

```
\ Initializing ...
\ Stylizing ...
\ Begin compilation of HyperTIES Space Telescope Demo.
: global/control.st0.c
\ Energizing ...
c~ ControlsPileID~
.ULP
.ZP
.ZP
.SP
.SL
16
c~ Times-Bold~
.UF
71 10
c~ FIRST~
.PS
15 46 67 10
c~ !OptionFirst~
c~ first-button~
.PT
71 92
c~ BACK PAGE~
.PS
15 84 67 92
c~ !OptionBack~
c~ back-button~
.PT
71 212
c~ NEXT PAGE~
.PS
15 83 67 212
c~ !OptionNext~
c~ next-button~
.PT
71 331
c~ LAST~
.PS
15 38 67 331
c~ !OptionLast~
c~ last-button~
.PT
.EL
.SL
.EL
.SL
29 10
c~ RETURN~
.PS
15 61 25 10
c~ !OptionReturn~
c~ return-button~
.PT
29 91
c~ TOPICS~
.PS
15 55 25 91
c~ !OptionTopics~
```

```
c~ topics-button~
.PT
29 166
c~ INDEX~
.PS
15 47 25 166
c~ !OptionIndex~
c~ index-button~
.PT
29 233
c~ HOME~
.PS
15 46 25 233
c~ !OptionHome~
c~ home-button~
.PT
29 299
c~ SHOW~
.PS
15 47 25 299
c~ !OptionShow~
c~ show-button~
.PT
29 366
c~ QUIT~
.PS
15 36 25 366
c~ !OptionQuit~
c~ quit-button~
.PT
29 422
c~ REFRESH~
.PS
15 73 25 422
c~ !OptionRefresh~
c~ refresh-button~
.PT
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents off
_on_page off
.f
;
: ./index.st0.d
c~ ContentsPileID~
.ULP
found-contents? off
_on_page off
.f
;
: ./index.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
```

c~ Master Index~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
18
c~ Times-Bold~
.UF
622 10
c~ Faint Object Camera - exploded view~
.PS
18 295 618 10
c~ Faint Object Camera - exploded view~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
598 10
c~ Faint Object Camera~
.PS
18 168 594 10
c~ Faint Object Camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
574 10
c~ Faint Object Spectrograph - Exploded view~
.PS
18 344 570 10
c~ Faint Object Spectrograph - Exploded view~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~

.UF
550 10
c~ Faint Object Spectrograph~
.PS
18 213 546 10
c~ Faint Object Spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
526 10
c~ Fine Guidance Sensors~
.PS
18 183 522 10
c~ Fine Guidance Sensors~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
502 10
c~ Goddard Space Flight Center~
.PS
18 236 498 10
c~ Goddard Space Flight Center~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
478 10
c~ High Resolution Spectrograph - exploded view~
.PS
18 371 474 10
c~ High Resolution Spectrograph - exploded view~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL

18
c~ Times-Bold~
.UF
454 10
c~ High Resolution Spectrograph~
.PS
18 244 450 10
c~ High Resolution Spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
430 10
c~ High Speed Photometer - exploded view~
.PS
18 318 426 10
c~ High Speed Photometer - exploded view~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
406 10
c~ High Speed Photometer~
.PS
18 191 402 10
c~ High Speed Photometer~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
382 10
c~ Hubble Space Telescope - Main View~
.PS
18 294 378 10
c~ Hubble Space Telescope - Main View~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF

.EL
.SL
18
c~ Times-Bold~
.UF
358 10
c~ Optical Telescope Assembly - diagram~
.PS
18 305 354 10
c~ Optical Telescope Assembly - diagram~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
334 10
c~ Optical Telescope Assembly~
.PS
18 221 330 10
c~ Optical Telescope Assembly~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
310 10
c~ Participating Organizations~
.PS
18 222 306 10
c~ Participating Organizations~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
286 10
c~ Project Responsibilities~
.PS
18 183 282 10
c~ Project Responsibilities~
c~ default-button~
.PT
18

c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
262 10
c~ Scientific Instruments~
.PS
18 179 258 10
c~ Scientific Instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
238 10
c~ Space Telescope Science Institute~
.PS
18 266 234 10
c~ Space Telescope Science Institute~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
214 10
c~ Spin the Earth~
.PS
18 120 210 10
c~ Spin the Earth~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
190 10
c~ Stop the Earth~
.PS
18 120 186 10
c~ Stop the Earth~
c~ default-button~

.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
166 10
c~ Support Systems Module - Exploded View~
.PS
18 338 162 10
c~ Support Systems Module - Exploded View~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
142 10
c~ Support Systems Module~
.PS
18 202 138 10
c~ Support Systems Module~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
118 10
c~ The Space Telescope in Orbit~
.PS
18 233 114 10
c~ The Space Telescope in Orbit~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
94 10
c~ Why the Hubble Space Telescope?~
.PS
18 273 90 10


```

c~ Why the Hubble Space Telescope?~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
70 10
c~ Wide Field/Planetary Camera - exploded view~
.PS
18 365 66 10
c~ Wide Field/Planetary Camera - exploded view~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
18
c~ Times-Bold~
.UF
46 10
c~ Wide Field/Planetary Camera~
.PS
18 238 42 10
c~ Wide Field/Planetary Camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./faintobk/faintobk.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN

```

c~ Faint Object Camera~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ An extremely sensitive camera capable of pinpointing and electronically
intensifying dim~
.PS
.EL
.SL
44 10
c~ objects.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./faintobk/faintobk.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Faint Object Camera~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL

18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.SL
574 40
c~ This instrument, being built by the~
.PS
18
c~ Times-Bold~
.UF
574 304
c~ European Space Agency~
.PS
18 192 570 304
c~ European Space Agency~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 501
c~ ,~
.PS
.EL
.SL
550 10
c~ uses the spatial resolution of the~
.PS
18
c~ Times-Bold~
.UF
550 255
c~ telescope~
.PS
18 71 546 255
c~ telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
550 331
c~ to capture images of very~
.PS
.EL
.SL
526 10
c~ faint objects in the universe~
.PS
18
c~ Times-Bold~
.UF
526 223
c~ (fig. 1)~
.PS

18 51 522 223
c~ (fig. 1)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
526 279
c~ .~
.PS
.EL
.SL
.EL
.SL
478 40
c~ It is expected to be able to detect stars as faint as the 28th~
.PS
.EL
.SL
454 10
c~ magnitude and will easily pick out stars of magnitude 24, which is~
.PS
.EL
.SL
430 10
c~ about the best a large ground observatory can now do. Magnitude is a~
.PS
.EL
.SL
406 10
c~ designation of brightness - the lower the number, the brighter the~
.PS
.EL
.SL
382 10
c~ object. The dimmest star the average person can see with the naked~
.PS
.EL
.SL
358 10
c~ eye are magnitude 6. The planet Venus is magnitude -4.~
.PS
.EL
.SL
.EL
.SL
310 40
c~ The Faint Object Camera has a basic focal ratio of f/96 and is~
.PS
.EL
.SL
286 10
c~ capable of observing faint objects or extended structures near bright~
.PS
.EL
.SL
262 10
c~ sources. This device will have four~

.PS
18
c~ Times-Bold~
.UF
262 271
c~ filter wheels~
.PS
18 97 258 271
c~ filter wheels~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
262 373
c~ , each containing a~
.PS
.EL
.SL
238 10
c~ variety of filters in 12 positions, which can be inserted in the optical~
.PS
.EL
.SL
214 10
c~ path.~
.PS
.EL
.SL
.EL
.SL
166 40
c~ The system works by gathering and focusing incoming feeble~
.PS
.EL
.SL
142 10
c~ starlight on an electronic image intensifier. The intensifier's output is~
.PS
.EL
.SL
118 10
c~ scanned by a vidicon camera tube and an image consisting of 250,000~
.PS
.EL
.SL
94 10
c~ picture elements is obtained. Exposure times for very faint objects~
.PS
.EL
.SL
70 10
c~ could run as long as ten hours.~
.PS
.EL
.SL
.EL
.SL

```
22 40
c~ An f/48 focal ratio camera system will permit the camera to~
.PS
.EL
.EL
.EL
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ operate in a~
.PS
18
c~ Times-Bold~
.UF
622 105
c~ spectrographic~
.PS
18 117 618 105
c~ spectrographic~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 227
c~ mode which is ideal for studying the~
.PS
.EL
.SL
598 10
c~ structure and dynamics of the center regions of galaxies, the area~
.PS
.EL
.SL
574 10
c~ where black holes are thought to occur. Thus the Faint Object~
.PS
.EL
.SL
550 10
c~ Camera serves as a third, general-purpose spectrograph. This mode of~
.PS
.EL
.SL
526 10
c~ operation will employ fourteen insertable filters.~
.PS
.EL
.EL
c~ DefinitionPileID~
.ULP
.ZP
```

```

c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./focexplo/focexplo.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Faint Object Camera - exploded view~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the Faint Object Camera with labeled components.~
.PS
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? off
_on_page off
.f
;
: ./focexplo/focexplo.st0.a
c~ ContentsPileID~
.ULP
found-contents?
off
_on_page off
.f
;
: ./faintobj/faintobj.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Faint Object Spectrograph~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~

```

```

c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ An instrument capable of analyzing the wavelength distribution, from ultraviolet
through~
.PS
.EL
.SL
44 10
c~ visible, of light from faint sources~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./faintobj/faintobj.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Faint Object Spectrograph~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
.EL

```



```
.SL
574 40
c~ The Faint Object Spectrograph~
.PS
18
c~ Times-Bold~
.UF
574 281
c~ (fig. 2)~
.PS
18 51 570 281
c~ (fig. 2)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 337
c~ is a versatile instrument~
.PS
.EL
.SL
550 10
c~ that can obtain the spectra of extremely faint astronomical objects in~
.PS
.EL
.SL
526 10
c~ the ultraviolet and visible wavebands. A spectrum is a distribution of~
.PS
.EL
.SL
502 10
c~ colors, or wavelengths, created by passing a beam of light through a~
.PS
.EL
.SL
478 10
c~ prism.~
.PS
.EL
.SL
.EL
.SL
430 40
c~ A spectrum reveals the nature of the source we are viewing. We~
.PS
.EL
.SL
406 10
c~ can tell whether it is hot or cold, dense or rarified, and even its~
.PS
.EL
.SL
382 10
c~ chemical composition. Analysis of the spectrum also yield the~
.PS
.EL
```

.SL
358 10
c~ remoteness and relative velocity of the object being studied.~
.PS
.EL
.SL
.EL
.SL
310 40
c~ The spectrograph works by picking up the image of a star, galaxy,~
.PS
.EL
.SL
286 10
c~ interstellar dust cloud or other object that appears on the~
.PS
18
c~ Times-Bold~
.UF
286 444
c~ telescope's~
.PS
18 84 282 444
c~ telescope's~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
262 10
c~ focal plane as a point of light. Then, via a system of~
.PS
18
c~ Times-Bold~
.UF
262 404
c~ optical mirrors~
.PS
18 120 258 404
c~ optical mirrors~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
238 10
c~ and~
.PS
18
c~ Times-Bold~
.UF
238 43
c~ gratings~
.PS

18 65 234 43
c~ gratings~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
238 113
c~ that work like prisms, the light beam is spread out, from~
.PS
.EL
.SL
214 10
c~ ultraviolet through the visible.~
.PS
.EL
.SL
.EL
.SL
166 40
c~ The fanned-out beam is recorded on an imaging device called a~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
142 10
c~ digicon detector~
.PS
18 127 138 10
c~ digicon detector~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
142 142
c~ , which counts the photons of light in each region of~
.PS
.EL
.SL
118 10
c~ the beam. The resulting spectrogram is then transmitted to Earth for~
.PS
.EL
.SL
94 10
c~ study.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~

```

.ULP
found-contents?
on
_on_page off
.f
;
: ./fosexplo/fosexplo.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Faint Object Spectrograph - Exploded view~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the Faint Object Spectrograph with labeled components.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./fosexplo/fosexplo.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Faint Object Spectrograph - Exploded view~
.SN

```

```

.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
17 10
c~ Faint Object Spectrograph - Exploded view~
.PP
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./fineguid/fineguid.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Fine Guidance Sensors~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ Instruments used to locate and lock on to a target object, maintaining position
of the~
.PS
.EL
.SL
44 10
c~ telescope relative to the target.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF

```

```

23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./fineguid/fineguid.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Fine Guidance Sensors~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.SL
574 40
c~ Because of the very high spatial resolution of the Space Telescope~
.PS
.EL
.SL
550 10
c~ great pointing stability is required. Two of the fine guidance sensors~
.PS
.EL
.SL
526 10
c~ will be used to locate and lock on to a target while the third is free to~
.PS
.EL
.SL
502 10
c~ view and precisely measure the relative positions of other stars in the~
.PS
.EL

```

.SL
478 10
c~ vicinity.~
.PS
.EL
.SL
.EL
.SL
430 40
c~ The three fine guidance sensors are expected to produce distance~
.PS
.EL
.SL
406 10
c~ measurements ten times more accurate than those done from~
.PS
18
c~ Times-Bold~
.UF
406 476
c~ Earth~
.PS
18 47 402 476
c~ Earth~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
406 528
c~ .~
.PS
.EL
.SL
382 10
c~ The sensors work through a complex system of mirrors and light~
.PS
.EL
.SL
358 10
c~ detectors to locate the position of a star against a background of~
.PS
.EL
.SL
334 10
c~ other stars. In measuring the distance to a star,~
.PS
18
c~ Times-Bold~
.UF
334 367
c~ ground controllers~
.PS
18 150 330 367
c~ ground controllers~
c~ default-button~
.PT
18

c~ Times-Roman~
.UF
.EL
.SL
310 10
c~ will focus the sensors on a foreground star to transmit its position~
.PS
.EL
.SL
286 10
c~ relative to the stars in the background. Similar measurements are~
.PS
.EL
.SL
262 10
c~ made about six months later. Changes will indicate the distance of~
.PS
.EL
.SL
238 10
c~ the star from the~
.PS
18
c~ Times-Bold~
.UF
238 143
c~ earth~
.PS
18 43 234 143
c~ earth~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
238 191
c~ .~
.PS
.EL
.SL
.EL
.SL
190 40
c~ The precise measurement of star positions is called astrometry.~
.PS
.EL
.SL
166 10
c~ Information provided by the fine guidance sensors will assist in~
.PS
.EL
.SL
142 10
c~ resolving the open-versus-closed universe question.~
.PS
.EL
.EP
c~ DefinitionPileID~

.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./goddards/goddards.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Goddard Space Flight Center~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ NASA center in Greenbelt, MD which will operate the Hubble Space Telescope once
it is~
.PS
.EL
.SL
44 10
c~ in orbit.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on

```
_on_page off
.f
;
: ./goddards/goddards.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Goddard Space Flight Center~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.SL
574 40
c~ Once the Space Shuttle carries the~
.PS
18
c~ Times-Bold~
.UF
574 306
c~ Hubble Space Telescope~
.PS
18 190 570 306
c~ Hubble Space Telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 501
c~ into~
.PS
.EL
.SL
550 10
c~ orbit, project personnel at Goddard will operate the satellite through~
.PS
.EL
.SL
526 10
c~ the Space Telescope Operations Control Center (STOCC), located at~
.PS
.EL
.SL
502 10
c~ Goddard.~
.PS
```

.EL
.SL
.EL
.SL
454 40
c~ The STOCC is the largest and most complex control center for a~
.PS
.EL
.SL
430 10
c~ scientific satellite to date, and will enable astronomers to utilize the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
406 10
c~ Hubble Space Telescope~
.PS
18 190 402 10
c~ Hubble Space Telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
406 205
c~ much like a ground observatory. The~
.PS
.EL
.SL
382 10
c~ astronomers typically will work at the~
.PS
18
c~ Times-Bold~
.UF
382 298
c~ Space Telescope Science~
.PS
18 191 378 298
c~ Space Telescope Science~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
358 10
c~ Institute in Baltimore. They will send their observing requests to the~
.PS
.EL
.SL
334 10
c~ STOCC where the Hubble Space Telescope's controllers will program~
.PS

.EL
.SL
310 10
c~ the observations. The data and images obtained by the Telescope's~
.PS
.EL
.SL
286 10
c~ instruments then will be transmitted to the STOCC and on to the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
262 10
c~ Space Telescope Science Institute~
.PS
18 266 258 10
c~ Space Telescope Science Institute~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
262 281
c~ , where astronomers will study~
.PS
.EL
.SL
238 10
c~ the information and present their findings to the world community.~
.PS
.EL
.SL
.EL
.SL
190 40
c~ It is expected that the STOCC will operate 24 hours per day and~
.PS
.EL
.SL
166 10
c~ provide a schedule of 3,500 hours of observing time annually. By~
.PS
.EL
.SL
142 10
c~ comparison, ground observatories, which can operate only during the~
.PS
.EL
.SL
118 10
c~ night, offer just 2000 hours of observing time per year.~
.PS
.EL
.EP
c~ DefinitionPileID~

```

.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./highreso/highreso.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ High Resolution Spectrograph~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ An instrument capable of obtaining the ultraviolet spectra of individual objects
in~
.PS
.EL
.SL
44 10
c~ crowded fields.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on

```

```

_on_page off
.f
;
: ./highreso/highreso.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ High Resolution Spectrograph~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ The High Resolution Spectrograph~
.PS
18
c~ Times-Bold~
.UF
622 275
c~ (fig. 3)~
.PS
18 51 618 275
c~ (fig. 3)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 331
c~ will be able to use the full~
.PS
.EL
.SL
598 10
c~ resolving capability of the~
.PS
18
c~ Times-Bold~
.UF
598 209
c~ telescope~
.PS
18 71 594 209
c~ telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
598 285

```

c~ to see much dimmer objects than~
.PS
.EL
.SL
574 10
c~ previous space-born instruments. Although it performs in much the~
.PS
.EL
.SL
550 10
c~ same way as the~
.PS
18
c~ Times-Bold~
.UF
550 136
c~ Faint Object Spectrograph~
.PS
18 213 546 136
c~ Faint Object Spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
550 354
c~ , it will be much more~
.PS
.EL
.SL
526 10
c~ accurate because it will be using more light and resolving it into~
.PS
.EL
.SL
502 10
c~ much finer increments. The High Resolution Spectrograph will be~
.PS
.EL
.SL
478 10
c~ looking at only the ultraviolet region of the spectrum, wavelengths~
.PS
.EL
.SL
454 10
c~ that do not reach Earth. This ultraviolet region should provide the~
.PS
.EL
.SL
430 10
c~ most detailed chemical composition information yet obtained on~
.PS
.EL
.SL
406 10
c~ objects in space. The instrument's extremely fine resolution will~
.PS

```

.EL
.SL
382 10
c~ enable it to pick out individual stars in crowded fields. In addition,~
.PS
.EL
.SL
358 10
c~ binary stars that cannot be differentiated optically will be resolved so~
.PS
.EL
.SL
334 10
c~ that each star can be studied separately. The~
.PS
18
c~ Times-Bold~
.UF
334 349
c~ spectrograph~
.PS
18 104 330 349
c~ spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
334 458
c~ will be~
.PS
.EL
.SL
310 10
c~ able to study such objects as supernovae, active galaxies, bright~
.PS
.EL
.SL
286 10
c~ quasars, and even phenomena in our own solar system such as~
.PS
.EL
.SL
262 10
c~ planetary atmospheres, auroral activity, and the presence of~
.PS
.EL
.SL
238 10
c~ deuterium in comets. Deuterium, thought to have been manufactured~
.PS
.EL
.SL
214 10
c~ during the Big Bang, occurs throughout the universe. If found in~
.PS
.EL
.SL

```



```

190 10
c~ comets, it will reveal more about the relation of our solar system to~
.PS
.EL
.SL
166 10
c~ the original cataclysmic explosion.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./hrsexplo/hrsexplo.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ High Resolution Spectrograph - exploded view~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the High Resolution Spectrograph with labeled components.~
.PS
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? off
_on_page off
.f
;
: ./hrsexplo/hrsexplo.st0.a
c~ ContentsPileID~
.ULP
found-contents?
off
_on_page off
.f

```

```

;
: ./highspee/highspee.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ High Speed Photometer~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ Measures the brightness of an object, either within a particular wavelength or~
.PS
.EL
.SL
44 10
c~ throughout the entire spectrum; detects fluctuations.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./highspee/highspee.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ High Speed Photometer~
.SN

```

```

.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.SL
574 40
c~ The High Speed Photometer~
.PS
18
c~ Times-Bold~
.UF
574 258
c~ (fig. 4)~
.PS
18 51 570 258
c~ (fig. 4)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 314
c~ is designed to provide~
.PS
.EL
.SL
550 10
c~ accurate observatons of the total light from an object in space, note~
.PS
.EL
.SL
526 10
c~ any fluctuations in brightness on a time scale down to microseconds,~
.PS
.EL
.SL
502 10
c~ and to detail any fine shapes or structures associated with the light~
.PS
.EL
.SL
478 10
c~ source. These measurements are made over a wide spectral interval,~
.PS
.EL
.SL
454 10
c~ including the ultraviolet.~
.PS
.EL

```

.SL
.EL
.SL
406 40
c~ It is the simplest instrument of the group, containing no moving~
.PS
.EL
.SL
382 10
c~ parts, and relies entirely on the pinpoint accuracy of the spacecraft's~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
358 10
c~ fine guidance sensors~
.PS
18 168 354 10
c~ fine guidance sensors~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
358 183
c~ to accomplish its work. After the light of a~
.PS
.EL
.SL
334 10
c~ star or other source is received, a~
.PS
18
c~ Times-Bold~
.UF
334 262
c~ detector~
.PS
18 65 330 262
c~ detector~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
334 332
c~ can measure either the~
.PS
.EL
.SL
310 10
c~ total brightness or the intensity of light within a particular portion of~
.PS
.EL
.SL
286 10

```

c~ the spectrum.~
.PS
.EL
.SL
.EL
.SL
238 40
c~ The High Speed Photometer, in addition, will transmit accurate~
.PS
.EL
.SL
214 10
c~ information on fluctuation in brightness over time. Detection of~
.PS
.EL
.SL
190 10
c~ rapidly spinning neutron or other compact stars will be possible, as~
.PS
.EL
.SL
166 10
c~ well as detailed data on the shape and structure of the fine spikes or~
.PS
.EL
.SL
142 10
c~ flares often associated with such compact objects.~
.PS
.EL
.SL
.EL
.SL
94 40
c~ The instrument will also be of special value to astronomers in~
.PS
.EL
.SL
70 10
c~ establishing calibration standards for faint stellar objects.~
.PS
.EL
.EL
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./hspexplo/hspexplo.st0.d
c~ DefinitionPileID~
.ULP

```

```

.ZP
c~ Definition~
.SN
c~ High Speed Photometer - exploded view~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the High Speed Photometer with components labeled.~
.PS
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? off
_on_page off
.f
;
: ./hspexplo/hspexplo.st0.a
c~ ContentsPileID~
.ULP
found-contents?
off
_on_page off
.f
;
: ./spacetel/spacetel.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Hubble Space Telescope - Main View~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the telescope with major components labelled.~
.PS
.EL
.SL
16

```

```

c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./spacetal/spacetal.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Hubble Space Telescope - Main View~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
177 1
c~ telescope - main view~
.PP
468 564 177 1
c~ Faint Object Spectrograph - Exploded view~
c~ Main view - shape FOS~
.PT
468 564 177 1
c~ Faint Object Camera - exploded view~
c~ Main view - shape FOC~
.PT
468 564 177 1
c~ High Resolution Spectrograph - exploded view~
c~ Main view - shape HRS~
.PT
468 564 177 1
c~ High Speed Photometer - exploded view~
c~ Main view - shape HSP~
.PT

```

```

468 564 177 1
c~ Wide Field/Planetary Camera - exploded view~
c~ Main view - shape WFPC~
.PT
468 564 177 1
c~ Optical Telescope Assembly - diagram~
c~ Main view - shape OTA~
.PT
468 564 177 1
c~ Fine Guidance Sensors~
c~ Main view - shape FGS~
.PT
468 564 177 1
c~ High Speed Photometer - exploded view~
c~ Main view - shape HSP~
.PT
468 564 177 1
c~ Faint Object Spectrograph~
c~ Main view - word Faint Object Spectrograph~
.PT
468 564 177 1
c~ High Resolution Spectrograph~
c~ Main view - word High Resolution Spectrograph~
.PT
468 564 177 1
c~ High Speed Photometer~
c~ Main view - word High Speed Photometer~
.PT
468 564 177 1
c~ Faint Object Camera~
c~ Main view - word Faint Object Camera~
.PT
468 564 177 1
c~ Wide Field Planetary Camera~
c~ Main view - word Wide Field Planetary Camera~
.PT
468 564 177 1
c~ Support Systems Module~
c~ Main view - word Support System module~
.PT
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./opticalt/opticalt.st0.d
c~ DefinitionPileID~
.ULP
.ZP

```



```

c~ Definition~
.SN
c~ Optical Telescope Assembly~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ The central component of the Hubble Space Telescope, consisting of a 94 inch (2.4
m)~
.PS
.EL
.SL
44 10
c~ reflecting Cassegrain telescope and supporting structures.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./opticalt/opticalt.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Optical Telescope Assembly~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~

```

```

.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ The Optical Telescope Assembly~
.PS
18
c~ Times-Bold~
.UF
622 261
c~ (fig. 5)~
.PS
18 51 618 261
c~ (fig. 5)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 317
c~ will mount a 94-inch (2.4~
.PS
.EL
.SL
598 10
c~ m) reflecting cassegrain-type telescope, consisting of a paraboloidal~
.PS
.EL
.SL
574 10
c~ primary mirror and a hyperboloidal secondary mirror. The optical~
.PS
.EL
.SL
550 10
c~ effect is the same as that of a telephoto lens. Light beams enter the~
.PS
.EL
.SL
526 10
c~ open end of the telescope and strike the~
.PS
18
c~ Times-Bold~
.UF
526 312
c~ primary mirror~
.PS
18 124 522 312
c~ primary mirror~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
526 441

```

c~ at the rear.~
.PS
.EL
.SL
502 10
c~ The parabolic shape of the primary mirror causes the beams to~
.PS
.EL
.SL
478 10
c~ converge upon the~
.PS
18
c~ Times-Bold~
.UF
478 153
c~ secondary mirror~
.PS
18 138 474 153
c~ secondary mirror~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
478 296
c~ . The secondary mirror's~
.PS
.EL
.SL
454 10
c~ hyperbolic shape aligns the beams in parallel and bounces them back~
.PS
.EL
.SL
430 10
c~ through a hole in the center of the primary mirror. The~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
406 10
c~ scientific instruments~
.PS
18 173 402 10
c~ scientific instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
406 188
c~ are positioned behind the primary mirror~
.PS
.EL
.SL

382 10
c~ where they can be moved into the path of the reflected light. The~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
358 10
c~ primary mirror~
.PS
18 124 354 10
c~ primary mirror~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
358 139
c~ is made of ultra-low expansion titanium silicate~
.PS
.EL
.SL
334 10
c~ glass with an aluminum-magnesium fluoride coating. To reduce~
.PS
.EL
.SL
310 10
c~ weight, the front and back plates are fused to a honeycomb core. The~
.PS
.EL
.SL
286 10
c~ mirror will be heated during operation to 70 degrees F to minimize~
.PS
.EL
.SL
262 10
c~ variations from its original accuracy. This heat will come from~
.PS
.EL
.SL
238 10
c~ electrical strip heaters, powered by the~
.PS
18
c~ Times-Bold~
.UF
238 303
c~ solar arrays~
.PS
18 94 234 303
c~ solar arrays~
c~ default-button~
.PT
18
c~ Times-Roman~

```

.UF
238 402
c~ , which will~
.PS
.EL
.SL
214 10
c~ radiate to the back of the mirror. The~
.PS
18
c~ Times-Bold~
.UF
214 300
c~ orientation~
.PS
18 89 210 300
c~ orientation~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
214 394
c~ and~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
190 10
c~ stabilization control~
.PS
18 160 186 10
c~ stabilization control~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
190 175
c~ system of the telescope can point with an~
.PS
.EL
.SL
166 10
c~ accuracy of 0.01 arc second and can hold onto a target for extended~
.PS
.EL
.SL
142 10
c~ periods within 0.007 arc-second. This angle would translate into a~
.PS
.EL
.SL
118 10
c~ distance slightly larger than the diameter of a dime if the telescope~
.PS

```

```

.EL
.SL
94 10
c~ were 500 miles away. Such accuracy is necessary in order to study~
.PS
.EL
.SL
70 10
c~ very faint objects, some of which require exposures of 10 hours or~
.PS
.EL
.SL
46 10
c~ more. The telescope can be turned and changed from one direction to~
.PS
.EL
.SL
22 10
c~ another at a rate of 90 degrees in 20 minutes.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./otadiagr/otadiagr.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Optical Telescope Assembly - diagram~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the Optical Telescope Assembly.~
.PS
.EL
.SL
16

```

```

c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./otadiagr/otadiagr.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Optical Telescope Assembly - diagram~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
299 10
c~ Optical Telescope Assembly - diagram~
.PP
337 450 299 10
c~ Scientific Instruments~
c~ OTA - word radial S.I.~
.PT
337 450 299 10
c~ Scientific Instruments~
c~ OTA - word axial S.I.~
.PT
337 450 299 10
c~ Fine Guidance Sensors~
c~ OTA - word fine guidance~
.PT
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~

```

```

.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./particip/particip.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Participating Organizations~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ For a description of the participating organizations and their responsibilities,
see article.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./particip/particip.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP

```


.ZP
c~ Participating Organizations~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ The~
.PS
18
c~ Times-Bold~
.UF
622 45
c~ Hubble Space Telescope~
.PS
18 190 618 45
c~ Hubble Space Telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 240
c~ is truly a cooperative effort~
.PS
18
c~ Times-Bold~
.UF
622 449
c~ (fig. 6)~
.PS
18 51 618 449
c~ (fig. 6)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 505
c~ .~
.PS
.EL
.SL
598 10
c~ Each of the following organizations has distinct responsibilities:~
.PS
.EL
.SL
.EL
.SL
550 40
c~ - NASA's Office of Space Science and Applications,~

.PS
.EL
.SL
526 10
c~ Washington, DC, is responsible for overall direction of the Hubble~
.PS
.EL
.SL
502 10
c~ Space Telescope Program.~
.PS
.EL
.SL
.EL
.SL
454 40
c~ - Marshall Space Flight Center, Huntsville, AL, is the leading~
.PS
.EL
.SL
430 10
c~ NASA center for the Hubble Space Telescope, providing day-to-day~
.PS
.EL
.SL
406 10
c~ management of the project. Marshall also directs the construction~
.PS
.EL
.SL
382 10
c~ and integration of the telescope and spacecraft systems.~
.PS
.EL
.SL
.EL
.SL
334 40
c~ --
.PS
18
c~ Times-Bold~
.UF
334 52
c~ Goddard Space Flight Center~
.PS
18 236 330 52
c~ Goddard Space Flight Center~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
334 293
c~ in Greenbelt, MD, is responsible~
.PS
.EL
.SL

310 10
c~ for development of the Telescope's four American-contributed~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
286 10
c~ scientific instruments~
.PS
18 173 282 10
c~ scientific instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
286 188
c~ , the development of the ground system, and~
.PS
.EL
.SL
262 10
c~ Telescope operations once in orbit.~
.PS
.EL
.SL
.EL
.SL
214 40
c~ - European Space Agency (ESA), a consortium of eleven western~
.PS
.EL
.SL
190 10
c~ European nations, is responsible for developing the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
166 10
c~ Faint Object Camera~
.PS
18 168 162 10
c~ Faint Object Camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
166 183
c~ , one of five~
.PS
18
c~ Times-Bold~

.UF
166 277
c~ scientific instruments~
.PS
18 173 162 277
c~ scientific instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
166 455
c~ aboard~
.PS
.EL
.SL
142 10
c~ the Hubble Space Telescope. ESA is also developing the~
.PS
18
c~ Times-Bold~
.UF
142 433
c~ solar arrays~
.PS
18 94 138 433
c~ solar arrays~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
118 10
c~ which power the spacecraft and will provide a small resident staff to~
.PS
.EL
.SL
94 10
c~ help operate the~
.PS
18
c~ Times-Bold~
.UF
94 137
c~ Space Telescope Science Institute~
.PS
18 266 90 137
c~ Space Telescope Science Institute~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
94 408
c~ in Baltimore.~
.PS

.EL
.SL
.EL
.SL
46 40
c~ The ESA's principal members include: Belgium, Denmark,~
.PS
.EL
.SL
22 10
c~ France, West Germany, Ireland, Italy, the Netherlands, Spain,~
.PS
.EL
.EP
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ Sweden, Switzerland, and the United Kingdom. Associate members~
.PS
.EL
.SL
598 10
c~ include Austria and Norway.~
.PS
.EL
.SL
.EL
.SL
550 40
c~ - Johnson Space Center in Houston, Texas, will launch the~
.PS
.EL
.SL
526 10
c~ Hubble Space Telescope using the Space Shuttle.~
.PS
.EL
.SL
.EL
.SL
478 40
c~ - Kennedy Space Center, Florida, is also involved in Space~
.PS
.EL
.SL
454 10
c~ Shuttle launch operations.~
.PS
.EL
.SL
.EL

.SL
406 40
c~ - The Association of Universities for Research in Astronomy~
.PS
.EL
.SL
382 10
c~ (AURA) has responsibility for operating the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
358 10
c~ Space Telescope Science Institute~
.PS
18 266 354 10
c~ Space Telescope Science Institute~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
358 281
c~ in Baltimore, MD, under~
.PS
.EL
.SL
334 10
c~ contract to NASA's~
.PS
18
c~ Times-Bold~
.UF
334 167
c~ Goddard Space Flight Center~
.PS
18 236 330 167
c~ Goddard Space Flight Center~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
334 408
c~ . AURA~
.PS
.EL
.SL
310 10
c~ includes: University of Arizona, California Institute of Technology,~
.PS
.EL
.SL
286 10
c~ University of California at Berkeley, University of Chicago,~
.PS

```

.EL
.SL
262 10
c~ University of Colorado, Harvard, University of Hawaii, University of~
.PS
.EL
.SL
238 10
c~ Illinois, Indiana University, Johns Hopkins University, Massachusetts~
.PS
.EL
.SL
214 10
c~ Institute of Technology, University of Michigan, Ohio State,~
.PS
.EL
.SL
190 10
c~ Princeton, University of Texas at Austin, University of Wisconsin,~
.PS
.EL
.SL
166 10
c~ and Yale.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./projectr/projectr.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Project Responsibilities~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10

```

```

c~ A chart illustrating the organizations working on the Hubble Space Telescope and
their~
.PS
.EL
.SL
44 10
c~ responsibilities.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./projectr/projectr.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Project Responsibilities~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
38 10
c~ Project responsibilities~
.PP
598 507 38 10
c~ Support Systems Module~
c~ resp. - word support system~
.PT
598 507 38 10
c~ Optical Telescope Assembly~
c~ resp. - word optical telescope assembly~

```



```

.PT
598 507 38 10
c~ Fine Guidance Sensors~
c~ resp. - word fine guidance~
.PT
598 507 38 10
c~ Faint Object Camera~
c~ resp. - word faint object camera~
.PT
598 507 38 10
c~ Goddard Space Flight Center/STOCC~
c~ resp. - word goddard~
.PT
598 507 38 10
c~ Scientific Instruments~
c~ resp. - word Scientific instrument~
.PT
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./scientif/scientif.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Scientific Instruments~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ The wide field/planetary and faint object cameras, the faint object and high
resolution~
.PS
.EL
.SL
44 10
c~ spectrographs, and the high-speed photometer.~
.PS

```

```

.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./scientif/scientif.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Scientific Instruments~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ The five scientific instruments, four American and one European,~
.PS
.EL
.SL
598 10
c~ are located behind the primary mirror, at the focal plane, where they~
.PS
.EL
.SL
574 10
c~ can pick up light reflected from the telescope. They are the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL

```

550 10
c~ wide field/planetary camera~
.PS
18 221 546 10
c~ wide field/planetary camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
550 236
c~ , the~
.PS
18
c~ Times-Bold~
.UF
550 274
c~ faint object spectrograph~
.PS
18 198 546 274
c~ faint object spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
550 477
c~ , the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
526 10
c~ high resolution spectrograph~
.PS
18 231 522 10
c~ high resolution spectrograph~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
526 246
c~ , the~
.PS
18
c~ Times-Bold~
.UF
526 284
c~ high speed photometer~
.PS
18 182 522 284
c~ high speed photometer~
c~ default-button~
.PT
18

c~ Times-Roman~
.UF
526 471
c~ , and~
.PS
.EL
.SL
502 10
c~ the~
.PS
18
c~ Times-Bold~
.UF
502 39
c~ faint object camera~
.PS
18 152 498 39
c~ faint object camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
502 196
c~ , the latter provided by the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
478 10
c~ European Space Agency~
.PS
18 192 474 10
c~ European Space Agency~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
478 207
c~ . In addition, the~
.PS
18
c~ Times-Bold~
.UF
478 337
c~ fine guidance sensors~
.PS
18 168 474 337
c~ fine guidance sensors~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
478 510

```

c~ ,~
.PS
.EL
.SL
454 10
c~ part of the~
.PS
18
c~ Times-Bold~
.UF
454 95
c~ support systems module~
.PS
18 193 450 95
c~ support systems module~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
454 293
c~ , because of their ability to~
.PS
.EL
.SL
430 10
c~ accurately locate stars, could be considered a sixth scientific~
.PS
.EL
.SL
406 10
c~ instrument. Each instrument is housed in a separate module and will~
.PS
.EL
.SL
382 10
c~ draw 110 to 150 watts of power. All are exchangeable during~
.PS
.EL
.SL
358 10
c~ maintenance visits by the Space Shuttle.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./spacetem/spacetem.st0.d

```

```

c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Space Telescope Science Institute~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ The center for scientific activities associated with the Hubble Space Telescope.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./spacetem/spacetem.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Space Telescope Science Institute~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18

```

c~ Times-Roman~
.UF
622 10
c~ The Space Telescope Science institute, opened in 1983 and operated~
.PS
.EL
.SL
598 10
c~ under contract to~
.PS
18
c~ Times-Bold~
.UF
598 146
c~ Goddard Space Flight Center~
.PS
18 236 594 146
c~ Goddard Space Flight Center~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
598 387
c~ , will be the center~
.PS
.EL
.SL
574 10
c~ for all aspects of science activities associated with the observatory.~
.PS
.EL
.SL
550 10
c~ The Space Telescope Science Institute will manage the planning and~
.PS
.EL
.SL
526 10
c~ implementation of research projects, provide a facility for~
.PS
.EL
.SL
502 10
c~ astronomers using the Hubble Space Telescope, and collect, analyze,~
.PS
.EL
.SL
478 10
c~ and disseminate the data obtained. Following a nationwide~
.PS
.EL
.SL
454 10
c~ competition, management responsibility for the Space Telescope~
.PS
.EL
.SL

430 10
c~ Science Institute was given to the assoication of Universities for~
.PS
.EL
.SL
406 10
c~ Research in Astronomy~
.PS
18
c~ Times-Bold~
.UF
406 193
c~ (AURA)~
.PS
18 64 402 193
c~ (AURA)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
406 262
c~ , a federation of 17 major U.S.~
.PS
.EL
.SL
382 10
c~ universities. Under this arrangement, the Institute is operated by an~
.PS
.EL
.SL
358 10
c~ independent agent outside of NASA which is directly responsible to~
.PS
.EL
.SL
334 10
c~ the community of current and potential users.~
.PS
18
c~ Times-Bold~
.UF
334 359
c~ AURA~
.PS
18 52 330 359
c~ AURA~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
334 416
c~ also manages~
.PS
.EL
.SL
310 10


```

c~ major observatories at Kitt Peak in Arizona, Sacramento Peak in~
.PS
.EL
.SL
286 10
c~ New Mexico, and Cerro Tololo in Chile.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./supports/supports.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Support Systems Module~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ The structures and equipment which provide power, communications, orientation,
and~
.PS
.EL
.SL
44 10
c~ control to the Space Telescope.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~

```

```
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./supports/supports.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Support Systems Module~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ The Support Systems Module~
.PS
18
c~ Times-Bold~
.UF
622 234
c~ (fig. 7)~
.PS
18 51 618 234
c~ (fig. 7)~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
622 290
c~ will enclose the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
598 10
c~ Optical Telescope Assembly~
.PS
18 221 594 10
```

c~ Optical Telescope Assembly~
 c~ default-button~
 .PT
 18
 c~ Times-Roman~
 .UF
 598 236
 c~ and~
 .PS
 18
 c~ Times-Bold~
 .UF
 598 269
 c~ scientific instruments~
 .PS
 18 173 594 269
 c~ scientific instruments~
 c~ default-button~
 .PT
 18
 c~ Times-Roman~
 .UF
 598 447
 c~ and will~
 .PS
 .EL
 .SL
 574 10
 c~ provide all interfaces with the Shuttle orbiter.~
 .PS
 .EL
 .SL
 .EL
 .SL
 526 40
 c~ The module has four main sections: the light shield, the forward~
 .PS
 .EL
 .SL
 502 10
 c~ shell, the equipment section, and the aft shroud. These four pieces fit~
 .PS
 .EL
 .SL
 478 10
 c~ together like stacked cannisters to enclose the telescope assembly and~
 .PS
 .EL
 .SL
 454 10
 c~ scientific instruments.~
 .PS
 .EL
 .SL
 .EL
 .SL
 406 40
 c~ The~

.PS
18
c~ Times-Bold~
.UF
406 75
c~ aperture door~
.PS
18 110 402 75
c~ aperture door~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
406 190
c~ , which also serves as a light shield, is located~
.PS
.EL
.SL
382 10
c~ at the front of the Support Systems Module. The telescope must be~
.PS
.EL
.SL
358 10
c~ shielded from the Sun, Earth, and Moon so that the scientific~
.PS
.EL
.SL
334 10
c~ instruments are not damaged by a flood of light. While in operation,~
.PS
.EL
.SL
310 10
c~ the telescope will not be turned to within 50 degrees of the Sun,~
.PS
.EL
.SL
286 10
c~ precluding observations of the planet Mercury. Internal~
.PS
18
c~ Times-Bold~
.UF
286 430
c~ baffles~
.PS
18 51 282 430
c~ baffles~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
286 486
c~ in the~
.PS

.EL
.SL
262 10
c~ Support Systems Module door and just below the~
.PS
18
c~ Times-Bold~
.UF
262 379
c~ secondary mirror~
.PS
18 138 258 379
c~ secondary mirror~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.SL
238 10
c~ prevent scattered light from degrading the focal plane image.~
.PS
.EL
.SL
.EL
.SL
190 40
c~ Just behind the light shield and the forward shell is the equipment~
.PS
.EL
.SL
166 10
c~ section of the spacecraft. This doughnut-shaped section is made up of~
.PS
.EL
.SL
142 10
c~ 10 compartments that house the electronic and control modules.~
.PS
.EL
.SL
118 10
c~ Access to many of these modules will be easy as most compartments~
.PS
.EL
.SL
94 10
c~ open from the outside via a hatch or access door. An astronaut can~
.PS
.EL
.SL
70 10
c~ open a hatch, disconnect a module from its plug-in compartment,~
.PS
.EL
.SL
46 10

c~ and insert a new module, all without disturbing the other instruments~
.PS
.EL
.SL
22 10
c~ in the spacecraft.~
.PS
.EL
.EP
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
598 40
c~ The~
.PS
18
c~ Times-Bold~
.UF
598 75
c~ aft~
.PS
18 22 594 75
c~ aft~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
598 102
c~ shroud fits over the section containing the~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
574 10
c~ scientific instruments~
.PS
18 173 570 10
c~ scientific instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 188
c~ and the~
.PS
18

c~ Times-Bold~
.UF
574 250
c~ fine guidance sensors~
.PS
18 168 570 250
c~ fine guidance sensors~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
574 423
c~ . Access~
.PS
.EL
.SL
550 10
c~ covers on this shroud enable astronauts to get at the instruments and~
.PS
.EL
.SL
526 10
c~ sensors for removal or maintenance.~
.PS
.EL
.SL
.EL
.SL
478 40
c~ Handrails and portable foot restraints are fixed on the external~
.PS
.EL
.SL
454 10
c~ surface to permit astronauts to perform their maintenance and~
.PS
.EL
.SL
430 10
c~ refurbishment tasks. Four~
.PS
18
c~ Times-Bold~
.UF
430 207
c~ magnetic torquers~
.PS
18 145 426 207
c~ magnetic torquers~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
430 357
c~ , also located on the~
.PS

.EL
.SL
406 10
c~ shroud exterior, work with four reaction wheels within the Support~
.PS
.EL
.SL
382 10
c~ Systems Module equipment section to control the spacecraft's~
.PS
.EL
.SL
358 10
c~ orientation in space. The magnetic torquers are magnetized metal~
.PS
.EL
.SL
334 10
c~ rods controlled by an onboard computer. A change in their position~
.PS
.EL
.SL
310 10
c~ causes the spacecraft to re-align itself in relation to the Earth`s~
.PS
.EL
.SL
286 10
c~ magnetic field.~
.PS
.EL
.SL
.EL
.SL
238 40
c~ Electrical power is supplied by onboard batteries, which are~
.PS
.EL
.SL
214 10
c~ charged by the two~
.PS
18
c~ Times-Bold~
.UF
214 157
c~ solar arrays~
.PS
18 94 210 157
c~ solar arrays~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
214 256
c~ during the sunlit portion of the~
.PS


```

.EL
.SL
190 10
c~ telescope's orbit. An average of 2.4 kw is needed to operate the~
.PS
.EL
.SL
166 10
c~ spacecraft and its instruments.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./ssmexplo/ssmexplo.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Support Systems Module - Exploded View~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the Support Systems Module with components labeled. (the picture
doesn't~
.PS
.EL
.SL
44 10
c~ exist... )~
.PS
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? off
_on_page off
.f

```

```

;
: ./ssmexplo/ssmexplo.st0.a
c~ ContentsPileID~
.ULP
found-contents?
off
_on_page off
.f
;
: ./orbview/orbview.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ The Space Telescope in Orbit~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ An artist's conception of the space telescope in orbit.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./orbview/orbview.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP

```

```

.ZP
c~ The Space Telescope in Orbit~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
132 5
c~ orbital view~
.PP
509 533 132 5
c~ Hubble Space Telescope - Main View~
c~ orbital view - shape telescope~
.PT
32
c~ Times-Bold~
.UF
.EL
.SL
94 85
c~ Diagram~
.PS
40 123 86 85
c~ Hubble Space Telescope - Main View~
c~ default-button~
.PT
94 296
c~ Introduction~
.PS
40 180 86 296
c~ Introduction article~
c~ default-button~
.PT
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./introduc/introduc.st0.d
c~ DefinitionPileID~
.ULP
.ZP

```

```

c~ Definition~
.SN
c~ Why the Hubble Space Telescope?~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A short description of the telescope and its purpose.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./introduc/introduc.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Why the Hubble Space Telescope?~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL

```

.SL
.EL
.SL
574 40
c~ Imagine trying to see the clouds from the bottom of a muddy~
.PS
.EL
.SL
550 10
c~ pond. That is how astronomers describe their view of the stars and~
.PS
.EL
.SL
526 10
c~ planets through the Earth's atmosphere. As advanced as~
.PS
.EL
.SL
502 10
c~ astronomical technology has become, our capabilities will be forever~
.PS
.EL
.SL
478 10
c~ limited by the turbulence and brightness of our atmosphere. Even the~
.PS
.EL
.SL
454 10
c~ finest ground observatories, such as the one at Mt. Palomar,~
.PS
.EL
.SL
430 10
c~ California, are restricted by these conditions. In addition, the~
.PS
.EL
.SL
406 10
c~ selective absorption of the atmosphere, which lets in visible light and~
.PS
.EL
.SL
382 10
c~ radio waves emitted by stars and planets, but excludes most other~
.PS
.EL
.SL
358 10
c~ forms of energy, limits our knowledge of celestial bodies.~
.PS
.EL
.SL
.EL
.SL
310 40
c~ To open the universe to observation in infrared, ultraviolet,~
.PS

.EL
.SL
286 10
c~ x-ray, gamma-ray, and cosmic ray energies, NASA launched~
.PS
.EL
.SL
262 10
c~ numerous satellites, each helping to explain different processes behind~
.PS
.EL
.SL
238 10
c~ astronomical phenomena. But, to date, the value of these orbiting~
.PS
.EL
.SL
214 10
c~ observatories has been limited by their relatively small size and~
.PS
.EL
.SL
190 10
c~ limited spectral capability.~
.PS
.EL
.SL
.EL
.SL
142 40
c~ Now, for the first time, a ground-sized observatory will be placed~
.PS
.EL
.SL
118 10
c~ in orbit to view the universe in visible and ultraviolet light~
.PS
.EL
.SL
94 10
c~ unobscured by Earth's atmosphere.~
.PS
.EL
.SL
.EL
.SL
46 40
c~ Called the~
.PS
18
c~ Times-Bold~
.UF
46 122
c~ Edwin P. Hubble Space Telescope~
.PS
18 266 42 122
c~ Edwin P. Hubble Space Telescope~
c~ default-button~

.PT
18
c~ Times-Roman~
.UF
46 393
c~ , the new~
.PS
.EL
.SL
22 10
c~ observatory is a NASA-wide and international~
.PS
18
c~ Times-Bold~
.UF
22 368
c~ cooperative effort~
.PS
18 139 18 368
c~ cooperative effort~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
22 512
c~ .~
.PS
.EL
.EP
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ Its name honors Edwin P. Hubble (1889-1953), who discovered that~
.PS
.EL
.SL
598 10
c~ the universe extends far beyond the Milky Way galaxy.~
.PS
.EL
.SL
.EL
.SL
550 40
c~ The~
.PS
18
c~ Times-Bold~
.UF
550 75

c~ Hubble Space Telescope~
.PS
18 190 546 75
c~ Hubble Space Telescope~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
550 270
c~ will weigh about 25,000 pounds~
.PS
.EL
.SL
526 10
c~ (11,300 kg) and will have a length of 43 feet (13.1 m) and a diameter~
.PS
.EL
.SL
502 10
c~ of 14 feet (4.26 m). Its major components are an~
.PS
18
c~ Times-Bold~
.UF
.EL
.SL
478 10
c~ optical telescope assembly~
.PS
18 206 474 10
c~ optical telescope assembly~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
478 221
c~ , five~
.PS
18
c~ Times-Bold~
.UF
478 263
c~ scientific instruments~
.PS
18 173 474 263
c~ scientific instruments~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
478 441
c~ , and a~
.PS
18
c~ Times-Bold~


```

.UF
.EL
.SL
454 10
c~ support systems module~
.PS
18 193 450 10
c~ support systems module~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
454 208
c~ .~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./widefiel/widefiel.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Wide Field/Planetary Camera~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
65 10
c~ A camera that can take photographs either in "wide-field" or "planetary" mode.
The~
.PS
.EL
.SL
44 10
c~ resulting images are transmitted by radio to Earth.~
.PS
.EL

```

.SL
16
c~ Times-Bold~
.UF
23 10
c~ FULL ENTRY~
.PS
15 92 19 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./widefiel/widefiel.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Wide Field/Planetary Camera~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
.EL
.SL
.EL
.SL
574 40
c~ This instrument~
.PS
18
c~ Times-Bold~
.UF
574 165
c~ (fig. 8)~
.PS
18 51 570 165
c~ (fig. 8)~
c~ default-button~
.PT
18
c~ Times-Roman~

.UF
574 221
c~ can operate in one of two modes. In~
.PS
.EL
.SL
550 10
c~ "wide field" mode, its focal ratio of f/12.9 will permit examination of~
.PS
.EL
.SL
526 10
c~ large areas of space, leading to more accurate plotting of the spatial~
.PS
.EL
.SL
502 10
c~ relationships of distant objects such as galaxies and quasars.~
.PS
.EL
.SL
478 10
c~ High-resolution images of planets within our solar system can be~
.PS
.EL
.SL
454 10
c~ obtained by the planetary camera, which has a focal ratio of f/30.~
.PS
.EL
.SL
.EL
.SL
406 40
c~ Images telemetered to Earth by radio will be far better than~
.PS
.EL
.SL
382 10
c~ pictures produced by ground-based cameras. Pictures of Jupiter, for~
.PS
.EL
.SL
358 10
c~ example, will be comparable to those taken by the two Voyager~
.PS
.EL
.SL
334 10
c~ spacecraft in 1979. Pictures of more distant planets will not be as~
.PS
.EL
.SL
310 10
c~ clear as those taken by Voyager, but will be far superior to those~
.PS
.EL
.SL

286 10
c~ taken from Earth.~
.PS
.EL
.SL
.EL
.SL
238 40
c~ The camera consists of a complex system of instruments and~
.PS
.EL
.SL
214 10
c~ mirrors. The field of view is split by a~
.PS
18
c~ Times-Bold~
.UF
214 295
c~ pyramidal mirror~
.PS
18 141 210 295
c~ pyramidal mirror~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
214 441
c~ into four~
.PS
.EL
.SL
190 10
c~ separate areas which are focused onto four~
.PS
18
c~ Times-Bold~
.UF
190 335
c~ charge-coupled devices~
.PS
18 183 186 335
c~ charge-coupled devices~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
190 523
c~ .~
.PS
.EL
.SL
166 10
c~ These devices have been designed to receive light of low intensity at~
.PS
.EL

```

.SL
142 10
c~ very high resolution. A portion of the image is received on each~
.PS
.EL
.SL
118 10
c~ target plate and is subdivided into 640,000 picture elements (pixels).~
.PS
.EL
.SL
94 10
c~ The light intensities of each pixel are transmitted to Earth via~
.PS
.EL
.SL
70 10
c~ telemetry signals for assembly into images for study. Images can be~
.PS
.EL
.SL
46 10
c~ created from different spectral bands by directing the light through~
.PS
.EL
.SL
22 10
c~ any one of 50 spectral filters within the camera.~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./wfpceexpl/wfpceexpl.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Wide Field/Planetary Camera - exploded view~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL

```

```
16
c~ Times-Italic~
.UF
65 10
c~ A diagram of the Wide Field and Planetary Camera with components labeled.~
.PS
.EL
.SL
16
c~ Times-Bold~
.UF
44 10
c~ FULL ENTRY~
.PS
15 92 40 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./wfpexpl/wfpexpl.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Wide Field/Planetary Camera - exploded view~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
171 10
c~ Wide Field and Planetary Camera - diagram~
.PP
.EL
.SL
18
c~ Times-Bold~
.UF
151 10
c~ Wide Field/Planetary Camera~
.PS
18 238 147 10
```

```

c~ Wide Field/Planetary Camera~
c~ default-button~
.PT
18
c~ Times-Roman~
.UF
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./earth/earth.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Spin the Earth~
.SN
.ZP
.SP
86 544 0 0
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
21 10
c~ earth~
.PP
.EL
.SL
16
c~ Times-Bold~
.UF
4 10
c~ FULL ENTRY~
.PS
15 92 0 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP

```

```

c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./earth/earth.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Spin the Earth~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ Spin the Earth!~
.PS
581 140
c~ earth~
.PP
55 64 581 140
c~ Stop the Earth~
c~ spin~
.PT
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
: ./earth/stopearth.st0.d
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ Stop the Earth~
.SN
.ZP
.SP
86 544 0 0

```



```
c~ !Full-Entry ~
c~ full-entry-background~
.PT
.SL
16
c~ Times-Italic~
.UF
21 10
c~ earth~
.PP
.EL
.SL
16
c~ Times-Bold~
.UF
4 10
c~ FULL ENTRY~
.PS
15 92 0 10
c~ FULL ENTRY~
c~ full-entry-button~
.PT
16
c~ Times-Italic~
.UF
.EL
.EP
c~ ContentsPileID~
.ULP
found-contents? on
_on_page off
.f
;
: ./earth/stopearth.st0.a
c~ ContentsPileID~
.ULP
c~ ContentsPileID~
.ULP
.ZP
c~ Stop the Earth~
.SN
.SP
646 544 0 0
c~ !Show ~
c~ show-background~
.PT
.SL
18
c~ Times-Roman~
.UF
622 10
c~ Stop the Earth!~
.PS
581 140
c~ earth~
.PP
55 64 581 140
c~ Spin the Earth~
```

```
c~ circle-button~
.PT
622 214
c~ I want to get off!~
.PS
.EL
.EP
c~ DefinitionPileID~
.ULP
.ZP
c~ Definition~
.SN
c~ ContentsPileID~
.ULP
found-contents?
on
_on_page off
.f
;
\ End compilation of HyperTIES Space Telescope Demo.
```