



# **PTRL3050**

K Y`DfYggi fY`HYgh]b[

HYfa`H\fYY`##`&\$&\$

7ci fgY`Cj Yfj ]Yk

GHJZZ'7cbHJWñ'8YHJ]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWñhcb	D\cbY
DYma Ub A cgtU[ \]a ]	dYma Ub4 i bgk "YXi "Ui			\$&-' , ) ) %&&

@YWñ fyfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWñhcb	D\cbY
5\ a UX'8Y\ [ \Ub ? \U`]	U"XY\ [ \Ub_\U`]4 i bgk "YXi "Ui			

8Ya cbghfUñcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWñhcb	D\cbY
HfU]k ]ñ7 \i b[	hfU]k ]ñWñi b[ 4 i bgk "YXi "Ui			

GVXcc``7cbHJWñ:ñZcfa Uh]cb

7 ci fgY'8YHJ]`g

7 fYX]hDc]bhr`\*`

Gi a a UfmcZhY'7 ci fgY

H\]g`Wci fgY`k ]`Wcj Yf`hY`UbU`m]WU`UbX`bi a Yf]WU`a Yh`cXg`tc`]bhYfdFYhk Y`dfYggi fY`hYghg`H\YcfmcZ  
fUbg]Ybhk Y`hYgh]b[ "DfUW]WU`UgdYWg`cZhY`XYg][ b`UbX`dYfZcfa UbW`cZ]Y`X`hYgh]bgrfi a YbHU]cb"  
DfYggi fY`XfUk Xck b`hYghg": U`!cZZhYghg"A i`h]fU]h`hYghg": Ug`k Y`hYgh]b[ "": `ck!UZhYf!Zck "gcbWfcbU`UbX  
]gcWfcbU`a cX]ZYX": bhYfZYfYbW`hYgh]b[ "Di`gY`hYgh]b[ "8f]`ghYa`hYghg": fUW] fYX`fYgYfj c]f`hYghg"  
5bU`mg]g`cZa i`h]d\UgY`Zck`hYghg"

7 ci fgY'5]a g

H\Y`Wci fgY`U]a g`hc`Y`d`gh`XYbhr]b`hY`XYg][ b`cZ]md]WU`c]`UbX`[ Ug`k Y`Wca`d`Y]cb`UbX`]hr]a`dUW]cb  
fYgYfj c]f`dfcXi`W]j`]m`

H\Y`Wci fgY`]g`X]j`]XYX`]bhc`hk`c`dUfhr"

DUfh`%`5bU`m]WU`a Yh`cXg

z`7\UdhYf`%Wcj Yfg`hY`[ YbYfU`]b]fcXi`W]cb`hc`k`Y`hYgh]b[ ž]mdYg`cZk`Y`hYgh]b[ žZ`bXUa`YbHU`Zck  
Yei`U]cbg`UbX`X]a`Ybg]cb`Ygg]j`Uf]UV`Yg]b`XYgW]V]b[ `Zck`dfcdYf]Yg"

z`7\UdhYf`&Wcj Yfg`Zck`]b`]XYU`]nYX`fYgYfj c]fgž`X]ZYfYbh]mdYg`cZVci`bXUfmWcbX]h]cbg`UbX  
Wc]ffYgdc]b]b[ `]XYU`]nYX`Zck`Yei`U]cbg`Ug`k`Y`Zck`Yei`U]cbg"

z`7\UdhYf` `Wcj Yfg`Ub`]b]fcXi`W]cb`hc`k`Y`hYgh]bhYfdFYh]cb`hYWX]b]ei`Ygž`i`g]b[ `gYa`]!@`[ Uf]h]a`]W  
UbU`mg]gž]mdY!`W`fj`Y`a`UHW]b[ ž`dfYggi`fY`XYf]j`U]j`Y`UbX`dfYggi`fY`hYgh]b[ `]b`fYU`]gh]WfYgYfj c]fg"

z`7\UdhYf`(`Wcj Yfg`hY`YZYW]hcZg\_]b`ZUW]cf`UbX`k`Y`VcfY`g]c]fU[`Y`cb`hY`dfYggi`fY`fUbg]YbhXU]U`UbX  
Wc]ffYgdc]b]b[ `]b]Y`gci`fW]`gc`i`h]cbgž`fYgYfj c]f`]a`]hYgh]b[ `UbX`]bhYfdFYh]cb`hYWX]b]ei`Yg`i`g]b[ `gYa`]!@`[  
d`chUbX`XYf]j`U]j`Y`h]mdY!`W`fj`Y`a`UHW]b[ `hYWX]b]ei`Y"

z`7\UdhYf`) `Wcj Yfg`hY`XfUk`Xck`b`k`Y`dfYggi`fY`hYgh]b[ `Zc]f]`Uf]UV`Y`Zck`fU]h]gž`Wc]ffYgdc]b]b[  
]bhYfdFYh]cb`hYWX]b]ei`Yg`UbX`di`gY`hYgh]b[ `XYg][ b`UbX`]bhYfdFYh]cb`a`Yh`cXc`c[ `]Yg"

z''7\UdHYf\*`Wcj Yfg`bHYfdFYUjcb`hYWXb]ei Yg`ZcfdFYggi fY`Vi ]X!i d`hYghZ`Udd`]WUjcb`cZdfYggi fY  
XYfj] Uhj`Y`]b`Vi ]X!i d`hYghUbU`mg]g`UbX`]bHYfdFYUjcb`cZVi ]X!i d`hYghZ`ck ]b[ `U`j Uf]UV`Y`Zck`fUH`"

z''7\UdHYf+. `Wcj Yfg`k Y`hYgh]bHYfdFYUjcb`hYWXb]ei Yg`]b`YHYfc[ YbYci g`fYgYfj`c]fg`]bWi`X]b[ `ZUW`fYX  
fYgYfj`c]f`UbX`fYgYfj`c]fg`k`]h`gYU`]b[ `Z]i`hg`"

DUfh`&.`Bi`a`Yf]WU`K`Y`DfYggi fY`HYgh]b[

H\]g`WXUdHYf`Wcj Yfg`%&`bi`a`Yf]WU`k`Y`hYgh]b[ `i`g]b[ `gHUH`!cZHY`!UfhW`a`a`YfW]U`g]a`i`Uh]cb`gcZk`UfY`Zi`g]b[  
XUfU`W`a`a`cb`mUj`U`]UV`Y`]b`]bXi`ghfmUbX`&E`bHYfdFYUjcb`cZi`bW`bj`Yb]cbU`fYgYfj`c]fg`k`Y`hYgh`"

7ci`fgY`@YUfb]b[ `Ci`hW`a`Yg

%`5V`]mhc`[`U]b`hcfci`[`\]bHYfdFYUjcb`cZVi`]X!i`d`UbX`Xfuk`!Xck`b`k`Y`hYgh`Zc`f`]bZ]b]h`UW]b[  
fYgYfj`c]fg`i`g]b[ `UbU`m]WU`UddfcUWX`/  
&`→Yb]h]ZmYUfmUbX`UH`h]a`Y`YZY`Wg`UbX`]bHYfdFYUjcb`cZfYU`k`Y`hYgh`  
'`" `bHYfdFYUjcb`cZk`Y`hYgh`Zc`f`YHYfc[ YbYci g`fYgYfj`c]fg`  
(`5V`]mhc`i`gY`bi`a`Yf]WU`k`Y`hYghUbU`mg]g`

HYUW]b[ `GfUH`[ ]Yg`

D`YUgY`fYZY`f`h`Y`]bZcfa`Uh]cb`]b`A`ccX`Y`

# 5ggYgga Ybh

## 5ggYgga YbhHUg\_g

5ggYgga YbhHUg_	K Y][ \h	8i Y'8UH	Gh XYbh@YUfb]b[ Ci hWta Yg'5ggYggYX
5gg][ ba Ybhg'	&\$i	Bch5dd`]WUV`Y	%ž&ž' ž(
: ]bU`9I Ua`	) \$i	8i f]b[ `hY`YI Ua `dYf]cX	%ž&ž' ž(
A ]X`HYfa `9I Ua`	' \$i	' \$#%\$#&\$&\$\$(. \$\$`DA	%ž&ž' ž(

## 5ggYgga Ybh8YHU]`g

5ggYgga Ybh%`5gg][ ba Ybhg

GHUfhXUH. `Bch5dd`]WUV`Y

8YHU]`g.

GYj YfU`Ugg][ ba Ybhg`Zcf`X]ZYfYbhgYW]cbg`cZH`Y`Wci fgY

5ggYgga Ybh&.: ]bU`9I Ua

GHUfhXUH. `Bch5dd`]WUV`Y

8YHU]`g.

: ]bU`YI Ua`fXi f]b[ `hY`YI Ua `dYf]cXL

5ggYgga Ybh'. `A ]X`HYfa `9I Ua

GHUfhXUH. `Bch5dd`]WUV`Y

8YHU]`g.

A ]X`HYfa `YI Ua

F Ygci fWg

DfYgW]VYX F Ygci fWg

# Gi Va ]gg]cb`cZ5ggYgga YbhHUg\_g

H\Y`GWcc`Ug`XYj`Y`cdYX`U`[ i ]XY`]b`Y`tc`Y`d`mci`k`Y`b`gi`Va`]h]b[ `U`Wci`fgY`Ugg][ ba`Ybh`

K`Y`YbWci`fU[ `Y`mci`tc`fYh]b`U`WcdmciZYj`YfmUgg][ ba`Ybhgi`Va`]h]X`Zcf`UggYgga`YbhZcf`mci`f`ck`b`fYWcfX`Y`h`Yf`]b`U`fXWcdmci`f`Y`YWfcb]WZfa`"

5`UggYgga`Ybh]a`i`gh`Uj`Y`Ub`UggYgga`YbhWcj`Yf`g`YYhUthUWXYX`"

## @UH`Gi Va ]gg]cb`cZUb`5gg][ ba`Ybh

:`i`a`Uf\_g`Zcf`Ub`Ugg][ ba`YbhUfY`cb`mdcgg]V`Y`k`Y`b`Ub`Ugg][ ba`Ybh]g`fYW]j`YX`Vmi`h`Y`Xi`Y`XUH`"

K`Y`i`bXYfghUbx`h`UhUh]a`Yg`mci`a`UmbchVY`UV`Y`tc`gi`Va`]h]Ub`Ugg][ ba`Ybhcb`h]a`Yz`UbX`h`Y`GWcc`k`]`UW`a`a`cXUH`Ubm]j]f`UbX`fYUgcbUV`Y`Yi`h]bg]cb`"K`Y`k`ci`X`fYW`a`a`YbX`mci`fYj`]Yk`h`Y`I`BGK`GdYW]U`7`cbg]XYfUh]cb`[ i ]XY`]b`Yg`-`gYY`gYW]cb`VY`ck`"

@UH`gi`Va`]gg]cb`k`]`bchVY`UW`dYX`UbX`k`]`VY`Wcbg]XYfYX`Ug`bc`gi`Va`]gg]cb`"

## GdYW]U`7`cbg]XYfUh]cb

Mci`Wb`Udd`mZcf`gdYW]U`Wcbg]XYfUh]cb`h`fci`[ \`[H\Y`Bi`WYi`g`Gh`XYbh<i`V`k`Y`b`\]](#)`bYgg`cf`c`h`Yf`W]fW`a`gh`UbW]g`]b`h`fZ]fY`k`]h`mci`f`UggYgga`Ybh`dYfZ`fa`UbW`"G]W\_bYggza`]gUj`Ybh`fY`cf`c`h`Yf`W]fW`a`gh`UbW]g`VY`mcbX`mci`f`Wcbf`c`a`Um`"

- DfYj`Ybh`mci`Z`ca`W`a`d`Y`h]b[ `U`Wci`fgY`fYei`]fYa`Ybh`
- ?`YYd`mci`Z`ca`Uth`Y`bX]b[ `Ub`UggYggUV`Y`UW]j`]m`
- G`hd`mci`gi`Va`]h]b[ `UggYggUV`Y`k`cf`\_`Zcf`U`Wci`fgY`
- G][`b]Z]Wb`hmi`UZZY`Wmci`f`dYfZ`fa`UbW`]b`UggYggUV`Y`k`cf`\_`z`VY`]h]U`Z`fa`U`Y`bX]c`Z`gYa`Ygh`Yf`Yi`Ua`]b`U]c`bZ`U`WUgg`h`g]z`U`U`V`c`f`U`rc`fmi`h`g]z`U`gYa`]b`Uf`dYfY`b`h]cb`cf`U`bmi`h`Yf`Z`fa`c`Z`UggYgga`Ybh`

K`Y`Ug`\_`h`Uh`mci`d`Y`UgY`W`b`h]W`h`Y`7`ci`fgY`7`cbj`Ybcf]a`a`YX]UH`mcbW`mci`Uj`Y`W`a`d`Y`h`X`h`Y`gdYW]U`Wcbg]XYfUh]cb`Udd`]W]h]cbZ`bc`UH`f`h`Ub`cb`Y`k`YY`\_`Z`ca`gi`Va`]gg]cb`"

A`cfY`XYh]g]cb`gdYW]U`Wcbg]XYfUh]cb`Wb`VY`Zci`bX`Uh`[k`k`k`"gh`XYbh`i`bgk`"YXi`"Ui`#gdYW\]U`!Wcbg\]XYfUh\]cb`](#)

## Gh`XYbh`Gi`ddcfh

H\Y`I`b]j`Yfg]m]UbX`h`Y`: `UW`h`mdfcj`]XY`U`k`]XY`f`Ub[ `Y`c`Zgi`ddcfhgYfj`]W]g`Zcf`gh`XYbh]z`]bW]X]b[ .`

- @]VfUfm]fU]b]b[ `UbX`gi`ddcfhgYfj`]W]g`!`[k`k`k`"VfUfm\]i`bgk`"YXi`"Ui`](#)
- I`BGK`@YUfb]b[ `7`YbhY`!`[k`k`k`"Wi`bgk`"YXi`"Ui`](#)
- 7`ci`bgY`]b[ `gi`ddcfh!`[k`k`k`"Wci`bgY`\]b\[ `i`bgk`"YXi`"Ui`](#)

9ei`]h]U`Y`@YUfb]b[ `GYfj`]W]g`U]a`g`tc`dfcj`]XY`U`g]h`XYbh]k`]h`U`Z`YY`UbX`W`bZ]XYbh]U`gYfj`]W`h`Uh`dfcj`]XYg`d`f`UW]W]`gi`ddcfh`tc`Ybgi`fY`h`Uh`mci`f`Y`U`h`W`bX]h]cb`XcYgbfmi`UXj`YfgY`m`UZZY`Wmci`f`gh`X]Yg`" [\`fdg`#gh`XYbh`i`bgk`"YXi`"Ui`#`g`](#)

## 5 WUXYa ]W< cbYgmiUbX`D`U[ ]Uf]ga

Mci f`YWñ fYf`UbX`H\Y`I b]j Yfg]mi k ]`YI dYWñmci f`gi Va ]H\X`Ugg][ ba Ybñg`UfY`hfi`mimci f`ck b`k cf`"I BGK  
`Ug`j Yfm`WYUf`[ i ]XY`]bYg`cb`k `Uhd`U[ ]Uf]ga `]g`UbX`ck`hc`Uj`c]X`]H`D`U[ ]Uf]ga `]g`i`g]b[ `H\Y`k cfXg`cf  
]XYUg`cZch`Yfg`UbX`dfYgYbñ]b[ `H\Ya`Ug`mci f`ck b`"D`U[ ]Uf]ga `]g`U`mdY`cZ]bñY`YWñ U`H\YZñ`ñWñb`H\_U  
a UbmZcfa gž`Zca`X`Y`]VYfUH`VX`YUñ]b[ `hc`UWñ]XYbñU`miW`dm]b[ `Zca`U`gci fW`k`]Hci hUW`bck`YX[ Ya Ybñ  
H\Y`I b]j Yfg]mi`Ug`UXcdH\X`Ub`YXi`Wñ]j`Y`UddfcUW`hc`d`U[ ]Uf]ga `UbX`Ug`XYj`Y`cdYX`U`fUb[ Y`cZ  
fYgci fW`g`hc`gi ddcfñgh`XYbñ]"5`"H\Y`XYñU]g`cb`d`U[ ]Uf]ga ž]bWñ`X]b[ `gca`Y`i`gYZ`"fYgci fW`gž`Wñb`VY  
Zci bX`Uh`[k`k`k`"gh`XYbñi`bgk`"YXi`"Ui`#d`U\[ \]Uf\]ga`](#)



5 WUXYa ]W#Zcfa Uh]cb

7 ci fgY'F Ygi `hg

: cf'XYHU]g'cb'l BGK 'UggYgga Ybhd'Wzd'YUgY'j ]g]h [k k k "gh XYbhi bgk "YXi "Ui #UggYgga Ybh](#)

#'gca Y']bghUbW'g'mci f'Z]bU'Wci fgY'fYgi `ha UmVY'k ]h\Y'X'UbX'bcfY'YUgYX'cb'h\Y'l BGK 'd'UbbYX'XUH" H\]g:]g']bX]WUH'X'VmiU'Wci fgY' [ fUXY'fYgi `hcZY]h\Yf.

- @9'-' ]bX]WUH'g'mci `Uj Y'bc'hWca d'Yh'X'cbY'cf'a cfY']h'a g'cZUggYgga Ybh'cf
- K 8'-' ]bX]WUH'g'h\YfY' ]g'Ub']ggi Y'k ]h'cbY'cf'a cfY'Ugg][ ba Ybh'cf
- K 7'-' k \]h' ]bX]WUH'g'mci `Uj Y'Udd']YX'Zc'GdYW]U'7cbg]XYfUH]cb'Xi Y'hc']`bYgg'cf'a ]gUX] Ybh'fY UbX'h\Y'Wci fgY'fYgi `hg`Uj Y'bc'hVYYb'Z]bU']gYX"

#'Y]h\Yf'Yj Ybh]hik ci `X'VY'mci f'fYgdcbg]V']h'hc'WcbhUWh'h\Y'7ci fgY'7cbj YbYf'Ug'gccb'Ug'dfUW]WUV'Y'Vi h bc`UH'f'h\Ub'Z]j Y'f) EXUm]UZ'Yf'fY'YUgY'cZ'h\Y'Wci fgY'fYgi `h'Z'mci `Xcb'h'WcbhUWh'h\Y'Wcbj YbYf'cb'h]a Yz mci `a UmVY'fYei ]fYX'hc'fY!gi Va ]h'Ub'Ugg][ ba Ybhcf'fY!g]h'h\Y'Z]bU'Yi Ua `UbX'a UmfYgi `h]b'mci `ZU] ]b[ `h\Y



7F ⇒ CG'Dfcj ]XYf'7cXY.'\$\$\$-, ;

5W\_bck `YX[ Ya YbhcZ7ci bhfm

K Y'UW\_bck `YX[ Y'hY'6YXY[ U'dYcd`Y`k \c'UfY'hY'hfUX]]cbU`W ghcX]Ubg'cZhY`UbXg'cb`k \]W`I BGK  
? Ybg]b[ hc b`WJa di g`]g`cW]hYX"