

18.4px;">Menyelesaikan tugas besar elektronika yang diberikan oleh Bapak Dr. Darwison, M.T.</p><p class="MsoListParagraphCxSpMiddle" style="background-color: white; color: #333333; font-size: 14.85px; margin-left: 39.3pt; text-indent: -18pt;">b. Mengetahui rangkaian dari OP-AMP SPECIFICATIONS</p><p class="MsoListParagraphCxSpMiddle" style="background-color: white; color: #333333; font-size: 14.85px; margin-left: 39.3pt; text-indent: -18pt;">c. Mengetahui fungsi dari OP-AMP SPECIFICATIONS</p><i style="background-color: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif;">

2. Alat dan Bahan</i><div><i>
</i></div><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><center><div style="text-align: justify;"><u>ALAT</u></div></center></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div style="text-align: justify;"><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><b style="font-family: times; font-size: x-large;">Osiloskop<div class="separator" style="clear: both; text-align: left;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"></blockquote></blockquote></blockquote></div><div class="separator" style="clear: both;">Osiloskop adalah komponen elektronika yang mempunyai kemampuan

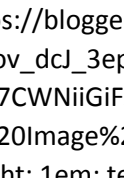
style="border: 0px; margin: 0px; outline: 0px; padding: 0px; vertical-align: baseline;">menyimpan electron-elektron selama waktu yang tidak tertentu. Osiloskop dilengkapi dengan tabung sinar katode. Peranti pemancar elektron memproyeksikan sorotan elektron ke layar tabung sinar katode.</div><div class="separator" style="clear: both;">Spesifikasi:</div><div class="separator" style="clear: both;"><div class="separator" style="clear: both; text-align: center;"></div>Pinout:</div><div class="separator" style="clear: both;"><div class="separator" style="clear: both; text-align: center;"></div>
</div><div class="separator" style="clear: both;"><div class="separator" style="clear: both; text-align: center;">Keterangan:</div></div><div class="separator" style="clear: both;"><div class="separator" style="clear: both; text-align: center;"></div>
<div class="separator" style="clear: both; text-align: center;"><a
href="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEgqAUDhcnouxAt7m9i9qpCBai
LYRa8CUIY2BzleH4FH755_4ZPcHir6Q5oq5i2ET1pZ4Nvqlk2AswUQQu-lxAKweNRSJE_OC8s50fAX82GI9
HSWOXAd7Rt3s2QhA_B9MvANnkIFhkAL-S3VjfXTkVIUcLgtbWc29hWUkEtczCRblkvV9DN72DIOMowP/
s505/WhatsApp%20Image%202022-07-07%20at%2017.46.06.jpeg" style="color: #cd2b25;
margin-left: 1em; margin-right: 1em; text-decoration-line: none;"></div>
<div class="separator" style="clear: both;
text-align: center;">
</div></div><li style="margin: 0px 0px 0.25em; padding: 0px;"><span
style="font-family: times; font-size:
large;">Voltmeter</div></center></div></blockquote><blockquote
style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align:
left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family:
Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align:
center;"></div></center></blockquote><blockquote style="background-color: white; border: none; color:
#4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><div
class="separator" style="clear: both;"><span style="font-family: times; font-size:
medium;"></div></blockquote></div></blockquote><blockquote style="border: none;
margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"><blockquote style="border: none; margin:
0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color:
white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px
40px; padding: 0px;"><span style="font-family: times; font-size: medium; text-align:
justify;">Merupakan alat untuk mengukur tegangan pada suatu circuit. Dalam menggunakannya kita
memparalelkan voltmeter dengan rangkaian yang ingin diukur besar tegangannya. Jika tegangan
berupa tegangan DC maka pengalinya di set pada bagian DC, dan jika AC maka diset pada bagian AC.
Hasil pada layar akan dikali dengan pengalinya terlebih dahulu, maka akan muncul nilai tegangan
pada rangkaian</blockquote></div></blockquote><blockquote style="border: none; margin:

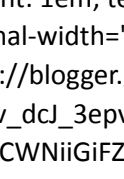
Opx Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px Opx Opx 40px; padding: 0px;"><p>Spesifikasi:</p></blockquote></div></blockquote></blockquote><blockquote style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px Opx Opx 40px; padding: 0px;"><p></p></div><div class="separator" style="clear: both; text-align: center;"></div></blockquote></div></blockquote><blockquote style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><div style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><div style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px Opx Opx 40px; padding: 0px;"><div class="separator" style="clear: both; text-align: left;">Pinout</div></div></div></div></div><div style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><div style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px Opx Opx 40px; padding: 0px;"><div class="separator" style="clear: both; text-align: center;"></div></div><p style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"> </p><p style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;">
</p><p style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;">
</p><p style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;">
</p><p style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"> </p></div></div><div style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><b style="background-color: white; color: #424242; font-family: arial; font-size: x-large;">Generator Daya
</div></div><div style="border: none; margin: 0px Opx Opx 40px; padding: 0px;"><div style="text-align: left;"><div style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px Opx Opx 40px; padding: 0px;"><div><b

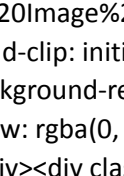
style="color: #424242;">1. Signal Generator</div></blockquote></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;">Signal generator berfungsi untuk memberikan input berupa tegangan AC pada rangkaian. </blockquote></div></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><p style="text-align: center;"> </p></blockquote><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><p>Spesifikasi: </p></blockquote><div class="separator" style="background-color: white; clear: both; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; text-align: center;"></div><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><div><b style="color: #424242;">2) Power Suply</div><div><div class="separator" style="clear: both; text-align: center;">conversion efficiency:
96%</div></div></blockquote></div></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div style="text-align: justify;">
</div></center></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><center><div style="text-align: justify;"><b style="font-family: Times; font-size: x-large; text-align: left;"><u>BAHAN</u></div></center></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div style="text-align: justify;"><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><b style="font-family: Times; text-align: left;">Resistor</div></center><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div class="separator" style="clear: both;"></div></center><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"></div></div></center><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div class="separator" style="clear: both; text-align: left;">
</div></center><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><center><div class="separator" style="clear: both; text-align: justify;">Resistor adalah komponen Elektronika

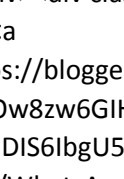
Spesifikasi

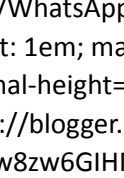
Tabel warna

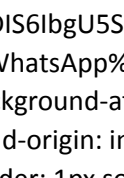


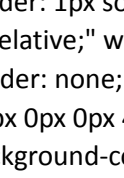


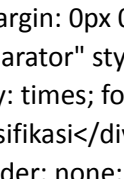


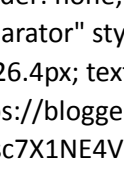
















54f_XXiXanw-6kZjY0c4VBEEULM2-DRRRwlmVqn98rOpKlf-_aBtSfsF9Evj7SKyAakmKhr1hlqxMUUnT/s1280/WhatsApp%20Image%202022-07-06%20at%2004.34.45%20(1).jpeg" style="color: #cd2b25; margin-left: 1em; margin-right: 1em; text-decoration-line: none;"></div><div style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;">
</div><div style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"> Op Amp - LM741</div></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;">Op-Amp adalah salah satu dari bentuk IC Linear yang berfungsi sebagai Penguat Sinyal listrik. Sebuah Op-Amp terdiri dari beberapa Transistor, Dioda, Resistor dan Kapasitor yang terinterkoneksi dan terintegrasi sehingga memungkinkannya untuk menghasilkan Gain (penguatan) yang tinggi pada rentang frekuensi yang luas. Dalam bahasa Indonesia, Op-Amp atau Operational Amplifier sering disebut juga dengan Penguat Operasional.</blockquote></div></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><div style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><p class="MsoNormal" style="color: #424242; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; margin-left: 0.5in;"></p></div></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><div class="separator" style="clear: both; color: #424242; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; text-align: center;"></div></blockquote></div></blockquote></blockquote></blockquote></blockquote></blockquote></blo

`<blockquote style="background-color: white; border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><div class="separator" style="clear: both; color: #424242; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif;">Konfigurasi PIN LM741</div></blockquote><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><div class="separator" style="clear: both; text-align: center;"></div></blockquote><div class="separator" style="background-color: white; clear: both; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; text-align: center;"></div><br style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;" /><div class="separator" style="background-color: white; clear: both; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; text-align: center;">Spesifikasi:</div><div class="separator" style="background-color: white; clear: both; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; text-align: center;"></div><center style="background-color: white; color: #4e4e4e; font-family: Crushed; font-size: 26.4px;"><div class="MsoNormal" style="margin-bottom: 0cm; text-align: justify;"><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><center style="font-family: "Comic Sans MS";"><div class="separator" style="clear: both; text-align: justify;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><b style="font-family: times; text-align: left;">Kapasitor</div><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; text-align: center;"></div></div>
</center><center><div class="separator" style="clear: both; text-align: left;">Kapasitor adalah komponen elektronika yang mempunyai kemampuan menyimpan electron-elektron selama waktu yang tidak tertentu. Kapasitor mempunyai satuan Farad dari nama Michael Faraday.</div></center></div></center></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: left;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;"><p style="text-align: left;">Pinout:</p></blockquote></div></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align:

<div class="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding: 0px;><p></p><div class="separator"
style="clear: both; text-align: center;></div></blockquote></div></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;><blockquote style="border: none; margin: 0px 0px 0px 40px; padding:
0px;><div style="text-align: left;><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; font-size: 26.4px; margin: 0px 0px 0px 40px; padding:
0px;><center><div class="MsoNormal" style="margin-bottom: 0cm; text-align: justify,><span
style="font-family: times; font-size:
medium,>Spesifikasi:</div></center></blockquote></div></blockquote></blockquote><blo
ckquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;><div style="text-align:
left,><div class="separator" style="background-color: white; clear: both; color: #4e4e4e;
font-family: Crushed; font-size: 26.4px; text-align: center,><a
href="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXSg3Sx4rPzyIvpP1oOuHNpjFqi09YBU1s_WOWKKOFn1MOjOPFRssYDu2C_WXwdPhRaoPuYP-M5b6CY8kOnjh014N28q4ncdP88xk9fzs-kb2CKzk6k5OLjzPq4zx-C2U29IVKM3Ge04QujsY6XXDq3xnIJwJHM9m5D6FWNaCVoAjQ8Jxomrf03kt2BezZiT/s796/WhatsApp%20Image%202022-07-07%20at%2018.11.41.jpeg" style="color: #cd2b25;
margin-left: 1em; margin-right: 1em; text-decoration-line: none;></div><center style="background-color: white; color:
#4e4e4e; font-family: Crushed; font-size: 26.4px;><div class="MsoNormal" style="margin-bottom:
0cm; text-align: justify,><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em,><li
style="margin: 0px 0px 0.25em; padding: 0px;><b style="font-family: times; text-align: left;><span
style="font-size: medium,>Ground</div><div class="separator" style="clear:
both,>

3. Dasar Teori

Spesifikasi OP-AMP Parameter Frekuensi

14.6 SPESIFIKASI OP-AMP— PARAMETER FREKUENSI

Sebuah op-amp dirancang untuk menjadi penguat. Operasi ini cenderung tidak stabil (berosilasi) karena umpan balik positif. Untuk memastikan operasi yang stabil, op-amp dibuat dengan sirkuit kompensasi internal, yang juga menyebabkan penguatan loop terbuka yang sangat tinggi berkurang dengan meningkatnya frekuensi. Pengurangan penguatan ini disebut sebagai roll-off. Di kebanyakan op-amp, roll-off terjadi pada kecepatan 20 dB per dekade (20 dB / dekade) atau 6 dB per oktaf (6 dB / oktaf).

Perhatikan bahwa sementara spesifikasi op-amp mencantumkan gain tegangan loop terbuka (AVD), pengguna biasanya menghubungkan op-amp menggunakan resistor umpan balik untuk mengurangi penguatan tegangan rangkaian ke nilai yang jauh lebih kecil (gain tegangan loop tertutup, ACL). Sejumlah perbaikan sirkuit dihasilkan dari pengurangan penguatan ini. Pertama, penguatan tegangan penguat adalah nilai yang lebih stabil dan presisi yang ditetapkan oleh resistor eksternal; kedua, impedansi masukan rangkaian dinaikkan melebihi impedansi op-amp saja; ketiga, impedansi keluaran rangkaian dikurangi dari yang ada pada op-amp terakhir

"Times New Roman"; font-size: x-large;">Gain-Bandwidth

class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm; text-align: justify;">

 Karena sirkuit kompensasi internal termasuk dalam op-amp, tegangan

 penguatan turun seiring dengan peningkatan frekuensi. Spesifikasi op-amp memberikan deskripsi

 penguatan versus bandwidth. Gambar 14.28 memberikan plot penguatan versus frekuensi untuk

 op-amp tipikal. Pada frekuensi rendah ke operasi dc, penguatannya adalah nilai yang dicantumkan

 oleh spesifikasi pabrikan AVD (penguatan diferensial tegangan) dan biasanya merupakan

 nilai yang sangat besar. Ketika frekuensi sinyal input meningkat, gain loop terbuka

 turun hingga akhirnya mencapai nilai 1 (kesatuan). Frekuensi pada nilai penguatan

 ini ditentukan oleh pabrikan sebagai bandwidth gain kesatuan, B1. Meskipun nilai ini adalah

 frekuensi (lihat Gambar 14.28) di mana penguatan menjadi 1, nilai ini dapat dianggap sebagai bandwidth, karena pita frekuensi dari 0 Hz ke frekuensi gain juga merupakan bandwidth. Oleh karena itu, seseorang dapat merujuk ke titik di mana penguatan berkurang menjadi 1 sebagai

 frekuensi penguatan-kesatuan (f1) atau bandwidth penguatan-kesatuan (B1).

class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm; text-align: justify;">
 Frekuensi lain yang menarik adalah yang ditunjukkan pada Gambar 14.28, di mana penguatan turun sebesar 3 dB (atau menjadi 0.707 gain dc, AVD), ini menjadi frekuensi cutoff dari op-amp, fC. Faktanya, frekuensi gain dan frekuensi cutoff terkait dengan

class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm;">

12pt;"><o:p></o:p></p><div class="separator" style="background-color: white; clear: both; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; text-align: center;"></div><p class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm;">Persamaan (14.22) menunjukkan bahwa frekuensi gain juga dapat disebut produk gain-bandwidth dari op-amp. </p><p class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm;">Laju, SR</p><p class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm;">Parameter lain yang mencerminkan kemampuan op-amp untuk menangani sinyal yang berbeda-beda adalah laju perubahan tegangan, yang didefinisikan sebagai</p><p class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm;"><o:p></o:p></p><div class="separator" style="background-color: white; clear: both; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; text-align: center;"></div><p class="MsoNormal" style="background: white; color: #757575; font-family: Roboto, sans-serif; font-size: 15px; line-height: normal; margin-bottom: 0cm; text-align: justify;">Perubahan Arus Laju perubahan tegangan memberikan parameter yang menetapkan laju perubahan maksimum tegangan keluaran saat digerakkan oleh sinyal masukan langkah besar. * Jika seseorang mencoba untuk menggerakkan output pada tingkat perubahan voltase yang lebih besar daripada laju perubahan tegangan, output tidak akan dapat berubah cukup cepat dan tidak akan bervariasi pada kisaran penuh yang diharapkan, mengakibatkan sinyal terpotong atau distorsi. Bagaimanapun, output tidak

akan menjadi duplikat yang diperkuat dari sinyal input jika laju perubahan tegangan op-amp terlampaui.

Frekuensi Sinyal Maksimum

maksimum op-amp dapat beroperasi bergantung pada parameter bandwidth (BW) dan laju perubahan tegangan (SR) op-amp. Untuk sinyal sinusoidal dengan bentuk umum

o



Selain itu, frekuensi maksimum, f , dalam Persamaan. (14.24), juga dibatasi oleh bandwidth unitygain.

Selain itu, frekuensi maksimum, f , dalam Persamaan. (14.24), juga dibatasi oleh bandwidth unitygain.

Resistor

Resistor adalah komponen Elektronika Pasif yang memiliki nilai resistansi atau hambatan tertentu yang berfungsi untuk membatasi dan mengatur arus listrik dalam suatu rangkaian Elektronika ($V = IR$).

Jenis Resistor yang digunakan disini adalah Fixed Resistor, dimana merupakan resistor dengan nilai tetap

terdiri dari film tipis karbon yang diendapkan subtrat isolator kemudian dipotong berbentuk spiral. Keuntungan jenis fixed resistor ini dapat menghasilkan resistor dengan toleransi yang lebih rendah.

MS"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"><div style="font-family: times; font-size: large;">Cara menghitung nilai resistor:</div></blockquote><div style="font-size: large; font-weight: 400; text-align: left;"><div style="text-align: center;">Tabel warna</div></div><div style="font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; text-align: left;"><div style="text-align: justify;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: center;"></div><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: center;"></div><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">
</div></div></div></div><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><div style="text-align: justify;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">Contoh :</div></div></div></div><div><div style="text-align: justify;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">Gelang ke 1 : Coklat = 1</div></div></div></div><div><div style="text-align: justify;"><div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">Gelang ke 2 : Hitam = 0</div></div></div></div><div><div style="text-align: justify;"><div class="separator" style="clear: both; text-align: center;"><div class="separator"

style="clear: both; font-family: times; font-size: large; text-align: left;">Gelang ke 3 : Hijau
 = 5 nol dibelakang angka gelang ke-2; atau kalikan 105

<div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">Gelang ke 4 : Perak
 = Toleransi 10%

<div class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear: both; font-family: times; font-size: large; text-align: left;">Maka nilai resistor tersebut adalah $10 \times 105 = 1.000.000 \text{ Ohm}$ atau 1 MOhm dengan toleransi 10%.

<p>Spesifikasi</p>

</div>

</div><div style="font-family: 'Comic Sans MS'; font-size: medium; font-weight: 400; text-align: left;"><ul style="line-height: 1.4; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"> Op Amp - LM741</div>

Op-Amp adalah salah satu dari bentuk IC Linear yang berfungsi sebagai Penguat Sinyal listrik. Sebuah Op-Amp terdiri dari beberapa Transistor, Dioda, Resistor dan Kapasitor yang terinterkoneksi dan terintegrasi sehingga memungkinkannya untuk menghasilkan Gain (penguatan) yang tinggi pada rentang frekuensi yang luas. Dalam bahasa Indonesia, Op-Amp atau Operational Amplifier sering disebut juga dengan Penguat Operasional.</div>

<p class="MsoNormal" style="color: #424242; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; margin-left: 0.5in;"></p></div>

<div class="separator" style="clear: both; color: #424242; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; text-align: center;"><a

href="https://1.bp.blogspot.com/-kw855goDfO8/YD0HYODPOJI/AAAAAAAAAaQ/eCco_3cgdW4HeD
O2qhtir4yp33oq7ugtGCLcBGAsYHQ/s300/ic%2Bopamp1.JPG" style="color: #3540a0; margin-left:
1em; margin-right: 1em; text-decoration-line: none;"></div></blockquote><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; color: #424242; font-family: Arial, Tahoma, Helvetica,
FreeSans, sans-serif;">Konfigurasi PIN LM741</div></blockquote><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;
text-align: center;"><a
href="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEjbtMuABzpxpBFif6-xWR8cskliv
Jl5-VDmt9KkDwHYdcfP0dBinAQvjZeJtnh2mxENZbU_ujkYhsBZfA7yT_wdobEpBhJ-go3Gme-ZQFgSCqpb
SrXpHr1NdOWm4tmdDmX3rxNqXOVmmEdYFsFTyWFOUQwu_CXgVly8EI1_glyvG_dW5g9CRR44qyTp/
s277/WhatsApp%20Image%202022-07-06%20at%2000.01.50.jpeg" style="clear: left; color: #cd2b25;
float: left; margin-bottom: 1em; margin-left: 1em; text-decoration-line: none;"></div><div class="separator" style="clear: both; font-family:
"Comic Sans MS"; font-size: medium; font-weight: 400; text-align: center;"><a
href="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEg3B7s3SParJA1TdglyUumkvuQ
fWNFA-oYF6FnI0-koUpFYRfL-ID0FV512iFWMuxLbHspqTp1-9RwpK4ucXrZEdisLHzVLaFrNpwot1GjqsZP
rR1Ms_cxrjRKjHM9wiJlV9LqNVtq3Z7w_-J9pwSoSpBLKFuVo2F6Z3srxe9Ib1tk6n1JR9ksPTAsP/s1015/W
hatsApp%20Image%202022-07-07%20at%2018.06.52.jpeg" style="color: #cd2b25; margin-left: 1em;
margin-right: 1em; text-decoration-line: none;"></div><br style="font-family: "Comic Sans MS"; font-size: medium;
font-weight: 400; text-align: left;" /><div class="separator" style="clear: both; font-family:
"Comic Sans MS"; font-size: medium; font-weight: 400; text-align: center;"><span
style="font-family: times;">Spesifikasi</div><div class="separator" style="clear: both;

font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; text-align: center;"></div></div></center></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><center style="background-color: white; color: #4e4e4e; font-family: Crushed;"><div style="text-align: justify;"><center style="font-family: "Comic Sans MS"; font-weight: 400;"><div class="MsoNormal" style="margin-bottom: 0cm; text-align: justify;"><ul style="list-style-type: none; margin: 0.5em 0px; padding: 0px 2.5em;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><center style="font-family: "Comic Sans MS"; font-size: medium;"><div class="separator" style="clear: both; text-align: justify;"><li style="margin: 0px 0px 0.25em; padding: 0px;"><b style="font-family: times; text-align: left;">Kapasitor</div><div class="separator" style="clear: both; text-align: left;"><div class="separator" style="clear: both; text-align: center;"></div>
</div>
</center><center><div class="separator" style="clear: both; text-align: left;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;">Kapasitor adalahkomponen elektronika yang mempunyai kemampuanmenyimpan electron-elektron selama waktu yang tidak tertentu. Kapasitor mempunyai satuan Farad dari nama Michael Faraday. <blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>Nilai kapasitor (104J) : $10 \cdot 10^4 \text{ pF} = 10^5 \text{ pF} = 100\text{nF}$; toleransi 5% = $\pm 95\text{nF}$ sampai 105nF </p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>Kapasitor adalah komponen elektronika pasif yang dapat menyimpan muatan listrik dalam waktu sementara.</p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>Cara menghitung nilai kapasitor</p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>1. Masukan 2 angka pertama langsung untuk nilai kapasitor.</p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote

style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>2. Angka ke-3 berfungsi sebagai perpangkatan (10^n) nilai kapasitor.</p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>3. Satuan kapasitor dalam piko farad.</p></div></center></blockquote></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p>4. Huruf terakhir menyatakan nilai toleransi dari kapasitor.</p></div></center></blockquote></blockquote></div></center></div></center></div></center></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="background-color: white; border: none; color: #4e4e4e; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"><center><div style="text-align: justify;"><p><br style="font-family: times, "times new roman"; serif; font-weight: 400; text-align: left;" /><b style="font-family: times, "times new roman"; serif; text-align: left;">Daftar nilai toleransi kapasitor :
B = 0.10pF
C = 0.25pF
D = 0.5pF
E = 0.5%
F = 1%
G = 2%
H = 3%
J = 5%
K = 10%
M = 20%
Z = + 80% dan -20%</p></div></center></blockquote><center style="background-color: white; color: #4e4e4e; font-family: Crushed;"><div style="text-align: justify;"><blockquote style="border: none; font-family: "Comic Sans MS"; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"><p>Pinout:</p></div></center></blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><center style="background-color: white; color: #4e4e4e; font-family: Crushed;"><div style="text-align: justify;"><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;"><p></p></div><div class="separator" style="clear: both; text-align: center;"><div><div class="separator" style="clear: both; color: #777777; text-align: justify;"> Jawab :</div></div><div><div class="separator" style="clear: both; color: #777777; text-align: justify;"> fc = f₁/AVD</div></div><div><div class="separator" style="clear: both; color: #777777; text-align: justify;"> = 200 kHz/50 V/mv</div></div><div><div class="separator" style="clear: both; color: #777777; text-align: justify;"> = 4 Hz</div></div></div><div style="color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400;"><br style="color: #222222;" /></div><blockquote style="border: none; color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px;"><div><div>1.Tentukan frekuensi cutoff dari op-amp yang memiliki nilai <i>B</i>1=1 MHz dan <i>A</i>VD= 200 V / mV.</div></div></div><div style="color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400;"><div class="separator" style="clear: both; color: #222222; text-align: center;"></div></div><div class="separator" style="clear: both; font-family: "Times New Roman"; font-size: medium; font-weight: 400; text-align: center;">
</div><blockquote style="border: none; color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: justify;">2. Untuk op-amp yang memiliki laiu perubahan tegangan SR = 2 V / μs,

[illegible]

vIJvo9mc08F+7Qf691ueEDDCNnSimGdZWvS4/5kH0KtLQ2r71aTltIOk/qnbuLzgU/KX7MyDXyc7itWaOI
5DNxMbE4tiCePcrjV836cKHm5vMfAfU9wZHhIBldw+1Ft6LWE8T/jGFhTMVZqvqgPTP9U0AkTnJAFcuzS
XVqXy4FO6Nj3n7eFKtJowvuuLhzlsIIZ6dNAKEgrRzYCVi181c3z6GhkWy4/LK63TFEBZ/ZaxzaX7aAWJZkgCx
qUVBcpX+kuBoMB8cSUX3YrTfGEIKBuiXWFLXhyJtf+WWEt8CoSgo1riKWcnkZXnYb/4UzuZF3TmnCFnQ
m56zjvConQJG2FaGNaPjZzoZL7XbTuGfDC5e7Vd/5av3K/Beo3a0b9+e9u3b067J2/jkyEr+5r9Wj+l4VTW
CM5tnM6Tn1wwcOZbxo4fQo1l1yuT3pUq/Xdy+tp8l37yNr2cJPhv9G0duWtNtwchc+RiEbR1AvSaTOWh
yrqys/46lprsPDWecQYv8k+Hdh7FkSnPyezd2gkzZ+b2ZtDqO/FjanQuLamLT5G2/HoryWeuWOPCWJof
upmDlyviXqw9aX2dANDCOPHbFIYOm8WGk/e4sb41hdzepP/+ZAFiWZlAsSkuQH5GAIEqFzbPpFWFQri
6ZGPsvX68cuxSlyHPm8hhHh2Ug8QykmWj5jHkeQ1iSOavwPfJrdLHt6bfjy+6+HhAoRycio13N14O3AvD9
avBmqMCC12ixVN8+FWOZC/klfAhpXIGDVTd2NYj4+jWp6clG7zLb16jWfXo3btx3tsLRBGJDuHN6b1lINE
xLc+WK1WrLd+o0ux7LhV/15/7zdBOO6xe0Ij3qrWISVHwLHut0CYb/P3tNZ80HUbkYad0PvtKeJRIZGHTB
m0QGS+fPTQv/ht4zFinO3aUE8wtYEXnh8FsWFRH3rNOYH1+g/4F/Gi7qiljOs5JE2R9w/Swa0VTcnnVpnAl
B861sgY1FT/vsLJqTVwd3ubwL3J3meoxJg0HJg5MKUJ5aoOYPNNBZsDwjfHBYh+jzVALE2zCwN7DjPdw3
znMCuGnuYtX1d8qg9gZ7T9lc9bCCGendQDhBHK6nyf0HX5WUwP1EAKpybVwjN7cdquuJV41RjfhTE2a
YAITCtAdCc4GojeSd9KruQs05HFJ6JQNR1d07CG/suq5X9wRbNydEwNPHKWpdOy08RqOjabjqazURG8
mLkbr2SuXzhsPe2LZMPFsxYDfr+dZugwbBqqbsNut6GmdrvpE2I5OoOW9QL4/U7y6cFPM9nPAXffpvwY
PyDB8s8oauUrSPP5Z1K0wBixB1m2YC8RQOTW9hTzqkbQiUx0n2SifAy7DXNsBOHWuM9St8Td3qhm6sJ
Y5/zcpvi6lqDixwGsuukAx21Wdi2Ja/7X+TgwmKSNgtajY6jhkZOynZZxOIZDt9nQNNQ3zjWAWz93lITQ+m
OidfankmpMyHRdzlKpF03U0zUrov6tY/scVtOjd9HvrFfJ9uoDrdgOHw8bttao6PomAX/H4LCD5Uhgmg
Gie4YBIOqJVXpJvXsGpxUHDocd7cZq2hTKQdG2GwkzDO5sm8Xy4xpgYNNiOLmwOYW8PmDmCeWhz1
slIZ6VNLowTBwYVB7PonUZsPI4oWYLVquV2KtbGfQ7AIXrBrlzKq72cNjMHJ9UAW+3igzcG4XNAdii+WtA
Bdy8P+L780rcCHz9Bj818iV7ic5sDLUBKsdmNadUblfyv44RXyDnYur4wXze+mvmH4rr8dVOz6VV6dy45q
9lk74Tmbvwe4L6+tOs1wIOZ7ZTWDnBhOo+vNpxOWkNfTCOMi5tWMCCJevZ+scyArt8y8KQJ3j3Qzyb+R
QL21Wi5sj9x5D5QGRvYbHdY0algWXXO9Qb/t4dgcFo6OeY/cnh8w/UzqsZPo8S0VTgWljMrHYeJKcBCNXn+
XQTsiQDnLgpavUqBMQ0bviMxUK5D92nL8i3pQc9ju+L58g/Dfv+Y1n1qMOZBsCivtNHNblSa3a34qNunL
xLkL+T6oL/7NerEgvQ9dPcas5qXI7ZqP1z/qyrBJUxk/+HNafz2fQ7FAzF8MqJiHXIwAELTICCG7VjOjVzXy5i
pE0znBHD1/m3t/DaCCmzcffX8eJe5Ly42fGuGbvQSDn4Y+ME9FynK6zcqOpXnF+30Clgbzz+61zB3Ti1qF
XfH2G8HWy1FcX9WazwJ3ck/R0HWdiB19qV6tF1vCjYc/byGEeEbSCBB2ri5qSnF3T3wKFOctv09o2qIRH9
X6kGa95hB81RLXrWyL4Mz2JQysXxRP9wL49ZrL9rOhXN+/iN5+BXH3Lk3TwJUcvhPG2Y3jaFnGG/d8Ffli
1i6uWQ1Qb7Ln+57Uf6sERUuUw6/5IJbuv0litadybecMvvywPCWLfKZUhbq0H7Wal6HODOYLZ8PAHsw
8ksak0EY4f01pw2e9V3LRYsNuj2DbI5Wo1CeYDK45H4lhucjvgY0p5+NLIW5zCb5oSpxbw3KNfasm0qV8
PtzdfXir3QTW7/Etq9LkSNfQ366nf6lv1MBIqPyASwHR+FXrgtr7hlgPcXcFq+R1yMPZb/ZTmPDDlKe7D0
2jRnK0nNJEkrMTiYOWcCpVLKQem0nM778kPili1C4VAXqth/F6iOhGc6HoN7cw/c96/NWiaKUKOdH80F
L2X/zfhlonPm1L/XeKErpCg34asY2zp5ZQY+qhSleoztNm9IYW8/Crp7U7ppiCsP3yHs7EbGtSyDt3s+Kn4x
i13X0h9PYj32I73rvErXyq/zXrsxbDy6m6ntG9F5yCL+PBXG9dVtKF4H4Zr1ncj382Ywbmgg8/beSggmD3ve
QgjxLKR9F4bDIPj0TUtcC4TFbEkxU6TDZkuYcdCk6vEtEdBU+PdANFv8HAA6lvh1SpJZCBNN/DNjsapx73/g
OHSU+08CNVuwqjbnb2s0m9O8ejTtCaTWay2Yc38mJccNljYpRpUh+5/4yHebZkKstxQtEDpKwtMydWw
OM4dHvoubx/tMOpl+IZJegDBSK4h0ygdUTk2px6vtfuR2/GejW0zc2T6OPtMz/6wOw2oh+UwKijmtv5p
k9tL734tMfehJ3hf/XXng62RT475rZguKZgccWM0mTGyrumFLuHvFZNGwxX1p47trTJgUPf0WiLg/kPBd
NVvjZmbVzFYUTcfuAly4fVnVuBYITVF4cKLMhz1viYR4+jK+jfM/LZb931WhWKOLXlv/lbDdWlx/+XqM3f/k
uzCcFbTnMNU889Jw1nEsySsWw44W/9CrNAOEI5qLV8Kcm55av8icZ8rSbOGVxHEXlnOsnzmdVcyrIKFE
EL8N73kASKaXX0rU/HLrYtb7di122wd2Rb/afuleB6v/GzXWNfPj2KVOjB7/y3MihL3DBFNifLsdLzuCCHKb
id0XRuKeFZjzKEYNE1D0zRUxycytnDMZs/yMU03ijjtr8H/jQyb9c45z100YaNzct4mdZyJTtCgliYR4ebzkaQIs
hxfQq9Ng5v2+jT9WLuGHZccle76esPUAh+UmB34eZZdtm9Om27cMHDqCMeODmL3yH66b7Ziu7GZ+j8
rk8ypBna8CCZo4iaDxIxnUvTHVKzRg5L/OtaZyrv5Mu6p1GfDzv9y8Xy52LRPN+Ullf7LXvoAATqKRuw32
7HbNLQXoNPZYdNQRBasCS0QGtr9znTDjk2JH3+iaklaIKyTaaHeLqmHbPJkZLe4MQQohEEiCEEEI4TQJE
EIIIRwmgQIIYQQQjhNAoQQQgghnCYBQgghhBBokwAhhBBCKdJgBBCCCGE0yRACCGEEMJpEiCEEEI
4TQJEEIIIRwmgQIIYQQQjhNAoQQQgghnCYBQgghhBBokwAhhHg4hs7z/+zaF5yUsXiOSYAQQJwEB+E

hBzgZ7Uh7E8OGbo17tLzJZEXTbckqQxu6ao57XZWKMqVMIDEGnt0aX8YmrJqOLVIB2nQVs8mEyaSiSyG
Lx0gChBDCEfpZ5jSrTOtFl7CluoGD2PObmeRfHh93d3zKNmfi4h1ciE2sDK1XdzG/1/sU8SpOnYBfMqgoX
0lZlJE4Ys+zeZl/5X3ccfcpS/Mhi9lXlZaEkrReZdf8XrxfxlvldQL45WQ0UsrcZEAIYRwmnloiPoeLng3mMoxN
Y2NDBsROWfx5isu5Gu4iKta8hYInas/tKZ87eHsuKdJC0QymSpjDGwROxn05iu45GvloqtaihiYI/eoPtC5fm
+E77qFJIYvHSAKEEMJJsewO6ohfGVdc3Koz/C9zmlsad1fQqkBW8rwzmhBrshfVE8xqU49v192Sq+IUMI/
GGHdZ0aoAWfO8w+iUhcyJWW2o9+06bkkhi8dMAoQQwinGvU1MmrSCbVM/xscIF2/23khEWle2lqO
Meic32Qr7sy486QsObq4NoMkXSzmvPYWDfsE4VcZYODrqHXJnK4z/g4WM4+ZaApp8wVlpZPEESIAQQj
jBzvUVE5m6NRLb5cW0LpSN7MU78eMNe+qbG6GsblOQR07vEXRSSVwfs4ex7Tow/bDI6Rz2C8XJMsYg
dHUbCmZ1572gkySWcgx7xrajw/TDSCmLJ0EChBAi8/QzLB4/i/0WwHGHVV+UJkdWXxrPOoOe6hushlyp
Sp7sxfh8c2T8OpVT87rhPzqYqKd24C8Qp8sYrCFqJlonO8U+30xCKZ+aRzf/0QRLIYsnRAKEECLTrle+Z/yC4
9wf0xe1pS8VX3HBvdY4DiTvfgfA4N4afwpm9aTm9LNoxDWr9+8wgHXS8q58sYjHtr8C+YFc+a0zkbV8i
s7d+BATK+RDxBEiCEEJkUQ/D0IH66nOSmQss+RvrlxuWVKgzYlvqlrvXYWN7Nk4OS3bcSRQx7JnSj97Lza
V5Nv9weroyxHmPsu3nIUbI7W6MgZs8EuvVexvnUCTliwpmXR1CZJ4ECCFEphj3NjB58nruPHBjQ3JsWg
O8XXJQpvtq7qZ2uRv2G/6Fs+FVdw6nQhbQu+csjkinfKoeuowJ4zf/wmTzqsucUyEs6N2TWakVshHG1gH
1aDL5IKYncwriSIBQgiRCXau/hLEtO0pr4BtlxbQqmA2shVqxaJLqUx5ZD3OuGp5yFm6Dd/26sX4Xdlpn7
pHKGOSHB9XjT5S9Pm2170Gr8rjEI0qF//cbGYzHstSEemQQIIUTGtNMShjmZXRFWrNzki/kyy/yLk8PF
m/pTjpKydyM9e2LkM3Fk1oDfud2WjWXYUNTdWx2OzbVgvKy9XE8UhlD2Pr2FMnmngmetAfygaiEb2G
1mYiPCsaZ1Q4cQTpAAIYTikPXAOD4p50fj5s1pnmJpxsflfcnp4oJb9eGknPNI4cSE6vi82pHlqXbKA4ZG2LE
NLJizhPVb/2BZYBe+XRjyUt1++GhIDmQJCVT3eZW0y1MfX+lwXSE4qBGvzvulHRFP/HTES0AchBAiAZH8P
foD8nl44eWV1uKOu7s77nnf5budkSmmpQ7fMJAeM4+Q+k0EBuF/TaHNZ71ZedGCzW4nYtuXVKrUh+D
oJ392z4dHL2PCNzCwx0yOpHGNBlg4OMqPcl3WcE+mtBaPgQQIIUTGFFPCEX8zWIKvv8yY03oilGkPgbVe
o8Wc+5MgObixtAnFqgxhf+wTOp/n0SOXMXZJTLGRAPcWUeq/S7sfbMv5BPBYSIIQQz1Ts/u+oUqwRS6/F
V2u2Cyz2L0+9sfufmy4M1ZTOSyheEPFOXxWthkLryjy4DLxWEiAEEI8U9G7+IK54pdsDbdjt2vc3jqStv7T2
Jf2wx+eKiNiO8Na9mRt2LM+kkfh4M4af974cBL/nDvHddPzUbbixSYBQgxbFkOs6BXJwbP+51tf6xkyQ+b
ORb2vDz8yUrI/xpT0KMqY1M86fJFYuPqz+2oWncAP/97k+eldMWLTQKEEOKZ0xULqm7Hbrehabbnpon
dfmUFX77tikvWgrRZHfrcHNdDsZsxnTV0uYVTPCYSIIQQIjVGBNtHdqJTI4YUzZ6bd0Ydfw7GZAJxPJAAIY
QQqbCGzKRrl2nsPzKdDzyzUqD1KkJf6CYIIR4vCRBCCJGc/SorevszZHMORuQWupXITu4qlzgsTRBCJAAIY
R4wZkxmzO5KJnZn0HKzhG07b4w7tHY2jn+V8uTrAvA8evdIE0Qdl3FqqhomoamKljiNiXM1GHYbqsmEy
WRGt9tf7DEUQiQJAUilKtQHA8dzs6R1kAb3tgyhoZ8ffhkuNWk1aT8xGZ23NYSZ7ZswdOvd+GdR3Oa3Ti
XI4VaJYQeTzdhoEacYfPslfT8eiAjx45n9JAeNKtehvY+Vei36zbX9i/hm7d98SzxGaN/O8JNa7II8ajlYjxquUq
kEQ9PAoQQIHu2os8f5eDBg4+4HObwl+/jIEfPR5P2HluPswXCztVfv+L9Cu/RqF172rdvT/v27Wjyjt85sua
n+S93ElORHPd2M6HRW1TruoQj4UpCC4T59t9Ma/0BXbdFYthDWd+2CB5VR3LILLwF4IHL+AjhZ53gyCO
U65HTd1AkQ4IHJAFCCJGKWA4vGMBXX331aMu3Qxn67SPu46uvGLDgMGnGpam3BYsnkkkGAMCJ3Mrx
xa6YcjHjgaZi3futCsexuVPzuX8zxf/OfUbXIV7A5888kn9nRIPbgMhbsjQAI2dq+GF7VgjiR4m8/ahkHMGb
WRPo9QrkGTP6TGy/bU0/FYyMBQgiROkVBeW6WtA7SIGzrMBrVrEnNDJfatJ3yTzpdGBaOzmhJvYdfuZ
Osy0Q9PRk/Dxd8m/7ILQdQocqY93Lj+cF0zqQ6K5MeHzTSCxCPoYztj1quMimEeHgSIIQQl7JH0QJhw3xq
le0q1WTK/tgHWxQMg7Y7K2hRMCu53ujH9nAbjqidf0qB/ka/sTtdLsAMggQQrZAJEAIIV5yBpaLvxPYuB
w+vIXoNjeYiyZH4mvX9rFqYhfK53PH3ect2k1Yz/FrBxj5rhse70/ipJrevtMLEEY64zqEeP5JgBBCCGXolrjbL1
XdlrIFQlCsh6Wt23AQy57B1fDM25BZxy0pbs807BqaAekFCEf0Ra48N8/8EMJ5EiCEE0Ih2K6to59fMSP1
mM3+W2YURUVVVTQlkrPbV7IhJAq7PZR1bYrgWW0Mh2K0uDs1NBXFflud08ew/Ey6zRdCPNckQAghHj
MD/aW4NdCB5eYBfh7/DW2bt6HbtwMZOmIM44Nms/Kf65jtJq7snk+PyvnnwKIGHrwKDmDgpiPejB9G9
cXUqNBjlvw8zs6Why4RU4rkgAUlI8Vg5wkM4cDKaNoD++k9xYNMUrBZrYguEppqHHn7xht6GYTJhMFIQt
SQuE1YzJ9DDdFw7CQw5wMvrlKF3xfJMAIYR4jHTOzmIG5daLuJSpEYK2IyRoPCb6WeY0q0zrZRZcyOQBty
lc8ORlghBCPj3KlOPoeuHg3YOqxjPr3HUSdP8T5MLkXlBOUQ0HU93DBu8FUMixeKV/xhEmAEEI8NrG7g+
joVwZXFzeqD/8Lc1obOmyYL61nYKsA1qfygCqRmlh2B3XEr4wrLm7VGf5XmqUr5SueCgkQQojHw7jHpk
mTWLFtKh/7uJDrzd5sjEit8rJy5+ASvqxetil1p3AyVpFm9kww7m1i0qQVbJv6MT4uuXiz90ZSLV4pX/GUSI
AQQjwW9usrmDh1K5G2yyxuXYhs2YvT6ccbJ8s2XJ6JWO6fURJ11wUrdmeHv1nsvuuTKmcPjvXV0xk6tZ
IbJcX07pQNriX78SPN1KWm5SveFokQAghHgOdM4vHM2u/BXBwZ9UXIM6RfD/GsziT4mFNGuF7BILZ6

w36bQtFUeQKQUP6GRaPn0Vc8d5h1RelyZHVl8azzpDyWVhSvuLpkAAhhHh01kN8P34Bx+8P7lvaQt+Kr
+DiXotxB6zJNtY5P6MePkU6s+ae9M9nhvXQ94xfcJzE4u1LxVdccK81jhTFK+UrnHJEEKIRxYTPJ2gny4nub
XQwr6RfuR2eYUqA7YRIbw9GkoAACAA SURBVHRjx21+aVuQvJ/O44rcIJAJMQRPD+Kny0kKy7KPkX65cX
mLCgO2RT24uZSveEokQAghHo1xjw2TJ7M+2TOw1WPTaODtQo4y3Vl9N8lr0Vv5pqw3fuNCSHHxLFlw7
m1g8uT1yR4xrnJsWgO8XXJQpvtqkhavIK94WiRACCeif3qLwRN205U8hds1jQqIDZshWiVZKJjyWHR1D
V+w36BcdgpOzAFw+wc/WXIKZtT1G62C4toFXBbGQr1lpFSWbtkvIVT4sECCEI9A4vXgkk3dFYLvaky1m
Li/zp3gOF7zrT+GoCqBzYXYD8hbpyOpbdzl35gYP8zill4Z2msUjJ7MrInnZWGaL7PMvzg5XLypP+Vo/PgIK
V/x9EiAEEl8POsBxn1SDr/GzWnePOXS7OPy+OZ0SZz4yAhlbcdCeNUYwroNa/jztDSyp8d6YByfIPOjcSpl2
7x5Mz4u70tOfxfcqg/nLzNSvuKpkgAhhHhoMX+P5oN8Hnh5eaW5uLu74+6el3e/20mkfp1VncpT9M2m
jPvzilwdpyuGv0d/QD6PtMvWy8s9rnzstv3OyMxbFK+4umRACGEeAQKJpMpc0v8xbDdYsJktqDK3EY2U
zJZtiZTwoBJKV/xtEiAEElIYTTJEAIIYQQwmkSIIQQQgjhNAKQQgghhHcABAgghBBCOE0ChBBCCCGcJgFCC
CGEEE6TACGEEElp0mAEElIYTTJEAIIYQQwmkSIIQQQgjhNAKQQgghhHcABAgghBBCOE0ChBBCCCGcJg
FCCCGEE6TACGEEElp0mAEElIYTTXu4AYbyg+xZCCCGesYwDhENHUTU01YzJbEHRn8JRPVEGuqaiWKIJ
D9dpxLitutlKxpr+Rg+5byGEEOLFUGA0Lm5az5jRo9lxJef8HbFD/l6+TmUp3NsT4Qj6hQbZvanmd8bVOu
9k6h0to35ZyR1X6vOt5vuYn/M+/6vMWzP+giEEEl8TekGCPvtFXxRrR6Tj8Sgmc6xdlgnvppzhNindXRPhIH
5zAl+yZeTUI+kX8IH7xtBnTLV6b3pTqYChDP7/k9xhHPu9D3UZ30cQgghnpp0AoSD2yvaUChvfZzeJ6s+7a
oV63+hlgfSOtCmankFSe7MJzZ93+Fxu0tQ2nXZweRz/pQhBBCPDVpBghFieJgUDXcfqz8LwZRVFQAMN
hQ1etWMyAXcViNmGyJLZfO3QVq6KiaiqKxYJVTTIWwGHHpqJYLSbsgE1T4t5vtqDaARzYVctmswmTyYK
S4WW/Hc1swmQyYdZtGIBh0zCb4tZpeuJx2XQLjPOCDSB8M23uV/I2FavZjMlkwmLVk419NLDbtPhjS7ra
hqqoqKqKajU/el6Z3ncqZ6PFbWsy69jiTibh/EyaTsLZ2HQsJhNKKm4Dh66iqgqKxYzZoqBIMvQYNg2rqgGp
CmaTCbPZjMVqxWpNctIOHVVVURQLZrMFJcnOTaeW06WCFyU6beS2ojxwTEIIf67Ug8QMvYdYMqwxHf
3ykSNXYT7+ojcBACNyeugut45uYEpAMxr1Xc8/vw+ncYUSVOiwnEsaYL3OX4tHEBAwmOHD+9O1eRP8+
y/i7xtWDOzEXNzDr5N60uSjzsw7eJyNE7vyUaUylHqjPgPWxCT69iF+Ht6WWuXLUPzVOvT59TxaOgev39
rGil+L4uFZnLqjNnPFZMuF3wP5rKwXHgWrOWvx39zSAPUG28Y14LXq37DmipZYyXdzW97fxtChdnnKFC9
Ntc6z+Tsqqp3bFhCj7NI0SRm/HE9yXEO3D24ksnDBjE8cBjfdmxEO54z2Xk1fnRpZvad+smwbcTHFPXwp
HjdUWYy+bCL2wu8EfIYWL4+CVOU1mL/jToYb28bR4LXqfLpMstxxWa+z58dJDonTkW4Na1K9Tmembb+
WcZeCI4JjqycweOBwhvdtR503i1OizFu806ApHUdu5IYNwMr1PT8yaUgfenZoSM3qdeg8bTvXVEC9zObx
bXktZbcX29Nj4CBTNTyLd3PTAgHxH9DOiOQEfWt+A65vT/k+zMmFEXBFHmevT8N4j2fHPhU7MqomXO
Z0usTanVczFlrJLvHNuSd9nM5Gqmgairm638yrHZBijYy65IG+bbJ1nTpWJ5XlvwyYA5rPv3MrevBDOufl4
8XqtPt5Fz2HTSbnev7WHKpwVwr9yP4JjODI/nxqrulMlViKZLrmlHDFs42wdXxi1vA2afvz/c0+DOrz3oPPU
wJoiV5HPgXb4jQ+ds4sj5swRPb0Ex18I0m38FHQfRZ/5gdq/aFMrtg1/QMazx+4ncM4Hmjfrz2yUzqqoSf
Wgi9fJ7UuGbLYQZmdl3OmdzYxXdy+SiUNMIXI07GcK3D6ayW14azD6fMHjVuPMrPTpP5bAJMKIiHt2Ud
hP3ck9RUKJPMK9IYdxfbC+Sy+n9NTuHa3tRteIXrL2hoqkxhMxuSoHsPnw47QQxVjtgeBU8mqbtJrL3noKi
RHNIxksKu79K+yWX0QHb7fW0K5pTWiCEE0iIk84YCAsho+MCxOIr92sFB/bwP+ISKgfedRZw0mzDplow
W3S0C7NpWqQlrVbcStJUb+Py8nYUylGlxrPOozl0Li/4CG+3ygzdF4nNYQAqJ6bUwNoTct/ticRuxK07Pf0
DPD1qMfNMBtfrkVvoU96VQm2XxVW6QOzWHrzl6kvz+Zfimv2NUNYODWD+2aStBDko3n49NzQ7hm
Fg3F5Jq0I5KdUzfuyCYcN8fAo1PfNqDxX8gFBPM/2zstSadCQ+UADaRVYM9KfbrCPEGpnCd9onw5Y+5XE
t1JZliSdDj7dc8W0+n0txJ0Po2qEEzD8bV4FfX0Kb8vWZEhIT182kmDkzuyG+2Xz5dM6FdALLPTZ1Lk7uSv
05al7/dK//QPMcrrzx3d9xA2Vt11nSpjz1p4QQoygoioL5zGwa+mbD99M5XNCBiD/xL5qTEp23yxgIIYR4i
TgZIIDoYLqXzkXBFr8TnrDSwc1fWpA/1+v03Ptgk4Ht8jzqe2clf+uV3HHYubasHj65qzDiiCV+CzvXI9bHx60y
ww+bE9ctj1s3ImFdWkzsGVoVt/zNmHfrBigcmtqlcgVewbfrBm7pYL/2A/37LU8IGA+MU7i/m6iddCmVi
yLthArvOq/NI86XokBwnZ5AZ/mL0nnPx+MAXbFilVzbT9pns2eoVR1y0+zeRexAcqhQTTQv4BXfBsXO+5k
+KF/P5bHn0zYhk4U8yxLix4BBATELb26NKS2X01aTjuYzh0zYWz6vAQ5i/iz8nZ85lvdQ69yBfnof2fuij/CNt
CpmCdIW/RI2HdAry40rO1HzZbTOBiLBAghhHhJPVSA+LJ0Lgq22JQkQGicnVsDzxwl6bI12TV21DY6l8yB1
4dLuKSNEsDiw0Jg0gDxQ3183Cox7FBGAQKs/46lprsPDWecQYv8k+Hdh7FkSnPyezdg2gkzZ+b2ZtDqO6k
PdEw4zp10LZWlwM3/SBIg5j8QIMwHR1LRvRjtN6ZWVRpO7Tudk2FsTXd8Gs7gjBbJn8O7M2zJfJrn96b
BtBOYz8yl96DV3HEA6FxaUheflm359ZYS3wKhoChWLBLYLfiW9YZsOIjYP4v2ChWky8xCRqo751ELa1u7G
j1f0+PNfQl2flrT99VaSfStYLRysFiXujCVACCHES+kxBQgHt39tTYGsXtSdef7BZvOorXQu+Qqlum0mAucDx

NBMBAjUE0xt4IXnR0FsWNSHXnNOYL3+A/5FvKg7ainjeg5jU2SSyvQhA4Rycio13N14O3AvD7azGKgxpgrg
7Hx41QKBjYmoDvDw/ImjDlvr0msMJ63V+8C+CV91RLB3Xk2GbluPjioNbK5qSz60ygX8lHyxiYI2MQU3v
bgwjmpBFX9OoxdcETpnFnPm/sutCTMKcF45bK2iaz43KgX+RYu/WSGJUR2KA6CQBQgghXibpB4hRcQFi
YapdGEKDBOIx59KyaE58m87nbJJh+NrpmdQt8Abd14TiwM61pWkHiOEPGyDQOT+3Kb6uJaj4cQCbrjA
cZuVXUvimv91Pg4Mjhs8eV/45ri5Grqm7GYo3OaPIF0YY+PHQETvpG8lV3KW6cjiE1Gomo6uaVhD/2XV8
j+4omV+3+mezfm5NPV1pUTFjwlydRMHDM6v7EpJ1/y8/nEgwUOxnp0DDU8clK20zJOx2roNhu6pmG+
EcziuRu5ks44SvXkDwwdsoyj4THEmsyYTWYUTcdmT9g5Y2p4kLNsJ5adjkXTbdh0Dc18g+DFc9l4RYflrXQ
ulpOi/hsIx8ChZW7KLSGEEC+2NAOEzRbJnn7lcfWoweRjJmw2A3Bgu7uBTiWYk7/JL9yw2RK7BYxo/p70K
SXy12DQ5muYVQ1NucvusZ9SveNiTqmAXeHc7Lp4u1VmyP5o7EbcuvPff4i361v03R2FzRG37uycuni7Vq
D/3qi4OREyYL+2HP+iHtQctju+398g/Pevec2nFmMOWJNSaaDf/Jkmvtko6r+OuzZH/Hn9Rrsi2cjf5Gdu2g
xw2DAfn0QNDzqcDtxLIM0BqByb1ZxSuV3J9/pHdB02ianjB/N566+Zfyg28/vO+GRY7l8Uj5rD2B0/iMEI/5
2vX/Oh1pgDJD0btNPMbVWa3K75qdikLxPnLuT7oL74N+vFgsPpzRkazZ6h1Sn6Vmv6jhrL+HHjGDduPO
Mnz+KXXeeJdABonJ7bitK5XclfsQl9J85l4fdB9PvVrQg8Fh+PK2fwvw6q64/72cLZeOMNfOw5x54V/XooQ
QoiMpB4glBscXD+Tr6rlx92jMLV7zea3fZeIDD3KmrH+IMvrjnfpFgT+sJ3TEUlaJ5Sb7Fvcj7aNmtF1wAhGD
unPkClrOB6uAyyq3D61mZNNSeHkU5aPBP7HvWhR3Q35jXMSyeLvn571e89l5PozbR34lsHEpvDwKUbpPP
YvZcNmX8YCrjHpvGDGXpuSS1V8xOJg5ZwKkkLSL26DNsHNeGst7u+JRrz6SNpwkLO8XGif684eOod9nW
TNhyjuunt7NkYH2KerpTwK8Xc7efJcoOqDfZ831P6r9VgqillyHXfBBL999EyfS+L2HOMEMY3Ns0hqFLzyX
pDoph58QhLDiVcpYF9dpOZnz5leVLFqFwqQrUbT+K1UdCM5gHwiBmbxCta7yH37sVebVkyQrky0vevPn
IV+Q9eq0LjStz9Ro7Z3zJh+VLuqRwKsRUBc+o1UclTdi5QshcfyoWLkbFjwNYdihSHilmhBAvgXRaIHtU+Bk
dzaqe2AKhWeNmRjRZ0JK2QMRz6CpWiyX+CZ4KipYkYNht6Jb4fWq2+BalxHUm1RbfAmFDu79Os2WqB
QLAsFpSPLNCMSefmMCIn5XShMlKrb/fSqAnnpce3wJhuz8zpEmN3+7+OcbPoGkyY7GqJL6UyX1n7mS
wpDwZUp9mwYGuWOJn4lw/poz+jHaelUO+ZuqOu5gt5oTZO6PDb3J60yi+CPqL6BTna8Jssalm37lujXu/
RUGXx5gLIcRLlePHeYv/IAd3f/+CSIV7syVcx2534DAMDlCdu64Re3oN89amP+mVEEKII5sEiJeSnRurOldW
syQNes9g5Z9/c/jkKU4e2s2GpVMYO3MDJ0wZ70UilcTLswLEy0q7QvDcvrSsU5lXsXsJzLlqfNxxlLM2nOSe
ReajFkIikT4JEEIIIRwmgQIIYQQQjhNAoQQQgghnCYBQgghhBBokwAhhBBCCCKdJgBBCCCGE0yRACCGE
EMJpEiCEEEII4TQJEEIIIRwmgQIIYQQQjhNAoQQQgghnCYBQgghhBBokwAhhBBCCCKdJgBBCCCGE0yRA
CCGEEMJpEiCEEC8cu65gsViwWCyYTSZM8Yvj/ga6jmZNXG+xWrFaLVjMZixWBc3mSG/3LyEHumrFbDZh
MpmxWfVrsRgZv0XWUhLI3o+k27Mn3quuo5rhtFE1PZR8mzPJRVLaKQAghXiYx5/lz6lc0/qg2devU4O1Xi
+Lr44F78eYsvW4HFC7vmM/g1pXI5+6Ou09ZanzanGaNGlDLz48Pm3Vn5A/7uGaSmus+5cZelg5uRY1yJS
lUrCzvNhhMz0fCUgSCRBYu/TmdLz4ohoe7O57FatPv+/UcvK0lBmKP5MSmWXxbpxhehd/n86lbuawk3Y
eVwxPa0Xv1zXT+jnieSYAQ4qEZ6BldpT11z+MxPUZGDMFDP6BY+a/55WwkFouF2DtH+SmgFkW832Fsi
DVuO10n+sAo3s3jQp53AtkXEdcCYb53kpX9a5M/ty/V+6zjttRcELuPKe0b0OzrYYwdN5xvmr1LUfeceFX4
gp+v2tJ+n64TFjyCDzxcyFa4BUuvaqm0QETzV//qVOv9OzfVZC0QyhgCWnWND33iRSQBQoiH5AgP4cDJ
aNK7jjVsOt7zbxWDT15u7AtsYIXzXTNr2NKO903M8f0QosO5pvXXSnWbhX3ElYa2EwnWdS5Lj13RiWs1
S/MoZaXC3neHc9xa5Jtb6ymQ/HsuPh+yryLqTSrv1Ts3Px5CP3nHyZK1dB0DdVyi61D/XB38aHBjLoo6b7
9Mss6FCd7tgK0XHCBFHFDPCaUzz5h1H5zircqRybQsstirkp+eGFJgBDioeicndOMyq0XcSmtizRHLOc3T8K
/vA/u7j6UbT6ExTsuEJtQu1u5ums+vd4vglfXogT8cpLoTNT81sMTaN7NTdT/PBm4pgeYHvxgkb4JjoXyo
pbhYFsuaVgT5K5onZMYsyG29xfpV+YGx8gJiQJED5AP0rueHiVomxB1NWbC8VI4K9Pyxhf8yDq9UTU6n
pmYs3hvxNTOrvvL8DwjCHUCGXc54fBxfIefBVy/5RfNJ4MiEpUojC0aCWdF505eG7LwwdRdHQdQ3VasJ
ketnD4NMnAUKIh6Eclqi+By7eDZh6LO1rNMMWwc5Bb/KKSz4aLrqKlrwFQR/KD63LU3v4Du5pmWmBU
DgS1lquS6+n/OHN5DHFcRB1/hDnwzKVNJ4f+kVmNytCDpfclPlkCGuO38Oq3y8JKzFJElFqAcJw2DCf+J6G
+bKRq1QHvtySy18sWopV9hsLaODjwyffXyDDatn6L+Nqe+DyShUGbltK8klMOWZ9RKs551LuQznGxBad
WHgl5fdv7969nD59+oF1R44cYd++fUnWOLi7ey7DvhvLjDITGdSmOm/UDeKYffEUSYAQ4iHE7g6io18ZX
F3cqD78L9K+jjW4u6IVBbLm4Z3RIST/fVPnzKJNVW9ZdyuTbQHKESa07MLiVNP9M31MDhvmS+sZ2CqA
9XdfvAETsYfn0qG8D665XMIT+F06TN7M2QglxV0DiQFiNP9GWjHH3uPsrkUM/uwNvAu+wxeLjmJ5Nqf
w3lve3o+3SjZnzvmU4SiIGxcWtKJwtuyU+vxnbsR/IY3wDXxTtxPLrqX8rirHJtGi43wuJ8sPERERZMmShcG
DBz+wPn/+Pj5+SWuMP/L0Lq1GbQ7Mq4FluwwpvSaxMveoPS0SYAQwlnGPTZNmsSKbVP52MeFXG/2Z
mNE2hWx5ego3smdjcl+6whP+oLjJmsDmvDF0vNk5mcaQDkaRMvOi7iS/Dc508dk5c7BJXxZvRAF60/hZ

Kzy4nVjoBNzYStTO1ejmLsrrq7uFP/gG5YfDnvgSvd+gMjuXZVmrRpSrXQ+PPNXplXgcoLPhmJ5wRpfnh7
NX7t8T4fj95NVCbzpXF3HT3L5SRvkbMPKUBDm790o3aX63iboovmMrxKa3pOO9SijETW7ZsIUuWLKxb
ty5h3fXr18mSJQt9+vRJ3DB0HR2KFKLp3KNEqDoONC7v+ZurOgLxVEmAEMJJ9usrmDh1K5G2yyxuXYhs
2YvT6ccbafblGqGraVMwK+7vBXEYSR9xzJ6xtOswncOZvgxWODaxBZ0WXknxw5vZY7KcXsmYbh9R0jUX
RWu2p0f/mey++yI249vRISgubJtGp6oFccuRE8832jEvJLGAH2iBCD3L8s/L4ZbNi5pDt3FbwkMa7IRuH8fn
X8zmUFTGWycys3eEH3lc3PAL3lvJdokF/nXosymSFBIEPcHUNh2Ym8pAnWHDhpEISxbu3LmTsG7VqIVky
ZKFX3/9NXFD7RJzW5Uij09pavecx54r0aiKjIF42iRACOEUnTOLxzNrvwVwcGfVF5TOKRXfxrM4k9bvlzWE
MVXzkL3Y52yOjF+nnmJeN39GBzvxK60cY1KLjsxP3u7r1DFphO8ZSGWvN+i3LRRFebFaIAw15sH+dLuO+
fp2xjQsQnaXV3i9+wbC4mus5GMg1Mur+LqyB1m93yXgt6uZbvV5eRgoV/5gytBpbL2Z0RialLRTs2nsm5
Wc5b5mZfA0mn00hGBTyu3UE9No1X4OF1L5/1KrViOKFSr0wLr+/fuTJUswrly58uB+rm1nYqsKFPT0IF/Z
evT75RiRL16P3AtNAoQQzrAe4vvxCzh+//c1agt9K76Ci3stxh1lo/3UuMca/4Jk9azJ9LNxzs31/anw4B1Z
HboA4B6fAqtO85LeYeFU8ekc35GPXyKdGbNvRft11bh5PIRzDuSvMnGQfTfgbyd24U8701PGDCZchCljZu
bB+DnnY3cb3RgyUnpME9KDz3A0qAZbL5oSdJqYKB19jvquMWvXcuQI1teKrxTiXqjD6QY8wMqJ6e2pt3sl
AMrVVUIV65cNG3a9IH1VatWJW/evAn/vnz5MmAnRnOgme9weMVQGr/li6tPdQbsjE7Z4iGeGAKQqJg
hJng6QT9dTtKFYGHfSD9yu7xClQHbSL09wcqxse+SJ0dJum+Nggp9TOjWm2XnnWlyVTkxTQ0d5qbsN3b
qmBy3+aVtQfj+Oo9UBsA/5wxCV7fjg67LOWuyP1BRKKcmUcszO8XbrkgIZfqFWfEBYlzbZyOe+wYWZf8
2XJRvNEU9sslKwD2qKP8NG4CK0LCsGoaWvxixXWQv4+nNyPlg2J2DKaqqtZfeszJbU7gbRTTGvjz6xzKb
/7W7duJUuWLHTo0CFh3aITp8iaNSu1a9cGwDAMAgICMO5sY9by42iAYdOIObmQ5oW8+GDMCZQUex
ZPigQIITLLuMeGyZNzf+fBSzL12DQaeLuQo0x3VqccMQZA2G/+FM7mRd05pwhZ0Jues444dweAeoJprd
ozJ3m7r7PHFL2Vb8p64zcu5R0hLwLTgUGU9yxK3QEROR5qjnvGRexVtgytTYHCdQncGRUXLHSD6H9G8E
4eF1zL92dXhI5+/+6AqP1M/qwoObLlo+bgP7hu0VNOgPQSMcznWflta+q26cPIceMYd38ZNZguLQNYm
qk7MeKpIUxpkJf8TeeSWj7Wtk+nVbsZnE1lI3369KFUqVJUqFCBGtNm8PPPP/P6668zduxYvL29Wb16N
e3atWPFihUYd1bR+rNadt5T0HQdPWIHfatXo9eWcGmBelokQAiRSfarvxA0bXvKVgbbJRa0Kki2biVotShl
CwGA9fg4quXJSEK239Kr13h2OTVADdSTU2ndbjbJL9ycPSbLwRFU9X6DfsExGC/gmDP71UU0Le6Op08Bi
r/lxydNW9Doo1p82KwXc4KvYjEAFK7uXsqI9m/j6+6Ou89btBzyPRuORyRcSZuOzqFIWW/c87/Fp33ms+
u6833+/wlGFAcmN+XvFO54+OQlb96kiy/l/JekvOMnXXau/jSagT9dS6XVQuP8oq74/+9MquNPypYtS5M
mTfjnn3+oUaMG77//Pj/99BMAAwYMoFKISkyYMCHusO+spk3JwrzTrC8Tv5/HjHFDCZy3l1svcxJ8BiRAiC
dMxfSf6GrWOL14JJN3RWC1WpMtZi4v86d4Dhe860/haGp1Udh62hfJhotnLQb8fjvNgYuGTUPVbdjtNIS
LEt9PrHFqWhv8ZyXvN3b2mHQuzG5A3ildWX3rLufO3HgB50FwJDxh02SyxLVAWOKeHqknLVRdR1MSn8
Zp1fQHX8eG5f6T0tWxvAVCMycp02TLwzwq02FJ+wmbdhOmVALJpUuXyJlIC4GBgZk96vjp4dW4FghN
QdFfpOHAmWWgxj/tNMUrNhWrUFVFSxW7Zl8hyVAiCfllGL7MFr2XEvYsz6UR2U9wLhPyuHXuDnNm6
dcmn1cHt+cLri4VWf4X6kkJuUEE6r78GrH5ak27QIYWhjHNixgzpL1bP1jGYFdmVhiAW000xv1Y4Zydt9n
T0mI5S1HQvhVWMI6zas4c/TL2InhvgvWrhwIvMyZGHT2rXP+ICeK/qtLQz5oBBer3djs0TSF8II+eU72rbtR
r8BPejYQRrjoc/9RAhAUI8OdYQ/te4IB5VxxLygtdVMX+P5oN8Hnh5eaW5uLu74+6el3e/25nK7WThbJj
Yg5IH0rpTl5y/prThs94ruWixYbdHsO3LSITqE8y984vo6v8/ziTLD04fk36dVZ3KU/TNpoz788oL2Pog/qu++
uor/u///o9bt24960N5fljP8Wv3iri7uJctSLsKAULixKIOvOldlFbLL2lXn2Nhk0J4V+zK8tQGlzxBEiDEE2Lnyo
ovedvVhawF27A69EUf2qSk3cybfEkrLJnNaV4hmPYEUuu1Fsy5P9OU4wZLmxSjypD9xGLHIFq770Mck91
iwmS2oL6lc0eJ/6wdO3bwww8/POvDeI7EcnRRL2oXyIlLsgBhv/OLXV59BRE3Snz3rxkwc2BwRdxCHnrq
7WpzPz55EiAEE+EEbGdkZ060aVhUbLnfodRR+V6N22x7P+uCsUaLeVa/H9+24XF+Jevx9j9Um5CvFwcRO
z9H32+m8W0RgXJ+kCAsHPrh7YUyuaCi8f7TD+jAhrnptfE08WFriXbsOzG07s6kAAhngArlTO70mXafo5
M/wDPrAVovSpUbq9KUzS7+lam4pdbCbfbWu32TqyLf7T9pHOIzaEOZO6pQAAGHVJREFUEP9B9rvbmP
DNUFZdvMWm5skDRBTbe5Ymh4sLLI614m/r1rk0rw5eLi64ZC9B9y2RGfyFx0cChHjs7FdX0Nt/CJtDDSK3
dKNE9txU+f/2zjysqmr94zzPPSCOHCaIQNMslbVr3iyV6DpUDmU5oYCGWJqm5XQzHErTNBAZr6KpiGZX
wxRNM/s5jzniACqIOKGhDOIAZx4/vz9AgTMgJB2l1ud51j/nHNhr7XP2Xt/9ru9639mn/pJr7gaDwSZNIryc
T4OnsXTzDrYlJrD6lzPqmxz7KlmlpAUO3os/j160+ZtfkGWvLNBYTuGit7uiEpFhBLHwql5cUCQuLK2yuuP
r4EexUhBISgajHeY+/soYxZcRENoLn0X7q72PO034/YtHK0XI68gs1q5jrdAzLOJJOcblt2IN8OHebosSMc3n
+I346dsNfXi9qptFsora6dVvxcykUaQHOq4rcoqMFU1fWhJ+vn2Yyf+wtZOCSgFCns+gN53IEhDOvx6Zhq
6wmQkAlqhRlyiKGDfiSnTnF+Qhu/8SIzX1p+K+ZJvtbtSjVStRqYvS5qpVSuQyGTKZEjCi16mL96Jr0esroT6

MeWyf0RcfH5/Ht65+RBwtsPx/Ck8RHZKW5WNT2cYxYcLHjLHpMccyKXwbmRYN3Ebyts+gb0XOpU9X/C
KOYuVsAraMqBjQ2/BYVgM4VfVbBLDleKq66XTo9DWgH1X9/Vbh9WHI386s0TPYePIBsfk5kx8fCYihJN2Q
odNeZcXbrilClaiF6DP5cewbvPx6PwKHDWPYsGEMCzAq+6O2D/IS2J2qavQqOZu+q8snvEJn06dwdzdhc5
kxbhDerZ7Co+MU9t++wdFVE3jVw4Vn35/LT6ezUFYmgIFFT30qlcr2TVYNx1SVt4O8ap6wdA8yOGOrqM
qJ4xy2WRTnNBeyVdY9PIXyW9TXIOOMTaNSVRld27cxkfXbf+NEtffID36/OeV8v1V0fRQemU6H+nVxkkqL
t19LkUokRWJBYo+0aR/i0rPZProFdYQHQC7MHJv7yz6+0eRfLd0RsRb/DSyOXUadijecgRgIO/AfPr9swujV
p0mX/UwAiHn9uEY/LuNYtc9I/rcLQxt5kynOSeRVSYCAaBQoKhgE2Hjx1Hxc6ko7wZ5Kp4QW0VVPpnEpL
FjbBTBmUzk9t+tP/VVYw+XkFPxITaOhIVVG4lv1454vzfc5pG1qvp+o3ZmlfNUX0XXx5EZdGrshJNTSWtUS
kA4efUmLI3OjQRfnrKXIHh+NzEX1YCa9Jg3cJZIsPf05zuxC0Pwl0NkhoVDejH552yTNM1qLkT64CzxYOCa
W0XvKY7xdfcmePouJ11llyMhSSvjue3u8C9nQxr7kqX8EpW2DPeYefMfnTt2vXxrcdQoo6VEzb+22Pkzs6
Z9Kvluezag6FRx8pZwvbln6LtZyquz6MmjyuX7nM5cvfLeMIC3u6F+WB8BrAilM3KNCBPiuRkS/WR9Kw
A9OOYwEZROPa00BSJzaj13Nb5IEQ/KXQyUIbEci/us7haGFZQWdu6cheNxp+3q0nbKbfJ0BxZl5vN7IhW
6xlovqoC2OVpXRAQE2j0AYtdW9i8Hln9eFqnnC+tsiomG1nKq7PoxGY0kzZJP0fPNHiaT+L//hBa7kXHwQ
bVw8GRB/Cbkyg1UDmyJ9IYBlqbb9BQkBIXgyjAqU/PwV/du549FxNEv3XUFmKHnvxpENLBJZniZSke7/D
GT+lrNc3fUpzzk2oe/a2+XnhngSAWFLDPmkHD/Pg3KUv1GnRfkoK6QGrc5k5DotannR+2qrSkBrbtbIRIT+F
4+cfWC3SJRAI/mlyc9g0tCVSqRQX01oYmlxOrP6cwX4j+ezz0fj7fsbKY7ctP5D9iQgBIXhydJriyoZqs4nRqN
OhfVQVUYIWZ0B+ag6dGzrzTs58rcblScgjDWnfqL24hiGveJPwlUrfTIUkvFrBEht3ZFK3WntO4OVey5T+
Gi2V5K5fznj32iGa4s3mZxoWYwoT80ncGISWWZLnFouLhnEK/4JWOtCWXRCAgEfwUepaO3Uo1TrkKt
URVVo62GIKqQEALbU3iQ6V1caNw3jrMK01+9Eb1GUxSZsCogDDy4cp07tpbbFIxMrw3zhI3+kSnWhVE
Rt1d9k57ifqSJvRNyERjGoHQZvl///b0mLWHPI2IO4GK0+F+jPruJmb6QXWS8N7OSNz6EJ36uB3gBu5nnC
TjTs0RYAKB4K+JEBCCakDHjc1T8Gn+L4YvPsotuQqVWo1arUF17yK7128I5b4efe5mApq50GXeSq0RTs1
NGoV8lt7iZ33Pem2ypZSHoUHCA/2oVUDCQ29Z2GpkncRRnLW+fG0vROvzU3BtN6W+lwcAb0msfmWl
diA6jTzh4xkZaa5w7rWQDjBPq1oIGmI96xDWO2CQYf86ham+k1mi02zeIWUP9PHUdEuaP++Kdcru9NJ8
LdHCAhB9WBQkHX8B8ImDMU3YDSTpn7J7HlhhC9ez7GbcvSy6xxYPo5Xmrjy7Jtj+Sp8ARHhYcyZNob+3i
/TZ86JGpAa20jetggi1u0i+h13JPVeYulvd61OQlozX/NalweaBm0mv/Qbhiw2TR7AR99IWF3DVJ0JZ8gHC
Vw31Q/GPLZFRlBuVzTvUeUo99JEfrFYQENJdvlqPvb2wrN3FOcLTVuGePxPg4jOq3yUYVRpUaLuZVEXZy
MrJyQrlaGZSuJgfyU45wvz8xSwzBoVCiLt0GrIco0Fe26UVm2WmvhHa5cyqLQyg5ArbZU5Ve5Bq3O9IM
Gtl/OvQqNhT2PWpnc5Ls1oteqkN8vMPsen3h8ApsgBISg+jDo0KiUKJQIEQINRlt8kzGi1xXftBTqouhDcQR
CKZchqwnLF/qbrFsQzc57Oq6t9MfLoQ4tRqzB2jZsY24SAZ72SF8P53ypNZmCg98QODyWU1YVkyrUBY
MZseK6WTlw/c11LjeyT3dNVb6e+FQpwUj1vxutsyhuLCeeaN70rJBPZ7pOoxny/iQE5Nqun9eB+HoTCD
XyOCA08uRereGt8ZK9IzubBkUlJmsn/5eN5o5kqLNyeTaFGMKDk1P5CJSVnmS0HaiywZ9Ar+CVetII0vg65
6ZzOj4io7o6cwbls5s//ismfTCF29/UKCGsDt5M+puNT7ri7P2zNeSfitOW/VVxIR+xHdGvujFTqQvMeU/h
2SzK3S12D+nvN2BY3iTeBu9L0jQ+J3nmt7LKj8hTzAyeS9NDAY9Chvp/BtqhRvN1rOgceVOX4BLZCCAIB4A
+iTV9JWNxRFIAhewMfPe+lvUd/4tKtpJxRjpCvkn1mn/lrw+TxanTWDY6iLn77Is/kCqViMHBLl9mOq1pS
V8ZrtxRBWAge8NHPO9ojOf/OMy7oCH/4FRecW3LIF25qFQ1LAJRIR+HEd3dvUx7qT6SjN1JyNSYPblqM/
+Hf/sezNqTh2UryWnC/Ubx3U1z8aQ6GU5vZwlufaJ5vJXkPhknM6g2K4nxHvtmv03bvgs4cqdIYOcfDufd
Nr2Ye8B6FAwAzXmWfNgX//FTmDKluH2xkF+vW0+VpNXeYd/sbjhLHGg6+DsyNRYIEA8O8bl3Fyb+nIXa5
F+pTofjN+o7ik67jvzZu0hcNIX3WzSgftux5gLiScYnsBICQAgEfwgIJ78NI/7sw5nmPts/60B9iZTuocfNPA4A
GPPYGOSJvUtXYi9qAANZmz5neMhmrFkfANRno/APXmb+ZK48ybdh8ZR0YTufdaiPRNqd00OmPdCsSb
AX7s0+YGNzvbv9VtjHYcxhnd/T2Du9xtwUMycJ5+IC6DXJ+vUnZ7PkJErmbeSFHIGPBifVg2QNPRmInUzC
wadnKtbpuI3eYttC8SVQpMeR/+mngxKuFoSSdFdZlk/D5r2X8SfciJ0hQfnEjxxPdcKMgVKtTF0b/HxaP01
1YzvEUdHJ4eQvxlC+WkTo3i/Xe/5qjZqVNxev4QRq7MLDmGQYdWlcl3fRtT14KAeJLxWYHEBACwR+hYB
+x4WspHRRQHJmDTyMJ9TuGsMtiQEFJ6jedcXJsyZid96HgIPNHT2R1hqUnPwUyeVGa2nPRAQxfah5WL
9gXS/jaa6VeV3Bkkg+NJPXpGLKLMI0w3CZxqCeN31vG9Zq2AaPCPg4ABWe+fo1GDk0J2lZGSYIhaxOTB3z
EdxIWnSScCR/CBwnXzSZLY942liLWsSv6HdwI9Xhp4i9YtpJkk7zqY7y9POkddZ5CVXXEcdRciOyJi7QL88sk
DIKSEtoZJ9eeRF+wEkI5LBpbHuavjKQMdOjWbMnjWy5+rHiAQBJPr9Ofpl6Ehd6hp802Rml4OjX79I/Ms
V8J5LqDOFDpIDB1MBjzGbDe00sClgnGN8fxahFpdKg1WpQK2XIZLYqR/XXRggIgaDSGMnbGknkFpO03e
pUYvq4IXFsxZikHltLBHd+CqKpgytvLUkjX4in8RZWnc2cmdnCL0GRJKcf44Yv2HFRXNKfySPRZGRbMk2SR

yeGkMfNwmOrcaQIFPqvQc7mdDaDZ9Q8x0g1U1FfRxFGMINCsDTXsrr4edLTWIFHPwmkOGxp6yvkats
WTB4BCvMFJSem+sWEL3zHrprK/H3cqBOixGsMTOzKLiwhf6je7akQb1n6DpsHJ8vOoDNrSSGW6wd3AS
Jx0A25JZWOUZy1g/Ew/4phiTetvj7M+TtYnavtjTzcMPVxRlnaWNe7DuTny4VVmhZQHkilB7OFkRywR6m
9fRjySXziVeVuoDBI1aYC1drAulJxvfHMBZyCkzv/iGhUuimRbgTdu3wkmtaRdKDUQICIGsugzSQyPYbdZI
EHH1Xg/PB0c8PKzbAZUng2li1Ndng+YxPjxYey3Yn3Q5h7ip19SyTsbjX/gYkzvy/rMRMJjdmPehavE+3ni4
OCFXykoCJ5Np3c2jJlXwHGGvVwVRkfRxHKlHl0cqpD8w9/pcRKsozRQXMP30oSweDg5ZhbSdJZGRZHU
Rey2fDR8zjae9A/Lt28gJlmm4NTX8G17RR25apQVUCeQnGaeR0bUefZD9htUnjx3u4PeLZOI14NPWNFSB
IRKuQ8yLnlocT5jHqzFa4N6vF0j1nsvlcBCaG7TLxfUxzqPMeHP/z+yPCcv3UCb41YzQ3zJCWkRgwmePk1c
2OqNQHXROMry3/+8x+mT59e5rWYmBh8fX3R64s7Kz/BI2/1YNqBe0URiDuHiBofQbL1VSxBMUJACASV
RHNhJXMi93NXWbrqaFGTX1tNUAtHJG69iTpjlcx6ZwvDmjkgcelOyM+Wn6KMeh3ywrvkK5WkxQQQFH
fJZCLTCGHIHCL33zU7vllp59rqIFo4SnDrHUVRf7RcXtyHxs2CSbqVw6X032uOk71SPo4ijHkbCfK0x6VrLEV
Wkiw2ft6ckM23zM+nQoZcDaDmbJQ/wcvMI4KUJ78ILP4sJV34jA71JUi7h2JuJclgYS93mn2wkWqzksiO
Mu2lBtRtNYb9Jt6BBwc+pnXdBvxz+jFk5f4TIwadBvWDDDZ95oNrnaYMWXWjArtPjORs/or2de1p0m8R
aRrAcIvE0T0Yu8FC1E19lij/YJZUtpWBESVJA+0Wi2Ojo6MGTOmzOtt27altZs2JS/kbmZ4My8GLj3DXbU
WAxquHtXmpohAPBYhIASCsqHkeOi7tPPpj6+vr3kb9A7tPeoisWYGVJ1jvrc7LwR/jOXrg0HG9X3h9GvTm
WnbjxLrF8jCiyZr+srjhL7bDp/+Fo7v68ugd9rjUVdSYgY05rlp2AvXf89g89aN7LhQc+6MlfjxPESZyjednXBs
OYYiK8l8Rk9cbX4+jXfYGdKLAZHJyNTniA4YzIkziayAfbHhrC1rZmGOTyMk9TsSYmJmMdxOZKhny95bZr6l
1mYoUwh9zQnHlh+yx+QE3d87kuccnXgrOJLVbpbGxn7XCNaTDiHhd2U5sh/Y7aPE5KGPnz1mwzd1XiC3
vwP2yxEMNTnogkYvtTy1lxAqKKxfixAns7OxISEh49FphYSH/+Mc/GDFiRMkHNvdZ6vccTu7P0+OTZRY
8/gC1qkaF6WosQkAIBJWh4DBzuzXB2dUVV2tNKKUqldK48xfSNbup5rN16jgWnbZ++1Mkf41Pu5GsO7a
CUUH/Jd1EPxQcnku3Js7Wj+/qilQqRSptTOcv9nJPe5MNI9rzzEsDCd1Rg/bRV9bH8Yg7/BTUFafXt1iSlkL8
xE+IO21pVFpyD/3EL6kFKM/F4DdsCeZWkq1ERm6hbbfUpMb0wU3iSKsxSZS1kkygtZsPoWY7QGyIlZt1f
k/h8PRgNt0p+9adTYN52t6DwYkWoJHW0N8koc9tBy3x7JgM0ND2uL+eNjXpd2n69kXM4ieM/ZZiAioO
Rfjx7AlI82XgqAcD0TVjC8qKgo7OzvOnz//6LW9e/diZ2fHt99+W7anN3azwO9IPF2cadK6F1MSU6nlis7fH
SEgBIJKoiqdwa/cZmWskcvLeXpVkbvVixcC13DboEcms+TQU1Xw+DledkGvkCGTK1DXoNxRlfvXlKDbGg
XnOo+T8Ck8YwP229h4jOi18kpvJuPUq/mfLQ/gYtNI4L0ZCaGE2NuZkF3NR4/TwccvPxKFUITkDy7E25tp7
CvwGh5UrQJGi7G9sHN2YfitNLLZGrSln1wdu5JVklDcSBHTYT6G6zo3ZK3oi6UX9yuFIZbPzKqIsmOjV/mt
X/1Yq6l5Sb1eaL9A1lswVhZ1DFruzAqNz5rDBgwgIYNG2lSDQLCwsKws7Pj1KITpT6pp0BjQCPP5tS6L+n/T
w8auHsTsveByDfxGISAEahqEtorLHm/NYNWXEdVq+9elfVxIOXOlme0c5Dg0j2En2+bP4saZNfZ96PNp2
nsSc7jZiAIOJMjZLNBVB0iWT/XXMvi1J+jdVBLXCUuNE76kzRkKq9zOI+jWkWnMStnEuk/159sRxN+mIGN
PPCb3Wp3Ar6TL7388Kr36KSqJ8hxs3c0qW0pRy5AoVmlJ1LzS/J/Gpjy8LK7U1soA90zvRQGKPR+8oi4m
3NGkxBATFmRmAH2HMZr1FAVGJ8VnBYDDg7OyMt7d3mdd9fHxwdHREpysShWvXrsWYvYu478+iAYw
6DQXnV+Dr5Uq3RRaqAAvKIASEQFCDMGRvJKjt20Qcu8Slm7La+wRUWR+HCapz8/F2f4Hg7zOsRAIUJH
/tQ7uRG8lKi8UvcChmVpJQ3m3nQ39LXhbfQbzT3oO6kpliacbcTQR7uflvGZvZunEH1WoleZipcUA0x+8
WZWq8ezyaAW2788WO/OLw/gMOzehCY4/XmfblARjvsvlt3m1WzDfbD5HvKKN6v4FNn45momrUh5r
SjRfNRFn8ZPMXCppe9Aw4VYPwIXXrRc38WoQ6e6wvLe7jg+P4r/y9OhKx1qqtd4rHP48GHs7Oxo3bo1
CkWR0NuzZw/PPvssbm5uANy/f5/g4GCM2Rvwf/8r9uap0Gi1aO/u4TPvLozfnl97r78qQggIgaAGocv8gc
BObxHywwmyanG2vUr7OMysJFuZOm4RVq0k6jSier1A4JpMLiaMLui/6SYTWQGH53ajiXM5XhbXli+LtHF
nvth7D+3NDYxo/wwwDQxIx/Ua4CSRX2FH9GTGTviCb+bNZNLyKcRsv0zho3OliCWqL23avEdUigJQc+3Hq
fTr/ALNm7ejm/84QmbHsu7odQr/iCNU8nakKmsNd+7CZoMEkYF8V+LoQIDhVePsGXZ5/Rp7oK0SUc+i
l7HjjPZZb+jx47POjNnzqRRo0aEhYXh5eVF9+7dcXNz4+Tjk7z44ou8+uqrPPPMmxw6dAhjdHlBLZvy2qDP
WPDtMhaGfslXy37jVkl1LuFYDEQJCIKhR6JHL5Gi0Ncis8KdQeR+HKXK59Tu89soS3m89iBXXVRj1MixbSSr
qZZEVO/71KGQy5loKZm60AXqNCqVKXVKt0rRjGGuYmaJkYtapUcrlyGQyFEo1arX6iWqCGRSmFTZL9U0
ms36ejDp0Wk1x9U4ZKq1JBOLh/3jc+KzQoUOHR8sX27ztY82aNeTm5gKQlZXfqlWrSE9Pf9iZ4t+ZuigCo
VGh0taoSjE1FiEgBAJBLcNA9sYg2r4dwbFLI7gpE4HovxN5eXnY2dkxduzY6u5KrUcICFAUMvQkflDIJ3eCu
GHE1mW1+AftZakpCTs7OxYtmxZdXel1iMEhEAgqH3o5cjkGmr9SpDAjEWLFiGvXj1u3rxZ3V2p9QgBIRA
IBIJag8FgoKCgoLq78bdACAIbQCAQCASVRggIguAgEAgEIUYICIFAIBAIBJXm/wHJRbd2lsgXrgAAAABJRU5
ErkJggg==" style="background-attachment: initial; background-clip: initial; background-image: initial;

background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border: 1px solid rgb(238, 238, 238); box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px; padding: 5px; position: relative;" width="320" /></div><div class="separator" style="clear: both; color: #222222; text-align: justify;">
</div></div><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"><div style="text-align: justify;">Karena <i>V</i><i>o</i>= <i>A</i>CL<i>V</i>i</i>, kita dapat menggunakan dari mana kita mendapatkan Setiap kenaikan tegangan loop tertutup yang besarnya lebih besar dari 40 akan mendorong output pada laju yang lebih besar daripada laju perubahan tegangan yang dimungkinkan, sehingga gain loop tertutup maksimum adalah 40.</div></blockquote></blockquote><div> </div></div><div style="color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400;"><h2 style="color: black; font-family: times;"> 3.3 <i>Pilihan ganda</i></h2></div><blockquote style="border: none; color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px;"><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: justify; white-space: pre-wrap;">1. Rangkaian op-amp memiliki besar tegangan input sama dengan output, namun gelombang sinyal input berbeda fasa dengan gelombang sinyal output. Op-amp jenis ini disebut.....</div></blockquote><blockquote style="border: none; color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px;"><div><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">a. Op-amp inverting</div></div></div><div><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">b. Op-amp non inverting</div></div></div><div><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">c. Op-amp differensial</div></div></div><div><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">d. Op-amp integrator</div></div></div><div><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">e. Op-amp penjumlahan</div></div></div></blockquote><div style="color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400;"><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">
</div></div></div><blockquote style="border: none; color: black; font-family: "Times New Roman"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px;"><div style="color: #4e4e4e; font-family: times; font-size: 26.4px; text-align: -webkit-center; white-space: pre-wrap;"><div style="text-align: justify;">2. Pada Rangkaian Dasar Op-Amp, Jika besar tegangan input sama dengan tegangan output yang gelombang sinyal input dengan gelombang sinyal outputnya

memiliki fase yang sama atau sefase. Op-amp ini sering disebut...

a. Op-amp sebagai penjumlah

b. Op-amp Inverting

c. Op-amp Integrator

d. Op-amp Non Inverting

e. Op-amp Differensial

Prinsip Kerja

4.

Gambar Rangkaian

Percobaan

A. Prosedur Percobaan

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at:

<http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

input

Read more at:

<http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

- Siapkan alat dan bahan yang dibutuhkan dalam membuat rangkaian tersebut.
- Diantara alat dan bahan yang digunakan adalah Gsine, Op-Amp, Osiloskop serta Ground.
- Rangkailah alat dan bahan tersebut seperti gambar di bawah ini.
- Simulasikan pada software proteus. Gambar Simulasi

Prinsip kerja pembagi tegangan operasional amplifier (OP AMP) adalah membandingkan kedua nilai input (input inverting dan non-inverting), apabila kedua input bernilai sama maka OP AMP tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output OP AMP akan memberikan tegangan output.

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasa

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

Copyright © Elektronika Dasar

Rangkaian

B. Gambar Rangkaian

Rangkaian inverting OP-AMP

Rangkaian non-inverting OP-AMP

AueD19SgizSAEAz5TEqQCLcBGAsYHQ/image.png

ueD19SgizSAEAz5TEqQCLcBGAsYHQ/w357-h335/image.png

C. Prinsip kerja

Prinsip kerja pembagi tegangan operasional amplifier (OP AMP) adalah membandingkan kedua nilai input (input inverting dan non-inverting), apabila kedua input bernilai sama maka OP AMP tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output OP AMP akan memberikan tegangan output.

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

Prinsip kerja sebuah operasional Amplifier (Op-Amp) adalah membandingkan nilai kedua input (input inverting dan input non-inverting), apabila kedua input bernilai sama maka output Op-amp tidak ada (nol) dan apabila terdapat perbedaan nilai input keduanya maka output Op-amp akan memberikan tegangan output. Operasional amplifier (Op-Amp) dibuat dari penguat diferensial dengan 2 input

Read more at: <http://elektronika-dasar.web.id/operasional-amplifier-op-amp/>

Copyright © Elektronika Dasar

[illegible]

[illegible]

style="background-color: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px;" />
</div>