

# **ARTS2694**

 $D\cbc\c[m'H\Ycfm'UbX'8YgWf]dh]cb$ 

HYfa 'C bY''##'&\$&%

# 7ci fgY<sup>\*</sup>Cj Yfj ]Yk

### GHJZ7cbHJWh8YHJ]`g

#### 7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D∖cbY
A Yb[]ghi 5a VYfVYf	a "Ua VYfVYf4 i bgk "YXi "Ui	H65	A 6 % (%	f\$&Ł
	_			- \$*))*\$)

#### GWXcc``7cbHJWhi±bZcfa Uh]cb

GWkcc`cZ<iaUb]hJYg'UbX'@Ub[iU[Yg

@c\\U||cb. G\\cc``C\\Z|\\\žA\cfj\Yb'6fck\b'6i]\X]b[\z'@\j\Y``&z'&),

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D\cbY.'Ž\*%'&'-',)'%\*,%

: UI . 'Ž \* %'&'-' , ) ', +\$)

9a U]`. '<u>\U`4 i bgk "YXi "Ui</u>

## 7ci fgY 8YW] g

7 fYX]hDc]bhg\*\*

Gi a a UfmcZh\Y 7 ci fgY

7 ci fgY @YUfb]b[ Ci hWca Yg

### 5ggYgga Ybh

#### 5ggYgga YbhHUg\_g

5ggYgga Ybh'tUg_	K Y][ \h	8iY'8UHY	Gh XYbh@YUfb]b[ Ci hWca Yg 5ggYggYX
7 `Ugg'hYgh'=	' \$1	%+#\$' #&\$&%`\$\$\$`5A	%ž <sup>:</sup> &
7`Ugg'hYgh'=	' \$1	\$+#\$(#&\$&%`\$\$\$`5A	%ž'&
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#### 5ggYgga Ybh'8YHJ]`g

5ggYgga Ybh% 7`Ugg hYgh=

8YHJ]`g.

5 '%\f'HyghZcW'g]b['cb'a U'cf'hcd]Wg'WcjYfYX']b'H\Y'`YWh fYgž'h hcf]U'gž'UbX'fYei]fYX'fYUX]b[g"'\dX]j]XiU`Wca a Ybhg'k]``VY'dfcj]XYX"

Hi fb]h]b'gYh]b[.'H\]g'Ugg][ba Ybh]g'gi Va ]hhYX'h\fci [\'Hi fb]h]b'UbX'gh XYbhg'Xc'bchgYY'Hi fb]h]b g]a ]'Uf]hmfYdcfhg"

5ggYgga Ybh& 7`Ugg hYgh=

8 YHJ]`g.

5 '%\f'hYgh'ZcW'g]b['cb'a U'cf'hcd]Wg'WcjYfYX']b'h\Y'`YWh fYgž'h hcf]U`gž'UbX'fYei]fYX'fYUX]b[g"'±bX]j]Xi U`Wca a Ybhg'k]``VY'dfcj]XYX"

 $\label{thm:condition} \mbox{Hi fb]h]b'gYh]b[.'H\]g'Ugg][ba Ybh]g'gi Va ]hhYX'h\fci [\'Hi fb]h]b'UbX'gh XYbhg'Xc'bchgYY'Hi fb]h]b g]a ]'Uf]hmfYdcfhg''$ 

5ggYgga Ybh' DfcV Ya gYh

GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]~gg.

 $H\[g^*]g^*U^*H\[Y^!\ca Y^*Ugg][\ ba Ybh]bj\ c^*j\ ]b[\ 'k\ cf\_'cb^*U^a\ U^cf'dfcV^Ya\ 'gYh'^5'dfcV^Ya\ 'gYh]g^*U'gYf]Yg^*cZXUHU gYhg^*XYg][\ bYX^*gi\ WX^*h\ Uhgh XYbhg^*Udd^m^*]b[\ i\ ]gh]WWcbWYdhg^*UbX^*UbU^mh]WU^*Z^TUa\ Yk\ cf\_g^*hc^*`Ub[\ i\ U[\ Y] Ybhg^*U'gYhg^*CZXUHU gYhg^*XYg][\ bYX^*gi\ WX^*h\ Uhgh XYbhg^*Udd^m^*]b[\ i\ Ugh]WWcbWYdhg^*UbX^*UbU^mh]WU^*Z^TUa\ Yk\ cf\_g^*hc^*`Ub[\ i\ U[\ Y] Ybhg^*U'gYhg^*CZXUHU gYhg^*CZXUHU gYhg^*CZXUHU$ 

#### 5 hhyb XUb WY F Yei ]fYa Ybhg

 $5\,\text{HY}bXUbW''cZhi hcf]U'g'']g'a UbXUhcfm']b'h\]g'Wci fgY'''5\,\text{HY}bXUbW'']g'hU_Yb'Uh'h\ Y'hi hcf]U'g'''l bYl W'gYX UVgYbW''Zfca 'a cfY'h\Ub'&$l 'cZhi hcf]U'g'k ]``'fYgi 'h']b'h\Y'Uk UfX'cZZU]`'[fUXY'''+b'hi hcf]U'gž'mci 'k ]``'UWf] Y`m Yb[U[Y'k]h\ WcfY'Wci fgY'WcbhYbhžYbUV`]b['mci 'hc'Uh'U]b'7 @C''' UbX'7 @C''' "$ 

.

# 7ci fgY'GWXYXi `Y

#### J]Yk WUgg'ha YhUV'Y

#### H]a YHJV`Y

8 UHY	HmdY	7 cbhYbh	
K YY_'%'%)': YVfi Ufm'!'%	@YWhifY	±blfcXi W¶cbʻUbXʻD\cbYljWg	
: YVfi Ufm	Hi hcf]U`	91 YfWjgYgʻcbʻd\cbYhjWg	
		D`YUqY`bchY`h\UhXYhU]`YX`]bZcfa Uh cb`UbX	
		]bg/fi Wfcb ZcfYUWX k YY_fg`YWi fY hcd]WUbX hi hcf]U`	
		hUg_gž:WUgg#cb`]bY:UWfjj ]hjYg:UbX:YI dYWfUfjcbik ]```VY	
		Uj U]`UV`Y`cb`A ccX`Y"`@YWfi fY#fi hcf]U``hcd]Wg`UbX	
		gWXYXi`Y`UfY`giVYWihc`WXUb[Y"`Mci`aighWcbgi`h AccX`Y`ZcffY[i`Uf`idXUhYg"	
	F YUX]b[	7 \UdhYf %fHYl hVcc_Ł	
K YY_'&.'&&': YVfi Ufm!'&*		D\cbYa ]WUbU`mg]g`flŁ	
: YVfi Ufm	Hi hcf]U`	91 YfWjgYg cb d\cbYa ]WUbU`mg]g flŁ	
	FYUX]b[	7 \UdhYf`&	
K YY_'' .'%'A UfWX'!')	@YWhifY	D\cbYa]WUbU`mg]gʻf⊨Ł	
A UfVX	Hi hcf]U`	9l YfWjgYgʻcbʻd\cbYa jWUbU`mgjgʻf⊨Ł	
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K YY_'(.', 'A UfW\'!'‰	@YWnifY	D\cbc`c[]WU``ZYUhi fYg"	
A UfVX	Hi hcf]U`	91 YfW]gYg'cb'd\cbc`c[]\WJ``ZYUhi fYg"	
	FYUX]b[	7 \UdhYf"(	
K YY_^).^%)^A UfWX^!^%-	@YWhifY	A cfd\c`c[ m"	
A UfVX	Hi hcf]U`	9l YfWjgYgʻcbʻa cfd\c`c[ m"	
	FYUX]b[	7 \UdlYf`)	
	5ggYgga Ybh	HYghflŁ	
K YY_'*.'&&'A UfWX'!'&* A UfWX	A cXi `Y	: `YI ]V]`]hmiK YY_°Bc`WUggYg"	
K YY_"+."&- "A UfVX"!"&	@YWnifY	D\cbc`c[]WU``5`HYfbUHjcb`flŁ	
5df]`	Hi hcf]U`	91 YfWjgYg'cb'd\cbc`c[]WU``U`hYfbUhjcb'fl±"	
	FYUX]b[	7 \ Ud h Y f · *	

K YY_', .') '5df]`!'- '5df]`	@YWhifY	D\cbc`c[]\W``U`hYfbUh]cb`f\\UbX`A cfd\cd\cbYa]\Wgf\	
	Hi hcf]U`	91 YfWjgYgʻcbʻd\cbc`c[ ]WU``U`HYfbUHjcbʻf\eliubX a cfd\cd\cbYa ]Wgʻf\eli	
	FYUX]b[	$7 \UdhYf' + UbX'7 \UdhYf',$	
	5ggYgga Ybh	HYghf⊭Ł	
K_YY_'''&'5df]`'!'%* 5df]`	@YWhifY	A cfd\cd\cbYa ]Wg`f⊨Ł/DfcXi Wfj ]lmi/ A cfd\c`c[ m#GmbHJ ]bhYfZJWY	
	Hi hcf]U`	91 YfW]gYgʻcbʻdfcXi Wfj ]lmiUbXʻa cfd\c`c[ m#gmbHJl ]bhYfZJWY	
	FYUX]b[	7\UdhYf'- 'UbX'7\UdhYf'%\$	
K_YY_"%\$."%-"5df]`"!"&'	@YWh fY	8]UVX.fcbm#GmbVX.fcbmiUbX^5VglrfUWfbYgg	
5df]`	Hi hcf]U`	91 YfW]gYg`cb`X]UW\fcbm#gmbW\fcbmiUbX UVglfUWhbYgg	
	FYUX]b[	7\UdhYf`%%`UbX`7\UdhYf`%&	
	5ggYgga Ybh	: ]bU``Ugg][ ba YbhXi Y"	

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

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

Image: Ybwei bhyfu'dfcv'ya k \yb'uhhya dhjb[ 'hc'gi va ]hmci f'Ugg][ ba Ybhh\fci [ \ 'Hi fb]h]bž'd'YUgY

Hy'Yd\cby'9| hy'fbu''Gi ddcfhcb'-', ) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hy'fbu'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'''=Z'mci
UfY'i bUV'Y'hc'gi va ]hmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\ 'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'Y! hy'bg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W\_Yhbi a VYf'Zfca '9! hy'fbU''Gi ddcfhfU'cb[ 'k ]h\ 'Ubmch\Yf'fy'Yj UbhXcW a Ybhgt'hc
]bWi XY'Ug'Yj ]XYbW' hc'gi ddcfhmci f'Y! hy'bg]cb'Udd']WUh]cb"'=Zmci 'Ya U]''9! hy'fbU''Gi ddcfhmci 'k ]'`
Ui hca Uh]WJ'`mfYW']j Y'U'h]W\_Yhbi a VYfZ'Vi h]Zmci 'hY'Yd\cbY'mci 'k ]``bYYX'hc'gdYW]Z]WJ'`mUg\_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj ]XYg'i dXUhy'g'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hyf''

; YbYfU`mž'UggYgga YbhiHug\_g'a i ghVY'gi Va ]hhYX'Y`YVWfcb]\WJ``mij ]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ ba Ybh''=b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk ]```VY'gHJhYX'cb'mci f'\\circ i fgY'g'A ccX`Y'g]hY'k ]h\U`hYfbUh]j Y'gi Va ]gg]cb'XYHJ]`g"

cfi]bZcfa Uhjcbicbi\ckihcigi Va ]hUgg][ ba Ybhgicbi]bYij ]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va ]hUgg][ ba Ybha ccXiY

# 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=hWJbihU\_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiWXYUh]b[ihciUWW]XYbhU`mWcdm]b[iZfca iUigci fWYik]h\ci hiUW\_bck iYX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga ]bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

• i bXYfgHJbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'gh XYbh'Uhil BGK

# 5 WUXYa ]W + DZcfa Uhjcb

: 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/
- I BGK < YU`h\ UbX GUZYmdc`]W[Yg/
- YI Ua ]bUh]cb dfcW/Xi fYg/
- gdYWJU``Wcbg]XYfUHjcb']b'H\Y'Yj YbhcZ]``bYgg'cf'a ]gUXj Ybh fY/
- gh XYbhYei ]hmUbX'X]gUV]`]hm/
- UbX'ch\Yf'YggYbhJU`'UWUXYa ]W]bZcfa UhJcbž'gYY