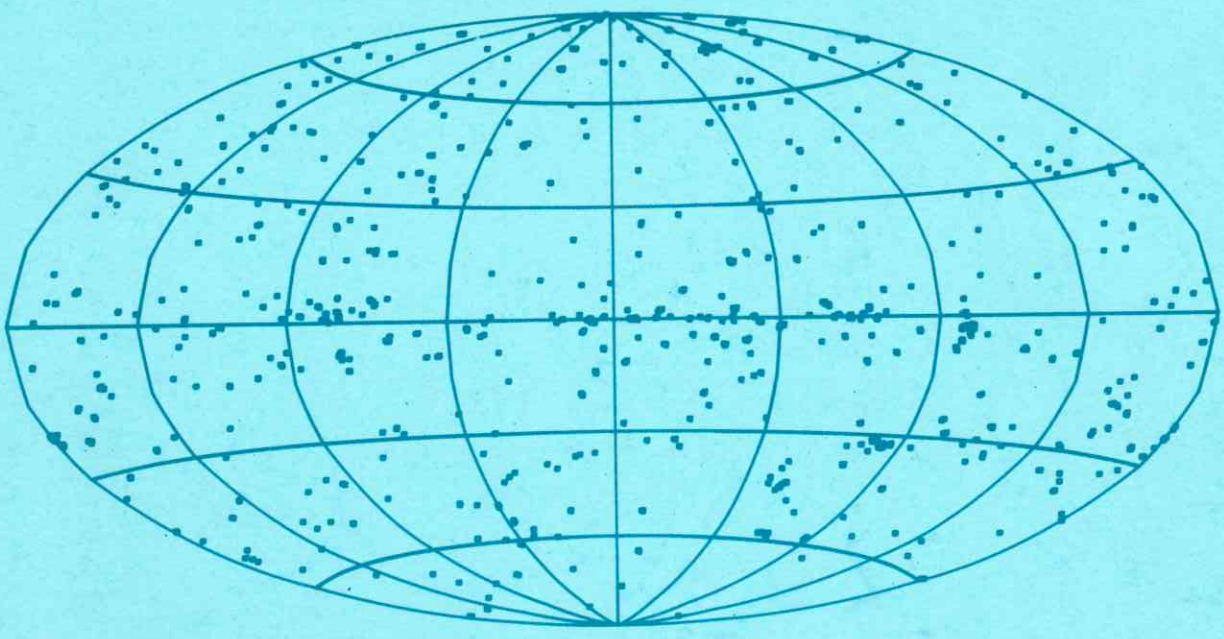
exosat esa

EXOSAT EXPRESS

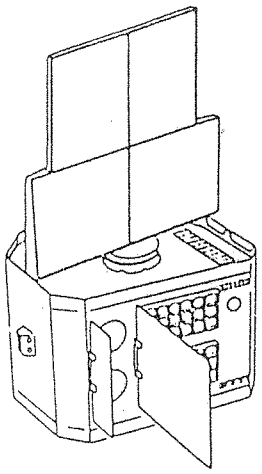


EXOSAT

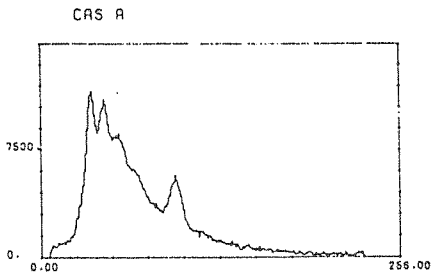
No. 14

EUROPEAN X-RAY ASTRONOMY SATELLITE

December 1985



EXOSAT EXPRESS



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Front Cover

The positions of several hundred cosmic X-ray sources, detected in the field of view of the telescopes during the first two years of operation, are plotted in galactic coordinates.

Courtesy: P. Giommi

FOREWORD

Attention is drawn to previous discussions of the EXOSAT mission lifetime in respect of orbital stability and remaining attitude control and manoeuvre gas (propane) estimated by the two methods of logging and thermal gauging - ref. Express No.9 p.51/Express No.11 p.3. Obviously, the optimum use of the remaining propane will have been made if the spacecraft re-enters the atmosphere at exactly the same time as the propane is exhausted. Recent estimates indicate a continuing discrepancy between the logging and gauging methods for the absolute amount of gas remaining, namely 3.2 kg (logging) and 2.1 kg (gauging) as of 1.12.85, although both give a similar usage figure of about 9 gm/day.

EXOSAT's natural orbit would decay in April 1986 but the on-board hydrazine thruster system, originally foreseen to modify the orbit to carry out occultation measurements, can be used to raise the perigee height and extend the lifetime. A 10 m s^{-1} thrust at apogee will raise the perigee by $\sim$350 km and increase the lifetime by about 3 weeks, but will consume an extra 50 gm of propane (equivalent to 5 days normal usage) for stability during the thrust. Two 10 m s^{-1} thrusts are planned for 1.3.86 and 8.3.86, thus extending the lifetime until the beginning of June.

Estimated propane usage from 1.12.85 to 1.6.86, including the 100 grams for the hydrazine thrust, is 1.7 kg. Further perigee raising will be undertaken, commensurate with remaining fuel estimates, once every 3 weeks in order to maintain at any time an orbit lifetime of between 4 and 7 weeks. Note that an accurate fuel assessment should be possible by recognising the transition between liquid and gas during thermal gauging when approximately 700 grams remain.

Attention is drawn to the discussion on p.44 of the AO-4 programme which will be selected by the Committee on Observation Proposal Selection (COPS) at their meeting on 18th and 19th February 1986.

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OBSERVATORY STATUS AS OF 31.12.85

Now that the strategy for extending the mission lifetime has been fixed, the March/April schedule will be determined on the assumption that 10 ms^{-1} thrusts take place as planned on 1/3 and 8/3. Should this strategy alter for any reason, some re-arrangement of the time line at short notice can be expected.

1. Hardware

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

Tests on all malfunctioning elements of the payload with the exception of the grating mechanism of telescope no.1 have been carried out recently. CMA2 and detector C of the ME experiment continue to show 'normal' counter operation but at a much reduced gain. Both PSD's still exhibit the 'failure modes' as described previously, namely rapid increase in 'LEP' counts on the PSD1 grid and a very high count rate on the PSD2 guard.

2. Performance and Operations

All slewing is now carried out at the lowest possible slew rate of 43°/hr. Double limit cycling about the X-axis and therefore excessive fuel usage has occurred frequently during 85°/hr and rarely during 43°/hr slews. Such cycling uses an additional amount of propane equivalent to about 20 hours of operation in order to save 2 to 3 hours of manoeuvre time and, although the duration of certain manoeuvres will be of the order of 5 to 6 hours, the saving at this stage of the mission is considered justified.

Readers are reminded of the note in Express No.9 p.6 concerning measures implemented to conserve fuel including the use of the Fine Sun Sensor (FSS) and 1 star for satellite attitude control and reconstitution from January 1985. Since June 1985, when procedural and software modifications were introduced to allow reconstitution from 2 stars while controlling via 1 star and the FSS, it has become apparent that uncertainties in the FSS calibration can lead to a reduction of pointing accuracy, in the worst cases of the order of several arc seconds for long observations. Further calibration of the FSS is planned and corrected attitude data will be published as appropriate, however in the meantime PI's primarily interested in position determination should contact the Observatory for the most up-to-date correction.

Minor loss of observation time because of solar activity has occurred in the period 1/11/85 - 31/12/85.

3. On-board Software

Reference is made to the description in Express No.13 (p.3) of the packet timing or data anomalies in certain OBC modes or combinations of modes.

Further investigation has shown that the first and second packet data content problem (point (2) of the referenced article) was caused by an error in the ground software protocol, present since launch and corrected on day 324 (85). Note that the first and second data packets produced by any program executed prior to this date could in principle contain invalid data and users are therefore recommended to exclude these packets from the analysis.

Use of the standard OBC mode configuration defined in Express No.13 p.38 has partially eliminated the occurrence of telemetry overload alarms at 85% load, (Express No.13 p.4) although the problem still exists and is under investigation.

A potential system level error in the treatment of 'overspill' counts for certain OBC modes, namely GHEBL2, GHEBL4 and MHER2 has recently been noted. Users are reminded that 'overspill' counting should be extremely rare, given the 8 bit counting ($\leq$255 counts), spectral shape, line strengths and time resolutions involved and to our knowledge has occurred only during an observation of Sco X-1 in the GHEBL4 packets. Nevertheless, a design specification error for certain situations in the definition of which channel has counted over 255 counts, as described in the OBC software documentation, resulted in the FOT production software combining the MSB of channel n with the LSB of channel n-1. This error has been corrected on day 350 (1985). Prior to this date, 'overspill' counting can be recognised by counts in the dedicated 'overspill' channels and data in any such packets should not be used in the analysis.

4. Future Plans

During the EXOSAT hardware development phase and the initial design for the Observatory system, a principle decision was made on cost grounds to re-use the Hewlett Packard 1000 series computer systems, already procured for instrument calibration and check-out facilities, at ESOC for EXOSAT data analysis and support to the operational programme. These systems, adequately upgraded during the operation phase, have supported throughout the first years of the mission many aspects of mission planning, production of the automatic analysis, calibration and instrument performance assessment, development and provision of the interactive data analysis system and the research activities of the team. It has been obvious for some time that the execution of these tasks approaches the CPU limitation of the HP-1000 systems, which are suited more to instrument control and data analysis than to scientific data analysis in its full sense. Also, their 16-bit word length and consequent 32K byte address space impose a

severe constraint on software development and prevent the transport of software from more modern machines with 32-bit word length.

The discovery of quasi-periodic oscillations from a number of binary X-ray sources and the general importance of X-ray variability study and timing analysis have increased substantially the demand for CPU power. The Observatory is therefore procuring a Dec Microvax Q7 system, comprising 71 MB disc, 2 MB memory, 1600 bpi tape deck and 8-port I/O interface together with an additional 71 MB disc, two terminals and laser printer. Timing analysis and spectral fitting software will be implemented on the Microvax and will be available to users of the IA system by the early summer. Note that the Microvax will be connected directly to the existing HP systems in order to facilitate file transfer.

The AO-4 observation programme is expected to include a number of long observations which in certain cases and normally in agreement with the PI may be terminated before the approved time has been used. To maximise the scientific return from EXOSAT in its final operational phase by making use of any observing time made available in this way, the Observatory proposes to identify from the approved AO-4 programme a number of observations which, with the prior approval of the PI, can be scheduled at very short notice. Clearly the OBC and P/L configuration must be determined in advance, but this constraint is felt justified to optimise the programme. Once the AO-4 programme has been selected, PI's can contact the the mission planning group to discuss the suitability of scheduling their observation in this way.

A paper has been prepared for the Feb. 1986 Science Programme Committee (SPC) meeting outlining the Agency's plans for support to the EXOSAT user community for the next several years. The plans will be discussed with the scientific advisory bodies, the Astrophysics Working Group (AWG) and the Space Science Advisory Committee (SSAC) in January 1986.

LIST OF AO-3 OBSERVATIONS 1.11.85 - 31.12.85

Day (85)	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator	
306	07.15	PKS 2155-304	21 55 53	-30 30 42	100	17 40	Treves	
307	03.25	H2103+095	20 57 13	+08 56 09	98	3 27	Page	
307	09.15	Cygnus-A	19 57 37	+40 33 02	93	5 34	Fabian	
307	17.00	EXO 2030+37	20 30 31	+37 24 30	98	4 59	TOO	
308	00.30	Cas-A	23 20 48	+58 31 35	123	7 59	CAL	
308	12.07	MCG 8-11-11	05 51 16	+46 28 41	129	6 8	Maraschi	
308	21.20	NGC 3516	11 04 03	+72 50 46	94	9 56	Reichert	
309	09.06	AG Draconis	16 01 38	+66 53 48	83	7 0	Viotti	
310	10.59	VW Hyi	04 09 22	-71 28 01	91	3 9	TOO	
310	20.45	H1926+503	19 33 09	+50 58 47	91	8 27	Motch	
311	08.06	AGN 3C390.3	18 45 17	+79 40 36	100	7 19	Shafer	
311	17.13	NGC 3516	11 03 57	+72 50 17	96	10 32	Reichert	
312	06.55	U Gem	07 52 08	+22 08 03	109	12 5	Watson	AO-1
312	23.25	H0139-68	01 39 47	-68 10 50	94	12 30	Beuermann	
314	06.31	VW Hyi	04 09 22	-71 28 01	90	4 15	TOO	
314	13.40	U Gem	07 52 08	+22 08 03	111	7 20	Córdova	AO-2
315	00.46	L AND	23 34 54	+46 10 14	128	13 18	Pallavicini	
315	17.55	4U0142+61	01 42 54	+61 29 57	133	6 27	TOO	
316	03.25	U Gem	07 52 08	+22 08 03	113	4 35	Cordova	AO-2
316	12.05	PKS 2155-304	21 55 53	-30 29 59	90	25 25	Treves	
317	18.05	PG2130+099	21 29 53	+09 52 56	96	15 57	Zamorani	
318	14.05	U Gem	07 52 08	+22 08 03	115	4 25	Cordova	AO-2
318	23.58	Cyg X-2	21 42 42	+38 02 30	105	12 22	Hasinger	
319	15.35	PG2304+042	23 04 23	+04 14 35	115	5 7	Elvis	
320	02.05	BD-16 6218	23 05 35	-15 43 06	107	4 6	Shafer	
320	09.39	NGC 1566	04 19 06	-55 05 15	105	5 55	Alloin	
320	19.35	1E0849+080	08 49 44	+08 04 57	101	5 22	Giommi	
321	19.02	2A0526-328	05 27 45	-32 51 35	121	31 21	Schrijver	
323	06.35	YZ Cmi	07 42 12	+03 42 05	118	8 48	Pallavicini	
323	18.25	A754	09 05 45	-09 24 43	94	7 32	Stewart	
324	03.20	A780	09 17 09	-12 04 43	91	8 40	Stewart	
324	13.25	Ty Pyx	08 57 58	-27 35 47	90	8 10	Culhane	
329	06.18	NGC 3227	10 20 56	+20 08 26	92	6 53	Elvis	
329	16.12	1E0951.5+691	09 51 12	+69 02 18	110	14 15	Barr	
330	08.37	NGC 3516	11 03 51	+72 51 48	105	10 23	Reichert	
330	22.35	HD 82443	09 29 58	+27 14 29	107	5 23	Pallavicini	
331	06.25	NGC 2991	09 31 13	+10 24 06	102	5 35	Reichert	
331	12.50	PSR 0950+08	09 50 39	+08 11 13	97	6 0	de Korte	
331	21.20	4U0833-45	08 31 13	-45 43 57	91	9 5	Smith	
332	08.05	LMC X-4	05 33 11	-66 24 54	91	1 0	Pietsch	
333	04.35	LMC X-4	05 33 12	-66 25 18	91	10 58	Pietsch	
333	18.20	NGC 526A	01 21 40	-35 21 46	109	5 24	Pounds	
334	03.03	III ZW 2	00 07 55	+10 39 24	118	7 16	Pounds	
334	13.05	PG 0049+171	00 49 11	+17 07 11	129	7 5	Zamorani	
334	22.52	MKN 335	00 03 39	+19 53 00	119	7 18	Pounds	
335	11.40	PG 1121+422	11 22 05	+42 18 02	95	5 55	Elvis	
335	18.30	1E1112+405	11 12 49	+41 00 59	96	16 57	Giommi	

Day (85)	Time	Target	RA	Dec	SAA	Duration h m	Principal Investigator	
336	12.20	1E1112+405	11 12 46	+41 00 48	97	11 51	Giommi	
337	02.20	NGC 4051	12 00 47	+44 49 20	91	57 32	Lawrence	
339	14.02	CW1103+254	11 03 01	+25 24 02	95	16 2	Beuermann	
340	06.50	CW1103+254	11 03 05	+25 24 18	96	6 11	Beuermann	
340	16.37	NGC 3516	11 03 56	+72 52 09	110	18 21	Reichert	
341	14.45	OJ 287	08 52 08	+20 19 37	125	11 45	Pollock	
342	05.05	NGC 3227	10 20 58	+20 08 27	105	5 45	Elvis	
342	13.07	OJ 287	08 52 08	+20 19 38	126	11 32	Pollock	
343	04.18	Vela SNR	08 53 16	-43 59 32	94	3 1	Smith	AO-2
343	09.45	NGC 1566	04 19 05	-55 05 51	101	5 30	Alloin	
344	05.28	LMC X-2	05 21 39	-72 02 04	85	20 1	Motch	
345	07.22	0142+61	01 42 42	+61 27 54	127	3 2	TOO	
345	16.30	1E0849+080	08 49 42	+08 05 01	126	6 35	Giommi	
346	00.30	PG1012+008	10 11 13	+00 59 41	104	8 30	Elvis	
346	12.00	OJ 287	08 52 05	+20 19 03	130	11 37	Pollock	
347	03.25	Vela SNR	08 53 13	-46 37 58	95	5 2	Smith	AO-2
348	02.22	LMC X-6	05 03 05	-66 32 10	90	9 11	Pakull	
348	12.27	N63A	05 35 42	-65 29 58	91	6 35	Stewart	AO-2
348	22.15	WD1031-115	10 31 32	-11 27 52	97	5 48	Shipman	
349	07.13	AD Leo	10 17 02	+20 08 45	113	8 37	Pallavicini	
349	16.45	NGC 3227	10 20 55	+20 08 25	113	7 38	Elvis	
350	03.16	BD+48 1958A	11 34 44	+47 44 57	106	10 25	Shafer	
350	15.50	1E1112+405	11 12 46	+41 03 18	109	8 40	Giommi	
351	14.20	Cal 83	05 44 12	-68 24 58	88	16 17	Cowley	
352	18.17	Fornax	02 37 50	-34 46 57	107	5 3	Markert	AO-2
353	02.45	Mira	02 16 48	-03 14 50	122	5 32	Mouchet	
353	11.55	WD0004+330	00 04 54	+32 58 16	106	5 39	Shipman	
353	21.10	WW Cet	00 08 46	-11 47 54	89	10 20	Beuermann	AO-1
354	10.20	PG0052+251	00 52 07	+25 06 35	112	5 29	Elvis	
354	18.05	III ZW 2	00 07 57	+10 39 25	97	6 20	Pounds	
355	16.20	X Leo	09 48 31	+12 07 10	124	11 57	Cordova	
356	09.45	WD0109-264	01 09 42	-26 31 15	93	6 25	Shipman	
356	17.30	UV Ceti	01 36 21	-18 16 37	103	9 29	De Jager	
357	05.20	TON S210	01 19 23	-28 38 30	94	10 39	Bues	
357	18.31	UV Ceti	01 35 52	-18 11 04	102	8 8	De Jager	
358	05.05	RS Aquarii	23 41 08	-15 36 29	77	5 37	Viotti	
358	13.10	MKN 335	00 03 42	+19 53 09	96	6 28	Pounds	
359	07.50	4U0042+32	00 42 04	+32 42 37	108	5 11	Parmar	
359	16.04	Gamma Cas	00 53 28	+60 24 47	115	29 41	Parmar	
361	03.15	XY Leo	10 00 27	+17 37 28	128	14 40	Vilhu	
361	21.34	NGC 3227	10 20 55	+20 08 25	125	6 1	Elvis	
362	07.30	MKN 231	12 54 20	+57 09 54	105	6 57	Elvis	
363	06.05	2S0114+650	01 14 21	+64 59 39	115	8 18	Swank	
363	18.40	MKN 766	12 15 33	+29 44 42	104	55 41	Ops	
1986								
001	06.49	2S0114+650	01 14 21	+64 59 39	114	2 7	Swank	

OUTSTANDING AO-1/AO-2 POINTINGS

AO-1 (8)

Target	Proposal No.	Comments
SC 0627-54	CLU F10	To be scheduled
3C345	AGN F50	TOO Status waiting for outburst
GX340+0	OCC G1	Occultation - on hold
GX349+2	OCC G4	" "
PSR2055-52	LLX F117	Scheduled Jan. '86
GX339-4	HLX F17	To be scheduled
NGC 5506	AGN F3	Scheduled Jan.'86/Feb. '86 (2 observations)

AO-2 (22)

Target	Proposal No.	Comments
Decided by PI	AGN 024	
NGC 1808	AGN 057	To be scheduled
Abell 2235	CLU 006	" "
3A1006+475	MIS 011	" "
G41.1-0.3	SNR 030	" "
G39.9+0.0	SNR 041	" "
A0538-66	HLX 053	TOO Status (5 observations)
AM Her	HLX 063	To be scheduled
A0535+26	HLX 154	Scheduled Mar.86 (5 observations)
H1615+09	MIS 019	Scheduled Feb. 86
RCW 86	SNR 039	Partially complete;to be scheduled
MCG6-30-15	AGN 036	Scheduled Jan.'86
NGC 5548	AGN 124	" " (2 observations)

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
1983			
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: $\leq$ 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
1984			
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
1985			
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

Circular No	Title	Comment	Authors
4044	NGC 3031	Flux increases and variablity in the 0.1-6 keV range	P. Barr, P. Giommi
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 3σ 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
4131	γ-Cas	Strong time variability detected consistent with source flux modulation of period 6000±200s.	D. Dal Fiume, F. Frontera, E. Manzo, S. Re, R. Robba
4140	GX5-1	Correlation between spectral state (hard/soft) and presence/absence of QPO.	M. van der Klis, F. Jansen, J. van Paradijs, W. Lewin, J. Trümper, M. Sztajno
4147	GX17+2	QPO's observed with centroid frequency of 2.4 Hz at a flux of $\sim 1.4 \times 10^{-11}$ J/m^2/s.	A.Langmeier, G.Hasinger, M. Sztajno J. Trümper, W. Pietsch
4153	V1341 Cyg	Evidence of two types of QPO's intensity-dependent hard spectrum between 18 and 42 Hz and, in the active state, soft, intensity-independent at 5.64 Hz.	G. Hasinger, A. Langmeier, M. Sztajno, W. Pietsch, M. Gottwald

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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.

20. Uncorrelated Soft and Hard X-ray Short Term Variations from Am Her.
Stella, L., Beuermann, K., Patterson, J.

22. Intermittent Stellar Wind Accretion and the Long Term Activity of the Pop.I Binary Systems containing an X-ray Pulsar.
Stella, L., White, N.E., Rosner, R.

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

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A DESCRIPTION OF THE EXOSAT TIMING ANALYSIS INTERACTIVE SYSTEM

A short description is given of the facilities supported by the EXOSAT Timing Analysis Interactive System and of the improvements which will be implemented in the near future.

1. Rate Buffers and Light Curves

The EXOSAT Timing Analysis Interactive System consists of a set of programs scheduled from a control program (TINTE), which can be executed directly from the File Manager or from the LE, ME or GS interactive system. The Timing Analysis system uses as input files X-ray light curve points stored in the so-called rate buffers by the interactive analysis system of the various instruments. Rate buffers consist of a header containing the basic information concerning the instrument, the PHA channel, the integration time etc., and of a binned light curve whose points are described by: start time of the bin, exposure fraction (to correct for instrumental dead times), count rate and count rate error.

The Timing Analysis Interactive System is designed to operate on one or two rate buffers which partially overlap in time and refer to two different energy bands (or instruments). The latter is to permit the determination of hardness ratio, cross-correlations etc. which can require the use of two (simultaneous) time series.

2. Interaction

The interaction between the system and the user can be handled in 3 different ways which correspond, more or less, to various levels of expertise of the user. In particular:

a. After issuing a command, all the following parameters are input by replying to the relevant questions.

b. The command and all the following parameters are input to the system as a single string.

c. The string(s) as in b. can be written into a macro file and run automatically via a special command.

At the current state of development the following commands are available:

--- Set up commands ----------		--- Execution commands ----------	
SF	set input files	ST	run statistical analysis
SR	set no. of recs	VA	run detailed RMS variab analysis
EL	set min expos limits	HD	run hdns ratio vs intensity
EB	set error bar option	PL	write data in Pablo-like file
BG	set manual bkgd subtraction	PC	prepare correlation input files
GA	set gap filling options	PF	run phase fitting
BU	set params for burst search	LH	list rate buffer header
SI	set selection on intensity	LR	list rate buffer points
SC	set params for correlat. anal.	CC	run correlation analysis
RD	reset defaults	FC	final correlation analysis
PU	purge file(s) one by one	PD	plot results or data
PA	purge files automatically	FG	execute a FMGR command
MD	map good data intervals	VE	write energy in RMS variab file
HA	hardcopy alphanumeric screen	PT	plot (or fold) rate buffer data
HG	hardcopy graphic screen	FT	FFT power spectrum analysis
ED	edit a file	F2	FFT with trend rem. & selection
RB	rebin the data	FD	folding period search
WI	time window(s) handling	@@,MA	run macro MA
IN	infos on set up	??,XX	infos on command XX
EX	exit	??,??	general infos

3. Objectives

The purposes of the Timing Analysis Interactive System are as follows:

a. 'Clean' the Data. A series of set-up commands is designed to remove all bad-quality light-curve points from the time series to be analysed. This data, whilst only marginally affecting the average count rate, can strongly affect the determination of the higher statistical moments. 'Cleaning' is carried out through a set of qualification criteria (such as time windows, intensity windows, exposure fraction windows etc.) which can be enabled and disabled.

b. Remove Long-Term Trends. Trend removal techniques are often needed to exclude the effects of long-term variability in the evaluation of the Correlation Functions and the Power Spectrum (PS). A facility is provided to remove trends by means of a polynomial fit to the data.

c. Bridge Data Gaps. Several timing analysis techniques (e.g. Correlation Functions, PS) require the use of uninterrupted time series. Bad data gaps and/or telemetry dropouts can be filled with simulated data obtained by the use of several different techniques.

d. Test the Hypothesis of Source Constancy. This is done by the use of the χ^2 and the RMS variability tests and by the determination of the source statistical moments.

e. Search for Flares/Bursts. A search for flares and/or bursts can be performed interactively by specifying the significance level above which an event is revealed. It is also possible to carry out a millisecond burst search by using the local average technique discussed by Rothschild et al. 1974 (Ap.J.Lett., 189, L13) in connection with the very short-term activity of Cyg X-1.

f. Compute Correlation Functions. Partially unbiased Auto Correlation (ACF) and Time Skewness (TSF) Functions can be calculated for a time series of any length shorter than 5000 bins. When analysing two simultaneous time series from different instruments and/or energy bands, a partially unbiased Cross Correlation Function (CCF) can also be calculated (for details see Stella et al. 1984, Ap.J., 282, 713). The results from different time intervals (5000 bins) can be averaged to produce an average ACF, CCF and TSF. To allow for maximum flexibility the programs which compute the correlation functions do not use Fast Fourier Transform algorithms. Correlation Functions are widely used to characterise the aperiodic source flickering and to investigate the amount of correlation and any possible time lag between the source variations in two different energy bands.

g. Search for Coherent Pulsations. This can be done using 3 different approaches: (1) the Power Spectrum Technique (which uses an FFT algorithm on data intervals long up to 4096 bins), (2) The Folding Analysis Technique (which can use an unlimited number of data bins to search for coherent pulsations over up to 75 trial periods), (3) the Phase Fitting Technique (which is normally used to determine the pulsation period as accurately as possible). The Power Spectrum Technique is rapid and straightforward to search for pulsations over a wide range of frequencies and is the most commonly used technique. The Folding analysis allows a more sensitive search for coherent pulsations when dealing with non-continuous or unevenly spaced data (cf. Leahy et al. 1983, Ap.J., 266, 160), but is highly CPU consuming and is usually applied over a limited number of trial periods.

h. Characterise the RMS Variability as a Function of Energy. This technique is often used to establish whether the source is more variable at high or low energies.

j. Investigate the Hardness Ratio as a Function of Time and/or Source Intensity. This simple investigation of the source spectral changes has proven to be very powerful in establishing the presence of absorption dips, intensity-correlated spectral changes etc.

4. Recent Developments

Following the interest in the recent discovery of fast (1-50 Hz) Quasi-Periodic Oscillations (QPO) in the flux of several bright galactic X-ray sources, a dedicated software package has been developed as a part of the EXOSAT Timing Interactive System to search for QPO and investigate their properties. A new type of compact rate buffer, the so-called Millisecond-Type Rate Buffers, has been defined and implemented in order to store onto disk a very high number of light curve bins (currently up to $2\text{-}4 \times 10^7$, depending on disk space availability). These rate buffers are accessed by a dedicated Power Spectrum Program which uses an FFT algorithm and allows storage of $\leqslant 256$ colour-coded power spectra together with the source light curve into an 'PS image'. This type of display has proven to be a very powerful means of investigating QPO. The 'PS images' can be analysed and the power spectra fitted to various models using a dedicated program which allows a fully interactive selection of the power spectra in order to investigate the possible dependence of the QPO parameters on source intensity, activity state etc.

5. Future Developments

A major rewrite of the EXOSAT Timing Analysis Interactive System will be made during 1986 in order to:

(i) make the software more complete and flexible (in particular the limitations on the maximum number of points which can be analysed at once, will be made less stringent).

(ii) adapt the package to Vax machines.

(iii) make the system more user-friendly, by standardising the interaction with the various programs.

L. Stella

CMA FILTER POLICY FOR AGN OBSERVATIONS

An increasing number of active galactic nuclei are being found by EXOSAT to exhibit rapid X-ray variability, on a timescale less than a typical EXOSAT observation duration. However, study of the X-ray variations in the CMA have been hampered by the filter wheel rotation policy used to date, which involved obtaining an equal number of counts in the Lexan, Al-P and Boron filters in order to obtain maximum spectral information. As a result, most of the observation duration was usually spent in the filter with the lowest throughput! A typical example is shown in Figure 1, where a Seyfert galaxy exhibited marked variations in the ME waveband, but the soft X-ray light curve was seriously disrupted by the filter changes.

Therefore, the default filter strategy (and the one recommended by the Observatory!) will be changed as follows:

a. The observation will be started in Lexan.

b. If the count rate is high enough (and spectral information is desired), an Al-P exposure will be performed until approx. 30 counts from the source are obtained.

c. If the count rate is sufficiently high, a Boron exposure to be performed until approx. 50 counts obtained.

HOWEVER the Al-P and Boron exposures would only be performed if more than 80% of the observation would still take place in Lexan. (The amount of time needed for the Al-P and Boron exposures can be predicted by the Observatory Controller from the initial Lexan count rate in real time).

(Of course if the PI is interested principally in variability we recommend spending the entire observation in Lexan).

This procedure is now the default strategy for AGN and will be adhered to unless the PI specifically requests otherwise for his/her observation.

P. Barr

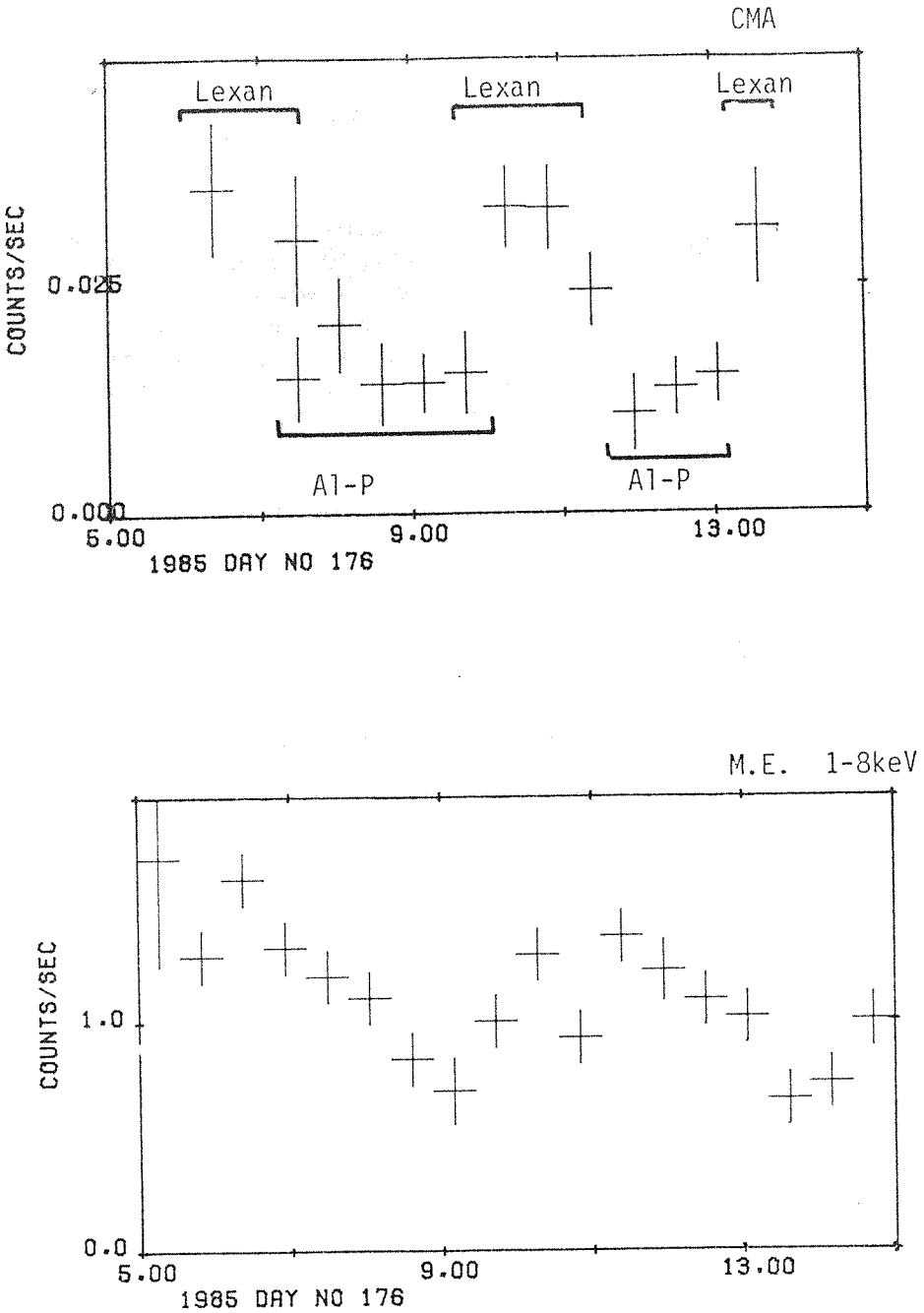


Figure 1. The effect of filter wheel rotation on the soft X-ray light curve of a variable active galactic nucleus; matching light curves from the CMA and ME

THE HISTORY OF THE GSPC BACKGROUND AND GAIN

This report considers the evolution of the GSPC background and gain from launch to the beginning of 1986. The qualified event (QE) rate, photomultiplier (PM) rate, cell temperature and detector gain have been obtained from a sample of background observations, selected at random since there is no variation of the background over the range of altitude where the instrument is operated.

In Figure 1 the evolution with time of the PM rate, QE rate, detector gain and cell temperature is shown. The detector gain is defined in terms of a parameter called the gain conversion factor, GCF, which is the ratio of the average energy of the two lead lines measured from the gain 2.0 CCF background (channel no. 171.55), to that measured for a particular observation. An increasing value of GCF corresponds to a decrease in detector gain (i.e. any detected line feature will move to a lower channel number). The time axis is given in day no. of 1983 (i.e. Day 1 = 1.1.83) such that day 1000 corresponds to 1985 day 269.

It is apparent from Figure 1 that the PM and QE rates have been increasing since 1983 day no. 700 (December 1984). This is most probably caused by an increase in the solar particle flux during the approach to solar maximum. There has also been an increase in the GCF to 1.2, that is a 20% decrease in the detector gain. The temperature of the gas cell has fluctuated between 10 and 14°C, and shows the sinusoidal variation caused by the variation in the distance of the earth from the sun (ref. Express No.4 p.35).

In Figure 2 the GCF and QE rate are plotted as a function of PM rate and show a very good correlation between both the GCF and PM rate and the QE rate and PM rate. The discontinuity in QE rate from a linear relation which occurs above a PM rate of 1950 ct/2 sec is caused by the progressive failure of the upper level energy discriminator on the GSPC in early 1985. This allows additional events to be registered as qualified (ref. Express No.11 p.2). Also shown in Figure 2 is the GCF as a function of cell temperature. In this case there is no strong correlation.

The gain of the GSPC is dependent on both the cell temperature and the overall count rate seen by the PM tube. A correlation of the gain with the cell temperature is to be expected because the light yield is dependent on the gas pressure (and hence temperature). The GCF will be inversely proportional to temperature in degrees Kelvin. During some observations when the detector cooled from 12 to 6°C, a marked decrease in gain can be seen. However, large excursions in cell temperature only occur when sources are observed at beta angles above 130°. Since the 90-130° constraint

was imposed in late 1983 the variation in cell temperature has been relatively small.

Figure 2 indicates that the dominant effect on the detector gain is the overall increase in PM count rate. This is to be expected since the gain of the PM tube is dependent on the amount of UV light received per second. The PM rate reflects the total counts registered in the detector above a certain energy threshold, that is background and any source in the field of view. The increase in the background PM count rate from 1600 to 2200 ct/2 sec is comparable to that seen when a bright source is observed (such as the Crab). There is no noticeable change in the GCF after the slew onto a bright source (even for Sco X-1). However the PM tube is also registering background events which are not counted if their energy is below that of the lower level discriminator. This count rate is not measurable but is probably very large, thus dominating the count rate dependence of the PM tube.

While the correlation between PM count rate and GCF is good, it is not recommended to use this to predict the gain of the GSPC for a particular observation. There will still be a second order correction required because of the temperatue dependence. In addition the gain will drift slightly as a function of the time after switch on. The most accurate gain determination is still obtained using the position of the lead lines.

The overall increase in the background has caused the QE rate to almost double over the past year. About 20 ct/2 sec of this comes from the failure of the upper level discriminator in early 1985. This failure does not affect the spectrum obtained from the packet data. However, the overall increase in background does seem to be associated with the slight change in the shape of the background. Figure 3 shows the ratio of a background spectrum obtained in January 1986 to that in the CCF (adjusted to a GCF = 1.0), indicating that the overall increase in background is associated with a broad bump between channels 25 and 100. Although this is a subtle effect, it does mean that for observations made in 1985 the re-normalisation of the CCF to the slew background will leave an excess below channel 100.

To overcome this problem, time-dependent backgrounds are being generated and will shortly be placed in the CCF. If the background continues to increase, further updates will be provided. The procedure for background subtraction will then be as follows:

1. Ascertain the PM count rate in the slew preceeding the observation of interest. Remember that because the PM rate includes source counts the on-source PM rate cannot be used. Alternatively, a reasonable estimate can be obtained from Figure 1. Compare this with the PM rates of the CCF backgrounds to find the optimum CCF background to use.

2. Obtain the gain for the observation from the lead lines. Re-adjust the CCF background to the new gain value.

3. Re-normalise the CCF background to the same count rate as in the slew (channels 120-300 recommended). As a check the re-normalised CCF background should be subtracted from the slew background to ensure that the residual spectrum is clean.

4. If the residual spectrum is not satisfactory it may be necessary to generate a local background, and users should contact the Observatory in the first instance. In general, however, the CCF backgrounds should be quite adequate.

N.E. White
F. Haberl

FIGURE 1.

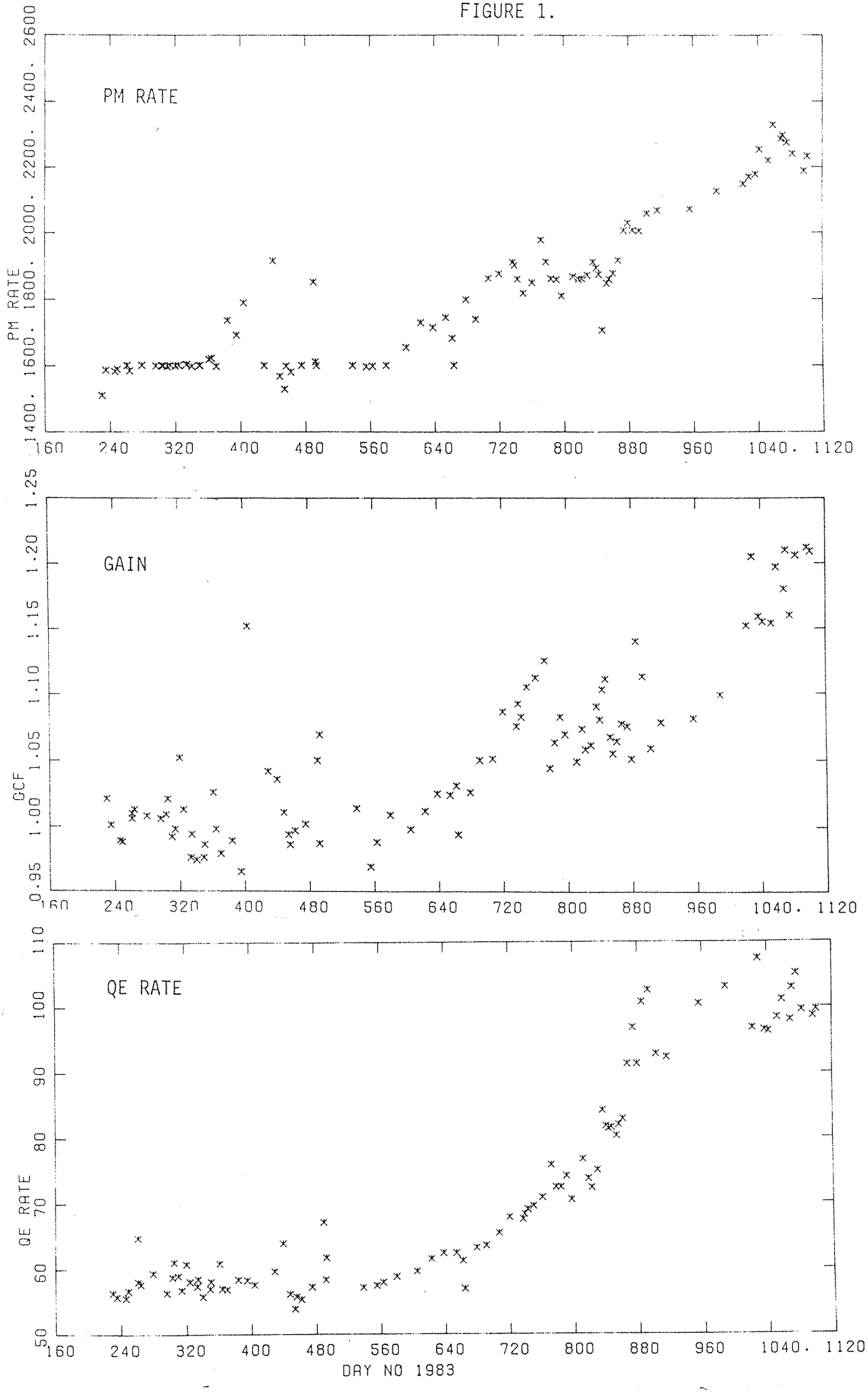

PM RATE
PM RATE
1400. 1600. 1800. 2000. 2200. 2400. 2600
160 240 320 400 480 560 640 720 800 880 960 1040. 1120
GAIN
GCF
0.95 1.00 1.05 1.10 1.15 1.20 1.25
160 240 320 400 480 560 640 720 800 880 960 1040. 1120
QE RATE
QE RATE
50 60 70 80 90 100 110
160 240 320 400 480 560 640 720 800 880 960 1040. 1120
DAY NO 1983

FIGURE 1 (cont'd)

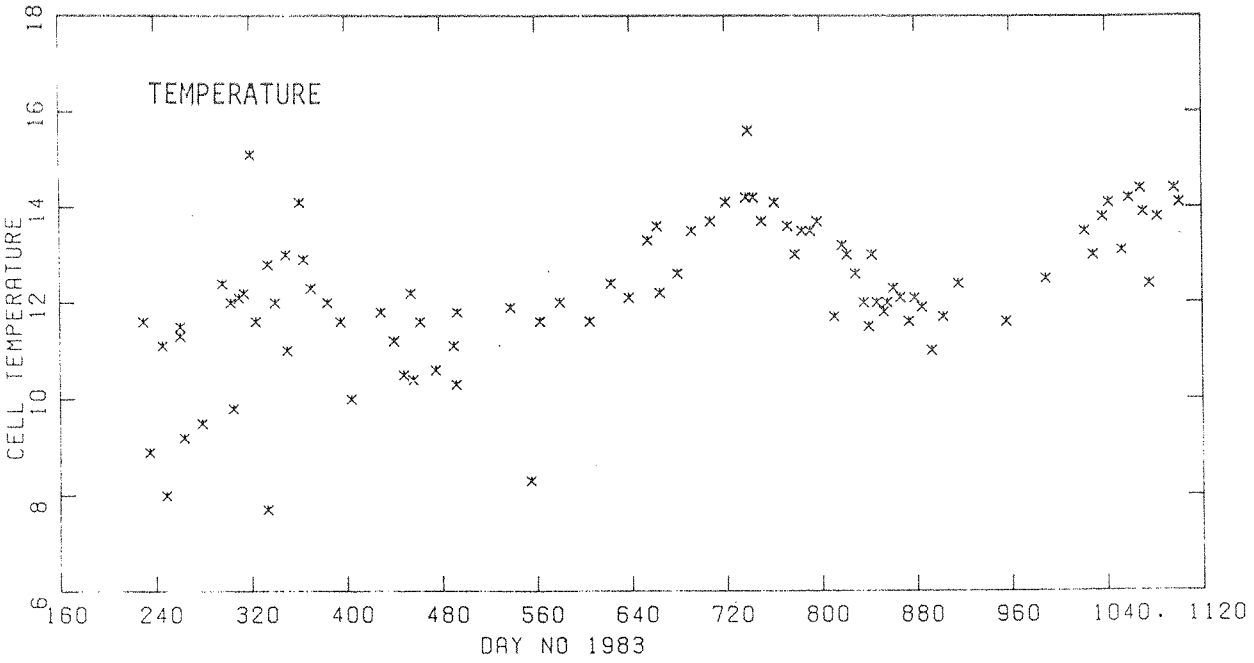


FIGURE 2.

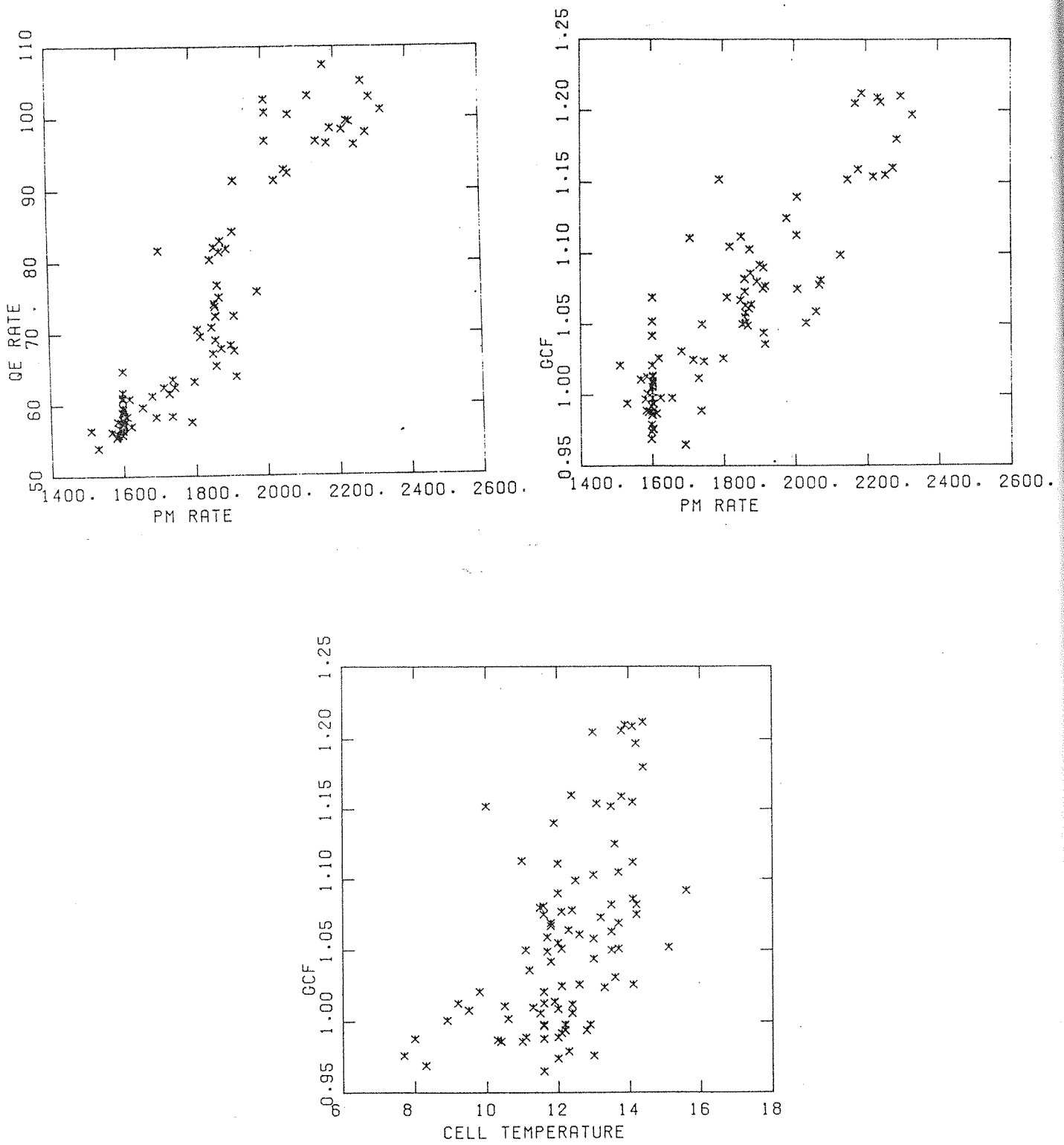
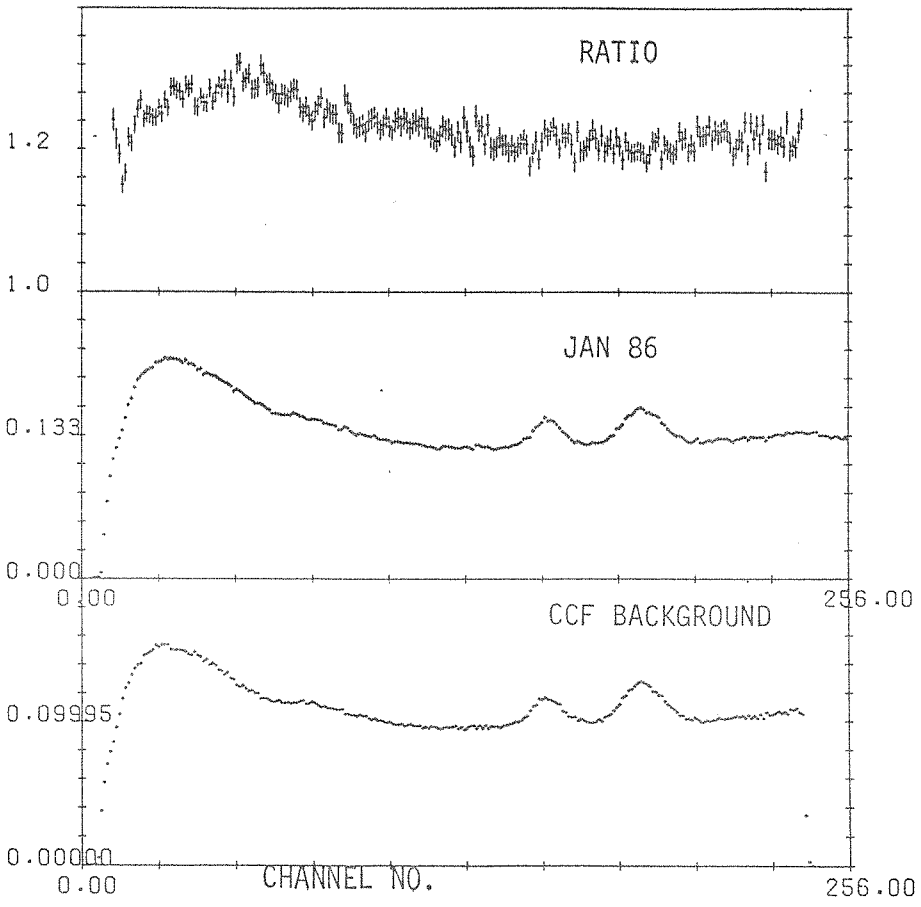

QE RATE
50
60
70
80
90
100
110
1400.
1600.
1800.
2000.
2200.
2400.
2600.
PM RATE
GCF
0.95
1.00
1.05
1.10
1.15
1.20
1.25
1400.
1600.
1800.
2000.
2200.
2400.
2600.
PM RATE
GCF
0.95
1.00
1.05
1.10
1.15
1.20
1.25
6
8
10
12
14
16
18
CELL TEMPERATURE

FIGURE 3.


RATIO
1.2
1.0
JAN 86
0.133
0.000
0.00
256.00
CCF BACKGROUND
0.09995
0.00000
0.00
CHANNEL NO.
256.00

EXOSAT: THE FINAL ORBITS

The purpose of this note is to summarise the rationale behind the Observatory's planning for the final, critical phase of the mission. EXOSAT, through frugal use of the available fuel and assuming a successful perigee raising strategy, should continue to operate until about October 1986. The current observation program which comprises targets selected from AO-3 should be largely complete ($\sim$85%) by March 1986 when the AO-4 program would commence.

Given the uncertainties surrounding the end of flight operations and the obvious need to minimise the expenditure of fuel, a certain number of mission planning constraints will be imposed. The constraints are summarised as follows:

- Severe reduction of the number of simultaneous, co-ordinated or phase-locked observations.

- Reduced revisit capability for short exposures.

- All AO-4 selected targets will be categorised in priority according to recommendations of the Committee on Observation Proposal Selection (COPS) as follows:

    1. Essential observations which must be performed prior to the end of the mission.

    2. Desirable observations which should be performed provided they satisfy an optimised manoeuvre strategy.

    3. Observations which will be performed only if time allows or which fit into an optimised manoeuvre strategy.

With this approach, the Observatory should be able to complete the AO-3 program and the vast majority of the AO-4 (priority 1 & 2) program before October 1986.

The situation with the grating also requires some clarification. The 1000 line/mm grating on the LE1 telescope has not been used since a serious mechanical malfunction occurred early in the mission (ref. Express No.1 p.3). It should be stressed that the failure left the grating at an angle of 45 degress to the X-ray beam, ie. stuck half-way in - the worst of both worlds, useless for spectroscopy, impossible for imaging, and extremely difficult for photometric observations except on the brightest of sources. Only by careful control of the drive mechanism were we literally able to drag the grating out of the X-ray beam, although there is no evidence that it is completely orthogonal to the optical axis. The Agency is currently evaluating the following aspects related to grating observations:-

1. The grating insertion procedure.

2. The number of possible grating targets on which the grating could obtain reasonable spectra (brightness criteria) based on the AO-1 to AO-3 observation programs.

3. Assessment of the typical exposures required on each of these possible targets.

4. Assessment of the impact a possible grating observation program would have on the LE photometric/imaging observations and the overall schedule.

5. Assessment of the best insertion time given the celestial constraints imposed on key grating targets.

6. Impact of any grating program on the overall fuel usage.

For AO-4 the grating was not offered in the overall instrument complement available to observers. This resulted from major uncertainties in the success of the grating insertion procedure as well as a large number of incomplete AO-1 to AO-3 observations. Note that if a possible attempt to place the grating in the beam were successful, it is likely to be irreversible. In addition, those observers with incomplete grating observations to date can naturally expect their observations to be performed (subject to celestial or mission planning constraints), should the grating become available.

Finally, let us look towards the future. Currently, the Agency is in the initial phase of development of the high-throughput X-ray Spectroscopy Mission. This is a cornerstone of the future ESA Science programme which represents the next major step in the Agency's high energy astrophysics program. Whilst ROSAT and Astro-C will naturally fill an important gap for high energy astrophysics in the late 1980's, one of the next truly world-class observatories in which the general astronomer can actively participate will be this mission. The experience gained by the ESA team in working with the world-wide user community which has developed out of the EXOSAT program will certainly be utilised in our next big stride. I hope you, the user, will be able to participate and take a step forward with us.

A. Peacock

FORMAT OF PRINTED LINE OF ARCHIVE

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. 12 = unstable attitude
15 = ME HTR3 OPT or HTR5 running, in addition to 2 other indicated programs
16 = faulty ME HTR3 OPT data (invalid sampling rate of 32 Hz)
17 = unexplained anomaly in ME HTR3 data
* = 1st pointing of multi-pointing FOT 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	

1984 day 306 to day 365 inclusive

84/341	1352..341	2250	00 03 41	+19	53.5	MKN335	AGN	F34			8	L	MG	Pounds, Prof. K.A.
84/355	1710..355	2305	00 08 24	+70	27.1	0008+70	AGN	056			30	L	MG	Witzel, Dr. A.
84/313	1644..314	1415	00 13 05	+81	18.7	S5 0014+81	AGN	126			23	L	MG	Zimmermann, Dr. H.U.
84/314	1701..314	2017	00 26 42	+59	29.9	4U 0027+59	HLX	079			55	L	MG	Van Paradijs, Dr. J.
84/356	0014..356	0704	00 26 48	+70	19.8	0027+70	AGN	056			30	L	MG	Witzel, Dr. A.
84/363	2050..364	0504	00 36 04	+48	1.3	NGC 185	AGN	095	15	16	115	L	MG	Weisskopf, M. C.
84/364	0722..364	2125	00 39 54	+40	57.5	M31	HLX	077			58	L	MG	Van der Klis, Dr. M.
84/342	1404..342	1935	00 53 27	+60	25.5	GAMMA CASS.	LLX	163			153	L	MG	Frontera, F.
84/331	0034..331	0848	00 53 44	-01	34.4	A119	CLU	-005			2	L	MG	Morini, Dr. M.
84/329	1622..329	1942	00 54 16	-33	17.2	WD 0500-33	LLX	-095			61	L	MG	Heise, Dr. J.
84/349	1912..350	0227	00 54 28	+14	27.3	PHL909	AGN	F1	16		7	L	MG	Stewart, Dr. G.C.
84/327	0838..327	1307	01 02 04	-24	16.8	A 140	CLU	012	16		3	L	MG	McKechnie, Dr. S.P.
84/307	1150..307	1520	01 15 14	-73	43.9	SMC X-1	HLX	091			58	L	MG	Van der Klis, Dr. M.
84/330	1500..330	2203	01 21 52	-59	6.6	FAIRALL 9	AGN	F 34			8	L	MG	Pounds, Prof. K.A.
84/357	1609..357	2134	01 21 54	-35	20.4	NGC526A	AGN	G17			25	L	MG	Turner, Dr. M.J.L.
84/361	1829..362	0140	01 22 25	+08	24.5	A 193	CLU	013	16		3	L	MG	McKechnie, Dr. S.P.
84/340	0551..340	1710	01 24 42	+62	49.2	G127.1+0.5	SNR	F47			35	L	MG	Peacock, Dr. A.
84/341	0203..341	1050	01 36 24	-18	14.8	UV CETI	LLX	029			137	L	MG	Butler, C.J.
84/318	1130..318	1737	01 39 17	-68	10.4	H0139-68	LLX	154			63	L	MG	Beuermann, Dr. K.
84/352	1030..352	1706	02 36 43	-52	27.3	3A0234-526	MIS	F18			27	L	MG	Pye, Dr. J.P.
84/330	1009..330	1348	03 23 57	-54	45.7	LB 1663	LLX	047			130	L	MG	Kahn, Prof. S.
84/308	0940..308	1620	04 09 30	-71	25.3	VW HYDRI	LLX	G12			61	L	MG	Heise, Dr. J.
84/320	0430..320	1432	05 09 44	-68	48.6	N103B	SNR	020	16		6	L	MG	Schnopper, Prof. H.W.
84/365	0723..365	2150	05 26 09	-66	9.2	BURST WATCH	TOO	006	11	16	50	L	MG	Staubert, Dr. R.
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84/323	1024..323	1831	05 34 22	-58	3.7	H0534-58	LLX	146			121	L	MG	Tuohy, Dr. I. R.
84/358	0437..358	0916	05 38 51	-64	9.0	LMC X-3	HLX	137			85	L	MG	Treves, Dr. A.
84/361	1220..361	1547	05 38 54	-64	8.7	LMC X-3	HLX	137	15	16	85	L	MG	Treves, Dr. A.
84/354	0104..354	0449	05 38 59	-64	8.4	LMC X-3	HLX	137	15	16	85	L	MG	Treves, Dr. A.
84/350	0530..350	1020	05 39 00	-64	8.1	LMC X-3	HLX	075	17	15	58	L	MG	Van der Klis, Dr. M.
84/347	1405..347	1932	05 39 01	-64	8.0	LMC X-3	HLX	075			58	L	MG	Van der Klis, Dr. M.
84/308	1737..308	2035	05 39 10	-64	6.6	LMC X-3	HLX	075			58	L	MG	Van der Klis, Dr. M.
84/357	2339..358	0349	05 40 20	-69	48.4	LMC X-1	HLX	151	11		93	L	MG	Ilovaisky, Dr S.A.
84/328	1716..328	2129	05 40 33	-69	47.1	LMC X-1	HLX	151	11	16	93	L	MG	Ilovaisky, Dr S.A.
84/327	1607..327	1906	05 40 35	-69	47.2	LMC X-1	HLX	151	11	16	93	L	MG	Ilovaisky, Dr S.A.
84/328	0144..328	0300	05 40 35	-69	47.2	LMC X-1	HLX	151	11		93	L	MG	Ilovaisky, Dr S.A.
84/310	0533..310	1103	05 49 59	-07	16.9	NGC2110	AGN	F34			8	L	MG	Pounds, Prof. K.A.
84/306	1534..306	1849	05 51 18	+46	28.3	MGC 8-11-11	AGN	111			22	L	MG	Maraschi, Dr. L.
84/350	1145..350	1919	05 56 33	-38	21.6	3A 0557-383	AGN	036	16		8	L	MG	Pounds, Prof. K.A.
84/308	2339..309	0454	06 14 34	+09	11.1	4U0614+09	HLX	070	16		36	L	MG	Mason, Dr. K.O.
84/312	1638..313	0010	06 14 34	+09	11.1	4U0614+09	HLX	070	16		36	L	MG	Mason, Dr. K.O.

84/327	2019..328 0036	06	35	34	-62	36.4	RR PIC		LLX 090	15	16		145	L	MG	Van der Woerd, H.
84/339	0514..339 1055	06	52	21	-23	52.4	EZ CAM		LLX 009				135	L	MG	Willis, Dr. A. J.
84/310	1844..311 0213	06	55	46	+54	18.7	MR 374		AGN 123				16	L	MG	Bergeron, Dr. J.
84/328	2354..329 0214	07	12	32	+55	51.6	IH0712+558		MIS -033				124	L	MG	Wood, Dr. K. S.
84/306	0632..306 1319	07	17	38	+55	53.5	A 576		CLU 019				119	L	MG	Mushotzky, R. F.
84/334	0150..334 1130	07	27	01	-25	59.6	3A0726-260		LLX 053				49	L	MG	Corbet, Dr. R.H.D.
84/319	0314..319 0530	07	31	34	+32	.3	YY GEM		LLX 045			*	139	L	MG	Gibson, D. M.
84/319	0600..319 0844	07	31	38	+32	.2	YY GEM	+	LLX 045			C	139	L	MG	Gibson, D. M.
84/319	0910..319 2149	07	31	46	+32	.2	YY GEM	+	LLX 045	16		C	139	L	MG	Gibson, D. M.
84/319	2220..320 0217	07	31	54	+32	.2	YY GEM	+	LLX 045	16		C	139	L	MG	Gibson, D. M.
84/363	0048..363 0705	07	40	04	+76	48.8	0740+76		AGN 056	15	16		30	L	MG	Witzel, Dr. A.
84/322	0340..322 1251	07	40	18	+29	2.5	SIGMA GEM		LLX F14				6	L	MG	Schnopper, Prof. H.W.
84/323	2044..324 0556	07	40	18	+29	2.5	SIGMA GEM		LLX F14				6	L	MG	Schnopper, Prof. H.W.
84/326	0226..326 1122	07	40	21	+29	2.0	SIGMA GEM		LLX F14	16			6	L	MG	Schnopper, Prof. H.W.
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84/329	0510..329 0817	08	14	04	-49	3.5	CPD-48 1577		LLX -071				142	L	MG	Williams, Dr. G. A.
84/329	2259..330 0602	08	14	04	-49	3.6	CPD-48 1577		LLX -071				142	L	MG	Williams, Dr. G. A.
84/310	1315..310 1617	08	51	43	+09	7.0	PK 219+31.1		LLX 110				66	L	MG	De Korte, Dr. P.A.J.
84/344	0444..344 1304	08	52	05	+20	19.0	OJ 287		AGN 107				68	L	MG	Pollock, Dr. A.M.T.
84/345	1655..346 0220	08	52	05	+20	19.0	OJ 287		AGN 107				68	L	MG	Pollock, Dr. A.M.T.
84/352	2339..353 0041	08	54	29	-47	29.8	IH0900-48		PV			C	0	L	MG	
84/315	0428..315 1738	08	56	04	+14	22.3	0855+143		AGN 009				106	L	MG	Bregman, J. N.
84/345	0258..345 1506	08	56	04	+14	22.3	0855+143		AGN 009				68	L	MG	Pollock, Dr. A.M.T.
84/337	0850..337 1343	08	58	01	-27	36.4	TY PYX		LLX 143				226	L	MG	White, Dr. N.
84/352	1850..352 2014	08	58	17	-47	55.6	IH0900-48		PV			*	0	L	MG	
84/353	0514..353 1604	09	00	20	-40	21.1	VELA X-1		HLX G17				35	L	MG	Peacock, Dr. A.
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84/351	1904..351 2208	09	13	12	-07	5.9	H0917-074		MIS 035			C	13	L	MG	Lawrence, Dr. A.
84/351	2245..352 0701	09	17	11	-07	26.0	H0917-074		MIS 035			C	13	L	MG	Lawrence, Dr. A.
84/351	1615..351 1824	09	20	48	-07	48.0	H0917-074		MIS 035	15	16	*	13	L	MG	Lawrence, Dr. A.
84/344	1904..345 0020	09	43	26	-14	5.1	NGC 2992		AGN 033				8	L	MG	Pounds, Prof. K.A.
84/359	0326..359 0712	09	43	27	-14	5.2	NGC 2992		AGN 033				8	L	MG	Pounds, Prof. K.A.
84/365	0127..365 0444	09	43	27	-14	5.1	NGC 2992		AGN 033	15	16		8	L	MG	Pounds, Prof. K.A.
84/353	1849..353 2249	09	43	28	-14	4.8	NGC 2992		AGN 033	15	16		8	L	MG	Pounds, Prof. K.A.
84/337	2300..338 0248	09	43	29	-14	4.7	NGC 2992		AGN 033				8	L	MG	Pounds, Prof. K.A.
84/334	2001..334 2259	09	56	10	+35	55.6	PG 0956+35		LLX 094				61	L	MG	Heise, Dr. J.
84/321	2256..322 0202	10	03	15	+35	10.4	1003+35		EXG F7				29	L	MG	Miller, Dr. L.
84/326	1249..326 1612	10	17	05	+20	8.2	GL 388		LLX 148	16			66	L	MG	De Korte, Dr. P.A.J.
84/338	0400..338 0743	10	17	38	-08	25.8	RW SEX		LLX 090				145	L	MG	Van der Woerd, H.
84/314	2310..315 0217	10	17	40	+49	34.8	IH 1013+498		MIS 011				110	L	MG	Schwartz, Dr. D. A.
84/344	1509..344 1800	10	22	30	-18	22.7	PK 261+32.1		LLX 110				66	L	MG	De Korte, Dr. P.A.J.
84/347	2155..348 0150	10	34	39	+00	8.6	PG 1034+001		LLX 095	16			61	L	MG	Heise, Dr. J.
84/349	0159..349 0835	10	45	09	+72	1.8	1044+71		AGN 056	16			30	L	MG	Witzel, Dr. A.
84/326	1804..327 0005	10	54	00	+70	28.7	1053+70		AGN 056	16			30	L	MG	Witzel, Dr. A.
84/335	0002..335 0251	11	00	48	+36	16.8	GL 411		LLX 171				154	L	MG	Schmitt, J. H.
84/340	1912..340 2230	11	01	50	+38	29.7	MKN 421		AGN 012				172	L	MG	Bowyer, Prof. S.
84/337	1704..337 2018	11	01	55	+38	29.7	MKN 421		AGN 012				172	L	MG	Bowyer, Prof. S.
84/338	1912..339 0208	11	01	55	+38	29.8	MKN 421		AGN 012				172	L	MG	Bowyer, Prof. S.
84/355	0710..355 1359	11	14	49	+18	14.7	1114+18		HLX 015				9	L	MG	Biermann, Prof. Dr. P.
84/333	1844..333 2245	11	19	42	+59	22.3	NGC 3642		EXG F36				35	L	MG	Peacock, Dr. A.

84/333	1044..333	1229	11	24	11	+59	27.Ø	I 691		EXG	F36			*	35	L	MG	Peacock, Dr. A.
84/333	1249..333	1756	11	24	11	+59	27.Ø	I 691		EXG	F36			C	35	L	MG	Peacock, Dr. A.
84/318	2ØØØ..319	Ø113	11	29	59	+69	36.4	HD 1ØØ696		LLX	F12Ø	16			81	L	MG	Bedford, Dr. D.K.
84/317	2Ø5Ø..317	2330	11	3Ø	58	+7Ø	25.7	MKN18Ø		AGN	Ø38				21	L	MG	Warwick, Dr. R.S.
84/325	Ø614..325	Ø928	11	31	Ø3	+7Ø	25.9	MKN18Ø		AGN	Ø38	15	16		21	L	MG	Warwick, Dr. R.S.
84/3Ø8	Ø148..3Ø8	Ø53Ø	11	31	Ø9	+7Ø	25.3	MKN18Ø		AGN	Ø38				21	L	MG	Warwick, Dr. R.S.
84/333	Ø443..333	Ø92Ø	11	33	41	+7Ø	28.5	MKN18Ø		AGN	Ø38	15	16		21	L	MG	Warwick, Dr. R.S.
84/335	Ø435..335	1Ø41	11	33	58	+55	16.2	A 1318		CLU	-13	16			3	L	MG	McKechnie, Dr. S.P.
84/348	Ø424..348	19ØØ	11	37	29	+66	6.2	3C263		CAL	ØØ3				42	L	MG	Smith, Dr. A.
84/318	ØØ34..318	Ø4Ø9	11	37	32	+66	4.6	3C263		CAL	ØØ3				42		MG	Smith, Dr. A.
84/357	ØØ47..357	Ø415	11	5Ø	Ø1	-66	54.6	NOVA MUSCAE		LLX	162	11			152	L	MG	Krautter, J.
84/346	Ø51Ø..346	Ø83Ø	11	57	Ø7	+29	34.Ø	1156+295		AGN	Ø85				19	L	MG	McHardy, Dr. I.
84/357	Ø715..357	1229	12	Ø8	1Ø	+39	42.8	NGC 4151		AGN	Ø97	16			87	L	MG	Perola, Prof. G.
84/363	Ø941..363	1748	12	Ø8	11	+39	42.4	NGC 4151		AGN	Ø97	15	16		87	L	MG	Perola, Prof. G.
84/359	Ø95Ø..359	13Ø7	12	Ø8	12	+39	42.1	NGC 4151		AGN	Ø97	16			87	L	MG	Perola, Prof. G.
84/351	1Ø59..351	135Ø	12	Ø8	13	+39	42.2	NGC 4151		AGN	Ø97	16			87	L	MG	Perola, Prof. G.
84/354	Ø739..354	1149	12	Ø8	13	+39	42.3	NGC 4151		AGN	Ø97	16			87	L	MG	Perola, Prof. G.
84/335	1148..335	15Ø9	12	11	11	+53	21.5	PG 121Ø+533		LLX	Ø95				61	L	MG	Heise, Dr. J.
84/356	1825..356	215Ø	12	19	Ø4	+3Ø	27.7	2A1219+3Ø5		AGN	Ø34				21	L	MG	Warwick, Dr. R.S.
84/36Ø	21Ø9..361	ØØ44	12	28	56	+12	41.1	M87		PV				*	Ø	L	MG	
84/361	Ø415..361	1ØØ2	12	28	56	+12	41.1	M87	+	PV				C	Ø	L	MG	
84/36Ø	Ø239..36Ø	Ø9Ø9	12	54	ØØ	+28	11.4	COMA CLU		CLU	Ø16	16		C	118	L	MG	Gorenstein, Dr. P.
84/359	2212..36Ø	Ø143	12	57	29	+28	11.4	COMA CLU		CLU	Ø16	16		C	118	L	MG	Gorenstein, Dr. P.
84/36Ø	1ØØ5..36Ø	1921	12	57	29	+27	29.4	COMA CLU		CLU	Ø16	16		C	118	L	MG	Gorenstein, Dr. P.
84/359	145Ø..359	21Ø8	13	ØØ	58	+28	11.3	COMA CLU		CLU	Ø16	16		*	118	L	MG	Gorenstein, Dr. P.
84/348	2Ø1Ø..349	ØØ24	13	Ø2	5Ø	+59	44.5	GD 323		LLX	Ø94	16			61	L	MG	Heise, Dr. J.
84/349	1Ø42..349	1644	18	27	21	+79	34.7	1826+79		AGN	Ø56	16			3Ø	L	MG	Witzel, Dr. A.
84/322	1542..322	2116	19	24	Ø3	+27	16.7	NOVA VUL 84		TOO		11			47	L	MG	Oegelmann, Dr.H.
84/3Ø7	18ØØ..3Ø7	2351	19	56	21	+35	1.Ø	CYGNUS X-1		HLX	Ø44				52	L	MG	Page, Dr. C.G.
84/356	Ø851..356	16Ø5	2Ø	1Ø	18	+72	17.5	2Ø1Ø+72		AGN	Ø56				3Ø	L	MG	Witzel, Dr. A.
84/317	Ø853..317	1853	2Ø	21	24	+4Ø	13.8	G78.2+2.1		SNR	Ø4Ø				35	L	MG	Peacock, Dr. A.
84/316	165Ø..316	1954	21	1Ø	54	+49	51.9	GD 394		LLX	Ø95				61	L	MG	Heise, Dr. J.
84/311	Ø9Ø8..311	12Ø5	21	19	21	-17	5.8	HD2Ø3387		LLX	ØØ8				134	L	MG	Praderie, F.
84/321	1456..321	21Ø2	21	29	58	+Ø9	52.3	II ZW 136		AGN	123				16	L	MG	Bergeron, Dr. J.
84/311	1342..311	1747	21	55	52	-3Ø	3Ø.9	PKS2155-3Ø4		AGN	11Ø				86	L	MG	Tanzi, Dr. E.
84/312	Ø947..312	1347	21	55	52	-3Ø	3Ø.9	PKS2155-3Ø4		AGN	11Ø				86	L	MG	Tanzi, Dr. E.
84/316	1124..316	1443	21	55	53	-3Ø	29.8	PKS2155-3Ø4		AGN	11Ø				86	L	MG	Tanzi, Dr. E.
84/342	2125..343	Ø2Ø2	22	Ø6	Ø2	+54	14.3	3A22Ø6+543		LLX	Ø39				57	L	MG	Watson, Dr. M.G.
84/312	Ø21Ø..312	Ø837	22	Ø6	Ø7	-47	28.Ø	NGC7213		AGN	F34				8	L	MG	Pounds, Prof. K.A.
84/311	Ø53Ø..311	Ø647	22	3Ø	44	-37	35.6	IH2236-372		MIS	Ø11				11Ø	L	MG	Schwartz, Dr. D. A.
84/315	195Ø..316	Ø133	22	32	57	-26	2Ø.Ø	NGC7314		AGN	F34				8	L	MG	Pounds, Prof. K.A.
84/323	Ø355..323	Ø8Ø1	22	35	59	-2Ø	55.4	GLIESE 867		LLX	Ø83				144	L	MG	Jensen, K. A.
84/311	1946..311	2347	22	5Ø	3Ø	-14	34.2	GL 876		LLX	171				154	L	MG	Schmitt, J. H.
84/325	13ØØ..325	1829	22	51	2Ø	-17	53.4	MR 2251-178		AGN	Ø82	16			8	L	MG	Pounds, Prof. K.A.
84/3Ø7	Ø323..3Ø7	Ø929	22	51	21	-17	54.Ø	MR 2251-178		AGN	Ø82				8	L	MG	Pounds, Prof. K.A.
84/316	Ø23Ø..316	Ø938	22	51	22	-17	52.9	MR 2251-178		AGN	Ø82				8	L	MG	Pounds, Prof. K.A.
84/332	1139..332	18Ø6	22	51	23	-17	53.4	MR 2251-178		AGN	-Ø82	16			8	L	MG	Pounds, Prof. K.A.
84/336	Ø714..337	Ø613	22	58	46	+58	34.6	G1Ø9.1-1.Ø		SNR	F32				2	L	MG	Morini, Dr. M.
84/332	1933..333	Ø235	23	ØØ	4Ø	+Ø8	33.7	NGC7469		AGN	F34	16			8	L	MG	Pounds, Prof. K.A.
84/325	193Ø..325	2246	23	Ø2	ØØ	-Ø8	59.5	MCG 2-58-22		AGN	Ø64	16			9Ø	L	MG	Scarsi, Dr. L.

84/327	Ø3Ø8..327	Ø617	23	Ø2	ØØ	-Ø8	59.5	MCG 2-58-22	AGN Ø64	16	9Ø	L	MG	Scarsi, Dr. L.
84/329	1Ø43..329	1417	23	Ø2	Ø1	-Ø8	59.4	MCG 2-58-22	AGN -Ø64		9Ø	L	MG	Scarsi, Dr. L.
84/331	15Ø8..331	2234	23	Ø2	Ø1	-Ø8	59.3	MCG 2-58-22	AGN -Ø64		9Ø	L	MG	Scarsi, Dr. L.
84/322	2339..323	Ø251	23	Ø2	Ø4	-Ø8	59.6	MCG 2-58-22	AGN Ø64		9Ø	L	MG	Scarsi, Dr. L.
84/321	Ø626..321	1232	23	Ø2	Ø5	-Ø8	59.9	MCG2-58-22	AGN F34		8	L	MG	Pounds, Prof. K.A.
84/331	11Ø4..331	1414	23	13	31	-Ø2	9.3	FEIGE 1Ø8	LLX -Ø94		61	L	MG	Heise, Dr. J.
84/341	2354..342	1Ø34	23	29	16	+19	37.7	EQ PEG	LLX Ø29		137	L	MG	Butler, C.J.
84/338	1Ø13..338	1633	23	54	2Ø	-35	5.1	3A2356-341	AGN Ø62		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
Antonella Flammia	" "	427
Maria Gonano	" "	427
Frank Haberl	" "	717
Carlo Izzo	" "	427
Mark Sweeney	" "	716
Gianpiero Tagliaferri	" "	427
Margit Farkas	Data Assistant	713
Grazia Giommi	" "	709
Linda Osborne	" "	709
Sandra Andrews	Secretary	704

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

Please note the following extension numbers: DCR 547
Computer Room 427

Personnel Changes (1.11.85 - 31.12.85)

Miss A. Flammia has been recruited as an Observatory Controller.

Mrs L. Osborne has rejoined the group as a Data Assistant.

Dr A. Nota has resigned her post as Observatory Controller.
Miss S. Ernst has resigned her post as a Data Assistant.

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