



US006972902B1

(12) **United States Patent**
Chen et al.

(10) **Patent No.:** **US 6,972,902 B1**
(45) **Date of Patent:** **Dec. 6, 2005**

(54) **TELESCOPE SYSTEM HAVING
AUTO-TRACKING ALTITUDE-AZIMUTHAL
MOUNT AND METHODS FOR
CALIBRATING SAME**

2004/0051942 A1 3/2004 Compton
2004/0085632 A1 5/2004 Shen
2004/0090673 A1 5/2004 McWilliams

FOREIGN PATENT DOCUMENTS

(75) Inventors: **Chin Chuan Chen**, Richmond (CA);
Yan Liu, Richmond (CA)

CA 2347370 5/2000
CA 2356340 5/2000

(Continued)

(73) Assignee: **Pacific Telescope Corp.**, Richmond
(CA)

OTHER PUBLICATIONS

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

Bill Burton; Ready, Compute, Aim; (1998) Astronomy
Magazine, pp. 194-198.

(Continued)

(21) Appl. No.: **10/950,568**

Primary Examiner—Mark A. Robinson
Assistant Examiner—Mark Consilvio

(22) Filed: **Sep. 28, 2004**

(74) *Attorney, Agent, or Firm*—Oyen Wiggs Green &
Mutala LLP

(51) **Int. Cl.**⁷ **G02B 23/00**

(52) **U.S. Cl.** **359/429; 359/399; 359/900**

(58) **Field of Search** 359/900, 399,
359/429, 430; 356/138, 614

(57) **ABSTRACT**

(56) **References Cited**

One aspect of the invention provides a method for calibrat-
ing an alt-az telescope system with a latitude of an observer
location. The telescope system comprises a telescope tube
mounted for pivotal motion about altitude and azimuthal
axes and a latitude indicator coupled to a corresponding one
of the altitude and azimuthal axes. The latitude indicator
indicates a latitude value which varies with movement of the
telescope tube about the corresponding axis. The method
involves obtaining encoder information indicative of a first
angular position of the telescope tube about the correspond-
ing axis, wherein at the first angular position, the latitude
indicator indicates a first latitude value. The orientation of
the telescope tube is then adjusted to a second angular
position, wherein at the second angular position, the latitude
indicator indicates a second latitude value that differs from
the first latitude value by an amount corresponding to the
observer latitude. The method then involves subtracting the
encoder information at the first angular position from the
encoder information at the second angular position to deter-
mine a difference value indicative of the latitude of the
observer location.

U.S. PATENT DOCUMENTS

4,400,066	A *	8/1983	Byers	359/430
4,682,091	A *	7/1987	Krewalk et al.	318/685
4,764,881	A	8/1988	Gagnon		
5,124,844	A	6/1992	Wraight		
5,133,050	A	7/1992	George et al.		
5,311,203	A	5/1994	Norton		
5,508,844	A	4/1996	Blake, Sr.		
6,304,376	B1 *	10/2001	Baun et al.	359/429
6,366,349	B1	4/2002	Houde-Walter		
6,369,942	B1	4/2002	Hedrick et al.		
6,392,799	B1	5/2002	Baun et al.		
6,563,636	B1	5/2003	Baun et al.		
6,603,602	B1	8/2003	McWilliams		
6,671,091	B2	12/2003	McWilliams		
2001/0033416	A1	10/2001	Baun et al.		
2003/0025994	A1	2/2003	McWilliams		
2003/0156324	A1	8/2003	Baun et al.		
2003/0197930	A1	10/2003	Baun et al.		
2004/0047036	A1	3/2004	Baun et al.		

41 Claims, 14 Drawing Sheets

