



# ARTS2570

HYfa YX]UH'GdUb]g\ '5

HYfa 'Cby' '# '&\$%

7ci fgY`Cj Yfj JYk

`GHUZZ7cbhUWh8YHJ`g`

`7cbj Ybcfg`

B Ua Y	9a Uj`	5j Uj`UVj]m	@cWjhcb	D\cbY
<YbUf`J JWbhY! 7f]gh`VU`	\`j JWbhYW]ghcVU`4 i bgk "YXi "Ui	Hi YgXUm`g`%" \$`hc &" \$da `cf`Vm		

7ci fgY'8YHJ]`g

7fYX]hDc]bqg`\*`

Gi a a UfmicZ\hY'7ci fgY

Gi VYWh5fYU. 'E bS` [eZ S` V >Sf[ 3\_ Wd[US` E fgV[Wd

K ]h`a cFY`hUb` " `a ]`cb`GdUb]g\`gdYU\_Yfg`]b`hY`i G5`U`cbYž< ]gdUb]WW`h`fY`]g`]bWfYUg]b[ `m  
g][ b]Z]WbH`H\]g`Wd`i fgY`Yb\UbW`g`mci`f`UV`]mhc`UddfYU]UHY`hY`Wd`a`d`YI`]mhcZ< ]gdUb]WW`h`fY`UW`cgg  
fk`c`Wd`b]bYbqg`H\Y`Wd`i fgY`]g`UV`ci`h`Y`Ufb]b[ `hc`gdYU`ž`fYUX`UbX`k`f]hY`GdUb]g\`Vmi`g]b[ `hY`a`YX]i`a`cZ  
W`h`fY`"J`cW]Vi`UfmUbX`[`fUa`a`U]W]`g]fi`W]fYg`UfY`d`fYgYbH`X`]b`hY`Wd`b]hI`hcZ`W`h`fU`m`fY`Yj`Ub]h`c`d]Wg`  
Hcd]Wg`a`Um]b]W] XY. `Ub[ i U[ Y`UbX`Wd`a`a`i`b]W]h]cbž`VY`]YZ`gmg]h`a`gž`UbX`hY`Ybj`]f`c`b`a`Y`b`h`

H\Y`Ub[ i U[ Y`cZ]bg]fi`W]cb`]g`GdUb]g\`K`Y`UfY`hY`Z]fghi`b]j`Yfg]m]b`5i`ghfU`]U`i`g]b[ `hY`]bbcj`Uhj`Y`cb`]bY  
Wd`UW]b[ `dfc[`fUa`k`\]W`cZ]Yfg`mci`U`i`b]ei`Y`cddc`f]i`b]mhc`k`cf`\_`ci`hg]XY`cZ]WUgg`k`]h`U`d`YfgcbU`ž`b]Uhj`Y!  
gdYU\_Yf`Ub[ i U[ Y`Wd`UW`"]b`U`fYU`h]a`Yž`cb`]bY`YUfb]b[ `Ybj`]f`c`b`a`Y`b`h`K`Y`\`cd`Y`h`Uh`h`]g`i`b]ei`Y`d`YfgcbU`  
YI`d`Yf]YbW`k`]`VY`f]i`m`Yb`c`m]U`V`Y`UbX`k`]`a`chj`UHY`mci`hc`Wd`b]b]i`Y`YUfb]b[ `GdUb]g\`"

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

%`I`bXYfghUbX`UbX`fYgdc`bX`hc`hY`a`U]b`dc]bqg`cZ`cfU`UbX`k`f]hY`b`hYI`hg`XYU`]b[ `k`]h`h`c`d]Wg`cZ  
Vfc`UXYf`gcW]U`Wd`bW`fbg`YbWd`i`bH`fYX`]b`GdUb]g\`gdYU\_]b[ `Wd`a`a`i`b]h]Yg`"  
&`Dfc`Xi`W`g]a`d`Yž`Wd`\`YfYb]h]hYI`hg`f`c`fU`UbX`k`f]hY`b`c`b`Wd`a`a`c`b`h`c`d]Wg`c`f`UfYUg`cZ`d`YfgcbU`]b`hY`fY`gh`  
'`" `8`YgW]VY`YI`d`Yf]YbW`g`UbX`Yj`Ybqg`UbX`dfcj`XY`fYUgcbg`c`f`YI`d`Ub]h]cbg`Z`f`c`d]b]cbg`UbX`d`Ub`g  
(`" `8`]gh]b[ i ]g\`g][ b]Z]Wb]hX]Z]YfYbW`g`VY`k`Y`Yb`g`ca`Y`W`g`h`ca`gž`Uh]h`XYg`c`f`VY`]Y`Zj`d`fYj`U`Y`b]h]b`h`Y  
< ]gdUb]WgdYU\_]b[ `Wd`a`a`i`b]m]UbX`h`c`gY`cZ`h`Y`]f`c`k`b`"  
)`" `I`gY`ghfU]h`[ ]Yg`hc`Wd`cd`YfU]h`Y`Z]Y`W]j`Y`mk`]h`c`h`Y`f`a`Ya`VYfg`cZ`h`Y`[`f`ci`d`"

HYUW]b[ `GhfU]h`[ ]Yg`

F`U]cbU`Y`Z`c`f`h`Y`]b]W]g]cb`cZ`Wd`b]h]b]h]UbX`hYUW]b[ `UddfcUW]`

@Ub[ i U[ Yg`UfY`VYgh`YUfbYX`h`fci`[ \`i`gY`cZ`h`Y`Ub[ i U[ Y`"K`Y`d`f`c`j`XYž`h`Y`fY`Z`c`fYž`c`d`d`c`f]i`b]h]Yg`Z`c`f`  
gh`XYbqg`hc`i`gY`hY`Ub[ i U[ Y`UbX`k`Y`X`c`g`c`]b`U`a`Y`Ub]b[ Z`k`Um`H`U]h]gž`k`Y`i`gY`U`h`Ya`U]W]UddfcUW]`hc`  
hY`c`f[`Ub]n]U]cb`cZ`Wd`i`fgY`a`U]h]f]U`g`"H\Y`h`c`d]Wg`Wd`j`YfYX`fY`d`fYgYb]h]W`fY`b]h]g]gi`Yg`]b`GdUb]g\`gdYU\_]b[  
Wd`i`b]h]Yg`"

H\]g`Wd`i`fgY`Ya`d`c`mg`gh`XYb]h]W]b]h]fYX`YUfb]b[ `Ug`hY`VUg]g`Z`c`f`]hg`]bg]fi`W]cbU`XYg][`b`UbX`Ya`d`Ug]nYg`  
hY`]a`d`c`f]U`b]W`cZ`UW]j`Y`YUfb]b[ "

H\Y`hYUW]b[ ]b`h`]g`Wd`i`fgY`]g`V`Y`b`X`Y`X.`c`b`]bY`UbX`]b`WUgg`UW]j`]h]Yg`"``

H\Y`Ub[ i U[ Y`cZ]bgfhi W]cb`]g`GdUb]g\`"

: fca `h\Y`; i ]XY`]bYg`cb`@YUfb]b[ `h\Uh`bZca `HYUW]b[ `gh XYbhg`Wca a i b]W]hY`]bZca Uhcbz]XYUg`UbX  
Uf[ i a Ybhg`Vch`cfU`mUbX`]b`k`f]h]b[ ``H\Ymi[ U\Yf`UbX`dfcW]gg`]bZca Uhcb`Zca `U`j`Uf]YmicZdUdYfz  
Ui X]c] ]gi U`UbX`Y`YWfcb]Wgci fW]g``H\Ymi gY`#i`YZYW]j`Y`mVch`Ug`U`a`YUbg`cZWca a i b]W]hcb`UbX`Ug`Ub  
U]X`h`YUfb]b[ `Ug`k`Y``Ug`XYa`cbghfU]h`gca`Y`UV`]m]Ug`Ub`]bXYdYbXYbh`YUfbYf`"

## 5ggYgga Ybh

H\]g]g\*! c7`Wci fgYžYei ]j U`YbhY`tc`%) \$\`ci fg`cZgh XmUh\ca Y`UbX`]bWUggžmci`g\ci`X`a U\_Y`gi fY`tc U`cWUHY`hja Y`Zcf`h\]g`Wci fgY"

Gh XYbhg`UfY`YI dYWYX`tc`Wca Y`tc`: UW`tc`: UW`YW`i fYg`UbX`h`hc f]U`g`dfYdUfYX"D`YUgY`Wca d`YHY`XY k YY\_mUW`j]Yg`VYZcfY`YW`i fY`UbX`hY`UW`j]h]Yg`VYZcfY`h`hc f]U`g`fIGYY`A ccX`Y`Zcf`Z`fh`YF`XYHU]YgŁ"

## 5ggYgga YbhHUg\_g`

5ggYgga YbhHUg_g`	K Y][ \h	8i Y`8UH`	Gh XYbh@YUfb]b[











# F Ygci fWg

DfYgWf]VYX F Ygci fWg

C b]bY 7cUW ]b[ . di fW Ug]b[ UbX fY[ ]ghf]b[ h fci [ \ @]b[ i Ua Yfh]b[ k YVg]h

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%" ; c'hc \hfdg.##k k k"]b[ i Ua Yfh]b[ "Wca #Y[ ]ghfc"d\d
&" GY'YWh'ci f'i b]j Yfg]mžgY'YWh'ci f]bgfhi Wcf#WUgg'gYWh]cbžYbhYf'nci f'dYfgcbU'']bZcfa Uhcb'UbX
gY'YWh'ci f'dUma Ybhcdh]cb.
' " 7 \ccgY'nci f'gYgg]cb'Zca 'hY'Uj U]UV'Y'gYgg]cb'hja Yg"Mc' f'gYgg]cb'k ]'VY'cb'hY'gUa Y'XUm'UbX
Uh'hY'gUa Y'hja Y'i b'Ygg'nci 'WU'Ub[ Y']h
(" 5h'hY'YbX'cZ'hY'fY[ ]ghfU]cb'dfcW'ggž'nci 'k ]'fYW]j Y'U'W'cbZ'fa Uhcb'Ya U]'k ]h'nci f'W'UW]b[
gYgg]cb'U[ YbXU"Mc' 'WU'bgUj Y'hY'U[ YbXU'Ug'U'XcW'a Ybhcb'nci f'XYg_hcd"D'YUgY'W'Y'W'U''hY
]bZ'c[ ]'b'nci f'Gh XYbh]DcftU'hcc. [ c'hc \hfdg.##k k k"]b[ i Ua Yfh]b[ "Wca 'UbX'W]W'cb
"Gh XYbh'hc'c[ ]'b"i5bm]ggi Yž'hY'gh XYbhg\ci 'X'W'cbUWh]gi ddcfh4 ]b[ i Ua Yfh]b[ "Wca 'fh]g'g'hY
Z]gh'gh'UbX'hY'a cghYZ]W]Ybhk Um'hc'\Y'd'nci 'E'
)" D'YUgY'bc'hY'. C b]bY 7cUW ]b[ 'gYgg]cbg'Zca 'k YY_' 'hc'k YY_ '%%
```

F YWca a YbXYX'HYI hWcc\_''

- - E i Ā'hY'dUFYVW3/A W fUk !<]'/' 'fx'YX]h]cb''&\$%)

# F YWca a YbXYX F Ygci fWg

'DfUW]W'A U\_Yg'DYfZYWh'bhYfa YX]UhY'GdUb]g\ ; fUa a Uf. 'K ]h '% \$'9l YfW]gYg f'DfUW]W'A U\_Yg DYfZYWh'GYf]YgE'DUdYfVUW\_ 'C W'cVYf'&ž&\$%&

Vm; ]XU'B ]ggYbVYf[

```
H\]g'Wci fgY'i gYg'A ccX'Y'Ug'U'fYgci fW'W'bfY'k \Yf'gh XYbh]WU'UW]gg'U'k ]XY'gY'YWh]cb'cZa UHf]U'g
gdYW]U'mXYg[ ]bY'h'c'XYj Y'cd'Ub[ i U[ Y'g_]g'UbX'W'h'fY" 'A ccX'Y'dfcj ]XYg'U'Wca dfY\Ybg]j Y
Ybj ]fcba Ybh'hc'Yi d'cfY'Ub[ i U[ Y'UbX'W'h'fY'i g]b[ 'U'XU'U'VUgY'cZ'Ub[ i U[ Y' ]bZcfa Uhcb'W'cbU]b]b[
fYUX]b[ 'hYi hž] ]XYcgž'gcb[ gž[ fUa a Uf'dfUW]W'UbX'U''VfUfmcZ]bhYfbYhYfYgci fWg"': cf'A ccX'Y
a UHf]U'gžYgdYW]U'm'Ui X]c'a UHf]U'gž'i gY'hY'UH'ghj Yfg]cb'cZa cn]'U': # 9: C L 'fA UW' 'K ]bXck gE'ž'nci
UfY'i g]b[ 'ch'Yf'Vfck gYfg'nci 'a ][ \hYI dYf]YbW'Wca dU]V] ]midfcV'Ya g" 'fGdYW]U'm'k ]h' bh'fbYh9l d'cfYfE
Hc''ghYb'cf'gYY'hY'Ui X]c'j ]gi U'a UHf]U'Z]Yg'Zca 'A ccX'Yž]Z'nci 'UfY'U'i gYf'cZK ]bXck gž'nci 'bYXX'hY
UH'ghj Yfg]cb'cZK ]bXck g'A YX]U'D'Um'f'ž'nci 'i gY'A UWž'nci 'bYXX'hY'UH'ghj Yfg]cb'cZ' E i ]W'hja Y"
fi i fh'Yf' ]bgfhi W]cbg:]b'A ccX'YE
```

# 7ci fgY'9j U'i Uh]cb'UbX'8Yj Y'cda Ybh

7ci fgYg'UfY'dYf]cX]W'm'fYj ]Yk YX'UbX'gh XYbh]'ZYXVUW\_]g'i gYX'hc'ja dfcj Y'hYa "'

: YYXVUW\_]g[ UH'YfYX'Zca 'gh XYbh'i g]b[ 'a m9l dYf]YbW''h]g'YbWci fU[ YX'gh XYbh]Wca d'Yh'hY]f fj Ymg'Vm'UW]gg]b[ 'hY'dYfgcbU']gYX'k YV'']b\_] ]U'hY'A ccX'Y Wci fgY'g]h

Gi Va ]gg]cb`cZ5ggYgga YbhHUg\_g

Gi Va ]gg]cb`cZ5ggYgga YbhHUg\_g

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

≠mci `YbWci bhYf`U`dfcV`Ya `k \Yb`U`H`Ya dh]b[ `hc`gi Va ]hmc`i f`Ugg][ ba YbhHfci [ \`Hi fb]h]b`z`d`YUgY  
H`Yd\cbY`9I H`fbU`Gi ddcfhcb`-` , ) `` `` ` %cf`Ya U]`H`Ya `cb`YI H`fbU`H`hgi ddcfh4 i bgk "YXi "Ui ``Gi ddcfh  
\ci fg`UfY` , .\$\$Ua `--`%\$.\$\$da `cb`k YY\_XUmg`UbX`- .\$\$Ua `--).\$\$da `cb`k YY\_YbXg`fI \*) `XUmg`U`m`YUfL`≠mci  
UfY`i bUV`Y`hc`gi Va ]hmc`i f`Ugg][ ba YbhXi Y`hc`U`ZU`i`hik ]H`Hi fb]h]b`mci `a UmiUdd`miZc`f`Ub`YI H`bg]cb`z`Vi hmc`i  
a i ghfY`H]b`mci f`h]W`Yhbi a VYf`Z`ca `9I H`fbU`Gi ddcfhfU`cb[ `k ]H`U`bmc`H`Yf`fY`Yj UbhXcW a Yb`hgL`hc  
]bWi XY`Ug`Yj ]XYbW`hc`gi ddcfhmc`i f`YI H`bg]cb`Udd`]W]h]cb"≠mci `Ya U]`9I H`fbU`Gi ddcfhmc`i `k ]`

5 WUXYa ]W<c bYghmUbX`D`U[ ]Uf]ga

D`U[ ]Uf]ga `]g`i g]b[ `hY`k cfXg`cf]XYUg`cZchYfg`UbX`dfYgYbh]b[ `hYa `Ug`mci f`ck b" `hWUb`hU`Y`a Ubm  
Zcfa gZ`Zca `XY`]VYfUHY`WXYU]b[ `hc`UWV]XYbhU`mW`dm]b[ `Zca `U`gci fW`k ]h`ci hUW`bck `YX[ Ya Ybh`

I BGK `[ fci dg`d`U[ ]Uf]ga `]bhc`hY`Zc`ck ]b[ `WUHY[ cf]Yg.

7 cdm]b[ .`i g]b[ `hY`gUa Y`cf`j Yfmg]a ]Uf`k cfXg`hc`hY`cf][ ]bU`hYI hcf]XYU`k ]h`ci hUW`bck `YX[ ]b[ `hY  
gci fW`cf`i g]b[ `ei chU]cb`a Uf`g" `H\]g`U`gc`Udd`]Yg`hc`]a U[ YgZ`UfhUbX`XYg][ b`dfc`YWgZ`Ug`k Y`Ug  
dfYgYbhU]cbg`k \YfY`gca YcbY`dfYgYbh]g`UbchYf`g]XYUg`cf`k cfXg`k ]h`ci hW`YX]h`

hUddfcdf]UHY`dUfUd`fUg]b[ .`7`Ub[ ]b[ `U`ZYk `k cfXg`UbX`d`fUgYg`k \]Y`a cghmifYU]b]b[ `hY`cf][ ]bU`  
ghfi W`i fY`UbX`#`f`dfc[ fYgg]cb`cZ]XYUg`cZ`hY`cf][ ]bU`Z`UbX`]bZcfa U]cb`k ]h`ci hUW`bck `YX[ Ya Ybh`H\]g`U`gc  
Udd`]Yg`]b`dfYgYbhU]cbg`k \YfY`gca YcbY`dUfUd`fUgYg`UbchYf`g]XYUg`cf`k cfXg`k ]h`ci hW`YX]h`UbX`hc  
d]YW]b[ `hc[ YhYf`ei chYg`UbX`dUfUd`fUgYg`]bhc`U`bYk `k \c`Yz`k ]h`ci hUddfcdf]UHY`fYZYfYbW]b[ "

7 c`i g]cb.`k cf\_]b[ `k ]h`chYfg`Vi hdUgg]b[ `cZ`hY`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`UbchYf`gh`XYbhVYZc`fY`hY`Xi Y`XUHY`Zc`f`Zc`hY`di fdcgY`cZ`hY`a

- i bXYfghUbx'mci f'f][ \hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[ ]Uf]ga ž'Wc'dmf][ \hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5W'W'dhUV'Y'I gY'cZ I BGK '⇒H'F'Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUbxUfXg'cZVY\Uj ]ci f'YI dY'W'X'cZYj Yfmcby']b'h'Y'I BGK 'W'a a i b]m
- 'cW'W'h'gYfj ]W'g'UbX' ]bZ'fa U]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k ]''VY'ZJa ]]Uf'hc'mci ž'c'h'Yfg'k ]''VY'bYk "'; U]b]b[ 'U'gc`]X'i bXYfghUbx]b[ 'cZU''h'Y fY'U'Y'X'UgdY'W'g'cZ9@-G9'k ]''\Y'd'mci 'a U\_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\h'hd.##gi V'Y'W'f'i \]X'Y'g"'\]VfUfm'i bgk "Y'X'i "U'i #' \]g'Y'#J'V'ci h' \]g'Y](#)

5 WUXYa ]WbZcfa Uhcb`

: cfYggYbhU`ghi XYbh]bZcfa Uhcb`fY`Uh]b[ `hc.

- fYei YghZcfYI hYbg]cb/