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P59

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Title of Research:

"Analysis and Interpretation of Diffuse X-Ray Emission Using Data from the EINSTEIN Satellite"

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I. INTRODUCTION

In our proposal which led to this grant entitled "Analysis and Interpretation of Diffuse X-ray Emission Using Data from the *Einstein* Satellite," we outlined an ambitious program to create a uniquely powerful and accessible archive of the HEAO-2 Imaging Proportional Counter (IPC) database and to begin exploring the scientific utility of that database for studies of diffuse X-ray emission. We have largely achieved our goals.

II. TECHNICAL ACCOMPLISHMENTS

As of June 1990, we had available on three large-format optical disks all information for the more than 200,000,000 photons detected by the IPC during its operational lifetime. This represents all of the data recorded in all 4079 HEAO-2 sequence numbers. By all photons we mean: all energy channels, masked out counts as well as those included in standard $60' \times 60'$ images, all viewing geometry codes, all background levels, aspected (for all aspect solution quality levels) as well as non-aspected data, calibration sequences – everything. The data are grouped by `HUT.XPR` files and include the `.TGR` and `ASP.MAG` files – essentially everything that is needed to construct images and perform spatial, spectral, and timing analysis. An exhaustive catalog provides for easy browsing; for example, determining the number of 1.5 – 3.5 keV photons available for timing analysis (including no-aspect data at viewing geometries 1 – 3 for all background levels) for 3C273 requires only the position of 3C273 and 30 seconds of the user's time. Incidentally, these looser photon acceptance criteria, appropriate for timing and spectral analysis of most point sources, will provide 30 – 40% more data than was available heretofore.

Physically mounting the desired disk takes 1 minute, while transferring all of the relevant files to magnetic disk is completed in less than 30 seconds. A software

system to construct and analyze images including a variety of innovations such as flexible data editing, solar-scattered flux and cosmic ray contamination removal, flat-fielding, optimized source detection algorithms for point and extended sources, etc. has also been completed and documented. A user's reference manual for the system – Op-Ed (for Optical disk Processing of *Einstein* Data) – has also been written; a copy is attached as Appendix A. The system has been used by several Columbia faculty and students not associated with the project, as well as by visitors from Princeton, Caltech, and elsewhere. Remote use of the system has also been demonstrated; as an example, the *entire* database was downloaded over commercial networks using FTP to the University of Washington where it is now in use. We are currently engaged in discussions with the High Energy Astrophysics Science Archive Research Center (HEASARC) at the GSFC to transfer the database and software system to them to ensure continued community access followingthe termination of our funding. We expect this transfer to be completed shortly.

III. SCIENTIFIC ACCOMPLISHMENTS

The significant scientific benefits of the new IPC database and analysis system have been summarized for the community in three papers, all of which are now scheduled for publication in *The Astrophysical Journal* during 1991:

1. "The Detection of X-rays from the Hot Interstellar Medium of the Large Magellanic Cloud," by Wang, Hamilton, Helfand and Wu describes data editing, solar scattered flux decontamination, spectrally dependent vignetting corrections necessary for analyzing diffuse emission, and a number of techniques for constructing maps from mosaiced images.

2. "The Intensity and Spectrum of the Diffuse X-ray Background," by Wu, Hamilton, Helfand and Wang includes detailed descriptions of flat-field construction and application for the IPC, the spectrum and intensity of both cosmic ray events and the calibration source leak, and source excision algorithms.

3. "Faint X-ray Source Counts and the Origin of the X-ray Background," by Hamilton, Helfand, and Wu includes a detailed description of considerations

relevant to faint source detection in IPC fields and presents an optimized algorithm for finding source candidates, selecting detection thresholds, and measuring source parameters.

These three papers also present major new scientific findings relevant to the global structure of the interstellar medium and the origin of the cosmic X-ray background. Preprints of these accepted papers are available on request.

In addition, we have constructed an all-sky map of the diffuse X-ray emission (all discrete sources subtracted) in each of nine energy bands derived from the entire database. An example is reproduced as Figure 1. Since the HEAO-2 IPC only covered $\sim 5\%$ of the sky with pointed observations, the pixel size is chosen as $5° \times 5°$ in this figure, although spatial information on the diffuse emission is available on scales down to $\sim 5'$ limited only by the statistics of the data. This map, as well as the catalog of sources which was an inevitable byproduct of its creation, is proving useful in planning future observations (e.g., with ROSAT) as well as providing important new scientific information on the Galactic contribution to the diffuse X-ray background.

IV. PERSONNEL

Over the eighteen-month funding period, this grant has supported, in whole or in part, the work of one faculty member (the PI), three post-doctoral fellows, two graduate students, two undergraduates and one contracts administrator (summarized in Table 1). Both graduate students received their Ph.D.s toward the end of the grant period; one is now a post-doctoral fellow at the University of Wahsington working on NASA-sponsored research with Professor Bruce Margon and the other is a post-doc at SUNY Stonybrook working with Professor F. Walter on data from the HST GHRS. One of the undergraduates has gone on to graduate school in Astronomy, while the other will be a student at the National Radio Astronomy

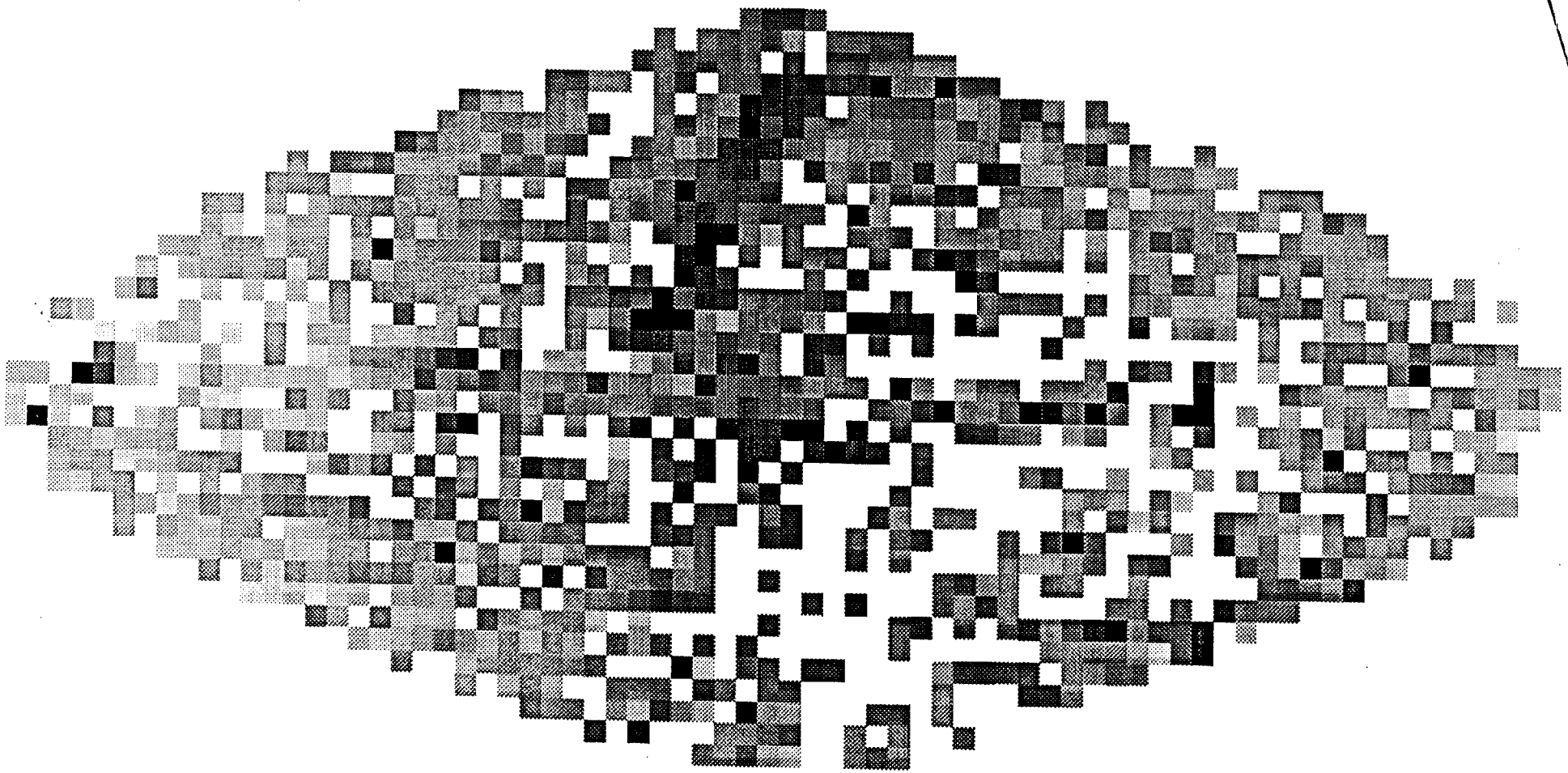

Fig. 1. A gray-scale representation of the sky in Galactic coordinates as observed in the 1.73 – 2.1 keV band by the *Einstein* IPC. Observations are averaged in $5° \times 5°$ bins. All discrete sources have been removed and regions of extended X-ray emission associated with supernova remnants, clusters of galaxies, etc. have been excluded. The roughly circular feature in the upper right-hand quadrant of the map is emission associated with the North Polar Spur.

Observatory this summer. The post-doc receiving most of his support under this grant (T. Hamilton) was awarded a highly competitive NASA Long Term Space Astrophysics Research Program 5-year grant (as was the PI). Another of the short-term post-docs (L. Kay) now has a faculty position in Astronomy and has received a Summer Fellowship at the NASA-Ames Research Center this year. In summary, the scientific personnel supported under this grant have all gone on (or are continuing) to make significant contributions to the national research program in astrophysics.

Table 1: Personnel

NAME	POSITION
D. Helfand	Professor (PI)
T. Hamilton	Post-doctoral Research Fellow
L. Kay	Post-doctoral Research Fellow
W. van der Veen	Post-doctoral Research Fellow
X. Wu	Graduate Student
S. Zoonematkermani	Graduate Student
H. Richman	Undergraduate/Research Aide
J. Broekman	Undergraduate
V. Buckingham	Administrator

APPENDIX A

Optical Disk Processing of EINSTEIN Data:

A User's Reference Manual

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Chapter I

INTRODUCTION TO Op-Ed

The Optical-disk Processing System for Einstein Data has been designed at Columbia University to create efficient and convenient access to the IPC data. Op-Ed can be initiated by typing 'Op-Ed' after the usual UNIX C shell prompt (%) from any directory.

Op-Ed consists of a user friendly interface system, a manual explaining how to use the software and several optical disks that contain the IPC files. The interface system is run on the CONVEX in the directory /mnt2/Einstein/oped_command. Each user works in his/her own subdirectory, thus providing a protected working environment. All output files produced by Op-Ed are written to the directory /ipc/(user name). A description of the structure and procedures of the user interface is provided by the Op-Ed manual.

The manual for Op-Ed is divided into both sections and chapters. Where appropriate, examples have been included. In addition, a table of contents is provided to assist users in locating specific information.

The optical disk drive is located in Pupin Hall on the 13th floor beside the CONVEX. The disks containing IPC files are in office 1331. For instructions on how properly to use the optical disk please refer to chapter II.5 in this manual.

Certain notation is used throughtout the manual; note that all Op-Ed commands are enclosed in the symbols <>.

Furthermore, several acronyms have been adopted for the sake of convenience to both the Op-Ed users and the Op-Ed writers. The acronyms listed below appear throughout the manual and in the text of the interface:

IPC - Imaging Proportional Counter
XPR - X-ray Photon Record
TGR - Timing Gap Record
PI - Pulse Independent
PHA - Pulse Height Amplitude
HUT - HEAO Universal Time

Chapter I.1

LET'S GET STARTED

To initiate the Optical-Disk Processing System of Einstein Data, the user must log on to the CONVEX into his/her account. If a user does not have an account,or accesss to one, on the CONVEX at Columbia University, please see Claire Russel in Pupin Hall room 1008A. Once the user has successfully logged on to the CONVEX, he/she may type Op-Ed after the UNIX prompt %. The Op-Ed greeting should appear:

Welcome to the Optical-Disk Processing of Einstein-Data at Columbia University!

Welcome to Op-Ed!

Op-Ed is designed to perform:
- **Photon and Time Filtering**
- **Image Production**
- **Source Identification and Analysis**
- **Produce Inputs for Spectral Analysis Programs**

Type help for a list of the available commands.

Op-Ed>

At this point, the user may type <help> to obtain a list of the Op-Ed commands. However, if the user is familiar with Op-Ed he/she may proceed directly to a specific command.

When using Op-Ed, please remember to use only lower case letters. Also, when a reply of "yes" or "no" is required, the user can not abbreviate.

Chapter I.2

HANDY UNIX COMMANDS

Op-Ed is designed to permit the user to take advantage of the ordinary UNIX commands as supplemental operations. To return to the UNIX prompt %, the user may either <exit> Op-Ed, or he/she may type "ctrl-z" . The operation ctrl-z permits the user to suspend the Op-Ed screen temporarily in order to use UNIX commands. To return to Op-Ed, the user must type "fg" after the UNIX prompt %.

For users not familiar with UNIX, below is a list of convenient functions and explanations.

% cat (filename) - scrolls the contents of the designated file onto your screen.

% help - is a built in, easy-to-use aid for the UNIX System.

% info (command) - provides the user with information about any UNIX command. Info is an on-line indexing utility for UNIX commands.

% man (command) - is similar to info. Man also provides the user with information about any UNIX command. Man accesses the reference material in the "CONVEX UNIX Programmer's Manual".

% ps agu - displays information about processes that are being run on the computer. The information includes the user ID, the status of the process, the CPU time accumulated by the process and the process name.

% cd - changes the directory. The user should indicate which directory he/she would like to change to.

% cp (sourcefile) (destination) - makes an exact replica of a file and puts it in another file name.

% rm (file name) - removes or deletes one or more files from a directory.

% mv (oldname) (newname) - changes the name of a file or directory, or moves a file to another directory.

% mount_od (ipc_#disk) - mounts the optical disk that is currently on the drive. Do not use if unfamiliar with this command. See % man mount.

% umount_od (ipc_#disk) - unmounts the optical disk that is currently on the drive.

% print (filename) - submits a file to be printed on the line printer with a header.

The following is a summary of the Op-Ed commands. They are usually performed in the order listed below:

<help> - provides a list of the available Op-Ed commands.
<diskcheck> - determines which disk is on the drive and if it is active.
<spacecheck> - checks the status of the magnetic disk space.
<remove> - removes all XPR files in the directory ipc/(user name).
<select> - enables the user to select the IPC files.
<load> - loads the selected files.
<scan> - creates an image editted with user-selected criteria and searches for discrete sources over a designated region of the sky.
<exam> - examines selected x-ray point sources and creates output.
<araip> - creates an input data file for aips.
<exit> - exits the user from the Op-Ed system and returns him/her to the UNIX prompt %.

Chapter II.1

HELP

<Help> calls the main menu which lists all of the functions available in Op-Ed. Any time a prompt appears, the user may use <help> to obtain a list of the functions. The Op-Ed functions are Diskcheck, Exam, Exit, Help, Load, Remove, Select, Scan and Spacecheck.

Example 01

When the user initiates <help>, the screen should read:

Op-Ed> help

The valid commands are:

araip	create data files viewed by aips on IIS.
diskcheck	check which optical disk is currently mounted.
exam	examine point sources found by <scan>.
exit	exit the Op-Ed system.
help	list the valid commands.
load	load IPC files selected by <select> from optical disk.
remove	remove all the XPR files in your directory.
scan	scan for point sources using IPC files loaded by <load>.
select	select a new set of IPC files.
spacecheck	check for magnetic disk space usage.

For more information, please refer to the Op-Ed Manual.

Op-Ed> Here, the user should enter the appropriate command.

SPACECHECK

When running Op-Ed it is important to keep track of the available magnetic disk space provided by the computer system. Often, a user will run into problems when he/she runs short of space. When the user selects files, he/she is told the file size of the selection. At this point, it is wise for the user to compare the file size with the amount of available magnetic disk space to ensure that the computer can accomodate the Op-Ed programs.

The user may <exit> Op-Ed to check the magnetic disk status by using the appropriate UNIX command, 'df'. However, Op-Ed provides the command <spacecheck> which conveniently permits the user to check the status of the magnetic disk space from inside of the Op-Ed system.

<Spacecheck> provides the user with the following information:

- Filesystem - device file name
- Kbytes - total size of the IPC disk in units of kilobytes
- Used - amount of disk space already occupied in units of kilobytes
- Avail - amount of available disk space in units of kilobytes
- Capacity - percentage of disk space already occupied
- Mounted on - refers to the IPC disk name

In addition, <spacecheck> lists a breakdown of the occupied magnetic disk space by indicating the amount of kilobytes used by each user and the corresponding user names. If the user finds that he/she is short on disk space, either the Op-Ed command <remove> should be executed, or he/she should request that other users delete files to create space on the magnetic disk.

Example 02

```
Op-Ed> spacecheck

Filesystem            kbytes    used   avail capacity  Mounted on
/dev/da2g             411128  121816  248192    33%    /ipc
29960    /ipc/Einstein
1400     /ipc/aips
18688    /ipc/ipc
24       /ipc/isis
70216    /ipc/sde
104      /ipc/wxy

Op-Ed>
```

Chapter II.3

DISKCHECK

<Diskcheck> tells the user which optical disk is currently mounted on the drive. Furthermore, <diskcheck> indicates if the drive is in use or available.

Due to hardware limitations, only one user may use the optical disk drive at a time. Before the user begins to <load>, it might be helpful to determine the status of the optical disks and the drive.

Example 03

In the case below, optical disk ipc_#5 is on the drive and it is not in use. Hence, the user is free to use the drive.

Op-Ed> diskcheck

ipc_#5 is currently mounted and available.

Op-Ed>

In the following case, another user is loading files from ipc_#3.

Op-Ed> diskcheck

ipc_#3 is currently mounted and in use.

Op-Ed>

Chapter II.4

SELECT

All of the IPC data files are recorded on optical disks 1 through 5. In order to access the data, the user must <select> the appropriate files from the catalogue. <Select> permits the user to choose files according to major frame or HUT number, sequence number and/or sky coordinates. When using more than one selection criteria, <select> is inclusive. More specifically, if a user selects both a specific sky coordinate and a sequence number, all sources that have either value are selected.

The user may choose either to input manually a list of one or more HUT numbers, the minimum and maximum values for a range of HUT numbers, and/or the name of a file which contains a list of HUT numbers. Please note that a file containing a list of HUT numbers should consist of a single column of values of which the last entry is a -1. In addition, this file must be in the directory /ipc/(user name).

Similarly, the user may choose either to input manually a list of one or more sequence numbers, the minimum and maximum values for a range of sequence numbers, and/or the name of a file which contains a list of sequence numbers. The sequence list file format resembles that of the HUT numbers in that it should list the values in a single column and conclude with a -1 and must reside in the directory /ipc/(user name).

Example 04

The following is a file, seqlist, which could be used as input for selecting the 5 listed sequence numbers.

filename: seqlist

```
27
30
35
10770
10556
-1
```

To <select> files according to the sky coordinates, the user must supply the right ascension and declination of the center of the field and the radius of the desired area. The corresponding units required are hours minutes seconds, degrees minutes seconds and arcminutes.

When manually entering a list of sky coordinates, the first value input should be the radius of the field that the user wants to scan. On the following line, the user should enter the coordinates of the first field center separating each value by a blank space. Similarily, the next line should contain the second coordinate and so on until a

negative value is entered. The negative entry denotes the end of the list. If the user wants to scan many field center coordinates, he/she may enter the name of a file that contains a list of the values. The file must reside in the directory /ipc/(user name) and be formatted as follows:

line 1: radius of field
line 2: first field center sky coordinate
line 3: second field center sky coordinate
line 4: third field center sky coordinate ...
last line: negative sky coordinate.

Example 05

The following file, skycoordlist, is a properly formatted file to be used as input for <select>. It is used later in this chapter in the second example of a <select> run.

File name: skycoordlist

```
30
1 6 0 13 4 0
4 13 26 1 0 0
5 18 16 16 35 25
8 0 0 10 0 32
9 0 22 14 4 0
11 19 35 -77 48 0
14 20 0 73 0 0
14 14 13 9 0 0
18 21 17 -34 25 0
19 19 0 15 0 0
23 11 0 2 24 0
-1 0 0 0 0 0
```

Once the selection criteria have been set by the user, Op-Ed provides a summary of the selected number of records, amount of good exposure time (in seconds), average count rate, and total file size (in kilobytes). Note that the user should compare the file size to the amount of available disk space provided by <spacecheck>.

The user is given the option to see a list of the selected files. The list appears on the terminal one screen at a time. In addition, the list is saved in a file /ipc/(user name)/ipclist for reference. The user may request to see the list in the order of increasing HUT number, sequence number, right ascension, declination, exposure time, total count rate, or file size. For each file, the sequence number, right ascension, declination, roll angle, exposure time, count rate per second, size (kilobytes), and location (tape number/file number on tape/disk number) is given.

Three examples are provided below. In the first case, example 06, all of the files are selected that have a sequence number of 27.

It is then requested that the files be listed in order of increasing HUT number. In the second case, 07, a previously executed command is still running. And in the third case, 08, the user opts to input a sky coordinate list file. The properly formated input file "skycoordlist" is shown in example 05. Here, the user requests to see the selected IPC files in order of increasing sequence numbers.

Example 06

```
Op-Ed> select

Make file selection on: (pick a number)

   (1) specific major HUT numbers
   (2) major HUT number range
   (3) major HUT number list file
   (4) specific sequence numbers
   (5) sequence number range
   (6) sequence number list file
   (7) specific sky coordinates
   (8) sky coordinate list file

   (9) select these files
   (0) quit

4

Enter each sequence number, end with -1:
(from 27 to 10776)

27
-1

Make file selection on: (pick a number)

   (1) specific major HUT number
   (2) major HUT number range
   (3) major HUT number list file
   (4) specific sequence numbers
   (5) sequence number range
   (6) sequence number list file
   (7) specific sky coordinates
   (8) sky coordinate list file

   (9) select these files
   (0) quit

9

number of records selected =          19
good exposure time (second) =    47528.32
average count rate (c/s) =    1.285044
and total file size (kb) =        17555
```

Do you want to see the files selected?
(answer with "yes" or "no")

yes

Select one order to sort the records:

(1) major HUT number
(2) sequence number
(3) Right Ascension
(4) Declination
(5) exposure time
(6) total count rate
(7) file size

(0) sorry, do not list

4

Filename	Seq#	R.A.	Dec.	Roll	Time	Rate	Size	Location
					sec	c/s	kb	tt/fff/d
IPC0665177	27	14h 9m 59s	72d 59m 59s	146	1311	1.3	408	43/ 55/3
IPC0665231	27	14h 9m 59s	72d 59m 59s	146	3029	1.3	1243	43/ 55/3
IPC0665377	27	14h 9m 59s	72d 59m 59s	146	2785	1.3	1271	43/ 55/3
IPC0665525	27	14h 9m 59s	72d 59m 59s	146	325	1.3	198	43/ 55/3
IPC0666139	27	14h 9m 59s	72d 59m 59s	144	1966	1.3	340	43/ 55/3
IPC0666215	27	14h 9m 59s	72d 59m 59s	144	3587	1.3	902	43/ 55/3
IPC0666363	27	14h 9m 59s	72d 59m 59s	144	3021	1.3	927	43/ 55/3
IPC0667185	27	14h 9m 59s	72d 59m 59s	144	2770	1.3	1114	43/ 55/3
IPC0667311	27	14h 9m 59s	72d 59m 59s	144	2699	1.3	1348	43/ 55/3
IPC0667458	27	14h 9m 59s	72d 59m 59s	144	2580	1.3	1319	43/ 55/3
IPC0668227	27	14h 9m 59s	72d 59m 59s	144	2006	1.3	353	43/ 55/3
IPC0668296	27	14h 9m 59s	72d 59m 59s	144	3384	1.3	963	43/ 55/3
IPC0668443	27	14h 9m 59s	72d 59m 59s	144	2813	1.3	1009	43/ 55/3
IPC0669336	27	14h 9m 59s	72d 59m 59s	145	1597	1.3	397	43/ 55/3
IPC0669391	27	14h 9m 59s	72d 59m 59s	145	2499	1.3	1455	43/ 55/3
IPC0669538	27	14h 9m 59s	72d 59m 59s	145	2948	1.3	1652	43/ 55/3
IPC0670308	27	14h 9m 59s	72d 59m 59s	145	2034	1.3	331	43/ 55/3
IPC0670376	27	14h 9m 59s	72d 59m 59s	145	3301	1.3	1125	43/ 55/3

Press return to continue. Answer "quit" to stop display.

(pressed return)

Filename	Seq#	R.A.	Dec.	Roll	Time	Rate	Size	Location
					sec	c/s	kb	tt/fff/d
IPC0670523	27	14h 9m 59s	72d 59m 59s	145	2872	1.3	1200	43/ 55/3

Another copy is saved in the file "ipclist".

Op-Ed>

Once the user is confident in his/her selection criteria, he/she should proceed to <load> the necessary files from the optical disks. Moreover, <select> has a built in safety feature which prevents the user from selecting new files if either <scan> or <exam> is running.

Example 07

If the user tries to <select> new files before <scan> has completed, the following message will appear:

```
Op-Ed> select

The command scan is sill running.
You cannot select new files now.

Op-Ed>
```

In this case, the user should wait a few minutes until <scan> ends. The user is free to select other commands that can run simultaneously with <scan>.

Example 08

```
Op-Ed> select

Make file selection on: (pick a number)

   (1) specific major HUT numbers
   (2) major HUT number range
   (3) major HUT number list file
   (4) specific sequence numbers
   (5) sequence number range
   (6) sequence number list file
   (7) specific sky coordinates
   (8) sky coordinate list file

   (9) select these files
   (0) quit

8

Enter the name of RA and DEC list file:

skycoordlist

Make file selection on: (pick a number)

   (1) specific major HUT numbers
   (2) major HUT number range
   (3) major HUT number list file
   (4) specific sequence numbers
```

(5) sequence number range
(6) sequence number list file
(7) specific sky coordinates
(8) sky coordinate list file

(9) select these files
(0) quit

9

number of records selected = 28
good exposure time (second) = 35621.44
average count rate (c/s) = 1.594658
and total file size (kb) = 9514

Do you want to see the files selected?

yes

Select one order to sort the records:

(1) major HUT number
(2) sequence number
(3) Right Ascension
(4) Declination
(5) exposure time
(6) count rate
(7) file size

(0) sorry, do not list

2

Filename	Seq#	R.A.	Dec.	Roll	Time	Rate	Size	Location
					sec	c/s	kb	tt/fff/d
IPC1134504	323	7h 59m 29s	9d 31m 59s	75	1276	1.6	209	5/ 22/1
IPC0221163	489	5h 18m 16s	16d 35m 25s	90	562	1.6	89	31/ 11/3
IPC0221182	489	5h 18m 16s	16d 35m 25s	90	2048	1.6	287	31/ 11/3
IPC1880035	1000	19h 18m 47s	14d 59m 59s	-108	2636	1.6	910	29/ 11/3
IPC1880197	1000	19h 18m 47s	14d 59m 59s	-108	1596	1.6	256	29/ 11/3
IPC0527263	1122	11h 19m 35s	-77d 47m 59s	47	1084	1.6	415	35/ 89/3
IPC0720834	1197	19h 20m 50s	14d 57m 23s	101	1720	1.6	351	23/ 63/2
IPC0720894	1197	19h 20m 50s	14d 57m 23s	101	0	0.0	7	23/ 63/2
IPC0720940	1197	19h 20m 50s	14d 57m 23s	101	2335	1.6	617	23/ 63/2
IPC0721088	1197	19h 20m 50s	14d 57m 23s	101	2130	1.6	578	23/ 63/2
IPC0721174	1197	19h 20m 50s	14d 57m 23s	101	0	0.0	128	23/ 63/2
IPC0721236	1197	19h 20m 50s	14d 57m 23s	101	1005	1.6	258	23/ 63/2
IPC0309940	2233	18h 21m 17s	-34d 24m 59s	-90	745	1.6	182	32/ 76/3
IPC0309966	2233	18h 21m 17s	-34d 24m 59s	-90	2130	1.6	503	32/ 76/3
IPC0457169	3234	23h 10m 50s	2d 24m 9s	-66	679	1.6	305	35/ 13/3
IPC0457214	3234	23h 10m 50s	2d 24m 9s	-66	272	1.6	219	35/ 13/3
IPC0457288	3234	23h 10m 50s	2d 24m 9s	-66	1857	1.6	1523	35/ 13/3
IPC0957009	4521	4h 13m 26s	0d 55m 47s	104	1204	1.6	218	53/ 57/4

Press return to continue. Answer "quit" to stop display.

(return)

Filename	Seq#	R.A.	Dec.	Roll	Time sec	Rate c/s	Size kb	Location tt/fff/d
IPC1696946	10437	14h 14m 13s	9d 6m 38s	-108	1142	1.6	305	49/ 27/4
IPC1697078	10437	14h 14m 13s	9d 6m 38s	-108	287	1.6	46	49/ 27/4
IPC1697088	10437	14h 14m 13s	9d 6m 38s	-108	1124	1.6	262	49/ 27/4
IPC1697214	10437	14h 14m 13s	9d 6m 38s	-108	1814	1.6	298	49/ 27/4
IPC1697352	10437	14h 14m 13s	9d 6m 38s	-108	1817	1.6	278	49/ 27/4
IPC1697489	10437	14h 14m 13s	9d 6m 38s	-108	1672	1.6	480	49/ 27/4
IPC1697626	10437	14h 14m 13s	9d 6m 38s	-108	246	1.6	37	49/ 27/4
IPC1697635	10437	14h 14m 13s	9d 6m 38s	-108	1563	1.6	223	49/ 27/4
IPC0489547	10766	1h 6m 5s	13d 3m 59s	-68	1479	1.6	243	57/ 10/4
IPC0489681	10766	1h 6m 5s	13d 3m 59s	-68	1199	1.6	287	57/ 10/4

Another copy is saved in file "ipclist".

Op-Ed>

Chapter II.5

LOAD

In order to <load> the files from the optical disks, the user must first <select> the files that he/she wants. Once the files have been properly selected, <load> can be initiated from the Op-Ed> prompt.

It is likely that the selected files are recorded on more than one optical disk. <Load> first reads the files from the disk that is currently on the drive. Then, <load> will prompt the user to place the appropriate disk on the drive. In order to read all of the necessary files, the user may have to mount several disks. To change the optical disks properly, it is useful to understand the configuration of the disk drive.

All of the Einstein Data is contained on 5 sides of optical disks numbered IPC_#1, IPC_#2,...,IPC_#5. Each cartridge holds one disk with two sides, A and B. The cartridges are labeled to indicate which side corresponds to each IPC_#.

The drive used at CAL is located on the 13th floor beside the CONVEX. The drive has two slots labeled A and B. The optical disk resides in slot A as the cartridge is stored in slot B. The disk must be removed directly from the cartridge into the drive slot A. Similarly, the disk must be replaced directly from the drive slot A into the cartridge.

Begin this procedure by switching the drive to the off position. The round green light will blink for approximately five seconds. Once the green light is permanently off, remove the empty cartridge from slot B. Then, keeping the same side of the cartridge face up, cautiously place the cartridge in slot A. Be sure to push the cartridge as far back as it will go, then remove it. Please note that it is important not to flip the empty cartridge to ensure that the disk will be replaced right side up.

Now, you are ready to insert the appropriate disk in the drive. Holding the cartridge with the disk IPC_# indicated below face-up, insert it into position in slot A, then remove it. If this was done correctly, the cartridge should feel lighter since it no longer contains the disk. The disk is now in slot A. Keeping the same side up, you must continue by inserting the empty cartridge into slot B for storage while you load from the disk.

Finally, switch to start and wait for a constant green light.

Instructions similar to those above are provided by Op-Ed the first time that a disk must be changed. It may not be necessary to change disks if the desired files are contained on the disk which is currently mounted on the drive. The user can determine the status and the number of the optical disk which is currently on the drive by using <diskcheck>.

Example 09

In this case, the user selects to load files that are recorded on an optical disk that had previously been mounted on the drive:

```
Op-Ed> load

Loading XPR files from optical disk ipc_#3, please wait...

(a few minutes pass until loading finishes)

Op-Ed>
```

Due to hardware limitations, only one user may use <load> at a time. If the user stops the job <load>, Op-Ed must be manually informed by the user. Otherwise, if the user later attempts to use <load>, he/she will be messsaged 'Optical Drive already in use. Try again later'. If the user is absolutely confident that there is no other user, then the situation can be rectified by the following set of procedures.

-Exit Op-Ed by entering the command <exit> after the Op-Ed> prompt.
-At the % prompt, enter the command:
  echo no > /mnt2/Einstein/oped_message/reading .
-Return to Op-Ed.
-Proceed.

If a user prefers, the disks can be mounted from the UNIX mode by using the appropriate commands. It is important that the user mount each optical disk after it is placed on the drive and unmount each disk before it is removed from the drive (please refer to a UNIX manual, or 'handy UNIX commands' for more details).

Please note, the disk drive should never be left empty. The Op-Ed command <load> automatically mounts and unmounts the disks as it prompts the user. The user should only place the disks in the drive and remove them as instructed by Op-Ed.

Once the user has completed the loading procedures, he/she may proceed to perform <scan>.

Chapter II.6

REMOVE

If a user finds that he/she is low on magnetic disk space, Op-Ed offers the command <remove> which removes all or some of the XPR files from the directory /ipc/(user name).

<Remove> permits the user to delete unwanted XPR files. The user must specify whether he/she prefers to include or exclude the most recently selected files in permanently deleting previously selected XPR files. In addition, the user has the option to exit <remove> without deleting any files and to return to promt Op-Ed>.

Example 10

In the following case, the user is certain that he/she wants to erase all previously selected XPR files.

```
Op-Ed> remove

Do you want to delete:
all - all of hte XPR files
part - all of the XPR files excluding those most recently selected
none - qquit and return to Op-Ed>

Please type "all", "part" or "none" to respond.
all

(a moment passes until the operation is completed)

Op-Ed>
```

Chapter II.7

SCAN

To create an image from the XPR file and locate discrete X-ray sources therein one uses the command scan. Once the user has loaded the appropriate files, he/she may initiate <scan>. <Scan> searches for sources over a region of the sky using the selected Einstein IPC files (TGR and XPR) which cover the designated area.

A unique advantage of Op-Ed is that the user has complete control over editting the raw data to produce images optimized for the scientific problem at hand. A large amount of data is then available for the first time, and images with very low amounts of contaminating counts can be created.

The user may customize the XPR photon selection criteria by choosing one or several of the following options:

- 'change masked out data' automatically switches the status from "include" to "do not include" masked out data or vice versa.
- 'change rib width' prompts the user to input the optimal rib width.
- 'change PHA PI bin' alternates the status of the bin selection between PHA and PI.
- 'change energy range' permits the user to input the minimum and maximum energy bin.
- 'default settings' submits no masked out data, deletion of 4 arcmin under ribs, use of PI bin energy and an energy range channel 2 to 10.
- 'accept it' sets the criteria as listed on the screen and continues to customize the TGR criteria.

The user may accept or change the TGR selection criteria. The changes have been divided into two categories, basic and special.

One or several of the following basic specifications can be made:

- 'background level' ranges from 0 to 4.
- 'viewing geometry' ranges from 1 to 5.
- 'high voltage value' ranges from 0 to 9.
- 'aspect separation' ranges from 0 to 15.
- 'aspect mode' provides the option to include no aspect, locked on mode, extrapolated mode and/or map mode data.

One or several of the following special specifications can be made:

- 'telemetry' may include the good or bad telemetry, or both.
- 'high voltage' on, off or both may be included.
- 'data' that is good, bad or both may be included.
- 'filter' in place, not in place or both may be included.
- 'calibration' , no calibration, or both may be included.

For definitions and explanations of Einstein terminology

(ie. calibration, high voltage, etc.) please refer to the "Einstein Observatory Revised User's Manual" edited by D.E. Harris.

The user may opt to select the default settings of:
- background level 0-2
- viewing geometry 1-3
- high voltage 4-9
- aspect separation 0-15
- aspect mode locked on mapping
- good telemetry only
- high voltage on only
- good data only
- no filter in place
- no calibration data

Once the criteria have been selected and accepted, the user must enter the right ascension and declination of the scan area and the desired signal-to-noise ratio threshold for the discrete source search.

Each time that the skycoordinates are entered, Op-Ed saves them in a sile so that during the following run of scan, the user can opt to reuse the prior list of pointing vectors. Also, if the user enters a negative value as the first entry of the pointing vectors, <scan> automatically inputs the sky coordinates of the first field listed in ipclist. <Scan> then produces the files digit_map and source_list which are explained in Section III of the manual.

It should be noted that each time <scan> is run, new files are produced that replace the previously created files. The user is presented with the option either to overwrite or to rename any existing such files.

Also note that analysis of the maps created here using the option <exam> can be done using the same editting criteria or any subset and/or superset thereof.

Example 11

In the case below, the user is running scan for the second time. The user chooses to save the old output files by opting to rename them. Furthermore, he/she makes many changes to the TGR and XPR photon criteria. Please note that the user chooses only one area to scan.

```
Op-Ed> scan
The file digit_map exists which will be overwritten by your new task.
Do you want to keep the previous file?

yes

Please give it a new name:

olddigit
```

The file source_list exists which will be overwritten by your new task.
Do you want to keep the previous file?

yes

Please give it a new name:

oldsources

The current XPR photon criteria are:

no masked out data
delete 4 arcmin data under ribs
use PI bin energy
energy range: channel 2 to 10

Your option to:

(0) accept it
(1) change masked out data setting
(2) change ribs width setting
(3) change PHA PI bin setting
(4) change energy range
(5) get default settings

1

The current XPR photon criteria are:

include masked out data
delete 4 arcmin data under ribs
use PI bin energy
energy range: channel 2 to 10

Your option to:

(0) accept it
(1) change masked out data setting
(2) change ribs width setting
(3) change PHA PI bin setting
(4) change energy range
(5) get default settings

2

Enter the width of the ribs:
(in arc minute unit)

3

The current XPR photon criteria are:

include masked out data

```
    delete 3 arcmin data under ribs
    use PI bin energy
    energy range: channel  2 to 10

 Your option to:

    (0) accept it
    (1) change masked out data setting
    (2) change ribs width setting
    (3) change PHA PI bin setting
    (4) change energy range
    (5) get default settings

 3

 The current XPR photon criteria are:

    include masked out data
    delete 3 arcmin data under ribs
    use PHA bin energy
    energy range: channel  2 to 10

 Your option to:

    (0) accept it
    (1) change masked out data setting
    (2) change ribs width setting
    (3) change PHA PI bin setting
    (4) change energy range
    (5) get default settings

 4

 Enter the lowest energy channel:
 (from 0 to 15)

 1

 Enter the highest energy channel:
 (from  0 to 15)

 9

 The current XPR photon criteria are:

    include masked out data
    delete 3 arcmin data under ribs
    use PHA bin energy
    energy range: channel  1 to  9

Your option to:

    (0) accept it
    (1) change masked out data setting
```

(2) change ribs width setting
(3) change PHA PI bin setting
(4) change energy range
(5) get default settings

0

The current TGR criteria are:

```
     background level:  0  1  2
     viewing geometry:     1  2  3
   high voltage value:                 4  5  6  7  8  9
    aspect separation:  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
          aspect mode:                 locked on                 mapping
```

good telemetry only
high voltage on only
good data only
no filter in place
no calibration data

Your option to:

(0) accept it
(1) make basic changes
(2) make special changes
(3) get default settings

1

Make change on:

(0) exit
(1) background level
(2) viewing geometry
(3) high voltage value
(4) aspect separation
(5) aspect mode

1

Enter the lowest background level:
(from 0 to 4)

0

Enter the highest background level:
(from 0 to 4)

4

Make change on:

(0) exit

```
    (1) background level
    (2) viewing geometry
    (3) high voltage value
    (4) aspect separation
    (5) aspect mode

4

Enter the lowest aspect separation:
(from 0 to 15)

0

Enter the highest aspect separation:
(from  0 to 15)

10

Make change on:

   (0) exit
   (1) background level
   (2) viewing geometry
   (3) high voltage value
   (4) aspect separation
   (5) aspect mode

0

The current TGR criteria are:

     background level:  0  1  2  3  4
     viewing geometry:     1  2  3
   high voltage value:              4  5  6  7  8  9
    aspect separation:  0  1  2  3  4  5  6  7  8  9 10
         aspect mode:              locked on           mapping
   good telemetry only
   high voltage on only
   good data only
   no filter in place
   no calibration data

Your option to:

   (0) accept it
   (1) make basic changes
   (2) make special changes
   (3) get default settings

2

Change setting on:

   (0) exit
```

```
   (1) telemetry
   (2) high voltage
   (3) bad data
   (4) filter
   (5) calibration

0

The current TGR criteria are:

     background level:  0  1  2  3  4
     viewing geometry:     1  2  3
   high voltage value:                 4  5  6  7  8  9
    aspect separation:  0  1  2  3  4  5  6  7  8  9 10
          aspect mode:  no aspect
   good telemetry only
   high voltage on only
   good data only
   no filter in place
   no calibration data

Your option to:

   (0) accept it
   (1) make basic changes
   (2) make special changes
   (3) get default settings

0

A file of pointing vectors already exists.
Do you want to use it?

no

Enter the center RA and DEC of the scan area:
(hour min sec deg min sec)

14 9 59 72 59 59

Enter the source signal to noise ratio criterion:

4

Another pointing? Enter again:
(negative hour to exit)

-14 0 0 0 0 0

The job scan is submitted.
Two files will be created: digit_map and source_list

Op-Ed>
```

Chapter II.8

EXAM

<Exam> examines the X-ray point sources listed in the <scan> output file source_list. The results of <exam> are written in the files named print_out and spec_out.

For each source, <exam> produces the raw maps of photon count, exposure time, and flux. In addition, <exam> calculates an accurate position for each source and displays its spectrum and hardness ratio.

The procedures for running <exam> are very similar to those for <scan>.

The user may customize the XPR photon criteria by choosing one or several of the following options:

- 'change masked out data' automatically switches the status from "include" to "do not include" masked out data or vice versa.
- 'change rib width' prompts the user to input the optimal rib width.
- 'change PHA PI bin' alternates the status of the bin selection between PHA and PI.
- 'change energy range' permits the user to input the minimum and maximum energy bins.
- 'default settings' submits no masked out data, deletion of 4 arcmin under ribs, use of PI bin energy and an energy range channel 2 to 10.
- 'accept it' sets the criteria as listed on the screen and continues to customize the TGR criteria.

The user may accept or change the TGR selection criteria. The changes have been divided into two categories, basic and special.

One or several of the following basic specifications can be made:

- 'background level' ranges from 0 to 4.
- 'viewing geometry' ranges from 1 to 5.
- 'high voltage value' ranges from 0 to 9.
- 'aspect separation' ranges from 0 to 15.
- 'aspect mode' provides the option to include no aspect, locked on mode, extrapolated mode and/or map mode data.

One or several of the following special specifications can be made:

- 'telemetry' may include the good or bad telemetry, or both.
- 'high voltage' on, off or both may be included.
- 'data' that is good, bad or both may be included.
- 'filter' in place, not in place or both may be included.
- 'calibration' , no calibration, or both may be included.

The user may opt to select the default settings of:

- background level 0-2
- viewing geometry 1-3

- high voltage 4-9
- aspect separation 0-15
- aspect mode locked on mapping
- good telemetry only
- high voltage on only
- good data only
- no filter in place
- no calibration data

Example 12

In this case, the user first attempts to run <exam> before <scan> has finshed running.

```
Op-Ed> exam

The source_list file is empty.
Please use scan command to detect point sources before running exam.
```

The user now waits until <scan> finishes, then tries <exam> again. Please note that <scan> was run using the same criteria as the example 11 of this manual. However, to run <exam> the user opts to set the criteria to the default values. Also, the user saves the previous output by renaming the file.

Example 13

```
Op-Ed> exam

The file print_out exists which will be overwritten by your new task.
Do you want to keep the previous file?

yes

Please give it a new name:

oldfile

The current XPR photon criteria are:

   include masked out data
   delete  3 arcmin data under ribs
   use PHA bin energy
   energy range: channel  1 to  9

Your option to:

   (0) accept it
```

```
   (1) change masked out data setting
   (2) change rib width setting
   (3) change PHA PI bin setting
   (4) change energy range
   (5) get default settings

5

The current XPR photon criteria are:

   no masked out data
   delete  4 arcmin data under ribs
   use PI bin energy
   energy range: channel  2 to 10

Your option to:

   (0) accept it
   (1) change masked out data setting
   (2) change rib width setting
   (3) change PHA PI bin setting
   (4) change energy range
   (5) get default settings

0

The current TGR criteria are:

     background level:  0  1  2  3  4
     viewing geometry:     1  2  3
   high voltage value:                4  5  6  7  8  9
    aspect separation:  0  1  2  3  4  5  6  7  8  9 10
          aspect mode:  no aspect
   good telemetry only
   high voltage on only
   good data only
   no filter in place
   no calibration data

Your option to:

   (0) accept it
   (1) make basic changes
   (2) make special changes
   (3) get default settings

3

The current TGR criteria are:

     background level:  0  1  2
     viewing geometry:     1  2  3
   high voltage value:                4  5  6  7  8  9
    aspect separation:  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
```

```
        aspect mode:                locked on                mapping
    good telemetry only
    high voltage on only
    good data only
    no filter in place
    no calibration data

 Your option to:

    (0) accept it
    (1) make basic changes
    (2) make special changes
    (3) get default settings

 0

 The job exam is submitted.
 It will create the output file.

 Op-Ed>
```

Once the criteria have been selected and accepted, Op-Ed submits <exam> as a background job allowing the user to perform other tasks in the foreground as it runs.

It should be noted that each time <exam> is run, a new output file is produced that replaces the one previously created. In the example above, the user has opted to save the old file by renaming it.

Chapter II.9

ARAIP

<Araip> is an option availble for users who wish to use their output on Aips. It is especially convenient for those users interested in viewing the flux array of their sources on the International Imaging System (IIS) screen.

Once the user has selected the appropriate sources, he/she is ready to run <araip>. In order to run <araip>, the user must enter the sky coordinates of their field centers, preferred map size (the maximum is 1024 X 1024), and the number of IPC pixels. Please note that each IPC pixel is equivalent to 4 ordinary pixels.

Also, the user may select the criteria for which he/she wishes to scan the data. It is a similar menu driven selection process to those of scan and exam.

The output file araip_data is created in the directory /ipc/(user name). The output file, araip_data, should be used only as input for Aips. It is not in legible format for UNIX. In order to access it in Aips, remeber to issue the following Aips command:
> setenv NAME /ipc/(user name)/araip_data
such that "NAME" is any word in capital letters that is used as "input araip" in Aips.

Example 14

```
Op-Ed> araip

The current XPR photon criteria are:

   no masked out data
   delete  4 arcmin data under ribs
   use PI bin energy
   energy range: channel  2 to 10

Your option to:

   (0) accept it
   (1) change masked out data setting
   (2) change rib width setting
   (3) change PHA PI bin setting
   (4) change energy range
   (5) get default settings

0

The current TGR criteria are:

     background level:  0  1  2
```

```
  viewing geometry:      1  2  3
 high voltage value:                  4  5  6  7  8  9
  aspect separation:  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
        aspect mode:                  locked on                  mapping
 good telemetry only
 high voltage on only
 good data only
 no filter in place
 no calibration data

 Your option to:

    (0) accept it
    (1) make basic changes
    (2) make special changes
    (3) get default settings

 0
 Enter the center RA and DEC of the map:
 (hour min sec  degree min sec)

 -1 0 0 0 0 0

 Enter the resolution of the square map:
 (number of pixels in both sides, <=1024)

 120

 Enter the pixel size:
 (number of IPC pixels of 8 arc seconds)

 4

 The job araip is submitted.
 It will create a file called araip_data for aips.

 Op-Ed>
```

Chapter II.10

Exit

When executed from the prompt Op-Ed>, <exit> returns the user to the UNIX Operating System prompt %.

Chapter III.1

<SELECT> OUTPUT

<Select> produces two files, xprlist and tgrlist, in the user's local directory, ipc/(user name), which serve as input for <scan> and <exam>. In addition, <select> creates hidden files .disk1, .disk2, ...,.disk5, in the user's local directory, which serve as input for <load>.

The hidden files .disk1, .disk2, ...,.disk5 contain the selected IPC file names corresponding to the appropriate number disk on which it is recorded. <Load> inputs one .disk# file at a time as it loads the IPC files listed from the disk.

Example 15

In the case of <select> example given earlier in the manual, all of the IPC files are listed on disk #3. Therefore, the files .disk1, .disk2, .disk4 and .disk5 are empty. Only .disk3 contains IPC file names. Below is an example of .disk3.

0665177
0665231
0665377
0665525
0666139
0666215
0666363
0667185
0667311
0667458
0668227
0668296
0668443
0669336
0669391
0669538
0670308
0670376
0670523

The output file xprlist contains the names of the xpr files paired with the corresponding path names. The loaded xpr files are located in /ipc/(user name)/xpr_file.

The output file tgrlist contains the names of the tgr files paired with the corresponding path names. The tgr files

are recorded on the magnetic disk. The loaded tgr files are located in /mnt2/Einstein/tgr_file.

The structure of Op-Ed enables the user to exit so that he/she may manipulate the output files from UNIX. To protect the files from being overwritten, xprlist and tgrlist may be renamed through ordinary UNIX commands. As long as the final format of tgrlist and/or xprlist is correct, the user may manipulate these files as he/she wishes. Please note that the proper format is vital since the programs serve as input to <load>. The required formats are:

* for the tgrlist: /mnt2/Einstein/tgr_file/(file name) such that the file name is written exactly as ipc(7 digit HUT number).tgr

Example 16

/mnt2/Einstein/tgr_file/ipc0665177.tgr
/mnt2/Einstein/tgr_file/ipc0665231.tgr
/mnt2/Einstein/tgr_file/ipc0665377.tgr
/mnt2/Einstein/tgr_file/ipc0665525.tgr
/mnt2/Einstein/tgr_file/ipc0666139.tgr
/mnt2/Einstein/tgr_file/ipc0666215.tgr
/mnt2/Einstein/tgr_file/ipc0666363.tgr
/mnt2/Einstein/tgr_file/ipc0667185.tgr
/mnt2/Einstein/tgr_file/ipc0667311.tgr
/mnt2/Einstein/tgr_file/ipc0667458.tgr
/mnt2/Einstein/tgr_file/ipc0668227.tgr
/mnt2/Einstein/tgr_file/ipc0668296.tgr
/mnt2/Einstein/tgr_file/ipc0668443.tgr
/mnt2/Einstein/tgr_file/ipc0669336.tgr
/mnt2/Einstein/tgr_file/ipc0669391.tgr
/mnt2/Einstein/tgr_file/ipc0669538.tgr
/mnt2/Einstein/tgr_file/ipc0670308.tgr
/mnt2/Einstein/tgr_file/ipc0670376.tgr
/mnt2/Einstein/tgr_file/ipc0670523.tgr

* for the xprlist: /ipc/user/xpr_file/(file name) such that the file name is written exactly as xpr(7 digit HUT number).xpr

Example 17

xpr_file/ipc0665177.xpr
xpr_file/ipc0665231.xpr
xpr_file/ipc0665377.xpr
xpr_file/ipc0665525.xpr
xpr_file/ipc0666139.xpr
xpr_file/ipc0666215.xpr
xpr_file/ipc0666363.xpr
xpr_file/ipc0667185.xpr
xpr_file/ipc0667311.xpr
xpr_file/ipc0667458.xpr
xpr_file/ipc0668227.xpr
xpr_file/ipc0668296.xpr
xpr_file/ipc0668443.xpr
xpr_file/ipc0669336.xpr

```
xpr_file/ipc0669391.xpr
xpr_file/ipc0669538.xpr
xpr_file/ipc0670308.xpr
xpr_file/ipc0670376.xpr
xpr_file/ipc0670523.xpr
```

Furthermore, to maintain consistency, the user should remember to change all of the <select> output files when manipulating the files from the UNIX system; i.e., if the user edits tgrlist, he/she must make the corresponding changes in xprlist.

Chapter III.2

DIGIT_MAP

Digit_map is a product of <scan>. It is a large file that provides the user with all of the information determined by <scan>.

The output file digit_map lists the right ascension and declination of three mappings, followed by the three mappings themselves. The maps that appear are arrays of the photon counts, exposure times and fluxes (photons per exposure time for each pixel) of the field.

Following the three maps, digit_map lists each detected source with its right ascension, declination, signal-to-noise ratio (sigma), flux and flux upper limit. This final section of the digit_map contains the same data as source_list.

Please note that the structure of Op-Ed enables the user to exit to UNIX where he/she can manipulate, print or read digit_map.

Example 18

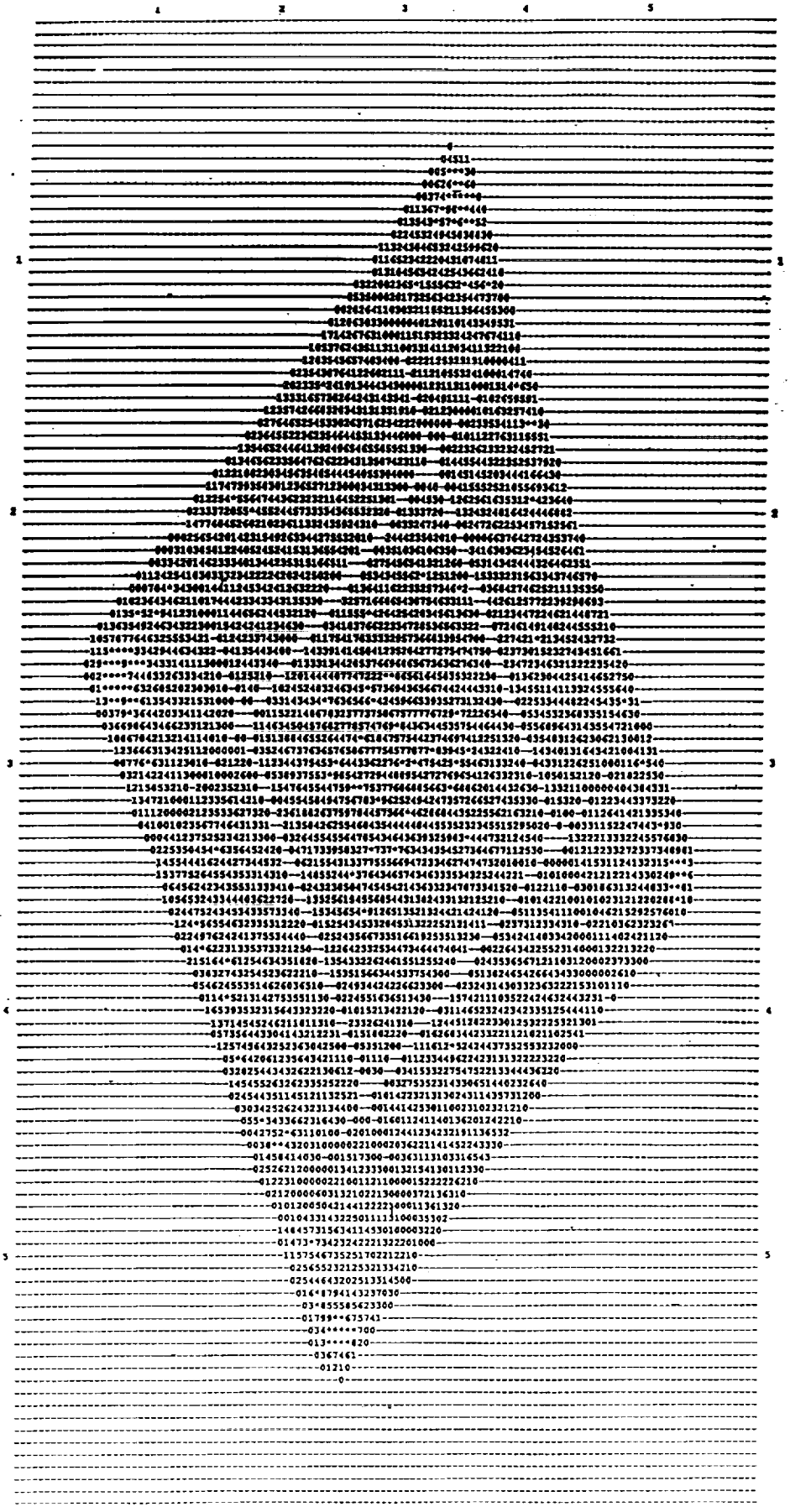
Below is an example of digit_map. In this case, scan was run with the same criteria as shown in the <scan> example of this manual.

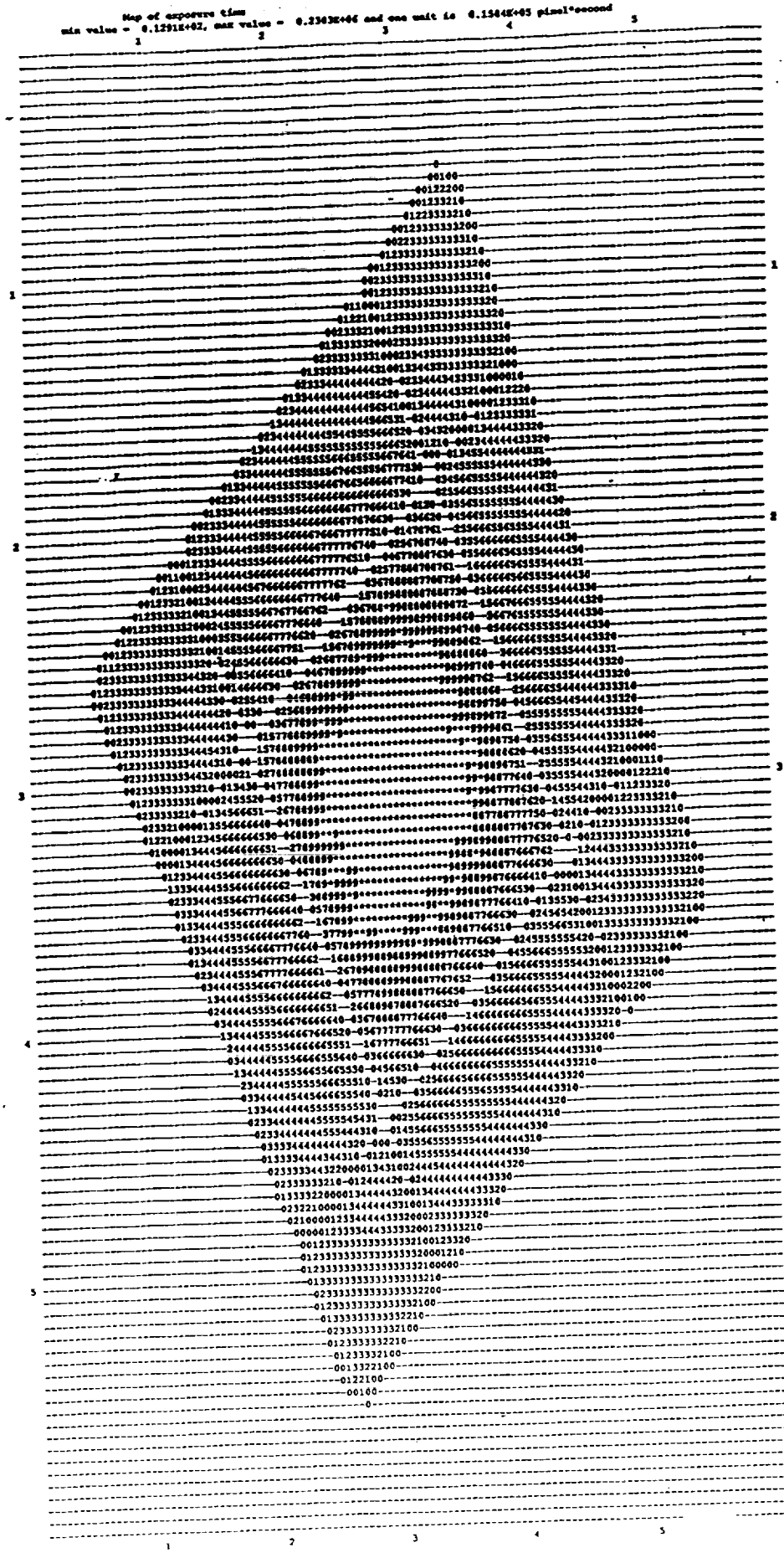
59m 59.00s

420 bins of 8 pixels each, and energy range is from channel 1 to 9

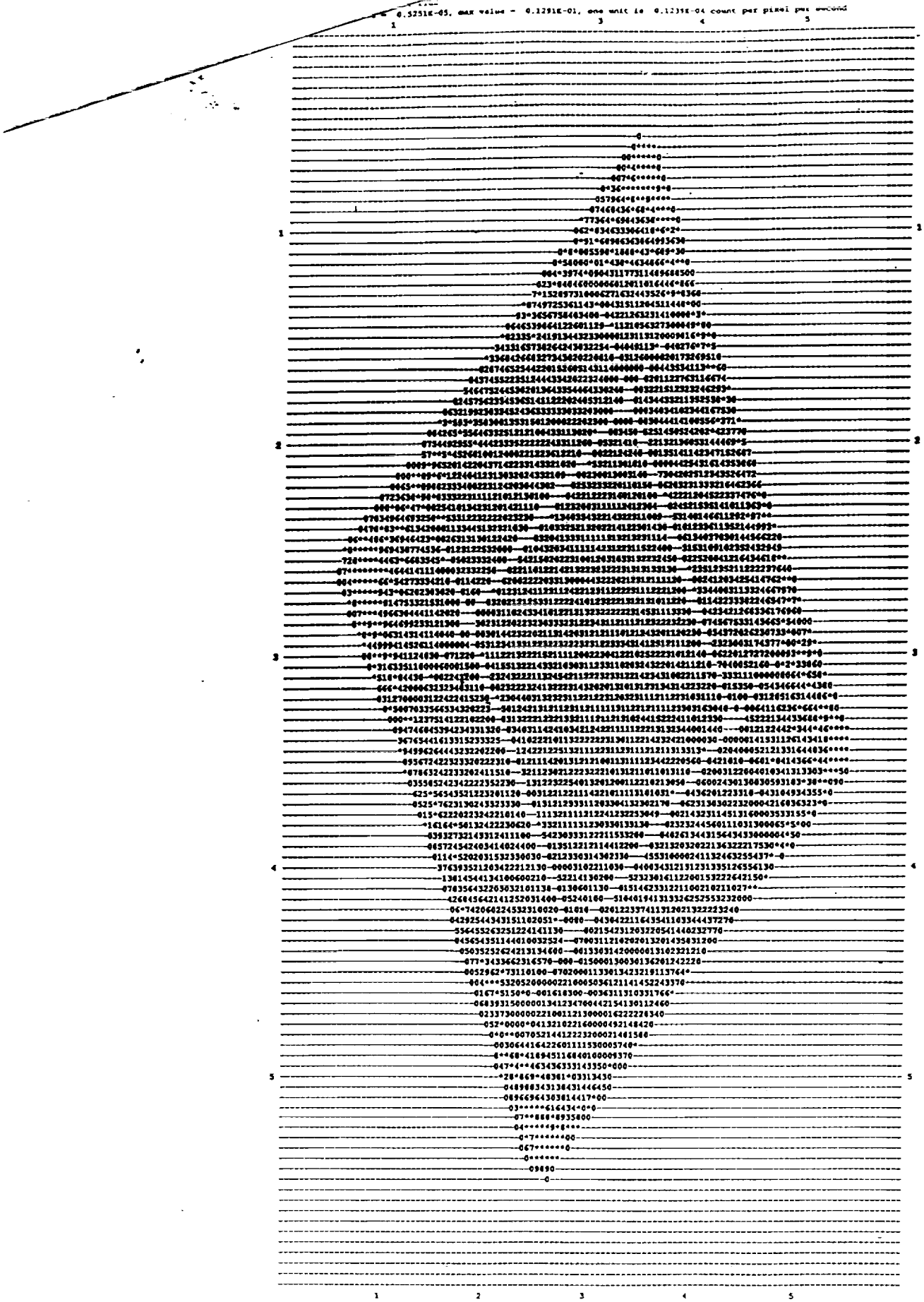
of photon count

photon number = 16459 with min = 1 max = 21 and one unit is 0.9500E+00 count





ORIGINAL PAGE IS
OF POOR QUALITY



Threshold of source identification is 4.0 sigma.

#	RA	DEC	Sigma	Flux	Uplimit	I	J
1	14h 7m 33.65s	73d 48m 27.92s	5.84	0.09059	0.11359	70	15
2	14h 20m 52.92s	73d 6m 54.24s	4.82	0.06663	0.08718	16	53
3	13h 58m 32.28s	72d 49m 42.40s	5.56	0.09654	0.12755	108	69
4	14h 11m 29.56s	72d 10m 21.69s	5.15	0.09236	0.12286	54	107

There are totally 4 sources found in this area.

Chapter III.3

SOURCE_LIST

Source_list is a small file produced by <scan>. The ouput file source_list primarily functions as an input file for <exam>.

Source_list lists the sources found by <scan> with the corresponding values of right ascension, declination, sigma (signal-to-noise ratio), flux and the upper limit of the flux, respectively. However, the values are not labeled in source_list. It is a sublist of the larger, more easily read output file digit_map.

The user should note that an identical file named source_punch is simultaneously produced by <scan>. When a user edits source_list for the UNIX mode, he/she need not change source_punch. However, if the user renames a source_punch file, the corresponding source_punch file should also be renamed and saved. For users unfamiliar with the programs initiated by <scan>, please note that souce_punch is a file that contains the list of souces that are to be punched out when scanning the field to produce images. <Exam> requires that the corresponding source_punch and source_list be input.

Example 19

The file source_list below was created according to the criteria set in the <scan> example given earlier in this manual.

14	7	33.65	73	48	27.92	5.84	0.09059	0.11359
14	20	52.92	73	6	54.24	4.82	0.06663	0.08718
13	58	32.28	72	49	42.40	5.58	0.09654	0.12759
14	11	29.58	72	10	21.69	5.15	0.09236	0.12286

Chapter III.4

PRINT_OUT

The output file print_out contains all of the data produced by <exam>. Print_out is a large, easy-to-read file.

Print_out lists the original source positions followed by three maps of the corresponding photon count, exposure time and flux (photon count per exposure time for each pixel). These maps differ from those in digit_map in that they cover a much smaller area and in that they have twice the resolution.

For each image file that covers a source corresponding to a selected file name, print_out lists small maps of photon count and exposure time accompanied by the amount of exposure time at the center.

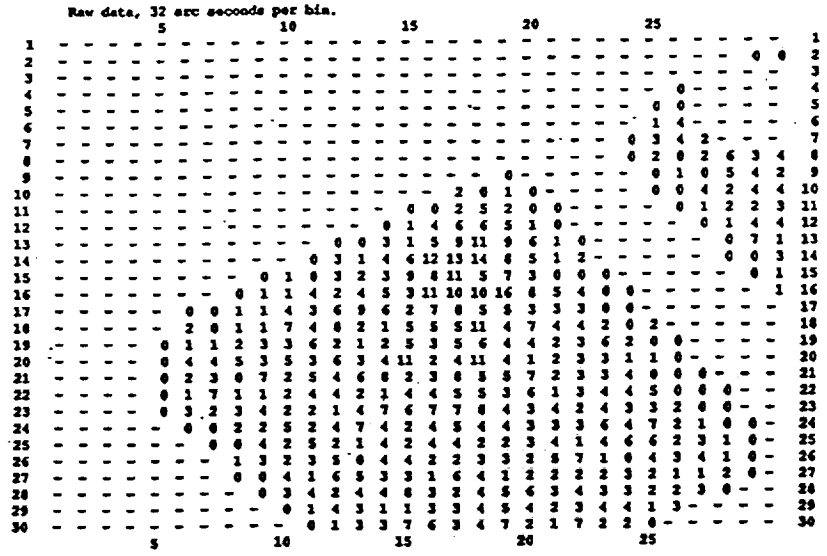
For each channel (0-15), print_out provides the spectrum of photon counts at both the source position within a 3′ radius and in surrounding annulus (5-8 arcmins). This data may be used as input for Finspec.

Example 20

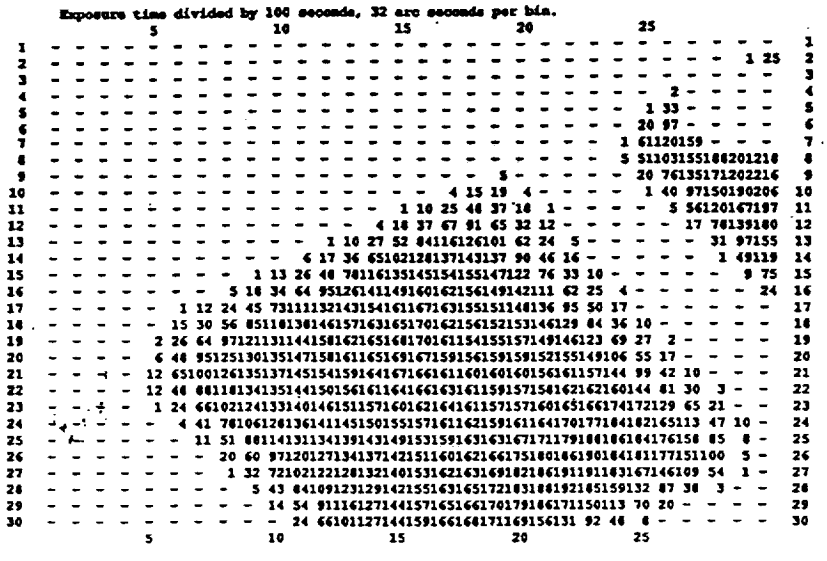
The print_out file below was produced by using the default values for <exam> and <scan> for the selected files with a sequence number equal to 27.

Source Center RA = 14h 18m 13.95s DEC = 73d 10m 35.17s
Energy Range from channel 2 to 10, Broad Band

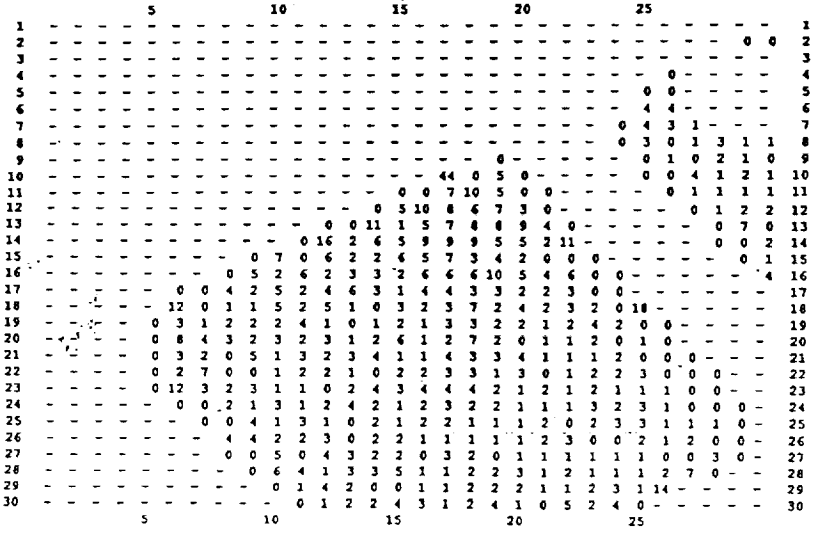
Raw data, 32 arc seconds per bin.



Exposure time divided by 100 seconds, 32 arc seconds per bin.



Counts for 10,000 seconds, 32 arc seconds per bin.



```
ighted center at                RA = 14h 18m  3.16s DEC = 73d 11m 10.99s (  5.6X -4.5) pixels off the map center.
Maximum sigma of    8.01 at     RA = 14h 17m 55.51s DEC = 73d 11m 23.13s ( 10.0X -6.0) pixels off the map center.
Maximum flux of 0.009839 at     RA = 14h 18m 10.26s DEC = 73d 11m 55.16s (  2.0X-10.0) pixels off the map center.
Maximum upper limit of 0.013599 at RA = 14h 18m 10.26s DEC = 73d 11m 55.16s (  2.0X-10.0) pixels off the map center.

Raw data for ipc0665177, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  1  1  0  0  0
 0  0  0  0  0  1  0  0  1  0
 0  0  0  1  0  1  0  0  1  1
 0  0  0  0  0  1  0  0  1  0
 0  0  0  0  0  1  0  0  0  0
 0  0  0  0  0  0  1  2  0  0
 0  1  0  0  0  1  0  1  0  1
 0  0  0  0  0  0  0  1  0  0
 0  0  0  0  0  0  0  1  0  0

Exposure time in 100 seconds. Center Exp =  455.2 Flux = 0.0504
 0  0  0  0  0  1  3  3  3  3
 0  0  0  0  2  3  3  3  4  3
 0  0  1  3  3  3  4  4  4  4
 1  2  3  3  4  4  4  4  4  4
 3  3  3  4  4  4  4  4  4  4
 3  4  4  4  4  4  4  4  4  4
 3  4  4  4  4  4  4  4  4  4
 3  4  4  4  4  4  4  4  4  4
 3  4  4  4  4  4  4  4  4  4
 3  4  4  4  4  4  4  4  4  4

Raw data for ipc0665231, 32 arc seconds per bin.
 0  0  0  0  0  0  1  0  1  0
 0  0  0  0  1  0  0  2  0  0
 0  0  0  1  0  1  1  1  1  2
 0  0  1  0  2  2  0  1  0  0
 0  1  0  0  1  0  0  0  1  1
 0  0  1  1  1  2  0  3  3  1
 0  1  0  0  0  1  1  0  0  0
 0  0  0  0  0  0  0  0  1  0
 2  0  0  0  2  0  1  2  0  1
 1  2  2  0  4  0  1  0  0  1

Exposure time in 100 seconds. Center Exp = 1052.0 Flux = 0.0622
 0  0  0  0  0  4  7  7  7  7
 0  0  0  1  6  7  8  8  9  8
 0  0  4  7  8  8 10 10  9  9
 2  6  7  7  9 10 10 10  9  9
 8  8  8 10 10 10 10 10 10  9
 8  9 10 10 10 10 11 10  9  9
 8 10 10 10 10 11 10  9  9 10
 8  9 10 10 10 10  9  9 10 10
 9  9 10 10 10 10 10  9 10 10
 9  9  9 10 10 10 10 10 10  9

Raw data for ipc0665377, 32 arc seconds per bin.
 0  0  0  0  0  0  1  1  1  0
 0  0  0  0  0  0  0  0  1  1
 0  0  0  1  1  0  3  0  1  1
 0  3  0  0  0  0  0  1  2  0
 0  0  0  1  0  1  0  0  1  0
 1  0  0  0  0  2  0  2  0  1
 0  0  2  0  0  1  0  1  0  0
 0  0  0  0  0  0  0  1  0  0
 1  0  0  0  0  0  0  2  0  0
 0  1  0  0  1  0  0  1  0  0

Exposure time in 100 seconds. Center Exp =  967.4 Flux = 0.0439
 0  0  0  0  0  4  6  7  7  6
 0  0  0  1  6  7  7  8  8  8
 0  0  3  7  7  7  9  9  9  8
 2  6  6  7  8  9  9  9  8  8
 7  7  7  9  9  9  9  9  9  8
 7  9  9  9  9  9 10  9  8  8
 8  8  9  9  9 10  9  8  8  9
 8  8  9  9  9  9  9  9  9  9
 8  8  9  9  9  9  9  9  9  9
 8  8  8  9  9  9  9  9  9  9

Raw data for ipc0665525, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  1  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0

Exposure time in 100 seconds. Center Exp =  112.6 Flux = 0.0102
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  1  0
 0  0  0  0  0  0  1  1  1  0
 0  0  0  0  1  1  1  1  1  1
 0  0  0  1  1  1  1  1  1  1
 0  1  1  1  1  1  1  1  1  1
 0  1  1  1  1  1  1  1  1  1
 0  1  1  1  1  1  1  1  1  1
 0  1  1  1  1  1  1  1  1  1
 0  1  1  1  1  1  1  1  1  1

Raw data for ipc0666139, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  1  1  0  0
 0  0  0  0  1  0  2  0  0  0
 0  0  0  1  0  1  0  2  1  0
 0  0  1  2  0  0  1  0  0  0
 0  2  0  0  1  0  0  1  0  0
 1  0  0  0  0  0  0  1  0  0
 1  0  0  0  0  0  0  0  0  0

Exposure time in 100 seconds. Center Exp =  537.5 Flux = 0.0391
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  8  0  0  0  3  4  0  0
 0  0  0  0  1  4  4  4  4  0
 0  0  0  2  5  5  5  6  5  2
 0  0  4  5  5  6  6  6  5  5
 1  4  5  5  6  6  6  6  6  5
 5  4  5  6  6  6  6  6  6  6
 5  6  6  6  6  7  6  6  6  6
 6  6  6  6  7  7  6  6  6  6

Raw data for ipc0666215, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  1  0  0
 0  0  0  0  0  1  1  3  0  0
 0  0  0  0  1  0  2  3  0  0
 0  0  0  1  0  0  1  0  1  0
 0  1  0  0  0  0  1  1  0  1
 1  0  0  0  0  0  0  0  1  0
 0  0  0  0  1  1  0  0  0  0
 0  0  0  0  0  0  0  2  0  0

Exposure time in 100 seconds. Center Exp =  980.8 Flux = 0.0255
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  1  0  0
 0  0  0  0  0  0  5  7  0  0
 0  0  0  0  2  8  8  8  7  0
 0  0  0  4  9  9  9 11 10  4
 0  1  7  9  9 11 11 11 10  9
 2  8  9 10 11 12 12 11 11 10
 9  8 10 11 12 12 11 11 11 11
10 11 12 12 12 13 12 11 11 11
11 12 12 12 12 13 11 11 11 11

Raw data for ipc0666363, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  1  0  0
 0  0  0  0  0  0  3  0  1  0
 0  0  0  0  2  0  0  0  0  0
 0  0  0  0  1  0  1  0  1  1
 0  0  1  0  0  0  1  0  0  0
 0  0  0  0  0  0  0  1  0  2
 0  1  0  0  0  1  1  1  0  1
 0  0  0  0  0  0  0  1  1  0

Exposure time in 100 seconds. Center Exp =  826.5 Flux = 0.0279
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  4  6  0  0
 0  0  0  0  1  6  7  7  6  0
 0  0  0  3  7  7  8  9  8  3
 0  0  6  8  8  9  9  9  9  8
 2  7  7  8  9 10 10  9  9  8
 8  7  9  9 10 10 10 10  9  9
 8  9 10 10 10 11 10  9  9  9
 9 10 10 10 10 11 10  9  9  9

Raw data for ipc0667185, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  1  0  1  1  0
 0  0  0  0  0  1  0  0  0  0
 0  0  0  1  1  0  0  0  1  0
 0  0  1  0  0  1  2  0  0  3
 0  0  0  0  0  0  0  0  0  1
 1  1  0  0  1  1  0  0  1  0
 0  0  0  1  0  0  0  0  0  0
 0  2  0  0  2  0  2  2  1  0

Exposure time in 100 seconds. Center Exp =  798.7 Flux = 0.0385
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  3  0  0
 0  0  0  0  0  2  6  6  3  0
 0  0  0  0  4  6  6  7  7  2
 0  0  1  6  7  7  8  8  8  6
 0  3  7  7  8  9  9  8  8  7
 5  6  7  8  9  9  9  8  8  8
 7  7  9  9  9  9  9  9  8  8
 8  9  9  9  9 10  9  8  8  8
 8  9  9  9 10  9  8  8  9  9

Raw data for ipc0667311, 32 arc seconds per bin.
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  1  0
 0  0  0  0  0  1  1  0  2  0
 0  0  0  0  1  1  1  0  0  0
 0  0  0  0  0  0  0  1  0  0
 0  0  1  1  0  0  0  0  0  0
 0  0  1  0  1  0  1  0  0  0
 1  0  0  1  1  0  0  0  0  1
 1  1  0  1  1  0  0  1  0  0

Exposure time in 100 seconds. Center Exp =  777.9 Flux = 0.0303
 0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  3  0  0
 0  0  0  0  0  2  6  6  3  0
 0  0  0  0  4  6  6  7  7  1
 0  0  1  6  6  7  8  8  8  6
 0  3  6  7  7  8  9  8  8  7
 5  6  7  8  9  9  9  8  8  8
 7  7  8  9  9  9  9  9  8  8
 8  9  9  9  9  9  8  8  8  8
 8  9  9  9  9  9  8  8  8  8
```

...38, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	2	0	0	0
0	0	1	0	0	0	1	0	1	0
0	0	0	0	0	1	1	1	0	0
1	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	1	0
0	0	1	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 744.2 Flux = 0.0220

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	3	0
0	0	0	0	0	2	5	5	3	0
0	0	0	0	4	6	6	7	7	1
0	0	1	5	6	7	7	8	7	6
0	3	6	6	7	8	8	8	8	7
5	6	6	7	8	8	8	8	8	7
7	7	8	8	8	9	8	8	8	8
7	8	8	9	9	9	9	8	8	8
8	8	8	9	9	8	8	8	8	8

Raw data for ipc0668227, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	1	1	1
0	0	0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	1	0	1	1
0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	0	0
0	0	0	0	1	0	0	1	0	0

Exposure time in 100 seconds. Center Exp = 612.4 Flux = 0.0283

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	2	4	1	0
0	0	0	0	0	3	4	4	4	0
0	0	0	1	4	5	5	6	5	4
0	0	3	5	5	6	6	6	6	5
1	4	5	5	6	6	6	6	6	6
5	5	5	6	6	6	6	6	6	6
5	6	6	6	6	7	7	6	6	6
6	6	6	6	7	7	6	6	6	6
6	6	6	7	7	6	6	6	6	6

Raw data for ipc0668296, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1	1	0
0	0	0	0	0	0	0	3	1	0
0	0	0	0	0	3	0	1	1	0
0	0	0	0	1	1	0	1	4	1
0	1	0	1	0	1	0	0	1	0
2	0	0	0	0	0	1	2	0	0
0	0	0	0	1	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1034.1 Flux = 0.0325

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	4	7	2	0
0	0	0	0	1	6	8	8	8	1
0	0	0	3	8	8	8	10	9	7
0	0	5	8	8	10	11	11	10	9
2	7	8	9	10	11	11	10	10	10
9	8	9	11	11	11	11	11	10	10
9	10	11	11	11	12	11	11	10	10
10	11	11	11	12	12	11	10	11	10
10	11	11	11	12	11	10	11	11	11

Raw data for ipc0668443, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	2	0	0	0
0	2	0	0	0	0	0	1	1	0
0	0	2	0	0	1	1	0	1	0
0	1	1	0	0	0	1	1	0	2
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	1	0

Exposure time in 100 seconds. Center Exp = 859.5 Flux = 0.0290

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	3	6	2	0
0	0	0	0	0	0	5	7	6	6	1
0	0	0	0	2	6	7	7	8	8	6
0	0	4	7	7	8	9	9	8	8	7
1	6	7	7	9	9	9	9	8	8	8
7	7	8	9	9	9	9	9	8	8	8
8	9	9	9	9	10	9	9	8	8	8
9	9	9	9	10	10	9	8	9	9	9
8	9	9	9	10	9	9	9	9	9	9

Raw data for ipc0669336, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	1	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1
1	0	0	0	0	0	1	0	0	0
1	1	0	0	0	0	0	1	0	0
0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 516.2 Flux = 0.0266

0	0	0	0	0	0	0	2	0	0
0	0	0	0	0	0	3	3	3	0
0	0	0	0	2	4	3	4	4	2
0	0	0	3	4	4	4	5	5	4
0	1	4	4	4	5	5	5	5	4
3	3	4	4	5	5	5	5	4	5
4	4	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5

Raw data for ipc0669391, 32 arc seconds per bin.

0	0	0	0	0	0	0	2	0	0
0	0	0	0	0	0	2	1	1	0
0	0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	1	0	1	2	0	1
0	1	0	0	0	0	1	0	0	0	0
1	0	0	0	0	0	1	1	0	0	0
1	0	0	0	0	1	1	0	0	1	0
0	2	0	0	0	0	1	0	2	0	1
0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	1	0

Exposure time in 100 seconds. Center Exp = 807.6 Flux = 0.0422

0	0	0	0	0	0	0	3	1	0
0	0	0	0	0	1	5	5	5	0
0	0	0	0	3	6	6	6	7	4
0	0	1	5	6	6	7	8	7	7
0	3	6	6	7	8	8	8	7	7
5	6	6	7	8	8	8	8	7	7
7	7	8	8	8	8	8	8	8	7
7	8	8	8	8	9	9	7	8	7
7	8	8	8	8	8	8	8	8	8
7	8	8	8	8	8	8	8	8	8

Raw data for ipc0669538, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	0	1	0
0	0	0	2	1	0	1	0	0	1
0	0	0	0	1	0	0	0	0	0
1	0	1	1	0	0	0	1	1	0
0	0	0	0	0	1	0	0	0	0
0	1	0	1	0	2	0	1	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 952.8 Flux = 0.0251

0	0	0	0	0	0	0	4	1	0
0	0	0	0	0	1	6	6	6	0
0	0	0	0	4	7	7	8	8	5
0	0	1	6	7	7	9	9	9	8
0	3	7	7	8	9	10	9	9	8
6	7	7	8	9	10	9	9	9	9
8	8	9	10	9	10	10	10	9	9
8	10	10	10	10	10	10	9	9	9
8	10	10	10	10	10	9	9	9	9
8	9	10	10	10	10	9	9	10	10

Raw data for ipc0670308, 32 arc seconds per bin.

0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	2	1	0	0	0
0	0	0	1	0	1	0	0	0	1
0	0	0	0	1	1	2	0	0	1
0	0	0	0	0	0	1	0	1	0
0	0	0	0	0	1	0	0	0	0
0	1	0	1	0	0	0	0	1	0
0	0	0	0	1	0	0	1	1	1
0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 678.6 Flux = 0.0385

0	0	0	0	0	0	1	4	3	0
0	0	0	0	0	3	5	5	5	2
0	0	0	1	4	5	5	6	6	5
0	0	3	5	5	5	6	6	6	5
1	4	5	5	6	6	7	6	6	6
5	5	5	6	6	7	6	6	6	6
5	6	6	7	7	7	7	6	6	6
6	6	7	7	7	7	7	6	6	6
6	6	6	7	7	7	6	6	6	7
6	6	6	7	7	7	7	6	6	7

Raw data for ipc0670376, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	1	2	0	2	0	0
0	0	0	0	0	1	1	0	0	1
0	0	1	1	0	1	0	0	0	0
0	1	0	0	1	0	1	0	0	1
0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	0	1	0
0	0	0	0	0	2	0	1	0	0

Exposure time in 100 seconds. Center Exp = 1101.8 Flux = 0.0248

0	0	0	0	0	0	0	2	7	5	0
0	0	0	0	0	0	5	8	8	8	4
0	0	0	0	2	7	8	8	10	10	9
0	0	5	8	8	9	11	10	10	10	9
2	7	8	8	10	11	11	11	10	10	
9	8	9	11	11	11	11	11	10	10	
9	10	11	11	11	11	12	10	10	10	
10	11	11	11	11	12	11	10	10	10	
9	10	11	11	11	11	10	10	11	11	
10	10	11	11	11	11	11	10	11	11	

Raw data for ipc0670523, 32 arc seconds per bin.

0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	2	2	0
0	0	0	0	0	0	1	2	1	1
0	0	0	0	0	0	0	1	1	0
0	1	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	1	0
0	0	1	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0	0
0	0	0	1	1	0	1	1	0	0

Exposure time in 100 seconds. Center Exp = 959.0 Flux = 0.0296

0	0	0	0	0	0	2	6	4	0
0	0	0	0	0	4	7	7	7	3
0	0	0	2	6	7	7	8	8	8
0	0	4	7	7	8	9	9	9	8
2	6	7	7	9	9	9	9	8	9
8	7	8	9	9	9	9	9	9	9
8	9	9	9	10	10	10	9	9	9
8	9	10	9	10	10	9	9	9	9
8	9	9	10	10	10	9	9	9	9
8	9	9	9	10	10	9	9	9	9

Energy	<3min Source	5<-<8 Bkgd	BS Count	Error	Flux
CHN 0	0	0	0.00	0.00	0.00000
CHN 1	3	15	-4.17	2.54	-0.00040
CHN 2	50	111	-3.06	8.68	-0.00029
CHN 3	96	89	53.46	10.79	0.00508
CHN 4	64	68	31.50	8.92	0.00299
CHN 5	62	62	32.36	8.73	0.00308
CHN 6	48	38	29.84	7.53	0.00284
CHN 7	26	27	13.09	5.67	0.00124
CHN 8	32	24	20.53	6.12	0.00195
CHN 9	44	27	31.09	7.08	0.00296
CHN 10	22	22	11.48	5.20	0.00109
CHN 11	27	52	2.14	6.24	0.00020
CHN 12	25	69	-7.98	6.38	-0.00076
CHN 13	47	94	2.07	8.28	0.00020
CHN 14	53	147	-17.27	9.31	-0.00164
CHN 15	216	422	14.28	17.68	0.00136
Total	815	1267	209.36		0.01990
Broad Band	444	468	220.29		0.02094

Hardness Parameter (H-S)/(H+S) = 0.257

Source Center RA = 14h 7m 34.34s DEC = 72d 34m 52.54s
Energy Range from channel 2 to 10, Broad Band

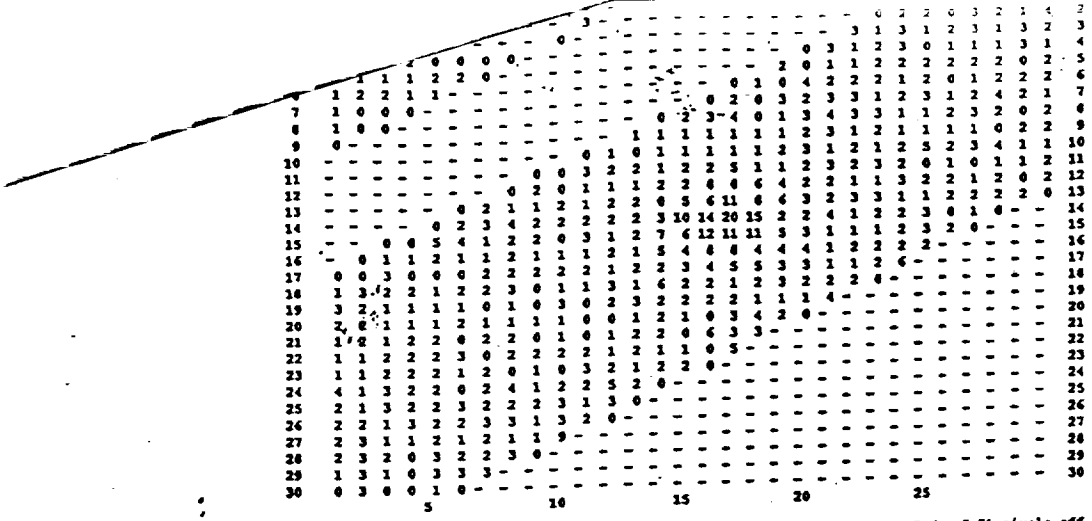
Raw data, 32 arc seconds per bin.

					5					10					15					20					25						
1	5	2	5	7	5	-	-	-	-	-	9	2	-	-	-	-	-	-	-	-	-	-	-	0	2	6	2	6	2	9	1
2	2	4	3	1	5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	0	4	7	2	8	7	4	11	2
3	3	9	3	6	5	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	4	3	8	3	7	8	4	9	6	3
4	2	7	2	6	2	8	1	0	-	-	-	-	-	-	-	-	-	-	-	0	6	4	5	8	2	4	4	5	8	3	4
5	2	4	4	3	6	3	0	-	-	-	-	-	-	-	-	-	-	-	2	2	4	4	7	6	7	6	6	7	1	5	5
6	3	5	6	3	1	-	-	-	-	-	-	-	-	-	-	-	0	2	1	10	5	6	6	4	6	2	3	7	6	7	6
7	5	2	1	0	-	-	-	-	-	-	-	-	-	-	-	0	6	2	9	7	8	7	4	5	8	4	6	10	6	4	7
8	2	0	0	-	-	-	-	-	-	-	-	-	-	0	4	8	11	2	4	9	11	7	9	4	5	6	8	7	2	5	8
9	0	-	-	-	-	-	-	-	-	-	-	-	1	2	3	5	5	3	3	6	8	4	7	3	4	4	4	2	7	6	9
10	-	-	-	-	-	-	-	-	-	-	0	2	2	4	3	3	5	5	6	8	3	5	4	5	12	5	8	10	3	4	10
11	-	-	-	-	-	-	-	-	0	0	7	5	5	3	5	6	15	4	5	5	7	5	8	5	2	3	2	3	4	6	11
12	-	-	-	-	-	-	-	0	3	2	3	4	4	7	5	19	21	16	12	6	5	4	4	7	5	5	4	5	2	5	12
13	-	-	-	-	-	0	1	2	4	5	3	6	5	2	13	14	28	21	15	8	6	8	7	3	3	6	5	5	4	0	13
14	-	-	-	-	0	2	7	10	6	5	7	6	5	9	23	33	47	37	6	5	10	4	5	5	8	2	3	0	-	-	14
15	-	-	0	0	7	9	4	5	6	2	9	5	5	17	15	29	27	27	14	9	5	4	3	5	7	3	0	-	-	-	15
16	-	0	1	3	6	3	4	5	4	4	3	5	3	11	11	18	20	10	11	10	3	6	6	5	2	-	-	-	-	-	16
17	0	0	8	2	2	2	6	5	5	5	5	3	5	5	7	10	12	13	7	7	4	3	4	2	-	-	-	-	-	-	17
18	3	7	6	6	3	5	7	9	1	3	4	8	4	14	6	5	4	5	7	5	5	3	0	-	-	-	-	-	-	-	18
19	7	7	4	4	4	3	2	4	1	8	1	5	7	6	6	6	6	4	3	2	2	-	-	-	-	-	-	-	-	-	19
20	5	5	4	4	4	6	3	3	4	4	1	1	4	6	4	2	7	9	3	0	-	-	-	-	-	-	-	-	-	-	20
21	4	7	4	5	5	1	5	6	2	3	2	4	5	5	2	13	7	2	-	-	-	-	-	-	-	-	-	-	-	-	21
22	4	4	7	6	5	7	2	5	5	5	5	3	6	4	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	22
23	3	3	6	6	6	4	5	2	3	2	8	5	4	5	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
24	10	3	8	5	6	1	5	10	3	6	6	10	3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24
25	5	3	8	5	6	8	5	5	4	6	3	3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
26	6	6	3	8	5	6	7	7	3	5	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
27	6	7	4	3	6	2	4	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
28	4	7	5	0	7	4	4	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
29	3	7	2	1	7	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29
30	1	6	1	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
					5					10					15					20					25						

Exposure time divided by 100 seconds, 32 arc seconds per bin.

```
                 5            10           15           20           25
 1  309304298274255 - - - - - 231 82 - - - - - - - - - - - 8129221242251245239    1
 2  297287269264256 - - - - - 26 - - - - - - - - - - - 43199239249250250249242    2
 3  271256256251242 - - - - 2 - - - - - - - - - - - 104218241251249256262252243    3
 4  256250239233232231172 36 - - - - - - - - - - - 28179226240242246262267261246245    4
 5  254246236233224117  7 - - - - - - - - - - - 91210233246241244261264263249236238    5
 6  254247242197 56 - - - - - - - - - - - 17145214230234239243251257259258247237243    6
 7  251226134 18 - - - - - - - - - - - 77209230241233227231237244256256254244239239    7
 8  195 75  2 - - - - - - - - - - 14145239259260246234231224236257255250242237236247    8
 9   36 - - - - - - - - - - - 50193236258262262258245233234246250246238235237254253    9
10  - - - - - - - - - - 12114209230245251261267262246226227235238235234238245248245   10
11  - - - - - - - - 2 47177223238234238248259261254238225227236232231238239238236231   11
12  - - - - - - - 11106212231238239235233237245247245242240240234226223229232226226198   12
13  - - - - - 2 40161225237234232239234229230235237241244241237228218215215216219139 13   13
14  - - - - 13 94203231241243246253248235226227230237242240244248232217211205194 70 - -   14
15  - - 2 40139219230229233247256253241223219223234237238245250249233218209146 12 - - -   15
16  - 12 73172222235235234239246247238226218221224227231235239242235227210 66 - - - - -   16
17   33120203223230234241245241238238236230225222220222225227228231231177 32 - - - - - -   17
18  158215230230230234240242240235232232230225223225221217215214213112  5 - - - - - - -   18
19  232237235231230231236244243235226226226226226226220214209168 45 - - - - - - - - -   19
20  235237237233230235242243236226221219217216219221221207119 11 - - - - - - - - - -   20
21  235240238235235234232225218218219217212211211214186 63 - - - - - - - - - - - -   21
22  240242242242237229221215212218222216207202197127 19 - - - - - - - - - - - - -   22
23  237241243240236230223216212213213209202169 73  4 - - - - - - - - - - - - - -   23
24  228232236235230224216207204202201196141 34 - - - - - - - - - - - - - - - -   24
25  214225230230225217211204199194170 87  8 - - - - - - - - - - - - - - - - -   25
26  217225224218213210207200189136 46  2 - - - - - - - - - - - - - - - - - -   26
27  215213208204203199193167100 21 - - - - - - - - - - - - - - - - - - - -   27
28  197194195200200190144 60  4 - - - - - - - - - - - - - - - - - - - - -   28
29  184185191196176116 30 - - - - - - - - - - - - - - - - - - - - - - -   29
30  180183178142 77 11 - - - - - - - - - - - - - - - - - - - - - - - -   30
                 5            10           15           20           25
```

ORIGINAL PAGE IS
OF POOR QUALITY



```
                                -  3  -  -  -  -  -  -  -  -  -  -  -  0  2  2  0  3  2  1  4    2
                           -  -  0  -  -  -  -  -  -  -  -  -  -  -  3  1  3  1  2  3  1  3  2    3
              2  0  0  0  0  -  -  -  -  -  -  -  -  -  -  -  0  3  1  2  3  0  1  1  1  3  1    4
        1  1  1  2  2  0  -  -  -  -  -  -  -  -  -  -  -  2  0  1  1  2  2  2  2  2  2  0  2    5
     1  2  2  1  1  -  -  -  -  -  -  -  -  -  -  -  0  1  0  4  2  2  2  1  2  0  1  2  2  2    6
  7  1  0  0  0  -  -  -  -  -  -  -  -  -  -  -  0  2  0  3  2  3  3  1  2  3  1  2  4  2  1    7
  8  1  0  0  -  -  -  -  -  -  -  -  -  -  0  2  3  4  0  1  3  4  3  3  1  1  2  3  2  0  2    8
  9  0  -  -  -  -  -  -  -  -  -  -  -  1  1  1  1  1  1  1  2  3  1  2  1  1  1  1  0  2  2    9
 10  -  -  -  -  -  -  -  -  -  -  0  1  0  1  1  1  1  1  2  3  1  2  1  2  5  2  3  4  1  1   10
 11  -  -  -  -  -  -  -  -  0  0  3  2  2  1  2  2  5  1  1  2  3  2  3  2  0  1  0  1  1  2   11
 12  -  -  -  -  -  -  -  0  2  0  1  1  1  2  2  8  8  6  4  2  2  1  1  3  2  2  1  2  0  2   12
 13  -  -  -  -  -  0  2  1  1  2  1  2  2  8  5  6 11  8  6  3  2  3  3  1  1  2  2  2  2  0   13
 14  -  -  -  -  0  2  3  4  2  2  2  2  2  3 10 14 20 15  2  2  4  1  2  2  3  0  1  0  -  -   14
 15  -  -  0  0  5  4  1  2  2  0  3  1  2  7  6 12 11 11  5  3  1  1  1  2  3  2  0  -  -  -   15
 16  -  0  1  1  2  1  1  2  1  1  1  2  1  5  4  8  8  4  4  4  1  2  2  2  2  -  -  -  -  -   16
 17  0  0  3  0  0  0  2  2  2  2  2  1  2  2  3  4  5  5  3  3  1  1  2  6  -  -  -  -  -  -   17
 18  1  3  2  2  1  2  2  3  0  1  1  3  1  6  2  2  1  2  3  2  2  2  0  -  -  -  -  -  -  -   18
 19  3  2  1  1  1  1  0  1  0  3  0  2  3  2  2  2  2  1  1  1  4  -  -  -  -  -  -  -  -  -   19
 20  2  0  1  1  1  2  1  1  1  1  0  0  1  2  1  0  3  4  2  0  -  -  -  -  -  -  -  -  -  -   20
 21  1  2  1  2  2  0  2  2  0  1  0  1  2  2  0  6  3  3  -  -  -  -  -  -  -  -  -  -  -  -   21
 22  1  1  2  2  2  3  0  2  2  2  2  1  2  1  1  0  5  -  -  -  -  -  -  -  -  -  -  -  -  -   22
 23  1  1  2  2  2  1  2  0  1  0  3  2  1  2  2  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -   23
 24  4  1  3  2  2  0  2  4  1  2  2  5  2  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   24
 25  2  1  3  2  2  3  2  2  2  3  1  3  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   25
 26  2  2  1  3  2  2  3  3  1  3  2  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   26
 27  2  3  1  1  2  1  2  1  1  9  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   27
 28  2  3  2  0  3  2  2  3  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   28
 29  1  3  1  0  3  3  3  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   29
 30  0  3  0  0  1  0  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   30
                 5              10             15             20             25

Weighted center at                  RA = 14h  7m 23.85s DEC = 72d 35m 18.44s (  3.6X -3.2) pixels off the map center.
Maximum sigma of  16.12 at          RA = 14h  7m 19.64s DEC = 72d 35m 40.49s (  6.0X -6.0) pixels off the map center.
Maximum flux of 0.017135 at         RA = 14h  7m 19.64s DEC = 72d 35m 40.49s (  6.0X -6.0) pixels off the map center.
Maximum upper limit of 0.017428 at  RA = 14h  7m 19.64s DEC = 72d 35m 40.49s (  6.0X -6.0) pixels off the map center.

Raw data for ipc0665177, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp =  638.4 Flux = 0.0394
    0    0    1    0    0    0    0    0    0    0         5    6    6    6    6    7    7    7    6    5
    0    0    0    1    0    0    0    2    0    0         6    6    6    6    6    7    7    7    6    5
    0    1    0    0    0    2    3    0    1    0         6    6    6    6    6    6    6    6    6    6
    0    1    0    0    0    2    1    0    1    0         6    6    6    6    6    6    6    6    6    6
    0    0    0    0    1    0    0    1    1    0         7    6    6    6    6    6    6    6    6    7
    0    0    0    0    0    0    1    1    0    0         6    6    5    5    6    6    6    6    6    7
    0    0    0    0    0    1    0    0    0    0         6    6    6    6    6    6    6    6    6    6
    0    0    0    0    0    0    0    0    1    0         6    6    6    6    6    6    6    6    6    6
    0    0    1    1    0    0    0    0    0    0         6    6    6    6    6    5    5    5    5    3
    0    0    0    0    0    0    0    0    0    0         6    6    6    6    6    5    5    4    1    0

Raw data for ipc0665231, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp = 1475.3 Flux = 0.0409
    0    0    1    1    1    0    2    1    0    0        13   14   15   15   16   16   17   16   14   13
    0    0    0    0    0    2    3    0    0    0        15   15   14   14   16   16   16   16   14   13
    0    1    0    0    1    0    1    1    3    0        15   15   14   14   14   15   15   15   15   15
    0    0    0    1    2    2    4    1    0    0        16   15   14   14   14   14   15   15   15   15
    2    0    1    1    0    1    0    0    1    0        16   15   14   14   14   14   15   15   15   16
    0    1    0    3    0    1    0    2    1    1        15   14   13   13   14   15   14   15   15   16
    1    2    1    1    1    0    0    1    0    0        14   13   14   14   13   14   14   14   15   15
    0    1    0    2    0    0    0    0    0    1        15   14   14   13   13   14   14   13   14   14
    0    1    2    1    1    0    0    0    0    0        14   14   14   14   14   13   13   12   13    8
    0    0    0    0    1    0    0    0    0    0        14   13   14   14   14   13   13   11    3    0

Raw data for ipc0665377, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp = 1356.7 Flux = 0.0527
    0    0    0    0    0    0    1    1    1    1        12   13   13   14   14   15   15   15   13   12
    0    0    0    0    1    3    0    1    1    0        14   14   13   13   14   14   15   15   13   12
    1    0    0    0    1    2    4    2    0    1        13   14   13   13   13   14   14   14   14   14
    1    0    0    0    2    5    1    5    0    1        14   13   13   13   13   13   13   14   14   14
    1    0    0    0    0    0    2    5    2    1        15   14   13   12   13   13   14   14   14   15
    0    0    0    0    1    1    2    0    0    0        14   13   12   12   13   13   13   14   14   15
    0    0    0    1    1    0    2    1    2    1        13   12   13   12   12   13   13   13   13   13
    1    0    0    1    0    1    0    1    0    0        13   13   13   12   12   12   13   12   13   13
    0    0    1    1    0    1    0    0    1    0        13   13   13   13   12   12   12   11   12    7
    0    0    0    1    1    0    1    1    0    0        13   12   12   13   13   12   12   10    2    0

Raw data for ipc0665525, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp =  157.9 Flux = 0.0637
    0    0    0    0    0    0    0    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    0    2    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    1    0    0    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    1    0    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    0    2    1    0    1         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    1    1    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    0    0    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    0    0    0    0    0         1    1    1    1    1    1    1    1    1    1
    0    0    0    0    0    0    0    0    0    0         1    1    1    1    1    1    1    1    1    0
    0    0    0    0    0    0    0    0    0    0         1    1    1    1    1    1    1    1    0    0

Raw data for ipc0666139, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp =  906.8 Flux = 0.0393
    0    1    0    0    0    0    0    1    0    1         5    9    9   10    9    9   10   10   10   10
    0    0    0    2    0    2    1    1    1    0         9    9    9    9    9    9    9   10    9   10
    0    2    0    0    0    0    1    0    0    0        10    9   10    9    9    9    9    9    9   10
    0    0    0    0    0    0    1    3    0    0        10   10   10   10    9    9    9    9    9    9
    1    0    0    0    1    3    0    1    0    0        10   10   10    9    9    8    9    9    9    9
    0    0    0    0    2    1    0    1    0    0        10   10   10    9    9    9    9    9    9    9
    0    0    0    1    0    0    1    1    0    0         9    9    9    9    9    9    9    9    9    9
    0    0    0    0    0    1    0    0    1    1         9    9    9    9    9    9    9    8    8    8
    0    2    0    0    0    1    0    0    0    0         9    9    9    9    8    9    9    9    8    8
    0    0    0    0    0    0    0    1    0    0         9    9    9    8    8    8    9    9    7    1

Raw data for ipc0666215, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp = 1654.5 Flux = 0.0338
    2    0    1    0    0    0    2    0    1    0         9   16   17   18   17   17   18   19   19   19
    0    0    0    1    0    0    1    0    1    1        17   17   18   18   17   17   17   18   17   18
    0    0    0    0    2    1    2    2    1    0        18   17   18   18   17   17   17   17   17   18
    1    0    0    0    5    0    3    2    0    2        18   19   19   19   16   16   17   17   18   18
    0    0    1    1    1    3    1    1    2    0        19   19   18   17   16   16   16   17   17   17
    0    0    0    0    2    0    2    0    2    1        18   18   18   16   16   16   16   16   17   17
    0    0    1    0    0    1    1    1    1    1        17   18   18   17   16   16   16   16   16   16
    0    0    0    0    0    0    0    0    1    0        17   17   17   17   16   17   17   16   16   15
    0    0    0    0    0    0    0    0    0    0        17   16   16   16   16   17   17   16   16   14
    0    0    0    0    0    0    1    1    1    0        16   16   16   16   15   15   17   16   13    2

Raw data for ipc0666363, 32 arc seconds per bin.      Exposure time in 100 seconds. Center Exp = 1394.3 Flux = 0.0352
    0    0    1    0    0    0    0    0    0    0         8   14   15   15   14   14   15   16   16   16
    0    1    0    1    1    1    2    1    0    0        14   14   15   15   14   14   14   15   15   15
    0    0    0    0    0    0    3    2    0    0        15   14   15   15   14   14   14   14   15   15
    0    1    1    1    2    2    3    2    0    0        15   16   16   16   14   13   14   14   15   15
    0    0    0    0    1    1    0    1    0    0        16   16   16   14   13   13   14   15   14   15
    0    0    0    1    1    0    1    0    0    1        15   15   15   14   14   14   13   14   14   14
    1    0    1    0    0    2    0    3    0    0        14   15   15   14   14   14   13   14   14   13
    1    1    0    1    0    0    1    0    0    0        14   14   14   14   14   14   14   13   13   12
    0    0    0    1    0    0    0    1    0    0        14   14   14   14   13   14   14   14   13   12
    0    0    0    0    1    1    1    2    0    0        14   13   13   13   13   13   14   14   11    2
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...65, 32 arc seconds per bin.

0	0	0	0	0	1	1	0	0	1
0	0	1	0	0	0	2	1	1	2
1	0	0	0	1	1	0	2	0	0
0	1	0	1	1	0	5	4	1	0
1	0	0	2	2	2	2	3	0	0
0	0	0	1	1	1	0	2	1	0
1	0	0	0	0	0	2	1	1	1
0	2	0	0	1	2	0	1	1	0
0	0	0	0	0	0	1	0	0	0
0	0	0	1	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1272.6 Flux = 0.0466

9	12	14	13	13	13	14	14	15	14
13	13	14	14	13	13	13	14	14	14
13	13	14	13	13	13	13	13	13	14
14	14	15	13	13	13	13	13	14	13
14	14	14	13	12	12	13	13	13	13
14	14	13	12	12	12	12	13	13	13
13	14	14	13	13	12	12	12	13	12
13	13	13	13	12	13	12	12	12	11
13	12	13	13	13	13	13	12	12	11
12	12	12	12	12	12	13	12	9	0

Raw data for ipc0667311, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
0	1	1	0	0	1	1	1	0	0
0	0	1	0	2	0	1	2	0	1
0	0	0	1	0	1	5	1	0	0
0	0	1	1	1	3	1	1	2	1
0	1	1	1	1	0	4	1	3	0
1	0	0	0	0	1	0	1	1	0
1	0	1	0	1	1	0	0	1	0
0	0	0	0	1	1	0	0	0	1
0	0	0	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1239.4 Flux = 0.0426

0	12	13	13	13	13	14	14	14	14
12	13	13	13	13	12	13	13	13	14
13	12	13	13	13	12	13	13	13	13
14	14	14	13	12	12	12	13	13	13
14	14	14	12	12	12	13	13	13	13
14	14	13	12	12	12	12	13	13	13
13	13	13	12	12	12	12	12	12	12
12	13	13	13	12	13	12	12	12	11
12	12	12	12	12	13	12	12	12	10
12	12	12	12	11	12	12	12	6	0

Raw data for ipc0667456, 32 arc seconds per bin.

0	1	0	1	0	2	0	0	0	0
0	0	0	0	0	1	2	2	1	1
0	0	0	0	1	1	3	1	1	2
1	0	0	0	1	3	3	1	0	0
2	0	1	0	1	1	1	3	1	0
0	0	0	2	1	0	0	0	1	0
0	0	1	0	0	0	2	2	0	1
0	0	0	1	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1165.6 Flux = 0.0421

0	11	13	13	12	12	13	13	14	13
12	12	13	13	12	12	12	13	13	13
12	12	13	12	12	12	12	12	12	13
13	13	14	13	12	12	12	12	13	13
13	13	13	12	11	11	12	12	12	13
13	13	12	11	11	11	11	12	12	12
12	13	13	12	12	11	11	12	12	11
12	12	12	12	12	12	12	11	11	11
12	12	12	12	12	12	12	11	11	10
12	11	11	11	11	12	12	11	6	0

Raw data for ipc0668227, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	1	0
0	0	2	0	0	0	0	1	2	0
0	0	0	0	1	1	0	1	2	0
1	0	0	1	1	1	2	3	0	1
0	0	0	1	0	0	2	0	1	1
0	0	0	1	0	2	0	0	0	0
0	0	0	0	1	1	0	0	0	0
0	0	0	2	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	1	1	2	0	0

Exposure time in 100 seconds. Center Exp = 924.1 Flux = 0.0406

7	9	10	9	9	10	10	10	11	10
9	10	10	10	9	9	10	10	10	10
9	9	10	9	9	9	9	9	10	10
10	10	10	9	9	9	9	10	10	10
10	10	10	9	9	9	9	9	10	10
10	10	9	9	9	9	9	9	9	10
10	10	9	9	9	9	9	9	9	9
9	9	9	9	9	9	9	9	6	6
9	9	9	9	9	9	9	9	6	7
9	9	9	6	9	9	9	9	5	6

Raw data for ipc0668296, 32 arc seconds per bin.

0	1	0	0	0	1	1	0	0	0
1	0	0	0	0	1	1	1	1	1
0	0	1	0	1	0	3	0	2	1
0	0	1	0	1	2	1	5	0	0
0	1	0	4	2	4	3	2	0	0
1	0	1	1	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	0	0	0
0	1	0	0	1	0	3	0	0	0
0	1	0	0	0	0	0	0	2	0

Exposure time in 100 seconds. Center Exp = 1560.3 Flux = 0.0370

12	15	17	16	16	17	16	16	16	17
16	17	17	16	16	16	17	17	17	17
16	16	17	16	16	16	16	16	16	17
17	16	16	16	15	16	16	16	17	17
16	16	17	15	15	15	16	16	16	17
17	17	15	15	15	15	16	16	16	16
17	17	16	15	15	15	15	16	16	16
16	16	16	16	15	16	15	15	15	14
15	16	16	15	16	16	15	15	15	12
15	15	15	15	15	16	16	15	9	0

Raw data for ipc0668443, 32 arc seconds per bin.

1	0	1	0	0	0	1	0	0	0
0	0	0	0	0	4	1	2	0	0
0	1	0	0	0	1	0	1	1	0
1	0	0	0	1	1	3	1	1	0
0	0	1	0	0	3	6	1	0	1
0	0	0	0	0	1	0	0	1	2
0	0	0	1	0	0	3	0	0	0
0	0	1	2	0	0	0	0	0	0
0	0	0	0	1	0	0	1	1	0
0	0	0	1	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1296.9 Flux = 0.0363

10	13	14	13	13	14	15	15	15	14
13	14	14	14	13	13	14	14	14	14
13	13	14	13	13	13	13	13	14	14
14	15	15	13	13	13	13	14	14	14
15	15	14	13	12	12	13	14	14	14
14	14	13	12	12	13	13	13	13	14
14	14	13	13	13	12	12	13	13	13
13	13	13	13	13	13	12	12	12	12
13	13	13	13	13	13	13	12	12	10
13	12	12	12	12	13	13	12	7	0

Raw data for ipc0669336, 32 arc seconds per bin.

0	0	0	0	0	0	0	0	0	0
1	0	0	1	0	1	0	0	0	0
0	0	1	0	0	0	1	0	0	0
0	0	0	0	1	2	3	1	0	0
0	0	0	0	1	1	0	0	2	1
0	1	0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	0	0	1
0	1	0	0	1	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 741.9 Flux = 0.0311

6	7	8	7	7	8	8	8	8	7
7	8	8	7	7	8	8	8	8	8
7	7	8	7	7	7	7	7	8	8
8	8	8	7	7	7	7	8	8	8
8	8	8	7	7	7	7	7	8	8
8	7	7	7	7	7	7	7	7	8
8	8	7	7	7	7	7	7	7	7
7	7	7	7	7	7	7	7	7	7
7	7	7	7	7	7	7	7	6	5
7	7	7	7	7	7	7	7	3	0

Raw data for ipc0669391, 32 arc seconds per bin.

1	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	1	0	0
0	1	3	0	0	2	0	0	0	0
0	1	0	0	0	1	3	1	0	1
1	0	1	0	1	1	2	0	1	0
0	0	0	0	0	0	0	0	1	0
0	1	0	1	0	0	0	1	0	0
0	0	0	0	1	0	0	0	1	0
0	0	1	0	0	0	0	0	0	0

Exposure time in 100 seconds. Center Exp = 1160.7 Flux = 0.0275

10	11	12	12	12	13	13	14	13	12
12	12	12	12	11	12	13	12	13	13
11	12	12	12	11	11	12	12	12	12
12	13	12	12	11	12	12	12	12	12
13	13	12	11	11	11	12	12	12	12
13	12	11	11	11	11	12	12	12	12
12	12	11	11	11	11	11	11	11	12
12	12	12	11	11	11	11	11	10	11
11	12	11	11	12	11	11	11	10	8
11	11	11	11	11	11	11	11	5	0

Raw data for ipc0669538, 32 arc seconds per bin.

1	0	0	0	2	0	2	0	0	0
0	0	0	0	1	2	2	0	3	0
0	1	0	0	0	0	1	1	2	1
0	0	0	0	3	2	2	2	1	0
1	0	0	1	1	2	0	1	1	0
1	0	0	0	0	3	1	0	0	2
1	0	1	0	1	1	0	1	0	1
0	0	0	0	0	0	0	0	0	0
0	0	1	0	1	1	1	1	0	1
1	0	1	0	0	0	0	1	0	0

Exposure time in 100 seconds. Center Exp = 1369.3 Flux = 0.0407

11	13	14	14	14	15	16	16	16	14
14	15	15	14	14	14	15	15	15	15
14	14	14	14	13	14	14	14	15	15
14	16	15	14	14	14	14	14	15	14
15	16	14	13	13	14	14	14	14	15
15	14	13	13	13	13	14	14	14	14
15	14	13	13	13	13	13	14	14	14
14	14	14	13	13	13	13	13	12	13
13	14	14	13	14	14	13	13	12	10
13	13	13	13	13	14	13	13	6	0

Raw data for ipc0670308, 32 arc seconds per bin.

0	0	0	0	0	1	2	1	0	0
0	1	0	0	1	0	2	0	1	1
0	0	1	1	0	2	2	2	0	0
1	0	0	0	1	1	1	3	1	0
1	1	0	2	1	1	0	2	0	1
0	0	0	0	0	0	1	0	1	0
0	1	0	0	0	0	0	0	1	0
0	0	1	1	1	0	1	0	1	0
0	1	1	0	0	1	0	0	0	0
0	0	1	2	1	0	1	0	0	0

Exposure time in 100 seconds. Center Exp = 961.0 Flux = 0.0528

8	9	10	10	10	11	11	11	10	9
10	10	10	9	9	10	10	10	10	10
9	10	10	9	9	9	10	10	10	10
10	11	10	9	9	9	9	10	10	10
11	10	9	9	9	9	10	10	10	10
10	9	9	9	9	9	10	10	10	10
10	10	9	9	9	9	9	9	9	10
10	10	9	9	9	9	9	9	8	9
9	9	9	9	10	9	9	8	8	8
9	9	9	9	9	9	9	8	3	0

						0	0	1	1
				1	3	1	0	0	1
			1	4	4	1	0	1	1
		0	2	2	3	1	2	0	1
	1	0	1	0	2	2	1	0	1
0	0	0	0	1	3	1	1	0	0
0	1	0	1	1	0	0	0	0	2
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	2	0	0	0

Exposure time in 100 seconds. Center Exp = 1540.2 Flux = 0.0419

14	15	16	16	16	17	16	16	17	15
16	16	16	15	15	17	17	17	17	16
15	16	16	16	15	16	16	16	17	17
16	17	16	15	15	16	16	16	16	16
16	17	16	15	15	16	16	16	16	17
17	15	15	15	15	15	16	16	16	16
16	16	15	15	15	15	15	15	16	16
16	16	15	15	15	15	15	15	14	15
15	16	15	15	16	15	15	14	13	10
15	15	14	15	15	15	14	13	6	0

Raw data for ipc0670523, 32 arc seconds per bin.

1	0	0	0	1	0	1	0	0	0
0	1	0	0	0	0	1	3	0	0
0	0	0	1	2	2	0	2	1	1
0	2	0	3	1	2	5	2	1	0
0	1	0	2	0	0	3	1	1	0
0	1	0	0	0	2	2	1	0	1
0	0	0	1	2	0	0	0	0	1
0	0	1	2	1	0	0	2	0	1
0	0	1	0	0	1	0	1	0	0
0	0	1	1	0	0	0	1	0	0

Exposure time in 100 seconds. Center Exp = 1357.9 Flux = 0.0467

12	13	14	14	14	15	15	16	15	13
14	14	14	13	13	15	15	15	15	14
13	14	14	13	13	14	14	14	15	14
14	15	14	13	13	13	14	14	14	14
15	15	14	13	13	13	14	14	14	15
15	13	13	13	13	13	14	14	14	14
14	14	13	13	13	13	13	13	13	14
14	14	13	13	13	13	13	13	12	13
13	13	13	13	14	13	13	12	12	9
13	13	12	13	13	13	13	12	5	0

Energy	<3min Source	5<-08 Bkgd	BS Count	Error	Flux
CHN 0	0	1	-0.64	0.64	-0.00003
CHN 1	55	67	12.21	9.07	0.00053
CHN 2	156	103	39.11	15.19	0.00170
CHN 3	164	151	7.55	12.87	0.00033
CHN 4	135	103	69.21	13.30	0.00300
CHN 5	98	63	57.76	11.12	0.00251
CHN 6	102	59	64.32	11.23	0.00279
CHN 7	106	46	76.62	11.17	0.00333
CHN 8	61	51	48.43	10.09	0.00210
CHN 9	75	48	44.34	9.73	0.00192
CHN 10	67	50	35.06	9.35	0.00152
CHN 11	56	7.	10.65	9.22	0.00046
CHN 12	76	83	22.99	10.48	0.00100
CHN 13	109	143	17.66	12.94	0.00077
CHN 14	130	219	-9.88	14.81	-0.00043
CHN 15	219	364	-13.50	19.17	-0.00059
Total	1569	1702	481.89		0.02092
Broad Band	924	754	442.40		0.01920

Hardness Parameter (H-S)/(H+S) = 0.476

SPEC_OUT

Spec_out is a file produced by <exam>. It is a subfile of digit_map containing only the spectrum data which may be used as input for Finspec. The format of spec_out is designed specifically to match the input requirements of Finspec.

The first column of spec_out lists the background subtracted source counts for each channel from 1 to 15. The second column lists the errors. For more details, refer to the Standard SAO Information File for Finspec called FINSPEC.WU which resides in CUAPH1::CAP:[USER.HEAO.SOURCE]FINSPEC.WU.

Example 21

The file below was created simultaneously with the previous example of digit_map.

```
finspec input for source at  14   7   3.95  73  27  54.40
COUNTS.ERRORS       30.04   11.29 ^
                   -20.35   12.62 ^
                    -4.75    9.77 ^
                   -16.41    7.81 ^
                     1.53    7.42 ^
                    -6.88    6.39 ^
                     4.09    6.50 ^
                    -3.33    4.94 ^
                     0.69    6.16 ^
                    13.70    7.46 ^
                     6.95    8.13 ^
                     7.01    9.49 ^
                    14.89   11.55 ^
                     0.37   12.18 ^
                   -51.32   14.86
OFF.AXIS.ARCMIN  30.292
LIVE.TIME   45673.3
SOURCE.RADIUS.ARCMIN  3.000
finspec input for source at  14  16  36.47  73  16  56.48
COUNTS.ERRORS       -5.75    3.52 ^
                     3.03    8.77 ^
                    21.27    9.03 ^
                     7.98    6.99 ^
                    19.97    7.10 ^
                     2.65    4.79 ^
                    10.41    5.80 ^
                     9.85    5.09 ^
                     4.89    4.71 ^
                     4.81    4.42 ^
                    -0.07    4.30 ^
                   -10.07    4.37 ^
                    -0.58    7.37 ^
                    19.31    9.00 ^
                    85.77   16.93
F.AXIS.ARCMIN  32.746
VE.TIME   45673.3
URCE.RADIUS.ARCMIN  3.000
nspec input for source at  14  18  10.21  73  11  54.65
UNTS.ERRORS         -4.17    2.54 ^
                    -3.06    8.68 ^
                    53.46   10.79 ^
                    31.50    8.92 ^
                    32.36    8.73 ^
                    29.84    7.53 ^
                    13.09    5.67 ^
                    20.53    6.12 ^
                    31.09    7.08 ^
                    11.48    5.20 ^
                     2.14    6.24 ^
                    -7.98    6.38 ^
                     2.07    8.26 ^
                   -17.27    9.31 ^
                    14.28   17.68
```

```
                    e at  14  12  30.07  73   3  24.04
                   9.06    9.90 ^
                  53.20   15.65 ^
                  24.74   13.94 ^
                  26.59   11.51 ^
                  38.32   10.40 ^
                  26.73    9.21 ^
                  13.83    8.01 ^
                  10.44    7.25 ^
                   1.37    6.97 ^
                  -7.97    6.78 ^
                  -4.97    8.23 ^
                   7.88   10.53 ^
                 -11.28   14.05 ^
                   1.21   15.75 ^
                   4.33   22.46
 OFF.AXIS.ARCMIN  11.805
 LIVE.TIME   45673.3
 SOURCE.RADIUS.ARCMIN  3.000
 finspec input for source at  14  13  28.00  73   0  40.79
 COUNTS.ERRORS ,    18.31    9.51 ^
                    35.43   15,04 ^
                    31.26   13.61 ^
                    26.48   11.17 ^
                    21.71    9.80 ^
                    29.46    8.66 ^
                    15.14    7.82 ^
                    15.38    7.64 ^
                    10.86    7.65 ^
                    10.22    7.67 ^
                    19.58    8.92 ^
                    16.20   10.78 ^
                    20.31   14.40 ^
                    36.12   16.09 ^
                   -10.35   21.66
 OFF.AXIS.ARCMIN  15.476
 LIVE.TIME   45673.3
 SOURCE.RADIUS.ARCMIN  3.000
 finspec input for source at  14   9   5.32  72  58   7.28
 COUNTS.ERRORS     -12.65   11.46 ^
                   -21.90   15.24 ^
                    15.03   13.61 ^
                    35.54   12.28 ^
                     6.49    9.67 ^
                    30.98    9.50 ^
                    17.09    8.59 ^
                    14.90    8.25 ^
                    -1.04    7.30 ^
                    10.68    8.31 ^
                   -18.25    7.73 ^
                   -39.86    9.78 ^
                   -45.51   13.03 ^
                    -3.41   16.54 ^
                    70.75   23.50
)FF.AXIS.ARCMIN   4.062
:IVE.TIME   45673.3
:OURCE.RADIUS.ARCMIN  3.000
'inspec input for source at  14  12  14.20  72  54  20.77
'OUNTS.ERRORS     -25.13    8.37 ^
                    8.68   15.15 ^
                    0.12   12.98 ^
                    0.36   10.73 ^
                   15.23    9.93 ^
                   -8.68    7.95 ^
                   -3.92    7.28 ^
                   20.83    8.54 ^
                    6.84    7.34 ^
                    4.35    7.81 ^
                   -9.60    7.47 ^
                   -9.95    9.82 ^
                   -6.44   13.15 ^
                    6.47   15.21 ^
                  -35.06   22.53
F.AXIS.ARCMIN  11.709
VE.TIME   45673.3
URCE.RADIUS.ARCMIN  3.000
ispec input for source at  14   5  49.90  72  52   5.78
NTS.ERRORS        3.67    9.02 ^
                 43.65   14.86 ^
                 34.53   12.42 ^
                 22.21    9.89 ^
                 17.28    8.48 ^
                 17.26    7.41 ^
                  8.63    7.23 ^
                 21.82    7.22 ^
                 11.33    7.08 ^
                  4.01    6.96 ^
                 19.85    8.20 ^
                 15.09   10.26 ^
                 23.41   13.41 ^
                 10.78   13.99 ^
                 15.67   19.96
```

```
                  73.3
      DIUS.ARCMIN  3.000
 spec input for source at  14   8  15.90  72  42  38.36
COUNTS.ERRORS        3.35    6.96 ^
                     7.88   10.98 ^
                    16.99    9.62 ^
                     5.78    7.35 ^
                     1.11    6.37 ^
                     2.81    5.42 ^
                    -5.36    5.00 ^
                     3.56    4.95 ^
                    -4.00    4.60 ^
                     6.98    5.46 ^
                    17.62    6.76 ^
                    16.99    8.21 ^
                    22.46   10.34 ^
                    11.14   11.44 ^
                    -2.83   14.95
OFF.AXIS.ARCMIN  18.916
LIVE.TIME    45673.3
SOURCE.RADIUS.ARCMIN  3.000
finspec input for source at  14   7  19.61  72  35  40.25
COUNTS.ERRORS       12.21    9.07 ^
                    39.11   15.19 ^
                     7.55   12.87 ^
                    69.21   13.30 ^
                    57.76   11.12 ^
                    64.32   11.23 ^
                    76.62   11.17 ^
                    48.43   10.09 ^
                    44.34    9.73 ^
                    35.06    9.35 ^
                    10.65    9.22 ^
                    22.99   10.48 ^
                    17.66   12.94 ^
                    -9.88   14.81 ^
                   -13.50   19.17
OFF.AXIS.ARCMIN  27.454
LIVE.TIME    45673.3
SOURCE.RADIUS.ARCMIN  3.000
```