

# **MODL5100**

FYgYUfWX`UbX`H\Ycf]Yg`cZHfUbg`Uh]cb`UbX`+bhYfdfYh]b[

GYa YghYf'Hk c''#'&\$%

# 7ci fgY<sup>·</sup>Cj Yfj ]Yk

# <sup>'</sup>GHJZZ'7cbHJWh'8YHJ]`g'

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] <b>m</b>	@cWUhjcb	D∖cbY
GUbXfU` <u`y< td=""><td>g"\U`Y4 i bgk "YXi "Ui</td><td>A cbXUmg<sup>.</sup>(!)da <sup>.</sup>Vm Uddc]bha YbhVm Ya U]`</td><td>A cfj Yb<sup>·</sup>6fck b &amp;\$+</td><td>Ž*%'&amp;'-',) %&amp;+-</td></u`y<>	g"\U`Y4 i bgk "YXi "Ui	A cbXUmg <sup>.</sup> (!)da <sup>.</sup> Vm Uddc]bha YbhVm Ya U]`	A cfj Yb <sup>·</sup> 6fck b &\$+	Ž*%'&'-',) %&+-

ZUgh XYbhYl dYf]YbWg¹]`bYggža ]gUXj Ybh fY`cf`ch\Yf`cWW ffYbW h\Una U\_Yg`UVgYbW 'Zca 'U WUgg#UW]j ]lmi bUj c]XUV`Yž'cf`Yl dYWg`hc`VY`UVgYbhZca 'U`Zcfh\Waa ]b[ 'WUgg#UW]j ]lmi h\Ymg\ci `X`gYY\_ dYfa ]gg]cb`Zca 'h\Y`7 ci fgY`5i h\cf]lmi`UbX`k \YfY`Udd`]WUV`Yž'h\Y]f`fYei Yghg\ci `X`VY`UW\aa dUb]YX`VmUb cf][ ]bU``cf`Wff]ZYX`WcdmcZU'a YX]WU``WYfh]ZWUhY`cf`ch\Yf`Zcfa 'cZUddfcdf]UhY`Yj ]XYbW\"

5.7 ci fgY '5 i h\cf]hma UmYI W gY 'U'ghi XYbh'Zica 'WUggYg'cf'UWjj ]hjYg'Zcf'i d'hc'cbY'a cbh\"'<ck Yj Yfž'h\Ym a UmUgg][ b'UXX]hjcbU``UbX#cf'U'hYfbUhj Y'HUg\_g'hc'Ybgi fY'Wca d`]UbW"''5'7 ci fgY '5 i h\cf]hm'Wcbg]XYf]b[ 'h\Y [fUbh]b[ 'cZUVgYbW'a i gh'VY'gUhjgZ]YX'U'ghi XYbhk ]``ghj```VY'UV'Y'hc'a YYhh\Y'Wci fgY'g'`YUfb]b[ 'ci h\Can Yg UbX#cf'j c'i a Y'cZ'YUfb]b[ "'5'ghi XYbh'gYY\_]b[ 'Uddfcj U`'hc'VY'UVgYbh'Zcf'a cfY'h\Ub'cbY'a cbh\'a i gh'Udd'm ]b'k f]hjb[ 'hc'h\Y'8YUb'UbX'dfcj ]XY'U``cf][]bU``cf'WYfhjZ]YX'gi ddcfh]b[ 'XcW a Ybh'Incb"

: cfa cfY`]bZcfa Uhjcb`UVci hih\Y`UhhYbXUbWY`dfchcWc`g`]b`h\Y`: UW\`hmcZ5fhg`UbX`GcVJU` GVJYbWYg.`<u>\hndg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbHghi XYbhg#UWUXYa ]WY]bZcfa Uhjcb#dfchcWc`g![i ]XY`]bYg#</u>

#### 5 WUXYa ]W = b Zcfa Uh]cb

: cf'YggYbhJU``ghi XYbh`]bZcfa UhJcb`fY`UhJb[`hc.`fYei Yghg`Zcf`Yl hYbg]cb/fYj ]Yk `cZa Uf\_g/cWW dUhJcbU``\YU`h\
UbX`gUZYhm'Yl Ua ]bUhJcb`dfcWYxi fYg/gdYWJU``Wcbg]XYfUhJcb`]b`h\Y`Yj YbhcZ]``bYgg`cf`a ]gUXj Ybhi fY/
ghi XYbhYei ]hmUbX`X]gUV]`]hm'UbX`ch\Yf`YggYbhJU``UWUXYa ]W]bZcfa UhJcbž
gYY`\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhghi XYbhg#UWUXYa ]W]bZcfa UhJcb#dfchcWc`g![i ]XY`]bYg#

# 7ci fgY 8YHJ] g

7 fYX]hDc]bhg\*\*

## Gi a a UfmcZh\Y 7ci fgY

H\]g`Wci fgY`dfcj ]XYg`h\YcfYf]W\``UbX`fYgYUfW\!Xf]j Yb`Zci bXUh]cbg`UbX`df]b\ydYg`h\Uhi bXYfd]b`h\Y dfcZYgg]cbU``dfUW]\W``cZffUbg`Uh]cb`UbX`]bhYfdfYh]b[ "`Mci `k ]```XYj Y`cd`U`gci bX`i bXYfgHJbX]b[ `cZh\Y`a U]bhYfdfYh]b[ `Ug`k Y```Ug`Yh\]\W\`fYei ]fYa Ybhg`Ug`dfcZYgg]cbU``hfUbg`Uhcfg`UbX ]bhYfdfYhYfg"'\#iU`gc`]bhfcXi \Wg`mci `hc`\WcbhYa dcfUfm]bhYfX]g\yd`]bUfmfYgYUfW\`cb`HfUbg`Uhjcb`UbX ]bhYfdfYh]b[ `Zfca `k \]\W\`mci `k ]```XYj Y`cd`Ub`UV]`]mhc`Udd`mh\Y`h\Ycf]Ygž'df]b\yd`Yg`UbX`fYgYUfW\`Z]bX]b[ g hc`mci f'dfU\yf]\Wž`\WcbXi \Wi]bXYdYbXYbhYbei ]fmUbX`a U\_Y`]bZcfa YX`\Xc]\Wg`]b`h\Y`dfc\W`gg`cZhfUbg`Uh]cb\UbX`]bhYfdfYh]b[ "

## 5 hh Y WcbWi g]cb cZh ]g Wci fgY h Y gh XYbhk ] ` VY UV Y hc

- % Wf]hjei Y`WcbhYa dcfUfmihfUbg`Uhjcb`UbX`]bhYfdfYhjb[ 'h\Ycf]YgžfYgYUfW\`UbX`dfcZYgg]cbU``Yh\]Wg &" Udd`mihfUbg`Uhjcb`UbX`]bhYfdfYhjb[ 'h\Ycf]Yg`UbX`fYgYUfW\`hc`dfUWf)WY`VmWcbXi Wfjb[ ']bXYdYbXYbh Ybei ]fmUbX`a U\_]b[ ']bZcfa YX`XYW[q]cbg`VUqYX`cb`h\YcfmUbX`Yj ]XYbW/
- ' " Udd`mih\Ycf]Yg`UbX`fYgYUfW\ 'bc`t\\Y`XYj Y`cda YbhcZg\_]``g`]b'j Uf]ci g`]bhYfdfYh]b[ 'a cXYg ( " XYj ]gY`ghfUhY[ ]Yg`]bZcfa YX`Vmih\Ycf]Yg`UbX`fYgYUfW\ 'bc`gc`j Y`hfUbg`Uh]cb`dfcV`Ya g

#### HYUWX]b[ 'GhfUhY[]Yq'

 $H Y W i fgY ]g H U i [\hVmk UmcZU H c!\ci f`YW i fY UbX cbY!\ci f`h hcf]U`k YY_`m]b k \]W. W bhYa dcfUfm fYgY UfW. `UbX 'h Ycf]Yg `cZhfUbg`Uh]cb `UbX ]bhYfdfYh]b[ `UfY Wf]h]WU``mYI Ua ]bYX `UbX `Udd`]YX" `H\Y `YW i fYg W a V]bY `Zci bXUh]cbU``h Ycf]Yg k ]h `]bhYfX]gW]d`]bUfmfYgYUfW. hc ]bZcfa `UbX `^h gh]ZmdfcZYgg]cbU` dfUW]WW" `H\]g _bck `YX[ Y ]g `gc`]X]Z]YX `h fci [ \ `dfUW]WU``h hcf]U`g`]b k \]W. `VUg]WhfUbg`Uh]cb `UbX `]bhYfdfYh]b[ g_]``g `UfY `XYj Y`cdYX" `H\YgY `g_]``g `UfY `h Yb `fYZ]bYX ]b `U j Uf]Y hmcZfYU`!k cfX `gW bUf]cg ]b k \]W. `fYgYUfW ž h Ycfmž `UbX `Yh ]WU`` W bg]XYfUh]cbg `UfY `Udd`]YX hc `cj YfW a Y 'h Y``]b[ i ]gh]W gcW]cW `h fU`z`UbX `Wc[ b]h] Y W. U``Yb[ Yg`cZhfUbg`Uh]cb `UbX ]bhYfdfYh]b[ "`H\]g `Wci fgY `gYfj Yg`Ug`U `Zci bXUh]cb `Zcf`dfcZYgg]cbU``hfUbg`Uh]cb `UbX ]bhYfdfYh]b[ "g_]``g `XYj Y`cda YbhN fci [ \ci hh\Y 'hfUbg`Uh]cb `UbX#cf`]bhYfdfYh]b[ `dfc[ fUa g"`$ 

# 5ggYgga Ybh

# 5ggYgga YbhHUg\_g

5ggYgga Ybh'hJg_	K Y][\h	

 $\label{thm:continuous} \begin{tabular}{ll} Hi fb]h]b gYhh]b [. H\]g Ugg][ba Ybh]g gi Va]hhYX hAfci [\Thi fb]h]b UbX ghi XYbhg WUb gYY Hi fb]h]b g]a] Uf]hm fYdcfhg"$ 

5ggYgga Ybh ( Ei]n

GHJfhXUhY. Bch5dd`]WUV`Y

@Yb[h\.'&\$']hYa g

8YHJ]`g. `Ghi XYbhg`Wca d`YhY`U`&\$!]hYa `ei ]n`cb`Yh\]Wg`cZh\Y`dfcZYgg]cb`UbX`hfUbg`Uh]cb`UbX`]bhYfdfYh]b[

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

Gh XYbhgʻUfYʻYl dYWYXʻhcʻdi hh\Y]fʻbUa YgʻUbXʻgh XYbhbi a VYfgʻcbʻYj YfmdU[YʻcZh\Y]fʻUgg][ba Ybhgʻ

#### Hi fb]h]b Gi Va ]gg]cb

#mci YbWci bhYf'U'dfcV`Ya k \Yb'UhYa dh]b[ 'rc'gi Va ]hmci f'Ugg][ ba Ybhh\fci [ \ 'Hi fb]h]bž'd`YUgY
hY`Yd\cbY'9I hYfbU`Gi ddcfhcb'-', ) "''' %cf'Ya U]`'h\Ya 'cb'<u>YI hYfbU`hY`hgi ddcfh4 i bgk "YXi "Ui"</u>"'Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY\_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY\_YbXg'fl \*) 'XUmg'U'mYUft!" #mci
UfY'i bUV`Y'hc'gi Va ]hmci f'Ugg][ ba YbhXi Y'hc'U'ZUi `hk ]h\ 'Hi fb]h]b'mci 'a UmUdd`m'Zcf'Ub'YI hYbg]cbž'Vi hmci
a i ghfYhU]b'mci f'h]W\_Yhbi a VYf'Zfca '9I hYfbU''Gi ddcfhfU'cb[ 'k ]h\ 'Ubmch\Yf'fY'Yj UbhXcW a Ybhgt'hc
]dU XYb

- K cf\_'gi Va ]hhyx'%5'hc'% 'XUmg'UZhYf'h\Y'gh]di `Uhyx'XYUX`]bY'k ]``'VY'UggYggYX'UbX'ZYYXVUW\_dfcj ]XYX'Vi h'U'a Uf\_'cZnYfc'k ]``'VY'fYWcfXYX'''=Zh\Y'k cf\_'k ci `X'\Uj Y'fYWf]j YX'U'dUgg'a Uf\_'Vi h'Zcf h\Y'`'UhYbYgg'UbX'h\Y'k cf\_']g'U'Wca di `gcfm'Wci fgY'Wca dcbYbh'f\i fX`Y'fYei ]fYa Ybhz'U'gh XYbh'k ]`` VY'XYYA YX'hc'\Uj Y'a Yhh\Uh'fYei ]fYa Ybh/
- K cf\_'gi Va ]hhYX`&\$`cf`a cfY`XUmg`UZhYf`h\Y`gh]di `UhYX`XYUX`]bY`k ]```bchVY`UWW\dhYX`Zcf UggYgga YbhUbX`k ]```fYWY]j Y`bc`ZYYXVUW\_ža Uf\_'cf`[ fUXY"'=Zh\Y`UggYgga YbhHUg\_']g`U`Wca di `gcfm Wca dcbYbhcZh\Y`Wci fgY`U`gh XYbhk ]```fYWY]j Y`Ub`l bgUh]gZJWcfm: U]``fl : Ł`[ fUXY`Ug`U`fYgi `hcZ i bgUh]gZJWcfmdYfZcfa UbWY`]b`Ub`YggYbh]U``Wca dcbYbhcZh\Y`Wci fgY"

H\]g']bZcfa Uh]cb']g'U`gc'Uj U]`UV`Y'Uh

\hdg.#k k k "Uffg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa ]W]bZcfa Uhcb#dfchcWc`g![i ]XY`]bYg#

### GdYWJU`7cbq]XYfUhcb55dd`]WUhcbq

 $\label{thm:condition} $$Mci `WUb`Udd`m'Zcf'gdYW]U``Wcbg]XYfUh]cb`k \Yb`]``bYgg`cf`ch\Yf`W]fW a ghUbWfg`]bhYfZYfY`k ]h\`mci f UggYgga Ybh'dYfZcfa UbWf''$ 

G]W\_bYggža ]gUXj Ybhi fY'cf'ch\Yf'W]fW a ghUbWrg'VYmcbX'mci f'Wcbhfc``a Um

ł DfYj Ybhmci Zfca Wca d`Yhjb[ 'U'Wci fgY'fYei ]fYa Ybhž

ł "? YYd 'mci 'Zfca 'UthYbX]b[ 'Ub 'UggYggUV'Y 'UWhj ]lmž

ł Ghod moi igi Va ]hh]b[ iUggYggUV Y k cf\_ Zcf U Wci fgYž

ł G][ b]Z]WUbhmUZZYWimci fidYfZcfa UbWijbiUggYggUV`Yik cf\_žVYi]hUiZcfa U``YbX!cZlgYa YghYfiYl Ua ]bUh]cbž'U WUqqihYqhž'Ui`UVcfUhcfmhYqhž'UiqYa ]bUfidfYqYbhUh]cbicfiUbmch\YfiZcfa icZiUqqYqga Ybh'

cfilia fth Yfixyfuljgi]bify`uhjcbihciGdYWju`i7 cbg]XYfuhjcbi]bWi X]b[iiK \Ybihci5dd`mižii<ckihci5dd`mi`ubXiiGiddcfhjb[i8cWia Ybhuhjcbiid`YugYifyZyfihcih\YiGdYWju`i7 cbg]XYfuhjcbik YVghjY.ii\hdg.#ghiXYbhibgk "YXii"ui #gdYWju`iWcbg]XYfuhjcb

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

D`U[]Uf]ga `]g`i g]b[ 'h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b[ 'h\Ya `Ug`mci f`ck b"'=hWJb'hU\_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b[ 'hc`UWW]XYbhU`mWcdm]b[ 'Zfca `U`gci fWY'k ]h\ci hUW\_bck `YX[ Ya Ybh'

IBGK [fcidgdu[]uf]ga ]bhch\YZc``ck]b[ WuhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'j Yfmg]a ]`Uf'k cfXg'hc'h\Y'cf][]bU`hYl h'cf']XYU'k ]h\ci h'UW\_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf\_g"'H\]g'U`gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfcYWhgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k ]h\ci h'WfYX]h'

±DUddfcdf]UhY`dUfUd\fUg]b[.'W\Ub[]b['U'ZYk'kcfXg'UbX'd\fUgYg'k\]`Y`acghmfYhJ]b]b['h\Y`cf][]bU`ghfi WhifY`UbX`]bZcfaUh]cb`k]h\ci hUW\_bck`YX[YaYbh'H\]g'U`gc'Udd`]Yg`]b'dfYgYbhUh]cbg'k\YfY`gcaYcbYdUfUd\fUgYg`Ubch\Yf'g`]XYUg`cf'kcfXg'k]h\ci hWfYX]h''±iU`gc'Udd`]Yg`hc'd]YW]b['hc[Yh\Yf'ei chYg'UbXdUfUd\fUgYg`]bhc'U'bYk'k\c`Yžk]h\ci hfYZ/fYbW]b['UbX'U'ghi XYbh'g`ck b'UbU`mg]g`hc'Vf]b['h\Y`aUhYf]U`hc[Yh\Yf''

7 c``i g]cb. 'k cf\_]b[ 'k ]h\ 'ch\Yfg'Vi h'dUgg]b[ 'cZZh\Y'k cf\_'Ug'U'dYfgcb'g']bX]j ]Xi U``k cf\_"'7 c``i g]cb'U`gc ]bWi XYg'dfcj ]X]b[ 'mci f'k cf\_'hc'Ubch\Yf'ghi XYbhVYZcfY'h\Y'Xi Y'XUhYžcf'Zcf'h\Y'di fdcgY'cZh\Ya d`U[ ]Uf]g]b[ 'Uh'Ubmh]a Yž'dUm]b[ 'Ubch\Yf'dYfgcb'hc'dYfZcfa 'Ub'UWUXYa ]WhUg\_ž'ghYU`]b[ 'cf'UWei ]f]b[ Ubch\Yf'dYfgcb'g'UWUXYa ]Wk cf\_'UbX'Wcdm]b[ ']hz'cZYf]b[ 'hc'Wca d`YhY'Ubch\Yf'dYfgcb'g'k cf\_'cf'gYY\_]b[ dUma YbhZcf'Wca d`YhJb[ 'UWUXYa ]Wk cf\_"

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[ˈgci fW/gˈk \]WX`\Uj Y`bchVYYb`fYUXžk]h\ci hUW\_bck`YX[]b[ˈh\Y`″gYWcbXUfm″gci fW/Zfca k \]WX`\_bck`YX[Y`cZh\Ya`\Ug'VYYb`cVhU]bYX"

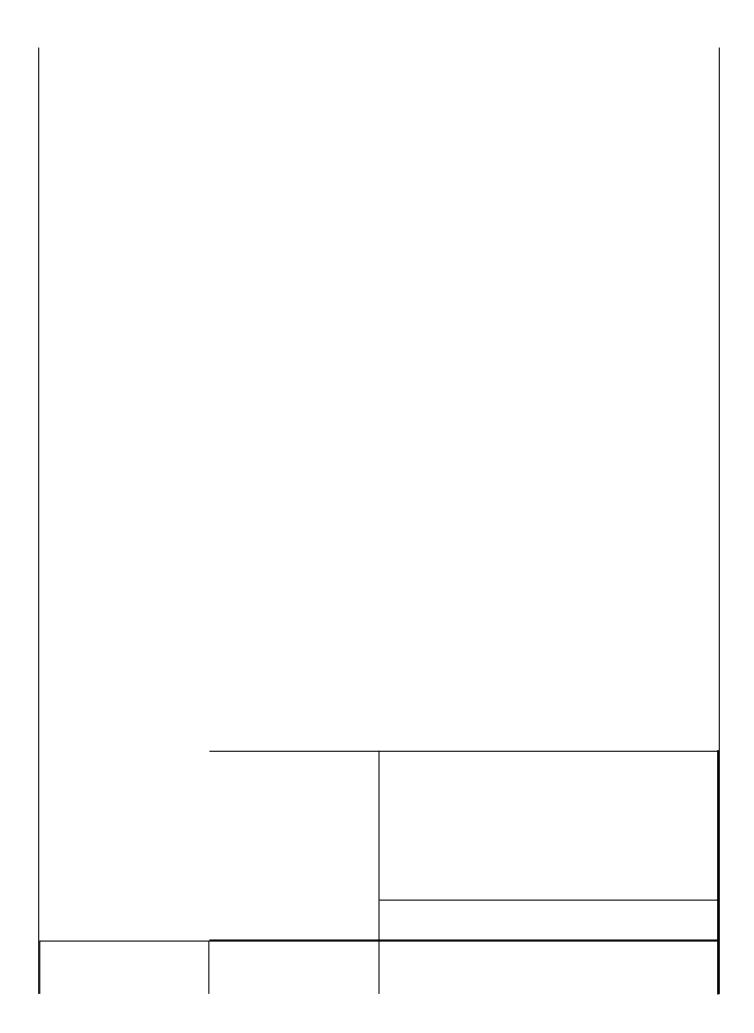
8 i d`]\WUh]cb`ff`gY`Zld`U[]\Uf]ga "Ł`gi Va]\h]b[`mci f`ck b`k cf\_ž]b`k \c`Y`cf`]b`dUfhžk\YfY`]h\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\hYX`Zcf`Ubch\\$f`UqqYqqaYYbhcf\\&cf`Wci f\@Y`UhI BGK `cf`Ubch\Yf`]\m' '

7 cffy Wrify ZyfybWjb[ 'dfUWf)Wyg.

• DUfUd\fug]b[ ž'gi a a Uf]g]b[ ž'YggUmk f]r]b[ 'UbX'r]a Y'a UbU[ Ya Ybh

‰

• VYHYfa UbU[Ymcifh]a Y



	FY`Uhjcbg\]d`VYhkYYb`h\Ycf]Yg`UbX`dfUWhjWY`]b YXiWUhjcbU``UbX`dfcZYgg]cbU``gYhfjb[g
Hi hcf]U`	FYj ]g]cb
	Ei]n

# FYgci fWfg

## DfYgWf]VYX F Ygci fWYg

- < U`Yž'G"'f&\$\$+ $E'5a_g$  g` [fk ;` fWdbd\f[` Y"'6Ug]b[ ghc\_Y. `DU`[ fUj Y'A U\Ma ]``Ub"
- A i bXUmž'>"'fUbm'YX]h]cbfi; `fdaVgU[`YFdS` e'Sf[a` EfgV[We"'@cbXcb#BM'Fci hYX[Y"'fbj U]'UV'Ycb`]bY'j ]U'AccX`YŁ
- DÒWX\UW\_Yfž: "'f&\$\$(Ł"; `fdaVgU[`Y; `fWdbdWf[`Y E fgV[Wež@cbXcb#B M 'F ci hYX[Y"
- 7\UdhYfg'a Uf\_YX`I`WUb`VY`Zci bX`]b.`FZWDagf'WWYW: S`VTaa] aXFcS` e'Sf[a` EfgV[We'f&\$% Ł YX]hYX`Vm7 Ufa Yb`A]``Yb`UbX`: fUbWYgWU'6UfIf]bU"@cbXcb#BM`Fci hYX[Y"'fbj U]`Uv`Y`cb`]bY`j ]U