

[5. Link Download</div>](#dw)

</div>

</center>

<div style="font-size: large; text-align: justify;">
</div>

<h3 style="text-align: justify;">
</h3><h2>1. Tujuan

[Daftar] </h2>

<div><div style="margin-left: 20px;"><p style="text-align: left;"></p><ul style="background-color: none; line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px; text-align: justify;"><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; line-height: normal; margin: 0cm 0cm 3pt 18pt;">Mengetahui dan memahami

aplikasi dari Voltage summing dalam rangkaian listrik</p><li style="margin: 0px 0px 0.25em; padding: 0px; text-align: justify;"><p class="MsoNormal"

style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; line-height: normal; margin: 0cm 0cm 3pt 18pt;">Mampu mengaplikasikan dan membuat rangkaian berkaitan dengan materi Voltage summing</p>

<li style="margin: 0px 0px 0.25em; padding: 0px; text-align: justify;"><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; line-height: normal; margin: 0cm 0cm 3pt 18pt;">Memenuhi penugasan Elektronika yang diberi oleh Bapak Darwison, M.T</p><p></p></div>

<h3 style="text-align: justify;"><b style="background-color: black;">
</h3><h3

style="text-align: justify;">2. Alat dan Bahan

[Daftar]</h3></div><div>
</div><h3 style="text-align: left;"><u

style="background-color: black;">A. Alat</u></h3><h4 style="text-align: justify;"></h4><h3><u

style="background-color: black;">1. Osiloskop</u></h3><div><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em; text-align: justify;"><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"></div>
</div><div class="separator" style="clear: both;">Osiloskop adalah komponen elektronika yang mempunyai kemampuan menyimpan electron-elektron selama waktu yang tidak tertentu. Osiloskop dilengkapi dengan tabung sinar katode. Peranti pemancar elektron memproyeksikan sorotan elektron ke layar tabung sinar katode.</div><div class="separator" style="clear: both;">
</div><div class="separator" style="clear: both;"><i style="background-color: black;">Spesifikasi:</i></div><div class="separator" style="clear: both;"><div class="separator" style="clear: both; text-align: center;"></div>
</div><div class="separator" style="clear: both;"><i style="background-color: black;">Pinout:</i></div><div class="separator" style="clear: both;"><div class="separator" style="background-color: black; clear: both; text-align: center;"><br

[illegible]



Multimeter

Cara Menggunakan Multimeter :

- Perhatikan terlebih dahulu jarum penunjuk yang memperlihatkan skala pengukuran.
- Perhatikan pula pengaturan knob atau saklar yang digunakan untuk mengatur fungsi Ampere, Voltage, ataupun Ohm. Lalu lakukan setting juga pada skala x1, x10 atau yang lainnya. Pastikan knob pada posisi Off

saat sudah tidak digunakan lagi.

Tentukan lubang untuk memasukkan kabel jack sesuai dengan fungsi yang diinginkan. Terdapat dua lubang yaitu (+) dan (–) yang nantinya menunjukkan polaritas dari tegangan atau probe.

Cek kembali apakah baterai telah terpasang dengan baik. Pastikan kondisi baterai tersebut masih bagus dan berkualitas.

Spesifikasi :

Pin out

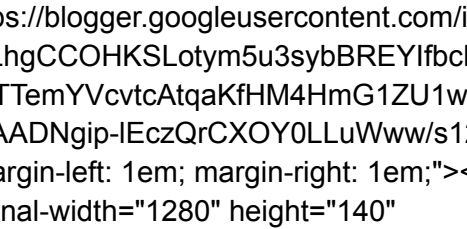
3. DC Generator

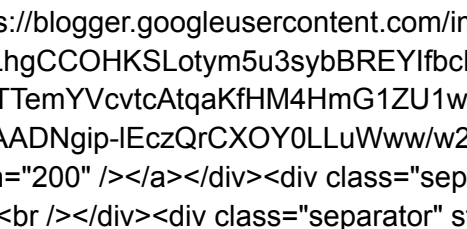
style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><p style="text-align: justify;">Generator arus searah (DC) adalah mesin berputar yang memasok output listrik dengan tegangan dan arus searah Prinsip dasar operasinya sama dengan generator sinkron.</p></blockquote><div class="separator" style="clear: both; text-align: center;">
</div><div class="separator" style="clear: both; text-align: center;"></div><div class="separator" style="clear: both; text-align: center;"><u style="background-color: black;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: center;"></div>
</u><h3 style="clear: both; text-align: justify;"><u>
</u><span style="color:

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Generator</u></h3></div><p></p><blockquote
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inherit;"><span style="box-sizing: border-box; letter-spacing: 0.162px; vertical-align:
inherit;">Sebuah mesin yang mengubah energi mekanik menjadi energi listrik dikenal
sebagai generator AC. <span style="box-sizing: border-box; letter-spacing:
0.162px; vertical-align: inherit;">Energi mekanik disuplai ke Generator AC melalui turbin uap,
turbin gas, dan mesin pembakaran. <span style="box-sizing: border-box;
letter-spacing: 0.162px; vertical-align: inherit;">Daya listrik bolak-balik berupa tegangan dan
arus bolak-balik merupakan
keluarannya.</div><p></p></blockquote><p><span
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medium;"></p><div class="separator" style="clear: both; text-align:
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style="background-color: black; font-family: times; font-size: large;"><u>B.
Bahan</u></h3></div><p></p><blockquote style="border: none;
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Resistor

elektronika pasif yang berfungsi untuk menghambat dan mengatur arus listrik dalam suatu rangkaian elektronika. Satuan nilai **Resistor** atau Hambatan adalah Ohm. Spesifikasi dari resistor adalah resistansinya dan daya listrik yang dapat dihantarkan. Karakteristik lain termasuk koefisien suhu, derau listrik (noise), dan induktansi. **Resistor** dapat diintegrasikan kedalam sirkuit hibrida dan papan sirkuit cetak, bahkan sirkuit terpadu.





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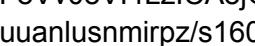
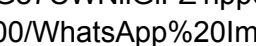
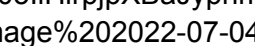
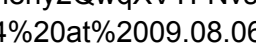
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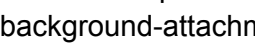
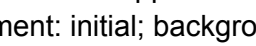
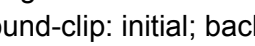
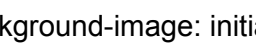
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elektronika yang berfungsi untuk menjumlahkan dua buah atau lebih tegangan listrik.
Rangkaian ini dibuat menggunakan IC <i style="cursor:
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B2S9rA_b7YlmdKfldkRQE64K8t4HI=s0-d"), auto !important;">.. Gambar 15.8
menunjukkan hubungan dengan keluaran menjadi penjumlahan dari ketiga masukan
tersebut, masing-masing dikalikan dengan keuntungan yang berbeda. Tegangan
keluarannya adalah</p></div><div style="margin-left: 60px; text-align: justify;
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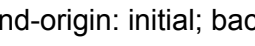
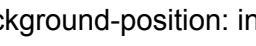
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</div><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: center;"></div><div class="separator" style="clear: both; text-align: center;">
</div><div class="separator" style="clear: both; text-align: center;">
</div><div class="separator" style="clear: both; text-align: center;"><p style="box-sizing: border-box; margin: 0px 0px 1em; text-align: justify;">Tanda minus pertama dalam rumus sebagai indikator bahwa polaritas output sama pada komparator. Bila tegangan pada input inverting lebih positif daripada tegangan pada input non inverting tegangan output akan menjadi (-), keadaan akan terjadi sebaliknya jika tegangan inverting lebih kecil dari tegangan non inverting.</p><p style="box-sizing: border-box; margin: 0px 0px 1em; text-align: justify;">Penguat Differensiator / Differensial mempunyai kemungkinan untuk berubah, perbedaan tegangan yang kecil menjadi signal tegangan yang lebih besar. Dengan impedansi input sangat rendah dan rangkaian tipe ini dapat diisolasi (di buffer / disangga) dengan penguat pengikut tegangan (voltage follower).</p></div><div class="separator" style="clear: both; text-align: center;">
</div></div></div><div style="margin-left: 60px; text-align: justify; text-indent: 0px;"><div class="separator" style="clear: both; text-align: center;"><h3 style="clear: both; text-align: left;"><u style="background-color: black;">3 Voltage Subtraction/ Difference Amplifier</u></h3></div></div><div style="margin-left: 60px; text-align: justify; text-indent: 0px;"><div class="separator" style="clear: both; text-align: center;"><div

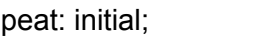
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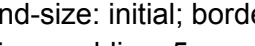
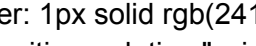
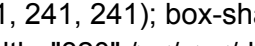
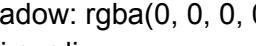
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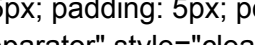





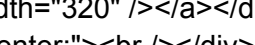
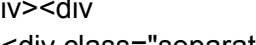





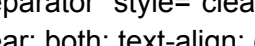
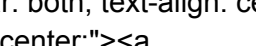
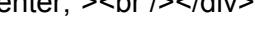
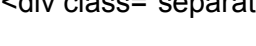



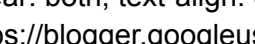


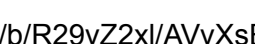





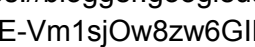
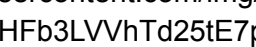
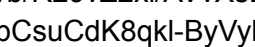
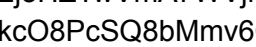


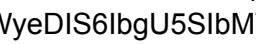
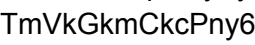
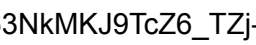



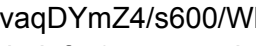
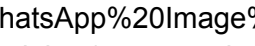
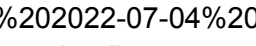





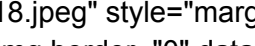
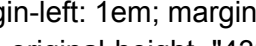
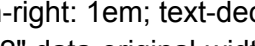
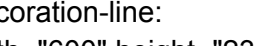


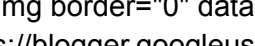
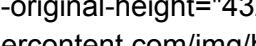
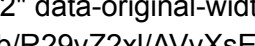
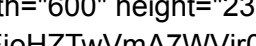


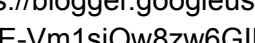
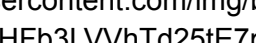
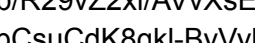






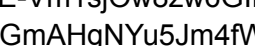
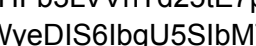
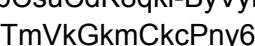
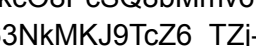





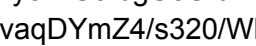
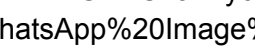
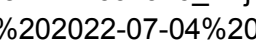





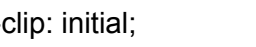





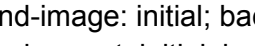
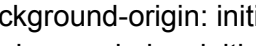
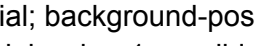
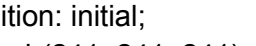




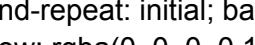
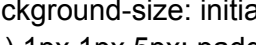
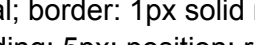
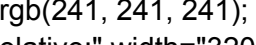






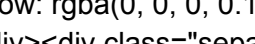
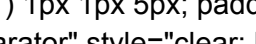
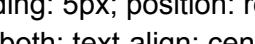
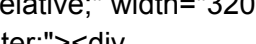





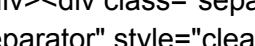
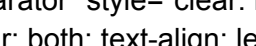
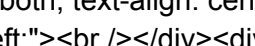
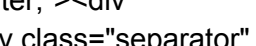


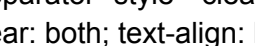
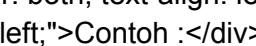
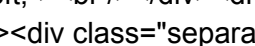
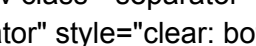



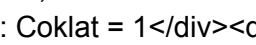
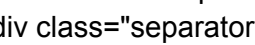





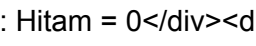
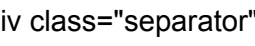
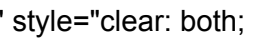





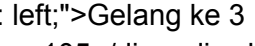
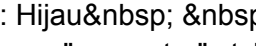
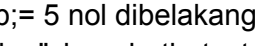
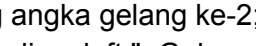





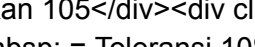
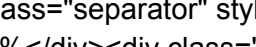
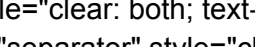
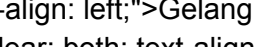





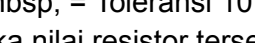
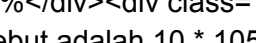
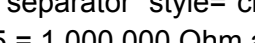
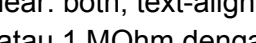




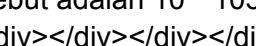
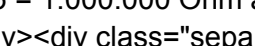
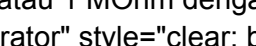


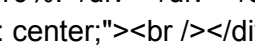
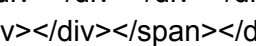
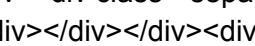
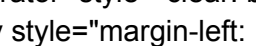




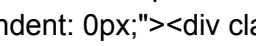





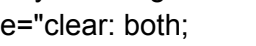





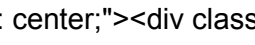





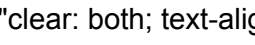
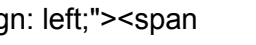





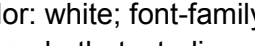
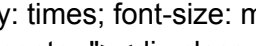
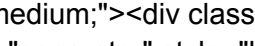
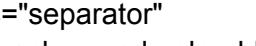





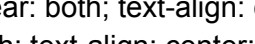
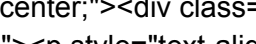



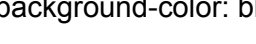






[illegible]

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</p><p> </p><p> </p><p> </p><p>
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</p></div></div></div></div></div><div style="margin-left: 60px; text-align: justify; text-indent: 0px;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: center;"><p style="text-align: justify;"><u><b style="background-color: black;">Konfigurasi Pin 741 </u></p></div></div></div></div><div style="margin-left: 60px; text-align: justify; text-indent: 0px;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="background-color: black; clear: both; text-align: center;"><blockquote style="border: none; font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"><div class="separator" style="clear: both; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; text-align: center;"></div></blockquote><p> </p><div class="separator" style="clear: both; font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; text-align: center;"></div><p style="text-align: left;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border-image: initial; border-width: 1px;

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<!--<div style="font-size: 18px; text-indent: 20.0pt;">3.3. Soal[Daftar]

src="https://blogger.googleusercontent.com/img/a/AVvXsEgZoANBaDAnP1BM6ThInN8Ju1y3ulHlx7JdMaiWfG0qFMXMYJmL5lqKmkB-mrG9K2DpKsgwom8MbhZBM4XmE1Bmb3M8yixOh-gsMI7jt1OD-2T3i4S-oto7zxsbfJ-oHqyteDhtXOLG1jn2W_EISl6vkj07dbiCVKFAwwT8_LpMnTFmjHfBe-kXZ1WQ" width="320" /></div><div class="separator" style="clear: both; text-align: justify;">
</div><p></p><p class="MsoListParagraph" style="text-align: justify; text-indent: -18pt;"> 2. </p><p></p><p> 1 MΩ, R1 100 kΩ, R2 50 kΩ, dan R3 500 kΩ.</p><div class="separator" style="clear: both; text-align: center;"><p class="MsoListParagraph" style="text-align: justify; text-indent: -18pt;"> </p><div class="separator" style="clear: both; text-align: center;"></div><div class="separator" style="clear: both; text-align: justify;">solusi</div><div class="separator" style="clear: both; text-align: justify;">
</div><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: justify;"></div></div><p></p><div style="text-align: justify;">Outputnya terlihat sebagai perbedaan V2 dan V1 dikalikan dengan faktor penguatan 20.</div><div style="text-align: justify;">
</div></div></div></div><div><div style="background-color: black; color: white; font-family: times; font-size: medium;">
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3.2 Problem

[Daftar]

1.

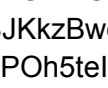
Hitung tegangan keluaran untuk rangkaian Gambar 15.51 dengan masukan $V_1 = 40 \text{ mV rms}$ dan $V_2 = 20 \text{ mV rms}$.

Solusi :

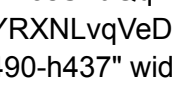
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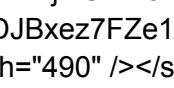
Tentukan tegangan keluaran untuk rangkaian Gambar 15.53.

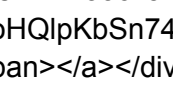
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</div><span
style="white-space: pre-wrap;"><div style="text-align: justify;"> &
 </div></div><div><div class="separator"
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style="white-space: pre-wrap;">
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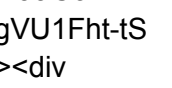

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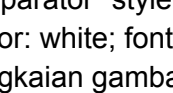
2. Tentukan tegangan keluaran untuk rangkaian gambar dibawah

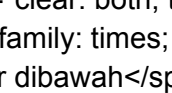


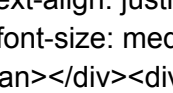


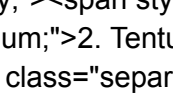


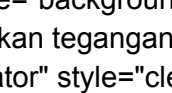


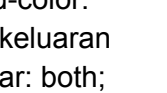


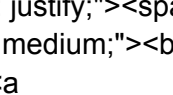


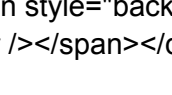


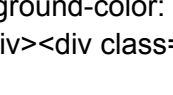


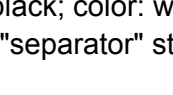


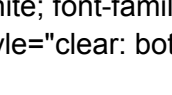


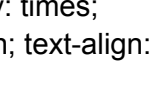


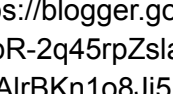


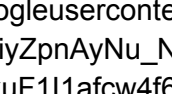


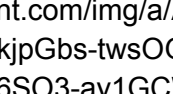


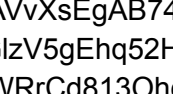


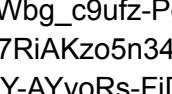


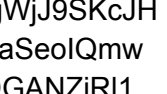


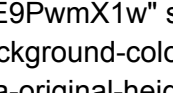


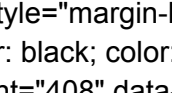


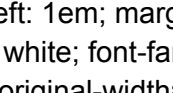


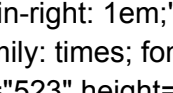


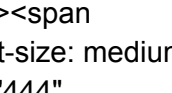


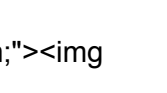


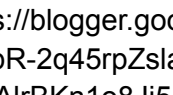


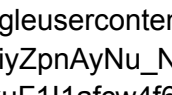


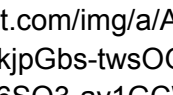


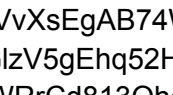


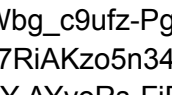


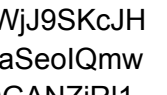


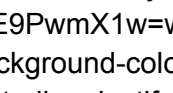


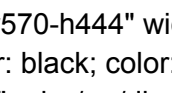


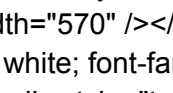


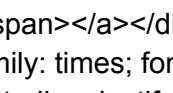


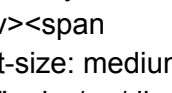


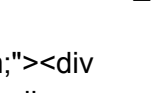


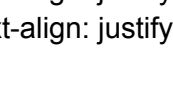


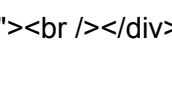


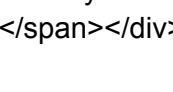


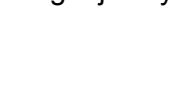






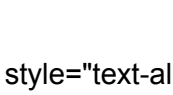


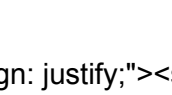


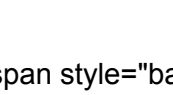


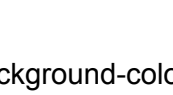


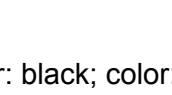










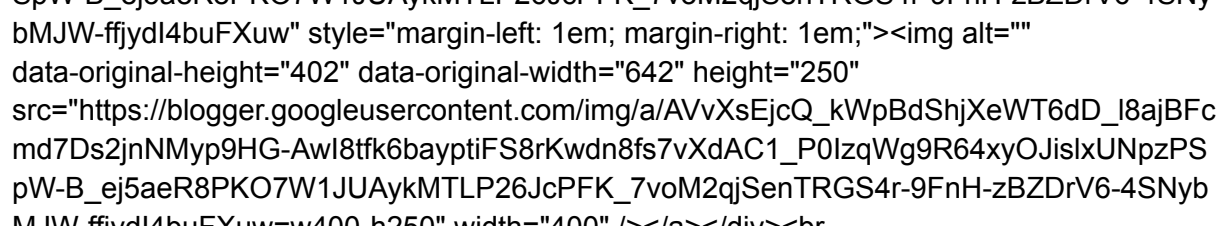


telah tertera pada Sub Bab Alat dan Bahan di atas

- Merangkai Rangkaian sesuai dengan jenisnya masing-masing dan sesuai dengan gambar
- Amatilah nilai input dan output dengan menyesuaikannya dengan rumus yang ada
- Amatilah respon grafik sinyal input dan outputnya.

B. Rangkaian Simulasi dan Prinsip Kerja

Summing amplifier (Penguat Penjumlah)



Pertama V input ($V_1 = 5\text{ V}$, $V_2 = 5\text{ V}$, dan $V_3 = 5\text{ V}$) akan diumpungkan ke resistor R1, R2, dan R3 dan masuk ke kaki inverting. Pada Op Amp terjadi penguatan, dengan perhitungan V_{out} nya

[https://blogger.googleusercontent.com/img/a/AVvXsEjcQ_kWpBdShjXeWT6dD_I8ajBFcmd7Ds2jnNMyp9HG-Awl8tfk6bayptiFS8rKwdn8fs7vXdAC1_P0IzqWg9R64xyOJislxUNpzPSpW-B_ej5aeR8PKO7W1JUAykMTLP26JcPFK_7voM2qjSenTRGS4r-9FnH-zBZDrV6-4SNybMJW-ffjydI4buFXuw=w400-h250](https://blogger.googleusercontent.com/img/a/AVvXsEjcQ_kWpBdShjXeWT6dD_I8ajBFcmd7Ds2jnNMyp9HG-Awl8tfk6bayptiFS8rKwdn8fs7vXdAC1_P0IzqWg9R64xyOJislxUNpzPSpW-B_ej5aeR8PKO7W1JUAykMTLP26JcPFK_7voM2qjSenTRGS4r-9FnH-zBZDrV6-4SNybMJW-ffjydI4buFXuw)

[illegible]

style="font-family: times; ">engan inputan $V_1 = 50 \text{ mV} \sin(1000t)$ dan $V_2 = 10 \text{ mV} \sin(3000t)$ dan masuk ke kaki inverting. Pada Op Amp terjadi penguatan, dengan perhitungan $V_{out} = - (R_f/R_1 V_1 + R_f/R_2 V_2)$ </p><p style="background-color: black; clear: both; font-size: medium; text-align: justify; "></p><p style="background-color: black; clear: both; font-size: medium; text-align: justify; ">Tanda negatif disini menandakan bahwa terjadi pembalikan fasa dikarenakan input masuk kekaki i</p><div class="separator" style="background-color: black; clear: both; font-size: medium; text-align: left; "><div class="separator" style="clear: both; "><div class="separator" style="clear: both; text-align: center; "></div>
</div><div class="separator" style="clear: both; text-align: justify; ">Pertama V_1 dan V_2 diumpangkan ke resistor dengan nilai $V_1 = 40 \text{ mV rms}$ dan $V_2 = 20 \text{ mV rms}$. Kemudian masuk ke kaki inverting dan terjadi penguatan dengan V_{out} </div>
</div></p></div><div class="separator" style="background-color: black; clear: both; font-size: medium; text-align: left; ">
</div><p style="background-color: black; clear: both; font-size: medium; text-align: justify; "><span style="font-family:

"Times New Roman"; font-size: medium; text-align: left;">Maka dapat disimulan Vo Rms nya sebesar -1.18 V. Pada penguatan kali ini terjadi pembalikan fasa.

oltage Subtraction/ Difference Amplifier

</div></div></div></div></div>

</div></div></div></div></div>

[illegible]

style="clear: both; text-align: left;">Maka $V_1 - V_2 = 10\text{ V} - 5\text{ V} = 5\text{ V}$. Terlihat pada voltmeter pada kaki output sebesar + 5,01 V (mendekati dengan perhitungan).

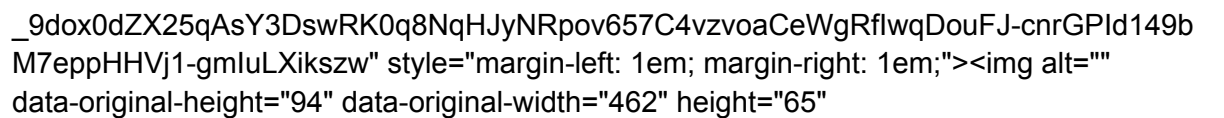
<u style="background-color: black;">3) Voltage Subtraction/ Difference Amplifier 2 input sinyal</u></h3></div></div><div style="margin-left: 20px;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: left;">
</div><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: center;"></div>
</div><div class="separator" style="background-color: black; clear: both; text-align: center;">
</div><div class="separator" style="background-color: black; clear: both; text-align: justify;">Pertama V input satu (V_1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op amp pertama. V out hasil penguatan op amp pertama diumpankan ke resistor dan masuk ke kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V outnya </div><div class="separator" style="background-color: black; clear: both; text-align: left;">
</div><div class="separator" style="background-color: black; clear: both; text-align: left;"></div><div class="separator" style="background-color: black; clear: both; text-align: left;">
</div><div class="separator" style="background-color: black; clear: both; text-align: left;">Vout = $-(10k/10k V_2 - 10k/10k 10k/10k V_1)$ </div><div class="separator" style="background-color: black; clear: both; text-align: left;">Vout = $-(V_2 - V_1)$ </div><div class="separator" style="background-color: black; clear: both; text-align: left;">Vout =

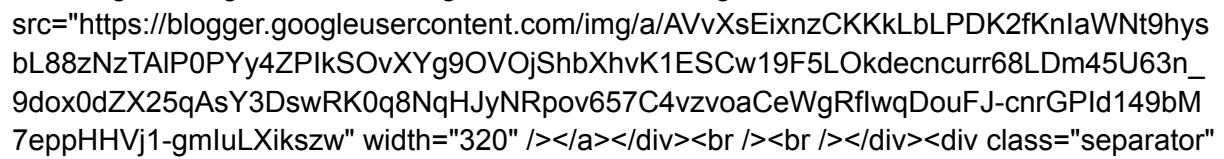
[illegible]

text-align: left;">>Dengan $V_1 \text{ rms} = 6 \text{ V}$ dan $V_2 \text{ rms} = 5 \text{ V}$ sehingga didapatkan nilai $V_{out} = -20 (v_2 - v_1) = -20 \cdot -1 = 20 \text{ V}$. Maka dapat disimpulkan untuk hasil dari dua penguatan op amp diatas menghasilkan nilai v output akhir sebesar 20 V

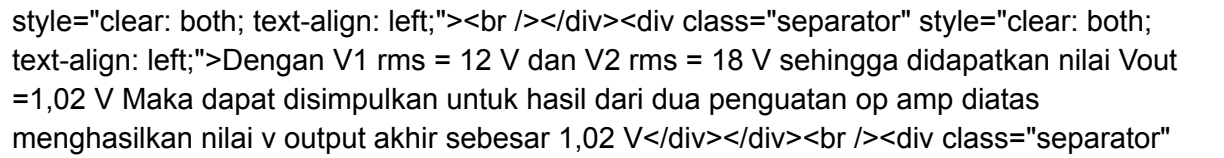
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</div><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: justify;">Pertama V input satu (V_1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op amp pertama. V out hasil penguatan op amp pertama diumpankan ke resistor dan masuk ke kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V outnya

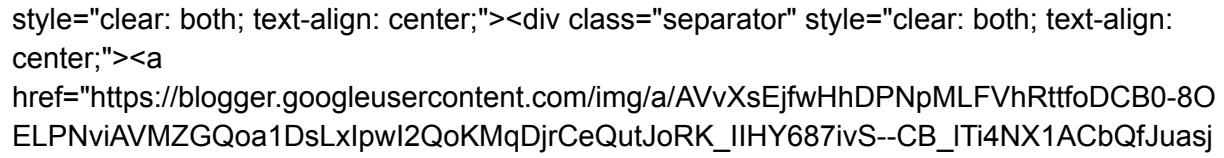
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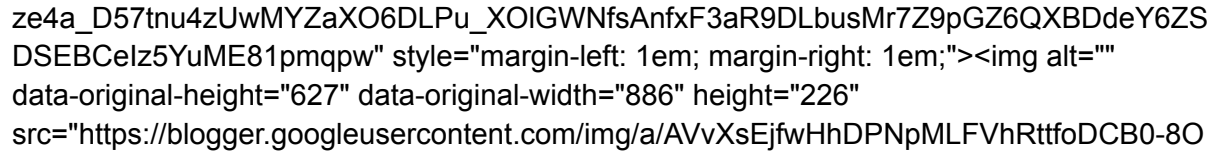


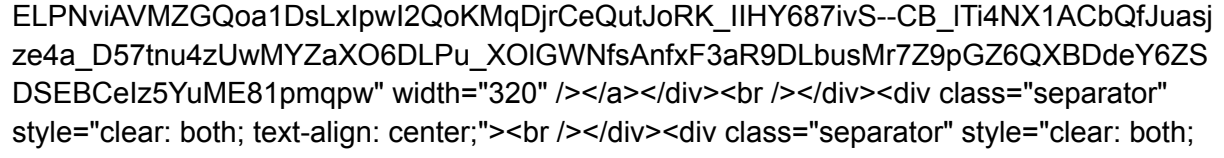


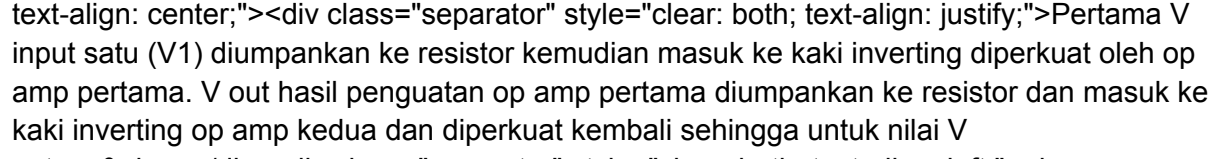
Dengan V_1 rms = 12 V dan V_2 rms = 18 V sehingga didapatkan nilai V_{out} = 1,02 V Maka dapat disimpulkan untuk hasil dari dua penguatan op amp diatas menghasilkan nilai v output akhir sebesar 1,02 V

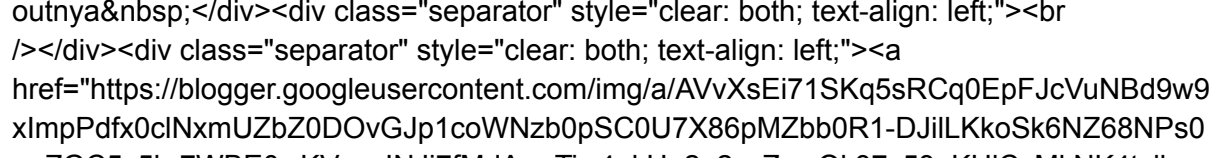


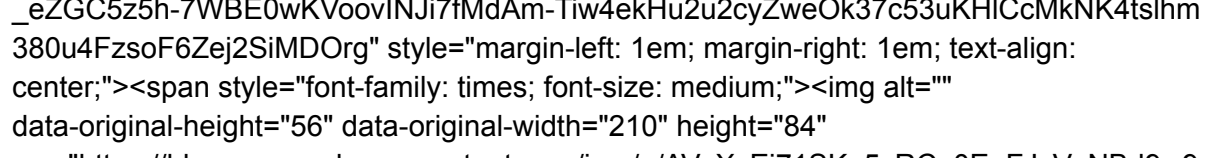


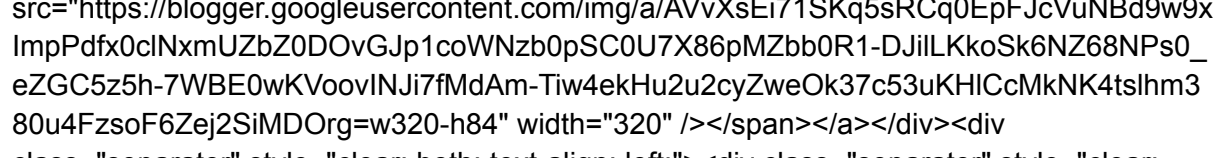


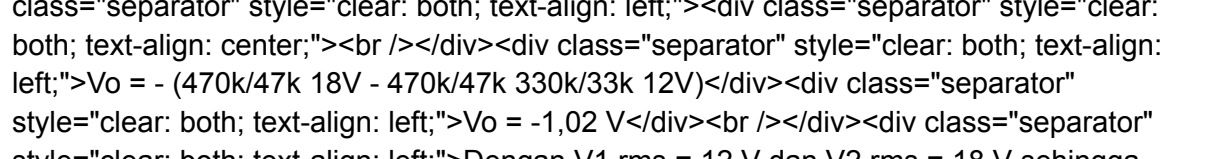


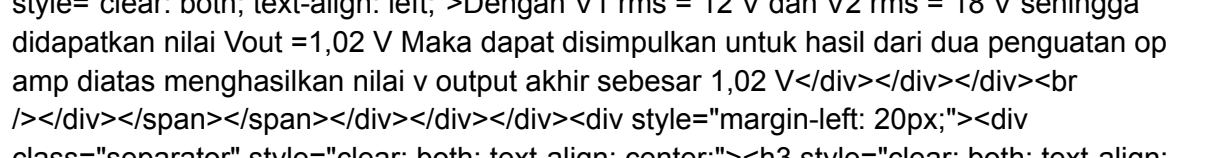














left;"><u style="background-color: black;">C. Video Simulasi

Rangkaian</u></h3></div></div><div style="margin-left: 20px;"><div class="separator" style="clear: both; text-align: center;"><div style="text-align: left;">Rangkaian 15.8

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Rangkaian 15.9 (Example)</div><div style="text-align: left;">
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</div>
Pilihan ganda No 1</div><div style="text-align: left;">
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