

ARTS1453

=blfcXi Wfcfm7 \]bYgY'Zcf'6UW_[fci bX'GdYU_Yfg'6

HYfa 'H\fYY''##'&\$%-

7ci fgY[·]Cj Yfj]Yk

GHUZZ:7cbHUWh8YHJ]`g`

'7cbj Ybcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
DUb'K Ub[DUb"k Ub[4 i bgk "YXi "Ui	6m'Uddc]bha Ybh	@&ž*F *&(*	\$&`-',)
			A cfj Yb 6fck b	&' (-

·@YWhi fYfg·

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
DUb'K Ub[DUb"k Ub[4 i bgk "YXi "Ui	6m'Uddc]bha Ybh	@&ž [.] F	\$&`-',)
			A cfj Yb 6fck b	&' (-

'Hi hcfg'

BUa Y	9a U]`	5j U]`UV]`]m	@cWUh]cb	D\cbY
Mjb[`]'Gi b	M]b[`]"gi b4 i bgk "YXi "Ui	6m'Uddc]bha Ybh	@&ž°F	\$&`-',)
			A cfj Yb 6fck b	&*(\$
7 \Yb[!K Y] [.] K Ub[W.Yb[!k Y]"k Ub[4 i bgk "YXi "Ui	@Brojildeloglop}bytramYbnh	≆18vž F & (\$ž	\$&`-',)
			A cfj Yb 6fck b	&, %)

GWXcc`7cbHJWh=bZcf` HJWh=bZcf` HJWh=bZcf` HJWh=bZcf` HJWh=bZcf` HJWh=bZcf`

7ci fgY 8YW] g

7 fYX]hDc]bhg * *

Gi a a UfmcZh\Y 7ci fgY

Gi VYWnUfYU. 7\]bYgY Gh X]Yg

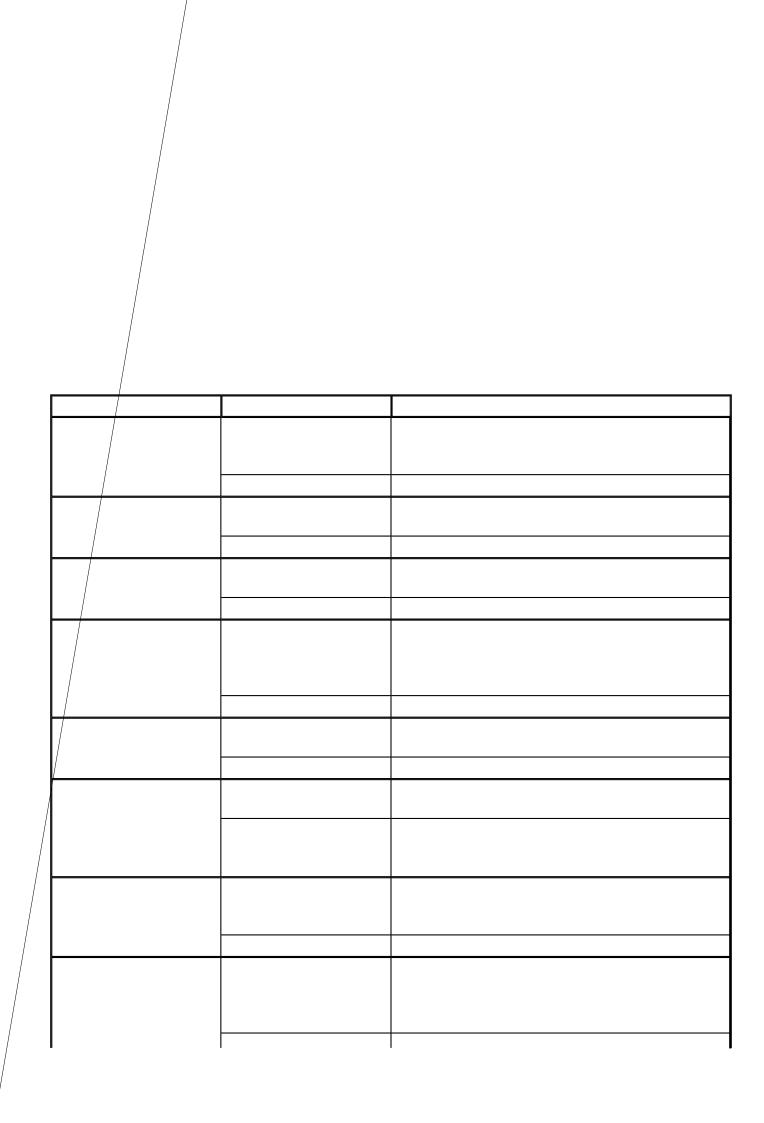
H\]g'7\]bYgY'`Ub[i U[Y'Wci fgY']g'XYg][bYX'Zcf'7\]bYgY'VUW_[fci bX'gdYU_Yfg'k\c'\Uj Y'UWci]fYX'gci bX _bck `YX[Y'Zfca 'h\Y'dfYj]ci g']bffcXi WfcfmWci fgY'5F HG%() &'cf'k\c'dcggYgg'Wca dUfUV'Y'dfcZ]WJYbWm]b 7\]bYgY'''7cbh]bi]b['h\Y'dfYWYX]b['k cf_ž'h\Y'dfYgYbhWci fgY'Z fh\Yf'XYj Y`cdg'mci f'Zci f``Ub[i U[Y'g_]``g f]"Y''``]ghYb]b['ž'gdYU_]b['ZfYUX]b['UbX'k f]h]b['E']b'Ub']bhY[fUhYX'a UbbYf''=h]bffcXi WYg'mci 'hc'Uddfcl]a UhY`m ') \$'j cWUVi `Ufmk cfXgž'U`cb['k]h\ 'h\Y'UggcWJUhYX'gcWJcW' `hi fU`'UbX``]b[i]gh]WUk UfYbYgg']b'XUmhc!XUm hcd]Wg'zigi WX'Ug'hU`_]b['UVci hh\Y'k YUh\Yfz'gYY]b['U'XcWfcfz'fYbh]b['U'd`UWY'hc'`]j Y'UbX'dfYdUf]b['Zcf'hfUj Y''

7 ci fgY @YUfb]b[Ci hMca Yg

- %" | bXYfqHJbX:UbX:i qY:Uddfcl]a UHY:m') \$:YqqYbHJU:i cWJVi:\Ufm]HYa q"
- &" 5dd`mih\Y`Zci f``Ub[i U[Y`g_]``g`]b`7\]bYgY`f]"Y"``]ghYb]b[ž`gdYU_]b[ž`fYUX]b[`UbX`k f]h]b[Ł`Uhi ddYf]bhfcXi Wfcfm`Yj Y`ž'hU_]b[`]bhc`UVWci bh'ghi XYbhgfi\Yf]hU[Y`VUW_[fci bX"
- '" 7 ca a i b]\WhYYZ]\WjYbhm]b`7 \]bYgY`cb`hcd]\Vg`gi \W`Ug`HJ`_]b[`UVci hth\Y`k YUh\Yfz`gYY]b[`U`Xc\\cf UbX`dfYdUf]b[`Zcf`lfUj Y`z`]b`Vch\`cfU``UbX`k f]\thYb`Zcfa gz`]b`U``]b[i]gh]\W``mUbX`gc\Vjc\V`hifU``m Uddfcdf]UhY`a UbbYf"
- ("5ddm]bXYdYbXYbh`YUfb]b['glfUhY[]Yg'hc']bWfYUgY'7\]bYgY'dfcZJWJYbWnVYmcbX'h\Y'WUggfcca"

HYUWX]b['GhfUhY[]Yq'

H\]g``Ub[i U[Y Wci fgY fYei]fYg'h\Y ghi XYbhg'hc'UhhYbX'WUggYg'hchU``]b[') '\ci fg'dYf'k YY_.'cbY'&!\ci f YWi fYžcbY'%!\ci f'h hcf]U``UbX'cbY'&!\ci f'h hcf]U`''H\Y `YWi fY Wcj Yfg'bYk 'j cWUVi `Ufmž[fUa a Uh]WU`ghi Wi fYž`Yggcb'hYl hUbX'W 'hi fU``Uk UfYbYgg/h\Y'%!\ci f'h hcf]U`'ZcW gYg'cb'`]ghYb]b['UbX'gdYU_]b[Yl YfW]gYgž'UbX'h\Y'&!\ci f'h hcf]U`'cb'fYUX]b['UbX'k f]h]b['hUg_g'di g'dfU[a Uh]WWUf]Z]WUh]cb']b'XYhU]''' 6Yg]XYg'h\Y'ZUWY'hc!ZUWY'\ci fgž'U'a]b]a i a 'cZ' '\ci fg'cZk YY_`mghi Xm]b['h]a Y'ci hg]XY'h\Y'WUggfcca 'UfYf'ei]fYX']b'cfXYf'hc'cVhU]b'U'gUh]gZUWhcfm`YUfb]b['fYgi `h'H\Y'ghi XYbhg'UfY'YI dYWhYX'hc'fYj]Yk 'YUW\Y'yggcb'UbX'Z]b]g\'U``'k cf_Vcc_'YI YfW]gYg'Ug'gccb'UZhYf'h\Y'k YY_`mWUggYg'Ug'dcgg]V'Y''';]j Yb'h\UhYUW\bYk 'Yggcb']g'VUgYX'cb'U``WcbhYbhWcj YfYX'dfYj]ci g`mž'h\Y'ghi XYbhg'g\ci `X'bchdcghdcbY'h\Y]f'ghi X]Yg''



	Hi hcf]U`	@Yggcb'%'K cf_Vcc_
K YY_''%%Bcj Ya VYf'! %) 'Bcj Ya VYf	@YWn fY	@Yggcb"% "HfUj Y`.""J UWUVi `Ufmž"[fUa a Uf"UbX `Ub[i U[Y"dfUW¶WY"
	@YWn fY	@Yggcb"% "K cf_Vcc_
K YY_'%\$.'% 'Bcj Ya VYf'! &&'Bcj Ya VYf	@YWn fY	@Yggcb`&\$`5hih\Y`5]fdcfh`JUWUVi`Ufmž[fUaaUf`UbX `Ub[iU[Y`dfUWf)WY`
	Hi hcf]U`	@Yggcb'&\$'K cf_Vcc_'
		5ggYgga Ybh' . F YUX 5 ci X

 $\label{thm:local-control} YbWti fu[YX'hc'Z]``ci hih\Y'A m9I dYf]YbWf'gi fj YmfUbcbma ci g'UbX'i b]j Yfg]lmlk]XYE'hc'Yj U'i UhY h\Y]f'h\UW]b['UbX''YUfb]b['YI dYf]YbWfg''6ch\'cfU``UbX'k f]hhYb'ZYYXVUW_'Zfca 'ghi XYbhg'k]```VY'i gYX'hc Z h\Yf']a dfcj Y'h\Y'Wti fgY'''$

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

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

_Zmci YbWci bhYf'U'dfcV`Ya 'k \Yb'UhYa dhJb['hc'gi Va]hmci f'Ugg][ba Ybhh\fci [\ 'Hi fb]hJbž'd`YUgY
hY`Yd\cbY'9| hYfbU``Gi ddcfhcb'-',) '' ' ' %cf'Ya U]`'h\Ya 'cb'Y! hYfbU`hY`hgi ddcfh4 i bgk "YXi "Ui '"'Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-') .\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUft'' =Zmci
UfY'i bUV`Y'hc'gi Va]hmci f'Ugg][ba YbhXi Y'hc'U'ZUi 'hk]h\'Hi fb]hJb'mci 'a Um'Udd'mZcf'Ub'Y! hYbg]cbžVi hmci
a i ghfYhU]b'mci f'hJW_Yhbi a VYf'Zfca '9! hYfbU``Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY`Yj UbhXcW a Ybhgt'hc
]bWi XY'Ug'Yj]XYbW'hc'gi ddcfhmci f'Y! hYbg]cb'Udd`]WUhJcb'' =Zmci 'Ya U]`'9! hYfbU``Gi ddcfhmci 'k]``

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

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i±iWUbihU_Yia Ubm Zcfa qžZfca iXYi]VYfUhYiW\YUh|b[ihciUVW]XYbhU`mWcdm]b[iZfca iUigci fWik]h\ci hiUW_bck iYX[Ya Ybh'i

IBGK '[fci dg'd'U[]Uf]ga ']bhc'h\Y'Zc``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'

⇒ Uddfcdf]UhY 'dUfUd\fUg]b[...7\Ub[]b['U'ZYk 'k cfXg'UbX'd\fUgYg'k \]'Y 'a cghmfYhJ]b]b['h\Y'cf][]bU` ghfi Wh fY 'UbX#cf'dfc[fYgg]cb'cZ]XYUg'cZh\Y'cf][]bU'žUbX']bZcfa Uh]cb'k]h\ci hUW_bck `YX[Ya Ybh'H\]g'U`gc Udd`]Yg']b'dfYgYbhUh]cbg'k \YfY'gca YcbY'dUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci hWfYX]hUbX'hc d]YW]b['hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk 'k \c`Yžk]h\ci hUddfcdf]UhY'fYZYfYbW]b["

7 c``i g]cb. 'k cf_]b['k]th 'cth Yfg'Vi hidUgg]b['cZZth 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_'thc'Ubcth Yf'ghi XYbh'VYZcfY'th Y'Xi Y'XUHYZcf'Zcf'th Y'di fdcgY'cZth Ya

- i bXYfgfUbX mci f'f][\hg'UbX'fYgdcbg]V]`]hJYg'Ug'U'gh XYbhUhl BGK
- VY`Uk UfY`cZd`U[]Uf]ga ž`Wcdmf][\hz'l BGK `Gh XYbh7cXY`cZ7cbXi WhUbX`5VWWdhUV`Y`l gY`cZ I BGK `=\forall H`F Ygci f\W\g`Dc`]\m\m
- VY 'Uk UfY 'cZh\Y 'ghUbXUfXg 'cZVY\Uj]ci f'Yl dYWYX 'cZYj YfmcbY ']b 'h\Y 'l BGK 'Wca a i b]hm
- `cWUHY 'gYfj]WYg'UbX ']bZcfa UH]cb'UVci hI BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh\YgY'UfYUg'k]``VY'ZJa]`]Uf'hc'mci žch\Yfg'k]``VY'bYk"'; U]b]b['U'gc`]X'i bXYfgHJbX]b['cZU``h\YfY`UhYX'UgdYWhg'cZ9@&9'k]``\Y`d'mci 'a U_Y'h\Y'a cghicZmci f'ghi X]Yg'Uh'l BGK "'\\hd.##gi V'YWfi |XYg"`]VfUfm'i bgk "YXi "Ui #\`]qY#JVci hY`]qY

5WUXYa]W±bZcfaUhjcb

: cf`YggYbhJU``gh XYbh]bZcfa UhJcb`fY`UhJb['hc.

- fYei Yghg Zcf Yl hYbg]cb/`UhY gi Va]gg]cbg [i]XY`]bYg/fYj]Yk 'cZa Uf_g/