NOTE:

The following is a description of the Yale Astronomy Department's photographic plate collection and measuring facility as of early 2012. It was presented at the *Workshop on Preserving Astronomy's Archival Record*, April 17-19, 2012 in Washington, DC. **The Yale plate vault no longer exists.** In 2016 the majority of plates and the PDS measuring machine were relocated to the Pisgah Astronomical Research Institute (PARI) in Rosman, North Carolina. The remainder of the plates were returned to their home observatories, as requested. This document is presented here for historical purposes.

— *note added March, 2022*

Yale plate vault: Overview

New Haven - Science Hill locations

- Canner Street, until moved in the 1950s to...
- 135 Prospect Street, until moved in 1975 to...
- Gibbs Lab 3rd floor, until moved in 1990 to...
- Gibbs Lab 1st floor; along with all SPM plates that had been stored in the Beinecke Rare Book Library

Current configuration

2 bays in Gibbs Lab,
(2 x 12'x20'= 480 sq-ft total)

Yale plate vault: Contents – Yale plates

Tel./program	Quant.	Plt-size	Comments
Loomis Tel.	~1/4 aisle	8x10	
Yale pi plts	70,000p	8x10	Yale parallax series
Yale Zone plts	~1 aisle	17x17	
Yale 1-m Bethany	cabinet(5'x3'x1.5')		misc
Yale 1-m CTIO	80in	8x8	misc (clusters,...)
Yale 26" AG	~1/2 aisle	8x10	var., clusters, MPs,...
YSO AG (SPM)	2,125p	17x17	SPM
YSO AG (VMC)	110p	17x17	VMC

Yale plate vault: Contents – NonYale plates

Tel./program	Quant.	Plt-size	Comments
Allegheny (misc)	715in	8x10	MPs, var., clusters, etc.
Caltech 48" Schmidt	6p	14x14	Plaut's window
CIDA (Schmidt)	11p	12x12	M44 (1979)
CTIO (Schmidt?)	4p	14x14	Plaut's window
CTIO Schmidt	16p	8x8	prism & calib plates
CTIO 4-m	3in	8x10	misc
CTIO 4-m	5p	14x14	misc
Dearborn	2in	4x5	pi plates
Hamburg AG	10in	10x10	Yale Zone Cat? 1940's
Hamburg	small box	3x4	Hyades (1946)
KPNO 4-m	18in	8x10	misc
KPNO 4-m	4p	14x14	misc
KPNO 84"	25p	5x7	Plaut's window, clusters
Lick AG	20p	8x10	NGC188 (1960s)
Lowell	16in	4x5	lunar

(cont.)

Yale plate vault: Contents – NonYale plates *(cont.)*

Tel./program	Quant.	Plt-size	Comments
McCormick	25in	5x7	Procyon
McDonald	2p	8x10	MP218 (1985)
Mt Stromlo 26"	15p	5x7	NGC3680 (1992), sgr
Mt Stromlo 26"	10p	6x6	globular clusters
Mt Stromlo 26"	10p	var.	IC2391
Mt Stromlo 74"	2in	3x4	clusters
Sydney AG	16in	8x8	Yale Zone Cat?
USNOFS 61"	60in	5x7	Various parallax series
Van Vleck	75in	5x7	pi
Yerkes 40" refr	72in	8x10	pi
Yerkes 40" refr	20in	8x10	Procyon

Yale plate vault: Contents – Other plates

Tel./program	Quant.	Plt-size	Comments
Mystery plates:			
????	64in	8x10	????
????	small box	4x6	marked "From Columbia"
????	small box	3x4	Eros
????	2in	3x4	"copies" of misc (1963)
????	4in-box	8x10?	box marked "Sydney Obs"
????	3p	7x7	(1915)
????	2in-box	8x8?	"S. Majewski to R. Mendez"
Blanco 1 project (I. Platais):			
CTIO?	1in	5x7	"Jane Russell", Blanco 1?
Yale 1-m?	2in-box	8x10?	with Blanco 1 plates
Yale 1-m	1in	8x8	with Blanco 1 plates
YSO AG	2in-box	8x10	i car & Blanco 1

SA project (D. Casetti):

Includes two large wooden crates of 20x20 plates PLUS a file cabinet full of various-sized plates (Hale 5-m, DuPont 2.5-m, 60" Mt Wilson) on loan from UVA (S. Majewski)

Yale plate vault: 2020 PDS microdensitometer

Moved from Gibbs 172 to Gibbs 157 (adjacent to the plate vault) in Oct 2008. VAX cluster control was replaced by a single Linux PC with DR11 emulation card. **Status: Working.**

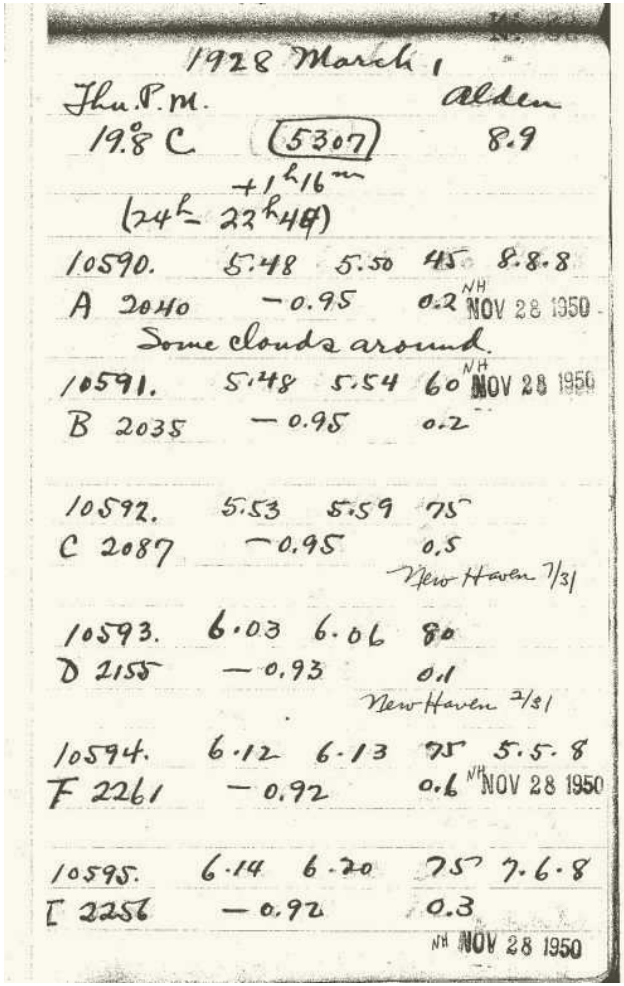
http://www.astro.yale.edu/girard/pdsmove/

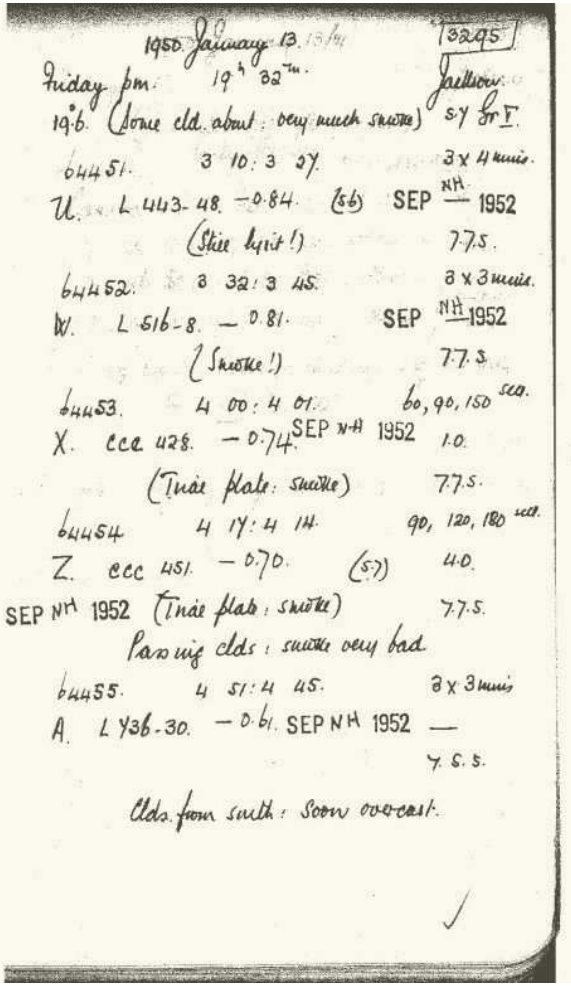
Also, in 2008, improved thermal & humidity control was added to both the plate vault and the measuring room

Yale plate vault: Yale-plate logs

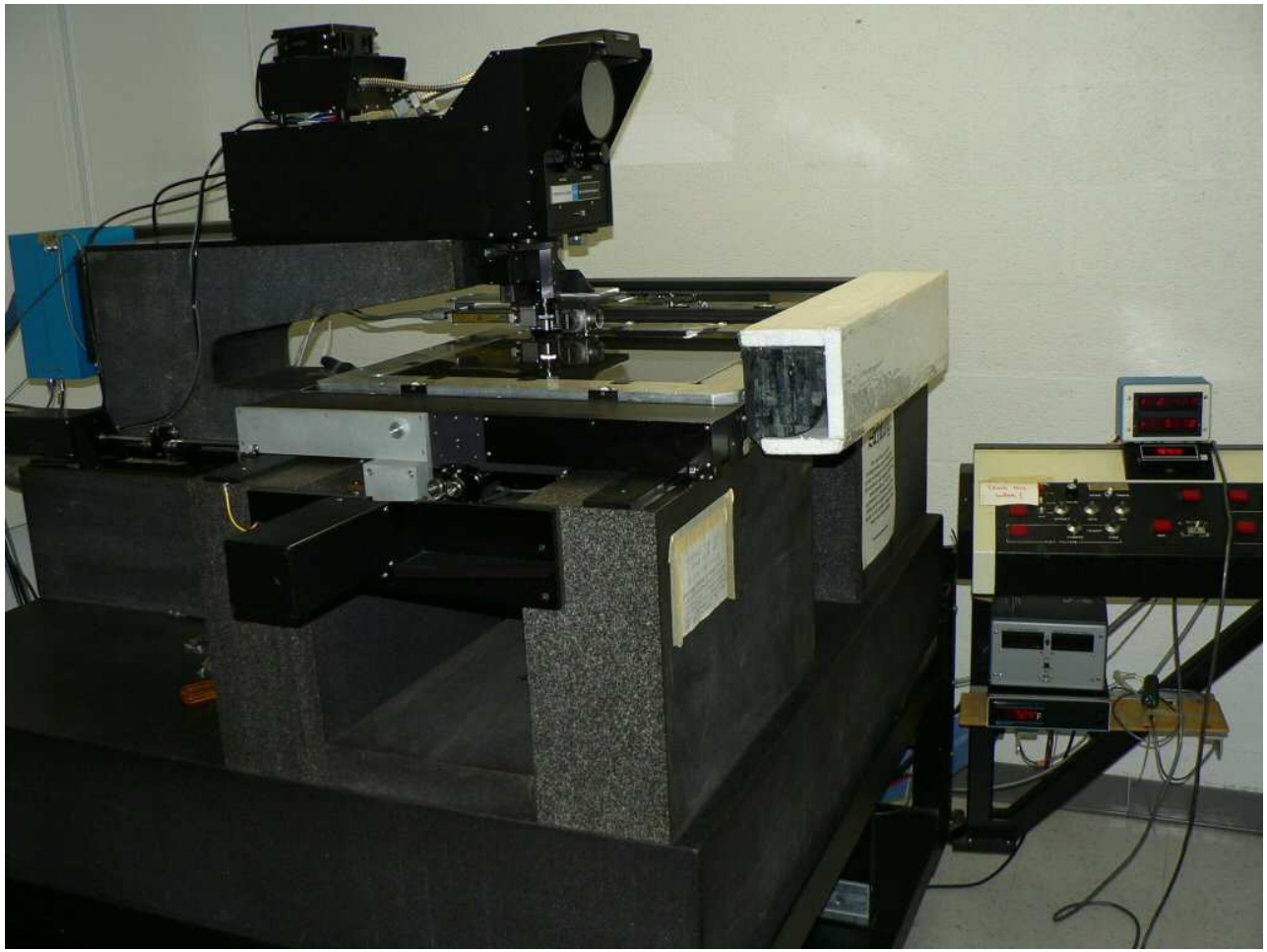
Plate logs

- SPM plate logs are in machine-readable form.
- Yale π-plate log books (70,000 plates) are in a storage room adjacent to the machine shop on Gibbs 1st floor.





Yale plate vault: Photo-tour



Yale plate vault: Photo-tour

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Highlights of Science Results from Yale's Current Plate-Measuring Programs
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Orbits of Globular Clusters (GCs) -
At Yale we have measured the absolute proper motions of 36 globular clusters; this represents 58% of the total number of all clusters currently measured. The proper-motion measurements are key quantities in determining the orbits of GCs about the Milky-Way (MW) center. Precise knowledge of their orbits (shape and size distributions, possible dynamical associations) is crucial in the overall effort to understand the formation of the GC system of the MW and to quantify individual GC survival rates in the MW (competition between internal processes such as two-body relaxation and external ones such as gravitational shock with the disk, bulge, and molecular clouds).

Satellite Orbits -
Similarly, as with the GCs, we have measured the absolute proper motions of five galactic satellites of the MW; the Sagittarius dwarf galaxy, both Magellanic Clouds, the Canis Major overdensity (thought to be the core of a disrupting satellite), and the Fornax dwarf galaxy. Our results are unquestionably the most accurate such ground-based measures, rivaled only by HST-based measurements. Orbits of satellites allow the modeling of their interaction with the MW, and with one another, in the case of the Clouds.

Tidal Streams and Halo Overdensities -
A large number of tidal streams and stellar overdensities are now known to inhabit the MW halo; these were detected from large-area photometric surveys. We have measured proper motions in three major such systems; the Sagittarius trailing stream, the Monoceros stream, and the Virgo Overdensity. The proper-motion data were combined with line of sight velocities in order to 1) model the disruption of the Sagittarius dwarf galaxy and constrain the MW potential, 2) model the Monoceros stream and the likely event that lead to its formation and 3) understand the nature of the Virgo overdensity as pericentric debris of a tidally disrupted satellite on a very eccentric orbit and connect other halo overdensities with this same event. These are the first 3-D kinematical studies of distant halo substructure.

Main Components of the Milky Way -
The most recent installment of the Southern Proper Motion (SPM) catalogs, SPM4, provides absolute proper motions of over 100 million stars, down to V=17.5, in the southern sky. This and previous SPM catalog versions have allowed a more precise kinematic description of the MW's major component systems. For instance, structural parameters of the Thick Disk, including the vertical shear in its tangential velocity distribution, have provided insight into the underlying potential and mass distribution of the MW disk.

Education -
One outgrowth of our research utilizing photographic material has been the development of a graduate level course in astrometry and the application of astrometric techniques to the solution of a variety of current astrophysical problems. That course has now evolved into an introductory textbook edited by van Altena, "Astrometry for Astrophysics: Methods, Models and Applications", to be published by Cambridge University Press in November 2012. The text is intended for a one-semester introductory course that will hopefully lead to further study by students or serve as a primer on the field for researchers in related astronomical fields.

Refereed Papers (2009-present)

Casetti-Dinescu, D. I.; Vieira, K.; Girard, T. M.; van Altena, W. F. 2012, "Constraints on the Magellanic Clouds' Interaction from the Distribution of OB Stars and the Kinematics of Giants", ApJ (in press)

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Zacharias, N.; Finch, C.; Girard, T.; Hambly, N.; Wycoff, G.; Zacharias, M. I.; Castillo, D.; Corbin, T.; DiVittorio, M.; Dutta, S.; and 20 coauthors 2010, "The Third US Naval Observatory CCD Astrograph Catalog (UCAC3)", AJ 139, 2184

Casetti-Dinescu, D. I.; Girard, T. M.; Platais, I.; van Altena, W. F. 2010b, "Detection of a Stellar Stream Behind Open Cluster NGC 188: Another Part of the Monoceros Stream", AJ 139, 1889

Vicente, B.; Abad, C.; Garzón, F.; Girard, T. M. 2010, "Astrometry with Carte du Ciel plates, San Fernando zone II. CdC-SF: a precise proper motion catalogue", A&A 509, 62

Casetti-Dinescu, D. I.; Girard, T. M.; Majewski, S. R.; Vivas, A. K.; Wilhelm, R.; Carlin, J. L.; Beers, T. C.; van Altena, W. F. 2009, "Proper Motions in Kapteyn Selected Area 103: A Preliminary Orbit for the Virgo Stellar Stream", ApJ 701, L21

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Henry, T. J.; Monet, D. G.; Shankland, P. D.; Reid, M. J.; van Altena, W.; Zacharias, N. 2009, "Ground-Based Astrometry 2010-2020", The Astronomy and Astrophysics Decadal Survey, Position Papers, no. 20

