# Report on the Rosat-IUE All Sky Survey (RIASS) Program

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## 1 - Introduction.

The main purpose of the RIASS program (**ROSAT - IUE All Sky Survey**) was to use the opportunity supplied by the All Sky Survey in the EUV and soft X-rays of the ROSAT satellite to acquire the most extensive simultaneous spectral coverage ever obtained with space telescopes for objects whose theoretical understanding strongly relies on observations in different energy regimes.

A total of 128 objects ranging from planets and cool stars to interacting binaries and active galactic nuclei (AGN) have been observed in this program. RIASS raised such great interest among the astronomical community that it also triggered observations with the hard X-ray satellite GINGA and ground based telescopes. The IUE observations for this program were performed at both VILSPA and GSFC stations from August 1990 through January 1991. In spite of the difficult observational requirements brought on by the broad scope, simultaneity, and multiwavelength nature of this unique observing campaign, all the operational aspects of this program were completed with a high degree of success.

## 2 - Organization and Scheduling of the RIASS Program.

VILSPA and GSFC took different approaches only at the very beginning of the RIASS organization. At ESA this was submitted as a "large" (or "heroic") proposal for the $13^{th}$ episode of IUE and was run as an observatory program with specific targets suggested by 29 European investigators. At NASA, targets were identified from 18 accepted individual programs whose corresponding shift allocations were devoted either partially or entirely to RIASS. Hence, a composite list for the RIASS program, which identified NASA and ESA PIs for each target, was constructed from these proposals. The observational requirements and data distribution agreements for each target were then coordinated on the basis of this list.

The scheduling constraints for this program were largely driven by the ROSAT survey time line and a major factor contributing to the high degree of operational success enjoyed by this program was the relatively trouble free and timely progression of the ROSAT all sky survey. Due to the special NASA and ESA coordination required by this program various operational aspects could not be handled easily under the normal arrangements for IUE operations. In fact, the total ESA and NASA allocation of 103.5 shifts to be performed within the 6 months of the ROSAT survey required the adoption of an observing strategy aiming to maximize the use of the IUE time within the ROSAT periods of visibility of the program targets with minimal impact to regular G.O. programs. To accomplish this, an integrated scheduling method was adopted which permitted RIASS observations to be scheduled at either station without regard to program code or PI affiliation. The general success of this scheduling method also contributed substantially to the success of the program as a whole. VILSPA took the prime responsibility for the final program and schedule definition adopted by both stations.

Because of the size and complexity of the RIASS program, some impact to the scheduling of normal IUE programs, including the loss of flexibility in scheduling other target of opportunity programs, was inevitable. However, every effort was

made to minimize this impact and the efforts by the scheduling staff at both stations were very commendable. Ultimately, the RIASS program accounted for 34%, 23% and 8% of VILSPA, US1 and US2 shifts respectively during the six month survey period, averaging to 22% for the total program. The actual shifts used were 62.85, 41.75 and 15.5 for VILSPA, US1 and US2 shifts respectively, bringing the total number of shifts to 120. The difference in the allocated and effective shifts used was covered by transferring normal IUE programs to RIASS under specific request of G.O.s and IUE contingency shifts under mutual agreement of the ESA and NASA IUE Project Scientists.

Further details of the RIASS program organization and scheduling have been given in progress reports made to the IUE Three-Agency Coordination Committee in January of 1991.

### 3 - Performance and Efficiency of the RIASS Program.

The integrated scheduling approach adopted in this program made the normal mode of IUE Guest Observer operations difficult to accommodate and a service observing scheme was employed at both stations. At NASA, the level of effort required for this scheme was far beyond service observing support performed in the past. Special observational requests within the RIASS program, such as variable star monitoring programs and target of opportunity observations, were accommodated in this extended service observing mode. An increase of about 1.5 full-time staff members over the current NASA IUE operations staffing level was required to coordinate and support the total of 57 RIASS shifts in this manner.

The RIASS strategy was revealed to be an efficient one which allowed observations of targets of different nature within one shift. The efforts of observatory staff members at both stations also allowed prompt and extensive RIASS target of opportunity observations of an outburst of the dwarf nova VW Hyi. On the whole, only a very small fraction of the scheduled targets were observed outside the nominal ROSAT visibility period due to satellite constraints and higher priority normal IUE

programs. During the entire program 454 observations (255 SWP and 199 LWP spectra) were made of 128 targets requiring a total of 669 hours of exposure time. Observationally, a 70% efficiency can be claimed based on the exposure times and actual shifts used. Taking into account the different types of objects, cool stars, interacting binaries, and AGN, the highest efficiency was achieved by the latter group ($\sim$ 80%) due to the very long exposures times. The present estimated observing efficiency for regular IUE G.O. programs is $\sim$ 60%. Although it appears that the RIASS program has been especially efficient in terms of exposure time on target when compared to regular programs, this is clearly at least partly due to the large number of long exposures employed. Still, it is reassuring to see that the overall efficiency of the program has been high.

**4 - Results of the RIASS program.**

Presently, early ROSAT Sky Survey processing has been completed for some 25% of the X-ray and all of the EUV data. These X-ray data and all IUE data have now been delivered to PI's in the RIASS program. Unfortunately, the proprietary period for some of the IUE data collected during the beginning of the survey has expired while the corresponding ROSAT data are not yet available. This negative aspect is due to unforseen software extraction problems of the X-ray survey procedure.

The first results of this unique effort are now available. These results are representative of some of the research fields which have made up a major part of the RIASS program: stellar activity and AGN studies. For the stars the emphasis was on the study of accretion and coronal phenomena, while the AGN studies were concentrated on variability studies of individual objects and statistical properties.

Figure 1 shows some of the light curves of the six days of RIASS observations of the spotted red dwarf flare star in the binary system BY Draconis. An activity event took place during this period and has been detected in most wavelengths bands. Such observations will allow a detailed study of the relationship between chromosphere, transition region and corona during a flare, as well as the determination of the

emission measure distribution up to $3 \cdot 10^6$ K and hence the instantaneous modeling of the outer atmosphere.

Figure 2 shows the instantaneous UV/soft X-ray luminosity ratio as a function of the redshift of the source for 8 of the 24 AGN observed and processed so far. It shows an unexpectedly strong relative increase in the intensity of the UV emission with respect the soft X-rays with increasing red-shift. This might be a luminosity effect or a strong wavelength dependence of AGN evolution. The point in the lower right part of the diagram is the only highly polarized QSO in the sample. Its location in the diagram supports the evidence that this class of objects really represents a distinct aspect of the AGN phenomena.

Table 1 lists the log of IUE observations made in support of the RIASS program.

## 5 - Summary.

The operational aspects of the RIASS program have been brought to a successful conclusion. There is every indication that the difficult observational requirements necessary to achieve the diverse scientific goals of the program have been satisfied to a high degree. To achieve this success it was necessary to adopt an integrated scheduling and service observing mode for the IUE observations which proved to be more labor intensive than the normal mode of operations. Considered as an experiment in a new mode of IUE operations, the RIASS program has yielded some useful lessons while demonstrating the feasibility of conducting a large scale campaign involving coordinated observations with IUE and other space telescopes. As a scientific opportunity, RIASS has generated a broad base of participation within the international astronomical community which has already begun to reap the scientific benefits of this program.

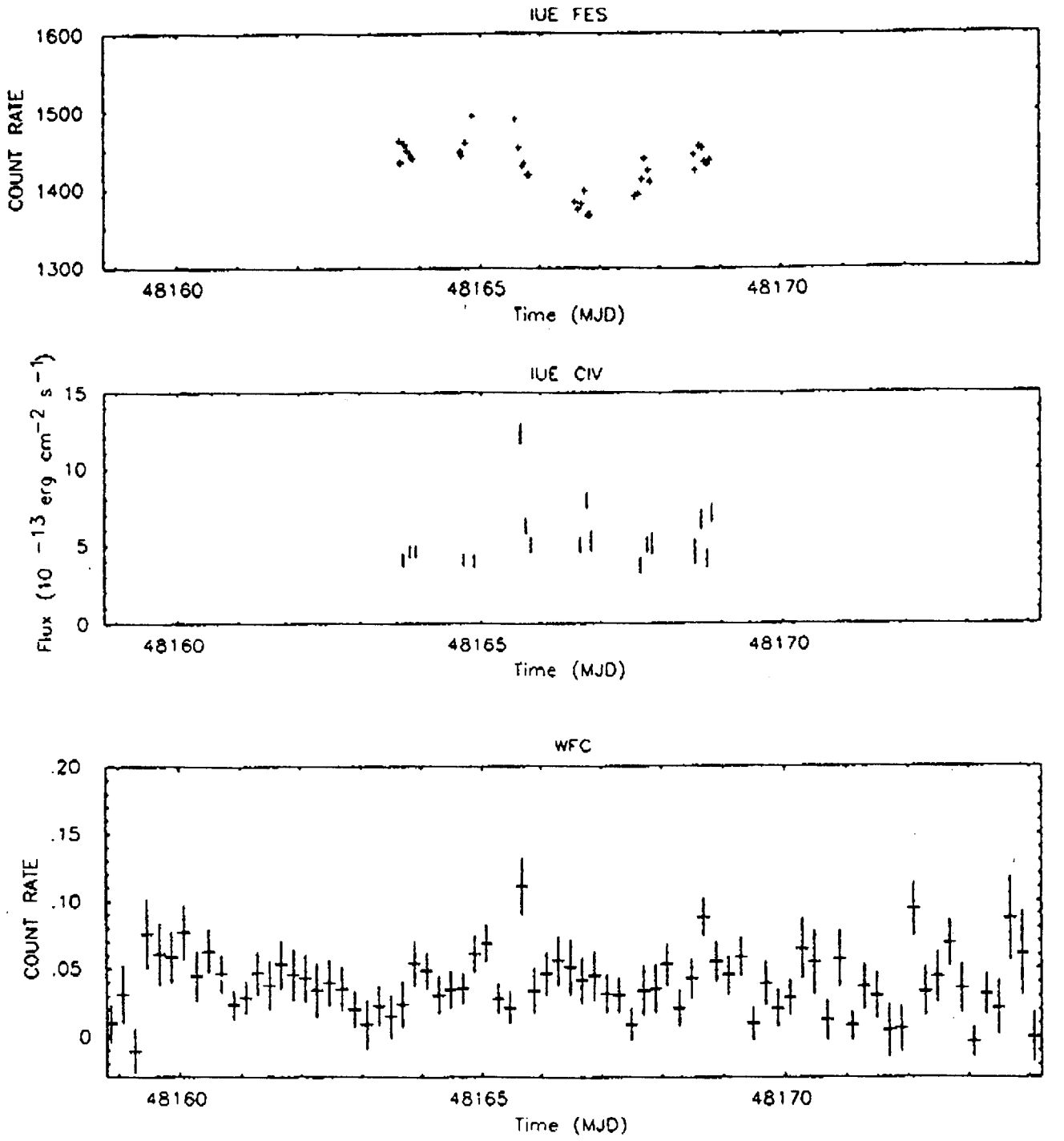


Fig. 1:

These three diagrams show the RIASS observations of the spotted dwarf star BY Dra (P.I.: M.Barstow, University of Leicester). Top: IUE-FES (5400 A); Middle: IUE CIV line emission (1549 A); Bottom: ROSAT-WFC (60-300 A).

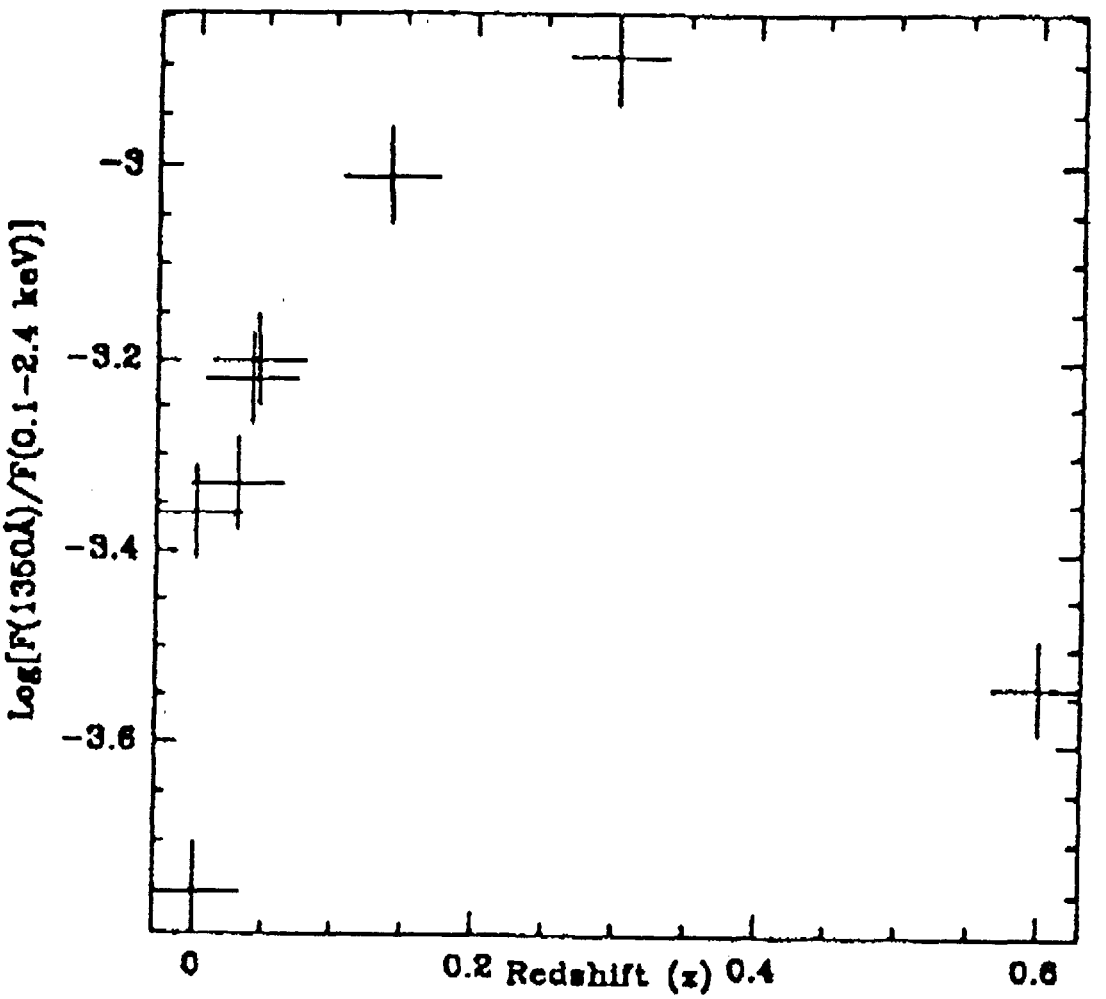


Fig. 2:

UV/X-ray flux ratio versus redshift for a selected sample of AGN in the RIASS program.

Table 1: Log of IUE observations in support of RIASS program.

| Target ID / ROSAT Window | Image # | Res. | Time | PI (NASA/ESA) | Program ID | IUE Date/Shift |
|---|---|---|---|---|---|---|
| HD 143454 JUL-30:AUG-01 | SWP39385 | Low | 10+50min | Stencel(N) / Selvelli(E) | ZAMRS / MI180 | AUG-02-1990/US1 |
| | LWP18504 | Low | 30 min | Stencel(N) / Selvelli(E) | ZAMRS / MI180 | AUG-02-1990/US1 |
| HD 22468 AUG-01:AUG-03 | SWP39386 | Low | 30 min | Guinan(N) | RSMEG | AUG-02-1990/US1 |
| | LWP18552 | High | 13 min | Guinan(N) | RSMEG | AUG-10-1990/US2 |
| HD 154905 JUL-31:AUG-09 | SWP39387 | Low | 40 min | Ayres(N) | CCMTA | AUG-02-1990/US1 |
| 3C 345 AUG-07:AUG-11 | SWP39425 | Low | 485 min | Urry(N) / Green(N) | RGMCU / AGMRG | AUG-08-1990/VIL |
| | SWP39431 | Low | 327 min | Urry(N) / Green(N) | RGMCU / AGMRG | AUG-09-1990/VIL |
| HD 109857 AUG-08:AUG-12 | SWP39434 | High | 100 min | de Martino(E) | MI180 | AUG-10-1990/US2 |
| HD 128620 AUG-08:AUG-11 | SWP39441 | Low | 23 min | Ayres(N) / Jordan(E) | CCMTA / MC180 | AUG-11-1990/US2 |
| | LWP18562 | High | 2 min | Ayres(N) / Jordan(E) | CCMTA / MC180 | AUG-11-1990/US2 |
| HD 128621 AUG-08:AUG-11 | SWP39442 | Low | 40 min | Ayres(N) / Jordan(E) | CCMTA / MC180 | AUG-11-1990/US2 |
| | LWP18561 | High | 3 min | Ayres(N) / Jordan(E) | CCMTA / MC180 | AUG-11-1990/US2 |
| E1615+061 AUG-11:AUG-13 | SWP39443 | Low | 420 min | Piro(E) | MQ180 | AUG-11-1990/VIL |
| | LWP18564 | Low | 70 min | Piro(E) | MQ180 | AUG-11-1990/VIL |
| HD 24534 AUG-13:AUG-15 | SWP39462 | High | 20 min | de Martino(E) | MI180 | AUG-14-1990/US1 |
| HD 21629 AUG-11:AUG-14 | LWP18585 | Low | 80 min | de Martino(E) | MI180 | AUG-14-1990/US1 |
| HD 71243 AUG-06:AUG-14 | SWP39463 | Low | 50 min | Haisch(N) | CCMBH | AUG-14-1990/US1 |
| | LWP18586 | Low | 1min 11s | Haisch(N) | CCMBH | AUG-14-1990/US1 |
| 3C 371 AUG-13:SEP-19 | SWP39472 | Low | 314 min | Treves(E) | MQ180 | AUG-16-1990/VIL |
| | LWP18601 | Low | 157 min | Ulrich(E) | MQ180 | AUG-16-1990/VIL |
| | SWP39502 | Low | 380 min | Urry(N) | RGMCU | AUG-20-1990/VIL |
| | LWP18627 | Low | 180 min | Malkan(N) | AGMMM | AUG-20-1990/VIL |
| | SWP39540 | Low | 255 min | Courvoisier(E) | MQ180 | AUG-26-1990/VIL |
| | LWP18668 | Low | 126 min | | | AUG-26-1990/VIL |
| | SWP39555 | Low | 285 min | | | AUG-31-1990/US1 |
| | LWP18684 | Low | 140 min | | | AUG-31-1990/US1 |
| | SWP39594 | Low | 280 min | | | SEP-06-1990/US1 |
| | LWP18715 | Low | 130 min | | | SEP-06-1990/US1 |
| | LWP18754 | Low | 140 min | | | SEP-10-1990/US1 |
| | SWP39609 | Low | 290 min | | | SEP-10-1990/US1 |
| | SWP39637 | Low | 266 min | | | SEP-14-1990/VIL |
| | LWP18784 | Low | 125 min | | | SEP-14-1990/VIL |
| | SWP39655 | Low | 282 min | | | SEP-17-1990/VIL |

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|---|---|---|---|---|---|---|
| | LWP18806 | Low | 140 min | | | SEP-17-1990/VIL |
| HD 28307 | SWP39503 | Low | 70 min | Ayres(N) | CCMTA | AUG-20-1990/US1 |
| AUG-18:AUG-20 | | | | | | |
| HD 35072 | SWP39504 | Low | 95 min | Ayres(N) | CCMTA | AUG-20-1990/US1 |
| AUG-15:AUG-22 | | | | | | |
| HD 25940 | SWP39529 | High | 1min 50s | Peters(N) | XBMGP | AUG-25-1990/US2 |
| AUG-20:AUG-22 | | | | de Martino(E) | MI180 | |
| | LWP18672 | Low | 0.9 sec | Peters(N) | XBMGP | AUG-27-1990/US2 |
| | | | | de Martino(E) | MI180 | |
| | SWP39544 | Low | 1.3 sec | Peters(N) | XBMGP | AUG-27-1990/US2 |
| | | | | de Martino(E) | MI180 | |
| HD 159181 | SWP39543 | Low | 20 min | Ayres(N) | CCMTA | AUG-27-1990/US2 |
| AUG-19:AUG-28 | | | | Harper(E) | MC180 | |
| | LWP18671 | High | 10 min | Ayres(N) | CCMTA | AUG-27-1990/US2 |
| | | | | Harper(E) | MC180 | |
| HD 33328 | SWP39542 | High | 50 sec | Peters(N) | XBMGP | AUG-27-1990/US2 |
| AUG-26:AUG-28 | | | | | | |
| HD 31398 | LWP18670 | High | 20 min | Harper(E) | MC180 | AUG-27-1990/US2 |
| AUG-27:AUG-30 | SWP39541 | Low | 120 min | Harper(E) | MC180 | AUG-27-1990/US2 |
| KAZ 102 | SWP39545 | Low | 435 min | Malkan(N) | AGMMM | AUG-27-1990/VIL |
| JUL-30:OCT-17 | SWP30558 | Low | 388 min | Wilkes(N) | AGMBW | AUG-31-1990/VIL |
| JAN-18:JAN-25 | SWP39608 | Low | 428 min | Ulrich(E) | MQ180 | SEP-10-1990/VIL |
| | SWP39664 | Low | 420 min | Maraschi(E) | MQ180 | SEP-19-1990/VIL |
| | SWP39718 | Low | 423 min | | | SEP-27-1990/VIL |
| | SWP39788 | Low | 379 min | | | OCT-07-1990/VIL |
| | SWP39831 | Low | 405 min | | | OCT-14-1990/VIL |
| | LWP19011 | Low | 390 min | | | OCT-14-1990/US1 |
| | SWP40691 | Low | 333 min | | | JAN-27-1991/VIL |
| 3C390.3 | SWP39554 | Low | 414 min | Courvoisier(E) | MQ180 | AUG-30-1990/VIL |
| AUG-29:SEP-08 | SWP39565 | Low | 400 min | Courvoisier(E) | MQ180 | SEP-01-1990/VIL |
| HD31910 | SWP39569 | Low | 50 min | Ayres(N) | CCMTA | SEP-02-1990/US2 |
| SEP-01:SEP-04 | | | | | | |
| HD34029 | SWP39570 | Low | 1 min | Ayres(N) | CCMTA | SEP-02-1990/US2 |
| SEP-02:SEP-04 | | | | | | |
| HD150798 | LWP18694 | High | 10 min | Harper(E) | MC180 | SEP-02-1990/US2 |
| AUG-31:SEP-04 | SWP39568 | Low | 70 min | Harper(E) | MC180 | SEP-02-1990/US2 |
| HD155885 | SWP39571 | Low | 140 min | Ayres(N) | CCMTA | SEP-02-1990/US2 |
| AUG-31:SEP-02 | | | | | | |
| HD163930 | SWP39613 | Low | 120 min | Linsky(N) | RSMJL | SEP-11-1990/US1 |
| SEP-09:SEP-13 | | | | Rodono'(E) | MC180 | |
| | LWP18763 | High | 90 min | Linsky(N) | RSMJL | SEP-11-1990/US1 |
| | | | | Rodono'(E) | MC180 | |
| HD164284 | SWP39614 | High | 2m 10s | Peters(N) | XBMGP | SEP-11-1990/US1 |
| SEP-10:SEP-13 | SWP39631 | Low | 1.3 sec | Peters(N) | XBMGP | SEP-13-1990/US1 |
| | LWP18778 | Low | 0.9 sec | Peters(N) | XBMGP | SEP-13-1990/US1 |
| HD39587 | LWP18764 | High | 25 min | Ayres(N) | CCMTA | SEP-11-1990/US1 |
| SEP-09:SEP-11 | SWP39615 | Low | 75 min | Guinan(N) | RSMEG | SEP-11-1990/US1 |
| | | | | Harper(E) | MC180 | |
| | | | | Jordan(E) | MC180 | |
| HD165341 | SWP39630 | Low | 45 min | Ayres(N) | CCMTA | SEP-13-1990/US1 |

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|---|---|---|---|---|---|---|
| SEP-12:SEP-15 | | | | | | |
| LB 1800 | SWP39632 | Low | 25 min | Raymond(N) | XBMJR | SEP-13-1990/US1 |
| SEP-14:SEP-21 | LWP18779 | Low | 35 min | Raymond(N) | XBMJR | SEP-13-1990/US1 |
| | SWP39633 | Low | 40 min | Raymond(N) | XBMJR | SEP-13-1990/US1 |
| HD44982 | SWP39634 | Low | 100 min | Linsky(N) | RSMJL | SEP-13-1990/US1 |
| SEP-12:SEP-17 | | | | Rodono'(E) | MC180 | |
| AM HER | SWP39670 | Low | 35 min | Beuermann(E) | MI180 | SEP-21-1990/VIL |
| SEP-18:SEP-25 | LWP18842 | Low | 25 min | de Martino(E) | MI180 | SEP-21-1990/VIL |
| | SWP39671 | Low | 70 min | | | SEP-21-1990/VIL |
| | LWP18843 | Low | 50 min | | | SEP-21-1990/VIL |
| | SWP39672 | Low | 60 min | | | SEP-21-1990/VIL |
| HD45314 | SWP39696 | High | 15 min | de Martino(E) | MI180 | SEP-23-1990/US2 |
| SEP-17:SEP-20 | | | | | | |
| HD48737 | SWP39697 | Low | 20 min | Ayres(N) | CCMTA | SEP-23-1990/US2 |
| SEP-22:SEP-25 | | | | | | |
| HD173667 | SWP39698 | Low | 45 min | Ayres(N) | CCMTA | SEP-23-1990/US2 |
| SEP-26:SEP-29 | LWP18855 | High | 18 min | Ayres(N) | CCMTA | SEP-23-1990/US2 |
| 3C 382 | SWP39709 | Low | 380 min | Clavel(E) | MQ180 | SEP-25-1990/VIL |
| SEP-23:SEP-26 | | | | | | |
| HD 234677 | SWP39725 | Low | 90 min | Barstow(E) | MC180 | SEP-29-1990/VIL |
| SEP-29:OCT-07 | LWP18893 | Low | 8+8 min | Rodono'(E) | MC180 | SEP-29-1990/VIL |
| | SWP39726 | Low | 90 min | | | SEP-29-1990/VIL |
| | LWP18894 | Low | 8+8 min | | | SEP-29-1990/VIL |
| | SWP39727 | Low | 97 min | | | SEP-29-1990/VIL |
| | LWP18895 | Low | 8+8 min | | | SEP-29-1990/VIL |
| | SWP39733 | Low | 90 min | | | SEP-30-1990/VIL |
| | LWP18904 | Low | 8+8 min | | | SEP-30-1990/VIL |
| | SWP39734 | Low | 93 min | | | SEP-30-1990/VIL |
| | LWP18905 | Low | 150 min | | | SEP-30-1990/VIL |
| | LWP18911 | High | 75 min | | | OCT-01-1990/VIL |
| | SWP39738 | Low | 75 min | | | OCT-01-1990/VIL |
| | LWP18912 | High | 40 min | | | OCT-01-1990/VIL |
| | SWP39739 | Low | 75 min | | | OCT-01-1990/VIL |
| | LWP18913 | High | 40 min | | | OCT-01-1990/VIL |
| | SWP39740 | Low | 60 min | | | OCT-01-1990/VIL |
| | LWP18922 | High | 75 min | | | OCT-02-1990/VIL |
| | SWP39745 | Low | 75 min | | | OCT-02-1990/VIL |
| | LWP18923 | High | 75 min | | | OCT-02-1990/VIL |
| | SWP39746 | Low | 75 min | | | OCT-02-1990/VIL |
| | LWP18924 | High | 40 min | | | OCT-02-1990/VIL |
| | SWP39747 | Low | 39 min | | | OCT-02-1990/VIL |
| | LWP18930 | High | 75 min | | | OCT-03-1990/VIL |
| | SWP39754 | Low | 75 min | | | OCT-03-1990/VIL |
| | LWP18931 | High | 60 min | | | OCT-03-1990/VIL |
| | SWP39755 | Low | 75 min | | | OCT-03-1990/VIL |
| | LWP18932 | High | 50 min | | | OCT-03-1990/VIL |
| | SWP39756 | Low | 45 min | | | OCT-03-1990/VIL |
| | SWP39761 | Low | 30 min | | | OCT-04-1990/VIL |
| | LWP18936 | High | 75 min | | | OCT-04-1990/VIL |
| | SWP39762 | Low | 50 min | | | OCT-04-1990/VIL |
| | LWP18937 | High | 50 min | | | OCT-04-1990/VIL |
| | SWP39763 | Low | 50 min | | | OCT-04-1990/VIL |
| | LWP18938 | High | 50 min | | | OCT-04-1990/VIL |
| | SWP39764 | Low | 50 min | | | OCT-04-1990/VIL |
| HD 72905 | SWP39773 | Low | 65 min | Ayres(N) | CCMTA | OCT-05-1990/VIL |
| OCT-04:OCT-07 | | | | | | |

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|---|---|---|---|---|---|---|
| HD 62509 | SWP39774 | Low | 105 min | Ayres(N) | CCMTA | OCT-05-1990/VIL |
| OCT-05:OCT-07 | | | | | | |
| HD 82210 | SWP39793 | Low | 65 min | Ayres(N) | CCMTA | OCT-08-1990/US2 |
| 0CT-07:OCT-11 | LWP18970 | High | 12 min | Ayres(N) | CCMTA | OCT-08-1990/US2 |
| | SWP39794 | Low | 70 min | Ayres(N) | CCMTA | OCT-08-1990/US2 |
| HD 61421 | SWP39801 | Low | 4 min | Ayres(N) | CCMTA | OCT-09-1990/VIL |
| OCT-08:OCT-11 | | | | | | |
| HD 64511 | SWP39800 | Low | 70 min | de Martino(E) | MI180 | OCT-09-1990/VIL |
| OCT-08:OCT-10 | LWP18974 | Low | 27 min | | | OCT-09-1990/VIL |
| HD 58978 | SWP39806 | High | 2m 50s | Henrichs(E) | MI180 | OCT-11-1990/US2 |
| OCT-10:OCT-13 | LWP18982 | High | 1m 30s | Henrichs(E) | MI180 | OCT-11-1990/US2 |
| HD 61064 | SWP39807 | Low | 55 min | Ayres(N) | CCMTA | OCT-11-1990/US2 |
| OCT-09:OCT-11 | LWP18983 | High | 70 min | Ayres(N) | CCMTA | OCT-11-1990/US2 |
| H1821+643 | SWP39826 | Low | 290 min | Halpern(N) | QSMJH | OCT-13-1990/US1 |
| OCT-13:NOV-19 | LWP19005 | Low | 123 min | Fink(E) | MQ180 | OCT-13-1990/US1 |
| | SWP39868 | Low | 270 min | Malkan(N) | AGMMM | OCT-19-1990/VIL |
| | LWP19035 | Low | 108 min | Ulrich(E) | MQ180 | OCT-19-1990/VIL |
| | SWP39930 | Low | 290 min | | | OCT-23-1990/US1 |
| | LWP19054 | Low | 120 min | | | OCT-23-1990/US1 |
| | SWP39985 | Low | 279 min | | | OCT-28-1990/VIL |
| | LWP19085 | Low | 120 min | | | OCT-28-1990/VIL |
| | SWP40046 | Low | 280 min | | | NOV-04-1990/VIL |
| | LWP19144 | Low | 106 min | | | NOV-04-1990/VIL |
| | SWP40089 | Low | 272 min | | | NOV-09-1990/VIL |
| | LWP19182 | Low | 100 min | | | NOV-09-1990/VIL |
| | SWP40103 | Low | 271 min | | | NOV-13-1990/VIL |
| | LWP19219 | Low | 100 min | | | NOV-13-1990/VIL |
| HM Sge | SWP39837 | Low | 10 min | Nussbaumer(E) | MI180 | OCT-15-1990/US1 |
| OCT-13:OCT:16 | LWP19015 | Low | 8 min | Stencel(N) | ZAMRS | OCT-15-1990/US1 |
| | SWP39838 | Low | 80 min | | | OCT-15-1990/US1 |
| | LWP19016 | Low | 80 min | | | OCT-15-1990/US1 |
| | LWP19017 | High | 177 min | | | OCT-15-1990/US1 |
| Mrk 205 | SWP39842 | Low | 400 min | Ulrich(E) | MQ180 | OCT-16-1990/US1 |
| OCT-16:OCT-20 | | | | | | |
| CK VUL | SWP39860 | Low | 750 min | Krautter(E) | MI180 | OCT-18-1990/COL |
| OCT-17:OCT-20 | | | | | | |
| HD 187399 | SWP39888 | High | 80 min | de Martino(E) | MI180 | OCT-20-1990/US1 |
| OCT-19:OCT-23 | | | | | | |
| HD 106677 | LWP19045 | High | 30 min | Linsky(N) | RSMJL | OCT-20-1990/US1 |
| OCT-21:OCT-26 | SWP39889 | Low | 75 min | Rodono' (E) | MC180 | OCT-20-1990/US1 |
| HD 72779 | SWP39890 | Low | 95 min | Ayres(N) | CCMTA | OCT-20-1990/US1 |
| OCT-18:OCT-21 | | | | | | |
| Mrk 509 | SWP39925 | Low | 30 min | Westergaard(E) | MQ180 | OCT-23-1990/US2 |
| OCT-23:OCT-25 | LWP19048 | Low | 30 min | Gaskell(N) | AGMCG | OCT-23-1990/US2 |
| | SWP39926 | Low | 45 min | | | OCT-23-1990/US2 |
| | LWP19049 | Low | 20 min | | | OCT-23-1990/US2 |
| | SWP39928 | Low | 30 min | | | OCT-23-1990/VIL |
| | LWP19053 | Low | 30 min | | | OCT-23-1990/VIL |
| | SWP39929 | Low | 40+40min | | | OCT-23-1990/VIL |
| QQ VUL | SWP39927 | Low | 94 min | de Martino(E) | MI180 | OCT-23-1990/VIL |
| OCT-22:OCT-25 | LWP19052 | Low | 94 min | | | OCT-23-1990/VIL |

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| JUPITER | SWP39931 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| OCT-24:OCT-26 | SWP39932 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39933 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39934 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39935 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39936 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39937 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39938 | Low | 15 min | Clarke | SAMJC | Oct-24-1990/US2 |
| | SWP39952 | High | 30 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | | Low | + 6 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | | High | +30 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | SWP39953 | Low | 15 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | SWP39954 | Low | 15 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | SWP39955 | Low | 15 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | SWP39956 | Low | 15 min | Clarke | SAMJC | Oct-26-1990/US2 |
| | SWP39957 | Low | 15 min | Clarke | SAMJC | Oct-26-1990/US2 |
| CH Cyg | LWP19071 | High | 50 min | Cardini(E) | MI180 | OCT-27-1990/VIL |
| OCT-24:OCT-30 | SWP39971 | High | 100 min | Stencel(N) | ZAMRS | OCT-27-1990/VIL |
| | LWP19072 | Low | 10 min | | | OCT-27-1990/VIL |
| | SWP39972 | Low | 15 min | | | OCT-27-1990/VIL |
| HD 109387 | SWP39973 | High | 1m 25s | Peters(N) | XBMGP | OCT-27-1990/VIL |
| OCT-28:NOV-01 | | | | de Martino(E) | MI180 | |
| HD 203387 | LWP19073 | High | 15+15min | Montesinos(E) | MC180 | OCT-27-1990/VIL |
| OCT-30:NOV-01 | SWP39974 | Low | 15 min | Haisch(N) | CCMBH | OCT-27-1990/VIL |
| LHG 83 | SWP39995 | Low | 407 min | Pakull(E) | MI180 | OCT-29-1990/VIL |
| SEP-27:NOV-14 | SWP40017 | Low | 380 min | | | NOV-01-1990/US1 |
| | SWP40047 | Low | 375 min | | | NOV-04-1990/US1 |
| | SWP40075 | Low | 380 min | | | NOV-07-1990/US1 |
| SN 1987A | SWP40002 | Low | 270 min | Sonnerborn(N) | SNMGS | OCT-30-1990/US1 |
| OCT-10:NOV-07 | LWP19090 | Low | 105 min | | | OCT-30-1990/US1 |
| PKS 2155-304 | SWP40024 | Low | 60 min | Urry(N) | RGMCU | NOV-02-1990/US2 |
| NOV-03:NOV-05 | LWP19124 | Low | 30 min | | | NOV-02-1990/US2 |
| | SWP40025 | Low | 50 min | | | NOV-02-1990/US2 |
| | SWP40056 | Low | 80 min | | | NOV-05-1990/US1 |
| | LWP19155 | Low | 30 min | | | NOV-05-1990/US1 |
| VW HYI | SWP40028 | Low | 20 min | Naylor(E) | MI180 | NOV-03-1990/VIL |
| | LWP19128 | Low | 10 min | | | NOV-03-1990/VIL |
| | SWP40029 | Low | 20 min | | | NOV-03-1990/VIL |
| | LWP19129 | Low | 10 min | | | NOV-03-1990/VIL |
| | SWP40030 | Low | 20 min | | | NOV-03-1990/VIL |
| | LWP19130 | Low | 6 min | | | NOV-03-1990/VIL |
| | SWP40031 | Low | 15 min | | | NOV-03-1990/VIL |
| | LWP19131 | Low | 3 min | | | NOV-03-1990/VIL |
| | SWP40032 | Low | 5 min | | | NOV-03-1990/VIL |
| | LWP19132 | Low | 1m 30s | | | NOV-03-1990/US1 |
| | SWP40033 | Low | 2 min | | | NOV-03-1990/US1 |
| | LWP19133 | Low | 1m 30s | | | NOV-03-1990/US1 |
| | SWP40034 | Low | 4 min | | | NOV-03-1990/US1 |
| | LWP19134 | Low | 1m 30s | | | NOV-03-1990/US1 |
| | SWP40035 | Low | 4m 30s | | | NOV-03-1990/US1 |
| | LWP19135 | Low | 1m 45s | | | NOV-03-1990/US1 |
| | SWP40036 | Low | 4m 30s | | | NOV-03-1990/US1 |
| | SWP40037 | Low | 4m 30s | | | NOV-03-1990/US1 |
| | LWP19136 | Low | 1m 45s | | | NOV-03-1990/US1 |
| | SWP40038 | Low | 4 min | | | NOV-03-1990/US1 |
| | LWP19137 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40039 | Low | 3 min | | | NOV-04-1990/US2 |
| | LWP19138 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40040 | Low | 2m 30s | | | NOV-04-1990/US2 |

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| | LWP19139 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40041 | Low | 2m 30s | | | NOV-04-1990/US2 |
| | LWP19140 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40042 | Low | 2m 30s | | | NOV-04-1990/US2 |
| | LWP19141 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40043 | Low | 2m 15s | | | NOV-04-1990/US2 |
| | LWP19142 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40044 | Low | 2m 15s | | | NOV-04-1990/US2 |
| | LWP19143 | Low | 1 min | | | NOV-04-1990/US2 |
| | SWP40045 | Low | 2m 30s | | | NOV-04-1990/US2 |
| | SWP40057 | Low | 10 min | | | NOV-05-1990/US1 |
| | LWP19156 | Low | 7 min | | | NOV-05-1990/US1 |
| | SWP40058 | Low | 10 min | | | NOV-05-1990/US1 |
| | LWP19157 | Low | 6 min | | | NOV-05-1990/US1 |
| | SWP40059 | Low | 10 min | | | NOV-05-1990/US1 |
| | SWP40073 | Low | 30 min | | | NOV-07-1990/VIL |
| | LWP19172 | Low | 20 min | | | NOV-07-1990/VIL |
| HD 1581 NOV-03:NOV-08 | SWP40060 | Low | 65 min | Ayres(N) | CCMTA | NOV-05-1990/US1 |
| Mrk 279 NOV-05:NOV-10 | SWP40074 | Low | 120 min | Gakell(N) | | NOV-07-1990/VIL |
| | LWP19173 | Low | 107 min | | | NOV-07-1990/VIL |
| H0139-68 NOV-07:NOV-13 | SWP40082 | Low | 227 min | de Martino(E) | MI180 | NOV-08-1990/US1 |
| | LWP19175 | Low | 165 min | | | NOV-08-1990/US1 |
| HD77137;TYPyx NOV-10:NOV-13 | FES 2383 | Full-field | | Rodono'(E) | MC180 | NOV-10-1990/US2 |
| | LWP19186 | High | 60 min | Linsky(N) | RSMJL | NOV-10-1990/US2 |
| | SWP40092 | Low | 30 min | Gimenez(E) | MC180 | NOV-10-1990/US2 |
| | LWP19187 | High | 60 min | | | NOV-10-1990/US2 |
| | SWP40093 | Low | 90 min | | | NOV-10-1990/US2 |
| | LWP19188 | High | 60 min | | | NOV-10-1990/US2 |
| | LWP19189 | High | 60 min | | | NOV-10-1990/US2 |
| | FES 2384 | Default | | | | NOV-10-1990/US2 |
| | LWP19190 | High | 60 min | | | NOV-10-1990/VIL |
| | SWP40094 | Low | 90 min | | | NOV-10-1990/VIL |
| | LWP19191 | High | 60 min | | | NOV-10-1990/VIL |
| | LWP19192 | High | 90 min | | | NOV-10-1990/VIL |
| | FES 2385 | Default | | | | NOV-10-1990/VIL |
| | LWP19193 | High | 90 min | | | NOV-10-1990/US1 |
| | SWP40095 | Low | 90 min | | | NOV-10-1990/US1 |
| | LWP19194 | High | 90 min | | | NOV-10-1990/US1 |
| | LWP19195 | High | 90 min | | | NOV-10-1990/US1 |
| | LWP19196 | High | 90 min | | | NOV-10-1990/US1 |
| | SWP40096 | Low | 90 min | | | NOV-11-1990/US2 |
| | LWP19197 | High | 90 min | | | NOV-11-1990/US2 |
| | LWP19198 | High | 90 min | | | NOV-11-1990/US2 |
| | LWP19199 | High | 90 min | | | NOV-11-1990/US2 |
| | FES 2386 | Default | | | | NOV-11-1990/US2 |
| | SWP40097 | Low | 30 min | | | NOV-11-1990/US2 |
| | | | +90 min | | | NOV-11-1990/VIL |
| | LWP19200 | High | 90 min | | | NOV-11-1990/VIL |
| | LWP19201 | High | 90 min | | | NOV-11-1990/VIL |
| | FES 2387 | Default | | | | NOV-11-1990/VIL |
| | LWP19202 | High | 90 min | | | NOV-11-1990/US1 |
| | SWP40098 | Low | 120 min | | | NOV-11-1990/US1 |
| | LWP19203 | High | 90 min | | | NOV-11-1990/US1 |
| | LWP19204 | High | 90 min | | | NOV-11-1990/US1 |
| | LWP19205 | High | 90 min | | | NOV-11-1990/US1 |
| | SWP40099 | Low | 100 min | | | NOV-12-1990/US2 |
| | LWP19206 | High | 90 min | | | NOV-12-1990/US2 |
| | LWP19207 | High | 60 min | | | NOV-12-1990/US2 |
| | LWP19208 | High | 90 min | | | NOV-12-1990/US2 |
| | SWP40100 | Low | 40 min | | | NOV-12-1990/US2 |
| | | | +80 min | | | NOV-12-1990/VIL |

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| | LWP19209 | High | 90 min | | | NOV-12-1990/VIL |
| | LWP19210 | High | 90 min | | | NOV-12-1990/VIL |
| | LWP19211 | High | 90 min | | | NOV-12-1990/VIL |
| | FES 2388 | Default | | | | NOV-12-1990/VIL |
| | SWP40101 | Low | 120 min | | | NOV-12-1990/US1 |
| | LWP19212 | High | 90 min | | | NOV-12-1990/US1 |
| | LWP19213 | High | 90 min | | | NOV-12-1990/US1 |
| | LWP19214 | High | 90 min | | | NOV-12-1990/US1 |
| | SWP40102 | Low | 110 min | | | NOV-13-1990/US2 |
| | LWP19215 | High | 90 min | | | NOV-13-1990/US2 |
| | LWP19216 | High | 70 min | | | NOV-13-1990/US2 |
| | LWP19217 | High | 75 min | | | NOV-13-1990/US2 |
| | LWP19218 | High | 90 min | | | NOV-13-1990/US2 |
| HD 212697 | SWP40124 | Low | 100 min | Rossi(E) | MC180 | NOV-17-1990/US2 |
| NOV-14:NOV-17 | LWP19235 | High | 40 min | Ayres (N) | CCMTA | NOV-17-1990/US2 |
| N LMC 88#2 | SWP40135 | Low | 830 min | Krautter(E) | MI180 | NOV-18-1990/COL |
| NOV-03:NOV-26 | FES 2394 | Default | | | | NOV-18-1990/VIL |
| HD 201091 | SWP40140 | Low | 185 min | Ayres(N) | CCMTA | NOV-19-1990/VIL |
| NOV-18:NOV-22 | | | | | | |
| HD 85444 | LWP19249 | High | 50 min | Haisch(N) | CCMBH | NOV-20-1990/US2 |
| NOV-18:NOV-20 | SWP40145 | Low | 90 min | | | NOV-20-1990/US2 |
| | LWP19250 | Low | 0m 15sec | | | NOV-20-1990/US2 |
| HD 212571 | LWP19261 | High | 45 sec | Henrichs(E) | MI180 | NOV-21-1990/US1 |
| NOV-21:NOV-23 | SWP40157 | High | 1m 20sec | Peters(N) | XBMGP | NOV-21-1990/US1 |
| NGC 4051 | SWP40161 | Low | 133 min | Green(N) | | NOV-22-1990/VIL |
| NOV-21:NOV-24 | LWP19265 | Low | 133 min | Walter(E) | MQ180 | NOV-22-1990/VIL |
| | SWP40162 | Low | 100 min | | | NOV-22-1990/VIL |
| Fairall 9 | LWP19270 | Low | 50 min | Walter(E) | MQ180 | NOV-23-1990/US1 |
| NOV-22:NOV-26 | SWP40179 | Low | 100 min | | | NOV-23-1990/US1 |
| | SWP40180 | Low | 20 min | | | NOV-23-1990/US1 |
| HD 129333 | LWP19285 | High | 90 min | Guinan(N) | RSMEG | NOV-26-1990/US1 |
| NOV-23:NOV-29 | SWP40203 | Low | 300 min | | | NOV-26-1990/US1 |
| NGC 4151 | SWP40207 | Low | 100 min | Walter(E) | MQ180 | NOV-27-1990/VIL |
| NOV-26:NOV-29 | LWP19289 | Low | 50 min | | | NOV-27-1990/VIL |
| HD 200120 | SWP40208 | High | 1m 15sec | Peters(N) | XBMGP | NOV-27-1990/VIL |
| NOV-24:NOV-29 | | | | | | |
| AG DRA | SWP40226 | Low | 10+2 min | Stencel(N) | ZAMRS | NOV-29-1990/VIL |
| NOV-24:DEC-04 | LWP19313 | Low | 10+4 min | Nussbaumer(E) | MI180 | NOV-29-1990/VIL |
| | SWP40227 | High | 71 min | Viotti(E) | MI180 | NOV-29-1990/VIL |
| MRK 876 | SWP40246 | Low | 240 min | Ulrich(E) | MQ180 | DEC-02-1990/VIL |
| NOV-30:DEC-11 | LWP19339 | Low | 125 min | | | DEC-02-1990/VIL |
| | SWP40274 | Low | 240 min | | | DEC-05-1990/VIL |
| | LWP19355 | Low | 109 min | | | DEC-05-1990/VIL |
| | SWP40289 | Low | 240 min | | | DEC-08-1990/VIL |
| | LWP19372 | Low | 170 min | | | DEC-08-1990/VIL |
| | SWP40305 | Low | 240 min | | | DEC-10-1990/VIL |
| | LWP19380 | Low | 154 min | | | DEC-10-1990/VIL |
| HD 222800 | SWP40263 | Low | 30 min | Viotti(E) | MI180 | DEC-03-1990/US1 |
| DEC-02:DEC-05 | LWP19348 | Low | 30 min | Stencel(N) | ZAMRS | DEC-03-1990/US1 |
| | SWP40265 | High | 115 min | | | DEC-03-1990/US1 |
| (JET) | SWP40264 | Low | 180 min | | | DEC-03-1990/US1 |
| HD 222107 | LWP19349 | High | 4 min | Guinan(N) | RSMEG | DEC-04-1990/US2 |

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| DEC-30:JAN-03 | SWP40266 | Low | 30 min | Rodono' (E) | MC180 | DEC-04-1990/US2 |
| | LWP19500 | High | 4 min | Guinan(N) | RSMEG | DEC-31-1990/US2 |
| | SWP40500 | Low | 30 min | Rodono' (E) | MI180 | DEC-31-1990/US2 |
| | SWP40693 | Low | 30 min | Guinan(N) | RSMEG | JAN-27-1991/US2 |
| | LWP19655 | High | 4 min | Rodono' (E) | MC180 | JAN-27-1991/US2 |
| HD 108102 | LWP19377 | High | 210 min | Linsky(N) | RSMJL | DEC-09-1990/VIL |
| DEC-07:DEC-09 | SWP40294 | Low | 120 min | Rodono' (E) | MC180 | DEC-09-1990/VIL |
| | LWP19378 | Low | 4m 40sec | | | DEC-09-1990/VIL |
| HD102870 | SWP40307 | Low | 65 min | Ayres(N) | CCMTA | DEC-11-1990/VIL |
| DEC-10:DEC-12 | LWP19389 | High | 20 min | Ayres(N) | CCMTA | DEC-11-1990/US1 |
| PG 1211+143 | SWP40308 | Low | 200 min | Ulrich(E) | MQ180 | DEC-11-1990/VIL |
| DEC-10:DEC12 | LWP19386 | Low | 60 min | | | DEC-11-1990/VIL |
| HD 218356 | SWP40309 | Low | 72 min | Harper(E) | MC180 | DEC-11-1990/US1 |
| DEC-11:DEC-14 | LWP19387 | High | 20 min | | | DEC-11-1990/US1 |
| HD 222368 | SWP40310 | Low | 125 min | Ayres(N) | CCMTA | DEC-11-1990/US1 |
| DEC-10:DEC-13 | LWP19388 | High | 20 min | | | DEC-11-1990/US1 |
| HD 210334 | LWP19393 | High | 60 min | Rodono' (E) | MC180 | DEC-12-1990/VIL |
| DEC-10:DEC-14 | SWP40313 | Low | 30 min | Gimenez(E) | MC180 | DEC-12-1990/VIL |
| | LWP19394 | High | 70 min | | | DEC-12-1990/VIL |
| | SWP40314 | Low | 30+30 min | | | DEC-12-1990/VIL |
| | LWP19395 | High | 70 min | | | DEC-12-1990/VIL |
| | FES2399 | Default | | | | DEC-12-1990/VIL |
| | LWP19396 | High | 70 min | | | DEC-12-1990/US1 |
| | SWP40315 | Low | 60 min | | | DEC-12-1990/US1 |
| | LWP19397 | High | 70 min | | | DEC-12-1990/US1 |
| | LWP19398 | High | 70 min | | | DEC-12-1990/US1 |
| | SWP40316 | Low | 30 min | | | DEC-12-1990/US1 |
| | SWP40317 | Low | 30+30 min | | | DEC-13-1990/VIL |
| | LWP19404 | High | 70 min | | | DEC-13-1990/VIL |
| | LWP19405 | High | 60 min | | | DEC-13-1990/VIL |
| | SWP40318 | Low | 30 min | | | DEC-13-1990/VIL |
| | LWP19406 | High | 60 min | | | DEC-13-1990/VIL |
| | SWP40319 | Low | 40 min | | | DEC-13-1990/VIL |
| | LWP19407 | High | 60 min | | | DEC-13-1990/VIL |
| | FES2400 | Default | | | | DEC-13-1990/VIL |
| | SWP40320 | Low | 50 min | | | DEC-13-1990/US1 |
| | LWP19408 | High | 50 min | | | DEC-13-1990/US1 |
| | SWP40321 | Low | 50 min | | | DEC-13-1990/US1 |
| | LWP19409 | High | 32 min | | | DEC-13-1990/US1 |
| | LWP19410 | High | 22 min | | | DEC-13-1990/US1 |
| HD 126660 | SWP40329 | Low | 25 min | Ayres(N) | CCMTA | DEC-14-1990/VIL |
| DEC-14:DEC:18 | | | | | | |
| HD 111812 | SWP40330 | Low | 10+10 min | Haisch(N) | CCMBH | DEC-14-1990/VIL |
| DEC-12:DEC-15 | | | | | | |
| HD 4128 | SWP40363 | Low | 35 min | Montesinos(E) | MC180 | DEC-16-1990/US2 |
| DEC-15:DEC-18 | LWP19419 | High | 10 min | Haisch(N) | CCMBH | DEC-16-1990/US2 |
| HD 220657 | SWP40364 | Low | 20 min | Haisch(N) | CCMBH | DEC-16-1990/US2 |
| DEC-15:DEC-17 | LWP19420 | High | 20 min | | | DEC-16-1990/US2 |
| HD 114710 | SWP40380 | Low | 130 min | Ayres(N) | CCMTA | DEC-18-1990/VIL |
| DEC-17:DEC-19 | | | | | | |
| 3C 273 | LWP19447 | Low | 30 min | Courvoisier(E) | MQ180 | DEC-19-1990/US1 |
| DEC-18:DEC-21 | SWP40391 | Low | 70 min | Urry(N) | RGMCU | DEC-19-1990/US1 |
| | LWP19448 | Low | 27 min | | | DEC-19-1990/US1 |
| | SWP40392 | Low | 30 min | | | DEC-19-1990/US1 |

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| | SWP40393 | Low | 25 min | | | DEC-19-1990/US1 |
| | SWP40412 | Low | 25 min | | | DEC-20-1990/US1 |
| | LWP19450 | Low | 27 min | | | DEC-20-1990/US1 |
| | SWP40413 | Low | 30 min | | | DEC-20-1990/US1 |
| | LWP19451 | Low | 27 min | | | DEC-20-1990/US1 |
| | SWP40414 | Low | 30 min | | | DEC-20-1990/US1 |
| HD 93497 | LWP19465 | High | 15 min | Montesinos(E) | MC180 | DEC-23-1990/VIL |
| DEC-23:DEC:26 | SWP40444 | Low | 25 min | Ayres(N) | CCMTA | DEC-23-1990/VIL |
| Mrk 335 | SWP40445 | Low | 193 min | Ulrich(E) | MQ180 | DEC-23-1990/VIL |
| DEC-23:DEC-25 | LWP19466 | Low | 94 min | Gaskell(N) | AGMCG | DEC-23-1990/VIL |
| | | | | Walter(E) | MQ180 | |
| HD 117555 | LWP19468 | High | 130 min | Guinan(N) | RSMEG | DEC-24-1990/VIL |
| DEC-23:DEC-26 | SWP40449 | Low | 140 min | | | |
| HD 16157 | LWP19479 | High | 15 min | Jordan(E) | MC180 | DEC-26-1990/US1 |
| DEC-26:DEC-29 | SWP40462 | Low | 90 min | | | DEC-26-1990/US1 |
| | LWP19480 | Low | 5 min | | | DEC-26-1990/US1 |
| HD 223460 | SWP40463 | Low | 105 min | Ayres(N) | CCMTA | DEC-26-1990/US1 |
| DEC-26:DEC-29 | LWP19481 | High | 45 min | | | DEC-26-1990/US1 |
| HD 224085 | SWP40464 | Low | 60 min | Guinan(N) | RSMEG | DEC-26-1990/US1 |
| DEC-24:DEC-26 | LWP19482 | High | 40 min | | | DEC-26-1990/US1 |
| NGC 3783 | SWP 40469 | Low | 55+55+55m | Gaskell(N) | AGMCG | DEC-27-1990/VIL |
| DEC-25:DEC28 | | | | | | |
| HD 88661 | LWP19483 | High | 3 min | Peters(N) | XBMGP | DEC-27-1990/US2 |
| DEC-25:DEC-30 | SWP40465 | High | 4m 30s | de Martino(E) | MI180 | DEC-27-1990/US2 |
| 3C 279 | SWP40489 | Low | 240 min | Urry(N) | RGMCU | DEC-29-1990/VIL |
| DEC-28:DEC-30 | LWP19492 | Low | 120 min | | | |
| X0748-67 | SWP40490 | Low | 440 min | Penninx(E) | MI180 | DEC-29-1990/US1 |
| DEC-27:JAN-05 | SWP40507 | Low | 393 min | | | DEC-31-1990/US1 |
| | SWP40542 | Low | 370 min | | | JAN-06-1991/US1 |
| HD 36705 | SWP40491 | Low | 70 min | Collier(E) | MC180 | DEC-30-1990/US2 |
| DEC-12:JAN-16 | LWP19493 | Low | 3 min | Rodono'(E) | MC180 | DEC-30-1990/US2 |
| | SWP40492 | Low | 90 min | Vilhu(E) | MC180 | DEC-30-1990/US2 |
| | LWP19494 | Low | 2 min | | | DEC-30-1990/US2 |
| | SWP40493 | Low | 90 min | | | DEC-30-1990/US2 |
| | LWP19495 | Low | 2 min | | | DEC-30-1990/US2 |
| | SWP40494 | Low | 90 min | | | DEC-30-1990/VIL |
| | LWP19496 | High | 20 min | | | DEC-30-1990/VIL |
| | SWP40495 | Low | 90 min | | | DEC-30-1990/VIL |
| | SWP49496 | Low | 90 min | | | DEC-30-1990/VIL |
| | LWP19497 | High | 25+25 min | | | DEC-30-1990/VIL |
| | SWP40497 | Low | 90 min | | | DEC-30-1990/US1 |
| | LWP19498 | High | 50 min | | | DEC-30-1990/US1 |
| | SWP40498 | Low | 90 min | | | DEC-30-1990/US1 |
| | SWP40499 | Low | 90 min | | | DEC-30-1990/US1 |
| | LWP19499 | High | 70 min | | | DEC-30-1990/US1 |
| HD 4502 | LWP19501 | High | 15 min | Linsky(N) | RSMJL | DEC-31-1990/US2 |
| JAN-02:JAN-04 | SWP40501 | Low | 20 min | Rodono'(E) | MC180 | DEC-31-1990/US2 |
| | LWP19502 | High | 10 min | | | DEC-31-1990/US2 |
| NGC 5548 | SWP40531 | Low | 50 min | Walter(E) | MQ180 | JAN-05-1991/VIL |
| JAN-17:JAN-18 | LWP19508 | Low | 50 min | | | JAN-05-1991/VIL |
| | SWP40532 | Low | 50 min | | | JAN-05-1991/VIL |
| MRK 478 | LWP19509 | Low | 60 min | Gaskell(N) | AGMCG | JAN-05-1991/VIL |

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| JAN-17:JAN-18 | SWP40533 | Low | 50+50 min | | | JAN-05-1991/VIL |
| EX HYA | LWP19511 | Low | 30 min | de Martino(E) | MI180 | JAN-06-1991/VIL |
| JAN-17:JAN-19 | SWP40539 | Low | 40 min | | | JAN-06-1991/VIL |
| HD 115659 | SWP40538 | Low | 85 min | Haisch(N) | CCMBH | JAN-06-1991/VIL |
| JAN-09:JAN-11 | | | | | | |
| HD 6903 | SWP40544 | Low | 30 min | Ayres(N) | CCMTA | JAN-07-1991/US1 |
| HD 1671 | SWP40545 | Low | 110 min | Ayres(N) | CCMTA | JAN-07-1991/US1 |
| JAN-03:JAN-05 | | | | | | |
| HD 150708 | SWP40549 | Low | 100 min | Linsky(N) | RSMJL | JAN-08-1991/VIL |
| JAN-01:JAN-12 | LWP19524 | High | 303 min | Rodono'(E) | MC180 | JAN-08-1991/VIL |
| E1405-451 | SWP40570 | Low | 82 min | de Martino(E) | MI180 | JAN-12-1991/VIL |
| | LWP19555 | Low | 84 min | | | JAN-12-1991/VIL |
| MRK 590 | SWP40591 | Low | 150 min | Peterson(N) | AGMBP | JAN-14-1991/US1 |
| JAN-13:JAN-15 | LWP19577 | Low | 90 min | Walter(E) | MQ180 | JAN-14-1991/US1 |
| HD 17206 | SWP40592 | Low | 75 min | Ayres(N) | CCMTA | JAN-14-1991/US1 |
| JAN-14:JAN-16 | LWP19578 | High | 18 min | | | JAN-14-1991/US1 |
| HD 14386 | LWP19583 | Low | 5 min | Karovska(N) | LGMMK | JAN-15-1991/US1 |
| JAN-13:JAN-16 | SWP40597 | High | 374 min | | | JAN-15-1991/US1 |
| | LWP19584 | Low | 3 min | | | JAN-15-1991/US1 |
| HD 131156 | SWP40635 | Low | 90 min | Jordan(E) | MC180 | JAN-20-1991/VIL |
| JAN-19:JAN-21 | LWP19606 | High | 25 min | Ayres(N) | CCMTA | JAN-20-1991/VIL |
| HD 124850 | SWP40636 | Low | 35 min | Ayres(N) | CCMTA | JAN-20-1991/VIL |
| JAN-19:JAN-21 | | | | | | |
| HD 134083 | SWP40637 | Low | 95 min | Ayres(N) | CCMTA | JAN-20-1991/VIL |
| JAN-20:JAN-23 | LWP19658 | High | 30 min | Ayres(N) | CCMTA | JAN-27-1991/US2 |
| HD 17925 | SWP40670 | Low | 90 min | Ayres(N) | CCMTA | JAN-24-1991/US1 |
| JAN-21:JAN-23 | | | | | | |
| EF Eri | LWP19643 | Low | 60 min | de Martino(E) | MI180 | JAN-24-1991/US1 |
| JAN-23:JAN-25 | SWP40671 | Low | 120 min | | | JAN-24-1991/US1 |
| Mrk 841 | SWP40674 | Low | 160 min | Ulrich(E) | MQ180 | JAN-25-1991/VIL |
| JAN-24:JAN-25 | LWP19648 | Low | 80 min | Walter(E) | MQ180 | JAN-25-1991/VIL |
| HD 112091 | SWP40675 | High | 6 min | de Martino(E) | MI180 | JAN-25-1991/VIL |
| JAN-25 | | | | | | |
| HD 5394 | SWP40692 | High | 8 sec | Peters(N) | XBMGP | JAN-27-1991/US2 |
| | LWP19654 | High | 6 sec | de Martino(E) | MI180 | JAN-27-1991/US2 |
| HD 33262 | SWP40694 | Low | 40 min | Rossi(E) | MC180 | JAN-27-1991/US2 |
| | LWP19656 | High | 20 min | Ayres(N) | CCMTA | JAN-27-1991/US2 |
| HD 110432 | LWP19657 | High | 3 min | de Martino(E) | MI180 | JAN-27-1991/US2 |
| | SWP40695 | High | 9 min | | | JAN-27-1991/US2 |