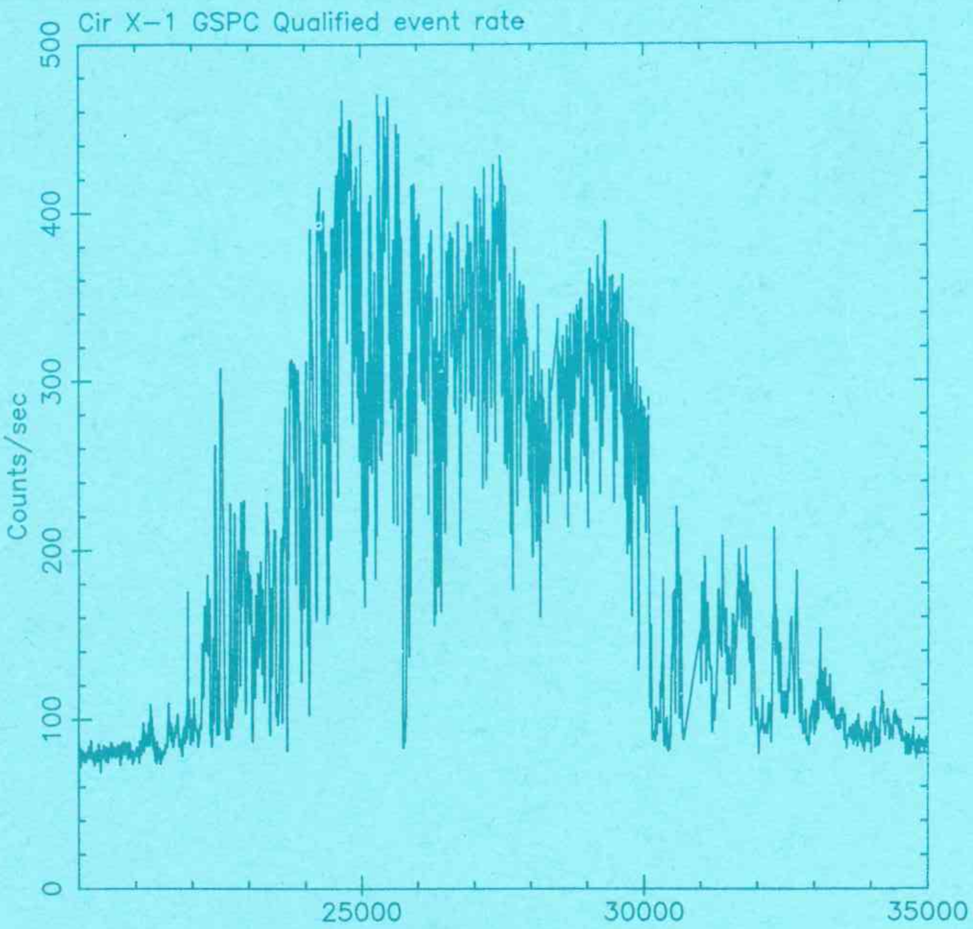
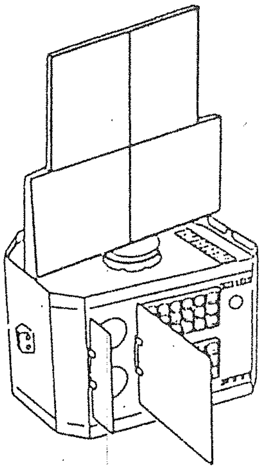
EXOSAT EXPRESS



No. 13

EXOSAT
EUROPEAN X-RAY ASTRONOMY SATELLITE

October 1985



EXOSAT EXPRESS

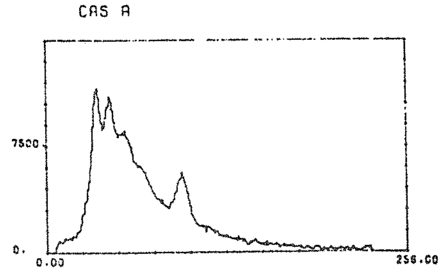


TABLE OF CONTENTS

NO. 13 OCTOBER 1985

Front Cover

An intensity profile of the GSPC qualified event counts from Cir X-1, observed in a transition through a high state on 28 July 1985. Rapid flux variations of more than a factor 10 in less than 10 sec can be seen. Note that the background of ~77 ct/s has not been subtracted and that for comparison the CRAB, which has a much harder spectrum, would give a count rate of ~200 ct/s.

Courtesy: A. Tennant

FOREWORD

Scheduling of AO-3 observations in January/February 1986 is now in progress and the time lines will be produced in the normal manner about 6-8 weeks in advance. Reference is made to the note in Express No.12 p.4 concerning the orbit modification strategy to be followed in order to extend EXOSAT's lifetime beyond its natural limit in April 1986. This strategy is presently under review in the light of estimates of remaining propane control gas and restrictions (solar aspect angle) on the Delta-V manoeuvre. P.I.'s are again advised that from January 1986 onwards the Observatory cannot guarantee that all observations will take place according to the advance schedules and some re-arrangement may be necessary following each orbit manoeuvre.

New procedures have been instituted for orbit preparation and liaison with the P.I. (ref. p.37), principally to assist observers with the selection of the optimum ME OBC mode for observations of specific categories of source. In addition, standard telexes summarising the outcome of each observation are sent to the P.I. (only) immediately after the observation and near real time analysis of data using the IA system (ref. Express No.12 p.78) is possible. These modifications to procedures are designed to provide a better service to our users, whose comments would be appreciated.

Now that EXOSAT publications regularly appear in the literature it is becoming difficult to maintain comprehensive lists, particularly the bibliography itself and the list of serendipitous sources discovered in the telescope FOV or in the ME offset quadrants or during slews. Readers are encouraged to inform the Editor of published articles and source positions.

An announcement is given on p.53 of a Workshop on The Physics of Accretion onto Compact Objects to be held in Tenerife from 21-25 April 1986. Attention is drawn to the Vacancy Notice on p.54 and readers are kindly requested to display a copy or bring it to the attention of suitable candidates.

Readers are reminded that a response to the AO-4 announcement of opportunity is required by 1.1.86.

EXOSAT EXPRESS

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OBSERVATORY STATUS AS OF 31.10.85

AO-3 is approximately 50% complete.

1. Hardware

There have been no changes in the status of the spacecraft or payload hardware.

Following the X-gyro malfunction on day 366 (1984) and subsequent attempts at re-activation (ref. Express No.9 p.2), the Contractor (Ferranti) has analysed all relevant data from the failure itself and further tests, specifically with regard to re-use of the X-gyro should one of the Y, Z or skew gyros fail. The main conclusion of this work is that it would be necessary to switch off the X-gyro some 40 minutes after power-on because the temperature limit of 85°C for safe operation would be reached. Effectively, the X-gyro cannot therefore be used and must be considered as failed. Work has progressed on the definition of on-board software and operating procedures for a 'two gyro failure' mode (ref. p.45) and will be complete shortly.

Analysis of the ME Detector C malfunction on day 232 (ref. Express No.12 p.2) suggests a component failure in the HT convertor low voltage supply circuitry common to both Argon and Xenon detectors such that the monitored HT has an arbitrary value and the actual HT delivered to the detector anodes is considerably lower, consistent with the observed factor of 5 reduction in gas gain. It is not anticipated that Detector C will be operated during the remainder of the mission. Although this malfunction bears some resemblance to the behaviour exhibited by CMA2 (ref. Express No.2 p.4) in terms of a severely reduced gain operation and rather arbitrary HT monitor values, it is believed unlikely that the two problems are related particularly as CMA2 was operated satisfactorily for a period of about 30 hours some months after the initial 'failure'.

2. Performance and Operations

A general increase in the > Emin, > Emax, Guard count rates of all ME detectors and in the GSPC count rates (PM, SCA(E) and QEP) has been observed over the previous 12 months. This is believed to reflect an increase in solar activity throughout the approach to solar maximum. It has not led to any measurable degradation in instrument performance.

A number of users have reported the presence of 'spikes' in the normal (background) energy spectra of individual Xenon detectors. These 'spikes' occur in channel 137 (at nominal gain), differ in intensity in each detector eg. ~ 1 ct/min for detector E, $\lesssim 0.01$ ct/min for detector F and show a strong intensity and weak amplitude dependence with electronic gain. Background-subtracted spectra are, of course, clean. Electronic tests show no evidence of counts in this channel and, since internal detector discharge would be unlikely to give a constant amplitude signal, the explanation is probably in terms of pick-up on the signal lines from a source of system level interference.

A loss of approximately 10 hours of observation time occurred on day 295 (H2215-086) when a klystron was replaced in the uplink power amplifier of the antenna at VILSPA.

3. On-board Software

Attention is drawn to the article on p.34 describing the new OBC modes MHTR4 and MHTR5, and the layout of the data on the FOT (including MHER7). Printed on p.37 is a copy of an article already mailed to all P.I.'s, summarising the optimum OBC configurations recommended by the Observatory for observations of specific categories of X-ray sources.

Users are reminded of the discussion (Express No.11, p.71) of potential errors in packet reference times (PRT) when high time resolution programs are executed in high-number slots (5 and 6). Such programs are now executed in the low-number slots to avoid this problem. Three further 'timing anomalies' exist and are summarised below:

(1) A second error can occur in the PRT's for HER6 and any other mode which calculates a time resolution of the PRT greater than 1 SWC, such as MDIR2, MPULS, MPULS2. This error, which occurs randomly and rarely, was first detected during the design of MHER7 and was corrected for MHER6 packets on day 281 (1985). Prior to this, the least significant bit of the most significant PRT word is very occasionally not updated when the least significant word re-cycles. The error is detectable and the correct timing word can be determined fairly obviously, since the interval between packet reference times should be constant. For the MDIR2, MPULS and MPULS2 programs, the error potentially still exists and modifications to the code will be incorporated shortly (details in the next Express).

(2) Initial data packets from MHER7 and MHER6, that is the first and second packets produced after start-up, <u>can</u> contain incorrect data. The error is recognised by non-statistical excess counts in particular bytes which are clearly not indicative of source variability. Although the effect is

rare, users are recommended to ignore the first two packets produced by MHER6 or MHER7 if inclusion in the analysis would give odd results. The problem, which is under investigation, is believed to be caused by an error in synchronisation between clearing of output buffer areas and program initiation.

(3) Recently, a telemetry load restriction of ≤ 85% has been applied to specific combinations of OBC modes to avoid continuous telemetry overload alarms. These are thought to result from 'beating' between the output frequencies of programs producing at specific instants in time large packets of data eg. MHER4 is conjunction with many other programs. Again, the problem is under investigation and seems to have appeared only within the last few months because of increased use of higher time resolutions for all programs. Note that the normal telemetry usage figure has been about 99% and considerable effort will be made to 'retrieve' the missing margin.

4. Observation Output

Following the failure of ME detector C, a software modification to the ME automatic analysis has been implemented to account for 3 detectors only in experiment half 1.

Some delay has therefore occurred in production and despatch of the ME automatic analysis output for the period 232 (1985) to 254 (1985).

5. Future Plans

Now that EXOSAT is probably within its last year of operations, serious thought is being given to a post-operations exploitation phase in terms of continuing provision of the Interactive Analysis System for guest investigators and maintaining a science team for support of the IA system and to act as a focus for EXOSAT data analysis and research. Further details will be given in a future issue of the Express.

LIST OF AO-3 OBSERVATIONS 31.08.85 - 1.11.85

Day (85)	Time	Target	RA	Dec	SAA	Duration h	m	Principal Investigator	
242	10.15	1758-250	17 57 57	-25 06 20	113	6	15	van Paradijs	
242	18.58	MXB1730-33	17 30 06	-33 01 15	106	12	1	TOO	
243	08.28	GX-349+2	17 02 15	-36 22 54	100	50	27	Cooke	
246	11.45	4U1722+119	17 22 17	+11 53 24	96	5	15	McHardy	
246	19.36	IRAS 1833+326	18 33 02	+32 38 13	107	5	15	OPS	
247	04.37	1744-265	17 44 42	-26 34 32	105	14	22	Lewin	
247	22.15	ESO 103-G35	18 33 15	-65 30 23	106	5	50	Pounds	
248	06.20	2S 1636-536	16 36 45	-53 40 49	93	23	36	Turner	
249	14.37	2S 1636-536	16 36 43	-53 40 58	92	5	32	Turner	AO-2
249	23.30	2S1822-000	18 22 40	-00 04 06	110	18	30	Illovaisky	
250	19.12	EXO 1847-031	18 46 52	-03 07 46	116	5	18	TOO	
251	01.38	2S1905+000	19 05 46	+00 03 47	120	17	21	Chevalier	
251	21.10	SERPENS X-1	18 37 21	+04 57 40	111	13	54	Illovaisky	
252	13.50	4U1746-37	17 46 37	-37 04 13	100	12	42	Lewin	
253	12.32	MXB 1730-333	17 30 15	-33 00 24	96	5	28	TOO	
253	19.00	XB1732-304	17 32 24	-30 28 17	96	12	32	Stella	
254	09.30	4U1705-44	17 05 04	-44 04 02	91	27	19	Langmeier	
255	13.42	GPS 1709-396	17 09 11	-39 40 42	90	5	48	Turner	
255	20.45	GPS 1713-388	17 13 30	-38 48 44	91	4	45	Watson	
256	02.50	MXB1730-333	17 30 15	-33 00 25	93	7	10	TOO	
256	13.12	IRAS 1833+326	18 32 59	+32 37 49	102	6	14	OPS	
257	11.21	LE CAL	19 56 34	+35 03 02	117	7	22	Observatory	
257	21.30	E2003+225	20 03 21	+22 30 22	123	15	51	Osborne	
258	16.40	X1813-140	18 13 04	-14 05 00	100	11	50	Parmar	
259	07.30	AM HER	18 14 47	+49 49 25	94	3	29	Shafer	
259	14.23	GPS 1858+015	18 59 18	+01 23 07	111	8	36	Watson	
260	01.36	1758-250	17 57 57	-25 06 23	95	12	52	v.Paradijs	AO-2
261	10.35	TERZAN 5	17 44 52	-24 46 58	91	4	25	Turner	
261	16.26	A1850-087	18 50 31	-08 45 03	107	12	41	Stella	
262	06.00	GR 11(2)	18 37 33	-10 54 46	103	5	25	Warwick	
262	12.14	GR 11(2)	18 28 34	-09 45 11	100	8	4	Warwick	
262	23.00	NGC6553	18 06 26	-25 56 34	95	4	59	Swank	AO-2
263	04.55	GX9+1	17 58 25	-20 33 49	92	3	30	Ponman	
264	20.40	EXO 1757-259	17 57 59	-26 07 51	91	8	33	TOO	
265	07.35	G11.2-0-3	18 08 22	-19 28 31	93	12	56	Peacock	
265	21.50	4U1820-30	18 20 59	-30 24 50	95	7	39	Stella	
266	08.30	AQL X-1	19 09 15	+00 31 52	107	3	18	v.Paradijs	AO-2
266	17.36	A0535+26	05 35 55	+26 18 52	95	7	24	Stella	
267	04.06	HR 1099	03 34 19	+00 27 03	126	14	16	Culhane	
267	21.20	IH 0422-086	04 23 25	-08 40 45	114	6	40	Schwartz	AO-2
268	17.47	UX Ari	03 23 38	+28 35 28	125	23	13	Pallavicini	
269	19.19	G104-27	06 12 33	+17 46 14	90	6	16	Paerels	
279	03.00	GD 71	05 49 43	+15 54 17	95	7	59	Paerels	
270	13.20	HD24912	03 55 49	+35 41 50	118	9	41	Prinja	
271	01.47	3C129	04 46 14	+45 00 46	107	7	58	Morini	
271	12.20	G148.2+0.8	03 55 05	+54 07 46	111	11	52	Claas	
272	12.00	HD24912	03 55 49	+35 41 21	120	10	30	Prinja	
273	03.45	IRAS 1833+326	18 33 02	+32 37 29	93	5	54	Ops	

Day (85)	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator	
273	12.40	4U1831-23	18 31 38	-23 14 13	90	4 56	Lewin	
273	18.40	G21.5-0.1	18 30 45	-10 25 45	90	5 9	Smith	
274	01.55	G 754	19 17 04	-45 35 11	96	8 41	Schmitt	AO-2
274	13.16	SMC X-3	00 49 47	-72 43 34	104	3 9	TOO	
274	18.26	H0139-68	01 40 03	-68 09 45	107	6 41	Beuermann	
275	03.35	PKS 1934-63	19 34 34	-63 51 53	93	11 58	Peacock	AO-1
276	10.55	PKS 2005-489	20 05 42	-49 01 33	101	5 5	Warwick	
276	17.47	4U1705-44	17 05 27	-43 59 55	71	16 43	Langmeier	
277	13.14	RS Oph	17 47 25	-08 44 15	76	4 46	TOO	
277	21.15	Cyg X-3	20 30 24	+40 45 21	113	5 15	TOO	
278	05.20	SS 433	19 09 14	+04 51 23	97	15 19	Watson	AO-2
278	23.24	Cyg X-3	20 30 24	+40 45 21	113	12 12	Mason	AO-2
280	05.25	Cyg X-3	20 30 26	+40 45 53	112	11 6	Mason	AO-2
280	19.00	E1821+643	18 21 31	+64 17 37	91	6 6	Stanger	
281	03.55	4U0541+60	05 38 25	+60 52 04	103	7 40	McClintock	
281	14.22	Crab	05 31 37	+22 00 40	111	12 0	Cal	
282	05.40	4U0541+60	05 38 25	+60 52 05	104	5 56	McClintock	
282	13.48	MCG 8-11-11	05 51 17	+46 27 48	105	6 10	Maraschi	
283	02.30	NGC 1566	04 19 08	-55 02 57	106	4 0	Alloin	
283	20.00	3C120	04 30 26	+05 12 00	128	13 59	Tanzi	
284	15.59	Cyg X-3	20 30 38	+40 46 00	110	7 4	TOO	
285	04.14	H0459+248	04 59 30	+24 41 53	122	7 46	Tuohy	
285	17.15	Cyg X-3	20 30 38	+40 46 00	110	8 34	TOO	
286	04.45	EV Lacertae	22 44 27	+44 04 20	131	5 48	Linsky	
286	14.20	4U1916-05	19 16 02	-05 21 26	90	11 1	Mason	
287	13.45	G69.0+2.7	19 50 51	+32 43 31	101	5 15	Claas	
287	22.15	EV Lacertae	22 44 24	+44 04 53	131	11 52	Linsky	
288	14.10	G65.7+1.2	19 49 54	+29 15 27	100	5 9	Smith	
288	21.00	Cyg X-1	19 56 17	-49 00 39	102	7 10	Page	AO-2
289	07.30	PKS 2005-489	20 05 34	-49 00 39	90	5 49	Warwick	
289	15.50	NGC 6814	19 39 47	-10 28 23	92	4 0	Branduardi	
291	10.55	LE Cal	19 56 18	+35 01 38	100	10 39	LE Cal	
292	00.50	HD 193793	20 18 57	+43 39 22	105	4 55	TOO	
292	08.10	PSR 1929+10	19 29 43	+10 50 34	90	8 56	Ögelman	
292	18.30	WZ Sge	20 05 12	+17 31 06	99	7 20	Lamb	
293	04.15	X2127+119	21 27 36	+11 54 47	118	6 15	Redfern	AO-2
293	14.10	NGC 1566	05 19 14	-55 03 36	106	5 30	Alloin	
294	00.20	Crab	05 31 41	+22 01 07	123	13 55	Hasinger	
295	20.20	H2215-086	22 15 14	-08 38 12	123	4 49	Chiappetti	
296	05.00	VV 47	07 54 10	+53 34 23	98	4 55	Barstow	
296	13.00	E1821+643	18 21 36	+64 17 27	91	5 50	Stanger	
296	23.05	H2252-035	22 52 38	-03 28 39	133	8 14	Pietsch	
297	11.00	PKS 2155-304	21 55 54	-30 29 58	109	13 55	Treves	
298	03.09	IH2236-372	22 32 16	-37 43 32	111	5 48	Schwartz	AO-2
299	04.50	GL 832	21 30 05	-49 15 26	94	5 4	Schmitt	
299	13.50	Cyg X-3	20 30 47	+40 45 45	103	5 10	TOO	
299	23.10	H2252-035	22 52 36	-03 29 12	130	8 13	Pietsch	
300	12.00	Nova Vul 2	20 24 31	+27 38 37	100	4 59	TOO	

Day (85)	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator	
300	18.30	G70.7+1.2	20 02 18	+33 28 18	96	8 50	TOO	
301	07.35	NGC 7172	21 58 47	-32 07 30	105	4 49	Pounds	AO-2
301	15.36	Cyg X-2	21 42 24	+38 03 48	116	12 16	Hasinger	
302	15.54	EXO 2030+40	20 30 30	+37 25 00	101	1 36	TOO	
302	20.08	H2103+095	21 02 54	+09 27 28	103	6 34	Page	
303	05.10	CG Cyg	20 56 06	+34 56 30	105	5 20	Bedford	
303	11.21	EXO 2030+40	20 30 30	+37 25 00	101	22 38	TOO	
304	13.15	PKS 0745-19	07 45 27	-19 08 34	93	12 46	Fabian	
305	06.30	NGC 526A	01 21 46	-35 21 26	128	11 30	Pounds	

OUTSTANDING AO-1/AO-2 POINTINGS

AO-1 (5)

Target	Proposal No.	Comments
SC 0627-54	CLU F10	To be scheduled
3C345	AGN F50	TOO Status waiting for outburst
U Gem	LLX G17	" " " "
GX340+0	OCC G1	Occultation - on hold
GX349+2	OCC G4	" "

AO-2 (24)

Target	Proposal No.	Comments
Decided by PI	AGN 024	
NGC 1808	AGN 057	To be scheduled
Abell 2235	CLU 006	" "
3A1006+475	MIS 011	Scheduled Nov. '85
N63A	SNR 028	Scheduled Dec. '85
G41.1-0.3	SNR 030	To be scheduled
G39.9+0.0	SNR 041	" "
U Gem	LLX 105	TOO status waiting for outburst (2 observations)
3A1954+319	HLX 039	To be scheduled
A0538-66	HLX 053	TOO Status (5 observations)
AM Her	HLX 063	Scheduled Nov. '85
A0535+26	HLX 154	Scheduled Mar.86 (5 observations)
Fornax	AGN 075	Scheduled Dec. '85
H1615+09	MIS 019	To be scheduled
RCW 86	SNR 039	Partially complete;to be scheduled

EXOSAT X-RAY SOURCES

'New' X-ray sources are discovered by EXOSAT serendipitously in the FOV of the telescope or in the offset quadrants of the ME or from an analysis of ME/GSPC 'background' data recorded during manoeuvres. We intend to maintain a list of published 'new' sources and readers are encouraged to report 'discoveries'.

EXOSAT Source Nomenclature

Source Position:	RA	02H	30m	20.5s	(1950)
	DEC	-02D	20m	33.2s	

Name : EXO 023020-0220.5

EXO 074824-6737.4:	IAU Telegram No. 4039
EXO 184639-0307.5:	IAU Telegram No. 4051
EXO 174725-2124.7:	IAU Telegram No. 4058
EXO 203021+3727.9:	IAU Telegram No. 4066
EXO 063111+1801.9:	IAU Telegram No. 4081
EXO 041604-5504.9:	IAU Telegram No. 4097
EXO 125653+2809.9:	Space Science Reviews, 40, 1985, 648. (and M.N.R.A.S. (1985),216, p.1043-1055)
EXO 125757+2840.3:	" " "
EXO 125905+2807.0:	" " "
EXO 125921+2828.2:	" " "
EXO 125938+2803.1:	" " "

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: $\lesssim$ 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

Circular No.	Title	Comment	Authors
3923	Her X-1	Her X-1 'on' again at 80 Uhuru flux units, 1.24s pulsations (March 1.5 - 1.8)	J. Trümper, P. Kahabka H. Ögelmann, W. Pietsch, W. Voges, M. Gottwald, A. Parmar
3932	2S1254-690	Discovery of type 1 Burst and an absorption 'event'.	T. J.-L. Courvoisier, A. Peacock, M. Pakull
3935	AN URSAE MAJORIS	Serendipitous observation: soft X-ray flux suggests a return to the 'bright' state.	J.P. Osborne
3939	VW HYDRI	Discovery of X-ray pulsations during superoutburst	J. Heise, F. Paerels, H. van der Woerd
3952	2S1254-690	Discovery of a 3.9hr period in the X-ray light curve	T. J.-L. Courvoisier A. Parmar, A. Peacock
3961	4U1323-62	Type 1 Burst discovered	M. van der Klis, F.A. Jansen, J. van Paradijs, W.H.G. Lewin
3980	TV Columbae	X-ray periodicity discovered in range 1-7 keV.	A.C. Brinkman, J. Schrijver
3996	2S 0142+61	1456 sec Modulation of the X-ray flux	N.E. White, P. Giommi, A.N. Parmar, F.E. Marshall
4033	1E1402.3+0416	Rapid variability in BL Lac Objects.	P. Giommi, P. Barr
4038	PG0834-488	Detection of a hard X-ray flux	M.C. Cook
4039	EXO 0748-676	Discovery of a bright transient X-ray source which shows bursts, irregular intensity dips and periodic total eclipses	A.N. Parmar, N.E. White, P. Giommi F. Haberl.
4043	GX 5-1	Quasi periodic oscillation in the 1-10 keV flux	M. van der Klis, F. Jansen, J. van Paradijs, W. Lewin, J. Trümper, M. Sztajno
4044	4U 1323-62	Periodic dips in the 1-10 keV flux	M. van der Klis, A. Parmar, J. van Paradijs, F. Jansen, W. Lewin
4044	NGC 3031	Flux increases and variablity in the 0.1-6 keV range	P. Barr, P. Giommi

Circular No	Title	Comment	Authors
4049	RS OPHIUCHI	Intense X-ray emission detected; spectrum soft & absorbed.	F.A. Cordova, K.O. Mason, M.F. Bode, P. Barr
4051	EXO 1846-031	Detection of a new bright X-ray transient; non-variable flux .2 Crab.	A.N. Parmar, N.E.White
4051	4U1624-49	Periodic intensity dips discovered in the 2-10 keV flux.	M.G. Watson, R. Willingale, R. King I.E. Grindlay, J. Halpern
4054	NGC 4051	Quasi-periodic flux variations observed.	A. Lawrence, M. Elvis K. Pounds, M. Watson
4057	EXO 0748-676	Still active at 0.01 Crab - 21 type I bursts in total.	A.N. Parmar, M. Gottwald, F.Haberl N.E. White
4058	EXO 1747-214	New transient X-ray source Intensity 0.07 Crab, Type I bursts seen.	A.N. Parmar, N.E.White P. Giommi, L. Stella M. Sweeney
4060	SCO X-1	Quasi-periodic fast variability between 4 and 9 Hz during quiescent state.	J. Middleditch, W. Priedhorsky
4065	Nova Vul 1984 No. 2	Detected at 3 σ level in 0.04-2 keV range soon after outburst.	J. Krautter, H. Ögelman,
4066	EXO 2030+375	Discovery of a bright, uncatalogued, transient X-ray pulsar period 41.83s.	A.N. Parmar, L. Stella P. Ferri, N.E. White
4068	SCO X-1	Intensity dependent quasi-periodic oscillations in 5-35 KeV data.	M. van der Klis, F. Jansen, N. White, L. Stella, A. Peacock
4070	CYG X-2	Intensity dependent quasi-periodic oscillations in 1-10 KeV flux.	G. Hasinger, A. Langmeier, M. Sztajno, N. White,
4081	EXO 063111+ 1801.9	Improved position of an Einstein serendipitous source - tentative optical counterpart	G.F. Bignami, P.A. Caraveo, L. Salotti, G.G.C. Palumbo
4082	AG-DRA	Detection of X-ray emission at minimum phase.	L. Piro, A. Cassatella L. Spinoglio, R.Viotti A. Altamore

Circular No	Title	Comment	Authors
4083	R. AQ	Weak X-ray emission at maximum suggests non-correlation with MIRA-type variations.	R. Viotti, L. Piro, M. Friedjung, A.Cassatella
4083	1E1048.1-5937	X-ray pulsations with a period 6.44s; power law spectrum, high obscuration.	A.P. Smale, P. Charles R.H.D. Corbet, F.D. Seward.
4096	BR CIRCINI	Extreme high-state flux (> 3 Crab) observed	A.F. Tennant, R. Shafer
4097	EXO 041604-5504.9	Discovery of a new soft X-ray source; X-ray flux variable, 70% changes on a timescale of 1 month. Possible optical counterpart - A5 type star.	D. Alloin, D. Pelat, S. D'Odorico
4101	GX349+2	Low frequency noise and possible quasi-periodic oscillations detected in the average power spectra of the fluctuations in the X-ray flux.	W.H.G. Lewin, J. van Paradijs, F. Jansen, M. van der Klis, J. Trümper, M. Sztajno
4102	GX17+2	Discovery of quasi-periodic oscillations at an average frequency of 7.2 Hz.	L. Stella, A.N.Parmar, N.E. White
4102	V741 TAU	Soft X-ray pulsations with period of 554.79s discovered.	K.A. Jensen
4110	MXB1730-335	40 Type II flat-topped bursts detected in a 16 hr observation Quasi-periodic oscillations observed in some of the bursts.	L. Stella, A.N. Parmar N.E. White, W.H.G. Lewin, J. van Paradijs
4111	4U1705-44	14 Type I X-ray bursts detected	M. Sztajno, J. Frank J. Trümper, G.Hasinger W. Pietsch, J. van Paradijs.
4112	EXO 2030+375	Intensity of X-ray flux shows almost linear decay from 700 mCrab on 19/5 to 35 mCrab on 10/7. Pulse period decreased rapidly, consistent with pulsar in an eccentric orbit	N.E. White, P. Ferri, A.N. Parmar, L. Stella

Circular No	Title	Comment	Authors
4116	GX 349+2	Confirmation of existence of quasi-periodic oscillations (4101)	B.A. Cooke, L. Stella, T. Ponman
4117	4U1820-30	Quasi-periodic oscillations disocvered in high (400-500 mCrab) non-bursting state.	L. Stella, N. White, W. Priedhorsky

RECENT EXOSAT Preprint List

This list of recent EXOSAT preprints refers to all papers, with an Observatory Team member as author, which have been accepted for publication. Once the paper is published in the literature, it will be removed from this list.

10. An EXOSAT Observation of Quiescent and Flare Coronal X-ray Emission from Algol.

    White, N.E., Culhane, J.L., Parmar, A.N. Kellett, B.J., Kahn, S., van den Oord, G.H.J., Kuijpers, J.

12. The Evolution of the 1984 Outburst of the Transient X-ray Source 4U 1630-47.

    Parmar, A.N., Stella, L., White, N.E.

14. A Study of the Continuum and Iron K line emission from low mass X-ray binaries.

    White, N.E., Peacock, A., Hasinger, G. Mason, K.O., Manzo, G, Taylor, B.G. Branduardi-Raymond, G.

15. The orbital periods of the low mass X-ray Binaries.

    White, N.E.

16. X-rays from the Magnetic White Dwarf PG 1658+441.

    Pravdo, S.H., Marshall, F.E., White, N.E. Giommi, P.

17. Rapid X-ray and Optical Variability in the X-ray selected BL Lac object 1E1402.3+0416.

    Giommi, P., Barr, P., Gioia, I.M., Maccacaro, T., Schild, R., Garilli, B., Maccagni, D.

Copies of these preprints are available on request to the Observatory Secretary.

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FOURTH CAMBRIDGE STELLAR SYSTEMS WORKSHOP 'COOL STARS AND THE SUN': A REPORT

At the recent Fourth Cambridge Stellar Systems Workshop on 'Cool Stars and the Sun' held in Santa Fe, New Mexico from October 16-18 1985, a number of presentations of results obtained using the EXOSAT Observatory were given.

The Workshop covered all aspects of cool star (later than F) observation and theory including such topics as stellar activity cycles, rotation-activity relations, the new field of astro-seismology, Doppler imaging of star spots, coronal heating and mass loss estimates. There were over 150 participants with about 30 from European institutes.

Many of the EXOSAT observations were of flares detected from known flare stars or RS CVn systems, often in conjunction with optical, radio or IUE observations. EXOSAT's continuous coverage allows the temporal and spectral evolution of flares to be studied in detail. An intense X-ray flare from EQ Peg, reported by R. Pallavicini (Arcetri), gave a peak ME count rate of 15 cts/s, probably the brightest stellar flare seen by EXOSAT. Unfortunately, the flare was already in progress when EXOSAT started observing and the impulsive phase was therefore not observed. C. Butler (Armagh) also reported the detection of a flare from EQ Peg and one from UV Ceti. Interestingly, there appears to be a correlation between the 'quiescent' X-ray intensity and the $H\gamma$ emission in the latter suggesting that the 'quiescent' emission may result from many small unresolved flares. A. Collier-Cameron (Cambridge) reported the detection of a flare from HD 36075 and possible evidence for an orbital modulation of the X-ray intensity. J. Doyle (Armagh) presented results of U band photometric observations of the flare star YZ CMi showing an intense flare. The simultaneous EXOSAT observations did not, however, detect any significant increase suggesting that the energy source is dissipated before reaching the corona.

Many single stars have also been observed with EXOSAT. R. Pallavicini presented the results of a survey of coronal emission from late type stars. 11 stars were observed and of these 9 had temperatures and emission features similar to those measured by Einstein. Two (η Pic and AU Mic) showed evidence of intensity variability by a factor of $\sim$4 since the Einstein observations. Probably the first detection of a stellar flare from a 'normal' single star was reported by B. Monsignori- Fossi (Arcetri). The GO dwarf star π^1 Uma was observed to flare with an energy at least a factor of 10 higher than a bright solar flare. Ph. Gondoin (Meudon) compared the X-ray properties of the K III star HD 12929 star with three slightly earlier type (F and G) giant stars and showed that the X-ray flux in the 3000 Angstrom Lexan filter is two orders of magnitude less than that from the comparison stars. It is possible that the corona in the K star is much cooler than in the comparison stars.

The continuous coverage of EXOSAT allows the sizes of stellar coronae in eclipsing systems to be estimated. Examples of this technique were shown by A. Parmar (EXOSAT Observatory) for Algol and AR Lac. The lack of evidence for an eclipse of the K star in the Algol system gives a lower limit of $> 3\ R_*$ for the size of the associated corona. Similarly, in the AR Lac system, the X-ray eclipse of the K companion was not observed, although during the eclipse of the G primary the X-ray intensity fell to $\sim$50% of its un-eclipsed value suggesting that the corona associated with this star is much smaller than that associated with the K star. In addition to reporting the detection of a large flare from Castor (α Gem), D. Droemer (New Mexico Tech) reported on an EXOSAT observation of YY Gem showing a shallow X-ray eclipse, indicative of an extended corona whereas earlier radio data suggested that a deep X-ray eclipse would be expected.

C. Shrijver (Utrecht) presented results of a coordinated X-ray optical study of λ-AND designed to investigate the relation between X-ray emission and spot activity. The data indicates that the X-ray intensity is anti-correlated with optical magnitude as might be expected if the X-ray active regions are associated with dark stellar spots.

Many stellar coronae are bright enough for observation with the EXOSAT gratings. C. Shrijver reported on such observations of Capella and σ^2CrB. The spectra cannot be represented adequately by a single temperature thermal plasma model. Neither does comparison with expected differential emission measure models for a single quasi static loop show good agreement, suggesting that the X-ray emission may be coming from a large number of small flaring loops.

A.N. Parmar

NEW OBC MODES MHTR4 AND MHTR5

There are two new ME OBC modes which have been tested successfully during the recent Crab Nebula observation and are now fully operational. They are MHTR4, designed to provide extremely high time resolution over a selected energy band, and MHTR5, designed to replace MHTR3 for most observations.

MHTR4 provides intensity samples at 0.25 msec time resolution over a selectable range of energy channels. The ME energy samples are processed and a single bit is set to '0' or '1' per sample corresponding to the absence or presence of a photon within the defined energy range. With 0.25 msec time resolution, MHTR4 uses 58% of available telemetry. The deadtime is the usual deadtime associated with the 4K sampling rate (10% on a background observation, 40% on a 1 Crab source). There is no selection on detector ID and the ME should normally be co-aligned for maximum observing efficiency. MHTR4 can be operated in conjunction with MHER2, MHER4 or MHER5 in order to obtain simultaneous spectral information. The CPU usage should remain below its limit for all allowable count rates (ie. a limit of $<$ 500 cts/s/detector based on detector safety considerations) unless either MHER4 or MHER5 is used in conjunction with LDIR2 and GHBL4 in which case the ME count rate to be processed by the OBC must be below $\sim$1500 cts/s. Note that it is possible to process only Ar or Xe data in the OBC to reduce CPU usage and deadtime. MHTR5 cannot easily be used to give a lower time resolution than 0.25 msec because at less frequent sampling rates the deadtime increases unacceptably.

MHTR5 is designed to replace MHTR3 because it requires half as much telemetry to provide the same information. It samples the qualified event counter, which can be configured to record the Ar, Xe or the sum of both sets of detectors, at various rates typically between 1 and 31 msec. MHTR5 gives a 4 bit intensity sample (0-15) rather than an 8-bit sample (0-255) thereby reducing by a half the telemetry usage. This means that the maximum time resolution at which MHTR5 can be operated is 1 msec for 60% telemetry usage compared to 2 msec with MHTR3. At 2 msec time resolution MHTR5 uses 30% of available telemetry etc. If more than 15 qualified events are detected during the sampling interval the program sets the value 15 which therefore indicates 15 or more counts. For long integration intervals, especially if Xe is being sampled, it is sometimes advisable to use MHTR3 to avoid overflows. The deadtime associated with the qualified event counter is small and can be ignored for most purposes.

A.N. Parmar

FOT LAYOUT: MHER7/MHTR4/MHTR5

This information should be read in conjunction with the descriptions of these OBC modes given in EXOSAT Express No.12 and p.36.

MHER7

Program 72.

11 workspace parameters.

wsp 2 = distance between consecutive samples in units of 2^{-14} seconds.

wsp 3 = number of samples per bin of intensity profile.

wsp 4/5 = start/end channels of 1st or only energy range.

wsp 6/7 = start/end channels of 2nd range; both zero if only one range.

wsp 8/9/10/11 = limits of 3rd and 4th ranges; all are zero, if there are 1 or 2 ranges only.

Record type on FOT = I7.

MHTR4

Program 73.

4 workspace parameters.

wsp 2 = as for HER7.

wsp 3/4 = start/end channel of selected energy range.

Record type on FOT = T4.

MHTR5

Program 74.

2 workspace parameters.

wsp 2 = as for HER7, but note that the QE is sampled, not the energy.

Record type on FOT = T5.

General information for all 3 Programs

All three programs produce records similar in layout to ME/MHTR3, namely:

bytes 0-3	=	reference time
bytes 4-31	=	unused
bytes 32-287	=	256 bytes of actual data

For MHER7, the data samples are 4 bits long and are stored such that the time increases more rapidly than the energy range. One record thus contains data for all the (1, 2 or 4) selected ranges. For MHTR4 the samples are 1 bit long, ie. the value 1 indicates that an event within the selected energy range occurred. For MHTR5 the samples are again 4 bits long. The value 15 for a four bit counter means "greater than or equal to 15".

In all cases information is stored to tape in chronological order of its reception on the ground, which means (for users of HP and IBM computers) in order of decreasing significance within a memory buffer. This applies at the bit level as well as the byte level. Users of DEC computers must take special care that samples are accessed in the correct order, because their address convention at the byte level differs from the convention used in OBC and FOT documentation. Within a byte, the "decreasing significance" convention applies to all computers, eg. the first sample of an MHTR4 record should be extracted from the most significant bit of a byte.

J.R. Sternberg

ORBIT PREPARATION AND LIAISON

Slight modifications have been introduced into the procedures for orbit preparation and liaison (ref. Express No.5 pp.5/6) with the P.I., which together with the standard OBC configurations defined on p.38-41 should improve the efficiency of the observation programme.

Orbit schedules are produced about 6-8 weeks in advance, usually 4 orbits at a time, and Anne Fahey informs each P.I. of observation times, coordinates etc. once the schedule is approved. These schedules will be subject to internal review to recommend an OBC configuration for each observation and one of the Duty Scientists or Observatory Controllers will liaise with the P.I. in the normal manner to discuss this configuration and other observational procedures. A further short review will take place some two weeks prior to the orbit with the aim of freezing the observation strategy and any unresolved disagreements will then be referred to the Project Scientist.

Observers are urged to reply promptly to all telexes requesting confirmation of OBC configurations and to discuss with any member of the Observatory Team the rationale behind particular choices. In this way, we hope to provide a better service to the user and to optimise the scientific return from all observations, given the limited remaining mission duration.

D. Andrews

STANDARD OBC CONFIGURATIONS

Recent discoveries made with the EXOSAT medium energy experiment have highlighted the need to improve the on-board high time resolution application software. The Observatory has therefore implemented a number of new on-board computer programs (modes - eg. MHER7, MHTR5, MHTR4) to exploit to the full the capabilities of the system. Naturally, with several ME experiment modes designed for quite specific applications, the selection of a particular combination of modes which would maximise the scientific return from an observation is not always straightforward. To assist the user, a few standard OBC configurations suitable for observing a wide range of classes of X-ray object have therefore been defined and are outlined in this note. Note that the two new OBC modes, MHTR4 and MHTR5, are described on p.34.

1a) Faint ME Source (a)

This is the standard EXOSAT configuration for observations of weak ME sources, if high time resolution is not important. The ME array halves will normally be swapped every 3 hr or so using the standard array swap strategy (eg. H1+, H2-, H1-, H2+ etc) to give the best estimate of the background counting rate. Unexpected brightening of the source or solar activity should not cause CPU or telemetry overload problems.

OBC Program	Comments	% Telemetry
MHER4	det. ID, 256 channel spectra every 10s. Intensity samples (Ar+Xe) every 0.25s.	27
MHTR5	4 msec intensity samples summed over all Ar detectors.	15
GHBL4	256 channel spectrum every 8s.	5
LDIR2	Direct mode	~25
		= ~ 72%

1b) Faint ME Source (b)

This configuration substitutes MHER6 for MHTR5 and provides intensity samples over a selected range of energy channels with a time resolution of 9 msec. If a limited energy range of 2-6 keV is chosen, the background for an 'offset mode' observation in the MHER6 data is about a factor of 10 lower than that in MHTR5. This mode could be used, for example, to search for low level pulsed emission with periods $>$50 msec from a supernova remnant. The telemetry usage, $\sim$84%, is slightly higher than for Faint Source (a). If higher time resolution is required, it is possible to reduce the telemetry requirements of the LE by using a diamond filter and hence increase the MHER6 resolution to 6 msec. Note that MHER6 has an option to accumulate intensity samples over two selected ranges of energy channels.

A major disadvantage of MHER6 is that CPU overload can occur if the source count rate increases to $\sim$500 cts/sec. This results in a halt of the CPU processor and a potentially dangerous spacecraft operational state since monitoring of 'safety mode' conditions is continuously carried out by the OBC, notwithstanding the loss of about 20 minutes of data while programs are re-initiated. This mode will therefore not be used if there is the slightest chance of bright flaring or bursting behaviour.

2. Intermediate Source Strength Configuration

This configuration is designed to provide high time resolution spectra during an X-ray burst. Even during the most intense flares or bursts, the CPU usage will remain comfortably below the level at which the OBC would halt. It is also suited to observations of all sources of medium intensity such as long period pulsars (Vela X-1), dipping sources (X1755-338) etc. The LE is used with a diamond filter in order to reduce the telemetry load. Depending on whether the observer is primarily interested in the continuum or burst properties, the ME configuration can be offset, coaligned or a combination of both. A full LE image can be acquired if MHTR5 data is collected with a time resolution of 4 msec. Note that changing the time resolution of the MHTR5 data would result in a loss of about 20 minutes OBC data (QE rates are still available from the housekeeping telemetry).

OBC Program	Comments	% Telemetry
MHER5	64 channel Ar and Xe spectra every 1 and 2s respectively and intensity samples (Ar only) every 31 msec per half experiment.	31
MHTR5	Ar intensity samples summed over all detectors every 2 msec.	30
GHBL4	256 channel spectra every 2s	17
LDIR2	Diamond filter	$\sim$10
		= $\sim$88%

3. High Time Resolution Configuration

This configuration is designed to provide the highest possible time resolution continuous data (0.25 msec) over a selected range of energy channels, together with high time resolution ME spectra and GSPC spectra at the normal time resolution. The ME would normally be coaligned although it is sometimes worth spending 1 hr with each array half offset to obtain good background estimates. This mode should be considered the standing 'QPO hunting' configuration. Although certain circumstances may allow it, the LE is normally not operated because of CPU limitations.

OBC Program	Comments	% Telemetry
MHTR4	Intensity samples over the whole instrument at 0.25 msec for a selected energy band.	58
MHER5	64 channel spectra for Ar and Xe every 1 and 2s and 31 msec Ar intensity samples per half experiment.	31
GHBL4	256 channel spectra every 8s.	5
		= 94%

4. Energy Dependent High Time Resolution Configuration

This configuration is designed to give high time resolution data in four energy bands. It can be used, for example, to determine the energy dependence of any QPO's detected with the High Time Resolution configuration. Normally the ME should be coaligned, although an hour or so in array offset mode (each half) is recommended if spectra are also of prime importance. The maximum incident count rate (source + background) which can be accommodated with both MHER5 and MHER7 active is ~1300 cts/s. Since the Xe background is ~600 cts/s, this represents an incident source count rate of ~700 cts/s (or ~200 UFU; coaligned).For sources brighter than this, only the Ar data should be routed to the OBC, resulting in a lower deadtime and no Xe data in the HER5 packets. Incident source count rates of up to ~1200 cts/s can be accommodated in this way. If required, MHER7 can be configured to give intensity samples over 2 selectable energy ranges every 2 msec.

Alternatively, MHER2 may be substituted for MHER5. MHER2 will provide 128 channel Argon and Xenon spectra every 1s integrated over the whole instrument. The disadvantage is that if an array is offset to provide background information, MHER2 must be stopped and MHER5 started resulting in the loss of ~5 minutes of ME data. Note that MHER2 does not provide intensity samples. MHER2 requires significantly less CPU than MHER5 and can probably be used for all allowable incident count rates.

OBC Program	Comments	% Telemetry
MHER7	Intensity samples over 4 selected energy bands every 4 msec.	60
MHER5	64 channel Ar and Xe spectra every 1 and 2s respectively and Ar intensity samples every 31 msec per half experiment	31
GHBL4	256 channel spectra every 8s.	5
		= 96%

5. Extremely Bright Source Energy Dependent Configuration

This configuration has been designed for observations of extremely bright sources such as Sco X-1, GX5-1 to provide energy-dependent high time resolution data with a minimum deadtime from OBC sampling losses. To ensure the safe operation of the detectors, the ME should be coaligned or slightly offset to provide an incident count rate in each Ar detector of not more than 500 cts/s. Only Ar data should be routed to the OBC to minimise the deadtime. Xe data is provided by MHTR5. Spectral data is provided by the GSPC only.If required MHER7 can be configured to provide intensity samples over 2 selectable energy ranges every 2s.

OBC Program	Comments	% Telemetry
MHER7	Intensity samples summed over 4 selectable Ar energy channel ranges every 4 msec.	60
MHTR5	Intensity samples summed over all Xe detectors only every 2 msec.	30
GHBL4	256 channel spectra every 4s.	9
		99%

6. Pulsar Configuration

For sources with known periods $\lesssim$ 10s it is often advisable to use either MPULS or MPULS2 OBC programs in order to minimise the telemetry load and provide high quality phase resolved spectra. MPULS should be used with sources brighter than $\sim$50 cts/s and MPULS2 with fainter sources. The telemetry usage depends on the pulsar period and the number of times the data is folded over this period prior to telemetry.

Please contact the Observatory Team member planning your observation for more details.

A. Parmar

CORRECTION FACTORS TO BE APPLIED TO LE COUNT RATES

A number of separate correction factors which must be applied to the LE data in order to determine flux intensities, are summarised below:

(1) The 'Flap'

- 'Shadowing' of the FOV of both LEIT1 and LEIT2, which can be explained in terms of an 'over-opening' of the ME flap to 94.5°, 4.5° greater than nominal (ref. Express No.12 p.67).

- Divide count rates by 0.735.

- This correction is applied in the observatory software by a modification to the derived on-axis effective area curves when converting count rates to fluxes (eg. LFFIT, LFCRA, LFLUX, figs. Ga-Ic of Sect. 8.1 in FOTH, ESPEC etc). The CCF, itself, is not modified to include the effect.

(2) Sum Signal Distribution

- Required to correct for counts below the effective lower threshold of the sum signal distribution.

- determined from the observed sum signal distribution by fitting a Pearson type I function (prog. EFCOR at ESOC).

- typical correction: divide by 0.98.

- A fixed correction of this value is made in the Observatory software as for (1).

- refer to FOTH Sect. 8.1.3. for notes on the sum signal calibration.

(3) Sample Rate Dead Time Correction

- Loss of events caused by the restriction of $\lesssim 1$ event per sample interval (1.92 ms at the nominal rate of 512 Hz), determined by normal Poisson statistics.

- multiply count rates by a factor C defined as $C = 512 \log_e (1-T/512)/T$ where T is total no. of counts sampled per second. T is the observed count rate corrected for point (5) below.

- correction is typically 4% for the nominal background count rates.

- This factor has recently (3.7.85) been included in the image accumulation software (ADIMA) and count rates derived from these images are corrected. The LCURV program has always included this effect.

  Note that with the use of a diamond filter to reduce telemetry loading, T, the total no. of counts, must be inferred from the average local background.

(4) 'Vignetting'

- Variation of mirror efficiency across the telescope FOV.

- Typically +5-10% for pointed sources - Note that the spacecraft attitude is normally such that the target of observation is expected to appear at 8-10 arcmin from the optical axes of the LE1 telescope. Refer to CCF for other off-axis values.

- Included in observatory analysis software (SOSTA) since Sept. 85.

- See FOTH Sect. 8.1, fig. A.

(5) Telemetry Dead Time (Exposure fraction)

- Because of telemetry limitiations imposed by the requirements of the ME/GS data and the background variability in the CMA, it is generally not possible to transmit all events collected by the telescope and the experiment therefore has an effective 'ON' time somewhat less than elapsed time.

- Calculated from the buffer collection time in the packets and the difference between packet reference times of adjacent packets.

- very variable.

- this has always been included in the observatory telemetry reading software (ADIMA, LCURV).

(6) Internal Electronic Dead Times

- Examination of the time tag distribution of LE events shows that a small fraction of events with specific values of the time tag related to the electronic reset are 'lost'. This effect, of the order of 0.75%, is negligible for all count rates and is therefore not included in the Observatory analysis software.

J. Osborne

ERRATUM TO GSPC CALIBRATION REPORT (EXPRESS NO. 11)

Because of a typing error the channel boundary definition was given incorrectly (page 53). The convention is:

$$E = (N - 0.5).GP + 0.150$$

where N is 0-255 (as defined in the FOTH). This formula applies to both gain 1.0 and 2.0 (with GP different by a factor of 2). The zero reference point is at the lower boundary of channel N = 1.0. To bin gain 2.0 into gain 1.0 data the convention is:

$$CH\ (0)_{1.0} = CH\ (0)_{2.0}$$

$$CH\ (1)_{1.0} = CH\ (1)_{2.0} + CH\ (2)_{2.0}$$

$$CH\ (2)_{1.0} = CH\ (3)_{2.0} + CH\ (4)_{2.0}$$

etc...

N. White

BACK-UP MODE OPERATION

EXOSAT is a 3-axis stabilised satellite relying primarily on a 3-axis + skew gyro pack for attitude control. Gyro drift is automatically compensated on-board by comparing the gyro outputs with the star tracker and Fine Sun Sensor (FSS) outputs, directly or via the OBC programs ROLLER and SMC.

In the event of a double gyro failure, 3-axis attitude measurement via the gyro pack is no longer possible. Provision was therefore made within the AOCE microprocessor to synthesise the gyro data from the star tracker and FSS readings. This is the so-called "Back-up Mode" which will allow EXOSAT operations to continue should a further gyro fail.

This mode was implemented late in the design phase of the satellite and has the following drawbacks.

- the star tracker data in particular is noisy in comparison with the gyro data, which will inevitably result in increased propane consumption and/or decreased pointing stability. A trade-off between the two can be made by adjusting the control loop gains which are stored in the microprocessor RAM.
- slew manoeuvres pose severe operational problems because of the size of the star tracker FOV (3° square). This restricts the magnitude of a slew to about 2° since it is not possible to switch from one star to another during the slew. Large manoeuvres would therefore be accomplished as a series of short steps, known as "star-hopping", which is very time-consuming and expensive in propane usage.

Because of the problems associated with the 'star hopping' technique for slewing, consideration has been given to using the remaining healthy gyros. In this respect, it is fortunate that the failed gyro is the X-gyro which can always be replaced by the FSS (with the restriction that the sun azimuth angle remains in the range 30° to 150°). Work is in progress to define the procedures for utilising the two remaining gyros (after a further single failure) instead of the star tracker to control the Y and Z axes during the slew. This function will be carried out by an OBC program which reads the relevant gyro outputs and interfaces with the AOCE via the microprocessor RAM to induce the required thruster firings. Reductions in slewing time, propane consumption and operational complexity can be achieved by replacing the original 'star hopping' technique with this procedure.

Work on the definition of the OBC program is now almost complete and coding has begun. Testing of the program and drafting of the supporting operational procedures should be finished shortly. The program is expected to occupy more than one application program slot in the OBC.

To summarise, if and when the Back-up Mode becomes operational, the impact will be as follows:

- a degradation in pointing stability from ± 2" to ± 10".
- an increase in overall propane consumption of about 25%.
- a restriction of the solar aspect angle to 30° - 150° (constrained in any case to $90° \leq \beta \leq 130°$ for nearly all observations).
- a time penalty during manoeuvres (~1 hr).
- continuous use of the FSS implies a roll about the spacecraft X-axis during observations of up to 1°/day.
- a limitation in space available in the OBC for payload programs <u>during manoeuvres</u>.

P. Prior
Spacecraft Operations Group

F O R M A T   O F   P R I N T E D   L I N E   O F   A R C H I V E

The information in the data archive list is from 3 sources:

A = auxiliary data (=manoeuvre history)
F = FOT request file
- = manual (via editor) insertion

description of field	data source	printout format
start time of stable pointing	A	yy/ddd hhmm
end " " " "	A	..ddd hhmm
right ascension (of star tracker)	A	hh mm ss
declination (" " ") (RA & dec are in 1950 epoch; note that these are not the target coordinates - normally target is offset from star tracker by about 2 arc mins)	A	+/-dd mm.m
target name (left justified) (no special convention for names; the + sign to indicate a trim is always the 16th character, if present)	A	up to 16 characters
proposal code : divided into 2 fields,		up to 8 characters
- class of proposal(PV ,TOO,LLX,AGN, OPS,CAL,HLX,CLU,SNR,OCC,EXG, or MIS)	F	
- identification of proposal	F	
miscellaneous footnotes: 11 = solar aspect angle < 90 degs. 13 = partial data loss 19 = OBC problem or crash * = 1st pointing of multi-pointing FOT		12 = unstable attitude 18 = ME/HER4 data problem 21 = raster scan C = continuation of a '*' FOT
principal investigator (a number > 0 pointing to a table of PI's names and addresses. 0 means 'Observatory'.)	F	
4 flags for whether FOTs exist : (space means corresponding FOT doesn't exist)	F	L = LE1 available K = LE2 " M = ME " G = GS "
P.I. name (from FOT request; a blank space is shown if the request was for the Observatory, e.g. for data from performance verification phase; PI name will not be in final log, only the PI number plus list of names)	F	

E X O S A T   D A T A   A R C H I V E

1984 day 242 to day 3Ø5

84/295	ØØ53..295 1Ø23	ØØ Ø3 16	-74 45.9	EØØØ3.Ø-7443	EXG F3		27	L MG	Pye, Dr. J.P.
84/266	Ø243..266 Ø736	ØØ 25 36	-77 22.3	BETA HYDRI	LLX ØØ4		132	L MG	Dravins, D.
84/3Ø3	1312..3Ø3 173Ø	Ø1 16 ØØ	-73 44.4	SMC X-1	HLX Ø91		58	L MG	Van der Klis, Dr. M.
84/292	Ø4Ø9..292 1Ø42	Ø1 16 Ø3	-73 44.7	SMC X-1	HLX G-8		91	L MG	Robba, Dr. R.
84/295	19Ø9..296 Ø125	Ø1 16 Ø9	-73 44.1	SMC X-1	HLX Ø91		58	L MG	Van der Klis, Dr. M.
84/299	1438..299 2ØØØ	Ø1 16 Ø9	-73 44.6	SMC X-1	HLX Ø91		58	L MG	Van der Klis, Dr. M.
84/291	1458..291 21ØØ	Ø1 22 Ø5	-59 5.9	FAIRALL -9	AGN Ø64		9Ø	L MG	Scarsi, Dr. L.
84/293	1148..293 144Ø	Ø1 22 Ø5	-59 5.9	FAIRALL-9	AGN Ø64		9Ø	L MG	Scarsi, Dr. L.
84/295	1234..295 1757	Ø1 22 Ø5	-59 5.9	FAIRALL-9	AGN Ø64	27 28	9Ø	L MG	Scarsi, Dr. L.
84/296	21Ø3..296 2355	Ø1 22 Ø5	-59 5.9	FAIRALL-9	AGN Ø64		9Ø	L MG	Scarsi, Dr. L.
84/299	Ø852..299 132Ø	Ø1 22 Ø5	-59 5.9	FAIRALL-9	AGN Ø64		9Ø	L MG	Scarsi, Dr. L.
84/3Ø2	Ø8Ø4..3Ø2 1228	Ø1 38 17	+67 48.4	HD1Ø221	LLX F125		83	L MG	Ferrari, Dr. A.
84/297	Ø1Ø2..297 Ø8ØØ	Ø1 39 57	-68 1Ø.1	HØ139-68	LLX 154		63	L MG	Beuermann, Dr. K.
84/259	2349..26Ø Ø513	Ø2 25 21	+31 7.8	MKN 1Ø4Ø	AGN F34		8	L MG	Pounds, Prof. K.A.
84/253	15ØØ..253 19ØØ	Ø2 32 35	+Ø3 32.8	FEIGE 24	LLX Ø96		61	L MG	Heise, Dr. J.
84/255	Ø84Ø..255 1134	Ø2 32 36	+Ø3 32.8	FEIGE 24	LLX Ø96		61	L MG	Heise, Dr. J.
84/258	2339..259 Ø45Ø	Ø2 51 23	+41 25.4	NGC 1129	CLU ØØ4		2	L MG	Morini, Dr. M.
84/289	1ØØ4..289 1414	Ø3 16 22	-45 48.3	SC Ø316-458	CLU Ø12		3	L MG	McKechnie, Dr. S.P.
84/265	Ø647..265 1216	Ø3 23 46	+Ø2 16.3	HØ323+Ø22	AGN Ø76		111	L M	Bradt, H.
84/267	Ø626..267 1216	Ø3 23 46	+Ø2 16.3	HØ323+Ø22	AGN Ø76		111	L MG	Bradt, H.
84/246	2354..247 Ø319	Ø3 27 54	+43 46.5	GK PER	LLX Ø96		57	L MG	Watson, Dr. M.G.
84/292	1339..292 161Ø	Ø3 31 16	+53 2.9	VØ332+53	HLX 1Ø3		231	L MG	Davelaar Dr. J.
84/261	19ØØ..261 22Ø5	Ø3 31 17	+53 2.7	VØ332+53	HLX 1Ø3		231	L MG	Davelaar Dr. J.
84/258	Ø159..258 Ø519	Ø3 31 21	+53 2.6	VØ332+53	HLX 1Ø3		231	L MG	Davelaar Dr. J.
84/264	1517..265 Ø425	Ø3 36 Ø4	+Ø9 5Ø.2	Ø335+Ø96	CLU F16		6	L MG	Schnopper, Prof. H.W.
84/285	2Ø57..285 23Ø4	Ø3 38 27	-54 19.4	Ø338-54	TOO		Ø	L MG	
84/266	1542..266 1821	Ø4 Ø5 Ø9	+47 37.Ø	HD 2594Ø	LLX 137		149	L MG	Henrichs, H. F.
84/251	1655..251 1959	Ø4 Ø9 29	-71 25.4	VH HYDRI	LLX Ø97		61	L MG	Heise, Dr. J.
84/255	1425..255 175Ø	Ø4 Ø9 56	-71 24.3	VW HYDRI	LLX Ø97		74	L MG	Pringle, Dr. J.E.
84/3Ø4	1655..3Ø4 19Ø2	Ø4 Ø9 56	-71 26.2	VW HYDRI	LLX G12		61	L MG	Heise, Dr. J.
84/262	2125..263 ØØ5Ø	Ø4 Ø9 58	-71 24.2	VW HYDRI	LLX Ø97		74	L MG	Pringle, Dr. J.E.
84/247	2Ø39..248 ØØØ9	Ø4 Ø9 59	-71 23.7	VW HYDRI	LLX Ø97		74	L MG	Pringle, Dr. J.E.
84/297	1737..297 225Ø	Ø4 Ø9 59	-71 25.6	VW HYDRI	LLX G12		61	L MG	Heise, Dr. J.
84/252	Ø725..252 1Ø2Ø	Ø4 1Ø ØØ	-71 24.3	VW HYDRI	LLX Ø97		74	L MG	Pringle, Dr. J.E.
84/259	Ø715..259 1Ø3Ø	Ø4 1Ø Ø1	-71 24.5	VW HYDRI	LLX Ø97		74	L MG	Pringle, Dr. J.E.
84/27Ø	2Ø28..27Ø 2353	Ø4 1Ø Ø1	-71 24.3	VW HYDRI	LLX Ø98		145	L MG	Van der Woerd, H.
84/274	135Ø..274 1719	Ø4 1Ø Ø1	-71 25.1	VW HYDRI	LLX Ø98		145	L MG	Van der Woerd, H.
84/293	Ø6Ø5..293 Ø929	Ø4 1Ø Ø1	-71 26.3	VW HYDRI	LLX Ø98		61	L MG	Heise, Dr. J.
84/266	2Ø47..267 Ø4ØØ	Ø4 1Ø Ø2	-71 25.Ø	VW HYDRI	LLX Ø97		61	L MG	Heise, Dr. J.
84/278	Ø648..278 1ØØ3	Ø4 1Ø Ø4	-71 25.1	VW HYDRI	LLX Ø98		145	L MG	Van der Woerd, H.
84/298	114Ø..298 1151	Ø4 1Ø Ø4	-71 25.8	VW HYDRI	LLX G12		61	L MG	Heise, Dr. J.
84/3Ø1	ØØ17..3Ø1 1Ø59	Ø4 1Ø Ø4	-71 25.9	VW HYDRI	LLX G12		61	L MG	Heise, Dr. J.

84/289	16ØØ..289	1959	Ø4 1Ø Ø5	-71 25.3	VW HYDRI		LLX Ø98			145	L	MG	Van der Woerd, H.
84/285	165Ø..285	192Ø	Ø4 1Ø Ø6	-71 24.9	VW HYDRI		LLX Ø98			145	L	MG	Van der Woerd, H.
84/281	1945..281	2346	Ø4 1Ø Ø7	-71 25.Ø	VW HYDRI		LLX Ø98			145	L	MG	Van der Woerd, H.
84/276	2Ø43..277	Ø23Ø	Ø4 1Ø 48	+1Ø 22.3	A 478		AGN Ø84			7	L	MG	Stewart, Dr. G.C.
84/253	Ø916..253	13ØØ	Ø4 14 24	+ØØ 59.8	1HØ414+ØØ9		AGN Ø38			21	L	MG	Warwick, Dr. R.S.
84/258	Ø748..258	112Ø	Ø4 14 25	+ØØ 59.7	1HØ414+ØØ9		AGN Ø38			21	L	MG	Warwick, Dr. R.S.
84/266	1Ø16..266	1316	Ø4 14 26	+ØØ 59.5	1HØ414+ØØ9		AGN Ø38			21	L	MG	Warwick, Dr. R.S.
84/274	Ø9Ø1..274	1149	Ø4 14 26	+ØØ 59.5	1HØ414+ØØ9		AGN Ø38			21	L	MG	Warwick, Dr. R.S.
84/281	1Ø2Ø..281	1736	Ø4 15 3Ø	+17 9.4	HYADES III		LLX F14		C	6	L	MG	Schnopper, Prof. H.W.
84/254	1555..254	171Ø	Ø4 16 14	-12 16.9	HØ416-12		MIS F16			226	L	MG	White, Dr. N.
84/3Ø4	2Ø44..3Ø4	2327	Ø4 19 Ø9	-55 4.1	NGC 1566		AGN Ø43			1Ø9	L	MG	Alloin, D.
84/277	Ø452..277	Ø744	Ø4 19 12	-55 2.8	NGC 1566		AGN Ø43			1Ø9	L	MG	Alloin, D.
84/281	Ø4ØØ..281	Ø926	Ø4 22 35	+16 59.3	HYADES II		LLX F14		C	6	L	MG	Schnopper, Prof. H.W.
84/28Ø	231Ø..281	Ø239	Ø4 25 58	+17 22.Ø	HYADES I		LLX F14		*	6	L	MG	Schnopper, Prof. H.W.
84/284	1114..284	2Ø39	Ø4 26 19	+26 6.2	TAU-C1 F1		LLX G21			24	L	MG	Bleeker, Dr. J.A.M.
84/284	Ø327..284	Ø846	Ø4 3Ø Ø6	+Ø5 17.2	3C12Ø		AGN Ø83			8	L	MG	Pounds, Prof. K.A.
84/286	Ø126..286	Ø633	Ø4 3Ø Ø6	+Ø5 17.2	3C12Ø		AGN Ø83			8	L	MG	Pounds, Prof. K.A.
84/276	Ø636..276	1828	Ø4 3Ø Ø7	+Ø5 16.8	3C12Ø		AGN Ø83			8	L	MG	Pounds, Prof. K.A.
84/277	1Ø24..277	1548	Ø4 3Ø Ø7	+Ø5 16.8	3C12Ø		AGN Ø83			8	L	MG	Pounds, Prof. K.A.
84/28Ø	1348..28Ø	2Ø35	Ø4 3Ø Ø7	+Ø5 17.1	3C12Ø		AGN Ø83			8	L	MG	Pounds, Prof. K.A.
84/249	1153..249	1941	Ø4 3Ø 39	+Ø5 16.8	3C 12Ø		AGN 112			86	L	MG	Tanzi, Dr. E.
84/278	13Ø2..278	1834	Ø4 3Ø 4Ø	+Ø5 16.8	3C 12Ø		AGN 112			86	L	MG	Tanzi, Dr. E.
84/297	Ø944..297	1628	Ø4 48 Ø8	-74 59.2	HØ453-75		LLX 146	11		121	L	MG	Tuohy, Dr. I. R.
84/284	2254..285	14Ø1	Ø4 52 45	+3Ø 33.9	TAU-C2 F1		LLX G21			24	L	MG	Bleeker, Dr. J.A.M.
84/3Ø4	1127..3Ø4	1359	Ø4 55 5Ø	+51 57.7	HØ452 +51 A		MIS ØØ5			121	L	MG	Tuohy, Dr. I. R.
84/298	1429..298	1719	Ø5 Ø7 48	-Ø3 53.Ø	4UØ5Ø4-Ø4		HLX Ø16			157	L	MG	Patterson, J.
84/273	18Ø2..273	21ØØ	Ø5 23 29	+43 2.1	VRO42.Ø5.Ø1		SNR Ø18			81	L	MG	Bedford, Dr. D.K.
84/267	1422..267	1911	Ø5 29 Ø5	-Ø3 4Ø.8	GL 2Ø5		LLX 171			154	L	MG	Schmitt, J. H.
84/288	2345..289	Ø7Ø3	Ø5 3Ø 48	+21 58.6	CRAB NEBULA	+	CAL 2-ØØ		C	Ø	L	MG	
84/288	1659..288	2323	Ø5 31 38	+22 1.1	CRAB NEBULA		CAL 2-ØØ		*	Ø	L	MG	
84/3Ø2	15Ø2..3Ø2	2339	Ø5 38 Ø7	+26 46.6	S 147		SNR Ø1Ø			128	L	MG	Rothenflug, R.
84/293	2315..294	Ø424	Ø5 38 3Ø	-69 11.4	N 157B		SNR ØØ1			126	L	MG	Trussoni, E.
84/294	17Ø7..294	23Ø5	Ø5 44 44	-68 48.5	PSRØ54Ø-69		SNR Ø23			6	L	MG	Schnopper, Prof. H.W.
84/279	1714..279	2Ø3Ø	Ø5 51 2Ø	+46 27.4	MCG 8-11-11		AGN III			22	L	MG	Maraschi, Dr. L.
84/298	1957..298	224Ø	Ø5 52 52	+28 48.7	4UØ55Ø+29		HLX Ø16			157	L	MG	Patterson, J.
84/291	2238..292	Ø21Ø	Ø5 58 51	-5Ø 26.5	PKSØ558-5Ø4		AGN Ø67			111	L	MG	Bradt, H.
84/272	Ø816..272	12ØØ	Ø6 14 31	+Ø9 1Ø.8	4UØ614+Ø9		HLX Ø7Ø			36	L	MG	Mason, Dr. K.O.
84/3Ø5	Ø2Ø9..3Ø5	Ø735	Ø6 14 31	+Ø9 1Ø.5	4UØ614+Ø9		HLX Ø7Ø	16		36	L	MG	Mason, Dr. K.O.
84/293	181Ø..293	21ØØ	Ø6 24 34	+14 56.4	HD 45314		LLX 137			149	L	MG	Henrichs, H. F.
84/299	Ø1Ø5..299	Ø547	Ø6 25 11	-25 16.7	ABELL 15		LLX Ø94			61	L	MG	Heise, Dr. J.
84/252	1145..252	1615	Ø6 37 44	-75 11.3	PKSØ637-75		AGN G13	11		23	L	MG	Zimmermann, Dr. H.U.
84/277	18Ø1..277	2Ø54	Ø6 51 38	+55 39.6	PK 158+17.1		LLX 11Ø			66	L	MG	De Korte, Dr. P.A.J.
84/3Ø3	Ø159..3Ø3	Ø455	Ø7 26 59	-25 59.2	3AØ726-26Ø		HLX Ø39		*	57	L	MG	Watson, Dr. M.G.
84/3Ø3	Ø841..3Ø3	Ø922	Ø8 Ø9 54	+46 9.7	MKN 86		HLX Ø39		C	57	L	MG	Watson, Dr. M.G.
84/3Ø3	1937..3Ø4	ØØ19	Ø8 35 ØØ	+48 49.7	PG Ø834+488		LLX Ø63			141	L	MG	Cook, M. C.
84/244	Ø329..244	1Ø21	15 56 46	-6Ø 35.8	1556-6Ø5		HLX 1Ø7			98	L	MG	Pakull, Dr. M.
84/251	Ø515..251	1441	16 36 39	-53 4Ø.5	2S1636-536		HLX Ø46			25	L	MG	Turner, Dr. M.J.L.
84/27Ø	1418..27Ø	18Ø5	16 55 56	+35 22.5	HER X-1		HLX 114	11		167	L	MG	Voges, W.
84/254	1926..255	Ø1ØØ	17 Ø2 14	-36 22.7	17Ø2-363		HLX Ø95			55		MG	Van Paradijs, Dr. J.
84/25Ø	1227..25Ø	18ØØ	17 Ø9 35	-23 19.9	OPHICHUS CL		CLU Ø22			12Ø	L	MG	Nulsen, P. E. J.
84/257	Ø616..257	234Ø	17 27 ØØ	-34 15.4	MXB 1728-34		HLX ØØ7			156	L	MG	Foster, A. J.
84/246	1814..246	2124	17 28 48	-24 44.4	GX1+4		HLX G21			36	L	MG	Mason, Dr. K.O.

84/25Ø	Ø7ØØ..25Ø 1Ø18	17 28 48	-24 44.Ø	GX1+4		HLX	Ø82			36	L	MG	Mason, Dr. K.O.
84/255	Ø23Ø..255 Ø528	17 28 49	-24 44.Ø	GX1+4		HLX	Ø82			36	L	MG	Mason, Dr. K.O.
84/242	1615..242 1916	17 28 56	-24 42.5	GX1+4		HLX	Ø82			36	L	MG	Mason, Dr. K.O.
84/256	2329..257 Ø45Ø	17 29 23	-16 6.Ø	V442 OPH		LLX	Ø89			145	L	MG	Van der Woerd, H.
84/262	1143..262 16Ø8	17 57 56	-25 6.5	1758-25Ø		HLX	Ø95		*	55	L	MG	Van Paradijs, Dr. J.
84/262	1639..262 1912	17 57 56	-24 54.5	1758-25Ø	+	HLX	Ø95		C	55	L	MG	Van Paradijs, Dr. J.
84/269	Ø3Ø5..269 Ø731	18 Ø5 18	+Ø5 49.1	V426OPH		LLX	Ø44	11		138	L	MG	Szkody, P.
84/255	2Ø14..256 Ø825	18 Ø6 53	+69 47.7	3C 371		AGN	115			116	L	MG	Worrall, D. M.
84/273	23ØØ..274 Ø614	18 Ø6 58	+69 46.8	3C 371		AGN	115			5Ø	L	MG	Staubert, Dr. R.
84/243	143Ø..244 Ø1Ø9	18 11 28	-23 3Ø.4	JUPITER	+	MIS	F1		C	6	L	MG	Schnopper, Prof. H.W.
84/249	22Ø2..25Ø Ø436	18 13 Ø1	-14 4.7	GX 17+2		HLX	Ø82			166	L	MG	Sztajno, M.
84/25Ø	1938..251 Ø33Ø	18 13 Ø1	-14 4.7	GX 17+2		HLX	Ø82			166	L	MG	Sztajno, M.
84/243	1Ø55..243 1346	18 13 38	-23 28.5	JUPITER		MIS	F1		*	6	L	MG	Schnopper, Prof. H.W.
84/272	2216..273 Ø145	18 14 46	+49 49.3	AM HER		HLX	Ø63			61	L	MG	Heise, Dr. J.
84/3Ø1	14Ø1..3Ø1 1812	18 14 54	+49 48.1	AM HER		HLX	Ø63	11		61	L	MG	Heise, Dr. J.
84/245	Ø2Ø9..245 Ø3ØØ	18 14 58	+49 5Ø.9	AM HER		HLX	Ø63			61	L	MG	Heise, Dr. J.
84/244	1235..244 2128	18 17 34	-16 13.3	1E1875.5-16		LLX	152			98	L	MG	Pakull, Dr. M.
84/261	1144..261 1636	18 19 44	-59 4Ø.8	H1829-591		MIS	Ø35		C	13	L	MG	Lawrence, Dr. A.
84/27Ø	Ø555..27Ø 1221	18 2Ø 2Ø	-3Ø 25.4	182Ø-3Ø3		HLX	133			17Ø	L	MG	Ponman, Dr. T. J.
84/261	Ø552..261 Ø826	18 21 ØØ	-59 24.2	H1829-591		MIS	Ø35		C	13	L	MG	Lawrence, Dr. A.
84/263	Ø73Ø..263 2352	18 22 15	-37 1Ø.1	2A 1822-371		HLX	Ø68			36	L	MG	Mason, Dr. K.O.
84/273	Ø4Ø8..273 Ø519	18 28 44	-29 27.7	V 1Ø17 SGR		LLX	G12			61	L	MG	Heise, Dr. J.
84/261	Ø9Ø9..261 1Ø53	18 28 45	-59 21.2	H1829-591		MIS	Ø35		C	13	L	MG	Lawrence, Dr. A.
84/268	16Ø4..269 Ø12Ø	18 32 33	+51 39.Ø	BY DRA		LLX	Ø91			146	L	MG	De Jager, C.
84/269	1657..27Ø Ø1Ø4	18 32 33	+51 38.9	BY DRA		LLX	Ø91			146	L	MG	De Jager, C.
84/27Ø	Ø1Ø4..27Ø Ø4Ø4	18 32 33	+51 38.9	BY DRA		LLX	Ø7Ø			75		MG	Pallavicini, Dr. R.
84/276	Ø232..276 Ø349	18 33 38	-Ø7 4Ø.8	H1833-Ø77	+	HLX	Ø4Ø		C	161	L	MG	Cooke, B. A.
84/276	ØØ4Ø..276 Ø214	18 34 41	-Ø7 4Ø.Ø	H1833-Ø77		HLX	Ø4Ø		*	161	L	MG	Cooke, B. A.
84/261	Ø3Ø8..261 Ø5Ø1	18 35 49	-59 16.6	H1829-591		MIS	Ø35		*	13	L	MG	Lawrence, Dr. A.
84/242	Ø246..242 1358	18 43 49	-Ø3 2.Ø	G 29.7-Ø.3		SNR	ØØ2			44	L	MG	Koch-Miramond, Dr. L.
84/259	1719..259 2111	18 44 42	+79 42.Ø	3C39Ø.3		TOO				Ø	L	MG	
84/251	2312..252 Ø431	18 46 11	+ØØ 3Ø.3	V 6Ø3 AQI		LLX	159			15Ø	L	MG	Metz, K.
84/253	222Ø..254 Ø432	18 46 13	+ØØ 3Ø.2	V 6Ø3 AQI		LLX	159			15Ø	L	MG	Metz, K.
84/245	2Ø28..246 Ø234	18 51 4Ø	-31 15.9	V 1223 SGR		LLX	153			63	L	MG	Beuermann, Dr. K.
84/242	2143..243 Ø415	18 51 49	-31 13.5	V 1223 SGR		LLX	153			63	L	MG	Beuermann, Dr. K.
84/279	2314..28Ø 1113	18 53 2Ø	+Ø1 14.6	G34.6-Ø.5		SNR	Ø3Ø			129	L	MG	Jones, L. R.
84/275	ØØ43..275 Ø3Ø6	19 Ø5 32	+43 54.9	MV LYR		LLX	Ø94		C	61	L	MG	Heise, Dr. J.
84/283	1356..284 ØØ29	19 Ø5 47	+ØØ 2.9	MXB19Ø6+ØØ		HLX	Ø5Ø			96	L	MG	Brinkmann, Dr. W.
84/277	2259..278 Ø45Ø	19 Ø8 35	+ØØ 28.Ø	AQL X-1		HLX	Ø8Ø			55	L	MG	Van Paradijs, Dr. J.
84/265	15Ø9..265 1821	19 Ø9 13	+Ø4 52.5	SS 433		HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/273	1153..273 1548	19 Ø9 14	+Ø4 52.3	SS 433		HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/278	2134..279 ØØ1Ø	19 Ø9 14	+Ø4 51.9	SS 433		HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/268	1Ø21..268 1351	19 Ø9 15	+Ø4 51.7	SS 433		LLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/269	Ø9Ø4..269 15Ø6	19 Ø9 15	+Ø4 51.7	SS 433		HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/271	Ø2Ø6..271 Ø623	19 Ø9 15	+Ø4 51.7	SS 433		HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/275	2Ø25..275 2314	19 Ø9 21	+Ø4 53.8	SS433	+	HLX	Ø35			7	L	MG	Stewart, Dr. G.C.
84/287	Ø649..287 14Ø1	19 21 34	-29 22.7	1921-293		AGN	F26	11		12	L	MG	Willmore, Prof. A.P.
84/288	Ø712..288 1355	19 21 34	-29 22.6	1921-293		AGN	F26	11		12	L	MG	Willmore, Prof. A.P.
84/286	Ø923..286 1533	19 21 35	-29 22.9	1921-293		AGN	F26	11		12	L	MG	Willmore, Prof. A.P.
84/282	Ø623..282 1238	19 39 33	+16 35.2	HM SGE		LLX	1Ø3			148	L	MG	Cordova, Dr. F. A.

84/287	2331..288 Ø534	19 39 49	-1Ø 29.Ø	NGC6814	AGN ØØ1		1	L	MG	Branduardi-Raymont, Dr.
84/262	Ø755..262 Ø929	19 44 Ø6	-42 9.8	CD-42	LLX 412		61	L	MG	Heise, Dr. J.
84/3Ø5	1ØØ8..3Ø5 124Ø	19 5Ø 4Ø	+77 35.2	AB DRA	LLX F35		36	L	MG	Mason, Dr. K.O.
84/289	2226..29Ø Ø254	19 55 1Ø	+39 39.3	V1Ø16 CYG	LLX 1Ø3		148	L	MG	Cordova, Dr. F. A.
84/287	16Ø9..287 2149	2Ø Ø5 39	-49 1.2	PKS2ØØ5-489	AGN Ø4Ø		21	L	MG	Warwick, Dr. R.S.
84/254	Ø73Ø..254 13Ø5	2Ø Ø5 42	-49 1.Ø	PKS2ØØ5-489	AGN Ø4Ø		21	L	MG	Warwick, Dr. R.S.
84/274	1952..274 2316	2Ø 27 54	+39 2.1	GD 391	LLX Ø94	*	61	L	MG	Heise, Dr. J.
84/246	Ø514..246 1544	2Ø 3Ø 21	+4Ø 47.5	CYG X-3	HLX 147		36		MG	Mason, Dr. K.O.
84/247	Ø546..247 1554	2Ø 3Ø 21	+4Ø 47.4	CYG X-3	HLX 147		36		MG	Mason, Dr. K.O.
84/26Ø	1841..261 ØØ56	2Ø 3Ø 24	+4Ø 46.5	4U2Ø3Ø+4Ø	HLX F24		58		MG	Van der Klis, Dr. M.
84/272	1437..272 2Ø46	2Ø 3Ø 24	+4Ø 46.1	CYG X-3	TOO		58		MG	Van der Klis, Dr. M.
84/273	Ø72Ø..273 Ø941	2Ø 41 58	-31 33.2	HD 197481	LLX F7Ø		75	L	MG	Pallavicini, Dr. R.
84/3Ø4	Ø242..3Ø4 Ø819	2Ø 59 Ø8	-24 45.8	SC2Ø59-247	AGN 1Ø5		3	L	MG	McKechnie, Dr. S.P.
84/282	Ø156..282 Ø428	21 ØØ Ø5	+27 34.7	ER VUL	LLX F97		61	L	MG	Heise, Dr. J.
84/296	Ø359..296 1825	21 27 27	+11 54.8	X2127+119	HLX Ø54	15 16	163	L	MG	Redfern, R. M.
84/258	1416..258 21Ø9	21 4Ø 45	+43 21.3	SS CYG	LLX Ø69		57	L	MG	Watson, Dr. M.G.
84/259	1312..259 154Ø	21 4Ø 45	+43 21.3	SS CYG	LLX Ø69		57	L	MG	Watson, Dr. M.G.
84/262	ØØ31..262 Ø459	21 4Ø 45	+43 21.3	SS CYG	LLX Ø69		57	L	MG	Watson, Dr. M.G.
84/263	Ø33Ø..263 Ø455	21 4Ø 45	+43 21.3	SS CYG	LLX Ø69		57	L	MG	Watson, Dr. M.G.
84/265	21ØØ..265 2339	21 4Ø 45	+43 21.1	SS SIG	LLX Ø69		57	L	MG	Watson, Dr. M.G.
84/248	Ø3ØØ..248 22ØØ	22 Ø6 26	+45 31.3	AR LAC	LLX F121	12	82	L	MG	Eyles, Dr. C.
84/243	Ø7Ø9..243 Ø817	22 Ø6 4Ø	+45 29.6	AR LAC	LLX F121		82	L	MG	Eyles, Dr. C.
84/299	23Ø7..3ØØ Ø235	22 23 Ø5	-Ø5 14.9	2223-Ø52	AGN Ø85		19	L	MG	McHardy, Dr. I.
84/292	1949..293 Ø335	22 51 2Ø	-17 53.3	MR 2251-178	AGN Ø84		8	L	MG	Pounds, Prof. K.A.
84/3ØØ	1Ø55..3ØØ 1535	22 51 23	-17 53.6	MR 2251-178	AGN Ø82		8	L	MG	Pounds, Prof. K.A.
84/245	1549..245 174Ø	23 14 51	+78 22.1	H2311+77	MIS F16		226	L	MG	White, Dr. N.
84/3ØØ	Ø517..3ØØ Ø739	23 17 ØØ	-27 42.5	1H 2322-269	LLX ØØ8		11Ø	L	MG	Schwartz, Dr. D. A.

OBSERVATORY TEAM

		Ext.
David Andrews	Observatory Manager	705*
Julian Sternberg	Observatory Software	703
Julian Lewis	System Software/HP Computers	702
Nick White	Senior Observatory Scientist	764
Paul Barr	Duty Scientist/Mission Planning	711
Paolo Giommi	"	710
Manfred Gottwald	"	758
Julian Osborne	"	714
Arvind Parmar	"	763
Rick Shafer	"	712
Luigi Stella	"	715
Anne Fahey	Mission Planning	707
Paolo Ferri	Observatory Controller	716
Maria Gonano	" "	427
Frank Haberl	" "	717
Carlo Izzo	" "	427
Antonella Nota	" "	717
Mark Sweeney	" "	716
Gianpiero Tagliaferri	" "	427
Susanne Ernst	Data Assistant	713
Margit Farkas	" "	709
Grazia Giommi	" "	709
Sandra Andrews	Secretary	704

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

Personnel Changes (1.9.85 - 31.10.85)

Dr. R. Shafer has been recruited as a Duty Scientist.

Messrs. G. Tagliaferri and C. Izzo have been recruited as Observatory Controllers.

A FIVE DAY WORKSHOP ON

THE PHYSICS OF ACCRETION ONTO COMPACT OBJECTS

to be held on the Island of

TENERIFE

(part of the Canaries group)

1986 APRIL 21-25

Organised in conjunction with

THE EUROPEAN SPACE AGENCY

and

THE INSTITUTO DE ASTROFISICA DE CANARIAS

Organising Committee: K.O. Mason, M.G. Watson, N.E. White, P.G. Murdin, H.V. Bradt, and J.A. van Paradijs.

Objectives: To promote discussion and interchange of ideas on all aspects of the physics of accretion onto compact objects both in interacting close binary systems and active galactic nuclei.

For further details please complete the following information and return to N.E. White, EXOSAT Observatory, ESOC, Robert Bosch Str. 5, 6100 Darmstadt, W. Germany.

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ADDRESS:...

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THE EUROPEAN SPACE AGENCY

VACANCIES FOR RESEARCH FELLOWS

ASTROPHYSICS DIVISION, SPACE SCIENCE DEPARTMENT

at ESTEC, Noordwijk, The Netherlands

OPTICAL ASTRONOMY - Observational Astronomy using the ESA photon counting system developed for the Space Telescope and the development of detector systems for future space astronomy missions. (M. Perryman 1719-8-3615).

X-RAY ASTRONOMY - Development of imaging detectors for future space astronomy missions with participation in the analysis of EXOSAT data. (A. Peacock 1719-8-3563).

SUBMILLIMETRE ASTRONOMY - Development of a super-heterodyne system for ground-based submillimetre astronomy, participation in observationl campaigns and data analysis. (M. Kessler 1719-8-3623).

GAMMA-RAY ASTRONOMY - Development of the COMPTEL Instrument for the Gamma Ray Observatory mission and data analysis. (K. Bennett 1719-8-3559).

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