



## EDITORIAL

Astro-Nav over Five Centuries

Preparing a talk on this subject for the R.A.S.C. recently, I was reminded again of the continued association of astronomy with the very practical task of the navigator in getting from A to B. Many famous astronomers of the past like Galileo, Halley, Mayer, and the mathematician Euler made significant contributions to the subject, and such well known observatories as the Royal Greenwich Observatory and the U.S. Naval Observatory owe their origin to the needs of the navigator.

During World War II a great deal of effort went into the simplification of the procedure of obtaining astronomical fixes by air navigators. The University of Toronto played some part in this effort. Dr. Frank Hogg invented, and Gerry Longworth built, about six bread-board models of a very ingenious two-star sextant which reduced the paper work in obtaining a fix to a single subtraction. (One of the Hogg two-star sextants is in the possession of the Department, another has been purchased from a surplus dealer by Mrs. Hogg.) The first computing assignment of FERUT, the original U. of T. digital computer, was the computation of a set of new-style sight-reduction tables devised by the writer; Mrs. Sally (Hogg) McDonald, then at university, spent the better part of one summer organizing, cutting and pasting hundreds of yards of computer output into a form suitable for publication.

In the last years of the war and in the years following however, navigation appeared to be turning its back on astronomy. Radar and other electromagnetic systems provided reasonably reliable "instant" fixes, and, in fact, today's navigators of trans-ocean commercial carriers rely almost entirely on systems like DECCA and LORAN, with "astro" playing a seldom used reserve role in case of failure of the "black boxes".

It was interesting for me, therefore, to learn that one of the most sophisticated of air navigation systems under development today again introduces astronomical fixing as an important component. The system relies basically on accelerometers mounted upon a gyro-stabilized platform, and an on-board computer which integrates measured accelerations and multiplies by elapsed time to display position continuously. But, because a gyro behaves like an 84-minute pendulum, the oscillations so engendered in the system are damped out by a doppler system measuring ground speed. And, because the doppler system is subject to secular errors, the final corrections are made by a tracking "sextant" which, directed onto suitable stars by the computer, scans for them and feeds back their precise altitudes to the computer for almost instantaneous fixes which then correct the output of the doppler - damped inertial system. When and if the system is perfected it will provide the ultimate dream of the military - a self-contained, unjammable system completely free of human error.

It seems that "astro" has come a long circuitous way to its ultimate role.

J.F.H.

## OBSERVING

### New Programs

Gretchen Hagen has undertaken an observing program with the G40 system of the 74-inch. She has selected ten stars of magnitude 10 - 11 in NGC 457 which she is observing for radial velocity in order to determine the cluster velocity and so test two bright stars in the field of the cluster for membership. The G40 definition has been considerably improved recently by Dr. Garrison who, in the course of testing, rotated the Schmidt corrector plate through 180 degrees - why this helps we don't know!

Stanley Jeffers has taken a few preliminary direct photographs with the Carnegie Image Tube mounted at the Nasmyth focus of the 24-inch telescope.

Dr. Heard has added some faint eclipsing binary systems to the G12 program, encouraged by the fact that, even in winter it now seems to be possible to get good spectrograms at this dispersion for late-type stars as faint as 9.5 magnitude (phot.).

### Papers Submitted during January

Petrie, R. M. and  
Heard, J.F.

"Radial Velocities and Luminosities of 77 Stars in the Field of the Alpha Persei Cluster".

- van den Bergh, S. "The Globular Clusters in the Andromeda Nebula" (accepted by Nature).
- van den Bergh, S. "Globular Clusters and the Extragalactic Distance Scale".
- Spinrad, H., Taylor, J.B. and van den Bergh, S. "The M7 Giants in the Nuclear Bulge of the Galaxy".

### COMINGS AND GOINGS

Gretchen Hagen spent about a month in Tucson working on the reduction of the photometric observations which Peter had made there.

Dr. Roeder visited the Steward Observatory on Dec. 13 and conducted a discussion on "Problems concerning the Absorption Line Spectra of QSO's".

Dave Goodenough returned from his observing session at Cerro Tololo with a good bag of photometric data. He lost part of one night to clouds and of another to excessive humidity.

Dr. van den Bergh spent part of the week of January 13 here. Since returning to Pasadena he reports that he lost some observing time to the very heavy rains that they have been having in Southern California. He also reports detecting a nucleus in NGC 1782, and that its spectrum shows that it is not a Seyfert nucleus as reported recently. He is puzzled too at having found a velocity dispersion of 2000 km/sec. in one of the filaments of Cas A. He expects to be visiting Seattle and Victoria in February.

Dr. Fernie visited the Yale Department of Astronomy on January 15th, giving a colloquium on "Cepheid Variables and Galactic Structure".

On Feb. 3-6 Dr. Anand will present two seminars at the State University of New York at Stony Brook in the Department of Earth and Space Sciences: "Structure and Evolution of Rapidly Rotating Stars" and "Relativistically Rotating Stars".

#### January Seminars

On Jan. 8 and 9, Dr. P.J. Mezger of NRAO, GreenBank spoke on "Star Formation Associated with HII Regions" and "Research at N.R.A.O."; on Jan. 15 Dr. Roberts on "Methods of Measuring Field Strengths in Radio Sources"; on Jan. 22 John Schmitt on "Observations of BL Lacertae" and Hugh Ross on "Some Preliminary Observations of Low Frequency Cut-off Sources"; today Dr. Carmen Costain of the D.R.A.O. is speaking on "Recent Research at D.R.A.O." .

February Seminars

- Feb. 5  
Countdown  
Chalmers Hardenbergh. "Infrared  
Astronomical Observations".
- Feb. 12  
Dr. Garrison, "A New Chapter in the  
History of Pleione".
- Feb. 25  
4:00 p.m.  
Room 203 McLennan Lab.  
Dr. Anne Underhill, Sterrewacht-  
Sonnenborgh, Utrecht. "The Hydrogen  
Content of the Ia Supergiants of  
Type B.
- Feb. 26  
Dr. Peter Pesch, Warner and Swasey  
Observatory. "Faint Hyades Members".

RASC Meeting

The next meeting of the Toronto Centre will be held on Feb. 14  
at the Planetarium. Dr. Kronberg will speak on "Radio Astronomy at  
Jodrell Bank".

Course G2000: Seminars in Astrophysics

- Feb. 6  
13  
20  
27
- Fred Hickok, "T Tauri Stars".  
Hugh Ross, "Optical Variability in QSO's"  
Nancy Evans, "Radar Observations of Venus"  
'to be announced'

LETTER TO THE EDITOR

Sir,

I should like to identify the ninth DDO Alumnus attending the  
Tucson reunion referred to in DDD 1, 12, p. 5. He was, of course,  
my son Bertrand who now knows the French and English names of 18  
telescopes from Toronto to California.

Sincerely yours,  
Rene Racine

Award

Announcement was made on Dec. 21 of the award of the Medal of  
Service of the Order of Canada to Dr. Helen S. Hogg. Investiture will  
take place in Ottawa in April.

Appointment

Jim Thomson, B.A. Waterloo, a former summer assistant at the  
D.A.O., has been appointed observing assistant here as of Jan. 27.  
His principal duty will be with the 74-inch telescope.

### Accidents

On their return trip from attending the 60th Anniversary Banquet of the Hamilton Centre of the R.A.S.C. on Jan. 22, Miss Northcott and Mrs. Fidler (Executive Secretary of the R.A.S.C.) suffered what might have been a serious accident when Mrs. Fidler's car went out of control and overturned. Miss Northcott spent the night in hospital with a superficial head injury, but is recovering well. Mrs. Fidler had bruises only. The car was badly wrecked.

Dr. A. W. Brewer of the Department of Physics, who sometimes attends our Countdowns, and Mrs. Brewer suffered serious burns as a result of a paraffin fire in their home in Thornhill a few weeks ago. Dr. Brewer has been discharged from hospital, but Mrs. Brewer is still there.

### Named Subcommittee Member

Dr. Roeder has agreed to serve on a subcommittee of the I.A.U. National Committee to study the feasibility of founding a Canadian professional astronomical journal.

### Alumni

Doug Hube writes that Kam Leung (1963-64) is at K.P.N.O. this month on an observing session. He also says that during the next two months DDO alumni are scheduled to use more than one half of the available time on two Kitt Peak telescopes.

Christine Coutts (Ph.D. 1967) has returned from her post-doctoral stint at Asiago and is spending a few months working with Mrs. Hogg.

### Gift.

Dr. MacRae reports that Mr. D. M. Dunlap, grandson of the DDO Founder, has made a gift of \$2000 to the Observatory as a token of the continuing interest of the Dunlap family.

### Red's Luck

"Red" Durdle, former ZIC of maintenance in the Physics Tower and Frank McDonald's vacation substitute at the Observatory last summer, has been promoted to be caretaker at the new girls' residence of New College.

### Omission

The name of Raymonde Verreault was inadvertently omitted from last month's list of those attending the "Texas" Symposium.

### Let's Get This Strite

It turns out that the name of Mrs. Alice Streit, new Secretarial Assistant at the Department, is pronounced Strite, not Straight as earlier stited. So, it turns out that only Dr. Roberts has been raight all this time.