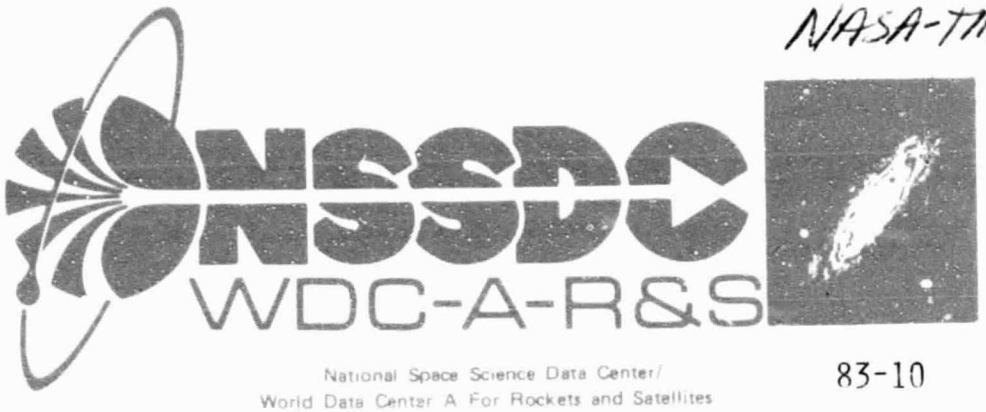
NASA-TM-85456



National Space Science Data Center/
World Data Center A For Rockets and Satellites

83-10

Documentation for the Machine-Readable Version

of the

Fourth Cambridge Radio Survey Catalogue (4C)

(Pilkington, Gower, Scott and Wills 1965, 1967)

September 1983

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DOCUMENTATION FOR THE MACHINE-READABLE VERSION

OF THE

FOURTH CAMBRIDGE RADIO SURVEY CATALOGUE (4C)

(PILKINGTON, GOWER, SCOTT AND WILLS 1965, 1967)

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September 1983

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
National Aeronautics and Space Administration
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ABSTRACT

A detailed description of the machine-readable catalog as it is currently being distributed by the Astronomical Data Center is given. In addition to some minor format modifications and corrections, and resorting of the machine version to correspond to the published catalog, cross identifications to 3C sources and remarks indicators were computerized and added to the data records.

SECTION 1 - INTRODUCTION

The machine-readable *Fourth Cambridge Radio Survey (4C) Catalogue* contains all survey data from the papers of Pilkington and Scott (1965) and Gower, Scott and Wills (1967). These data result from a survey of radio sources between declinations -07° and +80° using the large Cambridge interferometer at 178 MHz. The computerized catalog contains for each source the 4C number, 1950 position, measured flux density, and accuracy class. For some sources miscellaneous brief comments such as cross identifications to the 3C catalog or remarks on contamination from nearby sources are given at the ends of the data records.

This document describes the machine-readable catalog available from the Astronomical Data Center. It is intended to enable users to read and process the data without the unnecessary problems or guesswork often encountered when undertaking such a task. For additional details concerning the observations, instrumentation, analysis of the data, derivation of the source positions, and compilation of the catalog, the source references should be consulted. This document should be distributed with any machine-readable copy of the catalog.

SOURCE REFERENCE

Gower, J. F. R., Scott, P. F. and Wills D. 1967, *Mem. Roy. Astron. Soc.* 71, 49.
Pilkington, J. D. H. and Scott, P. F. 1965, *Mem. Roy. Astron. Soc.* 69, 183.

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the contents of the machine-readable 4C catalog is given in Table 1. The suggested format specifications apply to FORTRAN formatted read statements and can be modified depending upon individual programming and processing requirements. Since all numerical fields contain valid data (i.e. only character [A-format] fields may contain blanks) special processing is not required to check for default values or to distinguish between blank fields and true zero values. Alternate format specifications are given in parentheses.

Table 1. Tape Contents. *Fourth Cambridge Radio Survey Catalogue.*

Byte(s)	Units	Suggested Format	Description
1- 8	---	A8	The 4C number. The first byte contains the zone sign; the first two digits give the zone, while the last two sequentiall, number the source in the zone (there are no sequential numbers > 100). Bytes 7-8 contain the characters ".1" only for source 4C+25.56.1, which was added by Pilkington and Scott (1965) after publication of the catalog.
9-10	---	2X	Blank
11-12	hours	I2	Right ascension, α, equinox 1950.0. The positions were determined from interference pattern phases (see Pilkington and Scott 1965).
13	---	1X	Blank
14-15	min	I2	α
16	---	1X	Blank
17-20	sec	F4.1	α
21-22	---	2X	Blank
23	---	A1	Sign of declination, δ, equinox 1950.0
24-25	°	I2	δ

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
26	---	1X	Blank
27-30	'	F4.1	δ
31-33	---	3X	Blank
34-40	$W.m^{-2}\ Hz^{-1}$	F7.1	Flux density (10^{-26} MKS) at 178 MHz. See source references for additional information. Byte 40 is blank for sources having lower accuracy data.
41-42	---	2X	Blank
43-44	---	I2	Numerical code for position and flux density error class. The codes having e's and ℓ's plus *'s are assigned the same numerical codes as those without the asterisks (i.e. be* = be = 21). The codes are as follows: 1 = a, 11 = ae, 14 = blank 2 = b, 21 = be, 15 = † 3 = c, 31 = ce 13 = a*, 12 = aℓ 23 = b*, 22 = bℓ 33 = c*, 32 = cℓ † a special code indicating that a character class is listed in the published catalog, but the flux density is from 3C only and is enclosed in parentheses.
45-47	---	3X	Blank
48-52	°	F5.1	Galactic longitude ℓ^{II}.
53-54	---	2X	Blank
55-59	°	F5.1 (A1,F4.1)	Galactic latitude b^{II}.
60	---	1X	Blank

Table 1. (concluded)

Byte(s)	Units	Suggested Format	Description
61-63	---	A3	Position and flux density error class in character form (lower case letters) corresponding to numerical code in bytes 43-44. The symbols have the following meanings: a,b,c: Error class of source; estimated standard errors for sources in various ranges of flux density are given in Tables II and III of the respective source references. e: Possible right ascension lobe-shift *earlier*. ℓ: Possible right ascension lobe-shift *later*. The magnitude of the lobe shift for each 1° interval is given in Tables I of the source references. *: The source is confused by a weaker uncataloged one. The weaker source will usually lie within 30' and have a flux density of ≥ 1/3 of the main source. The quoted error class for each source *includes* the effect of such confusing sources.
64	---	1X	Blank
65-72	---	A8	Remarks. Only cross identifications to the *Revised 3C Catalogue* (Bennett 1962) are actually given in the remarks field; however, additional remarks given in the published catalog, for which there is insufficient room in the 8-byte field, are indicated by an asterisk. Asterisks can occur alone or with 3C numbers.

SECTION 3 - TAPE CHARACTERISTICS

The information contained in Table 2 is sufficient for a user to describe the indigenous characteristics of the machine-readable 4C Catalog to a computer. Information easily varied from installation to installation, such as block size (physical record length), blocking factor (number of logical records per physical record), total number of blocks, tape density, number of tracks, and internal coding (EBCDIC, ASCII, etc.) is not included. This information should always be supplied if secondary copies are transmitted to other users or installations.

Table 2. Tape Characteristics. *Fourth Cambridge Radio Survey Catalogue.*

NUMBER OF FILES	1
LOGICAL RECORD LENGTH (BYTES)	72
RECORD FORMAT	FB*
TOTAL NUMBER OF LOGICAL RECORDS	4844

* Fixed block length (last block may be short)

SECTION 4 - REMARKS, MODIFICATIONS, ACKNOWLEDGMENT AND REFERENCES

The machine-readable version of the 4C catalog was received on magnetic tape from Dr. G. G. Pooley of Mullard Radio Astronomy Observatory, Cambridge on 1 March 1983. As received, the file consisted of 80-byte card images with a blank record following every fifth data record. The following modifications were made so that the data structures conform more closely to those of other computerized catalogs and so that the data are easier to process and to interpret.

1. Blank records, clearly a problem for data processing, searching and sorting, were removed.

2. The 4C numbers in the machine file were written as positive and negative integers (e.g. 7901, -105, -7) rather than as real numbers in the form ±xx.xx, as they are normally written in the literature. The integers were converted to the present form.

3. Negative declinations had minus signs on both degrees and minutes. The latter were removed, while minus signs were moved to all occur in byte 23 and plus signs were added for positive declinations (previously blank). Signs were also moved or added to byte 55 in the Galactic latitude field. Preceding zeros were added to these fields to make uniform numbers.

4. The file was sorted by 4C number to correspond exactly with the published catalog. The error classes (in character form) and remarks were keyed to a separate data set on disk. After interval checks throughout the then 4843 records, the newly keyed records were added to the original data set. The numerical and character coded classes should be equivalent in all cases. The file was then resorted by 4C number, South to North.

5. There were only 3623 sources in the printed 1967 catalog, while 3624 records are contained in the machine version. Source 4C+48.61, found in the machine catalog, is missing from the published version. The character class for 4C+48.61 (a) was obtained from the machine version and inserted. The source 4C+25.56.1, added as an addendum to the 1965 publication, was in the machine version as a duplicate of 4C+25.56. The ".1" was added to the 4C number (bytes 7-8) for this record.

6. The logical record length was changed from 80 bytes to 72 bytes, since bytes 72-80 were never used.

7. Numerical codes for 4C-02.07, 4C+21.19 and 4C+29.58 did not agree with the published catalog, so they were corrected in the machine version. The character and numerical codes have not been checked entirely, so additional disagreements may be found. In these cases, reference should be made to the source papers.

8. Some sources having numerical class code 14 were found to have non-blank character codes in the published catalog. These sources have only 3C flux densities enclosed in parentheses. To distinguish them from published sources with blank class codes, a new numerical code of 15 was defined and added to the appropriate records.

ACKNOWLEDGMENT

Appreciation is expressed to Dr. G. G. Pooley for supplying the catalog on magnetic tape and for an accompanying description of the data format.

REFERENCES

Bennett, A. S. 1962, *Mem. Roy. Astron. Soc.* 68, 163
Gower, J. F. R., Scott, P. F. and Wills D. 1967, *Mem. Roy. Astron. Soc.* 71, 49.
Pilkington, J. D. H. and Scott, P. F. 1965, *Mem. Roy. Astron. Soc.* 69, 183.

SECTION 5 - SAMPLE LISTING

The sample listing given on the following pages contains logical data records exactly as they are recorded on the tape. Groups of records from the beginning and the end of the catalog are illustrated. The beginning of each record and bytes within the record are indicated by the column heading index across the top of each page (digits read vertically).

L I S T I N G O F R E C O R D S F R O M T A P E F I L E

TAPE FILE NAME: 4C Radio Survey
RECORDS 1 TO 30
TAPE FILE 62
RECORD LENGTH 72 BYTES
INPUT VOLSER ADC007

COLUMN HEADING INDEX													
RECORD	1	-06.01	0	5	56.6	-06	15.7	8.2	1	95.2	-66.5	a	3C3
RECORD	2	-06.02	0	8	10.7	-06	13.5	3.0	2	96.5	-66.7	b	
RECORD	3	-06.03	0	40	13.3	-06	30.8	5.3	1	116.9	-69.0	a	
RECORD	4	-06.04	0	46	27.1	-06	23.6	4.5	2	121.2	-69.0	b	
RECORD	5	-06.05	1	25	47.2	-06	13.6	2.6	21	147.1	-67.1	bu	
RECORD	6	-06.06	1	35	16.7	-06	48.6	2.2	2	153.2	-66.7	b	
RECORD	7	-06.07	2	0	26.8	-06	18.1	2.1	1	165.1	-62.9	a	
RECORD	8	-06.08	2	21	1.7	-06	52.1	2.2	2	174.0	-60.6	b	
RECORD	9	-06.09	3	13	7.4	-06	11.6	2.8	2	187.9	-49.8	b	
RECORD	10	-06.10	3	46	39.8	-06	17.9	4.8	1	194.8	-42.9	a	
RECORD	11	-06.11	5	19	22.3	-06	8.5	5.5	1	208.1	-22.7	a	
RECORD	12	-06.12	5	24	10.1	-06	29.0	2.2	1	209.0	-21.8	a	
RECORD	13	-06.13	5	42	41.7	-06	33.4	2.9	22	211.3	-17.7	bl	
RECORD	14	-06.14	5	45	30.6	-06	37.3	4.1	2	211.6	-17.1	b	
RECORD	15	-06.15	5	55	15.1	-06	34.9	3.2	1	212.7	-14.9	a	
RECORD	16	-06.16	6	40	46.9	-06	45.2	3.0	2	218.1	-04.9	b	
RECORD	17	-06.17	7	24	26.6	-06	7.4	5.1	2	222.5	+05.0	b	
RECORD	18	-06.18	7	41	58.9	-06	19.4	5.1	1	224.8	+08.7	a	
RECORD	19	-06.19	8	52	40.9	-06	58.3	5.2	1	234.9	+23.4	a	3C209
RECORD	20	-06.20	9	8	26.6	-06	43.3	3.5	2	237.1	+26.8	b	
RECORD	21	-06.21	9	17	16.1	-06	10.2	4.4	1	238.1	+28.9	a	
RECORD	22	-06.22	9	20	21.5	-06	51.4	6.5	1	239.3	+29.0	a	
RECORD	23	-06.23	9	30	21.3	-06	29.6	2.1	1	240.6	+31.3	a	
RECORD	24	-06.24	9	54	31.2	-06	35.5	2.2	2	245.3	+35.8	b	
RECORD	25	-06.25	10	12	8.6	-06	2.2	2.1	1	248.5	+39.5	a	
RECORD	26	-06.26	10	53	20.1	-06	43.4	3.7	1	257.4	+45.9	a	
RECORD	27	-06.27	11	0	14.1	-06	31.0	2.6	1	261.2	+47.1	a	
RECORD	28	-06.28	11	23	52.4	-06	10.5	2.7	2	264.3	+50.6	b	*
RECORD	29	-06.29	11	26	40.1	-06	45.8	3.5	22	269.7	+50.5	bl	
RECORD	30	-06.30	11	55	38.3	-06	36.3	2.2	1	280.3	+53.6	a	

LISTING OF RECORDS FROM TAPE FILE

TAPE FILE NAME: 4C Radio Survey
RECORDS 4815 TO 4844
TAPE FILE 62
RECORD LENGTH 72 BYTES
INPUT VOLSER ADC007

COLUMN HEADING IDENTIFY														
RECORD	4815	+78.04	3	51	14.7	+78	35.5	2.6	2	131.6	+19.2	b		
RECORD	4816	+78.05	4	37	57.1	+78	33.2	2.5	1	133.3	+20.8	a		
RECORD	4817	+78.06	6	10	40.1	+78	20.2	3.2	1	135.7	+24.9	a		
RECORD	4818	+78.07	8	41	50.0	+78	39.5	7.3	1	134.8	+32.3	a		
RECORD	4819	+78.08	8	54	49.8	+78	19.5	2.0	1	134.9	+33.0	a		
RECORD	4820	+78.09	9	32	29.7	+78	29.7	3.2	1	133.5	+34.5	a		
RECORD	4821	+78.10	10	46	15.2	+78	37.5	2.8	2	110.9	+24.1	b		
RECORD	4822	+79.01	0	55	12.5	+79	35.2	2.2	21	123.3	+17.0	ba		
RECORD	4823	+79.02	2	1	37.5	+79	39.1	6.3	1	126.4	+17.5	a		
RECORD	4824	+79.03	2	11	54.0	+79	34.9	2.3	22	126.8	+17.6	b1		
RECORD	4825	+79.04	3	44	17.4	+79	53.6	3.9	1	130.4	+19.9	a		
RECORD	4826	+79.05	4	59	22.0	+79	6.0	3.4	1	133.4	+22.0	a		
RECORD	4827	+79.06	9	26	31.6	+79	18.6	15.8	1	132.9	+33.8	a	3C220.1	
RECORD	4828	+79.07	9	39	56.8	+79	50.8	2.4	1	132.0	+34.0	a		
RECORD	4829	+79.08	9	52	49.2	+79	20.8	2.4	1	132.0	+34.8	a		
RECORD	4830	+79.09	10	24	27.8	+79	9.5	2.9	1	130.9	+35.9	a		
RECORD	4831	+79.10	10	47	36.6	+79	27.2	2.9	1	129.6	+36.3	a		
RECORD	4832	+79.11	10	57	56.8	+79	23.4	2.1	1	129.1	+36.7	a		
RECORD	4833	+79.12	12	18	13.1	+79	41.9	2.2	1	124.7	+37.6	a		
RECORD	4834	+79.13	13	57	2.1	+79	55.7	3.7	1	119.3	+37.0	a		
RECORD	4835	+79.14	14	14	56.6	+79	18.4	2.3	1	118.1	+37.3	a		
RECORD	4836	+79.15	16	12	18.4	+79	42.0	3.5	2	113.4	+33.6	b		
RECORD	4837	+79.16	17	1	7.9	+79	30.3	3.6	1	112.0	+31.7	a		
RECORD	4838	+79.17	17	33	50.5	+79	51.4	7.1	1	111.9	+30.2	a		
RECORD	4839	+79.18	18	45	41.6	+79	42.1	32.6	1	111.4	+27.1	a	3C390.3	
RECORD	4840	+79.19	18	55	1.4	+79	45.3	3.4	2	111.5	+26.7	b	*	
RECORD	4841	+79.20	19	37	25.0	+79	48.0	3.9	1	112.0	+24.8	a		
RECORD	4842	+79.21	21	8	35.8	+79	57.8	2.9	1	114.2	+21.4	a		
RECORD	4843	+79.22	23	0	22.4	+79	36.0	2.3	1	118.0	+18.1	a		
RECORD	4844	+79.23	23	53	1.6	+79	36.9	11.1	1	120.4	+17.3	a	3C469.1	