IUE esa NEWSLETTER

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IUE ESA Newsletter :

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OBSERVATORY CONTROLLER'S MESSAGE

At the time of writing this message we just have finished to collect and catalogue the proposals for the 6th round of IUE observations. There are 276 proposals, more than last year: this clearly shows that European Astronomers still like IUE!

The proposals will now be reviewed by the new European IUE allocation Committee, which has been recently appointed: names and institutions of the members of the Committee are listed on page 3 of this Newsletter.

The satellite, as you can read at page 5 and following continues to perform satisfactorily, the only cirtical area is the gyro system which is left without redundancy. However,a new Attitude Control Software, based on a two-gyros configuration, has already been successfully designed in case of a further failure.

Several changes in the Observatory Staff will occur during the next months: Luciana Bianchi and Patrizio Patriarchi will leave VILSPA at the end of the year to return to their home Institutions, Turin and Arcetri Observatories respectively; Chris Blades, the UK Resident Scientist, will soon move to the Space Telescope Science Institute in Baltimore. I like to thank all of them for their contribution to the IUE Project and I wish them the best success in their future activity.

More changes are expected during the next year and we will certainly look for new scientific personnel: young, active astronomers who may be available in the near future are welcome to enquire about these openings (see also page 110 of this Newsletter).

A set of microfiches containing the IUE Merged Log of the first 4 years of observations is included in the present issue. On the same subject, I like to point out the availability of an interactive computerized access to the Merged Log (see page 52) which has been recently installed at VILSPA. Our Visitors are welcome to use it and I am sure they will find it very useful for the preparation of their observations.

P.Benvenuti.

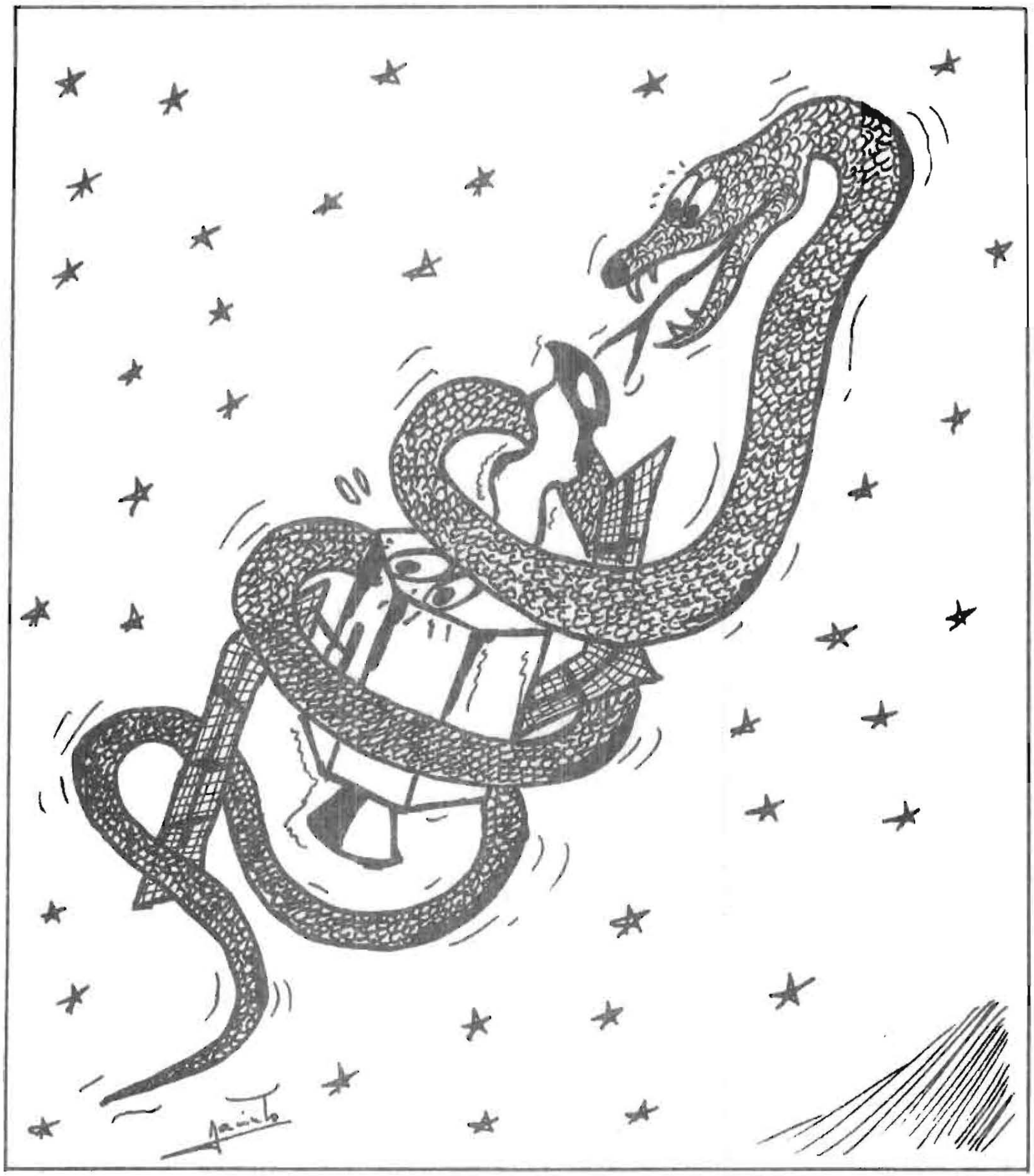
New European Selection Committee for IUE

The proposals requesting Observing time for IUE are each year evaluated by a Selection Committee. Due to the changes in the agreements between ESA and SERC made last year, a new Selection Committee had to be composed. Below we give for your information the complete list of the members of this Committee.

M. Grewing/Chairman	Astr. Institut, Tübingen
A. Willis/Vicechairman	U.C.L., London
M. Barlow	U.C.L., London
G. Bath	Dept. of Astrophys., Oxford
R. Canal	Inst. de Físicas, Barcelona
R. Carswell	Instit. of Astronomy, Cambridge
D. Clark	R.A.L., Oxon
J. Danziger	E.S.O., München
C. de Loore	Astroph. Instituut, Brussel
R. Ellis	Durham University, Durham
C. Jordan	Dept. of Theor. Phys., Oxford
R. Kudritzki	Inst. fur Theor. Physik, Kiel
H. Lamers	Space Research Lab., Utrecht
J. Lequeux	Obs. de Meudon, Meudon
A. Meadows	Dept. of Astronomy, Leicester
G. Miley	Sternwacht, Leiden
H. Nussbaumer	Atomic Phys. and Astrophys. Group, Zurich
N. Panagia	Inst. di Radio Astron., Bologna
G. Perola	Inst. Astronomico, Roma
F. Praderie	Obs. de Meudon, Meudon
J. Rahe	Remeis Sternwarte, Bamberg

SECRETARY: P. Benvenuti, VILSPA

Adventures of AIYOUEEE at apogee



This observing of Alpha Serpentis through the large aperture turns out rather different than I anticipated!!!

IUE SPACECRAFT STATUS

The spacecraft continues to support science operations normally and effectively. The solar array power output continues to decrease with life, as expected. This reduced power output limits the time one may operate at Beta angles greater than 120 or less than 20 . After recharging the batteries, operation at high or low Beta may be restarted.

On July 27 Gyro-2 failed; this is the third Gyro to fail,so the spacecraft is now left without any back-up Gyro capability: the three now operating are the minimum required by the current control system. The GSFC Guidance and Control Branch is designing a control system that would use two Gyros and the Digital Fine Sun Sensor, as a back-up control system, in the event of another gyro failure.The initial control system design is nearly complete and the dynamic simulations show that this back-up control system is feasible. A high priority is placed on this work and the new control system is expected to be operational by March 1983.

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Following is a complete and detailed IUE Status Report issued in the NASA IUE Newsletter Nr.18, March 1982,which we like to present to the European Community of IUE Users. The report has been updated where new figures are available or the status had changed since.

J.FAELKER.

I. SCIENTIFIC INSTRUMENT HARDWARE STATUS

A. CAMERAS (4)

i) Long Wavelength Redundant (LWR) - standard camera.
no operational problems

ii) Short Wavelength Prime (SWP) - standard camera.
no operational problems

iii) Long Wavelength Prime (LWP) - available on G/O request.
read scan control frequently fails
max. 45 minutes extra overhead time for
turn on/off.

iv) Short Wavelength Redundant (SWR) - Not available
read section grid voltages usually fail

B. SPECTROGRAPHS (2)

i) Short Wavelength
Entrance Apertures
Large Aperture (SWLA) - oval shape
Length for trailed spectra :
21.4 ± 0.4 arcsec.
Area for extended sources:
200 ± 5 sq.arcsec.
(Panek 1982a)

Small Aperture (SWSA) - probably non-circular
effective shape
area ~ 6.8 sq. arcsec (Panek 1982a)
point source throughput 0.53 + 0.13

Orientation - variable (Schiffer 1980)
(Patriarchi 1981)
Echelle Mode - functional
Low Dispersion Mode - functional

ii) Long Wavelength

Entrance Apertures
Large Aperture (LWLA) - oval shape
Length for trailed spectra :
20.5 ± 1.0 arcsec.
area for extended sources :
203 ± 6 sq. arcsec.
(Panek 1982a)

Small Aperture (LWSA) - probably non-circular effective shape
area ~ 6.9 sq. arcsec (Panek 1982a)
point source throughput :
0.49 ± 0.15

Orientation - variable (Schiffer 1980)
(Patriarchi 1981)
Echelle Mode - functional
Low dispersion mode - functional

C. FINE ERROR SENSORS(2)

i) FES 1 - back-up system last used 1978 Feb 18
2 magnitudes less sensitive than FES 2

ii) FES 2 - standard
positional accuracy 0.27 arcsec
near center of field.
3 arcsec elsewhere
8 arcsec for m < -0.6 or
14.2 < m < 16

field size 8 arcmin radius
eff. wavelength ~ 5200 A
visual calibration (Holm and Rice 1981)
experiences electronic confusion from
operation aperture closure mechanism and
the Sun shutter mechanism

II. SPACECRAFT (S/C) HARDWARE STATUS

A. GYROS (6)

No. required for three-axis stabilized attitude control - 3
No. healthy - 3
Gyro-1 (failed at 1981 March 2, 19:50 GMT)
Gyro-2 (failed at 1982 July 27, 07:00 GMT)
Gyro-6 (stuck since turned off for 1979 shadow season)
No. failed - 3
S/C drift rates - 3 to 20 arcsec/hour (in pitch & yaw)
usually largest shortly after slewing
Maneuver accuracy since 1981 Nov 21
error/length $\sim 4 \times 10^{-4}$ (Panek and Baroffio 1982)

B. REACTION WHEELS(4)

No. required for slewing - 3
No. in use - 3 (pitch, yaw, and roll)
Backup (skewed wheel) never used in orbit

C. <u>HYDRAZINE SYSTEM</u>

Required for reaction wheel maintenance, orbit change
maneuvers, and emergency sun acquisitions
~ 22 kg available
usage rate ~ 0.5 kg/year

D. <u>SOLAR ARRAYS AS OF 1982 MAY</u>

75% of capacity at launch (Fragola & Espejo 1982)
Power positive zone - depends upon activity level
Beta angles 120 to 20 with 1 camera reading
and 1 camera exposing

E. <u>BATTERIES</u>(2)

Max. depth of discharge during September 1982 shadow season
Battery #1 61.34%
Battery #2 61.18%

F. <u>ON-BOARD COMPUTER</u>(2)

i) OBC 1
Temperature limit 55.8 C
Last crash 1982 Feb 21 (1.3 hours lost)
Software systems
8K - standard
4K - new crash resistant system
capable of supporting science operations
- bug in attitude control logic

ii) OBC 2
backup system
never used in orbit

III. <u>IMAGE PROCESSING SYSTEM STATUS</u>

(Alderman, Turnrose, and Northover 1981)

The current system has evolved through a series of modifications. The following list is my interpretation of the most significant modifications and their implementation dates (VILSPA date in parenthesis).

Averaged Intensity Transfer Function 1978 May 22 (78 June 14)

Improved λ calibration Line Library	
Low dispersion	1978 Sept 21 (79 Feb 01)
High dispersion	1979 Nov 23 (81 Mar 10)
Correct SWP ITF error	1979 Jul 07 (79 Aug 07)
Mean dispersion constants:	
Low dispersion	1979 Oct 30 (81 Mar 10)
High dispersion	1980 Jul 18 (81 Mar 10)
Improved λ calibration Line Library	
"New" Low dispersion software	
Parameterized low dispersion constants	1980 Nov 4 (81 Mar 10)
Parameterized high dispersion constants	1981 May 19 (82 Mar 11)
"New" High dispersion software	1981 Nov 10 (82 Mar 11)

IV. INSTRUMENTAL PERFORMANCE

A. NOISE

i) Readout noise ~10 DN/pixel

ii) Periodic noise (microphonics)

SWP - covers entire image
amplitude generally 1-3 DN
amplitude may be increased to 10-40 DN by mechanical activity in S/C, incl. roll slews
frequency ~200 Hz (Northover 1979)

LWR - affects a few lines in ~85% of images
amplitude up to 110 DN
amplitude decays ~25% image line (Panek 1981)
frequency ~300 HZ (Panek 1981)
occurence associated with heating of read section of camera
occurrence modified by delaying read (Holm and Panek 1982)

LWP - occurrence associated with Roll slews
amplitude up to 7 DN.
affects only the lines when a roll slew is in progress (Faelker 1982)

iii) Bright spots

radioactive disintegrations in phosphor ~30 spots/hr (Coleman et al. 1977)
permanent blemishes
most pronounced pseudo-emission feature ~2190 A low dispersion, large aperture
others (Ponz 1980)

iv) Typical signal/noise ratio

for well exposed point source spectra
SWP 10-30 old software (Cassatella et al. 1980)
7-27 new software
LWR 12-21 old software (Settle et al. 1981)
8-15 new software (Barylak 1982)
LWP 9-25 old software (Settle et al. 1981)
6-18 new software (Barylak, 1982)

v) S/N properties of averaged spectra

(Clarke 1981a)
(West and Shuttleworth 1981)

B. BACKGROUND

i) Phosphorescence fogging

During low-radiation shifts
LWR & SWP 6-10 DN/hour/pixel
LWP 4-7 DN/hour/pixel (Ake 1982)
Fogging rate depends on no. and type of PREPS before exposure
Overexposures cause "ghost" spectrum fogging
phosporescence decay rate
$\sim t^{-0.8}$ up to several hours (Coleman 1978)
unknown after long time intervals

ii) Radiation fogging

caused by Cerenkov radiation from electrons in the van Allen belts (Coleman et al. 1977)
may be severe near perigee (US shift 2)
recent experience 22% low fogging shifts
15% high fogging shifts

C. PHOTOMETRIC PROPERTIES

i) Upper limits to ITFs (Turnrose 1980)

ii) Linearity errors in processed spectra

SWP -10 to -20 percent for Net DN<20
+10 to +15 percent for ave. DN>220 @ 1300 A
(Holm 1981b)
LWR +10 to +20 percent for Net DN<40
LWP -5 to -10 percent for Net DN<50
(Settle et al. 1981)
possibly better with ITF 1

D. ABSOLUTE CALIBRATION

i) Low dispersion SWP and LWR (Holm et al. 1982)

ii) High dispersion SWP and LWR (Cassatella et al. 1981)
For new softwere (Cassatella et al. 1982)

iib) Low dispersion LWP (Blades & Cassatella 1982)

iii) High dispersion software
LWP - not yet available

iv) Accuracy of standards
±10% 1300A - 3400 A

v) Echelle ripple correction (Ake 1981)

E. SENSITIVITY VARIATION

i) Temperature dependence (Schiffer 1982a)
SWP -0.5%/ C of head amplifier temperature (THDA)
LWR -1.1%/ C of THDA
LWP unknown

ii) Repeatability (1σ after temperature correction)
(Schiffer 1982a)
SWP 2% in 150 A bins
LWR 2.5% in 300 A bins
LWP unknown

iii) Temporal dependence (Schiffer 1982a)

SWP -6.3%/year @ 1850 A before 1979.3
≤0.3%/year since 1979.3

LWR ≤1.%/year until mid 1980
-4.5%/year @ 2400 A and 2600 A since mid 1980

LWP unknown

F. WAVELENGTH RESOLUTION

i) Short wavelength echelle mode
small aperture FWHM 0.085 A @ 1150 A
(Boggess et al. 1978)
0.19 A @ 2100 A
(Boggess et al. 1978)
large/small 1.01 (Penston 1979)

ii) Short wavelength low dispersion mode
large aperture FWHM 6.1 A
(Cassatella & Penston 1978)
large/small 0.99±0.7
(Ponz & Cassatella 1981)

iii) Long wavelength echelle mode

small aperture FWHM 0.20 A
(Boggess et al. 1978)
large/small 1.09
(Penston 1979)

iv) Long wavelength low dispersion mode

large aperture FWHM 9.2 A
(Cassatella & Penston 1978)
large/small 1.17±0.15
(Ponz & Cassatella 1981)

G. WAVELENGTH ACCURACY

i) Internal consistency of wavelength calibration determinations (Thompson et al. 1981)

SWP 2.0 km/sec
LWR 2.7 km/sec
LWP unknown

ii) Possible systematic errors

SWP unknown now
early data (Leckrone 1980)
LWR ~10 km/sec
LWP unknown

H. MISCELLANEOUS

i) Grating scattered light
(Clarke 1981b)
Stickland 1980)

ii) Halation: Backscattering of Electrons from the phosphor decay length ~32+3 pixels (Coleman 1978)

iii) Scattered Light in the Telescope

$F_{scat} \sim d^{-2.5} F_*$ (Schiffer 1982b)
where d is in arcsec (5<d<40)

iv) Plate scale

1.51±0.04 arcsec/pixel

v) Residual geometric errors in geometrically corrected image

±0.4 arcsec = ±0.2 pixels (Panek et al. 1982)

vi) Exposure timing (Schiffer 1980b, Heck 1981)

command units 0.4096 seconds
effective response delay 0.12 seconds LWR & SWP
unknown LWP

vii) Longest Exposure to Date

SWP 15293 1273 minutes

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IUE DATA REDUCTION

XVI. Orbital Velocity Corrections

INTRODUCTION

The resolving power ($R = \lambda/FWHM$) of the IUE spectrographs varies from 1.0×10^4 to 1.5×10^4 over the entire wavelength range covered (Boggess, et al., 1978). Therefore the IUE velocity resolution varies from 20 km s^{-1} to 30 km s^{-1}. If it is assumed that the centroid of a line can be determined to approximately 10% of its FWHM, then a measured radial velocity should be accurate to about 2 km s^{-1} (best case). The orbital velocity of the Earth about the Sun ($\sim$ 30 km s^{-1}) and the velocity of the spacecraft about the Earth ($\sim$4 km s^{-1} at perigee) are both larger than the best possible velocity determinations and their effect should be removed from the data.

Two subprograms, VELSUN and VELSAT, have been written for IUESIPS, the International Ultraviolet Explorer Spectral Image Processing System, to calculate orbital velocities. VELSUN determines the velocity vector of the Earth at a given time using the orbital elements of the Earth and the time derivatives of these elements (A. E., 1980). VELSAT determines the velocity vector of the spacecraft about the Earth at a given time using all the orbital elements of the spacecraft for Nov. 22, 1979, except for the period, which is set to exactly one sidereal day. Since the orbit of the spacecraft is periodically adjusted to maintain a sidereal period and, moreover, an approximately fixed ground path, it is not necessary to update the orbital elements used by the program. This program is accurate to ± 0.25 km s^{-1} over the entire life of the spacecraft (launch to present), and VELSUN is accurate to better than 0.01 km s. Both of these subprograms will be added to IUESIPS in the near future.

The following sets of equations giving the rectangular coordinates of a body in its orbit as a function of the orbital elements were adopted (A. D. Dubyago, 1961):

$$\left.\begin{aligned} x &= r(\cos u \cos\Omega - \sin u \cos i \sin\Omega), \\ y &= r(\cos u \sin\Omega + \sin u \cos i \cos\Omega), \\ z &= r \sin u \sin i. \end{aligned}\right\} \quad (1) \text{ and}$$

$$\mu = \frac{k\sqrt{1+m}}{a^{3/2}} = \frac{2\pi}{P} = n$$

$$E - e \sin E = M_o + \mu (t - t_o) = M, \quad (2)$$

$$\left.\begin{aligned} r \sin v &= a\sqrt{1 - e^2} \sin E, \\ r \cos v &= a(\cos E - e), \\ u &= v + \omega \end{aligned}\right\} \quad (3)$$

The first three equations (set 1) give the position of the orbiting body in a rectangular coordinate system. The +X axis is toward the Vernal Equinox and the +Z axis is in the direction from the origin toward the celestial pole or the Ecliptic pole (depending on the system of the orbital elements). The coordinate system is righthanded.

The orbital elements, constants and various intermediate quantities used in the equations are listed below.

The orbital elements are:

a = semi major axis (kilometers)

i = inclination of orbit to ecliptic or equator (Radians)

T = time of pericenter passage (Julian Date)

e = eccentricity

ω = the argument of pericenter (the angle between the ascending node and and pericenter measured along the orbit) (Radians)

Equinox and the line of nodes - measured along the ecliptic or equator from the Vernal Equinox to the ascending node) (Radians)

and P = the period in years.

Other quantities used in the equations:

m = mass of orbiting body

$\mu = n$ = the mean angular motion

k = gaussion constant = $\dfrac{2\pi a^{3/2}}{P\sqrt{1+m}}$

$\pi = 3.14159265$

E = eccentric anomaly

M = mean anomaly

M_o= mean anomaly at time t_o

$t_o = T$ = time when $M_o = 0$

v = true anomaly (the angle between pericenter and the position of the body - measured along the orbit)

r = distance from primary to the orbiting body

u = longitude of pericenter (sometimes designated θ) - the sum of the angles v and ω

The equations in set (1) were differentiated with respect to time to obtain the following set of equations defining the velocity veotor of the body:

$$\left.\begin{aligned} V_x &= (\mu/V_3)\left[aV_2(C_4C_3C_7 - C_5C_8) - C_1V_1(C_5C_7 + C_4C_3C_8)\right] \\ V_y &= (\mu/V_3)\left[C_1V_1(C_4C_5C_8 - C_3C_7) - aV_2(C_4C_5C_7 + C_3C_8)\right] \\ V_z &= (\mu C_2/V_3)\ (C_1C_8V_1 - aC_7V_2)\ , \end{aligned}\right\} \quad (4)$$

where

$C_1 = a\ (1-e^2)^{1/2}$

$C_2 = \sin\ (i)$

$C_3 = \sin(\Omega)$

$C_4 = \cos(i)$

$C_5 = \cos(\Omega)$

$C_7 = \sin(\omega)$

$C_8 = \cos(\omega)$

$V_1 = \cos(E)$

$V_2 = \sin(E)$

$V_3 = \left[1 - e\cos(E)\right]$

The program VELSAT uses this set of equations in this form with orbital elements referred to the equatorial system. VELSUN uses the orbital elements of the Earth referred to the ecliptic system which leads to a simplified set of equations since in this case $i = 0$ and Ω can be given an arbitrary value (set $\Omega = 0$). The following set of equations, derived from set (4) give the rectangular velocity components of the Earth in the ecliptic system:

$$\left.\begin{aligned} V_x' &= -(\mu/V_3)\,(aC_8V_2 + C_1C_7V_1) \\ V_y' &= (\mu/V_3)\,(C_1C_8V_1 - aC_7V_2) \\ V_z' &= 0.0 \end{aligned}\right\} \quad (5)$$

To obtain the velocities in the equatorial system from these the following relations are used:

$$\begin{aligned} V_x &= V_x' \\ V_y &= V_y' \cos(\epsilon) \\ V_z &= V_y' \sin(\epsilon), \end{aligned}$$

where ϵ = the obliquity (about 23°).

Since these equations involve the eccentric anomaly, E, in addition to the orbital elements it was necessary to solve equation (2) (Keplers Equation) for E where the known values are e, M_o, μ , t_o and t. In order to solve this equation the following series approximation (W. M. Smart, 1965) was used:

$$E = M + (e - \frac{e^3}{8}) \sin (M) + (1/2)e^2 \sin(2M) + (3/8)e^3 \sin (3M)$$

The eccentricity of the IUE's orbit is 0.23 which causes an error in E with this approximation of about 0.1 radian. The Earth's orbital excentricity is so small that the approximation causes no appreciable error.

FORTRAN LISTINGS

Listings of the two FORTRAN subroutines, VELSUN and VELSAT are given in Appendix A. Program documentation is in the form of in-line comment statements. Table 1 presents a set of sample input and output for each of the subroutines.

C. Harvel

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APPENDIX A

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      SUBROUTINE VELSUN(TIME,VX,VY,VZ,IERROR)
      IMPLICIT REAL*8(A-H,O-Z)
C
      REAL*8 INC,NODE,MØ
C
C     ORIGINAL PROGRAM WRITTEN BY HOWARD L. COHEN AND ARTHUR
C     YOUNG INDIANA UNIVERSITY ASTRONOMY DEPT.( PGM NAME
C     WAS 'ORBVAL'). CIRCA 1965
C
C     PROGRAM REWRITTEN BY C. HARVEL 1/24/8Ø
C     COMPUTER SCIENCE CORPORATION, DEPT. OF ASTRONOMY
C
C     PROGRAM MODIFIED BY DAK 1/2Ø/78
C     GIVEN THE TIME THIS PROGRAM COMPUTES THE THREE
C     COMPONENTS OF THE EARTHS RADIAL VELOCITY,VX,VY,VZ(RIGHT
C     HANDED COORDINATE SYSTEM--- X POSITIVE TOWARD THE VERNAL
C     EQUINOX AND  Z  POSITIVE TOWARD THE NORTH.
C     VX,VY,VZ IN KM/SEC, TIME=JD-24ØØØØØ.ØDØ( ELEMENTS ARE IN
C     ECLIPTIC SYSTEM.  )  THE ERROR CODE IERROR=Ø IF THERE ARE
C     NO ERRORS AND  1  IF THE TIME GIVEN IS OUTSIDE THE
C     RANGE JDI TO JDF.
C
      REAL*8 MA,MU,JDI,JDF,E(3),OB(3),OM(3),M(3),SP(2)
C
      DATA PIE/3.1415926535898DØ/
      DATA JDI,JDF /1.5Ø2D4, 5.15445D4/
      DATA E /Ø.Ø1675104DØ,1.1444D-9, 9.4D-17/
      DATA OB /Ø.4Ø93197470Ø, 6.2179Ø99D-9, 2.146755D-17/
      DATA OM /1.7666368Ø7DØ, 8.21499D-7, 5.916666D-15/
      DATA M /6.25658378DØ, 1.72Ø196977D-2, 1.9547688D-15/
      DATA SP /365.256360Ø42DØ, 1.1D-7/
      DATA A /1.496D8/
      IERROR=Ø
C
C     THE DATA ABOVE ARE TAKEN FROM THE AMERICAN EPHEMERIS
C     AND NAUTICAL ALMANAC(198Ø) PAGE 544( THE EXPLANATION
C     SECTION ).  JDI=THE EPOCH OF THE DATA(JULIAN DATE OF
C     EPOCH MINUS 24ØØØØØ), JDF= FINAL JULIAN DATE BEYOND
C     WHICH THESE DATA ARE INVALID, E=THE ECCENTRICITY(2ND
C     AND 3RD ENTRIES IN THESE ARRAYS ARE THE 1ST AND 2ND TIME
C     DERIVITIVES ), OB=THE OBLIQUITY OF THE ECLIPTIC(IN RADIANS),
C     OM=THE LONGITUDE OF PERIHELION(RADIANS). M=THE MEAN ANOMALY
C     (RADIANS), SP=THE SIDERIAL PERIOD(DAYS) AND A=THE SEMIMAJOR
C     AXIS(KILOMETERS).
C
C
C
      IF(TIME.LT.JDI.OR.TIME.GT.JDF) GO TO 5
      GO TO 1Ø
    5 IERROR=1
      RETURN
      STOP
C
C     CALCULATE ELAPSED TIME SINCE JD 2415Ø2Ø.Ø
   1Ø D= TIME-JDI
      D2= D*D
C     CALCULATE THE ECCENTRICITY
      ECC= E(1) - E(2) * D - E(3) * D2
C     CALCULATE THE OBLIQUITY OF THE ECLIPTIC
      OBL= OB(1) - OB(2) * D - OB(3) * D2
C     CALCULATE THE LONGITUDE OF PERIHELION
      OMEGA= OM(1) + OM(2) * D +OM(3) * D2
C     CALCULATE THE MEAN ANOMALY
```

```
      MA= M(1) + M(2) * D - M(3) * D2
C     CALCULATE THE ECCENTRIC  ANOMALY
      EA=MA+(ECC-(ECC**3)/8.DØ)*DSIN(MA)+(Ø.5*ECC*ECC*
    1 DSIN(2.*MA)+(Ø.375*(ECC**3)*DSIN(3.*MA)))
C     CALCULATE THE EARTHS SIDERIAL PERIOD
      P=( SP(1) + SP(2) * D )*8.64DØ4
C     CALCULATE THE MEAN MOTION
      MU=(2.DØ*PIE)/P
C
C
C
      C1=A*(1.DØ-ECC**2)**Ø.5
C     C2 THROUGH C6  NOT USED FOR EARTH ORBIT
      C7=DSIN(OMEGA)
      C8=DCOS(OMEGA)
      V1=DCOS(EA)
      V2=DSIN(EA)
      V3=(1.DØ-ECC*V1)
C
C
      VXECL= -(MU/V3)*(A*C8*V2+C1*C7*V1)
      VYECL=  (MU/V3)*(C1*C8*V1-A*C7*V2)
      VZECL  = Ø.ØDØ
C
C     VXECL,VYECL AND VZECL ARE THE VELOCITIES IN THE
C     ECLIPTIC SYSTEM.
C
C
      VX= VXECL
      VY= VYECL*DCOS(OBL)
      VZ= VYECL*DSIN(OBL)
C
C
C
      RETURN
      END
C
```

```
      SUBROUTINE VELSAT(TIME,VX,VY,VZ,IERROR)
      IMPLICIT REAL*8 (A-H,O-Z)
C
      REAL*8 INC,NODE,MA,MU,MØ,JDI,JDF
C
C     PROGRAM WRITTEN BY C. HARVEL 1/24/8Ø
C     COMPUTER SCIENCES CORPORATION.DEPT. OF ASTRONOMY
C
C     GIVEN THE TIME (JULIAN DATE) THIS PROGRAM COMPUTES
C     THE THREE COMPONENTS OF THE SATELLITES (IUE)
C     RADIAL VELOCITY---VX,VY,VZ.  COORDINATE SYSTEM IS
C     RIGHT HANDED WITH  X  POSITIVE TOWARD THE VERNAL
C     EQUINOX, AND  Z  POSITIVE TOWARD THE NORTH.
C     VX,VY,VZ ARE IN KM/SEC, TIME=JULIAN-DATE MINUS
C     24ØØØØØ.Ø .  ALL ELEMENTS ARE REFERED TO THE EARTH'S
C     EQUATOR( NOT THE ECLIPTIC). THE ERROR CODE IERROR=Ø
C     IF THERE ARE NO ERRORS AND  1  IF THE TIME IS NOT
C     IN THE RANGE JDI TO JDF.
C
C
C
C
C     TIME=JD-24ØØØØØ.ØDØ
C     VX,VY,VZ=  VELOCITIES IN KM/SEC
C
C
C
      DATA A,INC,T,ECC,OMEGA,NODE,P,MØ,PIE/4.21632DØ4,
     1 Ø.4934541DØ,44199.5DØ,Ø.2359693DØ,4.7283238DØ,3.385275DØ,
     2 8.61642DØ4,4.3Ø3283804DØ,3.14159265359DØ/
      DATA JDI,JDF / 43199.DØ, 462ØØ.DØ /
C
C     THE DATA ABOVE ARE TAKEN FROM THE IUE PREDICTED
C     SATELLITE MAP TABLE (NASA, GODDARD--NOV. 22, 1979).
C     ALL DATA ARE FOR THE EPOCH JD2444199.5 (NOV. 22,1979).
C     A=SEMI MAJOR AXIS(KM), INC=INCLINATION TO EQUATOR(RADIANS),
C     T=EPOCH, ECC=ECCENTRICITY, OMEGA=LONGITUDE OF PERIGEE
C     (RADIANS), NODE=RIGHT ASCENSION OF THE ASCENDING NODE
C     (RADIANS), P=SIDERIAL PREIOD, MØ=MEAN ANOMALY AT EPOCH.
C
C
C
      IERROR=Ø
C
      IF(TIME.LT.JDI.OR.TIME.GT.JDF) GO TO 5
      GO TO 1Ø
    5 IERROR=1
      RETURN
      STOP
C
   1Ø MU=(2.*PIE)/P
      MA=MU*(TIME-T)*8.64DØ4+MØ
      EA=MA+(ECC-(ECC**3)/8.)*DSIN(MA)+(Ø.5*ECC*ECC*
     1 DSIN(2.*MA)+(Ø.375*(ECC**3)*DSIN(3.*MA)))
C
      C1=A*(1.-ECC**2)**Ø.5
      C2=DSIN(INC)
      C3=DSIN(NODE)
      C4=DCOS(INC)
      C5=DCOS(NODE)
C     C6=  NOT USED
      C7=DSIN(OMEGA)
      C8=DCOS(OMEGA)
```

```
      V1=DCOS(EA)
      V2=DSIN(EA)
      V3=(1.-ECC*V1)
C
C
      VX=(MU/V3)*(A*(C4*C3*C7-C5*C8)*V2-C1*(C5*C7+C4*C3*C8)*V1)
      VY=(MU/V3)*(C1*(C4*C5*C8-C3*C7)*V1-A*(C4*C5*C7+C3*C8)*V2)
      VZ= (MU*C2/V3)*(C1*C8*V1-A*C7*V2)
C
C
      RETURN
      END
```

TABLE 1

Sample Input/Output Values for Programs

Program	Input Time JD-2400000	Vx (km/sec)	Vy (km/sec	Vz (km/sec)
VELSUN	43251.0D0	0.13207D+02	-0.24371D+02	-0.10568D+02
VELSAT	43251.0D0	0.18857D+01	0.15146D+01	-0.54586D+00

PHOTOMETRIC CONSEQUENCES OF THE MICROPHONIC AVOIDANCE TECHNIQUE

The resident astronomers have completed the minimal testing required to detect any serious photometric errors which might be introduced by the LWR ping avoidance technique (in which the heater warmup time before the read is extended by 4 minutes). The testing consisted of sequences of alternating normal and ping avoidance reads. No significant differences could be found in the net extracted spectra of well exposed images. Flat field images did indicate that the gross flux number is marginally higher in the ping avoidance reads i.e. the target is read out more heavily after the extended heater warmup. Much of this would cancel out in the background subtraction for the net spectra. No careful study of linearity has been made. However, the natural variations along the spectra due to spectral sensitivity and grating blaze, and the high order echelle spectra where the interorder background is high, provide a zero-order verification of linearity. Only a few strong absorption lines have been studied.

We therefore believe that there will be many instances in which the observer can gain the benefits of ping avoidance without significant photometric error. Our test results are described below in some detail since the comparisons of the spectra are of general interest as an illustration of the repeatability and signal/noise of LWR spectra.

A) Studies of flat field images

Based on 3 sequences totalling 7 images in all, we find that the ping avoidance nulls have 97±64 flux numbers (FN) more than the null read normally. Based on only one series of 3 tungsten flood lamp exposures, we found the intermediate level exposures to be about 60 FN brighter when read with the ping avoidance technique. The available data is consistent with the change in FN being insensitive to exposure level.

B) Studies of low dispersion, trailed spectra

A sequence of 4 exposures, each a 31.2 s trail on HD60753, was obtained as follows:

LWR10930	test read
LWR10931	normal read
LWR10932	test read
LWR10933	normal read

here, 'test read' refers to the ping avoidance read

To study differences between the derived net fluxes, we studied ratios of the net flux spectra. The ratio of two normal reads illustrates the expected level of repeatability and signal/noise. Several typical examples are shown on the next page.

C) Studies of low dispersion, point spectra

A sequence of three 24 s exposures of BD+75°325 was obtained, sandwiching a test read between two normal reads. Again, the test spectrum agreed within the expected limits for normally read spectra.

A Technique for Avoiding Microphonics on the LWR Camera

It is possible to reduce the probability of contamination of LWR images by microphonic noise "pings" by extending by 4 minutes the warmup of the cathode heater prior to the read. As seen in the table below, the probability of a ping is reduced from about 80% to about 15%. Furthermore, the pings which do occur tend to fall much higher in the image, averaging 1/7 of the way down from the top. In contrast, the pings in normally read images tend to fall about 1/3 of the way up from the bottom.

The effects of the extended heater warmup on other aspects of the spectral images are yet to be fully explored. However, some testing for photometric changes is described in the attached report. While a slight change in flat field images is detectable, no significant effects were discerned in the net spectra extracted from well exposed images.

At the present, the observatory staff recommends that this technique be used only when as warranted by the benefits of ping avoidance. Observers are urged to evaluate the test results in the context of their particular program. Note that the read will require an extra 4 minutes.

The read procedures have been modified so that the telescope operators can perform the ping avoidance reads routinely when requested on the observing form.

LWR Ping Statistical Data

type of read	No. of images	% with a ping	y*	y range	period
4^m extra warmup	114	15	790	615-895	Spring '81
normal warmup	312	85	435	154-727	Spring '81

* y is line number; y=895 at the top and 127 at the bottom of the image.
For the low dispersion spectra,

$$\text{wavelength (A)} = \begin{cases} 5184 - 4.662 * y & \text{large aperture} \\ 5281 - 4.662 * y & \text{small aperture} \end{cases}$$

For the high dispersion spectra,

Mg II λ2795 is at y ≈ 320

Mg II λ2803 is at y ≈ 230 in order 83 and at y ≈ 650 in order 82.

October 5, 1981

D) Studies of high dispersion spectra

Four 26 s exposures of Lambda Leporis,B1 IV, were obtained in the order:

LWR11196 normal read
LWR11197 test read
LWR11198 normal read
LWR11199 test read

Ratios between the test reads and the normal reads were formed for the extracted spectra for orders 81,82,83 and 100. Several typical results are shown on the next page.

Equivalent widths, residual intensities, and radial velocities were checked for the MgII lines and for the sharp interstellar FeII line at 2599 A in order 89. The values for LWR9758 are also given to indicate the dispersion among normally read images widely separated in time.

		2795 A (order 83)			2803 A (order 82)			both
Image	type	EW (A)	% residual	V_r	EW (A)	% residual	V_r	V_r
LWR11196	N	0.543±.002	-0.9±0.9	12.1	0.451±.003	8.0±0.0	-10.1	10.4
LWR11197	T	0.500 .002	-0.8 0.8	15.5	0.455 .003	9.7 0.2	-5.0	14.6
LWR11198	N	0.499 .007	-0.3 0.1	12.1	0.468 .002	6.9 0.1	0.0	15.4
LWR11199	T	0.500 .007	-1.3 0.6	15.5	0.436 .003	3.9 0.2	-1.6	16.4
mean	-	0.511±.022	-0.8±0.4	13.8	0.453±.013	7.1±2.4	-4.2	14.2
LWR 9758	N	0.525±.010	-0.1±0.2	40.3	0.427±.011	1.8±0.1	66.9	43.0

		2599 A (order 89)		
Image	type	EW (A)	% residual	V_r
LWR11196	N	0.337±.002	9.5±0.0	11.7
LWR11197	T	0.340 .004	12.2 0.5	11.7
LWR11198	N	0.349 .006	10.8 0.4	11.7
LWR11199	T	0.324 .006	12.0 0.0	11.1
mean	-	0.338±.010	11.1±1.2	11.6±0.3
LWR 9758	N	0.318±.002	13.8±0.1	42.1

Note on velocities: The velocities were corrected for earth and spacecraft motions. The difference of more than 25 km/sec between LWR9758 and the images LWR11196-11199 appears to be a good example of thermal shifts. LWR9758 was taken with THDA = 17.2C, and was processed with the mean calibrations. LWR11196-11199 were taken at THDA ~ 12.5C, and were processed with the new processing scheme which includes empirical THDA corrections (Thompson, Turnrose, Bohlin IUE Newsletter 15, p.8). Figure 14 on p. 51 IUE Newsletter No. 15 indicates that the wavelengths reported for LWR9758 would be too large by ≈22 km/s, so its velocity should be decreased by this amount.

A.V. Holm

R. J. Panek

September 11, 1981

LOW DISPERSION TRAILED SPECTRA

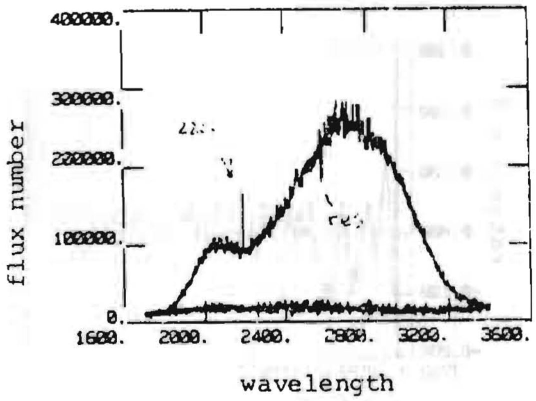


FIG 1: Gross spectrum LWR10930

The hot pixel near 2200 A and a reseau mark are flagged.

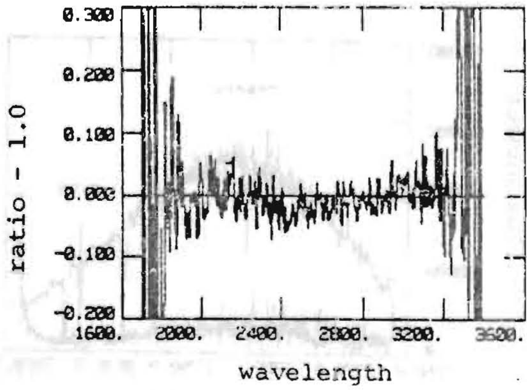


FIG 2: Ratio of test read/normal read
LWR10930/LWR10931 smooth 5 pixels

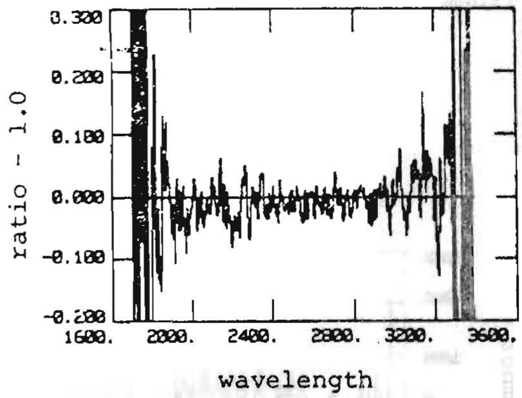


FIG 3: Ratio of test read/normal read
LWR10932/LWR19033 smooth 5 pixels

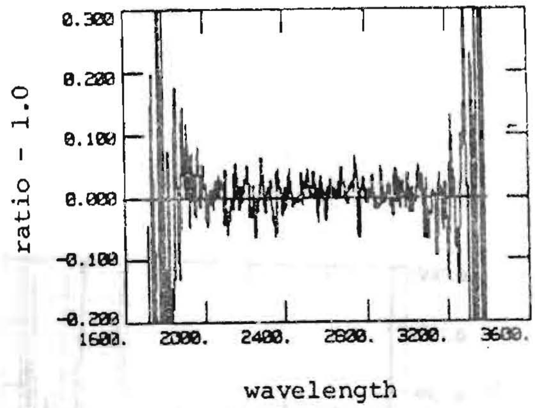


FIG 4: Ratio of normal read/normal read
LWR10933/LWR10931 smooth 5 pixels

Illustrates the expected level of repeatability.

HIGH DISPERSION SPECTRA

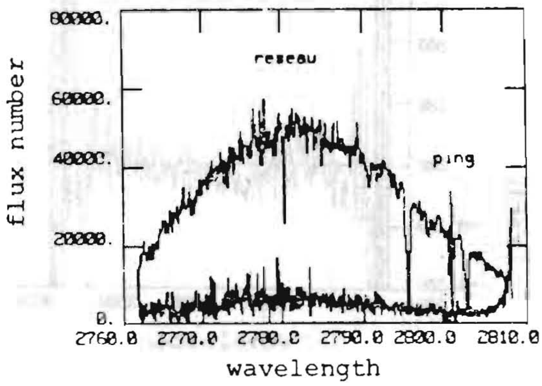


FIG 5: Order 83 Gross spectrum and background LWR11196

The MgII lines are evident at 2795, 2803 A. A reseau mark and the ping are marked.

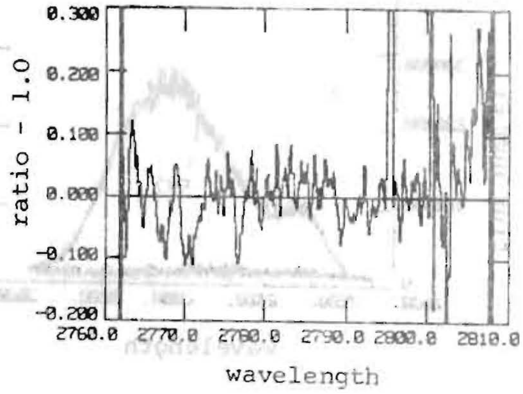


FIG 6: Order 83 Ratio Test read/normal read LWR11197/LWR11196

The effect of the ping is seen near 2801 A. The ratio also differs markedly from unity at the MgII lines.

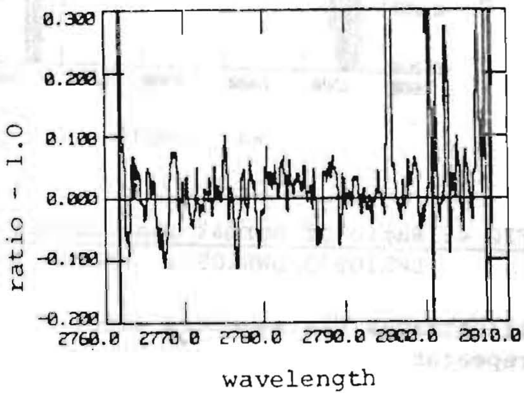


FIG 7: Order 83 Ratio Normal read/normal read LWR11198/LWR11196

Again the ping is apparent, and the ratio is extreme at the MgII lines.

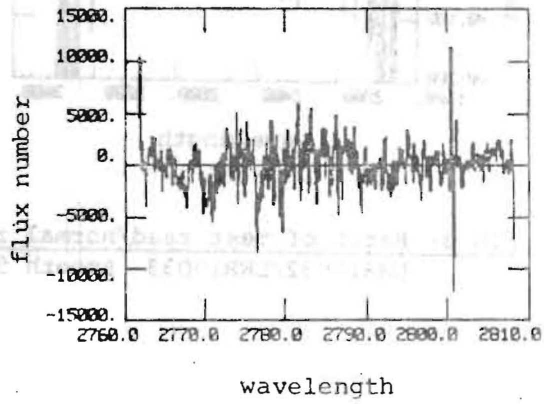


FIG 8: Order 83 Difference Test read - normal read LWR11197 - LWR11196

The ping is evident, but the difference is smooth across the MgII lines. This indicates that the anomalous ratio there is due to the noise inherent in very deep lines.

S/N CHARACTERISTICS OF LWP AND LWR CAMERAS AT HIGH DISPERSION

M. Barylak, ESA/VILSPA

SUMMARY

A comparison between the signal-to-noise (S/N) ratios of the LWP and the LWR camera at high dispersion is presented. Two methods were used to obtain these ratios: a polynomial fit of the net spectra and a simplified Fourier analysis. The LWP, compared with the LWR, provides a better S/N longward of 2500 A. The opposite happens shortward of this wavelength.
The data reduction was carried out with the Tololo-Vienna Interactive Image Processing System at VILSPA.

INTRODUCTION

High resolution spectra of the three standard stars HD93521, BD + 28°4211 and BD + 75° 325 were used for the investigation of the noise characteristic of the LWP camera. The image numbers and the observational data are given in Table 1.

TABLE I: IUE Images used

Image No.	Object	Exp.time	Date	Observer
LWR 13186	BD+75°325	2160 s	07May82	Cassatella
LWP 1464	BD+75°325	1960 s	25Jan82	Wamsteker
LWR 5024	BD+28°4211	4800 s	13Jul79	Beeckmans
LWP 1441	BD+28°4211	4080 s	14Jan82	Patriarchi
LWR 9953	HD 93521	270 s	19Feb81	Bianchi
LWP 1280	HD 93521	240 s	19Feb81	Bianchi

Fourteen orders were chosen at intervals of approximately 100 A. The net spectra were resampled at constant intervals using linear

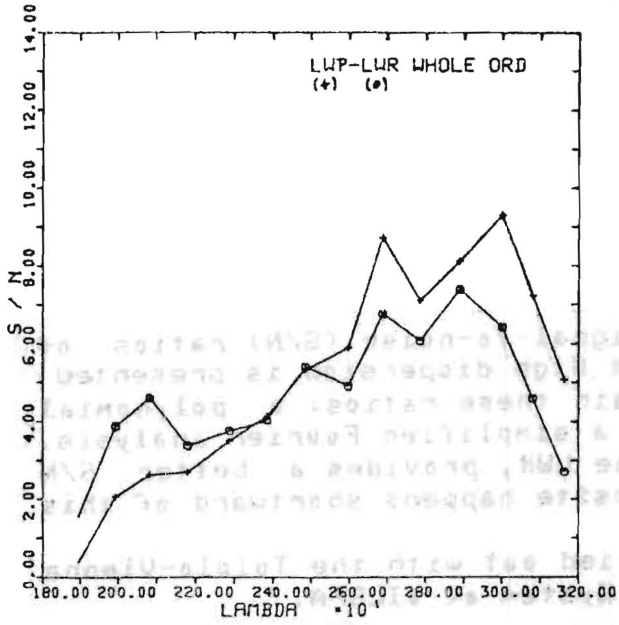


Figure 1. S/N ratio as obtained by fitting the whole order with a polinomial of second degree including negative values at the end.

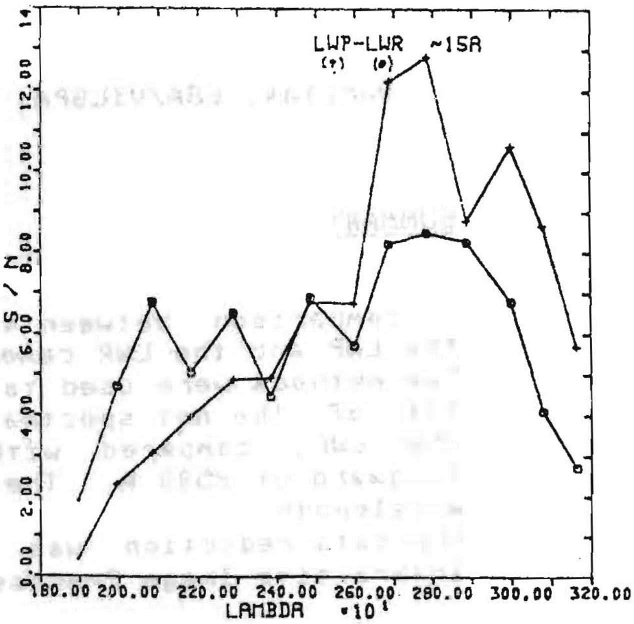


Figure 2. Same as figure 1,but here only the middle part of the individual order was fitted.

interpolation. This procedure has certainly reduced the noise contents of the spectra somewhat, but this is not significant. Two methods were applied to obtain the S/N ratio for each individual order: a polynomial fit and a simplified Fourier analysis.

POLYNOMIAL FIT

In this case the net spectrum was fitted by a polynomial of second degree. This fit was used to determine the S/N-ratio by two different methods. One using the whole order fit and the other using only the middle part of each order. This served to analyse the consequences of the inclusion of the negative values at the ends of the orders, which were excluded by the use of the truncated orders.
The mean value of each range fitted was taken as representative of the signal and the square root of the reduced chi square $\chi = [(Y-Y(fit))^2/n]^{1/2}$, where n is the degree of freedom (which is the number of data points minus the number of coefficients minus 1), was taken as that one for the noise.

The results are shown in Fig. 1 (whole order fit) and Fig. 2 (fit of the middle part of an order). There the average of the S/N ratio of the three stars are presented. Although LWP has a worse noise characteristic from 1800 A to 2400 A, it behaves better than LWR longward of 2500 A (see also LWP User's Guide).

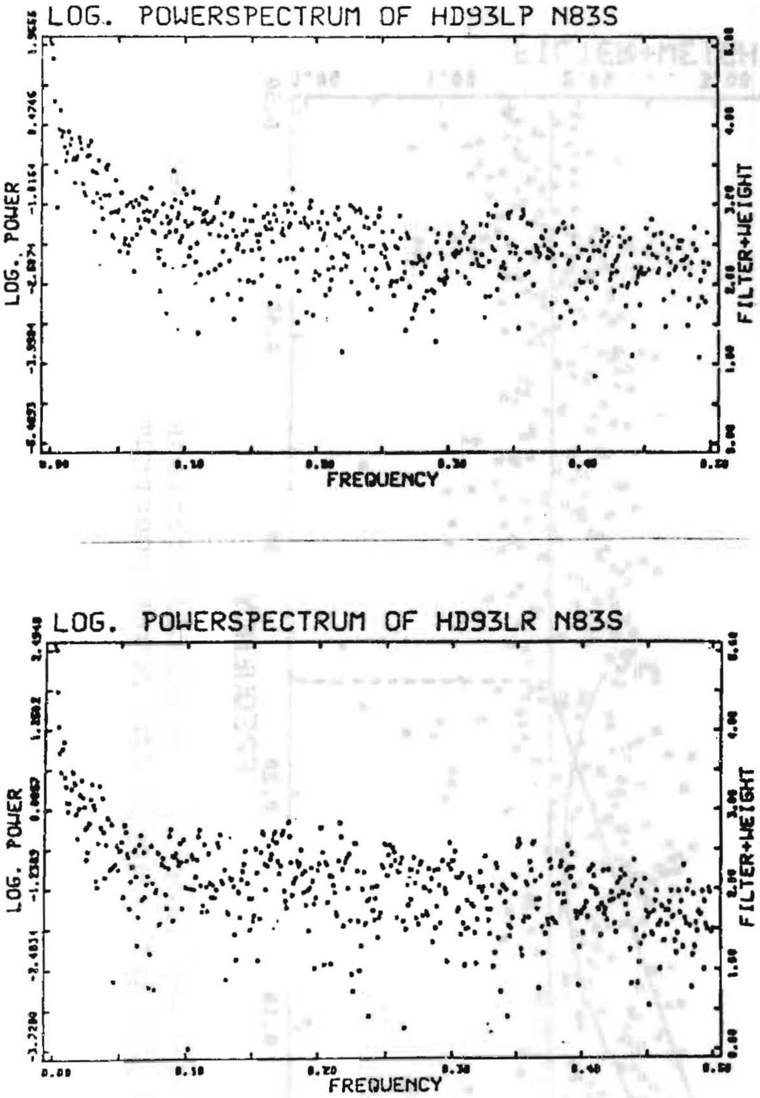


Figure 3. The logarithmic power spectra of order 83 for the LWP camera (top) and the LWR camera (bottom) versus Nyquist frequency (see text).

FOURIER ANALYSIS

In order to prove the results obtained by the method above, I use a Fourier analysis of the net spectra of the star HD 93521 employing the Fourier-package of the Tololo-Vienna Image Processing System. The logarithmic power spectrum of each order was plotted against the Nyquist frequency Ny (= 1/2 Δx, where Δx is the distance of the data points).

The following two assumptions were made: 1, all the signal is contained in the lower frequencies (i.e. from 0.0 to 0.25 Ny) and 2, the higher frequencies (from 0.25 to 0.25 Ny), contain the noise only. Then the area under the power spectrum from 0.0 to 0.25 Ny is representative of the signal and the area under the spectra from 0.25 Ny represents the noise.

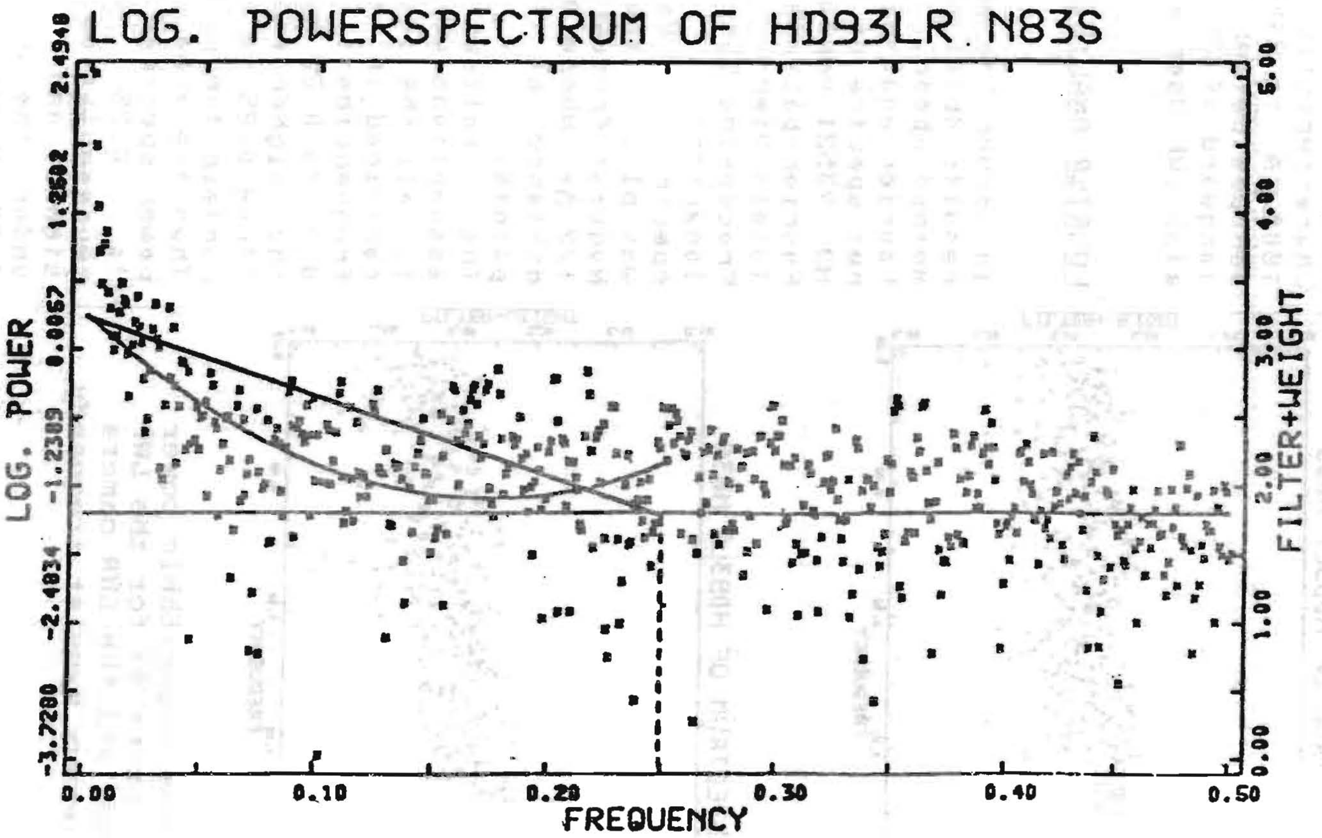


Figure 4. Illustration of the simplifications done in order to compute the areas under the power spectrum (see text).

As one can see in Fig. 3 the computation of the real area under the power spectrum is not an easy task. Therefore some simplifications were made. The power spectrum form 0.0 to 0.25 Ny was first approximated by a Voigt function, which was subsequently substituted by a straight line (see Fig. 4). The part from 0.25 to 0.5 Ny of the power spectrum was fitted by a constant (assuming "white noise"). The results (Fig. 5) of this method confirm the results obtained with the polynomial fitting approach.

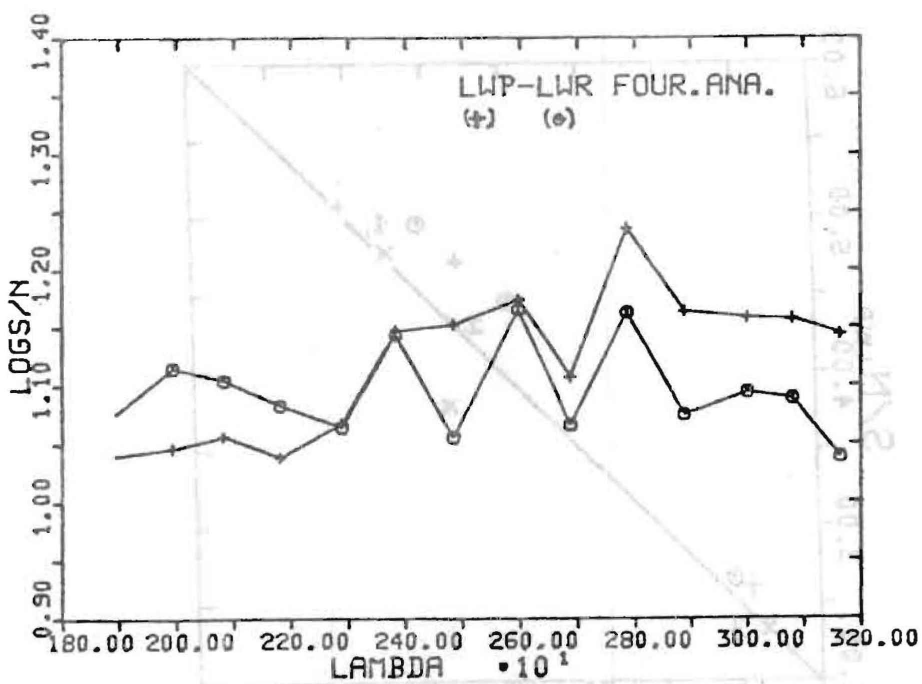


Figure 5. Result of the simplified Fourier analysis. These results are in good agreement with those obtained by the polynomial fit shown in figure 1.

S/N AT THE MgII LINES

The signal-to-noise ratios of LWP and LWR at the two resonance lines Mg II 2795.5 and Mg II 2802.7 are of special interest.
A polynomial fit, as described above, was made over an interval of 4 A centered at these two lines.
The Mg II 2802.7 lies close to the end of order 83, therefore the S/N ratios for this line were computed at the end of order 83 (+) and at the beginning of order 82 (x)

(see Fig. 6). The S/N ratios of the Mg II 2808.7 line of these two different orders are not comparable, because they represent the characteristics of a completely different area of the detector. Fig. 6 shows a comparison of the S/N ratios of LWP and LWR as obtained for the same three standard stars. As one can see for the Mg II 2795.5 line of order 83 (o) the ratios lie above the 1:1-line in favor of the LWP. The same holds for the Mg II 2802.7 line of order 82 (x), LWR seems to have an equal (in case of star BD + 75° 325 (2,) even a better) noise characteristic than LWP.

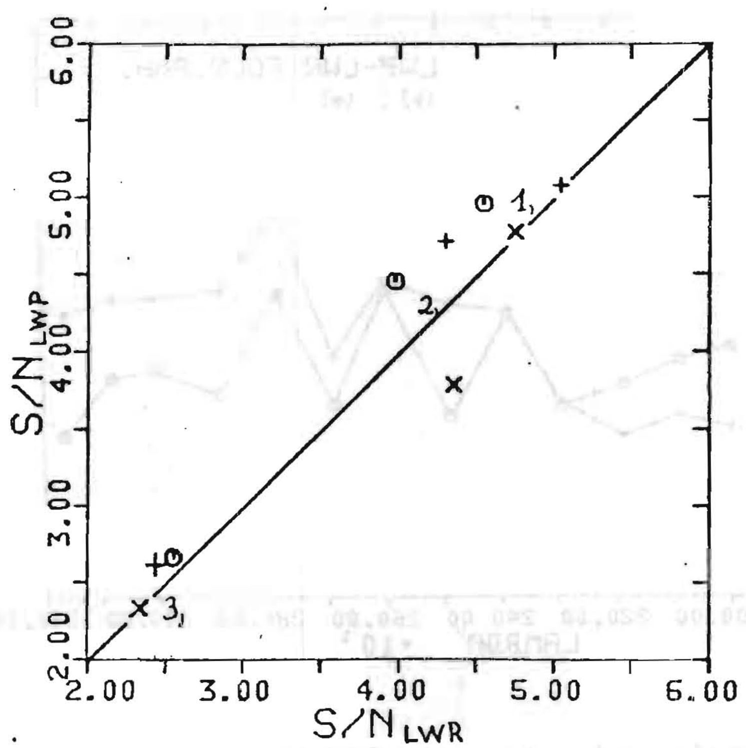


Figure 6. Comparison of the S/N ratios of the LWP and LWR cameras at the position of the Mg II lines for the stars BD +28° 4211 (1), BD +75°325 (2) and HD 93521 (3). See also text.

CONCLUSION

It appears, that LWP is mainly useful for spectral studies in the wavelenght range from 2500 to 3200 A. In this region the S/N in the LWP is about a factor of 1.4 better than in LWR. Conversely the LWR seems to be more appropriate for studies shortward of 2500 A, where it is clearly better than the LWP both in terms of S/N and of sensitivity. For studies of the Mg II lines of order 83 again the usage of LWP is advisable.

ACKNOWLEDGEMENT

I would like to thank A. Cassatella and D. de Pablo for helpful discussions and W. Wamsteker for his corrections. I want to acknowledge the work of E. Torres, who made the first implementation of the TV system in VILSPA.

USE OF THE LWP CAMERA, AND ITS ABSOLUTE CALIBRATION

Over the last eighteen months the Project has invested considerable time in the calibration and study of the LWP camera. Much of the work has been completed, and the camera is now available on a routine basis to all Guest Observers. In this note we compare the properties of the two long wavelength cameras (See also ESA IUE Newsletter # 11), in order to help GOs decide which camera they should choose, and present the absolute calibration of the LWP camera (see also Barylak (this newsletter)).

In the Users Guide for the LWP camera (Settle, Shuttleworth and Sandford, 1981) a comparison of the two LW cameras in the low-dispersion mode shows that the LWP is both more sensitive and has better S/N characteristics longward of 2500 A. Shortward of 2500 A the LWR is the better camera. Figures 1 and 2 illustrate these properties. Other studies presented at the September 1982 3-Agency Meeting, VILSPA showed that at high dispersion the spectroscopic resolution is better in the LWP over most of the orders studied, except near 2800 A and longward - where the resolutions are similar (see Figure 3, and Barylak loc.cit). The LWP camera shows the same characteristic high frequency noise as the other cameras, and has the same sensitivity to the background radiation as the SWP camera. The LWP camera does not suffer from the narrow band of microphonic type distortion prevalent in the LWR camera.

However the LWP ITF table may not be as well defined as the LWR ITF, since it contains only two, rather than four images. Also, it has been used much less than the LWR camera over the lifetime of the IUE, so there is much less photometric data available for this camera.

GOs wishing to use the LWP camera should inform the Resident Astronomer during their training session. Both tracking stations keep each other informed of planned LWP usage, thereby minimizing the switches between the two LW cameras as well as saving time during operations. Only one switch to the LWP and back is allowed per shift. Some time will be lost to the user during the switch - in the worst case about 20 mins - although some of the time can be hidden in other satellite operations.

Over the last year, both Observatories have been acquiring observations of standard stars to calibrate the LWP camera, and a provisonal curve was presented at the 3-Agency meeting. Although a small amount of work still needs to be done on verification of the absolute calibration, we present the data here, so that GOs can use it in their observations. The calibration has been included within IUESIPS by the end of October. The full details of the work will be published elsewhere.

The procedure used to determine the sensitivity curve of the LWP camera was to establish its overall shape, using trailed images of bright stars having well-established fluxes. To fix its absolute value we used fainter stars which can be accurately timed during exposure with IUE. This method is the same as that used in the revision of the absolute calibration of the SWP and LWR cameras and is independent of the LWR camera. To determine the shape, 12 trailed spectra of 4 HD stars (3360, 34816, 155763 and 214680) were used, whilst the absolute value was fixed with 23 spectra of 4 other stars (HD 60753, HD 93521, BD +28° 4211 and BD +75° 325). The resulting mean sensitivity curve, weighted according to the square-root of the number of individual spectra, is shown in Figure 4, and given in table I in 25 A bins for a wavelength range from 1900-3200 A.

As a first check on this calibration, we have compared fluxes obtained from both the LWP and LWR observations of the same star, finding the result that the two cameras are internally consistent, i.e. both cameras give the same fluxes to within reasonable errors (10%). There is a tendency for the LWP to give slightly large fluxes, of the order of 5%, compared to the LWR. Taken overall, the two calibrations agree well.

J.C. Blades
A.C. Cassatella

TABLE I
ABSOLUTE CALIBRATION OF THE LWP CAMERA AT LOW DISPERSION

Lambda (A)	S_λ^{-1}	Lambda (A)	S_λ^{-1}
1900	11	2600	0.583
1925	4.13	2625	0.539
1950	3.04	2650	0.506
1975	2.59	2675	0.507
2000	2.44	2700	0.502
2025	2.17	2725	0.498
2050	1.97	2750	0.501
2075	1.96	2775	0.500
2100	1.98	2800	0.511
2125	1.96	2825	0.520
2150	1.99	2850	0.540
2175	2.05	2875	0.549
2200	1.95	2900	0.565
2225	1.93	2925	0.604
2250	1.81	2950	0.663
2275	1.62	2975	0.704
2300	1.50	3000	0.795
2325	1.37	3025	0.909
2350	1.26	3050	1.09
2375	1.14	3075	1.25
2400	1.02	3100	1.48
2425	0.947	3125	1.79
2450	0.864	3150	2.15
2475	0.804	3175	2.70
2500	0.730	3200	5.98
2525	0.679		
2550	0.624		
2575	0.599		

S_λ^{-1} : 10^{-14} erg cm^{-2} A^{-1} FN^{-1}

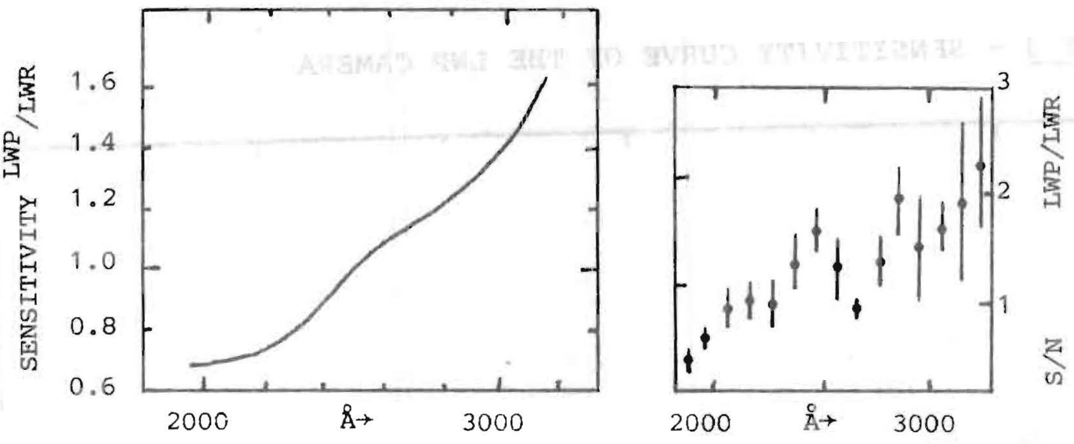


FIGURE 1 (a & b) - Comparison of the sensitivity of the S/N ratio for the two long wavelength cameras (Settle, Shittleworth, Sanford, 1981)

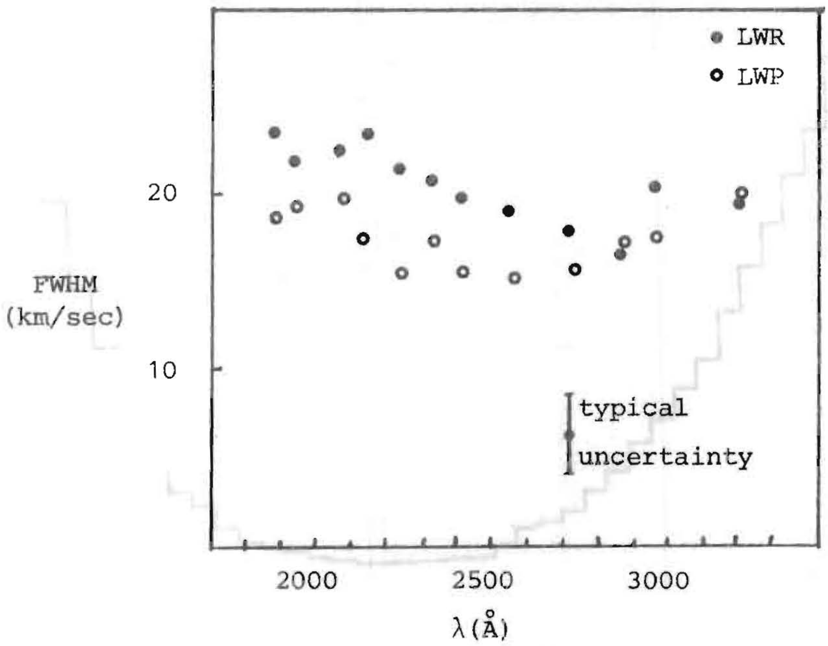
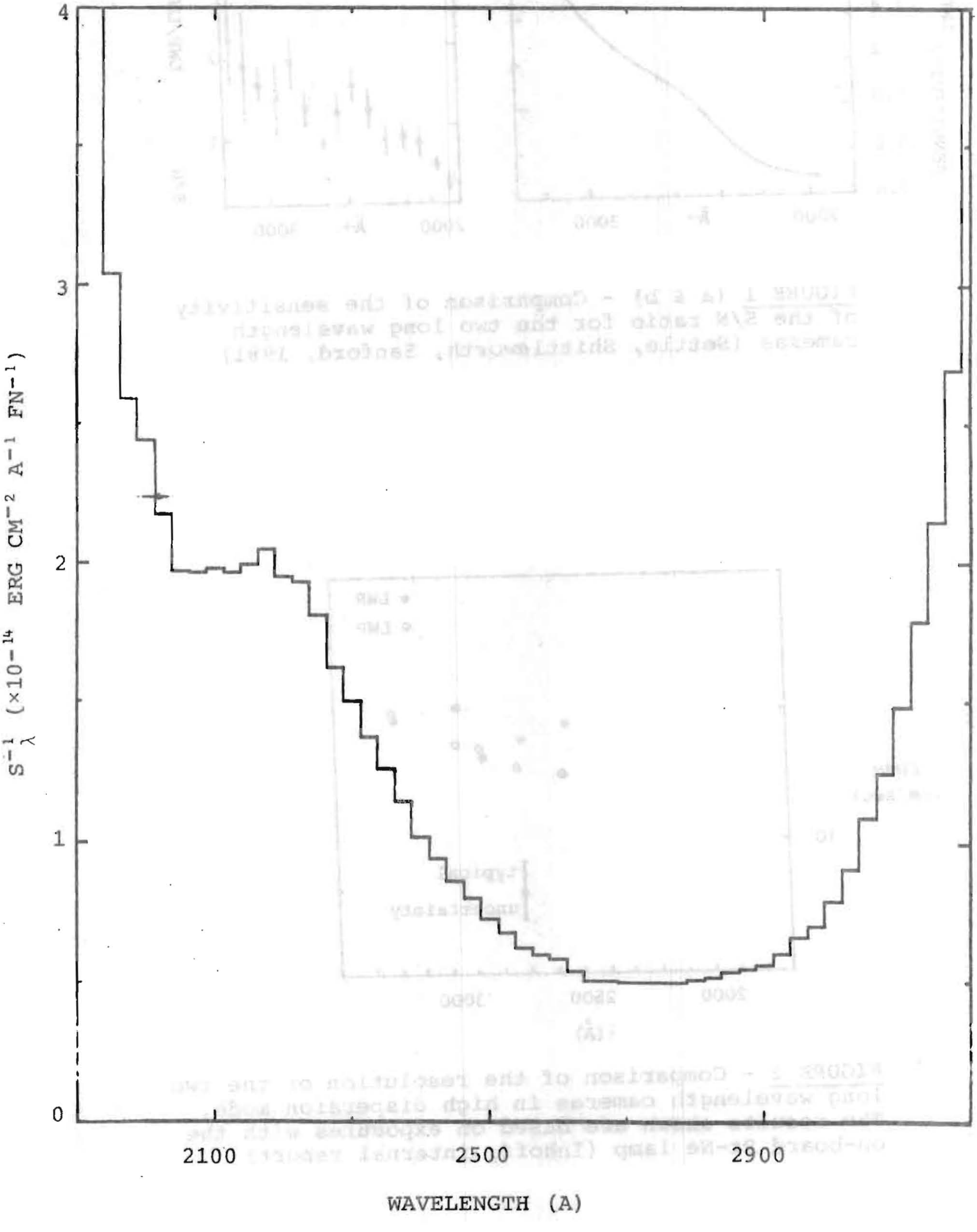


FIGURE 2 - Comparison of the resolution of the two long wavelength cameras in high dispersion mode. The results shown are based on exposures with the on-board Pt-Ne lamp (Inhoff, internal report)

FIGURE 3 - SENSITIVITY CURVE OF THE LWP CAMERA



ABSOLUTE CALIBRATION OF IUE HIGH RESOLUTION SPECTRA: CHANGES WITH THE NEW SOFTWARE

1. INTRODUCTION

High resolution spectra of point sources obtained through the spectrograph's large entrance apertures can be calibrated in terms of absolute fluxes using the high resolution calibration curves by Cassatella, Ponz and Selvelli (1981).

This calibration however, is only applicable to spectra processed with the software available at GSFC before November 10, 1981 and at VILSPA before March 11, 1982. At the above dates a new high resolution data processing software was installed at both IUE ground stations.

The new software, documented by Bohlin and Turnrose (1982) and references therein, makes use of substantially better geometric and photometric correction procedures. It also allows for a better registration of the orders, providing a more precise matching of the order's center with the wavelength dispersion overlays. Moreover, the slit height is optimized as a function of the order width and separation, instead of being fixed to about 6.4 pixels (for point source spectra) as in the old software. These changes, but in particular the upgraded precision in localizing the orders and the background in the images, have the global effect to increase the net flux extracted from the higher spectral orders (at the short wavelength ends of the cameras).

In the present report the influence of the new software on the high resolution calibration is studied, and preliminary results are provided.

2. CALIBRATION SAMPLE AND DATA ANALYSIS

Two pairs of low-high resolution spectra of the same star are used for each camera to redetermine the calibration factors C defined by Cassatella et al. (1981). These are SWP 9842 (low) and SWP 9843 (high) for BD +75^{o}325; SWP 8703, SWP 8704, LWR 8703 and LWR 8704 for HD 60753.

The results were verified by taking the ratio of the spectra processed with the new and old software. This provides directly the corrections to be applied to the old C_{λ} curves. The smoothed calibration curves are shown in

Figure 1 and Figure 2 for the SWP and LWR camera, respectively, together with the previous curves in Cassatella et al..

The values are also reported in Table 1.

3. RESULTS AND DISCUSSION

The internal consistency of the new high resolution calibration, although based on a smaller sample of spectra, is similar to that of the old one, i.e. about 10% shortward of 2200 A and about 5% longward of these wavelengths.

Examples of the new absolute calibration applied to high resolution spectra processed with the new software are given in Figure 3 and and 4 for both the SWP and LWR Cameras.

In Figure 3a the calibrated high resolution spectrum of HD 187473 (from SWP 8280) is compared with a low resolution spectrum (SWP 8279) of the same target after rebinning both data at 2A intervals. The corresponding r.m.s. deviation is about 4%. A slightly better accuracy is obtained in the case of BD +28°4211 (using SWP 5778 and SWP 5779), as shown in Figure 3b. A similar comparison for the LWR camera is presented in Figure 3c for BD +75° 325 using LWR 8305 and LWR 8304. The r.m.s. deviation is about 6%. These comparisons are quite satisfactory although the selected spectral regions, corresponding to high orders, are the most sensitive to errors. Better precisions are obtained at longer wavelengths. This is shown in Figure 4, where the original LWR high resolution spectrum of HD 144668 is compared with a low resolution spectrum taken close in time, in a region around 2580 A. The r.m.s. deviation is about 3% in this case.

It is clear from Figures 1 and 2 that the new calibration factors C_λ are systematically lower at the short wavelength end of the cameras than in the old software. This is due to the gain in extracted flux expected as a consequence of the improved data extraction. In particular, the gain in extracted net flux is about 10% around order 110 in both cameras (near 1250 A in the SWP and near 2100 in the LWR), and decreases regularily with decreasing order number. This is in good agreement with the new software evaluation tests reported by Bohlin and Turnrose (1982). Longward of 1450 A in the SWP camera and 2425 A in the LWR, the new software does not show any significant gain compared with the old software. As a consequence, the new and old curves C_λ coincide longward of these wavelengths.

Concerning the absolute calibration of emission line sources with faint or no continuum, the same equations hold as for the old software, i.e.:

$$C_\lambda = 228.009 - 0.0755\,\lambda \text{ for } 1400 \leqslant \lambda \leqslant 1975 \text{ A}$$

$$C_\lambda = 167.099 - 0.0229\,\lambda \text{ for } 2300 \leqslant \lambda \leqslant 3100 \text{ A}$$

These equations fit very well the new calibration for continuous sources longward of 1575 A in the SWP, and of 2500 A in the LWR camera.

Cross checks of the above equations, using spectra of RR Tel, confirm their validity.

A.Cassatella
D.Ponz
P.L.Selvelli

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Bohlin, R.C., Turnrose, B.E., 1982, ESA IUE Newsletter No. 13, p. 14 and NASA IUE Newsletter No. 18, p. 29

TABLE 1 - CALIBRATION FACTORS C_λ

Lambda (A)	New	Old	Lambda (A)	New	Old
1250	205	230	1925	230	292
1275	192	208	1950	206	259
1300	178	193	1975	190	229
1325	168	176	2000	177	207
1350	158	163	2025	168	191
1375	148	152	2050	159	180
1400	142	143	2075	153	171
1425	136	136	2100	146	165
1450	131		2125	142	159
1475	126		2150	138	153
1500	122		2175	134	149
1525	118		2200	131	143
1550	114		2225	129	139
1575	110		2250	126	136
1600	108		2275	124	132
1625	105		2300	122	129
1650	103		2325	120	126
1675	101		2350	119	122
1700	100		2375	118	120
1725	98		2400	117	118
1750	96		2425	116	116
1775	94		2450	115	
1800	92		2475	114	
1825	90		2500	113	
1850	88		2525	112	
1875	86		2550	110	
1900	84		2575	109	
1925	82		2600	108	
1950	81		2625	107	
1975	80		2650	106	
			2675	105	
			2700	104.5	
			2725	104.0	
			2750	103.5	
			2775	103.0	
			2800	102.5	
			2825	102.0	
			2850	101.5	
			2875	100.5	
			2900	100.2	
			2825	100.0	
			2950	99.0	
			3000	98.5	
			3025	98.0	
			3050	97.5	
			3075	97.0	
			3100	96.5	

FIGURE CAPTIONS

FIGURE 1:

C_{λ} curve applicable to SWP high resolution spectra of continuous sources processed with the new software (crosses) and the old software (dots). The two curves coincide longward of 1450 A.

FIGURE 2:

C_{λ} curve applicable to LWR high resolution spectra of continuous sources processed with the new software (crosses) and old software (dots). The two curves coincide longward of 2425 A.

FIGURE 3 (a,b and c) :

Comparison between a low resolution (thick line) SWP spectrum and a calibrated high resolution spectrum (thin line) of the the stars HD 187473 and BD $+28^{\circ}4211$. both resampled at 2 A intervals. Figure 3c shows the the same comparison for BD $+75^{\circ}325$.

FIGURE 4:

Calibrated high resolution spectrum of HD 144668 compared with a low resolution spectrum (dots) taken close in time.

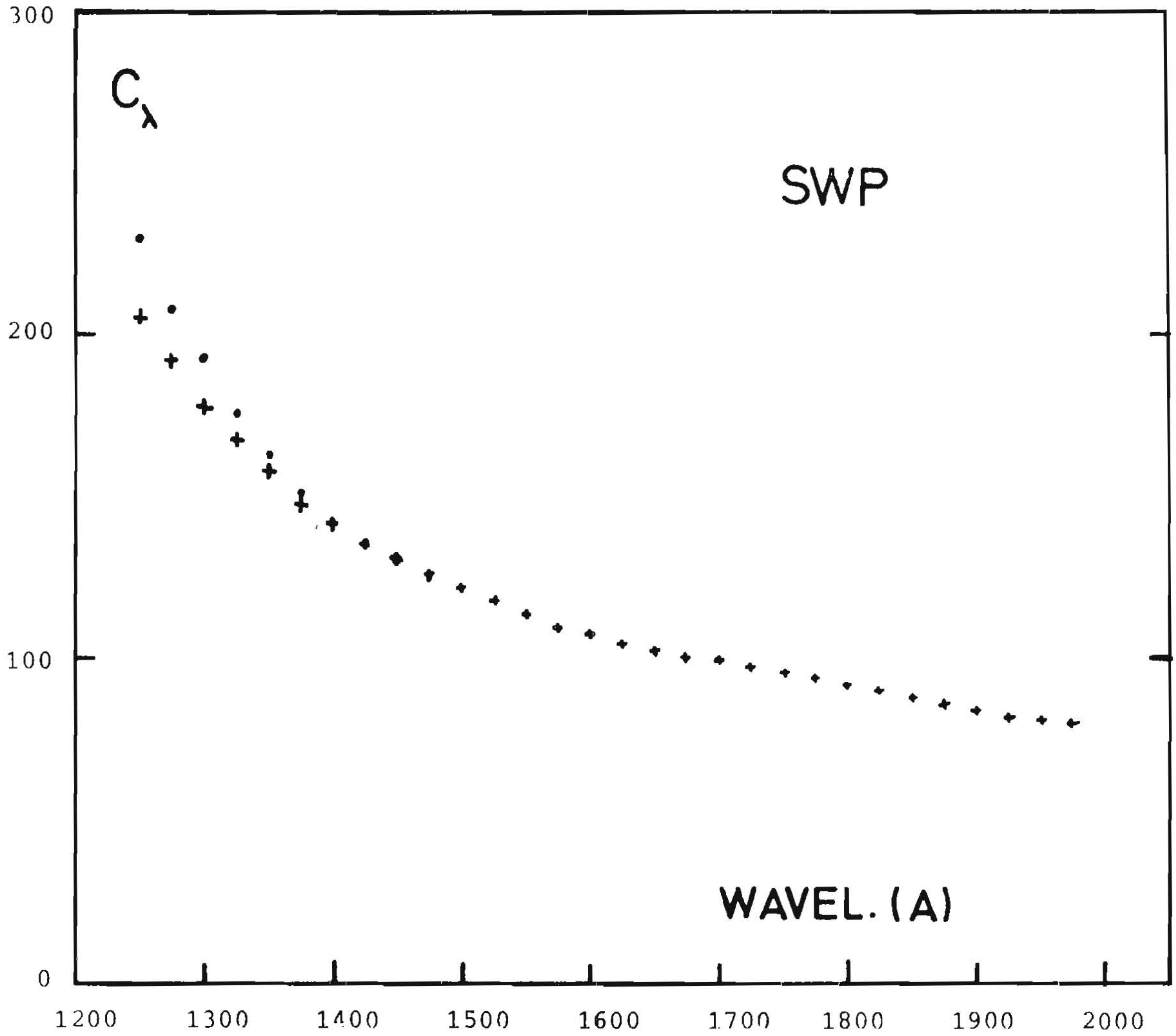
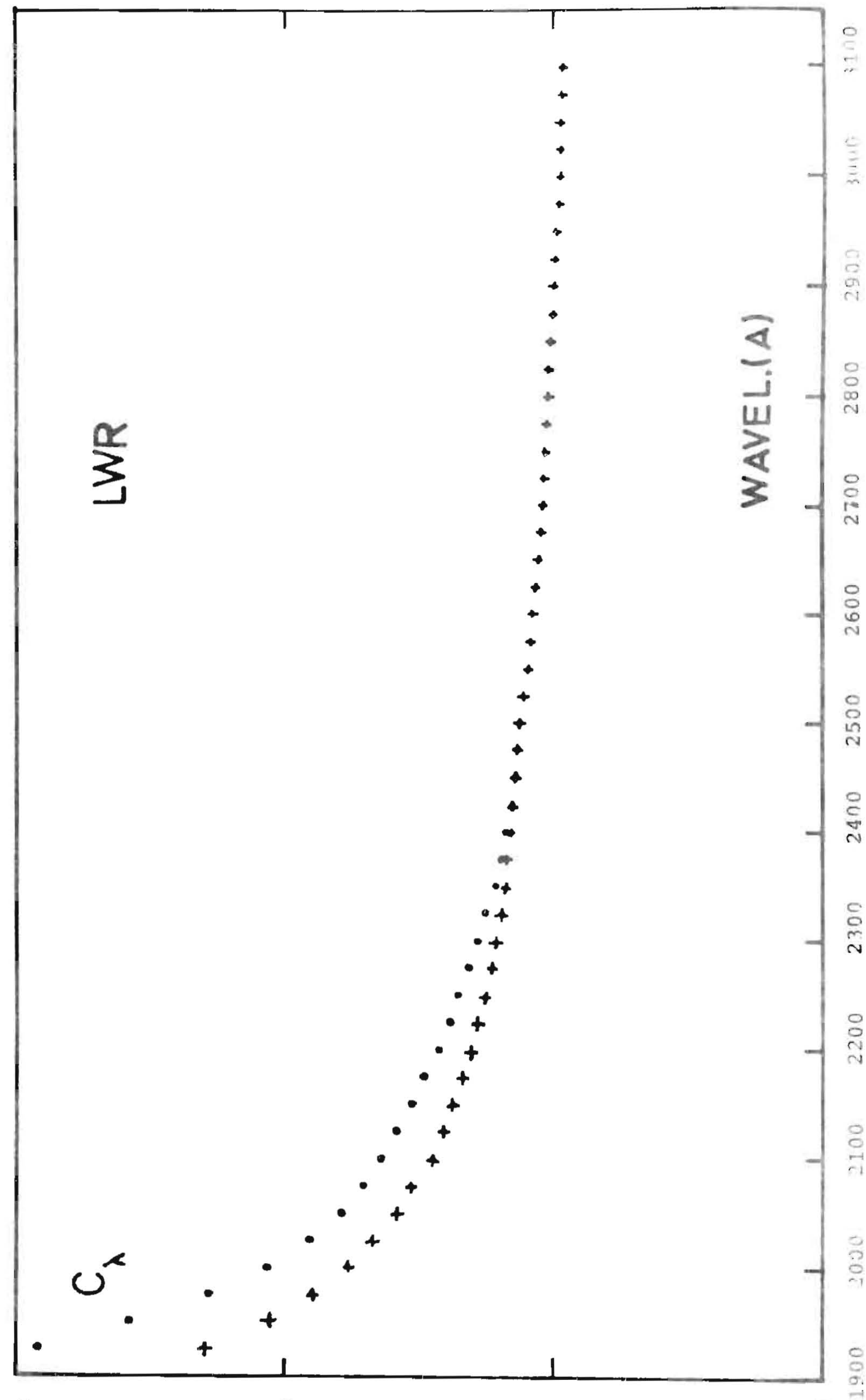

300
200
100
0
C_λ
SWP
WAVEL. (A)
1200
1300
1400
1500
1600
1700
1800
1900
2000

FIGURE 1

FIGURE 2


LWR
WAVEL.(A)
Cλ
300
200
100
0
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100

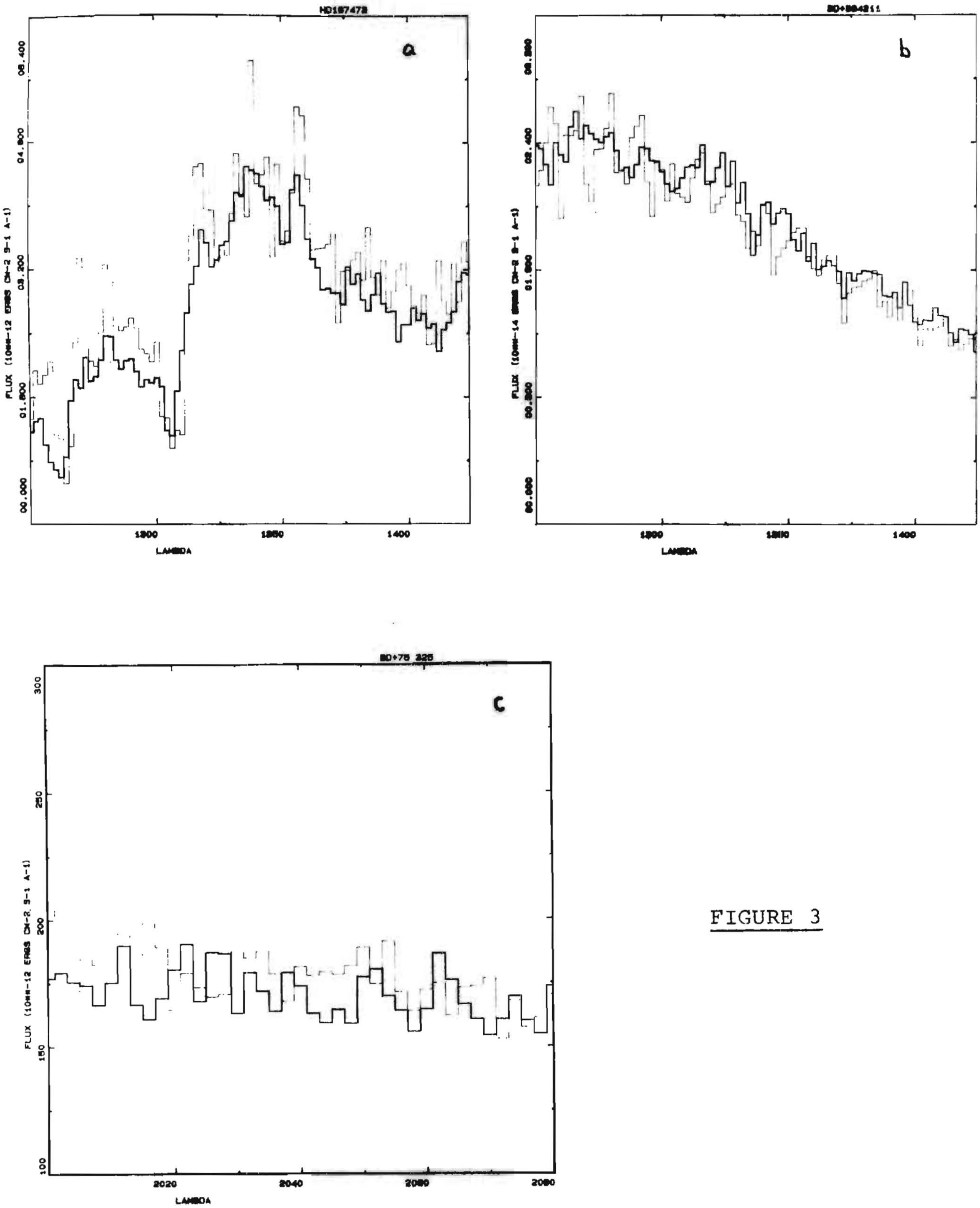
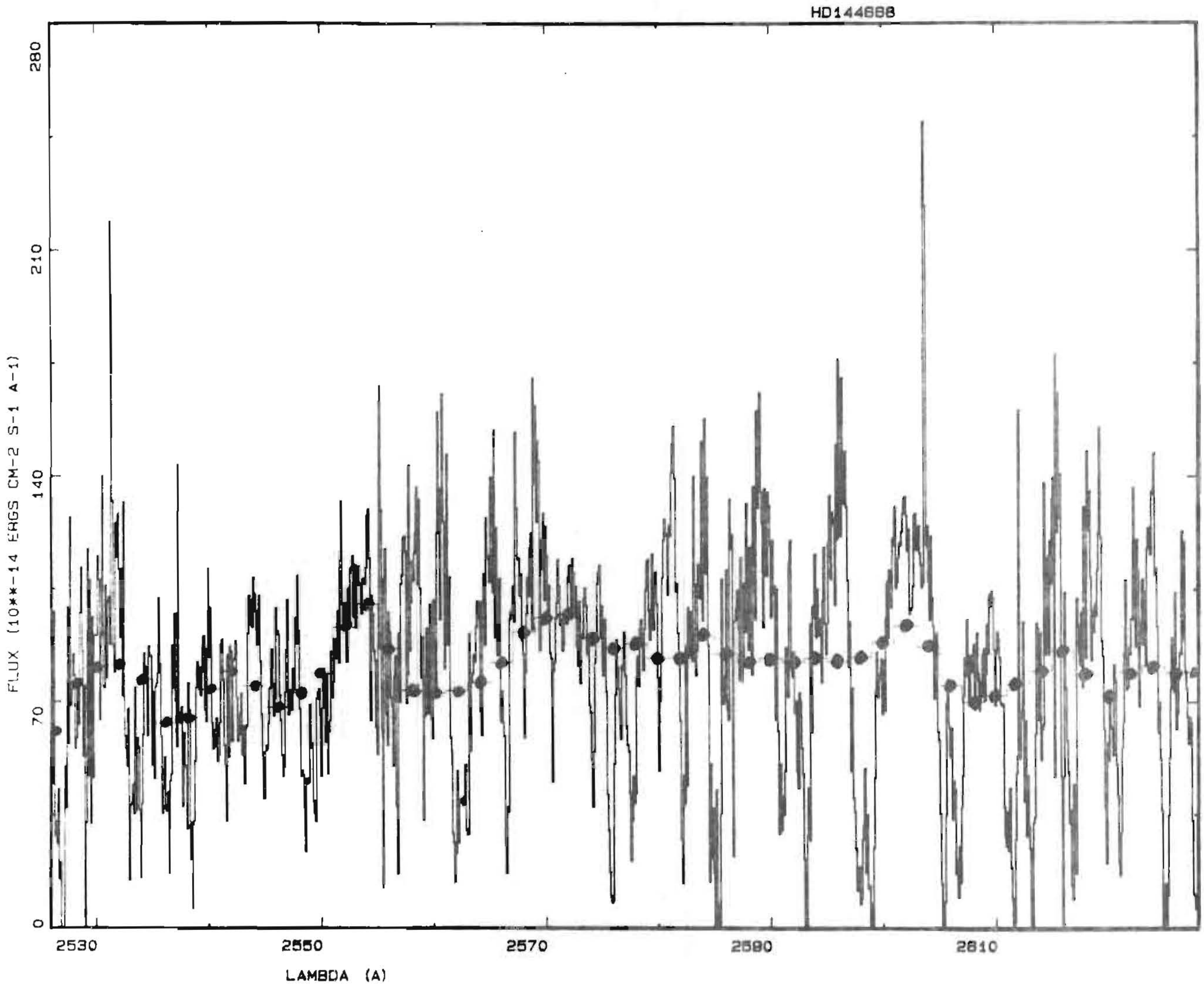

a
b
c
BD+75 325
LAMBDA
LAMBDA
LAMBDA
1300
1350
1400
2020
2040
2060
2080
100
150
200
250
300

FIGURE 3



HD144668
FLUX (10**-14 ERGS CM-2 S-1 A-1)
280
210
140
70
0
2530
2550
2570
2590
2610
LAMBDA (A)

FIGURE 4

Interactive Facility for consulting the Merged Log of Observations at VILSPA

1. Introduction

Since the 1st. of October '82, a new facility is at the disposal of the Guest Observers, Resident Astronomers and Scientific Visitors of VILSPA.

This new facility enables the visitor to use a computer terminal to communicate in a conversational way with a file of Merged Log of observations. The type of questions allowed is powerful enough to quickly retrieve any collection of data placed in such Merged Log.

At the moment, the system is in operation every day from 16.00 hrs. local onwards. Experience will advise whether or not to modify this schedule.

The facility is implemented around a Data Base Management Package which allows the application to operate with the data files without constraining the file design or its contents.

2. Merged Log Consultations

The Merged log file is organized in "Records" of 80 characters. Each record describes an observation and is subdivided into "Fields", which are each one of the elements of the recorded observation. The actual descriptors of these fields are:

NAM - Object name (up to 8 characters).
CLA - Object class (2 digits).
MAG - Object magnitud (up to 3 characters).

RHO - Right Ascension hours coordinates.

RMI - Right Ascension minutes coordinates.

RSE - Right Ascension seconds coordinates.

SIG - Declination sign (+ or -).

DDE - Degrees Declination coordinates.

DMI - Minutes Declination Coordinates.

DIS - Dispersion Image (H or L).

CAM - Camera (1, 2, 3 or 4).

NIM - Image Number (up to 5 digits).

APE - Aperture (S or L).

LST - Large Aperture status (O or C).

DAY - Day of Observation.

MON - Month of Observation (3 characters).

YEA - Year of Observation.

EHO - Exposure start hours.

EMI - Exposure start minutes.

ESE - Exposure start seconds.

ELM - Exposure length minutes (3 digits).

ELS - Exposure length seconds.

OBS - Observing program (5 characters).

Our interactive facility allows to ask questions about any of these fields or any boolean combination of them. The response is given in a pre-specified format.

The questions to the Merged Log are structured in the form:

'COMMAND' 'CRITERIA'

where the 'COMMANDS' allowed to the user are:

FI: Identify the set of records that meet certain criteria

FIA: Extracts from the previously selected records the ones meeting certain criteria.

FIO: Same as FIA (Find AND) but performing the 'OR' operation between previously selected records and the ones meeting the specified criteria.

CO: Count: returns a count of the number of records meeting specified criteria.

COA: Count + "AND" criteria (similar to FIA).

COO: Count + "OR" criteria (similar to FIO).

LK: Establishes start position to retrieve records in logical sequence order.

GN: Obtain next record in the list.

DR: Display a record.

VIEW: Specify a display format.

and the 'CRITERIA' are boolean function constituted with the above mentioned "Field Descriptors".

A few examples will show the power of the system.

<u>EXAMPLE 1:</u> Display the records meeting the criteria:

- Camera is LWP
- Low Dispersion
- Object Classification is 99 (Nulls and Flat Field)
- Image Sequential Number higher than or equal to 1000.

The question to be asked is:

FI CAM=1 AND DIS=L AND CLA=99 AND NIM>1000.

The system will respond that he found 81 records.

On commanding DR VIEW:MERV02 (Display Record with the output format MERV02), the first record will be displayed.

Commanding GN (Get Next) will retrieve after every new "Carriage Return" the next record complying with the search criteria.

EXAMPLE 2: Let us assume that we are interested in collecting the observations made in high dispersion with the shortwave spectrograph to the object NGC 4151. The difficulty to overcome is the fact that the object might be coded under different names so that we can only rely on its coordinates. Furthermore, the recorded coordinates might differ by a small amount, so that, in conclusion, what we want is to find the high dispersion observations made to objects whose R.A. and Declination are around one of the recorded coordinate values of that object.

One way of proceeding could be as follows:

. First let us find the coordinates of this object:

FI NAM='NGC 4151'

The system will respond with

'115 RECORDS FOUND'

and the first one will be displayed.
Notice the coordinates R.A. = 12 08 00 and declination = + 39 41 00.

. Find now all records with coordinates 12 08 and 39 41 (i.e. within 60 seconds above these values):

FI RHO=12 AND RMI=08 AND DDE=39 AND DMI=41.

The system will respond

'207 RECORDS FOUND'

and the first one will be displayed.
(Notice there are more records than in the preliminar question).

. The command

FIA CAM=3

will select from the 207 records the ones observed with SWP camera.

System responds with

'117 RECORDS FOUND'.

. Now, the command

FIA DIS=H

will select (from the previous set) the observations in high resolution.

The system respond with

'5 RECORDS FOUND'

and the first one will be displayed. After subsequent 'Carriage Returns' the other 4 records will be also displayed.

. Of course, after a little experience, an overall command like

FI RHO=12 AND RMI=08 AND DDE=39 AND DMI=41 AND CAM=3 AND DISP=H

would have performed the whole search.

3. Available Display Formats

The system offers more ample facilities than the ones described here. As a matter of fact the user can even create his/her own display format. For reference, it is included here a reduced list of the available formats (called 'views' or 'userviews', in IGCS jargon).

D. de Pablo, IGCS

APPENDIX B

VIEW:MERV01

```
                         MERGE   LOG

                      COORDINATES
   OBJECT           R.ASC.          DEC.                          OBS.DATE
NAME   CL  MAG   HOUR MIN SEC   DEG MIN   CAM IMAGE AP ST   DAY MONTH YEAR
34029 45   00    05   12 .59    45  56    4   01022  S  0   09   FEB   78

          EXPOSURE
       ST.         LENGTH
  HOUR MIN  SEC   MIN  SEC   PROG.          COMMENTS
   22   02   00   001   20   CEJLL     GCOMMISSIONG PERIOD
```

VIEW:MERV02

```
MERGE LOG
---------
                                        CLASS                 16
      OBJECT ID.      +75  325
                                        MAGNITUDE             92
                         HR MN SC                             D.  M.
      RIGHT ASCENSION    08 04 43       DECLINATION           +75 06
      DISPERSION            L
      CAMERA N.             4        IMAGE N.              01024
      APERTURE              S        LARGE AP. STATUS        0
      DATE OF OBSERVATION      10FEB78
                       START               LENGHT
      EXPOSURE     HR MN SC                MN. SC.
                   04 27 00                010 00
      OBSERVER PROGRAM       HSSRH
      COMMENTS               GCOMMISSIONING PERIO
```

VIEW:REPV01

```
415184 90120800+3941H401025S010FEB7804560006000  TRG   GCOMMISSIONING PERIO
```

VIEW:REPV02

```
-OBJECT  CL  MG RIGHT ASC   DEC.   C IMAGE       DATE        EXPOSURE      OBS
  4151 84 120 12 08 00 + 39 41 L 4 01026 S 0 11 FEB 78 19 57 00 060 00    TRG
```

VIEW:REPV03

```
-OBJECT  CL  MG RIGHT ASC   DEC.   C IMAGE       DATE        EXPOSURE
  6826 71 104 19 43 27 + 50 24 L 3 01140 S 0 13 MAR 78 20 44 00 002 30
```

VIEW:REPV04

```
153919 59  65 17.00.32 -37.46 H 4 01027 S0 11FEB78 22 53 00 100 00 XSAKD
```

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THIRD EUROPEAN IUE CONFERENCE

Under the auspices of the European Space Agency and the Instituto de Optica (Daza de Valdez) the Third European IUE Conference was held on 10-13 May 1982 in Madrid. The Conference was attended by 166 participants from no less then 13 countries. The proceedings of the conference have already appeared in press, (due to extreme efficiency of the ESTEC publication department). Below we give the table of contents of the proceedings.
The proceedings have been edited by E. Rolfe, A. Heck and B. Battrick as an ESA special publication (ESA-SP-176). Copies (175 F.F.) can be obtained from:

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1359	11652	11728	11817	15138	15209	15270
1360	11653	11732	11818	15139	15210	17275
1361	11662	11733	11819	15140	15214	15276
1363	11663	11734	11820	15147	15215	17277
1364	11664	11735	11827	15148	15216	15278
1365	11665	11736	11830	15149	15217	15289
	11672	11737	11831	15155	15218	15295
	11673	11744	11832	15156	15219	15296
	11674	11745	11849	15157	15220	15297
	11683	11753	11858	15165	15226	15298
	11684	11754	11859	15166	15227	15299
	11685	11755		15173	15228	15300
	11692	11769		15174	15229	15306
	11693	11770		15175	15230	15307
	11694	11778		15176	14237	15308
	11695	11779		15184	15238	15309
	11702	11780		15185	15239	15310
	11703	11781		15186	15244	15313
	11704	11784		15187	15250	15322
	11705	11785		15188	15251	15329
	11718	11789		15199	15252	15331
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	11721	11804		15206	15255	15346

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1373	11899	11968	15365	15472	15592
1374	11900	11969	15371	15484	
1387	11901	11976	15372	15485	
	11902	11977	15373	15486	
	11903	11984	15374	15487	
	11904	11992	15375	15488	
	11905	12002	15376	15489	
	11906	12003	15377	15498	
	11907	12004	15378	15499	
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	11916	12006	15384	15531	
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Camera 1 LWP	Camera 2 LWR		Camera 3 SWP		
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1397	12061	12144	15605	15711	15856
1398	12062	12151	15606	15712	15871
1399	12071	12153	15620	15713	15872
1403	12072	12154	15632	15718	15873
1408	12073	12164	15633	15734	15874
1409	12074	12165	15634	15735	15883
1410	12075	12166	15635	15736	15888
1411	12076	12167	15636	15737	15889
1412	12090	12191	15637	15738	15890
1413	12106	12192	15638	15739	15891
1414	12114	12193	15648	15747	15894
1415	12124	12208	15657	15761	15895
1416	12125	12209	15673	15762	
	12126	12210	15690	15763	
	12127	12211	15691	15792	
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1418	1455	12234	12317	12444	15903	15989	16130
1419	1456	12236	12318	12445	15907	15996	16131
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1421	1458	12251	12326	12447	15915	15998	16133
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1438	1466	12271	12349	12482	15939	16031	16161
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1442	1470	12284	12395		15950	16049	16165
1443	1471	12287	12407		15951	16050	16166
1444	1472	12288	12408		15952	16051	16167
1445	1473	12289	12418		15965	16052	16168
1446	1474	12293	12419		15966	16068	16197
1447	1475	12294	12420		15967	16075	16198
1448	1476	12295	12430		15968	16076	16199
1449	1477	12306	12438		15983	16103	16200
1450		12307	12439		15984	16104	16201
1451		12313	12440		15985	16119	16210
1452		12314	12441		15986	16127	16211
1453		12315	12442		15987	16128	

VILSPA IMAGES FOR RELEASE TO SCIENTIFIC COMMUNITY

1982 September 1st (despatched 1982 February)

Camera 1 LWP			Camera 2 LWR		Camera 3 SWP	
1488	12489	12554	12628	16228	16306	16411
1489	12490	12555	12629	16229	16311	16415
1490	12491	12556	12639	16230	16317	16416
1491	12492	12557	12640	16231	16318	16422
1492	12493	12558	12649	16232	16319	16423
1493	12494	12559	12650	16233	16320	16430
	12495	12560	12651	16242	16327	
	12503	12564	12652	16243	16328	
	12506	12565	12662	16253	16329	
	12507	12566	12665	16254	16330	
	12515	12567	12675	16263	16346	
	12519	12578	12676	16264	16347	
	12523	12579	12677	16265	16348	
	12528	12580	12681	16274	16349	
	12529	12581		16278	16363	
	12530	12588		16284	16374	
	12531	12595		16285	16375	
	12532	12596		16286	16376	
	12534	12597		16287	16377	
	12542	12598		16288	16378	
	12543	12599		16289	16379	
	12544	12612		16290	16390	
	12545	12618		16291	16398	
	12546	12619		16295	16399	
	12547	12620		16303	16400	
	12552	12626		16304	16401	
	12553	12627		16305	16410	

VILSPA IMAGES FOR RELEASE TO SCIENTIFIC COMMUNITY

1982 October 1st (despatched 1982 March)

Camera 1 LWP	Camera 2 LWR			Camera 3 SWP		
1497	12695	12795	12834	16454	16527	16603
1498	12696	12796	12835	16455	16528	16611
1499	12697	12797	12842	16456	16529	16612
1500	12703	12798	12843	16457	16530	16613
1501	12704	12799	12844	16459	16540	16620
1502	12705	12800	12845	16460	16541	16627
1503	12710	12801	12850	16467	16542	16628
	12711	12802	12851	16476	16543	16629
	12724	12805	12852	16478	16544	16644
	12728	12806	12863	16485	16552	16645
	12729	12807	12864	16486	16553	16649
	12758	12808	12865	16487	16554	16650
	12764	12809	12866	16488	16555	16651
	12765	12810	12879	16493	16561	16659
	12774	12811	12888	16494	16562	16664
	12775	12812	12903	16495	16563	16665
	12780	12813	12904	16504	16564	16666
	12782	12814	12914	16505	16573	16667
	12783	12815	12915	16516	16574	16669
	12784	12816	12916	16517	16575	16670
	12785	12817	12917	16518	16580	
	12786	12826	12918	16519	16581	
	12794	12833	12919	16526	16590	
			12920			

VILSPA IMAGES FOR RELEASE TO SCIENTIFIC COMMUNITY

1982 November 1st (despatched 1982 April)

Camera 1 LWP	Camera 2 LWR		Camera 3 SWP	
1510	12925	13013	16675	16740
1511	12926	13014	16676	16741
1512	12927	13020	16677	16747
1513	12928	13025	16678	16749
1514	12943	13030	16683	16752
1523	12950	13036	16684	16753
1524	12951	13049	16686	16754
1525	12952	13063	16687	16760
1526	12963	13092	16694	16761
1527	12964	13100	16695	16782
1528	12965	13101	16696	16811
1529	12972	13102	16697	16816
1530	12973		16698	16824
1531	12981		16699	16829
1532	12990		16707	16835
1533	12998		16708	16842
	12999		16718	16846
	13006		16719	16854
	13007		16729	16855
	13012		16730	

VILSPA IMAGES FOR RELEASE TO SCIENTIFIC COMMUNITY

1982 December 1st (despatched 1982 May)

Camera 1 LWP	Camera 2 LWR		Camera 3 SWP		
1534	13113	13279	16863	16927	17036
1535	13123	13286	16864	16935	17037
1536	13124	13291	16865	16936	17038
1547	13134	13306	16866	16937	17039
1548	13135	13307	16867	16945	17040
1553	13147	13308	16868	16956	17053
1554	13148	13326	16869	16957	17067
	13159	13359	16970	16958	17068
	13171	13360	16871	16971	17069
	13184		16872	16972	17075
	13185		16879	16976	17076
	13186		16882	16987	
	13187		16886	16988	
	13213		16888	16989	
	13223		16890	16990	
	13234		16899	16999	
	13241		16909	17008	
	13249		16910	17009	
	13257		16911	17018	
	13258		16912	17019	
	13259		16913	17029	
	13260		16914	17030	
	13268		16915	17033	
	13269		16925	17034	
	13270		16926	17035	

VILSPA IMAGES FOR RELEASE TO SCIENTIFIC COMMUNITY

1983 January 1st (despatched 1982 June)

Camera 1 LWP	Camera 2 LWR		Camera 3 SWP	
1565	13370	13464	17085	17203
1566	13371	13465	17086	17211
1567	13379	13466	17087	17228
1568	13380	13470	17093	17238
1569	13390	13479	17094	17239
1570	13391	13480	17095	17249
1571	13392	13481	17096	17250
1572	13393	13482	17097	17257
1573	13400	13489	17104	17265
1574	13413	13497	17105	17266
1581	13414	13503	17127	17278
1582	13415	13504	17135	17284
1583	13424	13514	17136	17285
1584	13425	13515	17140	17286
	13432	13522	17141	17304
	13433	13523	17147	17313
	13447	13528	17168	
	13448	13533	17169	
	13449	13548	17170	
	13450	13549	17179	
	13461	13565	17180	
	13462	13569	17181	
	13463		17197	

INTERNATIONAL ULTRAVIOLET EXPLORER

ESA LOG OF IMAGES

01MAY82 - 30SEP82

SORTED BY STELLAR COORDINATES

PROGRAMME REFERENCE NUMBERS FOR THE PROGRAMME IDENTIFICATION IN THIS LISTING CAN BE FOUND IN I U E E S A NEWSLETTER NO. 13 (JUNE 1982), PAGE 43.

CLASSIFICATION OF OBJECTS USED IN THE JOINT ESA/SRC LOG OF IUE OBSERVATIONS
****

00 SUN
01 EARTH
02 MOON
03 PLANET
04 PLANETARY SATELLITE
05 MINOR PLANET
06 COMET
07 INTERPLANETARY MEDIUM
08
09

10 W C
11 W N
12 MAIN SEQUENCE O
13 SUPERGIANT O
14 OE
15 OF
16 SD O
17 WD O
18
19 UV-STRONG

20 B0-B2 V-IV
21 B3-B5 V-IV
22 B6-B9.5 V-IV
23 B0-B2 III-I
24 B3-B5 III-I
25 B6-B9.5 III-I
26 BE
27 BP
28 SDB
29 WDB

30 A0-A3 V-IV
31 A4-A9 V-IV
32 A0-A3 III-I
33 A4-A9 III-I
34 AE
35 AM
36 AP
37 WDA
38
39 COMPOSITE

40 F0-F2
41 F3-F9
42 FP
43 LATE TYPE DEGENERATE STARS.
44 G (TO 1FEB79); GIV-VI (FROM 1FEB79)
45 G I-II (FROM 1FEB79)
46 K (TO 1FEB79); K IV-VI (FROM 1FEB79)
47 K I-III (FROM 1FEB79)
48 M (TO 1FEB79); M DWARFS (FM 1FEB79)
49 M I-III (FROM 1FEB79)

50 R,N OR S TYPES
51 LONG PERIOD VARIABLE STARS
52 IRREGULAR VARIABLES
53 REGULAR VARIABLES
54 DWARF NOVAE
55 CLASSICAL NOVAE
56 SUPERNOVAE
57 SYMBIOTIC STARS
58 T TAURI
59 X-RAY

60 SHELL STAR
61 ETA CARINAE
62 PULSAR
63 NOVA-LIKE
64 STELLAR OBJECT NOT INCLUDED ABOVE
65
66
67
68
69

70 PLANETARY NEBULA + CENTRAL STAR
71 PLANETARY NEBULA - CENTRAL STAR
72 H II REGION
73 REFLECTION NEBULA
74 DARK CLOUD (ABSORTION SPECTRUM)
75 SUPERNOVA REMNANT
76 RING NEBULA (SHOCK IONISED)
77
78
79

80 SPIRAL GALAXY
81 ELLIPTICAL GALAXY
82 IRREGULAR GALAXY
83 GLOBULAR CLUSTER
84 SEYFERT GALAXY
85 QUASAR
86 RADIO GALAXY
87 BL LACERTAE OBJECT
88 EMISSION LINE GALAXY (NON-SEYFERT)
89

90 INTERGALACTIC MEDIUM
91
92
93
94
95
96
97
98 WAVELENGTH CALIBRATION (NASA LOG)
99 NULLS AND FLAT FIELDS (NASA LOG)

THE CLASSIFICATION IS SUPPLIED BY D STICKLAND FOR USE ONLY WITHIN THE PROJECT

EXPOSURE CLASSIFICATION CODES

****

SINCE 1 AUG 78 A TWO-DIGIT CODE HAS BEEN USED TO DESCRIBE EXPOSURE LEVELS. THIS CODE OCCUPIES THE FIRST TWO CHARACTER POSITIONS OF THE COMMENT FIELD.

DIGIT 1: EXPOSURE LEVEL OF CONTINUUM
DIGIT 2: EXPOSURE LEVEL OF EMISSION LINES

THE CLASSIFICATIONS BELOW APPLY TO BOTH:

0: NOT APPLICABLE
1: NO SPECTRUM VISIBLE
2: FAINT SPECTRUM; MAX DN < 20 ABOVE BACKGROUND
3: UNDEREXPOSED: MAX DN < 100 ABOVE BACKGROUND
4: WEAK: MAX DN BETWEEN 100 AND 150 ABOVE BACKGROUND
5: GOOD: NO SATURATION BUT MAX DN OVER 150 ABOVE BACKGROUND
6: A BIT STRONG: A FEW PIXELS SATURATED
7: SATURATED FOR LESS THAN HALF THE SPECTRUM
8: MOSTLY SATURATED BUT SOME PARTS USABLE
9: COMPLETELY SATURATED

ON 1 SEP 79 A FURTHER DIGIT WAS ADDED TO DESCRIBE THE LEVEL OF THE BACKGROUND. THE MEAN DN GIVEN BY A SUBSET HISTOGRAM OF WIDTH 2 PIXELS BETWEEN:

SWP 550,130 AND 685,310
AND LWR 160,195 AND 90,300

HAS BEEN CODED AS FOLLOWS: (LIMITS INCLUSIVE)

0 DN<20
1 21<DN<30
2 31<DN<40
3 41<DN<50
4 50<DN<60
5 60<DN70
6 71<DN<80
7 80<DN<90
8 91<DN<100
9 DN>101
X SATURATED

OBJECT	CL	MAG	RT ASCN HR MN SC	[illegible]	[illegible]	[illegible]	IMAGE	APERT OB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
IIIZ*2	84	15.0	00 07 57	+10 12	L	3	15957	L	0	14MAY82	02 37 28	120 00	EE217	231
HD 2151	44	2.8	00 23 09	-77 32	H	2	13730	L	0	20JUL82	23 02 18	007 00	EC004	602 MN=196
HD 2151	44	2.8	00 23 09	-77 32	H	2	13731	L	0	20JUL82	23 47 36	015 00	EC004	702 MN=272
HD 2151	44	2.8	00 23 09	-77 32	H	2	13732	L	0	21JUL82	00 27 33	015 00	EC004	702 MN=226
HD 2151	44	2.8	00 23 09	-77 32	H	2	13733	L	0	21JUL82	01 07 50	015 00	EC004	702 MN=299
HD 2151	44	2.8	00 23 09	-77 32	H	2	13734	L	0	21JUL82	01 51 29	015 00	EC004	702 MN=239
LB 1559	28	99.9	00 29 18	-47 41	L	2	14143	L	0	10SEP82	21 24 28	008 00	EA035	502 4-MIN-HTR
LB 1559	28	99.9	00 29 18	-47 41	L	3	17913	L	0	10SEP82	21 45 20	008 00	EA035	500
HD 3360	20	3.7	00 34 10	+53 37	L	3	17539	L	0	31JUL82	21 43 00	000 01	PHCAL	500 R=15, 1 ITER.
HD 3360	20	3.7	00 34 10	+53 37	L	3	17541	L	0	31JUL82	22 58 07	000 06	PHCAL	901 R=10, 4 ITER
HD 3360	20	3.7	00 34 10	+53 37	L	3	17544	L	0	01AUG82	00 41 00	000 08	PHCAL	901 R=10, 4 ITER
HD 3360	20	3.7	00 34 10	+53 37	L	3	17547	L	0	01AUG82	02 08 58	000 08	PHCAL	901 R=10, 4 ITER
HD 3360	20	3.7	00 34 10	+53 37	L	3	17735	L	0	21AUG82	23 54 16	000 08	PHCAL	900 TRAIL,R=10,ITER=4
HD 3360	20	03.7	00 34 10	+53 37	L	3	17993	L	0	17SEP82	22 12 41	000 08	PHCAL	901 TRAIL,I=4,R=10
ZETA CAS	20	3.6	00 34 10	+50 37	H	1	1571	L	0	11JUN82	02 08 27	000 21	PHCAL	501
ZETA CAS	20	3.6	00 34 10	+50 37	L	1	1572	L	0	11JUN82	02 42 21	000 01	PHCAL	501 1 ITER, R=20.83
ZETA CAS	20	3.6	00 34 10	+50 37	L	1	1573	L	0	11JUN82	03 17 43	000 01	PHCAL	501 1 ITER, R=20.83
HD 4247	40	05.2	00 42 16	-22 17	L	3	17039	L	0	25MAY82	06 51 16	002 00	EC052	500
AZZ 18	23	12.5	00 45 24	-73 23	L	2	14207	L	0	18SEP82	21 22 11	045 00	EI213	603 4-MIN-HTR
AZZ 18	23	12.5	00 45 24	-73 23	L	3	18014	L	0	18SEP82	20 40 13	035 00	EI213	300
AZZ 18	23	12.5	00 45 24	-73 23	L	3	18015	L	0	18SEP82	22 11 25	066 00	EI213	401
HD 5394	26	02.6	00 53 40	+60 27	H	3	16913	L	0	07MAY82	04 12 41	000 11	EA080	501
HD 5394	26	02.6	00 53 40	+60 27	H	3	17093	L	0	01JUN82	22 47 03	000 06	EA080	501
HD 5394	20	02.6	00 53 40	+60 27	H	3	17588	S	0	04AUG82	21 43 25	000 11	EA080	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	17859	L	0	06SEP82	18 11 48	000 08	EI273	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	17900	L	0	09SEP82	18 31 54	000 08	EI273	501
HD 5394	26	2.6	00 53 40	+60 27	H	3	17935	L	0	12SEP82	17 12 39	000 08	EA087	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	17967	L	0	15SEP82	18 26 43	000 08	EA087	501
HD 5394	20	2.9	00 53 40	+60 27	H	3	18011	L	0	18SEP82	17 23 01	000 08	EI273	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	18051	L	0	21SEP82	17 21 07	000 08	EI273	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	18097	L	0	24SEP82	18 56 45	000 08	EI273	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	18136	L	0	27SEP82	18 23 06	000 08	EI273	501
HD 5394	20	2.6	00 53 40	+60 27	H	3	18164	L	0	30SEP82	18 38 34	000 08	EI273	501
SK 80	13	12.4	00 57 54	-72 27	H	2	13621	L	0	07JUL82	00 01 39	222 00	EM242	306 4-MIN-HTR-W-UP
SB 410	28	12.5	00 58 56	-33 59	L	2	14194	L	0	16SEP82	19 40 38	012 00	EA035	502 4-MIN-HTR
SB 410	28	12.5	00 58 56	-33 59	L	3	17982	L	0	16SEP82	20 12 44	011 00	EA035	600
AZZ 258	12	13.7	00 59 06	-72 46	L	3	18079	L	0	23SEP82	17 02 56	065 00	EI273	501
AZZ 258	12	13.9	00 59 07	-72 46	L	2	14229	L	0	21SEP82	20 36 11	060 00	EI213	503 4-MIN-HTR, MN=679
AZZ 287	13	12.8	01 00 19	-72 29	L	2	14184	L	0	15SEP82	20 35 17	060 00	EI213	703 4-MIN-HTR, MN=[illegible]
AZZ 287	13	12.8	01 00 19	-72 29	L	2	14185	L	0	15SEP82	22 20 01	020 00	EI213	503 4-MIN-HTR
AZZ 287	13	12.8	01 00 19	-72 29	L	3	17970	L	0	15SEP82	21 40 35	075 00	EI213	601
AZZ 315	25	11.0	01 01 12	-72 25	L	2	14206	L	0	18SEP82	19 54 32	020 00	EI213	602 4-MIN-HTR
AZZ 315	20	11.0	01 01 12	-72 25	L	3	17971	L	0	15SEP82	22 52 41	014 00	EI213	301
AZZ 315	22	11.0	01 01 12	-72 26	L	3	18054	L	0	21SEP82	22 02 59	025 00	EI213	400
RX AND	54	11.3	01 01 46	+41 02	L	2	13931	L	0	13AUG82	01 14 15	010 00	EI215	502
RX AND	54	11.3	01 01 46	+41 02	L	2	13942	L	0	13AUG82	23 12 25	010 00	EI215	503 4-MIN-HTR-[illegible]
RX AND	54	11.0	01 01 46	+41 02	L	2	13950	L	0	14AUG82	18 52 26	012 00	EI215	602 4-MIN-HTR-[illegible]
RX AND	54	12.0	01 01 46	+41 02	L	2	13961	L	0	16AUG82	01 15 18	015 11	EI215	5024-MIN-HTR-[illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DG MN	DISP	CAM	IMAGE	APERT SB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
RX AND	54	11.0	01 01 46	+41 02	L	2	13969	L	0	16AUG82	20 19 12	015 00	EI215	503 4-MIN-HTR-WM-UP
RX AND	54	11.3	01 01 46	+41 02	L	3	17673	L	0	13AUG82	01 00 21	010 00	EI215	421
RX AND	54	11.3	01 01 46	+41 02	L	3	17678	L	0	13AUG82	22 59 19	010 00	EI215	421
RX AND	54	11.0	01 01 46	+41 02	L	3	17688	L	0	14AUG82	18 36 54	012 00	EI215	550
RX AND	54	12.0	01 01 46	+41 02	L	3	17702	L	0	16AUG82	00 56 28	015 00	EI215	500
RX AND	54	11.0	01 01 46	+41 02	L	3	17713	L	0	16AUG82	19 44 38	020 00	EI215	550
AZZ 393	20	11.5	01 04 22	-72 35	L	2	14230	L	0	21SEP82	22 50 06	016 00	EI213	703 4-MIN-HTR
AZZ 393	23	11.5	01 04 22	-72 36	L	2	14241	L	0	23SEP82	18 38 33	010 00	EI273	502 4-MIN-HTR
AZZ 393	23	11.5	01 04 22	-72 36	L	3	18060	L	0	23SEP82	18 59 09	015 00	EI273	401
SB 459	28	99.9	01 06 05	-32 59	L	2	14144	L	0	10SEP82	22 49 55	008 00	EA035	502 4-MIN-HTR, MN=607
SB 459	28	12.1	01 06 05	-32 59	L	3	17984	L	0	16SEP82	23 09 39	008 00	EA035	500
SB 460	28	12.6	01 06 13	-27 09	L	2	14195	L	0	16SEP82	21 11 30	025 00	EA035	502 4-MIN-HTR
SB 460	28	12.6	01 06 13	-27 09	L	3	17983	L	0	16SEP82	21 42 15	042 00	EA035	500
HD 6903	45	5.5	01 07 08	+19 23	H	1	1611	L	0	07JUL82	23 43 33	004 00	EC275	303
HD 6903	45	5.5	01 07 08	+19 23	L	3	17377	L	0	07JUL82	23 10 35	030 00	EC275	332
SB 485	28	13.2	01 09 45	-26 29	L	2	14179	L	0	14SEP82	22 47 05	015 00	EA011	403 4-MIN-HTR
SB 485	28	13.2	01 09 45	-26 29	L	3	17960	L	0	14SEP82	22 30 43	013 00	EA011	500
HD 7570	41	04.9	01 12 56	-45 18	L	3	17038	L	0	25MAY82	04 37 20	080 00	EC052	701
UV PSC	44	9.2	01 14 18	+06 33	L	2	13608	L	0	05JUL82	02 01 19	025 00	EC206	502
0116-289	64	99.9	01 16 26	-28 51	L	3	17679	L	0	14AUG82	00 19 12	086 00	EI215	111
0119-013	85	15.2	01 19 27	-01 13	L	3	17219	L	0	15JUN82	00 24 11	387 00	EE234	346 READ AT GSFC
0122-591	84	13.5	01 21 51	-59 04	L	2	13123	L	0	01MAY82	05 10 42	050 00	EE278	453 4-MIN-HTR-WM-UP
ES0113	84	13.0	01 21 51	-59 04	L	2	13514	L	0	17JUN82	23 23 13	060 00	EE278	343 4-MIN-HTR-WM-UP
E113IG45	84	13.5	01 21 51	-59 04	L	2	13801	L	0	30JUL82	01 09 49	090 00	EE278	553
0122-591	84	13.5	01 21 51	-59 04	L	3	16890	L	0	05MAY82	05 35 30	090 00	EE278	571
ES0113	84	13.0	01 21 51	-59 04	L	3	17249	L	0	18JUN82	00 27 30	070 00	EE278	360
E113IG45	84	13.5	01 21 51	-59 04	L	3	17521	L	0	30JUL82	02 43 25	060 00	EE278	631
HD 8799	41	04.8	01 24 39	+15 09	H	2	13425	L	0	06JUN82	05 12 53	025 00	EC081	633
HD 9250	45	07.2	01 29 18	+63 20	L	2	13836	L	0	01AUG82	22 29 35	015 00	EC201	301 MN=505
HD 9250	45	07.2	01 29 18	+63 20	L	3	17557	L	0	01AUG82	23 12 26	060 00	EC201	101
NGC 598	80	13.0	01 31 02	+30 24	L	1	1584	L	0	20JUN82	23 32 46	369 00	SO611	403
KT PER	54	11.0	01 34 02	+50 42	L	2	13968	L	0	16AUG82	18 57 35	020 00	EI215	4034-MIN-HTR-WM-UP, MN703
KT PER	54	11.0	01 34 02	+50 42	L	3	17712	L	0	16AUG82	18 30 15	015 00	EI215	400
HO139-68	59	16.1	01 39 37	-68 09	L	2	13504	L	0	17JUN82	03 10 52	090 00	EE218	233 4-MIN-HTR-WM-UP
HO139-68	59	16.1	01 39 37	-68 09	L	3	17239	L	0	17JUN82	04 45 37	060 00	EE218	231
HD 11544	45	06.8	01 51 35	+56 20	L	2	13835	L	0	01AUG82	21 19 30	005 00	EC201	301 MN=545
HD 11544	45	06.8	01 51 35	+56 20	L	3	17556	L	0	01AUG82	21 47 19	025 00	EC201	100
+37 442	16	10.0	01 55 28	+38 17	H	2	14193	L	0	16SEP82	16 47 57	060 00	EA011	504 4-MIN-HTR
WX HYI	54	13.0	02 08 29	-63 33	L	2	13952	L	0	14AUG82	23 06 28	060 00	EI215	453 4-MIN-HTR-WM-UP
WX HYI	54	13.0	02 08 29	-63 33	L	3	17690	L	0	14AUG82	22 00 08	060 00	EI215	340
TZ PER	54	13.0	02 10 19	+58 09	L	2	13907	L	0	09AUG82	18 32 44	060 00	EI094	413 4-MIN-HTR-WM-UP
TZ PER	54	13.0	02 10 19	+58 09	L	3	17643	L	0	09AUG82	19 37 54	043 00	EI094	311
TZ PER	54	13.5	02 10 19	+58 09	L	3	17654	L	0	11AUG82	01 18 53	028 00	EI094	310
TZ PER	54	13.5	02 10 19	+58 09	L	3	17663	L	0	11AUG82	23 45 45	050 00	EI215	311
+56 501	12	9.4	02 14 58	+56 55	L	2	13808	L	0	30JUL82	21 48 32	014 00	EM064	702 MN=341
+56 501	12	9.4	02 14 58	+56 55	L	2	13810	L	0	31JUL82	01 14 42	007 00	EM064	601 4-MIN-HTR-WM-UP
+56 501	12	9.4	02 14 58	+56 55	L	3	17528	L	0	30JUL82	23 21 25	026 00	EM064	800
+56 501	12	9.4	02 14 58	+56 55	L	3	17530	L	0	31JUL82	01 40 23	012 00	EM064	500

OBJECT	CL	MAG	RT ASCN HR MN SC	[illegible]	[illegible]	[illegible]	IMAGE	APERT OB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
00 843	20	9.3	02 15 16	+56 54	L	2	13807	L	0	30JUL82	20 47 25	008 00	EM064	702 4-MIN-HTR--M-UP
00 843	20	9.3	02 15 16	+56 54	L	2	13812	L	0	31JUL82	03 32 44	004 00	EM064	502 4-MIN-HTR--M-UP
00 843	20	9.3	02 15 16	+56 54	L	3	17527	L	0	30JUL82	21 00 00	020 00	EM064	700
00 929	20	10.3	02 15 22	+56 56	L	2	13809	L	0	31JUL82	00 09 44	012 00	EM064	502 4-MIN-HTR--M-UP
00 929	20	10.3	02 15 22	+56 56	L	3	17529	L	0	31JUL82	00 36 43	030 00	EM064	500
00 936	12	10.3	02 15 24	+56 55	L	2	13811	L	0	31JUL82	02 17 35	014 00	EM064	502 4-MIN-HTR--M-UP
00 936	12	10.3	02 15 24	+56 55	L	3	17531	L	0	31JUL82	02 43 18	030 00	EM064	500
NGC 936	80	10.3	02 25 04	-01 23	L	2	13569	L	0	29JUN82	04 04 38	099 00	EE160	203 4-MIN-HTR--M-UP
+61 303	59	10.8	02 36 41	+61 01	L	2	13752	L	0	22JUL82	21 10 26	045 00	EI121	503
+61 303	59	10.8	02 36 41	+61 01	L	3	17464	L	0	22JUL82	22 00 56	120 00	EI121	441
A0234-52	84	15.0	02 36 41	-52 24	L	1	1582	L	0	18JUN82	23 29 44	200 00	EE225	562
NGC 1068	84	11.0	02 40 07	-00 13	L	3	17623	L	0	07AUG82	23 16 35	150 00	EE257	201 OFFSET 12ARCSEC
HD 16901	45	05.4	02 40 49	+44 05	L	2	13834	L	0	01AUG82	20 29 24	004 00	EC201	601 MN=217
HD 16901	45	05.4	02 40 49	+44 05	L	3	17555	L	0	01AUG82	20 37 55	016 00	EC201	201
NGC 1097	80	11.0	02 44 06	-30 28	L	2	13497	L	0	14JUN82	03 39 33	120 00	EE216	304
NGC 1097	80	11.0	02 44 06	-30 28	L	3	17203	L	0	13JUN82	02 50 20	177 00	EE211	301
HD19994	41	5.1	03 10 13	-01 23	H	2	13753	L	0	23JUL82	00 33 52	050 00	EM162	500
NGC 1313	80	99.9	03 17 39	-66 41	L	2	13644	L	0	09JUL82	20 45 46	417 00	EE208	309
NGC 1313	80	99.9	03 17 39	-66 41	L	3	17392	L	0	09JUL82	21 02 39	387 00	EE208	203 SERENDIPITY
HD 22001	41	04.7	03 28 30	-63 07	L	3	17034	L	0	25MAY82	01 33 08	002 20	EC052	500
NGC 1360	70	11.0	03 31 07	-26 02	L	3	18044	L	0	20SEP82	21 52 47	000 45	EA254	501
NGC 1514	70	9.4	04 06 08	+30 39	L	2	14219	L	0	20SEP82	16 00 36	015 00	EA254	503 4-MIN-HTR, MN=871
NGC 1514	70	9.4	04 06 08	+30 39	L	3	18042	L	0	20SEP82	17 47 32	040 00	EA254	501
VW HYI	54	09.6	04 09 22	-71 25	L	2	13953	L	0	15AUG82	01 11 16	004 00	EI215	502 4-MIN-HTR--M-UP
VW HYI	54	09.6	04 09 22	-71 25	L	3	17691	L	0	15AUG82	00 35 32	004 00	EI215	500
NGC 1672	88	12.5	04 44 55	-59 20	L	2	13523	L	0	19JUN82	04 54 10	049 00	EE225	303 4-MIN-HTR--M-UP
NGC 1672	88	12.5	04 44 55	-59 20	L	3	17257	L	0	19JUN82	03 34 31	075 00	EE225	301
HD 31295	36	4.7	04 52 08	+10 04	L	2	14124	L	0	08SEP82	16 55 17	000 10	EA115	702 4-MIN-HTR, MN=761
HD 31295	36	4.7	04 52 09	+10 04	L	2	14124	S	0	08SEP82	16 52 25	000 10	EA115	502 4-MIN-HTR, MN=761
HD 31295	36	4.7	04 52 08	+10 04	H	2	14125	L	0	08SEP82	18 21 40	007 00	EA115	502 4-MIN-HTR
HD 31295	36	4.7	04 52 08	+10 04	L	2	17884	L	0	08SEP82	17 23 43	000 12	EA115	500
HD 31295	36	4.7	04 52 08	+10 04	L	2	17884	S	0	08SEP82	17 20 30	000 40	EA115	500
HD 31295	36	4.7	04 52 08	+10 04	L	3	17883	L	0	08SEP82	16 44 28	000 30	EA115	700
HD 31295	36	4.7	04 52 08	+10 04	L	3	17883	S	0	08SEP82	16 46 33	000 24	EA115	300
HD 31295	36	4.7	04 52 08	+10 04	H	3	17885	L	0	08SEP82	17 49 19	012 00	EA115	500
HD 31295	36	4.7	04 52 08	+10 04	H	3	17886	L	0	08SEP82	18 49 49	025 00	EA115	700
HD 31398	47	02.9	04 53 44	+33 05	L	3	17719	L	0	18AUG82	17 11 44	465 00	EC232	572 STARTED AT GSFC
SK-67 18	13	12.0	04 55 18	-67 13	H	2	13616	L	0	05JUL82	23 44 45	238 00	EM242	306
HD 31964	33	3.5	04 56 23	+43 45	H	2	14247	L	0	24SEP82	17 12 29	060 00	EI273	701 4-MIN-HTR
HD 31964	33	3.5	04 58 22	+40 45	H	2	14277	L	0	27SEP82	19 28 17	010 00	EI273	402 MN=543
HD 31964	33	3.5	04 58 22	+40 45	L	3	18137	L	0	27SEP82	18 57 05	025 00	EI273	720
HD 31964	33	3.5	04 58 23	+43 45	H	3	18166	L	0	30SEP82	19 58 33	060 00	EI273	401
ABELL 7	70	15.2	05 00 52	-15 41	L	2	14212	L	0	19SEP82	16 48 00	065 00	EA254	403 4-MIN-HTR
HD 33262	41	04.7	05 04 39	-57 32	L	3	17040	L	0	25MAY82	07 43 29	009 00	EC052	500
C AUSTIN	06	7.0	05 06 00	-29 25	L	3	17453	L	0	20JUL82	21 16 01	058 30	EST00	121 NUCLEUS IN LAP
C AUSTIN	06	7.0	05 07 27	-29 15	L	2	13735	L	0	21JUL82	03 11 07	030 00	EST00	273 NUCLEUS INLAP
NGC 1846	83	11.3	05 07 36	-67 32	L	2	13213	L	0	10MAY82	01 40 28	363 00	EE104	307
0521-364	87	15.5	05 21 13	-36 30	L	2	13148	L	0	03MAY82	00 51 41	240 00	EE168	309 HI-DISP [illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DEG MN	DISP CAM	IMAGE	APERT OB LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
0521-364	87	15.5	05 21 13	-36 30	L 2	13171	L 0	05MAY82	00 39 25	260 00	EE168	307
0521-364	87	15.5	05 21 13	-36 26	L 3	16879	L 0	01MAY82	00 44 21	226 00	EE168	232
NGC 1987	83	12.1	05 27 54	-70 47	L 2	14011	L 0	25AUG82	18 38 43	425 00	GLOBC	309 4-MIN-HTR-WM-UP
NGC 2004	83	9.9	05 30 44	-67 19	L 2	13390	L 0	02JUN82	22 33 15	043 00	EE176	501
NGC 2004	83	09.8	05 30 45	-67 19	H 1	1548	L 0	11MAY82	00 54 52	393 00	EE174	305
NGC 2004	83	9.9	05 30 45	-67 19	H 3	17147	L 0	07JUN82	22 36 39	430 00	EE176	304
IU ORI	58	09.2	05 32 08	-05 44	L 2	14060	L 0	30AUG82	18 43 04	030 00	EC271	3034-MIN-HTR-WM-UP,MN805
IU ORI	58	09.2	05 32 08	-05 44	L 3	17813	L 0	30AUG82	19 16 27	150 00	EC271	302
HD269696	16	11.2	05 32 08	-69 55	H 1	1660	L 0	31AUG82	18 30 58	085 00	EI239	403
HD269696	16	11.2	05 32 08	-69 55	L 1	1661	L 0	31AUG82	22 32 52	002 00	EI239	502
HD269696	16	11.2	05 32 08	-69 55	L 3	17820	L 0	31AUG82	20 10 21	001 30	EI239	501 REF PT -34,-204
HD269696	16	11.2	05 32 08	-69 55	L 3	17820	L 0	31AUG82	20 03 11	001 15	EI239	401 REF PT 2,-212
HD269696	16	11.2	05 32 08	-69 55	H 3	17821	L 0	31AUG82	20 49 07	100 00	EI239	501
HD269696	16	11.2	05 32 08	-69 55	H 3	17822	L 0	31AUG82	22 59 44	100 00	EI239	502
-5 1305	30	08.0	05 32 20	-05 36	H 2	14015	L 0	26AUG82	20 09 32	150 00	EA069	5044-MIN-HTR-WM-UP,MN720
HD 36861	12	3.8	05 32 23	+09 54	H 3	17860	L 0	06SEP82	18 45 32	000 30	EI273	701
HD 36861	12	3.8	05 32 23	+09 54	H 3	17934	L 0	12SEP82	16 32 26	000 20	EA087	501
HD 36861	13	3.3	05 32 23	+09 54	H 3	17968	L 0	15SEP82	19 02 45	000 20	EA087	501
HD 36861	12	3.8	05 32 23	+09 54	H 3	18010	L 0	18SEP82	16 50 23	000 20	EI273	601
HD 36861	12	3.8	05 32 23	+09 54	H 3	18050	L 0	21SEP82	16 40 55	000 20	EI273	501
HD 36861	12	3.8	05 32 23	+09 54	H 3	18165	L 0	30SEP82	19 15 50	000 20	EI273	501
HD 36861	12	3.8	05 32 23	+09 54	H 3	17901	L 0	09SEP82	19 07 06	000 25	EI273	701
HD 36861	12	3.8	05 32 23	+09 54	H 3	18096	L 0	24SEP82	16 47 17	000 20	EI273	501
PI 2441	58	10.8	05 34 23	-[illegible] 27	L 2	14061	L 0	30AUG82	22 27 59	030 00	EC271	352 4-MIN-HTR-WM-UP
PI 2441	58	10.8	05 34 23	-34 27	L 3	17814	L 0	30AUG82	23 03 20	165 00	EC271	222
HD 37202	26	2.8	05 34 39	+21 07	H 2	14078	S C	02SEP82	23 15 55	000 50	EA166	712
HD 37202	26	2.8	05 34 39	+21 07	H 3	17842	S C	02SEP82	23 12 17	000 40	EA166	611
A0538-66	59	13.2	05 35 42	-66 54	L 2	13615	L 0	05JUL82	20 57 57	030 00	EM242	402
A0538-66	59	13.2	05 35 42	-66 54	L 3	17365	L 0	05JUL82	21 32 57	060 00	EM242	441
0538-66A	13	13.5	05 35 43	-66 54	L 3	17371	L 0	06JUL82	22 50 52	040 00	EM242	501STAR A IN A0538 FIELD
0538-669	59	13.5	05 35 43	-66 54	L 3	18167	L 0	30SEP82	22 04 23	062 00	EI273	301 TWO STARS IN APERTUR
NGC 2100	83	09.6	05 42 23	-69 15	H 3	17575	L 0	03AUG82	18 51 09	359 00	VILSP	304
C AUSTIN	06	7.0	05 43 28	-21 04	L 2	13791	L 0	28JUL82	21 29 00	025 00	ESTOO	372 4-MIN-HTR-WM-UP
C AUSTIN	06	7.0	05 43 28	-21 04	L 2	13792	L 0	28JUL82	22 45 36	030 00	ESTOO	051 4-MIN-HTR-WM-UP
C AUSTIN	06	7.0	05 43 28	-21 04	L 3	17512	L 0	28JUL82	21 57 43	002 00	ESTOO	131
HD 39801	49	00.8	05 52 28	+07 24	H 3	17725	L 0	20AUG82	18 53 38	370 00	EC232	132
IC 2149	70	11.0	05 52 41	+46 06	L 2	14220	L 0	20SEP82	18 52 16	006 00	EA254	502 4-MIN-HTR, MN=823
HD 45166	10	10.0	06 23 36	+08 00	L 2	14102	L 0	06SEP82	20 00 23	001 50	EI273	502 4-MIN-HTR, MN=704
HD 45166	10	10.0	06 23 36	+08 00	L 3	17861	L 0	06SEP82	19 41 40	002 00	EI273	551
HD 45166	10	10.0	06 23 36	+08 00	L 3	17969	L 0	15SEP82	19 42 30	002 00	EI273	501
HD 45166	11	9.9	06 23 36	+08 00	L 3	18009	L 0	18SEP82	16 13 09	002 00	EI273	550
A 15	70	15.7	06 24 59	-25 21	L 3	16925	L 0	08MAY82	00 57 48	080 00	EA137	501
+34 1543	16	9.4	07 06 58	+34 30	H 3	17959	L 0	14SEP82	18 21 57	160 00	EA011	502
-44 3318	40	10.0	07 17 56	-44 30	L 2	14023	L 0	27AUG82	18 22 20	090 00	EA069	7044-MIN-HTR-[illegible]
-44 3318	40	10.0	07 17 56	-44 30	L 2	14025	L 0	27AUG82	21 49 11	015 00	EA069	342 4-MIN-HTR-[illegible]
-44 3318	40	10.0	07 17 56	-44 30	L 3	17779	L 0	26AUG82	18 36 31	060 00	EA069	341
-44 3318	40	10.0	07 17 56	-44 31	L 3	17788	L 0	27AUG82	19 55 31	110 00	EA069	551
A 20	70	16.6	07 20 22	+01 [illegible]	L 3	16927	L 0	08MAY82	05 02 37	143 00	EA137	501

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DG MN	DISP	CAM	IMAGE	APERT OB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
NGC 2392	71	10.4	07 26 13	+21 01	L	2	14221	L	0	20SEP82	20 03 49	060 00	EA254	5334-MIN-HTR,11ASEC WEST
NGC 2392	71	10.4	07 26 13	+21 01	L	3	18043	L	0	20SEP82	19 33 08	015 00	EA254	301 11ARCSEC WEST-STAR
0729+103	59	14.5	07 29 44	+10 03	L	2	14094	L	0	05SEP82	17 54 33	025 00	EI060	302 4-MIN-HTR
0729+103	59	14.5	07 29 44	+10 03	L	3	17953	L	0	05SEP82	17 00 02	050 00	EI060	301
HD 60753	21	06.7	07 32 08	-50 25	L	1	1629	L	0	04AUG82	01 28 36	000 06	PHCAL	501
-31 4800	16	10.5	07 34 35	-32 06	H	2	13594	L	0	02JUL82	22 55 05	080 00	EA008	404
+75 325	16	9.5	08 04 43	+75 07	L	1	1676	S	0	22SEP82	19 30 41	000 40	PHCAL	503
+75 325	16	9.5	08 04 43	+75 07	L	1	1675	L	0	22SEP82	19 34 56	000 20	PHCAL	403
+75 325	16	9.5	08 04 43	+75 07	L	1	1677	L	0	22SEP82	20 08 25	001 20	PHCAL	503 TRAIL,I=3,R=0.60
+75 325	16	09.5	08 04 43	+75 07	H	2	13186	L	0	07MAY82	05 08 02	036 00	PHCAL	501 4-MIN-HTR-WM-UP
+75 325	16	09.5	08 04 43	+75 07	L	2	13187	L	0	07MAY82	07 12 43	001 20	PHCAL	501 TRAIL,R=0.25,1ITER
+75 325	16	9.5	08 04 43	+75 07	L	2	13466	S	0	10JUN82	05 44 16	001 12	PHCAL	402
+75 325	16	9.5	08 04 43	+75 07	L	2	13466	L	0	10JUN82	05 39 53	000 24	PHCAL	502
+75 325	16	9.5	08 04 43	+75 07	L	2	14233	S	0	22SEP82	16 54 17	000 48	PHCAL	502 MN=194
+75 325	16	9.5	08 04 43	+75 07	L	2	14233	L	0	22SEP82	16 50 15	000 24	PHCAL	502 MN=194
+75 325	16	9.5	08 04 43	+75 07	L	2	14234	L	0	22SEP82	17 30 39	001 14	PHCAL	402 MN=307,TR,I=3,R=0.81
+75 325	16	09.5	08 04 43	+75 07	L	3	16914	L	0	07MAY82	06 39 20	000 43	PHCAL	501 TRAIL,R=43.4,1ITER
+75 325	16	09.5	08 04 43	+75 07	L	3	16915	L	0	07MAY82	07 46 09	001 07	PHCAL	501 TRAIL,R=0.30,1ITER
+75 325	16	9.5	08 04 43	+75 07	L	3	18065	S	0	22SEP82	18 52 14	000 28	PHCAL	501
+75 325	16	9.5	08 04 43	+75 07	L	3	18065	L	0	22SEP82	18 48 08	000 14	PHCAL	501
+75 325	16	9.5	08 04 43	+75 07	L	3	18066	L	0	22SEP82	19 18 35	000 43	PHCAL	401 TRAIL,I=3,R=1.38
L532-81	37	12.0	08 39 34	-32 47	L	2	13549	L	0	23JUN82	02 22 04	045 00	EA144	602 MN=528
L532-81	37	12.0	08 39 34	-32 47	L	3	17236	L	0	23JUN82	00 37 01	090 00	EA144	501
A 31	70	15.5	08 51 36	+09 06	L	3	16926	L	0	08MAY82	03 22 54	040 00	EA137	101 WRONG STAR
IC 2448	70	12.5	09 06 33	-69 44	H	2	13759	L	0	24JUL82	00 10 29	195 00	EA165	345
IC 2448	70	12.5	09 06 33	-69 44	H	3	17473	L	0	23JUL82	21 06 15	180 00	EA165	372
IC 2448	70	12.5	09 06 33	-69 44	L	3	17474	L	0	24JUL82	03 29 28	010 00	EA165	451
+81 266	16	11.9	09 13 43	+81 56	H	3	17344	L	0	03JUL82	01 17 41	150 00	EA008	401
KS 292	16	11.3	09 18 20	-45 19	L	2	14141	L	0	10SEP82	16 47 09	002 00	EA035	502 4-MIN-HTR
KS 292	16	11.3	09 18 20	-45 19	L	3	17910	L	0	10SEP82	16 41 40	001 30	EA035	600
KS 292	16	11.3	09 18 20	-45 19	H	3	17911	L	0	10SEP82	17 15 49	125 00	EA035	502
NGC 2903	80	10.0	09 29 20	+21 43	L	2	13279	L	0	20MAY82	04 13 35	210 00	EM264	306 4-MIN-HTR-WM-UP
NGC 2903	80	10.0	09 29 20	+21 43	L	3	16999	L	0	20MAY82	01 06 31	180 00	EM264	302
NGC 2903	80	12.0	09 29 20	+21 43	L	3	17085	L	0	01JUN82	00 45 58	195 00	EE207	312
HD 82901	51	7.0	09 30 59	-62 34	H	1	1609	L	0	07JUL82	20 35 08	017 00	EC275	032
HD 82901	51	09.0	09 30 59	-62 34	H	2	14103	L	0	06SEP82	20 55 32	060 00	EI273	132 4-MIN-HTR, MN=065
HD 82901	51	8.0	09 30 59	-62 34	L	2	14161	L	0	12SEP82	23 15 26	003 00	EI220	132 MN=371
NGC 2997	80	12.0	09 43 27	-30 58	L	2	13489	L	0	12JUN82	22 51 03	180 00	EE211	306 4-MIN-HTR-WM-UP
NGC 2997	80	12.0	09 43 27	-30 58	L	3	17211	L	0	13JUN82	22 42 55	210 00	EE216	301
SA027400	00	09.4	09 48 31	+55 54	L	1	1566	L	0	04JUN82	05 50 13	001 30	EE521	401
0957+561	85	17.5	09 57 57	+56 08	L	1	1565	L	0	03JUN82	23 37 15	323 00	EE521	233
+18 2307	46	9.7	09 58 56	+17 39	L	2	13479	L	0	11JUN82	22 55 11	025 00	EC048	233
+18 2307	46	9.7	09 58 56	+17 39	L	2	13480	L	0	12JUN82	02 29 11	025 00	EC048	233
+18 2307	46	9.7	09 58 56	+17 39	L	2	13481	L	0	12JUN82	03 42 33	040 00	EC048	343
+18 2307	46	9.7	09 58 56	+17 39	L	2	13482	L	0	12JUN82	05 00 16	040 00	EC048	333
+18 2307	46	9.7	09 58 56	+17 39	L	3	17197	L	0	11JUN82	23 24 30	251 00	EC048	122 SEE VILSPA LOG
HD 88366	51	7.0	10 04 45	-61 18	H	1	1610	L	0	07JUL82	21 35 40	060 00	EC275	032
HD 88366	51	8.0	10 07 46	-61 18	H	2	14135	L	0	09SEP82	19 44 34	100 00	EI273	104 4-MIN-HTR

OBJECT	CL	MAG	RT ASCN HR MN SC	[illegible]	[illegible]		IMAGE	APERT OB	LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD 88366	51	8.0	10 07 46	-61 18	L	2	14160	L	0	12SEP82	21 52 05	030 00	EI220	132 4-MIN-HTR
NGC 3195	70	12.5	10 10 06	-80 37	L	2	13754	L	0	23JUL82	03 11 00	033 00	EA165	202
NGC 3195	70	12.5	10 10 06	-80 37	L	3	17465	L	0	23JUL82	02 34 40	030 00	EA165	221
1011-282	85	15.8	10 11 12	-28 17	L	3	17313	L	0	28JUN82	22 58 39	240 00	EE160	232
HD 89841	53	8.5	10 18 48	-55 04	L	3	17505	L	0	28JUL82	01 42 49	125 00	EM122	301
HD 90177	26	08.4	10 21 07	-59 22	L	2	13847	L	0	03AUG82	00 33 45	015 00	EA173	701 4-MIN-HTR-WM-UP
HD 90177	26	08.4	10 21 07	-59 22	L	2	13848	L	0	03AUG82	01 27 35	007 00	EA173	502 4-MIN-HTR-WM-UP
HD 90177	26	08.4	10 21 07	-59 22	L	3	17567	L	0	02AUG82	23 25 27	027 00	EA173	301
HD 90177	26	08.4	10 21 07	-59 22	L	3	17568	L	0	03AUG82	00 51 50	031 00	EA173	301
HD 90772	40	04.7	10 25 32	-57 23	L	2	13833	S	0	01AUG82	18 50 43	001 00	EC201	502 MN=457
HD 90772	40	04.7	10 25 32	-57 23	L	2	13833	L	0	01AUG82	18 39 12	003 12	EC201	702 TRAIL,R=.104,MN=457
HD 90772	40	04.7	10 25 32	-57 23	L	3	17554	S	0	01AUG82	19 25 27	005 00	EC201	300
HD 90772	40	04.7	10 25 32	-57 23	L	3	17554	L	0	01AUG82	19 10 58	005 00	EC201	500
F 34	16	11.2	10 36 41	+43 22	H	3	17349	L	0	03JUL82	20 59 30	120 00	EA008	501
TR16/112	12	9.3	10 43 20	-59 28	L	2	13565	L	0	27JUN82	22 54 37	003 00	EM282	502 4-MIN-HTR-WM-UP
TR16/112	12	9.3	10 43 20	-59 28	H	3	17304	L	0	27JUN82	23 21 53	386 00	EM282	603MOD REF POS -27,-205
HD 93632	13	8.3	10 45 16	-59 50	H	2	14296	L	0	29SEP82	22 29 42	065 00	EM221	403 4-MIN-HTR
NGC 3516	84	13.0	11 03 23	+72 50	L	2	13135	L	0	02MAY82	05 46 11	114 00	EE278	454
NGC 3516	84	13.5	11 03 23	+72 50	L	2	13157	L	0	04MAY82	05 44 29	120 00	EE278	554
NGC 3516	84	13.0	11 03 23	+72 50	L	3	16882	L	0	02MAY82	01 20 10	250 00	EE278	452
NGC 3516	84	13.5	11 03 23	+72 50	L	3	16888	L	0	04MAY82	01 20 50	260 00	EE278	452
E438-609	80	14.5	11 08 22	-29 14	L	2	13576	L	0	30JUN82	02 20 43	203 00	EE160	305 4-MIN-HTR-WM-UP
E438-609	80	14.5	11 08 22	-29 14	L	3	17321	L	0	29JUN82	23 12 55	180 00	EE160	302
HD 99967	47	06.5	11 27 42	+46 55	L	2	13414	S	0	05JUN82	04 42 59	005 00	EC081	302
HD 99967	47	06.6	11 27 42	+46 56	L	2	13414	L	0	05JUN82	04 27 44	012 00	EC081	402
NGC 3918	70	10.8	11 47 50	-56 54	L	2	14213	L	0	19SEP82	19 08 53	055 00	EA254	673 4-MIN-HTR
NGC 3918	70	10.8	11 47 50	-56 54	H	2	14214	L	0	19SEP82	21 04 04	050 00	EA254	76 CAM NOT PREPARED
NGC 3918	70	10.9	11 47 50	-56 54	H	2	14215	L	0	19SEP82	22 44 07	036 00	EA254	153 MN=175
NGC 3918	70	10.8	11 47 50	-56 54	H	2	14222	L	0	20SEP82	22 52 54	025 00	EA254	232 MN=534
NGC 3918	70	10.8	11 47 50	-56 54	L	3	18028	L	0	19SEP82	18 59 53	003 00	EA254	512
NGC 3918	70	10.8	11 47 50	-56 54	L	3	18029	L	0	19SEP82	20 09 30	050 00	EA254	591
NGC 3918	70	10.8	11 47 50	-56 54	H	3	18030	L	0	19SEP82	22 00 30	015 00	EA254	050
MKN 198	84	15.0	12 06 43	+47 20	L	2	13234	L	0	13MAY82	00 34 11	429 00	EE258	229
HD106111	53	6.0	12 10 04	-69 52	H	3	17496	L	0	26JUL82	20 35 20	390 00	EC124	763
HD106111	53	6.0	12 10 04	-69 52	H	3	17503	L	0	27JUL82	20 55 46	150 00	EM122	552
HD108283	41	04.9	12 23 54	+27 33	H	2	13415	L	0	05JUN82	05 38 54	005 00	EC081	302 MN=322
NGC 4449	80	99.9	12 25 48	+44 24	L	2	13653	L	0	10JUL82	20 53 06	200 00	EE208	306
NGC 4449	80	99.9	12 25 48	+44 24	L	3	17399	L	0	10JUL82	21 12 16	160 00	EE208	302 SERENDIPITY
NGC 4449	80	99.9	12 25 48	+44 24	L	3	17400	L	0	11JUL82	00 18 18	209 00	EE208	302
HD109399	23	07.6	12 32 12	-72 26	H	3	16988	L	0	19MAY82	02 01 24	035 00	EM264	501
HD110258	53	8.5	12 38 33	-59 31	L	3	17504	L	0	28JUL82	00 08 19	050 00	EM122	101
-53 5293	52	9.4	12 40 26	-54 15	L	2	13260	L	0	18MAY82	06 49 10	050 00	EC228	403
HD111226	22	06.4	12 45 14	-24 35	H	3	16987	L	0	19MAY82	00 37 56	025 00	EM264	501
NGC 4696	81	13.0	12 46 03	-41 02	L	3	17601	L	0	05AUG82	19 55 09	180 00	EE097	112
NGC 4696	81	13.0	12 46 03	-41 02	L	3	17602	L	0	05AUG82	23 25 53	142 00	EE097	112 OFFSET 4ARCSEC [illegible]
HD111456	41	05.9	12 46 29	+60 36	H	2	13424	L	0	06JUN82	01 31 16	050 00	EC081	634
HD111456	41	05.9	12 46 29	+60 36	L	3	17136	L	0	06JUN82	02 24 49	125 00	EC081	731
HD111558	25	07.3	12 47 59	-57 22	H	2	13268	L	0	19MAY82	02 51 52	020 00	EM264	402 [illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECLN DEG MN	DISP	CAM	IMAGE	APERT OB	LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD111558	25	07.3	12 47 59	-09 22	H	3	16989	L	0	19MAY82	03 26 45	060 00	EM264	401
HD113001	16	9.6	12 58 05	+36 02	H	3	17343	L	0	02JUL82	20 50 21	060 00	EA008	500
SATURN	03	1.0	13 01 13	-03 51	L	3	17418	L	0	13JUL82	23 23 31	035 00	ES009	830
1302-102	85	14.9	13 02 56	-10 17	L	3	17228	L	0	15JUN82	22 09 14	250 00	EE234	342
1302-102	85	14.9	13 02 56	-10 17	L	3	17229	L	0	16JUN82	02 56 05	250 00	EE234	342 READ AT GSFC
HD113996	47	4.7	13 04 47	+27 54	H	2	13742	L	0	22JUL82	02 09 18	040 00	EM162	232 4-MIN-HTR-WM-UP
HD114710	44	4.3	13 09 32	+28 03	H	2	13743	L	0	22JUL82	03 29 07	018 00	EM162	562 MN=312
MARS	03	0.6	13 15 07	-08 28	H	2	13701	S	C	17JUL82	21 11 01	020 00	ES009	602 4-MIN-HTR-WM-UP
MARS	03	0.6	13 15 07	-08 28	H	2	13702	S	C	17JUL82	22 18 34	060 00	ES009	703 4-MIN-HTR-WM-UP
MARS	03	0.6	13 15 07	-08 28	H	2	13703	S	C	17JUL82	23 55 29	180 00	ES009	806 4-MIN-HTR-WM-UP
MARS	03	0.6	13 15 07	-08 28	L	3	17441	L	0	18JUL82	03 21 47	020 00	ES009	321
MARS	03	0.6	13 15 07	-08 28	L	3	17441	S	C	17JUL82	21 38 05	055 00	ES009	221 SEE LOG BOOK
HZ 44	16	11.7	13 21 19	+36 24	H	3	17350	L	0	03JUL82	23 40 44	247 00	EA008	502
HD116538	20	07.9	13 22 08	-51 35	H	2	13269	L	0	19MAY82	04 48 22	028 00	EM264	502 4-MIN-HTR-WM-UP
HD116538	20	07.9	13 22 08	-51 35	H	3	16990	L	0	19MAY82	05 24 16	060 00	EM264	601
1331+170	85	16.0	13 31 10	+17 04	L	1	1630	L	0	06AUG82	18 30 28	430 00	EE257	302
NGC 5236	80	8.6	13 34 17	-29 37	L	2	13380	L	0	02JUN82	02 36 20	015 00	EE037	301
NGC 5236	80	8.6	13 34 17	-29 37	L	3	17097	L	0	02JUN82	02 55 23	172 00	EE037	701
ETA UMA	21	2.8	13 45 34	+49 34	H	1	1570	L	0	11JUN82	01 13 08	000 06	PHCAL	501
JUPITER	03	-1.7	13 55 00	-10 32	L	3	17417	L	0	13JUL82	22 03 08	009 00	ES009	840
TOL 89	88	15.0	13 58 25	-32 50	L	1	1554	L	0	15MAY82	00 51 04	409 00	EE148	303
TOL 89	88	15.0	13 58 25	-32 50	L	3	16971	L	0	16MAY82	00 57 01	120 00	EE148	301
TOL 89	88	15.0	13 58 25	-32 50	L	3	16972	L	0	16MAY82	03 19 18	267 00	EE148	303
M101 NUC	80	10.0	14 01 26	+54 35	L	3	17481	L	0	24JUL82	20 58 43	120 00	EE010	301
NGC 5461	72	12.0	14 01 56	+54 33	L	2	13768	L	0	24JUL82	23 26 03	180 00	EE010	305 MN=742
NGC 5461	72	12.0	14 01 56	+54 33	L	3	17482	L	0	25JUL82	02 31 15	180 00	EE010	302 READ AT GSFC
HD125111	40	06.4	14 14 22	+39 59	L	3	17135	L	0	05JUN82	23 20 15	110 00	EC081	721
HD125162	36	4.3	14 14 29	+46 19	L	2	14114	L	0	07SEP82	20 05 08	000 09	EA115	702 4-MIN-HTR
HD125162	36	4.3	14 14 29	+46 19	L	2	14114	S	0	07SEP82	20 02 06	000 06	EA115	402 4-MIN-HTR
HD125162	36	4.3	14 14 29	+46 19	L	2	14115	S	0	07SEP82	21 42 36	000 14	EA115	702 4-MIN-HTR
HD125162	36	4.3	14 14 29	+46 19	L	2	14115	L	0	07SEP82	21 39 33	000 05	EA115	602 4-MIN-HTR
HD125162	36	4.3	14 14 29	+46 19	H	2	14116	L	0	07SEP82	22 12 28	006 00	EA115	702 4-MIN-HTR
HD125162	36	4.3	14 14 29	+46 19	H	2	14117	L	0	07SEP82	23 21 18	004 00	EA115	502 4-MIN-HTR, MN=875
HD125162	36	4.3	14 14 29	+46 19	L	3	17871	L	0	07SEP82	19 59 06	000 25	EA115	700
HD125162	36	4.3	14 14 29	+46 19	L	3	17871	S	0	07SEP82	19 56 05	000 15	EA115	300
HD125162	36	4.3	14 14 29	+46 19	L	3	17872	L	0	07SEP82	20 37 18	000 10	EA115	500
HD125162	36	4.3	14 14 29	+46 19	L	3	17872	S	0	07SEP82	20 34 13	000 30	EA115	700
HD125162	36	4.3	14 14 29	+46 19	H	3	17873	L	0	07SEP82	21 04 52	010 00	EA115	501
HD125162	36	4.3	14 14 29	+46 19	H	3	17874	L	0	07SEP82	22 48 00	025 00	EA115	701
HE2-108	70	13.0	14 14 48	-51 57	L	3	17067	L	0	30MAY82	00 41 50	045 00	EA254	431
HD124979	12	07.7	14 14 51	-51 16	H	2	13270	L	0	19MAY82	06 41 04	060 00	EM264	403 4-MIN-HTR-WM-UP
A1422+48	84	15.3	14 19 39	+48 01	L	1	1583	L	0	20JUN82	01 14 11	160 00	EE225	331
A1422+48	84	15.3	14 19 37	+48 01	L	3	17265	L	0	19JUN82	22 45 32	140 00	EE225	331
HD127821	41	06.1	14 29 35	+63 25	H	2	13413	L	0	04JUN82	22 44 59	100 00	EC081	735 MN=749
HD127821	41	06.1	14 29 35	+63 25	L	3	17127	L	0	05JUN82	00 28 51	215 00	EC081	742
MKN 478	84	14.6	14 40 05	+35 39	L	2	13447	L	0	08JUN82	23 19 15	055 00	EE231	001 SERENDIPITY
MKN 478	84	14.6	14 40 05	+35 39	L	2	13448	L	0	09JUN82	00 58 12	080 00	EE231	341
MKN 478	84	14.6	14 40 05	+35 [illegible]	L	2	13449	L	0	09JUN82	03 01 08	090 00	EE231	341

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DG MN	DISP BEAM	IMAGE	APERT OB	LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
MKN 478	84	14.6	14 40 05	+35 39	L	2	13450	L	0	09JUN82	05 06 50	040 00	EE231	231
MKN 478	84	14.6	14 40 05	+35 39	L	3	17168	L	0	08JUN82	23 15 09	095 00	EE231	351
MKN 478	84	14.6	14 40 05	+35 39	L	3	17169	L	0	09JUN82	01 38 15	015 00	EE231	001 SERENDIPITY
MKN 478	84	14.6	14 40 05	+35 39	L	3	17170	L	0	09JUN82	02 25 55	057 00	EE231	241
NGC 5824	83	10.3	15 00 54	-32 53	H	1	1587	L	0	25JUN82	19 54 35	000 00	EM181	309 READ AT GSFC EXP1010
NGC 5824	83	10.3	15 00 54	-32 53	H	1	1589	L	0	26JUN82	23 18 40	725 00	EM181	309 READ AT GSFC
NGC 5824	83	10.3	15 00 54	-32 53	H	3	17295	L	0	25JUN82	20 21 51	935 00	EM181	009SERENDIPITY,READ GSFC
NGC 5824	83	10.3	15 00 54	-32 53	H	3	17298	L	0	26JUN82	23 22 33	710 00	EM181	117 READ AT GSFC
HD138749	21	04.8	15 30 55	+31 32	H	3	16910	3	0	07MAY82	01 36 55	003 10	EA080	501
HD138789	26	04.2	15 30 55	+31 32	H	3	17096	L	0	02JUN82	01 08 32	002 00	EA080	501
HD138749	21	4.2	15 30 55	+31 32	H	3	17334	L	0	01JUL82	21 11 20	001 45	EA080	501
HD138749	21	04.2	15 30 55	+31 32	H	3	17585	L	0	04AUG82	19 32 42	001 45	EA080	501
ANON GAL	80	14.2	15 35 21	+54 43	L	2	13432	L	0	06JUN82	22 55 27	050 00	EE231	301 GALAXY NEAR MKN486
ANON GAL	80	14.2	15 35 21	+54 43	L	2	13433	L	0	07JUN82	01 00 34	180 00	EE231	402 GALAXY NEAR MKN 486
ANON GAL	80	14.2	15 35 21	+54 43	L	3	17140	L	0	06JUN82	23 56 07	060 00	EE231	201 GALAXY NEAR MKN486
ANON GAL	80	14.2	15 35 21	+54 43	L	3	17141	L	0	07JUN82	04 05 50	100 00	EE231	201 GALAXY NEAR MKN486
HD141527	52	5.8	15 46 31	+28 19	L	2	13257	L	0	18MAY82	00 29 50	002 00	EC228	552 4-MIN-HTR-AM-UP
+33 2642	20	10.8	15 50 01	+33 05	L	2	13370	S	0	01JUN82	05 00 37	009 30	PHCAL	503
+33 2642	20	10.8	15 50 01	+33 05	L	2	13370	L	0	01JUN82	04 53 33	003 10	PHCAL	503
+33 2642	20	10.8	15 50 01	+33 05	L	2	13463	S	0	09JUN82	23 24 57	009 30	PHCAL	402
+33 2642	20	10.8	15 50 01	+33 05	L	2	13463	L	0	09JUN82	23 17 24	003 10	PHCAL	502
+33 2642	20	10.8	15 50 01	+33 05	L	3	17086	L	0	01JUN82	05 31 13	004 00	PHCAL	400
+33 2642	20	10.8	15 50 01	+33 05	L	3	17086	S	0	01JUN82	05 15 12	012 00	PHCAL	500
+33 2642	20	10.8	15 50 01	+33 05	L	3	17179	S	0	09JUN82	23 58 48	012 00	PHCAL	500
+33 2642	20	10.8	15 50 01	+33 05	L	3	17179	L	0	09JUN82	23 51 03	004 00	PHCAL	500
1550+191	63	15.4	15 50 33	+19 05	L	2	13503	L	0	16JUN82	22 26 05	120 00	EE218	343 4-MIN-HTR-AM-UP
1550+191	63	15.4	15 50 33	+19 05	L	3	17238	L	0	17JUN82	00 32 39	090 00	EE218	331
1550+191	63	15.2	15 50 33	+19 05	L	3	17677	L	0	13AUG82	20 11 18	120 00	EI215	331
1550+191	63	15.2	15 50 33	+19 05	L	3	17714	L	0	16AUG82	21 31 34	256 00	EI215	342
URANUS	03	5.8	15 53 00	-20 05	L	3	17425	S	C	14JUL82	21 01 40	396 00	ES009	542
URANUS	03	5.8	15 53 06	-20 05	L	3	17419	S	C	14JUL82	01 11 54	145 00	ES009	330
HD142983	24	4.8	15 55 23	-14 08	H	2	14075	S	C	02SEP82	16 04 32	006 30	EA166	513 4-MIN-HTR
HD142983	24	4.8	15 55 23	-14 08	H	3	17839	S	C	02SEP82	17 12 06	004 30	EA166	410
RY LUP	58	11.5	15 56 05	-40 14	L	3	16899	L	0	06MAY82	01 04 02	403 00	EM147	233
T CR B	57	10.0	15 57 24	+26 04	L	2	13392	L	0	03JUN82	04 04 34	040 00	EC175	561
T CR B	57	10.0	15 57 24	+26 04	L	3	17104	L	0	03JUN82	03 05 16	055 00	EC175	451
HD143414	11	10.2	15 59 23	-62 33	H	3	16976	L	0	17MAY82	01 03 10	400 00	EM264	463
EX LUP	58	13.5	15 59 42	-40 10	L	2	14049	L	0	29AUG82	22 16 00	030 00	EC271	232 4-MIN-HTR-AM-UP
EX LUP	58	13.5	15 59 42	-40 10	L	3	17805	L	0	29AUG82	22 51 56	175 00	EC271	231
AG DRA	57	9.9	16 01 24	+66 57	L	2	13393	L	0	03JUN82	05 39 27	005 00	EC175	501 MN=289
AG DRA	57	99.9	16 01 24	+66 57	L	2	13860	L	0	04AUG82	22 32 51	006 00	EI145	571 MN=221
AG DRA	57	9.9	16 01 24	+66 57	L	3	17105	L	0	03JUN82	05 10 40	010 00	EC175	461
AG DRA	57	99.9	16 01 24	+66 57	L	3	17589	S	0	04AUG82	22 57 40	003 00	EI145	251
AG DRA	57	99.9	16 01 24	+66 57	L	3	17589	L	0	04AUG82	22 41 30	013 00	EI145	571
HD144668	33	07.6	16 05 13	-38 58	H	2	14016	L	0	27AUG82	00 01 49	100 00	EA069	454 4-MIN-HTR-AM-UP
HD144668	33	07.6	16 05 13	-38 58	L	3	17780	L	0	26AUG82	23 28 37	030 00	EA069	731
HD144812	26	08.5	16 06 19	-48 27	L	2	13845	L	0	02AUG82	18 42 58	015 00	EA173	401 MN=312
HD144812	26	08.5	16 06 19	-48 27	L	2	13846	L	0	02AUG82	22 09 25	040 00	EA173	552 [illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DEG MN	DISP	CAM	IMAGE	APERT OB	LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD144312	26	08.5	16 06 19	-49 27	L	3	17566	L	0	02AUG82	19 06 08	180 00	EA173	402
IC 4593	10	11.2	16 09 23	+12 12	H	3	17948	L	0	13SEP82	19 03 35	253 00	EA008	503
HD146361	41	5.7	16 12 48	+33 59	H	2	13607	L	0	05JUL82	00 36 07	040 00	EC206	552
HD144668	33	07.6	16 15 13	-38 58	H	2	14026	L	0	27AUG82	23 12 31	100 00	EA069	454 4-MIN-HTR-WM-UP
HD144668	33	07.6	16 15 13	-38 58	L	2	14027	L	0	28AUG82	01 31 49	008 00	EA069	7724-MIN-HTR-WM-UP;MN667
HD144668	33	07.6	16 15 13	-38 58	L	3	17789	L	0	27AUG82	22 37 48	030 00	EA069	731
HD144668	33	07.6	16 15 13	-38 58	L	3	17790	L	0	28AUG82	00 55 53	012 00	EA069	510
A 39	70	15.6	16 25 33	+28 01	L	3	16937	L	0	09MAY82	06 35 09	078+00	EA137	500
HD148478	72	99.9	16 26 19	-26 19	H	2	14271	S	0	26SEP82	20 42 11	020 00	EC116	111 4-MIN-HTR
HD148478	72	99.9	16 26 19	-26 19	H	3	18121	S	0	26SEP82	21 11 10	060 00	EC116	120
HD148478	72	99.9	16 26 19	-26 19	H	3	18122	S	0	26SEP82	22 41 17	008 30	EC116	210
HD148478	49	1.0	16 26 20	-26 19	H	2	14263	L	0	25SEP82	22 41 29	003 30	EC116	501 4-MIN-HTR
HD148478	49	1.0	16 26 20	-26 19	H	3	18110	L	0	25SEP82	22 12 14	004 00	EC116	501
HD148478	49	1.0	16 26 20	-26 19	H	3	18111	L	0	25SEP82	22 56 19	020 00	EC116	501 OFFSET 5.5 ARCSEC
HD148743	31	6.9	16 27 48	-07 24	L	2	13660	L	0	12JUL82	01 56 02	008 20	STAND	402 TRAIL,2ITER,R=0.08
HD148743	31	6.9	16 27 48	-07 24	L	3	17409	L	0	12JUL82	00 36 18	006 00	STAND	301
HD148743	31	6.9	16 27 48	-07 24	L	3	17410	L	0	12JUL82	01 19 34	015 00	STAND	401
HD149161	47	4.8	16 30 15	+11 35	L	2	14272	L	0	26SEP82	23 13 35	005 00	EC116	332 MN=471
HD149757	12	2.6	16 34 24	-10 28	H	3	17335	L	0	01JUL82	21 58 14	000 23	EA080	501
HD149757	12	02.6	16 34 24	-10 28	H	3	17584	L	0	04AUG82	16 53 05	000 23	EA080	501
HD149757	12	2.6	16 34 24	-10 28	H	3	17858	L	0	06SEP82	17 32 35	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	17899	L	0	09SEP82	17 47 53	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	17936	L	0	12SEP82	17 56 58	000 25	EA087	501
HD149757	12	2.6	16 34 24	-10 28	H	3	17966	L	0	15SEP82	17 24 08	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	18012	L	0	18SEP82	18 00 56	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	18052	L	0	21SEP82	18 00 33	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	18081	L	0	23SEP82	20 11 06	000 25	EA080	501
HD149757	12	2.6	16 34 24	-10 28	H	3	18135	L	0	27SEP82	17 42 25	000 25	EI273	501
HD149757	12	2.6	16 34 24	-10 28	H	3	18163	L	0	30SEP82	17 52 54	000 25	EI273	501
AH HER	54	12.8	16 42 06	+25 21	L	2	13908	L	0	09AUG82	22 15 37	040 00	EI094	513 4-MIN-HTR-WM-UP
AH HER	54	12.4	16 42 06	+25 21	L	2	13918	L	0	10AUG82	23 05 48	025 00	EI094	412 4-MIN-HTR-WM-UP
AH HER	54	12.2	16 42 06	+25 21	L	2	13923	L	0	11AUG82	22 38 08	020 00	EI215	502 4-MIN-HTR-WM-UP
AH HER	54	12.3	16 42 06	+25 21	L	2	13929	L	0	12AUG82	19 09 27	020 00	EI215	502 4-MIN-HTR-WM-UP
AH HER	54	12.4	16 42 06	+25 21	L	2	13941	L	0	13AUG82	18 35 41	020 00	EI215	503 4-MIN-HTR-WM-UP
AH HER	54	11.0	16 42 06	+25 21	L	2	13951	L	0	14AUG82	20 28 54	035 00	EI215	603 4-MIN-HTR-WM-UP
AH HER	54	12.8	16 42 06	+25 21	L	3	17644	L	0	09AUG82	21 31 42	040 00	EI094	511 --
AH HER	54	12.4	16 42 06	+25 21	L	3	17653	L	0	10AUG82	22 36 38	025 00	EI094	410
AH HER	54	12.2	16 42 06	+25 21	L	3	17662	L	0	11AUG82	22 12 34	020 00	EI215	421
AH HER	54	12.3	16 42 06	+25 21	L	3	17671	L	0	12AUG82	18 44 11	020 00	EI215	521
AH HER	54	12.4	16 42 06	+25 21	L	3	17676	L	0	13AUG82	18 59 54	022 00	EI215	520
AH HER	54	11.0	16 42 06	+25 21	L	3	17689	L	0	14AUG82	19 50 23	035 00	EI215	500
AH HER	54	12.0	16 42 06	+25 21	L	3	17701	L	0	15AUG82	23 33 12	040 00	EI215	500 MICROPHONICS
NGC 6210	70	9.7	16 42 24	+23 53	H	2	14149	L	0	11SEP82	17 09 33	364 00	EA008	569 4-MIN-HTR, MN=757
NGC 6210	70	9.7	16 42 24	+23 53	L	3	17925	L	0	11SEP82	17 00 16	006 00	EA008	450
AK SCO	58	09.0	16 51 23	-36 48	L	2	14049	S	0	29AUG82	18 44 19	012 00	EC271	332 4-MIN-HTR-WM-UP
AK SCO	58	09.0	16 51 23	-36 48	L	2	14049	L	0	29AUG82	18 29 04	012 00	EC271	452
AK SCO	58	09.0	16 51 23	-36 48	L	3	17804	L	0	29AUG82	19 02 22	170 00	EC271	341
HD 55763	25	3.5	17 08 33	+5? 47	[illegible]	1	1374	L	0	11JUN82	04 21 45	000 01	PHCAL	501 [illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DE[illegible]	[illegible]	[illegible]	IMAGE	APERT OB	LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD157999	47	4.8	17 24 02	+04 11	L	3	13120	L	0	26SEP82	16 39 46	210 00	EC116	141
HD159561	31	2.2	17 32 37	+12 36	L	2	13661	S	0	12JUL82	03 41 04	000 04	STAND	702
HD159561	33	2.1	17 32 37	+12 36	L	2	14250	L	0	24SEP82	23 16 09	000 01	VILSP	501
HD159561	31	2.2	17 32 37	+12 36	L	3	17411	S	0	12JUL82	03 11 24	000 30	STAND	700
HD159561	31	2.2	17 32 37	+12 36	L	3	17411	L	0	12JUL82	03 07 00	000 08	STAND	500 TRAIL,1ITER,R=2.50
NEPTUNE	03	7.7	17 36 06	-22 01	L	3	17438	S	C	16JUL82	20 13 36	840 00	ES009	239 READ AT GSFC
NEPTUNE	03	7.7	17 36 11	-22 01	L	3	17434	S	C	15JUL82	21 09 41	740 00	ES009	347 READ AT GSFC
NGC 6445	70	13.0	17 46 17	-19 59	L	2	133[illegible]8	L	0	24MAY82	05 15 51	120 00	EA027	113 SERENDIPITY
NGC 6445	70	13.0	17 46 17	-19 59	L	3	17030	L	0	24MAY82	04 46 28	180 00	EA027	121
HD162732	22	06.4	17 48 45	+16 20	H	3	18085	L	0	23SEP82	22 47 01	025 00	EA080	601
HD164284	20	4.8	17 57 47	+04 22	H	3	16909	S	0	07MAY82	00 42 33	004 30	EA080	602
HD164284	20	4.8	17 57 47	+04 22	H	3	17336	L	0	01JUL82	22 46 45	001 20	EA080	501
HD164284	20	04.8	17 57 47	+04 22	H	3	17586	L	0	04AUG82	20 17 22	001 20	EA080	501
HD164284	20	4.8	17 57 47	+04 22	H	3	18082	L	0	23SEP82	20 59 09	001 20	EA080	401
HD164402	23	5.6	17 58 52	-22 47	H	2	14287	L	0	28SEP82	21 56 13	004 30	EM221	502 4-MIN-HTR
HD164402	23	5.8	17 58 52	-22 47	H	3	18147	L	0	30SEP82	22 22 18	007 30	EM221	701
HD164492	13	7.3	17 59 21	-20 02	H	2	14286	L	0	28SEP82	21 00 31	013 30	EM221	403
HD164492	13	7.3	17 59 21	-20 02	H	3	18146	L	0	28SEP82	21 18 53	017 00	EM221	501
HD164704	24	7.7	18 00 17	-22 50	H	2	14288	L	0	28SEP82	23 00 56	040 00	EM221	504 4-MIN-HTR
HD164704	21	7.7	18 00 17	-22 53	H	3	18156	L	0	29SEP82	20 54 52	050 00	EM221	501
C BOWELL	12	06.0	18 04 47	-23 06	L	2	14039	L	0	29AUG82	00 53 36	050 00	ES284	1134-MIN-HTR-WM-UP,MN781
C BOWELL	12	06.0	18 04 47	-23 08	L	3	17795	L	0	28AUG82	19 12 21	010 00	ES284	121
C BOWELL	12	06.0	18 04 47	-23 08	L	3	17796	L	0	29AUG82	00 36 47	010 00	ES284	121
UZ SER	54	12.8	18 08 33	-14 56	L	2	13901	L	0	08AUG82	19 45 56	060 00	EI094	4134-MIN-HTR-WM-UP,MN761
UZ SER	54	13.1	18 08 33	-14 56	L	2	13909	L	0	10AUG82	00 47 38	055 00	EI094	4134-MIN-HTR-WM-UP,MN793
UZ SER	54	13.1	18 08 33	-14 56	L	2	13917	L	0	10AUG82	19 13 49	070 00	EI094	4134-MIN-HTR-WM-UP,MN815
UZ SER	54	13.5	18 08 33	-14 56	L	2	13922	L	0	11AUG82	18 52 20	060 00	EI215	403 4-MIN-HTR-WM-UP
UZ SER	54	14.5	18 08 33	-14 56	L	2	13930	L	0	12AUG82	22 36 43	080 00	EI215	303 4-MIN-HTR-WM-UP
UZ SER	54	16.0	18 08 33	-14 56	L	2	13960	L	0	15AUG82	21 25 20	090 00	EI215	2034-MIN-HTR-WM-UP,MN765
UZ SER	54	12.8	18 08 33	-14 56	L	3	17633	L	0	08AUG82	19 02 28	040 00	EI094	411
UZ SER	54	13.1	18 08 33	-14 56	L	3	17645	L	0	09AUG82	23 43 46	060 00	EI094	411
UZ SER	54	13.1	18 08 33	-14 56	L	3	17652	L	0	10AUG82	20 28 38	070 00	EI094	411
UZ SER	54	13.5	18 08 33	-14 56	L	3	17661	L	0	11AUG82	19 59 36	080 00	EI215	321
UZ SER	54	14.5	18 08 33	-14 56	L	3	17672	L	0	12AUG82	20 22 17	130 00	EI215	331
UZ SER	54	16.0	18 08 33	-14 56	L	3	17700	L	0	15AUG82	18 20 10	180 00	EI215	301
NGC 6563	70	13.1	18 08 45	-33 53	L	2	13306	L	0	24MAY82	01 07 20	060 00	EA027	114 SERENDIPITY
NGC 6563	70	13.1	18 08 45	-33 53	L	3	17029	L	0	24MAY82	00 43 48	120 00	EA027	341
NGC 6567	70	11.5	18 10 48	-19 05	L	2	13307	L	0	24MAY82	03 18 06	060 00	EA027	344
NGC 6567	70	11.5	18 10 48	-19 05	L	3	17019	L	0	23MAY82	04 40 53	186 00	EA027	681
SWST 1	70	11.0	18 12 58	-30 53	H	3	17068	L	0	30MAY82	02 39 49	130 00	EA254	361
HD168183	23	8.3	18 16 08	-14 41	H	2	14295	L	0	29SEP82	19 05 09	085 00	EM221	503 4-MIN-HTR
HD168183	23	8.3	18 16 08	-14 41	H	3	18155	L	0	29SEP82	16 32 06	150 00	EM221	501
HD168206	10	9.4	18 16 20	-11 37	L	2	14101	L	0	06SEP82	16 37 56	008 00	EI273	502 4-MIN-HTR, [illegible]
HD168206	10	9.4	18 16 20	-11 39	L	2	14134	L	0	09SEP82	17 03 32	008 00	EI273	602 4-MIN-HTR, MN=271
HD168206	10	9.4	18 16 20	-11 39	L	2	14158	L	0	12SEP82	19 02 59	008 00	EI273	502 4-MIN-HTR
HD168206	10	9.4	18 16 20	-11 39	L	2	14183	L	0	15SEP82	16 39 41	008 00	EI273	502 MN=275
HD168206	10	9.4	18 16 20	-11 39	L	2	14205	L	0	18SEP82	18 22 26	008 00	EI273	501 4-MIN-[illegible]
HD168206	16	9.4	18 16 20	-11 39	L	2	14227	L	0	21SEP82	18 24 58	008 00	EI273	502 MN=[illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DEG MN	DISP CAM	IMAGE	APERT OB LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD168206	16	9.4	18 16 20	-11 39	L 2	14228	L 0	21SEP82	19 14 03	008 00	EI273	502 4-MIN-HTR, MN=877
HD168206	10	9.4	18 16 20	-11 39	L 2	14248	L 0	24SEP82	20 18 49	008 00	EI273	501 MN=735
HD168206	10	9.4	18 16 20	-11 39	L 2	14276	L 0	27SEP82	16 51 09	008 00	EI273	503 4-MIN-HTR, MN=652
HD168206	10	9.4	18 16 20	-11 39	L 2	14302	L 0	30SEP82	17 11 06	008 00	EI273	502 4-MIN-HTR
HD168206	10	9.4	18 16 20	-11 39	L 3	17857	L 0	06SEP82	16 14 56	020 00	EI273	451
HD168206	10	9.4	18 16 20	-11 39	L 3	17898	L 0	09SEP82	16 36 19	020 00	EI273	550
HD168206	10	9.4	18 16 20	-11 39	L 3	17937	L 0	12SEP82	18 39 00	020 00	EI273	550
HD168206	10	9.4	18 16 20	-11 39	L 3	17965	L 0	15SEP82	16 16 34	020 00	EI273	551
HD168206	10	9.4	18 16 20	-11 29	L 3	18013	L 0	18SEP82	18 43 29	020 00	EI273	560
HD168206	16	9.4	18 16 20	-11 39	L 3	18053	L 0	21SEP82	18 46 25	020 00	EI273	450
HD168206	10	9.4	18 16 20	-11 39	L 3	18098	L 0	24SEP82	19 55 25	020 00	EI273	501
HD168206	10	9.4	18 16 20	-11 39	L 3	18134	L 0	27SEP82	16 27 52	020 00	EI273	450
HD168206	10	9.4	18 16 20	-11 39	L 3	18162	L 0	30SEP82	16 47 56	020 00	EI273	451
COMET	06	13.1	18 18 33	-22 19	L 2	13326	L 0	28MAY82	01 46 43	326 00	ES058	218 COMET BOWELL
COMET	06	12.5	18 19 34	-22 17	L 2	13291	L 0	22MAY82	01 49 28	346 00	ES058	228 COMET BOWELL
HD169515	23	9.0	18 22 43	-12 43	L 2	13636	L 0	08JUL82	22 07 42	020 00	EI151	603
HD169515	23	9.3	18 22 43	-12 43	L 2	13658	L 0	11JUL82	21 14 37	030 00	EI151	602
HD169515	23	9.3	18 22 43	-12 43	L 2	13659	L 0	11JUL82	23 36 29	030 00	EI151	602
HD169515	27	99.9	18 22 43	-12 43	L 2	14249	L 0	24SEP82	22 05 40	020 00	EI273	601
HD169515	23	9.0	18 22 43	-12 43	L 3	17386	L 0	08JUL82	23 32 00	060 00	EI151	402
HD169515	23	9.3	18 22 43	-12 43	L 3	17408	L 0	11JUL82	21 48 02	105 00	EI151	481
HD169515	27	99.9	18 22 43	-12 43	L 3	18099	L 0	24SEP82	21 02 37	060 00	EI273	501
NGC 6681	83	6.2	18 40 00	-32 21	L 2	13972	L 0	17AUG82	18 45 11	090 00	EA068	304 4-MIN-HTR-WM-UP
NGC 6681	83	6.2	18 40 00	-32 21	L 2	13973	L 0	17AUG82	20 50 31	280 00	EA068	207 SERENDIPITY,4-M-HTR
NGC 6681	83	6.2	18 40 00	-32 21	L 3	17717	L 0	17AUG82	20 20 13	327 00	EA068	302
MV SGR	52	13.0	18 41 33	-21 00	L 2	13258	L 0	18MAY82	01 40 56	060 00	EC228	433 4-MIN-HTR-WM-UP
U1849-31	59	13.2	18 51 49	-31 14	L 2	14095	L 0	05SEP82	20 04 09	050 00	EI060	453 4-MIN-HTR
U1849-31	59	13.2	18 51 49	-31 14	L 2	14096	L 0	05SEP82	21 51 13	055 00	EI060	553 4-MIN-HTR
U1849-31	59	13.2	18 51 49	-31 14	L 3	17854	L 0	05SEP82	19 20 01	040 00	EI060	341
U1849-31	59	13.2	18 51 49	-31 14	L 3	17855	L 0	05SEP82	20 57 34	050 00	EI060	351
U1849-31	59	13.2	18 51 49	-31 14	L 3	17856	L 0	05SEP82	22 49 54	057 00	EI060	351
A 51	70	15.4	18 58 06	-18 17	L 3	16935	L 0	09MAY82	00 51 39	120 00	EA137	401
NGC 6752	80	15.8	19 05 42	-60 02	L 3	17053	L 0	27MAY82	00 55 00	413 00	EA068	303
RC 3781	83	17.0	19 07 05	-60 08	L 3	17444	L 0	18JUL82	20 49 23	418 00	EE102	402
HD180093	52	11.4	19 13 17	-33 37	L 2	13259	L 0	18MAY82	03 49 53	120 00	EC228	344 4-MIN-HTR-WM-UP
E141-G55	84	13.9	19 16 57	-58 46	L 1	1631	L 0	07AUG82	19 14 48	050 00	EE257	453
E141-G55	84	13.9	19 16 57	-58 46	L 1	1632	L 0	07AUG82	21 12 03	050 00	EE257	451
E141-G55	84	13.9	19 16 57	-58 46	L 3	17622	L 0	07AUG82	20 08 21	060 00	EE257	231
NOVA AQL	55	12.8	19 20 50	+02 24	L 2	13286	L 0	21MAY82	05 21 16	142 00	VILSP	504
NOVA AQU	55	12.8	19 20 50	+02 24	L 2	13579	L 0	01JUL82	03 18 04	105 00	ET000	433
NOVA AQL	55	12.8	19 20 50	+02 24	L 3	17008	L 0	21MAY82	01 16 55	240 00	VILSP	352
NOVA AQU	55	12.8	19 20 50	+02 24	L 3	17330	L 0	30JUN82	23 13 57	240 00	ET000	452
HD184279	26	6.9	19 31 07	+03 39	H 2	14076	L 0	02SEP82	17 51 35	020 00	EA166	612 4-MIN-HTR
HD184279	26	6.9	19 31 07	+03 39	H 3	17840	L 0	02SEP82	18 22 45	026 00	EA166	511
EM CYG	54	15.0	19 36 42	+30 24	L 3	17634	L 0	08AUG82	23 33 20	124 00	EI094	791
HD186791	47	2.6	19 43 53	+10 29	L 3	18109	L 0	25SEP82	18 35 53	180 00	EC116	372
OO AQL	44	9.3	19 45 48	+09 11	L 2	13609	L 0	05JUL82	03 07 16	036 00	EC206	502
HD188728	36	5.2	19 53 52	+1[illegible]	L 2	14128	L 0	08SEP82	22 59 14	000 16	EA115	700 4-MIN-[illegible]

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DEG MN	DISP +CAM	IMAGE	APERT OB LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD188728	36	5.2	19 53 52	+11 17	L 2	14128	S 0	08SEP82	22 56 31	000 16	EA115	502 4-MIN-HTR, MN=891
HD188728	36	5.2	19 53 52	+11 17	L 3	17889	L 0	08SEP82	22 04 50	000 16	EA115	500
HD188728	36	5.2	19 53 52	+11 17	L 3	17889	S 0	08SEP82	22 01 08	001 10	EA115	700
HD188728	36	5.2	19 53 52	+11 17	H 3	17890	L 0	08SEP82	22 29 51	000 18	EA115	501
NGC 6853	71	13.0	19 57 24	+22 35	L 2	13741	L 0	21JUL82	21 02 16	035 00	EA165	113 4-MIN-HTR-WM-UP
NGC 6853	71	13.0	19 57 24	+22 35	L 3	17460	L 0	21JUL82	20 55 29	020 00	EA165	23
NGC 6853	71	13.0	19 57 24	+22 35	L 3	17461	L 0	21JUL82	23 19 28	020 00	EA165	231
NGC 6853	71	13.0	19 57 24	+22 35	L 3	17462	L 0	22JUL82	00 39 28	020 00	EA165	121
RR TEL	57	10.1	20 00 20	-55 52	H 1	1664	L 0	17SEP82	18 27 11	040 00	PHCAL	273
RR TEL	57	10.1	20 00 20	-55 52	L 1	1665	S 0	17SEP82	19 46 46	003 30	PHCAL	363
RR TEL	57	10.1	20 00 20	-55 52	L 1	1665	L 0	17SEP82	19 38 38	005 00	PHCAL	473
RR TEL	57	10.1	20 00 20	-55 52	L 1	1666	C 0	17SEP82	20 19 52	005 14	PHCAL	273 TRAIL,I=3,R=0.191
RR TEL	57	10.1	20 00 20	-55 52	L 2	14202	S 0	17SEP82	16 43 21	006 00	PHCAL	372 MN=586
RR TEL	57	10.1	20 00 20	-55 52	L 2	14202	L 0	17SEP82	16 34 47	006 00	PHCAL	472 MN=586
RR TEL	57	10.1	20 00 20	-55 52	L 2	14203	L 0	17SEP82	17 14 16	006 00	PHCAL	372 MN=330,TR,I=3,R=.167
HD200120	26	04.7	20 08 07	+47 20	H 2	13184	L 0	07MAY82	02 14 05	001 30	EA080	501 4-MIN-HTR-AM-UP
HD200120	26	04.7	20 08 07	+47 20	L 2	13185	L 0	07MAY82	03 16 53	000 01	EA080	501 4-MIN-HTR-AM-UP
HD200120	26	04.7	20 08 07	+47 20	H 3	16911	L 0	07MAY82	02 18 44	001 30	EA080	501
HD200120	26	04.7	20 08 07	+47 20	L 3	16912	L 0	07MAY82	03 20 08	000 01	EA080	501
NGC 6834	70	11.8	20 08 49	+36 19	L 3	17018	L 0	23MAY82	00 44 57	180 00	EA027	351
FG SGE	40	09.6	20 09 43	+20 11	L 2	13391	L 0	02JUN82	23 37 08	160 00	EC175	501
HD192577	47	3.7	20 12 03	+46 35	H 2	14262	L 0	25SEP82	17 18 43	050 00	EC116	274 4-MIN-HTR, MN=767
HD192577	47	3.7	20 12 03	+46 35	H 3	18108	L 0	25SEP82	16 25 30	050 00	EC116	151
HD192639	13	7.1	20 12 39	+37 12	H 2	14285	L 0	28SEP82	16 15 44	090 00	EM221	805 4-MIN-HTR
HD192640	36	4.9	20 12 40	+36 39	L 2	14126	L 0	08SEP82	20 19 13	000 15	EA115	700
HD192640	36	4.9	20 12 40	+36 39	L 2	14126	S 0	08SEP82	20 16 08	000 14	EA115	502
HD192640	36	4.9	20 12 40	+36 39	H 2	14127	L 0	08SEP82	21 22 26	010 00	EA115	502 MN=552
HD192640	36	4.9	20 12 40	+36 39	L 3	17887	L 0	08SEP82	20 13 14	000 23	EA115	500
HD192640	36	4.9	20 12 40	+36 39	L 3	17887	S 0	08SEP82	20 08 59	001 40	EA115	700
HD192640	36	4.9	20 12 40	+36 39	H 3	17888	L 0	08SEP82	20 45 00	022 00	EA115	500
HD193514	13	7.4	20 17 20	+39 07	H 3	18145	L 0	28SEP82	17 59 45	140 00	EM221	502
PU VUL	63	99.9	20 19 01	+21 25	L 2	13861	L 0	04AUG82	23 30 29	030 00	EI145	501 MN=771,4-M-HTR-WM-UP
PU VUL	63	99.9	20 19 01	+21 25	L 3	17590	L 0	05AUG82	00 03 17	103 00	EI145	202
+40 4227	64	8.5	20 31 27	+41 09	L 2	13666	L 0	12JUL82	20 33 06	048 00	EI110	603 4-MIN-HTR-WM-UP
+40 4227	64	8.5	20 31 27	+41 09	L 2	13667	L 0	13JUL82	00 51 38	038 00	EI110	503 4-MIN-HTR-AM-UP
+40 4227	64	8.5	20 31 27	+41 09	L 3	17413	L 0	12JUL82	21 28 02	200 00	EI110	401
HD196378	41	05.1	20 35 55	-60 43	L 3	17035	L 0	25MAY82	02 16 59	009 20	EC052	400
HD197481	48	8.6	20 42 04	-31 31	H 3	17291	L 0	23JUN82	21 09 24	000 00	EC013	039 TOTAL TIME=1080
HD197692	41	04.3	20 43 08	-25 27	L 3	17033	L 0	25MAY82	00 45 56	002 30	EC052	500
A 72	70	16.1	20 47 40	+13 22	L 3	16936	L 0	09MAY82	03 45 26	100 00	EA137	501
HD200120	26	04.7	20 58 07	+47 20	L 2	13379	L 0	02JUN82	00 33 50	000 01	EA080	401
HD200120	20	4.7	20 58 07	+47 20	L 2	13584	L 0	01JUL82	23 46 19	000 01	EA080	501
HD200120	26	04.7	20 58 07	+47 20	H 3	17094	L 0	01JUN82	23 32 22	001 10	EA080	501
HD200120	26	04.7	20 58 07	+47 20	L 3	17095	L 0	02JUN82	00 30 36	000 01	EA080	501
HD200120	20	4.7	20 58 07	+47 20	H 3	17337	L 0	01JUL82	23 41 27	001 30	EA080	501
HD200120	20	04.7	20 58 07	+47 20	H 3	17587	L 0	04AUG82	21 02 33	001 30	EA080	501
HD200120	20	4.7	20 58 07	+47 20	H 3	18083	L 0	23SEP82	21 37 30	001 30	EA080	501
HD200120	20	4.7	20 58 07	+47 20	L 3	18084	L 0	23SEP82	22 05 18	000 01	EA080	501

OBJECT	CL	MAG	RT ASCN HR MN SC	DECL DEG MN	DISP	CAM	IMAGE	APERT OB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD200391	44	7.3	21 00 16	+27 37	L	2	13605	L	0	04JUL82	20 45 15	004 00	EC206	502
HD200391	44	7.3	21 00 16	+27 37	H	2	13606	L	0	04JUL82	21 23 30	150 00	EC206	404
HD203608	41	04.2	21 22 20	-65 36	L	3	17036	L	0	25MAY82	03 03 48	004 00	EC052	600
JL 76	28	11.3	21 23 06	-82 54	L	2	14178	L	0	14SEP82	16 17 06	006 00	EA035	403 4-MIN-HTR
JL 76	28	11.3	21 23 06	-82 54	L	3	17958	L	0	14SEP82	16 40 58	014 00	EA035	400
HD204075	45	3.7	21 23 49	-22 38	H	3	17292	L	0	24JUN82	20 33 36	987 00	EC013	039 READ AT GSFC
K 648	70	14.0	21 27 34	+11 57	L	2	13360	L	0	31MAY82	06 39 35	060 00	EA254	431
K 648	70	14.0	21 27 34	+11 57	L	3	17069	L	0	30MAY82	06 04 00	060 00	EA254	461
NGC 7099	83	99.9	21 37 30	-23 25	L	2	13719	L	0	19JUL82	21 44 45	075 00	EE102	404
NGC 7099	83	99.9	21 37 30	-23 25	L	2	13720	L	0	20JUL82	00 30 34	193 00	EE102	205 SERENDIPITY
NGC 7099	83	99.9	21 37 30	-23 25	L	3	17448	L	0	19JUL82	21 48 21	050 00	EE102	100 SERENDIPITY
NGC 7099	83	99.9	21 37 30	-23 25	L	3	17449	L	0	19JUL82	23 05 51	240 00	EE102	401
SS CYG	54	11.8	21 40 44	+43 21	L	2	13585	L	0	02JUL82	00 46 47	020 00	EI109	463
SS CYG	54	11.8	21 40 44	+43 21	L	2	13586	L	0	02JUL82	02 11 34	025 00	EI109	463
SS CYG	54	11.8	21 40 44	+43 21	L	2	13587	L	0	02JUL82	03 20 37	023 00	EI109	463
SS CYG	54	11.8	21 40 44	+43 21	L	2	13637	L	0	09JUL82	00 48 31	025 00	EI109	572 4-MIN-HTR-WM-UP
SS CYG	54	11.8	21 40 44	+43 21	L	2	13638	L	0	09JUL82	02 02 16	018 00	EI109	452
SS CYG	54	11.8	21 40 44	+43 21	L	2	13639	L	0	09JUL82	03 13 28	017 00	EI109	462
SS CYG	54	11.8	21 40 44	+43 21	L	2	13668	L	0	13JUL82	02 28 26	020 00	EI110	583 4-MIN-HTR-WM-UP
SS CYG	54	11.8	21 40 44	+43 21	L	3	17338	L	0	02JUL82	01 15 44	051 00	EI109	471
SS CYG	54	11.8	21 40 44	+43 21	L	3	17339	L	0	02JUL82	02 46 16	020 00	EI109	350
SS CYG	54	11.8	21 40 44	+43 21	L	3	17387	L	0	09JUL82	01 16 56	040 00	EI109	372
SS CYG	54	11.8	21 40 44	+43 21	L	3	17388	L	0	09JUL82	02 32 59	025 00	EI109	352
SS CYG	54	11.8	21 40 44	+43 21	L	3	17414	L	0	13JUL82	01 54 05	025 00	EI110	360
SS CYG	54	11.8	21 40 44	+43 21	L	3	17415	L	0	13JUL82	02 54 25	040 00	EI110	470
+28 4211	16	10.5	21 48 56	+28 38	L	1	1568	L	0	10JUN82	23 40 24	000 50	PHCAL	402
+28 4211	16	10.5	21 48 56	+28 38	L	1	1569	L	0	11JUN82	00 13 37	000 50	PHCAL	402
+28 4211	16	10.5	21 48 56	+28 38	L	1	1640	L	0	21AUG82	18 50 09	000 50	PHCAL	502
+28 4211	16	10.5	21 48 56	+28 38	L	1	1642	L	0	21AUG82	20 32 53	000 50	PHCAL	502
+28 4211	16	10.5	21 48 56	+28 38	L	1	1644	L	0	21AUG82	21 48 24	000 50	PHCAL	502
+28 4211	12	10.5	21 48 56	+28 38	L	1	1678	S	0	22SEP82	22 19 03	001 20	PHCAL	503
+28 4211	12	10.5	21 48 56	+28 38	L	1	1678	L	0	22SEP82	22 14 19	000 50	PHCAL	503
+28 4211	12	10.5	21 48 56	+28 38	L	1	1679	L	0	22SEP82	22 55 14	003 20	PHCAL	503 TRAIL,I=3,R=0.30
+28 4211	16	10.5	21 48 56	+28 38	L	2	13371	L	0	01JUN82	06 57 38	001 00	PHCAL	402 MN=426
+28 4211	16	10.5	21 48 56	+28 38	L	2	13464	S	0	10JUN82	01 25 08	003 00	PHCAL	502
+28 4211	16	10.5	21 48 56	+28 38	L	2	13464	L	0	10JUN82	01 20 20	001 00	PHCAL	502
+28 4211	16	10.5	21 48 56	+28 38	L	2	13465	L	0	10JUN82	02 21 19	003 51	PHCAL	502 1-ITER, R=0.095
+28 4211	16	10.5	21 48 56	+28 38	L	3	17087	S	0	01JUN82	06 52 51	001 20	PHCAL	600
+28 4211	16	10.5	21 48 56	+28 38	L	3	17087	L	0	01JUN82	06 48 50	000 26	PHCAL	500
+28 4211	16	10.5	21 48 56	+28 38	L	3	17180	S	0	10JUN82	01 15 09	001 20	PHCAL	600
+28 4211	16	10.5	21 48 56	+28 38	L	3	17180	L	0	10JUN82	01 10 44	000 26	PHCAL	500
+28 4211	16	10.5	21 48 56	+28 38	L	3	17181	L	0	10JUN82	03 26 56	001 18	PHCAL	500 1 ITER, R=0.250
+28 4211	12	10.5	21 48 56	+28 38	L	3	18067	S	0	22SEP82	21 37 21	000 52	PHCAL	501
+28 4211	12	10.5	21 48 56	+28 38	L	3	18067	L	0	22SEP82	21 32 54	000 26	PHCAL	501
+28 4211	12	10.5	21 48 56	+28 38	L	3	18068	L	0	22SEP82	22 04 35	001 18	PHCAL	501 TRAIL,I=3,R=0.77
+25 4655	16	9.0	21 57 25	+26 12	H	2	14170	L	0	13SEP82	17 35 53	045 00	EA011	503 4-MIN-HTR, [illegible]
+25 4655	16	9.0	21 57 25	+26 12	H	3	17947	L	0	13SEP82	16 46 11	045 00	EA011	601
HD209750	44	02.9	22 03 13	-00 34	[illegible]	3	17050	L	0	28MAY82	23 42 04	780 00	EC232	779 REA[illegible]

OBJECT	CL	MAG	RT ASCN HR	MN	SC	DECL DEG	MN	DISP	CAM	IMAGE	APERT OB	LG	DATE	START HR	MN	SC	LENGTH MIN	SC	PROG	COMMENT
RV PEG	54	12.6	22	11	36	+12	27	L	2	13924	L	0	12AUG82	01	07	55	015	00	EI215	322 4-MIN-HTR-WM-UP
RV PEG	54	12.6	22	11	36	+12	27	L	3	17664	L	0	12AUG82	01	29	46	018	00	EI215	331
HD213845	41	05.2	22	31	58	-20	58	L	3	17037	L	0	25MAY82	03	47	24	008	30	EC052	500
RZ GRU	54	12.5	22	44	12	-43	00	L	2	13627	L	0	08JUL82	01	14	29	030	00	EC275	502
RZ GRU	54	12.5	22	44	12	-43	00	L	2	14104	L	0	06SEP82	23	16	14	027	00	EI273	452 4-MIN-HTR
RZ GRU	54	12.5	22	44	12	-43	00	L	2	14136	L	0	09SEP82	22	43	53	030	00	EI273	503 4-MIN-HTR
RZ GRU	54	12.5	22	44	12	-43	00	L	2	14159	L	0	12SEP82	19	57	21	030	00	EI274	503
RZ GRU	54	12.9	22	44	12	-43	00	L	2	14278	L	0	27SEP82	21	55	15	030	00	EI273	553
RZ GRU	54	12.5	22	44	12	-43	00	L	3	17378	L	0	08JUL82	01	52	05	030	00	EC275	541
RZ GRU	54	12.5	22	44	12	-43	00	L	3	17379	L	0	08JUL82	02	59	17	047	00	EC275	551
RZ GRU	54	12.5	22	44	12	-43	00	L	3	17862	L	0	06SEP82	22	32	03	040	00	EI273	441
RZ GRU	54	12.5	22	44	12	-43	00	L	3	17902	L	0	09SEP82	22	05	03	035	00	EI273	500
RZ GRU	54	12.5	22	44	12	-43	00	L	3	17938	L	0	12SEP82	20	33	28	040	00	EI274	551
RZ GRU	54	12.9	22	44	12	-43	00	L	3	18138	L	0	27SEP82	21	15	53	035	00	EI273	441
RZ GRU	54	12.9	22	44	12	-43	00	L	3	18139	L	0	27SEP82	22	28	20	035	00	EI273	441
2252-035	59	13.2	22	52	43	-03	27	L	2	13241	L	0	14MAY82	07	31	00	013	00	EE217	301 4-MIN-HTR-WM-UP
2252-035	59	13.2	22	52	43	-03	27	L	3	16958	L	0	14MAY82	05	37	46	033	19	EE217	331 TRAILED,R=0.03,3ITER
HD217782	36	5.1	23	00	18	+42	29	L	2	14111	L	0	07SEP82	16	18	46	000	20	EA115	702 4-MIN-HTR, MN=843
HD217782	36	5.1	23	00	18	+42	29	L	2	14111	S	0	07SEP82	16	15	24	000	18	EA115	502 4-MIN-HTR, MN=843
HD217782	36	5.1	23	00	18	+42	29	H	2	14112	L	0	07SEP82	16	57	54	015	00	EA115	503 4-MIN-HTR
HD217782	36	5.1	23	00	18	+42	29	H	2	14113	L	0	07SEP82	18	05	15	025	00	EA115	703 4-MIN-HTR
HD217782	36	5.1	23	00	18	+42	29	L	3	17868	L	0	07SEP82	16	25	17	001	30	EA115	701
HD217782	36	5.1	23	00	18	+42	29	L	3	17868	S	0	07SEP82	16	22	00	000	44	EA115	501
HD217782	36	5.1	23	00	18	+42	29	H	3	17869	L	0	07SEP82	17	25	50	022	00	EA115	500
HD217782	36	5.1	23	00	18	+42	29	H	3	17870	L	0	07SEP82	18	42	40	035	00	EA115	501
NGC 7469	84	13.0	23	00	44	+08	36	L	2	13515	L	0	18JUN82	02	17	29	060	00	EE278	344 4-MIN-HTR-WM-UP
NGC 7469	84	13.0	23	00	44	+08	36	L	3	17250	S	0	18JUN82	05	27	16	020	00	EE278	221
NGC 7469	84	13.0	23	00	44	+08	36	L	3	17250	L	0	18JUN82	03	22	00	120	00	EE278	451
NGC 7469	84	13.0	23	00	45	+08	36	L	2	13124	L	0	01MAY82	07	20	10	023	00	EE278	333 4-MIN-HTR-WM-UP
NGC 7469	84	13.0	23	00	45	+08	36	L	2	13800	L	0	29JUL82	20	53	58	075	00	EE278	454 4-MIN-HTR-WM-UP
NGC 7469	84	13.0	23	00	45	+08	36	L	3	16886	L	0	03MAY82	06	27	11	080	00	EE278	341
NGC 7469	84	13.0	23	00	45	+08	36	L	3	17520	L	0	29JUL82	22	12	08	120	00	EE278	352
NGC25822	84	14.0	23	02	07	-08	57	L	2	13775	L	0	25JUL82	23	38	16	210	00	EE266	605 4-MIN-HTR-WM-UP
NGC25822	84	14.0	23	02	07	-08	57	L	3	17266	L	0	20JUN82	04	50	22	054	00	EE225	231
NGC25822	84	14.0	23	02	07	-08	57	L	3	17489	L	0	25JUL82	21	29	44	120	00	EE266	351
NGC25822	84	14.0	23	02	07	-08	57	L	3	17490	L	0	26JUL82	03	11	30	036	00	EE266	230
HD218393	26	6.8	23	04	51	+49	55	H	2	14077	L	0	02SEP82	21	09	52	070	00	EA166	613 4-MIN-HTR
HD218393	26	6.8	23	04	51	+49	55	H	3	17841	L	0	02SEP82	19	46	41	080	00	EA166	511
2308+098	85	15.0	23	08	46	+09	52	L	3	16945	L	0	12MAY82	01	18	53	388	00	EE258	352
NGC 7469	84	13.3	23	11	44	+08	36	L	3	16956	L	0	14MAY82	00	57	04	045	00	EE217	331
F108	37	12.9	23	13	36	-02	07	L	2	13548	L	0	22JUN82	22	57	55	022	00	EA144	502
F108	37	12.9	23	13	36	-02	07	L	3	17284	L	0	22JUN82	22	48	19	005	00	EA144	301
F108	37	12.9	23	13	36	-02	07	L	3	17285	L	0	22JUN82	23	40	46	010	00	EA144	501
L791-40	43	14.0	23	17	06	-17	22	L	3	17278	L	0	21JUN82	22	56	54	010	00	EI144	503
NGC 7662	70	10.0	23	23	29	+42	16	L	3	17076	L	0	31MAY82	05	36	40	015	00	EA254	570
HB 12	70	12.0	23	23	57	+57	[illegible]	L	2	13359	L	0	31MAY82	03	18	19	120	00	EA254	331
HB 12	70	12.0	23	23	57	+57	51	L	3	17075	L	0	31MAY82	00	43	45	150	00	EA254	231
23 315	28	11.0	23	41	42	[illegible]	[illegible]	L	3	17981	L	0	16SEP82	19	07	06	002	00	EA035	600

OBJECT	CL	MAG	RT ASCN HR MN SC	[illegible]	[illegible]		IMAGE	APERT OB	APERT LG	DATE	START HR MN SC	LENGTH MIN SC	PROG	COMMENT
HD223047	45	05.0	23 43 33	+46 09	L	2	13837	S	0	02AUG82	00 43 57	003 00	EC201	502 MN=475
HD223047	45	05.0	23 43 33	+46 09	L	2	13837	L	0	02AUG82	00 37 42	003 00	EC201	702
HD223047	45	05.0	23 43 33	+46 09	L	3	17558	S	0	02AUG82	01 30 52	016 00	EC201	601
HD223047	45	05.0	23 43 33	+46 09	L	3	17558	L	0	02AUG82	01 06 12	020 00	EC201	801
SB 939	16	10.3	23 57 46	-39 41	L	2	14142	L	0	10SEP82	20 18 42	002 00	EA035	502 4-MIN-HTR
SB 939	16	10.3	23 57 46	-39 41	L	3	17912	L	0	10SEP82	20 49 40	003 00	EA035	500

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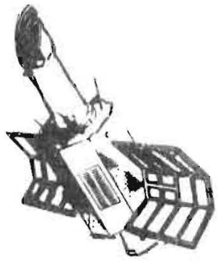

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AT THE OBSERVATORY AT VILLAFRANCA, MADRID, SPAIN

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