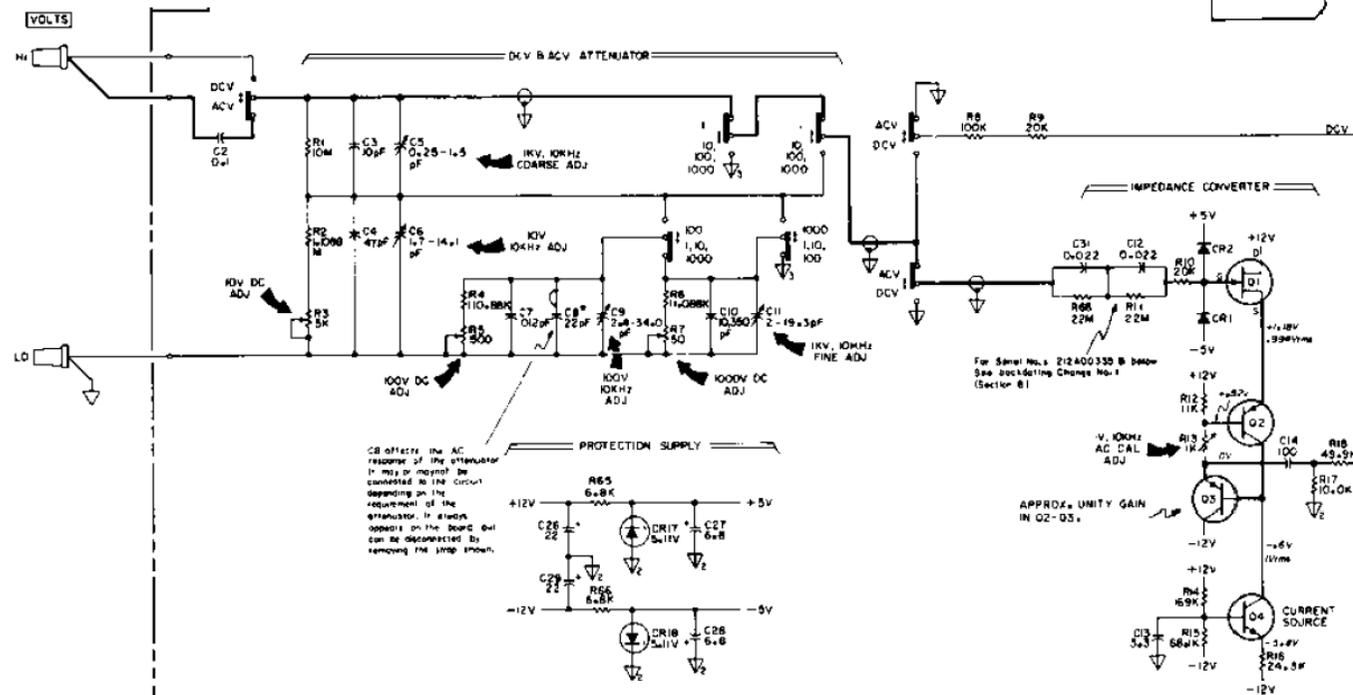
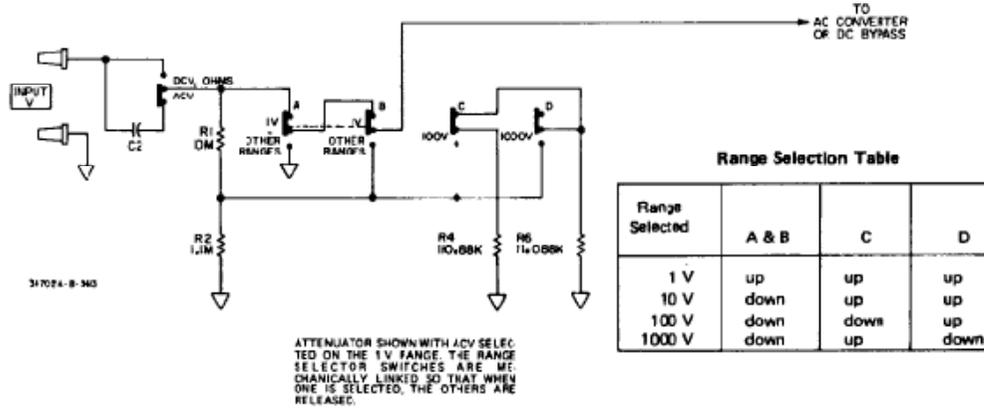
NOTE: THE SWITCHES IN THIS DIAGRAM SYMBOLIZE JFET SWITCHES.  
THE SWITCH POSITIONS ARE IN THE VDC, 2V RANGE, FILTER NOT CALLED, AND INT CONFIGURATION



[Fluke (1980) FROM.. 8860a multimeter service manual .pdf]

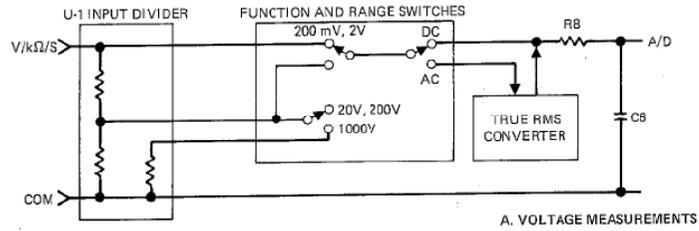
## 2.2 Digitalni multimetar HP 34740A, HP 34750A

100 kHz, 5½ cifara, (10 .. 11,1 MΩ) || (80 .. 180 pF), ≤ 1000 V P

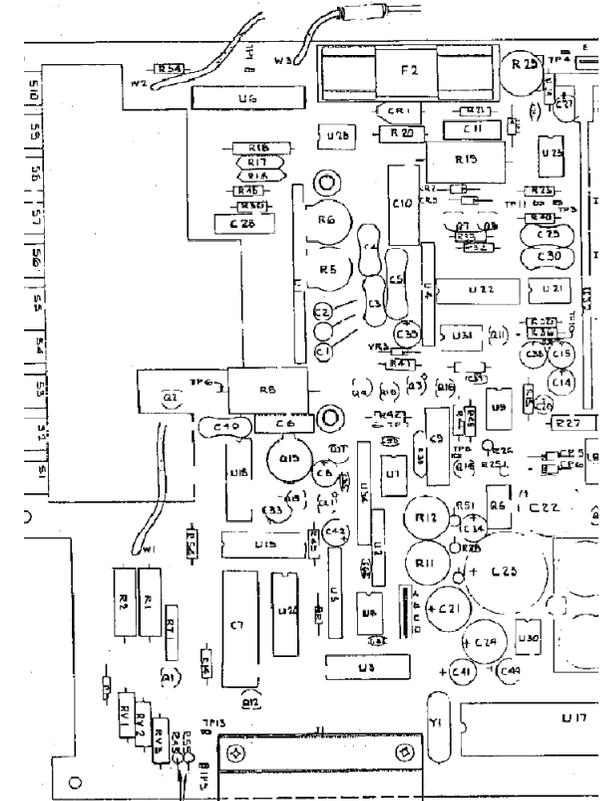
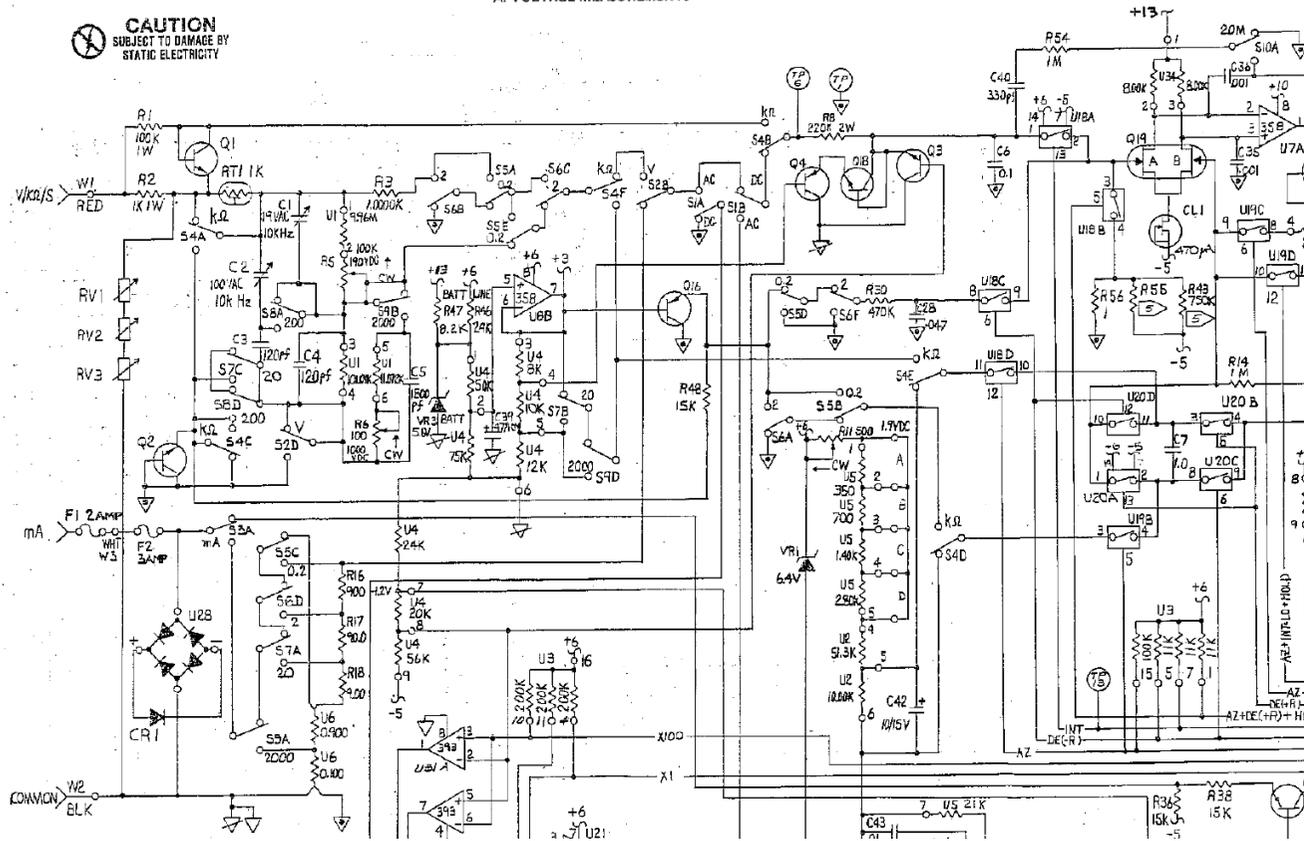


### 2.3 Digitalni multimetar Fluke 8050A

50 kHz, 4½ cifre, 10 MΩ || < 100 pF, ≤ 1000 V P



**CAUTION**  
SUBJECT TO DAMAGE BY  
STATIC ELECTRICITY

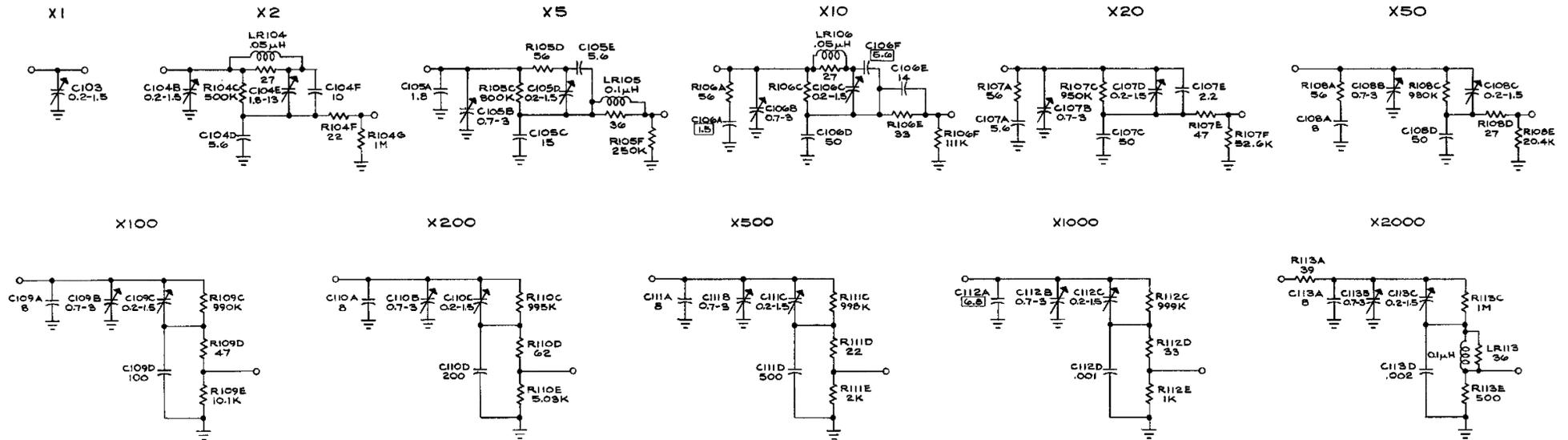
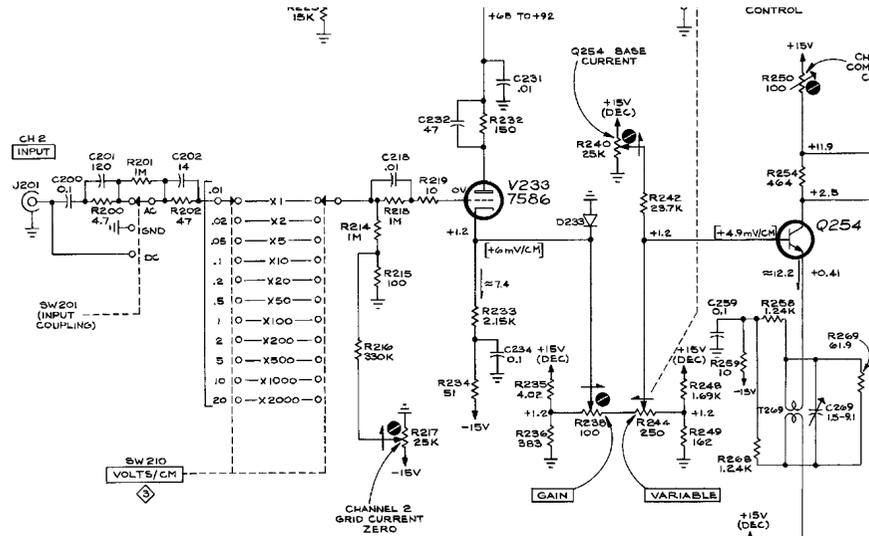


[Fluke (1984) 8050A Digital multimeter instruction manual .pdf]



## 2.5 Tektronix 10A2A Y pojačavač osciloscopa

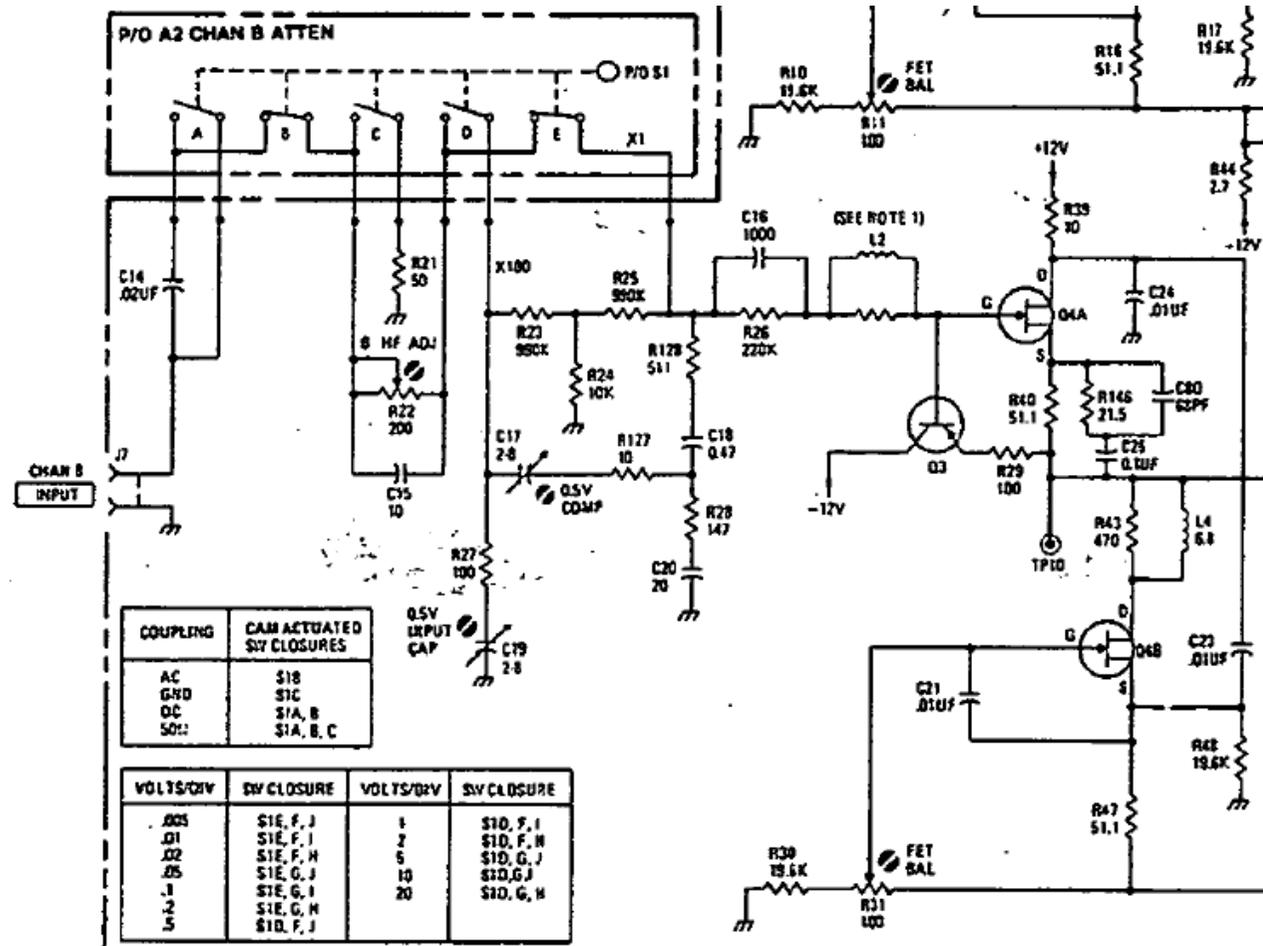
> 100 MHz za -3 dB, 1 MΩ || 20 pF, ≤ 600 V P



[Tektronix (1967) Type 10A2A dual-trace amplifier .djvu]

## 2.6 Storiž osciloskop HP 1741A

100 MHz za -3 dB, 1 MΩ || 20 pF, 50 Ω, ≤ 250 V P



[Agilent (1978) HP 1741A Oscilloscope Operating and Service Manual (01741-90911) .pdf]

