SHORT COMMUNICATIONS

SOURCE CORRECTIONS TO THE SYDNEY RADIO SOURCE SURVEY CATALOGUE*

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The primary purpose of this communication is to report some modifications to two of the three radio source catalogues based on the Mills Cross pencil beam survey of sources at 85·5 Mc/s (Mills, Slee, and Hill 1958, 1960, 1961). These catalogues will subsequently be referred to as MSH.

A considerable proportion of the modifications have resulted from a careful reexamination of our records between declinations +10° and −10°. This reappraisal was made with a view to obtaining a clearer picture of the discrepancies with the Cambridge 3C source survey (Edge *et al.* 1959) which overlaps ours in this band of declinations.

A secondary purpose of this paper is therefore to make some general comments on the degree of confirmation of the revised MSH sources by the 3C survey in the overlap region.

The modifications to MSH are given in Tables 1, 2, 3, and 4 below. They include the addition of sources to, and the deletion of sources from, the catalogues, alterations to data regarding other sources, and the clarification of a number of duplications which unfortunately eluded our scrutiny prior to publication.

The method of reexamination of our records in the declination range +10° to −10° was as follows. We first examined our records in regions where there are 3C sources but no corresponding MSH sources, or where the correspondence was uncertain. There were 59 3C sources involved. In every instance our records were examined at the 3C position and around its northern and southern (declination) lobeshifts. MSH data involved were also checked. In addition a number of other MSH sources (37 in all, stronger than 20×10^{-26} Wm^{-2} $(c/s)^{-1}$ at 85·5 Mc/s) were rechecked because the Kellermann and Harris (1960) interferometer observations at the California Institute of Technology Radio Observatory suggested that they were doubtful. A further 6 MSH sources listed by Bennett and Smith (1961) as being doubtful were also rechecked.§ In all these instances modifications were made to our published data only if reinterpretation seemed necessary on the basis of our own records.

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§ The other MSH sources which these authors list as doubtful had already been concerned in the previous checking.

A realistic impression of the impact of these changes to our catalogue can be gauged by considering the 209 MSH sources between declination $+10°$ and $-10°$ and stronger than flux 20×10^{-26} Wm^{-2} (c/s)$^{-1}$ at 85·5 Mc/s. These constitute the section of MSH which has been checked most thoroughly in relation to the Cambridge and Cal. Tech. data. Of these sources 9 have been

TABLE 1

DELETIONS FROM THE MSH CATALOGUE

14+0*1*	00—0*4*	17—0*5*
15+0*11*	13—0*5*	08—1*10*
16+0*8*	16—0*10*	20—1*5*
18+0*10*	16—0*12*	

deleted and data relating to 24 others altered and in addition 3 sources with flux $\geqslant 20 \times 10^{-26}$ Wm^{-2} (c/s)$^{-1}$ have been added to the list. The most serious defects, those of deletions and additions, so far revealed in MSH amount therefore to only a small percentage of the bright ($\geqslant 20$ flux units) sources.

With regard to the remaining MSH sources within the declination band, i.e. those fainter than 20 flux units, we shall not be able to check either their

TABLE 2

SOURCES TO BE ADDED TO THE MSH CATALOGUE*

New Reference Number	Position (1950) R.A. h m	Position (1950) Dec. ° ′	Flux Density (10^{-26} Wm^{-2} (c/s)$^{-1}$)	Notes
04+0s_1	04 39·2^4	+01 06^{10}	14 :	Probably 3C 124A lobe shifted north
19+0s_1	19 01·6^4	+05 37^8	100	3C 396B
19+0s_2	19 04·5^6	+07 21^9	60 :	3C 397B
20+0s_1	20 20·3^3	+09 57^8	27	Probably 3C 411A
03—0s_1	03 36·2^6	—01 54^{10}	8 :	Source number 26 in Harris & Roberts (1960)
07—0s_1	07 05·6^3	—08 00^6	16	3C 174A
11—0s_1	11 37·0^5	—02 17^8	15 ::	
17—0s_1	17 32·5^5	—08 18^{10}	15 :	3C 360A
02—1s_1	02 47·0^4	—19 53^7	15	Very probably distinct from 02—2*17*

* For convenience, reference numbers have been given to these sources. The numbers in the first column above indicate the hour of Right Ascension, the sign and tens digit of the source declination in our usual manner, but the italicized serial number usually following these is replaced by the italic letter *s* (indicating that the source is supplementary to the MSH catalogue) with a suffix giving the number of the source on the supplementary list. Thus 19+0s_2 indicates that the source is the second supplementary source in 19^h to 20^h interval of R.A. between declination $0°$ and $+10°$.

reliability or completeness until new data become available, for example, from an adequately sensitive pencil-beam survey.

The Sydney cross-type radio telescope displays a considerable deterioration in sensitivity at large zenith angles, where most of the present comparisons have

TABLE 3

ALTERATIONS TO MSH DATA*

MSH Source	Alteration
00+01	Change S to 10:†
03+06	Change S to 19
05+03	Perhaps some influence by 05S4A
06+09	Change S to 10:
06+013	Change S to 12:; a doubtful source
09+02	It is not clear if this source really exists because of sidelobe interference from 09S1A. If it does exist, then S should be reduced
13+011	Change S to 22†; a doubtful source
14+06	One record only
16+07	A doubtful source
18+06	Change S to 22†
19+03	A doubtful source
00—01	Change Dec. to —00 19^6
00—09	Change Dec. to —02 00^8
02—015	Change S to 9 and remove † sign
04—07	Change R.A. to 04 16·1^5
06—012	Change S to 18†
09—09	Change S to 50:: (14)
10—019	Change S to 12
12—02 and 3	A duplication. Combine data to give R.A. 12^h 04·0^8, Dec. —07° 32^6, flux 14
12—013	Change R.A. to 12^h 39·8^3
12—014	Change S to 8:; a doubtful source
15—014	Change S to 12
17—012	Change S to 35:; a doubtful source, possibly interference from 17S2A
17—013	Change Dec. to —08° 25^{10}; possibly interference from 17S2A
19—012	A doubtful source
19—013	Change R.A. to 19^h 44·4^4
22—016	Change S to 12
11—16	Change Dec. to —19° 41^6
14—116	Change Dec. to —19° 53^6
21—114	Change R.A. to 21^h 53^m·5^2, and Dec. to —11° 33^6

* This list includes alterations to MSH source data as well as additional notes to these sources; MSH flux density is denoted by S.

been made (Mills *et al.* 1958). Further, the resolution is less and the relative sidelobe responses are greater at the large zenith distances. Therefore, we expect the unchecked parts of the survey south of declination —10° will tend to be more reliable than those discussed here.

TABLE 4

DUPLICATIONS*

MSH Duplication	New Reference Number	Replacement Position (1950) R.A. h m	Replacement Position (1950) Dec. ° ′	Flux Density (10^{-26} W m^{-2} (c/s)$^{-1}$)
00—11 and 23—125	23—125	23 59·8^2	—17 29^6	21
09—15 and 09—26	09—26	09 30·3^3	—20 01^6	11
10—121 and 10—214	10—214	10 48·8^4	—20 15^6	11
11—210 and 11—211	11—210	11 51·9^4	—28 09^8	11
12—112 and 12—28	12—28	12 36·4^6	—20 01^7	10†
21—121 and 21—213	21—121	21 49·4^4	—19 58^7	16†

* In all cases the replacement source has the average of the duplicated positions and fluxes.

Considerable discrepancies still exist between the revised MSH and 3C in that within apparently equivalent flux density intervals the former includes a considerable number of sources not found in the latter. The additional sources in the MSH list are mainly listed as extended sources. With the cooperation of Mr. Ryle we have searched for the cause of these differences between the two catalogues. In most instances it appears that the extended sources listed in MSH are associated with some concentration of emission such as small groups of sources. The conclusion is that the discrepancies between MSH and 3C result primarily from the different responses of the two methods of observations, interferometer and pencil-beam aerial systems, to regions of the sky where the radio brightness distribution is complex. The differing angular resolutions of the two equipments also contribute to the discrepancies.

References

BENNETT, A. S., and SMITH, F. G. (1961).—*Mon. Not. R. Astr. Soc.* **122**: 71.

EDGE, D. O., SHAKESHAFT, J. R., MCADAM, W. B., BALDWIN, J. E., and ARCHER, S. (1959).—*Mem. R. Astr. Soc.* **68**: 37.

HARRIS, D. E., and ROBERTS, J. A. (1960).—Observations of the C.I.T. Radio Observatory No. 1.

KELLERMANN, K. I., and HARRIS, D. E. (1960).—Observations of the C.I.T. Radio Observatory No. 7.

MILLS, B. Y., SLEE, O. B., and HILL, E. R. (1958).—*Aust. J. Phys.* **11**: 360.

MILLS, B. Y., SLEE, O. B., and HILL, E. R. (1960).—*Aust. J. Phys.* **13**: 676.

MILLS, B. Y., SLEE, O. B., and HILL, E. R. (1961).—*Aust. J. Phys.* **14**: 497.

MILLS, B. Y., LITTLE, A. G., SHERIDAN, K. V., and SLEE, O. B. (1958).—*Proc. Inst. Radio Engrs., N.Y.* **46**: 67.