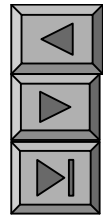
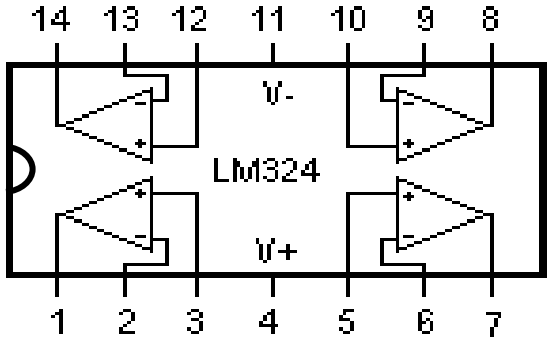
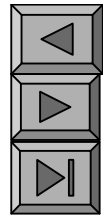


5

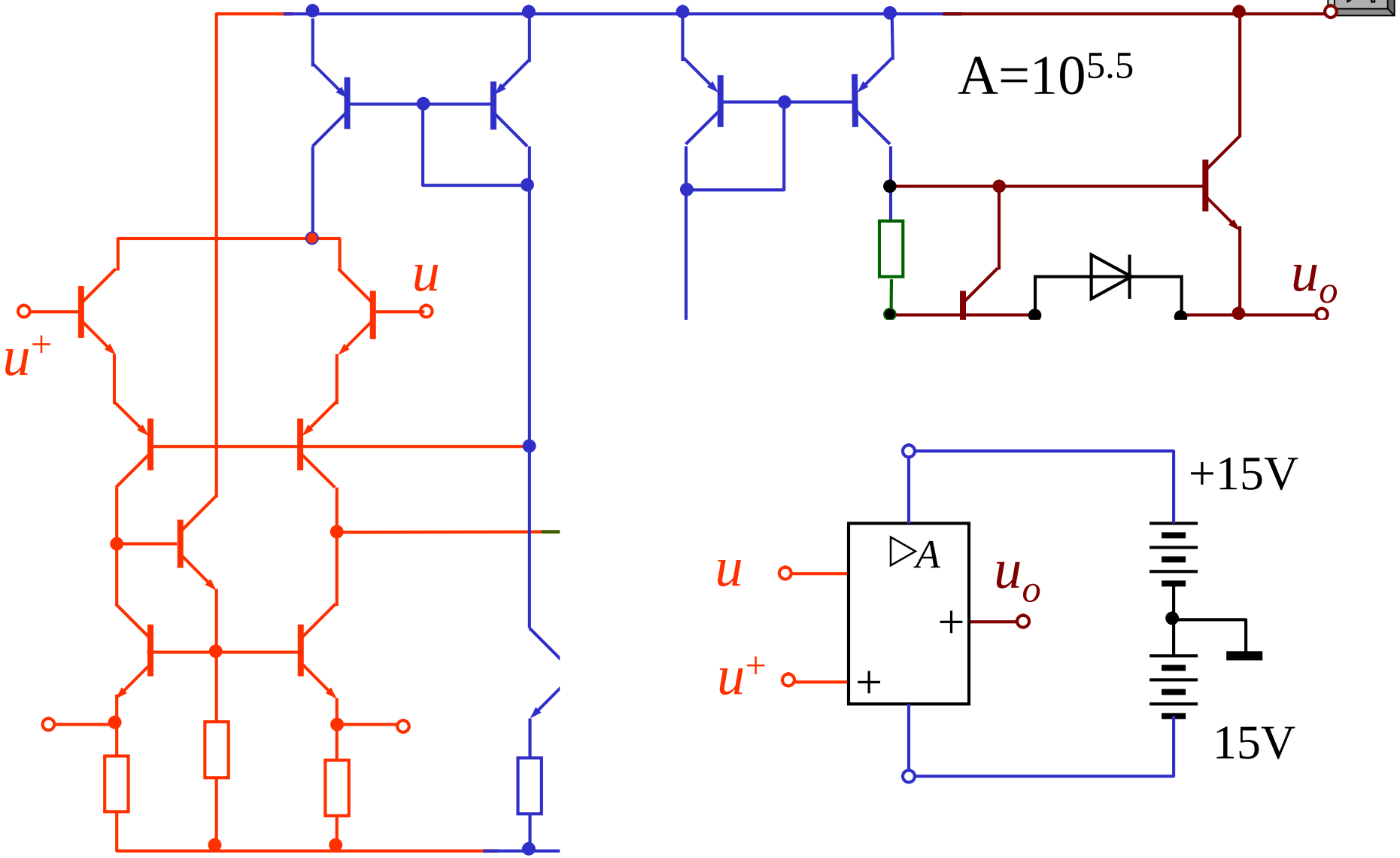
(

LM324N
W9910D9448
MALAYSIA
LM108H
B9442AB
LM324J
M51957B
03C9


14 13 12 11 10 9 8
V-
LM324
V+
1 2 3 4 5 6 7



F007 (A741)

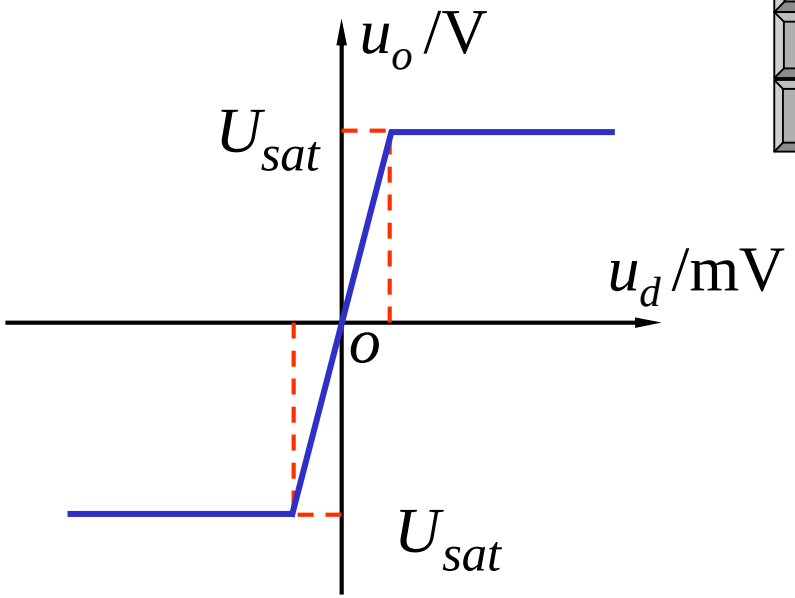


2010 3 3

2. ( )

(1) $|u_d|$

$u_o = A\,u_d$



$|u_d| \quad \left|\frac{u_o}{A}\right| \quad \left|\frac{13}{10^{5.5}}\right|$

u_d

F007 A $10^{5.5}$

E_C 15V

U_{sat} 13V

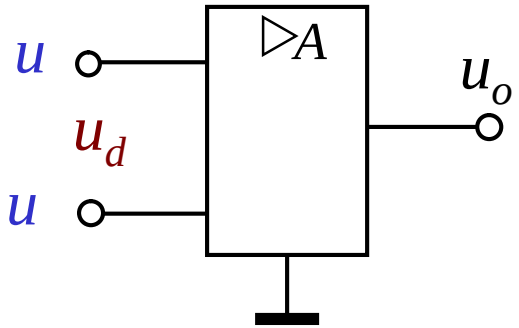
(2) $|u_d|$

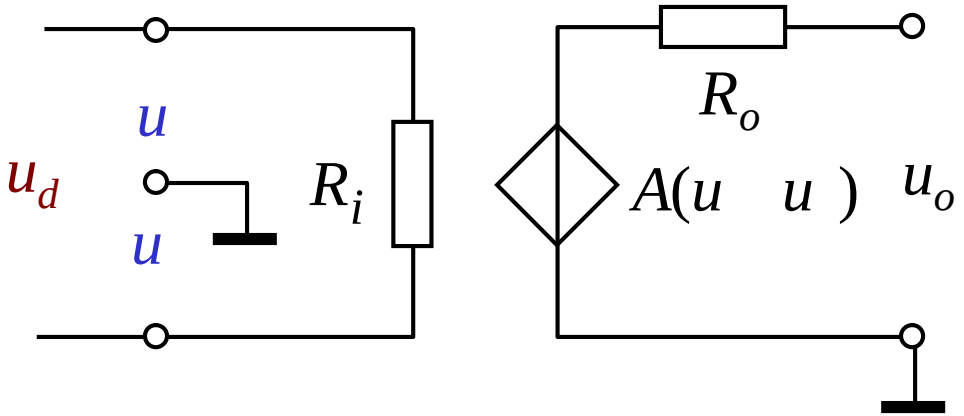
u_o U_{sat}

u_d

A

3.





R_i

10^3 10^{12}

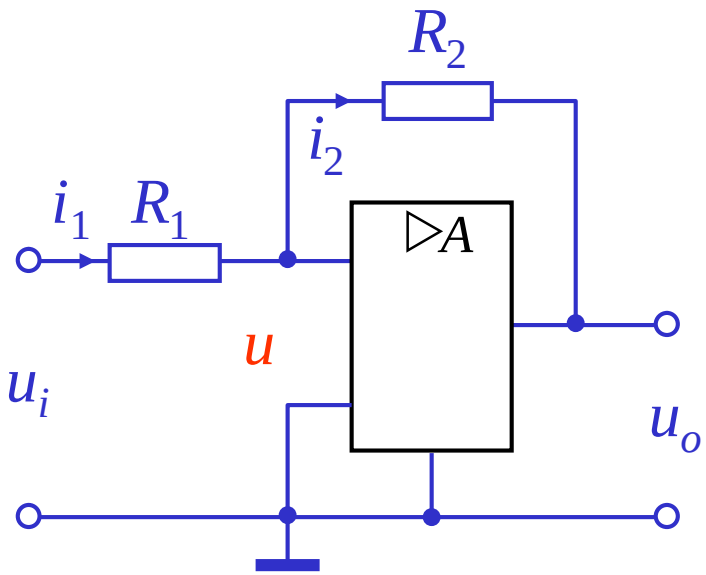
VCVS

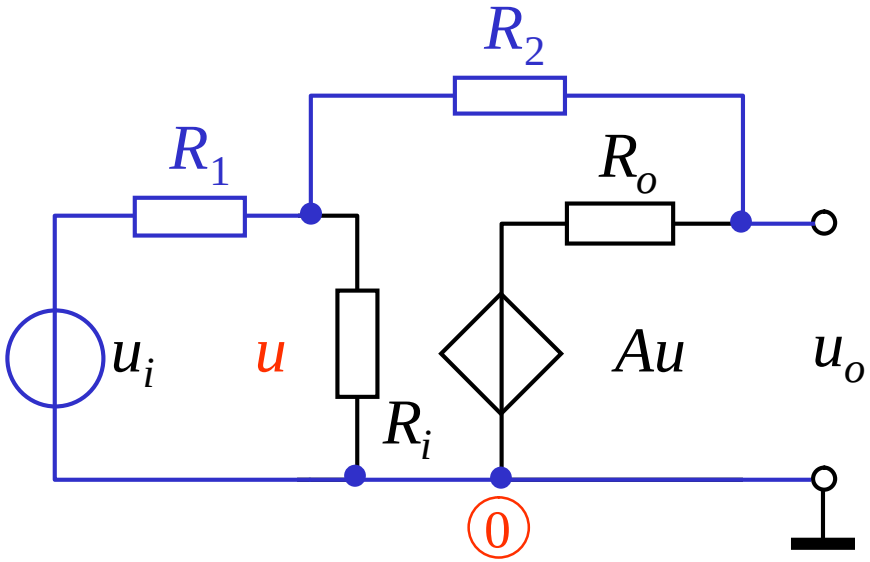
u_o

R_o

( )

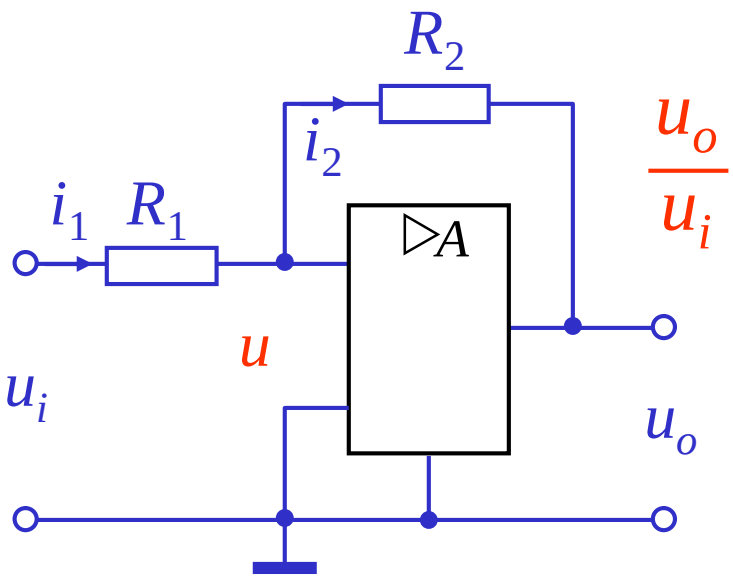
5 2





u_o u_i u_{n1} u u_{n2} u

$$\begin{cases} \left[\frac{1}{R_1} \quad \frac{1}{R_i} \quad \frac{1}{R_2}\right] u \quad \frac{1}{R_2} u_o \quad \frac{u_i}{R_1} \\ \frac{1}{R_2} u \quad \left[\frac{1}{R_o} \quad \frac{1}{R_2}\right] u_o \quad \frac{Au}{R_o} \end{cases} \quad u$$



$\frac{u_o}{u_i}$ $\frac{R_2}{R_1}$ $\frac{1}{1 \quad \frac{\left(1 \quad \frac{R_2}{R_o}\right)\left(1 \quad \frac{R_2}{R_1} \quad \frac{R_2}{R_i}\right)}{A \quad \frac{R_o}{R_2}}}$

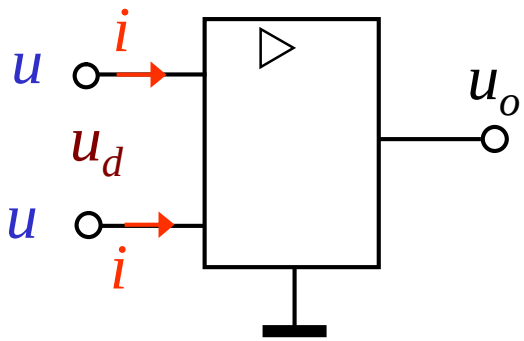
A

A 10^7

$\frac{u_o}{u_i}$ $\frac{R_2}{R_1}$ (1) R_1 R_2

u_o $\frac{R_2}{R_1}$ u_i

5 3



A R_i R_o 0 · · ·

R_i (1) i i 0

(“ ”)

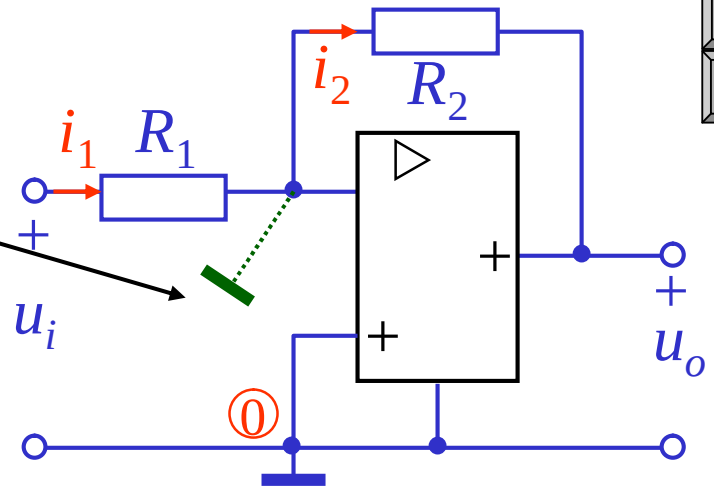
$\frac{u_o}{A}$ u_d (u u) 0 (2) u u

(“ ”)

2

1 $i_1 = i_2$

$$\frac{u_i}{R_1} = -\frac{u_o}{R_2} \longrightarrow \frac{u_o}{u_i} = -\frac{R_2}{R_1}$$

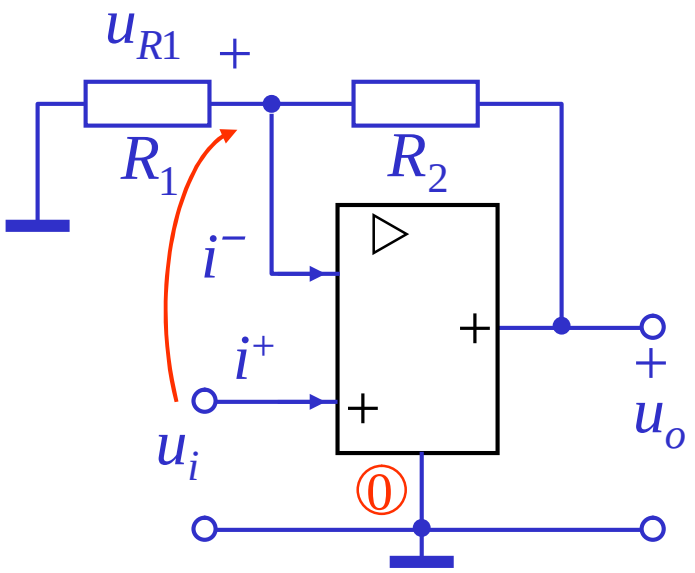


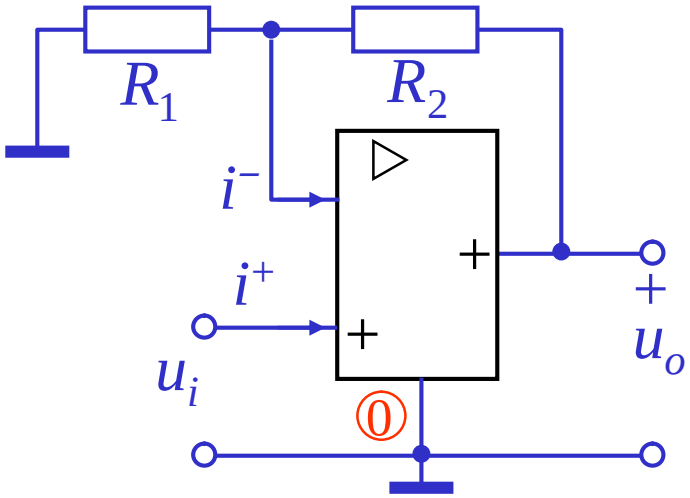
1 R_1 R_2

u_{R1} $\dfrac{R_1}{R_1+R_2}u_o$

2 u_{R1} u_i

$$u_o \quad \frac{R_1+R_2}{R_1}u_i \longrightarrow \frac{u_o}{u_i} \quad 1 \quad \frac{R_2}{R_1}$$

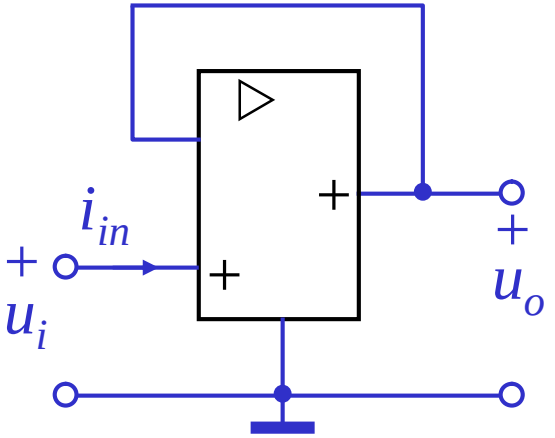




$$\frac{u_o}{u_{in}} \quad 1 \quad \frac{R_2}{R_1}$$

$R_2=0$

R_1



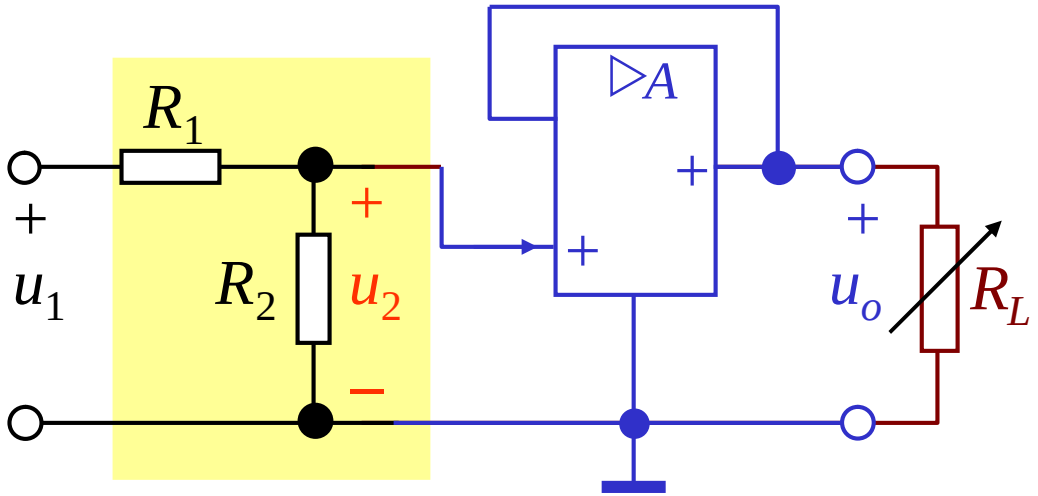
$u_o = u_i$

R_i “ ”

u_o

R_L

u_2 (u_o)

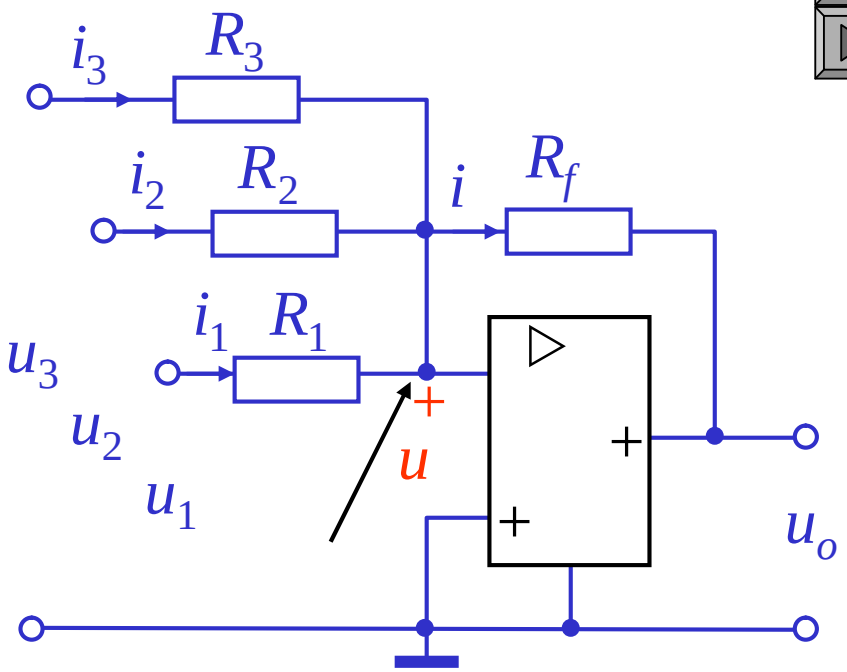


$i \quad 0$

$\therefore \; i_1 \quad i_2 \quad i_3 \quad i$

$$\frac{u_1}{R_1} \quad \frac{u_2}{R_2} \quad \frac{u_3}{R_3} \qquad \frac{u_o}{R_f}$$

$$u_o \qquad \left(\frac{R_f}{R_1} u_1 \quad \frac{R_f}{R_2} u_2 \quad \frac{R_f}{R_3} u_3 \right)$$



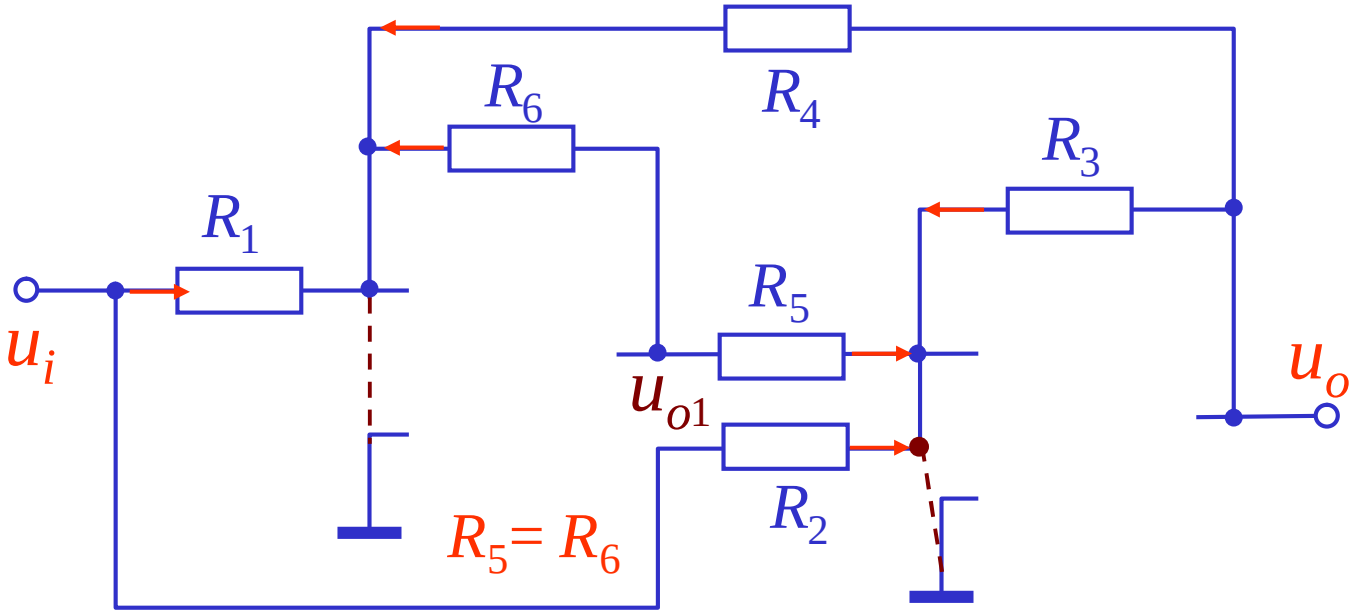
$:$

$\left(\qquad \right) u_{n1} \quad \frac{u_1}{R_1} \quad \frac{u_2}{R_2} \quad \frac{u_3}{R_3} \quad \frac{u_o}{R_{f/}} \quad 0$

$R_1 \quad R_2 \quad R_3 \quad R_f$

$u_o \qquad (u_1 \quad u_2 \quad u_3)$

5–3



$$\frac{u_i}{R_1} \quad \frac{u_o}{R_4} \quad \frac{u_{o1}}{R_6}$$

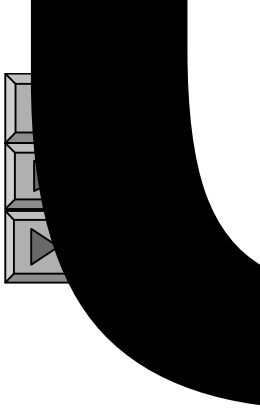
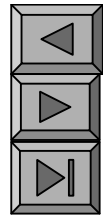
$$\frac{u_i}{R_2} \quad \frac{u_o}{R_3} \quad \frac{u_{o1}}{R_5}$$

$$\Rightarrow \quad \frac{u_i}{R_1} \quad \frac{u_i}{R_2} \quad \frac{u_o}{R_4} \quad \frac{u_o}{R_3}$$

$$(G_1 \quad G_2)u_i \quad (G_3 \quad G_4)u_o$$

$$\frac{u_o}{u_i} \quad \frac{(G_1 \quad G_2)}{(G_3 \quad G_4)}$$

5 7 u_o

u_{s1} u_{s2} u_{S1}

u_o