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Format For Optical Astrometric Observations Of Comets, Minor Planets and Natural Satellites

Astrometric observations of comets, minor planets and natural satellites submitted for publication in the [Minor Planet Circulars \(MPCs\)](#), [Minor Planet Electronic Circulars](#) and [IAU Circulars](#) are represented by a standard 80-column record.

The formats are described below. The format beyond column 13 are identical for all three types of object (comets, minor planets and natural satellites). All observations must have a designation--never leave columns 1 to 12 blank.

SUMMARY OF FORMAT:

Please note that TABs must NOT be used. Columns marked as 'blank' must contain spaces (ASCII 32).

MINOR PLANETS

Columns	Format	Use
1 - 5	A5	Minor planet number
6 - 12	A7	Provisional or temporary designation
13	A1	Discovery asterisk

Minor planet numbers and [provisional designations](#) are official designations assigned by the Minor Planet Center. Temporary designations are designations, preferably no more than six (6) characters long (the absolute maximum is seven (7) characters), assigned by the observer for new or unidentified objects. Temporary designations must consist of alphanumeric characters only: do not include spaces. All observations of the same "new" object reported in the same message must have the same temporary designation.

COMETS

Columns	Format	Use
1 - 4	I4	Periodic comet number
5	A1	Letter indicating type of orbit
6 - 12	A7	Provisional or temporary designation
13	X	Not used, must be blank

Periodic comet numbers and [provisional designations](#) are official designations assigned by, respectively, the Minor Planet Center and Central Bureau for Astronomical Telegrams. Temporary designations are designations, up to six (6) characters long, assigned by the observer for new or unidentified objects. In practice, temporary designations on comet observations will be very rare.

NATURAL SATELLITES

Columns	Format	Use
1	A1	Planet identifier
2 - 4	I3	Satellite number
5	A1	"S"
6 - 12	A7	Provisional or temporary designation
13	X	Not used, must be blank

MINOR PLANETS, COMETS AND NATURAL SATELLITES

Columns	Format	Use
14	A1	Note 1
15	A1	Note 2
16 - 32		Date of observation
33 - 44		Observed RA (J2000.0)
45 - 56		Observed Decl. (J2000.0)
57 - 65	9X	Must be blank
66 - 71	F5.3,A1	Observed magnitude and band (or nuclear/total flag for comets)
72 - 77	X	Must be blank
78 - 80	A3	Observatory code

DETAILED NOTES:

MINOR PLANETS

NUMBER

Columns 1-5 contain a zero-padded, right-justified number--e.g., an observation of (1) would be given as 00001, an observation of (3202) would be 03202. If there is no number these columns must be blank.

Six-digit numbers are to be stored in packed form (A0000 = 100000), in order to be consistent with the format specifier earlier in this document.

PROVISIONAL/TEMPORARY DESIGNATION

Columns 6-12 contain the provisional designation or the temporary designation. The provisional designation is stored in a [7-character packed form](#).

Temporary designations are designations assigned by the observer for new or unidentified objects. Such designations must begin in column 6, should not exceed 6 characters in length, and should start with one or more letters.

It is important that every observation has a designation and that the same designation is used for all observations of the same object.

DISCOVERY ASTERISK

Discovery observations for new (or unidentified) objects should contain '*' in column 13. Only one asterisked observation per object is expected.

COMETS

PERIODIC COMET NUMBER

Periodic comets that have been observed at more than one return are assigned numbers. Reference should be made to the editorial notices on MPC 23803-23804 and 24421 for more complete details of the circumstances under which numbers are assigned.

Examples:

Comet	P/ Number	Columns 1-4 will contain
P/Halley	1P	0001
P/Encke	2P	0002
P/Biela	3D	0003
P/Wild 4	116P	0116

See the complete list of [periodic comet numbers](#).

ORBIT TYPE

Column 5 contains 'C' for a long-period comet, 'P' for a short-period comet, 'D' for a 'defunct' comet, 'X' for an uncertain comet or 'A' for a minor planet given a cometary designation.

PROVISIONAL DESIGNATION

Columns 6-12 contain a packed version of the provisional designation. The first two digits of the year are packed into a single character in column 6 (I = 18, J = 19, K = 20). Columns 7-8 contain the last two digits of the year. Column 9 contains the half-month letter. Columns 10-11 contain the order within the half-month. Column 12 will be normally be '0', except for split comets, when the fragment designation is stored there as a lower-case letter.

Examples:

1995 A1 = J95A010

1994 P1-B = J94P01b refers to fragment B of 1994 P1

1994 P1 = J94P010 refers to the whole comet 1994 P1

Columns 6-12 may contain a minor-planet provisional designation. In such a situation column 12 will contain a capital letter.

NATURAL SATELLITES

PLANET IDENTIFIER

A single character to represent the planet that the satellites belongs to.

Char	Planet
J	Jupiter
S	Saturn
U	Uranus
N	Neptune

This is given only for those objects with Roman numeral designations.

SATELLITE NUMBER

For those objects with Roman numeral designations, columns 2-4 contain the number of the satellite.

COLUMN 5

Column 5 is always "S" for a satellite observation.

PROVISIONAL DESIGNATION

Columns 6-12 contain a packed version of the provisional designation for those objects without Roman numeral designations.

The first two digits of the year are packed into a single character in column 6 (I = 18, J = 19, K = 20). Columns 7-8 contain the last two digits of the year. Column 9 contains the half-month letter. Columns 10-11 contain the order within the half-month. Column 12 will be always be '0'. This is similar to the scheme used for comets.

Examples

123456789012

J013S Jupiter XIII

N002S Neptune II

SJ99U030 S/1999 U 3 (Third new Uranian satellite discovered in 1999)

SK20J010 S/2020 J 1 (First new Jovian satellite discovered in 2020)

COMETS, MINOR PLANETS AND NATURAL SATELLITES

NOTE 1

This column contains a alphabetical publishable note or a numeric or non-alphanumeric character program code. The list of [standard codes](#) used for observations of minor planets is given in each batch of [MPCs](#).

NOTE 2

This column serves two purposes. For those observations which have been converted to the J2000.0 system by rotating B1950.0 coordinates this column contains 'A', to indicate that the value has been adjusted. For those observations reduced in the J2000.0 system this column is used to indicate how the observation was made. The following codes will be used:

P Photographic (default if column is blank)

E	Encoder
C	CCD
T	Meridian or transit circle
M	Micrometer
V/v	"Roving Observer" observation
R/r	Radar observation
S/s	Satellite observation
c	Corrected-without-republication CCD observation
o	Occultation-derived observations

In addition, there is 'X' which is used only for already-filed observations. It was given originally only to discovery observations that were approximate or semi-accurate and that had accurate measures corresponding to the time of discovery: this has been extended to other replaced discovery observations. Observations marked 'X' are to be suppressed in residual blocks. They are retained so that there exists an original record of a discovery.

DATE OF OBSERVATIONS

Columns 16-32 contain the date and UTC time of the mid-point of observation. If the observation refers to one end of a trailed image, then the time of observation will be either the start time of the exposure or the finish time of the exposure. The format is "YYYY MM DD.ddddddd", with the decimal day of observation normally being given to a precision of 0.00001 days. *Where such precision is justified*, there is the option of recording times to 0.000001 days.

OBSERVED RA (J2000.0)

Columns 33-44 contain the observed J2000.0 right ascension. The format is "HH MM SS.ddd", with the seconds of R.A. normally being given to a precision of 0.01s. There is the option of recording the right ascension to 0.001s, *where such precision is justified*.

OBSERVED DECL (J2000.0)

Columns 45-56 contain the observed J2000.0 declination. The format is "sDD MM SS.dd" (with "s" being the sign), with the seconds of Decl. normally being given to a precision of 0.01". There is the option of recording the declination to 0".01, *where such precision is justified*.

OBSERVED MAGNITUDE AND BAND

The observed magnitude (normally to a precision of 0.1 mag.) and the band in which the measurement was made. The observed magnitude can be given to 0.01 mag., *where such precision is justified*. The default magnitude scale is photographic, although magnitudes may be given in V- or R-band, for example. For comets, the magnitude must be specified as being nuclear, N, or total, T.

The current list of acceptable magnitude bands is: B (default if band is not indicated), V, R, I, J, C, W, U, g, r, i and z. Non-recognized magnitude bands will cause observations to be rejected. Addition of new recognised bands requires knowledge of a standard correction to convert a magnitude in that band to V.

OBSERVATORY CODE

Observatory codes are stored in columns 78-80. Lists of [observatory codes](#) are published from time to time in the [MPCs](#). Note that new observatory codes are assigned only upon receipt of acceptable astrometric observations.

Example Observations

Here we give some examples of [valid observations](#).

