ACTR/Q

DATA ACQUISITION UPDATE

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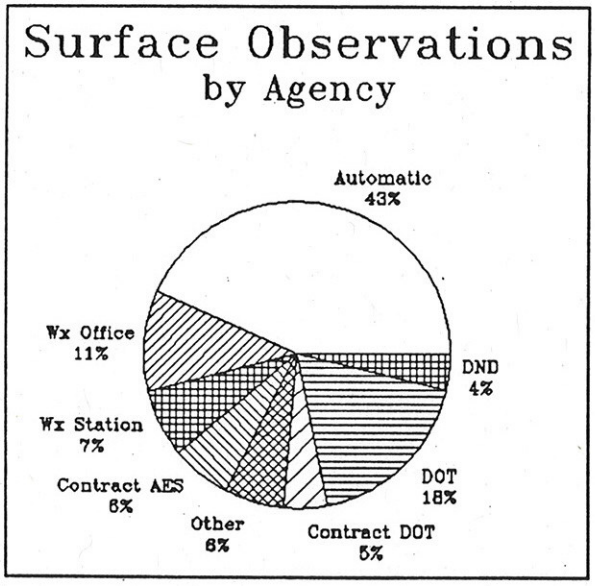
Automation of Canada's surface observing network

by Ken Devine

Surface observations are supplied by many different agencies. At present AES supplies 67%



of all observations to the system. The Department of Transport takes or pays for 23%, the Department of National Defence 4% and other agencies 6%. There were 3.2 million hourly observations taken in Canada last year. The trend in surface observations is to automate in almost all cases.

In the spring of 1969, the first operational automatic observing station, a MARS 1, was installed at Liard River, B.C. At that time AES supplied only 55% of all observations. Although the number of manned stations increased 20% by 1990, autostations supplied 93% of the increase in observations. In 1990 automatic stations supplied 1.25 million hourly observations.

The future of surface observing lies with automatic observing systems despite concerns with the type, quality and reliability of machine observations. These concerns will have to be addressed before automatic observations realize their full potential. In 1990, 25 new automatic stations were installed which will supply another 220 thousand observations per year. At this rate, one half of the surface observations will be taken by automatic stations by 1995.

The number of manned observations has changed little in the last twenty years. Manned observations will continue to occupy an important place in the surface network mainly due to the versatility of the observers. As these observers become much more concerned with their other

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duties, then automation may be a better method. Surface observations will continue to be important since they supply groundtruthing for remote sensing systems as well as information unavailable by those techniques. ■

Requirements for polar-orbiting satellite data are met using 3 receiving stations

by Oscar Koren

The current configuration of 2 receiving stations at Edmonton and Toronto results in real-time data from the circled areas shown in Figure 1.

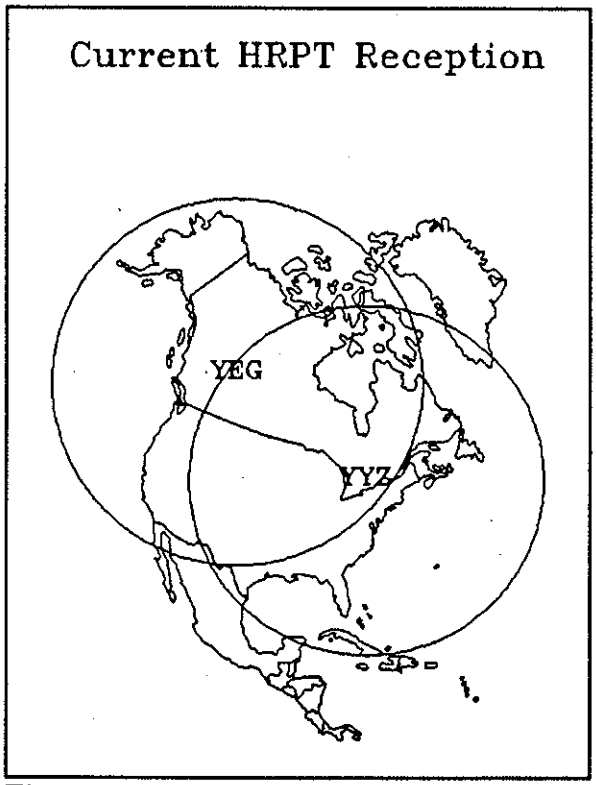

Figure 1

The proposed configuration (Figure 2) of 3 polar-orbiting satellite receiving stations at Edmonton, Halifax and Resolute Bay will result in increased coverage over the Western Atlantic and over the Arctic of:

- high resolution imagery data;
- vertical sounding data;
- ARGOS Data Collection and Locating System (DCLS) data;
- sea-state and sea-ice data from future satellites; and
- other research data.

Requirements for polar-orbiting satellite data over the eastern Pacific would be better met if a receiving station were placed at Vancouver; however, with a GOES receiving capability already there, we are able to obtain cloud data every 30 minutes.

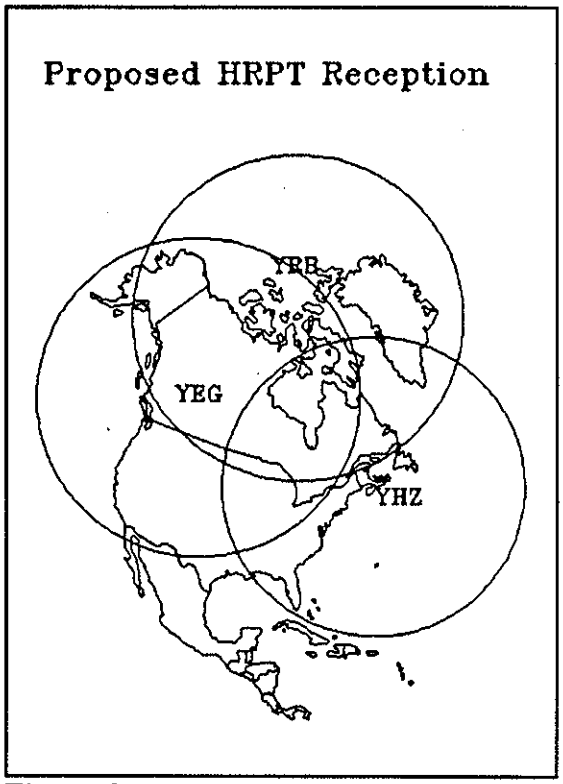

Figure 2

Since the first polar-orbiting meteorological satellite was placed in orbit in 1960, satellite data has become an essential part of the information required by a number of AES Programs.

Weather Services Program - Forecasters use satellite imagery to identify and analyse different cloud systems and to predict their movement and development. Satellite imagery is the only source of data over the Arctic with a resolution required by a meteorologist to issue weather forecasts and warnings. Satellite data also forms part of the

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meteorological database, used as input to numerical prediction models. The ARGOS DCLS on-board the NOAA series of polar-orbiting satellites permits the reception of data from drifting buoys and the calculation of their locations.

Ice Program - Satellite observations of icebergs and of general ice conditions provide an essential input for decisions affecting Arctic transportation and other Arctic activities. Ice observations are also required for ice research and are part of the international data exchange program.

Air Quality Program - Satellite observations of ozone, smog and other forms of pollution provide an important source of data, particularly over the Arctic, for various air quality research projects.

Climate Program - Satellite data is used to support the climate research, particularly over the Arctic, and the impact that the environmental change may have on it. Data is being collected and archived to allow for future studies. ■

Status of AES sunshine sensor

By John Cook

The first 6 months of detailed data from the Downsview test site have been analyzed, and a preliminary paper has been written. The final paper of one year's data is to be presented at the WMO TECO Conference at Vienna in May 1992. The paper will discuss the difficulties of threshold calibration as it relates to the Campbell Stokes sensor, the sun tracking pyrheliometer, local climatological conditions and changing threshold standards.

We are currently procuring 10 additional sensors for further field trials in the Regions and the CARE site at Egbert. Discussions are to proceed with the Canadian Climate Centre for the test procedures to be used for field tests. Agriculture Canada has expressed a real need for an automated sunshine sensor at its sites. The procurement is proceeding smoothly, with the exception of controlling the quality of the blown glass globes. We are investigating other manufacturing techniques that would yield a more uniform product.

The U.S. National Weather Service has also been evaluating sunshine sensors. Their preliminary report of sensor comparisons is quite favourable to the AES sensor. Another sensor has been promised to them from the next procurement for continued evaluation in lower latitude applications. ■

Harris Wong receives award for AES

By D. Dockendorff

On May 7, 1991 Harris Wong accepted a plaque on behalf of Environment Canada from the American Society for Metals (ASM). The award was issued in recognition of Harris' valuable assistance in furthering the aims and purposes of the Society and the Ontario Chapter. The Society reviews and analyses advanced materials, surface protection techniques for corrosion resistance, manufacturing methods, lubricants and other materials for a wide variety of applications.

Harris is an engineer in the Technology Division and he has been a participating member of the ASM for ten years. Harris' professional engineering duties have been aimed at a variety of projects, and products including radar bearings, lubricating agents, radar tower hoists, anemometer towers, and housings such as the radiometer dome. He has been the focal point as an internal expert in these areas and is a valued employee. ■

Basic sensors being tested at C.A.R.E.

By R. Van Cauwenberghe

In order to support procurement decisions for several Directorates, a test was set up at the CARE site.

Under evaluation are 13 humidity sensors from 3 different manufacturers as well as 9 temperature sensors which are part of these sensors. The manufacturers are Campbell Scientific, Rotronics and Multisens. Five thermometer screens are under evaluation as well, including two R.M. Young screens and a marine screen.

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At the same site five Stevenson screens, all fitted with different roof materials, are on test. The purpose of this test is to find a roof material which will be a suitable alternative to asbestos.

Reference temperature, humidity, wind and radiation data is being recorded to support the analysis. All of the data is being logged on a CR7X data logger. ■

DND implements mesoscale observing network

By Steve Hardaker

The Department of National Defence has installed a mesonetwork of eight automatic weather stations on the CFB Gagetown Range, an area of approximately 1150 square km located in southern New Brunswick. The network was installed primarily to improve forest fire danger assessment but data is collected year-round.

The network is a telemetry-based system of Campbell Scientific CR10 data-loggers. Two repeater stations are also part of the system. The stations are powered by batteries which are recharged by solar cells. The present sensor configuration measures temperature, relative humidity, rainfall, and wind speed and direction. Currently, three types of data summaries are produced and stored for transmission to the network base-station: Hourly summaries (24/day), Fire Weather Index (FWI) summaries (3/day), and AES climate summaries (2/day). The FWI summary is used operationally but all data are archived on floppy disks and tape cartridges for later analysis.

The network's independence from power and communications lines permitted great latitude in accommodating meteorological considerations since stations could be sited anywhere.

The system operates unattended and, at various times, automatically retrieves actual and forecast FWI data, calculates actual and forecast indices, and transmits the information to Range Control, Forestry Canada, and to the New Brunswick Provincial Fire Centre. ■

Transport Canada selects new RVR sensor

By R. Van Cauwenberghe

For the past forty years, Transport Canada (TC) has relied on the transmissometer as the visibility sensor for the calculation of Runway Visual Range (RVR). The READAC sensor evaluation project which was conducted by the ACSL Test and Evaluation Unit at St. John's, Newfoundland, concluded that two forward scatter type sensors provided reliable and accurate visibility measurements in all types of weather. In fact, it was found that the performance of the Belfort and Qualimetrics sensors was equal or superior to a transmissometer. Since the cost of the Belfort sensor was slightly less than that of the Qualimetrics, AES selected it for the READAC visibility sensor and Qualimetrics was chosen as an alternate.

Whereas transmissometers are large, expensive, costly to maintain and require considerable space (75 metres), the forward scatter sensors are less costly, much smaller, mount on a single post and require very little maintenance. On this basis, Transport Canada decided to replace their transmissometers with forward scatter meters. Because they required additional diagnostic data which was not available from the Belfort sensor, TC opted to purchase the Qualimetrics unit. They have since ordered 108 of these sensors and expect to realize some very significant cost savings in the process. The Department of National Defence has also ordered a number of these sensors. ■

Advanced PIs for READAC

By C.E. Robinson

The Rev.B Generic Peripheral Interface (PI) designs have been completed and a new printed circuit layout has been sent for photoplotting. The specific adaptations of the generic PI for Cloud, Visibility and POSS PIs are being formalized and a model of each of the new Rev.B PCB versions will be constructed and confirmed before procurement.

Formal procurement documentation and contract material were prepared for quotation in

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September. The new PIs will be procured as a "make-to-print" fabrication and assembly contract; and AES will take the engineering responsibility.

Test procedures and jigs will be provided to the contractor, as necessary, to ensure proper performance of the PIs and a quality assurance monitor will be assigned. We are planning to procure 37 Cloud, 37 Visibility and 20 POSS PIs for implementation with the new Qualimetrics laser ceilometer, Belfort forward scatter meter and POSS sensors. We anticipate delivery from the contractor to be approximately January 1992 assuming there are no surprises. ■

Remote video observations protect mountain passes

By John Thomas

Transport Canada and the Canadian Coast Guard have been using remote video cameras in B.C. for a number of years in order to determine weather conditions for flying. Knowing the elevation of the terrain being viewed and its distance from the camera, a fairly accurate assessment of ceiling, visibility and precipitation occurrence can be made. In an area without a manned observation, this information is invaluable. At remote sites on the Queen Charlotte Islands, the CCG can determine whether or not their helicopters will be able to land with service crews. No flights are aborted due to below limits weather.

In 1989, a camera system was installed by Transport Canada at Manning Park Lodge about 8 km east of Allison Pass. Readouts for the system were placed in the Kelowna Weather Office, Abbotsford and Vancouver Flight Service Stations, and the Pacific Weather Centre. The system operates by taking a single image (black and white) on demand and transmitting it via telephone line to the receiving sites. The camera is dialed up and controlled via touch tone signals to retrieve and transmit an image. The 2 cameras, pointing east and west along the valley are housed in an environmental shelter with windshield wipers that can be turned on and off by the remote operator. The capturing and transmission hardware is off-the-shelf technology.

The images are used for aviation weather briefings and are used extensively in the Weather Centre for the VFR Route Forecast from Hope to Princeton. While the images are useful for determining visibility and ceilings below about 5000 feet, the 300X190 pixel resolution of the NTI 2000 equipment leaves much to be desired. In order to increase the resolution and the definition of clouds, the Pacific Region is developing a system using color cameras with a more powerful PC-based operating system.

The proposed system will use high resolution color cameras and software to grab single frame images which can be displayed in VGA (640X640 pixels) on any PC with a VGA display capability. The system will store the images at the camera site and will download via telephone to any PC which dials into the system. Software will be developed to animate the images after they are downloaded. This will enable a user to dial up, download a series of images at 1 or 1/2 hour intervals and animate them.

The contract for the development of the operating system was awarded to Dedicated Technologies Ltd. and a prototype system will be delivered in December. The system will then be installed at Manning Park and tested in parallel with the black and white system. Further development work and operational use will be determined after the spring trials. Pacific Region, the sponsor of this project, is optimistic about the system's potential. ■

READAC installations proceeding smoothly

By Rick Lee

Over the past 6 months, a team of Regional staff, led by the Autostations Life Cycle Manager in the Operational Data Acquisition Systems Division has installed 12 READAC autostations from Hope in the Pacific Region to Churchill Falls in the Atlantic Region.

Tad Drozdz, Ron Bezant and Dave Stiles have assembled the many dozens of components required at each site and shipped them to the site prepared by each Region. In a cooperative effort, each autostation was installed, principally led by Dave Stiles. Dave also provided electronics maintenance training to Regional staff on the

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READAC, the Belfort Visibility Gauge and the 8329a laser ceilometer. Assistance was also provided to DND at Cold Lake.

Regional staff, prepared through training and hands-on installation experience, went on to install successive READACs in their Region. By next spring, the balance of READAC installations will have been completed.

The installation phase of READAC has proceeded on time and by all accounts, the autostations are operating reliably. ■

Edmonton Doppler radar announced

By Bill Hume and Dave Burnett

On May 17, the Honorable Don Mazankowski officially announced the Edmonton Doppler Radar to the Canadian public. The project, managed by Bill Hume of Western Region, falls under the AES Doppler Radar Program headed by Eric Aldcroft. The project's successful completion was the result of a concerted effort by John Scott and staff of the ARMP King City radar group with the assistance of many regional and headquarters staff.

The radar upgrade was one of the 4 Doppler radars announced under the Green Plan earlier in the year.

The project saw the C-band radar system located at Carvel, 15 km west of Edmonton, upgraded to a Doppler system. It involved replacement of the processor with an Enterprise supplied upgrade, addition of a Lassen PSP32 signal processor and duplication of the King City imaging and display system. Two King Automated Radar Display System (KARDS) workstations were purchased for the Alberta Weather Centre (AlWC) and the Edmonton Weather Office. As well, the 14-monitor 5-DROP display system was mounted in the AlWC. The full suite of animated Doppler, conventional CAPPI and severe weather products produced by the King based system is updated on a 10-minute cycle and is on display at all times in the Weather Centre. The project proceeded on schedule and well within the $600K budget originally proposed.

Proceeding concurrently with this project, the Canadian Forces Forecast Centre in Edmonton upgraded their display system making use of the Image Manager (IM) display system developed in Trenton. An interface was developed enabling display of all the Edmonton radar products on IM. That software will in turn be installed on Image Manager display systems in other Weather Offices in Alberta enabling display of all data from the Carvel radar and the conventional radars at Vulcan and Cold Lake. As well, through agreement with Alberta Research Council, some data has been received from the ARC C-band radar in Red Deer.

With the heightened public awareness of severe weather in Alberta after the 1987 tornado, a special emphasis has been placed on staff training to ensure effective use of the new system. Western Region was fortunate to have the services of Tom Nichols who had transferred from Toronto in March. Tom developed the initial training plan and has continued an on-the-job training program with AlWC staff.

The Doppler radar performance generally exceeded the expectations of the operational meteorologists who worked with it. Steve Blackwell of the AlWC has taken a lead role dealing with the media and the public to help explain the new technology. Public expectations were largely met in improved warning performance in the Edmonton area. However, because it was a quiet year for severe storms near Edmonton, Doppler capability could only be tested on the lower end of the severity scale.

This fall, Western Region will begin a more thorough evaluation of the upgrade. Consideration will be given to the performance of the radar facility itself, the utility of all the displays and the results achieved in the forecast program. Tom Nichols and the Severe Weather Team will review the 1991 season to determine where Doppler forecast techniques can be fine-tuned to further improve warning reliability. ■

Documentation support services

By Rick Lee

Do you ever wonder who produces the documentation, information bulletins, manual modifications, and the technical training material used by every staff member across AES involved in equipment maintenance? *Continued on page 7.*

The necessary, but often unrecognized labour is led by Joanne Pacini, Publications Editor, and supported by Gayle Thody in ACSO. Together, with draft documentation written by the Operational Support, and other Engineering staff, they maintain the original bilingual documentation for many of AES' operational systems. They respond to regional requests for copies and produce the documents needed for advanced maintenance training.

Over the past 6 months, a number of bulletins and modification instructions have been completed. Among them are:
- Solar Radiation (F);
- IWD/DCP;
- CWSR-81 Relay Replacement;
- CWSR-81 Brush Replacement for Azimuth/Elevation Drive;
- GMD/ADRES S/D Converter replacement;
- GMD/ADRES New Transpondersonde; and
- Waste Disposal for Precipitation Gauges.

In the coming months, look for:
- READAC Operators' Manual;
- Tilting Pole (F);
- Change 1 - MAPS II Maintenance;
- Remote Temperature Display (F); and
- IWD/DCP (F).

If you require copies of documents to maintain equipment, Joanne and Gayle can be contacted at (416) 739-4569 and (416) 739-4202. ■

Staffing completed for Doppler project office

By Eric Aldcroft

As of mid-August, the Doppler Project Office has had its full staff complement of six including the Project Manager. A memo was issued to Regions introducing the individual staff members, outlining their roles and suggesting who their primary contacts were likely to be in the Regions.

With the Project Office fully staffed, work started in earnest on the assessment of alternative approaches to implementing the complete national network of Doppler weather radars. The principal activity is to issue a "Price and Availability" enquiry to industry in order to better assess the viability and cost of alternative implementation approaches. Approaches that are under consideration for all or part of the national network include:
- retrofitting existing radars;
- purchasing new radars;
- purchasing off-the-shelf processing systems;
- developing (under contract or in-house) a processing system based on AES owned technology (i.e. King City and RDP);
- purchasing a radar service which uses privately owned equipment;
- leasing equipment; and
- employing government but privately operated equipment.

The project schedule now calls for the Project Office to provide the results of our evaluation of the alternative approaches together with recommendations in the spring of 1992.

The contract to Dopplerize the McGill radar was placed and work is now underway, with the first design review meeting having been held in July. The schedule for the McGill contract requires the system to be operational late in 1992. Due to a lack of funds, tentative plans to proceed with the Dopplerization of the Alberta Research Council's S-Band radar at Penhold have been cancelled. ■

Training workshops for operational data acquisition systems

By Rick Lee

The Operational Data Acquisition Systems Division (ACSO) is providing an increasing range of advanced maintenance workshops for AES regional staff and DND personnel. These workshops cover most meteorological observing systems in use in the AES.

Courses are led by specialist Technologists and Engineers from AES Downsview, and by experienced regional staff. The courses cover theory yet are oriented to the practical, hands-on approach to ensure that knowledge and skills are relevant to the maintenance and installation work that must be carried out.

New courses to be developed or currently under development include the Hydrogen Generator, UPS, READAC Level 3, RDP and 8329a (QL1214) Maintenance.

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Over the next six months, ACSO will be offering the following courses:

Planned

Course and Level	Dates	Location
CWSR-81 (L3)	2-27 Mar 92	Britt
Hydrogen Generator (L3)	Jan 92	Cornwall
Inspectors' Course (L3)	19-29 Nov 91	Toronto
	9-20 Dec 91	Toronto
MAPS-II Autostation (L2)	Dec 91	Toronto
MARS-II Autostation (L3)	Jan 92	Toronto
QL1212-1 Ceilometer (L3)	28 Oct-1 Nov 91	Toronto
QL1212-2 Ceilometer (L3)	4-8 Nov 91	Toronto
UPS-1 (L3)	3-7 Feb 92	TBD
UPS-2 (L3)	10-17 Feb 92	TBD

Tentative

READAC (L3)	Course to be developed and will be provided in mid-1992

Unscheduled Courses

Belfort Visibility (L3)	The introductory course is considered sufficient for Level 3 maintenance at present as sensors will not be operational until spring 1992.
GMD/ADRES	No additional requirement for training has been identified by Regions at this time.
8329a Ceilometers (QL1214) (L3)	As the 8329a will not be operational until spring 1992, no further training beyond the introduction is planned at this stage.
RBC	No further courses are planned.
READAC (L2)	No additional courses beyond the introductory courses provided during installation are anticipated for the balance of the Fiscal Year.
SCEPTRE (L3)	As the RDP project is advancing and will replace the SCEPTRE system, no further courses are planned.

Further information on Advanced Maintenance and Installation Training can be obtained from the Division Chief, Rick Lee at (416) 739-4559 or from one of the Course Directors at (416) 739-4566. ■

Personnel changes

- Tod Benko: relocated from Saskatoon to WAEOE.
- Hugh Black: transferred from ACSI to ACSO.
- George Davies: appointed Inspector, Winnipeg.
- Bill Flores: transferred from ACSI to ACSO.
- Peter Gunst: Inspector, Winnipeg, deceased.
- Tony Hilton: joined Atlantic Region from ACSL as Inspector.
- George Hoskins: transferred from Transport Canada to MAEOE.
- Gunar Ilzins: term appointment to develop the Hydrogen Generator Maintenance Course.
- Darryl Lynch: transferred from WSD, Downsview to DASB (Network Auto. Project).
- Paul Morse: Joined Doppler Radar Project Team from Transport Canada.
- Dejan Ristic: joined Doppler Radar Project Team from OWC.
- Gerry Rockwell: transferred from Forecast Operations to Inspector, Atlantic Region.
- John Schneider: transferred from WSD to Doppler Radar Project Team.
- Randy Sheppard: appointed Port Meteorological Officer, Atlantic Region.
- Rose Soylugil: term in Technical Records Office.
- Malcolm Still: transferred from ACSI to ARD, Downsview.
- Les Torok: transferred from ACSL to Doppler Radar Project Team.
- Roberto Vinluan: transferred from ACSI to ACSO.
- Gary Wagner: joined MAEOE.
- Suri Weinberg: joined Doppler Radar Project Team from ACSI.
- Mike Yan: transferred from ACSI to ACSO.
- Dave Zaluski: appointed Inspector, Saskatoon.

The purpose of this publication is to inform AES staff and others about observing systems and data acquisition activities in the AES. It is published twice per year in April and October by the Weather Services Program Branch of Weather Services Directorate. Permission to copy portions of this publication is granted provided that the source is acknowledged. Articles and ideas are welcome. Please address correspondence or inquiries to:

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