APPENDIX A

GLOSSARY

Appendix A. Glossary

AAVSO: the American Association of Variable Star Observers. The AAVSO provided data for the construction of pre-launch ephemerides of large-amplitude variable stars, and provided data for the construction of the Hipparcos light curves (Volume 12) for these objects.

Abscissa: the angular coordinate of a star measured from an arbitrary origin on the reference great-circle to the normal projection of the star on that circle. The perpendicular coordinate is known as the ordinate of the star. The collection of abscissa measurements were used to derive the astrometric parameters of each star. The individual abscissa measurements are retained as useful intermediate astrometric data on the ASCII CD-ROMs. See also great-circle reduction.

ac magnitude: the magnitude derived from measurements of the modulation amplitude of the image dissector tube (IDT) signal. See also dc magnitude, IDT signal, and main grid.

Accuracy: the uncertainty of a measured quantity, including accidental and systematic errors. The term is often used synonymously with 'external standard error' (cf. precision).

Astrometric binary: a physical stellar system not observed as a visual double because of its small separation and/or large magnitude difference, but evidently non-single because of the detectable non-linear proper motion of the photocentre. A large residual from a model with five astrometric parameters may also indicate that the actual motion may deviate from the assumed rectilinear motion of the centre of mass.

Astrometric parameter determination: the final step of the 'three-step' method, which allowed the calculation of astrometric parameters for any (single) star from its observed abscissae on (typically) 50 different reference great-circles.

Attitude determination: the name given to the process by which the data from the satellite (the star mapper transits and the gyro data) were used to derive a description of the three-axis attitude of the viewing directions of the payload at any instant in time. On-board, this process (referred to as real-time attitude determination) used the brighter star transit information from the star mapper to yield a three-axis attitude accurate to about 1 arcsec rms. On the ground, this was improved to some 0.1 arcsec for the direction of the spin axis, and to a few milliarcsec for the spin phase.

Barycentric Julian Date: see Section 1.2.3 on time scales. The epochs in the Hipparcos and Tycho Epoch Photometry Annexes (the compilations of epoch photometry) have been corrected to the solar system barycentre by the application of light-time corresponding to the projected coordinate distance from the satellite to the barycentre, and are expressed in terms of Barycentric Julian Date, BJD(TT).

Basic angle: the fixed angle, approximately 58°, between the two viewing directions of the Hipparcos telescope. The exact value of the basic angle was determined during commissioning to a precision of about 1 arcsec, sufficient for the piloting of the image dissector tube to the transiting programme stars. During the great-circle reductions, the basic angle was determined, as part of the geometrical transformation parameters, to much better than a milliarcsec. The stability of the basic angle during the calibration period (of one reference great-circle, or about 10.7 hours) was ensured by the payload thermal control.

BJD: see Barycentric Julian Date

B_T magnitude: see Tycho magnitudes.

Catalogue entry: the term 'entry', rather than object or star, is used in those contexts where it is appropriate to draw attention to the fact that a given HIP number may refer not necessarily to a single star, but either to the photocentre, or to a component, or to the centre of mass of a double or multiple system. An entry can represent the whole (double or multiple) system; it may be one of two or three entries processed together

(referred to as a 'two-pointing' or 'three-pointing' system); or it may have been processed independently of any other entry of the system.

Catalogue epoch: J1991.25. Positions are given at the catalogue epoch.

CCDM Catalogue: the Catalogue of Components of Double and Multiple Stars, compiled at the Observatoire Royal de Belgique for the purposes of the collection and unification of double and multiple star data (see Section 1.4.4).

CCDM number: the data in Part C of the Double and Multiple Systems Annex (see Section 2.3) are identified by their numbers in the CCDM Catalogue. These numbers are based upon the approximate equatorial coordinates of the system at epoch and equinox J2000.0, in the format hhmm.m±ddmm.

CDS: the Centre de Données astronomiques de Strasbourg (the astronomical data centre at Strasbourg).

Celestia 2000: the CD-ROM package containing the primary parts of the Hipparcos and Tycho Catalogues, in a bit-optimised format, and supplied with interrogation software for use on specific computer platforms.

Censoring: see de-censoring.

Complementary field of view: during the observation of a programme star in one of the two fields of view, the region of the sky covered by the other field of view is referred to as the complementary field of view.

Cosmic error: see stochastic solutions.

Cramér-Rao limit (or Minimum Variance Bound): in statistical estimation a lower bound to the variance of an unbiased estimator of a parameter. The practical importance of the limit is that it is often much easier to calculate than the actual variance of a given estimator, and is independent of the choice of estimator: it is given by the negative inverse of the expected curvature (or Hessian matrix) of the log-likelihood function. The realism of the Cramér-Rao limit as an estimator of the variance of a given parameter must be investigated e.g. by Monte Carlo simulations.

Data analysis consortia (or data reduction consortia): the scientific groups responsible for the parallel treatment of the main mission data (FAST and NDAC) and the star mapper (or Tycho) data (TDAC). Their composition is given in the introduction to this volume. FAST and NDAC each delivered their own astrometric, double star, and photometric catalogues and annexes, which were merged to provide the unique Hipparcos Catalogue products.

dc magnitude: the magnitude derived from measurements of the zero-level of the image dissector tube (IDT) signal. See also ac magnitude, IDT signal, and main grid.

De-censoring: Because of photon noise, a star close to the magnitude limit of the Tycho observations will not be detected at every transit across the star mapper. Those transits not giving a detection are referred to as 'censored'. If only the detected transits were used to derive a mean magnitude for such a star, this would be strongly biased towards higher brightness. De-censoring is the mathematical process taking the censored transits into account in order to derive a bias-free mean magnitude (see Volume 4 for further details).

Detection: in the context of the Tycho Catalogue, this refers to a significant peak in the stream of photon count samples from the star mapper. The transit of a star may or may not produce a detection, depending on the star's brightness, the level of background counts and photon noise. Conversely, a detection does not necessarily correspond to a transit of a star, but may also be produced by random photon noise.

Detector's response profile: the response of the main detector as a function of the distance to its centre. It is tabulated in Section 1.4.

Double and multiple stars: an introduction to the complexities of the analysis and presentation of double and multiple systems in the context of the Hipparcos Catalogue is given in Section 1.4. Systems may be classified as 'double' or 'multiple', with between one to four entries with a common system identifier (CCDM number). An individual *entry* may also be classified as 'double' or 'multiple'. Systems may be further considered as 'single-pointing', 'two-pointing', or 'three-pointing', depending upon the number of entries considered together during the data analysis (the term 'pointing' referring to the way in which the sensitive area of the image dissector tube detector was directed to receive the light from a catalogue entry). Thus a double system may be 'single-pointing' or 'two-pointing', or may have two completely 'independent' entries.

Similarly, a multiple system may be 'single-pointing', 'two-pointing', or 'three-pointing', or may have two to four independent entries (with a common CCDM number). The term 'multiple' is to be considered as specifically referring to a number of components equal to or larger than three. There is not always a clear distinction between independent entries and multiple entries considered as a multiple system.

Double and Multiple Systems Annex: all of the Hipparcos Catalogue data on double and multiple systems is collected into the Double and Multiple Systems Annex, divided into five parts (C, G, O, V, and X), each comprising data on specific types of double or multiple system. Flags in the main catalogue indicate the way in which the system was processed (Fields H10, 48, 55–61). Summary data are given in Fields H62–67 of the main catalogue for entries resolved into exactly two components. See Section 2.3 for details.

Double star processing: the specific treatment of the Hipparcos data aimed at discovering and determining the astrometric parameters of double and multiple star systems. The Hipparcos instrument could resolve doubles down to about 0.1 arcsec separation with a magnitude difference below about 4 magnitudes. Some 10 000 systems were known in the Hipparcos Input Catalogue to need this special treatment. An additional 3000 new double or multiple systems have been discovered by Hipparcos, and due to its many complexities, the double-star processing has been a major problem area in the reductions. Not only the implementation but also the basic principles of the double-star reductions were different in the two reduction-consortia.

Ephemeris: the barycentric motion of the Earth was taken from the ephemerides VSOP 82 and ELP 2000 constructed by the Bureau des Longitudes. For the purposes of calculating stellar aberration and parallax this is equivalent, to within 0.01 mas, with the use of the Jet Propulsion Laboratory DE200 ephemeris.

Epoch photometry: the data contained in the Hipparcos or Tycho Epoch Photometry Annex, being the calibrated photometric data acquired at each epoch of observation. Observation times are given in Julian Date (TT), and corrected for arrival time at the solar system barycentre.

Equinox: see J2000, and ICRS.

FAST Consortium (Fundamental Astrometry by Space Techniques): one of the two data analysis consortia for the main mission data. See also data analysis consortia.

Field of view: one of the regions of sky, $0\overset{\circ}{.}9 \times 0\overset{\circ}{.}9$ in size, visible at any given instant to the Hipparcos payload. The two fields of view (preceding and following), separated by the basic angle of about 58°, were brought to a common focal surface by means of the 'beam-combining' mirror.

Five-parameter model: the basic model describing the modulated image dissector tube signal in terms of a general two-harmonic trigonometric function, with five unknown parameters. The phases determined from the model fitting were used as inputs to the great-circle reductions. The term may also refer to the standard astrometric model, whereby the apparent motion of a (single, unperturbed) star is described by the five astrometric parameters.

Great circle: one revolution of the satellite, roughly corresponding to a great circle projected on the sky, corresponded to a period of approximately 2.1 hours. Data from several great circles, comprising a reference great-circle set, were reduced together as part of the great-circle reductions.

Great-circle reduction: the first step in the 'three-step' reduction method, whereby phases determined by the image dissector tube data processing were brought together (over about 5 satellite rotations or revolutions, or about 10.7 hours), to derive the along-scan abscissae of the stars, with respect to an adopted 'reference great-circle' by the method of least-squares.

Grid period (or grid step): the period of the main modulating grid. From the great-circle reductions the mean grid period was found to be 1.207 366 arcsec, with extreme values (depending on position in the field of view) of 1.207 348 and 1.207 371 arcsec. Where only an approximate value of the grid period is relevant, the nominal pre-launch value of 1.208 arcsec is frequently used. Where a more accurate value was appropriate (for example, to correct slit errors in the sphere solution), a value of 1.2074 arcsec has been adopted.

Grid-step ambiguity: the along-scan phase measurements were made modulo one grid period (approximately 1.208 arcsec), so that stars with relatively poor *a priori* knowledge in their positions (or as a consequence of the poor instantaneous knowledge of the satellite attitude) suffered a corresponding uncertainty in the determination of their grid coordinates. If different measurements differ within a reference great-circle, this

fact can be recognised in the great-circle processing and duly corrected—the effect is then referred to as a grid-step inconsistency. Once made consistent at the level of the great-circle reductions, the grid coordinate may still be incorrect by a multiple of the grid step. This problem is referred to as that of grid-step errors. Such errors do not generally affect the validity of the great-circle abscissae derivations: they are recognised and corrected during the sphere solution process, and updated values are used in iterations of the great-circle reductions to improve the attitude knowledge.

Grid-step error: see also grid-step ambiguity. In the double-star reductions, a grid-step error may occur for any (or several) stars in a system with poorly known *a priori* positions, and especially for new doubles with a large magnitude difference, the separation may be in error by one or more times 1.2 arcsec (due to differences in the scanning geometry, the unit is not exactly that of the nominal grid period).

GSC: the Guide Star Catalog for the Hubble Space Telescope. Used as an element of the Tycho Input Catalogue, and for the construction of identification charts (Volume 13).

HIC: catalogue identifier with associated running numbers, identifying entries and corresponding data in the Hipparcos Input Catalogue.

HIP: catalogue identifier with associated running numbers, identifying entries and corresponding data in the (final) Hipparcos Catalogue and associated annexes. HIP is also the 'official' concise name for the Hipparcos Catalogue, assigned by the CDS.

Hipparcos Input Catalogue: the catalogue of about 120 000 programme stars, constructed by the Input Catalogue Consortium as the basis for the scientific observations and satellite attitude reference. It contained all the information necessary for the scientific satellite operations, as well as the compilation of available data necessary for the data reductions. It was published in printed form as ESA SP–1136 (1992), and on CD-ROM. It is also available, in machine-readable form, from the CDS.

Hipparcos magnitude: the magnitude, designated by *Hp*, sensed by the (broad-band) main detection system of the Hipparcos payload. The payload response was calibrated as a function of wavelength before launch, and photometric calibration was carried out throughout the mission by means of the reductions to an adopted system defined by standard stars.

Hp: see Hipparcos magnitude.

ICRF: the International Celestial Reference Frame is the realisation of the International Celestial Reference System, of which the Hipparcos and Tycho Catalogues represent extensions to optical wavelengths (see Section 1.2.2 for further details).

ICRS: the International Celestial Reference System, in which the Hipparcos and Tycho Catalogue positions and proper motions are given. This is consistent with the conventional equatorial system for the mean equator and equinox of J2000, previously realised by the FK5 Catalogue (see Section 1.2.2 for further details).

IDT detector: see image dissector tube.

IDT signal: the signal of an image passing over the grid as recorded by the image dissector tube (IDT) detector. The signal consisted of a zero-level (dc component) and a first and second harmonic modulation (ac component). See also main grid, ac magnitudes and dc magnitudes.

IFOV: abbreviation for 'Instantaneous Field of View'. See image dissector tube.

IFOV attenuation: a double-star component at a certain distance from the target position was observed with a reduced intensity that can be expressed in magnitudes. The double-star photometry has to take this attenuation into account.

IFOV profile: see detector's response profile.

Image dissector tube: the main detector used for the Hipparcos payload. A standard ITT 4012 RP tube, the detector had a sensitive area, or instantaneous field of view, of about 38 arcsec diameter, pointed towards the programme stars as they crossed the main field of view by adjusting the detector's coil currents. The instantaneous field of view was not sharp-edged: its profile is given in Section 1.4. The sloping wings resulted in considerable problems with double and multiple stars at around 20 arcsec separation, and the non-zero response at even larger distances resulted in the so-called 'veiling-glare' effect near bright stars.

INCA Consortium: the scientific consortium responsible for the construction of the Hipparcos Input Catalogue.

Inclined slits: part of the star mapper grid consisting of four $\vee$-shaped slits, and used for the determination of the transverse coordinate of star images. The apex of the inclined is located in the viewing plane. See also vertical slits.

Instantaneous field of view: see image dissector tube.

J2000: the relevance of the standard epoch J2000 is described in Section 1.2.6. The conventional equatorial system for the mean equator and equinox of J2000, and its relationship with the International Celestial Reference System (ICRS) in which the Hipparcos and Tycho Catalogue positions and proper motions are given, is described in Sections 1.2.1 and 1.2.2.

Julian Date: see Section 1.2.3 on time scales.

Main grid: the main modulating grid of 2688 parallel slits, each of width 3.13 μm, and separated by 8.2 μm, or approximately 1.208 arcsec on the sky. The grid, engraved on the spherical surface of a piece of glass matching the telescope's focal plane curvature, was built up from 168 by 46 elements (each containing 16 lines), referred to as 'scan fields'. With the scanning of the telescopes, stellar images moved across the focal plane roughly perpendicular to the grid lines, resulting in a very regular modulation of the light observed from behind the grid. See also IDT signal.

Main mission/main experiment/main grid: sometimes used to refer to the Hipparcos Catalogue related aspects of the satellite or mission, in contrast to the 'star mapper' or Tycho Catalogue related aspects.

mas: milliarcsec (0.001 seconds of arc).

Mission duration: before launch, the nominal mission duration had been set as 2.5 years, in addition to the 4–6 weeks required for the satellite and payload commissioning, although consumables on-board (principally the cold gas necessary for the attitude control) were sized for a period of approximately 5 years. A proposed mission duration of 2.5 years was determined as a result of simulations demonstrating the extent to which the astrometric parameters of the programme stars can be decoupled as a function of the mission lifetime. A longer mission would theoretically provide an improvement in positions and parallaxes by a factor $T^{1/2}$, where T is the mission lifetime, while proper motions would improve by a factor of $T^{3/2}$, the additional factor of T improvement being due to the larger time baseline. The actual mission duration, between launch and formal termination of operations, was just over four years, with high-quality scientific data being accumulated during a period of about 37 months.

Modulating grid: see main grid.

Multiple stars: see double and multiple stars.

NDAC Consortium (Northern Data Analysis Consortium): one of the two data analysis consortia for the main mission data. See also data analysis consortia.

Nominal scanning law: see scanning law.

Observational frame: the basic time unit of 32/15 s, also referred to as T4, used to fit the photon counts to the five-parameter model.

Orbital period (of the Hipparcos satellite): the interval between perigee passages. In its geostationary transfer orbit, the orbital period of the Hipparcos satellite was approximately 10.7 hours.

Parallax: the Hipparcos and Tycho Catalogues provide the annual parallax, π, from which the coordinate distance is $(\sin\pi)^{-1}$ astronomical units, or with sufficient approximation, π^{-1} parsec if π is expressed in arcsec. The parallax determinations are trigonometric, absolute (in the sense that the parallax determination of a given star is not dependent upon either the parallaxes, or assumptions concerning the parallaxes, of other stars—including stars close by on the sky), and independent of any previous distance determinations. Analyses place a limit on the global parallax zero-point offset of less than 0.1 milliarcsec, and give confidence that the published standard errors are a reliable indication of their true external errors.

Position: the Hipparcos and Tycho Catalogues provide the barycentric coordinate direction, specified as right ascension, α, and declination, δ.

Precision: the uncertainty of a measured quantity due to accidental errors. The term 'precision' is often used synonymously with 'internal (or formal) standard error' as derived e.g. from a least-squares solution (cf. accuracy).

Programme star: one of the stars (approximately 120 000) contained in the Hipparcos Input Catalogue, and observed by the main detector. The observing programme was defined before launch and remained essentially fixed for the entire mission duration.

Proper motion: the Hipparcos and Tycho Catalogues provide the rate of change of the barycentric coordinate direction expressed as proper motion components $\mu_{\alpha *} = \mu_\alpha \cos\delta$ and μ_δ, in angular measure per unit time (milliarcsec per Julian year).

Quantile: the term 'quantile' is used synonymously with the term 'fractile', the latter defined in *A Dictionary of Statistical Terms* (M.G. Kendall & W.R. Buckland 1957) as 'A term introduced ... to denote the variate value below which lies a given fraction of the cumulative frequency. This term is synonymous with the more generally used term quantile (q.v.), and the necessity for its coining is not clear.' The corresponding definition of 'quantile' implies that its use strictly relates only to rational fractiles.

Reference frame/reference system: the terminology used in the 1991 IAU resolution on reference frames and reference systems advocates the use of the term 'reference system' for conceptual matters, and 'reference frame' for the practical realisation of such a reference system in the form of a catalogue. The relationship between the Hipparcos reference frame, the International Celestial Reference System (ICRS), and the International Celestial Reference Frame (ICRF) are described in Section 1.2.2.

Reference great-circle: a reference plane chosen to correspond to the mean scanning motion of the satellite during several hours, and signifying also the collection of observations during this time-interval. In practice the maximum duration of observations constituting the reference great-circle was limited by the satellite's orbital period, corresponding to about 5 great-circle scans, or about 10.67 hours—typical lengths of the reference great-circles were somewhat shorter. Star abscissae were projected onto the reference great-circle (through a knowledge of the three-axis attitude of the satellite) and solved for during the great-circle reductions.

Scanning law: the three-axis attitude of the satellite, determining where the two fields of view of the satellite were directed, at any instant of time. The nominal scanning law is a deterministic scanning motion which defined the required satellite attitude. By comparing the target and actual attitude on-board, by means of the star mapper transits, corrections to the actual attitude were effected by means of regular (roughly every 400 s) three-axis gas jet actuations, which brought the attitude back to its target one. In this way, deviations between the actual and nominal scanning law were kept to within about 10 arcmin throughout the mission.

Scientific Selection Committee: the ESA-appointed selection committee responsible for independently allocating scientific priorities to the stars proposed for observation by Hipparcos, and generally monitoring the scientific contents of the Hipparcos Input Catalogue.

SIMBAD Data Base: the data base set up by the Centre de Données astronomiques de Strasbourg.

Single-pointing systems: double or multiple systems comprising two or more stars within a single catalogue entry. They were observed as a unique target by pointing the detector to the direction assigned to them in the Hipparcos Input Catalogue. As a rule, multiple systems with no relative distance larger than about 10 arcsec were observed as a single entry.

Sphere solution: the second step of the 'three-step method', which combined the great-circle data for a number of reference stars and determined the 'great-circle zero-points'. These zero-points defined the interconnection between the reference great-circle reference systems leading to the global Hipparcos reference system.

Standard error: estimated errors are given following the recommendations of the *'ISO Standards Handbook 3: Statistical Methods'*, where the standard error is defined as: 'the standard deviation of an estimator; the standard error provides an estimation of the random part of the total estimation error involved in estimating a population parameter from a sample.'

Star mapper: the detection chain (including aperiodic vertical and inclined grids, relay optics and detectors) located on each side of the main grid (two were provided for redundancy reasons). The prime purpose of the star mapper was to provide three-axis (hence, the inclined slits) attitude information to the satellite, in

real-time, on the basis of the time of transits of some 40 000 bright reference stars distributed over the sphere. It was also used for the Tycho experiment, and included, for this reason, two photometric channels (B_T and V_T), each sampled by their own photomultiplier tube detectors. In contrast to the detector used for the main field of view, the star mapper detectors sampled the entire signal generated simultaneously by star transits over the entire star mapper grid.

Star mapper grid: the arrangement of four vertical and four inclined grids, arranged aperiodically at one side of the main grid, used for the satellite real-time attitude determination and the Tycho measurements.

Star observing strategy: the on-board algorithm which determined the cycle of star observations on the main grid, on the basis of the satellite attitude, and the information contained in the programme star file.

Stochastic solutions: in the Hipparcos Catalogue context this refers to cases where astrometric solutions could not be found in reasonable agreement with the standard errors of the Hipparcos observations. The solutions postulate the presence of a non-zero physical scatter in excess of the measurement noise, referred to as the 'cosmic error'. They may be double or multiple systems of unknown characteristics, or short-period astrometric binaries (see Part X of the Double and Multiple Systems Annex).

Survey: the magnitude-limited set of stars (dependent on the galactic latitude and spectral type) that were included in the Hipparcos Input Catalogue. Some objects in very crowded regions (and thus suffering from an excessive demand for observing time) or subject to severe veiling glare had to be excluded from the survey, and its completeness was also influenced by the uncertainties on magnitudes and/or spectral types.

Target: any direction defined by an entry of the Hipparcos Input Catalogue used to direct the sensitive area of the image dissector tube during the mission.

TDAC Consortium: see Tycho Consortium

Terrestrial Time (TT): see Section 1.2.3 on time scales.

Three-pointing system: an extension of the two-pointing system, where three consecutive pointings of the detector system were reduced together.

Three-step method: the break-down of the (directly) intractably large Hipparcos reduction problem (to estimate simultaneously more than 600 000 astrometric parameters along with large numbers of additional satellite attitude unknowns and time-dependent geometrical calibration terms) in three partial steps. The first step is the 'great-circle reduction', the second step the 'sphere solution' and the last step the 'astrometric parameter determination'.

Transit: the crossing of a star's image across the modulating grid assembly. In the context of the Hipparcos Catalogue this term refers to a crossing of the main grid; in the context of the Tycho Catalogue it refers to the crossing of one of the star mapper slit systems (either vertical or inclined; see star mapper).

Transit file: a compilation of the calibrated 5-parameter model data from the image dissector tube for a subset of the Hipparcos Catalogue entries, including also the detailed scanning geometry. The transit files were originally used in the NDAC double-star reductions, and were constructed for all systems recognised as double or multiple, or suspected as such during the early phases of the data reductions. As a result, the transit data are available for all double and multiple systems, plus a few thousand catalogue entries finally considered as either suspected or single stars. See Section 2.9.

Two-pointing system: a double or multiple system with two catalogue entries sufficiently separated on the sky that they could not be observed within a single detector pointing, yet sufficiently nearby on the sky that the consecutive pointings of the detector were influenced by light from the other component, demanding that the two consecutive pointings had to be reduced together, taking into account the influence of the signals from each possibly affecting the other due to their proximity (typical separations of such systems are around 20 arcsec). A two-pointing double is a specific case of a two-pointing system, where the system comprises a total of two components, each corresponding to an individual catalogue entry. A two-pointing system may be a triple star, with two components contained within one detector pointing (or catalogue entry) and the third within a second pointing. Similarly a two-pointing system may embrace a quadruple system.

TYC: catalogue identifier with associated running numbers, identifying stars in the (final) Tycho Catalogue and associated annexes. TYC is also the 'official' concise name for the Tycho Catalogue, assigned by the CDS.

Tycho Consortium: the data analysis consortium responsible for the star mapper (or Tycho) data.

Tycho experiment: the exploitation of the star mapper data measurements (needed for a real-time determination of the satellite attitude) to provide astrometric and two-colour photometric data for all stars recognised as crossing the star mapper grid.

Tycho Input Catalogue: the catalogue, derived from the Guide Star Catalog and the INCA data base, in collaboration with members of the Guide Star Selection team at the Space Telescope Science Institute and of the INCA Consortium, used as an input to the Tycho data reductions.

Tycho Input Catalogue Revision (TICR): an intermediate catalogue produced in the Tycho data reductions. It was derived from the first year of Tycho observations.

Tycho magnitudes (B_T, V_T): the magnitude system defined by the Tycho instrument, in reasonable correspondence with the usual Johnson B and V magnitude system. Transformation equations between the various systems are provided.

Veiling glare: phase perturbations on the measurements of programme stars on the main grid in the presence of nearby bright stars, from either field of view, caused by the profile of the image dissector tube response (see also image dissector tube).

Vertical slits: part of the star mapper grid consisting of four slits perpendicular to the scanning motion of the satellite, used for the determination of the along-scan attitude angle. See also inclined slits and attitude determination.

VIM (Variability Induced Mover): a close binary, astrometrically observed by its photocentre, in which one (or both) of the components is variable (see R. Wielen, 1996, *Astronomy & Astrophysics*, 314, 679). The duplicity of such an object can be discovered from the fact that the photocentre oscillates along the arc joining the two components in relation to the total brightness of the system. This effect appears to be significant for a few hundred stars in the Hipparcos Catalogue, for which special solutions are given in Part V of the Double and Multiple Systems Annex. See Section 2.3.5 for details.

V_T: see Tycho magnitudes.

WDS: the Washington Catalogue of Visual Double Stars (see Section 1.4.4).