

**INTDS
NEWSLETTER**

**August 1998
Vol. 25, No. 1**

CONTENTS

- Editor's Note 1
- Conference Announcement 2
- Election of INTDS Board Members 3

Technical contributions

- * *A statistical Analysis of INTDS World Conference Attendance and Participation* 4
J. P. Greene and K. L. Unterzuber
Argonne National Laboratory
- * *High-Speed Mechanical Motion in Vacuum* 10
W. Lozowski
Indian University Cyclotron Facility

- Advertisements
- INTDS Membership list

The INTDS Newsletter is an informal source of information for and from the membership. The INTDS assumes no responsibility for the statements and opinions advanced by the contributions.

Cover picture: Jef Van Gestel loading an electron beam evaporator at IRMM for the preparation of ^{10}B reference layers for neutron fluence rate monitoring.

Editor's Note

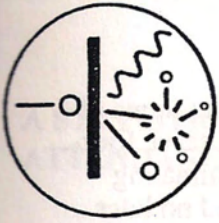
Dear Colleagues,

Any last abstracts for the INTDS conference? The official closing date was July 31. Full information can be found on <http://www.ornl.gov/isotopes/intds.htm>. If you cannot travel to Oak Ridge for this conference or if you cannot produce a suitable conference paper please remember the INTDS Newsletter is always pleased to receive short technical contributions.

The INTDS publication database has been updated on 23 July 1998, and now includes 786 publications on target preparation and related topics. If you would like a copy (or an updated copy) of this EXCEL database, I can send this on email. Please contact me on ingelbrecht@irmm.jrc.be.

Chris Ingelbrecht
Editor

International Nuclear Target



Development Society

ornl

19TH World Conference of the INTDS

*Nuclear Targets
Preparation, Characterization, and Use*

**Oak Ridge, TN, USA
October 5-9, 1998**

Second Announcement and Final Call for Papers

The 19th World Conference of the International Nuclear Target Development Society will be held in Oak Ridge, Tennessee, USA on October 5-9, 1998. Topics of this Conference will include the preparation, characterization, and use of targets in low, medium, and high energy accelerator experiments and applications and will include radioactive ion beam studies.

Contributions are encouraged in the following and related areas:

- Enrichment of stable and radioactive isotopes,
- Chemical and physical processing of research materials,
- Target preparation techniques,
- Target characterization,
- Target influences on experiment design and interpretation, and
- Radioactive ion beam studies.

Program Committee:

W. Scott Aaron, ORNL, Oak Ridge, TN, USA
 Harold Adair, ORNL-retired, Oak Ridge, TN, USA
 John Greene, ANL, Argonne, IL, USA
 Joanne Heagney, Micro Matter Co., Deer Harbor, WA, USA
 Chris Ingelbrecht, IRMM, Geel, Belgium
 Bill Lozowski, IUCF, Bloomington, IN, USA
 Peter Maier-Komor, T. U. München, Garching, Germany

Organizing Committee:

W. Scott Aaron, Co-Chair
 Harold Adair, Co-Chair
 Lee Zevenbergen
 Joy Lee, Conference Office

Deadlines:	Hotel Reservation	September 1, 1998
	Registration	July 31, 1998
	Submission of Tour Information Forms	July 31, 1998
	Submission of Abstracts	July 31, 1998
	Submission of Papers	October 5, 1998

Publication of Proceedings: Nuclear Instruments and Methods in Physics Research

Contact:

W. Scott Aaron Telephone: 423-574-5916 Fax: 423-574-1900 e-mail: wxa@ornl.gov

Mailing Address: ORNL, P. O. Box 2009, Oak Ridge, TN, USA 37831-8044

July 31, 1998

Dear INTDS Member,

The following is a ballot for the election of three (3) Directors to fill the expiring terms of Pete Gobby, Scott Aaron, and Anna Stolarz. The newly elected Directors will serve four-year terms. Your completed ballot may be either mailed or FAXED to the Nominating Committee Chairperson, Hans Maier at the address given below, to be received no later than Sept. 25, 1998, or it may be brought to the Conference in Oak Ridge. The following slate of Candidates are those Members nominated by the Nominating Committee.

Sincerely yours,

Joanne M. Heagney
Joanne M. Heagney,
Corresponding Sec.-Treasurer

.....

1998 INTDS BOARD OF DIRECTORS ELECTION BALLOT

Candidates Nominated by the Nominating Committee:

- Pete Gobby
 Anna Stolarz
 Andrzej Lipski

Write-in Candidates:

-

Please vote for no more than three (3) candidates. **BALLOTS WITH MORE THAN THREE (3) VOTES WILL NOT BE COUNTED!** Please sign and print your name on the ballot. You may bring the ballot to the conference at Oak Ridge or mail or FAX it to the following address, to be received no later than September 25, 1998.

H. Maier
 Universität München
 Sektion Physik
 Am Coulombwall 1
 D-85748 Garching
 Germany
 FAX: 49-89-2891-4034

Signature

Printed Name

Post-It [®] Fax Note	7671	Date	8/5/98	# of pages	1
To	Chris Engelbrecht	From	J. HEAGNEY		
Co./Dept.	IRMK	Co.	MICROMATTER Co.		
Phone #		Phone	(360) 376-4007		

A STATISTICAL ANALYSIS OF INTDS WORLD CONFERENCE ATTENDANCE AND PARTICIPATION

*John P. Greene and Keri L. Unterzuber
Physics Division, Argonne National Laboratory, 9700 South Cass Avenue,
Argonne, IL 60439 USA*

Abstract

In order to ascertain projected trends, if any, in attendance and participation at INTDS World Conferences, we have examined the pertinent data available from the Proceedings of the past INTDS World Conferences. The tables and plots derived illustrate the current trends in member attendance and participation in these conferences. The data compiled here might be of use in planning future conferences.

1. Introduction

In the planning of an INTDS World Conference, it would be helpful to know what level of participation to expect. To a first approximation, the participation is reflected by the membership of the INTDS as a whole. It is for this reason that the membership information was also collected. Analysis of the data would reveal any fluctuations in membership, number of papers presented at the conferences, information, we hope, of value to the INTDS.

2. Data Collection

To determine the number of INTDS members for any given year, the total membership was obtained from the membership lists published in the INTDS Newsletter [1-16]. Table 1 gives the number of members and date of issue for each of the INTDS Newsletters. It should be noted that this is an incomplete set of data, taking into account only those INTDS Newsletters available to the authors. The data range covers a ten year span and it should be sufficient to illustrate any overall trends in INTDS membership.

Any information available from the INTDS membership regarding total membership numbers prior to 1987 would be helpful in assembling a complete historical picture.

Attendance at, and participation in, INTDS World Conferences data was derived from the individual INTDS Conference Proceedings [17-32]. Not included here is the Workshop held at Argonne National Laboratory, October, 1982. Tabulated data include the number of people participating, the number of countries represented and the total

number of papers presented at each of the eighteen INTDS World Conferences held so far. The data are presented in Table 2. This listing is also incomplete as there were no numbers available from the first two conferences held in Montreal and Oak Ridge.

Any information available from the INTDS membership regarding these two conferences would be welcome.

3. Analysis of the Collected Data

The data are tabulated from the referenced sources and entered into a database such as Microsoft Excel. Plots are then drawn using Microsoft Excel or Origin 4.0.

3.1 INTDS Membership

In order to investigate a perceived drop in INTDS membership, the member data from Table 1 is plotted for the ten year span 1987 to 1997. The plot of Figure 1 shows a peak in membership in December 1992 of 102. Currently, the membership is shrinking slowly with the most recent membership total of 72 as of December 1997.

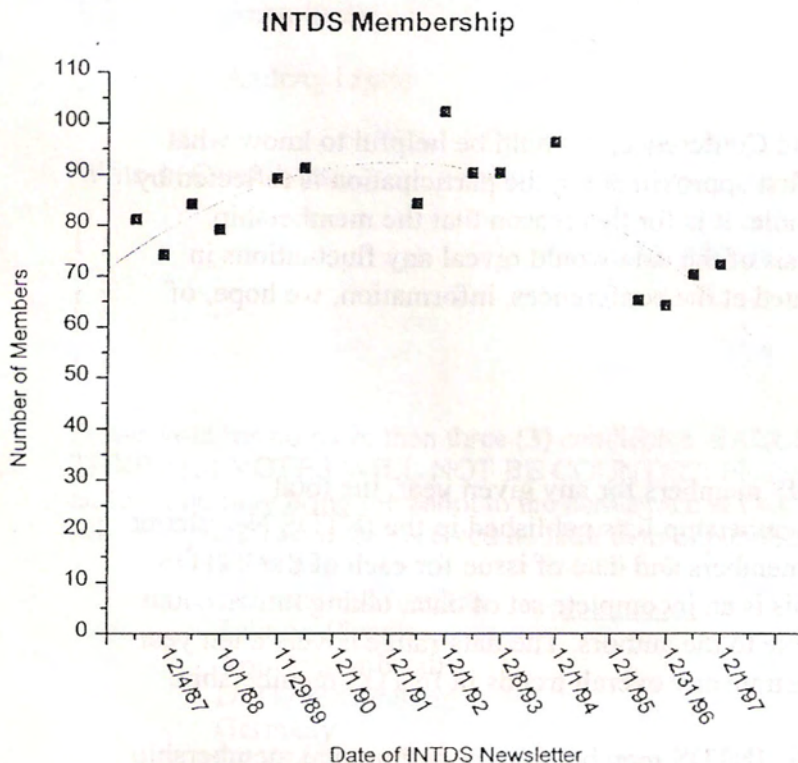


FIGURE 1. INTDS annual membership derived from the Newsletter.

One might question the importance of membership statistics regarding INTDS Conference participation. It should be argued that INTDS Conference participation is not limited to members and so may not be coupled as such. In fact, the INTDS should strive to attract participation from outside the membership.

3.2 Attendance and Participation at the INTDS World Conferences

In order to investigate a perceived drop in the number of papers presented at the INTDS World Conferences, data have been compiled for the number of papers presented at each of the conferences where the data are available. These numbers, taken from Table 2, are plotted in Figure 2. Although it is apparent that the number of papers presented varies widely, it clearly follows closely the number of attendees (see Table 2). It may be more helpful to plot the number of papers as some fraction of the attendees. Also apparent is an overall slow increase in the number of papers presented as illustrated by the line fitted to the data. There is an indication that the number of papers might be leveling off at approximately 40 papers since about 1990. This remains to be seen at future conferences.

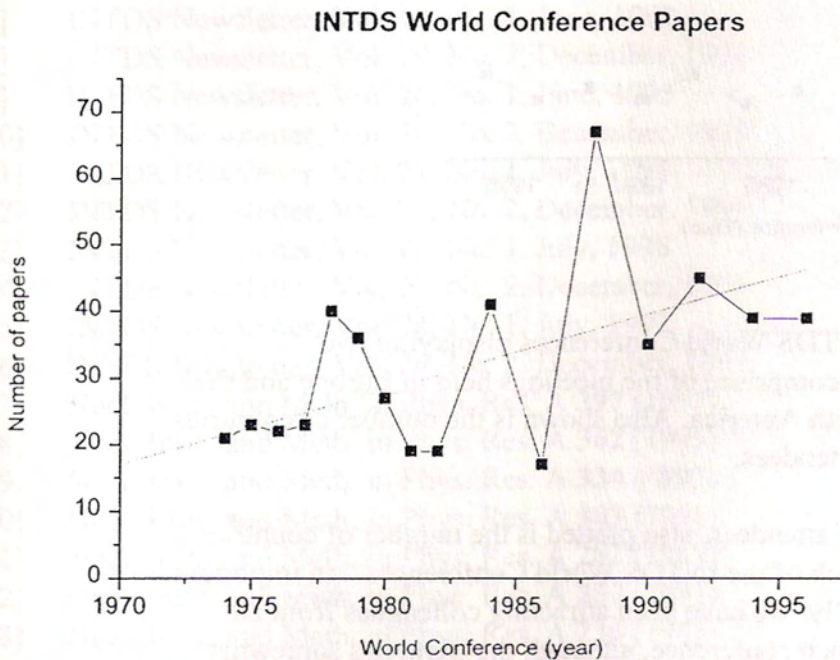


FIGURE 2. Number of papers presented at each of the World Conferences showing a steady increase through 1992 and possible leveling off since.

In an effort to predict future conference attendance, a plot is given in Figure 3 showing overall conference attendance. Besides the data missing for the first two conferences, the number of attendees and countries represented was not available from the Proceedings of the 10th World Conference held in Israel. As before, the data presented vary widely. It becomes evident from the plot that the attendance, with a few exceptions, condenses roughly into two populations reflecting the European and North American Conferences, respectively. On the whole, the North American conferences attract only about one-half of the attendance that the European conferences do. This occurs for many reasons, the overwhelming fact being the cost of trans-Atlantic air transportation.

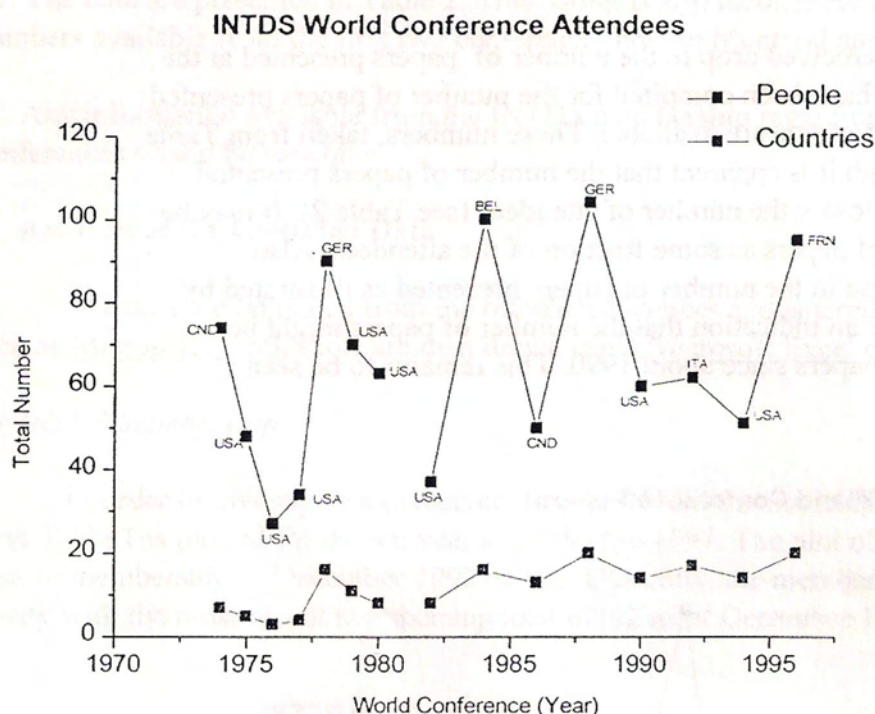


FIGURE 3. Attendance at the INTDS World Conferences displaying two populations roughly comprised of the meetings held in Europe and the meetings held in North America. Also shown is the number of countries represented by the attendees.

In addition to the number of attendees, also plotted is the number of countries represented by these attendees at each of the INTDS World Conferences. An important point to the INTDS is that historically, we have been attracting colleagues from an increasing number of countries at each conference, although the trend has somewhat leveled off.

Conclusion

In conclusion, the data seem to indicate that there are no alarming trends regarding the INTDS membership at the present, although the membership is on the decline. The data also show that participation is greater at the INTDS World Conferences held at sites in Europe. These conferences have traditionally attracted more attendees, by approximately a factor of two. Based on this analysis, the INTDS might wish to improve its efforts at attracting new members and also to publicize its World Conferences to a larger audience.

Acknowledgments

The authors would like to thank Dr. Walter Henning, the Physics Division Director, and Dr. Irshad Ahmad, the Target Facility Group Leader, for their continuing support of these efforts. This work is supported by the U.S. Department of Energy, Nuclear Physics Division, under Contract No. W-31-109-ENG-38.

References

- [1] INTDS Newsletter, Vol. 14, No. 1, August, 1987
- [2] INTDS Newsletter, Vol. 14, No. 2, December, 1987
- [3] INTDS Newsletter, Vol. 15, No. 1, August, 1988
- [4] INTDS Newsletter, Vol. 15, No. 2, December, 1988
- [5] INTDS Newsletter, Vol. 16, No. 1, December, 1989
- [6] INTDS Newsletter, Vol. 17, No. 1, June, 1990
- [7] INTDS Newsletter, Vol. 19, No. 1, June, 1992
- [8] INTDS Newsletter, Vol. 19, No. 2, December, 1992
- [9] INTDS Newsletter, Vol. 20, No. 1, June, 1993
- [10] INTDS Newsletter, Vol. 20, No. 2, December, 1993
- [11] INTDS Newsletter, Vol. 21, No. 1, July, 1994
- [12] INTDS Newsletter, Vol. 21, No. 2, December, 1994
- [13] INTDS Newsletter, Vol. 23, No. 1, July, 1996
- [14] INTDS Newsletter, Vol. 23, No. 2, December, 1996
- [15] INTDS Newsletter, Vol. 24, No. 1, July, 1997
- [16] INTDS Newsletter, Vol. 24, No. 2, December, 1997
- [17] Nucl. Instr. and Meth. in Phys. Res. A **397** (1997)
- [18] Nucl. Instr. and Meth. in Phys. Res. A **362** (1995)
- [19] Nucl. Instr. and Meth. in Phys. Res. A **334** (1993)
- [20] Nucl. Instr. and Meth. in Phys. Res. A **303** (1991)
- [21] Nucl. Instr. and Meth. in Phys. Res. A **282** (1989)
- [22] Nucl. Instr. and Meth. in Phys. Res. A **257** (1987)
- [23] Nucl. Instr. and Meth. in Phys. Res. A **236** (1985)
- [24] Proc. 11th World Conf. Int. Nuclear Target Development Society, Seattle, WA, USA, 1982
- [25] Proceedings of the 10th INTDS World Conference, Rehovot, Israel, (1981)
- [26] Nuclear Instruments and Methods **200** (1982)
- [27] Proc. World Conf. Int. Nuclear Target Development Society (1979), ed., J. Jaklovsky (Plenum, New York, 1981)
- [28] Nuclear Instruments and Methods **167** (1979)
- [29] Proc. of the Sixth Ann. Conf. of the INTDS, Berkeley, CA, USA (LBL-7950)(1977)
- [30] Proc. 1976 World Conf. of the INTDS, Los Alamos, NM, USA (LA-6850-C) (1976)
- [31] Proc. 4th Ann. Int. Conf. Nuclear Target Development Society, Argonne National Laboratory, Argonne, IL, USA, ANL/PHY/MSD-76-1, 1975
- [32] Proc. of the 3rd World Conf. of the INTDS, Chalk River, Ontario, Canada, (AECL-5503)(1974)

TABLE 1. Total INTDS Membership listing taken from the INTDS Newsletters**INTDS Membership**

<u>Date</u>	<u>Members</u>
2/4/87	81
12/4/87	74
6/17/88	84
10/1/88	79
11/29/89	89
5/1/90	91
5/8/92	84
12/1/92	102
5/26/93	90
12/8/93	90
12/94	96
7/31/96	65
12/31/96	64
7/97	70
12/97	72

from [Ref's 1-16]

TABLE 2. Tabulated data derived from INTDS World Conference Proceedings

<u>World Conf.</u>	<u>Year</u>	<u>Place</u>	<u>People</u>	<u>Countries</u>	<u>Papers</u>
18	1996	France	95	20	39
17	1994	USA	51	14	39
16	1992	Italy	62	17	45
15	1990	USA	60	14	35
14	1988	Germany	104	20	67
13	1986	Canada	50	13	17
12	1984	Belgium	100	16	41
11	1982	USA	37	8	19
10	1981	Israel	---	---	19
9	1980	USA	63	8	27
8	1979	USA	70	11	36
7	1978	Germany	90	16	40
6	1977	USA	34	4	23
5	1976	USA	27	3	22
4	1975	USA	48	5	23
3	1974	Canada	74	7	21
2	1973	USA	---	---	---
1	1972	Canada	---	---	---

from [Ref's 17-32]

A Pulsed-Beam Chopper with High Speed in Vacuum

W.R. Lozowski, V.P. Derenchuk, R.R. Kupper, R.J. Brown, F. Sperisen, B. Hamilton
Indiana University Cyclotron Facility, Bloomington, IN 47408

An electrical motor, gear drive, and a 13-cm diameter chopper-wheel combination was developed to operate at a final drive speed of 400 Hz (24,000 rpm) in a 10^{-7} -mbar vacuum. Intermediate 1-2 h operation was expected, however, the chopper assembly has run without maintenance and perfectly for periods of up to 8 h on more than 60 days. The chopper is part of the current project at IUCF to build a pulsed, polarized ion source for protons and deuterons. It is hoped the information gathered and gained to achieve high-speed operation of the motor and gearing will be useful to Newsletter readers.

1. Motor

The motor used was a pulsed-DC step motor (Slo-Syn model M06-LE08, Superior Electric, Bristol, CT, USA) rated to supply 190 mN-m (27 oz-in) torque at 1500 rpm (3000 rpm max.). It was prepared for vacuum operation at IUCF as described below. Note that the armature of these motors is de-magnetized and the motor ruined if the armature is removed from the motor housing. With care, it is possible to open the housing and access the bearings without so doing.

In operation, the motor speed was ramped up or down at the rate of ~ 25 rpm/s. This avoided excessive inertial load forces in the drive gears.

2. Bearings

While ceramic ball bearings in stainless-steel races were the ideal choice for sustained high-speed operation in high vacuum, these are expensive (typically \sim \$100 US/bearing). For our application, an oil-free apparatus was not required, although it needed to be nearly so to allow operation nearby of a sensitive time-of-flight mass spectrometer. Completely satisfactory performance of the motor and gearhead bearings was achieved by replacing the standard lubrication grease in them with a specific oil [1]. First, the bearings were thoroughly cleaned with toluene and acetone. Thereafter, the bearing balls were coated with a thin film of Fomblin perfluoro-polyether vacuum pump oil (Ausimont Co., Morristown NJ 07962, type YL-25/6, available from Kert J. Lesker Co., USA, England, Germany, Hungary). Excess oil was blotted.

3. Gearhead

A small, commercial speed-reducer (Secs, Inc., 520 Homestead Ave., Mount Vernon, NY 10550, model SR18, 17.00:1, torque rating of 457 mN-m) was used. It worked well as a gearhead to provide a 1:17 ratio increase. Thus, a motor speed of only 1412 rpm produced a final shaft speed of 24,004 rpm. Aside from opening the gearbox to remove the grease and to apply the Fomblin oil, the only modification was to drill a vent hole of 0.5-mm diameter in the aluminum housing.

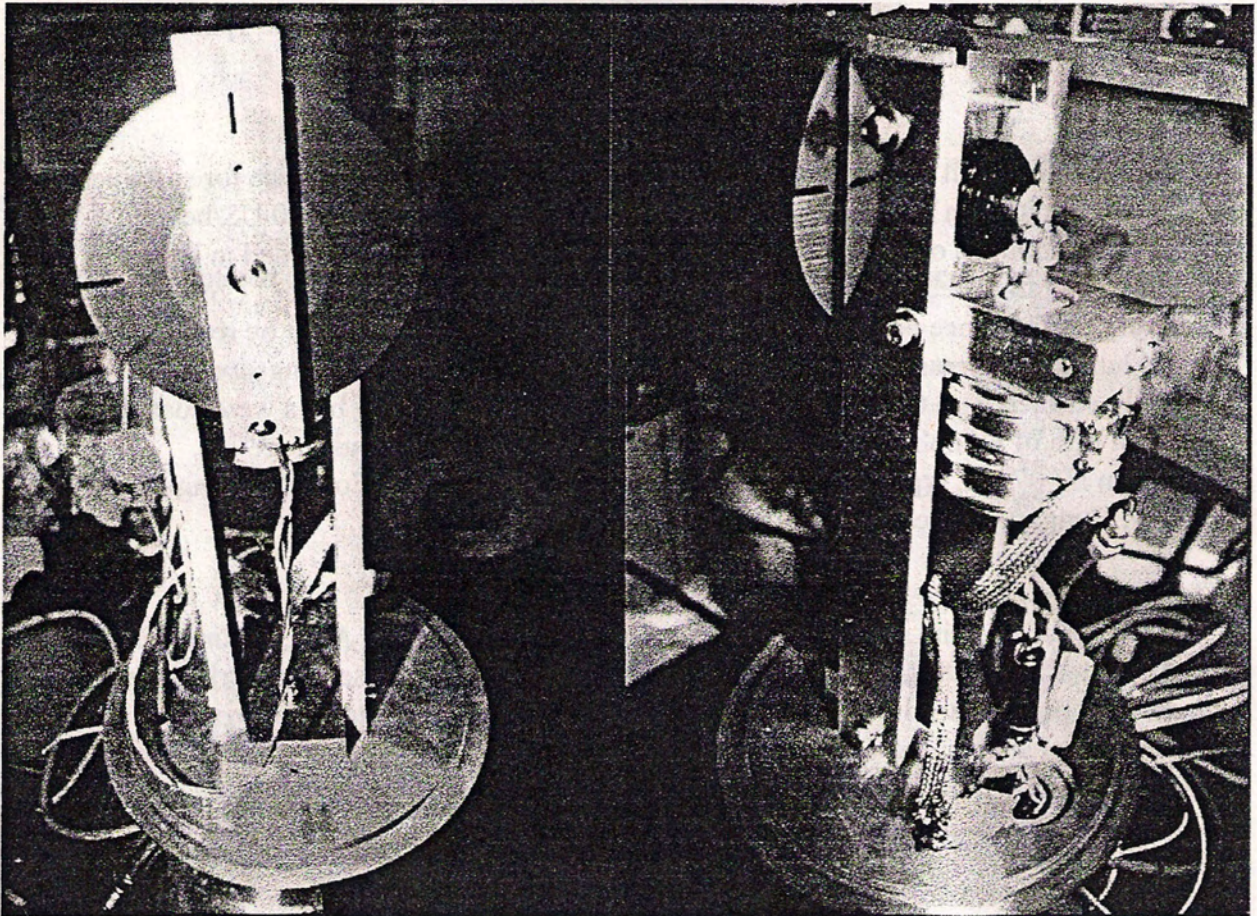
[1] Private conversation with Tom Wise, University of Wisconsin

4. Cooling

The motor and gearing was cooled with 296-K water. The water was delivered to the motor housing via 1-mm ID copper tubing soldered to a circular strip of 1.5-mm-thick Cu sheet drawn tight to the housing. Indium foil was used ensure good thermal contact of the motor support block (Al), the gearhead support block (Al), and two aluminum supports which positioned the assembly. Through conduction to the room air, these last-listed supports (total cross-sectional area of $\sim 16 \text{ cm}^2$) were thought to lower the operating temperature by $\sim 8 \text{ K}$. Additional water cooling was not used for the gearhead. During operation, thermal equilibrium was reached at 307 K (max. allowable motor temperature: 400 K) in the motor support block and 312 K in the gearhead housing.

5. Chopper wheel

At 400 Hz, the output shaft of the gearhead had sufficient available torque to drive a 13-cm diameter wheel and hub with a total weight of $\sim 10 \text{ g}$. To stay within this limit, an aluminum two-piece hub was made to support an old-style PC floppy disk (13 cm in diameter and nicely planar). The hub was machined to center the 28.7-mm diameter center hole of the disk and to pinch-clamp the ring of disk area within diameters of 28.7 mm and 34 mm. Three nylon screws bound the hub and wheel. The combined weight of the screws, hub, and wheel was 8.7 g.



Figs. Chopper assembly mounted on a 20-cm diameter flange. The slotted disk at the top is an old style "five-and-a-quarter" floppy disk (13 cm in diameter).