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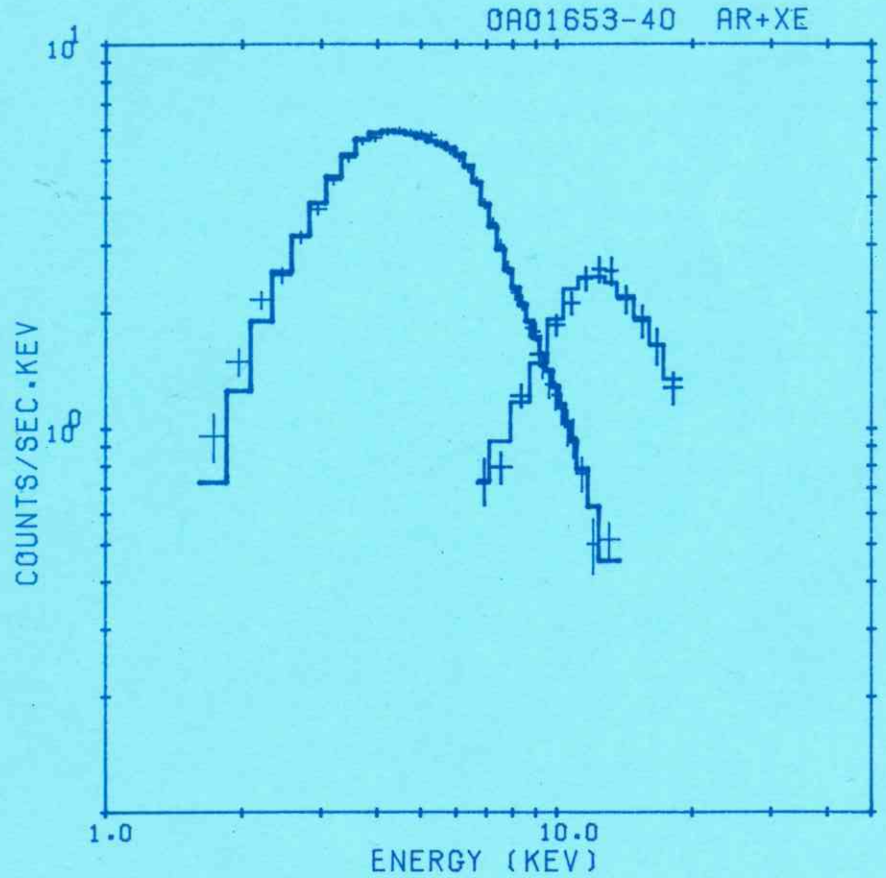
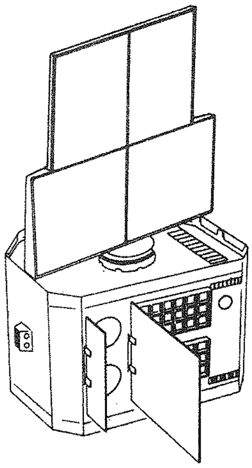


EXOSAT
EUROPEAN X-RAY ASTRONOMY SATELLITE

No. 3 February 1984



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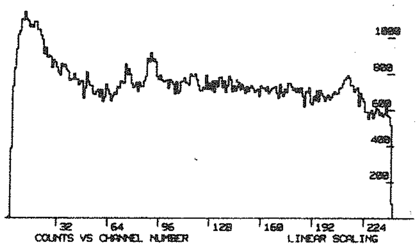

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Front Cover:

Counts spectra from the medium energy experiment Argon and Xenon data for an observation of the 38s pulsar OA0 1653-40, showing the greater sensitivity of the Xe detectors above 10 keV. The derived photon spectrum is in good agreement with a typical accreting pulsar power law spectrum with an Fe emission feature and a high energy break.

Courtesy: A. Parmar

FOREWORD

Issue 3 of the EXOSAT EXPRESS marks the beginning of a standard format containing status reports on hardware, operations, software (in the broadest sense), performance characteristics, a list of targets observed in the current AO period, Observatory Team structure and contributed articles/items of news etc. It is hoped that 'standardisation' of the Express coincides with 'routine' operations, although two recent events - a partial re-activation of CMA2 (p. 4) and a solar proton event giving at satellite altitudes a maximum particle density (> 10 MeV) of 660 cm^{-2} s^{-1} sr^{-1} (p. 5) - suggest otherwise. From time to time the general information on travel, hotels etc. and complete AO/PV-CAL. target lists will be reprinted. All information in this issue reflects the status as of 29.2.84, with AO-1 about 80% complete.

Special to Issue 3 of the EXPRESS are the short biographies and notes of the research interests of the Duty Scientists, preliminary notes on the ME automatic analysis (not included in the FOT handbook revision) and the article 'A Guide to the LE CCF'. Although the stucture of the CCF is defined in the handbook, the intention here is to provide Observers as rapidly as possible with supplementary information to aid their scientific analysis.

Attention is drawn to the paragraph under "future plans" covering proposed changes in the Observatory Team structure and the modification to the Observatory computing facilities which will provide observers with the possibility of interactive analysis of their data on a routine basis. These changes are foreseen to take place over the next few months but they are dependent upon recruitment of suitable personnel, hence the advertisement on page 40. Information is also given on p.41, of various scientific positions within the Agency.

Readers are reminded of the announcement of the 18th ESLAB Symposium on X-ray Astronomy (p.43) and of the intention to maintain a bibliography of all EXOSAT related publications.

EXOSAT EXPRESS

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OBSERVATORY STATUS AS OF 29th FEBRUARY 1984

EXOSAT has been operational for just over 9 months and the programme of observations approved by the Committee on Observation Proposal Selection (COPS) in response to AO-1 is about 80% complete (see p. 11-21).

1. Hardware

1.1 Spacecraft

Z- and X-gyro drifts have been increasing monotonically for some months and are now at 0.6°/hr and 0.4°/hr respectively, such that the accuracy of the drift compensation applied by the attitude and orbit control electronics (AOCE) is reduced. A drift of lower magnitude is observed with the Y-gyro. Two of the four IRAS gyros (similar design) showed a high drift rate (>0.5°/hr) after one year in orbit, although 12 such gyros have been in continuous ground operation for 9 years and only one is presently outside the specification limit. If the drift rates continue to increase, there will be a gradual degradation in open-loop performance ie. during manoeuvres or perigee passes (<50.000 km) when no update from the star tracker of the inertial reference is supplied to the gyros, resulting in larger pointing offsets after manoeuvres or on re-acquisition following perigee and, for observation periods (closed loop), a longer settling time for stable pointing. Note that, at present, stable pointing (< 5 arcsec) is achieved within approximately 20 mins. of the 'closed loop' configuration and that the ± 1 arcsec limit-cycling maintains inertial pointing to within ± 3 arcsec in Y and Z with a bias offset of +5 arcsec in Y (introduced to compensate for an AOCE operational anomaly). No increase is expected in fuel consumption as a result of increasing gyro drift rate.

On board computer (OBC) memory parity error interrupts and erroneous CPU overload errors continue to occur with little impact on operations. The frequency of memory parity interrupts has reduced from 1 or 2/day to 1/several days, apparently after refreshing (write to memory) the entire memory area and re-loading a new version of the in-flight software although the observed gradual reduction is not consistent with the expected behaviour.

There is no explanation for the CPU overload errors which occur about once per 4 to 6 weeks; diagnostic software has been incorporated to aid further investigation.

1.2 Payload

1.2.1 LE1

PSD1 is used routinely (Section 2) for those AO-1 observations approved as relevant PSD targets by the COPS at their meeting on 21.10.83 (Issue 2 p.4). For background limited observations the PSD (operated at its lowest gas gain) is about a factor of 2 less sensitive than the CMA for source detection (details in part 1 of the Observers Guide issued as part of AO-2).

To avoid instabilities in the CMA1 detector/HT supply combination at elevated temperatures, operational procedures have been instituted to maintain a low average detector temperature consistent with carrying out all observations. These procedures include:

- 28V power supply (analogue electronics + HT convertors) switch off for manoeuvres/perigee passes.
- ß angle 'preference' 130° $\leqslant$ ß $\leqslant$ 90°
- Observations (particularly co-ordinated) with ß angle > 130° or < 90° (but consistent with other constraints) are scheduled and interleaved with 'preferred' ß angle targets.

There is no operation at present of the grating because of the partial jamming of the mechanism.

1.2.2 LE2

Reactivation of the detectors of telescope no. 2 has been attempted from time to time since the malfunctions on 28.10.83 and 11.6.83 respectively of the CMA and PSD. No explanation exists for either failure. For the CMA, ideas of temperature effects and mechanical contact problems have been discussed and the general strategy has been to maintain a cool detector (approx. 13°C) and to exchange CMA/PSD a few times prior to any test. In the case of the PSD, which exhibited anomalous behaviour 10 mins. after the first switch-on, gas flushing and in-orbit 'bake out' (temperature rise from typically 25°C to 50°C) using the gas system solenoid valves have so far proved unsuccessful.

After one abortive test on 29.12.83, a second test following the same procedure on 9.2.84 led to a 'partial reactivation' of CMA2. The detector was operated at its' minimum HT setting of 900V on plate 1 and 2830V on plate 2 for approximately 24 hours. Observations were carried out on 0851+202, OI 417, 4C55.16 (FWHM of LSF for 0851 approx. 25 arcsec) on days 40/41. Activation of CMA2 at its' nominal gain (1150V on plate 1 and 2910V on plate 2) resulted in only 30 minutes of normal operation before the malfunction reappeared. Since then no further operation of CMA2 has been achieved, although some confidence now exists that the detector has not suffered an irreversible failure and attempts to re-activate it will be continued.

1.2.3 ME

All sixteen proportional counters operate satisfactorily.

A component failure on 26.11.83 in the drive mechanism electronics for detectors E,F,G,H (lower half-experiment) such that the motor disable pulse is not automatically issued after the requisite movement, has led to a re-appraisal of the simultaneous background monitoring strategy involving no offset of these detectors. If necessary, a procedure can be established to use the OBC time-tagged command facility to issue the motor disable command after n seconds of movement. Further information will be given in a forthcoming issue of the Express.

1.2.4 GSPC

The GSPC continues to operate satisfactorily.

From approximately day 360, gain variations (up to 10%) of the GSPC photomultiplier have been observed. These are caused by the systematic 28V line switch-off during maneouvres instituted to maintain CMA1 as cool as possible. The gain will be measured according to the equivalent energy of light emitting diode (LED) test pulses and the CCF updated per observation. PI's with GS prime observations between day 360 and the establishment of the gain monitoring procedure will be informed separately of the estimated variation.

2. Performance and Operations

Tables 1 and 2 give the current performance parameters of the EXOSAT instruments based upon the latest analyses of PV/Cal phase data. Note refinements in the total effective area of the ME, the total effective geometric area of the GSPC and updated figures for PSD1.

PSD1 operations since re-activation total approximately 24 hours. Preliminary analysis of the data suggests that the 'LEP' (low energy pulse) behaviour differs somewhat from that observed prior to the original breakdown on 27.6.83. Initial switch-on 'LEP' count rates are reproducible at approximately 2 c/s, ie. no increasing trend from one observation to the next, followed by relatively stable operation for 1 to 4 hours, depending apparently on 'age' of gas/whether detector 'baked-out' or not, and then a steady increase to 4/5 c/s over 1/2 hours with fluctuations superimposed. An arbitrary maximum allowable LEP of 5 c/s (below the level observed immediately prior to the breakdown on 27.6.83) has been imposed, such that PSD observations are practically limited to 300 min. at least until the phenomenon is better understood. Detector gain variations are observed consistent with the absence of automatic gain control (AGC) HT compensation for gas density fluctuations as the detector is 'topped up' for window leakage. Further details of the PSD performance will be supplied in the FOT handbook or in forthcoming issues of the EXPRESS.

During the period 1.1.84 to 29.2.84, one sun safety mode trigger on 8/1 and a giant solar 'proton' event on 16/2 disrupted normal operations. Triggering of the sun safety mode was caused by an operational error in the initiation of a fairly uncommon Y-axis only slew, and resulted in the loss of one observation. At 09.07Z on 16/2 EXOSAT 'detected' the onset of a solar proton 'event' which reached a maximum particle density of 660 p cm^{-2} s^{-1} sr^{-1} at satellite altitudes about one hour later, followed by an exponential decay over 24 hours and a continuing enhanced (approx. factor 2 higher background in GSPC/ME) activity for about 6 days. Considerable disruption to the planned observation time line between 16/2 and 22/2 occurred, particularly with respect to ME/GSPC operations (ref. AO-1 list p.21).

On 28.2.84, SNOW on the VILSPA antenna caused a telemetry loss for approximately three hours, (ref. p.44).

AO-1 completion is expected between the middle and end of April, slightly dependent upon re-scheduling of omitted or disrupted observations. Note that a number of AO-1 observations, approximately 55, cannot be performed during the formal AO-1 phase because of coordinated observations after April or violation of the solar constraint, and will be inserted in the appropriate place in the AO-2 time line.

3. On-board Software

A new version of the basic in-flight (BIF) software has been loaded and is running satisfactorily. BIF24 incorporates the following modifications.

- Application program slots: 5 large, 1 small
- Program ROLLER core resident/program SMC interchangeable.

BIF25 is currently under test and will ease operations by allowing all commonly used spacecraft sub-system programs ie. ROLLER, SMC and SAOM to be core-resident. This is achieved by deleting the program BURST, which is not useful because of background variability and solar activity, and re-configuring the program BOM as an interchangeable program.

A modification has been incorporated in the ME program MHER5 (Issue 2. p.6) to allow separate accumulation of Argon and Xenon energy histograms and hence independent variation of the collection times. This feature is available on board but requires some ground support software change.

Design of a new ME application program MHER6 is complete, implementation together with the appropriate ground support software for both MHER5 and MHER6 is scheduled prior to the beginning of AO-2. MHER6 allows intensity profile accumulations for offset and on-axis experiment halves within one or two separate energy ranges, E1<E<E2 and/or E3<E<E4 with time resolutions <1 SWC(32 msec). Full information will be available in Part III of the Observatory Users' Guide.

4. Observation Output

Final Observation Tape (FOT) production has been transferred from a Honeywell to a Siemens computer, increasing both speed and efficiency of production. While some delays occurred with the software conversion and scheduling organisation, current FOT production is at day 23 for LE1/GSPC and day 19 for ME. Some delays occurred in the production of GSPC/ME FOT's because of the PM gain variation monitoring (ref. Section 1.2.4) and errors in filing data from the new MHER5 mode. Despatch of tapes to PI's generally occurs within 1 week of production and we are looking at methods of reducing the gap between tape available at ESOC and in the hands of the PI.

Some observers have requested that the satellite pointing data during slews be included on the FOT to maximise the use of the ME/GSPC slew data, generated mainly for background correlation. Several bright sources have been 'scanned', some known and others unexpected. A method of obtaining the pointing history during slews is being investigated and will be implemented on the FOT if feasible. Prior to this, slew history can usually be reconstructed for specific requests from the manoeuvre history file data.

As expected, initial FOT production back-logs have now more or less migrated through the Observatory system to appear as a back-log in automatic analysis production further complicated by problems of ME energy channel conversion and resolution functions and the general organisation of the AUTO production system. Current production is at day 285 for LE1/LE2/GSPC, and day 262 for the ME with some gaps because of tape reading problems.

Despatch of the auto output to PI's generally occurs about 2-3 weeks after production. It is stressed that the raison d'être of the automatic analysis is to provide the observer with an overview of the results of the observation (note the plans for interactive analysis) and that the output is only 'scanned' by the duty scientists for obvious faults. It is neither practical nor functionally necessary to subject the auto output to a rigorous scientific examination and observers are particularly urged to heed the various warnings in both output and documentation. Note that for the ME spectral fitting is not presently incorporated in the automatic analysis software.

In the LE automatic analysis an incorrect bin size factor for full resolution images has produced source count rate under-estimations which are a few percent or zero for faint sources (20-30 photons) and up to a factor of 5 for sources with several hundred photons. Further details will be given in the next EXPRESS and PI's whose prime LE observations are affected will be informed directly.

Updating and improvement of calibration data has continued since the launch. The calibration histories will be distributed on tape during March to all institutes, and should be used instead of the calibration data on the original AO-1 FOT's. Orbit history data for AO-1 will be included on the same tape (because of errors in the orbit data on some early FOT's).

Documentation for the re-issue of the Final Observation Tape Handbook (FOTH) is in the final stage of preparation and the complete FOTH should be available during March. Included in the FOTH are notes on the LE and GSPC automatic analysis, which have been distributed separately to all AO-1 PI's (NB. one copy only to the hardware institutes). Equivalent notes on the current ME automatic analysis are reproduced on p.31.

5. Future Plans

Efforts to schedule co-ordinated observations and the re-scheduling of those observations not correctly carried out during the high solar activity from 16/2 to 22/2 have increased considerably the quantity of near real time mission planning, nevertheless the time line has been published marginally 4 weeks in advance, viz. March 15th on 15/2 and March 31st on 27/2. The complete AO-1 time line should be available by about mid-March. A number of improvements have been incorporated in the mission planning software and operations, and it should be possible to maintain such an advance time line for AO-2. It must be emphasised that the mission planner or any other observatory team member concerned with the advance planning of the observations will accept inputs from the PI only (or a deputy nominated in writing by the PI). Some recent examples of multiplexing in the input stream have caused a high second derivative of the 'planning function' which can only result in delays in the issue of the time line.

Documentation for AO-2 was issued at the end of January. A response is required at the latest on 9th of March leading to evaluation and selection of the AO-2 programme by mid-April.

The review of EXOSAT scientific operations at ESOC since launch has been completed and it is intended to implement a number of changes. These changes should streamline the operations, improve the working conditions within the observatory, generate a better scientific environment and improve the service to the scientific community.

With the addition of a further HP processor, more disc storage capacity, extra terminals and by linking to the ESOC mainframe computer for CPU intensive operations, a system will be provided to enable the visiting observer to undertake interactive analysis of his data in the 48 hrs following the observation. The observer will be able to call on the support of the resident astronomers (duty scientists) to assist him with the analysis.

The observatory team structure will be modified to provide a scientific focal point within the team. Operations in the EXOSAT Dedicated Control Room (real time EX2 system) will be undertaken by more operationally oriented personnel, leaving the resident astronomers more time for work concerned with calibration, auto analysis overview, interactive analysis support and their own research programmes. Extra manpower will be devoted to mission planning while an increase in the number of data aides should speed up the more clerically oriented tasks.

These changes will be implemented over the coming months so that by the first anniversary of routine operations the new system should be functioning fully. A key element in the change is the recruitment of Duty Scientists/Observatory Controllers and attention is drawn to the 'advertisement' on page 40. In the next issue of the EXPRESS a fuller description of the observatory computational facilities will be given.

TABLE 1

PERFORMANCE CHARACTERISTICS (LE)

LE1	Characteristics			
Energy Range	0.04-2 keV (6-300 A) CMA 0.3 - 2 keV PSD			
Energy resolution	Five filters are available for broad-band spectroscopy (CMA) $(\Delta E/E) = 41/E(keV)^{0.5}$ %FWHM (PSD)			
Field of view	2.2° diameter (CMA) 1.5° diameter (PSD)			
Effective area (cm^2)	Thin Lexan Filter	Al/P Filter	Boron Filter	Open position (PSD)
.05 keV	0.4	2.6	-	-
.1 keV	11.1	0.4	-	-
.5 keV	4.5	3.3	0.4	1.9
1.0 keV	3.2	2.5	2.0	13.5
1.5 keV	2.2	1.6	1.8	9.7
2.0 keV	0.6	0.5	0.6	1.9
Spatial resolution (Line spread function HEW)				
On axis :	18 arc sec (CMA) 3 arc min (PSD)			
20 arc minutes off-axis:	40 arc sec (CMA) 3.5 arc min (PSD)			
Average steady residual background**	1.8 cnts/sec/cm^2 (CMA) 0.7 cnts/sec/cm^2/kev (PSD)			

* Subject to UV contamination between 900 - 2600 A

** Background rate subject to flaring

TABLE 2

PERFORMANCE CHARACTERISTICS (ME & GSPC)

Medium Energy Experiment	Characteristics
Total effective area	1500 cm^2 (all quadrants co-aligned)
Effective energy range	1-20 keV (Argon proportional counters) 5-50 keV (Xenon proportional counters)
Energy resolution ($\Delta E/E$)	$51/E\ (kev)^{1/2}$ % FWHM (Argon counters) 18% for 10 keV $\leq E \leq$ 30 keV (Xenon counters)
Field of view	45 arc minutes FWHM, triangular response with a 3' flat top
Total residual background	4 cnts/sec/keV (2-10 keV Argon counters co-aligned)
Gas Scintillation Counter (GSPC)	
Total effective geometric area	150 cm^2
Effective energy range	2-18 keV or 2-40 keV, depending on gain setting
Energy resolution ($\Delta E/E$)	$27/E\ (kev)^{1/2}$ % FWHM
Field of view	45 arc minutes FWHM triangular response with a 3' flat top
Total residual background rate	1.3 cnts/sec/keV (2-10 keV)

AO-1 OBSERVATIONS: 17.8.83 - 29.02.84

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
198	01.42	GX339-4	16 59 02	-48 43 06	137	6 19	Illovaisky
213	02.40	Jupiter	15 53 50	-19 42 05	113	14 40	Schnopper
221	03.22	GK Per	03 27 46	+43 44 24	76	7 0	Watson
228	08.47	3C120	04 29 59	+05 15 00	76	23 53	Chiappetti
229	21.45	1514-241	15 14 45	-24 11 22	89	9 28	Maccagni
230	09.25	Algol	03 04 53	+40 46 00	90	34 0	White
231	21.40	4U1223-62	12 23 50	-62 29 37	80	8 15	Re
232	07.51	NGC1316	03 23 00	-37 12 00	103	4 45	Machetto
232	14.18	NGC1360	03 31 07	-26 02 20	100	3 27	De Korte
232	19.32	Hyades Field	04 19 09	+14 19 30	81	5 59	Schnopper
233	15.00	T Tau	04 19 04	+19 25 04	81	2 52	Brown
233	18.58	Hyades Field	04 25 29	+15 46 29	80	4 38	Schopper
234	02.00	Feige 24	02 32 30	+03 30 59	110	9 43	Heise
234	13.00	Feige 31	03 01 59	+02 45 59	104	3 57	Heise
234	17.56	NGC 1068	02 40 07	-00 13 31	110	12 37	Lawrence
235	07.28	NGC 1090	02 43 59	-00 27 24	109	2 9	Fricke
235	11.45	FA 71	20 14 48	-57 43 00	129	5 23	Fricke
235	19.29	NGC 5506	14 10 42	-02 58 00	62	9 7	McHardy
236	07.25	GK Per	03 27 45	+43 44 24	89	13 03	TOO
238	19.25	Her X-1	16 56 02	+35 25 03	91	3 5	TOO
238	23.35	MKN 506	17 20 42	+30 55 59	97	3 30	Bleeker
239	04.26	2S1957+115	19 57 02	+11 34 15	138	6 59	Pakull
239	13.13	MSH 15-22	15 09 59	-58 56 57	90	3 49	Aschenbach
239	18.02	RCW 86	14 29 26	-62 01 59	87	4 25	Peacock
239	22.57	RCW 86	14 40 01	-62 12 00	87	5 19	Peacock
240	05.21	1543-475	15 43 49	-47 33 35	91	2 3	TOO
241	05.09	G191 828	05 48 46	+00 11 12	69	2 42	Heise
241	10.37	MSH 15-52	15 09 59	-58 56 57	99	4 28	Aschenbach
241	17.39	HD 149499B	16 34 19	-57 22 13	99	2 13	Heise
241	22.20	1617-155	16 17 04	-15 31 15	90	6 10	Peacock
242	05.05	1617-155	16 17 05	-15 29 16	90	4 55	Peacock
242	10.35	1617-155	16 17 05	-15 27 15	90	5 24	Peacock
242	16.30	1617-155	16 16 57	-15 26 54	90	2 24	Peacock
242	21.14	4U1626-67	16 27 14	-67 21 16	98	7 52	Mason
243	09.05	3A1246-588	12 46 38	-58 51 00	73	4 0	Warwick
243	14.51	40 Eri-B	04 13 00	-07 44 00	96	5 57	Heise
243	22.27	2A0316+413	03 19 10	+41 20 00	98	7 06	Branduardi
244	23.40	NGC 1685	04 50 03	-03 01 00	98	4 39	Pounds
245	07.10	MKN 1040	02 25 17	+31 05 21	114	1 33	Pounds
245	09.46	MKN 1040	02 20 20	+31 57 43	114	1 22	Pounds
245	13.55	0241+622	02 41 01	+62 15 27	96	5 9	Warwick
246	06.55	Roph (C)	16 24 00	-24 20 00	88	17 46	Montmerle
247	03.14	NGC 6814	19 39 54	-10 26 59	133	5 50	Branduardi
247	11.47	ESO141-G55	19 16 57	-58 45 52	115	3 32	Branduardi
247	17.02	ESO103-G35	18 33 22	-65 28 17	107	8 06	Pounds
248	18.51	NGC 7314	22 33 01	-26 18 00	160	3 58	Pounds

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
249	01.58	Fairall 9	01 21 51	-59 03 59	121	2 51	Scarsi
249	07.35	3A0234-526	02 36 41	-52 24 30	116	3 14	Pye
249	13.16	NGC 526A	01 22 00	-35 18 00	136	6 20	Turner
249	22.40	1978 Nov 19	01 16 32	-28 53 00	140	22 53	Hurley
251	00.20	1803+78	18 03 39	+78 27 54	87	7 18	Biermann
251	09.16	AKN 120	05 13 38	-00 12 16	87	2 44	Pounds
251	13.20	NGC 2110	05 49 47	-07 28 06	78	3 48	Pounds
251	19.43	VW Cep	20 38 03	+75 24 52	96	5 06	Heise
252	15.3	IC 443	06 13 45	+22 40 00	73	5 40	Bleeker
252	22.19	IE0630+1748	06 30 00	+17 47 59	68	9 49	Caraveo
253	10.23	NGC 2264	06 38 17	+09 42 19	67	14 17	Charles
254	02.51	LP658-2	05 52 42	-04 09 00	80	5 54	Heise
254	11.30	4U1715-39	17 15 07	-39 19 12	93	1 21	Van Paradijs
254	14.13	HR 5999	16 05 12	-38 58 22	79	7 8	Brown
254	22.46	4U1705-32	17 05 40	-32 13 12	90	1 30	Van Paradijs
255	03.17	3C 382	18 33 12	+32 39 15	103	5 56	Perryman
256	07.44	SU Uma	08 08 04	+62 45 36	68	3 15	Evans
256	18.12	BD 75-325	08 04 44	+75 06 48	76	2 17	De Korte
256	22.50	Cyg X-2	21 42 37	+38 05 28	132	2 27	Treves
257	04.18	WW Cet	00 08 52	-11 45 27	166	4 22	Beuermann
257	11.15	RCW 86	14 36 48	-62 23 33	76	3 54	Peacock
257	17.04	GX5-1	17 58 03	-25 04 39	99	1 54	Kendziorra
257	21.40	H2252-035	22 52 43	-03 26 40	171	7 19	Pietsch
258	07.48	3U1809+50	18 15 08	+50 00 55	95	1 30	Heise
258	10.05	3U1809+50	18 15 08	+49 30 55	95	6 19	Heise
258	19.20	Cyg X-2	21 42 37	+38 05 28	132	2 3	Treves
258	23.46	GR 372	17 48 53	+70 52 42	89	7 55	Heise
260	04.25	H2252-035	22 52 43	-03 26 40	169	6 17	Pietsch
260	12.58	XB1916-05	19 16 00	-05 19 51	115	7 57	White
260	22.38	V 566 Oph	17 54 23	+04 59 31	94	3 18	Heise
261	04.03	MKN 504	16 59 12	+29 29 00	80	2 43	Bleeker
261	09.13	4U1909+07	19 09 12	+07 37 30	112	1 10	Van Paradijs
261	12.41	4U1812-12	18 12 26	-12 07 48	98	1 25	Van Paradijs
261	16.26	Cyg X-2	21 42 37	+38 05 28	131	1 55	Treves
261	20.46	HD 209943	22 00 13	+82 37 51	95	2 4	Heise
262	09.00	Tau-C1 F1	04 26 14	+26 03 30	106	5 18	Bleeker
262	16.37	3A0656-072	06 56 00	-07 12 00	72	2 33	Warwick
262	23.15	NGC 1535	04 11 48	-12 51 33	105	8 16	Osborne
263	23.35	Cyg X-2	21 42 37	+38 05 28	131	1 10	Treves
264	03.29	NGC 1832	05 09 47	-15 44 48	100	2 5	Fricke
264	07.44	HD 497985	06 47 29	-43 59 55	81	1 51	De Korte
264	12.04	AM Her	18 14 57	+49 50 54	93	1 46	Heise
264	14.22	AM Her	18 15 35	+49 50 19	93	7 10	Heise
265	00.03	OA01653-40	16 57 16	-41 34 45	80	8 18	Parmar
265	09.48	G357.7-0.1	17 36 59	-30 57 00	87	3 19	Aschenbach
265	16.12	Cyg X-2	21 42 37	+38 05 28	130	2 17	Treves
265	20.40	GX13+1	18 11 37	-17 10 16	94	3 1	Taylor
266	03.12	1803+78	18 03 39	+78 27 54	90	7 59	Biermann

Day	Time	Target	RA			Dec			SAA	Duration		Principal Investigator
										h	m	
266	13.02	4U1744-26	17	44	49	-26	32	49	87	10	39	D'Amico
267	13.03	GX1+4	17	28	58	-24	42	44	83	12	52	Hall
268	04.15	Cyg X-1	19	56	28	+35	03	55	117	5	40	Page
268	12.20	Tycho SNR	22	29	59	+63	51	38	114	3	0	Davelaar
268	17.47	Tycho SNR	00	22	30	+63	51	38	114	10	8	Davelaar
269	06.01	3C58	02	01	51	+64	35	23	122	4	10	Davelaar
269	12.55	TAU-C2F1	04	52	39	+30	31	12	106	8	38	Bleeker
270	00.15	4U1728-16	17	28	49	-16	55	32	81	12	21	Charles
271	11.20	D143631	16	12	48	+33	59	03	66	27	32	Brinkman
272	20.21	4U2129+47	21	29	35	+47	04	08	122	3	13	Pietsch
273	02.11	NGC 3031	09	48	29	+69	00	00	75	4	24	Bleeker
273	08.50	PSR 0833-45	08	33	39	-45	00	19	66	9	36	Zimmermann
273	18.49	PSR 0833-45	08	33	28	-45	01	04	66	5	21	Zimmermann
274	03.13	G21.5-0.9	18	30	47	-10	36	55	91	3	56	Davelaar
275	04.18	Beta Ori	05	12	08	-08	15	29	109	5	43	UV 1
275	12.23	Crab Nebula	05	31	31	+21	58	54	105	12	37	Brinkman
276	02.13	1st Pnt ME Raster	05	24	26	+23	38	20	107	0	47	Brinkman
277	14.15	End Pnt ME Raster	05	31	46	+20	25	29	107	0	47	Brinkman
277	15.46	Crab Nebula	05	31	31	+21	58	54	107	2	11	Brinkman
277	19.58	4U2129+47	21	29	35	+47	04	08	121	9	32	Pietsch
279	02.06	EY Cygni	19	52	40	+32	13	39	107	7	39	Beuermann
279	13.10	MR 2251	22	51	25	-17	50	54	144	24	5	PV/CAL
280	15.17	1822-371	18	22	22	-37	08	03	81	5	32	Mason
280	23.20	CN Ori	05	49	39	-05	25	34	93	3	51	Mason
281	14.40	1803+78	18	03	38	+78	27	54	64	6	25	Biermann
281	23.26	0851+202	08	51	57	+20	17	57	65	2	04	Willmore
282	16.34	Fairall 9	01	21	47	-58	59	00	114	3	21	Scarsi
282	21.21	WX Hyi	02	08	17	-63	28	13	109	4	0	Mason
283	03.53	1928+73	19	27	37	+73	51	14	98	8	6	Biermann
283	14.35	MK509	20	41	12	-10	50	34	113	4	21	Molteni
283	21.50	H0850+13	08	41	31	+12	59	15	67	1	25	Sims
284	04.11	H225-086	22	15	21	-08	31	38	135	5	32	Maraschi
284	12.45	Fairall 9	01	21	47	-58	59	00	114	2	3	Scarsi
284	16.50	V1223 SGR	18	52	02	-31	17	50	84	7	14	Osborne
285	02.59	H2003+22	20	03	09	+22	31	39	106	6	15	Maraschi
285	11.50	W Uma	09	40	42	+56	07	40	76	7	20	Heise
286	12.16	Fairall 9	01	21	47	-58	59	00	113	7	25	Scarsi
286	22.40	SS433	19	09	02	+04	52	00	89	12	19	Watson
287	14.39	OA0538-66	05	37	23	-66	58	26	91	9	5	TOO
288	03.10	SS433	19	09	32	+04	52	00	89	10	49	Watson
288	16.15	Fairall 9	01	21	47	-58	58	59	112	3	26	Scarsi
288	21.48	MR2251-179	22	51	21	-17	46	00	135	2	54	Pounds
289	02.50	SS433	19	09	32	+04	52	00	88	12	17	Watson
290	09.05	V410TAU	04	16	15	+28	22	43	135	3	7	Brown
290	14.34	Fairall 9	01	21	47	-58	59	00	112	3	1	Scarsi
290	20.35	HR1009	03	34	05	+00	30	14	147	3	4	Barstow
291	02.32	HD45348	06	22	19	-52	38	13	92	7	25	UV2

Day	Time	Target	RA			Dec			SAA	Duration h	m	Principal Investigator
291	11.34	EPS ORI	05	33	28	-01	09	49	118	5	1	UV3
291	18.21	LMC X-4	05	32	04	-66	21	31	92	6	39	Pakull
292	03.25	Sirius B	06	43	44	-16	38	45	98	25	29	Heise
293	21.40	HD37128	05	33	28	-01	98	50	120	14	3	Bianchi
294	19.07	Alpha CM	07	36	21	+05	22	28	92	5	3	Mewe
295	03.00	4U2030+40	20	30	11	+40	48	04	106	0	40	Van der Klis
295	05.57	4C59.08	07	03	37	+59	33	34	104	2	41	Strom
295	12.10	MK509	20	41	12	-10	50	34	102	2	7	Molteni
295	16.57	Her X-1	16	55	44	+35	21	35	65	3	20	Trumper
295	22.10	3A1954+319	19	53	38	+31	57	37	97	3	15	Warwick
296	02.37	NGC 6853	19	57	04	+22	34	53	97	3	44	Osborne
296	08.08	GR 288	20	32	37	+18	50	20	104	5	57	Heise
296	16.22	1803+78	18	02	09	+78	25	42	96	10	42	Biermann
297	21.57	Capella	05	13	00	+45	55	18	125	24	58	PV/Cal
299	01.24	Cygnus X-3	20	30	03	+40	47	57	104	10	13	Peacock
299	14.22	IC 4997	20	17	30	+16	35	16	97	2	13	Parmar
300	01.40	YZ CNC	08	07	51	+28	17	24	95	2	11	Heise
300	05.56	E0135.1-7122	01	35	10	-71	27	14	96	2	50	Pye
300	10.17	E0121.9-7335	01	21	52	-73	40	45	94	3	8	Pye
300	15.45	MR 2251-179	22	51	21	-17	46	00	124	5	54	Pounds
301	14.15	H0850+13	08	49	48	+12	36	00	83	5	45	Sims
301	21.31	YZ CNC	08	07	51	+28	17	24	96	2	16	Heise
302	02.45	E0112.0-7059	01	12	02	-70	59	46	95	2	1	Pye
302	05.54	E0101-3-7301	01	01	20	-73	01	23	93	3	17	Pye
302	10.20	E0101.5-7226	01	01	33	-72	26	34	94	3	21	Pye
302	14.14	E0059.0-7228	00	59	04	-72	28	56	93	3	52	Pye
302	18.26	E0057.6-7228	00	57	39	-72	28	02	93	5	34	Pye
303	01.27	LMC X-4	05	32	47	-66	24	13	92	4	35	Pakull
303	08.30	SU Uma	08	08	04	+62	45	36	103	3	21	Evans
303	14.04	E0049.4-7339	00	49	26	-73	39	27	92	2	51	Pye
303	19.37	YZ CNC	08	07	51	+28	17	23	98	1	40	Heise
304	00.45	PKS2155-304	21	55	58	-30	27	52	103	15	27	Maccagni
305	08.21	3C120	04	29	59	+05	15	00	147	5	29	Tanzi
305	16.28	4U0033+58	00	33	12	+58	50	59	131	3	47	Horstmann
305	22.41	YZ CNC	08	07	51	+28	17	24	100	2	14	Heise
306	03.28	ESO141-G55	19	16	56	-58	45	52	69	4	26	Branduardi
306	10.30	PKS0521-365	05	21	14	-36	30	12	114	4	30	Maccagni
306	16.52	PKS0548-322	05	48	49	-32	16	56	113	3	8	Maccagni
306	22.13	NGC 6814	19	30	53	-10	27	00	74	10	52	Branduardi
307	07.25	MK 509	20	41	26	-10	54	17	90	4	14	Molteni
307	14.25	AM Her	18	14	57	+49	50	55	82	5	1	Heise
307	21.56	YZ CNC	08	07	51	+28	17	24	102	2	4	Heise
308	04.26	NGC 6853	19	57	25	+22	34	45	88	2	30	Pakull
309	00.02	4U2030+40	20	30	38	+40	47	13	99	3	7	Van der Klis
309	05.25	MKN 335	00	03	45	+19	55	30	143	3	24	Pounds
309	11.48	NGC 7469	23	00	44	+08	36	18	126	3	4	Pounds
309	23.13	YZ CNC	08	07	51	+28	17	24	104	1	34	Heise
310	02.59	NGC 7213	22	06	14	-47	25	00	92	3	50	Pounds

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
310	09.06	NGC 526A	01 21 39	-35 19 00	125	6 28	Turner
310	18.26	MR 2251-179	22 51 26	-17 50 54	114	1 58	Pounds
310	22.49	MCG2-58-22	23 02 07	-08 57 19	120	3 23	Pounds
311	03.56	PHL 380	22 40 12	-04 30 00	116	1 53	Heise
311	11.08	NGC 4151	12 08 00	+39 40 50	67	6 34	Perola
311	20.18	PG0026+129	00 26 38	+12 59 29	146	3 7	Maraschi
312	02.15	YZ CNC	08 07 51	+28 17 24	106	1 11	Heise
312	21.04	MCG8-11-11	05 51 10	+46 25 55	132	1 42	Maraschi
313	01.40	Ton 524A	10 28 47	+29 02 27	78	8 5	Fink
313	11.38	Praesepe	08 37 00	+20 10 00	99	7 35	Schnopper
313	21.25	YZ CNC	08 07 51	+28 17 24	108	11 57	Heise
314	11.57	Abell 78	21 33 20	+31 28 13	106	3 4	Osborne
314	18.01	MKN 205	12 19 34	+75 35 15	96	2 55	Zimmermann
314	23.31	MKN 618	04 34 00	-10 28 36	144	4 40	Fink
315	06.43	SS Cygni	21 40 44	+43 21 18	109	1 13	Watson
315	10.56	NGC 4151	12 08 00	+39 40 50	70	3 51	Perola
315	17.31	YZ CNC	08 07 51	+28 17 24	110	2 24	Heise
316	13.57	PKS0735+178	07 35 14	+17 49 09	116	5 22	Willmore
316	21.50	1928+73	19 28 49	+73 51 44	100	7 38	Biermann
317	07.17	3A2056+493	20 56 00	+49 19 48	101	3 21	Warwick
317	14.32	PKS0735+178	07 35 14	+17 49 09	117	3 54	Willmore
317	21.10	YZ CNC	08 07 51	+28 17 24	112	1 11	Heise
318	05.04	LMC X-4	05 34 47	-66 24 13	91	1 43	Pakull
318	09.34	PKS0735+178	07 35 13	+17 49 09	118	4 23	Willmore
318	16.25	VW Hyi	04 09 29	-71 25 23	90	3 21	TOO
318	22.30	3C111	04 15 01	+37 54 20	156	1 19	Briel
319	02.46	MKN 352	00 57 08	+31 33 30	146	1 2	Fink
319	06.03	VW Hyi	04 09 28	-71 25 23	90	2 4	Heise
319	11.16	NGC 4151	12 08 00	+39 40 50	73	6 29	Perola
320	08.21	G0921+06	09 22 02	+06 20 45	92	5 28	Pounds
320	16.53	2A1348+700	13 51 52	+69 33 16	90	3 55	Fink
320	23.17	RU Peg	22 11 36	+12 27 11	105	2 42	Beuermann
321	04.20	MR2251-179	22 51 26	-17 50 54	103	1 33	Pounds
321	08.22	KT Per	01 33 48	+50 41 25	141	1 26	Heise
321	12.45	LMC X-4	05 34 15	-66 38 56	92	32 58	Pakull
323	01.17	NGC 4151	12 08 00	+39 40 50	76	5 58	Perola
324	04.36	V0332+53	03 31 05	+53 00 36	146	6 26	TOO
324	12.36	NGC 3587	11 11 54	+55 17 31	94	2 54	De Korte
324	16.44	EG 71	10 38 33	+43 12 38	93	2 20	De Korte
324	20.25	Ton 524A	10 28 48	+29 06 00	90	3 31	Bleeker
325	01.11	XY Leo	09 58 57	+17 40 00	92	1 50	Heise
325	04.46	NGC 2811	09 13 48	-16 06 12	91	3 40	Fricke
325	10.15	Vela SNR	08 16 00	-44 00 00	91	3 0	Smith
325	15.32	V0332+53	03 31 05	+53 00 35	147	3 17	TOO
325	21.20	VW Hyi	04 09 29	-71 25 23	89	3 1	Heise
326	01.44	NGC 7293	22 26 55	-21 05 40	92	2 27	Van der Klis
326	06.00	BPM 97859	23 09 48	+10 31 00	113	1 10	Heise
326	10.00	A0543-68	05 43 49	-68 23 40	89	6 36	Pakull
326	17.28	LMC X-4	05 32 46	-66 24 13	91	5 11	Pakull

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
327	01.15	KT Per	01 33 48	+50 41 24	139	1 15	Heise
327	21.53	PHL 5200	22 25 54	-05 34 17	96	14 2	Schnopper
328	14.47	IRAS I	04 09 42	+05 25 08	165	5 10	TOO
328	22.47	IRAS II	04 13 47	+12 17 36	171	3 58	TOO
329	05.40	V0332+53	03 31 14	+53 00 16	147	6 8	TOO
329	14.23	OX 169	21 41 13	+17 29 49	91	5 4	Perryman
329	21.38	VW Hyi	04 09 28	-71 25 23	88	6 21	Heise
330	06.20	3A0020-260	00 18 12	-25 59 00	108	3 33	Pye
330	12.10	OX 169	21 41 13	+17 29 49	91	4 58	Perryman
330	19.16	0A0526-328	05 27 33	-32 51 19	123	5 59	Brinkman
331	14.45	MR 2251-179	22 51 26	-17 59 54	93	2 30	Pounds
331	18.47	OX 169	21 41 13	+17 29 49	90	4 32	Perryman
332	01.33	2A0526-328	05 27 33	-32 51 19	123	6 16	Brinkman
332	09.50	MR 2251-178	22 51 26	-17 50 54	92	5 55	Pounds
332	18.10	V0332+53	03 31 14	+53 00 17	147	5 24	TOO
333	02.32	2A0311-227	03 12 00	-22 46 49	133	4 7	Watson
333	08.11	HD 22049	03 30 34	-09 37 34	147	7 8	Horstmann
333	18.47	PKS2155-304	21 55 58	-30 37 52	75	2 49	Maccagni
333	23.39	VW Hyi	04 09 29	-71 25 23	87	7 57	Heise
334	10.06	PKS0521-365	05 21 14	-36 30 11	120	4 52	Maccagni
334	16.56	PKS0548-322	05 48 50	-32 16 56	122	2 44	Maccagni
335	23.44	V0332+53	03 31 05	+55 00 36	146	6 43	TOO
336	08.40	1156+295	11 56 57	+29 33 24	83	3 58	McHardy
336	14.48	2223-05	22 23 10	-05 12 23	86	3 37	McHardy
336	20.04	TT Ari	02 03 09	+14 58 00	144	2 31	Beuermann
337	00.56	4U2030+40	20 30 38	+40 47 13	83	1 39	Van der Klis
337	05.21	VW Hyi	04 09 29	-71 25 23	86	1 24	Heise
337	07.55	A0538-66	05 36 44	-67 17 56	90	9 58	McKay
337	20.00	2109-09	21 09 28	-09 01 56	66	3 25	TOO
338	01.49	SS Cygni	21 40 44	+43 21 18	95	6 35	Watson
338	10.52	PG1012-029	10 12 37	-02 53 34	95	6 00	Mason
339	07.01	PG1257+279	12 57 03	+27 54 23	74	2 23	Mason
339	11.02	BE Uma	11 55 10	+49 13 06	96	5 36	Schrijver
339	19.04	Lamda AND	23 35 05	+46 11 14	114	1 51	Gronenschild
339	23.50	Feige 4	00 17 24	+13 36 00	116	2 40	Heise
340	05.25	1156+295	11 56 17	+29 33 24	87	3 23	McHardy
340	11.19	VW Hyi	04 09 29	-71 25 23	86	1 33	Heise
340	15.00	2223-05	22 23 10	-05 12 23	82	3 41	McHardy
340	21.01	TT Ari	02 03 09	+14 58 00	140	2 42	Beuermann
341	00.46	0235+164	02 35 53	+16 24 03	148	5 9	McHardy
341	08.11	2200+420	22 00 39	+42 02 09	96	9 12	Maccagni
341	19.48	0851+202	08 51 57	+20 17 57	124	6 47	Willmore
342	22.34	1156+295	11 56 17	+29 33 24	89	3 16	McHardy
343	05.25	MR2251-179	22 51 26	-17 50 54	81	1 14	Pounds
343	09.01	0235+104	02 35 53	+16 24 05	145	3 19	McHardy
343	14.53	2223-05	22 23 10	-05 12 22	79	3 28	McHardy
343	20.44	CW1103+253	11 02 58	+25 22 42	99	4 41	Beuermann
344	04.08	1928+73	19 28 49	+73 51 44	99	7 21	Biermann

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
344	13.52	MKN 382	07 52 03	+39 19 10	141	7 57	Fink
345	01.06	LMC X-3	05 38 40	-64 06 34	93	6 3	Treves
345	09.25	0235+164	02 35 53	+16 24 05	143	3 26	McHardy
345	16.07	2223-05	22 23 10	-05 12 22	77	2 45	McHardy
345	21.09	1156+295	11 56 57	+29 33 24	92	3 00	McHardy
346	18.20	2S0921-630	09 21 25	-63 04 45	81	8 19	Corbet
347	05.05	PSR0031-07	00 31 36	-07 36 33	104	2 55	Bell-Burnell
347	10.45	NGC3783	11 36 33	-37 37 41	73	7 57	Bell-Burnell
347	19.58	MCG5-23-16	09 45 24	-30 43 00	97	4 13	Pounds
348	05.09	0235+164	02 35 53	+16 24 05	141	2 36	McHardy
348	08.53	HT Cas	01 07 01	+59 48 26	123	5 49	Mason
348	17.09	A1202+31	12 02 05	+31 27 00	95	3 41	Pye
348	23.25	NGC 246	00 44 32	-12 08 44	102	3 5	De Korte
349	03.44	II ZW 1	01 19 30	-01 17 59	116	4 31	Bleeker
349	11.42	NGC 3227	10 20 46	+20 07 08	112	5 44	Lawrence
350	17.44	0241+622	02 41 01	+62 15 27	132	5 50	Warwick
351	02.02	NGC 4151	12 08 01	+39 41 01	98	6 29	Pounds
351	09.47	HZ 21	12 11 24	+33 12 00	96	2 15	Heise
351	13.14	HZ 34	12 53 00	+37 34 00	90	2 2	Heise
351	17.10	3C273	12 26 33	+02 19 26	20	7 50	Turner
352	03.13	4U2030+40	20 30 38	+40 47 13	15	1 23	Van der Klis
352	07.20	MR2251-179	22 51 26	-17 50 54	72	2 9	Pounds
352	11.02	III ZW 2	00 08 00	+10 42 00	100	3 55	Bleeker
352	17.45	NGC2922	09 43 17	-14 05 42	110	6 4	Turner
353	01.58	1215+303	12 15 21	+30 23 40	95	7 57	Maccagni
353	12.35	NGC 6888	20 10 17	+38 12 15	70	3 00	Wendker
354	01.53	NGC 6888	20 10 17	+38 12 15	70	8 02	Wendker
355	02.33	4U0115+634	01 15 14	+63 38 38	120	11 1	Staubert
355	15.33	Cas A	23 21 11	+58 52 00	106	15 27	PV/Cal
356	09.30	X Per	03 51 15	+30 54 01	151	2 4	Robba
356	13.55	HD 121130	13 49 58	+64 58 11	100	3 7	Bedford
356	19.01	NGC 4096	12 03 29	+47 45 13	107	3 3	Gioia
356	23.34	NGC 4490	12 26 09	+41 54 56	100	3 37	Gioia
358	12.49	V0332+53	03 31 14	+53 00 24	138	3 23	TOO
358	19.08	M82	09 51 52	+69 54 58	123	20 44	Biermann
359	18.40	V0332+53	03 31 14	+53 00 24	138	3 50	TOO
360	00.37	NGC 5005	13 08 38	+37 19 25	94	2 55	Gioia
360	05.17	NGC 4244	12 14 59	+38 05 06	104	1 58	Gioia
360	08.46	NGC 4656	12 41 33	+32 27 00	97	1 54	Gioia
360	11.52	NGC 4395	12 23 21	+33 49 22	101	3 13	Gioia
360	16.19	HD 111812	12 49 16	+27 48 44	94	1 28	Zwaan
360	18.51	NGC 4559	12 33 29	+28 14 23	97	4 01	Gioia
361	19.20	MR 2251-179	22 51 26	-17 50 54	63	1 32	Pounds
361	22.56	NGC 693	01 47 54	+05 54 53	112	3 9	Peacock
362	03.04	PG0134+070	01 34 28	+07 01 09	109	2 51	Mason
362	08.26	EG 187	12 54 36	+22 18 00	92	5 6	Heise
362	17.20	NGC 3991/4/5	11 54 57	+32 37 39	109	11 30	Gavazzi
363	07.40	HT Cas	01 07 01	+59 48 26	115	4 50	Osborne

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
363	14.49	NGC 4725	12 48 00	+25 47 20	96	1 27	Gioia
363	17.27	NGC 4565	12 33 52	+26 15 50	99	2 3	Gioia
363	22.08	V0332+53	03 31 14	+53 00 24	135	2 33	TOO
364	03.22	3A1146-118	11 46 29	-11 51 22	96	3 10	Pye
364	07.29	3A1030-346	10 33 36	-35 42 00	99	7 30	Pye
364	19.53	SU UMA	08 08 05	+62 45 36	135	3 07	Evans
365	12.56	MKN 290	15 34 45	+58 04 00	89	1 52	Bleeker
365	16.07	MKN 474	14 53 05	+48 52 47	90	2 51	Bleeker
365	20.56	SA57	13 06 00	+29 30 00	96	28 2	McKechnie
002	03.25	II ZW I	01 19 30	-01 18 00	98	2 20	Bleeker
002	08.24	V0332+53	03 31 15	+53 00 24	133	2 56	TOO
002	13.20	HD 224801	23 58 12	+44 58 00	98	4 2	Ferrari
002	19.05	3A0316-442	03 16 12	-44 16 34	97	2 44	Pye
003	00.11	NGC 988	02 33 00	-09 34 30	100	2 59	Fricke
003	05.43	MKN 590	02 12 05	-00 59 57	108	3 29	Bleeker
003	13.06	4U2030+40	20 30 38	+40 47 13	68	4 26	Van der Klis
004	08.52	A1060	10 34 30	-27 16 00	107	7 8	Schnopper
004	18.47	3A0729+103	07 28 43	+10 02 46	165	5 48	Pye
005	02.32	NGC 4361	12 21 55	-18 30 31	90	3 17	Osborne
005	08.08	A1367	11 41 53	+20 06 59	115	8 51	Schnopper
005	18.35	HD 115383	13 14 18	+09 41 06	90	2 49	Pallavicini
005	23.01	3C273	12 26 33	+02 19 43	99	14 16	Grewing
006	15.32	4U0033+58	00 33 12	+58 51 00	105	1 2	Van Paradijs
006	21.34	CW 1103+253	11 02 58	+25 22 42	128	8 5	Beuermann
007	08.40	V0332+53	03 31 15	+53 00 24	129	3 22	TOO
008	02.19	3C120	04 30 31	+05 15 00	137	1 33	Tanzi
008	05.55	Lamda AND	23 35 06	+46 11 14	91	6 31	Gronenschild
008	23.55	CW 1103+253	11 02 58	+25 22 42	128	7 12	Beuermann
009	09.40	NGC 4581	12 35 36	+01 43 00	100	6 15	Peacock
009	18.46	4U0352+309	03 52 15	+30 54 01	133	1 40	Robba
009	23.01	1928+73	19 28 49	+73 51 44	96	7 30	Biermann
010	08.45	V0332+53	03 31 15	+53 00 24	127	5 46	TOO
010	19.15	4U0352+309	03 52 15	+30 54 01	132	1 8	Robba
010	22.55	HD 127762	14 30 04	+38 31 34	91	2 03	Zwaan
011	20.54	0109+49	01 09 05	+49 12 40	103	1 23	Miller
012	01.31	HD 4614	00 46 03	+57 33 03	103	2 16	Pallavicini
012	08.08	4U1036-56	10 36 10	-56 33 00	93	0 35	Van Paradijs
012	10.51	E0336-358	03 36 54	-35 41 00	100	7 35	Mason
012	20.53	HD133029A	14 58 54	+47 38 00	92	2 24	Ferrari
013	00.37	OQ 208	14 04 46	+28 41 29	94	4 29	Cavaliere
013	07.36	Puppis A	08 21 39	-42 49 00	115	11 31	Aschenbach
013	21.46	1309-057	13 09 02	-05 36 07	94	13 34	Schnopper
014	13.00	HD 115521	13 15 04	+05 43 58	98	9 25	Bedford
015	18.51	HD 13174	02 06 34	+25 42 15	104	0 54	Zwaan
015	22.18	4U0115+63	01 15 14	+63 28 38	106	4 45	Staubert
016	06.44	1147+245	11 47 44	+24 34 34	125	8 51	Willmore
016	17.26	E1352.2+1830	13 52 12	+18 20 58	96	5 49	Stewart
017	00.39	HD 124897	14 13 23	+19 26 30	92	5 26	Pallavicini
017	09.20	1147+245	11 47 44	+24 34 34	126	6 21	Willmore

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
017	17.37	HD 118100	13 32 07	-08 05 06	92	2 42	Pallavicini
017	22.55	HD 20630	03 16 44	+03 11 18	110	1 47	Pallavicini
018	04.00	BE Uma	11 55 10	+49 13 03	125	1 49	Cole
018	09.43	1147+245	11 47 44	+24 34 34	127	5 21	Willmore
018	17.56	BE Uma	11 55 10	+49 13 03	125	1 17	Cole
019	09.30	3A0004+725	00 04 17	+72 31 19	101	4 13	Pye
019	15.52	VO332+53	03 31 15	+53 00 24	119	2 59	TOO
019	21.48	BE Uma	11 55 10	+49 13 03	126	1 12	Cole
020	01.40	PKS1103-006	11 03 58	-00 36 36	131	6 9	Bergeron
020	10.39	NGC 4690	12 46 00	-41 02 02	90	27 45	Manzo
021	15.15	NGC 4507	12 32 54	-39 38 02	95	5 45	Bergeron
021	23.41	HD 81799	09 25 01	-22 07 25	134	1 10	Zwaan
022	04.00	HD 18322	02 53 59	-09 05 52	96	2 30	Bedford
022	08.56	V0332+53	03 31 15	+53 00 24	117	4 41	TOO
023	03.34	PSR1055-52	10 55 49	-52 10 44	100	13 16	Brinkmann
023	20.58	V0332+53	03 31 15	+53 00 23	116	9 34	TOO
024	09.22	4U0316+41	03 16 30	+40 50 00	112	6 2	Branduardi
024	16.33	NGC 1275	03 16 30	+41 20 11	112	9 51	PV/Cal
025	03.32	3A0316+414	03 12 50	+41 20 00	111	6 51	Branduardi
025	11.58	A426	03 16 30	+42 04 59	111	7 8	Branduardi
025	23.10	4U0352+309	03 52 15	+30 54 01	117	7 08	Robba
027	01.33	MCG8-11-11	05 51 10	+46 25 55	137	1 10	Maraschi
027	05.37	MKN 348	00 46 04	+31 41 04	79	8 54	Bergeron
027	17.4	3C111	04 15 02	+37 54 21	121	2 15	Briel
027	22.47	MKN 205	12 19 34	+75 35 15	116	2 8	Zimmermann
028	04.00	PKS 1136-13	11 36 38	-13 34 09	125	11 36	Bergeron
028	18.30	2A1348+700	13 51 52	+69 33 16	111	3 17	Fink
029	00.44	PKS 1217+23	12 17 38	+02 20 21	125	3 55	Zimmermann
029	07.08	0916+86	09 16 17	+86 25 15	111	2 52	Witzel
029	12.10	3A1344-325	13 44 58	-32 35 02	91	3 50	Pye
029	18.24	3C 273	12 26 32	+02 19 27	123	4 01	PV/Cal
030	16.38	EPS CRA	13 55 21	-37 10 26	89	3 7	Heise
030	22.20	PKS1136-13	11 36 39	-13 34 08	128	5 57	Bergeron
031	08.07	HD 16157	02 32 28	-44 00 36	74	1 43	Pallavicini
031	13.57	HD 72905	08 34 46	+65 11 41	132	1 50	Pallavicini
031	18.22	HD 2905	00 30 08	+62 39 22	91	2 50	Zwaan
031	23.35	2A1219+305	12 18 33	+30 23 24	131	3 13	Warwick
032	04.38	NGC 5548	14 15 42	+25 22 00	106	3 50	Branduardi
032	11.04	MKN 421	11 01 39	+38 28 00	145	3 54	Warwick
032	17.45	MKN 501	16 52 13	+39 47 00	80	3 53	Warwick
033	01.01	LMC X-2	05 21 17	-72 00 22	84	6 57	Pakull
033	11.44	MKN 421	11 01 39	+38 38 00	145	2 36	Warwick
033	17.17	2A1219+305	12 18 34	+30 23 24	133	12 53	Warwick
034	12.02	MKN 501	16 52 14	+39 47 00	81	2 23	Warwick
034	16.30	NGC 5033	13 11 09	+36 52 00	122	3 5	Pounds
034	22.01	NGC 4593	12 37 01	-05 04 00	123	2 38	Pounds

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
035	23.47	VV Pup	08 12 52	-18 53 54	142	3 54	Osborne
036	05.46	2S1254-690	12 54 21	-69 01 07	86	6 17	Peacock
036	14.03	PG 1524+438	15 24 10	+43 51 59	99	2 14	Mason
036	17.45	MKN 501	16 52 14	+39 46 59	82	4 5	Warwick
037	00.55	MKN 421	11 01 40	+38 27 59	147	2 55	Warwick
037	06.24	2A1219+305	12 18 34	+30 23 25	135	3 21	Warwick
037	13.08	MKN 79	07 38 47	+49 55 50	141	1 22	Pounds
038	05.48	0851+202	08 51 03	+20 09 26	172	4 45	Willmore
038	14.32	MKN 876	16 13 48	+65 50 00	98	8 18	Pounds
039	00.48	0014+81	00 14 03	+81 18 27	99	3 11	Witzel
039	06.35	0851+202	08 51 03	+20 09 26	171	4 25	Willmore
039	13.34	HD 20902	03 20 44	+49 41 06	101	6 48	UV 4
039	22.40	2353+81	23 53 58	+81 36 11	98	2 52	Witzel
040	06.20	0851+202	08 51 03	+20 09 26	170	4 24	Willmore
040	14.07	OI417	07 10 03	+43 54 26	139	5 29	Cavaliere
041	00.05	4C55.16	08 31 04	+55 44 41	138	1 45	Cavaliere
041	04.25	IE0643-1648	06 43 04	-16 48 25	128	5 19	Beuermann
042	01.10	Omega Cen	13 23 48	-47 23 00	99	13 45	Koch-Miramond
042	18.09	4U1323-62	13 23 04	-61 48 00	92	2 5	Van Paradijs
042	21.20	3A1239-599	12 39 07	-59 55 47	97	2 19	Warwick
043	02.12	IE0643-1648	06 43 04	-16 48 25	127	0 44	Beuermann
043	06.07	0754+100	07 54 23	+10 04 39	154	7 29	Maccagni
043	16.47	IE0643-1648	06 43 04	-16 48 25	127	2 22	Beuermann
043	21.47	E1149.4-6209	11 48 15	-62 15 00	100	5 21	Bignami
044	05.28	4U1322-42	13 22 32	-42 45 30	104	11 7	Molteni
044	18.25	3A1431-409	14 33 34	-40 59 32	94	13 25	McHardy
045	19.32	4U0115+63	01 15 14	+63 28 38	86	4 14	Staubert
046	05.15	Vela X-1	09 00 13	-40 21 25	125	2 30	Peacock
046	10.53	0300+470	03 00 10	+47 04 33	91	2 17	Biermann
046	15.45	Cen X-3	11 19 02	-60 20 57	105	11 44	Peacock
047	06.05	Vela X-1	09 00 13	-40 21 25	125	2 48	Peacock
047	11.30	4U1547-49*	15 43 34	-47 30 59	84	5 30	Peacock
048	19.22	Vela X-1	09 00 13	-40 21 25	125	1 54	Peacock
049	08.52	Vela X-1**	09 00 13	-40 21 25	125	3 38	Peacock
049	14.18	Pleiades	03 45 00	+23 58 00	90	13 5	PV/Cal
050	05.35	Vela X-1	09 00 13	-40 21 25	125	2 49	Peacock
050	11.22	SN1006 West	14 59 07	-41 51 23	94	7 7	Pye
050	18.53	SN1006 East**	15 00 14	-41 39 47	94	9 36	Pye
051	05.50	RCW 86**	14 38 11	-62 12 00	90	4 55	Peacock
051	12.38	HD 127493*	14 29 08	-22 29 35	108	2 0	De Korte
051	16.44	A2147*	15 58 56	+16 05 00	96	6 5	Morini
052	00.23	MKN 29845*	16 03 22	+17 56 06	95	3 1	Peacock
052	06.23	Vela X-1**	09 00 13	-40 21 25	125	2 5	Peacock
052	10.39	MKN 291*	15 52 54	+19 20 19	98	5 57	De Korte
053	07.10	Vela X-1**	09 00 13	-40 21 25	125	2 15	Peacock
053	12.30	RCW 86**	14 39 36	-62 22 00	91	3 43	Peacock
053	17.46	H1626+01	16 23 12	+01 52 11	89	1 45	White
053	21.17	G292.0+1.8	11 22 20	-58 58 59	109	7 34	Fitton

Day	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator
054	07.15	1538+149	15 38 31	+14 57 25	102	9 7	Maccagni
054	18.55	HD 30945	04 45 22	-17 01 23	92	2 50	Bedford
058	00.49	3C279	12 53 35	-05 31 07	139	8 21	Cavaliere
055	10.55	M13A	16 39 54	+36 33 01	93	4 35	Birkinshaw
055	18.15	4U0352+309	03 52 15	+30 54 01	87	2 3	Robba
055	22.40	4U0115+63	01 15 14	+63 28 37	79	3 29	Staubert
056	04.43	E0731.4+3158	07 31 26	+31 58 47	133	6 21	Horstmann
057	00.55	N2146	06 10 45	+78 22 30	104	3 25	Fricke
057	06.00	H1659+44	16 59 00	+44 28 12	91	1 48	White
057	08.38	Her 1/2	17 15 00	+50 13 00	90	24 07	McKechnie
058	15.58	MKN 291	15 52 54	+19 20 20	103	5 02	Willmore
059	23.06	GR 275	16 20 30	+26 02 24	98	6 19	Heise
059	09.06	H1642+11	16 42 05	+11 51 00	92	1 24	White
059	13.18	1308+326	13 08 08	+32 36 54	138	4 4	McHardy
059	19.45	RCW 86	14 38 11	-62 22 20	96	3 24	Peacock

SAA : Solar Aspect Angle
UV1,2,3,4 : UV Star observations: calibration of filter UV Sensitivity
TOO : Target of Opportunity
IRAS I : Strong unidentified IRAS Source) EXOSAT 'blank field'
II : NGC 2982, large IR excess detected by IRAS) calibration
PV/Cal : Performance Verification/Calibration target
* : LE1 only because of solar proton event of 16.2.84.
** : LE1/GS only because of solar proton event of 16.2.84.

Note that the durations of some 'long' observations have been modified in this listing because of an incorrect inclusion of perigee pass times in the previous listing.

IAU (EXOSAT) TELEGRAMS

Circular No.	Title	Comment	Authors
3841	Hercules X-1	Anomalous X-ray behaviour	EXOSAT Team
3842	Supernova in NGC 5236	Multi-waveband observations	W. Wamsteker
3850	GK Persei	351s periodicity during an outburst	M. Watson, A. Smith EXOSAT Team
3854	MXB 1730-335	Active, type 1 bursts	G. Pollard, N. White P. Barr, L. Stella
3858	4U 1543-45	Accurate position, ultra-soft spectrum	R. Blissett, EXOSAT Team
3872	GX 1+4	Unexpected low X-ray state: $\leqslant$ 4 UFU	R. Hall, J. Davelaar EXOSAT Team
3882	4U1755-33	Periodic dips in intensity	N. White, A. Parmar K. Mason
3887	4U2129+47 = V1727 Cygni	Unexpected low X-ray and optical state	W. Pietsch, H. Steinle M. Gottwald
3893	V0332+53	Accurate position, and flux	J. Davelaar, R. Blissett, L. Stella M. McKay, N. White, J. Bleeker
3902	V0332+53	Discovery of 4.4s period	L. Stella, N. White
3906	V0332+53	Unexpected brightening	A.N. Parmar R.J. Blissett T. Courvoisier L. Chiappetti
3912	V0332+53	Orbital parameters determination	N. White, J.Davelaar, A.N. Parmar, L. Stella M. van der Klis

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OBSERVATORY TEAM

		Ext.
David Andrews	Observatory Manager	705*
Julian Sternberg	Observatory Software	703
Julian Lewis	System Software/HP Computers	702
Christine Durham	On-board Software	712
Mike McKay	Mission Planning/Duty Scientist	707
Paul Barr	Duty Scientist	715
Lucio Chiappetti	"	717
Thierry Courvoisier	"	711
Jaap Davelaar	"	710
Paolo Giommi	"	715
Manfred Gottwald	"	758
Julian Osborne	"	714
Arvind Parmar	"	716
Luigi Stella	"	716
Anne Fahey	Data Assistant	709
Linda Osborne	" "	713
Susanne Ernst	" "	713
Sandra Andrews	Secretary	704

*Direct dialling to any extension, prefixed by 886, is possible, eg. 06151-886-705

<u>Personnel Changes</u> (from 01.01.84 to 29.02.84)

- Dr R.J. Blissett has resigned his position as EXOSAT Duty Scientist, effective from 01.02.84.

- Susanne Ernst has been recruited as a data-assistant.

Duty Scientists' Profiles

The profiles of the current EXOSAT Duty Scientists with whom the astronomical community interact are given in the following few pages. Their background, their tasks within the observatory and their current research interests are described. They are all employed by the Agency on one year but renewable contracts with the status of Research Fellows. Their principal rôle is to ensure the smooth scientific operation of EXOSAT in part by providing services and assistance to observers. However, as young scientists with Ph.D's or equivalent, they are expected to maintain their scientific interests in order to provide the proper service to other scientists and to be able to pursue their scientific careers, (eventually for the majority, outside the Agency) after termination of EXOSAT operations.

Paul Barr

Paul graduated from University College London in 1976, and obtained his Ph.D in 1979 with a thesis entitled 'An Investigation of Compact Extragalactic X-ray Sources' while at the Mullard Space Science Laboratory, where he was involved in the analysis of Ariel V and Copernicus data from observations of X-ray binaries, clusters of galaxies and active galactic nuclei. Following his Ph.D he carried out post-doctoral research at UCL, principally on Seyfert Galaxies, and was a guest observer on the IUE and IRAS satellites. He joined the EXOSAT Observatory Team in May 1983, some three weeks prior to the EXOSAT launch.

Within the EXOSAT team, Paul is responsible for the evaluation of both long and short term background variations of ME/GSPC data and is designing and developing a general purpose spectral fitting algorithm.

Paul's research interests are in the area of Active Galactic Nuclei. He is currently working on the analysis of GSPC data from observations of M87 and the Virgo cluster, and on data obtained from recent observations of the rapid burster 1730-333, which is providing new insight into the physics of accretion discs in X-ray bursters.

Lucio Chiappetti

Lucio graduated in Physics at the State University of his native Milan in 1979 with a thesis on Ultraviolet (IUE) Observations of celestial X-ray sources (Cyg X-1, Am Her, SMC X-2). He spent one year at Mullard Space Science Laboratory with the support of a grant from the Italian National Research Council (CNR), working on Ariel 5 X-ray observations. He returned to Milan University for one year and then to MSSL for a further 9 months, pursuing his interests in both X-ray and UV wavebands, with studies of black hole candidates, cataclysmic variables and low mass X-ray binaries. In June 1982 he joined the staff of the Institute for Cosmic Physics of the CNR (Milan), from where he is on leave of absence.

He joined the EXOSAT Observatory Team in July 1982. His main pre-launch activity was concerned with the ground calibration analysis of the CMA's at ESOC and at the Cosmic Ray Working Group (Leiden), and he continuously supports all aspects of the CMA calibration, including point spread function, sum signal analysis, linearisation, the effective area and the UV contamination.

Lucio is involved in a number of EXOSAT AO-1 proposals, both with his former institution and within the framework of wider collaborations, including galactic and extragalactic targets (Cyg X-2, the black hole candidates GX339-4 and LMC X-3, some cataclysmic variables, the Seyferts 3C 120 and MCG 8-11-11 etc.), and is actively participating in the analysis of the data. He is also working on the establishment of the EXOSAT data base.

Thierry J.-L. Courvoisier

Thierry, born and educated in Geneva, received his diploma in Physics from the Federal Institute of Technology in Zurich and developed his interest in Astrophysics at the Institute for Theoretical Physics of the University of Zurich, where he obtained his Ph.D with a thesis on 'Neutrino Transport and Neutrino Luminosity in Supernovae' in 1980. His immediate post-doctoral activity represented a complete change to EXOSAT attitude manoeuvre software development at ESOC, until he returned to 'Astrophysics' by joining the EXOSAT Observatory Team in January 1982.

Prior to the launch of EXOSAT, Thierry participated in ground calibration measurements and data analysis of the GSPC and he designed, developed and commissioned the GSPC automatic analysis software. In the operational phase, he has full responsibility for the GSPC calibration.

For the past three years, Thierry's main research interest has been in the area of Active Galactic Nuclei. Together with a colleague at the University of Zurich, he has developed a model describing the overall spectrum of AGN's and now plans a test series of correlated AGN observations using EXOSAT, radio, optical and IR facilities. He is also analysing EXOSAT data on X-ray bursters, particularly 2S1636-536 for which he has demonstrated a good agreement with the accepted model of a nuclear flash on the surface of a neutron star, even though the EXOSAT observation gave quite different results to previous observations.

Jaap Davelaar

Jaap's involvement with X-ray Astronomy dates back to 1974, when he joined the Cosmic Ray Working Group at the University of Leiden and carried out research on local supernova remnants (eg. NPS, Lupus loop). He obtained his Ph.D in 1979 with a thesis on 'Structure in Galactic Soft X-ray Features'. From 1979-1982 he was in receipt of an ESA Research Fellowship at the Space Science Department of ESTEC where he participated in the development of imaging gas scintillation proportional counters for use in X-ray astronomy. He joined the EXOSAT Observatory Team in April 1982.

Prior to the launch of EXOSAT, Jaap was involved in the ground calibration measurements and data analysis of the LE telescopes and associated software development. His present responsibilites are the calibration and analysis of telescope data with particular emphasis on the PSD aspects.

Jaap's main research interests lie in the area of supernova remnants and their interaction with the interstellar medium, compact objects in SNR's and binary systems. In particular, he is currently working on the analysis of data from observations of the X-ray transient V0332+53 for which EXOSAT provided an accurate position leading to optical and IR counterparts, the Tycho SNR, and GX1+4 where a large change in the rate of mass transfer has been observed.

Paolo Giommi

Paolo obtained his doctorate in Physics at the University of Milan in 1980 with a thesis entitled 'The contribution of discrete sources to the diffuse X-ray background'. After a short continuation of his research in Milan, he joined the High Energy Astrophysics Division of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts and was involved for two years in the analysis and scientific interpretation of the results of Einstein Satellite observations. He joined the EXOSAT Observatory Team in September 1982.

Paolo's main research interest lies in the field of extragalactic X-ray astronomy and he has participated in several studies of Quasars, Seyfert Galaxies and BL Lac objects, particularly concerning X-ray variability, red shift and luminosity distributions of QSO's, cosmologicial evolution of AGN's and BL Lac objects and correlation between X-ray and other waveband luminosities.

Within the EXOSAT team, Paolo is involved in the study of extragalactic X-ray sources and the establishment of the EXOSAT X-ray data base. Specifically, he is currently concerned with an X-ray study of the galaxy M83 observed shortly after the supernova EVANS explosion, X-ray emission and variability of a possible X-ray counterpart of the γ-ray source Geminga and of BL Lac objects.

Manfred Gottwald

Manfred received his diploma in Physics from the University of Munich in 1979 and then spent 3 years at the Max Planck Institut für Extraterrestrische Physik in Garching working on the analysis of COS-B data, specifically related to the interaction between cosmic rays and the interstellar medium. He obtained his Ph.D in 1983 with a thesis on 'Galactic Gamma Rays and the Interstellar Medium' and joined the EXOSAT Observatory Team in July 1983 one month after the launch.

Within the EXOSAT team, Manfred is responsible for the determination of the collimator response for ME/GSPC and their misalignment, and the design of analysis software for experiment/OBC modes incorporated post-launch.

Together with former colleagues at MPI, he is involved in a study of the X-ray binary system 4U2129+47. Because of EXOSAT's ability to perform long continuous observations, the X-ray emission has been observed over at least one binary orbital period and coupled with correlated optical data it has been demonstrated that 4U2129+47 has entered a previously undetected 'quiescent' state.

Julian Osborne

Julian graduated in astronomy from University College London in 1977 and spent the following 5 years at the Mullard Space Science Laboratory working on the pre-launch calibration and post-launch analysis of data from the soft X-ray telescopes on Ariel 6. He joined the EXOSAT Observatory Team in October 1982.

Within the Observatory Team, Julian was reponsible for the specification of many of the real time graphics facilities available to observers and he is presently concerned with GSPC spectral fitting definition and LE automatic analysis software maintenance.

Julian's current research interests lie in studies of AM Her and related objects eg. V1223 Sgr, EX Hya, 1E2203+22, VV Pup. Simultaneous X-ray, optical and IUE observations of 2203+22 including an EXOSAT grating measurement provide high quality data on the relative luminosities of the various spectral components. X-ray periodicities in the data from DQ Her objects have been observed, some at the optical period, some not. The simultaneous X-ray/ optical observations will provide information on the geometry and structure of these binaries.

Arvind Parmar

Arvind obtained his Ph.D in 1982 from University College London (Mullard Space Science Laboratory) with a thesis on 'X-ray emission from Hercules X-1 and OA01653-40 and X-ray Spectroscopy of Solar Flares'. His research at MSSL involved the analysis of data from the Ariel 5, Copernicus and SMM satellites, guest observations with the Einstein satellite and optical observations from the South African Observatory. He joined the EXOSAT Observatory Team in July 1982.

Within the EXOSAT team, Arvind has designed, developed and commissioned much of the ME interactive analysis software available presently at the Observatory, and has participated in the ME automatic analysis program development and the calibration of the ME.

His current research interests are in the areas of X-ray binaries and stellar coronae, combining his background in cosmic and solar physics, and in the application of crystal spectrometers, similar to those flown on SMM, to extra-solar astronomy. He is actively involved in the analysis of data from EXOSAT observations of Her X-1 with initial results presented at the recent Florence Meeting, and is carrying out a detailed phase resolved spectral study of the 38s pulsar OA01653-40. Data from observations of 4U1755-33 and V0332+53 is also being analysed.

Luigi Stella

Luigi was awarded a Doctorate in Theoretical Astrophysics by the University of Rome in July 1980 for a thesis on 'Some Aspects of the Physics of Collapsed Objects'. From October 1980 to April 1981 he continued his theoretical work on models of galactic X-ray sources and cosmology at the International School for Advanced Studies (Trieste, Italy). In May 1981 he joined the High Energy Astrophysics Division of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts where he worked on the analysis and the theoretical interpretation of Einstein X-ray observations of globular cluster sources, AM Her-type objects and the unique source SS 433, particularly the precise characteristic of the time variability of these sources in different X-ray energy bands. Luigi carried on at the same time his theoretical study of magnetic field instabilities in accretion disc models.

In October 1982 he joined the EXOSAT Observatory Team and has contributed to software development for the analysis of EXOSAT data, especially in the field of time-variability analysis, and to the establishment of the EXOSAT data base.

In the past few months Luigi has been involved in the analysis and interpretation of EXOSAT observational data from the transient X-ray source V0332+53 and from AM-Her type objects. The detailed analysis of the short-term flux variations from V0332+53 led to the discovery of a composite type of variability consisting of 4.4sec coherent pulsations together with a Cyg X-1 type of aperiodic flickering.

Notes on the ME Automatic Analysis

These notes describe the main changes in the current ME Automatic Analysis with respect to the formal documentation (FOTH - Issue 1) and are intended to aid observers with the interpretation of the auto output and to highlight areas where the analysis is less than comprehensive. Updates to the FOTH will be issued as and when available.

1. The initial analysis output has been expanded and improved to list the HT settings and spacecraft pointing position for each observation on a FOT.

2. Power spectral density and auto-correlation plots have been removed from the HK analysis because of misleading results caused by the sample multiplexing of the scientific channels.

3. The auxiliary data output now lists the spacecraft roll angle and the RA and DEC of any offset quadrant. Note that in the experiment status section position mon.1 refers to the offset on half 2 and vice-versa.

4. A modification has been made to the method of background subtraction. Prior to launch it was assumed that a simple subtraction of the counts in an offset half experiment would provide a good estimate of the background in an aligned half. In practice, for an observation of a blank field, if the counts in half 2 are subtracted from those in half 1, a residual counting rate of 8-10 ct s^{-1} remains. In order to correct for this in the energy data analysis the standard background spectra stored in the CCF are used to provide an estimate of the residual counting rate over the channels of interest. This correction factor is then applied to the data after the counts in an offset half have been subtracted. The likely uncertainty in this process seems to be about 1-2 c/s in Argon between 2 and 10 keV. A better estimate of the source strength can be obtained using slew data to derive a local set of correction factors.

5. The channels used to construct the time profiles have been changed in order to provide more useful plots. Except for extremely hard and bright sources almost all the observed source counts will be in the lower half channels of Ar and Xe and the channel ranges chosen by the program have been modified to reflect this.

6. In version 1.1 the intensity distributions have been rescaled so that binning problems do not cause the occasional 'spikes' in the distributions seen in the earlier version of the auto.

7. Plots of counts against channel have been expanded so that 4 sets of plots (instead of 3) are now produced. These are for source and background, background, source with background subtracted and source corrected for particle background differences (see above). All spectra are now corrected for dead time losses and the correction factor is given below the listing of the spectra. Note that for a typical background or weak source observation the correction factor is 1.09 and for the Crab Nebula it is 1.40 at the nominal 4096 Hz sampling.

8. A listing of the calibration data for each counter is given. This is primarily of use in ensuring that users' software correctly decodes the revised CCF. Note that the revised CCF is not yet available on the FOTs.

9. Spectral fitting is not currently included in the ME auto analysis. This is because of software modifications needed to reflect the changes made to the CCF. These will be implemented shortly.

10. If a source has a known period the auto analysis can fold the data over a range of periods close to the known period. The program then outputs folded light curves at a period corresponding to the maximum calculated chi-square. However, the best estimate of the period at the epoch at which the observation was made must be known at the time of auto-running. Therefore observers who have an EXOSAT observation of a known pulsar are requested to inform the Duty Scientist planning the orbit of the period, such that the period folding can be correctly scheduled when the auto analysis is run.

A. Parmar

A GUIDE TO THE LE CCF

1. Introduction

Some information is presented here to aid EXOSAT observers in the use of the Low Energy Telescope Current Calibration File to process scientific data. For the layout of the CCF readers are referred to the EXOSAT Observers Guide Part III (the Final Observation Tape Handbook, referred to below as "the FOTH"), section 3.7.1, Rev.1.

This document gives an overview of the contents and omissions of the current CCF, what is meant by "current data", whether the data is preliminary or final and includes a few suggestions on how to use the data.

It is intended to print update notes (when changes to the CCF content are made) and specific documents concerning:

- the CMA effective area (in preparation)
- the CMA point spread function
- the CMA sum signal and its use
- the PSD effective area
- the PSD point spread function
- the PSD energy resolution
- the grating

2. The "current" calibration data

This document refers to the CCF contained on the latest FOT's produced at the time of writing.

The overall SHF key is the time from which the data is valid and refers to the beginning of the mission (early experiment switch on).

It should be stressed that ALL the data in the CCF is based on GROUND CALIBRATION measurements. The times indicated for the single data types refer either to the beginning of the mission, or to the time when the data was put into the file. They are not relevant and can be ignored.

All the data in the CCF is VALID FROM THE BEGINNING OF THE MISSION. However not all of it is yet in a final form (future calibration updates - see FOTH Sect. 5 - will still refer to the beginning of the mission, ie. replace the current values).

Changes in the CCF are described below to enable observers to relate the CCF contents of a FOT to a particular stage of the calibration analysis.

Not all the changes have been recorded in the Calibration History, (FOTH Section 5) since in the early period of the mission the status of some ground calibration data was still highly preliminary.

The starting point for the Calibration History is dated day 277 1983. This date appears as the "last update of file" as well as the "last update of cal. history". The overall SHF key is set to day 1 1980. Some early AO-1 FOTs may contain this CCF (indicated below as CCF 0).

The change between CCF 0 and CCF 1 concerns data type B1 (optics effective area). In CCF 0 this contained two errors, ie. one point in the positional grids giving the effective area as a function of position was incorrectly set to -1 (both CMA and PSD grids). This was point no. 39 of the grids (respectively bytes 332-3 for the CMA and 460-1 for the PSD. The correct values are 806 (CMA) and 695 (PSD). This applies to both LE1 and LE2.

A further change has been made to the calibration history and transmitted to the FOT Production Team. CCF 2 is being written onto the more recent FOTs.

CCF 2 appplies to LE2 only (although few FOTs will be actually produced since the experiment is presently inoperative): the "last update" time will be day 340 (the overall SHF key is unchanged) and the data types involved are E1 and E4, which have been replaced by the final data.

Any CCF with a "last update" time earlier than day 277 1983 should be regarded as highly preliminary. This will mainly apply to Performance Verification FOTs. The following stages in CCF updating have occurred.

	"last update" day	overall SHF key day
CCF -2	166 1981	1 1980
CCF -1	189 1983	166 1981
CCF 0	277 1983	1 1980
1	297 1983	150 1983
2	340 1983	150 1983

CCF -2 is the pre-launch CCF and should NOT be used at all. All the content is either preliminary or not defined. Most data types are also NOT consistent with the present FOTH specifications. This CCF should be disregarded.

CCF -1 is the first post-launch CCF supplied to FOT Production. The following data types are different from CCF 0: A4, B1 (the "missing point" described above), B2 (no information on the Aluminium/Parylene filter support grid), B4 to B6 and B8 to BA (different thicknesses for the filters), BD (preliminary mis-alignments), D1.

3. Status of the "current" data

Please note that "final" refers to the final results of the GROUND calibration analysis, except if otherwise stated.

A1 - Energy grid: this is in its final form.

A2 - CMA pos. grid: this is in its final form. No spare points used.

A3 - PSD pos. grid: this is in the final form, however it refers to 8 arcsec pixels, while the linearised coordinates on a FOT are in 4 arcsec pixels. This should be taken into account when using the grid. No spare points used.

A4 - Mass absorption coeff: this is in its final form.

B1 - Optics effective area: this is in its final ground based form, ie. does not include the (approximately 32%) obscuration caused by the partial flap deployment. Also note that the value of the correction factor for the on-axis position (x=0, y=0, 25th point of the position grid, bytes 304- 305 (PSD) and 432-433 (CMA) is not 100% as specified in the FOTH, but 97.8%.

B2 - Miscellaneous: this is in its final form, except that the MgF_2 filter thickness is missing.

B3-BC - Filter information. The thicknesses should be regarded as reasonable but still preliminary and the thickness as a function of position is not present (all correction factors set to 100%), with the exception of the Boron filter (data types B7 and BC).

BD - Misalignments: this is in its final form (based on in-flight measurements).

BE - Gains - thresholds: unused (set to -1).

C1 - CMA efficiency: these data should be regarded as reasonable but still preliminary. Note also that "spare" values are erroneously set to 0, not to -1.

C2-C5 - CMA Sum signal efficiency correction. This is in its final form.

C6-CD - CMA PSF/LSF. This is in its final ground based form, ie. does not include the effects of the flap obscuration.

CE - CMA sum signal: this is in its final form. Only 8 out of 10 count rates are used.

CF - CMA Acceptancies: This is in its final form.

CG - CMA Hot spots: unused. Note however that two hot spots are known to exist at x = 155, y = 71 (LE1) and X = -11 y = -20 (LE2) with an extent of ± 8 pixels in either direction (linearised coordinates).

CH - Miscellaneous: unused.

D1 - PSD Components: These data should be regarded as preliminary. The thicknesses as a function of position for PPL, Carbon coating, Lexan are set to 100% (including erroneously the spare points in the position grid). The thicknesses of Argon and Methane versus position are not constant, however they are scaled to 10,000 at the centre (not 100). The spare points are erroneously set to -100.

D2 - PSD Support grid: The coefficients for the off-axis modulation are dummy (all set to 0).

D3-DA - PSD PSF/LSF: These numbers are based on the electronic settings used during ground calibration and in-flight prior to the breakdown of the PSDs. Only the values within 31' from the centre are given (ie. the outermost 23 points of the position grid are set to -1).

DB-DE - PSD PSF/LSF: See the note for data types D3-DA. The outermost values of each PSF/LSF curve are often set to -1.

DF - PSD PSF/LSF: Only the data for gas gain #3 are provided.

DG - PSD PSF/LSF: See the note for data types D3-DA.

DH - PSD PSF/LSF: See the notes for data types D3-DA. Only 4 positions out of 5 are supplied.

DI-DJ - Energy pulse height: See the note for data types D3-DA. The coefficients are set to identical values for all electronic gains. Values for AGC #1 (0.33) are a copy of the ones for AGC #2 (0.5).

DK - Energy resolution: It is assumed equal for all positions in the position grid.

DL-DM - Rise time: All values are set to 1.

DW - Window charge-up areas: unused.

DO - Miscellaneous: unused.

E1 - Grating dispersion. Preliminary values for LE1, Unused for LE2.

E2-4 - Grating: unused.

F1-F3 - In flight sources: unused.

4. Differences between LE1 and LE2.

The energy and position grids, the mass absorption coefficients (data types A1-A4) and the optics efficiency (B1-B2) are the same for both experiments. Filter thicknesses (B3-BC) and the mis-alignnments (BD) differ.

CMA data types (with the exception of the efficiency - data type C1) are identified for both experiments: see explanation in section 5.

PSD data types refer to each experiment.

The only grating information available (see section 3 above) is for LE1.

5. Future Updates

The final values for data types E1 and E4 (LE2 only) have been put in the calibration history and will be available on the FOT.

The final values for data type C1 (LE2 only) are available and should be put in the calibration history in the near future.

6. Source of the data

The data in the LE CCF has been derived from the analysis of the ground calibration data obtained during four calibration tests at the Long Beam Test Facility of the Max Planck Institut für Extraterrestrische Physik, Garching. The analysis has been a collaborative effort between the LE hardware institutes - Space Research Laboratory (Utrecht), Cosmic Ray Working Group (Leiden), and Mullard Space Science Laboratory - and the EXOSAT Observatory (LC for the CMA, JD for the PSD).

For the CMA data it should be noted that the detector on LE1 was replaced after the ground calibration. The data in the CCF is therefore a copy of the corresponding LE2 CCF, with the exception of data type C1. The latter contains the efficiency of the detector previously mounted on LE1, considered to be a "standard" CMA. The efficiency of LE2 as a function of energy is, however, abnormal.

The use of LE2 data for LE1 should have no effect on the PSF/LSF parameters (data types C6-CD), since these are dominated by the optics.

A difference in the sum signal-related data (C2-C5, CE, CF) because of a possible difference in gain between the two detectors, should also be small.

All the CMA calibration data is based on empirical fits to the raw data; no specific modelling is implied.

For the PSD the LE1 and LE2 CCF are specific to each experiment. The LE2 PSD has not been operational. The LE1 CCF is valid for PSD observations from launch to day 179. The PSD was operated on the nominal AGC setting of 0.66.

The LE1 PSD calibration data is derived from the ground calibration measurements with the addition of model data to data types D3-DA, where insufficient experimental results were available. The model data takes account of the PSD response/X-ray optics and is validated by comparison with a number of experimental control points. For the grating the analysis of the ground calibration data is still in progress at Utrecht.

7. A note on interpolation

Observatory software uses a cubic spline interpolation for all parameter-parameter functions and a simple two-dimensional interpolation for positional dependency. Information on this will be included in the specific documents referred to in Section 1.

8. Linearisation Coefficients

These coefficients are not part of the CCF. The actual numbers and the procedure used for the linearisation are not particularly relevant for the observer. For general information, however, a brief description is provided of the linearisation process and also an indication of the origin and status of the coefficients themselves.

The linearisation corrects for:

- the gross geometric distortion (eg. the "curved edges").
- the central channel distortion (the "cross" seen on unlinearised images).
- the "channel 22" bar (the horizontal bar seen on unlinearised images).
- the pulse height dependent effects (disabled for the CMAs).
- the temperature zooming.

The linearisation does NOT correct for (ref. FOTH: Issue 2).

- de-blurring (fluctuations of the pointing position).
- the central hot spots (see section 3, data type CG).

- the defects in filters 6 (LE1), 2 and 3 (LE2) (ring-like features on the upper left edge).
- the diagonal (radial) streaks visible in long exposures.
- the "dent" in the point spread function due to the partial flap obscuration.
- the elongation of the point spread function for UV sources with Filter 2.
- the diagonal (tangential) bar occasionally occurring in LE1 in the lower left quadrant.

The linearisation coefficients used by the FOT production software were generated using data taken on the ground (Long Beam Tests) with the following exceptions:

- the central channel distortion coefficients for the CMA's are based on in flight Fe^{55} (filter wheel source) calibrations.
- the gross distortion coefficients for LE1 CMA (not calibrated on the ground) are based on a 50-point raster scan in flight. They are reasonably correct in the central area covered by the raster scan, but the errors could be larger in the outer part of the field of view.

All the sets of coefficients (with the exception of the central channel correction for LE2 PSD), are considered final at the time of generation. For LE1 PSD (which is now operated at a reduced gain) an evolution can be expected.

L. Chiappetti
J. Davelaar

EUROPEAN SPACE AGENCY

VACANCIES AT THE EUROPEAN SPACE OPERATIONS CENTRE ESOC DARMSTADT, GERMANY

The European X-ray Observatory satellite EXOSAT was launched in May 1983 with an orbital life expectancy of about 3.5 years. The orbit is such that EXOSAT is more or less continuously in real time contact with the observatory control centre at ESOC, Darmstadt where operations are conducted round-the-clock, seven days per week.

Applications are invited for research fellowship positions from graduates with a first degree in physics or other physical science, mathematics or computer science or electronics to work as

EXOSAT DUTY SCIENTISTS/OBSERVATORY CONTROLLERS

Their tasks, to be undertaken in a shift system, include -

- operation of the on-board scientific instruments in the optimum mode for the observation being conducted.
- operation of quick-look displays, visual display units, alpha-numerics and strip charts while the observation is in progress.
- monitoring of the proper functioning of the instruments over short timescales and the determination of longer term trends.
- operation of computer equipment to generate automatic scientific analysis output.
- writing and update of software modules associated with instrument state-of-health monitoring.

Applicants should have an aptitude for operations and experience of working with computer based systems including programming. They must posses a good knowledge of English or French with a working knowledge of the other. Applications can only be accepted from candidates who are nationals of ESA member states.

Please send a detailed CV to the Head of Personnel, ESOC, Darmstadt.

Head of Personnel,
ESOC,
Robert Bosch Strasse 5,
6100 Darmstadt,
West Germany.

with a copy to Dr D. Andrews, EXOSAT Observatory Manager at the same address.

EUROPEAN SPACE AGENCY

The European Space Agency has a number of vacancies or potential vacancies for scientific positions in

ASTROPHYSICS, SPACE SCIENCE DEPARTMENT, at ESTEC, Noordwijk, Netherlands.

- Staff scientist (Ph.D or equivalent) to work in gamma-ray astronomy on the analysis of data from earlier satellites and on the development of the COMPTEL instrument for the Gamma-Ray Observatory.

- Staff scientist (Ph.D or equivalent) to work in millimetre and sub-millimetre wave astronomy on the development of instrumentation for potential future space missions and to support studies on such missions.

- Research fellows (4)(Ph.D or equivalent) to work in optical, X-ray and gamma-ray astronomy, with the undertaking of observing programmes and analysis of data from ground-based facilities and EXOSAT and to support the development of instrumentation for future space applications.

SPACE TELESCOPE SCIENCE INSTITUTE, Homewood Campus, John Hopkins University, Baltimore, Maryland, USA

- Astronomers (Ph.D or equivalent), systems analysts and software specialists (graduate level) to support the preparation for and operations of the Space Telescope and to undertake research programmes.

SPACE TELESCOPE, EUROPEAN COORDINATION FACILITY, at ESO Garching bei Munchen, West Germany.

- Instrument scientists (Ph.D or equivalent) and software specialists (graduate level) to support the preparations for and operate the European facility for the archival, retrieval and dissemination of ST scientific data and information to European ST observers and to undertake research programmes.

EXOSAT OBSERVATORY at ESOC, Darmstadt, West Germany

- Research fellows (Ph.D or equivalent) to work as resident astronomers in support of EXOSAT scientific operations and analysis and to undertake research activities in X-ray astronomy.

- Observatory controllers (graduate level) to support EXOSAT scientific operations.

<u>IUE OBSERVATORY</u>, at Villafranca, Madrid, Spain.

- Research fellows (Ph.D or equivalent) to work as resident astronomers in support of IUE scientific operations and analysis and to undertake research activities in ultraviolet astronomy.

The appointments range from short-term (2-3 years) to longer term (4 or more years) but no positions are tenured.

An excellent knowledge of English or French is required with a working knowledge of the other language.

Applications can only be accepted from candidates who are nationals of ESA member states.

Please send letters of application with detailed curriculum vitae to:

Head of Personnel,
ESA/ESTEC,
Postbus 299,
2200 AG Noordwijk,
The Netherlands.

18TH ESLAB SYMPOSIUM

X-RAY ASTRONOMY

The 18th ESLAB SYMPOSIUM will be held in the

EUROPA HOTEL
SCHEVENINGEN
THE HAGUE, NETHERLANDS

from NOVEMBER 5 to NOVEMBER 9, 1984.

The format of the symposium will be:

- invited papers to set the scene
- contributed papers (forming the bulk of the meeting) reporting on the latest findings from EXOSAT, TENMA; the Einstein Observatory and other missions.
- concluding rapporteur papers.

The Scientific Programme Committee includes J.A.M. Bleeker, M. Grewing, H. Schnopper, Y. Tanaka.

The proceedings will be published in several volumes of Space Science Reviews and collected together in book form by Reidel.

Co-sponsorship by COSPAR has been sought.

Attendance will be limited to 150-200 persons. If you wish further information, please fill in and return the slip below.

To: Mrs D. Mulders, ESTEC, PO Box 299, 2200 AG Noordwijk, The Netherlands.

SURNAME.......................... FORENAMES......................

ADDRESS ....

....

TELEPHONE NUMBER .... TELEX NUMBER ....

I would like to receive the formal announcements YES NO

I plan to attend the symposium YES NO

I plan to present a paper YES NO

with tentative topic ....

....

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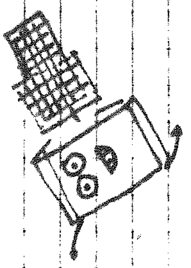
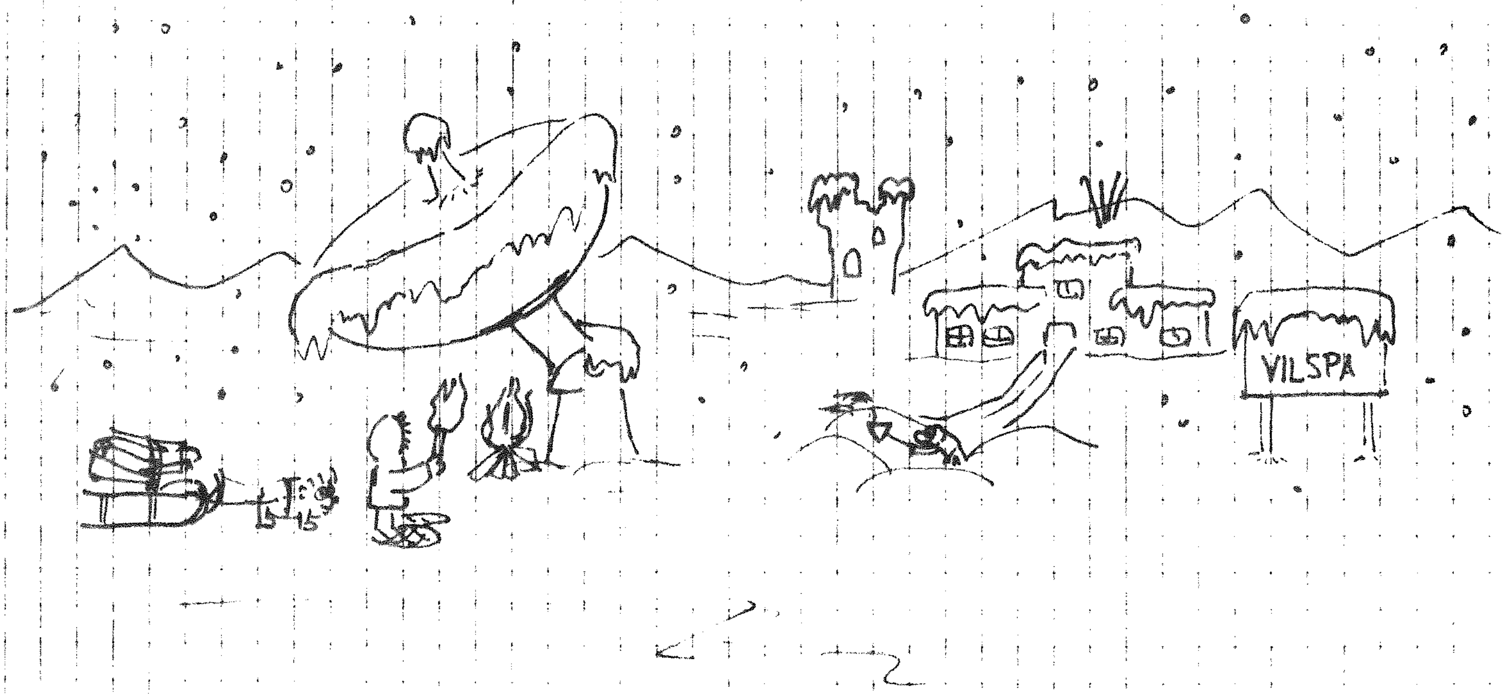
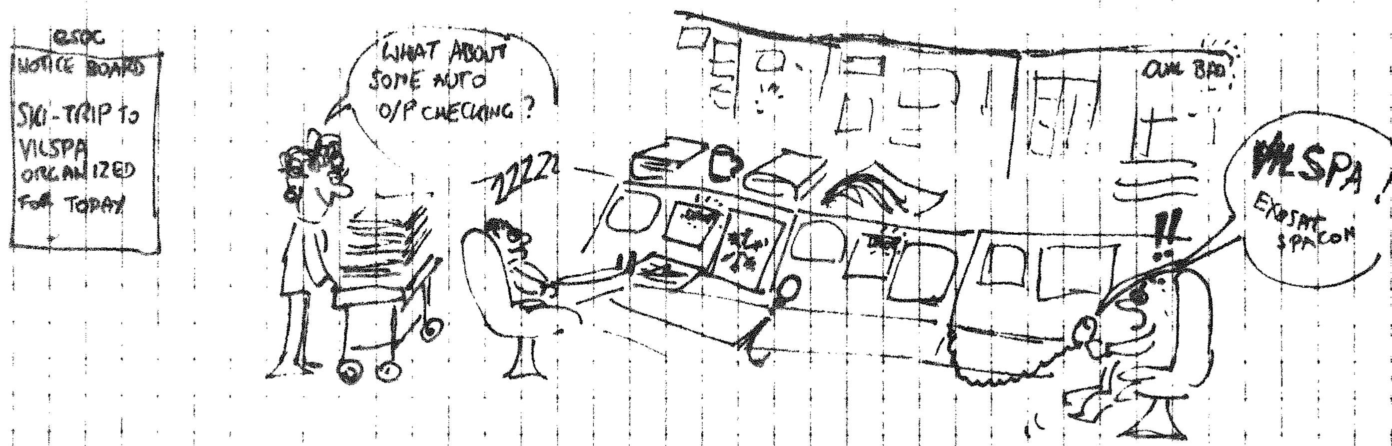
NO TELEMETRY







because of snow on the antenna at VILSPA.

They are trying warming it up now.

L.C. PINXIT

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☐ Please add my name and address (printed below) to the EXOSAT Express mailing list.

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Tear off the page and return to: EXOSAT Observatory, ESOC, Darmstadt.